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TRABAJO FIN DE GRADO

"*ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILINDRO-PARABÓLICOS EN LA CAMPIÑA SUR*"

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FECHA:

DOCUMENTO Nº 1

MEMORIA Y ANEJOS

MEMORIA

ÍNDICE DE LA MEMORIA

1. DATOS PREVIOS

El presente proyecto ha sido redactado por el estudiante Jesús Fernández González, como Trabajo Fin de Grado, para obtener el título correspondiente al Grado de Ingeniería Civil, en la especialidad de Construcciones Civiles, impartido en la Escuela Politécnica de Cáceres, que está integrada dentro de la Universidad de Extremadura.

La redacción este trabajo se ha realizado de acuerdo con la normativa actual, y bajo la dirección y tutela de los profesores D. José María Ceballos Martínez y Dª. Elia María Quirós Rosado, contando también con la inestimable ayuda de los también profesores D. Jesús Ángel Torrecilla Pinero y D. Francisco Javier Torrella Unanua.

La elección del proyecto ha estado motivada por su novedad y la variedad de ámbitos que se tocan en su desarrollo. Las energías renovables están incrementando su presencia continuamente en el mapa energético mundial y suponen grandes inversiones, por lo que representan y representarán un gran mercado para la ingeniería, no solo la civil, sino también la mecánica, eléctrica, etc.

2. OBJETO Y EMPLAZAMIENTO DEL PROYECTO

El objeto del presente proyecto es ubicar la localización idónea para implantar una central termosolar de colectores cilindro-parabólicos en la comarca de la Campiña Sur (Badajoz), además de definir la mayor parte de las obras civiles relacionadas con su construcción, como son:

- El movimiento de tierras (Desbroce, desmonte y terraplén)
- La estructura de los colectores (Cimentaciones y estructura metálica)
- Las balsas de regulación
- La reposición de servicios
- Las actuaciones de integración ambiental
- El cerramiento de la central

Quedan fuera del ámbito de este proyecto actuaciones como la impulsión de agua hasta las balsas, los viales internos, la depuración de las aguas empleadas en el ciclo de funcionamiento, el drenaje, la remodelación de la carretera de acceso, etc., además de otras cuya definición correría a cargo de profesionales con otra titulación, como son las conducciones internas de la planta, la turbina, las torres de refrigeración, la subestación transformadora, etc.

Tras realizar el estudio multicriterio detallado en el apartado siguiente, se ha ubicado la central termosolar en el término municipal de Llerena (Badajoz), a una distancia de 3,5 km del núcleo urbano hacia el noreste.

Se ha considerado que este proyecto es de iniciativa privada.

Figura 1 – Ubicación de la planta termosolar. Fuente: Diputación de Badajoz

3. DESCRIPCIÓN DEL PROYECTO

3.1. ESTUDIO DE LA UBICACIÓN ÓPTIMA

El primer paso seguido para la realización de este proyecto ha sido determinar el emplazamiento más idóneo para la implantación de la central termosolar, paro lo cual se ha procedido a realizar un estudio multicriterio de la zona de estudio, comprendida e las hojas 830, 831, 855, 856, 877 y 878 del Mapa Topográfico Nacional a escala 1:50.000 (MTN50) creado por el Instituto Geográfico Nacional (IGN).

Este área se ha elegido debido a las características topográficas y climatológicas que presenta, ya que para la construcción de una planta termosolar se necesita un terreno llano y con un mínimo de radiación solar necesario para que dicha instalación sea eficiente energéticamente.

Los parámetros estudiados de esta zona para la determinación de la ubicación de la central han sido los siguientes:

- Pendiente: Con el objetivo de que el movimiento de tierras no suponga un gasto excesivo, la planta termosolar necesita situarse en zonas llanas o con muy poca pendiente. Como criterio se ha decidido eliminar los terrenos con una pendiente mayor al 5%.
- Orientación: Para poder aprovechar al máximo la radiación solar, la central termosolar deberá estar orientada al sur, por lo cual se descartarán las áreas que no lo cumplan.
- Recursos hídricos: Es uno de los condicionantes más importantes, ya que toda planta termosolar requiere de un gran volumen de agua para su funcionamiento, aunque actualmente se está mejorando la tecnología de estas instalaciones para reducir este consumo. Para realizar una estimación del coste necesario para conducir agua hasta el lugar de construcción, se ha supuesto un coste de 150.000 €/km, limitando la distancia máxima a 15 km.
- Vías de comunicación: La existencia de una vía de comunicación cercana a la central termosolar ayuda a mejorar el acceso y la logística de la planta, tanto en fase de construcción como en explotación, lo que permite reducir costes como los de transporte, principalmente. Se ha considerado que el coste de la construcción de una carretera de acceso es de 200.000 €/km, al igual que como máximo, la central se situará a 5 km de una vía existente.
- Líneas eléctricas: Al tratarse de una instalación cuyo objetivo es la generación de energía eléctrica, necesita conectarse a una línea de transporte para transferir la

producción a la red nacional para su posterior distribución y consumo. Como coste por kilómetro de esta infraestructura se ha adoptado un valor de 100.000 €, aunque debido al reducido número de líneas cuyas características son las adecuadas, se han eliminado las zonas ubicadas a más de 15 km de una de ellas.

- Zonas protegidas: Todo proyecto de obra civil tiene, en mayor o menor medida, un impacto sobre el medio, por lo que para minimizar esta afección se han omitido las zonas afectadas por protecciones ambientales tales como ZEPA, ZEC (antiguo LIC) o reservas naturales.

Posteriormente se han aislado con el programa de análisis ArcGIS, las áreas de terreno donde se cumplen estos criterios, obteniendo una serie de zonas propicias para la implantación, 6 concretamente, que seguidamente han sido objeto de estudio, comparando las ventajas y las desventajas de cada una de las opciones. Como conclusión se ha determinado que la ubicación óptima para la central termosolar se encuentra en el término municipal de Llerena.

Este estudio se encuentra desarrollado en detalle en el **Anejo nº 6** de este Documento nº 1.

3.2. SITUACIÓN ACTUAL

Actualmente los terrenos donde se va a ubicar la planta termosolar están empleados principalmente a cultivos, exceptuando una parcela que tiene olivos plantados. Es una zona donde no afloran rocas, lo que supone una ventaja a la hora de realizar la explanación, mejorando los rendimientos y evitando el uso excesivo de maquinaria pesada e incluso de explosivos.

Existe un camino de acceso pavimentado que va desde la N-432, al nordeste de Llerena, hasta el embalse de Llerena, cuyo firme presenta algunas patologías y tiene un ancho de calzada reducido. Para llegar hasta la ubicación de la planta hay que tomar un camino agrícola en peores condiciones, sin pavimentar y estrecho. Tal y como se ha indicado anteriormente, dentro del ámbito de este proyecto no se incluye la valoración de la mejor opción para el acceso a la central.

En el **Anejo nº 1** se incluye un reportaje fotográfico del lugar de emplazamiento de la planta termosolar.

3.3. SERVICIOS AFECTADOS

Al realizar la citada visita al emplazamiento elegido se observó la existencia de pozos en los terrenos agrícolas, que denotan la existencia de una conducción. Posteriormente, se ha comprobado que en la cartografía catastral existe una parcela de dominio público con la descripción “Colector”. A fecha de cierre de este proyecto no se ha podido recabar más información referente a este servicio por lo que se ha presupuestado una partida alzada de abono íntegro para la reposición de este servicio.

3.4. CARTOGRAFÍA Y TOPOGRAFÍA

Para realizar el estudio multicriterio se ha utilizado tanto cartografía vectorial como Modelos Digitales del Terreno (MDT), proporcionados por el Instituto Geográfico Nacional (IGN). La cartografía vectorial del IGN es la BCN25/BTN25, Base Cartográfica Numérica y Base Topográfica Nacional a escala 1:25.000. Los Modelos Digitales del Terreno empleados según la denominación del IGN, son los MDT05/MDT05-LIDAR.

Una vez obtenida la ubicación óptima para la central termosolar, el cálculo de la explanación y movimiento de tierras, se han realizado con la cartografía vectorial de la Junta de Extremadura a escala 1:10.000, por falta de medios más precisos, ya que se trata de una escala demasiado amplia para estas operaciones.

La cartografía empleada se describe con más profundidad en el **Anejo nº 2**, en el que se incluyen también los puntos necesarios para el replanteo de la obra.

3.5. GEOLOGÍA Y GEOTECNIA

Este proyecto se encuentra situado en la denominada zona de Ossa Morena, en el sector suroccidental de la Península Ibérica, con suelos provenientes de la era

Cenozoica, entre los períodos Terciario y Cuaternario, más concretamente en la época del Plioceno y del Pleistoceno, respectivamente. Este suelo está compuesto, principalmente, por costras calcáreas y fangos con cantos. Se trata de materiales postectónicos no asimilables a ningún dominio concepto, que corresponden a procesos edáfico-sedimentarios. Se trata de un encostramiento calizo pulverulento, con una zona masiva hacia la base, y laminar hacia el techo, que se disponen sobre arcillas rojas terciarias a las que engloba en la zona basal, con textura en enrejado. Hidrogeológicamente hablando, los terrenos precámbricos y paleozoicos son prácticamente impermeables, por lo que todos los afloramientos subterráneos tanto en surgencias naturales como en pozos responden a situaciones locales.

Los datos geotécnicos empleados en este estudio se han obtenido del proyecto "Renovación del firme y acondicionamiento de la EX-111, de Azuaga a EX-103 por Zalamea de la Serena, tramo 23+750 (intersección Ex-211) a 43+360 (intersección BA-159)", cedido por la Junta de Extremadura.

Todos los detalles se encuentran recogidos en el **Anejo nº 3** de esta memoria, así como un estudio de estabilidad de los taludes de la explanación.

3.6. HIDROLOGÍA Y CLIMATOLOGÍA

Para el diseño de las balsas de regulación hay que calcular los datos de la precipitación diaria máxima, para lo cual se han aplicado los métodos de Gumbel y el SQRT-ETMAX con los datos pluviométricos de las estaciones situadas más próximas a la ubicación de la central, obteniendo los siguientes resultados:

Estación		Período de retorno T= 100 años		Período de retorno T= 500 años	
		Gumbel	SQRT-ET_{MAX}	Gumbel	SQRT-ET_{MAX}
4381	Casas de Reina	109,6 mm	108,4 mm	134,3 mm	139,9 mm
4383	Berlanga	91,9 mm	90,1 mm	112,0 mm	115,2 mm
4387	Villagarcía de la Torre	103,4 mm	103,9 mm	127,8 mm	135,7 mm
4388	Higuera de Llerena	96,7 mm	93,0 mm	119,5 mm	120,6 mm

En la definición de las balsas también juega un papel importante en el balance anual de gasto la evapotranspiración, por lo que se ha determinado su valor realizando la media de los obtenidos según los métodos de Thornthwaite, de Blaney y Criddle y de Hargreaves.

Mes	ETP (mm/mes)
E	41,542
F	48,015
M	76,584
A	95,566
M	132,606
J	168,115
J	185,732
A	175,747
S	126,744
O	87,225
N	54,365
D	42,909
TOTAL	**1235,151**

Para la definición de los rendimientos y el plan de obra es necesario tener en cuenta los días perdidos debido a la climatología, por lo que se han determinado los coeficientes de reducción de los días de trabajo a partir de las isolíneas publicadas por el Ministerio de Obras Públicas, siguiendo las pautas marcadas en el Pliego de Prescripciones Técnicas Generales (PG-3) y en la Instrucción de Hormigón Estructural (EHE-08) respecto a las limitaciones de la ejecución por meteorología.

Mes	Hormigones	Explanaciones	Producción de áridos	Riegos y tratamientos	Mezclas bituminosas	Otras actividades
Enero	0,0648	0,0605	0,0705	0,0122	0,0306	0,0705
Febrero	0,0599	0,0564	0,0730	0,0097	0,0310	0,0730
Marzo	0,0649	0,0581	0,0722	0,0142	0,0398	0,0722
Abril	0,0785	0,0732	0,0785	0,0306	0,0611	0,0785
Mayo	0,0807	0,0747	0,0807	0,0585	0,0688	0,0807
Junio	0,0824	0,0798	0,0824	0,0773	0,0773	0,0824
Julio	0,0841	0,0832	0,0841	0,0824	0,0824	0,0841
Agosto	0,0841	0,0838	0,0841	0,0836	0,0836	0,0841
Septiembre	0,0798	0,0781	0,0798	0,0764	0,0764	0,0798
Octubre	0,0739	0,0692	0,0739	0,0516	0,0645	0,0739
Noviembre	0,0790	0,0713	0,0790	0,0191	0,0573	0,0790
Diciembre	0,0649	0,0554	0,0722	0,0051	0,0255	0,0722
ANUAL	**0,8969**	**0,8438**	**0,9301**	**0,5206**	**0,6982**	**0,9301**

Todos los procedimientos y datos de partida están desarrollados en el **Anejo nº 4** de este Documento nº 1.

3.7. SISMICIDAD

De acuerdo con la Norma de Construcción Sismorresistente: Parte general y edificación (NCSE- 02), aprobada por el Real Decreto 997/2002, de 27 de septiembre, la actuación contemplada en este proyecto se clasifica como construcción de importancia especial. Además en esta Norma se establece que lo descrito en ella será de aplicación en las construcciones de nueva planta que no estén dentro de las excepciones. Una de estas excepciones determina que no será necesario tener en cuenta los efectos sísmicos en las edificaciones de importancia normal o especial cuando la aceleración sísmica básica ab sea inferior a 0,04·g, siendo g la aceleración de la gravedad. Para definir se se cumple o no esta premisa se puede emplear el mapa de peligrosidad sísmica o la referencia de términos municipales en el anejo 1 de la Norma.

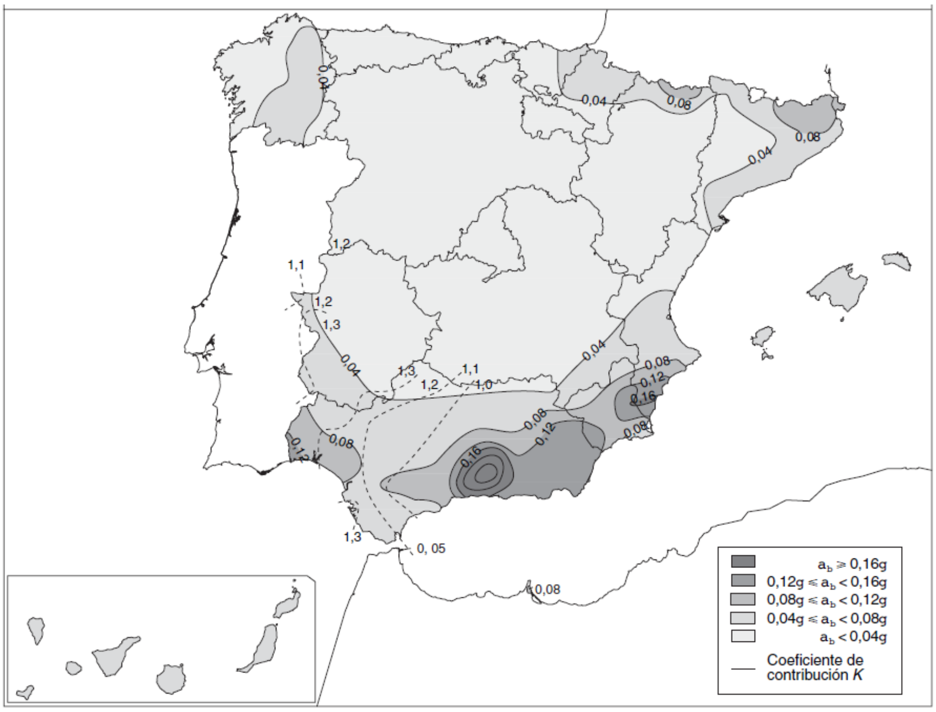


Figura 2 – Mapa de peligrosidad sísmica. Fuente: NCSE-02

Las obras definidas en este proyecto se encuentran en el término municipal de Llerena, en la provincia de Badajoz, que presenta una aceleración sísmica básica (ab) de 0,04·g y coeficiente de contribución (K) de 1,3. Por lo tanto, será necesario tener en cuenta la acción sísmica en el cálculo de la estabilidad de los taludes y en el dimensionamiento de la estructura.

Siguiendo las pautas marcadas en la Norma se obtiene una aceleración de cálculo de 0,04966·g.

Todos los cálculos están incluidos pormenorizadamente en el **Anejo nº 5** de esta Memoria.

3.8. ESTRUCTURAS

El diseño de la estructura metálica del colector se ha basado en las características del colector EUROTrough, aunque también se barajaron los colectores HELIOTrough y los Luz System Collectors (LS-2 y LS-3).

El cálculo y comprobación de la estructura, además de la definición de acciones actuantes sobre el colector, se ha realizado según la siguiente normativa:

- Instrucción de Hormigón Estructural, EHE-08
- Instrucción de Acero Estructural, EAE-11
- Código Técnico de la Edificación – Seguridad Estructural, especialmente los siguientes documentos: Acero, Acciones en la Edificación y Cimientos
- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera, IAP-11
- Norma de Construcción Sismorresistente: Parte general y edificación, NCSE-02

Para la estructura del colector se ha utilizado como material de diseño el acero S355 J2, mientras que para las cimentaciones se han supuesto para el cálculo de HA-25/P/20/IIa, con armaduras de acero B 500 S.

Como programa de cálculo para la estructura se ha empleado el "Robot Structural Analysis Professional" y mediante un proceso iterativo, se ha obtenido la estructura final, que se encuentra caracterizada en el **Documento nº 2 – Planos**.

Todos los detalles del proceso de cálculo están recogidos en el **Anejo nº 7**, en el que además se incluye un listado de cálculo generado a partir del citado programa de análisis de estructuras.

3.9. MOVIMIENTOS DE TIERRA

Para el cálculo de los movimientos de tierra se ha empleado el programa de análisis AutoCAD Civil 3D, utilizando la cartografía cedida por la Junta de Extremadura, a través de su servicio de cartografía, a escala 1:10.000. Tal y como se ha indicado anteriormente, la escala de esta cartografía es demasiado amplia para este cálculo, pero por falta de medios se supondrá como correcta.

Tras un estudio previo del perfil del terreno se ha adoptado una pendiente de un 0,25% hacia la dirección este, como un mínimo para permitir el drenaje de la explanación ya que en este sentido la superficie presenta una menor orografía, y de un 1% de pendiente hacia el sur, debido a que existe un mayor relieve en esta dirección y a que el arroyo al que se dirigirá el drenaje se encuentra al sur de la planta termosolar.

Después de unas primeras iteraciones, se comprobó que para obtener una compensación entre las tierras de desmonte y las de terraplén, el nivel de la explanación quedaría muy bajo respecto al nivel del camino de acceso, por lo que se procedió al diseño de las balsas de regulación de tal manera que fueran excavadas en su mayor parte, para emplear dicho excedente para subir la cota de la plataforma. Sin embargo, al observar que la elevación de la explanación seguía siendo baja para el camino de acceso, se procedió a rebajar este, ampliando el ancho de la plataforma.

Las cotas finales de todos los puntos se pueden comprobar en el anexo de replanteo incluido en el Anejo nº 2 – Cartografía y topografía, donde están incluidos los puntos de límite de adquisición de terrenos, que se corresponden con el pie de terraplén o la cabeza de desmonte de los taludes de la explanación; los puntos de las cimentaciones de los colectores, a cota de plataforma, de modo que puedan utilizarse como puntos de comprobación de la elevación de la misma durante su ejecución; los puntos del límite de explanación y los puntos que definen las balsas de regulación.

Con todo esto se obtienen los siguientes valores de movimientos de tierra:

Área de desbroce	1.644.801,732 m^2 (164,5 ha)
Volumen de desmonte	2.219.036,290 m^3
Volumen de terraplén	2.218.846,590 m^3

3.10. CÁLCULOS HIDRÁULICOS

Tal y como se ha indicado anteriormente, para la realización de la explanación se empleará el volumen de tierras sobrante de las balsas de regulación, por lo que se ha definido la geometría y la capacidad de estas. Para esto, se ha realizado la simulación de gasto de agua de la central termosolar, suponiendo que se consigue depurar al menos el 55% del volumen de agua empleado en los ciclos de funcionamiento, y que la impulsión no se realiza en los meses más secos, debido a la reducida capacidad del Embalse de Llerena.

Con esto se obtiene que la máxima capacidad requerida es de algo más de 282.000 m^3. Dejando un margen de seguridad se han diseñado las balsas para una capacidad conjunta de 300.000 m^3, repartida en 3 balsas iguales de 100.000 m^3 cada una, cuya geometría se corresponde con 151 m de lado en el fondo y 4 m de profundidad.

De acuerdo con el RD 9/2008, por el que se modifica el Reglamento del Dominio Público Hidráulico, las balsas objeto de este proyecto no requieren clasificación debido a que no presentan ni una altura superior a los 5 m ni una capacidad de embalse superior a los 100.000 m^3.

Para el cálculo de la altura de resguardo y el ancho de coronación se ha utilizado las directrices establecidas en los citados Reglamento Técnico sobre Seguridad de Presas y Embalses, el RD 9/2008, además de la las Guías Técnicas de Seguridad de Presas y la Instrucción para proyecto, construcción y explotación de grandes presas.

Los procedimientos y cálculos empleados se encuentran detallados en el **Anejo nº 8**, que incluye el estudio de estabilidad de los taludes de la balsa.

4. ESTUDIO DE SEGURIDAD Y SALUD

Se ha redactado el Estudio de Seguridad y Salud de este proyecto según lo dispuesto en la Ley 31/1995, de 8 de noviembre, de prevención de riesgos laborales, y en el Real Decreto 1627/1997, de 24 de octubre, por el que se establecen las disposiciones mínimas de seguridad y salud en las obras de construcción, incluido en el **Anejo nº 10** de esta Memoria. En este Estudio se analizan los riesgos que emanan de la realización de las obras y establece y marca unas directrices para eliminar o disminuir al máximo posible dichos riesgos y sus consecuencias. También define la acción preventiva a realizar acorde a los medios de producción, adaptando lo indicado en la planificación de trabajos y tratando de incluir dichas medidas dentro de la propia actividad de las obras.

Se ha realizado el Presupuesto del Estudio de acuerdo con el número máximo de trabajadores previstos en la obra (145), en el que se incluyen las protecciones individuales y colectivas, las instalaciones eléctricas y contraincendios, las instalaciones de higiene y bienestar, la medicina preventiva y primeros auxilios, así como la formación y reuniones de obligado cumplimiento. Con lo que el Presupuesto de Ejecución Material asciende a un total de **OCHOCIENTOS OCHENTA Y CINCO MIL OCHOCIENTOS SESENTA Y SIETE EUROS con SETENTA Y CUATRO CÉNTIMOS (885.867,74 €)**.

5. ESTUDIO DE IMPACTO AMBIENTAL

De acuerdo con la Ley 16/2015, de 23 de abril, de protección ambiental de la Comunidad Autónoma de Extremadura, y la Ley 21/2013, de 9 de diciembre, de evaluación ambiental, el presente proyecto se debe someter a una evaluación ambiental ordinaria.

Por lo tanto, se redacta el Estudio de Impacto Ambiental, en el que se realiza un inventario ambiental, en el que se recogen las características actuales de la zona de ubicación de la central termosolar, desde un punto de vista del medio físico, del medio biológico, del medio perceptual, del medio socioeconómico y del patrimonio. Posteriormente se han enumerado y evaluado los efectos ambientales del proyecto, estableciendo la conclusión de que el efecto generado por la planta es compatible con el medioambiente.

De acuerdo con estos efectos y con la problemática analizada se proponen una serie de medidas preventivas y correctoras encaminadas a reducir los impactos producidos por la construcción. Además se indica las características del Plan de Vigilancia y Seguimiento Ambiental.

Este Estudio de Impacto Ambiental queda definido en el **Anejo nº 11** del Documento nº 1.

6. GESTIÓN DE RESIDUOS

Se ha redactado el estudio de gestión de residuos de acuerdo con el Real Decreto 105/2008, de 1 de febrero, por el que se regula la producción y gestión de los residuos de construcción y demolición, y en particular por la imposición establecida en el artículo 4, apartado 1 - a), donde se determina la obligación de "incluir en el proyecto de ejecución de la obra un estudio de gestión de residuos de construcción y demolición".

Este estudio está incluido en el **Anejo nº 12**, en el que se estima que el coste de la gestión de residuos será el siguiente:

Residuo	Estimación (m^3)	Precio gestión (€/m^3)	Precio transporte (€/m^3)	Importe total (€)
RCD Nivel I				
Tierras del desbroce	391.763,797	1,80	1,50	1.057.762,25
Tierras de la excavación	50.110,48	1,80	1,50	90.198,86
RCD Nivel II				
Naturaleza pétrea				
Hormigón	164,480	3,50	1,50	8.635,20
Naturaleza no pétrea				
Madera	657,921	5,20	1,50	5.131,78
Plástico	328,960	4,85	1,50	2.393,18

Metales	493,440	6,10	1,50	4.514,98
Papel	164,480	4,10	1,50	1.011,55
Residuos potencialmente peligrosos				
Residuos pot. peligrosos	82,240	15,25	3,80	4.765.81
Resto de costes de gestión				
Costes de gestión, tramitación documental, alquileres, etc.				6.500,00
TOTAL				**1.181.084,34 €**

7. TERRENOS AFECTADOS

Al tratarse de un proyecto de iniciativa privada, no se expropiarán los terrenos y, por lo tanto, el Promotor deberá adquirirlos mediante un acuerdo con los propietarios. Sin embargo, como estimación se ha realizado una estimación del coste de adquisición empleando los precios utilizados para las expropiaciones. Con esto se obtiene un presupuesto de adquisición de terrenos de **SETECIENTOS VEINTINUEVE MIL CUATROCIENTOS CINCUENTA Y NUEVE EUROS con OCHO CÉNTIMOS (729.459,08 €)**.

En el **Anejo nº 13** se detallan las parcelas afectadas y se incluyen en un anexo las fichas catastrales de las mismas.

8. JUSTIFICACIÓN DE PRECIOS

En el **Anejo nº 14** se describen los costes directos y los indirectos de las distintas unidades de obra incluidas en los Cuadros de Precios nº 1 y nº 2 del Documento nº 4 – Presupuesto. Adicionalmente, se incluyen los listados de mano de obra, maquinaria y materiales empleados en la obra, además de los precios descompuestos.

9. PLAN DE OBRA

El programa de trabajos se encuentra incluido en el **Anejo nº 15** mediante un diagrama de barras o de Gantt, resultando un plazo total para la ejecución de las obras de **SETENTA Y OCHO MESES (78 meses)**.

10. PRESUPUESTO

10.1. PRESUPUESTO BASE DE LICITACIÓN

El Presupuesto se encuentra detallado en el **Documento nº 4** de este proyecto, mediante las mediciones auxiliares y generales, los Cuadros de Precio nº 1 y nº 2, los presupuestos parciales y el resumen del presupuesto, el cual se adjunta a continuación:

RESUMEN DE PRESUPUESTO

PLANTA TERMOSOLAR EN LLERENA

CAPITULO	RESUMEN	EUROS	%
1	ACTUACIONES PREVIAS	1.250.861,78	0,60
2	REPOSICIÓN SERVICIOS AFECTADOS	139.405,60	0,07
3	MOVIMIENTO DE TIERRAS	11.827.080,99	5,69
4	ESTRUCTURAS	190.278.513,17	91,54
5	INTEGRACIÓN AMBIENTAL	801.567,08	0,39
6	VARIOS	1.496.742,69	0,72
7	SEGURIDAD Y SALUD	885.867,74	0,43
8	GESTIÓN DE RESIDUOS	1.181.084,34	0,57
	TOTAL EJECUCIÓN MATERIAL	**207.861.123,39**	
	15,00 % GG + BI	31.179.168,51	
	21,00 % I.V.A.	50.198.461,30	
	TOTAL PRESUPUESTO CONTRATA	**289.238.753,20**	
	TOTAL PRESUPUESTO GENERAL	**289.238.753,20**	

Asciende el presupuesto general a la expresada cantidad de **DOSCIENTOS OCHENTA Y NUEVE MILLONES DOSCIENTOS TREINTA Y OCHO MIL SETECIENTOS CINCUENTA Y TRES EUROS con VEINTE CÉNTIMOS.**

10.2. PRESUPUESTO DE INVERSIÓN

Se obtiene al sumar el Presupuesto Base de Licitación y el coste estimado de adquisición de terrenos, obteniéndose el siguiente resultado:

PRESUPUESTO BASE DE LICITACIÓN	289.238.753,20 €
PRESUPUESTO ADQUISICIÓN TERRENOS	729.459,08 €
PRESUPUESTO DE INVERSIÓN	**289.968.212,28 €**

Con lo que el presupuesto de inversión asciende a **DOSCIENTOS OCHENTA Y NUEVE MIL NOVECIENTOS SESENTA Y OCHO MIL DOSCIENTOS DOCE EUROS con VEINTIOCHO CÉNTIMOS (289.968.212,28 €)**.

11. REVISIÓN DE PRECIOS

Al tratarse de un proyecto de promoción privada, no es de obligado cumplimiento lo dispuesto en el Real Decreto Legislativo 3/2011, de 14 de noviembre, por el que se aprueba el Texto Refundido de la Ley de Contratos del Sector Público, respecto a la revisión de precios, modificado por la Ley 2/2015, de 30 de marzo, de desindexación de la economía española.

Sin embargo, se propone que el Promotor siga los procedimientos marcados para la revisión de precios, dada la gran duración prevista de las obras (78 meses). Como fórmula de revisión de precios, se propone el empleo de la **Fórmula 821** – Obras de edificación general con alto componente de materiales metálicos e instalaciones, del Real Decreto 1359/2011, de 7 de octubre, por el que se aprueba la relación de materiales básicos y las fórmulas-tipo generales de revisión de precios de los contratos de obras y de contratos de suministro de fabricación de armamento y equipamiento de las Administraciones Públicas, la cual se corresponde con la siguiente:

$$K_t = 0{,}08A_t/A_0 + 0{,}01B_t/B_0 + 0{,}05C_t/C_0 + 0{,}01E_t/E_0 + 0{,}02F_t/F_0 + 0{,}01L_t/L_0 + 0{,}04M_t/M_0 + 0{,}03P_t/P_0 + 0{,}01Q_t/Q_0 + 0{,}03R_t/R_0 + 0{,}18S_t/S_0 + 0{,}08T_t/T_0 + 0{,}01U_t/U_0 + 0{,}02V_t/V_0 + + 0{,}42$$

12. CLASIFICACIÓN DEL CONTRATISTA

De forma similar a la revisión de precios, al tratarse de un proyecto de promoción privada, no es de obligado cumplimiento lo dispuesto en el Real Decreto Legislativo 3/2011, de 14 de noviembre, por el que se aprueba el Texto Refundido de la Ley de Contratos del Sector Público, ni lo dispuesto en el Real Decreto 1098/2001, de 12 de octubre, por el que se aprueba el Reglamento general de la Ley de Contratos de las Administraciones Públicas.

Sin embargo, dado el Presupuesto Base de Licitación, se propone que el Promotor pueda exigir al Contratista la siguiente clasificación:

- Grupo A) Movimiento de tierras y perforaciones
    - Subgrupo 2. Explanaciones
- Grupo C) Edificaciones
    - Subgrupo 3. Estructuras metálicas

De acuerdo con lo establecido en el Artículo 26 del Reglamento, este contrato de obras será de **categoría 6**, ya que la cuantía es superior a 5 millones de euros.

13. DOCUMENTOS QUE COMPONEN EL PROYECTO

DOCUMENTO Nº 1 – MEMORIA Y ANEJOS

Memoria

Anejos

Anejo nº 1 – Situación actual

Anejo nº 2 – Cartografía y topografía

Anejo nº 3 – Geología y geotecnia

Anejo nº 4 – Hidrología y climatología

Anejo nº 5 – Sismicidad

Anejo nº 6 – Estudio de la ubicación óptima

Anejo nº 7 – Cálculos estructurales

Anejo nº 8 – Cálculos hidráulicos

Anejo nº 9 – Movimientos de tierra

Anejo nº 10 – Estudio de Seguridad y Salud

Anejo nº 11 – Estudio de Impacto Ambiental
Anejo nº 12 – Gestión de residuos
Anejo nº 13 – Terrenos afectados
Anejo nº 14 – Justificación de precios
Anejo nº 15 – Plan de obra

DOCUMENTO Nº 2 – PLANOS

Plano nº 1 – Situación
Plano nº 2 – Emplazamiento
Plano nº 3 – Planta general
Plano nº 4 – Movimiento de tierras
Plano nº 5 – Balsas
Plano nº 6 – Estructura
Plano nº 7 – Cerramientos

DOCUMENTO Nº 3 – PLIEGO DE PRESCRIPCIONES TÉCNICAS PARTICULARES

DOCUMENTO Nº 4 – PRESUPUESTO

Mediciones auxiliares
Mediciones generales
Cuadro de precios nº 1
Cuadro de precios nº 2
Presupuestos parciales
Resumen de presupuesto

14. CONCLUSIÓN

Con todo lo expuesto en este proyecto se entiende que se cumple con lo establecido para el Trabajo Fin de Grado y, por lo tanto, se eleva al Tribunal del Proyecto para su aprobación y calificación.

Cáceres, febrero de 2016

El autor del proyecto,

Fdo: Jesús Fernández González

ANEJO Nº 1

SITUACIÓN ACTUAL

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad localizar y describir el lugar de emplazamiento de la central termosolar. Para una mejor definición se adjunta al final un reportaje fotográfico de la zona de ubicación.

2. UBICACIÓN DE LA PLANTA TERMOSOLAR

La planta se ubicará en la provincia de Badajoz, más concretamente en el término municipal de Llerena, situado al sureste de la misma, en la comarca de la Campiña Sur. Esta zona se caracteriza principalmente por tener un clima cálido y un terreno con baja orografía, lo que lo hace ideal para la ubicación de una central termosolar de este tipo. El proceso para la elección del lugar óptimo para su construcción está detallado en el Anejo nº 6 de este proyecto.

Figura 1 – Provincia de Badajoz. Fuente: Wikipedia

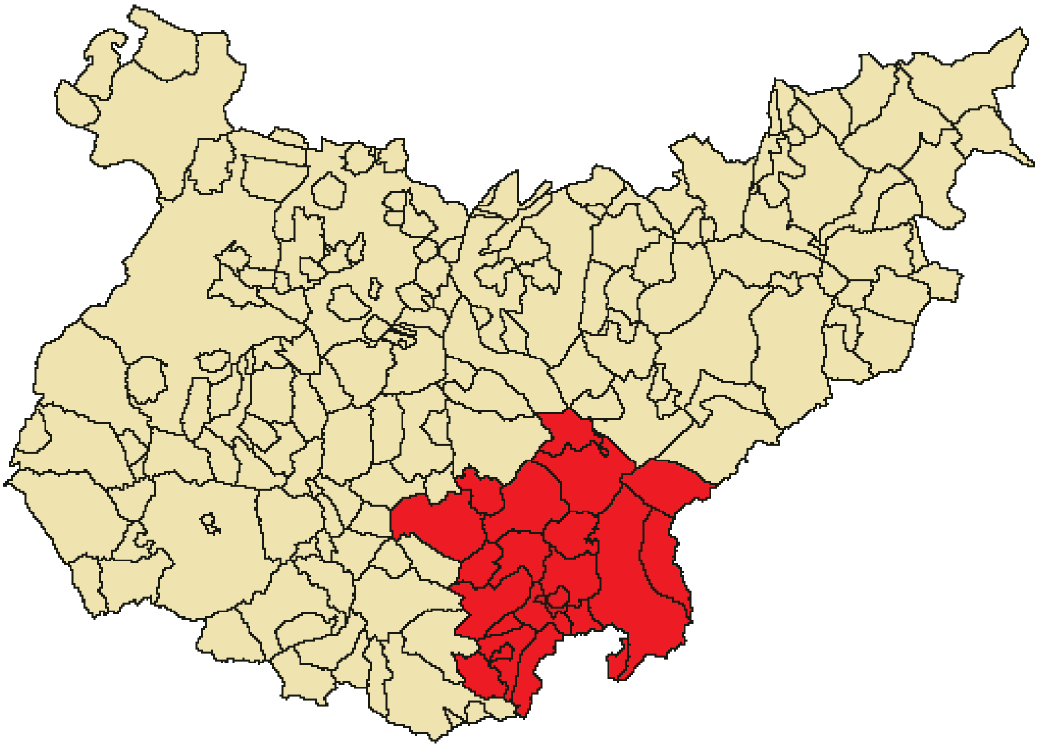


Figura 2 – La comarca de la Campiña Sur. Fuente: [Wikipedia]

Figura 3 – Término municipal de Llerena. Fuente: [Wikipedia]

Figura 4 – Ubicación de la planta termosolar. Fuente: Diputación de Badajoz

3. CONDICIONES ACTUALES DEL TERRENO

Actualmente los terrenos donde se va a ubicar la planta termosolar están empleados principalmente a cultivos, exceptuando una parcela que tiene olivos plantados. Es una zona donde no afloran rocas, lo que supone una ventaja a la hora de realizar la explanación, mejorando los rendimientos y evitando el uso excesivo de maquinaria pesada e incluso de explosivos.

Existe un camino de acceso pavimentado que va desde la N-432, al nordeste de Llerena, hasta el embalse de Llerena, cuyo firme presenta algunas patologías y tiene un ancho de calzada reducido. Para llegar hasta la ubicación de la planta hay que tomar un camino agrícola en peores condiciones, sin pavimentar y estrecho. En otro estudio se valorará la opción más conveniente para disponer de un acceso en buenas condiciones hasta la central, ya que no está dentro del ámbito de este proyecto.

Estas características se pueden observar con más detalle en las fotografías adjuntas a continuación.

ANEXO 1.1

REPORTAJE FOTOGRÁFICO

1. INTRODUCCIÓN

Las fotografías se realizaron a finales de octubre de 2015 y en ellas se documenta la situación del camino de acceso y de los terrenos donde se ubica la planta termosolar. Inicialmente se incluye una imagen de la situación donde se tomaron las imágenes.

2. FOTOGRAFÍAS

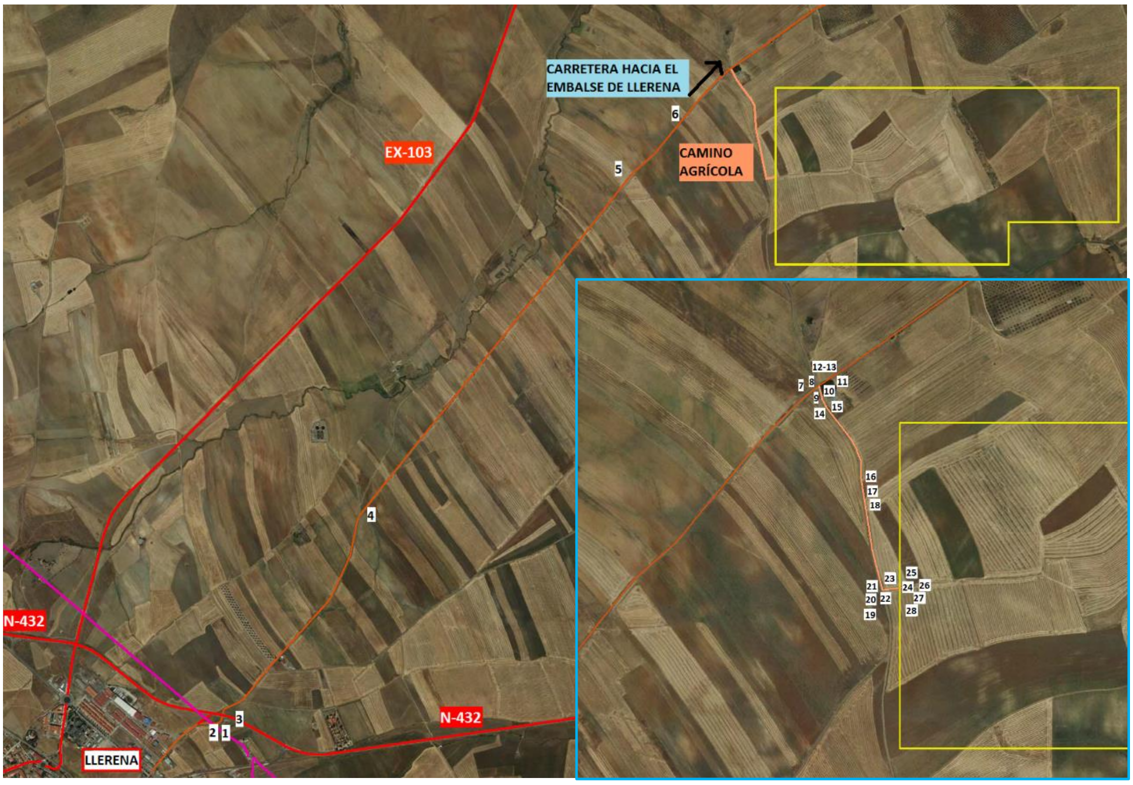


Figura 5 – Posición de las fotografías

Fotografía 1 – Intersección del camino al embalse con la N-432

Fotografía 2 – Intersección del camino al embalse con la N-432

Fotografía 3 – Detalle de la señalización en la intersección de la carretera del embalse con la N-432

Fotografía 4 – Carretera del embalse

Fotografía 5 – Tramo de la carretera del embalse donde el firme presenta más patologías

Fotografía 6 – Carretera del embalse

Fotografía 7 – Panorámica desde la intersección de la carretera del embalse con el camino agrícola

Fotografía 8 – Intersección de la carretera del embalse con el camino agrícola

Fotografía 9 – Detalle de la intersección de la carretera del embalse con el camino agrícola

Fotografía 10 – Detalle de la intersección de la carretera del embalse con el camino agrícola

Fotografía 11 – Detalle de la intersección de la carretera del embalse con el camino agrícola

Fotografía 12 – Detalle del cambio de firme a gravilla en la intersección

Fotografía 13 – Detalle del firme de la carretera del embalse

Fotografía 14 – Detalle del cambio de gravilla a tierra en el camino agrícola

Fotografía 15 – Detalle del estado del camino agrícola

Figura 16 – Terrenos de ubicación de la central situados al norte

Fotografía 17 – Terrenos de ubicación de la central situados al norte

Fotografía 18 – Terrenos de ubicación de la central situados al norte

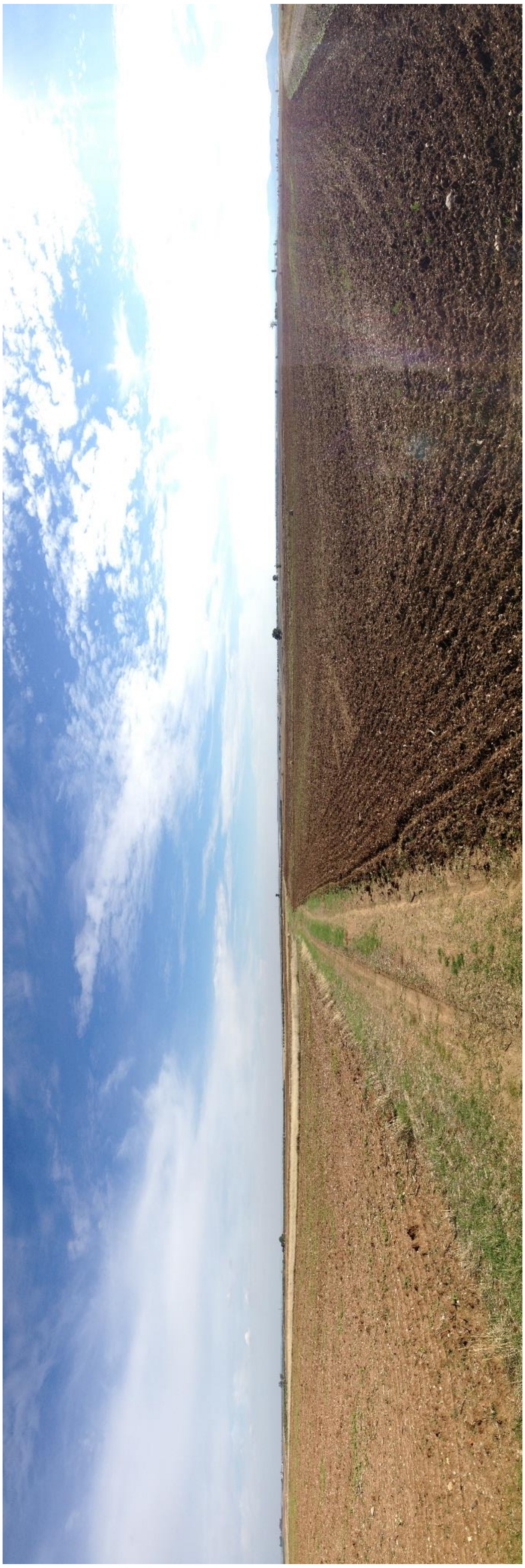
Fotografía 19 – Imagen hacia Llerena desde el acceso a los terrenos de la central

Fotografía 20 – Panorámica desde la intersección del camino agrícola con el acceso a los terrenos

Fotografía 21 – Acceso desde el camino agrícola hacia los terrenos donde se ubicará la central

Fotografía 22 – Acceso desde el camino agrícola hacia los terrenos donde se ubicará la central

Fotografía 23 – Detalle del acceso a los terrenos de ubicación de la central



Fotografía 24 – Panorámica de los terrenos de construcción de la planta

Fotografía 25 – Detalle de los terrenos al norte de la planta termosolar

Fotografía 26 – Detalle de los terrenos al este de la planta termosolar

Fotografía 27 – Detalle de los terrenos al sur-sureste de la planta termosolar

Fotografía 28 – Detalle de los terrenos al sur-suroeste de la planta termosolar

ANEJO Nº 2

CARTOGRAFÍA Y TOPOGRAFÍA

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad describir la cartografía empleada para este proyecto, así como definir las bases y los puntos necesarios para el replanteo de la obra y, por lo tanto, su correcta ejecución.

2. CARTOGRAFÍA EMPLEADA

En este proyecto se ha utilizado tanto cartografía vectorial como Modelos Digitales del Terreno (MDT), proporcionados por el Instituto Geográfico Nacional (IGN) y por la Junta de Extremadura. La cartografía vectorial del IGN es la **BCN25/BTN25**, utilizada para realizar el estudio multicriterio detallado en el Anejo nº 6. La cartografía BCN25 es la Base Cartográfica Numérica a escala 1:25.000 y se trata de una base de datos geográfica 2D de referencia formada a partir de los ficheros digitales del Mapa Topográfico Nacional a esa misma escala, de los que se extrae la geometría original de los elementos. Por otro lado, la cartografía BTN25 es la Base Topográfica Nacional a escala 1:25.000 y se trata de una base de datos topográfica 3D de referencia, capturada a partir de pares estereoscópicos u ortofotografías del Plan Nacional de Ortofotografía Aérea (PNOA). Desde el año 2006, la BCN25 está siendo sustituida por la BTN25, por lo que la disponibilidad de esta última no es absoluta en toda España. Ambas cartografías tiene el Sistema Geodésico de Referencia ETRS89 y proyección UTM en el huso correspondiente, que en el caso de este proyecto se ha trabajado con hojas del huso 29 y otras del huso 30.

Los Modelos Digitales del Terreno empleados en este proyecto también para el estudio multicriterio, según la denominación del IGN, son los **MDT05/MDT05-LIDAR**. Estos tipos de modelos se pueden obtener de dos formas: bien por estereocorrelación automática de vuelos fotogramétricos del PNOA con resolución de 25 a 50 cm/pixel, o por interpolación de vuelos LIDAR del PNOA. Se tratan de archivos con formato ASCII con matriz ESRI (asc), con el Sistema Geodésico de Referencia ETRS89 y proyección UTM en el huso correspondiente, que, al igual que en el caso de la cartografía vectorial del IGN, en este proyecto se han empleado modelos del huso 29 y otros del huso 30.

Una vez obtenida la ubicación óptima para la central termosolar, las operaciones restantes se han realizado con la **cartografía** vectorial de la Junta de Extremadura a **escala 1:10.000**. A pesar de ser una escala demasiado amplia para este proyecto, se ha realizado la explanación y los volúmenes de tierras con esta cartografía por falta de medios más precisos.

3. BASES DE REPLANTEO

Para poder georreferenciar y ubicar correctamente todos los elementos constructivos necesarios para la implantación de la central termosolar según lo proyectado, es necesario tener referencias fijas, y para ello existen bases de replanteo repartidas por todo el territorio, cuyas coordenadas son conocidas y fijas.

Una vez localizadas las bases más cercanas a la obra, se realizan bases topográficas más cercanas al emplazamiento de la misma, pero por falta de medios no se han podido situar estos elementos.

A continuación se adjuntan las fichas de las bases de replanteo más cercanas a la ubicación de la obra. Estos documentos están obtenidos del Instituto Geográfico Nacional (IGN).

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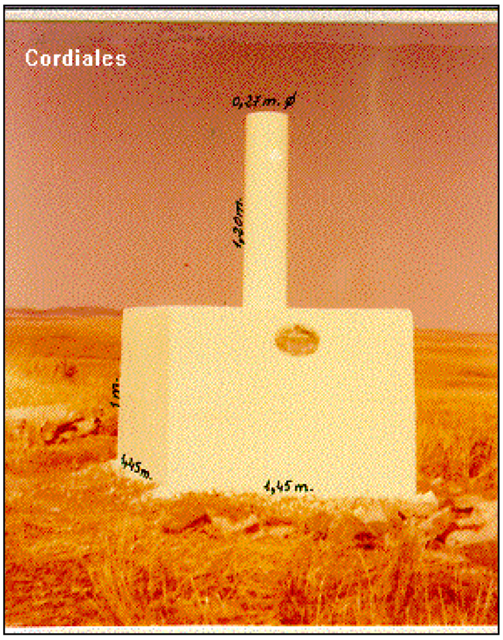
Área de Geodesia
Subdirección General de Geodesia y Cartografía

Reseña Vértice Geodésico

2-ene-2016

Número.....: 87757
Nombre.....: Cordiales
Municipios: Llerena
Provincias: Badajoz
Fecha de Construcción........: 30 de junio de 1974
Pilar sin centrado forzado..: 1,20 m **de alto,** 0,27 m **de diámetro.**
Último cuerpo.......................: 1,00 m **de alto,** 1,45 m **de ancho.**
Total cuerpos.........: 1 **de** 1,00 m **de alto.**



Coordenadas Geográficas:

Sistema de Ref.:	ED 50	ETRS89
Longitud...........:	- 5° 59' 14,7812"	- 5° 59' 19,60521" ±0.111 m
Latitud..............:	38° 17' 46,9656"	38° 17' 42,49053" ±0.104 m
Alt. Elipsoidal...:		654,472 m ±0.102 (BP)
Compensación.:	01 de abril de 1988	01 de noviembre de 2009
		Elipse de error al 95% de confianza.

Coordenadas UTM. Huso 30 :

Sistema de Ref.:	ED 50	ETRS89
X.........................:	238730,52 m	238620,554 m
Y.........................:	4242993,76 m	4242788,750 m
Factor escala.....:	1,000440700	1,000441469
Convergencia...:	- 1° 51' 09"	- 1° 51' 12"

Altitud sobre el nivel medio del mar: 599,292 m. (BP)

Situación:

Situado en lo alto de la loma de Los Cordiales, en la linde entre un cordel de ganado y una tierra de labor.

Acceso:

Desde Llerena, por la carretera C-413 en dirección a Castuera, a los 6 Km. del cruce con la N-432, sobre el Km. 45,700, se sigue por un carril que va en dirección N.O. y, tras recorrer 850 m., se llega al vértice, con el coche. El vértice es visible desde la carretera.

Horizonte GPS:

Despejado

CF: Centrado Forzado. CP: Cabeza Pilar. BP: Base Pilar. CN: Clavo Nivelado. CS: Clavo Suelo.

NO EXISTE CROQUIS

Observaciones:

Informe del estado del Vértice: ftp://ftp.geodesia.ign.es/utilidades/InfoRG.pdf

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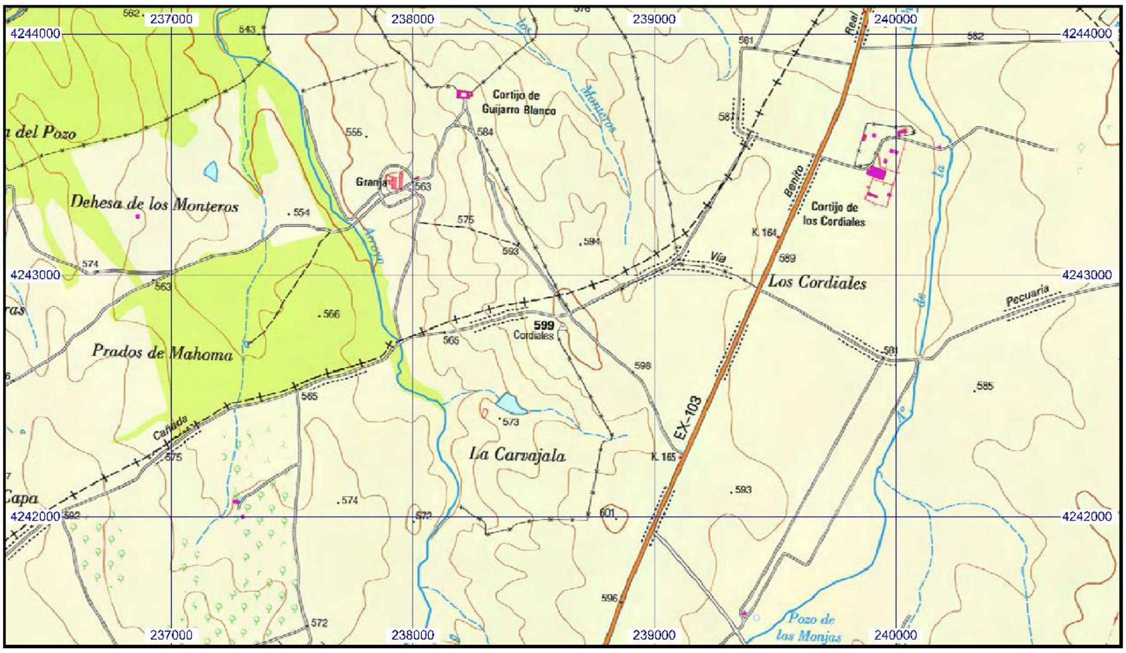
Área de Geodesia

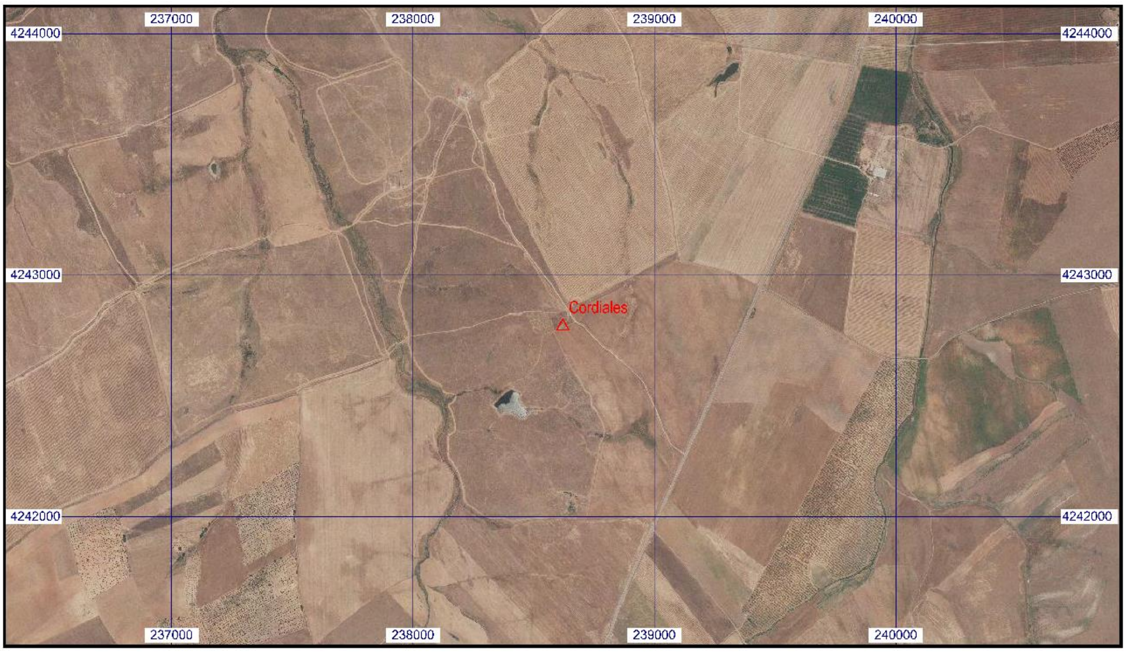
Subdirección General de Geodesia y Cartografía

Cartografía de situación

2-ene-2016

Escala 1:25.000 **087757 Cordiales** **Coordenadas ETRS89. Huso 30**





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Área de Geodesia
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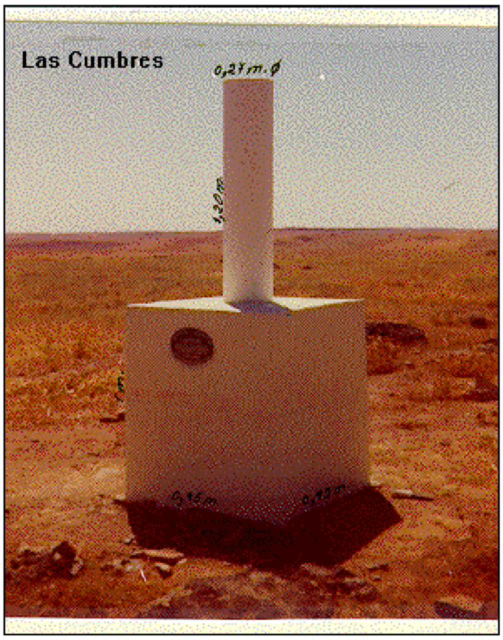
Reseña Vértice Geodésico

2-ene-2016

Número.....: 87785
Nombre.....: Las Cumbres
Municipios: Berlanga
Provincias: Badajoz
Fecha de Construcción........: 19 de julio de 1974
Pilar sin centrado forzado..: 1,20 m **de alto,** 0,27 m **de diámetro.**
Último cuerpo.......................: 1,00 m **de alto,** 0,95 m **de ancho.**
Total cuerpos.........: 1 **de** 1,00 m **de alto.**



Coordenadas Geográficas:

Sistema de Ref.:	ED 50	ETRS89
Longitud...........:	- 5° 54' 07,4277"	- 5° 54' 12,24511" ±0.123 m
Latitud..............:	38° 15' 01,1621"	38° 14' 56,68477" ±0.126 m
Alt. Elipsoidal...:		657,501 m ±0.129 (BP)
Compensación.:	01 de abril de 1988	01 de noviembre de 2009

Elipse de error al 95% de confianza.

Coordenadas UTM. Huso 30 :

Sistema de Ref.:	ED 50	ETRS89
X........................:	246038,16 m	245928,078 m
Y........................:	4237643,69 m	4237438,652 m
Factor escala....:	1,000394332	1,000395079
Convergencia...:	- 1° 47' 51"	- 1° 47' 54"

Altitud sobre el nivel medio del mar: 602,441 m. (BP)

Situación:

Situado en la parte más alta de la loma amesetada de Las Cumbres, en terreno de pastos.

Acceso:

Desde Ahillones, por la carretera N-432 hacia Llerena, a los 3 Km. de recorrido y unos 800 m. antes de cruzar el arroyo de La Corbacha, sale un camino hacia el S., se sigue por él y a los 550 m. se deja el vehículo. A pie, campo a través y en dirección S.E., se llega al vértice en 5 minutos.

Horizonte GPS:

Despejado

CF: Centrado Forzado. CP: Cabeza Pilar. BP: Base Pilar. CN: Clavo Nivelado. CS: Clavo Suelo.

NO EXISTE CROQUIS

Observaciones:

Estado: 13 de octubre de 1997
Pilar: Deteriorado **Base:** Deteriorada

Informe del estado del Vértice: ftp://ftp.geodesia.ign.es/utilidades/InfoRG.pdf

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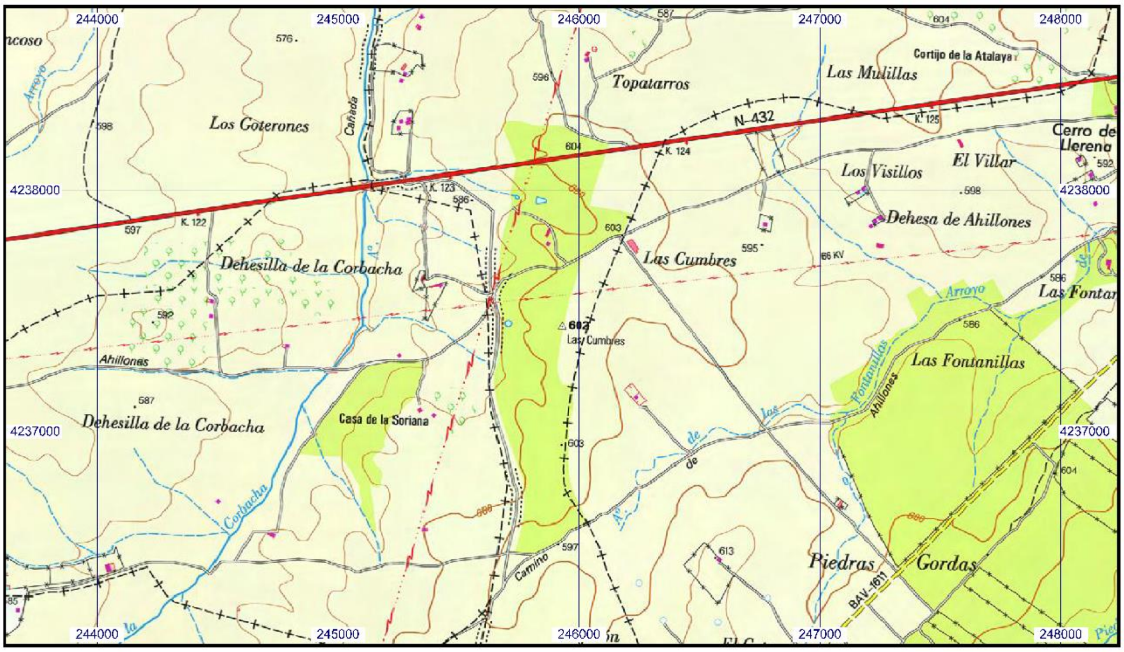
Área de Geodesia

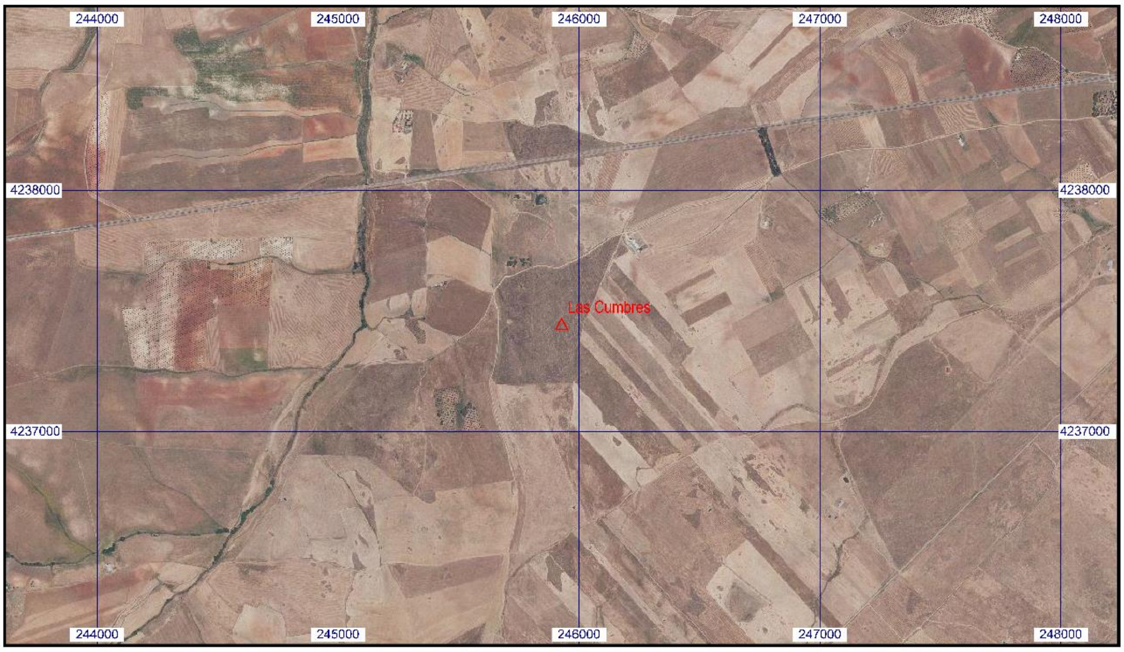
Subdirección General de Geodesia y Cartografía

Cartografía de situación

2-ene-2016

Escala 1:25.000 **087785 Las Cumbres** **Coordenadas ETRS89. Huso 30**





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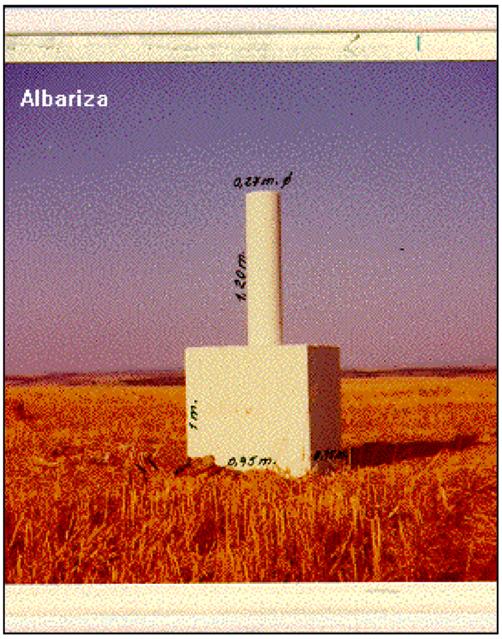
Área de Geodesia
Subdirección General de Geodesia y Cartografía

Reseña Vértice Geodésico

2-ene-2016

Número.....: 87798
Nombre.....: Albariza
Municipios: Berlanga
Provincias: Badajoz
Fecha de Construcción........: 16 de julio de 1974
Pilar sin centrado forzado..: 1,20 m **de alto,** 0,27 m **de diámetro.**
Último cuerpo.......................: 1,00 m **de alto,** 0,95 m **de ancho.**
Total cuerpos.........: 1 **de** 1,00 m **de alto.**



Coordenadas Geográficas:

Sistema de Ref.:	ED 50	ETRS89
Longitud...........:	- 5° 52' 51,0065"	- 5° 52' 55,82400" ±0.111 m
Latitud.............:	38° 18' 33,2808"	38° 18' 28,80777" ±0.106 m
Alt. Elipsoidal...:		653,818 m ±0.123 (BP)
Compensación.:	01 de abril de 1988	01 de noviembre de 2009
		Elipse de error al 95% de confianza.

Coordenadas UTM. Huso 30 :

Sistema de Ref.:	ED 50	ETRS89
X.........................:	248100,10 m	247990,054 m
Y.........................:	4244125,52 m	4243920,414 m
Factor escala.....:	1,000381474	1,000382214
Convergencia...:	- 1° 47' 12"	- 1° 47' 15"

Altitud sobre el nivel medio del mar: 598,807 m. (BP)

Situación:
Situado en la parte N. del cerro Albariza y en terreno de labor.

Acceso:
Desde Berlanga, por la carretera a Higuera de Llerena, a los 3,5 Km., después de pasar el cortijo de Abril, sale un carril en dirección O., que pasa por detrás del cortijo. Recorridos unos 1.000 m. se deja el vehículo y se continúa a pie, en dirección O., unos 400 m., campo a través, hasta el vértice.

Horizonte GPS:
Despejado

CF: Centrado Forzado. CP: Cabeza Pilar. BP: Base Pilar. CN: Clavo Nivelado. CS: Clavo Suelo.

NO EXISTE CROQUIS

Observaciones:

Estado: 13 de octubre de 1997
Pilar: Deteriorado **Base:** Deteriorada
Informe del estado del Vértice: ftp://ftp.geodesia.ign.es/utilidades/InfoRG.pdf

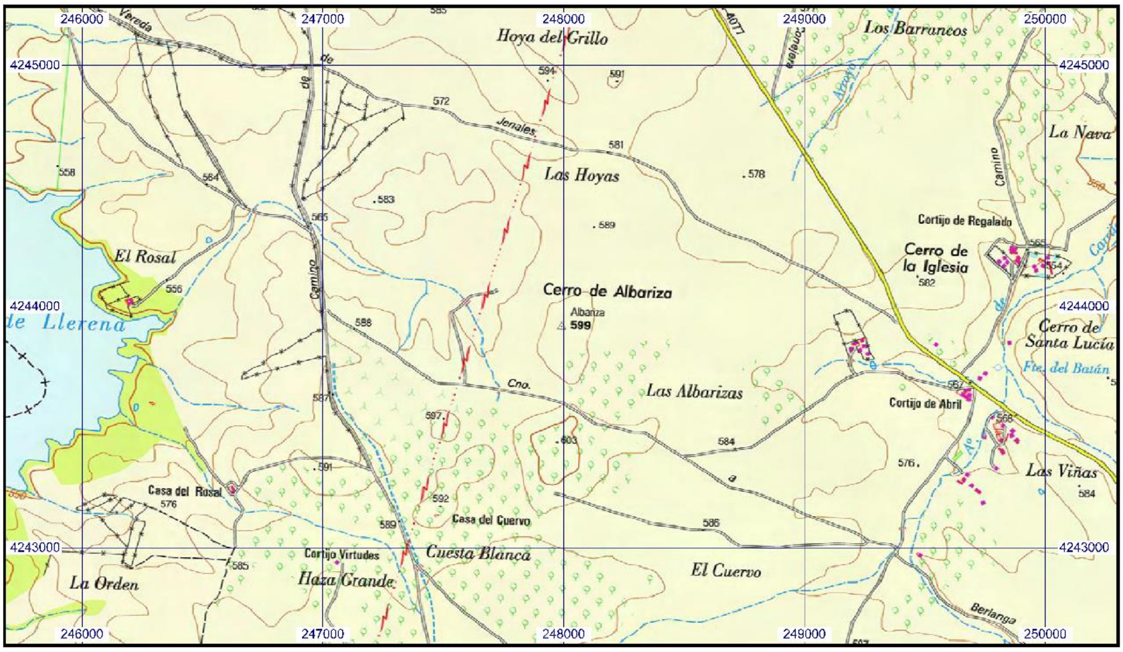
GOBIERNO DE ESPAÑA | MINISTERIO DE FOMENTO | INSTITUTO GEOGRÁFICO NACIONAL

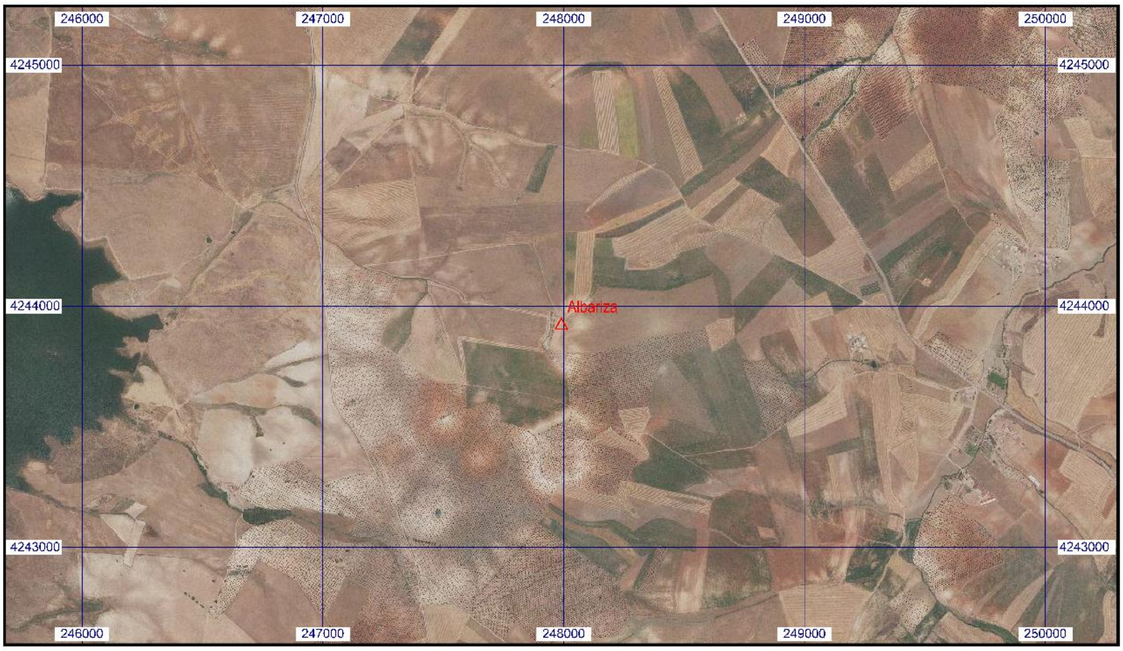
Área de Geodesia

Subdirección General de Geodesia y Cartografía

Cartografía de situación 2-ene-2016

Escala 1:25.000 **087798 Albariza** **Coordenadas ETRS89. Huso 30**





ANEXO 2.1

COORDENADAS DE REPLANTEO

1. INTRODUCCIÓN

Los puntos incluidos en los apartados siguientes se han obtenido del programa AutoCAD Civil 3D, tras realizar los cálculos de los movimientos de tierra para la explanación de la central y las balsas de abastecimiento. Tal y como se indica en este anejo, por falta de datos más precisos, se ha empleado la cartografía a escala 1:10.000 de la Junta de Extremadura, por lo que no se ha podido obtener la exactitud necesaria.

2. COORDENADAS DE LOS PUNTOS

Se adjuntan a continuación los puntos necesarios para la correcta ubicación y construcción de la planta termosolar. Todos ellos están referenciados según el Sistema Geodésico de Referencia ETRS89 en el huso 30.

2.1. LÍMITE DE ADQUISICIÓN DE TERRENOS

El código **D** es para los puntos situados en la cabeza del talud de desmonte y el código **T** es para los situados en el pie del talud de terraplén. Indican los límites de ocupación de la central y, por lo tanto, los límites de los terrenos a adquirir.

Coord. X	Coord. Y	Elevación	Código
239953,220	4239855,270	609,810	D
239949,220	4239855,470	609,810	D
239943,435	4239871,367	609,707	D
239942,169	4239880,239	609,666	D
239940,378	4239888,119	609,618	D
239939,637	4239891,558	609,580	D
239937,651	4239898,206	609,505	D
239936,466	4239901,875	609,500	D
239934,588	4239907,243	609,494	D
239932,222	4239913,790	609,522	D
239928,478	4239924,052	609,563	D
239927,381	4239927,151	609,560	D
239925,358	4239932,921	609,541	D

Coord. X	Coord. Y	Elevación	Código
239969,201	4240400,928	601,376	T
239967,625	4240443,188	601,012	T
239966,718	4240470,458	600,821	T
239967,504	4240474,982	600,739	T
239968,475	4240477,146	600,683	T
239969,785	4240479,115	600,616	T
239971,403	4240480,848	600,537	T
239973,280	4240482,291	600,451	T
239976,493	4240483,792	600,310	T
239979,940	4240484,557	600,165	T
239984,060	4240484,873	599,999	T
240047,430	4240488,123	598,214	T
240129,916	4240491,612	596,256	T

Coord. X	Coord. Y	Elevación	Código
239921,342	4239943,731	609,505	D
239918,821	4239951,224	609,353	D
239917,744	4239954,396	609,289	D
239911,943	4239969,777	609,240	D
239910,742	4239972,667	609,231	D
239907,577	4239980,118	609,236	D
239905,181	4239988,911	609,263	D
239904,995	4239989,827	609,265	D
239903,706	4239998,313	609,180	D
239902,050	4240006,769	609,268	D
239900,417	4240015,331	609,364	D
239898,256	4240026,788	609,481	D
239896,963	4240033,102	609,542	D
239893,972	4240047,987	609,654	D
239893,047	4240053,112	609,694	D
239890,614	4240068,597	609,675	D
239890,148	4240071,909	609,671	D
239887,428	4240092,399	609,639	D
239885,838	4240106,737	609,698	D
239884,668	4240124,630	609,679	D
239883,387	4240152,021	609,424	D
239886,200	4240169,560	609,450	D
239890,150	4240170,190	609,450	D
239895,635	4240151,563	609,500	D
239899,292	4240134,364	609,586	D
239901,296	4240126,739	609,686	D
239904,600	4240112,383	609,675	D
239908,439	4240097,226	609,627	D
239913,634	4240080,066	609,719	D
239921,757	4240055,575	609,739	D
239929,149	4240034,011	609,511	D
239936,597	4240010,679	609,247	D
239967,753	4240014,288	608,619	D
239969,022	4240066,687	608,495	D
239971,458	4240111,316	607,712	D
239973,224	4240146,251	607,103	D
239974,990	4240181,186	606,570	D
239976,547	4240197,117	605,963	D
239977,659	4240216,502	605,600	D
239979,165	4240233,533	605,018	D
239979,480	4240248,109	604,989	D
240790,307	4239529,445	595,778	D
240777,306	4239529,019	596,024	D
240766,392	4239528,614	596,255	D
240757,127	4239528,233	596,467	D
240747,334	4239527,948	596,632	D

Coord. X	Coord. Y	Elevación	Código
240184,789	4240493,542	595,149	T
240188,685	4240493,495	595,165	T
240217,975	4240491,843	595,922	T
240276,262	4240488,496	597,451	T
240333,036	4240484,313	599,401	T
240349,080	4240483,110	599,962	T
240380,956	4240482,892	599,999	T
240420,715	4240480,623	601,025	T
240457,481	4240478,512	601,984	T
240489,910	4240476,698	602,200	T
240539,757	4240476,592	602,608	T
240559,220	4240476,769	603,014	T
240591,408	4240476,253	603,616	T
240623,596	4240475,738	604,239	T
240671,571	4240474,992	604,072	T
240700,648	4240475,200	604,065	T
240706,822	4240475,291	603,999	T
240757,160	4240476,524	603,676	T
240807,499	4240477,758	603,204	T
240857,838	4240478,992	603,071	T
240908,177	4240480,225	602,722	T
240952,290	4240480,006	602,286	T
240996,404	4240479,786	601,578	T
241040,517	4240479,567	600,870	T
241084,631	4240479,348	600,162	T
241139,999	4240479,070	600,013	T
241195,367	4240478,792	600,013	T
241261,570	4240478,464	600,011	T
241327,773	4240478,136	600,010	T
241393,976	4240477,808	600,009	T
241460,179	4240477,479	600,007	T
241512,070	4240477,222	600,006	T
241563,962	4240476,964	600,006	T
241615,854	4240476,707	600,005	T
241667,745	4240476,449	600,004	T
241736,386	4240476,107	600,003	T
241805,026	4240475,764	600,003	T
241806,124	4240475,656	600,003	T
241807,206	4240475,328	600,003	T
241808,202	4240474,796	600,003	T
241809,076	4240474,080	600,003	T
241809,793	4240473,207	600,003	T
241810,326	4240472,211	600,003	T
241810,656	4240471,127	600,003	T
241810,765	4240470,020	600,003	T
241809,803	4240421,818	600,002	T

Coord. X	Coord. Y	Elevación	Código
240732,338	4239527,727	596,780	D
240723,478	4239527,547	596,889	D
240714,592	4239527,533	596,918	D
240697,003	4239527,633	596,913	D
240688,043	4239527,709	596,902	D
240686,711	4239527,625	596,942	D
240681,406	4239527,738	596,899	D
240676,499	4239527,851	596,865	D
240664,543	4239527,145	597,248	D
240655,128	4239526,611	597,536	D
240647,019	4239526,655	597,534	D
240638,883	4239526,655	597,556	D
240633,694	4239526,613	597,588	D
240629,315	4239526,643	597,582	D
240623,020	4239526,754	597,555	D
240622,765	4239526,735	597,551	D
240618,622	4239526,841	597,519	D
240551,443	4239524,797	598,708	D
240484,264	4239522,754	599,898	D
240476,902	4239522,680	599,965	D
240431,557	4239522,879	599,979	D
240377,377	4239523,128	599,990	D
240330,239	4239523,346	599,998	D
240299,281	4239522,785	600,154	D
240227,812	4239520,221	601,747	D
240175,639	4239517,935	603,173	D
240123,467	4239515,649	604,625	D
240097,084	4239514,509	604,998	D
240083,681	4239514,501	605,037	D
240031,847	4239512,120	606,421	D
239980,012	4239509,739	607,724	D
239974,632	4239510,213	607,850	D
239971,191	4239511,340	607,919	D
239967,288	4239513,612	607,984	D
239964,119	4239516,503	608,037	D
239962,709	4239518,278	608,062	D
239960,963	4239521,199	608,090	D
239959,799	4239524,397	608,101	D
239959,132	4239527,735	608,099	D
239959,029	4239529,997	608,089	D
239960,412	4239584,904	607,886	D
239961,794	4239639,810	607,797	D
239962,555	4239682,426	607,842	D
239962,897	4239724,761	608,095	D
239961,905	4239761,084	608,948	D
239961,985	4239798,377	609,259	D

Coord. X	Coord. Y	Elevación	Código
241808,841	4240373,616	600,001	T
241808,334	4240348,219	600,001	T
241807,625	4240312,761	600,000	T
241807,152	4240286,507	599,975	T
241806,962	4240274,301	599,948	T
241806,758	4240260,896	599,911	T
241809,568	4240197,660	597,866	T
241812,378	4240134,424	595,851	T
241813,116	4240083,854	594,965	T
241812,381	4240041,729	594,913	T
241815,064	4239984,526	592,984	T
241817,746	4239927,324	591,084	T
241818,874	4239870,680	589,953	T
241821,148	4239820,075	588,325	T
241822,966	4239763,249	586,849	T
241823,143	4239753,425	586,627	T
241821,851	4239747,231	586,472	T
241820,640	4239744,710	586,388	T
241816,774	4239739,904	586,151	T
241812,066	4239736,702	585,918	T
241805,041	4239734,855	585,656	T
241798,450	4239734,361	585,420	T
241790,244	4239733,888	585,202	T
241782,038	4239733,415	584,999	T
241759,173	4239733,301	585,000	T
241689,234	4239737,975	587,483	T
241658,473	4239739,029	588,089	T
241637,170	4239739,172	588,216	T
241598,939	4239738,767	588,111	T
241570,848	4239740,037	588,822	T
241538,174	4239742,139	589,955	T
241517,668	4239742,094	590,002	T
241440,444	4239748,736	593,509	T
241384,870	4239751,257	594,898	T
241334,160	4239752,685	595,741	T
241279,388	4239753,762	596,415	T
241220,704	4239754,321	596,839	T
241222,204	4239711,926	595,455	T
241223,703	4239669,532	594,498	T
241225,878	4239623,940	592,953	T
241228,052	4239578,348	591,414	T
241229,392	4239534,279	590,286	T
241229,359	4239530,802	590,266	T
241229,146	4239528,123	590,269	T
241228,221	4239525,688	590,287	T
241226,821	4239523,780	590,315	T

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
239962,064	4239835,669	609,583	D	241224,505	4239522,020	590,360	T
239962,390	4239852,312	609,587	D	241221,731	4239521,129	590,416	T
239963,900	4239905,013	609,562	D	241219,997	4239521,011	590,452	T
239965,322	4239941,955	609,088	D	241138,812	4239523,977	592,137	T
239966,745	4239978,896	608,579	D	241094,941	4239525,551	593,030	T
239945,711	4239973,975	609,086	D	241065,154	4239526,429	593,560	T
239955,423	4239906,523	609,586	D	241012,326	4239529,015	594,974	T
239957,517	4239882,407	609,853	D	240981,099	4239528,889	594,988	T
239956,683	4239871,246	609,843	D	240935,724	4239528,667	594,991	T
239979,328	4240257,106	604,983	T	240859,724	4239528,403	595,035	T
239979,278	4240259,491	604,982	T	240844,238	4239528,645	595,189	T
239977,508	4240277,687	604,293	T	240828,976	4239528,858	595,347	T
239976,762	4240292,756	604,073	T	240815,862	4239529,113	595,492	T
239976,054	4240308,581	603,878	T	240802,220	4239529,298	595,617	T
239974,534	4240329,772	603,327	T	240799,228	4239529,353	595,653	T
239971,791	4240363,696	602,293	T	240791,243	4239529,500	595,754	T

2.2. LÍMITES DE LA EXPLANACIÓN

Los puntos con el código **LE** son aquellos que delimitan la explanación de la planta termosolar y los que van acompañados por el código **IP** establecen los límites de la isla de potencia, donde se localizarán las tres balsas y todas las instalaciones.

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
239980,000	4240470,000	606,947	LE	241520,000	4239755,000	595,947	LE
240000,000	4240470,000	606,897	LE	241500,000	4239755,000	595,997	LE
240020,000	4240470,000	606,847	LE	241480,000	4239755,000	596,047	LE
240040,000	4240470,000	606,797	LE	241460,000	4239755,000	596,097	LE
240060,000	4240470,000	606,747	LE	241440,000	4239755,000	596,147	LE
240080,000	4240470,000	606,697	LE	241420,000	4239755,000	596,197	LE
240100,000	4240470,000	606,647	LE	241400,000	4239755,000	596,247	LE
240120,000	4240470,000	606,597	LE	241380,000	4239755,000	596,297	LE
240140,000	4240470,000	606,547	LE	241360,000	4239755,000	596,347	LE
240160,000	4240470,000	606,497	LE	241340,000	4239755,000	596,397	LE
240180,000	4240470,000	606,447	LE	241320,000	4239755,000	596,447	LE
240200,000	4240470,000	606,397	LE	241300,000	4239755,000	596,497	LE
240220,000	4240470,000	606,347	LE	241280,000	4239755,000	596,547	LE
240240,000	4240470,000	606,297	LE	241260,000	4239755,000	596,597	LE
240260,000	4240470,000	606,247	LE	241240,000	4239755,000	596,647	LE
240280,000	4240470,000	606,197	LE	241220,000	4239755,000	596,697	LE
240300,000	4240470,000	606,147	LE	241220,000	4239735,000	596,497	LE
240320,000	4240470,000	606,097	LE	241220,000	4239715,000	596,297	LE
240340,000	4240470,000	606,047	LE	241220,000	4239695,000	596,097	LE
240360,000	4240470,000	605,997	LE	241220,000	4239675,000	595,897	LE

Coord. X	Coord. Y	Elevación	Código
240380,000	4240470,000	605,947	LE
240400,000	4240470,000	605,897	LE
240420,000	4240470,000	605,847	LE
240440,000	4240470,000	605,797	LE
240460,000	4240470,000	605,747	LE
240480,000	4240470,000	605,697	LE
240500,000	4240470,000	605,647	LE
240520,000	4240470,000	605,597	LE
240540,000	4240470,000	605,547	LE
240560,000	4240470,000	605,497	LE
240580,000	4240470,000	605,447	LE
240600,000	4240470,000	605,397	LE
240620,000	4240470,000	605,347	LE
240640,000	4240470,000	605,297	LE
240660,000	4240470,000	605,247	LE
240680,000	4240470,000	605,197	LE
240700,000	4240470,000	605,147	LE
240720,000	4240470,000	605,097	LE
240740,000	4240470,000	605,047	LE
240760,000	4240470,000	604,997	LE
240780,000	4240470,000	604,947	LE
240800,000	4240470,000	604,897	LE
240820,000	4240470,000	604,847	LE
240840,000	4240470,000	604,797	LE
240860,000	4240470,000	604,747	LE
240880,000	4240470,000	604,697	LE
240900,000	4240470,000	604,647	LE
240920,000	4240470,000	604,597	LE
240940,000	4240470,000	604,547	LE
240960,000	4240470,000	604,497	LE
240980,000	4240470,000	604,447	LE
241000,000	4240470,000	604,397	LE
241020,000	4240470,000	604,347	LE
241040,000	4240470,000	604,297	LE
241060,000	4240470,000	604,247	LE
241080,000	4240470,000	604,197	LE
241100,000	4240470,000	604,147	LE
241120,000	4240470,000	604,097	LE
241140,000	4240470,000	604,047	LE
241160,000	4240470,000	603,997	LE
241180,000	4240470,000	603,947	LE
241200,000	4240470,000	603,897	LE
241220,000	4240470,000	603,847	LE
241240,000	4240470,000	603,797	LE
241260,000	4240470,000	603,747	LE
241280,000	4240470,000	603,697	LE

Coord. X	Coord. Y	Elevación	Código
241220,000	4239655,000	595,697	LE
241220,000	4239635,000	595,497	LE
241220,000	4239615,000	595,297	LE
241220,000	4239595,000	595,097	LE
241220,000	4239575,000	594,897	LE
241220,000	4239555,000	594,697	LE
241220,000	4239535,000	594,497	LE
241220,000	4239530,000	594,447	LE
241200,000	4239530,000	594,497	LE
241180,000	4239530,000	594,547	LE
241160,000	4239530,000	594,597	LE
241140,000	4239530,000	594,647	LE
241120,000	4239530,000	594,697	LE
241100,000	4239530,000	594,747	LE
241080,000	4239530,000	594,797	LE
241060,000	4239530,000	594,847	LE
241040,000	4239530,000	594,897	LE
241020,000	4239530,000	594,947	LE
241000,000	4239530,000	594,997	LE
240980,000	4239530,000	595,047	LE
240960,000	4239530,000	595,097	LE
240940,000	4239530,000	595,147	LE
240920,000	4239530,000	595,197	LE
240900,000	4239530,000	595,247	LE
240880,000	4239530,000	595,297	LE
240860,000	4239530,000	595,347	LE
240840,000	4239530,000	595,397	LE
240820,000	4239530,000	595,447	LE
240800,000	4239530,000	595,497	LE
240780,000	4239530,000	595,547	LE
240760,000	4239530,000	595,597	LE
240740,000	4239530,000	595,647	LE
240720,000	4239530,000	595,697	LE
240700,000	4239530,000	595,747	LE
240680,000	4239530,000	595,797	LE
240660,000	4239530,000	595,847	LE
240640,000	4239530,000	595,897	LE
240620,000	4239530,000	595,947	LE
240600,000	4239530,000	595,997	LE
240580,000	4239530,000	596,047	LE
240560,000	4239530,000	596,097	LE
240540,000	4239530,000	596,147	LE
240520,000	4239530,000	596,197	LE
240500,000	4239530,000	596,247	LE
240480,000	4239530,000	596,297	LE
240460,000	4239530,000	596,347	LE

Coord. X	Coord. Y	Elevación	Código
241300,000	4240470,000	603,647	LE
241320,000	4240470,000	603,597	LE
241340,000	4240470,000	603,547	LE
241360,000	4240470,000	603,497	LE
241380,000	4240470,000	603,447	LE
241400,000	4240470,000	603,397	LE
241420,000	4240470,000	603,347	LE
241440,000	4240470,000	603,297	LE
241460,000	4240470,000	603,247	LE
241480,000	4240470,000	603,197	LE
241500,000	4240470,000	603,147	LE
241520,000	4240470,000	603,097	LE
241540,000	4240470,000	603,047	LE
241560,000	4240470,000	602,997	LE
241580,000	4240470,000	602,947	LE
241600,000	4240470,000	602,897	LE
241620,000	4240470,000	602,847	LE
241640,000	4240470,000	602,798	LE
241660,000	4240470,000	602,748	LE
241680,000	4240470,000	602,698	LE
241700,000	4240470,000	602,648	LE
241720,000	4240470,000	602,598	LE
241740,000	4240470,000	602,548	LE
241760,000	4240470,000	602,498	LE
241780,000	4240470,000	602,448	LE
241800,000	4240470,000	602,398	LE
241805,000	4240470,000	602,385	LE
241805,000	4240450,000	602,185	LE
241805,000	4240430,000	601,985	LE
241805,000	4240410,000	601,785	LE
241805,000	4240390,000	601,585	LE
241805,000	4240370,000	601,385	LE
241805,000	4240350,000	601,185	LE
241805,000	4240330,000	600,985	LE
241805,000	4240310,000	600,785	LE
241805,000	4240290,000	600,585	LE
241805,000	4240270,000	600,385	LE
241805,000	4240250,000	600,185	LE
241805,000	4240230,000	599,985	LE
241805,000	4240210,000	599,785	LE
241805,000	4240190,000	599,585	LE
241805,000	4240170,000	599,385	LE
241805,000	4240150,000	599,185	LE
241805,000	4240130,000	598,985	LE
241805,000	4240110,000	598,785	LE
241805,000	4240090,000	598,585	LE

Coord. X	Coord. Y	Elevación	Código
240440,000	4239530,000	596,397	LE
240420,000	4239530,000	596,447	LE
240400,000	4239530,000	596,497	LE
240380,000	4239530,000	596,547	LE
240360,000	4239530,000	596,597	LE
240340,000	4239530,000	596,647	LE
240320,000	4239530,000	596,697	LE
240300,000	4239530,000	596,747	LE
240280,000	4239530,000	596,797	LE
240260,000	4239530,000	596,847	LE
240240,000	4239530,000	596,897	LE
240220,000	4239530,000	596,947	LE
240200,000	4239530,000	596,997	LE
240180,000	4239530,000	597,047	LE
240160,000	4239530,000	597,097	LE
240140,000	4239530,000	597,147	LE
240120,000	4239530,000	597,197	LE
240100,000	4239530,000	597,247	LE
240080,000	4239530,000	597,297	LE
240060,000	4239530,000	597,347	LE
240040,000	4239530,000	597,397	LE
240020,000	4239530,000	597,447	LE
240000,000	4239530,000	597,497	LE
239980,000	4239530,000	597,547	LE
239980,000	4239550,000	597,747	LE
239980,000	4239570,000	597,947	LE
239980,000	4239590,000	598,147	LE
239980,000	4239610,000	598,347	LE
239980,000	4239630,000	598,547	LE
239980,000	4239650,000	598,747	LE
239980,000	4239670,000	598,947	LE
239980,000	4239690,000	599,147	LE
239980,000	4239710,000	599,347	LE
239980,000	4239730,000	599,547	LE
239980,000	4239750,000	599,747	LE
239980,000	4239770,000	599,947	LE
239980,000	4239790,000	600,147	LE
239980,000	4239810,000	600,347	LE
239980,000	4239830,000	600,547	LE
239980,000	4239850,000	600,747	LE
239980,000	4239870,000	600,947	LE
239980,000	4239890,000	601,147	LE
239980,000	4239910,000	601,347	LE
239980,000	4239930,000	601,547	LE
239980,000	4239950,000	601,747	LE
239980,000	4239970,000	601,947	LE

Coord. X	Coord. Y	Elevación	Código
241805,000	4240070,000	598,385	LE
241805,000	4240050,000	598,185	LE
241805,000	4240030,000	597,985	LE
241805,000	4240010,000	597,785	LE
241805,000	4239990,000	597,585	LE
241805,000	4239970,000	597,385	LE
241805,000	4239950,000	597,185	LE
241805,000	4239930,000	596,985	LE
241805,000	4239910,000	596,785	LE
241805,000	4239890,000	596,585	LE
241805,000	4239870,000	596,385	LE
241805,000	4239850,000	596,185	LE
241805,000	4239830,000	595,985	LE
241805,000	4239810,000	595,785	LE
241805,000	4239790,000	595,585	LE
241805,000	4239770,000	595,385	LE
241805,000	4239755,000	595,235	LE
241800,000	4239755,000	595,248	LE
241780,000	4239755,000	595,298	LE
241760,000	4239755,000	595,348	LE
241740,000	4239755,000	595,397	LE
241720,000	4239755,000	595,447	LE
241700,000	4239755,000	595,497	LE
241680,000	4239755,000	595,547	LE
241660,000	4239755,000	595,597	LE
241640,000	4239755,000	595,647	LE
241620,000	4239755,000	595,697	LE
241600,000	4239755,000	595,747	LE
241580,000	4239755,000	595,797	LE
241560,000	4239755,000	595,847	LE
241540,000	4239755,000	595,897	LE

Coord. X	Coord. Y	Elevación	Código
239980,000	4239990,000	602,147	LE
239980,000	4239994,545	602,192	LE
239980,000	4240003,685	602,284	LE
239980,000	4240010,000	602,347	LE
239980,000	4240030,000	602,547	LE
239980,000	4240050,000	602,747	LE
239980,000	4240070,000	602,947	LE
239980,000	4240090,000	603,147	LE
239980,000	4240110,000	603,347	LE
239980,000	4240130,000	603,547	LE
239980,000	4240150,000	603,747	LE
239980,000	4240170,000	603,947	LE
239980,000	4240190,000	604,147	LE
239980,000	4240210,000	604,347	LE
239980,000	4240230,000	604,547	LE
239980,000	4240250,000	604,747	LE
239980,000	4240270,000	604,947	LE
239980,000	4240290,000	605,147	LE
239980,000	4240310,000	605,347	LE
239980,000	4240330,000	605,547	LE
239980,000	4240350,000	605,747	LE
239980,000	4240370,000	605,947	LE
239980,000	4240390,000	606,147	LE
239980,000	4240410,000	606,347	LE
239980,000	4240430,000	606,547	LE
239980,000	4240450,000	606,747	LE
239980,000	4240470,000	606,947	LE
241197,5891	4240013,54	599,3385	IP
240997,589	4240013,540	599,839	IP
240997,589	4240213,540	601,839	IP
241197,589	4240213,540	601,339	IP

2.3. BALSAS

Los puntos codificados con **PB** son los situados en el pie del terraplén del resguardo de las balsas, los que tengan el código **CB** son los que representan la coronación de las balsas y lo puntos acompañados por el código **FB** indican los límites del fondo de las balsas.

Coord. X	Coord. Y	Elevación	Código
240992,684	4240041,150	600,127	TB
240992,685	4240040,973	600,125	TB
240992,666	4240039,894	600,114	TB

Coord. X	Coord. Y	Elevación	Código
240809,100	4239966,390	599,838	TB
240809,127	4239966,435	599,839	TB
240809,709	4239967,343	599,846	TB

Coord. X	Coord. Y	Elevación	Código
240992,647	4240039,537	600,111	TB
240992,548	4240038,463	600,100	TB
240992,501	4240038,107	600,097	TB
240992,323	4240037,043	600,087	TB
240992,250	4240036,690	600,083	TB
240991,992	4240035,642	600,074	TB
240991,892	4240035,293	600,070	TB
240991,556	4240034,268	600,061	TB
240991,430	4240033,926	600,058	TB
240991,019	4240032,928	600,049	TB
240990,866	4240032,595	600,046	TB
240990,381	4240031,631	600,038	TB
240990,203	4240031,309	600,035	TB
240989,647	4240030,385	600,027	TB
240989,445	4240030,075	600,024	TB
240988,821	4240029,195	600,017	TB
240988,595	4240028,901	600,015	TB
240987,906	4240028,070	600,008	TB
240987,658	4240027,793	600,006	TB
240986,908	4240027,016	600,000	TB
240986,639	4240026,758	599,998	TB
240985,833	4240026,040	599,993	TB
240985,544	4240025,802	599,991	TB
240984,687	4240025,147	599,987	TB
240984,380	4240024,931	599,986	TB
240983,476	4240024,343	599,982	TB
240983,153	4240024,150	599,981	TB
240982,206	4240023,632	599,978	TB
240981,869	4240023,464	599,977	TB
240980,886	4240023,019	599,975	TB
240980,537	4240022,876	599,975	TB
240979,524	4240022,507	599,973	TB
240979,164	4240022,391	599,973	TB
240978,126	4240022,100	599,973	TB
240977,759	4240022,011	599,973	TB
240976,701	4240021,799	599,973	TB
240976,328	4240021,739	599,974	TB
240975,258	4240021,608	599,975	TB
240974,882	4240021,576	599,976	TB
240973,804	4240021,526	599,978	TB
240973,582	4240021,520	599,978	TB
240973,384	4240021,520	599,979	TB
240973,350	4240021,520	599,979	TB
240841,610	4240022,192	600,315	TB
240836,954	4240022,216	600,327	TB
240831,523	4240022,244	600,341	TB

Coord. X	Coord. Y	Elevación	Código
240809,738	4239967,384	599,847	TB
240810,385	4239968,247	599,854	TB
240810,416	4239968,286	599,854	TB
240811,124	4239969,099	599,860	TB
240811,157	4239969,135	599,861	TB
240811,923	4239969,895	599,866	TB
240811,958	4239969,927	599,867	TB
240812,777	4239970,629	599,872	TB
240812,803	4239970,650	599,872	TB
240812,813	4239970,658	599,872	TB
240813,681	4239971,299	599,876	TB
240813,719	4239971,325	599,876	TB
240814,631	4239971,901	599,880	TB
240814,670	4239971,923	599,880	TB
240815,622	4239972,432	599,882	TB
240815,662	4239972,451	599,883	TB
240816,648	4239972,889	599,884	TB
240816,690	4239972,906	599,884	TB
240817,544	4239973,213	599,885	TB
240817,705	4239973,271	599,886	TB
240817,747	4239973,284	599,886	TB
240818,786	4239973,575	599,886	TB
240818,829	4239973,585	599,886	TB
240819,886	4239973,799	599,885	TB
240819,930	4239973,807	599,885	TB
240821,000	4239973,943	599,884	TB
240821,045	4239973,947	599,884	TB
240822,122	4239974,006	599,882	TB
240822,149	4239974,007	599,882	TB
240822,346	4239974,009	599,881	TB
240822,350	4239974,009	599,881	TB
240822,405	4239974,010	599,881	TB
240827,303	4239974,034	599,869	TB
240832,202	4239974,058	599,857	TB
240837,101	4239974,082	599,845	TB
240841,302	4239974,102	599,835	TB
240973,350	4239974,750	599,511	TB
240973,400	4239974,749	599,511	TB
240974,478	4239974,715	599,508	TB
240974,579	4239974,708	599,508	TB
240975,651	4239974,596	599,504	TB
240975,752	4239974,582	599,504	TB
240976,814	4239974,392	599,499	TB
240976,913	4239974,370	599,499	TB
240977,958	4239974,104	599,493	TB
240978,057	4239974,075	599,493	TB

Coord. X	Coord. Y	Elevación	Código
240826,091	4240022,271	600,355	TB
240822,350	4240022,290	600,364	TB
240822,190	4240022,294	600,365	TB
240821,113	4240022,340	600,368	TB
240820,795	4240022,366	600,369	TB
240820,656	4240022,383	600,369	TB
240819,724	4240022,494	600,373	TB
240819,409	4240022,543	600,374	TB
240818,351	4240022,751	600,379	TB
240818,042	4240022,824	600,380	TB
240817,002	4240023,112	600,386	TB
240816,701	4240023,207	600,387	TB
240815,686	4240023,572	600,394	TB
240815,394	4240023,690	600,396	TB
240815,156	4240023,796	600,397	TB
240814,409	4240024,131	600,402	TB
240814,127	4240024,269	600,405	TB
240813,179	4240024,783	600,412	TB
240812,910	4240024,942	600,414	TB
240812,002	4240025,525	600,422	TB
240811,747	4240025,703	600,425	TB
240810,886	4240026,352	600,433	TB
240810,646	4240026,548	600,436	TB
240809,836	4240027,260	600,445	TB
240809,613	4240027,472	600,448	TB
240809,487	4240027,601	600,449	TB
240808,859	4240028,243	600,457	TB
240808,654	4240028,469	600,460	TB
240807,959	4240029,295	600,470	TB
240807,772	4240029,534	600,473	TB
240807,141	4240030,409	600,483	TB
240806,974	4240030,660	600,486	TB
240806,410	4240031,580	600,497	TB
240806,263	4240031,841	600,500	TB
240805,769	4240032,801	600,511	TB
240805,643	4240033,070	600,514	TB
240805,222	4240034,063	600,525	TB
240805,117	4240034,340	600,528	TB
240804,770	4240035,361	600,539	TB
240804,687	4240035,643	600,542	TB
240804,417	4240036,687	600,553	TB
240804,355	4240036,972	600,556	TB
240804,163	4240038,034	600,567	TB
240804,123	4240038,320	600,570	TB
240804,010	4240039,393	600,581	TB
240803,991	4240039,680	600,584	TB

Coord. X	Coord. Y	Elevación	Código
240979,080	4239973,733	599,487	TB
240979,177	4239973,696	599,486	TB
240980,173	4239973,281	599,480	TB
240980,268	4239973,237	599,479	TB
240981,230	4239972,750	599,472	TB
240981,323	4239972,698	599,471	TB
240982,248	4239972,142	599,463	TB
240982,338	4239972,084	599,462	TB
240983,219	4239971,461	599,454	TB
240983,305	4239971,396	599,453	TB
240984,139	4239970,711	599,444	TB
240984,221	4239970,638	599,443	TB
240985,002	4239969,893	599,434	TB
240985,080	4239969,813	599,433	TB
240985,805	4239969,014	599,423	TB
240985,878	4239968,927	599,422	TB
240986,542	4239968,077	599,412	TB
240986,609	4239967,984	599,410	TB
240987,208	4239967,087	599,400	TB
240987,270	4239966,987	599,399	TB
240987,801	4239966,048	599,388	TB
240987,856	4239965,943	599,387	TB
240988,317	4239964,968	599,376	TB
240988,364	4239964,857	599,375	TB
240988,752	4239963,851	599,364	TB
240988,792	4239963,735	599,363	TB
240989,104	4239962,702	599,351	TB
240989,136	4239962,583	599,350	TB
240989,371	4239961,530	599,339	TB
240989,393	4239961,406	599,338	TB
240989,550	4239960,338	599,327	TB
240989,563	4239960,212	599,325	TB
240989,640	4239959,135	599,314	TB
240989,644	4239959,059	599,314	TB
240989,649	4239958,862	599,312	TB
240989,649	4239958,850	599,312	TB
241191,465	4239957,997	598,798	TB
241191,878	4239937,464	598,592	TB
241192,346	4239914,182	598,358	TB
241192,384	4239912,287	598,339	TB
241192,423	4239910,339	598,319	TB
241192,441	4239909,454	598,311	TB
241192,478	4239907,616	598,292	TB
241192,590	4239902,054	598,236	TB
241192,624	4239900,342	598,219	TB
241192,641	4239899,504	598,211	TB

Coord. X	Coord. Y	Elevación	Código
240803,958	4240040,758	600,595	TB
240803,956	4240040,927	600,597	TB
240803,959	4240041,124	600,599	TB
240803,959	4240041,150	600,599	TB
240805,166	4240101,794	601,202	TB
240806,965	4240192,150	602,101	TB
240806,966	4240192,181	602,102	TB
240807,027	4240193,258	602,112	TB
240807,033	4240193,318	602,113	TB
240807,123	4240194,008	602,119	TB
240807,173	4240194,388	602,123	TB
240807,183	4240194,446	602,124	TB
240807,401	4240195,502	602,134	TB
240807,415	4240195,558	602,134	TB
240807,710	4240196,595	602,144	TB
240807,727	4240196,648	602,144	TB
240808,098	4240197,661	602,154	TB
240808,119	4240197,712	602,154	TB
240808,562	4240198,695	602,163	TB
240808,586	4240198,742	602,163	TB
240809,101	4240199,690	602,171	TB
240809,127	4240199,735	602,172	TB
240809,709	4240200,643	602,179	TB
240809,738	4240200,684	602,180	TB
240810,385	4240201,547	602,187	TB
240810,416	4240201,586	602,187	TB
240811,124	4240202,399	602,193	TB
240811,157	4240202,435	602,194	TB
240811,923	4240203,195	602,199	TB
240811,958	4240203,227	602,200	TB
240812,777	4240203,929	602,205	TB
240812,813	4240203,958	602,205	TB
240813,681	4240204,599	602,209	TB
240813,719	4240204,625	602,209	TB
240814,058	4240204,838	602,210	TB
240814,631	4240205,201	602,213	TB
240814,670	4240205,223	602,213	TB
240815,622	4240205,732	602,215	TB
240815,662	4240205,751	602,216	TB
240816,648	4240206,189	602,217	TB
240816,690	4240206,206	602,218	TB
240817,705	4240206,571	602,219	TB
240817,747	4240206,584	602,219	TB
240818,786	4240206,875	602,219	TB
240818,829	4240206,885	602,219	TB
240819,886	4240207,099	602,218	TB

Coord. X	Coord. Y	Elevación	Código
241192,875	4239887,848	598,093	TB
241193,075	4239877,932	597,994	TB
241193,246	4239869,394	597,908	TB
241193,396	4239861,965	597,833	TB
241193,467	4239858,431	597,798	TB
241193,527	4239855,442	597,768	TB
241193,643	4239849,669	597,710	TB
241193,746	4239844,523	597,658	TB
241193,839	4239839,908	597,612	TB
241193,923	4239835,745	597,570	TB
241193,999	4239831,972	597,532	TB
241194,068	4239828,535	597,497	TB
241194,131	4239825,392	597,466	TB
241194,189	4239822,507	597,437	TB
241194,220	4239820,955	597,421	TB
241194,242	4239819,849	597,410	TB
241194,292	4239817,393	597,385	TB
241194,337	4239815,115	597,362	TB
241194,341	4239814,942	597,361	TB
241194,343	4239814,821	597,359	TB
241194,347	4239814,646	597,358	TB
241194,351	4239814,448	597,356	TB
241194,354	4239814,307	597,354	TB
241194,357	4239814,118	597,352	TB
241194,361	4239813,923	597,350	TB
241194,364	4239813,783	597,349	TB
241194,404	4239811,803	597,329	TB
241194,441	4239809,951	597,310	TB
241194,476	4239808,217	597,293	TB
241194,483	4239807,850	597,289	TB
241194,484	4239807,673	597,288	TB
241194,467	4239806,674	597,278	TB
241194,465	4239806,594	597,277	TB
241194,446	4239806,238	597,273	TB
241194,368	4239805,394	597,265	TB
241194,347	4239805,163	597,263	TB
241194,301	4239804,807	597,259	TB
241194,214	4239804,291	597,254	TB
241194,189	4239804,144	597,253	TB
241194,122	4239803,743	597,249	TB
241194,049	4239803,390	597,246	TB
241193,791	4239802,342	597,236	TB
241193,691	4239801,993	597,233	TB
241193,356	4239800,968	597,223	TB
241193,229	4239800,626	597,220	TB
241192,818	4239799,629	597,211	TB

Coord. X	Coord. Y	Elevación	Código
240819,930	4240207,106	602,218	TB
240821,000	4240207,243	602,217	TB
240821,045	4240207,247	602,217	TB
240821,442	4240207,269	602,216	TB
240822,122	4240207,306	602,215	TB
240822,149	4240207,307	602,215	TB
240822,346	4240207,309	602,214	TB
240822,350	4240207,309	602,214	TB
240828,914	4240207,341	602,198	TB
240836,387	4240207,378	602,180	TB
240842,794	4240207,409	602,164	TB
240973,350	4240208,050	601,844	TB
240973,400	4240208,049	601,844	TB
240974,478	4240208,015	601,841	TB
240974,579	4240208,008	601,841	TB
240975,651	4240207,896	601,837	TB
240975,752	4240207,882	601,837	TB
240976,814	4240207,692	601,832	TB
240976,913	4240207,670	601,832	TB
240977,958	4240207,404	601,826	TB
240978,057	4240207,375	601,826	TB
240979,080	4240207,033	601,820	TB
240979,177	4240206,996	601,819	TB
240980,173	4240206,581	601,813	TB
240980,268	4240206,537	601,812	TB
240981,230	4240206,050	601,805	TB
240981,323	4240205,998	601,804	TB
240982,248	4240205,442	601,796	TB
240982,337	4240205,383	601,795	TB
240983,219	4240204,761	601,787	TB
240983,305	4240204,695	601,786	TB
240984,139	4240204,010	601,777	TB
240984,205	4240203,953	601,776	TB
240984,221	4240203,937	601,776	TB
240985,002	4240203,193	601,767	TB
240985,080	4240203,113	601,766	TB
240985,805	4240202,314	601,756	TB
240985,878	4240202,227	601,755	TB
240986,361	4240201,608	601,747	TB
240986,541	4240201,377	601,745	TB
240986,609	4240201,284	601,744	TB
240987,208	4240200,386	601,733	TB
240987,269	4240200,287	601,732	TB
240987,801	4240199,348	601,721	TB
240987,856	4240199,243	601,720	TB
240988,317	4240198,268	601,709	TB
241192,665	4239799,295	597,208	TB
241192,180	4239798,332	597,200	TB
241192,003	4239798,009	597,197	TB
241191,446	4239797,085	597,189	TB
241191,244	4239796,776	597,187	TB
241190,620	4239795,896	597,179	TB
241190,394	4239795,601	597,177	TB
241189,705	4239794,771	597,171	TB
241189,457	4239794,493	597,168	TB
241188,708	4239793,717	597,162	TB
241188,438	4239793,458	597,161	TB
241187,633	4239792,741	597,155	TB
241187,344	4239792,502	597,154	TB
241186,486	4239791,848	597,149	TB
241186,180	4239791,631	597,148	TB
241185,275	4239791,043	597,144	TB
241184,952	4239790,850	597,143	TB
241184,006	4239790,333	597,140	TB
241183,669	4239790,164	597,140	TB
241182,686	4239789,719	597,138	TB
241182,337	4239789,577	597,137	TB
241181,323	4239789,208	597,136	TB
241180,964	4239789,092	597,136	TB
241179,925	4239788,800	597,135	TB
241179,558	4239788,712	597,135	TB
241178,501	4239788,500	597,136	TB
241178,128	4239788,440	597,136	TB
241177,058	4239788,308	597,138	TB
241176,682	4239788,277	597,138	TB
241175,604	4239788,226	597,140	TB
241175,382	4239788,221	597,141	TB
241175,184	4239788,221	597,141	TB
241175,150	4239788,221	597,141	TB
241024,150	4239788,991	597,527	TB
241023,990	4239788,995	597,527	TB
241022,913	4239789,041	597,530	TB
241022,595	4239789,067	597,531	TB
241021,524	4239789,195	597,535	TB
241021,209	4239789,244	597,537	TB
241020,151	4239789,452	597,541	TB
241019,842	4239789,525	597,543	TB
241018,803	4239789,813	597,548	TB
241018,501	4239789,908	597,550	TB
241017,486	4239790,273	597,556	TB
241017,194	4239790,391	597,558	TB
241016,209	4239790,831	597,565	TB

Coord. X	Coord. Y	Elevación	Código
240988,364	4240198,157	601,708	TB
240988,752	4240197,151	601,697	TB
240988,792	4240197,035	601,696	TB
240988,845	4240196,860	601,694	TB
240989,104	4240196,002	601,684	TB
240989,135	4240195,883	601,683	TB
240989,370	4240194,830	601,672	TB
240989,393	4240194,706	601,671	TB
240989,521	4240193,830	601,662	TB
240989,549	4240193,638	601,660	TB
240989,563	4240193,512	601,658	TB
240989,640	4240192,435	601,647	TB
240989,643	4240192,359	601,647	TB
240989,649	4240192,162	601,645	TB
240989,649	4240192,150	601,645	TB
240992,684	4240041,150	600,127	TB
240992,685	4240040,973	600,125	TB
240992,666	4240039,894	600,114	TB
240992,647	4240039,537	600,111	TB
240992,548	4240038,463	600,100	TB
240992,501	4240038,107	600,097	TB
240992,323	4240037,043	600,087	TB
240992,250	4240036,690	600,083	TB
240991,992	4240035,642	600,074	TB
240991,892	4240035,293	600,070	TB
240991,556	4240034,268	600,061	TB
240991,430	4240033,926	600,058	TB
240991,019	4240032,928	600,049	TB
240990,866	4240032,595	600,046	TB
240990,381	4240031,631	600,038	TB
240990,203	4240031,309	600,035	TB
240989,647	4240030,385	600,027	TB
240989,445	4240030,075	600,024	TB
240988,821	4240029,195	600,017	TB
240988,595	4240028,901	600,015	TB
240987,906	4240028,070	600,008	TB
240987,658	4240027,793	600,006	TB
240986,908	4240027,016	600,000	TB
240986,639	4240026,758	599,998	TB
240985,833	4240026,040	599,993	TB
240985,544	4240025,802	599,991	TB
240984,687	4240025,147	599,987	TB
240984,380	4240024,931	599,986	TB
240983,476	4240024,343	599,982	TB
240983,153	4240024,150	599,981	TB
240982,206	4240023,632	599,978	TB
241015,928	4239790,970	597,567	TB
241014,979	4239791,484	597,574	TB
241014,710	4239791,642	597,577	TB
241013,803	4239792,226	597,585	TB
241013,548	4239792,403	597,587	TB
241012,687	4239793,053	597,596	TB
241012,447	4239793,248	597,598	TB
241011,637	4239793,961	597,608	TB
241011,414	4239794,172	597,610	TB
241010,660	4239794,943	597,620	TB
241010,454	4239795,170	597,623	TB
241009,760	4239795,995	597,633	TB
241009,573	4239796,235	597,636	TB
241008,942	4239797,110	597,646	TB
241008,775	4239797,361	597,649	TB
241008,211	4239798,281	597,659	TB
241008,064	4239798,542	597,662	TB
241007,570	4239799,501	597,673	TB
241007,444	4239799,770	597,676	TB
241007,023	4239800,764	597,687	TB
241006,917	4239801,040	597,690	TB
241006,571	4239802,062	597,701	TB
241006,487	4239802,343	597,704	TB
241006,218	4239803,388	597,715	TB
241006,156	4239803,672	597,718	TB
241005,964	4239804,734	597,730	TB
241005,923	4239805,020	597,732	TB
241005,811	4239806,093	597,744	TB
241005,792	4239806,380	597,746	TB
241005,759	4239807,458	597,757	TB
241005,757	4239807,627	597,759	TB
241005,760	4239807,824	597,761	TB
241005,760	4239807,850	597,761	TB
241008,765	4239958,850	599,264	TB
241008,767	4239958,881	599,264	TB
241008,828	4239959,958	599,275	TB
241008,833	4239960,018	599,275	TB
241008,974	4239961,088	599,286	TB
241008,983	4239961,146	599,286	TB
241009,202	4239962,202	599,296	TB
241009,216	4239962,258	599,297	TB
241009,511	4239963,295	599,306	TB
241009,528	4239963,348	599,307	TB
241009,899	4239964,361	599,316	TB
241009,919	4239964,411	599,316	TB
241010,363	4239965,395	599,325	TB

Coord. X	Coord. Y	Elevación	Código
240981,869	4240023,464	599,977	TB
240980,886	4240023,019	599,975	TB
240980,537	4240022,876	599,975	TB
240979,524	4240022,507	599,973	TB
240979,164	4240022,391	599,973	TB
240978,126	4240022,100	599,973	TB
240977,759	4240022,011	599,973	TB
240976,701	4240021,799	599,973	TB
240976,328	4240021,739	599,974	TB
240975,258	4240021,608	599,975	TB
240974,882	4240021,576	599,976	TB
240973,804	4240021,526	599,978	TB
240973,582	4240021,520	599,978	TB
240973,384	4240021,520	599,979	TB
240973,350	4240021,520	599,979	TB
240841,610	4240022,192	600,315	TB
240836,954	4240022,216	600,327	TB
240831,523	4240022,244	600,341	TB
240826,091	4240022,271	600,355	TB
240822,350	4240022,290	600,364	TB
240822,190	4240022,294	600,365	TB
240821,113	4240022,340	600,368	TB
240820,795	4240022,366	600,369	TB
240820,656	4240022,383	600,369	TB
240819,724	4240022,494	600,373	TB
240819,409	4240022,543	600,374	TB
240818,351	4240022,751	600,379	TB
240818,042	4240022,824	600,380	TB
240817,002	4240023,112	600,386	TB
240816,701	4240023,207	600,387	TB
240815,686	4240023,572	600,394	TB
240815,394	4240023,690	600,396	TB
240815,156	4240023,796	600,397	TB
240814,409	4240024,131	600,402	TB
240814,127	4240024,269	600,405	TB
240813,179	4240024,783	600,412	TB
240812,910	4240024,942	600,414	TB
240812,002	4240025,525	600,422	TB
240811,747	4240025,703	600,425	TB
240810,886	4240026,352	600,433	TB
240810,646	4240026,548	600,436	TB
240809,836	4240027,260	600,445	TB
240809,613	4240027,472	600,448	TB
240809,487	4240027,601	600,449	TB
240808,859	4240028,243	600,457	TB
240808,654	4240028,469	600,460	TB

Coord. X	Coord. Y	Elevación	Código
241010,387	4239965,442	599,326	TB
241010,901	4239966,390	599,334	TB
241010,927	4239966,434	599,334	TB
241011,510	4239967,342	599,342	TB
241011,539	4239967,384	599,342	TB
241012,186	4239968,247	599,349	TB
241012,217	4239968,285	599,349	TB
241012,925	4239969,099	599,356	TB
241012,958	4239969,134	599,356	TB
241013,724	4239969,894	599,362	TB
241013,758	4239969,926	599,362	TB
241014,577	4239970,628	599,367	TB
241014,614	4239970,657	599,367	TB
241015,481	4239971,298	599,371	TB
241015,519	4239971,324	599,372	TB
241016,431	4239971,900	599,375	TB
241016,471	4239971,923	599,375	TB
241017,422	4239972,431	599,378	TB
241017,463	4239972,451	599,378	TB
241018,448	4239972,888	599,380	TB
241018,490	4239972,905	599,380	TB
241019,505	4239973,270	599,381	TB
241019,547	4239973,283	599,381	TB
241020,586	4239973,574	599,381	TB
241020,629	4239973,584	599,381	TB
241021,687	4239973,798	599,381	TB
241021,731	4239973,806	599,381	TB
241022,801	4239973,942	599,380	TB
241022,845	4239973,946	599,379	TB
241023,922	4239974,005	599,377	TB
241023,949	4239974,006	599,377	TB
241024,146	4239974,008	599,377	TB
241024,150	4239974,008	599,377	TB
241104,767	4239974,404	599,179	TB
241105,220	4239974,406	599,178	TB
241108,394	4239974,421	599,170	TB
241111,569	4239974,437	599,163	TB
241114,745	4239974,453	599,155	TB
241117,921	4239974,468	599,147	TB
241121,097	4239974,484	599,139	TB
241124,274	4239974,499	599,131	TB
241124,491	4239974,500	599,131	TB
241124,790	4239974,502	599,130	TB
241125,078	4239974,503	599,129	TB
241125,293	4239974,504	599,129	TB
241125,592	4239974,506	599,128	TB

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240807,959	4240029,295	600,470	TB	241125,855	4239974,507	599,128	TB
240807,772	4240029,534	600,473	TB	241126,037	4239974,508	599,127	TB
240807,141	4240030,409	600,483	TB	241126,294	4239974,509	599,126	TB
240806,974	4240030,660	600,486	TB	241129,546	4239974,525	599,119	TB
240806,410	4240031,580	600,497	TB	241132,799	4239974,541	599,111	TB
240806,263	4240031,841	600,500	TB	241134,185	4239974,548	599,107	TB
240805,769	4240032,801	600,511	TB	241136,053	4239974,557	599,103	TB
240805,643	4240033,070	600,514	TB	241139,307	4239974,573	599,095	TB
240805,222	4240034,063	600,525	TB	241142,561	4239974,589	599,087	TB
240805,117	4240034,340	600,528	TB	241145,816	4239974,605	599,079	TB
240804,770	4240035,361	600,539	TB	241149,072	4239974,621	599,071	TB
240804,687	4240035,643	600,542	TB	241152,328	4239974,637	599,063	TB
240804,417	4240036,687	600,553	TB	241155,584	4239974,653	599,055	TB
240804,355	4240036,972	600,556	TB	241158,841	4239974,669	599,047	TB
240804,163	4240038,034	600,567	TB	241162,098	4239974,685	599,039	TB
240804,123	4240038,320	600,570	TB	241163,642	4239974,692	599,035	TB
240804,010	4240039,393	600,581	TB	241165,356	4239974,701	599,031	TB
240803,991	4240039,680	600,584	TB	241168,614	4239974,717	599,023	TB
240803,958	4240040,758	600,595	TB	241171,873	4239974,733	599,015	TB
240803,956	4240040,927	600,597	TB	241175,132	4239974,749	599,007	TB
240803,959	4240041,124	600,599	TB	241175,150	4239974,749	599,007	TB
240803,959	4240041,150	600,599	TB	241175,200	4239974,748	599,007	TB
240805,166	4240101,794	601,202	TB	241176,278	4239974,714	599,004	TB
240806,965	4240192,150	602,101	TB	241176,378	4239974,707	599,003	TB
240806,966	4240192,181	602,102	TB	241177,451	4239974,595	598,999	TB
240807,027	4240193,258	602,112	TB	241177,551	4239974,581	598,999	TB
240807,033	4240193,318	602,113	TB	241178,457	4239974,419	598,995	TB
240807,123	4240194,008	602,119	TB	241178,613	4239974,391	598,995	TB
240807,173	4240194,388	602,123	TB	241178,679	4239974,378	598,994	TB
240807,183	4240194,446	602,124	TB	241178,713	4239974,369	598,994	TB
240807,401	4240195,502	602,134	TB	241179,130	4239974,263	598,992	TB
240807,415	4240195,558	602,134	TB	241179,758	4239974,103	598,989	TB
240807,710	4240196,595	602,144	TB	241179,857	4239974,074	598,988	TB
240807,727	4240196,648	602,144	TB	241180,534	4239973,847	598,984	TB
240808,098	4240197,661	602,154	TB	241180,880	4239973,732	598,982	TB
240808,119	4240197,712	602,154	TB	241180,977	4239973,695	598,982	TB
240808,562	4240198,695	602,163	TB	241180,979	4239973,695	598,982	TB
240808,586	4240198,742	602,163	TB	241181,192	4239973,606	598,980	TB
240809,101	4240199,690	602,171	TB	241181,652	4239973,414	598,977	TB
240809,127	4240199,735	602,172	TB	241181,972	4239973,280	598,975	TB
240809,709	4240200,643	602,179	TB	241182,067	4239973,236	598,974	TB
240809,738	4240200,684	602,180	TB	241182,089	4239973,225	598,974	TB
240810,385	4240201,547	602,187	TB	241183,030	4239972,749	598,967	TB
240810,416	4240201,586	602,187	TB	241183,123	4239972,697	598,966	TB
240811,124	4240202,399	602,193	TB	241184,047	4239972,141	598,958	TB
240811,157	4240202,435	602,194	TB	241184,137	4239972,083	598,958	TB

Coord. X	Coord. Y	Elevación	Código
240811,923	4240203,195	602,199	TB
240811,958	4240203,227	602,200	TB
240812,777	4240203,929	602,205	TB
240812,813	4240203,958	602,205	TB
240813,681	4240204,599	602,209	TB
240813,719	4240204,625	602,209	TB
240814,058	4240204,838	602,210	TB
240814,631	4240205,201	602,213	TB
240814,670	4240205,223	602,213	TB
240815,622	4240205,732	602,215	TB
240815,662	4240205,751	602,216	TB
240816,648	4240206,189	602,217	TB
240816,690	4240206,206	602,218	TB
240817,705	4240206,571	602,219	TB
240817,747	4240206,584	602,219	TB
240818,786	4240206,875	602,219	TB
240818,829	4240206,885	602,219	TB
240819,886	4240207,099	602,218	TB
240819,930	4240207,106	602,218	TB
240821,000	4240207,243	602,217	TB
240821,045	4240207,247	602,217	TB
240821,442	4240207,269	602,216	TB
240822,122	4240207,306	602,215	TB
240822,149	4240207,307	602,215	TB
240822,346	4240207,309	602,214	TB
240822,350	4240207,309	602,214	TB
240828,914	4240207,341	602,198	TB
240836,387	4240207,378	602,180	TB
240842,794	4240207,409	602,164	TB
240973,350	4240208,050	601,844	TB
240973,400	4240208,049	601,844	TB
240974,478	4240208,015	601,841	TB
240974,579	4240208,008	601,841	TB
240975,651	4240207,896	601,837	TB
240975,752	4240207,882	601,837	TB
240976,814	4240207,692	601,832	TB
240976,913	4240207,670	601,832	TB
240977,958	4240207,404	601,826	TB
240978,057	4240207,375	601,826	TB
240979,080	4240207,033	601,820	TB
240979,177	4240206,996	601,819	TB
240980,173	4240206,581	601,813	TB
240980,268	4240206,537	601,812	TB
240981,230	4240206,050	601,805	TB
240981,323	4240205,998	601,804	TB
240982,248	4240205,442	601,796	TB

Coord. X	Coord. Y	Elevación	Código
241185,018	4239971,461	598,949	TB
241185,105	4239971,395	598,948	TB
241185,938	4239970,710	598,939	TB
241186,021	4239970,637	598,938	TB
241186,802	4239969,893	598,929	TB
241186,880	4239969,813	598,928	TB
241186,895	4239969,796	598,928	TB
241187,604	4239969,013	598,918	TB
241187,677	4239968,927	598,917	TB
241188,341	4239968,076	598,907	TB
241188,408	4239967,983	598,906	TB
241189,007	4239967,086	598,895	TB
241189,069	4239966,987	598,894	TB
241189,600	4239966,048	598,884	TB
241189,655	4239965,943	598,882	TB
241190,116	4239964,968	598,872	TB
241190,163	4239964,857	598,870	TB
241190,551	4239963,850	598,859	TB
241190,591	4239963,735	598,858	TB
241190,718	4239963,316	598,854	TB
241190,903	4239962,702	598,847	TB
241190,935	4239962,582	598,846	TB
241191,170	4239961,529	598,835	TB
241191,192	4239961,406	598,833	TB
241191,349	4239960,338	598,822	TB
241191,362	4239960,212	598,821	TB
241191,439	4239959,135	598,810	TB
241191,443	4239959,059	598,809	TB
241191,448	4239958,862	598,807	TB
241191,448	4239958,850	598,807	TB
240987,900	4240192,150	602,519	CB
240987,900	4240041,150	602,519	CB
240987,900	4240041,150	602,519	CB
240987,860	4240040,072	602,519	CB
240987,740	4240039,000	602,519	CB
240987,541	4240037,940	602,519	CB
240987,265	4240036,897	602,519	CB
240986,911	4240035,878	602,519	CB
240986,483	4240034,888	602,519	CB
240985,983	4240033,932	602,519	CB
240985,414	4240033,016	602,519	CB
240984,778	4240032,144	602,519	CB
240984,080	4240031,323	602,519	CB
240983,322	4240030,555	602,519	CB
240982,510	4240029,845	602,519	CB
240981,647	4240029,197	602,519	CB

Coord. X	Coord. Y	Elevación	Código
240982,337	4240205,383	601,795	TB
240983,219	4240204,761	601,787	TB
240983,305	4240204,695	601,786	TB
240984,139	4240204,010	601,777	TB
240984,205	4240203,953	601,776	TB
240984,221	4240203,937	601,776	TB
240985,002	4240203,193	601,767	TB
240985,080	4240203,113	601,766	TB
240985,805	4240202,314	601,756	TB
240985,878	4240202,227	601,755	TB
240986,361	4240201,608	601,747	TB
240986,541	4240201,377	601,745	TB
240986,609	4240201,284	601,744	TB
240987,208	4240200,386	601,733	TB
240987,269	4240200,287	601,732	TB
240987,801	4240199,348	601,721	TB
240987,856	4240199,243	601,720	TB
240988,317	4240198,268	601,709	TB
240988,364	4240198,157	601,708	TB
240988,752	4240197,151	601,697	TB
240988,792	4240197,035	601,696	TB
240988,845	4240196,860	601,694	TB
240989,104	4240196,002	601,684	TB
240989,135	4240195,883	601,683	TB
240989,370	4240194,830	601,672	TB
240989,393	4240194,706	601,671	TB
240989,521	4240193,830	601,662	TB
240989,549	4240193,638	601,660	TB
240989,563	4240193,512	601,658	TB
240989,640	4240192,435	601,647	TB
240989,643	4240192,359	601,647	TB
240989,649	4240192,162	601,645	TB
240989,649	4240192,150	601,645	TB
240992,684	4239807,850	597,794	TB
240992,685	4239807,673	597,792	TB
240992,666	4239806,594	597,781	TB
240992,647	4239806,237	597,778	TB
240992,548	4239805,163	597,767	TB
240992,502	4239804,807	597,764	TB
240992,323	4239803,743	597,754	TB
240992,250	4239803,390	597,750	TB
240991,992	4239802,342	597,741	TB
240991,892	4239801,993	597,737	TB
240991,556	4239800,968	597,728	TB
240991,430	4239800,626	597,725	TB
240991,019	4239799,628	597,716	TB

Coord. X	Coord. Y	Elevación	Código
240980,739	4240028,616	602,519	CB
240979,790	4240028,103	602,519	CB
240978,805	4240027,661	602,519	CB
240977,791	4240027,294	602,519	CB
240976,752	4240027,003	602,519	CB
240975,695	4240026,790	602,519	CB
240974,624	4240026,656	602,519	CB
240973,547	4240026,601	602,519	CB
240973,350	4240026,600	602,519	CB
240973,350	4240026,600	602,519	CB
240822,350	4240026,600	602,519	CB
240822,350	4240026,600	602,519	CB
240821,272	4240026,640	602,519	CB
240820,200	4240026,760	602,519	CB
240819,140	4240026,959	602,519	CB
240818,097	4240027,235	602,519	CB
240817,078	4240027,589	602,519	CB
240816,088	4240028,017	602,519	CB
240815,132	4240028,517	602,519	CB
240814,216	4240029,086	602,519	CB
240813,344	4240029,722	602,519	CB
240812,523	4240030,421	602,519	CB
240811,755	4240031,178	602,519	CB
240811,045	4240031,990	602,519	CB
240810,397	4240032,853	602,519	CB
240809,816	4240033,762	602,519	CB
240809,303	4240034,710	602,519	CB
240808,861	4240035,695	602,519	CB
240808,494	4240036,709	602,519	CB
240808,203	4240037,748	602,519	CB
240807,990	4240038,805	602,519	CB
240807,856	4240039,876	602,519	CB
240807,801	4240040,953	602,519	CB
240807,800	4240041,150	602,519	CB
240807,800	4240041,150	602,519	CB
240807,800	4240192,150	602,519	CB
240807,800	4240192,150	602,519	CB
240807,840	4240193,228	602,519	CB
240807,960	4240194,300	602,519	CB
240808,159	4240195,360	602,519	CB
240808,435	4240196,403	602,519	CB
240808,789	4240197,422	602,519	CB
240809,217	4240198,412	602,519	CB
240809,717	4240199,368	602,519	CB
240810,286	4240200,284	602,519	CB
240810,922	4240201,156	602,519	CB

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240990,866	4239799,295	597,713	TB	240811,621	4240201,978	602,519	CB
240990,381	4239798,331	597,704	TB	240812,378	4240202,745	602,519	CB
240990,203	4239798,009	597,702	TB	240813,190	4240203,455	602,519	CB
240989,647	4239797,084	597,694	TB	240814,053	4240204,103	602,519	CB
240989,445	4239796,775	597,691	TB	240814,962	4240204,684	602,519	CB
240988,821	4239795,895	597,684	TB	240815,910	4240205,197	602,519	CB
240988,595	4239795,601	597,682	TB	240816,895	4240205,639	602,519	CB
240987,906	4239794,770	597,675	TB	240817,909	4240206,006	602,519	CB
240987,658	4239794,493	597,673	TB	240818,948	4240206,297	602,519	CB
240986,909	4239793,716	597,667	TB	240820,005	4240206,510	602,519	CB
240986,639	4239793,457	597,665	TB	240821,076	4240206,644	602,519	CB
240985,833	4239792,740	597,660	TB	240822,153	4240206,699	602,519	CB
240985,544	4239792,502	597,658	TB	240822,350	4240206,700	602,519	CB
240984,687	4239791,847	597,654	TB	240822,350	4240206,700	602,519	CB
240984,380	4239791,631	597,652	TB	240973,350	4240206,700	602,519	CB
240983,476	4239791,043	597,649	TB	240973,350	4240206,700	602,519	CB
240983,153	4239790,850	597,648	TB	240974,428	4240206,660	602,519	CB
240982,206	4239790,332	597,645	TB	240975,500	4240206,540	602,519	CB
240981,869	4239790,163	597,644	TB	240976,560	4240206,341	602,519	CB
240980,886	4239789,719	597,642	TB	240977,603	4240206,065	602,519	CB
240980,537	4239789,576	597,642	TB	240978,622	4240205,711	602,519	CB
240979,524	4239789,207	597,640	TB	240979,612	4240205,283	602,519	CB
240979,164	4239789,091	597,640	TB	240980,568	4240204,783	602,519	CB
240978,126	4239788,800	597,640	TB	240981,484	4240204,214	602,519	CB
240977,759	4239788,711	597,640	TB	240982,356	4240203,578	602,519	CB
240976,701	4239788,499	597,640	TB	240983,178	4240202,880	602,519	CB
240976,328	4239788,439	597,641	TB	240983,945	4240202,122	602,519	CB
240975,258	4239788,307	597,642	TB	240984,655	4240201,310	602,519	CB
240974,882	4239788,276	597,643	TB	240985,303	4240200,447	602,519	CB
240973,804	4239788,225	597,645	TB	240985,884	4240199,539	602,519	CB
240973,582	4239788,220	597,645	TB	240986,397	4240198,590	602,519	CB
240973,384	4239788,220	597,646	TB	240986,839	4240197,605	602,519	CB
240973,350	4239788,220	597,646	TB	240987,206	4240196,591	602,519	CB
240840,117	4239788,900	597,986	TB	240987,497	4240195,552	602,519	CB
240837,669	4239788,912	597,992	TB	240987,710	4240194,495	602,519	CB
240834,812	4239788,927	597,999	TB	240987,844	4240193,424	602,519	CB
240831,955	4239788,941	598,007	TB	240987,899	4240192,347	602,519	CB
240829,097	4239788,956	598,014	TB	240987,900	4240192,150	602,519	CB
240826,239	4239788,970	598,021	TB	240987,900	4240192,150	602,519	CB
240823,381	4239788,985	598,029	TB	240973,350	4240202,950	602,519	CB
240822,350	4239788,990	598,031	TB	240822,350	4240202,950	602,519	CB
240822,190	4239788,994	598,032	TB	240822,350	4240202,950	602,519	CB
240821,113	4239789,040	598,035	TB	240821,422	4240202,910	602,519	CB
240820,795	4239789,066	598,036	TB	240820,500	4240202,790	602,519	CB
240820,516	4239789,099	598,037	TB	240819,592	4240202,592	602,519	CB
240819,724	4239789,194	598,040	TB	240818,705	4240202,316	602,519	CB

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240819,409	4239789,243	598,041	TB	240817,844	4240201,965	602,519	CB
240818,351	4239789,451	598,046	TB	240817,017	4240201,542	602,519	CB
240818,042	4239789,524	598,047	TB	240816,230	4240201,048	602,519	CB
240817,613	4239789,643	598,050	TB	240815,487	4240200,489	602,519	CB
240817,002	4239789,812	598,053	TB	240814,796	4240199,868	602,519	CB
240816,701	4239789,907	598,054	TB	240814,160	4240199,190	602,519	CB
240815,686	4239790,272	598,061	TB	240813,585	4240198,460	602,519	CB
240815,394	4239790,390	598,063	TB	240813,075	4240197,683	602,519	CB
240814,650	4239790,723	598,068	TB	240812,634	4240196,866	602,519	CB
240814,409	4239790,831	598,069	TB	240812,265	4240196,013	602,519	CB
240814,127	4239790,969	598,071	TB	240811,970	4240195,132	602,519	CB
240813,428	4239791,348	598,077	TB	240811,752	4240194,228	602,519	CB
240813,179	4239791,483	598,079	TB	240811,612	4240193,309	602,519	CB
240812,910	4239791,641	598,081	TB	240811,553	4240192,382	602,519	CB
240812,002	4239792,225	598,089	TB	240811,550	4240192,150	602,519	CB
240811,747	4239792,402	598,092	TB	240811,550	4240192,150	602,519	CB
240810,886	4239793,052	598,100	TB	240811,550	4240041,150	602,519	CB
240810,646	4239793,247	598,103	TB	240811,550	4240041,150	602,519	CB
240809,836	4239793,960	598,112	TB	240811,590	4240040,222	602,519	CB
240809,613	4239794,172	598,115	TB	240811,710	4240039,300	602,519	CB
240808,859	4239794,943	598,124	TB	240811,908	4240038,392	602,519	CB
240808,654	4239795,169	598,127	TB	240812,184	4240037,505	602,519	CB
240807,959	4239795,995	598,137	TB	240812,535	4240036,644	602,519	CB
240807,772	4239796,234	598,140	TB	240812,959	4240035,817	602,519	CB
240807,141	4239797,109	598,150	TB	240813,452	4240035,030	602,519	CB
240806,974	4239797,360	598,153	TB	240814,011	4240034,287	602,519	CB
240806,410	4239798,280	598,164	TB	240814,632	4240033,596	602,519	CB
240806,263	4239798,541	598,167	TB	240815,310	4240032,960	602,519	CB
240805,923	4239799,202	598,174	TB	240816,040	4240032,385	602,519	CB
240805,769	4239799,500	598,178	TB	240816,817	4240031,875	602,519	CB
240805,643	4239799,770	598,181	TB	240817,634	4240031,434	602,519	CB
240805,223	4239800,761	598,192	TB	240818,487	4240031,065	602,519	CB
240805,222	4239800,763	598,192	TB	240819,368	4240030,770	602,519	CB
240805,116	4239801,039	598,195	TB	240820,272	4240030,552	602,519	CB
240804,770	4239802,061	598,206	TB	240821,191	4240030,412	602,519	CB
240804,686	4239802,343	598,209	TB	240822,118	4240030,353	602,519	CB
240804,417	4239803,387	598,220	TB	240822,350	4240030,350	602,519	CB
240804,355	4239803,672	598,223	TB	240822,350	4240030,350	602,519	CB
240804,163	4239804,734	598,234	TB	240973,350	4240030,350	602,519	CB
240804,122	4239805,020	598,237	TB	240973,350	4240030,350	602,519	CB
240804,010	4239806,093	598,248	TB	240974,278	4240030,390	602,519	CB
240803,991	4239806,380	598,251	TB	240975,200	4240030,510	602,519	CB
240803,958	4239807,458	598,262	TB	240976,108	4240030,708	602,519	CB
240803,956	4239807,627	598,263	TB	240976,995	4240030,984	602,519	CB
240803,959	4239807,824	598,265	TB	240977,856	4240031,335	602,519	CB
240803,959	4239807,850	598,266	TB	240978,683	4240031,759	602,519	CB

Coord. X	Coord. Y	Elevación	Código
240804,085	4239814,164	598,329	TB
240804,190	4239819,421	598,381	TB
240805,316	4239876,029	598,944	TB
240805,592	4239889,900	599,082	TB
240806,381	4239929,530	599,476	TB
240806,964	4239958,850	599,768	TB
240806,966	4239958,881	599,769	TB
240807,027	4239959,958	599,779	TB
240807,032	4239960,018	599,780	TB
240807,173	4239961,088	599,790	TB
240807,183	4239961,146	599,791	TB
240807,401	4239962,202	599,801	TB
240807,415	4239962,258	599,801	TB
240807,710	4239963,295	599,811	TB
240807,727	4239963,348	599,811	TB
240808,098	4239964,361	599,821	TB
240808,118	4239964,412	599,821	TB
240808,339	4239964,901	599,825	TB
240808,562	4239965,395	599,830	TB
240808,586	4239965,442	599,830	TB
240809,100	4239966,390	599,838	TB
240809,127	4239966,435	599,839	TB
240809,709	4239967,343	599,846	TB
240809,738	4239967,384	599,847	TB
240810,385	4239968,247	599,854	TB
240810,416	4239968,286	599,854	TB
240811,124	4239969,099	599,860	TB
240811,157	4239969,135	599,861	TB
240811,923	4239969,895	599,866	TB
240811,958	4239969,927	599,867	TB
240812,777	4239970,629	599,872	TB
240812,803	4239970,650	599,872	TB
240812,813	4239970,658	599,872	TB
240813,681	4239971,299	599,876	TB
240813,719	4239971,325	599,876	TB
240814,631	4239971,901	599,880	TB
240814,670	4239971,923	599,880	TB
240815,622	4239972,432	599,882	TB
240815,662	4239972,451	599,883	TB
240816,648	4239972,889	599,884	TB
240816,690	4239972,906	599,884	TB
240817,544	4239973,213	599,885	TB
240817,705	4239973,271	599,886	TB
240817,747	4239973,284	599,886	TB
240818,786	4239973,575	599,886	TB
240818,829	4239973,585	599,886	TB

Coord. X	Coord. Y	Elevación	Código
240979,471	4240032,252	602,519	CB
240980,213	4240032,811	602,519	CB
240980,904	4240033,432	602,519	CB
240981,540	4240034,110	602,519	CB
240982,115	4240034,840	602,519	CB
240982,625	4240035,617	602,519	CB
240983,066	4240036,434	602,519	CB
240983,436	4240037,287	602,519	CB
240983,730	4240038,168	602,519	CB
240983,948	4240039,072	602,519	CB
240984,088	4240039,991	602,519	CB
240984,148	4240040,918	602,519	CB
240984,150	4240041,150	602,519	CB
240984,150	4240041,150	602,519	CB
240984,150	4240192,150	602,519	CB
240984,150	4240192,150	602,519	CB
240984,110	4240193,078	602,519	CB
240983,990	4240194,000	602,519	CB
240983,792	4240194,908	602,519	CB
240983,516	4240195,795	602,519	CB
240983,165	4240196,656	602,519	CB
240982,742	4240197,483	602,519	CB
240982,248	4240198,271	602,519	CB
240981,689	4240199,013	602,519	CB
240981,068	4240199,704	602,519	CB
240980,390	4240200,340	602,519	CB
240979,660	4240200,915	602,519	CB
240978,883	4240201,425	602,519	CB
240978,066	4240201,866	602,519	CB
240977,213	4240202,236	602,519	CB
240976,332	4240202,530	602,519	CB
240975,428	4240202,748	602,519	CB
240974,509	4240202,888	602,519	CB
240973,582	4240202,948	602,519	CB
240973,350	4240202,950	602,519	CB
240973,350	4240202,950	602,519	CB
240987,900	4239958,850	600,186	CB
240987,900	4239807,850	600,186	CB
240987,900	4239807,850	600,186	CB
240987,860	4239806,772	600,186	CB
240987,740	4239805,700	600,186	CB
240987,541	4239804,640	600,186	CB
240987,265	4239803,597	600,186	CB
240986,911	4239802,578	600,186	CB
240986,483	4239801,588	600,186	CB
240985,983	4239800,632	600,186	CB

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240819,886	4239973,799	599,885	TB	240985,414	4239799,716	600,186	CB
240819,930	4239973,807	599,885	TB	240984,778	4239798,844	600,186	CB
240821,000	4239973,943	599,884	TB	240984,080	4239798,023	600,186	CB
240821,045	4239973,947	599,884	TB	240983,322	4239797,255	600,186	CB
240822,122	4239974,006	599,882	TB	240982,510	4239796,545	600,186	CB
240822,149	4239974,007	599,882	TB	240981,647	4239795,897	600,186	CB
240822,346	4239974,009	599,881	TB	240980,739	4239795,316	600,186	CB
240822,350	4239974,009	599,881	TB	240979,790	4239794,803	600,186	CB
240822,405	4239974,010	599,881	TB	240978,805	4239794,361	600,186	CB
240827,303	4239974,034	599,869	TB	240977,791	4239793,994	600,186	CB
240832,202	4239974,058	599,857	TB	240976,752	4239793,703	600,186	CB
240837,101	4239974,082	599,845	TB	240975,695	4239793,490	600,186	CB
240841,302	4239974,102	599,835	TB	240974,624	4239793,356	600,186	CB
240973,350	4239974,750	599,511	TB	240973,547	4239793,301	600,186	CB
240973,400	4239974,749	599,511	TB	240973,350	4239793,300	600,186	CB
240974,478	4239974,715	599,508	TB	240973,350	4239793,300	600,186	CB
240974,579	4239974,708	599,508	TB	240822,350	4239793,300	600,186	CB
240975,651	4239974,596	599,504	TB	240822,350	4239793,300	600,186	CB
240975,752	4239974,582	599,504	TB	240821,272	4239793,340	600,186	CB
240976,814	4239974,392	599,499	TB	240820,200	4239793,460	600,186	CB
240976,913	4239974,370	599,499	TB	240819,140	4239793,659	600,186	CB
240977,958	4239974,104	599,493	TB	240818,097	4239793,935	600,186	CB
240978,057	4239974,075	599,493	TB	240817,078	4239794,289	600,186	CB
240979,080	4239973,733	599,487	TB	240816,088	4239794,717	600,186	CB
240979,177	4239973,696	599,486	TB	240815,132	4239795,217	600,186	CB
240980,173	4239973,281	599,480	TB	240814,216	4239795,786	600,186	CB
240980,268	4239973,237	599,479	TB	240813,344	4239796,422	600,186	CB
240981,230	4239972,750	599,472	TB	240812,523	4239797,121	600,186	CB
240981,323	4239972,698	599,471	TB	240811,755	4239797,878	600,186	CB
240982,248	4239972,142	599,463	TB	240811,045	4239798,690	600,186	CB
240982,338	4239972,084	599,462	TB	240810,397	4239799,553	600,186	CB
240983,219	4239971,461	599,454	TB	240809,816	4239800,462	600,186	CB
240983,305	4239971,396	599,453	TB	240809,303	4239801,410	600,186	CB
240984,139	4239970,711	599,444	TB	240808,861	4239802,395	600,186	CB
240984,221	4239970,638	599,443	TB	240808,494	4239803,409	600,186	CB
240985,002	4239969,893	599,434	TB	240808,203	4239804,448	600,186	CB
240985,080	4239969,813	599,433	TB	240807,990	4239805,505	600,186	CB
240985,805	4239969,014	599,423	TB	240807,856	4239806,576	600,186	CB
240985,878	4239968,927	599,422	TB	240807,801	4239807,653	600,186	CB
240986,542	4239968,077	599,412	TB	240807,800	4239807,850	600,186	CB
240986,609	4239967,984	599,410	TB	240807,800	4239807,850	600,186	CB
240987,208	4239967,087	599,400	TB	240807,800	4239958,850	600,186	CB
240987,270	4239966,987	599,399	TB	240807,800	4239958,850	600,186	CB
240987,801	4239966,048	599,388	TB	240807,840	4239959,928	600,186	CB
240987,856	4239965,943	599,387	TB	240807,960	4239961,000	600,186	CB
240988,317	4239964,968	599,376	TB	240808,159	4239962,060	600,186	CB

Coord. X	Coord. Y	Elevación	Código
240988,364	4239964,857	599,375	TB
240988,752	4239963,851	599,364	TB
240988,792	4239963,735	599,363	TB
240989,104	4239962,702	599,351	TB
240989,136	4239962,583	599,350	TB
240989,371	4239961,530	599,339	TB
240989,393	4239961,406	599,338	TB
240989,550	4239960,338	599,327	TB
240989,563	4239960,212	599,325	TB
240989,640	4239959,135	599,314	TB
240989,644	4239959,059	599,314	TB
240989,649	4239958,862	599,312	TB
240989,649	4239958,850	599,312	TB
240992,684	4240041,150	600,127	TB
240992,685	4240040,973	600,125	TB
240992,666	4240039,894	600,114	TB
240992,647	4240039,537	600,111	TB
240992,548	4240038,463	600,100	TB
240992,501	4240038,107	600,097	TB
240992,323	4240037,043	600,087	TB
240992,250	4240036,690	600,083	TB
240991,992	4240035,642	600,074	TB
240991,892	4240035,293	600,070	TB
240991,556	4240034,268	600,061	TB
240991,430	4240033,926	600,058	TB
240991,019	4240032,928	600,049	TB
240990,866	4240032,595	600,046	TB
240990,381	4240031,631	600,038	TB
240990,203	4240031,309	600,035	TB
240989,647	4240030,385	600,027	TB
240989,445	4240030,075	600,024	TB
240988,821	4240029,195	600,017	TB
240988,595	4240028,901	600,015	TB
240987,906	4240028,070	600,008	TB
240987,658	4240027,793	600,006	TB
240986,908	4240027,016	600,000	TB
240986,639	4240026,758	599,998	TB
240985,833	4240026,040	599,993	TB
240985,544	4240025,802	599,991	TB
240984,687	4240025,147	599,987	TB
240984,380	4240024,931	599,986	TB
240983,476	4240024,343	599,982	TB
240983,153	4240024,150	599,981	TB
240982,206	4240023,632	599,978	TB
240981,869	4240023,464	599,977	TB
240980,886	4240023,019	599,975	TB

Coord. X	Coord. Y	Elevación	Código
240808,435	4239963,103	600,186	CB
240808,789	4239964,122	600,186	CB
240809,217	4239965,112	600,186	CB
240809,717	4239966,068	600,186	CB
240810,286	4239966,984	600,186	CB
240810,922	4239967,856	600,186	CB
240811,621	4239968,678	600,186	CB
240812,378	4239969,445	600,186	CB
240813,190	4239970,155	600,186	CB
240814,053	4239970,803	600,186	CB
240814,962	4239971,384	600,186	CB
240815,910	4239971,897	600,186	CB
240816,895	4239972,339	600,186	CB
240817,909	4239972,706	600,186	CB
240818,948	4239972,997	600,186	CB
240820,005	4239973,210	600,186	CB
240821,076	4239973,344	600,186	CB
240822,153	4239973,399	600,186	CB
240822,350	4239973,400	600,186	CB
240822,350	4239973,400	600,186	CB
240973,350	4239973,400	600,186	CB
240973,350	4239973,400	600,186	CB
240974,428	4239973,360	600,186	CB
240975,500	4239973,240	600,186	CB
240976,560	4239973,041	600,186	CB
240977,603	4239972,765	600,186	CB
240978,622	4239972,411	600,186	CB
240979,612	4239971,983	600,186	CB
240980,568	4239971,483	600,186	CB
240981,484	4239970,914	600,186	CB
240982,356	4239970,278	600,186	CB
240983,178	4239969,580	600,186	CB
240983,945	4239968,822	600,186	CB
240984,655	4239968,010	600,186	CB
240985,303	4239967,147	600,186	CB
240985,884	4239966,239	600,186	CB
240986,397	4239965,290	600,186	CB
240986,839	4239964,305	600,186	CB
240987,206	4239963,291	600,186	CB
240987,497	4239962,252	600,186	CB
240987,710	4239961,195	600,186	CB
240987,844	4239960,124	600,186	CB
240987,899	4239959,047	600,186	CB
240987,900	4239958,850	600,186	CB
240987,900	4239958,850	600,186	CB
240973,350	4239969,650	600,186	CB

Coord. X	Coord. Y	Elevación	Código
240980,537	4240022,876	599,975	TB
240979,524	4240022,507	599,973	TB
240979,164	4240022,391	599,973	TB
240978,126	4240022,100	599,973	TB
240977,759	4240022,011	599,973	TB
240976,701	4240021,799	599,973	TB
240976,328	4240021,739	599,974	TB
240975,258	4240021,608	599,975	TB
240974,882	4240021,576	599,976	TB
240973,804	4240021,526	599,978	TB
240973,582	4240021,520	599,978	TB
240973,384	4240021,520	599,979	TB
240973,350	4240021,520	599,979	TB
240841,610	4240022,192	600,315	TB
240836,954	4240022,216	600,327	TB
240831,523	4240022,244	600,341	TB
240826,091	4240022,271	600,355	TB
240822,350	4240022,290	600,364	TB
240822,190	4240022,294	600,365	TB
240821,113	4240022,340	600,368	TB
240820,795	4240022,366	600,369	TB
240820,656	4240022,383	600,369	TB
240819,724	4240022,494	600,373	TB
240819,409	4240022,543	600,374	TB
240818,351	4240022,751	600,379	TB
240818,042	4240022,824	600,380	TB
240817,002	4240023,112	600,386	TB
240816,701	4240023,207	600,387	TB
240815,686	4240023,572	600,394	TB
240815,394	4240023,690	600,396	TB
240815,156	4240023,796	600,397	TB
240814,409	4240024,131	600,402	TB
240814,127	4240024,269	600,405	TB
240813,179	4240024,783	600,412	TB
240812,910	4240024,942	600,414	TB
240812,002	4240025,525	600,422	TB
240811,747	4240025,703	600,425	TB
240810,886	4240026,352	600,433	TB
240810,646	4240026,548	600,436	TB
240809,836	4240027,260	600,445	TB
240809,613	4240027,472	600,448	TB
240809,487	4240027,601	600,449	TB
240808,859	4240028,243	600,457	TB
240808,654	4240028,469	600,460	TB
240807,959	4240029,295	600,470	TB
240807,772	4240029,534	600,473	TB

Coord. X	Coord. Y	Elevación	Código
240822,350	4239969,650	600,186	CB
240822,350	4239969,650	600,186	CB
240821,422	4239969,610	600,186	CB
240820,500	4239969,490	600,186	CB
240819,592	4239969,292	600,186	CB
240818,705	4239969,016	600,186	CB
240817,844	4239968,665	600,186	CB
240817,017	4239968,242	600,186	CB
240816,230	4239967,748	600,186	CB
240815,487	4239967,189	600,186	CB
240814,796	4239966,568	600,186	CB
240814,160	4239965,890	600,186	CB
240813,585	4239965,160	600,186	CB
240813,075	4239964,383	600,186	CB
240812,634	4239963,566	600,186	CB
240812,265	4239962,713	600,186	CB
240811,970	4239961,832	600,186	CB
240811,752	4239960,928	600,186	CB
240811,612	4239960,009	600,186	CB
240811,553	4239959,082	600,186	CB
240811,550	4239958,850	600,186	CB
240811,550	4239958,850	600,186	CB
240811,550	4239807,850	600,186	CB
240811,550	4239807,850	600,186	CB
240811,590	4239806,922	600,186	CB
240811,710	4239806,000	600,186	CB
240811,908	4239805,092	600,186	CB
240812,184	4239804,205	600,186	CB
240812,535	4239803,344	600,186	CB
240812,959	4239802,517	600,186	CB
240813,452	4239801,730	600,186	CB
240814,011	4239800,987	600,186	CB
240814,632	4239800,296	600,186	CB
240815,310	4239799,660	600,186	CB
240816,040	4239799,085	600,186	CB
240816,817	4239798,575	600,186	CB
240817,634	4239798,134	600,186	CB
240818,487	4239797,765	600,186	CB
240819,368	4239797,470	600,186	CB
240820,272	4239797,252	600,186	CB
240821,191	4239797,112	600,186	CB
240822,118	4239797,053	600,186	CB
240822,350	4239797,050	600,186	CB
240822,350	4239797,050	600,186	CB
240973,350	4239797,050	600,186	CB
240973,350	4239797,050	600,186	CB

Coord. X	Coord. Y	Elevación	Código
240807,141	4240030,409	600,483	TB
240806,974	4240030,660	600,486	TB
240806,410	4240031,580	600,497	TB
240806,263	4240031,841	600,500	TB
240805,769	4240032,801	600,511	TB
240805,643	4240033,070	600,514	TB
240805,222	4240034,063	600,525	TB
240805,117	4240034,340	600,528	TB
240804,770	4240035,361	600,539	TB
240804,687	4240035,643	600,542	TB
240804,417	4240036,687	600,553	TB
240804,355	4240036,972	600,556	TB
240804,163	4240038,034	600,567	TB
240804,123	4240038,320	600,570	TB
240804,010	4240039,393	600,581	TB
240803,991	4240039,680	600,584	TB
240803,958	4240040,758	600,595	TB
240803,956	4240040,927	600,597	TB
240803,959	4240041,124	600,599	TB
240803,959	4240041,150	600,599	TB
240805,166	4240101,794	601,202	TB
240806,965	4240192,150	602,101	TB
240806,966	4240192,181	602,102	TB
240807,027	4240193,258	602,112	TB
240807,033	4240193,318	602,113	TB
240807,123	4240194,008	602,119	TB
240807,173	4240194,388	602,123	TB
240807,183	4240194,446	602,124	TB
240807,401	4240195,502	602,134	TB
240807,415	4240195,558	602,134	TB
240807,710	4240196,595	602,144	TB
240807,727	4240196,648	602,144	TB
240808,098	4240197,661	602,154	TB
240808,119	4240197,712	602,154	TB
240808,562	4240198,695	602,163	TB
240808,586	4240198,742	602,163	TB
240809,101	4240199,690	602,171	TB
240809,127	4240199,735	602,172	TB
240809,709	4240200,643	602,179	TB
240809,738	4240200,684	602,180	TB
240810,385	4240201,547	602,187	TB
240810,416	4240201,586	602,187	TB
240811,124	4240202,399	602,193	TB
240811,157	4240202,435	602,194	TB
240811,923	4240203,195	602,199	TB
240811,958	4240203,227	602,200	TB

Coord. X	Coord. Y	Elevación	Código
240974,278	4239797,090	600,186	CB
240975,200	4239797,210	600,186	CB
240976,108	4239797,408	600,186	CB
240976,995	4239797,684	600,186	CB
240977,856	4239798,035	600,186	CB
240978,683	4239798,459	600,186	CB
240979,471	4239798,952	600,186	CB
240980,213	4239799,511	600,186	CB
240980,904	4239800,132	600,186	CB
240981,540	4239800,810	600,186	CB
240982,115	4239801,540	600,186	CB
240982,625	4239802,317	600,186	CB
240983,066	4239803,134	600,186	CB
240983,436	4239803,987	600,186	CB
240983,730	4239804,868	600,186	CB
240983,948	4239805,772	600,186	CB
240984,088	4239806,691	600,186	CB
240984,148	4239807,618	600,186	CB
240984,150	4239807,850	600,186	CB
240984,150	4239807,850	600,186	CB
240984,150	4239958,850	600,186	CB
240984,150	4239958,850	600,186	CB
240984,110	4239959,778	600,186	CB
240983,990	4239960,700	600,186	CB
240983,792	4239961,608	600,186	CB
240983,516	4239962,495	600,186	CB
240983,165	4239963,356	600,186	CB
240982,742	4239964,183	600,186	CB
240982,248	4239964,971	600,186	CB
240981,689	4239965,713	600,186	CB
240981,068	4239966,404	600,186	CB
240980,390	4239967,040	600,186	CB
240979,660	4239967,615	600,186	CB
240978,883	4239968,125	600,186	CB
240978,066	4239968,566	600,186	CB
240977,213	4239968,936	600,186	CB
240976,332	4239969,230	600,186	CB
240975,428	4239969,448	600,186	CB
240974,509	4239969,588	600,186	CB
240973,582	4239969,648	600,186	CB
240973,350	4239969,650	600,186	CB
240973,350	4239969,650	600,186	CB
241189,700	4239958,850	599,681	CB
241189,700	4239807,850	599,681	CB
241189,700	4239807,850	599,681	CB
241189,660	4239806,772	599,681	CB

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240812,777	4240203,929	602,205	TB	241189,540	4239805,700	599,681	CB
240812,813	4240203,958	602,205	TB	241189,341	4239804,640	599,681	CB
240813,681	4240204,599	602,209	TB	241189,065	4239803,597	599,681	CB
240813,719	4240204,625	602,209	TB	241188,711	4239802,578	599,681	CB
240814,058	4240204,838	602,210	TB	241188,283	4239801,588	599,681	CB
240814,631	4240205,201	602,213	TB	241187,783	4239800,632	599,681	CB
240814,670	4240205,223	602,213	TB	241187,214	4239799,716	599,681	CB
240815,622	4240205,732	602,215	TB	241186,578	4239798,844	599,681	CB
240815,662	4240205,751	602,216	TB	241185,880	4239798,023	599,681	CB
240816,648	4240206,189	602,217	TB	241185,122	4239797,255	599,681	CB
240816,690	4240206,206	602,218	TB	241184,310	4239796,545	599,681	CB
240817,705	4240206,571	602,219	TB	241183,447	4239795,897	599,681	CB
240817,747	4240206,584	602,219	TB	241182,539	4239795,316	599,681	CB
240818,786	4240206,875	602,219	TB	241181,590	4239794,803	599,681	CB
240818,829	4240206,885	602,219	TB	241180,605	4239794,361	599,681	CB
240819,886	4240207,099	602,218	TB	241179,591	4239793,994	599,681	CB
240819,930	4240207,106	602,218	TB	241178,552	4239793,703	599,681	CB
240821,000	4240207,243	602,217	TB	241177,495	4239793,490	599,681	CB
240821,045	4240207,247	602,217	TB	241176,424	4239793,356	599,681	CB
240821,442	4240207,269	602,216	TB	241175,347	4239793,301	599,681	CB
240822,122	4240207,306	602,215	TB	241175,150	4239793,300	599,681	CB
240822,149	4240207,307	602,215	TB	241175,150	4239793,300	599,681	CB
240822,346	4240207,309	602,214	TB	241024,150	4239793,300	599,681	CB
240822,350	4240207,309	602,214	TB	241024,150	4239793,300	599,681	CB
240828,914	4240207,341	602,198	TB	241023,072	4239793,340	599,681	CB
240836,387	4240207,378	602,180	TB	241022,000	4239793,460	599,681	CB
240842,794	4240207,409	602,164	TB	241020,940	4239793,659	599,681	CB
240973,350	4240208,050	601,844	TB	241019,897	4239793,935	599,681	CB
240973,400	4240208,049	601,844	TB	241018,878	4239794,289	599,681	CB
240974,478	4240208,015	601,841	TB	241017,888	4239794,717	599,681	CB
240974,579	4240208,008	601,841	TB	241016,932	4239795,217	599,681	CB
240975,651	4240207,896	601,837	TB	241016,016	4239795,786	599,681	CB
240975,752	4240207,882	601,837	TB	241015,144	4239796,422	599,681	CB
240976,814	4240207,692	601,832	TB	241014,323	4239797,121	599,681	CB
240976,913	4240207,670	601,832	TB	241013,555	4239797,878	599,681	CB
240977,958	4240207,404	601,826	TB	241012,845	4239798,690	599,681	CB
240978,057	4240207,375	601,826	TB	241012,197	4239799,553	599,681	CB
240979,080	4240207,033	601,820	TB	241011,616	4239800,462	599,681	CB
240979,177	4240206,996	601,819	TB	241011,103	4239801,410	599,681	CB
240980,173	4240206,581	601,813	TB	241010,661	4239802,395	599,681	CB
240980,268	4240206,537	601,812	TB	241010,294	4239803,409	599,681	CB
240981,230	4240206,050	601,805	TB	241010,003	4239804,448	599,681	CB
240981,323	4240205,998	601,804	TB	241009,790	4239805,505	599,681	CB
240982,248	4240205,442	601,796	TB	241009,656	4239806,576	599,681	CB
240982,337	4240205,383	601,795	TB	241009,601	4239807,653	599,681	CB
240983,219	4240204,761	601,787	TB	241009,600	4239807,850	599,681	CB

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240983,305	4240204,695	601,786	TB	241009,600	4239807,850	599,681	CB
240984,139	4240204,010	601,777	TB	241009,600	4239958,850	599,681	CB
240984,205	4240203,953	601,776	TB	241009,600	4239958,850	599,681	CB
240984,221	4240203,937	601,776	TB	241009,640	4239959,928	599,681	CB
240985,002	4240203,193	601,767	TB	241009,760	4239961,000	599,681	CB
240985,080	4240203,113	601,766	TB	241009,959	4239962,060	599,681	CB
240985,805	4240202,314	601,756	TB	241010,235	4239963,103	599,681	CB
240985,878	4240202,227	601,755	TB	241010,589	4239964,122	599,681	CB
240986,361	4240201,608	601,747	TB	241011,017	4239965,112	599,681	CB
240986,541	4240201,377	601,745	TB	241011,517	4239966,068	599,681	CB
240986,609	4240201,284	601,744	TB	241012,086	4239966,984	599,681	CB
240987,208	4240200,386	601,733	TB	241012,722	4239967,856	599,681	CB
240987,269	4240200,287	601,732	TB	241013,421	4239968,678	599,681	CB
240987,801	4240199,348	601,721	TB	241014,178	4239969,445	599,681	CB
240987,856	4240199,243	601,720	TB	241014,990	4239970,155	599,681	CB
240988,317	4240198,268	601,709	TB	241015,853	4239970,803	599,681	CB
240988,364	4240198,157	601,708	TB	241016,762	4239971,384	599,681	CB
240988,752	4240197,151	601,697	TB	241017,710	4239971,897	599,681	CB
240988,792	4240197,035	601,696	TB	241018,695	4239972,339	599,681	CB
240988,845	4240196,860	601,694	TB	241019,709	4239972,706	599,681	CB
240989,104	4240196,002	601,684	TB	241020,748	4239972,997	599,681	CB
240989,135	4240195,883	601,683	TB	241021,805	4239973,210	599,681	CB
240989,370	4240194,830	601,672	TB	241022,876	4239973,344	599,681	CB
240989,393	4240194,706	601,671	TB	241023,953	4239973,399	599,681	CB
240989,521	4240193,830	601,662	TB	241024,150	4239973,400	599,681	CB
240989,549	4240193,638	601,660	TB	241024,150	4239973,400	599,681	CB
240989,563	4240193,512	601,658	TB	241175,150	4239973,400	599,681	CB
240989,640	4240192,435	601,647	TB	241175,150	4239973,400	599,681	CB
240989,643	4240192,359	601,647	TB	241176,228	4239973,360	599,681	CB
240989,649	4240192,162	601,645	TB	241177,300	4239973,240	599,681	CB
240989,649	4240192,150	601,645	TB	241178,360	4239973,041	599,681	CB
240992,684	4239807,850	597,794	TB	241179,403	4239972,765	599,681	CB
240992,685	4239807,673	597,792	TB	241180,422	4239972,411	599,681	CB
240992,666	4239806,594	597,781	TB	241181,412	4239971,983	599,681	CB
240992,647	4239806,237	597,778	TB	241182,368	4239971,483	599,681	CB
240992,548	4239805,163	597,767	TB	241183,284	4239970,914	599,681	CB
240992,502	4239804,807	597,764	TB	241184,156	4239970,278	599,681	CB
240992,323	4239803,743	597,754	TB	241184,978	4239969,580	599,681	CB
240992,250	4239803,390	597,750	TB	241185,745	4239968,822	599,681	CB
240991,992	4239802,342	597,741	TB	241186,455	4239968,010	599,681	CB
240991,892	4239801,993	597,737	TB	241187,103	4239967,147	599,681	CB
240991,556	4239800,968	597,728	TB	241187,684	4239966,239	599,681	CB
240991,430	4239800,626	597,725	TB	241188,197	4239965,290	599,681	CB
240991,019	4239799,628	597,716	TB	241188,639	4239964,305	599,681	CB
240990,866	4239799,295	597,713	TB	241189,006	4239963,291	599,681	CB
240990,381	4239798,331	597,704	TB	241189,297	4239962,252	599,681	CB

Coord. X	Coord. Y	Elevación	Código
240990,203	4239798,009	597,702	TB
240989,647	4239797,084	597,694	TB
240989,445	4239796,775	597,691	TB
240988,821	4239795,895	597,684	TB
240988,595	4239795,601	597,682	TB
240987,906	4239794,770	597,675	TB
240987,658	4239794,493	597,673	TB
240986,909	4239793,716	597,667	TB
240986,639	4239793,457	597,665	TB
240985,833	4239792,740	597,660	TB
240985,544	4239792,502	597,658	TB
240984,687	4239791,847	597,654	TB
240984,380	4239791,631	597,652	TB
240983,476	4239791,043	597,649	TB
240983,153	4239790,850	597,648	TB
240982,206	4239790,332	597,645	TB
240981,869	4239790,163	597,644	TB
240980,886	4239789,719	597,642	TB
240980,537	4239789,576	597,642	TB
240979,524	4239789,207	597,640	TB
240979,164	4239789,091	597,640	TB
240978,126	4239788,800	597,640	TB
240977,759	4239788,711	597,640	TB
240976,701	4239788,499	597,640	TB
240976,328	4239788,439	597,641	TB
240975,258	4239788,307	597,642	TB
240974,882	4239788,276	597,643	TB
240973,804	4239788,225	597,645	TB
240973,582	4239788,220	597,645	TB
240973,384	4239788,220	597,646	TB
240973,350	4239788,220	597,646	TB
240840,117	4239788,900	597,986	TB
240837,669	4239788,912	597,992	TB
240834,812	4239788,927	597,999	TB
240831,955	4239788,941	598,007	TB
240829,097	4239788,956	598,014	TB
240826,239	4239788,970	598,021	TB
240823,381	4239788,985	598,029	TB
240822,350	4239788,990	598,031	TB
240822,190	4239788,994	598,032	TB
240821,113	4239789,040	598,035	TB
240820,795	4239789,066	598,036	TB
240820,516	4239789,099	598,037	TB
240819,724	4239789,194	598,040	TB
240819,409	4239789,243	598,041	TB
240818,351	4239789,451	598,046	TB

Coord. X	Coord. Y	Elevación	Código
241189,510	4239961,195	599,681	CB
241189,644	4239960,124	599,681	CB
241189,699	4239959,047	599,681	CB
241189,700	4239958,850	599,681	CB
241189,700	4239958,850	599,681	CB
241175,150	4239969,650	599,681	CB
241024,150	4239969,650	599,681	CB
241024,150	4239969,650	599,681	CB
241023,222	4239969,610	599,681	CB
241022,300	4239969,490	599,681	CB
241021,392	4239969,292	599,681	CB
241020,505	4239969,016	599,681	CB
241019,644	4239968,665	599,681	CB
241018,817	4239968,242	599,681	CB
241018,030	4239967,748	599,681	CB
241017,287	4239967,189	599,681	CB
241016,596	4239966,568	599,681	CB
241015,960	4239965,890	599,681	CB
241015,385	4239965,160	599,681	CB
241014,875	4239964,383	599,681	CB
241014,434	4239963,566	599,681	CB
241014,065	4239962,713	599,681	CB
241013,770	4239961,832	599,681	CB
241013,552	4239960,928	599,681	CB
241013,412	4239960,009	599,681	CB
241013,353	4239959,082	599,681	CB
241013,350	4239958,850	599,681	CB
241013,350	4239958,850	599,681	CB
241013,350	4239807,850	599,681	CB
241013,350	4239807,850	599,681	CB
241013,390	4239806,922	599,681	CB
241013,510	4239806,000	599,681	CB
241013,708	4239805,092	599,681	CB
241013,984	4239804,205	599,681	CB
241014,335	4239803,344	599,681	CB
241014,759	4239802,517	599,681	CB
241015,252	4239801,730	599,681	CB
241015,811	4239800,987	599,681	CB
241016,432	4239800,296	599,681	CB
241017,110	4239799,660	599,681	CB
241017,840	4239799,085	599,681	CB
241018,617	4239798,575	599,681	CB
241019,434	4239798,134	599,681	CB
241020,287	4239797,765	599,681	CB
241021,168	4239797,470	599,681	CB
241022,072	4239797,252	599,681	CB

Coord. X	Coord. Y	Elevación	Código
240818,042	4239789,524	598,047	TB
240817,613	4239789,643	598,050	TB
240817,002	4239789,812	598,053	TB
240816,701	4239789,907	598,054	TB
240815,686	4239790,272	598,061	TB
240815,394	4239790,390	598,063	TB
240814,650	4239790,723	598,068	TB
240814,409	4239790,831	598,069	TB
240814,127	4239790,969	598,071	TB
240813,428	4239791,348	598,077	TB
240813,179	4239791,483	598,079	TB
240812,910	4239791,641	598,081	TB
240812,002	4239792,225	598,089	TB
240811,747	4239792,402	598,092	TB
240810,886	4239793,052	598,100	TB
240810,646	4239793,247	598,103	TB
240809,836	4239793,960	598,112	TB
240809,613	4239794,172	598,115	TB
240808,859	4239794,943	598,124	TB
240808,654	4239795,169	598,127	TB
240807,959	4239795,995	598,137	TB
240807,772	4239796,234	598,140	TB
240807,141	4239797,109	598,150	TB
240806,974	4239797,360	598,153	TB
240806,410	4239798,280	598,164	TB
240806,263	4239798,541	598,167	TB
240805,923	4239799,202	598,174	TB
240805,769	4239799,500	598,178	TB
240805,643	4239799,770	598,181	TB
240805,223	4239800,761	598,192	TB
240805,222	4239800,763	598,192	TB
240805,116	4239801,039	598,195	TB
240804,770	4239802,061	598,206	TB
240804,686	4239802,343	598,209	TB
240804,417	4239803,387	598,220	TB
240804,355	4239803,672	598,223	TB
240804,163	4239804,734	598,234	TB
240804,122	4239805,020	598,237	TB
240804,010	4239806,093	598,248	TB
240803,991	4239806,380	598,251	TB
240803,958	4239807,458	598,262	TB
240803,956	4239807,627	598,263	TB
240803,959	4239807,824	598,265	TB
240803,959	4239807,850	598,266	TB
240804,085	4239814,164	598,329	TB
240804,190	4239819,421	598,381	TB

Coord. X	Coord. Y	Elevación	Código
241022,991	4239797,112	599,681	CB
241023,918	4239797,053	599,681	CB
241024,150	4239797,050	599,681	CB
241024,150	4239797,050	599,681	CB
241175,150	4239797,050	599,681	CB
241175,150	4239797,050	599,681	CB
241176,078	4239797,090	599,681	CB
241177,000	4239797,210	599,681	CB
241177,908	4239797,408	599,681	CB
241178,795	4239797,684	599,681	CB
241179,656	4239798,035	599,681	CB
241180,483	4239798,459	599,681	CB
241181,271	4239798,952	599,681	CB
241182,013	4239799,511	599,681	CB
241182,704	4239800,132	599,681	CB
241183,340	4239800,810	599,681	CB
241183,915	4239801,540	599,681	CB
241184,425	4239802,317	599,681	CB
241184,866	4239803,134	599,681	CB
241185,236	4239803,987	599,681	CB
241185,530	4239804,868	599,681	CB
241185,748	4239805,772	599,681	CB
241185,888	4239806,691	599,681	CB
241185,948	4239807,618	599,681	CB
241185,950	4239807,850	599,681	CB
241185,950	4239807,850	599,681	CB
241185,950	4239958,850	599,681	CB
241185,950	4239958,850	599,681	CB
241185,910	4239959,778	599,681	CB
241185,790	4239960,700	599,681	CB
241185,592	4239961,608	599,681	CB
241185,316	4239962,495	599,681	CB
241184,965	4239963,356	599,681	CB
241184,542	4239964,183	599,681	CB
241184,048	4239964,971	599,681	CB
241183,489	4239965,713	599,681	CB
241182,868	4239966,404	599,681	CB
241182,190	4239967,040	599,681	CB
241181,460	4239967,615	599,681	CB
241180,683	4239968,125	599,681	CB
241179,866	4239968,566	599,681	CB
241179,013	4239968,936	599,681	CB
241178,132	4239969,230	599,681	CB
241177,228	4239969,448	599,681	CB
241176,309	4239969,588	599,681	CB
241175,382	4239969,648	599,681	CB

Coord. X	Coord. Y	Elevación	Código
240805,316	4239876,029	598,944	TB
240805,592	4239889,900	599,082	TB
240806,381	4239929,530	599,476	TB
240806,964	4239958,850	599,768	TB
240806,966	4239958,881	599,769	TB
240807,027	4239959,958	599,779	TB
240807,032	4239960,018	599,780	TB
240807,173	4239961,088	599,790	TB
240807,183	4239961,146	599,791	TB
240807,401	4239962,202	599,801	TB
240807,415	4239962,258	599,801	TB
240807,710	4239963,295	599,811	TB
240807,727	4239963,348	599,811	TB
240808,098	4239964,361	599,821	TB
240808,118	4239964,412	599,821	TB
240808,339	4239964,901	599,825	TB
240808,562	4239965,395	599,830	TB
240808,586	4239965,442	599,830	TB

Coord. X	Coord. Y	Elevación	Código
241175,150	4239969,650	599,681	CB
241175,150	4239969,650	599,681	CB
240822,350	4240041,150	597,119	FB
240973,350	4240041,150	597,119	FB
240973,350	4240192,150	597,119	FB
240822,350	4240192,150	597,119	FB
240822,350	4240041,150	597,119	FB
240822,350	4239807,850	594,786	FB
240973,350	4239807,850	594,786	FB
240973,350	4239958,850	594,786	FB
240822,350	4239958,850	594,786	FB
240822,350	4239807,850	594,786	FB
241024,150	4239807,850	594,281	FB
241175,150	4239807,850	594,281	FB
241175,150	4239958,850	594,281	FB
241024,150	4239958,850	594,281	FB
241024,150	4239807,850	594,281	FB

2.4. CIMENTACIONES

Estos puntos representan las 4 esquinas de todas las cimentaciones de los colectores de la planta termosolar. La cota indicada en las tablas es la correspondiente a la explanación, por lo que sirven de puntos de relleno para la construcción de la misma.

Coord. X	Coord. Y	Elevación	Código
240024,500	4240446,450	606,600	C
240028,000	4240446,450	606,592	C
240042,000	4240446,450	606,557	C
240045,500	4240446,450	606,548	C
240059,500	4240446,450	606,513	C
240063,000	4240446,450	606,504	C
240077,000	4240446,450	606,469	C
240080,500	4240446,450	606,460	C
240094,500	4240446,450	606,425	C
240098,000	4240446,450	606,417	C
240112,000	4240446,450	606,382	C
240115,500	4240446,450	606,373	C
240129,500	4240446,450	606,338	C
240133,000	4240446,450	606,329	C
240147,000	4240446,450	606,294	C
240150,500	4240446,450	606,285	C

Coord. X	Coord. Y	Elevación	Código
240572,000	4239912,828	599,895	C
240575,500	4239912,828	599,887	C
240589,500	4239912,828	599,852	C
240593,000	4239912,828	599,843	C
240607,000	4239912,828	599,808	C
240610,500	4239912,828	599,799	C
240624,500	4239912,828	599,764	C
240628,000	4239912,828	599,755	C
240642,000	4239912,828	599,720	C
240645,500	4239912,828	599,712	C
240659,500	4239912,828	599,677	C
240663,000	4239912,828	599,668	C
240677,000	4239912,828	599,633	C
240680,500	4239912,828	599,624	C
240694,500	4239912,828	599,589	C
240698,000	4239912,828	599,580	C

Coord. X	Coord. Y	Elevación	Código
240164,500	4240446,450	606,250	C
240168,000	4240446,450	606,242	C
240182,000	4240446,450	606,207	C
240185,500	4240446,450	606,198	C
240199,500	4240446,450	606,163	C
240203,000	4240446,450	606,154	C
240217,000	4240446,450	606,119	C
240220,500	4240446,450	606,110	C
240234,500	4240446,450	606,075	C
240238,000	4240446,450	606,067	C
240252,000	4240446,450	606,032	C
240255,500	4240446,450	606,023	C
240269,500	4240446,450	605,988	C
240273,000	4240446,450	605,979	C
240287,000	4240446,450	605,944	C
240290,500	4240446,450	605,935	C
240304,500	4240446,450	605,900	C
240308,000	4240446,450	605,892	C
240322,000	4240446,450	605,857	C
240325,500	4240446,450	605,848	C
240339,500	4240446,450	605,813	C
240343,000	4240446,450	605,804	C
240357,000	4240446,450	605,769	C
240360,500	4240446,450	605,760	C
240374,500	4240446,450	605,725	C
240378,000	4240446,450	605,717	C
240392,000	4240446,450	605,682	C
240395,500	4240446,450	605,673	C
240409,500	4240446,450	605,638	C
240413,000	4240446,450	605,629	C
240427,000	4240446,450	605,594	C
240430,500	4240446,450	605,585	C
240444,500	4240446,450	605,550	C
240448,000	4240446,450	605,542	C
240462,000	4240446,450	605,507	C
240465,500	4240446,450	605,498	C
240479,500	4240446,450	605,463	C
240483,000	4240446,450	605,454	C
240497,000	4240446,450	605,419	C
240500,500	4240446,450	605,410	C
240514,500	4240446,450	605,375	C
240518,000	4240446,450	605,367	C
240532,000	4240446,450	605,332	C
240535,500	4240446,450	605,323	C
240549,500	4240446,450	605,288	C
240553,000	4240446,450	605,279	C

Coord. X	Coord. Y	Elevación	Código
240712,000	4239912,828	599,545	C
240715,500	4239912,828	599,537	C
240729,500	4239912,828	599,502	C
240733,000	4239912,828	599,493	C
240747,000	4239912,828	599,458	C
240750,500	4239912,828	599,449	C
240764,500	4239912,828	599,414	C
240768,000	4239912,828	599,405	C
240768,000	4239908,828	599,365	C
240764,500	4239908,828	599,374	C
240750,500	4239908,828	599,409	C
240747,000	4239908,828	599,418	C
240733,000	4239908,828	599,453	C
240729,500	4239908,828	599,462	C
240715,500	4239908,828	599,497	C
240712,000	4239908,828	599,505	C
240698,000	4239908,828	599,540	C
240694,500	4239908,828	599,549	C
240680,500	4239908,828	599,584	C
240677,000	4239908,828	599,593	C
240663,000	4239908,828	599,628	C
240659,500	4239908,828	599,637	C
240645,500	4239908,828	599,672	C
240642,000	4239908,828	599,680	C
240628,000	4239908,828	599,715	C
240624,500	4239908,828	599,724	C
240610,500	4239908,828	599,759	C
240607,000	4239908,828	599,768	C
240593,000	4239908,828	599,803	C
240589,500	4239908,828	599,812	C
240575,500	4239908,828	599,847	C
240572,000	4239908,828	599,855	C
240558,000	4239908,828	599,890	C
240554,500	4239908,828	599,899	C
240540,500	4239908,828	599,934	C
240537,000	4239908,828	599,943	C
240523,000	4239908,828	599,978	C
240519,500	4239908,828	599,987	C
240505,500	4239908,828	600,022	C
240502,000	4239908,828	600,030	C
240488,000	4239908,828	600,065	C
240484,500	4239908,828	600,074	C
240470,500	4239908,828	600,109	C
240467,000	4239908,828	600,118	C
240453,000	4239908,828	600,153	C
240449,500	4239908,828	600,162	C

Coord. X	Coord. Y	Elevación	Código
240567,000	4240446,450	605,244	C
240570,500	4240446,450	605,235	C
240584,500	4240446,450	605,200	C
240588,000	4240446,450	605,192	C
240602,000	4240446,450	605,157	C
240605,500	4240446,450	605,148	C
240619,500	4240446,450	605,113	C
240623,000	4240446,450	605,104	C
240637,000	4240446,450	605,069	C
240640,500	4240446,450	605,060	C
240654,500	4240446,450	605,025	C
240658,000	4240446,450	605,017	C
240672,000	4240446,450	604,982	C
240675,500	4240446,450	604,973	C
240689,500	4240446,450	604,938	C
240693,000	4240446,450	604,929	C
240707,000	4240446,450	604,894	C
240710,500	4240446,450	604,885	C
240724,500	4240446,450	604,850	C
240728,000	4240446,450	604,842	C
240742,000	4240446,450	604,807	C
240745,500	4240446,450	604,798	C
240759,500	4240446,450	604,763	C
240763,000	4240446,450	604,754	C
240777,000	4240446,450	604,719	C
240780,500	4240446,450	604,711	C
240794,500	4240446,450	604,676	C
240798,000	4240446,450	604,667	C
240812,000	4240446,450	604,632	C
240815,500	4240446,450	604,623	C
240829,500	4240446,450	604,588	C
240833,000	4240446,450	604,579	C
240847,000	4240446,450	604,544	C
240850,500	4240446,450	604,536	C
240864,500	4240446,450	604,501	C
240868,000	4240446,450	604,492	C
240882,000	4240446,450	604,457	C
240885,500	4240446,450	604,448	C
240899,500	4240446,450	604,413	C
240903,000	4240446,450	604,404	C
240917,000	4240446,450	604,369	C
240920,500	4240446,450	604,361	C
240934,500	4240446,450	604,326	C
240938,000	4240446,450	604,317	C
240952,000	4240446,450	604,282	C
240955,500	4240446,450	604,273	C

Coord. X	Coord. Y	Elevación	Código
240435,500	4239908,828	600,197	C
240432,000	4239908,828	600,205	C
240418,000	4239908,828	600,240	C
240414,500	4239908,828	600,249	C
240400,500	4239908,828	600,284	C
240397,000	4239908,828	600,293	C
240383,000	4239908,828	600,328	C
240379,500	4239908,828	600,337	C
240365,500	4239908,828	600,372	C
240362,000	4239908,828	600,380	C
240348,000	4239908,828	600,415	C
240344,500	4239908,828	600,424	C
240330,500	4239908,828	600,459	C
240327,000	4239908,828	600,468	C
240313,000	4239908,828	600,503	C
240309,500	4239908,828	600,512	C
240295,500	4239908,828	600,547	C
240292,000	4239908,828	600,555	C
240278,000	4239908,828	600,590	C
240274,500	4239908,828	600,599	C
240260,500	4239908,828	600,634	C
240257,000	4239908,828	600,643	C
240243,000	4239908,828	600,678	C
240239,500	4239908,828	600,687	C
240225,500	4239908,828	600,722	C
240222,000	4239908,828	600,730	C
240208,000	4239908,828	600,765	C
240204,500	4239908,828	600,774	C
240190,500	4239908,828	600,809	C
240187,000	4239908,828	600,818	C
240173,000	4239908,828	600,853	C
240169,500	4239908,828	600,862	C
240155,500	4239908,828	600,897	C
240152,000	4239908,828	600,905	C
240138,000	4239908,828	600,940	C
240134,500	4239908,828	600,949	C
240120,500	4239908,828	600,984	C
240117,000	4239908,828	600,993	C
240103,000	4239908,828	601,028	C
240099,500	4239908,828	601,037	C
240085,500	4239908,828	601,072	C
240082,000	4239908,828	601,080	C
240068,000	4239908,828	601,115	C
240064,500	4239908,828	601,124	C
240050,500	4239908,828	601,159	C
240047,000	4239908,828	601,167	C

Coord. X	Coord. Y	Elevación	Código
240969,500	4240446,450	604,238	C
240973,000	4240446,450	604,229	C
240987,000	4240446,450	604,194	C
240990,500	4240446,450	604,186	C
241004,500	4240446,450	604,151	C
241008,000	4240446,450	604,142	C
241022,000	4240446,450	604,107	C
241025,500	4240446,450	604,098	C
241039,500	4240446,450	604,063	C
241043,000	4240446,450	604,054	C
241057,000	4240446,450	604,019	C
241060,500	4240446,450	604,011	C
241074,500	4240446,450	603,976	C
241078,000	4240446,450	603,967	C
241092,000	4240446,450	603,932	C
241095,500	4240446,450	603,923	C
241109,500	4240446,450	603,888	C
241113,000	4240446,450	603,879	C
241127,000	4240446,450	603,844	C
241130,500	4240446,450	603,836	C
241144,500	4240446,450	603,801	C
241148,000	4240446,450	603,792	C
241162,000	4240446,450	603,757	C
241165,500	4240446,450	603,748	C
241179,500	4240446,450	603,713	C
241183,000	4240446,450	603,704	C
241197,000	4240446,450	603,669	C
241200,500	4240446,450	603,661	C
241214,500	4240446,450	603,626	C
241218,000	4240446,450	603,617	C
241232,000	4240446,450	603,582	C
241235,500	4240446,450	603,573	C
241249,500	4240446,450	603,538	C
241253,000	4240446,450	603,529	C
241267,000	4240446,450	603,494	C
241270,500	4240446,450	603,486	C
241284,500	4240446,450	603,451	C
241288,000	4240446,450	603,442	C
241302,000	4240446,450	603,407	C
241305,500	4240446,450	603,398	C
241319,500	4240446,450	603,363	C
241323,000	4240446,450	603,354	C
241337,000	4240446,450	603,319	C
241340,500	4240446,450	603,311	C
241354,500	4240446,450	603,276	C
241358,000	4240446,450	603,267	C

Coord. X	Coord. Y	Elevación	Código
240033,000	4239908,828	601,202	C
240029,500	4239908,828	601,211	C
240015,500	4239908,828	601,246	C
240012,000	4239908,828	601,255	C
240012,000	4239900,774	601,174	C
240015,500	4239900,774	601,166	C
240029,500	4239900,774	601,131	C
240033,000	4239900,774	601,122	C
240047,000	4239900,774	601,087	C
240050,500	4239900,774	601,078	C
240064,500	4239900,774	601,043	C
240068,000	4239900,774	601,034	C
240082,000	4239900,774	601,000	C
240085,500	4239900,774	600,991	C
240099,500	4239900,774	600,956	C
240103,000	4239900,774	600,947	C
240117,000	4239900,774	600,912	C
240120,500	4239900,774	600,904	C
240134,500	4239900,774	600,869	C
240138,000	4239900,774	600,860	C
240152,000	4239900,774	600,825	C
240155,500	4239900,774	600,816	C
240169,500	4239900,774	600,781	C
240173,000	4239900,774	600,772	C
240187,000	4239900,774	600,737	C
240190,500	4239900,774	600,729	C
240204,500	4239900,774	600,694	C
240208,000	4239900,774	600,685	C
240222,000	4239900,774	600,650	C
240225,500	4239900,774	600,641	C
240239,500	4239900,774	600,606	C
240243,000	4239900,774	600,597	C
240257,000	4239900,774	600,562	C
240260,500	4239900,774	600,554	C
240274,500	4239900,774	600,519	C
240278,000	4239900,774	600,510	C
240292,000	4239900,774	600,475	C
240295,500	4239900,774	600,466	C
240309,500	4239900,774	600,431	C
240313,000	4239900,774	600,422	C
240327,000	4239900,774	600,387	C
240330,500	4239900,774	600,379	C
240344,500	4239900,774	600,344	C
240348,000	4239900,774	600,335	C
240362,000	4239900,774	600,300	C
240365,500	4239900,774	600,291	C

Coord. X	Coord. Y	Elevación	Código
241372,000	4240446,450	603,232	C
241375,500	4240446,450	603,223	C
241389,500	4240446,450	603,188	C
241393,000	4240446,450	603,179	C
241407,000	4240446,450	603,144	C
241410,500	4240446,450	603,136	C
241424,500	4240446,450	603,101	C
241428,000	4240446,450	603,092	C
241442,000	4240446,450	603,057	C
241445,500	4240446,450	603,048	C
241459,500	4240446,450	603,013	C
241463,000	4240446,450	603,004	C
241477,000	4240446,450	602,969	C
241480,500	4240446,450	602,961	C
241494,500	4240446,450	602,926	C
241498,000	4240446,450	602,917	C
241512,000	4240446,450	602,882	C
241515,500	4240446,450	602,873	C
241529,500	4240446,450	602,838	C
241533,000	4240446,450	602,829	C
241547,000	4240446,450	602,794	C
241550,500	4240446,450	602,786	C
241564,500	4240446,450	602,751	C
241568,000	4240446,450	602,742	C
241582,000	4240446,450	602,707	C
241585,500	4240446,450	602,698	C
241599,500	4240446,450	602,663	C
241603,000	4240446,450	602,654	C
241617,000	4240446,450	602,619	C
241620,500	4240446,450	602,611	C
241634,500	4240446,450	602,576	C
241638,000	4240446,450	602,567	C
241652,000	4240446,450	602,532	C
241655,500	4240446,450	602,523	C
241669,500	4240446,450	602,488	C
241673,000	4240446,450	602,480	C
241687,000	4240446,450	602,445	C
241690,500	4240446,450	602,436	C
241704,500	4240446,450	602,401	C
241708,000	4240446,450	602,392	C
241722,000	4240446,450	602,357	C
241725,500	4240446,450	602,348	C
241739,500	4240446,450	602,313	C
241743,000	4240446,450	602,305	C
241757,000	4240446,450	602,270	C
241760,500	4240446,450	602,261	C

Coord. X	Coord. Y	Elevación	Código
240379,500	4239900,774	600,256	C
240383,000	4239900,774	600,247	C
240397,000	4239900,774	600,212	C
240400,500	4239900,774	600,204	C
240414,500	4239900,774	600,169	C
240418,000	4239900,774	600,160	C
240432,000	4239900,774	600,125	C
240435,500	4239900,774	600,116	C
240449,500	4239900,774	600,081	C
240453,000	4239900,774	600,072	C
240467,000	4239900,774	600,037	C
240470,500	4239900,774	600,029	C
240484,500	4239900,774	599,994	C
240488,000	4239900,774	599,985	C
240502,000	4239900,774	599,950	C
240505,500	4239900,774	599,941	C
240519,500	4239900,774	599,906	C
240523,000	4239900,774	599,897	C
240537,000	4239900,774	599,862	C
240540,500	4239900,774	599,854	C
240554,500	4239900,774	599,819	C
240558,000	4239900,774	599,810	C
240572,000	4239900,774	599,775	C
240575,500	4239900,774	599,766	C
240589,500	4239900,774	599,731	C
240593,000	4239900,774	599,722	C
240607,000	4239900,774	599,687	C
240610,500	4239900,774	599,679	C
240624,500	4239900,774	599,644	C
240628,000	4239900,774	599,635	C
240642,000	4239900,774	599,600	C
240645,500	4239900,774	599,591	C
240659,500	4239900,774	599,556	C
240663,000	4239900,774	599,547	C
240677,000	4239900,774	599,512	C
240680,500	4239900,774	599,504	C
240694,500	4239900,774	599,469	C
240698,000	4239900,774	599,460	C
240712,000	4239900,774	599,425	C
240715,500	4239900,774	599,416	C
240729,500	4239900,774	599,381	C
240733,000	4239900,774	599,372	C
240747,000	4239900,774	599,337	C
240750,500	4239900,774	599,329	C
240764,500	4239900,774	599,294	C
240768,000	4239900,774	599,285	C

Coord. X	Coord. Y	Elevación	Código
241760,500	4240443,300	602,229	C
241757,000	4240443,300	602,238	C
241743,000	4240443,300	602,273	C
241739,500	4240443,300	602,282	C
241725,500	4240443,300	602,317	C
241722,000	4240443,300	602,326	C
241708,000	4240443,300	602,361	C
241704,500	4240443,300	602,369	C
241690,500	4240443,300	602,404	C
241687,000	4240443,300	602,413	C
241673,000	4240443,300	602,448	C
241669,500	4240443,300	602,457	C
241655,500	4240443,300	602,492	C
241652,000	4240443,300	602,501	C
241638,000	4240443,300	602,536	C
241634,500	4240443,300	602,544	C
241620,500	4240443,300	602,579	C
241617,000	4240443,300	602,588	C
241603,000	4240443,300	602,623	C
241599,500	4240443,300	602,632	C
241585,500	4240443,300	602,667	C
241582,000	4240443,300	602,675	C
241568,000	4240443,300	602,710	C
241564,500	4240443,300	602,719	C
241550,500	4240443,300	602,754	C
241547,000	4240443,300	602,763	C
241533,000	4240443,300	602,798	C
241529,500	4240443,300	602,807	C
241515,500	4240443,300	602,842	C
241512,000	4240443,300	602,850	C
241498,000	4240443,300	602,885	C
241494,500	4240443,300	602,894	C
241480,500	4240443,300	602,929	C
241477,000	4240443,300	602,938	C
241463,000	4240443,300	602,973	C
241459,500	4240443,300	602,982	C
241445,500	4240443,300	603,017	C
241442,000	4240443,300	603,025	C
241428,000	4240443,300	603,060	C
241424,500	4240443,300	603,069	C
241410,500	4240443,300	603,104	C
241407,000	4240443,300	603,113	C
241393,000	4240443,300	603,148	C
241389,500	4240443,300	603,157	C
241375,500	4240443,300	603,192	C
241372,000	4240443,300	603,200	C

Coord. X	Coord. Y	Elevación	Código
240768,000	4239896,774	599,245	C
240764,500	4239896,774	599,254	C
240750,500	4239896,774	599,289	C
240747,000	4239896,774	599,297	C
240733,000	4239896,774	599,332	C
240729,500	4239896,774	599,341	C
240715,500	4239896,774	599,376	C
240712,000	4239896,774	599,385	C
240698,000	4239896,774	599,420	C
240694,500	4239896,774	599,429	C
240680,500	4239896,774	599,464	C
240677,000	4239896,774	599,472	C
240663,000	4239896,774	599,507	C
240659,500	4239896,774	599,516	C
240645,500	4239896,774	599,551	C
240642,000	4239896,774	599,560	C
240628,000	4239896,774	599,595	C
240624,500	4239896,774	599,604	C
240610,500	4239896,774	599,639	C
240607,000	4239896,774	599,647	C
240593,000	4239896,774	599,682	C
240589,500	4239896,774	599,691	C
240575,500	4239896,774	599,726	C
240572,000	4239896,774	599,735	C
240558,000	4239896,774	599,770	C
240554,500	4239896,774	599,779	C
240540,500	4239896,774	599,814	C
240537,000	4239896,774	599,822	C
240523,000	4239896,774	599,857	C
240519,500	4239896,774	599,866	C
240505,500	4239896,774	599,901	C
240502,000	4239896,774	599,910	C
240488,000	4239896,774	599,945	C
240484,500	4239896,774	599,954	C
240470,500	4239896,774	599,989	C
240467,000	4239896,774	599,997	C
240453,000	4239896,774	600,032	C
240449,500	4239896,774	600,041	C
240435,500	4239896,774	600,076	C
240432,000	4239896,774	600,085	C
240418,000	4239896,774	600,120	C
240414,500	4239896,774	600,129	C
240400,500	4239896,774	600,164	C
240397,000	4239896,774	600,172	C
240383,000	4239896,774	600,207	C
240379,500	4239896,774	600,216	C

Coord. X	Coord. Y	Elevación	Código
241358,000	4240443,300	603,235	C
241354,500	4240443,300	603,244	C
241340,500	4240443,300	603,279	C
241337,000	4240443,300	603,288	C
241323,000	4240443,300	603,323	C
241319,500	4240443,300	603,332	C
241305,500	4240443,300	603,367	C
241302,000	4240443,300	603,375	C
241288,000	4240443,300	603,410	C
241284,500	4240443,300	603,419	C
241270,500	4240443,300	603,454	C
241267,000	4240443,300	603,463	C
241253,000	4240443,300	603,498	C
241249,500	4240443,300	603,507	C
241235,500	4240443,300	603,542	C
241232,000	4240443,300	603,550	C
241218,000	4240443,300	603,585	C
241214,500	4240443,300	603,594	C
241200,500	4240443,300	603,629	C
241197,000	4240443,300	603,638	C
241183,000	4240443,300	603,673	C
241179,500	4240443,300	603,682	C
241165,500	4240443,300	603,717	C
241162,000	4240443,300	603,725	C
241148,000	4240443,300	603,760	C
241144,500	4240443,300	603,769	C
241130,500	4240443,300	603,804	C
241127,000	4240443,300	603,813	C
241113,000	4240443,300	603,848	C
241109,500	4240443,300	603,857	C
241095,500	4240443,300	603,892	C
241092,000	4240443,300	603,900	C
241078,000	4240443,300	603,935	C
241074,500	4240443,300	603,944	C
241060,500	4240443,300	603,979	C
241057,000	4240443,300	603,988	C
241043,000	4240443,300	604,023	C
241039,500	4240443,300	604,032	C
241025,500	4240443,300	604,067	C
241022,000	4240443,300	604,075	C
241008,000	4240443,300	604,110	C
241004,500	4240443,300	604,119	C
240990,500	4240443,300	604,154	C
240987,000	4240443,300	604,163	C
240973,000	4240443,300	604,198	C
240969,500	4240443,300	604,207	C

Coord. X	Coord. Y	Elevación	Código
240365,500	4239896,774	600,251	C
240362,000	4239896,774	600,260	C
240348,000	4239896,774	600,295	C
240344,500	4239896,774	600,304	C
240330,500	4239896,774	600,339	C
240327,000	4239896,774	600,347	C
240313,000	4239896,774	600,382	C
240309,500	4239896,774	600,391	C
240295,500	4239896,774	600,426	C
240292,000	4239896,774	600,435	C
240278,000	4239896,774	600,470	C
240274,500	4239896,774	600,479	C
240260,500	4239896,774	600,514	C
240257,000	4239896,774	600,522	C
240243,000	4239896,774	600,557	C
240239,500	4239896,774	600,566	C
240225,500	4239896,774	600,601	C
240222,000	4239896,774	600,610	C
240208,000	4239896,774	600,645	C
240204,500	4239896,774	600,654	C
240190,500	4239896,774	600,689	C
240187,000	4239896,774	600,697	C
240173,000	4239896,774	600,732	C
240169,500	4239896,774	600,741	C
240155,500	4239896,774	600,776	C
240152,000	4239896,774	600,785	C
240138,000	4239896,774	600,820	C
240134,500	4239896,774	600,829	C
240120,500	4239896,774	600,864	C
240117,000	4239896,774	600,872	C
240103,000	4239896,774	600,907	C
240099,500	4239896,774	600,916	C
240085,500	4239896,774	600,951	C
240082,000	4239896,774	600,960	C
240068,000	4239896,774	600,994	C
240064,500	4239896,774	601,003	C
240050,500	4239896,774	601,038	C
240047,000	4239896,774	601,047	C
240033,000	4239896,774	601,082	C
240029,500	4239896,774	601,091	C
240015,500	4239896,774	601,126	C
240012,000	4239896,774	601,134	C
240012,000	4239887,720	601,044	C
240015,500	4239887,720	601,035	C
240029,500	4239887,720	601,000	C
240033,000	4239887,720	600,991	C

Coord. X	Coord. Y	Elevación	Código
240955,500	4240443,300	604,242	C
240952,000	4240443,300	604,250	C
240938,000	4240443,300	604,285	C
240934,500	4240443,300	604,294	C
240920,500	4240443,300	604,329	C
240917,000	4240443,300	604,338	C
240903,000	4240443,300	604,373	C
240899,500	4240443,300	604,382	C
240885,500	4240443,300	604,417	C
240882,000	4240443,300	604,425	C
240868,000	4240443,300	604,460	C
240864,500	4240443,300	604,469	C
240850,500	4240443,300	604,504	C
240847,000	4240443,300	604,513	C
240833,000	4240443,300	604,548	C
240829,500	4240443,300	604,557	C
240815,500	4240443,300	604,592	C
240812,000	4240443,300	604,600	C
240798,000	4240443,300	604,635	C
240794,500	4240443,300	604,644	C
240780,500	4240443,300	604,679	C
240777,000	4240443,300	604,688	C
240763,000	4240443,300	604,723	C
240759,500	4240443,300	604,732	C
240745,500	4240443,300	604,767	C
240742,000	4240443,300	604,775	C
240728,000	4240443,300	604,810	C
240724,500	4240443,300	604,819	C
240710,500	4240443,300	604,854	C
240707,000	4240443,300	604,863	C
240693,000	4240443,300	604,898	C
240689,500	4240443,300	604,906	C
240675,500	4240443,300	604,941	C
240672,000	4240443,300	604,950	C
240658,000	4240443,300	604,985	C
240654,500	4240443,300	604,994	C
240640,500	4240443,300	605,029	C
240637,000	4240443,300	605,038	C
240623,000	4240443,300	605,073	C
240619,500	4240443,300	605,081	C
240605,500	4240443,300	605,116	C
240602,000	4240443,300	605,125	C
240588,000	4240443,300	605,160	C
240584,500	4240443,300	605,169	C
240570,500	4240443,300	605,204	C
240567,000	4240443,300	605,213	C
240047,000	4239887,720	600,956	C
240050,500	4239887,720	600,948	C
240064,500	4239887,720	600,913	C
240068,000	4239887,720	600,904	C
240082,000	4239887,720	600,869	C
240085,500	4239887,720	600,860	C
240099,500	4239887,720	600,826	C
240103,000	4239887,720	600,817	C
240117,000	4239887,720	600,782	C
240120,500	4239887,720	600,773	C
240134,500	4239887,720	600,738	C
240138,000	4239887,720	600,729	C
240152,000	4239887,720	600,694	C
240155,500	4239887,720	600,686	C
240169,500	4239887,720	600,651	C
240173,000	4239887,720	600,642	C
240187,000	4239887,720	600,607	C
240190,500	4239887,720	600,598	C
240204,500	4239887,720	600,563	C
240208,000	4239887,720	600,554	C
240222,000	4239887,720	600,519	C
240225,500	4239887,720	600,511	C
240239,500	4239887,720	600,476	C
240243,000	4239887,720	600,467	C
240257,000	4239887,720	600,432	C
240260,500	4239887,720	600,423	C
240274,500	4239887,720	600,388	C
240278,000	4239887,720	600,379	C
240292,000	4239887,720	600,344	C
240295,500	4239887,720	600,336	C
240309,500	4239887,720	600,301	C
240313,000	4239887,720	600,292	C
240327,000	4239887,720	600,257	C
240330,500	4239887,720	600,248	C
240344,500	4239887,720	600,213	C
240348,000	4239887,720	600,204	C
240362,000	4239887,720	600,169	C
240365,500	4239887,720	600,161	C
240379,500	4239887,720	600,126	C
240383,000	4239887,720	600,117	C
240397,000	4239887,720	600,082	C
240400,500	4239887,720	600,073	C
240414,500	4239887,720	600,038	C
240418,000	4239887,720	600,029	C
240432,000	4239887,720	599,994	C
240435,500	4239887,720	599,986	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240553,000	4240443,300	605,248	C	240449,500	4239887,720	599,951	C
240549,500	4240443,300	605,256	C	240453,000	4239887,720	599,942	C
240535,500	4240443,300	605,291	C	240467,000	4239887,720	599,907	C
240532,000	4240443,300	605,300	C	240470,500	4239887,720	599,898	C
240518,000	4240443,300	605,335	C	240484,500	4239887,720	599,863	C
240514,500	4240443,300	605,344	C	240488,000	4239887,720	599,854	C
240500,500	4240443,300	605,379	C	240502,000	4239887,720	599,819	C
240497,000	4240443,300	605,388	C	240505,500	4239887,720	599,811	C
240483,000	4240443,300	605,423	C	240519,500	4239887,720	599,776	C
240479,500	4240443,300	605,431	C	240523,000	4239887,720	599,767	C
240465,500	4240443,300	605,466	C	240537,000	4239887,720	599,732	C
240462,000	4240443,300	605,475	C	240540,500	4239887,720	599,723	C
240448,000	4240443,300	605,510	C	240554,500	4239887,720	599,688	C
240444,500	4240443,300	605,519	C	240558,000	4239887,720	599,679	C
240430,500	4240443,300	605,554	C	240572,000	4239887,720	599,644	C
240427,000	4240443,300	605,563	C	240575,500	4239887,720	599,636	C
240413,000	4240443,300	605,598	C	240589,500	4239887,720	599,601	C
240409,500	4240443,300	605,606	C	240593,000	4239887,720	599,592	C
240395,500	4240443,300	605,641	C	240607,000	4239887,720	599,557	C
240392,000	4240443,300	605,650	C	240610,500	4239887,720	599,548	C
240378,000	4240443,300	605,685	C	240624,500	4239887,720	599,513	C
240374,500	4240443,300	605,694	C	240628,000	4239887,720	599,504	C
240360,500	4240443,300	605,729	C	240642,000	4239887,720	599,469	C
240357,000	4240443,300	605,738	C	240645,500	4239887,720	599,461	C
240343,000	4240443,300	605,773	C	240659,500	4239887,720	599,426	C
240339,500	4240443,300	605,781	C	240663,000	4239887,720	599,417	C
240325,500	4240443,300	605,816	C	240677,000	4239887,720	599,382	C
240322,000	4240443,300	605,825	C	240680,500	4239887,720	599,373	C
240308,000	4240443,300	605,860	C	240694,500	4239887,720	599,338	C
240304,500	4240443,300	605,869	C	240698,000	4239887,720	599,329	C
240290,500	4240443,300	605,904	C	240712,000	4239887,720	599,294	C
240287,000	4240443,300	605,913	C	240715,500	4239887,720	599,286	C
240273,000	4240443,300	605,948	C	240729,500	4239887,720	599,251	C
240269,500	4240443,300	605,956	C	240733,000	4239887,720	599,242	C
240255,500	4240443,300	605,991	C	240747,000	4239887,720	599,207	C
240252,000	4240443,300	606,000	C	240750,500	4239887,720	599,198	C
240238,000	4240443,300	606,035	C	240764,500	4239887,720	599,163	C
240234,500	4240443,300	606,044	C	240768,000	4239887,720	599,154	C
240220,500	4240443,300	606,079	C	240768,000	4239884,570	599,123	C
240217,000	4240443,300	606,088	C	240764,500	4239884,570	599,132	C
240203,000	4240443,300	606,123	C	240750,500	4239884,570	599,167	C
240199,500	4240443,300	606,131	C	240747,000	4239884,570	599,175	C
240185,500	4240443,300	606,166	C	240733,000	4239884,570	599,210	C
240182,000	4240443,300	606,175	C	240729,500	4239884,570	599,219	C
240168,000	4240443,300	606,210	C	240715,500	4239884,570	599,254	C
240164,500	4240443,300	606,219	C	240712,000	4239884,570	599,263	C

Coord. X	Coord. Y	Elevación	Código
240150,500	4240443,300	606,254	C
240147,000	4240443,300	606,263	C
240133,000	4240443,300	606,298	C
240129,500	4240443,300	606,306	C
240115,500	4240443,300	606,341	C
240112,000	4240443,300	606,350	C
240098,000	4240443,300	606,385	C
240094,500	4240443,300	606,394	C
240080,500	4240443,300	606,429	C
240077,000	4240443,300	606,438	C
240063,000	4240443,300	606,473	C
240059,500	4240443,300	606,481	C
240045,500	4240443,300	606,516	C
240042,000	4240443,300	606,525	C
240028,000	4240443,300	606,560	C
240024,500	4240443,300	606,569	C
240024,500	4240434,246	606,478	C
240028,000	4240434,246	606,470	C
240042,000	4240434,246	606,435	C
240045,500	4240434,246	606,426	C
240059,500	4240434,246	606,391	C
240063,000	4240434,246	606,382	C
240077,000	4240434,246	606,347	C
240080,500	4240434,246	606,338	C
240094,500	4240434,246	606,303	C
240098,000	4240434,246	606,295	C
240112,000	4240434,246	606,260	C
240115,500	4240434,246	606,251	C
240129,500	4240434,246	606,216	C
240133,000	4240434,246	606,207	C
240147,000	4240434,246	606,172	C
240150,500	4240434,246	606,163	C
240164,500	4240434,246	606,128	C
240168,000	4240434,246	606,120	C
240182,000	4240434,246	606,085	C
240185,500	4240434,246	606,076	C
240199,500	4240434,246	606,041	C
240203,000	4240434,246	606,032	C
240217,000	4240434,246	605,997	C
240220,500	4240434,246	605,988	C
240234,500	4240434,246	605,953	C
240238,000	4240434,246	605,945	C
240252,000	4240434,246	605,910	C
240255,500	4240434,246	605,901	C
240269,500	4240434,246	605,866	C
240273,000	4240434,246	605,857	C

Coord. X	Coord. Y	Elevación	Código
240698,000	4239884,570	599,298	C
240694,500	4239884,570	599,307	C
240680,500	4239884,570	599,342	C
240677,000	4239884,570	599,350	C
240663,000	4239884,570	599,385	C
240659,500	4239884,570	599,394	C
240645,500	4239884,570	599,429	C
240642,000	4239884,570	599,438	C
240628,000	4239884,570	599,473	C
240624,500	4239884,570	599,482	C
240610,500	4239884,570	599,517	C
240607,000	4239884,570	599,525	C
240593,000	4239884,570	599,560	C
240589,500	4239884,570	599,569	C
240575,500	4239884,570	599,604	C
240572,000	4239884,570	599,613	C
240558,000	4239884,570	599,648	C
240554,500	4239884,570	599,657	C
240540,500	4239884,570	599,692	C
240537,000	4239884,570	599,700	C
240523,000	4239884,570	599,735	C
240519,500	4239884,570	599,744	C
240505,500	4239884,570	599,779	C
240502,000	4239884,570	599,788	C
240488,000	4239884,570	599,823	C
240484,500	4239884,570	599,832	C
240470,500	4239884,570	599,867	C
240467,000	4239884,570	599,875	C
240453,000	4239884,570	599,910	C
240449,500	4239884,570	599,919	C
240435,500	4239884,570	599,954	C
240432,000	4239884,570	599,963	C
240418,000	4239884,570	599,998	C
240414,500	4239884,570	600,007	C
240400,500	4239884,570	600,042	C
240397,000	4239884,570	600,050	C
240383,000	4239884,570	600,085	C
240379,500	4239884,570	600,094	C
240365,500	4239884,570	600,129	C
240362,000	4239884,570	600,138	C
240348,000	4239884,570	600,173	C
240344,500	4239884,570	600,182	C
240330,500	4239884,570	600,217	C
240327,000	4239884,570	600,225	C
240313,000	4239884,570	600,260	C
240309,500	4239884,570	600,269	C

Coord. X	Coord. Y	Elevación	Código
240287,000	4240434,246	605,822	C
240290,500	4240434,246	605,813	C
240304,500	4240434,246	605,778	C
240308,000	4240434,246	605,770	C
240322,000	4240434,246	605,735	C
240325,500	4240434,246	605,726	C
240339,500	4240434,246	605,691	C
240343,000	4240434,246	605,682	C
240357,000	4240434,246	605,647	C
240360,500	4240434,246	605,638	C
240374,500	4240434,246	605,603	C
240378,000	4240434,246	605,595	C
240392,000	4240434,246	605,560	C
240395,500	4240434,246	605,551	C
240409,500	4240434,246	605,516	C
240413,000	4240434,246	605,507	C
240427,000	4240434,246	605,472	C
240430,500	4240434,246	605,463	C
240444,500	4240434,246	605,428	C
240448,000	4240434,246	605,420	C
240462,000	4240434,246	605,385	C
240465,500	4240434,246	605,376	C
240479,500	4240434,246	605,341	C
240483,000	4240434,246	605,332	C
240497,000	4240434,246	605,297	C
240500,500	4240434,246	605,288	C
240514,500	4240434,246	605,253	C
240518,000	4240434,246	605,245	C
240532,000	4240434,246	605,210	C
240535,500	4240434,246	605,201	C
240549,500	4240434,246	605,166	C
240553,000	4240434,246	605,157	C
240567,000	4240434,246	605,122	C
240570,500	4240434,246	605,113	C
240584,500	4240434,246	605,078	C
240588,000	4240434,246	605,070	C
240602,000	4240434,246	605,035	C
240605,500	4240434,246	605,026	C
240619,500	4240434,246	604,991	C
240623,000	4240434,246	604,982	C
240637,000	4240434,246	604,947	C
240640,500	4240434,246	604,938	C
240654,500	4240434,246	604,903	C
240658,000	4240434,246	604,895	C
240672,000	4240434,246	604,860	C
240675,500	4240434,246	604,851	C

Coord. X	Coord. Y	Elevación	Código
240295,500	4239884,570	600,304	C
240292,000	4239884,570	600,313	C
240278,000	4239884,570	600,348	C
240274,500	4239884,570	600,357	C
240260,500	4239884,570	600,392	C
240257,000	4239884,570	600,400	C
240243,000	4239884,570	600,435	C
240239,500	4239884,570	600,444	C
240225,500	4239884,570	600,479	C
240222,000	4239884,570	600,488	C
240208,000	4239884,570	600,523	C
240204,500	4239884,570	600,532	C
240190,500	4239884,570	600,567	C
240187,000	4239884,570	600,575	C
240173,000	4239884,570	600,610	C
240169,500	4239884,570	600,619	C
240155,500	4239884,570	600,654	C
240152,000	4239884,570	600,663	C
240138,000	4239884,570	600,698	C
240134,500	4239884,570	600,707	C
240120,500	4239884,570	600,742	C
240117,000	4239884,570	600,750	C
240103,000	4239884,570	600,785	C
240099,500	4239884,570	600,794	C
240085,500	4239884,570	600,829	C
240082,000	4239884,570	600,837	C
240068,000	4239884,570	600,872	C
240064,500	4239884,570	600,881	C
240050,500	4239884,570	600,916	C
240047,000	4239884,570	600,925	C
240033,000	4239884,570	600,960	C
240029,500	4239884,570	600,969	C
240015,500	4239884,570	601,004	C
240012,000	4239884,570	601,012	C
240012,000	4239881,420	600,981	C
240015,500	4239881,420	600,972	C
240029,500	4239881,420	600,937	C
240033,000	4239881,420	600,928	C
240047,000	4239881,420	600,893	C
240050,500	4239881,420	600,885	C
240064,500	4239881,420	600,850	C
240068,000	4239881,420	600,841	C
240082,000	4239881,420	600,806	C
240085,500	4239881,420	600,797	C
240099,500	4239881,420	600,762	C
240103,000	4239881,420	600,754	C

Coord. X	Coord. Y	Elevación	Código
240689,500	4240434,246	604,816	C
240693,000	4240434,246	604,807	C
240707,000	4240434,246	604,772	C
240710,500	4240434,246	604,763	C
240724,500	4240434,246	604,728	C
240728,000	4240434,246	604,720	C
240742,000	4240434,246	604,685	C
240745,500	4240434,246	604,676	C
240759,500	4240434,246	604,641	C
240763,000	4240434,246	604,632	C
240777,000	4240434,246	604,597	C
240780,500	4240434,246	604,588	C
240794,500	4240434,246	604,553	C
240798,000	4240434,246	604,545	C
240812,000	4240434,246	604,510	C
240815,500	4240434,246	604,501	C
240829,500	4240434,246	604,466	C
240833,000	4240434,246	604,457	C
240847,000	4240434,246	604,422	C
240850,500	4240434,246	604,413	C
240864,500	4240434,246	604,378	C
240868,000	4240434,246	604,370	C
240882,000	4240434,246	604,335	C
240885,500	4240434,246	604,326	C
240899,500	4240434,246	604,291	C
240903,000	4240434,246	604,282	C
240917,000	4240434,246	604,247	C
240920,500	4240434,246	604,239	C
240934,500	4240434,246	604,204	C
240938,000	4240434,246	604,195	C
240952,000	4240434,246	604,160	C
240955,500	4240434,246	604,151	C
240969,500	4240434,246	604,116	C
240973,000	4240434,246	604,107	C
240987,000	4240434,246	604,072	C
240990,500	4240434,246	604,064	C
241004,500	4240434,246	604,029	C
241008,000	4240434,246	604,020	C
241022,000	4240434,246	603,985	C
241025,500	4240434,246	603,976	C
241039,500	4240434,246	603,941	C
241043,000	4240434,246	603,932	C
241057,000	4240434,246	603,897	C
241060,500	4240434,246	603,889	C
241074,500	4240434,246	603,854	C
241078,000	4240434,246	603,845	C

Coord. X	Coord. Y	Elevación	Código
240117,000	4239881,420	600,719	C
240120,500	4239881,420	600,710	C
240134,500	4239881,420	600,675	C
240138,000	4239881,420	600,666	C
240152,000	4239881,420	600,631	C
240155,500	4239881,420	600,623	C
240169,500	4239881,420	600,588	C
240173,000	4239881,420	600,579	C
240187,000	4239881,420	600,544	C
240190,500	4239881,420	600,535	C
240204,500	4239881,420	600,500	C
240208,000	4239881,420	600,491	C
240222,000	4239881,420	600,456	C
240225,500	4239881,420	600,448	C
240239,500	4239881,420	600,413	C
240243,000	4239881,420	600,404	C
240257,000	4239881,420	600,369	C
240260,500	4239881,420	600,360	C
240274,500	4239881,420	600,325	C
240278,000	4239881,420	600,316	C
240292,000	4239881,420	600,281	C
240295,500	4239881,420	600,273	C
240309,500	4239881,420	600,238	C
240313,000	4239881,420	600,229	C
240327,000	4239881,420	600,194	C
240330,500	4239881,420	600,185	C
240344,500	4239881,420	600,150	C
240348,000	4239881,420	600,141	C
240362,000	4239881,420	600,106	C
240365,500	4239881,420	600,098	C
240379,500	4239881,420	600,063	C
240383,000	4239881,420	600,054	C
240397,000	4239881,420	600,019	C
240400,500	4239881,420	600,010	C
240414,500	4239881,420	599,975	C
240418,000	4239881,420	599,966	C
240432,000	4239881,420	599,931	C
240435,500	4239881,420	599,923	C
240449,500	4239881,420	599,888	C
240453,000	4239881,420	599,879	C
240467,000	4239881,420	599,844	C
240470,500	4239881,420	599,835	C
240484,500	4239881,420	599,800	C
240488,000	4239881,420	599,791	C
240502,000	4239881,420	599,756	C
240505,500	4239881,420	599,748	C

Coord. X	Coord. Y	Elevación	Código
241092,000	4240434,246	603,810	C
241095,500	4240434,246	603,801	C
241109,500	4240434,246	603,766	C
241113,000	4240434,246	603,757	C
241127,000	4240434,246	603,722	C
241130,500	4240434,246	603,714	C
241144,500	4240434,246	603,679	C
241148,000	4240434,246	603,670	C
241162,000	4240434,246	603,635	C
241165,500	4240434,246	603,626	C
241179,500	4240434,246	603,591	C
241183,000	4240434,246	603,582	C
241197,000	4240434,246	603,547	C
241200,500	4240434,246	603,539	C
241214,500	4240434,246	603,504	C
241218,000	4240434,246	603,495	C
241232,000	4240434,246	603,460	C
241235,500	4240434,246	603,451	C
241249,500	4240434,246	603,416	C
241253,000	4240434,246	603,407	C
241267,000	4240434,246	603,372	C
241270,500	4240434,246	603,364	C
241284,500	4240434,246	603,329	C
241288,000	4240434,246	603,320	C
241302,000	4240434,246	603,285	C
241305,500	4240434,246	603,276	C
241319,500	4240434,246	603,241	C
241323,000	4240434,246	603,232	C
241337,000	4240434,246	603,197	C
241340,500	4240434,246	603,189	C
241354,500	4240434,246	603,154	C
241358,000	4240434,246	603,145	C
241372,000	4240434,246	603,110	C
241375,500	4240434,246	603,101	C
241389,500	4240434,246	603,066	C
241393,000	4240434,246	603,057	C
241407,000	4240434,246	603,022	C
241410,500	4240434,246	603,014	C
241424,500	4240434,246	602,979	C
241428,000	4240434,246	602,970	C
241442,000	4240434,246	602,935	C
241445,500	4240434,246	602,926	C
241459,500	4240434,246	602,891	C
241463,000	4240434,246	602,882	C
241477,000	4240434,246	602,847	C
241480,500	4240434,246	602,839	C

Coord. X	Coord. Y	Elevación	Código
240519,500	4239881,420	599,713	C
240523,000	4239881,420	599,704	C
240537,000	4239881,420	599,669	C
240540,500	4239881,420	599,660	C
240554,500	4239881,420	599,625	C
240558,000	4239881,420	599,616	C
240572,000	4239881,420	599,581	C
240575,500	4239881,420	599,573	C
240589,500	4239881,420	599,538	C
240593,000	4239881,420	599,529	C
240607,000	4239881,420	599,494	C
240610,500	4239881,420	599,485	C
240624,500	4239881,420	599,450	C
240628,000	4239881,420	599,441	C
240642,000	4239881,420	599,406	C
240645,500	4239881,420	599,398	C
240659,500	4239881,420	599,363	C
240663,000	4239881,420	599,354	C
240677,000	4239881,420	599,319	C
240680,500	4239881,420	599,310	C
240694,500	4239881,420	599,275	C
240698,000	4239881,420	599,266	C
240712,000	4239881,420	599,231	C
240715,500	4239881,420	599,223	C
240729,500	4239881,420	599,188	C
240733,000	4239881,420	599,179	C
240747,000	4239881,420	599,144	C
240750,500	4239881,420	599,135	C
240764,500	4239881,420	599,100	C
240768,000	4239881,420	599,091	C
240768,000	4239872,366	599,001	C
240764,500	4239872,366	599,010	C
240750,500	4239872,366	599,045	C
240747,000	4239872,366	599,053	C
240733,000	4239872,366	599,088	C
240729,500	4239872,366	599,097	C
240715,500	4239872,366	599,132	C
240712,000	4239872,366	599,141	C
240698,000	4239872,366	599,176	C
240694,500	4239872,366	599,185	C
240680,500	4239872,366	599,220	C
240677,000	4239872,366	599,228	C
240663,000	4239872,366	599,263	C
240659,500	4239872,366	599,272	C
240645,500	4239872,366	599,307	C
240642,000	4239872,366	599,316	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241494,500	4240434,246	602,804	C	240628,000	4239872,366	599,351	C
241498,000	4240434,246	602,795	C	240624,500	4239872,366	599,360	C
241512,000	4240434,246	602,760	C	240610,500	4239872,366	599,395	C
241515,500	4240434,246	602,751	C	240607,000	4239872,366	599,403	C
241529,500	4240434,246	602,716	C	240593,000	4239872,366	599,438	C
241533,000	4240434,246	602,707	C	240589,500	4239872,366	599,447	C
241547,000	4240434,246	602,672	C	240575,500	4239872,366	599,482	C
241550,500	4240434,246	602,664	C	240572,000	4239872,366	599,491	C
241564,500	4240434,246	602,629	C	240558,000	4239872,366	599,526	C
241568,000	4240434,246	602,620	C	240554,500	4239872,366	599,535	C
241582,000	4240434,246	602,585	C	240540,500	4239872,366	599,570	C
241585,500	4240434,246	602,576	C	240537,000	4239872,366	599,578	C
241599,500	4240434,246	602,541	C	240523,000	4239872,366	599,613	C
241603,000	4240434,246	602,532	C	240519,500	4239872,366	599,622	C
241617,000	4240434,246	602,497	C	240505,500	4239872,366	599,657	C
241620,500	4240434,246	602,489	C	240502,000	4239872,366	599,666	C
241634,500	4240434,246	602,454	C	240488,000	4239872,366	599,701	C
241638,000	4240434,246	602,445	C	240484,500	4239872,366	599,710	C
241652,000	4240434,246	602,410	C	240470,500	4239872,366	599,745	C
241655,500	4240434,246	602,401	C	240467,000	4239872,366	599,753	C
241669,500	4240434,246	602,366	C	240453,000	4239872,366	599,788	C
241673,000	4240434,246	602,357	C	240449,500	4239872,366	599,797	C
241687,000	4240434,246	602,322	C	240435,500	4239872,366	599,832	C
241690,500	4240434,246	602,314	C	240432,000	4239872,366	599,841	C
241704,500	4240434,246	602,279	C	240418,000	4239872,366	599,876	C
241708,000	4240434,246	602,270	C	240414,500	4239872,366	599,885	C
241722,000	4240434,246	602,235	C	240400,500	4239872,366	599,920	C
241725,500	4240434,246	602,226	C	240397,000	4239872,366	599,928	C
241739,500	4240434,246	602,191	C	240383,000	4239872,366	599,963	C
241743,000	4240434,246	602,182	C	240379,500	4239872,366	599,972	C
241757,000	4240434,246	602,147	C	240365,500	4239872,366	600,007	C
241760,500	4240434,246	602,139	C	240362,000	4239872,366	600,016	C
241760,500	4240430,246	602,099	C	240348,000	4239872,366	600,051	C
241757,000	4240430,246	602,107	C	240344,500	4239872,366	600,060	C
241743,000	4240430,246	602,142	C	240330,500	4239872,366	600,095	C
241739,500	4240430,246	602,151	C	240327,000	4239872,366	600,103	C
241725,500	4240430,246	602,186	C	240313,000	4239872,366	600,138	C
241722,000	4240430,246	602,195	C	240309,500	4239872,366	600,147	C
241708,000	4240430,246	602,230	C	240295,500	4239872,366	600,182	C
241704,500	4240430,246	602,239	C	240292,000	4239872,366	600,191	C
241690,500	4240430,246	602,274	C	240278,000	4239872,366	600,226	C
241687,000	4240430,246	602,282	C	240274,500	4239872,366	600,235	C
241673,000	4240430,246	602,317	C	240260,500	4239872,366	600,270	C
241669,500	4240430,246	602,326	C	240257,000	4239872,366	600,278	C
241655,500	4240430,246	602,361	C	240243,000	4239872,366	600,313	C
241652,000	4240430,246	602,370	C	240239,500	4239872,366	600,322	C

Coord. X	Coord. Y	Elevación	Código
241638,000	4240430,246	602,405	C
241634,500	4240430,246	602,414	C
241620,500	4240430,246	602,449	C
241617,000	4240430,246	602,457	C
241603,000	4240430,246	602,492	C
241599,500	4240430,246	602,501	C
241585,500	4240430,246	602,536	C
241582,000	4240430,246	602,545	C
241568,000	4240430,246	602,580	C
241564,500	4240430,246	602,589	C
241550,500	4240430,246	602,624	C
241547,000	4240430,246	602,632	C
241533,000	4240430,246	602,667	C
241529,500	4240430,246	602,676	C
241515,500	4240430,246	602,711	C
241512,000	4240430,246	602,720	C
241498,000	4240430,246	602,755	C
241494,500	4240430,246	602,764	C
241480,500	4240430,246	602,799	C
241477,000	4240430,246	602,807	C
241463,000	4240430,246	602,842	C
241459,500	4240430,246	602,851	C
241445,500	4240430,246	602,886	C
241442,000	4240430,246	602,895	C
241428,000	4240430,246	602,930	C
241424,500	4240430,246	602,939	C
241410,500	4240430,246	602,974	C
241407,000	4240430,246	602,982	C
241393,000	4240430,246	603,017	C
241389,500	4240430,246	603,026	C
241375,500	4240430,246	603,061	C
241372,000	4240430,246	603,070	C
241358,000	4240430,246	603,105	C
241354,500	4240430,246	603,114	C
241340,500	4240430,246	603,149	C
241337,000	4240430,246	603,157	C
241323,000	4240430,246	603,192	C
241319,500	4240430,246	603,201	C
241305,500	4240430,246	603,236	C
241302,000	4240430,246	603,245	C
241288,000	4240430,246	603,280	C
241284,500	4240430,246	603,289	C
241270,500	4240430,246	603,324	C
241267,000	4240430,246	603,332	C
241253,000	4240430,246	603,367	C
241249,500	4240430,246	603,376	C

Coord. X	Coord. Y	Elevación	Código
240225,500	4239872,366	600,357	C
240222,000	4239872,366	600,366	C
240208,000	4239872,366	600,401	C
240204,500	4239872,366	600,410	C
240190,500	4239872,366	600,445	C
240187,000	4239872,366	600,453	C
240173,000	4239872,366	600,488	C
240169,500	4239872,366	600,497	C
240155,500	4239872,366	600,532	C
240152,000	4239872,366	600,541	C
240138,000	4239872,366	600,576	C
240134,500	4239872,366	600,585	C
240120,500	4239872,366	600,620	C
240117,000	4239872,366	600,628	C
240103,000	4239872,366	600,663	C
240099,500	4239872,366	600,672	C
240085,500	4239872,366	600,707	C
240082,000	4239872,366	600,715	C
240068,000	4239872,366	600,750	C
240064,500	4239872,366	600,759	C
240050,500	4239872,366	600,794	C
240047,000	4239872,366	600,803	C
240033,000	4239872,366	600,838	C
240029,500	4239872,366	600,847	C
240015,500	4239872,366	600,882	C
240012,000	4239872,366	600,890	C
240012,000	4239868,366	600,850	C
240015,500	4239868,366	600,842	C
240029,500	4239868,366	600,807	C
240033,000	4239868,366	600,798	C
240047,000	4239868,366	600,763	C
240050,500	4239868,366	600,754	C
240064,500	4239868,366	600,719	C
240068,000	4239868,366	600,710	C
240082,000	4239868,366	600,675	C
240085,500	4239868,366	600,667	C
240099,500	4239868,366	600,632	C
240103,000	4239868,366	600,623	C
240117,000	4239868,366	600,588	C
240120,500	4239868,366	600,580	C
240134,500	4239868,366	600,545	C
240138,000	4239868,366	600,536	C
240152,000	4239868,366	600,501	C
240155,500	4239868,366	600,492	C
240169,500	4239868,366	600,457	C
240173,000	4239868,366	600,448	C

Coord. X	Coord. Y	Elevación	Código
241235,500	4240430,246	603,411	C
241232,000	4240430,246	603,420	C
241218,000	4240430,246	603,455	C
241214,500	4240430,246	603,464	C
241200,500	4240430,246	603,499	C
241197,000	4240430,246	603,507	C
241183,000	4240430,246	603,542	C
241179,500	4240430,246	603,551	C
241165,500	4240430,246	603,586	C
241162,000	4240430,246	603,595	C
241148,000	4240430,246	603,630	C
241144,500	4240430,246	603,639	C
241130,500	4240430,246	603,674	C
241127,000	4240430,246	603,682	C
241113,000	4240430,246	603,717	C
241109,500	4240430,246	603,726	C
241095,500	4240430,246	603,761	C
241092,000	4240430,246	603,770	C
241078,000	4240430,246	603,805	C
241074,500	4240430,246	603,814	C
241060,500	4240430,246	603,849	C
241057,000	4240430,246	603,857	C
241043,000	4240430,246	603,892	C
241039,500	4240430,246	603,901	C
241025,500	4240430,246	603,936	C
241022,000	4240430,246	603,945	C
241008,000	4240430,246	603,980	C
241004,500	4240430,246	603,989	C
240990,500	4240430,246	604,024	C
240987,000	4240430,246	604,032	C
240973,000	4240430,246	604,067	C
240969,500	4240430,246	604,076	C
240955,500	4240430,246	604,111	C
240952,000	4240430,246	604,120	C
240938,000	4240430,246	604,155	C
240934,500	4240430,246	604,164	C
240920,500	4240430,246	604,199	C
240917,000	4240430,246	604,207	C
240903,000	4240430,246	604,242	C
240899,500	4240430,246	604,251	C
240885,500	4240430,246	604,286	C
240882,000	4240430,246	604,295	C
240868,000	4240430,246	604,330	C
240864,500	4240430,246	604,338	C
240850,500	4240430,246	604,373	C
240847,000	4240430,246	604,382	C

Coord. X	Coord. Y	Elevación	Código
240187,000	4239868,366	600,413	C
240190,500	4239868,366	600,405	C
240204,500	4239868,366	600,370	C
240208,000	4239868,366	600,361	C
240222,000	4239868,366	600,326	C
240225,500	4239868,366	600,317	C
240239,500	4239868,366	600,282	C
240243,000	4239868,366	600,273	C
240257,000	4239868,366	600,238	C
240260,500	4239868,366	600,230	C
240274,500	4239868,366	600,195	C
240278,000	4239868,366	600,186	C
240292,000	4239868,366	600,151	C
240295,500	4239868,366	600,142	C
240309,500	4239868,366	600,107	C
240313,000	4239868,366	600,098	C
240327,000	4239868,366	600,063	C
240330,500	4239868,366	600,055	C
240344,500	4239868,366	600,020	C
240348,000	4239868,366	600,011	C
240362,000	4239868,366	599,976	C
240365,500	4239868,366	599,967	C
240379,500	4239868,366	599,932	C
240383,000	4239868,366	599,923	C
240397,000	4239868,366	599,888	C
240400,500	4239868,366	599,880	C
240414,500	4239868,366	599,845	C
240418,000	4239868,366	599,836	C
240432,000	4239868,366	599,801	C
240435,500	4239868,366	599,792	C
240449,500	4239868,366	599,757	C
240453,000	4239868,366	599,748	C
240467,000	4239868,366	599,713	C
240470,500	4239868,366	599,705	C
240484,500	4239868,366	599,670	C
240488,000	4239868,366	599,661	C
240502,000	4239868,366	599,626	C
240505,500	4239868,366	599,617	C
240519,500	4239868,366	599,582	C
240523,000	4239868,366	599,573	C
240537,000	4239868,366	599,538	C
240540,500	4239868,366	599,530	C
240554,500	4239868,366	599,495	C
240558,000	4239868,366	599,486	C
240572,000	4239868,366	599,451	C
240575,500	4239868,366	599,442	C

Coord. X	Coord. Y	Elevación	Código
240833,000	4240430,246	604,417	C
240829,500	4240430,246	604,426	C
240815,500	4240430,246	604,461	C
240812,000	4240430,246	604,470	C
240798,000	4240430,246	604,505	C
240794,500	4240430,246	604,513	C
240780,500	4240430,246	604,548	C
240777,000	4240430,246	604,557	C
240763,000	4240430,246	604,592	C
240759,500	4240430,246	604,601	C
240745,500	4240430,246	604,636	C
240742,000	4240430,246	604,645	C
240728,000	4240430,246	604,680	C
240724,500	4240430,246	604,688	C
240710,500	4240430,246	604,723	C
240707,000	4240430,246	604,732	C
240693,000	4240430,246	604,767	C
240689,500	4240430,246	604,776	C
240675,500	4240430,246	604,811	C
240672,000	4240430,246	604,820	C
240658,000	4240430,246	604,855	C
240654,500	4240430,246	604,863	C
240640,500	4240430,246	604,898	C
240637,000	4240430,246	604,907	C
240623,000	4240430,246	604,942	C
240619,500	4240430,246	604,951	C
240605,500	4240430,246	604,986	C
240602,000	4240430,246	604,995	C
240588,000	4240430,246	605,030	C
240584,500	4240430,246	605,038	C
240570,500	4240430,246	605,073	C
240567,000	4240430,246	605,082	C
240553,000	4240430,246	605,117	C
240549,500	4240430,246	605,126	C
240535,500	4240430,246	605,161	C
240532,000	4240430,246	605,170	C
240518,000	4240430,246	605,205	C
240514,500	4240430,246	605,213	C
240500,500	4240430,246	605,248	C
240497,000	4240430,246	605,257	C
240483,000	4240430,246	605,292	C
240479,500	4240430,246	605,301	C
240465,500	4240430,246	605,336	C
240462,000	4240430,246	605,345	C
240448,000	4240430,246	605,380	C
240444,500	4240430,246	605,388	C

Coord. X	Coord. Y	Elevación	Código
240589,500	4239868,366	599,407	C
240593,000	4239868,366	599,398	C
240607,000	4239868,366	599,363	C
240610,500	4239868,366	599,355	C
240624,500	4239868,366	599,320	C
240628,000	4239868,366	599,311	C
240642,000	4239868,366	599,276	C
240645,500	4239868,366	599,267	C
240659,500	4239868,366	599,232	C
240663,000	4239868,366	599,223	C
240677,000	4239868,366	599,188	C
240680,500	4239868,366	599,180	C
240694,500	4239868,366	599,145	C
240698,000	4239868,366	599,136	C
240712,000	4239868,366	599,101	C
240715,500	4239868,366	599,092	C
240729,500	4239868,366	599,057	C
240733,000	4239868,366	599,048	C
240747,000	4239868,366	599,013	C
240750,500	4239868,366	599,005	C
240764,500	4239868,366	598,970	C
240768,000	4239868,366	598,961	C
240768,000	4239860,313	598,880	C
240764,500	4239860,313	598,889	C
240750,500	4239860,313	598,924	C
240747,000	4239860,313	598,933	C
240733,000	4239860,313	598,968	C
240729,500	4239860,313	598,976	C
240715,500	4239860,313	599,011	C
240712,000	4239860,313	599,020	C
240698,000	4239860,313	599,055	C
240694,500	4239860,313	599,064	C
240680,500	4239860,313	599,099	C
240677,000	4239860,313	599,108	C
240663,000	4239860,313	599,143	C
240659,500	4239860,313	599,151	C
240645,500	4239860,313	599,186	C
240642,000	4239860,313	599,195	C
240628,000	4239860,313	599,230	C
240624,500	4239860,313	599,239	C
240610,500	4239860,313	599,274	C
240607,000	4239860,313	599,283	C
240593,000	4239860,313	599,318	C
240589,500	4239860,313	599,326	C
240575,500	4239860,313	599,361	C
240572,000	4239860,313	599,370	C

Coord. X	Coord. Y	Elevación	Código
240430,500	4240430,246	605,423	C
240427,000	4240430,246	605,432	C
240413,000	4240430,246	605,467	C
240409,500	4240430,246	605,476	C
240395,500	4240430,246	605,511	C
240392,000	4240430,246	605,520	C
240378,000	4240430,246	605,555	C
240374,500	4240430,246	605,563	C
240360,500	4240430,246	605,598	C
240357,000	4240430,246	605,607	C
240343,000	4240430,246	605,642	C
240339,500	4240430,246	605,651	C
240325,500	4240430,246	605,686	C
240322,000	4240430,246	605,695	C
240308,000	4240430,246	605,730	C
240304,500	4240430,246	605,738	C
240290,500	4240430,246	605,773	C
240287,000	4240430,246	605,782	C
240273,000	4240430,246	605,817	C
240269,500	4240430,246	605,826	C
240255,500	4240430,246	605,861	C
240252,000	4240430,246	605,870	C
240238,000	4240430,246	605,905	C
240234,500	4240430,246	605,913	C
240220,500	4240430,246	605,948	C
240217,000	4240430,246	605,957	C
240203,000	4240430,246	605,992	C
240199,500	4240430,246	606,001	C
240185,500	4240430,246	606,036	C
240182,000	4240430,246	606,045	C
240168,000	4240430,246	606,080	C
240164,500	4240430,246	606,088	C
240150,500	4240430,246	606,123	C
240147,000	4240430,246	606,132	C
240133,000	4240430,246	606,167	C
240129,500	4240430,246	606,176	C
240115,500	4240430,246	606,211	C
240112,000	4240430,246	606,220	C
240098,000	4240430,246	606,255	C
240094,500	4240430,246	606,263	C
240080,500	4240430,246	606,298	C
240077,000	4240430,246	606,307	C
240063,000	4240430,246	606,342	C
240059,500	4240430,246	606,351	C
240045,500	4240430,246	606,386	C
240042,000	4240430,246	606,395	C

Coord. X	Coord. Y	Elevación	Código
240558,000	4239860,313	599,405	C
240554,500	4239860,313	599,414	C
240540,500	4239860,313	599,449	C
240537,000	4239860,313	599,458	C
240523,000	4239860,313	599,493	C
240519,500	4239860,313	599,501	C
240505,500	4239860,313	599,536	C
240502,000	4239860,313	599,545	C
240488,000	4239860,313	599,580	C
240484,500	4239860,313	599,589	C
240470,500	4239860,313	599,624	C
240467,000	4239860,313	599,633	C
240453,000	4239860,313	599,668	C
240449,500	4239860,313	599,676	C
240435,500	4239860,313	599,711	C
240432,000	4239860,313	599,720	C
240418,000	4239860,313	599,755	C
240414,500	4239860,313	599,764	C
240400,500	4239860,313	599,799	C
240397,000	4239860,313	599,808	C
240383,000	4239860,313	599,843	C
240379,500	4239860,313	599,851	C
240365,500	4239860,313	599,886	C
240362,000	4239860,313	599,895	C
240348,000	4239860,313	599,930	C
240344,500	4239860,313	599,939	C
240330,500	4239860,313	599,974	C
240327,000	4239860,313	599,983	C
240313,000	4239860,313	600,018	C
240309,500	4239860,313	600,026	C
240295,500	4239860,313	600,061	C
240292,000	4239860,313	600,070	C
240278,000	4239860,313	600,105	C
240274,500	4239860,313	600,114	C
240260,500	4239860,313	600,149	C
240257,000	4239860,313	600,158	C
240243,000	4239860,313	600,193	C
240239,500	4239860,313	600,202	C
240225,500	4239860,313	600,237	C
240222,000	4239860,313	600,245	C
240208,000	4239860,313	600,280	C
240204,500	4239860,313	600,289	C
240190,500	4239860,313	600,324	C
240187,000	4239860,313	600,333	C
240173,000	4239860,313	600,368	C
240169,500	4239860,313	600,377	C

Coord. X	Coord. Y	Elevación	Código
240028,000	4240430,246	606,430	C
240024,500	4240430,246	606,438	C
240024,500	4240422,193	606,358	C
240028,000	4240422,193	606,349	C
240042,000	4240422,193	606,314	C
240045,500	4240422,193	606,305	C
240059,500	4240422,193	606,270	C
240063,000	4240422,193	606,262	C
240077,000	4240422,193	606,227	C
240080,500	4240422,193	606,218	C
240094,500	4240422,193	606,183	C
240098,000	4240422,193	606,174	C
240112,000	4240422,193	606,139	C
240115,500	4240422,193	606,130	C
240129,500	4240422,193	606,095	C
240133,000	4240422,193	606,087	C
240147,000	4240422,193	606,052	C
240150,500	4240422,193	606,043	C
240164,500	4240422,193	606,008	C
240168,000	4240422,193	605,999	C
240182,000	4240422,193	605,964	C
240185,500	4240422,193	605,955	C
240199,500	4240422,193	605,920	C
240203,000	4240422,193	605,912	C
240217,000	4240422,193	605,877	C
240220,500	4240422,193	605,868	C
240234,500	4240422,193	605,833	C
240238,000	4240422,193	605,824	C
240252,000	4240422,193	605,789	C
240255,500	4240422,193	605,780	C
240269,500	4240422,193	605,745	C
240273,000	4240422,193	605,737	C
240287,000	4240422,193	605,702	C
240290,500	4240422,193	605,693	C
240304,500	4240422,193	605,658	C
240308,000	4240422,193	605,649	C
240322,000	4240422,193	605,614	C
240325,500	4240422,193	605,605	C
240339,500	4240422,193	605,570	C
240343,000	4240422,193	605,562	C
240357,000	4240422,193	605,527	C
240360,500	4240422,193	605,518	C
240374,500	4240422,193	605,483	C
240378,000	4240422,193	605,474	C
240392,000	4240422,193	605,439	C
240395,500	4240422,193	605,430	C

Coord. X	Coord. Y	Elevación	Código
240155,500	4239860,313	600,412	C
240152,000	4239860,313	600,420	C
240138,000	4239860,313	600,455	C
240134,500	4239860,313	600,464	C
240120,500	4239860,313	600,499	C
240117,000	4239860,313	600,507	C
240103,000	4239860,313	600,542	C
240099,500	4239860,313	600,551	C
240085,500	4239860,313	600,586	C
240082,000	4239860,313	600,595	C
240068,000	4239860,313	600,630	C
240064,500	4239860,313	600,639	C
240050,500	4239860,313	600,674	C
240047,000	4239860,313	600,682	C
240033,000	4239860,313	600,717	C
240029,500	4239860,313	600,726	C
240015,500	4239860,313	600,761	C
240012,000	4239860,313	600,770	C
240012,000	4239856,313	600,730	C
240015,500	4239856,313	600,721	C
240029,500	4239856,313	600,686	C
240033,000	4239856,313	600,677	C
240047,000	4239856,313	600,642	C
240050,500	4239856,313	600,634	C
240064,500	4239856,313	600,599	C
240068,000	4239856,313	600,590	C
240082,000	4239856,313	600,555	C
240085,500	4239856,313	600,546	C
240099,500	4239856,313	600,511	C
240103,000	4239856,313	600,502	C
240117,000	4239856,313	600,467	C
240120,500	4239856,313	600,459	C
240134,500	4239856,313	600,424	C
240138,000	4239856,313	600,415	C
240152,000	4239856,313	600,380	C
240155,500	4239856,313	600,372	C
240169,500	4239856,313	600,337	C
240173,000	4239856,313	600,328	C
240187,000	4239856,313	600,293	C
240190,500	4239856,313	600,284	C
240204,500	4239856,313	600,249	C
240208,000	4239856,313	600,240	C
240222,000	4239856,313	600,205	C
240225,500	4239856,313	600,197	C
240239,500	4239856,313	600,162	C
240243,000	4239856,313	600,153	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240409,500	4240422,193	605,395	C	240257,000	4239856,313	600,118	C
240413,000	4240422,193	605,387	C	240260,500	4239856,313	600,109	C
240427,000	4240422,193	605,352	C	240274,500	4239856,313	600,074	C
240430,500	4240422,193	605,343	C	240278,000	4239856,313	600,065	C
240444,500	4240422,193	605,308	C	240292,000	4239856,313	600,030	C
240448,000	4240422,193	605,299	C	240295,500	4239856,313	600,021	C
240462,000	4240422,193	605,264	C	240309,500	4239856,313	599,986	C
240465,500	4240422,193	605,255	C	240313,000	4239856,313	599,978	C
240479,500	4240422,193	605,220	C	240327,000	4239856,313	599,943	C
240483,000	4240422,193	605,212	C	240330,500	4239856,313	599,934	C
240497,000	4240422,193	605,177	C	240344,500	4239856,313	599,899	C
240500,500	4240422,193	605,168	C	240348,000	4239856,313	599,890	C
240514,500	4240422,193	605,133	C	240362,000	4239856,313	599,855	C
240518,000	4240422,193	605,124	C	240365,500	4239856,313	599,846	C
240532,000	4240422,193	605,089	C	240379,500	4239856,313	599,811	C
240535,500	4240422,193	605,080	C	240383,000	4239856,313	599,803	C
240549,500	4240422,193	605,045	C	240397,000	4239856,313	599,768	C
240553,000	4240422,193	605,037	C	240400,500	4239856,313	599,759	C
240567,000	4240422,193	605,002	C	240414,500	4239856,313	599,724	C
240570,500	4240422,193	604,993	C	240418,000	4239856,313	599,715	C
240584,500	4240422,193	604,958	C	240432,000	4239856,313	599,680	C
240588,000	4240422,193	604,949	C	240435,500	4239856,313	599,671	C
240602,000	4240422,193	604,914	C	240449,500	4239856,313	599,636	C
240605,500	4240422,193	604,905	C	240453,000	4239856,313	599,628	C
240619,500	4240422,193	604,870	C	240467,000	4239856,313	599,593	C
240623,000	4240422,193	604,862	C	240470,500	4239856,313	599,584	C
240637,000	4240422,193	604,827	C	240484,500	4239856,313	599,549	C
240640,500	4240422,193	604,818	C	240488,000	4239856,313	599,540	C
240654,500	4240422,193	604,783	C	240502,000	4239856,313	599,505	C
240658,000	4240422,193	604,774	C	240505,500	4239856,313	599,496	C
240672,000	4240422,193	604,739	C	240519,500	4239856,313	599,461	C
240675,500	4240422,193	604,730	C	240523,000	4239856,313	599,453	C
240689,500	4240422,193	604,695	C	240537,000	4239856,313	599,418	C
240693,000	4240422,193	604,687	C	240540,500	4239856,313	599,409	C
240707,000	4240422,193	604,652	C	240554,500	4239856,313	599,374	C
240710,500	4240422,193	604,643	C	240558,000	4239856,313	599,365	C
240724,500	4240422,193	604,608	C	240572,000	4239856,313	599,330	C
240728,000	4240422,193	604,599	C	240575,500	4239856,313	599,321	C
240742,000	4240422,193	604,564	C	240589,500	4239856,313	599,286	C
240745,500	4240422,193	604,555	C	240593,000	4239856,313	599,278	C
240759,500	4240422,193	604,520	C	240607,000	4239856,313	599,243	C
240763,000	4240422,193	604,512	C	240610,500	4239856,313	599,234	C
240777,000	4240422,193	604,477	C	240624,500	4239856,313	599,199	C
240780,500	4240422,193	604,468	C	240628,000	4239856,313	599,190	C
240794,500	4240422,193	604,433	C	240642,000	4239856,313	599,155	C
240798,000	4240422,193	604,424	C	240645,500	4239856,313	599,146	C

Coord. X	Coord. Y	Elevación	Código
240812,000	4240422,193	604,389	C
240815,500	4240422,193	604,380	C
240829,500	4240422,193	604,345	C
240833,000	4240422,193	604,337	C
240847,000	4240422,193	604,302	C
240850,500	4240422,193	604,293	C
240864,500	4240422,193	604,258	C
240868,000	4240422,193	604,249	C
240882,000	4240422,193	604,214	C
240885,500	4240422,193	604,205	C
240899,500	4240422,193	604,170	C
240903,000	4240422,193	604,162	C
240917,000	4240422,193	604,127	C
240920,500	4240422,193	604,118	C
240934,500	4240422,193	604,083	C
240938,000	4240422,193	604,074	C
240952,000	4240422,193	604,039	C
240955,500	4240422,193	604,030	C
240969,500	4240422,193	603,995	C
240973,000	4240422,193	603,987	C
240987,000	4240422,193	603,952	C
240990,500	4240422,193	603,943	C
241004,500	4240422,193	603,908	C
241008,000	4240422,193	603,899	C
241022,000	4240422,193	603,864	C
241025,500	4240422,193	603,855	C
241039,500	4240422,193	603,820	C
241043,000	4240422,193	603,812	C
241057,000	4240422,193	603,777	C
241060,500	4240422,193	603,768	C
241074,500	4240422,193	603,733	C
241078,000	4240422,193	603,724	C
241092,000	4240422,193	603,689	C
241095,500	4240422,193	603,681	C
241109,500	4240422,193	603,646	C
241113,000	4240422,193	603,637	C
241127,000	4240422,193	603,602	C
241130,500	4240422,193	603,593	C
241144,500	4240422,193	603,558	C
241148,000	4240422,193	603,549	C
241162,000	4240422,193	603,514	C
241165,500	4240422,193	603,506	C
241179,500	4240422,193	603,471	C
241183,000	4240422,193	603,462	C
241197,000	4240422,193	603,427	C
241200,500	4240422,193	603,418	C

Coord. X	Coord. Y	Elevación	Código
240659,500	4239856,313	599,111	C
240663,000	4239856,313	599,103	C
240677,000	4239856,313	599,068	C
240680,500	4239856,313	599,059	C
240694,500	4239856,313	599,024	C
240698,000	4239856,313	599,015	C
240712,000	4239856,313	598,980	C
240715,500	4239856,313	598,971	C
240729,500	4239856,313	598,936	C
240733,000	4239856,313	598,928	C
240747,000	4239856,313	598,893	C
240750,500	4239856,313	598,884	C
240764,500	4239856,313	598,849	C
240768,000	4239856,313	598,840	C
240768,000	4239848,259	598,760	C
240764,500	4239848,259	598,768	C
240750,500	4239848,259	598,803	C
240747,000	4239848,259	598,812	C
240733,000	4239848,259	598,847	C
240729,500	4239848,259	598,856	C
240715,500	4239848,259	598,891	C
240712,000	4239848,259	598,900	C
240698,000	4239848,259	598,935	C
240694,500	4239848,259	598,943	C
240680,500	4239848,259	598,978	C
240677,000	4239848,259	598,987	C
240663,000	4239848,259	599,022	C
240659,500	4239848,259	599,031	C
240645,500	4239848,259	599,066	C
240642,000	4239848,259	599,075	C
240628,000	4239848,259	599,110	C
240624,500	4239848,259	599,118	C
240610,500	4239848,259	599,153	C
240607,000	4239848,259	599,162	C
240593,000	4239848,259	599,197	C
240589,500	4239848,259	599,206	C
240575,500	4239848,259	599,241	C
240572,000	4239848,259	599,250	C
240558,000	4239848,259	599,285	C
240554,500	4239848,259	599,293	C
240540,500	4239848,259	599,328	C
240537,000	4239848,259	599,337	C
240523,000	4239848,259	599,372	C
240519,500	4239848,259	599,381	C
240505,500	4239848,259	599,416	C
240502,000	4239848,259	599,425	C

Coord. X	Coord. Y	Elevación	Código
241214,500	4240422,193	603,383	C
241218,000	4240422,193	603,374	C
241232,000	4240422,193	603,339	C
241235,500	4240422,193	603,331	C
241249,500	4240422,193	603,296	C
241253,000	4240422,193	603,287	C
241267,000	4240422,193	603,252	C
241270,500	4240422,193	603,243	C
241284,500	4240422,193	603,208	C
241288,000	4240422,193	603,199	C
241302,000	4240422,193	603,164	C
241305,500	4240422,193	603,156	C
241319,500	4240422,193	603,121	C
241323,000	4240422,193	603,112	C
241337,000	4240422,193	603,077	C
241340,500	4240422,193	603,068	C
241354,500	4240422,193	603,033	C
241358,000	4240422,193	603,024	C
241372,000	4240422,193	602,989	C
241375,500	4240422,193	602,981	C
241389,500	4240422,193	602,946	C
241393,000	4240422,193	602,937	C
241407,000	4240422,193	602,902	C
241410,500	4240422,193	602,893	C
241424,500	4240422,193	602,858	C
241428,000	4240422,193	602,849	C
241442,000	4240422,193	602,814	C
241445,500	4240422,193	602,806	C
241459,500	4240422,193	602,771	C
241463,000	4240422,193	602,762	C
241477,000	4240422,193	602,727	C
241480,500	4240422,193	602,718	C
241494,500	4240422,193	602,683	C
241498,000	4240422,193	602,674	C
241512,000	4240422,193	602,639	C
241515,500	4240422,193	602,631	C
241529,500	4240422,193	602,596	C
241533,000	4240422,193	602,587	C
241547,000	4240422,193	602,552	C
241550,500	4240422,193	602,543	C
241564,500	4240422,193	602,508	C
241568,000	4240422,193	602,499	C
241582,000	4240422,193	602,464	C
241585,500	4240422,193	602,456	C
241599,500	4240422,193	602,421	C
241603,000	4240422,193	602,412	C

Coord. X	Coord. Y	Elevación	Código
240488,000	4239848,259	599,460	C
240484,500	4239848,259	599,468	C
240470,500	4239848,259	599,503	C
240467,000	4239848,259	599,512	C
240453,000	4239848,259	599,547	C
240449,500	4239848,259	599,556	C
240435,500	4239848,259	599,591	C
240432,000	4239848,259	599,600	C
240418,000	4239848,259	599,635	C
240414,500	4239848,259	599,643	C
240400,500	4239848,259	599,678	C
240397,000	4239848,259	599,687	C
240383,000	4239848,259	599,722	C
240379,500	4239848,259	599,731	C
240365,500	4239848,259	599,766	C
240362,000	4239848,259	599,775	C
240348,000	4239848,259	599,810	C
240344,500	4239848,259	599,818	C
240330,500	4239848,259	599,853	C
240327,000	4239848,259	599,862	C
240313,000	4239848,259	599,897	C
240309,500	4239848,259	599,906	C
240295,500	4239848,259	599,941	C
240292,000	4239848,259	599,950	C
240278,000	4239848,259	599,985	C
240274,500	4239848,259	599,993	C
240260,500	4239848,259	600,028	C
240257,000	4239848,259	600,037	C
240243,000	4239848,259	600,072	C
240239,500	4239848,259	600,081	C
240225,500	4239848,259	600,116	C
240222,000	4239848,259	600,125	C
240208,000	4239848,259	600,160	C
240204,500	4239848,259	600,168	C
240190,500	4239848,259	600,203	C
240187,000	4239848,259	600,212	C
240173,000	4239848,259	600,247	C
240169,500	4239848,259	600,256	C
240155,500	4239848,259	600,291	C
240152,000	4239848,259	600,300	C
240138,000	4239848,259	600,335	C
240134,500	4239848,259	600,343	C
240120,500	4239848,259	600,378	C
240117,000	4239848,259	600,387	C
240103,000	4239848,259	600,422	C
240099,500	4239848,259	600,431	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241617,000	4240422,193	602,377	C	240085,500	4239848,259	600,466	C
241620,500	4240422,193	602,368	C	240082,000	4239848,259	600,474	C
241634,500	4240422,193	602,333	C	240068,000	4239848,259	600,509	C
241638,000	4240422,193	602,324	C	240064,500	4239848,259	600,518	C
241652,000	4240422,193	602,289	C	240050,500	4239848,259	600,553	C
241655,500	4240422,193	602,281	C	240047,000	4239848,259	600,562	C
241669,500	4240422,193	602,246	C	240033,000	4239848,259	600,597	C
241673,000	4240422,193	602,237	C	240029,500	4239848,259	600,606	C
241687,000	4240422,193	602,202	C	240015,500	4239848,259	600,641	C
241690,500	4240422,193	602,193	C	240012,000	4239848,259	600,649	C
241704,500	4240422,193	602,158	C	240012,000	4239844,259	600,609	C
241708,000	4240422,193	602,149	C	240015,500	4239844,259	600,601	C
241722,000	4240422,193	602,114	C	240029,500	4239844,259	600,566	C
241725,500	4240422,193	602,106	C	240033,000	4239844,259	600,557	C
241739,500	4240422,193	602,071	C	240047,000	4239844,259	600,522	C
241743,000	4240422,193	602,062	C	240050,500	4239844,259	600,513	C
241757,000	4240422,193	602,027	C	240064,500	4239844,259	600,478	C
241760,500	4240422,193	602,018	C	240068,000	4239844,259	600,469	C
241760,500	4240418,193	601,978	C	240082,000	4239844,259	600,434	C
241757,000	4240418,193	601,987	C	240085,500	4239844,259	600,426	C
241743,000	4240418,193	602,022	C	240099,500	4239844,259	600,391	C
241739,500	4240418,193	602,031	C	240103,000	4239844,259	600,382	C
241725,500	4240418,193	602,066	C	240117,000	4239844,259	600,347	C
241722,000	4240418,193	602,074	C	240120,500	4239844,259	600,338	C
241708,000	4240418,193	602,109	C	240134,500	4239844,259	600,303	C
241704,500	4240418,193	602,118	C	240138,000	4239844,259	600,295	C
241690,500	4240418,193	602,153	C	240152,000	4239844,259	600,260	C
241687,000	4240418,193	602,162	C	240155,500	4239844,259	600,251	C
241673,000	4240418,193	602,197	C	240169,500	4239844,259	600,216	C
241669,500	4240418,193	602,206	C	240173,000	4239844,259	600,207	C
241655,500	4240418,193	602,241	C	240187,000	4239844,259	600,172	C
241652,000	4240418,193	602,249	C	240190,500	4239844,259	600,163	C
241638,000	4240418,193	602,284	C	240204,500	4239844,259	600,128	C
241634,500	4240418,193	602,293	C	240208,000	4239844,259	600,120	C
241620,500	4240418,193	602,328	C	240222,000	4239844,259	600,085	C
241617,000	4240418,193	602,337	C	240225,500	4239844,259	600,076	C
241603,000	4240418,193	602,372	C	240239,500	4239844,259	600,041	C
241599,500	4240418,193	602,381	C	240243,000	4239844,259	600,032	C
241585,500	4240418,193	602,416	C	240257,000	4239844,259	599,997	C
241582,000	4240418,193	602,424	C	240260,500	4239844,259	599,988	C
241568,000	4240418,193	602,459	C	240274,500	4239844,259	599,953	C
241564,500	4240418,193	602,468	C	240278,000	4239844,259	599,945	C
241550,500	4240418,193	602,503	C	240292,000	4239844,259	599,910	C
241547,000	4240418,193	602,512	C	240295,500	4239844,259	599,901	C
241533,000	4240418,193	602,547	C	240309,500	4239844,259	599,866	C
241529,500	4240418,193	602,556	C	240313,000	4239844,259	599,857	C

Coord. X	Coord. Y	Elevación	Código
241515,500	4240418,193	602,591	C
241512,000	4240418,193	602,599	C
241498,000	4240418,193	602,634	C
241494,500	4240418,193	602,643	C
241480,500	4240418,193	602,678	C
241477,000	4240418,193	602,687	C
241463,000	4240418,193	602,722	C
241459,500	4240418,193	602,731	C
241445,500	4240418,193	602,766	C
241442,000	4240418,193	602,774	C
241428,000	4240418,193	602,809	C
241424,500	4240418,193	602,818	C
241410,500	4240418,193	602,853	C
241407,000	4240418,193	602,862	C
241393,000	4240418,193	602,897	C
241389,500	4240418,193	602,906	C
241375,500	4240418,193	602,941	C
241372,000	4240418,193	602,949	C
241358,000	4240418,193	602,984	C
241354,500	4240418,193	602,993	C
241340,500	4240418,193	603,028	C
241337,000	4240418,193	603,037	C
241323,000	4240418,193	603,072	C
241319,500	4240418,193	603,081	C
241305,500	4240418,193	603,116	C
241302,000	4240418,193	603,124	C
241288,000	4240418,193	603,159	C
241284,500	4240418,193	603,168	C
241270,500	4240418,193	603,203	C
241267,000	4240418,193	603,212	C
241253,000	4240418,193	603,247	C
241249,500	4240418,193	603,256	C
241235,500	4240418,193	603,291	C
241232,000	4240418,193	603,299	C
241218,000	4240418,193	603,334	C
241214,500	4240418,193	603,343	C
241200,500	4240418,193	603,378	C
241197,000	4240418,193	603,387	C
241183,000	4240418,193	603,422	C
241179,500	4240418,193	603,431	C
241165,500	4240418,193	603,466	C
241162,000	4240418,193	603,474	C
241148,000	4240418,193	603,509	C
241144,500	4240418,193	603,518	C
241130,500	4240418,193	603,553	C
241127,000	4240418,193	603,562	C
240327,000	4239844,259	599,822	C
240330,500	4239844,259	599,813	C
240344,500	4239844,259	599,778	C
240348,000	4239844,259	599,770	C
240362,000	4239844,259	599,735	C
240365,500	4239844,259	599,726	C
240379,500	4239844,259	599,691	C
240383,000	4239844,259	599,682	C
240397,000	4239844,259	599,647	C
240400,500	4239844,259	599,638	C
240414,500	4239844,259	599,603	C
240418,000	4239844,259	599,595	C
240432,000	4239844,259	599,560	C
240435,500	4239844,259	599,551	C
240449,500	4239844,259	599,516	C
240453,000	4239844,259	599,507	C
240467,000	4239844,259	599,472	C
240470,500	4239844,259	599,463	C
240484,500	4239844,259	599,428	C
240488,000	4239844,259	599,420	C
240502,000	4239844,259	599,385	C
240505,500	4239844,259	599,376	C
240519,500	4239844,259	599,341	C
240523,000	4239844,259	599,332	C
240537,000	4239844,259	599,297	C
240540,500	4239844,259	599,288	C
240554,500	4239844,259	599,253	C
240558,000	4239844,259	599,245	C
240572,000	4239844,259	599,210	C
240575,500	4239844,259	599,201	C
240589,500	4239844,259	599,166	C
240593,000	4239844,259	599,157	C
240607,000	4239844,259	599,122	C
240610,500	4239844,259	599,113	C
240624,500	4239844,259	599,078	C
240628,000	4239844,259	599,070	C
240642,000	4239844,259	599,035	C
240645,500	4239844,259	599,026	C
240659,500	4239844,259	598,991	C
240663,000	4239844,259	598,982	C
240677,000	4239844,259	598,947	C
240680,500	4239844,259	598,938	C
240694,500	4239844,259	598,903	C
240698,000	4239844,259	598,895	C
240712,000	4239844,259	598,860	C
240715,500	4239844,259	598,851	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241113,000	4240418,193	603,597	C	240729,500	4239844,259	598,816	C
241109,500	4240418,193	603,606	C	240733,000	4239844,259	598,807	C
241095,500	4240418,193	603,641	C	240747,000	4239844,259	598,772	C
241092,000	4240418,193	603,649	C	240750,500	4239844,259	598,763	C
241078,000	4240418,193	603,684	C	240764,500	4239844,259	598,728	C
241074,500	4240418,193	603,693	C	240768,000	4239844,259	598,720	C
241060,500	4240418,193	603,728	C	240768,000	4239835,205	598,629	C
241057,000	4240418,193	603,737	C	240764,500	4239835,205	598,638	C
241043,000	4240418,193	603,772	C	240750,500	4239835,205	598,673	C
241039,500	4240418,193	603,780	C	240747,000	4239835,205	598,682	C
241025,500	4240418,193	603,815	C	240733,000	4239835,205	598,717	C
241022,000	4240418,193	603,824	C	240729,500	4239835,205	598,725	C
241008,000	4240418,193	603,859	C	240715,500	4239835,205	598,760	C
241004,500	4240418,193	603,868	C	240712,000	4239835,205	598,769	C
240990,500	4240418,193	603,903	C	240698,000	4239835,205	598,804	C
240987,000	4240418,193	603,912	C	240694,500	4239835,205	598,813	C
240973,000	4240418,193	603,947	C	240680,500	4239835,205	598,848	C
240969,500	4240418,193	603,955	C	240677,000	4239835,205	598,857	C
240955,500	4240418,193	603,990	C	240663,000	4239835,205	598,892	C
240952,000	4240418,193	603,999	C	240659,500	4239835,205	598,900	C
240938,000	4240418,193	604,034	C	240645,500	4239835,205	598,935	C
240934,500	4240418,193	604,043	C	240642,000	4239835,205	598,944	C
240920,500	4240418,193	604,078	C	240628,000	4239835,205	598,979	C
240917,000	4240418,193	604,087	C	240624,500	4239835,205	598,988	C
240903,000	4240418,193	604,122	C	240610,500	4239835,205	599,023	C
240899,500	4240418,193	604,130	C	240607,000	4239835,205	599,032	C
240885,500	4240418,193	604,165	C	240593,000	4239835,205	599,067	C
240882,000	4240418,193	604,174	C	240589,500	4239835,205	599,075	C
240868,000	4240418,193	604,209	C	240575,500	4239835,205	599,110	C
240864,500	4240418,193	604,218	C	240572,000	4239835,205	599,119	C
240850,500	4240418,193	604,253	C	240558,000	4239835,205	599,154	C
240847,000	4240418,193	604,262	C	240554,500	4239835,205	599,163	C
240833,000	4240418,193	604,297	C	240540,500	4239835,205	599,198	C
240829,500	4240418,193	604,305	C	240537,000	4239835,205	599,207	C
240815,500	4240418,193	604,340	C	240523,000	4239835,205	599,242	C
240812,000	4240418,193	604,349	C	240519,500	4239835,205	599,250	C
240798,000	4240418,193	604,384	C	240505,500	4239835,205	599,285	C
240794,500	4240418,193	604,393	C	240502,000	4239835,205	599,294	C
240780,500	4240418,193	604,428	C	240488,000	4239835,205	599,329	C
240777,000	4240418,193	604,437	C	240484,500	4239835,205	599,338	C
240763,000	4240418,193	604,472	C	240470,500	4239835,205	599,373	C
240759,500	4240418,193	604,480	C	240467,000	4239835,205	599,382	C
240745,500	4240418,193	604,515	C	240453,000	4239835,205	599,417	C
240742,000	4240418,193	604,524	C	240449,500	4239835,205	599,425	C
240728,000	4240418,193	604,559	C	240435,500	4239835,205	599,460	C
240724,500	4240418,193	604,568	C	240432,000	4239835,205	599,469	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240710,500	4240418,193	604,603	C	240418,000	4239835,205	599,504	C
240707,000	4240418,193	604,612	C	240414,500	4239835,205	599,513	C
240693,000	4240418,193	604,647	C	240400,500	4239835,205	599,548	C
240689,500	4240418,193	604,655	C	240397,000	4239835,205	599,557	C
240675,500	4240418,193	604,690	C	240383,000	4239835,205	599,592	C
240672,000	4240418,193	604,699	C	240379,500	4239835,205	599,600	C
240658,000	4240418,193	604,734	C	240365,500	4239835,205	599,635	C
240654,500	4240418,193	604,743	C	240362,000	4239835,205	599,644	C
240640,500	4240418,193	604,778	C	240348,000	4239835,205	599,679	C
240637,000	4240418,193	604,787	C	240344,500	4239835,205	599,688	C
240623,000	4240418,193	604,822	C	240330,500	4239835,205	599,723	C
240619,500	4240418,193	604,830	C	240327,000	4239835,205	599,732	C
240605,500	4240418,193	604,865	C	240313,000	4239835,205	599,767	C
240602,000	4240418,193	604,874	C	240309,500	4239835,205	599,775	C
240588,000	4240418,193	604,909	C	240295,500	4239835,205	599,810	C
240584,500	4240418,193	604,918	C	240292,000	4239835,205	599,819	C
240570,500	4240418,193	604,953	C	240278,000	4239835,205	599,854	C
240567,000	4240418,193	604,962	C	240274,500	4239835,205	599,863	C
240553,000	4240418,193	604,997	C	240260,500	4239835,205	599,898	C
240549,500	4240418,193	605,005	C	240257,000	4239835,205	599,907	C
240535,500	4240418,193	605,040	C	240243,000	4239835,205	599,942	C
240532,000	4240418,193	605,049	C	240239,500	4239835,205	599,950	C
240518,000	4240418,193	605,084	C	240225,500	4239835,205	599,985	C
240514,500	4240418,193	605,093	C	240222,000	4239835,205	599,994	C
240500,500	4240418,193	605,128	C	240208,000	4239835,205	600,029	C
240497,000	4240418,193	605,137	C	240204,500	4239835,205	600,038	C
240483,000	4240418,193	605,172	C	240190,500	4239835,205	600,073	C
240479,500	4240418,193	605,180	C	240187,000	4239835,205	600,082	C
240465,500	4240418,193	605,215	C	240173,000	4239835,205	600,117	C
240462,000	4240418,193	605,224	C	240169,500	4239835,205	600,125	C
240448,000	4240418,193	605,259	C	240155,500	4239835,205	600,160	C
240444,500	4240418,193	605,268	C	240152,000	4239835,205	600,169	C
240430,500	4240418,193	605,303	C	240138,000	4239835,205	600,204	C
240427,000	4240418,193	605,312	C	240134,500	4239835,205	600,213	C
240413,000	4240418,193	605,347	C	240120,500	4239835,205	600,248	C
240409,500	4240418,193	605,355	C	240117,000	4239835,205	600,256	C
240395,500	4240418,193	605,390	C	240103,000	4239835,205	600,291	C
240392,000	4240418,193	605,399	C	240099,500	4239835,205	600,300	C
240378,000	4240418,193	605,434	C	240085,500	4239835,205	600,335	C
240374,500	4240418,193	605,443	C	240082,000	4239835,205	600,344	C
240360,500	4240418,193	605,478	C	240068,000	4239835,205	600,379	C
240357,000	4240418,193	605,487	C	240064,500	4239835,205	600,388	C
240343,000	4240418,193	605,522	C	240050,500	4239835,205	600,423	C
240339,500	4240418,193	605,530	C	240047,000	4239835,205	600,431	C
240325,500	4240418,193	605,565	C	240033,000	4239835,205	600,466	C
240322,000	4240418,193	605,574	C	240029,500	4239835,205	600,475	C

Coord. X	Coord. Y	Elevación	Código
240308,000	4240418,193	605,609	C
240304,500	4240418,193	605,618	C
240290,500	4240418,193	605,653	C
240287,000	4240418,193	605,662	C
240273,000	4240418,193	605,697	C
240269,500	4240418,193	605,705	C
240255,500	4240418,193	605,740	C
240252,000	4240418,193	605,749	C
240238,000	4240418,193	605,784	C
240234,500	4240418,193	605,793	C
240220,500	4240418,193	605,828	C
240217,000	4240418,193	605,837	C
240203,000	4240418,193	605,872	C
240199,500	4240418,193	605,880	C
240185,500	4240418,193	605,915	C
240182,000	4240418,193	605,924	C
240168,000	4240418,193	605,959	C
240164,500	4240418,193	605,968	C
240150,500	4240418,193	606,003	C
240147,000	4240418,193	606,012	C
240133,000	4240418,193	606,047	C
240129,500	4240418,193	606,055	C
240115,500	4240418,193	606,090	C
240112,000	4240418,193	606,099	C
240098,000	4240418,193	606,134	C
240094,500	4240418,193	606,143	C
240080,500	4240418,193	606,178	C
240077,000	4240418,193	606,187	C
240063,000	4240418,193	606,222	C
240059,500	4240418,193	606,230	C
240045,500	4240418,193	606,265	C
240042,000	4240418,193	606,274	C
240028,000	4240418,193	606,309	C
240024,500	4240418,193	606,318	C
240024,500	4240410,139	606,237	C
240028,000	4240410,139	606,228	C
240042,000	4240410,139	606,193	C
240045,500	4240410,139	606,185	C
240059,500	4240410,139	606,150	C
240063,000	4240410,139	606,141	C
240077,000	4240410,139	606,106	C
240080,500	4240410,139	606,097	C
240094,500	4240410,139	606,062	C
240098,000	4240410,139	606,053	C
240112,000	4240410,139	606,018	C
240115,500	4240410,139	606,010	C

Coord. X	Coord. Y	Elevación	Código
240015,500	4239835,205	600,510	C
240012,000	4239835,205	600,519	C
240012,000	4239832,055	600,487	C
240015,500	4239832,055	600,479	C
240029,500	4239832,055	600,444	C
240033,000	4239832,055	600,435	C
240047,000	4239832,055	600,400	C
240050,500	4239832,055	600,391	C
240064,500	4239832,055	600,356	C
240068,000	4239832,055	600,347	C
240082,000	4239832,055	600,312	C
240085,500	4239832,055	600,304	C
240099,500	4239832,055	600,269	C
240103,000	4239832,055	600,260	C
240117,000	4239832,055	600,225	C
240120,500	4239832,055	600,216	C
240134,500	4239832,055	600,181	C
240138,000	4239832,055	600,172	C
240152,000	4239832,055	600,138	C
240155,500	4239832,055	600,129	C
240169,500	4239832,055	600,094	C
240173,000	4239832,055	600,085	C
240187,000	4239832,055	600,050	C
240190,500	4239832,055	600,041	C
240204,500	4239832,055	600,006	C
240208,000	4239832,055	599,998	C
240222,000	4239832,055	599,963	C
240225,500	4239832,055	599,954	C
240239,500	4239832,055	599,919	C
240243,000	4239832,055	599,910	C
240257,000	4239832,055	599,875	C
240260,500	4239832,055	599,866	C
240274,500	4239832,055	599,831	C
240278,000	4239832,055	599,823	C
240292,000	4239832,055	599,788	C
240295,500	4239832,055	599,779	C
240309,500	4239832,055	599,744	C
240313,000	4239832,055	599,735	C
240327,000	4239832,055	599,700	C
240330,500	4239832,055	599,691	C
240344,500	4239832,055	599,656	C
240348,000	4239832,055	599,648	C
240362,000	4239832,055	599,613	C
240365,500	4239832,055	599,604	C
240379,500	4239832,055	599,569	C
240383,000	4239832,055	599,560	C

Coord. X	Coord. Y	Elevación	Código
240129,500	4240410,139	605,975	C
240133,000	4240410,139	605,966	C
240147,000	4240410,139	605,931	C
240150,500	4240410,139	605,922	C
240164,500	4240410,139	605,887	C
240168,000	4240410,139	605,879	C
240182,000	4240410,139	605,844	C
240185,500	4240410,139	605,835	C
240199,500	4240410,139	605,800	C
240203,000	4240410,139	605,791	C
240217,000	4240410,139	605,756	C
240220,500	4240410,139	605,747	C
240234,500	4240410,139	605,712	C
240238,000	4240410,139	605,704	C
240252,000	4240410,139	605,669	C
240255,500	4240410,139	605,660	C
240269,500	4240410,139	605,625	C
240273,000	4240410,139	605,616	C
240287,000	4240410,139	605,581	C
240290,500	4240410,139	605,572	C
240304,500	4240410,139	605,537	C
240308,000	4240410,139	605,529	C
240322,000	4240410,139	605,494	C
240325,500	4240410,139	605,485	C
240339,500	4240410,139	605,450	C
240343,000	4240410,139	605,441	C
240357,000	4240410,139	605,406	C
240360,500	4240410,139	605,397	C
240374,500	4240410,139	605,362	C
240378,000	4240410,139	605,354	C
240392,000	4240410,139	605,319	C
240395,500	4240410,139	605,310	C
240409,500	4240410,139	605,275	C
240413,000	4240410,139	605,266	C
240427,000	4240410,139	605,231	C
240430,500	4240410,139	605,222	C
240444,500	4240410,139	605,187	C
240448,000	4240410,139	605,179	C
240462,000	4240410,139	605,144	C
240465,500	4240410,139	605,135	C
240479,500	4240410,139	605,100	C
240483,000	4240410,139	605,091	C
240497,000	4240410,139	605,056	C
240500,500	4240410,139	605,047	C
240514,500	4240410,139	605,012	C
240518,000	4240410,139	605,004	C

Coord. X	Coord. Y	Elevación	Código
240397,000	4239832,055	599,525	C
240400,500	4239832,055	599,516	C
240414,500	4239832,055	599,481	C
240418,000	4239832,055	599,473	C
240432,000	4239832,055	599,438	C
240435,500	4239832,055	599,429	C
240449,500	4239832,055	599,394	C
240453,000	4239832,055	599,385	C
240467,000	4239832,055	599,350	C
240470,500	4239832,055	599,341	C
240484,500	4239832,055	599,306	C
240488,000	4239832,055	599,298	C
240502,000	4239832,055	599,263	C
240505,500	4239832,055	599,254	C
240519,500	4239832,055	599,219	C
240523,000	4239832,055	599,210	C
240537,000	4239832,055	599,175	C
240540,500	4239832,055	599,166	C
240554,500	4239832,055	599,131	C
240558,000	4239832,055	599,123	C
240572,000	4239832,055	599,088	C
240575,500	4239832,055	599,079	C
240589,500	4239832,055	599,044	C
240593,000	4239832,055	599,035	C
240607,000	4239832,055	599,000	C
240610,500	4239832,055	598,991	C
240624,500	4239832,055	598,956	C
240628,000	4239832,055	598,948	C
240642,000	4239832,055	598,913	C
240645,500	4239832,055	598,904	C
240659,500	4239832,055	598,869	C
240663,000	4239832,055	598,860	C
240677,000	4239832,055	598,825	C
240680,500	4239832,055	598,816	C
240694,500	4239832,055	598,781	C
240698,000	4239832,055	598,773	C
240712,000	4239832,055	598,738	C
240715,500	4239832,055	598,729	C
240729,500	4239832,055	598,694	C
240733,000	4239832,055	598,685	C
240747,000	4239832,055	598,650	C
240750,500	4239832,055	598,641	C
240764,500	4239832,055	598,606	C
240768,000	4239832,055	598,598	C
240768,000	4239823,001	598,507	C
240764,500	4239823,001	598,516	C

Coord. X	Coord. Y	Elevación	Código
240532,000	4240410,139	604,969	C
240535,500	4240410,139	604,960	C
240549,500	4240410,139	604,925	C
240553,000	4240410,139	604,916	C
240567,000	4240410,139	604,881	C
240570,500	4240410,139	604,872	C
240584,500	4240410,139	604,837	C
240588,000	4240410,139	604,829	C
240602,000	4240410,139	604,794	C
240605,500	4240410,139	604,785	C
240619,500	4240410,139	604,750	C
240623,000	4240410,139	604,741	C
240637,000	4240410,139	604,706	C
240640,500	4240410,139	604,697	C
240654,500	4240410,139	604,662	C
240658,000	4240410,139	604,654	C
240672,000	4240410,139	604,619	C
240675,500	4240410,139	604,610	C
240689,500	4240410,139	604,575	C
240693,000	4240410,139	604,566	C
240707,000	4240410,139	604,531	C
240710,500	4240410,139	604,522	C
240724,500	4240410,139	604,487	C
240728,000	4240410,139	604,479	C
240742,000	4240410,139	604,444	C
240745,500	4240410,139	604,435	C
240759,500	4240410,139	604,400	C
240763,000	4240410,139	604,391	C
240777,000	4240410,139	604,356	C
240780,500	4240410,139	604,347	C
240794,500	4240410,139	604,312	C
240798,000	4240410,139	604,304	C
240812,000	4240410,139	604,269	C
240815,500	4240410,139	604,260	C
240829,500	4240410,139	604,225	C
240833,000	4240410,139	604,216	C
240847,000	4240410,139	604,181	C
240850,500	4240410,139	604,172	C
240864,500	4240410,139	604,137	C
240868,000	4240410,139	604,129	C
240882,000	4240410,139	604,094	C
240885,500	4240410,139	604,085	C
240899,500	4240410,139	604,050	C
240903,000	4240410,139	604,041	C
240917,000	4240410,139	604,006	C
240920,500	4240410,139	603,997	C

Coord. X	Coord. Y	Elevación	Código
240750,500	4239823,001	598,551	C
240747,000	4239823,001	598,560	C
240733,000	4239823,001	598,595	C
240729,500	4239823,001	598,603	C
240715,500	4239823,001	598,638	C
240712,000	4239823,001	598,647	C
240698,000	4239823,001	598,682	C
240694,500	4239823,001	598,691	C
240680,500	4239823,001	598,726	C
240677,000	4239823,001	598,735	C
240663,000	4239823,001	598,770	C
240659,500	4239823,001	598,778	C
240645,500	4239823,001	598,813	C
240642,000	4239823,001	598,822	C
240628,000	4239823,001	598,857	C
240624,500	4239823,001	598,866	C
240610,500	4239823,001	598,901	C
240607,000	4239823,001	598,910	C
240593,000	4239823,001	598,945	C
240589,500	4239823,001	598,953	C
240575,500	4239823,001	598,988	C
240572,000	4239823,001	598,997	C
240558,000	4239823,001	599,032	C
240554,500	4239823,001	599,041	C
240540,500	4239823,001	599,076	C
240537,000	4239823,001	599,085	C
240523,000	4239823,001	599,120	C
240519,500	4239823,001	599,128	C
240505,500	4239823,001	599,163	C
240502,000	4239823,001	599,172	C
240488,000	4239823,001	599,207	C
240484,500	4239823,001	599,216	C
240470,500	4239823,001	599,251	C
240467,000	4239823,001	599,260	C
240453,000	4239823,001	599,295	C
240449,500	4239823,001	599,303	C
240435,500	4239823,001	599,338	C
240432,000	4239823,001	599,347	C
240418,000	4239823,001	599,382	C
240414,500	4239823,001	599,391	C
240400,500	4239823,001	599,426	C
240397,000	4239823,001	599,435	C
240383,000	4239823,001	599,470	C
240379,500	4239823,001	599,478	C
240365,500	4239823,001	599,513	C
240362,000	4239823,001	599,522	C

Coord. X	Coord. Y	Elevación	Código
240934,500	4240410,139	603,962	C
240938,000	4240410,139	603,954	C
240952,000	4240410,139	603,919	C
240955,500	4240410,139	603,910	C
240969,500	4240410,139	603,875	C
240973,000	4240410,139	603,866	C
240987,000	4240410,139	603,831	C
240990,500	4240410,139	603,822	C
241004,500	4240410,139	603,787	C
241008,000	4240410,139	603,779	C
241022,000	4240410,139	603,744	C
241025,500	4240410,139	603,735	C
241039,500	4240410,139	603,700	C
241043,000	4240410,139	603,691	C
241057,000	4240410,139	603,656	C
241060,500	4240410,139	603,647	C
241074,500	4240410,139	603,612	C
241078,000	4240410,139	603,604	C
241092,000	4240410,139	603,569	C
241095,500	4240410,139	603,560	C
241109,500	4240410,139	603,525	C
241113,000	4240410,139	603,516	C
241127,000	4240410,139	603,481	C
241130,500	4240410,139	603,472	C
241144,500	4240410,139	603,437	C
241148,000	4240410,139	603,429	C
241162,000	4240410,139	603,394	C
241165,500	4240410,139	603,385	C
241179,500	4240410,139	603,350	C
241183,000	4240410,139	603,341	C
241197,000	4240410,139	603,306	C
241200,500	4240410,139	603,297	C
241214,500	4240410,139	603,262	C
241218,000	4240410,139	603,254	C
241232,000	4240410,139	603,219	C
241235,500	4240410,139	603,210	C
241249,500	4240410,139	603,175	C
241253,000	4240410,139	603,166	C
241267,000	4240410,139	603,131	C
241270,500	4240410,139	603,123	C
241284,500	4240410,139	603,088	C
241288,000	4240410,139	603,079	C
241302,000	4240410,139	603,044	C
241305,500	4240410,139	603,035	C
241319,500	4240410,139	603,000	C
241323,000	4240410,139	602,991	C

Coord. X	Coord. Y	Elevación	Código
240348,000	4239823,001	599,557	C
240344,500	4239823,001	599,566	C
240330,500	4239823,001	599,601	C
240327,000	4239823,001	599,610	C
240313,000	4239823,001	599,645	C
240309,500	4239823,001	599,653	C
240295,500	4239823,001	599,688	C
240292,000	4239823,001	599,697	C
240278,000	4239823,001	599,732	C
240274,500	4239823,001	599,741	C
240260,500	4239823,001	599,776	C
240257,000	4239823,001	599,785	C
240243,000	4239823,001	599,820	C
240239,500	4239823,001	599,828	C
240225,500	4239823,001	599,863	C
240222,000	4239823,001	599,872	C
240208,000	4239823,001	599,907	C
240204,500	4239823,001	599,916	C
240190,500	4239823,001	599,951	C
240187,000	4239823,001	599,960	C
240173,000	4239823,001	599,995	C
240169,500	4239823,001	600,003	C
240155,500	4239823,001	600,038	C
240152,000	4239823,001	600,047	C
240138,000	4239823,001	600,082	C
240134,500	4239823,001	600,091	C
240120,500	4239823,001	600,126	C
240117,000	4239823,001	600,134	C
240103,000	4239823,001	600,169	C
240099,500	4239823,001	600,178	C
240085,500	4239823,001	600,213	C
240082,000	4239823,001	600,222	C
240068,000	4239823,001	600,257	C
240064,500	4239823,001	600,266	C
240050,500	4239823,001	600,301	C
240047,000	4239823,001	600,309	C
240033,000	4239823,001	600,344	C
240029,500	4239823,001	600,353	C
240015,500	4239823,001	600,388	C
240012,000	4239823,001	600,397	C
240012,000	4239819,001	600,357	C
240015,500	4239819,001	600,348	C
240029,500	4239819,001	600,313	C
240033,000	4239819,001	600,304	C
240047,000	4239819,001	600,269	C
240050,500	4239819,001	600,261	C

Coord. X	Coord. Y	Elevación	Código
241337,000	4240410,139	602,956	C
241340,500	4240410,139	602,948	C
241354,500	4240410,139	602,913	C
241358,000	4240410,139	602,904	C
241372,000	4240410,139	602,869	C
241375,500	4240410,139	602,860	C
241389,500	4240410,139	602,825	C
241393,000	4240410,139	602,816	C
241407,000	4240410,139	602,781	C
241410,500	4240410,139	602,773	C
241424,500	4240410,139	602,738	C
241428,000	4240410,139	602,729	C
241442,000	4240410,139	602,694	C
241445,500	4240410,139	602,685	C
241459,500	4240410,139	602,650	C
241463,000	4240410,139	602,641	C
241477,000	4240410,139	602,606	C
241480,500	4240410,139	602,598	C
241494,500	4240410,139	602,563	C
241498,000	4240410,139	602,554	C
241512,000	4240410,139	602,519	C
241515,500	4240410,139	602,510	C
241529,500	4240410,139	602,475	C
241533,000	4240410,139	602,466	C
241547,000	4240410,139	602,431	C
241550,500	4240410,139	602,423	C
241564,500	4240410,139	602,388	C
241568,000	4240410,139	602,379	C
241582,000	4240410,139	602,344	C
241585,500	4240410,139	602,335	C
241599,500	4240410,139	602,300	C
241603,000	4240410,139	602,291	C
241617,000	4240410,139	602,256	C
241620,500	4240410,139	602,248	C
241634,500	4240410,139	602,213	C
241638,000	4240410,139	602,204	C
241652,000	4240410,139	602,169	C
241655,500	4240410,139	602,160	C
241669,500	4240410,139	602,125	C
241673,000	4240410,139	602,116	C
241687,000	4240410,139	602,081	C
241690,500	4240410,139	602,073	C
241704,500	4240410,139	602,038	C
241708,000	4240410,139	602,029	C
241722,000	4240410,139	601,994	C
241725,500	4240410,139	601,985	C

Coord. X	Coord. Y	Elevación	Código
240064,500	4239819,001	600,226	C
240068,000	4239819,001	600,217	C
240082,000	4239819,001	600,182	C
240085,500	4239819,001	600,173	C
240099,500	4239819,001	600,138	C
240103,000	4239819,001	600,129	C
240117,000	4239819,001	600,094	C
240120,500	4239819,001	600,086	C
240134,500	4239819,001	600,051	C
240138,000	4239819,001	600,042	C
240152,000	4239819,001	600,007	C
240155,500	4239819,001	599,998	C
240169,500	4239819,001	599,963	C
240173,000	4239819,001	599,955	C
240187,000	4239819,001	599,920	C
240190,500	4239819,001	599,911	C
240204,500	4239819,001	599,876	C
240208,000	4239819,001	599,867	C
240222,000	4239819,001	599,832	C
240225,500	4239819,001	599,823	C
240239,500	4239819,001	599,788	C
240243,000	4239819,001	599,780	C
240257,000	4239819,001	599,745	C
240260,500	4239819,001	599,736	C
240274,500	4239819,001	599,701	C
240278,000	4239819,001	599,692	C
240292,000	4239819,001	599,657	C
240295,500	4239819,001	599,648	C
240309,500	4239819,001	599,613	C
240313,000	4239819,001	599,605	C
240327,000	4239819,001	599,570	C
240330,500	4239819,001	599,561	C
240344,500	4239819,001	599,526	C
240348,000	4239819,001	599,517	C
240362,000	4239819,001	599,482	C
240365,500	4239819,001	599,473	C
240379,500	4239819,001	599,438	C
240383,000	4239819,001	599,430	C
240397,000	4239819,001	599,395	C
240400,500	4239819,001	599,386	C
240414,500	4239819,001	599,351	C
240418,000	4239819,001	599,342	C
240432,000	4239819,001	599,307	C
240435,500	4239819,001	599,298	C
240449,500	4239819,001	599,263	C
240453,000	4239819,001	599,255	C

Coord. X	Coord. Y	Elevación	Código
241739,500	4240410,139	601,950	C
241743,000	4240410,139	601,941	C
241757,000	4240410,139	601,906	C
241760,500	4240410,139	601,898	C
241760,500	4240406,139	601,858	C
241757,000	4240406,139	601,866	C
241743,000	4240406,139	601,901	C
241739,500	4240406,139	601,910	C
241725,500	4240406,139	601,945	C
241722,000	4240406,139	601,954	C
241708,000	4240406,139	601,989	C
241704,500	4240406,139	601,998	C
241690,500	4240406,139	602,033	C
241687,000	4240406,139	602,041	C
241673,000	4240406,139	602,076	C
241669,500	4240406,139	602,085	C
241655,500	4240406,139	602,120	C
241652,000	4240406,139	602,129	C
241638,000	4240406,139	602,164	C
241634,500	4240406,139	602,173	C
241620,500	4240406,139	602,208	C
241617,000	4240406,139	602,216	C
241603,000	4240406,139	602,251	C
241599,500	4240406,139	602,260	C
241585,500	4240406,139	602,295	C
241582,000	4240406,139	602,304	C
241568,000	4240406,139	602,339	C
241564,500	4240406,139	602,348	C
241550,500	4240406,139	602,383	C
241547,000	4240406,139	602,391	C
241533,000	4240406,139	602,426	C
241529,500	4240406,139	602,435	C
241515,500	4240406,139	602,470	C
241512,000	4240406,139	602,479	C
241498,000	4240406,139	602,514	C
241494,500	4240406,139	602,523	C
241480,500	4240406,139	602,558	C
241477,000	4240406,139	602,566	C
241463,000	4240406,139	602,601	C
241459,500	4240406,139	602,610	C
241445,500	4240406,139	602,645	C
241442,000	4240406,139	602,654	C
241428,000	4240406,139	602,689	C
241424,500	4240406,139	602,698	C
241410,500	4240406,139	602,733	C
241407,000	4240406,139	602,741	C

Coord. X	Coord. Y	Elevación	Código
240467,000	4239819,001	599,220	C
240470,500	4239819,001	599,211	C
240484,500	4239819,001	599,176	C
240488,000	4239819,001	599,167	C
240502,000	4239819,001	599,132	C
240505,500	4239819,001	599,123	C
240519,500	4239819,001	599,088	C
240523,000	4239819,001	599,080	C
240537,000	4239819,001	599,045	C
240540,500	4239819,001	599,036	C
240554,500	4239819,001	599,001	C
240558,000	4239819,001	598,992	C
240572,000	4239819,001	598,957	C
240575,500	4239819,001	598,948	C
240589,500	4239819,001	598,913	C
240593,000	4239819,001	598,905	C
240607,000	4239819,001	598,870	C
240610,500	4239819,001	598,861	C
240624,500	4239819,001	598,826	C
240628,000	4239819,001	598,817	C
240642,000	4239819,001	598,782	C
240645,500	4239819,001	598,773	C
240659,500	4239819,001	598,738	C
240663,000	4239819,001	598,730	C
240677,000	4239819,001	598,695	C
240680,500	4239819,001	598,686	C
240694,500	4239819,001	598,651	C
240698,000	4239819,001	598,642	C
240712,000	4239819,001	598,607	C
240715,500	4239819,001	598,598	C
240729,500	4239819,001	598,563	C
240733,000	4239819,001	598,555	C
240747,000	4239819,001	598,520	C
240750,500	4239819,001	598,511	C
240764,500	4239819,001	598,476	C
240768,000	4239819,001	598,467	C
240768,000	4239810,948	598,387	C
240764,500	4239810,948	598,395	C
240750,500	4239810,948	598,430	C
240747,000	4239810,948	598,439	C
240733,000	4239810,948	598,474	C
240729,500	4239810,948	598,483	C
240715,500	4239810,948	598,518	C
240712,000	4239810,948	598,527	C
240698,000	4239810,948	598,562	C
240694,500	4239810,948	598,570	C

Coord. X	Coord. Y	Elevación	Código
241393,000	4240406,139	602,776	C
241389,500	4240406,139	602,785	C
241375,500	4240406,139	602,820	C
241372,000	4240406,139	602,829	C
241358,000	4240406,139	602,864	C
241354,500	4240406,139	602,873	C
241340,500	4240406,139	602,908	C
241337,000	4240406,139	602,916	C
241323,000	4240406,139	602,951	C
241319,500	4240406,139	602,960	C
241305,500	4240406,139	602,995	C
241302,000	4240406,139	603,004	C
241288,000	4240406,139	603,039	C
241284,500	4240406,139	603,048	C
241270,500	4240406,139	603,083	C
241267,000	4240406,139	603,091	C
241253,000	4240406,139	603,126	C
241249,500	4240406,139	603,135	C
241235,500	4240406,139	603,170	C
241232,000	4240406,139	603,179	C
241218,000	4240406,139	603,214	C
241214,500	4240406,139	603,222	C
241200,500	4240406,139	603,257	C
241197,000	4240406,139	603,266	C
241183,000	4240406,139	603,301	C
241179,500	4240406,139	603,310	C
241165,500	4240406,139	603,345	C
241162,000	4240406,139	603,354	C
241148,000	4240406,139	603,389	C
241144,500	4240406,139	603,397	C
241130,500	4240406,139	603,432	C
241127,000	4240406,139	603,441	C
241113,000	4240406,139	603,476	C
241109,500	4240406,139	603,485	C
241095,500	4240406,139	603,520	C
241092,000	4240406,139	603,529	C
241078,000	4240406,139	603,564	C
241074,500	4240406,139	603,572	C
241060,500	4240406,139	603,607	C
241057,000	4240406,139	603,616	C
241043,000	4240406,139	603,651	C
241039,500	4240406,139	603,660	C
241025,500	4240406,139	603,695	C
241022,000	4240406,139	603,704	C
241008,000	4240406,139	603,739	C
241004,500	4240406,139	603,747	C

Coord. X	Coord. Y	Elevación	Código
240680,500	4239810,948	598,605	C
240677,000	4239810,948	598,614	C
240663,000	4239810,948	598,649	C
240659,500	4239810,948	598,658	C
240645,500	4239810,948	598,693	C
240642,000	4239810,948	598,702	C
240628,000	4239810,948	598,737	C
240624,500	4239810,948	598,745	C
240610,500	4239810,948	598,780	C
240607,000	4239810,948	598,789	C
240593,000	4239810,948	598,824	C
240589,500	4239810,948	598,833	C
240575,500	4239810,948	598,868	C
240572,000	4239810,948	598,877	C
240558,000	4239810,948	598,912	C
240554,500	4239810,948	598,920	C
240540,500	4239810,948	598,955	C
240537,000	4239810,948	598,964	C
240523,000	4239810,948	598,999	C
240519,500	4239810,948	599,008	C
240505,500	4239810,948	599,043	C
240502,000	4239810,948	599,052	C
240488,000	4239810,948	599,087	C
240484,500	4239810,948	599,095	C
240470,500	4239810,948	599,130	C
240467,000	4239810,948	599,139	C
240453,000	4239810,948	599,174	C
240449,500	4239810,948	599,183	C
240435,500	4239810,948	599,218	C
240432,000	4239810,948	599,227	C
240418,000	4239810,948	599,262	C
240414,500	4239810,948	599,270	C
240400,500	4239810,948	599,305	C
240397,000	4239810,948	599,314	C
240383,000	4239810,948	599,349	C
240379,500	4239810,948	599,358	C
240365,500	4239810,948	599,393	C
240362,000	4239810,948	599,402	C
240348,000	4239810,948	599,437	C
240344,500	4239810,948	599,445	C
240330,500	4239810,948	599,480	C
240327,000	4239810,948	599,489	C
240313,000	4239810,948	599,524	C
240309,500	4239810,948	599,533	C
240295,500	4239810,948	599,568	C
240292,000	4239810,948	599,577	C

Coord. X	Coord. Y	Elevación	Código
240990,500	4240406,139	603,782	C
240987,000	4240406,139	603,791	C
240973,000	4240406,139	603,826	C
240969,500	4240406,139	603,835	C
240955,500	4240406,139	603,870	C
240952,000	4240406,139	603,879	C
240938,000	4240406,139	603,914	C
240934,500	4240406,139	603,922	C
240920,500	4240406,139	603,957	C
240917,000	4240406,139	603,966	C
240903,000	4240406,139	604,001	C
240899,500	4240406,139	604,010	C
240885,500	4240406,139	604,045	C
240882,000	4240406,139	604,054	C
240868,000	4240406,139	604,089	C
240864,500	4240406,139	604,097	C
240850,500	4240406,139	604,132	C
240847,000	4240406,139	604,141	C
240833,000	4240406,139	604,176	C
240829,500	4240406,139	604,185	C
240815,500	4240406,139	604,220	C
240812,000	4240406,139	604,229	C
240798,000	4240406,139	604,264	C
240794,500	4240406,139	604,272	C
240780,500	4240406,139	604,307	C
240777,000	4240406,139	604,316	C
240763,000	4240406,139	604,351	C
240759,500	4240406,139	604,360	C
240745,500	4240406,139	604,395	C
240742,000	4240406,139	604,404	C
240728,000	4240406,139	604,439	C
240724,500	4240406,139	604,447	C
240710,500	4240406,139	604,482	C
240707,000	4240406,139	604,491	C
240693,000	4240406,139	604,526	C
240689,500	4240406,139	604,535	C
240675,500	4240406,139	604,570	C
240672,000	4240406,139	604,579	C
240658,000	4240406,139	604,614	C
240654,500	4240406,139	604,622	C
240640,500	4240406,139	604,657	C
240637,000	4240406,139	604,666	C
240623,000	4240406,139	604,701	C
240619,500	4240406,139	604,710	C
240605,500	4240406,139	604,745	C
240602,000	4240406,139	604,754	C

Coord. X	Coord. Y	Elevación	Código
240278,000	4239810,948	599,612	C
240274,500	4239810,948	599,620	C
240260,500	4239810,948	599,655	C
240257,000	4239810,948	599,664	C
240243,000	4239810,948	599,699	C
240239,500	4239810,948	599,708	C
240225,500	4239810,948	599,743	C
240222,000	4239810,948	599,752	C
240208,000	4239810,948	599,787	C
240204,500	4239810,948	599,795	C
240190,500	4239810,948	599,830	C
240187,000	4239810,948	599,839	C
240173,000	4239810,948	599,874	C
240169,500	4239810,948	599,883	C
240155,500	4239810,948	599,918	C
240152,000	4239810,948	599,926	C
240138,000	4239810,948	599,961	C
240134,500	4239810,948	599,970	C
240120,500	4239810,948	600,005	C
240117,000	4239810,948	600,014	C
240103,000	4239810,948	600,049	C
240099,500	4239810,948	600,058	C
240085,500	4239810,948	600,093	C
240082,000	4239810,948	600,101	C
240068,000	4239810,948	600,136	C
240064,500	4239810,948	600,145	C
240050,500	4239810,948	600,180	C
240047,000	4239810,948	600,189	C
240033,000	4239810,948	600,224	C
240029,500	4239810,948	600,233	C
240015,500	4239810,948	600,268	C
240012,000	4239810,948	600,276	C
240012,000	4239806,948	600,236	C
240015,500	4239806,948	600,228	C
240029,500	4239806,948	600,193	C
240033,000	4239806,948	600,184	C
240047,000	4239806,948	600,149	C
240050,500	4239806,948	600,140	C
240064,500	4239806,948	600,105	C
240068,000	4239806,948	600,096	C
240082,000	4239806,948	600,061	C
240085,500	4239806,948	600,053	C
240099,500	4239806,948	600,018	C
240103,000	4239806,948	600,009	C
240117,000	4239806,948	599,974	C
240120,500	4239806,948	599,965	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240588,000	4240406,139	604,789	C	240134,500	4239806,948	599,930	C
240584,500	4240406,139	604,797	C	240138,000	4239806,948	599,921	C
240570,500	4240406,139	604,832	C	240152,000	4239806,948	599,886	C
240567,000	4240406,139	604,841	C	240155,500	4239806,948	599,878	C
240553,000	4240406,139	604,876	C	240169,500	4239806,948	599,843	C
240549,500	4240406,139	604,885	C	240173,000	4239806,948	599,834	C
240535,500	4240406,139	604,920	C	240187,000	4239806,948	599,799	C
240532,000	4240406,139	604,929	C	240190,500	4239806,948	599,790	C
240518,000	4240406,139	604,964	C	240204,500	4239806,948	599,755	C
240514,500	4240406,139	604,972	C	240208,000	4239806,948	599,747	C
240500,500	4240406,139	605,007	C	240222,000	4239806,948	599,712	C
240497,000	4240406,139	605,016	C	240225,500	4239806,948	599,703	C
240483,000	4240406,139	605,051	C	240239,500	4239806,948	599,668	C
240479,500	4240406,139	605,060	C	240243,000	4239806,948	599,659	C
240465,500	4240406,139	605,095	C	240257,000	4239806,948	599,624	C
240462,000	4240406,139	605,104	C	240260,500	4239806,948	599,615	C
240448,000	4240406,139	605,139	C	240274,500	4239806,948	599,580	C
240444,500	4240406,139	605,147	C	240278,000	4239806,948	599,572	C
240430,500	4240406,139	605,182	C	240292,000	4239806,948	599,537	C
240427,000	4240406,139	605,191	C	240295,500	4239806,948	599,528	C
240413,000	4240406,139	605,226	C	240309,500	4239806,948	599,493	C
240409,500	4240406,139	605,235	C	240313,000	4239806,948	599,484	C
240395,500	4240406,139	605,270	C	240327,000	4239806,948	599,449	C
240392,000	4240406,139	605,279	C	240330,500	4239806,948	599,440	C
240378,000	4240406,139	605,314	C	240344,500	4239806,948	599,405	C
240374,500	4240406,139	605,322	C	240348,000	4239806,948	599,397	C
240360,500	4240406,139	605,357	C	240362,000	4239806,948	599,362	C
240357,000	4240406,139	605,366	C	240365,500	4239806,948	599,353	C
240343,000	4240406,139	605,401	C	240379,500	4239806,948	599,318	C
240339,500	4240406,139	605,410	C	240383,000	4239806,948	599,309	C
240325,500	4240406,139	605,445	C	240397,000	4239806,948	599,274	C
240322,000	4240406,139	605,454	C	240400,500	4239806,948	599,265	C
240308,000	4240406,139	605,489	C	240414,500	4239806,948	599,230	C
240304,500	4240406,139	605,497	C	240418,000	4239806,948	599,222	C
240290,500	4240406,139	605,532	C	240432,000	4239806,948	599,187	C
240287,000	4240406,139	605,541	C	240435,500	4239806,948	599,178	C
240273,000	4240406,139	605,576	C	240449,500	4239806,948	599,143	C
240269,500	4240406,139	605,585	C	240453,000	4239806,948	599,134	C
240255,500	4240406,139	605,620	C	240467,000	4239806,948	599,099	C
240252,000	4240406,139	605,629	C	240470,500	4239806,948	599,090	C
240238,000	4240406,139	605,664	C	240484,500	4239806,948	599,055	C
240234,500	4240406,139	605,672	C	240488,000	4239806,948	599,047	C
240220,500	4240406,139	605,707	C	240502,000	4239806,948	599,012	C
240217,000	4240406,139	605,716	C	240505,500	4239806,948	599,003	C
240203,000	4240406,139	605,751	C	240519,500	4239806,948	598,968	C
240199,500	4240406,139	605,760	C	240523,000	4239806,948	598,959	C

Coord. X	Coord. Y	Elevación	Código
240185,500	4240406,139	605,795	C
240182,000	4240406,139	605,804	C
240168,000	4240406,139	605,839	C
240164,500	4240406,139	605,847	C
240150,500	4240406,139	605,882	C
240147,000	4240406,139	605,891	C
240133,000	4240406,139	605,926	C
240129,500	4240406,139	605,935	C
240115,500	4240406,139	605,970	C
240112,000	4240406,139	605,978	C
240098,000	4240406,139	606,013	C
240094,500	4240406,139	606,022	C
240080,500	4240406,139	606,057	C
240077,000	4240406,139	606,066	C
240063,000	4240406,139	606,101	C
240059,500	4240406,139	606,110	C
240045,500	4240406,139	606,145	C
240042,000	4240406,139	606,153	C
240028,000	4240406,139	606,188	C
240024,500	4240406,139	606,197	C
240024,500	4240397,085	606,107	C
240028,000	4240397,085	606,098	C
240042,000	4240397,085	606,063	C
240045,500	4240397,085	606,054	C
240059,500	4240397,085	606,019	C
240063,000	4240397,085	606,010	C
240077,000	4240397,085	605,975	C
240080,500	4240397,085	605,967	C
240094,500	4240397,085	605,932	C
240098,000	4240397,085	605,923	C
240112,000	4240397,085	605,888	C
240115,500	4240397,085	605,879	C
240129,500	4240397,085	605,844	C
240133,000	4240397,085	605,835	C
240147,000	4240397,085	605,800	C
240150,500	4240397,085	605,792	C
240164,500	4240397,085	605,757	C
240168,000	4240397,085	605,748	C
240182,000	4240397,085	605,713	C
240185,500	4240397,085	605,704	C
240199,500	4240397,085	605,669	C
240203,000	4240397,085	605,660	C
240217,000	4240397,085	605,625	C
240220,500	4240397,085	605,617	C
240234,500	4240397,085	605,582	C
240238,000	4240397,085	605,573	C

Coord. X	Coord. Y	Elevación	Código
240537,000	4239806,948	598,924	C
240540,500	4239806,948	598,915	C
240554,500	4239806,948	598,880	C
240558,000	4239806,948	598,872	C
240572,000	4239806,948	598,837	C
240575,500	4239806,948	598,828	C
240589,500	4239806,948	598,793	C
240593,000	4239806,948	598,784	C
240607,000	4239806,948	598,749	C
240610,500	4239806,948	598,740	C
240624,500	4239806,948	598,705	C
240628,000	4239806,948	598,697	C
240642,000	4239806,948	598,662	C
240645,500	4239806,948	598,653	C
240659,500	4239806,948	598,618	C
240663,000	4239806,948	598,609	C
240677,000	4239806,948	598,574	C
240680,500	4239806,948	598,565	C
240694,500	4239806,948	598,530	C
240698,000	4239806,948	598,522	C
240712,000	4239806,948	598,487	C
240715,500	4239806,948	598,478	C
240729,500	4239806,948	598,443	C
240733,000	4239806,948	598,434	C
240747,000	4239806,948	598,399	C
240750,500	4239806,948	598,390	C
240764,500	4239806,948	598,355	C
240768,000	4239806,948	598,347	C
240768,000	4239798,894	598,266	C
240764,500	4239798,894	598,275	C
240750,500	4239798,894	598,310	C
240747,000	4239798,894	598,319	C
240733,000	4239798,894	598,354	C
240729,500	4239798,894	598,362	C
240715,500	4239798,894	598,397	C
240712,000	4239798,894	598,406	C
240698,000	4239798,894	598,441	C
240694,500	4239798,894	598,450	C
240680,500	4239798,894	598,485	C
240677,000	4239798,894	598,494	C
240663,000	4239798,894	598,529	C
240659,500	4239798,894	598,537	C
240645,500	4239798,894	598,572	C
240642,000	4239798,894	598,581	C
240628,000	4239798,894	598,616	C
240624,500	4239798,894	598,625	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240252,000	4240397,085	605,538	C	240610,500	4239798,894	598,660	C
240255,500	4240397,085	605,529	C	240607,000	4239798,894	598,669	C
240269,500	4240397,085	605,494	C	240593,000	4239798,894	598,704	C
240273,000	4240397,085	605,486	C	240589,500	4239798,894	598,712	C
240287,000	4240397,085	605,451	C	240575,500	4239798,894	598,747	C
240290,500	4240397,085	605,442	C	240572,000	4239798,894	598,756	C
240304,500	4240397,085	605,407	C	240558,000	4239798,894	598,791	C
240308,000	4240397,085	605,398	C	240554,500	4239798,894	598,800	C
240322,000	4240397,085	605,363	C	240540,500	4239798,894	598,835	C
240325,500	4240397,085	605,354	C	240537,000	4239798,894	598,844	C
240339,500	4240397,085	605,319	C	240523,000	4239798,894	598,879	C
240343,000	4240397,085	605,311	C	240519,500	4239798,894	598,887	C
240357,000	4240397,085	605,276	C	240505,500	4239798,894	598,922	C
240360,500	4240397,085	605,267	C	240502,000	4239798,894	598,931	C
240374,500	4240397,085	605,232	C	240488,000	4239798,894	598,966	C
240378,000	4240397,085	605,223	C	240484,500	4239798,894	598,975	C
240392,000	4240397,085	605,188	C	240470,500	4239798,894	599,010	C
240395,500	4240397,085	605,179	C	240467,000	4239798,894	599,019	C
240409,500	4240397,085	605,144	C	240453,000	4239798,894	599,054	C
240413,000	4240397,085	605,136	C	240449,500	4239798,894	599,062	C
240427,000	4240397,085	605,101	C	240435,500	4239798,894	599,097	C
240430,500	4240397,085	605,092	C	240432,000	4239798,894	599,106	C
240444,500	4240397,085	605,057	C	240418,000	4239798,894	599,141	C
240448,000	4240397,085	605,048	C	240414,500	4239798,894	599,150	C
240462,000	4240397,085	605,013	C	240400,500	4239798,894	599,185	C
240465,500	4240397,085	605,004	C	240397,000	4239798,894	599,194	C
240479,500	4240397,085	604,969	C	240383,000	4239798,894	599,229	C
240483,000	4240397,085	604,961	C	240379,500	4239798,894	599,237	C
240497,000	4240397,085	604,926	C	240365,500	4239798,894	599,272	C
240500,500	4240397,085	604,917	C	240362,000	4239798,894	599,281	C
240514,500	4240397,085	604,882	C	240348,000	4239798,894	599,316	C
240518,000	4240397,085	604,873	C	240344,500	4239798,894	599,325	C
240532,000	4240397,085	604,838	C	240330,500	4239798,894	599,360	C
240535,500	4240397,085	604,829	C	240327,000	4239798,894	599,369	C
240549,500	4240397,085	604,794	C	240313,000	4239798,894	599,404	C
240553,000	4240397,085	604,786	C	240309,500	4239798,894	599,412	C
240567,000	4240397,085	604,751	C	240295,500	4239798,894	599,447	C
240570,500	4240397,085	604,742	C	240292,000	4239798,894	599,456	C
240584,500	4240397,085	604,707	C	240278,000	4239798,894	599,491	C
240588,000	4240397,085	604,698	C	240274,500	4239798,894	599,500	C
240602,000	4240397,085	604,663	C	240260,500	4239798,894	599,535	C
240605,500	4240397,085	604,654	C	240257,000	4239798,894	599,544	C
240619,500	4240397,085	604,619	C	240243,000	4239798,894	599,579	C
240623,000	4240397,085	604,611	C	240239,500	4239798,894	599,587	C
240637,000	4240397,085	604,576	C	240225,500	4239798,894	599,622	C
240640,500	4240397,085	604,567	C	240222,000	4239798,894	599,631	C

Coord. X	Coord. Y	Elevación	Código
240654,500	4240397,085	604,532	C
240658,000	4240397,085	604,523	C
240672,000	4240397,085	604,488	C
240675,500	4240397,085	604,479	C
240689,500	4240397,085	604,444	C
240693,000	4240397,085	604,436	C
240707,000	4240397,085	604,401	C
240710,500	4240397,085	604,392	C
240724,500	4240397,085	604,357	C
240728,000	4240397,085	604,348	C
240742,000	4240397,085	604,313	C
240745,500	4240397,085	604,304	C
240759,500	4240397,085	604,269	C
240763,000	4240397,085	604,261	C
240777,000	4240397,085	604,226	C
240780,500	4240397,085	604,217	C
240794,500	4240397,085	604,182	C
240798,000	4240397,085	604,173	C
240812,000	4240397,085	604,138	C
240815,500	4240397,085	604,129	C
240829,500	4240397,085	604,094	C
240833,000	4240397,085	604,086	C
240847,000	4240397,085	604,051	C
240850,500	4240397,085	604,042	C
240864,500	4240397,085	604,007	C
240868,000	4240397,085	603,998	C
240882,000	4240397,085	603,963	C
240885,500	4240397,085	603,954	C
240899,500	4240397,085	603,919	C
240903,000	4240397,085	603,911	C
240917,000	4240397,085	603,876	C
240920,500	4240397,085	603,867	C
240934,500	4240397,085	603,832	C
240938,000	4240397,085	603,823	C
240952,000	4240397,085	603,788	C
240955,500	4240397,085	603,779	C
240969,500	4240397,085	603,744	C
240973,000	4240397,085	603,736	C
240987,000	4240397,085	603,701	C
240990,500	4240397,085	603,692	C
241004,500	4240397,085	603,657	C
241008,000	4240397,085	603,648	C
241022,000	4240397,085	603,613	C
241025,500	4240397,085	603,604	C
241039,500	4240397,085	603,569	C
241043,000	4240397,085	603,561	C

Coord. X	Coord. Y	Elevación	Código
240208,000	4239798,894	599,666	C
240204,500	4239798,894	599,675	C
240190,500	4239798,894	599,710	C
240187,000	4239798,894	599,719	C
240173,000	4239798,894	599,753	C
240169,500	4239798,894	599,762	C
240155,500	4239798,894	599,797	C
240152,000	4239798,894	599,806	C
240138,000	4239798,894	599,841	C
240134,500	4239798,894	599,849	C
240120,500	4239798,894	599,884	C
240117,000	4239798,894	599,893	C
240103,000	4239798,894	599,928	C
240099,500	4239798,894	599,937	C
240085,500	4239798,894	599,972	C
240082,000	4239798,894	599,981	C
240068,000	4239798,894	600,016	C
240064,500	4239798,894	600,024	C
240050,500	4239798,894	600,059	C
240047,000	4239798,894	600,068	C
240033,000	4239798,894	600,103	C
240029,500	4239798,894	600,112	C
240015,500	4239798,894	600,147	C
240012,000	4239798,894	600,156	C
240012,000	4239794,894	600,116	C
240015,500	4239794,894	600,107	C
240029,500	4239794,894	600,072	C
240033,000	4239794,894	600,063	C
240047,000	4239794,894	600,028	C
240050,500	4239794,894	600,019	C
240064,500	4239794,894	599,984	C
240068,000	4239794,894	599,976	C
240082,000	4239794,894	599,941	C
240085,500	4239794,894	599,932	C
240099,500	4239794,894	599,897	C
240103,000	4239794,894	599,888	C
240117,000	4239794,894	599,853	C
240120,500	4239794,894	599,844	C
240134,500	4239794,894	599,809	C
240138,000	4239794,894	599,801	C
240152,000	4239794,894	599,766	C
240155,500	4239794,894	599,757	C
240169,500	4239794,894	599,722	C
240173,000	4239794,894	599,713	C
240187,000	4239794,894	599,678	C
240190,500	4239794,894	599,670	C

Coord. X	Coord. Y	Elevación	Código
241057,000	4240397,085	603,526	C
241060,500	4240397,085	603,517	C
241074,500	4240397,085	603,482	C
241078,000	4240397,085	603,473	C
241092,000	4240397,085	603,438	C
241095,500	4240397,085	603,429	C
241109,500	4240397,085	603,394	C
241113,000	4240397,085	603,386	C
241127,000	4240397,085	603,351	C
241130,500	4240397,085	603,342	C
241144,500	4240397,085	603,307	C
241148,000	4240397,085	603,298	C
241162,000	4240397,085	603,263	C
241165,500	4240397,085	603,254	C
241179,500	4240397,085	603,219	C
241183,000	4240397,085	603,211	C
241197,000	4240397,085	603,176	C
241200,500	4240397,085	603,167	C
241214,500	4240397,085	603,132	C
241218,000	4240397,085	603,123	C
241232,000	4240397,085	603,088	C
241235,500	4240397,085	603,079	C
241249,500	4240397,085	603,044	C
241253,000	4240397,085	603,036	C
241267,000	4240397,085	603,001	C
241270,500	4240397,085	602,992	C
241284,500	4240397,085	602,957	C
241288,000	4240397,085	602,948	C
241302,000	4240397,085	602,913	C
241305,500	4240397,085	602,904	C
241319,500	4240397,085	602,869	C
241323,000	4240397,085	602,861	C
241337,000	4240397,085	602,826	C
241340,500	4240397,085	602,817	C
241354,500	4240397,085	602,782	C
241358,000	4240397,085	602,773	C
241372,000	4240397,085	602,738	C
241375,500	4240397,085	602,730	C
241389,500	4240397,085	602,695	C
241393,000	4240397,085	602,686	C
241407,000	4240397,085	602,651	C
241410,500	4240397,085	602,642	C
241424,500	4240397,085	602,607	C
241428,000	4240397,085	602,598	C
241442,000	4240397,085	602,563	C
241445,500	4240397,085	602,555	C

Coord. X	Coord. Y	Elevación	Código
240204,500	4239794,894	599,635	C
240208,000	4239794,894	599,626	C
240222,000	4239794,894	599,591	C
240225,500	4239794,894	599,582	C
240239,500	4239794,894	599,547	C
240243,000	4239794,894	599,539	C
240257,000	4239794,894	599,504	C
240260,500	4239794,894	599,495	C
240274,500	4239794,894	599,460	C
240278,000	4239794,894	599,451	C
240292,000	4239794,894	599,416	C
240295,500	4239794,894	599,407	C
240309,500	4239794,894	599,372	C
240313,000	4239794,894	599,364	C
240327,000	4239794,894	599,329	C
240330,500	4239794,894	599,320	C
240344,500	4239794,894	599,285	C
240348,000	4239794,894	599,276	C
240362,000	4239794,894	599,241	C
240365,500	4239794,894	599,232	C
240379,500	4239794,894	599,197	C
240383,000	4239794,894	599,189	C
240397,000	4239794,894	599,154	C
240400,500	4239794,894	599,145	C
240414,500	4239794,894	599,110	C
240418,000	4239794,894	599,101	C
240432,000	4239794,894	599,066	C
240435,500	4239794,894	599,057	C
240449,500	4239794,894	599,022	C
240453,000	4239794,894	599,014	C
240467,000	4239794,894	598,979	C
240470,500	4239794,894	598,970	C
240484,500	4239794,894	598,935	C
240488,000	4239794,894	598,926	C
240502,000	4239794,894	598,891	C
240505,500	4239794,894	598,882	C
240519,500	4239794,894	598,847	C
240523,000	4239794,894	598,839	C
240537,000	4239794,894	598,804	C
240540,500	4239794,894	598,795	C
240554,500	4239794,894	598,760	C
240558,000	4239794,894	598,751	C
240572,000	4239794,894	598,716	C
240575,500	4239794,894	598,707	C
240589,500	4239794,894	598,672	C
240593,000	4239794,894	598,664	C

Coord. X	Coord. Y	Elevación	Código
241459,500	4240397,085	602,520	C
241463,000	4240397,085	602,511	C
241477,000	4240397,085	602,476	C
241480,500	4240397,085	602,467	C
241494,500	4240397,085	602,432	C
241498,000	4240397,085	602,423	C
241512,000	4240397,085	602,388	C
241515,500	4240397,085	602,380	C
241529,500	4240397,085	602,345	C
241533,000	4240397,085	602,336	C
241547,000	4240397,085	602,301	C
241550,500	4240397,085	602,292	C
241564,500	4240397,085	602,257	C
241568,000	4240397,085	602,248	C
241582,000	4240397,085	602,213	C
241585,500	4240397,085	602,205	C
241599,500	4240397,085	602,170	C
241603,000	4240397,085	602,161	C
241617,000	4240397,085	602,126	C
241620,500	4240397,085	602,117	C
241634,500	4240397,085	602,082	C
241638,000	4240397,085	602,073	C
241652,000	4240397,085	602,038	C
241655,500	4240397,085	602,030	C
241669,500	4240397,085	601,995	C
241673,000	4240397,085	601,986	C
241687,000	4240397,085	601,951	C
241690,500	4240397,085	601,942	C
241704,500	4240397,085	601,907	C
241708,000	4240397,085	601,898	C
241722,000	4240397,085	601,863	C
241725,500	4240397,085	601,855	C
241739,500	4240397,085	601,820	C
241743,000	4240397,085	601,811	C
241757,000	4240397,085	601,776	C
241760,500	4240397,085	601,767	C
241760,500	4240393,935	601,736	C
241757,000	4240393,935	601,744	C
241743,000	4240393,935	601,779	C
241739,500	4240393,935	601,788	C
241725,500	4240393,935	601,823	C
241722,000	4240393,935	601,832	C
241708,000	4240393,935	601,867	C
241704,500	4240393,935	601,876	C
241690,500	4240393,935	601,911	C
241687,000	4240393,935	601,919	C

Coord. X	Coord. Y	Elevación	Código
240607,000	4239794,894	598,629	C
240610,500	4239794,894	598,620	C
240624,500	4239794,894	598,585	C
240628,000	4239794,894	598,576	C
240642,000	4239794,894	598,541	C
240645,500	4239794,894	598,532	C
240659,500	4239794,894	598,497	C
240663,000	4239794,894	598,489	C
240677,000	4239794,894	598,454	C
240680,500	4239794,894	598,445	C
240694,500	4239794,894	598,410	C
240698,000	4239794,894	598,401	C
240712,000	4239794,894	598,366	C
240715,500	4239794,894	598,357	C
240729,500	4239794,894	598,322	C
240733,000	4239794,894	598,314	C
240747,000	4239794,894	598,279	C
240750,500	4239794,894	598,270	C
240764,500	4239794,894	598,235	C
240768,000	4239794,894	598,226	C
240768,000	4239785,840	598,136	C
240764,500	4239785,840	598,144	C
240750,500	4239785,840	598,179	C
240747,000	4239785,840	598,188	C
240733,000	4239785,840	598,223	C
240729,500	4239785,840	598,232	C
240715,500	4239785,840	598,267	C
240712,000	4239785,840	598,276	C
240698,000	4239785,840	598,311	C
240694,500	4239785,840	598,319	C
240680,500	4239785,840	598,354	C
240677,000	4239785,840	598,363	C
240663,000	4239785,840	598,398	C
240659,500	4239785,840	598,407	C
240645,500	4239785,840	598,442	C
240642,000	4239785,840	598,450	C
240628,000	4239785,840	598,485	C
240624,500	4239785,840	598,494	C
240610,500	4239785,840	598,529	C
240607,000	4239785,840	598,538	C
240593,000	4239785,840	598,573	C
240589,500	4239785,840	598,582	C
240575,500	4239785,840	598,617	C
240572,000	4239785,840	598,625	C
240558,000	4239785,840	598,660	C
240554,500	4239785,840	598,669	C

Coord. X	Coord. Y	Elevación	Código
241673,000	4240393,935	601,954	C
241669,500	4240393,935	601,963	C
241655,500	4240393,935	601,998	C
241652,000	4240393,935	602,007	C
241638,000	4240393,935	602,042	C
241634,500	4240393,935	602,051	C
241620,500	4240393,935	602,086	C
241617,000	4240393,935	602,094	C
241603,000	4240393,935	602,129	C
241599,500	4240393,935	602,138	C
241585,500	4240393,935	602,173	C
241582,000	4240393,935	602,182	C
241568,000	4240393,935	602,217	C
241564,500	4240393,935	602,226	C
241550,500	4240393,935	602,261	C
241547,000	4240393,935	602,269	C
241533,000	4240393,935	602,304	C
241529,500	4240393,935	602,313	C
241515,500	4240393,935	602,348	C
241512,000	4240393,935	602,357	C
241498,000	4240393,935	602,392	C
241494,500	4240393,935	602,401	C
241480,500	4240393,935	602,436	C
241477,000	4240393,935	602,444	C
241463,000	4240393,935	602,479	C
241459,500	4240393,935	602,488	C
241445,500	4240393,935	602,523	C
241442,000	4240393,935	602,532	C
241428,000	4240393,935	602,567	C
241424,500	4240393,935	602,576	C
241410,500	4240393,935	602,611	C
241407,000	4240393,935	602,619	C
241393,000	4240393,935	602,654	C
241389,500	4240393,935	602,663	C
241375,500	4240393,935	602,698	C
241372,000	4240393,935	602,707	C
241358,000	4240393,935	602,742	C
241354,500	4240393,935	602,751	C
241340,500	4240393,935	602,785	C
241337,000	4240393,935	602,794	C
241323,000	4240393,935	602,829	C
241319,500	4240393,935	602,838	C
241305,500	4240393,935	602,873	C
241302,000	4240393,935	602,882	C
241288,000	4240393,935	602,917	C
241284,500	4240393,935	602,925	C

Coord. X	Coord. Y	Elevación	Código
240540,500	4239785,840	598,704	C
240537,000	4239785,840	598,713	C
240523,000	4239785,840	598,748	C
240519,500	4239785,840	598,757	C
240505,500	4239785,840	598,792	C
240502,000	4239785,840	598,800	C
240488,000	4239785,840	598,835	C
240484,500	4239785,840	598,844	C
240470,500	4239785,840	598,879	C
240467,000	4239785,840	598,888	C
240453,000	4239785,840	598,923	C
240449,500	4239785,840	598,932	C
240435,500	4239785,840	598,967	C
240432,000	4239785,840	598,975	C
240418,000	4239785,840	599,010	C
240414,500	4239785,840	599,019	C
240400,500	4239785,840	599,054	C
240397,000	4239785,840	599,063	C
240383,000	4239785,840	599,098	C
240379,500	4239785,840	599,107	C
240365,500	4239785,840	599,142	C
240362,000	4239785,840	599,151	C
240348,000	4239785,840	599,186	C
240344,500	4239785,840	599,194	C
240330,500	4239785,840	599,229	C
240327,000	4239785,840	599,238	C
240313,000	4239785,840	599,273	C
240309,500	4239785,840	599,282	C
240295,500	4239785,840	599,317	C
240292,000	4239785,840	599,326	C
240278,000	4239785,840	599,361	C
240274,500	4239785,840	599,369	C
240260,500	4239785,840	599,404	C
240257,000	4239785,840	599,413	C
240243,000	4239785,840	599,448	C
240239,500	4239785,840	599,457	C
240225,500	4239785,840	599,492	C
240222,000	4239785,840	599,501	C
240208,000	4239785,840	599,536	C
240204,500	4239785,840	599,544	C
240190,500	4239785,840	599,579	C
240187,000	4239785,840	599,588	C
240173,000	4239785,840	599,623	C
240169,500	4239785,840	599,631	C
240155,500	4239785,840	599,666	C
240152,000	4239785,840	599,675	C

Coord. X	Coord. Y	Elevación	Código
241270,500	4240393,935	602,960	C
241267,000	4240393,935	602,969	C
241253,000	4240393,935	603,004	C
241249,500	4240393,935	603,013	C
241235,500	4240393,935	603,048	C
241232,000	4240393,935	603,057	C
241218,000	4240393,935	603,092	C
241214,500	4240393,935	603,100	C
241200,500	4240393,935	603,135	C
241197,000	4240393,935	603,144	C
241183,000	4240393,935	603,179	C
241179,500	4240393,935	603,188	C
241165,500	4240393,935	603,223	C
241162,000	4240393,935	603,232	C
241148,000	4240393,935	603,267	C
241144,500	4240393,935	603,275	C
241130,500	4240393,935	603,310	C
241127,000	4240393,935	603,319	C
241113,000	4240393,935	603,354	C
241109,500	4240393,935	603,363	C
241095,500	4240393,935	603,398	C
241092,000	4240393,935	603,407	C
241078,000	4240393,935	603,442	C
241074,500	4240393,935	603,450	C
241060,500	4240393,935	603,485	C
241057,000	4240393,935	603,494	C
241043,000	4240393,935	603,529	C
241039,500	4240393,935	603,538	C
241025,500	4240393,935	603,573	C
241022,000	4240393,935	603,582	C
241008,000	4240393,935	603,617	C
241004,500	4240393,935	603,625	C
240990,500	4240393,935	603,660	C
240987,000	4240393,935	603,669	C
240973,000	4240393,935	603,704	C
240969,500	4240393,935	603,713	C
240955,500	4240393,935	603,748	C
240952,000	4240393,935	603,757	C
240938,000	4240393,935	603,792	C
240934,500	4240393,935	603,800	C
240920,500	4240393,935	603,835	C
240917,000	4240393,935	603,844	C
240903,000	4240393,935	603,879	C
240899,500	4240393,935	603,888	C
240885,500	4240393,935	603,923	C
240882,000	4240393,935	603,932	C

Coord. X	Coord. Y	Elevación	Código
240138,000	4239785,840	599,710	C
240134,500	4239785,840	599,719	C
240120,500	4239785,840	599,754	C
240117,000	4239785,840	599,763	C
240103,000	4239785,840	599,798	C
240099,500	4239785,840	599,806	C
240085,500	4239785,840	599,841	C
240082,000	4239785,840	599,850	C
240068,000	4239785,840	599,885	C
240064,500	4239785,840	599,894	C
240050,500	4239785,840	599,929	C
240047,000	4239785,840	599,938	C
240033,000	4239785,840	599,973	C
240029,500	4239785,840	599,981	C
240015,500	4239785,840	600,016	C
240012,000	4239785,840	600,025	C
240012,000	4239782,690	599,994	C
240015,500	4239782,690	599,985	C
240029,500	4239782,690	599,950	C
240033,000	4239782,690	599,941	C
240047,000	4239782,690	599,906	C
240050,500	4239782,690	599,897	C
240064,500	4239782,690	599,862	C
240068,000	4239782,690	599,854	C
240082,000	4239782,690	599,819	C
240085,500	4239782,690	599,810	C
240099,500	4239782,690	599,775	C
240103,000	4239782,690	599,766	C
240117,000	4239782,690	599,731	C
240120,500	4239782,690	599,722	C
240134,500	4239782,690	599,687	C
240138,000	4239782,690	599,679	C
240152,000	4239782,690	599,644	C
240155,500	4239782,690	599,635	C
240169,500	4239782,690	599,600	C
240173,000	4239782,690	599,591	C
240187,000	4239782,690	599,556	C
240190,500	4239782,690	599,547	C
240204,500	4239782,690	599,513	C
240208,000	4239782,690	599,504	C
240222,000	4239782,690	599,469	C
240225,500	4239782,690	599,460	C
240239,500	4239782,690	599,425	C
240243,000	4239782,690	599,417	C
240257,000	4239782,690	599,382	C
240260,500	4239782,690	599,373	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240868,000	4240393,935	603,967	C	240274,500	4239782,690	599,338	C
240864,500	4240393,935	603,975	C	240278,000	4239782,690	599,329	C
240850,500	4240393,935	604,010	C	240292,000	4239782,690	599,294	C
240847,000	4240393,935	604,019	C	240295,500	4239782,690	599,285	C
240833,000	4240393,935	604,054	C	240309,500	4239782,690	599,250	C
240829,500	4240393,935	604,063	C	240313,000	4239782,690	599,242	C
240815,500	4240393,935	604,098	C	240327,000	4239782,690	599,207	C
240812,000	4240393,935	604,107	C	240330,500	4239782,690	599,198	C
240798,000	4240393,935	604,142	C	240344,500	4239782,690	599,163	C
240794,500	4240393,935	604,150	C	240348,000	4239782,690	599,154	C
240780,500	4240393,935	604,185	C	240362,000	4239782,690	599,119	C
240777,000	4240393,935	604,194	C	240365,500	4239782,690	599,110	C
240763,000	4240393,935	604,229	C	240379,500	4239782,690	599,075	C
240759,500	4240393,935	604,238	C	240383,000	4239782,690	599,066	C
240745,500	4240393,935	604,273	C	240397,000	4239782,690	599,031	C
240742,000	4240393,935	604,282	C	240400,500	4239782,690	599,023	C
240728,000	4240393,935	604,317	C	240414,500	4239782,690	598,988	C
240724,500	4240393,935	604,325	C	240418,000	4239782,690	598,979	C
240710,500	4240393,935	604,360	C	240432,000	4239782,690	598,944	C
240707,000	4240393,935	604,369	C	240435,500	4239782,690	598,935	C
240693,000	4240393,935	604,404	C	240449,500	4239782,690	598,900	C
240689,500	4240393,935	604,413	C	240453,000	4239782,690	598,891	C
240675,500	4240393,935	604,448	C	240467,000	4239782,690	598,856	C
240672,000	4240393,935	604,457	C	240470,500	4239782,690	598,848	C
240658,000	4240393,935	604,492	C	240484,500	4239782,690	598,813	C
240654,500	4240393,935	604,500	C	240488,000	4239782,690	598,804	C
240640,500	4240393,935	604,535	C	240502,000	4239782,690	598,769	C
240637,000	4240393,935	604,544	C	240505,500	4239782,690	598,760	C
240623,000	4240393,935	604,579	C	240519,500	4239782,690	598,725	C
240619,500	4240393,935	604,588	C	240523,000	4239782,690	598,716	C
240605,500	4240393,935	604,623	C	240537,000	4239782,690	598,681	C
240602,000	4240393,935	604,632	C	240540,500	4239782,690	598,673	C
240588,000	4240393,935	604,667	C	240554,500	4239782,690	598,638	C
240584,500	4240393,935	604,675	C	240558,000	4239782,690	598,629	C
240570,500	4240393,935	604,710	C	240572,000	4239782,690	598,594	C
240567,000	4240393,935	604,719	C	240575,500	4239782,690	598,585	C
240553,000	4240393,935	604,754	C	240589,500	4239782,690	598,550	C
240549,500	4240393,935	604,763	C	240593,000	4239782,690	598,541	C
240535,500	4240393,935	604,798	C	240607,000	4239782,690	598,506	C
240532,000	4240393,935	604,807	C	240610,500	4239782,690	598,498	C
240518,000	4240393,935	604,842	C	240624,500	4239782,690	598,463	C
240514,500	4240393,935	604,850	C	240628,000	4239782,690	598,454	C
240500,500	4240393,935	604,885	C	240642,000	4239782,690	598,419	C
240497,000	4240393,935	604,894	C	240645,500	4239782,690	598,410	C
240483,000	4240393,935	604,929	C	240659,500	4239782,690	598,375	C
240479,500	4240393,935	604,938	C	240663,000	4239782,690	598,366	C

Coord. X	Coord. Y	Elevación	Código
240465,500	4240393,935	604,973	C
240462,000	4240393,935	604,982	C
240448,000	4240393,935	605,017	C
240444,500	4240393,935	605,025	C
240430,500	4240393,935	605,060	C
240427,000	4240393,935	605,069	C
240413,000	4240393,935	605,104	C
240409,500	4240393,935	605,113	C
240395,500	4240393,935	605,148	C
240392,000	4240393,935	605,157	C
240378,000	4240393,935	605,192	C
240374,500	4240393,935	605,200	C
240360,500	4240393,935	605,235	C
240357,000	4240393,935	605,244	C
240343,000	4240393,935	605,279	C
240339,500	4240393,935	605,288	C
240325,500	4240393,935	605,323	C
240322,000	4240393,935	605,332	C
240308,000	4240393,935	605,367	C
240304,500	4240393,935	605,375	C
240290,500	4240393,935	605,410	C
240287,000	4240393,935	605,419	C
240273,000	4240393,935	605,454	C
240269,500	4240393,935	605,463	C
240255,500	4240393,935	605,498	C
240252,000	4240393,935	605,506	C
240238,000	4240393,935	605,541	C
240234,500	4240393,935	605,550	C
240220,500	4240393,935	605,585	C
240217,000	4240393,935	605,594	C
240203,000	4240393,935	605,629	C
240199,500	4240393,935	605,638	C
240185,500	4240393,935	605,673	C
240182,000	4240393,935	605,681	C
240168,000	4240393,935	605,716	C
240164,500	4240393,935	605,725	C
240150,500	4240393,935	605,760	C
240147,000	4240393,935	605,769	C
240133,000	4240393,935	605,804	C
240129,500	4240393,935	605,813	C
240115,500	4240393,935	605,848	C
240112,000	4240393,935	605,856	C
240098,000	4240393,935	605,891	C
240094,500	4240393,935	605,900	C
240080,500	4240393,935	605,935	C
240077,000	4240393,935	605,944	C

Coord. X	Coord. Y	Elevación	Código
240677,000	4239782,690	598,331	C
240680,500	4239782,690	598,323	C
240694,500	4239782,690	598,288	C
240698,000	4239782,690	598,279	C
240712,000	4239782,690	598,244	C
240715,500	4239782,690	598,235	C
240729,500	4239782,690	598,200	C
240733,000	4239782,690	598,192	C
240747,000	4239782,690	598,157	C
240750,500	4239782,690	598,148	C
240764,500	4239782,690	598,113	C
240768,000	4239782,690	598,104	C
241227,000	4240217,950	601,309	C
241230,500	4240217,950	601,301	C
241244,500	4240217,950	601,266	C
241248,000	4240217,950	601,257	C
241262,000	4240217,950	601,222	C
241265,500	4240217,950	601,213	C
241279,500	4240217,950	601,178	C
241283,000	4240217,950	601,169	C
241297,000	4240217,950	601,134	C
241300,500	4240217,950	601,126	C
241314,500	4240217,950	601,091	C
241318,000	4240217,950	601,082	C
241332,000	4240217,950	601,047	C
241335,500	4240217,950	601,038	C
241349,500	4240217,950	601,003	C
241353,000	4240217,950	600,994	C
241367,000	4240217,950	600,959	C
241370,500	4240217,950	600,951	C
241384,500	4240217,950	600,916	C
241388,000	4240217,950	600,907	C
241402,000	4240217,950	600,872	C
241405,500	4240217,950	600,863	C
241419,500	4240217,950	600,828	C
241423,000	4240217,950	600,819	C
241437,000	4240217,950	600,784	C
241440,500	4240217,950	600,776	C
241454,500	4240217,950	600,741	C
241458,000	4240217,950	600,732	C
241472,000	4240217,950	600,697	C
241475,500	4240217,950	600,688	C
241489,500	4240217,950	600,653	C
241493,000	4240217,950	600,644	C
241507,000	4240217,950	600,609	C
241510,500	4240217,950	600,601	C

Coord. X	Coord. Y	Elevación	Código
240063,000	4240393,935	605,979	C
240059,500	4240393,935	605,988	C
240045,500	4240393,935	606,023	C
240042,000	4240393,935	606,031	C
240028,000	4240393,935	606,066	C
240024,500	4240393,935	606,075	C
240024,500	4240384,881	605,985	C
240028,000	4240384,881	605,976	C
240042,000	4240384,881	605,941	C
240045,500	4240384,881	605,932	C
240059,500	4240384,881	605,897	C
240063,000	4240384,881	605,888	C
240077,000	4240384,881	605,853	C
240080,500	4240384,881	605,845	C
240094,500	4240384,881	605,810	C
240098,000	4240384,881	605,801	C
240112,000	4240384,881	605,766	C
240115,500	4240384,881	605,757	C
240129,500	4240384,881	605,722	C
240133,000	4240384,881	605,713	C
240147,000	4240384,881	605,678	C
240150,500	4240384,881	605,670	C
240164,500	4240384,881	605,635	C
240168,000	4240384,881	605,626	C
240182,000	4240384,881	605,591	C
240185,500	4240384,881	605,582	C
240199,500	4240384,881	605,547	C
240203,000	4240384,881	605,538	C
240217,000	4240384,881	605,503	C
240220,500	4240384,881	605,495	C
240234,500	4240384,881	605,460	C
240238,000	4240384,881	605,451	C
240252,000	4240384,881	605,416	C
240255,500	4240384,881	605,407	C
240269,500	4240384,881	605,372	C
240273,000	4240384,881	605,363	C
240287,000	4240384,881	605,328	C
240290,500	4240384,881	605,320	C
240304,500	4240384,881	605,285	C
240308,000	4240384,881	605,276	C
240322,000	4240384,881	605,241	C
240325,500	4240384,881	605,232	C
240339,500	4240384,881	605,197	C
240343,000	4240384,881	605,188	C
240357,000	4240384,881	605,153	C
240360,500	4240384,881	605,145	C

Coord. X	Coord. Y	Elevación	Código
241524,500	4240217,950	600,566	C
241528,000	4240217,950	600,557	C
241542,000	4240217,950	600,522	C
241545,500	4240217,950	600,513	C
241559,500	4240217,950	600,478	C
241563,000	4240217,950	600,469	C
241577,000	4240217,950	600,434	C
241580,500	4240217,950	600,426	C
241594,500	4240217,950	600,391	C
241598,000	4240217,950	600,382	C
241612,000	4240217,950	600,347	C
241615,500	4240217,950	600,338	C
241629,500	4240217,950	600,303	C
241633,000	4240217,950	600,294	C
241647,000	4240217,950	600,259	C
241650,500	4240217,950	600,251	C
241664,500	4240217,950	600,216	C
241668,000	4240217,950	600,207	C
241682,000	4240217,950	600,172	C
241685,500	4240217,950	600,163	C
241699,500	4240217,950	600,128	C
241703,000	4240217,950	600,120	C
241717,000	4240217,950	600,085	C
241720,500	4240217,950	600,076	C
241734,500	4240217,950	600,041	C
241738,000	4240217,950	600,032	C
241752,000	4240217,950	599,997	C
241755,500	4240217,950	599,988	C
241769,500	4240217,950	599,953	C
241773,000	4240217,950	599,945	C
241773,000	4240214,800	599,913	C
241769,500	4240214,800	599,922	C
241755,500	4240214,800	599,957	C
241752,000	4240214,800	599,966	C
241738,000	4240214,800	600,001	C
241734,500	4240214,800	600,009	C
241720,500	4240214,800	600,044	C
241717,000	4240214,800	600,053	C
241703,000	4240214,800	600,088	C
241699,500	4240214,800	600,097	C
241685,500	4240214,800	600,132	C
241682,000	4240214,800	600,141	C
241668,000	4240214,800	600,176	C
241664,500	4240214,800	600,184	C
241650,500	4240214,800	600,219	C
241647,000	4240214,800	600,228	C

Coord. X	Coord. Y	Elevación	Código
240374,500	4240384,881	605,110	C
240378,000	4240384,881	605,101	C
240392,000	4240384,881	605,066	C
240395,500	4240384,881	605,057	C
240409,500	4240384,881	605,022	C
240413,000	4240384,881	605,013	C
240427,000	4240384,881	604,978	C
240430,500	4240384,881	604,970	C
240444,500	4240384,881	604,935	C
240448,000	4240384,881	604,926	C
240462,000	4240384,881	604,891	C
240465,500	4240384,881	604,882	C
240479,500	4240384,881	604,847	C
240483,000	4240384,881	604,838	C
240497,000	4240384,881	604,803	C
240500,500	4240384,881	604,795	C
240514,500	4240384,881	604,760	C
240518,000	4240384,881	604,751	C
240532,000	4240384,881	604,716	C
240535,500	4240384,881	604,707	C
240549,500	4240384,881	604,672	C
240553,000	4240384,881	604,664	C
240567,000	4240384,881	604,629	C
240570,500	4240384,881	604,620	C
240584,500	4240384,881	604,585	C
240588,000	4240384,881	604,576	C
240602,000	4240384,881	604,541	C
240605,500	4240384,881	604,532	C
240619,500	4240384,881	604,497	C
240623,000	4240384,881	604,489	C
240637,000	4240384,881	604,454	C
240640,500	4240384,881	604,445	C
240654,500	4240384,881	604,410	C
240658,000	4240384,881	604,401	C
240672,000	4240384,881	604,366	C
240675,500	4240384,881	604,357	C
240689,500	4240384,881	604,322	C
240693,000	4240384,881	604,314	C
240707,000	4240384,881	604,279	C
240710,500	4240384,881	604,270	C
240724,500	4240384,881	604,235	C
240728,000	4240384,881	604,226	C
240742,000	4240384,881	604,191	C
240745,500	4240384,881	604,182	C
240759,500	4240384,881	604,147	C
240763,000	4240384,881	604,139	C

Coord. X	Coord. Y	Elevación	Código
241633,000	4240214,800	600,263	C
241629,500	4240214,800	600,272	C
241615,500	4240214,800	600,307	C
241612,000	4240214,800	600,315	C
241598,000	4240214,800	600,350	C
241594,500	4240214,800	600,359	C
241580,500	4240214,800	600,394	C
241577,000	4240214,800	600,403	C
241563,000	4240214,800	600,438	C
241559,500	4240214,800	600,447	C
241545,500	4240214,800	600,482	C
241542,000	4240214,800	600,490	C
241528,000	4240214,800	600,525	C
241524,500	4240214,800	600,534	C
241510,500	4240214,800	600,569	C
241507,000	4240214,800	600,578	C
241493,000	4240214,800	600,613	C
241489,500	4240214,800	600,622	C
241475,500	4240214,800	600,657	C
241472,000	4240214,800	600,665	C
241458,000	4240214,800	600,700	C
241454,500	4240214,800	600,709	C
241440,500	4240214,800	600,744	C
241437,000	4240214,800	600,753	C
241423,000	4240214,800	600,788	C
241419,500	4240214,800	600,797	C
241405,500	4240214,800	600,832	C
241402,000	4240214,800	600,840	C
241388,000	4240214,800	600,875	C
241384,500	4240214,800	600,884	C
241370,500	4240214,800	600,919	C
241367,000	4240214,800	600,928	C
241353,000	4240214,800	600,963	C
241349,500	4240214,800	600,972	C
241335,500	4240214,800	601,007	C
241332,000	4240214,800	601,015	C
241318,000	4240214,800	601,050	C
241314,500	4240214,800	601,059	C
241300,500	4240214,800	601,094	C
241297,000	4240214,800	601,103	C
241283,000	4240214,800	601,138	C
241279,500	4240214,800	601,147	C
241265,500	4240214,800	601,182	C
241262,000	4240214,800	601,190	C
241248,000	4240214,800	601,225	C
241244,500	4240214,800	601,234	C

Coord. X	Coord. Y	Elevación	Código
240777,000	4240384,881	604,104	C
240780,500	4240384,881	604,095	C
240794,500	4240384,881	604,060	C
240798,000	4240384,881	604,051	C
240812,000	4240384,881	604,016	C
240815,500	4240384,881	604,007	C
240829,500	4240384,881	603,972	C
240833,000	4240384,881	603,964	C
240847,000	4240384,881	603,929	C
240850,500	4240384,881	603,920	C
240864,500	4240384,881	603,885	C
240868,000	4240384,881	603,876	C
240882,000	4240384,881	603,841	C
240885,500	4240384,881	603,832	C
240899,500	4240384,881	603,797	C
240903,000	4240384,881	603,789	C
240917,000	4240384,881	603,754	C
240920,500	4240384,881	603,745	C
240934,500	4240384,881	603,710	C
240938,000	4240384,881	603,701	C
240952,000	4240384,881	603,666	C
240955,500	4240384,881	603,657	C
240969,500	4240384,881	603,622	C
240973,000	4240384,881	603,614	C
240987,000	4240384,881	603,579	C
240990,500	4240384,881	603,570	C
241004,500	4240384,881	603,535	C
241008,000	4240384,881	603,526	C
241022,000	4240384,881	603,491	C
241025,500	4240384,881	603,482	C
241039,500	4240384,881	603,447	C
241043,000	4240384,881	603,439	C
241057,000	4240384,881	603,404	C
241060,500	4240384,881	603,395	C
241074,500	4240384,881	603,360	C
241078,000	4240384,881	603,351	C
241092,000	4240384,881	603,316	C
241095,500	4240384,881	603,307	C
241109,500	4240384,881	603,272	C
241113,000	4240384,881	603,264	C
241127,000	4240384,881	603,229	C
241130,500	4240384,881	603,220	C
241144,500	4240384,881	603,185	C
241148,000	4240384,881	603,176	C
241162,000	4240384,881	603,141	C
241165,500	4240384,881	603,132	C

Coord. X	Coord. Y	Elevación	Código
241230,500	4240214,800	601,269	C
241227,000	4240214,800	601,278	C
241227,000	4240205,746	601,187	C
241230,500	4240205,746	601,178	C
241244,500	4240205,746	601,143	C
241248,000	4240205,746	601,135	C
241262,000	4240205,746	601,100	C
241265,500	4240205,746	601,091	C
241279,500	4240205,746	601,056	C
241283,000	4240205,746	601,047	C
241297,000	4240205,746	601,012	C
241300,500	4240205,746	601,004	C
241314,500	4240205,746	600,969	C
241318,000	4240205,746	600,960	C
241332,000	4240205,746	600,925	C
241335,500	4240205,746	600,916	C
241349,500	4240205,746	600,881	C
241353,000	4240205,746	600,872	C
241367,000	4240205,746	600,837	C
241370,500	4240205,746	600,829	C
241384,500	4240205,746	600,794	C
241388,000	4240205,746	600,785	C
241402,000	4240205,746	600,750	C
241405,500	4240205,746	600,741	C
241419,500	4240205,746	600,706	C
241423,000	4240205,746	600,697	C
241437,000	4240205,746	600,662	C
241440,500	4240205,746	600,654	C
241454,500	4240205,746	600,619	C
241458,000	4240205,746	600,610	C
241472,000	4240205,746	600,575	C
241475,500	4240205,746	600,566	C
241489,500	4240205,746	600,531	C
241493,000	4240205,746	600,522	C
241507,000	4240205,746	600,487	C
241510,500	4240205,746	600,479	C
241524,500	4240205,746	600,444	C
241528,000	4240205,746	600,435	C
241542,000	4240205,746	600,400	C
241545,500	4240205,746	600,391	C
241559,500	4240205,746	600,356	C
241563,000	4240205,746	600,347	C
241577,000	4240205,746	600,312	C
241580,500	4240205,746	600,304	C
241594,500	4240205,746	600,269	C
241598,000	4240205,746	600,260	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241179,500	4240384,881	603,097	C	241612,000	4240205,746	600,225	C
241183,000	4240384,881	603,089	C	241615,500	4240205,746	600,216	C
241197,000	4240384,881	603,054	C	241629,500	4240205,746	600,181	C
241200,500	4240384,881	603,045	C	241633,000	4240205,746	600,172	C
241214,500	4240384,881	603,010	C	241647,000	4240205,746	600,137	C
241218,000	4240384,881	603,001	C	241650,500	4240205,746	600,129	C
241232,000	4240384,881	602,966	C	241664,500	4240205,746	600,094	C
241235,500	4240384,881	602,957	C	241668,000	4240205,746	600,085	C
241249,500	4240384,881	602,922	C	241682,000	4240205,746	600,050	C
241253,000	4240384,881	602,914	C	241685,500	4240205,746	600,041	C
241267,000	4240384,881	602,879	C	241699,500	4240205,746	600,006	C
241270,500	4240384,881	602,870	C	241703,000	4240205,746	599,997	C
241284,500	4240384,881	602,835	C	241717,000	4240205,746	599,962	C
241288,000	4240384,881	602,826	C	241720,500	4240205,746	599,954	C
241302,000	4240384,881	602,791	C	241734,500	4240205,746	599,919	C
241305,500	4240384,881	602,782	C	241738,000	4240205,746	599,910	C
241319,500	4240384,881	602,747	C	241752,000	4240205,746	599,875	C
241323,000	4240384,881	602,739	C	241755,500	4240205,746	599,866	C
241337,000	4240384,881	602,704	C	241769,500	4240205,746	599,831	C
241340,500	4240384,881	602,695	C	241773,000	4240205,746	599,823	C
241354,500	4240384,881	602,660	C	241773,000	4240201,746	599,783	C
241358,000	4240384,881	602,651	C	241769,500	4240201,746	599,791	C
241372,000	4240384,881	602,616	C	241755,500	4240201,746	599,826	C
241375,500	4240384,881	602,607	C	241752,000	4240201,746	599,835	C
241389,500	4240384,881	602,572	C	241738,000	4240201,746	599,870	C
241393,000	4240384,881	602,564	C	241734,500	4240201,746	599,879	C
241407,000	4240384,881	602,529	C	241720,500	4240201,746	599,914	C
241410,500	4240384,881	602,520	C	241717,000	4240201,746	599,922	C
241424,500	4240384,881	602,485	C	241703,000	4240201,746	599,957	C
241428,000	4240384,881	602,476	C	241699,500	4240201,746	599,966	C
241442,000	4240384,881	602,441	C	241685,500	4240201,746	600,001	C
241445,500	4240384,881	602,432	C	241682,000	4240201,746	600,010	C
241459,500	4240384,881	602,398	C	241668,000	4240201,746	600,045	C
241463,000	4240384,881	602,389	C	241664,500	4240201,746	600,054	C
241477,000	4240384,881	602,354	C	241650,500	4240201,746	600,089	C
241480,500	4240384,881	602,345	C	241647,000	4240201,746	600,097	C
241494,500	4240384,881	602,310	C	241633,000	4240201,746	600,132	C
241498,000	4240384,881	602,301	C	241629,500	4240201,746	600,141	C
241512,000	4240384,881	602,266	C	241615,500	4240201,746	600,176	C
241515,500	4240384,881	602,258	C	241612,000	4240201,746	600,185	C
241529,500	4240384,881	602,223	C	241598,000	4240201,746	600,220	C
241533,000	4240384,881	602,214	C	241594,500	4240201,746	600,229	C
241547,000	4240384,881	602,179	C	241580,500	4240201,746	600,264	C
241550,500	4240384,881	602,170	C	241577,000	4240201,746	600,272	C
241564,500	4240384,881	602,135	C	241563,000	4240201,746	600,307	C
241568,000	4240384,881	602,126	C	241559,500	4240201,746	600,316	C

Coord. X	Coord. Y	Elevación	Código
241582,000	4240384,881	602,091	C
241585,500	4240384,881	602,083	C
241599,500	4240384,881	602,048	C
241603,000	4240384,881	602,039	C
241617,000	4240384,881	602,004	C
241620,500	4240384,881	601,995	C
241634,500	4240384,881	601,960	C
241638,000	4240384,881	601,951	C
241652,000	4240384,881	601,916	C
241655,500	4240384,881	601,908	C
241669,500	4240384,881	601,873	C
241673,000	4240384,881	601,864	C
241687,000	4240384,881	601,829	C
241690,500	4240384,881	601,820	C
241704,500	4240384,881	601,785	C
241708,000	4240384,881	601,776	C
241722,000	4240384,881	601,741	C
241725,500	4240384,881	601,733	C
241739,500	4240384,881	601,698	C
241743,000	4240384,881	601,689	C
241757,000	4240384,881	601,654	C
241760,500	4240384,881	601,645	C
241760,500	4240380,881	601,605	C
241757,000	4240380,881	601,614	C
241743,000	4240380,881	601,649	C
241739,500	4240380,881	601,658	C
241725,500	4240380,881	601,693	C
241722,000	4240380,881	601,701	C
241708,000	4240380,881	601,736	C
241704,500	4240380,881	601,745	C
241690,500	4240380,881	601,780	C
241687,000	4240380,881	601,789	C
241673,000	4240380,881	601,824	C
241669,500	4240380,881	601,833	C
241655,500	4240380,881	601,868	C
241652,000	4240380,881	601,876	C
241638,000	4240380,881	601,911	C
241634,500	4240380,881	601,920	C
241620,500	4240380,881	601,955	C
241617,000	4240380,881	601,964	C
241603,000	4240380,881	601,999	C
241599,500	4240380,881	602,008	C
241585,500	4240380,881	602,043	C
241582,000	4240380,881	602,051	C
241568,000	4240380,881	602,086	C
241564,500	4240380,881	602,095	C

Coord. X	Coord. Y	Elevación	Código
241545,500	4240201,746	600,351	C
241542,000	4240201,746	600,360	C
241528,000	4240201,746	600,395	C
241524,500	4240201,746	600,404	C
241510,500	4240201,746	600,439	C
241507,000	4240201,746	600,447	C
241493,000	4240201,746	600,482	C
241489,500	4240201,746	600,491	C
241475,500	4240201,746	600,526	C
241472,000	4240201,746	600,535	C
241458,000	4240201,746	600,570	C
241454,500	4240201,746	600,579	C
241440,500	4240201,746	600,614	C
241437,000	4240201,746	600,622	C
241423,000	4240201,746	600,657	C
241419,500	4240201,746	600,666	C
241405,500	4240201,746	600,701	C
241402,000	4240201,746	600,710	C
241388,000	4240201,746	600,745	C
241384,500	4240201,746	600,754	C
241370,500	4240201,746	600,789	C
241367,000	4240201,746	600,797	C
241353,000	4240201,746	600,832	C
241349,500	4240201,746	600,841	C
241335,500	4240201,746	600,876	C
241332,000	4240201,746	600,885	C
241318,000	4240201,746	600,920	C
241314,500	4240201,746	600,929	C
241300,500	4240201,746	600,964	C
241297,000	4240201,746	600,972	C
241283,000	4240201,746	601,007	C
241279,500	4240201,746	601,016	C
241265,500	4240201,746	601,051	C
241262,000	4240201,746	601,060	C
241248,000	4240201,746	601,095	C
241244,500	4240201,746	601,103	C
241230,500	4240201,746	601,138	C
241227,000	4240201,746	601,147	C
241227,000	4240193,693	601,067	C
241230,500	4240193,693	601,058	C
241244,500	4240193,693	601,023	C
241248,000	4240193,693	601,014	C
241262,000	4240193,693	600,979	C
241265,500	4240193,693	600,970	C
241279,500	4240193,693	600,935	C
241283,000	4240193,693	600,927	C

Coord. X	Coord. Y	Elevación	Código
241550,500	4240380,881	602,130	C
241547,000	4240380,881	602,139	C
241533,000	4240380,881	602,174	C
241529,500	4240380,881	602,183	C
241515,500	4240380,881	602,218	C
241512,000	4240380,881	602,226	C
241498,000	4240380,881	602,261	C
241494,500	4240380,881	602,270	C
241480,500	4240380,881	602,305	C
241477,000	4240380,881	602,314	C
241463,000	4240380,881	602,349	C
241459,500	4240380,881	602,358	C
241445,500	4240380,881	602,392	C
241442,000	4240380,881	602,401	C
241428,000	4240380,881	602,436	C
241424,500	4240380,881	602,445	C
241410,500	4240380,881	602,480	C
241407,000	4240380,881	602,489	C
241393,000	4240380,881	602,524	C
241389,500	4240380,881	602,532	C
241375,500	4240380,881	602,567	C
241372,000	4240380,881	602,576	C
241358,000	4240380,881	602,611	C
241354,500	4240380,881	602,620	C
241340,500	4240380,881	602,655	C
241337,000	4240380,881	602,664	C
241323,000	4240380,881	602,699	C
241319,500	4240380,881	602,707	C
241305,500	4240380,881	602,742	C
241302,000	4240380,881	602,751	C
241288,000	4240380,881	602,786	C
241284,500	4240380,881	602,795	C
241270,500	4240380,881	602,830	C
241267,000	4240380,881	602,839	C
241253,000	4240380,881	602,874	C
241249,500	4240380,881	602,882	C
241235,500	4240380,881	602,917	C
241232,000	4240380,881	602,926	C
241218,000	4240380,881	602,961	C
241214,500	4240380,881	602,970	C
241200,500	4240380,881	603,005	C
241197,000	4240380,881	603,014	C
241183,000	4240380,881	603,049	C
241179,500	4240380,881	603,057	C
241165,500	4240380,881	603,092	C
241162,000	4240380,881	603,101	C

Coord. X	Coord. Y	Elevación	Código
241297,000	4240193,693	600,892	C
241300,500	4240193,693	600,883	C
241314,500	4240193,693	600,848	C
241318,000	4240193,693	600,839	C
241332,000	4240193,693	600,804	C
241335,500	4240193,693	600,795	C
241349,500	4240193,693	600,761	C
241353,000	4240193,693	600,752	C
241367,000	4240193,693	600,717	C
241370,500	4240193,693	600,708	C
241384,500	4240193,693	600,673	C
241388,000	4240193,693	600,664	C
241402,000	4240193,693	600,629	C
241405,500	4240193,693	600,621	C
241419,500	4240193,693	600,586	C
241423,000	4240193,693	600,577	C
241437,000	4240193,693	600,542	C
241440,500	4240193,693	600,533	C
241454,500	4240193,693	600,498	C
241458,000	4240193,693	600,489	C
241472,000	4240193,693	600,454	C
241475,500	4240193,693	600,446	C
241489,500	4240193,693	600,411	C
241493,000	4240193,693	600,402	C
241507,000	4240193,693	600,367	C
241510,500	4240193,693	600,358	C
241524,500	4240193,693	600,323	C
241528,000	4240193,693	600,314	C
241542,000	4240193,693	600,279	C
241545,500	4240193,693	600,271	C
241559,500	4240193,693	600,236	C
241563,000	4240193,693	600,227	C
241577,000	4240193,693	600,192	C
241580,500	4240193,693	600,183	C
241594,500	4240193,693	600,148	C
241598,000	4240193,693	600,139	C
241612,000	4240193,693	600,104	C
241615,500	4240193,693	600,096	C
241629,500	4240193,693	600,061	C
241633,000	4240193,693	600,052	C
241647,000	4240193,693	600,017	C
241650,500	4240193,693	600,008	C
241664,500	4240193,693	599,973	C
241668,000	4240193,693	599,964	C
241682,000	4240193,693	599,929	C
241685,500	4240193,693	599,921	C

Coord. X	Coord. Y	Elevación	Código
241148,000	4240380,881	603,136	C
241144,500	4240380,881	603,145	C
241130,500	4240380,881	603,180	C
241127,000	4240380,881	603,189	C
241113,000	4240380,881	603,224	C
241109,500	4240380,881	603,232	C
241095,500	4240380,881	603,267	C
241092,000	4240380,881	603,276	C
241078,000	4240380,881	603,311	C
241074,500	4240380,881	603,320	C
241060,500	4240380,881	603,355	C
241057,000	4240380,881	603,364	C
241043,000	4240380,881	603,399	C
241039,500	4240380,881	603,407	C
241025,500	4240380,881	603,442	C
241022,000	4240380,881	603,451	C
241008,000	4240380,881	603,486	C
241004,500	4240380,881	603,495	C
240990,500	4240380,881	603,530	C
240987,000	4240380,881	603,539	C
240973,000	4240380,881	603,574	C
240969,500	4240380,881	603,582	C
240955,500	4240380,881	603,617	C
240952,000	4240380,881	603,626	C
240938,000	4240380,881	603,661	C
240934,500	4240380,881	603,670	C
240920,500	4240380,881	603,705	C
240917,000	4240380,881	603,714	C
240903,000	4240380,881	603,749	C
240899,500	4240380,881	603,757	C
240885,500	4240380,881	603,792	C
240882,000	4240380,881	603,801	C
240868,000	4240380,881	603,836	C
240864,500	4240380,881	603,845	C
240850,500	4240380,881	603,880	C
240847,000	4240380,881	603,889	C
240833,000	4240380,881	603,924	C
240829,500	4240380,881	603,932	C
240815,500	4240380,881	603,967	C
240812,000	4240380,881	603,976	C
240798,000	4240380,881	604,011	C
240794,500	4240380,881	604,020	C
240780,500	4240380,881	604,055	C
240777,000	4240380,881	604,064	C
240763,000	4240380,881	604,099	C
240759,500	4240380,881	604,107	C

Coord. X	Coord. Y	Elevación	Código
241699,500	4240193,693	599,886	C
241703,000	4240193,693	599,877	C
241717,000	4240193,693	599,842	C
241720,500	4240193,693	599,833	C
241734,500	4240193,693	599,798	C
241738,000	4240193,693	599,789	C
241752,000	4240193,693	599,754	C
241755,500	4240193,693	599,746	C
241769,500	4240193,693	599,711	C
241773,000	4240193,693	599,702	C
241773,000	4240189,693	599,662	C
241769,500	4240189,693	599,671	C
241755,500	4240189,693	599,706	C
241752,000	4240189,693	599,714	C
241738,000	4240189,693	599,749	C
241734,500	4240189,693	599,758	C
241720,500	4240189,693	599,793	C
241717,000	4240189,693	599,802	C
241703,000	4240189,693	599,837	C
241699,500	4240189,693	599,846	C
241685,500	4240189,693	599,881	C
241682,000	4240189,693	599,889	C
241668,000	4240189,693	599,924	C
241664,500	4240189,693	599,933	C
241650,500	4240189,693	599,968	C
241647,000	4240189,693	599,977	C
241633,000	4240189,693	600,012	C
241629,500	4240189,693	600,021	C
241615,500	4240189,693	600,056	C
241612,000	4240189,693	600,064	C
241598,000	4240189,693	600,099	C
241594,500	4240189,693	600,108	C
241580,500	4240189,693	600,143	C
241577,000	4240189,693	600,152	C
241563,000	4240189,693	600,187	C
241559,500	4240189,693	600,196	C
241545,500	4240189,693	600,231	C
241542,000	4240189,693	600,239	C
241528,000	4240189,693	600,274	C
241524,500	4240189,693	600,283	C
241510,500	4240189,693	600,318	C
241507,000	4240189,693	600,327	C
241493,000	4240189,693	600,362	C
241489,500	4240189,693	600,371	C
241475,500	4240189,693	600,406	C
241472,000	4240189,693	600,414	C

Coord. X	Coord. Y	Elevación	Código
240745,500	4240380,881	604,142	C
240742,000	4240380,881	604,151	C
240728,000	4240380,881	604,186	C
240724,500	4240380,881	604,195	C
240710,500	4240380,881	604,230	C
240707,000	4240380,881	604,239	C
240693,000	4240380,881	604,274	C
240689,500	4240380,881	604,282	C
240675,500	4240380,881	604,317	C
240672,000	4240380,881	604,326	C
240658,000	4240380,881	604,361	C
240654,500	4240380,881	604,370	C
240640,500	4240380,881	604,405	C
240637,000	4240380,881	604,414	C
240623,000	4240380,881	604,449	C
240619,500	4240380,881	604,457	C
240605,500	4240380,881	604,492	C
240602,000	4240380,881	604,501	C
240588,000	4240380,881	604,536	C
240584,500	4240380,881	604,545	C
240570,500	4240380,881	604,580	C
240567,000	4240380,881	604,589	C
240553,000	4240380,881	604,624	C
240549,500	4240380,881	604,632	C
240535,500	4240380,881	604,667	C
240532,000	4240380,881	604,676	C
240518,000	4240380,881	604,711	C
240514,500	4240380,881	604,720	C
240500,500	4240380,881	604,755	C
240497,000	4240380,881	604,763	C
240483,000	4240380,881	604,798	C
240479,500	4240380,881	604,807	C
240465,500	4240380,881	604,842	C
240462,000	4240380,881	604,851	C
240448,000	4240380,881	604,886	C
240444,500	4240380,881	604,895	C
240430,500	4240380,881	604,930	C
240427,000	4240380,881	604,938	C
240413,000	4240380,881	604,973	C
240409,500	4240380,881	604,982	C
240395,500	4240380,881	605,017	C
240392,000	4240380,881	605,026	C
240378,000	4240380,881	605,061	C
240374,500	4240380,881	605,070	C
240360,500	4240380,881	605,105	C
240357,000	4240380,881	605,113	C

Coord. X	Coord. Y	Elevación	Código
241458,000	4240189,693	600,449	C
241454,500	4240189,693	600,458	C
241440,500	4240189,693	600,493	C
241437,000	4240189,693	600,502	C
241423,000	4240189,693	600,537	C
241419,500	4240189,693	600,546	C
241405,500	4240189,693	600,581	C
241402,000	4240189,693	600,589	C
241388,000	4240189,693	600,624	C
241384,500	4240189,693	600,633	C
241370,500	4240189,693	600,668	C
241367,000	4240189,693	600,677	C
241353,000	4240189,693	600,712	C
241349,500	4240189,693	600,721	C
241335,500	4240189,693	600,755	C
241332,000	4240189,693	600,764	C
241318,000	4240189,693	600,799	C
241314,500	4240189,693	600,808	C
241300,500	4240189,693	600,843	C
241297,000	4240189,693	600,852	C
241283,000	4240189,693	600,887	C
241279,500	4240189,693	600,895	C
241265,500	4240189,693	600,930	C
241262,000	4240189,693	600,939	C
241248,000	4240189,693	600,974	C
241244,500	4240189,693	600,983	C
241230,500	4240189,693	601,018	C
241227,000	4240189,693	601,027	C
241227,000	4240181,639	600,946	C
241230,500	4240181,639	600,937	C
241244,500	4240181,639	600,902	C
241248,000	4240181,639	600,894	C
241262,000	4240181,639	600,859	C
241265,500	4240181,639	600,850	C
241279,500	4240181,639	600,815	C
241283,000	4240181,639	600,806	C
241297,000	4240181,639	600,771	C
241300,500	4240181,639	600,762	C
241314,500	4240181,639	600,727	C
241318,000	4240181,639	600,719	C
241332,000	4240181,639	600,684	C
241335,500	4240181,639	600,675	C
241349,500	4240181,639	600,640	C
241353,000	4240181,639	600,631	C
241367,000	4240181,639	600,596	C
241370,500	4240181,639	600,587	C

Coord. X	Coord. Y	Elevación	Código
240343,000	4240380,881	605,148	C
240339,500	4240380,881	605,157	C
240325,500	4240380,881	605,192	C
240322,000	4240380,881	605,201	C
240308,000	4240380,881	605,236	C
240304,500	4240380,881	605,245	C
240290,500	4240380,881	605,280	C
240287,000	4240380,881	605,288	C
240273,000	4240380,881	605,323	C
240269,500	4240380,881	605,332	C
240255,500	4240380,881	605,367	C
240252,000	4240380,881	605,376	C
240238,000	4240380,881	605,411	C
240234,500	4240380,881	605,420	C
240220,500	4240380,881	605,455	C
240217,000	4240380,881	605,463	C
240203,000	4240380,881	605,498	C
240199,500	4240380,881	605,507	C
240185,500	4240380,881	605,542	C
240182,000	4240380,881	605,551	C
240168,000	4240380,881	605,586	C
240164,500	4240380,881	605,595	C
240150,500	4240380,881	605,630	C
240147,000	4240380,881	605,638	C
240133,000	4240380,881	605,673	C
240129,500	4240380,881	605,682	C
240115,500	4240380,881	605,717	C
240112,000	4240380,881	605,726	C
240098,000	4240380,881	605,761	C
240094,500	4240380,881	605,770	C
240080,500	4240380,881	605,805	C
240077,000	4240380,881	605,813	C
240063,000	4240380,881	605,848	C
240059,500	4240380,881	605,857	C
240045,500	4240380,881	605,892	C
240042,000	4240380,881	605,901	C
240028,000	4240380,881	605,936	C
240024,500	4240380,881	605,945	C
240024,500	4240372,828	605,864	C
240028,000	4240372,828	605,855	C
240042,000	4240372,828	605,820	C
240045,500	4240372,828	605,812	C
240059,500	4240372,828	605,777	C
240063,000	4240372,828	605,768	C
240077,000	4240372,828	605,733	C
240080,500	4240372,828	605,724	C

Coord. X	Coord. Y	Elevación	Código
241384,500	4240181,639	600,552	C
241388,000	4240181,639	600,544	C
241402,000	4240181,639	600,509	C
241405,500	4240181,639	600,500	C
241419,500	4240181,639	600,465	C
241423,000	4240181,639	600,456	C
241437,000	4240181,639	600,421	C
241440,500	4240181,639	600,413	C
241454,500	4240181,639	600,378	C
241458,000	4240181,639	600,369	C
241472,000	4240181,639	600,334	C
241475,500	4240181,639	600,325	C
241489,500	4240181,639	600,290	C
241493,000	4240181,639	600,281	C
241507,000	4240181,639	600,246	C
241510,500	4240181,639	600,238	C
241524,500	4240181,639	600,203	C
241528,000	4240181,639	600,194	C
241542,000	4240181,639	600,159	C
241545,500	4240181,639	600,150	C
241559,500	4240181,639	600,115	C
241563,000	4240181,639	600,106	C
241577,000	4240181,639	600,071	C
241580,500	4240181,639	600,063	C
241594,500	4240181,639	600,028	C
241598,000	4240181,639	600,019	C
241612,000	4240181,639	599,984	C
241615,500	4240181,639	599,975	C
241629,500	4240181,639	599,940	C
241633,000	4240181,639	599,931	C
241647,000	4240181,639	599,896	C
241650,500	4240181,639	599,888	C
241664,500	4240181,639	599,853	C
241668,000	4240181,639	599,844	C
241682,000	4240181,639	599,809	C
241685,500	4240181,639	599,800	C
241699,500	4240181,639	599,765	C
241703,000	4240181,639	599,756	C
241717,000	4240181,639	599,721	C
241720,500	4240181,639	599,713	C
241734,500	4240181,639	599,678	C
241738,000	4240181,639	599,669	C
241752,000	4240181,639	599,634	C
241755,500	4240181,639	599,625	C
241769,500	4240181,639	599,590	C
241773,000	4240181,639	599,581	C

Coord. X	Coord. Y	Elevación	Código
240094,500	4240372,828	605,689	C
240098,000	4240372,828	605,680	C
240112,000	4240372,828	605,645	C
240115,500	4240372,828	605,637	C
240129,500	4240372,828	605,602	C
240133,000	4240372,828	605,593	C
240147,000	4240372,828	605,558	C
240150,500	4240372,828	605,549	C
240164,500	4240372,828	605,514	C
240168,000	4240372,828	605,505	C
240182,000	4240372,828	605,470	C
240185,500	4240372,828	605,462	C
240199,500	4240372,828	605,427	C
240203,000	4240372,828	605,418	C
240217,000	4240372,828	605,383	C
240220,500	4240372,828	605,374	C
240234,500	4240372,828	605,339	C
240238,000	4240372,828	605,330	C
240252,000	4240372,828	605,295	C
240255,500	4240372,828	605,287	C
240269,500	4240372,828	605,252	C
240273,000	4240372,828	605,243	C
240287,000	4240372,828	605,208	C
240290,500	4240372,828	605,199	C
240304,500	4240372,828	605,164	C
240308,000	4240372,828	605,155	C
240322,000	4240372,828	605,120	C
240325,500	4240372,828	605,112	C
240339,500	4240372,828	605,077	C
240343,000	4240372,828	605,068	C
240357,000	4240372,828	605,033	C
240360,500	4240372,828	605,024	C
240374,500	4240372,828	604,989	C
240378,000	4240372,828	604,980	C
240392,000	4240372,828	604,945	C
240395,500	4240372,828	604,937	C
240409,500	4240372,828	604,902	C
240413,000	4240372,828	604,893	C
240427,000	4240372,828	604,858	C
240430,500	4240372,828	604,849	C
240444,500	4240372,828	604,814	C
240448,000	4240372,828	604,805	C
240462,000	4240372,828	604,770	C
240465,500	4240372,828	604,762	C
240479,500	4240372,828	604,727	C
240483,000	4240372,828	604,718	C

Coord. X	Coord. Y	Elevación	Código
241773,000	4240177,639	599,541	C
241769,500	4240177,639	599,550	C
241755,500	4240177,639	599,585	C
241752,000	4240177,639	599,594	C
241738,000	4240177,639	599,629	C
241734,500	4240177,639	599,638	C
241720,500	4240177,639	599,673	C
241717,000	4240177,639	599,681	C
241703,000	4240177,639	599,716	C
241699,500	4240177,639	599,725	C
241685,500	4240177,639	599,760	C
241682,000	4240177,639	599,769	C
241668,000	4240177,639	599,804	C
241664,500	4240177,639	599,813	C
241650,500	4240177,639	599,848	C
241647,000	4240177,639	599,856	C
241633,000	4240177,639	599,891	C
241629,500	4240177,639	599,900	C
241615,500	4240177,639	599,935	C
241612,000	4240177,639	599,944	C
241598,000	4240177,639	599,979	C
241594,500	4240177,639	599,988	C
241580,500	4240177,639	600,023	C
241577,000	4240177,639	600,031	C
241563,000	4240177,639	600,066	C
241559,500	4240177,639	600,075	C
241545,500	4240177,639	600,110	C
241542,000	4240177,639	600,119	C
241528,000	4240177,639	600,154	C
241524,500	4240177,639	600,163	C
241510,500	4240177,639	600,198	C
241507,000	4240177,639	600,206	C
241493,000	4240177,639	600,241	C
241489,500	4240177,639	600,250	C
241475,500	4240177,639	600,285	C
241472,000	4240177,639	600,294	C
241458,000	4240177,639	600,329	C
241454,500	4240177,639	600,338	C
241440,500	4240177,639	600,373	C
241437,000	4240177,639	600,381	C
241423,000	4240177,639	600,416	C
241419,500	4240177,639	600,425	C
241405,500	4240177,639	600,460	C
241402,000	4240177,639	600,469	C
241388,000	4240177,639	600,504	C
241384,500	4240177,639	600,512	C

Coord. X	Coord. Y	Elevación	Código
240497,000	4240372,828	604,683	C
240500,500	4240372,828	604,674	C
240514,500	4240372,828	604,639	C
240518,000	4240372,828	604,630	C
240532,000	4240372,828	604,595	C
240535,500	4240372,828	604,587	C
240549,500	4240372,828	604,552	C
240553,000	4240372,828	604,543	C
240567,000	4240372,828	604,508	C
240570,500	4240372,828	604,499	C
240584,500	4240372,828	604,464	C
240588,000	4240372,828	604,455	C
240602,000	4240372,828	604,420	C
240605,500	4240372,828	604,412	C
240619,500	4240372,828	604,377	C
240623,000	4240372,828	604,368	C
240637,000	4240372,828	604,333	C
240640,500	4240372,828	604,324	C
240654,500	4240372,828	604,289	C
240658,000	4240372,828	604,280	C
240672,000	4240372,828	604,245	C
240675,500	4240372,828	604,237	C
240689,500	4240372,828	604,202	C
240693,000	4240372,828	604,193	C
240707,000	4240372,828	604,158	C
240710,500	4240372,828	604,149	C
240724,500	4240372,828	604,114	C
240728,000	4240372,828	604,106	C
240742,000	4240372,828	604,071	C
240745,500	4240372,828	604,062	C
240759,500	4240372,828	604,027	C
240763,000	4240372,828	604,018	C
240777,000	4240372,828	603,983	C
240780,500	4240372,828	603,974	C
240794,500	4240372,828	603,939	C
240798,000	4240372,828	603,931	C
240812,000	4240372,828	603,896	C
240815,500	4240372,828	603,887	C
240829,500	4240372,828	603,852	C
240833,000	4240372,828	603,843	C
240847,000	4240372,828	603,808	C
240850,500	4240372,828	603,799	C
240864,500	4240372,828	603,764	C
240868,000	4240372,828	603,756	C
240882,000	4240372,828	603,721	C
240885,500	4240372,828	603,712	C

Coord. X	Coord. Y	Elevación	Código
241370,500	4240177,639	600,547	C
241367,000	4240177,639	600,556	C
241353,000	4240177,639	600,591	C
241349,500	4240177,639	600,600	C
241335,500	4240177,639	600,635	C
241332,000	4240177,639	600,644	C
241318,000	4240177,639	600,679	C
241314,500	4240177,639	600,687	C
241300,500	4240177,639	600,722	C
241297,000	4240177,639	600,731	C
241283,000	4240177,639	600,766	C
241279,500	4240177,639	600,775	C
241265,500	4240177,639	600,810	C
241262,000	4240177,639	600,819	C
241248,000	4240177,639	600,854	C
241244,500	4240177,639	600,862	C
241230,500	4240177,639	600,897	C
241227,000	4240177,639	600,906	C
241227,000	4240168,585	600,816	C
241230,500	4240168,585	600,807	C
241244,500	4240168,585	600,772	C
241248,000	4240168,585	600,763	C
241262,000	4240168,585	600,728	C
241265,500	4240168,585	600,719	C
241279,500	4240168,585	600,684	C
241283,000	4240168,585	600,676	C
241297,000	4240168,585	600,641	C
241300,500	4240168,585	600,632	C
241314,500	4240168,585	600,597	C
241318,000	4240168,585	600,588	C
241332,000	4240168,585	600,553	C
241335,500	4240168,585	600,544	C
241349,500	4240168,585	600,509	C
241353,000	4240168,585	600,501	C
241367,000	4240168,585	600,466	C
241370,500	4240168,585	600,457	C
241384,500	4240168,585	600,422	C
241388,000	4240168,585	600,413	C
241402,000	4240168,585	600,378	C
241405,500	4240168,585	600,369	C
241419,500	4240168,585	600,334	C
241423,000	4240168,585	600,326	C
241437,000	4240168,585	600,291	C
241440,500	4240168,585	600,282	C
241454,500	4240168,585	600,247	C
241458,000	4240168,585	600,238	C

Coord. X	Coord. Y	Elevación	Código
240899,500	4240372,828	603,677	C
240903,000	4240372,828	603,668	C
240917,000	4240372,828	603,633	C
240920,500	4240372,828	603,624	C
240934,500	4240372,828	603,589	C
240938,000	4240372,828	603,581	C
240952,000	4240372,828	603,546	C
240955,500	4240372,828	603,537	C
240969,500	4240372,828	603,502	C
240973,000	4240372,828	603,493	C
240987,000	4240372,828	603,458	C
240990,500	4240372,828	603,449	C
241004,500	4240372,828	603,414	C
241008,000	4240372,828	603,406	C
241022,000	4240372,828	603,371	C
241025,500	4240372,828	603,362	C
241039,500	4240372,828	603,327	C
241043,000	4240372,828	603,318	C
241057,000	4240372,828	603,283	C
241060,500	4240372,828	603,274	C
241074,500	4240372,828	603,239	C
241078,000	4240372,828	603,231	C
241092,000	4240372,828	603,196	C
241095,500	4240372,828	603,187	C
241109,500	4240372,828	603,152	C
241113,000	4240372,828	603,143	C
241127,000	4240372,828	603,108	C
241130,500	4240372,828	603,099	C
241144,500	4240372,828	603,064	C
241148,000	4240372,828	603,056	C
241162,000	4240372,828	603,021	C
241165,500	4240372,828	603,012	C
241179,500	4240372,828	602,977	C
241183,000	4240372,828	602,968	C
241197,000	4240372,828	602,933	C
241200,500	4240372,828	602,924	C
241214,500	4240372,828	602,889	C
241218,000	4240372,828	602,881	C
241232,000	4240372,828	602,846	C
241235,500	4240372,828	602,837	C
241249,500	4240372,828	602,802	C
241253,000	4240372,828	602,793	C
241267,000	4240372,828	602,758	C
241270,500	4240372,828	602,749	C
241284,500	4240372,828	602,714	C
241288,000	4240372,828	602,706	C

Coord. X	Coord. Y	Elevación	Código
241472,000	4240168,585	600,203	C
241475,500	4240168,585	600,194	C
241489,500	4240168,585	600,159	C
241493,000	4240168,585	600,151	C
241507,000	4240168,585	600,116	C
241510,500	4240168,585	600,107	C
241524,500	4240168,585	600,072	C
241528,000	4240168,585	600,063	C
241542,000	4240168,585	600,028	C
241545,500	4240168,585	600,020	C
241559,500	4240168,585	599,985	C
241563,000	4240168,585	599,976	C
241577,000	4240168,585	599,941	C
241580,500	4240168,585	599,932	C
241594,500	4240168,585	599,897	C
241598,000	4240168,585	599,888	C
241612,000	4240168,585	599,853	C
241615,500	4240168,585	599,845	C
241629,500	4240168,585	599,810	C
241633,000	4240168,585	599,801	C
241647,000	4240168,585	599,766	C
241650,500	4240168,585	599,757	C
241664,500	4240168,585	599,722	C
241668,000	4240168,585	599,713	C
241682,000	4240168,585	599,678	C
241685,500	4240168,585	599,670	C
241699,500	4240168,585	599,635	C
241703,000	4240168,585	599,626	C
241717,000	4240168,585	599,591	C
241720,500	4240168,585	599,582	C
241734,500	4240168,585	599,547	C
241738,000	4240168,585	599,538	C
241752,000	4240168,585	599,503	C
241755,500	4240168,585	599,495	C
241769,500	4240168,585	599,460	C
241773,000	4240168,585	599,451	C
241773,000	4240165,435	599,419	C
241769,500	4240165,435	599,428	C
241755,500	4240165,435	599,463	C
241752,000	4240165,435	599,472	C
241738,000	4240165,435	599,507	C
241734,500	4240165,435	599,516	C
241720,500	4240165,435	599,551	C
241717,000	4240165,435	599,559	C
241703,000	4240165,435	599,594	C
241699,500	4240165,435	599,603	C

Coord. X	Coord. Y	Elevación	Código
241302,000	4240372,828	602,671	C
241305,500	4240372,828	602,662	C
241319,500	4240372,828	602,627	C
241323,000	4240372,828	602,618	C
241337,000	4240372,828	602,583	C
241340,500	4240372,828	602,574	C
241354,500	4240372,828	602,539	C
241358,000	4240372,828	602,531	C
241372,000	4240372,828	602,496	C
241375,500	4240372,828	602,487	C
241389,500	4240372,828	602,452	C
241393,000	4240372,828	602,443	C
241407,000	4240372,828	602,408	C
241410,500	4240372,828	602,399	C
241424,500	4240372,828	602,364	C
241428,000	4240372,828	602,356	C
241442,000	4240372,828	602,321	C
241445,500	4240372,828	602,312	C
241459,500	4240372,828	602,277	C
241463,000	4240372,828	602,268	C
241477,000	4240372,828	602,233	C
241480,500	4240372,828	602,224	C
241494,500	4240372,828	602,189	C
241498,000	4240372,828	602,181	C
241512,000	4240372,828	602,146	C
241515,500	4240372,828	602,137	C
241529,500	4240372,828	602,102	C
241533,000	4240372,828	602,093	C
241547,000	4240372,828	602,058	C
241550,500	4240372,828	602,050	C
241564,500	4240372,828	602,015	C
241568,000	4240372,828	602,006	C
241582,000	4240372,828	601,971	C
241585,500	4240372,828	601,962	C
241599,500	4240372,828	601,927	C
241603,000	4240372,828	601,918	C
241617,000	4240372,828	601,883	C
241620,500	4240372,828	601,875	C
241634,500	4240372,828	601,840	C
241638,000	4240372,828	601,831	C
241652,000	4240372,828	601,796	C
241655,500	4240372,828	601,787	C
241669,500	4240372,828	601,752	C
241673,000	4240372,828	601,743	C
241687,000	4240372,828	601,708	C
241690,500	4240372,828	601,700	C

Coord. X	Coord. Y	Elevación	Código
241685,500	4240165,435	599,638	C
241682,000	4240165,435	599,647	C
241668,000	4240165,435	599,682	C
241664,500	4240165,435	599,691	C
241650,500	4240165,435	599,726	C
241647,000	4240165,435	599,734	C
241633,000	4240165,435	599,769	C
241629,500	4240165,435	599,778	C
241615,500	4240165,435	599,813	C
241612,000	4240165,435	599,822	C
241598,000	4240165,435	599,857	C
241594,500	4240165,435	599,866	C
241580,500	4240165,435	599,901	C
241577,000	4240165,435	599,909	C
241563,000	4240165,435	599,944	C
241559,500	4240165,435	599,953	C
241545,500	4240165,435	599,988	C
241542,000	4240165,435	599,997	C
241528,000	4240165,435	600,032	C
241524,500	4240165,435	600,041	C
241510,500	4240165,435	600,075	C
241507,000	4240165,435	600,084	C
241493,000	4240165,435	600,119	C
241489,500	4240165,435	600,128	C
241475,500	4240165,435	600,163	C
241472,000	4240165,435	600,172	C
241458,000	4240165,435	600,207	C
241454,500	4240165,435	600,215	C
241440,500	4240165,435	600,250	C
241437,000	4240165,435	600,259	C
241423,000	4240165,435	600,294	C
241419,500	4240165,435	600,303	C
241405,500	4240165,435	600,338	C
241402,000	4240165,435	600,347	C
241388,000	4240165,435	600,382	C
241384,500	4240165,435	600,390	C
241370,500	4240165,435	600,425	C
241367,000	4240165,435	600,434	C
241353,000	4240165,435	600,469	C
241349,500	4240165,435	600,478	C
241335,500	4240165,435	600,513	C
241332,000	4240165,435	600,522	C
241318,000	4240165,435	600,557	C
241314,500	4240165,435	600,565	C
241300,500	4240165,435	600,600	C
241297,000	4240165,435	600,609	C

Coord. X	Coord. Y	Elevación	Código
241704,500	4240372,828	601,665	C
241708,000	4240372,828	601,656	C
241722,000	4240372,828	601,621	C
241725,500	4240372,828	601,612	C
241739,500	4240372,828	601,577	C
241743,000	4240372,828	601,568	C
241757,000	4240372,828	601,533	C
241760,500	4240372,828	601,525	C
241760,500	4240368,828	601,485	C
241757,000	4240368,828	601,493	C
241743,000	4240368,828	601,528	C
241739,500	4240368,828	601,537	C
241725,500	4240368,828	601,572	C
241722,000	4240368,828	601,581	C
241708,000	4240368,828	601,616	C
241704,500	4240368,828	601,625	C
241690,500	4240368,828	601,660	C
241687,000	4240368,828	601,668	C
241673,000	4240368,828	601,703	C
241669,500	4240368,828	601,712	C
241655,500	4240368,828	601,747	C
241652,000	4240368,828	601,756	C
241638,000	4240368,828	601,791	C
241634,500	4240368,828	601,800	C
241620,500	4240368,828	601,835	C
241617,000	4240368,828	601,843	C
241603,000	4240368,828	601,878	C
241599,500	4240368,828	601,887	C
241585,500	4240368,828	601,922	C
241582,000	4240368,828	601,931	C
241568,000	4240368,828	601,966	C
241564,500	4240368,828	601,975	C
241550,500	4240368,828	602,010	C
241547,000	4240368,828	602,018	C
241533,000	4240368,828	602,053	C
241529,500	4240368,828	602,062	C
241515,500	4240368,828	602,097	C
241512,000	4240368,828	602,106	C
241498,000	4240368,828	602,141	C
241494,500	4240368,828	602,149	C
241480,500	4240368,828	602,184	C
241477,000	4240368,828	602,193	C
241463,000	4240368,828	602,228	C
241459,500	4240368,828	602,237	C
241445,500	4240368,828	602,272	C
241442,000	4240368,828	602,281	C

Coord. X	Coord. Y	Elevación	Código
241283,000	4240165,435	600,644	C
241279,500	4240165,435	600,653	C
241265,500	4240165,435	600,688	C
241262,000	4240165,435	600,697	C
241248,000	4240165,435	600,732	C
241244,500	4240165,435	600,740	C
241230,500	4240165,435	600,775	C
241227,000	4240165,435	600,784	C
241227,000	4240156,381	600,694	C
241230,500	4240156,381	600,685	C
241244,500	4240156,381	600,650	C
241248,000	4240156,381	600,641	C
241262,000	4240156,381	600,606	C
241265,500	4240156,381	600,597	C
241279,500	4240156,381	600,562	C
241283,000	4240156,381	600,554	C
241297,000	4240156,381	600,519	C
241300,500	4240156,381	600,510	C
241314,500	4240156,381	600,475	C
241318,000	4240156,381	600,466	C
241332,000	4240156,381	600,431	C
241335,500	4240156,381	600,422	C
241349,500	4240156,381	600,387	C
241353,000	4240156,381	600,379	C
241367,000	4240156,381	600,344	C
241370,500	4240156,381	600,335	C
241384,500	4240156,381	600,300	C
241388,000	4240156,381	600,291	C
241402,000	4240156,381	600,256	C
241405,500	4240156,381	600,247	C
241419,500	4240156,381	600,212	C
241423,000	4240156,381	600,204	C
241437,000	4240156,381	600,169	C
241440,500	4240156,381	600,160	C
241454,500	4240156,381	600,125	C
241458,000	4240156,381	600,116	C
241472,000	4240156,381	600,081	C
241475,500	4240156,381	600,072	C
241489,500	4240156,381	600,037	C
241493,000	4240156,381	600,029	C
241507,000	4240156,381	599,994	C
241510,500	4240156,381	599,985	C
241524,500	4240156,381	599,950	C
241528,000	4240156,381	599,941	C
241542,000	4240156,381	599,906	C
241545,500	4240156,381	599,897	C

Coord. X	Coord. Y	Elevación	Código
241428,000	4240368,828	602,316	C
241424,500	4240368,828	602,324	C
241410,500	4240368,828	602,359	C
241407,000	4240368,828	602,368	C
241393,000	4240368,828	602,403	C
241389,500	4240368,828	602,412	C
241375,500	4240368,828	602,447	C
241372,000	4240368,828	602,456	C
241358,000	4240368,828	602,491	C
241354,500	4240368,828	602,499	C
241340,500	4240368,828	602,534	C
241337,000	4240368,828	602,543	C
241323,000	4240368,828	602,578	C
241319,500	4240368,828	602,587	C
241305,500	4240368,828	602,622	C
241302,000	4240368,828	602,631	C
241288,000	4240368,828	602,666	C
241284,500	4240368,828	602,674	C
241270,500	4240368,828	602,709	C
241267,000	4240368,828	602,718	C
241253,000	4240368,828	602,753	C
241249,500	4240368,828	602,762	C
241235,500	4240368,828	602,797	C
241232,000	4240368,828	602,806	C
241218,000	4240368,828	602,841	C
241214,500	4240368,828	602,849	C
241200,500	4240368,828	602,884	C
241197,000	4240368,828	602,893	C
241183,000	4240368,828	602,928	C
241179,500	4240368,828	602,937	C
241165,500	4240368,828	602,972	C
241162,000	4240368,828	602,981	C
241148,000	4240368,828	603,016	C
241144,500	4240368,828	603,024	C
241130,500	4240368,828	603,059	C
241127,000	4240368,828	603,068	C
241113,000	4240368,828	603,103	C
241109,500	4240368,828	603,112	C
241095,500	4240368,828	603,147	C
241092,000	4240368,828	603,156	C
241078,000	4240368,828	603,191	C
241074,500	4240368,828	603,199	C
241060,500	4240368,828	603,234	C
241057,000	4240368,828	603,243	C
241043,000	4240368,828	603,278	C
241039,500	4240368,828	603,287	C

Coord. X	Coord. Y	Elevación	Código
241559,500	4240156,381	599,862	C
241563,000	4240156,381	599,854	C
241577,000	4240156,381	599,819	C
241580,500	4240156,381	599,810	C
241594,500	4240156,381	599,775	C
241598,000	4240156,381	599,766	C
241612,000	4240156,381	599,731	C
241615,500	4240156,381	599,723	C
241629,500	4240156,381	599,688	C
241633,000	4240156,381	599,679	C
241647,000	4240156,381	599,644	C
241650,500	4240156,381	599,635	C
241664,500	4240156,381	599,600	C
241668,000	4240156,381	599,591	C
241682,000	4240156,381	599,556	C
241685,500	4240156,381	599,548	C
241699,500	4240156,381	599,513	C
241703,000	4240156,381	599,504	C
241717,000	4240156,381	599,469	C
241720,500	4240156,381	599,460	C
241734,500	4240156,381	599,425	C
241738,000	4240156,381	599,416	C
241752,000	4240156,381	599,381	C
241755,500	4240156,381	599,373	C
241769,500	4240156,381	599,338	C
241773,000	4240156,381	599,329	C
241773,000	4240152,381	599,289	C
241769,500	4240152,381	599,298	C
241755,500	4240152,381	599,333	C
241752,000	4240152,381	599,341	C
241738,000	4240152,381	599,376	C
241734,500	4240152,381	599,385	C
241720,500	4240152,381	599,420	C
241717,000	4240152,381	599,429	C
241703,000	4240152,381	599,464	C
241699,500	4240152,381	599,473	C
241685,500	4240152,381	599,508	C
241682,000	4240152,381	599,516	C
241668,000	4240152,381	599,551	C
241664,500	4240152,381	599,560	C
241650,500	4240152,381	599,595	C
241647,000	4240152,381	599,604	C
241633,000	4240152,381	599,639	C
241629,500	4240152,381	599,648	C
241615,500	4240152,381	599,683	C
241612,000	4240152,381	599,691	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241025,500	4240368,828	603,322	C	241598,000	4240152,381	599,726	C
241022,000	4240368,828	603,331	C	241594,500	4240152,381	599,735	C
241008,000	4240368,828	603,366	C	241580,500	4240152,381	599,770	C
241004,500	4240368,828	603,374	C	241577,000	4240152,381	599,779	C
240990,500	4240368,828	603,409	C	241563,000	4240152,381	599,814	C
240987,000	4240368,828	603,418	C	241559,500	4240152,381	599,822	C
240973,000	4240368,828	603,453	C	241545,500	4240152,381	599,857	C
240969,500	4240368,828	603,462	C	241542,000	4240152,381	599,866	C
240955,500	4240368,828	603,497	C	241528,000	4240152,381	599,901	C
240952,000	4240368,828	603,506	C	241524,500	4240152,381	599,910	C
240938,000	4240368,828	603,541	C	241510,500	4240152,381	599,945	C
240934,500	4240368,828	603,549	C	241507,000	4240152,381	599,954	C
240920,500	4240368,828	603,584	C	241493,000	4240152,381	599,989	C
240917,000	4240368,828	603,593	C	241489,500	4240152,381	599,997	C
240903,000	4240368,828	603,628	C	241475,500	4240152,381	600,032	C
240899,500	4240368,828	603,637	C	241472,000	4240152,381	600,041	C
240885,500	4240368,828	603,672	C	241458,000	4240152,381	600,076	C
240882,000	4240368,828	603,681	C	241454,500	4240152,381	600,085	C
240868,000	4240368,828	603,716	C	241440,500	4240152,381	600,120	C
240864,500	4240368,828	603,724	C	241437,000	4240152,381	600,129	C
240850,500	4240368,828	603,759	C	241423,000	4240152,381	600,164	C
240847,000	4240368,828	603,768	C	241419,500	4240152,381	600,172	C
240833,000	4240368,828	603,803	C	241405,500	4240152,381	600,207	C
240829,500	4240368,828	603,812	C	241402,000	4240152,381	600,216	C
240815,500	4240368,828	603,847	C	241388,000	4240152,381	600,251	C
240812,000	4240368,828	603,856	C	241384,500	4240152,381	600,260	C
240798,000	4240368,828	603,891	C	241370,500	4240152,381	600,295	C
240794,500	4240368,828	603,899	C	241367,000	4240152,381	600,304	C
240780,500	4240368,828	603,934	C	241353,000	4240152,381	600,339	C
240777,000	4240368,828	603,943	C	241349,500	4240152,381	600,347	C
240763,000	4240368,828	603,978	C	241335,500	4240152,381	600,382	C
240759,500	4240368,828	603,987	C	241332,000	4240152,381	600,391	C
240745,500	4240368,828	604,022	C	241318,000	4240152,381	600,426	C
240742,000	4240368,828	604,031	C	241314,500	4240152,381	600,435	C
240728,000	4240368,828	604,066	C	241300,500	4240152,381	600,470	C
240724,500	4240368,828	604,074	C	241297,000	4240152,381	600,479	C
240710,500	4240368,828	604,109	C	241283,000	4240152,381	600,514	C
240707,000	4240368,828	604,118	C	241279,500	4240152,381	600,522	C
240693,000	4240368,828	604,153	C	241265,500	4240152,381	600,557	C
240689,500	4240368,828	604,162	C	241262,000	4240152,381	600,566	C
240675,500	4240368,828	604,197	C	241248,000	4240152,381	600,601	C
240672,000	4240368,828	604,205	C	241244,500	4240152,381	600,610	C
240658,000	4240368,828	604,240	C	241230,500	4240152,381	600,645	C
240654,500	4240368,828	604,249	C	241227,000	4240152,381	600,654	C
240640,500	4240368,828	604,284	C	241227,000	4240144,328	600,573	C
240637,000	4240368,828	604,293	C	241230,500	4240144,328	600,564	C

Coord. X	Coord. Y	Elevación	Código
240623,000	4240368,828	604,328	C
240619,500	4240368,828	604,337	C
240605,500	4240368,828	604,372	C
240602,000	4240368,828	604,380	C
240588,000	4240368,828	604,415	C
240584,500	4240368,828	604,424	C
240570,500	4240368,828	604,459	C
240567,000	4240368,828	604,468	C
240553,000	4240368,828	604,503	C
240549,500	4240368,828	604,512	C
240535,500	4240368,828	604,547	C
240532,000	4240368,828	604,555	C
240518,000	4240368,828	604,590	C
240514,500	4240368,828	604,599	C
240500,500	4240368,828	604,634	C
240497,000	4240368,828	604,643	C
240483,000	4240368,828	604,678	C
240479,500	4240368,828	604,687	C
240465,500	4240368,828	604,722	C
240462,000	4240368,828	604,730	C
240448,000	4240368,828	604,765	C
240444,500	4240368,828	604,774	C
240430,500	4240368,828	604,809	C
240427,000	4240368,828	604,818	C
240413,000	4240368,828	604,853	C
240409,500	4240368,828	604,862	C
240395,500	4240368,828	604,897	C
240392,000	4240368,828	604,905	C
240378,000	4240368,828	604,940	C
240374,500	4240368,828	604,949	C
240360,500	4240368,828	604,984	C
240357,000	4240368,828	604,993	C
240343,000	4240368,828	605,028	C
240339,500	4240368,828	605,037	C
240325,500	4240368,828	605,072	C
240322,000	4240368,828	605,080	C
240308,000	4240368,828	605,115	C
240304,500	4240368,828	605,124	C
240290,500	4240368,828	605,159	C
240287,000	4240368,828	605,168	C
240273,000	4240368,828	605,203	C
240269,500	4240368,828	605,212	C
240255,500	4240368,828	605,247	C
240252,000	4240368,828	605,255	C
240238,000	4240368,828	605,290	C
240234,500	4240368,828	605,299	C

Coord. X	Coord. Y	Elevación	Código
241244,500	4240144,328	600,529	C
241248,000	4240144,328	600,521	C
241262,000	4240144,328	600,486	C
241265,500	4240144,328	600,477	C
241279,500	4240144,328	600,442	C
241283,000	4240144,328	600,433	C
241297,000	4240144,328	600,398	C
241300,500	4240144,328	600,389	C
241314,500	4240144,328	600,354	C
241318,000	4240144,328	600,346	C
241332,000	4240144,328	600,311	C
241335,500	4240144,328	600,302	C
241349,500	4240144,328	600,267	C
241353,000	4240144,328	600,258	C
241367,000	4240144,328	600,223	C
241370,500	4240144,328	600,214	C
241384,500	4240144,328	600,179	C
241388,000	4240144,328	600,171	C
241402,000	4240144,328	600,136	C
241405,500	4240144,328	600,127	C
241419,500	4240144,328	600,092	C
241423,000	4240144,328	600,083	C
241437,000	4240144,328	600,048	C
241440,500	4240144,328	600,039	C
241454,500	4240144,328	600,004	C
241458,000	4240144,328	599,996	C
241472,000	4240144,328	599,961	C
241475,500	4240144,328	599,952	C
241489,500	4240144,328	599,917	C
241493,000	4240144,328	599,908	C
241507,000	4240144,328	599,873	C
241510,500	4240144,328	599,864	C
241524,500	4240144,328	599,829	C
241528,000	4240144,328	599,821	C
241542,000	4240144,328	599,786	C
241545,500	4240144,328	599,777	C
241559,500	4240144,328	599,742	C
241563,000	4240144,328	599,733	C
241577,000	4240144,328	599,698	C
241580,500	4240144,328	599,689	C
241594,500	4240144,328	599,654	C
241598,000	4240144,328	599,646	C
241612,000	4240144,328	599,611	C
241615,500	4240144,328	599,602	C
241629,500	4240144,328	599,567	C
241633,000	4240144,328	599,558	C

Coord. X	Coord. Y	Elevación	Código
240220,500	4240368,828	605,334	C
240217,000	4240368,828	605,343	C
240203,000	4240368,828	605,378	C
240199,500	4240368,828	605,387	C
240185,500	4240368,828	605,422	C
240182,000	4240368,828	605,430	C
240168,000	4240368,828	605,465	C
240164,500	4240368,828	605,474	C
240150,500	4240368,828	605,509	C
240147,000	4240368,828	605,518	C
240133,000	4240368,828	605,553	C
240129,500	4240368,828	605,562	C
240115,500	4240368,828	605,597	C
240112,000	4240368,828	605,605	C
240098,000	4240368,828	605,640	C
240094,500	4240368,828	605,649	C
240080,500	4240368,828	605,684	C
240077,000	4240368,828	605,693	C
240063,000	4240368,828	605,728	C
240059,500	4240368,828	605,737	C
240045,500	4240368,828	605,772	C
240042,000	4240368,828	605,780	C
240028,000	4240368,828	605,815	C
240024,500	4240368,828	605,824	C
240024,500	4240360,774	605,744	C
240028,000	4240360,774	605,735	C
240042,000	4240360,774	605,700	C
240045,500	4240360,774	605,691	C
240059,500	4240360,774	605,656	C
240063,000	4240360,774	605,647	C
240077,000	4240360,774	605,612	C
240080,500	4240360,774	605,604	C
240094,500	4240360,774	605,569	C
240098,000	4240360,774	605,560	C
240112,000	4240360,774	605,525	C
240115,500	4240360,774	605,516	C
240129,500	4240360,774	605,481	C
240133,000	4240360,774	605,472	C
240147,000	4240360,774	605,437	C
240150,500	4240360,774	605,429	C
240164,500	4240360,774	605,394	C
240168,000	4240360,774	605,385	C
240182,000	4240360,774	605,350	C
240185,500	4240360,774	605,341	C
240199,500	4240360,774	605,306	C
240203,000	4240360,774	605,297	C

Coord. X	Coord. Y	Elevación	Código
241647,000	4240144,328	599,523	C
241650,500	4240144,328	599,514	C
241664,500	4240144,328	599,480	C
241668,000	4240144,328	599,471	C
241682,000	4240144,328	599,436	C
241685,500	4240144,328	599,427	C
241699,500	4240144,328	599,392	C
241703,000	4240144,328	599,383	C
241717,000	4240144,328	599,348	C
241720,500	4240144,328	599,340	C
241734,500	4240144,328	599,305	C
241738,000	4240144,328	599,296	C
241752,000	4240144,328	599,261	C
241755,500	4240144,328	599,252	C
241769,500	4240144,328	599,217	C
241773,000	4240144,328	599,208	C
241773,000	4240140,328	599,168	C
241769,500	4240140,328	599,177	C
241755,500	4240140,328	599,212	C
241752,000	4240140,328	599,221	C
241738,000	4240140,328	599,256	C
241734,500	4240140,328	599,265	C
241720,500	4240140,328	599,300	C
241717,000	4240140,328	599,308	C
241703,000	4240140,328	599,343	C
241699,500	4240140,328	599,352	C
241685,500	4240140,328	599,387	C
241682,000	4240140,328	599,396	C
241668,000	4240140,328	599,431	C
241664,500	4240140,328	599,440	C
241650,500	4240140,328	599,474	C
241647,000	4240140,328	599,483	C
241633,000	4240140,328	599,518	C
241629,500	4240140,328	599,527	C
241615,500	4240140,328	599,562	C
241612,000	4240140,328	599,571	C
241598,000	4240140,328	599,606	C
241594,500	4240140,328	599,614	C
241580,500	4240140,328	599,649	C
241577,000	4240140,328	599,658	C
241563,000	4240140,328	599,693	C
241559,500	4240140,328	599,702	C
241545,500	4240140,328	599,737	C
241542,000	4240140,328	599,746	C
241528,000	4240140,328	599,781	C
241524,500	4240140,328	599,789	C

Coord. X	Coord. Y	Elevación	Código
240217,000	4240360,774	605,262	C
240220,500	4240360,774	605,254	C
240234,500	4240360,774	605,219	C
240238,000	4240360,774	605,210	C
240252,000	4240360,774	605,175	C
240255,500	4240360,774	605,166	C
240269,500	4240360,774	605,131	C
240273,000	4240360,774	605,122	C
240287,000	4240360,774	605,087	C
240290,500	4240360,774	605,079	C
240304,500	4240360,774	605,044	C
240308,000	4240360,774	605,035	C
240322,000	4240360,774	605,000	C
240325,500	4240360,774	604,991	C
240339,500	4240360,774	604,956	C
240343,000	4240360,774	604,947	C
240357,000	4240360,774	604,912	C
240360,500	4240360,774	604,904	C
240374,500	4240360,774	604,869	C
240378,000	4240360,774	604,860	C
240392,000	4240360,774	604,825	C
240395,500	4240360,774	604,816	C
240409,500	4240360,774	604,781	C
240413,000	4240360,774	604,772	C
240427,000	4240360,774	604,737	C
240430,500	4240360,774	604,729	C
240444,500	4240360,774	604,694	C
240448,000	4240360,774	604,685	C
240462,000	4240360,774	604,650	C
240465,500	4240360,774	604,641	C
240479,500	4240360,774	604,606	C
240483,000	4240360,774	604,597	C
240497,000	4240360,774	604,562	C
240500,500	4240360,774	604,554	C
240514,500	4240360,774	604,519	C
240518,000	4240360,774	604,510	C
240532,000	4240360,774	604,475	C
240535,500	4240360,774	604,466	C
240549,500	4240360,774	604,431	C
240553,000	4240360,774	604,422	C
240567,000	4240360,774	604,387	C
240570,500	4240360,774	604,379	C
240584,500	4240360,774	604,344	C
240588,000	4240360,774	604,335	C
240602,000	4240360,774	604,300	C
240605,500	4240360,774	604,291	C

Coord. X	Coord. Y	Elevación	Código
241510,500	4240140,328	599,824	C
241507,000	4240140,328	599,833	C
241493,000	4240140,328	599,868	C
241489,500	4240140,328	599,877	C
241475,500	4240140,328	599,912	C
241472,000	4240140,328	599,921	C
241458,000	4240140,328	599,956	C
241454,500	4240140,328	599,964	C
241440,500	4240140,328	599,999	C
241437,000	4240140,328	600,008	C
241423,000	4240140,328	600,043	C
241419,500	4240140,328	600,052	C
241405,500	4240140,328	600,087	C
241402,000	4240140,328	600,096	C
241388,000	4240140,328	600,131	C
241384,500	4240140,328	600,139	C
241370,500	4240140,328	600,174	C
241367,000	4240140,328	600,183	C
241353,000	4240140,328	600,218	C
241349,500	4240140,328	600,227	C
241335,500	4240140,328	600,262	C
241332,000	4240140,328	600,271	C
241318,000	4240140,328	600,306	C
241314,500	4240140,328	600,314	C
241300,500	4240140,328	600,349	C
241297,000	4240140,328	600,358	C
241283,000	4240140,328	600,393	C
241279,500	4240140,328	600,402	C
241265,500	4240140,328	600,437	C
241262,000	4240140,328	600,446	C
241248,000	4240140,328	600,481	C
241244,500	4240140,328	600,489	C
241230,500	4240140,328	600,524	C
241227,000	4240140,328	600,533	C
241227,000	4240132,274	600,452	C
241230,500	4240132,274	600,444	C
241244,500	4240132,274	600,409	C
241248,000	4240132,274	600,400	C
241262,000	4240132,274	600,365	C
241265,500	4240132,274	600,356	C
241279,500	4240132,274	600,321	C
241283,000	4240132,274	600,313	C
241297,000	4240132,274	600,278	C
241300,500	4240132,274	600,269	C
241314,500	4240132,274	600,234	C
241318,000	4240132,274	600,225	C

Coord. X	Coord. Y	Elevación	Código
240619,500	4240360,774	604,256	C
240623,000	4240360,774	604,247	C
240637,000	4240360,774	604,212	C
240640,500	4240360,774	604,204	C
240654,500	4240360,774	604,169	C
240658,000	4240360,774	604,160	C
240672,000	4240360,774	604,125	C
240675,500	4240360,774	604,116	C
240689,500	4240360,774	604,081	C
240693,000	4240360,774	604,072	C
240707,000	4240360,774	604,037	C
240710,500	4240360,774	604,029	C
240724,500	4240360,774	603,994	C
240728,000	4240360,774	603,985	C
240742,000	4240360,774	603,950	C
240745,500	4240360,774	603,941	C
240759,500	4240360,774	603,906	C
240763,000	4240360,774	603,897	C
240777,000	4240360,774	603,862	C
240780,500	4240360,774	603,854	C
240794,500	4240360,774	603,819	C
240798,000	4240360,774	603,810	C
240812,000	4240360,774	603,775	C
240815,500	4240360,774	603,766	C
240829,500	4240360,774	603,731	C
240833,000	4240360,774	603,722	C
240847,000	4240360,774	603,687	C
240850,500	4240360,774	603,679	C
240864,500	4240360,774	603,644	C
240868,000	4240360,774	603,635	C
240882,000	4240360,774	603,600	C
240885,500	4240360,774	603,591	C
240899,500	4240360,774	603,556	C
240903,000	4240360,774	603,547	C
240917,000	4240360,774	603,512	C
240920,500	4240360,774	603,504	C
240934,500	4240360,774	603,469	C
240938,000	4240360,774	603,460	C
240952,000	4240360,774	603,425	C
240955,500	4240360,774	603,416	C
240969,500	4240360,774	603,381	C
240973,000	4240360,774	603,373	C
240987,000	4240360,774	603,338	C
240990,500	4240360,774	603,329	C
241004,500	4240360,774	603,294	C
241008,000	4240360,774	603,285	C

Coord. X	Coord. Y	Elevación	Código
241332,000	4240132,274	600,190	C
241335,500	4240132,274	600,181	C
241349,500	4240132,274	600,146	C
241353,000	4240132,274	600,138	C
241367,000	4240132,274	600,103	C
241370,500	4240132,274	600,094	C
241384,500	4240132,274	600,059	C
241388,000	4240132,274	600,050	C
241402,000	4240132,274	600,015	C
241405,500	4240132,274	600,006	C
241419,500	4240132,274	599,971	C
241423,000	4240132,274	599,963	C
241437,000	4240132,274	599,928	C
241440,500	4240132,274	599,919	C
241454,500	4240132,274	599,884	C
241458,000	4240132,274	599,875	C
241472,000	4240132,274	599,840	C
241475,500	4240132,274	599,831	C
241489,500	4240132,274	599,796	C
241493,000	4240132,274	599,788	C
241507,000	4240132,274	599,753	C
241510,500	4240132,274	599,744	C
241524,500	4240132,274	599,709	C
241528,000	4240132,274	599,700	C
241542,000	4240132,274	599,665	C
241545,500	4240132,274	599,656	C
241559,500	4240132,274	599,621	C
241563,000	4240132,274	599,613	C
241577,000	4240132,274	599,578	C
241580,500	4240132,274	599,569	C
241594,500	4240132,274	599,534	C
241598,000	4240132,274	599,525	C
241612,000	4240132,274	599,490	C
241615,500	4240132,274	599,481	C
241629,500	4240132,274	599,446	C
241633,000	4240132,274	599,438	C
241647,000	4240132,274	599,403	C
241650,500	4240132,274	599,394	C
241664,500	4240132,274	599,359	C
241668,000	4240132,274	599,350	C
241682,000	4240132,274	599,315	C
241685,500	4240132,274	599,306	C
241699,500	4240132,274	599,271	C
241703,000	4240132,274	599,263	C
241717,000	4240132,274	599,228	C
241720,500	4240132,274	599,219	C

Coord. X	Coord. Y	Elevación	Código
241022,000	4240360,774	603,250	C
241025,500	4240360,774	603,241	C
241039,500	4240360,774	603,206	C
241043,000	4240360,774	603,198	C
241057,000	4240360,774	603,163	C
241060,500	4240360,774	603,154	C
241074,500	4240360,774	603,119	C
241078,000	4240360,774	603,110	C
241092,000	4240360,774	603,075	C
241095,500	4240360,774	603,066	C
241109,500	4240360,774	603,031	C
241113,000	4240360,774	603,023	C
241127,000	4240360,774	602,988	C
241130,500	4240360,774	602,979	C
241144,500	4240360,774	602,944	C
241148,000	4240360,774	602,935	C
241162,000	4240360,774	602,900	C
241165,500	4240360,774	602,891	C
241179,500	4240360,774	602,856	C
241183,000	4240360,774	602,848	C
241197,000	4240360,774	602,813	C
241200,500	4240360,774	602,804	C
241214,500	4240360,774	602,769	C
241218,000	4240360,774	602,760	C
241232,000	4240360,774	602,725	C
241235,500	4240360,774	602,716	C
241249,500	4240360,774	602,681	C
241253,000	4240360,774	602,673	C
241267,000	4240360,774	602,638	C
241270,500	4240360,774	602,629	C
241284,500	4240360,774	602,594	C
241288,000	4240360,774	602,585	C
241302,000	4240360,774	602,550	C
241305,500	4240360,774	602,541	C
241319,500	4240360,774	602,506	C
241323,000	4240360,774	602,498	C
241337,000	4240360,774	602,463	C
241340,500	4240360,774	602,454	C
241354,500	4240360,774	602,419	C
241358,000	4240360,774	602,410	C
241372,000	4240360,774	602,375	C
241375,500	4240360,774	602,366	C
241389,500	4240360,774	602,331	C
241393,000	4240360,774	602,323	C
241407,000	4240360,774	602,288	C
241410,500	4240360,774	602,279	C

Coord. X	Coord. Y	Elevación	Código
241734,500	4240132,274	599,184	C
241738,000	4240132,274	599,175	C
241752,000	4240132,274	599,140	C
241755,500	4240132,274	599,132	C
241769,500	4240132,274	599,097	C
241773,000	4240132,274	599,088	C
241773,000	4240128,274	599,048	C
241769,500	4240128,274	599,057	C
241755,500	4240128,274	599,092	C
241752,000	4240128,274	599,100	C
241738,000	4240128,274	599,135	C
241734,500	4240128,274	599,144	C
241720,500	4240128,274	599,179	C
241717,000	4240128,274	599,188	C
241703,000	4240128,274	599,223	C
241699,500	4240128,274	599,231	C
241685,500	4240128,274	599,266	C
241682,000	4240128,274	599,275	C
241668,000	4240128,274	599,310	C
241664,500	4240128,274	599,319	C
241650,500	4240128,274	599,354	C
241647,000	4240128,274	599,363	C
241633,000	4240128,274	599,398	C
241629,500	4240128,274	599,406	C
241615,500	4240128,274	599,441	C
241612,000	4240128,274	599,450	C
241598,000	4240128,274	599,485	C
241594,500	4240128,274	599,494	C
241580,500	4240128,274	599,529	C
241577,000	4240128,274	599,538	C
241563,000	4240128,274	599,573	C
241559,500	4240128,274	599,581	C
241545,500	4240128,274	599,616	C
241542,000	4240128,274	599,625	C
241528,000	4240128,274	599,660	C
241524,500	4240128,274	599,669	C
241510,500	4240128,274	599,704	C
241507,000	4240128,274	599,713	C
241493,000	4240128,274	599,748	C
241489,500	4240128,274	599,756	C
241475,500	4240128,274	599,791	C
241472,000	4240128,274	599,800	C
241458,000	4240128,274	599,835	C
241454,500	4240128,274	599,844	C
241440,500	4240128,274	599,879	C
241437,000	4240128,274	599,888	C

Coord. X	Coord. Y	Elevación	Código
241424,500	4240360,774	602,244	C
241428,000	4240360,774	602,235	C
241442,000	4240360,774	602,200	C
241445,500	4240360,774	602,191	C
241459,500	4240360,774	602,156	C
241463,000	4240360,774	602,148	C
241477,000	4240360,774	602,113	C
241480,500	4240360,774	602,104	C
241494,500	4240360,774	602,069	C
241498,000	4240360,774	602,060	C
241512,000	4240360,774	602,025	C
241515,500	4240360,774	602,016	C
241529,500	4240360,774	601,981	C
241533,000	4240360,774	601,973	C
241547,000	4240360,774	601,938	C
241550,500	4240360,774	601,929	C
241564,500	4240360,774	601,894	C
241568,000	4240360,774	601,885	C
241582,000	4240360,774	601,850	C
241585,500	4240360,774	601,841	C
241599,500	4240360,774	601,806	C
241603,000	4240360,774	601,798	C
241617,000	4240360,774	601,763	C
241620,500	4240360,774	601,754	C
241634,500	4240360,774	601,719	C
241638,000	4240360,774	601,710	C
241652,000	4240360,774	601,675	C
241655,500	4240360,774	601,666	C
241669,500	4240360,774	601,632	C
241673,000	4240360,774	601,623	C
241687,000	4240360,774	601,588	C
241690,500	4240360,774	601,579	C
241704,500	4240360,774	601,544	C
241708,000	4240360,774	601,535	C
241722,000	4240360,774	601,500	C
241725,500	4240360,774	601,492	C
241739,500	4240360,774	601,457	C
241743,000	4240360,774	601,448	C
241757,000	4240360,774	601,413	C
241760,500	4240360,774	601,404	C
241760,500	4240356,774	601,364	C
241757,000	4240356,774	601,373	C
241743,000	4240356,774	601,408	C
241739,500	4240356,774	601,417	C
241725,500	4240356,774	601,452	C
241722,000	4240356,774	601,460	C

Coord. X	Coord. Y	Elevación	Código
241423,000	4240128,274	599,923	C
241419,500	4240128,274	599,931	C
241405,500	4240128,274	599,966	C
241402,000	4240128,274	599,975	C
241388,000	4240128,274	600,010	C
241384,500	4240128,274	600,019	C
241370,500	4240128,274	600,054	C
241367,000	4240128,274	600,063	C
241353,000	4240128,274	600,098	C
241349,500	4240128,274	600,106	C
241335,500	4240128,274	600,141	C
241332,000	4240128,274	600,150	C
241318,000	4240128,274	600,185	C
241314,500	4240128,274	600,194	C
241300,500	4240128,274	600,229	C
241297,000	4240128,274	600,238	C
241283,000	4240128,274	600,273	C
241279,500	4240128,274	600,281	C
241265,500	4240128,274	600,316	C
241262,000	4240128,274	600,325	C
241248,000	4240128,274	600,360	C
241244,500	4240128,274	600,369	C
241230,500	4240128,274	600,404	C
241227,000	4240128,274	600,412	C
241227,000	4240119,220	600,322	C
241230,500	4240119,220	600,313	C
241244,500	4240119,220	600,278	C
241248,000	4240119,220	600,269	C
241262,000	4240119,220	600,234	C
241265,500	4240119,220	600,226	C
241279,500	4240119,220	600,191	C
241283,000	4240119,220	600,182	C
241297,000	4240119,220	600,147	C
241300,500	4240119,220	600,138	C
241314,500	4240119,220	600,103	C
241318,000	4240119,220	600,094	C
241332,000	4240119,220	600,059	C
241335,500	4240119,220	600,051	C
241349,500	4240119,220	600,016	C
241353,000	4240119,220	600,007	C
241367,000	4240119,220	599,972	C
241370,500	4240119,220	599,963	C
241384,500	4240119,220	599,928	C
241388,000	4240119,220	599,920	C
241402,000	4240119,220	599,885	C
241405,500	4240119,220	599,876	C

Coord. X	Coord. Y	Elevación	Código
241708,000	4240356,774	601,495	C
241704,500	4240356,774	601,504	C
241690,500	4240356,774	601,539	C
241687,000	4240356,774	601,548	C
241673,000	4240356,774	601,583	C
241669,500	4240356,774	601,592	C
241655,500	4240356,774	601,626	C
241652,000	4240356,774	601,635	C
241638,000	4240356,774	601,670	C
241634,500	4240356,774	601,679	C
241620,500	4240356,774	601,714	C
241617,000	4240356,774	601,723	C
241603,000	4240356,774	601,758	C
241599,500	4240356,774	601,766	C
241585,500	4240356,774	601,801	C
241582,000	4240356,774	601,810	C
241568,000	4240356,774	601,845	C
241564,500	4240356,774	601,854	C
241550,500	4240356,774	601,889	C
241547,000	4240356,774	601,898	C
241533,000	4240356,774	601,933	C
241529,500	4240356,774	601,941	C
241515,500	4240356,774	601,976	C
241512,000	4240356,774	601,985	C
241498,000	4240356,774	602,020	C
241494,500	4240356,774	602,029	C
241480,500	4240356,774	602,064	C
241477,000	4240356,774	602,073	C
241463,000	4240356,774	602,108	C
241459,500	4240356,774	602,116	C
241445,500	4240356,774	602,151	C
241442,000	4240356,774	602,160	C
241428,000	4240356,774	602,195	C
241424,500	4240356,774	602,204	C
241410,500	4240356,774	602,239	C
241407,000	4240356,774	602,248	C
241393,000	4240356,774	602,283	C
241389,500	4240356,774	602,291	C
241375,500	4240356,774	602,326	C
241372,000	4240356,774	602,335	C
241358,000	4240356,774	602,370	C
241354,500	4240356,774	602,379	C
241340,500	4240356,774	602,414	C
241337,000	4240356,774	602,423	C
241323,000	4240356,774	602,458	C
241319,500	4240356,774	602,466	C

Coord. X	Coord. Y	Elevación	Código
241419,500	4240119,220	599,841	C
241423,000	4240119,220	599,832	C
241437,000	4240119,220	599,797	C
241440,500	4240119,220	599,788	C
241454,500	4240119,220	599,753	C
241458,000	4240119,220	599,745	C
241472,000	4240119,220	599,710	C
241475,500	4240119,220	599,701	C
241489,500	4240119,220	599,666	C
241493,000	4240119,220	599,657	C
241507,000	4240119,220	599,622	C
241510,500	4240119,220	599,613	C
241524,500	4240119,220	599,578	C
241528,000	4240119,220	599,570	C
241542,000	4240119,220	599,535	C
241545,500	4240119,220	599,526	C
241559,500	4240119,220	599,491	C
241563,000	4240119,220	599,482	C
241577,000	4240119,220	599,447	C
241580,500	4240119,220	599,438	C
241594,500	4240119,220	599,403	C
241598,000	4240119,220	599,395	C
241612,000	4240119,220	599,360	C
241615,500	4240119,220	599,351	C
241629,500	4240119,220	599,316	C
241633,000	4240119,220	599,307	C
241647,000	4240119,220	599,272	C
241650,500	4240119,220	599,263	C
241664,500	4240119,220	599,228	C
241668,000	4240119,220	599,220	C
241682,000	4240119,220	599,185	C
241685,500	4240119,220	599,176	C
241699,500	4240119,220	599,141	C
241703,000	4240119,220	599,132	C
241717,000	4240119,220	599,097	C
241720,500	4240119,220	599,088	C
241734,500	4240119,220	599,053	C
241738,000	4240119,220	599,045	C
241752,000	4240119,220	599,010	C
241755,500	4240119,220	599,001	C
241769,500	4240119,220	598,966	C
241773,000	4240119,220	598,957	C
241773,000	4240116,070	598,926	C
241769,500	4240116,070	598,934	C
241755,500	4240116,070	598,969	C
241752,000	4240116,070	598,978	C

Coord. X	Coord. Y	Elevación	Código
241305,500	4240356,774	602,501	C
241302,000	4240356,774	602,510	C
241288,000	4240356,774	602,545	C
241284,500	4240356,774	602,554	C
241270,500	4240356,774	602,589	C
241267,000	4240356,774	602,598	C
241253,000	4240356,774	602,633	C
241249,500	4240356,774	602,641	C
241235,500	4240356,774	602,676	C
241232,000	4240356,774	602,685	C
241218,000	4240356,774	602,720	C
241214,500	4240356,774	602,729	C
241200,500	4240356,774	602,764	C
241197,000	4240356,774	602,773	C
241183,000	4240356,774	602,808	C
241179,500	4240356,774	602,816	C
241165,500	4240356,774	602,851	C
241162,000	4240356,774	602,860	C
241148,000	4240356,774	602,895	C
241144,500	4240356,774	602,904	C
241130,500	4240356,774	602,939	C
241127,000	4240356,774	602,948	C
241113,000	4240356,774	602,983	C
241109,500	4240356,774	602,991	C
241095,500	4240356,774	603,026	C
241092,000	4240356,774	603,035	C
241078,000	4240356,774	603,070	C
241074,500	4240356,774	603,079	C
241060,500	4240356,774	603,114	C
241057,000	4240356,774	603,123	C
241043,000	4240356,774	603,158	C
241039,500	4240356,774	603,166	C
241025,500	4240356,774	603,201	C
241022,000	4240356,774	603,210	C
241008,000	4240356,774	603,245	C
241004,500	4240356,774	603,254	C
240990,500	4240356,774	603,289	C
240987,000	4240356,774	603,298	C
240973,000	4240356,774	603,333	C
240969,500	4240356,774	603,341	C
240955,500	4240356,774	603,376	C
240952,000	4240356,774	603,385	C
240938,000	4240356,774	603,420	C
240934,500	4240356,774	603,429	C
240920,500	4240356,774	603,464	C
240917,000	4240356,774	603,472	C

Coord. X	Coord. Y	Elevación	Código
241738,000	4240116,070	599,013	C
241734,500	4240116,070	599,022	C
241720,500	4240116,070	599,057	C
241717,000	4240116,070	599,066	C
241703,000	4240116,070	599,101	C
241699,500	4240116,070	599,109	C
241685,500	4240116,070	599,144	C
241682,000	4240116,070	599,153	C
241668,000	4240116,070	599,188	C
241664,500	4240116,070	599,197	C
241650,500	4240116,070	599,232	C
241647,000	4240116,070	599,241	C
241633,000	4240116,070	599,276	C
241629,500	4240116,070	599,284	C
241615,500	4240116,070	599,319	C
241612,000	4240116,070	599,328	C
241598,000	4240116,070	599,363	C
241594,500	4240116,070	599,372	C
241580,500	4240116,070	599,407	C
241577,000	4240116,070	599,416	C
241563,000	4240116,070	599,451	C
241559,500	4240116,070	599,459	C
241545,500	4240116,070	599,494	C
241542,000	4240116,070	599,503	C
241528,000	4240116,070	599,538	C
241524,500	4240116,070	599,547	C
241510,500	4240116,070	599,582	C
241507,000	4240116,070	599,591	C
241493,000	4240116,070	599,626	C
241489,500	4240116,070	599,634	C
241475,500	4240116,070	599,669	C
241472,000	4240116,070	599,678	C
241458,000	4240116,070	599,713	C
241454,500	4240116,070	599,722	C
241440,500	4240116,070	599,757	C
241437,000	4240116,070	599,766	C
241423,000	4240116,070	599,801	C
241419,500	4240116,070	599,809	C
241405,500	4240116,070	599,844	C
241402,000	4240116,070	599,853	C
241388,000	4240116,070	599,888	C
241384,500	4240116,070	599,897	C
241370,500	4240116,070	599,932	C
241367,000	4240116,070	599,941	C
241353,000	4240116,070	599,976	C
241349,500	4240116,070	599,984	C

Coord. X	Coord. Y	Elevación	Código
240903,000	4240356,774	603,507	C
240899,500	4240356,774	603,516	C
240885,500	4240356,774	603,551	C
240882,000	4240356,774	603,560	C
240868,000	4240356,774	603,595	C
240864,500	4240356,774	603,604	C
240850,500	4240356,774	603,639	C
240847,000	4240356,774	603,647	C
240833,000	4240356,774	603,682	C
240829,500	4240356,774	603,691	C
240815,500	4240356,774	603,726	C
240812,000	4240356,774	603,735	C
240798,000	4240356,774	603,770	C
240794,500	4240356,774	603,779	C
240780,500	4240356,774	603,814	C
240777,000	4240356,774	603,822	C
240763,000	4240356,774	603,857	C
240759,500	4240356,774	603,866	C
240745,500	4240356,774	603,901	C
240742,000	4240356,774	603,910	C
240728,000	4240356,774	603,945	C
240724,500	4240356,774	603,954	C
240710,500	4240356,774	603,989	C
240707,000	4240356,774	603,997	C
240693,000	4240356,774	604,032	C
240689,500	4240356,774	604,041	C
240675,500	4240356,774	604,076	C
240672,000	4240356,774	604,085	C
240658,000	4240356,774	604,120	C
240654,500	4240356,774	604,129	C
240640,500	4240356,774	604,164	C
240637,000	4240356,774	604,172	C
240623,000	4240356,774	604,207	C
240619,500	4240356,774	604,216	C
240605,500	4240356,774	604,251	C
240602,000	4240356,774	604,260	C
240588,000	4240356,774	604,295	C
240584,500	4240356,774	604,304	C
240570,500	4240356,774	604,339	C
240567,000	4240356,774	604,347	C
240553,000	4240356,774	604,382	C
240549,500	4240356,774	604,391	C
240535,500	4240356,774	604,426	C
240532,000	4240356,774	604,435	C
240518,000	4240356,774	604,470	C
240514,500	4240356,774	604,479	C

Coord. X	Coord. Y	Elevación	Código
241335,500	4240116,070	600,019	C
241332,000	4240116,070	600,028	C
241318,000	4240116,070	600,063	C
241314,500	4240116,070	600,072	C
241300,500	4240116,070	600,107	C
241297,000	4240116,070	600,115	C
241283,000	4240116,070	600,150	C
241279,500	4240116,070	600,159	C
241265,500	4240116,070	600,194	C
241262,000	4240116,070	600,203	C
241248,000	4240116,070	600,238	C
241244,500	4240116,070	600,247	C
241230,500	4240116,070	600,282	C
241227,000	4240116,070	600,290	C
241227,000	4240112,920	600,259	C
241230,500	4240112,920	600,250	C
241244,500	4240112,920	600,215	C
241248,000	4240112,920	600,206	C
241262,000	4240112,920	600,171	C
241265,500	4240112,920	600,163	C
241279,500	4240112,920	600,128	C
241283,000	4240112,920	600,119	C
241297,000	4240112,920	600,084	C
241300,500	4240112,920	600,075	C
241314,500	4240112,920	600,040	C
241318,000	4240112,920	600,031	C
241332,000	4240112,920	599,996	C
241335,500	4240112,920	599,988	C
241349,500	4240112,920	599,953	C
241353,000	4240112,920	599,944	C
241367,000	4240112,920	599,909	C
241370,500	4240112,920	599,900	C
241384,500	4240112,920	599,865	C
241388,000	4240112,920	599,857	C
241402,000	4240112,920	599,822	C
241405,500	4240112,920	599,813	C
241419,500	4240112,920	599,778	C
241423,000	4240112,920	599,769	C
241437,000	4240112,920	599,734	C
241440,500	4240112,920	599,725	C
241454,500	4240112,920	599,690	C
241458,000	4240112,920	599,682	C
241472,000	4240112,920	599,647	C
241475,500	4240112,920	599,638	C
241489,500	4240112,920	599,603	C
241493,000	4240112,920	599,594	C

Coord. X	Coord. Y	Elevación	Código
240500,500	4240356,774	604,514	C
240497,000	4240356,774	604,522	C
240483,000	4240356,774	604,557	C
240479,500	4240356,774	604,566	C
240465,500	4240356,774	604,601	C
240462,000	4240356,774	604,610	C
240448,000	4240356,774	604,645	C
240444,500	4240356,774	604,654	C
240430,500	4240356,774	604,689	C
240427,000	4240356,774	604,697	C
240413,000	4240356,774	604,732	C
240409,500	4240356,774	604,741	C
240395,500	4240356,774	604,776	C
240392,000	4240356,774	604,785	C
240378,000	4240356,774	604,820	C
240374,500	4240356,774	604,829	C
240360,500	4240356,774	604,864	C
240357,000	4240356,774	604,872	C
240343,000	4240356,774	604,907	C
240339,500	4240356,774	604,916	C
240325,500	4240356,774	604,951	C
240322,000	4240356,774	604,960	C
240308,000	4240356,774	604,995	C
240304,500	4240356,774	605,004	C
240290,500	4240356,774	605,039	C
240287,000	4240356,774	605,047	C
240273,000	4240356,774	605,082	C
240269,500	4240356,774	605,091	C
240255,500	4240356,774	605,126	C
240252,000	4240356,774	605,135	C
240238,000	4240356,774	605,170	C
240234,500	4240356,774	605,179	C
240220,500	4240356,774	605,214	C
240217,000	4240356,774	605,222	C
240203,000	4240356,774	605,257	C
240199,500	4240356,774	605,266	C
240185,500	4240356,774	605,301	C
240182,000	4240356,774	605,310	C
240168,000	4240356,774	605,345	C
240164,500	4240356,774	605,354	C
240150,500	4240356,774	605,389	C
240147,000	4240356,774	605,397	C
240133,000	4240356,774	605,432	C
240129,500	4240356,774	605,441	C
240115,500	4240356,774	605,476	C
240112,000	4240356,774	605,485	C

Coord. X	Coord. Y	Elevación	Código
241507,000	4240112,920	599,559	C
241510,500	4240112,920	599,550	C
241524,500	4240112,920	599,515	C
241528,000	4240112,920	599,507	C
241542,000	4240112,920	599,472	C
241545,500	4240112,920	599,463	C
241559,500	4240112,920	599,428	C
241563,000	4240112,920	599,419	C
241577,000	4240112,920	599,384	C
241580,500	4240112,920	599,375	C
241594,500	4240112,920	599,340	C
241598,000	4240112,920	599,332	C
241612,000	4240112,920	599,297	C
241615,500	4240112,920	599,288	C
241629,500	4240112,920	599,253	C
241633,000	4240112,920	599,244	C
241647,000	4240112,920	599,209	C
241650,500	4240112,920	599,200	C
241664,500	4240112,920	599,165	C
241668,000	4240112,920	599,157	C
241682,000	4240112,920	599,122	C
241685,500	4240112,920	599,113	C
241699,500	4240112,920	599,078	C
241703,000	4240112,920	599,069	C
241717,000	4240112,920	599,034	C
241720,500	4240112,920	599,025	C
241734,500	4240112,920	598,990	C
241738,000	4240112,920	598,982	C
241752,000	4240112,920	598,947	C
241755,500	4240112,920	598,938	C
241769,500	4240112,920	598,903	C
241773,000	4240112,920	598,894	C
241773,000	4240103,866	598,804	C
241769,500	4240103,866	598,812	C
241755,500	4240103,866	598,847	C
241752,000	4240103,866	598,856	C
241738,000	4240103,866	598,891	C
241734,500	4240103,866	598,900	C
241720,500	4240103,866	598,935	C
241717,000	4240103,866	598,944	C
241703,000	4240103,866	598,979	C
241699,500	4240103,866	598,987	C
241685,500	4240103,866	599,022	C
241682,000	4240103,866	599,031	C
241668,000	4240103,866	599,066	C
241664,500	4240103,866	599,075	C

Coord. X	Coord. Y	Elevación	Código
240098,000	4240356,774	605,520	C
240094,500	4240356,774	605,529	C
240080,500	4240356,774	605,564	C
240077,000	4240356,774	605,572	C
240063,000	4240356,774	605,607	C
240059,500	4240356,774	605,616	C
240045,500	4240356,774	605,651	C
240042,000	4240356,774	605,660	C
240028,000	4240356,774	605,695	C
240024,500	4240356,774	605,704	C
240024,500	4240347,720	605,613	C
240028,000	4240347,720	605,604	C
240042,000	4240347,720	605,569	C
240045,500	4240347,720	605,561	C
240059,500	4240347,720	605,526	C
240063,000	4240347,720	605,517	C
240077,000	4240347,720	605,482	C
240080,500	4240347,720	605,473	C
240094,500	4240347,720	605,438	C
240098,000	4240347,720	605,429	C
240112,000	4240347,720	605,394	C
240115,500	4240347,720	605,386	C
240129,500	4240347,720	605,351	C
240133,000	4240347,720	605,342	C
240147,000	4240347,720	605,307	C
240150,500	4240347,720	605,298	C
240164,500	4240347,720	605,263	C
240168,000	4240347,720	605,254	C
240182,000	4240347,720	605,219	C
240185,500	4240347,720	605,211	C
240199,500	4240347,720	605,176	C
240203,000	4240347,720	605,167	C
240217,000	4240347,720	605,132	C
240220,500	4240347,720	605,123	C
240234,500	4240347,720	605,088	C
240238,000	4240347,720	605,079	C
240252,000	4240347,720	605,044	C
240255,500	4240347,720	605,036	C
240269,500	4240347,720	605,001	C
240273,000	4240347,720	604,992	C
240287,000	4240347,720	604,957	C
240290,500	4240347,720	604,948	C
240304,500	4240347,720	604,913	C
240308,000	4240347,720	604,904	C
240322,000	4240347,720	604,869	C
240325,500	4240347,720	604,861	C

Coord. X	Coord. Y	Elevación	Código
241650,500	4240103,866	599,110	C
241647,000	4240103,866	599,119	C
241633,000	4240103,866	599,154	C
241629,500	4240103,866	599,162	C
241615,500	4240103,866	599,197	C
241612,000	4240103,866	599,206	C
241598,000	4240103,866	599,241	C
241594,500	4240103,866	599,250	C
241580,500	4240103,866	599,285	C
241577,000	4240103,866	599,294	C
241563,000	4240103,866	599,329	C
241559,500	4240103,866	599,337	C
241545,500	4240103,866	599,372	C
241542,000	4240103,866	599,381	C
241528,000	4240103,866	599,416	C
241524,500	4240103,866	599,425	C
241510,500	4240103,866	599,460	C
241507,000	4240103,866	599,469	C
241493,000	4240103,866	599,504	C
241489,500	4240103,866	599,512	C
241475,500	4240103,866	599,547	C
241472,000	4240103,866	599,556	C
241458,000	4240103,866	599,591	C
241454,500	4240103,866	599,600	C
241440,500	4240103,866	599,635	C
241437,000	4240103,866	599,644	C
241423,000	4240103,866	599,678	C
241419,500	4240103,866	599,687	C
241405,500	4240103,866	599,722	C
241402,000	4240103,866	599,731	C
241388,000	4240103,866	599,766	C
241384,500	4240103,866	599,775	C
241370,500	4240103,866	599,810	C
241367,000	4240103,866	599,818	C
241353,000	4240103,866	599,853	C
241349,500	4240103,866	599,862	C
241335,500	4240103,866	599,897	C
241332,000	4240103,866	599,906	C
241318,000	4240103,866	599,941	C
241314,500	4240103,866	599,950	C
241300,500	4240103,866	599,985	C
241297,000	4240103,866	599,993	C
241283,000	4240103,866	600,028	C
241279,500	4240103,866	600,037	C
241265,500	4240103,866	600,072	C
241262,000	4240103,866	600,081	C

Coord. X	Coord. Y	Elevación	Código
240339,500	4240347,720	604,826	C
240343,000	4240347,720	604,817	C
240357,000	4240347,720	604,782	C
240360,500	4240347,720	604,773	C
240374,500	4240347,720	604,738	C
240378,000	4240347,720	604,729	C
240392,000	4240347,720	604,694	C
240395,500	4240347,720	604,686	C
240409,500	4240347,720	604,651	C
240413,000	4240347,720	604,642	C
240427,000	4240347,720	604,607	C
240430,500	4240347,720	604,598	C
240444,500	4240347,720	604,563	C
240448,000	4240347,720	604,554	C
240462,000	4240347,720	604,519	C
240465,500	4240347,720	604,511	C
240479,500	4240347,720	604,476	C
240483,000	4240347,720	604,467	C
240497,000	4240347,720	604,432	C
240500,500	4240347,720	604,423	C
240514,500	4240347,720	604,388	C
240518,000	4240347,720	604,379	C
240532,000	4240347,720	604,344	C
240535,500	4240347,720	604,336	C
240549,500	4240347,720	604,301	C
240553,000	4240347,720	604,292	C
240567,000	4240347,720	604,257	C
240570,500	4240347,720	604,248	C
240584,500	4240347,720	604,213	C
240588,000	4240347,720	604,204	C
240602,000	4240347,720	604,169	C
240605,500	4240347,720	604,161	C
240619,500	4240347,720	604,126	C
240623,000	4240347,720	604,117	C
240637,000	4240347,720	604,082	C
240640,500	4240347,720	604,073	C
240654,500	4240347,720	604,038	C
240658,000	4240347,720	604,029	C
240672,000	4240347,720	603,994	C
240675,500	4240347,720	603,986	C
240689,500	4240347,720	603,951	C
240693,000	4240347,720	603,942	C
240707,000	4240347,720	603,907	C
240710,500	4240347,720	603,898	C
240724,500	4240347,720	603,863	C
240728,000	4240347,720	603,854	C

Coord. X	Coord. Y	Elevación	Código
241248,000	4240103,866	600,116	C
241244,500	4240103,866	600,125	C
241230,500	4240103,866	600,160	C
241227,000	4240103,866	600,168	C
241227,000	4240099,866	600,128	C
241230,500	4240099,866	600,120	C
241244,500	4240099,866	600,085	C
241248,000	4240099,866	600,076	C
241262,000	4240099,866	600,041	C
241265,500	4240099,866	600,032	C
241279,500	4240099,866	599,997	C
241283,000	4240099,866	599,988	C
241297,000	4240099,866	599,953	C
241300,500	4240099,866	599,945	C
241314,500	4240099,866	599,910	C
241318,000	4240099,866	599,901	C
241332,000	4240099,866	599,866	C
241335,500	4240099,866	599,857	C
241349,500	4240099,866	599,822	C
241353,000	4240099,866	599,813	C
241367,000	4240099,866	599,778	C
241370,500	4240099,866	599,770	C
241384,500	4240099,866	599,735	C
241388,000	4240099,866	599,726	C
241402,000	4240099,866	599,691	C
241405,500	4240099,866	599,682	C
241419,500	4240099,866	599,647	C
241423,000	4240099,866	599,638	C
241437,000	4240099,866	599,604	C
241440,500	4240099,866	599,595	C
241454,500	4240099,866	599,560	C
241458,000	4240099,866	599,551	C
241472,000	4240099,866	599,516	C
241475,500	4240099,866	599,507	C
241489,500	4240099,866	599,472	C
241493,000	4240099,866	599,464	C
241507,000	4240099,866	599,429	C
241510,500	4240099,866	599,420	C
241524,500	4240099,866	599,385	C
241528,000	4240099,866	599,376	C
241542,000	4240099,866	599,341	C
241545,500	4240099,866	599,332	C
241559,500	4240099,866	599,297	C
241563,000	4240099,866	599,289	C
241577,000	4240099,866	599,254	C
241580,500	4240099,866	599,245	C

Coord. X	Coord. Y	Elevación	Código
240742,000	4240347,720	603,819	C
240745,500	4240347,720	603,811	C
240759,500	4240347,720	603,776	C
240763,000	4240347,720	603,767	C
240777,000	4240347,720	603,732	C
240780,500	4240347,720	603,723	C
240794,500	4240347,720	603,688	C
240798,000	4240347,720	603,679	C
240812,000	4240347,720	603,644	C
240815,500	4240347,720	603,636	C
240829,500	4240347,720	603,601	C
240833,000	4240347,720	603,592	C
240847,000	4240347,720	603,557	C
240850,500	4240347,720	603,548	C
240864,500	4240347,720	603,513	C
240868,000	4240347,720	603,504	C
240882,000	4240347,720	603,469	C
240885,500	4240347,720	603,461	C
240899,500	4240347,720	603,426	C
240903,000	4240347,720	603,417	C
240917,000	4240347,720	603,382	C
240920,500	4240347,720	603,373	C
240934,500	4240347,720	603,338	C
240938,000	4240347,720	603,329	C
240952,000	4240347,720	603,294	C
240955,500	4240347,720	603,286	C
240969,500	4240347,720	603,251	C
240973,000	4240347,720	603,242	C
240987,000	4240347,720	603,207	C
240990,500	4240347,720	603,198	C
241004,500	4240347,720	603,163	C
241008,000	4240347,720	603,154	C
241022,000	4240347,720	603,119	C
241025,500	4240347,720	603,111	C
241039,500	4240347,720	603,076	C
241043,000	4240347,720	603,067	C
241057,000	4240347,720	603,032	C
241060,500	4240347,720	603,023	C
241074,500	4240347,720	602,988	C
241078,000	4240347,720	602,979	C
241092,000	4240347,720	602,944	C
241095,500	4240347,720	602,936	C
241109,500	4240347,720	602,901	C
241113,000	4240347,720	602,892	C
241127,000	4240347,720	602,857	C
241130,500	4240347,720	602,848	C
241594,500	4240099,866	599,210	C
241598,000	4240099,866	599,201	C
241612,000	4240099,866	599,166	C
241615,500	4240099,866	599,157	C
241629,500	4240099,866	599,122	C
241633,000	4240099,866	599,114	C
241647,000	4240099,866	599,079	C
241650,500	4240099,866	599,070	C
241664,500	4240099,866	599,035	C
241668,000	4240099,866	599,026	C
241682,000	4240099,866	598,991	C
241685,500	4240099,866	598,982	C
241699,500	4240099,866	598,947	C
241703,000	4240099,866	598,939	C
241717,000	4240099,866	598,904	C
241720,500	4240099,866	598,895	C
241734,500	4240099,866	598,860	C
241738,000	4240099,866	598,851	C
241752,000	4240099,866	598,816	C
241755,500	4240099,866	598,807	C
241769,500	4240099,866	598,772	C
241773,000	4240099,866	598,764	C
241773,000	4240091,813	598,683	C
241769,500	4240091,813	598,692	C
241755,500	4240091,813	598,727	C
241752,000	4240091,813	598,736	C
241738,000	4240091,813	598,771	C
241734,500	4240091,813	598,779	C
241720,500	4240091,813	598,814	C
241717,000	4240091,813	598,823	C
241703,000	4240091,813	598,858	C
241699,500	4240091,813	598,867	C
241685,500	4240091,813	598,902	C
241682,000	4240091,813	598,911	C
241668,000	4240091,813	598,946	C
241664,500	4240091,813	598,954	C
241650,500	4240091,813	598,989	C
241647,000	4240091,813	598,998	C
241633,000	4240091,813	599,033	C
241629,500	4240091,813	599,042	C
241615,500	4240091,813	599,077	C
241612,000	4240091,813	599,086	C
241598,000	4240091,813	599,121	C
241594,500	4240091,813	599,129	C
241580,500	4240091,813	599,164	C
241577,000	4240091,813	599,173	C

Coord. X	Coord. Y	Elevación	Código
241144,500	4240347,720	602,813	C
241148,000	4240347,720	602,805	C
241162,000	4240347,720	602,770	C
241165,500	4240347,720	602,761	C
241179,500	4240347,720	602,726	C
241183,000	4240347,720	602,717	C
241197,000	4240347,720	602,682	C
241200,500	4240347,720	602,673	C
241214,500	4240347,720	602,638	C
241218,000	4240347,720	602,630	C
241232,000	4240347,720	602,595	C
241235,500	4240347,720	602,586	C
241249,500	4240347,720	602,551	C
241253,000	4240347,720	602,542	C
241267,000	4240347,720	602,507	C
241270,500	4240347,720	602,498	C
241284,500	4240347,720	602,463	C
241288,000	4240347,720	602,455	C
241302,000	4240347,720	602,420	C
241305,500	4240347,720	602,411	C
241319,500	4240347,720	602,376	C
241323,000	4240347,720	602,367	C
241337,000	4240347,720	602,332	C
241340,500	4240347,720	602,323	C
241354,500	4240347,720	602,288	C
241358,000	4240347,720	602,280	C
241372,000	4240347,720	602,245	C
241375,500	4240347,720	602,236	C
241389,500	4240347,720	602,201	C
241393,000	4240347,720	602,192	C
241407,000	4240347,720	602,157	C
241410,500	4240347,720	602,148	C
241424,500	4240347,720	602,113	C
241428,000	4240347,720	602,105	C
241442,000	4240347,720	602,070	C
241445,500	4240347,720	602,061	C
241459,500	4240347,720	602,026	C
241463,000	4240347,720	602,017	C
241477,000	4240347,720	601,982	C
241480,500	4240347,720	601,973	C
241494,500	4240347,720	601,938	C
241498,000	4240347,720	601,930	C
241512,000	4240347,720	601,895	C
241515,500	4240347,720	601,886	C
241529,500	4240347,720	601,851	C
241533,000	4240347,720	601,842	C

Coord. X	Coord. Y	Elevación	Código
241563,000	4240091,813	599,208	C
241559,500	4240091,813	599,217	C
241545,500	4240091,813	599,252	C
241542,000	4240091,813	599,261	C
241528,000	4240091,813	599,296	C
241524,500	4240091,813	599,304	C
241510,500	4240091,813	599,339	C
241507,000	4240091,813	599,348	C
241493,000	4240091,813	599,383	C
241489,500	4240091,813	599,392	C
241475,500	4240091,813	599,427	C
241472,000	4240091,813	599,435	C
241458,000	4240091,813	599,470	C
241454,500	4240091,813	599,479	C
241440,500	4240091,813	599,514	C
241437,000	4240091,813	599,523	C
241423,000	4240091,813	599,558	C
241419,500	4240091,813	599,567	C
241405,500	4240091,813	599,602	C
241402,000	4240091,813	599,610	C
241388,000	4240091,813	599,645	C
241384,500	4240091,813	599,654	C
241370,500	4240091,813	599,689	C
241367,000	4240091,813	599,698	C
241353,000	4240091,813	599,733	C
241349,500	4240091,813	599,742	C
241335,500	4240091,813	599,777	C
241332,000	4240091,813	599,785	C
241318,000	4240091,813	599,820	C
241314,500	4240091,813	599,829	C
241300,500	4240091,813	599,864	C
241297,000	4240091,813	599,873	C
241283,000	4240091,813	599,908	C
241279,500	4240091,813	599,917	C
241265,500	4240091,813	599,952	C
241262,000	4240091,813	599,960	C
241248,000	4240091,813	599,995	C
241244,500	4240091,813	600,004	C
241230,500	4240091,813	600,039	C
241227,000	4240091,813	600,048	C
241227,000	4240087,813	600,008	C
241230,500	4240087,813	599,999	C
241244,500	4240087,813	599,964	C
241248,000	4240087,813	599,955	C
241262,000	4240087,813	599,920	C
241265,500	4240087,813	599,912	C

Coord. X	Coord. Y	Elevación	Código
241547,000	4240347,720	601,807	C
241550,500	4240347,720	601,798	C
241564,500	4240347,720	601,763	C
241568,000	4240347,720	601,755	C
241582,000	4240347,720	601,720	C
241585,500	4240347,720	601,711	C
241599,500	4240347,720	601,676	C
241603,000	4240347,720	601,667	C
241617,000	4240347,720	601,632	C
241620,500	4240347,720	601,623	C
241634,500	4240347,720	601,588	C
241638,000	4240347,720	601,580	C
241652,000	4240347,720	601,545	C
241655,500	4240347,720	601,536	C
241669,500	4240347,720	601,501	C
241673,000	4240347,720	601,492	C
241687,000	4240347,720	601,457	C
241690,500	4240347,720	601,448	C
241704,500	4240347,720	601,413	C
241708,000	4240347,720	601,405	C
241722,000	4240347,720	601,370	C
241725,500	4240347,720	601,361	C
241739,500	4240347,720	601,326	C
241743,000	4240347,720	601,317	C
241757,000	4240347,720	601,282	C
241760,500	4240347,720	601,273	C
241760,500	4240344,570	601,242	C
241757,000	4240344,570	601,251	C
241743,000	4240344,570	601,286	C
241739,500	4240344,570	601,294	C
241725,500	4240344,570	601,329	C
241722,000	4240344,570	601,338	C
241708,000	4240344,570	601,373	C
241704,500	4240344,570	601,382	C
241690,500	4240344,570	601,417	C
241687,000	4240344,570	601,426	C
241673,000	4240344,570	601,461	C
241669,500	4240344,570	601,469	C
241655,500	4240344,570	601,504	C
241652,000	4240344,570	601,513	C
241638,000	4240344,570	601,548	C
241634,500	4240344,570	601,557	C
241620,500	4240344,570	601,592	C
241617,000	4240344,570	601,601	C
241603,000	4240344,570	601,636	C
241599,500	4240344,570	601,644	C

Coord. X	Coord. Y	Elevación	Código
241279,500	4240087,813	599,877	C
241283,000	4240087,813	599,868	C
241297,000	4240087,813	599,833	C
241300,500	4240087,813	599,824	C
241314,500	4240087,813	599,789	C
241318,000	4240087,813	599,780	C
241332,000	4240087,813	599,745	C
241335,500	4240087,813	599,737	C
241349,500	4240087,813	599,702	C
241353,000	4240087,813	599,693	C
241367,000	4240087,813	599,658	C
241370,500	4240087,813	599,649	C
241384,500	4240087,813	599,614	C
241388,000	4240087,813	599,605	C
241402,000	4240087,813	599,570	C
241405,500	4240087,813	599,562	C
241419,500	4240087,813	599,527	C
241423,000	4240087,813	599,518	C
241437,000	4240087,813	599,483	C
241440,500	4240087,813	599,474	C
241454,500	4240087,813	599,439	C
241458,000	4240087,813	599,430	C
241472,000	4240087,813	599,395	C
241475,500	4240087,813	599,387	C
241489,500	4240087,813	599,352	C
241493,000	4240087,813	599,343	C
241507,000	4240087,813	599,308	C
241510,500	4240087,813	599,299	C
241524,500	4240087,813	599,264	C
241528,000	4240087,813	599,256	C
241542,000	4240087,813	599,221	C
241545,500	4240087,813	599,212	C
241559,500	4240087,813	599,177	C
241563,000	4240087,813	599,168	C
241577,000	4240087,813	599,133	C
241580,500	4240087,813	599,124	C
241594,500	4240087,813	599,089	C
241598,000	4240087,813	599,081	C
241612,000	4240087,813	599,046	C
241615,500	4240087,813	599,037	C
241629,500	4240087,813	599,002	C
241633,000	4240087,813	598,993	C
241647,000	4240087,813	598,958	C
241650,500	4240087,813	598,949	C
241664,500	4240087,813	598,914	C
241668,000	4240087,813	598,906	C

Coord. X	Coord. Y	Elevación	Código
241585,500	4240344,570	601,679	C
241582,000	4240344,570	601,688	C
241568,000	4240344,570	601,723	C
241564,500	4240344,570	601,732	C
241550,500	4240344,570	601,767	C
241547,000	4240344,570	601,776	C
241533,000	4240344,570	601,811	C
241529,500	4240344,570	601,819	C
241515,500	4240344,570	601,854	C
241512,000	4240344,570	601,863	C
241498,000	4240344,570	601,898	C
241494,500	4240344,570	601,907	C
241480,500	4240344,570	601,942	C
241477,000	4240344,570	601,951	C
241463,000	4240344,570	601,986	C
241459,500	4240344,570	601,994	C
241445,500	4240344,570	602,029	C
241442,000	4240344,570	602,038	C
241428,000	4240344,570	602,073	C
241424,500	4240344,570	602,082	C
241410,500	4240344,570	602,117	C
241407,000	4240344,570	602,126	C
241393,000	4240344,570	602,161	C
241389,500	4240344,570	602,169	C
241375,500	4240344,570	602,204	C
241372,000	4240344,570	602,213	C
241358,000	4240344,570	602,248	C
241354,500	4240344,570	602,257	C
241340,500	4240344,570	602,292	C
241337,000	4240344,570	602,301	C
241323,000	4240344,570	602,336	C
241319,500	4240344,570	602,344	C
241305,500	4240344,570	602,379	C
241302,000	4240344,570	602,388	C
241288,000	4240344,570	602,423	C
241284,500	4240344,570	602,432	C
241270,500	4240344,570	602,467	C
241267,000	4240344,570	602,476	C
241253,000	4240344,570	602,511	C
241249,500	4240344,570	602,519	C
241235,500	4240344,570	602,554	C
241232,000	4240344,570	602,563	C
241218,000	4240344,570	602,598	C
241214,500	4240344,570	602,607	C
241200,500	4240344,570	602,642	C
241197,000	4240344,570	602,651	C

Coord. X	Coord. Y	Elevación	Código
241682,000	4240087,813	598,871	C
241685,500	4240087,813	598,862	C
241699,500	4240087,813	598,827	C
241703,000	4240087,813	598,818	C
241717,000	4240087,813	598,783	C
241720,500	4240087,813	598,774	C
241734,500	4240087,813	598,739	C
241738,000	4240087,813	598,731	C
241752,000	4240087,813	598,696	C
241755,500	4240087,813	598,687	C
241769,500	4240087,813	598,652	C
241773,000	4240087,813	598,643	C
241773,000	4240079,759	598,563	C
241769,500	4240079,759	598,571	C
241755,500	4240079,759	598,606	C
241752,000	4240079,759	598,615	C
241738,000	4240079,759	598,650	C
241734,500	4240079,759	598,659	C
241720,500	4240079,759	598,694	C
241717,000	4240079,759	598,703	C
241703,000	4240079,759	598,738	C
241699,500	4240079,759	598,746	C
241685,500	4240079,759	598,781	C
241682,000	4240079,759	598,790	C
241668,000	4240079,759	598,825	C
241664,500	4240079,759	598,834	C
241650,500	4240079,759	598,869	C
241647,000	4240079,759	598,878	C
241633,000	4240079,759	598,913	C
241629,500	4240079,759	598,921	C
241615,500	4240079,759	598,956	C
241612,000	4240079,759	598,965	C
241598,000	4240079,759	599,000	C
241594,500	4240079,759	599,009	C
241580,500	4240079,759	599,044	C
241577,000	4240079,759	599,052	C
241563,000	4240079,759	599,087	C
241559,500	4240079,759	599,096	C
241545,500	4240079,759	599,131	C
241542,000	4240079,759	599,140	C
241528,000	4240079,759	599,175	C
241524,500	4240079,759	599,184	C
241510,500	4240079,759	599,219	C
241507,000	4240079,759	599,227	C
241493,000	4240079,759	599,262	C
241489,500	4240079,759	599,271	C

Coord. X	Coord. Y	Elevación	Código
241183,000	4240344,570	602,686	C
241179,500	4240344,570	602,694	C
241165,500	4240344,570	602,729	C
241162,000	4240344,570	602,738	C
241148,000	4240344,570	602,773	C
241144,500	4240344,570	602,782	C
241130,500	4240344,570	602,817	C
241127,000	4240344,570	602,826	C
241113,000	4240344,570	602,861	C
241109,500	4240344,570	602,869	C
241095,500	4240344,570	602,904	C
241092,000	4240344,570	602,913	C
241078,000	4240344,570	602,948	C
241074,500	4240344,570	602,957	C
241060,500	4240344,570	602,992	C
241057,000	4240344,570	603,000	C
241043,000	4240344,570	603,035	C
241039,500	4240344,570	603,044	C
241025,500	4240344,570	603,079	C
241022,000	4240344,570	603,088	C
241008,000	4240344,570	603,123	C
241004,500	4240344,570	603,132	C
240990,500	4240344,570	603,167	C
240987,000	4240344,570	603,175	C
240973,000	4240344,570	603,210	C
240969,500	4240344,570	603,219	C
240955,500	4240344,570	603,254	C
240952,000	4240344,570	603,263	C
240938,000	4240344,570	603,298	C
240934,500	4240344,570	603,307	C
240920,500	4240344,570	603,342	C
240917,000	4240344,570	603,350	C
240903,000	4240344,570	603,385	C
240899,500	4240344,570	603,394	C
240885,500	4240344,570	603,429	C
240882,000	4240344,570	603,438	C
240868,000	4240344,570	603,473	C
240864,500	4240344,570	603,482	C
240850,500	4240344,570	603,517	C
240847,000	4240344,570	603,525	C
240833,000	4240344,570	603,560	C
240829,500	4240344,570	603,569	C
240815,500	4240344,570	603,604	C
240812,000	4240344,570	603,613	C
240798,000	4240344,570	603,648	C
240794,500	4240344,570	603,657	C

Coord. X	Coord. Y	Elevación	Código
241475,500	4240079,759	599,306	C
241472,000	4240079,759	599,315	C
241458,000	4240079,759	599,350	C
241454,500	4240079,759	599,359	C
241440,500	4240079,759	599,394	C
241437,000	4240079,759	599,402	C
241423,000	4240079,759	599,437	C
241419,500	4240079,759	599,446	C
241405,500	4240079,759	599,481	C
241402,000	4240079,759	599,490	C
241388,000	4240079,759	599,525	C
241384,500	4240079,759	599,534	C
241370,500	4240079,759	599,569	C
241367,000	4240079,759	599,577	C
241353,000	4240079,759	599,612	C
241349,500	4240079,759	599,621	C
241335,500	4240079,759	599,656	C
241332,000	4240079,759	599,665	C
241318,000	4240079,759	599,700	C
241314,500	4240079,759	599,709	C
241300,500	4240079,759	599,744	C
241297,000	4240079,759	599,752	C
241283,000	4240079,759	599,787	C
241279,500	4240079,759	599,796	C
241265,500	4240079,759	599,831	C
241262,000	4240079,759	599,840	C
241248,000	4240079,759	599,875	C
241244,500	4240079,759	599,884	C
241230,500	4240079,759	599,919	C
241227,000	4240079,759	599,927	C
241227,000	4240075,759	599,887	C
241230,500	4240075,759	599,879	C
241244,500	4240075,759	599,844	C
241248,000	4240075,759	599,835	C
241262,000	4240075,759	599,800	C
241265,500	4240075,759	599,791	C
241279,500	4240075,759	599,756	C
241283,000	4240075,759	599,747	C
241297,000	4240075,759	599,712	C
241300,500	4240075,759	599,704	C
241314,500	4240075,759	599,669	C
241318,000	4240075,759	599,660	C
241332,000	4240075,759	599,625	C
241335,500	4240075,759	599,616	C
241349,500	4240075,759	599,581	C
241353,000	4240075,759	599,572	C

Coord. X	Coord. Y	Elevación	Código
240780,500	4240344,570	603,692	C
240777,000	4240344,570	603,700	C
240763,000	4240344,570	603,735	C
240759,500	4240344,570	603,744	C
240745,500	4240344,570	603,779	C
240742,000	4240344,570	603,788	C
240728,000	4240344,570	603,823	C
240724,500	4240344,570	603,832	C
240710,500	4240344,570	603,867	C
240707,000	4240344,570	603,875	C
240693,000	4240344,570	603,910	C
240689,500	4240344,570	603,919	C
240675,500	4240344,570	603,954	C
240672,000	4240344,570	603,963	C
240658,000	4240344,570	603,998	C
240654,500	4240344,570	604,007	C
240640,500	4240344,570	604,042	C
240637,000	4240344,570	604,050	C
240623,000	4240344,570	604,085	C
240619,500	4240344,570	604,094	C
240605,500	4240344,570	604,129	C
240602,000	4240344,570	604,138	C
240588,000	4240344,570	604,173	C
240584,500	4240344,570	604,182	C
240570,500	4240344,570	604,217	C
240567,000	4240344,570	604,225	C
240553,000	4240344,570	604,260	C
240549,500	4240344,570	604,269	C
240535,500	4240344,570	604,304	C
240532,000	4240344,570	604,313	C
240518,000	4240344,570	604,348	C
240514,500	4240344,570	604,357	C
240500,500	4240344,570	604,392	C
240497,000	4240344,570	604,400	C
240483,000	4240344,570	604,435	C
240479,500	4240344,570	604,444	C
240465,500	4240344,570	604,479	C
240462,000	4240344,570	604,488	C
240448,000	4240344,570	604,523	C
240444,500	4240344,570	604,532	C
240430,500	4240344,570	604,567	C
240427,000	4240344,570	604,575	C
240413,000	4240344,570	604,610	C
240409,500	4240344,570	604,619	C
240395,500	4240344,570	604,654	C
240392,000	4240344,570	604,663	C

Coord. X	Coord. Y	Elevación	Código
241367,000	4240075,759	599,537	C
241370,500	4240075,759	599,529	C
241384,500	4240075,759	599,494	C
241388,000	4240075,759	599,485	C
241402,000	4240075,759	599,450	C
241405,500	4240075,759	599,441	C
241419,500	4240075,759	599,406	C
241423,000	4240075,759	599,397	C
241437,000	4240075,759	599,362	C
241440,500	4240075,759	599,354	C
241454,500	4240075,759	599,319	C
241458,000	4240075,759	599,310	C
241472,000	4240075,759	599,275	C
241475,500	4240075,759	599,266	C
241489,500	4240075,759	599,231	C
241493,000	4240075,759	599,222	C
241507,000	4240075,759	599,187	C
241510,500	4240075,759	599,179	C
241524,500	4240075,759	599,144	C
241528,000	4240075,759	599,135	C
241542,000	4240075,759	599,100	C
241545,500	4240075,759	599,091	C
241559,500	4240075,759	599,056	C
241563,000	4240075,759	599,047	C
241577,000	4240075,759	599,012	C
241580,500	4240075,759	599,004	C
241594,500	4240075,759	598,969	C
241598,000	4240075,759	598,960	C
241612,000	4240075,759	598,925	C
241615,500	4240075,759	598,916	C
241629,500	4240075,759	598,881	C
241633,000	4240075,759	598,873	C
241647,000	4240075,759	598,838	C
241650,500	4240075,759	598,829	C
241664,500	4240075,759	598,794	C
241668,000	4240075,759	598,785	C
241682,000	4240075,759	598,750	C
241685,500	4240075,759	598,741	C
241699,500	4240075,759	598,706	C
241703,000	4240075,759	598,698	C
241717,000	4240075,759	598,663	C
241720,500	4240075,759	598,654	C
241734,500	4240075,759	598,619	C
241738,000	4240075,759	598,610	C
241752,000	4240075,759	598,575	C
241755,500	4240075,759	598,566	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240378,000	4240344,570	604,698	C	241769,500	4240075,759	598,531	C
240374,500	4240344,570	604,707	C	241773,000	4240075,759	598,523	C
240360,500	4240344,570	604,742	C	241773,000	4240066,705	598,432	C
240357,000	4240344,570	604,750	C	241769,500	4240066,705	598,441	C
240343,000	4240344,570	604,785	C	241755,500	4240066,705	598,476	C
240339,500	4240344,570	604,794	C	241752,000	4240066,705	598,485	C
240325,500	4240344,570	604,829	C	241738,000	4240066,705	598,520	C
240322,000	4240344,570	604,838	C	241734,500	4240066,705	598,528	C
240308,000	4240344,570	604,873	C	241720,500	4240066,705	598,563	C
240304,500	4240344,570	604,882	C	241717,000	4240066,705	598,572	C
240290,500	4240344,570	604,917	C	241703,000	4240066,705	598,607	C
240287,000	4240344,570	604,925	C	241699,500	4240066,705	598,616	C
240273,000	4240344,570	604,960	C	241685,500	4240066,705	598,651	C
240269,500	4240344,570	604,969	C	241682,000	4240066,705	598,660	C
240255,500	4240344,570	605,004	C	241668,000	4240066,705	598,695	C
240252,000	4240344,570	605,013	C	241664,500	4240066,705	598,703	C
240238,000	4240344,570	605,048	C	241650,500	4240066,705	598,738	C
240234,500	4240344,570	605,057	C	241647,000	4240066,705	598,747	C
240220,500	4240344,570	605,092	C	241633,000	4240066,705	598,782	C
240217,000	4240344,570	605,100	C	241629,500	4240066,705	598,791	C
240203,000	4240344,570	605,135	C	241615,500	4240066,705	598,826	C
240199,500	4240344,570	605,144	C	241612,000	4240066,705	598,834	C
240185,500	4240344,570	605,179	C	241598,000	4240066,705	598,869	C
240182,000	4240344,570	605,188	C	241594,500	4240066,705	598,878	C
240168,000	4240344,570	605,223	C	241580,500	4240066,705	598,913	C
240164,500	4240344,570	605,232	C	241577,000	4240066,705	598,922	C
240150,500	4240344,570	605,267	C	241563,000	4240066,705	598,957	C
240147,000	4240344,570	605,275	C	241559,500	4240066,705	598,966	C
240133,000	4240344,570	605,310	C	241545,500	4240066,705	599,001	C
240129,500	4240344,570	605,319	C	241542,000	4240066,705	599,009	C
240115,500	4240344,570	605,354	C	241528,000	4240066,705	599,044	C
240112,000	4240344,570	605,363	C	241524,500	4240066,705	599,053	C
240098,000	4240344,570	605,398	C	241510,500	4240066,705	599,088	C
240094,500	4240344,570	605,407	C	241507,000	4240066,705	599,097	C
240080,500	4240344,570	605,442	C	241493,000	4240066,705	599,132	C
240077,000	4240344,570	605,450	C	241489,500	4240066,705	599,141	C
240063,000	4240344,570	605,485	C	241475,500	4240066,705	599,176	C
240059,500	4240344,570	605,494	C	241472,000	4240066,705	599,184	C
240045,500	4240344,570	605,529	C	241458,000	4240066,705	599,219	C
240042,000	4240344,570	605,538	C	241454,500	4240066,705	599,228	C
240028,000	4240344,570	605,573	C	241440,500	4240066,705	599,263	C
240024,500	4240344,570	605,582	C	241437,000	4240066,705	599,272	C
240024,500	4240341,420	605,550	C	241423,000	4240066,705	599,307	C
240028,000	4240341,420	605,541	C	241419,500	4240066,705	599,316	C
240042,000	4240341,420	605,506	C	241405,500	4240066,705	599,351	C
240045,500	4240341,420	605,498	C	241402,000	4240066,705	599,359	C

Coord. X	Coord. Y	Elevación	Código
240059,500	4240341,420	605,463	C
240063,000	4240341,420	605,454	C
240077,000	4240341,420	605,419	C
240080,500	4240341,420	605,410	C
240094,500	4240341,420	605,375	C
240098,000	4240341,420	605,366	C
240112,000	4240341,420	605,331	C
240115,500	4240341,420	605,323	C
240129,500	4240341,420	605,288	C
240133,000	4240341,420	605,279	C
240147,000	4240341,420	605,244	C
240150,500	4240341,420	605,235	C
240164,500	4240341,420	605,200	C
240168,000	4240341,420	605,191	C
240182,000	4240341,420	605,156	C
240185,500	4240341,420	605,148	C
240199,500	4240341,420	605,113	C
240203,000	4240341,420	605,104	C
240217,000	4240341,420	605,069	C
240220,500	4240341,420	605,060	C
240234,500	4240341,420	605,025	C
240238,000	4240341,420	605,016	C
240252,000	4240341,420	604,981	C
240255,500	4240341,420	604,973	C
240269,500	4240341,420	604,938	C
240273,000	4240341,420	604,929	C
240287,000	4240341,420	604,894	C
240290,500	4240341,420	604,885	C
240304,500	4240341,420	604,850	C
240308,000	4240341,420	604,841	C
240322,000	4240341,420	604,806	C
240325,500	4240341,420	604,798	C
240339,500	4240341,420	604,763	C
240343,000	4240341,420	604,754	C
240357,000	4240341,420	604,719	C
240360,500	4240341,420	604,710	C
240374,500	4240341,420	604,675	C
240378,000	4240341,420	604,666	C
240392,000	4240341,420	604,631	C
240395,500	4240341,420	604,623	C
240409,500	4240341,420	604,588	C
240413,000	4240341,420	604,579	C
240427,000	4240341,420	604,544	C
240430,500	4240341,420	604,535	C
240444,500	4240341,420	604,500	C
240448,000	4240341,420	604,491	C

Coord. X	Coord. Y	Elevación	Código
241388,000	4240066,705	599,394	C
241384,500	4240066,705	599,403	C
241370,500	4240066,705	599,438	C
241367,000	4240066,705	599,447	C
241353,000	4240066,705	599,482	C
241349,500	4240066,705	599,491	C
241335,500	4240066,705	599,526	C
241332,000	4240066,705	599,534	C
241318,000	4240066,705	599,569	C
241314,500	4240066,705	599,578	C
241300,500	4240066,705	599,613	C
241297,000	4240066,705	599,622	C
241283,000	4240066,705	599,657	C
241279,500	4240066,705	599,666	C
241265,500	4240066,705	599,701	C
241262,000	4240066,705	599,709	C
241248,000	4240066,705	599,744	C
241244,500	4240066,705	599,753	C
241230,500	4240066,705	599,788	C
241227,000	4240066,705	599,797	C
241227,000	4240063,555	599,765	C
241230,500	4240063,555	599,757	C
241244,500	4240063,555	599,722	C
241248,000	4240063,555	599,713	C
241262,000	4240063,555	599,678	C
241265,500	4240063,555	599,669	C
241279,500	4240063,555	599,634	C
241283,000	4240063,555	599,625	C
241297,000	4240063,555	599,590	C
241300,500	4240063,555	599,582	C
241314,500	4240063,555	599,547	C
241318,000	4240063,555	599,538	C
241332,000	4240063,555	599,503	C
241335,500	4240063,555	599,494	C
241349,500	4240063,555	599,459	C
241353,000	4240063,555	599,450	C
241367,000	4240063,555	599,415	C
241370,500	4240063,555	599,407	C
241384,500	4240063,555	599,372	C
241388,000	4240063,555	599,363	C
241402,000	4240063,555	599,328	C
241405,500	4240063,555	599,319	C
241419,500	4240063,555	599,284	C
241423,000	4240063,555	599,275	C
241437,000	4240063,555	599,240	C
241440,500	4240063,555	599,232	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240462,000	4240341,420	604,456	C	241454,500	4240063,555	599,197	C
240465,500	4240341,420	604,448	C	241458,000	4240063,555	599,188	C
240479,500	4240341,420	604,413	C	241472,000	4240063,555	599,153	C
240483,000	4240341,420	604,404	C	241475,500	4240063,555	599,144	C
240497,000	4240341,420	604,369	C	241489,500	4240063,555	599,109	C
240500,500	4240341,420	604,360	C	241493,000	4240063,555	599,100	C
240514,500	4240341,420	604,325	C	241507,000	4240063,555	599,065	C
240518,000	4240341,420	604,316	C	241510,500	4240063,555	599,057	C
240532,000	4240341,420	604,281	C	241524,500	4240063,555	599,022	C
240535,500	4240341,420	604,273	C	241528,000	4240063,555	599,013	C
240549,500	4240341,420	604,238	C	241542,000	4240063,555	598,978	C
240553,000	4240341,420	604,229	C	241545,500	4240063,555	598,969	C
240567,000	4240341,420	604,194	C	241559,500	4240063,555	598,934	C
240570,500	4240341,420	604,185	C	241563,000	4240063,555	598,925	C
240584,500	4240341,420	604,150	C	241577,000	4240063,555	598,890	C
240588,000	4240341,420	604,141	C	241580,500	4240063,555	598,882	C
240602,000	4240341,420	604,106	C	241594,500	4240063,555	598,847	C
240605,500	4240341,420	604,098	C	241598,000	4240063,555	598,838	C
240619,500	4240341,420	604,063	C	241612,000	4240063,555	598,803	C
240623,000	4240341,420	604,054	C	241615,500	4240063,555	598,794	C
240637,000	4240341,420	604,019	C	241629,500	4240063,555	598,759	C
240640,500	4240341,420	604,010	C	241633,000	4240063,555	598,750	C
240654,500	4240341,420	603,975	C	241647,000	4240063,555	598,715	C
240658,000	4240341,420	603,966	C	241650,500	4240063,555	598,707	C
240672,000	4240341,420	603,931	C	241664,500	4240063,555	598,672	C
240675,500	4240341,420	603,923	C	241668,000	4240063,555	598,663	C
240689,500	4240341,420	603,888	C	241682,000	4240063,555	598,628	C
240693,000	4240341,420	603,879	C	241685,500	4240063,555	598,619	C
240707,000	4240341,420	603,844	C	241699,500	4240063,555	598,584	C
240710,500	4240341,420	603,835	C	241703,000	4240063,555	598,576	C
240724,500	4240341,420	603,800	C	241717,000	4240063,555	598,541	C
240728,000	4240341,420	603,791	C	241720,500	4240063,555	598,532	C
240742,000	4240341,420	603,756	C	241734,500	4240063,555	598,497	C
240745,500	4240341,420	603,748	C	241738,000	4240063,555	598,488	C
240759,500	4240341,420	603,713	C	241752,000	4240063,555	598,453	C
240763,000	4240341,420	603,704	C	241755,500	4240063,555	598,444	C
240777,000	4240341,420	603,669	C	241769,500	4240063,555	598,409	C
240780,500	4240341,420	603,660	C	241773,000	4240063,555	598,401	C
240794,500	4240341,420	603,625	C	241773,000	4240054,501	598,310	C
240798,000	4240341,420	603,616	C	241769,500	4240054,501	598,319	C
240812,000	4240341,420	603,581	C	241755,500	4240054,501	598,354	C
240815,500	4240341,420	603,573	C	241752,000	4240054,501	598,363	C
240829,500	4240341,420	603,538	C	241738,000	4240054,501	598,398	C
240833,000	4240341,420	603,529	C	241734,500	4240054,501	598,406	C
240847,000	4240341,420	603,494	C	241720,500	4240054,501	598,441	C
240850,500	4240341,420	603,485	C	241717,000	4240054,501	598,450	C

Coord. X	Coord. Y	Elevación	Código
240864,500	4240341,420	603,450	C
240868,000	4240341,420	603,441	C
240882,000	4240341,420	603,406	C
240885,500	4240341,420	603,398	C
240899,500	4240341,420	603,363	C
240903,000	4240341,420	603,354	C
240917,000	4240341,420	603,319	C
240920,500	4240341,420	603,310	C
240934,500	4240341,420	603,275	C
240938,000	4240341,420	603,266	C
240952,000	4240341,420	603,231	C
240955,500	4240341,420	603,223	C
240969,500	4240341,420	603,188	C
240973,000	4240341,420	603,179	C
240987,000	4240341,420	603,144	C
240990,500	4240341,420	603,135	C
241004,500	4240341,420	603,100	C
241008,000	4240341,420	603,091	C
241022,000	4240341,420	603,056	C
241025,500	4240341,420	603,048	C
241039,500	4240341,420	603,013	C
241043,000	4240341,420	603,004	C
241057,000	4240341,420	602,969	C
241060,500	4240341,420	602,960	C
241074,500	4240341,420	602,925	C
241078,000	4240341,420	602,916	C
241092,000	4240341,420	602,881	C
241095,500	4240341,420	602,873	C
241109,500	4240341,420	602,838	C
241113,000	4240341,420	602,829	C
241127,000	4240341,420	602,794	C
241130,500	4240341,420	602,785	C
241144,500	4240341,420	602,750	C
241148,000	4240341,420	602,742	C
241162,000	4240341,420	602,707	C
241165,500	4240341,420	602,698	C
241179,500	4240341,420	602,663	C
241183,000	4240341,420	602,654	C
241197,000	4240341,420	602,619	C
241200,500	4240341,420	602,610	C
241214,500	4240341,420	602,575	C
241218,000	4240341,420	602,567	C
241232,000	4240341,420	602,532	C
241235,500	4240341,420	602,523	C
241249,500	4240341,420	602,488	C
241253,000	4240341,420	602,479	C

Coord. X	Coord. Y	Elevación	Código
241703,000	4240054,501	598,485	C
241699,500	4240054,501	598,494	C
241685,500	4240054,501	598,529	C
241682,000	4240054,501	598,537	C
241668,000	4240054,501	598,572	C
241664,500	4240054,501	598,581	C
241650,500	4240054,501	598,616	C
241647,000	4240054,501	598,625	C
241633,000	4240054,501	598,660	C
241629,500	4240054,501	598,669	C
241615,500	4240054,501	598,704	C
241612,000	4240054,501	598,712	C
241598,000	4240054,501	598,747	C
241594,500	4240054,501	598,756	C
241580,500	4240054,501	598,791	C
241577,000	4240054,501	598,800	C
241563,000	4240054,501	598,835	C
241559,500	4240054,501	598,844	C
241545,500	4240054,501	598,879	C
241542,000	4240054,501	598,887	C
241528,000	4240054,501	598,922	C
241524,500	4240054,501	598,931	C
241510,500	4240054,501	598,966	C
241507,000	4240054,501	598,975	C
241493,000	4240054,501	599,010	C
241489,500	4240054,501	599,019	C
241475,500	4240054,501	599,054	C
241472,000	4240054,501	599,062	C
241458,000	4240054,501	599,097	C
241454,500	4240054,501	599,106	C
241440,500	4240054,501	599,141	C
241437,000	4240054,501	599,150	C
241423,000	4240054,501	599,185	C
241419,500	4240054,501	599,194	C
241405,500	4240054,501	599,229	C
241402,000	4240054,501	599,237	C
241388,000	4240054,501	599,272	C
241384,500	4240054,501	599,281	C
241370,500	4240054,501	599,316	C
241367,000	4240054,501	599,325	C
241353,000	4240054,501	599,360	C
241349,500	4240054,501	599,369	C
241335,500	4240054,501	599,404	C
241332,000	4240054,501	599,412	C
241318,000	4240054,501	599,447	C
241314,500	4240054,501	599,456	C

Coord. X	Coord. Y	Elevación	Código
241267,000	4240341,420	602,444	C
241270,500	4240341,420	602,435	C
241284,500	4240341,420	602,400	C
241288,000	4240341,420	602,392	C
241302,000	4240341,420	602,357	C
241305,500	4240341,420	602,348	C
241319,500	4240341,420	602,313	C
241323,000	4240341,420	602,304	C
241337,000	4240341,420	602,269	C
241340,500	4240341,420	602,260	C
241354,500	4240341,420	602,225	C
241358,000	4240341,420	602,217	C
241372,000	4240341,420	602,182	C
241375,500	4240341,420	602,173	C
241389,500	4240341,420	602,138	C
241393,000	4240341,420	602,129	C
241407,000	4240341,420	602,094	C
241410,500	4240341,420	602,085	C
241424,500	4240341,420	602,050	C
241428,000	4240341,420	602,042	C
241442,000	4240341,420	602,007	C
241445,500	4240341,420	601,998	C
241459,500	4240341,420	601,963	C
241463,000	4240341,420	601,954	C
241477,000	4240341,420	601,919	C
241480,500	4240341,420	601,910	C
241494,500	4240341,420	601,875	C
241498,000	4240341,420	601,867	C
241512,000	4240341,420	601,832	C
241515,500	4240341,420	601,823	C
241529,500	4240341,420	601,788	C
241533,000	4240341,420	601,779	C
241547,000	4240341,420	601,744	C
241550,500	4240341,420	601,735	C
241564,500	4240341,420	601,700	C
241568,000	4240341,420	601,692	C
241582,000	4240341,420	601,657	C
241585,500	4240341,420	601,648	C
241599,500	4240341,420	601,613	C
241603,000	4240341,420	601,604	C
241617,000	4240341,420	601,569	C
241620,500	4240341,420	601,560	C
241634,500	4240341,420	601,525	C
241638,000	4240341,420	601,517	C
241652,000	4240341,420	601,482	C
241655,500	4240341,420	601,473	C

Coord. X	Coord. Y	Elevación	Código
241300,500	4240054,501	599,491	C
241297,000	4240054,501	599,500	C
241283,000	4240054,501	599,535	C
241279,500	4240054,501	599,544	C
241265,500	4240054,501	599,578	C
241262,000	4240054,501	599,587	C
241248,000	4240054,501	599,622	C
241244,500	4240054,501	599,631	C
241230,500	4240054,501	599,666	C
241227,000	4240054,501	599,675	C
241227,000	4240050,501	599,635	C
241230,500	4240050,501	599,626	C
241244,500	4240050,501	599,591	C
241248,000	4240050,501	599,582	C
241262,000	4240050,501	599,547	C
241265,500	4240050,501	599,538	C
241279,500	4240050,501	599,504	C
241283,000	4240050,501	599,495	C
241297,000	4240050,501	599,460	C
241300,500	4240050,501	599,451	C
241314,500	4240050,501	599,416	C
241318,000	4240050,501	599,407	C
241332,000	4240050,501	599,372	C
241335,500	4240050,501	599,364	C
241349,500	4240050,501	599,329	C
241353,000	4240050,501	599,320	C
241367,000	4240050,501	599,285	C
241370,500	4240050,501	599,276	C
241384,500	4240050,501	599,241	C
241388,000	4240050,501	599,232	C
241402,000	4240050,501	599,197	C
241405,500	4240050,501	599,189	C
241419,500	4240050,501	599,154	C
241423,000	4240050,501	599,145	C
241437,000	4240050,501	599,110	C
241440,500	4240050,501	599,101	C
241454,500	4240050,501	599,066	C
241458,000	4240050,501	599,057	C
241472,000	4240050,501	599,022	C
241475,500	4240050,501	599,014	C
241489,500	4240050,501	598,979	C
241493,000	4240050,501	598,970	C
241507,000	4240050,501	598,935	C
241510,500	4240050,501	598,926	C
241524,500	4240050,501	598,891	C
241528,000	4240050,501	598,882	C

Coord. X	Coord. Y	Elevación	Código
241669,500	4240341,420	601,438	C
241673,000	4240341,420	601,429	C
241687,000	4240341,420	601,394	C
241690,500	4240341,420	601,385	C
241704,500	4240341,420	601,350	C
241708,000	4240341,420	601,342	C
241722,000	4240341,420	601,307	C
241725,500	4240341,420	601,298	C
241739,500	4240341,420	601,263	C
241743,000	4240341,420	601,254	C
241757,000	4240341,420	601,219	C
241760,500	4240341,420	601,210	C
241760,500	4240332,366	601,120	C
241757,000	4240332,366	601,129	C
241743,000	4240332,366	601,164	C
241739,500	4240332,366	601,172	C
241725,500	4240332,366	601,207	C
241722,000	4240332,366	601,216	C
241708,000	4240332,366	601,251	C
241704,500	4240332,366	601,260	C
241690,500	4240332,366	601,295	C
241687,000	4240332,366	601,304	C
241673,000	4240332,366	601,339	C
241669,500	4240332,366	601,347	C
241655,500	4240332,366	601,382	C
241652,000	4240332,366	601,391	C
241638,000	4240332,366	601,426	C
241634,500	4240332,366	601,435	C
241620,500	4240332,366	601,470	C
241617,000	4240332,366	601,479	C
241603,000	4240332,366	601,514	C
241599,500	4240332,366	601,522	C
241585,500	4240332,366	601,557	C
241582,000	4240332,366	601,566	C
241568,000	4240332,366	601,601	C
241564,500	4240332,366	601,610	C
241550,500	4240332,366	601,645	C
241547,000	4240332,366	601,654	C
241533,000	4240332,366	601,689	C
241529,500	4240332,366	601,697	C
241515,500	4240332,366	601,732	C
241512,000	4240332,366	601,741	C
241498,000	4240332,366	601,776	C
241494,500	4240332,366	601,785	C
241480,500	4240332,366	601,820	C
241477,000	4240332,366	601,829	C

Coord. X	Coord. Y	Elevación	Código
241542,000	4240050,501	598,847	C
241545,500	4240050,501	598,839	C
241559,500	4240050,501	598,804	C
241563,000	4240050,501	598,795	C
241577,000	4240050,501	598,760	C
241580,500	4240050,501	598,751	C
241594,500	4240050,501	598,716	C
241598,000	4240050,501	598,707	C
241612,000	4240050,501	598,672	C
241615,500	4240050,501	598,664	C
241629,500	4240050,501	598,629	C
241633,000	4240050,501	598,620	C
241647,000	4240050,501	598,585	C
241650,500	4240050,501	598,576	C
241664,500	4240050,501	598,541	C
241668,000	4240050,501	598,532	C
241682,000	4240050,501	598,497	C
241685,500	4240050,501	598,489	C
241699,500	4240050,501	598,454	C
241703,000	4240050,501	598,445	C
241717,000	4240050,501	598,410	C
241720,500	4240050,501	598,401	C
241734,500	4240050,501	598,366	C
241738,000	4240050,501	598,358	C
241752,000	4240050,501	598,323	C
241755,500	4240050,501	598,314	C
241769,500	4240050,501	598,279	C
241773,000	4240050,501	598,270	C
241773,000	4240042,448	598,189	C
241769,500	4240042,448	598,198	C
241755,500	4240042,448	598,233	C
241752,000	4240042,448	598,242	C
241738,000	4240042,448	598,277	C
241734,500	4240042,448	598,286	C
241720,500	4240042,448	598,321	C
241717,000	4240042,448	598,329	C
241703,000	4240042,448	598,364	C
241699,500	4240042,448	598,373	C
241685,500	4240042,448	598,408	C
241682,000	4240042,448	598,417	C
241668,000	4240042,448	598,452	C
241664,500	4240042,448	598,461	C
241650,500	4240042,448	598,496	C
241647,000	4240042,448	598,504	C
241633,000	4240042,448	598,539	C
241629,500	4240042,448	598,548	C

Coord. X	Coord. Y	Elevación	Código
241463,000	4240332,366	601,864	C
241459,500	4240332,366	601,872	C
241445,500	4240332,366	601,907	C
241442,000	4240332,366	601,916	C
241428,000	4240332,366	601,951	C
241424,500	4240332,366	601,960	C
241410,500	4240332,366	601,995	C
241407,000	4240332,366	602,004	C
241393,000	4240332,366	602,039	C
241389,500	4240332,366	602,047	C
241375,500	4240332,366	602,082	C
241372,000	4240332,366	602,091	C
241358,000	4240332,366	602,126	C
241354,500	4240332,366	602,135	C
241340,500	4240332,366	602,170	C
241337,000	4240332,366	602,179	C
241323,000	4240332,366	602,214	C
241319,500	4240332,366	602,222	C
241305,500	4240332,366	602,257	C
241302,000	4240332,366	602,266	C
241288,000	4240332,366	602,301	C
241284,500	4240332,366	602,310	C
241270,500	4240332,366	602,345	C
241267,000	4240332,366	602,354	C
241253,000	4240332,366	602,389	C
241249,500	4240332,366	602,397	C
241235,500	4240332,366	602,432	C
241232,000	4240332,366	602,441	C
241218,000	4240332,366	602,476	C
241214,500	4240332,366	602,485	C
241200,500	4240332,366	602,520	C
241197,000	4240332,366	602,528	C
241183,000	4240332,366	602,563	C
241179,500	4240332,366	602,572	C
241165,500	4240332,366	602,607	C
241162,000	4240332,366	602,616	C
241148,000	4240332,366	602,651	C
241144,500	4240332,366	602,660	C
241130,500	4240332,366	602,695	C
241127,000	4240332,366	602,703	C
241113,000	4240332,366	602,738	C
241109,500	4240332,366	602,747	C
241095,500	4240332,366	602,782	C
241092,000	4240332,366	602,791	C
241078,000	4240332,366	602,826	C
241074,500	4240332,366	602,835	C

Coord. X	Coord. Y	Elevación	Código
241615,500	4240042,448	598,583	C
241612,000	4240042,448	598,592	C
241598,000	4240042,448	598,627	C
241594,500	4240042,448	598,636	C
241580,500	4240042,448	598,671	C
241577,000	4240042,448	598,679	C
241563,000	4240042,448	598,714	C
241559,500	4240042,448	598,723	C
241545,500	4240042,448	598,758	C
241542,000	4240042,448	598,767	C
241528,000	4240042,448	598,802	C
241524,500	4240042,448	598,811	C
241510,500	4240042,448	598,846	C
241507,000	4240042,448	598,854	C
241493,000	4240042,448	598,889	C
241489,500	4240042,448	598,898	C
241475,500	4240042,448	598,933	C
241472,000	4240042,448	598,942	C
241458,000	4240042,448	598,977	C
241454,500	4240042,448	598,986	C
241440,500	4240042,448	599,021	C
241437,000	4240042,448	599,029	C
241423,000	4240042,448	599,064	C
241419,500	4240042,448	599,073	C
241405,500	4240042,448	599,108	C
241402,000	4240042,448	599,117	C
241388,000	4240042,448	599,152	C
241384,500	4240042,448	599,161	C
241370,500	4240042,448	599,196	C
241367,000	4240042,448	599,204	C
241353,000	4240042,448	599,239	C
241349,500	4240042,448	599,248	C
241335,500	4240042,448	599,283	C
241332,000	4240042,448	599,292	C
241318,000	4240042,448	599,327	C
241314,500	4240042,448	599,335	C
241300,500	4240042,448	599,370	C
241297,000	4240042,448	599,379	C
241283,000	4240042,448	599,414	C
241279,500	4240042,448	599,423	C
241265,500	4240042,448	599,458	C
241262,000	4240042,448	599,467	C
241248,000	4240042,448	599,502	C
241244,500	4240042,448	599,510	C
241230,500	4240042,448	599,545	C
241227,000	4240042,448	599,554	C

Coord. X	Coord. Y	Elevación	Código
241060,500	4240332,366	602,870	C
241057,000	4240332,366	602,878	C
241043,000	4240332,366	602,913	C
241039,500	4240332,366	602,922	C
241025,500	4240332,366	602,957	C
241022,000	4240332,366	602,966	C
241008,000	4240332,366	603,001	C
241004,500	4240332,366	603,010	C
240990,500	4240332,366	603,045	C
240987,000	4240332,366	603,053	C
240973,000	4240332,366	603,088	C
240969,500	4240332,366	603,097	C
240955,500	4240332,366	603,132	C
240952,000	4240332,366	603,141	C
240938,000	4240332,366	603,176	C
240934,500	4240332,366	603,185	C
240920,500	4240332,366	603,220	C
240917,000	4240332,366	603,228	C
240903,000	4240332,366	603,263	C
240899,500	4240332,366	603,272	C
240885,500	4240332,366	603,307	C
240882,000	4240332,366	603,316	C
240868,000	4240332,366	603,351	C
240864,500	4240332,366	603,360	C
240850,500	4240332,366	603,395	C
240847,000	4240332,366	603,403	C
240833,000	4240332,366	603,438	C
240829,500	4240332,366	603,447	C
240815,500	4240332,366	603,482	C
240812,000	4240332,366	603,491	C
240798,000	4240332,366	603,526	C
240794,500	4240332,366	603,535	C
240780,500	4240332,366	603,570	C
240777,000	4240332,366	603,578	C
240763,000	4240332,366	603,613	C
240759,500	4240332,366	603,622	C
240745,500	4240332,366	603,657	C
240742,000	4240332,366	603,666	C
240728,000	4240332,366	603,701	C
240724,500	4240332,366	603,710	C
240710,500	4240332,366	603,745	C
240707,000	4240332,366	603,753	C
240693,000	4240332,366	603,788	C
240689,500	4240332,366	603,797	C
240675,500	4240332,366	603,832	C
240672,000	4240332,366	603,841	C

Coord. X	Coord. Y	Elevación	Código
241227,000	4240038,448	599,514	C
241230,500	4240038,448	599,505	C
241244,500	4240038,448	599,470	C
241248,000	4240038,448	599,462	C
241262,000	4240038,448	599,427	C
241265,500	4240038,448	599,418	C
241279,500	4240038,448	599,383	C
241283,000	4240038,448	599,374	C
241297,000	4240038,448	599,339	C
241300,500	4240038,448	599,330	C
241314,500	4240038,448	599,295	C
241318,000	4240038,448	599,287	C
241332,000	4240038,448	599,252	C
241335,500	4240038,448	599,243	C
241349,500	4240038,448	599,208	C
241353,000	4240038,448	599,199	C
241367,000	4240038,448	599,164	C
241370,500	4240038,448	599,156	C
241384,500	4240038,448	599,121	C
241388,000	4240038,448	599,112	C
241402,000	4240038,448	599,077	C
241405,500	4240038,448	599,068	C
241419,500	4240038,448	599,033	C
241423,000	4240038,448	599,024	C
241437,000	4240038,448	598,989	C
241440,500	4240038,448	598,981	C
241454,500	4240038,448	598,946	C
241458,000	4240038,448	598,937	C
241472,000	4240038,448	598,902	C
241475,500	4240038,448	598,893	C
241489,500	4240038,448	598,858	C
241493,000	4240038,448	598,849	C
241507,000	4240038,448	598,814	C
241510,500	4240038,448	598,806	C
241524,500	4240038,448	598,771	C
241528,000	4240038,448	598,762	C
241542,000	4240038,448	598,727	C
241545,500	4240038,448	598,718	C
241559,500	4240038,448	598,683	C
241563,000	4240038,448	598,674	C
241577,000	4240038,448	598,639	C
241580,500	4240038,448	598,631	C
241594,500	4240038,448	598,596	C
241598,000	4240038,448	598,587	C
241612,000	4240038,448	598,552	C
241615,500	4240038,448	598,543	C

Coord. X	Coord. Y	Elevación	Código
240658,000	4240332,366	603,876	C
240654,500	4240332,366	603,885	C
240640,500	4240332,366	603,920	C
240637,000	4240332,366	603,928	C
240623,000	4240332,366	603,963	C
240619,500	4240332,366	603,972	C
240605,500	4240332,366	604,007	C
240602,000	4240332,366	604,016	C
240588,000	4240332,366	604,051	C
240584,500	4240332,366	604,060	C
240570,500	4240332,366	604,095	C
240567,000	4240332,366	604,103	C
240553,000	4240332,366	604,138	C
240549,500	4240332,366	604,147	C
240535,500	4240332,366	604,182	C
240532,000	4240332,366	604,191	C
240518,000	4240332,366	604,226	C
240514,500	4240332,366	604,235	C
240500,500	4240332,366	604,270	C
240497,000	4240332,366	604,278	C
240483,000	4240332,366	604,313	C
240479,500	4240332,366	604,322	C
240465,500	4240332,366	604,357	C
240462,000	4240332,366	604,366	C
240448,000	4240332,366	604,401	C
240444,500	4240332,366	604,410	C
240430,500	4240332,366	604,445	C
240427,000	4240332,366	604,453	C
240413,000	4240332,366	604,488	C
240409,500	4240332,366	604,497	C
240395,500	4240332,366	604,532	C
240392,000	4240332,366	604,541	C
240378,000	4240332,366	604,576	C
240374,500	4240332,366	604,585	C
240360,500	4240332,366	604,620	C
240357,000	4240332,366	604,628	C
240343,000	4240332,366	604,663	C
240339,500	4240332,366	604,672	C
240325,500	4240332,366	604,707	C
240322,000	4240332,366	604,716	C
240308,000	4240332,366	604,751	C
240304,500	4240332,366	604,760	C
240290,500	4240332,366	604,795	C
240287,000	4240332,366	604,803	C
240273,000	4240332,366	604,838	C
240269,500	4240332,366	604,847	C

Coord. X	Coord. Y	Elevación	Código
241629,500	4240038,448	598,508	C
241633,000	4240038,448	598,499	C
241647,000	4240038,448	598,464	C
241650,500	4240038,448	598,456	C
241664,500	4240038,448	598,421	C
241668,000	4240038,448	598,412	C
241682,000	4240038,448	598,377	C
241685,500	4240038,448	598,368	C
241699,500	4240038,448	598,333	C
241703,000	4240038,448	598,324	C
241717,000	4240038,448	598,289	C
241720,500	4240038,448	598,281	C
241734,500	4240038,448	598,246	C
241738,000	4240038,448	598,237	C
241752,000	4240038,448	598,202	C
241755,500	4240038,448	598,193	C
241769,500	4240038,448	598,158	C
241773,000	4240038,448	598,149	C
241773,000	4240030,394	598,069	C
241769,500	4240030,394	598,078	C
241755,500	4240030,394	598,113	C
241752,000	4240030,394	598,121	C
241738,000	4240030,394	598,156	C
241734,500	4240030,394	598,165	C
241720,500	4240030,394	598,200	C
241717,000	4240030,394	598,209	C
241703,000	4240030,394	598,244	C
241699,500	4240030,394	598,253	C
241685,500	4240030,394	598,288	C
241682,000	4240030,394	598,296	C
241668,000	4240030,394	598,331	C
241664,500	4240030,394	598,340	C
241650,500	4240030,394	598,375	C
241647,000	4240030,394	598,384	C
241633,000	4240030,394	598,419	C
241629,500	4240030,394	598,428	C
241615,500	4240030,394	598,463	C
241612,000	4240030,394	598,471	C
241598,000	4240030,394	598,506	C
241594,500	4240030,394	598,515	C
241580,500	4240030,394	598,550	C
241577,000	4240030,394	598,559	C
241563,000	4240030,394	598,594	C
241559,500	4240030,394	598,603	C
241545,500	4240030,394	598,638	C
241542,000	4240030,394	598,646	C

Coord. X	Coord. Y	Elevación	Código
240255,500	4240332,366	604,882	C
240252,000	4240332,366	604,891	C
240238,000	4240332,366	604,926	C
240234,500	4240332,366	604,935	C
240220,500	4240332,366	604,970	C
240217,000	4240332,366	604,978	C
240203,000	4240332,366	605,013	C
240199,500	4240332,366	605,022	C
240185,500	4240332,366	605,057	C
240182,000	4240332,366	605,066	C
240168,000	4240332,366	605,101	C
240164,500	4240332,366	605,110	C
240150,500	4240332,366	605,145	C
240147,000	4240332,366	605,153	C
240133,000	4240332,366	605,188	C
240129,500	4240332,366	605,197	C
240115,500	4240332,366	605,232	C
240112,000	4240332,366	605,241	C
240098,000	4240332,366	605,276	C
240094,500	4240332,366	605,285	C
240080,500	4240332,366	605,320	C
240077,000	4240332,366	605,328	C
240063,000	4240332,366	605,363	C
240059,500	4240332,366	605,372	C
240045,500	4240332,366	605,407	C
240042,000	4240332,366	605,416	C
240028,000	4240332,366	605,451	C
240024,500	4240332,366	605,460	C
240024,500	4240328,366	605,420	C
240028,000	4240328,366	605,411	C
240042,000	4240328,366	605,376	C
240045,500	4240328,366	605,367	C
240059,500	4240328,366	605,332	C
240063,000	4240328,366	605,323	C
240077,000	4240328,366	605,288	C
240080,500	4240328,366	605,280	C
240094,500	4240328,366	605,245	C
240098,000	4240328,366	605,236	C
240112,000	4240328,366	605,201	C
240115,500	4240328,366	605,192	C
240129,500	4240328,366	605,157	C
240133,000	4240328,366	605,148	C
240147,000	4240328,366	605,113	C
240150,500	4240328,366	605,105	C
240164,500	4240328,366	605,070	C
240168,000	4240328,366	605,061	C

Coord. X	Coord. Y	Elevación	Código
241528,000	4240030,394	598,681	C
241524,500	4240030,394	598,690	C
241510,500	4240030,394	598,725	C
241507,000	4240030,394	598,734	C
241493,000	4240030,394	598,769	C
241489,500	4240030,394	598,778	C
241475,500	4240030,394	598,813	C
241472,000	4240030,394	598,821	C
241458,000	4240030,394	598,856	C
241454,500	4240030,394	598,865	C
241440,500	4240030,394	598,900	C
241437,000	4240030,394	598,909	C
241423,000	4240030,394	598,944	C
241419,500	4240030,394	598,952	C
241405,500	4240030,394	598,987	C
241402,000	4240030,394	598,996	C
241388,000	4240030,394	599,031	C
241384,500	4240030,394	599,040	C
241370,500	4240030,394	599,075	C
241367,000	4240030,394	599,084	C
241353,000	4240030,394	599,119	C
241349,500	4240030,394	599,127	C
241335,500	4240030,394	599,162	C
241332,000	4240030,394	599,171	C
241318,000	4240030,394	599,206	C
241314,500	4240030,394	599,215	C
241300,500	4240030,394	599,250	C
241297,000	4240030,394	599,259	C
241283,000	4240030,394	599,294	C
241279,500	4240030,394	599,302	C
241265,500	4240030,394	599,337	C
241262,000	4240030,394	599,346	C
241248,000	4240030,394	599,381	C
241244,500	4240030,394	599,390	C
241230,500	4240030,394	599,425	C
241227,000	4240030,394	599,434	C
241227,000	4240026,394	599,394	C
241230,500	4240026,394	599,385	C
241244,500	4240026,394	599,350	C
241248,000	4240026,394	599,341	C
241262,000	4240026,394	599,306	C
241265,500	4240026,394	599,297	C
241279,500	4240026,394	599,262	C
241283,000	4240026,394	599,254	C
241297,000	4240026,394	599,219	C
241300,500	4240026,394	599,210	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240182,000	4240328,366	605,026	C	241314,500	4240026,394	599,175	C
240185,500	4240328,366	605,017	C	241318,000	4240026,394	599,166	C
240199,500	4240328,366	604,982	C	241332,000	4240026,394	599,131	C
240203,000	4240328,366	604,973	C	241335,500	4240026,394	599,122	C
240217,000	4240328,366	604,938	C	241349,500	4240026,394	599,087	C
240220,500	4240328,366	604,930	C	241353,000	4240026,394	599,079	C
240234,500	4240328,366	604,895	C	241367,000	4240026,394	599,044	C
240238,000	4240328,366	604,886	C	241370,500	4240026,394	599,035	C
240252,000	4240328,366	604,851	C	241384,500	4240026,394	599,000	C
240255,500	4240328,366	604,842	C	241388,000	4240026,394	598,991	C
240269,500	4240328,366	604,807	C	241402,000	4240026,394	598,956	C
240273,000	4240328,366	604,798	C	241405,500	4240026,394	598,947	C
240287,000	4240328,366	604,763	C	241419,500	4240026,394	598,912	C
240290,500	4240328,366	604,755	C	241423,000	4240026,394	598,904	C
240304,500	4240328,366	604,720	C	241437,000	4240026,394	598,869	C
240308,000	4240328,366	604,711	C	241440,500	4240026,394	598,860	C
240322,000	4240328,366	604,676	C	241454,500	4240026,394	598,825	C
240325,500	4240328,366	604,667	C	241458,000	4240026,394	598,816	C
240339,500	4240328,366	604,632	C	241472,000	4240026,394	598,781	C
240343,000	4240328,366	604,623	C	241475,500	4240026,394	598,773	C
240357,000	4240328,366	604,588	C	241489,500	4240026,394	598,738	C
240360,500	4240328,366	604,580	C	241493,000	4240026,394	598,729	C
240374,500	4240328,366	604,545	C	241507,000	4240026,394	598,694	C
240378,000	4240328,366	604,536	C	241510,500	4240026,394	598,685	C
240392,000	4240328,366	604,501	C	241524,500	4240026,394	598,650	C
240395,500	4240328,366	604,492	C	241528,000	4240026,394	598,641	C
240409,500	4240328,366	604,457	C	241542,000	4240026,394	598,606	C
240413,000	4240328,366	604,448	C	241545,500	4240026,394	598,598	C
240427,000	4240328,366	604,413	C	241559,500	4240026,394	598,563	C
240430,500	4240328,366	604,405	C	241563,000	4240026,394	598,554	C
240444,500	4240328,366	604,370	C	241577,000	4240026,394	598,519	C
240448,000	4240328,366	604,361	C	241580,500	4240026,394	598,510	C
240462,000	4240328,366	604,326	C	241594,500	4240026,394	598,475	C
240465,500	4240328,366	604,317	C	241598,000	4240026,394	598,466	C
240479,500	4240328,366	604,282	C	241612,000	4240026,394	598,431	C
240483,000	4240328,366	604,273	C	241615,500	4240026,394	598,423	C
240497,000	4240328,366	604,238	C	241629,500	4240026,394	598,388	C
240500,500	4240328,366	604,230	C	241633,000	4240026,394	598,379	C
240514,500	4240328,366	604,195	C	241647,000	4240026,394	598,344	C
240518,000	4240328,366	604,186	C	241650,500	4240026,394	598,335	C
240532,000	4240328,366	604,151	C	241664,500	4240026,394	598,300	C
240535,500	4240328,366	604,142	C	241668,000	4240026,394	598,291	C
240549,500	4240328,366	604,107	C	241682,000	4240026,394	598,256	C
240553,000	4240328,366	604,098	C	241685,500	4240026,394	598,248	C
240567,000	4240328,366	604,063	C	241699,500	4240026,394	598,213	C
240570,500	4240328,366	604,055	C	241703,000	4240026,394	598,204	C

Coord. X	Coord. Y	Elevación	Código
240584,500	4240328,366	604,020	C
240588,000	4240328,366	604,011	C
240602,000	4240328,366	603,976	C
240605,500	4240328,366	603,967	C
240619,500	4240328,366	603,932	C
240623,000	4240328,366	603,923	C
240637,000	4240328,366	603,888	C
240640,500	4240328,366	603,880	C
240654,500	4240328,366	603,845	C
240658,000	4240328,366	603,836	C
240672,000	4240328,366	603,801	C
240675,500	4240328,366	603,792	C
240689,500	4240328,366	603,757	C
240693,000	4240328,366	603,748	C
240707,000	4240328,366	603,713	C
240710,500	4240328,366	603,705	C
240724,500	4240328,366	603,670	C
240728,000	4240328,366	603,661	C
240742,000	4240328,366	603,626	C
240745,500	4240328,366	603,617	C
240759,500	4240328,366	603,582	C
240763,000	4240328,366	603,573	C
240777,000	4240328,366	603,538	C
240780,500	4240328,366	603,530	C
240794,500	4240328,366	603,495	C
240798,000	4240328,366	603,486	C
240812,000	4240328,366	603,451	C
240815,500	4240328,366	603,442	C
240829,500	4240328,366	603,407	C
240833,000	4240328,366	603,398	C
240847,000	4240328,366	603,363	C
240850,500	4240328,366	603,355	C
240864,500	4240328,366	603,320	C
240868,000	4240328,366	603,311	C
240882,000	4240328,366	603,276	C
240885,500	4240328,366	603,267	C
240899,500	4240328,366	603,232	C
240903,000	4240328,366	603,223	C
240917,000	4240328,366	603,188	C
240920,500	4240328,366	603,180	C
240934,500	4240328,366	603,145	C
240938,000	4240328,366	603,136	C
240952,000	4240328,366	603,101	C
240955,500	4240328,366	603,092	C
240969,500	4240328,366	603,057	C
240973,000	4240328,366	603,048	C

Coord. X	Coord. Y	Elevación	Código
241717,000	4240026,394	598,169	C
241720,500	4240026,394	598,160	C
241734,500	4240026,394	598,125	C
241738,000	4240026,394	598,116	C
241752,000	4240026,394	598,081	C
241755,500	4240026,394	598,073	C
241769,500	4240026,394	598,038	C
241773,000	4240026,394	598,029	C
241773,000	4240017,340	597,938	C
241769,500	4240017,340	597,947	C
241755,500	4240017,340	597,982	C
241752,000	4240017,340	597,991	C
241738,000	4240017,340	598,026	C
241734,500	4240017,340	598,035	C
241720,500	4240017,340	598,070	C
241717,000	4240017,340	598,078	C
241703,000	4240017,340	598,113	C
241699,500	4240017,340	598,122	C
241685,500	4240017,340	598,157	C
241682,000	4240017,340	598,166	C
241668,000	4240017,340	598,201	C
241664,500	4240017,340	598,210	C
241650,500	4240017,340	598,245	C
241647,000	4240017,340	598,253	C
241633,000	4240017,340	598,288	C
241629,500	4240017,340	598,297	C
241615,500	4240017,340	598,332	C
241612,000	4240017,340	598,341	C
241598,000	4240017,340	598,376	C
241594,500	4240017,340	598,385	C
241580,500	4240017,340	598,420	C
241577,000	4240017,340	598,428	C
241563,000	4240017,340	598,463	C
241559,500	4240017,340	598,472	C
241545,500	4240017,340	598,507	C
241542,000	4240017,340	598,516	C
241528,000	4240017,340	598,551	C
241524,500	4240017,340	598,560	C
241510,500	4240017,340	598,595	C
241507,000	4240017,340	598,603	C
241493,000	4240017,340	598,638	C
241489,500	4240017,340	598,647	C
241475,500	4240017,340	598,682	C
241472,000	4240017,340	598,691	C
241458,000	4240017,340	598,726	C
241454,500	4240017,340	598,734	C

Coord. X	Coord. Y	Elevación	Código
240987,000	4240328,366	603,013	C
240990,500	4240328,366	603,005	C
241004,500	4240328,366	602,970	C
241008,000	4240328,366	602,961	C
241022,000	4240328,366	602,926	C
241025,500	4240328,366	602,917	C
241039,500	4240328,366	602,882	C
241043,000	4240328,366	602,873	C
241057,000	4240328,366	602,838	C
241060,500	4240328,366	602,830	C
241074,500	4240328,366	602,795	C
241078,000	4240328,366	602,786	C
241092,000	4240328,366	602,751	C
241095,500	4240328,366	602,742	C
241109,500	4240328,366	602,707	C
241113,000	4240328,366	602,698	C
241127,000	4240328,366	602,663	C
241130,500	4240328,366	602,655	C
241144,500	4240328,366	602,620	C
241148,000	4240328,366	602,611	C
241162,000	4240328,366	602,576	C
241165,500	4240328,366	602,567	C
241179,500	4240328,366	602,532	C
241183,000	4240328,366	602,523	C
241197,000	4240328,366	602,488	C
241200,500	4240328,366	602,480	C
241214,500	4240328,366	602,445	C
241218,000	4240328,366	602,436	C
241232,000	4240328,366	602,401	C
241235,500	4240328,366	602,392	C
241249,500	4240328,366	602,357	C
241253,000	4240328,366	602,349	C
241267,000	4240328,366	602,314	C
241270,500	4240328,366	602,305	C
241284,500	4240328,366	602,270	C
241288,000	4240328,366	602,261	C
241302,000	4240328,366	602,226	C
241305,500	4240328,366	602,217	C
241319,500	4240328,366	602,182	C
241323,000	4240328,366	602,174	C
241337,000	4240328,366	602,139	C
241340,500	4240328,366	602,130	C
241354,500	4240328,366	602,095	C
241358,000	4240328,366	602,086	C
241372,000	4240328,366	602,051	C
241375,500	4240328,366	602,042	C
241440,500	4240017,340	598,769	C
241437,000	4240017,340	598,778	C
241423,000	4240017,340	598,813	C
241419,500	4240017,340	598,822	C
241405,500	4240017,340	598,857	C
241402,000	4240017,340	598,866	C
241388,000	4240017,340	598,901	C
241384,500	4240017,340	598,909	C
241370,500	4240017,340	598,944	C
241367,000	4240017,340	598,953	C
241353,000	4240017,340	598,988	C
241349,500	4240017,340	598,997	C
241335,500	4240017,340	599,032	C
241332,000	4240017,340	599,041	C
241318,000	4240017,340	599,076	C
241314,500	4240017,340	599,084	C
241300,500	4240017,340	599,119	C
241297,000	4240017,340	599,128	C
241283,000	4240017,340	599,163	C
241279,500	4240017,340	599,172	C
241265,500	4240017,340	599,207	C
241262,000	4240017,340	599,216	C
241248,000	4240017,340	599,251	C
241244,500	4240017,340	599,259	C
241230,500	4240017,340	599,294	C
241227,000	4240017,340	599,303	C
241227,000	4240014,190	599,272	C
241230,500	4240014,190	599,263	C
241244,500	4240014,190	599,228	C
241248,000	4240014,190	599,219	C
241262,000	4240014,190	599,184	C
241265,500	4240014,190	599,175	C
241279,500	4240014,190	599,140	C
241283,000	4240014,190	599,132	C
241297,000	4240014,190	599,097	C
241300,500	4240014,190	599,088	C
241314,500	4240014,190	599,053	C
241318,000	4240014,190	599,044	C
241332,000	4240014,190	599,009	C
241335,500	4240014,190	599,000	C
241349,500	4240014,190	598,965	C
241353,000	4240014,190	598,957	C
241367,000	4240014,190	598,922	C
241370,500	4240014,190	598,913	C
241384,500	4240014,190	598,878	C
241388,000	4240014,190	598,869	C

Coord. X	Coord. Y	Elevación	Código
241389,500	4240328,366	602,007	C
241393,000	4240328,366	601,999	C
241407,000	4240328,366	601,964	C
241410,500	4240328,366	601,955	C
241424,500	4240328,366	601,920	C
241428,000	4240328,366	601,911	C
241442,000	4240328,366	601,876	C
241445,500	4240328,366	601,867	C
241459,500	4240328,366	601,832	C
241463,000	4240328,366	601,824	C
241477,000	4240328,366	601,789	C
241480,500	4240328,366	601,780	C
241494,500	4240328,366	601,745	C
241498,000	4240328,366	601,736	C
241512,000	4240328,366	601,701	C
241515,500	4240328,366	601,692	C
241529,500	4240328,366	601,657	C
241533,000	4240328,366	601,649	C
241547,000	4240328,366	601,614	C
241550,500	4240328,366	601,605	C
241564,500	4240328,366	601,570	C
241568,000	4240328,366	601,561	C
241582,000	4240328,366	601,526	C
241585,500	4240328,366	601,517	C
241599,500	4240328,366	601,482	C
241603,000	4240328,366	601,474	C
241617,000	4240328,366	601,439	C
241620,500	4240328,366	601,430	C
241634,500	4240328,366	601,395	C
241638,000	4240328,366	601,386	C
241652,000	4240328,366	601,351	C
241655,500	4240328,366	601,342	C
241669,500	4240328,366	601,307	C
241673,000	4240328,366	601,299	C
241687,000	4240328,366	601,264	C
241690,500	4240328,366	601,255	C
241704,500	4240328,366	601,220	C
241708,000	4240328,366	601,211	C
241722,000	4240328,366	601,176	C
241725,500	4240328,366	601,167	C
241739,500	4240328,366	601,132	C
241743,000	4240328,366	601,124	C
241757,000	4240328,366	601,089	C
241760,500	4240328,366	601,080	C
241760,500	4240320,313	600,999	C
241757,000	4240320,313	601,008	C

Coord. X	Coord. Y	Elevación	Código
241402,000	4240014,190	598,834	C
241405,500	4240014,190	598,825	C
241419,500	4240014,190	598,790	C
241423,000	4240014,190	598,782	C
241437,000	4240014,190	598,747	C
241440,500	4240014,190	598,738	C
241454,500	4240014,190	598,703	C
241458,000	4240014,190	598,694	C
241472,000	4240014,190	598,659	C
241475,500	4240014,190	598,650	C
241489,500	4240014,190	598,615	C
241493,000	4240014,190	598,607	C
241507,000	4240014,190	598,572	C
241510,500	4240014,190	598,563	C
241524,500	4240014,190	598,528	C
241528,000	4240014,190	598,519	C
241542,000	4240014,190	598,484	C
241545,500	4240014,190	598,476	C
241559,500	4240014,190	598,441	C
241563,000	4240014,190	598,432	C
241577,000	4240014,190	598,397	C
241580,500	4240014,190	598,388	C
241594,500	4240014,190	598,353	C
241598,000	4240014,190	598,344	C
241612,000	4240014,190	598,309	C
241615,500	4240014,190	598,301	C
241629,500	4240014,190	598,266	C
241633,000	4240014,190	598,257	C
241647,000	4240014,190	598,222	C
241650,500	4240014,190	598,213	C
241664,500	4240014,190	598,178	C
241668,000	4240014,190	598,169	C
241682,000	4240014,190	598,134	C
241685,500	4240014,190	598,126	C
241699,500	4240014,190	598,091	C
241703,000	4240014,190	598,082	C
241717,000	4240014,190	598,047	C
241720,500	4240014,190	598,038	C
241734,500	4240014,190	598,003	C
241738,000	4240014,190	597,994	C
241752,000	4240014,190	597,959	C
241755,500	4240014,190	597,951	C
241769,500	4240014,190	597,916	C
241773,000	4240014,190	597,907	C
241227,000	4239986,450	598,994	C
241230,500	4239986,450	598,985	C

Coord. X	Coord. Y	Elevación	Código
241743,000	4240320,313	601,043	C
241739,500	4240320,313	601,052	C
241725,500	4240320,313	601,087	C
241722,000	4240320,313	601,096	C
241708,000	4240320,313	601,131	C
241704,500	4240320,313	601,139	C
241690,500	4240320,313	601,174	C
241687,000	4240320,313	601,183	C
241673,000	4240320,313	601,218	C
241669,500	4240320,313	601,227	C
241655,500	4240320,313	601,262	C
241652,000	4240320,313	601,271	C
241638,000	4240320,313	601,306	C
241634,500	4240320,313	601,314	C
241620,500	4240320,313	601,349	C
241617,000	4240320,313	601,358	C
241603,000	4240320,313	601,393	C
241599,500	4240320,313	601,402	C
241585,500	4240320,313	601,437	C
241582,000	4240320,313	601,446	C
241568,000	4240320,313	601,481	C
241564,500	4240320,313	601,489	C
241550,500	4240320,313	601,524	C
241547,000	4240320,313	601,533	C
241533,000	4240320,313	601,568	C
241529,500	4240320,313	601,577	C
241515,500	4240320,313	601,612	C
241512,000	4240320,313	601,621	C
241498,000	4240320,313	601,656	C
241494,500	4240320,313	601,664	C
241480,500	4240320,313	601,699	C
241477,000	4240320,313	601,708	C
241463,000	4240320,313	601,743	C
241459,500	4240320,313	601,752	C
241445,500	4240320,313	601,787	C
241442,000	4240320,313	601,796	C
241428,000	4240320,313	601,831	C
241424,500	4240320,313	601,839	C
241410,500	4240320,313	601,874	C
241407,000	4240320,313	601,883	C
241393,000	4240320,313	601,918	C
241389,500	4240320,313	601,927	C
241375,500	4240320,313	601,962	C
241372,000	4240320,313	601,971	C
241358,000	4240320,313	602,006	C
241354,500	4240320,313	602,014	C

Coord. X	Coord. Y	Elevación	Código
241244,500	4239986,450	598,950	C
241248,000	4239986,450	598,942	C
241262,000	4239986,450	598,907	C
241265,500	4239986,450	598,898	C
241279,500	4239986,450	598,863	C
241283,000	4239986,450	598,854	C
241297,000	4239986,450	598,819	C
241300,500	4239986,450	598,810	C
241314,500	4239986,450	598,775	C
241318,000	4239986,450	598,767	C
241332,000	4239986,450	598,732	C
241335,500	4239986,450	598,723	C
241349,500	4239986,450	598,688	C
241353,000	4239986,450	598,679	C
241367,000	4239986,450	598,644	C
241370,500	4239986,450	598,636	C
241384,500	4239986,450	598,601	C
241388,000	4239986,450	598,592	C
241402,000	4239986,450	598,557	C
241405,500	4239986,450	598,548	C
241419,500	4239986,450	598,513	C
241423,000	4239986,450	598,504	C
241437,000	4239986,450	598,469	C
241440,500	4239986,450	598,461	C
241454,500	4239986,450	598,426	C
241458,000	4239986,450	598,417	C
241472,000	4239986,450	598,382	C
241475,500	4239986,450	598,373	C
241489,500	4239986,450	598,338	C
241493,000	4239986,450	598,329	C
241507,000	4239986,450	598,294	C
241510,500	4239986,450	598,286	C
241524,500	4239986,450	598,251	C
241528,000	4239986,450	598,242	C
241542,000	4239986,450	598,207	C
241545,500	4239986,450	598,198	C
241559,500	4239986,450	598,163	C
241563,000	4239986,450	598,154	C
241577,000	4239986,450	598,119	C
241580,500	4239986,450	598,111	C
241594,500	4239986,450	598,076	C
241598,000	4239986,450	598,067	C
241612,000	4239986,450	598,032	C
241615,500	4239986,450	598,023	C
241629,500	4239986,450	597,988	C
241633,000	4239986,450	597,979	C

Coord. X	Coord. Y	Elevación	Código
241340,500	4240320,313	602,049	C
241337,000	4240320,313	602,058	C
241323,000	4240320,313	602,093	C
241319,500	4240320,313	602,102	C
241305,500	4240320,313	602,137	C
241302,000	4240320,313	602,145	C
241288,000	4240320,313	602,180	C
241284,500	4240320,313	602,189	C
241270,500	4240320,313	602,224	C
241267,000	4240320,313	602,233	C
241253,000	4240320,313	602,268	C
241249,500	4240320,313	602,277	C
241235,500	4240320,313	602,312	C
241232,000	4240320,313	602,320	C
241218,000	4240320,313	602,355	C
241214,500	4240320,313	602,364	C
241200,500	4240320,313	602,399	C
241197,000	4240320,313	602,408	C
241183,000	4240320,313	602,443	C
241179,500	4240320,313	602,452	C
241165,500	4240320,313	602,487	C
241162,000	4240320,313	602,495	C
241148,000	4240320,313	602,530	C
241144,500	4240320,313	602,539	C
241130,500	4240320,313	602,574	C
241127,000	4240320,313	602,583	C
241113,000	4240320,313	602,618	C
241109,500	4240320,313	602,627	C
241095,500	4240320,313	602,662	C
241092,000	4240320,313	602,670	C
241078,000	4240320,313	602,705	C
241074,500	4240320,313	602,714	C
241060,500	4240320,313	602,749	C
241057,000	4240320,313	602,758	C
241043,000	4240320,313	602,793	C
241039,500	4240320,313	602,802	C
241025,500	4240320,313	602,837	C
241022,000	4240320,313	602,845	C
241008,000	4240320,313	602,880	C
241004,500	4240320,313	602,889	C
240990,500	4240320,313	602,924	C
240987,000	4240320,313	602,933	C
240973,000	4240320,313	602,968	C
240969,500	4240320,313	602,977	C
240955,500	4240320,313	603,012	C
240952,000	4240320,313	603,020	C
241647,000	4239986,450	597,944	C
241650,500	4239986,450	597,936	C
241664,500	4239986,450	597,901	C
241668,000	4239986,450	597,892	C
241682,000	4239986,450	597,857	C
241685,500	4239986,450	597,848	C
241699,500	4239986,450	597,813	C
241703,000	4239986,450	597,804	C
241717,000	4239986,450	597,769	C
241720,500	4239986,450	597,761	C
241734,500	4239986,450	597,726	C
241738,000	4239986,450	597,717	C
241752,000	4239986,450	597,682	C
241755,500	4239986,450	597,673	C
241769,500	4239986,450	597,638	C
241773,000	4239986,450	597,630	C
241773,000	4239983,300	597,598	C
241769,500	4239983,300	597,607	C
241755,500	4239983,300	597,642	C
241752,000	4239983,300	597,651	C
241738,000	4239983,300	597,685	C
241734,500	4239983,300	597,694	C
241720,500	4239983,300	597,729	C
241717,000	4239983,300	597,738	C
241703,000	4239983,300	597,773	C
241699,500	4239983,300	597,782	C
241685,500	4239983,300	597,817	C
241682,000	4239983,300	597,825	C
241668,000	4239983,300	597,860	C
241664,500	4239983,300	597,869	C
241650,500	4239983,300	597,904	C
241647,000	4239983,300	597,913	C
241633,000	4239983,300	597,948	C
241629,500	4239983,300	597,957	C
241615,500	4239983,300	597,992	C
241612,000	4239983,300	598,000	C
241598,000	4239983,300	598,035	C
241594,500	4239983,300	598,044	C
241580,500	4239983,300	598,079	C
241577,000	4239983,300	598,088	C
241563,000	4239983,300	598,123	C
241559,500	4239983,300	598,132	C
241545,500	4239983,300	598,167	C
241542,000	4239983,300	598,175	C
241528,000	4239983,300	598,210	C
241524,500	4239983,300	598,219	C

Coord. X	Coord. Y	Elevación	Código
240938,000	4240320,313	603,055	C
240934,500	4240320,313	603,064	C
240920,500	4240320,313	603,099	C
240917,000	4240320,313	603,108	C
240903,000	4240320,313	603,143	C
240899,500	4240320,313	603,152	C
240885,500	4240320,313	603,187	C
240882,000	4240320,313	603,195	C
240868,000	4240320,313	603,230	C
240864,500	4240320,313	603,239	C
240850,500	4240320,313	603,274	C
240847,000	4240320,313	603,283	C
240833,000	4240320,313	603,318	C
240829,500	4240320,313	603,327	C
240815,500	4240320,313	603,362	C
240812,000	4240320,313	603,370	C
240798,000	4240320,313	603,405	C
240794,500	4240320,313	603,414	C
240780,500	4240320,313	603,449	C
240777,000	4240320,313	603,458	C
240763,000	4240320,313	603,493	C
240759,500	4240320,313	603,502	C
240745,500	4240320,313	603,537	C
240742,000	4240320,313	603,545	C
240728,000	4240320,313	603,580	C
240724,500	4240320,313	603,589	C
240710,500	4240320,313	603,624	C
240707,000	4240320,313	603,633	C
240693,000	4240320,313	603,668	C
240689,500	4240320,313	603,677	C
240675,500	4240320,313	603,712	C
240672,000	4240320,313	603,720	C
240658,000	4240320,313	603,755	C
240654,500	4240320,313	603,764	C
240640,500	4240320,313	603,799	C
240637,000	4240320,313	603,808	C
240623,000	4240320,313	603,843	C
240619,500	4240320,313	603,852	C
240605,500	4240320,313	603,887	C
240602,000	4240320,313	603,895	C
240588,000	4240320,313	603,930	C
240584,500	4240320,313	603,939	C
240570,500	4240320,313	603,974	C
240567,000	4240320,313	603,983	C
240553,000	4240320,313	604,018	C
240549,500	4240320,313	604,027	C

Coord. X	Coord. Y	Elevación	Código
241510,500	4239983,300	598,254	C
241507,000	4239983,300	598,263	C
241493,000	4239983,300	598,298	C
241489,500	4239983,300	598,307	C
241475,500	4239983,300	598,342	C
241472,000	4239983,300	598,350	C
241458,000	4239983,300	598,385	C
241454,500	4239983,300	598,394	C
241440,500	4239983,300	598,429	C
241437,000	4239983,300	598,438	C
241423,000	4239983,300	598,473	C
241419,500	4239983,300	598,482	C
241405,500	4239983,300	598,517	C
241402,000	4239983,300	598,525	C
241388,000	4239983,300	598,560	C
241384,500	4239983,300	598,569	C
241370,500	4239983,300	598,604	C
241367,000	4239983,300	598,613	C
241353,000	4239983,300	598,648	C
241349,500	4239983,300	598,656	C
241335,500	4239983,300	598,691	C
241332,000	4239983,300	598,700	C
241318,000	4239983,300	598,735	C
241314,500	4239983,300	598,744	C
241300,500	4239983,300	598,779	C
241297,000	4239983,300	598,788	C
241283,000	4239983,300	598,823	C
241279,500	4239983,300	598,831	C
241265,500	4239983,300	598,866	C
241262,000	4239983,300	598,875	C
241248,000	4239983,300	598,910	C
241244,500	4239983,300	598,919	C
241230,500	4239983,300	598,954	C
241227,000	4239983,300	598,963	C
241227,000	4239974,246	598,872	C
241230,500	4239974,246	598,863	C
241244,500	4239974,246	598,828	C
241248,000	4239974,246	598,820	C
241262,000	4239974,246	598,785	C
241265,500	4239974,246	598,776	C
241279,500	4239974,246	598,741	C
241283,000	4239974,246	598,732	C
241297,000	4239974,246	598,697	C
241300,500	4239974,246	598,688	C
241314,500	4239974,246	598,653	C
241318,000	4239974,246	598,645	C

Coord. X	Coord. Y	Elevación	Código
240535,500	4240320,313	604,062	C
240532,000	4240320,313	604,070	C
240518,000	4240320,313	604,105	C
240514,500	4240320,313	604,114	C
240500,500	4240320,313	604,149	C
240497,000	4240320,313	604,158	C
240483,000	4240320,313	604,193	C
240479,500	4240320,313	604,202	C
240465,500	4240320,313	604,237	C
240462,000	4240320,313	604,245	C
240448,000	4240320,313	604,280	C
240444,500	4240320,313	604,289	C
240430,500	4240320,313	604,324	C
240427,000	4240320,313	604,333	C
240413,000	4240320,313	604,368	C
240409,500	4240320,313	604,377	C
240395,500	4240320,313	604,412	C
240392,000	4240320,313	604,420	C
240378,000	4240320,313	604,455	C
240374,500	4240320,313	604,464	C
240360,500	4240320,313	604,499	C
240357,000	4240320,313	604,508	C
240343,000	4240320,313	604,543	C
240339,500	4240320,313	604,552	C
240325,500	4240320,313	604,587	C
240322,000	4240320,313	604,595	C
240308,000	4240320,313	604,630	C
240304,500	4240320,313	604,639	C
240290,500	4240320,313	604,674	C
240287,000	4240320,313	604,683	C
240273,000	4240320,313	604,718	C
240269,500	4240320,313	604,727	C
240255,500	4240320,313	604,762	C
240252,000	4240320,313	604,770	C
240238,000	4240320,313	604,805	C
240234,500	4240320,313	604,814	C
240220,500	4240320,313	604,849	C
240217,000	4240320,313	604,858	C
240203,000	4240320,313	604,893	C
240199,500	4240320,313	604,902	C
240185,500	4240320,313	604,937	C
240182,000	4240320,313	604,945	C
240168,000	4240320,313	604,980	C
240164,500	4240320,313	604,989	C
240150,500	4240320,313	605,024	C
240147,000	4240320,313	605,033	C

Coord. X	Coord. Y	Elevación	Código
241332,000	4239974,246	598,610	C
241335,500	4239974,246	598,601	C
241349,500	4239974,246	598,566	C
241353,000	4239974,246	598,557	C
241367,000	4239974,246	598,522	C
241370,500	4239974,246	598,513	C
241384,500	4239974,246	598,478	C
241388,000	4239974,246	598,470	C
241402,000	4239974,246	598,435	C
241405,500	4239974,246	598,426	C
241419,500	4239974,246	598,391	C
241423,000	4239974,246	598,382	C
241437,000	4239974,246	598,347	C
241440,500	4239974,246	598,339	C
241454,500	4239974,246	598,304	C
241458,000	4239974,246	598,295	C
241472,000	4239974,246	598,260	C
241475,500	4239974,246	598,251	C
241489,500	4239974,246	598,216	C
241493,000	4239974,246	598,207	C
241507,000	4239974,246	598,172	C
241510,500	4239974,246	598,164	C
241524,500	4239974,246	598,129	C
241528,000	4239974,246	598,120	C
241542,000	4239974,246	598,085	C
241545,500	4239974,246	598,076	C
241559,500	4239974,246	598,041	C
241563,000	4239974,246	598,032	C
241577,000	4239974,246	597,997	C
241580,500	4239974,246	597,989	C
241594,500	4239974,246	597,954	C
241598,000	4239974,246	597,945	C
241612,000	4239974,246	597,910	C
241615,500	4239974,246	597,901	C
241629,500	4239974,246	597,866	C
241633,000	4239974,246	597,857	C
241647,000	4239974,246	597,822	C
241650,500	4239974,246	597,814	C
241664,500	4239974,246	597,779	C
241668,000	4239974,246	597,770	C
241682,000	4239974,246	597,735	C
241685,500	4239974,246	597,726	C
241699,500	4239974,246	597,691	C
241703,000	4239974,246	597,682	C
241717,000	4239974,246	597,647	C
241720,500	4239974,246	597,639	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240133,000	4240320,313	605,068	C	241734,500	4239974,246	597,604	C
240129,500	4240320,313	605,077	C	241738,000	4239974,246	597,595	C
240115,500	4240320,313	605,112	C	241752,000	4239974,246	597,560	C
240112,000	4240320,313	605,120	C	241755,500	4239974,246	597,551	C
240098,000	4240320,313	605,155	C	241769,500	4239974,246	597,516	C
240094,500	4240320,313	605,164	C	241773,000	4239974,246	597,507	C
240080,500	4240320,313	605,199	C	241773,000	4239970,246	597,467	C
240077,000	4240320,313	605,208	C	241769,500	4239970,246	597,476	C
240063,000	4240320,313	605,243	C	241755,500	4239970,246	597,511	C
240059,500	4240320,313	605,251	C	241752,000	4239970,246	597,520	C
240045,500	4240320,313	605,286	C	241738,000	4239970,246	597,555	C
240042,000	4240320,313	605,295	C	241734,500	4239970,246	597,564	C
240028,000	4240320,313	605,330	C	241720,500	4239970,246	597,599	C
240024,500	4240320,313	605,339	C	241717,000	4239970,246	597,607	C
240024,500	4240316,313	605,299	C	241703,000	4239970,246	597,642	C
240028,000	4240316,313	605,290	C	241699,500	4239970,246	597,651	C
240042,000	4240316,313	605,255	C	241685,500	4239970,246	597,686	C
240045,500	4240316,313	605,246	C	241682,000	4239970,246	597,695	C
240059,500	4240316,313	605,211	C	241668,000	4239970,246	597,730	C
240063,000	4240316,313	605,203	C	241664,500	4239970,246	597,739	C
240077,000	4240316,313	605,168	C	241650,500	4239970,246	597,774	C
240080,500	4240316,313	605,159	C	241647,000	4239970,246	597,782	C
240094,500	4240316,313	605,124	C	241633,000	4239970,246	597,817	C
240098,000	4240316,313	605,115	C	241629,500	4239970,246	597,826	C
240112,000	4240316,313	605,080	C	241615,500	4239970,246	597,861	C
240115,500	4240316,313	605,072	C	241612,000	4239970,246	597,870	C
240129,500	4240316,313	605,037	C	241598,000	4239970,246	597,905	C
240133,000	4240316,313	605,028	C	241594,500	4239970,246	597,914	C
240147,000	4240316,313	604,993	C	241580,500	4239970,246	597,949	C
240150,500	4240316,313	604,984	C	241577,000	4239970,246	597,957	C
240164,500	4240316,313	604,949	C	241563,000	4239970,246	597,992	C
240168,000	4240316,313	604,940	C	241559,500	4239970,246	598,001	C
240182,000	4240316,313	604,905	C	241545,500	4239970,246	598,036	C
240185,500	4240316,313	604,897	C	241542,000	4239970,246	598,045	C
240199,500	4240316,313	604,862	C	241528,000	4239970,246	598,080	C
240203,000	4240316,313	604,853	C	241524,500	4239970,246	598,089	C
240217,000	4240316,313	604,818	C	241510,500	4239970,246	598,124	C
240220,500	4240316,313	604,809	C	241507,000	4239970,246	598,132	C
240234,500	4240316,313	604,774	C	241493,000	4239970,246	598,167	C
240238,000	4240316,313	604,765	C	241489,500	4239970,246	598,176	C
240252,000	4240316,313	604,730	C	241475,500	4239970,246	598,211	C
240255,500	4240316,313	604,722	C	241472,000	4239970,246	598,220	C
240269,500	4240316,313	604,687	C	241458,000	4239970,246	598,255	C
240273,000	4240316,313	604,678	C	241454,500	4239970,246	598,264	C
240287,000	4240316,313	604,643	C	241440,500	4239970,246	598,299	C
240290,500	4240316,313	604,634	C	241437,000	4239970,246	598,307	C

Coord. X	Coord. Y	Elevación	Código
240304,500	4240316,313	604,599	C
240308,000	4240316,313	604,590	C
240322,000	4240316,313	604,555	C
240325,500	4240316,313	604,547	C
240339,500	4240316,313	604,512	C
240343,000	4240316,313	604,503	C
240357,000	4240316,313	604,468	C
240360,500	4240316,313	604,459	C
240374,500	4240316,313	604,424	C
240378,000	4240316,313	604,415	C
240392,000	4240316,313	604,380	C
240395,500	4240316,313	604,372	C
240409,500	4240316,313	604,337	C
240413,000	4240316,313	604,328	C
240427,000	4240316,313	604,293	C
240430,500	4240316,313	604,284	C
240444,500	4240316,313	604,249	C
240448,000	4240316,313	604,240	C
240462,000	4240316,313	604,205	C
240465,500	4240316,313	604,197	C
240479,500	4240316,313	604,162	C
240483,000	4240316,313	604,153	C
240497,000	4240316,313	604,118	C
240500,500	4240316,313	604,109	C
240514,500	4240316,313	604,074	C
240518,000	4240316,313	604,065	C
240532,000	4240316,313	604,030	C
240535,500	4240316,313	604,022	C
240549,500	4240316,313	603,987	C
240553,000	4240316,313	603,978	C
240567,000	4240316,313	603,943	C
240570,500	4240316,313	603,934	C
240584,500	4240316,313	603,899	C
240588,000	4240316,313	603,890	C
240602,000	4240316,313	603,855	C
240605,500	4240316,313	603,847	C
240619,500	4240316,313	603,812	C
240623,000	4240316,313	603,803	C
240637,000	4240316,313	603,768	C
240640,500	4240316,313	603,759	C
240654,500	4240316,313	603,724	C
240658,000	4240316,313	603,715	C
240672,000	4240316,313	603,680	C
240675,500	4240316,313	603,672	C
240689,500	4240316,313	603,637	C
240693,000	4240316,313	603,628	C

Coord. X	Coord. Y	Elevación	Código
241423,000	4239970,246	598,342	C
241419,500	4239970,246	598,351	C
241405,500	4239970,246	598,386	C
241402,000	4239970,246	598,395	C
241388,000	4239970,246	598,430	C
241384,500	4239970,246	598,438	C
241370,500	4239970,246	598,473	C
241367,000	4239970,246	598,482	C
241353,000	4239970,246	598,517	C
241349,500	4239970,246	598,526	C
241335,500	4239970,246	598,561	C
241332,000	4239970,246	598,570	C
241318,000	4239970,246	598,605	C
241314,500	4239970,246	598,613	C
241300,500	4239970,246	598,648	C
241297,000	4239970,246	598,657	C
241283,000	4239970,246	598,692	C
241279,500	4239970,246	598,701	C
241265,500	4239970,246	598,736	C
241262,000	4239970,246	598,745	C
241248,000	4239970,246	598,780	C
241244,500	4239970,246	598,788	C
241230,500	4239970,246	598,823	C
241227,000	4239970,246	598,832	C
241227,000	4239962,193	598,752	C
241230,500	4239962,193	598,743	C
241244,500	4239962,193	598,708	C
241248,000	4239962,193	598,699	C
241262,000	4239962,193	598,664	C
241265,500	4239962,193	598,655	C
241279,500	4239962,193	598,620	C
241283,000	4239962,193	598,612	C
241297,000	4239962,193	598,577	C
241300,500	4239962,193	598,568	C
241314,500	4239962,193	598,533	C
241318,000	4239962,193	598,524	C
241332,000	4239962,193	598,489	C
241335,500	4239962,193	598,480	C
241349,500	4239962,193	598,445	C
241353,000	4239962,193	598,437	C
241367,000	4239962,193	598,402	C
241370,500	4239962,193	598,393	C
241384,500	4239962,193	598,358	C
241388,000	4239962,193	598,349	C
241402,000	4239962,193	598,314	C
241405,500	4239962,193	598,305	C

Coord. X	Coord. Y	Elevación	Código
240707,000	4240316,313	603,593	C
240710,500	4240316,313	603,584	C
240724,500	4240316,313	603,549	C
240728,000	4240316,313	603,540	C
240742,000	4240316,313	603,505	C
240745,500	4240316,313	603,497	C
240759,500	4240316,313	603,462	C
240763,000	4240316,313	603,453	C
240777,000	4240316,313	603,418	C
240780,500	4240316,313	603,409	C
240794,500	4240316,313	603,374	C
240798,000	4240316,313	603,365	C
240812,000	4240316,313	603,330	C
240815,500	4240316,313	603,322	C
240829,500	4240316,313	603,287	C
240833,000	4240316,313	603,278	C
240847,000	4240316,313	603,243	C
240850,500	4240316,313	603,234	C
240864,500	4240316,313	603,199	C
240868,000	4240316,313	603,190	C
240882,000	4240316,313	603,155	C
240885,500	4240316,313	603,147	C
240899,500	4240316,313	603,112	C
240903,000	4240316,313	603,103	C
240917,000	4240316,313	603,068	C
240920,500	4240316,313	603,059	C
240934,500	4240316,313	603,024	C
240938,000	4240316,313	603,015	C
240952,000	4240316,313	602,980	C
240955,500	4240316,313	602,972	C
240969,500	4240316,313	602,937	C
240973,000	4240316,313	602,928	C
240987,000	4240316,313	602,893	C
240990,500	4240316,313	602,884	C
241004,500	4240316,313	602,849	C
241008,000	4240316,313	602,840	C
241022,000	4240316,313	602,805	C
241025,500	4240316,313	602,797	C
241039,500	4240316,313	602,762	C
241043,000	4240316,313	602,753	C
241057,000	4240316,313	602,718	C
241060,500	4240316,313	602,709	C
241074,500	4240316,313	602,674	C
241078,000	4240316,313	602,665	C
241092,000	4240316,313	602,630	C
241095,500	4240316,313	602,622	C
241419,500	4239962,193	598,270	C
241423,000	4239962,193	598,262	C
241437,000	4239962,193	598,227	C
241440,500	4239962,193	598,218	C
241454,500	4239962,193	598,183	C
241458,000	4239962,193	598,174	C
241472,000	4239962,193	598,139	C
241475,500	4239962,193	598,130	C
241489,500	4239962,193	598,095	C
241493,000	4239962,193	598,087	C
241507,000	4239962,193	598,052	C
241510,500	4239962,193	598,043	C
241524,500	4239962,193	598,008	C
241528,000	4239962,193	597,999	C
241542,000	4239962,193	597,964	C
241545,500	4239962,193	597,956	C
241559,500	4239962,193	597,921	C
241563,000	4239962,193	597,912	C
241577,000	4239962,193	597,877	C
241580,500	4239962,193	597,868	C
241594,500	4239962,193	597,833	C
241598,000	4239962,193	597,824	C
241612,000	4239962,193	597,789	C
241615,500	4239962,193	597,781	C
241629,500	4239962,193	597,746	C
241633,000	4239962,193	597,737	C
241647,000	4239962,193	597,702	C
241650,500	4239962,193	597,693	C
241664,500	4239962,193	597,658	C
241668,000	4239962,193	597,649	C
241682,000	4239962,193	597,614	C
241685,500	4239962,193	597,606	C
241699,500	4239962,193	597,571	C
241703,000	4239962,193	597,562	C
241717,000	4239962,193	597,527	C
241720,500	4239962,193	597,518	C
241734,500	4239962,193	597,483	C
241738,000	4239962,193	597,474	C
241752,000	4239962,193	597,439	C
241755,500	4239962,193	597,431	C
241769,500	4239962,193	597,396	C
241773,000	4239962,193	597,387	C
241773,000	4239958,193	597,347	C
241769,500	4239958,193	597,356	C
241755,500	4239958,193	597,391	C
241752,000	4239958,193	597,399	C

Coord. X	Coord. Y	Elevación	Código
241109,500	4240316,313	602,587	C
241113,000	4240316,313	602,578	C
241127,000	4240316,313	602,543	C
241130,500	4240316,313	602,534	C
241144,500	4240316,313	602,499	C
241148,000	4240316,313	602,490	C
241162,000	4240316,313	602,455	C
241165,500	4240316,313	602,447	C
241179,500	4240316,313	602,412	C
241183,000	4240316,313	602,403	C
241197,000	4240316,313	602,368	C
241200,500	4240316,313	602,359	C
241214,500	4240316,313	602,324	C
241218,000	4240316,313	602,315	C
241232,000	4240316,313	602,280	C
241235,500	4240316,313	602,272	C
241249,500	4240316,313	602,237	C
241253,000	4240316,313	602,228	C
241267,000	4240316,313	602,193	C
241270,500	4240316,313	602,184	C
241284,500	4240316,313	602,149	C
241288,000	4240316,313	602,140	C
241302,000	4240316,313	602,105	C
241305,500	4240316,313	602,097	C
241319,500	4240316,313	602,062	C
241323,000	4240316,313	602,053	C
241337,000	4240316,313	602,018	C
241340,500	4240316,313	602,009	C
241354,500	4240316,313	601,974	C
241358,000	4240316,313	601,966	C
241372,000	4240316,313	601,931	C
241375,500	4240316,313	601,922	C
241389,500	4240316,313	601,887	C
241393,000	4240316,313	601,878	C
241407,000	4240316,313	601,843	C
241410,500	4240316,313	601,834	C
241424,500	4240316,313	601,799	C
241428,000	4240316,313	601,791	C
241442,000	4240316,313	601,756	C
241445,500	4240316,313	601,747	C
241459,500	4240316,313	601,712	C
241463,000	4240316,313	601,703	C
241477,000	4240316,313	601,668	C
241480,500	4240316,313	601,659	C
241494,500	4240316,313	601,624	C
241498,000	4240316,313	601,616	C

Coord. X	Coord. Y	Elevación	Código
241738,000	4239958,193	597,434	C
241734,500	4239958,193	597,443	C
241720,500	4239958,193	597,478	C
241717,000	4239958,193	597,487	C
241703,000	4239958,193	597,522	C
241699,500	4239958,193	597,531	C
241685,500	4239958,193	597,566	C
241682,000	4239958,193	597,574	C
241668,000	4239958,193	597,609	C
241664,500	4239958,193	597,618	C
241650,500	4239958,193	597,653	C
241647,000	4239958,193	597,662	C
241633,000	4239958,193	597,697	C
241629,500	4239958,193	597,706	C
241615,500	4239958,193	597,741	C
241612,000	4239958,193	597,749	C
241598,000	4239958,193	597,784	C
241594,500	4239958,193	597,793	C
241580,500	4239958,193	597,828	C
241577,000	4239958,193	597,837	C
241563,000	4239958,193	597,872	C
241559,500	4239958,193	597,881	C
241545,500	4239958,193	597,916	C
241542,000	4239958,193	597,924	C
241528,000	4239958,193	597,959	C
241524,500	4239958,193	597,968	C
241510,500	4239958,193	598,003	C
241507,000	4239958,193	598,012	C
241493,000	4239958,193	598,047	C
241489,500	4239958,193	598,055	C
241475,500	4239958,193	598,090	C
241472,000	4239958,193	598,099	C
241458,000	4239958,193	598,134	C
241454,500	4239958,193	598,143	C
241440,500	4239958,193	598,178	C
241437,000	4239958,193	598,187	C
241423,000	4239958,193	598,222	C
241419,500	4239958,193	598,230	C
241405,500	4239958,193	598,265	C
241402,000	4239958,193	598,274	C
241388,000	4239958,193	598,309	C
241384,500	4239958,193	598,318	C
241370,500	4239958,193	598,353	C
241367,000	4239958,193	598,362	C
241353,000	4239958,193	598,397	C
241349,500	4239958,193	598,405	C

Coord. X	Coord. Y	Elevación	Código
241512,000	4240316,313	601,581	C
241515,500	4240316,313	601,572	C
241529,500	4240316,313	601,537	C
241533,000	4240316,313	601,528	C
241547,000	4240316,313	601,493	C
241550,500	4240316,313	601,484	C
241564,500	4240316,313	601,449	C
241568,000	4240316,313	601,441	C
241582,000	4240316,313	601,406	C
241585,500	4240316,313	601,397	C
241599,500	4240316,313	601,362	C
241603,000	4240316,313	601,353	C
241617,000	4240316,313	601,318	C
241620,500	4240316,313	601,309	C
241634,500	4240316,313	601,274	C
241638,000	4240316,313	601,266	C
241652,000	4240316,313	601,231	C
241655,500	4240316,313	601,222	C
241669,500	4240316,313	601,187	C
241673,000	4240316,313	601,178	C
241687,000	4240316,313	601,143	C
241690,500	4240316,313	601,134	C
241704,500	4240316,313	601,099	C
241708,000	4240316,313	601,091	C
241722,000	4240316,313	601,056	C
241725,500	4240316,313	601,047	C
241739,500	4240316,313	601,012	C
241743,000	4240316,313	601,003	C
241757,000	4240316,313	600,968	C
241760,500	4240316,313	600,959	C
241760,500	4240308,259	600,879	C
241757,000	4240308,259	600,888	C
241743,000	4240308,259	600,923	C
241739,500	4240308,259	600,931	C
241725,500	4240308,259	600,966	C
241722,000	4240308,259	600,975	C
241708,000	4240308,259	601,010	C
241704,500	4240308,259	601,019	C
241690,500	4240308,259	601,054	C
241687,000	4240308,259	601,063	C
241673,000	4240308,259	601,098	C
241669,500	4240308,259	601,106	C
241655,500	4240308,259	601,141	C
241652,000	4240308,259	601,150	C
241638,000	4240308,259	601,185	C
241634,500	4240308,259	601,194	C

Coord. X	Coord. Y	Elevación	Código
241335,500	4239958,193	598,440	C
241332,000	4239958,193	598,449	C
241318,000	4239958,193	598,484	C
241314,500	4239958,193	598,493	C
241300,500	4239958,193	598,528	C
241297,000	4239958,193	598,537	C
241283,000	4239958,193	598,572	C
241279,500	4239958,193	598,580	C
241265,500	4239958,193	598,615	C
241262,000	4239958,193	598,624	C
241248,000	4239958,193	598,659	C
241244,500	4239958,193	598,668	C
241230,500	4239958,193	598,703	C
241227,000	4239958,193	598,712	C
241227,000	4239950,139	598,631	C
241230,500	4239950,139	598,622	C
241244,500	4239950,139	598,587	C
241248,000	4239950,139	598,579	C
241262,000	4239950,139	598,544	C
241265,500	4239950,139	598,535	C
241279,500	4239950,139	598,500	C
241283,000	4239950,139	598,491	C
241297,000	4239950,139	598,456	C
241300,500	4239950,139	598,447	C
241314,500	4239950,139	598,412	C
241318,000	4239950,139	598,404	C
241332,000	4239950,139	598,369	C
241335,500	4239950,139	598,360	C
241349,500	4239950,139	598,325	C
241353,000	4239950,139	598,316	C
241367,000	4239950,139	598,281	C
241370,500	4239950,139	598,272	C
241384,500	4239950,139	598,237	C
241388,000	4239950,139	598,229	C
241402,000	4239950,139	598,194	C
241405,500	4239950,139	598,185	C
241419,500	4239950,139	598,150	C
241423,000	4239950,139	598,141	C
241437,000	4239950,139	598,106	C
241440,500	4239950,139	598,097	C
241454,500	4239950,139	598,062	C
241458,000	4239950,139	598,054	C
241472,000	4239950,139	598,019	C
241475,500	4239950,139	598,010	C
241489,500	4239950,139	597,975	C
241493,000	4239950,139	597,966	C

Coord. X	Coord. Y	Elevación	Código
241620,500	4240308,259	601,229	C
241617,000	4240308,259	601,238	C
241603,000	4240308,259	601,273	C
241599,500	4240308,259	601,281	C
241585,500	4240308,259	601,316	C
241582,000	4240308,259	601,325	C
241568,000	4240308,259	601,360	C
241564,500	4240308,259	601,369	C
241550,500	4240308,259	601,404	C
241547,000	4240308,259	601,413	C
241533,000	4240308,259	601,448	C
241529,500	4240308,259	601,456	C
241515,500	4240308,259	601,491	C
241512,000	4240308,259	601,500	C
241498,000	4240308,259	601,535	C
241494,500	4240308,259	601,544	C
241480,500	4240308,259	601,579	C
241477,000	4240308,259	601,588	C
241463,000	4240308,259	601,623	C
241459,500	4240308,259	601,631	C
241445,500	4240308,259	601,666	C
241442,000	4240308,259	601,675	C
241428,000	4240308,259	601,710	C
241424,500	4240308,259	601,719	C
241410,500	4240308,259	601,754	C
241407,000	4240308,259	601,762	C
241393,000	4240308,259	601,797	C
241389,500	4240308,259	601,806	C
241375,500	4240308,259	601,841	C
241372,000	4240308,259	601,850	C
241358,000	4240308,259	601,885	C
241354,500	4240308,259	601,894	C
241340,500	4240308,259	601,929	C
241337,000	4240308,259	601,937	C
241323,000	4240308,259	601,972	C
241319,500	4240308,259	601,981	C
241305,500	4240308,259	602,016	C
241302,000	4240308,259	602,025	C
241288,000	4240308,259	602,060	C
241284,500	4240308,259	602,069	C
241270,500	4240308,259	602,104	C
241267,000	4240308,259	602,112	C
241253,000	4240308,259	602,147	C
241249,500	4240308,259	602,156	C
241235,500	4240308,259	602,191	C
241232,000	4240308,259	602,200	C

Coord. X	Coord. Y	Elevación	Código
241507,000	4239950,139	597,931	C
241510,500	4239950,139	597,922	C
241524,500	4239950,139	597,887	C
241528,000	4239950,139	597,879	C
241542,000	4239950,139	597,844	C
241545,500	4239950,139	597,835	C
241559,500	4239950,139	597,800	C
241563,000	4239950,139	597,791	C
241577,000	4239950,139	597,756	C
241580,500	4239950,139	597,748	C
241594,500	4239950,139	597,713	C
241598,000	4239950,139	597,704	C
241612,000	4239950,139	597,669	C
241615,500	4239950,139	597,660	C
241629,500	4239950,139	597,625	C
241633,000	4239950,139	597,616	C
241647,000	4239950,139	597,581	C
241650,500	4239950,139	597,573	C
241664,500	4239950,139	597,538	C
241668,000	4239950,139	597,529	C
241682,000	4239950,139	597,494	C
241685,500	4239950,139	597,485	C
241699,500	4239950,139	597,450	C
241703,000	4239950,139	597,441	C
241717,000	4239950,139	597,406	C
241720,500	4239950,139	597,398	C
241734,500	4239950,139	597,363	C
241738,000	4239950,139	597,354	C
241752,000	4239950,139	597,319	C
241755,500	4239950,139	597,310	C
241769,500	4239950,139	597,275	C
241773,000	4239950,139	597,266	C
241773,000	4239946,139	597,226	C
241769,500	4239946,139	597,235	C
241755,500	4239946,139	597,270	C
241752,000	4239946,139	597,279	C
241738,000	4239946,139	597,314	C
241734,500	4239946,139	597,323	C
241720,500	4239946,139	597,358	C
241717,000	4239946,139	597,366	C
241703,000	4239946,139	597,401	C
241699,500	4239946,139	597,410	C
241685,500	4239946,139	597,445	C
241682,000	4239946,139	597,454	C
241668,000	4239946,139	597,489	C
241664,500	4239946,139	597,498	C

Coord. X	Coord. Y	Elevación	Código
241218,000	4240308,259	602,235	C
241214,500	4240308,259	602,244	C
241200,500	4240308,259	602,279	C
241197,000	4240308,259	602,287	C
241183,000	4240308,259	602,322	C
241179,500	4240308,259	602,331	C
241165,500	4240308,259	602,366	C
241162,000	4240308,259	602,375	C
241148,000	4240308,259	602,410	C
241144,500	4240308,259	602,419	C
241130,500	4240308,259	602,454	C
241127,000	4240308,259	602,462	C
241113,000	4240308,259	602,497	C
241109,500	4240308,259	602,506	C
241095,500	4240308,259	602,541	C
241092,000	4240308,259	602,550	C
241078,000	4240308,259	602,585	C
241074,500	4240308,259	602,594	C
241060,500	4240308,259	602,629	C
241057,000	4240308,259	602,637	C
241043,000	4240308,259	602,672	C
241039,500	4240308,259	602,681	C
241025,500	4240308,259	602,716	C
241022,000	4240308,259	602,725	C
241008,000	4240308,259	602,760	C
241004,500	4240308,259	602,769	C
240990,500	4240308,259	602,804	C
240987,000	4240308,259	602,812	C
240973,000	4240308,259	602,847	C
240969,500	4240308,259	602,856	C
240955,500	4240308,259	602,891	C
240952,000	4240308,259	602,900	C
240938,000	4240308,259	602,935	C
240934,500	4240308,259	602,944	C
240920,500	4240308,259	602,979	C
240917,000	4240308,259	602,987	C
240903,000	4240308,259	603,022	C
240899,500	4240308,259	603,031	C
240885,500	4240308,259	603,066	C
240882,000	4240308,259	603,075	C
240868,000	4240308,259	603,110	C
240864,500	4240308,259	603,119	C
240850,500	4240308,259	603,154	C
240847,000	4240308,259	603,162	C
240833,000	4240308,259	603,197	C
240829,500	4240308,259	603,206	C

Coord. X	Coord. Y	Elevación	Código
241650,500	4239946,139	597,533	C
241647,000	4239946,139	597,541	C
241633,000	4239946,139	597,576	C
241629,500	4239946,139	597,585	C
241615,500	4239946,139	597,620	C
241612,000	4239946,139	597,629	C
241598,000	4239946,139	597,664	C
241594,500	4239946,139	597,673	C
241580,500	4239946,139	597,708	C
241577,000	4239946,139	597,716	C
241563,000	4239946,139	597,751	C
241559,500	4239946,139	597,760	C
241545,500	4239946,139	597,795	C
241542,000	4239946,139	597,804	C
241528,000	4239946,139	597,839	C
241524,500	4239946,139	597,847	C
241510,500	4239946,139	597,882	C
241507,000	4239946,139	597,891	C
241493,000	4239946,139	597,926	C
241489,500	4239946,139	597,935	C
241475,500	4239946,139	597,970	C
241472,000	4239946,139	597,979	C
241458,000	4239946,139	598,014	C
241454,500	4239946,139	598,022	C
241440,500	4239946,139	598,057	C
241437,000	4239946,139	598,066	C
241423,000	4239946,139	598,101	C
241419,500	4239946,139	598,110	C
241405,500	4239946,139	598,145	C
241402,000	4239946,139	598,154	C
241388,000	4239946,139	598,189	C
241384,500	4239946,139	598,197	C
241370,500	4239946,139	598,232	C
241367,000	4239946,139	598,241	C
241353,000	4239946,139	598,276	C
241349,500	4239946,139	598,285	C
241335,500	4239946,139	598,320	C
241332,000	4239946,139	598,329	C
241318,000	4239946,139	598,364	C
241314,500	4239946,139	598,372	C
241300,500	4239946,139	598,407	C
241297,000	4239946,139	598,416	C
241283,000	4239946,139	598,451	C
241279,500	4239946,139	598,460	C
241265,500	4239946,139	598,495	C
241262,000	4239946,139	598,504	C

Coord. X	Coord. Y	Elevación	Código
240815,500	4240308,259	603,241	C
240812,000	4240308,259	603,250	C
240798,000	4240308,259	603,285	C
240794,500	4240308,259	603,294	C
240780,500	4240308,259	603,329	C
240777,000	4240308,259	603,337	C
240763,000	4240308,259	603,372	C
240759,500	4240308,259	603,381	C
240745,500	4240308,259	603,416	C
240742,000	4240308,259	603,425	C
240728,000	4240308,259	603,460	C
240724,500	4240308,259	603,469	C
240710,500	4240308,259	603,504	C
240707,000	4240308,259	603,512	C
240693,000	4240308,259	603,547	C
240689,500	4240308,259	603,556	C
240675,500	4240308,259	603,591	C
240672,000	4240308,259	603,600	C
240658,000	4240308,259	603,635	C
240654,500	4240308,259	603,644	C
240640,500	4240308,259	603,679	C
240637,000	4240308,259	603,687	C
240623,000	4240308,259	603,722	C
240619,500	4240308,259	603,731	C
240605,500	4240308,259	603,766	C
240602,000	4240308,259	603,775	C
240588,000	4240308,259	603,810	C
240584,500	4240308,259	603,819	C
240570,500	4240308,259	603,854	C
240567,000	4240308,259	603,862	C
240553,000	4240308,259	603,897	C
240549,500	4240308,259	603,906	C
240535,500	4240308,259	603,941	C
240532,000	4240308,259	603,950	C
240518,000	4240308,259	603,985	C
240514,500	4240308,259	603,994	C
240500,500	4240308,259	604,029	C
240497,000	4240308,259	604,037	C
240483,000	4240308,259	604,072	C
240479,500	4240308,259	604,081	C
240465,500	4240308,259	604,116	C
240462,000	4240308,259	604,125	C
240448,000	4240308,259	604,160	C
240444,500	4240308,259	604,168	C
240430,500	4240308,259	604,204	C
240427,000	4240308,259	604,212	C

Coord. X	Coord. Y	Elevación	Código
241248,000	4239946,139	598,539	C
241244,500	4239946,139	598,547	C
241230,500	4239946,139	598,582	C
241227,000	4239946,139	598,591	C
241227,000	4239937,085	598,500	C
241230,500	4239937,085	598,492	C
241244,500	4239937,085	598,457	C
241248,000	4239937,085	598,448	C
241262,000	4239937,085	598,413	C
241265,500	4239937,085	598,404	C
241279,500	4239937,085	598,369	C
241283,000	4239937,085	598,361	C
241297,000	4239937,085	598,326	C
241300,500	4239937,085	598,317	C
241314,500	4239937,085	598,282	C
241318,000	4239937,085	598,273	C
241332,000	4239937,085	598,238	C
241335,500	4239937,085	598,229	C
241349,500	4239937,085	598,194	C
241353,000	4239937,085	598,186	C
241367,000	4239937,085	598,151	C
241370,500	4239937,085	598,142	C
241384,500	4239937,085	598,107	C
241388,000	4239937,085	598,098	C
241402,000	4239937,085	598,063	C
241405,500	4239937,085	598,054	C
241419,500	4239937,085	598,019	C
241423,000	4239937,085	598,011	C
241437,000	4239937,085	597,976	C
241440,500	4239937,085	597,967	C
241454,500	4239937,085	597,932	C
241458,000	4239937,085	597,923	C
241472,000	4239937,085	597,888	C
241475,500	4239937,085	597,879	C
241489,500	4239937,085	597,844	C
241493,000	4239937,085	597,836	C
241507,000	4239937,085	597,801	C
241510,500	4239937,085	597,792	C
241524,500	4239937,085	597,757	C
241528,000	4239937,085	597,748	C
241542,000	4239937,085	597,713	C
241545,500	4239937,085	597,704	C
241559,500	4239937,085	597,669	C
241563,000	4239937,085	597,661	C
241577,000	4239937,085	597,626	C
241580,500	4239937,085	597,617	C

Coord. X	Coord. Y	Elevación	Código
240413,000	4240308,259	604,247	C
240409,500	4240308,259	604,256	C
240395,500	4240308,259	604,291	C
240392,000	4240308,259	604,300	C
240378,000	4240308,259	604,335	C
240374,500	4240308,259	604,344	C
240360,500	4240308,259	604,379	C
240357,000	4240308,259	604,387	C
240343,000	4240308,259	604,422	C
240339,500	4240308,259	604,431	C
240325,500	4240308,259	604,466	C
240322,000	4240308,259	604,475	C
240308,000	4240308,259	604,510	C
240304,500	4240308,259	604,519	C
240290,500	4240308,259	604,554	C
240287,000	4240308,259	604,562	C
240273,000	4240308,259	604,597	C
240269,500	4240308,259	604,606	C
240255,500	4240308,259	604,641	C
240252,000	4240308,259	604,650	C
240238,000	4240308,259	604,685	C
240234,500	4240308,259	604,694	C
240220,500	4240308,259	604,729	C
240217,000	4240308,259	604,737	C
240203,000	4240308,259	604,772	C
240199,500	4240308,259	604,781	C
240185,500	4240308,259	604,816	C
240182,000	4240308,259	604,825	C
240168,000	4240308,259	604,860	C
240164,500	4240308,259	604,868	C
240150,500	4240308,259	604,903	C
240147,000	4240308,259	604,912	C
240133,000	4240308,259	604,947	C
240129,500	4240308,259	604,956	C
240115,500	4240308,259	604,991	C
240112,000	4240308,259	605,000	C
240098,000	4240308,259	605,035	C
240094,500	4240308,259	605,043	C
240080,500	4240308,259	605,078	C
240077,000	4240308,259	605,087	C
240063,000	4240308,259	605,122	C
240059,500	4240308,259	605,131	C
240045,500	4240308,259	605,166	C
240042,000	4240308,259	605,175	C
240028,000	4240308,259	605,210	C
240024,500	4240308,259	605,218	C

Coord. X	Coord. Y	Elevación	Código
241594,500	4239937,085	597,582	C
241598,000	4239937,085	597,573	C
241612,000	4239937,085	597,538	C
241615,500	4239937,085	597,529	C
241629,500	4239937,085	597,495	C
241633,000	4239937,085	597,486	C
241647,000	4239937,085	597,451	C
241650,500	4239937,085	597,442	C
241664,500	4239937,085	597,407	C
241668,000	4239937,085	597,398	C
241682,000	4239937,085	597,363	C
241685,500	4239937,085	597,355	C
241699,500	4239937,085	597,320	C
241703,000	4239937,085	597,311	C
241717,000	4239937,085	597,276	C
241720,500	4239937,085	597,267	C
241734,500	4239937,085	597,232	C
241738,000	4239937,085	597,223	C
241752,000	4239937,085	597,188	C
241755,500	4239937,085	597,180	C
241769,500	4239937,085	597,145	C
241773,000	4239937,085	597,136	C
241773,000	4239933,935	597,104	C
241769,500	4239933,935	597,113	C
241755,500	4239933,935	597,148	C
241752,000	4239933,935	597,157	C
241738,000	4239933,935	597,192	C
241734,500	4239933,935	597,201	C
241720,500	4239933,935	597,236	C
241717,000	4239933,935	597,244	C
241703,000	4239933,935	597,279	C
241699,500	4239933,935	597,288	C
241685,500	4239933,935	597,323	C
241682,000	4239933,935	597,332	C
241668,000	4239933,935	597,367	C
241664,500	4239933,935	597,376	C
241650,500	4239933,935	597,411	C
241647,000	4239933,935	597,419	C
241633,000	4239933,935	597,454	C
241629,500	4239933,935	597,463	C
241615,500	4239933,935	597,498	C
241612,000	4239933,935	597,507	C
241598,000	4239933,935	597,542	C
241594,500	4239933,935	597,550	C
241580,500	4239933,935	597,585	C
241577,000	4239933,935	597,594	C

Coord. X	Coord. Y	Elevación	Código
240024,500	4240304,259	605,178	C
240028,000	4240304,259	605,170	C
240042,000	4240304,259	605,135	C
240045,500	4240304,259	605,126	C
240059,500	4240304,259	605,091	C
240063,000	4240304,259	605,082	C
240077,000	4240304,259	605,047	C
240080,500	4240304,259	605,038	C
240094,500	4240304,259	605,003	C
240098,000	4240304,259	604,995	C
240112,000	4240304,259	604,960	C
240115,500	4240304,259	604,951	C
240129,500	4240304,259	604,916	C
240133,000	4240304,259	604,907	C
240147,000	4240304,259	604,872	C
240150,500	4240304,259	604,863	C
240164,500	4240304,259	604,828	C
240168,000	4240304,259	604,820	C
240182,000	4240304,259	604,785	C
240185,500	4240304,259	604,776	C
240199,500	4240304,259	604,741	C
240203,000	4240304,259	604,732	C
240217,000	4240304,259	604,697	C
240220,500	4240304,259	604,689	C
240234,500	4240304,259	604,654	C
240238,000	4240304,259	604,645	C
240252,000	4240304,259	604,610	C
240255,500	4240304,259	604,601	C
240269,500	4240304,259	604,566	C
240273,000	4240304,259	604,557	C
240287,000	4240304,259	604,522	C
240290,500	4240304,259	604,514	C
240304,500	4240304,259	604,479	C
240308,000	4240304,259	604,470	C
240322,000	4240304,259	604,435	C
240325,500	4240304,259	604,426	C
240339,500	4240304,259	604,391	C
240343,000	4240304,259	604,382	C
240357,000	4240304,259	604,347	C
240360,500	4240304,259	604,339	C
240374,500	4240304,259	604,304	C
240378,000	4240304,259	604,295	C
240392,000	4240304,259	604,260	C
240395,500	4240304,259	604,251	C
240409,500	4240304,259	604,216	C
240413,000	4240304,259	604,207	C

Coord. X	Coord. Y	Elevación	Código
241563,000	4239933,935	597,629	C
241559,500	4239933,935	597,638	C
241545,500	4239933,935	597,673	C
241542,000	4239933,935	597,682	C
241528,000	4239933,935	597,717	C
241524,500	4239933,935	597,725	C
241510,500	4239933,935	597,760	C
241507,000	4239933,935	597,769	C
241493,000	4239933,935	597,804	C
241489,500	4239933,935	597,813	C
241475,500	4239933,935	597,848	C
241472,000	4239933,935	597,857	C
241458,000	4239933,935	597,892	C
241454,500	4239933,935	597,900	C
241440,500	4239933,935	597,935	C
241437,000	4239933,935	597,944	C
241423,000	4239933,935	597,979	C
241419,500	4239933,935	597,988	C
241405,500	4239933,935	598,023	C
241402,000	4239933,935	598,032	C
241388,000	4239933,935	598,067	C
241384,500	4239933,935	598,075	C
241370,500	4239933,935	598,110	C
241367,000	4239933,935	598,119	C
241353,000	4239933,935	598,154	C
241349,500	4239933,935	598,163	C
241335,500	4239933,935	598,198	C
241332,000	4239933,935	598,207	C
241318,000	4239933,935	598,242	C
241314,500	4239933,935	598,250	C
241300,500	4239933,935	598,285	C
241297,000	4239933,935	598,294	C
241283,000	4239933,935	598,329	C
241279,500	4239933,935	598,338	C
241265,500	4239933,935	598,373	C
241262,000	4239933,935	598,382	C
241248,000	4239933,935	598,417	C
241244,500	4239933,935	598,425	C
241230,500	4239933,935	598,460	C
241227,000	4239933,935	598,469	C
241227,000	4239924,881	598,378	C
241230,500	4239924,881	598,370	C
241244,500	4239924,881	598,335	C
241248,000	4239924,881	598,326	C
241262,000	4239924,881	598,291	C
241265,500	4239924,881	598,282	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240427,000	4240304,259	604,172	C	241279,500	4239924,881	598,247	C
240430,500	4240304,259	604,164	C	241283,000	4239924,881	598,238	C
240444,500	4240304,259	604,128	C	241297,000	4239924,881	598,204	C
240448,000	4240304,259	604,120	C	241300,500	4239924,881	598,195	C
240462,000	4240304,259	604,085	C	241314,500	4239924,881	598,160	C
240465,500	4240304,259	604,076	C	241318,000	4239924,881	598,151	C
240479,500	4240304,259	604,041	C	241332,000	4239924,881	598,116	C
240483,000	4240304,259	604,032	C	241335,500	4239924,881	598,107	C
240497,000	4240304,259	603,997	C	241349,500	4239924,881	598,072	C
240500,500	4240304,259	603,989	C	241353,000	4239924,881	598,064	C
240514,500	4240304,259	603,954	C	241367,000	4239924,881	598,029	C
240518,000	4240304,259	603,945	C	241370,500	4239924,881	598,020	C
240532,000	4240304,259	603,910	C	241384,500	4239924,881	597,985	C
240535,500	4240304,259	603,901	C	241388,000	4239924,881	597,976	C
240549,500	4240304,259	603,866	C	241402,000	4239924,881	597,941	C
240553,000	4240304,259	603,857	C	241405,500	4239924,881	597,932	C
240567,000	4240304,259	603,822	C	241419,500	4239924,881	597,897	C
240570,500	4240304,259	603,814	C	241423,000	4239924,881	597,889	C
240584,500	4240304,259	603,779	C	241437,000	4239924,881	597,854	C
240588,000	4240304,259	603,770	C	241440,500	4239924,881	597,845	C
240602,000	4240304,259	603,735	C	241454,500	4239924,881	597,810	C
240605,500	4240304,259	603,726	C	241458,000	4239924,881	597,801	C
240619,500	4240304,259	603,691	C	241472,000	4239924,881	597,766	C
240623,000	4240304,259	603,682	C	241475,500	4239924,881	597,757	C
240637,000	4240304,259	603,647	C	241489,500	4239924,881	597,722	C
240640,500	4240304,259	603,639	C	241493,000	4239924,881	597,714	C
240654,500	4240304,259	603,604	C	241507,000	4239924,881	597,679	C
240658,000	4240304,259	603,595	C	241510,500	4239924,881	597,670	C
240672,000	4240304,259	603,560	C	241524,500	4239924,881	597,635	C
240675,500	4240304,259	603,551	C	241528,000	4239924,881	597,626	C
240689,500	4240304,259	603,516	C	241542,000	4239924,881	597,591	C
240693,000	4240304,259	603,507	C	241545,500	4239924,881	597,582	C
240707,000	4240304,259	603,472	C	241559,500	4239924,881	597,547	C
240710,500	4240304,259	603,464	C	241563,000	4239924,881	597,539	C
240724,500	4240304,259	603,429	C	241577,000	4239924,881	597,504	C
240728,000	4240304,259	603,420	C	241580,500	4239924,881	597,495	C
240742,000	4240304,259	603,385	C	241594,500	4239924,881	597,460	C
240745,500	4240304,259	603,376	C	241598,000	4239924,881	597,451	C
240759,500	4240304,259	603,341	C	241612,000	4239924,881	597,416	C
240763,000	4240304,259	603,332	C	241615,500	4239924,881	597,407	C
240777,000	4240304,259	603,297	C	241629,500	4239924,881	597,372	C
240780,500	4240304,259	603,289	C	241633,000	4239924,881	597,364	C
240794,500	4240304,259	603,254	C	241647,000	4239924,881	597,329	C
240798,000	4240304,259	603,245	C	241650,500	4239924,881	597,320	C
240812,000	4240304,259	603,210	C	241664,500	4239924,881	597,285	C
240815,500	4240304,259	603,201	C	241668,000	4239924,881	597,276	C

Coord. X	Coord. Y	Elevación	Código
240829,500	4240304,259	603,166	C
240833,000	4240304,259	603,157	C
240847,000	4240304,259	603,122	C
240850,500	4240304,259	603,114	C
240864,500	4240304,259	603,079	C
240868,000	4240304,259	603,070	C
240882,000	4240304,259	603,035	C
240885,500	4240304,259	603,026	C
240899,500	4240304,259	602,991	C
240903,000	4240304,259	602,982	C
240917,000	4240304,259	602,947	C
240920,500	4240304,259	602,939	C
240934,500	4240304,259	602,904	C
240938,000	4240304,259	602,895	C
240952,000	4240304,259	602,860	C
240955,500	4240304,259	602,851	C
240969,500	4240304,259	602,816	C
240973,000	4240304,259	602,807	C
240987,000	4240304,259	602,772	C
240990,500	4240304,259	602,764	C
241004,500	4240304,259	602,729	C
241008,000	4240304,259	602,720	C
241022,000	4240304,259	602,685	C
241025,500	4240304,259	602,676	C
241039,500	4240304,259	602,641	C
241043,000	4240304,259	602,632	C
241057,000	4240304,259	602,597	C
241060,500	4240304,259	602,589	C
241074,500	4240304,259	602,554	C
241078,000	4240304,259	602,545	C
241092,000	4240304,259	602,510	C
241095,500	4240304,259	602,501	C
241109,500	4240304,259	602,466	C
241113,000	4240304,259	602,457	C
241127,000	4240304,259	602,422	C
241130,500	4240304,259	602,414	C
241144,500	4240304,259	602,379	C
241148,000	4240304,259	602,370	C
241162,000	4240304,259	602,335	C
241165,500	4240304,259	602,326	C
241179,500	4240304,259	602,291	C
241183,000	4240304,259	602,282	C
241197,000	4240304,259	602,247	C
241200,500	4240304,259	602,239	C
241214,500	4240304,259	602,204	C
241218,000	4240304,259	602,195	C

Coord. X	Coord. Y	Elevación	Código
241682,000	4239924,881	597,241	C
241685,500	4239924,881	597,233	C
241699,500	4239924,881	597,198	C
241703,000	4239924,881	597,189	C
241717,000	4239924,881	597,154	C
241720,500	4239924,881	597,145	C
241734,500	4239924,881	597,110	C
241738,000	4239924,881	597,101	C
241752,000	4239924,881	597,066	C
241755,500	4239924,881	597,058	C
241769,500	4239924,881	597,023	C
241773,000	4239924,881	597,014	C
241773,000	4239920,881	596,974	C
241769,500	4239920,881	596,983	C
241755,500	4239920,881	597,018	C
241752,000	4239920,881	597,026	C
241738,000	4239920,881	597,061	C
241734,500	4239920,881	597,070	C
241720,500	4239920,881	597,105	C
241717,000	4239920,881	597,114	C
241703,000	4239920,881	597,149	C
241699,500	4239920,881	597,158	C
241685,500	4239920,881	597,193	C
241682,000	4239920,881	597,201	C
241668,000	4239920,881	597,236	C
241664,500	4239920,881	597,245	C
241650,500	4239920,881	597,280	C
241647,000	4239920,881	597,289	C
241633,000	4239920,881	597,324	C
241629,500	4239920,881	597,332	C
241615,500	4239920,881	597,367	C
241612,000	4239920,881	597,376	C
241598,000	4239920,881	597,411	C
241594,500	4239920,881	597,420	C
241580,500	4239920,881	597,455	C
241577,000	4239920,881	597,464	C
241563,000	4239920,881	597,499	C
241559,500	4239920,881	597,507	C
241545,500	4239920,881	597,542	C
241542,000	4239920,881	597,551	C
241528,000	4239920,881	597,586	C
241524,500	4239920,881	597,595	C
241510,500	4239920,881	597,630	C
241507,000	4239920,881	597,639	C
241493,000	4239920,881	597,674	C
241489,500	4239920,881	597,682	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241232,000	4240304,259	602,160	C	241475,500	4239920,881	597,717	C
241235,500	4240304,259	602,151	C	241472,000	4239920,881	597,726	C
241249,500	4240304,259	602,116	C	241458,000	4239920,881	597,761	C
241253,000	4240304,259	602,107	C	241454,500	4239920,881	597,770	C
241267,000	4240304,259	602,072	C	241440,500	4239920,881	597,805	C
241270,500	4240304,259	602,064	C	241437,000	4239920,881	597,814	C
241284,500	4240304,259	602,029	C	241423,000	4239920,881	597,849	C
241288,000	4240304,259	602,020	C	241419,500	4239920,881	597,857	C
241302,000	4240304,259	601,985	C	241405,500	4239920,881	597,892	C
241305,500	4240304,259	601,976	C	241402,000	4239920,881	597,901	C
241319,500	4240304,259	601,941	C	241388,000	4239920,881	597,936	C
241323,000	4240304,259	601,932	C	241384,500	4239920,881	597,945	C
241337,000	4240304,259	601,897	C	241370,500	4239920,881	597,980	C
241340,500	4240304,259	601,889	C	241367,000	4239920,881	597,989	C
241354,500	4240304,259	601,854	C	241353,000	4239920,881	598,024	C
241358,000	4240304,259	601,845	C	241349,500	4239920,881	598,032	C
241372,000	4240304,259	601,810	C	241335,500	4239920,881	598,067	C
241375,500	4240304,259	601,801	C	241332,000	4239920,881	598,076	C
241389,500	4240304,259	601,766	C	241318,000	4239920,881	598,111	C
241393,000	4240304,259	601,757	C	241314,500	4239920,881	598,120	C
241407,000	4240304,259	601,722	C	241300,500	4239920,881	598,155	C
241410,500	4240304,259	601,714	C	241297,000	4239920,881	598,164	C
241424,500	4240304,259	601,679	C	241283,000	4239920,881	598,198	C
241428,000	4240304,259	601,670	C	241279,500	4239920,881	598,207	C
241442,000	4240304,259	601,635	C	241265,500	4239920,881	598,242	C
241445,500	4240304,259	601,626	C	241262,000	4239920,881	598,251	C
241459,500	4240304,259	601,591	C	241248,000	4239920,881	598,286	C
241463,000	4240304,259	601,583	C	241244,500	4239920,881	598,295	C
241477,000	4240304,259	601,548	C	241230,500	4239920,881	598,330	C
241480,500	4240304,259	601,539	C	241227,000	4239920,881	598,338	C
241494,500	4240304,259	601,504	C	241227,000	4239912,828	598,258	C
241498,000	4240304,259	601,495	C	241230,500	4239912,828	598,249	C
241512,000	4240304,259	601,460	C	241244,500	4239912,828	598,214	C
241515,500	4240304,259	601,451	C	241248,000	4239912,828	598,205	C
241529,500	4240304,259	601,416	C	241262,000	4239912,828	598,170	C
241533,000	4240304,259	601,408	C	241265,500	4239912,828	598,162	C
241547,000	4240304,259	601,373	C	241279,500	4239912,828	598,127	C
241550,500	4240304,259	601,364	C	241283,000	4239912,828	598,118	C
241564,500	4240304,259	601,329	C	241297,000	4239912,828	598,083	C
241568,000	4240304,259	601,320	C	241300,500	4239912,828	598,074	C
241582,000	4240304,259	601,285	C	241314,500	4239912,828	598,039	C
241585,500	4240304,259	601,276	C	241318,000	4239912,828	598,030	C
241599,500	4240304,259	601,241	C	241332,000	4239912,828	597,995	C
241603,000	4240304,259	601,233	C	241335,500	4239912,828	597,987	C
241617,000	4240304,259	601,198	C	241349,500	4239912,828	597,952	C
241620,500	4240304,259	601,189	C	241353,000	4239912,828	597,943	C

Coord. X	Coord. Y	Elevación	Código
241634,500	4240304,259	601,154	C
241638,000	4240304,259	601,145	C
241652,000	4240304,259	601,110	C
241655,500	4240304,259	601,101	C
241669,500	4240304,259	601,066	C
241673,000	4240304,259	601,058	C
241687,000	4240304,259	601,023	C
241690,500	4240304,259	601,014	C
241704,500	4240304,259	600,979	C
241708,000	4240304,259	600,970	C
241722,000	4240304,259	600,935	C
241725,500	4240304,259	600,926	C
241739,500	4240304,259	600,891	C
241743,000	4240304,259	600,883	C
241757,000	4240304,259	600,848	C
241760,500	4240304,259	600,839	C
241760,500	4240295,205	600,748	C
241757,000	4240295,205	600,757	C
241743,000	4240295,205	600,792	C
241739,500	4240295,205	600,801	C
241725,500	4240295,205	600,836	C
241722,000	4240295,205	600,845	C
241708,000	4240295,205	600,880	C
241704,500	4240295,205	600,888	C
241690,500	4240295,205	600,923	C
241687,000	4240295,205	600,932	C
241673,000	4240295,205	600,967	C
241669,500	4240295,205	600,976	C
241655,500	4240295,205	601,011	C
241652,000	4240295,205	601,020	C
241638,000	4240295,205	601,055	C
241634,500	4240295,205	601,063	C
241620,500	4240295,205	601,098	C
241617,000	4240295,205	601,107	C
241603,000	4240295,205	601,142	C
241599,500	4240295,205	601,151	C
241585,500	4240295,205	601,186	C
241582,000	4240295,205	601,195	C
241568,000	4240295,205	601,230	C
241564,500	4240295,205	601,238	C
241550,500	4240295,205	601,273	C
241547,000	4240295,205	601,282	C
241533,000	4240295,205	601,317	C
241529,500	4240295,205	601,326	C
241515,500	4240295,205	601,361	C
241512,000	4240295,205	601,369	C

Coord. X	Coord. Y	Elevación	Código
241367,000	4239912,828	597,908	C
241370,500	4239912,828	597,899	C
241384,500	4239912,828	597,864	C
241388,000	4239912,828	597,856	C
241402,000	4239912,828	597,821	C
241405,500	4239912,828	597,812	C
241419,500	4239912,828	597,777	C
241423,000	4239912,828	597,768	C
241437,000	4239912,828	597,733	C
241440,500	4239912,828	597,724	C
241454,500	4239912,828	597,689	C
241458,000	4239912,828	597,681	C
241472,000	4239912,828	597,646	C
241475,500	4239912,828	597,637	C
241489,500	4239912,828	597,602	C
241493,000	4239912,828	597,593	C
241507,000	4239912,828	597,558	C
241510,500	4239912,828	597,549	C
241524,500	4239912,828	597,514	C
241528,000	4239912,828	597,506	C
241542,000	4239912,828	597,471	C
241545,500	4239912,828	597,462	C
241559,500	4239912,828	597,427	C
241563,000	4239912,828	597,418	C
241577,000	4239912,828	597,383	C
241580,500	4239912,828	597,374	C
241594,500	4239912,828	597,339	C
241598,000	4239912,828	597,331	C
241612,000	4239912,828	597,296	C
241615,500	4239912,828	597,287	C
241629,500	4239912,828	597,252	C
241633,000	4239912,828	597,243	C
241647,000	4239912,828	597,208	C
241650,500	4239912,828	597,199	C
241664,500	4239912,828	597,164	C
241668,000	4239912,828	597,156	C
241682,000	4239912,828	597,121	C
241685,500	4239912,828	597,112	C
241699,500	4239912,828	597,077	C
241703,000	4239912,828	597,068	C
241717,000	4239912,828	597,033	C
241720,500	4239912,828	597,025	C
241734,500	4239912,828	596,990	C
241738,000	4239912,828	596,981	C
241752,000	4239912,828	596,946	C
241755,500	4239912,828	596,937	C

Coord. X	Coord. Y	Elevación	Código
241498,000	4240295,205	601,404	C
241494,500	4240295,205	601,413	C
241480,500	4240295,205	601,448	C
241477,000	4240295,205	601,457	C
241463,000	4240295,205	601,492	C
241459,500	4240295,205	601,501	C
241445,500	4240295,205	601,536	C
241442,000	4240295,205	601,544	C
241428,000	4240295,205	601,579	C
241424,500	4240295,205	601,588	C
241410,500	4240295,205	601,623	C
241407,000	4240295,205	601,632	C
241393,000	4240295,205	601,667	C
241389,500	4240295,205	601,676	C
241375,500	4240295,205	601,711	C
241372,000	4240295,205	601,719	C
241358,000	4240295,205	601,754	C
241354,500	4240295,205	601,763	C
241340,500	4240295,205	601,798	C
241337,000	4240295,205	601,807	C
241323,000	4240295,205	601,842	C
241319,500	4240295,205	601,851	C
241305,500	4240295,205	601,886	C
241302,000	4240295,205	601,894	C
241288,000	4240295,205	601,929	C
241284,500	4240295,205	601,938	C
241270,500	4240295,205	601,973	C
241267,000	4240295,205	601,982	C
241253,000	4240295,205	602,017	C
241249,500	4240295,205	602,026	C
241235,500	4240295,205	602,061	C
241232,000	4240295,205	602,069	C
241218,000	4240295,205	602,104	C
241214,500	4240295,205	602,113	C
241200,500	4240295,205	602,148	C
241197,000	4240295,205	602,157	C
241183,000	4240295,205	602,192	C
241179,500	4240295,205	602,201	C
241165,500	4240295,205	602,236	C
241162,000	4240295,205	602,244	C
241148,000	4240295,205	602,279	C
241144,500	4240295,205	602,288	C
241130,500	4240295,205	602,323	C
241127,000	4240295,205	602,332	C
241113,000	4240295,205	602,367	C
241109,500	4240295,205	602,376	C

Coord. X	Coord. Y	Elevación	Código
241769,500	4239912,828	596,902	C
241773,000	4239912,828	596,893	C
241773,000	4239908,828	596,853	C
241769,500	4239908,828	596,862	C
241755,500	4239908,828	596,897	C
241752,000	4239908,828	596,906	C
241738,000	4239908,828	596,941	C
241734,500	4239908,828	596,950	C
241720,500	4239908,828	596,985	C
241717,000	4239908,828	596,993	C
241703,000	4239908,828	597,028	C
241699,500	4239908,828	597,037	C
241685,500	4239908,828	597,072	C
241682,000	4239908,828	597,081	C
241668,000	4239908,828	597,116	C
241664,500	4239908,828	597,124	C
241650,500	4239908,828	597,159	C
241647,000	4239908,828	597,168	C
241633,000	4239908,828	597,203	C
241629,500	4239908,828	597,212	C
241615,500	4239908,828	597,247	C
241612,000	4239908,828	597,256	C
241598,000	4239908,828	597,291	C
241594,500	4239908,828	597,299	C
241580,500	4239908,828	597,334	C
241577,000	4239908,828	597,343	C
241563,000	4239908,828	597,378	C
241559,500	4239908,828	597,387	C
241545,500	4239908,828	597,422	C
241542,000	4239908,828	597,431	C
241528,000	4239908,828	597,466	C
241524,500	4239908,828	597,474	C
241510,500	4239908,828	597,509	C
241507,000	4239908,828	597,518	C
241493,000	4239908,828	597,553	C
241489,500	4239908,828	597,562	C
241475,500	4239908,828	597,597	C
241472,000	4239908,828	597,606	C
241458,000	4239908,828	597,641	C
241454,500	4239908,828	597,649	C
241440,500	4239908,828	597,684	C
241437,000	4239908,828	597,693	C
241423,000	4239908,828	597,728	C
241419,500	4239908,828	597,737	C
241405,500	4239908,828	597,772	C
241402,000	4239908,828	597,781	C

Coord. X	Coord. Y	Elevación	Código
241095,500	4240295,205	602,411	C
241092,000	4240295,205	602,419	C
241078,000	4240295,205	602,454	C
241074,500	4240295,205	602,463	C
241060,500	4240295,205	602,498	C
241057,000	4240295,205	602,507	C
241043,000	4240295,205	602,542	C
241039,500	4240295,205	602,551	C
241025,500	4240295,205	602,586	C
241022,000	4240295,205	602,594	C
241008,000	4240295,205	602,629	C
241004,500	4240295,205	602,638	C
240990,500	4240295,205	602,673	C
240987,000	4240295,205	602,682	C
240973,000	4240295,205	602,717	C
240969,500	4240295,205	602,726	C
240955,500	4240295,205	602,761	C
240952,000	4240295,205	602,769	C
240938,000	4240295,205	602,804	C
240934,500	4240295,205	602,813	C
240920,500	4240295,205	602,848	C
240917,000	4240295,205	602,857	C
240903,000	4240295,205	602,892	C
240899,500	4240295,205	602,901	C
240885,500	4240295,205	602,936	C
240882,000	4240295,205	602,944	C
240868,000	4240295,205	602,979	C
240864,500	4240295,205	602,988	C
240850,500	4240295,205	603,023	C
240847,000	4240295,205	603,032	C
240833,000	4240295,205	603,067	C
240829,500	4240295,205	603,076	C
240815,500	4240295,205	603,111	C
240812,000	4240295,205	603,119	C
240798,000	4240295,205	603,154	C
240794,500	4240295,205	603,163	C
240780,500	4240295,205	603,198	C
240777,000	4240295,205	603,207	C
240763,000	4240295,205	603,242	C
240759,500	4240295,205	603,251	C
240745,500	4240295,205	603,286	C
240742,000	4240295,205	603,294	C
240728,000	4240295,205	603,329	C
240724,500	4240295,205	603,338	C
240710,500	4240295,205	603,373	C
240707,000	4240295,205	603,382	C

Coord. X	Coord. Y	Elevación	Código
241388,000	4239908,828	597,816	C
241384,500	4239908,828	597,824	C
241370,500	4239908,828	597,859	C
241367,000	4239908,828	597,868	C
241353,000	4239908,828	597,903	C
241349,500	4239908,828	597,912	C
241335,500	4239908,828	597,947	C
241332,000	4239908,828	597,955	C
241318,000	4239908,828	597,990	C
241314,500	4239908,828	597,999	C
241300,500	4239908,828	598,034	C
241297,000	4239908,828	598,043	C
241283,000	4239908,828	598,078	C
241279,500	4239908,828	598,087	C
241265,500	4239908,828	598,122	C
241262,000	4239908,828	598,130	C
241248,000	4239908,828	598,165	C
241244,500	4239908,828	598,174	C
241230,500	4239908,828	598,209	C
241227,000	4239908,828	598,218	C
241227,000	4239900,774	598,137	C
241230,500	4239900,774	598,129	C
241244,500	4239900,774	598,094	C
241248,000	4239900,774	598,085	C
241262,000	4239900,774	598,050	C
241265,500	4239900,774	598,041	C
241279,500	4239900,774	598,006	C
241283,000	4239900,774	597,997	C
241297,000	4239900,774	597,962	C
241300,500	4239900,774	597,954	C
241314,500	4239900,774	597,919	C
241318,000	4239900,774	597,910	C
241332,000	4239900,774	597,875	C
241335,500	4239900,774	597,866	C
241349,500	4239900,774	597,831	C
241353,000	4239900,774	597,822	C
241367,000	4239900,774	597,787	C
241370,500	4239900,774	597,779	C
241384,500	4239900,774	597,744	C
241388,000	4239900,774	597,735	C
241402,000	4239900,774	597,700	C
241405,500	4239900,774	597,691	C
241419,500	4239900,774	597,656	C
241423,000	4239900,774	597,648	C
241437,000	4239900,774	597,613	C
241440,500	4239900,774	597,604	C

Coord. X	Coord. Y	Elevación	Código
240693,000	4240295,205	603,417	C
240689,500	4240295,205	603,426	C
240675,500	4240295,205	603,461	C
240672,000	4240295,205	603,469	C
240658,000	4240295,205	603,504	C
240654,500	4240295,205	603,513	C
240640,500	4240295,205	603,548	C
240637,000	4240295,205	603,557	C
240623,000	4240295,205	603,592	C
240619,500	4240295,205	603,600	C
240605,500	4240295,205	603,635	C
240602,000	4240295,205	603,644	C
240588,000	4240295,205	603,679	C
240584,500	4240295,205	603,688	C
240570,500	4240295,205	603,723	C
240567,000	4240295,205	603,732	C
240553,000	4240295,205	603,767	C
240549,500	4240295,205	603,775	C
240535,500	4240295,205	603,810	C
240532,000	4240295,205	603,819	C
240518,000	4240295,205	603,854	C
240514,500	4240295,205	603,863	C
240500,500	4240295,205	603,898	C
240497,000	4240295,205	603,907	C
240483,000	4240295,205	603,942	C
240479,500	4240295,205	603,950	C
240465,500	4240295,205	603,985	C
240462,000	4240295,205	603,994	C
240448,000	4240295,205	604,029	C
240444,500	4240295,205	604,038	C
240430,500	4240295,205	604,073	C
240427,000	4240295,205	604,082	C
240413,000	4240295,205	604,117	C
240409,500	4240295,205	604,125	C
240395,500	4240295,205	604,160	C
240392,000	4240295,205	604,169	C
240378,000	4240295,205	604,204	C
240374,500	4240295,205	604,213	C
240360,500	4240295,205	604,248	C
240357,000	4240295,205	604,257	C
240343,000	4240295,205	604,292	C
240339,500	4240295,205	604,300	C
240325,500	4240295,205	604,335	C
240322,000	4240295,205	604,344	C
240308,000	4240295,205	604,379	C
240304,500	4240295,205	604,388	C
241454,500	4239900,774	597,569	C
241458,000	4239900,774	597,560	C
241472,000	4239900,774	597,525	C
241475,500	4239900,774	597,516	C
241489,500	4239900,774	597,481	C
241493,000	4239900,774	597,473	C
241507,000	4239900,774	597,438	C
241510,500	4239900,774	597,429	C
241524,500	4239900,774	597,394	C
241528,000	4239900,774	597,385	C
241542,000	4239900,774	597,350	C
241545,500	4239900,774	597,341	C
241559,500	4239900,774	597,306	C
241563,000	4239900,774	597,298	C
241577,000	4239900,774	597,263	C
241580,500	4239900,774	597,254	C
241594,500	4239900,774	597,219	C
241598,000	4239900,774	597,210	C
241612,000	4239900,774	597,175	C
241615,500	4239900,774	597,166	C
241629,500	4239900,774	597,131	C
241633,000	4239900,774	597,123	C
241647,000	4239900,774	597,088	C
241650,500	4239900,774	597,079	C
241664,500	4239900,774	597,044	C
241668,000	4239900,774	597,035	C
241682,000	4239900,774	597,000	C
241685,500	4239900,774	596,991	C
241699,500	4239900,774	596,956	C
241703,000	4239900,774	596,948	C
241717,000	4239900,774	596,913	C
241720,500	4239900,774	596,904	C
241734,500	4239900,774	596,869	C
241738,000	4239900,774	596,860	C
241752,000	4239900,774	596,825	C
241755,500	4239900,774	596,816	C
241769,500	4239900,774	596,782	C
241773,000	4239900,774	596,773	C
241773,000	4239896,774	596,733	C
241769,500	4239896,774	596,742	C
241755,500	4239896,774	596,776	C
241752,000	4239896,774	596,785	C
241738,000	4239896,774	596,820	C
241734,500	4239896,774	596,829	C
241720,500	4239896,774	596,864	C
241717,000	4239896,774	596,873	C

Coord. X	Coord. Y	Elevación	Código
240290,500	4240295,205	604,423	C
240287,000	4240295,205	604,432	C
240273,000	4240295,205	604,467	C
240269,500	4240295,205	604,475	C
240255,500	4240295,205	604,510	C
240252,000	4240295,205	604,519	C
240238,000	4240295,205	604,554	C
240234,500	4240295,205	604,563	C
240220,500	4240295,205	604,598	C
240217,000	4240295,205	604,607	C
240203,000	4240295,205	604,642	C
240199,500	4240295,205	604,650	C
240185,500	4240295,205	604,685	C
240182,000	4240295,205	604,694	C
240168,000	4240295,205	604,729	C
240164,500	4240295,205	604,738	C
240150,500	4240295,205	604,773	C
240147,000	4240295,205	604,782	C
240133,000	4240295,205	604,817	C
240129,500	4240295,205	604,825	C
240115,500	4240295,205	604,860	C
240112,000	4240295,205	604,869	C
240098,000	4240295,205	604,904	C
240094,500	4240295,205	604,913	C
240080,500	4240295,205	604,948	C
240077,000	4240295,205	604,957	C
240063,000	4240295,205	604,992	C
240059,500	4240295,205	605,000	C
240045,500	4240295,205	605,035	C
240042,000	4240295,205	605,044	C
240028,000	4240295,205	605,079	C
240024,500	4240295,205	605,088	C
240024,500	4240292,055	605,056	C
240028,000	4240292,055	605,048	C
240042,000	4240292,055	605,013	C
240045,500	4240292,055	605,004	C
240059,500	4240292,055	604,969	C
240063,000	4240292,055	604,960	C
240077,000	4240292,055	604,925	C
240080,500	4240292,055	604,916	C
240094,500	4240292,055	604,881	C
240098,000	4240292,055	604,873	C
240112,000	4240292,055	604,838	C
240115,500	4240292,055	604,829	C
240129,500	4240292,055	604,794	C
240133,000	4240292,055	604,785	C

Coord. X	Coord. Y	Elevación	Código
241703,000	4239896,774	596,908	C
241699,500	4239896,774	596,916	C
241685,500	4239896,774	596,951	C
241682,000	4239896,774	596,960	C
241668,000	4239896,774	596,995	C
241664,500	4239896,774	597,004	C
241650,500	4239896,774	597,039	C
241647,000	4239896,774	597,048	C
241633,000	4239896,774	597,083	C
241629,500	4239896,774	597,091	C
241615,500	4239896,774	597,126	C
241612,000	4239896,774	597,135	C
241598,000	4239896,774	597,170	C
241594,500	4239896,774	597,179	C
241580,500	4239896,774	597,214	C
241577,000	4239896,774	597,223	C
241563,000	4239896,774	597,258	C
241559,500	4239896,774	597,266	C
241545,500	4239896,774	597,301	C
241542,000	4239896,774	597,310	C
241528,000	4239896,774	597,345	C
241524,500	4239896,774	597,354	C
241510,500	4239896,774	597,389	C
241507,000	4239896,774	597,398	C
241493,000	4239896,774	597,433	C
241489,500	4239896,774	597,441	C
241475,500	4239896,774	597,476	C
241472,000	4239896,774	597,485	C
241458,000	4239896,774	597,520	C
241454,500	4239896,774	597,529	C
241440,500	4239896,774	597,564	C
241437,000	4239896,774	597,573	C
241423,000	4239896,774	597,608	C
241419,500	4239896,774	597,616	C
241405,500	4239896,774	597,651	C
241402,000	4239896,774	597,660	C
241388,000	4239896,774	597,695	C
241384,500	4239896,774	597,704	C
241370,500	4239896,774	597,739	C
241367,000	4239896,774	597,747	C
241353,000	4239896,774	597,782	C
241349,500	4239896,774	597,791	C
241335,500	4239896,774	597,826	C
241332,000	4239896,774	597,835	C
241318,000	4239896,774	597,870	C
241314,500	4239896,774	597,879	C

Coord. X	Coord. Y	Elevación	Código
240147,000	4240292,055	604,750	C
240150,500	4240292,055	604,741	C
240164,500	4240292,055	604,706	C
240168,000	4240292,055	604,698	C
240182,000	4240292,055	604,663	C
240185,500	4240292,055	604,654	C
240199,500	4240292,055	604,619	C
240203,000	4240292,055	604,610	C
240217,000	4240292,055	604,575	C
240220,500	4240292,055	604,566	C
240234,500	4240292,055	604,531	C
240238,000	4240292,055	604,523	C
240252,000	4240292,055	604,488	C
240255,500	4240292,055	604,479	C
240269,500	4240292,055	604,444	C
240273,000	4240292,055	604,435	C
240287,000	4240292,055	604,400	C
240290,500	4240292,055	604,391	C
240304,500	4240292,055	604,356	C
240308,000	4240292,055	604,348	C
240322,000	4240292,055	604,313	C
240325,500	4240292,055	604,304	C
240339,500	4240292,055	604,269	C
240343,000	4240292,055	604,260	C
240357,000	4240292,055	604,225	C
240360,500	4240292,055	604,216	C
240374,500	4240292,055	604,181	C
240378,000	4240292,055	604,173	C
240392,000	4240292,055	604,138	C
240395,500	4240292,055	604,129	C
240409,500	4240292,055	604,094	C
240413,000	4240292,055	604,085	C
240427,000	4240292,055	604,050	C
240430,500	4240292,055	604,041	C
240444,500	4240292,055	604,006	C
240448,000	4240292,055	603,998	C
240462,000	4240292,055	603,963	C
240465,500	4240292,055	603,954	C
240479,500	4240292,055	603,919	C
240483,000	4240292,055	603,910	C
240497,000	4240292,055	603,875	C
240500,500	4240292,055	603,866	C
240514,500	4240292,055	603,831	C
240518,000	4240292,055	603,823	C
240532,000	4240292,055	603,788	C
240535,500	4240292,055	603,779	C
241300,500	4239896,774	597,914	C
241297,000	4239896,774	597,922	C
241283,000	4239896,774	597,957	C
241279,500	4239896,774	597,966	C
241265,500	4239896,774	598,001	C
241262,000	4239896,774	598,010	C
241248,000	4239896,774	598,045	C
241244,500	4239896,774	598,054	C
241230,500	4239896,774	598,089	C
241227,000	4239896,774	598,097	C
241227,000	4239887,720	598,007	C
241230,500	4239887,720	597,998	C
241244,500	4239887,720	597,963	C
241248,000	4239887,720	597,954	C
241262,000	4239887,720	597,919	C
241265,500	4239887,720	597,911	C
241279,500	4239887,720	597,876	C
241283,000	4239887,720	597,867	C
241297,000	4239887,720	597,832	C
241300,500	4239887,720	597,823	C
241314,500	4239887,720	597,788	C
241318,000	4239887,720	597,779	C
241332,000	4239887,720	597,744	C
241335,500	4239887,720	597,736	C
241349,500	4239887,720	597,701	C
241353,000	4239887,720	597,692	C
241367,000	4239887,720	597,657	C
241370,500	4239887,720	597,648	C
241384,500	4239887,720	597,613	C
241388,000	4239887,720	597,604	C
241402,000	4239887,720	597,569	C
241405,500	4239887,720	597,561	C
241419,500	4239887,720	597,526	C
241423,000	4239887,720	597,517	C
241437,000	4239887,720	597,482	C
241440,500	4239887,720	597,473	C
241454,500	4239887,720	597,438	C
241458,000	4239887,720	597,429	C
241472,000	4239887,720	597,394	C
241475,500	4239887,720	597,386	C
241489,500	4239887,720	597,351	C
241493,000	4239887,720	597,342	C
241507,000	4239887,720	597,307	C
241510,500	4239887,720	597,298	C
241524,500	4239887,720	597,263	C
241528,000	4239887,720	597,255	C

Coord. X	Coord. Y	Elevación	Código
240549,500	4240292,055	603,744	C
240553,000	4240292,055	603,735	C
240567,000	4240292,055	603,700	C
240570,500	4240292,055	603,691	C
240584,500	4240292,055	603,656	C
240588,000	4240292,055	603,648	C
240602,000	4240292,055	603,613	C
240605,500	4240292,055	603,604	C
240619,500	4240292,055	603,569	C
240623,000	4240292,055	603,560	C
240637,000	4240292,055	603,525	C
240640,500	4240292,055	603,516	C
240654,500	4240292,055	603,481	C
240658,000	4240292,055	603,473	C
240672,000	4240292,055	603,438	C
240675,500	4240292,055	603,429	C
240689,500	4240292,055	603,394	C
240693,000	4240292,055	603,385	C
240707,000	4240292,055	603,350	C
240710,500	4240292,055	603,342	C
240724,500	4240292,055	603,307	C
240728,000	4240292,055	603,298	C
240742,000	4240292,055	603,263	C
240745,500	4240292,055	603,254	C
240759,500	4240292,055	603,219	C
240763,000	4240292,055	603,210	C
240777,000	4240292,055	603,175	C
240780,500	4240292,055	603,167	C
240794,500	4240292,055	603,132	C
240798,000	4240292,055	603,123	C
240812,000	4240292,055	603,088	C
240815,500	4240292,055	603,079	C
240829,500	4240292,055	603,044	C
240833,000	4240292,055	603,035	C
240847,000	4240292,055	603,000	C
240850,500	4240292,055	602,992	C
240864,500	4240292,055	602,957	C
240868,000	4240292,055	602,948	C
240882,000	4240292,055	602,913	C
240885,500	4240292,055	602,904	C
240899,500	4240292,055	602,869	C
240903,000	4240292,055	602,860	C
240917,000	4240292,055	602,825	C
240920,500	4240292,055	602,817	C
240934,500	4240292,055	602,782	C
240938,000	4240292,055	602,773	C

Coord. X	Coord. Y	Elevación	Código
241542,000	4239887,720	597,220	C
241545,500	4239887,720	597,211	C
241559,500	4239887,720	597,176	C
241563,000	4239887,720	597,167	C
241577,000	4239887,720	597,132	C
241580,500	4239887,720	597,123	C
241594,500	4239887,720	597,088	C
241598,000	4239887,720	597,080	C
241612,000	4239887,720	597,045	C
241615,500	4239887,720	597,036	C
241629,500	4239887,720	597,001	C
241633,000	4239887,720	596,992	C
241647,000	4239887,720	596,957	C
241650,500	4239887,720	596,948	C
241664,500	4239887,720	596,913	C
241668,000	4239887,720	596,905	C
241682,000	4239887,720	596,870	C
241685,500	4239887,720	596,861	C
241699,500	4239887,720	596,826	C
241703,000	4239887,720	596,817	C
241717,000	4239887,720	596,782	C
241720,500	4239887,720	596,773	C
241734,500	4239887,720	596,738	C
241738,000	4239887,720	596,730	C
241752,000	4239887,720	596,695	C
241755,500	4239887,720	596,686	C
241769,500	4239887,720	596,651	C
241773,000	4239887,720	596,642	C
241773,000	4239884,570	596,611	C
241769,500	4239884,570	596,619	C
241755,500	4239884,570	596,654	C
241752,000	4239884,570	596,663	C
241738,000	4239884,570	596,698	C
241734,500	4239884,570	596,707	C
241720,500	4239884,570	596,742	C
241717,000	4239884,570	596,751	C
241703,000	4239884,570	596,786	C
241699,500	4239884,570	596,794	C
241685,500	4239884,570	596,829	C
241682,000	4239884,570	596,838	C
241668,000	4239884,570	596,873	C
241664,500	4239884,570	596,882	C
241650,500	4239884,570	596,917	C
241647,000	4239884,570	596,926	C
241633,000	4239884,570	596,961	C
241629,500	4239884,570	596,969	C

Coord. X	Coord. Y	Elevación	Código
240952,000	4240292,055	602,738	C
240955,500	4240292,055	602,729	C
240969,500	4240292,055	602,694	C
240973,000	4240292,055	602,685	C
240987,000	4240292,055	602,650	C
240990,500	4240292,055	602,642	C
241004,500	4240292,055	602,607	C
241008,000	4240292,055	602,598	C
241022,000	4240292,055	602,563	C
241025,500	4240292,055	602,554	C
241039,500	4240292,055	602,519	C
241043,000	4240292,055	602,510	C
241057,000	4240292,055	602,475	C
241060,500	4240292,055	602,467	C
241074,500	4240292,055	602,432	C
241078,000	4240292,055	602,423	C
241092,000	4240292,055	602,388	C
241095,500	4240292,055	602,379	C
241109,500	4240292,055	602,344	C
241113,000	4240292,055	602,335	C
241127,000	4240292,055	602,300	C
241130,500	4240292,055	602,292	C
241144,500	4240292,055	602,257	C
241148,000	4240292,055	602,248	C
241162,000	4240292,055	602,213	C
241165,500	4240292,055	602,204	C
241179,500	4240292,055	602,169	C
241183,000	4240292,055	602,160	C
241197,000	4240292,055	602,125	C
241200,500	4240292,055	602,117	C
241214,500	4240292,055	602,082	C
241218,000	4240292,055	602,073	C
241232,000	4240292,055	602,038	C
241235,500	4240292,055	602,029	C
241249,500	4240292,055	601,994	C
241253,000	4240292,055	601,985	C
241267,000	4240292,055	601,950	C
241270,500	4240292,055	601,942	C
241284,500	4240292,055	601,907	C
241288,000	4240292,055	601,898	C
241302,000	4240292,055	601,863	C
241305,500	4240292,055	601,854	C
241319,500	4240292,055	601,819	C
241323,000	4240292,055	601,810	C
241337,000	4240292,055	601,775	C
241340,500	4240292,055	601,767	C
241615,500	4239884,570	597,004	C
241612,000	4239884,570	597,013	C
241598,000	4239884,570	597,048	C
241594,500	4239884,570	597,057	C
241580,500	4239884,570	597,092	C
241577,000	4239884,570	597,101	C
241563,000	4239884,570	597,136	C
241559,500	4239884,570	597,144	C
241545,500	4239884,570	597,179	C
241542,000	4239884,570	597,188	C
241528,000	4239884,570	597,223	C
241524,500	4239884,570	597,232	C
241510,500	4239884,570	597,267	C
241507,000	4239884,570	597,276	C
241493,000	4239884,570	597,311	C
241489,500	4239884,570	597,319	C
241475,500	4239884,570	597,354	C
241472,000	4239884,570	597,363	C
241458,000	4239884,570	597,398	C
241454,500	4239884,570	597,407	C
241440,500	4239884,570	597,442	C
241437,000	4239884,570	597,450	C
241423,000	4239884,570	597,485	C
241419,500	4239884,570	597,494	C
241405,500	4239884,570	597,529	C
241402,000	4239884,570	597,538	C
241388,000	4239884,570	597,573	C
241384,500	4239884,570	597,582	C
241370,500	4239884,570	597,617	C
241367,000	4239884,570	597,625	C
241353,000	4239884,570	597,660	C
241349,500	4239884,570	597,669	C
241335,500	4239884,570	597,704	C
241332,000	4239884,570	597,713	C
241318,000	4239884,570	597,748	C
241314,500	4239884,570	597,757	C
241300,500	4239884,570	597,792	C
241297,000	4239884,570	597,800	C
241283,000	4239884,570	597,835	C
241279,500	4239884,570	597,844	C
241265,500	4239884,570	597,879	C
241262,000	4239884,570	597,888	C
241248,000	4239884,570	597,923	C
241244,500	4239884,570	597,932	C
241230,500	4239884,570	597,967	C
241227,000	4239884,570	597,975	C

Coord. X	Coord. Y	Elevación	Código
241354,500	4240292,055	601,732	C
241358,000	4240292,055	601,723	C
241372,000	4240292,055	601,688	C
241375,500	4240292,055	601,679	C
241389,500	4240292,055	601,644	C
241393,000	4240292,055	601,635	C
241407,000	4240292,055	601,600	C
241410,500	4240292,055	601,592	C
241424,500	4240292,055	601,557	C
241428,000	4240292,055	601,548	C
241442,000	4240292,055	601,513	C
241445,500	4240292,055	601,504	C
241459,500	4240292,055	601,469	C
241463,000	4240292,055	601,460	C
241477,000	4240292,055	601,425	C
241480,500	4240292,055	601,417	C
241494,500	4240292,055	601,382	C
241498,000	4240292,055	601,373	C
241512,000	4240292,055	601,338	C
241515,500	4240292,055	601,329	C
241529,500	4240292,055	601,294	C
241533,000	4240292,055	601,286	C
241547,000	4240292,055	601,251	C
241550,500	4240292,055	601,242	C
241564,500	4240292,055	601,207	C
241568,000	4240292,055	601,198	C
241582,000	4240292,055	601,163	C
241585,500	4240292,055	601,154	C
241599,500	4240292,055	601,119	C
241603,000	4240292,055	601,111	C
241617,000	4240292,055	601,076	C
241620,500	4240292,055	601,067	C
241634,500	4240292,055	601,032	C
241638,000	4240292,055	601,023	C
241652,000	4240292,055	600,988	C
241655,500	4240292,055	600,979	C
241669,500	4240292,055	600,944	C
241673,000	4240292,055	600,936	C
241687,000	4240292,055	600,901	C
241690,500	4240292,055	600,892	C
241704,500	4240292,055	600,857	C
241708,000	4240292,055	600,848	C
241722,000	4240292,055	600,813	C
241725,500	4240292,055	600,804	C
241739,500	4240292,055	600,769	C
241743,000	4240292,055	600,761	C
241227,000	4239881,420	597,944	C
241230,500	4239881,420	597,935	C
241244,500	4239881,420	597,900	C
241248,000	4239881,420	597,891	C
241262,000	4239881,420	597,856	C
241265,500	4239881,420	597,848	C
241279,500	4239881,420	597,813	C
241283,000	4239881,420	597,804	C
241297,000	4239881,420	597,769	C
241300,500	4239881,420	597,760	C
241314,500	4239881,420	597,725	C
241318,000	4239881,420	597,716	C
241332,000	4239881,420	597,681	C
241335,500	4239881,420	597,673	C
241349,500	4239881,420	597,638	C
241353,000	4239881,420	597,629	C
241367,000	4239881,420	597,594	C
241370,500	4239881,420	597,585	C
241384,500	4239881,420	597,550	C
241388,000	4239881,420	597,541	C
241402,000	4239881,420	597,506	C
241405,500	4239881,420	597,498	C
241419,500	4239881,420	597,463	C
241423,000	4239881,420	597,454	C
241437,000	4239881,420	597,419	C
241440,500	4239881,420	597,410	C
241454,500	4239881,420	597,375	C
241458,000	4239881,420	597,366	C
241472,000	4239881,420	597,331	C
241475,500	4239881,420	597,323	C
241489,500	4239881,420	597,288	C
241493,000	4239881,420	597,279	C
241507,000	4239881,420	597,244	C
241510,500	4239881,420	597,235	C
241524,500	4239881,420	597,200	C
241528,000	4239881,420	597,192	C
241542,000	4239881,420	597,157	C
241545,500	4239881,420	597,148	C
241559,500	4239881,420	597,113	C
241563,000	4239881,420	597,104	C
241577,000	4239881,420	597,069	C
241580,500	4239881,420	597,060	C
241594,500	4239881,420	597,025	C
241598,000	4239881,420	597,017	C
241612,000	4239881,420	596,982	C
241615,500	4239881,420	596,973	C

Coord. X	Coord. Y	Elevación	Código
241757,000	4240292,055	600,726	C
241760,500	4240292,055	600,717	C
241760,500	4240283,001	600,626	C
241757,000	4240283,001	600,635	C
241743,000	4240283,001	600,670	C
241739,500	4240283,001	600,679	C
241725,500	4240283,001	600,714	C
241722,000	4240283,001	600,723	C
241708,000	4240283,001	600,758	C
241704,500	4240283,001	600,766	C
241690,500	4240283,001	600,801	C
241687,000	4240283,001	600,810	C
241673,000	4240283,001	600,845	C
241669,500	4240283,001	600,854	C
241655,500	4240283,001	600,889	C
241652,000	4240283,001	600,898	C
241638,000	4240283,001	600,933	C
241634,500	4240283,001	600,941	C
241620,500	4240283,001	600,976	C
241617,000	4240283,001	600,985	C
241603,000	4240283,001	601,020	C
241599,500	4240283,001	601,029	C
241585,500	4240283,001	601,064	C
241582,000	4240283,001	601,072	C
241568,000	4240283,001	601,107	C
241564,500	4240283,001	601,116	C
241550,500	4240283,001	601,151	C
241547,000	4240283,001	601,160	C
241533,000	4240283,001	601,195	C
241529,500	4240283,001	601,204	C
241515,500	4240283,001	601,239	C
241512,000	4240283,001	601,247	C
241498,000	4240283,001	601,282	C
241494,500	4240283,001	601,291	C
241480,500	4240283,001	601,326	C
241477,000	4240283,001	601,335	C
241463,000	4240283,001	601,370	C
241459,500	4240283,001	601,379	C
241445,500	4240283,001	601,414	C
241442,000	4240283,001	601,422	C
241428,000	4240283,001	601,457	C
241424,500	4240283,001	601,466	C
241410,500	4240283,001	601,501	C
241407,000	4240283,001	601,510	C
241393,000	4240283,001	601,545	C
241389,500	4240283,001	601,554	C

Coord. X	Coord. Y	Elevación	Código
241629,500	4239881,420	596,938	C
241633,000	4239881,420	596,929	C
241647,000	4239881,420	596,894	C
241650,500	4239881,420	596,885	C
241664,500	4239881,420	596,850	C
241668,000	4239881,420	596,842	C
241682,000	4239881,420	596,807	C
241685,500	4239881,420	596,798	C
241699,500	4239881,420	596,763	C
241703,000	4239881,420	596,754	C
241717,000	4239881,420	596,719	C
241720,500	4239881,420	596,710	C
241734,500	4239881,420	596,675	C
241738,000	4239881,420	596,667	C
241752,000	4239881,420	596,632	C
241755,500	4239881,420	596,623	C
241769,500	4239881,420	596,588	C
241773,000	4239881,420	596,579	C
241773,000	4239872,366	596,489	C
241769,500	4239872,366	596,497	C
241755,500	4239872,366	596,532	C
241752,000	4239872,366	596,541	C
241738,000	4239872,366	596,576	C
241734,500	4239872,366	596,585	C
241720,500	4239872,366	596,620	C
241717,000	4239872,366	596,629	C
241703,000	4239872,366	596,664	C
241699,500	4239872,366	596,672	C
241685,500	4239872,366	596,707	C
241682,000	4239872,366	596,716	C
241668,000	4239872,366	596,751	C
241664,500	4239872,366	596,760	C
241650,500	4239872,366	596,795	C
241647,000	4239872,366	596,804	C
241633,000	4239872,366	596,839	C
241629,500	4239872,366	596,847	C
241615,500	4239872,366	596,882	C
241612,000	4239872,366	596,891	C
241598,000	4239872,366	596,926	C
241594,500	4239872,366	596,935	C
241580,500	4239872,366	596,970	C
241577,000	4239872,366	596,979	C
241563,000	4239872,366	597,014	C
241559,500	4239872,366	597,022	C
241545,500	4239872,366	597,057	C
241542,000	4239872,366	597,066	C

Coord. X	Coord. Y	Elevación	Código
241375,500	4240283,001	601,589	C
241372,000	4240283,001	601,597	C
241358,000	4240283,001	601,632	C
241354,500	4240283,001	601,641	C
241340,500	4240283,001	601,676	C
241337,000	4240283,001	601,685	C
241323,000	4240283,001	601,720	C
241319,500	4240283,001	601,729	C
241305,500	4240283,001	601,764	C
241302,000	4240283,001	601,772	C
241288,000	4240283,001	601,807	C
241284,500	4240283,001	601,816	C
241270,500	4240283,001	601,851	C
241267,000	4240283,001	601,860	C
241253,000	4240283,001	601,895	C
241249,500	4240283,001	601,904	C
241235,500	4240283,001	601,939	C
241232,000	4240283,001	601,947	C
241218,000	4240283,001	601,982	C
241214,500	4240283,001	601,991	C
241200,500	4240283,001	602,026	C
241197,000	4240283,001	602,035	C
241183,000	4240283,001	602,070	C
241179,500	4240283,001	602,079	C
241165,500	4240283,001	602,114	C
241162,000	4240283,001	602,122	C
241148,000	4240283,001	602,157	C
241144,500	4240283,001	602,166	C
241130,500	4240283,001	602,201	C
241127,000	4240283,001	602,210	C
241113,000	4240283,001	602,245	C
241109,500	4240283,001	602,254	C
241095,500	4240283,001	602,289	C
241092,000	4240283,001	602,297	C
241078,000	4240283,001	602,332	C
241074,500	4240283,001	602,341	C
241060,500	4240283,001	602,376	C
241057,000	4240283,001	602,385	C
241043,000	4240283,001	602,420	C
241039,500	4240283,001	602,429	C
241025,500	4240283,001	602,464	C
241022,000	4240283,001	602,472	C
241008,000	4240283,001	602,507	C
241004,500	4240283,001	602,516	C
240990,500	4240283,001	602,551	C
240987,000	4240283,001	602,560	C

Coord. X	Coord. Y	Elevación	Código
241528,000	4239872,366	597,101	C
241524,500	4239872,366	597,110	C
241510,500	4239872,366	597,145	C
241507,000	4239872,366	597,153	C
241493,000	4239872,366	597,188	C
241489,500	4239872,366	597,197	C
241475,500	4239872,366	597,232	C
241472,000	4239872,366	597,241	C
241458,000	4239872,366	597,276	C
241454,500	4239872,366	597,285	C
241440,500	4239872,366	597,320	C
241437,000	4239872,366	597,328	C
241423,000	4239872,366	597,363	C
241419,500	4239872,366	597,372	C
241405,500	4239872,366	597,407	C
241402,000	4239872,366	597,416	C
241388,000	4239872,366	597,451	C
241384,500	4239872,366	597,460	C
241370,500	4239872,366	597,495	C
241367,000	4239872,366	597,503	C
241353,000	4239872,366	597,538	C
241349,500	4239872,366	597,547	C
241335,500	4239872,366	597,582	C
241332,000	4239872,366	597,591	C
241318,000	4239872,366	597,626	C
241314,500	4239872,366	597,635	C
241300,500	4239872,366	597,670	C
241297,000	4239872,366	597,678	C
241283,000	4239872,366	597,713	C
241279,500	4239872,366	597,722	C
241265,500	4239872,366	597,757	C
241262,000	4239872,366	597,766	C
241248,000	4239872,366	597,801	C
241244,500	4239872,366	597,810	C
241230,500	4239872,366	597,845	C
241227,000	4239872,366	597,853	C
241227,000	4239868,366	597,813	C
241230,500	4239868,366	597,805	C
241244,500	4239868,366	597,770	C
241248,000	4239868,366	597,761	C
241262,000	4239868,366	597,726	C
241265,500	4239868,366	597,717	C
241279,500	4239868,366	597,682	C
241283,000	4239868,366	597,673	C
241297,000	4239868,366	597,638	C
241300,500	4239868,366	597,630	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240973,000	4240283,001	602,595	C	241314,500	4239868,366	597,595	C
240969,500	4240283,001	602,603	C	241318,000	4239868,366	597,586	C
240955,500	4240283,001	602,638	C	241332,000	4239868,366	597,551	C
240952,000	4240283,001	602,647	C	241335,500	4239868,366	597,542	C
240938,000	4240283,001	602,682	C	241349,500	4239868,366	597,507	C
240934,500	4240283,001	602,691	C	241353,000	4239868,366	597,498	C
240920,500	4240283,001	602,726	C	241367,000	4239868,366	597,463	C
240917,000	4240283,001	602,735	C	241370,500	4239868,366	597,455	C
240903,000	4240283,001	602,770	C	241384,500	4239868,366	597,420	C
240899,500	4240283,001	602,778	C	241388,000	4239868,366	597,411	C
240885,500	4240283,001	602,813	C	241402,000	4239868,366	597,376	C
240882,000	4240283,001	602,822	C	241405,500	4239868,366	597,367	C
240868,000	4240283,001	602,857	C	241419,500	4239868,366	597,332	C
240864,500	4240283,001	602,866	C	241423,000	4239868,366	597,323	C
240850,500	4240283,001	602,901	C	241437,000	4239868,366	597,288	C
240847,000	4240283,001	602,910	C	241440,500	4239868,366	597,280	C
240833,000	4240283,001	602,945	C	241454,500	4239868,366	597,245	C
240829,500	4240283,001	602,953	C	241458,000	4239868,366	597,236	C
240815,500	4240283,001	602,988	C	241472,000	4239868,366	597,201	C
240812,000	4240283,001	602,997	C	241475,500	4239868,366	597,192	C
240798,000	4240283,001	603,032	C	241489,500	4239868,366	597,157	C
240794,500	4240283,001	603,041	C	241493,000	4239868,366	597,148	C
240780,500	4240283,001	603,076	C	241507,000	4239868,366	597,113	C
240777,000	4240283,001	603,085	C	241510,500	4239868,366	597,105	C
240763,000	4240283,001	603,120	C	241524,500	4239868,366	597,070	C
240759,500	4240283,001	603,128	C	241528,000	4239868,366	597,061	C
240745,500	4240283,001	603,163	C	241542,000	4239868,366	597,026	C
240742,000	4240283,001	603,172	C	241545,500	4239868,366	597,017	C
240728,000	4240283,001	603,207	C	241559,500	4239868,366	596,982	C
240724,500	4240283,001	603,216	C	241563,000	4239868,366	596,974	C
240710,500	4240283,001	603,251	C	241577,000	4239868,366	596,939	C
240707,000	4240283,001	603,260	C	241580,500	4239868,366	596,930	C
240693,000	4240283,001	603,295	C	241594,500	4239868,366	596,895	C
240689,500	4240283,001	603,303	C	241598,000	4239868,366	596,886	C
240675,500	4240283,001	603,338	C	241612,000	4239868,366	596,851	C
240672,000	4240283,001	603,347	C	241615,500	4239868,366	596,842	C
240658,000	4240283,001	603,382	C	241629,500	4239868,366	596,807	C
240654,500	4240283,001	603,391	C	241633,000	4239868,366	596,799	C
240640,500	4240283,001	603,426	C	241647,000	4239868,366	596,764	C
240637,000	4240283,001	603,435	C	241650,500	4239868,366	596,755	C
240623,000	4240283,001	603,470	C	241664,500	4239868,366	596,720	C
240619,500	4240283,001	603,478	C	241668,000	4239868,366	596,711	C
240605,500	4240283,001	603,513	C	241682,000	4239868,366	596,676	C
240602,000	4240283,001	603,522	C	241685,500	4239868,366	596,667	C
240588,000	4240283,001	603,557	C	241699,500	4239868,366	596,632	C
240584,500	4240283,001	603,566	C	241703,000	4239868,366	596,624	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240570,500	4240283,001	603,601	C	241717,000	4239868,366	596,589	C
240567,000	4240283,001	603,610	C	241720,500	4239868,366	596,580	C
240553,000	4240283,001	603,645	C	241734,500	4239868,366	596,545	C
240549,500	4240283,001	603,653	C	241738,000	4239868,366	596,536	C
240535,500	4240283,001	603,688	C	241752,000	4239868,366	596,501	C
240532,000	4240283,001	603,697	C	241755,500	4239868,366	596,492	C
240518,000	4240283,001	603,732	C	241769,500	4239868,366	596,457	C
240514,500	4240283,001	603,741	C	241773,000	4239868,366	596,449	C
240500,500	4240283,001	603,776	C	241773,000	4239860,313	596,368	C
240497,000	4240283,001	603,785	C	241769,500	4239860,313	596,377	C
240483,000	4240283,001	603,820	C	241755,500	4239860,313	596,412	C
240479,500	4240283,001	603,828	C	241752,000	4239860,313	596,421	C
240465,500	4240283,001	603,863	C	241738,000	4239860,313	596,456	C
240462,000	4240283,001	603,872	C	241734,500	4239860,313	596,464	C
240448,000	4240283,001	603,907	C	241720,500	4239860,313	596,499	C
240444,500	4240283,001	603,916	C	241717,000	4239860,313	596,508	C
240430,500	4240283,001	603,951	C	241703,000	4239860,313	596,543	C
240427,000	4240283,001	603,960	C	241699,500	4239860,313	596,552	C
240413,000	4240283,001	603,995	C	241685,500	4239860,313	596,587	C
240409,500	4240283,001	604,003	C	241682,000	4239860,313	596,596	C
240395,500	4240283,001	604,038	C	241668,000	4239860,313	596,631	C
240392,000	4240283,001	604,047	C	241664,500	4239860,313	596,639	C
240378,000	4240283,001	604,082	C	241650,500	4239860,313	596,674	C
240374,500	4240283,001	604,091	C	241647,000	4239860,313	596,683	C
240360,500	4240283,001	604,126	C	241633,000	4239860,313	596,718	C
240357,000	4240283,001	604,135	C	241629,500	4239860,313	596,727	C
240343,000	4240283,001	604,170	C	241615,500	4239860,313	596,762	C
240339,500	4240283,001	604,178	C	241612,000	4239860,313	596,771	C
240325,500	4240283,001	604,213	C	241598,000	4239860,313	596,805	C
240322,000	4240283,001	604,222	C	241594,500	4239860,313	596,814	C
240308,000	4240283,001	604,257	C	241580,500	4239860,313	596,849	C
240304,500	4240283,001	604,266	C	241577,000	4239860,313	596,858	C
240290,500	4240283,001	604,301	C	241563,000	4239860,313	596,893	C
240287,000	4240283,001	604,310	C	241559,500	4239860,313	596,902	C
240273,000	4240283,001	604,345	C	241545,500	4239860,313	596,937	C
240269,500	4240283,001	604,353	C	241542,000	4239860,313	596,945	C
240255,500	4240283,001	604,388	C	241528,000	4239860,313	596,980	C
240252,000	4240283,001	604,397	C	241524,500	4239860,313	596,989	C
240238,000	4240283,001	604,432	C	241510,500	4239860,313	597,024	C
240234,500	4240283,001	604,441	C	241507,000	4239860,313	597,033	C
240220,500	4240283,001	604,476	C	241493,000	4239860,313	597,068	C
240217,000	4240283,001	604,485	C	241489,500	4239860,313	597,077	C
240203,000	4240283,001	604,520	C	241475,500	4239860,313	597,112	C
240199,500	4240283,001	604,528	C	241472,000	4239860,313	597,120	C
240185,500	4240283,001	604,563	C	241458,000	4239860,313	597,155	C
240182,000	4240283,001	604,572	C	241454,500	4239860,313	597,164	C

Coord. X	Coord. Y	Elevación	Código
240168,000	4240283,001	604,607	C
240164,500	4240283,001	604,616	C
240150,500	4240283,001	604,651	C
240147,000	4240283,001	604,660	C
240133,000	4240283,001	604,695	C
240129,500	4240283,001	604,703	C
240115,500	4240283,001	604,738	C
240112,000	4240283,001	604,747	C
240098,000	4240283,001	604,782	C
240094,500	4240283,001	604,791	C
240080,500	4240283,001	604,826	C
240077,000	4240283,001	604,835	C
240063,000	4240283,001	604,870	C
240059,500	4240283,001	604,878	C
240045,500	4240283,001	604,913	C
240042,000	4240283,001	604,922	C
240028,000	4240283,001	604,957	C
240024,500	4240283,001	604,966	C
240024,500	4240279,001	604,926	C
240028,000	4240279,001	604,917	C
240042,000	4240279,001	604,882	C
240045,500	4240279,001	604,873	C
240059,500	4240279,001	604,838	C
240063,000	4240279,001	604,830	C
240077,000	4240279,001	604,795	C
240080,500	4240279,001	604,786	C
240094,500	4240279,001	604,751	C
240098,000	4240279,001	604,742	C
240112,000	4240279,001	604,707	C
240115,500	4240279,001	604,698	C
240129,500	4240279,001	604,663	C
240133,000	4240279,001	604,655	C
240147,000	4240279,001	604,620	C
240150,500	4240279,001	604,611	C
240164,500	4240279,001	604,576	C
240168,000	4240279,001	604,567	C
240182,000	4240279,001	604,532	C
240185,500	4240279,001	604,523	C
240199,500	4240279,001	604,488	C
240203,000	4240279,001	604,480	C
240217,000	4240279,001	604,445	C
240220,500	4240279,001	604,436	C
240234,500	4240279,001	604,401	C
240238,000	4240279,001	604,392	C
240252,000	4240279,001	604,357	C
240255,500	4240279,001	604,348	C

Coord. X	Coord. Y	Elevación	Código
241440,500	4239860,313	597,199	C
241437,000	4239860,313	597,208	C
241423,000	4239860,313	597,243	C
241419,500	4239860,313	597,252	C
241405,500	4239860,313	597,287	C
241402,000	4239860,313	597,295	C
241388,000	4239860,313	597,330	C
241384,500	4239860,313	597,339	C
241370,500	4239860,313	597,374	C
241367,000	4239860,313	597,383	C
241353,000	4239860,313	597,418	C
241349,500	4239860,313	597,427	C
241335,500	4239860,313	597,462	C
241332,000	4239860,313	597,470	C
241318,000	4239860,313	597,505	C
241314,500	4239860,313	597,514	C
241300,500	4239860,313	597,549	C
241297,000	4239860,313	597,558	C
241283,000	4239860,313	597,593	C
241279,500	4239860,313	597,602	C
241265,500	4239860,313	597,637	C
241262,000	4239860,313	597,645	C
241248,000	4239860,313	597,680	C
241244,500	4239860,313	597,689	C
241230,500	4239860,313	597,724	C
241227,000	4239860,313	597,733	C
241227,000	4239856,313	597,693	C
241230,500	4239856,313	597,684	C
241244,500	4239856,313	597,649	C
241248,000	4239856,313	597,640	C
241262,000	4239856,313	597,605	C
241265,500	4239856,313	597,597	C
241279,500	4239856,313	597,562	C
241283,000	4239856,313	597,553	C
241297,000	4239856,313	597,518	C
241300,500	4239856,313	597,509	C
241314,500	4239856,313	597,474	C
241318,000	4239856,313	597,465	C
241332,000	4239856,313	597,430	C
241335,500	4239856,313	597,422	C
241349,500	4239856,313	597,387	C
241353,000	4239856,313	597,378	C
241367,000	4239856,313	597,343	C
241370,500	4239856,313	597,334	C
241384,500	4239856,313	597,299	C
241388,000	4239856,313	597,290	C

Coord. X	Coord. Y	Elevación	Código
240269,500	4240279,001	604,313	C
240273,000	4240279,001	604,305	C
240287,000	4240279,001	604,270	C
240290,500	4240279,001	604,261	C
240304,500	4240279,001	604,226	C
240308,000	4240279,001	604,217	C
240322,000	4240279,001	604,182	C
240325,500	4240279,001	604,173	C
240339,500	4240279,001	604,138	C
240343,000	4240279,001	604,130	C
240357,000	4240279,001	604,095	C
240360,500	4240279,001	604,086	C
240374,500	4240279,001	604,051	C
240378,000	4240279,001	604,042	C
240392,000	4240279,001	604,007	C
240395,500	4240279,001	603,998	C
240409,500	4240279,001	603,963	C
240413,000	4240279,001	603,955	C
240427,000	4240279,001	603,920	C
240430,500	4240279,001	603,911	C
240444,500	4240279,001	603,876	C
240448,000	4240279,001	603,867	C
240462,000	4240279,001	603,832	C
240465,500	4240279,001	603,823	C
240479,500	4240279,001	603,788	C
240483,000	4240279,001	603,780	C
240497,000	4240279,001	603,745	C
240500,500	4240279,001	603,736	C
240514,500	4240279,001	603,701	C
240518,000	4240279,001	603,692	C
240532,000	4240279,001	603,657	C
240535,500	4240279,001	603,648	C
240549,500	4240279,001	603,613	C
240553,000	4240279,001	603,605	C
240567,000	4240279,001	603,570	C
240570,500	4240279,001	603,561	C
240584,500	4240279,001	603,526	C
240588,000	4240279,001	603,517	C
240602,000	4240279,001	603,482	C
240605,500	4240279,001	603,473	C
240619,500	4240279,001	603,438	C
240623,000	4240279,001	603,430	C
240637,000	4240279,001	603,395	C
240640,500	4240279,001	603,386	C
240654,500	4240279,001	603,351	C
240658,000	4240279,001	603,342	C

Coord. X	Coord. Y	Elevación	Código
241402,000	4239856,313	597,255	C
241405,500	4239856,313	597,247	C
241419,500	4239856,313	597,212	C
241423,000	4239856,313	597,203	C
241437,000	4239856,313	597,168	C
241440,500	4239856,313	597,159	C
241454,500	4239856,313	597,124	C
241458,000	4239856,313	597,115	C
241472,000	4239856,313	597,080	C
241475,500	4239856,313	597,072	C
241489,500	4239856,313	597,037	C
241493,000	4239856,313	597,028	C
241507,000	4239856,313	596,993	C
241510,500	4239856,313	596,984	C
241524,500	4239856,313	596,949	C
241528,000	4239856,313	596,940	C
241542,000	4239856,313	596,905	C
241545,500	4239856,313	596,897	C
241559,500	4239856,313	596,862	C
241563,000	4239856,313	596,853	C
241577,000	4239856,313	596,818	C
241580,500	4239856,313	596,809	C
241594,500	4239856,313	596,774	C
241598,000	4239856,313	596,765	C
241612,000	4239856,313	596,731	C
241615,500	4239856,313	596,722	C
241629,500	4239856,313	596,687	C
241633,000	4239856,313	596,678	C
241647,000	4239856,313	596,643	C
241650,500	4239856,313	596,634	C
241664,500	4239856,313	596,599	C
241668,000	4239856,313	596,591	C
241682,000	4239856,313	596,556	C
241685,500	4239856,313	596,547	C
241699,500	4239856,313	596,512	C
241703,000	4239856,313	596,503	C
241717,000	4239856,313	596,468	C
241720,500	4239856,313	596,459	C
241734,500	4239856,313	596,424	C
241738,000	4239856,313	596,416	C
241752,000	4239856,313	596,381	C
241755,500	4239856,313	596,372	C
241769,500	4239856,313	596,337	C
241773,000	4239856,313	596,328	C
241773,000	4239848,259	596,248	C
241769,500	4239848,259	596,256	C

Coord. X	Coord. Y	Elevación	Código
240672,000	4240279,001	603,307	C
240675,500	4240279,001	603,298	C
240689,500	4240279,001	603,263	C
240693,000	4240279,001	603,255	C
240707,000	4240279,001	603,220	C
240710,500	4240279,001	603,211	C
240724,500	4240279,001	603,176	C
240728,000	4240279,001	603,167	C
240742,000	4240279,001	603,132	C
240745,500	4240279,001	603,123	C
240759,500	4240279,001	603,088	C
240763,000	4240279,001	603,080	C
240777,000	4240279,001	603,045	C
240780,500	4240279,001	603,036	C
240794,500	4240279,001	603,001	C
240798,000	4240279,001	602,992	C
240812,000	4240279,001	602,957	C
240815,500	4240279,001	602,948	C
240829,500	4240279,001	602,913	C
240833,000	4240279,001	602,905	C
240847,000	4240279,001	602,870	C
240850,500	4240279,001	602,861	C
240864,500	4240279,001	602,826	C
240868,000	4240279,001	602,817	C
240882,000	4240279,001	602,782	C
240885,500	4240279,001	602,773	C
240899,500	4240279,001	602,738	C
240903,000	4240279,001	602,730	C
240917,000	4240279,001	602,695	C
240920,500	4240279,001	602,686	C
240934,500	4240279,001	602,651	C
240938,000	4240279,001	602,642	C
240952,000	4240279,001	602,607	C
240955,500	4240279,001	602,598	C
240969,500	4240279,001	602,563	C
240973,000	4240279,001	602,555	C
240987,000	4240279,001	602,520	C
240990,500	4240279,001	602,511	C
241004,500	4240279,001	602,476	C
241008,000	4240279,001	602,467	C
241022,000	4240279,001	602,432	C
241025,500	4240279,001	602,424	C
241039,500	4240279,001	602,389	C
241043,000	4240279,001	602,380	C
241057,000	4240279,001	602,345	C
241060,500	4240279,001	602,336	C

Coord. X	Coord. Y	Elevación	Código
241755,500	4239848,259	596,291	C
241752,000	4239848,259	596,300	C
241738,000	4239848,259	596,335	C
241734,500	4239848,259	596,344	C
241720,500	4239848,259	596,379	C
241717,000	4239848,259	596,388	C
241703,000	4239848,259	596,423	C
241699,500	4239848,259	596,431	C
241685,500	4239848,259	596,466	C
241682,000	4239848,259	596,475	C
241668,000	4239848,259	596,510	C
241664,500	4239848,259	596,519	C
241650,500	4239848,259	596,554	C
241647,000	4239848,259	596,563	C
241633,000	4239848,259	596,597	C
241629,500	4239848,259	596,606	C
241615,500	4239848,259	596,641	C
241612,000	4239848,259	596,650	C
241598,000	4239848,259	596,685	C
241594,500	4239848,259	596,694	C
241580,500	4239848,259	596,729	C
241577,000	4239848,259	596,737	C
241563,000	4239848,259	596,772	C
241559,500	4239848,259	596,781	C
241545,500	4239848,259	596,816	C
241542,000	4239848,259	596,825	C
241528,000	4239848,259	596,860	C
241524,500	4239848,259	596,869	C
241510,500	4239848,259	596,904	C
241507,000	4239848,259	596,912	C
241493,000	4239848,259	596,947	C
241489,500	4239848,259	596,956	C
241475,500	4239848,259	596,991	C
241472,000	4239848,259	597,000	C
241458,000	4239848,259	597,035	C
241454,500	4239848,259	597,044	C
241440,500	4239848,259	597,079	C
241437,000	4239848,259	597,087	C
241423,000	4239848,259	597,122	C
241419,500	4239848,259	597,131	C
241405,500	4239848,259	597,166	C
241402,000	4239848,259	597,175	C
241388,000	4239848,259	597,210	C
241384,500	4239848,259	597,219	C
241370,500	4239848,259	597,254	C
241367,000	4239848,259	597,262	C

Coord. X	Coord. Y	Elevación	Código
241074,500	4240279,001	602,301	C
241078,000	4240279,001	602,292	C
241092,000	4240279,001	602,257	C
241095,500	4240279,001	602,249	C
241109,500	4240279,001	602,214	C
241113,000	4240279,001	602,205	C
241127,000	4240279,001	602,170	C
241130,500	4240279,001	602,161	C
241144,500	4240279,001	602,126	C
241148,000	4240279,001	602,117	C
241162,000	4240279,001	602,082	C
241165,500	4240279,001	602,074	C
241179,500	4240279,001	602,039	C
241183,000	4240279,001	602,030	C
241197,000	4240279,001	601,995	C
241200,500	4240279,001	601,986	C
241214,500	4240279,001	601,951	C
241218,000	4240279,001	601,942	C
241232,000	4240279,001	601,907	C
241235,500	4240279,001	601,899	C
241249,500	4240279,001	601,864	C
241253,000	4240279,001	601,855	C
241267,000	4240279,001	601,820	C
241270,500	4240279,001	601,811	C
241284,500	4240279,001	601,776	C
241288,000	4240279,001	601,767	C
241302,000	4240279,001	601,732	C
241305,500	4240279,001	601,724	C
241319,500	4240279,001	601,689	C
241323,000	4240279,001	601,680	C
241337,000	4240279,001	601,645	C
241340,500	4240279,001	601,636	C
241354,500	4240279,001	601,601	C
241358,000	4240279,001	601,592	C
241372,000	4240279,001	601,557	C
241375,500	4240279,001	601,549	C
241389,500	4240279,001	601,514	C
241393,000	4240279,001	601,505	C
241407,000	4240279,001	601,470	C
241410,500	4240279,001	601,461	C
241424,500	4240279,001	601,426	C
241428,000	4240279,001	601,417	C
241442,000	4240279,001	601,382	C
241445,500	4240279,001	601,374	C
241459,500	4240279,001	601,339	C
241463,000	4240279,001	601,330	C

Coord. X	Coord. Y	Elevación	Código
241353,000	4239848,259	597,297	C
241349,500	4239848,259	597,306	C
241335,500	4239848,259	597,341	C
241332,000	4239848,259	597,350	C
241318,000	4239848,259	597,385	C
241314,500	4239848,259	597,394	C
241300,500	4239848,259	597,428	C
241297,000	4239848,259	597,437	C
241283,000	4239848,259	597,472	C
241279,500	4239848,259	597,481	C
241265,500	4239848,259	597,516	C
241262,000	4239848,259	597,525	C
241248,000	4239848,259	597,560	C
241244,500	4239848,259	597,568	C
241230,500	4239848,259	597,603	C
241227,000	4239848,259	597,612	C
241227,000	4239844,259	597,572	C
241230,500	4239844,259	597,563	C
241244,500	4239844,259	597,528	C
241248,000	4239844,259	597,520	C
241262,000	4239844,259	597,485	C
241265,500	4239844,259	597,476	C
241279,500	4239844,259	597,441	C
241283,000	4239844,259	597,432	C
241297,000	4239844,259	597,397	C
241300,500	4239844,259	597,388	C
241314,500	4239844,259	597,354	C
241318,000	4239844,259	597,345	C
241332,000	4239844,259	597,310	C
241335,500	4239844,259	597,301	C
241349,500	4239844,259	597,266	C
241353,000	4239844,259	597,257	C
241367,000	4239844,259	597,222	C
241370,500	4239844,259	597,214	C
241384,500	4239844,259	597,179	C
241388,000	4239844,259	597,170	C
241402,000	4239844,259	597,135	C
241405,500	4239844,259	597,126	C
241419,500	4239844,259	597,091	C
241423,000	4239844,259	597,082	C
241437,000	4239844,259	597,047	C
241440,500	4239844,259	597,039	C
241454,500	4239844,259	597,004	C
241458,000	4239844,259	596,995	C
241472,000	4239844,259	596,960	C
241475,500	4239844,259	596,951	C

Coord. X	Coord. Y	Elevación	Código
241477,000	4240279,001	601,295	C
241480,500	4240279,001	601,286	C
241494,500	4240279,001	601,251	C
241498,000	4240279,001	601,242	C
241512,000	4240279,001	601,207	C
241515,500	4240279,001	601,199	C
241529,500	4240279,001	601,164	C
241533,000	4240279,001	601,155	C
241547,000	4240279,001	601,120	C
241550,500	4240279,001	601,111	C
241564,500	4240279,001	601,076	C
241568,000	4240279,001	601,067	C
241582,000	4240279,001	601,032	C
241585,500	4240279,001	601,024	C
241599,500	4240279,001	600,989	C
241603,000	4240279,001	600,980	C
241617,000	4240279,001	600,945	C
241620,500	4240279,001	600,936	C
241634,500	4240279,001	600,901	C
241638,000	4240279,001	600,893	C
241652,000	4240279,001	600,858	C
241655,500	4240279,001	600,849	C
241669,500	4240279,001	600,814	C
241673,000	4240279,001	600,805	C
241687,000	4240279,001	600,770	C
241690,500	4240279,001	600,761	C
241704,500	4240279,001	600,726	C
241708,000	4240279,001	600,718	C
241722,000	4240279,001	600,683	C
241725,500	4240279,001	600,674	C
241739,500	4240279,001	600,639	C
241743,000	4240279,001	600,630	C
241757,000	4240279,001	600,595	C
241760,500	4240279,001	600,586	C
241760,500	4240270,948	600,506	C
241757,000	4240270,948	600,515	C
241743,000	4240270,948	600,550	C
241739,500	4240270,948	600,558	C
241725,500	4240270,948	600,593	C
241722,000	4240270,948	600,602	C
241708,000	4240270,948	600,637	C
241704,500	4240270,948	600,646	C
241690,500	4240270,948	600,681	C
241687,000	4240270,948	600,689	C
241673,000	4240270,948	600,724	C
241669,500	4240270,948	600,733	C

Coord. X	Coord. Y	Elevación	Código
241489,500	4239844,259	596,916	C
241493,000	4239844,259	596,907	C
241507,000	4239844,259	596,872	C
241510,500	4239844,259	596,864	C
241524,500	4239844,259	596,829	C
241528,000	4239844,259	596,820	C
241542,000	4239844,259	596,785	C
241545,500	4239844,259	596,776	C
241559,500	4239844,259	596,741	C
241563,000	4239844,259	596,732	C
241577,000	4239844,259	596,697	C
241580,500	4239844,259	596,689	C
241594,500	4239844,259	596,654	C
241598,000	4239844,259	596,645	C
241612,000	4239844,259	596,610	C
241615,500	4239844,259	596,601	C
241629,500	4239844,259	596,566	C
241633,000	4239844,259	596,557	C
241647,000	4239844,259	596,523	C
241650,500	4239844,259	596,514	C
241664,500	4239844,259	596,479	C
241668,000	4239844,259	596,470	C
241682,000	4239844,259	596,435	C
241685,500	4239844,259	596,426	C
241699,500	4239844,259	596,391	C
241703,000	4239844,259	596,383	C
241717,000	4239844,259	596,348	C
241720,500	4239844,259	596,339	C
241734,500	4239844,259	596,304	C
241738,000	4239844,259	596,295	C
241752,000	4239844,259	596,260	C
241755,500	4239844,259	596,251	C
241769,500	4239844,259	596,216	C
241773,000	4239844,259	596,208	C
241773,000	4239835,205	596,117	C
241769,500	4239835,205	596,126	C
241755,500	4239835,205	596,161	C
241752,000	4239835,205	596,170	C
241738,000	4239835,205	596,205	C
241734,500	4239835,205	596,213	C
241720,500	4239835,205	596,248	C
241717,000	4239835,205	596,257	C
241703,000	4239835,205	596,292	C
241699,500	4239835,205	596,301	C
241685,500	4239835,205	596,336	C
241682,000	4239835,205	596,344	C

Coord. X	Coord. Y	Elevación	Código
241655,500	4240270,948	600,768	C
241652,000	4240270,948	600,777	C
241638,000	4240270,948	600,812	C
241634,500	4240270,948	600,821	C
241620,500	4240270,948	600,856	C
241617,000	4240270,948	600,864	C
241603,000	4240270,948	600,899	C
241599,500	4240270,948	600,908	C
241585,500	4240270,948	600,943	C
241582,000	4240270,948	600,952	C
241568,000	4240270,948	600,987	C
241564,500	4240270,948	600,996	C
241550,500	4240270,948	601,031	C
241547,000	4240270,948	601,039	C
241533,000	4240270,948	601,074	C
241529,500	4240270,948	601,083	C
241515,500	4240270,948	601,118	C
241512,000	4240270,948	601,127	C
241498,000	4240270,948	601,162	C
241494,500	4240270,948	601,171	C
241480,500	4240270,948	601,206	C
241477,000	4240270,948	601,214	C
241463,000	4240270,948	601,249	C
241459,500	4240270,948	601,258	C
241445,500	4240270,948	601,293	C
241442,000	4240270,948	601,302	C
241428,000	4240270,948	601,337	C
241424,500	4240270,948	601,346	C
241410,500	4240270,948	601,381	C
241407,000	4240270,948	601,389	C
241393,000	4240270,948	601,424	C
241389,500	4240270,948	601,433	C
241375,500	4240270,948	601,468	C
241372,000	4240270,948	601,477	C
241358,000	4240270,948	601,512	C
241354,500	4240270,948	601,521	C
241340,500	4240270,948	601,556	C
241337,000	4240270,948	601,564	C
241323,000	4240270,948	601,599	C
241319,500	4240270,948	601,608	C
241305,500	4240270,948	601,643	C
241302,000	4240270,948	601,652	C
241288,000	4240270,948	601,687	C
241284,500	4240270,948	601,696	C
241270,500	4240270,948	601,731	C
241267,000	4240270,948	601,739	C

Coord. X	Coord. Y	Elevación	Código
241668,000	4239835,205	596,379	C
241664,500	4239835,205	596,388	C
241650,500	4239835,205	596,423	C
241647,000	4239835,205	596,432	C
241633,000	4239835,205	596,467	C
241629,500	4239835,205	596,476	C
241615,500	4239835,205	596,511	C
241612,000	4239835,205	596,519	C
241598,000	4239835,205	596,554	C
241594,500	4239835,205	596,563	C
241580,500	4239835,205	596,598	C
241577,000	4239835,205	596,607	C
241563,000	4239835,205	596,642	C
241559,500	4239835,205	596,651	C
241545,500	4239835,205	596,686	C
241542,000	4239835,205	596,694	C
241528,000	4239835,205	596,729	C
241524,500	4239835,205	596,738	C
241510,500	4239835,205	596,773	C
241507,000	4239835,205	596,782	C
241493,000	4239835,205	596,817	C
241489,500	4239835,205	596,826	C
241475,500	4239835,205	596,861	C
241472,000	4239835,205	596,869	C
241458,000	4239835,205	596,904	C
241454,500	4239835,205	596,913	C
241440,500	4239835,205	596,948	C
241437,000	4239835,205	596,957	C
241423,000	4239835,205	596,992	C
241419,500	4239835,205	597,001	C
241405,500	4239835,205	597,036	C
241402,000	4239835,205	597,044	C
241388,000	4239835,205	597,079	C
241384,500	4239835,205	597,088	C
241370,500	4239835,205	597,123	C
241367,000	4239835,205	597,132	C
241353,000	4239835,205	597,167	C
241349,500	4239835,205	597,175	C
241335,500	4239835,205	597,210	C
241332,000	4239835,205	597,219	C
241318,000	4239835,205	597,254	C
241314,500	4239835,205	597,263	C
241300,500	4239835,205	597,298	C
241297,000	4239835,205	597,307	C
241283,000	4239835,205	597,342	C
241279,500	4239835,205	597,350	C

Coord. X	Coord. Y	Elevación	Código
241253,000	4240270,948	601,774	C
241249,500	4240270,948	601,783	C
241235,500	4240270,948	601,818	C
241232,000	4240270,948	601,827	C
241218,000	4240270,948	601,862	C
241214,500	4240270,948	601,871	C
241200,500	4240270,948	601,906	C
241197,000	4240270,948	601,914	C
241183,000	4240270,948	601,949	C
241179,500	4240270,948	601,958	C
241165,500	4240270,948	601,993	C
241162,000	4240270,948	602,002	C
241148,000	4240270,948	602,037	C
241144,500	4240270,948	602,045	C
241130,500	4240270,948	602,080	C
241127,000	4240270,948	602,089	C
241113,000	4240270,948	602,124	C
241109,500	4240270,948	602,133	C
241095,500	4240270,948	602,168	C
241092,000	4240270,948	602,177	C
241078,000	4240270,948	602,212	C
241074,500	4240270,948	602,220	C
241060,500	4240270,948	602,255	C
241057,000	4240270,948	602,264	C
241043,000	4240270,948	602,299	C
241039,500	4240270,948	602,308	C
241025,500	4240270,948	602,343	C
241022,000	4240270,948	602,352	C
241008,000	4240270,948	602,387	C
241004,500	4240270,948	602,395	C
240990,500	4240270,948	602,430	C
240987,000	4240270,948	602,439	C
240973,000	4240270,948	602,474	C
240969,500	4240270,948	602,483	C
240955,500	4240270,948	602,518	C
240952,000	4240270,948	602,527	C
240938,000	4240270,948	602,562	C
240934,500	4240270,948	602,570	C
240920,500	4240270,948	602,605	C
240917,000	4240270,948	602,614	C
240903,000	4240270,948	602,649	C
240899,500	4240270,948	602,658	C
240885,500	4240270,948	602,693	C
240882,000	4240270,948	602,702	C
240868,000	4240270,948	602,737	C
240864,500	4240270,948	602,745	C

Coord. X	Coord. Y	Elevación	Código
241265,500	4239835,205	597,385	C
241262,000	4239835,205	597,394	C
241248,000	4239835,205	597,429	C
241244,500	4239835,205	597,438	C
241230,500	4239835,205	597,473	C
241227,000	4239835,205	597,482	C
241227,000	4239832,055	597,450	C
241230,500	4239832,055	597,441	C
241244,500	4239832,055	597,406	C
241248,000	4239832,055	597,398	C
241262,000	4239832,055	597,363	C
241265,500	4239832,055	597,354	C
241279,500	4239832,055	597,319	C
241283,000	4239832,055	597,310	C
241297,000	4239832,055	597,275	C
241300,500	4239832,055	597,266	C
241314,500	4239832,055	597,231	C
241318,000	4239832,055	597,223	C
241332,000	4239832,055	597,188	C
241335,500	4239832,055	597,179	C
241349,500	4239832,055	597,144	C
241353,000	4239832,055	597,135	C
241367,000	4239832,055	597,100	C
241370,500	4239832,055	597,092	C
241384,500	4239832,055	597,057	C
241388,000	4239832,055	597,048	C
241402,000	4239832,055	597,013	C
241405,500	4239832,055	597,004	C
241419,500	4239832,055	596,969	C
241423,000	4239832,055	596,960	C
241437,000	4239832,055	596,925	C
241440,500	4239832,055	596,917	C
241454,500	4239832,055	596,882	C
241458,000	4239832,055	596,873	C
241472,000	4239832,055	596,838	C
241475,500	4239832,055	596,829	C
241489,500	4239832,055	596,794	C
241493,000	4239832,055	596,785	C
241507,000	4239832,055	596,750	C
241510,500	4239832,055	596,742	C
241524,500	4239832,055	596,707	C
241528,000	4239832,055	596,698	C
241542,000	4239832,055	596,663	C
241545,500	4239832,055	596,654	C
241559,500	4239832,055	596,619	C
241563,000	4239832,055	596,610	C

Coord. X	Coord. Y	Elevación	Código
240850,500	4240270,948	602,780	C
240847,000	4240270,948	602,789	C
240833,000	4240270,948	602,824	C
240829,500	4240270,948	602,833	C
240815,500	4240270,948	602,868	C
240812,000	4240270,948	602,877	C
240798,000	4240270,948	602,912	C
240794,500	4240270,948	602,920	C
240780,500	4240270,948	602,955	C
240777,000	4240270,948	602,964	C
240763,000	4240270,948	602,999	C
240759,500	4240270,948	603,008	C
240745,500	4240270,948	603,043	C
240742,000	4240270,948	603,052	C
240728,000	4240270,948	603,087	C
240724,500	4240270,948	603,095	C
240710,500	4240270,948	603,130	C
240707,000	4240270,948	603,139	C
240693,000	4240270,948	603,174	C
240689,500	4240270,948	603,183	C
240675,500	4240270,948	603,218	C
240672,000	4240270,948	603,227	C
240658,000	4240270,948	603,262	C
240654,500	4240270,948	603,270	C
240640,500	4240270,948	603,305	C
240637,000	4240270,948	603,314	C
240623,000	4240270,948	603,349	C
240619,500	4240270,948	603,358	C
240605,500	4240270,948	603,393	C
240602,000	4240270,948	603,402	C
240588,000	4240270,948	603,437	C
240584,500	4240270,948	603,445	C
240570,500	4240270,948	603,480	C
240567,000	4240270,948	603,489	C
240553,000	4240270,948	603,524	C
240549,500	4240270,948	603,533	C
240535,500	4240270,948	603,568	C
240532,000	4240270,948	603,577	C
240518,000	4240270,948	603,612	C
240514,500	4240270,948	603,620	C
240500,500	4240270,948	603,655	C
240497,000	4240270,948	603,664	C
240483,000	4240270,948	603,699	C
240479,500	4240270,948	603,708	C
240465,500	4240270,948	603,743	C
240462,000	4240270,948	603,752	C

Coord. X	Coord. Y	Elevación	Código
241577,000	4239832,055	596,575	C
241580,500	4239832,055	596,567	C
241594,500	4239832,055	596,532	C
241598,000	4239832,055	596,523	C
241612,000	4239832,055	596,488	C
241615,500	4239832,055	596,479	C
241629,500	4239832,055	596,444	C
241633,000	4239832,055	596,435	C
241647,000	4239832,055	596,400	C
241650,500	4239832,055	596,392	C
241664,500	4239832,055	596,357	C
241668,000	4239832,055	596,348	C
241682,000	4239832,055	596,313	C
241685,500	4239832,055	596,304	C
241699,500	4239832,055	596,269	C
241703,000	4239832,055	596,261	C
241717,000	4239832,055	596,226	C
241720,500	4239832,055	596,217	C
241734,500	4239832,055	596,182	C
241738,000	4239832,055	596,173	C
241752,000	4239832,055	596,138	C
241755,500	4239832,055	596,129	C
241769,500	4239832,055	596,094	C
241773,000	4239832,055	596,086	C
241773,000	4239823,001	595,995	C
241769,500	4239823,001	596,004	C
241755,500	4239823,001	596,039	C
241752,000	4239823,001	596,048	C
241738,000	4239823,001	596,083	C
241734,500	4239823,001	596,091	C
241720,500	4239823,001	596,126	C
241717,000	4239823,001	596,135	C
241703,000	4239823,001	596,170	C
241699,500	4239823,001	596,179	C
241685,500	4239823,001	596,214	C
241682,000	4239823,001	596,222	C
241668,000	4239823,001	596,257	C
241664,500	4239823,001	596,266	C
241650,500	4239823,001	596,301	C
241647,000	4239823,001	596,310	C
241633,000	4239823,001	596,345	C
241629,500	4239823,001	596,354	C
241615,500	4239823,001	596,389	C
241612,000	4239823,001	596,397	C
241598,000	4239823,001	596,432	C
241594,500	4239823,001	596,441	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240448,000	4240270,948	603,787	C	241580,500	4239823,001	596,476	C
240444,500	4240270,948	603,795	C	241577,000	4239823,001	596,485	C
240430,500	4240270,948	603,830	C	241563,000	4239823,001	596,520	C
240427,000	4240270,948	603,839	C	241559,500	4239823,001	596,529	C
240413,000	4240270,948	603,874	C	241545,500	4239823,001	596,564	C
240409,500	4240270,948	603,883	C	241542,000	4239823,001	596,572	C
240395,500	4240270,948	603,918	C	241528,000	4239823,001	596,607	C
240392,000	4240270,948	603,927	C	241524,500	4239823,001	596,616	C
240378,000	4240270,948	603,962	C	241510,500	4239823,001	596,651	C
240374,500	4240270,948	603,970	C	241507,000	4239823,001	596,660	C
240360,500	4240270,948	604,005	C	241493,000	4239823,001	596,695	C
240357,000	4240270,948	604,014	C	241489,500	4239823,001	596,704	C
240343,000	4240270,948	604,049	C	241475,500	4239823,001	596,739	C
240339,500	4240270,948	604,058	C	241472,000	4239823,001	596,747	C
240325,500	4240270,948	604,093	C	241458,000	4239823,001	596,782	C
240322,000	4240270,948	604,102	C	241454,500	4239823,001	596,791	C
240308,000	4240270,948	604,137	C	241440,500	4239823,001	596,826	C
240304,500	4240270,948	604,145	C	241437,000	4239823,001	596,835	C
240290,500	4240270,948	604,180	C	241423,000	4239823,001	596,870	C
240287,000	4240270,948	604,189	C	241419,500	4239823,001	596,879	C
240273,000	4240270,948	604,224	C	241405,500	4239823,001	596,913	C
240269,500	4240270,948	604,233	C	241402,000	4239823,001	596,922	C
240255,500	4240270,948	604,268	C	241388,000	4239823,001	596,957	C
240252,000	4240270,948	604,277	C	241384,500	4239823,001	596,966	C
240238,000	4240270,948	604,312	C	241370,500	4239823,001	597,001	C
240234,500	4240270,948	604,320	C	241367,000	4239823,001	597,010	C
240220,500	4240270,948	604,355	C	241353,000	4239823,001	597,045	C
240217,000	4240270,948	604,364	C	241349,500	4239823,001	597,053	C
240203,000	4240270,948	604,399	C	241335,500	4239823,001	597,088	C
240199,500	4240270,948	604,408	C	241332,000	4239823,001	597,097	C
240185,500	4240270,948	604,443	C	241318,000	4239823,001	597,132	C
240182,000	4240270,948	604,452	C	241314,500	4239823,001	597,141	C
240168,000	4240270,948	604,487	C	241300,500	4239823,001	597,176	C
240164,500	4240270,948	604,495	C	241297,000	4239823,001	597,185	C
240150,500	4240270,948	604,530	C	241283,000	4239823,001	597,220	C
240147,000	4240270,948	604,539	C	241279,500	4239823,001	597,228	C
240133,000	4240270,948	604,574	C	241265,500	4239823,001	597,263	C
240129,500	4240270,948	604,583	C	241262,000	4239823,001	597,272	C
240115,500	4240270,948	604,618	C	241248,000	4239823,001	597,307	C
240112,000	4240270,948	604,627	C	241244,500	4239823,001	597,316	C
240098,000	4240270,948	604,662	C	241230,500	4239823,001	597,351	C
240094,500	4240270,948	604,670	C	241227,000	4239823,001	597,360	C
240080,500	4240270,948	604,705	C	241227,000	4239819,001	597,320	C
240077,000	4240270,948	604,714	C	241230,500	4239819,001	597,311	C
240063,000	4240270,948	604,749	C	241244,500	4239819,001	597,276	C
240059,500	4240270,948	604,758	C	241248,000	4239819,001	597,267	C

Coord. X	Coord. Y	Elevación	Código
240045,500	4240270,948	604,793	C
240042,000	4240270,948	604,802	C
240028,000	4240270,948	604,837	C
240024,500	4240270,948	604,845	C
240024,500	4240266,948	604,805	C
240028,000	4240266,948	604,797	C
240042,000	4240266,948	604,762	C
240045,500	4240266,948	604,753	C
240059,500	4240266,948	604,718	C
240063,000	4240266,948	604,709	C
240077,000	4240266,948	604,674	C
240080,500	4240266,948	604,665	C
240094,500	4240266,948	604,630	C
240098,000	4240266,948	604,622	C
240112,000	4240266,948	604,587	C
240115,500	4240266,948	604,578	C
240129,500	4240266,948	604,543	C
240133,000	4240266,948	604,534	C
240147,000	4240266,948	604,499	C
240150,500	4240266,948	604,490	C
240164,500	4240266,948	604,455	C
240168,000	4240266,948	604,447	C
240182,000	4240266,948	604,412	C
240185,500	4240266,948	604,403	C
240199,500	4240266,948	604,368	C
240203,000	4240266,948	604,359	C
240217,000	4240266,948	604,324	C
240220,500	4240266,948	604,315	C
240234,500	4240266,948	604,280	C
240238,000	4240266,948	604,272	C
240252,000	4240266,948	604,237	C
240255,500	4240266,948	604,228	C
240269,500	4240266,948	604,193	C
240273,000	4240266,948	604,184	C
240287,000	4240266,948	604,149	C
240290,500	4240266,948	604,140	C
240304,500	4240266,948	604,105	C
240308,000	4240266,948	604,097	C
240322,000	4240266,948	604,062	C
240325,500	4240266,948	604,053	C
240339,500	4240266,948	604,018	C
240343,000	4240266,948	604,009	C
240357,000	4240266,948	603,974	C
240360,500	4240266,948	603,965	C
240374,500	4240266,948	603,930	C
240378,000	4240266,948	603,922	C

Coord. X	Coord. Y	Elevación	Código
241262,000	4239819,001	597,232	C
241265,500	4239819,001	597,223	C
241279,500	4239819,001	597,188	C
241283,000	4239819,001	597,180	C
241297,000	4239819,001	597,145	C
241300,500	4239819,001	597,136	C
241314,500	4239819,001	597,101	C
241318,000	4239819,001	597,092	C
241332,000	4239819,001	597,057	C
241335,500	4239819,001	597,048	C
241349,500	4239819,001	597,013	C
241353,000	4239819,001	597,005	C
241367,000	4239819,001	596,970	C
241370,500	4239819,001	596,961	C
241384,500	4239819,001	596,926	C
241388,000	4239819,001	596,917	C
241402,000	4239819,001	596,882	C
241405,500	4239819,001	596,873	C
241419,500	4239819,001	596,839	C
241423,000	4239819,001	596,830	C
241437,000	4239819,001	596,795	C
241440,500	4239819,001	596,786	C
241454,500	4239819,001	596,751	C
241458,000	4239819,001	596,742	C
241472,000	4239819,001	596,707	C
241475,500	4239819,001	596,699	C
241489,500	4239819,001	596,664	C
241493,000	4239819,001	596,655	C
241507,000	4239819,001	596,620	C
241510,500	4239819,001	596,611	C
241524,500	4239819,001	596,576	C
241528,000	4239819,001	596,567	C
241542,000	4239819,001	596,532	C
241545,500	4239819,001	596,524	C
241559,500	4239819,001	596,489	C
241563,000	4239819,001	596,480	C
241577,000	4239819,001	596,445	C
241580,500	4239819,001	596,436	C
241594,500	4239819,001	596,401	C
241598,000	4239819,001	596,392	C
241612,000	4239819,001	596,357	C
241615,500	4239819,001	596,349	C
241629,500	4239819,001	596,314	C
241633,000	4239819,001	596,305	C
241647,000	4239819,001	596,270	C
241650,500	4239819,001	596,261	C

Coord. X	Coord. Y	Elevación	Código
240392,000	4240266,948	603,887	C
240395,500	4240266,948	603,878	C
240409,500	4240266,948	603,843	C
240413,000	4240266,948	603,834	C
240427,000	4240266,948	603,799	C
240430,500	4240266,948	603,790	C
240444,500	4240266,948	603,755	C
240448,000	4240266,948	603,747	C
240462,000	4240266,948	603,712	C
240465,500	4240266,948	603,703	C
240479,500	4240266,948	603,668	C
240483,000	4240266,948	603,659	C
240497,000	4240266,948	603,624	C
240500,500	4240266,948	603,615	C
240514,500	4240266,948	603,580	C
240518,000	4240266,948	603,572	C
240532,000	4240266,948	603,537	C
240535,500	4240266,948	603,528	C
240549,500	4240266,948	603,493	C
240553,000	4240266,948	603,484	C
240567,000	4240266,948	603,449	C
240570,500	4240266,948	603,440	C
240584,500	4240266,948	603,405	C
240588,000	4240266,948	603,397	C
240602,000	4240266,948	603,362	C
240605,500	4240266,948	603,353	C
240619,500	4240266,948	603,318	C
240623,000	4240266,948	603,309	C
240637,000	4240266,948	603,274	C
240640,500	4240266,948	603,265	C
240654,500	4240266,948	603,230	C
240658,000	4240266,948	603,222	C
240672,000	4240266,948	603,187	C
240675,500	4240266,948	603,178	C
240689,500	4240266,948	603,143	C
240693,000	4240266,948	603,134	C
240707,000	4240266,948	603,099	C
240710,500	4240266,948	603,090	C
240724,500	4240266,948	603,055	C
240728,000	4240266,948	603,047	C
240742,000	4240266,948	603,012	C
240745,500	4240266,948	603,003	C
240759,500	4240266,948	602,968	C
240763,000	4240266,948	602,959	C
240777,000	4240266,948	602,924	C
240780,500	4240266,948	602,915	C

Coord. X	Coord. Y	Elevación	Código
241664,500	4239819,001	596,226	C
241668,000	4239819,001	596,217	C
241682,000	4239819,001	596,182	C
241685,500	4239819,001	596,174	C
241699,500	4239819,001	596,139	C
241703,000	4239819,001	596,130	C
241717,000	4239819,001	596,095	C
241720,500	4239819,001	596,086	C
241734,500	4239819,001	596,051	C
241738,000	4239819,001	596,043	C
241752,000	4239819,001	596,008	C
241755,500	4239819,001	595,999	C
241769,500	4239819,001	595,964	C
241773,000	4239819,001	595,955	C
241773,000	4239810,948	595,874	C
241769,500	4239810,948	595,883	C
241755,500	4239810,948	595,918	C
241752,000	4239810,948	595,927	C
241738,000	4239810,948	595,962	C
241734,500	4239810,948	595,971	C
241720,500	4239810,948	596,006	C
241717,000	4239810,948	596,014	C
241703,000	4239810,948	596,049	C
241699,500	4239810,948	596,058	C
241685,500	4239810,948	596,093	C
241682,000	4239810,948	596,102	C
241668,000	4239810,948	596,137	C
241664,500	4239810,948	596,146	C
241650,500	4239810,948	596,181	C
241647,000	4239810,948	596,189	C
241633,000	4239810,948	596,224	C
241629,500	4239810,948	596,233	C
241615,500	4239810,948	596,268	C
241612,000	4239810,948	596,277	C
241598,000	4239810,948	596,312	C
241594,500	4239810,948	596,321	C
241580,500	4239810,948	596,356	C
241577,000	4239810,948	596,364	C
241563,000	4239810,948	596,399	C
241559,500	4239810,948	596,408	C
241545,500	4239810,948	596,443	C
241542,000	4239810,948	596,452	C
241528,000	4239810,948	596,487	C
241524,500	4239810,948	596,496	C
241510,500	4239810,948	596,531	C
241507,000	4239810,948	596,539	C

Coord. X	Coord. Y	Elevación	Código
240794,500	4240266,948	602,880	C
240798,000	4240266,948	602,872	C
240812,000	4240266,948	602,837	C
240815,500	4240266,948	602,828	C
240829,500	4240266,948	602,793	C
240833,000	4240266,948	602,784	C
240847,000	4240266,948	602,749	C
240850,500	4240266,948	602,740	C
240864,500	4240266,948	602,705	C
240868,000	4240266,948	602,697	C
240882,000	4240266,948	602,662	C
240885,500	4240266,948	602,653	C
240899,500	4240266,948	602,618	C
240903,000	4240266,948	602,609	C
240917,000	4240266,948	602,574	C
240920,500	4240266,948	602,565	C
240934,500	4240266,948	602,530	C
240938,000	4240266,948	602,522	C
240952,000	4240266,948	602,487	C
240955,500	4240266,948	602,478	C
240969,500	4240266,948	602,443	C
240973,000	4240266,948	602,434	C
240987,000	4240266,948	602,399	C
240990,500	4240266,948	602,390	C
241004,500	4240266,948	602,355	C
241008,000	4240266,948	602,347	C
241022,000	4240266,948	602,312	C
241025,500	4240266,948	602,303	C
241039,500	4240266,948	602,268	C
241043,000	4240266,948	602,259	C
241057,000	4240266,948	602,224	C
241060,500	4240266,948	602,215	C
241074,500	4240266,948	602,180	C
241078,000	4240266,948	602,172	C
241092,000	4240266,948	602,137	C
241095,500	4240266,948	602,128	C
241109,500	4240266,948	602,093	C
241113,000	4240266,948	602,084	C
241127,000	4240266,948	602,049	C
241130,500	4240266,948	602,040	C
241144,500	4240266,948	602,005	C
241148,000	4240266,948	601,997	C
241162,000	4240266,948	601,962	C
241165,500	4240266,948	601,953	C
241179,500	4240266,948	601,918	C
241183,000	4240266,948	601,909	C

Coord. X	Coord. Y	Elevación	Código
241493,000	4239810,948	596,574	C
241489,500	4239810,948	596,583	C
241475,500	4239810,948	596,618	C
241472,000	4239810,948	596,627	C
241458,000	4239810,948	596,662	C
241454,500	4239810,948	596,670	C
241440,500	4239810,948	596,705	C
241437,000	4239810,948	596,714	C
241423,000	4239810,948	596,749	C
241419,500	4239810,948	596,758	C
241405,500	4239810,948	596,793	C
241402,000	4239810,948	596,802	C
241388,000	4239810,948	596,837	C
241384,500	4239810,948	596,845	C
241370,500	4239810,948	596,880	C
241367,000	4239810,948	596,889	C
241353,000	4239810,948	596,924	C
241349,500	4239810,948	596,933	C
241335,500	4239810,948	596,968	C
241332,000	4239810,948	596,977	C
241318,000	4239810,948	597,012	C
241314,500	4239810,948	597,020	C
241300,500	4239810,948	597,055	C
241297,000	4239810,948	597,064	C
241283,000	4239810,948	597,099	C
241279,500	4239810,948	597,108	C
241265,500	4239810,948	597,143	C
241262,000	4239810,948	597,152	C
241248,000	4239810,948	597,187	C
241244,500	4239810,948	597,195	C
241230,500	4239810,948	597,230	C
241227,000	4239810,948	597,239	C
241227,000	4239806,948	597,199	C
241230,500	4239806,948	597,190	C
241244,500	4239806,948	597,155	C
241248,000	4239806,948	597,147	C
241262,000	4239806,948	597,112	C
241265,500	4239806,948	597,103	C
241279,500	4239806,948	597,068	C
241283,000	4239806,948	597,059	C
241297,000	4239806,948	597,024	C
241300,500	4239806,948	597,015	C
241314,500	4239806,948	596,980	C
241318,000	4239806,948	596,972	C
241332,000	4239806,948	596,937	C
241335,500	4239806,948	596,928	C

Coord. X	Coord. Y	Elevación	Código
241197,000	4240266,948	601,874	C
241200,500	4240266,948	601,866	C
241214,500	4240266,948	601,831	C
241218,000	4240266,948	601,822	C
241232,000	4240266,948	601,787	C
241235,500	4240266,948	601,778	C
241249,500	4240266,948	601,743	C
241253,000	4240266,948	601,734	C
241267,000	4240266,948	601,699	C
241270,500	4240266,948	601,691	C
241284,500	4240266,948	601,656	C
241288,000	4240266,948	601,647	C
241302,000	4240266,948	601,612	C
241305,500	4240266,948	601,603	C
241319,500	4240266,948	601,568	C
241323,000	4240266,948	601,559	C
241337,000	4240266,948	601,524	C
241340,500	4240266,948	601,516	C
241354,500	4240266,948	601,481	C
241358,000	4240266,948	601,472	C
241372,000	4240266,948	601,437	C
241375,500	4240266,948	601,428	C
241389,500	4240266,948	601,393	C
241393,000	4240266,948	601,384	C
241407,000	4240266,948	601,349	C
241410,500	4240266,948	601,341	C
241424,500	4240266,948	601,306	C
241428,000	4240266,948	601,297	C
241442,000	4240266,948	601,262	C
241445,500	4240266,948	601,253	C
241459,500	4240266,948	601,218	C
241463,000	4240266,948	601,209	C
241477,000	4240266,948	601,174	C
241480,500	4240266,948	601,166	C
241494,500	4240266,948	601,131	C
241498,000	4240266,948	601,122	C
241512,000	4240266,948	601,087	C
241515,500	4240266,948	601,078	C
241529,500	4240266,948	601,043	C
241533,000	4240266,948	601,034	C
241547,000	4240266,948	600,999	C
241550,500	4240266,948	600,991	C
241564,500	4240266,948	600,956	C
241568,000	4240266,948	600,947	C
241582,000	4240266,948	600,912	C
241585,500	4240266,948	600,903	C

Coord. X	Coord. Y	Elevación	Código
241349,500	4239806,948	596,893	C
241353,000	4239806,948	596,884	C
241367,000	4239806,948	596,849	C
241370,500	4239806,948	596,840	C
241384,500	4239806,948	596,805	C
241388,000	4239806,948	596,797	C
241402,000	4239806,948	596,762	C
241405,500	4239806,948	596,753	C
241419,500	4239806,948	596,718	C
241423,000	4239806,948	596,709	C
241437,000	4239806,948	596,674	C
241440,500	4239806,948	596,665	C
241454,500	4239806,948	596,630	C
241458,000	4239806,948	596,622	C
241472,000	4239806,948	596,587	C
241475,500	4239806,948	596,578	C
241489,500	4239806,948	596,543	C
241493,000	4239806,948	596,534	C
241507,000	4239806,948	596,499	C
241510,500	4239806,948	596,491	C
241524,500	4239806,948	596,456	C
241528,000	4239806,948	596,447	C
241542,000	4239806,948	596,412	C
241545,500	4239806,948	596,403	C
241559,500	4239806,948	596,368	C
241563,000	4239806,948	596,359	C
241577,000	4239806,948	596,324	C
241580,500	4239806,948	596,316	C
241594,500	4239806,948	596,281	C
241598,000	4239806,948	596,272	C
241612,000	4239806,948	596,237	C
241615,500	4239806,948	596,228	C
241629,500	4239806,948	596,193	C
241633,000	4239806,948	596,184	C
241647,000	4239806,948	596,149	C
241650,500	4239806,948	596,141	C
241664,500	4239806,948	596,106	C
241668,000	4239806,948	596,097	C
241682,000	4239806,948	596,062	C
241685,500	4239806,948	596,053	C
241699,500	4239806,948	596,018	C
241703,000	4239806,948	596,009	C
241717,000	4239806,948	595,974	C
241720,500	4239806,948	595,966	C
241734,500	4239806,948	595,931	C
241738,000	4239806,948	595,922	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241599,500	4240266,948	600,868	C	241752,000	4239806,948	595,887	C
241603,000	4240266,948	600,859	C	241755,500	4239806,948	595,878	C
241617,000	4240266,948	600,824	C	241769,500	4239806,948	595,843	C
241620,500	4240266,948	600,816	C	241773,000	4239806,948	595,834	C
241634,500	4240266,948	600,781	C	241773,000	4239798,894	595,754	C
241638,000	4240266,948	600,772	C	241769,500	4239798,894	595,763	C
241652,000	4240266,948	600,737	C	241755,500	4239798,894	595,798	C
241655,500	4240266,948	600,728	C	241752,000	4239798,894	595,806	C
241669,500	4240266,948	600,693	C	241738,000	4239798,894	595,841	C
241673,000	4240266,948	600,684	C	241734,500	4239798,894	595,850	C
241687,000	4240266,948	600,649	C	241720,500	4239798,894	595,885	C
241690,500	4240266,948	600,641	C	241717,000	4239798,894	595,894	C
241704,500	4240266,948	600,606	C	241703,000	4239798,894	595,929	C
241708,000	4240266,948	600,597	C	241699,500	4239798,894	595,938	C
241722,000	4240266,948	600,562	C	241685,500	4239798,894	595,973	C
241725,500	4240266,948	600,553	C	241682,000	4239798,894	595,981	C
241739,500	4240266,948	600,518	C	241668,000	4239798,894	596,016	C
241743,000	4240266,948	600,510	C	241664,500	4239798,894	596,025	C
241757,000	4240266,948	600,475	C	241650,500	4239798,894	596,060	C
241760,500	4240266,948	600,466	C	241647,000	4239798,894	596,069	C
241760,500	4240258,894	600,385	C	241633,000	4239798,894	596,104	C
241757,000	4240258,894	600,394	C	241629,500	4239798,894	596,113	C
241743,000	4240258,894	600,429	C	241615,500	4239798,894	596,148	C
241739,500	4240258,894	600,438	C	241612,000	4239798,894	596,156	C
241725,500	4240258,894	600,473	C	241598,000	4239798,894	596,191	C
241722,000	4240258,894	600,481	C	241594,500	4239798,894	596,200	C
241708,000	4240258,894	600,516	C	241580,500	4239798,894	596,235	C
241704,500	4240258,894	600,525	C	241577,000	4239798,894	596,244	C
241690,500	4240258,894	600,560	C	241563,000	4239798,894	596,279	C
241687,000	4240258,894	600,569	C	241559,500	4239798,894	596,288	C
241673,000	4240258,894	600,604	C	241545,500	4239798,894	596,323	C
241669,500	4240258,894	600,613	C	241542,000	4239798,894	596,331	C
241655,500	4240258,894	600,648	C	241528,000	4239798,894	596,366	C
241652,000	4240258,894	600,656	C	241524,500	4239798,894	596,375	C
241638,000	4240258,894	600,691	C	241510,500	4239798,894	596,410	C
241634,500	4240258,894	600,700	C	241507,000	4239798,894	596,419	C
241620,500	4240258,894	600,735	C	241493,000	4239798,894	596,454	C
241617,000	4240258,894	600,744	C	241489,500	4239798,894	596,462	C
241603,000	4240258,894	600,779	C	241475,500	4239798,894	596,497	C
241599,500	4240258,894	600,788	C	241472,000	4239798,894	596,506	C
241585,500	4240258,894	600,823	C	241458,000	4239798,894	596,541	C
241582,000	4240258,894	600,831	C	241454,500	4239798,894	596,550	C
241568,000	4240258,894	600,866	C	241440,500	4239798,894	596,585	C
241564,500	4240258,894	600,875	C	241437,000	4239798,894	596,594	C
241550,500	4240258,894	600,910	C	241423,000	4239798,894	596,629	C
241547,000	4240258,894	600,919	C	241419,500	4239798,894	596,637	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241533,000	4240258,894	600,954	C	241405,500	4239798,894	596,672	C
241529,500	4240258,894	600,963	C	241402,000	4239798,894	596,681	C
241515,500	4240258,894	600,998	C	241388,000	4239798,894	596,716	C
241512,000	4240258,894	601,006	C	241384,500	4239798,894	596,725	C
241498,000	4240258,894	601,041	C	241370,500	4239798,894	596,760	C
241494,500	4240258,894	601,050	C	241367,000	4239798,894	596,769	C
241480,500	4240258,894	601,085	C	241353,000	4239798,894	596,804	C
241477,000	4240258,894	601,094	C	241349,500	4239798,894	596,812	C
241463,000	4240258,894	601,129	C	241335,500	4239798,894	596,847	C
241459,500	4240258,894	601,138	C	241332,000	4239798,894	596,856	C
241445,500	4240258,894	601,173	C	241318,000	4239798,894	596,891	C
241442,000	4240258,894	601,181	C	241314,500	4239798,894	596,900	C
241428,000	4240258,894	601,216	C	241300,500	4239798,894	596,935	C
241424,500	4240258,894	601,225	C	241297,000	4239798,894	596,944	C
241410,500	4240258,894	601,260	C	241283,000	4239798,894	596,979	C
241407,000	4240258,894	601,269	C	241279,500	4239798,894	596,987	C
241393,000	4240258,894	601,304	C	241265,500	4239798,894	597,022	C
241389,500	4240258,894	601,313	C	241262,000	4239798,894	597,031	C
241375,500	4240258,894	601,348	C	241248,000	4239798,894	597,066	C
241372,000	4240258,894	601,356	C	241244,500	4239798,894	597,075	C
241358,000	4240258,894	601,391	C	241230,500	4239798,894	597,110	C
241354,500	4240258,894	601,400	C	241227,000	4239798,894	597,119	C
241340,500	4240258,894	601,435	C	241227,000	4239794,894	597,079	C
241337,000	4240258,894	601,444	C	241230,500	4239794,894	597,070	C
241323,000	4240258,894	601,479	C	241244,500	4239794,894	597,035	C
241319,500	4240258,894	601,488	C	241248,000	4239794,894	597,026	C
241305,500	4240258,894	601,523	C	241262,000	4239794,894	596,991	C
241302,000	4240258,894	601,531	C	241265,500	4239794,894	596,982	C
241288,000	4240258,894	601,566	C	241279,500	4239794,894	596,947	C
241284,500	4240258,894	601,575	C	241283,000	4239794,894	596,939	C
241270,500	4240258,894	601,610	C	241297,000	4239794,894	596,904	C
241267,000	4240258,894	601,619	C	241300,500	4239794,894	596,895	C
241253,000	4240258,894	601,654	C	241314,500	4239794,894	596,860	C
241249,500	4240258,894	601,662	C	241318,000	4239794,894	596,851	C
241235,500	4240258,894	601,697	C	241332,000	4239794,894	596,816	C
241232,000	4240258,894	601,706	C	241335,500	4239794,894	596,807	C
241218,000	4240258,894	601,741	C	241349,500	4239794,894	596,772	C
241214,500	4240258,894	601,750	C	241353,000	4239794,894	596,764	C
241200,500	4240258,894	601,785	C	241367,000	4239794,894	596,729	C
241197,000	4240258,894	601,794	C	241370,500	4239794,894	596,720	C
241183,000	4240258,894	601,829	C	241384,500	4239794,894	596,685	C
241179,500	4240258,894	601,837	C	241388,000	4239794,894	596,676	C
241165,500	4240258,894	601,872	C	241402,000	4239794,894	596,641	C
241162,000	4240258,894	601,881	C	241405,500	4239794,894	596,632	C
241148,000	4240258,894	601,916	C	241419,500	4239794,894	596,597	C
241144,500	4240258,894	601,925	C	241423,000	4239794,894	596,589	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241130,500	4240258,894	601,960	C	241437,000	4239794,894	596,554	C
241127,000	4240258,894	601,969	C	241440,500	4239794,894	596,545	C
241113,000	4240258,894	602,004	C	241454,500	4239794,894	596,510	C
241109,500	4240258,894	602,012	C	241458,000	4239794,894	596,501	C
241095,500	4240258,894	602,047	C	241472,000	4239794,894	596,466	C
241092,000	4240258,894	602,056	C	241475,500	4239794,894	596,457	C
241078,000	4240258,894	602,091	C	241489,500	4239794,894	596,422	C
241074,500	4240258,894	602,100	C	241493,000	4239794,894	596,414	C
241060,500	4240258,894	602,135	C	241507,000	4239794,894	596,379	C
241057,000	4240258,894	602,144	C	241510,500	4239794,894	596,370	C
241043,000	4240258,894	602,179	C	241524,500	4239794,894	596,335	C
241039,500	4240258,894	602,187	C	241528,000	4239794,894	596,326	C
241025,500	4240258,894	602,222	C	241542,000	4239794,894	596,291	C
241022,000	4240258,894	602,231	C	241545,500	4239794,894	596,283	C
241008,000	4240258,894	602,266	C	241559,500	4239794,894	596,248	C
241004,500	4240258,894	602,275	C	241563,000	4239794,894	596,239	C
240990,500	4240258,894	602,310	C	241577,000	4239794,894	596,204	C
240987,000	4240258,894	602,319	C	241580,500	4239794,894	596,195	C
240973,000	4240258,894	602,354	C	241594,500	4239794,894	596,160	C
240969,500	4240258,894	602,362	C	241598,000	4239794,894	596,151	C
240955,500	4240258,894	602,397	C	241612,000	4239794,894	596,116	C
240952,000	4240258,894	602,406	C	241615,500	4239794,894	596,108	C
240938,000	4240258,894	602,441	C	241629,500	4239794,894	596,073	C
240934,500	4240258,894	602,450	C	241633,000	4239794,894	596,064	C
240920,500	4240258,894	602,485	C	241647,000	4239794,894	596,029	C
240917,000	4240258,894	602,494	C	241650,500	4239794,894	596,020	C
240903,000	4240258,894	602,529	C	241664,500	4239794,894	595,985	C
240899,500	4240258,894	602,537	C	241668,000	4239794,894	595,976	C
240885,500	4240258,894	602,572	C	241682,000	4239794,894	595,941	C
240882,000	4240258,894	602,581	C	241685,500	4239794,894	595,933	C
240868,000	4240258,894	602,616	C	241699,500	4239794,894	595,898	C
240864,500	4240258,894	602,625	C	241703,000	4239794,894	595,889	C
240850,500	4240258,894	602,660	C	241717,000	4239794,894	595,854	C
240847,000	4240258,894	602,669	C	241720,500	4239794,894	595,845	C
240833,000	4240258,894	602,704	C	241734,500	4239794,894	595,810	C
240829,500	4240258,894	602,712	C	241738,000	4239794,894	595,801	C
240815,500	4240258,894	602,747	C	241752,000	4239794,894	595,766	C
240812,000	4240258,894	602,756	C	241755,500	4239794,894	595,758	C
240798,000	4240258,894	602,791	C	241769,500	4239794,894	595,723	C
240794,500	4240258,894	602,800	C	241773,000	4239794,894	595,714	C
240780,500	4240258,894	602,835	C	241773,000	4239785,840	595,623	C
240777,000	4240258,894	602,844	C	241769,500	4239785,840	595,632	C
240763,000	4240258,894	602,879	C	241755,500	4239785,840	595,667	C
240759,500	4240258,894	602,887	C	241752,000	4239785,840	595,676	C
240745,500	4240258,894	602,922	C	241738,000	4239785,840	595,711	C
240742,000	4240258,894	602,931	C	241734,500	4239785,840	595,720	C

Coord. X	Coord. Y	Elevación	Código
240728,000	4240258,894	602,966	C
240724,500	4240258,894	602,975	C
240710,500	4240258,894	603,010	C
240707,000	4240258,894	603,019	C
240693,000	4240258,894	603,054	C
240689,500	4240258,894	603,062	C
240675,500	4240258,894	603,097	C
240672,000	4240258,894	603,106	C
240658,000	4240258,894	603,141	C
240654,500	4240258,894	603,150	C
240640,500	4240258,894	603,185	C
240637,000	4240258,894	603,194	C
240623,000	4240258,894	603,229	C
240619,500	4240258,894	603,237	C
240605,500	4240258,894	603,272	C
240602,000	4240258,894	603,281	C
240588,000	4240258,894	603,316	C
240584,500	4240258,894	603,325	C
240570,500	4240258,894	603,360	C
240567,000	4240258,894	603,369	C
240553,000	4240258,894	603,404	C
240549,500	4240258,894	603,412	C
240535,500	4240258,894	603,447	C
240532,000	4240258,894	603,456	C
240518,000	4240258,894	603,491	C
240514,500	4240258,894	603,500	C
240500,500	4240258,894	603,535	C
240497,000	4240258,894	603,544	C
240483,000	4240258,894	603,579	C
240479,500	4240258,894	603,587	C
240465,500	4240258,894	603,622	C
240462,000	4240258,894	603,631	C
240448,000	4240258,894	603,666	C
240444,500	4240258,894	603,675	C
240430,500	4240258,894	603,710	C
240427,000	4240258,894	603,719	C
240413,000	4240258,894	603,754	C
240409,500	4240258,894	603,762	C
240395,500	4240258,894	603,797	C
240392,000	4240258,894	603,806	C
240378,000	4240258,894	603,841	C
240374,500	4240258,894	603,850	C
240360,500	4240258,894	603,885	C
240357,000	4240258,894	603,894	C
240343,000	4240258,894	603,929	C
240339,500	4240258,894	603,937	C

Coord. X	Coord. Y	Elevación	Código
241720,500	4239785,840	595,755	C
241717,000	4239785,840	595,763	C
241703,000	4239785,840	595,798	C
241699,500	4239785,840	595,807	C
241685,500	4239785,840	595,842	C
241682,000	4239785,840	595,851	C
241668,000	4239785,840	595,886	C
241664,500	4239785,840	595,895	C
241650,500	4239785,840	595,930	C
241647,000	4239785,840	595,938	C
241633,000	4239785,840	595,973	C
241629,500	4239785,840	595,982	C
241615,500	4239785,840	596,017	C
241612,000	4239785,840	596,026	C
241598,000	4239785,840	596,061	C
241594,500	4239785,840	596,070	C
241580,500	4239785,840	596,105	C
241577,000	4239785,840	596,113	C
241563,000	4239785,840	596,148	C
241559,500	4239785,840	596,157	C
241545,500	4239785,840	596,192	C
241542,000	4239785,840	596,201	C
241528,000	4239785,840	596,236	C
241524,500	4239785,840	596,244	C
241510,500	4239785,840	596,279	C
241507,000	4239785,840	596,288	C
241493,000	4239785,840	596,323	C
241489,500	4239785,840	596,332	C
241475,500	4239785,840	596,367	C
241472,000	4239785,840	596,376	C
241458,000	4239785,840	596,411	C
241454,500	4239785,840	596,419	C
241440,500	4239785,840	596,454	C
241437,000	4239785,840	596,463	C
241423,000	4239785,840	596,498	C
241419,500	4239785,840	596,507	C
241405,500	4239785,840	596,542	C
241402,000	4239785,840	596,551	C
241388,000	4239785,840	596,586	C
241384,500	4239785,840	596,594	C
241370,500	4239785,840	596,629	C
241367,000	4239785,840	596,638	C
241353,000	4239785,840	596,673	C
241349,500	4239785,840	596,682	C
241335,500	4239785,840	596,717	C
241332,000	4239785,840	596,726	C

Coord. X	Coord. Y	Elevación	Código
240325,500	4240258,894	603,972	C
240322,000	4240258,894	603,981	C
240308,000	4240258,894	604,016	C
240304,500	4240258,894	604,025	C
240290,500	4240258,894	604,060	C
240287,000	4240258,894	604,069	C
240273,000	4240258,894	604,104	C
240269,500	4240258,894	604,112	C
240255,500	4240258,894	604,147	C
240252,000	4240258,894	604,156	C
240238,000	4240258,894	604,191	C
240234,500	4240258,894	604,200	C
240220,500	4240258,894	604,235	C
240217,000	4240258,894	604,244	C
240203,000	4240258,894	604,279	C
240199,500	4240258,894	604,287	C
240185,500	4240258,894	604,322	C
240182,000	4240258,894	604,331	C
240168,000	4240258,894	604,366	C
240164,500	4240258,894	604,375	C
240150,500	4240258,894	604,410	C
240147,000	4240258,894	604,419	C
240133,000	4240258,894	604,454	C
240129,500	4240258,894	604,462	C
240115,500	4240258,894	604,497	C
240112,000	4240258,894	604,506	C
240098,000	4240258,894	604,541	C
240094,500	4240258,894	604,550	C
240080,500	4240258,894	604,585	C
240077,000	4240258,894	604,594	C
240063,000	4240258,894	604,629	C
240059,500	4240258,894	604,637	C
240045,500	4240258,894	604,672	C
240042,000	4240258,894	604,681	C
240028,000	4240258,894	604,716	C
240024,500	4240258,894	604,725	C
240024,500	4240254,894	604,685	C
240028,000	4240254,894	604,676	C
240042,000	4240254,894	604,641	C
240045,500	4240254,894	604,632	C
240059,500	4240254,894	604,597	C
240063,000	4240254,894	604,589	C
240077,000	4240254,894	604,554	C
240080,500	4240254,894	604,545	C
240094,500	4240254,894	604,510	C
240098,000	4240254,894	604,501	C

Coord. X	Coord. Y	Elevación	Código
241318,000	4239785,840	596,761	C
241314,500	4239785,840	596,769	C
241300,500	4239785,840	596,804	C
241297,000	4239785,840	596,813	C
241283,000	4239785,840	596,848	C
241279,500	4239785,840	596,857	C
241265,500	4239785,840	596,892	C
241262,000	4239785,840	596,901	C
241248,000	4239785,840	596,935	C
241244,500	4239785,840	596,944	C
241230,500	4239785,840	596,979	C
241227,000	4239785,840	596,988	C
241227,000	4239782,690	596,956	C
241230,500	4239782,690	596,948	C
241244,500	4239782,690	596,913	C
241248,000	4239782,690	596,904	C
241262,000	4239782,690	596,869	C
241265,500	4239782,690	596,860	C
241279,500	4239782,690	596,825	C
241283,000	4239782,690	596,817	C
241297,000	4239782,690	596,782	C
241300,500	4239782,690	596,773	C
241314,500	4239782,690	596,738	C
241318,000	4239782,690	596,729	C
241332,000	4239782,690	596,694	C
241335,500	4239782,690	596,685	C
241349,500	4239782,690	596,650	C
241353,000	4239782,690	596,642	C
241367,000	4239782,690	596,607	C
241370,500	4239782,690	596,598	C
241384,500	4239782,690	596,563	C
241388,000	4239782,690	596,554	C
241402,000	4239782,690	596,519	C
241405,500	4239782,690	596,510	C
241419,500	4239782,690	596,475	C
241423,000	4239782,690	596,467	C
241437,000	4239782,690	596,432	C
241440,500	4239782,690	596,423	C
241454,500	4239782,690	596,388	C
241458,000	4239782,690	596,379	C
241472,000	4239782,690	596,344	C
241475,500	4239782,690	596,335	C
241489,500	4239782,690	596,300	C
241493,000	4239782,690	596,292	C
241507,000	4239782,690	596,257	C
241510,500	4239782,690	596,248	C

Coord. X	Coord. Y	Elevación	Código
240112,000	4240254,894	604,466	C
240115,500	4240254,894	604,457	C
240129,500	4240254,894	604,422	C
240133,000	4240254,894	604,414	C
240147,000	4240254,894	604,379	C
240150,500	4240254,894	604,370	C
240164,500	4240254,894	604,335	C
240168,000	4240254,894	604,326	C
240182,000	4240254,894	604,291	C
240185,500	4240254,894	604,282	C
240199,500	4240254,894	604,247	C
240203,000	4240254,894	604,239	C
240217,000	4240254,894	604,204	C
240220,500	4240254,894	604,195	C
240234,500	4240254,894	604,160	C
240238,000	4240254,894	604,151	C
240252,000	4240254,894	604,116	C
240255,500	4240254,894	604,107	C
240269,500	4240254,894	604,072	C
240273,000	4240254,894	604,064	C
240287,000	4240254,894	604,029	C
240290,500	4240254,894	604,020	C
240304,500	4240254,894	603,985	C
240308,000	4240254,894	603,976	C
240322,000	4240254,894	603,941	C
240325,500	4240254,894	603,932	C
240339,500	4240254,894	603,897	C
240343,000	4240254,894	603,889	C
240357,000	4240254,894	603,854	C
240360,500	4240254,894	603,845	C
240374,500	4240254,894	603,810	C
240378,000	4240254,894	603,801	C
240392,000	4240254,894	603,766	C
240395,500	4240254,894	603,757	C
240409,500	4240254,894	603,722	C
240413,000	4240254,894	603,714	C
240427,000	4240254,894	603,679	C
240430,500	4240254,894	603,670	C
240444,500	4240254,894	603,635	C
240448,000	4240254,894	603,626	C
240462,000	4240254,894	603,591	C
240465,500	4240254,894	603,582	C
240479,500	4240254,894	603,547	C
240483,000	4240254,894	603,539	C
240497,000	4240254,894	603,504	C
240500,500	4240254,894	603,495	C

Coord. X	Coord. Y	Elevación	Código
241524,500	4239782,690	596,213	C
241528,000	4239782,690	596,204	C
241542,000	4239782,690	596,169	C
241545,500	4239782,690	596,160	C
241559,500	4239782,690	596,125	C
241563,000	4239782,690	596,117	C
241577,000	4239782,690	596,082	C
241580,500	4239782,690	596,073	C
241594,500	4239782,690	596,038	C
241598,000	4239782,690	596,029	C
241612,000	4239782,690	595,994	C
241615,500	4239782,690	595,986	C
241629,500	4239782,690	595,951	C
241633,000	4239782,690	595,942	C
241647,000	4239782,690	595,907	C
241650,500	4239782,690	595,898	C
241664,500	4239782,690	595,863	C
241668,000	4239782,690	595,854	C
241682,000	4239782,690	595,819	C
241685,500	4239782,690	595,811	C
241699,500	4239782,690	595,776	C
241703,000	4239782,690	595,767	C
241717,000	4239782,690	595,732	C
241720,500	4239782,690	595,723	C
241734,500	4239782,690	595,688	C
241738,000	4239782,690	595,679	C
241752,000	4239782,690	595,644	C
241755,500	4239782,690	595,636	C
241769,500	4239782,690	595,601	C
241773,000	4239782,690	595,592	C
240012,000	4239757,950	599,746	C
240015,500	4239757,950	599,738	C
240029,500	4239757,950	599,703	C
240033,000	4239757,950	599,694	C
240047,000	4239757,950	599,659	C
240050,500	4239757,950	599,650	C
240064,500	4239757,950	599,615	C
240068,000	4239757,950	599,606	C
240082,000	4239757,950	599,571	C
240085,500	4239757,950	599,563	C
240099,500	4239757,950	599,528	C
240103,000	4239757,950	599,519	C
240117,000	4239757,950	599,484	C
240120,500	4239757,950	599,475	C
240134,500	4239757,950	599,440	C
240138,000	4239757,950	599,431	C

Coord. X	Coord. Y	Elevación	Código
240514,500	4240254,894	603,460	C
240518,000	4240254,894	603,451	C
240532,000	4240254,894	603,416	C
240535,500	4240254,894	603,407	C
240549,500	4240254,894	603,372	C
240553,000	4240254,894	603,364	C
240567,000	4240254,894	603,329	C
240570,500	4240254,894	603,320	C
240584,500	4240254,894	603,285	C
240588,000	4240254,894	603,276	C
240602,000	4240254,894	603,241	C
240605,500	4240254,894	603,232	C
240619,500	4240254,894	603,197	C
240623,000	4240254,894	603,189	C
240637,000	4240254,894	603,154	C
240640,500	4240254,894	603,145	C
240654,500	4240254,894	603,110	C
240658,000	4240254,894	603,101	C
240672,000	4240254,894	603,066	C
240675,500	4240254,894	603,057	C
240689,500	4240254,894	603,022	C
240693,000	4240254,894	603,014	C
240707,000	4240254,894	602,979	C
240710,500	4240254,894	602,970	C
240724,500	4240254,894	602,935	C
240728,000	4240254,894	602,926	C
240742,000	4240254,894	602,891	C
240745,500	4240254,894	602,882	C
240759,500	4240254,894	602,847	C
240763,000	4240254,894	602,839	C
240777,000	4240254,894	602,804	C
240780,500	4240254,894	602,795	C
240794,500	4240254,894	602,760	C
240798,000	4240254,894	602,751	C
240812,000	4240254,894	602,716	C
240815,500	4240254,894	602,707	C
240829,500	4240254,894	602,672	C
240833,000	4240254,894	602,664	C
240847,000	4240254,894	602,629	C
240850,500	4240254,894	602,620	C
240864,500	4240254,894	602,585	C
240868,000	4240254,894	602,576	C
240882,000	4240254,894	602,541	C
240885,500	4240254,894	602,532	C
240899,500	4240254,894	602,497	C
240903,000	4240254,894	602,489	C

Coord. X	Coord. Y	Elevación	Código
240152,000	4239757,950	599,396	C
240155,500	4239757,950	599,388	C
240169,500	4239757,950	599,353	C
240173,000	4239757,950	599,344	C
240187,000	4239757,950	599,309	C
240190,500	4239757,950	599,300	C
240204,500	4239757,950	599,265	C
240208,000	4239757,950	599,256	C
240222,000	4239757,950	599,221	C
240225,500	4239757,950	599,213	C
240239,500	4239757,950	599,178	C
240243,000	4239757,950	599,169	C
240257,000	4239757,950	599,134	C
240260,500	4239757,950	599,125	C
240274,500	4239757,950	599,090	C
240278,000	4239757,950	599,082	C
240292,000	4239757,950	599,047	C
240295,500	4239757,950	599,038	C
240309,500	4239757,950	599,003	C
240313,000	4239757,950	598,994	C
240327,000	4239757,950	598,959	C
240330,500	4239757,950	598,950	C
240344,500	4239757,950	598,915	C
240348,000	4239757,950	598,907	C
240362,000	4239757,950	598,872	C
240365,500	4239757,950	598,863	C
240379,500	4239757,950	598,828	C
240383,000	4239757,950	598,819	C
240397,000	4239757,950	598,784	C
240400,500	4239757,950	598,775	C
240414,500	4239757,950	598,740	C
240418,000	4239757,950	598,732	C
240432,000	4239757,950	598,697	C
240435,500	4239757,950	598,688	C
240449,500	4239757,950	598,653	C
240453,000	4239757,950	598,644	C
240467,000	4239757,950	598,609	C
240470,500	4239757,950	598,600	C
240484,500	4239757,950	598,565	C
240488,000	4239757,950	598,557	C
240502,000	4239757,950	598,522	C
240505,500	4239757,950	598,513	C
240519,500	4239757,950	598,478	C
240523,000	4239757,950	598,469	C
240537,000	4239757,950	598,434	C
240540,500	4239757,950	598,425	C

Coord. X	Coord. Y	Elevación	Código
240917,000	4240254,894	602,454	C
240920,500	4240254,894	602,445	C
240934,500	4240254,894	602,410	C
240938,000	4240254,894	602,401	C
240952,000	4240254,894	602,366	C
240955,500	4240254,894	602,357	C
240969,500	4240254,894	602,322	C
240973,000	4240254,894	602,314	C
240987,000	4240254,894	602,279	C
240990,500	4240254,894	602,270	C
241004,500	4240254,894	602,235	C
241008,000	4240254,894	602,226	C
241022,000	4240254,894	602,191	C
241025,500	4240254,894	602,182	C
241039,500	4240254,894	602,147	C
241043,000	4240254,894	602,139	C
241057,000	4240254,894	602,104	C
241060,500	4240254,894	602,095	C
241074,500	4240254,894	602,060	C
241078,000	4240254,894	602,051	C
241092,000	4240254,894	602,016	C
241095,500	4240254,894	602,007	C
241109,500	4240254,894	601,972	C
241113,000	4240254,894	601,964	C
241127,000	4240254,894	601,929	C
241130,500	4240254,894	601,920	C
241144,500	4240254,894	601,885	C
241148,000	4240254,894	601,876	C
241162,000	4240254,894	601,841	C
241165,500	4240254,894	601,832	C
241179,500	4240254,894	601,797	C
241183,000	4240254,894	601,789	C
241197,000	4240254,894	601,754	C
241200,500	4240254,894	601,745	C
241214,500	4240254,894	601,710	C
241218,000	4240254,894	601,701	C
241232,000	4240254,894	601,666	C
241235,500	4240254,894	601,657	C
241249,500	4240254,894	601,622	C
241253,000	4240254,894	601,614	C
241267,000	4240254,894	601,579	C
241270,500	4240254,894	601,570	C
241284,500	4240254,894	601,535	C
241288,000	4240254,894	601,526	C
241302,000	4240254,894	601,491	C
241305,500	4240254,894	601,483	C

Coord. X	Coord. Y	Elevación	Código
240554,500	4239757,950	598,390	C
240558,000	4239757,950	598,382	C
240572,000	4239757,950	598,347	C
240575,500	4239757,950	598,338	C
240589,500	4239757,950	598,303	C
240593,000	4239757,950	598,294	C
240607,000	4239757,950	598,259	C
240610,500	4239757,950	598,250	C
240624,500	4239757,950	598,215	C
240628,000	4239757,950	598,207	C
240642,000	4239757,950	598,172	C
240645,500	4239757,950	598,163	C
240659,500	4239757,950	598,128	C
240663,000	4239757,950	598,119	C
240677,000	4239757,950	598,084	C
240680,500	4239757,950	598,075	C
240694,500	4239757,950	598,040	C
240698,000	4239757,950	598,032	C
240712,000	4239757,950	597,997	C
240715,500	4239757,950	597,988	C
240729,500	4239757,950	597,953	C
240733,000	4239757,950	597,944	C
240747,000	4239757,950	597,909	C
240750,500	4239757,950	597,900	C
240764,500	4239757,950	597,865	C
240768,000	4239757,950	597,857	C
240782,000	4239757,950	597,822	C
240785,500	4239757,950	597,813	C
240799,500	4239757,950	597,778	C
240803,000	4239757,950	597,769	C
240817,000	4239757,950	597,734	C
240820,500	4239757,950	597,725	C
240834,500	4239757,950	597,690	C
240838,000	4239757,950	597,682	C
240852,000	4239757,950	597,647	C
240855,500	4239757,950	597,638	C
240869,500	4239757,950	597,603	C
240873,000	4239757,950	597,594	C
240887,000	4239757,950	597,559	C
240890,500	4239757,950	597,550	C
240904,500	4239757,950	597,515	C
240908,000	4239757,950	597,507	C
240922,000	4239757,950	597,472	C
240925,500	4239757,950	597,463	C
240939,500	4239757,950	597,428	C
240943,000	4239757,950	597,419	C

Coord. X	Coord. Y	Elevación	Código
241319,500	4240254,894	601,448	C
241323,000	4240254,894	601,439	C
241337,000	4240254,894	601,404	C
241340,500	4240254,894	601,395	C
241354,500	4240254,894	601,360	C
241358,000	4240254,894	601,351	C
241372,000	4240254,894	601,316	C
241375,500	4240254,894	601,308	C
241389,500	4240254,894	601,273	C
241393,000	4240254,894	601,264	C
241407,000	4240254,894	601,229	C
241410,500	4240254,894	601,220	C
241424,500	4240254,894	601,185	C
241428,000	4240254,894	601,176	C
241442,000	4240254,894	601,141	C
241445,500	4240254,894	601,133	C
241459,500	4240254,894	601,098	C
241463,000	4240254,894	601,089	C
241477,000	4240254,894	601,054	C
241480,500	4240254,894	601,045	C
241494,500	4240254,894	601,010	C
241498,000	4240254,894	601,001	C
241512,000	4240254,894	600,966	C
241515,500	4240254,894	600,958	C
241529,500	4240254,894	600,923	C
241533,000	4240254,894	600,914	C
241547,000	4240254,894	600,879	C
241550,500	4240254,894	600,870	C
241564,500	4240254,894	600,835	C
241568,000	4240254,894	600,826	C
241582,000	4240254,894	600,791	C
241585,500	4240254,894	600,783	C
241599,500	4240254,894	600,748	C
241603,000	4240254,894	600,739	C
241617,000	4240254,894	600,704	C
241620,500	4240254,894	600,695	C
241634,500	4240254,894	600,660	C
241638,000	4240254,894	600,651	C
241652,000	4240254,894	600,616	C
241655,500	4240254,894	600,608	C
241669,500	4240254,894	600,573	C
241673,000	4240254,894	600,564	C
241687,000	4240254,894	600,529	C
241690,500	4240254,894	600,520	C
241704,500	4240254,894	600,485	C
241708,000	4240254,894	600,476	C

Coord. X	Coord. Y	Elevación	Código
240957,000	4239757,950	597,384	C
240960,500	4239757,950	597,375	C
240974,500	4239757,950	597,340	C
240978,000	4239757,950	597,332	C
240992,000	4239757,950	597,297	C
240995,500	4239757,950	597,288	C
241009,500	4239757,950	597,253	C
241013,000	4239757,950	597,244	C
241027,000	4239757,950	597,209	C
241030,500	4239757,950	597,200	C
241044,500	4239757,950	597,165	C
241048,000	4239757,950	597,157	C
241062,000	4239757,950	597,122	C
241065,500	4239757,950	597,113	C
241079,500	4239757,950	597,078	C
241083,000	4239757,950	597,069	C
241097,000	4239757,950	597,034	C
241100,500	4239757,950	597,025	C
241114,500	4239757,950	596,990	C
241118,000	4239757,950	596,982	C
241132,000	4239757,950	596,947	C
241135,500	4239757,950	596,938	C
241149,500	4239757,950	596,903	C
241153,000	4239757,950	596,894	C
241167,000	4239757,950	596,859	C
241170,500	4239757,950	596,850	C
241184,500	4239757,950	596,815	C
241188,000	4239757,950	596,807	C
241188,000	4239754,800	596,775	C
241184,500	4239754,800	596,784	C
241170,500	4239754,800	596,819	C
241167,000	4239754,800	596,828	C
241153,000	4239754,800	596,863	C
241149,500	4239754,800	596,871	C
241135,500	4239754,800	596,906	C
241132,000	4239754,800	596,915	C
241118,000	4239754,800	596,950	C
241114,500	4239754,800	596,959	C
241100,500	4239754,800	596,994	C
241097,000	4239754,800	597,003	C
241083,000	4239754,800	597,038	C
241079,500	4239754,800	597,046	C
241065,500	4239754,800	597,081	C
241062,000	4239754,800	597,090	C
241048,000	4239754,800	597,125	C
241044,500	4239754,800	597,134	C

Coord. X	Coord. Y	Elevación	Código
241722,000	4240254,894	600,441	C
241725,500	4240254,894	600,433	C
241739,500	4240254,894	600,398	C
241743,000	4240254,894	600,389	C
241757,000	4240254,894	600,354	C
241760,500	4240254,894	600,345	C
241760,500	4240245,840	600,255	C
241757,000	4240245,840	600,263	C
241743,000	4240245,840	600,298	C
241739,500	4240245,840	600,307	C
241725,500	4240245,840	600,342	C
241722,000	4240245,840	600,351	C
241708,000	4240245,840	600,386	C
241704,500	4240245,840	600,395	C
241690,500	4240245,840	600,430	C
241687,000	4240245,840	600,438	C
241673,000	4240245,840	600,473	C
241669,500	4240245,840	600,482	C
241655,500	4240245,840	600,517	C
241652,000	4240245,840	600,526	C
241638,000	4240245,840	600,561	C
241634,500	4240245,840	600,570	C
241620,500	4240245,840	600,605	C
241617,000	4240245,840	600,613	C
241603,000	4240245,840	600,648	C
241599,500	4240245,840	600,657	C
241585,500	4240245,840	600,692	C
241582,000	4240245,840	600,701	C
241568,000	4240245,840	600,736	C
241564,500	4240245,840	600,745	C
241550,500	4240245,840	600,780	C
241547,000	4240245,840	600,788	C
241533,000	4240245,840	600,823	C
241529,500	4240245,840	600,832	C
241515,500	4240245,840	600,867	C
241512,000	4240245,840	600,876	C
241498,000	4240245,840	600,911	C
241494,500	4240245,840	600,920	C
241480,500	4240245,840	600,955	C
241477,000	4240245,840	600,963	C
241463,000	4240245,840	600,998	C
241459,500	4240245,840	601,007	C
241445,500	4240245,840	601,042	C
241442,000	4240245,840	601,051	C
241428,000	4240245,840	601,086	C
241424,500	4240245,840	601,095	C

Coord. X	Coord. Y	Elevación	Código
241030,500	4239754,800	597,169	C
241027,000	4239754,800	597,178	C
241013,000	4239754,800	597,213	C
241009,500	4239754,800	597,221	C
240995,500	4239754,800	597,256	C
240992,000	4239754,800	597,265	C
240978,000	4239754,800	597,300	C
240974,500	4239754,800	597,309	C
240960,500	4239754,800	597,344	C
240957,000	4239754,800	597,353	C
240943,000	4239754,800	597,388	C
240939,500	4239754,800	597,396	C
240925,500	4239754,800	597,431	C
240922,000	4239754,800	597,440	C
240908,000	4239754,800	597,475	C
240904,500	4239754,800	597,484	C
240890,500	4239754,800	597,519	C
240887,000	4239754,800	597,528	C
240873,000	4239754,800	597,563	C
240869,500	4239754,800	597,571	C
240855,500	4239754,800	597,606	C
240852,000	4239754,800	597,615	C
240838,000	4239754,800	597,650	C
240834,500	4239754,800	597,659	C
240820,500	4239754,800	597,694	C
240817,000	4239754,800	597,703	C
240803,000	4239754,800	597,738	C
240799,500	4239754,800	597,746	C
240785,500	4239754,800	597,781	C
240782,000	4239754,800	597,790	C
240768,000	4239754,800	597,825	C
240764,500	4239754,800	597,834	C
240750,500	4239754,800	597,869	C
240747,000	4239754,800	597,878	C
240733,000	4239754,800	597,913	C
240729,500	4239754,800	597,921	C
240715,500	4239754,800	597,956	C
240712,000	4239754,800	597,965	C
240698,000	4239754,800	598,000	C
240694,500	4239754,800	598,009	C
240680,500	4239754,800	598,044	C
240677,000	4239754,800	598,053	C
240663,000	4239754,800	598,088	C
240659,500	4239754,800	598,096	C
240645,500	4239754,800	598,131	C
240642,000	4239754,800	598,140	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
241410,500	4240245,840	601,130	C	240628,000	4239754,800	598,175	C
241407,000	4240245,840	601,138	C	240624,500	4239754,800	598,184	C
241393,000	4240245,840	601,173	C	240610,500	4239754,800	598,219	C
241389,500	4240245,840	601,182	C	240607,000	4239754,800	598,228	C
241375,500	4240245,840	601,217	C	240593,000	4239754,800	598,263	C
241372,000	4240245,840	601,226	C	240589,500	4239754,800	598,271	C
241358,000	4240245,840	601,261	C	240575,500	4239754,800	598,306	C
241354,500	4240245,840	601,270	C	240572,000	4239754,800	598,315	C
241340,500	4240245,840	601,304	C	240558,000	4239754,800	598,350	C
241337,000	4240245,840	601,313	C	240554,500	4239754,800	598,359	C
241323,000	4240245,840	601,348	C	240540,500	4239754,800	598,394	C
241319,500	4240245,840	601,357	C	240537,000	4239754,800	598,403	C
241305,500	4240245,840	601,392	C	240523,000	4239754,800	598,438	C
241302,000	4240245,840	601,401	C	240519,500	4239754,800	598,446	C
241288,000	4240245,840	601,436	C	240505,500	4239754,800	598,481	C
241284,500	4240245,840	601,444	C	240502,000	4239754,800	598,490	C
241270,500	4240245,840	601,479	C	240488,000	4239754,800	598,525	C
241267,000	4240245,840	601,488	C	240484,500	4239754,800	598,534	C
241253,000	4240245,840	601,523	C	240470,500	4239754,800	598,569	C
241249,500	4240245,840	601,532	C	240467,000	4239754,800	598,578	C
241235,500	4240245,840	601,567	C	240453,000	4239754,800	598,613	C
241232,000	4240245,840	601,576	C	240449,500	4239754,800	598,621	C
241218,000	4240245,840	601,611	C	240435,500	4239754,800	598,656	C
241214,500	4240245,840	601,619	C	240432,000	4239754,800	598,665	C
241200,500	4240245,840	601,654	C	240418,000	4239754,800	598,700	C
241197,000	4240245,840	601,663	C	240414,500	4239754,800	598,709	C
241183,000	4240245,840	601,698	C	240400,500	4239754,800	598,744	C
241179,500	4240245,840	601,707	C	240397,000	4239754,800	598,753	C
241165,500	4240245,840	601,742	C	240383,000	4239754,800	598,788	C
241162,000	4240245,840	601,751	C	240379,500	4239754,800	598,796	C
241148,000	4240245,840	601,786	C	240365,500	4239754,800	598,831	C
241144,500	4240245,840	601,794	C	240362,000	4239754,800	598,840	C
241130,500	4240245,840	601,829	C	240348,000	4239754,800	598,875	C
241127,000	4240245,840	601,838	C	240344,500	4239754,800	598,884	C
241113,000	4240245,840	601,873	C	240330,500	4239754,800	598,919	C
241109,500	4240245,840	601,882	C	240327,000	4239754,800	598,928	C
241095,500	4240245,840	601,917	C	240313,000	4239754,800	598,963	C
241092,000	4240245,840	601,926	C	240309,500	4239754,800	598,971	C
241078,000	4240245,840	601,961	C	240295,500	4239754,800	599,006	C
241074,500	4240245,840	601,969	C	240292,000	4239754,800	599,015	C
241060,500	4240245,840	602,004	C	240278,000	4239754,800	599,050	C
241057,000	4240245,840	602,013	C	240274,500	4239754,800	599,059	C
241043,000	4240245,840	602,048	C	240260,500	4239754,800	599,094	C
241039,500	4240245,840	602,057	C	240257,000	4239754,800	599,103	C
241025,500	4240245,840	602,092	C	240243,000	4239754,800	599,138	C
241022,000	4240245,840	602,101	C	240239,500	4239754,800	599,146	C

Coord. X	Coord. Y	Elevación	Código
241008,000	4240245,840	602,136	C
241004,500	4240245,840	602,144	C
240990,500	4240245,840	602,179	C
240987,000	4240245,840	602,188	C
240973,000	4240245,840	602,223	C
240969,500	4240245,840	602,232	C
240955,500	4240245,840	602,267	C
240952,000	4240245,840	602,276	C
240938,000	4240245,840	602,311	C
240934,500	4240245,840	602,319	C
240920,500	4240245,840	602,354	C
240917,000	4240245,840	602,363	C
240903,000	4240245,840	602,398	C
240899,500	4240245,840	602,407	C
240885,500	4240245,840	602,442	C
240882,000	4240245,840	602,451	C
240868,000	4240245,840	602,486	C
240864,500	4240245,840	602,494	C
240850,500	4240245,840	602,529	C
240847,000	4240245,840	602,538	C
240833,000	4240245,840	602,573	C
240829,500	4240245,840	602,582	C
240815,500	4240245,840	602,617	C
240812,000	4240245,840	602,626	C
240798,000	4240245,840	602,661	C
240794,500	4240245,840	602,669	C
240780,500	4240245,840	602,704	C
240777,000	4240245,840	602,713	C
240763,000	4240245,840	602,748	C
240759,500	4240245,840	602,757	C
240745,500	4240245,840	602,792	C
240742,000	4240245,840	602,801	C
240728,000	4240245,840	602,836	C
240724,500	4240245,840	602,844	C
240710,500	4240245,840	602,879	C
240707,000	4240245,840	602,888	C
240693,000	4240245,840	602,923	C
240689,500	4240245,840	602,932	C
240675,500	4240245,840	602,967	C
240672,000	4240245,840	602,976	C
240658,000	4240245,840	603,011	C
240654,500	4240245,840	603,019	C
240640,500	4240245,840	603,054	C
240637,000	4240245,840	603,063	C
240623,000	4240245,840	603,098	C
240619,500	4240245,840	603,107	C

Coord. X	Coord. Y	Elevación	Código
240225,500	4239754,800	599,181	C
240222,000	4239754,800	599,190	C
240208,000	4239754,800	599,225	C
240204,500	4239754,800	599,234	C
240190,500	4239754,800	599,269	C
240187,000	4239754,800	599,277	C
240173,000	4239754,800	599,312	C
240169,500	4239754,800	599,321	C
240155,500	4239754,800	599,356	C
240152,000	4239754,800	599,365	C
240138,000	4239754,800	599,400	C
240134,500	4239754,800	599,409	C
240120,500	4239754,800	599,444	C
240117,000	4239754,800	599,452	C
240103,000	4239754,800	599,487	C
240099,500	4239754,800	599,496	C
240085,500	4239754,800	599,531	C
240082,000	4239754,800	599,540	C
240068,000	4239754,800	599,575	C
240064,500	4239754,800	599,584	C
240050,500	4239754,800	599,619	C
240047,000	4239754,800	599,627	C
240033,000	4239754,800	599,662	C
240029,500	4239754,800	599,671	C
240015,500	4239754,800	599,706	C
240012,000	4239754,800	599,715	C
240012,000	4239745,746	599,624	C
240015,500	4239745,746	599,616	C
240029,500	4239745,746	599,581	C
240033,000	4239745,746	599,572	C
240047,000	4239745,746	599,537	C
240050,500	4239745,746	599,528	C
240064,500	4239745,746	599,493	C
240068,000	4239745,746	599,484	C
240082,000	4239745,746	599,449	C
240085,500	4239745,746	599,441	C
240099,500	4239745,746	599,406	C
240103,000	4239745,746	599,397	C
240117,000	4239745,746	599,362	C
240120,500	4239745,746	599,353	C
240134,500	4239745,746	599,318	C
240138,000	4239745,746	599,309	C
240152,000	4239745,746	599,274	C
240155,500	4239745,746	599,266	C
240169,500	4239745,746	599,231	C
240173,000	4239745,746	599,222	C

Coord. X	Coord. Y	Elevación	Código
240605,500	4240245,840	603,142	C
240602,000	4240245,840	603,151	C
240588,000	4240245,840	603,186	C
240584,500	4240245,840	603,194	C
240570,500	4240245,840	603,229	C
240567,000	4240245,840	603,238	C
240553,000	4240245,840	603,273	C
240549,500	4240245,840	603,282	C
240535,500	4240245,840	603,317	C
240532,000	4240245,840	603,326	C
240518,000	4240245,840	603,361	C
240514,500	4240245,840	603,369	C
240500,500	4240245,840	603,404	C
240497,000	4240245,840	603,413	C
240483,000	4240245,840	603,448	C
240479,500	4240245,840	603,457	C
240465,500	4240245,840	603,492	C
240462,000	4240245,840	603,501	C
240448,000	4240245,840	603,536	C
240444,500	4240245,840	603,544	C
240430,500	4240245,840	603,579	C
240427,000	4240245,840	603,588	C
240413,000	4240245,840	603,623	C
240409,500	4240245,840	603,632	C
240395,500	4240245,840	603,667	C
240392,000	4240245,840	603,676	C
240378,000	4240245,840	603,711	C
240374,500	4240245,840	603,719	C
240360,500	4240245,840	603,754	C
240357,000	4240245,840	603,763	C
240343,000	4240245,840	603,798	C
240339,500	4240245,840	603,807	C
240325,500	4240245,840	603,842	C
240322,000	4240245,840	603,851	C
240308,000	4240245,840	603,886	C
240304,500	4240245,840	603,894	C
240290,500	4240245,840	603,929	C
240287,000	4240245,840	603,938	C
240273,000	4240245,840	603,973	C
240269,500	4240245,840	603,982	C
240255,500	4240245,840	604,017	C
240252,000	4240245,840	604,026	C
240238,000	4240245,840	604,061	C
240234,500	4240245,840	604,069	C
240220,500	4240245,840	604,104	C
240217,000	4240245,840	604,113	C

Coord. X	Coord. Y	Elevación	Código
240187,000	4239745,746	599,187	C
240190,500	4239745,746	599,178	C
240204,500	4239745,746	599,143	C
240208,000	4239745,746	599,134	C
240222,000	4239745,746	599,099	C
240225,500	4239745,746	599,091	C
240239,500	4239745,746	599,056	C
240243,000	4239745,746	599,047	C
240257,000	4239745,746	599,012	C
240260,500	4239745,746	599,003	C
240274,500	4239745,746	598,968	C
240278,000	4239745,746	598,960	C
240292,000	4239745,746	598,925	C
240295,500	4239745,746	598,916	C
240309,500	4239745,746	598,881	C
240313,000	4239745,746	598,872	C
240327,000	4239745,746	598,837	C
240330,500	4239745,746	598,828	C
240344,500	4239745,746	598,793	C
240348,000	4239745,746	598,785	C
240362,000	4239745,746	598,750	C
240365,500	4239745,746	598,741	C
240379,500	4239745,746	598,706	C
240383,000	4239745,746	598,697	C
240397,000	4239745,746	598,662	C
240400,500	4239745,746	598,653	C
240414,500	4239745,746	598,618	C
240418,000	4239745,746	598,610	C
240432,000	4239745,746	598,575	C
240435,500	4239745,746	598,566	C
240449,500	4239745,746	598,531	C
240453,000	4239745,746	598,522	C
240467,000	4239745,746	598,487	C
240470,500	4239745,746	598,478	C
240484,500	4239745,746	598,443	C
240488,000	4239745,746	598,435	C
240502,000	4239745,746	598,400	C
240505,500	4239745,746	598,391	C
240519,500	4239745,746	598,356	C
240523,000	4239745,746	598,347	C
240537,000	4239745,746	598,312	C
240540,500	4239745,746	598,303	C
240554,500	4239745,746	598,268	C
240558,000	4239745,746	598,260	C
240572,000	4239745,746	598,225	C
240575,500	4239745,746	598,216	C

Coord. X	Coord. Y	Elevación	Código
240203,000	4240245,840	604,148	C
240199,500	4240245,840	604,157	C
240185,500	4240245,840	604,192	C
240182,000	4240245,840	604,201	C
240168,000	4240245,840	604,236	C
240164,500	4240245,840	604,244	C
240150,500	4240245,840	604,279	C
240147,000	4240245,840	604,288	C
240133,000	4240245,840	604,323	C
240129,500	4240245,840	604,332	C
240115,500	4240245,840	604,367	C
240112,000	4240245,840	604,376	C
240098,000	4240245,840	604,411	C
240094,500	4240245,840	604,419	C
240080,500	4240245,840	604,454	C
240077,000	4240245,840	604,463	C
240063,000	4240245,840	604,498	C
240059,500	4240245,840	604,507	C
240045,500	4240245,840	604,542	C
240042,000	4240245,840	604,551	C
240028,000	4240245,840	604,586	C
240024,500	4240245,840	604,594	C
240024,500	4240242,690	604,563	C
240028,000	4240242,690	604,554	C
240042,000	4240242,690	604,519	C
240045,500	4240242,690	604,510	C
240059,500	4240242,690	604,475	C
240063,000	4240242,690	604,467	C
240077,000	4240242,690	604,432	C
240080,500	4240242,690	604,423	C
240094,500	4240242,690	604,388	C
240098,000	4240242,690	604,379	C
240112,000	4240242,690	604,344	C
240115,500	4240242,690	604,335	C
240129,500	4240242,690	604,300	C
240133,000	4240242,690	604,292	C
240147,000	4240242,690	604,257	C
240150,500	4240242,690	604,248	C
240164,500	4240242,690	604,213	C
240168,000	4240242,690	604,204	C
240182,000	4240242,690	604,169	C
240185,500	4240242,690	604,160	C
240199,500	4240242,690	604,125	C
240203,000	4240242,690	604,117	C
240217,000	4240242,690	604,082	C
240220,500	4240242,690	604,073	C

Coord. X	Coord. Y	Elevación	Código
240589,500	4239745,746	598,181	C
240593,000	4239745,746	598,172	C
240607,000	4239745,746	598,137	C
240610,500	4239745,746	598,128	C
240624,500	4239745,746	598,093	C
240628,000	4239745,746	598,085	C
240642,000	4239745,746	598,050	C
240645,500	4239745,746	598,041	C
240659,500	4239745,746	598,006	C
240663,000	4239745,746	597,997	C
240677,000	4239745,746	597,962	C
240680,500	4239745,746	597,953	C
240694,500	4239745,746	597,918	C
240698,000	4239745,746	597,910	C
240712,000	4239745,746	597,875	C
240715,500	4239745,746	597,866	C
240729,500	4239745,746	597,831	C
240733,000	4239745,746	597,822	C
240747,000	4239745,746	597,787	C
240750,500	4239745,746	597,778	C
240764,500	4239745,746	597,743	C
240768,000	4239745,746	597,735	C
240782,000	4239745,746	597,700	C
240785,500	4239745,746	597,691	C
240799,500	4239745,746	597,656	C
240803,000	4239745,746	597,647	C
240817,000	4239745,746	597,612	C
240820,500	4239745,746	597,603	C
240834,500	4239745,746	597,568	C
240838,000	4239745,746	597,560	C
240852,000	4239745,746	597,525	C
240855,500	4239745,746	597,516	C
240869,500	4239745,746	597,481	C
240873,000	4239745,746	597,472	C
240887,000	4239745,746	597,437	C
240890,500	4239745,746	597,428	C
240904,500	4239745,746	597,393	C
240908,000	4239745,746	597,385	C
240922,000	4239745,746	597,350	C
240925,500	4239745,746	597,341	C
240939,500	4239745,746	597,306	C
240943,000	4239745,746	597,297	C
240957,000	4239745,746	597,262	C
240960,500	4239745,746	597,253	C
240974,500	4239745,746	597,218	C
240978,000	4239745,746	597,210	C

Coord. X	Coord. Y	Elevación	Código
240234,500	4240242,690	604,038	C
240238,000	4240242,690	604,029	C
240252,000	4240242,690	603,994	C
240255,500	4240242,690	603,985	C
240269,500	4240242,690	603,950	C
240273,000	4240242,690	603,942	C
240287,000	4240242,690	603,907	C
240290,500	4240242,690	603,898	C
240304,500	4240242,690	603,863	C
240308,000	4240242,690	603,854	C
240322,000	4240242,690	603,819	C
240325,500	4240242,690	603,810	C
240339,500	4240242,690	603,775	C
240343,000	4240242,690	603,767	C
240357,000	4240242,690	603,732	C
240360,500	4240242,690	603,723	C
240374,500	4240242,690	603,688	C
240378,000	4240242,690	603,679	C
240392,000	4240242,690	603,644	C
240395,500	4240242,690	603,635	C
240409,500	4240242,690	603,600	C
240413,000	4240242,690	603,592	C
240427,000	4240242,690	603,557	C
240430,500	4240242,690	603,548	C
240444,500	4240242,690	603,513	C
240448,000	4240242,690	603,504	C
240462,000	4240242,690	603,469	C
240465,500	4240242,690	603,460	C
240479,500	4240242,690	603,425	C
240483,000	4240242,690	603,417	C
240497,000	4240242,690	603,382	C
240500,500	4240242,690	603,373	C
240514,500	4240242,690	603,338	C
240518,000	4240242,690	603,329	C
240532,000	4240242,690	603,294	C
240535,500	4240242,690	603,285	C
240549,500	4240242,690	603,250	C
240553,000	4240242,690	603,242	C
240567,000	4240242,690	603,207	C
240570,500	4240242,690	603,198	C
240584,500	4240242,690	603,163	C
240588,000	4240242,690	603,154	C
240602,000	4240242,690	603,119	C
240605,500	4240242,690	603,110	C
240619,500	4240242,690	603,075	C
240623,000	4240242,690	603,067	C

Coord. X	Coord. Y	Elevación	Código
240992,000	4239745,746	597,175	C
240995,500	4239745,746	597,166	C
241009,500	4239745,746	597,131	C
241013,000	4239745,746	597,122	C
241027,000	4239745,746	597,087	C
241030,500	4239745,746	597,078	C
241044,500	4239745,746	597,043	C
241048,000	4239745,746	597,035	C
241062,000	4239745,746	597,000	C
241065,500	4239745,746	596,991	C
241079,500	4239745,746	596,956	C
241083,000	4239745,746	596,947	C
241097,000	4239745,746	596,912	C
241100,500	4239745,746	596,903	C
241114,500	4239745,746	596,868	C
241118,000	4239745,746	596,860	C
241132,000	4239745,746	596,825	C
241135,500	4239745,746	596,816	C
241149,500	4239745,746	596,781	C
241153,000	4239745,746	596,772	C
241167,000	4239745,746	596,737	C
241170,500	4239745,746	596,728	C
241184,500	4239745,746	596,693	C
241188,000	4239745,746	596,685	C
241188,000	4239741,746	596,645	C
241184,500	4239741,746	596,653	C
241170,500	4239741,746	596,688	C
241167,000	4239741,746	596,697	C
241153,000	4239741,746	596,732	C
241149,500	4239741,746	596,741	C
241135,500	4239741,746	596,776	C
241132,000	4239741,746	596,785	C
241118,000	4239741,746	596,820	C
241114,500	4239741,746	596,828	C
241100,500	4239741,746	596,863	C
241097,000	4239741,746	596,872	C
241083,000	4239741,746	596,907	C
241079,500	4239741,746	596,916	C
241065,500	4239741,746	596,951	C
241062,000	4239741,746	596,960	C
241048,000	4239741,746	596,995	C
241044,500	4239741,746	597,003	C
241030,500	4239741,746	597,038	C
241027,000	4239741,746	597,047	C
241013,000	4239741,746	597,082	C
241009,500	4239741,746	597,091	C

Coord. X	Coord. Y	Elevación	Código
240637,000	4240242,690	603,032	C
240640,500	4240242,690	603,023	C
240654,500	4240242,690	602,988	C
240658,000	4240242,690	602,979	C
240672,000	4240242,690	602,944	C
240675,500	4240242,690	602,935	C
240689,500	4240242,690	602,900	C
240693,000	4240242,690	602,892	C
240707,000	4240242,690	602,857	C
240710,500	4240242,690	602,848	C
240724,500	4240242,690	602,813	C
240728,000	4240242,690	602,804	C
240742,000	4240242,690	602,769	C
240745,500	4240242,690	602,760	C
240759,500	4240242,690	602,725	C
240763,000	4240242,690	602,717	C
240777,000	4240242,690	602,682	C
240780,500	4240242,690	602,673	C
240794,500	4240242,690	602,638	C
240798,000	4240242,690	602,629	C
240812,000	4240242,690	602,594	C
240815,500	4240242,690	602,585	C
240829,500	4240242,690	602,550	C
240833,000	4240242,690	602,542	C
240847,000	4240242,690	602,507	C
240850,500	4240242,690	602,498	C
240864,500	4240242,690	602,463	C
240868,000	4240242,690	602,454	C
240882,000	4240242,690	602,419	C
240885,500	4240242,690	602,410	C
240899,500	4240242,690	602,375	C
240903,000	4240242,690	602,367	C
240917,000	4240242,690	602,332	C
240920,500	4240242,690	602,323	C
240934,500	4240242,690	602,288	C
240938,000	4240242,690	602,279	C
240952,000	4240242,690	602,244	C
240955,500	4240242,690	602,235	C
240969,500	4240242,690	602,200	C
240973,000	4240242,690	602,192	C
240987,000	4240242,690	602,157	C
240990,500	4240242,690	602,148	C
241004,500	4240242,690	602,113	C
241008,000	4240242,690	602,104	C
241022,000	4240242,690	602,069	C
241025,500	4240242,690	602,060	C

Coord. X	Coord. Y	Elevación	Código
240995,500	4239741,746	597,126	C
240992,000	4239741,746	597,135	C
240978,000	4239741,746	597,170	C
240974,500	4239741,746	597,178	C
240960,500	4239741,746	597,213	C
240957,000	4239741,746	597,222	C
240943,000	4239741,746	597,257	C
240939,500	4239741,746	597,266	C
240925,500	4239741,746	597,301	C
240922,000	4239741,746	597,310	C
240908,000	4239741,746	597,345	C
240904,500	4239741,746	597,353	C
240890,500	4239741,746	597,388	C
240887,000	4239741,746	597,397	C
240873,000	4239741,746	597,432	C
240869,500	4239741,746	597,441	C
240855,500	4239741,746	597,476	C
240852,000	4239741,746	597,485	C
240838,000	4239741,746	597,520	C
240834,500	4239741,746	597,528	C
240820,500	4239741,746	597,563	C
240817,000	4239741,746	597,572	C
240803,000	4239741,746	597,607	C
240799,500	4239741,746	597,616	C
240785,500	4239741,746	597,651	C
240782,000	4239741,746	597,660	C
240768,000	4239741,746	597,695	C
240764,500	4239741,746	597,703	C
240750,500	4239741,746	597,738	C
240747,000	4239741,746	597,747	C
240733,000	4239741,746	597,782	C
240729,500	4239741,746	597,791	C
240715,500	4239741,746	597,826	C
240712,000	4239741,746	597,835	C
240698,000	4239741,746	597,870	C
240694,500	4239741,746	597,878	C
240680,500	4239741,746	597,913	C
240677,000	4239741,746	597,922	C
240663,000	4239741,746	597,957	C
240659,500	4239741,746	597,966	C
240645,500	4239741,746	598,001	C
240642,000	4239741,746	598,010	C
240628,000	4239741,746	598,045	C
240624,500	4239741,746	598,053	C
240610,500	4239741,746	598,088	C
240607,000	4239741,746	598,097	C

Coord. X	Coord. Y	Elevación	Código
241039,500	4240242,690	602,025	C
241043,000	4240242,690	602,017	C
241057,000	4240242,690	601,982	C
241060,500	4240242,690	601,973	C
241074,500	4240242,690	601,938	C
241078,000	4240242,690	601,929	C
241092,000	4240242,690	601,894	C
241095,500	4240242,690	601,885	C
241109,500	4240242,690	601,850	C
241113,000	4240242,690	601,842	C
241127,000	4240242,690	601,807	C
241130,500	4240242,690	601,798	C
241144,500	4240242,690	601,763	C
241148,000	4240242,690	601,754	C
241162,000	4240242,690	601,719	C
241165,500	4240242,690	601,710	C
241179,500	4240242,690	601,675	C
241183,000	4240242,690	601,667	C
241197,000	4240242,690	601,632	C
241200,500	4240242,690	601,623	C
241214,500	4240242,690	601,588	C
241218,000	4240242,690	601,579	C
241232,000	4240242,690	601,544	C
241235,500	4240242,690	601,535	C
241249,500	4240242,690	601,500	C
241253,000	4240242,690	601,492	C
241267,000	4240242,690	601,457	C
241270,500	4240242,690	601,448	C
241284,500	4240242,690	601,413	C
241288,000	4240242,690	601,404	C
241302,000	4240242,690	601,369	C
241305,500	4240242,690	601,360	C
241319,500	4240242,690	601,325	C
241323,000	4240242,690	601,317	C
241337,000	4240242,690	601,282	C
241340,500	4240242,690	601,273	C
241354,500	4240242,690	601,238	C
241358,000	4240242,690	601,229	C
241372,000	4240242,690	601,194	C
241375,500	4240242,690	601,186	C
241389,500	4240242,690	601,151	C
241393,000	4240242,690	601,142	C
241407,000	4240242,690	601,107	C
241410,500	4240242,690	601,098	C
241424,500	4240242,690	601,063	C
241428,000	4240242,690	601,054	C

Coord. X	Coord. Y	Elevación	Código
240593,000	4239741,746	598,132	C
240589,500	4239741,746	598,141	C
240575,500	4239741,746	598,176	C
240572,000	4239741,746	598,185	C
240558,000	4239741,746	598,220	C
240554,500	4239741,746	598,228	C
240540,500	4239741,746	598,263	C
240537,000	4239741,746	598,272	C
240523,000	4239741,746	598,307	C
240519,500	4239741,746	598,316	C
240505,500	4239741,746	598,351	C
240502,000	4239741,746	598,360	C
240488,000	4239741,746	598,395	C
240484,500	4239741,746	598,403	C
240470,500	4239741,746	598,438	C
240467,000	4239741,746	598,447	C
240453,000	4239741,746	598,482	C
240449,500	4239741,746	598,491	C
240435,500	4239741,746	598,526	C
240432,000	4239741,746	598,535	C
240418,000	4239741,746	598,570	C
240414,500	4239741,746	598,578	C
240400,500	4239741,746	598,613	C
240397,000	4239741,746	598,622	C
240383,000	4239741,746	598,657	C
240379,500	4239741,746	598,666	C
240365,500	4239741,746	598,701	C
240362,000	4239741,746	598,710	C
240348,000	4239741,746	598,745	C
240344,500	4239741,746	598,753	C
240330,500	4239741,746	598,788	C
240327,000	4239741,746	598,797	C
240313,000	4239741,746	598,832	C
240309,500	4239741,746	598,841	C
240295,500	4239741,746	598,876	C
240292,000	4239741,746	598,885	C
240278,000	4239741,746	598,920	C
240274,500	4239741,746	598,928	C
240260,500	4239741,746	598,963	C
240257,000	4239741,746	598,972	C
240243,000	4239741,746	599,007	C
240239,500	4239741,746	599,016	C
240225,500	4239741,746	599,051	C
240222,000	4239741,746	599,059	C
240208,000	4239741,746	599,094	C
240204,500	4239741,746	599,103	C

Coord. X	Coord. Y	Elevación	Código
241442,000	4240242,690	601,019	C
241445,500	4240242,690	601,011	C
241459,500	4240242,690	600,976	C
241463,000	4240242,690	600,967	C
241477,000	4240242,690	600,932	C
241480,500	4240242,690	600,923	C
241494,500	4240242,690	600,888	C
241498,000	4240242,690	600,879	C
241512,000	4240242,690	600,844	C
241515,500	4240242,690	600,836	C
241529,500	4240242,690	600,801	C
241533,000	4240242,690	600,792	C
241547,000	4240242,690	600,757	C
241550,500	4240242,690	600,748	C
241564,500	4240242,690	600,713	C
241568,000	4240242,690	600,704	C
241582,000	4240242,690	600,669	C
241585,500	4240242,690	600,661	C
241599,500	4240242,690	600,626	C
241603,000	4240242,690	600,617	C
241617,000	4240242,690	600,582	C
241620,500	4240242,690	600,573	C
241634,500	4240242,690	600,538	C
241638,000	4240242,690	600,529	C
241652,000	4240242,690	600,494	C
241655,500	4240242,690	600,486	C
241669,500	4240242,690	600,451	C
241673,000	4240242,690	600,442	C
241687,000	4240242,690	600,407	C
241690,500	4240242,690	600,398	C
241704,500	4240242,690	600,363	C
241708,000	4240242,690	600,354	C
241722,000	4240242,690	600,319	C
241725,500	4240242,690	600,311	C
241739,500	4240242,690	600,276	C
241743,000	4240242,690	600,267	C
241757,000	4240242,690	600,232	C
241760,500	4240242,690	600,223	C
240012,000	4240217,950	604,347	C
240015,500	4240217,950	604,338	C
240029,500	4240217,950	604,303	C
240033,000	4240217,950	604,294	C
240047,000	4240217,950	604,259	C
240050,500	4240217,950	604,250	C
240064,500	4240217,950	604,215	C
240068,000	4240217,950	604,207	C

Coord. X	Coord. Y	Elevación	Código
240190,500	4239741,746	599,138	C
240187,000	4239741,746	599,147	C
240173,000	4239741,746	599,182	C
240169,500	4239741,746	599,191	C
240155,500	4239741,746	599,226	C
240152,000	4239741,746	599,234	C
240138,000	4239741,746	599,269	C
240134,500	4239741,746	599,278	C
240120,500	4239741,746	599,313	C
240117,000	4239741,746	599,322	C
240103,000	4239741,746	599,357	C
240099,500	4239741,746	599,366	C
240085,500	4239741,746	599,401	C
240082,000	4239741,746	599,409	C
240068,000	4239741,746	599,444	C
240064,500	4239741,746	599,453	C
240050,500	4239741,746	599,488	C
240047,000	4239741,746	599,497	C
240033,000	4239741,746	599,532	C
240029,500	4239741,746	599,541	C
240015,500	4239741,746	599,576	C
240012,000	4239741,746	599,584	C
240012,000	4239733,693	599,504	C
240015,500	4239733,693	599,495	C
240029,500	4239733,693	599,460	C
240033,000	4239733,693	599,451	C
240047,000	4239733,693	599,416	C
240050,500	4239733,693	599,408	C
240064,500	4239733,693	599,373	C
240068,000	4239733,693	599,364	C
240082,000	4239733,693	599,329	C
240085,500	4239733,693	599,320	C
240099,500	4239733,693	599,285	C
240103,000	4239733,693	599,276	C
240117,000	4239733,693	599,241	C
240120,500	4239733,693	599,233	C
240134,500	4239733,693	599,198	C
240138,000	4239733,693	599,189	C
240152,000	4239733,693	599,154	C
240155,500	4239733,693	599,145	C
240169,500	4239733,693	599,110	C
240173,000	4239733,693	599,101	C
240187,000	4239733,693	599,066	C
240190,500	4239733,693	599,058	C
240204,500	4239733,693	599,023	C
240208,000	4239733,693	599,014	C

Coord. X	Coord. Y	Elevación	Código
240082,000	4240217,950	604,172	C
240085,500	4240217,950	604,163	C
240099,500	4240217,950	604,128	C
240103,000	4240217,950	604,119	C
240117,000	4240217,950	604,084	C
240120,500	4240217,950	604,075	C
240134,500	4240217,950	604,040	C
240138,000	4240217,950	604,032	C
240152,000	4240217,950	603,997	C
240155,500	4240217,950	603,988	C
240169,500	4240217,950	603,953	C
240173,000	4240217,950	603,944	C
240187,000	4240217,950	603,909	C
240190,500	4240217,950	603,900	C
240204,500	4240217,950	603,865	C
240208,000	4240217,950	603,857	C
240222,000	4240217,950	603,822	C
240225,500	4240217,950	603,813	C
240239,500	4240217,950	603,778	C
240243,000	4240217,950	603,769	C
240257,000	4240217,950	603,734	C
240260,500	4240217,950	603,725	C
240274,500	4240217,950	603,690	C
240278,000	4240217,950	603,682	C
240292,000	4240217,950	603,647	C
240295,500	4240217,950	603,638	C
240309,500	4240217,950	603,603	C
240313,000	4240217,950	603,594	C
240327,000	4240217,950	603,559	C
240330,500	4240217,950	603,550	C
240344,500	4240217,950	603,515	C
240348,000	4240217,950	603,507	C
240362,000	4240217,950	603,472	C
240365,500	4240217,950	603,463	C
240379,500	4240217,950	603,428	C
240383,000	4240217,950	603,419	C
240397,000	4240217,950	603,384	C
240400,500	4240217,950	603,375	C
240414,500	4240217,950	603,340	C
240418,000	4240217,950	603,332	C
240432,000	4240217,950	603,297	C
240435,500	4240217,950	603,288	C
240449,500	4240217,950	603,253	C
240453,000	4240217,950	603,244	C
240467,000	4240217,950	603,209	C
240470,500	4240217,950	603,200	C

Coord. X	Coord. Y	Elevación	Código
240222,000	4239733,693	598,979	C
240225,500	4239733,693	598,970	C
240239,500	4239733,693	598,935	C
240243,000	4239733,693	598,926	C
240257,000	4239733,693	598,892	C
240260,500	4239733,693	598,883	C
240274,500	4239733,693	598,848	C
240278,000	4239733,693	598,839	C
240292,000	4239733,693	598,804	C
240295,500	4239733,693	598,795	C
240309,500	4239733,693	598,760	C
240313,000	4239733,693	598,752	C
240327,000	4239733,693	598,717	C
240330,500	4239733,693	598,708	C
240344,500	4239733,693	598,673	C
240348,000	4239733,693	598,664	C
240362,000	4239733,693	598,629	C
240365,500	4239733,693	598,620	C
240379,500	4239733,693	598,585	C
240383,000	4239733,693	598,577	C
240397,000	4239733,693	598,542	C
240400,500	4239733,693	598,533	C
240414,500	4239733,693	598,498	C
240418,000	4239733,693	598,489	C
240432,000	4239733,693	598,454	C
240435,500	4239733,693	598,445	C
240449,500	4239733,693	598,410	C
240453,000	4239733,693	598,402	C
240467,000	4239733,693	598,367	C
240470,500	4239733,693	598,358	C
240484,500	4239733,693	598,323	C
240488,000	4239733,693	598,314	C
240502,000	4239733,693	598,279	C
240505,500	4239733,693	598,270	C
240519,500	4239733,693	598,235	C
240523,000	4239733,693	598,227	C
240537,000	4239733,693	598,192	C
240540,500	4239733,693	598,183	C
240554,500	4239733,693	598,148	C
240558,000	4239733,693	598,139	C
240572,000	4239733,693	598,104	C
240575,500	4239733,693	598,095	C
240589,500	4239733,693	598,060	C
240593,000	4239733,693	598,052	C
240607,000	4239733,693	598,017	C
240610,500	4239733,693	598,008	C

Coord. X	Coord. Y	Elevación	Código
240484,500	4240217,950	603,165	C
240488,000	4240217,950	603,157	C
240502,000	4240217,950	603,122	C
240505,500	4240217,950	603,113	C
240519,500	4240217,950	603,078	C
240523,000	4240217,950	603,069	C
240537,000	4240217,950	603,034	C
240540,500	4240217,950	603,025	C
240554,500	4240217,950	602,990	C
240558,000	4240217,950	602,982	C
240572,000	4240217,950	602,947	C
240575,500	4240217,950	602,938	C
240589,500	4240217,950	602,903	C
240593,000	4240217,950	602,894	C
240607,000	4240217,950	602,859	C
240610,500	4240217,950	602,850	C
240624,500	4240217,950	602,815	C
240628,000	4240217,950	602,807	C
240642,000	4240217,950	602,772	C
240645,500	4240217,950	602,763	C
240659,500	4240217,950	602,728	C
240663,000	4240217,950	602,719	C
240677,000	4240217,950	602,684	C
240680,500	4240217,950	602,675	C
240694,500	4240217,950	602,640	C
240698,000	4240217,950	602,632	C
240712,000	4240217,950	602,597	C
240715,500	4240217,950	602,588	C
240729,500	4240217,950	602,553	C
240733,000	4240217,950	602,544	C
240747,000	4240217,950	602,509	C
240750,500	4240217,950	602,500	C
240764,500	4240217,950	602,465	C
240768,000	4240217,950	602,457	C
240768,000	4240214,800	602,425	C
240764,500	4240214,800	602,434	C
240750,500	4240214,800	602,469	C
240747,000	4240214,800	602,478	C
240733,000	4240214,800	602,513	C
240729,500	4240214,800	602,521	C
240715,500	4240214,800	602,556	C
240712,000	4240214,800	602,565	C
240698,000	4240214,800	602,600	C
240694,500	4240214,800	602,609	C
240680,500	4240214,800	602,644	C
240677,000	4240214,800	602,653	C
240624,500	4239733,693	597,973	C
240628,000	4239733,693	597,964	C
240642,000	4239733,693	597,929	C
240645,500	4239733,693	597,920	C
240659,500	4239733,693	597,885	C
240663,000	4239733,693	597,877	C
240677,000	4239733,693	597,842	C
240680,500	4239733,693	597,833	C
240694,500	4239733,693	597,798	C
240698,000	4239733,693	597,789	C
240712,000	4239733,693	597,754	C
240715,500	4239733,693	597,745	C
240729,500	4239733,693	597,710	C
240733,000	4239733,693	597,702	C
240747,000	4239733,693	597,667	C
240750,500	4239733,693	597,658	C
240764,500	4239733,693	597,623	C
240768,000	4239733,693	597,614	C
240782,000	4239733,693	597,579	C
240785,500	4239733,693	597,570	C
240799,500	4239733,693	597,535	C
240803,000	4239733,693	597,527	C
240817,000	4239733,693	597,492	C
240820,500	4239733,693	597,483	C
240834,500	4239733,693	597,448	C
240838,000	4239733,693	597,439	C
240852,000	4239733,693	597,404	C
240855,500	4239733,693	597,395	C
240869,500	4239733,693	597,360	C
240873,000	4239733,693	597,352	C
240887,000	4239733,693	597,317	C
240890,500	4239733,693	597,308	C
240904,500	4239733,693	597,273	C
240908,000	4239733,693	597,264	C
240922,000	4239733,693	597,229	C
240925,500	4239733,693	597,220	C
240939,500	4239733,693	597,185	C
240943,000	4239733,693	597,177	C
240957,000	4239733,693	597,142	C
240960,500	4239733,693	597,133	C
240974,500	4239733,693	597,098	C
240978,000	4239733,693	597,089	C
240992,000	4239733,693	597,054	C
240995,500	4239733,693	597,045	C
241009,500	4239733,693	597,010	C
241013,000	4239733,693	597,002	C

Coord. X	Coord. Y	Elevación	Código
240663,000	4240214,800	602,688	C
240659,500	4240214,800	602,696	C
240645,500	4240214,800	602,731	C
240642,000	4240214,800	602,740	C
240628,000	4240214,800	602,775	C
240624,500	4240214,800	602,784	C
240610,500	4240214,800	602,819	C
240607,000	4240214,800	602,828	C
240593,000	4240214,800	602,863	C
240589,500	4240214,800	602,871	C
240575,500	4240214,800	602,906	C
240572,000	4240214,800	602,915	C
240558,000	4240214,800	602,950	C
240554,500	4240214,800	602,959	C
240540,500	4240214,800	602,994	C
240537,000	4240214,800	603,003	C
240523,000	4240214,800	603,038	C
240519,500	4240214,800	603,046	C
240505,500	4240214,800	603,081	C
240502,000	4240214,800	603,090	C
240488,000	4240214,800	603,125	C
240484,500	4240214,800	603,134	C
240470,500	4240214,800	603,169	C
240467,000	4240214,800	603,178	C
240453,000	4240214,800	603,213	C
240449,500	4240214,800	603,221	C
240435,500	4240214,800	603,256	C
240432,000	4240214,800	603,265	C
240418,000	4240214,800	603,300	C
240414,500	4240214,800	603,309	C
240400,500	4240214,800	603,344	C
240397,000	4240214,800	603,353	C
240383,000	4240214,800	603,388	C
240379,500	4240214,800	603,396	C
240365,500	4240214,800	603,431	C
240362,000	4240214,800	603,440	C
240348,000	4240214,800	603,475	C
240344,500	4240214,800	603,484	C
240330,500	4240214,800	603,519	C
240327,000	4240214,800	603,528	C
240313,000	4240214,800	603,563	C
240309,500	4240214,800	603,571	C
240295,500	4240214,800	603,606	C
240292,000	4240214,800	603,615	C
240278,000	4240214,800	603,650	C
240274,500	4240214,800	603,659	C

Coord. X	Coord. Y	Elevación	Código
241027,000	4239733,693	596,966	C
241030,500	4239733,693	596,958	C
241044,500	4239733,693	596,923	C
241048,000	4239733,693	596,914	C
241062,000	4239733,693	596,879	C
241065,500	4239733,693	596,870	C
241079,500	4239733,693	596,835	C
241083,000	4239733,693	596,826	C
241097,000	4239733,693	596,791	C
241100,500	4239733,693	596,783	C
241114,500	4239733,693	596,748	C
241118,000	4239733,693	596,739	C
241132,000	4239733,693	596,704	C
241135,500	4239733,693	596,695	C
241149,500	4239733,693	596,660	C
241153,000	4239733,693	596,651	C
241167,000	4239733,693	596,616	C
241170,500	4239733,693	596,608	C
241184,500	4239733,693	596,573	C
241188,000	4239733,693	596,564	C
241188,000	4239729,693	596,524	C
241184,500	4239729,693	596,533	C
241170,500	4239729,693	596,568	C
241167,000	4239729,693	596,576	C
241153,000	4239729,693	596,611	C
241149,500	4239729,693	596,620	C
241135,500	4239729,693	596,655	C
241132,000	4239729,693	596,664	C
241118,000	4239729,693	596,699	C
241114,500	4239729,693	596,708	C
241100,500	4239729,693	596,743	C
241097,000	4239729,693	596,751	C
241083,000	4239729,693	596,786	C
241079,500	4239729,693	596,795	C
241065,500	4239729,693	596,830	C
241062,000	4239729,693	596,839	C
241048,000	4239729,693	596,874	C
241044,500	4239729,693	596,883	C
241030,500	4239729,693	596,918	C
241027,000	4239729,693	596,926	C
241013,000	4239729,693	596,961	C
241009,500	4239729,693	596,970	C
240995,500	4239729,693	597,005	C
240992,000	4239729,693	597,014	C
240978,000	4239729,693	597,049	C
240974,500	4239729,693	597,058	C

Coord. X	Coord. Y	Elevación	Código
240260,500	4240214,800	603,694	C
240257,000	4240214,800	603,703	C
240243,000	4240214,800	603,738	C
240239,500	4240214,800	603,746	C
240225,500	4240214,800	603,781	C
240222,000	4240214,800	603,790	C
240208,000	4240214,800	603,825	C
240204,500	4240214,800	603,834	C
240190,500	4240214,800	603,869	C
240187,000	4240214,800	603,878	C
240173,000	4240214,800	603,913	C
240169,500	4240214,800	603,921	C
240155,500	4240214,800	603,956	C
240152,000	4240214,800	603,965	C
240138,000	4240214,800	604,000	C
240134,500	4240214,800	604,009	C
240120,500	4240214,800	604,044	C
240117,000	4240214,800	604,053	C
240103,000	4240214,800	604,088	C
240099,500	4240214,800	604,096	C
240085,500	4240214,800	604,131	C
240082,000	4240214,800	604,140	C
240068,000	4240214,800	604,175	C
240064,500	4240214,800	604,184	C
240050,500	4240214,800	604,219	C
240047,000	4240214,800	604,228	C
240033,000	4240214,800	604,263	C
240029,500	4240214,800	604,271	C
240015,500	4240214,800	604,306	C
240012,000	4240214,800	604,315	C
240012,000	4240205,746	604,225	C
240015,500	4240205,746	604,216	C
240029,500	4240205,746	604,181	C
240033,000	4240205,746	604,172	C
240047,000	4240205,746	604,137	C
240050,500	4240205,746	604,128	C
240064,500	4240205,746	604,093	C
240068,000	4240205,746	604,085	C
240082,000	4240205,746	604,050	C
240085,500	4240205,746	604,041	C
240099,500	4240205,746	604,006	C
240103,000	4240205,746	603,997	C
240117,000	4240205,746	603,962	C
240120,500	4240205,746	603,953	C
240134,500	4240205,746	603,918	C
240138,000	4240205,746	603,910	C

Coord. X	Coord. Y	Elevación	Código
240960,500	4239729,693	597,093	C
240957,000	4239729,693	597,102	C
240943,000	4239729,693	597,137	C
240939,500	4239729,693	597,145	C
240925,500	4239729,693	597,180	C
240922,000	4239729,693	597,189	C
240908,000	4239729,693	597,224	C
240904,500	4239729,693	597,233	C
240890,500	4239729,693	597,268	C
240887,000	4239729,693	597,277	C
240873,000	4239729,693	597,312	C
240869,500	4239729,693	597,320	C
240855,500	4239729,693	597,355	C
240852,000	4239729,693	597,364	C
240838,000	4239729,693	597,399	C
240834,500	4239729,693	597,408	C
240820,500	4239729,693	597,443	C
240817,000	4239729,693	597,452	C
240803,000	4239729,693	597,487	C
240799,500	4239729,693	597,495	C
240785,500	4239729,693	597,530	C
240782,000	4239729,693	597,539	C
240768,000	4239729,693	597,574	C
240764,500	4239729,693	597,583	C
240750,500	4239729,693	597,618	C
240747,000	4239729,693	597,627	C
240733,000	4239729,693	597,662	C
240729,500	4239729,693	597,670	C
240715,500	4239729,693	597,705	C
240712,000	4239729,693	597,714	C
240698,000	4239729,693	597,749	C
240694,500	4239729,693	597,758	C
240680,500	4239729,693	597,793	C
240677,000	4239729,693	597,802	C
240663,000	4239729,693	597,837	C
240659,500	4239729,693	597,845	C
240645,500	4239729,693	597,880	C
240642,000	4239729,693	597,889	C
240628,000	4239729,693	597,924	C
240624,500	4239729,693	597,933	C
240610,500	4239729,693	597,968	C
240607,000	4239729,693	597,977	C
240593,000	4239729,693	598,012	C
240589,500	4239729,693	598,020	C
240575,500	4239729,693	598,055	C
240572,000	4239729,693	598,064	C

Coord. X	Coord. Y	Elevación	Código
240152,000	4240205,746	603,875	C
240155,500	4240205,746	603,866	C
240169,500	4240205,746	603,831	C
240173,000	4240205,746	603,822	C
240187,000	4240205,746	603,787	C
240190,500	4240205,746	603,778	C
240204,500	4240205,746	603,743	C
240208,000	4240205,746	603,735	C
240222,000	4240205,746	603,700	C
240225,500	4240205,746	603,691	C
240239,500	4240205,746	603,656	C
240243,000	4240205,746	603,647	C
240257,000	4240205,746	603,612	C
240260,500	4240205,746	603,603	C
240274,500	4240205,746	603,568	C
240278,000	4240205,746	603,560	C
240292,000	4240205,746	603,525	C
240295,500	4240205,746	603,516	C
240309,500	4240205,746	603,481	C
240313,000	4240205,746	603,472	C
240327,000	4240205,746	603,437	C
240330,500	4240205,746	603,428	C
240344,500	4240205,746	603,393	C
240348,000	4240205,746	603,385	C
240362,000	4240205,746	603,350	C
240365,500	4240205,746	603,341	C
240379,500	4240205,746	603,306	C
240383,000	4240205,746	603,297	C
240397,000	4240205,746	603,262	C
240400,500	4240205,746	603,253	C
240414,500	4240205,746	603,218	C
240418,000	4240205,746	603,210	C
240432,000	4240205,746	603,175	C
240435,500	4240205,746	603,166	C
240449,500	4240205,746	603,131	C
240453,000	4240205,746	603,122	C
240467,000	4240205,746	603,087	C
240470,500	4240205,746	603,078	C
240484,500	4240205,746	603,043	C
240488,000	4240205,746	603,035	C
240502,000	4240205,746	603,000	C
240505,500	4240205,746	602,991	C
240519,500	4240205,746	602,956	C
240523,000	4240205,746	602,947	C
240537,000	4240205,746	602,912	C
240540,500	4240205,746	602,903	C

Coord. X	Coord. Y	Elevación	Código
240558,000	4239729,693	598,099	C
240554,500	4239729,693	598,108	C
240540,500	4239729,693	598,143	C
240537,000	4239729,693	598,152	C
240523,000	4239729,693	598,187	C
240519,500	4239729,693	598,195	C
240505,500	4239729,693	598,230	C
240502,000	4239729,693	598,239	C
240488,000	4239729,693	598,274	C
240484,500	4239729,693	598,283	C
240470,500	4239729,693	598,318	C
240467,000	4239729,693	598,327	C
240453,000	4239729,693	598,362	C
240449,500	4239729,693	598,370	C
240435,500	4239729,693	598,405	C
240432,000	4239729,693	598,414	C
240418,000	4239729,693	598,449	C
240414,500	4239729,693	598,458	C
240400,500	4239729,693	598,493	C
240397,000	4239729,693	598,502	C
240383,000	4239729,693	598,537	C
240379,500	4239729,693	598,545	C
240365,500	4239729,693	598,580	C
240362,000	4239729,693	598,589	C
240348,000	4239729,693	598,624	C
240344,500	4239729,693	598,633	C
240330,500	4239729,693	598,668	C
240327,000	4239729,693	598,677	C
240313,000	4239729,693	598,712	C
240309,500	4239729,693	598,720	C
240295,500	4239729,693	598,755	C
240292,000	4239729,693	598,764	C
240278,000	4239729,693	598,799	C
240274,500	4239729,693	598,808	C
240260,500	4239729,693	598,843	C
240257,000	4239729,693	598,852	C
240243,000	4239729,693	598,886	C
240239,500	4239729,693	598,895	C
240225,500	4239729,693	598,930	C
240222,000	4239729,693	598,939	C
240208,000	4239729,693	598,974	C
240204,500	4239729,693	598,983	C
240190,500	4239729,693	599,018	C
240187,000	4239729,693	599,026	C
240173,000	4239729,693	599,061	C
240169,500	4239729,693	599,070	C

Coord. X	Coord. Y	Elevación	Código
240554,500	4240205,746	602,868	C
240558,000	4240205,746	602,860	C
240572,000	4240205,746	602,825	C
240575,500	4240205,746	602,816	C
240589,500	4240205,746	602,781	C
240593,000	4240205,746	602,772	C
240607,000	4240205,746	602,737	C
240610,500	4240205,746	602,728	C
240624,500	4240205,746	602,693	C
240628,000	4240205,746	602,685	C
240642,000	4240205,746	602,650	C
240645,500	4240205,746	602,641	C
240659,500	4240205,746	602,606	C
240663,000	4240205,746	602,597	C
240677,000	4240205,746	602,562	C
240680,500	4240205,746	602,553	C
240694,500	4240205,746	602,518	C
240698,000	4240205,746	602,510	C
240712,000	4240205,746	602,475	C
240715,500	4240205,746	602,466	C
240729,500	4240205,746	602,431	C
240733,000	4240205,746	602,422	C
240747,000	4240205,746	602,387	C
240750,500	4240205,746	602,378	C
240764,500	4240205,746	602,343	C
240768,000	4240205,746	602,335	C
240768,000	4240201,746	602,295	C
240764,500	4240201,746	602,303	C
240750,500	4240201,746	602,338	C
240747,000	4240201,746	602,347	C
240733,000	4240201,746	602,382	C
240729,500	4240201,746	602,391	C
240715,500	4240201,746	602,426	C
240712,000	4240201,746	602,435	C
240698,000	4240201,746	602,470	C
240694,500	4240201,746	602,478	C
240680,500	4240201,746	602,513	C
240677,000	4240201,746	602,522	C
240663,000	4240201,746	602,557	C
240659,500	4240201,746	602,566	C
240645,500	4240201,746	602,601	C
240642,000	4240201,746	602,610	C
240628,000	4240201,746	602,645	C
240624,500	4240201,746	602,653	C
240610,500	4240201,746	602,688	C
240607,000	4240201,746	602,697	C

Coord. X	Coord. Y	Elevación	Código
240155,500	4239729,693	599,105	C
240152,000	4239729,693	599,114	C
240138,000	4239729,693	599,149	C
240134,500	4239729,693	599,158	C
240120,500	4239729,693	599,193	C
240117,000	4239729,693	599,201	C
240103,000	4239729,693	599,236	C
240099,500	4239729,693	599,245	C
240085,500	4239729,693	599,280	C
240082,000	4239729,693	599,289	C
240068,000	4239729,693	599,324	C
240064,500	4239729,693	599,333	C
240050,500	4239729,693	599,368	C
240047,000	4239729,693	599,376	C
240033,000	4239729,693	599,411	C
240029,500	4239729,693	599,420	C
240015,500	4239729,693	599,455	C
240012,000	4239729,693	599,464	C
240012,000	4239721,639	599,383	C
240015,500	4239721,639	599,375	C
240029,500	4239721,639	599,340	C
240033,000	4239721,639	599,331	C
240047,000	4239721,639	599,296	C
240050,500	4239721,639	599,287	C
240064,500	4239721,639	599,252	C
240068,000	4239721,639	599,243	C
240082,000	4239721,639	599,208	C
240085,500	4239721,639	599,200	C
240099,500	4239721,639	599,165	C
240103,000	4239721,639	599,156	C
240117,000	4239721,639	599,121	C
240120,500	4239721,639	599,112	C
240134,500	4239721,639	599,077	C
240138,000	4239721,639	599,068	C
240152,000	4239721,639	599,033	C
240155,500	4239721,639	599,025	C
240169,500	4239721,639	598,990	C
240173,000	4239721,639	598,981	C
240187,000	4239721,639	598,946	C
240190,500	4239721,639	598,937	C
240204,500	4239721,639	598,902	C
240208,000	4239721,639	598,893	C
240222,000	4239721,639	598,858	C
240225,500	4239721,639	598,850	C
240239,500	4239721,639	598,815	C
240243,000	4239721,639	598,806	C

Coord. X	Coord. Y	Elevación	Código
240593,000	4240201,746	602,732	C
240589,500	4240201,746	602,741	C
240575,500	4240201,746	602,776	C
240572,000	4240201,746	602,785	C
240558,000	4240201,746	602,820	C
240554,500	4240201,746	602,828	C
240540,500	4240201,746	602,863	C
240537,000	4240201,746	602,872	C
240523,000	4240201,746	602,907	C
240519,500	4240201,746	602,916	C
240505,500	4240201,746	602,951	C
240502,000	4240201,746	602,960	C
240488,000	4240201,746	602,995	C
240484,500	4240201,746	603,003	C
240470,500	4240201,746	603,038	C
240467,000	4240201,746	603,047	C
240453,000	4240201,746	603,082	C
240449,500	4240201,746	603,091	C
240435,500	4240201,746	603,126	C
240432,000	4240201,746	603,135	C
240418,000	4240201,746	603,170	C
240414,500	4240201,746	603,178	C
240400,500	4240201,746	603,213	C
240397,000	4240201,746	603,222	C
240383,000	4240201,746	603,257	C
240379,500	4240201,746	603,266	C
240365,500	4240201,746	603,301	C
240362,000	4240201,746	603,310	C
240348,000	4240201,746	603,345	C
240344,500	4240201,746	603,353	C
240330,500	4240201,746	603,388	C
240327,000	4240201,746	603,397	C
240313,000	4240201,746	603,432	C
240309,500	4240201,746	603,441	C
240295,500	4240201,746	603,476	C
240292,000	4240201,746	603,485	C
240278,000	4240201,746	603,520	C
240274,500	4240201,746	603,528	C
240260,500	4240201,746	603,563	C
240257,000	4240201,746	603,572	C
240243,000	4240201,746	603,607	C
240239,500	4240201,746	603,616	C
240225,500	4240201,746	603,651	C
240222,000	4240201,746	603,660	C
240208,000	4240201,746	603,695	C
240204,500	4240201,746	603,703	C
240257,000	4239721,639	598,771	C
240260,500	4239721,639	598,762	C
240274,500	4239721,639	598,727	C
240278,000	4239721,639	598,718	C
240292,000	4239721,639	598,683	C
240295,500	4239721,639	598,675	C
240309,500	4239721,639	598,640	C
240313,000	4239721,639	598,631	C
240327,000	4239721,639	598,596	C
240330,500	4239721,639	598,587	C
240344,500	4239721,639	598,552	C
240348,000	4239721,639	598,543	C
240362,000	4239721,639	598,508	C
240365,500	4239721,639	598,500	C
240379,500	4239721,639	598,465	C
240383,000	4239721,639	598,456	C
240397,000	4239721,639	598,421	C
240400,500	4239721,639	598,412	C
240414,500	4239721,639	598,377	C
240418,000	4239721,639	598,368	C
240432,000	4239721,639	598,333	C
240435,500	4239721,639	598,325	C
240449,500	4239721,639	598,290	C
240453,000	4239721,639	598,281	C
240467,000	4239721,639	598,246	C
240470,500	4239721,639	598,237	C
240484,500	4239721,639	598,202	C
240488,000	4239721,639	598,193	C
240502,000	4239721,639	598,158	C
240505,500	4239721,639	598,150	C
240519,500	4239721,639	598,115	C
240523,000	4239721,639	598,106	C
240537,000	4239721,639	598,071	C
240540,500	4239721,639	598,062	C
240554,500	4239721,639	598,027	C
240558,000	4239721,639	598,018	C
240572,000	4239721,639	597,983	C
240575,500	4239721,639	597,975	C
240589,500	4239721,639	597,940	C
240593,000	4239721,639	597,931	C
240607,000	4239721,639	597,896	C
240610,500	4239721,639	597,887	C
240624,500	4239721,639	597,852	C
240628,000	4239721,639	597,843	C
240642,000	4239721,639	597,808	C
240645,500	4239721,639	597,800	C

Coord. X	Coord. Y	Elevación	Código
240190,500	4240201,746	603,738	C
240187,000	4240201,746	603,747	C
240173,000	4240201,746	603,782	C
240169,500	4240201,746	603,791	C
240155,500	4240201,746	603,826	C
240152,000	4240201,746	603,835	C
240138,000	4240201,746	603,870	C
240134,500	4240201,746	603,878	C
240120,500	4240201,746	603,913	C
240117,000	4240201,746	603,922	C
240103,000	4240201,746	603,957	C
240099,500	4240201,746	603,966	C
240085,500	4240201,746	604,001	C
240082,000	4240201,746	604,010	C
240068,000	4240201,746	604,045	C
240064,500	4240201,746	604,053	C
240050,500	4240201,746	604,088	C
240047,000	4240201,746	604,097	C
240033,000	4240201,746	604,132	C
240029,500	4240201,746	604,141	C
240015,500	4240201,746	604,176	C
240012,000	4240201,746	604,185	C
240012,000	4240193,693	604,104	C
240015,500	4240193,693	604,095	C
240029,500	4240193,693	604,060	C
240033,000	4240193,693	604,052	C
240047,000	4240193,693	604,017	C
240050,500	4240193,693	604,008	C
240064,500	4240193,693	603,973	C
240068,000	4240193,693	603,964	C
240082,000	4240193,693	603,929	C
240085,500	4240193,693	603,920	C
240099,500	4240193,693	603,885	C
240103,000	4240193,693	603,877	C
240117,000	4240193,693	603,842	C
240120,500	4240193,693	603,833	C
240134,500	4240193,693	603,798	C
240138,000	4240193,693	603,789	C
240152,000	4240193,693	603,754	C
240155,500	4240193,693	603,745	C
240169,500	4240193,693	603,710	C
240173,000	4240193,693	603,702	C
240187,000	4240193,693	603,667	C
240190,500	4240193,693	603,658	C
240204,500	4240193,693	603,623	C
240208,000	4240193,693	603,614	C

Coord. X	Coord. Y	Elevación	Código
240659,500	4239721,639	597,765	C
240663,000	4239721,639	597,756	C
240677,000	4239721,639	597,721	C
240680,500	4239721,639	597,712	C
240694,500	4239721,639	597,677	C
240698,000	4239721,639	597,668	C
240712,000	4239721,639	597,633	C
240715,500	4239721,639	597,625	C
240729,500	4239721,639	597,590	C
240733,000	4239721,639	597,581	C
240747,000	4239721,639	597,546	C
240750,500	4239721,639	597,537	C
240764,500	4239721,639	597,502	C
240768,000	4239721,639	597,493	C
240782,000	4239721,639	597,458	C
240785,500	4239721,639	597,450	C
240799,500	4239721,639	597,415	C
240803,000	4239721,639	597,406	C
240817,000	4239721,639	597,371	C
240820,500	4239721,639	597,362	C
240834,500	4239721,639	597,327	C
240838,000	4239721,639	597,318	C
240852,000	4239721,639	597,283	C
240855,500	4239721,639	597,275	C
240869,500	4239721,639	597,240	C
240873,000	4239721,639	597,231	C
240887,000	4239721,639	597,196	C
240890,500	4239721,639	597,187	C
240904,500	4239721,639	597,152	C
240908,000	4239721,639	597,143	C
240922,000	4239721,639	597,108	C
240925,500	4239721,639	597,100	C
240939,500	4239721,639	597,065	C
240943,000	4239721,639	597,056	C
240957,000	4239721,639	597,021	C
240960,500	4239721,639	597,012	C
240974,500	4239721,639	596,977	C
240978,000	4239721,639	596,968	C
240992,000	4239721,639	596,933	C
240995,500	4239721,639	596,925	C
241009,500	4239721,639	596,890	C
241013,000	4239721,639	596,881	C
241027,000	4239721,639	596,846	C
241030,500	4239721,639	596,837	C
241044,500	4239721,639	596,802	C
241048,000	4239721,639	596,793	C

Coord. X	Coord. Y	Elevación	Código
240222,000	4240193,693	603,579	C
240225,500	4240193,693	603,570	C
240239,500	4240193,693	603,535	C
240243,000	4240193,693	603,527	C
240257,000	4240193,693	603,492	C
240260,500	4240193,693	603,483	C
240274,500	4240193,693	603,448	C
240278,000	4240193,693	603,439	C
240292,000	4240193,693	603,404	C
240295,500	4240193,693	603,395	C
240309,500	4240193,693	603,360	C
240313,000	4240193,693	603,352	C
240327,000	4240193,693	603,317	C
240330,500	4240193,693	603,308	C
240344,500	4240193,693	603,273	C
240348,000	4240193,693	603,264	C
240362,000	4240193,693	603,229	C
240365,500	4240193,693	603,220	C
240379,500	4240193,693	603,185	C
240383,000	4240193,693	603,177	C
240397,000	4240193,693	603,142	C
240400,500	4240193,693	603,133	C
240414,500	4240193,693	603,098	C
240418,000	4240193,693	603,089	C
240432,000	4240193,693	603,054	C
240435,500	4240193,693	603,045	C
240449,500	4240193,693	603,010	C
240453,000	4240193,693	603,002	C
240467,000	4240193,693	602,967	C
240470,500	4240193,693	602,958	C
240484,500	4240193,693	602,923	C
240488,000	4240193,693	602,914	C
240502,000	4240193,693	602,879	C
240505,500	4240193,693	602,870	C
240519,500	4240193,693	602,835	C
240523,000	4240193,693	602,827	C
240537,000	4240193,693	602,792	C
240540,500	4240193,693	602,783	C
240554,500	4240193,693	602,748	C
240558,000	4240193,693	602,739	C
240572,000	4240193,693	602,704	C
240575,500	4240193,693	602,695	C
240589,500	4240193,693	602,660	C
240593,000	4240193,693	602,652	C
240607,000	4240193,693	602,617	C
240610,500	4240193,693	602,608	C

Coord. X	Coord. Y	Elevación	Código
241062,000	4239721,639	596,758	C
241065,500	4239721,639	596,750	C
241079,500	4239721,639	596,715	C
241083,000	4239721,639	596,706	C
241097,000	4239721,639	596,671	C
241100,500	4239721,639	596,662	C
241114,500	4239721,639	596,627	C
241118,000	4239721,639	596,618	C
241132,000	4239721,639	596,583	C
241135,500	4239721,639	596,575	C
241149,500	4239721,639	596,540	C
241153,000	4239721,639	596,531	C
241167,000	4239721,639	596,496	C
241170,500	4239721,639	596,487	C
241184,500	4239721,639	596,452	C
241188,000	4239721,639	596,443	C
241188,000	4239717,639	596,403	C
241184,500	4239717,639	596,412	C
241170,500	4239717,639	596,447	C
241167,000	4239717,639	596,456	C
241153,000	4239717,639	596,491	C
241149,500	4239717,639	596,500	C
241135,500	4239717,639	596,535	C
241132,000	4239717,639	596,543	C
241118,000	4239717,639	596,578	C
241114,500	4239717,639	596,587	C
241100,500	4239717,639	596,622	C
241097,000	4239717,639	596,631	C
241083,000	4239717,639	596,666	C
241079,500	4239717,639	596,675	C
241065,500	4239717,639	596,710	C
241062,000	4239717,639	596,718	C
241048,000	4239717,639	596,753	C
241044,500	4239717,639	596,762	C
241030,500	4239717,639	596,797	C
241027,000	4239717,639	596,806	C
241013,000	4239717,639	596,841	C
241009,500	4239717,639	596,850	C
240995,500	4239717,639	596,885	C
240992,000	4239717,639	596,893	C
240978,000	4239717,639	596,928	C
240974,500	4239717,639	596,937	C
240960,500	4239717,639	596,972	C
240957,000	4239717,639	596,981	C
240943,000	4239717,639	597,016	C
240939,500	4239717,639	597,025	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240624,500	4240193,693	602,573	C	240925,500	4239717,639	597,060	C
240628,000	4240193,693	602,564	C	240922,000	4239717,639	597,068	C
240642,000	4240193,693	602,529	C	240908,000	4239717,639	597,103	C
240645,500	4240193,693	602,520	C	240904,500	4239717,639	597,112	C
240659,500	4240193,693	602,485	C	240890,500	4239717,639	597,147	C
240663,000	4240193,693	602,477	C	240887,000	4239717,639	597,156	C
240677,000	4240193,693	602,442	C	240873,000	4239717,639	597,191	C
240680,500	4240193,693	602,433	C	240869,500	4239717,639	597,200	C
240694,500	4240193,693	602,398	C	240855,500	4239717,639	597,235	C
240698,000	4240193,693	602,389	C	240852,000	4239717,639	597,243	C
240712,000	4240193,693	602,354	C	240838,000	4239717,639	597,278	C
240715,500	4240193,693	602,345	C	240834,500	4239717,639	597,287	C
240729,500	4240193,693	602,310	C	240820,500	4239717,639	597,322	C
240733,000	4240193,693	602,302	C	240817,000	4239717,639	597,331	C
240747,000	4240193,693	602,267	C	240803,000	4239717,639	597,366	C
240750,500	4240193,693	602,258	C	240799,500	4239717,639	597,375	C
240764,500	4240193,693	602,223	C	240785,500	4239717,639	597,410	C
240768,000	4240193,693	602,214	C	240782,000	4239717,639	597,418	C
240768,000	4240189,693	602,174	C	240768,000	4239717,639	597,453	C
240764,500	4240189,693	602,183	C	240764,500	4239717,639	597,462	C
240750,500	4240189,693	602,218	C	240750,500	4239717,639	597,497	C
240747,000	4240189,693	602,227	C	240747,000	4239717,639	597,506	C
240733,000	4240189,693	602,262	C	240733,000	4239717,639	597,541	C
240729,500	4240189,693	602,270	C	240729,500	4239717,639	597,550	C
240715,500	4240189,693	602,305	C	240715,500	4239717,639	597,585	C
240712,000	4240189,693	602,314	C	240712,000	4239717,639	597,593	C
240698,000	4240189,693	602,349	C	240698,000	4239717,639	597,628	C
240694,500	4240189,693	602,358	C	240694,500	4239717,639	597,637	C
240680,500	4240189,693	602,393	C	240680,500	4239717,639	597,672	C
240677,000	4240189,693	602,402	C	240677,000	4239717,639	597,681	C
240663,000	4240189,693	602,437	C	240663,000	4239717,639	597,716	C
240659,500	4240189,693	602,445	C	240659,500	4239717,639	597,725	C
240645,500	4240189,693	602,480	C	240645,500	4239717,639	597,760	C
240642,000	4240189,693	602,489	C	240642,000	4239717,639	597,768	C
240628,000	4240189,693	602,524	C	240628,000	4239717,639	597,803	C
240624,500	4240189,693	602,533	C	240624,500	4239717,639	597,812	C
240610,500	4240189,693	602,568	C	240610,500	4239717,639	597,847	C
240607,000	4240189,693	602,577	C	240607,000	4239717,639	597,856	C
240593,000	4240189,693	602,612	C	240593,000	4239717,639	597,891	C
240589,500	4240189,693	602,620	C	240589,500	4239717,639	597,900	C
240575,500	4240189,693	602,655	C	240575,500	4239717,639	597,935	C
240572,000	4240189,693	602,664	C	240572,000	4239717,639	597,943	C
240558,000	4240189,693	602,699	C	240558,000	4239717,639	597,978	C
240554,500	4240189,693	602,708	C	240554,500	4239717,639	597,987	C
240540,500	4240189,693	602,743	C	240540,500	4239717,639	598,022	C
240537,000	4240189,693	602,752	C	240537,000	4239717,639	598,031	C

Coord. X	Coord. Y	Elevación	Código
240523,000	4240189,693	602,787	C
240519,500	4240189,693	602,795	C
240505,500	4240189,693	602,830	C
240502,000	4240189,693	602,839	C
240488,000	4240189,693	602,874	C
240484,500	4240189,693	602,883	C
240470,500	4240189,693	602,918	C
240467,000	4240189,693	602,927	C
240453,000	4240189,693	602,962	C
240449,500	4240189,693	602,970	C
240435,500	4240189,693	603,005	C
240432,000	4240189,693	603,014	C
240418,000	4240189,693	603,049	C
240414,500	4240189,693	603,058	C
240400,500	4240189,693	603,093	C
240397,000	4240189,693	603,102	C
240383,000	4240189,693	603,137	C
240379,500	4240189,693	603,145	C
240365,500	4240189,693	603,180	C
240362,000	4240189,693	603,189	C
240348,000	4240189,693	603,224	C
240344,500	4240189,693	603,233	C
240330,500	4240189,693	603,268	C
240327,000	4240189,693	603,277	C
240313,000	4240189,693	603,312	C
240309,500	4240189,693	603,320	C
240295,500	4240189,693	603,355	C
240292,000	4240189,693	603,364	C
240278,000	4240189,693	603,399	C
240274,500	4240189,693	603,408	C
240260,500	4240189,693	603,443	C
240257,000	4240189,693	603,452	C
240243,000	4240189,693	603,487	C
240239,500	4240189,693	603,495	C
240225,500	4240189,693	603,530	C
240222,000	4240189,693	603,539	C
240208,000	4240189,693	603,574	C
240204,500	4240189,693	603,583	C
240190,500	4240189,693	603,618	C
240187,000	4240189,693	603,627	C
240173,000	4240189,693	603,662	C
240169,500	4240189,693	603,670	C
240155,500	4240189,693	603,705	C
240152,000	4240189,693	603,714	C
240138,000	4240189,693	603,749	C
240134,500	4240189,693	603,758	C

Coord. X	Coord. Y	Elevación	Código
240523,000	4239717,639	598,066	C
240519,500	4239717,639	598,075	C
240505,500	4239717,639	598,110	C
240502,000	4239717,639	598,118	C
240488,000	4239717,639	598,153	C
240484,500	4239717,639	598,162	C
240470,500	4239717,639	598,197	C
240467,000	4239717,639	598,206	C
240453,000	4239717,639	598,241	C
240449,500	4239717,639	598,250	C
240435,500	4239717,639	598,285	C
240432,000	4239717,639	598,293	C
240418,000	4239717,639	598,328	C
240414,500	4239717,639	598,337	C
240400,500	4239717,639	598,372	C
240397,000	4239717,639	598,381	C
240383,000	4239717,639	598,416	C
240379,500	4239717,639	598,425	C
240365,500	4239717,639	598,460	C
240362,000	4239717,639	598,468	C
240348,000	4239717,639	598,503	C
240344,500	4239717,639	598,512	C
240330,500	4239717,639	598,547	C
240327,000	4239717,639	598,556	C
240313,000	4239717,639	598,591	C
240309,500	4239717,639	598,600	C
240295,500	4239717,639	598,635	C
240292,000	4239717,639	598,643	C
240278,000	4239717,639	598,678	C
240274,500	4239717,639	598,687	C
240260,500	4239717,639	598,722	C
240257,000	4239717,639	598,731	C
240243,000	4239717,639	598,766	C
240239,500	4239717,639	598,775	C
240225,500	4239717,639	598,810	C
240222,000	4239717,639	598,818	C
240208,000	4239717,639	598,853	C
240204,500	4239717,639	598,862	C
240190,500	4239717,639	598,897	C
240187,000	4239717,639	598,906	C
240173,000	4239717,639	598,941	C
240169,500	4239717,639	598,950	C
240155,500	4239717,639	598,985	C
240152,000	4239717,639	598,993	C
240138,000	4239717,639	599,028	C
240134,500	4239717,639	599,037	C

Coord. X	Coord. Y	Elevación	Código
240120,500	4240189,693	603,793	C
240117,000	4240189,693	603,802	C
240103,000	4240189,693	603,837	C
240099,500	4240189,693	603,845	C
240085,500	4240189,693	603,880	C
240082,000	4240189,693	603,889	C
240068,000	4240189,693	603,924	C
240064,500	4240189,693	603,933	C
240050,500	4240189,693	603,968	C
240047,000	4240189,693	603,977	C
240033,000	4240189,693	604,012	C
240029,500	4240189,693	604,020	C
240015,500	4240189,693	604,055	C
240012,000	4240189,693	604,064	C
240012,000	4240181,639	603,984	C
240015,500	4240181,639	603,975	C
240029,500	4240181,639	603,940	C
240033,000	4240181,639	603,931	C
240047,000	4240181,639	603,896	C
240050,500	4240181,639	603,887	C
240064,500	4240181,639	603,852	C
240068,000	4240181,639	603,844	C
240082,000	4240181,639	603,809	C
240085,500	4240181,639	603,800	C
240099,500	4240181,639	603,765	C
240103,000	4240181,639	603,756	C
240117,000	4240181,639	603,721	C
240120,500	4240181,639	603,712	C
240134,500	4240181,639	603,677	C
240138,000	4240181,639	603,669	C
240152,000	4240181,639	603,634	C
240155,500	4240181,639	603,625	C
240169,500	4240181,639	603,590	C
240173,000	4240181,639	603,581	C
240187,000	4240181,639	603,546	C
240190,500	4240181,639	603,537	C
240204,500	4240181,639	603,502	C
240208,000	4240181,639	603,494	C
240222,000	4240181,639	603,459	C
240225,500	4240181,639	603,450	C
240239,500	4240181,639	603,415	C
240243,000	4240181,639	603,406	C
240257,000	4240181,639	603,371	C
240260,500	4240181,639	603,362	C
240274,500	4240181,639	603,327	C
240278,000	4240181,639	603,319	C

Coord. X	Coord. Y	Elevación	Código
240120,500	4239717,639	599,072	C
240117,000	4239717,639	599,081	C
240103,000	4239717,639	599,116	C
240099,500	4239717,639	599,125	C
240085,500	4239717,639	599,160	C
240082,000	4239717,639	599,168	C
240068,000	4239717,639	599,203	C
240064,500	4239717,639	599,212	C
240050,500	4239717,639	599,247	C
240047,000	4239717,639	599,256	C
240033,000	4239717,639	599,291	C
240029,500	4239717,639	599,300	C
240015,500	4239717,639	599,335	C
240012,000	4239717,639	599,343	C
240012,000	4239708,585	599,253	C
240015,500	4239708,585	599,244	C
240029,500	4239708,585	599,209	C
240033,000	4239708,585	599,200	C
240047,000	4239708,585	599,165	C
240050,500	4239708,585	599,156	C
240064,500	4239708,585	599,121	C
240068,000	4239708,585	599,113	C
240082,000	4239708,585	599,078	C
240085,500	4239708,585	599,069	C
240099,500	4239708,585	599,034	C
240103,000	4239708,585	599,025	C
240117,000	4239708,585	598,990	C
240120,500	4239708,585	598,981	C
240134,500	4239708,585	598,946	C
240138,000	4239708,585	598,938	C
240152,000	4239708,585	598,903	C
240155,500	4239708,585	598,894	C
240169,500	4239708,585	598,859	C
240173,000	4239708,585	598,850	C
240187,000	4239708,585	598,815	C
240190,500	4239708,585	598,806	C
240204,500	4239708,585	598,771	C
240208,000	4239708,585	598,763	C
240222,000	4239708,585	598,728	C
240225,500	4239708,585	598,719	C
240239,500	4239708,585	598,684	C
240243,000	4239708,585	598,675	C
240257,000	4239708,585	598,640	C
240260,500	4239708,585	598,631	C
240274,500	4239708,585	598,597	C
240278,000	4239708,585	598,588	C

Coord. X	Coord. Y	Elevación	Código
240292,000	4240181,639	603,284	C
240295,500	4240181,639	603,275	C
240309,500	4240181,639	603,240	C
240313,000	4240181,639	603,231	C
240327,000	4240181,639	603,196	C
240330,500	4240181,639	603,187	C
240344,500	4240181,639	603,152	C
240348,000	4240181,639	603,144	C
240362,000	4240181,639	603,109	C
240365,500	4240181,639	603,100	C
240379,500	4240181,639	603,065	C
240383,000	4240181,639	603,056	C
240397,000	4240181,639	603,021	C
240400,500	4240181,639	603,012	C
240414,500	4240181,639	602,977	C
240418,000	4240181,639	602,969	C
240432,000	4240181,639	602,934	C
240435,500	4240181,639	602,925	C
240449,500	4240181,639	602,890	C
240453,000	4240181,639	602,881	C
240467,000	4240181,639	602,846	C
240470,500	4240181,639	602,837	C
240484,500	4240181,639	602,802	C
240488,000	4240181,639	602,794	C
240502,000	4240181,639	602,759	C
240505,500	4240181,639	602,750	C
240519,500	4240181,639	602,715	C
240523,000	4240181,639	602,706	C
240537,000	4240181,639	602,671	C
240540,500	4240181,639	602,662	C
240554,500	4240181,639	602,627	C
240558,000	4240181,639	602,619	C
240572,000	4240181,639	602,584	C
240575,500	4240181,639	602,575	C
240589,500	4240181,639	602,540	C
240593,000	4240181,639	602,531	C
240607,000	4240181,639	602,496	C
240610,500	4240181,639	602,487	C
240624,500	4240181,639	602,452	C
240628,000	4240181,639	602,444	C
240642,000	4240181,639	602,409	C
240645,500	4240181,639	602,400	C
240659,500	4240181,639	602,365	C
240663,000	4240181,639	602,356	C
240677,000	4240181,639	602,321	C
240680,500	4240181,639	602,312	C

Coord. X	Coord. Y	Elevación	Código
240292,000	4239708,585	598,553	C
240295,500	4239708,585	598,544	C
240309,500	4239708,585	598,509	C
240313,000	4239708,585	598,500	C
240327,000	4239708,585	598,465	C
240330,500	4239708,585	598,457	C
240344,500	4239708,585	598,422	C
240348,000	4239708,585	598,413	C
240362,000	4239708,585	598,378	C
240365,500	4239708,585	598,369	C
240379,500	4239708,585	598,334	C
240383,000	4239708,585	598,325	C
240397,000	4239708,585	598,290	C
240400,500	4239708,585	598,282	C
240414,500	4239708,585	598,247	C
240418,000	4239708,585	598,238	C
240432,000	4239708,585	598,203	C
240435,500	4239708,585	598,194	C
240449,500	4239708,585	598,159	C
240453,000	4239708,585	598,150	C
240467,000	4239708,585	598,115	C
240470,500	4239708,585	598,107	C
240484,500	4239708,585	598,072	C
240488,000	4239708,585	598,063	C
240502,000	4239708,585	598,028	C
240505,500	4239708,585	598,019	C
240519,500	4239708,585	597,984	C
240523,000	4239708,585	597,975	C
240537,000	4239708,585	597,940	C
240540,500	4239708,585	597,932	C
240554,500	4239708,585	597,897	C
240558,000	4239708,585	597,888	C
240572,000	4239708,585	597,853	C
240575,500	4239708,585	597,844	C
240589,500	4239708,585	597,809	C
240593,000	4239708,585	597,800	C
240607,000	4239708,585	597,765	C
240610,500	4239708,585	597,757	C
240624,500	4239708,585	597,722	C
240628,000	4239708,585	597,713	C
240642,000	4239708,585	597,678	C
240645,500	4239708,585	597,669	C
240659,500	4239708,585	597,634	C
240663,000	4239708,585	597,625	C
240677,000	4239708,585	597,590	C
240680,500	4239708,585	597,582	C

Coord. X	Coord. Y	Elevación	Código
240694,500	4240181,639	602,277	C
240698,000	4240181,639	602,269	C
240712,000	4240181,639	602,234	C
240715,500	4240181,639	602,225	C
240729,500	4240181,639	602,190	C
240733,000	4240181,639	602,181	C
240747,000	4240181,639	602,146	C
240750,500	4240181,639	602,137	C
240764,500	4240181,639	602,102	C
240768,000	4240181,639	602,094	C
240768,000	4240177,639	602,054	C
240764,500	4240177,639	602,062	C
240750,500	4240177,639	602,097	C
240747,000	4240177,639	602,106	C
240733,000	4240177,639	602,141	C
240729,500	4240177,639	602,150	C
240715,500	4240177,639	602,185	C
240712,000	4240177,639	602,194	C
240698,000	4240177,639	602,229	C
240694,500	4240177,639	602,237	C
240680,500	4240177,639	602,272	C
240677,000	4240177,639	602,281	C
240663,000	4240177,639	602,316	C
240659,500	4240177,639	602,325	C
240645,500	4240177,639	602,360	C
240642,000	4240177,639	602,369	C
240628,000	4240177,639	602,404	C
240624,500	4240177,639	602,412	C
240610,500	4240177,639	602,447	C
240607,000	4240177,639	602,456	C
240593,000	4240177,639	602,491	C
240589,500	4240177,639	602,500	C
240575,500	4240177,639	602,535	C
240572,000	4240177,639	602,544	C
240558,000	4240177,639	602,579	C
240554,500	4240177,639	602,587	C
240540,500	4240177,639	602,622	C
240537,000	4240177,639	602,631	C
240523,000	4240177,639	602,666	C
240519,500	4240177,639	602,675	C
240505,500	4240177,639	602,710	C
240502,000	4240177,639	602,719	C
240488,000	4240177,639	602,754	C
240484,500	4240177,639	602,762	C
240470,500	4240177,639	602,797	C
240467,000	4240177,639	602,806	C

Coord. X	Coord. Y	Elevación	Código
240694,500	4239708,585	597,547	C
240698,000	4239708,585	597,538	C
240712,000	4239708,585	597,503	C
240715,500	4239708,585	597,494	C
240729,500	4239708,585	597,459	C
240733,000	4239708,585	597,450	C
240747,000	4239708,585	597,415	C
240750,500	4239708,585	597,407	C
240764,500	4239708,585	597,372	C
240768,000	4239708,585	597,363	C
240782,000	4239708,585	597,328	C
240785,500	4239708,585	597,319	C
240799,500	4239708,585	597,284	C
240803,000	4239708,585	597,275	C
240817,000	4239708,585	597,240	C
240820,500	4239708,585	597,232	C
240834,500	4239708,585	597,197	C
240838,000	4239708,585	597,188	C
240852,000	4239708,585	597,153	C
240855,500	4239708,585	597,144	C
240869,500	4239708,585	597,109	C
240873,000	4239708,585	597,100	C
240887,000	4239708,585	597,065	C
240890,500	4239708,585	597,057	C
240904,500	4239708,585	597,022	C
240908,000	4239708,585	597,013	C
240922,000	4239708,585	596,978	C
240925,500	4239708,585	596,969	C
240939,500	4239708,585	596,934	C
240943,000	4239708,585	596,925	C
240957,000	4239708,585	596,890	C
240960,500	4239708,585	596,882	C
240974,500	4239708,585	596,847	C
240978,000	4239708,585	596,838	C
240992,000	4239708,585	596,803	C
240995,500	4239708,585	596,794	C
241009,500	4239708,585	596,759	C
241013,000	4239708,585	596,750	C
241027,000	4239708,585	596,715	C
241030,500	4239708,585	596,707	C
241044,500	4239708,585	596,672	C
241048,000	4239708,585	596,663	C
241062,000	4239708,585	596,628	C
241065,500	4239708,585	596,619	C
241079,500	4239708,585	596,584	C
241083,000	4239708,585	596,575	C

Coord. X	Coord. Y	Elevación	Código
240453,000	4240177,639	602,841	C
240449,500	4240177,639	602,850	C
240435,500	4240177,639	602,885	C
240432,000	4240177,639	602,894	C
240418,000	4240177,639	602,929	C
240414,500	4240177,639	602,937	C
240400,500	4240177,639	602,972	C
240397,000	4240177,639	602,981	C
240383,000	4240177,639	603,016	C
240379,500	4240177,639	603,025	C
240365,500	4240177,639	603,060	C
240362,000	4240177,639	603,069	C
240348,000	4240177,639	603,104	C
240344,500	4240177,639	603,112	C
240330,500	4240177,639	603,147	C
240327,000	4240177,639	603,156	C
240313,000	4240177,639	603,191	C
240309,500	4240177,639	603,200	C
240295,500	4240177,639	603,235	C
240292,000	4240177,639	603,244	C
240278,000	4240177,639	603,279	C
240274,500	4240177,639	603,287	C
240260,500	4240177,639	603,322	C
240257,000	4240177,639	603,331	C
240243,000	4240177,639	603,366	C
240239,500	4240177,639	603,375	C
240225,500	4240177,639	603,410	C
240222,000	4240177,639	603,419	C
240208,000	4240177,639	603,454	C
240204,500	4240177,639	603,462	C
240190,500	4240177,639	603,497	C
240187,000	4240177,639	603,506	C
240173,000	4240177,639	603,541	C
240169,500	4240177,639	603,550	C
240155,500	4240177,639	603,585	C
240152,000	4240177,639	603,594	C
240138,000	4240177,639	603,629	C
240134,500	4240177,639	603,637	C
240120,500	4240177,639	603,672	C
240117,000	4240177,639	603,681	C
240103,000	4240177,639	603,716	C
240099,500	4240177,639	603,725	C
240085,500	4240177,639	603,760	C
240082,000	4240177,639	603,769	C
240068,000	4240177,639	603,804	C
240064,500	4240177,639	603,812	C

Coord. X	Coord. Y	Elevación	Código
241097,000	4239708,585	596,540	C
241100,500	4239708,585	596,532	C
241114,500	4239708,585	596,497	C
241118,000	4239708,585	596,488	C
241132,000	4239708,585	596,453	C
241135,500	4239708,585	596,444	C
241149,500	4239708,585	596,409	C
241153,000	4239708,585	596,400	C
241167,000	4239708,585	596,365	C
241170,500	4239708,585	596,357	C
241184,500	4239708,585	596,322	C
241188,000	4239708,585	596,313	C
241188,000	4239705,435	596,281	C
241184,500	4239705,435	596,290	C
241170,500	4239705,435	596,325	C
241167,000	4239705,435	596,334	C
241153,000	4239705,435	596,369	C
241149,500	4239705,435	596,378	C
241135,500	4239705,435	596,413	C
241132,000	4239705,435	596,421	C
241118,000	4239705,435	596,456	C
241114,500	4239705,435	596,465	C
241100,500	4239705,435	596,500	C
241097,000	4239705,435	596,509	C
241083,000	4239705,435	596,544	C
241079,500	4239705,435	596,553	C
241065,500	4239705,435	596,588	C
241062,000	4239705,435	596,596	C
241048,000	4239705,435	596,631	C
241044,500	4239705,435	596,640	C
241030,500	4239705,435	596,675	C
241027,000	4239705,435	596,684	C
241013,000	4239705,435	596,719	C
241009,500	4239705,435	596,728	C
240995,500	4239705,435	596,763	C
240992,000	4239705,435	596,771	C
240978,000	4239705,435	596,806	C
240974,500	4239705,435	596,815	C
240960,500	4239705,435	596,850	C
240957,000	4239705,435	596,859	C
240943,000	4239705,435	596,894	C
240939,500	4239705,435	596,903	C
240925,500	4239705,435	596,938	C
240922,000	4239705,435	596,946	C
240908,000	4239705,435	596,981	C
240904,500	4239705,435	596,990	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240050,500	4240177,639	603,847	C	240890,500	4239705,435	597,025	C
240047,000	4240177,639	603,856	C	240887,000	4239705,435	597,034	C
240033,000	4240177,639	603,891	C	240873,000	4239705,435	597,069	C
240029,500	4240177,639	603,900	C	240869,500	4239705,435	597,078	C
240015,500	4240177,639	603,935	C	240855,500	4239705,435	597,113	C
240012,000	4240177,639	603,944	C	240852,000	4239705,435	597,121	C
240012,000	4240168,585	603,853	C	240838,000	4239705,435	597,156	C
240015,500	4240168,585	603,844	C	240834,500	4239705,435	597,165	C
240029,500	4240168,585	603,809	C	240820,500	4239705,435	597,200	C
240033,000	4240168,585	603,801	C	240817,000	4239705,435	597,209	C
240047,000	4240168,585	603,766	C	240803,000	4239705,435	597,244	C
240050,500	4240168,585	603,757	C	240799,500	4239705,435	597,253	C
240064,500	4240168,585	603,722	C	240785,500	4239705,435	597,288	C
240068,000	4240168,585	603,713	C	240782,000	4239705,435	597,296	C
240082,000	4240168,585	603,678	C	240768,000	4239705,435	597,331	C
240085,500	4240168,585	603,669	C	240764,500	4239705,435	597,340	C
240099,500	4240168,585	603,634	C	240750,500	4239705,435	597,375	C
240103,000	4240168,585	603,626	C	240747,000	4239705,435	597,384	C
240117,000	4240168,585	603,591	C	240733,000	4239705,435	597,419	C
240120,500	4240168,585	603,582	C	240729,500	4239705,435	597,428	C
240134,500	4240168,585	603,547	C	240715,500	4239705,435	597,463	C
240138,000	4240168,585	603,538	C	240712,000	4239705,435	597,471	C
240152,000	4240168,585	603,503	C	240698,000	4239705,435	597,506	C
240155,500	4240168,585	603,494	C	240694,500	4239705,435	597,515	C
240169,500	4240168,585	603,459	C	240680,500	4239705,435	597,550	C
240173,000	4240168,585	603,451	C	240677,000	4239705,435	597,559	C
240187,000	4240168,585	603,416	C	240663,000	4239705,435	597,594	C
240190,500	4240168,585	603,407	C	240659,500	4239705,435	597,603	C
240204,500	4240168,585	603,372	C	240645,500	4239705,435	597,638	C
240208,000	4240168,585	603,363	C	240642,000	4239705,435	597,646	C
240222,000	4240168,585	603,328	C	240628,000	4239705,435	597,681	C
240225,500	4240168,585	603,319	C	240624,500	4239705,435	597,690	C
240239,500	4240168,585	603,284	C	240610,500	4239705,435	597,725	C
240243,000	4240168,585	603,276	C	240607,000	4239705,435	597,734	C
240257,000	4240168,585	603,241	C	240593,000	4239705,435	597,769	C
240260,500	4240168,585	603,232	C	240589,500	4239705,435	597,778	C
240274,500	4240168,585	603,197	C	240575,500	4239705,435	597,813	C
240278,000	4240168,585	603,188	C	240572,000	4239705,435	597,821	C
240292,000	4240168,585	603,153	C	240558,000	4239705,435	597,856	C
240295,500	4240168,585	603,144	C	240554,500	4239705,435	597,865	C
240309,500	4240168,585	603,109	C	240540,500	4239705,435	597,900	C
240313,000	4240168,585	603,101	C	240537,000	4239705,435	597,909	C
240327,000	4240168,585	603,066	C	240523,000	4239705,435	597,944	C
240330,500	4240168,585	603,057	C	240519,500	4239705,435	597,953	C
240344,500	4240168,585	603,022	C	240505,500	4239705,435	597,988	C
240348,000	4240168,585	603,013	C	240502,000	4239705,435	597,996	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240362,000	4240168,585	602,978	C	240488,000	4239705,435	598,031	C
240365,500	4240168,585	602,969	C	240484,500	4239705,435	598,040	C
240379,500	4240168,585	602,934	C	240470,500	4239705,435	598,075	C
240383,000	4240168,585	602,926	C	240467,000	4239705,435	598,084	C
240397,000	4240168,585	602,891	C	240453,000	4239705,435	598,119	C
240400,500	4240168,585	602,882	C	240449,500	4239705,435	598,128	C
240414,500	4240168,585	602,847	C	240435,500	4239705,435	598,163	C
240418,000	4240168,585	602,838	C	240432,000	4239705,435	598,171	C
240432,000	4240168,585	602,803	C	240418,000	4239705,435	598,206	C
240435,500	4240168,585	602,794	C	240414,500	4239705,435	598,215	C
240449,500	4240168,585	602,759	C	240400,500	4239705,435	598,250	C
240453,000	4240168,585	602,750	C	240397,000	4239705,435	598,259	C
240467,000	4240168,585	602,715	C	240383,000	4239705,435	598,294	C
240470,500	4240168,585	602,707	C	240379,500	4239705,435	598,303	C
240484,500	4240168,585	602,672	C	240365,500	4239705,435	598,338	C
240488,000	4240168,585	602,663	C	240362,000	4239705,435	598,346	C
240502,000	4240168,585	602,628	C	240348,000	4239705,435	598,381	C
240505,500	4240168,585	602,619	C	240344,500	4239705,435	598,390	C
240519,500	4240168,585	602,584	C	240330,500	4239705,435	598,425	C
240523,000	4240168,585	602,575	C	240327,000	4239705,435	598,434	C
240537,000	4240168,585	602,541	C	240313,000	4239705,435	598,469	C
240540,500	4240168,585	602,532	C	240309,500	4239705,435	598,478	C
240554,500	4240168,585	602,497	C	240295,500	4239705,435	598,513	C
240558,000	4240168,585	602,488	C	240292,000	4239705,435	598,521	C
240572,000	4240168,585	602,453	C	240278,000	4239705,435	598,556	C
240575,500	4240168,585	602,444	C	240274,500	4239705,435	598,565	C
240589,500	4240168,585	602,409	C	240260,500	4239705,435	598,600	C
240593,000	4240168,585	602,401	C	240257,000	4239705,435	598,609	C
240607,000	4240168,585	602,366	C	240243,000	4239705,435	598,644	C
240610,500	4240168,585	602,357	C	240239,500	4239705,435	598,652	C
240624,500	4240168,585	602,322	C	240225,500	4239705,435	598,687	C
240628,000	4240168,585	602,313	C	240222,000	4239705,435	598,696	C
240642,000	4240168,585	602,278	C	240208,000	4239705,435	598,731	C
240645,500	4240168,585	602,269	C	240204,500	4239705,435	598,740	C
240659,500	4240168,585	602,234	C	240190,500	4239705,435	598,775	C
240663,000	4240168,585	602,226	C	240187,000	4239705,435	598,784	C
240677,000	4240168,585	602,191	C	240173,000	4239705,435	598,819	C
240680,500	4240168,585	602,182	C	240169,500	4239705,435	598,827	C
240694,500	4240168,585	602,147	C	240155,500	4239705,435	598,862	C
240698,000	4240168,585	602,138	C	240152,000	4239705,435	598,871	C
240712,000	4240168,585	602,103	C	240138,000	4239705,435	598,906	C
240715,500	4240168,585	602,094	C	240134,500	4239705,435	598,915	C
240729,500	4240168,585	602,059	C	240120,500	4239705,435	598,950	C
240733,000	4240168,585	602,051	C	240117,000	4239705,435	598,959	C
240747,000	4240168,585	602,016	C	240103,000	4239705,435	598,994	C
240750,500	4240168,585	602,007	C	240099,500	4239705,435	599,002	C

Coord. X	Coord. Y	Elevación	Código
240764,500	4240168,585	601,972	C
240768,000	4240168,585	601,963	C
240768,000	4240165,435	601,932	C
240764,500	4240165,435	601,940	C
240750,500	4240165,435	601,975	C
240747,000	4240165,435	601,984	C
240733,000	4240165,435	602,019	C
240729,500	4240165,435	602,028	C
240715,500	4240165,435	602,063	C
240712,000	4240165,435	602,072	C
240698,000	4240165,435	602,107	C
240694,500	4240165,435	602,115	C
240680,500	4240165,435	602,150	C
240677,000	4240165,435	602,159	C
240663,000	4240165,435	602,194	C
240659,500	4240165,435	602,203	C
240645,500	4240165,435	602,238	C
240642,000	4240165,435	602,247	C
240628,000	4240165,435	602,282	C
240624,500	4240165,435	602,290	C
240610,500	4240165,435	602,325	C
240607,000	4240165,435	602,334	C
240593,000	4240165,435	602,369	C
240589,500	4240165,435	602,378	C
240575,500	4240165,435	602,413	C
240572,000	4240165,435	602,422	C
240558,000	4240165,435	602,457	C
240554,500	4240165,435	602,465	C
240540,500	4240165,435	602,500	C
240537,000	4240165,435	602,509	C
240523,000	4240165,435	602,544	C
240519,500	4240165,435	602,553	C
240505,500	4240165,435	602,588	C
240502,000	4240165,435	602,596	C
240488,000	4240165,435	602,631	C
240484,500	4240165,435	602,640	C
240470,500	4240165,435	602,675	C
240467,000	4240165,435	602,684	C
240453,000	4240165,435	602,719	C
240449,500	4240165,435	602,728	C
240435,500	4240165,435	602,763	C
240432,000	4240165,435	602,771	C
240418,000	4240165,435	602,806	C
240414,500	4240165,435	602,815	C
240400,500	4240165,435	602,850	C
240397,000	4240165,435	602,859	C

Coord. X	Coord. Y	Elevación	Código
240085,500	4239705,435	599,037	C
240082,000	4239705,435	599,046	C
240068,000	4239705,435	599,081	C
240064,500	4239705,435	599,090	C
240050,500	4239705,435	599,125	C
240047,000	4239705,435	599,134	C
240033,000	4239705,435	599,169	C
240029,500	4239705,435	599,177	C
240015,500	4239705,435	599,212	C
240012,000	4239705,435	599,221	C
240012,000	4239696,381	599,131	C
240015,500	4239696,381	599,122	C
240029,500	4239696,381	599,087	C
240033,000	4239696,381	599,078	C
240047,000	4239696,381	599,043	C
240050,500	4239696,381	599,034	C
240064,500	4239696,381	598,999	C
240068,000	4239696,381	598,991	C
240082,000	4239696,381	598,956	C
240085,500	4239696,381	598,947	C
240099,500	4239696,381	598,912	C
240103,000	4239696,381	598,903	C
240117,000	4239696,381	598,868	C
240120,500	4239696,381	598,859	C
240134,500	4239696,381	598,824	C
240138,000	4239696,381	598,816	C
240152,000	4239696,381	598,781	C
240155,500	4239696,381	598,772	C
240169,500	4239696,381	598,737	C
240173,000	4239696,381	598,728	C
240187,000	4239696,381	598,693	C
240190,500	4239696,381	598,684	C
240204,500	4239696,381	598,649	C
240208,000	4239696,381	598,641	C
240222,000	4239696,381	598,606	C
240225,500	4239696,381	598,597	C
240239,500	4239696,381	598,562	C
240243,000	4239696,381	598,553	C
240257,000	4239696,381	598,518	C
240260,500	4239696,381	598,509	C
240274,500	4239696,381	598,474	C
240278,000	4239696,381	598,466	C
240292,000	4239696,381	598,431	C
240295,500	4239696,381	598,422	C
240309,500	4239696,381	598,387	C
240313,000	4239696,381	598,378	C

Coord. X	Coord. Y	Elevación	Código
240383,000	4240165,435	602,894	C
240379,500	4240165,435	602,903	C
240365,500	4240165,435	602,938	C
240362,000	4240165,435	602,947	C
240348,000	4240165,435	602,982	C
240344,500	4240165,435	602,990	C
240330,500	4240165,435	603,025	C
240327,000	4240165,435	603,034	C
240313,000	4240165,435	603,069	C
240309,500	4240165,435	603,078	C
240295,500	4240165,435	603,113	C
240292,000	4240165,435	603,122	C
240278,000	4240165,435	603,157	C
240274,500	4240165,435	603,165	C
240260,500	4240165,435	603,200	C
240257,000	4240165,435	603,209	C
240243,000	4240165,435	603,244	C
240239,500	4240165,435	603,253	C
240225,500	4240165,435	603,288	C
240222,000	4240165,435	603,297	C
240208,000	4240165,435	603,332	C
240204,500	4240165,435	603,340	C
240190,500	4240165,435	603,375	C
240187,000	4240165,435	603,384	C
240173,000	4240165,435	603,419	C
240169,500	4240165,435	603,428	C
240155,500	4240165,435	603,463	C
240152,000	4240165,435	603,472	C
240138,000	4240165,435	603,507	C
240134,500	4240165,435	603,515	C
240120,500	4240165,435	603,550	C
240117,000	4240165,435	603,559	C
240103,000	4240165,435	603,594	C
240099,500	4240165,435	603,603	C
240085,500	4240165,435	603,638	C
240082,000	4240165,435	603,647	C
240068,000	4240165,435	603,682	C
240064,500	4240165,435	603,690	C
240050,500	4240165,435	603,725	C
240047,000	4240165,435	603,734	C
240033,000	4240165,435	603,769	C
240029,500	4240165,435	603,778	C
240015,500	4240165,435	603,813	C
240012,000	4240165,435	603,822	C
240012,000	4240156,381	603,731	C
240015,500	4240156,381	603,722	C

Coord. X	Coord. Y	Elevación	Código
240327,000	4239696,381	598,343	C
240330,500	4239696,381	598,335	C
240344,500	4239696,381	598,300	C
240348,000	4239696,381	598,291	C
240362,000	4239696,381	598,256	C
240365,500	4239696,381	598,247	C
240379,500	4239696,381	598,212	C
240383,000	4239696,381	598,203	C
240397,000	4239696,381	598,168	C
240400,500	4239696,381	598,160	C
240414,500	4239696,381	598,125	C
240418,000	4239696,381	598,116	C
240432,000	4239696,381	598,081	C
240435,500	4239696,381	598,072	C
240449,500	4239696,381	598,037	C
240453,000	4239696,381	598,028	C
240467,000	4239696,381	597,993	C
240470,500	4239696,381	597,985	C
240484,500	4239696,381	597,950	C
240488,000	4239696,381	597,941	C
240502,000	4239696,381	597,906	C
240505,500	4239696,381	597,897	C
240519,500	4239696,381	597,862	C
240523,000	4239696,381	597,853	C
240537,000	4239696,381	597,818	C
240540,500	4239696,381	597,810	C
240554,500	4239696,381	597,775	C
240558,000	4239696,381	597,766	C
240572,000	4239696,381	597,731	C
240575,500	4239696,381	597,722	C
240589,500	4239696,381	597,687	C
240593,000	4239696,381	597,678	C
240607,000	4239696,381	597,643	C
240610,500	4239696,381	597,635	C
240624,500	4239696,381	597,600	C
240628,000	4239696,381	597,591	C
240642,000	4239696,381	597,556	C
240645,500	4239696,381	597,547	C
240659,500	4239696,381	597,512	C
240663,000	4239696,381	597,503	C
240677,000	4239696,381	597,468	C
240680,500	4239696,381	597,460	C
240694,500	4239696,381	597,425	C
240698,000	4239696,381	597,416	C
240712,000	4239696,381	597,381	C
240715,500	4239696,381	597,372	C

Coord. X	Coord. Y	Elevación	Código
240029,500	4240156,381	603,687	C
240033,000	4240156,381	603,678	C
240047,000	4240156,381	603,643	C
240050,500	4240156,381	603,635	C
240064,500	4240156,381	603,600	C
240068,000	4240156,381	603,591	C
240082,000	4240156,381	603,556	C
240085,500	4240156,381	603,547	C
240099,500	4240156,381	603,512	C
240103,000	4240156,381	603,503	C
240117,000	4240156,381	603,469	C
240120,500	4240156,381	603,460	C
240134,500	4240156,381	603,425	C
240138,000	4240156,381	603,416	C
240152,000	4240156,381	603,381	C
240155,500	4240156,381	603,372	C
240169,500	4240156,381	603,337	C
240173,000	4240156,381	603,329	C
240187,000	4240156,381	603,293	C
240190,500	4240156,381	603,285	C
240204,500	4240156,381	603,250	C
240208,000	4240156,381	603,241	C
240222,000	4240156,381	603,206	C
240225,500	4240156,381	603,197	C
240239,500	4240156,381	603,162	C
240243,000	4240156,381	603,153	C
240257,000	4240156,381	603,118	C
240260,500	4240156,381	603,110	C
240274,500	4240156,381	603,075	C
240278,000	4240156,381	603,066	C
240292,000	4240156,381	603,031	C
240295,500	4240156,381	603,022	C
240309,500	4240156,381	602,987	C
240313,000	4240156,381	602,978	C
240327,000	4240156,381	602,943	C
240330,500	4240156,381	602,935	C
240344,500	4240156,381	602,900	C
240348,000	4240156,381	602,891	C
240362,000	4240156,381	602,856	C
240365,500	4240156,381	602,847	C
240379,500	4240156,381	602,812	C
240383,000	4240156,381	602,803	C
240397,000	4240156,381	602,768	C
240400,500	4240156,381	602,760	C
240414,500	4240156,381	602,725	C
240418,000	4240156,381	602,716	C

Coord. X	Coord. Y	Elevación	Código
240729,500	4239696,381	597,337	C
240733,000	4239696,381	597,328	C
240747,000	4239696,381	597,293	C
240750,500	4239696,381	597,285	C
240764,500	4239696,381	597,250	C
240768,000	4239696,381	597,241	C
240782,000	4239696,381	597,206	C
240785,500	4239696,381	597,197	C
240799,500	4239696,381	597,162	C
240803,000	4239696,381	597,153	C
240817,000	4239696,381	597,118	C
240820,500	4239696,381	597,110	C
240834,500	4239696,381	597,075	C
240838,000	4239696,381	597,066	C
240852,000	4239696,381	597,031	C
240855,500	4239696,381	597,022	C
240869,500	4239696,381	596,987	C
240873,000	4239696,381	596,978	C
240887,000	4239696,381	596,943	C
240890,500	4239696,381	596,935	C
240904,500	4239696,381	596,900	C
240908,000	4239696,381	596,891	C
240922,000	4239696,381	596,856	C
240925,500	4239696,381	596,847	C
240939,500	4239696,381	596,812	C
240943,000	4239696,381	596,803	C
240957,000	4239696,381	596,768	C
240960,500	4239696,381	596,760	C
240974,500	4239696,381	596,725	C
240978,000	4239696,381	596,716	C
240992,000	4239696,381	596,681	C
240995,500	4239696,381	596,672	C
241009,500	4239696,381	596,637	C
241013,000	4239696,381	596,628	C
241027,000	4239696,381	596,593	C
241030,500	4239696,381	596,585	C
241044,500	4239696,381	596,550	C
241048,000	4239696,381	596,541	C
241062,000	4239696,381	596,506	C
241065,500	4239696,381	596,497	C
241079,500	4239696,381	596,462	C
241083,000	4239696,381	596,453	C
241097,000	4239696,381	596,418	C
241100,500	4239696,381	596,410	C
241114,500	4239696,381	596,375	C
241118,000	4239696,381	596,366	C

Coord. X	Coord. Y	Elevación	Código
240432,000	4240156,381	602,681	C
240435,500	4240156,381	602,672	C
240449,500	4240156,381	602,637	C
240453,000	4240156,381	602,628	C
240467,000	4240156,381	602,593	C
240470,500	4240156,381	602,585	C
240484,500	4240156,381	602,550	C
240488,000	4240156,381	602,541	C
240502,000	4240156,381	602,506	C
240505,500	4240156,381	602,497	C
240519,500	4240156,381	602,462	C
240523,000	4240156,381	602,453	C
240537,000	4240156,381	602,418	C
240540,500	4240156,381	602,410	C
240554,500	4240156,381	602,375	C
240558,000	4240156,381	602,366	C
240572,000	4240156,381	602,331	C
240575,500	4240156,381	602,322	C
240589,500	4240156,381	602,287	C
240593,000	4240156,381	602,278	C
240607,000	4240156,381	602,243	C
240610,500	4240156,381	602,235	C
240624,500	4240156,381	602,200	C
240628,000	4240156,381	602,191	C
240642,000	4240156,381	602,156	C
240645,500	4240156,381	602,147	C
240659,500	4240156,381	602,112	C
240663,000	4240156,381	602,103	C
240677,000	4240156,381	602,068	C
240680,500	4240156,381	602,060	C
240694,500	4240156,381	602,025	C
240698,000	4240156,381	602,016	C
240712,000	4240156,381	601,981	C
240715,500	4240156,381	601,972	C
240729,500	4240156,381	601,937	C
240733,000	4240156,381	601,928	C
240747,000	4240156,381	601,894	C
240750,500	4240156,381	601,885	C
240764,500	4240156,381	601,850	C
240768,000	4240156,381	601,841	C
240768,000	4240152,381	601,801	C
240764,500	4240152,381	601,810	C
240750,500	4240152,381	601,845	C
240747,000	4240152,381	601,854	C
240733,000	4240152,381	601,888	C
240729,500	4240152,381	601,897	C

Coord. X	Coord. Y	Elevación	Código
241132,000	4239696,381	596,331	C
241135,500	4239696,381	596,322	C
241149,500	4239696,381	596,287	C
241153,000	4239696,381	596,278	C
241167,000	4239696,381	596,243	C
241170,500	4239696,381	596,235	C
241184,500	4239696,381	596,200	C
241188,000	4239696,381	596,191	C
241188,000	4239692,381	596,151	C
241184,500	4239692,381	596,160	C
241170,500	4239692,381	596,195	C
241167,000	4239692,381	596,203	C
241153,000	4239692,381	596,238	C
241149,500	4239692,381	596,247	C
241135,500	4239692,381	596,282	C
241132,000	4239692,381	596,291	C
241118,000	4239692,381	596,326	C
241114,500	4239692,381	596,335	C
241100,500	4239692,381	596,370	C
241097,000	4239692,381	596,378	C
241083,000	4239692,381	596,413	C
241079,500	4239692,381	596,422	C
241065,500	4239692,381	596,457	C
241062,000	4239692,381	596,466	C
241048,000	4239692,381	596,501	C
241044,500	4239692,381	596,510	C
241030,500	4239692,381	596,545	C
241027,000	4239692,381	596,553	C
241013,000	4239692,381	596,588	C
241009,500	4239692,381	596,597	C
240995,500	4239692,381	596,632	C
240992,000	4239692,381	596,641	C
240978,000	4239692,381	596,676	C
240974,500	4239692,381	596,685	C
240960,500	4239692,381	596,720	C
240957,000	4239692,381	596,728	C
240943,000	4239692,381	596,763	C
240939,500	4239692,381	596,772	C
240925,500	4239692,381	596,807	C
240922,000	4239692,381	596,816	C
240908,000	4239692,381	596,851	C
240904,500	4239692,381	596,860	C
240890,500	4239692,381	596,895	C
240887,000	4239692,381	596,903	C
240873,000	4239692,381	596,938	C
240869,500	4239692,381	596,947	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240715,500	4240152,381	601,932	C	240855,500	4239692,381	596,982	C
240712,000	4240152,381	601,941	C	240852,000	4239692,381	596,991	C
240698,000	4240152,381	601,976	C	240838,000	4239692,381	597,026	C
240694,500	4240152,381	601,985	C	240834,500	4239692,381	597,035	C
240680,500	4240152,381	602,020	C	240820,500	4239692,381	597,070	C
240677,000	4240152,381	602,028	C	240817,000	4239692,381	597,078	C
240663,000	4240152,381	602,063	C	240803,000	4239692,381	597,113	C
240659,500	4240152,381	602,072	C	240799,500	4239692,381	597,122	C
240645,500	4240152,381	602,107	C	240785,500	4239692,381	597,157	C
240642,000	4240152,381	602,116	C	240782,000	4239692,381	597,166	C
240628,000	4240152,381	602,151	C	240768,000	4239692,381	597,201	C
240624,500	4240152,381	602,160	C	240764,500	4239692,381	597,210	C
240610,500	4240152,381	602,195	C	240750,500	4239692,381	597,245	C
240607,000	4240152,381	602,203	C	240747,000	4239692,381	597,253	C
240593,000	4240152,381	602,238	C	240733,000	4239692,381	597,288	C
240589,500	4240152,381	602,247	C	240729,500	4239692,381	597,297	C
240575,500	4240152,381	602,282	C	240715,500	4239692,381	597,332	C
240572,000	4240152,381	602,291	C	240712,000	4239692,381	597,341	C
240558,000	4240152,381	602,326	C	240698,000	4239692,381	597,376	C
240554,500	4240152,381	602,335	C	240694,500	4239692,381	597,385	C
240540,500	4240152,381	602,370	C	240680,500	4239692,381	597,420	C
240537,000	4240152,381	602,378	C	240677,000	4239692,381	597,428	C
240523,000	4240152,381	602,413	C	240663,000	4239692,381	597,463	C
240519,500	4240152,381	602,422	C	240659,500	4239692,381	597,472	C
240505,500	4240152,381	602,457	C	240645,500	4239692,381	597,507	C
240502,000	4240152,381	602,466	C	240642,000	4239692,381	597,516	C
240488,000	4240152,381	602,501	C	240628,000	4239692,381	597,551	C
240484,500	4240152,381	602,510	C	240624,500	4239692,381	597,560	C
240470,500	4240152,381	602,545	C	240610,500	4239692,381	597,595	C
240467,000	4240152,381	602,553	C	240607,000	4239692,381	597,603	C
240453,000	4240152,381	602,588	C	240593,000	4239692,381	597,638	C
240449,500	4240152,381	602,597	C	240589,500	4239692,381	597,647	C
240435,500	4240152,381	602,632	C	240575,500	4239692,381	597,682	C
240432,000	4240152,381	602,641	C	240572,000	4239692,381	597,691	C
240418,000	4240152,381	602,676	C	240558,000	4239692,381	597,726	C
240414,500	4240152,381	602,685	C	240554,500	4239692,381	597,735	C
240400,500	4240152,381	602,720	C	240540,500	4239692,381	597,770	C
240397,000	4240152,381	602,728	C	240537,000	4239692,381	597,778	C
240383,000	4240152,381	602,763	C	240523,000	4239692,381	597,813	C
240379,500	4240152,381	602,772	C	240519,500	4239692,381	597,822	C
240365,500	4240152,381	602,807	C	240505,500	4239692,381	597,857	C
240362,000	4240152,381	602,816	C	240502,000	4239692,381	597,866	C
240348,000	4240152,381	602,851	C	240488,000	4239692,381	597,901	C
240344,500	4240152,381	602,860	C	240484,500	4239692,381	597,910	C
240330,500	4240152,381	602,895	C	240470,500	4239692,381	597,945	C
240327,000	4240152,381	602,903	C	240467,000	4239692,381	597,953	C

Coord. X	Coord. Y	Elevación	Código
240313,000	4240152,381	602,938	C
240309,500	4240152,381	602,947	C
240295,500	4240152,381	602,982	C
240292,000	4240152,381	602,991	C
240278,000	4240152,381	603,026	C
240274,500	4240152,381	603,035	C
240260,500	4240152,381	603,070	C
240257,000	4240152,381	603,078	C
240243,000	4240152,381	603,113	C
240239,500	4240152,381	603,122	C
240225,500	4240152,381	603,157	C
240222,000	4240152,381	603,166	C
240208,000	4240152,381	603,201	C
240204,500	4240152,381	603,210	C
240190,500	4240152,381	603,245	C
240187,000	4240152,381	603,253	C
240173,000	4240152,381	603,288	C
240169,500	4240152,381	603,297	C
240155,500	4240152,381	603,332	C
240152,000	4240152,381	603,341	C
240138,000	4240152,381	603,376	C
240134,500	4240152,381	603,385	C
240120,500	4240152,381	603,420	C
240117,000	4240152,381	603,429	C
240103,000	4240152,381	603,463	C
240099,500	4240152,381	603,472	C
240085,500	4240152,381	603,507	C
240082,000	4240152,381	603,516	C
240068,000	4240152,381	603,551	C
240064,500	4240152,381	603,560	C
240050,500	4240152,381	603,595	C
240047,000	4240152,381	603,603	C
240033,000	4240152,381	603,638	C
240029,500	4240152,381	603,647	C
240015,500	4240152,381	603,682	C
240012,000	4240152,381	603,691	C
240012,000	4240144,328	603,610	C
240015,500	4240144,328	603,602	C
240029,500	4240144,328	603,567	C
240033,000	4240144,328	603,558	C
240047,000	4240144,328	603,523	C
240050,500	4240144,328	603,514	C
240064,500	4240144,328	603,479	C
240068,000	4240144,328	603,470	C
240082,000	4240144,328	603,435	C
240085,500	4240144,328	603,427	C

Coord. X	Coord. Y	Elevación	Código
240453,000	4239692,381	597,988	C
240449,500	4239692,381	597,997	C
240435,500	4239692,381	598,032	C
240432,000	4239692,381	598,041	C
240418,000	4239692,381	598,076	C
240414,500	4239692,381	598,085	C
240400,500	4239692,381	598,120	C
240397,000	4239692,381	598,128	C
240383,000	4239692,381	598,163	C
240379,500	4239692,381	598,172	C
240365,500	4239692,381	598,207	C
240362,000	4239692,381	598,216	C
240348,000	4239692,381	598,251	C
240344,500	4239692,381	598,260	C
240330,500	4239692,381	598,295	C
240327,000	4239692,381	598,303	C
240313,000	4239692,381	598,338	C
240309,500	4239692,381	598,347	C
240295,500	4239692,381	598,382	C
240292,000	4239692,381	598,391	C
240278,000	4239692,381	598,426	C
240274,500	4239692,381	598,434	C
240260,500	4239692,381	598,469	C
240257,000	4239692,381	598,478	C
240243,000	4239692,381	598,513	C
240239,500	4239692,381	598,522	C
240225,500	4239692,381	598,557	C
240222,000	4239692,381	598,566	C
240208,000	4239692,381	598,601	C
240204,500	4239692,381	598,609	C
240190,500	4239692,381	598,644	C
240187,000	4239692,381	598,653	C
240173,000	4239692,381	598,688	C
240169,500	4239692,381	598,697	C
240155,500	4239692,381	598,732	C
240152,000	4239692,381	598,741	C
240138,000	4239692,381	598,776	C
240134,500	4239692,381	598,784	C
240120,500	4239692,381	598,819	C
240117,000	4239692,381	598,828	C
240103,000	4239692,381	598,863	C
240099,500	4239692,381	598,872	C
240085,500	4239692,381	598,907	C
240082,000	4239692,381	598,916	C
240068,000	4239692,381	598,951	C
240064,500	4239692,381	598,959	C

Coord. X	Coord. Y	Elevación	Código
240099,500	4240144,328	603,392	C
240103,000	4240144,328	603,383	C
240117,000	4240144,328	603,348	C
240120,500	4240144,328	603,339	C
240134,500	4240144,328	603,304	C
240138,000	4240144,328	603,295	C
240152,000	4240144,328	603,260	C
240155,500	4240144,328	603,252	C
240169,500	4240144,328	603,217	C
240173,000	4240144,328	603,208	C
240187,000	4240144,328	603,173	C
240190,500	4240144,328	603,164	C
240204,500	4240144,328	603,129	C
240208,000	4240144,328	603,120	C
240222,000	4240144,328	603,085	C
240225,500	4240144,328	603,077	C
240239,500	4240144,328	603,042	C
240243,000	4240144,328	603,033	C
240257,000	4240144,328	602,998	C
240260,500	4240144,328	602,989	C
240274,500	4240144,328	602,954	C
240278,000	4240144,328	602,945	C
240292,000	4240144,328	602,910	C
240295,500	4240144,328	602,902	C
240309,500	4240144,328	602,867	C
240313,000	4240144,328	602,858	C
240327,000	4240144,328	602,823	C
240330,500	4240144,328	602,814	C
240344,500	4240144,328	602,779	C
240348,000	4240144,328	602,770	C
240362,000	4240144,328	602,735	C
240365,500	4240144,328	602,727	C
240379,500	4240144,328	602,692	C
240383,000	4240144,328	602,683	C
240397,000	4240144,328	602,648	C
240400,500	4240144,328	602,639	C
240414,500	4240144,328	602,604	C
240418,000	4240144,328	602,595	C
240432,000	4240144,328	602,560	C
240435,500	4240144,328	602,552	C
240449,500	4240144,328	602,517	C
240453,000	4240144,328	602,508	C
240467,000	4240144,328	602,473	C
240470,500	4240144,328	602,464	C
240484,500	4240144,328	602,429	C
240488,000	4240144,328	602,420	C

Coord. X	Coord. Y	Elevación	Código
240050,500	4239692,381	598,994	C
240047,000	4239692,381	599,003	C
240033,000	4239692,381	599,038	C
240029,500	4239692,381	599,047	C
240015,500	4239692,381	599,082	C
240012,000	4239692,381	599,091	C
240012,000	4239684,328	599,010	C
240015,500	4239684,328	599,001	C
240029,500	4239684,328	598,966	C
240033,000	4239684,328	598,958	C
240047,000	4239684,328	598,923	C
240050,500	4239684,328	598,914	C
240064,500	4239684,328	598,879	C
240068,000	4239684,328	598,870	C
240082,000	4239684,328	598,835	C
240085,500	4239684,328	598,826	C
240099,500	4239684,328	598,791	C
240103,000	4239684,328	598,783	C
240117,000	4239684,328	598,748	C
240120,500	4239684,328	598,739	C
240134,500	4239684,328	598,704	C
240138,000	4239684,328	598,695	C
240152,000	4239684,328	598,660	C
240155,500	4239684,328	598,651	C
240169,500	4239684,328	598,616	C
240173,000	4239684,328	598,608	C
240187,000	4239684,328	598,573	C
240190,500	4239684,328	598,564	C
240204,500	4239684,328	598,529	C
240208,000	4239684,328	598,520	C
240222,000	4239684,328	598,485	C
240225,500	4239684,328	598,476	C
240239,500	4239684,328	598,441	C
240243,000	4239684,328	598,433	C
240257,000	4239684,328	598,398	C
240260,500	4239684,328	598,389	C
240274,500	4239684,328	598,354	C
240278,000	4239684,328	598,345	C
240292,000	4239684,328	598,310	C
240295,500	4239684,328	598,301	C
240309,500	4239684,328	598,267	C
240313,000	4239684,328	598,258	C
240327,000	4239684,328	598,223	C
240330,500	4239684,328	598,214	C
240344,500	4239684,328	598,179	C
240348,000	4239684,328	598,170	C

Coord. X	Coord. Y	Elevación	Código
240502,000	4240144,328	602,385	C
240505,500	4240144,328	602,377	C
240519,500	4240144,328	602,342	C
240523,000	4240144,328	602,333	C
240537,000	4240144,328	602,298	C
240540,500	4240144,328	602,289	C
240554,500	4240144,328	602,254	C
240558,000	4240144,328	602,245	C
240572,000	4240144,328	602,210	C
240575,500	4240144,328	602,202	C
240589,500	4240144,328	602,167	C
240593,000	4240144,328	602,158	C
240607,000	4240144,328	602,123	C
240610,500	4240144,328	602,114	C
240624,500	4240144,328	602,079	C
240628,000	4240144,328	602,070	C
240642,000	4240144,328	602,035	C
240645,500	4240144,328	602,027	C
240659,500	4240144,328	601,992	C
240663,000	4240144,328	601,983	C
240677,000	4240144,328	601,948	C
240680,500	4240144,328	601,939	C
240694,500	4240144,328	601,904	C
240698,000	4240144,328	601,895	C
240712,000	4240144,328	601,860	C
240715,500	4240144,328	601,852	C
240729,500	4240144,328	601,817	C
240733,000	4240144,328	601,808	C
240747,000	4240144,328	601,773	C
240750,500	4240144,328	601,764	C
240764,500	4240144,328	601,729	C
240768,000	4240144,328	601,720	C
240768,000	4240140,328	601,680	C
240764,500	4240140,328	601,689	C
240750,500	4240140,328	601,724	C
240747,000	4240140,328	601,733	C
240733,000	4240140,328	601,768	C
240729,500	4240140,328	601,777	C
240715,500	4240140,328	601,812	C
240712,000	4240140,328	601,820	C
240698,000	4240140,328	601,855	C
240694,500	4240140,328	601,864	C
240680,500	4240140,328	601,899	C
240677,000	4240140,328	601,908	C
240663,000	4240140,328	601,943	C
240659,500	4240140,328	601,952	C

Coord. X	Coord. Y	Elevación	Código
240362,000	4239684,328	598,135	C
240365,500	4239684,328	598,127	C
240379,500	4239684,328	598,092	C
240383,000	4239684,328	598,083	C
240397,000	4239684,328	598,048	C
240400,500	4239684,328	598,039	C
240414,500	4239684,328	598,004	C
240418,000	4239684,328	597,995	C
240432,000	4239684,328	597,960	C
240435,500	4239684,328	597,952	C
240449,500	4239684,328	597,917	C
240453,000	4239684,328	597,908	C
240467,000	4239684,328	597,873	C
240470,500	4239684,328	597,864	C
240484,500	4239684,328	597,829	C
240488,000	4239684,328	597,820	C
240502,000	4239684,328	597,785	C
240505,500	4239684,328	597,777	C
240519,500	4239684,328	597,742	C
240523,000	4239684,328	597,733	C
240537,000	4239684,328	597,698	C
240540,500	4239684,328	597,689	C
240554,500	4239684,328	597,654	C
240558,000	4239684,328	597,645	C
240572,000	4239684,328	597,610	C
240575,500	4239684,328	597,602	C
240589,500	4239684,328	597,567	C
240593,000	4239684,328	597,558	C
240607,000	4239684,328	597,523	C
240610,500	4239684,328	597,514	C
240624,500	4239684,328	597,479	C
240628,000	4239684,328	597,470	C
240642,000	4239684,328	597,435	C
240645,500	4239684,328	597,427	C
240659,500	4239684,328	597,392	C
240663,000	4239684,328	597,383	C
240677,000	4239684,328	597,348	C
240680,500	4239684,328	597,339	C
240694,500	4239684,328	597,304	C
240698,000	4239684,328	597,295	C
240712,000	4239684,328	597,260	C
240715,500	4239684,328	597,252	C
240729,500	4239684,328	597,217	C
240733,000	4239684,328	597,208	C
240747,000	4239684,328	597,173	C
240750,500	4239684,328	597,164	C

Coord. X	Coord. Y	Elevación	Código
240645,500	4240140,328	601,987	C
240642,000	4240140,328	601,995	C
240628,000	4240140,328	602,030	C
240624,500	4240140,328	602,039	C
240610,500	4240140,328	602,074	C
240607,000	4240140,328	602,083	C
240593,000	4240140,328	602,118	C
240589,500	4240140,328	602,127	C
240575,500	4240140,328	602,162	C
240572,000	4240140,328	602,170	C
240558,000	4240140,328	602,205	C
240554,500	4240140,328	602,214	C
240540,500	4240140,328	602,249	C
240537,000	4240140,328	602,258	C
240523,000	4240140,328	602,293	C
240519,500	4240140,328	602,302	C
240505,500	4240140,328	602,337	C
240502,000	4240140,328	602,345	C
240488,000	4240140,328	602,380	C
240484,500	4240140,328	602,389	C
240470,500	4240140,328	602,424	C
240467,000	4240140,328	602,433	C
240453,000	4240140,328	602,468	C
240449,500	4240140,328	602,477	C
240435,500	4240140,328	602,512	C
240432,000	4240140,328	602,520	C
240418,000	4240140,328	602,555	C
240414,500	4240140,328	602,564	C
240400,500	4240140,328	602,599	C
240397,000	4240140,328	602,608	C
240383,000	4240140,328	602,643	C
240379,500	4240140,328	602,652	C
240365,500	4240140,328	602,687	C
240362,000	4240140,328	602,695	C
240348,000	4240140,328	602,730	C
240344,500	4240140,328	602,739	C
240330,500	4240140,328	602,774	C
240327,000	4240140,328	602,783	C
240313,000	4240140,328	602,818	C
240309,500	4240140,328	602,827	C
240295,500	4240140,328	602,862	C
240292,000	4240140,328	602,870	C
240278,000	4240140,328	602,905	C
240274,500	4240140,328	602,914	C
240260,500	4240140,328	602,949	C
240257,000	4240140,328	602,958	C

Coord. X	Coord. Y	Elevación	Código
240764,500	4239684,328	597,129	C
240768,000	4239684,328	597,120	C
240782,000	4239684,328	597,085	C
240785,500	4239684,328	597,077	C
240799,500	4239684,328	597,042	C
240803,000	4239684,328	597,033	C
240817,000	4239684,328	596,998	C
240820,500	4239684,328	596,989	C
240834,500	4239684,328	596,954	C
240838,000	4239684,328	596,945	C
240852,000	4239684,328	596,910	C
240855,500	4239684,328	596,902	C
240869,500	4239684,328	596,867	C
240873,000	4239684,328	596,858	C
240887,000	4239684,328	596,823	C
240890,500	4239684,328	596,814	C
240904,500	4239684,328	596,779	C
240908,000	4239684,328	596,770	C
240922,000	4239684,328	596,735	C
240925,500	4239684,328	596,727	C
240939,500	4239684,328	596,692	C
240943,000	4239684,328	596,683	C
240957,000	4239684,328	596,648	C
240960,500	4239684,328	596,639	C
240974,500	4239684,328	596,604	C
240978,000	4239684,328	596,595	C
240992,000	4239684,328	596,560	C
240995,500	4239684,328	596,552	C
241009,500	4239684,328	596,517	C
241013,000	4239684,328	596,508	C
241027,000	4239684,328	596,473	C
241030,500	4239684,328	596,464	C
241044,500	4239684,328	596,429	C
241048,000	4239684,328	596,420	C
241062,000	4239684,328	596,385	C
241065,500	4239684,328	596,377	C
241079,500	4239684,328	596,342	C
241083,000	4239684,328	596,333	C
241097,000	4239684,328	596,298	C
241100,500	4239684,328	596,289	C
241114,500	4239684,328	596,254	C
241118,000	4239684,328	596,245	C
241132,000	4239684,328	596,210	C
241135,500	4239684,328	596,202	C
241149,500	4239684,328	596,167	C
241153,000	4239684,328	596,158	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240243,000	4240140,328	602,993	C	241167,000	4239684,328	596,123	C
240239,500	4240140,328	603,002	C	241170,500	4239684,328	596,114	C
240225,500	4240140,328	603,037	C	241184,500	4239684,328	596,079	C
240222,000	4240140,328	603,045	C	241188,000	4239684,328	596,070	C
240208,000	4240140,328	603,080	C	241188,000	4239680,328	596,030	C
240204,500	4240140,328	603,089	C	241184,500	4239680,328	596,039	C
240190,500	4240140,328	603,124	C	241170,500	4239680,328	596,074	C
240187,000	4240140,328	603,133	C	241167,000	4239680,328	596,083	C
240173,000	4240140,328	603,168	C	241153,000	4239680,328	596,118	C
240169,500	4240140,328	603,177	C	241149,500	4239680,328	596,127	C
240155,500	4240140,328	603,212	C	241135,500	4239680,328	596,162	C
240152,000	4240140,328	603,220	C	241132,000	4239680,328	596,170	C
240138,000	4240140,328	603,255	C	241118,000	4239680,328	596,205	C
240134,500	4240140,328	603,264	C	241114,500	4239680,328	596,214	C
240120,500	4240140,328	603,299	C	241100,500	4239680,328	596,249	C
240117,000	4240140,328	603,308	C	241097,000	4239680,328	596,258	C
240103,000	4240140,328	603,343	C	241083,000	4239680,328	596,293	C
240099,500	4240140,328	603,352	C	241079,500	4239680,328	596,302	C
240085,500	4240140,328	603,387	C	241065,500	4239680,328	596,337	C
240082,000	4240140,328	603,395	C	241062,000	4239680,328	596,345	C
240068,000	4240140,328	603,430	C	241048,000	4239680,328	596,380	C
240064,500	4240140,328	603,439	C	241044,500	4239680,328	596,389	C
240050,500	4240140,328	603,474	C	241030,500	4239680,328	596,424	C
240047,000	4240140,328	603,483	C	241027,000	4239680,328	596,433	C
240033,000	4240140,328	603,518	C	241013,000	4239680,328	596,468	C
240029,500	4240140,328	603,527	C	241009,500	4239680,328	596,477	C
240015,500	4240140,328	603,562	C	240995,500	4239680,328	596,512	C
240012,000	4240140,328	603,570	C	240992,000	4239680,328	596,520	C
240012,000	4240132,274	603,490	C	240978,000	4239680,328	596,555	C
240015,500	4240132,274	603,481	C	240974,500	4239680,328	596,564	C
240029,500	4240132,274	603,446	C	240960,500	4239680,328	596,599	C
240033,000	4240132,274	603,437	C	240957,000	4239680,328	596,608	C
240047,000	4240132,274	603,402	C	240943,000	4239680,328	596,643	C
240050,500	4240132,274	603,394	C	240939,500	4239680,328	596,652	C
240064,500	4240132,274	603,359	C	240925,500	4239680,328	596,687	C
240068,000	4240132,274	603,350	C	240922,000	4239680,328	596,695	C
240082,000	4240132,274	603,315	C	240908,000	4239680,328	596,730	C
240085,500	4240132,274	603,306	C	240904,500	4239680,328	596,739	C
240099,500	4240132,274	603,271	C	240890,500	4239680,328	596,774	C
240103,000	4240132,274	603,262	C	240887,000	4239680,328	596,783	C
240117,000	4240132,274	603,227	C	240873,000	4239680,328	596,818	C
240120,500	4240132,274	603,219	C	240869,500	4239680,328	596,827	C
240134,500	4240132,274	603,184	C	240855,500	4239680,328	596,862	C
240138,000	4240132,274	603,175	C	240852,000	4239680,328	596,870	C
240152,000	4240132,274	603,140	C	240838,000	4239680,328	596,905	C
240155,500	4240132,274	603,131	C	240834,500	4239680,328	596,914	C

Coord. X	Coord. Y	Elevación	Código
240169,500	4240132,274	603,096	C
240173,000	4240132,274	603,087	C
240187,000	4240132,274	603,052	C
240190,500	4240132,274	603,044	C
240204,500	4240132,274	603,009	C
240208,000	4240132,274	603,000	C
240222,000	4240132,274	602,965	C
240225,500	4240132,274	602,956	C
240239,500	4240132,274	602,921	C
240243,000	4240132,274	602,912	C
240257,000	4240132,274	602,877	C
240260,500	4240132,274	602,869	C
240274,500	4240132,274	602,834	C
240278,000	4240132,274	602,825	C
240292,000	4240132,274	602,790	C
240295,500	4240132,274	602,781	C
240309,500	4240132,274	602,746	C
240313,000	4240132,274	602,737	C
240327,000	4240132,274	602,702	C
240330,500	4240132,274	602,694	C
240344,500	4240132,274	602,659	C
240348,000	4240132,274	602,650	C
240362,000	4240132,274	602,615	C
240365,500	4240132,274	602,606	C
240379,500	4240132,274	602,571	C
240383,000	4240132,274	602,562	C
240397,000	4240132,274	602,527	C
240400,500	4240132,274	602,519	C
240414,500	4240132,274	602,484	C
240418,000	4240132,274	602,475	C
240432,000	4240132,274	602,440	C
240435,500	4240132,274	602,431	C
240449,500	4240132,274	602,396	C
240453,000	4240132,274	602,387	C
240467,000	4240132,274	602,352	C
240470,500	4240132,274	602,344	C
240484,500	4240132,274	602,309	C
240488,000	4240132,274	602,300	C
240502,000	4240132,274	602,265	C
240505,500	4240132,274	602,256	C
240519,500	4240132,274	602,221	C
240523,000	4240132,274	602,212	C
240537,000	4240132,274	602,177	C
240540,500	4240132,274	602,169	C
240554,500	4240132,274	602,134	C
240558,000	4240132,274	602,125	C

Coord. X	Coord. Y	Elevación	Código
240820,500	4239680,328	596,949	C
240817,000	4239680,328	596,958	C
240803,000	4239680,328	596,993	C
240799,500	4239680,328	597,002	C
240785,500	4239680,328	597,037	C
240782,000	4239680,328	597,045	C
240768,000	4239680,328	597,080	C
240764,500	4239680,328	597,089	C
240750,500	4239680,328	597,124	C
240747,000	4239680,328	597,133	C
240733,000	4239680,328	597,168	C
240729,500	4239680,328	597,177	C
240715,500	4239680,328	597,212	C
240712,000	4239680,328	597,220	C
240698,000	4239680,328	597,255	C
240694,500	4239680,328	597,264	C
240680,500	4239680,328	597,299	C
240677,000	4239680,328	597,308	C
240663,000	4239680,328	597,343	C
240659,500	4239680,328	597,352	C
240645,500	4239680,328	597,387	C
240642,000	4239680,328	597,395	C
240628,000	4239680,328	597,430	C
240624,500	4239680,328	597,439	C
240610,500	4239680,328	597,474	C
240607,000	4239680,328	597,483	C
240593,000	4239680,328	597,518	C
240589,500	4239680,328	597,527	C
240575,500	4239680,328	597,562	C
240572,000	4239680,328	597,570	C
240558,000	4239680,328	597,605	C
240554,500	4239680,328	597,614	C
240540,500	4239680,328	597,649	C
240537,000	4239680,328	597,658	C
240523,000	4239680,328	597,693	C
240519,500	4239680,328	597,702	C
240505,500	4239680,328	597,737	C
240502,000	4239680,328	597,745	C
240488,000	4239680,328	597,780	C
240484,500	4239680,328	597,789	C
240470,500	4239680,328	597,824	C
240467,000	4239680,328	597,833	C
240453,000	4239680,328	597,868	C
240449,500	4239680,328	597,877	C
240435,500	4239680,328	597,912	C
240432,000	4239680,328	597,920	C

Coord. X	Coord. Y	Elevación	Código
240572,000	4240132,274	602,090	C
240575,500	4240132,274	602,081	C
240589,500	4240132,274	602,046	C
240593,000	4240132,274	602,037	C
240607,000	4240132,274	602,002	C
240610,500	4240132,274	601,994	C
240624,500	4240132,274	601,959	C
240628,000	4240132,274	601,950	C
240642,000	4240132,274	601,915	C
240645,500	4240132,274	601,906	C
240659,500	4240132,274	601,871	C
240663,000	4240132,274	601,862	C
240677,000	4240132,274	601,827	C
240680,500	4240132,274	601,819	C
240694,500	4240132,274	601,784	C
240698,000	4240132,274	601,775	C
240712,000	4240132,274	601,740	C
240715,500	4240132,274	601,731	C
240729,500	4240132,274	601,696	C
240733,000	4240132,274	601,687	C
240747,000	4240132,274	601,652	C
240750,500	4240132,274	601,644	C
240764,500	4240132,274	601,609	C
240768,000	4240132,274	601,600	C
240768,000	4240128,274	601,560	C
240764,500	4240128,274	601,569	C
240750,500	4240128,274	601,604	C
240747,000	4240128,274	601,612	C
240733,000	4240128,274	601,647	C
240729,500	4240128,274	601,656	C
240715,500	4240128,274	601,691	C
240712,000	4240128,274	601,700	C
240698,000	4240128,274	601,735	C
240694,500	4240128,274	601,744	C
240680,500	4240128,274	601,779	C
240677,000	4240128,274	601,787	C
240663,000	4240128,274	601,822	C
240659,500	4240128,274	601,831	C
240645,500	4240128,274	601,866	C
240642,000	4240128,274	601,875	C
240628,000	4240128,274	601,910	C
240624,500	4240128,274	601,919	C
240610,500	4240128,274	601,954	C
240607,000	4240128,274	601,962	C
240593,000	4240128,274	601,997	C
240589,500	4240128,274	602,006	C
240418,000	4239680,328	597,955	C
240414,500	4239680,328	597,964	C
240400,500	4239680,328	597,999	C
240397,000	4239680,328	598,008	C
240383,000	4239680,328	598,043	C
240379,500	4239680,328	598,052	C
240365,500	4239680,328	598,087	C
240362,000	4239680,328	598,095	C
240348,000	4239680,328	598,130	C
240344,500	4239680,328	598,139	C
240330,500	4239680,328	598,174	C
240327,000	4239680,328	598,183	C
240313,000	4239680,328	598,218	C
240309,500	4239680,328	598,227	C
240295,500	4239680,328	598,261	C
240292,000	4239680,328	598,270	C
240278,000	4239680,328	598,305	C
240274,500	4239680,328	598,314	C
240260,500	4239680,328	598,349	C
240257,000	4239680,328	598,358	C
240243,000	4239680,328	598,393	C
240239,500	4239680,328	598,401	C
240225,500	4239680,328	598,436	C
240222,000	4239680,328	598,445	C
240208,000	4239680,328	598,480	C
240204,500	4239680,328	598,489	C
240190,500	4239680,328	598,524	C
240187,000	4239680,328	598,533	C
240173,000	4239680,328	598,568	C
240169,500	4239680,328	598,576	C
240155,500	4239680,328	598,611	C
240152,000	4239680,328	598,620	C
240138,000	4239680,328	598,655	C
240134,500	4239680,328	598,664	C
240120,500	4239680,328	598,699	C
240117,000	4239680,328	598,708	C
240103,000	4239680,328	598,743	C
240099,500	4239680,328	598,751	C
240085,500	4239680,328	598,786	C
240082,000	4239680,328	598,795	C
240068,000	4239680,328	598,830	C
240064,500	4239680,328	598,839	C
240050,500	4239680,328	598,874	C
240047,000	4239680,328	598,883	C
240033,000	4239680,328	598,918	C
240029,500	4239680,328	598,926	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240575,500	4240128,274	602,041	C	240015,500	4239680,328	598,961	C
240572,000	4240128,274	602,050	C	240012,000	4239680,328	598,970	C
240558,000	4240128,274	602,085	C	240012,000	4239672,274	598,890	C
240554,500	4240128,274	602,094	C	240015,500	4239672,274	598,881	C
240540,500	4240128,274	602,129	C	240029,500	4239672,274	598,846	C
240537,000	4240128,274	602,137	C	240033,000	4239672,274	598,837	C
240523,000	4240128,274	602,172	C	240047,000	4239672,274	598,802	C
240519,500	4240128,274	602,181	C	240050,500	4239672,274	598,793	C
240505,500	4240128,274	602,216	C	240064,500	4239672,274	598,758	C
240502,000	4240128,274	602,225	C	240068,000	4239672,274	598,750	C
240488,000	4240128,274	602,260	C	240082,000	4239672,274	598,715	C
240484,500	4240128,274	602,269	C	240085,500	4239672,274	598,706	C
240470,500	4240128,274	602,304	C	240099,500	4239672,274	598,671	C
240467,000	4240128,274	602,312	C	240103,000	4239672,274	598,662	C
240453,000	4240128,274	602,347	C	240117,000	4239672,274	598,627	C
240449,500	4240128,274	602,356	C	240120,500	4239672,274	598,618	C
240435,500	4240128,274	602,391	C	240134,500	4239672,274	598,583	C
240432,000	4240128,274	602,400	C	240138,000	4239672,274	598,575	C
240418,000	4240128,274	602,435	C	240152,000	4239672,274	598,540	C
240414,500	4240128,274	602,444	C	240155,500	4239672,274	598,531	C
240400,500	4240128,274	602,479	C	240169,500	4239672,274	598,496	C
240397,000	4240128,274	602,487	C	240173,000	4239672,274	598,487	C
240383,000	4240128,274	602,522	C	240187,000	4239672,274	598,452	C
240379,500	4240128,274	602,531	C	240190,500	4239672,274	598,443	C
240365,500	4240128,274	602,566	C	240204,500	4239672,274	598,408	C
240362,000	4240128,274	602,575	C	240208,000	4239672,274	598,400	C
240348,000	4240128,274	602,610	C	240222,000	4239672,274	598,365	C
240344,500	4240128,274	602,619	C	240225,500	4239672,274	598,356	C
240330,500	4240128,274	602,654	C	240239,500	4239672,274	598,321	C
240327,000	4240128,274	602,662	C	240243,000	4239672,274	598,312	C
240313,000	4240128,274	602,697	C	240257,000	4239672,274	598,277	C
240309,500	4240128,274	602,706	C	240260,500	4239672,274	598,268	C
240295,500	4240128,274	602,741	C	240274,500	4239672,274	598,233	C
240292,000	4240128,274	602,750	C	240278,000	4239672,274	598,225	C
240278,000	4240128,274	602,785	C	240292,000	4239672,274	598,190	C
240274,500	4240128,274	602,794	C	240295,500	4239672,274	598,181	C
240260,500	4240128,274	602,829	C	240309,500	4239672,274	598,146	C
240257,000	4240128,274	602,837	C	240313,000	4239672,274	598,137	C
240243,000	4240128,274	602,872	C	240327,000	4239672,274	598,102	C
240239,500	4240128,274	602,881	C	240330,500	4239672,274	598,094	C
240225,500	4240128,274	602,916	C	240344,500	4239672,274	598,059	C
240222,000	4240128,274	602,925	C	240348,000	4239672,274	598,050	C
240208,000	4240128,274	602,960	C	240362,000	4239672,274	598,015	C
240204,500	4240128,274	602,969	C	240365,500	4239672,274	598,006	C
240190,500	4240128,274	603,004	C	240379,500	4239672,274	597,971	C
240187,000	4240128,274	603,012	C	240383,000	4239672,274	597,962	C

Coord. X	Coord. Y	Elevación	Código
240173,000	4240128,274	603,047	C
240169,500	4240128,274	603,056	C
240155,500	4240128,274	603,091	C
240152,000	4240128,274	603,100	C
240138,000	4240128,274	603,135	C
240134,500	4240128,274	603,144	C
240120,500	4240128,274	603,179	C
240117,000	4240128,274	603,187	C
240103,000	4240128,274	603,222	C
240099,500	4240128,274	603,231	C
240085,500	4240128,274	603,266	C
240082,000	4240128,274	603,275	C
240068,000	4240128,274	603,310	C
240064,500	4240128,274	603,319	C
240050,500	4240128,274	603,354	C
240047,000	4240128,274	603,362	C
240033,000	4240128,274	603,397	C
240029,500	4240128,274	603,406	C
240015,500	4240128,274	603,441	C
240012,000	4240128,274	603,450	C
240012,000	4240119,220	603,359	C
240015,500	4240119,220	603,351	C
240029,500	4240119,220	603,316	C
240033,000	4240119,220	603,307	C
240047,000	4240119,220	603,272	C
240050,500	4240119,220	603,263	C
240064,500	4240119,220	603,228	C
240068,000	4240119,220	603,219	C
240082,000	4240119,220	603,184	C
240085,500	4240119,220	603,176	C
240099,500	4240119,220	603,141	C
240103,000	4240119,220	603,132	C
240117,000	4240119,220	603,097	C
240120,500	4240119,220	603,088	C
240134,500	4240119,220	603,053	C
240138,000	4240119,220	603,044	C
240152,000	4240119,220	603,009	C
240155,500	4240119,220	603,001	C
240169,500	4240119,220	602,966	C
240173,000	4240119,220	602,957	C
240187,000	4240119,220	602,922	C
240190,500	4240119,220	602,913	C
240204,500	4240119,220	602,878	C
240208,000	4240119,220	602,869	C
240222,000	4240119,220	602,834	C
240225,500	4240119,220	602,826	C

Coord. X	Coord. Y	Elevación	Código
240397,000	4239672,274	597,927	C
240400,500	4239672,274	597,919	C
240414,500	4239672,274	597,884	C
240418,000	4239672,274	597,875	C
240432,000	4239672,274	597,840	C
240435,500	4239672,274	597,831	C
240449,500	4239672,274	597,796	C
240453,000	4239672,274	597,787	C
240467,000	4239672,274	597,752	C
240470,500	4239672,274	597,744	C
240484,500	4239672,274	597,709	C
240488,000	4239672,274	597,700	C
240502,000	4239672,274	597,665	C
240505,500	4239672,274	597,656	C
240519,500	4239672,274	597,621	C
240523,000	4239672,274	597,612	C
240537,000	4239672,274	597,577	C
240540,500	4239672,274	597,569	C
240554,500	4239672,274	597,534	C
240558,000	4239672,274	597,525	C
240572,000	4239672,274	597,490	C
240575,500	4239672,274	597,481	C
240589,500	4239672,274	597,446	C
240593,000	4239672,274	597,437	C
240607,000	4239672,274	597,402	C
240610,500	4239672,274	597,394	C
240624,500	4239672,274	597,359	C
240628,000	4239672,274	597,350	C
240642,000	4239672,274	597,315	C
240645,500	4239672,274	597,306	C
240659,500	4239672,274	597,271	C
240663,000	4239672,274	597,262	C
240677,000	4239672,274	597,227	C
240680,500	4239672,274	597,219	C
240694,500	4239672,274	597,184	C
240698,000	4239672,274	597,175	C
240712,000	4239672,274	597,140	C
240715,500	4239672,274	597,131	C
240729,500	4239672,274	597,096	C
240733,000	4239672,274	597,087	C
240747,000	4239672,274	597,052	C
240750,500	4239672,274	597,044	C
240764,500	4239672,274	597,009	C
240768,000	4239672,274	597,000	C
240782,000	4239672,274	596,965	C
240785,500	4239672,274	596,956	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240239,500	4240119,220	602,791	C	240799,500	4239672,274	596,921	C
240243,000	4240119,220	602,782	C	240803,000	4239672,274	596,912	C
240257,000	4240119,220	602,747	C	240817,000	4239672,274	596,877	C
240260,500	4240119,220	602,738	C	240820,500	4239672,274	596,869	C
240274,500	4240119,220	602,703	C	240834,500	4239672,274	596,834	C
240278,000	4240119,220	602,694	C	240838,000	4239672,274	596,825	C
240292,000	4240119,220	602,659	C	240852,000	4239672,274	596,790	C
240295,500	4240119,220	602,651	C	240855,500	4239672,274	596,781	C
240309,500	4240119,220	602,616	C	240869,500	4239672,274	596,746	C
240313,000	4240119,220	602,607	C	240873,000	4239672,274	596,737	C
240327,000	4240119,220	602,572	C	240887,000	4239672,274	596,702	C
240330,500	4240119,220	602,563	C	240890,500	4239672,274	596,694	C
240344,500	4240119,220	602,528	C	240904,500	4239672,274	596,659	C
240348,000	4240119,220	602,519	C	240908,000	4239672,274	596,650	C
240362,000	4240119,220	602,484	C	240922,000	4239672,274	596,615	C
240365,500	4240119,220	602,476	C	240925,500	4239672,274	596,606	C
240379,500	4240119,220	602,441	C	240939,500	4239672,274	596,571	C
240383,000	4240119,220	602,432	C	240943,000	4239672,274	596,562	C
240397,000	4240119,220	602,397	C	240957,000	4239672,274	596,527	C
240400,500	4240119,220	602,388	C	240960,500	4239672,274	596,519	C
240414,500	4240119,220	602,353	C	240974,500	4239672,274	596,484	C
240418,000	4240119,220	602,344	C	240978,000	4239672,274	596,475	C
240432,000	4240119,220	602,309	C	240992,000	4239672,274	596,440	C
240435,500	4240119,220	602,301	C	240995,500	4239672,274	596,431	C
240449,500	4240119,220	602,266	C	241009,500	4239672,274	596,396	C
240453,000	4240119,220	602,257	C	241013,000	4239672,274	596,387	C
240467,000	4240119,220	602,222	C	241027,000	4239672,274	596,352	C
240470,500	4240119,220	602,213	C	241030,500	4239672,274	596,344	C
240484,500	4240119,220	602,178	C	241044,500	4239672,274	596,309	C
240488,000	4240119,220	602,169	C	241048,000	4239672,274	596,300	C
240502,000	4240119,220	602,134	C	241062,000	4239672,274	596,265	C
240505,500	4240119,220	602,126	C	241065,500	4239672,274	596,256	C
240519,500	4240119,220	602,091	C	241079,500	4239672,274	596,221	C
240523,000	4240119,220	602,082	C	241083,000	4239672,274	596,212	C
240537,000	4240119,220	602,047	C	241097,000	4239672,274	596,177	C
240540,500	4240119,220	602,038	C	241100,500	4239672,274	596,169	C
240554,500	4240119,220	602,003	C	241114,500	4239672,274	596,134	C
240558,000	4240119,220	601,994	C	241118,000	4239672,274	596,125	C
240572,000	4240119,220	601,959	C	241132,000	4239672,274	596,090	C
240575,500	4240119,220	601,951	C	241135,500	4239672,274	596,081	C
240589,500	4240119,220	601,916	C	241149,500	4239672,274	596,046	C
240593,000	4240119,220	601,907	C	241153,000	4239672,274	596,037	C
240607,000	4240119,220	601,872	C	241167,000	4239672,274	596,002	C
240610,500	4240119,220	601,863	C	241170,500	4239672,274	595,994	C
240624,500	4240119,220	601,828	C	241184,500	4239672,274	595,959	C
240628,000	4240119,220	601,819	C	241188,000	4239672,274	595,950	C

Coord. X	Coord. Y	Elevación	Código
240642,000	4240119,220	601,784	C
240645,500	4240119,220	601,776	C
240659,500	4240119,220	601,741	C
240663,000	4240119,220	601,732	C
240677,000	4240119,220	601,697	C
240680,500	4240119,220	601,688	C
240694,500	4240119,220	601,653	C
240698,000	4240119,220	601,644	C
240712,000	4240119,220	601,609	C
240715,500	4240119,220	601,601	C
240729,500	4240119,220	601,566	C
240733,000	4240119,220	601,557	C
240747,000	4240119,220	601,522	C
240750,500	4240119,220	601,513	C
240764,500	4240119,220	601,478	C
240768,000	4240119,220	601,469	C
240768,000	4240116,070	601,438	C
240764,500	4240116,070	601,447	C
240750,500	4240116,070	601,482	C
240747,000	4240116,070	601,490	C
240733,000	4240116,070	601,525	C
240729,500	4240116,070	601,534	C
240715,500	4240116,070	601,569	C
240712,000	4240116,070	601,578	C
240698,000	4240116,070	601,613	C
240694,500	4240116,070	601,622	C
240680,500	4240116,070	601,657	C
240677,000	4240116,070	601,665	C
240663,000	4240116,070	601,700	C
240659,500	4240116,070	601,709	C
240645,500	4240116,070	601,744	C
240642,000	4240116,070	601,753	C
240628,000	4240116,070	601,788	C
240624,500	4240116,070	601,797	C
240610,500	4240116,070	601,832	C
240607,000	4240116,070	601,840	C
240593,000	4240116,070	601,875	C
240589,500	4240116,070	601,884	C
240575,500	4240116,070	601,919	C
240572,000	4240116,070	601,928	C
240558,000	4240116,070	601,963	C
240554,500	4240116,070	601,972	C
240540,500	4240116,070	602,007	C
240537,000	4240116,070	602,015	C
240523,000	4240116,070	602,050	C
240519,500	4240116,070	602,059	C

Coord. X	Coord. Y	Elevación	Código
241188,000	4239668,274	595,910	C
241184,500	4239668,274	595,919	C
241170,500	4239668,274	595,954	C
241167,000	4239668,274	595,962	C
241153,000	4239668,274	595,997	C
241149,500	4239668,274	596,006	C
241135,500	4239668,274	596,041	C
241132,000	4239668,274	596,050	C
241118,000	4239668,274	596,085	C
241114,500	4239668,274	596,094	C
241100,500	4239668,274	596,129	C
241097,000	4239668,274	596,137	C
241083,000	4239668,274	596,172	C
241079,500	4239668,274	596,181	C
241065,500	4239668,274	596,216	C
241062,000	4239668,274	596,225	C
241048,000	4239668,274	596,260	C
241044,500	4239668,274	596,269	C
241030,500	4239668,274	596,304	C
241027,000	4239668,274	596,312	C
241013,000	4239668,274	596,347	C
241009,500	4239668,274	596,356	C
240995,500	4239668,274	596,391	C
240992,000	4239668,274	596,400	C
240978,000	4239668,274	596,435	C
240974,500	4239668,274	596,444	C
240960,500	4239668,274	596,479	C
240957,000	4239668,274	596,487	C
240943,000	4239668,274	596,522	C
240939,500	4239668,274	596,531	C
240925,500	4239668,274	596,566	C
240922,000	4239668,274	596,575	C
240908,000	4239668,274	596,610	C
240904,500	4239668,274	596,619	C
240890,500	4239668,274	596,654	C
240887,000	4239668,274	596,662	C
240873,000	4239668,274	596,697	C
240869,500	4239668,274	596,706	C
240855,500	4239668,274	596,741	C
240852,000	4239668,274	596,750	C
240838,000	4239668,274	596,785	C
240834,500	4239668,274	596,794	C
240820,500	4239668,274	596,829	C
240817,000	4239668,274	596,837	C
240803,000	4239668,274	596,872	C
240799,500	4239668,274	596,881	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240505,500	4240116,070	602,094	C	240785,500	4239668,274	596,916	C
240502,000	4240116,070	602,103	C	240782,000	4239668,274	596,925	C
240488,000	4240116,070	602,138	C	240768,000	4239668,274	596,960	C
240484,500	4240116,070	602,147	C	240764,500	4239668,274	596,969	C
240470,500	4240116,070	602,182	C	240750,500	4239668,274	597,004	C
240467,000	4240116,070	602,190	C	240747,000	4239668,274	597,012	C
240453,000	4240116,070	602,225	C	240733,000	4239668,274	597,047	C
240449,500	4240116,070	602,234	C	240729,500	4239668,274	597,056	C
240435,500	4240116,070	602,269	C	240715,500	4239668,274	597,091	C
240432,000	4240116,070	602,278	C	240712,000	4239668,274	597,100	C
240418,000	4240116,070	602,313	C	240698,000	4239668,274	597,135	C
240414,500	4240116,070	602,322	C	240694,500	4239668,274	597,144	C
240400,500	4240116,070	602,357	C	240680,500	4239668,274	597,179	C
240397,000	4240116,070	602,365	C	240677,000	4239668,274	597,187	C
240383,000	4240116,070	602,400	C	240663,000	4239668,274	597,222	C
240379,500	4240116,070	602,409	C	240659,500	4239668,274	597,231	C
240365,500	4240116,070	602,444	C	240645,500	4239668,274	597,266	C
240362,000	4240116,070	602,453	C	240642,000	4239668,274	597,275	C
240348,000	4240116,070	602,488	C	240628,000	4239668,274	597,310	C
240344,500	4240116,070	602,497	C	240624,500	4239668,274	597,319	C
240330,500	4240116,070	602,532	C	240610,500	4239668,274	597,354	C
240327,000	4240116,070	602,540	C	240607,000	4239668,274	597,362	C
240313,000	4240116,070	602,575	C	240593,000	4239668,274	597,397	C
240309,500	4240116,070	602,584	C	240589,500	4239668,274	597,406	C
240295,500	4240116,070	602,619	C	240575,500	4239668,274	597,441	C
240292,000	4240116,070	602,628	C	240572,000	4239668,274	597,450	C
240278,000	4240116,070	602,663	C	240558,000	4239668,274	597,485	C
240274,500	4240116,070	602,672	C	240554,500	4239668,274	597,494	C
240260,500	4240116,070	602,707	C	240540,500	4239668,274	597,529	C
240257,000	4240116,070	602,715	C	240537,000	4239668,274	597,537	C
240243,000	4240116,070	602,750	C	240523,000	4239668,274	597,572	C
240239,500	4240116,070	602,759	C	240519,500	4239668,274	597,581	C
240225,500	4240116,070	602,794	C	240505,500	4239668,274	597,616	C
240222,000	4240116,070	602,803	C	240502,000	4239668,274	597,625	C
240208,000	4240116,070	602,838	C	240488,000	4239668,274	597,660	C
240204,500	4240116,070	602,847	C	240484,500	4239668,274	597,669	C
240190,500	4240116,070	602,882	C	240470,500	4239668,274	597,704	C
240187,000	4240116,070	602,890	C	240467,000	4239668,274	597,712	C
240173,000	4240116,070	602,925	C	240453,000	4239668,274	597,747	C
240169,500	4240116,070	602,934	C	240449,500	4239668,274	597,756	C
240155,500	4240116,070	602,969	C	240435,500	4239668,274	597,791	C
240152,000	4240116,070	602,978	C	240432,000	4239668,274	597,800	C
240138,000	4240116,070	603,013	C	240418,000	4239668,274	597,835	C
240134,500	4240116,070	603,022	C	240414,500	4239668,274	597,844	C
240120,500	4240116,070	603,057	C	240400,500	4239668,274	597,879	C
240117,000	4240116,070	603,065	C	240397,000	4239668,274	597,887	C

Coord. X	Coord. Y	Elevación	Código
240103,000	4240116,070	603,100	C
240099,500	4240116,070	603,109	C
240085,500	4240116,070	603,144	C
240082,000	4240116,070	603,153	C
240068,000	4240116,070	603,188	C
240064,500	4240116,070	603,197	C
240050,500	4240116,070	603,232	C
240047,000	4240116,070	603,240	C
240033,000	4240116,070	603,275	C
240029,500	4240116,070	603,284	C
240015,500	4240116,070	603,319	C
240012,000	4240116,070	603,328	C
240012,000	4240112,920	603,296	C
240015,500	4240112,920	603,288	C
240029,500	4240112,920	603,253	C
240033,000	4240112,920	603,244	C
240047,000	4240112,920	603,209	C
240050,500	4240112,920	603,200	C
240064,500	4240112,920	603,165	C
240068,000	4240112,920	603,156	C
240082,000	4240112,920	603,121	C
240085,500	4240112,920	603,113	C
240099,500	4240112,920	603,078	C
240103,000	4240112,920	603,069	C
240117,000	4240112,920	603,034	C
240120,500	4240112,920	603,025	C
240134,500	4240112,920	602,990	C
240138,000	4240112,920	602,981	C
240152,000	4240112,920	602,946	C
240155,500	4240112,920	602,938	C
240169,500	4240112,920	602,903	C
240173,000	4240112,920	602,894	C
240187,000	4240112,920	602,859	C
240190,500	4240112,920	602,850	C
240204,500	4240112,920	602,815	C
240208,000	4240112,920	602,806	C
240222,000	4240112,920	602,771	C
240225,500	4240112,920	602,763	C
240239,500	4240112,920	602,728	C
240243,000	4240112,920	602,719	C
240257,000	4240112,920	602,684	C
240260,500	4240112,920	602,675	C
240274,500	4240112,920	602,640	C
240278,000	4240112,920	602,631	C
240292,000	4240112,920	602,596	C
240295,500	4240112,920	602,588	C

Coord. X	Coord. Y	Elevación	Código
240383,000	4239668,274	597,922	C
240379,500	4239668,274	597,931	C
240365,500	4239668,274	597,966	C
240362,000	4239668,274	597,975	C
240348,000	4239668,274	598,010	C
240344,500	4239668,274	598,019	C
240330,500	4239668,274	598,054	C
240327,000	4239668,274	598,062	C
240313,000	4239668,274	598,097	C
240309,500	4239668,274	598,106	C
240295,500	4239668,274	598,141	C
240292,000	4239668,274	598,150	C
240278,000	4239668,274	598,185	C
240274,500	4239668,274	598,193	C
240260,500	4239668,274	598,228	C
240257,000	4239668,274	598,237	C
240243,000	4239668,274	598,272	C
240239,500	4239668,274	598,281	C
240225,500	4239668,274	598,316	C
240222,000	4239668,274	598,325	C
240208,000	4239668,274	598,360	C
240204,500	4239668,274	598,368	C
240190,500	4239668,274	598,403	C
240187,000	4239668,274	598,412	C
240173,000	4239668,274	598,447	C
240169,500	4239668,274	598,456	C
240155,500	4239668,274	598,491	C
240152,000	4239668,274	598,500	C
240138,000	4239668,274	598,535	C
240134,500	4239668,274	598,543	C
240120,500	4239668,274	598,578	C
240117,000	4239668,274	598,587	C
240103,000	4239668,274	598,622	C
240099,500	4239668,274	598,631	C
240085,500	4239668,274	598,666	C
240082,000	4239668,274	598,675	C
240068,000	4239668,274	598,710	C
240064,500	4239668,274	598,718	C
240050,500	4239668,274	598,753	C
240047,000	4239668,274	598,762	C
240033,000	4239668,274	598,797	C
240029,500	4239668,274	598,806	C
240015,500	4239668,274	598,841	C
240012,000	4239668,274	598,850	C
240012,000	4239659,220	598,759	C
240015,500	4239659,220	598,750	C

Coord. X	Coord. Y	Elevación	Código
240309,500	4240112,920	602,553	C
240313,000	4240112,920	602,544	C
240327,000	4240112,920	602,509	C
240330,500	4240112,920	602,500	C
240344,500	4240112,920	602,465	C
240348,000	4240112,920	602,456	C
240362,000	4240112,920	602,421	C
240365,500	4240112,920	602,413	C
240379,500	4240112,920	602,378	C
240383,000	4240112,920	602,369	C
240397,000	4240112,920	602,334	C
240400,500	4240112,920	602,325	C
240414,500	4240112,920	602,290	C
240418,000	4240112,920	602,281	C
240432,000	4240112,920	602,246	C
240435,500	4240112,920	602,238	C
240449,500	4240112,920	602,203	C
240453,000	4240112,920	602,194	C
240467,000	4240112,920	602,159	C
240470,500	4240112,920	602,150	C
240484,500	4240112,920	602,115	C
240488,000	4240112,920	602,106	C
240502,000	4240112,920	602,071	C
240505,500	4240112,920	602,063	C
240519,500	4240112,920	602,028	C
240523,000	4240112,920	602,019	C
240537,000	4240112,920	601,984	C
240540,500	4240112,920	601,975	C
240554,500	4240112,920	601,940	C
240558,000	4240112,920	601,931	C
240572,000	4240112,920	601,896	C
240575,500	4240112,920	601,888	C
240589,500	4240112,920	601,853	C
240593,000	4240112,920	601,844	C
240607,000	4240112,920	601,809	C
240610,500	4240112,920	601,800	C
240624,500	4240112,920	601,765	C
240628,000	4240112,920	601,756	C
240642,000	4240112,920	601,721	C
240645,500	4240112,920	601,713	C
240659,500	4240112,920	601,678	C
240663,000	4240112,920	601,669	C
240677,000	4240112,920	601,634	C
240680,500	4240112,920	601,625	C
240694,500	4240112,920	601,590	C
240698,000	4240112,920	601,581	C

Coord. X	Coord. Y	Elevación	Código
240029,500	4239659,220	598,715	C
240033,000	4239659,220	598,707	C
240047,000	4239659,220	598,672	C
240050,500	4239659,220	598,663	C
240064,500	4239659,220	598,628	C
240068,000	4239659,220	598,619	C
240082,000	4239659,220	598,584	C
240085,500	4239659,220	598,575	C
240099,500	4239659,220	598,540	C
240103,000	4239659,220	598,532	C
240117,000	4239659,220	598,497	C
240120,500	4239659,220	598,488	C
240134,500	4239659,220	598,453	C
240138,000	4239659,220	598,444	C
240152,000	4239659,220	598,409	C
240155,500	4239659,220	598,400	C
240169,500	4239659,220	598,365	C
240173,000	4239659,220	598,357	C
240187,000	4239659,220	598,322	C
240190,500	4239659,220	598,313	C
240204,500	4239659,220	598,278	C
240208,000	4239659,220	598,269	C
240222,000	4239659,220	598,234	C
240225,500	4239659,220	598,225	C
240239,500	4239659,220	598,190	C
240243,000	4239659,220	598,182	C
240257,000	4239659,220	598,147	C
240260,500	4239659,220	598,138	C
240274,500	4239659,220	598,103	C
240278,000	4239659,220	598,094	C
240292,000	4239659,220	598,059	C
240295,500	4239659,220	598,050	C
240309,500	4239659,220	598,015	C
240313,000	4239659,220	598,007	C
240327,000	4239659,220	597,972	C
240330,500	4239659,220	597,963	C
240344,500	4239659,220	597,928	C
240348,000	4239659,220	597,919	C
240362,000	4239659,220	597,884	C
240365,500	4239659,220	597,876	C
240379,500	4239659,220	597,841	C
240383,000	4239659,220	597,832	C
240397,000	4239659,220	597,797	C
240400,500	4239659,220	597,788	C
240414,500	4239659,220	597,753	C
240418,000	4239659,220	597,744	C

Coord. X	Coord. Y	Elevación	Código
240712,000	4240112,920	601,546	C
240715,500	4240112,920	601,538	C
240729,500	4240112,920	601,503	C
240733,000	4240112,920	601,494	C
240747,000	4240112,920	601,459	C
240750,500	4240112,920	601,450	C
240764,500	4240112,920	601,415	C
240768,000	4240112,920	601,406	C
240768,000	4240103,866	601,316	C
240764,500	4240103,866	601,325	C
240750,500	4240103,866	601,360	C
240747,000	4240103,866	601,368	C
240733,000	4240103,866	601,403	C
240729,500	4240103,866	601,412	C
240715,500	4240103,866	601,447	C
240712,000	4240103,866	601,456	C
240698,000	4240103,866	601,491	C
240694,500	4240103,866	601,500	C
240680,500	4240103,866	601,535	C
240677,000	4240103,866	601,543	C
240663,000	4240103,866	601,578	C
240659,500	4240103,866	601,587	C
240645,500	4240103,866	601,622	C
240642,000	4240103,866	601,631	C
240628,000	4240103,866	601,666	C
240624,500	4240103,866	601,675	C
240610,500	4240103,866	601,710	C
240607,000	4240103,866	601,718	C
240593,000	4240103,866	601,753	C
240589,500	4240103,866	601,762	C
240575,500	4240103,866	601,797	C
240572,000	4240103,866	601,806	C
240558,000	4240103,866	601,841	C
240554,500	4240103,866	601,850	C
240540,500	4240103,866	601,885	C
240537,000	4240103,866	601,893	C
240523,000	4240103,866	601,928	C
240519,500	4240103,866	601,937	C
240505,500	4240103,866	601,972	C
240502,000	4240103,866	601,981	C
240488,000	4240103,866	602,016	C
240484,500	4240103,866	602,025	C
240470,500	4240103,866	602,060	C
240467,000	4240103,866	602,068	C
240453,000	4240103,866	602,103	C
240449,500	4240103,866	602,112	C

Coord. X	Coord. Y	Elevación	Código
240432,000	4239659,220	597,709	C
240435,500	4239659,220	597,701	C
240449,500	4239659,220	597,666	C
240453,000	4239659,220	597,657	C
240467,000	4239659,220	597,622	C
240470,500	4239659,220	597,613	C
240484,500	4239659,220	597,578	C
240488,000	4239659,220	597,569	C
240502,000	4239659,220	597,534	C
240505,500	4239659,220	597,526	C
240519,500	4239659,220	597,491	C
240523,000	4239659,220	597,482	C
240537,000	4239659,220	597,447	C
240540,500	4239659,220	597,438	C
240554,500	4239659,220	597,403	C
240558,000	4239659,220	597,394	C
240572,000	4239659,220	597,359	C
240575,500	4239659,220	597,351	C
240589,500	4239659,220	597,316	C
240593,000	4239659,220	597,307	C
240607,000	4239659,220	597,272	C
240610,500	4239659,220	597,263	C
240624,500	4239659,220	597,228	C
240628,000	4239659,220	597,219	C
240642,000	4239659,220	597,184	C
240645,500	4239659,220	597,176	C
240659,500	4239659,220	597,141	C
240663,000	4239659,220	597,132	C
240677,000	4239659,220	597,097	C
240680,500	4239659,220	597,088	C
240694,500	4239659,220	597,053	C
240698,000	4239659,220	597,044	C
240712,000	4239659,220	597,009	C
240715,500	4239659,220	597,001	C
240729,500	4239659,220	596,966	C
240733,000	4239659,220	596,957	C
240747,000	4239659,220	596,922	C
240750,500	4239659,220	596,913	C
240764,500	4239659,220	596,878	C
240768,000	4239659,220	596,869	C
240782,000	4239659,220	596,834	C
240785,500	4239659,220	596,826	C
240799,500	4239659,220	596,791	C
240803,000	4239659,220	596,782	C
240817,000	4239659,220	596,747	C
240820,500	4239659,220	596,738	C

Coord. X	Coord. Y	Elevación	Código
240435,500	4240103,866	602,147	C
240432,000	4240103,866	602,156	C
240418,000	4240103,866	602,191	C
240414,500	4240103,866	602,200	C
240400,500	4240103,866	602,235	C
240397,000	4240103,866	602,243	C
240383,000	4240103,866	602,278	C
240379,500	4240103,866	602,287	C
240365,500	4240103,866	602,322	C
240362,000	4240103,866	602,331	C
240348,000	4240103,866	602,366	C
240344,500	4240103,866	602,375	C
240330,500	4240103,866	602,410	C
240327,000	4240103,866	602,418	C
240313,000	4240103,866	602,453	C
240309,500	4240103,866	602,462	C
240295,500	4240103,866	602,497	C
240292,000	4240103,866	602,506	C
240278,000	4240103,866	602,541	C
240274,500	4240103,866	602,550	C
240260,500	4240103,866	602,585	C
240257,000	4240103,866	602,593	C
240243,000	4240103,866	602,628	C
240239,500	4240103,866	602,637	C
240225,500	4240103,866	602,672	C
240222,000	4240103,866	602,681	C
240208,000	4240103,866	602,716	C
240204,500	4240103,866	602,725	C
240190,500	4240103,866	602,760	C
240187,000	4240103,866	602,768	C
240173,000	4240103,866	602,803	C
240169,500	4240103,866	602,812	C
240155,500	4240103,866	602,847	C
240152,000	4240103,866	602,856	C
240138,000	4240103,866	602,891	C
240134,500	4240103,866	602,900	C
240120,500	4240103,866	602,935	C
240117,000	4240103,866	602,943	C
240103,000	4240103,866	602,978	C
240099,500	4240103,866	602,987	C
240085,500	4240103,866	603,022	C
240082,000	4240103,866	603,031	C
240068,000	4240103,866	603,066	C
240064,500	4240103,866	603,075	C
240050,500	4240103,866	603,110	C
240047,000	4240103,866	603,118	C

Coord. X	Coord. Y	Elevación	Código
240834,500	4239659,220	596,703	C
240838,000	4239659,220	596,694	C
240852,000	4239659,220	596,659	C
240855,500	4239659,220	596,651	C
240869,500	4239659,220	596,616	C
240873,000	4239659,220	596,607	C
240887,000	4239659,220	596,572	C
240890,500	4239659,220	596,563	C
240904,500	4239659,220	596,528	C
240908,000	4239659,220	596,519	C
240922,000	4239659,220	596,484	C
240925,500	4239659,220	596,476	C
240939,500	4239659,220	596,441	C
240943,000	4239659,220	596,432	C
240957,000	4239659,220	596,397	C
240960,500	4239659,220	596,388	C
240974,500	4239659,220	596,353	C
240978,000	4239659,220	596,344	C
240992,000	4239659,220	596,309	C
240995,500	4239659,220	596,301	C
241009,500	4239659,220	596,266	C
241013,000	4239659,220	596,257	C
241027,000	4239659,220	596,222	C
241030,500	4239659,220	596,213	C
241044,500	4239659,220	596,178	C
241048,000	4239659,220	596,169	C
241062,000	4239659,220	596,134	C
241065,500	4239659,220	596,126	C
241079,500	4239659,220	596,091	C
241083,000	4239659,220	596,082	C
241097,000	4239659,220	596,047	C
241100,500	4239659,220	596,038	C
241114,500	4239659,220	596,003	C
241118,000	4239659,220	595,994	C
241132,000	4239659,220	595,959	C
241135,500	4239659,220	595,951	C
241149,500	4239659,220	595,916	C
241153,000	4239659,220	595,907	C
241167,000	4239659,220	595,872	C
241170,500	4239659,220	595,863	C
241184,500	4239659,220	595,828	C
241188,000	4239659,220	595,819	C
241188,000	4239656,070	595,788	C
241184,500	4239656,070	595,797	C
241170,500	4239656,070	595,832	C
241167,000	4239656,070	595,840	C

Coord. X	Coord. Y	Elevación	Código
240033,000	4240103,866	603,153	C
240029,500	4240103,866	603,162	C
240015,500	4240103,866	603,197	C
240012,000	4240103,866	603,206	C
240012,000	4240099,866	603,166	C
240015,500	4240099,866	603,157	C
240029,500	4240099,866	603,122	C
240033,000	4240099,866	603,113	C
240047,000	4240099,866	603,078	C
240050,500	4240099,866	603,070	C
240064,500	4240099,866	603,035	C
240068,000	4240099,866	603,026	C
240082,000	4240099,866	602,991	C
240085,500	4240099,866	602,982	C
240099,500	4240099,866	602,947	C
240103,000	4240099,866	602,938	C
240117,000	4240099,866	602,903	C
240120,500	4240099,866	602,895	C
240134,500	4240099,866	602,860	C
240138,000	4240099,866	602,851	C
240152,000	4240099,866	602,816	C
240155,500	4240099,866	602,807	C
240169,500	4240099,866	602,772	C
240173,000	4240099,866	602,763	C
240187,000	4240099,866	602,728	C
240190,500	4240099,866	602,720	C
240204,500	4240099,866	602,685	C
240208,000	4240099,866	602,676	C
240222,000	4240099,866	602,641	C
240225,500	4240099,866	602,632	C
240239,500	4240099,866	602,597	C
240243,000	4240099,866	602,588	C
240257,000	4240099,866	602,553	C
240260,500	4240099,866	602,545	C
240274,500	4240099,866	602,510	C
240278,000	4240099,866	602,501	C
240292,000	4240099,866	602,466	C
240295,500	4240099,866	602,457	C
240309,500	4240099,866	602,422	C
240313,000	4240099,866	602,413	C
240327,000	4240099,866	602,378	C
240330,500	4240099,866	602,370	C
240344,500	4240099,866	602,335	C
240348,000	4240099,866	602,326	C
240362,000	4240099,866	602,291	C
240365,500	4240099,866	602,282	C

Coord. X	Coord. Y	Elevación	Código
241153,000	4239656,070	595,875	C
241149,500	4239656,070	595,884	C
241135,500	4239656,070	595,919	C
241132,000	4239656,070	595,928	C
241118,000	4239656,070	595,963	C
241114,500	4239656,070	595,972	C
241100,500	4239656,070	596,007	C
241097,000	4239656,070	596,015	C
241083,000	4239656,070	596,050	C
241079,500	4239656,070	596,059	C
241065,500	4239656,070	596,094	C
241062,000	4239656,070	596,103	C
241048,000	4239656,070	596,138	C
241044,500	4239656,070	596,147	C
241030,500	4239656,070	596,182	C
241027,000	4239656,070	596,190	C
241013,000	4239656,070	596,225	C
241009,500	4239656,070	596,234	C
240995,500	4239656,070	596,269	C
240992,000	4239656,070	596,278	C
240978,000	4239656,070	596,313	C
240974,500	4239656,070	596,322	C
240960,500	4239656,070	596,357	C
240957,000	4239656,070	596,365	C
240943,000	4239656,070	596,400	C
240939,500	4239656,070	596,409	C
240925,500	4239656,070	596,444	C
240922,000	4239656,070	596,453	C
240908,000	4239656,070	596,488	C
240904,500	4239656,070	596,497	C
240890,500	4239656,070	596,532	C
240887,000	4239656,070	596,540	C
240873,000	4239656,070	596,575	C
240869,500	4239656,070	596,584	C
240855,500	4239656,070	596,619	C
240852,000	4239656,070	596,628	C
240838,000	4239656,070	596,663	C
240834,500	4239656,070	596,672	C
240820,500	4239656,070	596,707	C
240817,000	4239656,070	596,715	C
240803,000	4239656,070	596,750	C
240799,500	4239656,070	596,759	C
240785,500	4239656,070	596,794	C
240782,000	4239656,070	596,803	C
240768,000	4239656,070	596,838	C
240764,500	4239656,070	596,847	C

Coord. X	Coord. Y	Elevación	Código
240379,500	4240099,866	602,247	C
240383,000	4240099,866	602,238	C
240397,000	4240099,866	602,203	C
240400,500	4240099,866	602,195	C
240414,500	4240099,866	602,160	C
240418,000	4240099,866	602,151	C
240432,000	4240099,866	602,116	C
240435,500	4240099,866	602,107	C
240449,500	4240099,866	602,072	C
240453,000	4240099,866	602,063	C
240467,000	4240099,866	602,028	C
240470,500	4240099,866	602,020	C
240484,500	4240099,866	601,985	C
240488,000	4240099,866	601,976	C
240502,000	4240099,866	601,941	C
240505,500	4240099,866	601,932	C
240519,500	4240099,866	601,897	C
240523,000	4240099,866	601,888	C
240537,000	4240099,866	601,853	C
240540,500	4240099,866	601,845	C
240554,500	4240099,866	601,810	C
240558,000	4240099,866	601,801	C
240572,000	4240099,866	601,766	C
240575,500	4240099,866	601,757	C
240589,500	4240099,866	601,722	C
240593,000	4240099,866	601,713	C
240607,000	4240099,866	601,678	C
240610,500	4240099,866	601,670	C
240624,500	4240099,866	601,635	C
240628,000	4240099,866	601,626	C
240642,000	4240099,866	601,591	C
240645,500	4240099,866	601,582	C
240659,500	4240099,866	601,547	C
240663,000	4240099,866	601,538	C
240677,000	4240099,866	601,503	C
240680,500	4240099,866	601,495	C
240694,500	4240099,866	601,460	C
240698,000	4240099,866	601,451	C
240712,000	4240099,866	601,416	C
240715,500	4240099,866	601,407	C
240729,500	4240099,866	601,372	C
240733,000	4240099,866	601,363	C
240747,000	4240099,866	601,328	C
240750,500	4240099,866	601,320	C
240764,500	4240099,866	601,285	C
240768,000	4240099,866	601,276	C
240750,500	4239656,070	596,882	C
240747,000	4239656,070	596,890	C
240733,000	4239656,070	596,925	C
240729,500	4239656,070	596,934	C
240715,500	4239656,070	596,969	C
240712,000	4239656,070	596,978	C
240698,000	4239656,070	597,013	C
240694,500	4239656,070	597,022	C
240680,500	4239656,070	597,057	C
240677,000	4239656,070	597,065	C
240663,000	4239656,070	597,100	C
240659,500	4239656,070	597,109	C
240645,500	4239656,070	597,144	C
240642,000	4239656,070	597,153	C
240628,000	4239656,070	597,188	C
240624,500	4239656,070	597,197	C
240610,500	4239656,070	597,232	C
240607,000	4239656,070	597,240	C
240593,000	4239656,070	597,275	C
240589,500	4239656,070	597,284	C
240575,500	4239656,070	597,319	C
240572,000	4239656,070	597,328	C
240558,000	4239656,070	597,363	C
240554,500	4239656,070	597,372	C
240540,500	4239656,070	597,407	C
240537,000	4239656,070	597,415	C
240523,000	4239656,070	597,450	C
240519,500	4239656,070	597,459	C
240505,500	4239656,070	597,494	C
240502,000	4239656,070	597,503	C
240488,000	4239656,070	597,538	C
240484,500	4239656,070	597,547	C
240470,500	4239656,070	597,582	C
240467,000	4239656,070	597,590	C
240453,000	4239656,070	597,625	C
240449,500	4239656,070	597,634	C
240435,500	4239656,070	597,669	C
240432,000	4239656,070	597,678	C
240418,000	4239656,070	597,713	C
240414,500	4239656,070	597,722	C
240400,500	4239656,070	597,757	C
240397,000	4239656,070	597,765	C
240383,000	4239656,070	597,800	C
240379,500	4239656,070	597,809	C
240365,500	4239656,070	597,844	C
240362,000	4239656,070	597,853	C

Coord. X	Coord. Y	Elevación	Código
240768,000	4240091,813	601,195	C
240764,500	4240091,813	601,204	C
240750,500	4240091,813	601,239	C
240747,000	4240091,813	601,248	C
240733,000	4240091,813	601,283	C
240729,500	4240091,813	601,292	C
240715,500	4240091,813	601,327	C
240712,000	4240091,813	601,335	C
240698,000	4240091,813	601,370	C
240694,500	4240091,813	601,379	C
240680,500	4240091,813	601,414	C
240677,000	4240091,813	601,423	C
240663,000	4240091,813	601,458	C
240659,500	4240091,813	601,467	C
240645,500	4240091,813	601,502	C
240642,000	4240091,813	601,510	C
240628,000	4240091,813	601,545	C
240624,500	4240091,813	601,554	C
240610,500	4240091,813	601,589	C
240607,000	4240091,813	601,598	C
240593,000	4240091,813	601,633	C
240589,500	4240091,813	601,642	C
240575,500	4240091,813	601,677	C
240572,000	4240091,813	601,685	C
240558,000	4240091,813	601,720	C
240554,500	4240091,813	601,729	C
240540,500	4240091,813	601,764	C
240537,000	4240091,813	601,773	C
240523,000	4240091,813	601,808	C
240519,500	4240091,813	601,817	C
240505,500	4240091,813	601,852	C
240502,000	4240091,813	601,860	C
240488,000	4240091,813	601,895	C
240484,500	4240091,813	601,904	C
240470,500	4240091,813	601,939	C
240467,000	4240091,813	601,948	C
240453,000	4240091,813	601,983	C
240449,500	4240091,813	601,992	C
240435,500	4240091,813	602,027	C
240432,000	4240091,813	602,035	C
240418,000	4240091,813	602,070	C
240414,500	4240091,813	602,079	C
240400,500	4240091,813	602,114	C
240397,000	4240091,813	602,123	C
240383,000	4240091,813	602,158	C
240379,500	4240091,813	602,167	C

Coord. X	Coord. Y	Elevación	Código
240348,000	4239656,070	597,888	C
240344,500	4239656,070	597,897	C
240330,500	4239656,070	597,932	C
240327,000	4239656,070	597,940	C
240313,000	4239656,070	597,975	C
240309,500	4239656,070	597,984	C
240295,500	4239656,070	598,019	C
240292,000	4239656,070	598,028	C
240278,000	4239656,070	598,063	C
240274,500	4239656,070	598,071	C
240260,500	4239656,070	598,106	C
240257,000	4239656,070	598,115	C
240243,000	4239656,070	598,150	C
240239,500	4239656,070	598,159	C
240225,500	4239656,070	598,194	C
240222,000	4239656,070	598,203	C
240208,000	4239656,070	598,238	C
240204,500	4239656,070	598,246	C
240190,500	4239656,070	598,281	C
240187,000	4239656,070	598,290	C
240173,000	4239656,070	598,325	C
240169,500	4239656,070	598,334	C
240155,500	4239656,070	598,369	C
240152,000	4239656,070	598,378	C
240138,000	4239656,070	598,413	C
240134,500	4239656,070	598,421	C
240120,500	4239656,070	598,456	C
240117,000	4239656,070	598,465	C
240103,000	4239656,070	598,500	C
240099,500	4239656,070	598,509	C
240085,500	4239656,070	598,544	C
240082,000	4239656,070	598,553	C
240068,000	4239656,070	598,588	C
240064,500	4239656,070	598,596	C
240050,500	4239656,070	598,631	C
240047,000	4239656,070	598,640	C
240033,000	4239656,070	598,675	C
240029,500	4239656,070	598,684	C
240015,500	4239656,070	598,719	C
240012,000	4239656,070	598,728	C
240012,000	4239652,920	598,696	C
240015,500	4239652,920	598,687	C
240029,500	4239652,920	598,652	C
240033,000	4239652,920	598,644	C
240047,000	4239652,920	598,609	C
240050,500	4239652,920	598,600	C

Coord. X	Coord. Y	Elevación	Código
240365,500	4240091,813	602,202	C
240362,000	4240091,813	602,210	C
240348,000	4240091,813	602,245	C
240344,500	4240091,813	602,254	C
240330,500	4240091,813	602,289	C
240327,000	4240091,813	602,298	C
240313,000	4240091,813	602,333	C
240309,500	4240091,813	602,342	C
240295,500	4240091,813	602,377	C
240292,000	4240091,813	602,385	C
240278,000	4240091,813	602,420	C
240274,500	4240091,813	602,429	C
240260,500	4240091,813	602,464	C
240257,000	4240091,813	602,473	C
240243,000	4240091,813	602,508	C
240239,500	4240091,813	602,517	C
240225,500	4240091,813	602,552	C
240222,000	4240091,813	602,560	C
240208,000	4240091,813	602,595	C
240204,500	4240091,813	602,604	C
240190,500	4240091,813	602,639	C
240187,000	4240091,813	602,648	C
240173,000	4240091,813	602,683	C
240169,500	4240091,813	602,692	C
240155,500	4240091,813	602,727	C
240152,000	4240091,813	602,735	C
240138,000	4240091,813	602,770	C
240134,500	4240091,813	602,779	C
240120,500	4240091,813	602,814	C
240117,000	4240091,813	602,823	C
240103,000	4240091,813	602,858	C
240099,500	4240091,813	602,867	C
240085,500	4240091,813	602,902	C
240082,000	4240091,813	602,910	C
240068,000	4240091,813	602,945	C
240064,500	4240091,813	602,954	C
240050,500	4240091,813	602,989	C
240047,000	4240091,813	602,998	C
240033,000	4240091,813	603,033	C
240029,500	4240091,813	603,042	C
240015,500	4240091,813	603,077	C
240012,000	4240091,813	603,085	C
240012,000	4240087,813	603,045	C
240015,500	4240087,813	603,037	C
240029,500	4240087,813	603,002	C
240033,000	4240087,813	602,993	C

Coord. X	Coord. Y	Elevación	Código
240064,500	4239652,920	598,565	C
240068,000	4239652,920	598,556	C
240082,000	4239652,920	598,521	C
240085,500	4239652,920	598,512	C
240099,500	4239652,920	598,477	C
240103,000	4239652,920	598,469	C
240117,000	4239652,920	598,434	C
240120,500	4239652,920	598,425	C
240134,500	4239652,920	598,390	C
240138,000	4239652,920	598,381	C
240152,000	4239652,920	598,346	C
240155,500	4239652,920	598,337	C
240169,500	4239652,920	598,302	C
240173,000	4239652,920	598,294	C
240187,000	4239652,920	598,259	C
240190,500	4239652,920	598,250	C
240204,500	4239652,920	598,215	C
240208,000	4239652,920	598,206	C
240222,000	4239652,920	598,171	C
240225,500	4239652,920	598,162	C
240239,500	4239652,920	598,127	C
240243,000	4239652,920	598,119	C
240257,000	4239652,920	598,084	C
240260,500	4239652,920	598,075	C
240274,500	4239652,920	598,040	C
240278,000	4239652,920	598,031	C
240292,000	4239652,920	597,996	C
240295,500	4239652,920	597,987	C
240309,500	4239652,920	597,952	C
240313,000	4239652,920	597,944	C
240327,000	4239652,920	597,909	C
240330,500	4239652,920	597,900	C
240344,500	4239652,920	597,865	C
240348,000	4239652,920	597,856	C
240362,000	4239652,920	597,821	C
240365,500	4239652,920	597,813	C
240379,500	4239652,920	597,778	C
240383,000	4239652,920	597,769	C
240397,000	4239652,920	597,734	C
240400,500	4239652,920	597,725	C
240414,500	4239652,920	597,690	C
240418,000	4239652,920	597,681	C
240432,000	4239652,920	597,646	C
240435,500	4239652,920	597,638	C
240449,500	4239652,920	597,603	C
240453,000	4239652,920	597,594	C

Coord. X	Coord. Y	Elevación	Código
240047,000	4240087,813	602,958	C
240050,500	4240087,813	602,949	C
240064,500	4240087,813	602,914	C
240068,000	4240087,813	602,905	C
240082,000	4240087,813	602,870	C
240085,500	4240087,813	602,862	C
240099,500	4240087,813	602,827	C
240103,000	4240087,813	602,818	C
240117,000	4240087,813	602,783	C
240120,500	4240087,813	602,774	C
240134,500	4240087,813	602,739	C
240138,000	4240087,813	602,730	C
240152,000	4240087,813	602,695	C
240155,500	4240087,813	602,687	C
240169,500	4240087,813	602,652	C
240173,000	4240087,813	602,643	C
240187,000	4240087,813	602,608	C
240190,500	4240087,813	602,599	C
240204,500	4240087,813	602,564	C
240208,000	4240087,813	602,555	C
240222,000	4240087,813	602,520	C
240225,500	4240087,813	602,512	C
240239,500	4240087,813	602,477	C
240243,000	4240087,813	602,468	C
240257,000	4240087,813	602,433	C
240260,500	4240087,813	602,424	C
240274,500	4240087,813	602,389	C
240278,000	4240087,813	602,380	C
240292,000	4240087,813	602,345	C
240295,500	4240087,813	602,337	C
240309,500	4240087,813	602,302	C
240313,000	4240087,813	602,293	C
240327,000	4240087,813	602,258	C
240330,500	4240087,813	602,249	C
240344,500	4240087,813	602,214	C
240348,000	4240087,813	602,205	C
240362,000	4240087,813	602,170	C
240365,500	4240087,813	602,162	C
240379,500	4240087,813	602,127	C
240383,000	4240087,813	602,118	C
240397,000	4240087,813	602,083	C
240400,500	4240087,813	602,074	C
240414,500	4240087,813	602,039	C
240418,000	4240087,813	602,030	C
240432,000	4240087,813	601,995	C
240435,500	4240087,813	601,987	C

Coord. X	Coord. Y	Elevación	Código
240467,000	4239652,920	597,559	C
240470,500	4239652,920	597,550	C
240484,500	4239652,920	597,515	C
240488,000	4239652,920	597,506	C
240502,000	4239652,920	597,471	C
240505,500	4239652,920	597,463	C
240519,500	4239652,920	597,428	C
240523,000	4239652,920	597,419	C
240537,000	4239652,920	597,384	C
240540,500	4239652,920	597,375	C
240554,500	4239652,920	597,340	C
240558,000	4239652,920	597,331	C
240572,000	4239652,920	597,296	C
240575,500	4239652,920	597,288	C
240589,500	4239652,920	597,253	C
240593,000	4239652,920	597,244	C
240607,000	4239652,920	597,209	C
240610,500	4239652,920	597,200	C
240624,500	4239652,920	597,165	C
240628,000	4239652,920	597,156	C
240642,000	4239652,920	597,121	C
240645,500	4239652,920	597,113	C
240659,500	4239652,920	597,078	C
240663,000	4239652,920	597,069	C
240677,000	4239652,920	597,034	C
240680,500	4239652,920	597,025	C
240694,500	4239652,920	596,990	C
240698,000	4239652,920	596,981	C
240712,000	4239652,920	596,946	C
240715,500	4239652,920	596,938	C
240729,500	4239652,920	596,903	C
240733,000	4239652,920	596,894	C
240747,000	4239652,920	596,859	C
240750,500	4239652,920	596,850	C
240764,500	4239652,920	596,815	C
240768,000	4239652,920	596,806	C
240782,000	4239652,920	596,771	C
240785,500	4239652,920	596,763	C
240799,500	4239652,920	596,728	C
240803,000	4239652,920	596,719	C
240817,000	4239652,920	596,684	C
240820,500	4239652,920	596,675	C
240834,500	4239652,920	596,640	C
240838,000	4239652,920	596,631	C
240852,000	4239652,920	596,596	C
240855,500	4239652,920	596,588	C

Coord. X	Coord. Y	Elevación	Código
240449,500	4240087,813	601,952	C
240453,000	4240087,813	601,943	C
240467,000	4240087,813	601,908	C
240470,500	4240087,813	601,899	C
240484,500	4240087,813	601,864	C
240488,000	4240087,813	601,855	C
240502,000	4240087,813	601,820	C
240505,500	4240087,813	601,812	C
240519,500	4240087,813	601,777	C
240523,000	4240087,813	601,768	C
240537,000	4240087,813	601,733	C
240540,500	4240087,813	601,724	C
240554,500	4240087,813	601,689	C
240558,000	4240087,813	601,680	C
240572,000	4240087,813	601,645	C
240575,500	4240087,813	601,637	C
240589,500	4240087,813	601,602	C
240593,000	4240087,813	601,593	C
240607,000	4240087,813	601,558	C
240610,500	4240087,813	601,549	C
240624,500	4240087,813	601,514	C
240628,000	4240087,813	601,505	C
240642,000	4240087,813	601,470	C
240645,500	4240087,813	601,462	C
240659,500	4240087,813	601,427	C
240663,000	4240087,813	601,418	C
240677,000	4240087,813	601,383	C
240680,500	4240087,813	601,374	C
240694,500	4240087,813	601,339	C
240698,000	4240087,813	601,330	C
240712,000	4240087,813	601,295	C
240715,500	4240087,813	601,287	C
240729,500	4240087,813	601,252	C
240733,000	4240087,813	601,243	C
240747,000	4240087,813	601,208	C
240750,500	4240087,813	601,199	C
240764,500	4240087,813	601,164	C
240768,000	4240087,813	601,155	C
240768,000	4240079,759	601,075	C
240764,500	4240079,759	601,084	C
240750,500	4240079,759	601,119	C
240747,000	4240079,759	601,127	C
240733,000	4240079,759	601,162	C
240729,500	4240079,759	601,171	C
240715,500	4240079,759	601,206	C
240712,000	4240079,759	601,215	C

Coord. X	Coord. Y	Elevación	Código
240869,500	4239652,920	596,553	C
240873,000	4239652,920	596,544	C
240887,000	4239652,920	596,509	C
240890,500	4239652,920	596,500	C
240904,500	4239652,920	596,465	C
240908,000	4239652,920	596,456	C
240922,000	4239652,920	596,421	C
240925,500	4239652,920	596,413	C
240939,500	4239652,920	596,378	C
240943,000	4239652,920	596,369	C
240957,000	4239652,920	596,334	C
240960,500	4239652,920	596,325	C
240974,500	4239652,920	596,290	C
240978,000	4239652,920	596,281	C
240992,000	4239652,920	596,246	C
240995,500	4239652,920	596,238	C
241009,500	4239652,920	596,203	C
241013,000	4239652,920	596,194	C
241027,000	4239652,920	596,159	C
241030,500	4239652,920	596,150	C
241044,500	4239652,920	596,115	C
241048,000	4239652,920	596,106	C
241062,000	4239652,920	596,071	C
241065,500	4239652,920	596,063	C
241079,500	4239652,920	596,028	C
241083,000	4239652,920	596,019	C
241097,000	4239652,920	595,984	C
241100,500	4239652,920	595,975	C
241114,500	4239652,920	595,940	C
241118,000	4239652,920	595,931	C
241132,000	4239652,920	595,896	C
241135,500	4239652,920	595,888	C
241149,500	4239652,920	595,853	C
241153,000	4239652,920	595,844	C
241167,000	4239652,920	595,809	C
241170,500	4239652,920	595,800	C
241184,500	4239652,920	595,765	C
241188,000	4239652,920	595,756	C
241188,000	4239643,866	595,666	C
241184,500	4239643,866	595,674	C
241170,500	4239643,866	595,709	C
241167,000	4239643,866	595,718	C
241153,000	4239643,866	595,753	C
241149,500	4239643,866	595,762	C
241135,500	4239643,866	595,797	C
241132,000	4239643,866	595,806	C

Coord. X	Coord. Y	Elevación	Código
240698,000	4240079,759	601,250	C
240694,500	4240079,759	601,258	C
240680,500	4240079,759	601,293	C
240677,000	4240079,759	601,302	C
240663,000	4240079,759	601,337	C
240659,500	4240079,759	601,346	C
240645,500	4240079,759	601,381	C
240642,000	4240079,759	601,390	C
240628,000	4240079,759	601,425	C
240624,500	4240079,759	601,433	C
240610,500	4240079,759	601,468	C
240607,000	4240079,759	601,477	C
240593,000	4240079,759	601,512	C
240589,500	4240079,759	601,521	C
240575,500	4240079,759	601,556	C
240572,000	4240079,759	601,565	C
240558,000	4240079,759	601,600	C
240554,500	4240079,759	601,608	C
240540,500	4240079,759	601,643	C
240537,000	4240079,759	601,652	C
240523,000	4240079,759	601,687	C
240519,500	4240079,759	601,696	C
240505,500	4240079,759	601,731	C
240502,000	4240079,759	601,740	C
240488,000	4240079,759	601,775	C
240484,500	4240079,759	601,783	C
240470,500	4240079,759	601,818	C
240467,000	4240079,759	601,827	C
240453,000	4240079,759	601,862	C
240449,500	4240079,759	601,871	C
240435,500	4240079,759	601,906	C
240432,000	4240079,759	601,915	C
240418,000	4240079,759	601,950	C
240414,500	4240079,759	601,958	C
240400,500	4240079,759	601,993	C
240397,000	4240079,759	602,002	C
240383,000	4240079,759	602,037	C
240379,500	4240079,759	602,046	C
240365,500	4240079,759	602,081	C
240362,000	4240079,759	602,090	C
240348,000	4240079,759	602,125	C
240344,500	4240079,759	602,133	C
240330,500	4240079,759	602,168	C
240327,000	4240079,759	602,177	C
240313,000	4240079,759	602,212	C
240309,500	4240079,759	602,221	C

Coord. X	Coord. Y	Elevación	Código
241118,000	4239643,866	595,841	C
241114,500	4239643,866	595,849	C
241100,500	4239643,866	595,884	C
241097,000	4239643,866	595,893	C
241083,000	4239643,866	595,928	C
241079,500	4239643,866	595,937	C
241065,500	4239643,866	595,972	C
241062,000	4239643,866	595,981	C
241048,000	4239643,866	596,016	C
241044,500	4239643,866	596,024	C
241030,500	4239643,866	596,059	C
241027,000	4239643,866	596,068	C
241013,000	4239643,866	596,103	C
241009,500	4239643,866	596,112	C
240995,500	4239643,866	596,147	C
240992,000	4239643,866	596,156	C
240978,000	4239643,866	596,191	C
240974,500	4239643,866	596,199	C
240960,500	4239643,866	596,234	C
240957,000	4239643,866	596,243	C
240943,000	4239643,866	596,278	C
240939,500	4239643,866	596,287	C
240925,500	4239643,866	596,322	C
240922,000	4239643,866	596,331	C
240908,000	4239643,866	596,366	C
240904,500	4239643,866	596,374	C
240890,500	4239643,866	596,409	C
240887,000	4239643,866	596,418	C
240873,000	4239643,866	596,453	C
240869,500	4239643,866	596,462	C
240855,500	4239643,866	596,497	C
240852,000	4239643,866	596,506	C
240838,000	4239643,866	596,541	C
240834,500	4239643,866	596,549	C
240820,500	4239643,866	596,584	C
240817,000	4239643,866	596,593	C
240803,000	4239643,866	596,628	C
240799,500	4239643,866	596,637	C
240785,500	4239643,866	596,672	C
240782,000	4239643,866	596,681	C
240768,000	4239643,866	596,716	C
240764,500	4239643,866	596,724	C
240750,500	4239643,866	596,759	C
240747,000	4239643,866	596,768	C
240733,000	4239643,866	596,803	C
240729,500	4239643,866	596,812	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240295,500	4240079,759	602,256	C	240715,500	4239643,866	596,847	C
240292,000	4240079,759	602,265	C	240712,000	4239643,866	596,856	C
240278,000	4240079,759	602,300	C	240698,000	4239643,866	596,891	C
240274,500	4240079,759	602,308	C	240694,500	4239643,866	596,899	C
240260,500	4240079,759	602,343	C	240680,500	4239643,866	596,934	C
240257,000	4240079,759	602,352	C	240677,000	4239643,866	596,943	C
240243,000	4240079,759	602,387	C	240663,000	4239643,866	596,978	C
240239,500	4240079,759	602,396	C	240659,500	4239643,866	596,987	C
240225,500	4240079,759	602,431	C	240645,500	4239643,866	597,022	C
240222,000	4240079,759	602,440	C	240642,000	4239643,866	597,031	C
240208,000	4240079,759	602,475	C	240628,000	4239643,866	597,066	C
240204,500	4240079,759	602,484	C	240624,500	4239643,866	597,074	C
240190,500	4240079,759	602,519	C	240610,500	4239643,866	597,109	C
240187,000	4240079,759	602,527	C	240607,000	4239643,866	597,118	C
240173,000	4240079,759	602,562	C	240593,000	4239643,866	597,153	C
240169,500	4240079,759	602,571	C	240589,500	4239643,866	597,162	C
240155,500	4240079,759	602,606	C	240575,500	4239643,866	597,197	C
240152,000	4240079,759	602,615	C	240572,000	4239643,866	597,206	C
240138,000	4240079,759	602,650	C	240558,000	4239643,866	597,241	C
240134,500	4240079,759	602,659	C	240554,500	4239643,866	597,249	C
240120,500	4240079,759	602,694	C	240540,500	4239643,866	597,284	C
240117,000	4240079,759	602,702	C	240537,000	4239643,866	597,293	C
240103,000	4240079,759	602,737	C	240523,000	4239643,866	597,328	C
240099,500	4240079,759	602,746	C	240519,500	4239643,866	597,337	C
240085,500	4240079,759	602,781	C	240505,500	4239643,866	597,372	C
240082,000	4240079,759	602,790	C	240502,000	4239643,866	597,381	C
240068,000	4240079,759	602,825	C	240488,000	4239643,866	597,416	C
240064,500	4240079,759	602,834	C	240484,500	4239643,866	597,424	C
240050,500	4240079,759	602,869	C	240470,500	4239643,866	597,459	C
240047,000	4240079,759	602,877	C	240467,000	4239643,866	597,468	C
240033,000	4240079,759	602,912	C	240453,000	4239643,866	597,503	C
240029,500	4240079,759	602,921	C	240449,500	4239643,866	597,512	C
240015,500	4240079,759	602,956	C	240435,500	4239643,866	597,547	C
240012,000	4240079,759	602,965	C	240432,000	4239643,866	597,556	C
240012,000	4240075,759	602,925	C	240418,000	4239643,866	597,591	C
240015,500	4240075,759	602,916	C	240414,500	4239643,866	597,599	C
240029,500	4240075,759	602,881	C	240400,500	4239643,866	597,634	C
240033,000	4240075,759	602,872	C	240397,000	4239643,866	597,643	C
240047,000	4240075,759	602,837	C	240383,000	4239643,866	597,678	C
240050,500	4240075,759	602,829	C	240379,500	4239643,866	597,687	C
240064,500	4240075,759	602,794	C	240365,500	4239643,866	597,722	C
240068,000	4240075,759	602,785	C	240362,000	4239643,866	597,731	C
240082,000	4240075,759	602,750	C	240348,000	4239643,866	597,766	C
240085,500	4240075,759	602,741	C	240344,500	4239643,866	597,774	C
240099,500	4240075,759	602,706	C	240330,500	4239643,866	597,809	C
240103,000	4240075,759	602,697	C	240327,000	4239643,866	597,818	C

Coord. X	Coord. Y	Elevación	Código
240117,000	4240075,759	602,662	C
240120,500	4240075,759	602,654	C
240134,500	4240075,759	602,619	C
240138,000	4240075,759	602,610	C
240152,000	4240075,759	602,575	C
240155,500	4240075,759	602,566	C
240169,500	4240075,759	602,531	C
240173,000	4240075,759	602,522	C
240187,000	4240075,759	602,487	C
240190,500	4240075,759	602,479	C
240204,500	4240075,759	602,444	C
240208,000	4240075,759	602,435	C
240222,000	4240075,759	602,400	C
240225,500	4240075,759	602,391	C
240239,500	4240075,759	602,356	C
240243,000	4240075,759	602,347	C
240257,000	4240075,759	602,312	C
240260,500	4240075,759	602,303	C
240274,500	4240075,759	602,268	C
240278,000	4240075,759	602,260	C
240292,000	4240075,759	602,225	C
240295,500	4240075,759	602,216	C
240309,500	4240075,759	602,181	C
240313,000	4240075,759	602,172	C
240327,000	4240075,759	602,137	C
240330,500	4240075,759	602,128	C
240344,500	4240075,759	602,093	C
240348,000	4240075,759	602,085	C
240362,000	4240075,759	602,050	C
240365,500	4240075,759	602,041	C
240379,500	4240075,759	602,006	C
240383,000	4240075,759	601,997	C
240397,000	4240075,759	601,962	C
240400,500	4240075,759	601,953	C
240414,500	4240075,759	601,918	C
240418,000	4240075,759	601,910	C
240432,000	4240075,759	601,875	C
240435,500	4240075,759	601,866	C
240449,500	4240075,759	601,831	C
240453,000	4240075,759	601,822	C
240467,000	4240075,759	601,787	C
240470,500	4240075,759	601,778	C
240484,500	4240075,759	601,743	C
240488,000	4240075,759	601,735	C
240502,000	4240075,759	601,700	C
240505,500	4240075,759	601,691	C

Coord. X	Coord. Y	Elevación	Código
240313,000	4239643,866	597,853	C
240309,500	4239643,866	597,862	C
240295,500	4239643,866	597,897	C
240292,000	4239643,866	597,906	C
240278,000	4239643,866	597,941	C
240274,500	4239643,866	597,949	C
240260,500	4239643,866	597,984	C
240257,000	4239643,866	597,993	C
240243,000	4239643,866	598,028	C
240239,500	4239643,866	598,037	C
240225,500	4239643,866	598,072	C
240222,000	4239643,866	598,081	C
240208,000	4239643,866	598,116	C
240204,500	4239643,866	598,124	C
240190,500	4239643,866	598,159	C
240187,000	4239643,866	598,168	C
240173,000	4239643,866	598,203	C
240169,500	4239643,866	598,212	C
240155,500	4239643,866	598,247	C
240152,000	4239643,866	598,256	C
240138,000	4239643,866	598,291	C
240134,500	4239643,866	598,299	C
240120,500	4239643,866	598,334	C
240117,000	4239643,866	598,343	C
240103,000	4239643,866	598,378	C
240099,500	4239643,866	598,387	C
240085,500	4239643,866	598,422	C
240082,000	4239643,866	598,431	C
240068,000	4239643,866	598,466	C
240064,500	4239643,866	598,474	C
240050,500	4239643,866	598,509	C
240047,000	4239643,866	598,518	C
240033,000	4239643,866	598,553	C
240029,500	4239643,866	598,562	C
240015,500	4239643,866	598,597	C
240012,000	4239643,866	598,606	C
240012,000	4239639,866	598,566	C
240015,500	4239639,866	598,557	C
240029,500	4239639,866	598,522	C
240033,000	4239639,866	598,513	C
240047,000	4239639,866	598,478	C
240050,500	4239639,866	598,469	C
240064,500	4239639,866	598,434	C
240068,000	4239639,866	598,426	C
240082,000	4239639,866	598,391	C
240085,500	4239639,866	598,382	C

Coord. X	Coord. Y	Elevación	Código
240519,500	4240075,759	601,656	C
240523,000	4240075,759	601,647	C
240537,000	4240075,759	601,612	C
240540,500	4240075,759	601,603	C
240554,500	4240075,759	601,568	C
240558,000	4240075,759	601,560	C
240572,000	4240075,759	601,525	C
240575,500	4240075,759	601,516	C
240589,500	4240075,759	601,481	C
240593,000	4240075,759	601,472	C
240607,000	4240075,759	601,437	C
240610,500	4240075,759	601,428	C
240624,500	4240075,759	601,393	C
240628,000	4240075,759	601,385	C
240642,000	4240075,759	601,350	C
240645,500	4240075,759	601,341	C
240659,500	4240075,759	601,306	C
240663,000	4240075,759	601,297	C
240677,000	4240075,759	601,262	C
240680,500	4240075,759	601,253	C
240694,500	4240075,759	601,218	C
240698,000	4240075,759	601,210	C
240712,000	4240075,759	601,175	C
240715,500	4240075,759	601,166	C
240729,500	4240075,759	601,131	C
240733,000	4240075,759	601,122	C
240747,000	4240075,759	601,087	C
240750,500	4240075,759	601,079	C
240764,500	4240075,759	601,044	C
240768,000	4240075,759	601,035	C
240768,000	4240066,705	600,944	C
240764,500	4240066,705	600,953	C
240750,500	4240066,705	600,988	C
240747,000	4240066,705	600,997	C
240733,000	4240066,705	601,032	C
240729,500	4240066,705	601,040	C
240715,500	4240066,705	601,075	C
240712,000	4240066,705	601,084	C
240698,000	4240066,705	601,119	C
240694,500	4240066,705	601,128	C
240680,500	4240066,705	601,163	C
240677,000	4240066,705	601,172	C
240663,000	4240066,705	601,207	C
240659,500	4240066,705	601,215	C
240645,500	4240066,705	601,250	C
240642,000	4240066,705	601,259	C

Coord. X	Coord. Y	Elevación	Código
240099,500	4239639,866	598,347	C
240103,000	4239639,866	598,338	C
240117,000	4239639,866	598,303	C
240120,500	4239639,866	598,294	C
240134,500	4239639,866	598,259	C
240138,000	4239639,866	598,251	C
240152,000	4239639,866	598,216	C
240155,500	4239639,866	598,207	C
240169,500	4239639,866	598,172	C
240173,000	4239639,866	598,163	C
240187,000	4239639,866	598,128	C
240190,500	4239639,866	598,119	C
240204,500	4239639,866	598,084	C
240208,000	4239639,866	598,076	C
240222,000	4239639,866	598,041	C
240225,500	4239639,866	598,032	C
240239,500	4239639,866	597,997	C
240243,000	4239639,866	597,988	C
240257,000	4239639,866	597,953	C
240260,500	4239639,866	597,944	C
240274,500	4239639,866	597,909	C
240278,000	4239639,866	597,901	C
240292,000	4239639,866	597,866	C
240295,500	4239639,866	597,857	C
240309,500	4239639,866	597,822	C
240313,000	4239639,866	597,813	C
240327,000	4239639,866	597,778	C
240330,500	4239639,866	597,769	C
240344,500	4239639,866	597,734	C
240348,000	4239639,866	597,726	C
240362,000	4239639,866	597,691	C
240365,500	4239639,866	597,682	C
240379,500	4239639,866	597,647	C
240383,000	4239639,866	597,638	C
240397,000	4239639,866	597,603	C
240400,500	4239639,866	597,594	C
240414,500	4239639,866	597,559	C
240418,000	4239639,866	597,551	C
240432,000	4239639,866	597,516	C
240435,500	4239639,866	597,507	C
240449,500	4239639,866	597,472	C
240453,000	4239639,866	597,463	C
240467,000	4239639,866	597,428	C
240470,500	4239639,866	597,419	C
240484,500	4239639,866	597,384	C
240488,000	4239639,866	597,376	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240628,000	4240066,705	601,294	C	240502,000	4239639,866	597,341	C
240624,500	4240066,705	601,303	C	240505,500	4239639,866	597,332	C
240610,500	4240066,705	601,338	C	240519,500	4239639,866	597,297	C
240607,000	4240066,705	601,347	C	240523,000	4239639,866	597,288	C
240593,000	4240066,705	601,382	C	240537,000	4239639,866	597,253	C
240589,500	4240066,705	601,390	C	240540,500	4239639,866	597,244	C
240575,500	4240066,705	601,425	C	240554,500	4239639,866	597,209	C
240572,000	4240066,705	601,434	C	240558,000	4239639,866	597,201	C
240558,000	4240066,705	601,469	C	240572,000	4239639,866	597,166	C
240554,500	4240066,705	601,478	C	240575,500	4239639,866	597,157	C
240540,500	4240066,705	601,513	C	240589,500	4239639,866	597,122	C
240537,000	4240066,705	601,522	C	240593,000	4239639,866	597,113	C
240523,000	4240066,705	601,557	C	240607,000	4239639,866	597,078	C
240519,500	4240066,705	601,565	C	240610,500	4239639,866	597,069	C
240505,500	4240066,705	601,600	C	240624,500	4239639,866	597,034	C
240502,000	4240066,705	601,609	C	240628,000	4239639,866	597,026	C
240488,000	4240066,705	601,644	C	240642,000	4239639,866	596,991	C
240484,500	4240066,705	601,653	C	240645,500	4239639,866	596,982	C
240470,500	4240066,705	601,688	C	240659,500	4239639,866	596,947	C
240467,000	4240066,705	601,697	C	240663,000	4239639,866	596,938	C
240453,000	4240066,705	601,732	C	240677,000	4239639,866	596,903	C
240449,500	4240066,705	601,740	C	240680,500	4239639,866	596,894	C
240435,500	4240066,705	601,775	C	240694,500	4239639,866	596,859	C
240432,000	4240066,705	601,784	C	240698,000	4239639,866	596,851	C
240418,000	4240066,705	601,819	C	240712,000	4239639,866	596,816	C
240414,500	4240066,705	601,828	C	240715,500	4239639,866	596,807	C
240400,500	4240066,705	601,863	C	240729,500	4239639,866	596,772	C
240397,000	4240066,705	601,872	C	240733,000	4239639,866	596,763	C
240383,000	4240066,705	601,907	C	240747,000	4239639,866	596,728	C
240379,500	4240066,705	601,915	C	240750,500	4239639,866	596,719	C
240365,500	4240066,705	601,950	C	240764,500	4239639,866	596,684	C
240362,000	4240066,705	601,959	C	240768,000	4239639,866	596,676	C
240348,000	4240066,705	601,994	C	240782,000	4239639,866	596,641	C
240344,500	4240066,705	602,003	C	240785,500	4239639,866	596,632	C
240330,500	4240066,705	602,038	C	240799,500	4239639,866	596,597	C
240327,000	4240066,705	602,047	C	240803,000	4239639,866	596,588	C
240313,000	4240066,705	602,082	C	240817,000	4239639,866	596,553	C
240309,500	4240066,705	602,090	C	240820,500	4239639,866	596,544	C
240295,500	4240066,705	602,125	C	240834,500	4239639,866	596,509	C
240292,000	4240066,705	602,134	C	240838,000	4239639,866	596,501	C
240278,000	4240066,705	602,169	C	240852,000	4239639,866	596,466	C
240274,500	4240066,705	602,178	C	240855,500	4239639,866	596,457	C
240260,500	4240066,705	602,213	C	240869,500	4239639,866	596,422	C
240257,000	4240066,705	602,222	C	240873,000	4239639,866	596,413	C
240243,000	4240066,705	602,257	C	240887,000	4239639,866	596,378	C
240239,500	4240066,705	602,265	C	240890,500	4239639,866	596,369	C

Coord. X	Coord. Y	Elevación	Código
240225,500	4240066,705	602,300	C
240222,000	4240066,705	602,309	C
240208,000	4240066,705	602,344	C
240204,500	4240066,705	602,353	C
240190,500	4240066,705	602,388	C
240187,000	4240066,705	602,397	C
240173,000	4240066,705	602,432	C
240169,500	4240066,705	602,440	C
240155,500	4240066,705	602,475	C
240152,000	4240066,705	602,484	C
240138,000	4240066,705	602,519	C
240134,500	4240066,705	602,528	C
240120,500	4240066,705	602,563	C
240117,000	4240066,705	602,572	C
240103,000	4240066,705	602,607	C
240099,500	4240066,705	602,615	C
240085,500	4240066,705	602,650	C
240082,000	4240066,705	602,659	C
240068,000	4240066,705	602,694	C
240064,500	4240066,705	602,703	C
240050,500	4240066,705	602,738	C
240047,000	4240066,705	602,747	C
240033,000	4240066,705	602,782	C
240029,500	4240066,705	602,790	C
240015,500	4240066,705	602,825	C
240012,000	4240066,705	602,834	C
240012,000	4240063,555	602,803	C
240015,500	4240063,555	602,794	C
240029,500	4240063,555	602,759	C
240033,000	4240063,555	602,750	C
240047,000	4240063,555	602,715	C
240050,500	4240063,555	602,706	C
240064,500	4240063,555	602,671	C
240068,000	4240063,555	602,663	C
240082,000	4240063,555	602,628	C
240085,500	4240063,555	602,619	C
240099,500	4240063,555	602,584	C
240103,000	4240063,555	602,575	C
240117,000	4240063,555	602,540	C
240120,500	4240063,555	602,531	C
240134,500	4240063,555	602,496	C
240138,000	4240063,555	602,488	C
240152,000	4240063,555	602,453	C
240155,500	4240063,555	602,444	C
240169,500	4240063,555	602,409	C
240173,000	4240063,555	602,400	C

Coord. X	Coord. Y	Elevación	Código
240904,500	4239639,866	596,334	C
240908,000	4239639,866	596,326	C
240922,000	4239639,866	596,291	C
240925,500	4239639,866	596,282	C
240939,500	4239639,866	596,247	C
240943,000	4239639,866	596,238	C
240957,000	4239639,866	596,203	C
240960,500	4239639,866	596,194	C
240974,500	4239639,866	596,159	C
240978,000	4239639,866	596,151	C
240992,000	4239639,866	596,116	C
240995,500	4239639,866	596,107	C
241009,500	4239639,866	596,072	C
241013,000	4239639,866	596,063	C
241027,000	4239639,866	596,028	C
241030,500	4239639,866	596,019	C
241044,500	4239639,866	595,984	C
241048,000	4239639,866	595,976	C
241062,000	4239639,866	595,941	C
241065,500	4239639,866	595,932	C
241079,500	4239639,866	595,897	C
241083,000	4239639,866	595,888	C
241097,000	4239639,866	595,853	C
241100,500	4239639,866	595,844	C
241114,500	4239639,866	595,809	C
241118,000	4239639,866	595,801	C
241132,000	4239639,866	595,766	C
241135,500	4239639,866	595,757	C
241149,500	4239639,866	595,722	C
241153,000	4239639,866	595,713	C
241167,000	4239639,866	595,678	C
241170,500	4239639,866	595,669	C
241184,500	4239639,866	595,634	C
241188,000	4239639,866	595,626	C
241188,000	4239631,813	595,545	C
241184,500	4239631,813	595,554	C
241170,500	4239631,813	595,589	C
241167,000	4239631,813	595,598	C
241153,000	4239631,813	595,633	C
241149,500	4239631,813	595,641	C
241135,500	4239631,813	595,676	C
241132,000	4239631,813	595,685	C
241118,000	4239631,813	595,720	C
241114,500	4239631,813	595,729	C
241100,500	4239631,813	595,764	C
241097,000	4239631,813	595,773	C

Coord. X	Coord. Y	Elevación	Código
240187,000	4240063,555	602,365	C
240190,500	4240063,555	602,356	C
240204,500	4240063,555	602,321	C
240208,000	4240063,555	602,313	C
240222,000	4240063,555	602,278	C
240225,500	4240063,555	602,269	C
240239,500	4240063,555	602,234	C
240243,000	4240063,555	602,225	C
240257,000	4240063,555	602,190	C
240260,500	4240063,555	602,181	C
240274,500	4240063,555	602,146	C
240278,000	4240063,555	602,138	C
240292,000	4240063,555	602,103	C
240295,500	4240063,555	602,094	C
240309,500	4240063,555	602,059	C
240313,000	4240063,555	602,050	C
240327,000	4240063,555	602,015	C
240330,500	4240063,555	602,006	C
240344,500	4240063,555	601,971	C
240348,000	4240063,555	601,963	C
240362,000	4240063,555	601,928	C
240365,500	4240063,555	601,919	C
240379,500	4240063,555	601,884	C
240383,000	4240063,555	601,875	C
240397,000	4240063,555	601,840	C
240400,500	4240063,555	601,831	C
240414,500	4240063,555	601,796	C
240418,000	4240063,555	601,788	C
240432,000	4240063,555	601,753	C
240435,500	4240063,555	601,744	C
240449,500	4240063,555	601,709	C
240453,000	4240063,555	601,700	C
240467,000	4240063,555	601,665	C
240470,500	4240063,555	601,656	C
240484,500	4240063,555	601,621	C
240488,000	4240063,555	601,613	C
240502,000	4240063,555	601,578	C
240505,500	4240063,555	601,569	C
240519,500	4240063,555	601,534	C
240523,000	4240063,555	601,525	C
240537,000	4240063,555	601,490	C
240540,500	4240063,555	601,481	C
240554,500	4240063,555	601,446	C
240558,000	4240063,555	601,438	C
240572,000	4240063,555	601,403	C
240575,500	4240063,555	601,394	C

Coord. X	Coord. Y	Elevación	Código
241083,000	4239631,813	595,808	C
241079,500	4239631,813	595,816	C
241065,500	4239631,813	595,851	C
241062,000	4239631,813	595,860	C
241048,000	4239631,813	595,895	C
241044,500	4239631,813	595,904	C
241030,500	4239631,813	595,939	C
241027,000	4239631,813	595,948	C
241013,000	4239631,813	595,983	C
241009,500	4239631,813	595,991	C
240995,500	4239631,813	596,026	C
240992,000	4239631,813	596,035	C
240978,000	4239631,813	596,070	C
240974,500	4239631,813	596,079	C
240960,500	4239631,813	596,114	C
240957,000	4239631,813	596,123	C
240943,000	4239631,813	596,158	C
240939,500	4239631,813	596,166	C
240925,500	4239631,813	596,201	C
240922,000	4239631,813	596,210	C
240908,000	4239631,813	596,245	C
240904,500	4239631,813	596,254	C
240890,500	4239631,813	596,289	C
240887,000	4239631,813	596,298	C
240873,000	4239631,813	596,333	C
240869,500	4239631,813	596,341	C
240855,500	4239631,813	596,376	C
240852,000	4239631,813	596,385	C
240838,000	4239631,813	596,420	C
240834,500	4239631,813	596,429	C
240820,500	4239631,813	596,464	C
240817,000	4239631,813	596,473	C
240803,000	4239631,813	596,508	C
240799,500	4239631,813	596,516	C
240785,500	4239631,813	596,551	C
240782,000	4239631,813	596,560	C
240768,000	4239631,813	596,595	C
240764,500	4239631,813	596,604	C
240750,500	4239631,813	596,639	C
240747,000	4239631,813	596,648	C
240733,000	4239631,813	596,683	C
240729,500	4239631,813	596,691	C
240715,500	4239631,813	596,726	C
240712,000	4239631,813	596,735	C
240698,000	4239631,813	596,770	C
240694,500	4239631,813	596,779	C

Coord. X	Coord. Y	Elevación	Código
240589,500	4240063,555	601,359	C
240593,000	4240063,555	601,350	C
240607,000	4240063,555	601,315	C
240610,500	4240063,555	601,306	C
240624,500	4240063,555	601,271	C
240628,000	4240063,555	601,263	C
240642,000	4240063,555	601,228	C
240645,500	4240063,555	601,219	C
240659,500	4240063,555	601,184	C
240663,000	4240063,555	601,175	C
240677,000	4240063,555	601,140	C
240680,500	4240063,555	601,131	C
240694,500	4240063,555	601,096	C
240698,000	4240063,555	601,088	C
240712,000	4240063,555	601,053	C
240715,500	4240063,555	601,044	C
240729,500	4240063,555	601,009	C
240733,000	4240063,555	601,000	C
240747,000	4240063,555	600,965	C
240750,500	4240063,555	600,956	C
240764,500	4240063,555	600,921	C
240768,000	4240063,555	600,913	C
240768,000	4240054,501	600,822	C
240764,500	4240054,501	600,831	C
240750,500	4240054,501	600,866	C
240747,000	4240054,501	600,875	C
240733,000	4240054,501	600,910	C
240729,500	4240054,501	600,918	C
240715,500	4240054,501	600,953	C
240712,000	4240054,501	600,962	C
240698,000	4240054,501	600,997	C
240694,500	4240054,501	601,006	C
240680,500	4240054,501	601,041	C
240677,000	4240054,501	601,050	C
240663,000	4240054,501	601,085	C
240659,500	4240054,501	601,093	C
240645,500	4240054,501	601,128	C
240642,000	4240054,501	601,137	C
240628,000	4240054,501	601,172	C
240624,500	4240054,501	601,181	C
240610,500	4240054,501	601,216	C
240607,000	4240054,501	601,225	C
240593,000	4240054,501	601,260	C
240589,500	4240054,501	601,268	C
240575,500	4240054,501	601,303	C
240572,000	4240054,501	601,312	C

Coord. X	Coord. Y	Elevación	Código
240680,500	4239631,813	596,814	C
240677,000	4239631,813	596,823	C
240663,000	4239631,813	596,858	C
240659,500	4239631,813	596,866	C
240645,500	4239631,813	596,901	C
240642,000	4239631,813	596,910	C
240628,000	4239631,813	596,945	C
240624,500	4239631,813	596,954	C
240610,500	4239631,813	596,989	C
240607,000	4239631,813	596,998	C
240593,000	4239631,813	597,033	C
240589,500	4239631,813	597,041	C
240575,500	4239631,813	597,076	C
240572,000	4239631,813	597,085	C
240558,000	4239631,813	597,120	C
240554,500	4239631,813	597,129	C
240540,500	4239631,813	597,164	C
240537,000	4239631,813	597,173	C
240523,000	4239631,813	597,208	C
240519,500	4239631,813	597,216	C
240505,500	4239631,813	597,251	C
240502,000	4239631,813	597,260	C
240488,000	4239631,813	597,295	C
240484,500	4239631,813	597,304	C
240470,500	4239631,813	597,339	C
240467,000	4239631,813	597,348	C
240453,000	4239631,813	597,383	C
240449,500	4239631,813	597,391	C
240435,500	4239631,813	597,426	C
240432,000	4239631,813	597,435	C
240418,000	4239631,813	597,470	C
240414,500	4239631,813	597,479	C
240400,500	4239631,813	597,514	C
240397,000	4239631,813	597,523	C
240383,000	4239631,813	597,558	C
240379,500	4239631,813	597,566	C
240365,500	4239631,813	597,601	C
240362,000	4239631,813	597,610	C
240348,000	4239631,813	597,645	C
240344,500	4239631,813	597,654	C
240330,500	4239631,813	597,689	C
240327,000	4239631,813	597,698	C
240313,000	4239631,813	597,733	C
240309,500	4239631,813	597,741	C
240295,500	4239631,813	597,776	C
240292,000	4239631,813	597,785	C

Coord. X	Coord. Y	Elevación	Código
240558,000	4240054,501	601,347	C
240554,500	4240054,501	601,356	C
240540,500	4240054,501	601,391	C
240537,000	4240054,501	601,400	C
240523,000	4240054,501	601,435	C
240519,500	4240054,501	601,443	C
240505,500	4240054,501	601,478	C
240502,000	4240054,501	601,487	C
240488,000	4240054,501	601,522	C
240484,500	4240054,501	601,531	C
240470,500	4240054,501	601,566	C
240467,000	4240054,501	601,575	C
240453,000	4240054,501	601,610	C
240449,500	4240054,501	601,618	C
240435,500	4240054,501	601,653	C
240432,000	4240054,501	601,662	C
240418,000	4240054,501	601,697	C
240414,500	4240054,501	601,706	C
240400,500	4240054,501	601,741	C
240397,000	4240054,501	601,750	C
240383,000	4240054,501	601,785	C
240379,500	4240054,501	601,793	C
240365,500	4240054,501	601,828	C
240362,000	4240054,501	601,837	C
240348,000	4240054,501	601,872	C
240344,500	4240054,501	601,881	C
240330,500	4240054,501	601,916	C
240327,000	4240054,501	601,925	C
240313,000	4240054,501	601,960	C
240309,500	4240054,501	601,968	C
240295,500	4240054,501	602,003	C
240292,000	4240054,501	602,012	C
240278,000	4240054,501	602,047	C
240274,500	4240054,501	602,056	C
240260,500	4240054,501	602,091	C
240257,000	4240054,501	602,100	C
240243,000	4240054,501	602,135	C
240239,500	4240054,501	602,143	C
240225,500	4240054,501	602,178	C
240222,000	4240054,501	602,187	C
240208,000	4240054,501	602,222	C
240204,500	4240054,501	602,231	C
240190,500	4240054,501	602,266	C
240187,000	4240054,501	602,275	C
240173,000	4240054,501	602,310	C
240169,500	4240054,501	602,318	C

Coord. X	Coord. Y	Elevación	Código
240278,000	4239631,813	597,820	C
240274,500	4239631,813	597,829	C
240260,500	4239631,813	597,864	C
240257,000	4239631,813	597,873	C
240243,000	4239631,813	597,908	C
240239,500	4239631,813	597,916	C
240225,500	4239631,813	597,951	C
240222,000	4239631,813	597,960	C
240208,000	4239631,813	597,995	C
240204,500	4239631,813	598,004	C
240190,500	4239631,813	598,039	C
240187,000	4239631,813	598,048	C
240173,000	4239631,813	598,083	C
240169,500	4239631,813	598,091	C
240155,500	4239631,813	598,126	C
240152,000	4239631,813	598,135	C
240138,000	4239631,813	598,170	C
240134,500	4239631,813	598,179	C
240120,500	4239631,813	598,214	C
240117,000	4239631,813	598,223	C
240103,000	4239631,813	598,258	C
240099,500	4239631,813	598,266	C
240085,500	4239631,813	598,301	C
240082,000	4239631,813	598,310	C
240068,000	4239631,813	598,345	C
240064,500	4239631,813	598,354	C
240050,500	4239631,813	598,389	C
240047,000	4239631,813	598,398	C
240033,000	4239631,813	598,433	C
240029,500	4239631,813	598,441	C
240015,500	4239631,813	598,476	C
240012,000	4239631,813	598,485	C
240012,000	4239627,813	598,445	C
240015,500	4239627,813	598,436	C
240029,500	4239627,813	598,401	C
240033,000	4239627,813	598,393	C
240047,000	4239627,813	598,358	C
240050,500	4239627,813	598,349	C
240064,500	4239627,813	598,314	C
240068,000	4239627,813	598,305	C
240082,000	4239627,813	598,270	C
240085,500	4239627,813	598,261	C
240099,500	4239627,813	598,226	C
240103,000	4239627,813	598,218	C
240117,000	4239627,813	598,183	C
240120,500	4239627,813	598,174	C

Coord. X	Coord. Y	Elevación	Código
240155,500	4240054,501	602,353	C
240152,000	4240054,501	602,362	C
240138,000	4240054,501	602,397	C
240134,500	4240054,501	602,406	C
240120,500	4240054,501	602,441	C
240117,000	4240054,501	602,450	C
240103,000	4240054,501	602,485	C
240099,500	4240054,501	602,493	C
240085,500	4240054,501	602,528	C
240082,000	4240054,501	602,537	C
240068,000	4240054,501	602,572	C
240064,500	4240054,501	602,581	C
240050,500	4240054,501	602,616	C
240047,000	4240054,501	602,625	C
240033,000	4240054,501	602,660	C
240029,500	4240054,501	602,668	C
240015,500	4240054,501	602,703	C
240012,000	4240054,501	602,712	C
240012,000	4240050,501	602,672	C
240015,500	4240050,501	602,663	C
240029,500	4240050,501	602,628	C
240033,000	4240050,501	602,620	C
240047,000	4240050,501	602,585	C
240050,500	4240050,501	602,576	C
240064,500	4240050,501	602,541	C
240068,000	4240050,501	602,532	C
240082,000	4240050,501	602,497	C
240085,500	4240050,501	602,488	C
240099,500	4240050,501	602,453	C
240103,000	4240050,501	602,445	C
240117,000	4240050,501	602,410	C
240120,500	4240050,501	602,401	C
240134,500	4240050,501	602,366	C
240138,000	4240050,501	602,357	C
240152,000	4240050,501	602,322	C
240155,500	4240050,501	602,313	C
240169,500	4240050,501	602,278	C
240173,000	4240050,501	602,270	C
240187,000	4240050,501	602,235	C
240190,500	4240050,501	602,226	C
240204,500	4240050,501	602,191	C
240208,000	4240050,501	602,182	C
240222,000	4240050,501	602,147	C
240225,500	4240050,501	602,138	C
240239,500	4240050,501	602,103	C
240243,000	4240050,501	602,095	C

Coord. X	Coord. Y	Elevación	Código
240134,500	4239627,813	598,139	C
240138,000	4239627,813	598,130	C
240152,000	4239627,813	598,095	C
240155,500	4239627,813	598,086	C
240169,500	4239627,813	598,051	C
240173,000	4239627,813	598,043	C
240187,000	4239627,813	598,008	C
240190,500	4239627,813	597,999	C
240204,500	4239627,813	597,964	C
240208,000	4239627,813	597,955	C
240222,000	4239627,813	597,920	C
240225,500	4239627,813	597,911	C
240239,500	4239627,813	597,876	C
240243,000	4239627,813	597,868	C
240257,000	4239627,813	597,833	C
240260,500	4239627,813	597,824	C
240274,500	4239627,813	597,789	C
240278,000	4239627,813	597,780	C
240292,000	4239627,813	597,745	C
240295,500	4239627,813	597,736	C
240309,500	4239627,813	597,701	C
240313,000	4239627,813	597,693	C
240327,000	4239627,813	597,658	C
240330,500	4239627,813	597,649	C
240344,500	4239627,813	597,614	C
240348,000	4239627,813	597,605	C
240362,000	4239627,813	597,570	C
240365,500	4239627,813	597,561	C
240379,500	4239627,813	597,526	C
240383,000	4239627,813	597,518	C
240397,000	4239627,813	597,483	C
240400,500	4239627,813	597,474	C
240414,500	4239627,813	597,439	C
240418,000	4239627,813	597,430	C
240432,000	4239627,813	597,395	C
240435,500	4239627,813	597,386	C
240449,500	4239627,813	597,351	C
240453,000	4239627,813	597,343	C
240467,000	4239627,813	597,308	C
240470,500	4239627,813	597,299	C
240484,500	4239627,813	597,264	C
240488,000	4239627,813	597,255	C
240502,000	4239627,813	597,220	C
240505,500	4239627,813	597,211	C
240519,500	4239627,813	597,176	C
240523,000	4239627,813	597,168	C

Coord. X	Coord. Y	Elevación	Código
240257,000	4240050,501	602,060	C
240260,500	4240050,501	602,051	C
240274,500	4240050,501	602,016	C
240278,000	4240050,501	602,007	C
240292,000	4240050,501	601,972	C
240295,500	4240050,501	601,963	C
240309,500	4240050,501	601,928	C
240313,000	4240050,501	601,920	C
240327,000	4240050,501	601,885	C
240330,500	4240050,501	601,876	C
240344,500	4240050,501	601,841	C
240348,000	4240050,501	601,832	C
240362,000	4240050,501	601,797	C
240365,500	4240050,501	601,788	C
240379,500	4240050,501	601,753	C
240383,000	4240050,501	601,745	C
240397,000	4240050,501	601,710	C
240400,500	4240050,501	601,701	C
240414,500	4240050,501	601,666	C
240418,000	4240050,501	601,657	C
240432,000	4240050,501	601,622	C
240435,500	4240050,501	601,613	C
240449,500	4240050,501	601,578	C
240453,000	4240050,501	601,570	C
240467,000	4240050,501	601,535	C
240470,500	4240050,501	601,526	C
240484,500	4240050,501	601,491	C
240488,000	4240050,501	601,482	C
240502,000	4240050,501	601,447	C
240505,500	4240050,501	601,438	C
240519,500	4240050,501	601,403	C
240523,000	4240050,501	601,395	C
240537,000	4240050,501	601,360	C
240540,500	4240050,501	601,351	C
240554,500	4240050,501	601,316	C
240558,000	4240050,501	601,307	C
240572,000	4240050,501	601,272	C
240575,500	4240050,501	601,263	C
240589,500	4240050,501	601,228	C
240593,000	4240050,501	601,220	C
240607,000	4240050,501	601,185	C
240610,500	4240050,501	601,176	C
240624,500	4240050,501	601,141	C
240628,000	4240050,501	601,132	C
240642,000	4240050,501	601,097	C
240645,500	4240050,501	601,088	C

Coord. X	Coord. Y	Elevación	Código
240537,000	4239627,813	597,133	C
240540,500	4239627,813	597,124	C
240554,500	4239627,813	597,089	C
240558,000	4239627,813	597,080	C
240572,000	4239627,813	597,045	C
240575,500	4239627,813	597,036	C
240589,500	4239627,813	597,001	C
240593,000	4239627,813	596,993	C
240607,000	4239627,813	596,958	C
240610,500	4239627,813	596,949	C
240624,500	4239627,813	596,914	C
240628,000	4239627,813	596,905	C
240642,000	4239627,813	596,870	C
240645,500	4239627,813	596,861	C
240659,500	4239627,813	596,826	C
240663,000	4239627,813	596,818	C
240677,000	4239627,813	596,783	C
240680,500	4239627,813	596,774	C
240694,500	4239627,813	596,739	C
240698,000	4239627,813	596,730	C
240712,000	4239627,813	596,695	C
240715,500	4239627,813	596,686	C
240729,500	4239627,813	596,651	C
240733,000	4239627,813	596,643	C
240747,000	4239627,813	596,608	C
240750,500	4239627,813	596,599	C
240764,500	4239627,813	596,564	C
240768,000	4239627,813	596,555	C
240782,000	4239627,813	596,520	C
240785,500	4239627,813	596,511	C
240799,500	4239627,813	596,476	C
240803,000	4239627,813	596,468	C
240817,000	4239627,813	596,433	C
240820,500	4239627,813	596,424	C
240834,500	4239627,813	596,389	C
240838,000	4239627,813	596,380	C
240852,000	4239627,813	596,345	C
240855,500	4239627,813	596,336	C
240869,500	4239627,813	596,301	C
240873,000	4239627,813	596,293	C
240887,000	4239627,813	596,258	C
240890,500	4239627,813	596,249	C
240904,500	4239627,813	596,214	C
240908,000	4239627,813	596,205	C
240922,000	4239627,813	596,170	C
240925,500	4239627,813	596,161	C

Coord. X	Coord. Y	Elevación	Código
240659,500	4240050,501	601,053	C
240663,000	4240050,501	601,045	C
240677,000	4240050,501	601,010	C
240680,500	4240050,501	601,001	C
240694,500	4240050,501	600,966	C
240698,000	4240050,501	600,957	C
240712,000	4240050,501	600,922	C
240715,500	4240050,501	600,913	C
240729,500	4240050,501	600,878	C
240733,000	4240050,501	600,870	C
240747,000	4240050,501	600,835	C
240750,500	4240050,501	600,826	C
240764,500	4240050,501	600,791	C
240768,000	4240050,501	600,782	C
240768,000	4240042,448	600,702	C
240764,500	4240042,448	600,710	C
240750,500	4240042,448	600,745	C
240747,000	4240042,448	600,754	C
240733,000	4240042,448	600,789	C
240729,500	4240042,448	600,798	C
240715,500	4240042,448	600,833	C
240712,000	4240042,448	600,842	C
240698,000	4240042,448	600,877	C
240694,500	4240042,448	600,885	C
240680,500	4240042,448	600,920	C
240677,000	4240042,448	600,929	C
240663,000	4240042,448	600,964	C
240659,500	4240042,448	600,973	C
240645,500	4240042,448	601,008	C
240642,000	4240042,448	601,017	C
240628,000	4240042,448	601,052	C
240624,500	4240042,448	601,060	C
240610,500	4240042,448	601,095	C
240607,000	4240042,448	601,104	C
240593,000	4240042,448	601,139	C
240589,500	4240042,448	601,148	C
240575,500	4240042,448	601,183	C
240572,000	4240042,448	601,192	C
240558,000	4240042,448	601,227	C
240554,500	4240042,448	601,235	C
240540,500	4240042,448	601,270	C
240537,000	4240042,448	601,279	C
240523,000	4240042,448	601,314	C
240519,500	4240042,448	601,323	C
240505,500	4240042,448	601,358	C
240502,000	4240042,448	601,367	C

Coord. X	Coord. Y	Elevación	Código
240939,500	4239627,813	596,126	C
240943,000	4239627,813	596,118	C
240957,000	4239627,813	596,083	C
240960,500	4239627,813	596,074	C
240974,500	4239627,813	596,039	C
240978,000	4239627,813	596,030	C
240992,000	4239627,813	595,995	C
240995,500	4239627,813	595,986	C
241009,500	4239627,813	595,951	C
241013,000	4239627,813	595,943	C
241027,000	4239627,813	595,908	C
241030,500	4239627,813	595,899	C
241044,500	4239627,813	595,864	C
241048,000	4239627,813	595,855	C
241062,000	4239627,813	595,820	C
241065,500	4239627,813	595,811	C
241079,500	4239627,813	595,776	C
241083,000	4239627,813	595,768	C
241097,000	4239627,813	595,733	C
241100,500	4239627,813	595,724	C
241114,500	4239627,813	595,689	C
241118,000	4239627,813	595,680	C
241132,000	4239627,813	595,645	C
241135,500	4239627,813	595,636	C
241149,500	4239627,813	595,601	C
241153,000	4239627,813	595,593	C
241167,000	4239627,813	595,558	C
241170,500	4239627,813	595,549	C
241184,500	4239627,813	595,514	C
241188,000	4239627,813	595,505	C
241188,000	4239619,759	595,425	C
241184,500	4239619,759	595,433	C
241170,500	4239619,759	595,468	C
241167,000	4239619,759	595,477	C
241153,000	4239619,759	595,512	C
241149,500	4239619,759	595,521	C
241135,500	4239619,759	595,556	C
241132,000	4239619,759	595,565	C
241118,000	4239619,759	595,600	C
241114,500	4239619,759	595,608	C
241100,500	4239619,759	595,643	C
241097,000	4239619,759	595,652	C
241083,000	4239619,759	595,687	C
241079,500	4239619,759	595,696	C
241065,500	4239619,759	595,731	C
241062,000	4239619,759	595,740	C

Coord. X	Coord. Y	Elevación	Código
240488,000	4240042,448	601,402	C
240484,500	4240042,448	601,410	C
240470,500	4240042,448	601,445	C
240467,000	4240042,448	601,454	C
240453,000	4240042,448	601,489	C
240449,500	4240042,448	601,498	C
240435,500	4240042,448	601,533	C
240432,000	4240042,448	601,542	C
240418,000	4240042,448	601,577	C
240414,500	4240042,448	601,585	C
240400,500	4240042,448	601,620	C
240397,000	4240042,448	601,629	C
240383,000	4240042,448	601,664	C
240379,500	4240042,448	601,673	C
240365,500	4240042,448	601,708	C
240362,000	4240042,448	601,717	C
240348,000	4240042,448	601,752	C
240344,500	4240042,448	601,760	C
240330,500	4240042,448	601,795	C
240327,000	4240042,448	601,804	C
240313,000	4240042,448	601,839	C
240309,500	4240042,448	601,848	C
240295,500	4240042,448	601,883	C
240292,000	4240042,448	601,892	C
240278,000	4240042,448	601,927	C
240274,500	4240042,448	601,935	C
240260,500	4240042,448	601,970	C
240257,000	4240042,448	601,979	C
240243,000	4240042,448	602,014	C
240239,500	4240042,448	602,023	C
240225,500	4240042,448	602,058	C
240222,000	4240042,448	602,067	C
240208,000	4240042,448	602,102	C
240204,500	4240042,448	602,110	C
240190,500	4240042,448	602,145	C
240187,000	4240042,448	602,154	C
240173,000	4240042,448	602,189	C
240169,500	4240042,448	602,198	C
240155,500	4240042,448	602,233	C
240152,000	4240042,448	602,242	C
240138,000	4240042,448	602,277	C
240134,500	4240042,448	602,285	C
240120,500	4240042,448	602,320	C
240117,000	4240042,448	602,329	C
240103,000	4240042,448	602,364	C
240099,500	4240042,448	602,373	C

Coord. X	Coord. Y	Elevación	Código
241048,000	4239619,759	595,775	C
241044,500	4239619,759	595,783	C
241030,500	4239619,759	595,818	C
241027,000	4239619,759	595,827	C
241013,000	4239619,759	595,862	C
241009,500	4239619,759	595,871	C
240995,500	4239619,759	595,906	C
240992,000	4239619,759	595,915	C
240978,000	4239619,759	595,950	C
240974,500	4239619,759	595,958	C
240960,500	4239619,759	595,993	C
240957,000	4239619,759	596,002	C
240943,000	4239619,759	596,037	C
240939,500	4239619,759	596,046	C
240925,500	4239619,759	596,081	C
240922,000	4239619,759	596,090	C
240908,000	4239619,759	596,125	C
240904,500	4239619,759	596,133	C
240890,500	4239619,759	596,168	C
240887,000	4239619,759	596,177	C
240873,000	4239619,759	596,212	C
240869,500	4239619,759	596,221	C
240855,500	4239619,759	596,256	C
240852,000	4239619,759	596,265	C
240838,000	4239619,759	596,300	C
240834,500	4239619,759	596,308	C
240820,500	4239619,759	596,343	C
240817,000	4239619,759	596,352	C
240803,000	4239619,759	596,387	C
240799,500	4239619,759	596,396	C
240785,500	4239619,759	596,431	C
240782,000	4239619,759	596,440	C
240768,000	4239619,759	596,475	C
240764,500	4239619,759	596,483	C
240750,500	4239619,759	596,518	C
240747,000	4239619,759	596,527	C
240733,000	4239619,759	596,562	C
240729,500	4239619,759	596,571	C
240715,500	4239619,759	596,606	C
240712,000	4239619,759	596,615	C
240698,000	4239619,759	596,650	C
240694,500	4239619,759	596,658	C
240680,500	4239619,759	596,693	C
240677,000	4239619,759	596,702	C
240663,000	4239619,759	596,737	C
240659,500	4239619,759	596,746	C

Coord. X	Coord. Y	Elevación	Código
240085,500	4240042,448	602,408	C
240082,000	4240042,448	602,417	C
240068,000	4240042,448	602,452	C
240064,500	4240042,448	602,460	C
240050,500	4240042,448	602,495	C
240047,000	4240042,448	602,504	C
240033,000	4240042,448	602,539	C
240029,500	4240042,448	602,548	C
240015,500	4240042,448	602,583	C
240012,000	4240042,448	602,592	C
240012,000	4240038,448	602,552	C
240015,500	4240038,448	602,543	C
240029,500	4240038,448	602,508	C
240033,000	4240038,448	602,499	C
240047,000	4240038,448	602,464	C
240050,500	4240038,448	602,455	C
240064,500	4240038,448	602,420	C
240068,000	4240038,448	602,412	C
240082,000	4240038,448	602,377	C
240085,500	4240038,448	602,368	C
240099,500	4240038,448	602,333	C
240103,000	4240038,448	602,324	C
240117,000	4240038,448	602,289	C
240120,500	4240038,448	602,280	C
240134,500	4240038,448	602,245	C
240138,000	4240038,448	602,237	C
240152,000	4240038,448	602,202	C
240155,500	4240038,448	602,193	C
240169,500	4240038,448	602,158	C
240173,000	4240038,448	602,149	C
240187,000	4240038,448	602,114	C
240190,500	4240038,448	602,105	C
240204,500	4240038,448	602,070	C
240208,000	4240038,448	602,062	C
240222,000	4240038,448	602,027	C
240225,500	4240038,448	602,018	C
240239,500	4240038,448	601,983	C
240243,000	4240038,448	601,974	C
240257,000	4240038,448	601,939	C
240260,500	4240038,448	601,930	C
240274,500	4240038,448	601,895	C
240278,000	4240038,448	601,887	C
240292,000	4240038,448	601,852	C
240295,500	4240038,448	601,843	C
240309,500	4240038,448	601,808	C
240313,000	4240038,448	601,799	C

Coord. X	Coord. Y	Elevación	Código
240645,500	4239619,759	596,781	C
240642,000	4239619,759	596,790	C
240628,000	4239619,759	596,825	C
240624,500	4239619,759	596,833	C
240610,500	4239619,759	596,868	C
240607,000	4239619,759	596,877	C
240593,000	4239619,759	596,912	C
240589,500	4239619,759	596,921	C
240575,500	4239619,759	596,956	C
240572,000	4239619,759	596,965	C
240558,000	4239619,759	597,000	C
240554,500	4239619,759	597,008	C
240540,500	4239619,759	597,043	C
240537,000	4239619,759	597,052	C
240523,000	4239619,759	597,087	C
240519,500	4239619,759	597,096	C
240505,500	4239619,759	597,131	C
240502,000	4239619,759	597,140	C
240488,000	4239619,759	597,175	C
240484,500	4239619,759	597,183	C
240470,500	4239619,759	597,218	C
240467,000	4239619,759	597,227	C
240453,000	4239619,759	597,262	C
240449,500	4239619,759	597,271	C
240435,500	4239619,759	597,306	C
240432,000	4239619,759	597,315	C
240418,000	4239619,759	597,350	C
240414,500	4239619,759	597,358	C
240400,500	4239619,759	597,393	C
240397,000	4239619,759	597,402	C
240383,000	4239619,759	597,437	C
240379,500	4239619,759	597,446	C
240365,500	4239619,759	597,481	C
240362,000	4239619,759	597,490	C
240348,000	4239619,759	597,525	C
240344,500	4239619,759	597,533	C
240330,500	4239619,759	597,568	C
240327,000	4239619,759	597,577	C
240313,000	4239619,759	597,612	C
240309,500	4239619,759	597,621	C
240295,500	4239619,759	597,656	C
240292,000	4239619,759	597,665	C
240278,000	4239619,759	597,700	C
240274,500	4239619,759	597,708	C
240260,500	4239619,759	597,743	C
240257,000	4239619,759	597,752	C

Coord. X	Coord. Y	Elevación	Código
240327,000	4240038,448	601,764	C
240330,500	4240038,448	601,755	C
240344,500	4240038,448	601,720	C
240348,000	4240038,448	601,712	C
240362,000	4240038,448	601,677	C
240365,500	4240038,448	601,668	C
240379,500	4240038,448	601,633	C
240383,000	4240038,448	601,624	C
240397,000	4240038,448	601,589	C
240400,500	4240038,448	601,580	C
240414,500	4240038,448	601,545	C
240418,000	4240038,448	601,537	C
240432,000	4240038,448	601,502	C
240435,500	4240038,448	601,493	C
240449,500	4240038,448	601,458	C
240453,000	4240038,448	601,449	C
240467,000	4240038,448	601,414	C
240470,500	4240038,448	601,405	C
240484,500	4240038,448	601,370	C
240488,000	4240038,448	601,362	C
240502,000	4240038,448	601,327	C
240505,500	4240038,448	601,318	C
240519,500	4240038,448	601,283	C
240523,000	4240038,448	601,274	C
240537,000	4240038,448	601,239	C
240540,500	4240038,448	601,230	C
240554,500	4240038,448	601,195	C
240558,000	4240038,448	601,187	C
240572,000	4240038,448	601,152	C
240575,500	4240038,448	601,143	C
240589,500	4240038,448	601,108	C
240593,000	4240038,448	601,099	C
240607,000	4240038,448	601,064	C
240610,500	4240038,448	601,055	C
240624,500	4240038,448	601,020	C
240628,000	4240038,448	601,012	C
240642,000	4240038,448	600,977	C
240645,500	4240038,448	600,968	C
240659,500	4240038,448	600,933	C
240663,000	4240038,448	600,924	C
240677,000	4240038,448	600,889	C
240680,500	4240038,448	600,880	C
240694,500	4240038,448	600,845	C
240698,000	4240038,448	600,837	C
240712,000	4240038,448	600,802	C
240715,500	4240038,448	600,793	C

Coord. X	Coord. Y	Elevación	Código
240243,000	4239619,759	597,787	C
240239,500	4239619,759	597,796	C
240225,500	4239619,759	597,831	C
240222,000	4239619,759	597,840	C
240208,000	4239619,759	597,875	C
240204,500	4239619,759	597,883	C
240190,500	4239619,759	597,918	C
240187,000	4239619,759	597,927	C
240173,000	4239619,759	597,962	C
240169,500	4239619,759	597,971	C
240155,500	4239619,759	598,006	C
240152,000	4239619,759	598,015	C
240138,000	4239619,759	598,050	C
240134,500	4239619,759	598,058	C
240120,500	4239619,759	598,093	C
240117,000	4239619,759	598,102	C
240103,000	4239619,759	598,137	C
240099,500	4239619,759	598,146	C
240085,500	4239619,759	598,181	C
240082,000	4239619,759	598,190	C
240068,000	4239619,759	598,225	C
240064,500	4239619,759	598,233	C
240050,500	4239619,759	598,268	C
240047,000	4239619,759	598,277	C
240033,000	4239619,759	598,312	C
240029,500	4239619,759	598,321	C
240015,500	4239619,759	598,356	C
240012,000	4239619,759	598,365	C
240012,000	4239615,759	598,325	C
240015,500	4239615,759	598,316	C
240029,500	4239615,759	598,281	C
240033,000	4239615,759	598,272	C
240047,000	4239615,759	598,237	C
240050,500	4239615,759	598,228	C
240064,500	4239615,759	598,193	C
240068,000	4239615,759	598,185	C
240082,000	4239615,759	598,150	C
240085,500	4239615,759	598,141	C
240099,500	4239615,759	598,106	C
240103,000	4239615,759	598,097	C
240117,000	4239615,759	598,062	C
240120,500	4239615,759	598,053	C
240134,500	4239615,759	598,018	C
240138,000	4239615,759	598,010	C
240152,000	4239615,759	597,975	C
240155,500	4239615,759	597,966	C

Coord. X	Coord. Y	Elevación	Código
240729,500	4240038,448	600,758	C
240733,000	4240038,448	600,749	C
240747,000	4240038,448	600,714	C
240750,500	4240038,448	600,705	C
240764,500	4240038,448	600,670	C
240768,000	4240038,448	600,662	C
240768,000	4240030,394	600,581	C
240764,500	4240030,394	600,590	C
240750,500	4240030,394	600,625	C
240747,000	4240030,394	600,634	C
240733,000	4240030,394	600,669	C
240729,500	4240030,394	600,677	C
240715,500	4240030,394	600,712	C
240712,000	4240030,394	600,721	C
240698,000	4240030,394	600,756	C
240694,500	4240030,394	600,765	C
240680,500	4240030,394	600,800	C
240677,000	4240030,394	600,809	C
240663,000	4240030,394	600,844	C
240659,500	4240030,394	600,852	C
240645,500	4240030,394	600,887	C
240642,000	4240030,394	600,896	C
240628,000	4240030,394	600,931	C
240624,500	4240030,394	600,940	C
240610,500	4240030,394	600,975	C
240607,000	4240030,394	600,984	C
240593,000	4240030,394	601,019	C
240589,500	4240030,394	601,027	C
240575,500	4240030,394	601,062	C
240572,000	4240030,394	601,071	C
240558,000	4240030,394	601,106	C
240554,500	4240030,394	601,115	C
240540,500	4240030,394	601,150	C
240537,000	4240030,394	601,159	C
240523,000	4240030,394	601,194	C
240519,500	4240030,394	601,202	C
240505,500	4240030,394	601,237	C
240502,000	4240030,394	601,246	C
240488,000	4240030,394	601,281	C
240484,500	4240030,394	601,290	C
240470,500	4240030,394	601,325	C
240467,000	4240030,394	601,334	C
240453,000	4240030,394	601,369	C
240449,500	4240030,394	601,377	C
240435,500	4240030,394	601,412	C
240432,000	4240030,394	601,421	C

Coord. X	Coord. Y	Elevación	Código
240169,500	4239615,759	597,931	C
240173,000	4239615,759	597,922	C
240187,000	4239615,759	597,887	C
240190,500	4239615,759	597,878	C
240204,500	4239615,759	597,843	C
240208,000	4239615,759	597,835	C
240222,000	4239615,759	597,800	C
240225,500	4239615,759	597,791	C
240239,500	4239615,759	597,756	C
240243,000	4239615,759	597,747	C
240257,000	4239615,759	597,712	C
240260,500	4239615,759	597,703	C
240274,500	4239615,759	597,668	C
240278,000	4239615,759	597,660	C
240292,000	4239615,759	597,625	C
240295,500	4239615,759	597,616	C
240309,500	4239615,759	597,581	C
240313,000	4239615,759	597,572	C
240327,000	4239615,759	597,537	C
240330,500	4239615,759	597,528	C
240344,500	4239615,759	597,493	C
240348,000	4239615,759	597,485	C
240362,000	4239615,759	597,450	C
240365,500	4239615,759	597,441	C
240379,500	4239615,759	597,406	C
240383,000	4239615,759	597,397	C
240397,000	4239615,759	597,362	C
240400,500	4239615,759	597,353	C
240414,500	4239615,759	597,318	C
240418,000	4239615,759	597,310	C
240432,000	4239615,759	597,275	C
240435,500	4239615,759	597,266	C
240449,500	4239615,759	597,231	C
240453,000	4239615,759	597,222	C
240467,000	4239615,759	597,187	C
240470,500	4239615,759	597,178	C
240484,500	4239615,759	597,143	C
240488,000	4239615,759	597,135	C
240502,000	4239615,759	597,100	C
240505,500	4239615,759	597,091	C
240519,500	4239615,759	597,056	C
240523,000	4239615,759	597,047	C
240537,000	4239615,759	597,012	C
240540,500	4239615,759	597,003	C
240554,500	4239615,759	596,968	C
240558,000	4239615,759	596,960	C

Coord. X	Coord. Y	Elevación	Código
240418,000	4240030,394	601,456	C
240414,500	4240030,394	601,465	C
240400,500	4240030,394	601,500	C
240397,000	4240030,394	601,509	C
240383,000	4240030,394	601,544	C
240379,500	4240030,394	601,552	C
240365,500	4240030,394	601,587	C
240362,000	4240030,394	601,596	C
240348,000	4240030,394	601,631	C
240344,500	4240030,394	601,640	C
240330,500	4240030,394	601,675	C
240327,000	4240030,394	601,684	C
240313,000	4240030,394	601,719	C
240309,500	4240030,394	601,727	C
240295,500	4240030,394	601,762	C
240292,000	4240030,394	601,771	C
240278,000	4240030,394	601,806	C
240274,500	4240030,394	601,815	C
240260,500	4240030,394	601,850	C
240257,000	4240030,394	601,859	C
240243,000	4240030,394	601,894	C
240239,500	4240030,394	601,902	C
240225,500	4240030,394	601,937	C
240222,000	4240030,394	601,946	C
240208,000	4240030,394	601,981	C
240204,500	4240030,394	601,990	C
240190,500	4240030,394	602,025	C
240187,000	4240030,394	602,034	C
240173,000	4240030,394	602,069	C
240169,500	4240030,394	602,077	C
240155,500	4240030,394	602,112	C
240152,000	4240030,394	602,121	C
240138,000	4240030,394	602,156	C
240134,500	4240030,394	602,165	C
240120,500	4240030,394	602,200	C
240117,000	4240030,394	602,209	C
240103,000	4240030,394	602,244	C
240099,500	4240030,394	602,252	C
240085,500	4240030,394	602,287	C
240082,000	4240030,394	602,296	C
240068,000	4240030,394	602,331	C
240064,500	4240030,394	602,340	C
240050,500	4240030,394	602,375	C
240047,000	4240030,394	602,384	C
240033,000	4240030,394	602,419	C
240029,500	4240030,394	602,427	C

Coord. X	Coord. Y	Elevación	Código
240572,000	4239615,759	596,925	C
240575,500	4239615,759	596,916	C
240589,500	4239615,759	596,881	C
240593,000	4239615,759	596,872	C
240607,000	4239615,759	596,837	C
240610,500	4239615,759	596,828	C
240624,500	4239615,759	596,793	C
240628,000	4239615,759	596,785	C
240642,000	4239615,759	596,750	C
240645,500	4239615,759	596,741	C
240659,500	4239615,759	596,706	C
240663,000	4239615,759	596,697	C
240677,000	4239615,759	596,662	C
240680,500	4239615,759	596,653	C
240694,500	4239615,759	596,618	C
240698,000	4239615,759	596,610	C
240712,000	4239615,759	596,575	C
240715,500	4239615,759	596,566	C
240729,500	4239615,759	596,531	C
240733,000	4239615,759	596,522	C
240747,000	4239615,759	596,487	C
240750,500	4239615,759	596,478	C
240764,500	4239615,759	596,443	C
240768,000	4239615,759	596,435	C
240782,000	4239615,759	596,400	C
240785,500	4239615,759	596,391	C
240799,500	4239615,759	596,356	C
240803,000	4239615,759	596,347	C
240817,000	4239615,759	596,312	C
240820,500	4239615,759	596,303	C
240834,500	4239615,759	596,268	C
240838,000	4239615,759	596,260	C
240852,000	4239615,759	596,225	C
240855,500	4239615,759	596,216	C
240869,500	4239615,759	596,181	C
240873,000	4239615,759	596,172	C
240887,000	4239615,759	596,137	C
240890,500	4239615,759	596,128	C
240904,500	4239615,759	596,093	C
240908,000	4239615,759	596,085	C
240922,000	4239615,759	596,050	C
240925,500	4239615,759	596,041	C
240939,500	4239615,759	596,006	C
240943,000	4239615,759	595,997	C
240957,000	4239615,759	595,962	C
240960,500	4239615,759	595,953	C

Coord. X	Coord. Y	Elevación	Código
240015,500	4240030,394	602,462	C
240012,000	4240030,394	602,471	C
240012,000	4240026,394	602,431	C
240015,500	4240026,394	602,422	C
240029,500	4240026,394	602,387	C
240033,000	4240026,394	602,379	C
240047,000	4240026,394	602,344	C
240050,500	4240026,394	602,335	C
240064,500	4240026,394	602,300	C
240068,000	4240026,394	602,291	C
240082,000	4240026,394	602,256	C
240085,500	4240026,394	602,247	C
240099,500	4240026,394	602,212	C
240103,000	4240026,394	602,204	C
240117,000	4240026,394	602,169	C
240120,500	4240026,394	602,160	C
240134,500	4240026,394	602,125	C
240138,000	4240026,394	602,116	C
240152,000	4240026,394	602,081	C
240155,500	4240026,394	602,072	C
240169,500	4240026,394	602,037	C
240173,000	4240026,394	602,029	C
240187,000	4240026,394	601,994	C
240190,500	4240026,394	601,985	C
240204,500	4240026,394	601,950	C
240208,000	4240026,394	601,941	C
240222,000	4240026,394	601,906	C
240225,500	4240026,394	601,897	C
240239,500	4240026,394	601,862	C
240243,000	4240026,394	601,854	C
240257,000	4240026,394	601,819	C
240260,500	4240026,394	601,810	C
240274,500	4240026,394	601,775	C
240278,000	4240026,394	601,766	C
240292,000	4240026,394	601,731	C
240295,500	4240026,394	601,722	C
240309,500	4240026,394	601,687	C
240313,000	4240026,394	601,679	C
240327,000	4240026,394	601,644	C
240330,500	4240026,394	601,635	C
240344,500	4240026,394	601,600	C
240348,000	4240026,394	601,591	C
240362,000	4240026,394	601,556	C
240365,500	4240026,394	601,547	C
240379,500	4240026,394	601,512	C
240383,000	4240026,394	601,504	C

Coord. X	Coord. Y	Elevación	Código
240974,500	4239615,759	595,918	C
240978,000	4239615,759	595,910	C
240992,000	4239615,759	595,875	C
240995,500	4239615,759	595,866	C
241009,500	4239615,759	595,831	C
241013,000	4239615,759	595,822	C
241027,000	4239615,759	595,787	C
241030,500	4239615,759	595,778	C
241044,500	4239615,759	595,743	C
241048,000	4239615,759	595,735	C
241062,000	4239615,759	595,700	C
241065,500	4239615,759	595,691	C
241079,500	4239615,759	595,656	C
241083,000	4239615,759	595,647	C
241097,000	4239615,759	595,612	C
241100,500	4239615,759	595,603	C
241114,500	4239615,759	595,568	C
241118,000	4239615,759	595,560	C
241132,000	4239615,759	595,525	C
241135,500	4239615,759	595,516	C
241149,500	4239615,759	595,481	C
241153,000	4239615,759	595,472	C
241167,000	4239615,759	595,437	C
241170,500	4239615,759	595,428	C
241184,500	4239615,759	595,393	C
241188,000	4239615,759	595,385	C
241188,000	4239606,705	595,294	C
241184,500	4239606,705	595,303	C
241170,500	4239606,705	595,338	C
241167,000	4239606,705	595,347	C
241153,000	4239606,705	595,382	C
241149,500	4239606,705	595,390	C
241135,500	4239606,705	595,425	C
241132,000	4239606,705	595,434	C
241118,000	4239606,705	595,469	C
241114,500	4239606,705	595,478	C
241100,500	4239606,705	595,513	C
241097,000	4239606,705	595,522	C
241083,000	4239606,705	595,557	C
241079,500	4239606,705	595,565	C
241065,500	4239606,705	595,600	C
241062,000	4239606,705	595,609	C
241048,000	4239606,705	595,644	C
241044,500	4239606,705	595,653	C
241030,500	4239606,705	595,688	C
241027,000	4239606,705	595,697	C

Coord. X	Coord. Y	Elevación	Código
240397,000	4240026,394	601,469	C
240400,500	4240026,394	601,460	C
240414,500	4240026,394	601,425	C
240418,000	4240026,394	601,416	C
240432,000	4240026,394	601,381	C
240435,500	4240026,394	601,372	C
240449,500	4240026,394	601,337	C
240453,000	4240026,394	601,329	C
240467,000	4240026,394	601,294	C
240470,500	4240026,394	601,285	C
240484,500	4240026,394	601,250	C
240488,000	4240026,394	601,241	C
240502,000	4240026,394	601,206	C
240505,500	4240026,394	601,197	C
240519,500	4240026,394	601,162	C
240523,000	4240026,394	601,154	C
240537,000	4240026,394	601,119	C
240540,500	4240026,394	601,110	C
240554,500	4240026,394	601,075	C
240558,000	4240026,394	601,066	C
240572,000	4240026,394	601,031	C
240575,500	4240026,394	601,022	C
240589,500	4240026,394	600,987	C
240593,000	4240026,394	600,979	C
240607,000	4240026,394	600,944	C
240610,500	4240026,394	600,935	C
240624,500	4240026,394	600,900	C
240628,000	4240026,394	600,891	C
240642,000	4240026,394	600,856	C
240645,500	4240026,394	600,847	C
240659,500	4240026,394	600,812	C
240663,000	4240026,394	600,804	C
240677,000	4240026,394	600,769	C
240680,500	4240026,394	600,760	C
240694,500	4240026,394	600,725	C
240698,000	4240026,394	600,716	C
240712,000	4240026,394	600,681	C
240715,500	4240026,394	600,672	C
240729,500	4240026,394	600,637	C
240733,000	4240026,394	600,629	C
240747,000	4240026,394	600,594	C
240750,500	4240026,394	600,585	C
240764,500	4240026,394	600,550	C
240768,000	4240026,394	600,541	C
240768,000	4240017,340	600,451	C
240764,500	4240017,340	600,459	C

Coord. X	Coord. Y	Elevación	Código
241013,000	4239606,705	595,732	C
241009,500	4239606,705	595,740	C
240995,500	4239606,705	595,775	C
240992,000	4239606,705	595,784	C
240978,000	4239606,705	595,819	C
240974,500	4239606,705	595,828	C
240960,500	4239606,705	595,863	C
240957,000	4239606,705	595,872	C
240943,000	4239606,705	595,907	C
240939,500	4239606,705	595,915	C
240925,500	4239606,705	595,950	C
240922,000	4239606,705	595,959	C
240908,000	4239606,705	595,994	C
240904,500	4239606,705	596,003	C
240890,500	4239606,705	596,038	C
240887,000	4239606,705	596,047	C
240873,000	4239606,705	596,082	C
240869,500	4239606,705	596,090	C
240855,500	4239606,705	596,125	C
240852,000	4239606,705	596,134	C
240838,000	4239606,705	596,169	C
240834,500	4239606,705	596,178	C
240820,500	4239606,705	596,213	C
240817,000	4239606,705	596,222	C
240803,000	4239606,705	596,257	C
240799,500	4239606,705	596,265	C
240785,500	4239606,705	596,300	C
240782,000	4239606,705	596,309	C
240768,000	4239606,705	596,344	C
240764,500	4239606,705	596,353	C
240750,500	4239606,705	596,388	C
240747,000	4239606,705	596,397	C
240733,000	4239606,705	596,432	C
240729,500	4239606,705	596,440	C
240715,500	4239606,705	596,475	C
240712,000	4239606,705	596,484	C
240698,000	4239606,705	596,519	C
240694,500	4239606,705	596,528	C
240680,500	4239606,705	596,563	C
240677,000	4239606,705	596,572	C
240663,000	4239606,705	596,607	C
240659,500	4239606,705	596,615	C
240645,500	4239606,705	596,650	C
240642,000	4239606,705	596,659	C
240628,000	4239606,705	596,694	C
240624,500	4239606,705	596,703	C

Coord. X	Coord. Y	Elevación	Código
240750,500	4240017,340	600,494	C
240747,000	4240017,340	600,503	C
240733,000	4240017,340	600,538	C
240729,500	4240017,340	600,547	C
240715,500	4240017,340	600,582	C
240712,000	4240017,340	600,591	C
240698,000	4240017,340	600,626	C
240694,500	4240017,340	600,634	C
240680,500	4240017,340	600,669	C
240677,000	4240017,340	600,678	C
240663,000	4240017,340	600,713	C
240659,500	4240017,340	600,722	C
240645,500	4240017,340	600,757	C
240642,000	4240017,340	600,766	C
240628,000	4240017,340	600,801	C
240624,500	4240017,340	600,809	C
240610,500	4240017,340	600,844	C
240607,000	4240017,340	600,853	C
240593,000	4240017,340	600,888	C
240589,500	4240017,340	600,897	C
240575,500	4240017,340	600,932	C
240572,000	4240017,340	600,941	C
240558,000	4240017,340	600,976	C
240554,500	4240017,340	600,984	C
240540,500	4240017,340	601,019	C
240537,000	4240017,340	601,028	C
240523,000	4240017,340	601,063	C
240519,500	4240017,340	601,072	C
240505,500	4240017,340	601,107	C
240502,000	4240017,340	601,116	C
240488,000	4240017,340	601,151	C
240484,500	4240017,340	601,159	C
240470,500	4240017,340	601,194	C
240467,000	4240017,340	601,203	C
240453,000	4240017,340	601,238	C
240449,500	4240017,340	601,247	C
240435,500	4240017,340	601,282	C
240432,000	4240017,340	601,291	C
240418,000	4240017,340	601,326	C
240414,500	4240017,340	601,334	C
240400,500	4240017,340	601,369	C
240397,000	4240017,340	601,378	C
240383,000	4240017,340	601,413	C
240379,500	4240017,340	601,422	C
240365,500	4240017,340	601,457	C
240362,000	4240017,340	601,466	C

Coord. X	Coord. Y	Elevación	Código
240610,500	4239606,705	596,738	C
240607,000	4239606,705	596,747	C
240593,000	4239606,705	596,782	C
240589,500	4239606,705	596,790	C
240575,500	4239606,705	596,825	C
240572,000	4239606,705	596,834	C
240558,000	4239606,705	596,869	C
240554,500	4239606,705	596,878	C
240540,500	4239606,705	596,913	C
240537,000	4239606,705	596,922	C
240523,000	4239606,705	596,957	C
240519,500	4239606,705	596,965	C
240505,500	4239606,705	597,000	C
240502,000	4239606,705	597,009	C
240488,000	4239606,705	597,044	C
240484,500	4239606,705	597,053	C
240470,500	4239606,705	597,088	C
240467,000	4239606,705	597,097	C
240453,000	4239606,705	597,132	C
240449,500	4239606,705	597,140	C
240435,500	4239606,705	597,175	C
240432,000	4239606,705	597,184	C
240418,000	4239606,705	597,219	C
240414,500	4239606,705	597,228	C
240400,500	4239606,705	597,263	C
240397,000	4239606,705	597,272	C
240383,000	4239606,705	597,307	C
240379,500	4239606,705	597,315	C
240365,500	4239606,705	597,350	C
240362,000	4239606,705	597,359	C
240348,000	4239606,705	597,394	C
240344,500	4239606,705	597,403	C
240330,500	4239606,705	597,438	C
240327,000	4239606,705	597,447	C
240313,000	4239606,705	597,482	C
240309,500	4239606,705	597,490	C
240295,500	4239606,705	597,525	C
240292,000	4239606,705	597,534	C
240278,000	4239606,705	597,569	C
240274,500	4239606,705	597,578	C
240260,500	4239606,705	597,613	C
240257,000	4239606,705	597,622	C
240243,000	4239606,705	597,657	C
240239,500	4239606,705	597,665	C
240225,500	4239606,705	597,700	C
240222,000	4239606,705	597,709	C

Coord. X	Coord. Y	Elevación	Código
240348,000	4240017,340	601,501	C
240344,500	4240017,340	601,509	C
240330,500	4240017,340	601,544	C
240327,000	4240017,340	601,553	C
240313,000	4240017,340	601,588	C
240309,500	4240017,340	601,597	C
240295,500	4240017,340	601,632	C
240292,000	4240017,340	601,641	C
240278,000	4240017,340	601,676	C
240274,500	4240017,340	601,684	C
240260,500	4240017,340	601,719	C
240257,000	4240017,340	601,728	C
240243,000	4240017,340	601,763	C
240239,500	4240017,340	601,772	C
240225,500	4240017,340	601,807	C
240222,000	4240017,340	601,816	C
240208,000	4240017,340	601,851	C
240204,500	4240017,340	601,859	C
240190,500	4240017,340	601,894	C
240187,000	4240017,340	601,903	C
240173,000	4240017,340	601,938	C
240169,500	4240017,340	601,947	C
240155,500	4240017,340	601,982	C
240152,000	4240017,340	601,991	C
240138,000	4240017,340	602,026	C
240134,500	4240017,340	602,034	C
240120,500	4240017,340	602,069	C
240117,000	4240017,340	602,078	C
240103,000	4240017,340	602,113	C
240099,500	4240017,340	602,122	C
240085,500	4240017,340	602,157	C
240082,000	4240017,340	602,166	C
240068,000	4240017,340	602,201	C
240064,500	4240017,340	602,209	C
240050,500	4240017,340	602,244	C
240047,000	4240017,340	602,253	C
240033,000	4240017,340	602,288	C
240029,500	4240017,340	602,297	C
240015,500	4240017,340	602,332	C
240012,000	4240017,340	602,341	C
240012,000	4240014,190	602,309	C
240015,500	4240014,190	602,300	C
240029,500	4240014,190	602,265	C
240033,000	4240014,190	602,257	C
240047,000	4240014,190	602,222	C
240050,500	4240014,190	602,213	C

Coord. X	Coord. Y	Elevación	Código
240208,000	4239606,705	597,744	C
240204,500	4239606,705	597,753	C
240190,500	4239606,705	597,788	C
240187,000	4239606,705	597,797	C
240173,000	4239606,705	597,832	C
240169,500	4239606,705	597,840	C
240155,500	4239606,705	597,875	C
240152,000	4239606,705	597,884	C
240138,000	4239606,705	597,919	C
240134,500	4239606,705	597,928	C
240120,500	4239606,705	597,963	C
240117,000	4239606,705	597,972	C
240103,000	4239606,705	598,007	C
240099,500	4239606,705	598,015	C
240085,500	4239606,705	598,050	C
240082,000	4239606,705	598,059	C
240068,000	4239606,705	598,094	C
240064,500	4239606,705	598,103	C
240050,500	4239606,705	598,138	C
240047,000	4239606,705	598,147	C
240033,000	4239606,705	598,182	C
240029,500	4239606,705	598,190	C
240015,500	4239606,705	598,225	C
240012,000	4239606,705	598,234	C
240012,000	4239603,555	598,203	C
240015,500	4239603,555	598,194	C
240029,500	4239603,555	598,159	C
240033,000	4239603,555	598,150	C
240047,000	4239603,555	598,115	C
240050,500	4239603,555	598,106	C
240064,500	4239603,555	598,071	C
240068,000	4239603,555	598,063	C
240082,000	4239603,555	598,028	C
240085,500	4239603,555	598,019	C
240099,500	4239603,555	597,984	C
240103,000	4239603,555	597,975	C
240117,000	4239603,555	597,940	C
240120,500	4239603,555	597,931	C
240134,500	4239603,555	597,896	C
240138,000	4239603,555	597,888	C
240152,000	4239603,555	597,853	C
240155,500	4239603,555	597,844	C
240169,500	4239603,555	597,809	C
240173,000	4239603,555	597,800	C
240187,000	4239603,555	597,765	C
240190,500	4239603,555	597,756	C

Coord. X	Coord. Y	Elevación	Código
240064,500	4240014,190	602,178	C
240068,000	4240014,190	602,169	C
240082,000	4240014,190	602,134	C
240085,500	4240014,190	602,125	C
240099,500	4240014,190	602,090	C
240103,000	4240014,190	602,082	C
240117,000	4240014,190	602,047	C
240120,500	4240014,190	602,038	C
240134,500	4240014,190	602,003	C
240138,000	4240014,190	601,994	C
240152,000	4240014,190	601,959	C
240155,500	4240014,190	601,950	C
240169,500	4240014,190	601,915	C
240173,000	4240014,190	601,907	C
240187,000	4240014,190	601,872	C
240190,500	4240014,190	601,863	C
240204,500	4240014,190	601,828	C
240208,000	4240014,190	601,819	C
240222,000	4240014,190	601,784	C
240225,500	4240014,190	601,775	C
240239,500	4240014,190	601,740	C
240243,000	4240014,190	601,732	C
240257,000	4240014,190	601,697	C
240260,500	4240014,190	601,688	C
240274,500	4240014,190	601,653	C
240278,000	4240014,190	601,644	C
240292,000	4240014,190	601,609	C
240295,500	4240014,190	601,600	C
240309,500	4240014,190	601,565	C
240313,000	4240014,190	601,557	C
240327,000	4240014,190	601,522	C
240330,500	4240014,190	601,513	C
240344,500	4240014,190	601,478	C
240348,000	4240014,190	601,469	C
240362,000	4240014,190	601,434	C
240365,500	4240014,190	601,425	C
240379,500	4240014,190	601,390	C
240383,000	4240014,190	601,382	C
240397,000	4240014,190	601,347	C
240400,500	4240014,190	601,338	C
240414,500	4240014,190	601,303	C
240418,000	4240014,190	601,294	C
240432,000	4240014,190	601,259	C
240435,500	4240014,190	601,250	C
240449,500	4240014,190	601,215	C
240453,000	4240014,190	601,207	C

Coord. X	Coord. Y	Elevación	Código
240204,500	4239603,555	597,721	C
240208,000	4239603,555	597,713	C
240222,000	4239603,555	597,678	C
240225,500	4239603,555	597,669	C
240239,500	4239603,555	597,634	C
240243,000	4239603,555	597,625	C
240257,000	4239603,555	597,590	C
240260,500	4239603,555	597,581	C
240274,500	4239603,555	597,546	C
240278,000	4239603,555	597,538	C
240292,000	4239603,555	597,503	C
240295,500	4239603,555	597,494	C
240309,500	4239603,555	597,459	C
240313,000	4239603,555	597,450	C
240327,000	4239603,555	597,415	C
240330,500	4239603,555	597,406	C
240344,500	4239603,555	597,371	C
240348,000	4239603,555	597,363	C
240362,000	4239603,555	597,328	C
240365,500	4239603,555	597,319	C
240379,500	4239603,555	597,284	C
240383,000	4239603,555	597,275	C
240397,000	4239603,555	597,240	C
240400,500	4239603,555	597,231	C
240414,500	4239603,555	597,196	C
240418,000	4239603,555	597,188	C
240432,000	4239603,555	597,153	C
240435,500	4239603,555	597,144	C
240449,500	4239603,555	597,109	C
240453,000	4239603,555	597,100	C
240467,000	4239603,555	597,065	C
240470,500	4239603,555	597,056	C
240484,500	4239603,555	597,021	C
240488,000	4239603,555	597,013	C
240502,000	4239603,555	596,978	C
240505,500	4239603,555	596,969	C
240519,500	4239603,555	596,934	C
240523,000	4239603,555	596,925	C
240537,000	4239603,555	596,890	C
240540,500	4239603,555	596,881	C
240554,500	4239603,555	596,846	C
240558,000	4239603,555	596,838	C
240572,000	4239603,555	596,803	C
240575,500	4239603,555	596,794	C
240589,500	4239603,555	596,759	C
240593,000	4239603,555	596,750	C

Coord. X	Coord. Y	Elevación	Código
240467,000	4240014,190	601,172	C
240470,500	4240014,190	601,163	C
240484,500	4240014,190	601,128	C
240488,000	4240014,190	601,119	C
240502,000	4240014,190	601,084	C
240505,500	4240014,190	601,075	C
240519,500	4240014,190	601,040	C
240523,000	4240014,190	601,032	C
240537,000	4240014,190	600,997	C
240540,500	4240014,190	600,988	C
240554,500	4240014,190	600,953	C
240558,000	4240014,190	600,944	C
240572,000	4240014,190	600,909	C
240575,500	4240014,190	600,900	C
240589,500	4240014,190	600,865	C
240593,000	4240014,190	600,857	C
240607,000	4240014,190	600,822	C
240610,500	4240014,190	600,813	C
240624,500	4240014,190	600,778	C
240628,000	4240014,190	600,769	C
240642,000	4240014,190	600,734	C
240645,500	4240014,190	600,725	C
240659,500	4240014,190	600,690	C
240663,000	4240014,190	600,682	C
240677,000	4240014,190	600,647	C
240680,500	4240014,190	600,638	C
240694,500	4240014,190	600,603	C
240698,000	4240014,190	600,594	C
240712,000	4240014,190	600,559	C
240715,500	4240014,190	600,550	C
240729,500	4240014,190	600,515	C
240733,000	4240014,190	600,507	C
240747,000	4240014,190	600,472	C
240750,500	4240014,190	600,463	C
240764,500	4240014,190	600,428	C
240768,000	4240014,190	600,419	C
240012,000	4239986,450	602,032	C
240015,500	4239986,450	602,023	C
240029,500	4239986,450	601,988	C
240033,000	4239986,450	601,979	C
240047,000	4239986,450	601,944	C
240050,500	4239986,450	601,935	C
240064,500	4239986,450	601,900	C
240068,000	4239986,450	601,892	C
240082,000	4239986,450	601,857	C
240085,500	4239986,450	601,848	C

Coord. X	Coord. Y	Elevación	Código
240607,000	4239603,555	596,715	C
240610,500	4239603,555	596,706	C
240624,500	4239603,555	596,671	C
240628,000	4239603,555	596,663	C
240642,000	4239603,555	596,628	C
240645,500	4239603,555	596,619	C
240659,500	4239603,555	596,584	C
240663,000	4239603,555	596,575	C
240677,000	4239603,555	596,540	C
240680,500	4239603,555	596,531	C
240694,500	4239603,555	596,496	C
240698,000	4239603,555	596,488	C
240712,000	4239603,555	596,453	C
240715,500	4239603,555	596,444	C
240729,500	4239603,555	596,409	C
240733,000	4239603,555	596,400	C
240747,000	4239603,555	596,365	C
240750,500	4239603,555	596,356	C
240764,500	4239603,555	596,321	C
240768,000	4239603,555	596,313	C
240782,000	4239603,555	596,278	C
240785,500	4239603,555	596,269	C
240799,500	4239603,555	596,234	C
240803,000	4239603,555	596,225	C
240817,000	4239603,555	596,190	C
240820,500	4239603,555	596,181	C
240834,500	4239603,555	596,146	C
240838,000	4239603,555	596,138	C
240852,000	4239603,555	596,103	C
240855,500	4239603,555	596,094	C
240869,500	4239603,555	596,059	C
240873,000	4239603,555	596,050	C
240887,000	4239603,555	596,015	C
240890,500	4239603,555	596,006	C
240904,500	4239603,555	595,971	C
240908,000	4239603,555	595,963	C
240922,000	4239603,555	595,928	C
240925,500	4239603,555	595,919	C
240939,500	4239603,555	595,884	C
240943,000	4239603,555	595,875	C
240957,000	4239603,555	595,840	C
240960,500	4239603,555	595,831	C
240974,500	4239603,555	595,796	C
240978,000	4239603,555	595,788	C
240992,000	4239603,555	595,753	C
240995,500	4239603,555	595,744	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240099,500	4239986,450	601,813	C	241009,500	4239603,555	595,709	C
240103,000	4239986,450	601,804	C	241013,000	4239603,555	595,700	C
240117,000	4239986,450	601,769	C	241027,000	4239603,555	595,665	C
240120,500	4239986,450	601,760	C	241030,500	4239603,555	595,656	C
240134,500	4239986,450	601,725	C	241044,500	4239603,555	595,621	C
240138,000	4239986,450	601,717	C	241048,000	4239603,555	595,613	C
240152,000	4239986,450	601,682	C	241062,000	4239603,555	595,578	C
240155,500	4239986,450	601,673	C	241065,500	4239603,555	595,569	C
240169,500	4239986,450	601,638	C	241079,500	4239603,555	595,534	C
240173,000	4239986,450	601,629	C	241083,000	4239603,555	595,525	C
240187,000	4239986,450	601,594	C	241097,000	4239603,555	595,490	C
240190,500	4239986,450	601,585	C	241100,500	4239603,555	595,481	C
240204,500	4239986,450	601,550	C	241114,500	4239603,555	595,446	C
240208,000	4239986,450	601,542	C	241118,000	4239603,555	595,438	C
240222,000	4239986,450	601,507	C	241132,000	4239603,555	595,403	C
240225,500	4239986,450	601,498	C	241135,500	4239603,555	595,394	C
240239,500	4239986,450	601,463	C	241149,500	4239603,555	595,359	C
240243,000	4239986,450	601,454	C	241153,000	4239603,555	595,350	C
240257,000	4239986,450	601,419	C	241167,000	4239603,555	595,315	C
240260,500	4239986,450	601,410	C	241170,500	4239603,555	595,306	C
240274,500	4239986,450	601,375	C	241184,500	4239603,555	595,271	C
240278,000	4239986,450	601,367	C	241188,000	4239603,555	595,263	C
240292,000	4239986,450	601,332	C	241188,000	4239594,501	595,172	C
240295,500	4239986,450	601,323	C	241184,500	4239594,501	595,181	C
240309,500	4239986,450	601,288	C	241170,500	4239594,501	595,216	C
240313,000	4239986,450	601,279	C	241167,000	4239594,501	595,225	C
240327,000	4239986,450	601,244	C	241153,000	4239594,501	595,260	C
240330,500	4239986,450	601,235	C	241149,500	4239594,501	595,268	C
240344,500	4239986,450	601,200	C	241135,500	4239594,501	595,303	C
240348,000	4239986,450	601,192	C	241132,000	4239594,501	595,312	C
240362,000	4239986,450	601,157	C	241118,000	4239594,501	595,347	C
240365,500	4239986,450	601,148	C	241114,500	4239594,501	595,356	C
240379,500	4239986,450	601,113	C	241100,500	4239594,501	595,391	C
240383,000	4239986,450	601,104	C	241097,000	4239594,501	595,400	C
240397,000	4239986,450	601,069	C	241083,000	4239594,501	595,435	C
240400,500	4239986,450	601,060	C	241079,500	4239594,501	595,443	C
240414,500	4239986,450	601,025	C	241065,500	4239594,501	595,478	C
240418,000	4239986,450	601,017	C	241062,000	4239594,501	595,487	C
240432,000	4239986,450	600,982	C	241048,000	4239594,501	595,522	C
240435,500	4239986,450	600,973	C	241044,500	4239594,501	595,531	C
240449,500	4239986,450	600,938	C	241030,500	4239594,501	595,566	C
240453,000	4239986,450	600,929	C	241027,000	4239594,501	595,575	C
240467,000	4239986,450	600,894	C	241013,000	4239594,501	595,610	C
240470,500	4239986,450	600,885	C	241009,500	4239594,501	595,618	C
240484,500	4239986,450	600,850	C	240995,500	4239594,501	595,653	C
240488,000	4239986,450	600,842	C	240992,000	4239594,501	595,662	C

Coord. X	Coord. Y	Elevación	Código
240502,000	4239986,450	600,807	C
240505,500	4239986,450	600,798	C
240519,500	4239986,450	600,763	C
240523,000	4239986,450	600,754	C
240537,000	4239986,450	600,719	C
240540,500	4239986,450	600,710	C
240554,500	4239986,450	600,675	C
240558,000	4239986,450	600,667	C
240572,000	4239986,450	600,632	C
240575,500	4239986,450	600,623	C
240589,500	4239986,450	600,588	C
240593,000	4239986,450	600,579	C
240607,000	4239986,450	600,544	C
240610,500	4239986,450	600,535	C
240624,500	4239986,450	600,500	C
240628,000	4239986,450	600,492	C
240642,000	4239986,450	600,457	C
240645,500	4239986,450	600,448	C
240659,500	4239986,450	600,413	C
240663,000	4239986,450	600,404	C
240677,000	4239986,450	600,369	C
240680,500	4239986,450	600,360	C
240694,500	4239986,450	600,325	C
240698,000	4239986,450	600,317	C
240712,000	4239986,450	600,282	C
240715,500	4239986,450	600,273	C
240729,500	4239986,450	600,238	C
240733,000	4239986,450	600,229	C
240747,000	4239986,450	600,194	C
240750,500	4239986,450	600,185	C
240764,500	4239986,450	600,150	C
240768,000	4239986,450	600,142	C
240768,000	4239983,300	600,110	C
240764,500	4239983,300	600,119	C
240750,500	4239983,300	600,154	C
240747,000	4239983,300	600,163	C
240733,000	4239983,300	600,198	C
240729,500	4239983,300	600,206	C
240715,500	4239983,300	600,241	C
240712,000	4239983,300	600,250	C
240698,000	4239983,300	600,285	C
240694,500	4239983,300	600,294	C
240680,500	4239983,300	600,329	C
240677,000	4239983,300	600,338	C
240663,000	4239983,300	600,373	C
240659,500	4239983,300	600,381	C

Coord. X	Coord. Y	Elevación	Código
240978,000	4239594,501	595,697	C
240974,500	4239594,501	595,706	C
240960,500	4239594,501	595,741	C
240957,000	4239594,501	595,750	C
240943,000	4239594,501	595,785	C
240939,500	4239594,501	595,793	C
240925,500	4239594,501	595,828	C
240922,000	4239594,501	595,837	C
240908,000	4239594,501	595,872	C
240904,500	4239594,501	595,881	C
240890,500	4239594,501	595,916	C
240887,000	4239594,501	595,925	C
240873,000	4239594,501	595,960	C
240869,500	4239594,501	595,968	C
240855,500	4239594,501	596,003	C
240852,000	4239594,501	596,012	C
240838,000	4239594,501	596,047	C
240834,500	4239594,501	596,056	C
240820,500	4239594,501	596,091	C
240817,000	4239594,501	596,100	C
240803,000	4239594,501	596,135	C
240799,500	4239594,501	596,143	C
240785,500	4239594,501	596,178	C
240782,000	4239594,501	596,187	C
240768,000	4239594,501	596,222	C
240764,500	4239594,501	596,231	C
240750,500	4239594,501	596,266	C
240747,000	4239594,501	596,275	C
240733,000	4239594,501	596,310	C
240729,500	4239594,501	596,318	C
240715,500	4239594,501	596,353	C
240712,000	4239594,501	596,362	C
240698,000	4239594,501	596,397	C
240694,500	4239594,501	596,406	C
240680,500	4239594,501	596,441	C
240677,000	4239594,501	596,450	C
240663,000	4239594,501	596,485	C
240659,500	4239594,501	596,493	C
240645,500	4239594,501	596,528	C
240642,000	4239594,501	596,537	C
240628,000	4239594,501	596,572	C
240624,500	4239594,501	596,581	C
240610,500	4239594,501	596,616	C
240607,000	4239594,501	596,625	C
240593,000	4239594,501	596,660	C
240589,500	4239594,501	596,668	C

Coord. X	Coord. Y	Elevación	Código
240645,500	4239983,300	600,416	C
240642,000	4239983,300	600,425	C
240628,000	4239983,300	600,460	C
240624,500	4239983,300	600,469	C
240610,500	4239983,300	600,504	C
240607,000	4239983,300	600,513	C
240593,000	4239983,300	600,548	C
240589,500	4239983,300	600,556	C
240575,500	4239983,300	600,591	C
240572,000	4239983,300	600,600	C
240558,000	4239983,300	600,635	C
240554,500	4239983,300	600,644	C
240540,500	4239983,300	600,679	C
240537,000	4239983,300	600,688	C
240523,000	4239983,300	600,723	C
240519,500	4239983,300	600,731	C
240505,500	4239983,300	600,766	C
240502,000	4239983,300	600,775	C
240488,000	4239983,300	600,810	C
240484,500	4239983,300	600,819	C
240470,500	4239983,300	600,854	C
240467,000	4239983,300	600,863	C
240453,000	4239983,300	600,898	C
240449,500	4239983,300	600,906	C
240435,500	4239983,300	600,941	C
240432,000	4239983,300	600,950	C
240418,000	4239983,300	600,985	C
240414,500	4239983,300	600,994	C
240400,500	4239983,300	601,029	C
240397,000	4239983,300	601,038	C
240383,000	4239983,300	601,073	C
240379,500	4239983,300	601,081	C
240365,500	4239983,300	601,116	C
240362,000	4239983,300	601,125	C
240348,000	4239983,300	601,160	C
240344,500	4239983,300	601,169	C
240330,500	4239983,300	601,204	C
240327,000	4239983,300	601,213	C
240313,000	4239983,300	601,248	C
240309,500	4239983,300	601,256	C
240295,500	4239983,300	601,291	C
240292,000	4239983,300	601,300	C
240278,000	4239983,300	601,335	C
240274,500	4239983,300	601,344	C
240260,500	4239983,300	601,379	C
240257,000	4239983,300	601,388	C

Coord. X	Coord. Y	Elevación	Código
240575,500	4239594,501	596,703	C
240572,000	4239594,501	596,712	C
240558,000	4239594,501	596,747	C
240554,500	4239594,501	596,756	C
240540,500	4239594,501	596,791	C
240537,000	4239594,501	596,800	C
240523,000	4239594,501	596,835	C
240519,500	4239594,501	596,843	C
240505,500	4239594,501	596,878	C
240502,000	4239594,501	596,887	C
240488,000	4239594,501	596,922	C
240484,500	4239594,501	596,931	C
240470,500	4239594,501	596,966	C
240467,000	4239594,501	596,975	C
240453,000	4239594,501	597,010	C
240449,500	4239594,501	597,018	C
240435,500	4239594,501	597,053	C
240432,000	4239594,501	597,062	C
240418,000	4239594,501	597,097	C
240414,500	4239594,501	597,106	C
240400,500	4239594,501	597,141	C
240397,000	4239594,501	597,150	C
240383,000	4239594,501	597,185	C
240379,500	4239594,501	597,193	C
240365,500	4239594,501	597,228	C
240362,000	4239594,501	597,237	C
240348,000	4239594,501	597,272	C
240344,500	4239594,501	597,281	C
240330,500	4239594,501	597,316	C
240327,000	4239594,501	597,325	C
240313,000	4239594,501	597,360	C
240309,500	4239594,501	597,368	C
240295,500	4239594,501	597,403	C
240292,000	4239594,501	597,412	C
240278,000	4239594,501	597,447	C
240274,500	4239594,501	597,456	C
240260,500	4239594,501	597,491	C
240257,000	4239594,501	597,500	C
240243,000	4239594,501	597,535	C
240239,500	4239594,501	597,543	C
240225,500	4239594,501	597,578	C
240222,000	4239594,501	597,587	C
240208,000	4239594,501	597,622	C
240204,500	4239594,501	597,631	C
240190,500	4239594,501	597,666	C
240187,000	4239594,501	597,675	C

Coord. X	Coord. Y	Elevación	Código
240243,000	4239983,300	601,423	C
240239,500	4239983,300	601,431	C
240225,500	4239983,300	601,466	C
240222,000	4239983,300	601,475	C
240208,000	4239983,300	601,510	C
240204,500	4239983,300	601,519	C
240190,500	4239983,300	601,554	C
240187,000	4239983,300	601,563	C
240173,000	4239983,300	601,598	C
240169,500	4239983,300	601,606	C
240155,500	4239983,300	601,641	C
240152,000	4239983,300	601,650	C
240138,000	4239983,300	601,685	C
240134,500	4239983,300	601,694	C
240120,500	4239983,300	601,729	C
240117,000	4239983,300	601,738	C
240103,000	4239983,300	601,773	C
240099,500	4239983,300	601,781	C
240085,500	4239983,300	601,816	C
240082,000	4239983,300	601,825	C
240068,000	4239983,300	601,860	C
240064,500	4239983,300	601,869	C
240050,500	4239983,300	601,904	C
240047,000	4239983,300	601,913	C
240033,000	4239983,300	601,948	C
240029,500	4239983,300	601,956	C
240015,500	4239983,300	601,991	C
240012,000	4239983,300	602,000	C
240012,000	4239974,246	601,910	C
240015,500	4239974,246	601,901	C
240029,500	4239974,246	601,866	C
240033,000	4239974,246	601,857	C
240047,000	4239974,246	601,822	C
240050,500	4239974,246	601,813	C
240064,500	4239974,246	601,778	C
240068,000	4239974,246	601,770	C
240082,000	4239974,246	601,735	C
240085,500	4239974,246	601,726	C
240099,500	4239974,246	601,691	C
240103,000	4239974,246	601,682	C
240117,000	4239974,246	601,647	C
240120,500	4239974,246	601,638	C
240134,500	4239974,246	601,603	C
240138,000	4239974,246	601,595	C
240152,000	4239974,246	601,560	C
240155,500	4239974,246	601,551	C

Coord. X	Coord. Y	Elevación	Código
240173,000	4239594,501	597,710	C
240169,500	4239594,501	597,718	C
240155,500	4239594,501	597,753	C
240152,000	4239594,501	597,762	C
240138,000	4239594,501	597,797	C
240134,500	4239594,501	597,806	C
240120,500	4239594,501	597,841	C
240117,000	4239594,501	597,850	C
240103,000	4239594,501	597,885	C
240099,500	4239594,501	597,893	C
240085,500	4239594,501	597,928	C
240082,000	4239594,501	597,937	C
240068,000	4239594,501	597,972	C
240064,500	4239594,501	597,981	C
240050,500	4239594,501	598,016	C
240047,000	4239594,501	598,025	C
240033,000	4239594,501	598,060	C
240029,500	4239594,501	598,068	C
240015,500	4239594,501	598,103	C
240012,000	4239594,501	598,112	C
240012,000	4239590,501	598,072	C
240015,500	4239590,501	598,063	C
240029,500	4239590,501	598,028	C
240033,000	4239590,501	598,020	C
240047,000	4239590,501	597,985	C
240050,500	4239590,501	597,976	C
240064,500	4239590,501	597,941	C
240068,000	4239590,501	597,932	C
240082,000	4239590,501	597,897	C
240085,500	4239590,501	597,888	C
240099,500	4239590,501	597,853	C
240103,000	4239590,501	597,845	C
240117,000	4239590,501	597,810	C
240120,500	4239590,501	597,801	C
240134,500	4239590,501	597,766	C
240138,000	4239590,501	597,757	C
240152,000	4239590,501	597,722	C
240155,500	4239590,501	597,713	C
240169,500	4239590,501	597,678	C
240173,000	4239590,501	597,670	C
240187,000	4239590,501	597,635	C
240190,500	4239590,501	597,626	C
240204,500	4239590,501	597,591	C
240208,000	4239590,501	597,582	C
240222,000	4239590,501	597,547	C
240225,500	4239590,501	597,538	C

Coord. X	Coord. Y	Elevación	Código
240169,500	4239974,246	601,516	C
240173,000	4239974,246	601,507	C
240187,000	4239974,246	601,472	C
240190,500	4239974,246	601,463	C
240204,500	4239974,246	601,428	C
240208,000	4239974,246	601,420	C
240222,000	4239974,246	601,385	C
240225,500	4239974,246	601,376	C
240239,500	4239974,246	601,341	C
240243,000	4239974,246	601,332	C
240257,000	4239974,246	601,297	C
240260,500	4239974,246	601,288	C
240274,500	4239974,246	601,253	C
240278,000	4239974,246	601,245	C
240292,000	4239974,246	601,210	C
240295,500	4239974,246	601,201	C
240309,500	4239974,246	601,166	C
240313,000	4239974,246	601,157	C
240327,000	4239974,246	601,122	C
240330,500	4239974,246	601,113	C
240344,500	4239974,246	601,078	C
240348,000	4239974,246	601,070	C
240362,000	4239974,246	601,035	C
240365,500	4239974,246	601,026	C
240379,500	4239974,246	600,991	C
240383,000	4239974,246	600,982	C
240397,000	4239974,246	600,947	C
240400,500	4239974,246	600,938	C
240414,500	4239974,246	600,903	C
240418,000	4239974,246	600,895	C
240432,000	4239974,246	600,860	C
240435,500	4239974,246	600,851	C
240449,500	4239974,246	600,816	C
240453,000	4239974,246	600,807	C
240467,000	4239974,246	600,772	C
240470,500	4239974,246	600,763	C
240484,500	4239974,246	600,728	C
240488,000	4239974,246	600,720	C
240502,000	4239974,246	600,685	C
240505,500	4239974,246	600,676	C
240519,500	4239974,246	600,641	C
240523,000	4239974,246	600,632	C
240537,000	4239974,246	600,597	C
240540,500	4239974,246	600,588	C
240554,500	4239974,246	600,553	C
240558,000	4239974,246	600,545	C

Coord. X	Coord. Y	Elevación	Código
240239,500	4239590,501	597,503	C
240243,000	4239590,501	597,495	C
240257,000	4239590,501	597,460	C
240260,500	4239590,501	597,451	C
240274,500	4239590,501	597,416	C
240278,000	4239590,501	597,407	C
240292,000	4239590,501	597,372	C
240295,500	4239590,501	597,363	C
240309,500	4239590,501	597,328	C
240313,000	4239590,501	597,320	C
240327,000	4239590,501	597,285	C
240330,500	4239590,501	597,276	C
240344,500	4239590,501	597,241	C
240348,000	4239590,501	597,232	C
240362,000	4239590,501	597,197	C
240365,500	4239590,501	597,188	C
240379,500	4239590,501	597,153	C
240383,000	4239590,501	597,145	C
240397,000	4239590,501	597,110	C
240400,500	4239590,501	597,101	C
240414,500	4239590,501	597,066	C
240418,000	4239590,501	597,057	C
240432,000	4239590,501	597,022	C
240435,500	4239590,501	597,013	C
240449,500	4239590,501	596,978	C
240453,000	4239590,501	596,970	C
240467,000	4239590,501	596,935	C
240470,500	4239590,501	596,926	C
240484,500	4239590,501	596,891	C
240488,000	4239590,501	596,882	C
240502,000	4239590,501	596,847	C
240505,500	4239590,501	596,838	C
240519,500	4239590,501	596,803	C
240523,000	4239590,501	596,795	C
240537,000	4239590,501	596,760	C
240540,500	4239590,501	596,751	C
240554,500	4239590,501	596,716	C
240558,000	4239590,501	596,707	C
240572,000	4239590,501	596,672	C
240575,500	4239590,501	596,663	C
240589,500	4239590,501	596,628	C
240593,000	4239590,501	596,620	C
240607,000	4239590,501	596,585	C
240610,500	4239590,501	596,576	C
240624,500	4239590,501	596,541	C
240628,000	4239590,501	596,532	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240572,000	4239974,246	600,510	C	240642,000	4239590,501	596,497	C
240575,500	4239974,246	600,501	C	240645,500	4239590,501	596,488	C
240589,500	4239974,246	600,466	C	240659,500	4239590,501	596,453	C
240593,000	4239974,246	600,457	C	240663,000	4239590,501	596,445	C
240607,000	4239974,246	600,422	C	240677,000	4239590,501	596,410	C
240610,500	4239974,246	600,413	C	240680,500	4239590,501	596,401	C
240624,500	4239974,246	600,378	C	240694,500	4239590,501	596,366	C
240628,000	4239974,246	600,370	C	240698,000	4239590,501	596,357	C
240642,000	4239974,246	600,335	C	240712,000	4239590,501	596,322	C
240645,500	4239974,246	600,326	C	240715,500	4239590,501	596,313	C
240659,500	4239974,246	600,291	C	240729,500	4239590,501	596,278	C
240663,000	4239974,246	600,282	C	240733,000	4239590,501	596,270	C
240677,000	4239974,246	600,247	C	240747,000	4239590,501	596,235	C
240680,500	4239974,246	600,238	C	240750,500	4239590,501	596,226	C
240694,500	4239974,246	600,203	C	240764,500	4239590,501	596,191	C
240698,000	4239974,246	600,195	C	240768,000	4239590,501	596,182	C
240712,000	4239974,246	600,160	C	240782,000	4239590,501	596,147	C
240715,500	4239974,246	600,151	C	240785,500	4239590,501	596,138	C
240729,500	4239974,246	600,116	C	240799,500	4239590,501	596,103	C
240733,000	4239974,246	600,107	C	240803,000	4239590,501	596,095	C
240747,000	4239974,246	600,072	C	240817,000	4239590,501	596,060	C
240750,500	4239974,246	600,063	C	240820,500	4239590,501	596,051	C
240764,500	4239974,246	600,028	C	240834,500	4239590,501	596,016	C
240768,000	4239974,246	600,020	C	240838,000	4239590,501	596,007	C
240768,000	4239970,246	599,980	C	240852,000	4239590,501	595,972	C
240764,500	4239970,246	599,988	C	240855,500	4239590,501	595,963	C
240750,500	4239970,246	600,023	C	240869,500	4239590,501	595,928	C
240747,000	4239970,246	600,032	C	240873,000	4239590,501	595,920	C
240733,000	4239970,246	600,067	C	240887,000	4239590,501	595,885	C
240729,500	4239970,246	600,076	C	240890,500	4239590,501	595,876	C
240715,500	4239970,246	600,111	C	240904,500	4239590,501	595,841	C
240712,000	4239970,246	600,120	C	240908,000	4239590,501	595,832	C
240698,000	4239970,246	600,155	C	240922,000	4239590,501	595,797	C
240694,500	4239970,246	600,163	C	240925,500	4239590,501	595,788	C
240680,500	4239970,246	600,198	C	240939,500	4239590,501	595,753	C
240677,000	4239970,246	600,207	C	240943,000	4239590,501	595,745	C
240663,000	4239970,246	600,242	C	240957,000	4239590,501	595,710	C
240659,500	4239970,246	600,251	C	240960,500	4239590,501	595,701	C
240645,500	4239970,246	600,286	C	240974,500	4239590,501	595,666	C
240642,000	4239970,246	600,295	C	240978,000	4239590,501	595,657	C
240628,000	4239970,246	600,330	C	240992,000	4239590,501	595,622	C
240624,500	4239970,246	600,338	C	240995,500	4239590,501	595,613	C
240610,500	4239970,246	600,373	C	241009,500	4239590,501	595,578	C
240607,000	4239970,246	600,382	C	241013,000	4239590,501	595,570	C
240593,000	4239970,246	600,417	C	241027,000	4239590,501	595,535	C
240589,500	4239970,246	600,426	C	241030,500	4239590,501	595,526	C

Coord. X	Coord. Y	Elevación	Código
240575,500	4239970,246	600,461	C
240572,000	4239970,246	600,470	C
240558,000	4239970,246	600,505	C
240554,500	4239970,246	600,513	C
240540,500	4239970,246	600,548	C
240537,000	4239970,246	600,557	C
240523,000	4239970,246	600,592	C
240519,500	4239970,246	600,601	C
240505,500	4239970,246	600,636	C
240502,000	4239970,246	600,645	C
240488,000	4239970,246	600,680	C
240484,500	4239970,246	600,688	C
240470,500	4239970,246	600,723	C
240467,000	4239970,246	600,732	C
240453,000	4239970,246	600,767	C
240449,500	4239970,246	600,776	C
240435,500	4239970,246	600,811	C
240432,000	4239970,246	600,820	C
240418,000	4239970,246	600,855	C
240414,500	4239970,246	600,863	C
240400,500	4239970,246	600,898	C
240397,000	4239970,246	600,907	C
240383,000	4239970,246	600,942	C
240379,500	4239970,246	600,951	C
240365,500	4239970,246	600,986	C
240362,000	4239970,246	600,995	C
240348,000	4239970,246	601,030	C
240344,500	4239970,246	601,038	C
240330,500	4239970,246	601,073	C
240327,000	4239970,246	601,082	C
240313,000	4239970,246	601,117	C
240309,500	4239970,246	601,126	C
240295,500	4239970,246	601,161	C
240292,000	4239970,246	601,170	C
240278,000	4239970,246	601,205	C
240274,500	4239970,246	601,213	C
240260,500	4239970,246	601,248	C
240257,000	4239970,246	601,257	C
240243,000	4239970,246	601,292	C
240239,500	4239970,246	601,301	C
240225,500	4239970,246	601,336	C
240222,000	4239970,246	601,345	C
240208,000	4239970,246	601,380	C
240204,500	4239970,246	601,388	C
240190,500	4239970,246	601,423	C
240187,000	4239970,246	601,432	C
241044,500	4239590,501	595,491	C
241048,000	4239590,501	595,482	C
241062,000	4239590,501	595,447	C
241065,500	4239590,501	595,438	C
241079,500	4239590,501	595,403	C
241083,000	4239590,501	595,395	C
241097,000	4239590,501	595,360	C
241100,500	4239590,501	595,351	C
241114,500	4239590,501	595,316	C
241118,000	4239590,501	595,307	C
241132,000	4239590,501	595,272	C
241135,500	4239590,501	595,263	C
241149,500	4239590,501	595,228	C
241153,000	4239590,501	595,220	C
241167,000	4239590,501	595,185	C
241170,500	4239590,501	595,176	C
241184,500	4239590,501	595,141	C
241188,000	4239590,501	595,132	C
241188,000	4239582,448	595,052	C
241184,500	4239582,448	595,060	C
241170,500	4239582,448	595,095	C
241167,000	4239582,448	595,104	C
241153,000	4239582,448	595,139	C
241149,500	4239582,448	595,148	C
241135,500	4239582,448	595,183	C
241132,000	4239582,448	595,192	C
241118,000	4239582,448	595,227	C
241114,500	4239582,448	595,235	C
241100,500	4239582,448	595,270	C
241097,000	4239582,448	595,279	C
241083,000	4239582,448	595,314	C
241079,500	4239582,448	595,323	C
241065,500	4239582,448	595,358	C
241062,000	4239582,448	595,367	C
241048,000	4239582,448	595,402	C
241044,500	4239582,448	595,410	C
241030,500	4239582,448	595,445	C
241027,000	4239582,448	595,454	C
241013,000	4239582,448	595,489	C
241009,500	4239582,448	595,498	C
240995,500	4239582,448	595,533	C
240992,000	4239582,448	595,542	C
240978,000	4239582,448	595,577	C
240974,500	4239582,448	595,585	C
240960,500	4239582,448	595,620	C
240957,000	4239582,448	595,629	C

Coord. X	Coord. Y	Elevación	Código
240173,000	4239970,246	601,467	C
240169,500	4239970,246	601,476	C
240155,500	4239970,246	601,511	C
240152,000	4239970,246	601,520	C
240138,000	4239970,246	601,555	C
240134,500	4239970,246	601,563	C
240120,500	4239970,246	601,598	C
240117,000	4239970,246	601,607	C
240103,000	4239970,246	601,642	C
240099,500	4239970,246	601,651	C
240085,500	4239970,246	601,686	C
240082,000	4239970,246	601,695	C
240068,000	4239970,246	601,730	C
240064,500	4239970,246	601,738	C
240050,500	4239970,246	601,773	C
240047,000	4239970,246	601,782	C
240033,000	4239970,246	601,817	C
240029,500	4239970,246	601,826	C
240015,500	4239970,246	601,861	C
240012,000	4239970,246	601,870	C
240012,000	4239962,193	601,789	C
240015,500	4239962,193	601,780	C
240029,500	4239962,193	601,745	C
240033,000	4239962,193	601,737	C
240047,000	4239962,193	601,702	C
240050,500	4239962,193	601,693	C
240064,500	4239962,193	601,658	C
240068,000	4239962,193	601,649	C
240082,000	4239962,193	601,614	C
240085,500	4239962,193	601,605	C
240099,500	4239962,193	601,570	C
240103,000	4239962,193	601,562	C
240117,000	4239962,193	601,527	C
240120,500	4239962,193	601,518	C
240134,500	4239962,193	601,483	C
240138,000	4239962,193	601,474	C
240152,000	4239962,193	601,439	C
240155,500	4239962,193	601,430	C
240169,500	4239962,193	601,395	C
240173,000	4239962,193	601,387	C
240187,000	4239962,193	601,352	C
240190,500	4239962,193	601,343	C
240204,500	4239962,193	601,308	C
240208,000	4239962,193	601,299	C
240222,000	4239962,193	601,264	C
240225,500	4239962,193	601,255	C

Coord. X	Coord. Y	Elevación	Código
240943,000	4239582,448	595,664	C
240939,500	4239582,448	595,673	C
240925,500	4239582,448	595,708	C
240922,000	4239582,448	595,717	C
240908,000	4239582,448	595,752	C
240904,500	4239582,448	595,760	C
240890,500	4239582,448	595,795	C
240887,000	4239582,448	595,804	C
240873,000	4239582,448	595,839	C
240869,500	4239582,448	595,848	C
240855,500	4239582,448	595,883	C
240852,000	4239582,448	595,892	C
240838,000	4239582,448	595,927	C
240834,500	4239582,448	595,935	C
240820,500	4239582,448	595,970	C
240817,000	4239582,448	595,979	C
240803,000	4239582,448	596,014	C
240799,500	4239582,448	596,023	C
240785,500	4239582,448	596,058	C
240782,000	4239582,448	596,067	C
240768,000	4239582,448	596,102	C
240764,500	4239582,448	596,110	C
240750,500	4239582,448	596,145	C
240747,000	4239582,448	596,154	C
240733,000	4239582,448	596,189	C
240729,500	4239582,448	596,198	C
240715,500	4239582,448	596,233	C
240712,000	4239582,448	596,242	C
240698,000	4239582,448	596,277	C
240694,500	4239582,448	596,285	C
240680,500	4239582,448	596,320	C
240677,000	4239582,448	596,329	C
240663,000	4239582,448	596,364	C
240659,500	4239582,448	596,373	C
240645,500	4239582,448	596,408	C
240642,000	4239582,448	596,417	C
240628,000	4239582,448	596,452	C
240624,500	4239582,448	596,460	C
240610,500	4239582,448	596,495	C
240607,000	4239582,448	596,504	C
240593,000	4239582,448	596,539	C
240589,500	4239582,448	596,548	C
240575,500	4239582,448	596,583	C
240572,000	4239582,448	596,592	C
240558,000	4239582,448	596,627	C
240554,500	4239582,448	596,635	C

Coord. X	Coord. Y	Elevación	Código
240239,500	4239962,193	601,220	C
240243,000	4239962,193	601,212	C
240257,000	4239962,193	601,177	C
240260,500	4239962,193	601,168	C
240274,500	4239962,193	601,133	C
240278,000	4239962,193	601,124	C
240292,000	4239962,193	601,089	C
240295,500	4239962,193	601,080	C
240309,500	4239962,193	601,045	C
240313,000	4239962,193	601,037	C
240327,000	4239962,193	601,002	C
240330,500	4239962,193	600,993	C
240344,500	4239962,193	600,958	C
240348,000	4239962,193	600,949	C
240362,000	4239962,193	600,914	C
240365,500	4239962,193	600,905	C
240379,500	4239962,193	600,870	C
240383,000	4239962,193	600,862	C
240397,000	4239962,193	600,827	C
240400,500	4239962,193	600,818	C
240414,500	4239962,193	600,783	C
240418,000	4239962,193	600,774	C
240432,000	4239962,193	600,739	C
240435,500	4239962,193	600,730	C
240449,500	4239962,193	600,695	C
240453,000	4239962,193	600,687	C
240467,000	4239962,193	600,652	C
240470,500	4239962,193	600,643	C
240484,500	4239962,193	600,608	C
240488,000	4239962,193	600,599	C
240502,000	4239962,193	600,564	C
240505,500	4239962,193	600,555	C
240519,500	4239962,193	600,520	C
240523,000	4239962,193	600,512	C
240537,000	4239962,193	600,477	C
240540,500	4239962,193	600,468	C
240554,500	4239962,193	600,433	C
240558,000	4239962,193	600,424	C
240572,000	4239962,193	600,389	C
240575,500	4239962,193	600,380	C
240589,500	4239962,193	600,345	C
240593,000	4239962,193	600,337	C
240607,000	4239962,193	600,302	C
240610,500	4239962,193	600,293	C
240624,500	4239962,193	600,258	C
240628,000	4239962,193	600,249	C

Coord. X	Coord. Y	Elevación	Código
240540,500	4239582,448	596,670	C
240537,000	4239582,448	596,679	C
240523,000	4239582,448	596,714	C
240519,500	4239582,448	596,723	C
240505,500	4239582,448	596,758	C
240502,000	4239582,448	596,767	C
240488,000	4239582,448	596,802	C
240484,500	4239582,448	596,810	C
240470,500	4239582,448	596,845	C
240467,000	4239582,448	596,854	C
240453,000	4239582,448	596,889	C
240449,500	4239582,448	596,898	C
240435,500	4239582,448	596,933	C
240432,000	4239582,448	596,942	C
240418,000	4239582,448	596,977	C
240414,500	4239582,448	596,985	C
240400,500	4239582,448	597,020	C
240397,000	4239582,448	597,029	C
240383,000	4239582,448	597,064	C
240379,500	4239582,448	597,073	C
240365,500	4239582,448	597,108	C
240362,000	4239582,448	597,116	C
240348,000	4239582,448	597,151	C
240344,500	4239582,448	597,160	C
240330,500	4239582,448	597,195	C
240327,000	4239582,448	597,204	C
240313,000	4239582,448	597,239	C
240309,500	4239582,448	597,248	C
240295,500	4239582,448	597,283	C
240292,000	4239582,448	597,291	C
240278,000	4239582,448	597,326	C
240274,500	4239582,448	597,335	C
240260,500	4239582,448	597,370	C
240257,000	4239582,448	597,379	C
240243,000	4239582,448	597,414	C
240239,500	4239582,448	597,423	C
240225,500	4239582,448	597,458	C
240222,000	4239582,448	597,466	C
240208,000	4239582,448	597,501	C
240204,500	4239582,448	597,510	C
240190,500	4239582,448	597,545	C
240187,000	4239582,448	597,554	C
240173,000	4239582,448	597,589	C
240169,500	4239582,448	597,598	C
240155,500	4239582,448	597,633	C
240152,000	4239582,448	597,641	C

Coord. X	Coord. Y	Elevación	Código
240642,000	4239962,193	600,214	C
240645,500	4239962,193	600,205	C
240659,500	4239962,193	600,170	C
240663,000	4239962,193	600,162	C
240677,000	4239962,193	600,127	C
240680,500	4239962,193	600,118	C
240694,500	4239962,193	600,083	C
240698,000	4239962,193	600,074	C
240712,000	4239962,193	600,039	C
240715,500	4239962,193	600,030	C
240729,500	4239962,193	599,995	C
240733,000	4239962,193	599,987	C
240747,000	4239962,193	599,952	C
240750,500	4239962,193	599,943	C
240764,500	4239962,193	599,908	C
240768,000	4239962,193	599,899	C
240768,000	4239958,193	599,859	C
240764,500	4239958,193	599,868	C
240750,500	4239958,193	599,903	C
240747,000	4239958,193	599,912	C
240733,000	4239958,193	599,947	C
240729,500	4239958,193	599,955	C
240715,500	4239958,193	599,990	C
240712,000	4239958,193	599,999	C
240698,000	4239958,193	600,034	C
240694,500	4239958,193	600,043	C
240680,500	4239958,193	600,078	C
240677,000	4239958,193	600,087	C
240663,000	4239958,193	600,122	C
240659,500	4239958,193	600,130	C
240645,500	4239958,193	600,165	C
240642,000	4239958,193	600,174	C
240628,000	4239958,193	600,209	C
240624,500	4239958,193	600,218	C
240610,500	4239958,193	600,253	C
240607,000	4239958,193	600,262	C
240593,000	4239958,193	600,297	C
240589,500	4239958,193	600,305	C
240575,500	4239958,193	600,340	C
240572,000	4239958,193	600,349	C
240558,000	4239958,193	600,384	C
240554,500	4239958,193	600,393	C
240540,500	4239958,193	600,428	C
240537,000	4239958,193	600,437	C
240523,000	4239958,193	600,472	C
240519,500	4239958,193	600,480	C

Coord. X	Coord. Y	Elevación	Código
240138,000	4239582,448	597,676	C
240134,500	4239582,448	597,685	C
240120,500	4239582,448	597,720	C
240117,000	4239582,448	597,729	C
240103,000	4239582,448	597,764	C
240099,500	4239582,448	597,773	C
240085,500	4239582,448	597,808	C
240082,000	4239582,448	597,816	C
240068,000	4239582,448	597,851	C
240064,500	4239582,448	597,860	C
240050,500	4239582,448	597,895	C
240047,000	4239582,448	597,904	C
240033,000	4239582,448	597,939	C
240029,500	4239582,448	597,948	C
240015,500	4239582,448	597,983	C
240012,000	4239582,448	597,991	C
240012,000	4239578,448	597,951	C
240015,500	4239578,448	597,943	C
240029,500	4239578,448	597,908	C
240033,000	4239578,448	597,899	C
240047,000	4239578,448	597,864	C
240050,500	4239578,448	597,855	C
240064,500	4239578,448	597,820	C
240068,000	4239578,448	597,811	C
240082,000	4239578,448	597,776	C
240085,500	4239578,448	597,768	C
240099,500	4239578,448	597,733	C
240103,000	4239578,448	597,724	C
240117,000	4239578,448	597,689	C
240120,500	4239578,448	597,680	C
240134,500	4239578,448	597,645	C
240138,000	4239578,448	597,636	C
240152,000	4239578,448	597,601	C
240155,500	4239578,448	597,593	C
240169,500	4239578,448	597,558	C
240173,000	4239578,448	597,549	C
240187,000	4239578,448	597,514	C
240190,500	4239578,448	597,505	C
240204,500	4239578,448	597,470	C
240208,000	4239578,448	597,461	C
240222,000	4239578,448	597,426	C
240225,500	4239578,448	597,418	C
240239,500	4239578,448	597,383	C
240243,000	4239578,448	597,374	C
240257,000	4239578,448	597,339	C
240260,500	4239578,448	597,330	C

Coord. X	Coord. Y	Elevación	Código
240505,500	4239958,193	600,515	C
240502,000	4239958,193	600,524	C
240488,000	4239958,193	600,559	C
240484,500	4239958,193	600,568	C
240470,500	4239958,193	600,603	C
240467,000	4239958,193	600,612	C
240453,000	4239958,193	600,647	C
240449,500	4239958,193	600,655	C
240435,500	4239958,193	600,690	C
240432,000	4239958,193	600,699	C
240418,000	4239958,193	600,734	C
240414,500	4239958,193	600,743	C
240400,500	4239958,193	600,778	C
240397,000	4239958,193	600,787	C
240383,000	4239958,193	600,822	C
240379,500	4239958,193	600,830	C
240365,500	4239958,193	600,865	C
240362,000	4239958,193	600,874	C
240348,000	4239958,193	600,909	C
240344,500	4239958,193	600,918	C
240330,500	4239958,193	600,953	C
240327,000	4239958,193	600,962	C
240313,000	4239958,193	600,997	C
240309,500	4239958,193	601,005	C
240295,500	4239958,193	601,040	C
240292,000	4239958,193	601,049	C
240278,000	4239958,193	601,084	C
240274,500	4239958,193	601,093	C
240260,500	4239958,193	601,128	C
240257,000	4239958,193	601,137	C
240243,000	4239958,193	601,172	C
240239,500	4239958,193	601,180	C
240225,500	4239958,193	601,215	C
240222,000	4239958,193	601,224	C
240208,000	4239958,193	601,259	C
240204,500	4239958,193	601,268	C
240190,500	4239958,193	601,303	C
240187,000	4239958,193	601,312	C
240173,000	4239958,193	601,347	C
240169,500	4239958,193	601,355	C
240155,500	4239958,193	601,390	C
240152,000	4239958,193	601,399	C
240138,000	4239958,193	601,434	C
240134,500	4239958,193	601,443	C
240120,500	4239958,193	601,478	C
240117,000	4239958,193	601,487	C

Coord. X	Coord. Y	Elevación	Código
240274,500	4239578,448	597,295	C
240278,000	4239578,448	597,286	C
240292,000	4239578,448	597,251	C
240295,500	4239578,448	597,243	C
240309,500	4239578,448	597,208	C
240313,000	4239578,448	597,199	C
240327,000	4239578,448	597,164	C
240330,500	4239578,448	597,155	C
240344,500	4239578,448	597,120	C
240348,000	4239578,448	597,111	C
240362,000	4239578,448	597,076	C
240365,500	4239578,448	597,068	C
240379,500	4239578,448	597,033	C
240383,000	4239578,448	597,024	C
240397,000	4239578,448	596,989	C
240400,500	4239578,448	596,980	C
240414,500	4239578,448	596,945	C
240418,000	4239578,448	596,937	C
240432,000	4239578,448	596,902	C
240435,500	4239578,448	596,893	C
240449,500	4239578,448	596,858	C
240453,000	4239578,448	596,849	C
240467,000	4239578,448	596,814	C
240470,500	4239578,448	596,805	C
240484,500	4239578,448	596,770	C
240488,000	4239578,448	596,762	C
240502,000	4239578,448	596,727	C
240505,500	4239578,448	596,718	C
240519,500	4239578,448	596,683	C
240523,000	4239578,448	596,674	C
240537,000	4239578,448	596,639	C
240540,500	4239578,448	596,630	C
240554,500	4239578,448	596,595	C
240558,000	4239578,448	596,587	C
240572,000	4239578,448	596,552	C
240575,500	4239578,448	596,543	C
240589,500	4239578,448	596,508	C
240593,000	4239578,448	596,499	C
240607,000	4239578,448	596,464	C
240610,500	4239578,448	596,455	C
240624,500	4239578,448	596,420	C
240628,000	4239578,448	596,412	C
240642,000	4239578,448	596,377	C
240645,500	4239578,448	596,368	C
240659,500	4239578,448	596,333	C
240663,000	4239578,448	596,324	C

Coord. X	Coord. Y	Elevación	Código
240103,000	4239958,193	601,522	C
240099,500	4239958,193	601,530	C
240085,500	4239958,193	601,565	C
240082,000	4239958,193	601,574	C
240068,000	4239958,193	601,609	C
240064,500	4239958,193	601,618	C
240050,500	4239958,193	601,653	C
240047,000	4239958,193	601,662	C
240033,000	4239958,193	601,697	C
240029,500	4239958,193	601,705	C
240015,500	4239958,193	601,740	C
240012,000	4239958,193	601,749	C
240012,000	4239950,139	601,668	C
240015,500	4239950,139	601,659	C
240029,500	4239950,139	601,625	C
240033,000	4239950,139	601,616	C
240047,000	4239950,139	601,581	C
240050,500	4239950,139	601,572	C
240064,500	4239950,139	601,537	C
240068,000	4239950,139	601,529	C
240082,000	4239950,139	601,494	C
240085,500	4239950,139	601,485	C
240099,500	4239950,139	601,450	C
240103,000	4239950,139	601,441	C
240117,000	4239950,139	601,406	C
240120,500	4239950,139	601,397	C
240134,500	4239950,139	601,362	C
240138,000	4239950,139	601,354	C
240152,000	4239950,139	601,319	C
240155,500	4239950,139	601,310	C
240169,500	4239950,139	601,275	C
240173,000	4239950,139	601,266	C
240187,000	4239950,139	601,231	C
240190,500	4239950,139	601,222	C
240204,500	4239950,139	601,187	C
240208,000	4239950,139	601,179	C
240222,000	4239950,139	601,144	C
240225,500	4239950,139	601,135	C
240239,500	4239950,139	601,100	C
240243,000	4239950,139	601,091	C
240257,000	4239950,139	601,056	C
240260,500	4239950,139	601,047	C
240274,500	4239950,139	601,012	C
240278,000	4239950,139	601,004	C
240292,000	4239950,139	600,969	C
240295,500	4239950,139	600,960	C

Coord. X	Coord. Y	Elevación	Código
240677,000	4239578,448	596,289	C
240680,500	4239578,448	596,280	C
240694,500	4239578,448	596,245	C
240698,000	4239578,448	596,237	C
240712,000	4239578,448	596,202	C
240715,500	4239578,448	596,193	C
240729,500	4239578,448	596,158	C
240733,000	4239578,448	596,149	C
240747,000	4239578,448	596,114	C
240750,500	4239578,448	596,105	C
240764,500	4239578,448	596,070	C
240768,000	4239578,448	596,062	C
240782,000	4239578,448	596,027	C
240785,500	4239578,448	596,018	C
240799,500	4239578,448	595,983	C
240803,000	4239578,448	595,974	C
240817,000	4239578,448	595,939	C
240820,500	4239578,448	595,930	C
240834,500	4239578,448	595,895	C
240838,000	4239578,448	595,887	C
240852,000	4239578,448	595,852	C
240855,500	4239578,448	595,843	C
240869,500	4239578,448	595,808	C
240873,000	4239578,448	595,799	C
240887,000	4239578,448	595,764	C
240890,500	4239578,448	595,755	C
240904,500	4239578,448	595,720	C
240908,000	4239578,448	595,712	C
240922,000	4239578,448	595,677	C
240925,500	4239578,448	595,668	C
240939,500	4239578,448	595,633	C
240943,000	4239578,448	595,624	C
240957,000	4239578,448	595,589	C
240960,500	4239578,448	595,580	C
240974,500	4239578,448	595,545	C
240978,000	4239578,448	595,537	C
240992,000	4239578,448	595,502	C
240995,500	4239578,448	595,493	C
241009,500	4239578,448	595,458	C
241013,000	4239578,448	595,449	C
241027,000	4239578,448	595,414	C
241030,500	4239578,448	595,405	C
241044,500	4239578,448	595,370	C
241048,000	4239578,448	595,362	C
241062,000	4239578,448	595,327	C
241065,500	4239578,448	595,318	C

Coord. X	Coord. Y	Elevación	Código
240309,500	4239950,139	600,925	C
240313,000	4239950,139	600,916	C
240327,000	4239950,139	600,881	C
240330,500	4239950,139	600,872	C
240344,500	4239950,139	600,837	C
240348,000	4239950,139	600,829	C
240362,000	4239950,139	600,794	C
240365,500	4239950,139	600,785	C
240379,500	4239950,139	600,750	C
240383,000	4239950,139	600,741	C
240397,000	4239950,139	600,706	C
240400,500	4239950,139	600,697	C
240414,500	4239950,139	600,662	C
240418,000	4239950,139	600,654	C
240432,000	4239950,139	600,619	C
240435,500	4239950,139	600,610	C
240449,500	4239950,139	600,575	C
240453,000	4239950,139	600,566	C
240467,000	4239950,139	600,531	C
240470,500	4239950,139	600,522	C
240484,500	4239950,139	600,487	C
240488,000	4239950,139	600,478	C
240502,000	4239950,139	600,443	C
240505,500	4239950,139	600,435	C
240519,500	4239950,139	600,400	C
240523,000	4239950,139	600,391	C
240537,000	4239950,139	600,356	C
240540,500	4239950,139	600,347	C
240554,500	4239950,139	600,312	C
240558,000	4239950,139	600,304	C
240572,000	4239950,139	600,269	C
240575,500	4239950,139	600,260	C
240589,500	4239950,139	600,225	C
240593,000	4239950,139	600,216	C
240607,000	4239950,139	600,181	C
240610,500	4239950,139	600,172	C
240624,500	4239950,139	600,137	C
240628,000	4239950,139	600,129	C
240642,000	4239950,139	600,094	C
240645,500	4239950,139	600,085	C
240659,500	4239950,139	600,050	C
240663,000	4239950,139	600,041	C
240677,000	4239950,139	600,006	C
240680,500	4239950,139	599,997	C
240694,500	4239950,139	599,962	C
240698,000	4239950,139	599,954	C

Coord. X	Coord. Y	Elevación	Código
241079,500	4239578,448	595,283	C
241083,000	4239578,448	595,274	C
241097,000	4239578,448	595,239	C
241100,500	4239578,448	595,230	C
241114,500	4239578,448	595,195	C
241118,000	4239578,448	595,187	C
241132,000	4239578,448	595,152	C
241135,500	4239578,448	595,143	C
241149,500	4239578,448	595,108	C
241153,000	4239578,448	595,099	C
241167,000	4239578,448	595,064	C
241170,500	4239578,448	595,055	C
241184,500	4239578,448	595,020	C
241188,000	4239578,448	595,012	C
241188,000	4239570,394	594,931	C
241184,500	4239570,394	594,940	C
241170,500	4239570,394	594,975	C
241167,000	4239570,394	594,983	C
241153,000	4239570,394	595,018	C
241149,500	4239570,394	595,027	C
241135,500	4239570,394	595,062	C
241132,000	4239570,394	595,071	C
241118,000	4239570,394	595,106	C
241114,500	4239570,394	595,115	C
241100,500	4239570,394	595,150	C
241097,000	4239570,394	595,158	C
241083,000	4239570,394	595,193	C
241079,500	4239570,394	595,202	C
241065,500	4239570,394	595,237	C
241062,000	4239570,394	595,246	C
241048,000	4239570,394	595,281	C
241044,500	4239570,394	595,290	C
241030,500	4239570,394	595,325	C
241027,000	4239570,394	595,333	C
241013,000	4239570,394	595,368	C
241009,500	4239570,394	595,377	C
240995,500	4239570,394	595,412	C
240992,000	4239570,394	595,421	C
240978,000	4239570,394	595,456	C
240974,500	4239570,394	595,465	C
240960,500	4239570,394	595,500	C
240957,000	4239570,394	595,508	C
240943,000	4239570,394	595,543	C
240939,500	4239570,394	595,552	C
240925,500	4239570,394	595,587	C
240922,000	4239570,394	595,596	C

Coord. X	Coord. Y	Elevación	Código
240712,000	4239950,139	599,919	C
240715,500	4239950,139	599,910	C
240729,500	4239950,139	599,875	C
240733,000	4239950,139	599,866	C
240747,000	4239950,139	599,831	C
240750,500	4239950,139	599,822	C
240764,500	4239950,139	599,787	C
240768,000	4239950,139	599,779	C
240768,000	4239946,139	599,739	C
240764,500	4239946,139	599,747	C
240750,500	4239946,139	599,782	C
240747,000	4239946,139	599,791	C
240733,000	4239946,139	599,826	C
240729,500	4239946,139	599,835	C
240715,500	4239946,139	599,870	C
240712,000	4239946,139	599,879	C
240698,000	4239946,139	599,914	C
240694,500	4239946,139	599,922	C
240680,500	4239946,139	599,957	C
240677,000	4239946,139	599,966	C
240663,000	4239946,139	600,001	C
240659,500	4239946,139	600,010	C
240645,500	4239946,139	600,045	C
240642,000	4239946,139	600,054	C
240628,000	4239946,139	600,089	C
240624,500	4239946,139	600,097	C
240610,500	4239946,139	600,132	C
240607,000	4239946,139	600,141	C
240593,000	4239946,139	600,176	C
240589,500	4239946,139	600,185	C
240575,500	4239946,139	600,220	C
240572,000	4239946,139	600,229	C
240558,000	4239946,139	600,264	C
240554,500	4239946,139	600,272	C
240540,500	4239946,139	600,307	C
240537,000	4239946,139	600,316	C
240523,000	4239946,139	600,351	C
240519,500	4239946,139	600,360	C
240505,500	4239946,139	600,395	C
240502,000	4239946,139	600,403	C
240488,000	4239946,139	600,438	C
240484,500	4239946,139	600,447	C
240470,500	4239946,139	600,482	C
240467,000	4239946,139	600,491	C
240453,000	4239946,139	600,526	C
240449,500	4239946,139	600,535	C
240908,000	4239570,394	595,631	C
240904,500	4239570,394	595,640	C
240890,500	4239570,394	595,675	C
240887,000	4239570,394	595,683	C
240873,000	4239570,394	595,718	C
240869,500	4239570,394	595,727	C
240855,500	4239570,394	595,762	C
240852,000	4239570,394	595,771	C
240838,000	4239570,394	595,806	C
240834,500	4239570,394	595,815	C
240820,500	4239570,394	595,850	C
240817,000	4239570,394	595,858	C
240803,000	4239570,394	595,893	C
240799,500	4239570,394	595,902	C
240785,500	4239570,394	595,937	C
240782,000	4239570,394	595,946	C
240768,000	4239570,394	595,981	C
240764,500	4239570,394	595,990	C
240750,500	4239570,394	596,025	C
240747,000	4239570,394	596,033	C
240733,000	4239570,394	596,068	C
240729,500	4239570,394	596,077	C
240715,500	4239570,394	596,112	C
240712,000	4239570,394	596,121	C
240698,000	4239570,394	596,156	C
240694,500	4239570,394	596,165	C
240680,500	4239570,394	596,200	C
240677,000	4239570,394	596,208	C
240663,000	4239570,394	596,243	C
240659,500	4239570,394	596,252	C
240645,500	4239570,394	596,287	C
240642,000	4239570,394	596,296	C
240628,000	4239570,394	596,331	C
240624,500	4239570,394	596,340	C
240610,500	4239570,394	596,375	C
240607,000	4239570,394	596,383	C
240593,000	4239570,394	596,418	C
240589,500	4239570,394	596,427	C
240575,500	4239570,394	596,462	C
240572,000	4239570,394	596,471	C
240558,000	4239570,394	596,506	C
240554,500	4239570,394	596,515	C
240540,500	4239570,394	596,550	C
240537,000	4239570,394	596,558	C
240523,000	4239570,394	596,593	C
240519,500	4239570,394	596,602	C

Coord. X	Coord. Y	Elevación	Código	Coord. X	Coord. Y	Elevación	Código
240435,500	4239946,139	600,570	C	240505,500	4239570,394	596,637	C
240432,000	4239946,139	600,579	C	240502,000	4239570,394	596,646	C
240418,000	4239946,139	600,614	C	240488,000	4239570,394	596,681	C
240414,500	4239946,139	600,622	C	240484,500	4239570,394	596,690	C
240400,500	4239946,139	600,657	C	240470,500	4239570,394	596,725	C
240397,000	4239946,139	600,666	C	240467,000	4239570,394	596,733	C
240383,000	4239946,139	600,701	C	240453,000	4239570,394	596,768	C
240379,500	4239946,139	600,710	C	240449,500	4239570,394	596,777	C
240365,500	4239946,139	600,745	C	240435,500	4239570,394	596,812	C
240362,000	4239946,139	600,754	C	240432,000	4239570,394	596,821	C
240348,000	4239946,139	600,789	C	240418,000	4239570,394	596,856	C
240344,500	4239946,139	600,797	C	240414,500	4239570,394	596,865	C
240330,500	4239946,139	600,832	C	240400,500	4239570,394	596,900	C
240327,000	4239946,139	600,841	C	240397,000	4239570,394	596,908	C
240313,000	4239946,139	600,876	C	240383,000	4239570,394	596,943	C
240309,500	4239946,139	600,885	C	240379,500	4239570,394	596,952	C
240295,500	4239946,139	600,920	C	240365,500	4239570,394	596,987	C
240292,000	4239946,139	600,929	C	240362,000	4239570,394	596,996	C
240278,000	4239946,139	600,964	C	240348,000	4239570,394	597,031	C
240274,500	4239946,139	600,972	C	240344,500	4239570,394	597,040	C
240260,500	4239946,139	601,007	C	240330,500	4239570,394	597,075	C
240257,000	4239946,139	601,016	C	240327,000	4239570,394	597,083	C
240243,000	4239946,139	601,051	C	240313,000	4239570,394	597,118	C
240239,500	4239946,139	601,060	C	240309,500	4239570,394	597,127	C
240225,500	4239946,139	601,095	C	240295,500	4239570,394	597,162	C
240222,000	4239946,139	601,104	C	240292,000	4239570,394	597,171	C
240208,000	4239946,139	601,139	C	240278,000	4239570,394	597,206	C
240204,500	4239946,139	601,147	C	240274,500	4239570,394	597,215	C
240190,500	4239946,139	601,182	C	240260,500	4239570,394	597,250	C
240187,000	4239946,139	601,191	C	240257,000	4239570,394	597,258	C
240173,000	4239946,139	601,226	C	240243,000	4239570,394	597,293	C
240169,500	4239946,139	601,235	C	240239,500	4239570,394	597,302	C
240155,500	4239946,139	601,270	C	240225,500	4239570,394	597,337	C
240152,000	4239946,139	601,279	C	240222,000	4239570,394	597,346	C
240138,000	4239946,139	601,314	C	240208,000	4239570,394	597,381	C
240134,500	4239946,139	601,322	C	240204,500	4239570,394	597,390	C
240120,500	4239946,139	601,357	C	240190,500	4239570,394	597,425	C
240117,000	4239946,139	601,366	C	240187,000	4239570,394	597,433	C
240103,000	4239946,139	601,401	C	240173,000	4239570,394	597,468	C
240099,500	4239946,139	601,410	C	240169,500	4239570,394	597,477	C
240085,500	4239946,139	601,445	C	240155,500	4239570,394	597,512	C
240082,000	4239946,139	601,454	C	240152,000	4239570,394	597,521	C
240068,000	4239946,139	601,489	C	240138,000	4239570,394	597,556	C
240064,500	4239946,139	601,497	C	240134,500	4239570,394	597,565	C
240050,500	4239946,139	601,532	C	240120,500	4239570,394	597,600	C
240047,000	4239946,139	601,541	C	240117,000	4239570,394	597,608	C

Coord. X	Coord. Y	Elevación	Código
240033,000	4239946,139	601,576	C
240029,500	4239946,139	601,584	C
240015,500	4239946,139	601,619	C
240012,000	4239946,139	601,628	C
240012,000	4239937,085	601,538	C
240015,500	4239937,085	601,529	C
240029,500	4239937,085	601,494	C
240033,000	4239937,085	601,485	C
240047,000	4239937,085	601,451	C
240050,500	4239937,085	601,442	C
240064,500	4239937,085	601,407	C
240068,000	4239937,085	601,398	C
240082,000	4239937,085	601,363	C
240085,500	4239937,085	601,354	C
240099,500	4239937,085	601,319	C
240103,000	4239937,085	601,311	C
240117,000	4239937,085	601,276	C
240120,500	4239937,085	601,267	C
240134,500	4239937,085	601,232	C
240138,000	4239937,085	601,223	C
240152,000	4239937,085	601,188	C
240155,500	4239937,085	601,179	C
240169,500	4239937,085	601,144	C
240173,000	4239937,085	601,136	C
240187,000	4239937,085	601,101	C
240190,500	4239937,085	601,092	C
240204,500	4239937,085	601,057	C
240208,000	4239937,085	601,048	C
240222,000	4239937,085	601,013	C
240225,500	4239937,085	601,004	C
240239,500	4239937,085	600,969	C
240243,000	4239937,085	600,960	C
240257,000	4239937,085	600,925	C
240260,500	4239937,085	600,917	C
240274,500	4239937,085	600,882	C
240278,000	4239937,085	600,873	C
240292,000	4239937,085	600,838	C
240295,500	4239937,085	600,829	C
240309,500	4239937,085	600,794	C
240313,000	4239937,085	600,785	C
240327,000	4239937,085	600,750	C
240330,500	4239937,085	600,742	C
240344,500	4239937,085	600,707	C
240348,000	4239937,085	600,698	C
240362,000	4239937,085	600,663	C
240365,500	4239937,085	600,654	C

Coord. X	Coord. Y	Elevación	Código
240103,000	4239570,394	597,643	C
240099,500	4239570,394	597,652	C
240085,500	4239570,394	597,687	C
240082,000	4239570,394	597,696	C
240068,000	4239570,394	597,731	C
240064,500	4239570,394	597,740	C
240050,500	4239570,394	597,775	C
240047,000	4239570,394	597,783	C
240033,000	4239570,394	597,818	C
240029,500	4239570,394	597,827	C
240015,500	4239570,394	597,862	C
240012,000	4239570,394	597,871	C
240012,000	4239566,394	597,831	C
240015,500	4239566,394	597,822	C
240029,500	4239566,394	597,787	C
240033,000	4239566,394	597,778	C
240047,000	4239566,394	597,743	C
240050,500	4239566,394	597,735	C
240064,500	4239566,394	597,700	C
240068,000	4239566,394	597,691	C
240082,000	4239566,394	597,656	C
240085,500	4239566,394	597,647	C
240099,500	4239566,394	597,612	C
240103,000	4239566,394	597,603	C
240117,000	4239566,394	597,568	C
240120,500	4239566,394	597,560	C
240134,500	4239566,394	597,525	C
240138,000	4239566,394	597,516	C
240152,000	4239566,394	597,481	C
240155,500	4239566,394	597,472	C
240169,500	4239566,394	597,437	C
240173,000	4239566,394	597,428	C
240187,000	4239566,394	597,393	C
240190,500	4239566,394	597,385	C
240204,500	4239566,394	597,350	C
240208,000	4239566,394	597,341	C
240222,000	4239566,394	597,306	C
240225,500	4239566,394	597,297	C
240239,500	4239566,394	597,262	C
240243,000	4239566,394	597,253	C
240257,000	4239566,394	597,218	C
240260,500	4239566,394	597,210	C
240274,500	4239566,394	597,175	C
240278,000	4239566,394	597,166	C
240292,000	4239566,394	597,131	C
240295,500	4239566,394	597,122	C

Coord. X	Coord. Y	Elevación	Código
240379,500	4239937,085	600,619	C
240383,000	4239937,085	600,610	C
240397,000	4239937,085	600,575	C
240400,500	4239937,085	600,567	C
240414,500	4239937,085	600,532	C
240418,000	4239937,085	600,523	C
240432,000	4239937,085	600,488	C
240435,500	4239937,085	600,479	C
240449,500	4239937,085	600,444	C
240453,000	4239937,085	600,435	C
240467,000	4239937,085	600,400	C
240470,500	4239937,085	600,392	C
240484,500	4239937,085	600,357	C
240488,000	4239937,085	600,348	C
240502,000	4239937,085	600,313	C
240505,500	4239937,085	600,304	C
240519,500	4239937,085	600,269	C
240523,000	4239937,085	600,260	C
240537,000	4239937,085	600,225	C
240540,500	4239937,085	600,217	C
240554,500	4239937,085	600,182	C
240558,000	4239937,085	600,173	C
240572,000	4239937,085	600,138	C
240575,500	4239937,085	600,129	C
240589,500	4239937,085	600,094	C
240593,000	4239937,085	600,085	C
240607,000	4239937,085	600,050	C
240610,500	4239937,085	600,042	C
240624,500	4239937,085	600,007	C
240628,000	4239937,085	599,998	C
240642,000	4239937,085	599,963	C
240645,500	4239937,085	599,954	C
240659,500	4239937,085	599,919	C
240663,000	4239937,085	599,910	C
240677,000	4239937,085	599,875	C
240680,500	4239937,085	599,867	C
240694,500	4239937,085	599,832	C
240698,000	4239937,085	599,823	C
240712,000	4239937,085	599,788	C
240715,500	4239937,085	599,779	C
240729,500	4239937,085	599,744	C
240733,000	4239937,085	599,735	C
240747,000	4239937,085	599,700	C
240750,500	4239937,085	599,692	C
240764,500	4239937,085	599,657	C
240768,000	4239937,085	599,648	C

Coord. X	Coord. Y	Elevación	Código
240309,500	4239566,394	597,087	C
240313,000	4239566,394	597,078	C
240327,000	4239566,394	597,043	C
240330,500	4239566,394	597,035	C
240344,500	4239566,394	597,000	C
240348,000	4239566,394	596,991	C
240362,000	4239566,394	596,956	C
240365,500	4239566,394	596,947	C
240379,500	4239566,394	596,912	C
240383,000	4239566,394	596,903	C
240397,000	4239566,394	596,868	C
240400,500	4239566,394	596,860	C
240414,500	4239566,394	596,825	C
240418,000	4239566,394	596,816	C
240432,000	4239566,394	596,781	C
240435,500	4239566,394	596,772	C
240449,500	4239566,394	596,737	C
240453,000	4239566,394	596,728	C
240467,000	4239566,394	596,693	C
240470,500	4239566,394	596,685	C
240484,500	4239566,394	596,650	C
240488,000	4239566,394	596,641	C
240502,000	4239566,394	596,606	C
240505,500	4239566,394	596,597	C
240519,500	4239566,394	596,562	C
240523,000	4239566,394	596,553	C
240537,000	4239566,394	596,518	C
240540,500	4239566,394	596,510	C
240554,500	4239566,394	596,475	C
240558,000	4239566,394	596,466	C
240572,000	4239566,394	596,431	C
240575,500	4239566,394	596,422	C
240589,500	4239566,394	596,387	C
240593,000	4239566,394	596,378	C
240607,000	4239566,394	596,343	C
240610,500	4239566,394	596,335	C
240624,500	4239566,394	596,300	C
240628,000	4239566,394	596,291	C
240642,000	4239566,394	596,256	C
240645,500	4239566,394	596,247	C
240659,500	4239566,394	596,212	C
240663,000	4239566,394	596,203	C
240677,000	4239566,394	596,168	C
240680,500	4239566,394	596,160	C
240694,500	4239566,394	596,125	C
240698,000	4239566,394	596,116	C

Coord. X	Coord. Y	Elevación	Código
240768,000	4239933,935	599,616	C
240764,500	4239933,935	599,625	C
240750,500	4239933,935	599,660	C
240747,000	4239933,935	599,669	C
240733,000	4239933,935	599,704	C
240729,500	4239933,935	599,713	C
240715,500	4239933,935	599,748	C
240712,000	4239933,935	599,756	C
240698,000	4239933,935	599,791	C
240694,500	4239933,935	599,800	C
240680,500	4239933,935	599,835	C
240677,000	4239933,935	599,844	C
240663,000	4239933,935	599,879	C
240659,500	4239933,935	599,888	C
240645,500	4239933,935	599,923	C
240642,000	4239933,935	599,931	C
240628,000	4239933,935	599,966	C
240624,500	4239933,935	599,975	C
240610,500	4239933,935	600,010	C
240607,000	4239933,935	600,019	C
240593,000	4239933,935	600,054	C
240589,500	4239933,935	600,063	C
240575,500	4239933,935	600,098	C
240572,000	4239933,935	600,106	C
240558,000	4239933,935	600,141	C
240554,500	4239933,935	600,150	C
240540,500	4239933,935	600,185	C
240537,000	4239933,935	600,194	C
240523,000	4239933,935	600,229	C
240519,500	4239933,935	600,238	C
240505,500	4239933,935	600,273	C
240502,000	4239933,935	600,281	C
240488,000	4239933,935	600,316	C
240484,500	4239933,935	600,325	C
240470,500	4239933,935	600,360	C
240467,000	4239933,935	600,369	C
240453,000	4239933,935	600,404	C
240449,500	4239933,935	600,413	C
240435,500	4239933,935	600,448	C
240432,000	4239933,935	600,456	C
240418,000	4239933,935	600,491	C
240414,500	4239933,935	600,500	C
240400,500	4239933,935	600,535	C
240397,000	4239933,935	600,544	C
240383,000	4239933,935	600,579	C
240379,500	4239933,935	600,588	C

Coord. X	Coord. Y	Elevación	Código
240712,000	4239566,394	596,081	C
240715,500	4239566,394	596,072	C
240729,500	4239566,394	596,037	C
240733,000	4239566,394	596,028	C
240747,000	4239566,394	595,993	C
240750,500	4239566,394	595,985	C
240764,500	4239566,394	595,950	C
240768,000	4239566,394	595,941	C
240782,000	4239566,394	595,906	C
240785,500	4239566,394	595,897	C
240799,500	4239566,394	595,862	C
240803,000	4239566,394	595,853	C
240817,000	4239566,394	595,818	C
240820,500	4239566,394	595,810	C
240834,500	4239566,394	595,775	C
240838,000	4239566,394	595,766	C
240852,000	4239566,394	595,731	C
240855,500	4239566,394	595,722	C
240869,500	4239566,394	595,687	C
240873,000	4239566,394	595,678	C
240887,000	4239566,394	595,643	C
240890,500	4239566,394	595,635	C
240904,500	4239566,394	595,600	C
240908,000	4239566,394	595,591	C
240922,000	4239566,394	595,556	C
240925,500	4239566,394	595,547	C
240939,500	4239566,394	595,512	C
240943,000	4239566,394	595,503	C
240957,000	4239566,394	595,468	C
240960,500	4239566,394	595,460	C
240974,500	4239566,394	595,425	C
240978,000	4239566,394	595,416	C
240992,000	4239566,394	595,381	C
240995,500	4239566,394	595,372	C
241009,500	4239566,394	595,337	C
241013,000	4239566,394	595,328	C
241027,000	4239566,394	595,293	C
241030,500	4239566,394	595,285	C
241044,500	4239566,394	595,250	C
241048,000	4239566,394	595,241	C
241062,000	4239566,394	595,206	C
241065,500	4239566,394	595,197	C
241079,500	4239566,394	595,162	C
241083,000	4239566,394	595,153	C
241097,000	4239566,394	595,118	C
241100,500	4239566,394	595,110	C

Coord. X	Coord. Y	Elevación	Código
240365,500	4239933,935	600,623	C
240362,000	4239933,935	600,631	C
240348,000	4239933,935	600,666	C
240344,500	4239933,935	600,675	C
240330,500	4239933,935	600,710	C
240327,000	4239933,935	600,719	C
240313,000	4239933,935	600,754	C
240309,500	4239933,935	600,763	C
240295,500	4239933,935	600,798	C
240292,000	4239933,935	600,806	C
240278,000	4239933,935	600,841	C
240274,500	4239933,935	600,850	C
240260,500	4239933,935	600,885	C
240257,000	4239933,935	600,894	C
240243,000	4239933,935	600,929	C
240239,500	4239933,935	600,938	C
240225,500	4239933,935	600,973	C
240222,000	4239933,935	600,981	C
240208,000	4239933,935	601,017	C
240204,500	4239933,935	601,025	C
240190,500	4239933,935	601,060	C
240187,000	4239933,935	601,069	C
240173,000	4239933,935	601,104	C
240169,500	4239933,935	601,113	C
240155,500	4239933,935	601,148	C
240152,000	4239933,935	601,157	C
240138,000	4239933,935	601,192	C
240134,500	4239933,935	601,200	C
240120,500	4239933,935	601,235	C
240117,000	4239933,935	601,244	C
240103,000	4239933,935	601,279	C
240099,500	4239933,935	601,288	C
240085,500	4239933,935	601,323	C
240082,000	4239933,935	601,332	C
240068,000	4239933,935	601,367	C
240064,500	4239933,935	601,375	C
240050,500	4239933,935	601,410	C
240047,000	4239933,935	601,419	C
240033,000	4239933,935	601,454	C
240029,500	4239933,935	601,462	C
240015,500	4239933,935	601,497	C
240012,000	4239933,935	601,506	C
240012,000	4239924,881	601,415	C
240015,500	4239924,881	601,407	C
240029,500	4239924,881	601,372	C
240033,000	4239924,881	601,363	C

Coord. X	Coord. Y	Elevación	Código
241114,500	4239566,394	595,075	C
241118,000	4239566,394	595,066	C
241132,000	4239566,394	595,031	C
241135,500	4239566,394	595,022	C
241149,500	4239566,394	594,987	C
241153,000	4239566,394	594,978	C
241167,000	4239566,394	594,943	C
241170,500	4239566,394	594,935	C
241184,500	4239566,394	594,900	C
241188,000	4239566,394	594,891	C
241188,000	4239557,340	594,800	C
241184,500	4239557,340	594,809	C
241170,500	4239557,340	594,844	C
241167,000	4239557,340	594,853	C
241153,000	4239557,340	594,888	C
241149,500	4239557,340	594,897	C
241135,500	4239557,340	594,932	C
241132,000	4239557,340	594,940	C
241118,000	4239557,340	594,975	C
241114,500	4239557,340	594,984	C
241100,500	4239557,340	595,019	C
241097,000	4239557,340	595,028	C
241083,000	4239557,340	595,063	C
241079,500	4239557,340	595,072	C
241065,500	4239557,340	595,107	C
241062,000	4239557,340	595,115	C
241048,000	4239557,340	595,150	C
241044,500	4239557,340	595,159	C
241030,500	4239557,340	595,194	C
241027,000	4239557,340	595,203	C
241013,000	4239557,340	595,238	C
241009,500	4239557,340	595,247	C
240995,500	4239557,340	595,282	C
240992,000	4239557,340	595,290	C
240978,000	4239557,340	595,325	C
240974,500	4239557,340	595,334	C
240960,500	4239557,340	595,369	C
240957,000	4239557,340	595,378	C
240943,000	4239557,340	595,413	C
240939,500	4239557,340	595,422	C
240925,500	4239557,340	595,457	C
240922,000	4239557,340	595,465	C
240908,000	4239557,340	595,500	C
240904,500	4239557,340	595,509	C
240890,500	4239557,340	595,544	C
240887,000	4239557,340	595,553	C

Coord. X	Coord. Y	Elevación	Código
240047,000	4239924,881	601,328	C
240050,500	4239924,881	601,319	C
240064,500	4239924,881	601,285	C
240068,000	4239924,881	601,276	C
240082,000	4239924,881	601,241	C
240085,500	4239924,881	601,232	C
240099,500	4239924,881	601,197	C
240103,000	4239924,881	601,188	C
240117,000	4239924,881	601,153	C
240120,500	4239924,881	601,145	C
240134,500	4239924,881	601,110	C
240138,000	4239924,881	601,101	C
240152,000	4239924,881	601,066	C
240155,500	4239924,881	601,057	C
240169,500	4239924,881	601,022	C
240173,000	4239924,881	601,013	C
240187,000	4239924,881	600,978	C
240190,500	4239924,881	600,970	C
240204,500	4239924,881	600,935	C
240208,000	4239924,881	600,926	C
240222,000	4239924,881	600,891	C
240225,500	4239924,881	600,882	C
240239,500	4239924,881	600,847	C
240243,000	4239924,881	600,838	C
240257,000	4239924,881	600,803	C
240260,500	4239924,881	600,795	C
240274,500	4239924,881	600,760	C
240278,000	4239924,881	600,751	C
240292,000	4239924,881	600,716	C
240295,500	4239924,881	600,707	C
240309,500	4239924,881	600,672	C
240313,000	4239924,881	600,663	C
240327,000	4239924,881	600,628	C
240330,500	4239924,881	600,620	C
240344,500	4239924,881	600,585	C
240348,000	4239924,881	600,576	C
240362,000	4239924,881	600,541	C
240365,500	4239924,881	600,532	C
240379,500	4239924,881	600,497	C
240383,000	4239924,881	600,488	C
240397,000	4239924,881	600,453	C
240400,500	4239924,881	600,445	C
240414,500	4239924,881	600,410	C
240418,000	4239924,881	600,401	C
240432,000	4239924,881	600,366	C
240435,500	4239924,881	600,357	C

Coord. X	Coord. Y	Elevación	Código
240873,000	4239557,340	595,588	C
240869,500	4239557,340	595,597	C
240855,500	4239557,340	595,632	C
240852,000	4239557,340	595,640	C
240838,000	4239557,340	595,675	C
240834,500	4239557,340	595,684	C
240820,500	4239557,340	595,719	C
240817,000	4239557,340	595,728	C
240803,000	4239557,340	595,763	C
240799,500	4239557,340	595,772	C
240785,500	4239557,340	595,807	C
240782,000	4239557,340	595,815	C
240768,000	4239557,340	595,850	C
240764,500	4239557,340	595,859	C
240750,500	4239557,340	595,894	C
240747,000	4239557,340	595,903	C
240733,000	4239557,340	595,938	C
240729,500	4239557,340	595,947	C
240715,500	4239557,340	595,982	C
240712,000	4239557,340	595,990	C
240698,000	4239557,340	596,025	C
240694,500	4239557,340	596,034	C
240680,500	4239557,340	596,069	C
240677,000	4239557,340	596,078	C
240663,000	4239557,340	596,113	C
240659,500	4239557,340	596,122	C
240645,500	4239557,340	596,157	C
240642,000	4239557,340	596,165	C
240628,000	4239557,340	596,200	C
240624,500	4239557,340	596,209	C
240610,500	4239557,340	596,244	C
240607,000	4239557,340	596,253	C
240593,000	4239557,340	596,288	C
240589,500	4239557,340	596,297	C
240575,500	4239557,340	596,332	C
240572,000	4239557,340	596,340	C
240558,000	4239557,340	596,375	C
240554,500	4239557,340	596,384	C
240540,500	4239557,340	596,419	C
240537,000	4239557,340	596,428	C
240523,000	4239557,340	596,463	C
240519,500	4239557,340	596,472	C
240505,500	4239557,340	596,507	C
240502,000	4239557,340	596,515	C
240488,000	4239557,340	596,550	C
240484,500	4239557,340	596,559	C

Coord. X	Coord. Y	Elevación	Código
240449,500	4239924,881	600,322	C
240453,000	4239924,881	600,313	C
240467,000	4239924,881	600,278	C
240470,500	4239924,881	600,270	C
240484,500	4239924,881	600,235	C
240488,000	4239924,881	600,226	C
240502,000	4239924,881	600,191	C
240505,500	4239924,881	600,182	C
240519,500	4239924,881	600,147	C
240523,000	4239924,881	600,138	C
240537,000	4239924,881	600,103	C
240540,500	4239924,881	600,095	C
240554,500	4239924,881	600,060	C
240558,000	4239924,881	600,051	C
240572,000	4239924,881	600,016	C
240575,500	4239924,881	600,007	C
240589,500	4239924,881	599,972	C
240593,000	4239924,881	599,963	C
240607,000	4239924,881	599,928	C
240610,500	4239924,881	599,920	C
240624,500	4239924,881	599,885	C
240628,000	4239924,881	599,876	C
240642,000	4239924,881	599,841	C
240645,500	4239924,881	599,832	C
240659,500	4239924,881	599,797	C
240663,000	4239924,881	599,788	C
240677,000	4239924,881	599,753	C
240680,500	4239924,881	599,745	C
240694,500	4239924,881	599,710	C
240698,000	4239924,881	599,701	C
240712,000	4239924,881	599,666	C
240715,500	4239924,881	599,657	C
240729,500	4239924,881	599,622	C
240733,000	4239924,881	599,613	C
240747,000	4239924,881	599,578	C
240750,500	4239924,881	599,570	C
240764,500	4239924,881	599,535	C
240768,000	4239924,881	599,526	C
240768,000	4239920,881	599,486	C
240764,500	4239920,881	599,495	C
240750,500	4239920,881	599,530	C
240747,000	4239920,881	599,538	C
240733,000	4239920,881	599,573	C
240729,500	4239920,881	599,582	C
240715,500	4239920,881	599,617	C
240712,000	4239920,881	599,626	C

Coord. X	Coord. Y	Elevación	Código
240470,500	4239557,340	596,594	C
240467,000	4239557,340	596,603	C
240453,000	4239557,340	596,638	C
240449,500	4239557,340	596,647	C
240435,500	4239557,340	596,682	C
240432,000	4239557,340	596,690	C
240418,000	4239557,340	596,725	C
240414,500	4239557,340	596,734	C
240400,500	4239557,340	596,769	C
240397,000	4239557,340	596,778	C
240383,000	4239557,340	596,813	C
240379,500	4239557,340	596,822	C
240365,500	4239557,340	596,857	C
240362,000	4239557,340	596,865	C
240348,000	4239557,340	596,900	C
240344,500	4239557,340	596,909	C
240330,500	4239557,340	596,944	C
240327,000	4239557,340	596,953	C
240313,000	4239557,340	596,988	C
240309,500	4239557,340	596,997	C
240295,500	4239557,340	597,032	C
240292,000	4239557,340	597,040	C
240278,000	4239557,340	597,075	C
240274,500	4239557,340	597,084	C
240260,500	4239557,340	597,119	C
240257,000	4239557,340	597,128	C
240243,000	4239557,340	597,163	C
240239,500	4239557,340	597,172	C
240225,500	4239557,340	597,207	C
240222,000	4239557,340	597,215	C
240208,000	4239557,340	597,250	C
240204,500	4239557,340	597,259	C
240190,500	4239557,340	597,294	C
240187,000	4239557,340	597,303	C
240173,000	4239557,340	597,338	C
240169,500	4239557,340	597,347	C
240155,500	4239557,340	597,382	C
240152,000	4239557,340	597,390	C
240138,000	4239557,340	597,425	C
240134,500	4239557,340	597,434	C
240120,500	4239557,340	597,469	C
240117,000	4239557,340	597,478	C
240103,000	4239557,340	597,513	C
240099,500	4239557,340	597,522	C
240085,500	4239557,340	597,557	C
240082,000	4239557,340	597,565	C

Coord. X	Coord. Y	Elevación	Código
240698,000	4239920,881	599,661	C
240694,500	4239920,881	599,670	C
240680,500	4239920,881	599,705	C
240677,000	4239920,881	599,713	C
240663,000	4239920,881	599,748	C
240659,500	4239920,881	599,757	C
240645,500	4239920,881	599,792	C
240642,000	4239920,881	599,801	C
240628,000	4239920,881	599,836	C
240624,500	4239920,881	599,845	C
240610,500	4239920,881	599,880	C
240607,000	4239920,881	599,888	C
240593,000	4239920,881	599,923	C
240589,500	4239920,881	599,932	C
240575,500	4239920,881	599,967	C
240572,000	4239920,881	599,976	C
240558,000	4239920,881	600,011	C
240554,500	4239920,881	600,020	C
240540,500	4239920,881	600,055	C
240537,000	4239920,881	600,063	C
240523,000	4239920,881	600,098	C
240519,500	4239920,881	600,107	C
240505,500	4239920,881	600,142	C
240502,000	4239920,881	600,151	C
240488,000	4239920,881	600,186	C
240484,500	4239920,881	600,195	C
240470,500	4239920,881	600,230	C
240467,000	4239920,881	600,238	C
240453,000	4239920,881	600,273	C
240449,500	4239920,881	600,282	C
240435,500	4239920,881	600,317	C
240432,000	4239920,881	600,326	C
240418,000	4239920,881	600,361	C
240414,500	4239920,881	600,370	C
240400,500	4239920,881	600,405	C
240397,000	4239920,881	600,413	C
240383,000	4239920,881	600,448	C
240379,500	4239920,881	600,457	C
240365,500	4239920,881	600,492	C
240362,000	4239920,881	600,501	C
240348,000	4239920,881	600,536	C
240344,500	4239920,881	600,545	C
240330,500	4239920,881	600,580	C
240327,000	4239920,881	600,588	C
240313,000	4239920,881	600,623	C
240309,500	4239920,881	600,632	C

Coord. X	Coord. Y	Elevación	Código
240068,000	4239557,340	597,600	C
240064,500	4239557,340	597,609	C
240050,500	4239557,340	597,644	C
240047,000	4239557,340	597,653	C
240033,000	4239557,340	597,688	C
240029,500	4239557,340	597,697	C
240015,500	4239557,340	597,732	C
240012,000	4239557,340	597,740	C
240012,000	4239554,190	597,709	C
240015,500	4239554,190	597,700	C
240029,500	4239554,190	597,665	C
240033,000	4239554,190	597,656	C
240047,000	4239554,190	597,621	C
240050,500	4239554,190	597,613	C
240064,500	4239554,190	597,578	C
240068,000	4239554,190	597,569	C
240082,000	4239554,190	597,534	C
240085,500	4239554,190	597,525	C
240099,500	4239554,190	597,490	C
240103,000	4239554,190	597,481	C
240117,000	4239554,190	597,446	C
240120,500	4239554,190	597,438	C
240134,500	4239554,190	597,403	C
240138,000	4239554,190	597,394	C
240152,000	4239554,190	597,359	C
240155,500	4239554,190	597,350	C
240169,500	4239554,190	597,315	C
240173,000	4239554,190	597,306	C
240187,000	4239554,190	597,271	C
240190,500	4239554,190	597,263	C
240204,500	4239554,190	597,228	C
240208,000	4239554,190	597,219	C
240222,000	4239554,190	597,184	C
240225,500	4239554,190	597,175	C
240239,500	4239554,190	597,140	C
240243,000	4239554,190	597,131	C
240257,000	4239554,190	597,096	C
240260,500	4239554,190	597,088	C
240274,500	4239554,190	597,053	C
240278,000	4239554,190	597,044	C
240292,000	4239554,190	597,009	C
240295,500	4239554,190	597,000	C
240309,500	4239554,190	596,965	C
240313,000	4239554,190	596,956	C
240327,000	4239554,190	596,921	C
240330,500	4239554,190	596,913	C

Coord. X	Coord. Y	Elevación	Código
240295,500	4239920,881	600,667	C
240292,000	4239920,881	600,676	C
240278,000	4239920,881	600,711	C
240274,500	4239920,881	600,720	C
240260,500	4239920,881	600,755	C
240257,000	4239920,881	600,763	C
240243,000	4239920,881	600,798	C
240239,500	4239920,881	600,807	C
240225,500	4239920,881	600,842	C
240222,000	4239920,881	600,851	C
240208,000	4239920,881	600,886	C
240204,500	4239920,881	600,895	C
240190,500	4239920,881	600,930	C
240187,000	4239920,881	600,938	C
240173,000	4239920,881	600,973	C
240169,500	4239920,881	600,982	C
240155,500	4239920,881	601,017	C
240152,000	4239920,881	601,026	C
240138,000	4239920,881	601,061	C
240134,500	4239920,881	601,070	C
240120,500	4239920,881	601,105	C
240117,000	4239920,881	601,113	C
240103,000	4239920,881	601,148	C
240099,500	4239920,881	601,157	C
240085,500	4239920,881	601,192	C
240082,000	4239920,881	601,201	C
240068,000	4239920,881	601,236	C
240064,500	4239920,881	601,245	C
240050,500	4239920,881	601,279	C
240047,000	4239920,881	601,288	C
240033,000	4239920,881	601,323	C
240029,500	4239920,881	601,332	C
240015,500	4239920,881	601,367	C
240012,000	4239920,881	601,375	C
240012,000	4239912,828	601,295	C
240015,500	4239912,828	601,286	C
240029,500	4239912,828	601,251	C
240033,000	4239912,828	601,242	C
240047,000	4239912,828	601,207	C
240050,500	4239912,828	601,199	C
240064,500	4239912,828	601,164	C
240068,000	4239912,828	601,155	C
240082,000	4239912,828	601,120	C
240085,500	4239912,828	601,112	C
240099,500	4239912,828	601,077	C
240103,000	4239912,828	601,068	C

Coord. X	Coord. Y	Elevación	Código
240344,500	4239554,190	596,878	C
240348,000	4239554,190	596,869	C
240362,000	4239554,190	596,834	C
240365,500	4239554,190	596,825	C
240379,500	4239554,190	596,790	C
240383,000	4239554,190	596,781	C
240397,000	4239554,190	596,746	C
240400,500	4239554,190	596,738	C
240414,500	4239554,190	596,703	C
240418,000	4239554,190	596,694	C
240432,000	4239554,190	596,659	C
240435,500	4239554,190	596,650	C
240449,500	4239554,190	596,615	C
240453,000	4239554,190	596,606	C
240467,000	4239554,190	596,571	C
240470,500	4239554,190	596,563	C
240484,500	4239554,190	596,528	C
240488,000	4239554,190	596,519	C
240502,000	4239554,190	596,484	C
240505,500	4239554,190	596,475	C
240519,500	4239554,190	596,440	C
240523,000	4239554,190	596,431	C
240537,000	4239554,190	596,396	C
240540,500	4239554,190	596,388	C
240554,500	4239554,190	596,353	C
240558,000	4239554,190	596,344	C
240572,000	4239554,190	596,309	C
240575,500	4239554,190	596,300	C
240589,500	4239554,190	596,265	C
240593,000	4239554,190	596,256	C
240607,000	4239554,190	596,221	C
240610,500	4239554,190	596,213	C
240624,500	4239554,190	596,178	C
240628,000	4239554,190	596,169	C
240642,000	4239554,190	596,134	C
240645,500	4239554,190	596,125	C
240659,500	4239554,190	596,090	C
240663,000	4239554,190	596,081	C
240677,000	4239554,190	596,046	C
240680,500	4239554,190	596,038	C
240694,500	4239554,190	596,003	C
240698,000	4239554,190	595,994	C
240712,000	4239554,190	595,959	C
240715,500	4239554,190	595,950	C
240729,500	4239554,190	595,915	C
240733,000	4239554,190	595,906	C

Coord. X	Coord. Y	Elevación	Código
240117,000	4239912,828	601,033	C
240120,500	4239912,828	601,024	C
240134,500	4239912,828	600,989	C
240138,000	4239912,828	600,980	C
240152,000	4239912,828	600,945	C
240155,500	4239912,828	600,937	C
240169,500	4239912,828	600,902	C
240173,000	4239912,828	600,893	C
240187,000	4239912,828	600,858	C
240190,500	4239912,828	600,849	C
240204,500	4239912,828	600,814	C
240208,000	4239912,828	600,805	C
240222,000	4239912,828	600,770	C
240225,500	4239912,828	600,762	C
240239,500	4239912,828	600,727	C
240243,000	4239912,828	600,718	C
240257,000	4239912,828	600,683	C
240260,500	4239912,828	600,674	C
240274,500	4239912,828	600,639	C
240278,000	4239912,828	600,630	C
240292,000	4239912,828	600,595	C
240295,500	4239912,828	600,587	C
240309,500	4239912,828	600,552	C
240313,000	4239912,828	600,543	C
240327,000	4239912,828	600,508	C
240330,500	4239912,828	600,499	C
240344,500	4239912,828	600,464	C
240348,000	4239912,828	600,455	C
240362,000	4239912,828	600,420	C
240365,500	4239912,828	600,412	C
240379,500	4239912,828	600,377	C
240383,000	4239912,828	600,368	C
240397,000	4239912,828	600,333	C
240400,500	4239912,828	600,324	C
240414,500	4239912,828	600,289	C
240418,000	4239912,828	600,280	C
240432,000	4239912,828	600,245	C
240435,500	4239912,828	600,237	C
240449,500	4239912,828	600,202	C
240453,000	4239912,828	600,193	C
240467,000	4239912,828	600,158	C
240470,500	4239912,828	600,149	C
240484,500	4239912,828	600,114	C
240488,000	4239912,828	600,105	C
240502,000	4239912,828	600,070	C
240505,500	4239912,828	600,062	C

Coord. X	Coord. Y	Elevación	Código
240747,000	4239554,190	595,871	C
240750,500	4239554,190	595,863	C
240764,500	4239554,190	595,828	C
240768,000	4239554,190	595,819	C
240782,000	4239554,190	595,784	C
240785,500	4239554,190	595,775	C
240799,500	4239554,190	595,740	C
240803,000	4239554,190	595,731	C
240817,000	4239554,190	595,696	C
240820,500	4239554,190	595,688	C
240834,500	4239554,190	595,653	C
240838,000	4239554,190	595,644	C
240852,000	4239554,190	595,609	C
240855,500	4239554,190	595,600	C
240869,500	4239554,190	595,565	C
240873,000	4239554,190	595,556	C
240887,000	4239554,190	595,521	C
240890,500	4239554,190	595,513	C
240904,500	4239554,190	595,478	C
240908,000	4239554,190	595,469	C
240922,000	4239554,190	595,434	C
240925,500	4239554,190	595,425	C
240939,500	4239554,190	595,390	C
240943,000	4239554,190	595,381	C
240957,000	4239554,190	595,346	C
240960,500	4239554,190	595,338	C
240974,500	4239554,190	595,303	C
240978,000	4239554,190	595,294	C
240992,000	4239554,190	595,259	C
240995,500	4239554,190	595,250	C
241009,500	4239554,190	595,215	C
241013,000	4239554,190	595,206	C
241027,000	4239554,190	595,171	C
241030,500	4239554,190	595,163	C
241044,500	4239554,190	595,128	C
241048,000	4239554,190	595,119	C
241062,000	4239554,190	595,084	C
241065,500	4239554,190	595,075	C
241079,500	4239554,190	595,040	C
241083,000	4239554,190	595,031	C
241097,000	4239554,190	594,996	C
241100,500	4239554,190	594,988	C
241114,500	4239554,190	594,953	C
241118,000	4239554,190	594,944	C
241132,000	4239554,190	594,909	C
241135,500	4239554,190	594,900	C

Coord. X	Coord. Y	Elevación	Código
240519,500	4239912,828	600,027	C
240523,000	4239912,828	600,018	C
240537,000	4239912,828	599,983	C
240540,500	4239912,828	599,974	C
240554,500	4239912,828	599,939	C
240558,000	4239912,828	599,930	C

Coord. X	Coord. Y	Elevación	Código
241149,500	4239554,190	594,865	C
241153,000	4239554,190	594,856	C
241167,000	4239554,190	594,821	C
241170,500	4239554,190	594,813	C
241184,500	4239554,190	594,778	C
241188,000	4239554,190	594,769	C

ANEJO Nº 3

GEOLOGÍA Y GEOTECNIA

ÍNDICE

1. OBJETO Y ALCANCE

Este anejo comprende los datos geológicos, geotécnicos y de procedencia de materiales de la ubicación de la planta termosolar. Primeramente se detalla la información utilizada, indicando el proyecto fuente de estos datos. Posteriormente se explican tanto las características geológicas como las geotécnicas de la zona de ubicación de la central. Por último se especifica el origen de los materiales que se utilizarán en la construcción.

2. INFORMACIÓN UTILIZADA

Para desarrollar el apartado referente a la geología se ha utilizado la información del Instituto Geológico y Minero de España (IGME), mediante las hojas MAGNA a escala 1:50.000. En el caso de este proyecto, la hoja utilizada es la 877 (Llerena). Para los datos geotécnicos, sin embargo, se han tenido que interpolar de un proyecto situado en una zona cercana a la ubicación de la planta y con unas características geotécnicas similares. Concretamente se trata del proyecto “Renovación del firme y acondicionamiento de la EX-111, de Azuaga a EX-103 por Zalamea de la Serena, tramo 23+750 (intersección Ex-211) a 43+360 (intersección BA-159)”, cedido por la Junta de Extremadura.

3. GEOLOGÍA

3.1. ENCUADRE GEOLÓGICO

La región extremeña abarca parte de las zonas Centroibérica y Ossa Morena del Macizo Ibérico. Aproximadamente los dos tercios nororientales corresponden a la primera y el resto a la segunda. Este proyecto se encuentra situado, concretamente, en la denominada zona de Ossa Morena, en el sector suroccidental de la Península Ibérica.

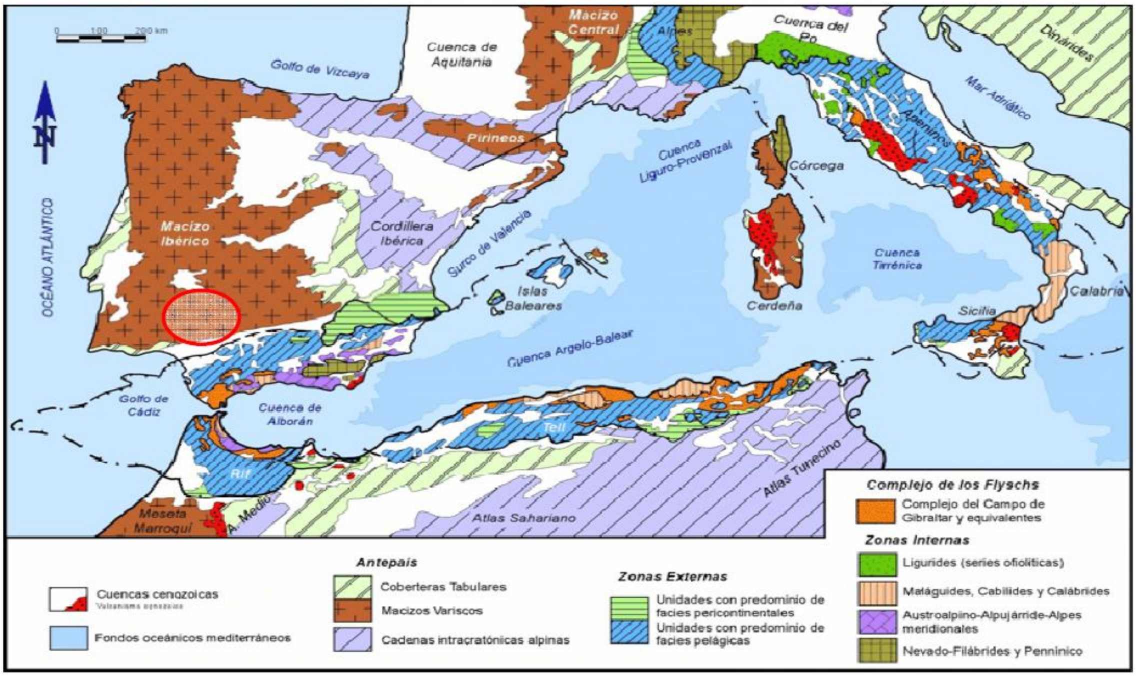


Figura 1 – Encuadre geológico general. Fuente: *Geología de España*, Vera, J.A.

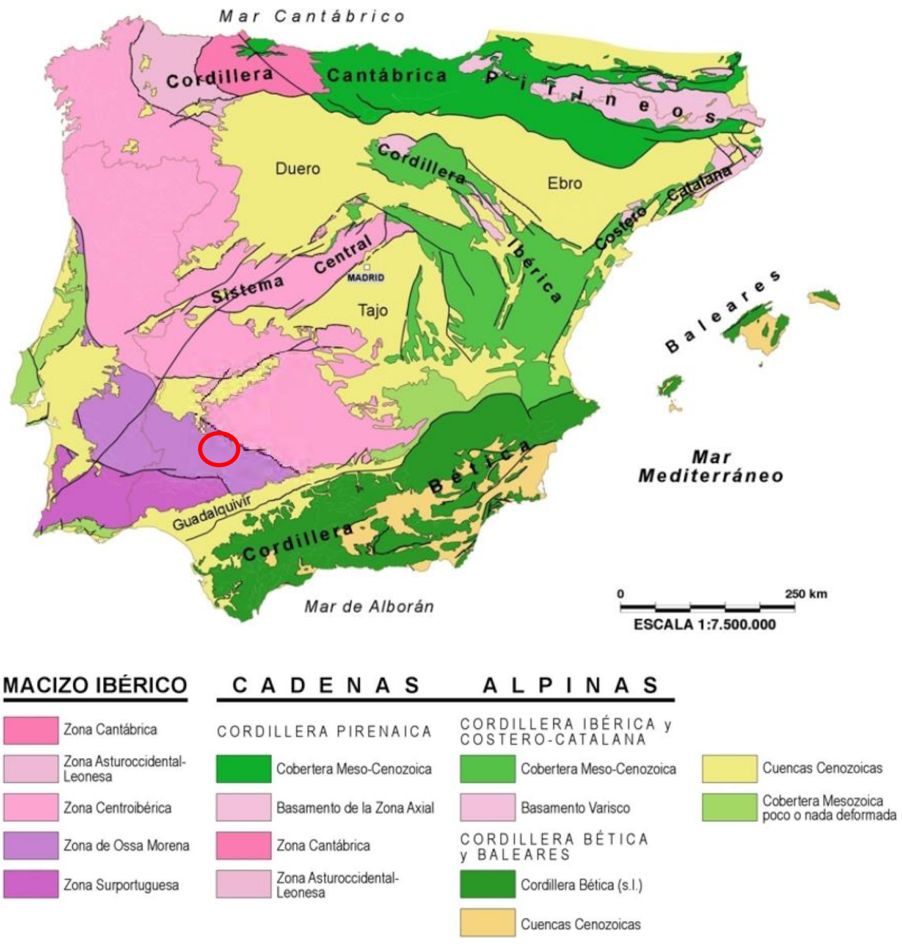


Figura 2 – Principales unidades geológicas de España peninsular, Portugal y Baleares.

Fuente: *Geología de España*, Vera, J.A.

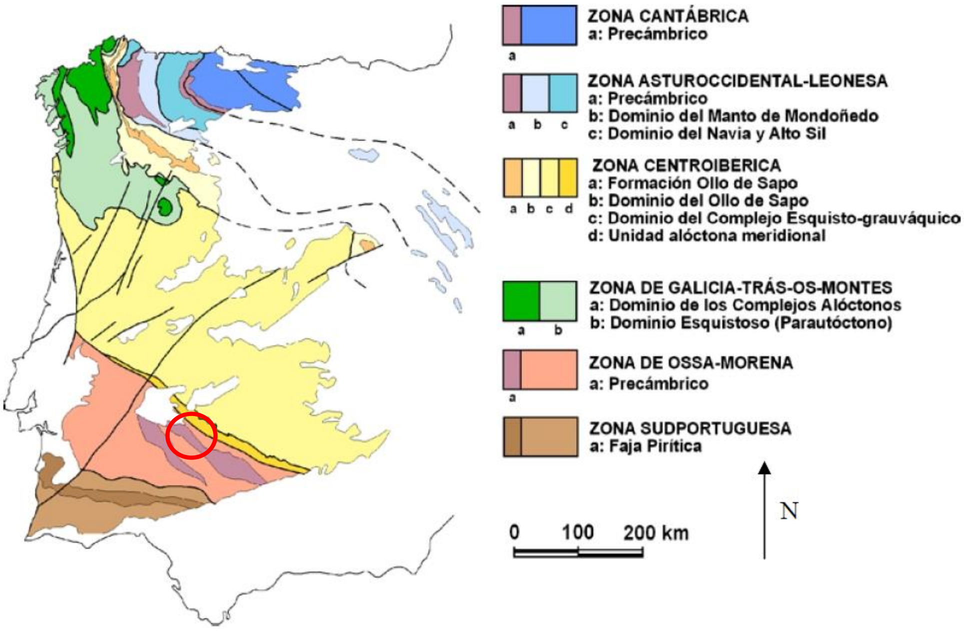


Figura 3 – Esquema del Macizo Ibérico. Fuente: *Geología de España*, Vera, J.A.

Según la hoja 877 de la cartografía geológica MAGNA del IGME, el proyecto se sitúa en una zona de suelo proveniente de la era Cenozoica, entre los períodos Terciario y Cuaternario, más concretamente en la época del Plioceno y del Pleistoceno, respectivamente.

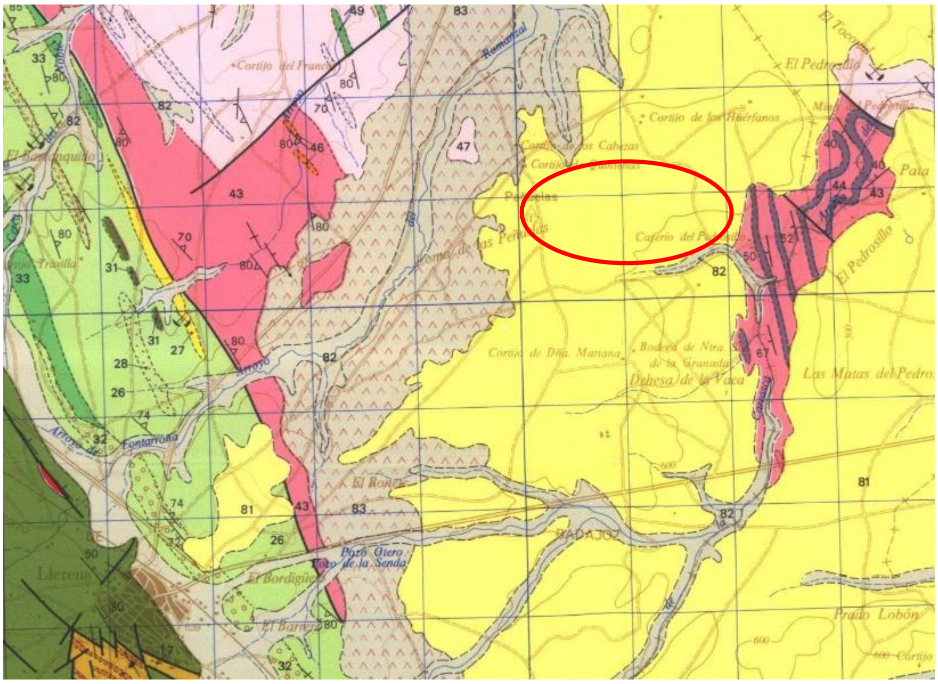


Figura 4 – Esquema geológico de la Hoja 877 (Llerena) MAGNA. Fuente: [IGME]

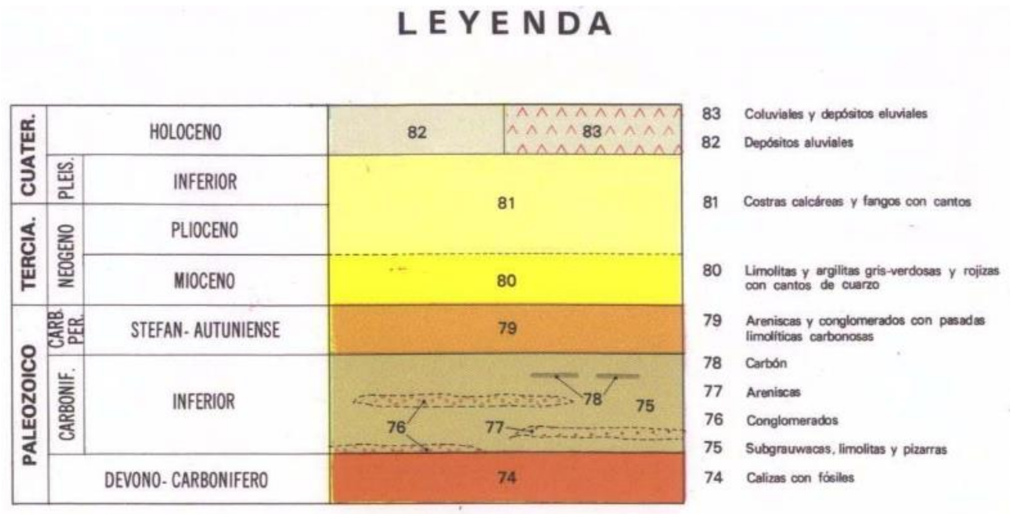


Figura 5 – Leyenda de la Hoja 877 (Llerena) MAGNA. Fuente: IGME

3.2. ESTRATIGRAFÍA

En la zona donde está ubicada la planta se pueden encontrar, principalmente, costras calcáreas y fangos con cantos. Según el IGME, se trata de materiales postectónicos no asimilables a ningún dominio concepto, que corresponden a procesos edáfico-sedimentarios. Se trata de un encostramiento calizo pulverulento, con una zona masiva hacia la base, y laminar hacia el techo, que se disponen sobre arcillas rojas terciarias a las que engloba en la zona basal, con textura en enrejado. Entra las formas de este enrejado aparecen posibles moldes de formas cristalinas que podrían corresponder a sulfatos, de los que no se reconoce ningún resto. El sustrato muestra una importante alteración hasta 2-3 metros, con desarrollo del suelo tipo "glei", con enrejado de carbonatos en las zonas expuestas a la superficie. Hacia la base se reconocen cantos cuarcíticos de pequeño tamaño, subredondeados. La parte superior son arcillas, limos y arenas rojas, de unos 2 metros de potencia. Se trata de materiales de descalcificación de la costra que eventualmente han sufrido un cierto transporte y/o aportes externos, ya que aparecen pequeños cantos cuarcíticos embalados en este material. La génesis de estas costras se relacionaría con procesos edáficos sobre una superficie de erosión previa, en un clima árido, de intensa evaporación en zonas de nivel piezométrico muy próximo a la superficie, y eventualmente, por encima de esta, desarrollándose una cierta actividad biológica acompañada de una intensa alteración del sustrato infrayacente. En este ambiente se produciría frecuentes fluctuaciones del nivel freático, con migración y depósito de carbonatos, procedentes de las formaciones calcáreas cámbricas y/o de alteración de rocas ígneas infrayacentes. Subsecuentemente, se implantaría un régimen climático bien distinto, con disolución parcial de las costras, con formación de materiales arcillosos-limosos tipo “tierra rosa”, a la que acompañan materiales transportados en mayor o menor grado.

En la comentada zona también se distinguen depósitos aluviales y coluviales y suelos aluviales. Los primeros son depósitos groseros, en ríos y llanuras de inundación constituidos, fundamentalmente, por gravas cuarcíticas, y arena en su mayor parte. Los coluviales y suelos aluviales son bandas procedentes de los materiales pliocuaternarios, donde los procesos antrópicos han debido jugar un papel importante.

3.3. TECTÓNICA

La zona en cuestión ha sufrido una evolución dinámica compleja y hoy en día no está claro si los materiales fueron estructurados durante una orogenia Precámbrica, Hercínica o bien si su estructura actual es el resultado de la superposición de varias etapas orogéncias.

Los materiales de la mitad nororiental de la Hoja 877 MAGNA del IGME presentan una disposición que indican la existencia de un gran anticlinorio con vergencia al suroeste. Aparece una serie de materiales precámbricos, rodeados hacia el noroeste y suroeste por series precámbricas más modernas y por series paleozoicas, que aparecen respectivamente en secuencia normal e invertida. Según la cartografía, este anticlinorio estaría roto por una falla de dirección N130E, aproximadamente, y el flanco normal estaría más completo, ya que en él llegan a aflorar materiales correlacionables con la sucesión Montemolín del anticlinorio Olivenza-Monesterio. El flanco invertido, menos desarrollado, se va ensanchando hacia el noroeste, y en la Hoja de Usagre (855) aparece una secuencia ininterrumpida desde la Formación carbonatada del Cámbrico, hasta la Sucesión Tentudía. Posteriormente, tanto la secuencia normal como la invertida están afectadas por una serie de pliegues cilíndricos de plano axial vertical, especialmente representados al norte de Villagarcía de la Torre.

La disposición de los materiales precámbricos, indica que han sido plegados junto a las series del Paleozoico inferior durante la orogenia hercínica. Esta macroestructura, explica por sí sola la disposición cartográfica de los materiales y es compatible con el grado de evolución metamórfica alcanzada por cada uno de ellos.

En las formaciones más antiguas Sucesión Montemolín, Sucesión Tentudía y posiblemente en la Formación Malcocinado se hace mención de dos posibles esquistosidades de flujo. En principio este contraste con las series superiores donde solo se observa una. El significado de esta posible esquistosidad y metamorfismo, no está claro, ya que podría estar relacionado con la presencia de cantos ya estructurados en la Formación Malcocinado y Torreárboles. En cualquier caso hay que indicar que no se observa ninguna estructura mesoscópica ni cartográfica que exija la actuación de una fase anterior.

3.4. HIDROGEOLOGÍA

Los terrenos precámbricos y paleozoicos son prácticamente impermeables, salvo quizás los afloramientos de calizas del Cámbrico, que pueden almacenar cantidades considerables y solo hay que esperar pequeñas captaciones, en relación con zonas de fracturas o en zonas muy alteradas.

Los depósitos terciarios y/o cuaternarios son materiales deleznables depositados y/o formados sobre un substrato impermeable. Se trata sin duda de un depósito colgado, que vierte sus aguas hacia el Arroyo Conejo y el Arroyo Romanzay, y existen una serie de fuentes siempre a la misma cota que nos marcan el contacto de estos materiales con el substrato impermeable. Las captaciones de estos materiales van a ser siempre bastante superficiales (0-20 m) y los caudales bajos o moderados.

En general, todos los afloramientos subterráneos tanto en surgencias naturales como en pozos responden a situaciones hidrogeológicas locales.

4. GEOTECNIA

4.1. UNIDADES GEOTÉCNICAS

A continuación se describen los materiales que se han adoptado para el desarrollo de este proyecto, ambos obtenidos del proyecto cedido por la Junta de Extremadura nombrado anteriormente.

Nivel 1: Suelo Cuaternario

Se trata del estrato superficial con una potencia de 4 metros. Se ha obtenido un **peso específico** de 16,4 kN/m^3. En cuanto a sus características resistentes, este suelo presenta una **cohesión** de 7 kPa y un **ángulo de rozamiento** de 30°. El valor obtenido en el Próctor Normal indica una **humedad óptima** de 19,2% con la que se obtiene una densidad seca máxima de 1,52 g/cm^3. Para los ensayos del **CBR** se obtiene un índice de 7,20%, además de un valor de **absorción** de un 4,73% y un **hinchamiento máximo** de un 0,42%.

Respecto a los límites de Atterberg, este estrato presenta un **Límite Líquido** (LL) de 52,1, un **Límite Plástico** de 34,8 y, por lo tanto, un **Índice de Plasticidad** (IP) de 17,3. Se ha obtenido un rango de contenido de **materia orgánica** de 0,08-0,16% y un rango de contenido en **sales solubles** de 0,10-0,68%. No se han detectado **sulfatos solubles**. Según el **PG-3** este suelo se clasifica como tolerable, por lo que puede ser utilizado para el cimiento, núcleo y espaldones de terraplenes.

Nivel 2: Suelo Paleozoico

Se trata del estrato superficial con una potencia de 6 metros. Se ha obtenido un **peso específico** de 19 kN/m^3. En cuanto a sus características resistentes, este suelo presenta una **cohesión** de 80 kPa y un **ángulo de rozamiento** de 28°. El valor obtenido en el Próctor Normal indica una **humedad óptima** de 11,9% con la que se obtiene una densidad seca máxima de 1,93 g/cm^3. Para los ensayos del **CBR** se obtiene un índice de 7,40%, además de un valor de **absorción** de un 4,30% y un **hinchamiento máximo** de un 1,60%.

Respecto a los límites de Atterberg, este estrato presenta un **Límite Líquido** (LL) de 52,1, un **Límite Plástico** de 34,8 y, por lo tanto, un **Índice de Plasticidad** (IP) de 17,3. Se ha obtenido un rango de contenido de **materia orgánica** de 0,04-0,08% y un rango de contenido en **sales solubles** de 0,09-0,70%. No se han detectado **sulfatos solubles**. Según el **PG-3** este suelo se clasifica como tolerable, por lo que puede ser utilizado para el cimiento, núcleo y espaldones de terraplenes.

4.2. TALUDES

En el proyecto cedido por la Junta se establecen las siguientes recomendaciones para los taludes en desmonte o terraplén:

Nivel	Material	Taludes recomendados (H:V)	
		<2 m	**>2 m**
1	Cuaternario	3:2	2:1
2	Paleozoico	1:1	3:2

5. PROCEDENCIA DE MATERIALES

5.1. ÁRIDOS

De acuerdo al balance de tierras detallado en el Anejo nº 9 – Movimientos de tierras, tras realizar la explanación de la planta termosolar habrá un excedente de tierras, por lo que no se necesitará suelos de préstamo. Debido a la falta de estudio geotécnico detallado de la zona de ubicación de la central, se detallan a continuación las canteras más cercanas a la obra, si se diera la circunstancia de necesitar suelo, para la explanación o para la ejecución de la carretera de acceso o de los viales internos de la planta, ninguno de los cuales está contemplado dentro de este proyecto:

EMPRESA	DIRECCIÓN	TFNO./FAX	MATERIAL	DISTANCIA	UTILIZACIÓN
Áridos La Dehesa de Quintana	Travesía Abajo s/n, Quintana de la Serena (Badajoz)	924 777 470	Áridos silíceos	80 km	Zahorra, morteros, hormigones y escolleras
Áridos y excavaciones San Francisco	Polígono industrial s/n, Medina de las Torres (Badajoz)	924 751 001 924 730 320	Áridos calizos	60 km	Zahorra, morteros, hormigones y mezclas bituminosas
Construcciones Moisés Villalba	Ctra. N-630 P.K. 737+500, Monesterio (Badajoz)	924 517 176	Áridos calizos	60 km	Zahorra y hormigones
Gévora Construcciones – Sierra del Castillo	Ctra. N-630 P.K. 677+000, Los Santos de Maimona (Badajoz)	924 544 749	Áridos calizos	50 km	Zahorra, morteros, hormigones y mezclas bituminosas
Horsihor	Calle Villafranza s/n, Puebla de la Reina (Badajoz)	924 360 081	Áridos silíceos	80 km	Zahorras, morteros y hormigones
Ocaytrans	Ctra. EX-105 P.K. 100+000, La Morera (Badajoz)	924 682 622	Áridos calizos	80 km	Zahorra artificial

5.2. HORMIGONES

A continuación se indican las plantas de hormigón situadas cerca de la ubicación de la obra:

EMPRESA	DIRECCIÓN	TELÉFONO	DISTANCIA
Hormigones Campiña Sur	Camino de Usagre s/n, Villagarcía de la Torre (Badajoz)	924 122 046	15 km
Hormigones Campiña Sur	Camino del Silo s/n, Bienvenida (Badajoz)	669 390 080 629 538 355	30 km
Hormigones Campiña Sur	Ctra. N-432 P.K. 141+600, Azuaga (Badajoz)	669 390 080 629 538 355	40 km
Hormigones Campiña Sur	Ctra. N-432 P.K. 155+000, Granja de Torrehermosa (Badajoz)	669 390 080 629 538 355	45 km
Hormigones Villalba	Ctra. N-630 P.K. 723+000, Monesterio (Badajoz)	924 517 176	45 km

6. BIBLIOGRAFÍA

- *Cartografía geológica MAGNA 50* (2ª Serie) (Enlace), Instituto Geológico y Minero de España, Ministerio de Economía y Competitividad.
- *Geología de España*, Vera, J.A., Sociedad Geológica de España – Instituto Geológico y Minero de España.
- *Proyecto "Renovación del firme y acondicionamiento de la EX-111, entre el P.K. 23+750 y el 43+360*", Junta de Extremadura.

ANEXO 3.1

INFORMES DE ESTABILIDAD DE TALUDES

1. INTRODUCCIÓN

Los informes adjuntos en este anexo se han creado con el software de cálculo **Slide** desarrollado por la empresa *Rocscience*. Primeramente, se ha incluido el informe de los taludes en terraplén y seguidamente, los taludes e desmonte. Se ha adoptado como altura la máxima obtenida al realizar la explanación de la central con el programa AutoCAD Civil 3D.

2. ESTABILIDAD DE TALUDES EN TERRAPLÉN

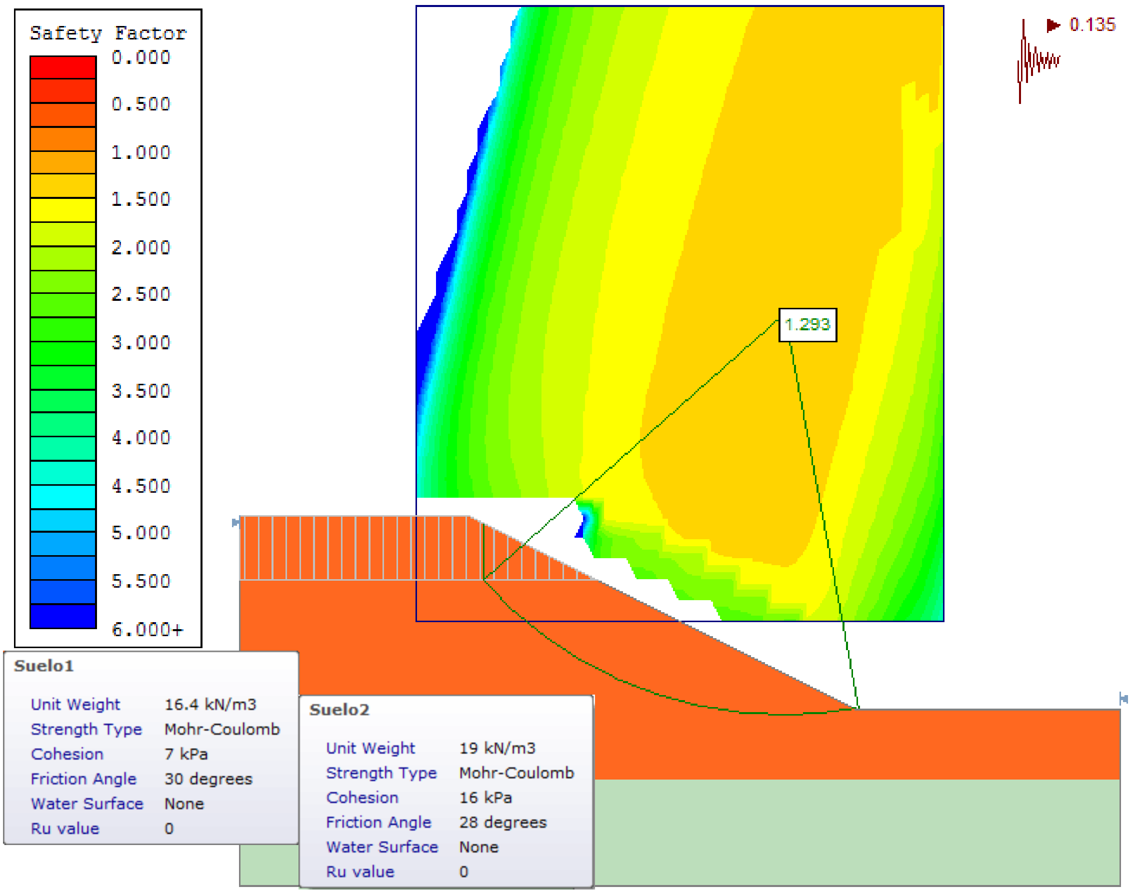


Figura 6 – Factor de seguridad del talud en terraplén

Slide Analysis Information

Estabilidad de los taludes de la explanación (Terraplén)

Project Summary

- File Name: Estabilidad talud explanación terraplén
- Slide Modeler Version: 6.036
- Project Title: Estabilidad de los taludes de la explanación (Terraplén)
- Author: Jesús Fernández González

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified
- Janbu simplified
- Ordinary/Fellenius

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 5
- Composite Surfaces: Disabled
- Reverse Curvature: Invalid Surfaces
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Loading

- Seismic Load Coefficient (Horizontal): 0.135

Tension Crack

- Tension crack Water level: dry

Material Properties

Property	Suelo1	Suelo2
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	16.4	19
Cohesion [kPa]	7	16
Friction Angle [deg]	30	28
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: Ordinary/Fellenius

- FS: 1.313060
- Center: 31.000, 32.500
- Radius: 22.892
- Left Slip Surface Endpoint: 13.847, 17.340
- Right Slip Surface Endpoint: 35.220, 10.000
- Left Slope Intercept: 13.847 20.577
- Right Slope Intercept: 35.220 10.000
- Resisting Moment=18339.5 kN-m
- Driving Moment=13967 kN-m
- Total Slice Area=78.9013 m2

Method: Bishop simplified

- FS: 1.389670
- Center: 32.800, 34.833
- Radius: 24.910
- Left Slip Surface Endpoint: 15.066, 17.340
- Right Slip Surface Endpoint: 34.964, 10.018
- Left Slope Intercept: 15.066 19.967
- Right Slope Intercept: 34.964 10.018
- Resisting Moment=16669.3 kN-m
- Driving Moment=11995.1 kN-m
- Total Slice Area=59.8849 m2

Method: Janbu simplified

- FS: 1.292730
- Center: 31.000, 32.500
- Radius: 22.892
- Left Slip Surface Endpoint: 13.847, 17.340
- Right Slip Surface Endpoint: 35.220, 10.000
- Left Slope Intercept: 13.847 20.577
- Right Slope Intercept: 35.220 10.000
- Resisting Horizontal Force=766.016 kN
- Driving Horizontal Force=592.556 kN
- Total Slice Area=78.9013 m2

Slice Data

- **Global Minimum Query (ordinary/fellenius) - Safety Factor: 1.31306**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.854904	48.7994	Suelo1	7	30	15.3315	20.1312	22.7439	0	22.7439
2	0.854904	54.9936	Suelo1	7	30	18.104	23.7717	29.0494	0	29.0494
3	0.854904	59.9804	Suelo1	7	30	20.8372	27.3605	35.2653	0	35.2653
4	0.854904	63.9186	Suelo1	7	30	23.4618	30.8067	41.2345	0	41.2345
5	0.854904	66.9285	Suelo1	7	30	25.92	34.0345	46.825	0	46.825
6	0.854904	69.1039	Suelo1	7	30	28.1631	36.9799	51.9267	0	51.9267
7	0.854904	70.5187	Suelo1	7	30	30.1506	39.5895	56.4467	0	56.4467
8	0.854904	71.233	Suelo1	7	30	31.8487	41.8192	60.3086	0	60.3086
9	0.854904	71.2955	Suelo1	7	30	33.2295	43.6323	63.449	0	63.449
10	0.854904	70.7466	Suelo1	7	30	34.2708	44.9996	65.8173	0	65.8173
11	0.854904	69.6195	Suelo1	7	30	34.9552	45.8983	67.3737	0	67.3737
12	0.854904	67.9422	Suelo1	7	30	35.2697	46.3112	68.0889	0	68.0889
13	0.854904	65.7379	Suelo1	7	30	35.2055	46.2269	67.9429	0	67.9429
14	0.854904	63.0257	Suelo1	7	30	34.7577	45.639	66.9248	0	66.9248
15	0.854904	59.8218	Suelo1	7	30	33.9254	44.5461	65.0317	0	65.0317
16	0.854904	56.139	Suelo1	7	30	32.7107	42.9511	62.2692	0	62.2692
17	0.854904	51.9879	Suelo1	7	30	31.1194	40.8617	58.6503	0	58.6503
18	0.854904	47.3765	Suelo1	7	30	29.1608	38.2899	54.1957	0	54.1957
19	0.854904	42.3109	Suelo1	7	30	26.847	35.2517	48.9333	0	48.9333
20	0.854904	36.795	Suelo1	7	30	24.1934	31.7674	42.8983	0	42.8983
21	0.854904	30.8308	Suelo1	7	30	21.2187	27.8614	36.1331	0	36.1331
22	0.854904	24.4183	Suelo1	7	30	17.9446	23.5624	28.687	0	28.687
23	0.854904	17.556	Suelo1	7	30	14.3962	18.9031	20.6168	0	20.6168
24	0.854904	10.2399	Suelo1	7	30	10.6015	13.9204	11.9865	0	11.9865
25	0.854904	2.66211	Suelo1	7	30	6.69286	8.78813	3.09714	0	3.09714

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.38967**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.795915	36.7264	Suelo1	7	30	17.2685	23.9975	29.4406	0	29.4406
2	0.795915	41.183	Suelo1	7	30	19.3938	26.951	34.5562	0	34.5562
3	0.795915	44.8411	Suelo1	7	30	21.2561	29.5389	39.0385	0	39.0385
4	0.795915	47.7825	Suelo1	7	30	22.8673	31.778	42.9167	0	42.9167
5	0.795915	50.073	Suelo1	7	30	24.2378	33.6825	46.2154	0	46.2154
6	0.795915	51.766	Suelo1	7	30	25.3762	35.2645	48.9555	0	48.9555
7	0.795915	52.9055	Suelo1	7	30	26.2898	36.5342	51.1546	0	51.1546
8	0.795915	53.5285	Suelo1	7	30	26.9848	37.5	52.8277	0	52.8277
9	0.795915	53.6657	Suelo1	7	30	27.4662	38.169	53.9862	0	53.9862
10	0.795915	53.3435	Suelo1	7	30	27.7379	38.5465	54.6401	0	54.6401

11	0.795915	52.5841	Suelo1	7	30	27.8029	38.6368	54.7965	0	54.7965
12	0.795915	51.4068	Suelo1	7	30	27.6634	38.443	54.4608	0	54.4608
13	0.795915	49.8277	Suelo1	7	30	27.3208	37.9669	53.6364	0	53.6364
14	0.795915	47.861	Suelo1	7	30	26.7758	37.2095	52.3244	0	52.3244
15	0.795915	45.5185	Suelo1	7	30	26.0281	36.1705	50.5247	0	50.5247
16	0.795915	42.8104	Suelo1	7	30	25.0768	34.8485	48.235	0	48.235
17	0.795915	39.7452	Suelo1	7	30	23.9203	33.2413	45.4512	0	45.4512
18	0.795915	36.33	Suelo1	7	30	22.5559	31.3452	42.1671	0	42.1671
19	0.795915	32.5707	Suelo1	7	30	20.9804	29.1558	38.3751	0	38.3751
20	0.795915	28.4718	Suelo1	7	30	19.1896	26.6672	34.0646	0	34.0646
21	0.795915	24.0367	Suelo1	7	30	17.1783	23.8721	29.2234	0	29.2234
22	0.795915	19.2679	Suelo1	7	30	14.9402	20.762	23.8366	0	23.8366
23	0.795915	14.1666	Suelo1	7	30	12.4681	17.3266	17.8863	0	17.8863
24	0.795915	8.73304	Suelo1	7	30	9.75334	13.5539	11.3517	0	11.3517
25	0.795915	2.96661	Suelo1	7	30	6.78566	9.42983	4.20859	0	4.20859

- **Global Minimum Query (janbu simplified) - Safety Factor: 1.29273**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.854904	48.7994	Suelo1	7	30	20.9092	27.03	34.6931	0	34.6931
2	0.854904	54.9936	Suelo1	7	30	23.8797	30.87	41.344	0	41.344
3	0.854904	59.9804	Suelo1	7	30	26.4717	34.2208	47.1479	0	47.1479
4	0.854904	63.9186	Suelo1	7	30	28.7092	37.1133	52.1577	0	52.1577
5	0.854904	66.9285	Suelo1	7	30	30.6115	39.5724	56.417	0	56.417
6	0.854904	69.1039	Suelo1	7	30	32.1944	41.6187	59.9614	0	59.9614
7	0.854904	70.5187	Suelo1	7	30	33.471	43.269	62.8198	0	62.8198
8	0.854904	71.233	Suelo1	7	30	34.4516	44.5366	65.0154	0	65.0154
9	0.854904	71.2955	Suelo1	7	30	35.1444	45.4322	66.5664	0	66.5664
10	0.854904	70.7466	Suelo1	7	30	35.5555	45.9636	67.4869	0	67.4869
11	0.854904	69.6195	Suelo1	7	30	35.6894	46.1368	67.7869	0	67.7869
12	0.854904	67.9422	Suelo1	7	30	35.5492	45.9555	67.4729	0	67.4729
13	0.854904	65.7379	Suelo1	7	30	35.136	45.4213	66.5477	0	66.5477
14	0.854904	63.0257	Suelo1	7	30	34.4498	44.5343	65.0113	0	65.0113
15	0.854904	59.8218	Suelo1	7	30	33.4891	43.2924	62.8604	0	62.8604
16	0.854904	56.139	Suelo1	7	30	32.251	41.6918	60.0879	0	60.0879
17	0.854904	51.9879	Suelo1	7	30	30.7307	39.7265	56.6841	0	56.6841
18	0.854904	47.3765	Suelo1	7	30	28.9223	37.3887	52.6349	0	52.6349
19	0.854904	42.3109	Suelo1	7	30	26.8177	34.6681	47.9227	0	47.9227
20	0.854904	36.795	Suelo1	7	30	24.4073	31.5521	42.5254	0	42.5254
21	0.854904	30.8308	Suelo1	7	30	21.6789	28.0249	36.4161	0	36.4161
22	0.854904	24.4183	Suelo1	7	30	18.6178	24.0678	29.5622	0	29.5622
23	0.854904	17.556	Suelo1	7	30	15.2067	19.6581	21.9245	0	21.9245
24	0.854904	10.2399	Suelo1	7	30	11.4245	14.7688	13.4559	0	13.4559
25	0.854904	2.66211	Suelo1	7	30	7.35757	9.51135	4.34979	0	4.34979

Interslice Data

- **Global Minimum Query (ordinary/fellenius) - Safety Factor: 1.31306**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	13.8469	17.34	0	0	0
2	14.7018	16.4245	0	0	0
3	15.5567	15.6015	0	0	0
4	16.4116	14.8582	0	0	0
5	17.2665	14.1848	0	0	0
6	18.1214	13.5739	0	0	0
7	18.9763	13.0196	0	0	0
8	19.8312	12.5172	0	0	0
9	20.6861	12.0628	0	0	0
10	21.541	11.6534	0	0	0
11	22.3959	11.2862	0	0	0
12	23.2509	10.9592	0	0	0
13	24.1058	10.6706	0	0	0
14	24.9607	10.4188	0	0	0
15	25.8156	10.2026	0	0	0
16	26.6705	10.0209	0	0	0
17	27.5254	9.873	0	0	0
18	28.3803	9.75816	0	0	0
19	29.2352	9.6759	0	0	0
20	30.0901	9.62586	0	0	0
21	30.945	9.60783	0	0	0
22	31.7999	9.62175	0	0	0
23	32.6548	9.66766	0	0	0
24	33.5097	9.74576	0	0	0
25	34.3646	9.85638	0	0	0
26	35.2195	10	0	0	0

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.38967**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	15.0665	17.34	0	0	0
2	15.8624	16.5683	13.9666	0	0
3	16.6583	15.8612	28.5604	0	0
4	17.4542	15.2119	43.0869	0	0
5	18.2501	14.6146	57.0128	0	0
6	19.0461	14.065	69.929	0	0
7	19.842	13.5593	81.5252	0	0
8	20.6379	13.0945	91.5714	0	0
9	21.4338	12.668	99.9044	0	0
10	22.2297	12.2775	106.418	0	0

11	23.0256	11.9214	111.055	0	0
12	23.8216	11.598	113.801	0	0
13	24.6175	11.3059	114.684	0	0
14	25.4134	11.044	113.764	0	0
15	26.2093	10.8113	111.141	0	0
16	27.0052	10.607	106.942	0	0
17	27.8011	10.4304	101.332	0	0
18	28.597	10.2807	94.5045	0	0
19	29.393	10.1577	86.6879	0	0
20	30.1889	10.0608	78.1438	0	0
21	30.9848	9.98984	69.1698	0	0
22	31.7807	9.94448	60.1009	0	0
23	32.5766	9.92461	51.313	0	0
24	33.3725	9.93019	43.226	0	0
25	34.1684	9.96123	36.3085	0	0
26	34.9644	10.0178	0	0	0

- **Global Minimum Query (janbu simplified) - Safety Factor: 1.29273**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	13.8469	17.34	0	0	0
2	14.7018	16.4245	20.4787	0	0
3	15.5567	15.6015	41.5154	0	0
4	16.4116	14.8582	62.0314	0	0
5	17.2665	14.1848	81.2425	0	0
6	18.1214	13.5739	98.5777	0	0
7	18.9763	13.0196	113.625	0	0
8	19.8312	12.5172	126.098	0	0
9	20.6861	12.0628	135.807	0	0
10	21.541	11.6534	142.648	0	0
11	22.3959	11.2862	146.585	0	0
12	23.2509	10.9592	147.644	0	0
13	24.1058	10.6706	145.906	0	0
14	24.9607	10.4188	141.505	0	0
15	25.8156	10.2026	134.623	0	0
16	26.6705	10.0209	125.492	0	0
17	27.5254	9.873	114.392	0	0
18	28.3803	9.75816	101.653	0	0
19	29.2352	9.6759	87.6568	0	0
20	30.0901	9.62586	72.844	0	0
21	30.945	9.60783	57.7155	0	0
22	31.7999	9.62175	42.8408	0	0
23	32.6548	9.66766	28.8664	0	0
24	33.5097	9.74576	16.5261	0	0
25	34.3646	9.85638	6.65482	0	0
26	35.2195	10	0	0	0

List Of Coordinates

Tension Crack

X	Y
0	17.34
20.32	17.34

External Boundary

X	50	50	50	35	23	13	0	0	0	0
Y	0	6	10	10	16	21	21	16	6	0

Material Boundary

X	Y
0	6
50	6

3. ESTABILIDAD DE TALUDES EN DESMONTE

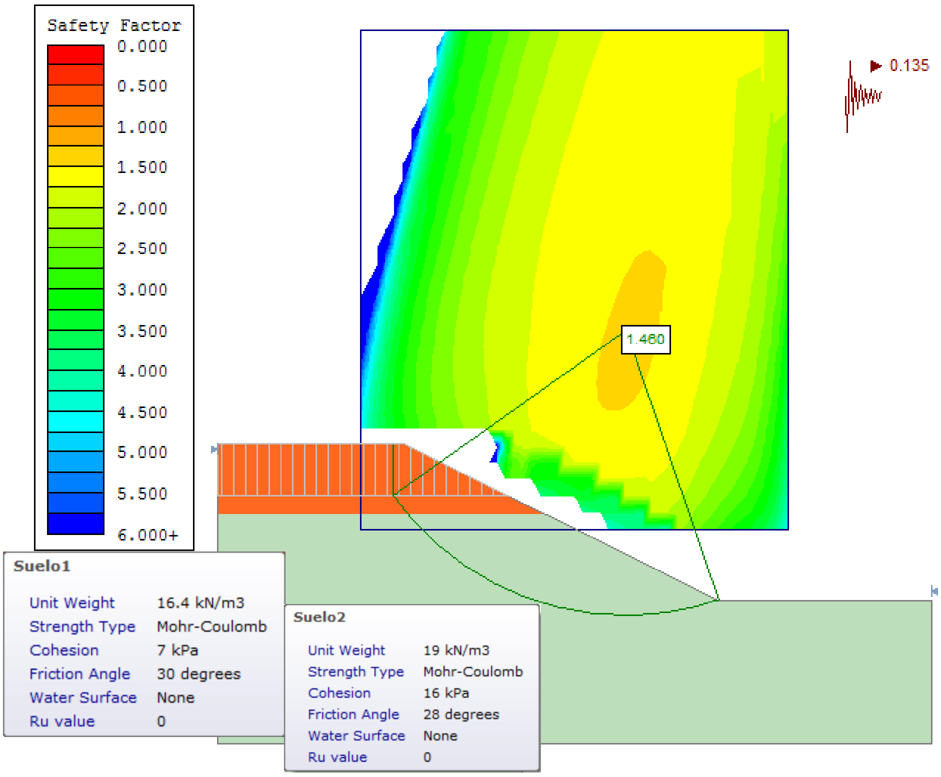


Figura 7 - Factor de seguridad del talud en desmonte

Slide Analysis Information

Estabilidad de los taludes de la explanaci�Desmonte)

Project Summary

- File Name: Estabilidad talud explanacion desmonte
- Slide Modeler Version: 6.036
- Project Title: Estabilidad de los taludes de la explanación (Desmonte)
- Author: Jesús Fernández González

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified
- Janbu simplified
- Ordinary/Fellenius

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3
- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 5
- Composite Surfaces: Disabled
- Reverse Curvature: Invalid Surfaces
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Loading

- Seismic Load Coefficient (Horizontal): 0.135

Tension Crack

- Tension crack Water level: dry

Material Properties

Property	Suelo1	Suelo2
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	16.4	19
Cohesion [kPa]	7	16
Friction Angle [deg]	30	28
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: Ordinary/Fellenius

- FS: 1.505360
- Center: 29.200, 30.167
- Radius: 20.990
- Left Slip Surface Endpoint: 12.585, 17.340
- Right Slip Surface Endpoint: 35.021, 10.000
- Left Slope Intercept: 12.585 21.000
- Right Slope Intercept: 35.021 10.000
- Resisting Moment=25860.8 kN-m
- Driving Moment=17179.1 kN-m
- Total Slice Area=101.356 m2

Method: Bishop simplified

- FS: 1.614190
- Center: 30.400, 32.500
- Radius: 22.894
- Left Slip Surface Endpoint: 13.244, 17.340
- Right Slip Surface Endpoint: 34.896, 10.052
- Left Slope Intercept: 13.244 20.878
- Right Slope Intercept: 34.896 10.052
- Resisting Moment=26337.7 kN-m
- Driving Moment=16316.3 kN-m
- Total Slice Area=85.3673 m2

Method: Janbu simplified

- FS: 1.459750
- Center: 28.600, 29.000
- Radius: 20.071
- Left Slip Surface Endpoint: 12.263, 17.340
- Right Slip Surface Endpoint: 35.069, 10.000
- Left Slope Intercept: 12.263 21.000
- Right Slope Intercept: 35.069 10.000
- Resisting Horizontal Force=1274.77 kN
- Driving Horizontal Force=873.277 kN
- Total Slice Area=110.005 m2

Slice Data

- **Global Minimum Query (Ordinary/Fellenius) - Safety Factor: 1.50536**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	1.12671	77.9331	Suelo1	7	30	13.8733	20.8843	24.0483	0	24.0483
2	0.887901	72.099	Suelo2	16	28	22.6272	34.0621	33.97	0	33.97
3	0.887901	80.186	Suelo2	16	28	25.8612	38.9304	43.1258	0	43.1258
4	0.887901	86.6816	Suelo2	16	28	29.0414	43.7177	52.1293	0	52.1293
5	0.887901	91.8042	Suelo2	16	28	32.0859	48.3008	60.749	0	60.749
6	0.887901	95.7158	Suelo2	16	28	34.9271	52.5778	68.7928	0	68.7928
7	0.887901	98.5405	Suelo2	16	28	37.5086	56.4639	76.1016	0	76.1016
8	0.887901	100.375	Suelo2	16	28	39.784	59.8892	82.5436	0	82.5436
9	0.887901	101.297	Suelo2	16	28	41.7152	62.7964	88.0112	0	88.0112
10	0.887901	101.368	Suelo2	16	28	43.2716	65.1394	92.4178	0	92.4178
11	0.887901	100.638	Suelo2	16	28	44.4294	66.8822	95.6955	0	95.6955
12	0.887901	98.9996	Suelo2	16	28	45.1186	67.9198	97.6469	0	97.6469
13	0.887901	95.867	Suelo2	16	28	45.0999	67.8916	97.5939	0	97.5939
14	0.887901	91.9256	Suelo2	16	28	44.5873	67.1199	96.1426	0	96.1426
15	0.887901	87.3056	Suelo2	16	28	43.6209	65.6651	93.4065	0	93.4065
16	0.887901	82.0238	Suelo2	16	28	42.2076	63.5376	89.4051	0	89.4051
17	0.887901	76.0925	Suelo2	16	28	40.3589	60.7547	84.1714	0	84.1714
18	0.887901	69.5203	Suelo2	16	28	38.0911	57.3408	77.7508	0	77.7508
19	0.887901	62.3123	Suelo2	16	28	35.4246	53.3268	70.2014	0	70.2014
20	0.887901	54.4699	Suelo2	16	28	32.3843	48.7501	61.594	0	61.594
21	0.887901	45.9913	Suelo2	16	28	28.9998	43.6551	52.0118	0	52.0118
22	0.887901	36.871	Suelo2	16	28	25.3048	38.0928	41.5505	0	41.5505
23	0.887901	27.1001	Suelo2	16	28	21.3378	32.121	30.3192	0	30.3192
24	0.887901	16.6656	Suelo2	16	28	17.142	25.8048	18.4402	0	18.4402
25	0.887901	5.55259	Suelo2	16	28	12.7663	19.218	6.0521	0	6.0521

- **Global Minimum Query (Bishop simplified) - Safety Factor: 1.61419**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	1.28455	81.8786	Suelo1	7	30	19.7635	31.902	43.1315	0	43.1315
2	0.848641	62.2536	Suelo2	16	28	26.1882	42.2728	49.412	0	49.412
3	0.848641	68.2718	Suelo2	16	28	28.6099	46.1818	56.7637	0	56.7637
4	0.848641	73.1733	Suelo2	16	28	30.7144	49.5788	63.1526	0	63.1526
5	0.848641	77.0774	Suelo2	16	28	32.5221	52.4968	68.6405	0	68.6405
6	0.848641	80.078	Suelo2	16	28	34.0496	54.9626	73.2781	0	73.2781
7	0.848641	82.2504	Suelo2	16	28	35.3108	56.9984	77.1068	0	77.1068
8	0.848641	83.6559	Suelo2	16	28	36.3167	58.622	80.1604	0	80.1604
9	0.848641	84.3445	Suelo2	16	28	37.0763	59.8482	82.4665	0	82.4665
10	0.848641	84.358	Suelo2	16	28	37.5971	60.6888	84.0473	0	84.0473

11	0.848641	83.7309	Suelo2	16	28	37.8845	61.1528	84.9201	0	84.9201
12	0.848641	82.0073	Suelo2	16	28	37.7728	60.9725	84.581	0	84.581
13	0.848641	79.2449	Suelo2	16	28	37.2705	60.1617	83.056	0	83.056
14	0.848641	75.9151	Suelo2	16	28	36.536	58.976	80.826	0	80.826
15	0.848641	72.0344	Suelo2	16	28	35.57	57.4167	77.8936	0	77.8936
16	0.848641	67.6162	Suelo2	16	28	34.3722	55.4833	74.2573	0	74.2573
17	0.848641	62.6713	Suelo2	16	28	32.941	53.1731	69.9124	0	69.9124
18	0.848641	57.2077	Suelo2	16	28	31.2737	50.4817	64.8506	0	64.8506
19	0.848641	51.2314	Suelo2	16	28	29.3661	47.4025	59.0596	0	59.0596
20	0.848641	44.7458	Suelo2	16	28	27.213	43.927	52.523	0	52.523
21	0.848641	37.7526	Suelo2	16	28	24.8075	40.044	45.2202	0	45.2202
22	0.848641	30.251	Suelo2	16	28	22.1411	35.7399	37.1254	0	37.1254
23	0.848641	22.2383	Suelo2	16	28	19.2034	30.9979	28.207	0	28.207
24	0.848641	13.7096	Suelo2	16	28	15.982	25.798	18.4273	0	18.4273
25	0.848641	4.65778	Suelo2	16	28	12.4618	20.1157	7.74059	0	7.74059

- **Global Minimum Query (Janbu simplified) - Safety Factor: 1.45975**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	1.04476	73.8014	Suelo1	7	30	21.7326	31.7241	42.8234	0	42.8234
2	0.906702	77.2745	Suelo2	16	28	30.0118	43.8097	52.3025	0	52.3025
3	0.906702	86.657	Suelo2	16	28	33.885	49.4636	62.9359	0	62.9359
4	0.906702	94.1207	Suelo2	16	28	37.2222	54.3351	72.0978	0	72.0978
5	0.906702	99.9655	Suelo2	16	28	40.0783	58.5043	79.939	0	79.939
6	0.906702	104.406	Suelo2	16	28	42.4949	62.032	86.5736	0	86.5736
7	0.906702	107.603	Suelo2	16	28	44.5043	64.9651	92.0898	0	92.0898
8	0.906702	109.677	Suelo2	16	28	46.131	67.3398	96.5561	0	96.5561
9	0.906702	110.725	Suelo2	16	28	47.3948	69.1845	100.026	0	100.026
10	0.906702	110.821	Suelo2	16	28	48.3102	70.5208	102.539	0	102.539
11	0.906702	110.025	Suelo2	16	28	48.8886	71.3651	104.127	0	104.127
12	0.906702	108.334	Suelo2	16	28	49.1194	71.702	104.76	0	104.76
13	0.906702	105.076	Suelo2	16	28	48.7446	71.1549	103.731	0	103.731
14	0.906702	100.789	Suelo2	16	28	47.9438	69.9859	101.533	0	101.533
15	0.906702	95.7521	Suelo2	16	28	46.809	68.3295	98.4175	0	98.4175
16	0.906702	89.9834	Suelo2	16	28	45.3379	66.182	94.3786	0	94.3786
17	0.906702	83.4959	Suelo2	16	28	43.5253	63.536	89.4022	0	89.4022
18	0.906702	76.2977	Suelo2	16	28	41.3633	60.3801	83.4667	0	83.4667
19	0.906702	68.3927	Suelo2	16	28	38.8409	56.698	76.5419	0	76.5419
20	0.906702	59.7803	Suelo2	16	28	35.9438	52.4689	68.5879	0	68.5879
21	0.906702	50.4555	Suelo2	16	28	32.6532	47.6655	59.5541	0	59.5541
22	0.906702	40.4088	Suelo2	16	28	28.9458	42.2537	49.3761	0	49.3761
23	0.906702	29.6259	Suelo2	16	28	24.7923	36.1906	37.973	0	37.973
24	0.906702	18.087	Suelo2	16	28	20.1557	29.4223	25.2438	0	25.2438
25	0.906702	5.78897	Suelo2	16	28	14.9997	21.8959	11.0885	0	11.0885

Interslice Data

- **Global Minimum Query (ordinary/fellenius) - Safety Factor: 1.50536**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	12.585	17.34	0	0	0
2	13.7117	16	0	0	0
3	14.5996	15.0865	0	0	0
4	15.4875	14.2749	0	0	0
5	16.3754	13.5501	0	0	0
6	17.2633	12.9012	0	0	0
7	18.1512	12.3199	0	0	0
8	19.0391	11.7999	0	0	0
9	19.927	11.336	0	0	0
10	20.8149	10.9242	0	0	0
11	21.7028	10.5612	0	0	0
12	22.5907	10.2443	0	0	0
13	23.4786	9.97143	0	0	0
14	24.3665	9.74072	0	0	0
15	25.2544	9.55079	0	0	0
16	26.1423	9.40053	0	0	0
17	27.0302	9.28907	0	0	0
18	27.9181	9.2158	0	0	0
19	28.806	9.18032	0	0	0
20	29.6939	9.18243	0	0	0
21	30.5818	9.22215	0	0	0
22	31.4697	9.29969	0	0	0
23	32.3576	9.41548	0	0	0
24	33.2455	9.57016	0	0	0
25	34.1334	9.76462	0	0	0
26	35.0213	10	0	0	0

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.61419**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	13.2444	17.34	0	0	0
2	14.529	16	43.4713	0	0
3	15.3776	15.2238	68.0128	0	0
4	16.2263	14.521	92.8513	0	0
5	17.0749	13.8833	116.945	0	0
6	17.9236	13.3042	139.508	0	0
7	18.7722	12.7786	159.95	0	0
8	19.6208	12.3023	177.827	0	0
9	20.4695	11.8718	192.82	0	0
10	21.3181	11.4843	204.704	0	0
11	22.1668	11.1376	213.34	0	0

12	23.0154	10.8296	218.659	0	0
13	23.864	10.5587	220.597	0	0
14	24.7127	10.3236	219.205	0	0
15	25.5613	10.1231	214.664	0	0
16	26.41	9.9563	207.205	0	0
17	27.2586	9.82247	197.111	0	0
18	28.1073	9.72102	184.719	0	0
19	28.9559	9.65151	170.419	0	0
20	29.8045	9.61367	154.657	0	0
21	30.6532	9.60732	137.945	0	0
22	31.5018	9.63245	120.86	0	0
23	32.3505	9.68916	104.055	0	0
24	33.1991	9.77768	88.2693	0	0
25	34.0477	9.89839	74.3374	0	0
26	34.8964	10.0518	0	0	0

- **Global Minimum Query (janbu simplified) - Safety Factor: 1.45975**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	12.2632	17.34	0	0	0
2	13.308	16	44.6882	0	0
3	14.2147	15.0033	80.0963	0	0
4	15.1214	14.1281	116.213	0	0
5	16.0281	13.3541	151.042	0	0
6	16.9348	12.6669	183.207	0	0
7	17.8415	12.056	211.746	0	0
8	18.7482	11.5132	235.986	0	0
9	19.6549	11.0325	255.467	0	0
10	20.5616	10.609	269.895	0	0
11	21.4683	10.2387	279.106	0	0
12	22.375	9.91872	283.047	0	0
13	23.2817	9.64641	281.755	0	0
14	24.1884	9.41982	275.34	0	0
15	25.0951	9.23737	264.09	0	0
16	26.0018	9.09786	248.392	0	0
17	26.9085	9.00039	228.717	0	0
18	27.8152	8.94433	205.617	0	0
19	28.7219	8.92935	179.741	0	0
20	29.6286	8.95536	151.839	0	0
21	30.5353	9.02251	122.781	0	0
22	31.442	9.13122	93.5734	0	0
23	32.3487	9.28217	65.3841	0	0
24	33.2554	9.47635	39.5771	0	0
25	34.1621	9.71507	17.7553	0	0
26	35.0688	10	0	0	0

List Of Coordinates

Tension Crack

X	Y
0	17.34
20.32	17.34

External Boundary

X	Y
50	0
50	10
35	10
23	16
13	21
0	21
0	16
0	0

Material Boundary

X	Y
0	16
23	16

ANEJO Nº 4

HIDROLOGÍA Y CLIMATOLOGÍA

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad definir los valores hidrológicos y climatológicos de la ubicación donde se construirá la central termosolar. Estos datos se emplearán en anejos sucesivos para realizar los cálculos necesarios, principalmente los relacionados con las balsas se regulación descritas en el Anejo nº 8 – Cálculos hidráulicos. En este proyecto no se incluye el diseño del drenaje de la planta.

2. HIDROLOGÍA

2.1. PLUVIOMETRÍA

Previamente al cálculo de la precipitación diaria correspondiente a cada período de retorno, es necesario obtener los datos de lluvia anuales registrados. Ante la inexistencia de una estación en la ubicación de la central, se ha procedido a obtener los valores de las estaciones cercanas y calcular la precipitación diaria de cada período de retorno, para posteriormente elegir el resultado más alto, para situarnos en el lado de la seguridad.

A continuación se enumeran las estaciones más cercanas a la zona de la obra y se resumen sus características. Los valores de la precipitación diaria máxima anual de cada una de ellas se han adjuntado en el anexo 4.1.

ESTACIÓN	LOCALIDAD	Nº DATOS	MEDIA	DESVIACIÓN TÍPICA
4381	Casas de Reina	42	47,6571	17,5064
4383	Berlanga	37	41,1595	17,1672
4387	Villagarcía de la Torre	44	43,2364	17,3492
4388	Higuera de Llerena	22	38,9682	15,2383

2.2. PRECIPITACIÓN DIARIA

Para calcular el valor de precipitación diaria correspondiente a los distintos períodos de retorno se han empleado dos métodos: el de Gumbel y el SQRT-ET_{MAX}.

Para hallar el valor máximo de precipitación a partir de datos de lluvia máximos anuales según el **método de Gumbel** se aplica la fórmula $x = x_m + \left(\frac{y_T - y_n}{S_n}\right) \cdot S_{n-1}$ donde x es el valor máximo de lluvia con un determinado período de retorno; x_m es el valor medio de los datos que tenemos; y_T es la variable de Gumbel que depende del período de retorno T, cuya fórmula es $y_T = -\ln\left[\ln\left(\frac{T}{T-1}\right)\right]$; las variables y_n y S_n dependen del número de datos y sus valores están tabulados; y S_{n-1} es la desviación estándar de los datos.

Nºdatos	yn	Sn	Nºdatos	yn	Sn	Nºdatos	yn	Sn
1	0,36651	0,00000	**35**	0,54034	1,12847	**69**	0,55453	1,18440
2	0,40434	0,49838	**36**	0,54105	1,13126	**70**	0,55477	1,18535
3	0,42859	0,64348	**37**	0,54174	1,13394	**71**	0,55500	1,18629
4	0,44580	0,73147	**38**	0,54239	1,13650	**72**	0,55523	1,18720
5	0,45879	0,79278	**39**	0,54302	1,13896	**73**	0,55546	1,18809
6	0,46903	0,83877	**40**	0,54362	1,14131	**74**	0,55567	1,18896
7	0,47735	0,87493	**41**	0,54420	1,14358	**75**	0,55589	1,18982
8	0,48428	0,90432	**42**	0,54475	1,14576	**76**	0,55610	1,19065
9	0,49015	0,92882	**43**	0,54529	1,14787	**77**	0,55630	1,19147
10	0,49521	0,94963	**44**	0,54580	1,14989	**78**	0,55650	1,19227
11	0,49961	0,96758	**45**	0,54630	1,15184	**79**	0,55669	1,19306
12	0,50350	0,98327	**46**	0,54678	1,15373	**80**	0,55689	1,19382
13	0,50695	0,99713	**47**	0,54724	1,15555	**81**	0,55707	1,19458
14	0,51004	1,00948	**48**	0,54769	1,15731	**82**	0,55726	1,19531
15	0,51284	1,02057	**49**	0,54812	1,15901	**83**	0,55744	1,19604
16	0,51537	1,03060	**50**	0,54854	1,16066	**84**	0,55761	1,19675
17	0,51768	1,03973	**51**	0,54895	1,16226	**85**	0,55779	1,19744
18	0,51980	1,04808	**52**	0,54934	1,16380	**86**	0,55796	1,19813
19	0,52175	1,05575	**53**	0,54972	1,16530	**87**	0,55812	1,19880
20	0,52355	1,06282	**54**	0,55009	1,16676	**88**	0,55828	1,19945
21	0,52522	1,06938	**55**	0,55044	1,16817	**89**	0,55844	1,20010
22	0,52678	1,07547	**56**	0,55079	1,16955	**90**	0,55860	1,20073
23	0,52823	1,08115	**57**	0,55113	1,17088	**91**	0,55876	1,20135
24	0,52959	1,08646	**58**	0,55146	1,17218	**92**	0,55891	1,20196
25	0,53086	1,09145	**59**	0,55177	1,17344	**93**	0,55905	1,20256
26	0,53206	1,09613	**60**	0,55208	1,17467	**94**	0,55920	1,20315
27	0,53319	1,10054	**61**	0,55238	1,17586	**95**	0,55934	1,20373
28	0,53426	1,10470	**62**	0,55268	1,17702	**96**	0,55948	1,20430
29	0,53527	1,10864	**63**	0,55296	1,17816	**97**	0,55962	1,20486
30	0,53622	1,11237	**64**	0,55324	1,17926	**98**	0,55976	1,20541
31	0,53713	1,11592	**65**	0,55351	1,18034	**99**	0,55989	1,20596
32	0,53799	1,11929	**66**	0,55378	1,18139	**100**	0,56002	1,20649
33	0,53881	1,12249	**67**	0,55403	1,18242	**101**	0,56015	1,20701
34	0,53959	1,12555	**68**	0,55429	1,18342			

Figura 1 – Valores de y_n y S_n según el número de datos

Según el **modelo SQRT-ET$_{MAX}$** para para hallar los valores máximos de lluvia con un determinado período de retorno, se aplica la siguiente fórmula:

$$F(x)\begin{cases} 0 & x < 0 \\ e^{-k\cdot\left(1+\sqrt{\alpha\cdot x}\right)\cdot e^{-\sqrt{\alpha\cdot x}}} & x \geq 0 \end{cases}$$

Se han calculado las precipitaciones para los períodos de retorno de 100 y 500 años, porque son los necesarios para el diseño de las balsas de regulación, tal y como se explica en el anejo nº 8 – Cálculos hidráulicos. Empleando las fórmulas indicadas, se obtienen los siguientes valores en las distintas estaciones:

Estación		Período de retorno T= 100 años		Período de retorno T= 500 años	
		Gumbel	SQRT-ET$_{MAX}$	Gumbel	SQRT-ET$_{MAX}$
4381	Casas de Reina	109,6 mm	108,4 mm	134,3 mm	139,9 mm
4383	Berlanga	91,9 mm	90,1 mm	112,0 mm	115,2 mm
4387	Villagarcía de la Torre	103,4 mm	103,9 mm	127,8 mm	135,7 mm
4388	Higuera de Llerena	96,7 mm	93,0 mm	119,5 mm	120,6 mm

Por lo tanto, para los cálculos indicados en los anejos siguientes que necesiten el dato de precipitación diaria con un período de retorno de 500 años se tomará el valor de la estación de Casas de Reina (**110 mm**), al igual que para la correspondiente al período de retorno de 1.000 años (**140 mm**).

3. EVAPOTRANSPIRACIÓN

Para realizar el cálculo del balance anual de gasto de agua en la central termosolar, se necesita obtener el dato del volumen de agua que se evapora de las balsas de regulación. Para ello, se calcula el valor de la evapotranspiración de la zona de ubicación de la planta. En este caso se ha obtenido este parámetro mediante tres fórmulas distintas y posteriormente se ha escogido el valor más alto. Estas fórmulas son las correspondientes a los métodos de Thornthwaite, de Blaney y Criddle y de Hargreaves. A continuación se desarrolla cada uno de los métodos y se calcula según los datos obtenidos de la página del "Atmospheric Science Data Center" desarrollado por la NASA, que se adjuntan en el anexo 4.2.

3.1. MÉTODO DE THORNTHWAITE

El método de Thornthwaite está basado en la determinación de la evapotranspiración en función de la temperatura media con una corrección en función de la duración astronómica del día y el número de días del mes. La fórmula propuesta es la siguiente:

$$ETP_{Tho} = e \cdot L$$

En ella ETP_{Tho} es la evapotranspiración corregida (mm/mes); e es la evapotranspiración mensual sin ajustar en mm; y L es el factor de corrección según el número de días del mes (N_d) y la duración astronómica del día N (horas del sol) y se obtiene de la siguiente tabla:

LAT. N.	E	F	M	A	M	J	J	A	S	O	N	D
27	0,92	0,88	1,03	1,07	1,16	1,15	1,18	1,13	1,02	0,99	0,90	0,90
28	0,91	0,88	1,03	1,07	1,16	1,16	1,18	1,13	1,02	0,98	0,90	0,90
29	0,91	0,87	1,03	1,07	1,17	1,16	1,19	1,13	1,03	0,98	0,90	0,89
30	0,90	0,87	1,03	1,08	1,18	1,17	1,20	1,14	1,03	0,98	0,89	0,88
35	0,87	0,85	1,03	1,09	1,21	1,21	1,23	1,16	1,03	0,97	0,86	0,85
36	0,87	0,85	1,03	1,10	1,21	1,22	1,24	1,16	1,03	0,97	0,86	0,84
37	0,86	0,84	1,03	1,10	1,22	1,23	1,25	1,17	1,03	0,97	0,85	0,83
38	0,85	0,84	1,03	1,10	1,23	1,24	1,25	1,17	1,04	0,96	0,84	0,83
39	0,85	0,84	1,03	1,11	1,23	1,24	1,26	1,18	1,04	0,96	0,84	0,82
40	0,84	0,83	1,03	1,11	1,24	1,25	1,27	1,18	1,04	0,96	0,83	0,81
41	0,83	0,83	1,03	1,11	1,25	1,26	1,27	1,19	1,04	0,96	0,82	0,80
42	0,82	0,83	1,03	1,12	1,26	1,27	1,28	1,19	1,04	0,95	0,82	0,79
43	0,81	0,82	1,02	1,12	1,26	1,28	1,29	1,20	1,04	0,95	0,81	0,77
44	0,81	0,82	1,02	1,13	1,27	1,29	1,30	1,20	1,04	0,95	0,80	0,76

La evapotranspiración mensual sin ajustar se calcula de acuerdo con la siguiente ecuación:

$$e = 16 \cdot \left(10 \cdot \frac{t_m}{I}\right)^a$$

Donde t_m es la temperatura media mensual en °C; a es una parámetro que se calcula según la expresión $a = 0{,}000000675 \cdot I^3 - 0{,}0000771 \cdot I^2 + 0{,}01792 \cdot I + 0{,}49239$;

e I es el índice de calor anual, que se calcula como el sumatorio de los índices de calor mensuales i_j, obtenidos a través de la expresión $i_j = \left(\frac{tm_j}{5}\right)^{1,514}$. Sin embargo, si la temperatura media mensual es superior a 26,5 °C, el valor de e se toma directamente al multiplicar el número de días del mes en cuestión y el dato obtenido de la siguiente tabla, que están expresados en mm/día:

tm(°C)	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
26						4.5	4.5	4.6	4.6	4.6
27	4.6	4.7	4.7	4.7	4.8	4.8	4.8	4.8	4.9	4.9
28	4.9	5	5	5	5	5.1	5.1	5.1	5.1	5.2
29	5.2	5.2	5.2	5.2	5.3	5.3	5.3	5.3	5.4	5.4
30	5.4	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.6	5.6
31	5.6	5.6	5.6	5.6	5.7	5.7	5.7	5.7	5.7	5.8
32	5.8	5.8	5.8	5.8	5.8	5.8	5.9	5.9	5.9	5.9
33	5.9	5.9	5.9	5.9	6	6	6	6	6	6
34	6	6	6	6	6.1	6.1	6.1	6.1	6.1	6.1
35	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
36	6.1	6.1	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
37	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
38	6.2									

Con todas estas indicaciones se obtienen los valores de evapotranspiración siguientes:

Mes	i_j	e (mm/mes)	L_j	ETP_{Tho} (mm/mes)
E	1,751	13,745	0,846	11,635
F	2,265	18,950	0,840	15,918
M	3,717	35,175	1,025	36,045
A	4,908	49,786	1,092	54,350
M	7,427	83,521	1,223	102,127
J	10,886	134,632	1,225	164,924
J	12,920	145,700	1,249	181,923
A	12,347	157,575	1,171	184,537
S	9,684	116,325	1,033	120,203
O	6,492	70,591	0,964	68,081
N	3,717	35,175	0,842	29,606
D	2,341	19,752	0,823	16,260
TOTAL		880,927		**985,609**

I= 78,455 a= 1,891

3.2. MÉTODO DE BLANEY Y CRIDDLE

El fundamento de la expresión definida por estos autores radica en considerar que el consumo de agua de un cultivo es función de la temperatura, la iluminación y la cubierta vegetal. La fórmula es la siguiente:

$$ETP_{B-C} = \frac{I_i}{I} \cdot (45{,}72 \cdot tm_i + 812{,}8)$$

Donde ETP_{B-C} es la evapotranspiración potencial mensual, en mm/mes; tm_i es la temperatura media mensual, en °C; I_i es el número de horas de luz del mes en cuestión, calculado como $N_i \cdot Nd_i$, siendo N_i la duración astronómica media del día y Nd_i el número de días del mes; e I es el número de horas del año, obtenido al sumar todas las horas mensuales (I_i).

Empleando los valores detallados en el anexo 4.2, se obtienen los siguientes resultados:

Mes	I_i	ETP_{B-C} (mm/mes)
E	304,730	78,505
F	302,400	82,078
M	368,900	112,739
A	393,000	129,817
M	440,200	165,806
J	441,000	190,630
J	449,500	207,728
A	421,600	191,361
S	372,000	153,909
O	347,200	125,056
N	303,000	92,599
D	296,360	81,018
TOTAL		**1611,247**

I= 4439,890

3.3. MÉTODO DE HARGREAVES

El método de Hargreaves utiliza parámetros térmicos y radiación solar, que estima a partir de la radiación extraterrestre. La fórmula es la siguiente:

$$ETr = 0{,}0023 \cdot Ra \cdot (T - t)^{0{,}5} \cdot (tm + 17{,}8)$$

Donde ETr es la evapotranspiración en mm/día; Ra es la radiación solar extraterrestre expresada en equivalente de agua, en mm/día; T–t es la diferencia entre la media mensual de temperaturas máximas y la de mínimas, en °C y tm es la temperatura media del aire, en °C. Para la conversión de unidades en la radiación solar se utilizan las siguientes equivalencias: $1\ {}^{cal}/_{cm^2 \cdot día} = 4{,}185\ {}^{J}/_{cm^2 \cdot día} = 0{,}0171\ {}^{mm}/_{día}$.

Con los datos disponibles, se han obtenido los siguientes valores:

Mes	Ra (mm/día)	T-t (°C)	ETr (mm/día)	ETr (mm/mes)
E	6,661	8,410	1,112	34,485
F	8,822	9,440	1,645	46,048
M	11,689	10,700	2,612	80,969
A	14,424	10,300	3,418	102,532
M	16,174	9,470	4,190	129,884
J	16,909	9,220	4,960	148,791
J	16,468	10,100	5,405	167,545
A	14,997	10,300	4,882	151,343
S	12,586	9,240	3,537	106,121
O	9,704	8,010	2,211	68,538
N	7,205	7,670	1,363	40,890
D	6,014	7,620	1,014	31,448
TOTAL				**1108,596**

3.4. VALORES MEDIOS

Con todos los valores obtenidos según los diferentes métodos desarrollados, se ha realizado la media, cuyo resultado será el empleado en los cálculos relativos al balance de consumo de agua de las balsas de resguardo incluidos en el Anejo nº 8 – Cálculos hidráulicos.

Mes	ETP (mm/mes)
E	41,542
F	48,015
M	76,584
A	95,566
M	132,606
J	168,115
J	185,732
A	175,747

S	126,744
O	87,225
N	54,365
D	42,909
TOTAL	**1235,151**

4. COEFICIENTES DE REDUCCIÓN DE LOS DÍAS DE TRABAJO

Para la definición de los rendimientos y el plan de obra es necesario tener en cuenta los días perdidos debido a la climatología. Para poder establecer esta reducción se han hallado los coeficientes de reducción de los días de trabajo a partir de las isolíneas publicadas por el Ministerio de Obras Públicas.

Para establecer los criterios a aplicar a la hora de determinar si un día se pierde o no se ha recurrido a las pautas marcadas en el Pliego de Prescripciones Técnicas Generales (PG-3) y en la Instrucción de Hormigón Estructural (EHE-08). A continuación se enumeran las limitaciones existentes para cada actividad prevista en la obra:

- <u>Rellenos</u>: Cuando la temperatura ambiente a la sombra sea inferior a 2 °C y/o cuando exista lluvia lo suficientemente importante como para modificar sustancialmente la humedad del relleno, se suspenderán los trabajos.
- <u>Hormigonado</u>: Se suspenderá el hormigonado cuando se dé alguna de estas circunstancias:
    - Cuando la temperatura ambiente descienda de los 0 °C
    - Cuando la temperatura ambiente sea superior a los 40 °C
    - Cuando exista lluvia
- <u>Producción de áridos</u>: Se paralizarán los trabajos cuando exista lluvia superior a los 10 mm.
- <u>Mezclas bituminosas</u>: Se considerará día perdido para el extendido de mezclas bituminosas cuando se dé alguna de estas circunstancias:
    - Cuando la temperatura sea inferior a los 5 °C a las 9 de la mañana
    - Cuando exista lluvia superior a 1 mm

- Riegos asfálticos: Se suspenderán los trabajos cuando:
    - La temperatura a las 9 de la mañana sea inferior a los 10 °C

      Caiga lluvia superior a 1 mm
- Otras actividades: Se paralizarán cuando se den lluvias superiores a 10 mm

Posteriormente se han obtenido los coeficientes del documento siguiendo estos criterios para cada unidad de obra, dando lugar a los siguientes coeficientes finales:

Mes	Hormigones	Explanaciones	Producción de áridos	Riegos y tratamientos	Mezclas bituminosas	Otras actividades
Enero	0,0648	0,0605	0,0705	0,0122	0,0306	0,0705
Febrero	0,0599	0,0564	0,0730	0,0097	0,0310	0,0730
Marzo	0,0649	0,0581	0,0722	0,0142	0,0398	0,0722
Abril	0,0785	0,0732	0,0785	0,0306	0,0611	0,0785
Mayo	0,0807	0,0747	0,0807	0,0585	0,0688	0,0807
Junio	0,0824	0,0798	0,0824	0,0773	0,0773	0,0824
Julio	0,0841	0,0832	0,0841	0,0824	0,0824	0,0841
Agosto	0,0841	0,0838	0,0841	0,0836	0,0836	0,0841
Septiembre	0,0798	0,0781	0,0798	0,0764	0,0764	0,0798
Octubre	0,0739	0,0692	0,0739	0,0516	0,0645	0,0739
Noviembre	0,0790	0,0713	0,0790	0,0191	0,0573	0,0790
Diciembre	0,0649	0,0554	0,0722	0,0051	0,0255	0,0722
ANUAL	**0,8969**	**0,8438**	**0,9301**	**0,5206**	**0,6982**	**0,9301**

5. BIBLIOGRAFÍA

- *Atmospheric Science Data Center* (Enlace), NASA.
- *Métodos de estimación de las evapotranspiraciones ETP y ETr* (Enlace), J. Almorox, Universidad Politécnica de Madrid.
- *Isolíneas de coeficientes de reducción de los días de trabajo* (Enlace), Dirección General de Carreteras y Caminos vecinales, Ministerio de Obras Públicas

ANEXO 4.1

DATOS PLUVIOMÉTRICOS

1. INTRODUCCIÓN

En este anexo se incluyen los datos de precipitaciones máximas anuales de las diferentes estaciones consideradas en este anejo, Casas de Reina (4381), Berlanga (4383), Villagarcía de la Torre (4387) e Higuera de Llerena (4388).

2. CASAS DE REINA

Año	Precipitación máxima (mm)
1951	68,1
1952	69,0
1953	84,7
1954	27,5
1955	44,1
1956	31,8
1957	29,3
1958	54,5
1959	43,8
1960	40,1
1961	58,5
1962	42,5
1963	56,3
1964	48,2
1965	58,7
1966	43,1
1967	72,5
1968	32,1
1969	44,6
1970	45,6
1971	44,5
1972	47,0
1973	41,0
1974	35,0
1975	42,0
1976	63,0
1977	39,0
1978	45,0
1983	27,5
1984	38,2
1985	40,7
1986	47,5

1987	34,3
1988	85,3
1990	38,1
1991	49,5
1993	28,8
1994	26,4
1995	105,8
1996	66,7
1997	34,6
1999	26,7

3. BERLANGA

Año	Precipitación máxima (mm)
1958	45,1
1959	25,3
1960	38,5
1961	55
1962	49,5
1963	44,5
1964	39
1965	40
1968	30
1969	37
1970	54
1971	31
1972	40
1973	44
1974	31
1975	28
1976	70
1977	48
1978	33
1979	38
1980	38
1981	47
1982	29
1983	28
1984	36
1985	45
1986	26
1987	36
1988	64
1989	95
1991	45

1994	17,5
1995	43
1996	52
1997	30
1998	30,3
1999	40,2

4. VILLAGARCÍA DE LA TORRE

Año	Precipitación máxima (mm)
1951	52
1953	35,5
1954	36,2
1955	33,5
1956	34,8
1957	49
1958	53
1959	57,5
1960	71,8
1961	53,4
1962	44,8
1963	38,2
1964	28,5
1965	58
1966	43,1
1968	26,7
1969	44,5
1970	42,6
1971	31
1972	34,8
1973	45,3
1974	27,3
1975	39,8
1978	30
1979	46,1
1980	30
1981	60
1982	46,2
1983	49,7
1984	28,6
1986	25,6
1987	34
1988	125
1989	59
1990	29

1991	27,5
1992	44,2
1993	36
1994	23
1995	40,5
1996	72
1997	36,5
1998	34,2
1999	44

5. HIGUERA DE LLERENA

Año	Precipitación máxima (mm)
1934	30,6
1935	42
1940	85,1
1941	35,5
1947	39,4
1967	61
1968	26
1969	66
1970	35
1972	20,5
1973	50
1974	30
1975	30
1977	43
1978	28
1979	30,5
1983	36
1990	32
1991	22
1992	32,7
1993	37
1996	45

ANEXO 4.2

DATOS METEOROLÓGICOS Y CLIMÁTICOS

1. INTRODUCCIÓN

Los datos meteorológicos y climáticos empleados en los cálculos del anejo e incluidos en este anexo han sido obtenidos a través de la aplicación web desarrollada por la NASA, cuyo enlace se ha incluido en la bibliografía de este anejo. Esta función requiere como valores iniciales la latitud y la longitud de la zona de estudio, tras lo cual mediante los datos obtenidos a través de la red de satélites de la NASA y realizando aproximaciones, muestra las características climáticas de dicha zona. En nuestro caso el punto de estudio se ha localizado en la latitud 38,27°, longitud -5,97° (38° 16’ 12’’ N 5° 58’ 12’’ W). A continuación se incluyen los resultados obtenidos.

2. DATOS

ATMOSPHERIC SCIENCE DATA CENTER

NASA Surface meteorology and Solar Energy - Available Tables

Latitude 38.27 / Longitude -5.97 was chosen.

Geometry Information

Elevation: **456** meters taken from the NASA GEOS-4 model elevation

	Northern boundary **39**	
Western boundary **-6**	Center Latitude **38.5** Longitude **-5.5**	Eastern boundary **-5**
	Southern boundary **38**	

Parameters for Solar Cooking:

Monthly Averaged Insolation Incident On A Horizontal Surface ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	2.39	3.26	4.55	5.50	6.39	7.50	7.68	6.76	5.19	3.44	2.46	1.98

Parameter Definition

Monthly Averaged Midday Insolation Incident On A Horizontal Surface (kW/m^2)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	0.38	0.47	0.60	0.66	0.72	0.84	0.86	0.78	0.66	0.47	0.38	0.32

Parameter Definition

Monthly Averaged Clear Sky Insolation Incident On A Horizontal Surface ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	3.20	4.28	5.70	7.27	8.10	8.35	8.07	7.22	6.06	4.63	3.36	2.83

Parameter Definition

Monthly Averaged Clear Sky Days (days)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	8	6	6	4	4	9	15	12	8	5	6	6

Parameter Definition

Parameters for Sizing and Pointing of Solar Panels and for Solar Thermal Applications:

Monthly Averaged Insolation Incident On A Horizontal Surface ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	2.39	3.26	4.55	5.50	6.39	7.50	7.68	6.76	5.19	3.44	2.46	1.98	4.76

Minimum And Maximum Difference From Monthly Averaged Insolation (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	-39	-26	-19	-20	-13	-21	-9	-9	-14	-19	-20	-28
Maximum	25	23	23	18	17	16	8	8	12	27	24	31

Parameter Definition

Monthly Averaged Diffuse Radiation Incident On A Horizontal Surface (kWh/m^2/day)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	0.79	1.06	1.41	1.86	2.13	1.98	1.75	1.60	1.45	1.23	0.90	0.75	1.41
Minimum	0.56	0.78	0.96	1.50	1.73	1.41	1.45	1.33	1.18	0.90	0.70	0.55	1.09
Maximum	0.84	1.18	1.59	2.05	2.32	2.44	2.04	1.85	1.67	1.31	0.95	0.77	1.59
22-year Average K	0.52	0.54	0.57	0.56	0.57	0.64	0.68	0.66	0.60	0.52	0.50	0.48	0.57
Minimum K	0.32	0.40	0.46	0.44	0.49	0.51	0.61	0.59	0.51	0.42	0.40	0.34	0.46
Maximum K	0.66	0.66	0.70	0.66	0.67	0.74	0.73	0.71	0.67	0.66	0.62	0.63	0.67

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Direct Normal Radiation (kWh/m^2/day)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	4.29	4.87	5.83	5.93	6.55	8.36	9.04	8.18	6.55	4.60	3.98	3.52	5.98

Minimum And Maximum Difference From Monthly Averaged Direct Normal Radiation (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum	-44	-25	-13	-20	-10	-17	-6	-7	-12	-14	-18	-29
Maximum	34	28	27	21	20	12	4	5	10	37	35	48

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Monthly Averaged Insolation Incident On A Horizontal Surface At Indicated GMT Times (kW/m^2)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@06	n/a	0.00	0.01	0.05	0.09	0.11	0.09	0.06	0.03	0.01	0.00	0.00
Average@09	0.14	0.21	0.34	0.45	0.54	0.59	0.59	0.54	0.43	0.28	0.19	0.13
Average@12	0.38	0.47	0.60	0.66	0.72	0.84	0.86	0.78	0.66	0.47	0.38	0.32
Average@15	0.25	0.35	0.46	0.51	0.56	0.67	0.71	0.65	0.50	0.32	0.22	0.19
Average@18	0.01	0.03	0.06	0.11	0.15	0.21	0.22	0.15	0.07	0.02	0.00	0.00
Average@21	n/a	n/a	n/a	n/a	0.00	0.00	0.00	n/a	n/a	n/a	n/a	n/a

Parameter Definition

Monthly Averaged Insolation Clearness Index (0 to 1.0)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average K	0.52	0.54	0.57	0.56	0.57	0.64	0.68	0.66	0.60	0.52	0.50	0.48	0.57
Minimum K	0.32	0.40	0.46	0.44	0.49	0.51	0.61	0.59	0.51	0.42	0.40	0.34	0.46
Maximum K	0.66	0.66	0.70	0.66	0.67	0.74	0.73	0.71	0.67	0.66	0.62	0.63	0.67

Parameter Definition

Monthly Averaged Insolation Normalized Clearness Index (0 to 1.0)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	0.48	0.49	0.52	0.51	0.52	0.59	0.62	0.60	0.55	0.47	0.46	0.44

Parameter Definition

Monthly Averaged Clear Sky Insolation Incident On A Horizontal Surface (kWh/m^2/day)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	3.20	4.28	5.70	7.27	8.10	8.35	8.07	7.22	6.06	4.63	3.36	2.83	5.76

Parameter Definition

Monthly Averaged Clear Sky Insolation Clearness Index (0 to 1.0)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	0.70	0.71	0.71	0.74	0.73	0.72	0.71	0.70	0.70	0.70	0.68	0.69

Parameter Definition

Monthly Averaged Clear Sky Insolation Normalized Clearness Index (0 to 1.0)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	0.64	0.65	0.65	0.67	0.66	0.65	0.65	0.64	0.64	0.64	0.62	0.63

Parameter Definition

Monthly Averaged Downward Longwave Radiative Flux ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	6.72	6.83	7.15	7.54	8.02	8.33	8.39	8.49	8.36	7.97	7.33	7.03	7.68

Parameter Definition

Solar Geometry:

Monthly Averaged Solar Noon (GMT time)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	1234	1238	1233	1225	1221	1224	1230	1229	1220	1210	1209	1217

Parameter Definition

Monthly Averaged Daylight Hours (hours)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	9.83	10.8	11.9	13.1	14.2	14.7	14.5	13.6	12.4	11.2	10.1	9.56

Parameter Definition

Monthly Averaged Daylight Average Of Hourly Cosine Solar Zenith Angles (dimensionless)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	0.32	0.43	0.48	0.55	0.59	0.62	0.61	0.55	0.53	0.44	0.35	0.32

Parameter Definition

Monthly Averaged Cosine Solar Zenith Angle At Mid-Time Between Sunrise And Solar Noon (dimensionless)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	0.36	0.44	0.53	0.60	0.64	0.65	0.64	0.62	0.57	0.48	0.39	0.34

Parameter Definition

Monthly Averaged Declination (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	-20.7	-12.3	-1.81	9.70	18.8	23.0	21.2	13.7	3.09	-8.44	-18.1	-22.8

Parameter Definition

Monthly Averaged Sunset Hour Angle (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	72.5	80.0	88.5	97.7	105	109	107	101	92.4	83.2	74.9	70.5

Parameter Definition

Monthly Averaged Maximum Solar Angle Relative To The Horizon (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Average	30.9	39.3	49.9	61.4	70.5	74.8	72.9	65.5	54.8	43.2	33.5	28.8

Parameter Definition

Monthly Averaged Hourly Solar Angles Relative To The Horizon (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0000 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0100 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0200 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0300 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0400 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0500 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0600 GMT	n/a	n/a	n/a	1.27	7.69	9.73	7.43	3.13	n/a	n/a	n/a	n/a
0700 GMT	n/a	n/a	4.17	12.9	19.1	20.9	18.6	14.6	9.95	4.50	n/a	n/a
0800 GMT	2.83	7.75	15.7	24.7	30.8	32.5	30.3	26.4	21.5	15.5	9.02	4.30
0900 GMT	12.5	18.1	26.7	36.2	42.5	44.3	42.0	38.0	32.6	25.7	18.3	13.4
1000 GMT	20.7	27.2	36.6	46.8	53.9	55.9	53.6	49.1	42.6	34.3	26.0	20.9
1100 GMT	26.9	34.3	44.5	55.7	63.8	66.5	64.2	58.6	50.4	40.5	31.3	26.2
1200 GMT	30.4	38.5	49.2	60.9	70.0	73.9	71.7	64.7	54.5	43.2	33.5	28.7
1300 GMT	30.6	39.0	49.4	60.3	68.7	72.9	71.7	64.5	53.5	41.8	32.2	27.9
1400 GMT	27.6	35.8	45.1	54.2	60.8	64.4	64.1	58.1	47.9	36.6	27.7	24.1
1500 GMT	21.7	29.4	37.5	44.9	50.3	53.4	53.5	48.4	39.1	28.7	20.6	17.8
1600 GMT	13.7	20.8	27.7	34.0	38.8	41.7	42.0	37.3	28.6	18.9	11.6	9.48
1700 GMT	4.20	10.7	16.8	22.4	27.0	30.0	30.2	25.6	17.3	8.09	1.44	n/a
1800 GMT	n/a	n/a	5.31	10.7	15.4	18.4	18.6	13.9	5.61	n/a	n/a	n/a
1900 GMT	n/a	n/a	n/a	n/a	4.14	7.37	7.36	2.35	n/a	n/a	n/a	n/a
2000 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2100 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2200 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2300 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Parameter Definition

Monthly Averaged Hourly Solar Azimuth Angles (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0000 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0100 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0200 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0300 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0400 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0500 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
0600 GMT	n/a	n/a	n/a	78.7	72.1	68.2	68.7	74.7	n/a	n/a	n/a	n/a
0700 GMT	n/a	n/a	95.7	87.8	80.7	76.5	77.2	83.7	93.8	104	n/a	n/a
0800 GMT	119	112	105	97.3	89.6	84.9	85.7	92.9	103	114	121	123
0900 GMT	129	123	116	108	99.6	94.1	95.1	103	115	125	132	134
1000 GMT	141	135	129	121	112	105	107	116	129	139	145	146
1100 GMT	155	150	146	141	132	124	124	135	147	157	160	160
1200 GMT	170	168	167	167	165	160	157	163	171	176	177	175
1300 GMT	187	186	190	198	206	209	202	198	197	196	194	191
1400 GMT	202	204	211	223	235	240	235	225	219	214	210	206
1500 GMT	216	220	229	241	252	256	252	244	236	229	223	219
1600 GMT	228	233	242	254	263	268	264	257	249	241	235	230
1700 GMT	239	244	253	264	273	276	274	267	259	252	245	n/a
1800 GMT	n/a	n/a	263	274	282	285	282	276	269	n/a	n/a	n/a
1900 GMT	n/a	n/a	n/a	n/a	290	293	291	285	n/a	n/a	n/a	n/a

2000 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2100 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2200 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2300 GMT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Parameter Definition

Parameters for Tilted Solar Panels:

Monthly Averaged Radiation Incident On An Equator-Pointed Tilted Surface ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE HRZ	2.39	3.26	4.55	5.50	6.39	7.50	7.68	6.76	5.19	3.44	2.46	1.98	4.76
K	0.52	0.54	0.57	0.56	0.57	0.64	0.68	0.66	0.60	0.52	0.50	0.48	0.57
Diffuse	0.79	1.06	1.41	1.86	2.13	1.98	1.75	1.60	1.45	1.23	0.90	0.75	1.41
Direct	4.29	4.87	5.83	5.93	6.55	8.36	9.04	8.18	6.55	4.60	3.98	3.52	5.98
Tilt 0	2.37	3.17	4.50	5.47	6.35	7.44	7.63	6.73	5.11	3.41	2.43	1.97	4.72
Tilt 23	3.46	4.13	5.31	5.79	6.29	7.15	7.43	6.96	5.82	4.27	3.37	2.91	5.25
Tilt 38	3.93	4.48	5.48	5.62	5.85	6.48	6.79	6.63	5.88	4.55	3.77	3.33	5.24
Tilt 53	4.19	4.59	5.36	5.17	5.12	5.50	5.81	5.96	5.64	4.59	3.95	3.57	4.95
Tilt 90	3.77	3.78	3.89	3.17	2.73	2.61	2.77	3.32	3.82	3.65	3.46	3.27	3.35
OPT	4.22	4.59	5.48	5.79	6.42	7.45	7.67	6.98	5.90	4.60	3.96	3.61	5.56
OPT ANG	61.0	52.0	39.0	22.0	10.0	4.00	7.00	17.0	34.0	48.0	58.0	63.0	34.4

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Minimum Radiation Incident On An Equator-pointed Tilted Surface ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MIN	1.46	2.42	3.69	4.38	5.53	5.95	6.97	6.12	4.45	2.78	1.98	1.42	3.93
K	0.32	0.40	0.46	0.44	0.49	0.51	0.61	0.59	0.51	0.42	0.40	0.34	0.46
Diffuse	0.84	1.18	1.59	2.05	2.32	2.44	2.04	1.85	1.67	1.31	0.95	0.77	1.59
Direct	2.40	3.64	5.06	4.71	5.85	6.87	8.41	7.58	5.72	3.91	3.25	2.49	5.00
Tilt 0	1.44	2.35	3.65	4.37	5.50	5.90	6.92	6.09	4.38	2.76	1.95	1.41	3.90
Tilt 23	1.84	2.87	4.16	4.55	5.43	5.69	6.74	6.27	4.89	3.30	2.56	1.88	4.19
Tilt 38	1.98	3.04	4.24	4.40	5.07	5.21	6.19	5.98	4.91	3.45	2.79	2.08	4.12
Tilt 53	2.04	3.05	4.11	4.05	4.48	4.51	5.33	5.38	4.68	3.44	2.88	2.17	3.85
Tilt 90	1.74	2.45	2.98	2.56	2.49	2.37	2.66	3.07	3.19	2.69	2.47	1.92	2.55
OPT	2.04	3.06	4.24	4.55	5.55	5.91	6.96	6.30	4.93	3.47	2.89	2.17	4.35
OPT ANG	53.0	47.0	36.0	20.0	9.00	4.00	7.00	17.0	32.0	44.0	55.0	58.0	31.7

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Maximum Radiation Incident On An Equator-pointed Tilted Surface ($kWh/m^2/day$)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
SSE MAX	2.99	4.00	5.59	6.48	7.46	8.67	8.27	7.30	5.81	4.36	3.06	2.60	5.55
K	0.66	0.66	0.70	0.66	0.67	0.74	0.73	0.71	0.67	0.66	0.62	0.63	0.67
Diffuse	0.56	0.78	0.96	1.50	1.73	1.41	1.45	1.33	1.18	0.90	0.70	0.55	1.09
Direct	5.78	6.26	7.42	7.22	7.90	9.44	9.49	8.63	7.25	6.34	5.38	5.24	7.20
Tilt 0	2.96	3.89	5.53	6.45	7.42	8.60	8.21	7.27	5.72	4.33	3.02	2.59	5.51
Tilt 23	4.66	5.33	6.76	6.90	7.35	8.24	7.99	7.54	6.61	5.72	4.48	4.20	6.32
Tilt 38	5.42	5.89	7.07	6.72	6.81	7.42	7.29	7.19	6.73	6.22	5.11	4.96	6.41
Tilt 53	5.86	6.11	6.98	6.19	5.92	6.26	6.23	6.46	6.47	6.36	5.44	5.41	6.14

Tilt 90	5.39	5.10	5.09	3.70	2.98	2.72	2.85	3.52	4.37	5.14	4.87	5.09	4.23
OPT	5.95	6.11	7.09	6.90	7.51	8.62	8.26	7.57	6.74	6.36	5.49	5.53	6.85
OPT ANG	64.0	54.0	42.0	23.0	10.0	4.00	7.00	18.0	35.0	51.0	61.0	66.0	36.1

NOTE:	*Diffuse radiation, direct normal radiation and tilted surface radiation are not calculated when the clearness index (K) is below 0.3 or above 0.8.*

Parameter Definition

Parameters for Sizing Battery or other Energy-storage Systems:

Minimum Available Insolation Over A Consecutive-day Period (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min/1 day	7.53	4.60	14.2	22.5	20.6	34.2	34.8	31.0	14.2	5.23	3.65	9.59
Min/3 day	24.4	33.2	33.9	35.6	31.1	45.3	61.1	59.1	41.6	31.1	28.8	22.7
Min/7 day	42.4	52.2	47.3	49.9	56.2	53.6	77.5	71.9	56.0	41.9	47.2	37.0
Min/14 day	53.3	60.1	62.2	58.2	68.0	69.7	86.1	81.5	60.5	54.9	54.3	50.6
Min/21 day	54.5	66.8	72.8	74.3	74.4	70.0	90.2	85.7	75.7	65.2	66.4	58.0
Min/Month	61.0	74.2	81.0	79.8	86.5	79.3	90.7	90.5	85.7	80.8	80.4	71.7

Parameter Definition

Solar Radiation Deficits Below Expected Values Incident On A Horizontal Surface Over A Consecutive-day Period (kWh/m^2)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 day	2.21	3.11	3.90	4.26	5.07	4.93	5.00	4.66	4.45	3.26	2.37	1.79
3 day	5.42	6.53	9.02	10.6	13.2	12.2	8.94	8.27	9.07	7.11	5.25	4.59
7 day	9.63	10.9	16.7	19.2	19.5	24.3	12.0	13.2	15.9	13.9	9.08	8.72
14 day	15.6	18.2	24.0	32.1	28.5	31.7	14.9	17.4	28.6	21.7	15.7	13.6
21 day	22.8	22.7	25.9	29.5	34.3	47.1	15.7	20.1	26.3	25.1	17.3	17.4
Month	28.8	23.5	26.6	33.3	26.6	46.5	22.0	19.8	22.2	20.4	14.4	17.3

Parameter Definition

Equivalent Number Of NO-SUN Or BLACK Days (days)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1 day	0.92	0.95	0.85	0.77	0.79	0.65	0.65	0.68	0.85	0.94	0.96	0.90
3 day	2.26	2.00	1.98	1.93	2.06	1.63	1.16	1.22	1.74	2.06	2.13	2.31
7 day	4.02	3.34	3.68	3.50	3.06	3.24	1.57	1.96	3.07	4.06	3.69	4.40
14 day	6.53	5.58	5.28	5.84	4.47	4.23	1.94	2.57	5.52	6.30	6.39	6.90
21 day	9.54	6.96	5.70	5.37	5.36	6.28	2.04	2.98	5.08	7.29	7.04	8.80
Month	12.0	7.21	5.85	6.05	4.17	6.20	2.86	2.93	4.27	5.94	5.85	8.76

Parameter Definition

Parameters for Sizing Surplus-product Storage Systems:

Available Surplus Insolation Over A Consecutive-day Period (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max/1 day	160	161	154	151	141	123	121	128	143	161	166	159
Max/3 day	156	160	148	149	140	122	119	124	138	150	164	153
Max/7 day	148	149	144	144	138	121	116	123	134	144	156	148
Max/14 day	142	143	135	139	134	118	113	117	128	139	136	142
Max/21 day	135	135	130	135	130	117	111	115	123	135	129	136
Max/Month	125	123	123	118	117	116	108	108	112	127	124	131

Parameter Definition

Cloud Information:

Monthly Averaged Daylight Cloud Amount (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	47.4	49.4	52.1	57.8	56.0	37.9	24.5	28.3	40.1	54.5	53.6	54.4	46.3

Parameter Definition

Monthly Averaged Cloud Amount At Indicated GMT Times (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Average@06	n/a	32.6	34.2	37.5	37.6	23.1	13.7	15.6	26.0	38.3	40.3	44.2
Average@09	39.1	42.9	45.1	55.1	50.6	32.8	22.3	26.1	38.2	49.4	48.8	47.7
Average@12	49.6	53.8	54.5	66.9	63.5	42.3	27.5	32.2	47.1	59.9	54.3	57.4
Average@15	53.4	56.6	59.5	70.1	67.4	48.4	32.3	37.5	50.5	60.0	57.8	58.0
Average@18	42.0	44.1	49.4	59.3	60.8	43.0	26.8	29.9	38.9	48.8	44.6	46.1
Average@21	n/a	n/a	n/a	n/a	37.5	28.6	14.3	n/a	n/a	n/a	n/a	n/a

Parameter Definition

Monthly Averaged Frequency Of Clear Skies At Indicated GMT Times (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
< 10% @0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
< 10% @3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
< 10% @6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
< 10% @9	39.1	35.0	35.6	26.0	31.5	53.1	62.9	54.5	41.0	31.5	27.1	27.4
< 10% @12	32.8	27.3	28.0	22.2	22.7	44.7	55.4	48.3	35.4	23.3	30.4	23.1
< 10% @15	28.8	27.1	24.6	19.0	18.7	36.2	47.9	43.8	31.6	24.6	27.5	22.7
< 10% @18	n/a	n/a	n/a	17.4	21.1	34.7	54.2	49.8	n/a	n/a	n/a	n/a
< 10% @21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Monthly Averaged Frequency Of Broken-cloud Skies At Indicated GMT Times (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 - 70% @0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 - 70% @3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 - 70% @6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
10 - 70% @9	25.6	25.7	22.5	21.2	20.8	15.9	17.3	23.9	24.2	22.4	29.2	25.8
10 - 70% @12	20.0	20.5	20.2	9.85	14.5	14.5	19.6	23.0	19.7	19.0	16.5	20.8
10 - 70% @15	19.2	18.1	17.8	10.7	13.9	16.9	23.9	22.5	20.0	17.8	15.0	23.3
10 - 70% @18	n/a	n/a	n/a	22.6	20.9	28.6	23.0	26.4	n/a	n/a	n/a	n/a
10 - 70% @21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Monthly Averaged Frequency Of Near-overcast Skies At Indicated GMT Times (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
>= 70% @0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
>= 70% @3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
>= 70% @6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
>= 70% @9	35.2	39.2	41.7	52.7	47.6	30.9	19.7	21.5	34.7	46.0	43.6	46.6
>= 70% @12	47.0	52.0	51.7	67.8	62.7	40.7	24.9	28.5	44.8	57.6	53.0	56.0
>= 70% @15	51.9	54.6	57.4	70.1	67.3	46.8	28.1	33.5	48.3	57.4	57.4	53.9
>= 70% @18	n/a	n/a	n/a	59.9	57.9	36.6	22.7	23.7	n/a	n/a	n/a	n/a
>= 70% @21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Parameter Definition

Meteorology (Temperature):

Monthly Averaged Air Temperature At 10 m Above The Surface Of The Earth (°C)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	7.24	8.58	11.9	14.3	18.8	24.2	27.1	26.3	22.4	17.2	11.9	8.77	16.6
Minimum	3.65	4.43	6.85	9.17	13.9	19.6	22.1	21.2	17.9	13.4	8.46	5.49	12.2
Maximum	12.0	13.8	17.6	19.5	23.4	28.9	32.2	31.5	27.1	21.4	16.1	13.1	21.4

Parameter Definition

Average Daily Temperature Range (°C)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	8.41	9.44	10.7	10.3	9.47	9.22	10.1 *	10.3	9.24	8.01	7.67	7.62

*** Warmest month**

Parameter Definition

Monthly Averaged Cooling Degree Days Above 18 °C

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
22-year Average	0	0	0	6	59	191	285	259	139	28	1	0	968

Parameter Definition

Monthly Averaged Heating Degree Days Below 18 °C

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
22-year Average	314	249	179	115	38	2	0	0	3	45	172	269	1386

Parameter Definition

Monthly Averaged Arctic Heating Degree Days Below 10 °C

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
22-year Average	75	42	13	2	0	0	0	0	0	0	12	45	189

Parameter Definition

Monthly Averaged Arctic Heating Degree Days Below 0 °C

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
22-year Average	0	0	0	0	0	0	0	0	0	0	0	0	0

Parameter Definition

Monthly Averaged Earth Skin Temperature (°C)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	6.61	8.52	13.1	16.9	23.1	30.0	33.2	31.5	25.7	18.4	11.7	8.08	18.9

Parameter Definition

Average Minimum, Maximum and Amplitude Of The Daily Mean Earth Temperature (°C)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Amplitude
Minimum	1.81	2.60	5.09	7.82	13.0	19.0	21.4	20.2	16.7	12.1	6.90	3.76	
Maximum	14.2	17.7	24.0	28.0	35.6	44.0	47.9	45.6	37.9	27.7	19.2	14.9	
Amplitude	6.23	7.56	9.45	10.1	11.3	12.4	13.2	12.7	10.5	7.80	6.19	5.58	23.0

Parameter Definition

Monthly Averaged Frost Days (days)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Sum
22-year Average	4	2	0	0	0	0	0	0	0	0	0	1	7

Parameter Definition

Dew/Frost Point Temperature At 10 m (°C)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily Average	1.91	1.54	1.29	1.81	3.91	5.43	6.10	7.52	8.24	7.54	5.27	3.56

Parameter Definition

Meteorology (Wind):

Monthly Averaged Wind Speed At 50 m Above The Surface Of The Earth (m/s)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	4.68	5.01	4.97	4.93	4.90	4.63	4.66	4.70	4.24	4.36	4.44	4.68	4.68

Minimum And Maximum Difference From Monthly Averaged Wind Speed At 50 m (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Minimum	-9	-18	-15	-8	-9	-10	-10	-7	-9	-13	-10	-11	-11
Maximum	8	17	21	12	14	8	9	7	8	10	7	10	11

It is recommended that users of these wind data review the SSE Methodology. The user may wish to correct for biases as well as local effects within the selected grid region.	***All height measurements are from the soil, water, or ice/snow surface instead of "effective" surface, which is usually taken to be near the tops of vegetated canopies.***

Parameter Definition *Units Conversion Chart*

Monthly Averaged Percent Of Time The Wind Speed At 50 m Above The Surface Of The Earth Is Within The Indicated Range (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
0 - 2 m/s	12	12	14	12	13	16	14	14	20	18	15	11	14
3 - 6 m/s	75	67	65	68	65	67	68	69	71	74	76	78	70
7 - 10 m/s	13	20	20	19	21	18	18	17	9	8	9	10	15
11 - 14 m/s	0	1	1	0	0	0	0	0	0	0	0	0	0
15 - 18 m/s	0	0	0	0	0	0	0	0	0	0	0	0	0
19 - 25 m/s	0	0	0	0	0	0	0	0	0	0	0	0	0

Parameter Definition

Monthly Averaged Wind Speed At 50 m Above The Surface Of The Earth For Indicated GMT Times (m/s)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Average@0130	5.29	5.51	5.52	5.57	5.82	5.79	5.82	5.63	5.05	4.97	5.04	5.25	5.43
Average@0430	5.34	5.51	5.46	5.42	5.68	5.67	5.83	5.55	5.14	4.96	4.92	5.21	5.39
Average@0730	5.37	5.34	4.95	4.19	3.70	3.17	3.23	3.60	4.18	4.63	4.81	5.19	4.35
Average@1030	3.66	3.69	3.64	3.70	3.70	3.28	3.18	2.74	2.31	2.70	3.11	3.71	3.28
Average@1330	3.78	4.68	4.70	4.68	4.48	3.97	3.92	4.01	3.49	3.88	3.73	3.78	4.08
Average@1630	4.19	4.76	4.76	5.04	4.86	4.41	4.44	4.76	3.92	4.09	4.08	4.21	4.46
Average@1930	4.68	5.14	5.12	5.19	5.11	4.91	4.97	5.33	4.62	4.62	4.70	4.84	4.93
Average@2230	5.19	5.49	5.60	5.63	5.82	5.84	5.89	5.96	5.25	5.01	5.11	5.29	5.50

Parameter Definition *Units Conversion Chart*

Monthly Averaged Wind Direction At 50 m Above The Surface Of The Earth (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10-year Average	72	76	69	63	59	40	19	285	261	234	186	119

Parameter Definition

Monthly Averaged Wind Direction At 50 m Above The Surface Of The Earth For Indicated GMT Times (degrees)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average@0130	60	71	43	289	332	309	344	303	4	90	88	93

Average@0430	59	66	52	357	24	2	35	5	54	69	72	83
Average@0730	63	64	57	43	48	40	58	44	67	71	73	77
Average@1030	67	69	73	126	116	190	183	200	132	99	85	77
Average@1330	106	134	100	234	205	225	213	225	197	180	155	115
Average@1630	120	196	358	254	242	250	234	239	223	215	195	126
Average@1930	82	223	339	262	258	263	250	252	234	216	186	101
Average@2230	65	79	22	267	277	272	269	268	238	185	138	98

Parameter Definition

Monthly Averaged Wind Speed At 10 m Above The Surface Of The Earth For Terrain Similar To Airports (m/s)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	3.71	3.97	3.93	3.89	3.87	3.66	3.68	3.71	3.35	3.44	3.51	3.71	3.70

It is recommended that users of these wind data review the SSE Methodology. The user may wish to correct for biases as well as local effects within the selected grid region.	*All height measurements are from the soil, water, or ice/snow surface instead of "effective" surface, which is usually taken to be near the tops of vegetated canopies.*

Parameter Definition *Units Conversion Chart*

Difference Between The Average Wind Speed At 10 m Above The Surface Of The Earth And The Average Wind speed At 50 m Above The Surface Of The Earth (%)
***Vegetation type* "Airport": flat rough grass**

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	-20	-21	-21	-21	-20	-20	-20	-20	-21	-20	-20	-20	-20

Parameter Definition

Monthly Averaged Wind Speed Adjusted For Height And Vegetation Type (m/s)
***Height* 100 meters**
***Vegetation type* "Airport": flat rough grass**

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
10-year Average	5.20	5.57	5.51	5.47	5.43	5.13	5.17	5.21	4.70	4.83	4.92	5.20	5.19

Parameter Definition

Monthly Averaged Wind Speed At 50, 100, 150 and 300 m Above The Surface Of The Earth (m/s)
***Vegetation type* "Airport": flat rough grass**

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
50m	4.68	5.01	4.97	4.93	4.90	4.63	4.66	4.70	4.24	4.36	4.44	4.68	4.68
100m	5.20	5.57	5.51	5.47	5.43	5.13	5.17	5.21	4.70	4.83	4.92	5.20	5.19
150m	5.53	5.91	5.86	5.81	5.77	5.45	5.49	5.54	4.99	5.14	5.23	5.53	5.52
300m	6.13	6.56	6.50	6.45	6.41	6.05	6.09	6.14	5.54	5.70	5.80	6.13	6.12

Parameter Definition

Monthly Averaged Wind Speed For Several Vegetation And Surface Types (m/s)
***Height* 100 meters**

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
35-m broadleaf-evergreen trees (70% coverage)	6.49	6.95	6.88	6.82	6.78	6.41	6.45	6.51	5.87	6.03	6.14	6.49	6.48
20-m broadleaf-deciduous trees (75% coverage)	5.93	6.39	6.37	6.37	6.42	6.19	6.32	6.28	5.55	5.63	5.69	5.97	6.09
20-m broadleaf and needleleaf trees (75% coverage)	6.67	6.95	6.69	6.55	6.42	6.02	6.06	6.24	5.71	5.99	6.19	6.63	6.34
17-m needleleaf-evergreen trees (75% coverage)	6.31	6.57	6.37	6.24	6.24	5.94	6.02	6.07	5.47	5.67	5.81	6.23	6.08
14-m needleleaf-deciduous trees (50% coverage)	6.23	6.57	6.42	6.28	6.24	5.86	5.89	6.11	5.67	5.91	6.02	6.31	6.12
Savanna:18-m broadleaf trees (30%) & groundcover	6.23	6.67	6.60	6.55	6.51	6.15	6.19	6.24	5.63	5.79	5.89	6.23	6.22
0.6-m perennial groundcover (100%)	5.65	6.05	5.99	5.94	5.90	5.58	5.61	5.66	5.11	5.25	5.35	5.65	5.64
0.5-m broadleaf shrubs (variable %) & groundcover	5.65	6.05	5.99	5.94	5.90	5.58	5.61	5.66	5.11	5.25	5.35	5.65	5.64

0.5-m broadleaf shrubs (10%) with bare soil	5.65	6.05	5.99	5.94	5.90	5.58	5.61	5.66	5.11	5.25	5.35	5.65	5.64
Tundra: 0.6-m trees/shrubs (variable %) & groundcover	5.65	6.05	5.99	5.94	5.90	5.58	5.61	5.66	5.11	5.25	5.35	5.65	5.64
Rough bare soil	5.46	5.84	5.78	5.74	5.70	5.39	5.42	5.47	4.93	5.07	5.17	5.46	5.45
Crop: 20-m broadleaf-deciduous trees (10%) & wheat	5.69	6.18	5.82	6.28	6.24	5.90	5.93	5.99	5.40	5.48	5.50	5.73	5.84
Rough glacial snow/ice	5.97	6.31	6.11	5.98	5.94	5.62	5.65	5.70	5.22	5.48	5.61	5.97	5.80
Smooth sea ice	5.31	5.57	5.40	5.24	5.21	4.92	4.95	5.10	4.70	4.97	5.06	5.35	5.15
Open water	5.02	5.38	5.32	5.28	5.25	4.96	4.99	5.03	4.54	4.67	4.75	5.02	5.02
"Airport": flat rough grass	5.20	5.57	5.51	5.47	5.43	5.13	5.17	5.21	4.70	4.83	4.92	5.20	5.19

Parameter Definition

Meteorology (Other):

Monthly Averaged Relative Humidity (%)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	71.4	65.2	53.1	47.8	42.2	33.5	29.5	34.1	44.8	56.9	66.7	71.9	51.3

Parameter Definition

Monthly Averaged Specific Humidity At 10 m Above The Surface Of The Earth (kg/kg)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
22-year Average	0.004995	0.004889	0.004798	0.005002	0.005795	0.006428	0.006726	0.007446	0.007828	0.007393	0.006348	0.005610

Parameter Definition

Monthly Averaged Atmospheric Pressure (kPa)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	96.9	96.8	96.5	96.2	96.2	96.3	96.3	96.3	96.4	96.5	96.5	96.7	96.4

Parameter Definition

Monthly Averaged Total Column Precipitable Water (cm)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	1.09	1.09	1.14	1.24	1.51	1.70	1.72	1.86	1.93	1.77	1.47	1.29	1.48

Parameter Definition

Monthly Averaged Precipitation (mm/day)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	2.21	1.84	1.47	2.02	1.93	0.92	0.42	0.41	1.25	2.58	3.21	3.07	1.77

Parameter Definition

Supporting Information:

Monthly Averaged Top-of-atmosphere Insolation (kWh/m^2/day)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	4.53	6.00	7.95	9.81	11.0	11.5	11.2	10.2	8.56	6.60	4.90	4.09	8.06

Parameter Definition

Monthly Averaged Surface Albedo (0 to 1.0)

Lat 38.27 Lon -5.97	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
22-year Average	0.16	0.17	0.17	0.19	0.20	0.21	0.22	0.21	0.20	0.17	0.15	0.15	0.18

Parameter Definition

ANEJO Nº 5

SISMICIDAD

ÍNDICE

1. OBJETO

Este anejo se ha redactado en cumplimiento de las prescripciones de la Norma de Construcción Sismorresistente: Parte general y edificación (NCSE- 02), aprobada por el Real Decreto 997/2002, de 27 de septiembre. Dicha norma es de aplicación en este proyecto, ya que se trata de un proyecto de edificaciones de planta nueva, según el ámbito de aplicación de la misma.

2. CLASIFICACIÓN SEGÚN LA IMPORTANCIA

Según el apartado 1.2.2. "Clasificación de las construcciones", de acuerdo con el uso al que se destinan y con los daños que pueda ocasionar su destrucción, estas se clasifican en:

"3. De importancia especial:

Aquellas cuya destrucción por terremoto, pueda interrumpir un servicio imprescindible o dar lugar a efectos catastróficos. En este grupo se incluyen las construcciones que así se consideren en el planeamiento urbanístico y documentos públicos análogos así como en reglamentaciones especiales y, al menos, las siguientes construcciones:

- *…*
- *Construcciones para instalaciones básicas de las poblaciones como depósitos de agua, gas, combustibles, estaciones de bombeo, redes de distribución,* ***centrales eléctricas*** *y centros de transformación*
- *…"*

Por lo tanto, nos encontramos ante una construcción de **importancia especial**.

3. CRITERIO DE APLICACIÓN DE LA NORMA

Según se establece en la norma NCSE – 02 en su apartado 1.2.3., esta será de aplicación para las construcciones de nueva planta, excepto:

- En las construcciones de importancia moderada
- En las edificaciones de importancia normal o especial cuando la aceleración sísmica básica a_b sea inferior a 0,04·g, siendo g la aceleración de la gravedad.
- …

Tal y como se detalla en el apartado anterior, nuestra construcción se ha clasificado como de importancia especial, por lo que habrá que comprobar si la ubicación de la planta está dentro de una zona cuya aceleración básica (a_b) sea inferior a 0,04·g o no. Para ello, se puede utilizar el mapa de peligrosidad sísmica o la referencia de términos municipales cuya a_b es igual o superior a este valor, en el anejo 1 de la Norma.

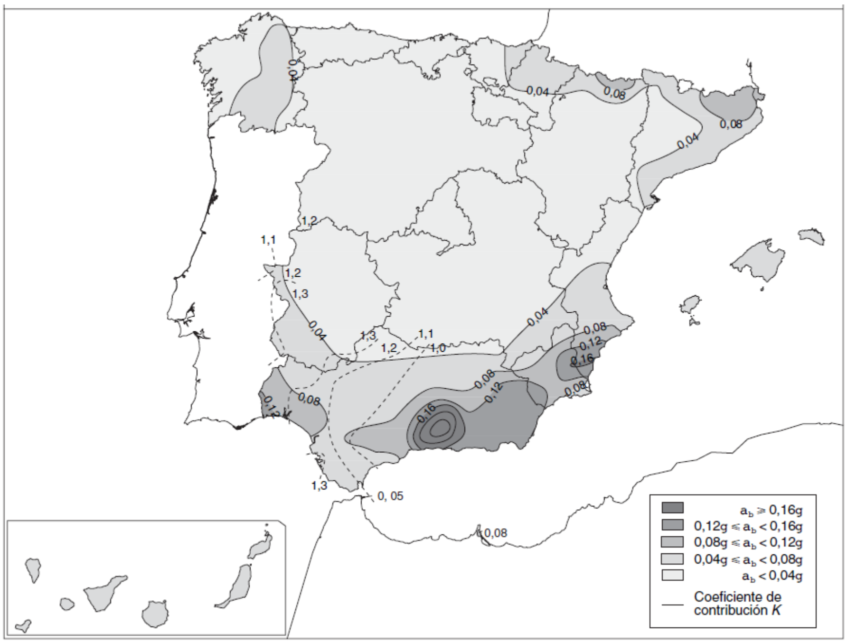


Figura 1 – Mapa de peligrosidad sísmica. Fuente: NCSE-02

Las obras definidas en este proyecto se encuentran en el término municipal de Llerena, en la provincia de Badajoz, que presenta una **aceleración sísmica básica (a_b) de 0,04·g y coeficiente de contribución (K) de 1,3**. Por lo tanto, las estructuras deberán de comprobarse según el método de cálculo desarrollado en la Norma.

4. ACELERACIÓN DE CÁLCULO

En el artículo 2.2. de la Norma se incluye la ecuación para el cálculo de la aceleración sísmica de cálculo:

$$\mathbf{a_c = S \cdot \rho \cdot a_b}$$

En esta fórmula S es el coeficiente de amplificación del terreno, ρ es el factor de riesgo y a_b es la aceleración básica.

Aceleración básica

Tal y como se ha determinado en el apartado anterior $\mathbf{a_b = 0{,}04 \cdot g}$.

Factor de riesgo

Este coeficiente adimensional de riesgo, es función de la probabilidad aceptable de que se exceda a_c en el período de vida para el que se proyecta la construcción. Su valor depende de la importancia de la misma: para construcciones de importancia especial $\boldsymbol{\rho}$ **= 1,3**.

Coeficiente de amplificación del terreno

La fórmula para el cálculo de este parámetro depende del valor de $\rho \cdot a_b$. En nuestro caso esta multiplicación es 0,052·g, por lo que al ser menor de 0,1·g, el coeficiente se calcula como C/1,25, siendo C el coeficiente del terreno, el cual depende de las características geotécnicas del terreno.

El valor de este coeficiente C del terreno es el valor medio obtenido al ponderar los coeficientes C_i de cada estrato del suelo existente en los 30 primeros metros, con su espesor e_i (metros), mediante la siguiente expresión:

$$C = \frac{\sum C_i \cdot e_i}{30}$$

Según la Norma los terrenos se clasifican en los siguientes tipos:

- Terreno tipo I: Roca compacta, suelo cementado o granular muy denso. Velocidad de propagación de las ondas elásticas transversales o de cizalla, v_s > 750 m/s.
- Terreno tipo II: Roca muy fracturada, suelos granulares densos o cohesivos duros. Velocidad de propagación de las ondas elásticas transversales o de cizalla, 750 m/s ≥ v_s > 400 m/s.
- Terreno tipo III: Suelo granular de compacidad media, o suelo cohesivo de consistencia firme a muy firme. Velocidad de propagación de las ondas elásticas transversales o de cizalla, 400 m/s ≥ v_s > 200 m/s.
- Terreno tipo IV: Suelo granular suelto, o suelo cohesivo blando. Velocidad de propagación de las ondas elásticas transversales o de cizalla, v_s ≤ 200 m/s.

A cada uno de estos tipos de terreno se le asigna un valor C_i según la siguiente tabla:

Tipo de terreno	*Coeficiente C*
I	1,0
II	1,3
III	1,6
IV	2,0

En nuestro caso los datos referentes a los espesores y a los tipos de terreno, se han obtenido del anejo de "Geología y geotecnia" del proyecto cedido por la Junta de Extremadura, el mismo del que se han conseguido los parámetros físicos y resistentes del suelo, tal y como se indica en el Anejo nº 3 de este proyecto. De acuerdo con esto, se ha supuesto que el terreno está formado por un terreno tipo IV de 4 m de espesor, seguido por un terreno tipo II de 6 m de espesor y un terreno tipo I hasta los 30 metros. Por lo tanto, se ha obtenido un coeficiente C del terreno de:

$$C = \frac{\sum C_i \cdot e_i}{30} = \frac{2 \cdot 4 + 1{,}3 \cdot 6 + 1 \cdot 20}{30} = 1{,}193$$

Finalmente, el **coeficiente de amplificación del terreno S**, queda como 1,193/1,25 = **0,955**.

Con todos estos valores, se obtiene una **aceleración de cálculo de 0,04966·g**. Este valor se utilizará tanto para las estructuras a calcular, como para el resguardo de las balsas de la central.

5. PERIODO CARACTERÍSTICO DEL ESPECTRO

Este valor se empleará para el cálculo de la ola sísmica, desarrollado en el Anejo nº 8 "Cálculos hidráulicos". Según la Norma en su apartado 2.3., el período característico del espectro (T_B) se calcula según la siguiente fórmula:

$$T_B = \frac{K \cdot C}{2,5}$$

En esta ecuación K es el coeficiente de contribución, cuyo valor ya se ha establecido en 1,3, y C es el coeficiente del terreno calculado en el apartado anterior, con una valor de 1,193. Con todo esto, se obtiene este período característico:

$$T_B = \frac{K \cdot C}{2,5} = \frac{1,3 \cdot 1,193}{2,5} = 0,62\ s$$

ANEJO Nº 6

ESTUDIO DE LA UBICACIÓN ÓPTIMA

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad localizar el emplazamiento idóneo para la construcción de la planta termosolar. Para encontrar dicha ubicación se ha procedido a realizar un estudio multicriterio de la zona de estudio según los criterios detallados en los siguientes apartados.

2. ZONA DE ESTUDIO

La zona de estudio de este proyecto se situó en el sudeste de Badajoz, más concretamente en la comarca de la Campiña Sur, la cual se corresponde, aproximadamente, con las hojas 830, 831, 855, 856, 877 y 878 del Mapa Topográfico Nacional a escala 1:50.000 (MTN50) creado por el Instituto Geográfico Nacional (IGN). Se puede ver esta superficie con más detalle en el plano correspondiente incluido en el Anexo "Planos" adjunto a este Anejo.

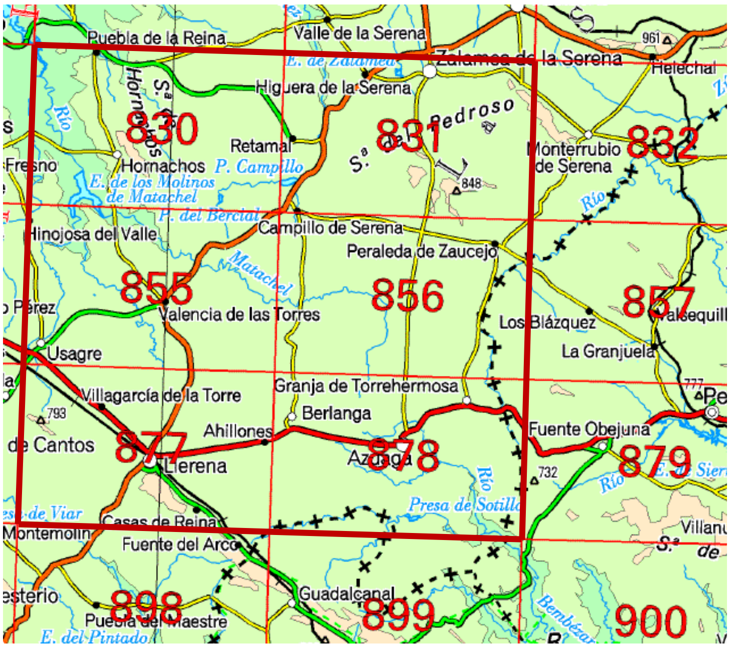


Figura 1 – Hojas incluidas en este estudio. Fuente: IGN

Este área se ha elegido debido a las características topográficas y climatológicas que presenta, ya que para la ubicación de una planta termosolar se necesita un terreno llano y con un mínimo de radiación solar necesario para que dicha instalación sea eficiente energéticamente.

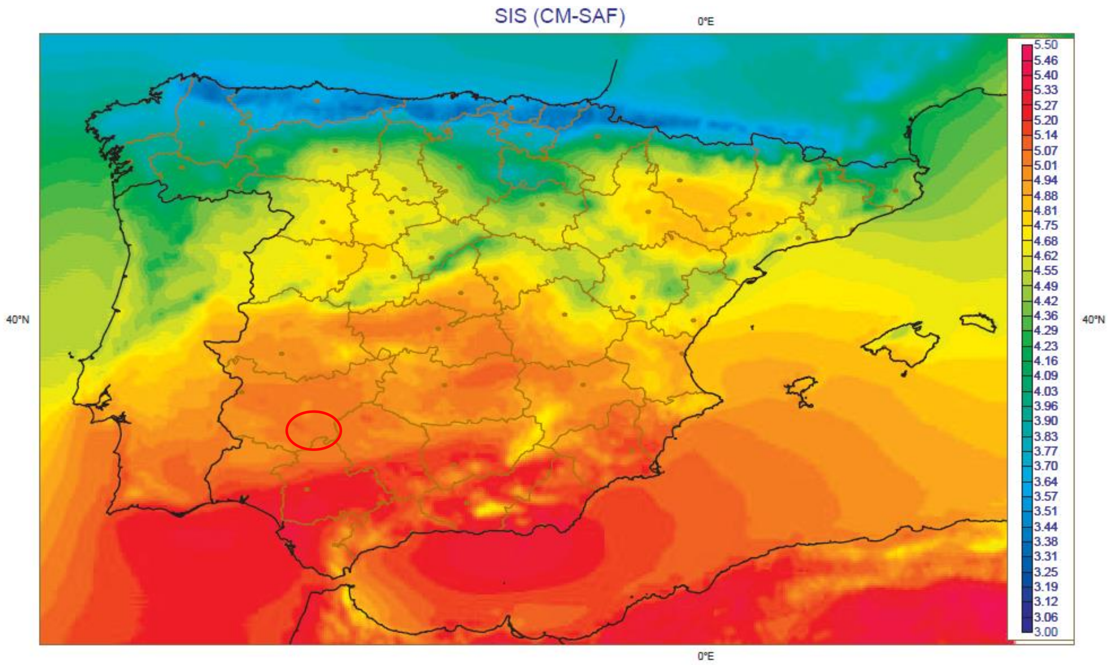


Figura 2 – Irradiancia global media [1983-2005] $\left(\frac{kWh}{m^2 \cdot día}\right)$. Fuente: AEMET

3. CARTOGRAFÍA EMPLEADA

Para realizar el estudio multicriterio, necesitaremos inicialmente obtener la cartografía que servirá de base para realizar todos los análisis pertinentes. En este proyecto se ha utilizado tanto cartografía vectorial como Modelos Digitales del Terreno (MDT), proporcionados por el Instituto Geográfico Nacional (IGN)[1] y por la Junta de Extremadura.

La cartografía vectorial escogida para esta parte del proyecto es, según la denominación del IGN, la **BCN25/BTN25**. La cartografía BCN25 es la Base Cartográfica Numérica a escala 1:25.000 y se trata de una base de datos geográfica 2D de referencia formada a partir de los ficheros digitales del Mapa Topográfico Nacional a esa misma escala, de los que se extrae la geometría original de los elementos. Por otro lado, la cartografía BTN25 es la Base Topográfica Nacional a escala 1:25.000 y se trata de una base de datos topográfica 3D de referencia, capturada a partir de pares estereoscópicos u ortofotografías del Plan Nacional de Ortofotografía Aérea (PNOA). Desde el año 2006, la BCN25 está siendo sustituida por la BTN25, por lo que la disponibilidad de esta última no es absoluta en toda España. Ambas cartografías tiene el Sistema Geodésico de Referencia ETRS89, proyección UTM en el huso correspondiente. En el caso de este proyecto hay hojas del huso 29 y otras del huso 30, lo que supone una pequeña dificultad, ya que se trabaja con un solo huso, teniendo que transformar la cartografía del otro huso.

Los Modelos Digitales del Terreno empleados en este proyecto, según la denominación del IGN, son los **MDT05/MDT05-LIDAR**. Estos tipos de modelos se pueden obtener de dos formas: bien por estereocorrelación automática de vuelos fotogramétricos del PNOA con resolución de 25 a 50 cm/pixel, o por interpolación de vuelos LIDAR del PNOA. Se tratan de archivos con formato ASCII con matriz ESRI (asc), con el Sistema Geodésico de Referencia ETRS89 y proyección UTM en el huso correspondiente. Estos modelos del terreno presentan la misma complicación que la cartografía, debido a la existencia de 2 husos (29 y 30) en la zona de estudio.

4. CARACTERIZACIÓN DE LA ZONA DE ESTUDIO

En este apartado se especifican los principales condicionantes que se han tenido en cuenta a la hora de realizar el estudio multicriterio para encontrar la ubicación óptima para la planta termosolar, los cuales son: pendiente, orientación, recursos hídricos, vías de comunicación, líneas eléctricas y zonas protegidas.

Todos estos elementos tienen su correspondiente plano en el Anexo incluido al final de este Anejo.

4.1. PENDIENTE

Las plantas termosolares, al ocupar una amplia extensión de terreno, necesitan situarse en zonas llanas o con muy poca pendiente para que el movimiento de tierras no suponga un gasto excesivo. Esta necesidad de terrenos sin mucha pendiente también obedece a la necesidad de que los colectores de la planta no generen sombra a los colectores contiguos.

Sin embargo, la explanación donde se implantan las centrales termosolares necesita tener una pendiente suficiente para permitir el drenaje de la misma.

4.2. ORIENTACIÓN

Para poder aprovechar al máximo la radiación solar, la central termosolar deberá estar orientada al **sur**, consiguiendo entonces un mayor número de horas de insolación, incrementando la radiación recibida y concentrada, mejorando, por tanto, su rendimiento. Esta orientación se conseguirá conjuntamente a la creación de la pendiente de la explanación.

4.3. RECURSOS HÍDRICOS

Es el condicionante más importante, ya que toda planta termosolar requiere de un gran volumen de agua para su funcionamiento, aunque actualmente se está mejorando la tecnología de estas instalaciones para reducir este consumo. Debido a la escasez de grandes ríos en la Campiña Sur, solo se han tenido en cuenta los embalses con una capacidad suficiente para poder asumir el consumo de una central termosolar. Estos embalses son:

- Embalse de Alange: Se encuentra en el municipio de Alange y se trata de una presa de gravedad. Almacena el agua del río Matachel y tiene una capacidad de 852 hm^3. Su uso es principalmente para abastecimiento, riego y de generación hidroeléctrica.

- Embalse de Los Molinos de Matachel: Se encuentra en el municipio de Hornachos y se trata de una presa de materiales sueltos con núcleo de arcilla. Almacena el agua del río Matachel y tiene una capacidad de 34 hm^3. Su uso principal es para abastecimiento y riego.
- Embalse de Llerena (también conocido como Embalse de Arroyo Conejos): Se encuentra entre los municipios de Higuera de Llerena y Berlanga, siendo una presa de gravedad. Almacena el agua del Arroyo Conejos y tiene una capacidad de 9 hm^3. Su uso es únicamente para abastecimiento.

4.4. VÍAS DE COMUNICACIÓN

La existencia de una vía de comunicación cercana a la central termosolar ayuda a mejorar el acceso y la logística de la planta, tanto en fase de construcción como en explotación, lo que permite reducir costes como los de transporte, principalmente.

Para el estudio multicriterio únicamente se han tenido en cuenta las carreteras nacionales, autonómicas y las provinciales, excluyendo aquellas que por la geometría y/o por el estado de la misma no podrían cumplir adecuadamente los propósitos buscados.

4.5. LÍNEAS ELÉCTRICAS

Al tratarse de una instalación cuyo objetivo es la generación de energía eléctrica, necesita conectarse a una línea de transporte para transferir la producción para su posterior distribución y consumo.

Para este tipo de plantas, se necesitan líneas con una tensión mínima, de tal forma que para el análisis se han eliminado todas las líneas de baja tensión y algunas de media tensión, quedándonos solo con las líneas de mayor capacidad. Para conocer esta información se ha recurrido a los mapas de la Red Eléctrica Española, para las líneas de media-alta tensión, y a los mapas facilitados por Endesa, para las líneas de media-baja tensión.

4.6. ZONAS PROTEGIDAS

Todo proyecto de obra civil tiene, en mayor o menor medida, un impacto sobre el medio. Para minimizar esta afección se omitirán en el estudio multicriterio las zonas afectadas por las siguientes protecciones ambientales:

- Zonas de Especial Protección para las Aves (ZEPAs): Son lugares que requieren medidas de conservación especiales con el fin de asegurar la supervivencia de las especies de aves, y en particular de las amenazadas. En la zona de estudio podemos encontrar las siguientes:
    - Campiña Sur – Embalse de Arroyo Conejo
    - Colonias de Cernícalo Primilla de Llerena
    - Sierra Grande de Hornachos
    - Sierras Centrales y embalse de Alange
- Lugares de Importancia Comunitaria (LICs): Son áreas que contribuyen de forma apreciable a mantener o reestablecer un tipo de hábitat natural o una especie en un estado de conservación favorable. Con la entrada en vigor del Decreto 110/2015, de 19 de mayo, publicado en el DOE el 3 de junio de 2015, los LICs pasan a denominarse Zonas de Especial Conservación (ZEC). En la zona de estudio encontramos los siguientes:
    - Río Bembézar
    - Río Matachel
    - Río Guadámez
    - Sierra Grande de Hornachos
    - Sierras de Bienvenida y La Capitana
    - Mina Mariquita
    - Río Palomillas
    - Río Ortiga
    - Río Zújar
- Reservas naturales: En la zona de estudio existe una en el término municipal de Berlanga, en el denominado “Parque de las Quinientas”.

5. ESTUDIO MULTICRITERIO

Un estudio multicriterio sirve como herramienta de gran utilidad para tomar decisiones basándose en una gran variedad de pautas objetivas, analizándolas conjuntamente. En nuestro caso, permitirá elegir la ubicación óptima para la construcción de la planta termosolar, a partir de los criterios enumerados en el apartado anterior.

Para realizar este estudio se ha empleado el programa **ArcGIS**, desarrollado por la empresa ESRI. Se trata de una aplicación del campo de los Sistemas de Información Geográfica que permite trabajar con una gran cantidad de información de diversos ámbitos conjuntamente, permitiendo crear mapas, analizarlos, conseguir información de multitud de ámbitos, etc., gracias a las herramientas implementadas en él.

Para aplicar al estudio los condicionantes del punto anterior, se han utilizado tanto la cartografía y los modelos del terreno detallados en el apartado 2, como servidores de información geográfica, que permiten introducir datos de forma virtual. A esta información inicial se le ha aplicado posteriormente distintas herramientas de tratamiento de datos. Una de esas herramientas es la denominada "*Buffer*", que permite crear zonas de influencia a partir de un punto, una línea o un polígono. En el caso de este proyecto se ha utilizado para establecer el coste/distancia de las vías de comunicación, de los recursos hídricos y de las líneas eléctricas, con el objetivo de minimizar el coste de las infraestructuras relativas a estos elementos. Tras consultar otros proyectos con estudios multicriterio similares, se han adoptado los siguientes costes:

- Vías de comunicación: Se ha establecido un coste de **200.000 €/km**, ya que la carretera de acceso a la central no necesitaría un ancho de plataforma excesivo y el paquete de firmes no tendría que soportar una gran cantidad de vehículos pesados. Debido al notable número de vías situadas en la zona de estudio, las zonas de influencia se han realizado cada 0,5 km para obtener un resultado más preciso.

- Recursos hídricos: El coste de los elementos necesarios para abastecer a la central termosolar, incluyendo la posibilidad de que sea una conducción forzada, se ha determinado en **150.000 €/km**. Los buffers se realizarán cada kilómetro, ya que existe un reducido número de embalses adecuados para satisfacer las necesidades de una planta termosolar, tal y como se ha indicado anteriormente.
- Líneas eléctricas: Se ha fijado un coste para los elementos de transporte de la energía eléctrica generada de **100.000 €/km**. Al igual que en los recursos hídricos, las zonas de influencia se crearán cada kilómetro, puesto que hay pocas líneas que son capaces de aceptar la energía producida.

Estos buffers están incluidos en los planos del Anexo adjunto al final de este anejo.

Tras crear todas las zonas de influencia, se han analizado los Modelos Digitales del Terreno para determinar tanto la pendiente como la orientación de toda la superficie de estudio, mediante las herramientas “*Aspect*” y “*Slope*” de ArcGIS, respectivamente. Los resultados se encuentran en los planos correspondientes del Anexo.

Posteriormente, se han aislado las zonas que cumplen conjuntamente la condición de tener una pendiente inferior al 5% y de estar orientadas al sur. A estas áreas se les ha incluido la información de los buffers de las carreteras, los embalses y las líneas eléctricas, estableciendo que, como máximo, la central se situaría a 5 kilómetros de una vía de comunicación y a 15 de un embalse y/o una línea eléctrica. Esta diferencia se debe a que existe un mayor número de carreteras aptas que embalses y líneas eléctricas. Para reducir el impacto ambiental, se han eliminado las zonas situadas dentro de una zona protegida ambientalmente, ya sea ZEPA, LIC (ahora ZEC) o reserva natural. Con todo ello se han extraído todas las áreas con las características adecuadas para albergar la planta termosolar, tal y como se puede comprobar en el plano respectivo incluido en el Anexo “Planos”.

6. ESTUDIO DE ALTERNATIVAS

Tras realizar el estudio multicriterio, se ha obtenido un gran número de pequeñas zonas que cumplen con todos los criterios adoptados. Para simplificar la adopción de la solución se ha procedido a encontrar agrupaciones lo suficientemente grandes para poder situar la planta termosolar, derivando en las siguientes posibles opciones:

- Opción 1: Campillo de Llerena
- Opción 2: Valencia de las Torres (Norte)
- Opción 3: Usagre
- Opción 4: Valencia de las Torres (Sur)
- Opción 5: Azuaga (Noroeste)
- Opción 6: Llerena
- Opción 7: Azuaga (Oeste)
- Opción 8: Valverde de Llerena

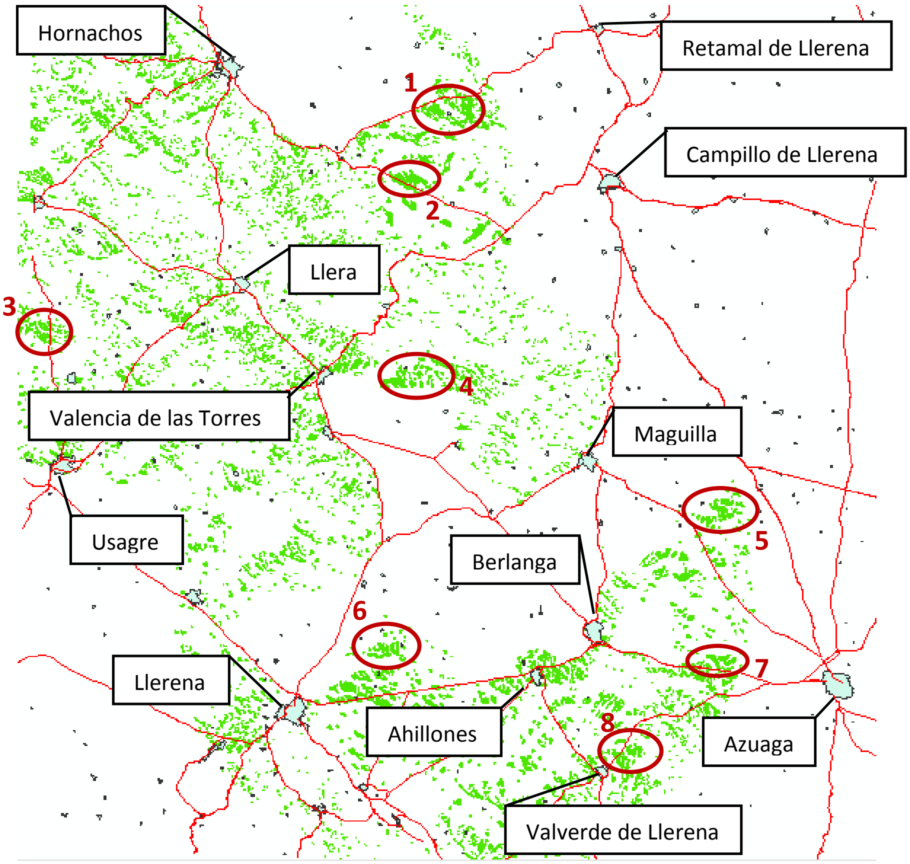


Figura 3 – Localización de todas las opciones consideradas

A continuación se expondrán las características de estas alternativas, destacando las ventajas y las desventajas para poder discernir la mejor opción.

6.1. OPCIÓN 1: CAMPILLO DE LLERENA

Esta alternativa se encuentra al noroeste del término municipal de Campillo de Llerena, junto a la carretera BA-119, que circula entre Retamal de Llerena y la carretera EX-343, a la altura del PK 8+300. La línea eléctrica más cercana se trata de una línea de alta tensión de 400 kV de doble circuito que está situada a unos 10 kilómetros. El embalse más cercano es el de Los Molinos situado en el municipio de Hornachos, a 17 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- Se trata de una zona con buena geología
- El embalse es de gran capacidad
- La línea eléctrica es de alta tensión
- No se crearía un gran impacto visual a ninguna población cercana

Inconvenientes

Como inconvenientes señalamos los siguientes:

- La línea eléctrica se encuentra a una distancia importante
- El recorrido para abastecer a la central sería también alto
- No hay grandes poblaciones cercanas que faciliten la logística
- La carretera de acceso no se encuentra en buen estado y necesitaría una ampliación de plataforma y refuerzo de firme

6.2. OPCIÓN 2: VALENCIA DE LAS TORRES (NORTE)

Esta alternativa está ubicada al norte del término municipal de Valencia de las Torres, junto a la carretera EX-343, que circula entre Hornachos y la carretera EX-103, a la altura del PK 6+500. La línea eléctrica más cercana se trata de una línea de alta tensión de 400 kV de doble circuito que está situada a unos 11 kilómetros. El embalse más cercano es el de Los Molinos situado en el municipio de Hornachos, a 12 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- El embalse es de gran capacidad
- La línea eléctrica es de alta tensión
- No se generaría un gran impacto visual a ninguna población cercana

Inconvenientes

Como inconvenientes señalamos los siguientes:

- Debido a la cercanía de una pequeña sierra y a la dirección de la carretera, la central debería tener un diseño irregular, que podría dificultar su construcción.
- La línea eléctrica se encuentra a una distancia importante
- Es una zona con una geología no muy buena

6.3. OPCIÓN 3: USAGRE

Esta posibilidad se localiza al norte del término municipal de Usagre, junto a la carretera BA-141, que circula entre esta localidad e Hinojosa del Valle, a la altura del PK 7+500. La línea eléctrica más cercana se trata de una línea de media tensión de 60÷110 kV que interferiría con la planta, por lo que sería objeto de desvío. El embalse más cercano es el de Los Molinos situado en el municipio de Hornachos, a 18 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- Se trata de una zona con buena geología
- El embalse es de gran capacidad
- La línea eléctrica se encontraría al lado
- No se crearía un gran impacto visual a ninguna población cercana

Inconvenientes

Como inconvenientes señalamos los siguientes:

- Debido a la cercanía de una sierra, los terrenos aptos para la construcción de la central dejan poco margen de maniobra
- Hay una vía pecuaria en la zona a ubicar la planta
- El recorrido para abastecer a la central sería alto
- La línea eléctrica hay que desviarla
- Es un terreno con una geología heterogénea
- No hay grandes poblaciones cercanas que faciliten la logística
- La carretera de acceso no se encuentra en buen estado y necesitaría una ampliación de plataforma y refuerzo de firme

6.4. OPCIÓN 4: VALENCIA DE LAS TORRES (SUR)

Esta alternativa se encuentra al sur del término municipal de Valencia de las Torres, junto a una vía agrícola, que circula entre esta localidad y Maguilla, a unos 3 kilómetros de la carretera EX-103. La línea eléctrica más cercana se trata de una línea de alta tensión de 400 kV de doble circuito que está situada a unos 8 km. Se encuentra a la misma distancia, unos 17 km aproximadamente, del embalse de Llerena y del embalse de Los Molino, eligiendo este último por ser de mayor capacidad.

Ventajas

Como ventajas se pueden destacar las siguientes:

- El embalse es de gran capacidad
- La línea eléctrica es de alta tensión
- No se generaría un gran impacto visual a ninguna población cercana
- Cerca de la ubicación se encuentra una vía de buenas características

Inconvenientes

Como inconvenientes señalamos los siguientes:

- La geología de esta zona no tiene las características óptimas
- El recorrido para abastecer a la central sería alto
- Hay una ZEPA cerca de la ubicación
- La carretera de acceso que no se encuentra en buen estado y necesitaría una ampliación de plataforma y refuerzo de firme

6.5. OPCIÓN 5: AZUAGA (NOROESTE)

Esta opción está ubicada al noroeste del término municipal de Azuaga, junto a la carretera BA-0-19, que circula entre esta localidad y Maguilla, a la altura del PK 9+900. La línea eléctrica más cercana se trata de una línea de media tensión de 60÷110 kV que está situada a unos 8 km. El embalse más cercano es el de Llerena situado entre los municipios de Higuera de Llerena y Berlanga, a 15 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- No se generaría un gran impacto visual a ninguna población cercana

Inconvenientes

Como inconvenientes señalamos los siguientes:

- La geología de esta zona no tiene las características óptimas
- El recorrido para abastecer a la central sería alto

- La capacidad del embalse es pequeña
- Hay una ZEPA cerca de la ubicación
- La carretera de acceso que no se encuentra en buen estado y necesitaría una ampliación de plataforma y refuerzo de firme en algunas zonas. Actualmente está licitada la redacción del proyecto de mejora de esta carretera.

6.6. OPCIÓN 6: LLERENA

Esta alternativa se localiza al norte del término municipal de Llerena, junto a la vía que circula entre esta localidad y el embalse. La línea eléctrica más cercana se trata de una línea de media tensión de 60÷110 kV que está situada a unos 3 km. El embalse más cercano es el de Llerena situado entre los municipios de Higuera de Llerena y Berlanga, a 6 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- El embalse está situado a no demasiada distancia
- Hay una línea eléctrica cercana a la ubicación
- Las carreteras EX-103 y la N-432 se encuentran a solo 2 y 3 km, respectivamente
- No se generaría un gran impacto visual a ninguna población cercana

Inconvenientes

Como inconvenientes señalamos los siguientes:

- Es una zona sísmica
- La geología del entorno no es muy buena
- El embalse no es de gran capacidad

6.7. Opción 7: Azuaga (Oeste)

Esta posibilidad se encuentra al oeste del término municipal de Azuaga, junto a la carretera N-432, a la altura del PK 138+000. La línea eléctrica más cercana se trata de una línea de media tensión de 60÷110 kV que interferiría con la planta, por lo que sería objeto de desvío. El embalse más cercano es el de Llerena situado entre los municipios de Higuera de Llerena y Berlanga, a 16 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- Se trata de una carretera nacional en buen estado
- La línea de tensión se encontraría al lado

Inconvenientes

Como inconvenientes señalamos los siguientes:

- El recorrido para abastecer a la central sería alto
- El embalse no tiene gran capacidad
- La línea eléctrica hay que desviarla
- Es un terreno con una geología no muy adecuada
- Podría crear un impacto visual en Azuaga

6.8. Opción 8: Valverde de Llerena

Esta opción se ubica en el centro-nordeste del término municipal de Valverde de Llerena, junto a la carretera EX-309, que circula entre el límite de provincia con Sevilla y la N-432, a la altura del PK 9+700. La línea eléctrica más cercana se trata de una línea de media tensión de 60÷110 kV que está situada a unos 5 km. El embalse más cercano es el de Llerena situado entre los municipios de Higuera de Llerena y Berlanga, a 15 km aproximadamente.

Ventajas

Como ventajas se pueden destacar las siguientes:

- Se trata de una zona con buena geología
- La línea eléctrica se encuentra cerca
- No se crearía un gran impacto visual a ninguna población cercana

Inconvenientes

Como inconvenientes señalamos los siguientes:

- Hay una vía pecuaria en la zona a ubicar la planta
- El recorrido para abastecer a la central sería alto
- La capacidad del embalse es baja
- Es un terreno con una geología heterogénea

6.9. CONCLUSIÓN

Tras estudiar todas las alternativas, se ha adoptado como solución ubicar la planta termosolar en **Llerena**. Principalmente se ha elegido porque es la opción que tiene los recursos necesarios a una distancia más reducida, ya sea vía de comunicación, embalse o línea eléctrica. Tal y como se ha especificado anteriormente, la distancia hasta la carretera EX-103 y a la N-432, es de 2 y 3 km respectivamente, por lo que se puede optar por cualquiera de las opciones como vía de comunicación. Para ambos casos, se podría utilizar la trazada de una vía ya existente. En el caso de la EX-103 sería un camino sin firme bituminoso y con un ancho de plataforma insuficiente. Sin embargo, para el acceso por la carretera nacional, se podría aprovechar la carretera que lleva hasta el embalse de Llerena, la cual está asfaltada hasta el cruce con el camino que conduce hasta la ubicación de la central, de unos 600 metros. El firme presenta algunos tramos con patologías, por lo que se tendría que proyectar la renovación del firme, además de la ampliación del ancho de calzada.

Respecto a la línea eléctrica, ya se ha indicado que existe una línea de 60÷110 kV a unos 3 km, existiendo muy cerca un transformador. Si esta línea no pudiera ser empleada, existe una línea de alta tensión de 400 kV a 4 km, por lo que no se produciría un gran incremento de presupuesto.

Debido a que se trata de estructuras que no transmiten grandes cargas al terreno, la geología no es un factor determinante para decidir la ubicación, a pesar de que en esa zona las características resistentes no son muy altas. Aunque se trata de un terreno con obligatoriedad de estudio sísmico, esta característica no es una variable definitiva para eliminar esta localización, ya que los colectores cilindro-parabólicos de las centrales termosolares no presentan una gran altura (<6,5 m), por lo que los efectos sísmicos no son muy importantes. Este emplazamiento escogido también permite minimizar el posible impacto visual a la población de Llerena y a la N-432, con una barrera verde ubicada en los cerramientos situados al sur, aunque en ciertas partes no será necesario ya que al realizar la explanación, los taludes de desmonte servirán de barrera visual.

Para disminuir la problemática derivada de la reducida capacidad del embalse de Llerena, se han diseñado las balsas de tal manera que la impulsión de agua solo se produzca en los meses más húmedos, entre noviembre y marzo, tal y como se puede comprobar en el Anejo nº 8 - Cálculos hidráulicos.

ANEXO 6.1

FUNCIONAMIENTO DE UNA PLANTA TERMOSOLAR DE COLECTORES CILINDRO-PARABÓLICOS

1. INTRODUCCIÓN

El propósito de este anexo es describir los tipos de plantas termosolares, indicando los elementos que componen la elegida para este proyecto, además de explicar de forma resumida su funcionamiento.

Todas las instalaciones termosolares tienen como objetivo aprovechar la energía del Sol para generar calor y utilizarlo con diversos fines, ya sea calentar agua de uso doméstico, para calefacción o para la producción de energía eléctrica. Los dispositivos captadores de la energía solar se denominan colectores y se clasifican en:

- Colectores de baja temperatura: Generalmente se usan para calentar agua
- Colectores de media temperatura: Se emplean habitualmente para calen agua o aire para usos residenciales o comerciales
- Colectores de alta temperatura: Son los utilizados para la generación de energía eléctrica

Son estos últimos los que se emplean en las plantas termosolares, por lo que nos vamos a centrar en ellos. Existen diversos tipos de colectores de alta temperatura, pero principalmente se diseñan centrales con los siguientes:

- Heliostatos: Están formados por un conjunto de espejos que dirigen los rayos solares a un receptor situado en una torre central. Están situados sobre una estructura que, mediante los giros adecuados, permite hacer un seguimiento al Sol.

- Colectores cilindro-parabólicos: Las plantas con este diseño de colector usan espejos cilíndricos curvados que reflejan la radiación solar en un tubo receptor situado en el punto focal de los reflectores. Estos espejos están montados sobre una estructura que admite el giro sobre un eje, permitiendo realizar el seguimiento a la trayectoria solar. Estos son los utilizados en el diseño de la planta proyectada.

- Reflectores Fresnel: Son espejos planos o con muy poca curvatura y de gran longitud, con inclinaciones alternas que reflejan la luz solar a dos receptores lineales.

- Disco: Son espejos situados en una estructura en forma de disco parabólico que concentra la radiación solar sobre un punto de la propia estructura, normalmente un motor Stirling. Toda la unidad hace el seguimiento a la trayectoria solar.

A continuación se van a describir con más detalle los elementos de una planta termosolar de colectores cilindro-parabólicos y su funcionamiento, que presenta muchas similitudes con las centrales que utilizan otros colectores.

2. ELEMENTOS CONFORMANTES DE LA PLANTA

Principalmente se pueden diferenciar las siguientes partes en una planta termosolar de colectores cilindro-parabólicos:

- Sistema colector-receptor situado en el campo solar
- Sistema generador situado en la isla de potencia
- Sistemas auxiliares: hidráulico, transformador, almacenamiento térmico, depurador, etc.

2.1. SISTEMA COLECTOR

Este sistema está compuesto por los colectores cilindro-parabólicos (CCP). Estos colectores están compuestos por un reflector, un tubo receptor y un sistema de seguimiento solar. El **reflector** está constituido por un conjunto de espejos que le otorgan su sección en forma de parábola. Para obtener su capacidad reflectora, se cubre el medio soporte con una película de plata o aluminio, normalmente, aunque actualmente se están creando materiales compuestos que mejoran esta característica. El medio soporte suele ser metálico o de un material compuesto que es el que aporta la rigidez al reflector. El tubo absorbente es uno de los elementos más importantes de todo CCP, ya que de él depende en gran medida el rendimiento global del colector.

Figura 4 – Colectores tipo EUROTrough. Fuente: bine.info

El **tubo receptor o absorbente** de un CCP consta en realidad de dos tubos concéntricos. Uno interior metálico, por el que circula el fluido de trabajo, y el exterior de cristal. El tubo metálico lleva un recubrimiento selectivo que es capaz de absorber gran cantidad de energía (>90%) y no emite una gran cantidad de esa energía en el espectro infrarrojo (<30%), lo que aumenta su rendimiento térmico. El tubo de cristal que rodea al interior metálico tiene la doble misión de reducir las pérdidas térmicas del segundo y de proteger de las inclemencias meteorológicas su recubrimiento selectivo. Para ello, entre el tubo metálico y el tubo de vidrio se induce el vacío. Por el interior del tubo receptor circula el fluido de trabajo o fluido de alta temperatura (HTF, según sus siglas en inglés: *High Temperature Fluid*). En la actualidad se utilizan distintos tipos de aceites sintéticos que permitan alcanzar mayores temperaturas reduciendo las pérdidas.

Figura 5 – Modelo de tubo receptor de la marca Siemens. Fuente: siemens.com

El **sistema de seguimiento** es el que permite que el reflector esté continuamente durante las horas útiles de radiación solar, concentrando esta energía en el tubo receptor. Habitualmente su trata de un mecanismo de giro implementado conjuntamente con la estructura de sustentación, cuyo eje de giro está orientado en la dirección Norte-Sur.

2.2. Sistema Generador

El sistema generador de energía eléctrica está constituido principalmente por la turbina de vapor, el intercambiador de calor, el condensador y la bomba de impulsión. El fluido de trabajo es impulsado desde la isla de potencia al campo solar mediante **bombas** capaces de impulsar aceites con una alta densidad y viscosidad. En el **intercambiador de calor** el aceite calienta el agua generando vapor. La **turbina** utiliza ese vapor para girar un alternador produciendo electricidad. El **condensador** permite convertir de nuevo el vapor en agua para reutilizarla.

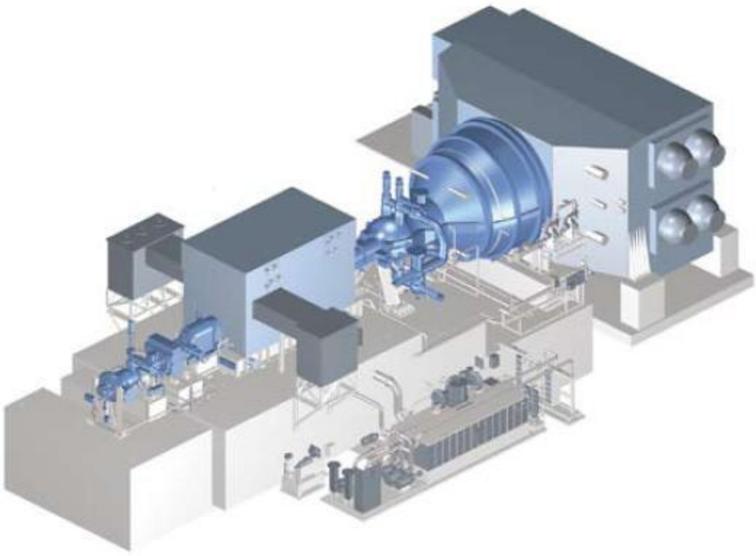


Figura 6 – Turbina de Siemens utilizada en algunas plantas termosolares. Fuente: Siemens.com

2.3. SISTEMAS AUXILIARES

Los sistemas auxiliares pueden ser opcionales aunque la mayoría de ellos suelen estar presentes en todas las centrales termosolares de colectores cilindro-parabólicos. Ordinariamente todas las plantas tienen **centros de transformación** que modifican la tensión y la intensidad de la corriente producida para que posible su vertido a la red de transporte.

Habitualmente las centrales están situadas más o menos alejadas de una fuente de recursos hídricos, por lo que necesitan construir **balsas** para almacenar el agua necesaria para su funcionamiento, además de los **sistemas de impulsión** de esta agua hasta los sistemas generadores. Con el objetivo de minimizar las necesidades de agua y el gasto en su transporte, también se pueden incorporar **sistemas de depuración** para la reutilización del agua, teniendo que incorporar solamente los volúmenes evaporados y los perdidos por filtraciones o pérdidas.

Algunas centrales también incorporan **sistemas de almacenamiento de calor**, con los que acumulan el calor sobrante que habitualmente no se aprovecha, mediante diversos sistemas como las sales fundentes, de tal forma que en períodos sin radiación solar (días nublados, noches, etc.), las plantas todavía pueden seguir generando electricidad.

3. FUNCIONAMIENTO DE LA CENTRAL

Tal y como se ha indicado anteriormente, una central termosolar se compone de un sistema receptor, un sistema generador y otros sistemas auxiliares. El sistema colector capta y concentra la radiación solar sobre el receptor, donde la energía radiante se convierte en energía térmica, la cual finalmente se transforma en energía eléctrica en el sistema de conversión de potencia.

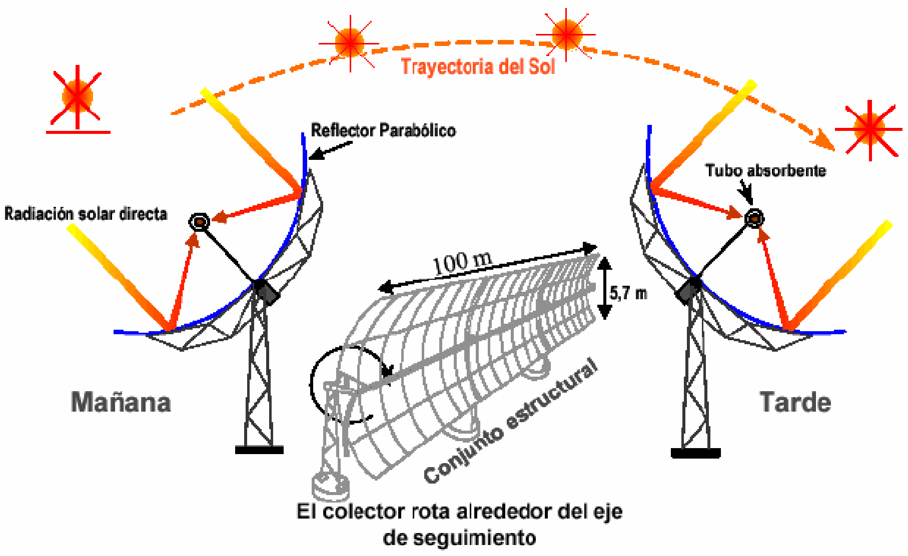


Figura 7 – Seguimiento solar típico de un colector. Fuente: blogspot.com

Los receptores están situados en el punto focal de los espejos, de tal forma que todos los rayos solares se reflejan en dichos espejos y calientan el fluido de trabajo hasta temperaturas cercanas a los 400 °C, en toda la longitud de los denominados lazos, los cuales están conformados por un conjunto de colectores.

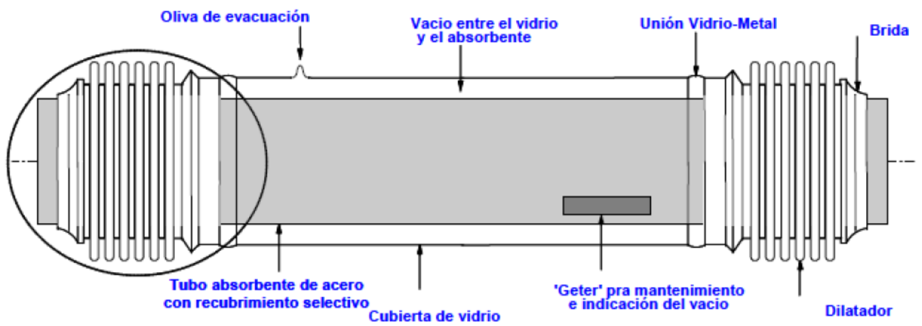


Figura 8 – Esquema de un tubo receptor. Fuente: blogspot.com

Posteriormente, el *High Temperature Fluid* (HTF) se transporta al sistema generador, donde se produce la transformación a energía mecánica. Para ello, el fluido pasa por distintos dispositivos en los que se producen intercambios de calor en distintos niveles. Si la planta termosolar cuenta con un sistema de almacenamiento de calor el HTF pasa por este para aprovechar el calor residual. Con todos los dispositivos se genera principalmente vapor, el cual se conduce hasta una turbina, donde se genera energía eléctrica. Posteriormente, este vapor pasa por un condensador y torres de refrigeración para reducir su temperatura y así volver a emplearlo en el intercambiador de calor y así volver a transformarse en vapor.

El fluido de trabajo, una vez ha salido del sistema generador, se impulsa nuevamente hacia el circuito de colectores, iniciándose de nuevo el proceso.

Una vez no se recibe suficiente radiación solar las plantas que no cuentan con sistemas de almacenamiento de calor, paran la producción, mientras que las que sí cuentan con esta tecnología, pueden seguir generando energía eléctrica, aunque con menor capacidad.

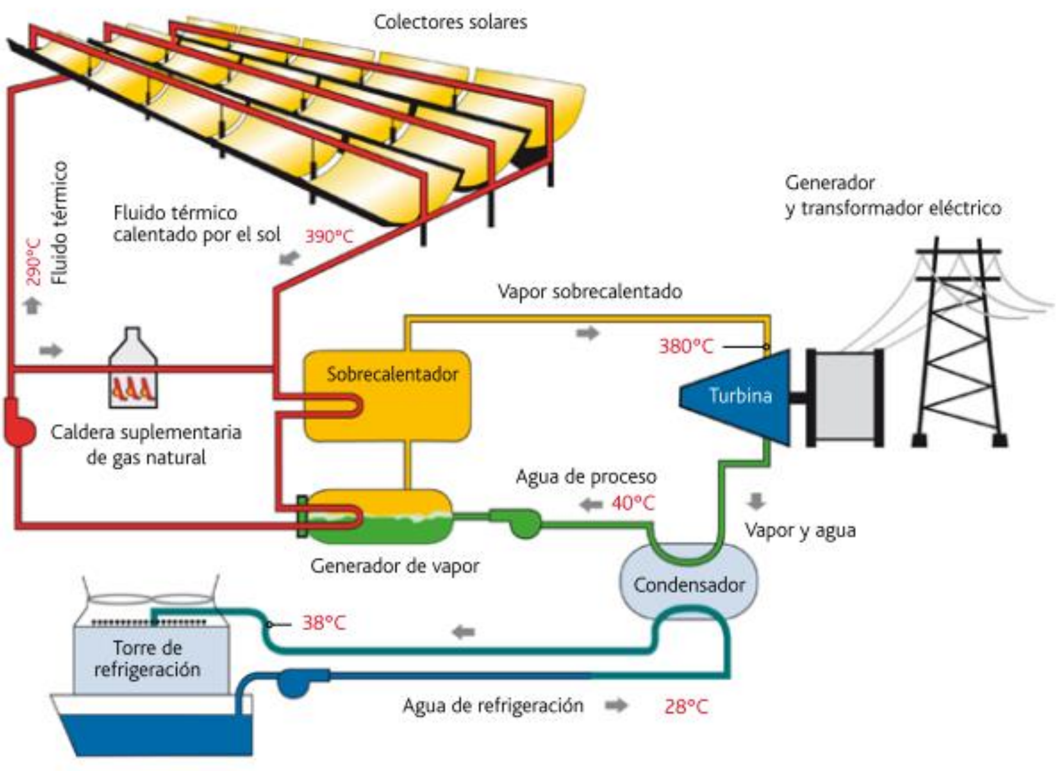
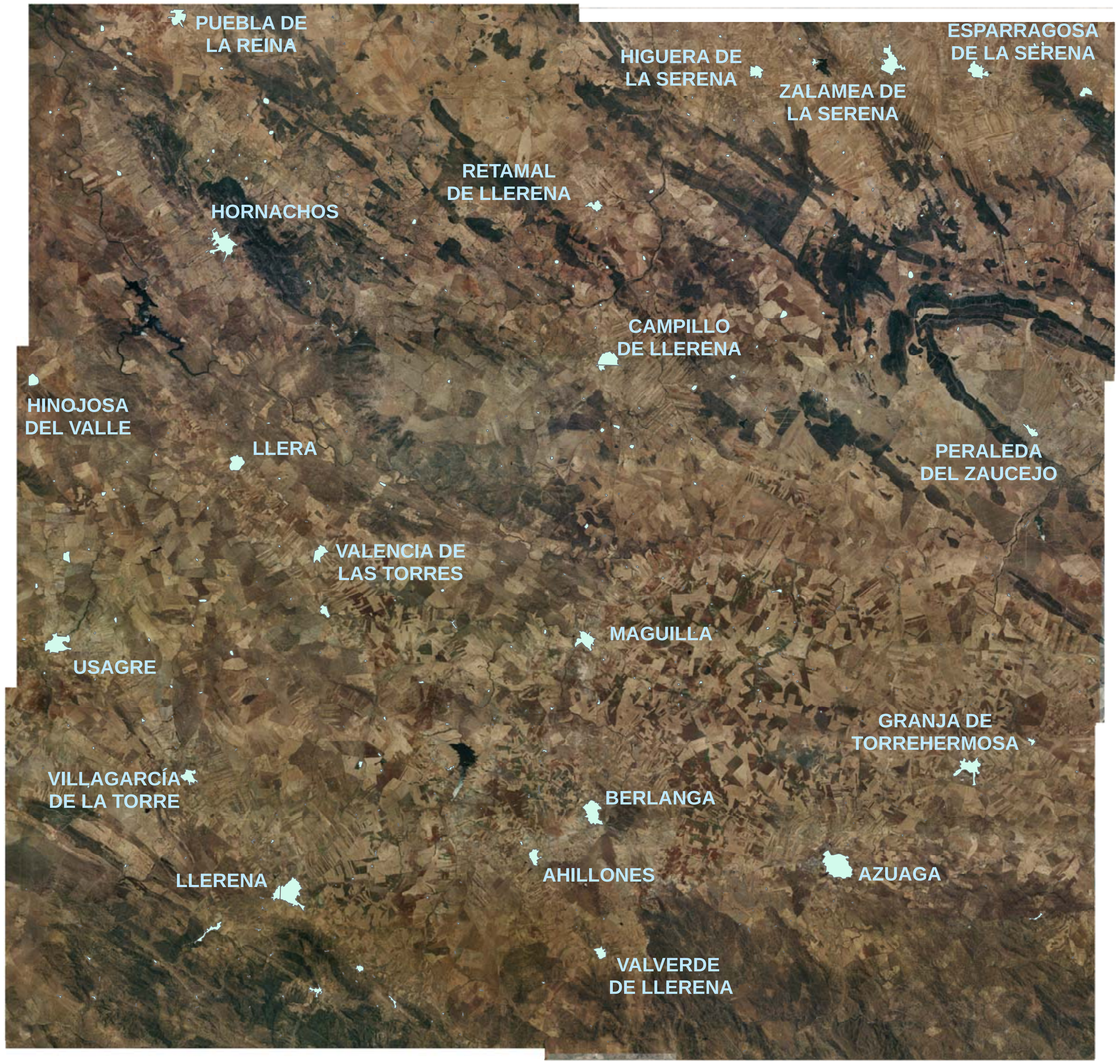


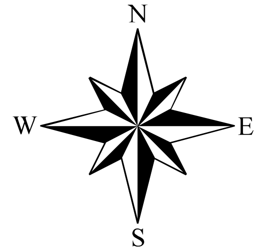
Figura 9 – Esquema de funcionamiento de una planta termosolar. Fuente: blogspot.com

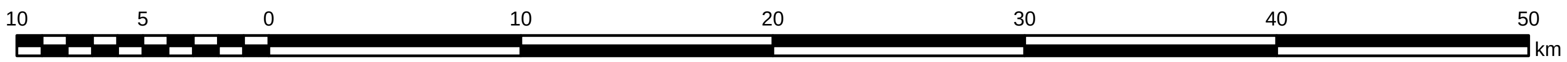
ANEXO 6.2

PLANOS DEL ESTUDIO DE LA UBICACIÓN ÓPTIMA

ÍNDICE DE PLANOS







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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR			
DESIGNACIÓN DEL PLANO ZONA DE ESTUDIO			
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:**	FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:**	**A6.1**
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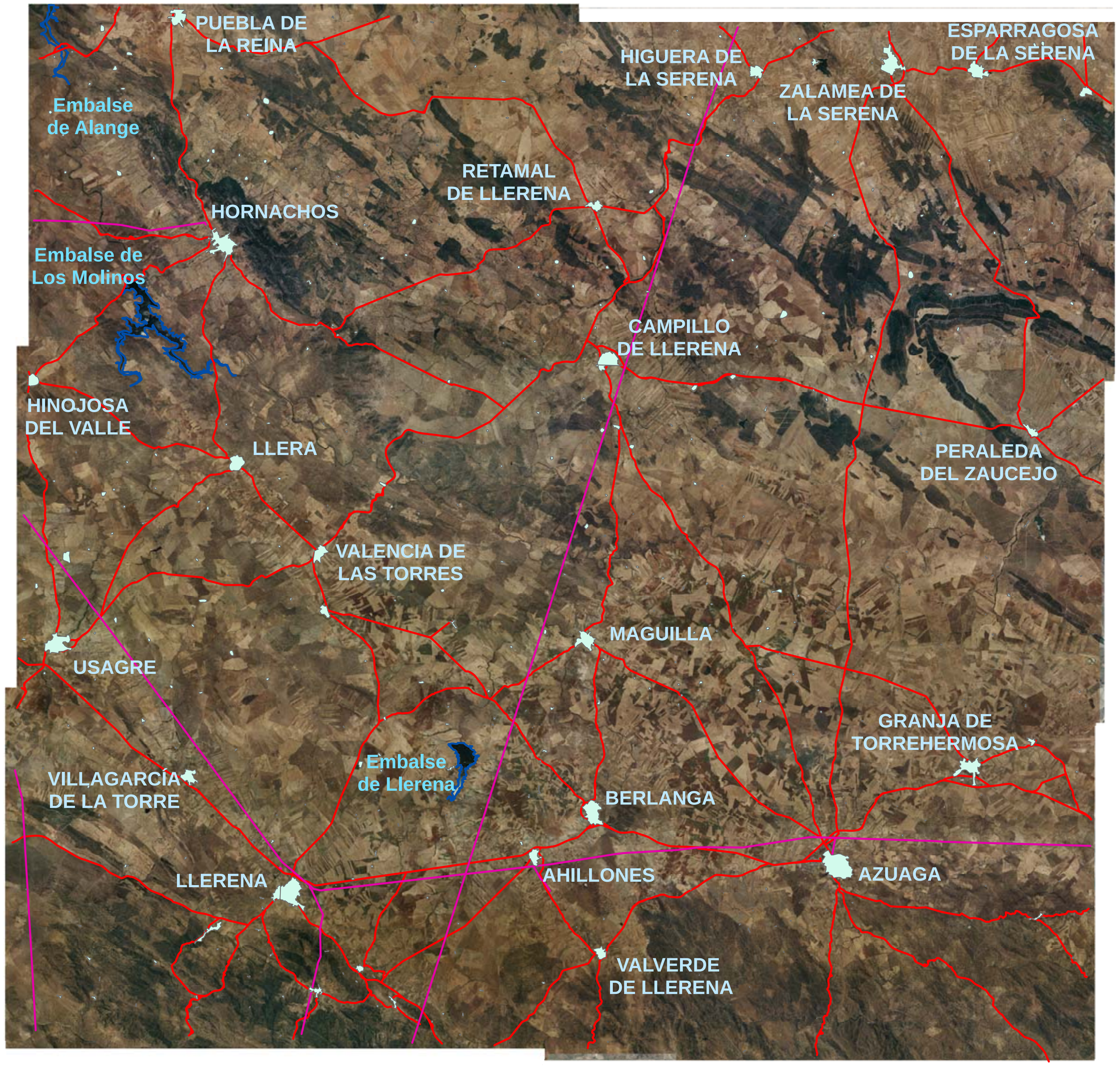

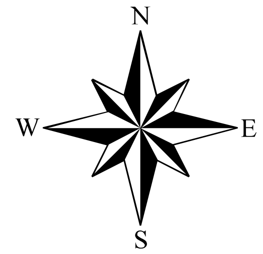

Leyenda

- Poblaciones
- Líneas eléctricas
- Vías de comunicación
- Embalses

10 5 0 10 20 30 40 50 km

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DESIGNACIÓN DEL PLANO RECURSOS DE LA ZONA DE ESTUDIO		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** A6.2
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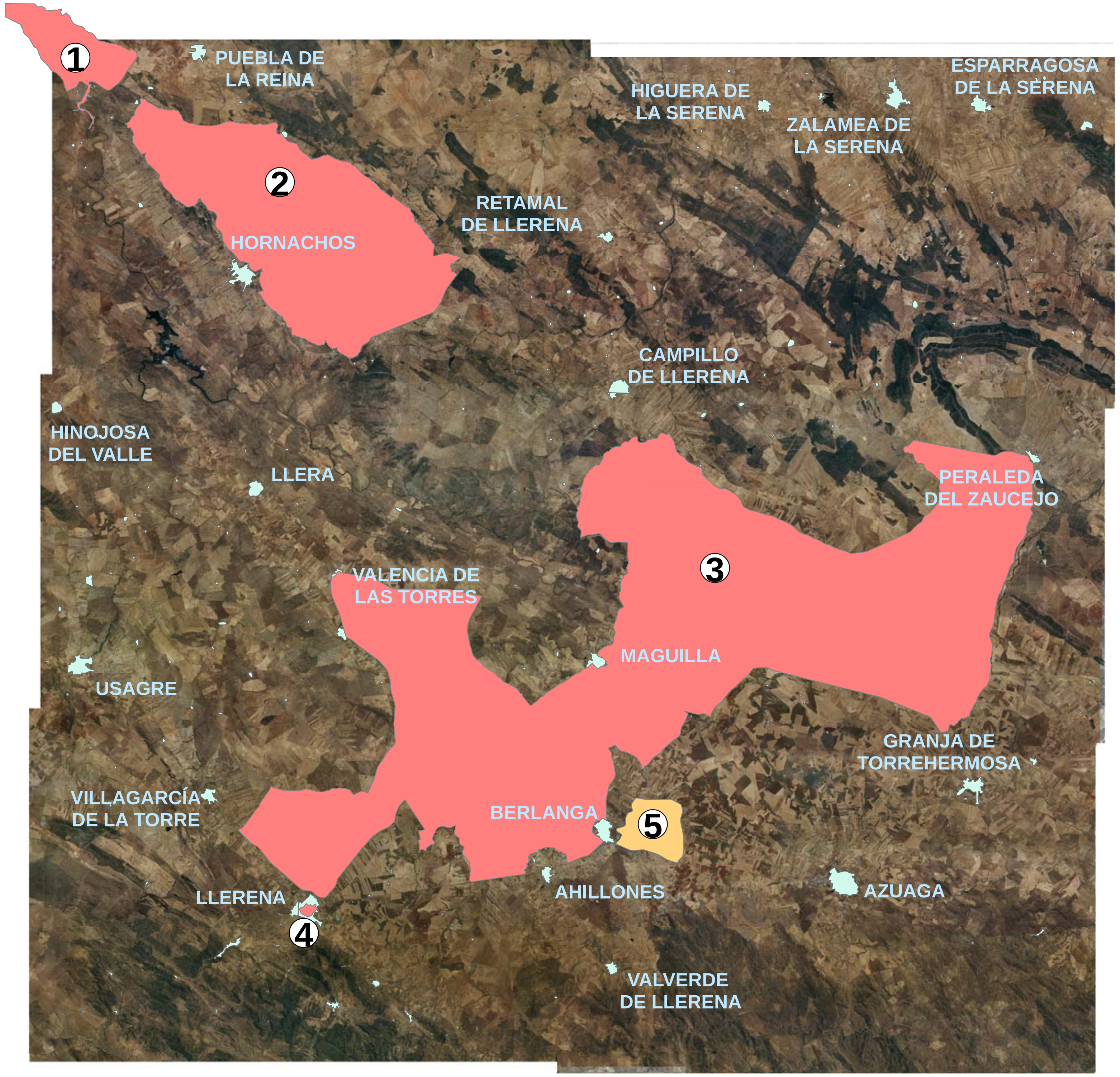
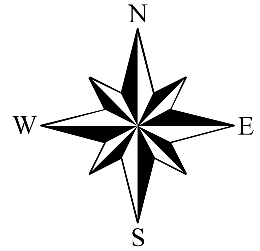
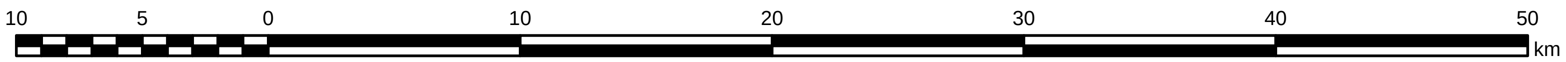




Leyenda

- Poblaciones
- ZEPA
- Reseva Natural

1. Sierras Centrales y Embalse de Alange
2. Sierra Grande de Hornachos
3. Campiña Sur - Embalse de Arroyo Conejos
4. Colonias de Cernícalo Primilla en Llerena
5. Parque de las Quinientas



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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR	
DESIGNACIÓN DEL PLANO ZONAS DE ESPECIAL PROTECCIÓN PARA LAS AVES (ZEPA) Y RESERVAS NATURALES	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ — **FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO:** A6.3
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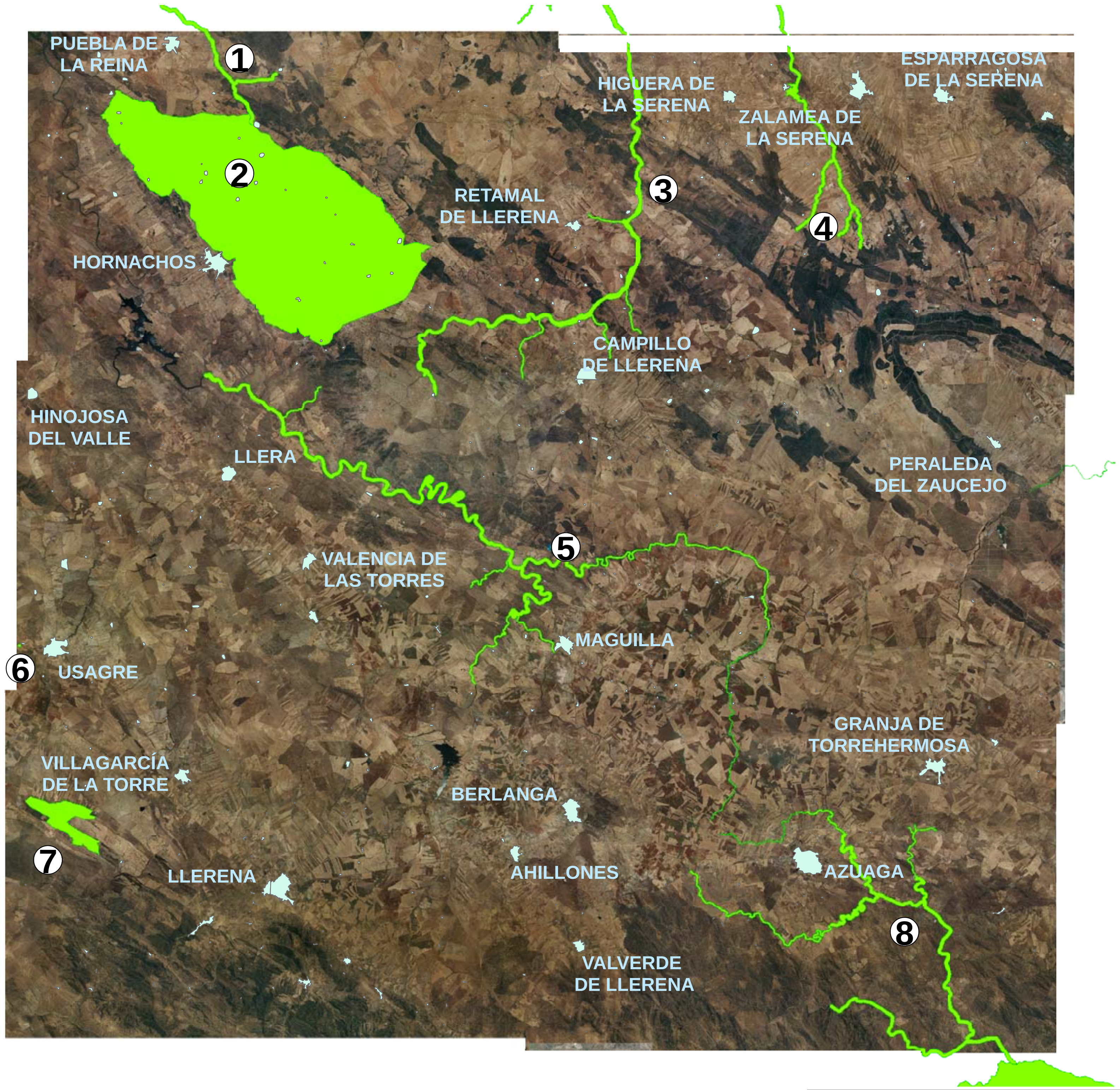

Leyenda

Poblaciones

ZEC/LIC

1. Río Palomillas
2. Sierra Grande de Hornachos
3. Río Guadamez
4. Río Ortiga
5. Río Matachel
6. Mina Mariquita
7. Sierras de Bienvenida y La Capitana
8. Río Bembézar

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DESIGNACIÓN DEL PLANO
ZONAS DE ESPECIAL CONSERVACIÓN (ZEC) / LUGARES DE IMPORTANCIA COMUNITARIA (LICS)

AUTOR	FIRMA	FECHA: FEBRERO 2016
JESÚS FERNÁNDEZ GONZÁLEZ		
TUTORES: JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		Nº DE PLANO: A6.4
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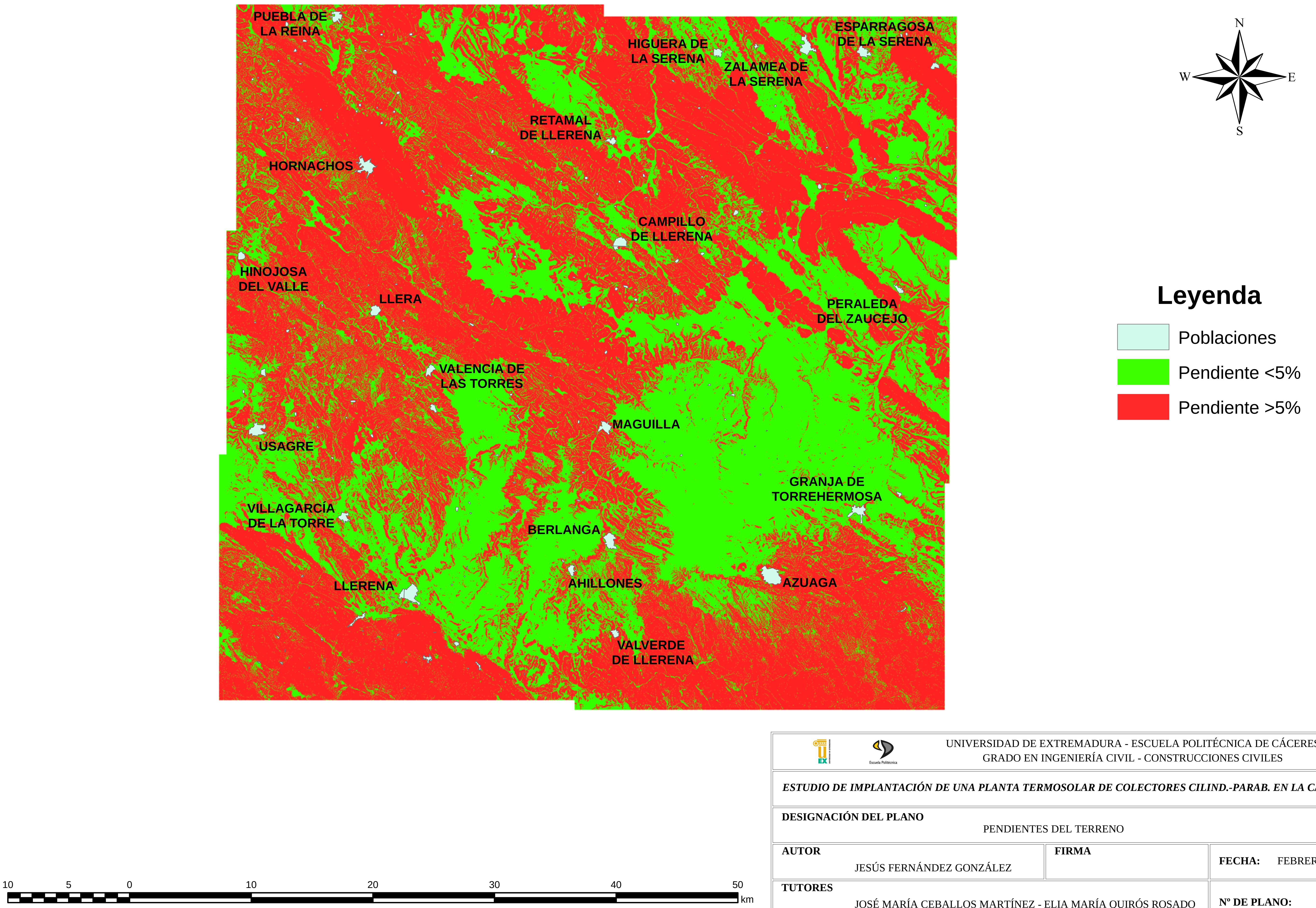

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GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO PENDIENTES DEL TERRENO	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ — **FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO:** A6.5
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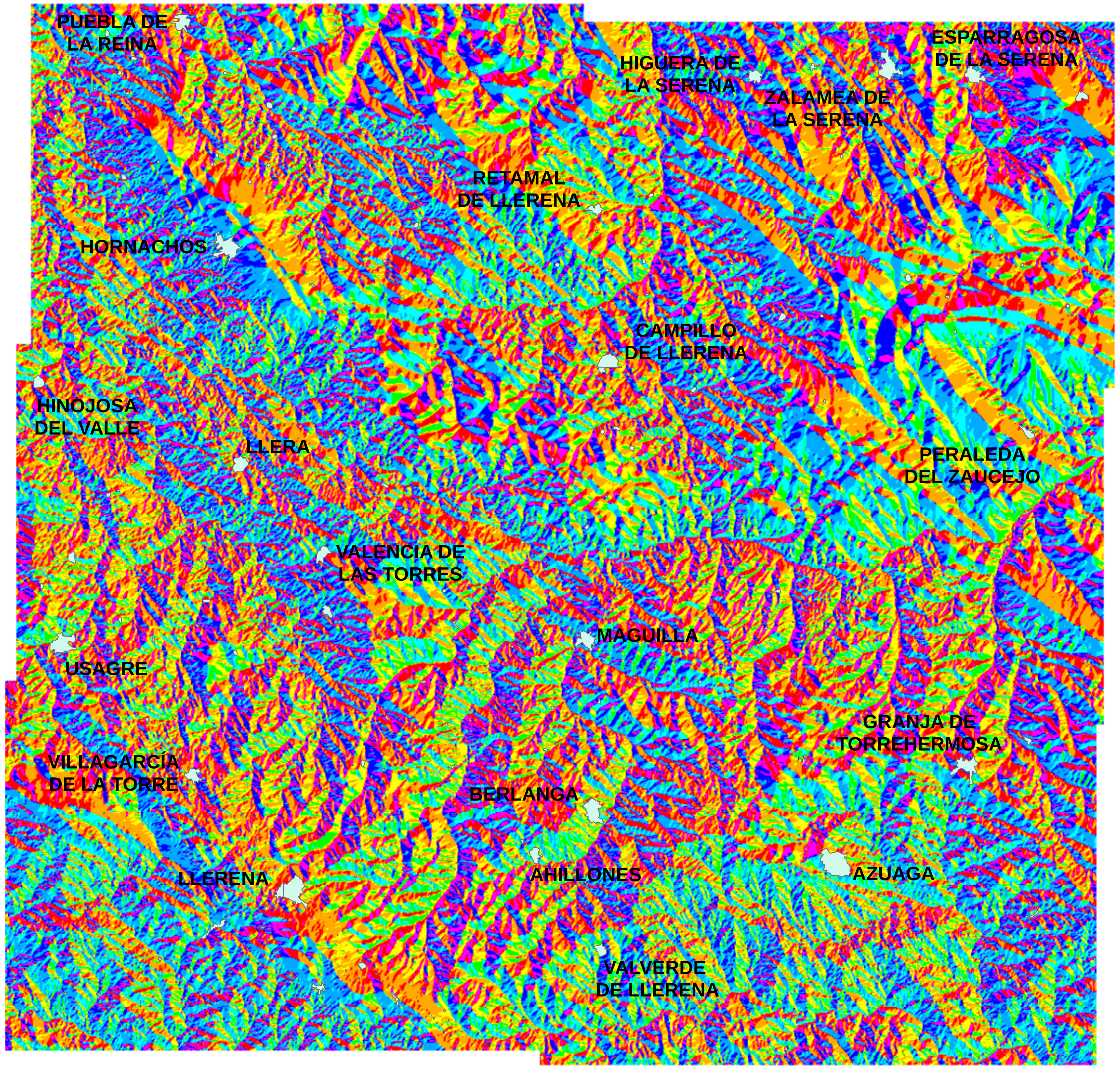
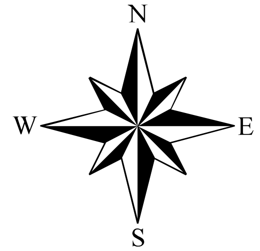
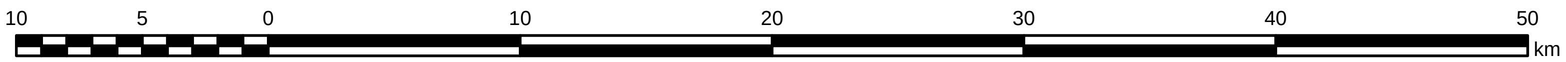




Leyenda

- Poblaciones
- Plano (-1)
- Norte (0-22.5)
- Nordeste (22.5-67.5)
- Este (67.5-112.5)
- Sudeste (112.5-157.5)
- Sur (157.5-202.5)
- Suroeste (202.5-247.5)
- Oeste (247.5-292.5)
- Noroeste (292.5-337.5)
- Norte (337.5-360)



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GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
ORIENTACIONES DEL TERRENO

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

FECHA: FEBRERO 2016

TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: **A6.6**

ESCALAS
E= 1:300.000

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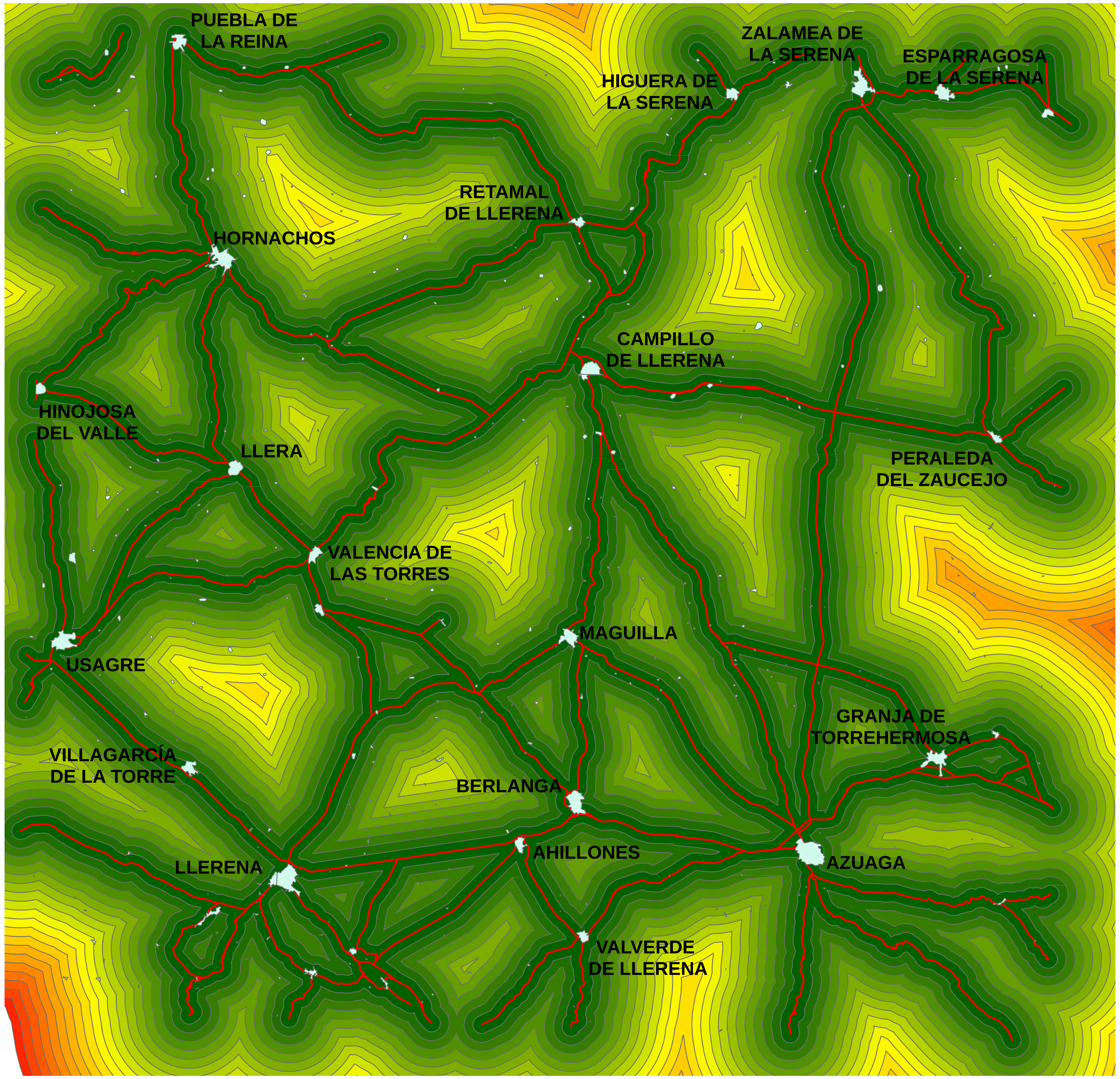

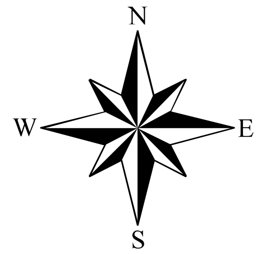

Leyenda

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	200.000 €		1.300.000 €
	300.000 €		1.400.000 €
	400.000 €		1.500.000 €
	500.000 €		1.600.000 €
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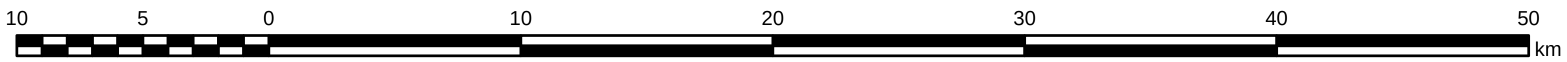
	900.000 €		2.000.000 €



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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
COSTE DE LOS RECURSOS - VÍAS DE COMUNICACIÓN

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

FECHA: FEBRERO 2016

TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: A6.7

ESCALAS E= 1:300.000

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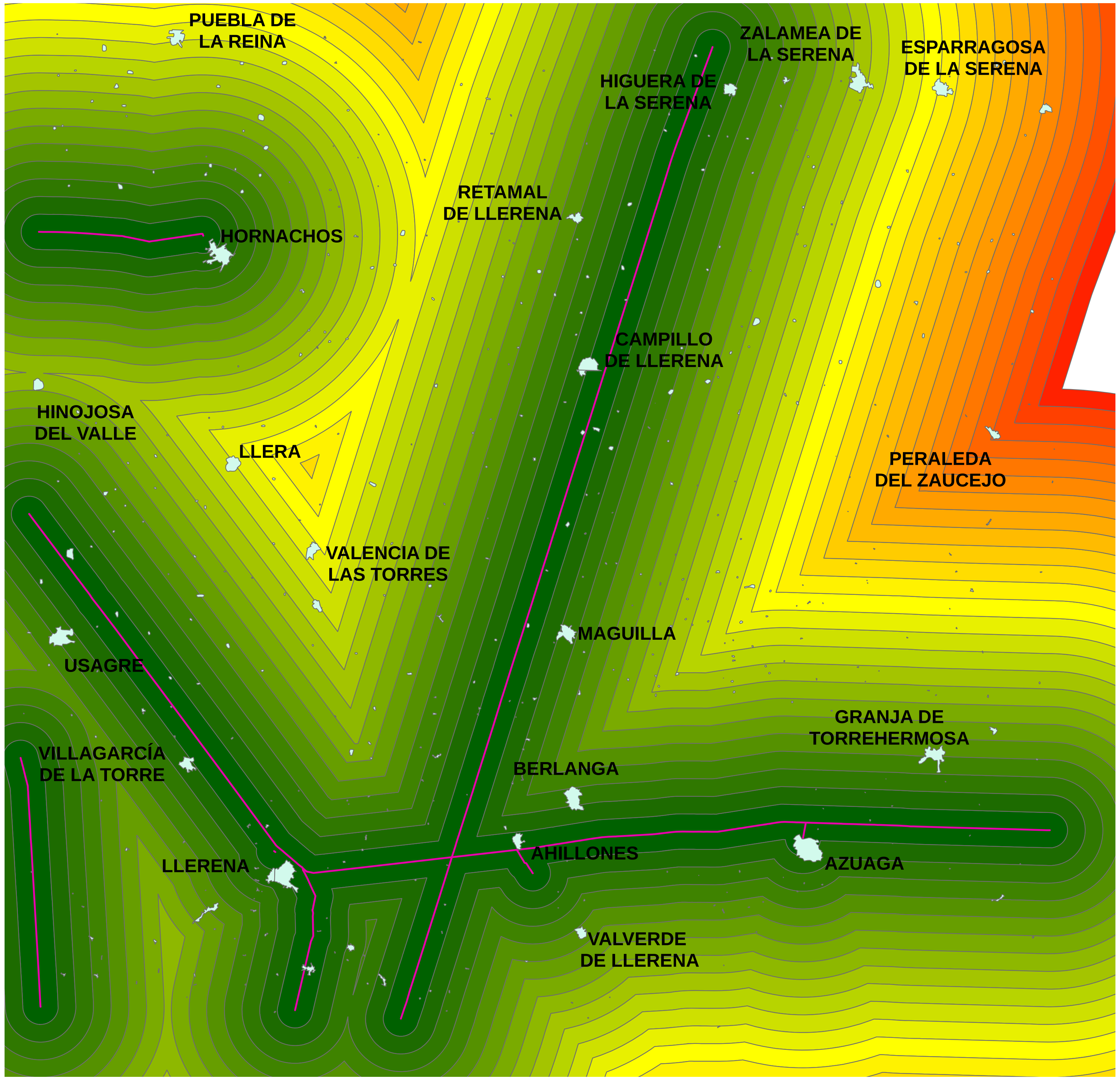

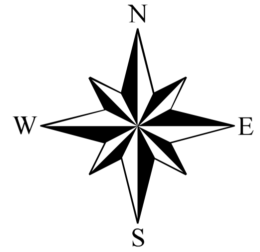

Leyenda

- Poblaciones
- Líneas eléctricas
- 100.000 €
- 200.000 €
- 300.000 €
- 400.000 €
- 500.000 €
- 600.000 €
- 700.000 €
- 800.000 €
- 900.000 €
- 1.000.000 €
- 1.100.000 €
- 1.200.000 €
- 1.300.000 €
- 1.400.000 €
- 1.500.000 €
- 1.600.000 €
- 1.700.000 €
- 1.800.000 €
- 1.900.000 €
- 2.000.000 €
- 2.100.000 €
- 2.200.000 €
- 2.300.000 €
- 2.400.000 €
- 2.500.000 €

10 5 0 10 20 30 40 50 km

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DESIGNACIÓN DEL PLANO
COSTE DE LOS RECURSOS - LÍNEAS ELÉCTRICAS

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** A6.7
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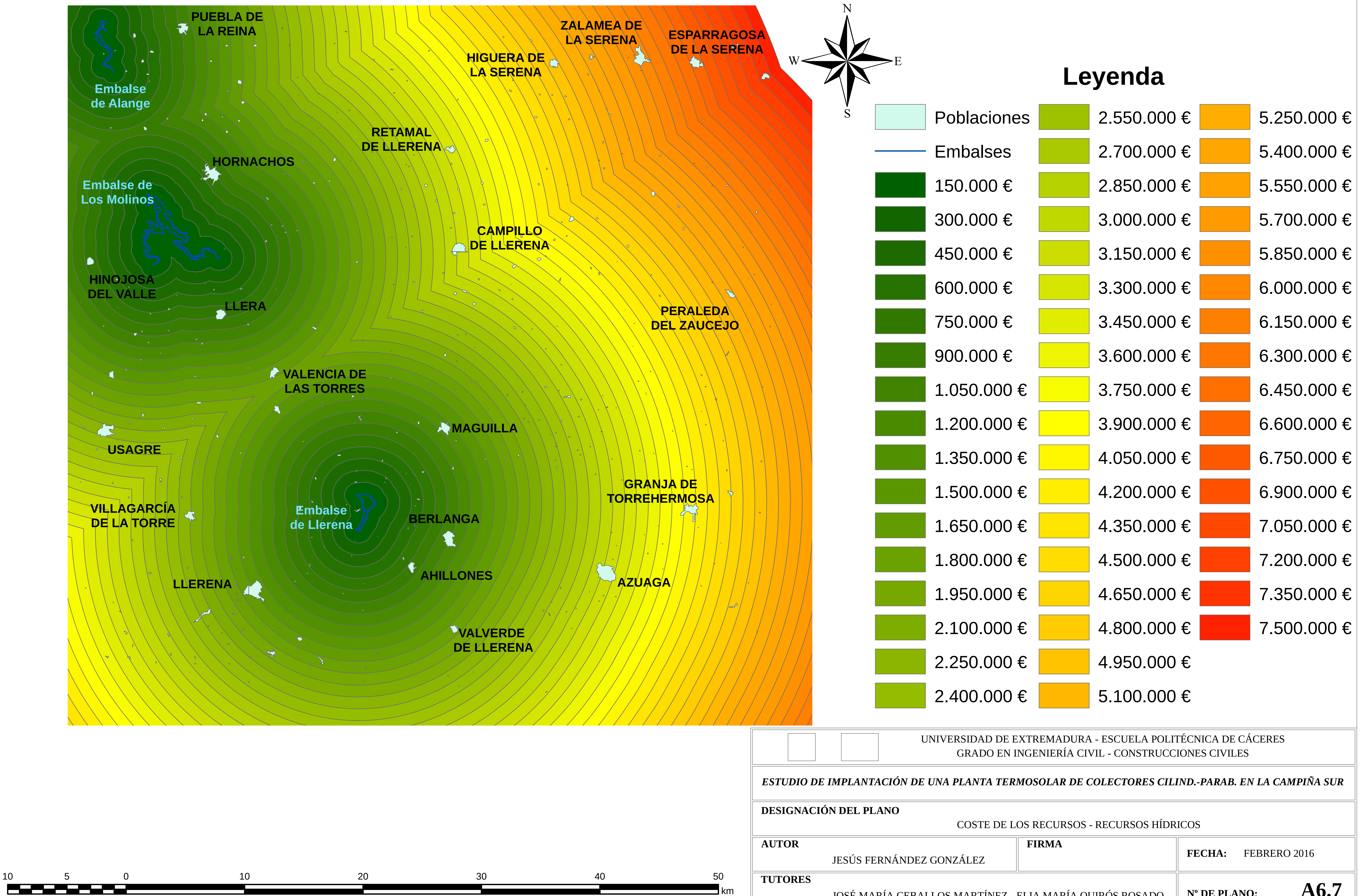

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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR		
DESIGNACIÓN DEL PLANO COSTE DE LOS RECURSOS - RECURSOS HÍDRICOS		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** A6.7
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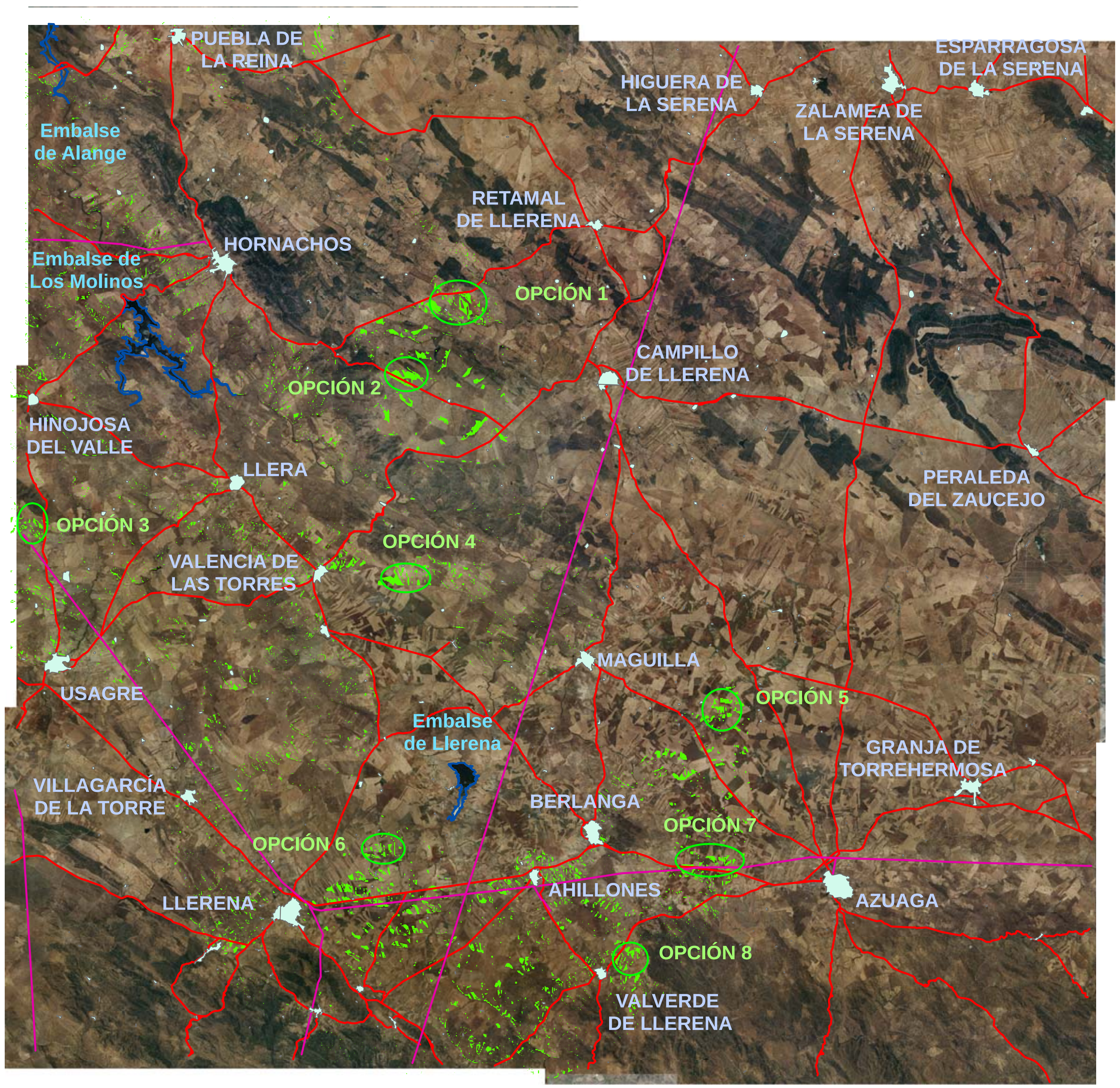

N
W E
S

Leyenda

- Poblaciones
- Zonas idóneas
- Embalses
- Vías de comunicación
- Líneas eléctricas

10 5 0 10 20 30 40 50 km

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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR	
DESIGNACIÓN DEL PLANO ZONAS IDÓNEAS PARA LA UBICACIÓN DE LA PLANTA - VISTA GENERAL	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**
	FECHA: FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO:** A6.8
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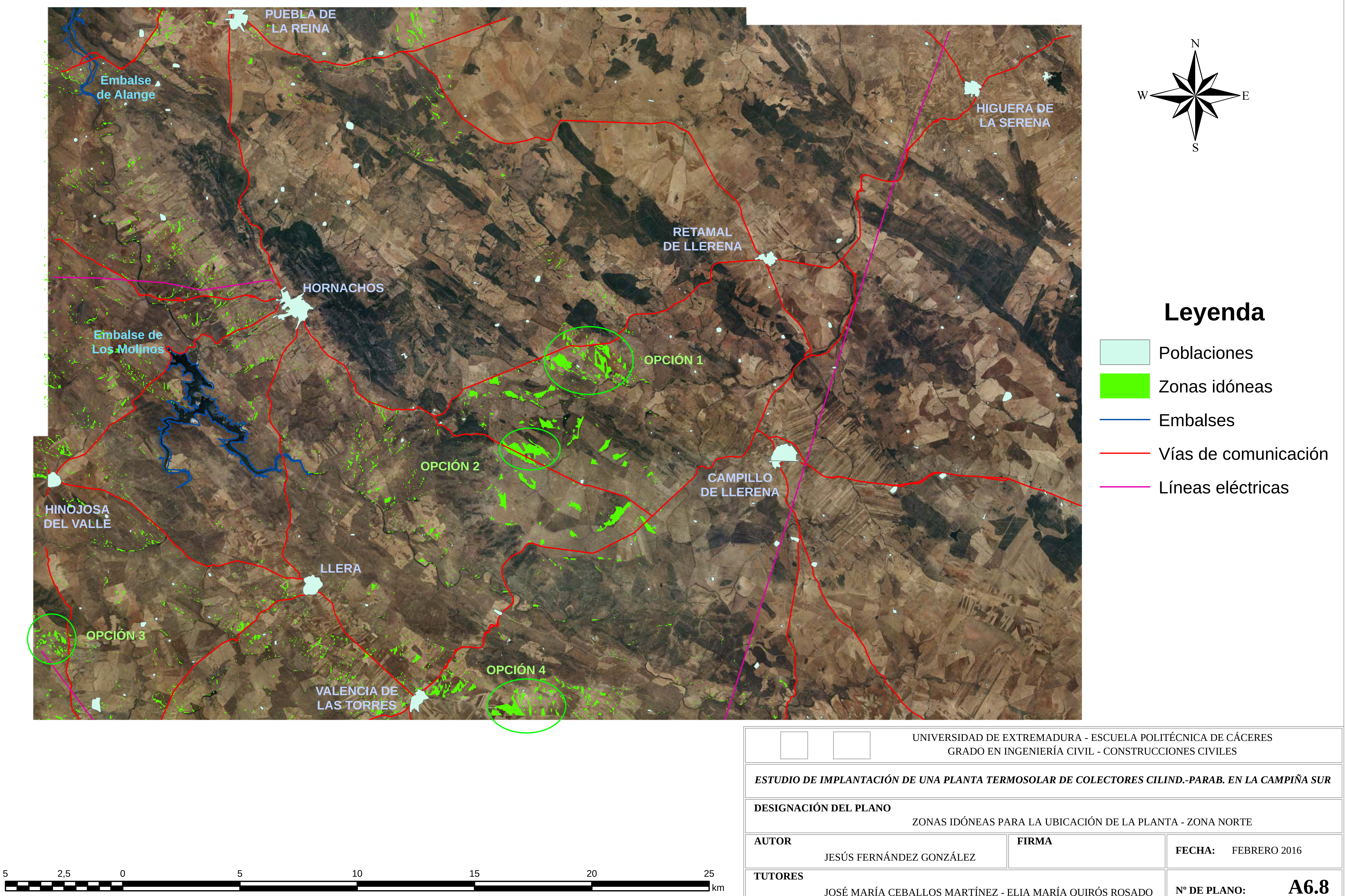

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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR	
DESIGNACIÓN DEL PLANO ZONAS IDÓNEAS PARA LA UBICACIÓN DE LA PLANTA - ZONA NORTE	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ / **FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO:** A6.8
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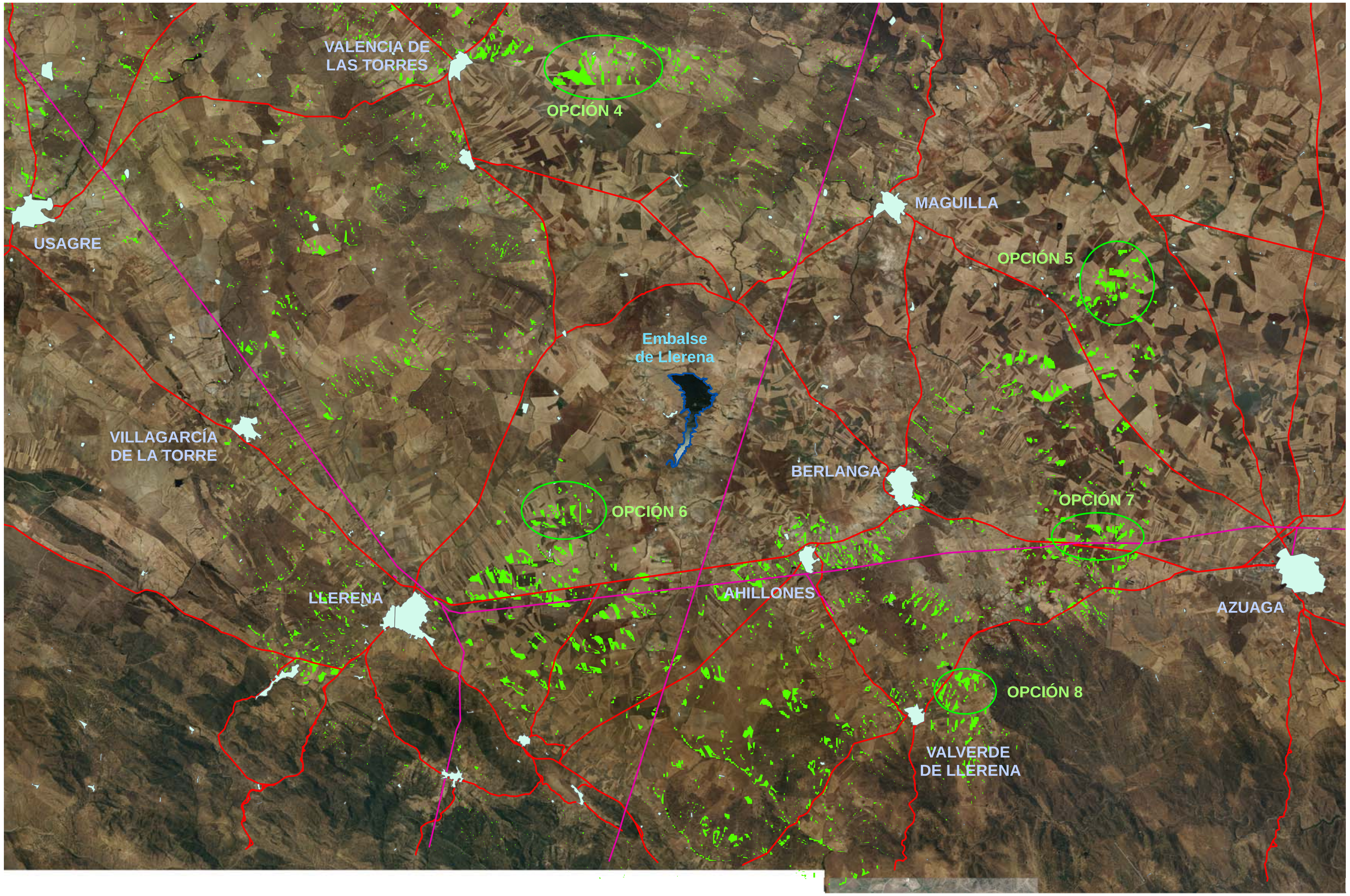
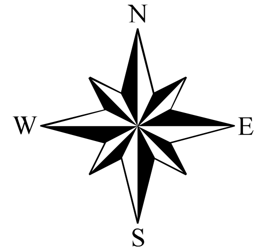
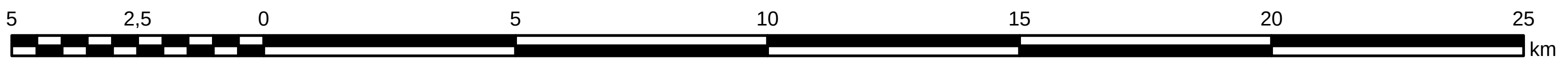




Leyenda

- Poblaciones
- Zonas idóneas
- Embalses
- Vías de comunicación
- Líneas eléctricas



UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES	
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR	
DESIGNACIÓN DEL PLANO ZONAS IDÓNEAS PARA LA UBICACIÓN DE LA PLANTA - ZONA SUR	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**
	FECHA: FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO:** A6.8
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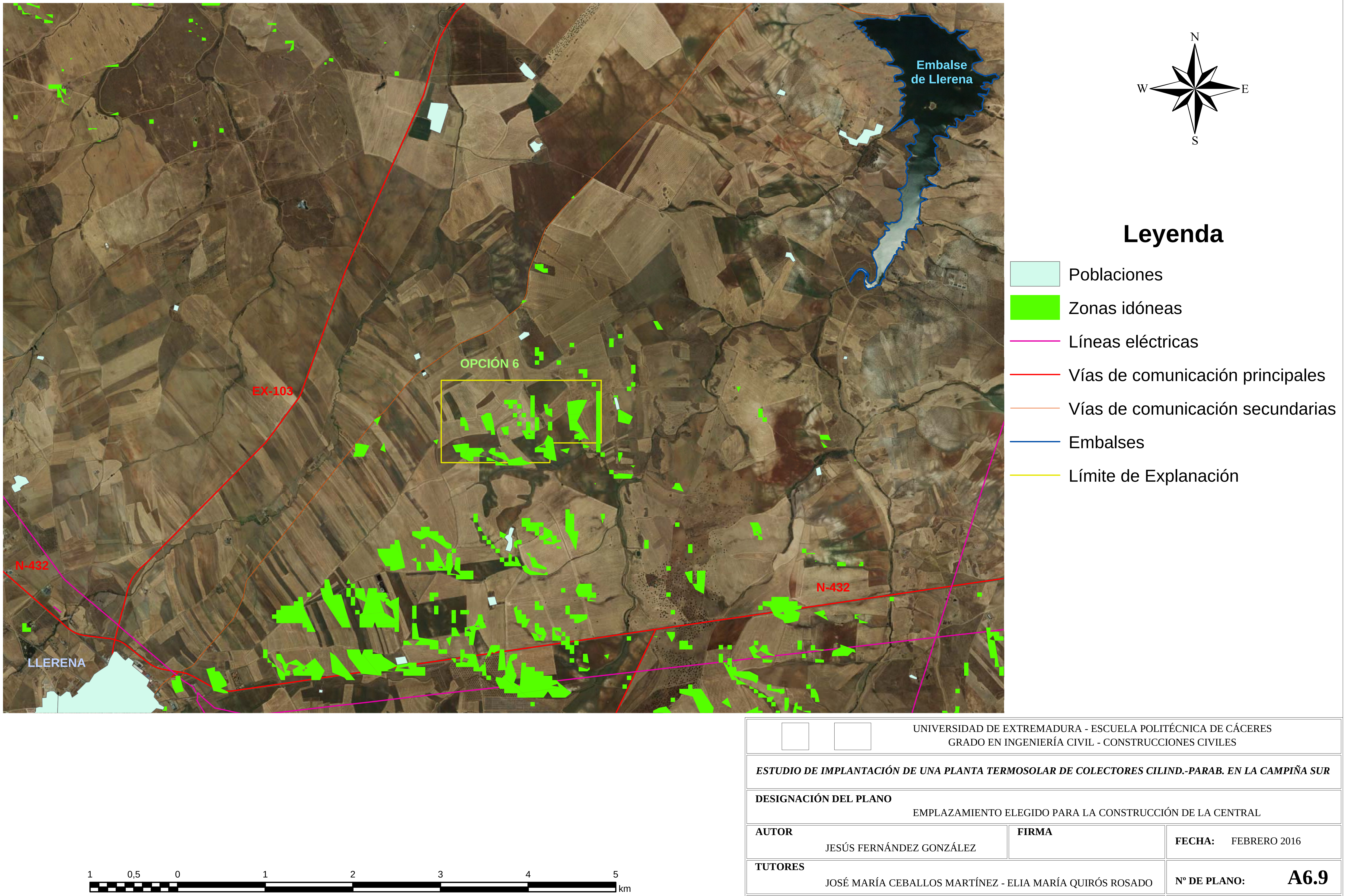


UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO EMPLAZAMIENTO ELEGIDO PARA LA CONSTRUCCIÓN DE LA CENTRAL		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** **A6.9**
ESCALAS E= 1:40.000		**HOJA Nº** **1** **DE** **1**

ANEJO Nº 7

CÁLCULOS ESTRUCTURALES

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad describir los cálculos necesarios para definir correctamente los colectores que forman parte de la central termosolar. En este proyecto no se incluyen los cálculos referentes a las edificaciones de la isla de potencia (intercambiadores, torres de refrigeración, depuradora, edificio administrativo y de control, etc.) ni los referentes a otras instalaciones, como las relacionadas con la impulsión.

2. CARACTERÍSTICAS GEOMÉTRICAS DEL COLECTOR

Previamente a realizar las comprobaciones se ha procedido a elegir el colector que servirá como base para los cálculos. Inicialmente se efectuó una recopilación de datos de los principales colectores existentes:

2.1. EUROTROUGH (SKAL-ET)

Se trata de un colector desarrollado por un consorcio de empresas europeas, entre las que se pueden encontrar las siguientes: Inabensa (Instalaciones Abengoa, S.A.), CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas), Flabeg, Fichtner, DLR (Deutsches Zentrum für Luft und Raumfahrt e.V.), Cres, Solel, Schlaich Bengermann und Partner GbR, etc. Los primeros prototipos surgieron en el 2000 y en 2005 lanzaron la segunda versión. Se trata de un diseño con una caja de torsión, que reducía el contenido de acero respecto de modelos anteriores, además de mejorar la resistencia a torsión. Tiene una apertura similar a otros colectores (~6 m) y longitudes de 100 o 150 metros. Es uno de los colectores más utilizado en las plantas termosolares.

Figura 1 – Fotografías del colector EUROTrough. Fuente: National Renewable Energy Laboratory

2.2. HELIOTROUGH

Desarrollado principalmente por la empresa Flagsol a partir de 2005, tras haber participado en el desarrollo del colector EUROTrough, con el objetivo de mejorar el diseño del colector parabólico, reduciendo el coste del campo solar y aumentando su rendimiento. Además de Flagsol, participaron empresas e instituciones como el Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit, schlaich bergermann partner (sbp), Fraunhofer-Institut für Materialfluss und Logistik (FhG-IML), DLR, etc. Está formado por un tubo de torsión y una estructura metálica con contrapesos para aportar estabilidad y facilitar los giros.

Figura 2 – Colector HELIOTrough en el momento de su colocación. Fuente: Heliotrough.com

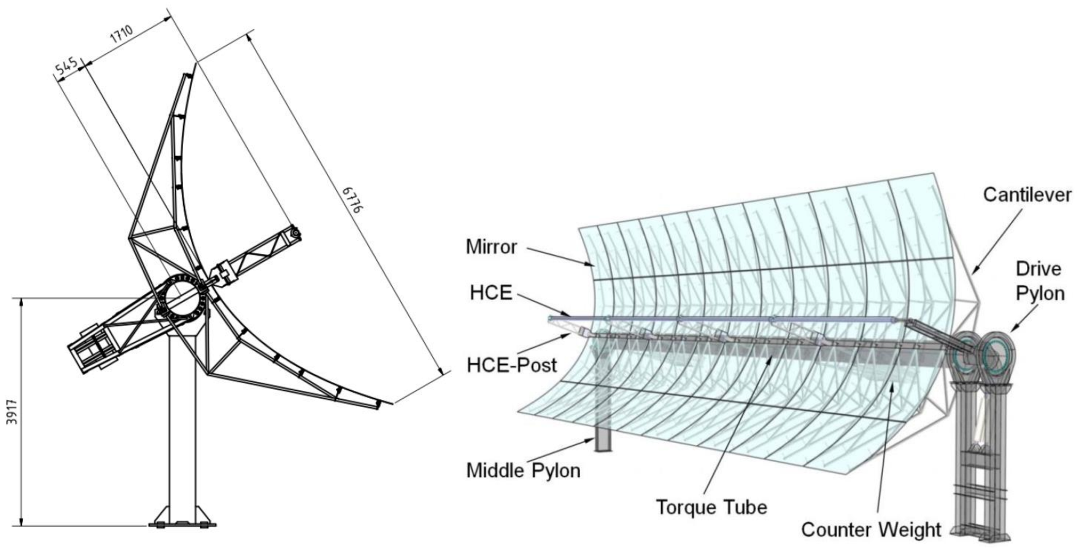


Figura 3 – Dimensiones y elementos conformantes del colector HELIOTrough. Fuente: Heliotrough.com

2.3. LUZ SYSTEM COLLECTORS

Estos colectores fueron los primeros en aparecer y lo hicieron en la década de 1980. Presentaban deficiencias en la concentración solar y en las estructuras, además de un precio elevado. Contaban con dos colectores diferentes: el LS-2 (1985) y el LS-3 (1989). El primero tenía un diseño con un tubo de torsión y el segundo una estructura en celosía.

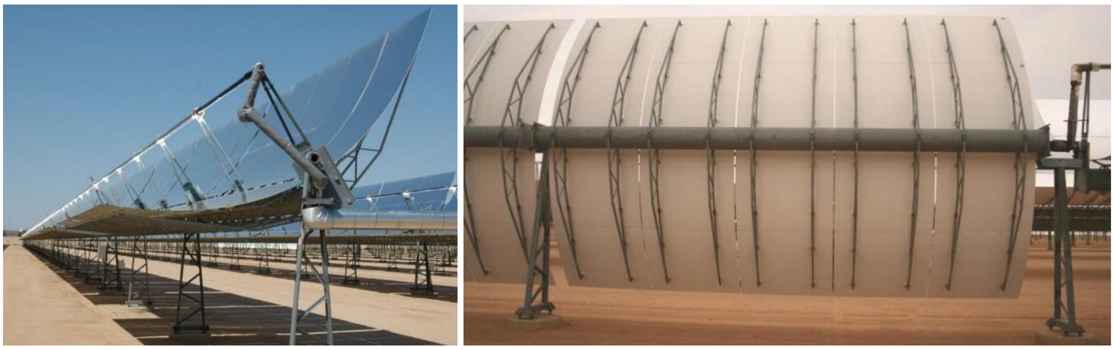
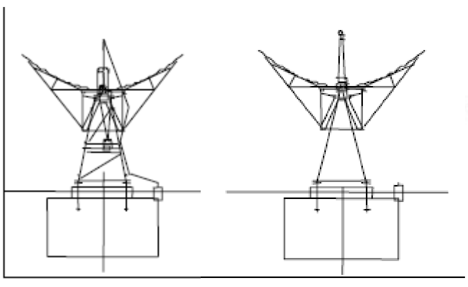


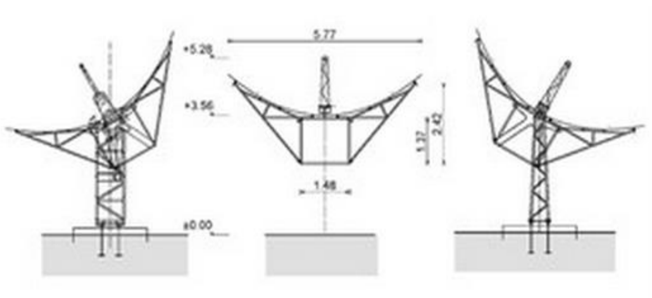
Figura 4 – Colectores tipo LS-2. Fuente: National Renewable Energy Laboratory

Figura 5 – Colectores tipo LS-3. Fuente: National Renewable Energy Laboratory

2.4. CONCLUSIÓN

Finalmente, se ha optado por el colector EUROTrough como base para la geometría del diseñado en este proyecto. Principalmente se ha elegido por ser el que tiene un uso más extendido y por la información disponible sobre sus características tanto geométricas como físicas. A continuación se incluye toda la documentación utilizada como base para el diseño del colector:





EuroTrough Model	ET100
Focal Length	1.71 m
Absorber Radius	3.5 cm
Aperture Width	5.77 m
Aperture Area	545 m²
Collector Length	99.5 m
Number of Modules per Drive	8
Number of Glass Facets	224
Number of Absorber Tubes (4.1 m)	24
Mirror reflectivity	94%
Weight of steel structure and pylons, per m^2 aperture area	19.0 kg

layout	parabolic trough collector
support structure	steel frame work, pre-galvanized, three variants; light weight, low torsion
collector length	12 m per element; 100 - 150 m collector length
drive	hydraulic drive
max. wind speed	operation: 14 m/s, stow: 40 m/s
tracking control	clock + sun sensor, <2 mrad
parabola	$y = x^2/4f$ with f = 1.71 m
aperture width	5.8 m
reflector	4 glass facets
absorber tube	evacuated glass envelope, UVAC® or other, application dependent
fluid	oil, steam, application dependent
cost	< 200 Euro/m²

EuroTrough Collector Component		strong SCE	"field" SCE
Glass mirrors	kg	747	747
HCE (incl. oil)	kg	73	73
Torque box	kg	597	597
End Plates	kg	186	130
Cantilever Arms	kg	384	231
HCE supports	kg	113	90
Torque Transfer	kg	32	32
Total weight steel structure only	kg	1,312	1,080
Specific weight steel only	kg/m²	19.0	15.6
Total weight incl. mirrors and HCE	kg	2,132	1,900
Specific weight kg/m²	kg/m²	30.9	27.5

Figura 6 – Datos del colector EUROTrough. Fuente: Enlace

3. BASES DE CÁLCULO

3.1. NORMATIVA

Para el diseño y comprobación del colector, tanto la estructura metálica como la cimentación, se ha utilizado principalmente la siguiente normativa:

- Instrucción de Hormigón Estructural, EHE-08
- Instrucción de Acero Estructural, EAE-11
- Código Técnico de la Edificación – Seguridad Estructural, especialmente los siguientes documentos:
    - Acero
    - Acciones en la Edificación

- Cimientos

- Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera, IAP-11
- Norma de Construcción Sismorresistente: Parte general y edificación, NCSE-02

3.2. MATERIALES

Para la estructura del colector se ha utilizado como material de diseño el acero S355 J2, cuyas características son:

- Tensión de límite elástico, f_y =
  - 355 N/mm^2, para un espesor nominal t ≤ 16 mm
  - 345 N/mm^2, para un espesor nominal 16 < t ≤ 40 mm
  - 335 N/mm^2, para un espesor nominal 40 < t ≤ 63 mm
- Tensión de rotura, f_u = 470 N/mm^2
- Resistencia de cálculo, $f_{yd} = f_y / \gamma_M$
- Resistencia última de cálculo, $f_{ud} = f_y / \gamma_{M2}$
- Temperatura del ensayo Charpy = -20 °C
- Módulo de elasticidad, E = 210.000 N/mm^2
- Módulo de rigidez, G = 81.000 N/mm^2
- Coeficiente de Poisson, ν = 0,3
- Coeficiente de dilatación térmica, $\alpha = 1{,}2 \cdot 10^{-5}$ °C^{-1}
- Densidad, ρ = 7.850 kg/m^3

γ_{M0} = 1,05	coeficiente parcial de seguridad relativo a la plastificación del material
γ_{M1} = 1,05	coeficiente parcial de seguridad relativo a los fenómenos de inestabilidad
γ_{M2} = 1,25	coeficiente parcial de seguridad relativo a la resistencia última del material o sección, y a la resistencia de los medios de unión
γ_{M3} = 1,1	coeficiente parcial para la resistencia al deslizamiento de uniones con tornillos pretensados en Estado Límite de Servicio.
γ_{M3} = 1,25	coeficiente parcial para la resistencia al deslizamiento de uniones con tornillos pretensazos en Estado Límite de Último.
γ_{M3} = 1,4	coeficiente parcial para la resistencia al deslizamiento de uniones con tornillos pretensazos y agujeros rasgados o con sobremedida.

Figura 7 – Coeficientes parciales de seguridad. Fuente: EAE-11

Las cimentaciones se han supuesto para el cálculo de HA-25/P/20/IIa, con armaduras de acero B 500 S, que presentan las siguientes características:

- Hormigón:
  - Resistencia característica, f_{ck} = 25 N/mm^2
  - Coeficiente parcial de seguridad en situaciones persistentes o transitorias, γ_c = 1,50
  - Coeficiente parcial de seguridad en situaciones accidentales, γ_c = 1,30
  - Deformación de rotura del hormigón a compresión simple, ε_{c0} = 2‰
  - Deformación de rotura del hormigón en flexión, ε_{cu} = 3,5‰

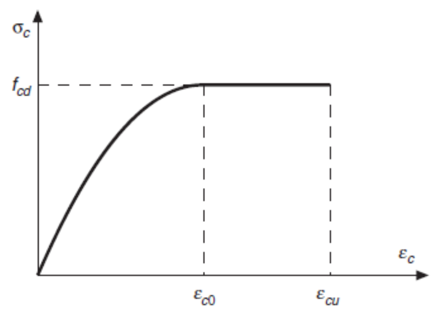


Figura 8 – Diagrama tensión-deformación del hormigón (parábola-rectángulo). Fuente: EHE-08

- Acero:
  - Límite elástico característico, f_{yk} = 500 N/mm^2
  - Coeficiente parcial de seguridad en situación persistente o transitoria, γ_s = 1,15
  - Coeficiente parcial de seguridad en situación accidental γ_s = 1,00
  - Deformación máxima en tracción, e_{max} = 10 ‰
  - Módulo de deformación longitudinal, E_s = 200.000 N/mm^2

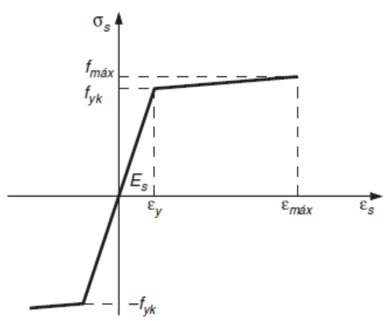


Figura 9 – Diagrama tensión-deformación en las armaduras pasivas. Fuente: EHE-08

3.3. ACCIONES

Para la definición de las acciones, se ha elegido primeramente la posición de los espejos más desfavorable. En este caso, esto se produce cuando los espejos tienen un ángulo de giro de 90° desde la vertical, tal y como muestra la siguiente imagen, ya que en esa posición, el empuje de viento es máximo y el coeficiente de seguridad al vuelco mínimo.

Figura 10 - Imagen de la estructura en la posición de cálculo.

A continuación se describen las acciones consideradas en el cálculo del colector:

<u>Cargas permanentes</u>

Estas cargas son, además del peso propio, las debidas al peso de los espejos y de la maquinaria de giro. Ante la dificultad de conseguir información de esta última se ha optado por suponer un peso de 200 kg (2kN) del conjunto del dispositivo, repartidos uniformemente en las barras superiores del apoyo doble, obteniendo una carga de **0,545 kN/m**. En cuanto a los espejos, se ha considerado el peso detallado en el apartado 2.4. (747 kg) repartidos de forma uniforme en los 14 brazos del colector, que se traducen en una carga de **0,083 kN/m**.

Viento

Para la definición de la carga debida al viento se ha optado por el método definido en la *Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera*, según el cual, la fuerza del viento se puede calcular según la siguiente fórmula:

$$\boldsymbol{F_w = \left(\frac{1}{2} \cdot \rho \cdot v_b^2\right) \cdot c_e(z) \cdot c_f \cdot A_{ref}}$$

En esta fórmula F_w es el empuje horizontal del viento, en N; ρ es la densidad del aire, que se tomará igual a 1,25 kg/m^3; v_b es la velocidad básica del viento, en m/s; A_{ref} es el área de referencia, en este caso tiene un valor de 68,125 m^2; $c_e(z)$ es el coeficiente de exposición en función de la altura z adoptada (3,52 m); y c_f es el coeficiente de fuerza del elemento considerado que varía según la geometría de la sección, la cual en nuestro caso, se trata de una parábola cóncava, aunque por falta de un estudio más preciso, se ha aproximado a una semicircunferencia, tomando un valor de c_f = 2,3.

La velocidad básica del viento v_b se calcula con la siguiente fórmula:

$$\boldsymbol{v_b = c_{dir} \cdot c_{season} \cdot v_{b,0}}$$

En esta ecuación v_b es la velocidad básica del viento, en m/s; c_{dir} es el factor direccional del viento que, por falta de un estudio más preciso, se toma igual a 1,0; c_{season} es el factor estacional del viento que, por falta de un estudio más preciso, se toma igual a 1,0; $v_{b,0}$ es la velocidad básica fundamental del viento y en este caso de estudio toma un valor de 27 m/s, según el mapa de isotacas siguiente:

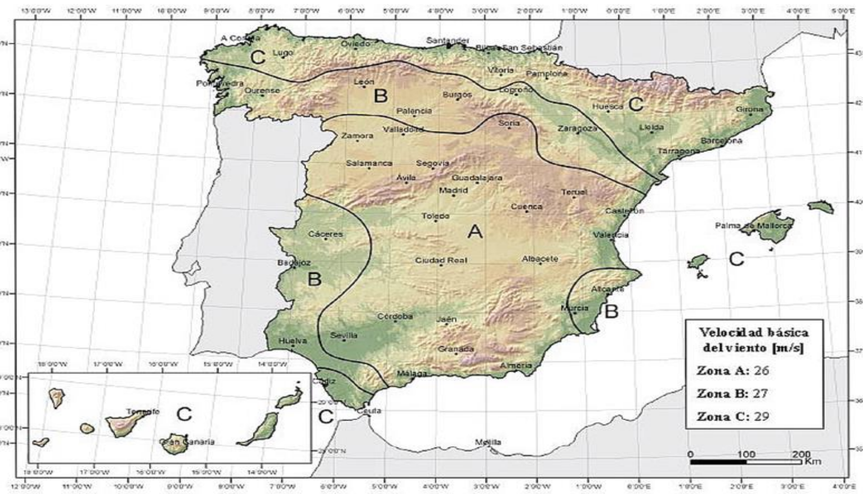


Figura 11 -Mapa de isotacas para la obtención de la velocidad básica fundamental $v_{b,0}$. Fuente: IAP-11

Con estos valores se obtiene un valor de v_b = 27 m/s.

El coeficiente de exposición en función de la altura z adoptada $c_e(z)$, se calcula de acuerdo a la siguiente ecuación, y que la altura de cálculo z (3,52m) es mayor que la altura mínima z_{min} (ver tabla inferior):

$$c_e(z) = k_r^2 \cdot \left[c_0^2 \cdot \left(\ln\left(\frac{z}{z_0}\right) \right)^2 + 7 \cdot k_l \cdot c_0 \cdot \ln\left(\frac{z}{z_0}\right) \right]$$

En esta fórmula k_r es el factor del terreno, obtenido según la tabla inferior, según el tipo de entorno, que en nuestro caso es un entorno Tipo I, correspondiente a un área plana y horizontal con vegetación despreciable y sin obstáculos; c_0 es el factor de topografía, y, en nuestro caso, al tratarse de una superficie descubierta sin obstáculos que perturben el flujo de viento, toma el valor de 1,0; z es la altura de cálculo (3,52 m); z_0 es la longitud de la rugosidad, obtenida según la tabla inferior; y k_l es el factor de turbulencia, que se tomará igual a 1,0.

TIPO DE ENTORNO	k_r	z_0 [m]	z_{min} [m]
0	0,156	0,003	1
I	0,170	0,01	1
II	0,190	0,05	2
III	0,216	0,30	5
IV	0,235	1,00	10

Con todos estos valores se obtiene un coeficiente de exposición $c_e(z)$ = 2,18.

Con todos estos parámetros obtenemos un empuje horizontal de viento **F_w = 155,6 kN**, que repartidos en la superficie del colector suponen una carga de **2.285 N/m²**.

Sismo

Tal y como se especifica en el Anejo nº 5 Sismicidad de este proyecto nos encontramos en una zona declarada como sísmica, por lo que resulta de aplicación la *Norma de Construcción Sismorresistente: Parte General y Edificación*, y la estructura deberá comprobarse teniendo en cuenta las acciones sísmicas. Según esta instrucción, las fuerzas sísmicas se calculan de acuerdo a la siguiente ecuación:

$$F_i = S_i \cdot P$$

En esta fórmula P es el peso a considerar de la estructura, en este caso se considera el 100% de las cargas permanentes, que de acuerdo con los datos adjuntos en el apartado 2.4., se trata de la estructura metálica y los espejos, que suman 21,32 kN, y el peso supuesto de la maquinaria de giro, 2 kN, haciendo un total de 23,32 kN; y S_i es el coeficiente sísmico del modo i de vibración de la estructura, el cual depende del periodo fundamental (T_F) de la estructura, y en nuestro caso T_F < 0,75 s, por lo que solo se considerará 1 modo de vibración. La ecuación para el cálculo de este coeficiente es la siguiente:

$$S = \frac{a_c}{g} \cdot \alpha_i \cdot \beta \cdot \eta_i$$

En esta fórmula, a_c es la aceleración de cálculo, definida en el Anejo nº 5 Sismicidad (0,04966·g); α_i es un coeficiente cuyo valor depende de los periodos T_F y T_B, como en nuestro caso $T_F < T_B$, α_i = 2,5; β es el coeficiente de respuesta, cuyo valor depende del coeficiente de comportamiento por ductilidad μ, que en nuestro caso tiene un valor de 1, por lo que β = 1,09; η_i es el factor de distribución, en este caso, al considerar que solo tiene una planta, toma un valor de 1.

Con estos valores se obtiene un coeficiente sísmico S = 0,135.

Con todos estos parámetros se obtiene una fuerza sísmica de **F = 3,15 kN**, que se aplicará en los extremos superiores de los brazos, en ambos ejes.

Sobrecarga de mantenimiento

Para tener en cuenta las posibles operaciones de mantenimiento, se ha supuesto una sobrecarga de acuerdo con el *Código Técnico de la Edificación – Seguridad Estructural – Acciones en la Edificación*. Se ha escogido el valor correspondiente a la categoría de uso G (Cubiertas accesibles únicamente para conservación), subcategoría G1.2 (cubiertas ligeras), por lo que se trata de una carga uniforme de **0,4 kN/m²**, que se repartirá en las caras laterales de la caja de torsión, que en la posición de cálculo se encuentran en la parte superior e inferior.

Sobrecarga de nieve

El cálculo de la acción de la nieve sobre la estructura se ha realizado de acuerdo con el *Código Técnico de la Edificación – Seguridad Estructural – Acciones en la Edificación*. Según se establece en este documento, la carga se determina con la siguiente fórmula:

$$q_n = \mu \cdot s_k$$

En esta ecuación, μ es el coeficiente de forma de la cubierta, que en nuestro caso al no producirse deslizamiento de la nieve al ser una superficie horizontal, toma un valor de 1; y s_k es el valor característico de la carga de nieve, que se determina de acurdo con la altitud y la zona. Este proyecto está situado en una Zona 4, a una altitud aproximada de 600 m. De acuerdo con la tabla inferior, la carga de nieve se traduce en una carga uniforme de **0,5 kN/m²**, que se repartirá en las caras laterales de la caja de torsión, que en la posición de cálculo se encuentran en la parte superior e inferior. Los brazos, al tener una inclinación elevada, no sufrirán sobrecarga por nieve, al igual que los espejos, debido a que tienen un rozamiento muy bajo y a que, para evitar daños y desgastes excesivos, se requiere un mantenimiento exigente.

Tabla E.2 Sobrecarga de nieve en un terreno horizontal (kN/m²)

Altitud (m)	**Zona de clima invernal**, (según figura E.2)						
	1	**2**	**3**	**4**	**5**	**6**	**7**
0	0,3	0,4	0,2	0,2	0,2	0,2	0,2
200	0,5	0,5	0,2	0,2	0,3	0,2	0,2
400	0,6	0,6	0,2	0,3	0,4	0,2	0,2
500	0,7	0,7	0,3	0,4	0,4	0,3	0,2
600	0,9	0,9	0,3	0,5	0,5	0,4	0,2
700	1,0	1,0	0,4	0,6	0,6	0,5	0,2
800	1,2	1,1	0,5	0,8	0,7	0,7	0,2
900	1,4	1,3	0,6	1,0	0,8	0,9	0,2
1.000	1,7	1,5	0,7	1,2	0,9	1,2	0,2
1.200	2,3	2,0	1,1	1,9	1,3	2,0	0,2
1.400	3,2	2,6	1,7	3,0	1,8	3,3	0,2
1.600	4,3	3,5	2,6	4,6	2,5	5,5	0,2
1.800	-	4,6	4,0	-	-	9,3	0,2
2.200	-	8,0	-	-	-	-	-

Figura 12 – Datos para el cálculo de la sobrecarga de nieve. Fuente: CTE

Temperatura

Las acciones generadas por la variación de la temperatura no se han tenido en cuenta en el cálculo de la estructura, debido a la elección de los apoyos, que se describen en el apartado siguiente, que permiten el movimiento debido a la dilatación y a la contracción de la estructura.

4. CÁLCULO DE LA ESTRUCTURA METÁLICA DEL COLECTOR

Para realizar la comprobación de la estructura metálica del colector nos hemos apoyado en el programa “**Robot Structural Analysis Professional**” desarrollado por Autodesk, con el cual se han realizado todas las comprobaciones y desde el cual se ha generado el listado de cálculo adjunto como anexo.

Se ha intentado representar lo más fielmente posible la estructura de acuerdo con la información existente. Sin embargo, existen diferencias respecto al colector EUROTrough comercial, ya que hay ciertos datos desconocidos, por lo que se ha aproximado algunas dimensiones. Además, las barras que permiten el giro han sido sustituidas por barras cuya comprobación no es de interés, por lo que se han sustituido por barras de sección maciza, para evitar errores en el cálculo del resto de barras. También se han añadido barras para simular la transmisión del giro a la caja de torsión y, por extensión, a los brazos.

Tras introducir la geometría, se han establecido las características de los apoyos de la estructura. Tal y como se ha indicado anteriormente, la estructura se ha diseñado de tal manera que permita los movimientos debidos a la variación de la temperatura. Se ha escogido un apoyo fijo, los situados en el mismo eje que este, permiten solamente el movimiento en el mismo sentido del eje, y los situados de forma opuesta al apoyo fijo solo restringen el movimiento en vertical.

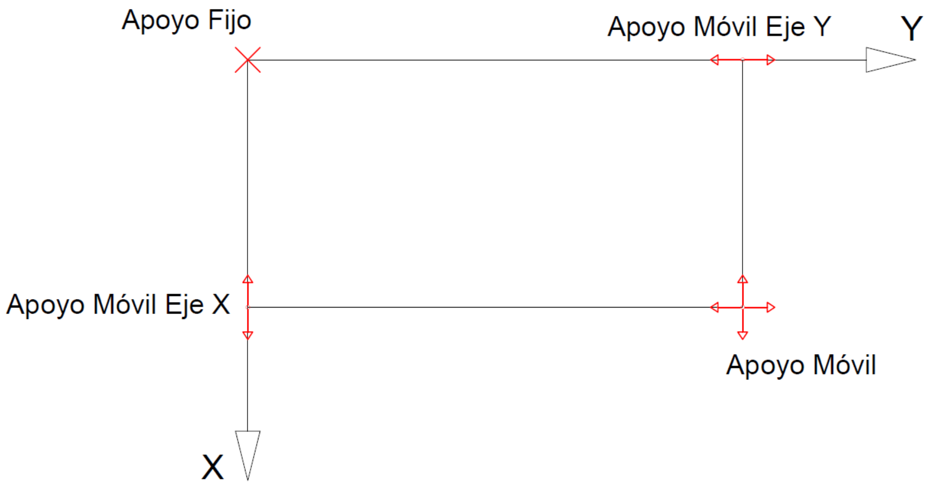


Figura 13 – Esquema en planta de la distribución de los apoyos

Posteriormente, se han introducido los casos de carga previstos y las acciones correspondientes, definidas en el apartado anterior. Para realizar la comprobación del colector se han generado combinaciones de carga de acuerdo con el Código Técnico de la Edificación – Seguridad Estructural, ya que se trata de una estructura metálica. Los coeficientes parciales de seguridad y los valores de combinación utilizados, así como las propias combinaciones están recogidas en las siguientes imágenes:

	Nature	Subnature	γmax	γmin	$\Psi_{0,1}$	$\Psi_{0,2}$	$\Psi_{0,3}$	$\Psi_{0,n}$	Ψ_1	$\Psi_{2,1}$	$\Psi_{2,n}$	Ψ_K	ξ_1	ξ_2
1	Dead	Peso proprio	1.35	0.8										
2	Live	Categoria A	1.5		0.7				0.5	0.3				
3	Live	Categoria B	1.5		0.7				0.5	0.3				
4	Live	Categoria C	1.5		0.7				0.7	0.6				
5	Live	Categoria D	1.5		0.7				0.7	0.6				
6	Live	Categoria F	1.5		0.7				0.7	0.6				
7	Live	Categoria H	1.5											
8	Wind		1.5		0.6				0.5					
9	Snow		1.5		0.7				0.5	0.2				
10	Snow	nieve >1000	1.5		0.7				0.5	0.2				
11	Snow	nieve <1000	1.5		0.5				0.2					
12	Temperature		1.5		0.6				0.5					
13	Accidental													
14	Seismic													
15	Live	terreno	1.5		0.7				0.7	0.7				

		Combination type	User-defined type	Loads			
				Dead	Live	Accidental	Seismic
1	ULS	USR	RES	(4) $\sum_{i\geq 1} G_i \cdot \begin{cases}\gamma_{max}^{(i)} \\ \gamma_{min}^{(i)}\end{cases}$	(19) $Q_i \cdot \gamma_i + \sum_{j\geq 1, i\neq j} Q_j \cdot \gamma_j \cdot \Psi_{0,1}$	(0) ———	(0) ———
2	SLS	USR	CAR	(1) $\sum_{i\geq 1} G_i \cdot \gamma_S^{(i)}$	(21) $Q_i + \sum_{j\geq 1, i\neq j} Q_j \cdot \Psi_{0,1}$	(0) ———	(0) ———
3	SLS	FRE		(1) $\sum_{i\geq 1} G_i \cdot \gamma_S^{(i)}$	(20) $Q_i \cdot \Psi_1 + \sum_{j\geq 1, i\neq j} Q_j \cdot \Psi_{2,1}$	(0) ———	(0) ———
4	SLS	USR	PER	(1) $\sum_{i\geq 1} G_i \cdot \gamma_S^{(i)}$	(22) $\sum_{i\geq 1} Q_i \cdot \Psi_{2,1}^{(i)}$	(0) ———	(0) ———

		Combination type	User-defined type	Loads			
				Dead	Live	Accidental	Seismic
4	SLS	USR	PER	(1) $\sum_{i\geq1} G_i \cdot \gamma_S^{(i)}$	(22) $\sum_{i\geq1} Q_i \cdot \Psi_{2,1}^{(i)}$	(0) ———	(0) ———
5	ACC	ACC		(5) $\sum_{i\geq1} G_i \cdot \gamma_a^{(i)}$	(20) $Q_i \cdot \Psi_1 + \sum_{j\geq1, i\neq j} Q_j \cdot \Psi_{2,1}$	(18) $\sum_{i\geq1} A_i \cdot \gamma_a^{(i)}$	(0) ———
6	ACC	USR	SIS	(5) $\sum_{i\geq1} G_i \cdot \gamma_a^{(i)}$	(22) $\sum_{i\geq1} Q_i \cdot \Psi_{2,1}^{(i)}$	(0) ———	(17) $\sum_{i\geq1} S_i \cdot \begin{cases} \gamma_a^{(i)} \\ -\gamma_a^{(i)} \end{cases}$

Figura 14 – Datos de la combinación de acciones en el programa de cálculo

Se ha modificado las secciones de las barras hasta obtener la estructura final de tal manera que se cumplan todas las comprobaciones exigidas. Todos los datos, resultados y comprobaciones están incluidas en el listado de cálculo adjunto como anexo, y las características de la estructura resultante están detalladas en el documento nº 2 “Planos”.

La estructura del colector está compuesta por 275 barras metálicas de acero S355 J2 con 4 secciones distintas, que presentan la siguiente geometría:

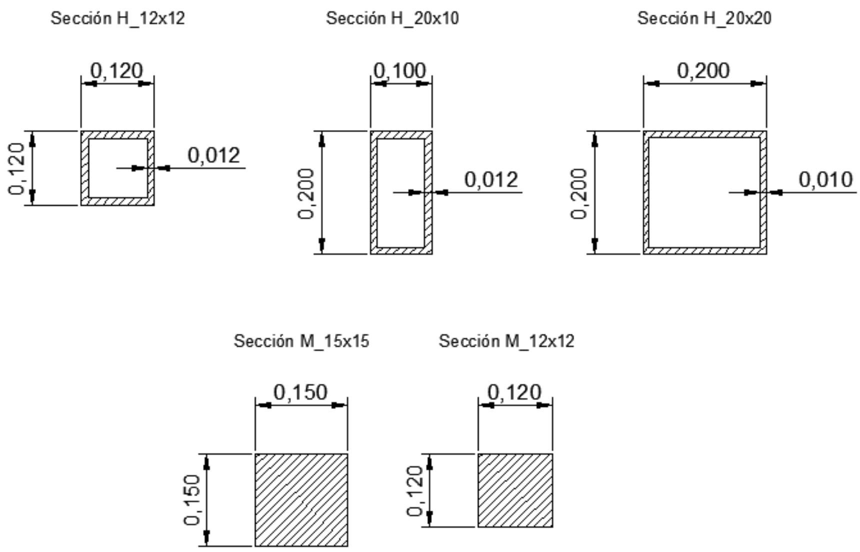


Figura 15 – Secciones empleadas en el colector

Sección	Altura (cm)	Ancho (cm)	Espesor (cm)	Peso unitario (kg/m)
H_12x12	12	12	1,2	40,7
H_20x10	20	10	1,2	52,0
H_20x20	20	20	1,0	59,7
M_15x15	15	15	-	176,6
M_12x12	12	12	-	113,0

La caja de torsión y los brazos están compuestos principalmente por barras con la sección H_12x12, exceptuando las barras que sustituyen al mecanismo de giro, que presentan una sección M_12x12. El apoyo simple está conformado por barras H_20x20 y una H_20x10, mientras que el apoyo doble presenta barras H_20x10 y H_12x12. La caja de torsión y los apoyos están conectados mediante una barra de sección M_15x15, que también sustituye al mecanismo de giro. En tabla inferior se especifican el número de barras, la longitud y el peso de las mismas para el módulo de 12 metros y para el de 100 metros, que será el construido en obra.

Sección	**Nº barras/ módulo 12 m**	**Longitud barras/ módulo 12 m (m)**	**Nº barras/ módulo 100 m**	**Longitud barras/ módulo 100 m (m)**
H_12x12	260	437,476	2010	3.423,238
H_20x10	9	19,945	30	64,566
H_20x20	2	6,790	12	40,740
M_15x15	2	0,280	16	2,240
M_12x12	2	2,720	16	21,760
TOTAL	275	-	2084	-

Sección	**Peso barras/ módulo 12 m (kg)**	**Peso barras/ módulo 100 m (kg)**
H_12x12	17.816,262	139.325,787
H_20x10	1.037,140	3.357,432
H_20x20	405,363	2.432,178
M_15x15	49,448	395,584
M_12x12	307,360	2.458,880
TOTAL	19.615,573	147.969,861

En la siguiente tabla se especifica el número de cada tipo de barra para cada módulo de 12 metros y para el de 100 metros. La geometría detallada de cada tipo de barra está recogida en el documento nº 2 “Planos”.

Tipo de Barra		Sección	Nº barras/ módulo 12 m	Nº barras/ módulo 100 m	Longitud/ unidad (m)	Longitud/ módulo 12 m (m)	Longitud/ módulo 100 m (m)
Caja de torsión	0	H_12x12	4	32	11,720	46,880	375,040
	1	H_12x12	30	240	1,360	40,800	326,400
	2	H_12x12	4	32	1,375	5,500	44,000
	3	H_12x12	14	112	1,610	22,540	180,320
	4	H_12x12	12	96	1,458	17,496	139,968
	5*	M_12x12	2	16	1,360	2,720	21,760
	6	H_12x12	32	256	1,250	40,000	320,000
	7	H_12x12	4	32	1,266	5,064	40,512
	8	H_12x12	14	112	1,518	21,252	170,016
	9	H_12x12	12	96	1,356	16,272	130,176
Brazo	B1	H_12x12	28	224	3,329	93,212	745,696
	B2	H_12x12	28	224	2,152	60,256	482,048
	B3	H_12x12	28	224	1,099	30,772	246,176
	B4	H_12x12	28	224	0,379	10,612	84,896
Apoyos	A1	H_20x20	2	12	3,395	6,790	40,740
	A2	H_20x10	1	6	1,577	1,577	9,462
	A3	H_20x10	4	12	3,231	12,924	38,772
	A4	H_20x10	2	6	1,108	2,216	6,648
	A5	H_20x10	2	6	1,614	3,228	9,684
	A6	H_12x12	6	18	1,050	6,300	18,900
	A7	H_12x12	4	12	1,484	5,936	17,808
	A8	H_12x12	2	6	0,725	1,450	4,350
	A9	H_12x12	2	6	1,030	2,060	6,180
Mec. giro	G1	M_15x15	1	12	0,140	0,140	1,680
	G2	M_15x15	1	4	0,140	0,140	0,560
	G3	H_12x12	4	32	1,418	5,672	45,376
	G4	H_12x12	4	32	1,418	5,672	45,376

*Esta barra también es parte de la sustitución del mecanismo de giro

5. CIMENTACIONES

Tras la comprobación de la estructura metálica del colector, se ha procedido a calcular la cimentación del apoyo simple y del apoyo doble. Para ello se crearon losas de cimentación en el programa de cálculo Robot, con el objetivo de conocer las solicitaciones que deben resistir. Inicialmente, se tanteó con una cimentación y se observó que se producía vuelco, por lo que se aumentó de forma simétrica el área de la losa hasta no observar reacciones negativas en el suelo. Ante la falta del dato relativo al coeficiente de balasto, se introdujo un valor pequeño (10.000 kN/m^3) y un valor alto (100.000 kN/m^3) para obtener la situación que requiera mayor cantidad de acero, tanto en la parte superior como en la inferior de la losa.

Finalmente se obtuvo las siguientes cimentaciones, ambas con HA-25/B/20/IIa:

Apoyo	Ancho (m)	Profundidad (m)	Canto (m)	Volumen (m^3)	Peso (kN)
Simple	4,00	3,50	0,60	8,400	210,000
Doble	3,15	3,50	0,60	6,615	165,375

A pesar de obtener un coeficiente de seguridad frente al vuelco pequeño (aproximadamente 1,35) en la posición de cálculo, no tiene mucha relevancia debido a que es poco probable que coincida el viento de cálculo con el sismo de cálculo y también debido a que, para una correcta operación y mantenimiento de la estructura, el colector deberá orientarse de tal manera que los espejos no ofrezcan su máxima resistencia frente al viento, la cual se obtiene en la posición de cálculo. La posición menos exigente se da al orientar los espejos hacia la vertical, en la que se obtienen coeficientes de seguridad frente al vuelco que superan ampliamente al mínimo exigido según el *Código Técnico de la Edificación – Seguridad Estructural* (2,0).

Por otro lado, se ha obtenido un coeficiente de seguridad frente al deslizamiento de 2,4, debido a que la situación más restrictiva se presenta en el vuelco. Situación parecida se produce en el hundimiento, ya que en la situación de ELU no se superan los 2 kN/m^2.

Para el cálculo de las armaduras, se han obtenido los datos del momento máximo positivo, para la armadura inferior, y el momento máximo negativo, para la armadura superior, tanto en la cimentación del apoyo simple como en la del apoyo doble y para ambos ejes de la losa, los cuales presentan los siguientes valores:

Cimentación	M^+_{XX} (kN·m/m)	M^-_{XX} (kN·m/m)	M^+_{YY} (kN·m/m)	M^-_{YY} (kN·m/m)
Apoyo simple	56,000	14,000	76,822	9,468
Apoyo doble	28,000	7,000	26,486	2,277

Tras estudiar estos datos, se ha determinado que únicamente es preciso colocar las armaduras mínimas, para lo cual se ha calculado las cuantías mínimas mecánicas y por geometría, escogiendo la mayor de las resultantes, de acuerdo con lo establecido en la *Instrucción de Hormigón Estructural* (EHE-08), donde se especifica que la cuantía mecánica mínima, en el artículo 42.3.2., se calcula, para hormigones cuya resistencia es inferior a 50 N/mm^2, con la siguiente fórmula:

$$A_s \geq 0{,}04 \cdot A_c \frac{f_{cd}}{f_{yd}}$$

En esta ecuación A_s es el área de acero, A_c es el área de la sección de hormigón, f_{cd} es la resistencia de cálculo del hormigón y f_{yd} es la resistencia de cálculo del acero. En este caso se ha calculado la armadura por metro de cimentación, por lo que A_c toma un valor de $6 \cdot 10^5$ mm^2. El valor de f_{cd} se calcula como la resistencia característica (25 N/mm^2) reducida por el coeficiente parcial de seguridad para situaciones permanentes o transitorias (1,5), obteniéndose un valor de 16,67 N/mm^2; al igual que el valor de f_{yd}, que se calcula como la resistencia característica (500 N/mm^2) reducida por el coeficiente parcial de seguridad para situaciones permanentes o transitorias (1,15), obteniéndose un valor de 434,78 N/mm^2. Con todos estos valores, se obtiene un A_s final de 920 mm^2/m.

El cálculo de la cuantía geométrica mínima se define en el apartado 42.3.5., donde se establece que para el caso de una losa con acero B 500 S, es un 1,8‰ de la sección de hormigón, por lo que se obtiene un A_s de 1080 mm^2/m.

Por lo tanto, la cuantía más restrictiva es la geométrica, por lo el A_s deberá ser mayor o igual a 1080 mm^2/m. Se ha optado por colocar 10 Ø12 mm por cada metro, que se traducen en 1131 mm^2/m, tanto en el eje X como en el eje Y, repartidos en la parte superior e inferior. Además, se añadirá una barra de Ø12 mm como armadura de piel en los laterales del canto, ya que se superan los 30 cm de espaciado máximo entre armaduras establecidos en el apartado 42.3.1. de la EHE-08.

6. SOLDADURAS

Para establecer las características de las uniones soldadas de la estructura nos hemos apoyado en las especificaciones definidas en la *Instrucción de Acero Estructural* (EAE-11), principalmente en el artículo 64, “Uniones entre piezas de sección tubular”.

En nuestro caso nos encontramos mayormente ante uniones tipo KT, T y N en la caja de torsión; uniones tipo Y, T y K en los brazos del colector; y uniones tipo Y y T en los apoyos.

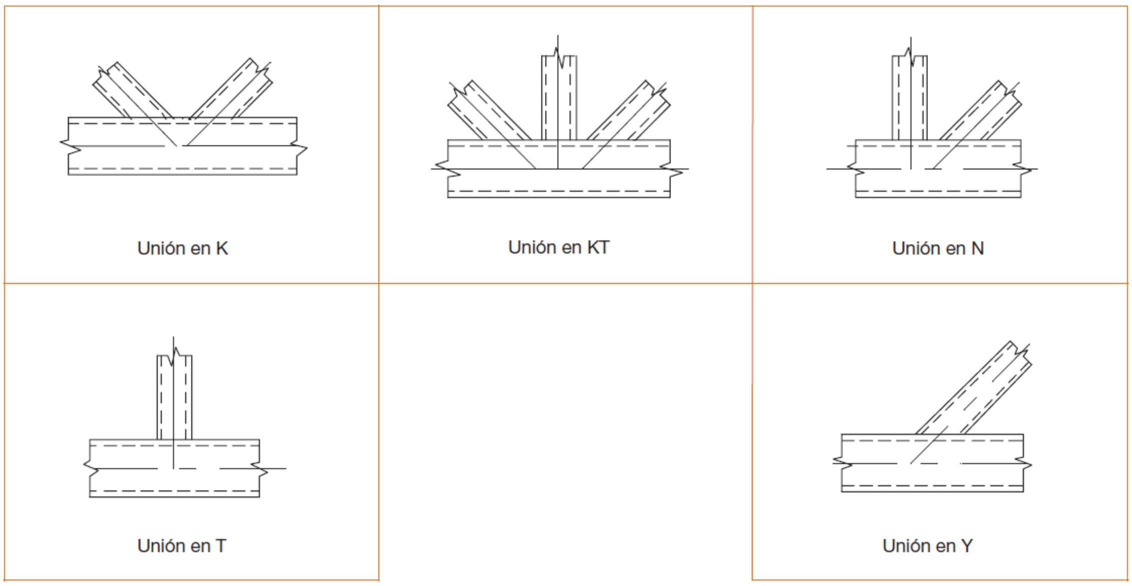


Figura 16 – Principales tipos de uniones existentes en el colector. Fuente: EAE-11

Tal y como se establece en el mencionado artículo, la soldadura se efectuará a lo largo de todo el perímetro de contacto, la cual podrá ser a tope, con penetración parcial, en ángulo o una combinación de ellas. Se elegirá el método más conveniente tras realizar pruebas de soldadura tal y como se especifica en el apartado 59.7 de la norma, con el objetivo de comprobar que se cumplen con las exigencias referentes a la holgura y al espesor de la garganta de la soldadura. A continuación se incluyen algunos detalles constructivos para la soldadura de las barras conformantes del colector.

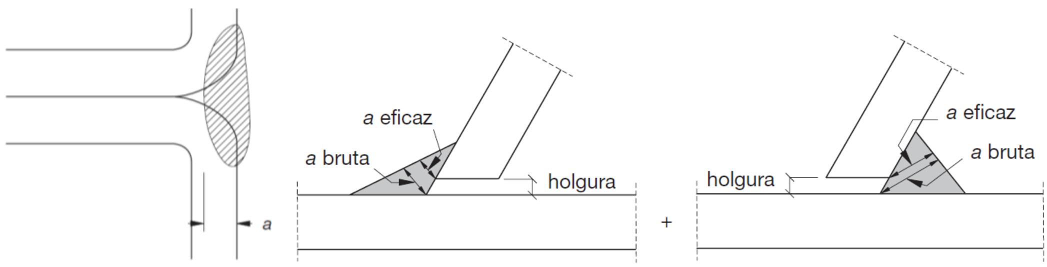


Figura 17 – Gargantas eficaces y brutas y holguras en uniones tubulares. Fuente: EAE-11

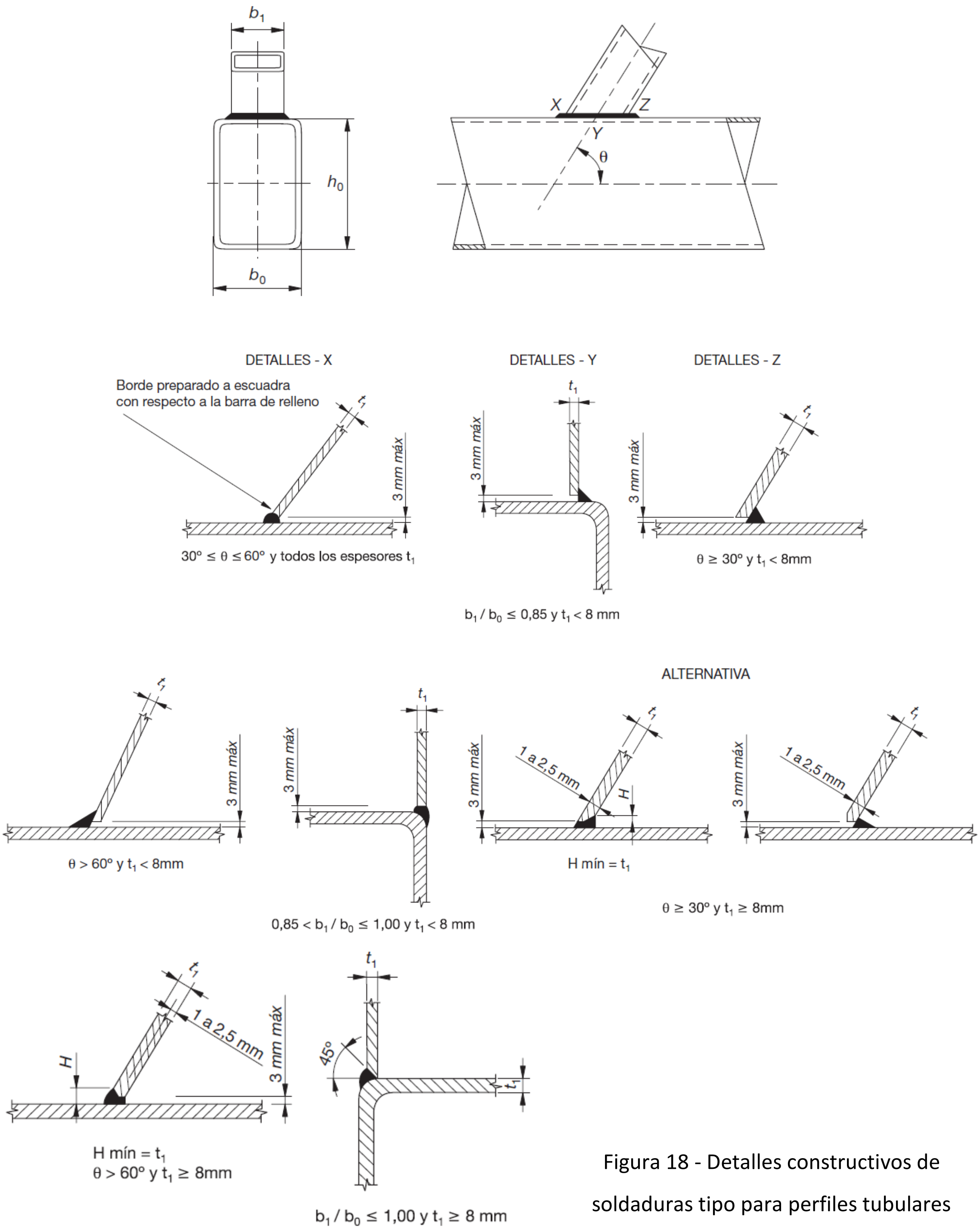


Figura 18 - Detalles constructivos de soldaduras tipo para perfiles tubulares rectangulares. Fuente: EAE-11

Según se establece en el artículo 59.3.2 de la EAE, el espesor de garganta no será superior a 0,7 veces el espesor de la pieza más delgada a unir y en el caso de soldadura en ángulo, no debe ser inferior a 3 mm con piezas de hasta 10 mm de espesor o a 4,5 mm con piezas de hasta 20 mm de espesor. Por lo tanto se ha adoptado un espesor de garganta eficaz de 5 mm. Para comprobar que este espesor es suficiente para resistir las solicitaciones se ha comprobado que la resistencia de cálculo de la soldadura es mayor o igual a la resultante de las fuerzas. Esta comprobación solo es necesaria para el caso de uniones a tope parciales o en ángulo, ya que en el caso de cordones a tope con penetración completa, solo es necesario que el método de soldadura esté reconocido y que el material de aportación presente características iguales o mejores al material de unión. Según se recoge en el artículo 59.8 la soldadura es válida si se cumple la siguiente condición:

$$\frac{F}{a \cdot L_W} \leq \frac{f_u}{\beta_W \cdot \gamma_{M2}\sqrt{3}}$$

En esta inecuación, F es la fuerza a la que está sometida la barra a unir, en N; a es el espesor eficaz de la garganta, que en nuestro caso es 5 mm; L_w es la longitud de soldadura y en nuestro caso nunca será superior a 150·a, por lo que no será de aplicación la reducción de la resistencia de la soldadura (β_{LW} = 1); f_u es la resistencia última del acero de las piezas a soldar, en nuestro caso al tratarse de acero S355, tiene un valor de 510 N/mm^2; β_W es el coeficiente de correlación, que depende del tipo de acero y para acero S355 tiene un valor de 0,9; y γ_{M2} es el coeficiente de minoración de resistencia, con un valor de 1,25.

Para comprobar las uniones se ha estudiado la unión más desfavorable con el programa “Robot”, según el cual la barra con mayor solicitación presenta una F = 292 kN, por lo que se obtiene como resultado **243,33 ≤ 261,73**, por lo que la soldadura a tope parcial o en ángulo con un espesor eficaz de al menos 5 mm, es VÁLIDA para su utilización en la estructura.

7. ANCLAJES A LA CIMENTACIÓN

Con el objetivo de transmitir correctamente las solicitaciones de la estructura metálica a la cimentación, se ha previsto la utilización de placas de base (basas de soporte) y pernos de anclaje, calculados según las directrices que marca el *Código Técnico de la Edificación – Seguridad Estructural – Acero*. Además, para una mejor comprensión, también se ha empleado documentación referente a las basas de soporte y pernos de anclaje de la Universidad de Castilla-La Mancha, cuyo enlace está incluido en el apartado de bibliografía.

Se trata de un proceso iterativo en el que se suponen las dimensiones de la placa y de los pernos, realizando posteriormente las comprobaciones necesarias según el CTE. A continuación se incluyen los cálculos realizados para la placa y los pernos finales.

Se ha partido de una placa con dimensiones 450x450x25 mm y con un acero S 275 J2. Inicialmente se ha procedido a determinar el área portante equivalente, que de acuerdo con el apartado 8.8.1 del CTE-SE-A, sus dimensiones (a_1 y b_1) son los valores más pequeños obtenidos de la siguiente tabla:

a_1	**b_1**
$a_1 = a + 2 \cdot a_r$	$b_1 = b + 2 \cdot b_r$
$a_1 = 5 \cdot a$	$b_1 = 5 \cdot b$
$a_1 = a + h$	$b_1 = b + h$
$a_1 = 5 \cdot b_1$ pero $a_1 \geq a$	$b_1 = 5 \cdot a_1$ pero $b_1 \geq b$

Los valores a y b son las dimensiones de la placa, a_r y b_r son las distancias desde el borde de la placa al borde de la cimentación y h es el canto de la cimentación. En este caso se ha procedido a calcular para la cimentación del apoyo simple, ya que es en este donde se producen las mayores solicitaciones, y se utilizarán los resultados obtenidos también para la cimentación del apoyo doble. Con todo esto a_1 = 1.050 mm y b_1 = 1.050 mm.

El siguiente parámetro a calcular es el factor de concentración kj, que se calcula con la siguiente ecuación:

$$k_j = \sqrt{\frac{a_1 \cdot b_1}{a \cdot b}} \leq 5$$

Con los valores calculados anteriormente y con los datos de partida, se obtiene un factor de concentración k_j = 2,625.

El siguiente paso es calcular la resistencia portante de la superficie de asiento f_{jd}, cuya fórmula se corresponde con la siguiente:

$$f_{jd} = \beta_j \cdot k_j \cdot f_{ck} \leq 3{,}3 \cdot f_{cd}$$

En esta ecuación β_j es el coeficiente de la unión, que puede tomarse como 2/3, f_{ck} es la resistencia característica del hormigón y f_{cd} es el valor de cálculo de la resistencia del hormigón, calculado como f_{ck}/γ_c. Con los valores de nuestro caso se obtiene el siguiente resultado:

$$f_{jd} = {}^{2}/_{3} \cdot 2{,}625 \cdot 25 \leq 3{,}3 \cdot \frac{25}{1{,}5}$$

$$f_{jd} = \mathbf{43{,}75\ N/mm^2} \leq 55\ N/mm^2$$

Para establecer el área eficaz de la cimentación, se calcula la distancia c que determina las distancias de incremento del área del perfil metálico. Este parámetro se calcula como:

$$c \leq t \cdot \sqrt{\frac{f_{yd}}{3 \cdot f_{jd}}}$$

En esta fórmula t es el espesor de la placa y f_{yd} la resistencia de cálculo de la placa. Con los valores de nuestro caso, se obtiene una distancia c = 3,4 cm y, por lo tanto, un área eficaz de 61.440 mm^2.

Para el cálculo de la resistencia en compresión del hormigón de cada rectángulo eficaz se emplea la siguiente ecuación:

Con los valores calculados se obtiene una resistencia de 2.688 kN que supera ampliamente la mayor carga generada por el colector, de 415 kN, por lo **que de acuerdo con este parámetro el diseño de la placa cumpliría**.

El siguiente apartado a calcular son las características de los pernos en la situación más desfavorable a flexión del colector, cuyas cargas se corresponden con 183 kN de fuerza axil, 108 kN de cortante y 54 kN·m de momento flector. Estos valores se han obtenido del programa de cálculo Autodesk Robot. Para determinar las ecuaciones a emplear, se ha calculado inicialmente la excentricidad de la carga, e = M/N, obteniendo un valor de 0,295 m. Para determinar si la carga resultante está fuera del tercio central de la placa, se compara este valor con a/6, ya que las dimensiones de la placa son iguales en ambos sentidos a = 450 mm, por lo que se obtiene un valor de 67 mm. Como e > a/6, se puede emplear el modelo simplificado para gran excentricidad, que emplea la siguiente formulación:

$$\sigma_b = \frac{4 \cdot [M + N \cdot (0{,}5 \cdot a - d)]}{a \cdot b \cdot (0{,}875 \cdot a - d)}$$

El valor d es la distancia del perno al borde de la placa y su valor habitual es de un 10-15% de la dimensión de la placa, por lo que se ha adoptado un valor de 50 mm (aunque por motivos constructivos en algunos puntos esta distancia será de 62 o 65 mm), con lo que la tensión máxima en la placa es de:

$$\sigma_b = \frac{4 \cdot [54 \cdot 10^6 + 183.000 \cdot (0{,}5 \cdot 450 - 50)]}{450 \cdot 450 \cdot (0{,}875 \cdot 450 - 50)} = 4{,}94\ N/mm^2$$

El valor de tracción que tienen que soportar los pernos se obtiene de la siguiente ecuación:

$$T = -N + \frac{[M + N \cdot (0{,}5 \cdot a - d)]}{(0{,}875 \cdot a - d)}$$

Obteniendo un resultado de <u>67,255 kN</u>.

Para determinar si la placa base soportará estas solicitaciones, se comparará el momento flector producido por las cargas y el momento resistente. El primero M_{Ed}, se calcula con la siguiente fórmula, don h es la dimensión del perfil metálico (200 mm):

$$M_{Ed} = \frac{\sigma_b \cdot a}{4} \cdot \left(\frac{3 \cdot a}{8} - \frac{h}{2}\right) = 33.600\ N \cdot mm$$

El momento resistente ($M_{p,Rd}$) se obtiene aplicando la siguiente ecuación:

$$M_{p,Rd} = \frac{e^2 \cdot f_{yd}}{4} = 39.400\ N \cdot mm$$

Como se cumple que $M_{p,Rd} > M_{Ed}$, **no se necesitarán cartelas de rigidez**.

Para determinar el número de pernos, se ha calculado la cuantía mínima de acero de acuerdo con los criterios establecidos en la EHE-08, en su artículo 42.3, y equiparando esta situación a la de una viga. Por lo tanto el área de acero A_s deberá cumplir:

$$A_s \geq 2{,}8‰ \cdot A_c$$

El área de hormigón se corresponde en este caso al área de la placa, por lo que A_s = mm2, que se traducirá en **3Ø16 mm de acero B 500 S**.

Este diámetro de los pernos deberá cumplir la siguiente condición:

$$\emptyset \geq \sqrt{\frac{4 \cdot T}{n \cdot \pi \cdot f_{yd}}}$$

En la inecuación n es el número de pernos por fila, que tal y como se ha determinado anteriormente, se emplearán 3 por fila, por lo que el diámetro de los pernos deberá ser mayor a 8 mm, situación que se cumple.

De acuerdo con el citado apartado 8.8.1 del CTE – SE – A, para la comprobación a cortante se deberá considerar la resistencia por rozamiento entre la placa base y el hormigón o mortero de nivelación y la resistencia a cortante de los pernos de anclaje. La primera se obtiene aplicando la siguiente ecuación:

$$F_{f,Rd} = C_{f,d} \cdot N_{c,Sd}$$

El parámetro $C_{f,d}$ es el coeficiente de rozamiento, que adoptará un valor de 0,2 al emplear un mortero de cemento y arena, por lo que $F_{f,Rd}$ resulta 36,6 kN.

La resistencia a cortante de los pernos será la menor de las siguientes:

- La resistencia a cortante según la ecuación correspondiente a los tornillos:

$$F_{Vd,Rd} = \frac{0{,}5 \cdot f_{ub} \cdot A_s}{\gamma_{M2}}$$

  Con los valores de nuestro caso se obtiene un valor de 264 kN.

- El valor obtenido mediante la fórmula siguiente:

$$F_{V2,Rd} = \frac{\alpha_b \cdot f_{ub} \cdot A_s}{\gamma_{M2}}$$

En esta ecuación ab se calcula como 0,44-0,0003·f_{yb}, por lo que se obtiene una resistencia de 154 kN.

Por lo tanto la resistencia a emplear será la menor de las dos, que en este caso es 154 kN.

Sumando ambos términos se obtiene el valor de la resistencia final a cortante, por lo que se obtiene 190,6 kN, muy superior a los 108 kN de la solicitación, por lo que **según este parámetro los pernos cumplen**.

Como comprobación adicional, se ha calculado la solicitación combinada de cortante y flexión, equiparando lo especificado en el CTE para tornillos, según lo cual se debe cumplir la siguiente inecuación:

$$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1.4 \cdot F_{t,Rd}} \leq 1$$

Con los valores de nuestro proyecto se obtiene un valor en el término de la izquierda de la inecuación de 0,75, que como es inferior a uno, **se comprueba que los pernos resisten**.

Tras haber obtenido las características de los pernos a emplear, solo resta definir la longitud de anclaje que tendrán. Para ello se han seguido las directrices que marca la EHE-08, en su artículo 69.5, según el cual nos encontramos ante un anclaje en posición I, por lo que la longitud básica se calculará según la siguiente ecuación:

$$l_{bI} = m \cdot \emptyset^2 \nless \frac{f_{yk}}{20} \cdot \emptyset$$

En nuestro caso el coeficiente m tiene un valor de 1,5, por lo que se obtiene l_{bI} = 384 $\nless$ **400 mm**. Como esta distancia se puede ejecutar, ya que el canto de la cimentación es de 600 mm, no hará falta determinar la longitud básica neta.

8. BIBLIOGRAFÍA

Normativa:

- *Instrucción de Hormigón Estructural* (EHE-08), Comisión Permanente del Hormigón, Ministerio de Fomento
- *Instrucción de Acero Estructural* (EAE-11), Comisión Permanente de Estructuras de Acero, Ministerio de Fomento
- *Código Técnico de la Edificación* (CTE), Ministerio de Fomento
- *Instrucción sobre las acciones a considerar en el proyecto de puentes de carretera* (IAP-11), Ministerio de Fomento
- *Norma de Construcción Sismorresistente: Parte general y edificación* (NCSE-02), Comisión Permanente de Normas Sismorresistentes, Ministerio de Fomento

Información colectores:

- *EUROTrough design issues and prototype testing at PSA*, “Proceedings of Solar Forum 2001 Solar Energy: The Power to Choose”, 2001, Washington DC (Enlace)
- *EUROTrough - Parabolic Trough Collector: Developed for Cost Efficient Solar Power Generation*, “11th SolarPACES International Symposium on Concentrated Solar Power and Chemical Energy Technologies”, 2002, Zurich (Enlace)
- *HELIOTrough*, (Página web)
- *Parabolic Trough Solar Field Technology*, National Renewable Energy Laboratory, United States Department of Energy, Office of Energy Efficiency and Renewable Energy (Enlace)

Coeficiente de fuerza en la ecuación de la fuerza del viento:

- *Energía Eólica: Teoría y conceptos*, Instituto de Energías Renovables de la UNAM (Enlace)
- Mecánica de Fluidos: Coeficientes de arrastre y sustentación, Universidad Nacional de Colombia (Enlace)

Cálculo de la placa y pernos de anclaje:

- Estructuras de acero. Basas, Universidad de Castilla-La Mancha (Enlace)

ANEXO 7.1

LISTADOS DE CÁLCULO

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILINDRO-PARABÓLICOS EN LA CAMPIÑA SUR

Proyecto: Colector cilindro-parabólico

Autor: JESÚS FERNÁNDEZ GONZÁLEZ

Dados - Nudos

Nudo	X (m)	Y (m)	Z (m)	Apoyo
1	0,0	0,0	3,370	
2	-0,878	0,0	0,200	
3	0,878	0,0	0,200	
4	0,0	0,200	4,110	
5	0,0	0,200	2,630	
6	-1,370	0,200	2,630	
7	-1,370	0,200	4,110	
8	0,0	0,555	4,110	
9	0,0	0,555	2,630	
10	-1,370	0,555	2,630	
11	-1,370	0,555	4,110	
12	0,0	1,545	4,110	
13	0,0	1,545	2,630	
14	-1,370	1,545	2,630	
15	-1,370	1,545	4,110	
16	0,0	2,205	4,110	
17	0,0	2,205	2,630	
18	-1,370	2,205	2,630	
19	-1,370	2,205	4,110	
20	0,0	3,195	4,110	
21	0,0	3,195	2,630	
22	-1,370	3,195	2,630	
23	-1,370	3,195	4,110	
24	0,0	3,855	4,110	
25	0,0	3,855	2,630	
26	-1,370	3,855	2,630	
27	-1,370	3,855	4,110	
28	0,0	4,845	4,110	
29	0,0	4,845	2,630	
30	-1,370	4,845	2,630	
31	-1,370	4,845	4,110	
32	0,0	5,505	4,110	
33	0,0	5,505	2,630	
34	-1,370	5,505	2,630	
35	-1,370	5,505	4,110	
36	0,0	6,495	4,110	
37	0,0	6,495	2,630	
38	-1,370	6,495	2,630	
39	-1,370	6,495	4,110	
40	0,0	7,155	4,110	
41	0,0	7,155	2,630	
42	-1,370	7,155	2,630	
43	-1,370	7,155	4,110	
44	0,0	8,145	4,110	
45	0,0	8,145	2,630	
46	-1,370	8,145	2,630	
47	-1,370	8,145	4,110	
48	0,0	8,805	4,110	
49	0,0	8,805	2,630	
50	-1,370	8,805	2,630	
51	-1,370	8,805	4,110	
52	0,0	9,795	4,110	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
53	0,0	9,795	2,630	
54	-1,370	9,795	2,630	
55	-1,370	9,795	4,110	
56	0,0	10,455	4,110	
57	0,0	10,455	2,630	
58	-1,370	10,455	2,630	
59	-1,370	10,455	4,110	
60	0,0	11,445	4,110	
61	0,0	11,445	2,630	
62	-1,370	11,445	2,630	
63	-1,370	11,445	4,110	
64	0,0	11,800	4,110	
65	0,0	11,800	2,630	
66	-1,370	11,800	2,630	
67	-1,370	11,800	4,110	
68	-0,888	12,000	0,200	
69	0,0	12,000	3,370	
70	0,888	12,000	0,200	
71	-0,630	13,150	1,400	
72	0,630	13,150	1,400	
73	-0,888	13,150	0,200	
74	0,0	0,200	3,370	
75	0,0	11,800	3,370	
76	-0,920	12,000	0,050	Movil_Y
77	-0,219	12,000	3,370	
78	0,920	12,000	0,050	Libre
79	0,219	12,000	3,370	
80	-0,630	12,000	1,400	
81	0,630	12,000	1,400	
82	0,888	13,150	0,200	
83	-0,920	13,150	0,050	Movil_Y
84	-0,219	13,150	3,370	
85	0,219	13,150	3,370	
86	0,920	13,150	0,050	Libre
87	0,845	12,000	0,400	
88	0,845	13,150	0,400	
89	0,597	12,000	1,550	
90	0,597	13,150	1,550	
91	-0,597	12,000	1,550	
92	-0,597	13,150	1,550	
93	-0,845	12,000	0,400	
94	-0,845	13,150	0,400	
95	0,350	12,000	2,700	
96	0,350	13,150	2,700	
97	-0,350	12,000	2,700	
98	-0,350	13,150	2,700	
99	0,0	0,555	1,458	
100	1,154	0,555	0,471	
101	0,426	0,555	1,654	
102	0,880	0,555	0,705	
103	0,0	0,555	5,282	
104	1,154	0,555	6,269	
105	0,426	0,555	5,086	
106	0,880	0,555	6,035	
107	0,0	1,545	1,458	
108	1,154	1,545	0,471	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
109	0,426	1,545	1,654	
110	0,880	1,545	0,705	
111	0,0	1,545	5,282	
112	1,154	1,545	6,269	
113	0,426	1,545	5,086	
114	0,880	1,545	6,035	
115	0,0	2,205	1,458	
116	0,426	2,205	1,654	
117	0,880	2,205	0,705	
118	0,0	2,205	5,282	
119	0,426	2,205	5,086	
120	0,880	2,205	6,035	
121	0,0	3,195	1,458	
122	0,426	3,195	1,654	
123	0,880	3,195	0,705	
124	0,0	3,195	5,282	
125	0,426	3,195	5,086	
126	0,880	3,195	6,035	
127	0,0	3,855	1,458	
128	0,426	3,855	1,654	
129	0,880	3,855	0,705	
130	0,0	3,855	5,282	
131	0,426	3,855	5,086	
132	0,880	3,855	6,035	
133	0,0	4,845	1,458	
134	0,426	4,845	1,654	
135	0,880	4,845	0,705	
136	0,0	4,845	5,282	
137	0,426	4,845	5,086	
138	0,880	4,845	6,035	
139	0,0	5,505	1,458	
140	0,426	5,505	1,654	
141	0,880	5,505	0,705	
142	0,0	5,505	5,282	
143	0,426	5,505	5,086	
144	0,880	5,505	6,035	
145	0,0	6,495	1,458	
146	0,426	6,495	1,654	
147	0,880	6,495	0,705	
148	0,0	6,495	5,282	
149	0,426	6,495	5,086	
150	0,880	6,495	6,035	
151	0,0	7,155	1,458	
152	0,426	7,155	1,654	
153	0,880	7,155	0,705	
154	0,0	7,155	5,282	
155	0,426	7,155	5,086	
156	0,880	7,155	6,035	
157	0,0	8,145	1,458	
158	0,426	8,145	1,654	
159	0,880	8,145	0,705	
160	0,0	8,145	5,282	
161	0,426	8,145	5,086	
162	0,880	8,145	6,035	
163	0,0	8,805	1,458	
164	0,426	8,805	1,654	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
165	0,880	8,805	0,705	
166	0,0	8,805	5,282	
167	0,426	8,805	5,086	
168	0,880	8,805	6,035	
169	0,0	9,795	1,458	
170	0,426	9,795	1,654	
171	0,880	9,795	0,705	
172	0,0	9,795	5,282	
173	0,426	9,795	5,086	
174	0,880	9,795	6,035	
175	0,0	10,455	1,458	
176	0,426	10,455	1,654	
177	0,880	10,455	0,705	
178	0,0	10,455	5,282	
179	0,426	10,455	5,086	
180	0,880	10,455	6,035	
181	0,0	11,445	1,458	
182	0,426	11,445	1,654	
183	0,880	11,445	0,705	
184	0,0	11,445	5,282	
185	0,426	11,445	5,086	
186	0,880	11,445	6,035	
187	1,154	2,205	0,471	
188	1,154	3,195	0,471	
189	1,154	3,855	0,471	
190	1,154	4,845	0,471	
191	1,154	5,505	0,471	
192	1,154	6,495	0,471	
193	1,154	7,155	0,471	
194	1,154	8,145	0,471	
195	1,154	8,805	0,471	
196	1,154	9,795	0,471	
197	1,154	10,455	0,471	
198	1,154	11,445	0,471	
199	1,154	2,205	6,269	
200	1,154	3,195	6,269	
201	1,154	3,855	6,269	
202	1,154	4,845	6,269	
203	1,154	5,505	6,269	
204	1,154	6,495	6,269	
205	1,154	7,155	6,269	
206	1,154	8,145	6,269	
207	1,154	8,805	6,269	
208	1,154	9,795	6,269	
209	1,154	10,455	6,269	
210	1,154	11,445	6,269	
211	1,584	11,166	0,050	
212	1,584	11,333	0,050	
213	1,418	11,333	0,050	
214	1,418	11,166	0,050	
215	1,251	11,333	0,050	
216	1,251	11,166	0,050	
217	1,085	11,333	0,050	
218	1,085	11,166	0,050	
219	0,919	11,333	0,050	
220	0,920	0,0	0,050	Movil_X

Nudo	X (m)	Y (m)	Z (m)	Apoyo
221	-0,920	0,0	0,050	Fijo
222	0,919	11,166	0,050	
223	0,753	11,333	0,050	
224	0,753	11,166	0,050	
225	0,586	11,333	0,050	
226	0,586	11,166	0,050	
227	0,420	11,333	0,050	
228	0,420	11,166	0,050	
229	0,254	11,333	0,050	
230	0,254	11,166	0,050	
231	0,088	11,333	0,050	
232	0,088	11,166	0,050	
233	-0,079	11,333	0,050	
234	-0,079	11,166	0,050	
235	-0,245	11,333	0,050	
236	-0,245	11,166	0,050	
237	-0,411	11,333	0,050	
238	-0,411	11,166	0,050	
239	-0,578	11,333	0,050	
240	-0,578	11,166	0,050	
241	-0,744	11,333	0,050	
242	-0,744	11,166	0,050	
243	-0,910	11,333	0,050	
244	-0,910	11,166	0,050	
245	-1,076	11,333	0,050	
246	-1,076	11,166	0,050	
247	-1,243	11,333	0,050	
248	-1,243	11,166	0,050	
249	-1,409	11,333	0,050	
250	-1,409	11,166	0,050	
251	-1,575	11,333	0,050	
252	-1,575	11,166	0,050	
253	1,584	11,499	0,050	
254	1,418	11,499	0,050	
255	1,251	11,499	0,050	
256	1,085	11,499	0,050	
257	0,919	11,499	0,050	
258	0,753	11,499	0,050	
259	0,586	11,499	0,050	
260	0,420	11,499	0,050	
261	0,254	11,499	0,050	
262	0,088	11,499	0,050	
263	-0,079	11,499	0,050	
264	-0,245	11,499	0,050	
265	-0,411	11,499	0,050	
266	-0,578	11,499	0,050	
267	-0,744	11,499	0,050	
268	-0,910	11,499	0,050	
269	-1,076	11,499	0,050	
270	-1,243	11,499	0,050	
271	-1,409	11,499	0,050	
272	-1,575	11,499	0,050	
273	1,584	11,665	0,050	
274	1,418	11,665	0,050	
275	1,251	11,665	0,050	
276	1,085	11,665	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
277	0,919	11,665	0,050	
278	0,753	11,665	0,050	
279	0,586	11,665	0,050	
280	0,420	11,665	0,050	
281	0,254	11,665	0,050	
282	0,088	11,665	0,050	
283	-0,079	11,665	0,050	
284	-0,245	11,665	0,050	
285	-0,411	11,665	0,050	
286	-0,578	11,665	0,050	
287	-0,744	11,665	0,050	
288	-0,910	11,665	0,050	
289	-1,076	11,665	0,050	
290	-1,243	11,665	0,050	
291	-1,409	11,665	0,050	
292	-1,575	11,665	0,050	
293	1,584	11,831	0,050	
294	1,418	11,831	0,050	
295	1,251	11,831	0,050	
296	1,085	11,831	0,050	
297	0,919	11,831	0,050	
298	0,753	11,831	0,050	
299	0,586	11,831	0,050	
300	0,420	11,831	0,050	
301	0,254	11,831	0,050	
302	0,088	11,831	0,050	
303	-0,079	11,831	0,050	
304	-0,245	11,831	0,050	
305	-0,411	11,831	0,050	
306	-0,578	11,831	0,050	
307	-0,744	11,831	0,050	
308	-0,910	11,831	0,050	
309	-1,076	11,831	0,050	
310	-1,243	11,831	0,050	
311	-1,409	11,831	0,050	
312	-1,575	11,831	0,050	
313	1,584	11,998	0,050	
314	1,418	11,998	0,050	
315	1,251	11,998	0,050	
316	1,085	11,998	0,050	
317	0,753	11,998	0,050	
318	0,586	11,998	0,050	
319	0,420	11,998	0,050	
320	0,254	11,998	0,050	
321	0,088	11,998	0,050	
322	-0,079	11,998	0,050	
323	-0,245	11,998	0,050	
324	-0,411	11,998	0,050	
325	-0,578	11,998	0,050	
326	-0,744	11,998	0,050	
327	-1,076	11,998	0,050	
328	-1,243	11,998	0,050	
329	-1,409	11,998	0,050	
330	-1,575	11,998	0,050	
331	1,584	12,164	0,050	
332	1,418	12,164	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
333	1,251	12,164	0,050	
334	1,085	12,164	0,050	
335	0,753	12,164	0,050	
336	0,586	12,164	0,050	
337	0,420	12,164	0,050	
338	0,254	12,164	0,050	
339	0,088	12,164	0,050	
340	-0,079	12,164	0,050	
341	-0,245	12,164	0,050	
342	-0,411	12,164	0,050	
343	-0,578	12,164	0,050	
344	-0,744	12,164	0,050	
345	-1,076	12,164	0,050	
346	-1,243	12,164	0,050	
347	-1,409	12,164	0,050	
348	-1,575	12,164	0,050	
349	1,584	12,330	0,050	
350	1,418	12,330	0,050	
351	1,251	12,330	0,050	
352	1,085	12,330	0,050	
353	0,919	12,330	0,050	
354	0,919	12,164	0,050	
355	0,753	12,330	0,050	
356	0,586	12,330	0,050	
357	0,420	12,330	0,050	
358	0,254	12,330	0,050	
359	0,088	12,330	0,050	
360	-0,079	12,330	0,050	
361	-0,245	12,330	0,050	
362	-0,411	12,330	0,050	
363	-0,578	12,330	0,050	
364	-0,744	12,330	0,050	
365	-0,910	12,330	0,050	
366	-0,910	12,164	0,050	
367	-1,076	12,330	0,050	
368	-1,243	12,330	0,050	
369	-1,409	12,330	0,050	
370	-1,575	12,330	0,050	
371	1,584	12,496	0,050	
372	1,418	12,496	0,050	
373	1,251	12,496	0,050	
374	1,085	12,496	0,050	
375	0,919	12,496	0,050	
376	0,753	12,496	0,050	
377	0,586	12,496	0,050	
378	0,420	12,496	0,050	
379	0,254	12,496	0,050	
380	0,088	12,496	0,050	
381	-0,079	12,496	0,050	
382	-0,245	12,496	0,050	
383	-0,411	12,496	0,050	
384	-0,578	12,496	0,050	
385	-0,744	12,496	0,050	
386	-0,910	12,496	0,050	
387	-1,076	12,496	0,050	
388	-1,243	12,496	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
389	-1,409	12,496	0,050	
390	-1,575	12,496	0,050	
391	1,584	12,663	0,050	
392	1,418	12,663	0,050	
393	1,251	12,663	0,050	
394	1,085	12,663	0,050	
395	0,919	12,663	0,050	
396	0,753	12,663	0,050	
397	0,586	12,663	0,050	
398	0,420	12,663	0,050	
399	0,254	12,663	0,050	
400	0,088	12,663	0,050	
401	-0,079	12,663	0,050	
402	-0,245	12,663	0,050	
403	-0,411	12,663	0,050	
404	-0,578	12,663	0,050	
405	-0,744	12,663	0,050	
406	-0,910	12,663	0,050	
407	-1,076	12,663	0,050	
408	-1,243	12,663	0,050	
409	-1,409	12,663	0,050	
410	-1,575	12,663	0,050	
411	1,584	12,829	0,050	
412	1,418	12,829	0,050	
413	1,251	12,829	0,050	
414	1,085	12,829	0,050	
415	0,919	12,829	0,050	
416	0,753	12,829	0,050	
417	0,586	12,829	0,050	
418	0,420	12,829	0,050	
419	0,254	12,829	0,050	
420	0,088	12,829	0,050	
421	-0,079	12,829	0,050	
422	-0,245	12,829	0,050	
423	-0,411	12,829	0,050	
424	-0,578	12,829	0,050	
425	-0,744	12,829	0,050	
426	-0,910	12,829	0,050	
427	-1,076	12,829	0,050	
428	-1,243	12,829	0,050	
429	-1,409	12,829	0,050	
430	-1,575	12,829	0,050	
431	1,584	12,995	0,050	
432	1,418	12,995	0,050	
433	1,251	12,995	0,050	
434	1,085	12,995	0,050	
435	0,919	12,995	0,050	
436	0,753	12,995	0,050	
437	0,586	12,995	0,050	
438	0,420	12,995	0,050	
439	0,254	12,995	0,050	
440	0,088	12,995	0,050	
441	-0,079	12,995	0,050	
442	-0,245	12,995	0,050	
443	-0,411	12,995	0,050	
444	-0,578	12,995	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
445	-0,744	12,995	0,050	
446	-0,910	12,995	0,050	
447	-1,076	12,995	0,050	
448	-1,243	12,995	0,050	
449	-1,409	12,995	0,050	
450	-1,575	12,995	0,050	
451	1,584	13,161	0,050	
452	1,418	13,161	0,050	
453	1,251	13,161	0,050	
454	1,085	13,161	0,050	
455	0,753	13,161	0,050	
456	0,586	13,161	0,050	
457	0,420	13,161	0,050	
458	0,254	13,161	0,050	
459	0,088	13,161	0,050	
460	-0,079	13,161	0,050	
461	-0,245	13,161	0,050	
462	-0,411	13,161	0,050	
463	-0,578	13,161	0,050	
464	-0,744	13,161	0,050	
465	-1,076	13,161	0,050	
466	-1,243	13,161	0,050	
467	-1,409	13,161	0,050	
468	-1,575	13,161	0,050	
469	1,584	13,328	0,050	
470	1,418	13,328	0,050	
471	1,251	13,328	0,050	
472	1,085	13,328	0,050	
473	0,753	13,328	0,050	
474	0,586	13,328	0,050	
475	0,420	13,328	0,050	
476	0,254	13,328	0,050	
477	0,088	13,328	0,050	
478	-0,079	13,328	0,050	
479	-0,245	13,328	0,050	
480	-0,411	13,328	0,050	
481	-0,578	13,328	0,050	
482	-0,744	13,328	0,050	
483	-1,076	13,328	0,050	
484	-1,243	13,328	0,050	
485	-1,409	13,328	0,050	
486	-1,575	13,328	0,050	
487	1,584	13,494	0,050	
488	1,418	13,494	0,050	
489	1,251	13,494	0,050	
490	1,085	13,494	0,050	
491	0,919	13,494	0,050	
492	0,919	13,328	0,050	
493	0,753	13,494	0,050	
494	0,586	13,494	0,050	
495	0,420	13,494	0,050	
496	0,254	13,494	0,050	
497	0,088	13,494	0,050	
498	-0,079	13,494	0,050	
499	-0,245	13,494	0,050	
500	-0,411	13,494	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
501	-0,578	13,494	0,050	
502	-0,744	13,494	0,050	
503	-0,910	13,494	0,050	
504	-0,910	13,328	0,050	
505	-1,076	13,494	0,050	
506	-1,243	13,494	0,050	
507	-1,409	13,494	0,050	
508	-1,575	13,494	0,050	
509	1,584	13,660	0,050	
510	1,418	13,660	0,050	
511	1,251	13,660	0,050	
512	1,085	13,660	0,050	
513	0,919	13,660	0,050	
514	0,753	13,660	0,050	
515	0,586	13,660	0,050	
516	0,420	13,660	0,050	
517	0,254	13,660	0,050	
518	0,088	13,660	0,050	
519	-0,079	13,660	0,050	
520	-0,245	13,660	0,050	
521	-0,411	13,660	0,050	
522	-0,578	13,660	0,050	
523	-0,744	13,660	0,050	
524	-0,910	13,660	0,050	
525	-1,076	13,660	0,050	
526	-1,243	13,660	0,050	
527	-1,409	13,660	0,050	
528	-1,575	13,660	0,050	
529	1,584	13,826	0,050	
530	1,418	13,826	0,050	
531	1,251	13,826	0,050	
532	1,085	13,826	0,050	
533	0,919	13,826	0,050	
534	0,753	13,826	0,050	
535	0,586	13,826	0,050	
536	0,420	13,826	0,050	
537	0,254	13,826	0,050	
538	0,088	13,826	0,050	
539	-0,079	13,826	0,050	
540	-0,245	13,826	0,050	
541	-0,411	13,826	0,050	
542	-0,578	13,826	0,050	
543	-0,744	13,826	0,050	
544	-0,910	13,826	0,050	
545	-1,076	13,826	0,050	
546	-1,243	13,826	0,050	
547	-1,409	13,826	0,050	
548	-1,575	13,826	0,050	
549	1,584	13,993	0,050	
550	1,418	13,993	0,050	
551	1,251	13,993	0,050	
552	1,085	13,993	0,050	
553	0,919	13,993	0,050	
554	0,753	13,993	0,050	
555	0,586	13,993	0,050	
556	0,420	13,993	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
557	0,254	13,993	0,050	
558	0,088	13,993	0,050	
559	-0,079	13,993	0,050	
560	-0,245	13,993	0,050	
561	-0,411	13,993	0,050	
562	-0,578	13,993	0,050	
563	-0,744	13,993	0,050	
564	-0,910	13,993	0,050	
565	-1,076	13,993	0,050	
566	-1,243	13,993	0,050	
567	-1,409	13,993	0,050	
568	-1,575	13,993	0,050	
569	1,583	11,000	0,050	
570	1,750	11,000	0,050	
571	1,750	11,166	0,050	
572	1,250	11,000	0,050	
573	1,417	11,000	0,050	
574	1,083	11,000	0,050	
575	1,750	11,332	0,050	
576	0,750	11,000	0,050	
577	0,917	11,000	0,050	
578	0,583	11,000	0,050	
579	0,250	11,000	0,050	
580	0,417	11,000	0,050	
581	0,083	11,000	0,050	
582	1,750	11,497	0,050	
583	1,750	11,663	0,050	
584	1,750	11,829	0,050	
585	1,750	11,995	0,050	
586	1,750	12,161	0,050	
587	1,750	12,326	0,050	
588	1,750	12,492	0,050	
590	1,750	12,658	0,050	
591	-0,250	11,000	0,050	
592	-0,083	11,000	0,050	
593	-0,583	11,000	0,050	
594	-0,417	11,000	0,050	
595	-0,750	11,000	0,050	
596	-0,917	11,000	0,050	
597	-1,083	11,000	0,050	
598	-1,250	11,000	0,050	
599	-1,583	11,000	0,050	
600	-1,417	11,000	0,050	
601	-1,750	11,000	0,050	
602	-1,750	11,166	0,050	
603	-1,750	11,332	0,050	
605	-1,750	11,497	0,050	
606	-1,750	11,663	0,050	
607	-1,750	11,829	0,050	
608	-1,750	11,995	0,050	
609	-1,750	12,161	0,050	
610	-1,750	12,326	0,050	
611	-1,750	12,492	0,050	
612	-1,750	12,658	0,050	
613	1,750	12,824	0,050	
614	1,750	12,989	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
615	1,750	13,155	0,050	
616	1,750	13,321	0,050	
617	1,750	13,487	0,050	
618	1,750	13,653	0,050	
620	1,750	13,818	0,050	
621	1,750	13,984	0,050	
622	1,583	14,150	0,050	
623	1,417	14,150	0,050	
624	1,750	14,150	0,050	
625	1,250	14,150	0,050	
626	1,083	14,150	0,050	
627	0,917	14,150	0,050	
628	0,750	14,150	0,050	
629	0,417	14,150	0,050	
630	0,250	14,150	0,050	
631	0,583	14,150	0,050	
632	0,083	14,150	0,050	
633	-1,750	12,824	0,050	
635	-1,750	12,989	0,050	
636	-1,750	13,155	0,050	
637	-1,750	13,321	0,050	
638	-1,750	13,487	0,050	
639	-1,750	13,653	0,050	
640	-1,750	13,818	0,050	
641	-0,083	14,150	0,050	
642	-0,250	14,150	0,050	
643	-0,583	14,150	0,050	
644	-0,750	14,150	0,050	
645	-0,417	14,150	0,050	
646	-0,917	14,150	0,050	
647	-1,083	14,150	0,050	
648	-1,250	14,150	0,050	
649	-1,750	13,984	0,050	
650	-1,417	14,150	0,050	
651	-1,583	14,150	0,050	
652	-1,750	14,150	0,050	
653	-1,563	1,813	0,050	
654	-1,375	1,813	0,050	
655	-1,375	1,625	0,050	
656	-1,563	1,625	0,050	
657	-1,375	1,438	0,050	
658	-1,563	1,438	0,050	
659	-1,375	1,250	0,050	
660	-1,563	1,250	0,050	
661	-1,375	1,063	0,050	
662	-1,563	1,063	0,050	
663	-1,375	0,875	0,050	
664	-1,563	0,875	0,050	
665	-1,375	0,688	0,050	
666	-1,563	0,688	0,050	
667	-1,375	0,500	0,050	
668	-1,563	0,500	0,050	
669	-1,375	0,313	0,050	
670	-1,563	0,313	0,050	
671	-1,375	0,125	0,050	
672	-1,563	0,125	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
673	-1,375	-0,063	0,050	
674	-1,563	-0,063	0,050	
675	-1,375	-0,250	0,050	
676	-1,563	-0,250	0,050	
677	-1,375	-0,438	0,050	
678	-1,563	-0,438	0,050	
679	-1,375	-0,625	0,050	
680	-1,563	-0,625	0,050	
681	-1,375	-0,813	0,050	
682	-1,563	-0,813	0,050	
683	-1,375	-1,000	0,050	
684	-1,563	-1,000	0,050	
685	-1,375	-1,188	0,050	
686	-1,563	-1,188	0,050	
687	-1,375	-1,375	0,050	
688	-1,563	-1,375	0,050	
689	-1,375	-1,563	0,050	
690	-1,563	-1,563	0,050	
691	-1,375	-1,750	0,050	
692	-1,563	-1,750	0,050	
693	-1,188	1,813	0,050	
694	-1,188	1,625	0,050	
695	-1,188	1,438	0,050	
696	-1,188	1,250	0,050	
697	-1,188	1,063	0,050	
698	-1,188	0,875	0,050	
699	-1,188	0,688	0,050	
700	-1,188	0,500	0,050	
701	-1,188	0,313	0,050	
702	-1,188	0,125	0,050	
703	-1,188	-0,063	0,050	
704	-1,188	-0,250	0,050	
705	-1,188	-0,438	0,050	
706	-1,188	-0,625	0,050	
707	-1,188	-0,813	0,050	
708	-1,188	-1,000	0,050	
709	-1,188	-1,188	0,050	
710	-1,188	-1,375	0,050	
711	-1,188	-1,563	0,050	
712	-1,188	-1,750	0,050	
713	-1,000	1,813	0,050	
714	-1,000	1,625	0,050	
715	-1,000	1,438	0,050	
716	-1,000	1,250	0,050	
717	-1,000	1,063	0,050	
718	-1,000	0,875	0,050	
719	-1,000	0,688	0,050	
720	-1,000	0,500	0,050	
721	-1,000	0,313	0,050	
722	-1,000	0,125	0,050	
723	-1,000	-0,250	0,050	
724	-1,000	-0,438	0,050	
725	-1,000	-0,625	0,050	
726	-1,000	-0,813	0,050	
727	-1,000	-1,000	0,050	
728	-1,000	-1,188	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
729	-1,000	-1,375	0,050	
730	-1,000	-1,563	0,050	
731	-1,000	-1,750	0,050	
732	-0,813	1,813	0,050	
733	-0,813	1,625	0,050	
734	-0,813	1,438	0,050	
735	-0,813	1,250	0,050	
736	-0,813	1,063	0,050	
737	-0,813	0,875	0,050	
738	-0,813	0,688	0,050	
739	-0,813	0,500	0,050	
740	-0,813	0,313	0,050	
741	-0,813	0,125	0,050	
742	-0,813	-0,250	0,050	
743	-0,813	-0,438	0,050	
744	-0,813	-0,625	0,050	
745	-0,813	-0,813	0,050	
746	-0,813	-1,000	0,050	
747	-0,813	-1,188	0,050	
748	-0,813	-1,375	0,050	
749	-0,813	-1,563	0,050	
750	-0,813	-1,750	0,050	
751	-0,625	1,813	0,050	
752	-0,625	1,625	0,050	
753	-0,625	1,438	0,050	
754	-0,625	1,250	0,050	
755	-0,625	1,063	0,050	
756	-0,625	0,875	0,050	
757	-0,625	0,688	0,050	
758	-0,625	0,500	0,050	
759	-0,625	0,313	0,050	
760	-0,625	0,125	0,050	
761	-0,625	-0,063	0,050	
762	-0,813	-0,063	0,050	
763	-0,625	-0,250	0,050	
764	-0,625	-0,438	0,050	
765	-0,625	-0,625	0,050	
766	-0,625	-0,813	0,050	
767	-0,625	-1,000	0,050	
768	-0,625	-1,188	0,050	
769	-0,625	-1,375	0,050	
770	-0,625	-1,563	0,050	
771	-0,625	-1,750	0,050	
772	-0,438	1,813	0,050	
773	-0,438	1,625	0,050	
774	-0,438	1,438	0,050	
775	-0,438	1,250	0,050	
776	-0,438	1,063	0,050	
777	-0,438	0,875	0,050	
778	-0,438	0,688	0,050	
779	-0,438	0,500	0,050	
780	-0,438	0,313	0,050	
781	-0,438	0,125	0,050	
782	-0,438	-0,063	0,050	
783	-0,438	-0,250	0,050	
784	-0,438	-0,438	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
785	-0,438	-0,625	0,050	
786	-0,438	-0,813	0,050	
787	-0,438	-1,000	0,050	
788	-0,438	-1,188	0,050	
789	-0,438	-1,375	0,050	
790	-0,438	-1,563	0,050	
791	-0,438	-1,750	0,050	
792	-0,250	1,813	0,050	
793	-0,250	1,625	0,050	
794	-0,250	1,438	0,050	
795	-0,250	1,250	0,050	
796	-0,250	1,063	0,050	
797	-0,250	0,875	0,050	
798	-0,250	0,688	0,050	
799	-0,250	0,500	0,050	
800	-0,250	0,313	0,050	
801	-0,250	0,125	0,050	
802	-0,250	-0,063	0,050	
803	-0,250	-0,250	0,050	
804	-0,250	-0,438	0,050	
805	-0,250	-0,625	0,050	
806	-0,250	-0,813	0,050	
807	-0,250	-1,000	0,050	
808	-0,250	-1,188	0,050	
809	-0,250	-1,375	0,050	
810	-0,250	-1,563	0,050	
811	-0,250	-1,750	0,050	
812	-0,063	1,813	0,050	
813	-0,063	1,625	0,050	
814	-0,063	1,438	0,050	
815	-0,063	1,250	0,050	
816	-0,063	1,063	0,050	
817	-0,063	0,875	0,050	
818	-0,063	0,688	0,050	
819	-0,063	0,500	0,050	
820	-0,063	0,313	0,050	
821	-0,063	0,125	0,050	
822	-0,063	-0,063	0,050	
823	-0,063	-0,250	0,050	
824	-0,063	-0,438	0,050	
825	-0,063	-0,625	0,050	
826	-0,063	-0,813	0,050	
827	-0,063	-1,000	0,050	
828	-0,063	-1,188	0,050	
829	-0,063	-1,375	0,050	
830	-0,063	-1,563	0,050	
831	-0,063	-1,750	0,050	
832	0,125	1,813	0,050	
833	0,125	1,625	0,050	
834	0,125	1,438	0,050	
835	0,125	1,250	0,050	
836	0,125	1,063	0,050	
837	0,125	0,875	0,050	
838	0,125	0,688	0,050	
839	0,125	0,500	0,050	
840	0,125	0,313	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
841	0,125	0,125	0,050	
842	0,125	-0,063	0,050	
843	0,125	-0,250	0,050	
844	0,125	-0,438	0,050	
845	0,125	-0,625	0,050	
846	0,125	-0,813	0,050	
847	0,125	-1,000	0,050	
848	0,125	-1,188	0,050	
849	0,125	-1,375	0,050	
850	0,125	-1,563	0,050	
851	0,125	-1,750	0,050	
852	0,313	1,813	0,050	
853	0,313	1,625	0,050	
854	0,313	1,438	0,050	
855	0,313	1,250	0,050	
856	0,313	1,063	0,050	
857	0,313	0,875	0,050	
858	0,313	0,688	0,050	
859	0,313	0,500	0,050	
860	0,313	0,313	0,050	
861	0,313	0,125	0,050	
862	0,313	-0,063	0,050	
863	0,313	-0,250	0,050	
864	0,313	-0,438	0,050	
865	0,313	-0,625	0,050	
866	0,313	-0,813	0,050	
867	0,313	-1,000	0,050	
868	0,313	-1,188	0,050	
869	0,313	-1,375	0,050	
870	0,313	-1,563	0,050	
871	0,313	-1,750	0,050	
872	0,500	1,813	0,050	
873	0,500	1,625	0,050	
874	0,500	1,438	0,050	
875	0,500	1,250	0,050	
876	0,500	1,063	0,050	
877	0,500	0,875	0,050	
878	0,500	0,688	0,050	
879	0,500	0,500	0,050	
880	0,500	0,313	0,050	
881	0,500	0,125	0,050	
882	0,500	-0,063	0,050	
883	0,500	-0,250	0,050	
884	0,500	-0,438	0,050	
885	0,500	-0,625	0,050	
886	0,500	-0,813	0,050	
887	0,500	-1,000	0,050	
888	0,500	-1,188	0,050	
889	0,500	-1,375	0,050	
890	0,500	-1,563	0,050	
891	0,500	-1,750	0,050	
892	0,688	1,813	0,050	
893	0,688	1,625	0,050	
894	0,688	1,438	0,050	
895	0,688	1,250	0,050	
896	0,688	1,063	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
897	0,688	0,875	0,050	
898	0,688	0,688	0,050	
899	0,688	0,500	0,050	
900	0,688	0,313	0,050	
901	0,688	0,125	0,050	
902	0,688	-0,063	0,050	
903	0,688	-0,250	0,050	
904	0,688	-0,438	0,050	
905	0,688	-0,625	0,050	
906	0,688	-0,813	0,050	
907	0,688	-1,000	0,050	
908	0,688	-1,188	0,050	
909	0,688	-1,375	0,050	
910	0,688	-1,563	0,050	
911	0,688	-1,750	0,050	
912	0,875	1,813	0,050	
913	0,875	1,625	0,050	
914	0,875	1,438	0,050	
915	0,875	1,250	0,050	
916	0,875	1,063	0,050	
917	0,875	0,875	0,050	
918	0,875	0,688	0,050	
919	0,875	0,500	0,050	
920	0,875	0,313	0,050	
921	0,875	0,125	0,050	
922	0,875	-0,250	0,050	
923	0,875	-0,438	0,050	
924	0,875	-0,625	0,050	
925	0,875	-0,813	0,050	
926	0,875	-1,000	0,050	
927	0,875	-1,188	0,050	
928	0,875	-1,375	0,050	
929	0,875	-1,563	0,050	
930	0,875	-1,750	0,050	
931	1,063	1,813	0,050	
932	1,063	1,625	0,050	
933	1,063	1,438	0,050	
934	1,063	1,250	0,050	
935	1,063	1,063	0,050	
936	1,063	0,875	0,050	
937	1,063	0,688	0,050	
938	1,063	0,500	0,050	
939	1,063	0,313	0,050	
940	1,063	0,125	0,050	
941	1,063	-0,250	0,050	
942	1,063	-0,438	0,050	
943	1,063	-0,625	0,050	
944	1,063	-0,813	0,050	
945	1,063	-1,000	0,050	
946	1,063	-1,188	0,050	
947	1,063	-1,375	0,050	
948	1,063	-1,563	0,050	
949	1,063	-1,750	0,050	
950	1,250	1,813	0,050	
951	1,250	1,625	0,050	
952	1,250	1,438	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
953	1,250	1,250	0,050	
954	1,250	1,063	0,050	
955	1,250	0,875	0,050	
956	1,250	0,688	0,050	
957	1,250	0,500	0,050	
958	1,250	0,313	0,050	
959	1,250	0,125	0,050	
960	1,250	-0,063	0,050	
961	1,063	-0,063	0,050	
962	1,250	-0,250	0,050	
963	1,250	-0,438	0,050	
964	1,250	-0,625	0,050	
965	1,250	-0,813	0,050	
966	1,250	-1,000	0,050	
967	1,250	-1,188	0,050	
968	1,250	-1,375	0,050	
969	1,250	-1,563	0,050	
970	1,250	-1,750	0,050	
971	1,438	1,813	0,050	
972	1,438	1,625	0,050	
973	1,438	1,438	0,050	
974	1,438	1,250	0,050	
975	1,438	1,063	0,050	
976	1,438	0,875	0,050	
977	1,438	0,688	0,050	
978	1,438	0,500	0,050	
979	1,438	0,313	0,050	
980	1,438	0,125	0,050	
981	1,438	-0,063	0,050	
982	1,438	-0,250	0,050	
983	1,438	-0,438	0,050	
984	1,438	-0,625	0,050	
985	1,438	-0,813	0,050	
986	1,438	-1,000	0,050	
987	1,438	-1,188	0,050	
988	1,438	-1,375	0,050	
989	1,438	-1,563	0,050	
990	1,438	-1,750	0,050	
991	1,625	1,813	0,050	
992	1,625	1,625	0,050	
993	1,625	1,438	0,050	
994	1,625	1,250	0,050	
995	1,625	1,063	0,050	
996	1,625	0,875	0,050	
997	1,625	0,688	0,050	
998	1,625	0,500	0,050	
999	1,625	0,313	0,050	
1000	1,625	0,125	0,050	
1001	1,625	-0,063	0,050	
1002	1,625	-0,250	0,050	
1003	1,625	-0,438	0,050	
1004	1,625	-0,625	0,050	
1005	1,625	-0,813	0,050	
1006	1,625	-1,000	0,050	
1007	1,625	-1,188	0,050	
1008	1,625	-1,375	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
1009	1,625	-1,563	0,050	
1010	1,625	-1,750	0,050	
1011	-1,750	1,810	0,050	
1012	-1,750	2,000	0,050	
1013	-1,566	2,000	0,050	
1014	-1,750	1,429	0,050	
1015	-1,750	1,619	0,050	
1016	-1,750	1,238	0,050	
1017	-1,382	2,000	0,050	
1018	-1,750	0,857	0,050	
1019	-1,750	1,048	0,050	
1020	-1,750	0,476	0,050	
1021	-1,750	0,667	0,050	
1022	-1,750	0,286	0,050	
1023	-1,750	0,095	0,050	
1024	-1,197	2,000	0,050	
1025	-1,013	2,000	0,050	
1026	-0,829	2,000	0,050	
1027	-0,645	2,000	0,050	
1028	-0,461	2,000	0,050	
1029	-0,276	2,000	0,050	
1030	-0,092	2,000	0,050	
1032	0,092	2,000	0,050	
1033	-1,038	-0,100	0,050	
1034	-1,750	-0,286	0,050	
1035	-1,750	-0,095	0,050	
1036	-1,750	-0,667	0,050	
1037	-1,750	-0,476	0,050	
1038	-1,750	-0,857	0,050	
1039	-1,750	-1,238	0,050	
1040	-1,750	-1,048	0,050	
1041	-1,750	-1,619	0,050	
1042	-1,750	-1,429	0,050	
1043	-1,750	-1,810	0,050	
1044	-1,566	-2,000	0,050	
1045	-1,750	-2,000	0,050	
1046	-1,382	-2,000	0,050	
1047	-1,197	-2,000	0,050	
1048	-0,829	-2,000	0,050	
1049	-0,645	-2,000	0,050	
1050	-1,013	-2,000	0,050	
1051	-0,276	-2,000	0,050	
1052	-0,092	-2,000	0,050	
1053	-0,461	-2,000	0,050	
1054	0,092	-2,000	0,050	
1055	0,276	2,000	0,050	
1056	0,461	2,000	0,050	
1057	0,645	2,000	0,050	
1058	0,829	2,000	0,050	
1059	1,013	2,000	0,050	
1060	1,197	2,000	0,050	
1061	1,382	2,000	0,050	
1062	1,566	2,000	0,050	
1064	1,750	1,810	0,050	
1065	1,750	1,429	0,050	
1066	1,750	1,238	0,050	

Nudo	X (m)	Y (m)	Z (m)	Apoyo
1067	1,750	1,619	0,050	
1068	1,750	2,000	0,050	
1069	1,750	1,048	0,050	
1070	1,750	0,857	0,050	
1071	1,750	0,476	0,050	
1072	1,750	0,286	0,050	
1073	1,750	0,667	0,050	
1074	1,750	0,095	0,050	
1075	0,276	-2,000	0,050	
1076	0,461	-2,000	0,050	
1077	0,829	-2,000	0,050	
1078	0,645	-2,000	0,050	
1079	1,197	-2,000	0,050	
1080	1,382	-2,000	0,050	
1081	1,013	-2,000	0,050	
1082	1,566	-2,000	0,050	
1083	1,750	-0,095	0,050	
1084	1,750	-0,476	0,050	
1085	1,750	-0,667	0,050	
1086	1,750	-0,286	0,050	
1087	1,750	-0,857	0,050	
1088	1,750	-1,048	0,050	
1089	1,750	-1,238	0,050	
1090	1,750	-1,619	0,050	
1091	1,750	-1,810	0,050	
1092	1,750	-1,429	0,050	
1093	1,750	-2,000	0,050	

Dados - Barras

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
1	4	74	0,740	0,0	RECT_M_12x12
2	74	5	0,740	0,0	RECT_M_12x12
3	68	70	1,775	0,0	RECT_H_20x10
4	64	75	0,740	0,0	RECT_M_12x12
5	5	6	1,370	180,0	RECT_H_12x12
6	7	6	1,480	0,0	RECT_H_12x12
7	7	4	1,370	0,0	RECT_H_12x12
8	8	9	1,480	0,0	RECT_H_12x12
9	9	10	1,370	-180,0	RECT_H_12x12
10	11	8	1,370	0,0	RECT_H_12x12
11	10	11	1,480	180,0	RECT_H_12x12
12	12	13	1,480	0,0	RECT_H_12x12
13	13	14	1,370	-180,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
14	14	15	1,480	180,0	RECT_H_12x12
15	15	12	1,370	0,0	RECT_H_12x12
16	16	17	1,480	0,0	RECT_H_12x12
17	17	18	1,370	180,0	RECT_H_12x12
18	18	19	1,480	180,0	RECT_H_12x12
19	19	16	1,370	0,0	RECT_H_12x12
20	4	8	0,355	90,0	RECT_H_12x12
21	8	12	0,990	90,0	RECT_H_12x12
22	12	16	0,660	90,0	RECT_H_12x12
23	17	13	0,660	-90,0	RECT_H_12x12
24	13	9	0,990	-90,0	RECT_H_12x12
25	9	5	0,355	-90,0	RECT_H_12x12
26	10	6	0,355	-90,0	RECT_H_12x12
27	10	14	0,990	90,0	RECT_H_12x12
28	14	18	0,660	90,0	RECT_H_12x12
29	5	10	1,415	90,0	RECT_H_12x12
30	10	13	1,690	90,0	RECT_H_12x12
31	13	18	1,521	90,0	RECT_H_12x12
32	4	9	1,522	90,0	RECT_H_12x12
33	9	12	1,781	90,0	RECT_H_12x12
34	12	17	1,620	90,0	RECT_H_12x12
35	7	11	0,355	90,0	RECT_H_12x12
36	11	15	0,990	90,0	RECT_H_12x12
37	15	19	0,660	90,0	RECT_H_12x12
38	6	11	1,522	90,0	RECT_H_12x12
39	11	14	1,781	90,0	RECT_H_12x12
40	14	19	1,620	90,0	RECT_H_12x12
41	7	8	1,415	90,0	RECT_H_12x12
42	8	15	1,690	90,0	RECT_H_12x12
43	15	16	1,521	90,0	RECT_H_12x12
44	20	21	1,480	0,0	RECT_H_12x12
45	21	22	1,370	180,0	RECT_H_12x12
46	22	23	1,480	180,0	RECT_H_12x12
47	23	20	1,370	0,0	RECT_H_12x12
48	24	25	1,480	0,0	RECT_H_12x12
49	25	26	1,370	-180,0	RECT_H_12x12
50	26	27	1,480	180,0	RECT_H_12x12
51	27	24	1,370	0,0	RECT_H_12x12
52	16	20	0,990	90,0	RECT_H_12x12
53	20	24	0,660	90,0	RECT_H_12x12
54	25	21	0,660	-90,0	RECT_H_12x12
55	21	17	0,990	-90,0	RECT_H_12x12
56	18	22	0,990	90,0	RECT_H_12x12
57	22	26	0,660	90,0	RECT_H_12x12
58	18	21	1,690	90,0	RECT_H_12x12
59	21	26	1,521	90,0	RECT_H_12x12
60	17	20	1,781	90,0	RECT_H_12x12
61	20	25	1,620	90,0	RECT_H_12x12
62	19	23	0,990	90,0	RECT_H_12x12
63	23	27	0,660	90,0	RECT_H_12x12
64	19	22	1,781	90,0	RECT_H_12x12
65	22	27	1,620	90,0	RECT_H_12x12
66	16	23	1,690	90,0	RECT_H_12x12
67	23	24	1,521	90,0	RECT_H_12x12
68	28	29	1,480	0,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
69	29	30	1,370	-180,0	RECT_H_12x12
70	30	31	1,480	180,0	RECT_H_12x12
71	31	28	1,370	0,0	RECT_H_12x12
72	32	33	1,480	0,0	RECT_H_12x12
73	33	34	1,370	-180,0	RECT_H_12x12
74	34	35	1,480	180,0	RECT_H_12x12
75	35	32	1,370	0,0	RECT_H_12x12
76	24	28	0,990	90,0	RECT_H_12x12
77	28	32	0,660	90,0	RECT_H_12x12
78	33	29	0,660	-90,0	RECT_H_12x12
79	29	25	0,990	-90,0	RECT_H_12x12
80	26	30	0,990	90,0	RECT_H_12x12
81	30	34	0,660	90,0	RECT_H_12x12
82	26	29	1,690	90,0	RECT_H_12x12
83	29	34	1,521	90,0	RECT_H_12x12
84	25	28	1,781	90,0	RECT_H_12x12
85	28	33	1,620	90,0	RECT_H_12x12
86	27	31	0,990	90,0	RECT_H_12x12
87	31	35	0,660	90,0	RECT_H_12x12
88	27	30	1,781	90,0	RECT_H_12x12
89	30	35	1,620	90,0	RECT_H_12x12
90	24	31	1,690	90,0	RECT_H_12x12
91	31	32	1,521	90,0	RECT_H_12x12
92	36	37	1,480	0,0	RECT_H_12x12
93	37	38	1,370	180,0	RECT_H_12x12
94	38	39	1,480	180,0	RECT_H_12x12
95	39	36	1,370	0,0	RECT_H_12x12
96	40	41	1,480	0,0	RECT_H_12x12
97	41	42	1,370	180,0	RECT_H_12x12
98	42	43	1,480	180,0	RECT_H_12x12
99	43	40	1,370	0,0	RECT_H_12x12
100	32	36	0,990	90,0	RECT_H_12x12
101	36	40	0,660	90,0	RECT_H_12x12
102	41	37	0,660	-90,0	RECT_H_12x12
103	37	33	0,990	-90,0	RECT_H_12x12
104	34	38	0,990	90,0	RECT_H_12x12
105	38	42	0,660	90,0	RECT_H_12x12
106	34	37	1,690	90,0	RECT_H_12x12
107	37	42	1,521	90,0	RECT_H_12x12
108	33	36	1,781	90,0	RECT_H_12x12
109	36	41	1,620	90,0	RECT_H_12x12
110	35	39	0,990	90,0	RECT_H_12x12
111	39	43	0,660	90,0	RECT_H_12x12
112	35	38	1,781	90,0	RECT_H_12x12
113	38	43	1,620	90,0	RECT_H_12x12
114	32	39	1,690	90,0	RECT_H_12x12
115	39	40	1,521	90,0	RECT_H_12x12
116	44	45	1,480	0,0	RECT_H_12x12
117	45	46	1,370	-180,0	RECT_H_12x12
118	46	47	1,480	180,0	RECT_H_12x12
119	47	44	1,370	0,0	RECT_H_12x12
120	48	49	1,480	0,0	RECT_H_12x12
121	49	50	1,370	180,0	RECT_H_12x12
122	50	51	1,480	180,0	RECT_H_12x12
123	51	48	1,370	0,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
124	40	44	0,990	90,0	RECT_H_12x12
125	44	48	0,660	90,0	RECT_H_12x12
126	49	45	0,660	-90,0	RECT_H_12x12
127	45	41	0,990	-90,0	RECT_H_12x12
128	42	46	0,990	90,0	RECT_H_12x12
129	46	50	0,660	90,0	RECT_H_12x12
130	42	45	1,690	90,0	RECT_H_12x12
131	45	50	1,521	90,0	RECT_H_12x12
132	41	44	1,781	90,0	RECT_H_12x12
133	44	49	1,620	90,0	RECT_H_12x12
134	43	47	0,990	90,0	RECT_H_12x12
135	47	51	0,660	90,0	RECT_H_12x12
136	43	46	1,781	90,0	RECT_H_12x12
137	46	51	1,620	90,0	RECT_H_12x12
138	40	47	1,690	90,0	RECT_H_12x12
139	47	48	1,521	90,0	RECT_H_12x12
140	52	53	1,480	0,0	RECT_H_12x12
141	53	54	1,370	180,0	RECT_H_12x12
142	54	55	1,480	180,0	RECT_H_12x12
143	55	52	1,370	0,0	RECT_H_12x12
144	56	57	1,480	0,0	RECT_H_12x12
145	57	58	1,370	180,0	RECT_H_12x12
146	58	59	1,480	180,0	RECT_H_12x12
147	59	56	1,370	0,0	RECT_H_12x12
148	48	52	0,990	90,0	RECT_H_12x12
149	52	56	0,660	90,0	RECT_H_12x12
150	57	53	0,660	-90,0	RECT_H_12x12
151	53	49	0,990	-90,0	RECT_H_12x12
152	50	54	0,990	90,0	RECT_H_12x12
153	54	58	0,660	90,0	RECT_H_12x12
154	50	53	1,690	90,0	RECT_H_12x12
155	53	58	1,521	90,0	RECT_H_12x12
156	49	52	1,781	90,0	RECT_H_12x12
157	52	57	1,620	90,0	RECT_H_12x12
158	51	55	0,990	90,0	RECT_H_12x12
159	55	59	0,660	90,0	RECT_H_12x12
160	51	54	1,781	90,0	RECT_H_12x12
161	54	59	1,620	90,0	RECT_H_12x12
162	48	55	1,690	90,0	RECT_H_12x12
163	55	56	1,521	90,0	RECT_H_12x12
164	75	65	0,740	0,0	RECT_M_12x12
165	1	2	3,289	0,0	RECT_H_20x20
166	2	221	0,156	0,0	RECT_H_20x20
167	2	3	1,755	90,0	RECT_H_20x10
168	220	3	0,156	0,0	RECT_H_20x20
169	3	1	3,289	0,0	RECT_H_20x20
170	56	60	0,990	90,0	RECT_H_12x12
171	76	68	0,153	0,0	RECT_H_20x10
172	95	90	1,645	0,0	RECT_H_12x12
173	61	57	0,990	-90,0	RECT_H_12x12
174	58	62	0,990	90,0	RECT_H_12x12
175	89	88	1,645	0,0	RECT_H_12x12
176	58	61	1,690	90,0	RECT_H_12x12
177	57	60	1,781	90,0	RECT_H_12x12
178	77	69	0,219	0,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
179	59	63	0,990	90,0	RECT_H_12x12
180	69	79	0,219	0,0	RECT_H_12x12
181	59	62	1,781	90,0	RECT_H_12x12
182	56	63	1,690	90,0	RECT_H_12x12
183	60	61	1,480	0,0	RECT_H_12x12
184	61	62	1,370	-180,0	RECT_H_12x12
185	63	62	1,480	0,0	RECT_H_12x12
186	63	60	1,370	0,0	RECT_H_12x12
187	65	66	1,370	-180,0	RECT_H_12x12
188	67	64	1,370	0,0	RECT_H_12x12
189	66	67	1,480	180,0	RECT_H_12x12
190	60	64	0,355	90,0	RECT_H_12x12
191	65	61	0,355	-90,0	RECT_H_12x12
192	66	62	0,355	-90,0	RECT_H_12x12
193	61	66	1,415	90,0	RECT_H_12x12
194	60	65	1,522	90,0	RECT_H_12x12
195	63	67	0,355	90,0	RECT_H_12x12
196	62	67	1,522	90,0	RECT_H_12x12
197	63	64	1,415	90,0	RECT_H_12x12
198	78	70	0,153	0,0	RECT_H_20x10
199	98	91	1,645	-0,0	RECT_H_12x12
200	92	93	1,645	-0,0	RECT_H_12x12
201	73	82	1,775	0,0	RECT_H_20x10
202	83	73	0,153	0,0	RECT_H_20x10
203	86	82	0,153	0,0	RECT_H_20x10
204	73	94	0,205	0,0	RECT_H_20x10
205	87	88	1,150	-12,2	RECT_H_12x12
206	89	90	1,150	-12,2	RECT_H_12x12
207	91	92	1,150	12,2	RECT_H_12x12
208	93	94	1,150	12,2	RECT_H_12x12
209	95	96	1,150	-12,2	RECT_H_12x12
210	97	98	1,150	12,2	RECT_H_12x12
211	94	71	1,023	0,0	RECT_H_20x10
212	68	93	0,205	0,0	RECT_H_20x10
213	93	80	1,023	0,0	RECT_H_20x10
214	71	92	0,153	0,0	RECT_H_20x10
215	92	98	1,176	0,0	RECT_H_20x10
216	98	84	0,683	0,0	RECT_H_20x10
217	80	91	0,153	0,0	RECT_H_20x10
218	91	97	1,176	0,0	RECT_H_20x10
219	97	77	0,683	0,0	RECT_H_20x10
220	81	89	0,153	0,0	RECT_H_20x10
221	89	95	1,176	0,0	RECT_H_20x10
222	95	79	0,683	0,0	RECT_H_20x10
223	72	90	0,153	0,0	RECT_H_20x10
224	90	96	1,176	0,0	RECT_H_20x10
225	96	85	0,683	0,0	RECT_H_20x10
226	82	88	0,204	0,0	RECT_H_20x10
227	88	72	1,023	0,0	RECT_H_20x10
228	70	87	0,204	0,0	RECT_H_20x10
229	87	81	1,023	0,0	RECT_H_20x10
230	10	99	1,803	0,0	RECT_H_12x12
231	9	99	1,172	0,0	RECT_H_12x12
232	99	101	0,469	180,0	RECT_H_12x12
233	9	101	1,065	0,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
234	101	102	1,052	0,0	RECT_H_12x12
235	11	103	1,803	180,0	RECT_H_12x12
236	8	103	1,172	180,0	RECT_H_12x12
237	103	105	0,469	0,0	RECT_H_12x12
238	8	105	1,065	180,0	RECT_H_12x12
239	105	106	1,052	180,0	RECT_H_12x12
240	14	107	1,803	0,0	RECT_H_12x12
241	13	107	1,172	0,0	RECT_H_12x12
242	107	109	0,469	180,0	RECT_H_12x12
243	13	109	1,065	0,0	RECT_H_12x12
244	109	110	1,052	0,0	RECT_H_12x12
245	15	111	1,803	180,0	RECT_H_12x12
246	12	111	1,172	180,0	RECT_H_12x12
247	111	113	0,469	0,0	RECT_H_12x12
248	12	113	1,065	180,0	RECT_H_12x12
249	113	114	1,052	180,0	RECT_H_12x12
250	18	115	1,803	0,0	RECT_H_12x12
251	17	115	1,172	0,0	RECT_H_12x12
252	115	116	0,469	180,0	RECT_H_12x12
253	17	116	1,065	0,0	RECT_H_12x12
254	116	117	1,052	0,0	RECT_H_12x12
255	19	118	1,803	180,0	RECT_H_12x12
256	16	118	1,172	180,0	RECT_H_12x12
257	118	119	0,469	0,0	RECT_H_12x12
258	16	119	1,065	180,0	RECT_H_12x12
259	119	120	1,052	180,0	RECT_H_12x12
260	22	121	1,803	0,0	RECT_H_12x12
261	21	121	1,172	0,0	RECT_H_12x12
262	121	122	0,469	180,0	RECT_H_12x12
263	21	122	1,065	0,0	RECT_H_12x12
264	122	123	1,052	0,0	RECT_H_12x12
265	23	124	1,803	180,0	RECT_H_12x12
266	20	124	1,172	180,0	RECT_H_12x12
267	124	125	0,469	0,0	RECT_H_12x12
268	20	125	1,065	180,0	RECT_H_12x12
269	125	126	1,052	180,0	RECT_H_12x12
270	26	127	1,803	0,0	RECT_H_12x12
271	25	127	1,172	0,0	RECT_H_12x12
272	127	128	0,469	180,0	RECT_H_12x12
273	25	128	1,065	0,0	RECT_H_12x12
274	128	129	1,052	0,0	RECT_H_12x12
275	27	130	1,803	180,0	RECT_H_12x12
276	24	130	1,172	180,0	RECT_H_12x12
277	130	131	0,469	0,0	RECT_H_12x12
278	24	131	1,065	180,0	RECT_H_12x12
279	131	132	1,052	180,0	RECT_H_12x12
280	30	133	1,803	0,0	RECT_H_12x12
281	29	133	1,172	0,0	RECT_H_12x12
282	133	134	0,469	180,0	RECT_H_12x12
283	29	134	1,065	0,0	RECT_H_12x12
284	134	135	1,052	0,0	RECT_H_12x12
285	31	136	1,803	180,0	RECT_H_12x12
286	28	136	1,172	180,0	RECT_H_12x12
287	136	137	0,469	0,0	RECT_H_12x12
288	28	137	1,065	180,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
289	137	138	1,052	180,0	RECT_H_12x12
290	34	139	1,803	0,0	RECT_H_12x12
291	33	139	1,172	0,0	RECT_H_12x12
292	139	140	0,469	180,0	RECT_H_12x12
293	33	140	1,065	0,0	RECT_H_12x12
294	140	141	1,052	0,0	RECT_H_12x12
295	35	142	1,803	180,0	RECT_H_12x12
296	32	142	1,172	180,0	RECT_H_12x12
297	142	143	0,469	0,0	RECT_H_12x12
298	32	143	1,065	180,0	RECT_H_12x12
299	143	144	1,052	180,0	RECT_H_12x12
300	38	145	1,803	0,0	RECT_H_12x12
301	37	145	1,172	0,0	RECT_H_12x12
302	145	146	0,469	180,0	RECT_H_12x12
303	37	146	1,065	0,0	RECT_H_12x12
304	146	147	1,052	0,0	RECT_H_12x12
305	39	148	1,803	180,0	RECT_H_12x12
306	36	148	1,172	180,0	RECT_H_12x12
307	148	149	0,469	0,0	RECT_H_12x12
308	36	149	1,065	180,0	RECT_H_12x12
309	149	150	1,052	180,0	RECT_H_12x12
310	42	151	1,803	0,0	RECT_H_12x12
311	41	151	1,172	0,0	RECT_H_12x12
312	151	152	0,469	180,0	RECT_H_12x12
313	41	152	1,065	0,0	RECT_H_12x12
314	152	153	1,052	0,0	RECT_H_12x12
315	43	154	1,803	180,0	RECT_H_12x12
316	40	154	1,172	180,0	RECT_H_12x12
317	154	155	0,469	0,0	RECT_H_12x12
318	40	155	1,065	180,0	RECT_H_12x12
319	155	156	1,052	180,0	RECT_H_12x12
320	46	157	1,803	0,0	RECT_H_12x12
321	45	157	1,172	0,0	RECT_H_12x12
322	157	158	0,469	180,0	RECT_H_12x12
323	45	158	1,065	0,0	RECT_H_12x12
324	158	159	1,052	0,0	RECT_H_12x12
325	47	160	1,803	180,0	RECT_H_12x12
326	44	160	1,172	180,0	RECT_H_12x12
327	160	161	0,469	0,0	RECT_H_12x12
328	44	161	1,065	180,0	RECT_H_12x12
329	161	162	1,052	180,0	RECT_H_12x12
330	50	163	1,803	0,0	RECT_H_12x12
331	49	163	1,172	0,0	RECT_H_12x12
332	163	164	0,469	180,0	RECT_H_12x12
333	49	164	1,065	0,0	RECT_H_12x12
334	164	165	1,052	0,0	RECT_H_12x12
335	51	166	1,803	180,0	RECT_H_12x12
336	48	166	1,172	180,0	RECT_H_12x12
337	166	167	0,469	0,0	RECT_H_12x12
338	48	167	1,065	180,0	RECT_H_12x12
339	167	168	1,052	180,0	RECT_H_12x12
340	54	169	1,803	0,0	RECT_H_12x12
341	53	169	1,172	0,0	RECT_H_12x12
342	169	170	0,469	180,0	RECT_H_12x12
343	53	170	1,065	0,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
344	170	171	1,052	0,0	RECT_H_12x12
345	55	172	1,803	180,0	RECT_H_12x12
346	52	172	1,172	180,0	RECT_H_12x12
347	172	173	0,469	0,0	RECT_H_12x12
348	52	173	1,065	180,0	RECT_H_12x12
349	173	174	1,052	180,0	RECT_H_12x12
350	58	175	1,803	0,0	RECT_H_12x12
351	57	175	1,172	0,0	RECT_H_12x12
352	175	176	0,469	180,0	RECT_H_12x12
353	57	176	1,065	0,0	RECT_H_12x12
354	176	177	1,052	0,0	RECT_H_12x12
355	59	178	1,803	180,0	RECT_H_12x12
356	56	178	1,172	180,0	RECT_H_12x12
357	178	179	0,469	0,0	RECT_H_12x12
358	56	179	1,065	180,0	RECT_H_12x12
359	179	180	1,052	180,0	RECT_H_12x12
360	62	181	1,803	0,0	RECT_H_12x12
361	61	181	1,172	0,0	RECT_H_12x12
362	181	182	0,469	180,0	RECT_H_12x12
363	61	182	1,065	0,0	RECT_H_12x12
364	182	183	1,052	0,0	RECT_H_12x12
365	63	184	1,803	180,0	RECT_H_12x12
366	60	184	1,172	180,0	RECT_H_12x12
367	184	185	0,469	0,0	RECT_H_12x12
368	60	185	1,065	180,0	RECT_H_12x12
369	185	186	1,052	180,0	RECT_H_12x12
370	1	74	0,200	0,0	RECT_M_15x15
371	75	69	0,200	0,0	RECT_M_15x15
372	81	80	1,259	0,0	RECT_H_20x10
373	72	71	1,259	0,0	RECT_H_20x10
374	99	102	1,158	0,0	RECT_H_12x12
375	102	100	0,361	0,0	RECT_H_12x12
376	107	110	1,158	0,0	RECT_H_12x12
377	110	108	0,361	0,0	RECT_H_12x12
378	115	117	1,158	0,0	RECT_H_12x12
379	117	187	0,361	0,0	RECT_H_12x12
380	121	123	1,158	0,0	RECT_H_12x12
381	123	188	0,361	0,0	RECT_H_12x12
382	127	129	1,158	0,0	RECT_H_12x12
383	129	189	0,361	0,0	RECT_H_12x12
384	133	135	1,158	0,0	RECT_H_12x12
385	135	190	0,361	0,0	RECT_H_12x12
386	139	141	1,158	0,0	RECT_H_12x12
387	141	191	0,361	0,0	RECT_H_12x12
388	145	147	1,158	-0,0	RECT_H_12x12
389	147	192	0,361	-0,0	RECT_H_12x12
390	151	153	1,158	0,0	RECT_H_12x12
391	153	193	0,361	0,0	RECT_H_12x12
392	157	159	1,158	0,0	RECT_H_12x12
393	159	194	0,361	0,0	RECT_H_12x12
394	163	165	1,158	0,0	RECT_H_12x12
395	165	195	0,361	0,0	RECT_H_12x12
396	169	171	1,158	-0,0	RECT_H_12x12
397	171	196	0,361	-0,0	RECT_H_12x12
398	175	177	1,158	0,0	RECT_H_12x12

Barra	Nudos	Nudo 2	Longitud (m)	Gama (Deg)	Sección
399	177	197	0,361	0,0	RECT_H_12x12
400	181	183	1,158	-0,0	RECT_H_12x12
401	183	198	0,361	-0,0	RECT_H_12x12
402	103	106	1,158	0,0	RECT_H_12x12
403	106	104	0,361	0,0	RECT_H_12x12
404	111	114	1,158	0,0	RECT_H_12x12
405	112	114	0,361	0,0	RECT_H_12x12
406	118	120	1,158	0,0	RECT_H_12x12
407	120	199	0,361	0,0	RECT_H_12x12
408	124	126	1,158	0,0	RECT_H_12x12
409	200	126	0,361	0,0	RECT_H_12x12
410	130	132	1,158	0,0	RECT_H_12x12
411	132	201	0,361	0,0	RECT_H_12x12
412	136	138	1,158	0,0	RECT_H_12x12
413	202	138	0,361	0,0	RECT_H_12x12
414	142	144	1,158	0,0	RECT_H_12x12
415	144	203	0,361	0,0	RECT_H_12x12
416	148	150	1,158	-0,0	RECT_H_12x12
417	204	150	0,361	0,0	RECT_H_12x12
418	154	156	1,158	0,0	RECT_H_12x12
419	156	205	0,361	0,0	RECT_H_12x12
420	160	162	1,158	0,0	RECT_H_12x12
421	206	162	0,361	0,0	RECT_H_12x12
422	166	168	1,158	0,0	RECT_H_12x12
423	168	207	0,361	0,0	RECT_H_12x12
424	172	174	1,158	-0,0	RECT_H_12x12
425	208	174	0,361	0,0	RECT_H_12x12
426	178	180	1,158	0,0	RECT_H_12x12
427	180	209	0,361	0,0	RECT_H_12x12
428	184	186	1,158	-0,0	RECT_H_12x12
429	210	186	0,361	0,0	RECT_H_12x12
430	84	85	0,438	0,0	RECT_H_12x12
431	74	11	1,597	0,0	RECT_H_12x12
432	74	10	1,597	-0,0	RECT_H_12x12
433	75	62	1,597	0,0	RECT_H_12x12
434	75	63	1,597	-0,0	RECT_H_12x12
435	74	7	1,557	0,0	RECT_H_12x12
436	74	6	1,557	0,0	RECT_H_12x12
437	75	67	1,557	0,0	RECT_H_12x12
438	66	75	1,557	0,0	RECT_H_12x12
439	79	85	1,150	0,0	RECT_H_12x12
440	77	84	1,150	0,0	RECT_H_12x12

Dados - Secciones

Nombre de la sección	Lista de barras
RECT_H_20x10	3 167 171 198 201A204 211A229 372 373
RECT_M_12x12	1 2 4 164
RECT_M_15x15	370 371
RECT_H_20x20	165 166 168 169
RECT_H_12x12	5A163 170 172A197 205A210 230A369 199 200 374A440

Nombre de la sección	RECT_BB (cm)	RECT_HH (cm)	RECT_ESP (cm)	SX (cm2)	SY (cm2)
RECT_H_20x10	10,000	20,000	1,200	66,240	24,000
RECT_M_12x12	12,000	12,000	0,0	144,000	120,000
RECT_M_15x15	15,000	15,000	0,0	225,000	187,500
RECT_H_20x20	20,000	20,000	1,000	76,000	40,000
RECT_H_12x12	12,000	12,000	1,200	51,840	43,200

Nombre de la sección	SZ (cm2)	IX (cm4)	IY (cm4)	IZ (cm4)
RECT_H_20x10	48,000	2380,034	3213,875	1022,835
RECT_M_12x12	120,000	2915,131	1728,000	1728,000
RECT_M_15x15	187,500	7117,019	4218,750	4218,750
RECT_H_20x20	40,000	6859,000	4585,333	4585,333
RECT_H_12x12	43,200	1721,093	1020,211	1020,211

Dados - Materiales

	Material	E (MPa)	G (MPa)	NI	LX (1/°C)	RO (kN/m3)	Re (MPa)
1	HA - 25	24850,000	10400,000	0,200	0,00	24,530	25,000
2	S 355	210000,000	81000,000	0,300	0,00	77,010	355,000

Dados - Apoyos

Nombre del apoyo	Lista de nudos	Condiciones de apoyo
Fijo	221	UX UY UZ
Movil_X	220	UY UZ
Movil_Y	76 83	UX UZ
Libre	78 86	UZ

Reacciones - Valores

Nudo/Caso	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
76/ 1	2,678	0,000	116,772	-0,000	-0,000	-0,000
76/ 2	75,043	0,000	76,797	-0,000	0,000	-0,000
76/ 3	0,422	-0,000	6,399	-0,000	0,000	-0,000
76/ 4	4,039	0,000	13,937	-0,000	0,000	-0,000
76/ 5	29,152	0,000	64,977	-0,000	-0,000	-0,000
76/ 6	0,264	0,000	3,999	-0,000	0,000	-0,000
76/ ULS+	116,378	0,000	275,838	-0,000	0,000	-0,000
76/ ULS-	2,142	0,000	93,418	-0,000	-0,000	-0,000
76/ SLS+	77,853	0,000	195,569	-0,000	0,000	-0,000
76/ SLS-	2,678	0,000	116,772	-0,000	-0,000	-0,000
76/ ACC+	31,829	0,000	181,749	0,000	0,000	0,000
76/ ACC-	-26,474	-0,000	51,796	-0,000	-0,000	-0,000
78/ 1	0,000	0,000	72,668	-0,000	-0,000	-0,000
78/ 2	0,000	0,000	-76,823	-0,000	-0,000	-0,000
78/ 3	-0,000	0,000	0,350	0,000	0,000	-0,000
78/ 4	-0,000	-0,000	2,606	-0,000	-0,000	-0,000
78/ 5	0,000	0,000	-64,589	0,000	0,000	-0,000
78/ 6	-0,000	0,000	0,219	0,000	-0,000	-0,000
78/ ULS+	0,000	0,000	98,792	-0,000	-0,000	-0,000
78/ ULS-	-0,000	0,000	-57,100	-0,000	-0,000	-0,000
78/ SLS+	0,000	0,000	73,128	-0,000	-0,000	-0,000
78/ SLS-	-0,000	0,000	-4,155	-0,000	-0,000	-0,000
78/ ACC+	0,000	0,000	137,257	0,000	0,000	0,000
78/ ACC-	-0,000	-0,000	8,080	-0,000	-0,000	-0,000
83/ 1	-2,423	0,000	36,363	-0,000	0,000	-0,000
83/ 2	-2,842	-0,000	57,797	0,000	0,000	-0,000
83/ 3	-0,382	0,000	-0,777	-0,000	-0,000	-0,000
83/ 4	0,254	0,000	2,318	-0,000	-0,000	-0,000
83/ 5	-6,558	-0,000	11,857	-0,000	0,000	-0,000
83/ 6	-0,239	0,000	-0,486	-0,000	0,000	-0,000
83/ ULS+	-1,939	0,000	135,786	0,000	0,000	-0,000
83/ ULS-	-7,713	-0,000	27,560	-0,000	0,000	-0,000
83/ SLS+	-2,423	0,000	94,160	0,000	0,000	-0,000
83/ SLS-	-5,384	0,000	35,343	-0,000	0,000	-0,000
83/ ACC+	4,135	0,000	48,221	0,000	0,000	0,000
83/ ACC-	-8,981	-0,000	24,506	-0,000	-0,000	-0,000
86/ 1	-0,000	0,000	48,189	0,000	-0,000	-0,000
86/ 2	0,000	-0,000	-57,769	0,000	0,000	-0,000
86/ 3	0,000	0,000	0,393	-0,000	0,000	-0,000
86/ 4	-0,000	-0,000	-3,070	-0,000	-0,000	-0,000
86/ 5	0,000	-0,000	-12,235	0,000	0,000	-0,000
86/ 6	-0,000	0,000	0,246	0,000	-0,000	-0,000
86/ ULS+	-0,000	0,000	65,830	0,000	-0,000	-0,000
86/ ULS-	-0,000	-0,000	-48,103	0,000	-0,000	-0,000
86/ SLS+	-0,000	0,000	48,706	0,000	-0,000	-0,000
86/ SLS-	-0,000	0,000	-9,580	0,000	-0,000	-0,000
86/ ACC+	0,000	0,000	60,424	0,000	-0,000	0,000
86/ ACC-	-0,000	-0,000	35,955	-0,000	-0,000	-0,000
220/ 1	0,000	0,145	134,580	0,000	0,000	0,000
220/ 2	0,000	-2,618	-126,087	-0,000	-0,000	-0,000
220/ 3	-0,000	0,019	0,861	-0,000	-0,000	0,000
220/ 4	0,000	-21,548	0,489	0,000	-0,000	0,000

Nudo/Caso	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
220/ 5	0,000	-0,553	-72,468	0,000	0,000	-0,000
220/ 6	-0,000	0,012	0,538	0,000	-0,000	0,000
220/ ULS+	0,000	0,233	183,379	0,000	0,000	0,000
220/ ULS-	0,000	-3,811	-81,466	0,000	-0,000	-0,000
220/ SLS+	0,000	0,170	135,711	0,000	0,000	0,000
220/ SLS-	0,000	-2,473	8,493	0,000	0,000	-0,000
220/ ACC+	0,000	21,693	207,048	0,000	0,000	0,000
220/ ACC-	-0,000	-21,403	62,112	-0,000	-0,000	-0,000
221/ 1	-0,254	-0,145	165,232	-0,000	-0,000	-0,000
221/ 2	72,313	2,618	126,095	0,000	-0,000	-0,000
221/ 3	-0,040	-0,019	5,486	0,000	-0,000	-0,000
221/ 4	-4,294	-22,552	-16,286	0,000	-0,000	-0,000
221/ 5	21,506	0,553	72,459	0,000	0,000	-0,000
221/ 6	-0,025	-0,012	3,429	-0,000	-0,000	-0,000
221/ ULS+	108,266	3,811	414,777	0,000	-0,000	-0,000
221/ ULS-	-0,421	-0,233	132,186	-0,000	-0,000	-0,000
221/ SLS+	72,059	2,473	293,041	-0,000	-0,000	-0,000
221/ SLS-	-0,306	-0,170	165,232	-0,000	-0,000	-0,000
221/ ACC+	21,252	22,407	237,691	0,000	0,000	0,000
221/ ACC-	-21,761	-22,697	92,772	-0,000	-0,000	-0,000
Caso 1	Espejos+Maq					
Suma final	0,000	-0,000	573,806	-0,000	-0,000	-0,000
Suma de reacci-ones <	0,000	-0,000	579,888	3400,353	57,652	0,000
Suma de esfuer-zos	0,000	-0,000	-579,888	-3400,353	-57,652	-0,000
Verificación	0,000	-0,000	0,000	0,000	-0,000	0,000
Precisión:	6,23592e-006		1,76699e-015			
Caso 2	Viento					
Suma final	144,515	0,000	0,009	0,000	0,000	-0,000
Suma de reacci-ones <	144,515	0,000	-0,000	-0,000	487,101	-867,968
Suma de esfuer-zos	-144,515	0,000	-0,000	-0,000	-487,101	867,971
Verificación	-0,000	0,000	-0,000	-0,000	-0,000	0,003
Precisión:	4,70475e-005		9,89318e-012			
Caso 3	SobrecargaMantenim					
Suma final	0,000	-0,000	12,713	-0,000	-0,000	-0,000
Suma de reacci-ones <	0,000	-0,000	12,714	76,282	8,709	0,000
Suma de esfuer-zos	0,000	0,000	-12,714	-76,282	-8,709	-0,000
Verificación	0,000	-0,000	-0,000	0,000	-0,000	0,000
Precisión:	3,20358e-006		2,22855e-013			
Caso 4	Sismo Eje Y					
Suma final	0,000	-44,100	-0,005	-0,000	-0,000	0,000
Suma de reacci-ones <	0,000	-44,100	0,000	276,463	0,000	-50,894
Suma de esfuer-zos	0,0	44,100	0,0	-276,463	0,0	50,891
Verificación	0,000	-0,000	0,000	0,000	0,000	-0,002
Precisión:	2,39091e-011		5,66615e-011			

Nudo/Caso	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
Caso 5	Sismo Eje X					
Suma final	44,100	0,000	0,002	0,000	0,000	-0,000
Suma de reacciones <	44,100	0,000	-0,000	-0,000	276,463	-264,598
Suma de esfuerzos	-44,100	0,0	0,0	0,0	-276,463	264,600
Verificación	-0,000	0,000	-0,000	-0,000	-0,000	0,002
Precisión:	2,06138e-013		1,79610e-011			
Caso 6	Nieve					
Suma final	0,000	-0,000	7,946	-0,000	-0,000	-0,000
Suma de reacciones <	0,000	-0,000	7,946	47,676	5,443	0,000
Suma de esfuerzos	-0,000	0,000	-7,946	-47,676	-5,443	0,000
Verificación	0,000	-0,000	-0,000	0,000	-0,000	0,000
Precisión:	3,00451e-006		2,23916e-013			
Caso ULS+	ULS+					
Suma final	222,705	4,044	1174,402	0,000	0,000	0,000
Suma de reacciones <	0,000	-0,000	475,829	2791,796	54,286	0,000
Suma de esfuerzos	0,000	-0,000	-475,829	-2791,796	-54,286	-0,000
Verificación	0,000	-0,000	0,000	0,000	-0,000	0,000
Precisión:	9,49550e-006		3,37288e-013			
Caso ULS-	ULS-					
Suma final	-5,992	-4,044	66,494	-0,000	-0,000	-0,000
Suma de reacciones <	0,000	-0,000	475,829	2791,796	54,286	0,000
Suma de esfuerzos	0,000	-0,000	-475,829	-2791,796	-54,286	-0,000
Verificación	0,000	-0,000	0,000	0,000	-0,000	0,000
Precisión:	9,49550e-006		3,37288e-013			
Caso SLS+	SLS+					
Suma final	147,488	2,643	840,315	-0,000	0,000	-0,000
Suma de reacciones <	0,000	-0,000	581,477	3409,888	58,740	0,000
Suma de esfuerzos	0,000	-0,000	-581,477	-3409,888	-58,740	-0,000
Verificación	0,000	-0,000	0,000	0,000	-0,000	0,000
Precisión:	6,83683e-006		4,65502e-014			
Caso SLS-	SLS-					
Suma final	-3,013	-2,643	312,105	-0,000	-0,000	-0,000
Suma de reacciones <	0,000	-0,000	581,477	3409,888	58,740	0,000
Suma de esfuerzos	0,000	-0,000	-581,477	-3409,888	-58,740	-0,000
Verificación	0,000	-0,000	0,000	0,000	-0,000	0,000
Precisión:	6,83683e-006		4,65502e-014			
Caso ACC+	ACC+					
Suma final	57,216	44,100	872,390	0,000	0,000	0,000
Suma de reacciones <	-44,100	-0,000	579,888	3400,353	-218,811	264,599

Nudo/Caso	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
Suma de esfuer-zos	44,100	-0,000	-579,888	-3400,353	218,811	-264,600
Verificación	0,000	-0,000	0,000	0,000	0,000	-0,001
Precisión:	6,23592e-006		-1,79592e-011			
Caso ACC-	ACC-					
Suma final	-57,216	-44,100	275,221	-0,000	-0,000	-0,000
Suma de reacci-ones <	-44,100	-0,000	579,888	3400,353	-218,811	264,599
Suma de esfuer-zos	44,100	-0,000	-579,888	-3400,353	218,811	-264,600
Verificación	0,000	-0,000	0,000	0,000	0,000	-0,001
Precisión:	6,23592e-006		-1,79592e-011			

Esfuerzos - Envolvente

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
1 / MAX	86,945	7,799	17,584	1,804	10,335	21,599
1 / MIN	-45,862	-33,001	-45,924	-0,633	-27,420	-8,774
2 / MAX	15,479	44,425	17,089	0,464	27,403	25,208
2 / MIN	-43,796	-68,823	-45,822	-2,244	-10,024	-37,223
3 / MAX	4,224	0,322	3,389	0,064	2,595	0,290
3 / MIN	-2,902	-0,165	-3,070	-0,288	-2,779	-0,282
4 / MAX	25,949	25,800	21,139	1,037	12,252	6,841
4 / MIN	-9,234	0,286	-49,750	-1,915	-29,551	-12,250
5 / MAX	27,008	1,001	3,491	0,659	1,797	0,949
5 / MIN	-9,964	-1,391	-1,652	-0,602	-2,611	-0,972
6 / MAX	9,100	0,268	1,753	0,122	1,273	0,357
6 / MIN	-14,905	-0,700	-0,613	-0,244	-1,321	-0,680
7 / MAX	11,752	1,569	3,711	0,085	2,729	0,871
7 / MIN	-34,398	-0,854	-1,807	-0,207	-1,980	-1,317
8 / MAX	9,908	0,564	1,111	0,064	0,306	1,529
8 / MIN	-20,709	-2,070	-1,186	-0,144	-0,470	-1,567
9 / MAX	4,713	0,535	0,781	0,195	0,505	0,914
9 / MIN	-1,688	-1,363	-0,340	-0,079	-0,184	-0,953
10 / MAX	11,979	1,206	1,046	0,199	0,379	0,810
10 / MIN	-15,036	-0,654	-0,420	-0,098	-0,680	-0,842
11 / MAX	22,660	0,262	0,863	0,059	0,830	0,909
11 / MIN	-2,687	-1,181	-1,186	-0,167	-0,926	-0,839
12 / MAX	-0,229	0,274	1,527	0,086	0,549	0,990
12 / MIN	-13,493	-1,308	-2,471	-0,075	-0,967	-1,091
13 / MAX	1,510	0,113	0,961	0,117	0,547	0,956
13 / MIN	-6,268	-1,337	-0,313	-0,055	-0,299	-0,876
14 / MAX	10,497	-0,031	0,781	0,052	0,645	0,700
14 / MIN	-2,666	-0,914	-0,338	-0,036	-0,511	-0,654
15 / MAX	1,241	0,748	0,801	0,152	0,315	0,627
15 / MIN	-3,555	-0,912	-0,276	-0,097	-0,328	-0,622
16 / MAX	6,731	0,302	1,468	0,070	0,805	0,741
16 / MIN	-5,515	-1,227	-2,594	-0,059	-0,951	-1,187
17 / MAX	3,593	0,127	0,934	0,058	0,386	0,895

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
17 / MIN	-0,969	-1,393	-0,282	-0,046	-0,416	-1,015
18 / MAX	5,683	0,190	0,963	0,051	0,646	0,524
18 / MIN	-3,403	-0,780	-0,365	-0,043	-0,779	-0,630
19 / MAX	4,479	0,727	1,086	0,193	0,308	0,534
19 / MIN	-5,359	-0,493	-0,285	-0,074	-0,591	-0,463
20 / MAX	40,014	24,218	8,880	0,437	2,134	6,394
20 / MIN	-0,886	-12,746	-4,762	-1,350	-1,193	-4,695
21 / MAX	70,707	4,514	1,068	0,057	0,735	1,950
21 / MIN	-8,622	-3,319	-1,380	-0,127	-0,631	-2,323
22 / MAX	140,762	10,663	1,496	0,116	1,301	3,391
22 / MIN	2,547	-8,391	-4,053	-0,213	-1,374	-3,559
23 / MAX	50,308	3,421	0,973	0,050	0,711	1,406
23 / MIN	-85,273	-0,784	-1,835	-0,039	-0,500	-0,724
24 / MAX	15,887	1,455	0,158	0,117	1,268	0,826
24 / MIN	-95,861	-0,527	-2,402	-0,196	-1,110	-0,568
25 / MAX	47,464	43,891	6,997	0,415	1,131	6,168
25 / MIN	-73,164	-14,371	-2,911	-1,588	-1,353	-12,582
26 / MAX	-0,281	2,423	1,498	0,032	2,753	0,360
26 / MIN	-9,987	-2,719	-15,173	-0,248	-2,634	-0,788
27 / MAX	2,286	1,566	2,579	0,045	1,273	0,609
27 / MIN	-77,965	-0,340	-0,360	-0,117	-1,281	-0,745
28 / MAX	-2,196	2,007	1,208	0,125	0,695	0,542
28 / MIN	-114,333	-0,175	-1,192	-0,226	-0,424	-0,696
29 / MAX	17,139	1,615	0,449	0,560	0,872	1,576
29 / MIN	-22,101	-3,054	-1,205	-0,622	-0,834	-2,346
30 / MAX	76,676	1,153	0,595	0,014	0,346	0,737
30 / MIN	-8,989	-0,206	-0,243	-0,051	-0,659	-0,257
31 / MAX	6,253	0,516	0,071	0,094	0,742	0,183
31 / MIN	-61,453	-0,608	-0,863	-0,021	-0,570	-0,235
32 / MAX	34,413	0,683	2,647	0,136	1,544	1,003
32 / MIN	-64,794	-1,143	-1,070	-0,300	-2,484	-0,790
33 / MAX	83,293	0,337	0,487	0,062	0,493	0,794
33 / MIN	-22,764	-1,083	-0,100	-0,098	-0,374	-0,783
34 / MAX	15,611	0,222	0,278	0,065	0,417	0,412
34 / MIN	-58,121	-0,927	-0,562	-0,050	-0,560	-0,903
35 / MAX	7,381	3,318	7,845	0,027	1,386	0,590
35 / MIN	-10,244	-3,401	-7,501	-0,124	-1,399	-0,632
36 / MAX	40,867	1,183	1,472	0,051	0,868	0,530
36 / MIN	-15,117	-0,711	-1,140	-0,196	-0,589	-0,445
37 / MAX	58,681	1,772	1,569	0,030	0,850	0,308
37 / MIN	-47,446	-0,822	-2,826	-0,031	-1,015	-0,818
38 / MAX	25,028	0,272	0,611	0,113	0,978	0,602
38 / MIN	0,647	-0,638	-1,356	-0,226	-1,086	-0,261
39 / MAX	3,083	0,186	0,346	0,009	0,342	0,460
39 / MIN	-54,474	-0,763	-0,413	-0,104	-0,454	-0,424
40 / MAX	39,531	0,198	0,417	0,065	0,411	0,272
40 / MIN	-3,901	-0,549	-0,138	-0,025	-0,265	-0,337
41 / MAX	26,624	1,084	0,308	0,176	0,572	0,729
41 / MIN	-18,947	-0,627	-0,889	-0,097	-0,687	-0,406
42 / MAX	43,422	0,641	0,351	0,134	0,277	0,258
42 / MIN	-41,964	-0,754	-0,232	-0,038	-0,316	-0,467
43 / MAX	31,629	0,833	0,142	0,101	0,505	0,425
43 / MIN	-28,595	-0,467	-0,556	-0,111	-0,355	-0,375
44 / MAX	0,333	0,195	1,416	0,074	0,774	0,633
44 / MIN	-13,355	-1,036	-2,693	-0,062	-1,136	-0,943

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
45 / MAX	1,322	0,087	1,184	0,070	0,694	0,629
45 / MIN	-5,385	-0,887	-0,349	-0,034	-0,402	-0,586
46 / MAX	11,381	0,043	1,102	0,043	0,895	0,431
46 / MIN	-2,204	-0,548	-0,419	-0,026	-0,736	-0,387
47 / MAX	1,141	0,456	1,000	0,115	0,496	0,438
47 / MIN	-5,265	-0,527	-0,335	-0,095	-0,481	-0,354
48 / MAX	6,912	0,170	1,393	0,060	0,956	0,427
48 / MIN	-6,406	-0,946	-2,730	-0,049	-1,039	-0,972
49 / MAX	5,369	0,073	1,070	0,030	0,471	0,547
49 / MIN	-1,184	-0,854	-0,329	-0,030	-0,525	-0,623
50 / MAX	6,720	0,163	1,148	0,035	0,770	0,295
50 / MIN	-3,904	-0,442	-0,426	-0,025	-0,928	-0,360
51 / MAX	4,047	0,396	1,199	0,155	0,389	0,293
51 / MIN	-6,457	-0,299	-0,344	-0,095	-0,706	-0,274
52 / MAX	165,598	4,537	1,809	0,034	0,941	2,025
52 / MIN	2,479	-3,856	-1,315	-0,033	-0,849	-2,271
53 / MAX	211,410	9,801	1,162	0,093	1,434	2,985
53 / MIN	-0,718	-8,313	-4,379	-0,183	-1,457	-3,397
54 / MAX	73,765	2,961	1,528	0,077	0,517	1,301
54 / MIN	-104,167	-0,202	-0,975	-0,018	-0,551	-0,540
55 / MAX	47,692	1,597	0,143	0,092	1,323	0,821
55 / MIN	-114,409	-0,515	-1,993	-0,169	-0,683	-0,525
56 / MAX	-2,261	0,528	2,600	0,031	1,511	0,339
56 / MIN	-174,091	-1,092	-0,244	-0,028	-1,064	-0,650
57 / MAX	-3,415	2,238	0,592	0,100	0,633	0,424
57 / MIN	-196,590	-0,159	-1,814	-0,191	-0,626	-0,933
58 / MAX	51,955	0,882	0,448	-0,001	0,411	0,398
58 / MIN	-5,978	-0,517	-0,074	-0,082	-0,380	-0,191
59 / MAX	3,793	0,413	0,043	0,100	0,785	0,189
59 / MIN	-41,541	-0,725	-0,845	-0,015	-0,517	-0,268
60 / MAX	56,308	0,358	0,543	0,096	0,633	0,470
60 / MIN	-15,573	-0,811	-0,195	-0,049	-0,381	-0,544
61 / MAX	9,206	0,360	0,316	0,055	0,530	0,339
61 / MIN	-34,388	-0,783	-0,721	-0,069	-0,651	-0,807
62 / MAX	92,239	1,005	1,252	0,091	0,940	0,321
62 / MIN	-50,815	-0,665	0,035	-0,166	-0,463	-0,482
63 / MAX	103,823	1,852	1,106	0,072	0,869	0,279
63 / MIN	-70,981	-0,875	-2,894	-0,004	-1,041	-0,902
64 / MAX	1,784	0,209	0,131	0,020	0,198	0,380
64 / MIN	-36,726	-0,739	-0,264	-0,094	-0,347	-0,460
65 / MAX	23,154	0,483	0,479	0,094	0,450	0,249
65 / MIN	-5,101	-0,386	-0,181	-0,015	-0,337	-0,366
66 / MAX	31,965	0,760	0,500	0,167	0,475	0,421
66 / MIN	-25,299	-0,914	-0,124	-0,037	-0,438	-0,615
67 / MAX	18,849	0,861	-0,017	0,095	0,612	0,412
67 / MIN	-14,855	-0,462	-0,632	-0,138	-0,501	-0,424
68 / MAX	0,109	0,308	1,417	0,064	0,823	0,423
68 / MIN	-13,498	-0,748	-2,709	-0,058	-1,150	-0,740
69 / MAX	2,038	0,029	1,207	0,024	0,725	0,333
69 / MIN	-4,548	-0,481	-0,372	-0,013	-0,423	-0,326
70 / MAX	11,862	0,091	1,184	0,025	0,959	0,201
70 / MIN	-2,222	-0,228	-0,455	-0,011	-0,794	-0,152
71 / MAX	0,938	0,341	1,045	0,107	0,540	0,349
71 / MIN	-5,583	-0,375	-0,361	-0,098	-0,517	-0,328
72 / MAX	7,314	0,460	1,392	0,052	0,978	0,583

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
72 / MIN	-6,639	-0,645	-2,734	-0,048	-1,039	-0,738
73 / MAX	6,355	0,030	1,090	0,027	0,489	0,186
73 / MIN	-1,304	-0,297	-0,346	-0,034	-0,549	-0,221
74 / MAX	7,069	0,143	1,177	0,015	0,791	0,131
74 / MIN	-4,082	-0,146	-0,443	-0,012	-0,951	-0,108
75 / MAX	4,042	0,364	1,206	0,133	0,404	0,244
75 / MIN	-7,170	-0,271	-0,364	-0,117	-0,727	-0,312
76 / MAX	222,671	4,242	2,161	0,054	1,107	1,850
76 / MIN	3,130	-3,956	-1,301	-0,010	-1,032	-2,183
77 / MAX	245,599	8,987	1,071	0,062	1,461	2,752
77 / MIN	-2,280	-8,205	-4,403	-0,139	-1,445	-3,205
78 / MAX	84,224	2,248	2,199	0,100	0,797	1,051
78 / MIN	-128,188	-0,455	-0,501	-0,039	-0,737	-0,458
79 / MAX	70,895	1,111	0,033	0,062	1,312	0,667
79 / MIN	-132,551	-0,736	-1,851	-0,125	-0,786	-0,324
80 / MAX	-3,437	0,323	2,444	0,047	1,548	0,475
80 / MIN	-231,098	-1,578	-0,133	-0,023	-0,910	-0,951
81 / MAX	-3,949	2,197	0,088	0,071	1,129	0,386
81 / MIN	-238,701	-0,193	-2,463	-0,143	-0,815	-0,996
82 / MAX	25,577	0,861	0,619	-0,001	0,635	0,318
82 / MIN	-2,791	-0,570	-0,040	-0,112	-0,521	-0,197
83 / MAX	0,957	0,386	0,012	0,100	0,746	0,262
83 / MIN	-20,471	-0,760	-0,752	-0,005	-0,522	-0,248
84 / MAX	32,746	0,440	0,630	0,122	0,671	0,435
84 / MIN	-14,030	-0,853	-0,226	-0,043	-0,519	-0,623
85 / MAX	7,775	0,574	0,330	0,048	0,589	0,430
85 / MIN	-15,593	-0,637	-0,753	-0,090	-0,632	-0,697
86 / MAX	123,170	0,906	1,501	0,062	1,056	0,400
86 / MIN	-74,209	-1,157	-0,004	-0,122	-0,748	-0,668
87 / MAX	128,524	1,645	0,617	0,093	0,996	0,341
87 / MIN	-81,678	-1,089	-2,732	-0,039	-0,924	-0,823
88 / MAX	1,152	0,259	0,140	0,026	0,175	0,403
88 / MIN	-18,281	-0,801	-0,259	-0,115	-0,300	-0,566
89 / MAX	7,849	0,686	0,500	0,109	0,418	0,372
89 / MIN	-5,650	-0,260	-0,200	-0,014	-0,396	-0,511
90 / MAX	17,697	0,717	0,649	0,177	0,671	0,393
90 / MIN	-10,110	-0,932	-0,133	-0,020	-0,547	-0,612
91 / MAX	6,949	0,863	-0,020	0,096	0,646	0,394
91 / MIN	-1,104	-0,500	-0,663	-0,157	-0,579	-0,457
92 / MAX	-0,103	0,632	1,424	0,055	0,828	0,649
92 / MIN	-13,088	-0,535	-2,700	-0,063	-1,142	-0,586
93 / MAX	2,300	0,020	1,200	0,007	0,719	0,051
93 / MIN	-4,038	-0,076	-0,372	-0,020	-0,419	-0,056
94 / MAX	11,652	0,295	1,195	0,006	0,967	0,203
94 / MIN	-2,259	-0,075	-0,463	-0,008	-0,802	-0,233
95 / MAX	0,714	0,451	1,046	0,106	0,541	0,259
95 / MIN	-5,584	-0,247	-0,361	-0,101	-0,517	-0,408
96 / MAX	7,836	0,782	1,398	0,044	0,970	0,835
96 / MIN	-6,272	-0,557	-2,726	-0,056	-1,034	-0,664
97 / MAX	6,669	0,269	1,082	0,024	0,488	0,187
97 / MIN	-1,360	-0,045	-0,347	-0,034	-0,546	-0,181
98 / MAX	6,831	0,338	1,159	0,015	0,778	0,265
98 / MIN	-4,079	-0,072	-0,433	-0,022	-0,937	-0,234
99 / MAX	4,435	0,402	1,209	0,126	0,404	0,225
99 / MIN	-7,285	-0,304	-0,362	-0,139	-0,727	-0,337

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
100 / MAX	243,621	3,949	2,351	0,084	1,192	1,874
100 / MIN	2,452	-4,316	-1,288	-0,038	-1,135	-2,351
101 / MAX	243,674	8,200	1,255	0,030	1,403	2,730
101 / MIN	-2,294	-8,288	-4,157	-0,112	-1,341	-2,984
102 / MAX	81,728	1,517	2,492	0,149	1,186	0,677
102 / MIN	-134,161	-1,376	-0,029	-0,072	-0,806	-0,442
103 / MAX	81,141	0,646	0,004	0,030	1,119	0,759
103 / MIN	-132,579	-1,167	-1,592	-0,076	-0,778	-0,374
104 / MAX	-3,938	0,329	2,039	0,086	1,398	0,560
104 / MIN	-247,784	-1,839	-0,011	-0,044	-0,872	-1,082
105 / MAX	-3,813	1,799	0,168	0,038	1,453	0,340
105 / MIN	-240,395	-0,302	-3,178	-0,092	-0,884	-0,882
106 / MAX	2,976	0,828	0,687	0,002	0,749	0,235
106 / MIN	-6,292	-0,614	-0,005	-0,122	-0,579	-0,251
107 / MAX	2,677	0,357	0,027	0,090	0,604	0,325
107 / MIN	-3,766	-0,789	-0,636	0,002	-0,473	-0,213
108 / MAX	13,218	0,520	0,653	0,127	0,634	0,453
108 / MIN	-13,602	-0,809	-0,239	-0,042	-0,599	-0,601
109 / MAX	15,535	0,766	0,325	0,040	0,633	0,533
109 / MIN	-3,490	-0,486	-0,747	-0,101	-0,577	-0,576
110 / MAX	131,621	0,794	1,778	0,029	1,003	0,450
110 / MIN	-84,691	-1,462	-0,264	-0,092	-0,890	-0,894
111 / MAX	130,625	1,236	0,121	0,144	1,207	0,338
111 / MIN	-79,428	-1,448	-2,525	-0,071	-0,812	-0,676
112 / MAX	1,860	0,292	0,136	0,024	0,213	0,394
112 / MIN	-0,719	-0,779	-0,244	-0,124	-0,233	-0,567
113 / MAX	0,048	0,808	0,504	0,107	0,375	0,443
113 / MIN	-15,623	-0,228	-0,206	-0,026	-0,443	-0,598
114 / MAX	8,882	0,682	0,691	0,180	0,756	0,416
114 / MIN	0,158	-0,960	-0,141	-0,014	-0,584	-0,602
115 / MAX	12,114	0,860	0,070	0,099	0,582	0,372
115 / MIN	-8,221	-0,538	-0,688	-0,165	-0,597	-0,474
116 / MAX	-0,168	0,951	1,431	0,049	0,810	0,872
116 / MIN	-12,081	-0,535	-2,687	-0,073	-1,128	-0,586
117 / MAX	1,909	0,382	1,185	0,028	0,695	0,233
117 / MIN	-3,876	-0,091	-0,353	-0,059	-0,403	-0,292
118 / MAX	10,803	0,644	1,162	0,022	0,941	0,447
118 / MIN	-2,243	-0,071	-0,448	-0,032	-0,779	-0,506
119 / MAX	0,492	0,579	1,020	0,105	0,513	0,324
119 / MIN	-4,865	-0,358	-0,341	-0,105	-0,494	-0,497
120 / MAX	8,256	1,094	1,447	0,039	0,910	1,078
120 / MIN	-5,343	-0,557	-2,658	-0,063	-0,990	-0,664
121 / MAX	6,174	0,849	1,021	0,039	0,456	0,607
121 / MIN	-1,340	-0,104	-0,328	-0,050	-0,502	-0,556
122 / MAX	6,070	0,583	1,068	0,035	0,715	0,468
122 / MIN	-4,071	-0,070	-0,393	-0,047	-0,866	-0,408
123 / MAX	5,166	0,468	1,188	0,128	0,377	0,431
123 / MIN	-6,903	-0,658	-0,334	-0,164	-0,690	-0,470
124 / MAX	228,478	3,660	2,376	0,134	1,196	1,945
124 / MIN	2,832	-4,671	-1,287	-0,071	-1,156	-2,484
125 / MAX	205,600	7,409	1,691	0,005	1,268	2,712
125 / MIN	-1,641	-8,933	-3,662	-0,077	-1,149	-3,107
126 / MAX	66,268	1,016	2,882	0,192	1,391	0,933
126 / MIN	-122,013	-2,375	-0,204	-0,101	-0,742	-0,547
127 / MAX	78,439	0,253	0,238	0,011	0,745	0,956

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
127 / MIN	-114,542	-1,547	-1,300	-0,050	-0,644	-0,387
128 / MAX	-3,771	0,353	1,501	0,135	1,069	0,563
128 / MIN	-224,109	-1,871	0,008	-0,075	-0,739	-1,048
129 / MAX	-3,007	1,181	0,369	0,013	1,588	0,301
129 / MIN	-201,712	-0,730	-3,834	-0,055	-0,942	-0,608
130 / MAX	3,987	0,795	0,674	0,004	0,743	0,172
130 / MIN	-25,553	-0,636	-0,007	-0,115	-0,551	-0,284
131 / MAX	24,270	0,328	0,125	0,063	0,387	0,385
131 / MIN	-4,796	-0,810	-0,478	0,001	-0,346	-0,179
132 / MAX	8,875	0,599	0,640	0,117	0,551	0,470
132 / MIN	-30,855	-0,680	-0,240	-0,044	-0,643	-0,605
133 / MAX	34,213	0,877	0,303	0,035	0,646	0,649
133 / MIN	-10,109	-0,411	-0,702	-0,097	-0,492	-0,635
134 / MAX	117,533	0,674	1,794	0,010	0,878	0,451
134 / MIN	-82,240	-1,581	-0,530	-0,068	-0,943	-0,957
135 / MAX	110,199	0,691	0,068	0,191	1,250	0,386
135 / MIN	-64,234	-1,790	-2,520	-0,101	-0,571	-0,709
136 / MAX	19,400	0,342	0,124	0,019	0,276	0,326
136 / MIN	0,512	-0,672	-0,242	-0,115	-0,175	-0,461
137 / MAX	-0,197	0,848	0,493	0,094	0,327	0,492
137 / MIN	-28,262	-0,180	-0,199	-0,032	-0,472	-0,594
138 / MAX	22,431	0,656	0,653	0,171	0,728	0,458
138 / MIN	-13,088	-0,981	-0,148	-0,020	-0,533	-0,586
139 / MAX	24,587	0,840	0,168	0,102	0,490	0,373
139 / MIN	-21,702	-0,570	-0,647	-0,165	-0,556	-0,475
140 / MAX	-0,153	1,265	1,536	0,050	0,686	1,092
140 / MIN	-10,636	-0,534	-2,520	-0,073	-0,990	-0,890
141 / MAX	0,795	0,808	1,050	0,050	0,585	0,508
141 / MIN	-4,364	-0,151	-0,304	-0,110	-0,329	-0,599
142 / MAX	9,129	0,990	0,985	0,037	0,799	0,687
142 / MIN	-2,253	-0,069	-0,396	-0,046	-0,659	-0,778
143 / MAX	0,368	0,813	0,888	0,105	0,401	0,531
143 / MIN	-3,955	-0,655	-0,288	-0,117	-0,402	-0,583
144 / MAX	9,884	1,383	1,657	0,043	0,659	1,300
144 / MIN	-4,803	-0,566	-2,338	-0,062	-0,774	-0,849
145 / MAX	4,207	1,619	0,791	0,058	0,317	1,125
145 / MIN	-1,630	-0,088	-0,294	-0,085	-0,334	-1,093
146 / MAX	4,979	0,894	0,757	0,043	0,500	0,692
146 / MIN	-4,370	-0,069	-0,320	-0,060	-0,620	-0,636
147 / MAX	6,197	0,679	0,993	0,128	0,259	0,669
147 / MIN	-6,525	-1,019	-0,276	-0,190	-0,529	-0,726
148 / MAX	176,961	3,360	2,230	0,178	1,119	2,198
148 / MIN	3,134	-5,037	-1,295	-0,102	-1,089	-2,593
149 / MAX	130,992	6,583	2,279	0,043	1,105	3,011
149 / MIN	-0,669	-9,673	-3,010	-0,053	-0,903	-3,286
150 / MAX	37,789	1,099	3,174	0,221	1,440	1,179
150 / MIN	-91,491	-3,399	-0,427	-0,125	-0,655	-0,978
151 / MAX	62,787	0,242	0,472	0,043	0,394	0,999
151 / MIN	-78,390	-1,713	-0,765	-0,042	-0,400	-0,407
152 / MAX	-2,931	0,359	0,944	0,179	0,544	0,530
152 / MIN	-160,299	-1,648	-0,250	-0,103	-0,480	-0,832
153 / MAX	-1,520	0,510	0,644	0,036	1,435	0,304
153 / MIN	-123,249	-1,622	-3,543	-0,034	-0,903	-0,679
154 / MAX	7,189	0,750	0,558	0,007	0,612	0,198
154 / MIN	-49,666	-0,653	-0,014	-0,094	-0,433	-0,295

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
155 / MAX	47,622	0,330	0,329	0,036	0,392	0,403
155 / MIN	-7,165	-0,795	-0,162	-0,016	-0,127	-0,166
156 / MAX	16,308	0,676	0,561	0,094	0,427	0,486
156 / MIN	-52,497	-0,466	-0,224	-0,042	-0,621	-0,650
157 / MAX	56,852	0,899	0,255	0,035	0,553	0,776
157 / MIN	-17,121	-0,399	-0,533	-0,070	-0,310	-0,602
158 / MAX	81,047	0,550	1,842	0,038	0,864	0,376
158 / MIN	-66,860	-1,456	-0,786	-0,042	-0,959	-0,848
159 / MAX	67,675	0,342	0,401	0,225	1,142	0,638
159 / MIN	-35,921	-2,190	-2,396	-0,125	-0,439	-0,720
160 / MAX	38,164	0,415	0,100	0,015	0,317	0,198
160 / MIN	0,667	-0,480	-0,256	-0,085	-0,152	-0,277
161 / MAX	-0,316	0,795	0,398	0,079	0,221	0,512
161 / MIN	-41,277	-0,106	-0,180	-0,027	-0,426	-0,488
162 / MAX	37,747	0,646	0,521	0,149	0,591	0,516
162 / MIN	-28,853	-0,968	-0,154	-0,039	-0,441	-0,549
163 / MAX	35,734	0,757	0,275	0,105	0,400	0,375
163 / MIN	-36,865	-0,653	-0,544	-0,160	-0,462	-0,424
164 / MAX	26,441	18,456	18,609	2,012	28,174	9,209
164 / MIN	-68,606	-7,545	-46,923	-0,365	-11,111	-4,448
165 / MAX	291,058	22,241	6,993	2,134	45,145	43,271
165 / MIN	-16,945	-22,390	-19,393	-2,057	-17,798	-38,498
166 / MAX	291,936	22,407	5,025	4,916	5,384	46,051
166 / MIN	-16,933	-22,697	-20,422	-3,972	-18,730	-41,243
167 / MAX	3,802	1,377	0,330	0,114	3,213	2,464
167 / MIN	-2,777	-3,132	-1,791	-0,022	-2,984	-2,248
168 / MAX	114,790	21,548	10,166	3,812	17,675	45,078
168 / MIN	-165,549	-21,693	-17,407	-4,639	-6,926	-40,684
169 / MAX	115,947	21,785	7,054	0,749	17,428	42,601
169 / MIN	-168,425	-21,859	-19,306	-2,832	-45,228	-38,108
170 / MAX	87,384	3,432	2,050	0,203	1,076	2,114
170 / MIN	-10,894	-4,908	-1,310	-0,125	-0,953	-2,549
171 / MAX	226,791	3,654	8,902	0,661	6,150	0,776
171 / MIN	4,153	-14,236	-12,396	-0,142	-4,594	-3,232
172 / MAX	13,009	0,690	1,013	0,018	0,581	1,240
172 / MIN	-37,276	-0,864	-0,685	-0,104	-1,207	-1,658
173 / MAX	39,479	0,524	1,323	0,135	0,592	1,049
173 / MIN	-22,735	-2,001	0,004	-0,065	-0,721	-0,642
174 / MAX	-1,439	0,353	0,067	0,199	1,201	0,307
174 / MIN	-59,163	-0,945	-2,593	-0,019	-1,366	-0,415
175 / MAX	11,380	0,091	0,840	0,121	0,387	0,404
175 / MIN	-37,420	0,000	-0,499	-0,194	-0,528	-0,834
176 / MAX	10,824	0,698	0,333	0,018	0,258	0,163
176 / MIN	-68,526	-0,675	-0,175	-0,069	-0,308	-0,271
177 / MAX	24,707	0,905	0,367	0,064	0,304	0,470
177 / MIN	-80,285	-0,337	-0,184	-0,038	-0,465	-0,857
178 / MAX	71,383	9,360	251,421	0,256	54,709	5,284
178 / MIN	0,533	-22,030	-22,702	-5,775	-20,968	-2,311
179 / MAX	38,768	0,199	1,751	0,111	0,864	0,546
179 / MIN	-44,544	-1,476	-0,986	-0,008	-0,869	-0,719
180 / MAX	23,700	9,360	127,783	5,361	25,919	2,443
180 / MIN	-44,513	-22,030	-117,064	-1,480	-40,415	-5,042
181 / MAX	56,664	0,627	0,255	0,094	0,371	0,311
181 / MIN	0,843	-0,177	-0,317	-0,001	-0,262	-0,381
182 / MAX	53,761	0,467	0,433	0,115	0,475	0,737

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
182 / MIN	-43,333	-1,162	-0,177	-0,069	-0,330	-0,558
183 / MAX	10,380	2,076	1,382	0,151	0,481	1,582
183 / MIN	-7,889	-0,554	-0,915	-0,074	-0,470	-1,547
184 / MAX	31,438	0,494	1,131	0,109	0,730	0,568
184 / MIN	0,482	-0,874	-0,467	-0,209	-0,385	-0,629
185 / MAX	10,713	1,384	1,251	0,136	0,963	1,060
185 / MIN	-8,873	-0,059	-0,919	-0,034	-0,888	-1,023
186 / MAX	2,797	0,953	0,805	0,100	0,166	0,676
186 / MIN	-6,839	-0,980	-0,362	-0,200	-0,538	-0,666
187 / MAX	37,115	0,735	3,729	0,163	2,012	0,763
187 / MIN	-13,069	-1,404	-1,815	-0,092	-2,722	-1,174
188 / MAX	8,840	0,704	3,879	0,174	2,955	1,029
188 / MIN	-15,971	-1,402	-2,065	-0,188	-1,985	-0,892
189 / MAX	20,806	1,000	0,712	0,177	1,393	0,828
189 / MIN	-2,728	-0,033	-1,852	-0,018	-1,349	-0,656
190 / MAX	35,257	4,208	3,454	1,744	1,443	6,832
190 / MIN	0,534	-28,089	-8,605	-0,581	-1,611	-4,616
191 / MAX	8,432	5,585	4,414	1,345	1,116	2,018
191 / MIN	-30,127	-17,100	-7,120	-0,428	-1,876	-4,399
192 / MAX	3,444	0,537	4,113	0,074	1,202	1,406
192 / MIN	-12,050	-7,634	-6,273	-0,042	-1,073	-1,270
193 / MAX	29,576	0,680	0,182	0,113	0,542	0,769
193 / MIN	-8,174	-1,127	-0,693	-0,190	-0,438	-0,426
194 / MAX	50,621	1,582	2,687	0,313	2,477	1,263
194 / MIN	-19,389	-0,569	-1,126	-0,122	-1,614	-1,004
195 / MAX	8,389	3,152	5,010	0,195	1,887	1,147
195 / MIN	-2,625	-3,709	-10,046	-0,065	-1,680	-0,429
196 / MAX	0,631	0,961	0,686	0,136	1,137	0,748
196 / MIN	-23,780	-0,156	-1,410	-0,026	-1,009	-0,570
197 / MAX	21,537	3,350	1,119	0,264	0,885	1,742
197 / MIN	-28,184	-1,871	-0,592	-0,175	-0,699	-2,599
198 / MAX	99,038	2,885	5,503	0,464	3,747	0,475
198 / MIN	-89,858	-10,291	-6,837	-0,142	-5,857	-2,067
199 / MAX	12,443	0,344	0,666	0,102	0,503	0,739
199 / MIN	-33,354	-0,617	-0,698	-0,037	-0,792	-1,423
200 / MAX	10,272	0,021	0,368	0,098	0,181	0,185
200 / MIN	-33,745	-0,297	-0,419	-0,004	-0,139	-0,644
201 / MAX	0,212	0,296	1,035	0,066	0,606	0,280
201 / MIN	-0,148	-0,177	-1,255	-0,295	-0,818	-0,248
202 / MAX	80,010	3,210	2,392	0,470	1,240	0,772
202 / MIN	-15,693	-11,006	-1,222	-0,171	-1,514	-2,374
203 / MAX	20,397	3,979	0,357	0,724	1,111	0,551
203 / MIN	-77,073	-14,949	-1,141	-0,098	-1,380	-3,138
204 / MAX	78,986	3,387	2,367	0,276	1,707	1,317
204 / MIN	-16,433	-11,279	-1,313	-0,078	-1,754	-1,029
205 / MAX	10,567	0,250	2,245	0,165	1,113	0,314
205 / MIN	-3,398	-0,422	-0,493	-0,296	-1,120	-0,178
206 / MAX	24,908	0,139	0,761	0,298	0,315	0,402
206 / MIN	-8,195	-0,257	-0,887	-0,532	-0,446	-0,367
207 / MAX	22,774	0,504	0,359	0,282	0,965	0,625
207 / MIN	-7,687	-0,909	-2,169	-0,636	-1,181	-0,515
208 / MAX	10,130	0,190	0,884	0,189	1,780	0,132
208 / MIN	-3,351	-0,344	-3,369	-0,286	-1,746	-0,227
209 / MAX	15,033	1,423	5,025	0,384	2,834	1,011
209 / MIN	-2,077	-1,877	-1,233	-0,903	-2,596	-1,092

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
210 / MAX	14,344	2,403	2,141	0,362	3,120	1,281
210 / MIN	-2,125	-1,883	-5,567	-0,859	-2,933	-1,654
211 / MAX	75,731	0,035	2,439	0,394	1,355	0,839
211 / MIN	-16,508	-1,239	-1,592	-0,095	-1,083	-0,430
212 / MAX	223,065	3,819	9,104	0,465	7,028	1,591
212 / MIN	4,263	-14,531	-8,996	-0,152	-5,483	-1,385
213 / MAX	248,682	0,205	8,803	0,530	5,501	0,966
213 / MIN	0,267	-1,276	-8,582	-0,156	-3,960	-0,342
214 / MAX	70,016	0,870	3,202	1,236	2,656	0,817
214 / MIN	-18,034	-2,105	-1,827	-1,074	-2,108	-0,131
215 / MAX	43,953	0,106	2,229	1,222	1,387	0,614
215 / MIN	-11,797	-0,576	-1,706	-0,600	-1,166	-0,188
216 / MAX	14,332	5,708	0,656	0,694	2,724	3,657
216 / MIN	-6,872	-9,974	-0,478	-0,180	-2,797	-3,153
217 / MAX	230,781	0,596	11,640	1,630	11,449	1,043
217 / MIN	-4,397	-1,943	-14,689	-1,195	-8,680	-0,248
218 / MAX	255,543	0,282	11,981	1,263	10,042	0,238
218 / MIN	-14,639	-0,156	-14,620	-0,685	-7,282	-0,352
219 / MAX	259,401	1,969	10,185	0,215	13,305	6,205
219 / MIN	-17,215	-14,080	-20,941	-0,316	-20,515	-3,408
220 / MAX	103,739	1,465	13,237	1,193	9,896	0,295
220 / MIN	-82,656	-1,363	-14,016	-0,948	-10,204	-0,098
221 / MAX	110,728	0,692	13,093	1,273	8,407	0,425
221 / MIN	-96,084	-0,687	-14,426	-0,765	-9,477	-0,704
222 / MAX	120,063	5,849	17,073	0,930	15,910	3,052
222 / MIN	-127,340	-10,433	-15,919	0,014	-19,227	-4,257
223 / MAX	11,086	1,573	2,612	1,892	2,785	0,504
223 / MIN	-44,610	-1,756	-3,542	-1,450	-3,327	-0,267
224 / MAX	3,678	1,542	1,969	1,127	1,147	0,396
224 / MIN	-19,839	-0,248	-2,555	-0,584	-1,911	-1,417
225 / MAX	4,419	1,828	0,730	0,544	2,466	4,951
225 / MIN	-15,920	-13,491	-0,925	-0,048	-2,904	-4,262
226 / MAX	19,984	4,156	0,485	0,575	1,755	1,967
226 / MIN	-76,941	-15,220	-1,509	-0,161	-1,797	-1,202
227 / MAX	10,920	0,023	0,867	0,548	0,973	0,397
227 / MIN	-48,884	-0,166	-1,980	-0,204	-0,996	-0,231
228 / MAX	99,657	3,049	10,180	0,266	5,094	1,339
228 / MIN	-88,223	-10,590	-7,741	-0,047	-7,608	-0,825
229 / MAX	99,599	0,229	9,743	0,392	4,097	0,284
229 / MIN	-90,714	-0,349	-7,696	-0,093	-5,826	-0,377
230 / MAX	6,480	0,532	0,561	0,095	0,129	0,656
230 / MIN	-0,002	-0,178	-0,395	-0,041	-0,434	-0,302
231 / MAX	0,017	0,155	0,215	0,045	0,122	0,191
231 / MIN	-2,727	-0,465	-0,168	-0,134	-0,168	-0,354
232 / MAX	1,360	0,031	0,438	0,016	0,090	0,120
232 / MIN	-0,037	-0,103	-0,073	-0,014	-0,061	-0,042
233 / MAX	0,086	0,023	0,953	0,047	0,112	0,036
233 / MIN	-4,833	-0,066	-0,644	-0,131	-0,275	-0,049
234 / MAX	0,013	0,036	0,771	0,004	0,010	0,025
234 / MIN	-4,336	-0,015	-0,653	-0,010	-0,206	-0,013
235 / MAX	7,721	0,934	0,359	0,358	0,505	2,129
235 / MIN	-8,726	-0,861	-0,660	-0,274	-0,193	-2,130
236 / MAX	1,498	2,241	0,031	0,633	0,105	3,072
236 / MIN	-0,810	-2,299	-0,132	-0,670	-0,057	-3,149
237 / MAX	1,111	0,224	0,421	0,486	0,208	0,199

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
237 / MIN	-0,649	-0,230	-0,788	-0,468	-0,122	-0,177
238 / MAX	8,032	1,770	0,471	0,170	0,116	3,482
238 / MIN	-5,970	-1,785	-0,689	-0,220	-0,141	-3,514
239 / MAX	7,819	1,546	0,475	0,305	0,379	2,083
239 / MIN	-6,498	-1,554	-0,498	-0,313	-0,383	-2,090
240 / MAX	9,392	0,436	0,519	0,030	0,142	0,533
240 / MIN	-0,023	-0,098	-0,275	-0,031	-0,369	-0,253
241 / MAX	0,103	0,086	0,314	0,026	0,085	0,171
241 / MIN	-3,143	-0,373	-0,081	-0,099	-0,282	-0,267
242 / MAX	1,948	0,015	0,686	0,003	0,161	0,088
242 / MIN	-0,046	-0,098	-0,186	-0,018	-0,107	-0,025
243 / MAX	0,223	0,012	1,644	0,028	0,093	0,041
243 / MIN	-6,499	-0,062	-0,890	-0,095	-0,541	-0,034
244 / MAX	0,034	0,036	1,181	0,003	0,003	0,026
244 / MIN	-6,120	-0,003	-1,048	-0,005	-0,299	-0,012
245 / MAX	8,356	0,989	0,375	0,330	0,149	2,145
245 / MIN	-7,747	-0,855	-0,379	-0,334	-0,065	-2,224
246 / MAX	2,161	2,240	0,196	0,619	0,404	3,058
246 / MIN	-1,764	-2,357	-0,432	-0,684	-0,204	-3,142
247 / MAX	1,993	0,224	0,166	0,481	0,082	0,203
247 / MIN	-0,729	-0,253	-0,485	-0,486	-0,110	-0,175
248 / MAX	8,686	1,765	0,924	0,167	0,427	3,468
248 / MIN	-6,514	-1,782	-1,243	-0,228	-0,257	-3,474
249 / MAX	7,920	1,551	0,894	0,308	0,378	2,086
249 / MIN	-6,581	-1,529	-0,864	-0,312	-0,372	-2,071
250 / MAX	9,026	0,336	0,392	0,007	0,043	0,352
250 / MIN	-0,401	-0,094	-0,364	-0,015	-0,183	-0,255
251 / MAX	0,568	0,079	0,522	0,022	0,182	0,165
251 / MIN	-2,639	-0,315	-0,211	-0,097	-0,455	-0,204
252 / MAX	1,737	0,018	0,887	-0,000	0,213	0,079
252 / MIN	-0,419	-0,061	-0,264	-0,019	-0,149	-0,021
253 / MAX	0,318	0,015	1,876	0,024	0,197	0,045
253 / MIN	-6,743	-0,023	-0,768	-0,085	-0,723	-0,012
254 / MAX	0,049	0,039	1,167	0,002	0,003	0,028
254 / MIN	-6,158	-0,003	-1,061	-0,005	-0,286	-0,013
255 / MAX	8,020	0,932	0,210	0,351	0,381	2,131
255 / MIN	-8,068	-0,837	-0,588	-0,321	-0,133	-2,164
256 / MAX	2,066	2,222	0,124	0,638	0,235	3,043
256 / MIN	-1,501	-2,299	-0,213	-0,680	-0,118	-3,116
257 / MAX	1,721	0,224	0,206	0,483	0,098	0,191
257 / MIN	-0,714	-0,242	-0,485	-0,480	-0,092	-0,169
258 / MAX	8,583	1,765	1,124	0,180	0,262	3,469
258 / MIN	-6,435	-1,783	-0,991	-0,229	-0,257	-3,490
259 / MAX	7,904	1,542	0,868	0,308	0,370	2,079
259 / MIN	-6,569	-1,541	-0,890	-0,313	-0,369	-2,079
260 / MAX	9,183	0,286	0,584	0,017	0,173	0,348
260 / MIN	-0,064	-0,066	-0,248	-0,019	-0,461	-0,168
261 / MAX	0,213	0,057	0,399	0,017	0,106	0,113
261 / MIN	-2,724	-0,246	-0,064	-0,066	-0,362	-0,176
262 / MAX	1,831	0,011	0,853	0,001	0,192	0,059
262 / MIN	-0,090	-0,064	-0,191	-0,011	-0,154	-0,016
263 / MAX	0,228	0,009	1,761	0,018	0,082	0,027
263 / MIN	-6,699	-0,040	-0,808	-0,063	-0,633	-0,020
264 / MAX	0,035	0,024	1,183	0,002	0,006	0,017
264 / MIN	-6,150	-0,002	-1,045	-0,004	-0,298	-0,008

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
265 / MAX	8,484	0,937	0,353	0,321	0,181	2,158
265 / MIN	-7,425	-0,881	-0,407	-0,323	-0,057	-2,193
266 / MAX	2,022	2,264	0,249	0,629	0,535	3,081
266 / MIN	-1,945	-2,314	-0,582	-0,657	-0,250	-3,116
267 / MAX	2,122	0,226	0,195	0,481	0,110	0,195
267 / MIN	-0,798	-0,238	-0,667	-0,483	-0,150	-0,183
268 / MAX	8,937	1,766	0,867	0,176	0,571	3,471
268 / MIN	-6,606	-1,773	-1,365	-0,202	-0,292	-3,472
269 / MAX	7,959	1,545	0,895	0,308	0,376	2,082
269 / MIN	-6,595	-1,535	-0,862	-0,310	-0,371	-2,075
270 / MAX	8,875	0,201	0,423	0,004	0,052	0,207
270 / MIN	-0,597	-0,049	-0,344	-0,013	-0,220	-0,155
271 / MAX	0,897	0,042	0,593	0,012	0,210	0,100
271 / MIN	-2,361	-0,189	-0,244	-0,059	-0,516	-0,121
272 / MAX	1,689	0,009	0,997	0,000	0,236	0,047
272 / MIN	-0,539	-0,036	-0,307	-0,012	-0,178	-0,011
273 / MAX	0,370	0,008	1,964	0,013	0,227	0,028
273 / MIN	-6,876	-0,012	-0,722	-0,051	-0,791	-0,007
274 / MAX	0,057	0,024	1,167	0,001	0,003	0,017
274 / MIN	-6,178	-0,002	-1,062	-0,003	-0,284	-0,008
275 / MAX	8,005	0,901	0,192	0,344	0,452	2,140
275 / MIN	-7,994	-0,858	-0,630	-0,327	-0,162	-2,153
276 / MAX	2,044	2,239	0,137	0,645	0,259	3,057
276 / MIN	-1,513	-2,273	-0,234	-0,664	-0,131	-3,091
277 / MAX	1,709	0,229	0,224	0,483	0,103	0,183
277 / MIN	-0,716	-0,237	-0,545	-0,480	-0,101	-0,173
278 / MAX	8,675	1,769	1,133	0,189	0,292	3,473
278 / MIN	-6,474	-1,778	-0,992	-0,211	-0,266	-3,484
279 / MAX	7,918	1,541	0,865	0,309	0,367	2,079
279 / MIN	-6,575	-1,541	-0,892	-0,311	-0,369	-2,079
280 / MAX	9,165	0,145	0,594	0,006	0,186	0,171
280 / MIN	-0,033	-0,024	-0,252	-0,008	-0,482	-0,090
281 / MAX	0,253	0,021	0,406	0,006	0,106	0,060
281 / MIN	-2,677	-0,127	-0,065	-0,035	-0,369	-0,089
282 / MAX	1,820	0,004	0,874	-0,000	0,196	0,031
282 / MIN	-0,093	-0,031	-0,202	-0,006	-0,160	-0,006
283 / MAX	0,241	0,004	1,772	0,007	0,085	0,015
283 / MIN	-6,724	-0,018	-0,797	-0,033	-0,642	-0,007
284 / MAX	0,037	0,013	1,184	0,001	0,007	0,009
284 / MIN	-6,154	-0,001	-1,044	-0,002	-0,298	-0,004
285 / MAX	8,522	0,904	0,350	0,321	0,193	2,163
285 / MIN	-7,346	-0,889	-0,415	-0,321	-0,063	-2,170
286 / MAX	2,011	2,272	0,266	0,637	0,567	3,087
286 / MIN	-2,008	-2,285	-0,619	-0,644	-0,266	-3,096
287 / MAX	2,147	0,228	0,203	0,481	0,119	0,188
287 / MIN	-0,820	-0,231	-0,705	-0,481	-0,158	-0,185
288 / MAX	8,999	1,767	0,856	0,183	0,607	3,471
288 / MIN	-6,633	-1,770	-1,389	-0,190	-0,298	-3,473
289 / MAX	7,969	1,540	0,896	0,309	0,375	2,079
289 / MIN	-6,600	-1,539	-0,862	-0,309	-0,371	-2,078
290 / MAX	8,870	0,077	0,434	0,006	0,055	0,086
290 / MIN	-0,634	-0,050	-0,339	-0,011	-0,231	-0,071
291 / MAX	0,963	0,041	0,610	0,011	0,221	0,038
291 / MIN	-2,334	-0,072	-0,256	-0,023	-0,524	-0,048
292 / MAX	1,691	0,009	1,011	0,000	0,237	0,019

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
292 / MIN	-0,561	-0,013	-0,323	-0,004	-0,183	-0,012
293 / MAX	0,389	0,009	1,967	0,013	0,239	0,013
293 / MIN	-6,891	-0,009	-0,722	-0,020	-0,794	-0,007
294 / MAX	0,060	0,008	1,168	0,001	0,001	0,006
294 / MIN	-6,180	-0,000	-1,060	-0,001	-0,284	-0,003
295 / MAX	7,985	0,864	0,195	0,339	0,464	2,148
295 / MIN	-7,976	-0,863	-0,636	-0,333	-0,171	-2,138
296 / MAX	2,070	2,243	0,144	0,654	0,265	3,060
296 / MIN	-1,493	-2,242	-0,240	-0,654	-0,137	-3,063
297 / MAX	1,697	0,230	0,230	0,483	0,102	0,174
297 / MIN	-0,724	-0,230	-0,548	-0,481	-0,101	-0,174
298 / MAX	8,694	1,770	1,144	0,198	0,299	3,473
298 / MIN	-6,489	-1,772	-0,982	-0,199	-0,272	-3,477
299 / MAX	7,921	1,540	0,864	0,310	0,367	2,078
299 / MIN	-6,577	-1,542	-0,894	-0,310	-0,368	-2,080
300 / MAX	9,172	0,018	0,591	0,004	0,187	0,024
300 / MIN	-0,026	-0,024	-0,254	-0,005	-0,479	-0,039
301 / MAX	0,240	0,018	0,403	0,004	0,105	0,019
301 / MIN	-2,683	-0,016	-0,063	-0,005	-0,367	-0,013
302 / MAX	1,823	0,005	0,873	0,000	0,195	0,004
302 / MIN	-0,089	-0,004	-0,201	-0,002	-0,160	-0,005
303 / MAX	0,240	0,006	1,769	0,006	0,083	0,008
303 / MIN	-6,723	-0,003	-0,799	-0,004	-0,639	-0,002
304 / MAX	0,037	0,002	1,185	0,001	0,007	0,002
304 / MIN	-6,154	-0,000	-1,044	-0,000	-0,298	-0,001
305 / MAX	8,516	0,871	0,351	0,324	0,192	2,181
305 / MIN	-7,341	-0,908	-0,414	-0,319	-0,063	-2,147
306 / MAX	2,015	2,290	0,269	0,646	0,570	3,096
306 / MIN	-1,999	-2,255	-0,622	-0,640	-0,268	-3,077
307 / MAX	2,144	0,231	0,205	0,483	0,118	0,181
307 / MIN	-0,823	-0,224	-0,705	-0,479	-0,158	-0,189
308 / MAX	9,001	1,767	0,859	0,191	0,609	3,470
308 / MIN	-6,635	-1,767	-1,386	-0,186	-0,298	-3,474
309 / MAX	7,969	1,539	0,896	0,309	0,376	2,078
309 / MIN	-6,600	-1,542	-0,862	-0,309	-0,371	-2,080
310 / MAX	8,887	0,037	0,433	0,009	0,056	0,051
310 / MIN	-0,625	-0,066	-0,340	-0,007	-0,229	-0,092
311 / MAX	0,952	0,055	0,606	0,015	0,220	0,048
311 / MIN	-2,357	-0,030	-0,255	-0,008	-0,520	-0,029
312 / MAX	1,698	0,013	1,003	0,004	0,235	0,008
312 / MIN	-0,556	-0,008	-0,323	-0,001	-0,181	-0,015
313 / MAX	0,389	0,011	1,958	0,016	0,238	0,012
313 / MIN	-6,882	-0,007	-0,729	-0,009	-0,787	-0,010
314 / MAX	0,060	0,001	1,169	0,001	0,001	0,002
314 / MIN	-6,179	-0,008	-1,060	-0,001	-0,285	-0,006
315 / MAX	7,989	0,827	0,193	0,337	0,464	2,162
315 / MIN	-7,970	-0,897	-0,639	-0,338	-0,169	-2,124
316 / MAX	2,066	2,272	0,144	0,663	0,267	3,083
316 / MIN	-1,505	-2,211	-0,243	-0,654	-0,138	-3,035
317 / MAX	1,699	0,236	0,227	0,483	0,103	0,166
317 / MIN	-0,724	-0,223	-0,551	-0,481	-0,102	-0,182
318 / MAX	8,695	1,775	1,141	0,208	0,301	3,475
318 / MIN	-6,488	-1,765	-0,985	-0,199	-0,271	-3,469
319 / MAX	7,921	1,540	0,864	0,311	0,367	2,078
319 / MIN	-6,577	-1,542	-0,894	-0,310	-0,369	-2,080

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
320 / MAX	9,196	0,060	0,584	0,015	0,177	0,080
320 / MIN	-0,027	-0,137	-0,252	-0,015	-0,464	-0,177
321 / MAX	0,203	0,113	0,392	0,028	0,102	0,083
321 / MIN	-2,724	-0,051	-0,061	-0,015	-0,358	-0,050
322 / MAX	1,837	0,034	0,858	0,006	0,192	0,014
322 / MIN	-0,083	-0,011	-0,191	-0,002	-0,156	-0,026
323 / MAX	0,229	0,024	1,756	0,027	0,079	0,019
323 / MIN	-6,705	-0,009	-0,811	-0,015	-0,629	-0,013
324 / MAX	0,035	0,003	1,185	0,003	0,006	0,003
324 / MIN	-6,151	-0,010	-1,044	-0,001	-0,299	-0,007
325 / MAX	8,484	0,836	0,353	0,326	0,182	2,203
325 / MIN	-7,379	-0,940	-0,409	-0,317	-0,059	-2,124
326 / MAX	2,009	2,319	0,259	0,655	0,554	3,115
326 / MIN	-1,950	-2,223	-0,605	-0,641	-0,259	-3,055
327 / MAX	2,123	0,238	0,205	0,484	0,113	0,173
327 / MIN	-0,810	-0,218	-0,687	-0,478	-0,155	-0,196
328 / MAX	8,964	1,771	0,873	0,199	0,591	3,470
328 / MIN	-6,616	-1,763	-1,367	-0,187	-0,292	-3,474
329 / MAX	7,964	1,539	0,895	0,309	0,376	2,078
329 / MIN	-6,597	-1,546	-0,863	-0,309	-0,371	-2,083
330 / MAX	8,968	0,080	0,418	0,018	0,054	0,145
330 / MIN	-0,546	-0,183	-0,348	-0,007	-0,209	-0,185
331 / MAX	0,820	0,172	0,568	0,052	0,206	0,105
331 / MIN	-2,502	-0,067	-0,239	-0,018	-0,487	-0,096
332 / MAX	1,730	0,036	0,947	0,013	0,224	0,018
332 / MIN	-0,507	-0,016	-0,304	-0,001	-0,167	-0,041
333 / MAX	0,366	0,020	1,912	0,044	0,224	0,015
333 / MIN	-6,815	-0,013	-0,760	-0,020	-0,751	-0,029
334 / MAX	0,057	0,002	1,169	0,003	0,001	0,008
334 / MIN	-6,169	-0,024	-1,060	-0,002	-0,286	-0,017
335 / MAX	8,053	0,785	0,191	0,337	0,440	2,176
335 / MIN	-7,969	-0,935	-0,627	-0,345	-0,156	-2,109
336 / MAX	2,024	2,304	0,137	0,672	0,262	3,112
336 / MIN	-1,584	-2,177	-0,241	-0,654	-0,133	-3,003
337 / MAX	1,762	0,244	0,213	0,482	0,104	0,156
337 / MIN	-0,701	-0,215	-0,546	-0,482	-0,103	-0,191
338 / MAX	8,591	1,781	1,225	0,219	0,291	3,483
338 / MIN	-6,470	-1,758	-1,048	-0,200	-0,278	-3,461
339 / MAX	7,917	1,540	0,868	0,312	0,368	2,078
339 / MIN	-6,574	-1,543	-0,890	-0,310	-0,368	-2,080
340 / MAX	9,291	0,104	0,537	0,024	0,150	0,156
340 / MIN	-0,028	-0,293	-0,266	-0,027	-0,394	-0,373
341 / MAX	0,039	0,245	0,360	0,063	0,097	0,181
341 / MIN	-2,944	-0,089	-0,055	-0,026	-0,324	-0,107
342 / MAX	1,887	0,069	0,768	0,011	0,177	0,024
342 / MIN	-0,055	-0,019	-0,167	-0,003	-0,130	-0,058
343 / MAX	0,200	0,048	1,705	0,062	0,071	0,035
343 / MIN	-6,598	-0,015	-0,851	-0,027	-0,589	-0,025
344 / MAX	0,031	0,004	1,182	0,005	0,004	0,007
344 / MIN	-6,135	-0,021	-1,047	-0,002	-0,298	-0,015
345 / MAX	8,363	0,795	0,368	0,326	0,150	2,227
345 / MIN	-7,555	-0,980	-0,388	-0,319	-0,064	-2,100
346 / MAX	2,093	2,355	0,230	0,666	0,475	3,141
346 / MIN	-1,783	-2,187	-0,515	-0,641	-0,233	-3,028
347 / MAX	2,061	0,245	0,201	0,486	0,087	0,164

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
347 / MIN	-0,772	-0,210	-0,576	-0,477	-0,132	-0,205
348 / MAX	8,734	1,775	1,037	0,210	0,500	3,470
348 / MIN	-6,564	-1,758	-1,308	-0,187	-0,269	-3,472
349 / MAX	7,941	1,539	0,895	0,310	0,378	2,078
349 / MIN	-6,589	-1,548	-0,863	-0,309	-0,372	-2,085
350 / MAX	9,321	0,103	0,381	0,036	0,031	0,281
350 / MIN	-0,262	-0,392	-0,376	-0,010	-0,162	-0,426
351 / MAX	0,336	0,355	0,428	0,102	0,167	0,227
351 / MIN	-3,088	-0,085	-0,194	-0,023	-0,364	-0,189
352 / MAX	1,890	0,082	0,723	0,024	0,174	0,023
352 / MIN	-0,344	-0,019	-0,240	-0,000	-0,112	-0,084
353 / MAX	0,290	0,037	1,767	0,090	0,180	0,026
353 / MIN	-6,545	-0,018	-0,911	-0,026	-0,603	-0,054
354 / MAX	0,045	0,002	1,175	0,004	0,001	0,015
354 / MIN	-6,127	-0,045	-1,054	-0,002	-0,293	-0,033
355 / MAX	7,970	0,735	0,226	0,337	0,342	2,193
355 / MIN	-8,099	-0,981	-0,572	-0,350	-0,117	-2,090
356 / MAX	2,242	2,342	0,120	0,683	0,225	3,146
356 / MIN	-1,427	-2,136	-0,205	-0,655	-0,138	-2,967
357 / MAX	1,694	0,253	0,198	0,482	0,084	0,145
357 / MIN	-0,786	-0,205	-0,407	-0,483	-0,076	-0,201
358 / MAX	8,528	1,790	1,148	0,231	0,248	3,493
358 / MIN	-6,445	-1,749	-0,943	-0,200	-0,275	-3,451
359 / MAX	7,895	1,540	0,867	0,313	0,372	2,078
359 / MIN	-6,570	-1,544	-0,891	-0,310	-0,370	-2,080
360 / MAX	6,806	0,283	0,737	0,027	0,159	0,350
360 / MIN	-0,103	-0,359	-0,367	-0,068	-0,543	-0,484
361 / MAX	0,513	0,313	0,029	0,096	0,053	0,278
361 / MIN	-2,704	-0,253	-0,114	-0,077	-0,088	-0,201
362 / MAX	1,563	0,054	0,551	0,008	0,077	0,069
362 / MIN	-0,028	-0,046	-0,127	-0,013	-0,128	-0,091
363 / MAX	-0,000	0,046	0,796	0,101	0,013	0,051
363 / MIN	-4,961	-0,030	-0,806	-0,076	-0,161	-0,019
364 / MAX	0,000	0,025	0,814	0,010	0,013	0,018
364 / MIN	-4,354	-0,014	-0,610	-0,006	-0,235	-0,010
365 / MAX	7,274	0,730	0,451	0,323	0,473	2,244
365 / MIN	-8,232	-1,080	-0,635	-0,350	-0,209	-2,098
366 / MAX	1,975	2,433	0,193	0,681	0,218	3,228
366 / MIN	-0,763	-2,137	-0,233	-0,638	-0,176	-2,963
367 / MAX	0,969	0,262	0,265	0,482	0,147	0,146
367 / MIN	-0,897	-0,202	-0,536	-0,484	-0,094	-0,229
368 / MAX	8,223	1,797	0,589	0,230	0,215	3,502
368 / MIN	-6,218	-1,744	-0,566	-0,184	-0,144	-3,443
369 / MAX	7,849	1,538	0,455	0,313	0,386	2,077
369 / MIN	-6,536	-1,542	-0,505	-0,309	-0,384	-2,079
370 / MAX	44,100	21,761	139,505	90,374	71,737	14,770
370 / MIN	-44,100	-108,266	-15,791	-32,704	-65,451	-7,015
371 / MAX	0,000	108,664	0,004	37,490	18,715	14,571
371 / MIN	-0,000	-22,339	-139,654	-95,124	-9,198	-10,327
372 / MAX	0,058	1,473	22,319	0,190	14,301	1,091
372 / MIN	-2,510	-1,491	-23,270	-0,155	-14,682	-1,022
373 / MAX	1,062	1,740	6,074	0,197	3,464	1,232
373 / MIN	-0,309	-1,715	-5,204	-0,176	-3,782	-1,337
374 / MAX	4,850	0,015	0,274	0,014	0,020	0,012
374 / MIN	-0,011	-0,036	-0,226	-0,005	-0,111	-0,034

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
375 / MAX	0,755	0,000	0,901	0,0	0,000	0,000
375 / MIN	-0,153	-0,000	-0,000	-0,000	-0,264	-0,000
376 / MAX	7,176	0,003	0,268	0,010	0,006	0,009
376 / MIN	-0,029	-0,036	-0,222	-0,003	-0,140	-0,033
377 / MAX	1,218	0,000	1,298	-0,000	0,000	0,000
377 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
378 / MAX	7,216	0,003	0,277	0,010	0,007	0,010
378 / MIN	-0,048	-0,039	-0,225	-0,002	-0,135	-0,035
379 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
379 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
380 / MAX	7,203	0,002	0,256	0,007	0,009	0,006
380 / MIN	-0,029	-0,024	-0,237	-0,002	-0,126	-0,022
381 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
381 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
382 / MAX	7,235	0,002	0,270	0,006	0,006	0,006
382 / MIN	-0,056	-0,024	-0,233	-0,001	-0,127	-0,022
383 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
383 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
384 / MAX	7,206	0,001	0,254	0,004	0,006	0,003
384 / MIN	-0,030	-0,013	-0,239	-0,001	-0,127	-0,012
385 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
385 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
386 / MAX	7,237	0,000	0,269	0,002	0,004	0,002
386 / MIN	-0,059	-0,008	-0,236	-0,001	-0,125	-0,008
387 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
387 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
388 / MAX	7,206	0,000	0,254	0,001	0,006	0,001
388 / MIN	-0,030	-0,002	-0,240	-0,001	-0,127	-0,002
389 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
389 / MIN	-0,153	-0,000	-0,000	-0,000	-0,387	-0,000
390 / MAX	7,235	0,008	0,269	0,001	0,002	0,007
390 / MIN	-0,059	-0,001	-0,235	-0,002	-0,126	-0,002
391 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
391 / MIN	-0,153	-0,000	-0,000	0,000	-0,387	-0,000
392 / MAX	7,203	0,010	0,255	0,002	0,006	0,009
392 / MIN	-0,028	-0,003	-0,239	-0,003	-0,127	-0,003
393 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
393 / MIN	-0,153	-0,000	-0,000	0,000	-0,387	-0,000
394 / MAX	7,225	0,024	0,272	0,002	0,002	0,021
394 / MIN	-0,055	-0,002	-0,232	-0,005	-0,129	-0,006
395 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
395 / MIN	-0,153	-0,000	-0,000	0,000	-0,387	-0,000
396 / MAX	7,190	0,021	0,264	0,003	0,005	0,020
396 / MIN	-0,025	-0,004	-0,229	-0,006	-0,134	-0,005
397 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
397 / MIN	-0,153	-0,000	-0,000	0,000	-0,387	-0,000
398 / MAX	7,185	0,045	0,283	0,003	0,001	0,040
398 / MIN	-0,044	-0,002	-0,220	-0,010	-0,141	-0,012
399 / MAX	1,218	0,000	1,298	0,000	0,000	0,000
399 / MIN	-0,153	-0,000	-0,000	0,000	-0,387	-0,000
400 / MAX	4,849	0,014	0,256	0,008	0,032	0,013
400 / MIN	-0,001	-0,025	-0,273	-0,011	-0,114	-0,022
401 / MAX	0,755	0,000	0,901	0,000	0,000	0,000
401 / MIN	-0,153	-0,000	-0,000	0,000	-0,264	-0,000
402 / MAX	8,473	1,596	0,462	0,100	0,357	2,444

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
402 / MIN	-9,175	-1,613	-0,434	-0,095	-0,383	-2,457
403 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
403 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
404 / MAX	8,547	1,621	0,520	0,101	0,367	2,465
404 / MIN	-9,276	-1,610	-0,456	-0,095	-0,384	-2,455
405 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
405 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136
406 / MAX	8,531	1,609	0,512	0,101	0,369	2,455
406 / MIN	-9,250	-1,609	-0,474	-0,096	-0,392	-2,454
407 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
407 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
408 / MAX	8,560	1,615	0,517	0,098	0,368	2,460
408 / MIN	-9,313	-1,610	-0,468	-0,095	-0,386	-2,455
409 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
409 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136
410 / MAX	8,536	1,609	0,510	0,099	0,370	2,454
410 / MIN	-9,261	-1,610	-0,483	-0,097	-0,395	-2,455
411 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
411 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
412 / MAX	8,564	1,611	0,516	0,097	0,368	2,457
412 / MIN	-9,322	-1,611	-0,471	-0,096	-0,387	-2,456
413 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
413 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136
414 / MAX	8,538	1,608	0,510	0,098	0,371	2,454
414 / MIN	-9,263	-1,611	-0,485	-0,098	-0,395	-2,456
415 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
415 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
416 / MAX	8,564	1,608	0,516	0,096	0,368	2,453
416 / MIN	-9,322	-1,614	-0,471	-0,097	-0,387	-2,459
417 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
417 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136
418 / MAX	8,538	1,608	0,510	0,098	0,370	2,453
418 / MIN	-9,264	-1,612	-0,485	-0,099	-0,395	-2,457
419 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
419 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
420 / MAX	8,562	1,604	0,516	0,097	0,367	2,450
420 / MIN	-9,317	-1,617	-0,469	-0,098	-0,386	-2,462
421 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
421 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136
422 / MAX	8,535	1,607	0,510	0,098	0,370	2,452
422 / MIN	-9,261	-1,612	-0,481	-0,100	-0,394	-2,458
423 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
423 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
424 / MAX	8,554	1,602	0,519	0,097	0,367	2,448
424 / MIN	-9,296	-1,620	-0,461	-0,099	-0,385	-2,465
425 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
425 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136
426 / MAX	8,533	1,606	0,514	0,098	0,368	2,451
426 / MIN	-9,243	-1,613	-0,468	-0,101	-0,390	-2,459
427 / MAX	2,507	3,150	2,180	0,000	0,738	1,136
427 / MIN	-2,394	-3,150	-2,048	-0,000	-0,762	-1,136
428 / MAX	8,515	1,608	0,475	0,096	0,355	2,453
428 / MIN	-9,213	-1,615	-0,423	-0,101	-0,376	-2,461
429 / MAX	2,507	3,150	2,048	0,000	0,738	1,136
429 / MIN	-2,394	-3,150	-2,180	-0,000	-0,762	-1,136

Barra	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
430 / MAX	0,072	7,259	11,010	1,016	2,406	1,415
430 / MIN	-0,283	-3,355	-9,585	-1,746	-2,343	-1,764
431 / MAX	29,263	1,825	7,859	1,318	3,695	2,096
431 / MIN	-16,011	-3,563	-3,240	-0,657	-8,404	-4,267
432 / MAX	-0,835	5,025	7,862	1,478	3,749	5,113
432 / MIN	-48,567	-2,537	-3,148	-0,831	-8,357	-2,912
433 / MAX	-0,846	-0,011	8,216	0,183	3,843	1,851
433 / MIN	-44,464	-3,826	-3,521	-0,659	-8,827	-4,259
434 / MAX	22,368	3,010	8,388	-0,013	4,023	3,290
434 / MIN	-17,649	-1,802	-3,593	-0,694	-8,923	-2,042
435 / MAX	34,013	1,909	8,826	1,245	4,046	2,442
435 / MIN	-24,866	-3,623	-3,171	-0,799	-9,271	-4,242
436 / MAX	6,771	4,698	8,926	1,456	4,147	4,890
436 / MIN	-48,635	-2,949	-3,152	-0,919	-9,326	-2,974
437 / MAX	23,200	1,933	9,428	0,042	4,411	2,144
437 / MIN	-19,459	-2,077	-3,682	-0,567	-9,843	-2,246
438 / MAX	1,738	0,465	3,511	0,242	4,181	3,723
438 / MIN	-57,616	-3,318	-9,160	-0,368	-9,656	-1,444
439 / MAX	3,512	3,487	7,787	0,306	3,311	2,053
439 / MIN	-13,504	-1,685	-0,810	-0,987	-4,801	-1,956
440 / MAX	9,641	3,406	4,667	0,454	1,919	1,968
440 / MIN	-7,392	-1,877	-3,130	-0,534	-2,823	-1,949

Tensiones - Extremos globales

	S max (MPa)	S min (MPa)	S max(My) (MPa)	S min(My) (MPa)	Fx/Ax (MPa)
MAX	357,473	38,876	321,754	0,0	47,376
Barra	178	100	178	423	77
Nudo	69	32	69	168	28
Caso	ACC+	ULS+	ACC+	6	ULS+
MIN	-38,479	-348,192	-0,000	-321,754	-47,798
Barra	81	178	429	178	104
Nudo	34	69	186	69	34
Caso	ULS-	ACC-	4	ACC-	ULS-

Comprobación de barras de acero

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 1 Barra_1 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.740 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 335.000 MPa

PARAMETROS DE LA SECCION: RECT_M_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=144.000 cm2	Az=144.000 cm2	Ax=144.000 cm2
tw=6.000 cm	Iy=1728.000 cm4	Iz=1728.000 cm4	Ix=2915.131 cm4
tf=6.000 cm	Wply=432.000 cm3	Wplz=432.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 18.460 kN	My,Ed = -27.420 kN*m	Mz,Ed = 8.055 kN*m	Vy,Ed = -15.146 kN
Nc,Rd = 4824.000 kN	My,Ed,max = -27.420 kN*m		Mz,Ed,max = 8.055 kN*m
	Vy,T,Rd = 2784.210 kN		
Nb,Rd = 4747.055 kN	My,c,Rd = 144.720 kN*m	Mz,c,Rd = 144.720 kN*m	Vz,Ed = -45.924 kN
	MN,y,Rd = 144.166 kN*m	MN,z,Rd = 144.166 kN*m	Vz,T,Rd = 2784.210 kN
			Tt,Ed = -0.028 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.740 m	Lam_y = 0.272	Lz = 0.740 m	Lam_z = 0.272
Lcr,y = 0.740 m	Xy = 0.984	Lcr,z = 0.740 m	Xz = 0.984
Lamy = 21.362	kyy = 0.737	Lamz = 21.362	kyz = 0.423

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.072 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.005 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.016 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 21.362 < Lambda,max = 210.000 Lambda,z = 21.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.167 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.127 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.5 cm < vx max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 2 Barra_2 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.740 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 335.000 MPa

PARAMETROS DE LA SECCION: RECT_M_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=144.000 cm2	Az=144.000 cm2	Ax=144.000 cm2
tw=6.000 cm	Iy=1728.000 cm4	Iz=1728.000 cm4	Ix=2915.131 cm4
tf=6.000 cm	Wply=432.000 cm3	Wplz=432.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 15.479 kN	My,Ed = -1.801 kN*m	Mz,Ed = -7.667 kN*m	Vy,Ed = 44.425 kN
Nc,Rd = 4824.000 kN	My,Ed,max = 7.580 kN*m	Mz,Ed,max = 25.208 kN*m	Vy,T,Rd = 2766.368 kN
Nb,Rd = 4747.055 kN	My,c,Rd = 144.720 kN*m	Mz,c,Rd = 144.720 kN*m	Vz,Ed = -12.677 kN
	MN,y,Rd = 144.256 kN*m	MN,z,Rd = 144.256 kN*m	Vz,T,Rd = 2766.368 kN
			Tt,Ed = -0.563 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.740 m	Lam_y = 0.272	Lz = 0.740 m	Lam_z = 0.272
Lcr,y = 0.740 m	Xy = 0.984	Lcr,z = 0.740 m	Xz = 0.984
Lamy = 21.362	kzy = 0.443	Lamz = 21.362	kzz = 0.724

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.008 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.016 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 21.362 < Lambda,max = 210.000 Lambda,z = 21.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.118 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.153 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.5 cm < vx max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 3 Barra_3 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.224 kN	My,Ed = -2.779 kN*m	Mz,Ed = 0.263 kN*m	Vy,Ed = 0.295 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -2.779 kN*m		Mz,Ed,max = 0.263 kN*m
	Vy,T,Rd = 490.161 kN		
Nb,Rd = 2100.497 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 3.389 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 862.683 kN
			Tt,Ed = -0.288 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.775 m	Lam_y = 0.334	Lz = 1.775 m	Lam_z = 0.591
Lcr,y = 1.775 m	Xy = 0.970	Lcr,z = 1.775 m	Xz = 0.893

Lamy = 25.490	kyy = 1.000	Lamz = 45.183	kyz = 0.582

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.490 < Lambda,max = 210.000 Lambda,z = 45.183 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

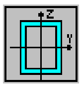
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 4 Barra_4 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.740 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 335.000 MPa

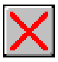


PARAMETROS DE LA SECCION: RECT_M_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=144.000 cm2	Az=144.000 cm2	Ax=144.000 cm2
tw=6.000 cm	Iy=1728.000 cm4	Iz=1728.000 cm4	Ix=2915.131 cm4
tf=6.000 cm	Wply=432.000 cm3	Wplz=432.000 cm3	

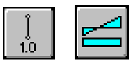
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

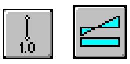
N,Ed = 4.356 kN	My,Ed = -29.551 kN*m	Mz,Ed = -5.981 kN*m	Vy,Ed = 10.759 kN
Nc,Rd = 4824.000 kN	My,Ed,max = -29.551 kN*m		Mz,Ed,max = -5.981 kN*m
	Vy,T,Rd = 2750.569 kN		
Nb,Rd = 4747.055 kN	My,c,Rd = 144.720 kN*m	Mz,c,Rd = 144.720 kN*m	Vz,Ed = -49.750 kN
	MN,y,Rd = 144.589 kN*m	MN,z,Rd = 144.589 kN*m	Vz,T,Rd = 2750.569 kN
			Tt,Ed = 1.037 kN*m
			CLASE DE LA SECCION = 1



PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:


respecto al eje y:


respecto al eje z:

Ly = 0.740 m	Lam_y = 0.272	Lz = 0.740 m	Lam_z = 0.272
Lcr,y = 0.740 m	Xy = 0.984	Lcr,z = 0.740 m	Xz = 0.984
Lamy = 21.362	kyy = 0.738	Lamz = 21.362	kyz = 0.432

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.077 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.018 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.012 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.012 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 21.362 < Lambda,max = 210.000 Lambda,z = 21.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.169 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.121 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.5 cm < vx max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 5 Barra_5 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 22.271 kN	My,Ed = -2.611 kN*m	Mz,Ed = 0.195 kN*m	Vy,Ed = 0.228 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -2.611 kN*m		Mz,Ed,max = 0.195 kN*m
	Vy,T,Rd = 590.104 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.944 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.084 kN
			Tt,Ed = 0.017 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.643	Lamz = 30.882	kyz = 0.396

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.012 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.004 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.036 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.028 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 6 Barra_6 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.128 kN	My,Ed = 0.426 kN*m	Mz,Ed = -0.020 kN*m	Vy,Ed = -0.196 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.426 kN*m	Mz,Ed,max = -0.311 kN*m	Vy,T,Rd = 590.147 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.572 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.117 kN
			Tt,Ed = 0.013 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.349	Lamz = 33.362	kzz = 0.803

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 7 Barra_7 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 11.752 kN	My,Ed = -1.279 kN*m	Mz,Ed = 0.777 kN*m	Vy,Ed = -0.854 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -1.279 kN*m		Mz,Ed,max = 0.777 kN*m
	Vy,T,Rd = 589.545 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.807 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.636 kN
			Tt,Ed = 0.072 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.654	Lamz = 30.882	kyz = 0.410

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.022 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 8 Barra_8 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 3.862 kN	My,Ed = 0.151 kN*m	Mz,Ed = 1.359 kN*m	Vy,Ed = -1.941 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.156 kN*m		Mz,Ed,max = -1.514 kN*m
	Vy,T,Rd = 588.801 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.208 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.041 kN
			Tt,Ed = -0.144 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.351	Lamz = 33.362	kzz = 0.601

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 9 Barra_9 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.490 kN	My,Ed = 0.312 kN*m	Mz,Ed = 0.912 kN*m	Vy,Ed = -1.359 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.312 kN*m	Mz,Ed,max = -0.950 kN*m	Vy,T,Rd = 588.652 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.669 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.921 kN
			Tt,Ed = 0.159 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.448	Lamz = 30.882	kzz = 0.588

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado

Caso de carga más desfavorable: 4 Sismo Eje Y

vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado

Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 10 Barra_10 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.722 kN	My,Ed = -0.099 kN*m	Mz,Ed = 0.660 kN*m	Vy,Ed = 0.958 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.099 kN*m		Mz,Ed,max = 0.660 kN*m
	Vy,T,Rd = 589.059 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.349 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.247 kN
			Tt,Ed = 0.119 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.457	Lamz = 30.882	kzz = 0.581

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 11 Barra_11 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 13.396 kN	My,Ed = 0.830 kN*m	Mz,Ed = -0.839 kN*m	Vy,Ed = -1.181 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.926 kN*m		Mz,Ed,max = 0.909 kN*m
	Vy,T,Rd = 588.989 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.186 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.191 kN
			Tt,Ed = -0.126 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943

Lamy = 33.362 kyy = 0.600 Lamz = 33.362 kyz = 0.357

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.007 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000   Lambda,z = 33.362 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 12 Barra_12   **PUNTOS:** 1   **COORDENADA:**   x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -13.493 kN	My,Ed = -0.113 kN*m	Mz,Ed = -0.947 kN*m	Vy,Ed = -1.308 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.219 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.316 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.175 kN
			Tt,Ed = 0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.007 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 13 Barra_13 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.510 kN	My,Ed = 0.378 kN*m	Mz,Ed = 0.213 kN*m	Vy,Ed = -0.289 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.378 kN*m	Mz,Ed,max = 0.213 kN*m	Vy,T,Rd = 589.711 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.672 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.769 kN
			Tt,Ed = 0.056 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.696	Lamz = 30.882	kyz = 0.365

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 14 Barra_14 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 10.497 kN	My,Ed = -0.451 kN*m	Mz,Ed = -0.622 kN*m	Vy,Ed = -0.855 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.502 kN*m	Mz,Ed,max = 0.643 kN*m	Vy,T,Rd = 589.804 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.644 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.843 kN
			Tt,Ed = 0.047 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.360	Lamz = 33.362	kzz = 0.586

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000   Lambda,z = 33.362 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 15 Barra_15   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.370 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.189 kN	My,Ed = 0.070 kN*m	Mz,Ed = 0.563 kN*m	Vy,Ed = -0.711 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.125 kN*m		Mz,Ed,max = 0.563 kN*m
	Vy,T,Rd = 589.288 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.131 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.430 kN
			Tt,Ed = -0.097 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.404	Lamz = 30.882	kzz = 0.637

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 16 Barra_16 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.731 kN	My,Ed = -0.487 kN*m	Mz,Ed = 0.629 kN*m	Vy,Ed = -1.227 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.597 kN*m	Mz,Ed,max = -1.187 kN*m	Vy,T,Rd = 589.784 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.732 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.827 kN
			Tt,Ed = -0.048 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.371	Lamz = 33.362	kzz = 0.678

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 17 Barra_17 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 3.535 kN	My,Ed = -0.291 kN*m	Mz,Ed = -1.015 kN*m	Vy,Ed = -1.393 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.356 kN*m	Mz,Ed,max = -1.015 kN*m	Vy,T,Rd = 590.049 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.044 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.039 kN
			Tt,Ed = 0.023 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.371	Lamz = 30.882	kzz = 0.604

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 18 Barra_18 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.977 kN	My,Ed = -0.694 kN*m	Mz,Ed = -0.363 kN*m	Vy,Ed = -0.420 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.694 kN*m		Mz,Ed,max = -0.363 kN*m
	Vy,T,Rd = 590.279 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.853 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.223 kN
			Tt,Ed = 0.000 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.618	Lamz = 33.362	kyz = 0.384

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 19 Barra_19 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.479 kN	My,Ed = -0.591 kN*m	Mz,Ed = -0.354 kN*m	Vy,Ed = -0.493 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.591 kN*m		Mz,Ed,max = -0.354 kN*m
	Vy,T,Rd = 589.217 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.929 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.373 kN
			Tt,Ed = 0.104 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952

Lamy = 30.882 kyy = 0.680 Lamz = 30.882 kyz = 0.359

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 20 Barra_20 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 40.014 kN	My,Ed = 0.483 kN*m	Mz,Ed = 6.394 kN*m	Vy,Ed = 23.667 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.126 kN*m	Mz,Ed,max = 6.394 kN*m	Vy,T,Rd = 582.814 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.812 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.251 kN
			Tt,Ed = -0.726 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.355 m	Lam_y = 0.105	Lz = 0.355 m	Lam_z = 0.105
Lcr,y = 0.355 m	Xy = 1.000	Lcr,z = 0.355 m	Xz = 1.000
Lamy = 8.002	kzy = 0.523	Lamz = 8.002	kzz = 0.718

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.022 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.017 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.041 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 8.002 < Lambda,max = 210.000 Lambda,z = 8.002 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.072 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.091 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 21 Barra_21 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 70.707 kN
Nc,Rd = 1840.320 kN
Nb,Rd = 1802.299 kN
My,Ed = 0.587 kN*m
My,Ed,max = 0.587 kN*m
My,c,Rd = 74.840 kN*m
MN,y,Rd = 74.840 kN*m
Mz,Ed = -0.793 kN*m
Mz,Ed,max = -0.793 kN*m
Mz,c,Rd = 74.840 kN*m
MN,z,Rd = 74.840 kN*m
Vy,Ed = 0.726 kN
Vy,T,Rd = 589.107 kN
Vz,Ed = 0.887 kN
Vz,T,Rd = 471.286 kN
Tt,Ed = -0.114 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:
Ly = 0.990 m
Lam_y = 0.292
Lcr,y = 0.990 m
Xy = 0.979
Lamy = 22.316
kzy = 0.405

respecto al eje z:
Lz = 0.990 m
Lam_z = 0.292
Lcr,z = 0.990 m
Xz = 0.979
Lamz = 22.316
kzz = 0.728

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.038 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 22 Barra_22 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.660 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 140.762 kN	My,Ed = 0.142 kN*m	Mz,Ed = -1.378 kN*m	Vy,Ed = 3.476 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.349 kN*m	Mz,Ed,max = -1.378 kN*m	Vy,T,Rd = 588.623 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.314 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.898 kN
			Tt,Ed = -0.161 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kzy = 0.510	Lamz = 14.878	kzz = 0.612

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.076 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.671 + (Mz,Ed/MN,z,Rd)^1.671 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.006 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.087 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.090 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 23 Barra_23 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -85.273 kN	My,Ed = -0.415 kN*m	Mz,Ed = 0.908 kN*m	Vy,Ed = 1.764 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.882 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.973 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.905 kN
			Tt,Ed = 0.039 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.046 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.664 + (Mz,Ed/MN,z,Rd)^1.664 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 24 Barra_24 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -95.861 kN	My,Ed = 0.398 kN*m	Mz,Ed = 0.548 kN*m	Vy,Ed = 0.208 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.371 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.067 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.496 kN
			Tt,Ed = -0.089 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.052 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.665 + (Mz,Ed/MN,z,Rd)^1.665 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*
Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 25 Barra_25 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.355 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 47.464 kN	My,Ed = -0.190 kN*m	Mz,Ed = 6.168 kN*m	Vy,Ed = -14.230 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.190 kN*m		Mz,Ed,max = 6.168 kN*m
	Vy,T,Rd = 585.577 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.006 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.461 kN
			Tt,Ed = -0.457 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.355 m	Lam_y = 0.105	Lz = 0.355 m	Lam_z = 0.105
Lcr,y = 0.355 m	Xy = 1.000	Lcr,z = 0.355 m	Xz = 1.000
Lamy = 8.002	kzy = 0.359	Lamz = 8.002	kzz = 0.818

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.026 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.016 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.024 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 8.002 < Lambda,max = 210.000 Lambda,z = 8.002 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.068 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.094 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*
Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 26 Barra_26 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -9.987 kN	My,Ed = 2.753 kN*m	Mz,Ed = -0.660 kN*m	Vy,Ed = -1.067 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 587.727 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -15.173 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.182 kN
			Tt,Ed = -0.248 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.005 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.032 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

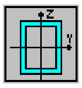
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 27 Barra_27 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -77.965 kN	My,Ed = 1.273 kN*m	Mz,Ed = -0.479 kN*m	Vy,Ed = 0.666 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.160 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.579 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.328 kN
			Tt,Ed = -0.109 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.042 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 28 Barra_28 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.660 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -114.333 kN	My,Ed = 0.571 kN*m	Mz,Ed = -0.625 kN*m	Vy,Ed = 1.233 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.865 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.877 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.092 kN
			Tt,Ed = -0.138 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.062 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.667 + (Mz,Ed/MN,z,Rd)^1.667 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 29 Barra_29 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 17.139 kN	My,Ed = -0.138 kN*m	Mz,Ed = -2.346 kN*m	Vy,Ed = -2.489 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.138 kN*m		Mz,Ed,max = -2.346 kN*m
	Vy,T,Rd = 588.798 kN		
Nb,Rd = 1744.837 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.146 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.039 kN
			Tt,Ed = -0.144 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.415 m	Lam_y = 0.418	Lz = 1.415 m	Lam_z = 0.418
Lcr,y = 1.415 m	Xy = 0.948	Lcr,z = 1.415 m	Xz = 0.948
Lamy = 31.902	kzy = 0.410	Lamz = 31.902	kzz = 0.647

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.009 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 31.902 < Lambda,max = 210.000 Lambda,z = 31.902 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 30 Barra_30 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 76.671 kN	My,Ed = -0.015 kN*m	Mz,Ed = 0.687 kN*m	Vy,Ed = 0.972 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.076 kN*m	Mz,Ed,max = 0.687 kN*m	Vy,T,Rd = 590.141 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.054 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.113 kN
			Tt,Ed = -0.014 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kzy = 0.446	Lamz = 38.102	kzz = 0.748

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.042 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.052 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 31 Barra_31 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -61.453 kN	My,Ed = 0.742 kN*m	Mz,Ed = -0.055 kN*m	Vy,Ed = 0.410 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.320 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.863 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.456 kN
			Tt,Ed = 0.094 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.033 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 32 Barra_32 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -64.794 kN	My,Ed = -0.872 kN*m	Mz,Ed = -0.790 kN*m	Vy,Ed = -0.964 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.447 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.811 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.558 kN
			Tt,Ed = -0.081 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.035 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 33 Barra_33 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /1/ 1*1.350 + 2*0.900 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 83.293 kN	My,Ed = -0.306 kN*m	Mz,Ed = -0.645 kN*m	Vy,Ed = -0.363 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.398 kN*m	Mz,Ed,max = -0.645 kN*m	Vy,T,Rd = 590.249 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.396 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.199 kN
			Tt,Ed = -0.003 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

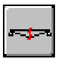
PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

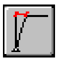
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kzy = 0.373	Lamz = 40.138	kzz = 0.627

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.045 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.664 + (Mz,Ed/MN,z,Rd)^1.664 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.056 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.057 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES



Flechas *No analizado*



Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

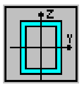
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 34 Barra_34 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /1/ 1*1.350 + 2*0.900 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -58.121 kN	My,Ed = 0.224 kN*m	Mz,Ed = -0.376 kN*m	Vy,Ed = -0.195 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.182 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.346 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.145 kN
			Tt,Ed = -0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.032 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 35 Barra_35 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -4.234 kN	My,Ed = -1.399 kN*m	Mz,Ed = 0.390 kN*m	Vy,Ed = 2.094 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.008 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 7.845 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.007 kN
			Tt,Ed = 0.027 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.002 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.017 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 36 Barra_36 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 40.867 kN	My,Ed = 0.535 kN*m	Mz,Ed = 0.195 kN*m	Vy,Ed = 0.822 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.535 kN*m	Mz,Ed,max = -0.266 kN*m	Vy,T,Rd = 588.262 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.761 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.610 kN
			Tt,Ed = -0.196 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.699	Lamz = 22.316	kyz = 0.378

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.022 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.028 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 37 Barra_37 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 58.681 kN	My,Ed = 0.850 kN*m	Mz,Ed = -0.282 kN*m	Vy,Ed = -0.218 kN

Nc,Rd = 1840.320 kN   My,Ed,max = -1.015 kN*m   Mz,Ed,max = -0.282 kN*m
Vy,T,Rd = 589.961 kN
Nb,Rd = 1840.320 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = -2.826 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 471.969 kN
Tt,Ed = -0.031 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.660 m   Lam_y = 0.195   Lz = 0.660 m   Lam_z = 0.195
Lcr,y = 0.660 m   Xy = 1.000   Lcr,z = 0.660 m   Xz = 1.000
Lamy = 14.878   kyy = 0.606   Lamz = 14.878   kyz = 0.490

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.032 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.001 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000   Lambda,z = 14.878 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.042 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.040 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm   Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm   Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 38 Barra_38   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 25.028 kN	My,Ed = 0.978 kN*m	Mz,Ed = -0.261 kN*m	Vy,Ed = -0.496 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -1.086 kN*m		Mz,Ed,max = 0.602 kN*m
	Vy,T,Rd = 589.091 kN		
Nb,Rd = 1728.798 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.356 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.272 kN
			Tt,Ed = -0.116 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.522 m	Lam_y = 0.449	Lz = 1.522 m	Lam_z = 0.449
Lcr,y = 1.522 m	Xy = 0.939	Lcr,z = 1.522 m	Xz = 0.939
Lamy = 34.308	kyy = 0.598	Lamz = 34.308	kyz = 0.418

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.014 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 34.308 < Lambda,max = 210.000   Lambda,z = 34.308 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 39 Barra_39 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -54.474 kN	My,Ed = -0.266 kN*m	Mz,Ed = -0.403 kN*m	Vy,Ed = -0.226 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.214 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.279 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.371 kN
			Tt,Ed = -0.104 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.030 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 40 Barra_40 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 39.531 kN	My,Ed = -0.106 kN*m	Mz,Ed = -0.313 kN*m	Vy,Ed = -0.206 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.106 kN*m		Mz,Ed,max = -0.313 kN*m
	Vy,T,Rd = 590.120 kN		
Nb,Rd = 1713.238 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.085 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.096 kN
			Tt,Ed = -0.016 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.620 m	Lam_y = 0.478	Lz = 1.620 m	Lam_z = 0.478
Lcr,y = 1.620 m	Xy = 0.931	Lcr,z = 1.620 m	Xz = 0.931
Lamy = 36.529	kzy = 0.435	Lamz = 36.529	kzz = 0.628

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.021 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 36.529 < Lambda,max = 210.000 Lambda,z = 36.529 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.026 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.026 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 41 Barra_41 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 25.758 kN	My,Ed = 0.372 kN*m	Mz,Ed = 0.283 kN*m	Vy,Ed = 0.520 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.499 kN*m		Mz,Ed,max = 0.283 kN*m
	Vy,T,Rd = 588.785 kN		
Nb,Rd = 1744.837 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.615 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.028 kN
			Tt,Ed = 0.146 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.415 m	Lam_y = 0.418	Lz = 1.415 m	Lam_z = 0.418
Lcr,y = 1.415 m	Xy = 0.948	Lcr,z = 1.415 m	Xz = 0.948
Lamy = 31.902	kyy = 0.630	Lamz = 31.902	kyz = 0.527

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.014 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 31.902 < Lambda,max = 210.000 Lambda,z = 31.902 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.021 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.021 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 42 Barra_42 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 43.422 kN	My,Ed = -0.316 kN*m	Mz,Ed = -0.247 kN*m	Vy,Ed = 0.254 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.316 kN*m		Mz,Ed,max = -0.327 kN*m
	Vy,T,Rd = 589.599 kN		
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.351 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.679 kN
			Tt,Ed = 0.066 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kzy = 0.361	Lamz = 38.102	kzz = 0.879

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.024 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 43 Barra_43 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 31.629 kN	My,Ed = 0.477 kN*m	Mz,Ed = 0.233 kN*m	Vy,Ed = 0.464 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.477 kN*m	Mz,Ed,max = 0.233 kN*m	Vy,T,Rd = 590.193 kN
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.500 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.154 kN
			Tt,Ed = -0.009 kN*m
			CLASE DE LA SECCION = 1

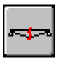
PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

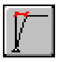
respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.662	Lamz = 34.279	kyz = 0.451

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.017 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.024 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES



Flechas *No analizado*



Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 44 Barra_44 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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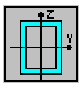
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -13.355 kN	My,Ed = 0.048 kN*m	Mz,Ed = -0.597 kN*m	Vy,Ed = -0.827 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.130 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.094 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.104 kN
			Tt,Ed = 0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.007 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 45 Barra_45 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.002 kN	My,Ed = 0.694 kN*m	Mz,Ed = 0.126 kN*m	Vy,Ed = -0.191 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.694 kN*m	Mz,Ed,max = -0.137 kN*m	Vy,T,Rd = 589.563 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.074 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.650 kN
			Tt,Ed = 0.070 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.668	Lamz = 30.882	kyz = 0.358

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 46 Barra_46 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 11.381 kN	My,Ed = -0.642 kN*m	Mz,Ed = -0.305 kN*m	Vy,Ed = -0.433 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.739 kN*m	Mz,Ed,max = 0.336 kN*m	Vy,T,Rd = 589.845 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.933 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.876 kN
			Tt,Ed = 0.043 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.606	Lamz = 33.362	kyz = 0.359

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 47 Barra_47 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 2 Viento

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.141 kN	My,Ed = -0.018 kN*m	Mz,Ed = -0.292 kN*m	Vy,Ed = 0.402 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.032 kN*m	Mz,Ed,max = -0.292 kN*m	Vy,T,Rd = 590.162 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.037 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.129 kN
			Tt,Ed = 0.012 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.405	Lamz = 30.882	kzz = 0.604

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 48 Barra_48 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.912 kN	My,Ed = -0.546 kN*m	Mz,Ed = 0.427 kN*m	Vy,Ed = -0.946 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.672 kN*m	Mz,Ed,max = -0.972 kN*m	Vy,T,Rd = 589.904 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.823 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.923 kN
			Tt,Ed = -0.037 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.371	Lamz = 33.362	kzz = 0.697

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.016 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 49 Barra_49 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 5.369 kN	My,Ed = -0.391 kN*m	Mz,Ed = -0.623 kN*m	Vy,Ed = -0.854 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.444 kN*m	Mz,Ed,max = -0.623 kN*m	Vy,T,Rd = 590.176 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.182 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.141 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.363	Lamz = 30.882	kzz = 0.605

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 50 Barra_50 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 5.835 kN	My,Ed = -0.799 kN*m	Mz,Ed = -0.143 kN*m	Vy,Ed = -0.154 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.799 kN*m		Mz,Ed,max = -0.143 kN*m
	Vy,T,Rd = 590.177 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.987 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.142 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.615	Lamz = 33.362	kyz = 0.399

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000   Lambda,z = 33.362 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 51 Barra_51   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.047 kN	My,Ed = -0.706 kN*m	Mz,Ed = -0.180 kN*m	Vy,Ed = -0.245 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.706 kN*m		Mz,Ed,max = -0.180 kN*m
	Vy,T,Rd = 589.737 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.072 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.789 kN
			Tt,Ed = 0.053 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.674	Lamz = 30.882	kyz = 0.365

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000   Lambda,z = 30.882 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 52 Barra_52   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 165.598 kN	My,Ed = 0.936 kN*m	Mz,Ed = -0.236 kN*m	Vy,Ed = -0.376 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.936 kN*m	Mz,Ed,max = -0.364 kN*m	Vy,T,Rd = 590.128 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.405 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.103 kN
			Tt,Ed = -0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.665	Lamz = 22.316	kyz = 0.547

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.090 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.675 + (Mz,Ed/MN,z,Rd)^1.675 = 0.001 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 22.316 < Lambda,max = 210.000   Lambda,z = 22.316 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.103 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.101 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm   Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 53 Barra_53   **PUNTOS:**   1   **COORDENADA:**   x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 211.410 kN	My,Ed = 0.867 kN*m	Mz,Ed = 0.834 kN*m	Vy,Ed = 3.558 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 0.867 kN*m	Mz,Ed,max = -1.394 kN*m	Vy,T,Rd = 588.716 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.547 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.973 kN
			Tt,Ed = -0.152 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kzy = 0.431	Lamz = 14.878	kzz = 0.633

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.115 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.685 + (Mz,Ed/MN,z,Rd)^1.685 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.006 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.130 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.132 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 54 Barra_54 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -104.167 kN	My,Ed = -0.551 kN*m	Mz,Ed = 0.728 kN*m	Vy,Ed = 0.815 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.740 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.528 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.792 kN
			Tt,Ed = 0.053 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.057 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.666 + (Mz,Ed/MN,z,Rd)^1.666 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 55 Barra_55 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -114.409 kN	My,Ed = 0.697 kN*m	Mz,Ed = 0.811 kN*m	Vy,Ed = 0.895 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.236 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.379 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.388 kN
			Tt,Ed = -0.102 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.062 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.667 + (Mz,Ed/MN,z,Rd)^1.667 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 56 Barra_56 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -174.091 kN	My,Ed = -1.064 kN*m	Mz,Ed = -0.650 kN*m	Vy,Ed = -0.543 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.024 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.600 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.019 kN
			Tt,Ed = -0.025 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.095 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.677 + (Mz,Ed/MN,z,Rd)^1.677 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 57 Barra_57 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -196.590 kN	My,Ed = 0.627 kN*m	Mz,Ed = 0.424 kN*m	Vy,Ed = 2.238 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.986 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.773 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.189 kN
			Tt,Ed = -0.126 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.107 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.682 + (Mz,Ed/MN,z,Rd)^1.682 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 58 Barra_58 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 51.912 kN	My,Ed = 0.404 kN*m	Mz,Ed = 0.038 kN*m	Vy,Ed = -0.407 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.404 kN*m	Mz,Ed,max = 0.221 kN*m	Vy,T,Rd = 589.481 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.303 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.585 kN
			Tt,Ed = -0.078 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.730	Lamz = 38.102	kyz = 0.494

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.028 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.036 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.035 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 59 Barra_59 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -41.541 kN	My,Ed = 0.785 kN*m	Mz,Ed = -0.109 kN*m	Vy,Ed = 0.321 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.252 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.845 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.402 kN
			Tt,Ed = 0.100 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.023 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 60 Barra_60 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 56.228 kN	My,Ed = -0.334 kN*m	Mz,Ed = -0.544 kN*m	Vy,Ed = -0.278 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.633 kN*m	Mz,Ed,max = -0.544 kN*m	Vy,T,Rd = 589.296 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.543 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.437 kN
			Tt,Ed = 0.096 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kyy = 0.674	Lamz = 40.138	kyz = 0.372

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.031 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.042 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.041 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 61 Barra_61 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /1/ 1*1.350 + 2*0.900 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -34.388 kN	My,Ed = 0.402 kN*m	Mz,Ed = -0.161 kN*m	Vy,Ed = 0.112 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.985 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.525 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.988 kN
			Tt,Ed = -0.029 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.019 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 62 Barra_62 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 92.239 kN	My,Ed = 0.481 kN*m	Mz,Ed = -0.472 kN*m	Vy,Ed = 0.299 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.481 kN*m	Mz,Ed,max = -0.472 kN*m	Vy,T,Rd = 589.205 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.954 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.364 kN
			Tt,Ed = -0.105 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kzy = 0.345	Lamz = 22.316	kzz = 0.704

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.050 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.665 + (Mz,Ed/MN,z,Rd)^1.665 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.058 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.058 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 63 Barra_63 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.660 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 103.823 kN	My,Ed = -0.898 kN*m	Mz,Ed = -0.495 kN*m	Vy,Ed = 0.198 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.898 kN*m		Mz,Ed,max = -0.495 kN*m
	Vy,T,Rd = 589.733 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.615 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.786 kN
			Tt,Ed = 0.053 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

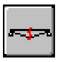
PARAMETROS DE PANDEO:

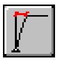
respecto al eje y:		respecto al eje z:	
Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kyy = 0.582	Lamz = 14.878	kyz = 0.517

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.056 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.666 + (Mz,Ed/MN,z,Rd)^1.666 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 14.878 < Lambda,max = 210.000   Lambda,z = 14.878 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.067 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.066 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES


Flechas *No analizado*


Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm   Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm   Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 64 Barra_64   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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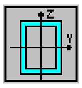
CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

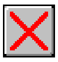


PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

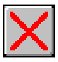
N,Ed = -36.726 kN	My,Ed = 0.053 kN*m	Mz,Ed = -0.214 kN*m	Vy,Ed = 0.000 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.004 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.002 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.003 kN
			Tt,Ed = -0.027 kN*m
			CLASE DE LA SECCION = 1



PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:


respecto al eje y:


respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.020 < 1.000   (6.2.3.(1))

(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 65 Barra_65 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 22.764 kN	My,Ed = -0.315 kN*m	Mz,Ed = -0.249 kN*m	Vy,Ed = -0.030 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.363 kN*m	Mz,Ed,max = -0.249 kN*m	Vy,T,Rd = 590.273 kN
Nb,Rd = 1713.238 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.418 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.218 kN
			Tt,Ed = -0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.620 m	Lam_y = 0.478	Lz = 1.620 m	Lam_z = 0.478
Lcr,y = 1.620 m	Xy = 0.931	Lcr,z = 1.620 m	Xz = 0.931
Lamy = 36.529	kyy = 0.605	Lamz = 36.529	kyz = 0.428

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.012 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 36.529 < Lambda,max = 210.000   Lambda,z = 36.529 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 66 Barra_66   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 31.965 kN	My,Ed = -0.358 kN*m	Mz,Ed = -0.245 kN*m	Vy,Ed = 0.161 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.358 kN*m		Mz,Ed,max = -0.277 kN*m
	Vy,T,Rd = 589.501 kN		
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.391 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.600 kN
			Tt,Ed = 0.076 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.609	Lamz = 38.102	kyz = 0.446

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.017 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 38.102 < Lambda,max = 210.000   Lambda,z = 38.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 67 Barra_67   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 17.399 kN   My,Ed = 0.612 kN*m   Mz,Ed = 0.339 kN*m   Vy,Ed = 0.771 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 0.612 kN*m	Mz,Ed,max = 0.339 kN*m	Vy,T,Rd = 589.692 kN
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.632 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.754 kN
			Tt,Ed = -0.057 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.669	Lamz = 34.279	kyz = 0.418

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.009 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.016 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 68 Barra_68 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -13.498 kN	My,Ed = 0.056 kN*m	Mz,Ed = -0.242 kN*m	Vy,Ed = -0.328 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.112 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.080 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.090 kN
			Tt,Ed = 0.017 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.007 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 69 Barra_69 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.605 kN	My,Ed = 0.725 kN*m	Mz,Ed = 0.069 kN*m	Vy,Ed = -0.107 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.725 kN*m	Mz,Ed,max = -0.078 kN*m	Vy,T,Rd = 590.031 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.111 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.025 kN
			Tt,Ed = 0.024 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.667	Lamz = 30.882	kyz = 0.363

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 70 Barra_70 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 11.862 kN	My,Ed = -0.689 kN*m	Mz,Ed = -0.046 kN*m	Vy,Ed = -0.062 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.791 kN*m	Mz,Ed,max = -0.046 kN*m	Vy,T,Rd = 590.024 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.000 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.020 kN
			Tt,Ed = 0.025 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.606	Lamz = 33.362	kyz = 0.348

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*
Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 71 Barra_71 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -5.583 kN	My,Ed = -0.398 kN*m	Mz,Ed = -0.034 kN*m	Vy,Ed = -0.044 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.220 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.043 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.176 kN
			Tt,Ed = 0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 72 Barra_72 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.272 kN	My,Ed = -0.486 kN*m	Mz,Ed = 0.216 kN*m	Vy,Ed = -0.645 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.605 kN*m	Mz,Ed,max = -0.738 kN*m	Vy,T,Rd = 589.830 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.737 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.864 kN
			Tt,Ed = -0.044 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.372	Lamz = 33.362	kzz = 0.728

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 73 Barra_73 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.355 kN	My,Ed = 0.461 kN*m	Mz,Ed = 0.186 kN*m	Vy,Ed = -0.297 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.461 kN*m	Mz,Ed,max = -0.221 kN*m	Vy,T,Rd = 590.187 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.033 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.149 kN
			Tt,Ed = 0.009 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.604	Lamz = 30.882	kyz = 0.367

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 74 Barra_74 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.050 kN	My,Ed = -0.805 kN*m	Mz,Ed = 0.068 kN*m	Vy,Ed = 0.102 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.805 kN*m		Mz,Ed,max = -0.082 kN*m
	Vy,T,Rd = 590.189 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.996 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.151 kN
			Tt,Ed = 0.009 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.614	Lamz = 33.362	kyz = 0.368

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 75 Barra_75 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.042 kN	My,Ed = -0.727 kN*m	Mz,Ed = -0.005 kN*m	Vy,Ed = 0.004 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.727 kN*m		Mz,Ed,max = -0.010 kN*m
	Vy,T,Rd = 590.165 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.099 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.132 kN
			Tt,Ed = 0.011 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.370 m   Lam_y = 0.404
Lcr,y = 1.370 m   Xy = 0.952
Lamy = 30.882   kyy = 0.673

respecto al eje z:

Lz = 1.370 m   Lam_z = 0.404
Lcr,z = 1.370 m   Xz = 0.952
Lamz = 30.882   kyz = 0.537

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000   Lambda,z = 30.882 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 76 Barra_76   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:
N,Ed = 222.671 kN   My,Ed = -0.443 kN*m   Mz,Ed = -0.761 kN*m   Vy,Ed = -0.599 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 1.099 kN*m	Mz,Ed,max = -0.761 kN*m	Vy,T,Rd = 590.057 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.558 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.046 kN
			Tt,Ed = 0.022 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.675	Lamz = 22.316	kyz = 0.438

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.121 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.688 + (Mz,Ed/MN,z,Rd)^1.688 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.138 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.137 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 77 Barra_77 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 245.599 kN	My,Ed = 1.174 kN*m	Mz,Ed = 0.593 kN*m	Vy,Ed = 3.026 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.174 kN*m	Mz,Ed,max = -1.285 kN*m	Vy,T,Rd = 588.893 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.338 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.114 kN
			Tt,Ed = -0.135 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kzy = 0.411	Lamz = 14.878	kzz = 0.656

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.133 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.694 + (Mz,Ed/MN,z,Rd)^1.694 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.005 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.151 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.151 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 78 Barra_78 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -128.188 kN	My,Ed = -0.737 kN*m	Mz,Ed = 0.396 kN*m	Vy,Ed = -0.217 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.444 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.199 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.555 kN
			Tt,Ed = 0.082 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.070 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.669 + (Mz,Ed/MN,z,Rd)^1.669 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 79 Barra_79 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -132.551 kN	My,Ed = 0.816 kN*m	Mz,Ed = 0.667 kN*m	Vy,Ed = 0.409 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.423 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.619 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.539 kN
			Tt,Ed = -0.084 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.072 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.670 + (Mz,Ed/MN,z,Rd)^1.670 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 80 Barra_80 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -231.098 kN	My,Ed = 1.548 kN*m	Mz,Ed = 0.341 kN*m	Vy,Ed = -1.578 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.276 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.444 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.221 kN
			Tt,Ed = 0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.126 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.690 + (Mz,Ed/MN,z,Rd)^1.690 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 81 Barra_81 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -238.701 kN	My,Ed = 1.129 kN*m	Mz,Ed = 0.334 kN*m	Vy,Ed = 2.197 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.267 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.150 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.413 kN
			Tt,Ed = -0.099 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.130 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.692 + (Mz,Ed/MN,z,Rd)^1.692 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 82 Barra_82 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 25.483 kN	My,Ed = 0.635 kN*m	Mz,Ed = 0.038 kN*m	Vy,Ed = -0.480 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.635 kN*m	Mz,Ed,max = -0.145 kN*m	Vy,T,Rd = 589.192 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.514 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.353 kN
			Tt,Ed = -0.106 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.711	Lamz = 38.102	kyz = 0.523

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.014 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.022 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*
Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 83 Barra_83 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -20.471 kN	My,Ed = 0.746 kN*m	Mz,Ed = -0.105 kN*m	Vy,Ed = 0.302 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.250 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.746 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.400 kN
			Tt,Ed = 0.100 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.011 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 84 Barra_84 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 32.746 kN	My,Ed = -0.368 kN*m	Mz,Ed = -0.623 kN*m	Vy,Ed = -0.320 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.671 kN*m	Mz,Ed,max = -0.623 kN*m	Vy,T,Rd = 589.024 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.583 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.219 kN
			Tt,Ed = 0.122 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kyy = 0.672	Lamz = 40.138	kyz = 0.387

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.018 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.028 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 85 Barra_85 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.775 kN	My,Ed = 0.184 kN*m	Mz,Ed = -0.564 kN*m	Vy,Ed = -0.434 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.184 kN*m	Mz,Ed,max = -0.564 kN*m	Vy,T,Rd = 589.846 kN
Nb,Rd = 1713.238 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.177 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.877 kN
			Tt,Ed = -0.042 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.620 m	Lam_y = 0.478	Lz = 1.620 m	Lam_z = 0.478
Lcr,y = 1.620 m	Xy = 0.931	Lcr,z = 1.620 m	Xz = 0.931
Lamy = 36.529	kzy = 0.404	Lamz = 36.529	kzz = 0.737

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 36.529 < Lambda,max = 210.000 Lambda,z = 36.529 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 86 Barra_86 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 123.170 kN	My,Ed = 0.738 kN*m	Mz,Ed = -0.497 kN*m	Vy,Ed = 0.108 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.748 kN*m		Mz,Ed,max = -0.497 kN*m
	Vy,T,Rd = 589.420 kN		
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.501 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.536 kN
			Tt,Ed = -0.084 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.567	Lamz = 22.316	kyz = 0.476

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.067 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.668 + (Mz,Ed/MN,z,Rd)^1.668 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.077 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.077 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 87 Barra_87 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 128.524 kN	My,Ed = 0.879 kN*m	Mz,Ed = -0.401 kN*m	Vy,Ed = 0.125 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.924 kN*m		Mz,Ed,max = -0.413 kN*m
	Vy,T,Rd = 589.482 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.732 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.586 kN
			Tt,Ed = 0.078 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 0.660 m Lam_y = 0.195
Lcr,y = 0.660 m Xy = 1.000
Lamy = 14.878 kyy = 0.572

respecto al eje z:

Lz = 0.660 m Lam_z = 0.195
Lcr,z = 0.660 m Xz = 1.000
Lamz = 14.878 kyz = 0.564

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.070 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.669 + (Mz,Ed/MN,z,Rd)^1.669 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.080 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.079 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 88 Barra_88 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -18.281 kN My,Ed = 0.014 kN*m Mz,Ed = -0.206 kN*m Vy,Ed = 0.046 kN

Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.025 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.021 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.020 kN
			Tt,Ed = -0.025 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.010 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 89 Barra_89 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.849 kN	My,Ed = -0.331 kN*m	Mz,Ed = -0.163 kN*m	Vy,Ed = 0.107 kN

Nc,Rd = 1840.320 kN   My,Ed,max = 0.348 kN*m   Mz,Ed,max = -0.189 kN*m   Vy,T,Rd = 590.280 kN
Nb,Rd = 1713.238 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = 0.419 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 472.224 kN
Tt,Ed = 0.000 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.620 m   Lam_y = 0.478
Lcr,y = 1.620 m   Xy = 0.931
Lamy = 36.529   kyy = 0.590

respecto al eje z:

Lz = 1.620 m   Lam_z = 0.478
Lcr,z = 1.620 m   Xz = 0.931
Lamz = 36.529   kyz = 0.511

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 36.529 < Lambda,max = 210.000   Lambda,z = 36.529 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 90 Barra_90   **PUNTOS:**   1   **COORDENADA:**   x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 17.697 kN	My,Ed = -0.434 kN*m	Mz,Ed = -0.216 kN*m	Vy,Ed = 0.132 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.434 kN*m		Mz,Ed,max = -0.237 kN*m
	Vy,T,Rd = 589.384 kN		
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.464 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.507 kN
			Tt,Ed = 0.087 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.619	Lamz = 38.102	kyz = 0.396

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.010 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 91 Barra_91 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.949 kN	My,Ed = 0.646 kN*m	Mz,Ed = 0.300 kN*m	Vy,Ed = 0.765 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.646 kN*m	Mz,Ed,max = 0.300 kN*m	Vy,T,Rd = 589.501 kN
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.632 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.600 kN
			Tt,Ed = -0.076 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.687	Lamz = 34.279	kyz = 0.399

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 92 Barra_92 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -13.088 kN	My,Ed = 0.051 kN*m	Mz,Ed = 0.109 kN*m	Vy,Ed = 0.165 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.144 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.088 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.115 kN
			Tt,Ed = 0.014 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.007 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 93 Barra_93 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.300 kN	My,Ed = 0.602 kN*m	Mz,Ed = 0.045 kN*m	Vy,Ed = -0.070 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.602 kN*m	Mz,Ed,max = -0.051 kN*m	Vy,T,Rd = 590.143 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.170 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.115 kN
			Tt,Ed = -0.014 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.694	Lamz = 30.882	kyz = 0.362

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado

Caso de carga más desfavorable: 2 Viento

vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado

Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*

TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 94 Barra_94 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 11.652 kN	My,Ed = -0.696 kN*m	Mz,Ed = 0.203 kN*m	Vy,Ed = 0.295 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.799 kN*m	Mz,Ed,max = -0.233 kN*m	Vy,T,Rd = 590.260 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.010 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.208 kN
			Tt,Ed = 0.002 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.606	Lamz = 33.362	kyz = 0.363

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))

(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000   Lambda,z = 33.362 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 95 Barra_95   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -5.584 kN	My,Ed = -0.397 kN*m	Mz,Ed = 0.095 kN*m	Vy,Ed = 0.148 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.228 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.042 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.182 kN
			Tt,Ed = 0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 96 Barra_96 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.836 kN	My,Ed = -0.776 kN*m	Mz,Ed = -0.231 kN*m	Vy,Ed = 0.315 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.970 kN*m	Mz,Ed,max = 0.235 kN*m	Vy,T,Rd = 590.071 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.180 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.056 kN
			Tt,Ed = -0.021 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.621	Lamz = 33.362	kyz = 0.350

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 97 Barra_97 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.669 kN	My,Ed = 0.455 kN*m	Mz,Ed = -0.181 kN*m	Vy,Ed = 0.269 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.455 kN*m	Mz,Ed,max = 0.187 kN*m	Vy,T,Rd = 590.183 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.025 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.146 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.370 m   Lam_y = 0.404
Lcr,y = 1.370 m   Xy = 0.952
Lamy = 30.882   kyy = 0.605

respecto al eje z:

Lz = 1.370 m   Lam_z = 0.404
Lcr,z = 1.370 m   Xz = 0.952
Lamz = 30.882   kyz = 0.351

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000   Lambda,z = 30.882 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 98 Barra_98   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 5.690 kN   My,Ed = -0.801 kN*m   Mz,Ed = 0.265 kN*m   Vy,Ed = 0.338 kN

Nc,Rd = 1840.320 kN	My,Ed,max = -0.801 kN*m Vy,T,Rd = 590.218 kN		Mz,Ed,max = 0.265 kN*m
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m MN,y,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m MN,z,Rd = 74.840 kN*m	Vz,Ed = 0.990 kN Vz,T,Rd = 472.175 kN Tt,Ed = 0.006 kN*m CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.615	Lamz = 33.362	kyz = 0.362

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 99 Barra_99 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.435 kN	My,Ed = -0.727 kN*m	Mz,Ed = 0.162 kN*m	Vy,Ed = 0.241 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.727 kN*m		Mz,Ed,max = -0.168 kN*m
	Vy,T,Rd = 589.993 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.099 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.994 kN
			Tt,Ed = -0.028 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.673	Lamz = 30.882	kyz = 0.353

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 100 Barra_100 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 243.621 kN	My,Ed = 1.104 kN*m	Mz,Ed = 0.360 kN*m	Vy,Ed = -1.662 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.104 kN*m	Mz,Ed,max = -1.015 kN*m	Vy,T,Rd = 589.796 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.484 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.837 kN
			Tt,Ed = 0.047 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.688	Lamz = 22.316	kyz = 0.409

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.132 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.694 + (Mz,Ed/MN,z,Rd)^1.694 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.151 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.151 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 101 Barra_101 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 243.674 kN	My,Ed = 1.302 kN*m	Mz,Ed = 0.287 kN*m	Vy,Ed = 2.162 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.302 kN*m	Mz,Ed,max = -1.020 kN*m	Vy,T,Rd = 589.135 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.754 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.308 kN
			Tt,Ed = -0.112 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kyy = 0.670	Lamz = 14.878	kyz = 0.415

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.132 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.694 + (Mz,Ed/MN,z,Rd)^1.694 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.150 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.149 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado

Caso de carga más desfavorable: 5 Sismo Eje X

vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado

Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 102 Barra_102 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.660 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -134.161 kN	My,Ed = 0.839 kN*m	Mz,Ed = 0.677 kN*m	Vy,Ed = -0.777 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.220 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.492 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.376 kN
			Tt,Ed = 0.103 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.073 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.670 + (Mz,Ed/MN,z,Rd)^1.670 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 103 Barra_103 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -132.579 kN	My,Ed = 0.798 kN*m	Mz,Ed = 0.490 kN*m	Vy,Ed = -0.056 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.660 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.592 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.728 kN
			Tt,Ed = -0.061 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.072 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.670 + (Mz,Ed/MN,z,Rd)^1.670 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 104 Barra_104 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -247.784 kN	My,Ed = 1.398 kN*m	Mz,Ed = 0.468 kN*m	Vy,Ed = -1.839 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.046 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.039 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.037 kN
			Tt,Ed = 0.023 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.135 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.695 + (Mz,Ed/MN,z,Rd)^1.695 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado

Caso de carga más desfavorable: 5 Sismo Eje X

vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado

Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*

TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 105 Barra_105 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -240.395 kN	My,Ed = 1.453 kN*m	Mz,Ed = 0.186 kN*m	Vy,Ed = 1.799 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.507 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -3.178 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.605 kN
			Tt,Ed = -0.075 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.131 < 1.000 (6.2.3.(1))

(My,Ed/MN,y,Rd)^ 1.693 + (Mz,Ed/MN,z,Rd)^1.693 = 0.001 < 1.000 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.007 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 106 Barra_106 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.532 kN	My,Ed = 0.534 kN*m	Mz,Ed = 0.105 kN*m	Vy,Ed = -0.413 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.534 kN*m	Mz,Ed,max = -0.108 kN*m	Vy,T,Rd = 589.570 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.376 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.656 kN
			Tt,Ed = -0.069 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.750	Lamz = 38.102	kyz = 0.431

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 38.102 < Lambda,max = 210.000   Lambda,z = 38.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 107 Barra_107   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.464 kN	My,Ed = 0.604 kN*m	Mz,Ed = -0.101 kN*m	Vy,Ed = 0.274 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.604 kN*m	Mz,Ed,max = 0.169 kN*m	Vy,T,Rd = 589.370 kN
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.548 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.496 kN
			Tt,Ed = 0.089 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.710	Lamz = 34.279	kyz = 0.398

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 34.279 < Lambda,max = 210.000   Lambda,z = 34.279 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 108 Barra_108   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 13.218 kN	My,Ed = -0.395 kN*m	Mz,Ed = 0.035 kN*m	Vy,Ed = 0.520 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.500 kN*m	Mz,Ed,max = -0.539 kN*m	Vy,T,Rd = 589.860 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.503 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.888 kN
			Tt,Ed = 0.041 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kzy = 0.374	Lamz = 40.138	kzz = 0.776

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.007 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.016 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 109 Barra_109 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.620 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 15.535 kN	My,Ed = -0.401 kN*m	Mz,Ed = 0.002 kN*m	Vy,Ed = -0.486 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 0.504 kN*m	Mz,Ed,max = -0.571 kN*m	Vy,T,Rd = 589.772 kN
Nb,Rd = 1713.238 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.558 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.818 kN
			Tt,Ed = -0.050 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.620 m	Lam_y = 0.478	Lz = 1.620 m	Lam_z = 0.478
Lcr,y = 1.620 m	Xy = 0.931	Lcr,z = 1.620 m	Xz = 0.931
Lamy = 36.529	kzy = 0.373	Lamz = 36.529	kzz = 0.788

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.008 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 36.529 < Lambda,max = 210.000 Lambda,z = 36.529 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 110 Barra_110 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 131.621 kN	My,Ed = 0.870 kN*m	Mz,Ed = -0.448 kN*m	Vy,Ed = -0.108 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.890 kN*m		Mz,Ed,max = -0.457 kN*m
	Vy,T,Rd = 589.675 kN		
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.778 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.740 kN
			Tt,Ed = -0.059 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.568	Lamz = 22.316	kyz = 0.522

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.072 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.670 + (Mz,Ed/MN,z,Rd)^1.670 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.083 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.082 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 111 Barra_111 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 130.625 kN	My,Ed = 0.808 kN*m	Mz,Ed = -0.536 kN*m	Vy,Ed = -0.420 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.812 kN*m		Mz,Ed,max = -0.536 kN*m
	Vy,T,Rd = 589.234 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.454 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.387 kN
			Tt,Ed = 0.102 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kyy = 0.563	Lamz = 14.878	kyz = 0.486

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.071 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.670 + (Mz,Ed/MN,z,Rd)^1.670 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.081 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.080 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 112 Barra_112 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.781 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.860 kN	My,Ed = -0.045 kN*m	Mz,Ed = 0.345 kN*m	Vy,Ed = -0.779 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.212 kN*m	Mz,Ed,max = -0.567 kN*m	Vy,T,Rd = 589.015 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.144 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.212 kN
			Tt,Ed = -0.123 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kzy = 0.447	Lamz = 40.138	kzz = 0.662

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 113 Barra_113 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.620 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -15.623 kN	My,Ed = 0.375 kN*m	Mz,Ed = -0.598 kN*m	Vy,Ed = 0.452 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.185 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.393 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.348 kN
			Tt,Ed = 0.107 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.008 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 114 Barra_114 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.882 kN	My,Ed = 0.756 kN*m	Mz,Ed = 0.278 kN*m	Vy,Ed = -0.876 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.756 kN*m	Mz,Ed,max = -0.347 kN*m	Vy,T,Rd = 589.114 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.643 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.291 kN
			Tt,Ed = 0.114 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.697	Lamz = 38.102	kyz = 0.368

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 115 Barra_115 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.521 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 12.114 kN	My,Ed = -0.429 kN*m	Mz,Ed = -0.222 kN*m	Vy,Ed = 0.002 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.429 kN*m		Mz,Ed,max = 0.244 kN*m
	Vy,T,Rd = 589.473 kN		
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.506 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.578 kN
			Tt,Ed = -0.079 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.621	Lamz = 34.279	kyz = 0.358

FORMULAS DE VERIFICACION:

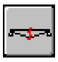
Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.007 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

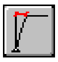
Control de estabilidad global de la barra:

Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES



Flechas *No analizado*



Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

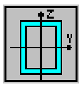
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 116 Barra_116 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -12.081 kN	My,Ed = 0.046 kN*m	Mz,Ed = 0.452 kN*m	Vy,Ed = 0.647 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.143 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.101 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.114 kN
			Tt,Ed = 0.014 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.007 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 117 Barra_117 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.717 kN	My,Ed = 0.695 kN*m	Mz,Ed = -0.062 kN*m	Vy,Ed = 0.088 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.695 kN*m	Mz,Ed,max = -0.062 kN*m	Vy,T,Rd = 589.674 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.075 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.740 kN
			Tt,Ed = -0.059 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.668	Lamz = 30.882	kyz = 0.354

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 118 Barra_118 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 10.803 kN	My,Ed = -0.672 kN*m	Mz,Ed = 0.447 kN*m	Vy,Ed = 0.644 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.777 kN*m	Mz,Ed,max = -0.506 kN*m	Vy,T,Rd = 590.102 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.979 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.082 kN
			Tt,Ed = -0.018 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.607	Lamz = 33.362	kyz = 0.362

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 119 Barra_119 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 2 Viento

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.492 kN	My,Ed = -0.026 kN*m	Mz,Ed = 0.265 kN*m	Vy,Ed = -0.358 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.042 kN*m	Mz,Ed,max = 0.265 kN*m	Vy,T,Rd = 590.207 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.050 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.166 kN
			Tt,Ed = 0.007 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.397	Lamz = 30.882	kzz = 0.611

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 120 Barra_120 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.256 kN	My,Ed = -0.727 kN*m	Mz,Ed = -0.547 kN*m	Vy,Ed = 0.760 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.910 kN*m	Mz,Ed,max = 0.578 kN*m	Vy,T,Rd = 589.835 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.106 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.868 kN
			Tt,Ed = -0.044 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.621	Lamz = 33.362	kyz = 0.354

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 121 Barra_121 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.174 kN	My,Ed = 0.408 kN*m	Mz,Ed = -0.556 kN*m	Vy,Ed = 0.849 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.408 kN*m	Mz,Ed,max = 0.607 kN*m	Vy,T,Rd = 590.239 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.954 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.192 kN
			Tt,Ed = 0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.366	Lamz = 30.882	kzz = 0.597

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 122 Barra_122 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.850 kN	My,Ed = -0.755 kN*m	Mz,Ed = 0.456 kN*m	Vy,Ed = 0.563 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.755 kN*m		Mz,Ed,max = 0.456 kN*m
	Vy,T,Rd = 590.180 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.928 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.144 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.617	Lamz = 33.362	kyz = 0.369

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 123 Barra_123 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 5.166 kN	My,Ed = -0.690 kN*m	Mz,Ed = 0.322 kN*m	Vy,Ed = 0.468 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.690 kN*m		Mz,Ed,max = 0.322 kN*m
	Vy,T,Rd = 589.538 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.052 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.630 kN
			Tt,Ed = -0.072 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.675	Lamz = 30.882	kyz = 0.349

FORMULAS DE VERIFICACION:

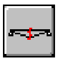
Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

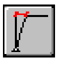
Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES



Flechas *No analizado*



Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 124 Barra_124 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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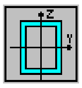
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 228.478 kN	My,Ed = 0.939 kN*m	Mz,Ed = 0.547 kN*m	Vy,Ed = -1.947 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.939 kN*m	Mz,Ed,max = -1.111 kN*m	Vy,T,Rd = 589.577 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.164 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.662 kN
			Tt,Ed = 0.069 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kzy = 0.426	Lamz = 22.316	kzz = 0.656

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.124 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.689 + (Mz,Ed/MN,z,Rd)^1.689 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.142 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.142 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 125 Barra_125 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:
N,Ed = 205.600 kN My,Ed = 1.267 kN*m Mz,Ed = -0.094 kN*m Vy,Ed = 0.915 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 1.267 kN*m	Mz,Ed,max = -0.578 kN*m	Vy,T,Rd = 589.498 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.825 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.598 kN
			Tt,Ed = -0.076 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kyy = 0.660	Lamz = 14.878	kyz = 0.473

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.112 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.684 + (Mz,Ed/MN,z,Rd)^1.684 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 14.878 < Lambda,max = 210.000   Lambda,z = 14.878 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.127 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.125 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 126 Barra_126   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 0.660 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -122.013 kN	My,Ed = 0.826 kN*m	Mz,Ed = 0.922 kN*m	Vy,Ed = -1.805 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.038 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 2.376 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.230 kN
			Tt,Ed = 0.121 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.066 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.668 + (Mz,Ed/MN,z,Rd)^1.668 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 127 Barra_127 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -114.542 kN	My,Ed = -0.644 kN*m	Mz,Ed = 0.442 kN*m	Vy,Ed = 0.174 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.925 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.300 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.940 kN
			Tt,Ed = -0.035 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.062 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.667 + (Mz,Ed/MN,z,Rd)^1.667 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 128 Barra_128 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -224.109 kN	My,Ed = 1.069 kN*m	Mz,Ed = 0.534 kN*m	Vy,Ed = -1.871 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.782 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.393 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.826 kN
			Tt,Ed = 0.049 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.122 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.688 + (Mz,Ed/MN,z,Rd)^1.688 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 129 Barra_129 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -201.712 kN	My,Ed = 1.588 kN*m	Mz,Ed = -0.012 kN*m	Vy,Ed = 1.084 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.727 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -3.834 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.782 kN
			Tt,Ed = -0.054 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.110 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.683 + (Mz,Ed/MN,z,Rd)^1.683 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.008 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 130 Barra_130 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -25.553 kN	My,Ed = 0.743 kN*m	Mz,Ed = 0.032 kN*m	Vy,Ed = -0.541 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.168 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.646 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.334 kN
			Tt,Ed = -0.108 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.014 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 131 Barra_131 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 24.198 kN	My,Ed = 0.359 kN*m	Mz,Ed = -0.088 kN*m	Vy,Ed = 0.243 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.359 kN*m	Mz,Ed,max = 0.229 kN*m	Vy,T,Rd = 589.654 kN
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.251 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.723 kN
			Tt,Ed = 0.061 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.774	Lamz = 34.279	kyz = 0.424

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.013 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 132 Barra_132 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.781 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -30.855 kN	My,Ed = 0.182 kN*m	Mz,Ed = 0.335 kN*m	Vy,Ed = -0.466 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.832 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.288 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.866 kN
			Tt,Ed = -0.044 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.017 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 133 Barra_133 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.620 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /1/ 1*1.350 + 2*0.900 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 33.614 kN	My,Ed = -0.403 kN*m	Mz,Ed = -0.533 kN*m	Vy,Ed = 0.376 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.501 kN*m	Mz,Ed,max = -0.533 kN*m	Vy,T,Rd = 589.608 kN
Nb,Rd = 1713.238 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.558 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.686 kN
			Tt,Ed = -0.066 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.620 m	Lam_y = 0.478	Lz = 1.620 m	Lam_z = 0.478
Lcr,y = 1.620 m	Xy = 0.931	Lcr,z = 1.620 m	Xz = 0.931
Lamy = 36.529	kzy = 0.371	Lamz = 36.529	kzz = 0.643

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.018 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 36.529 < Lambda,max = 210.000 Lambda,z = 36.529 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 134 Barra_134 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 117.533 kN	My,Ed = 0.878 kN*m	Mz,Ed = -0.343 kN*m	Vy,Ed = -0.322 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.898 kN*m		Mz,Ed,max = -0.419 kN*m
	Vy,T,Rd = 589.916 kN		
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.794 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.933 kN
			Tt,Ed = -0.036 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.569	Lamz = 22.316	kyz = 0.581

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.064 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.668 + (Mz,Ed/MN,z,Rd)^1.668 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.075 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.075 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 135 Barra_135 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 110.199 kN	My,Ed = 0.617 kN*m	Mz,Ed = -0.603 kN*m	Vy,Ed = -0.949 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.617 kN*m	Mz,Ed,max = -0.603 kN*m	Vy,T,Rd = 588.977 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.799 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.182 kN
			Tt,Ed = 0.127 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kzy = 0.348	Lamz = 14.878	kzz = 0.713

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.060 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.667 + (Mz,Ed/MN,z,Rd)^1.667 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.068 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.068 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 136 Barra_136 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.781 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 17.689 kN	My,Ed = -0.075 kN*m	Mz,Ed = 0.258 kN*m	Vy,Ed = -0.670 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.276 kN*m	Mz,Ed,max = -0.461 kN*m	Vy,T,Rd = 589.102 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.197 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.282 kN
			Tt,Ed = -0.115 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kzy = 0.439	Lamz = 40.138	kzz = 0.671

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.010 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.016 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.016 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 137 Barra_137 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.620 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -28.262 kN	My,Ed = 0.321 kN*m	Mz,Ed = -0.594 kN*m	Vy,Ed = 0.492 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.317 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.355 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.454 kN
			Tt,Ed = 0.094 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.015 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 138 Barra_138 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 21.654 kN	My,Ed = 0.728 kN*m	Mz,Ed = 0.327 kN*m	Vy,Ed = -0.888 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.728 kN*m	Mz,Ed,max = 0.327 kN*m	Vy,T,Rd = 589.219 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.630 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.375 kN
			Tt,Ed = 0.103 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.691	Lamz = 38.102	kyz = 0.356

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.012 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.021 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 139 Barra_139 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.521 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 24.587 kN My,Ed = -0.454 kN*m Mz,Ed = -0.245 kN*m Vy,Ed = -0.029 kN

Nc,Rd = 1840.320 kN My,Ed,max = -0.454 kN*m Mz,Ed,max = -0.246 kN*m
Vy,T,Rd = 589.379 kN
Nb,Rd = 1728.997 kN My,c,Rd = 74.840 kN*m Mz,c,Rd = 74.840 kN*m Vz,Ed = -0.558 kN
MN,y,Rd = 74.840 kN*m MN,z,Rd = 74.840 kN*m Vz,T,Rd = 471.503 kN
Tt,Ed = -0.088 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.521 m Lam_y = 0.449 Lz = 1.521 m Lam_z = 0.449
Lcr,y = 1.521 m Xy = 0.940 Lcr,z = 1.521 m Xz = 0.940
Lamy = 34.279 kyy = 0.605 Lamz = 34.279 kyz = 0.384

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.013 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 140 Barra_140 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -10.636 kN	My,Ed = -0.063 kN*m	Mz,Ed = 0.785 kN*m	Vy,Ed = 1.113 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.008 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.267 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.006 kN
			Tt,Ed = 0.027 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.006 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 141 Barra_141 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.243 kN	My,Ed = 0.585 kN*m	Mz,Ed = -0.133 kN*m	Vy,Ed = 0.193 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.585 kN*m	Mz,Ed,max = -0.133 kN*m	Vy,T,Rd = 589.150 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.941 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.320 kN
			Tt,Ed = -0.110 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.672	Lamz = 30.882	kyz = 0.348

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 142 Barra_142 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.129 kN	My,Ed = -0.532 kN*m	Mz,Ed = 0.687 kN*m	Vy,Ed = 0.990 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.613 kN*m	Mz,Ed,max = -0.778 kN*m	Vy,T,Rd = 590.059 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.774 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.048 kN
			Tt,Ed = -0.022 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.364	Lamz = 33.362	kzz = 0.603

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 1.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 143 Barra_143 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 2 Viento

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.368 kN	My,Ed = -0.024 kN*m	Mz,Ed = 0.455 kN*m	Vy,Ed = -0.618 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.034 kN*m	Mz,Ed,max = 0.455 kN*m	Vy,T,Rd = 590.230 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.042 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.184 kN
			Tt,Ed = 0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.385	Lamz = 30.882	kzz = 0.609

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado

Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado

Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 144 Barra_144 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.884 kN	My,Ed = -0.511 kN*m	Mz,Ed = -0.838 kN*m	Vy,Ed = 1.153 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.659 kN*m	Mz,Ed,max = 0.867 kN*m	Vy,T,Rd = 589.724 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.791 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.779 kN
			Tt,Ed = -0.054 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.376	Lamz = 33.362	kzz = 0.586

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.016 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 145 Barra_145 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.207 kN	My,Ed = 0.258 kN*m	Mz,Ed = -1.093 kN*m	Vy,Ed = 1.619 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.258 kN*m	Mz,Ed,max = 1.125 kN*m	Vy,T,Rd = 590.127 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.704 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.101 kN
			Tt,Ed = -0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.397	Lamz = 30.882	kzz = 0.585

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 146 Barra_146 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 3.655 kN	My,Ed = -0.471 kN*m	Mz,Ed = 0.628 kN*m	Vy,Ed = 0.761 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.471 kN*m		Mz,Ed,max = 0.628 kN*m
	Vy,T,Rd = 590.252 kN		
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.561 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.202 kN
			Tt,Ed = 0.003 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.378	Lamz = 33.362	kzz = 0.623

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 147 Barra_147 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.197 kN	My,Ed = -0.529 kN*m	Mz,Ed = 0.467 kN*m	Vy,Ed = 0.679 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.529 kN*m		Mz,Ed,max = 0.467 kN*m

Vy,T,Rd = 589.099 kN
Nb,Rd = 1751.405 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = 0.848 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 471.279 kN
Tt,Ed = -0.115 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.687	Lamz = 30.882	kyz = 0.349

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.003 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000   Lambda,z = 30.882 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 148 Barra_148   **PUNTOS:**   3   **COORDENADA:**   x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 176.961 kN	My,Ed = 0.600 kN*m	Mz,Ed = 0.668 kN*m	Vy,Ed = -2.018 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.600 kN*m	Mz,Ed,max = -1.060 kN*m	Vy,T,Rd = 589.434 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.595 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.547 kN
			Tt,Ed = 0.083 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kzy = 0.461	Lamz = 22.316	kzz = 0.634

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.096 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.678 + (Mz,Ed/MN,z,Rd)^1.678 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.110 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.111 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 149 Barra_149 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 130.992 kN	My,Ed = 1.105 kN*m	Mz,Ed = -0.553 kN*m	Vy,Ed = -0.798 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.105 kN*m	Mz,Ed,max = -0.553 kN*m	Vy,T,Rd = 590.072 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.663 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.058 kN
			Tt,Ed = -0.020 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.660 m	Lam_y = 0.195	Lz = 0.660 m	Lam_z = 0.195
Lcr,y = 0.660 m	Xy = 1.000	Lcr,z = 0.660 m	Xz = 1.000
Lamy = 14.878	kyy = 0.646	Lamz = 14.878	kyz = 0.440

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.071 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.670 + (Mz,Ed/MN,z,Rd)^1.670 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000 Lambda,z = 14.878 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.084 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.082 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 150 Barra_150 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.660 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -91.491 kN	My,Ed = 0.685 kN*m	Mz,Ed = 1.151 kN*m	Vy,Ed = -2.927 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.959 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.847 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.168 kN
			Tt,Ed = 0.129 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.050 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.665 + (Mz,Ed/MN,z,Rd)^1.665 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.005 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

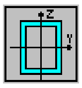
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 151 Barra_151 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

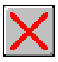
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -78.390 kN	My,Ed = -0.400 kN*m	Mz,Ed = 0.639 kN*m	Vy,Ed = -0.315 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.269 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.764 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.215 kN
			Tt,Ed = 0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

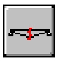
respecto al eje y:



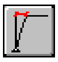
respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.043 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES



Flechas *No analizado*



Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 152 Barra_152 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -160.299 kN	My,Ed = 0.544 kN*m	Mz,Ed = 0.530 kN*m	Vy,Ed = -1.648 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.554 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.486 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.643 kN
			Tt,Ed = 0.071 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:
respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.087 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.674 + (Mz,Ed/MN,z,Rd)^1.674 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*
Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 153 Barra_153 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -123.249 kN	My,Ed = 1.435 kN*m	Mz,Ed = -0.248 kN*m	Vy,Ed = 0.084 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.239 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -3.543 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.191 kN
			Tt,Ed = -0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.067 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.668 + (Mz,Ed/MN,z,Rd)^1.668 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.008 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 154 Barra_154 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -49.666 kN	My,Ed = 0.612 kN*m	Mz,Ed = 0.013 kN*m	Vy,Ed = -0.536 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.369 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.558 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.495 kN
			Tt,Ed = -0.089 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.027 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 155 Barra_155 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.521 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 47.620 kN	My,Ed = 0.359 kN*m	Mz,Ed = 0.291 kN*m	Vy,Ed = -0.647 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.359 kN*m	Mz,Ed,max = 0.291 kN*m	Vy,T,Rd = 590.147 kN
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.267 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.117 kN
			Tt,Ed = 0.013 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.759	Lamz = 34.279	kyz = 0.459

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.026 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 156 Barra_156 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.781 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -52.497 kN	My,Ed = 0.365 kN*m	Mz,Ed = -0.251 kN*m	Vy,Ed = -0.076 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.252 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.465 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.202 kN
			Tt,Ed = -0.003 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.029 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 157 Barra_157 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.620 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 56.068 kN	My,Ed = -0.310 kN*m	Mz,Ed = -0.420 kN*m	Vy,Ed = 0.327 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.553 kN*m	Mz,Ed,max = -0.420 kN*m	Vy,T,Rd = 590.018 kN
Nb,Rd = 1713.238 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.533 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.014 kN
			Tt,Ed = -0.026 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.620 m	Lam_y = 0.478	Lz = 1.620 m	Lam_z = 0.478
Lcr,y = 1.620 m	Xy = 0.931	Lcr,z = 1.620 m	Xz = 0.931
Lamy = 36.529	kyy = 0.667	Lamz = 36.529	kyz = 0.373

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.030 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 36.529 < Lambda,max = 210.000 Lambda,z = 36.529 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.040 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.039 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 158 Barra_158 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 80.632 kN	My,Ed = 0.864 kN*m	Mz,Ed = -0.331 kN*m	Vy,Ed = 0.134 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.959 kN*m		Mz,Ed,max = -0.331 kN*m
	Vy,T,Rd = 589.890 kN		
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.842 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.912 kN
			Tt,Ed = 0.038 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.590	Lamz = 22.316	kyz = 0.468

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.044 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.664 + (Mz,Ed/MN,z,Rd)^1.664 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.054 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.053 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 159 Barra_159 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 67.675 kN	My,Ed = 0.317 kN*m	Mz,Ed = -0.549 kN*m	Vy,Ed = -1.245 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.317 kN*m	Mz,Ed,max = -0.549 kN*m	Vy,T,Rd = 588.834 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.861 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.067 kN
			Tt,Ed = 0.141 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.660 m　Lam_y = 0.195　Lz = 0.660 m　Lam_z = 0.195
Lcr,y = 0.660 m　Xy = 1.000　Lcr,z = 0.660 m　Xz = 1.000
Lamy = 14.878　kzy = 0.368　Lamz = 14.878　kzz = 0.620

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.037 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 14.878 < Lambda,max = 210.000　Lambda,z = 14.878 < Lambda,max = 210.000　ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.042 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.4 cm　Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.4 cm　Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 160 Barra_160　**PUNTOS:** 3　**COORDENADA:** x = 1.00 L = 1.781 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /1/ 1*1.350 + 2*0.900 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)　fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 36.162 kN	My,Ed = -0.131 kN*m	Mz,Ed = -0.016 kN*m	Vy,Ed = -0.325 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.271 kN*m	Mz,Ed,max = -0.193 kN*m	Vy,T,Rd = 589.804 kN

Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.226 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.843 kN
			Tt,Ed = -0.047 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kyy = 0.685	Lamz = 40.138	kyz = 0.491

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.020 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 161 Barra_161 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.620 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -41.277 kN	My,Ed = 0.079 kN*m	Mz,Ed = -0.386 kN*m	Vy,Ed = 0.316 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.893 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.039 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.915 kN
			Tt,Ed = 0.038 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.022 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 162 Barra_162 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 37.747 kN	My,Ed = 0.453 kN*m	Mz,Ed = 0.246 kN*m	Vy,Ed = -0.576 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.453 kN*m	Mz,Ed,max = 0.246 kN*m	Vy,T,Rd = 589.827 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.358 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.861 kN
			Tt,Ed = 0.044 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.717	Lamz = 38.102	kyz = 0.384

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.021 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.028 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 163 Barra_163 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.521 m

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CARGAS:

Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 35.734 kN	My,Ed = -0.427 kN*m	Mz,Ed = -0.216 kN*m	Vy,Ed = -0.127 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.427 kN*m		Mz,Ed,max = -0.235 kN*m
	Vy,T,Rd = 589.396 kN		
Nb,Rd = 1728.997 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.544 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.517 kN
			Tt,Ed = -0.086 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.521 m	Lam_y = 0.449	Lz = 1.521 m	Lam_z = 0.449
Lcr,y = 1.521 m	Xy = 0.940	Lcr,z = 1.521 m	Xz = 0.940
Lamy = 34.279	kyy = 0.589	Lamz = 34.279	kyz = 0.441

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.019 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 34.279 < Lambda,max = 210.000 Lambda,z = 34.279 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 164 Barra_164 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 335.000 MPa

PARAMETROS DE LA SECCION: RECT_M_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=144.000 cm2	Az=144.000 cm2	Ax=144.000 cm2
tw=6.000 cm	Iy=1728.000 cm4	Iz=1728.000 cm4	Ix=2915.131 cm4
tf=6.000 cm	Wply=432.000 cm3	Wplz=432.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 26.441 kN	My,Ed = 19.643 kN*m	Mz,Ed = 0.447 kN*m	Vy,Ed = -0.175 kN
Nc,Rd = 4824.000 kN	My,Ed,max = 19.643 kN*m		Mz,Ed,max = 0.576 kN*m
	Vy,T,Rd = 2784.180 kN		
Nb,Rd = 4747.055 kN	My,c,Rd = 144.720 kN*m	Mz,c,Rd = 144.720 kN*m	Vz,Ed = -32.766 kN
	MN,y,Rd = 143.927 kN*m	MN,z,Rd = 143.927 kN*m	Vz,T,Rd = 2784.180 kN
			Tt,Ed = -0.029 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.740 m	Lam_y = 0.272	Lz = 0.740 m	Lam_z = 0.272
Lcr,y = 0.740 m	Xy = 0.984	Lcr,z = 0.740 m	Xz = 0.984
Lamy = 21.362	kyy = 0.737	Lamz = 21.362	kyz = 0.569

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.037 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.012 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 21.362 < Lambda,max = 210.000 Lambda,z = 21.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.108 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.069 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*

Desplazamientos

vx = 0.5 cm < vx max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.5 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 165 Barra_165 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 3.289 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x20

h=20.000 cm	gM0=1.000	gM1=1.000	
b=20.000 cm	Ay=40.000 cm2	Az=36.000 cm2	Ax=76.000 cm2
tw=1.000 cm	Iy=4585.333 cm4	Iz=4585.333 cm4	Ix=6859.000 cm4
tf=1.000 cm	Wply=542.000 cm3	Wplz=542.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 159.500 kN	My,Ed = -17.798 kN*m	Mz,Ed = 2.249 kN*m	Vy,Ed = 0.220 kN
Nc,Rd = 2698.000 kN	My,Ed,max = 45.145 kN*m		Mz,Ed,max = 2.972 kN*m
	Vy,T,Rd = 818.982 kN		
Nb,Rd = 2445.861 kN	My,c,Rd = 192.410 kN*m	Mz,c,Rd = 192.410 kN*m	Vz,Ed = -19.393 kN
	MN,y,Rd = 192.410 kN*m	MN,z,Rd = 192.410 kN*m	Vz,T,Rd = 737.084 kN
			Tt,Ed = 0.154 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 3.289 m	Lam_y = 0.554	Lz = 3.289 m	Lam_z = 0.554
Lcr,y = 3.289 m	Xy = 0.907	Lcr,z = 3.289 m	Xz = 0.907
Lamy = 42.347	kyy = 0.703	Lamz = 42.347	kyz = 0.579

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.059 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.667 + (Mz,Ed/MN,z,Rd)^1.667 = 0.020 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.026 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 42.347 < Lambda,max = 210.000 Lambda,z = 42.347 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.239 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.179 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.1 cm < vx max = L/150.000 = 2.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 1.3 cm < vy max = L/150.000 = 2.2 cm Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 166 Barra_166 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.156 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x20

h=20.000 cm	gM0=1.000	gM1=1.000	
b=20.000 cm	Ay=40.000 cm2	Az=36.000 cm2	Ax=76.000 cm2
tw=1.000 cm	Iy=4585.333 cm4	Iz=4585.333 cm4	Ix=6859.000 cm4
tf=1.000 cm	Wply=542.000 cm3	Wplz=542.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 54.726 kN	My,Ed = -6.537 kN*m	Mz,Ed = 46.051 kN*m	Vy,Ed = -22.697 kN
Nc,Rd = 2698.000 kN	My,Ed,max = -6.537 kN*m		Mz,Ed,max = 46.051 kN*m
	Vy,T,Rd = 792.601 kN		
Nb,Rd = 2698.000 kN	My,c,Rd = 192.410 kN*m	Mz,c,Rd = 192.410 kN*m	Vz,Ed = -8.206 kN
	MN,y,Rd = 192.410 kN*m	MN,z,Rd = 192.410 kN*m	Vz,T,Rd = 713.340 kN
			Tt,Ed = 4.916 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.156 m	Lam_y = 0.026	Lz = 0.156 m	Lam_z = 0.026
Lcr,y = 0.156 m	Xy = 1.000	Lcr,z = 0.156 m	Xz = 1.000
Lamy = 2.007	kzy = 0.571	Lamz = 2.007	kzz = 0.977

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.020 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.097 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.029 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.012 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.033 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.033 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 2.007 < Lambda,max = 210.000 Lambda,z = 2.007 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.193 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.273 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.1 cm Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 167 Barra_167 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.755 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.947 kN	My,Ed = -0.226 kN*m	Mz,Ed = 1.590 kN*m	Vy,Ed = -1.807 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 0.228 kN*m	Mz,Ed,max = 1.590 kN*m	Vy,T,Rd = 491.805 kN
Nb,Rd = 2106.329 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -0.259 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 865.578 kN
			Tt,Ed = 0.016 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.755 m   Lam_y = 0.330
Lcr,y = 1.755 m   Xy = 0.970
Lamy = 25.200   kzy = 0.360

respecto al eje z:

Lz = 1.755 m   Lam_z = 0.585
Lcr,z = 1.755 m   Xz = 0.896
Lamz = 44.670   kzz = 0.581

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.200 < Lambda,max = 210.000   Lambda,z = 44.670 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.2 cm   Verificado
Caso de carga más desfavorable: 2 Viento
vy = 0.0 cm < vy max = L/150.000 = 1.2 cm   Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 168 Barra_168   **PUNTOS:**   1   **COORDENADA:**   x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x20

h=20.000 cm	gM0=1.000	gM1=1.000	
b=20.000 cm	Ay=40.000 cm2	Az=36.000 cm2	Ax=76.000 cm2
tw=1.000 cm	Iy=4585.333 cm4	Iz=4585.333 cm4	Ix=6859.000 cm4
tf=1.000 cm	Wply=542.000 cm3	Wplz=542.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 30.379 kN   My,Ed = 5.312 kN*m   Mz,Ed = 45.078 kN*m   Vy,Ed = 21.403 kN

Nc,Rd = 2698.000 kN	My,Ed,max = 5.312 kN*m	Mz,Ed,max = 45.078 kN*m	Vy,T,Rd = 794.135 kN
Nb,Rd = 2698.000 kN	My,c,Rd = 192.410 kN*m	Mz,c,Rd = 192.410 kN*m	Vz,Ed = -3.390 kN
	MN,y,Rd = 192.410 kN*m	MN,z,Rd = 192.410 kN*m	Vz,T,Rd = 714.721 kN
			Tt,Ed = -4.639 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.156 m	Lam_y = 0.026	Lz = 0.156 m	Lam_z = 0.026
Lcr,y = 0.156 m	Xy = 1.000	Lcr,z = 0.156 m	Xz = 1.000
Lamy = 2.007	kzy = 0.585	Lamz = 2.007	kzz = 0.981

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.011 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.092 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.027 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.031 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.031 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 2.007 < Lambda,max = 210.000   Lambda,z = 2.007 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.176 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.257 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.1 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.0 cm < vy max = L/150.000 = 0.1 cm   Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 169 Barra_169   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x20

h=20.000 cm	gM0=1.000	gM1=1.000	
b=20.000 cm	Ay=40.000 cm2	Az=36.000 cm2	Ax=76.000 cm2
tw=1.000 cm	Iy=4585.333 cm4	Iz=4585.333 cm4	Ix=6859.000 cm4
tf=1.000 cm	Wply=542.000 cm3	Wplz=542.000 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 29.512 kN	My,Ed = 5.634 kN*m	Mz,Ed = 42.601 kN*m	Vy,Ed = 21.710 kN
Nc,Rd = 2698.000 kN	My,Ed,max = -13.928 kN*m		Mz,Ed,max = 42.601 kN*m
	Vy,T,Rd = 812.470 kN		
Nb,Rd = 2445.861 kN	My,c,Rd = 192.410 kN*m	Mz,c,Rd = 192.410 kN*m	Vz,Ed = -5.691 kN
	MN,y,Rd = 192.410 kN*m	MN,z,Rd = 192.410 kN*m	Vz,T,Rd = 731.223 kN
			Tt,Ed = -1.330 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 3.289 m	Lam_y = 0.554	Lz = 3.289 m	Lam_z = 0.554
Lcr,y = 3.289 m	Xy = 0.907	Lcr,z = 3.289 m	Xz = 0.907
Lamy = 42.347	kzy = 0.423	Lamz = 42.347	kzz = 0.647

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.011 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.085 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.027 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.008 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 42.347 < Lambda,max = 210.000   Lambda,z = 42.347 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.149 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.186 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.1 cm < vx max = L/150.000 = 2.2 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 1.3 cm < vy max = L/150.000 = 2.2 cm   Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 170 Barra_170 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 87.384 kN	My,Ed = 0.352 kN*m	Mz,Ed = -0.699 kN*m	Vy,Ed = -0.682 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.352 kN*m	Mz,Ed,max = -0.699 kN*m	Vy,T,Rd = 589.288 kN
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.334 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.430 kN
			Tt,Ed = 0.097 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kzy = 0.474	Lamz = 22.316	kzz = 0.704

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.047 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.664 + (Mz,Ed/MN,z,Rd)^1.664 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.056 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.057 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 171 Barra_171 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 226.791 kN	My,Ed = 4.735 kN*m	Mz,Ed = -3.196 kN*m	Vy,Ed = -14.100 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 4.735 kN*m	Mz,Ed,max = -3.196 kN*m	Vy,T,Rd = 488.032 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -9.111 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 858.936 kN
			Tt,Ed = 0.640 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.153 m	Lam_y = 0.029	Lz = 0.153 m	Lam_z = 0.051
Lcr,y = 0.153 m	Xy = 1.000	Lcr,z = 0.153 m	Xz = 1.000
Lamy = 2.203	kzy = 0.588	Lamz = 3.904	kzz = 0.964

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.096 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.678 + (Mz,Ed/MN,z,Rd)^1.678 = 0.007 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.029 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.011 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 2.203 < Lambda,max = 210.000 Lambda,z = 3.904 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.148 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.151 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 172 Barra_172 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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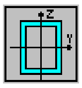
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -37.276 kN	My,Ed = -1.207 kN*m	Mz,Ed = -0.650 kN*m	Vy,Ed = 0.382 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.210 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.013 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.368 kN
			Tt,Ed = -0.104 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.020 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 173 Barra_173 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 39.479 kN	My,Ed = 0.591 kN*m	Mz,Ed = 0.672 kN*m	Vy,Ed = -1.000 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.629 kN*m		Mz,Ed,max = 0.672 kN*m
	Vy,T,Rd = 589.905 kN		
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.232 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.924 kN
			Tt,Ed = 0.037 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kzy = 0.353	Lamz = 22.316	kzz = 0.636

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.021 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 174 Barra_174 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.990 m

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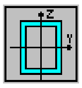
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

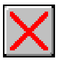
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -59.163 kN	My,Ed = -1.366 kN*m	Mz,Ed = 0.307 kN*m	Vy,Ed = -0.945 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.354 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.593 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.683 kN
			Tt,Ed = 0.187 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

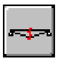
respecto al eje y:



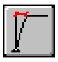
respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.032 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES



Flechas *No analizado*



Desplazamientos
vx = 0.1 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 175 Barra_175 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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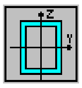
CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -37.420 kN	My,Ed = -0.524 kN*m	Mz,Ed = -0.751 kN*m	Vy,Ed = 0.044 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.332 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.742 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.665 kN
			Tt,Ed = -0.190 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.020 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 176 Barra_176 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -68.526 kN	My,Ed = -0.308 kN*m	Mz,Ed = -0.060 kN*m	Vy,Ed = 0.472 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.792 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.333 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.833 kN
			Tt,Ed = -0.048 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.037 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 177 Barra_177 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.781 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -80.285 kN	My,Ed = 0.190 kN*m	Mz,Ed = -0.574 kN*m	Vy,Ed = 0.274 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.028 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.250 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.022 kN
			Tt,Ed = 0.025 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.044 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.664 + (Mz,Ed/MN,z,Rd)^1.664 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 178 Barra_178 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.219 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 24.057 kN	My,Ed = 54.709 kN*m	Mz,Ed = 5.284 kN*m	Vy,Ed = -16.457 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 54.709 kN*m		Mz,Ed,max = 5.284 kN*m
	Vy,T,Rd = 566.005 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 186.519 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 452.804 kN
			Tt,Ed = -2.360 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.219 m	Lam_y = 0.065	Lz = 0.219 m	Lam_z = 0.065
Lcr,y = 0.219 m	Xy = 1.000	Lcr,z = 0.219 m	Xz = 1.000
Lamy = 4.937	kyy = 0.994	Lamz = 4.937	kyz = 0.596

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.013 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.607 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.029 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.412 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.041 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.041 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 4.937 < Lambda,max = 210.000 Lambda,z = 4.937 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.782 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.519 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 179 Barra_179 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 38.768 kN	My,Ed = -0.869 kN*m	Mz,Ed = -0.039 kN*m	Vy,Ed = 0.199 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.869 kN*m		Mz,Ed,max = -0.088 kN*m
	Vy,T,Rd = 589.544 kN		
Nb,Rd = 1802.299 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.751 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.635 kN
			Tt,Ed = 0.072 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.990 m	Lam_y = 0.292	Lz = 0.990 m	Lam_z = 0.292
Lcr,y = 0.990 m	Xy = 0.979	Lcr,z = 0.990 m	Xz = 0.979
Lamy = 22.316	kyy = 0.576	Lamz = 22.316	kyz = 0.594

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.021 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 22.316 < Lambda,max = 210.000 Lambda,z = 22.316 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.7 cm Verificado
Caso de carga más desfavorable: 2 Viento

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 180 Barra_180 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: **RECT_H_12x12**

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.209 kN	My,Ed = -40.415 kN*m	Mz,Ed = -5.042 kN*m	Vy,Ed = -16.457 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -40.415 kN*m		Mz,Ed,max = -5.042 kN*m
	Vy,T,Rd = 546.648 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 92.345 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 437.319 kN
			Tt,Ed = 4.241 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.219 m	Lam_y = 0.065	Lz = 0.219 m	Lam_z = 0.065
Lcr,y = 0.219 m	Xy = 1.000	Lcr,z = 0.219 m	Xz = 1.000
Lamy = 4.937	kyy = 1.000	Lamz = 4.937	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.371 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.030 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.211 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.074 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.074 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 4.937 < Lambda,max = 210.000 Lambda,z = 4.937 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.581 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.392 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 181 Barra_181 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.781 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 56.664 kN	My,Ed = 0.190 kN*m	Mz,Ed = -0.381 kN*m	Vy,Ed = 0.189 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.190 kN*m	Mz,Ed,max = -0.381 kN*m	Vy,T,Rd = 589.314 kN
Nb,Rd = 1686.158 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.192 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.451 kN
			Tt,Ed = 0.094 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.781 m	Lam_y = 0.525	Lz = 1.781 m	Lam_z = 0.525
Lcr,y = 1.781 m	Xy = 0.916	Lcr,z = 1.781 m	Xz = 0.916
Lamy = 40.138	kzy = 0.370	Lamz = 40.138	kzz = 0.615

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.031 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.138 < Lambda,max = 210.000 Lambda,z = 40.138 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.037 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.038 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*

Desplazamientos

vx = 1.0 cm < vx max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 182 Barra_182 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.690 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 53.761 kN	My,Ed = 0.375 kN*m	Mz,Ed = 0.306 kN*m	Vy,Ed = -0.544 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.375 kN*m	Mz,Ed,max = 0.306 kN*m	Vy,T,Rd = 589.861 kN
Nb,Rd = 1701.727 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.334 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.889 kN
			Tt,Ed = 0.041 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.690 m	Lam_y = 0.499	Lz = 1.690 m	Lam_z = 0.499
Lcr,y = 1.690 m	Xy = 0.925	Lcr,z = 1.690 m	Xz = 0.925
Lamy = 38.102	kyy = 0.679	Lamz = 38.102	kyz = 0.449

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.029 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 38.102 < Lambda,max = 210.000 Lambda,z = 38.102 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.037 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.037 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 1.1 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 183 Barra_183   **PUNTOS:**   3   **COORDENADA:**   x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 10.380 kN	My,Ed = 0.180 kN*m	Mz,Ed = -1.547 kN*m	Vy,Ed = 2.076 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.180 kN*m	Mz,Ed,max = -1.547 kN*m	Vy,T,Rd = 589.627 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.182 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.702 kN
			Tt,Ed = 0.064 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.411	Lamz = 33.362	kzz = 0.582

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 184 Barra_184 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 31.438 kN	My,Ed = 0.607 kN*m	Mz,Ed = -0.199 kN*m	Vy,Ed = 0.331 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.607 kN*m	Mz,Ed,max = 0.254 kN*m	Vy,T,Rd = 589.253 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.030 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.402 kN
			Tt,Ed = -0.100 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.693	Lamz = 30.882	kyz = 0.373

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.017 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 185 Barra_185 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.480 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.613 kN	My,Ed = 0.324 kN*m	Mz,Ed = -0.988 kN*m	Vy,Ed = 1.384 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.324 kN*m	Mz,Ed,max = 1.060 kN*m	Vy,T,Rd = 589.209 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.379 kN

MN,y,Rd = 74.840 kN*m MN,z,Rd = 74.840 kN*m Vz,T,Rd = 471.367 kN
Tt,Ed = 0.104 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kzy = 0.381	Lamz = 33.362	kzz = 0.593

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 186 Barra_186 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12
h=12.000 cm gM0=1.000 gM1=1.000

b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.797 kN	My,Ed = -0.050 kN*m	Mz,Ed = -0.663 kN*m	Vy,Ed = 0.953 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.114 kN*m	Mz,Ed,max = -0.663 kN*m	Vy,T,Rd = 588.324 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.362 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.659 kN
			Tt,Ed = -0.190 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kzy = 0.385	Lamz = 30.882	kzz = 0.586

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 187 Barra_187 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 37.115 kN	My,Ed = -2.722 kN*m	Mz,Ed = -1.174 kN*m	Vy,Ed = -1.404 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -2.722 kN*m		Mz,Ed,max = -1.174 kN*m
	Vy,T,Rd = 588.606 kN		
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 3.182 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.885 kN
			Tt,Ed = 0.163 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.630	Lamz = 30.882	kyz = 0.391

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.020 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.007 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000   Lambda,z = 30.882 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.045 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 188 Barra_188 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.370 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.445 kN	My,Ed = 1.878 kN*m	Mz,Ed = 1.004 kN*m	Vy,Ed = -1.361 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.878 kN*m	Mz,Ed,max = 1.004 kN*m	Vy,T,Rd = 588.950 kN
Nb,Rd = 1751.405 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.872 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.160 kN
			Tt,Ed = 0.130 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.370 m	Lam_y = 0.404	Lz = 1.370 m	Lam_z = 0.404
Lcr,y = 1.370 m	Xy = 0.952	Lcr,z = 1.370 m	Xz = 0.952
Lamy = 30.882	kyy = 0.657	Lamz = 30.882	kyz = 0.366

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 30.882 < Lambda,max = 210.000 Lambda,z = 30.882 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.022 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 189 Barra_189 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 13.467 kN	My,Ed = 1.393 kN*m	Mz,Ed = 0.828 kN*m	Vy,Ed = 0.892 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.393 kN*m	Mz,Ed,max = 0.828 kN*m	Vy,T,Rd = 588.925 kN
Nb,Rd = 1735.203 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.852 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.140 kN
			Tt,Ed = 0.132 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.480 m	Lam_y = 0.437	Lz = 1.480 m	Lam_z = 0.437
Lcr,y = 1.480 m	Xy = 0.943	Lcr,z = 1.480 m	Xz = 0.943
Lamy = 33.362	kyy = 0.585	Lamz = 33.362	kyz = 0.398

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.007 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 33.362 < Lambda,max = 210.000 Lambda,z = 33.362 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.022 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 190 Barra_190 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.355 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 35.257 kN	My,Ed = -0.244 kN*m	Mz,Ed = 6.832 kN*m	Vy,Ed = -28.089 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.026 kN*m	Mz,Ed,max = 6.832 kN*m	Vy,T,Rd = 576.921 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -3.577 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 461.537 kN
			Tt,Ed = 1.299 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.355 m	Lam_y = 0.105	Lz = 0.355 m	Lam_z = 0.105
Lcr,y = 0.355 m	Xy = 1.000	Lcr,z = 0.355 m	Xz = 1.000
Lamy = 8.002	kzy = 0.440	Lamz = 8.002	kzz = 0.689

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.019 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.019 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.049 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.008 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.023 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.023 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 8.002 < Lambda,max = 210.000 Lambda,z = 8.002 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.067 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.088 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 191 Barra_191 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -30.127 kN	My,Ed = 0.077 kN*m	Mz,Ed = -4.399 kN*m	Vy,Ed = -17.100 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 582.679 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.393 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.144 kN
			Tt,Ed = 0.739 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.016 < 1.000   (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.009 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.029 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000   (6.2.6)

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.2 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm   Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 192 Barra_192   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 3.112 kN	My,Ed = 1.202 kN*m	Mz,Ed = -0.557 kN*m	Vy,Ed = -3.501 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.202 kN*m	Mz,Ed,max = 0.660 kN*m	Vy,T,Rd = 590.044 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -6.273 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.035 kN
			Tt,Ed = 0.023 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.355 m	Lam_y = 0.105	Lz = 0.355 m	Lam_z = 0.105
Lcr,y = 0.355 m	Xy = 1.000	Lcr,z = 0.355 m	Xz = 1.000

Lamy = 8.002 kyy = 0.611 Lamz = 8.002 kyz = 0.367

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.006 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.013 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 8.002 < Lambda,max = 210.000 Lambda,z = 8.002 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /7/ 1*1.000 + 2*1.000

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 193 Barra_193 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.415 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 29.375 kN	My,Ed = -0.244 kN*m	Mz,Ed = 0.588 kN*m	Vy,Ed = -0.941 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.244 kN*m		Mz,Ed,max = 0.588 kN*m
	Vy,T,Rd = 589.567 kN		
Nb,Rd = 1744.837 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.184 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.654 kN
			Tt,Ed = -0.070 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.415 m   Lam_y = 0.418
Lcr,y = 1.415 m   Xy = 0.948
Lamy = 31.902   kzy = 0.464

respecto al eje z:

Lz = 1.415 m   Lam_z = 0.418
Lcr,z = 1.415 m   Xz = 0.948
Lamz = 31.902   kzz = 0.722

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.016 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 31.902 < Lambda,max = 210.000   Lambda,z = 31.902 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.024 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm   Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 194 Barra_194   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.522 m

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CARGAS:

Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:

S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 50.621 kN My,Ed = -0.966 kN*m Mz,Ed = -0.360 kN*m Vy,Ed = 0.720 kN
Nc,Rd = 1840.320 kN My,Ed,max = -0.966 kN*m Mz,Ed,max = 0.844 kN*m
Vy,T,Rd = 589.030 kN
Nb,Rd = 1728.798 kN My,c,Rd = 74.840 kN*m Mz,c,Rd = 74.840 kN*m Vz,Ed = -1.126 kN
MN,y,Rd = 74.840 kN*m MN,z,Rd = 74.840 kN*m Vz,T,Rd = 471.224 kN
Tt,Ed = -0.122 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.522 m Lam_y = 0.449
Lcr,y = 1.522 m Xy = 0.939
Lamy = 34.308 kyy = 0.622

respecto al eje z:

Lz = 1.522 m Lam_z = 0.449
Lcr,z = 1.522 m Xz = 0.939
Lamz = 34.308 kyz = 0.417

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.028 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 34.308 < Lambda,max = 210.000 Lambda,z = 34.308 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.042 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.042 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 195 Barra_195 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.121 kN	My,Ed = 1.887 kN*m	Mz,Ed = 0.160 kN*m	Vy,Ed = -0.359 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.887 kN*m	Mz,Ed,max = 0.307 kN*m	Vy,T,Rd = 589.888 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -10.046 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.911 kN
			Tt,Ed = 0.038 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.355 m	Lam_y = 0.105	Lz = 0.355 m	Lam_z = 0.105
Lcr,y = 0.355 m	Xy = 1.000	Lcr,z = 0.355 m	Xz = 1.000
Lamy = 8.002	kyy = 0.603	Lamz = 8.002	kyz = 0.539

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.021 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 8.002 < Lambda,max = 210.000 Lambda,z = 8.002 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos

vx = 0.0 cm < vx max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.0 cm < vy max = L/150.000 = 0.2 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 196 Barra_196 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.522 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -23.780 kN	My,Ed = -1.009 kN*m	Mz,Ed = -0.385 kN*m	Vy,Ed = 0.656 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.885 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.410 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.108 kN
			Tt,Ed = 0.136 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:
respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.013 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

DESPLAZAMIENTOS LIMITES
Flechas *No analizado*
Desplazamientos
vx = 0.9 cm < vx max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
vy = 0.1 cm < vy max = L/150.000 = 1.0 cm Verificado
Caso de carga más desfavorable: 10 SLS /3/ 1*1.000 + 3*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 197 Barra_197 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.415 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 21.537 kN	My,Ed = -0.371 kN*m	Mz,Ed = 1.280 kN*m	Vy,Ed = -1.871 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.467 kN*m	Mz,Ed,max = 1.280 kN*m	Vy,T,Rd = 588.480 kN
Nb,Rd = 1744.837 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.592 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.784 kN
			Tt,Ed = -0.175 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.415 m	Lam_y = 0.418	Lz = 1.415 m	Lam_z = 0.418
Lcr,y = 1.415 m	Xy = 0.948	Lcr,z = 1.415 m	Xz = 0.948
Lamy = 31.902	kzy = 0.372	Lamz = 31.902	kzz = 0.629

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.012 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 31.902 < Lambda,max = 210.000 Lambda,z = 31.902 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.025 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas *No analizado*

Desplazamientos
vx = 0.0 cm < vx max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
vy = 0.1 cm < vy max = L/150.000 = 0.9 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 198 Barra_198 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 99.038 kN	My,Ed = -1.523 kN*m	Mz,Ed = 0.475 kN*m	Vy,Ed = 2.885 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -1.523 kN*m		Mz,Ed,max = 0.475 kN*m
	Vy,T,Rd = 491.047 kN		
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 5.305 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 864.242 kN
			Tt,Ed = -0.142 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.153 m	Lam_y = 0.029	Lz = 0.153 m	Lam_z = 0.051
Lcr,y = 0.153 m	Xy = 1.000	Lcr,z = 0.153 m	Xz = 1.000
Lamy = 2.203	kyy = 0.978	Lamz = 3.904	kyz = 0.572

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.042 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.006 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 2.203 < Lambda,max = 210.000 Lambda,z = 3.904 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.055 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.054 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 199 Barra_199 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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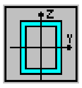
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -33.354 kN	My,Ed = -0.598 kN*m	Mz,Ed = -1.279 kN*m	Vy,Ed = -0.555 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.381 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.647 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.505 kN
			Tt,Ed = 0.088 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.018 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 200 Barra_200 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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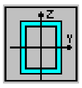
CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -33.745 kN	My,Ed = -0.018 kN*m	Mz,Ed = -0.644 kN*m	Vy,Ed = -0.284 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.292 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.276 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.434 kN
			Tt,Ed = 0.096 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.018 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 201 Barra_201 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.098 kN	My,Ed = -0.626 kN*m	Mz,Ed = 0.261 kN*m	Vy,Ed = 0.268 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -0.626 kN*m		Mz,Ed,max = 0.261 kN*m
	Vy,T,Rd = 490.117 kN		
Nb,Rd = 2100.497 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 0.964 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 862.605 kN
			Tt,Ed = -0.295 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.775 m	Lam_y = 0.334	Lz = 1.775 m	Lam_z = 0.591
Lcr,y = 1.775 m	Xy = 0.970	Lcr,z = 1.775 m	Xz = 0.893
Lamy = 25.490	kyy = 1.000	Lamz = 45.183	kyz = 0.581

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.490 < Lambda,max = 210.000 Lambda,z = 45.183 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 202 Barra_202 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 80.010 kN	My,Ed = 1.240 kN*m	Mz,Ed = -2.374 kN*m	Vy,Ed = -11.004 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 1.240 kN*m	Mz,Ed,max = -2.374 kN*m	Vy,T,Rd = 489.069 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -1.030 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 860.761 kN
			Tt,Ed = 0.469 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.153 m	Lam_y = 0.029	Lz = 0.153 m	Lam_z = 0.051
Lcr,y = 0.153 m	Xy = 1.000	Lcr,z = 0.153 m	Xz = 1.000
Lamy = 2.203	kzy = 0.608	Lamz = 3.904	kzz = 0.987

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.034 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.022 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 2.203 < Lambda,max = 210.000 Lambda,z = 3.904 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.058 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.066 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 203 Barra_203 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.153 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -77.073 kN	My,Ed = -1.355 kN*m	Mz,Ed = -0.808 kN*m	Vy,Ed = -14.949 kN
Nt,Rd = 2351.520 kN	My,pl,Rd = 146.067 kN*m	Mz,pl,Rd = 87.279 kN*m	Vy,T,Rd = 487.527 kN
	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 0.155 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 858.048 kN
			Tt,Ed = 0.724 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.033 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.031 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 204 Barra_204 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 78.986 kN	My,Ed = 1.707 kN*m	Mz,Ed = -1.029 kN*m	Vy,Ed = -11.272 kN

Nc,Rd = 2351.520 kN	My,Ed,max = 1.707 kN*m	Mz,Ed,max = 1.277 kN*m	Vy,T,Rd = 490.234 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -1.150 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 862.811 kN
			Tt,Ed = 0.276 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.205 m	Lam_y = 0.038	Lz = 0.205 m	Lam_z = 0.068
Lcr,y = 0.205 m	Xy = 1.000	Lcr,z = 0.205 m	Xz = 1.000
Lamy = 2.937	kzy = 0.608	Lamz = 5.206	kzz = 0.987

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.034 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.023 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 2.937 < Lambda,max = 210.000 Lambda,z = 5.206 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.053 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.055 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 205 Barra_205 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.150 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 10.559 kN	My,Ed = 1.105 kN*m	Mz,Ed = 0.314 kN*m	Vy,Ed = -0.344 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.105 kN*m	Mz,Ed,max = 0.314 kN*m	Vy,T,Rd = 587.241 kN

Nb,Rd = 1781.679 kN | My,c,Rd = 74.840 kN*m | Mz,c,Rd = 74.840 kN*m | Vz,Ed = 1.724 kN
MN,y,Rd = 74.840 kN*m | MN,z,Rd = 74.840 kN*m | Vz,T,Rd = 469.793 kN
Tt,Ed = -0.296 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.150 m | Lam_y = 0.339
Lcr,y = 1.150 m | Xy = 0.968
Lamy = 25.923 | kyy = 0.999

respecto al eje z:

Lz = 1.150 m | Lam_z = 0.339
Lcr,z = 1.150 m | Xz = 0.968
Lamz = 25.923 | kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 206 Barra_206 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.150 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 24.855 kN | My,Ed = -0.445 kN*m | Mz,Ed = 0.302 kN*m | Vy,Ed = 0.126 kN
Nc,Rd = 1840.320 kN | My,Ed,max = -0.445 kN*m | Mz,Ed,max = 0.402 kN*m
Vy,T,Rd = 584.812 kN

Nb,Rd = 1781.679 kN My,c,Rd = 74.840 kN*m Mz,c,Rd = 74.840 kN*m Vz,Ed = -0.840 kN
MN,y,Rd = 74.840 kN*m MN,z,Rd = 74.840 kN*m Vz,T,Rd = 467.850 kN
Tt,Ed = -0.532 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.150 m Lam_y = 0.339 Lz = 1.150 m Lam_z = 0.339
Lcr,y = 1.150 m Xy = 0.968 Lcr,z = 1.150 m Xz = 0.968
Lamy = 25.923 kyy = 0.997 Lamz = 25.923 kyz = 0.598

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.014 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 207 Barra_207 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.150 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm gM0=1.000 gM1=1.000
b=12.000 cm Ay=28.800 cm2 Az=23.040 cm2 Ax=51.840 cm2
tw=1.200 cm Iy=1020.211 cm4 Iz=1020.211 cm4 Ix=1721.093 cm4
tf=1.200 cm Wply=210.816 cm3 Wplz=210.816 cm3

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 22.563 kN My,Ed = -1.181 kN*m Mz,Ed = -0.352 kN*m Vy,Ed = 0.175 kN
Nc,Rd = 1840.320 kN My,Ed,max = -1.181 kN*m Mz,Ed,max = -0.352 kN*m
Vy,T,Rd = 584.423 kN

Nb,Rd = 1781.679 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.169 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.539 kN
			Tt,Ed = -0.570 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.150 m	Lam_y = 0.339	Lz = 1.150 m	Lam_z = 0.339
Lcr,y = 1.150 m	Xy = 0.968	Lcr,z = 1.150 m	Xz = 0.968
Lamy = 25.923	kyy = 0.997	Lamz = 25.923	kyz = 0.598

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.012 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.010 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.010 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 208 Barra_208 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /13/ 1*0.800 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 10.130 kN	My,Ed = 1.758 kN*m	Mz,Ed = -0.223 kN*m	Vy,Ed = -0.258 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 1.758 kN*m	Mz,Ed,max = -0.223 kN*m	Vy,T,Rd = 587.404 kN
Nb,Rd = 1781.679 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.820 kN

MN,y,Rd = 74.840 kN*m MN,z,Rd = 74.840 kN*m Vz,T,Rd = 469.923 kN
Tt,Ed = -0.280 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.150 m	Lam_y = 0.339	Lz = 1.150 m	Lam_z = 0.339
Lcr,y = 1.150 m	Xy = 0.968	Lcr,z = 1.150 m	Xz = 0.968
Lamy = 25.923	kyy = 0.999	Lamz = 25.923	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.023 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 209 Barra_209 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 15.033 kN	My,Ed = -2.596 kN*m	Mz,Ed = 0.658 kN*m	Vy,Ed = 0.796 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 2.834 kN*m	Mz,Ed,max = 0.658 kN*m	Vy,T,Rd = 582.114 kN
Nb,Rd = 1781.679 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 5.025 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 465.692 kN

Tt,Ed = -0.794 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.150 m	Lam_y = 0.339	Lz = 1.150 m	Lam_z = 0.339
Lcr,y = 1.150 m	Xy = 0.968	Lcr,z = 1.150 m	Xz = 0.968
Lamy = 25.923	kyy = 0.998	Lamz = 25.923	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.008 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.004 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.011 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.014 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.014 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.052 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.040 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 210 Barra_210 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.150 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 14.344 kN	My,Ed = -2.933 kN*m	Mz,Ed = -1.391 kN*m	Vy,Ed = 1.960 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 3.120 kN*m	Mz,Ed,max = -1.391 kN*m	Vy,T,Rd = 582.549 kN
Nb,Rd = 1781.679 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -5.567 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.039 kN
			Tt,Ed = -0.752 kN*m

CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.150 m	Lam_y = 0.339	Lz = 1.150 m	Lam_z = 0.339
Lcr,y = 1.150 m	Xy = 0.968	Lcr,z = 1.150 m	Xz = 0.968
Lamy = 25.923	kyy = 0.998	Lamz = 25.923	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.008 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.012 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.061 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.052 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 211 Barra_211 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 75.731 kN	My,Ed = 1.184 kN*m	Mz,Ed = -0.411 kN*m	Vy,Ed = -1.146 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 1.184 kN*m	Mz,Ed,max = 0.761 kN*m	Vy,T,Rd = 489.524 kN
Nb,Rd = 2275.788 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -1.504 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 861.562 kN
			Tt,Ed = 0.394 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.023 m	Lam_y = 0.192	Lz = 1.023 m	Lam_z = 0.341
Lcr,y = 1.023 m	Xy = 1.000	Lcr,z = 1.023 m	Xz = 0.968
Lamy = 14.685	kzy = 0.612	Lamz = 26.030	kzz = 0.995

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.032 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 14.685 < Lambda,max = 210.000 Lambda,z = 26.030 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.045 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.047 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 212 Barra_212 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 223.065 kN	My,Ed = 5.568 kN*m	Mz,Ed = -1.370 kN*m	Vy,Ed = -14.422 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 5.568 kN*m	Mz,Ed,max = 1.580 kN*m	Vy,T,Rd = 489.386 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -6.521 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 861.320 kN
			Tt,Ed = 0.416 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.205 m	Lam_y = 0.038	Lz = 0.205 m	Lam_z = 0.068
Lcr,y = 0.205 m	Xy = 1.000	Lcr,z = 0.205 m	Xz = 1.000
Lamy = 2.937	kyy = 0.952	Lamz = 5.206	kyz = 0.560

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.095 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.677 + (Mz,Ed/MN,z,Rd)^1.677 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.029 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.008 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 2.937 < Lambda,max = 210.000 Lambda,z = 5.206 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.141 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.135 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 213 Barra_213 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 248.682 kN	My,Ed = 4.451 kN*m	Mz,Ed = -0.339 kN*m	Vy,Ed = -1.276 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 4.451 kN*m	Mz,Ed,max = 0.966 kN*m	Vy,T,Rd = 488.971 kN
Nb,Rd = 2275.788 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -6.142 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 860.590 kN
			Tt,Ed = 0.485 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.023 m	Lam_y = 0.192	Lz = 1.023 m	Lam_z = 0.341
Lcr,y = 1.023 m	Xy = 1.000	Lcr,z = 1.023 m	Xz = 0.968
Lamy = 14.685	kyy = 0.963	Lamz = 26.030	kyz = 0.572

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.106 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.681 + (Mz,Ed/MN,z,Rd)^1.681 = 0.003 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.007 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 14.685 < Lambda,max = 210.000   Lambda,z = 26.030 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.141 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.138 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 214 Barra_214   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 70.016 kN	My,Ed = 2.656 kN*m	Mz,Ed = 0.762 kN*m	Vy,Ed = 0.569 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 2.656 kN*m	Mz,Ed,max = 0.762 kN*m	Vy,T,Rd = 484.433 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -1.667 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 852.601 kN
			Tt,Ed = 1.236 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.153 m	Lam_y = 0.029	Lz = 0.153 m	Lam_z = 0.051
Lcr,y = 0.153 m	Xy = 1.000	Lcr,z = 0.153 m	Xz = 1.000
Lamy = 2.203	kyy = 0.984	Lamz = 3.904	kyz = 0.575

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.030 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.015 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.015 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 2.203 < Lambda,max = 210.000 Lambda,z = 3.904 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.053 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 215 Barra_215 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 43.953 kN	My,Ed = 1.387 kN*m	Mz,Ed = -0.134 kN*m	Vy,Ed = -0.157 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 1.387 kN*m	Mz,Ed,max = -0.134 kN*m	Vy,T,Rd = 484.513 kN
Nb,Rd = 2245.560 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -1.605 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 852.744 kN
			Tt,Ed = 1.222 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 1.176 m	Lam_y = 0.221	Lz = 1.176 m	Lam_z = 0.392
Lcr,y = 1.176 m	Xy = 0.995	Lcr,z = 1.176 m	Xz = 0.955
Lamy = 16.887	kyy = 0.994	Lamz = 29.934	kyz = 0.581

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.019 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.015 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.015 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 16.887 < Lambda,max = 210.000 Lambda,z = 29.934 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 216 Barra_216 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 14.332 kN	My,Ed = -2.488 kN*m	Mz,Ed = -3.153 kN*m	Vy,Ed = -9.974 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -2.797 kN*m		Mz,Ed,max = 3.657 kN*m
	Vy,T,Rd = 487.708 kN		
Nb,Rd = 2337.352 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -0.425 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 858.366 kN
			Tt,Ed = 0.694 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.683 m	Lam_y = 0.128	Lz = 0.683 m	Lam_z = 0.227
Lcr,y = 0.683 m	Xy = 1.000	Lcr,z = 0.683 m	Xz = 0.994
Lamy = 9.801	kzy = 0.617	Lamz = 17.374	kzz = 0.998

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.006 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.020 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 9.801 < Lambda,max = 210.000 Lambda,z = 17.374 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.060 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 217 Barra_217 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 230.781 kN	My,Ed = 9.512 kN*m	Mz,Ed = 1.018 kN*m	Vy,Ed = -0.165 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 9.512 kN*m	Mz,Ed,max = 1.043 kN*m	Vy,T,Rd = 483.887 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -12.244 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 851.641 kN
			Tt,Ed = 1.326 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.153 m	Lam_y = 0.029	Lz = 0.153 m	Lam_z = 0.051
Lcr,y = 0.153 m	Xy = 1.000	Lcr,z = 0.153 m	Xz = 1.000
Lamy = 2.203	kyy = 0.950	Lamz = 3.904	kyz = 0.559

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.098 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.678 + (Mz,Ed/MN,z,Rd)^1.678 = 0.011 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.014 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.016 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.016 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 2.203 < Lambda,max = 210.000 Lambda,z = 3.904 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.167 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.148 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 218 Barra_218 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 255.543 kN	My,Ed = 8.402 kN*m	Mz,Ed = 0.024 kN*m	Vy,Ed = 0.264 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 8.402 kN*m	Mz,Ed,max = -0.287 kN*m	Vy,T,Rd = 485.365 kN
Nb,Rd = 2245.560 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -12.040 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 854.242 kN
			Tt,Ed = 1.082 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.176 m	Lam_y = 0.221	Lz = 1.176 m	Lam_z = 0.392
Lcr,y = 1.176 m	Xy = 0.995	Lcr,z = 1.176 m	Xz = 0.955
Lamy = 16.887	kyy = 0.967	Lamz = 29.934	kyz = 0.577

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.109 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.682 + (Mz,Ed/MN,z,Rd)^1.682 = 0.008 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.014 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.013 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 16.887 < Lambda,max = 210.000 Lambda,z = 29.934 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.167 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.151 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 219 Barra_219 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 255.446 kN	My,Ed = -5.272 kN*m	Mz,Ed = -3.390 kN*m	Vy,Ed = -13.955 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -18.552 kN*m		Mz,Ed,max = 6.138 kN*m
	Vy,T,Rd = 491.438 kN		
Nb,Rd = 2337.352 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -19.406 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 864.930 kN
			Tt,Ed = 0.077 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.683 m	Lam_y = 0.128	Lz = 0.683 m	Lam_z = 0.227
Lcr,y = 0.683 m	Xy = 1.000	Lcr,z = 0.683 m	Xz = 0.994
Lamy = 9.801	kyy = 0.954	Lamz = 17.374	kyz = 0.564

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.109 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.682 + (Mz,Ed/MN,z,Rd)^1.682 = 0.008 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.028 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.022 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 9.801 < Lambda,max = 210.000 Lambda,z = 17.374 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.269 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.252 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 220 Barra_220 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 26.093 kN	My,Ed = 7.104 kN*m	Mz,Ed = -0.046 kN*m	Vy,Ed = -1.155 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 7.104 kN*m	Mz,Ed,max = 0.131 kN*m	Vy,T,Rd = 488.012 kN
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -10.148 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 858.901 kN
			Tt,Ed = -0.644 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 0.153 m   Lam_y = 0.029
Lcr,y = 0.153 m   Xy = 1.000
Lamy = 2.201   kyy = 0.994

respecto al eje z:

Lz = 0.153 m   Lam_z = 0.051
Lcr,z = 0.153 m   Xz = 1.000
Lamz = 3.902   kyz = 0.579

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.011 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.007 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.012 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 2.201 < Lambda,max = 210.000   Lambda,z = 3.902 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.060 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 221 Barra_221   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 110.728 kN	My,Ed = -0.898 kN*m	Mz,Ed = -0.383 kN*m	Vy,Ed = -0.687 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -0.898 kN*m		Mz,Ed,max = 0.425 kN*m
	Vy,T,Rd = 491.406 kN		
Nb,Rd = 2245.572 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 1.557 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 864.874 kN
			Tt,Ed = 0.082 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.176 m	Lam_y = 0.221	Lz = 1.176 m	Lam_z = 0.392
Lcr,y = 1.176 m	Xy = 0.995	Lcr,z = 1.176 m	Xz = 0.955
Lamy = 16.886	kzy = 0.609	Lamz = 29.933	kzz = 0.995

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.047 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.664 + (Mz,Ed/MN,z,Rd)^1.664 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 16.886 < Lambda,max = 210.000 Lambda,z = 29.933 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.056 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.058 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 222 Barra_222 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /3/ 1*1.350 + 3*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 21.588 kN	My,Ed = -6.056 kN*m	Mz,Ed = -0.497 kN*m	Vy,Ed = 2.019 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -15.093 kN*m		Mz,Ed,max = -1.876 kN*m
	Vy,T,Rd = 489.338 kN		
Nb,Rd = 2337.322 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -13.188 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 861.235 kN
			Tt,Ed = 0.424 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 0.683 m | Lam_y = 0.128
Lcr,y = 0.683 m | Xy = 1.000
Lamy = 9.804 | kyy = 0.996

respecto al eje z:

Lz = 0.683 m | Lam_z = 0.227
Lcr,z = 0.683 m | Xz = 0.994
Lamz = 17.378 | kyz = 0.580

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.009 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.015 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 9.804 < Lambda,max = 210.000   Lambda,z = 17.378 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.125 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.094 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 223 Barra_223   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -44.517 kN	My,Ed = -3.327 kN*m	Mz,Ed = 0.504 kN*m	Vy,Ed = 1.573 kN
Nt,Rd = 2351.520 kN	My,pl,Rd = 146.067 kN*m	Mz,pl,Rd = 87.279 kN*m	Vy,T,Rd = 480.467 kN
	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 2.612 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 845.622 kN
			Tt,Ed = 1.892 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.019 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.023 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.023 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 224 Barra_224 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 3.056 kN	My,Ed = 1.020 kN*m	Mz,Ed = 0.363 kN*m	Vy,Ed = 0.964 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -1.911 kN*m		Mz,Ed,max = -0.771 kN*m
	Vy,T,Rd = 488.374 kN		
Nb,Rd = 2245.572 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -2.429 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 859.539 kN
			Tt,Ed = -0.584 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.176 m	Lam_y = 0.221	Lz = 1.176 m	Lam_z = 0.392
Lcr,y = 1.176 m	Xy = 0.995	Lcr,z = 1.176 m	Xz = 0.955
Lamy = 16.886	kyy = 1.000	Lamz = 29.933	kyz = 0.581

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 16.886 < Lambda,max = 210.000 Lambda,z = 29.933 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 225 Barra_225 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.419 kN	My,Ed = -2.295 kN*m	Mz,Ed = -2.114 kN*m	Vy,Ed = -6.245 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -2.904 kN*m		Mz,Ed,max = 2.151 kN*m
	Vy,T,Rd = 489.561 kN		
Nb,Rd = 2337.322 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -0.859 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 861.628 kN
			Tt,Ed = 0.387 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.683 m	Lam_y = 0.128	Lz = 0.683 m	Lam_z = 0.227
Lcr,y = 0.683 m	Xy = 1.000	Lcr,z = 0.683 m	Xz = 0.994
Lamy = 9.804	kzy = 0.619	Lamz = 17.378	kzz = 0.999

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.002 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.013 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 9.804 < Lambda,max = 210.000 Lambda,z = 17.378 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.036 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.039 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 226 Barra_226 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.204 m

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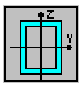
CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -76.941 kN	My,Ed = -1.738 kN*m	Mz,Ed = 1.967 kN*m	Vy,Ed = -15.217 kN
Nt,Rd = 2351.520 kN	My,pl,Rd = 146.067 kN*m	Mz,pl,Rd = 87.279 kN*m	Vy,T,Rd = 488.427 kN
	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 0.284 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 859.632 kN
			Tt,Ed = 0.575 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.033 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.662 + (Mz,Ed/MN,z,Rd)^1.662 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.031 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 227 Barra_227 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.023 m

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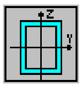
CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

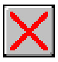


PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -48.884 kN	My,Ed = -0.152 kN*m	Mz,Ed = 0.396 kN*m	Vy,Ed = -0.143 kN
Nt,Rd = 2351.520 kN	My,pl,Rd = 146.067 kN*m	Mz,pl,Rd = 87.279 kN*m	Vy,T,Rd = 488.591 kN
	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 0.607 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 859.920 kN
			Tt,Ed = 0.548 kN*m
			CLASE DE LA SECCION = 1



PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.021 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.661 + (Mz,Ed/MN,z,Rd)^1.661 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.007 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 228 Barra_228 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 99.657 kN	My,Ed = -1.154 kN*m	Mz,Ed = 0.125 kN*m	Vy,Ed = 3.049 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -1.154 kN*m		Mz,Ed,max = -0.498 kN*m
	Vy,T,Rd = 491.783 kN		
Nb,Rd = 2351.520 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 2.470 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 865.537 kN
			Tt,Ed = -0.020 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.204 m	Lam_y = 0.038	Lz = 0.204 m	Lam_z = 0.068
Lcr,y = 0.204 m	Xy = 1.000	Lcr,z = 0.204 m	Xz = 1.000
Lamy = 2.933	kyy = 0.978	Lamz = 5.199	kyz = 0.572

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.042 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.006 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 2.933 < Lambda,max = 210.000 Lambda,z = 5.199 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.053 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.053 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 229 Barra_229 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 99.599 kN	My,Ed = -0.703 kN*m	Mz,Ed = -0.377 kN*m	Vy,Ed = -0.349 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 1.594 kN*m	Mz,Ed,max = -0.377 kN*m	Vy,T,Rd = 491.730 kN
Nb,Rd = 2275.738 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = 2.301 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 865.445 kN
			Tt,Ed = 0.029 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.023 m	Lam_y = 0.192	Lz = 1.023 m	Lam_z = 0.341
Lcr,y = 1.023 m	Xy = 1.000	Lcr,z = 1.023 m	Xz = 0.968
Lamy = 14.688	kyy = 0.985	Lamz = 26.037	kyz = 0.578

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.042 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.663 + (Mz,Ed/MN,z,Rd)^1.663 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.003 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 14.688 < Lambda,max = 210.000 Lambda,z = 26.037 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.056 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.055 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 230 Barra_230 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.478 kN	My,Ed = -0.065 kN*m	Mz,Ed = -0.302 kN*m	Vy,Ed = 0.532 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.266 kN*m		Mz,Ed,max = 0.656 kN*m
	Vy,T,Rd = 590.127 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.258 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.101 kN
			Tt,Ed = 0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 231 Barra_231 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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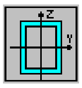
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -2.717 kN	My,Ed = -0.110 kN*m	Mz,Ed = -0.354 kN*m	Vy,Ed = -0.465 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.907 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.107 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.126 kN
			Tt,Ed = -0.134 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.001 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 232 Barra_232 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.360 kN	My,Ed = -0.061 kN*m	Mz,Ed = 0.072 kN*m	Vy,Ed = -0.103 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.090 kN*m	Mz,Ed,max = 0.120 kN*m	Vy,T,Rd = 590.147 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.209 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.117 kN
			Tt,Ed = -0.013 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 233 Barra_233 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -4.833 kN	My,Ed = -0.275 kN*m	Mz,Ed = -0.035 kN*m	Vy,Ed = -0.066 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 588.939 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.953 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.151 kN
			Tt,Ed = -0.131 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 234 Barra_234 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -4.336 kN	My,Ed = -0.206 kN*m	Mz,Ed = 0.025 kN*m	Vy,Ed = 0.036 kN

Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.183 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.771 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.147 kN
			Tt,Ed = -0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.002 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 235 Barra_235 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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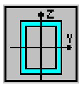
CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.185 kN	My,Ed = 0.505 kN*m	Mz,Ed = -0.284 kN*m	Vy,Ed = -0.271 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.505 kN*m	Mz,Ed,max = -0.284 kN*m	Vy,T,Rd = 589.980 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.660 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.984 kN
			Tt,Ed = 0.029 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.803 m Lam_y = 0.532
Lcr,y = 1.803 m Xy = 0.914
Lamy = 40.641 kyy = 1.000

respecto al eje z:

Lz = 1.803 m Lam_z = 0.532
Lcr,z = 1.803 m Xz = 0.914
Lamz = 40.641 kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 236 Barra_236 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.741 kN	My,Ed = 0.045 kN*m	Mz,Ed = -3.149 kN*m	Vy,Ed = -2.299 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.045 kN*m	Mz,Ed,max = -3.149 kN*m	Vy,T,Rd = 583.767 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.014 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.014 kN
			Tt,Ed = 0.633 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000   Lambda,z = 26.419 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.026 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 237 Barra_237   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -0.203 kN	My,Ed = -0.018 kN*m	Mz,Ed = -0.156 kN*m	Vy,Ed = 0.218 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 585.281 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.104 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.225 kN
			Tt,Ed = 0.486 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.000 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 238 Barra_238 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.257 kN	My,Ed = 0.095 kN*m	Mz,Ed = -3.514 kN*m	Vy,Ed = -1.785 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.095 kN*m	Mz,Ed,max = -3.514 kN*m	Vy,T,Rd = 588.538 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.196 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.830 kN
			Tt,Ed = 0.170 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 239 Barra_239 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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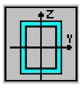
CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.351 kN	My,Ed = 0.057 kN*m	Mz,Ed = -2.090 kN*m	Vy,Ed = -1.554 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.057 kN*m	Mz,Ed,max = -2.090 kN*m	Vy,T,Rd = 587.142 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.172 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.714 kN
			Tt,Ed = 0.305 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000   Lambda,z = 23.706 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 240 Barra_240   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.380 kN	My,Ed = -0.118 kN*m	Mz,Ed = -0.253 kN*m	Vy,Ed = 0.436 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.287 kN*m		Mz,Ed,max = 0.533 kN*m
	Vy,T,Rd = 590.036 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.275 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.029 kN
			Tt,Ed = -0.024 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.014 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 241 Barra_241 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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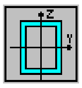
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -3.127 kN	My,Ed = -0.282 kN*m	Mz,Ed = -0.267 kN*m	Vy,Ed = -0.373 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.260 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.314 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.408 kN
			Tt,Ed = -0.099 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.002 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 242 Barra_242 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.941 kN	My,Ed = -0.107 kN*m	Mz,Ed = 0.042 kN*m	Vy,Ed = -0.098 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.161 kN*m	Mz,Ed,max = 0.088 kN*m	Vy,T,Rd = 590.105 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.456 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.084 kN
			Tt,Ed = -0.017 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 243 Barra_243 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.065 m

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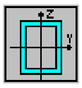
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.499 kN	My,Ed = -0.138 kN*m	Mz,Ed = 0.041 kN*m	Vy,Ed = -0.062 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.304 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.871 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.443 kN
			Tt,Ed = -0.095 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.004 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 244 Barra_244 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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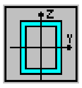
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.120 kN	My,Ed = -0.264 kN*m	Mz,Ed = -0.012 kN*m	Vy,Ed = 0.036 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.227 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.048 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.181 kN
			Tt,Ed = -0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 245 Barra_245 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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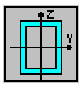
CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

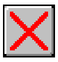


PARAMETROS DE LA SECCION: RECT_H_12x12

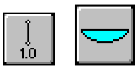
h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

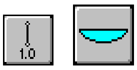
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.099 kN	My,Ed = -0.013 kN*m	Mz,Ed = 2.145 kN*m	Vy,Ed = -0.855 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.022 kN*m	Mz,Ed,max = 2.145 kN*m	Vy,T,Rd = 586.886 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.020 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.509 kN
			Tt,Ed = 0.330 kN*m
			CLASE DE LA SECCION = 1

 **PARAMETROS DE ALABEO:**

PARAMETROS DE PANDEO:

 respecto al eje y:

 respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000   Lambda,z = 40.641 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 246 Barra_246   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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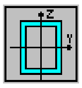
CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

 **PARAMETROS DE LA SECCION: RECT_H_12x12**

h=12.000 cm   gM0=1.000   gM1=1.000

b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.961 kN	My,Ed = 0.159 kN*m	Mz,Ed = -3.142 kN*m	Vy,Ed = -2.357 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.159 kN*m	Mz,Ed,max = -3.142 kN*m	Vy,T,Rd = 583.912 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.191 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.130 kN
			Tt,Ed = 0.619 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: / respecto al eje z:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.028 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 247 Barra_247 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2

tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.027 kN	My,Ed = -0.065 kN*m	Mz,Ed = 0.203 kN*m	Vy,Ed = -0.253 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.065 kN*m		Mz,Ed,max = 0.203 kN*m
	Vy,T,Rd = 585.278 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.281 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.223 kN
			Tt,Ed = -0.486 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 248 Barra_248 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2

tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.262 kN	My,Ed = 0.277 kN*m	Mz,Ed = 3.461 kN*m	Vy,Ed = 1.747 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.277 kN*m	Mz,Ed,max = 3.461 kN*m	Vy,T,Rd = 587.935 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.427 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.348 kN
			Tt,Ed = -0.228 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 249 Barra_249 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4

tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.353 kN	My,Ed = 0.027 kN*m	Mz,Ed = 2.086 kN*m	Vy,Ed = 1.551 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.027 kN*m	Mz,Ed,max = 2.086 kN*m	Vy,T,Rd = 587.075 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.130 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.660 kN
			Tt,Ed = -0.312 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 250 Barra_250 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.026 kN	My,Ed = -0.141 kN*m	Mz,Ed = -0.254 kN*m	Vy,Ed = 0.336 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.183 kN*m		Mz,Ed,max = 0.352 kN*m
	Vy,T,Rd = 590.133 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.346 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.107 kN
			Tt,Ed = -0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 251 Barra_251 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.568 kN	My,Ed = 0.159 kN*m	Mz,Ed = 0.066 kN*m	Vy,Ed = -0.163 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.427 kN*m		Mz,Ed,max = -0.125 kN*m
	Vy,T,Rd = 589.798 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.500 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.838 kN
			Tt,Ed = -0.047 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 252 Barra_252 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.690 kN	My,Ed = -0.149 kN*m	Mz,Ed = 0.050 kN*m	Vy,Ed = -0.061 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.213 kN*m	Mz,Ed,max = 0.079 kN*m	Vy,T,Rd = 590.087 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.657 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.069 kN
			Tt,Ed = -0.019 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 253 Barra_253 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.401 kN	My,Ed = -0.723 kN*m	Mz,Ed = 0.022 kN*m	Vy,Ed = -0.022 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.409 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.876 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.527 kN
			Tt,Ed = -0.085 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 254 Barra_254 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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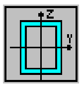
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.158 kN	My,Ed = -0.266 kN*m	Mz,Ed = -0.013 kN*m	Vy,Ed = 0.039 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.232 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.061 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.186 kN
			Tt,Ed = -0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 255 Barra_255 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.069 kN	My,Ed = -0.033 kN*m	Mz,Ed = 2.131 kN*m	Vy,Ed = -0.837 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.080 kN*m	Mz,Ed,max = 2.131 kN*m	Vy,T,Rd = 586.825 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.063 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.460 kN
			Tt,Ed = 0.336 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 256 Barra_256 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.037 kN	My,Ed = 0.097 kN*m	Mz,Ed = -3.116 kN*m	Vy,Ed = -2.299 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.097 kN*m	Mz,Ed,max = -3.116 kN*m	Vy,T,Rd = 583.723 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.108 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.978 kN
			Tt,Ed = 0.638 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))

(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000   Lambda,z = 26.419 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 257 Barra_257   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.001 kN	My,Ed = -0.074 kN*m	Mz,Ed = -0.147 kN*m	Vy,Ed = 0.206 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.080 kN*m	Mz,Ed,max = -0.147 kN*m	Vy,T,Rd = 585.309 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.415 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.247 kN
			Tt,Ed = 0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 258 Barra_258 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.057 kN	My,Ed = 0.126 kN*m	Mz,Ed = -3.490 kN*m	Vy,Ed = -1.783 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.126 kN*m	Mz,Ed,max = -3.490 kN*m	Vy,T,Rd = 588.427 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.234 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.742 kN
			Tt,Ed = 0.180 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 259 Barra_259 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.349 kN	My,Ed = 0.042 kN*m	Mz,Ed = 2.079 kN*m	Vy,Ed = 1.542 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.042 kN*m	Mz,Ed,max = 2.079 kN*m	Vy,T,Rd = 587.062 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.151 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.650 kN
			Tt,Ed = -0.313 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 260 Barra_260 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.183 kN	My,Ed = -0.078 kN*m	Mz,Ed = -0.168 kN*m	Vy,Ed = 0.286 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.381 kN*m		Mz,Ed,max = 0.347 kN*m
	Vy,T,Rd = 590.132 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.201 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.106 kN
			Tt,Ed = -0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000   Lambda,z = 40.641 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 261 Barra_261   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.213 kN	My,Ed = 0.039 kN*m	Mz,Ed = 0.038 kN*m	Vy,Ed = -0.120 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.196 kN*m		Mz,Ed,max = -0.103 kN*m
	Vy,T,Rd = 589.927 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.201 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.942 kN
			Tt,Ed = -0.035 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 262 Barra_262 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.822 kN	My,Ed = -0.154 kN*m	Mz,Ed = 0.029 kN*m	Vy,Ed = -0.064 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.192 kN*m	Mz,Ed,max = 0.059 kN*m	Vy,T,Rd = 590.165 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.623 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.132 kN
			Tt,Ed = -0.011 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 263 Barra_263 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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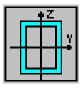
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.358 kN	My,Ed = -0.633 kN*m	Mz,Ed = -0.015 kN*m	Vy,Ed = -0.040 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.632 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.761 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.705 kN
			Tt,Ed = -0.063 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

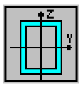
CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 264 Barra_264 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.150 kN	My,Ed = -0.261 kN*m	Mz,Ed = -0.008 kN*m	Vy,Ed = 0.024 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.245 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.045 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.196 kN
			Tt,Ed = -0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 265 Barra_265 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.230 kN	My,Ed = 0.148 kN*m	Mz,Ed = 0.637 kN*m	Vy,Ed = -0.824 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.148 kN*m	Mz,Ed,max = 2.123 kN*m	Vy,T,Rd = 586.996 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.322 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.597 kN
			Tt,Ed = 0.319 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 266 Barra_266 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.730 kN	My,Ed = 0.213 kN*m	Mz,Ed = -3.116 kN*m	Vy,Ed = -2.314 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.213 kN*m	Mz,Ed,max = -3.116 kN*m	Vy,T,Rd = 583.814 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.252 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.051 kN
			Tt,Ed = 0.629 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.028 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 267 Barra_267 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:

Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.106 kN	My,Ed = -0.084 kN*m	Mz,Ed = 0.195 kN*m	Vy,Ed = -0.238 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.084 kN*m		Mz,Ed,max = 0.195 kN*m
	Vy,T,Rd = 585.314 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.372 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.251 kN
			Tt,Ed = -0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 268 Barra_268 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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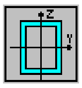
CARGAS:

Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

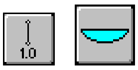
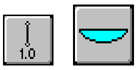
h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.471 kN	My,Ed = 0.403 kN*m	Mz,Ed = 3.469 kN*m	Vy,Ed = 1.760 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.403 kN*m	Mz,Ed,max = 3.469 kN*m	Vy,T,Rd = 588.206 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.588 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.565 kN
			Tt,Ed = -0.202 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

 respecto al eje y:  respecto al eje z:

Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.035 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.051 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 269 Barra_269 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.386 kN	My,Ed = 0.021 kN*m	Mz,Ed = 2.082 kN*m	Vy,Ed = 1.545 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.021 kN*m	Mz,Ed,max = 2.082 kN*m	Vy,T,Rd = 587.097 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.126 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.677 kN
			Tt,Ed = -0.310 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 270 Barra_270 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.875 kN	My,Ed = -0.123 kN*m	Mz,Ed = -0.154 kN*m	Vy,Ed = 0.201 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.220 kN*m		Mz,Ed,max = 0.207 kN*m
	Vy,T,Rd = 590.184 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.315 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.147 kN
			Tt,Ed = -0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 271 Barra_271 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.897 kN	My,Ed = 0.187 kN*m	Mz,Ed = 0.040 kN*m	Vy,Ed = -0.089 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.508 kN*m		Mz,Ed,max = -0.065 kN*m
	Vy,T,Rd = 590.015 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.593 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.012 kN
			Tt,Ed = -0.026 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.172 m	Lam_y = 0.346
Lcr,y = 1.172 m	Xy = 0.967
Lamy = 26.419	kyy = 1.000

respecto al eje z:

Lz = 1.172 m	Lam_z = 0.346
Lcr,z = 1.172 m	Xz = 0.967
Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 272 Barra_272 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.599 kN	My,Ed = -0.178 kN*m	Mz,Ed = 0.030 kN*m	Vy,Ed = -0.036 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.236 kN*m	Mz,Ed,max = 0.047 kN*m	Vy,T,Rd = 590.161 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.768 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.129 kN
			Tt,Ed = -0.012 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 273 Barra_273 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.534 kN	My,Ed = -0.791 kN*m	Mz,Ed = 0.015 kN*m	Vy,Ed = -0.012 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.760 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.964 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.808 kN
			Tt,Ed = -0.051 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.004 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 274 Barra_274 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.178 kN	My,Ed = -0.264 kN*m	Mz,Ed = -0.008 kN*m	Vy,Ed = 0.024 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.253 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.062 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.202 kN
			Tt,Ed = -0.003 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 275 Barra_275 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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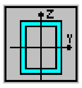
CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.067 kN	My,Ed = -0.030 kN*m	Mz,Ed = 2.140 kN*m	Vy,Ed = -0.858 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.073 kN*m	Mz,Ed,max = 2.140 kN*m	Vy,T,Rd = 586.831 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.057 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.465 kN
			Tt,Ed = 0.336 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 276 Barra_276 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.918 kN	My,Ed = 0.108 kN*m	Mz,Ed = -3.091 kN*m	Vy,Ed = -2.273 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.108 kN*m	Mz,Ed,max = -3.091 kN*m	Vy,T,Rd = 583.644 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.116 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.915 kN
			Tt,Ed = 0.645 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

respecto al eje z: (columns 3–4)

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 277 Barra_277 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.018 kN	My,Ed = -0.081 kN*m	Mz,Ed = -0.163 kN*m	Vy,Ed = 0.221 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.093 kN*m	Mz,Ed,max = -0.163 kN*m	Vy,T,Rd = 585.313 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.454 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.251 kN
			Tt,Ed = 0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 278 Barra_278 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.286 kN	My,Ed = 0.194 kN*m	Mz,Ed = 3.462 kN*m	Vy,Ed = 1.761 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.194 kN*m	Mz,Ed,max = 3.462 kN*m	Vy,T,Rd = 588.115 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.320 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.492 kN
			Tt,Ed = -0.211 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000   Lambda,z = 24.005 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.032 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 279 Barra_279   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.356 kN	My,Ed = 0.043 kN*m	Mz,Ed = 2.078 kN*m	Vy,Ed = 1.540 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.043 kN*m	Mz,Ed,max = 2.078 kN*m	Vy,T,Rd = 587.079 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.153 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.663 kN
			Tt,Ed = -0.311 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 280 Barra_280 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.165 kN	My,Ed = -0.070 kN*m	Mz,Ed = -0.090 kN*m	Vy,Ed = 0.145 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.391 kN*m		Mz,Ed,max = 0.171 kN*m
	Vy,T,Rd = 590.208 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.191 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.167 kN
			Tt,Ed = -0.007 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 281 Barra_281 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.253 kN	My,Ed = 0.037 kN*m	Mz,Ed = 0.018 kN*m	Vy,Ed = -0.050 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.198 kN*m		Mz,Ed,max = -0.041 kN*m
	Vy,T,Rd = 590.131 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.200 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.105 kN
			Tt,Ed = -0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.172 m   Lam_y = 0.346
Lcr,y = 1.172 m   Xy = 0.967
Lamy = 26.419   kyy = 1.000

respecto al eje z:

Lz = 1.172 m   Lam_z = 0.346
Lcr,z = 1.172 m   Xz = 0.967
Lamz = 26.419   kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000   Lambda,z = 26.419 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 282 Barra_282   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.812 kN	My,Ed = -0.160 kN*m	Mz,Ed = 0.016 kN*m	Vy,Ed = -0.031 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.196 kN*m	Mz,Ed,max = 0.031 kN*m	Vy,T,Rd = 590.218 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.644 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.174 kN
			Tt,Ed = -0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 0.469 m   Lam_y = 0.138
Lcr,y = 0.469 m   Xy = 1.000
Lamy = 10.570   kyy = 1.000

respecto al eje z:

Lz = 0.469 m   Lam_z = 0.138
Lcr,z = 0.469 m   Xz = 1.000
Lamz = 10.570   kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000   Lambda,z = 10.570 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 283 Barra_283   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.383 kN	My,Ed = -0.642 kN*m	Mz,Ed = -0.004 kN*m	Vy,Ed = -0.018 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.944 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.772 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.955 kN
			Tt,Ed = -0.033 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 284 Barra_284 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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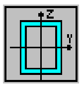
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.154 kN	My,Ed = -0.260 kN*m	Mz,Ed = -0.004 kN*m	Vy,Ed = 0.013 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.263 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.044 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.211 kN
			Tt,Ed = -0.002 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 285 Barra_285 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.191 kN	My,Ed = 0.142 kN*m	Mz,Ed = 0.580 kN*m	Vy,Ed = -0.874 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.142 kN*m	Mz,Ed,max = 2.156 kN*m	Vy,T,Rd = 586.987 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.318 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.590 kN
			Tt,Ed = 0.320 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 286 Barra_286 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.198 kN	My,Ed = 0.341 kN*m	Mz,Ed = 3.077 kN*m	Vy,Ed = 2.260 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.341 kN*m	Mz,Ed,max = 3.077 kN*m	Vy,T,Rd = 583.662 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.397 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.930 kN
			Tt,Ed = -0.644 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 287 Barra_287 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.179 kN	My,Ed = -0.101 kN*m	Mz,Ed = 0.188 kN*m	Vy,Ed = -0.231 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.101 kN*m		Mz,Ed,max = 0.188 kN*m
	Vy,T,Rd = 585.333 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.451 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.266 kN
			Tt,Ed = -0.481 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 288 Barra_288 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.445 kN	My,Ed = 0.387 kN*m	Mz,Ed = 3.469 kN*m	Vy,Ed = 1.764 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.387 kN*m	Mz,Ed,max = 3.469 kN*m	Vy,T,Rd = 588.332 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.566 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.666 kN
			Tt,Ed = -0.190 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.034 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.051 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 289 Barra_289 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.382 kN	My,Ed = 0.022 kN*m	Mz,Ed = 2.079 kN*m	Vy,Ed = 1.540 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.022 kN*m	Mz,Ed,max = 2.079 kN*m	Vy,T,Rd = 587.105 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.126 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.684 kN
			Tt,Ed = -0.309 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 290 Barra_290 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.870 kN	My,Ed = -0.115 kN*m	Mz,Ed = -0.057 kN*m	Vy,Ed = 0.076 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.231 kN*m		Mz,Ed,max = 0.081 kN*m
	Vy,T,Rd = 590.279 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.305 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.223 kN
			Tt,Ed = -0.000 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 291 Barra_291 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.963 kN	My,Ed = 0.192 kN*m	Mz,Ed = 0.013 kN*m	Vy,Ed = -0.022 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.524 kN*m		Mz,Ed,max = -0.013 kN*m
	Vy,T,Rd = 590.209 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.610 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.167 kN
			Tt,Ed = -0.007 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 292 Barra_292 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.597 kN	My,Ed = -0.183 kN*m	Mz,Ed = 0.013 kN*m	Vy,Ed = -0.013 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.237 kN*m	Mz,Ed,max = 0.019 kN*m	Vy,T,Rd = 590.244 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.781 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.195 kN
			Tt,Ed = -0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 293 Barra_293 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.550 kN	My,Ed = -0.794 kN*m	Mz,Ed = 0.005 kN*m	Vy,Ed = -0.004 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.075 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.967 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.060 kN
			Tt,Ed = -0.020 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.004 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 294 Barra_294 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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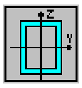
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.180 kN	My,Ed = -0.264 kN*m	Mz,Ed = -0.003 kN*m	Vy,Ed = 0.008 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.269 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.060 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.216 kN
			Tt,Ed = -0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 295 Barra_295 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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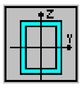
CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.034 kN	My,Ed = -0.017 kN*m	Mz,Ed = 2.143 kN*m	Vy,Ed = -0.863 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.042 kN*m	Mz,Ed,max = 2.143 kN*m	Vy,T,Rd = 586.825 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.033 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.460 kN
			Tt,Ed = 0.336 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 296 Barra_296 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.829 kN	My,Ed = 0.118 kN*m	Mz,Ed = -3.063 kN*m	Vy,Ed = -2.242 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.118 kN*m	Mz,Ed,max = -3.063 kN*m	Vy,T,Rd = 583.555 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.126 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.844 kN
			Tt,Ed = 0.654 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.042 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 297 Barra_297 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.003 kN	My,Ed = -0.076 kN*m	Mz,Ed = -0.174 kN*m	Vy,Ed = 0.230 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.084 kN*m	Mz,Ed,max = -0.174 kN*m	Vy,T,Rd = 585.314 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.425 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.251 kN
			Tt,Ed = 0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000   Lambda,z = 10.570 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 298 Barra_298   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.251 kN	My,Ed = 0.181 kN*m	Mz,Ed = 3.469 kN*m	Vy,Ed = 1.769 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 0.181 kN*m	Mz,Ed,max = 3.469 kN*m	Vy,T,Rd = 588.231 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.304 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.584 kN
			Tt,Ed = -0.199 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 299 Barra_299 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.337 kN	My,Ed = 0.040 kN*m	Mz,Ed = -2.080 kN*m	Vy,Ed = -1.542 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.040 kN*m	Mz,Ed,max = -2.080 kN*m	Vy,T,Rd = 587.093 kN

Nb,Rd = 1794.471 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = -0.147 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 469.674 kN
Tt,Ed = 0.310 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:
Ly = 1.052 m   Lam_y = 0.310
Lcr,y = 1.052 m   Xy = 0.975
Lamy = 23.706   kzy = 0.600

respecto al eje z:
Lz = 1.052 m   Lam_z = 0.310
Lcr,z = 1.052 m   Xz = 0.975
Lamz = 23.706   kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000   Lambda,z = 23.706 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 300 Barra_300   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.803 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.172 kN   My,Ed = -0.068 kN*m   Mz,Ed = -0.012 kN*m   Vy,Ed = 0.008 kN
Nc,Rd = 1840.320 kN   My,Ed,max = -0.390 kN*m   Mz,Ed,max = -0.012 kN*m
Vy,T,Rd = 590.265 kN

Nb,Rd = 1682.188 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = -0.191 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 472.212 kN
Tt,Ed = 0.002 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.803 m   Lam_y = 0.532   Lz = 1.803 m   Lam_z = 0.532
Lcr,y = 1.803 m   Xy = 0.914   Lcr,z = 1.803 m   Xz = 0.914
Lamy = 40.641   kyy = 1.000   Lamz = 40.641   kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000   Lambda,z = 40.641 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 301 Barra_301   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm   gM0=1.000   gM1=1.000
b=12.000 cm   Ay=28.800 cm2   Az=23.040 cm2   Ax=51.840 cm2
tw=1.200 cm   Iy=1020.211 cm4   Iz=1020.211 cm4   Ix=1721.093 cm4
tf=1.200 cm   Wply=210.816 cm3   Wplz=210.816 cm3

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.240 kN   My,Ed = 0.036 kN*m   Mz,Ed = -0.002 kN*m   Vy,Ed = 0.016 kN
Nc,Rd = 1840.320 kN   My,Ed,max = -0.195 kN*m   Mz,Ed,max = 0.017 kN*m
Vy,T,Rd = 590.241 kN

Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.197 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.193 kN
			Tt,Ed = 0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 302 Barra_302 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.815 kN	My,Ed = -0.160 kN*m	Mz,Ed = 0.004 kN*m	Vy,Ed = 0.001 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.195 kN*m	Mz,Ed,max = 0.004 kN*m	Vy,T,Rd = 590.275 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.643 kN

	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.220 kN
			Tt,Ed = -0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 303 Barra_303 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.382 kN	My,Ed = -0.639 kN*m	Mz,Ed = 0.005 kN*m	Vy,Ed = 0.003 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.246 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.769 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.196 kN

Tt,Ed = -0.004 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 304 Barra_304 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.154 kN	My,Ed = -0.260 kN*m	Mz,Ed = -0.001 kN*m	Vy,Ed = 0.002 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.280 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.044 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.224 kN
			Tt,Ed = -0.000 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000   (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 305 Barra_305 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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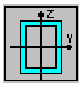
CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

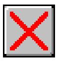


PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

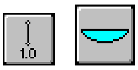
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

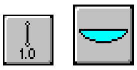
N,Ed = 0.119 kN	My,Ed = 0.130 kN*m	Mz,Ed = 0.544 kN*m	Vy,Ed = -0.908 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.130 kN*m	Mz,Ed,max = 2.181 kN*m	Vy,T,Rd = 586.952 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.310 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.562 kN
			Tt,Ed = 0.324 kN*m
			CLASE DE LA SECCION = 1



PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

 respecto al eje y:

 respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 306 Barra_306 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.319 kN	My,Ed = 0.311 kN*m	Mz,Ed = 3.096 kN*m	Vy,Ed = 2.290 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.311 kN*m	Mz,Ed,max = 3.096 kN*m	Vy,T,Rd = 583.753 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.364 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.002 kN
			Tt,Ed = -0.635 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 307 Barra_307 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.251 kN	My,Ed = -0.119 kN*m	Mz,Ed = -0.189 kN*m	Vy,Ed = 0.231 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.119 kN*m		Mz,Ed,max = -0.189 kN*m
	Vy,T,Rd = 585.318 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.538 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.255 kN
			Tt,Ed = 0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 308 Barra_308 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.390 kN	My,Ed = 0.354 kN*m	Mz,Ed = 3.467 kN*m	Vy,Ed = 1.767 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.354 kN*m	Mz,Ed,max = 3.467 kN*m	Vy,T,Rd = 588.411 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.526 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.729 kN
			Tt,Ed = -0.182 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.034 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 309 Barra_309 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.366 kN	My,Ed = 0.023 kN*m	Mz,Ed = -2.080 kN*m	Vy,Ed = -1.542 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.023 kN*m	Mz,Ed,max = -2.080 kN*m	Vy,T,Rd = 587.105 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.127 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.684 kN
			Tt,Ed = 0.309 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 310 Barra_310 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.887 kN	My,Ed = -0.114 kN*m	Mz,Ed = 0.041 kN*m	Vy,Ed = -0.048 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.229 kN*m		Mz,Ed,max = -0.045 kN*m
	Vy,T,Rd = 590.186 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.305 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.149 kN
			Tt,Ed = 0.009 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 311 Barra_311 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.952 kN	My,Ed = 0.190 kN*m	Mz,Ed = -0.014 kN*m	Vy,Ed = 0.044 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.520 kN*m		Mz,Ed,max = 0.037 kN*m
	Vy,T,Rd = 590.164 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.606 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.131 kN
			Tt,Ed = 0.012 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 312 Barra_312 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.606 kN	My,Ed = -0.181 kN*m	Mz,Ed = -0.005 kN*m	Vy,Ed = 0.011 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.235 kN*m	Mz,Ed,max = -0.010 kN*m	Vy,T,Rd = 590.237 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.773 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.190 kN
			Tt,Ed = 0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

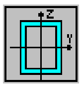
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 313 Barra_313 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.541 kN	My,Ed = -0.787 kN*m	Mz,Ed = -0.007 kN*m	Vy,Ed = 0.003 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.176 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.958 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.141 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.004 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

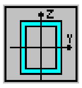
NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 314 Barra_314 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.179 kN	My,Ed = -0.264 kN*m	Mz,Ed = 0.002 kN*m	Vy,Ed = -0.008 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.280 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.060 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.224 kN
			Tt,Ed = 0.000 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 315 Barra_315 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.012 kN	My,Ed = -0.009 kN*m	Mz,Ed = 2.143 kN*m	Vy,Ed = -0.862 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.022 kN*m	Mz,Ed,max = 2.143 kN*m	Vy,T,Rd = 586.818 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.017 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.455 kN
			Tt,Ed = 0.337 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 316 Barra_316 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.687 kN	My,Ed = 0.132 kN*m	Mz,Ed = 3.083 kN*m	Vy,Ed = 2.272 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.132 kN*m	Mz,Ed,max = 3.083 kN*m	Vy,T,Rd = 583.647 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.136 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.917 kN
			Tt,Ed = -0.645 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 317 Barra_317 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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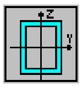
CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -0.006 kN	My,Ed = -0.073 kN*m	Mz,Ed = -0.182 kN*m	Vy,Ed = 0.236 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 585.316 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.405 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.253 kN
			Tt,Ed = 0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.000 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 318 Barra_318 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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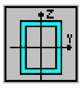
CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.227 kN	My,Ed = 0.174 kN*m	Mz,Ed = 3.475 kN*m	Vy,Ed = 1.775 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.174 kN*m	Mz,Ed,max = 3.475 kN*m	Vy,T,Rd = 588.322 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.295 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.657 kN
			Tt,Ed = -0.191 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 319 Barra_319 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.341 kN	My,Ed = 0.040 kN*m	Mz,Ed = -2.080 kN*m	Vy,Ed = -1.542 kN

Nc,Rd = 1840.320 kN	My,Ed,max = 0.040 kN*m	Mz,Ed,max = -2.080 kN*m	Vy,T,Rd = 587.084 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.148 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.667 kN
			Tt,Ed = 0.311 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 320 Barra_320 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.196 kN	My,Ed = -0.070 kN*m	Mz,Ed = 0.071 kN*m	Vy,Ed = -0.137 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.383 kN*m		Mz,Ed,max = -0.177 kN*m

	Vy,T,Rd = 590.173 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.196 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.139 kN
			Tt,Ed = 0.011 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000   Lambda,z = 40.641 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 321 Barra_321   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.172 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.203 kN	My,Ed = 0.036 kN*m	Mz,Ed = -0.023 kN*m	Vy,Ed = 0.086 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.191 kN*m		Mz,Ed,max = 0.078 kN*m

	Vy,T,Rd = 590.035 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.193 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.028 kN
			Tt,Ed = 0.024 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 322 Barra_322 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.828 kN	My,Ed = -0.156 kN*m	Mz,Ed = -0.010 kN*m	Vy,Ed = 0.034 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.192 kN*m	Mz,Ed,max = -0.026 kN*m	Vy,T,Rd = 590.232 kN

Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.628 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.186 kN
			Tt,Ed = 0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 323 Barra_323 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.364 kN	My,Ed = -0.629 kN*m	Mz,Ed = 0.015 kN*m	Vy,Ed = 0.024 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.000 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.756 kN

	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.000 kN
			Tt,Ed = 0.027 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 324 Barra_324 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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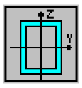
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.151 kN	My,Ed = -0.260 kN*m	Mz,Ed = 0.003 kN*m	Vy,Ed = -0.010 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.268 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.044 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.214 kN
			Tt,Ed = 0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 325 Barra_325 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.067 kN	My,Ed = 0.120 kN*m	Mz,Ed = 0.509 kN*m	Vy,Ed = -0.940 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.120 kN*m	Mz,Ed,max = 2.203 kN*m	Vy,T,Rd = 586.925 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.301 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.540 kN
			Tt,Ed = 0.326 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.019 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 326 Barra_326 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.411 kN	My,Ed = 0.290 kN*m	Mz,Ed = 3.115 kN*m	Vy,Ed = 2.319 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.290 kN*m	Mz,Ed,max = 3.115 kN*m	Vy,T,Rd = 583.838 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.340 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.070 kN
			Tt,Ed = -0.626 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 327 Barra_327 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.220 kN	My,Ed = -0.111 kN*m	Mz,Ed = -0.196 kN*m	Vy,Ed = 0.238 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.111 kN*m		Mz,Ed,max = -0.196 kN*m
	Vy,T,Rd = 585.299 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.501 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.240 kN
			Tt,Ed = 0.484 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 328 Barra_328 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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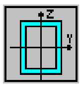
CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

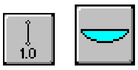
h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

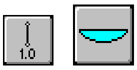
N,Ed = 2.352 kN	My,Ed = 0.340 kN*m	Mz,Ed = -3.474 kN*m	Vy,Ed = -1.763 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.340 kN*m	Mz,Ed,max = -3.474 kN*m	Vy,T,Rd = 588.232 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.507 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.586 kN
			Tt,Ed = 0.199 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:



respecto al eje y:



respecto al eje z:

Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.034 < 1.000 (6.3.3.(4))

N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*

TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 329 Barra_329 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.367 kN	My,Ed = 0.023 kN*m	Mz,Ed = -2.083 kN*m	Vy,Ed = -1.546 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.023 kN*m	Mz,Ed,max = -2.083 kN*m	Vy,T,Rd = 587.100 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.126 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.680 kN
			Tt,Ed = 0.309 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))

(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 330 Barra_330 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.968 kN	My,Ed = -0.122 kN*m	Mz,Ed = 0.145 kN*m	Vy,Ed = -0.183 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.209 kN*m		Mz,Ed,max = -0.185 kN*m
	Vy,T,Rd = 590.105 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.321 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.084 kN
			Tt,Ed = 0.017 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000   Lambda,z = 40.641 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 331 Barra_331   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.820 kN	My,Ed = 0.179 kN*m	Mz,Ed = -0.044 kN*m	Vy,Ed = 0.117 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.487 kN*m		Mz,Ed,max = 0.093 kN*m
	Vy,T,Rd = 589.948 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.568 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.958 kN
			Tt,Ed = 0.033 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 332 Barra_332 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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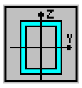
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

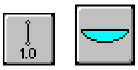
h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

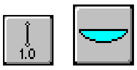
N,Ed = 1.654 kN	My,Ed = -0.167 kN*m	Mz,Ed = -0.024 kN*m	Vy,Ed = 0.036 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.224 kN*m	Mz,Ed,max = -0.041 kN*m	Vy,T,Rd = 590.153 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.717 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.123 kN
			Tt,Ed = 0.013 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:



respecto al eje y:



respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 333 Barra_333 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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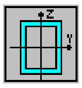
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.473 kN	My,Ed = -0.751 kN*m	Mz,Ed = -0.017 kN*m	Vy,Ed = 0.012 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.829 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.912 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.864 kN
			Tt,Ed = 0.044 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.004 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 334 Barra_334 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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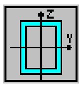
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.169 kN	My,Ed = -0.264 kN*m	Mz,Ed = 0.008 kN*m	Vy,Ed = -0.024 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.261 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.060 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.209 kN
			Tt,Ed = 0.002 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 335 Barra_335 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:

Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.005 kN	My,Ed = -0.007 kN*m	Mz,Ed = 2.143 kN*m	Vy,Ed = -0.860 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.016 kN*m	Mz,Ed,max = 2.143 kN*m	Vy,T,Rd = 586.815 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.012 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.452 kN
			Tt,Ed = 0.337 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 336 Barra_336 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.700 kN	My,Ed = 0.130 kN*m	Mz,Ed = 3.112 kN*m	Vy,Ed = 2.304 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.130 kN*m	Mz,Ed,max = 3.112 kN*m	Vy,T,Rd = 583.736 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.136 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.989 kN
			Tt,Ed = -0.636 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 337 Barra_337 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.007 kN	My,Ed = -0.072 kN*m	Mz,Ed = -0.191 kN*m	Vy,Ed = 0.244 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.073 kN*m	Mz,Ed,max = -0.191 kN*m	Vy,T,Rd = 585.322 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.394 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.258 kN
			Tt,Ed = 0.482 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 338 Barra_338 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.133 kN	My,Ed = 0.166 kN*m	Mz,Ed = 3.483 kN*m	Vy,Ed = 1.781 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.166 kN*m	Mz,Ed,max = 3.483 kN*m	Vy,T,Rd = 588.422 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.270 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.738 kN
			Tt,Ed = -0.181 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 339 Barra_339 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.342 kN	My,Ed = 0.039 kN*m	Mz,Ed = -2.080 kN*m	Vy,Ed = -1.543 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.039 kN*m	Mz,Ed,max = -2.080 kN*m	Vy,T,Rd = 587.073 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.146 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.658 kN
			Tt,Ed = 0.312 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 340 Barra_340 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.277 kN	My,Ed = -0.101 kN*m	Mz,Ed = 0.156 kN*m	Vy,Ed = -0.293 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.316 kN*m		Mz,Ed,max = -0.373 kN*m
	Vy,T,Rd = 590.129 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.250 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.103 kN
			Tt,Ed = 0.015 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 341 Barra_341 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.033 kN	My,Ed = 0.036 kN*m	Mz,Ed = -0.047 kN*m	Vy,Ed = 0.167 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.173 kN*m		Mz,Ed,max = 0.149 kN*m
	Vy,T,Rd = 589.800 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.179 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.840 kN
			Tt,Ed = 0.047 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kyy = 1.000	Lamz = 26.419	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 342 Barra_342 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.878 kN	My,Ed = -0.130 kN*m	Mz,Ed = -0.025 kN*m	Vy,Ed = 0.069 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.177 kN*m	Mz,Ed,max = -0.058 kN*m	Vy,T,Rd = 590.180 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.539 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.144 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 343 Barra_343 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.257 kN	My,Ed = -0.589 kN*m	Mz,Ed = 0.027 kN*m	Vy,Ed = 0.048 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.645 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.705 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.716 kN
			Tt,Ed = 0.062 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 344 Barra_344 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.135 kN	My,Ed = -0.263 kN*m	Mz,Ed = 0.007 kN*m	Vy,Ed = -0.021 kN

Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.245 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.047 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.196 kN
			Tt,Ed = 0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 345 Barra_345 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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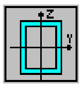
CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.058 kN	My,Ed = -0.043 kN*m	Mz,Ed = 0.209 kN*m	Vy,Ed = 0.174 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.064 kN*m		Mz,Ed,max = 0.209 kN*m
	Vy,T,Rd = 590.216 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.012 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.173 kN
			Tt,Ed = 0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.007 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 346 Barra_346 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.622 kN	My,Ed = 0.234 kN*m	Mz,Ed = 3.141 kN*m	Vy,Ed = 2.355 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.234 kN*m	Mz,Ed,max = 3.141 kN*m	Vy,T,Rd = 583.945 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.275 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.156 kN
			Tt,Ed = -0.616 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 347 Barra_347 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.154 kN	My,Ed = -0.093 kN*m	Mz,Ed = -0.205 kN*m	Vy,Ed = 0.245 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.093 kN*m		Mz,Ed,max = -0.205 kN*m
	Vy,T,Rd = 585.287 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.414 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.230 kN
			Tt,Ed = 0.486 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kzy = 0.600	Lamz = 10.570	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000 Lambda,z = 10.570 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 348 Barra_348 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.181 kN	My,Ed = 0.282 kN*m	Mz,Ed = -3.472 kN*m	Vy,Ed = -1.758 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.282 kN*m	Mz,Ed,max = -3.472 kN*m	Vy,T,Rd = 588.126 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.418 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.501 kN
			Tt,Ed = 0.210 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.004 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.050 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 349 Barra_349 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.353 kN	My,Ed = 0.025 kN*m	Mz,Ed = -2.085 kN*m	Vy,Ed = -1.548 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.025 kN*m	Mz,Ed,max = -2.085 kN*m	Vy,T,Rd = 587.092 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.127 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.673 kN
			Tt,Ed = 0.310 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 350 Barra_350 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 9.321 kN	My,Ed = -0.140 kN*m	Mz,Ed = 0.280 kN*m	Vy,Ed = -0.391 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.162 kN*m		Mz,Ed,max = -0.424 kN*m
	Vy,T,Rd = 589.921 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.357 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.936 kN
			Tt,Ed = 0.035 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000   Lambda,z = 40.641 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 351 Barra_351   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.172 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.336 kN	My,Ed = 0.137 kN*m	Mz,Ed = -0.075 kN*m	Vy,Ed = 0.200 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.364 kN*m		Mz,Ed,max = 0.160 kN*m
	Vy,T,Rd = 589.714 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.428 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.771 kN
			Tt,Ed = 0.055 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.172 m   Lam_y = 0.346
Lcr,y = 1.172 m   Xy = 0.967
Lamy = 26.419   kyy = 1.000

respecto al eje z:

Lz = 1.172 m   Lam_z = 0.346
Lcr,z = 1.172 m   Xz = 0.967
Lamz = 26.419   kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000   Lambda,z = 26.419 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 352 Barra_352   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.872 kN	My,Ed = -0.112 kN*m	Mz,Ed = -0.045 kN*m	Vy,Ed = 0.082 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.174 kN*m	Mz,Ed,max = -0.084 kN*m	Vy,T,Rd = 590.041 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.494 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.033 kN
			Tt,Ed = 0.024 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 0.469 m
Lam_y = 0.138
Lcr,y = 0.469 m
Xy = 1.000
Lamy = 10.570
kyy = 1.000

respecto al eje z:

Lz = 0.469 m
Lam_z = 0.138
Lcr,z = 0.469 m
Xz = 1.000
Lamz = 10.570
kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 10.570 < Lambda,max = 210.000   Lambda,z = 10.570 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 353 Barra_353   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.047 kN	My,Ed = -0.603 kN*m	Mz,Ed = -0.015 kN*m	Vy,Ed = 0.037 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.358 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 1.767 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.486 kN
			Tt,Ed = 0.090 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.004 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 354 Barra_354 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.052 m

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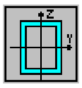
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -6.127 kN	My,Ed = -0.266 kN*m	Mz,Ed = 0.015 kN*m	Vy,Ed = -0.045 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.238 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -1.054 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.190 kN
			Tt,Ed = 0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 355 Barra_355 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.012 kN	My,Ed = -0.006 kN*m	Mz,Ed = 2.142 kN*m	Vy,Ed = -0.858 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.016 kN*m	Mz,Ed,max = 2.142 kN*m	Vy,T,Rd = 586.816 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.013 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.452 kN
			Tt,Ed = 0.337 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.006 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.017 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 356 Barra_356 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.952 kN	My,Ed = 0.090 kN*m	Mz,Ed = 3.146 kN*m	Vy,Ed = 2.342 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.090 kN*m	Mz,Ed,max = 3.146 kN*m	Vy,T,Rd = 583.838 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.094 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.070 kN
			Tt,Ed = -0.626 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 357 Barra_357 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -0.079 kN	My,Ed = -0.050 kN*m	Mz,Ed = 0.145 kN*m	Vy,Ed = -0.205 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 585.319 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.271 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.255 kN
			Tt,Ed = -0.483 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.000 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 358 Barra_358 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 2.099 kN	My,Ed = 0.124 kN*m	Mz,Ed = 3.493 kN*m	Vy,Ed = 1.790 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.124 kN*m	Mz,Ed,max = 3.493 kN*m	Vy,T,Rd = 588.537 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.231 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.829 kN
			Tt,Ed = -0.170 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.049 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 359 Barra_359 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.323 kN	My,Ed = 0.040 kN*m	Mz,Ed = -2.080 kN*m	Vy,Ed = -1.544 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.040 kN*m	Mz,Ed,max = -2.080 kN*m	Vy,T,Rd = 587.062 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.145 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.649 kN
			Tt,Ed = 0.313 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000 Lambda,z = 23.706 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 360 Barra_360 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.803 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.795 kN	My,Ed = 0.143 kN*m	Mz,Ed = 0.105 kN*m	Vy,Ed = -0.208 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.520 kN*m		Mz,Ed,max = -0.271 kN*m
	Vy,T,Rd = 589.992 kN		
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.001 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.993 kN
			Tt,Ed = -0.028 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kyy = 1.000	Lamz = 40.641	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.013 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 361 Barra_361 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.513 kN	My,Ed = -0.013 kN*m	Mz,Ed = -0.201 kN*m	Vy,Ed = -0.253 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.029 kN*m		Mz,Ed,max = -0.201 kN*m
	Vy,T,Rd = 589.490 kN		
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.014 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.592 kN
			Tt,Ed = -0.077 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 362 Barra_362 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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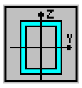
CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

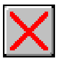


PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

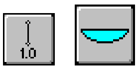
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

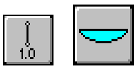
N,Ed = 1.557 kN	My,Ed = -0.128 kN*m	Mz,Ed = -0.035 kN*m	Vy,Ed = 0.034 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.128 kN*m		Mz,Ed,max = -0.051 kN*m
	Vy,T,Rd = 590.281 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.321 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.225 kN
			Tt,Ed = 0.000 kN*m
			CLASE DE LA SECCION = 1



PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

 respecto al eje y:

 respecto al eje z:

Ly = 0.469 m	Lam_y = 0.138	Lz = 0.469 m	Lam_z = 0.138
Lcr,y = 0.469 m	Xy = 1.000	Lcr,z = 0.469 m	Xz = 1.000
Lamy = 10.570	kyy = 1.000	Lamz = 10.570	kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 10.570 < Lambda,max = 210.000   Lambda,z = 10.570 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.003 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 363 Barra_363   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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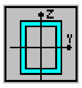
CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

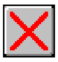
h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -4.961 kN	My,Ed = -0.152 kN*m	Mz,Ed = 0.023 kN*m	Vy,Ed = 0.025 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 589.699 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.796 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.759 kN
			Tt,Ed = 0.057 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

 respecto al eje y:  respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nt,Rd = 0.003 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.001 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 364 Barra_364 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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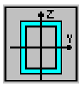
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2

tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -4.354 kN	My,Ed = -0.235 kN*m	Mz,Ed = -0.005 kN*m	Vy,Ed = -0.008 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 590.229 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.814 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.183 kN
			Tt,Ed = 0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.002 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.002 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 365 Barra_365 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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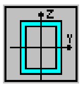
CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.274 kN	My,Ed = 0.277 kN*m	Mz,Ed = 0.385 kN*m	Vy,Ed = 0.310 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.277 kN*m	Mz,Ed,max = 0.385 kN*m	Vy,T,Rd = 590.222 kN
Nb,Rd = 1682.188 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.270 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.178 kN
			Tt,Ed = 0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.803 m	Lam_y = 0.532	Lz = 1.803 m	Lam_z = 0.532
Lcr,y = 1.803 m	Xy = 0.914	Lcr,z = 1.803 m	Xz = 0.914
Lamy = 40.641	kzy = 0.600	Lamz = 40.641	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 40.641 < Lambda,max = 210.000 Lambda,z = 40.641 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.011 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.012 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 366 Barra_366 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.253 kN	My,Ed = 0.032 kN*m	Mz,Ed = 3.228 kN*m	Vy,Ed = 2.433 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.032 kN*m	Mz,Ed,max = 3.228 kN*m	Vy,T,Rd = 584.163 kN
Nb,Rd = 1778.761 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.030 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.330 kN
			Tt,Ed = -0.595 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.172 m	Lam_y = 0.346	Lz = 1.172 m	Lam_z = 0.346
Lcr,y = 1.172 m	Xy = 0.967	Lcr,z = 1.172 m	Xz = 0.967
Lamy = 26.419	kzy = 0.600	Lamz = 26.419	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.005 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.010 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.010 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.419 < Lambda,max = 210.000 Lambda,z = 26.419 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.027 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 367 Barra_367 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.469 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -0.123 kN	My,Ed = -0.042 kN*m	Mz,Ed = 0.146 kN*m	Vy,Ed = -0.202 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 585.308 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.251 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.246 kN
			Tt,Ed = -0.484 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.000 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 368 Barra_368 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.969 kN	My,Ed = 0.058 kN*m	Mz,Ed = 3.502 kN*m	Vy,Ed = 1.797 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.058 kN*m	Mz,Ed,max = 3.502 kN*m	Vy,T,Rd = 588.870 kN
Nb,Rd = 1792.767 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.148 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.096 kN
			Tt,Ed = -0.137 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.065 m	Lam_y = 0.314	Lz = 1.065 m	Lam_z = 0.314
Lcr,y = 1.065 m	Xy = 0.974	Lcr,z = 1.065 m	Xz = 0.974
Lamy = 24.005	kzy = 0.600	Lamz = 24.005	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.006 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 24.005 < Lambda,max = 210.000 Lambda,z = 24.005 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.030 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.048 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 369 Barra_369 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.319 kN	My,Ed = 0.043 kN*m	Mz,Ed = -2.079 kN*m	Vy,Ed = -1.542 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.043 kN*m	Mz,Ed,max = -2.079 kN*m	Vy,T,Rd = 587.061 kN
Nb,Rd = 1794.471 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.149 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.649 kN
			Tt,Ed = 0.313 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.052 m	Lam_y = 0.310	Lz = 1.052 m	Lam_z = 0.310
Lcr,y = 1.052 m	Xy = 0.975	Lcr,z = 1.052 m	Xz = 0.975
Lamy = 23.706	kzy = 0.600	Lamz = 23.706	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))

(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 23.706 < Lambda,max = 210.000   Lambda,z = 23.706 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.018 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 370 Barra_370   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 0.200 m

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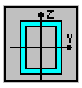
CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355)   fy = 335.000 MPa

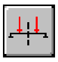
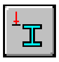


PARAMETROS DE LA SECCION: RECT_M_15x15

h=15.000 cm	gM0=1.000	gM1=1.000	
b=15.000 cm	Ay=225.000 cm2	Az=225.000 cm2	Ax=225.000 cm2
tw=7.500 cm	Iy=4218.750 cm4	Iz=4218.750 cm4	Ix=7117.019 cm4
tf=7.500 cm	Wply=843.750 cm3	Wplz=843.750 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

	My,Ed = 13.790 kN*m	Mz,Ed = 3.499 kN*m	Vy,Ed = -21.252 kN
	My,pl,Rd = 282.656 kN*m	Mz,pl,Rd = 282.656 kN*m	Vy,T,Rd = 1941.814 kN
	My,c,Rd = 282.656 kN*m	Mz,c,Rd = 282.656 kN*m	Vz,Ed = 93.721 kN
			Vz,T,Rd = 1941.814 kN
	Mb,Rd = 282.656 kN*m		Tt,Ed = 90.374 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

z = 1.000	Mcr = 69604.625 kN*m	Curva,LT - d	XLT = 1.000
Lcr,upp=0.200 m	Lam_LT = 0.064	fi,LT = 0.374	XLT,mod = 1.000

PARAMETROS DE PANDEO:

 respecto al eje y:  respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.007 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.011 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.048 < 1.000   (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.554 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.554 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
My,Ed/(XLT*My,Rk/gM1) + Mz,Ed/(Mz,Rk/gM1) = 0.061 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas
uy = 0.0 cm < uy max = L/200.000 = 0.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /6/ 1*1.000 + 2*1.000 + 6*0.500
uz = 0.0 cm < uz max = L/200.000 = 0.1 cm Verificado
Caso de carga más desfavorable: 4 Sismo Eje Y

Desplazamientos *No analizado*

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 371 Barra_371 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 335.000 MPa

PARAMETROS DE LA SECCION: RECT_M_15x15

h=15.000 cm	gM0=1.000	gM1=1.000	
b=15.000 cm	Ay=225.000 cm2	Az=225.000 cm2	Ax=225.000 cm2
tw=7.500 cm	Iy=4218.750 cm4	Iz=4218.750 cm4	Ix=7117.019 cm4
tf=7.500 cm	Wply=843.750 cm3	Wplz=843.750 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

My,Ed = 12.199 kN*m	Mz,Ed = -5.757 kN*m	Vy,Ed = 22.848 kN
My,pl,Rd = 282.656 kN*m	Mz,pl,Rd = 282.656 kN*m	Vy,T,Rd = 1815.137 kN
My,c,Rd = 282.656 kN*m	Mz,c,Rd = 282.656 kN*m	Vz,Ed = -93.827 kN
		Vz,T,Rd = 1815.137 kN
Mb,Rd = 282.656 kN*m		Tt,Ed = -95.124 kN*m
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

z = 1.000	Mcr = 69604.625 kN*m	Curva,LT - d	XLT = 1.000
Lcr,upp=0.200 m	Lam_LT = 0.064	fi,LT = 0.374	XLT,mod = 1.000

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.007 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.013 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.052 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.583 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.583 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
My,Ed/(XLT*My,Rk/gM1) + Mz,Ed/(Mz,Rk/gM1) = 0.064 < 1.000 (6.3.3.(4))

DESPLAZAMIENTOS LIMITES

Flechas
uy = 0.0 cm < uy max = L/200.000 = 0.1 cm Verificado
Caso de carga más desfavorable: 5 Sismo Eje X
uz = 0.0 cm < uz max = L/200.000 = 0.1 cm Verificado
Caso de carga más desfavorable: 10 SLS /1/ 1*1.000 + 2*0.600 + 3*1.000 + 6*0.500

Desplazamientos *No analizado*

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 372 Barra_372 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.259 m

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CARGAS:
Caso de carga más desfavorable: 2 Viento

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.058 kN	My,Ed = -12.579 kN*m	Mz,Ed = 0.950 kN*m	Vy,Ed = -1.323 kN
Nc,Rd = 2351.520 kN	My,Ed,max = -12.579 kN*m		Mz,Ed,max = 0.950 kN*m
	Vy,T,Rd = 491.139 kN		
Nb,Rd = 2228.284 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -19.948 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 864.405 kN
			Tt,Ed = -0.126 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.259 m	Lam_y = 0.237	Lz = 1.259 m	Lam_z = 0.419
Lcr,y = 1.259 m	Xy = 0.992	Lcr,z = 1.259 m	Xz = 0.948

Lamy = 18.081	kyy = 1.000	Lamz = 32.050	kyz = 0.581

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.018 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.023 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 18.081 < Lambda,max = 210.000 Lambda,z = 32.050 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.092 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.064 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 373 Barra_373 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_20x10

h=20.000 cm	gM0=1.000	gM1=1.000	
b=10.000 cm	Ay=24.000 cm2	Az=42.240 cm2	Ax=66.240 cm2
tw=1.200 cm	Iy=3213.875 cm4	Iz=1022.835 cm4	Ix=2380.034 cm4
tf=1.200 cm	Wply=411.456 cm3	Wplz=245.856 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.043 kN	My,Ed = 3.175 kN*m	Mz,Ed = -1.337 kN*m	Vy,Ed = -1.715 kN
Nc,Rd = 2351.520 kN	My,Ed,max = 3.175 kN*m	Mz,Ed,max = -1.337 kN*m	Vy,T,Rd = 490.837 kN
Nb,Rd = 2228.284 kN	My,c,Rd = 146.067 kN*m	Mz,c,Rd = 87.279 kN*m	Vz,Ed = -4.690 kN
	MN,y,Rd = 146.067 kN*m	MN,z,Rd = 87.279 kN*m	Vz,T,Rd = 863.873 kN
			Tt,Ed = -0.176 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.259 m	Lam_y = 0.237	Lz = 1.259 m	Lam_z = 0.419
Lcr,y = 1.259 m	Xy = 0.992	Lcr,z = 1.259 m	Xz = 0.948
Lamy = 18.081	kyy = 1.000	Lamz = 32.050	kyz = 0.581

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.005 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 18.081 < Lambda,max = 210.000   Lambda,z = 32.050 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.031 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.029 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 374 Barra_374   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.850 kN	My,Ed = -0.098 kN*m	Mz,Ed = 0.008 kN*m	Vy,Ed = -0.036 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.111 kN*m		Mz,Ed,max = -0.034 kN*m
	Vy,T,Rd = 590.139 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.225 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.111 kN
			Tt,Ed = 0.014 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000   Lambda,z = 26.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 375 Barra_375   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.693 kN	My,Ed = -0.264 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.264 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 0.901 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.004 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.002 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 376 Barra_376 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.175 kN	My,Ed = -0.123 kN*m	Mz,Ed = 0.009 kN*m	Vy,Ed = -0.036 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.140 kN*m		Mz,Ed,max = -0.033 kN*m
	Vy,T,Rd = 590.182 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.222 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.146 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000   Lambda,z = 26.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 377 Barra_377   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000   (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000   (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000   (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000   Lambda,z = 8.128 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000   (6.3.3.(4))

N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000   (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 378 Barra_378 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.216 kN	My,Ed = -0.121 kN*m	Mz,Ed = 0.010 kN*m	Vy,Ed = -0.039 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.135 kN*m		Mz,Ed,max = -0.035 kN*m
	Vy,T,Rd = 590.182 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.225 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.145 kN
			Tt,Ed = 0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000   Lambda,z = 26.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000   (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000

(6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 379 Barra_379 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 380 Barra_380 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.201 kN	My,Ed = -0.126 kN*m	Mz,Ed = 0.006 kN*m	Vy,Ed = -0.024 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.126 kN*m		Mz,Ed,max = -0.022 kN*m
	Vy,T,Rd = 590.215 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.237 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.172 kN
			Tt,Ed = 0.007 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 381 Barra_381 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 382 Barra_382 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.235 kN	My,Ed = -0.123 kN*m	Mz,Ed = 0.006 kN*m	Vy,Ed = -0.024 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.127 kN*m		Mz,Ed,max = -0.022 kN*m
	Vy,T,Rd = 590.222 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.233 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.178 kN
			Tt,Ed = 0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 383 Barra_383 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 384 Barra_384 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.206 kN	My,Ed = -0.127 kN*m	Mz,Ed = 0.003 kN*m	Vy,Ed = -0.013 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.127 kN*m		Mz,Ed,max = -0.012 kN*m
	Vy,T,Rd = 590.247 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.239 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.197 kN
			Tt,Ed = 0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 385 Barra_385 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 386 Barra_386 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.237 kN	My,Ed = -0.123 kN*m	Mz,Ed = 0.002 kN*m	Vy,Ed = -0.008 kN

Nc,Rd = 1840.320 kN   My,Ed,max = -0.125 kN*m   Mz,Ed,max = -0.008 kN*m
Vy,T,Rd = 590.259 kN
Nb,Rd = 1780.630 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = -0.235 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 472.207 kN
Tt,Ed = 0.002 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000   (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000   Lambda,z = 26.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 387 Barra_387   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:
N,Ed = 1.156 kN   My,Ed = -0.387 kN*m

Nc,Rd = 1840.320 kN   My,Ed,max = -0.387 kN*m
Nb,Rd = 1840.320 kN   My,c,Rd = 74.840 kN*m   Vz,Ed = 1.298 kN
MN,y,Rd = 74.840 kN*m   Vz,c,Rd = 472.226 kN
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m   Lam_y = 0.106   Lz = 0.361 m   Lam_z = 0.106
Lcr,y = 0.361 m   Xy = 1.000   Lcr,z = 0.361 m   Xz = 1.000
Lamy = 8.128   kyy = 1.000   Lamz = 8.128   kzy = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000   (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000   (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000   (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000   Lambda,z = 8.128 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000   (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000   (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 388 Barra_388   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm   gM0=1.000   gM1=1.000
b=12.000 cm   Ay=28.800 cm2   Az=23.040 cm2   Ax=51.840 cm2
tw=1.200 cm   Iy=1020.211 cm4   Iz=1020.211 cm4   Ix=1721.093 cm4
tf=1.200 cm   Wply=210.816 cm3   Wplz=210.816 cm3

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.206 kN   My,Ed = -0.127 kN*m   Mz,Ed = 0.000 kN*m   Vy,Ed = -0.002 kN
Nc,Rd = 1840.320 kN   My,Ed,max = -0.127 kN*m   Mz,Ed,max = -0.002 kN*m
Vy,T,Rd = 590.277 kN
Nb,Rd = 1780.630 kN   My,c,Rd = 74.840 kN*m   Mz,c,Rd = 74.840 kN*m   Vz,Ed = -0.240 kN
MN,y,Rd = 74.840 kN*m   MN,z,Rd = 74.840 kN*m   Vz,T,Rd = 472.222 kN
Tt,Ed = 0.001 kN*m
CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 389 Barra_389 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 390 Barra_390 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.235 kN	My,Ed = -0.123 kN*m	Mz,Ed = -0.002 kN*m	Vy,Ed = 0.008 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.126 kN*m		Mz,Ed,max = 0.007 kN*m
	Vy,T,Rd = 590.271 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.235 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.217 kN
			Tt,Ed = -0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968

Lamy = 26.102 kyy = 0.999 Lamz = 26.102 kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 391 Barra_391 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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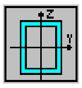
CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

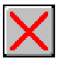


PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

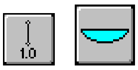
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

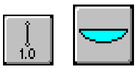


PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:



respecto al eje y:



respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 392 Barra_392 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.202 kN	My,Ed = -0.127 kN*m	Mz,Ed = -0.002 kN*m	Vy,Ed = 0.010 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.127 kN*m		Mz,Ed,max = 0.009 kN*m
	Vy,T,Rd = 590.256 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.239 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.205 kN
			Tt,Ed = -0.003 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 393 Barra_393 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 394 Barra_394 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.225 kN	My,Ed = -0.123 kN*m	Mz,Ed = -0.006 kN*m	Vy,Ed = 0.024 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.129 kN*m		Mz,Ed,max = 0.021 kN*m
	Vy,T,Rd = 590.231 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.231 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.184 kN
			Tt,Ed = -0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 395 Barra_395 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 396 Barra_396 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /12/ 1*1.350 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.188 kN	My,Ed = -0.124 kN*m	Mz,Ed = -0.005 kN*m	Vy,Ed = 0.021 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.134 kN*m		Mz,Ed,max = 0.020 kN*m
	Vy,T,Rd = 590.220 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.229 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.176 kN
			Tt,Ed = -0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.005 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 397 Barra_397 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 398 Barra_398 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.185 kN	My,Ed = -0.121 kN*m	Mz,Ed = -0.012 kN*m	Vy,Ed = 0.045 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.141 kN*m		Mz,Ed,max = 0.040 kN*m
	Vy,T,Rd = 590.181 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.220 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.144 kN
			Tt,Ed = -0.010 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 399 Barra_399 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.156 kN	My,Ed = -0.387 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.387 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 1.298 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.005 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.003 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.006 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 400 Barra_400 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 4.849 kN	My,Ed = -0.114 kN*m	Mz,Ed = -0.001 kN*m	Vy,Ed = 0.008 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.114 kN*m		Mz,Ed,max = 0.009 kN*m
	Vy,T,Rd = 590.219 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.273 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.175 kN
			Tt,Ed = -0.006 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.003 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 401 Barra_401 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

---

CARGAS:
Caso de carga más desfavorable: 7 ULS /11/ 1*1.350 + 2*1.500 + 6*0.750

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.693 kN	My,Ed = -0.264 kN*m	
Nc,Rd = 1840.320 kN	My,Ed,max = -0.264 kN*m	
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Vz,Ed = 0.901 kN
	MN,y,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
		CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: | respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kyy = 1.000	Lamz = 8.128	kzy = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
My,Ed/My,c,Rd = 0.004 < 1.000 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.002 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.004 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.002 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 402 Barra_402 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.021 kN	My,Ed = -0.021 kN*m	Mz,Ed = -2.450 kN*m	Vy,Ed = -1.604 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.021 kN*m		Mz,Ed,max = -2.450 kN*m
	Vy,T,Rd = 589.279 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.025 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.423 kN
			Tt,Ed = 0.098 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kzy = 0.600	Lamz = 26.102	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 403 Barra_403 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = 3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 404 Barra_404 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

---

CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.547 kN	My,Ed = 0.367 kN*m	Mz,Ed = 0.003 kN*m	Vy,Ed = -0.014 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.367 kN*m	Mz,Ed,max = -0.013 kN*m	Vy,T,Rd = 590.233 kN

Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.312 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.187 kN
			Tt,Ed = -0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 405 Barra_405 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.361 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: **RECT_H_12x12**

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		

Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 406 Barra_406 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.531 kN	My,Ed = 0.369 kN*m	Mz,Ed = 0.003 kN*m	Vy,Ed = -0.012 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.369 kN*m	Mz,Ed,max = -0.011 kN*m	Vy,T,Rd = 590.242 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.317 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.193 kN
			Tt,Ed = -0.004 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 407 Barra_407 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:

Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:

S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = 3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 408 Barra_408 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.560 kN	My,Ed = 0.368 kN*m	Mz,Ed = 0.002 kN*m	Vy,Ed = -0.009 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.368 kN*m	Mz,Ed,max = -0.009 kN*m	Vy,T,Rd = 590.249 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.317 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.199 kN
			Tt,Ed = -0.003 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.158 m Lam_y = 0.342
Lcr,y = 1.158 m Xy = 0.968
Lamy = 26.102 kyy = 0.999

respecto al eje z:

Lz = 1.158 m Lam_z = 0.342
Lcr,z = 1.158 m Xz = 0.968
Lamz = 26.102 kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 409 Barra_409 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.361 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 0.361 m Lam_y = 0.106
Lcr,y = 0.361 m Xy = 1.000
Lamy = 8.128 kzy = 0.600

respecto al eje z:

Lz = 0.361 m Lam_z = 0.106
Lcr,z = 0.361 m Xz = 1.000
Lamz = 8.128 kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 410 Barra_410 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.536 kN	My,Ed = 0.370 kN*m	Mz,Ed = 0.001 kN*m	Vy,Ed = -0.007 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.370 kN*m	Mz,Ed,max = -0.006 kN*m	Vy,T,Rd = 590.261 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.321 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.209 kN
			Tt,Ed = -0.002 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:

Ly = 1.158 m Lam_y = 0.342

respecto al eje z:

Lz = 1.158 m Lam_z = 0.342

Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 411 Barra_411 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = -1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = -1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000

Lamy = 8.128 kzy = 0.600 Lamz = 8.128 kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 412 Barra_412 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.564 kN	My,Ed = 0.368 kN*m	Mz,Ed = 0.001 kN*m	Vy,Ed = -0.004 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.368 kN*m	Mz,Ed,max = -0.003 kN*m	Vy,T,Rd = 590.270 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.318 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.216 kN
			Tt,Ed = -0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 413 Barra_413 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.361 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 414 Barra_414 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.538 kN	My,Ed = 0.371 kN*m	Mz,Ed = 0.000 kN*m	Vy,Ed = -0.001 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.371 kN*m	Mz,Ed,max = -0.001 kN*m	Vy,T,Rd = 590.280 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.322 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.224 kN
			Tt,Ed = -0.000 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)

Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 415 Barra_415 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = -1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = -1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000   Lambda,z = 8.128 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 416 Barra_416   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.564 kN	My,Ed = 0.368 kN*m	Mz,Ed = -0.000 kN*m	Vy,Ed = 0.002 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.368 kN*m	Mz,Ed,max = 0.002 kN*m	Vy,T,Rd = 590.275 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.318 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.220 kN
			Tt,Ed = 0.001 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000   Lambda,z = 26.102 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 417 Barra_417   **PUNTOS:** 3   **COORDENADA:** x = 1.00 L = 0.361 m

---

CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000   Lambda,z = 8.128 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))

N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 418 Barra_418 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.538 kN	My,Ed = 0.370 kN*m	Mz,Ed = -0.001 kN*m	Vy,Ed = 0.004 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.370 kN*m	Mz,Ed,max = 0.004 kN*m	Vy,T,Rd = 590.267 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.322 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.213 kN
			Tt,Ed = 0.002 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000

(6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 419 Barra_419 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = -1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = -1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 420 Barra_420 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.001 kN	My,Ed = 0.000 kN*m	Mz,Ed = -2.456 kN*m	Vy,Ed = -1.611 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.000 kN*m	Mz,Ed,max = -2.456 kN*m	Vy,T,Rd = 589.290 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.000 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.432 kN
			Tt,Ed = 0.097 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kzy = 0.600	Lamz = 26.102	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 421 Barra_421 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.361 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = -1.136 kN*m	Vy,Ed = 3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = -1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 422 Barra_422 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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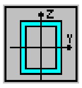
CARGAS:
Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

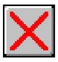


PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

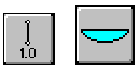
FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.535 kN	My,Ed = 0.370 kN*m	Mz,Ed = -0.002 kN*m	Vy,Ed = 0.010 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.370 kN*m	Mz,Ed,max = 0.009 kN*m	Vy,T,Rd = 590.248 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.320 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.198 kN
			Tt,Ed = 0.003 kN*m
			CLASE DE LA SECCION = 1

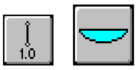


PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:



respecto al eje y:



respecto al eje z:

Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*

TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 423 Barra_423 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = 3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 424 Barra_424 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.002 kN	My,Ed = -0.000 kN*m	Mz,Ed = -2.456 kN*m	Vy,Ed = -1.611 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.000 kN*m		Mz,Ed,max = -2.456 kN*m
	Vy,T,Rd = 589.289 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.000 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.432 kN
			Tt,Ed = 0.097 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kzy = 0.600	Lamz = 26.102	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:

BARRA: 425 Barra_425 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.361 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = -1.136 kN*m	Vy,Ed = 3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = -1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 426 Barra_426 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.158 m

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CARGAS:

Caso de carga más desfavorable: 5 Sismo Eje X

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 8.533 kN	My,Ed = 0.368 kN*m	Mz,Ed = -0.003 kN*m	Vy,Ed = 0.014 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 0.368 kN*m	Mz,Ed,max = 0.013 kN*m	Vy,T,Rd = 590.231 kN
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.315 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 472.185 kN
			Tt,Ed = 0.005 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kyy = 0.999	Lamz = 26.102	kyz = 0.599

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.005 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.000 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.000 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.000 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.010 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.008 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 427 Barra_427 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /4/ 1*1.000 + 4*-1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = 3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))
Control de estabilidad global de la barra:
Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 428 Barra_428 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.005 kN	My,Ed = -0.003 kN*m	Mz,Ed = -2.457 kN*m	Vy,Ed = -1.612 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.003 kN*m		Mz,Ed,max = -2.457 kN*m
	Vy,T,Rd = 589.293 kN		
Nb,Rd = 1780.630 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.003 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.434 kN
			Tt,Ed = 0.096 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.158 m	Lam_y = 0.342	Lz = 1.158 m	Lam_z = 0.342
Lcr,y = 1.158 m	Xy = 0.968	Lcr,z = 1.158 m	Xz = 0.968
Lamy = 26.102	kzy = 0.600	Lamz = 26.102	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.003 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.000 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.002 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 26.102 < Lambda,max = 210.000 Lambda,z = 26.102 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.020 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.033 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 429 Barra_429 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.361 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /2/ 1*1.000 + 4*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.113 kN	My,Ed = -0.024 kN*m	Mz,Ed = 1.136 kN*m	Vy,Ed = -3.150 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.024 kN*m		Mz,Ed,max = 1.136 kN*m
	Vy,c,Rd = 590.283 kN		
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -0.132 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,c,Rd = 472.226 kN
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 0.361 m	Lam_y = 0.106	Lz = 0.361 m	Lam_z = 0.106
Lcr,y = 0.361 m	Xy = 1.000	Lcr,z = 0.361 m	Xz = 1.000
Lamy = 8.128	kzy = 0.600	Lamz = 8.128	kzz = 1.000

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.001 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.005 < 1.000 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.000 < 1.000 (6.2.6.(1))

Control de estabilidad global de la barra:

Lambda,y = 8.128 < Lambda,max = 210.000 Lambda,z = 8.128 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.009 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.015 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 430 Barra_430 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 0.438 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 0.006 kN	My,Ed = -1.917 kN*m	Mz,Ed = -1.764 kN*m	Vy,Ed = 7.259 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 2.190 kN*m	Mz,Ed,max = -1.764 kN*m	Vy,T,Rd = 579.832 kN
Nb,Rd = 1840.320 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -9.585 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 463.865 kN
			Tt,Ed = 1.016 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 0.438 m	Lam_y = 0.129	Lz = 0.438 m	Lam_z = 0.129
Lcr,y = 0.438 m	Xy = 1.000	Lcr,z = 0.438 m	Xz = 1.000
Lamy = 9.873	kyy = 1.000	Lamz = 9.873	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.000 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.004 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.013 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.021 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.018 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.018 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 9.873 < Lambda,max = 210.000   Lambda,z = 9.873 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.041 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 431 Barra_431 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000

b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 13.701 kN	My,Ed = -8.404 kN*m	Mz,Ed = -1.258 kN*m	Vy,Ed = -1.116 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -8.404 kN*m		Mz,Ed,max = -1.258 kN*m
	Vy,T,Rd = 583.779 kN		
Nb,Rd = 1717.014 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 7.859 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.024 kN
			Tt,Ed = 0.632 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.597 m	Lam_y = 0.471	Lz = 1.597 m	Lam_z = 0.471
Lcr,y = 1.597 m	Xy = 0.933	Lcr,z = 1.597 m	Xz = 0.933
Lamy = 36.000	kyy = 1.000	Lamz = 36.000	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.007 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.028 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.002 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.017 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 36.000 < Lambda,max = 210.000 Lambda,z = 36.000 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.130 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.092 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 432 Barra_432 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000

b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -26.172 kN	My,Ed = -8.357 kN*m	Mz,Ed = 2.829 kN*m	Vy,Ed = 2.592 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 584.997 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 7.862 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 467.997 kN
			Tt,Ed = 0.514 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.014 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.031 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.004 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.017 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.009 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 433 Barra_433 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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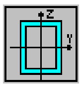
CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -26.210 kN	My,Ed = -8.827 kN*m	Mz,Ed = -0.758 kN*m	Vy,Ed = -0.663 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 583.507 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 8.216 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 466.805 kN
			Tt,Ed = -0.659 kN*m

CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.014 < 1.000   (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.029 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.018 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.011 < 1.000   (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 434 Barra_434 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 13.245 kN	My,Ed = -8.923 kN*m	Mz,Ed = 3.290 kN*m	Vy,Ed = 3.010 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -8.923 kN*m		Mz,Ed,max = 3.290 kN*m
	Vy,T,Rd = 585.625 kN		
Nb,Rd = 1717.014 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 8.388 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.500 kN
			Tt,Ed = -0.453 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.597 m Lam_y = 0.471 Lz = 1.597 m Lam_z = 0.471

Lcr,y = 1.597 m	Xy = 0.933	Lcr,z = 1.597 m	Xz = 0.933
Lamy = 36.000	kyy = 1.000	Lamz = 36.000	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.007 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.035 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.005 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.018 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 36.000 < Lambda,max = 210.000 Lambda,z = 36.000 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.153 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.123 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 435 Barra_435 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 18.246 kN	My,Ed = -9.271 kN*m	Mz,Ed = -0.367 kN*m	Vy,Ed = -0.395 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -9.271 kN*m		Mz,Ed,max = -0.367 kN*m
	Vy,T,Rd = 587.201 kN		
Nb,Rd = 1723.342 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 8.826 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 469.761 kN
			Tt,Ed = 0.300 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.557 m	Lam_y = 0.459	Lz = 1.557 m	Lam_z = 0.459

Lcr,y = 1.557 m	Xy = 0.936	Lcr,z = 1.557 m	Xz = 0.936
Lamy = 35.099	kyy = 0.999	Lamz = 35.099	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.010 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.031 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.019 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.005 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 35.099 < Lambda,max = 210.000 Lambda,z = 35.099 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.137 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.090 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 436 Barra_436 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 4 Sismo Eje Y

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 6.771 kN	My,Ed = -0.267 kN*m	Mz,Ed = 3.932 kN*m	Vy,Ed = 3.824 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -0.267 kN*m		Mz,Ed,max = 3.932 kN*m
	Vy,T,Rd = 578.069 kN		
Nb,Rd = 1723.342 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 0.291 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 462.455 kN
			Tt,Ed = 1.187 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.557 m	Lam_y = 0.459	Lz = 1.557 m	Lam_z = 0.459

Lcr,y = 1.557 m	Xy = 0.936	Lcr,z = 1.557 m	Xz = 0.936
Lamy = 35.099	kzy = 0.600	Lamz = 35.099	kzz = 1.000

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.008 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.007 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.001 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.021 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.021 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 35.099 < Lambda,max = 210.000 Lambda,z = 35.099 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.039 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.059 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 437 Barra_437 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 21.060 kN	My,Ed = -9.843 kN*m	Mz,Ed = 2.144 kN*m	Vy,Ed = 1.883 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -9.843 kN*m		Mz,Ed,max = 2.144 kN*m
	Vy,T,Rd = 588.753 kN		
Nb,Rd = 1723.342 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 9.428 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 471.002 kN
			Tt,Ed = -0.149 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.557 m	Lam_y = 0.459	Lz = 1.557 m	Lam_z = 0.459

Lcr,y = 1.557 m	Xy = 0.936	Lcr,z = 1.557 m	Xz = 0.936
Lamy = 35.099	kyy = 0.999	Lamz = 35.099	kyz = 0.600

FORMULAS DE VERIFICACION:

Control de la resistencia de la sección:

N,Ed/Nc,Rd = 0.011 < 1.000   (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.037 < 1.000   (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000   (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.020 < 1.000   (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000   (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 35.099 < Lambda,max = 210.000   Lambda,z = 35.099 < Lambda,max = 210.000   ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.161 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.120 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 438 Barra_438   **PUNTOS:** 1   **COORDENADA:** x = 0.00 L = 0.000 m

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CARGAS:
Caso de carga más desfavorable: 13 ACC /5/ 1*1.000 + 5*-1.000

MATERIAL:
S 355 (S 355)   fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 1.738 kN	My,Ed = -1.533 kN*m	Mz,Ed = -0.414 kN*m	Vy,Ed = -0.785 kN
Nc,Rd = 1840.320 kN	My,Ed,max = 3.508 kN*m	Mz,Ed,max = 0.808 kN*m	Vy,T,Rd = 588.362 kN
Nb,Rd = 1723.342 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 3.511 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 470.689 kN
			Tt,Ed = -0.187 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

Ly = 1.557 m	Lam_y = 0.459	Lz = 1.557 m	Lam_z = 0.459
Lcr,y = 1.557 m	Xy = 0.936	Lcr,z = 1.557 m	Xz = 0.936

Lamy = 35.099 kyy = 1.000 Lamz = 35.099 kyz = 0.600

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.001 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.002 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.001 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.007 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.003 < 1.000 (6.2.6)
Control de estabilidad global de la barra:
Lambda,y = 35.099 < Lambda,max = 210.000 Lambda,z = 35.099 < Lambda,max = 210.000 ESTABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.054 < 1.000 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.040 < 1.000 (6.3.3.(4))

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 439 Barra_439 **PUNTOS:** 1 **COORDENADA:** x = 0.00 L = 0.000 m

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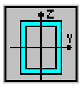
CARGAS:
Caso de carga más desfavorable: 13 ACC /3/ 1*1.000 + 5*1.000

MATERIAL:
S 355 (S 355) fy = 355.000 MPa



PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = -13.504 kN	My,Ed = -4.198 kN*m	Mz,Ed = -0.967 kN*m	Vy,Ed = -1.685 kN
Nt,Rd = 1840.320 kN	My,pl,Rd = 74.840 kN*m	Mz,pl,Rd = 74.840 kN*m	Vy,T,Rd = 580.132 kN
	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = 6.847 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 464.105 kN
			Tt,Ed = -0.987 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y: respecto al eje z:

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:

N,Ed/Nt,Rd = 0.007 < 1.000 (6.2.3.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.009 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.003 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.015 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.017 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.017 < 1.000 (6.2.6)

Perfil correcto

CALCULOS DE LAS ESTRUCTURAS DE ACERO

NORMA: *UNE-EN 1993-1:2008/AC:2009, Eurocode 3: Design of steel structures.*
TIPO DEL ANALISIS: Verificación de las barras

GRUPO:
BARRA: 440 Barra_440 **PUNTOS:** 3 **COORDENADA:** x = 1.00 L = 1.150 m

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CARGAS:
Caso de carga más desfavorable: 7 ULS /14/ 1*0.800 + 2*1.500

MATERIAL:
S 355 (S 355) fy = 355.000 MPa

PARAMETROS DE LA SECCION: RECT_H_12x12

h=12.000 cm	gM0=1.000	gM1=1.000	
b=12.000 cm	Ay=28.800 cm2	Az=23.040 cm2	Ax=51.840 cm2
tw=1.200 cm	Iy=1020.211 cm4	Iz=1020.211 cm4	Ix=1721.093 cm4
tf=1.200 cm	Wply=210.816 cm3	Wplz=210.816 cm3	

FUERZAS INTERNAS Y RESISTENCIAS ULTIMAS:

N,Ed = 7.173 kN	My,Ed = -1.709 kN*m	Mz,Ed = -1.949 kN*m	Vy,Ed = 3.406 kN
Nc,Rd = 1840.320 kN	My,Ed,max = -1.709 kN*m		Mz,Ed,max = 1.968 kN*m
	Vy,T,Rd = 585.621 kN		
Nb,Rd = 1781.679 kN	My,c,Rd = 74.840 kN*m	Mz,c,Rd = 74.840 kN*m	Vz,Ed = -2.695 kN
	MN,y,Rd = 74.840 kN*m	MN,z,Rd = 74.840 kN*m	Vz,T,Rd = 468.497 kN
			Tt,Ed = 0.453 kN*m
			CLASE DE LA SECCION = 1

PARAMETROS DE ALABEO:

PARAMETROS DE PANDEO:

respecto al eje y:		respecto al eje z:	
Ly = 1.150 m	Lam_y = 0.339	Lz = 1.150 m	Lam_z = 0.339
Lcr,y = 1.150 m	Xy = 0.968	Lcr,z = 1.150 m	Xz = 0.968
Lamy = 25.923	kzy = 0.599	Lamz = 25.923	kzz = 0.999

FORMULAS DE VERIFICACION:
Control de la resistencia de la sección:
N,Ed/Nc,Rd = 0.004 < 1.000 (6.2.4.(1))
(My,Ed/MN,y,Rd)^ 1.660 + (Mz,Ed/MN,z,Rd)^1.660 = 0.004 < 1.000 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.006 < 1.000 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.006 < 1.000 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.008 < 1.000 (6.2.6)

Control de estabilidad global de la barra:

Lambda,y = 25.923 < Lambda,max = 210.000 Lambda,z = 25.923 < Lambda,max = 210.000 ESTABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.043 < 1.000 (6.3.3.(4))

N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.044 < 1.000 (6.3.3.(4))

Perfil correcto

ANEJO Nº 8

CÁLCULOS HIDRÁULICOS

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad describir el proceso de cálculo seguido para determinar la capacidad de las balsas de regulación, incluyendo los datos de partida, balance de consumo y el cálculo de las dimensiones de las balsas. En este proyecto no se incluye el cálculo de la impulsión desde el embalse de Llerena, ni el desagüe de las balsas, al igual que no se ha estudiado las conducciones internas de la planta.

2. CONSUMOS DE AGUA

Inicialmente se han establecido unos datos de partida con el objetivo de establecer un balance del gasto de agua de la planta termosolar. Para ello, se han consultado otros proyectos y, sin realizar un estudio de detalle, se han adoptado los siguientes valores:

- El área total de los captadores de la planta se obtiene al multiplicar el área de cada módulo de 100 m de colectores (545 m^2, tal y como viene recogido en el Anejo nº 7 – Cálculos estructurales) por el número estimado de módulos que necesita la central, que tal y como se puede comprobar en el Documento nº 2 – Planos, suman un total de 656, por lo que la central contará con **357.520 m^2**.
- Se ha estimado que, de media y como máximo, se darán las horas mensuales de funcionamiento recogidas en la siguiente tabla (**3.409 horas anuales**):

Mes	Nº horas funcionamiento/día	Mes	Nº horas funcionamiento/día
ENERO	7	JULIO	12
FEBRERO	8	AGOSTO	11
MARZO	9	SEPTIEMBRE	10
ABRIL	10	OCTUBRE	9
MAYO	11	NOVIEMBRE	7
JUNIO	12	DICIEMBRE	6

- De forma aproximada se ha supuesto un consumo de agua para los sistemas de refrigeración de 120 m^3 por cada hora de funcionamiento.

- Como gasto de agua en el ciclo de potencia y para distintos servicios, se ha estipulado un gasto medio de 12 m^3 por hora de funcionamiento.
- Para la limpieza de los espejos concentradores, se ha estimado un gasto de 0,1 litros por cada m^2 de captadores y por día.

Con estos datos, obtenemos las siguientes estimaciones de consumos anuales para la central termosolar:

- Consumo anual de agua para refrigeración, 409.080 m^3/año
- Consumo anual de agua en el ciclo de potencia y servicios varios, 40.908 m^3/año
- Consumo anual de agua para la limpieza de espejos, 13.049 m^3/año

A la suma de estos gastos anuales se le ha añadido un 15% derivado de posibles fugas, imprevistos, etc. por lo que se ha estimado un **consumo total de 532.492,55 m^3** cada año.

Los valores de evapotranspiración son los definidos en el Anejo nº 4 – Hidrología y climatología.

3. BALANCE DEL CONSUMO

El balance del consumo se ha realizado mediante un proceso iterativo hasta conseguir que el volumen final a partir del segundo año sea lo más parecido al volumen inicial de ese mismo año, no superando la capacidad de las balsas supuestas.

Para evitar unas necesidades hídricas muy altas, se ha realizado el balance suponiendo que se consigue depurar al menos el 55% del consumo de agua, ya que esta no sufre una contaminación excesiva durante el funcionamiento de la planta, por lo que su depuración sería sencilla.

A continuación se adjuntan los balances de los 3 primeros años de funcionamiento.

AÑO 1		Volumen inicial (m^3)	Aportacion (m^3)	Evapotrans (mm)	Evapotrans (m^3)	Limp espej (m^3)	Consumo (m^3)	Depuración (m^3)	Volumen final (m^3)
Enero	1q	34.800,000	34.800	20,5	1.711,795	305	16.470,3	9.058,665	60.171,570
	2q	60.171,570	34.800	20,5	1.711,795	305	16.470,3	9.058,665	85.543,140
Febrero	1q	85.543,140	34.800	24,0	2.004,052	395	17.001,6	9.350,880	110.293,368
	2q	110.293,368	34.800	24,0	2.004,052	395	17.001,6	9.350,880	135.043,595
Marzo	1q	135.043,595	34.800	38,0	3.173,083	435	21.176,1	11.646,855	156.706,267
	2q	156.706,267	34.800	38,0	3.173,083	435	21.176,1	11.646,855	178.368,939
Abril	1q	178.368,939	34.800	47,5	3.966,354	460	22.770,0	12.523,500	198.496,085
	2q	198.496,085	34.800	47,5	3.966,354	460	22.770,0	12.523,500	218.623,232
Mayo	1q	218.623,232	0	66,0	5.511,144	595	25.881,9	14.235,045	200.870,232
	2q	200.870,232	0	66,0	5.511,144	595	25.881,9	14.235,045	183.117,233
Junio	1q	183.117,233	0	84,0	7.014,184	865	27.324,0	15.028,200	162.942,249
	2q	162.942,249	0	84,0	7.014,184	865	27.324,0	15.028,200	142.767,266
Julio	1q	142.767,266	0	92,5	7.723,952	960	28.234,8	15.529,140	121.377,654
	2q	121.377,654	0	92,5	7.723,952	960	28.234,8	15.529,140	99.988,041
Agosto	1q	99.988,041	0	87,5	7.306,441	895	25.881,9	14.235,045	80.139,745
	2q	80.139,745	0	87,5	7.306,441	895	25.881,9	14.235,045	60.291,449
Septiembre	1q	60.291,449	0	63,0	5.260,638	505	22.770,0	12.523,500	44.279,311
	2q	44.279,311	0	63,0	5.260,638	505	22.770,0	12.523,500	28.267,173
Octubre	1q	28.267,173	0	43,5	3.632,345	395	21.176,1	11.646,855	14.710,583
	2q	14.710,583	34.800	43,5	3.632,345	395	21.176,1	11.646,855	35.953,993
Noviembre	1q	35.953,993	34.800	27,0	2.254,559	280	15.939,0	8.766,450	61.046,884
	2q	61.046,884	34.800	27,0	2.254,559	280	15.939,0	8.766,450	86.139,775
Diciembre	1q	86.139,775	34.800	21,0	1.753,546	275	14.117,4	7.764,570	112.558,399
	2q	112.558,399	34.800	21,0	1.753,546	275	14.117,4	7.764,570	138.977,023

AÑO 2		Volumen inicial (m^3)	Aportacion (m^3)	Evapotrans (mm)	Evapotrans (m^3)	Limp espej (m^3)	Consumo (m^3)	Depuración (m^3)	Volumen final (m^3)
Enero	1q	138.977,023	34.800	20,5	1.711,795	305	16.470,3	9.058,665	164.348,594
	2q	164.348,594	34.800	20,5	1.711,795	305	16.470,3	9.058,665	189.720,164
Febrero	1q	189.720,164	34.800	24,0	2.004,052	395	17.001,6	9.350,880	214.470,391
	2q	214.470,391	34.800	24,0	2.004,052	395	17.001,6	9.350,880	239.220,619
Marzo	1q	239.220,619	34.800	38,0	3.173,083	435	21.176,1	11.646,855	260.883,291
	2q	260.883,291	34.800	38,0	3.173,083	435	21.176,1	11.646,855	282.545,963
Abril	1q	282.545,963	0	47,5	3.966,354	460	22.770,0	12.523,500	267.873,109
	2q	267.873,109	0	47,5	3.966,354	460	22.770,0	12.523,500	253.200,255
Mayo	1q	253.200,255	0	66,0	5.511,144	595	25.881,9	14.235,045	235.447,256
	2q	235.447,256	0	66,0	5.511,144	595	25.881,9	14.235,045	217.694,256
Junio	1q	217.694,256	0	84,0	7.014,184	865	27.324,0	15.028,200	197.519,273
	2q	197.519,273	0	84,0	7.014,184	865	27.324,0	15.028,200	177.344,289
Julio	1q	177.344,289	0	92,5	7.723,952	960	28.234,8	15.529,140	155.954,677
	2q	155.954,677	0	92,5	7.723,952	960	28.234,8	15.529,140	134.565,065
Agosto	1q	134.565,065	0	87,5	7.306,441	895	25.881,9	14.235,045	114.716,769
	2q	114.716,769	0	87,5	7.306,441	895	25.881,9	14.235,045	94.868,472
Septiembre	1q	94.868,472	0	63,0	5.260,638	505	22.770,0	12.523,500	78.856,335
	2q	78.856,335	0	63,0	5.260,638	505	22.770,0	12.523,500	62.844,197
Octubre	1q	62.844,197	0	43,5	3.632,345	395	21.176,1	11.646,855	49.287,607
	2q	49.287,607	0	43,5	3.632,345	395	21.176,1	11.646,855	35.731,017
Noviembre	1q	35.731,017	34.800	27,0	2.254,559	280	15.939,0	8.766,450	60.823,908
	2q	60.823,908	34.800	27,0	2.254,559	280	15.939,0	8.766,450	85.916,799
Diciembre	1q	85.916,799	34.800	21,0	1.753,546	275	14.117,4	7.764,570	112.335,423
	2q	112.335,423	34.800	21,0	1.753,546	275	14.117,4	7.764,570	138.754,047

AÑO 3		Volumen inicial (m^3)	Aportacion (m^3)	Evapotrans (mm)	Evapotrans (m^3)	Limp espej (m^3)	Consumo (m^3)	Depuración (m^3)	Volumen final (m^3)
Enero	1q	138.754,047	34.800	20,5	1.711,795	305	16.470,3	9.058,665	164.125,617
	2q	164.125,617	34.800	20,5	1.711,795	305	16.470,3	9.058,665	189.497,187
Febrero	1q	189.497,187	34.800	24,0	2.004,052	395	17.001,6	9.350,880	214.247,415
	2q	214.247,415	34.800	24,0	2.004,052	395	17.001,6	9.350,880	238.997,642
Marzo	1q	238.997,642	34.800	38,0	3.173,083	435	21.176,1	11.646,855	260.660,314
	2q	260.660,314	34.800	38,0	3.173,083	435	21.176,1	11.646,855	282.322,986
Abril	1q	282.322,986	0	47,5	3.966,354	460	22.770,0	12.523,500	267.650,132
	2q	267.650,132	0	47,5	3.966,354	460	22.770,0	12.523,500	252.977,278
Mayo	1q	252.977,278	0	66,0	5.511,144	595	25.881,9	14.235,045	235.224,279
	2q	235.224,279	0	66,0	5.511,144	595	25.881,9	14.235,045	217.471,280
Junio	1q	217.471,280	0	84,0	7.014,184	865	27.324,0	15.028,200	197.296,296
	2q	197.296,296	0	84,0	7.014,184	865	27.324,0	15.028,200	177.121,313
Julio	1q	177.121,313	0	92,5	7.723,952	960	28.234,8	15.529,140	155.731,700
	2q	155.731,700	0	92,5	7.723,952	960	28.234,8	15.529,140	134.342,088
Agosto	1q	134.342,088	0	87,5	7.306,441	895	25.881,9	14.235,045	114.493,792
	2q	114.493,792	0	87,5	7.306,441	895	25.881,9	14.235,045	94.645,496
Septiembre	1q	94.645,496	0	63,0	5.260,638	505	22.770,0	12.523,500	78.633,358
	2q	78.633,358	0	63,0	5.260,638	505	22.770,0	12.523,500	62.621,220
Octubre	1q	62.621,220	0	43,5	3.632,345	395	21.176,1	11.646,855	49.064,630
	2q	49.064,630	0	43,5	3.632,345	395	21.176,1	11.646,855	35.508,040
Noviembre	1q	35.508,040	34.800	27,0	2.254,559	280	15.939,0	8.766,450	60.600,931
	2q	60.600,931	34.800	27,0	2.254,559	280	15.939,0	8.766,450	85.693,822
Diciembre	1q	85.693,822	34.800	21,0	1.753,546	275	14.117,4	7.764,570	112.112,446
	2q	112.112,446	34.800	21,0	1.753,546	275	14.117,4	7.764,570	138.531,070

Como se puede comprobar, la máxima capacidad requerida según estos balances es de algo más de 282.000 m^3 en marzo-abril a partir del segundo, por lo que las balsas definidas en el apartado siguiente deberán tener, como mínimo ese volumen de almacenamiento.

Como se puede comprobar, para el primer año se ha supuesto que la impulsión se inicia una quincena antes de la puesta en funcionamiento de la planta, al igual que se ha establecido que la impulsión será durante los meses de enero a abril y de octubre a diciembre, mientras que para los años siguientes la aportación de agua solo se realizará entre enero y marzo, y entre noviembre y diciembre. El tiempo de impulsión podrá ampliarse para contrarrestar el balance negativo anual obtenido en el estudio, de unos 220 m^3/año. El diseño y el cálculo de dicha impulsión no están incluidos en este proyecto.

4. CÁLCULO DE LAS BALSAS

Según se ha calculado en el apartado anterior, la planta termosolar necesitará una capacidad de almacenamiento de al menos 282.000 m^3. Para tener en cuenta que las suposiciones de gasto no son exactas y con el objetivo de tener un resguardo de capacidad, se han diseñado las balsas para obtener un volumen de 300.000 m^3. Con el objetivo de evitar excavaciones muy profundas y para facilitar las tareas de mantenimiento y conservación, se ha optado por construir 3 balsas de 100.000 m^3 cada una.

4.1. CÁLCULO DE LAS DIMENSIONES PRINCIPALES

Como criterios iniciales se ha supuesto que las balsas serán excavadas, para reutilizar el volumen de tierras en la explanación de la planta, mientras que el resguardo se hará en terraplén. Para los taludes se han utilizado los definidos en el Anejo nº 3 – Geología y Geotecnia, que para taludes de más de 2 metros establece una pendiente 2:1 (H:V). Como comprobación, se adjunta un estudio de estabilidad de los taludes al final de este anejo. Se ha adoptado como profundidad máxima de las balsas 4 metros, con el objetivo de no realizar excavaciones muy profundas y de que a la vez no ocupen extensiones muy altas. Con todos estos datos se obtienen balsas de 151 metros de lado en el fondo, tal y como se puede comprobar en los planos correspondientes incluidos en el Documento nº 2 de este proyecto.

4.2. CLASIFICACIÓN DE LAS BALSAS

Previo a la determinación de la altura de resguardo y del ancho de coronación, se han clasificado las balsas, ya que estos parámetros varían según la clasificación de la balsa de acuerdo con el *Reglamento Técnico sobre Seguridad de Presas y Embalses*. De acuerdo con el RD 9/2008, por el que se modifica el *Reglamento del Dominio Público Hidráulico*, en su artículo 367 establece la obligatoriedad de clasificar las presas y las balsas con una altura superior a los 5 metros o con una capacidad de embalse superior a los 100.000 m^3. Por lo tanto, las balsas objeto de este anejo **no requieren clasificación**. Para la definición de los siguientes apartados se han adoptado los criterios correspondientes a la clasificación tipo C, la menos restrictiva.

4.3. CÁLCULO DE LA ALTURA DE RESGUARDO

Para el cálculo de resguardo se ha utilizado las directrices establecidas en los citados *Reglamento Técnico sobre Seguridad de Presas y Embalses*, el RD 9/2008, además de la las *Guías Técnicas de Seguridad de Presas* y la *Instrucción para proyecto, construcción y explotación de grandes presas*.

Inicialmente hay que establecer los siguientes niveles de embalse:

- Nivel Máximo Normal (NMN): Es el máximo nivel que puede alcanzar el agua del embalse en un régimen normal de explotación
- Nivel para la Avenida de Proyecto (NAP): Es el máximo nivel que se alcanza en el embalse, considerando su acción laminadora, cuando recibe la avenida de proyecto

- Nivel para la Avenida Extrema (NAE): Es el máximo nivel que se alcanza en el embalse si se produce la avenida extrema, habida cuenta la acción laminadora del mismo

En nuestro caso el NMN se sitúa a la cota del terreno, ya que el volumen de embalse se encuentra excavado. Para el cálculo del NAP y del NAE, se necesita establecer previamente los períodos de retorno de aplicación, que de acuerdo con la Guía Técnica de Seguridad de Presas nº 4, para una presa de categoría C el período de retorno para la avenida de proyecto es de 100 años y el de la avenida extrema es de 500 años. Los valores de precipitación correspondientes a estos períodos están detallados en el Anejo nº 4 – Hidrología y climatología.

El NAP se calcula como el NMM más el aumento de cota por la precipitación con el período de retorno de 100 años:

$$NAP = NMN + P_{d100} = Cota\ terreno + 0{,}11\ m$$

EL NAE se obtiene al sumar la cota del NMN y la precipitación con el período de retorno de 500 años:

$$NAE = NMN + P_{d500} = Cota\ terreno + 0{,}14\ m$$

A continuación se ha calculado la altura de ola por viento, según dos fórmulas, para emplear el valor más alto. La primera ecuación es de la fórmula de Stevenson, incluida la *Guía Técnica de Seguridad de Presas nº 2*:

$$A = 0{,}76 + 0{,}34 \cdot F^{0{,}5} - 0{,}26 \cdot F^{0{,}25}$$

En esta fórmula A es la altura de ola, en metros; y F es el fetch, en kilómetros, que para el caso de nuestra balsa toma el valor de 0,166 km, dando lugar a una altura de ola de **0,73 m**.

La segunda es la fórmula de Iribarren, utilizada en las obras marítimas:

$$H_s = 1{,}2 \cdot F^{0{,}25}$$

En esta ecuación H_S es la altura de ola en metros y F es el fetch en kilómetros, que al igual que en la fórmula anterior, toma un valor de 0,166 km, por lo que se obtiene una altura de ola de **0,77 m**. Al ser un valor más alto, este será el dato utilizado posteriormente para determinar la altura de resguardo.

Igualmente, se precisa calcular la altura de ola sísmica, debido a que las balsas se sitúan en zona sísmica. Se ha calculado según la fórmula del artículo 55 de la *Instrucción para proyecto, construcción y explotación de grandes presas*:

$$H_s = \frac{K \cdot T_B \cdot \sqrt{g \cdot H}}{2 \cdot \pi}$$

En esta ecuación K es la aceleración sísmica horizontal, que se corresponde con el valor calculado en el Anejo nº 5 – Sismicidad, K = 0,04966·g, y g toma un valor de 10 m/s^2; T es el período natural del terremoto, calculado también en el Anejo nº 5, T = 0,62 s; y H la altura máxima de embalse, que en este caso son 4 metros. Con todos estos valores, se obtiene una altura de ola de **0,31 m**.

De acuerdo con el *Reglamento Técnico sobre Seguridad de Presas y Embalses*, se determinan dos tipos de resguardos:

- Resguardo normal: Es el relativo al Nivel Máximo Normal (NMN). Este resguardo, además de ser suficiente para el desagüe de las avenidas, será igual o superior a las sobreelevaciones producidas por los oleajes máximos, por lo tanto deberá ser superior a los siguientes valores:
    - NMN + Oleaje por viento = Cota terreno + 0,77 m
    - NMN + Oleaje sísmico = Cota terreno + 0,31 m
- Resguardo mínimo: Es el relativo al Nivel para la Avenida de Proyecto (NAP). Este resguardo será igual o superior a las sobreelevaciones producidas por los oleajes en situaciones de avenida, que en nuestro caso estas sobreelevaciones tienen los siguientes valores:
    - NAP + Oleaje por viento = NMN + 0,88 m
    - NAP + Oleaje sísmico = NMN + 0,42 m

Además, en la *Instrucción para proyecto, construcción y explotación de grandes presas* se establecen los siguientes criterios para la determinación de la altura de resguardo:

- El resguardo será, como mínimo, de vez y media la altura de la máxima ola posible originada por el viento = NMN + 1,16 m
- En las zonas de media y alta sismicidad este resguardo no será inferior a 1 m más la altura de la ola sísmica = NMN + 1,31 m

Dejando un pequeño margen de seguridad se ha adoptado un resguardo para las 3 balsas de **1,40 m**.

4.4. CÁLCULO DEL ANCHO DE CORONACIÓN

Según se especifica en el artículo 55 de la *Instrucción para proyecto, construcción y explotación de grandes presas*, la anchura mínima de la coronación en las zonas de sismicidad baja cuando la altura de la presa sea inferior a 15 metros, la anchura de coronación será como mínimo de 3 metros. En las zonas de sismicidad media, como es nuestro caso según la imagen siguiente, el ancho de coronación mínimo será el establecido anteriormente incrementado un 25%, por lo que las balsas tendrán un ancho de coronación de **3,75 m**.

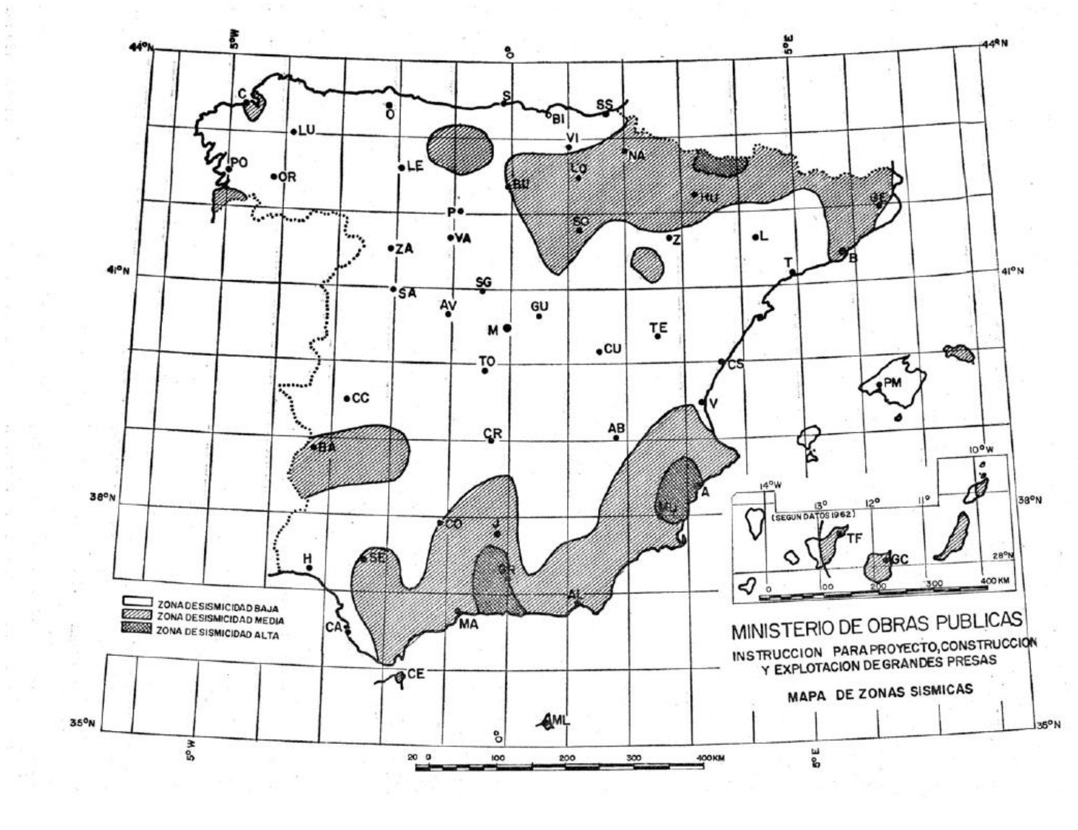

Figura 1 – Mapa de sismicidad. Fuente: BOE

5. BIBLIOGRAFÍA

Normativa:

- *Reglamento Técnico sobre Seguridad de Presas y Embalses* (Enlace), Comisión Permanente de Normas para Grandes Presas, Ministerio de Obras Públicas, Transportes y Medio Ambiente
- *Reglamento del Dominio Público Hidráulico* (Enlace), Ministerio de Obras Públicas y Urbanismo
- *Guías Técnicas de Seguridad de Presas* (Enlace), Ministerio de Agricultura, Alimentación y Medio Ambiente
- *Instrucción para proyecto, construcción y explotación de grandes presas* (Enlace), Ministerio de Obras Públicas

ANEXO 8.1

ESTABILIDAD DE LOS TALUDES DE LAS BALSAS

1. INTRODUCCIÓN

La comprobación de la estabilidad de los taludes de la balsa se ha realizado con el programa de cálculo *Slide* desarrollado por la empresa Rocscience. Es el mismo programa utilizado para la determinación del factor de seguridad de los taludes de la explanación.

Las propiedades de los suelos incluidos en el estudio están recogidas en el Anejo nº 3 – Geología y geotecnia, mientras que el coeficiente de empuje horizontal derivado del sismo toma el mismo valor del coeficiente sísmico calculado en el apartado 3.3 del Anejo nº 7 – Cálculos estructurales.

A continuación se incluye el informe obtenido del programa de cálculo.

2. INFORME DE ESTABILIDAD DE LOS TALUDES DE LA BALSA

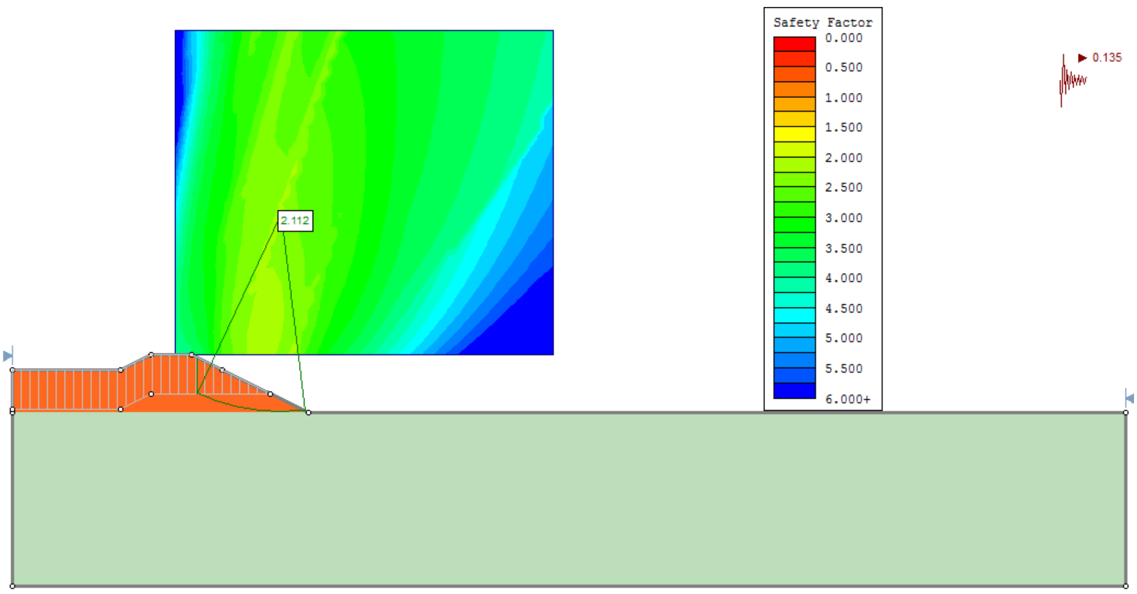

Figura 2 – Coeficiente de seguridad del talud de las balsas

Slide Analysis Information

Estudio de implantación de una planta termosolar de colectores cilindro-parabólicos en la Campiña Sur

Project Summary

- File Name: Estabilidad talud balsa termosolar
- Slide Modeler Version: 6.036
- Project Title: Estudio de implantación de una planta termosolar de colectores cilindro-parabólicos en la Campiña Sur
- Author: Jesús Fernández González

General Settings

- Units of Measurement: Metric Units
- Time Units: days
- Permeability Units: meters/second
- Failure Direction: Left to Right
- Data Output: Standard
- Maximum Material Properties: 20
- Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

- Bishop simplified
- Janbu simplified
- Ordinary/Fellenius

- Number of slices: 25
- Tolerance: 0.005
- Maximum number of iterations: 50
- Check malpha < 0.2: Yes
- Initial trial value of FS: 1
- Steffensen Iteration: Yes

Groundwater Analysis

- Groundwater Method: Water Surfaces
- Pore Fluid Unit Weight: 9.81 kN/m3

- Advanced Groundwater Method: None

Random Numbers

- Pseudo-random Seed: 10116
- Random Number Generation Method: Park and Miller v.3

Surface Options

- Surface Type: Circular
- Search Method: Grid Search
- Radius Increment: 5
- Composite Surfaces: Disabled
- Reverse Curvature: Invalid Surfaces
- Minimum Elevation: Not Defined
- Minimum Depth: Not Defined

Loading

- Seismic Load Coefficient (Horizontal): 0.135

Tension Crack

- Tension crack Water level: dry

Material Properties

Property	Suelo1	Suelo2
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [kN/m3]	16.4	19
Cohesion [kPa]	7	16
Friction Angle [deg]	30	28
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: Ordinary/Fellenius

- FS: 2.159540
- Center: 24.800, 34.400
- Radius: 18.390
- Left Slip Surface Endpoint: 17.013, 17.740
- Right Slip Surface Endpoint: 27.053, 16.149
- Left Slope Intercept: 17.013 21.168
- Right Slope Intercept: 27.053 16.149
- Resisting Moment=4922.51 kN-m
- Driving Moment=2279.43 kN-m
- Total Slice Area=22.0758 m2

Method: Bishop Simplified

- FS: 2.206510
- Center: 24.800, 34.400
- Radius: 18.390
- Left Slip Surface Endpoint: 17.013, 17.740
- Right Slip Surface Endpoint: 27.053, 16.149
- Left Slope Intercept: 17.013 21.168
- Right Slope Intercept: 27.053 16.149
- Resisting Moment=5029.57 kN-m
- Driving Moment=2279.43 kN-m
- Total Slice Area=22.0758 m2

Method: Janbu simplified

- FS: 2.112400
- Center: 24.800, 34.400
- Radius: 18.390
- Left Slip Surface Endpoint: 17.013, 17.740
- Right Slip Surface Endpoint: 27.053, 16.149
- Left Slope Intercept: 17.013 21.168
- Right Slope Intercept: 27.053 16.149
- Resisting Horizontal Force=264.235 kN
- Driving Horizontal Force=125.088 kN
- Total Slice Area=22.0758 m2

Slice Data

- **Global Minimum Query (Ordinary/Fellenius) - Safety Factor: 2.15954**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.401591	22.5177	Suelo1	7	30	14.9202	32.2208	43.6836	0	43.6836
2	0.401591	22.3554	Suelo1	7	30	15.1296	32.673	44.4669	0	44.4669
3	0.401591	22.1191	Suelo1	7	30	15.2816	33.0012	45.0354	0	45.0354
4	0.401591	21.8108	Suelo1	7	30	15.3748	33.2026	45.3843	0	45.3843
5	0.401591	21.4324	Suelo1	7	30	15.4084	33.2751	45.5098	0	45.5098
6	0.401591	20.9857	Suelo1	7	30	15.3814	33.2167	45.4088	0	45.4088
7	0.401591	20.4722	Suelo1	7	30	15.2933	33.0264	45.0791	0	45.0791
8	0.401591	19.8933	Suelo1	7	30	15.1436	32.7032	44.5193	0	44.5193
9	0.401591	19.2502	Suelo1	7	30	14.9323	32.2468	43.7287	0	43.7287
10	0.401591	18.5441	Suelo1	7	30	14.6593	31.6574	42.7078	0	42.7078
11	0.401591	17.7759	Suelo1	7	30	14.325	30.9354	41.4573	0	41.4573
12	0.401591	16.9466	Suelo1	7	30	13.9297	30.0817	39.9788	0	39.9788
13	0.401591	16.0567	Suelo1	7	30	13.4741	29.0978	38.2745	0	38.2745
14	0.401591	15.1071	Suelo1	7	30	12.959	27.9854	36.3477	0	36.3477
15	0.401591	14.0982	Suelo1	7	30	12.3854	26.7467	34.2022	0	34.2022
16	0.401591	13.0305	Suelo1	7	30	11.7544	25.3842	31.8424	0	31.8424
17	0.401591	11.9045	Suelo1	7	30	11.0675	23.9008	29.2731	0	29.2731
18	0.401591	10.7203	Suelo1	7	30	10.3263	22.3	26.5004	0	26.5004
19	0.401591	9.47817	Suelo1	7	30	9.53235	20.5855	23.5307	0	23.5307
20	0.401591	8.17825	Suelo1	7	30	8.68764	18.7613	20.3711	0	20.3711
21	0.401591	6.82055	Suelo1	7	30	7.79422	16.8319	17.0294	0	17.0294
22	0.401591	5.40503	Suelo1	7	30	6.85441	14.8024	13.5141	0	13.5141
23	0.401591	3.93154	Suelo1	7	30	5.87062	12.6778	9.83431	0	9.83431
24	0.401591	2.39988	Suelo1	7	30	4.8455	10.4641	5.9999	0	5.9999
25	0.401591	0.809736	Suelo1	7	30	3.78185	8.16705	2.0214	0	2.0214

- **Global Minimum Query (Bishop simplified) - Safety Factor: 2.20651**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.401591	22.5177	Suelo1	7	30	15.9537	35.202	48.8473	0	48.8473
2	0.401591	22.3554	Suelo1	7	30	15.9654	35.2278	48.8919	0	48.8919
3	0.401591	22.1191	Suelo1	7	30	15.9303	35.1503	48.7578	0	48.7578
4	0.401591	21.8108	Suelo1	7	30	15.8491	34.9712	48.4474	0	48.4474
5	0.401591	21.4324	Suelo1	7	30	15.7223	34.6915	47.9632	0	47.9632
6	0.401591	20.9857	Suelo1	7	30	15.5506	34.3126	47.3068	0	47.3068
7	0.401591	20.4722	Suelo1	7	30	15.3343	33.8352	46.48	0	46.48
8	0.401591	19.8933	Suelo1	7	30	15.0736	33.2601	45.4838	0	45.4838
9	0.401591	19.2502	Suelo1	7	30	14.7689	32.5878	44.3193	0	44.3193
10	0.401591	18.5441	Suelo1	7	30	14.4204	31.8187	42.9872	0	42.9872
11	0.401591	17.7759	Suelo1	7	30	14.0281	30.9531	41.4881	0	41.4881
12	0.401591	16.9466	Suelo1	7	30	13.592	29.9909	39.8213	0	39.8213
13	0.401591	16.0567	Suelo1	7	30	13.1121	28.932	37.9874	0	37.9874
14	0.401591	15.1071	Suelo1	7	30	12.5883	27.7763	35.9855	0	35.9855
15	0.401591	14.0982	Suelo1	7	30	12.0204	26.5231	33.815	0	33.815

16	0.401591	13.0305	Suelo1	7	30	11.4081	25.172	31.4747	0	31.4747
17	0.401591	11.9045	Suelo1	7	30	10.751	23.7221	28.9635	0	28.9635
18	0.401591	10.7203	Suelo1	7	30	10.0487	22.1725	26.2795	0	26.2795
19	0.401591	9.47817	Suelo1	7	30	9.30066	20.522	23.4208	0	23.4208
20	0.401591	8.17825	Suelo1	7	30	8.50633	18.7693	20.385	0	20.385
21	0.401591	6.82055	Suelo1	7	30	7.665	16.9129	17.1696	0	17.1696
22	0.401591	5.40503	Suelo1	7	30	6.77586	14.951	13.7715	0	13.7715
23	0.401591	3.93154	Suelo1	7	30	5.83801	12.8816	10.1873	0	10.1873
24	0.401591	2.39988	Suelo1	7	30	4.85043	10.7025	6.41298	0	6.41298
25	0.401591	0.809736	Suelo1	7	30	3.81201	8.41123	2.44432	0	2.44432

- **Global Minimum Query (Janbu simplified) - Safety Factor: 2.1124**

Slice Number	Width [m]	Weight [kN]	Base Material	Base Cohesion [kPa]	Base Friction Angle [degrees]	Shear Stress [kPa]	Shear Strength [kPa]	Base Normal Stress [kPa]	Pore Pressure [kPa]	Effective Normal Stress [kPa]
1	0.401591	22.5177	Suelo1	7	30	16.5861	35.0364	48.5603	0	48.5603
2	0.401591	22.3554	Suelo1	7	30	16.6026	35.0713	48.621	0	48.621
3	0.401591	22.1191	Suelo1	7	30	16.5704	35.0034	48.5032	0	48.5032
4	0.401591	21.8108	Suelo1	7	30	16.4902	34.8339	48.2099	0	48.2099
5	0.401591	21.4324	Suelo1	7	30	16.3625	34.5642	47.7426	0	47.7426
6	0.401591	20.9857	Suelo1	7	30	16.1878	34.1952	47.1034	0	47.1034
7	0.401591	20.4722	Suelo1	7	30	15.9666	33.7279	46.2941	0	46.2941
8	0.401591	19.8933	Suelo1	7	30	15.6991	33.1628	45.3153	0	45.3153
9	0.401591	19.2502	Suelo1	7	30	15.3856	32.5005	44.1682	0	44.1682
10	0.401591	18.5441	Suelo1	7	30	15.0261	31.7412	42.853	0	42.853
11	0.401591	17.7759	Suelo1	7	30	14.6209	30.8852	41.3703	0	41.3703
12	0.401591	16.9466	Suelo1	7	30	14.1699	29.9324	39.72	0	39.72
13	0.401591	16.0567	Suelo1	7	30	13.6729	28.8827	37.9018	0	37.9018
14	0.401591	15.1071	Suelo1	7	30	13.1299	27.7356	35.9151	0	35.9151
15	0.401591	14.0982	Suelo1	7	30	12.5406	26.4908	33.759	0	33.759
16	0.401591	13.0305	Suelo1	7	30	11.9047	25.1475	31.4322	0	31.4322
17	0.401591	11.9045	Suelo1	7	30	11.2218	23.7049	28.9336	0	28.9336
18	0.401591	10.7203	Suelo1	7	30	10.4913	22.1619	26.2611	0	26.2611
19	0.401591	9.47817	Suelo1	7	30	9.71284	20.5174	23.4127	0	23.4127
20	0.401591	8.17825	Suelo1	7	30	8.88553	18.7698	20.386	0	20.386
21	0.401591	6.82055	Suelo1	7	30	8.00877	16.9177	17.178	0	17.178
22	0.401591	5.40503	Suelo1	7	30	7.08159	14.9592	13.7857	0	13.7857
23	0.401591	3.93154	Suelo1	7	30	6.10304	12.8921	10.2053	0	10.2053
24	0.401591	2.39988	Suelo1	7	30	5.07199	10.7141	6.43299	0	6.43299
25	0.401591	0.809736	Suelo1	7	30	3.98722	8.42261	2.46403	0	2.46403

Interslice Data

- **Global Minimum Query (Ordinary/Fellenius) - Safety Factor: 2.15954**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	17.0131	17.74	0	0	0
2	17.4147	17.5581	0	0	0
3	17.8163	17.3877	0	0	0
4	18.2179	17.2283	0	0	0
5	18.6195	17.0797	0	0	0
6	19.0211	16.9416	0	0	0
7	19.4227	16.8138	0	0	0
8	19.8243	16.696	0	0	0
9	20.2259	16.588	0	0	0
10	20.6274	16.4896	0	0	0
11	21.029	16.4008	0	0	0
12	21.4306	16.3213	0	0	0
13	21.8322	16.2511	0	0	0
14	22.2338	16.19	0	0	0
15	22.6354	16.1379	0	0	0
16	23.037	16.0947	0	0	0
17	23.4386	16.0605	0	0	0
18	23.8402	16.0351	0	0	0
19	24.2418	16.0185	0	0	0
20	24.6434	16.0107	0	0	0
21	25.0449	16.0117	0	0	0
22	25.4465	16.0214	0	0	0
23	25.8481	16.0399	0	0	0
24	26.2497	16.0673	0	0	0
25	26.6513	16.1035	0	0	0
26	27.0529	16.1486	0	0	0

- **Global Minimum Query (bishop simplified) - Safety Factor: 2.20651**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	17.0131	17.74	0	0	0
2	17.4147	17.5581	5.51799	0	0
3	17.8163	17.3877	10.4591	0	0
4	18.2179	17.2283	14.8194	0	0
5	18.6195	17.0797	18.5991	0	0
6	19.0211	16.9416	21.8031	0	0
7	19.4227	16.8138	24.4402	0	0
8	19.8243	16.696	26.5229	0	0
9	20.2259	16.588	28.0675	0	0
10	20.6274	16.4896	29.0942	0	0
11	21.029	16.4008	29.6263	0	0
12	21.4306	16.3213	29.691	0	0
13	21.8322	16.2511	29.3187	0	0
14	22.2338	16.19	28.5435	0	0
15	22.6354	16.1379	27.4029	0	0

16	23.037	16.0947	25.9383	0	0
17	23.4386	16.0605	24.1945	0	0
18	23.8402	16.0351	22.2205	0	0
19	24.2418	16.0185	20.0689	0	0
20	24.6434	16.0107	17.7969	0	0
21	25.0449	16.0117	15.4658	0	0
22	25.4465	16.0214	13.1418	0	0
23	25.8481	16.0399	10.8957	0	0
24	26.2497	16.0673	8.80383	0	0
25	26.6513	16.1035	6.94816	0	0
26	27.0529	16.1486	0	0	0

- **Global Minimum Query (Janbu simplified) - Safety Factor: 2.1124**

Slice Number	X coordinate [m]	Y coordinate - Bottom [m]	Interslice Normal Force [kN]	Interslice Shear Force [kN]	Interslice Force Angle [degrees]
1	17.0131	17.74	0	0	0
2	17.4147	17.5581	5.21136	0	0
3	17.8163	17.3877	9.84992	0	0
4	18.2179	17.2283	13.912	0	0
5	18.6195	17.0797	17.3985	0	0
6	19.0211	16.9416	20.3144	0	0
7	19.4227	16.8138	22.6691	0	0
8	19.8243	16.696	24.4754	0	0
9	20.2259	16.588	25.7503	0	0
10	20.6274	16.4896	26.5139	0	0
11	21.029	16.4008	26.7904	0	0
12	21.4306	16.3213	26.6072	0	0
13	21.8322	16.2511	25.9953	0	0
14	22.2338	16.19	24.9892	0	0
15	22.6354	16.1379	23.6271	0	0
16	23.037	16.0947	21.9508	0	0
17	23.4386	16.0605	20.0058	0	0
18	23.8402	16.0351	17.8415	0	0
19	24.2418	16.0185	15.5116	0	0
20	24.6434	16.0107	13.0737	0	0
21	25.0449	16.0117	10.5901	0	0
22	25.4465	16.0214	8.12763	0	0
23	25.8481	16.0399	5.75828	0	0
24	26.2497	16.0673	3.55933	0	0
25	26.6513	16.1035	1.61381	0	0
26	27.0529	16.1486	0	0	0

List Of Coordinates

Tension Crack

X	Y
0	16.34
10	16.34
12.8	17.74
23.87	17.74

External Boundary

X	Y
102.85	0
102.85	16
27.35	16
19.35	20
16.55	21.4
12.8	21.4
10	20
0	20
0	16
0	0

Material Boundary

X	Y
0	16
27.35	16

ANEJO Nº 9

MOVIMIENTOS DE TIERRA

ÍNDICE

1. OBJETO

Este anejo se ha redactado con el objetivo de definir los criterios seguidos para la definición de la explanación de la central termosolar, así como incluir los resultados obtenidos.

2. MOVIMIENTOS DE TIERRA

Para el cálculo de los movimientos de tierra se ha empleado el programa de análisis AutoCAD Civil 3D, desarrollado por la empresa Autodesk. Inicialmente, se ha conseguido cartografía en formato digital para poder realizar todas las modificaciones necesarias. Esta cartografía ha sido cedida por la Junta de Extremadura, a través de su servicio de cartografía y se trata de una cartografía vectorial a escala 1:10.000, más concretamente la correspondiente a la hoja 0877_3-2. La escala de esta cartografía es demasiado amplia para este cálculo, pero por falta de medios se supondrá como correcta.

Se ha partido de dos superficies base, una la correspondiente al terreno natural y otra del terreno desbrozado que, tal y como se puede comprobar en el presupuesto, se corresponde con el terreno natural rebajado 25 cm, con el objetivo de obtener los volúmenes de movimiento con una mayor exactitud. Tras lo cual se ha procedido a realizar la explanación para la central termosolar.

Tras un estudio previo del perfil del terreno se ha adoptado una pendiente de un 0,25% hacia la dirección este, como un mínimo para permitir el drenaje de la explanación ya que en este sentido la superficie presenta una menor orografía, y de un 1% de pendiente hacia el sur, debido a que existe un mayor relieve en esta dirección y a que el arroyo al que se dirigirá el drenaje se encuentra al sur de la planta termosolar.

Después de unas primeras iteraciones, se comprobó que para obtener una compensación entre las tierras de desmonte y las de terraplén, el nivel de la explanación quedaría muy bajo respecto al nivel del camino de acceso, por lo que se procedió al diseño de las balsas de regulación de tal manera que fueran excavadas en su mayor parte, para emplear dicho excedente para subir la cota de la plataforma. Sin embargo, al observar que la elevación de la explanación seguía siendo baja para el camino de acceso, se procedió a rebajar este, ampliando el ancho de la plataforma. En este proyecto no se incluye la mejora de los accesos a la planta, únicamente está contemplado la ejecución de la rebaja de la cota del camino existente.

En cuanto a las características de los taludes, se siguieron los criterios marcados en el anejo de geología y geotecnia del proyecto de "Renovación del firme de la EX-111" cedido por la Junta de Extremadura, que ha servido de base para la redacción del anjo correspondiente en este proyecto. Estas recomendaciones establecían que los taludes de más de 2 metros de altura deberán tener una inclinación de 2:1 (H:V). Una vez se ha hallado la cota final de la explanación, se ha comprobado la estabilidad de los taludes de mayor altura, tanto en desmonte como en terraplén, cuyos informes están incluidos en los anexos del Anejo nº 3 – Geología y geotecnia.

Las cotas finales de todos los puntos se pueden comprobar en el anexo de replanteo incluido en el Anejo nº 2 – Cartografía y topografía, donde están incluidos los puntos de límite de adquisición de terrenos, que se corresponden con el pie de terraplén o la cabeza de desmonte de los taludes de la explanación; los puntos de las cimentaciones de los colectores, a cota de plataforma, de modo que puedan utilizarse como puntos de comprobación de la elevación de la misma durante su ejecución; los puntos del límite de explanación y los puntos que definen las balsas de regulación.

Con todo esto se obtienen los siguientes valores de movimientos de tierra:

Área de desbroce	1.644.801,732 m^2 (164,5 ha)
Volumen de desmonte	2.219.036,290 m^3
Volumen de terraplén	2.218.846,590 m^3

Por lo tanto el balance de tierras supone un excedente de tierras de 189,700 m^3. Estas tierras servirán de reserva en el caso de que el desbroce sea mayor o si se encuentran suelos que no cumplen las características físicas, químicas y/o resistentes exigidas. En el caso de que no se empleen, se llevarán a un gestor de residuos autorizado o a un vertedero autorizado, cumplimentado los trámites necesarios para ello.

La tierra vegetal excavada en el desbroce se empleará en la hidrosiembra de los taludes y en las medidas compensatorias ambientales. Si no tuviesen las características requeridas, se trasladarán a un gestor de residuos o a un vertedero autorizado, cumplimentado los trámites necesarios para ello.

Como se puede comprobar en el plano nº 4, los mayores volúmenes de desmonte y terraplén se sitúan en el lado oeste de la central, lo que minimizará la distancia de transporte de las tierras. También la ubicación central de las balsas permite reducir estas distancias igualmente, moderando los costes de transporte.

ANEJO Nº 10

ESTUDIO DE SEGURIDAD Y SALUD

ÍNDICE

MEMORIA

1. OBJETO

Este anejo tiene como finalidad analizar los riesgos que emanan de la realización de las obras y establece y marca unas directrices para eliminar o disminuir al máximo posible dichos riesgos y sus consecuencias. También define la acción preventiva a realizar acorde a los medios de producción, adaptando lo indicado en la planificación de trabajos y tratando de incluir dichas medidas dentro de la propia actividad de las obras. Se pretende lograr la máxima colaboración de todas las personas y entidades implicadas en la obra, para que tomen conciencia de la necesidad de aplicar las adecuadas medidas preventivas durante la ejecución de la obra. Todo ello de acuerdo con lo dispuesto en la Ley 31/1995, de 8 de noviembre, de prevención de riesgos laborales, y con lo establecido en el Real Decreto 1627/1997, de 24 de octubre, por el que se establecen las disposiciones mínimas de seguridad y salud en las obras de construcción.

2. CARACTERÍSTICAS DE LA OBRA

2.1. DATOS GENERALES Y DESCRIPCIÓN DE LA OBRA

El objeto del presente proyecto es ubicar la localización idónea para implantar una central termosolar de colectores cilindro-parabólicos en la comarca de la Campiña Sur (Badajoz), además de definir la mayor parte de las obras civiles relacionadas con su construcción, como son:

- El movimiento de tierras (Desbroce, desmonte y terraplén)
- La estructura de los colectores (Cimentaciones y estructura metálica)
- Las balsas de regulación
- La reposición de servicios
- Las actuaciones de integración ambiental
- El cerramiento de la central

Quedan fuera del ámbito de este proyecto actuaciones como la impulsión de agua hasta las balsas, los viales internos, la depuración de las aguas empleadas en el ciclo de funcionamiento, el drenaje, la remodelación de la carretera de acceso, etc., además de otras cuya definición correría a cargo de profesionales con otra titulación, como son las conducciones internas de la planta, la turbina, las torres de refrigeración, la subestación transformadora, etc.

Tras realizar el estudio multicriterio detallado en el apartado siguiente, se ha ubicado la central termosolar en el término municipal de Llerena (Badajoz), a una distancia de 3,5 km del núcleo urbano hacia el noreste.

Se ha considerado que este proyecto es de iniciativa privada.

Tal y como se indica en el anejo nº 15 – Plan de obra, la duración de este proyecto se ha estimado en **78 meses**. Con este dato y con el Presupuesto de Ejecución Material (202.065.113,64 €), se ha procedido a calcular el número de personal previsto en la obra, de la forma a continuación descrita:

Presupuesto de Ejecución Material	202.065.113,64 €
Porcentaje de mano de obra	13%
Coste de mano de obra	26.268.464,77 €
Duración de la obra (años)	6,5
Coste anual de la mano de obra	4.041.302,27 €
Horas de trabajo anuales	1.738 h
Coste medio de la mano de obra (€/h)	16
Nº de trabajadores	145

Por lo tanto, se dimensionarán las protecciones y las instalaciones de higiene y bienestar para 145 trabajadores, siguiendo las indicaciones del Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT):

- Superficie de aseos: 2 m^2/trabajador
- Superficie de vestuarios: 2 m^2/trabajador
- Superficie de comedor: 2 m^2/trabajador
- Nº de retretes o urinarios: 1 ud/25 trabajadores
- Nº de lavabos: 1 ud/25 trabajadores
- Nº de duchas: 1 ud/25 trabajadores

- Nº mesas: 1/10 trabajadores
- Nº bancos: 1/5 trabajadores
- Nº taquillas: 1/trabajador

Tal y como se indica en el Presupuesto de este Estudio de Seguridad y Salud, se ha obtenido un PEM final de OCHOCIENTOS OCHENTA Y CINCO MIL OCHOCIENTOS SESENTA Y SIETE EUROS con SETENTA Y CUATRO CÉNTIMOS (885.867,74 €).

2.2. UNIDADES QUE COMPONEN LA OBRA

Al efecto de los posibles riesgos, las diferentes fases que se tendrán en las obras, de forma general, son:

- Replanteo y tareas previas
- Desbroce
- Movimientos de tierra
- Estructuras
- Limpieza y labores fin de obra

2.3. SERVICIOS AFECTADOS POR LA OBRA

Tal y como se indica en la memoria del proyecto, se ha detectado un colector subterráneo en el área de actuación. Para actuar con la mayor seguridad se procederá a identificar al organismo o compañía responsable del mismo y se seguirán todas las pautas de seguridad que marque. Ante la presencia de cualquier otro elemento no previsto, se adoptarán siempre las correctas medidas de seguridad y salud.

2.4. ACTIVIDADES FUERA DEL PERÍMETRO DE LA OBRA

Si es necesario realizar acopios fuera del recinto de la obra, estos serán vallados y balizados en todo su perímetro. Se realizarán transportes a lugares autorizados de tratamiento de residuos, lo que supone una serie de riesgos, sobre todo cuando se utilizan o cruzan carreteras. Para mitigar las consecuencias de estos riesgos se deberá tener en cuenta las siguientes disposiciones:

- Se señalizará con las señales TR-301 (40) y TP-50 en ambos lados de la carretera.
- Si la zona de interceptación o cruce de la carretera es una zona sin visibilidad, se deberán utilizar los señalistas necesarios para una correcta regulación del tráfico, tanto de la carretera como de los vehículos de obra, estos irán provistos de señales manuales de paso y stop y de radioteléfonos si entre ellos no se ven.

2.5. MAQUINARIA A EMPLEAR EN LA OBRA

La maquinaria prevista a emplear en la obra será:

- Retroexcavadora
- Pala cargadora
- Dumper
- Camión basculante
- Hormigonera
- Camión hormigonera
- Camión de riego
- Compactadora

2.6. MEDIOS AUXILIARES Y HERRAMIENTAS A EMPLEAR EN LAS OBRAS

Los principales medios auxiliares y herramientas cuyo uso se prevé son:

- Niveles, taquímetros, estaciones totales y/o GPS
- Jalones para alineaciones
- Radiales
- Medios de soldadura
- Llaves inglesas
- Vibrador de hormigón
- Caja de herramientas

2.7. ENERGÍAS A EMPLEAR EN LAS OBRAS

Las energías que están previstas de ser utilizadas son:

- Combustibles líquidos (gasóleo y gasolina) para las diversas máquinas y vehículos
- Electricidad para alumbrado, instalaciones de higiene y diversas máquinas y herramientas eléctricas

3. RIESGOS Y MEDIDAS PREVENTIVAS EN LAS ACTIVIDADES DE LA OBRA

Previo al comienzo de los trabajos de cada actividad, se deberá dar por escrito una explicación pormenorizada de los riesgos existentes y las correspondientes medidas preventivas a todos los operarios que intervengan en dicha tarea.

A continuación se describen los riesgos asociados a los distintos trabajos relacionados con este proyecto y las consecuentes medidas y procedimientos preventivos.

3.1. REPLANTEO Y TAREAS PREVIAS

Riesgos:

- Caídas de personas al mismo nivel
- Atropellos y/o colisiones
- Golpes y/o cortes con objetos y/o maquinaria
- Insolaciones
- Exposición al polvo

Medidas preventivas:

- Protecciones colectivas:
  - Vallado perimetral de la zona de obras

- Protecciones individuales:
    - Casco de seguridad
    - Botas de seguridad
    - Ropa de alta visibilidad
- Señalización de seguridad:
    - Señales de obligatoriedad de uso de los EPIs especificados
    - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Se realizarán estas tareas con la suficiente antelación tratando de evitar en todo lo posible su realización al mismo tiempo que la actuación de maquinaria. En caso de coincidencia habrá que realizar la señalización oportuna para cortes, desvíos, etc. Los operarios irán provistos, además de otras protecciones de ropa con elementos reflectantes y calzado de seguridad. En los trabajos junto a líneas eléctricas aéreas, se tendrán en cuenta las distancias de seguridad. Si existiese la posibilidad de levantamiento de polvo, se deberá regar la zona convenientemente para evitar que este se produzca. Cualquier redondo de hierro que se clave en la obra para replanteo, sujeción de algo o cualquier otro fin, deberá estar protegido en su parte superior con setas de PVC. En todo momento se mantendrán las zonas de trabajo en perfectas condiciones de limpieza y orden.

3.2. DESBROCE Y MOVIMIENTOS DE TIERRA

Riesgos:

- Caídas de personas al mismo o a distinto nivel
- Caídas desde maquinaria
- Atropellos y/o colisiones
- Golpes y/o cortes con objetos y/o maquinaria
- Atrapamientos
- Caídas y/o desprendimientos de material
- Vuelco de maquinaria

- Inestabilidad de taludes
- Insolaciones
- Exposición al polvo
- Ruido
- Vibraciones
- Proyección de fragmentos o partículas
- Sobreesfuerzos
- Contactos eléctricos
- Incendios

Medidas preventivas:

- Protecciones colectivas:
  - Vallado perimetral de la zona de obras
  - Dispositivo de marcha atrás en las máquinas
  - Topes para vehículos o maquinaria pesada
  - Señalización de tráfico
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Ropa de alta visibilidad
  - Gafas de protección
  - Mascarilla antipolvo
  - Guantes
  - Protectores auditivos
  - Botas impermeables
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

En todo momento los trabajadores deberán llevar los EPIs especificados de forma correcta. Para evitar los riesgos de atropello y atrapamiento, el personal debe ir equipado en todo momento de chaleco reflectante homologados y en perfecto estado de visibilidad. En tiempo lluvioso se utilizarán elementos impermeables, con la obligación de parar los trabajos si la lluvia genera un peligro potencial.

Se deberán guardar las convenientes distancias de seguridad en todas las operaciones con maquinaria. Los operarios no deberán situarse, ni en las excavaciones ni en rellenos, en el radio de acción de la maquinaria ni debajo de cargas suspendidas. El personal no deberá permanecer bajo el frente de excavación. Se deberá prestar especial atención a las líneas eléctricas, tanto a las aéreas como las subterráneas. Si se encontraran conducciones o servicios subterráneos imprevistos, se paralizarán de inmediato los trabajos, avisando a la Dirección de la Obra.

No se deberán sobrecargar los bordes de la excavación ni colocar elementos inestables cercanos a los mismos. Se realizarán inspecciones periódicas para asegurar la estabilidad de las excavaciones y/o rellenos, especialmente tras un período de lluvias. Las zanjas se mantendrán abiertas el mínimo tiempo posible.

Siempre que sea posible, se regará para evitar la producción de polvo. En todo momento se mantendrán las zonas de trabajo en perfectas condiciones de limpieza y orden.

3.3. ESTRUCTURAS

Riesgos:

- Caídas de personas al mismo o a distinto nivel
- Caídas desde maquinaria
- Atropellos y/o colisiones
- Golpes y/o cortes con objetos y/o maquinaria
- Atrapamientos

- Caídas y/o desprendimientos de material
- Vuelco de maquinaria
- Insolaciones
- Exposición al polvo
- Ruido
- Vibraciones
- Irritación en la piel
- Proyección de fragmentos o partículas
- Sobreesfuerzos
- Contactos eléctricos
- Incendios provocados por medios de soldadura

Medidas preventivas:

- Protecciones colectivas:
  - Vallado perimetral de la zona de obras
  - Dispositivo de marcha atrás en las máquinas
  - Topes para vehículos o maquinaria pesada
  - Señalización de tráfico
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Ropa de alta visibilidad
  - Gafas de protección
  - Gafas/máscaras para soldadura
  - Mascarilla antipolvo
  - Guantes
  - Protectores auditivos
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

En todo momento los trabajadores deberán llevar los EPIs especificados de forma correcta. Especialmente, los operarios deberán utilizar guantes para evitar afecciones en la piel con el contacto del cemento. Para evitar los riesgos de atropello y atrapamiento, el personal debe ir equipado en todo momento de chaleco reflectante homologados y en perfecto estado de visibilidad.

Los operarios no deberán situarse en el radio de acción de la maquinaria ni debajo de cargas suspendidas. Se deberán guardar las convenientes distancias de seguridad en todas las operaciones con maquinaria. Se deberá prestar especial atención en las operaciones de hormigonado, comprobando la correcta disposición de los encofrados, en el caso de que sea preciso su utilización. Todas las esperas, redondos y pernos de anclaje que supongan un peligro potencial, deberán ir protegidas con setas de PVC.

Se deberá prestar especial atención a las líneas eléctricas, si existen, especialmente a las aéreas para evitar contactos con la maquinaria de elevación de los elementos estructurales.

Se procurará no llenar en exceso la cuba en prevención de vertidos innecesarios durante el transporte de hormigón. No se permitirá la presencia de ningún trabajador cerca del camión ni fuera del campo de visión del conductor durante las maniobras que este realice. Las maniobras de vertido serán dirigidas por personal competente que vigilará que no se realicen maniobras inseguras. Se prohibirá la limpieza de la cuba, mangueras, utensilios, etc. en la proximidad de los tajos.

Se señalizará correctamente la zona recién hormigonada para evitar accidentes. Los operarios no podrán cargar más de 25 kg manualmente.

Los operarios deberán llevar guantes para evitar cortes y atrapamientos durante la colocación de las estructuras metálicas y los espejos del colector. Estos últimos deberán ser transportados e instalados según establezca el fabricante para evitar su rotura y/o daño.

Siempre que sea posible, se regará para evitar la producción de polvo. En todo momento se mantendrán las zonas de trabajo en perfectas condiciones de limpieza y orden.

3.4. LIMPIEZA Y LABORES FIN DE OBRA

Riesgos:

- Caídas de personas al mismo o a distinto nivel
- Caídas desde maquinaria
- Atropellos y/o colisiones
- Golpes y/o cortes con objetos y/o maquinaria
- Atrapamientos
- Insolaciones
- Exposición al polvo
- Ruido
- Proyección de fragmentos o partículas

Medidas preventivas:

- Protecciones colectivas:
    - Vallado perimetral de la zona de obras
    - Dispositivo de marcha atrás en las máquinas
    - Señalización de tráfico
- Protecciones individuales:
    - Casco de seguridad
    - Botas de seguridad
    - Ropa de alta visibilidad
    - Gafas de protección
    - Mascarilla antipolvo
    - Guantes
- Señalización de seguridad:

- Señales de obligatoriedad de uso de los EPIs especificados
- Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Se deberán retirar todos los restos de materiales, áridos, escombros, etc., bien a lugares de acopios establecidos para tal fin o bien a vertederos autorizados, usando siempre las herramientas adecuadas a lo que se va a limpiar.

Si se interfiere con el tráfico rodado o tránsito de personas, en estas actividades se tendrá que mantener la señalización.

4. RIESGOS Y MEDIDAS PREVENTIVAS PARA LAS MÁQUINAS

Previo al comienzo de los trabajos con cada máquina, se deberá dar por escrito una explicación pormenorizada de los riesgos existentes y las correspondientes medidas preventivas a todos los operarios que intervengan en dicha tarea.

A continuación se describen los riesgos relacionados con la distinta maquinaria asociada a la realización de este proyecto y las consecuentes medidas y procedimientos preventivos.

4.1. MEDIDAS PREVENTIVAS GENERALES PARA LAS MÁQUINAS AUTOPROPULSADAS

- El conductor-maquinista será una persona experta y cualificada para este trabajo. Se impedirá el acceso a la máquina a toda persona que no esté debidamente autorizada.
- El conductor-maquinista antes de acceder a la máquina al iniciar su jornada, tendrá conocimiento de las dificultades, alteraciones o circunstancias que presente el terreno y su tarea, y que de forma directa puedan afectarle por ser constitutivos de riesgo.

- No se realizarán nunca ajustes en la máquina si esta está en movimiento o con el motor en marcha. En caso de avería paralizar la máquina y no trabajar nunca en este estado. Para realizar operaciones de servicio, para el motor, poner el freno de mano y bloquear la máquina. En posición de parada, los frenos no se liberarán jamás, si antes no se ha instalado los tacos de inmovilización de las ruedas.
- La cabina de la máquina deberá estar muy ordenada y limpia, en especial de grasas, aceites, trapos etc.
- Queda prohibido que el conductor abandone la máquina con el motor en marcha.
- Toda la maquinaria estará dotada de luces, bocina y avisador acústico de marcha atrás
- En caso de calentamiento del motor no abrir nunca directamente la tapa del radiador.
- No tocar nunca el líquido anticorrosión. Si por causas de fuerza mayor hubiera que tocarlo, habría que protegerse con guantes y gafas anti-proyecciones.
- No se podrá fumar cuando se manipule la batería o se abastezca de combustible.
- No se deberá tocar directamente el electrolito de la batería con las manos. Si esto fuera imprescindible por algún motivo se deberá realizar con guantes de seguridad que protejan frente a agentes cáusticos y corrosivos.
- Si, por alguna causa de fuerza mayor, hubiere de manipularse en el sistema eléctrico, habrá que desconectar el motor y extraer la llave del contacto.
- En las labores de limpieza de la máquina, el trabajador que la realice deberá ir protegido con mascarilla, mono y guante de goma. Si se utilizase aire a presión deberá llevar gafas anti-impactos y tener mucha precaución con las posibles proyecciones de objetos y partículas.
- Se deberá vigilar la presión de los neumáticos y trabajar con la presión que recomienda el fabricante de la máquina.
- Durante el relleno de aire de las ruedas, hay que situarse tras la banda de rodadura, apartándose del punto de conexión y llanta.

- Antes de iniciar cada turno de trabajo se tendrá que comprobar que los mandos funcionan correctamente, realizándose dichas pruebas con marchas y movimientos sumamente suaves.
- Se deberá ajustar el asiento del conductor-maquinista para que pueda alcanzar los controles con facilidad.
- Si hubiere contacto con cables eléctricos, el maquinista-conductor no deberá salir de la máquina hasta haber interrumpido el contacto y alejado la máquina del lugar. Entonces deberá saltar sin tocar al mismo tiempo la máquina y el suelo.
- Si por causa de fuerza mayor la máquina debiera ser arrancada mediante otra batería, hay que tratar de evitar los chisporroteos de los cables, ya que los líquidos de la batería desprenden gases inflamables y, además esta podría explotar.
- Se revisarán periódicamente todos los puntos de escape del motor, con el fin de asegurar que el conductor no recibe gases procedentes de la combustión. Esta precaución se extremará en motores provistos de ventilador para aspiración del radiador.
- Todas las máquinas de obra estarán provistos de botiquín de primeros auxilios.
- Las máquinas estarán provistos de un extintor, timbrado y con las revisiones legales al día.
- Si, por cualquier circunstancia, tuvieran que transitar por una vía pública, deberán cumplir con las disposiciones legales que se requieren para ello, debiendo, además de tener colocado un cinturón de seguridad.
- Queda prohibido abandonar la máquina o estacionarla indebidamente en rampas y pendientes.
- Se impedirá el trabajo de la maquinaria en aquellas zonas de desniveles o pendientes excesivas en las que el terreno no garantice unas perfectas condiciones de trabajo.
- En ningún caso, se utilizará maquinaria no diseñada para tal fin como elemento de izado de materiales o personas, salvo por requisitos de extrema gravedad, salvamento o socorro.

- La circulación sobre terrenos desiguales e irregulares se realizará a velocidad lenta.
- La vestimenta del conductor-maquinista será ceñida, a fin de evitar enganches accidentales con salientes, mandos, controles, etc.
- Se prohíbe encaramarse a la máquina durante la realización de cualquier movimiento.
- Antes de arrancar el motor, el conductor-maquinista deberá cerciorarse de que no hay nadie, ni ningún obstáculo en el área de operación de la máquina.
- Los conductores-maquinistas se cerciorarán de que sus operaciones no pondrán en peligro a los trabajadores que se encuentres en zanjas o pozos, así como a ningún otro, próximos al lugar donde el realiza dichas operaciones.
- Los conductores-maquinistas deberán controlar los excesos de comida, así como evitar la ingestión de bebidas alcohólicas antes o durante el trabajo.
- Los conductores-maquinistas no tomarán ningún medicamento sin prescripción facultativa, en especial aquellos que produzcan efectos negativos para una adecuada conducción.
- En los relevos de personal, el operario saliente indicará sus impresiones al entrante sobre el estado de la máquina y anotarlo en un libro de incidencias que permanecerá en la obra.

4.2. RETROEXCAVADORA

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Ambiente pulvígeno
- Aplastamientos
- Atrapamientos
- Atropellos y/o colisiones
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel

- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Vibraciones
- Sobreesfuerzos
- Ruido
- Vuelco de máquinas y/o camiones

Medidas preventivas:

- Protecciones colectivas:
    - Señalización acústica de marcha atrás
    - Topes para impedir el acercamiento a zonas peligrosas de taludes
    - Señalización de obra
- Protecciones individuales:
    - Casco de seguridad
    - Botas de seguridad
    - Protectores auditivos
    - Gafas protectoras
    - Mascarilla
    - Chaleco reflectante
- Señalización de seguridad:
    - Señales de obligatoriedad de uso de los EPIs especificados
    - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Cuando se vaya a trabajar en una zanja o trinchera se mantendrá siempre una distancia mínima de 2 metros al borde de la excavación. Se utilizarán los apoyos hidráulicos de inmovilización para mayor seguridad en las operaciones, siempre que no suponga una sobrecarga en la excavación y puedan producirse roturas en el terreno. En el caso del estacionamiento de la máquina, la distancia de seguridad se aumentará hasta los 3 metros.

Cuando se utilice la retroexcavadora en lugares en los que haya servicios afectados, se excavará hasta 50 cm por encima de la generatriz superior del servicio, terminándose la excavación mediante medios manuales, con las precauciones necesarias según el servicio. Si se encontraran cables eléctricos imprevistos, no se deberá salir de la máquina hasta haberse alejado del lugar y haber interrumpido el contacto. Se avisará a la Dirección Facultativa antes de proceder a cualquier actuación.

Se prohibirá la presencia de personas dentro del radio de acción de la máquina cuando esté en funcionamiento. No estará permitido el transporte o izado de personas con la retroexcavadora.

No estará permitido realizar esfuerzos por encima del límite de carga útil de la retroexcavadora. Se prohíbe el manejo de grandes cargas (cuchara llena) bajo régimen de fuertes vientos, ya que el choque del viento puede hacer inestable la carga. Se prohíbe expresamente utilizar la retroexcavadora como una grúa, para la colocación de las tuberías, piezas, etc.

Además se cumplirán todas las recomendaciones generales de la maquinaria.

4.3. PALA CARGADORA

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Ambiente pulvígeno
- Aplastamientos
- Atrapamientos
- Atropellos y/o colisiones
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Vibraciones

- Sobreesfuerzos
- Ruido
- Vuelco de máquinas y/o camiones

Medidas preventivas:

- Protecciones colectivas:
  - Señalización acústica de marcha atrás
  - Topes para impedir el acercamiento a zonas peligrosas de taludes
  - Señalización de obra
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Protectores auditivos
  - Gafas protectoras
  - Mascarilla
  - Chaleco reflectante
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Antes de iniciar las maniobras de carga y descarga del material, además de haber accionado el freno de mano de la cabina de la pala. Todas las maniobras de carga y descarga serán dirigidas, en caso necesario, por un especialista, conocedor del proceder más adecuado.

Durante los transportes de tierras la cuchara permanecerá en una posición que no entorpezca la visión del conductor y que no ponga en peligro la estabilidad del vehículo. Se evitarán las oscilaciones o frenazos bruscos que puedan desequilibrar la pala, excepto por motivos de seguridad mayor.

La circulación sobre terrenos desiguales y complicados se efectuará a velocidad lenta. El conductor se cerciorará, cuando circulen o trabajen cerca de zanjas o pozos, que no existe peligro para los trabajadores situados en estos lugares.

Se prohíbe transportar o izar personas utilizando la cuchara.

No estará permitido realizar esfuerzos por encima del límite de carga útil de la pala. Se prohíbe el manejo de grandes cargas (cuchara llena) bajo régimen de fuertes vientos, ya que el choque del viento puede hacer inestable la carga.

Además se cumplirán todas las recomendaciones generales de la maquinaria.

4.4. DUMPER Y CAMIÓN BASCULANTE

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Ambiente pulvígeno
- Aplastamientos
- Atrapamientos
- Atropellos y/o colisiones
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Vibraciones
- Sobreesfuerzos
- Ruido
- Vuelco de máquinas y/o camiones

Medidas preventivas:

- Protecciones colectivas:
    - Señalización acústica de marcha atrás
    - Topes para impedir el acercamiento a zonas peligrosas de taludes
    - Señalización de obra
- Protecciones individuales:
    - Casco de seguridad
    - Botas de seguridad
    - Protectores auditivos
    - Gafas protectoras
    - Mascarilla
    - Chaleco reflectante
- Señalización de seguridad:
    - Señales de obligatoriedad de uso de los EPIs especificados
    - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Antes de iniciar las maniobras de carga y descarga del material, además de haber accionado el freno de mano de la cabina del camión, se colocarán calzos inmovilizadores en las cuatro ruedas.

Todas las maniobras de carga y descarga serán dirigidas, en caso necesario, por un especialista, conocedor del proceder más adecuado.

Las cargas se instalarán sobre la caja de forma uniforme, compensando los pesos. Las operaciones de carga y descarga de los camiones se realizarán en los lugares destinados a tal efecto. El colmo máximo permitido para materiales sueltos no superará la pendiente ideal del 5% y se cubrirá con una lona en previsión de desplomes. Se dispondrá de elementos adecuados, para el acceso a la caja o zona de carga, mediante escaleras portátiles, móviles, fijas, etc. que ofrezcan seguridad a la persona que suba o baje a las labores de inspección, colocación y retirada de lonas, etc.

Además se cumplirán todas las recomendaciones generales de la maquinaria.

4.5. CAMIÓN HORMIGONERA

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Ambiente pulvígeno
- Aplastamientos
- Atrapamientos
- Atropellos y/o colisiones
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Vibraciones
- Sobreesfuerzos
- Ruido
- Vuelco de máquinas y/o camiones

Medidas preventivas:

- Protecciones colectivas:
  - Señalización acústica de marcha atrás
  - Topes para impedir el acercamiento a zonas peligrosas de taludes
  - Señalización de obra
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Guantes
  - Gafas protectoras
  - Mascarilla
  - Chaleco reflectante

- Señalización de seguridad:
    - Señales de obligatoriedad de uso de los EPIs especificados
    - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Se procurará no llenar en exceso la cuba en prevención de vertidos innecesarios durante el transporte de hormigón.

Se mantendrá siempre una distancia mínima al borde de la excavación de 2 metros. Se colocarán topes para evitar caídas y deslizamientos. Para la aproximación del camión al borde de la zanja, un operario dará las indicaciones pertinentes al conductor.

No se permitirá la presencia de ningún trabajador cerca del camión durante las maniobras ni fuera del campo de visión del conductor.

Los operarios que manejen las canaletas desde la parte superior de las zanjas evitarán permanecer a una distancia inferior a los 60 cm del borde de la zanja.

Se prohibirán la limpieza de la cuba y canaletas en la proximidad de los tajos.

4.6. COMPACTADORA

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Ambiente pulvígeno
- Aplastamientos
- Atrapamientos
- Atropellos y/o colisiones
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria

- Vibraciones
- Sobreesfuerzos
- Ruido
- Vuelco de máquinas y/o camiones

Medidas preventivas:

- Protecciones colectivas:
  - Señalización acústica de marcha atrás
  - Topes para impedir el acercamiento a zonas peligrosas de taludes
  - Señalización de obra
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Protectores auditivos
  - Gafas protectoras
  - Mascarilla
  - Guantes
  - Chaleco reflectante
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Todos los vehículos serán revisados periódicamente quedando reflejadas las revisiones en el libro de mantenimiento. Estarán todos dotados de luces, bocina y avisador acústico de marcha atrás. Si el compactador es de neumáticos, la presión de estos debe ser la prescrita por el fabricante, debiendo parar la máquina cuando dicha presión no sea la adecuada.

Para subir o bajar de la máquina, se hará de forma frontal utilizando los peldaños y asideros dispuestos para tal función y por tanto no saltar directamente al suelo, salvo en caso de un peligro inminente.

La puesta en estación y los movimientos del compactador durante las operaciones de compactación, serán dirigidos por un señalista o especialista. Se comprobará inicialmente que no existe ningún obstáculo o persona en el trayecto del compactador.

Los compactadores mantendrán una distancia de seguridad respecto al extendido mínima de 8 m.

4.7. CAMIÓN DE RIEGO

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Ambiente pulvígeno
- Aplastamientos
- Atrapamientos
- Atropellos y/o colisiones
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Vibraciones
- Sobreesfuerzos
- Ruido
- Vuelco de máquinas y/o camiones

Medidas preventivas:

- Protecciones colectivas:
    - Señalización acústica de marcha atrás

  - Topes para impedir el acercamiento a zonas peligrosas de taludes
  - Señalización de obra
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Protectores auditivos
  - Gafas protectoras
  - Mascarilla
  - Guantes
  - Chaleco reflectante
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Los camiones dedicados al riego de tierras en obra estarán en perfectas condiciones de mantenimiento y conservación. Las entradas y salidas a la obra se realizarán con precaución, auxiliado por las señales de un miembro de la obra. Si por cualquier circunstancia tuviera que parar en la rampa el vehículo quedará frenado y calzado con topes. Estarán todos dotados de luces, bocina y avisador acústico de marcha atrás.

Se prohíbe expresamente cargar los camiones por encima de la carga máxima marcada por el fabricante, para prevenir los riesgos de sobrecarga.

5. RIESGOS Y MEDIDAS PREVENTIVAS PARA LOS MEDIOS AUXILIARES

5.1. ELEMENTOS DE TOPOGRAFÍA

Riesgos:

- Ambiente pulvígeno
- Atropellos y/o colisiones
- Caída de objetos
- Caídas de personas a distinto o al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Ruido

Medidas preventivas:

- Protecciones colectivas:
    - Señalización de obra
- Protecciones individuales:
    - Casco de seguridad
    - Botas de seguridad
    - Protectores auditivos
    - Gafas protectoras
    - Chaleco reflectante
- Señalización de seguridad:
    - Señales de obligatoriedad de uso de los EPIs especificados
    - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Los técnicos que participen en estas tareas deberán llevar siempre el chaleco reflectante de alta visibilidad. Se intentará que no se realice ninguna otra tarea que pueda suponer un riesgo al personal, mientras se lleven a cabo las tareas de replanteo y comprobación.

5.2. MEDIOS DE SOLDADURA

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Problemas de visión
- Golpes y/o cortes con objetos y/o maquinaria
- Ruido
- Quemaduras
- Incendios

Medidas preventivas:

- Protecciones colectivas:
    - Señalización de la zona destinada a la soldadura
- Protecciones individuales:
    - Gafas o máscaras protectoras
    - Guantes
    - Mono de trabajo o delantal ignífugo
    - Casco de seguridad o gorro de lana
    - Botas de seguridad
    - Protectores auditivos
- Señalización de seguridad:
    - Señales de obligatoriedad de uso de los EPIs especificados

- Señales de prohibición de paso a toda persona ajena a las obras
- Carteles de “PELIGRO: MATERIALES INFLAMABLES”

Procedimientos preventivos:

Los operarios deberán utilizar las protecciones oculares adecuadas según el tipo de soldadura. El resto de los trabajadores permanecerán alejados del lugar de actuación siempre que sea posible. Si tienen que permanecer cerca de la posición donde se efectúe la soldadura, no deberán mirar nunca directamente a la operación, a menos de que tengan la protección adecuada.

Soldadura eléctrica:

La alimentación de energía eléctrica al grupo se realizará mediante conexión a través del cuadro eléctrico general y sus protecciones diferenciales en combinación con la red general de toma de tierras.

Antes de empezar el trabajo de soldadura, es necesario examinar el lugar y prevenir la caída de chispas sobre materias combustibles que puedan dar lugar a un incendio, sobre las personas o sobre el resto de la obra.

Se prohíbe expresamente dejar la pinza y su electrodo directamente en el suelo, se apoyará sobre un soporte aislante cuando se deba interrumpir el trabajo. Estará prohibido no instalar ni mantener instalada la protección de las flemas del grupo de soldadura, al igual que anular y/o no instalar la toma de tierra de la carcasa del grupo de soldadura. Para el empalme de mangueras se utilizarán conectores estancos o fundas termosoldadas. No se permitirá el uso de mangueras deterioradas, con cortes y/o con empalmes mal realizados.

Se deberá desconectar totalmente el grupo de soldadura cada vez que se realice una pausa durante la realización de los trabajos, además de cuando se terminen los trabajos.

Soldadura oxiacetilénica y oxicorte:

El traslado de botellas se realizará siempre sobre el carro portabotellas y con las correspondientes protecciones de las boquillas. No se tendrán las botellas expuestas al sol tanto en el acopio como durante su utilización. Las botellas se deberán utilizar en posición vertical, incluso cuando ya hayan sido utilizadas.

Los mecheros deberán estar provistos de válvulas antirretroceso de llama. Se deberá comprobar de forma segura, antes de cada uso, la inexistencia de cualquier fuga en mangueras, grifos o sopletes. Las mangueras se recogerán en carretes circulares, se deberán utilizar mangueras de igual color para cada tipo de gas. No se deberá dejar directamente en el suelo los mecheros.

En la ejecución de un corte se comprobará previamente que no existe peligro de que el trozo cortado caiga en una zona peligrosa (tránsito de personas, materiales inflamables, etc.).

Al terminar el trabajo, se deben cerrar perfectamente las botellas, al igual que cuando se realice una pausa. Este cierre se hará mediante la llave que poseen para tal efecto, evitando utilizar cualquier otra herramienta, para evitar estropear cualquier componente.

5.3. RADIALES

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Ruido
- Quemaduras
- Incendios

- Sobreesfuerzos

Medidas preventivas:

- Protecciones colectivas:
  - Señalización de la zona destinada al corte
- Protecciones individuales:
  - Gafas o máscaras protectoras
  - Guantes
  - Mono de trabajo
  - Casco de seguridad
  - Botas de seguridad
  - Protectores auditivos
  - Chaleco reflectante
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Los operarios deberán utilizar las protecciones individuales en todo momento. El resto de trabajadores permanecerán alejados del lugar de actuación siempre que sea posible. Se deberá paralizar la actividad en el momento en el que se perciba algún fallo en la herramienta, desconectándola de inmediato de la red eléctrica.

5.4. VIBRADOR DE HORMIGÓN

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Atrapamientos
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Vibraciones
- Sobreesfuerzos
- Ruido

Medidas preventivas:

- Protecciones colectivas:
  - Vallado perimetral de la obra
- Protecciones individuales:
  - Casco de seguridad
  - Botas de seguridad
  - Gafas de protección
  - Mascarilla
  - Guantes
  - Ropa de alta visibilidad
- Señalización de seguridad:
  - Señales de obligatoriedad de uso de los EPIs especificados
  - Señales de prohibición de paso a toda persona ajena a las obras

Procedimientos preventivos:

Se evitará vibrar directamente sobre las armaduras. Las conexiones eléctricas se efectuarán mediante conductores estancos de intemperie. Se vigilará que no sean anulados los elementos de protección contra el riesgo eléctrico.

6. RIESGOS Y MEDIDAS PREVENTIVAS DE MATERIALES

6.1. ÁRIDOS Y TIERRAS

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Atrapamientos
- Caída de objetos y/o máquinas
- Caídas de personas a distinto nivel
- Caídas de personas al mismo nivel
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Ambiente pulvígeno

Medidas preventivas:

Los áridos y excavaciones estarán acopiados de forma correcta en un lugar preparado para ello, de tal forma que no entorpezcan el paso de personas o vehículos. No se situarán cerca de zanjas y pozos. Siempre que sea posible se regarán para evitar la generación de polvo. Estarán en la obra el tiempo imprescindible. Si no van a ser reutilizadas en la propia obra, deberán transportarse a un gestor autorizado lo antes posible.

Los operarios que manejen este material deberán utilizar los siguientes equipos de protección individual:

- Casco
- Guantes
- Mascarilla

- Gafas protectoras
- Calzado de seguridad

6.2. Ferralla y perfiles metálicos

Riesgos:

- Proyecciones de objetos y/o fragmentos
- Contactos eléctricos
- Cuerpos extraños en ojos
- Golpes y/o cortes con objetos y/o maquinaria
- Sobreesfuerzos

Medidas preventivas:

Los perfiles y la ferralla estarán acopiados de forma correcta en un lugar preparado para ello, de tal forma que no entorpezcan el paso de personas o vehículos. No se situarán cerca de zanjas y pozos. Se taparán para evitar su oxidación y su deterioro. Estarán en la obra el tiempo imprescindible.

Los operarios que manejen este material deberán utilizar los siguientes equipos de protección individual:

- Casco
- Guantes
- Gafas protectoras
- Calzado de seguridad

7. RIESGOS Y MEDIDAS PREVENTIVAS PARA TERCEROS

Al tratarse de una zona agrícola, se reducen los riesgos a terceros. Para intentar eliminarlos por completo se vallará mediante un cerramiento de al menos 2 metros de altura y se impedirá el paso a cualquier persona ajena a las obras. Se indicarán estas prohibiciones en lugares visibles y en las entradas/salidas de la obra.

8. PROTECCIONES COLECTIVAS

8.1. GENERALES

Señales óptico-acústicas de vehículos de obra:

Las máquinas autoportantes que puedan intervenir en las operaciones de manutención deberán disponer de:

- Una bocina o claxon de señalización acústica cuyo nivel sonoro sea superior al ruido ambiental, de manera que sea claramente audible; si se trata de señales intermitentes, la duración, intervalo y agrupación de los impulsos deberá permitir su correcta identificación, Anexo IV del R.D. 485/97.
- Señales sonoras o luminosas (previsiblemente ambas a la vez) para indicación de la maniobra de marcha atrás, Anexo I del R.D. 1215/97.
- Los dispositivos de emisión de señales luminosas para uso en caso de peligro grave deberán ser objeto de revisiones especiales o ir provistos de una bombilla auxiliar.
- En la parte más alta de la cabina dispondrán de un señalizado rotativo luminoso destelleante de color ámbar para alertar de su presencia en circulación viaria.
- Dos focos de posición y cruce en la parte delantera y dos pilotos luminosos de color rojo detrás.
- Dispositivo de balizamiento de posición y preseñalización (lamas, conos, cintas, mallas, lámparas destelleantes, etc.).

Protección de personas en instalación eléctrica:

Instalación eléctrica ajustada al Reglamento Electrotécnico para Baja Tensión y hojas de interpretación, certificada por instalador autorizado. En aplicación de lo indicado en el apartado 3A del Anexo IV al R.D. 1627/97 de 24 de octubre de 1997, la instalación eléctrica deberá satisfacer, además, las siguientes condiciones:

- Deberá proyectarse, realizarse y utilizarse de manera que no entrañe peligro de incendio ni de explosión y de modo que las personas estén debidamente protegidas contra los riesgos de electrocución por contacto directo o indirecto
- El proyecto, la realización y la elección del material y de los dispositivos de protección deberán tener en cuenta el tipo y la potencia de la energía suministrada, las condiciones de los factores externos y la competencia de las personas que tengan acceso a partes de la instalación
- Los cables serán adecuados a la carga que han de soportar, conectados a las bases mediante clavijas normalizadas, blindados e interconexionados con uniones antihumedad y anti-choque. Los fusibles blindados y calibrados según la carga máxima a soportar por los interruptores
- Continuidad de la toma de tierra en las líneas de suministro interno de obra con un valor máximo de la resistencia de 80 Ohmios. Las máquinas fijas dispondrán de toma de tierra independiente
- Las tomas de corriente estarán provistas de conductor de toma a tierra y serán blindadas
- Todos los circuitos de suministro a las máquinas e instalaciones de alumbrado estarán protegidos por fusibles blindados o interruptores magnetotérmicos y disyuntores diferenciales de alta sensibilidad en perfecto estado de funcionamiento
- Distancia de seguridad a líneas de Alta Tensión: 3,3 + Tensión (kV)/100 (ante el desconocimiento del voltaje de la línea, se mantendrá una distancia de seguridad mínima de 5 m)

En tajos en condiciones de humedad muy elevadas:

- Es preceptivo el empleo de transformador portátil de seguridad de 24 V o protección mediante transformador de separación de circuitos
- Se acogerá a lo dispuesto en la MIBT 028 (locales mojados)

9. PROTECCIONES INDIVIDUALES

Afecciones en la piel por dermatitis de contacto:

- Guantes de protección frente a abrasión
- Guantes de protección frente a agentes químicos

Quemaduras físicas y químicas:

- Guantes de protección frente a abrasión
- Guantes de protección frente a agentes químicos
- Guantes de protección frente a calor

Insolación:

- Sombreros de paja

Proyecciones de objetos y/o fragmentos:

- Calzado con protección contra golpes mecánicos
- Casco protector de la cabeza contra riesgos mecánicos
- Gafas de seguridad para uso básico (choque o impacto con partículas sólidas)
- Pantalla facial abatible con visor de rejilla metálica, con atalaje adaptado al casco

Ambiente pulvígeno:

- Equipos de protección de las vías respiratorias con filtro mecánico
- Gafas de seguridad para uso básico (choque o impacto con partículas sólidas)
- Pantalla facial abatible con visor de rejilla metálica, con atalaje adaptado al casco

Ambientes pobres de oxígeno:

- Equipo de respiración autónomo, revisado y cargado

Aplastamientos:

- Calzado con protección contra golpes mecánicos
- Casco protector de la cabeza contra riesgos mecánicos

Atmósfera anaerobia (con falta de oxígeno) producida por gases inertes:

- Equipo de respiración autónomo, revisado y cargado

Atmósferas tóxicas, irritantes:

- Equipo de respiración autónomo, revisado y cargado
- Gafas de seguridad para uso básico (choque o impacto con partículas sólidas)
- Impermeables, trajes de agua
- Mascarilla respiratoria de filtro para humos de soldadura
- Pantalla facial abatible con visor de rejilla metálica, con atalaje adaptado al casco

Atrapamientos:

- Calzado con protección contra golpes mecánicos
- Casco protector de la cabeza contra riesgos mecánicos
- Guantes de protección frente a abrasión

Atropellos y/o colisiones:

- Chaleco reflectante

Caída de objetos y/o de máquinas:

- Bolsa portaherramientas
- Calzado con protección contra golpes mecánicos
- Casco protector de la cabeza contra riesgos mecánicos

Caída o colapso de andamios:

- Cinturón de seguridad anti-caídas
- Cinturón de seguridad clase para trabajos de poda y postes

Caídas de personas a distinto nivel:

- Cinturón de seguridad anti-caídas
- Cinturón de seguridad clase para trabajos de poda y postes

Caídas de personas al mismo nivel:

- Bolsa portaherramientas
- Calzado de protección sin suela anti-perforante

Contactos eléctricos directos:

- Calzado con protección contra descargas eléctricas
- Casco protector de la cabeza contra riesgos eléctricos
- Gafas de seguridad contra arco eléctrico
- Guantes dieléctricos

Contactos eléctricos indirectos:

- Botas de agua aislantes

Cuerpos extraños en ojos:

- Gafas de seguridad contra proyección de líquidos
- Gafas de seguridad para uso básico (choque o impacto con partículas sólidas)
- Pantalla facial abatible con visor de rejilla metálica, con atalaje adaptado al casco

Golpe por rotura de cable:

- Casco protector de la cabeza contra riesgos mecánicos
- Gafas de seguridad para uso básico (choque o impacto con partículas sólidas)
- Pantalla facial abatible con visor de rejilla metálica, con atalaje adaptado al casco

Golpes y/o cortes con objetos y/o maquinaria:

- Bolsa portaherramientas
- Calzado con protección contra golpes mecánicos
- Casco protector de la cabeza contra riesgos mecánicos
- Chaleco reflectante para señalistas y estrobadores
- Guantes de protección frente a abrasión

Pisada sobre objetos punzantes.

- Bolsa portaherramientas
- Calzado de protección con suela anti-perforante

Incendios:

- Equipo de respiración autónomo, revisado y cargado

Inundaciones:

- Botas de agua
- Impermeables, trajes de agua

Vibraciones:

- Cinturón de protección lumbar

Sobreesfuerzos:

- Cinturón de protección lumbar

Ruido:

- Protectores auditivos

Trauma sonoro:

- Protectores auditivos

Caída de personas de altura:

- Cinturón de seguridad anti-caídas

10. FORMACIÓN

Todo el personal debe recibir, al ingresar en la obra, una exposición de los métodos de trabajo y los riesgos que éstos pudieran entrañar, así como de las medidas de seguridad que deberá emplear. Eligiendo el personal más cualificado, se impartirán cursillos de socorrismo y primeros auxilios, de forma que todos los tajos dispongan de algún socorrista.

El contratista determinará, con el visto bueno de la Dirección de Obra, la frecuencia y la duración de la formación en materia de seguridad y salud que recibirán los operarios durante la obra.

11. VIGILANCIA DE LA SALUD

11.1. BOTIQUÍN

Se dispondrá de un botiquín conteniendo el material especificado en la Ordenanza General de Seguridad e Higiene en el Trabajo. Se repondrá el contenido del botiquín cada mes y de manera inmediata cuando se use algo de él. El botiquín estará en todo momento en la obra en el coche del encargado, que se aparcará en un mismo lugar todos los días, este lugar deberá ser sabido por todos los trabajadores de la obra y, o bien todos deberán tener una llave, o bien se tendrá abierto para el acceso al mismo de cualquier persona.

11.2. ASISTENCIA A LOS ACCIDENTADOS

Se dispondrán paneles en la obra, en lugares bien visibles, donde figuren lo teléfonos y direcciones de los Centros asignados para urgencias, ambulancias, taxis, etc., para garantizar un rápido transporte de los posibles accidentados a los centros de asistencia. Se informará a todos los trabajadores de palabra y además se pondrán paneles sobre la información de los diferentes emplazamientos de los Centros Médicos (servicios propios, Mutuas Patronales, Mutualidades Laborales, Ambulatorios, etc.) donde debe trasladarse a los accidentados para su más rápido y efectivo tratamiento.

11.3. RECONOCIMIENTOS MÉDICOS

Todo el personal que empiece a trabajar en la obra deberá pasar un reconocimiento médico previo a su incorporación a los trabajos, que será repetido en el período de un año o tras una baja.

12. ORGANIZACIÓN PREVENTIVA DE LA OBRA

La empresa constructora dispondrá de un servicio de prevención propio o ajeno que realizará la labor preventiva. Designará un trabajador como recurso preventivo con la formación adecuada y que permanecerá en la obra durante todo el desarrollo de las mismas. Este será el interlocutor válido con el coordinador de seguridad y salud de las obras.

13. PROCEDIMIENTO A SEGUIR EN CASO DE ACCIDENTE O EMERGENCIA

Se entiende por accidente de trabajo toda lesión corporal que el trabajador sufra con ocasión o por consecuencia del trabajo que ejecuta por cuenta ajena. Tendrán la consideración de accidente de trabajo:

- Los que sufra el trabajador al ir o volver del lugar de trabajo
- Los que sufra el trabajador con ocasión o como consecuencia del desempeño de cargos electivos de carácter sindical o de gobierno de las Entidades Gestoras, así como los ocurridos al ir o volver del lugar en que se ejerciten las funciones propias de dichos cargos.
- Los ocurridos con ocasión o por consecuencia de las tareas que, aun siendo distintas a las de su categoría profesional, ejecute el trabajador en cumplimiento de las órdenes del empresario o espontáneamente en interés del buen funcionamiento de la Empresa.
- Los acaecidos en actos de salvamento y en otros de naturaleza análoga, cuando unos y otros tengan conexión con el trabajo.
- Las enfermedades no incluidas en el artículo siguiente, que contraiga el trabajador con motivo de la realización de su trabajo, siempre que se pruebe que la enfermedad tuvo por causa exclusiva la ejecución del mismo.

- Las enfermedades o defectos padecidos con anterioridad por el trabajador, que se agraven como consecuencia de la lesión constitutiva del accidente.
- Las consecuencias del accidente que resulten modificadas en su naturaleza, curación, gravedad o terminación, por enfermedades intercurrentes, que constituyan complicaciones derivadas del proceso patológico determinado por el accidente mismo o tengan su origen en afecciones adquiridas en el nuevo medio en que se haya situado el paciente para su curación.

Se presumirá, salvo prueba en contrario, que son constitutivas de accidentes de trabajo las lesiones que sufra el trabajador durante el tiempo y en el lugar de trabajo. (Art. 84 de la Ley General de la Seguridad Social. Cap. III. Sección primera. Contingencias protegibles). Se darán instrucciones concretas a todos los trabajadores de las actuaciones que deberán hacer en caso de accidentes y que a continuación se detallan.

13.1. ACTUACIÓN EN CASO DE ACCIDENTE

La empresa constructora se encargará de que los trabajadores tengan unas nociones, aunque sean básicas, de primeros auxilios ya que por muy perfecta que sea la empresa, siempre existe la posibilidad de que se produzca un accidente, y no siempre hay personal sanitario especializado. En este sentido, presentamos unas nociones básicas de primeros auxilios analizando sus características y procedimientos generales de intervención, de forma que nos familiaricemos con algunas pautas elementales de actuación en caso de accidente, lesión o, enfermedad.

Podemos definir Primeros Auxilios como el conjunto de actuaciones, tratamiento y cuidados de emergencia que se dan a un trabajador de forma inmediata y provisional en caso de accidente o enfermedad repentina, antes de disponer de apoyo médico completo. Como criterios generales de actuación en caso de accidente podemos señalar:

- Conservar la calma en todo momento: Para que la intervención sea eficaz, debemos estar tranquilos para actuar con rapidez.
- Hacer un rápido examen de la situación: Es fundamental detectar las posibles fuentes de riesgo que existan en el lugar del accidente y, actuar sobre ellas.

- Antes de iniciar la ayuda a las víctimas debemos eliminar el riesgo para evitar nuevos accidentes, o nuevos accidentados.
- Localizar a todos los afectados: Nuestra actuación debe priorizarse sobre aquellas personas cuyo estado revista mayor gravedad. Cuando se llega al lugar de accidente no se debe comenzar a actuar curando al primer herido que se encuentre, ya que puede haber otros heridos más graves y que necesiten ayuda más urgente.
- Solicitar auxilio sanitario con la mayor urgencia posible, indicando el lugar exacto donde se ha producido el accidente, el número y el estado aparente de la víctima.
- Una vez se ha efectuado el rescate de las víctimas no se debe cambiar de sitio ni mover al accidentado antes de cerciorarse de su estado y, haberle proporcionado los primeros auxilios. Si no se conoce las posibles lesiones NO SE LE MOVERÁ.
- Nunca se dé de beber a una persona sin conocimiento.
- No permita que el accidentado se enfríe.
- Tranquilizar a la víctima. Lo primero que hay que hacer es, realizar una evaluación del estado del accidentado que supone recoger de forma sistemática y precisa todos aquellos datos que puedan ser de utilidad para facilitar, no sólo la actuación de los primeros auxilios sino también la posterior intervención de los equipos médicos. Existen dos formas complementarias y consecutivas de evaluar una situación:
    - Evaluación inicial: es una situación de urgencia. Lo primero que debe hacerse es una rápida evaluación del estado de la persona accidentada. Esta primera valoración se inicia con la primera impresión que se tiene al ver a la persona herida y las circunstancias que rodean al accidente, comprobando las constantes vitales de la persona accidentada, para, realizar un examen básico comprobando:
        - Respiración: se debe comprobar la respiración de la persona accidentada, movimiento del tórax, sentir la salida del aire por la nariz y la boca…

        - Circulación sanguínea: actividad del corazón y ausencia de grandes hemorragias; comprobar el pulso, examinar si el corazón late con normalidad…
        - Conciencia: actividad del sistema nervioso.
    - Evaluación secundaria: en un segundo lugar hay que proceder a una revisión más detenida del estado del accidentado, con lo que se comprueba si existen lesiones o alteraciones importantes, fijando la atención en tres puntos:
        - Comprobación de las funciones vitales.
        - Exploración física general: se han de buscar fracturas de miembros o columna vertebral, golpes recibidos en la cabeza, tórax y/o espalda que pueden producir lesiones o hemorragias internas.

Es conveniente anotar algunos datos básicos que luego servirán al servicio médico como por ejemplo:

- Datos personales.
- Constantes vitales.
- Enfermedades que padezca.
- Medicación que toma.
- Alergias a medicamentos.
- Localización de dolores.
- Explicaciones sobre lo sucedido.
- Actuaciones de primeros auxilios realizadas.

Los primeros auxilios no son tratamientos médicos. Son actuaciones de emergencia para reducir los efectos de las lesiones y estabilizar el estado del accidentado. A continuación ofrecemos algunas orientaciones sobre las actuaciones concretas que deben desarrollarse con un accidentado:

- <u>Comprobación de la respiración</u>. En la evaluación inicial lo primero que hay que hacer es comprobar si existe respiración:

- Nos debemos situar a la altura de los hombros, retirando o aflojando la ropa y objetos que molesten el pecho de la víctima.
- Colocaremos al sujeto sobre un plano duro, boca arriba con los brazos a lo largo del cuerpo.
- Comprobaremos la respiración acercando un lateral de nuestra cara a la boca y la nariz de la víctima para sentir la entrada y salida de aire.
- Si no sentimos la respiración, comprobar que la boca y faringe están libres de objetos que puedan obstruir las vías aéreas. La lengua también puede obstruir el paso del aire para evitarlo, hay que hacer una maniobra que se denomina «hiperextensión»: pondremos una mano en la frente que empujará hacia abajo y, la otra en la nuca que tirará hacia arriba, consiguiendo así estirar el cuello elevando la mandíbula. Si hay respiración giraremos la cabeza hacia un lado y pasaremos a realizar una evaluación secundaria; si por el contrario no hay respiración realizaremos la respiración boca a boca y volveremos a tomar el pulso.

- Boca a boca. Consiste en introducir en los pulmones de la víctima el aire de nuestra boca, laringe, faringe, tráquea y bronquios antes de que quede viciado por nuestra propia respiración. Los pasos a seguir son:

  - Manteniendo el cuello de la víctima en extensión pegaremos los labios herméticamente alrededor de la boca del accidentado mientras pinzamos la nariz con los dedos índice y pulgar de la mano que mantenemos en la frente; le insuflaremos el aire con fuerza moderada durante no más de 2 segundos a la vez que miramos el tórax y el abdomen y, nos aseguramos que el tórax sube.
  - No retirar la mano de la nuca, si lo hacemos porque la boca está firmemente cerrada y es necesario abrirla no la apoyéis en la garganta ya que impediría la entrada de aire.
  - Si al insuflar el aire vemos que el abdomen sube es porque el aire pasa al estómago en vez de los pulmones; entonces hemos de corregir la postura de la cabeza realizando de nuevo la hiperextensión.

- Comprobación del pulso. El pulso lo vamos a localizar en cualquiera de las arterias carótidas situadas en el cuello a ambos lados de la nuez.
    - Utilizaremos 2 o 3 dedos (nunca el pulgar) de la mano que teníamos en la nuca, que, haremos resbalar por cualquiera de los laterales de la tráquea (mejor el lado opuesto a nosotros).
    - Si sentimos el pulso seguiremos realizando el boca a boca a ritmo de 1 insuflación cada 5 segundos.
    - Si no sentimos en pulso NO golpear el tórax con el puño, comenzaremos el masaje cardíaco externo.

- Masaje cardiaco externo. Consiste en comprimir el corazón entre el esternón y la columna vertebral cargando nuestro peso sobre el tercio inferior del esternón de la víctima.
    - Para localizar este punto con exactitud seguiremos con los dedos de la mano el borde inferior de la costilla en dirección al esternón, y en la zona central del pecho chocaremos con la punta cartilaginosa del esternón. En este punto pondremos 2 ó 3 dedos de la otra mano en dirección a la cabeza y aquí, colocaremos el talón de la primera mano.
    - Sin apoyar ni la palma de la mano ni los dedos sobre la víctima, pondremos la otra mano sobre la primera, entrelazando los dedos, y, con los brazos rectos y perpendiculares al pecho de la víctima dejaremos caer nuestro peso con el fin de descender al tórax unos centímetros.
    - Las comprensiones tienen que ser secas y rítmicas, contaremos hasta llegar a 15 donde volveremos a dar dos insuflaciones rápidas y de nuevo daremos masajes.
    - Al finalizar cada secuencia volveremos a valorar el pulso está presente, si no hay pulso seguiremos realizando el masaje. Si hay pulso volveremos a valorar la respiración.
    - Daremos por finalizado el masaje cuando:

- Otra persona nos sustituya.
- Estemos agotados y no podemos continuar con la reanimación.
- Recupere las constantes vitales.
- Un médico certifique el fallecimiento.

A continuación ofrecemos algunas orientaciones sobre las actuaciones concretas que deben desarrollarse en una intervención básica de primeros auxilios:

- Accidentes con heridas sin hemorragias fuertes. La manera de actuar ante una herida es el siguiente:
  - Limpiar la zona afectada.
  - Lavar con abundante agua.
  - Limpiar con una gasa.
  - Desinfectar la herida con antiséptico.
  - Cubrir la herida con una gasa estéril y fijarla con esparadrapo.
  - No utilizar algodón en contacto con la herida.

- Accidentes con hemorragias fuertes. Cuando se produce una hemorragia hay que:
  - Taponar la herida.
  - Cubrirla con un apósito y comprimir. Pasados 5 minutos atar el apósito fuertemente mediante vendas.
  - Si la herida continua sangrando, poner otras vendas sobre la misma sin retirar la anterior, a la vez que se lava la extremidad afectada. Si se ha empapado de sangre las gasas se ponen otras sin quitar las primeras.
  - Se procurará elevar la zona herida ya esto disminuirá la presión de la sangre sobre la zona y sangrará menos.
  - Hay que acostar al herido, ya que toda hemorragia puede ocasionar un desmayo.
  - Comprensión de la arteria por encima de la herida si la hemorragia sigue o si hay algún cuerpo extraño. Para hacer un vendaje comprensivo se aprieta a tope con un pañuelo o venda la herida y, poniendo el nudo por

encima de la herida, se espera unos 15 minutos (tiempo que tarda en formarse el coágulo). Si la sangre se ha coagulado es mejor no tocar la herida para evitar la reproducción de la hemorragia.

- Accidentes con hemorragias internas. Una hemorragia interna hay que sospecharla ya que la sangre no fluye al exterior y, por tanto, no se ve. Los síntomas que nos hace intuir su existencia son:
    - Piel fría, pálida y sudorosa
    - Respiración superficial y rápida
    - Pulso rápido y débil
    - Inquietud
    - Empeoramiento creciente del estado de conciencia o del estado general

  La manera de proceder será:
    - Trasladar urgentemente al hospital más cercano
    - Si está consciente acostar boca arriba y con las piernas elevadas. Si no está consciente en posición lateral de seguridad.
    - Aflojar cualquier prenda apretada
    - No dar de comer ni beber
    - Tranquilizar al herido
    - Vigilar el estado de consciencia, respiración, pulso etc.

- Accidentes con fracturas. Los síntomas que nos pueden indicar que existe una fractura son:
    - Impotencia funcional, es decir, que no puede mover el miembro fracturado
    - Movilidad anormal. El miembro puede moverse de forma extraña.
    - Deformación del miembro a simple vista.
    - La región fracturada estará hinchada, roja y duele.

- Si el accidentado no puede mover las piernas o brazos, no los siente o tiene hormigueo, hay que sospechar que tiene fracturada la columna vertebral.

Las medidas a aplicar en caso de fracturas son:

- Explorar signos vitales y buscar otras posibles lesiones.
- Prohibir todo movimiento y transporte antes de la inmovilización.
- Inmovilización del miembro fracturado.
- Elevación del foco de la fractura.
- Si existe sospecha de fractura de la columna vertebral no mover al accidentado, impidiendo que flexione su columna vertebral.
- En las inmovilizaciones hay que tener en cuenta:
  - Se debe inmovilizar no sólo la zona fracturada, sino también las articulaciones situadas por encima y por debajo.
  - Las tiras de inmovilización nunca deben estar en la zona de fractura.
  - La presión de los vendajes debe ser la suficiente para inmovilizar sin dificultar la circulación sanguínea.
  - Los dedos siempre deben quedar visibles

- Accidentes con quemaduras. Las quemaduras pueden ser de 1er grado, de 2º grado y de 3er grado. Además de la profundidad, hay que tener en cuenta la extensión de la misma por la pérdida de líquidos corporales que toda quemadura conlleva. Lo ideal es llamar a una persona preparada para que evalúe las quemaduras. La extensión de la zona quemada es decisiva para la evaluación del accidente; las quemaduras cuya extensión es mayor que la superficie de una mano se consideran lesiones importantes, a excepción de las de 1er grado. Hasta que llegue alguien el personal preparado en primeros auxilios, de manera general algunas medidas a seguir son:
  - No correr: si el accidentado está ardiendo, no debe correr porque se aviva el fuego.

- Debe ponerse en posición horizontal y rodar sobre sí mismo y, envolverse en mantas.
- Retirar anillos, pulseras, quitar la ropa comprensiva. Lavar la herida con suero salino, o en su defecto con agua fresca y limpia.

En quemaduras de 1er y 2º grado realizaremos un tratamiento local:

- Aplicaremos agua fría que elimina parte del dolor y desciende el foco de calor.
- Limpiar alrededor de la herida con antiséptico.
- Untar con vaselina estéril, aceite de parafina o pomada.
- No abrir la ampolla ya que esto dejaría vía libre a los gérmenes aumentando el riesgo de infección y la sensación de dolor.

Ante quemaduras de 3er grado o muy graves se dará un tratamiento general, vigilando siempre las constantes vitales:

- Acostar a la víctima y tranquilizarla.
- No quitarle la ropa a menos que esté empapada en líquido cáustico como la sosa o la lejía.
- No tocar ni aplicar ninguna sustancia sobre la quemadura.
- Cubrir las lesiones con compresas estériles secas, paños o sábanas limpias.
- Tapar con una manta al accidentado.
- Si puede beber, darle agua a la que se habrá añadido una cucharadita de sal y otra de bicarbonato por cada litro de agua.
- Trasladar a un hospital con carácter de urgencia.

13.2. ACTUACIÓN EN CASO DE INCENDIO

Si detecta un incendio:

- Comunique la emergencia utilizando los pulsadores de alarma y por teléfono al número indicado en la obra indicando quién informa, qué ocurre y dónde ocurre. Si no consigue comunicar con el teléfono indicado, llame a los bomberos.

- Si se encuentra capacitado y la intervención no entraña peligro, intente apagar el fuego. Si no, desaloje la zona, cerrando puertas y ventanas, si la magnitud del fuego lo permite.

Si se encuentra atrapado por el fuego:

- Si hay humo camine a gatas, utilizando un pañuelo húmedo protegiéndose la nariz y boca
- Cierre las puertas entre usted y el humo.
- Tape las ranuras alrededor de las puertas y aberturas, utilizando trapos y alfombras. Mójelas si tiene agua a mano.
- Busque un recinto con ventana al exterior y hágase ver. Comunique con los medios de los que disponga, dónde se encuentra.
- No abra nunca una puerta si al tocarla percibe una temperatura superior a la habitual.

13.3. ACTUACIÓN EN OTRAS EMERGENCIAS

- <u>Envenenamiento por ácidos o bases</u>
    - Llamada 112
    - Traslado urgente
    - Si está consciente, dar de beber agua
    - No provocar el vómito

- <u>Quemaduras químicas</u>
    - Solicitar asistencia sanitaria
    - Llamada al 112
    - Quitar la ropa
    - Lavar abundantemente bajo ducha la zona afectada (10-15 minutos)

- <u>Inhalación de productos químicos</u>
    - Llamada 112

    - Traslado urgente
    - Mantenerle tumbado y abrigado

- Choque eléctrico
    - Llamada 112
    - ELIMINAR LA CAUSA DEL ACCIDENTE ANTES DE ASISTIR AL MISMO, CORTANDO EL SUMINISTRO ELÉCTRICO

14. TELÉFONOS DE URGENCIAS E INTERÉS

En la obra siempre estará a disposición de la misma, al menos, el teléfono del Coordinador de Seguridad y Salud. En paneles y siempre visibles desde cualquier zona de la obra, deberán constar, al menos, los teléfonos siguientes:

- Urgencias: 112
- Hospital general de Llerena, Avda. Badajoz, 1, tfno. 924 877 000
- Centro de Salud "Llerena", Paseo de San Antón, s/n, tfno. 924 870 250 / 251
- Cruz Roja, tfno. 924 870 114
- Policía local de Llerena, tfno. 092 / 924 870 007
- Guardia Civil: 062 / 924 873 819
- Policía nacional 091
- Información toxicológica: 915620420

15. INSTALACIONES DE HIGIENE Y BIENESTAR

Para atender las necesidades del personal que trabaja en las obras, así como del personal técnico de la empresa constructora y Dirección Técnica, se dispondrá en la obra de casetas que contengan, aseos, comedores y vestuarios con capacidad para seis personas. Los servicios tendrán, al menos, un inodoro, dos duchas y dos lavabos, dotados de acometida de agua, saneamiento y energía eléctrica, así como de portarrollos con papel, jabón y toallas. El comedor dispondrá una mesa caliente para calentar comida, una mesa de madera y sillas para seis personas, deberá tener un contenedor de basuras que se vaciará diariamente. El comedor estará dotado de acometida de agua potable, saneamiento y energía eléctrica. El vestuario dispondrá de seis taquillas con llave, perchas y bancos de madera.

Cáceres, febrero de 2016

El autor del proyecto

Fdo: Jesús Fernández González

PLANOS

ÍNDICE DE PLANOS

Nº PLANO	DESIGNACIÓN	Nº HOJAS
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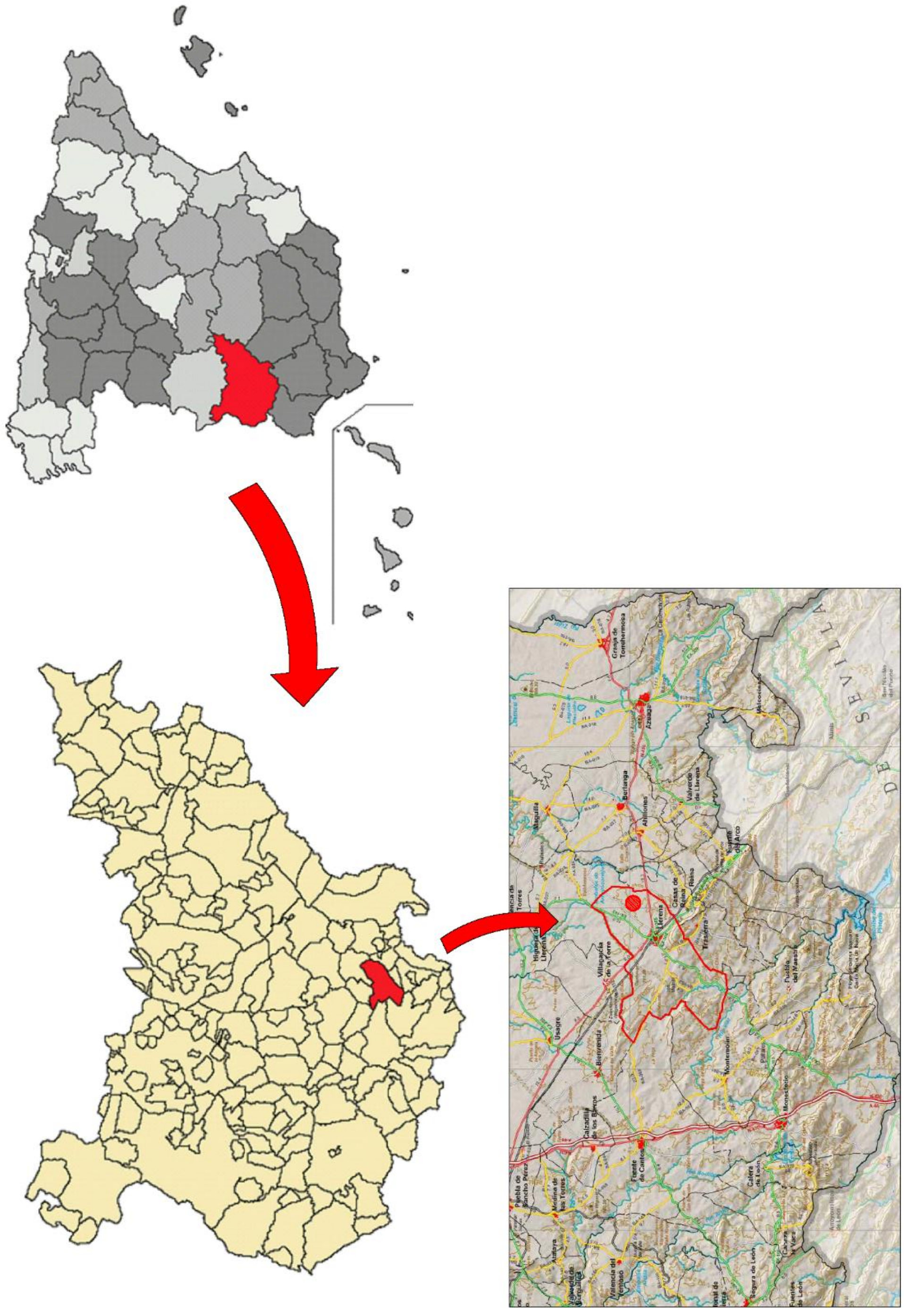
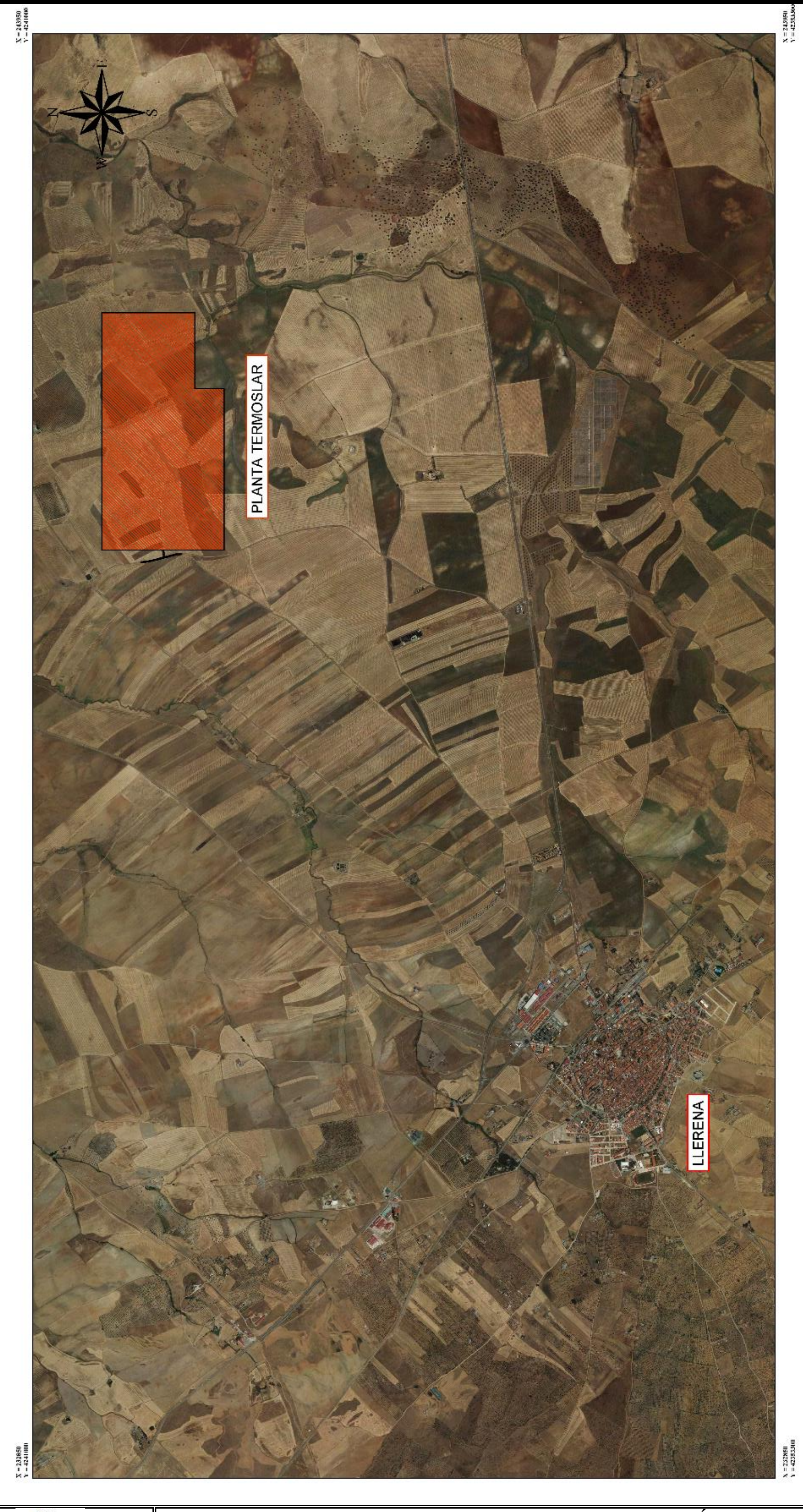
SS2	EMPLAZAMIENTO	2 hojas
SS3	SEÑALIZACIÓN	4 hojas
SS4	PROCEDIMIENTOS PREVENTIVOS	21 hojas
SS5	INSTALACIONES DE HIGIENE Y SALUD	2 hojas



	UNIVERSIDAD DE EXTREMADURA – ESCUELA POLITÉCNICA DE CÁCERES GRADO EN INGENIERÍA CIVIL – CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIN.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO	SITUACIÓN		
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** **SS1**
ESCALA	S/ ESCALA		**HOJA Nº 1 DE 1**



Escuela Politécnica	UNIVERSIDAD DE EXTREMADURA – ESCUELA POLITÉCNICA DE CÁCERES GRADO EN INGENIERÍA CIVIL – CONSTRUCCIONES CIVILES		
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DESIGNACIÓN DEL PLANO	EMPLAZAMIENTO		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA**	FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO**	**SS2**
ESCALA	S/ ESCALA	**HOJA Nº 1 DE 1**	

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DESIGNACIÓN DEL PLANO	SEÑALIZACIÓN		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA**	FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO**	**SS3**
ESCALA S/ ESCALA		**HOJA Nº 1 DE 4**	

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TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO**	**SS3**
ESCALA S/ ESCALA		**HOJA Nº 2 DE 4**	

ESPECIFICACIONES

SEÑALES DE ADVERTENCIA

FORMA TRIANGULAR. PICTOGRAMA NEGRO SOBRE FONDO AMARILLO (EL AMARILLO DEBERA CUBRIR COMO MINIMO EL 50% DE LA SUPERFICIE DE LA SEÑAL), BORDES NEGROS.
COMO EXCEPCION, EL FONDO DE LA SEÑAL SOBRE "MATERIAS NOCIVAS O IRRITANTES" SERA DE COLOR NARAANJA, EN LUGAR DE AMARILLO, PARA EVITAR CONFUSIONES CON OTRAS SEÑALES SIMILARES UTILIZADAS PARA LA REGULACION DEL TRAFICO POR CARRETERA.

SEÑALES DE PROHIBICIÓN

FORMA REDONDA. PICTOGRAMA NEGRO SOBRE FONDO BLANCO, BORDES Y BANDA /TRANSVERSAL DESCENDENTE DE IZQUIERDA A DERECHA ATRAVESANDO EL PICTOGRAMA A 45° RESPECTO A LA HORIZONTAL) ROJOS (EL ROJO DEBERA CUBRIR COMO MINIMO EL 35% DE LA SUPERFICIE DE LA SEÑAL).

SEÑALES DE OBLIGACIÓN

FORMA REDONDA. PICTOGRAMA BLANCO SOBRE FONDO AZUL (EL AZUL DEBERA CUBRIR COMO MINIMO EL 50% DE LA SUPERFICIE DE LA SEÑAL).

SEÑALES RELATIVAS A LOS EQUIPOS DE LUCHA CONTRA INCENDIOS

FORMA RECTANGULAR O CUADRADO. PICTOGRAMA BLANCO SOBRE FONDO ROJO (EL ROJO DEBERA CUBRIR COMO MINIMO EL 50% DE LA SUPERFICIE DE LA SEÑAL).

SEÑALES DE SALVAMENTO O SOCORRO

FORMA RECTANGULAR O CUADRADA. PICTOGRAMA BLANCO SOBRE FONDO VERDE (EL VERDE DEBERA CUBRIR COMO MINIMO EL 50% DE LA SUPERFICIE DE LA SEÑAL).

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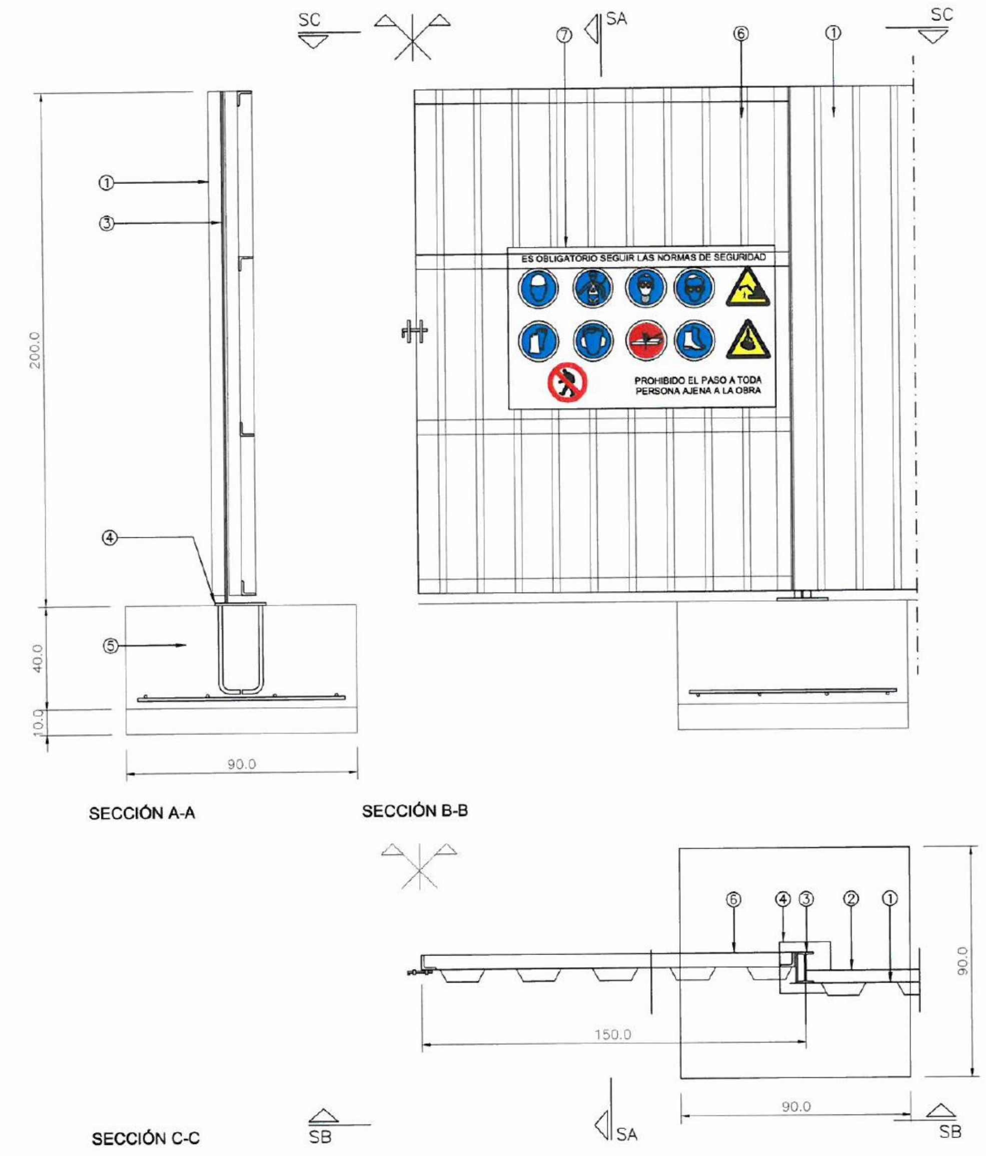
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO**	**SS3**
ESCALA	S/ ESCALA	**HOJA Nº 3 DE 4**	

SEÑALIZACIÓN DE ENTRADA A OBRA



LEYENDA

1. CHAPA GRECADA e=1.2 mm
2. TUBO DE ACERO HUECO
3. SOPORTE, PERFIL LAMINADO IPE 120
4. PLACA DE APOYO 200.200.10 4ø16
5. ZAPATA DE HORMIGÓN ARMADO
6. PUERTA DE ACCESO
7. PANEL DE SEÑALIZACIÓN DE ENTRADA A LA OBRA

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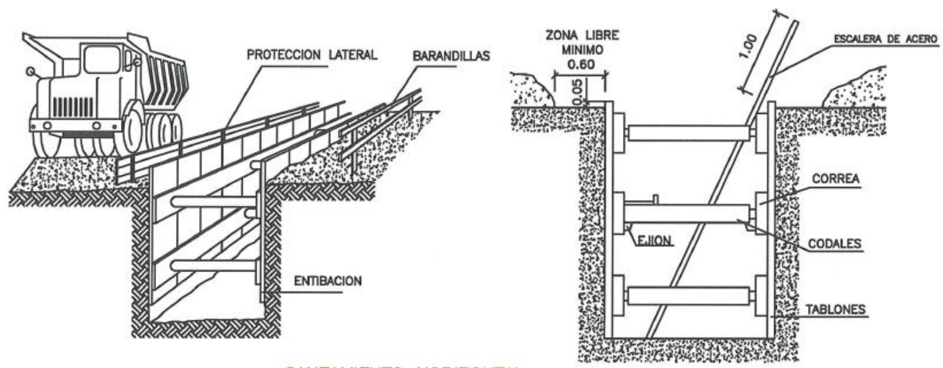
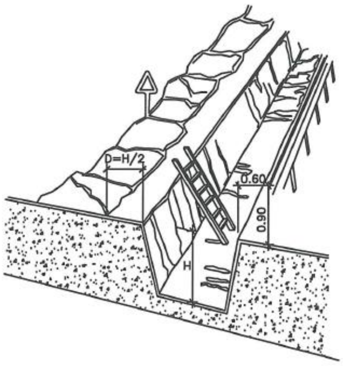


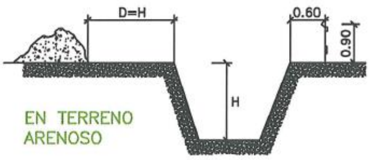
SANEAMIENTO HORIZONTAL



PROTECCION EN ZANJAS

EN HUECOS Y ABERTURAS

DETALLE DE PASARELA PEATON



EN TERRENO ARENOSO

ENTIBACION LIGERA

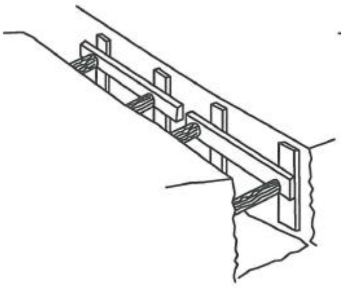
- SE COLOCA EL MATERIAL DE CONTENCION DE FORMA REPARTIDA Y CUBRIENDO MENOS DEL 50% DE LA SUPERFICIE.
- PUEDE UTILIZARSE EN TERRENOS ESTABLES Y CON PROFUNDIDAD DE HASTA 2.00m, SIN SOLICITACIONES.

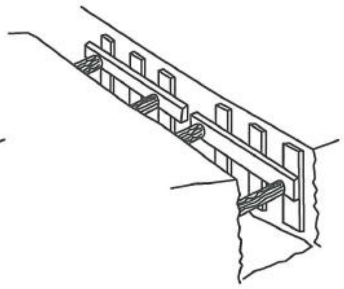
ENTIBACION SEMICUAJADA

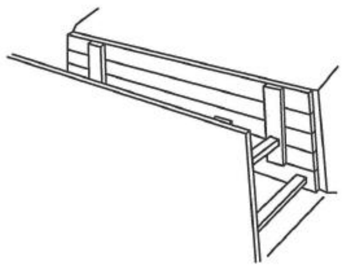
- SE EFECTUARA COMO MINIMO EN TERRENOS SIN SOLICITACION Y HASTA UNA PROFUNDIDAD E 2.50m, O CON PROFUNDIDADES INFERIORES SI HAY SOLICITACION.

ENTIBACION CUAJADA

- SE INSTALA PARA CUBRIR TODA LA SUPERFICIE DE LAS PAREDES EXCAVADAS, POR LO QUE ES ADECUADA PARA CASI LA TOTALIDAD DE LAS SITUACIONES Y OFRECE EL MAYOR PORCENTAGE DE GARANTIAS.







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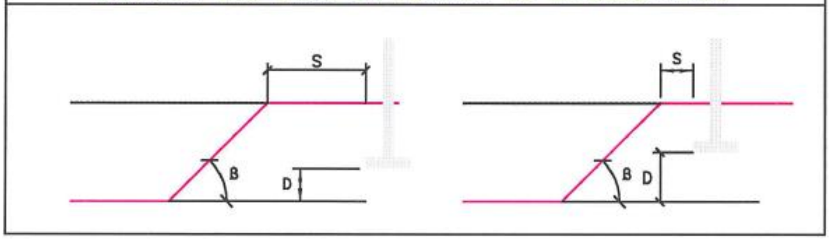
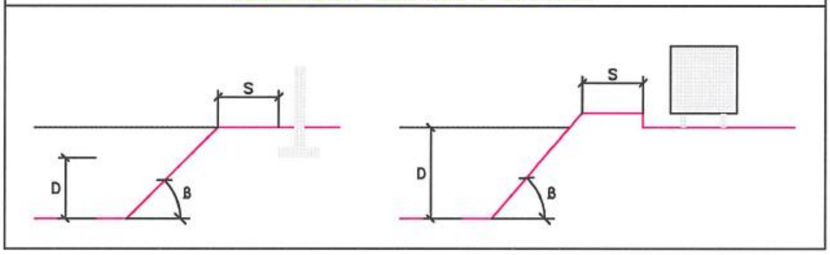
DISTANCIA AL TALUD		
TIPO DE SOLICITACION	ANGULO DE TALUD	
	$\beta > 60°$	$\beta \leq 60°$
CIMENTACION	D	D
VIAL O ACOPIOS EVENTUALES	D	D/2

DISTANCIA DEL TALUD EN FUNCION DE LA SOLICITACION

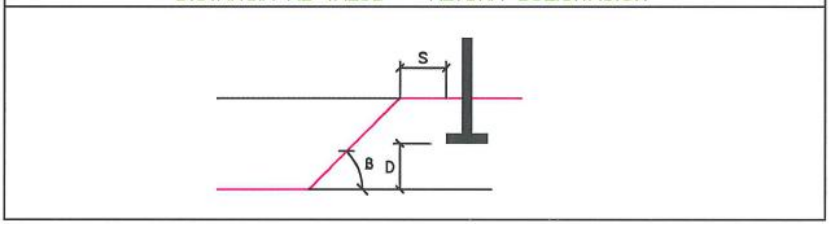


S= DISTANCIA A LA FUERZA, PESO ESTATICO O DINAMICO QUE AFECTA AL TALUD
D= ALTURA HASTA LA FUERZA, PESO ESTATICO O DINAMICO QUE AFECTA AL TALUD
B= ANGULO DEL TERRENO AL TALUD A EXCAVAR

SOLICITACION ESTATICA Y DINAMICA



DISTANCIA AL TALUD = ALTURA SOLICITACION



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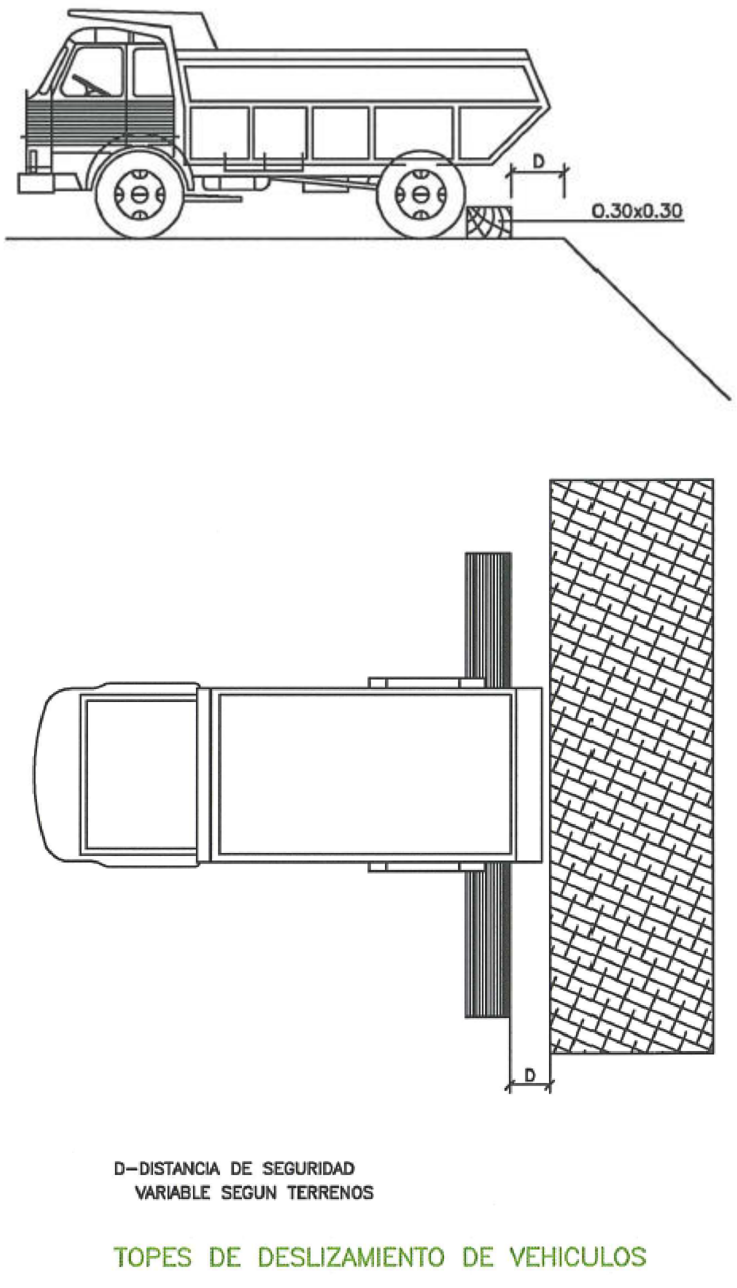
ESCALA	S/ ESCALA		**HOJA Nº 2 DE 21**



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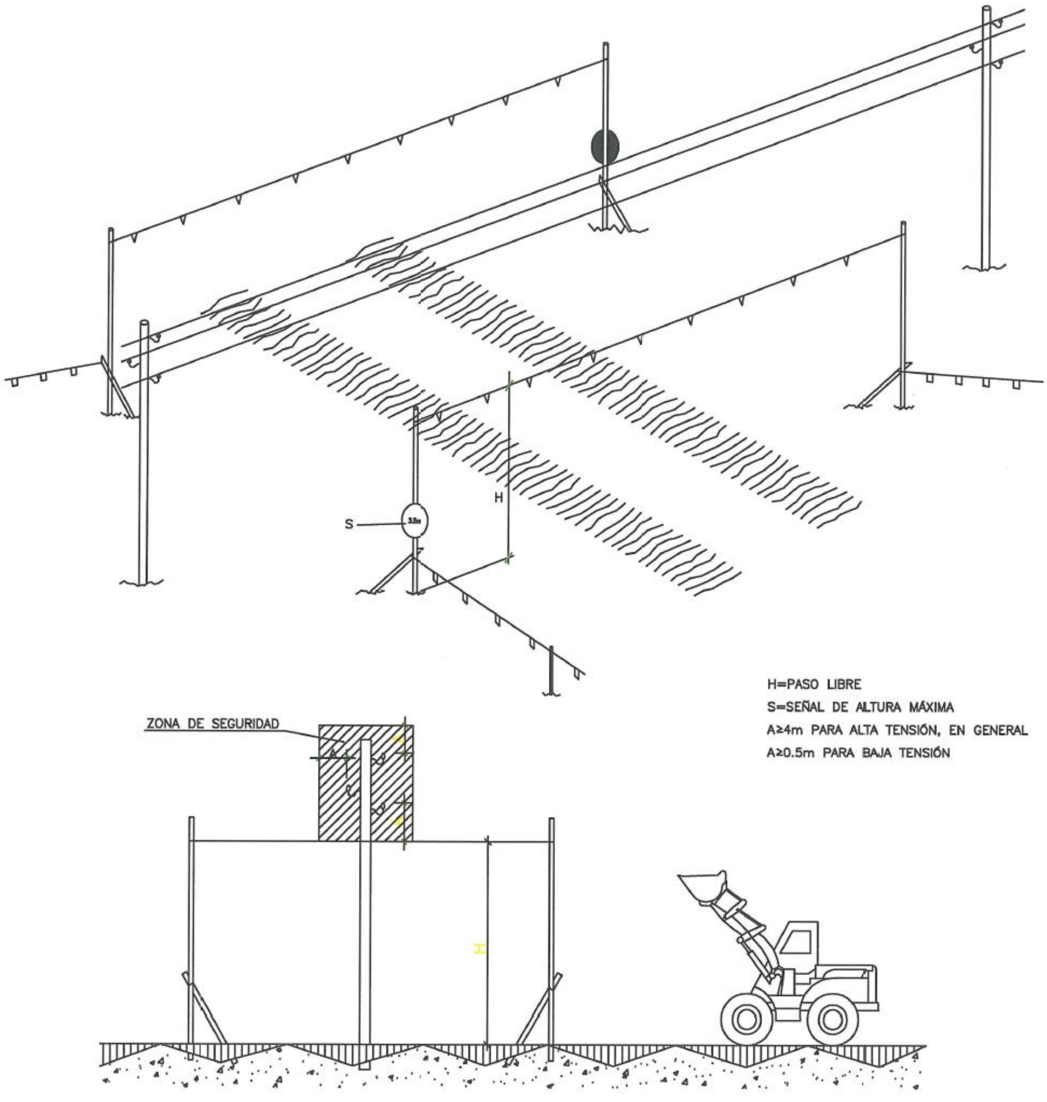

PÓRTICO PROTECTOR DE LINEA ELÉCTRICA AÉREA
DE ALTA TENSIÓN Y
DE BAJA TENSIÓN.

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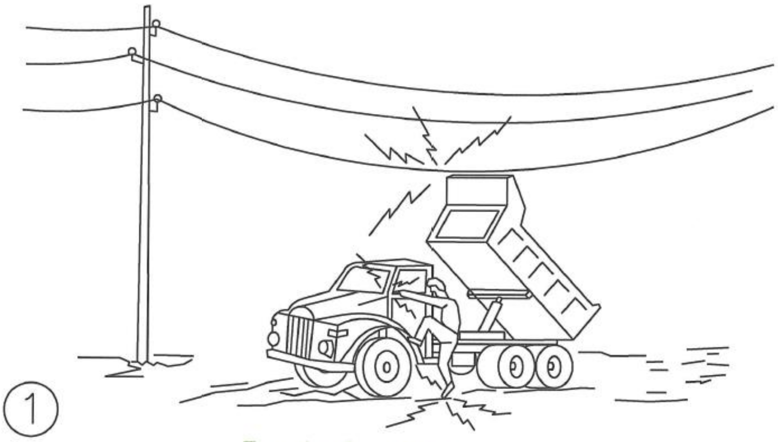
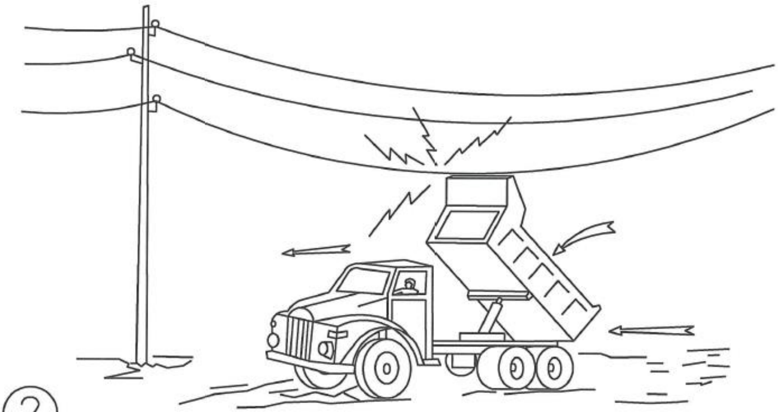
ESCALA S/ ESCALA		**HOJA Nº 4 DE 21**	



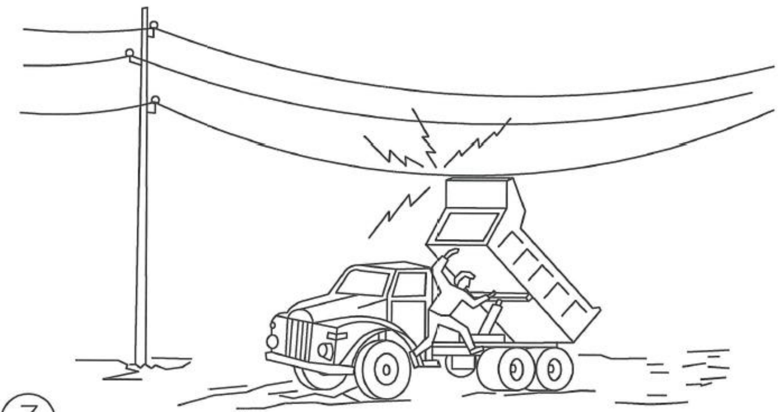
1

En ningún caso desciende lentamente



2

Si contacta, no abandone la cábina, intente en primer lugar bajarlo y alejarse



3

Si no consigue que baje, salte del camión lo más lejos posible

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TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO**	**SS4**
ESCALA S/ ESCALA		**HOJA Nº 5 DE 21**	

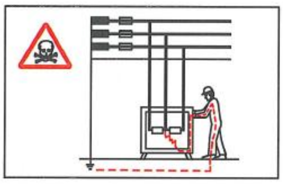
RIESGOS ELÉCTRICOS
CAUSAS DE ACCIDENTES POR ELECTRICIDAD

1— CONTACTOS DIRECTOS

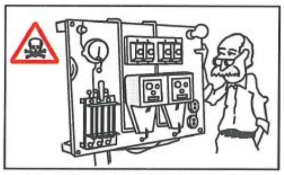
MANIPULACIÓN DE INSTALACIONES

REPARACIÓN DE EQUIPOS BAJO TENSIÓN

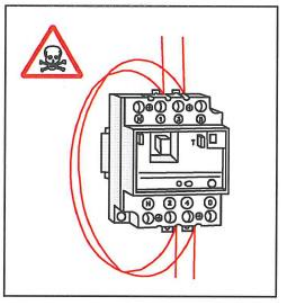
2— CONTACTOS INDIRECTOS



DEFECTOS DE AISLAMIENTO EN MAQUINAS SIN PROTECCIÓN.



DEFECTOS DE AISLAMIENTO EN MÁQUINAS CUYO SISTEMA DE PROTECCION SE ENCUENTRA MAL CALIBRADO O DISEÑADO.



PUENTEADO DE ELEMENTOS DE PROTECCIÓN.

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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIN.-PARAB. EN LA CAMPIÑA SUR			
DESIGNACIÓN DEL PLANO	PROCEDIMIENTOS PREVENTIVOS		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA**	FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO**	**SS4**
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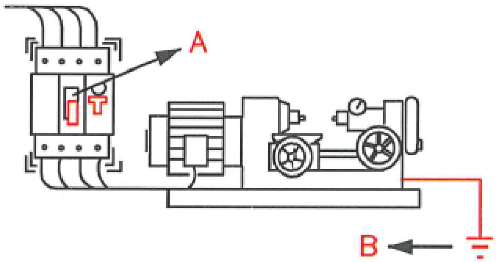
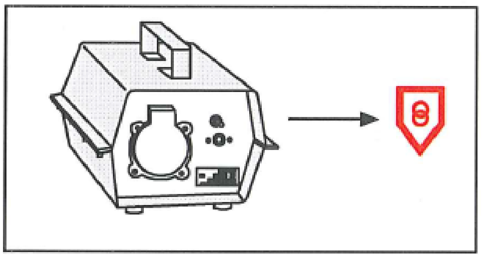
SISTEMAS DE PROTECCIÓN



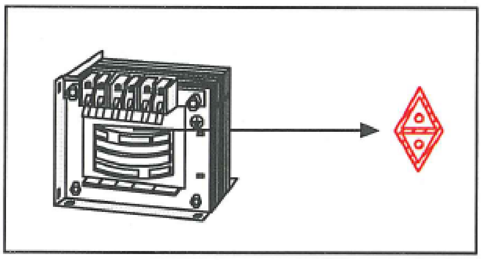
A –EL INTERRUPTOR DIFERENCIAL LIMITA LA INTENSIDAD Y EL TIEMPO, DEL DEFECTO.

B –LA PUESTA A TIERRA NOS LIMITA LA TENSIÓN DE DEFECTO A VALORES DE SEGURIDAD.



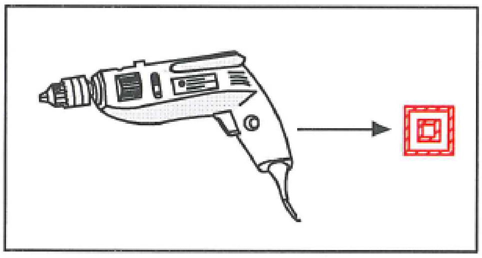
TENSIÓN DE SEGURIDAD:

–CON PEQUEÑAS TENSIONES ES PRÁCTICAMENTE IMPOSIBLE CAUSAR DAÑO A LAS PERSONAS.



TRANSFORMADOR SEPARADOR DE CIRCUITOS:

–NO EXISTE UNIÓN ELÉCTRICA ENTRE EL CIRCUITO DE ALIMENTACIÓN Y EL DE UTILIZACIÓN.



DOBLE AISLAMIENTO:

–EL CONTACTO SOLO SE PRODUCIRA EN EL CASO DE FALLO DE LOS DOS AISLAMIENTOS.

–NO MANIPULE LAS INSTALACIONES ELÉCTRICAS SI NO ESTA PREPARADO Y AUTORIZADO PARA ELLO.

–NO UTILICE AGUA PARA APAGAR FUEGOS DE ORIGEN ELÉCTRICO.

–ANTE UNA PERSONA ELECTRIZADA NO LA TOQUE DIRECTAMENTE.

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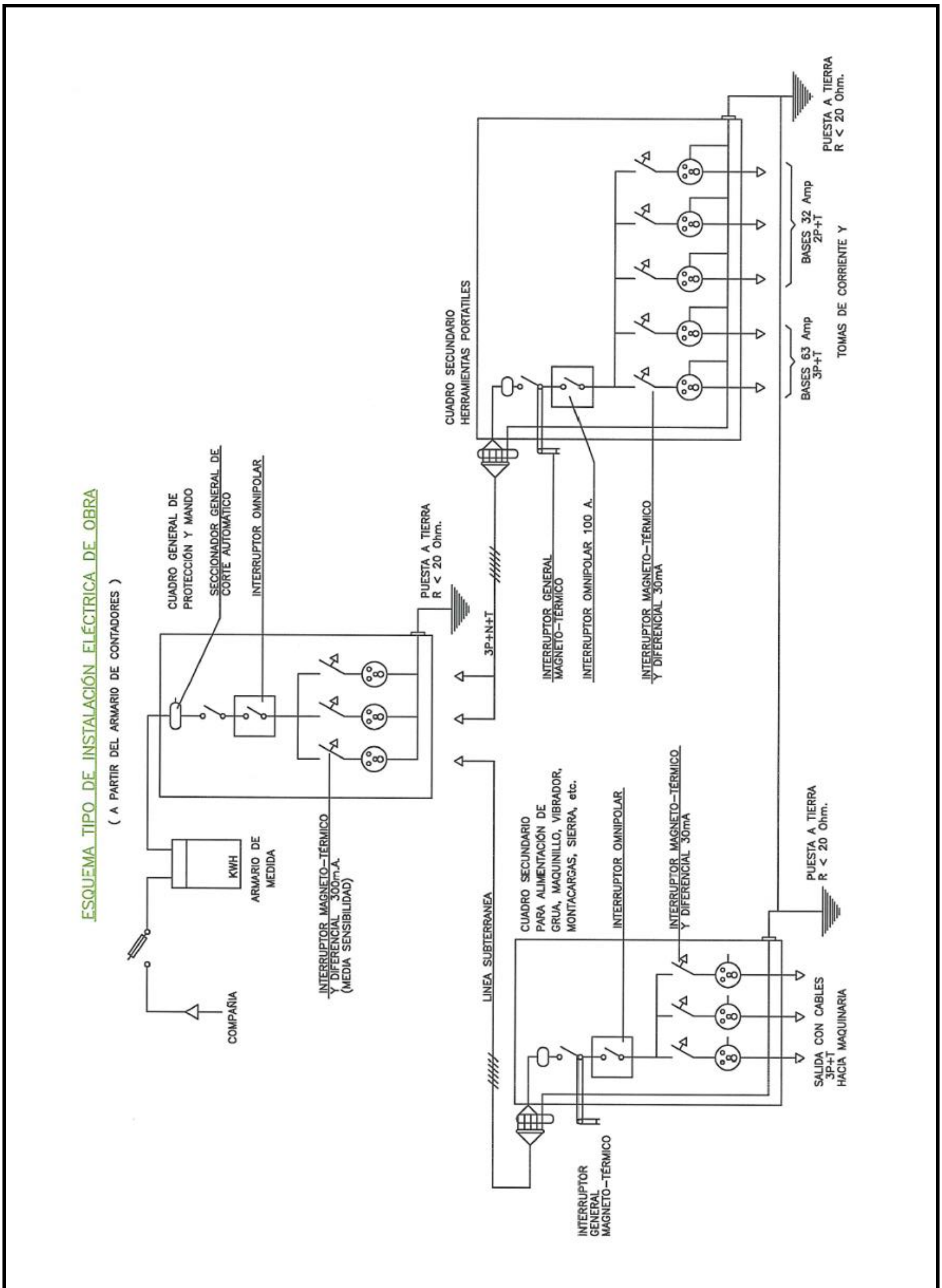
ESCALA	S/ ESCALA	**HOJA Nº 7 DE 21**	



	UNIVERSIDAD DE EXTREMADURA – ESCUELA POLITÉCNICA DE CÁCERES GRADO EN INGENIERÍA CIVIL – CONSTRUCCIONES CIVILES

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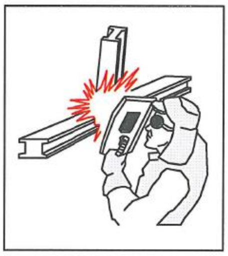
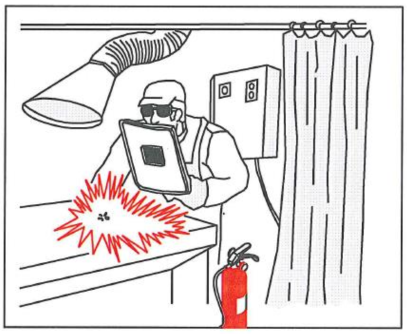
SOLDADURA ELECTRICA

USE MATERIAL DE PROTECCIÓN PERSONAL:

- PANTALLA DE MANO O DE CABEZA
- GAFAS DE PROTECCION CONTRA PROYECCIONES
- MANDIL
- GUANTES
- POLAINAS



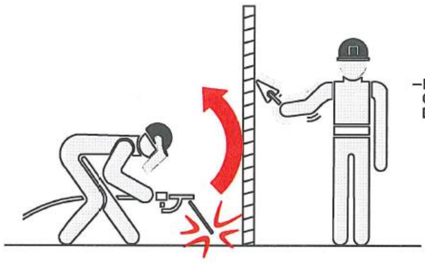
- SI SE TRABAJA POR ENCIMA DE LA CABEZA ES NECESARIO PROTEGER, ADEMAS DE ESTA EL CUELLO Y OTRAS PARTES QUE PUEDAN QUEDAR EXPUESTAS A LAS PARTÍCULAS INCANDESCENTES



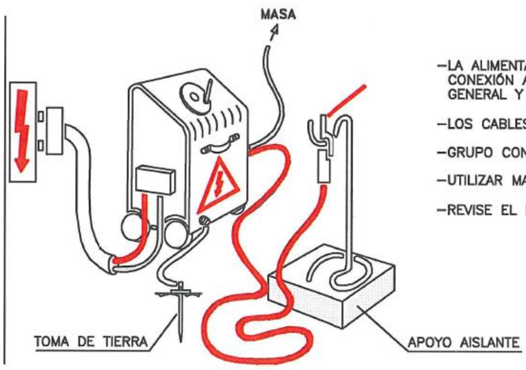
- NO SUELDE CERCA DE RECIPIENTES QUE CONTENGAN O HAYAN CONTENIDO PRODUCTOS INFLAMABLES. PUEDE PROVOCAR UNA EXPLOSIÓN.
- VIGILE DONDE CAEN LAS CHISPAS O MATERIAL FUNDIDO. CUANDO SEA NECESARIO SOLDAR POR ENCIMA DE MATERIAL COMBUSTIBLE PROTEJALO CON UNA LONA IGNÍFUGA.

AISLAMIENTO DEL PUESTO DE SOLDADURA:

- CUANDO EL PUESTO ES FIJO, SE PROTEGERÁ POR UNA CORTINA INCANDESCENTE.
- EXTRACCIÓN DE HUMO.
- SE DISPONDRÁ DE UN EXTINTOR CERCA DE LA CÁBINA DE SOLDADURA.



- EVITAR LA EXPOSICIÓN A RADIACIONES DE CUALQUIER OPERARIO QUE NO DISPONGA DE LAS ADECUADAS PROTECCIONES.



- LA ALIMENTACIÓN SE REALIZARA MEDIANTE CONEXIÓN A TRAVÉS DEL CUADRO ELÉCTRICO GENERAL Y SUS PROTECCIONES.
- LOS CABLES SERÁN DE IGUAL SECCIÓN.
- GRUPO CONECTADO A TOMA DE TIERRA.
- UTILIZAR MANGUERAS EN BUEN ESTADO.
- REVISE EL EQUIPO.

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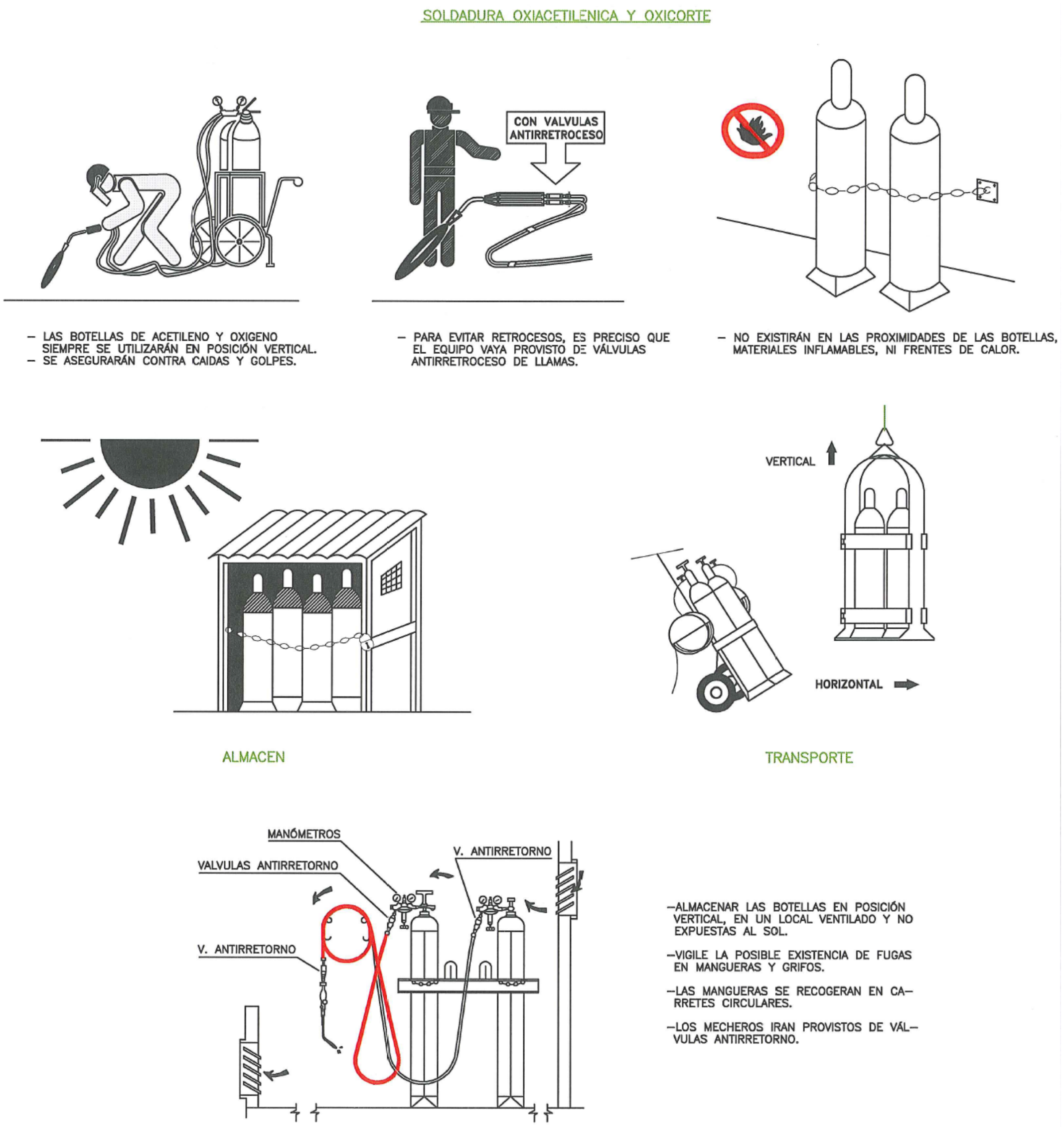

Escuela Politécnica	UNIVERSIDAD DE EXTREMADURA – ESCUELA POLITÉCNICA DE CÁCERES GRADO EN INGENIERÍA CIVIL – CONSTRUCCIONES CIVILES		
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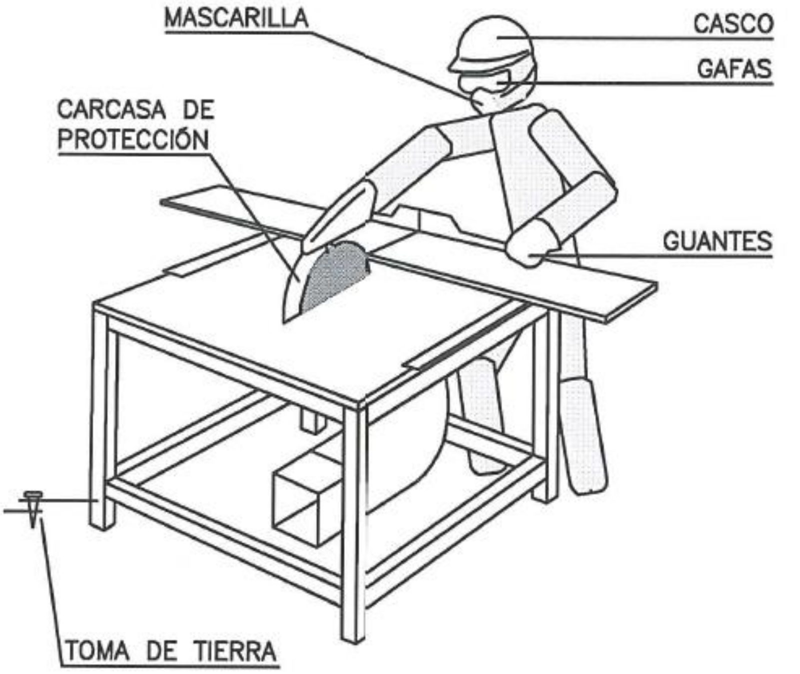
SIERRA CIRCULAR



- DEBEN UTILIZARSE EMPUJADORES ADECUADOS EN LOS TRABAJOS EN QUE EL TAMAÑO DE LAS PIEZAS A CORTAR COMPROMETA LA SEGURIDAD DE LAS MANOS DEL OPERARIO.
- CON LOS DISCOS DE CARBURUM O WIDIA DEBEN EXTREMARSE LAS PRECAUCIONES EN CUANTO AL EQUILIBRADO Y EMPUJE DE LA PIEZA, YA QUE SON FRAGILES Y TIENEN GRAN FACILIDAD PARA LA ROTURA.
- LA SIERRA CIRCULAR ESTARA PROTEGIDA FRENTE A RIESGOS ELECTRICOS CON INTERRUPTOR DIFERENCIAL ASOCIADO A TOMA DE TIERRA.
- LA UTILIZACIÓN DE LA SIERRA SE HARA SÓLO POR EL PERSONAL AUTORIZADO.
- SE UTILIZARÁN LOS SIGUIENTES EQUIPOS DE PROTECCIÓN INDIVIDUAL: CASCO, GAFAS DE SEGURIDAD, MASCARILLA Y GUANTES.
- EL DISCO POR SU PARTE POSTERIOR DEBE ESTAR TOTALMENTE PROTEGIDO.

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DUMPER

– CON EL VEHICULO CARGADO LAS RAMPAS DEBEN BAJARSE MARCHA ATRÁS.

– NO SE DEBE CICULAR A MAS DE 20 Km/h. LA CONDUCCIÓN SE HARÁ DE FORMA PRUDENTE.

– COLOCAR TOPE DE FIN DE RECORRIDO PARA VERTER MATERIALES.

– EN NINGUN CASO SE SUPERARA LA CARGA MAXIMA. SE DISPONDRA LA CARGA DE MANERA QUE GARANTICE LA ESTABILIDAD DEL DUMPER.

– LA CARGA NUNCA DIFICULTARA LA VISIBILIDAD DEL CONDUCTOR.

– EL MANEJO DEL DUMPER SOLO LO REALIZARA PERSONAL AUTORIZADO.
– EL CONDUCTOR DEBERA UTILIZAR CINTURON ANTIVIBRATORIO.
– PARA CIRCULAR POR VIAS PUBLICAS ESTARAN PROVISTOS DE LUCES Y DISPOSITIVOS DE AVISO ACUSTICO.
– ESTA ABSOLUTAMENTE PROHIBIDO EL TRANSPORTE DE PERSONAL.

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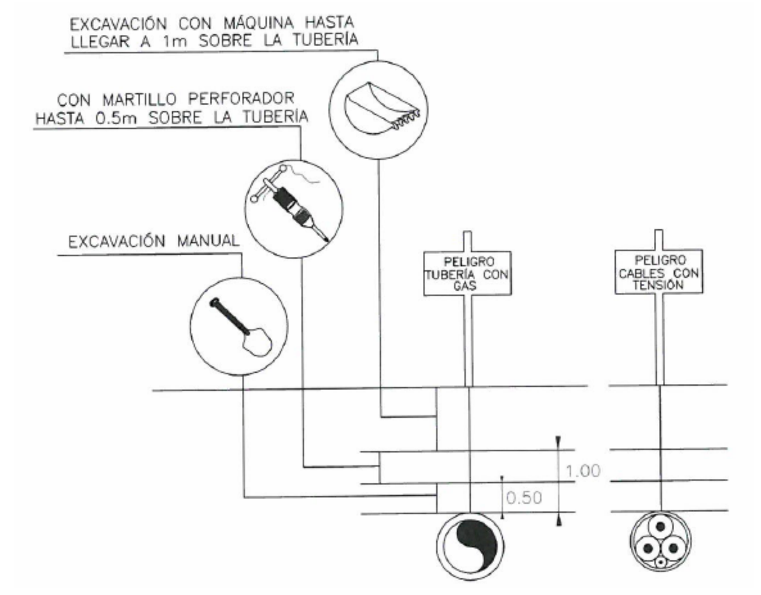
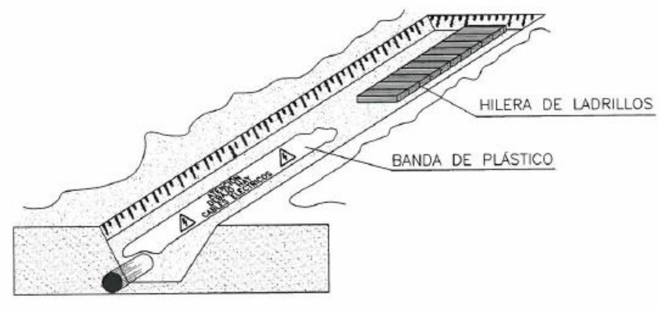
DISTANCIAS MÍNIMAS DE SEGURIDAD RECOMENDADAS EN TRABAJOS DE EXCAVACIONES SOBRE CONDUCCIONES DE GAS Y ELECTRICIDAD



FORMAS MÁS USUALES DE SEÑALIZACIÓN INTERIOR Y PROTECCIÓN EMPLEADAS EN CONSTRUCCIONES ELÉCTRICAS



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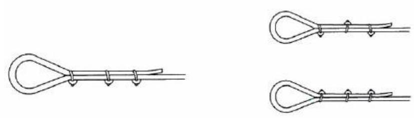
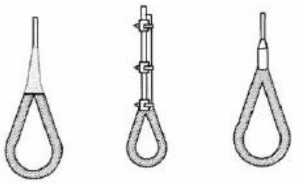
TIPOS DE ESLINGAS

GAZAS



METODO CORRECTO

METODOS INCORRECTOS

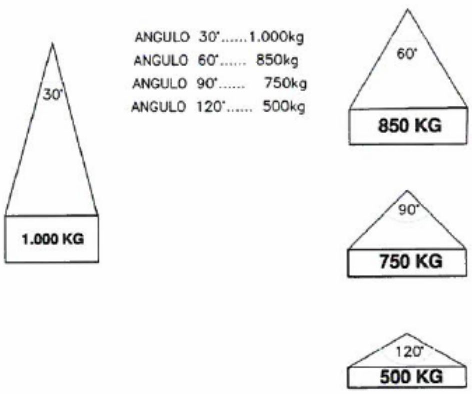


DIAMETRO DEL	NUMERO DE PLLOS	DISTANCIA ENTRE PLLOS
Hasta 12 mm	3	6 DIAMETRO
12 mm a 20 mm	4	6 DIAMETRO
20 mm a 25 mm	5	6 DIAMETRO
25 mm a 35 mm	6	6 DIAMETRO

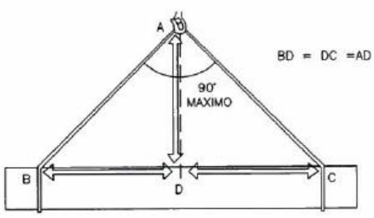
MANEJO DE MATERIALES

LA MISMA ESLINGA

ANGULO 30°......1.000kg
ANGULO 60°...... 850kg
ANGULO 90°...... 750kg
ANGULO 120°...... 500kg



RELACION ENTRE EL ANGULO DE LA ESLINGA Y SU CAPACIDAD DE CARGA



LA CARGA DEBE IR BIEN CENTRADA Y LA ESLINGA NO DEBE TRABAJAR CON ANGULOS SUPERIORES A NOVENTA GRADOS

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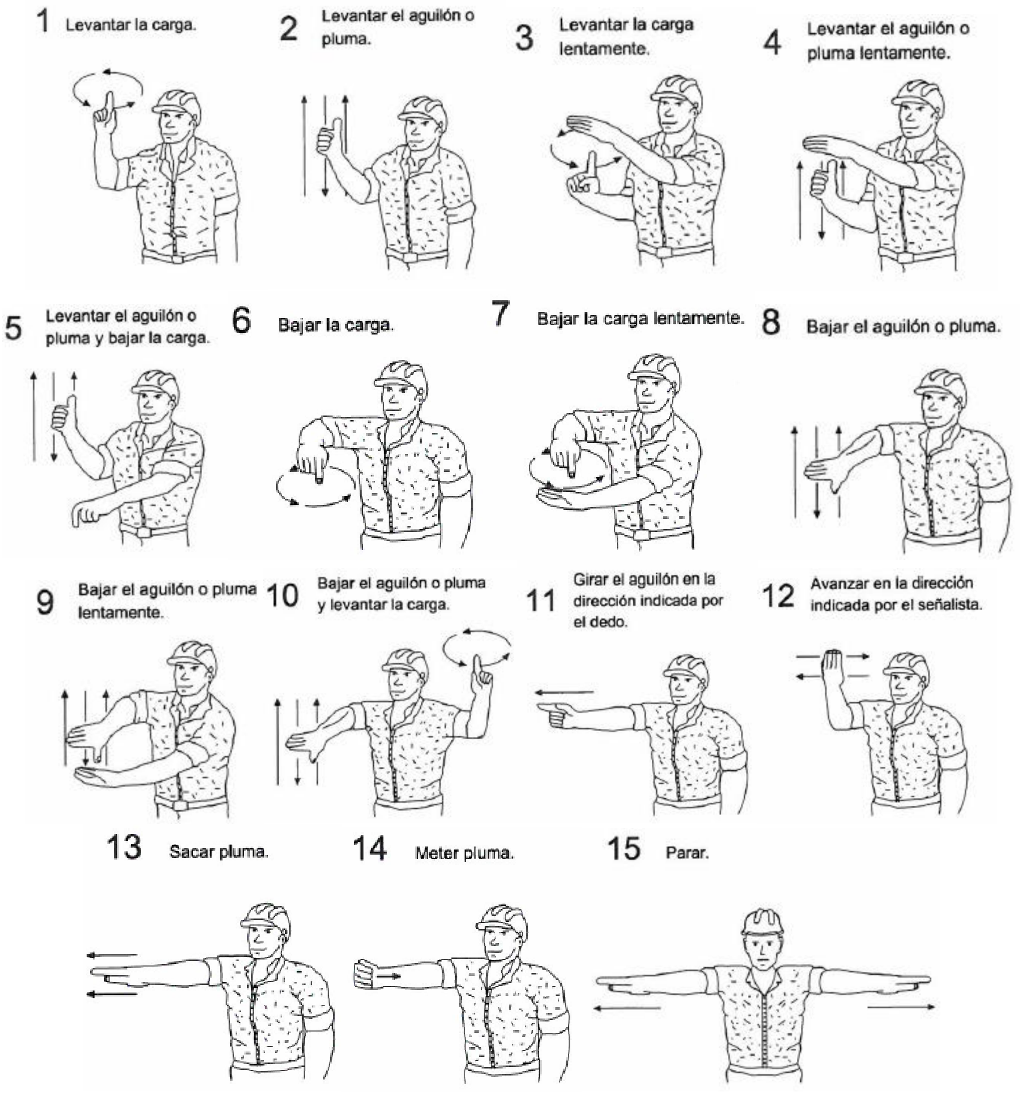
CÓDIGO DE SEÑALES DE MANIOBRAS

Si se quiere que no haya confusiones peligrosas cuando el maquinista o enganchador cambien de una máquina a otra y con mayor razón de un taller a otro es necesareo que todo el mundo hable el mismo idioma y mande con las mismas señales.

Nada mejor para ello que seguir los movimientos que para cada operación se insertan a continuación.



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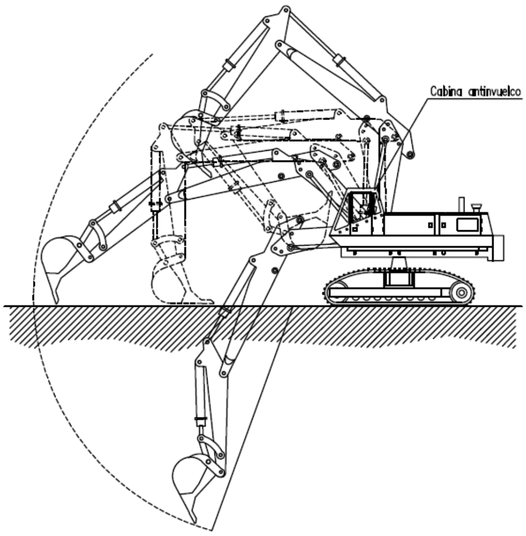
ESCALA	S/ ESCALA			**HOJA Nº 16 DE 21**	

ELEMENTOS AUXILIARES Y MAQUINARIA
(Retroexcavadora)



NORMAS BÁSICAS DE SEGURIDAD Y PROTECCIONES COLECTIVAS :

- Los caminos de circulación interna de la obra, se cuidarán para evitar blandones y embarramientos excesivos que mermen la seguridad de la circulación de la maquinaria.
- No se admitirán en esta obra máquinas que no vengan con la protección de cabina antivuelco o pórtico de seguridad.
- Se prohibirá que los conductores abandonen la máquina con el motor en marcha.
- Se prohibirá que los conductores abandonen la pala con la cuchara izada y sin apoyar en el suelo.
- La cuchara durante los transportes de tierras, permanecerá lo más baja posible para poder desplazarse con la máxima estabilidad.
- Los ascensos o descensos en carga de la máquina se efectuarán siempre utilizando marchas cortas.
- La circulación sobre terrenos desiguales se efectuará a velocidad lenta.
- Se prohibirá transportar personas en el interior de la cuchara.
- Se prohibirá izar personas para acceder a trabajos puntuales utilizando la cuchara.
- Las máquinas a utilizar en esta obra, estarán dotadas de un extintor, timbrado y con las revisiones al día.
- Las máquinas a utilizar en esta obra, estarán dotadas de luces y bocina de retroceso.
- Se prohibirá arrancar el motor sin antes cerciorarse de que no hay nadie en el área de operación de la pala.
- Los conductores se cerciorarán de que no existe peligro para los trabajadores que se encuentren en el interior de pozos o zanjas próximos al lugar de excavación.
- Se acotará a una distancia igual a la del alcance máximo del brazo excavador, el entorno de la máquina. Sé prohibe en la zona la realización de trabajos o la permanencia de personas.
- Se prohibirá en esta obra utilizar la retroexcavadora como una grúa, para la introducción de piezas, tuberías, etc., en el interior de las zanjas.
- Se prohibirá realizar trabajos en el interior de las trincheras o zanjas, en la zona de alcance del brazo de la retro.
- A los maquinistas de estas máquinas se les comunicará por escrito la siguiente normativa preventiva, antes del inicio de los trabajos.

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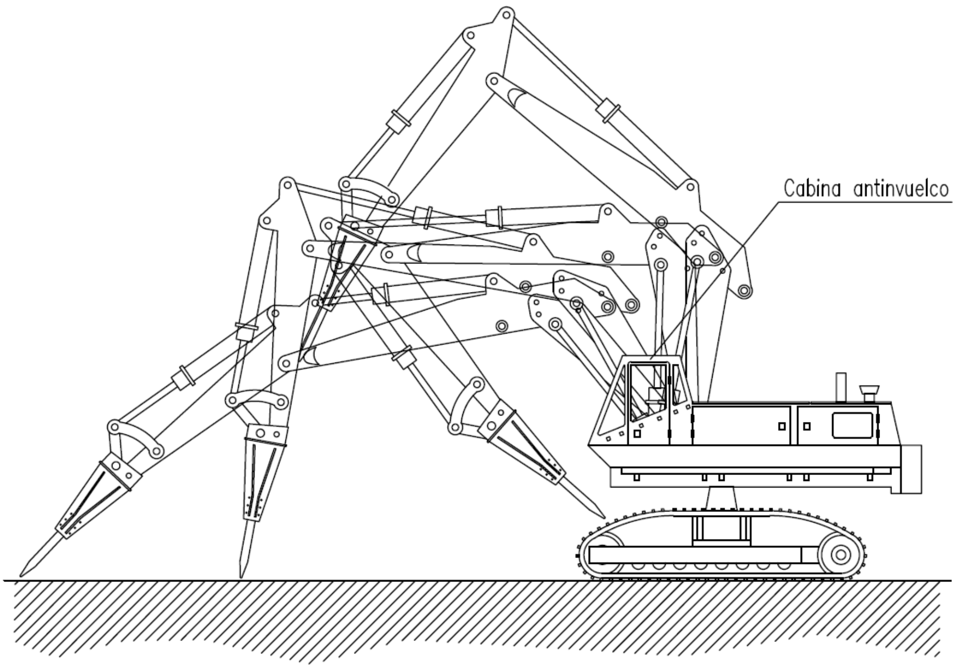
ELEMENTOS AUXILIARES Y MAQUINARIA
(Martillo)



NORMAS BÁSICAS DE SEGURIDAD Y PROTECCIONES COLECTIVAS :

- Las maniobras en la grúa serán dirigidas por un especialista.
- Los gruistas de esta obra siempre llevarán puesto un cinturón de seguridad clase C que amarrarán al punto sólido y seguro, ubicado según los planos.
- Las gruas cumplirán la normativa emanada de la Instrucción Técnica Complementaria del Reglamento de Aparatos Elevadores B.O.E.7-7-88.
- Las gruas torre a instalar en esta obra, se montarán siguiendo expresamente todas las maniobras que el fabricante dé, sin omitir ni cambiar los medios auxiliares o de seguridad recomendados.
- Se prohibirá sobrepasar la carga máxima admisible.
- El gruista tendrá en todo momento la carga suspendida a la vista. Si eso no es posible las maniobras serán dirigidas por un especialista.
- Se prohibirá la permanencia de operarios bajo las cargas en suspensión.
- El conductor tendrá el certificado de capacitación correspondiente.
- La grúa sobre oruga tendrá al día el libro de mantenimiento.
- No se trabajará en ningún caso con vientos superiores a los 50 Km./h.
- La elevación, descenso y traslado de las piezas se realizará lentamente, ya que los movimientos bruscos pueden provocar la rotura de los cables.
- Evitar las paradas y arrancadas de golpe.

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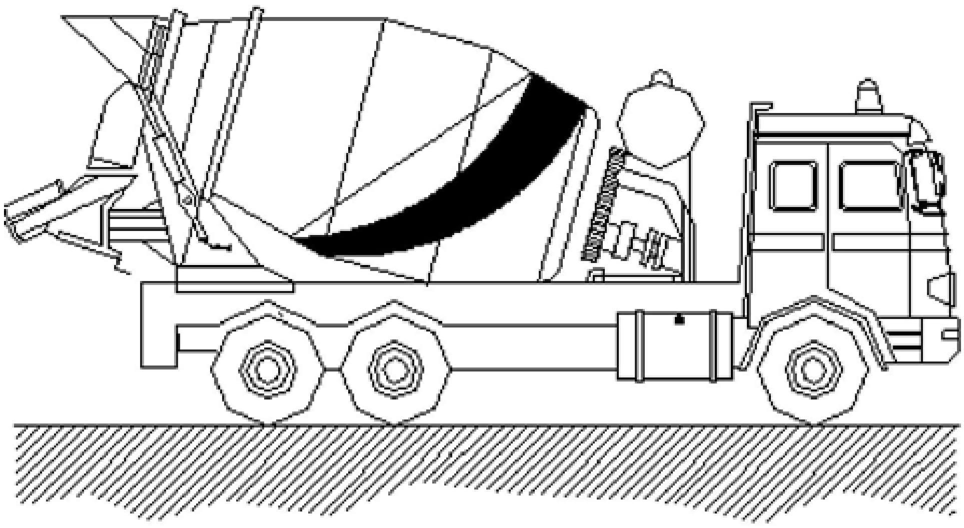
DESIGNACIÓN DEL PLANO	PROCEDIMIENTOS PREVENTIVOS		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA**	FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO**	**SS4**
ESCALA S/ ESCALA		**HOJA Nº 18 DE 21**	

ELEMENTOS AUXILIARES Y MAQUINARIA
(Camión hormigonera)



NORMAS BASICAS DE SEGURIDAD Y PROTECCIONES COLECTIVAS :

- Las rampas de acceso tendrán una pendiente no superior al 20%.
- El depósito y canaletas se limpiarán en un lugar al aire libre lejos de las obras principales.
- El camión se situará en el lugar de vaciado dirigido por el encargado de obra o persona en quien delegue.
- Los camiones de hormigón no se podrán acercar a menos de 2 metros del borde superior de los taludes.

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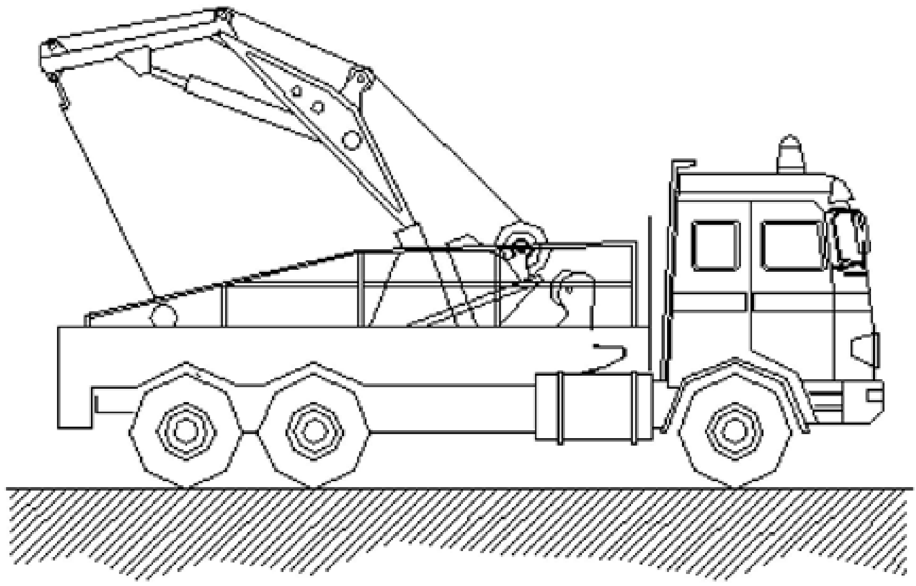
DESIGNACIÓN DEL PLANO	PROCEDIMIENTOS PREVENTIVOS		
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** SS4
ESCALA	S/ ESCALA		**HOJA Nº 19 DE 21**

ELEMENTOS AUXILIARES Y MAQUINARIA
(Camión grúa de carga-descarga)



NORMAS BASICAS DE SEGURIDAD Y PROTECCIONES COLECTIVAS :

- Los maniobras en la grúa serán dirigidas por un especialista.
- Los ganchos de la grúa tendrán cerradura de seguridad.
- Se prohibirá sobrepasar la carga máxima admisible.
- El gruista tendrá en todo momento la carga suspendida a la vista. Si eso no es posible las maniobras serán dirigidas por un especialista.
- Las rampas de circulación no superarán en ningún caso una inclinación superior al 20%.
- Se prohibirá estacionar el camión a menos de 2 metros del borde superior de los taludes.
- Se prohibirá arrastrar cargas con el camión.
- Se prohibirá la permanencia de personas a distancias inferiores a las 5 metros del camión.
- Se prohibirá la permanencia de operarios bajo las cargas en suspensión.
- El conductor tendrá el certificado de capacitación correspondiente.
- Se extremarán las precauciones durante los maniobras de suspensión de objetos estructurales para su colocación en obra, ya que habrán operarios trabajando en el lugar, y un pequeño movimiento inesperado puede provocar graves accidentes.
- No se trabajará en ningún caso con vientos superiores a los 50 Km/h.

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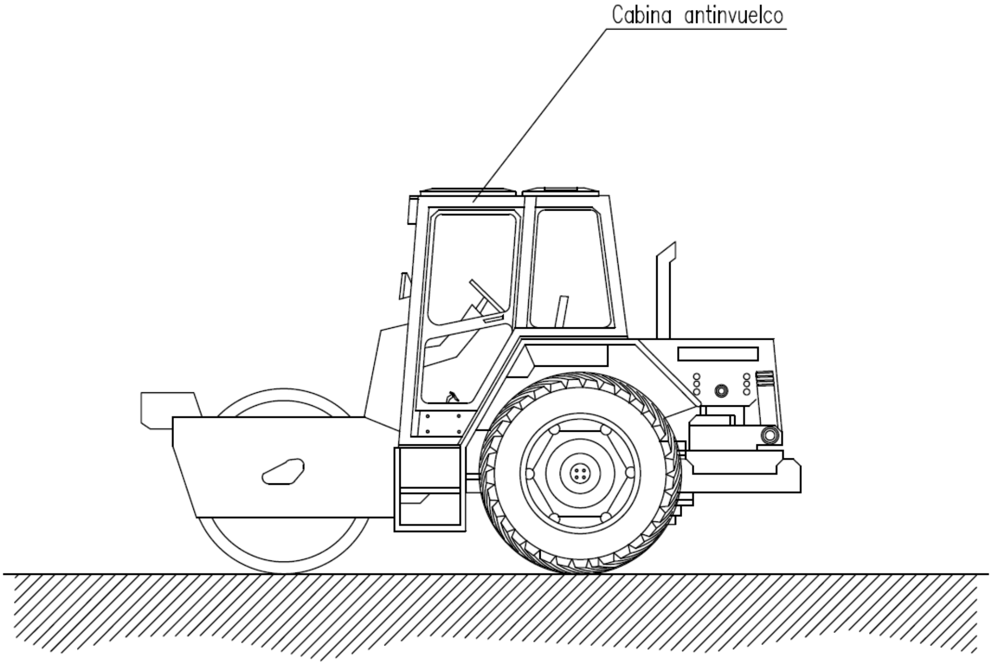
DESIGNACIÓN DEL PLANO	PROCEDIMIENTOS PREVENTIVOS
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**
FECHA	FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO
Nº DE PLANO	**SS4**
ESCALA	S/ ESCALA
HOJA Nº 20 DE 21	

ELEMENTOS AUXILIARES Y MAQUINARIA
(Compactadora)



NORMAS BÁSICAS DE SEGURIDAD Y PROTECCIONES COLECTIVAS :

- Estarán dotadas de faros de marcha hacia adelante y de retroceso, retrovisores en ambos lados, pórtico de seguridad antivuelco y antiimpactos y un extintor.

- Serán inspeccionadas diariamente controlando el buen funcionamiento del motor, sistemas hidráulicos, frenos, dirección, luces, bocina retroceso, transmisiones, cadenas y neumáticos.

- Se prohibirá trabajar o permanecer dentro del radio de acción de la compactadora de ruedas, para evitar los riesgos por atropello.

- Se prohibirá en esta obra, el transporte de personas sobre la compactadora de ruedas, para evitar los riesgos de caídas o de atropellos.

- Se prohibirán las labores de mantenimiento o reparación de maquinaria con el motor en marcha, en prevención de riesgos innecesarios.

- Se señalizarán los caminos de circulación interna mediante cuerda de banderolas y señales normalizadas de tráfico.

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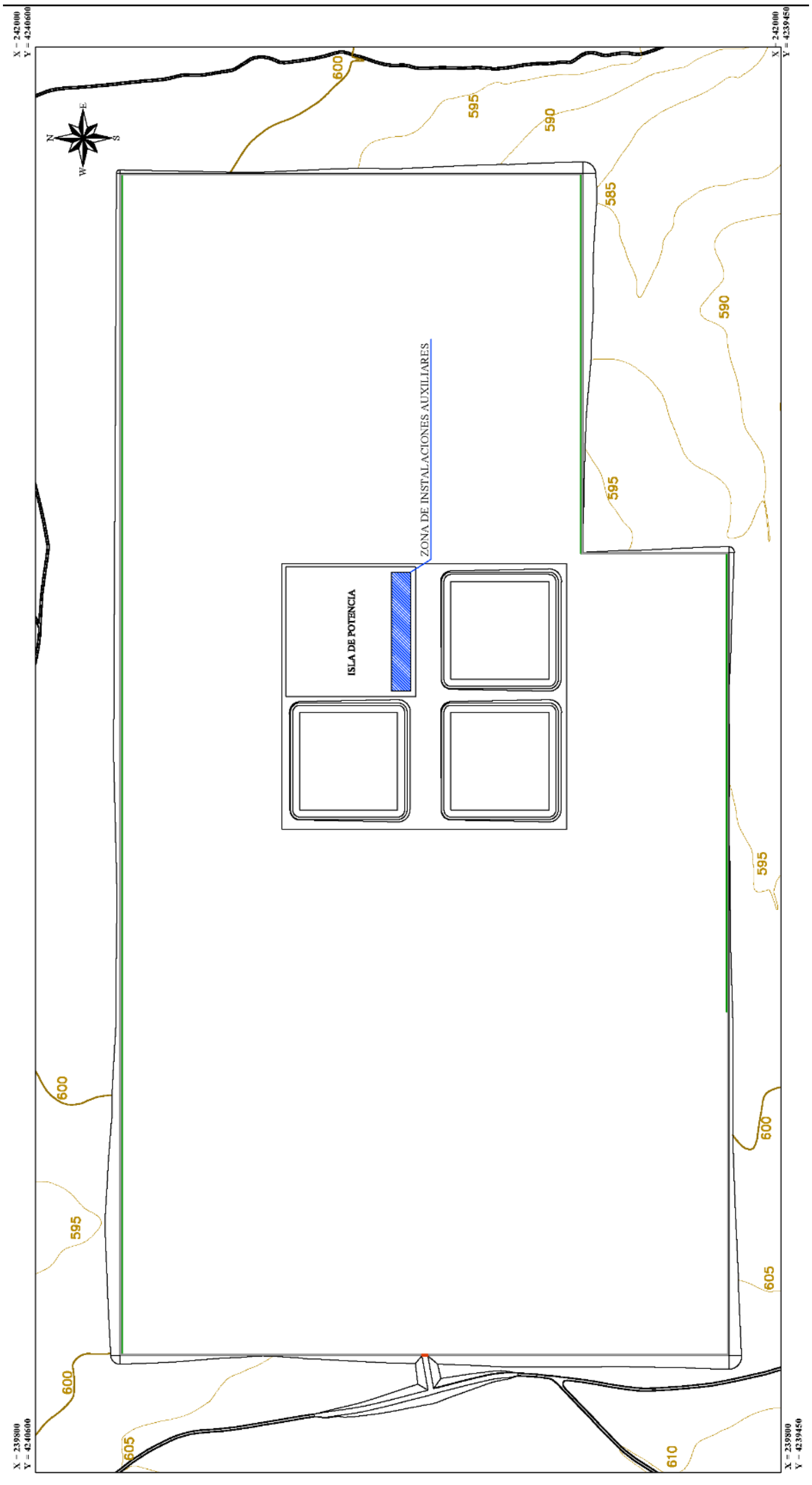
DESIGNACIÓN DEL PLANO	PROCEDIMIENTOS PREVENTIVOS		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA**	FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO**	**SS4**
ESCALA	S/ ESCALA	**HOJA Nº 21 DE 21**	



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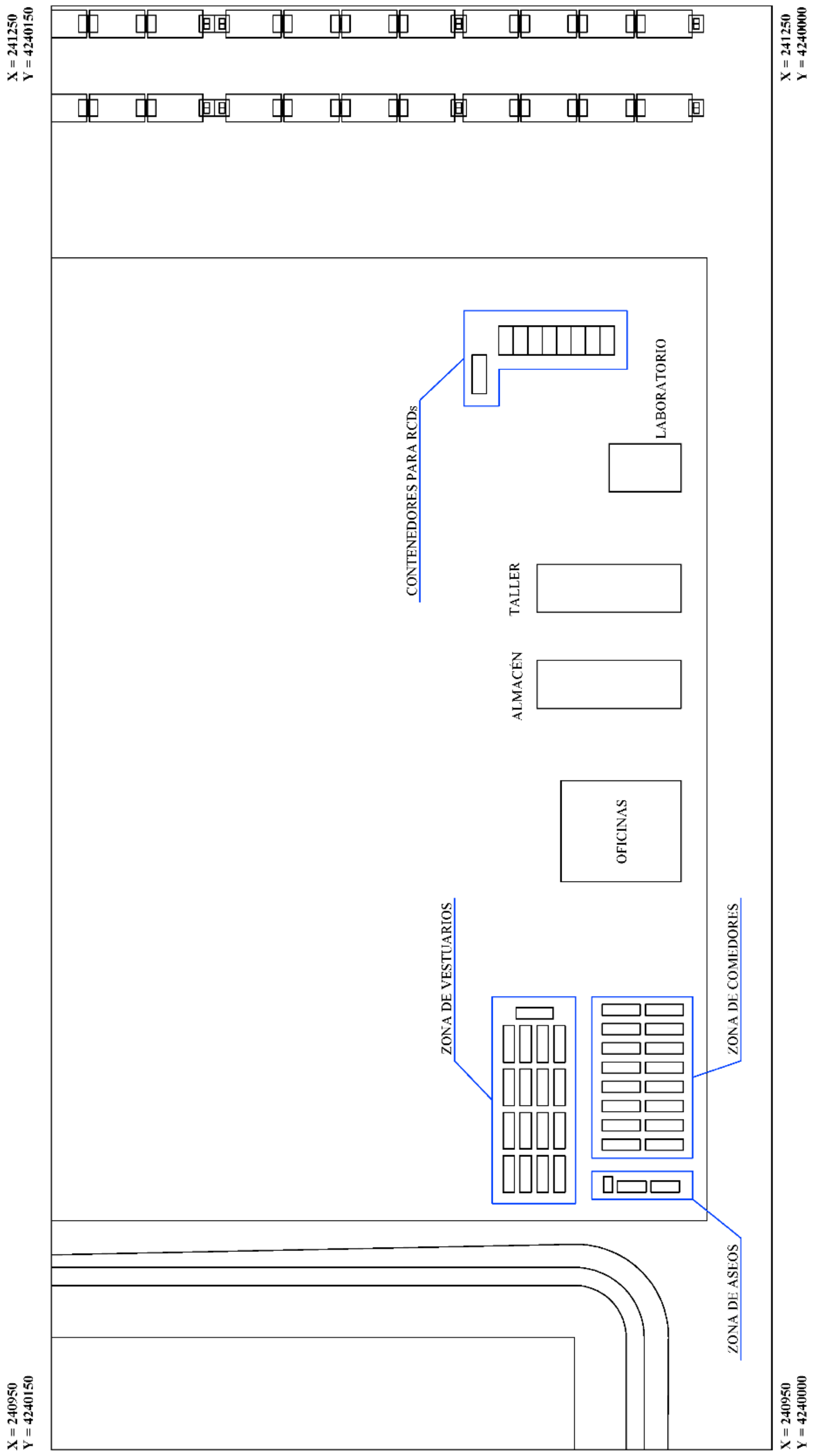
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIN.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO	INSTALACIONES DE HIGIENE Y BIENESTAR		
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** **SS5**
ESCALA	S/ ESCALA		**HOJA Nº 1 DE 2**



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GRADO EN INGENIERÍA CIVIL – CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIN.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO	INSTALACIONES DE HIGIENE Y BIENESTAR		
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ – ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** SS5
ESCALA	S/ ESCALA		**HOJA Nº 2 DE 2**

PLIEGO DE PRESCRIPCIONES TÉCNICAS PARTICULARES

1. DISPOSICIONES LEGALES DE APLICACIÓN

Serán de obligado cumplimiento durante la ejecución de las obras, entre otras, las disposiciones contenidas en la normativa siguiente:

- Real Decreto Legislativo 2/2015, de 23 de octubre, por el que se aprueba el texto refundido de la Ley del Estatuto de los Trabajadores (BOE de 24 de octubre de 2015).
- Ley 31/1995, de 8 de noviembre, de Prevención de Riesgos Laborales (BOE de 10 de noviembre de 1995), incluidas todas las modificaciones posteriores.
- Real Decreto 39/1997, de 17 de enero, por el que se aprueba el Reglamento de los Servicios de Prevención (BOE de 31 de enero de 1997), incluidas todas las modificaciones posteriores.
- Real Decreto 485/1997, de 14 de abril, sobre disposiciones mínimas en materia de Señalización de Seguridad y Salud en el Trabajo (BOE de 23 de abril de 1997), modificado por el Real Decreto 598/2015.
- Real Decreto 486/1997, de 14 de abril, por el que se establecen las disposiciones mínimas de seguridad y salud en los Locales de Trabajo (BOE de 23 de abril de 1997), incluidas todas las modificaciones posteriores.
- Real Decreto 773/1997, de 30 de mayo, sobre disposiciones mínimas de seguridad y salud relativas a la utilización por los trabajadores de Equipos de Protección Personal (BOE de 12 de junio de 1997 y corrección de errores en BOE de 18 de julio de 1997), incluidas todas las modificaciones posteriores.
- Real Decreto 1215/1997, de 18 de julio, por el que se establecen las disposiciones mínimas de seguridad y salud para la utilización por los trabajadores de los Equipos de Trabajo (BOE de 7 de agosto de 1997), modificado por el Real Decreto 2177/2004.
- Real Decreto 1627/1997, de 24 de octubre, por el que se establecen disposiciones mínimas de seguridad y salud en las Obras de Construcción (BOE de 25 de octubre de 1997), incluidas todas las modificaciones posteriores.

- Orden Ministerial de 28 de agosto de 1970, por la que se aprueba la Ordenanza de Trabajo en la Construcción, Vidrio y Cerámica (BOE de 5 a 9 de septiembre de 1970), incluidas todas las modificaciones y sustituciones posteriores.
- Orden Ministerial de 9 de marzo de 1971, por la que se aprueba la Ordenanza General de Seguridad e Higiene en el Trabajo (BOE de 16 y 17 de marzo de 1971) incluidas todos los Reales Decretos posteriores y la Ley 31/95, que derogan parte de esta Orden Ministerial.
- Resolución de 29 de febrero de 2008, por el que se publica el Convenio Colectivo de trabajo del sector de la “Construcción y obras públicas de la provincia de Badajoz”.
- Real Decreto 223/2008, de 15 de febrero, por el que se aprueban el Reglamento sobre condiciones técnicas y garantías de seguridad en líneas eléctricas de alta tensión y sus instrucciones técnicas complementarias ITC-LAT 01 a 09. (BOE de 19 de marzo de 2008), incluidas las modificaciones incluidas por el Real Decreto 560/2010.
- Decreto 848/2002, de 2 de agosto, por el que se aprueba el Reglamento Electrotécnico para Baja Tensión e Instrucciones Técnicas complementarias (BOE 18 de septiembre de 2002), incluidas las modificaciones posteriores.
- Real Decreto Legislativo 6/2015, de 30 de octubre, por el que se aprueba el texto refundido de la Ley sobre Tráfico, Circulación de Vehículos a Motor y Seguridad Vial (BOE de 31 de octubre de 2015).
- Real Decreto 1428/2003, de 21 de noviembre, por el que se aprueba el Reglamento General de Circulación (BOE de 23 de diciembre de 2003), incluidas las modificaciones posteriores.
- Orden Ministerial de 31 de agosto de 1987, por la que se aprueba la Instrucción 8.3- IC, sobre Señalización, Balizamiento, Defensa, Limpieza y Terminación de Obras Fijas en Vías Fuera de Poblado (BOE de 18 de septiembre de 1987).
- Orden Circular 15/2003, de 13 de octubre, sobre Señalización de los Tramos Afectados por la Puesta en Servicio de las Obras. Remates de Obras.
- Orden Circular 16/2003, de 20 de noviembre, sobre Intensificación y ubicación de carteles de obra.

- Orden Circular 301/89 T, de 27 de abril, sobre Señalización de Obras.
- Manual de Ejemplos de Señalización de Obras Fijas (1997).
- Recomendaciones para la Señalización Móvil de Obras (1997).

Toda aquella normativa relativa a la Seguridad, Salud y Medicina del Trabajo que se encuentre vigente en el momento de ejecución de las obras resultará igualmente aplicable.

2. PERSONAL EN OBRA Y OPERACIONES

En cada grupo o equipo de trabajo el Contratista deberá asegurar la presencia constante de un encargado o capataz responsable de la aplicación de las presentes normas. El encargado o capataz deberá estar provisto siempre de una copia de tales normas, así como de todas las eventuales autorizaciones escritas del Ingeniero Director y/o del coordinador en materia de seguridad y salud.

Todos los operarios afectos a la obra deberán vestir, cuando tengan que realizar trabajos en la carretera o sus proximidades, un vestuario adecuado de color bien perceptible a distancia por los usuarios de la carretera (prendas reflectantes). Por la noche o en cualquier otra circunstancia donde la visibilidad sea escasa, dicho vestuario deberá estar provisto de tiras de tejido reflectante de color blanco.

Cuando un vehículo se halle parado en la zona de trabajo, cualquier operación de entrada o salida de personas, carga o descarga de materiales, apertura de portezuelas, volcado de cajas basculante, etc., deberá realizarse exclusivamente en el interior de la demarcación de la zona de trabajo, evitando toda ocupación de parte de la calzada abierta a la circulación. El conductor que, emprendiendo la marcha a partir del reposo, deba salir de la zona de trabajo delimitada, está obligado a ceder la preferencia de paso a los vehículos que eventualmente lleguen a aquélla. Si la zona de trabajo se halla situada a la derecha de la calzada (arcén o carril de marcha normal), el conductor deberá mantener su vehículo en el citado arcén hasta que haya alcanzado una velocidad mínima de 40 Km/h y sólo entonces podrá colocarse en el carril de marcha normal, teniendo la precaución de señalar claramente tal maniobra mediante el uso de las señales de dirección. Está prohibido realizar, en cualquier punto de la carretera, la maniobra de retroceso, si no es el interior de las zonas de trabajo debidamente delimitadas. Cuando tal maniobra se hiciese necesaria por causa de las obras, deberá realizarse exclusivamente en el arcén y con la ayuda de uno o varios hombres provistos de bandera roja o señales manuales en horas diurnas, o de una lámpara roja en horas nocturnas o en circunstancias de poca visibilidad, que señale anticipadamente la maniobra a los vehículos que se aproximen.

Todas las señalizaciones manuales que se citan en los párrafos anteriores deberán realizarse a una distancia mínima de 100 m de la zona en que se realiza la maniobra. Además, debe colocarse un hombre con bandera roja en todos los puntos donde puedan producirse conflictos entre los vehículos que circulen por la parte de calzada abierta a la circulación y el equipo de construcción. Ningún vehículo, instrumento o material perteneciente o utilizado por el Contratista deberá dejarse en la calzada durante la suspensión de los trabajos.

Cuando, por exigencias del trabajo, se hiciera necesario mantener el bloqueo total o parcial de la calzada, y también durante la suspensión de los trabajos, tanto de día como de noche, todos los medios de trabajo y los materiales deberán agruparse lo más apartado posible de la barrera delantera, fuera de la calzada.

3. CONDICIONES DE LOS MEDIOS DE PROTECCIÓN

Todas las prendas de protección personal o elementos de protección colectiva tendrán fijado un período de vida útil, desechándose a su término. Cuando por las circunstancias del trabajo se produzca un deterioro más rápido en una determinada prenda o equipo, se repondrá ésta, independientemente de la duración prevista o fecha de entrega. Toda prenda o equipo de protección que haya sufrido un tratamiento límite, es decir, el máximo para el que fue concebido (por ejemplo, por un accidente) será desechado y repuesto al momento. Aquellas prendas que por su uso hayan adquirido más holguras o tolerancias de las admitidas por el fabricante serán respuestas inmediatamente.

El uso de una prenda o equipo de protección nunca representará un riesgo en sí mismo.

3.1. PROTECCIONES INDIVIDUALES

Condiciones generales: Como norma general, se han elegido equipos de protección individual ergonómicos, con el fin de evitar las negativas a su uso. Por lo expuesto, se especifica como condición expresa que todos los equipos de protección individual utilizables en esta obra, cumplirán las siguientes condiciones generales:

- Tendrán la marca "CE" reglamentaria
- Los equipos de protección individual que cumplan con la indicación expresada en el punto anterior, tienen autorizado su uso durante su período de vigencia. Llegando a la fecha de caducidad, se constituirá un acopio ordenado, que será revisado por el Coordinador en materia de Seguridad y Salud durante la ejecución de la obra, para que autorice su eliminación de la obra.
- Las normas de utilización de los equipos de protección individual, se atenderán a lo previsto en la reglamentación vigente.

Condiciones técnicas específicas: A continuación se especifican las normas que hay que aplicar para su utilización:

- Todo equipo de protección individual en uso que esté deteriorado o roto, será reemplazado de inmediato, quedando constancia en la oficina de obra del motivo del cambio y el nombre de la empresa y de la persona que recibe el nuevo equipo de protección individual. Así mismo, se investigarán los abandonos de estos equipos de protección, con el fin de dar la máxima seriedad posible a la utilización de estas protecciones.

- Los equipos de protección individual, con las condiciones expresadas, han sido valorados según las fórmulas usuales de cálculo de consumos de equipos de protección individual, por consiguiente, se entienden valoradas todas las utilizables por el personal y mandos de cada contratista, subcontratistas y trabajadores autónomos.

3.2. PROTECCIONES COLECTIVAS

En la Memoria de este Estudio de Seguridad y Salud, se han definido los medios de protección colectiva. El contratista adjudicatario es el responsable de que en la obra, cumplan todos ellos, con las siguientes condiciones generales:

- La protección colectiva de esta obra, ha sido diseñada en los Planos de Seguridad y Salud. El Plan de Seguridad y Salud los respetará fidedignamente o podrá modificarlas justificadamente, debiendo ser aprobadas tales modificaciones por el Coordinador de Seguridad y Salud durante la ejecución de la obra.
- Las posibles propuestas alternativas que se presenten en el Plan de Seguridad y Salud, requieren para poder ser aprobadas, seriedad y una representación técnica de calidad en forma de planos de ejecución de obra.
- Las protecciones colectivas de esta obra, estarán en acopio disponible para uso inmediato, dos días antes de la fecha decidida para su montaje, según lo previsto en el plan de ejecución de obra.
- Serán nuevas, a estrenar, si sus componentes tienen caducidad de uso reconocida, o si así se especifica en su apartado correspondiente dentro de este Pliego de condiciones técnicas y particulares de Seguridad y Salud. Idéntico principio al descrito, se aplicará a los componentes de madera.
- Antes de ser necesario su uso, estarán en acopio real en la obra con las condiciones idóneas de almacenamiento para su buena conservación. El contratista deberá velar para que su calidad se corresponda con la definida en el Plan de Seguridad y Salud.

- Serán instaladas previamente al inicio de cualquier trabajo que requiera su montaje.
- Queda prohibida la iniciación de un trabajo o actividad que requiera protección colectiva, hasta que esta esté montada por completo en el ámbito del riesgo que neutraliza o elimina.
- El contratista, queda obligado a incluir y suministrar en su plan de ejecución de obra, la fecha de montaje, mantenimiento, cambio de ubicación y retirada de cada una de las protecciones colectivas que se contienen en este Estudio de Seguridad y Salud, siguiendo el esquema del plan de ejecución de obra que suministrará incluido en los documentos técnicos citados.
- Serán desmontadas de inmediato, las protecciones colectivas en uso en las que se aprecien deterioros con merma efectiva de su calidad real. Se sustituirá a continuación el componente deteriorado y se volverá a montar la protección colectiva una vez resuelto el problema. Entre tanto se realiza esta operación, se suspenderán los trabajos protegidos por el tramo deteriorado y se aislará eficazmente la zona para evitar accidentes. Estas operaciones quedarán protegidas mediante el uso de equipos de protección individual. En cualquier caso, estas situaciones se evalúan como riesgo intolerable.
- Durante la realización de la obra, puede ser necesario variar el modo o la disposición de la instalación de la protección colectiva prevista en el Plan de Seguridad y Salud aprobado. Si ello supone variación al contenido del Plan de Seguridad y Salud, los Planos de Seguridad y Salud, para concretar exactamente la nueva disposición o forma de montaje. Estos Planos deberán ser aprobados por el Coordinador en materia de Seguridad y Salud durante la ejecución de la obra.
- Las protecciones colectivas proyectadas en este trabajo, están destinadas a la protección de los riesgos de todos los trabajadores y visitantes de la obra; es decir: trabajadores del contratista, los de las empresas subcontratistas, empresas colaboradoras, trabajadores autónomos y visitas de los técnicos de dirección de obra o de visitas de las inspecciones de organismos oficiales o de invitados por diversas causas.

- El contratista, en virtud de la legislación vigente, está obligado al montaje, mantenimiento en buen estado y retirada de la protección colectiva por sus medios o mediante subcontratación, respondiendo ante los promotores, según las cláusulas penalizadoras del contrato de adjudicación de obra y del Pliego de condiciones técnicas y particulares del proyecto.
- El montaje y uso correcto de la protección colectiva definida en este Estudio de Seguridad y Salud, es preferible al uso de equipos de protección individual para defenderse de idéntico riesgo; en consecuencia, no se admitirá el cambio de uso de protección colectiva por el de equipos de protección individual.
- El contratista, queda obligado a conservar en la posición de uso prevista y montada, las protecciones colectivas que fallen por cualquier causa, hasta que se realice la investigación necesaria por el contratista, dando cuenta al Coordinador en materia de Seguridad y Salud durante la ejecución de la obra. En caso de fallo por accidente, se procederá según las normas legales vigentes, avisando además sin demora, inmediatamente, tras ocurrir los hechos, al Coordinador en materia de Seguridad y Salud durante la ejecución de la obra, y al Director de Obra.

Condiciones técnicas de instalación y uso de las protecciones colectivas: Dentro del apartado correspondiente de cada protección colectiva, se especificarán en el Plan de Seguridad y Salud que elabore el contratista las condiciones técnicas de instalación y uso, junto con su calidad, definición técnica de la unidad y las normas de obligado cumplimiento que se han creado para que sean cumplidas por los trabajadores que deben montarlas, mantenerlas, cambiarlas de posición y retirarlas.

El contratista, recogerá obligatoriamente en su Plan de Seguridad y Salud, las condiciones técnicas y demás especificaciones.

4. SEÑALIZACIÓN DE OBRA

Señalización de riesgos en el trabajo: Cumplirá con el contenido del Real Decreto 485 de 14 de abril de 1997 (incluyendo las modificaciones posteriores), que no se reproduce por economía documental. Desarrolla los preceptos específicos sobre señalización de riesgos en el trabajo según la Ley 31/1995 de 8 de noviembre de Prevención de Riesgos Laborales. En las descripciones de las Mediciones y Presupuesto, se especifican: el tipo, modelo, tamaño y material de cada una de las señales previstas para ser utilizadas en la obra. Estos textos deben tenerse por transcritos a este Pliego de condiciones técnicas y particulares, como normas de obligado cumplimiento.

Descripción técnica: Serán nuevas, a estrenar. Con el fin de economizar costos se eligen y valoran los modelos adhesivos en tres tamaños comercializados: pequeño, mediano y grande. Con el fin de no aumentar innecesariamente el texto de este Pliego de condiciones de Seguridad y Salud, deben tenerse por transcritas en él, las literaturas de las mediciones referentes a la señalización de riesgos en el trabajo.

Normas para el montaje de las señales:

- Está previsto el cambio de ubicación de cada señal mensualmente como mínimo para garantizar su máxima eficacia. Se pretende que por integración en el "paisaje habitual de la obra" no sea ignorada por los trabajadores.
- Las señales permanecerán cubiertas por elementos opacos cuando el riesgo, recomendación o información que anuncian sea innecesario y no convenga por cualquier causa su retirada.
- Se mantendrá permanentemente un tajo de limpieza y mantenimiento de señales, que garantice su eficacia.

Señalización vial: Esta señalización cumplirá con el "Código de la Circulación" y con el contenido de la Norma de carreteras 8.3-IC, señalización, balizamiento, defensa, limpieza y terminación de obras fijas fuera de poblado que no se reproducen por economía documental. En las descripciones de las Mediciones y Presupuesto, se especifican el tipo, modelo, tamaño y material de cada una de las señales previstas para ser utilizadas en la obra. Estos textos deben tenerse por transcritos a este Pliego de condiciones técnicas y particulares como características de obligado cumplimiento.

Normas para el montaje de las señales:

- No se instalarán en los paseos o arcenes, pues ello constituiría un obstáculo fijo temporal para la circulación.
- Queda prohibido inmovilizarlas con piedras apiladas o con materiales sueltos, se instalarán sobre los pies derechos metálicos y trípodes que les son propios.
- Las señales permanecerán cubiertas por elementos opacos cuando el riesgo, recomendación o información que anuncian sea innecesario y no convenga por
- cualquier causa su retirada.
- Se instalarán en los lugares y a las distancias que se indican en los planos específicos de señalización vial.
- Se mantendrá permanentemente un tajo de limpieza y mantenimiento de señales, que garantice la eficacia de la señalización vial instalada en esta obra.
- En cualquier caso y pese a lo previsto en los planos de señalización vial, se tendrán en cuenta los comentarios y posibles recomendaciones que haga la Guardia Civil de Tráfico.

Normas de seguridad de obligado cumplimiento por los montadores de la señalización vial: Se hará entrega a los montadores de las señales del siguiente texto y firmarán un recibo de recepción, que estará archivado a disposición del Coordinador en materia de Seguridad y Salud durante la ejecución de la obra y en su caso, de la Autoridad Laboral. La tarea es muy importante, de su buen hacer depende que no existan accidentes en la obra. Una señal es necesaria para avisar a los trabajadores de la existencia de algún riesgo, peligro o aviso necesario para su integridad física. Se deben seguir lo más exactamente posible los planos e indicaciones.

Obligaciones expresas del Contratista: No se podrá dar comienzo a ninguna obra, en tanto el Contratista no haya colocado todas las señales de obra necesarias, las cuales han de ser adecuadas en tipo, tamaño, número y modalidad, de acuerdo todo ello a la normativa vigente. Durante la ejecución de las obras el Contratista cuidará de la perfecta conservación de las señales, vallas, conos, cintas y demás elementos de señalización y balizamiento, de tal forma que se mantengan siempre en perfecto estado, para lo cual realizará las sustituciones, reparaciones y limpiezas que sean necesarias. Las señales colocadas no deberán permanecer más tiempo del necesario, por lo que deberán retirarse inmediatamente después de finalizada su utilidad.

Características de las señales: Las señales deberán tener las dimensiones establecidas para la categoría "MEDIANAS", recomendada por la tabla 4 de la instrucción 8.3-IC de señalización de obras. Todas las señales serán reflectantes, como mínimo con el nivel 1 (según normas UNE), aunque se considera recomendable utilizar un nivel superior donde la iluminación ambiente dificulte su percepción o donde la peligrosidad sea elevada. Los elementos de color blanco, amarillo, rojo y azul deberán ser reflexivos. Todas las superficies planas de señales y elementos de balizamiento se colocarán perpendiculares al eje de la vía. Las señales se podrán colocar mediante trípodes o elementos de sustentación similares, a alturas inferiores a 1 m cuando la duración de la obra así lo aconseje.

5. SERVICIOS DE PREVENCIÓN

5.1. SERVICIO TÉCNICO DE SEGURIDAD Y SALUD

La obra deberá contar con un Técnico de Seguridad cuya misión será la prevención de riesgos que puedan presentarse durante la ejecución de los trabajos y asesorar al Jefe de Obra sobre las medidas de Seguridad a adoptar. Así mismo investigará las causas de los accidentes ocurridos, para modificar, si ello es posible, los condicionantes que los produjeron, a fin de evitar su repetición.

5.2. SERVICIO MÉDICO

La empresa constructora podrá disponer de un servicio médico propio dentro de la misma o mancomunado.

6. DELEGADO DE PREVENCIÓN Y COMITÉ DE SEGURIDAD Y SALUD

Son, respectivamente, el representante de los trabajadores y el órgano de consulta de actuaciones en materia de prevención de riesgos. Su constitución, competencias y forma de actuar se regirán por lo establecido en los artículos 35, 36, 37, 38, 39 y 40 de la Ley 31/1995, de 8 de noviembre, de Prevención de Riesgos Laborales.

7. INSTALACIONES MÉDICAS

Se dispondrá de un botiquín conteniendo el material especificado en la Ordenanza General de Seguridad e Higiene en el Trabajo. Dicho botiquín se revisará mensualmente y se repondrá inmediatamente el material consumido.

8. INSTALACIONES DE HIGIENE Y BIENESTAR

Las instalaciones provisionales de obra se adaptarán, en lo relativo a elementos, dimensiones y características, a lo especificado en los Artículos 39, 40, 41 y 42 de la Ordenanza General de Seguridad e Higiene y en los artículos 335, 336 y 337 de la Ordenanza Laboral de la Construcción. En cumplimiento de los citados artículos, la obra dispondrá de locales debidamente dotados para vestuarios, servicios higiénicos y comedor. Los vestuarios dispondrán de taquillas individuales con llave, asientos, iluminación y ventilación. Los servicios higiénicos tendrán calefacción, iluminación, un lavabo con espejo y una ducha con agua caliente y fría por cada 10 trabajadores, y un retrete por cada 15 trabajadores. El comedor dispondrá de mesas, asientos, pila lavavajillas, calienta-comidas, calefacción para el invierno y recipiente para desperdicios. Para la limpieza y conservación de estos locales se dispondrá de un trabajador con la dedicación necesaria.

9. EQUIPO DE SEGURIDAD

Se dispondrá una brigada de seguridad formada por un peón especializado y un peón, que se encargará de las labores de instalación, mantenimiento, reparación y remoción de protecciones y señalización de obra. Dicha brigada recorrerá la obra completa y empleará el tiempo necesario para la correcta realización de las operaciones descritas en el apartado anterior.

10. COORDINADORES EN MATERIA DE SEGURIDAD Y SALUD

La designación se hará antes del inicio de la obra. Dicho coordinador será el técnico competente integrado en la dirección facultativa, y designado por el promotor para llevar a cabo las tareas que se mencionan en el artículo 9 del Real Decreto 1627/1997, de 24 de octubre, por el que se establecen disposiciones mínimas de seguridad y salud en las obras de construcción, incluidas las modificaciones posteriores.

11. PLAN DE SEGURIDAD Y SALUD EN EL TRABAJO

El Contratista de la obra elaborará un Plan de Seguridad y Salud en el Trabajo en el que se analicen, estudien, desarrollen y complementen las previsiones contenidas en el presente estudio de seguridad y salud, en función de su propio sistema de ejecución de la obra. Dicho Plan incluirá, en su caso, las propuestas de medidas alternativas de prevención que proponga el contratista, con las correspondientes justificación técnica y valoración económica. Estas medidas alternativas no implicarán ni disminución de los niveles de protección previstos en este Estudio, ni disminución del importe total de su presupuesto.

Deberá ser aprobado antes del inicio de la obra por el coordinador en materia de seguridad y salud durante la ejecución de las obras. El plan, con el correspondiente informe del citado coordinador, será elevado para su aprobación por el promotor.

El Plan de Seguridad y Salud podrá ser modificado por el contratista en función del proceso de ejecución de la obra, de la evolución de los trabajos y de las posibles incidencias y modificaciones que pudieran surgir a lo largo de la obra. Para su modificación será necesaria la autorización expresa del coordinador en materia de seguridad y salud, y siempre verificando las condiciones expuestas anteriormente.

12. LIBRO DE INCIDENCIAS

En cada centro de trabajo existirá, con fines de control y seguimiento del Plan de Seguridad y Salud en el Trabajo, un libro de incidencias que constará de hojas por duplicado y habilitado al efecto. Dicho libro de incidencias será facilitado por la Oficina de Supervisión de Proyectos u órgano equivalente de la Administración. El libro de incidencias deberá mantenerse siempre en obra, en poder del coordinador en materia de seguridad y salud durante la ejecución de las obras, o de la dirección facultativa si no fuera necesaria la designación del coordinador. A él se tendrá acceso según lo dispuesto en el artículo 13.3 del Real Decreto 1627/1997, de 24 de octubre, por el que se establecen disposiciones mínimas de seguridad y salud en las obras de construcción.

Cáceres, febrero de 2016

El autor del proyecto,

Fdo: Jesús Fernández González

PRESUPUESTO

1. MEDICIONES

MEDICIONES

Estudio de Seguridad y Salud - Planta Termosolar Llerena

CÓDIGO	RESUMEN	UDS	LONGITUD	ANCHURA	ALTURA	PARCIALES	CANTIDAD

CAPÍTULO 1 PROTECCIONES INDIVIDUALES

S03IA010 **ud CASCO DE SEGURIDAD**

Casco de seguridad con arnés de adaptación, homologado. Certificado CE. s/ R.D. 773/97.
N maximo de trabajadores

145,00

S03IA070 **ud GAFAS CONTRA IMPACTOS**

Gafas protectoras contra impactos, incoloras, homologadas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

145,00

S03IA090 **ud GAFAS ANTIPOLVO**

Gafas antipolvo antiempañables, panorámicas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

145,00

S03IA100 **ud SEMI MÁSCARA ANTIPOLVO 1 FILTRO**

Semi-mascarilla antipolvo un filtro, (amortizable en 3 usos). Certificado CE. s/ R.D. 773/97.

145,00

S03IA110 **ud FILTRO RECAMBIO MASCARILLA**

Filtro recambio de mascarilla para polvo y humos, homologado. Certificado CE. s/ R.D. 773/97.

145,00

S03IC090 **ud MONO DE TRABAJO**

Mono de trabajo de una pieza de poliéster-algodón. Amortizable en un uso. Certificado CE; s/ R.D. 773/97.

145,00

S03IC100 **ud TRAJE IMPERMEABLE**

Traje impermeable de trabajo, 2 piezas de PVC. Amortizable en un uso. Certificado CE; s/ R.D. 773/97.

145,00

S03IM040 **ud PAR GUANTES DE USO GENERAL**

Par de guantes de uso general de lona y serraje. Certificado CE; s/ R.D. 773/97.

175,00

S03IM010 **ud PAR GUANTES DE GOMA LÁTEX-ANTIC.**

Par guantes de goma látex-anticorte. Certificado CE; s/ R.D. 773/97.

175,00

S03IP010 **ud PAR DE BOTAS DE AGUA**

Par de botas altas de agua. Certificado CE; s/ R.D. 773/97.

145,00

S03IP030 **ud PAR DE BOTAS C/PUNTERA METAL.**

Par de botas de seguridad con puntera metálica para refuerzo y plantillas de acero flexibles, para riesgos de perforación, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

145,00

S03IC140 **ud PETO REFLECTANTE DE SEGURIDAD**

Peto reflectante de seguridad personal en colores amarillo y rojo, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

160,00

S03IA040 **ud PANTALLA SEGURIDAD SOLDADOR**

Pantalla manual de seguridad para soldador, con fijación en cabeza, (amortizable en 5 usos). Certificado CE. s/ R.D. 773/97.

50,00

S03IA120 **ud CASCOS PROTECTORES AUDITIVOS**

Protectores auditivos con arnés a la nuca, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

175,00

S03IC130 **ud MANDIL CUERO PARA SOLDADOR**

Mandil de cuero para soldador, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

50,00

S03IM060 **ud PAR GUANTES PARA SOLDADOR**

Par de guantes para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

50,00

S03IP050 **ud PAR DE POLAINAS SOLDADURA**

Par de polainas para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

50,00

CAPÍTULO 2 PROTECCIONES COLECTIVAS

S02S010 **ud SEÑAL TRIANGULAR I/SOPORTE**

Señal de seguridad triangular de L=70 cm., normalizada, con trípode tubular, amortizable en cinco usos, i/colocación y desmontaje. s/ R.D. 485/97.

2,00

S02S030 **ud SEÑAL CIRCULAR I/SOPORTE**

Señal de seguridad circular de D=60 cm., normalizada, con soporte metálico de acero galvanizado de 80x40x2 mm. y 2 m. de altura, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y desmontaje. s/ R.D. 485/97.

2,00

S02S070 **ud PANEL DIRECCIONAL C/SOPORTE**

Panel direccional reflectante de 60x90 cm., con soporte metálico, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y montaje. s/ R.D. 485/97.

1,00

S02B010 **m. CINTA BALIZAMIENTO BICOLOR 8 cm.**

Cinta de balizamiento bicolor rojo/blanco de material plástico, incluso colocación y desmontaje.R.D. 485/97.

1.000,00

S03CB200 **ud VALLA DE OBRA REFLECTANTE**

Valla de obra reflectante de 170x25 cm. de poliéster reforzado con fibra de vidrio, con terminación en colores rojo y blanco, patas metálicas, amortizable en 5 usos, incluso colocación y desmontaje. s/ R.D. 486/97.

5,00

CAPÍTULO 3 INST. ELÉCTRICAS Y CONTRAINCENDIO

S03CE070 **ud CUADRO GENERAL OBRA Pmáx= 40 kW.**

Cuadro general de mandos y protección de obra para una potencia máxima de 40 kW. compuesto por armario metálico con revestimiento de poliéster, de 90x60 cm., índice de protección IP 559, con cerradura, interruptor automático magnetotérmico más diferencial de 4x125 A., un interruptor automático magnetotérmico de 4x63 A., y 5 interruptores automáticos magnetotérmicos de 2x25 A., incluyendo cableado, rótulos de identificación de circuitos, bornas de salida y p.p. de conexión a tierra, para una resistencia no superior de 80 Ohmios, totalmente instalado. (amortizable en 4 obras). s/ R.D. 486/97.

2,00

S03CF020 **ud EXTINTOR POLVO ABC 9 kg. PR.INC.**

Extintor de polvo químico ABC polivalente antibrasa de eficacia 43A/233B, de 9 kg. de agente extintor, con soporte, manómetro comprobable y manguera con difusor. Medida la unidad instalada. s/ R.D. 486/97.

10,00

S03CF030 **ud EXTINTOR CO2 5 kg.**

Extintor de nieve carbónica CO_2, de eficacia 89B, con 5 kg. de agente extintor, modelo NC-5-P, con soporte y boquilla con difusor. Medida la unidad instalada. s/ R.D. 486/97.

10,00

S03IC110 **ud TRAJE EXTINCIÓN DE INCENDIOS**

Traje resistente al fuego de fibra Nomex. (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

2,00

S03IM090 **ud PAR GUANTES EXTINCIÓN INCENDIOS**

Par de guantes para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97.

2,00

S03IP060 **ud PAR POLAINAS EXTIN.INCENDIOS**

Par de polainas para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97.

2,00

CAPÍTULO 4 INST. HIGIENE Y BIENESTAR

S01C085 **ms ALQUILER CASETA ASEO 14,10 m2.**

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseos en obra de 6,00x2,30x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l., dos retretes, cuatro placas de ducha y pileta de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste, puerta madera en turca, cortina en ducha. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica mono. 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Según nº trabajadores	2	78,00	156,00	
				156,00

S01C025 **ms ALQUILER CASETA ASEO 6,20 m2.**

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseo en obra de 3,25x1,90x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l.; 1 retretes, 3 urinarios y lavabo de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste , puerta madera en baños. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica monofásica a 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Según nº trabajdores	1	78,00	78,00	
				78,00

S01C205 **ms ALQUILER CASETA COMEDOR 18,35 m2**

Mes de alquiler (min. 12 meses) de caseta prefabricada para comedor de obra de 7,87x2,33x2,30 m. de 18,35 m2. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido autoextinguible, interior con tablero melaminado en color. Cubierta en arco de chapa galvanizada ondulada reforzada con perfil de acero; fibra de vidrio de 60 mm., interior con tablex lacado. Suelo de aglomerado revestido con PVC continuo de 2 mm., y poliestireno de 50 mm. con apoyo en base de chapa galvanizada de sección trapezoidal. Puerta de 0,8x2 m., de chapa galvanizada de 1mm., reforzada y con poliestireno de 20 mm., picaporte y cerradura. Dos ventanas aluminio anodizado corredera, contraventana de acero galvanizado. Instalación eléctrica a 220 V., toma de tierra, automático, 2 fluorescentes de 40 W., enchufes para 1500 W. y punto luz exterior de 60 W. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Según nº trabajadores	16	78,00	1.248,00	
				1.248,00

S01C215 **ms ALQUILER CASETA VESTUARIO 17,90 m2**

Mes de alquiler de caseta prefabricada para vestuario de obra de 7,60x2,35x2,30 m. de 17,90 m2. Estructura de acero galvanizado. Cubierta y cerramiento lateral de chapa galvanizada trapezoidal de 0,6 mm. reforzada con perfiles de acero, interior prelacado. Suelo de aglomerado hidrófugo de 19 mm. puerta de acero de 1mm., de 0,80x2,00 m. pintada con cerradura. Ventana fija de cristal de 6 mm., recercado con perfil de goma. Incluye bancos y colgadores. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Según nº trabajadores	17	78,00	1.326,00	
				1.326,00

S04W040 **ud COSTO MENSUAL LIMPIEZA Y DESINF.**

Costo mensual de limpieza y desinfección de casetas de obra, considerando dos horas a la semana un peón ordinario. Art 32 y 42.

Caseta aseo 14,10 m2	2	78,00	156,00	
Caseta aseo 6,20 m2	1	78,00	78,00	
Comedor	16	78,00	1.248,00	
Vestuarios	17	78,00	1.326,00	
				2.808,00

S01A020 **m. ACOMETIDA ELÉCT. CASETA 4x6 mm2**

Acometida provisional de electricidad a caseta de obra, desde el cuadro general formada por manguera flexible de 4x6 mm2. de tensión nominal 750 V., incorporando conductor de tierra color verde y amarillo, fijada sobre apoyos intermedios cada 2,50 m. totalmente instalada.

1.000,00

S01A030 **ud ACOMETIDA PROV.FONTANERÍA 25 mm.**

Acometida provisional de fontanería para obra de la red general municipal de agua potable hasta una longitud máxima de 8 m., realizada con tubo de polietileno de 25 mm. de diámetro, de alta densidad y para 10 atmósferas de presión máxima con collarín de toma de fundición, p.p. de piezas especiales de polietileno y tapón roscado, incluso derechos y permisos para la conexión, totalmente terminada y funcionando, y sin incluir la rotura del pavimento.

2,00

S01A040 **ud ACOMETIDA PROVIS. SANEAMIENTO**

Acometida provisional de saneamiento de caseta de obra a la red general municipal, hasta una distancia máxima de 100 m., formada por: rotura del pavimento con compresor, excavación manual de zanjas de saneamiento en terrenos de consistencia dura, colocación de tubería de hormigón en masa de enchufe de campana, con junta de goma de 20 cm. de diámetro interior, tapado posterior de la acometida y reposición del pavimento con hormigón en masa HM/15/B/40, sin incluir formación del pozo en el punto de acometida y con p.p. de medios auxiliares.

2,00

S01M060 **ud HORNO MICROONDAS**

Horno microondas de 18 litros de capacidad, con plato giratorio incorporado (amortizable en 5 usos).

16,00

S01M070 **ud TAQUILLA METÁLICA INDIVIDUAL**

Taquilla metálica individual para vestuario de 1,80 m. de altura en acero laminado en frío, con tratamiento antifosfatante y antocorrosivo, con pintura secada al horno, cerradura, balda y tubo percha, lamas de ventilación en puerta, colocada, (amortizable en 3 usos).

145,00

S01M080 **ud MESA MELAMINA PARA 10 PERSONAS**

Mesa de melamina para comedor de obra con capacidad para 10 personas, (amortizable en 4 usos).

15,00

S01M090 **ud BANCO MADERA PARA 5 PERSONAS**

Banco de madera con capacidad para 5 personas, (amortizable en 2 usos).

29,00

CAPÍTULO 5 MEDICINA PREVENTIVA Y PRIMEROS AUXILIOS

S04W060 **ud VIGILANCIA DE LA SALUD**

Vigilancia de la salud obligatoria anual por trabajador que incluye: Planificación de la vigilancia de la salud; análisis de los accidentes de trabajo; análisis de las enfermedades profesionales; análisis de las enfermedades comunes; análisis de los resultados de la vigilancia de la salud; análisis de los riesgos que puedan afectar a trabajadores sensibles (embarazadas, postparto, discapacitados, menores, etc. (Art. 37.3 g del Reglamento de los Servicios de Prevención); formación de los trabajadores en primeros auxilios; asesoramiento al empresario acerca de la vigilancia de la salud; elaboración de informes, recomendaciones, medidas sanitarias preventivas, estudios estadísticos, epidemiológicos, memoria anual del estado de salud (Art. 23 d y e de la Ley de Prevención de Riesgos Laborales); colaboración con el sistema nacional de salud en materias como campañas preventivas, estudios epidemiológicos y reporte de la documentación requerida por dichos organismos (Art. 38 del Reglamento de los Servicios de Prevención y Art. 21 de la ley 14/86 General de Sanidad); sin incluir el reconocimiento médico que realizará la mutua con cargo a cuota de la Seguridad Social.

145,00

S04W070 **ud BOTIQUIN DE URGENCIA**

Botiquín de urgencia qu incluya como mínimo vendajes, gasas esterilizadas, algodón, alcohol 96º, agua oxigenada, tintura de yodo, tiritas, esparadrapo, torniquete, bolsa para gua o hielo, guantes esterilizados, termómetro y apósitos

15,00

S04W080 **ud REPOSICIÓN BOTIQUÍN**

78,00

S04W090 **ud RECONOCIMIENTO MÉDICO**

Reconocimiento médico por trabajador. Se realizará uno al iniciarse las obras y se repetirá cada año o tras una baja o accidente laboral.

Según nº trabajadores	145	8,00	1.160,00

1.160,00

CAPÍTULO 6 FORMACIÓN Y REUNIONES DE OBLIGADO CUMPLIMIENTO

S04W050 **ud COSTO MENSUAL FORMAC.SEG.Y SAL.**

Costo mensual de formación de seguridad y salud en el trabajo, considerando una hora a la semana y realizada por un encargado.

78,00

S04W020 **ud COSTO MENSUAL COMITÉ SEGURIDAD**

Costo mensual del Comité de Seguridad y salud en el Trabajo, considerando una reunión al mes de dos horas y formado por un técnico cualificado en materia de seguridad y salud, dos trabajadores con categoria de oficial de 2ª o ayudante y un vigilante con categoria de oficial de 1ª.

78,00

2. CUADRO DE PRECIOS Nº 1

CUADRO DE PRECIOS 1

Estudio de Seguridad y Salud - Planta Termosolar Llerena

CÓDIGO	UD	RESUMEN	PRECIO
CAPÍTULO 1 PROTECCIONES INDIVIDUALES			
S03IA010	**ud**	**CASCO DE SEGURIDAD** Casco de seguridad con arnés de adaptación, homologado. Certificado CE. s/ R.D. 773/97. DOS EUROS con CUARENTA Y OCHO CÉNTIMOS	**2,48**
S03IA070	**ud**	**GAFAS CONTRA IMPACTOS** Gafas protectoras contra impactos, incoloras, homologadas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97. CERO EUROS con OCHENTA Y DOS CÉNTIMOS	**0,82**
S03IA090	**ud**	**GAFAS ANTIPOLVO** Gafas antipolvo antiempañables, panorámicas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97. CERO EUROS con CINCUENTA Y DOS CÉNTIMOS	**0,52**
S03IA100	**ud**	**SEMI MÁSCARA ANTIPOLVO 1 FILTRO** Semi-mascarilla antipolvo un filtro, (amortizable en 3 usos). Certificado CE. s/ R.D. 773/97. DOS EUROS con OCHENTA CÉNTIMOS	**2,80**
S03IA110	**ud**	**FILTRO RECAMBIO MASCARILLA** Filtro recambio de mascarilla para polvo y humos, homologado. Certificado CE. s/ R.D. 773/97. DOS EUROS con VEINTIDOS CÉNTIMOS	**2,22**
S03IC090	**ud**	**MONO DE TRABAJO** Mono de trabajo de una pieza de poliéster-algodón. Amortizable en un uso. Certificado CE; s/ R.D. 773/97. TRECE EUROS con SESENTA Y DOS CÉNTIMOS	**13,62**
S03IC100	**ud**	**TRAJE IMPERMEABLE** Traje impermeable de trabajo, 2 piezas de PVC. Amortizable en un uso. Certificado CE; s/ R.D. 773/97. SIETE EUROS con CUARENTA Y TRES CÉNTIMOS	**7,43**
S03IM040	**ud**	**PAR GUANTES DE USO GENERAL** Par de guantes de uso general de lona y serraje. Certificado CE; s/ R.D. 773/97. UN EUROS con VEINTICUATRO CÉNTIMOS	**1,24**
S03IM010	**ud**	**PAR GUANTES DE GOMA LÁTEX-ANTIC.** Par guantes de goma látex-anticorte. Certificado CE; s/ R.D. 773/97. DOS EUROS con VEINTIDOS CÉNTIMOS	**2,22**
S03IP010	**ud**	**PAR DE BOTAS DE AGUA** Par de botas altas de agua. Certificado CE; s/ R.D. 773/97. SIETE EUROS con CUARENTA Y TRES CÉNTIMOS	**7,43**
S03IP030	**ud**	**PAR DE BOTAS C/PUNTERA METAL.** Par de botas de seguridad con puntera metálica para refuerzo y plantillas de acero flexibles, para riesgos de perforación, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97. SIETE EUROS con CUARENTA Y DOS CÉNTIMOS	**7,42**

S03IC140 ud **PETO REFLECTANTE DE SEGURIDAD** **2,88**

Peto reflectante de seguridad personal en colores amarillo y rojo, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

DOS EUROS con OCHENTA Y OCHO CÉNTIMOS

S03IA040 ud **PANTALLA SEGURIDAD SOLDADOR** **1,98**

Pantalla manual de seguridad para soldador, con fijación en cabeza, (amortizable en 5 usos). Certificado CE. s/ R.D. 773/97.

UN EUROS con NOVENTA Y OCHO CÉNTIMOS

S03IA120 ud **CASCOS PROTECTORES AUDITIVOS** **2,47**

Protectores auditivos con arnés a la nuca, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

DOS EUROS con CUARENTA Y SIETE CÉNTIMOS

S03IC130 ud **MANDIL CUERO PARA SOLDADOR** **5,33**

Mandil de cuero para soldador, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

CINCO EUROS con TREINTA Y TRES CÉNTIMOS

S03IM060 ud **PAR GUANTES PARA SOLDADOR** **2,39**

Par de guantes para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

DOS EUROS con TREINTA Y NUEVE CÉNTIMOS

S03IP050 ud **PAR DE POLAINAS SOLDADURA** **2,68**

Par de polainas para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

DOS EUROS con SESENTA Y OCHO CÉNTIMOS

CAPÍTULO 2 PROTECCIONES COLECTIVAS

S02S010 **ud** **SEÑAL TRIANGULAR I/SOPORTE** **23,15**

Señal de seguridad triangular de L=70 cm., normalizada, con trípode tubular, amortizable en cinco usos, i/colocación y desmontaje. s/ R.D. 485/97.

VEINTITRES EUROS con QUINCE CÉNTIMOS

S02S030 **ud** **SEÑAL CIRCULAR I/SOPORTE** **26,78**

Señal de seguridad circular de D=60 cm., normalizada, con soporte metálico de acero galvanizado de 80x40x2 mm. y 2 m. de altura, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y desmontaje. s/ R.D. 485/97.

VEINTISEIS EUROS con SETENTA Y OCHO CÉNTIMOS

S02S070 **ud** **PANEL DIRECCIONAL C/SOPORTE** **37,78**

Panel direccional reflectante de 60x90 cm., con soporte metálico, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y montaje. s/ R.D. 485/97.

TREINTA Y SIETE EUROS con SETENTA Y OCHO CÉNTIMOS

S02B010 **m.** **CINTA BALIZAMIENTO BICOLOR 8 cm.** **0,70**

Cinta de balizamiento bicolor rojo/blanco de material plástico, incluso colocación y desmontaje.R.D. 485/97.

CERO EUROS con SETENTA CÉNTIMOS

S03CB200 **ud** **VALLA DE OBRA REFLECTANTE** **25,60**

Valla de obra reflectante de 170x25 cm. de poliéster reforzado con fibra de vidrio, con terminación en colores rojo y blanco, patas metálicas, amortizable en 5 usos, incluso colocación y desmontaje. s/ R.D. 486/97.

VEINTICINCO EUROS con SESENTA CÉNTIMOS

CAPÍTULO 3 INST. ELÉCTRICAS Y CONTRAINCENDIO

S03CE070	**ud**	**CUADRO GENERAL OBRA Pmáx= 40 kW.** Cuadro general de mandos y protección de obra para una potencia máxima de 40 kW. compuesto por armario metálico con revestimiento de poliéster, de 90x60 cm., índice de protección IP 559, con cerradura, interruptor automático magnetotérmico más diferencial de 4x125 A., un interruptor automático magnetotérmico de 4x63 A., y 5 interruptores automáticos magnetotérmicos de 2x25 A., incluyendo cableado, rótulos de identificación de circuitos, bornas de salida y p.p. de conexión a tierra, para una resistencia no superior de 80 Ohmios, totalmente instalado. (amortizable en 4 obras). s/ R.D. 486/97. DOSCIENTOS NOVENTA Y CUATRO EUROS con TREINTA Y SIETE CÉNTIMOS	**294,37**
S03CF020	**ud**	**EXTINTOR POLVO ABC 9 kg. PR.INC.** Extintor de polvo químico ABC polivalente antibrasa de eficacia 43A/233B, de 9 kg. de agente extintor, con soporte, manómetro comprobable y manguera con difusor. Medida la unidad instalada. s/ R.D. 486/97. SETENTA Y DOS EUROS con CINCUENTA Y SEIS CÉNTIMOS	**72,56**
S03CF030	**ud**	**EXTINTOR CO2 5 kg.** Extintor de nieve carbónica CO2, de eficacia 89B, con 5 kg. de agente extintor, modelo NC-5-P, con soporte y boquilla con difusor. Medida la unidad instalada. s/ R.D. 486/97. CIENTO TREINTA Y NUEVE EUROS con SETENTA Y UN CÉNTIMOS	**139,71**
S03IC110	**ud**	**TRAJE EXTINCIÓN DE INCENDIOS** Traje resistente al fuego de fibra Nomex. (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97. SETENTA Y CINCO EUROS con OCHENTA Y UN CÉNTIMOS	**75,81**
S03IM090	**ud**	**PAR GUANTES EXTINCIÓN INCENDIOS** Par de guantes para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97. CUARENTA Y UN EUROS con SETENTA Y CUATRO CÉNTIMOS	**41,74**
S03IP060	**ud**	**PAR POLAINAS EXTIN.INCENDIOS** Par de polainas para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97. TREINTA Y SIETE EUROS con CINCUENTA Y SEIS CÉNTIMOS	**37,56**

CAPÍTULO 4 INST. HIGIENE Y BIENESTAR

S01C085 ms **ALQUILER CASETA ASEO 14,10 m2.** **186,81**

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseos en obra de 6,00x2,30x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l., dos retretes, cuatro placas de ducha y pileta de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste, puerta madera en turca, cortina en ducha. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica mono. 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

CIENTO OCHENTA Y SEIS EUROS con OCHENTA Y UN CÉNTIMOS

S01C025 ms **ALQUILER CASETA ASEO 6,20 m2.** **87,78**

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseo en obra de 3,25x1,90x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l.; 1 retretes, 3 urinarios y lavabo de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste , puerta madera en baños. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica monofásica a 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

OCHENTA Y SIETE EUROS con SETENTA Y OCHO CÉNTIMOS

S01C205 ms **ALQUILER CASETA COMEDOR 18,35 m2** **174,43**

Mes de alquiler (min. 12 meses) de caseta prefabricada para comedor de obra de 7,87x2,33x2,30 m. de 18,35 m2. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido autoextinguible, interior con tablero melaminado en color. Cubierta en arco de chapa galvanizada ondulada reforzada con perfil de acero; fibra de vidrio de 60 mm., interior con tablex lacado. Suelo de aglomerado revestido con PVC continuo de 2 mm., y poliestireno de 50 mm. con apoyo en base de chapa galvanizada de sección trapezoidal. Puerta de 0,8x2 m., de chapa galvanizada de 1mm., reforzada y con poliestireno de 20 mm., picaporte y cerradura. Dos ventanas aluminio anodizado corredera, contraventana de acero galvanizado. Instalación eléctrica a 220 V., toma de tierra, automático, 2 fluorescentes de 40 W., enchufes para 1500 W. y punto luz exterior de 60 W. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

CIENTO SETENTA Y CUATRO EUROS con CUARENTA Y TRES CÉNTIMOS

S01C215 ms **ALQUILER CASETA VESTUARIO 17,90 m2** **165,92**

Mes de alquiler de caseta prefabricada para vestuario de obra de 7,60x2,35x2,30 m. de 17,90 m2. Estructura de acero galvanizado. Cubierta y cerramiento lateral de chapa galvanizada trapezoidal de 0,6 mm. reforzada con perfiles de acero, interior prelacado. Suelo de aglomerado hidrófugo de 19 mm. puerta de acero de 1mm., de 0,80x2,00 m. pintada con cerradura. Ventana fija de cristal de 6 mm., recercado con perfil de goma. Incluye bancos y colgadores. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

CIENTO SESENTA Y CINCO EUROS con NOVENTA Y DOS CÉNTIMOS

S04W040 ud **COSTO MENSUAL LIMPIEZA Y DESINF.** **92,76**

Costo mensual de limpieza y desinfección de casetas de obra, considerando dos horas a la semana un peón ordinario. Art 32 y 42.

NOVENTA Y DOS EUROS con SETENTA Y SEIS CÉNTIMOS

S01A020 m. **ACOMETIDA ELÉCT. CASETA 4x6 mm2** **7,62**

Acometida provisional de electricidad a caseta de obra, desde el cuadro general formada por manguera flexible de 4x6 mm2. de tensión nominal 750 V., incorporando conductor de tierra color verde y amarillo, fijada sobre apoyos intermedios cada 2,50 m. totalmente instalada.

SIETE EUROS con SESENTA Y DOS CÉNTIMOS

S01A030 ud **ACOMETIDA PROV.FONTANERÍA 25 mm.** **772,50**

Acometida provisional de fontanería para obra de la red general municipal de agua potable hasta una longitud máxima de 8 m., realizada con tubo de polietileno de 25 mm. de diámetro, de alta densidad y para 10 atmósferas de presión máxima con collarín de toma de fundición, p.p. de piezas especiales de polietileno y tapón roscado, incluso derechos y permisos para la conexión, totalmente terminada y funcionando, y sin incluir la rotura del pavimento.

SETECIENTOS SETENTA Y DOS EUROS con CINCUENTA CÉNTIMOS

S01A040 ud **ACOMETIDA PROVIS. SANEAMIENTO** **927,00**

Acometida provisional de saneamiento de caseta de obra a la red general municipal, hasta una distancia máxima de 100 m., formada por: rotura del pavimento con compresor, excavación manual de zanjas de saneamiento en terrenos de consistencia dura, colocación de tubería de hormigón en masa de enchufe de campana, con junta de goma de 20 cm. de diámetro interior, tapado posterior de la acometida y reposición del pavimento con hormigón en masa HM/15/B/40, sin incluir formación del pozo en el punto de acometida y con p.p. de medios auxiliares.

NOVECIENTOS VEINTISIETE EUROS

S01M060	**ud**	**HORNO MICROONDAS** Horno microondas de 18 litros de capacidad, con plato giratorio incorporado (amortizable en 5 usos). TREINTA Y DOS EUROS con VEINTIUN CÉNTIMOS	**32,21**
S01M070	**ud**	**TAQUILLA METÁLICA INDIVIDUAL** Taquilla metálica individual para vestuario de 1,80 m. de altura en acero laminado en frío, con tratamiento antifosfatante y antocorrosivo, con pintura secada al horno, cerradura, balda y tubo percha, lamas de ventilación en puerta, colocada, (amortizable en 3 usos). CUARENTA EUROS con SETENTA Y CINCO CÉNTIMOS	**40,75**
S01M080	**ud**	**MESA MELAMINA PARA 10 PERSONAS** Mesa de melamina para comedor de obra con capacidad para 10 personas, (amortizable en 4 usos). SESENTA Y TRES EUROS con VEINTIUN CÉNTIMOS	**63,21**
S01M090	**ud**	**BANCO MADERA PARA 5 PERSONAS** Banco de madera con capacidad para 5 personas, (amortizable en 2 usos). SESENTA Y DOS EUROS con CUARENTA Y NUEVE CÉNTIMOS	**62,49**

CAPÍTULO 5 MEDICINA PREVENTIVA Y PRIMEROS AUXILIOS

S04W060 **ud** **VIGILANCIA DE LA SALUD** **60,71**

Vigilancia de la salud obligatoria anual por trabajador que incluye: Planificación de la vigilancia de la salud; análisis de los accidentes de trabajo; análisis de las enfermedades profesionales; análisis de las enfermedades comunes; análisis de los resultados de la vigilancia de la salud; análisis de los riesgos que puedan afectar a trabajadores sensibles (embarazadas, postparto, discapacitados, menores, etc. (Art. 37.3 g del Reglamento de los Servicios de Prevención); formación de los trabajadores en primeros auxilios; asesoramiento al empresario acerca de la vigilancia de la salud; elaboración de informes, recomendaciones, medidas sanitarias preventivas, estudios estadísticos, epidemiológicos, memoria anual del estado de salud (Art. 23 d y e de la Ley de Prevención de Riesgos Laborales); colaboración con el sistema nacional de salud en materias como campañas preventivas, estudios epidemiológicos y reporte de la documentación requerida por dichos organismos (Art. 38 del Reglamento de los Servicios de Prevención y Art. 21 de la ley 14/86 General de Sanidad); sin incluir el reconocimiento médico que realizará la mutua con cargo a cuota de la Seguridad Social.

SESENTA EUROS con SETENTA Y UN CÉNTIMOS

S04W070 **ud** **BOTIQUIN DE URGENCIA** **64,89**

Botiquín de urgencia qu incluya como mínimo vendajes, gasas esterilizadas, algodón, alcohol 96º, agua oxigenada, tintura de yodo, tiritas, esparadrapo, torniquete, bolsa para gua o hielo, guantes esterilizados, termómetro y apósitos

SESENTA Y CUATRO EUROS con OCHENTA Y NUEVE CÉNTIMOS

S04W080 **ud** **REPOSICIÓN BOTIQUÍN** **36,05**

TREINTA Y SEIS EUROS con CINCO CÉNTIMOS

S04W090 **ud** **RECONOCIMIENTO MÉDICO** **81,55**

Reconocimiento médico por trabajador. Se realizará uno al iniciarse las obras y se repetirá cada año o tras una baja o accidente laboral.

OCHENTA Y UN EUROS con CINCUENTA Y CINCO CÉNTIMOS

CAPÍTULO 6 FORMACIÓN Y REUNIONES DE OBLIGADO CUMPLIMIENTO

S04W050 **ud** **COSTO MENSUAL FORMAC.SEG.Y SAL.** **51,26**

Costo mensual de formación de seguridad y salud en el trabajo, considerando una hora a la semana y realizada por un encargado.

CINCUENTA Y UN EUROS con VEINTISEIS CÉNTIMOS

S04W020 **ud** **COSTO MENSUAL COMITÉ SEGURIDAD** **99,10**

Costo mensual del Comité de Seguridad y salud en el Trabajo, considerando una reunión al mes de dos horas y formado por un técnico cualificado en materia de seguridad y salud, dos trabajadores con categoria de oficial de 2ª o ayudante y un vigilante con categoria de oficial de 1ª.

NOVENTA Y NUEVE EUROS con DIEZ CÉNTIMOS

3. CUADRO DE PRECIOS Nº 2

CUADRO DE PRECIOS 2

Estudio de Seguridad y Salud - Planta Termosolar Llerena

CÓDIGO **UD** **RESUMEN** **PRECIO**

CAPÍTULO 1 PROTECCIONES INDIVIDUALES

S03IA010 **ud** **CASCO DE SEGURIDAD**

Casco de seguridad con arnés de adaptación, homologado. Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		2,41
Suma la partida		2,41
Costes indirectos	3,00%	0,07
TOTAL PARTIDA		**2,48**

S03IA070 **ud** **GAFAS CONTRA IMPACTOS**

Gafas protectoras contra impactos, incoloras, homologadas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		0,80
Suma la partida		0,80
Costes indirectos	3,00%	0,02
TOTAL PARTIDA		**0,82**

S03IA090 **ud** **GAFAS ANTIPOLVO**

Gafas antipolvo antiempañables, panorámicas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		0,50
Suma la partida		0,50
Costes indirectos	3,00%	0,02
TOTAL PARTIDA		**0,52**

S03IA100 **ud** **SEMI MÁSCARA ANTIPOLVO 1 FILTRO**

Semi-mascarilla antipolvo un filtro, (amortizable en 3 usos). Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		2,72
Suma la partida		2,72
Costes indirectos	3,00%	0,08
TOTAL PARTIDA		**2,80**

S03IA110 **ud** **FILTRO RECAMBIO MASCARILLA**

Filtro recambio de mascarilla para polvo y humos, homologado. Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		2,16
Suma la partida		2,16
Costes indirectos	3,00%	0,06
TOTAL PARTIDA		**2,22**

S03IC090 **ud** **MONO DE TRABAJO**

Mono de trabajo de una pieza de poliéster-algodón. Amortizable en un uso. Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		13,22
Suma la partida		13,22
Costes indirectos	3,00%	0,40
TOTAL PARTIDA		**13,62**

S03IC100 **ud** **TRAJE IMPERMEABLE**

Traje impermeable de trabajo, 2 piezas de PVC. Amortizable en un uso. Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		7,21
Suma la partida		7,21
Costes indirectos	3,00%	0,22
TOTAL PARTIDA		**7,43**

S03IM040 **ud** **PAR GUANTES DE USO GENERAL**

Par de guantes de uso general de lona y serraje. Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		1,20
Suma la partida		1,20
Costes indirectos	3,00%	0,04
TOTAL PARTIDA		**1,24**

S03IM010 **ud** **PAR GUANTES DE GOMA LÁTEX-ANTIC.**

Par guantes de goma látex-anticorte. Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		2,16
Suma la partida		2,16
Costes indirectos	3,00%	0,06
TOTAL PARTIDA		**2,22**

S03IP010 **ud** **PAR DE BOTAS DE AGUA**

Par de botas altas de agua. Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		7,21
Suma la partida		7,21
Costes indirectos	3,00%	0,22
TOTAL PARTIDA		**7,43**

S03IP030 **ud** **PAR DE BOTAS C/PUNTERA METAL.**

Par de botas de seguridad con puntera metálica para refuerzo y plantillas de acero flexibles, para riesgos de perforación, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		7,20
Suma la partida		7,20
Costes indirectos	3,00%	0,22
TOTAL PARTIDA		**7,42**

S03IC140 **ud** **PETO REFLECTANTE DE SEGURIDAD**

Peto reflectante de seguridad personal en colores amarillo y rojo, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		2,80
Suma la partida		2,80
Costes indirectos	3,00%	0,08
TOTAL PARTIDA		**2,88**

S03IA040 **ud** **PANTALLA SEGURIDAD SOLDADOR**

Pantalla manual de seguridad para soldador, con fijación en cabeza, (amortizable en 5 usos). Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		1,92
Suma la partida		1,92
Costes indirectos	3,00%	0,06
TOTAL PARTIDA		**1,98**

S03IA120 **ud** **CASCOS PROTECTORES AUDITIVOS**

Protectores auditivos con arnés a la nuca, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.

Resto de obra y materiales		2,40
Suma la partida		2,40
Costes indirectos	3,00%	0,07
TOTAL PARTIDA		**2,47**

S03IC130 **ud** **MANDIL CUERO PARA SOLDADOR**

Mandil de cuero para soldador, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		5,17
Suma la partida		5,17
Costes indirectos	3,00%	0,16
TOTAL PARTIDA		**5,33**

S03IM060 **ud** **PAR GUANTES PARA SOLDADOR**

Par de guantes para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		2,32
Suma la partida		2,32
Costes indirectos	3,00%	0,07
TOTAL PARTIDA		**2,39**

S03IP050 **ud** **PAR DE POLAINAS SOLDADURA**

Par de polainas para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales		2,60
Suma la partida		2,60
Costes indirectos	3,00%	0,08
TOTAL PARTIDA		**2,68**

CAPÍTULO 2 PROTECCIONES COLECTIVAS

S02S010 **ud** **SEÑAL TRIANGULAR I/SOPORTE**

Señal de seguridad triangular de L=70 cm., normalizada, con trípode tubular, amortizable en cinco usos, i/colocación y desmontaje. s/ R.D. 485/97.

Mano de obra		1,96
Resto de obra y materiales		20,52
Suma la partida		22,48
Costes indirectos	3,00%	0,67
TOTAL PARTIDA		**23,15**

S02S030 **ud** **SEÑAL CIRCULAR I/SOPORTE**

Señal de seguridad circular de D=60 cm., normalizada, con soporte metálico de acero galvanizado de 80x40x2 mm. y 2 m. de altura, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y desmontaje. s/ R.D. 485/97.

Mano de obra		2,55
Resto de obra y materiales		23,45
Suma la partida		26,00
Costes indirectos	3,00%	0,78
TOTAL PARTIDA		**26,78**

S02S070 **ud** **PANEL DIRECCIONAL C/SOPORTE**

Panel direccional reflectante de 60x90 cm., con soporte metálico, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y montaje. s/ R.D. 485/97.

Mano de obra		2,55
Resto de obra y materiales		34,13
Suma la partida		36,68
Costes indirectos	3,00%	1,10
TOTAL PARTIDA		**37,78**

S02B010 **m.** **CINTA BALIZAMIENTO BICOLOR 8 cm.**

Cinta de balizamiento bicolor rojo/blanco de material plástico, incluso colocación y desmontaje.R.D. 485/97.

Mano de obra		0,64
Resto de obra y materiales		0,04
Suma la partida		0,68
Costes indirectos	3,00%	0,02
TOTAL PARTIDA		**0,70**

S03CB200 **ud** **VALLA DE OBRA REFLECTANTE**

Valla de obra reflectante de 170x25 cm. de poliéster reforzado con fibra de vidrio, con terminación en colores rojo y blanco, patas metálicas, amortizable en 5 usos, incluso colocación y desmontaje. s/ R.D. 486/97.

Mano de obra		1,28
Resto de obra y materiales		23,57
Suma la partida		24,85
Costes indirectos	3,00%	0,75
TOTAL PARTIDA		**25,60**

CAPÍTULO 3 INST. ELÉCTRICAS Y CONTRAINCENDIO

S03CE070 ud **CUADRO GENERAL OBRA Pmáx= 40 kW.**

Cuadro general de mandos y protección de obra para una potencia máxima de 40 kW. compuesto por armario metálico con revestimiento de poliéster, de 90x60 cm., índice de protección IP 559, con cerradura, interruptor automático magnetotérmico más diferencial de 4x125 A., un interruptor automático magnetotérmico de 4x63 A., y 5 interruptores automáticos magnetotérmicos de 2x25 A., incluyendo cableado, rótulos de identificación de circuitos, bornas de salida y p.p. de conexión a tierra, para una resistencia no superior de 80 Ohmios, totalmente instalado. (amortizable en 4 obras). s/ R.D. 486/97.

Resto de obra y materiales 285,80

Suma la partida 285,80
Costes indirectos................... 3,00% 8,57

TOTAL PARTIDA 294,37

S03CF020 ud **EXTINTOR POLVO ABC 9 kg. PR.INC.**

Extintor de polvo químico ABC polivalente antibrasa de eficacia 43A/233B, de 9 kg. de agente extintor, con soporte, manómetro comprobable y manguera con difusor. Medida la unidad instalada. s/ R.D. 486/97.

Mano de obra 1,28
Resto de obra y materiales 69,17

Suma la partida 70,45
Costes indirectos................... 3,00% 2,11

TOTAL PARTIDA 72,56

S03CF030 ud **EXTINTOR CO2 5 kg.**

Extintor de nieve carbónica CO2, de eficacia 89B, con 5 kg. de agente extintor, modelo NC-5-P, con soporte y boquilla con difusor. Medida la unidad instalada. s/ R.D. 486/97.

Mano de obra 1,28
Resto de obra y materiales 134,36

Suma la partida 135,64
Costes indirectos................... 3,00% 4,07

TOTAL PARTIDA 139,71

S03IC110 ud **TRAJE EXTINCIÓN DE INCENDIOS**

Traje resistente al fuego de fibra Nomex. (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales 73,60

Suma la partida 73,60
Costes indirectos................... 3,00% 2,21

TOTAL PARTIDA 75,81

S03IM090 ud **PAR GUANTES EXTINCIÓN INCENDIOS**

Par de guantes para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales 40,52

Suma la partida 40,52
Costes indirectos................... 3,00% 1,22

TOTAL PARTIDA 41,74

S03IP060 ud **PAR POLAINAS EXTIN.INCENDIOS**

Par de polainas para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97.

Resto de obra y materiales 36,47

Suma la partida 36,47
Costes indirectos................... 3,00% 1,09

TOTAL PARTIDA 37,56

CAPÍTULO 4 INST. HIGIENE Y BIENESTAR

S01C085 ms ALQUILER CASETA ASEO 14,10 m2.

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseos en obra de 6,00x2,30x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l., dos retretes, cuatro placas de ducha y pileta de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste, puerta madera en turca, cortina en ducha. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica mono. 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Mano de obra		1,09
Resto de obra y materiales		180,28
Suma la partida		181,37
Costes indirectos	3,00%	5,44
TOTAL PARTIDA		**186,81**

S01C025 ms ALQUILER CASETA ASEO 6,20 m2.

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseo en obra de 3,25x1,90x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l.; 1 retretes, 3 urinarios y lavabo de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste , puerta madera en baños. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica monofásica a 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Mano de obra		1,09
Resto de obra y materiales		84,13
Suma la partida		85,22
Costes indirectos	3,00%	2,56
TOTAL PARTIDA		**87,78**

S01C205 ms ALQUILER CASETA COMEDOR 18,35 m2

Mes de alquiler (min. 12 meses) de caseta prefabricada para comedor de obra de 7,87x2,33x2,30 m. de 18,35 m2. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido autoextinguible, interior con tablero melaminado en color. Cubierta en arco de chapa galvanizada ondulada reforzada con perfil de acero; fibra de vidrio de 60 mm., interior con tablex lacado. Suelo de aglomerado revestido con PVC continuo de 2 mm., y poliestireno de 50 mm. con apoyo en base de chapa galvanizada de sección trapezoidal. Puerta de 0,8x2 m., de chapa galvanizada de 1mm., reforzada y con poliestireno de 20 mm., picaporte y cerradura. Dos ventanas aluminio anodizado corredera, contraventana de acero galvanizado. Instalación eléctrica a 220 V., toma de tierra, automático, 2 fluorescentes de 40 W., enchufes para 1500 W. y punto luz exterior de 60 W. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Mano de obra		1,09
Resto de obra y materiales		168,26
Suma la partida		169,35
Costes indirectos	3,00%	5,08
TOTAL PARTIDA		**174,43**

S01C215 **ms** **ALQUILER CASETA VESTUARIO 17,90 m2**

Mes de alquiler de caseta prefabricada para vestuario de obra de 7,60x2,35x2,30 m. de 17,90 m2. Estructura de acero galvanizado. Cubierta y cerramiento lateral de chapa galvanizada trapezoidal de 0,6 mm. reforzada con perfiles de acero, interior prelacado. Suelo de aglomerado hidrófugo de 19 mm. puerta de acero de 1mm., de 0,80x2,00 m. pintada con cerradura. Ventana fija de cristal de 6 mm., recercado con perfil de goma. Incluye bancos y colgadores. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

Mano de obra		1,09
Resto de obra y materiales		160,00
Suma la partida		161,09
Costes indirectos	3,00%	4,83
TOTAL PARTIDA		**165,92**

S04W040 **ud** **COSTO MENSUAL LIMPIEZA Y DESINF.**

Costo mensual de limpieza y desinfección de casetas de obra, considerando dos horas a la semana un peón ordinario. Art 32 y 42.

Resto de obra y materiales		90,06
Suma la partida		90,06
Costes indirectos	3,00%	2,70
TOTAL PARTIDA		**92,76**

S01A020 **m.** **ACOMETIDA ELÉCT. CASETA 4x6 mm2**

Acometida provisional de electricidad a caseta de obra, desde el cuadro general formada por manguera flexible de 4x6 mm2. de tensión nominal 750 V., incorporando conductor de tierra color verde y amarillo, fijada sobre apoyos intermedios cada 2,50 m. totalmente instalada.

Mano de obra		1,59
Resto de obra y materiales		5,81
Suma la partida		7,40
Costes indirectos	3,00%	0,22
TOTAL PARTIDA		**7,62**

S01A030 **ud** **ACOMETIDA PROV.FONTANERÍA 25 mm.**

Acometida provisional de fontanería para obra de la red general municipal de agua potable hasta una longitud máxima de 8 m., realizada con tubo de polietileno de 25 mm. de diámetro, de alta densidad y para 10 atmósferas de presión máxima con collarín de toma de fundición, p.p. de piezas especiales de polietileno y tapón roscado, incluso derechos y permisos para la conexión, totalmente terminada y funcionando, y sin incluir la rotura del pavimento.

Resto de obra y materiales		750,00
Suma la partida		750,00
Costes indirectos	3,00%	22,50
TOTAL PARTIDA		**772,50**

S01A040 **ud** **ACOMETIDA PROVIS. SANEAMIENTO**

Acometida provisional de saneamiento de caseta de obra a la red general municipal, hasta una distancia máxima de 100 m., formada por: rotura del pavimento con compresor, excavación manual de zanjas de saneamiento en terrenos de consistencia dura, colocación de tubería de hormigón en masa de enchufe de campana, con junta de goma de 20 cm. de diámetro interior, tapado posterior de la acometida y reposición del pavimento con hormigón en masa HM/15/B/40, sin incluir formación del pozo en el punto de acometida y con p.p. de medios auxiliares.

Resto de obra y materiales		900,00
Suma la partida		900,00
Costes indirectos	3,00%	27,00
TOTAL PARTIDA		**927,00**

S01M060 **ud** **HORNO MICROONDAS**

Horno microondas de 18 litros de capacidad, con plato giratorio incorporado (amortizable en 5 usos).

Mano de obra		1,28
Resto de obra y materiales		29,99
Suma la partida		31,27
Costes indirectos	3,00%	0,94
TOTAL PARTIDA		**32,21**

S01M070 **ud** **TAQUILLA METÁLICA INDIVIDUAL**

Taquilla metálica individual para vestuario de 1,80 m. de altura en acero laminado en frío, con tratamiento antifosfatante y antocorrosivo, con pintura secada al horno, cerradura, balda y tubo percha, lamas de ventilación en puerta, colocada, (amortizable en 3 usos).

Mano de obra		1,28
Resto de obra y materiales		38,28
Suma la partida		39,56
Costes indirectos	3,00%	1,19
TOTAL PARTIDA		**40,75**

S01M080 **ud** **MESA MELAMINA PARA 10 PERSONAS**

Mesa de melamina para comedor de obra con capacidad para 10 personas, (amortizable en 4 usos).

Mano de obra		1,28
Resto de obra y materiales		60,09
Suma la partida		61,37
Costes indirectos	3,00%	1,84
TOTAL PARTIDA		**63,21**

S01M090 **ud** **BANCO MADERA PARA 5 PERSONAS**

Banco de madera con capacidad para 5 personas, (amortizable en 2 usos).

Mano de obra		1,28
Resto de obra y materiales		59,39
Suma la partida		60,67
Costes indirectos	3,00%	1,82
TOTAL PARTIDA		**62,49**

CAPÍTULO 5 MEDICINA PREVENTIVA Y PRIMEROS AUXILIOS

S04W060 **ud** **VIGILANCIA DE LA SALUD**

Vigilancia de la salud obligatoria anual por trabajador que incluye: Planificación de la vigilancia de la salud; análisis de los accidentes de trabajo; análisis de las enfermedades profesionales; análisis de las enfermedades comunes; análisis de los resultados de la vigilancia de la salud; análisis de los riesgos que puedan afectar a trabajadores sensibles (embarazadas, postparto, discapacitados, menores, etc. (Art. 37.3 g del Reglamento de los Servicios de Prevención); formación de los trabajadores en primeros auxilios; asesoramiento al empresario acerca de la vigilancia de la salud; elaboración de informes, recomendaciones, medidas sanitarias preventivas, estudios estadísticos, epidemiológicos, memoria anual del estado de salud (Art. 23 d y e de la Ley de Prevención de Riesgos Laborales); colaboración con el sistema nacional de salud en materias como campañas preventivas, estudios epidemiológicos y reporte de la documentación requerida por dichos organismos (Art. 38 del Reglamento de los Servicios de Prevención y Art. 21 de la ley 14/86 General de Sanidad); sin incluir el reconocimiento médico que realizará la mutua con cargo a cuota de la Seguridad Social.

Resto de obra y materiales 58,94

Suma la partida 58,94
Costes indirectos................... 3,00% 1,77

TOTAL PARTIDA 60,71

S04W070 **ud** **BOTIQUIN DE URGENCIA**

Botiquín de urgencia qu incluya como mínimo vendajes, gasas esterilizadas, algodón, alcohol 96º, agua oxigenada, tintura de yodo, tiritas, esparadrapo, torniquete, bolsa para gua o hielo, guantes esterilizados, termómetro y apósitos

Resto de obra y materiales 63,00

Suma la partida 63,00
Costes indirectos................... 3,00% 1,89

TOTAL PARTIDA 64,89

S04W080 **ud** **REPOSICIÓN BOTIQUÍN**

Resto de obra y materiales 35,00

Suma la partida 35,00
Costes indirectos................... 3,00% 1,05

TOTAL PARTIDA 36,05

S04W090 **ud** **RECONOCIMIENTO MÉDICO**

Reconocimiento médico por trabajador. Se realizará uno al iniciarse las obras y se repetirá cada año o tras una baja o accidente laboral.

Resto de obra y materiales 79,17

Suma la partida 79,17
Costes indirectos................... 3,00% 2,38

TOTAL PARTIDA 81,55

CAPÍTULO 6 FORMACIÓN Y REUNIONES DE OBLIGADO CUMPLIMIENTO

S04W050 ud **COSTO MENSUAL FORMAC.SEG.Y SAL.**

Costo mensual de formación de seguridad y salud en el trabajo, considerando una hora a la semana y realizada por un encargado.

Resto de obra y materiales		49,77
Suma la partida		49,77
Costes indirectos	3,00%	1,49
TOTAL PARTIDA		**51,26**

S04W020 ud **COSTO MENSUAL COMITÉ SEGURIDAD**

Costo mensual del Comité de Seguridad y salud en el Trabajo, considerando una reunión al mes de dos horas y formado por un técnico cualificado en materia de seguridad y salud, dos trabajadores con categoria de oficial de 2ª o ayudante y un vigilante con categoria de oficial de 1ª.

Resto de obra y materiales		96,21
Suma la partida		96,21
Costes indirectos	3,00%	2,89
TOTAL PARTIDA		**99,10**

4. PRESUPUESTOS PARCIALES

PRESUPUESTO

Estudio de Seguridad y Salud - Planta Termosolar Llerena

CÓDIGO	RESUMEN	CANTIDAD	PRECIO	IMPORTE
CAPÍTULO 1 PROTECCIONES INDIVIDUALES				
S03IA010	ud **CASCO DE SEGURIDAD** Casco de seguridad con arnés de adaptación, homologado. Certificado CE. s/ R.D. 773/97.	145,00	2,48	359,60
S03IA070	ud **GAFAS CONTRA IMPACTOS** Gafas protectoras contra impactos, incoloras, homologadas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.	145,00	0,82	118,90
S03IA090	ud **GAFAS ANTIPOLVO** Gafas antipolvo antiempañables, panorámicas, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.	145,00	0,52	75,40
S03IA100	ud **SEMI MÁSCARA ANTIPOLVO 1 FILTRO** Semi-mascarilla antipolvo un filtro, (amortizable en 3 usos). Certificado CE. s/ R.D. 773/97.	145,00	2,80	406,00
S03IA110	ud **FILTRO RECAMBIO MASCARILLA** Filtro recambio de mascarilla para polvo y humos, homologado. Certificado CE. s/ R.D. 773/97.	145,00	2,22	321,90
S03IC090	ud **MONO DE TRABAJO** Mono de trabajo de una pieza de poliéster-algodón. Amortizable en un uso. Certificado CE; s/ R.D. 773/97.	145,00	13,62	1.974,90
S03IC100	ud **TRAJE IMPERMEABLE** Traje impermeable de trabajo, 2 piezas de PVC. Amortizable en un uso. Certificado CE; s/ R.D. 773/97.	145,00	7,43	1.077,35
S03IM040	ud **PAR GUANTES DE USO GENERAL** Par de guantes de uso general de lona y serraje. Certificado CE; s/ R.D. 773/97.	175,00	1,24	217,00
S03IM010	ud **PAR GUANTES DE GOMA LÁTEX-ANTIC.**			

		Par guantes de goma látex-anticorte. Certificado CE; s/ R.D. 773/97.			
			175,00	2,22	388,50
S03IP010	**ud**	**PAR DE BOTAS DE AGUA**			
		Par de botas altas de agua. Certificado CE; s/ R.D. 773/97.			
			145,00	7,43	1.077,35
S03IP030	**ud**	**PAR DE BOTAS C/PUNTERA METAL.**			
		Par de botas de seguridad con puntera metálica para refuerzo y plantillas de acero flexibles, para riesgos de perforación, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.			
			145,00	7,42	1.075,90
S03IC140	**ud**	**PETO REFLECTANTE DE SEGURIDAD**			
		Peto reflectante de seguridad personal en colores amarillo y rojo, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.			
			160,00	2,88	460,80
S03IA040	**ud**	**PANTALLA SEGURIDAD SOLDADOR**			
		Pantalla manual de seguridad para soldador, con fijación en cabeza, (amortizable en 5 usos). Certificado CE. s/ R.D. 773/97.			
			50,00	1,98	99,00
S03IA120	**ud**	**CASCOS PROTECTORES AUDITIVOS**			
		Protectores auditivos con arnés a la nuca, (amortizables en 3 usos). Certificado CE. s/ R.D. 773/97.			
			175,00	2,47	432,25
S03IC130	**ud**	**MANDIL CUERO PARA SOLDADOR**			
		Mandil de cuero para soldador, (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.			
			50,00	5,33	266,50
S03IM060	**ud**	**PAR GUANTES PARA SOLDADOR**			
		Par de guantes para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.			
			50,00	2,39	119,50
S03IP050	**ud**	**PAR DE POLAINAS SOLDADURA**			
		Par de polainas para soldador, (amortizables en 3 usos). Certificado CE; s/ R.D. 773/97.			
			50,00	2,68	134,00

TOTAL CAPÍTULO 1 PROTECCIONES INDIVIDUALES 8.604,85

CAPÍTULO 2 PROTECCIONES COLECTIVAS

S02S010 **ud** **SEÑAL TRIANGULAR I/SOPORTE**

Señal de seguridad triangular de L=70 cm., normalizada, con trípode tubular, amortizable en cinco usos, i/colocación y desmontaje. s/ R.D. 485/97.

2,00 | 23,15 | 46,30

S02S030 **ud** **SEÑAL CIRCULAR I/SOPORTE**

Señal de seguridad circular de D=60 cm., normalizada, con soporte metálico de acero galvanizado de 80x40x2 mm. y 2 m. de altura, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y desmontaje. s/ R.D. 485/97.

2,00 | 26,78 | 53,56

S02S070 **ud** **PANEL DIRECCIONAL C/SOPORTE**

Panel direccional reflectante de 60x90 cm., con soporte metálico, amortizable en cinco usos, i/p.p. de apertura de pozo, hormigonado H-10/B/40, colocación y montaje. s/ R.D. 485/97.

1,00 | 37,78 | 37,78

S02B010 **m.** **CINTA BALIZAMIENTO BICOLOR 8 cm.**

Cinta de balizamiento bicolor rojo/blanco de material plástico, incluso colocación y desmontaje.R.D. 485/97.

1.000,00 | 0,70 | 700,00

S03CB200 **ud** **VALLA DE OBRA REFLECTANTE**

Valla de obra reflectante de 170x25 cm. de poliéster reforzado con fibra de vidrio, con terminación en colores rojo y blanco, patas metálicas, amortizable en 5 usos, incluso colocación y desmontaje. s/ R.D. 486/97.

5,00 | 25,60 | 128,00

TOTAL CAPÍTULO 2 PROTECCIONES COLECTIVAS 965,64

CAPÍTULO 3 INST. ELÉCTRICAS Y CONTRAINCENDIO

S03CE070	**ud**	**CUADRO GENERAL OBRA Pmáx= 40 kW.** Cuadro general de mandos y protección de obra para una potencia máxima de 40 kW. compuesto por armario metálico con revestimiento de poliéster, de 90x60 cm., índice de protección IP 559, con cerradura, interruptor automático magnetotérmico más diferencial de 4x125 A., un interruptor automático magnetotérmico de 4x63 A., y 5 interruptores automáticos magnetotérmicos de 2x25 A., incluyendo cableado, rótulos de identificación de circuitos, bornas de salida y p.p. de conexión a tierra, para una resistencia no superior de 80 Ohmios, totalmente instalado. (amortizable en 4 obras). s/ R.D. 486/97.	2,00	294,37	588,74
S03CF020	**ud**	**EXTINTOR POLVO ABC 9 kg. PR.INC.** Extintor de polvo químico ABC polivalente antibrasa de eficacia 43A/233B, de 9 kg. de agente extintor, con soporte, manómetro comprobable y manguera con difusor. Medida la unidad instalada. s/ R.D. 486/97.	10,00	72,56	725,60
S03CF030	**ud**	**EXTINTOR CO2 5 kg.** Extintor de nieve carbónica CO2, de eficacia 89B, con 5 kg. de agente extintor, modelo NC-5-P, con soporte y boquilla con difusor. Medida la unidad instalada. s/ R.D. 486/97.	10,00	139,71	1.397,10
S03IC110	**ud**	**TRAJE EXTINCIÓN DE INCENDIOS** Traje resistente al fuego de fibra Nomex. (amortizable en 3 usos). Certificado CE; s/ R.D. 773/97.	2,00	75,81	151,62
S03IM090	**ud**	**PAR GUANTES EXTINCIÓN INCENDIOS** Par de guantes para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97.	2,00	41,74	83,48
S03IP060	**ud**	**PAR POLAINAS EXTIN.INCENDIOS** Par de polainas para extinción de incendios, de fibra Nomex aluminizado, (amortizables en 2 usos). Certificado CE; s/ R.D. 773/97.	2,00	37,56	75,12

TOTAL CAPÍTULO 3 INST. ELÉCTRICAS Y CONTRAINCENDIO.......................... 3.021,66

CAPÍTULO 4 INST. HIGIENE Y BIENESTAR

S01C085 **ms** **ALQUILER CASETA ASEO 14,10 m2.**

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseos en obra de 6,00x2,30x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l., dos retretes, cuatro placas de ducha y pileta de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste, puerta madera en turca, cortina en ducha. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica mono. 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

156,00 186,81 29.142,36

S01C025 **ms** **ALQUILER CASETA ASEO 6,20 m2.**

Mes de alquiler (min. 12 meses) de caseta prefabricada para aseo en obra de 3,25x1,90x2,30 m. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido. Ventana de 0,84x0,80 m. de aluminio anodizado, corredera, con reja y luna de 6 mm., termo eléctrico de 50 l.; 1 retretes, 3 urinarios y lavabo de tres grifos, todo de fibra de vidrio con terminación de gel-coat blanco y pintura antideslizante, suelo contrachapado hidrófugo con capa fenolítica antideslizante y resistente al desgaste , puerta madera en baños. Tubería de polibutileno aislante y resistente a incrustaciones, hielo y corrosiones, instalación eléctrica monofásica a 220 V. con automático. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

78,00 87,78 6.846,84

S01C205 **ms** **ALQUILER CASETA COMEDOR 18,35 m2**

Mes de alquiler (min. 12 meses) de caseta prefabricada para comedor de obra de 7,87x2,33x2,30 m. de 18,35 m2. Estructura y cerramiento de chapa galvanizada pintada, aislamiento de poliestireno expandido autoextinguible, interior con tablero melaminado en color. Cubierta en arco de chapa galvanizada ondulada reforzada con perfil de acero; fibra de vidrio de 60 mm., interior con tablex lacado. Suelo de aglomerado revestido con PVC continuo de 2 mm., y poliestireno de 50 mm. con apoyo en base de chapa galvanizada de sección trapezoidal. Puerta de 0,8x2 m., de chapa galvanizada de 1mm., reforzada y con poliestireno de 20 mm., picaporte y cerradura. Dos ventanas aluminio anodizado corredera, contraventana de acero galvanizado. Instalación eléctrica a 220 V., toma de tierra, automático, 2 fluorescentes de 40 W., enchufes para 1500 W. y punto luz exterior de 60 W. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

1.248,00 174,43 217.688,64

S01C215 **ms** **ALQUILER CASETA VESTUARIO 17,90 m2**

Mes de alquiler de caseta prefabricada para vestuario de obra de 7,60x2,35x2,30 m. de 17,90 m2. Estructura de acero galvanizado. Cubierta y cerramiento lateral de chapa galvanizada trapezoidal de 0,6 mm. reforzada con perfiles de acero, interior prelacado. Suelo de aglomerado hidrófugo de 19 mm. puerta de acero de 1mm., de 0,80x2,00 m. pintada con cerradura. Ventana fija de cristal de 6 mm., recercado con perfil de goma. Incluye bancos y colgadores. Con transporte a 50 km.(ida). Entrega y recogida del módulo con camión grúa. Según R.D. 486/97.

1.326,00 165,92 220.009,92

S04W040 **ud** **COSTO MENSUAL LIMPIEZA Y DESINF.**

Costo mensual de limpieza y desinfección de casetas de obra, considerando dos horas a la semana un peón ordinario. Art 32 y 42.

2.808,00 92,76 260.470,08

S01A020 **m.** **ACOMETIDA ELÉCT. CASETA 4x6 mm2**

Acometida provisional de electricidad a caseta de obra, desde el cuadro general formada por manguera flexible de 4x6 mm2. de tensión nominal 750 V., incorporando conductor de tierra color verde y amarillo, fijada sobre apoyos intermedios cada 2,50 m. totalmente instalada.

1.000,00 7,62 7.620,00

S01A030 **ud** **ACOMETIDA PROV.FONTANERÍA 25 mm.**

Acometida provisional de fontanería para obra de la red general municipal de agua potable hasta una longitud máxima de 8 m., realizada con tubo de polietileno de 25 mm. de diámetro, de alta densidad y para 10 atmósferas de presión máxima con collarín de toma de fundición, p.p. de piezas especiales de polietileno y tapón roscado, incluso derechos y permisos para la conexión, totalmente terminada y funcionando, y sin incluir la rotura del pavimento.

			2,00	772,50	1.545,00
S01A040	**ud**	**ACOMETIDA PROVIS. SANEAMIENTO**			
		Acometida provisional de saneamiento de caseta de obra a la red general municipal, hasta una distancia máxima de 100 m., formada por: rotura del pavimento con compresor, excavación manual de zanjas de saneamiento en terrenos de consistencia dura, colocación de tubería de hormigón en masa de enchufe de campana, con junta de goma de 20 cm. de diámetro interior, tapado posterior de la acometida y reposición del pavimento con hormigón en masa HM/15/B/40, sin incluir formación del pozo en el punto de acometida y con p.p. de medios auxiliares.			
			2,00	927,00	1.854,00
S01M060	**ud**	**HORNO MICROONDAS**			
		Horno microondas de 18 litros de capacidad, con plato giratorio incorporado (amortizable en 5 usos).			
			16,00	32,21	515,36
S01M070	**ud**	**TAQUILLA METÁLICA INDIVIDUAL**			
		Taquilla metálica individual para vestuario de 1,80 m. de altura en acero laminado en frío, con tratamiento antifosfatante y antocorrosivo, con pintura secada al horno, cerradura, balda y tubo percha, lamas de ventilación en puerta, colocada, (amortizable en 3 usos).			
			145,00	40,75	5.908,75
S01M080	**ud**	**MESA MELAMINA PARA 10 PERSONAS**			
		Mesa de melamina para comedor de obra con capacidad para 10 personas, (amortizable en 4 usos).			
			15,00	63,21	948,15
S01M090	**ud**	**BANCO MADERA PARA 5 PERSONAS**			
		Banco de madera con capacidad para 5 personas, (amortizable en 2 usos).			
			29,00	62,49	1.812,21

TOTAL CAPÍTULO 4 INST. HIGIENE Y BIENESTAR 754.361,31

CAPÍTULO 5 MEDICINA PREVENTIVA Y PRIMEROS AUXILIOS

S04W060 **ud** **VIGILANCIA DE LA SALUD**

Vigilancia de la salud obligatoria anual por trabajador que incluye: Planificación de la vigilancia de la salud; análisis de los accidentes de trabajo; análisis de las enfermedades profesionales; análisis de las enfermedades comunes; análisis de los resultados de la vigilancia de la salud; análisis de los riesgos que puedan afectar a trabajadores sensibles (embarazadas, postparto, discapacitados, menores, etc. (Art. 37.3 g del Reglamento de los Servicios de Prevención); formación de los trabajadores en primeros auxilios; asesoramiento al empresario acerca de la vigilancia de la salud; elaboración de informes, recomendaciones, medidas sanitarias preventivas, estudios estadísticos, epidemiológicos, memoria anual del estado de salud (Art. 23 d y e de la Ley de Prevención de Riesgos Laborales); colaboración con el sistema nacional de salud en materias como campañas preventivas, estudios epidemiológicos y reporte de la documentación requerida por dichos organismos (Art. 38 del Reglamento de los Servicios de Prevención y Art. 21 de la ley 14/86 General de Sanidad); sin incluir el reconocimiento médico que realizará la mutua con cargo a cuota de la Seguridad Social.

145,00 60,71 8.802,95

S04W070 **ud** **BOTIQUIN DE URGENCIA**

Botiquín de urgencia qu incluya como mínimo vendajes, gasas esterilizadas, algodón, alcohol 96º, agua oxigenada, tintura de yodo, tiritas, esparadrapo, torniquete, bolsa para gua o hielo, guantes esterilizados, termómetro y apósitos

15,00 64,89 973,35

S04W080 **ud** **REPOSICIÓN BOTIQUÍN**

78,00 36,05 2.811,90

S04W090 **ud** **RECONOCIMIENTO MÉDICO**

Reconocimiento médico por trabajador. Se realizará uno al iniciarse las obras y se repetirá cada año o tras una baja o accidente laboral.

1.160,00 81,55 94.598,00

TOTAL CAPÍTULO 5 MEDICINA PREVENTIVA Y PRIMEROS AUXILIOS............ 107.186,20

	CAPÍTULO 6 FORMACIÓN Y REUNIONES DE OBLIGADO CUMPLIMIENTO				
S04W050	**ud**	**COSTO MENSUAL FORMAC.SEG.Y SAL.**			
	Costo mensual de formación de seguridad y salud en el trabajo, considerando una hora a la semana y realizada por un encargado.		78,00	51,26	3.998,28
S04W020	**ud**	**COSTO MENSUAL COMITÉ SEGURIDAD**			
	Costo mensual del Comité de Seguridad y salud en el Trabajo, considerando una reunión al mes de dos horas y formado por un técnico cualificado en materia de seguridad y salud, dos trabajadores con categoria de oficial de 2ª o ayudante y un vigilante con categoria de oficial de 1ª.		78,00	99,10	7.729,80

TOTAL CAPÍTULO 6 FORMACIÓN Y REUNIONES DE OBLIGADO CUMPLIMIENTO ... 11.728,08

TOTAL... 885.867,74

5. RESUMEN DE PRESUPUESTO

RESUMEN DE PRESUPUESTO

Estudio de Seguridad y Salud - Planta Termosolar Llerena

CAPITULO	RESUMEN	EUROS	%
1	PROTECCIONES INDIVIDUALES	8.604,85	0,97
2	PROTECCIONES COLECTIVAS	965,64	0,11
3	INST. ELÉCTRICAS Y CONTRAINCENDIO	3.021,66	0,34
4	INST. HIGIENE Y BIENESTAR	754.361,31	85,16
5	MEDICINA PREVENTIVA Y PRIMEROS AUXILIOS	107.186,20	12,10
6	FORMACIÓN Y REUNIONES DE OBLIGADO CUMPLIMIENTO	11.728,08	1,32
	TOTAL EJECUCIÓN MATERIAL	**885.867,74**	

Asciende el presupuesto de ejecución material a la expresada cantidad de OCHOCIENTOS OCHENTA Y CINCO MIL OCHOCIENTOS SESENTA Y SIETE EUROS con SETENTA Y CUATRO CÉNTIMOS

Cáceres, febrero de 2016.

El autor del proyecto,

Fdo: Jesús Fernández González

ANEJO Nº 11

ESTUDIO DE IMPACTO AMBIENTAL

ÍNDICE

1. OBJETO

Este anejo se ha redactado con el objetivo de definir la necesidad o no de sometimiento a evaluación de impacto ambiental, cumpliendo con la legislación ambiental, tanto autonómica como nacional, además de definir las características de la zona de actuación, los efectos derivados de la construcción, tanto positivos como negativos, y las medidas preventivas y correctoras derivadas.

2. CLASIFICACIÓN AMBIENTAL DE LA ACTUACIÓN

Para la clasificación ambiental de la actuación contemplada en este proyecto, se ha seguido lo marcado en la **Ley 16/2015, de 23 de abril, de protección ambiental de la Comunidad Autónoma de Extremadura**, y en la **Ley 21/2013, de 9 de diciembre, de evaluación ambiental**.

En el artículo 62, Ámbito de aplicación, perteneciente a la subsección 1ª, Evaluación de impacto ambiental ordinaria para la formulación de la declaración de impacto ambiental, de la sección 2ª, Evaluación de impacto ambiental de proyectos, del capítulo VII, Evaluación ambiental, del título I, Prevención ambiental, de la **Ley 16/2015** se define lo siguiente:

“Deberán someterse a evaluación de impacto ambiental ordinaria los proyectos, públicos o privados, consistentes en la realización de las obras, instalaciones o cualquier otra actividad que se pretendan llevar a cabo en el ámbito territorial de la Comunidad Autónoma de Extremadura en los siguientes casos:

a) <u>Los comprendidos en el anexo IV</u>, así como los proyectos que presentándose fraccionados alcancen los umbrales del anexo IV mediante la acumulación de las magnitudes o dimensiones de cada uno de los proyectos considerados.

b) Los sometidos a evaluación ambiental simplificada cuando así lo decida el órgano ambiental en cada caso.

c) *La modificación en las características de un proyecto cuando dicha modificación por sí sola o en combinación con otras, cumpla con los umbrales establecidos en el anexo IV.*
d) *Los proyectos que se encuentran sometidos a evaluación ambiental simplificada cuando así lo solicite el promotor."*

De acuerdo con lo indicado en el citado Anexo IV, Proyectos sometidos a evaluación ambiental ordinaria, **el presente proyecto se encuadra dentro del punto j)**, del Grupo 3, Industria energética, que cita "*Instalaciones para la producción de energía eléctrica a partir de la energía solar destinada a su venta a la red, que no se ubiquen en cubiertas o tejados de edificios existentes y que ocupen más de 50 ha de superficie o más de 5 ha en áreas protegidas*", ya que la actuación contemplada ocupa una superficie total de 164,5 ha.

En el apartado 1. del artículo 7, Ámbito de aplicación de la evaluación de impacto ambiental, perteneciente al título I, Principios y disposiciones generales, de la **Ley 21/2013** se define lo siguiente:

"Serán objeto de una evaluación de impacto ambiental ordinaria los siguientes proyectos:

a) *Los comprendidos en el anexo I, así como los proyectos que, presentándose fraccionados, alcancen los umbrales del anexo I mediante la acumulación de las magnitudes o dimensiones de cada uno de los proyectos considerados.*
b) *Los comprendidos en el apartado 2, cuando así lo decida caso por caso el órgano ambiental, en el informe de impacto ambiental de acuerdo con los criterios del anexo III.*
c) *Cualquier modificación de las características de un proyecto consignado en el anexo I o en el anexo II, cuando dicha modificación cumple, por sí sola, los umbrales establecidos en el anexo I.*
d) *Los proyectos incluidos en el apartado 2, cuando así lo solicite el promotor."*

De acuerdo con lo indicado en el citado Anexo I, Proyectos sometidos a evaluación ambiental ordinaria regulada en el título II, capítulo II, sección 1ª; **el presente proyecto se encuadra dentro del punto j)**, del Grupo 3, Industria energética, que cita

"*Instalaciones para la producción de energía eléctrica a partir de la energía solar destinada a su venta a la red, que no se ubiquen en cubiertas o tejados de edificios existentes y que ocupen más de 100 ha de superficie*", ya que la actuación contemplada ocupa una superficie total de 164,5 ha.

Con todo esto, **se establece la necesidad de someter el presente proyecto a una evaluación ambiental ordinaria**. Como nos encontramos ante un proyecto redactado como Trabajo Fin de Grado, no se elevará a conocimiento de la administración para su estudio. Sin embargo, a continuación se establece el procedimiento que se seguiría en caso de ser un proyecto de construcción real:

Inicialmente, se solicitaría al órgano ambiental que elaborara un documento de alcance del estudio de impacto ambiental, presentando una documentación inicial que incluiría, como mínimo la definición, características y ubicación del proyecto; as principales alternativas que se consideran y un análisis de los potenciales impactos de cada una de ellas; y un diagnóstico territorial y del medio ambiente afectado por el proyecto. Tras haber recabado las alegaciones oportunas de las Administraciones Públicas afectadas y las personas interesadas, se requerirá la elaboración del estudio de impacto ambiental, el cual se someterá a información pública junto al proyecto, con el objetivo de recoger todos los requerimientos que realicen las personas que se crean afectadas. Simultáneamente, se consultará de nuevo a las Administraciones Públicas afectadas y a las personas, físicas o jurídicas, públicas o privadas, interesadas o vinculadas con el medio ambiente. Tras este proceso, se iniciará la evaluación propiamente dicha, remitiendo al órgano correspondiente la solicitud de este estudio junto a la siguiente documentación: el documento técnico del proyecto, el estudio de impacto ambiental, las alegaciones e informes recibidos en los trámites de información pública y de consultas a las Administraciones Públicas afectadas y a las personas interesadas, y la documentación acreditativa de haberse procedido por parte del solicitante al pago de la tasa exigible legalmente. Tras el período de evaluación, este órgano formulará la Declaración de Impacto Ambiental (DIA), que tendrá la naturaleza de informe preceptivo y determinante, y determinará si procede o no, a los efectos ambientales, la realización del proyecto y, en su caso, las condiciones en las que puede desarrollarse, las medidas correctoras y las medidas compensatorias.

3. DESCRIPCIÓN DEL PROYECTO

El objeto del presente proyecto es ubicar la localización idónea para implantar una central termosolar de colectores cilindro-parabólicos en la comarca de la Campiña Sur (Badajoz), además de definir la mayor parte de las obras civiles relacionadas con su construcción, como son:

- El movimiento de tierras (Desbroce, desmonte y terraplén)
- La estructura de los colectores (Cimentaciones y estructura metálica)
- Las balsas de regulación
- La reposición de servicios
- Las actuaciones de integración ambiental
- El cerramiento de la central

Quedan fuera del ámbito de este proyecto actuaciones como la impulsión de agua hasta las balsas, los viales internos, la depuración de las aguas empleadas en el ciclo de funcionamiento, el drenaje, la remodelación de la carretera de acceso, etc., además de otras cuya definición correría a cargo de profesionales con otra titulación, como son las conducciones internas de la planta, la turbina, las torres de refrigeración, la subestación transformadora, etc.

Tras realizar el estudio multicriterio detallado en el apartado siguiente, se ha ubicado la central termosolar en el término municipal de Llerena (Badajoz), a una distancia de 3,5 km del núcleo urbano hacia el noreste.

4. INVENTARIO AMBIENTAL

4.1. SITUACIÓN

El término municipal de Llerena pertenece a la provincia de Badajoz y está encuadrada en la comarca de la Campiña Sur al sudeste de esta, distando aproximadamente 117 km de la capital provincial homónima. Está ubicada en la latitud 38° 14’ 15’’ N y longitud 6° 00’ 55’’ O, correspondientes a las coordenadas UTM X = 761.231 e Y = 4.236.380, huso 29N. El término municipal tiene una extensión de 162,7 km^2 y está situado a una altitud de 641 m sobre el nivel del mar.

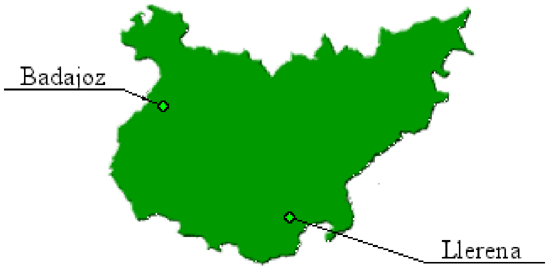


Figura 1 – Ubicación del término municipal de Llerena. Fuente: [Diputación de Badajoz]

4.2. MEDIO FÍSICO

El **clima** es un factor determinante de cara a la caracterización del medio físico, no sólo por la influencia que tiene sobre la configuración del mismo, sino también por ser uno de los factores que más influyen en las características biológicas y socioeconómicas de un determinado territorio. Va a condicionar, junto con otros factores, la estratificación y composición vegetal, así como la cualidad y cantidad de los cultivos que podemos encontrar. Por tanto, el objetivo del presente apartado es caracterizar climáticamente el área de estudio, no sólo para complementar las descripciones de otros aspectos del medio muy ligados a este factor, como la vegetación, sino también para reflejar aquellos parámetros más importantes a la hora de proyectar medidas correctoras que conlleven siembras o plantaciones, así como las relacionadas con el mantenimiento de la calidad atmosférica del entorno de las obras.

El clima de la zona de estudio es mediterráneo subtropical, con inviernos suaves, y veranos secos y calurosos. Presenta una temperatura media anual entre los 14 y 16 °C, situándose la media de las máximas entre 24 y 26 °C y la media de las mínimas entre 6 y 8 °C. Las temperaturas máximas anuales se dan en los meses de julio-agosto y las mínimas en enero. El período más frío abarca desde noviembre a marzo y el período cálido entre junio y septiembre. En cuanto a la precipitación, la media anual varía entre los 500 y 1.000 mm, presentando un déficit medio anual entre 350 y 600 mm. El período seco tiene una duración de 3 a 5 meses y la precipitación de invierno alcanza un 38%, mientras que en primavera desciende hasta un 28%.

Con estos valores definen, según la clasificación agroclimática de J. Papadakis, unos inviernos tipo Citrus y unos veranos tipo Arroz. En estas condiciones son posibles los siguientes cultivos: Cereales para grano de invierno (trigo, cebada avena, etc…) y primavera (arroz, maíz, sorgo, etc…), leguminosas para grano (judías, habas, lentejas, etc…) en siembra otoñal o primaveral, tubérculos (patata, batata), hortalizas de hoja, o tallo de fruto, cultivos industriales, vid, y olivo. En lo que respecta a la vegetación natural se define una vegetación típica de la gran formación *Durilignosa*, como es la del bosque esclerófilo mediterráneo: encinares, junto a otras especies que componen el matorral: jara, genistas, cantueso, etc.

Los terrenos sobre los que se asienta la planta termosolar, se encuentran, desde el punto de vista **geológico**, situados en la denominada zona de Ossa Morena, en el sector suroccidental de la Península Ibérica, con suelos provenientes de la era Cenozoica, entre los períodos Terciario y Cuaternario, más concretamente en la época del Plioceno y del Pleistoceno, respectivamente. Este suelo está compuesto, principalmente, por costras calcáreas y fangos con cantos. Se trata de materiales postectónicos no asimilables a ningún dominio concepto, que corresponden a procesos edáfico-sedimentarios. Se trata de un encostramiento calizo pulverulento, con una zona masiva hacia la base, y laminar hacia el techo, que se disponen sobre arcillas rojas terciarias a las que engloba en la zona basal, con textura en enrejado. Los terrenos precámbricos y paleozoicos son prácticamente impermeables, por lo que todos los afloramientos subterráneos tanto en surgencias naturales como en pozos responden a situaciones locales.

Hidrogeológicamente hablando, Llerena está atravesada por la línea imaginaria que separa las Cuencas Hidrográficas del Guadiana y del Guadalquivir, de forma que los cursos de agua correspondientes a la mitad norte pertenecen al río Guadiana y los de la mitad sur al Guadalquivir. El término municipal de Llerena es recorrido por los siguientes cursos fluviales: Arroyo el Cañuelo y Arroyo de los Molinos pertenecientes a la Cuenca Hidrográfica del Guadalquivir y Río Retín, Río de la Llave y Arroyo de la Carrasca pertenecientes a la Cuenca Hidrográfica del Guadiana. La zona no se encuentra sobre ningún acuífero, y los afloramientos subterráneos serán de tipo local. Desde este punto de vista, se distingue una serie de materiales de diferente comportamiento:

- Terrenos precámbricos y paleozoicos: La zona donde se ubica el proyecto de localiza en este área. Los terrenos son prácticamente impermeables, excepto los afloramientos de calizas del Cámbrico, donde aparecen pequeñas captaciones, en zonas de fracturas o en zonas muy alteradas. Se presenta en la zona noroeste de Llerena.
- Depósitos terciarios y/o cuaternarios: Se trata de materiales deleznables depositadas sobre substrato impermeable. Es un depósito colgado, que vierte sus aguas hacia los arroyos Conejo y Romanzay, danto lugar a una serie de fuentes, muy superficiales. Se localizan en la mitad oriental del término municipal.
- Formaciones de calizas: Se localiza en la mitad sureste de la localidad, y tampoco cuenta con litologías capaces desarrollar acuíferos, aunque serían previsibles por el desarrollo cárstico de las calizas, pero tampoco se han localizado

4.3. MEDIO BIOLÓGICO

El área de ubicación de la central termosolar se encuentra hacia el centro del cuadrante sureste peninsular, lo que va a determinar los rasgos generales climáticos y biogeográficos como una zona mediterránea con cierta influencia subtropical. Desde el punto de vista bioclimático el área de proyecto se encuentra situada en la región mediterránea, caracterizada por la presencia de un déficit pluviométrico estival característico.

La vegetación arbórea predominante, por tanto, está constituida por dehesas de encinas y alcornoques, especies que aparecen frecuentemente entremezcladas y con un sotobosque formado por cultivos cerealísticos, pastizal o matorral. El uso mayoritario del suelo corresponde a labor intensiva, con alternativa general formada por cereal de invierno (trigo, cebada y avena) y planta de barbecho (girasol, haba, garbanzo, veza, colza). Las serie de vegetación potencial, es la serie 24e: Mesomediterránea bética, marianense y araceno-pacense basófila de *Quercus rotundifolia* o encina (*Paeonio coriaceae-Querceto rotundifoliae sigmetum*). Pertenecen a esta serie los encinares sobre calizas y con precipitaciones por debajo de 600mm anuales. Son especies habituales en los mismos: *Quercus coccifera* (coscoja), *Juniperus oxycedrus*, *Jasminum fruticans* (jazmín silvestre), *Crateagus monogyna* (majuelo o espino albar), *Paeonia broteri* y *Blupeurumrigidum*. Las etapas de sustitución son retamares, coscojares con majuelos, lastonares de *Helictotrichon filifolium* con *Fetusca scariosa* y tomillares mixtos.

La fauna, en la zona objeto de estudio, se encuentra condicionada por las características de la vegetación. Como consecuencia directa del distinto grado de antropización y de naturalidad que presentan las comunidades vegetales existentes en la actualidad, las comunidades animales asociadas varían en su composición.

Para la caracterización de la fauna en el área de estudio, se ha recurrido a la identificación de las principales especies animales asociadas a los distintos biotopos presentes en el ámbito analizado. Como localización de mayor interés faunístico encontramos las estepas y dehesas próximas a Llerena. Las dehesas de esta zona forman pequeñas manchas, incluidas en lo que es el ecosistema más extenso (la pseudoestepa). Son superficies cubiertas de encinas de forma bastante dispersa, que le da un aspecto de sabana, e incluso se pueden ver especies más propias de esas latitudes como el elanio azul o la carraca. Estas dehesas permiten la existencia de grullas. Las áreas esteparias son las mejor representadas, convirtiéndose en zonas óptimas para avutardas y sisones. Como especies amenazadas se pueden citar las siguientes:

- Familia *Accipitridae*:
    - Aquila chrysaetos: Vulnerable
    - Hieraetus fasciatus: Sensible a la alteración del hábitat
- Familia *Falconidae*:
    - Falco naumanni: Sensible a la alteración del hábitat
- Familia *Ciconidae*:
    - Ciconia nigra: En peligro de extinción
    - Ciconia ciconia: Vulnerable

- Familia *Otididae*:
    - Otis tarda: Sensible a la alteración del hábitat

4.4. MEDIO PERCEPTUAL

El especial enclave geográfico de la ciudad de Llerena proporciona a su término una diversidad paisajística única. Los últimos montes de Sierra Morena nos ofrecen la posibilidad de contemplar amplios espacios de bosque mediterráneo y estepas cerealistas desde uno de los puntos más elevados de la provincia de Badajoz. El municipio se encuentra rodeado de grandes extensiones de encinares, conformando un magnífico paisaje en el que conviven la fauna y flora más representativa de la dehesa extremeña, sin olvidar que ésta surge de la actividad agrícola y ganadera integrada y respetuosa con el medio.

El paisaje de la zona de estudio está marcado por la actividad humana, que a su vez está condicionada por las características topográficas del terreno, así como de las condiciones de fertilidad, climatología, características edáficas, etc… del mismo. Se genera de esta manera una interacción entre la actividad humana y el medio físico que modifica.

4.5. MEDIO SOCIOECONÓMICO

De acuerdo con las cifras ofrecidas por el Instituto Nacional de Estadística (INE), Llerena contaba en 2015 con una población de 5.929 habitantes, 2.965 varones y 2.964 mujeres, indicando una tendencia a la baja con respecto a años anteriores.

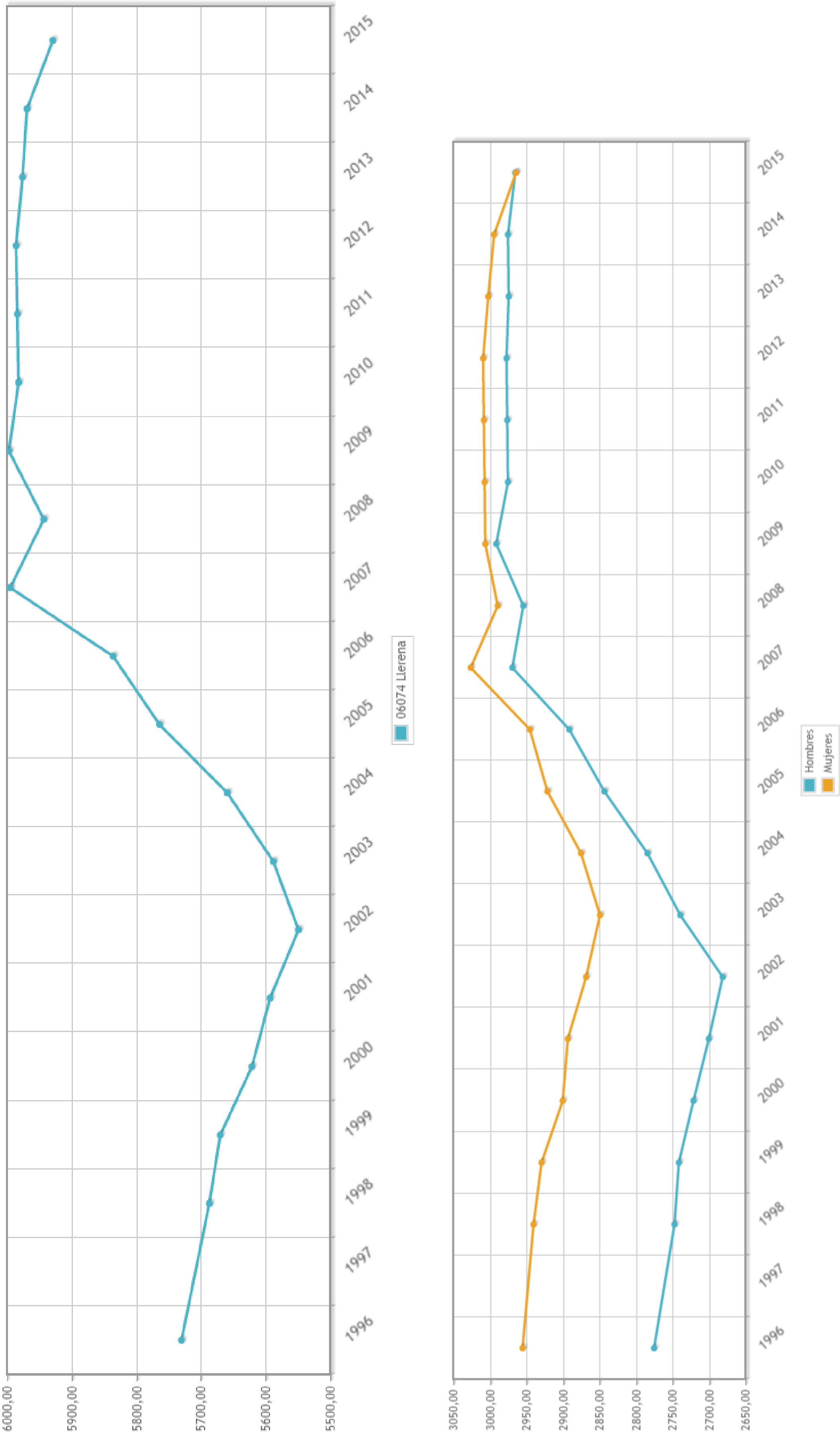


Figura 2 – Evolución de la población de Llerena, total (izquierda) y por sexo (derecha). Fuente: [INE]

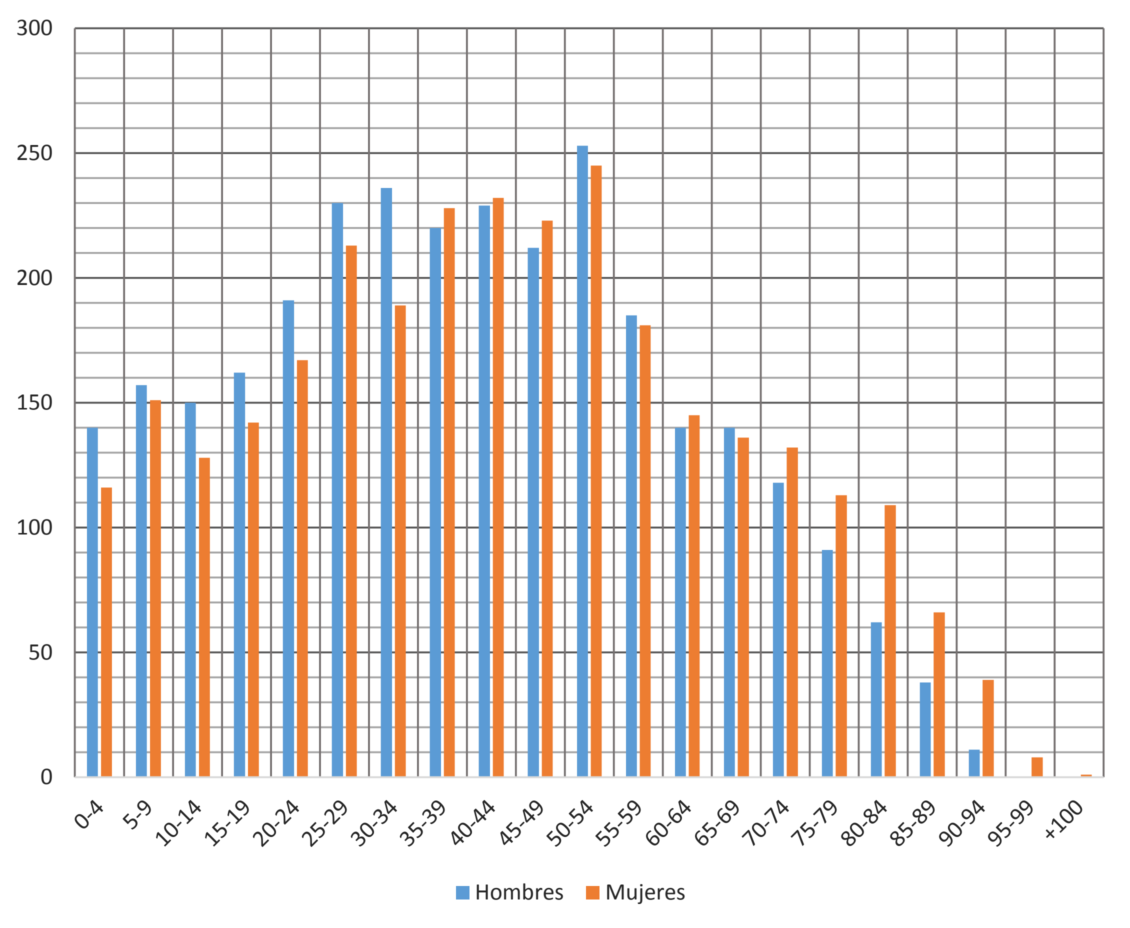


Figura 4 – Reparto de la población de Llerena en el año 2015 por edad y sexo. Fuente: INE

En cuanto a la actividad económica, se vive fundamentalmente de la agricultura y ganadería, destacando en sus cultivos los cereales, con tendencia a disminuir en su superficie y sin ningún regadío. Como árboles, los más abundantes son los alcornoques, encinas y las higueras. Las actividades agropecuarias son las de mayor importancia económica, donde destacan los cultivos herbáceos. Otro cultivo importante es el olivar, siendo menos importantes son el viñedo y los frutales. La mayor parte de la superficie labrada está ocupada por herbáceos y en concreto por los cereales de secano como el trigo, cebada y avena y, en menor cantidad el lino, maíz, sorgo y mijo. El olivar ocupa el área de mayor pendiente en la zona de las estribaciones de Sierra Morena. Los viñedos apenas son significativos, las manchas de frutales, higueras, almendros, albérchigos, membrillos, azufaifo y castaños, así como los huertos familiares con sandías, melones, ajos, cebollas y otros productos de secano, son meramente anecdóticos. Los pastos ocupan el 34,35% de la superficie de las explotaciones y la mayoría de ellos son dehesas.

Las especies arbóreas forestales más representativas son la encina, el olivo, además eucalipto y pino.

El tejido industrial de Llerena es escaso y poco dinámico. La industria es uno de los sectores económicos con menor presencia activa en la localidad.

El sector terciario tiene su referente más significativo en el comercio. El comercio minorista tiene valores en Llerena superiores a los niveles medios provinciales, aunque su distribución es desigual, al tener una alta presencia en comercio de alimentación (el de carácter más básico) y baja presencia en no alimentación (vestido, calzado, electrodomésticos, etc.). Estos niveles altos de la actividad del mercado básico minorista de Llerena tienen gran poder centralizador, atrayendo clientes de localidades próximas. El comercio mayor es minoritario y los más numerosos son los dedicados a bebidas y tabaco y cereales, abonos y plantas.

4.6. PATRIMONIO

El centro histórico de Llerena, fue declarado Conjunto Histórico Artístico el 29 de diciembre de 1966 y en él se reúne un relevante patrimonio artístico, en el que cabe destacar, en el terreno de la arquitectura y el urbanismo, los siguientes:

- Plaza de España: Fue coso taurino, mercado y sede de festejos. En el lado Sur de la plaza está la iglesia de Nuestra Señora de la Granada con una balconada con arcos de 2 pisos. En el lado Norte, (frente a la iglesia) se halla el portal de la Casineta que ha tenido los apelativos de portal de las Tiendas, de la Boticas, del Pan o de la Cárcel. Se trata de 12 arcos de ladrillo encalado, columnas de cantería y 2 plantas con balcones y ventanas y remate corrido abalaustrado. En el lado Este se ve el Ayuntamiento y el portal de Morales, con 9 arcos. En alguna de las casas que están en esta zona vivió el pintor Francisco de Zurbarán y su esposa. Cerca está la fuente que diseñó el pintor en 1617.
- Iglesia de Nuestra Señora de la Granada: Esta iglesia está situada en la plaza del Ayuntamiento; tiene una fachada barroca con una balconada con arcos de 2 pisos. Fue éste un añadido del siglo XVIII, sobre la fachada norte de la iglesia, con

vistas a poder acceder a los acontecimientos que se manifestaran en la plaza Mayor. La iglesia tiene una magnífica torre de ladrillo, en cuyo interior se confirmó la existencia de una gran cantidad de restos humanos en 1964.

- Convento de Santa Clara: Situado en la calle de la Corredera. Tiene un mirador de planta poligonal con celosía de piedra. En su iglesia hay una talla de San Jerónimo del escultor Juan Martínez Montañés. También se pueden admirar las pinturas murales y los retablos barrocos.
- Palacio de los Zapata: En la Plaza de la Inquisición. Buen ejemplo de arquitectura nobiliaria. Fue sede de la Inquisición. Tiene un patio mudéjar.
- Palacio episcopal: Residencia de los priores de la Orden de Santiago. Su portada está enmarcada con alfiz y los blasones de la Orden.

En la zona de implantación de la central termosolar no se ve afectada directamente ninguna **vía pecuaria**, aunque en las cercanías a la misma se encuentra la "Colada de la Dehesa del Hondo o del Charco de Ruiz Pérez", más concretamente al sur de la zona de actuación.

Tal y como se indica en el Anejo nº 6 – Estudio de la ubicación óptima, para el análisis multicriterio se descartaron las zonas situadas en **espacios protegidos**, por lo que se evita afectar a estas áreas. Sin embargo, cabe destacar la Zona de Especial Protección para las Aves (ZEPA) denominada "Campiña Sur – Embalse de Arroyo Conejos", situada a unos 270 m del emplazamiento de la central. Esta ZEPA está situada en el sureste provincia de Badajoz. Es un área abrupta que comprende los términos de Azuaga, Berlanga, Campillo de Llerena, Granja de Torrehermosa, Higuera de Llerena, Llerena, Maguilla, Peraleda del Zaucejo y Valencia de las Torres. Los cursos de agua más importantes que se sitúan en este espacio son el Río Matachel, Arroyo del Soldado, del Ciego, del Chiquillo, de la Quiruela, de los Albanales, Arroyo Naranjo, A. Veguillas, De Bonal, el Pedrosillo, etc. Incluye en este espacio el Embalse de Arroyo Conejos y embalse del Rosal, ambos humedales acogen ornitofauna acuática de Importancia Internacional según los criterios de Ramsar. Un total de 17 elementos referidos en la Directiva Hábitat se encuentran representados en dicho enclave. De ellos 9 son hábitat y 8 se corresponden con taxones del Anexo II. En este mismo enclave se encuentran un total de 35 taxones pertenecientes a la Directiva Aves, de los cuales 9 pertenecen al anexo I de la citada Directiva. El hábitat característico del lugar se encuentra representado por dehesas de Quercus con algunas manchas de vegetación de encina y alcornoque más condensadas, formando casi bosques. Se destacan también formaciones de retamares y vegetación propia de cursos de agua, como la presencia de *Emys orbicularis* y *Mauremys leprosa*, así como *Lutra lutra*, estando representados los peces, tales como *Anaecypris hispánica*, especie catalogada como en peligro y *Chondrostoma polylepis*. En aves aparecen importantes colonias de *Gelochelidon nilotica* y de *Glareola pratincola*, así como grandes concentraciones invernales de *Grus grus*. Se destaca también la presencia de *Chlidonias Níger*, en peligro de extinción.

5. EVALUACIÓN DE LOS EFECTOS AMBIENTALES DEL PROYECTO

El análisis se ha abordado desde una doble perspectiva. Así, se ha realizado una valoración descriptiva de las afecciones producidas por el proyecto, que, en los casos en que ha sido posible, se ha completado con una cuantificación de lo que suponen estas alteraciones para el conjunto del área afectada. Alguno de los impactos producidos, como la superficie de vegetación afectada, son fácilmente cuantificables, sin embargo, otros, como los que afectan a determinados grupos faunísticos, son más complejos y más difíciles de cuantificar, por lo impredecible de las respuestas de determinados elementos del medio ante interferencias exteriores, o por la dificultad de precisar no sólo la magnitud, sino también el momento en el que se manifieste la alteración. En la valoración de la magnitud de los impactos se han tenido en cuenta además las características de su ocurrencia (ponderándose su valor en función de ellas), así como su grado de reversibilidad, sus efectos acumulativos o sinérgicos, la posibilidad de recuperación, su periodicidad en el tiempo, y su continuidad en el espacio. De este modo, las alteraciones se evalúan cualitativamente, de acuerdo con una escala de valores de cuatro categorías:

- <u>Compatible</u>: Impacto en el que el grado de afección queda controlado una vez finalizadas las obras y tiene un carácter reversible. Dentro de esta categoría se incluyen asimismo aquellos impactos cuya magnitud no tiene un alto grado de significación, debido a su baja intensidad, o bien, a que son simultáneos a otras afecciones existentes anteriormente y de mayor intensidad.

- Moderado: Impacto cuya recuperación no precisa prácticas protectoras o correctoras intensivas, y en el que la consecución de las condiciones ambientales iniciales requiere cierto tiempo.
- Severo: Aquél en el que la recuperación de las condiciones del medio exige la adecuación de medidas protectoras o correctoras, y en el que, aún con esas medidas, aquella recuperación precisa de un período de tiempo dilatado.
- Crítico: Aquél cuya magnitud es superior al umbral aceptable. Provoca una pérdida permanente de la calidad de las condiciones ambientales, sin posible recuperación, incluso con la adopción de medidas protectoras o correctoras.

5.1. EFECTOS SOBRE EL MEDIO FÍSICO

Para la determinación de los principales efectos potenciales generados sobre el **suelo** por la depuradora, el colector y la tubería, resulta conveniente diferenciar dos fases: la de construcción y la de explotación, dados los diferentes efectos que se pueden generar en una y otra:

Fase de construcción: En esta primera fase se producirán las alteraciones más importantes sobre el sustrato, debido a los importantes volúmenes de tierra que se moverán. Sin embargo, debido a la escasez de vegetación de la zona no supondrá un incremento en la erosión, aunque si se modificará la evolución edáfica que hubiera tenido de contar con la presencia de la cubierta vegetal, lo que provocará en las superficies afectadas cambios en los horizontes edáficos debidos a la mezcla de tierras de los distintos niveles y a la pérdida del horizonte superficial que es el más rico en nutrientes. También se producirá un cambio en la permeabilidad de la superficie si finalmente se realizan los viales internos.

Con todo esto, se deduce que la ocupación y la destrucción del perfil del suelo tendrán una incidencia importante. Sin embargo, se prevé reducir este impacto mediante la realización de plantaciones y siembras que permitirán un incremento de la cubierta vegetal con respecto a la situación inicial, por lo que esta afección se podrá considerar como **COMPATIBLE-MODERADA**.

Fase de explotación: Las afecciones que potencialmente se pueden generar sobre el suelo en esta fase, se centran exclusivamente a las causadas por el posible vertido del fluido de alta temperatura (HTF) o aceites y fluidos de la maquinaria de generación, a lo largo de las distintas manipulaciones a que se ven sometidos durante el proceso generador. Se tratará en cualquier caso de posibles vertidos accidentales, lo cual unido a la aplicación de medidas cautelares de funcionamiento y a lo reducido de los volúmenes que se vertería, se concluye que el impacto podrá ser **COMPATIBLE**.

Las posibles afecciones sobre los **recursos hídricos** de la zona tendrán lugar fundamentalmente durante la fase de construcción, debido a posibles vertidos de aguas a los cauces de la red de drenaje natural de la zona de estudio, que pueden portar un elevado contenido en partículas en suspensión pero que no afectarán las condiciones actuales de los cursos de agua existentes. Sin embargo, durante el funcionamiento de la planta termosolar se ha proyectado la existencia de una depuradora de las aguas empleadas por la central, por lo que no habrá un empeoramiento de la calidad del agua. Debido a la necesidad hídrica de la central, habrá una disminución del agua disponible en el embalse de Llerena, aunque se podrá reducir esta necesidad diseñando un sistema de drenaje eficiente que permita reutilizar todo este volumen. El efecto ambiental por lo tanto será **COMPATIBLE**.

Respecto a las afecciones posibles a la **atmósfera**, la actuación podrá generar potencialmente tres tipos de alteración: ruido, polvo y olores. La alteración de la calidad del entorno por **ruido** se producirá durante la fase de construcción, como consecuencia de la presencia de la maquinaria necesaria para la obra. Sin embargo, este efecto desaparecerá en la práctica, una vez hayan finalizado las obras, quedando únicamente un nivel de ruido reducido debido a las bombas, maquinaria y la turbina de generación, que contarán con elementos de atenuación de la emisión sonora. Cabe destacar que la ubicación de la planta se encuentra alejada del núcleo urbano, por lo que será poco posible que llegue a afectar a la población. Con todo esto el impacto se puede considerar como **COMPATIBLE**.

Respecto a la afección por **polvo**, seguirá un patrón muy parecido al ruido. Principalmente, los efectos se notarán durante la construcción debido al tránsito de maquinaria, ya que una vez esté la central en explotación las formaciones de polvo serán mínimas. Se regará cada vez que sea necesario todos los viales de la obra para reducir al mínimo la producción de polvo. Igualmente, debido a la lejanía de la población y, por lo tanto, a la reducida posibilidad de afección, este impacto será **COMPATIBLE**.

La generación de **olores** tendrá lugar también durante la construcción debido a las emisiones de la maquinaria, que cesarán una vez se ponga en funcionamiento la central ya que se trata de energía limpia y las únicas posibles emisiones serán de vapor de agua, inocuas. Además, la afección a la población será mínima debida a la distancia a la que se encuentra respecto al emplazamiento de la planta, por lo que el impacto será **COMPATIBLE**.

En cuanto a los **gases** vertidos a la atmósfera, sin duda, es donde se notará una diferencia notable y positiva, aunque quizá no se note de manera local. La generación de energía termosolar es una fuente de recursos limpia y renovable que evita la producción de gases de efecto invernadero, como el CO_2, NO_x, CH_4, CFC,… lo que a la larga supone una reducción o una mitigación del calentamiento global. Por lo tanto este efecto, es sin duda el más beneficioso y por lo tanto su afección se considera **POSITIVA**.

5.2. EFECTOS SOBRE EL MEDIO BIÓTICO

Respecto a la afección sobre la **vegetación**, durante la fase de construcción se producirá una pérdida total de la vegetación existente en la ubicación de la planta. Sin embargo, el único arbolado existente es correspondiente a olivos situados en la parcela 41 del polígono 3 catastral de 20 ha, y el resto son tierras de labor con poco valor ecológico. Sin embargo, tras la ejecución de la central, se plantará arbolado y siembras, que mejorarán la situación, mejorando incluso la situación inicial, por lo que la afección se considerará **COMPATIBLE**.

Durante la fase de construcción, se prevé que puedan existir alteraciones en el comportamiento de las **poblaciones faunísticas** habitantes de los alrededores, las cuales se verán influenciadas por el movimiento de maquinaria y personal necesarios para la ejecución de la obra. Asimismo, hay que señalar que tras la explanación podrían desaparecer cierto número de hábitats, lo que obligará a sus pobladores a desplazarse a otros lugares más o menos próximos donde encontrar nuevos lugares de residencia acordes con sus necesidades. Sin embargo, al tratarse de cultivos, el número de poblaciones sería reducido. Cabe destacar que debido a la cercanía de la ZEPA “Campiña Sur – Embalse de Arroyo Conejos”, las aves podrían verse afectadas por la construcción y explotación de la planta. Sin embargo, si este proyecto fuera a realizarse, se acordaría con los organismos pertinentes la ejecución de actuaciones compensatorias destinadas a alejar las aves de la zona más cercana a la central. Además está previsto la ejecución de pantallas verdes en los límites de la explanación para evitar afecciones mayores, principalmente deslumbramientos. Con todo esto se puede considerar la afección como **COMPATIBLE-MODERADA**.

5.3. EFECTOS SOBRE EL PAISAJE

Se trata, en este caso de determinar los posibles impactos que pueden producirse en el paisaje, entendido éste como un contexto formado por los elementos naturales (bosques, vegetación,…) o realizados por el hombre (monumentos, obras,…). Además de las alteraciones físicas que pueden producirse en él, existen otras alteraciones con carácter subjetivo que también deben considerarse y que se refieren a la percepción visual de ese paisaje, por los observadores de fuera de la planta termosolar. Hay dos conceptos que corresponden al tipo de alteraciones a las que se refiere este apartado: la obstrucción visual, que puede definirse como la pérdida o ganancia de calidad ambiental que se deriva de la presencia física de la planta y estructuras directamente relacionadas con ella en el campo visual de los observadores, y la intrusión visual que representa esta misma variación en la calidad ambiental cuando se tiene en cuenta el valor estético del paisaje, sobre el que dicha intrusión se realiza. Ya que los juicios de valor intervienen necesariamente en la aparición del impacto global de un proyecto sobre el paisaje, aquí se examinarán los hechos objetivos, ligados a la perturbación de la organización espacial de los elementos del entorno distinguiendo los efectos inmediatos y directo de la obra, por una parte, y los efectos a largo plazo e inducidos, por otra. La perturbación inmediata y directa tiene por causas:

- La sustitución que provoca la presencia de la obra, por la ocupación del emplazamiento en sí misma, que genera una artificialización del entorno en un medio rural
- La ruptura de la continuidad de la vegetación (pudiendo traducirse por la ocultación de campos visuales, apertura de desmontes, etc.)
- La oposición de formas y colores que provoca en el entorno agrícola

La perturbación a largo plazo e inducida se debe a:

- La modificación del ritmo de evolución de la zona próxima a las instalaciones, dada la modificación del régimen del suelo que es precisa, y que puede conducir a la larga a la transformación de una zona agraria en un área urbana.
- La transformación de las estructuras agrarias, consecuencia de lo anterior

Durante la fase de construcción de la central termosolar se precisa una gran cantidad de maquinaria que provoca un impacto visual negativo que se extiende a las cuencas visuales en las que estará integrada. En la fase de explotación, el impacto visual será el derivado de la presencia de los colectores y las instalaciones, que producirán una obstrucción visual. Para minimizar estas afecciones se podrá proyectar la ejecución de pantallas verdes en los límites de la explanación. Con todas estas consideraciones el impacto sobre el paisaje se podrá considerar como **COMPATIBLE-MODERADO**.

5.4. EFECTOS SOBRE EL MEDIO SOCIOECONÓMICO

Por el tipo de proyecto, no se provocará ningún efecto reseñable sobre las tendencias demográficas de la **población** de la zona, ya que una vez la planta esté en funcionamiento, el número de técnicos y empleados que necesitará será bajo, por lo que no se producirá un aumento significativo de población.

Respecto al **empleo**, la ejecución de la central podrá suponer contrataciones de personal y/o maquinaria de carácter local, además de las derivadas por la presencia de trabajadores y maquinaria en comercios, talleres, restaurantes, etc. Esto también supondrá un incremento en la actividad comercial e industrial, debido a la magnitud del proyecto, repercutiendo en la economía local.

En el caso de las infraestructuras cercanas, principalmente carreteras y caminos, se podrán producir molestias debido al tránsito de maquinaria. La principal afección se producirá en la intersección de la N-432 con la carretera del embalse de manera puntual, mientras que esta se verá más afectada por el movimiento de maquinaria al tratarse de una calzada estrecha, aunque debido a que su uso es principalmente agrícola, el número de afectados será menor que si fuera una vía de comunicación principal.

Con todos estos aspectos, se podrá considerar el efecto como **COMPATIBLE** e incluso positivo en algunos ámbitos.

6. MEDIDAS PREVENTIVAS Y CORRECTORAS

En este apartado se contemplan las medidas correctoras que minimicen el impacto, tanto visual como sobre el resto del medio físico, generado por la construcción y posterior funcionamiento de la planta termosolar de Llerena.

El análisis de los efectos del proyecto detallado en el apartado anterior, ha determinado que los más importantes son la pérdida de suelo natural por ocupación del mismo, la pérdida de calidad paisajística y la posible afección a la ZEPA “Campiña Sur – Embalse de Arroyo Conejos”. El resto de afecciones, con menor importancia, también serán estudiados y se propondrán las medidas necesarias para mitigar su efecto.

6.1. MEDIDAS REFERENTES AL MEDIO FÍSICO

Durante la fase de construcción, se tomarán las medidas preventivas oportunas para que de un modo planificado, quede asegurada la desafectación a recursos naturales y culturales de interés, como consecuencia de la localización y dimensionamiento de las actividades auxiliares de obra y vertederos (en el caso de que se decida no llevar el material sobrante a vertedero autorizado). Una vez finalizada la fase de construcción, el contratista procederá a la limpieza, retirada, y depósito de todos los elementos no existentes en la situación original.

Siempre que sea posible, se retirará la capa de tierra vegetal junto con la propia broza de la zona que va a ser excavada. Esta tierra vegetal, aparte de ser suelo fértil originado in situ y por consiguiente similar al existente en los alrededores y colonizable por la vegetación autóctona, posee una gran cantidad de semillas y microfauna simbiótica con un elevado poder de autocolonización. El manejo de los suelos vegetales requiere un gran cuidado para no perder sus características. Las normas más elementales son las siguientes:

- Evitar al máximo el paso de maquinaria pesada para evitar que se compacte
- Procurar manejar el suelo con condiciones de humedad (tempero) apropiada evitando hacerlo cuando esté muy seco o muy húmedo
- Mantenerlo en acopios hasta que, finalizadas las obras se puedan extender sobre las superficies desnudas. Estos acopios o caballones no deberán superar 2 m de altura, ya que por encima de este tamaño, las capas inferiores se compactan y se pierde la difusión del oxígeno
- Una vez hechos los acopios, evitar en todo momento el paso de maquinaria por encima, e incluso el pisoteo
- Esta tierra vegetal se utilizará en la recuperación de los terrenos alterados

La maquinaria utilizada en las obras deberá estar homologada por los servicios técnicos autorizados, en lo relativo a los niveles de potencia acústica admisible, emisión sonora de máquinas, equipos de obras y vehículos a motor. El contratista facilitará las comprobaciones oportunas requeridas en cualquier momento por el director de obra o de los representantes acreditados de los órganos de inspección de la Administración competente. Para ello, cuando sea requerido, el contratista presentará al cirector de las obras la documentación acreditativa de que la maquinaria y vehículos a emplear cumplen con la legislación aplicable para cada una de ellas. Esta documentación deberá estar actualizada al día del inicio de las obras y mantener su vigencia durante todo el período de desarrollo de las mismas.

El combustible requerido para la maquinaria y equipos será transportado hasta el sitio de trabajo y suministrado por medio de surtidores, bombas manuales o tanques con su propio surtidor, al igual que el aceite requerido para realizar cambios a la maquinaria. El cambio de aceite de la maquinaria de obra se realizará en talleres autorizados o se drenará colocando previamente un recipiente o bandeja que permita recolectar el aceite usado, almacenándolo temporalmente en bidones correctamente etiquetados, para ser retirados por gestor autorizado de residuos peligrosos. Para cada uno de los aspectos mencionados anteriormente se establecen las siguientes medidas preventivas:

- La maquinaria, el área de almacenamiento de lubricantes y combustibles, así como la salida de la fosa séptica se ubicarán a más de 200 m de cauces.
- En ningún caso se verterán las aguas procedentes de los sanitarios al cauce si no se dispone de la autorización de la Confederación Hidrográfica.
- El terreno en el que se ubique la maquinaria y el almacenamiento de lubricantes y combustibles y el resto de residuos peligrosos que se generen durante la obra (baterías, envases de plástico contaminados, aerosoles, filtros, etc.) tendrá el suelo impermeabilizado.
- Los aceites y combustibles se almacenarán en recipientes en buen estado y etiquetados según la normativa vigente.
- Los cambios de aceite y demás operaciones de mantenimiento de la maquinaria y vehículos de obra se harán sobre la plataforma impermeabilizada anteriormente.
- En el caso de verter accidentalmente en el suelo aceites o combustible, se retirará el suelo contaminado en un contenedor específico para poder ser retirado por gestor autorizado de residuos peligrosos.
- El contratista tendrá que darse de alta como pequeño productor de residuos tóxicos y peligrosos, de acuerdo con la legislación extremeña.

- La limpieza de las cubas de hormigón se realizará en un punto específico consistente en una excavación en el suelo con un plástico. Una vez finalizadas las obras el hormigón se retirará y se enviará a vertedero autorizado.
- Los restos orgánicos serán retirados por el servicio municipal.
- Las piezas metálicas, neumáticos y elementos plásticos se llevarán a vertedero autorizado.

Los camiones y vehículos utilizados, en general, para el transporte de materiales deberán tener los protectores para polvos sobre las ruedas para evitar su lanzamiento a causa del rodamiento del vehículo, así como para minimizar las emisiones fugitivas a la atmósfera. Antes de iniciar el transporte, se deberán retirar los sobrantes que quedan después del cargue de los vehículos sobre las estructuras laterales y no colocar materiales que superen el nivel del platón, además de fijar la carpa para que quede ajustada y evitar el escape de material a la vía o al aire. Para mitigar la producción de polvo se regará la superficie de tránsito de maquinaria. El funcionamiento de los motores de los vehículos deberá estar siempre en las mejores condiciones técnicas posibles para evitar la emisión innecesaria de contaminantes propios de la combustión como CO, CO_2, NO_x, SO_x e hidrocarburos, cuyas concentraciones deben estar por debajo de las normas o recomendaciones.

Una vez hayan finalizado las obras, en el terreno ocupado por los campamentos de obra, maquinaria y acopio de material, se procederá a la retirada de todos los elementos ajenos al entorno natural, procedentes de la actividad de obra. El suelo impermeabilizado para almacenamiento de residuos peligrosos se levantará y sus restos se llevarán a vertedero autorizado. El resto del terreno ocupado por las instalaciones anteriormente mencionadas se subsolará o escarificará (unos 40 cm de profundidad) con el fin de descompactarlo y permitir su revegetación posterior.

6.2. MEDIDAS REFERENTES AL MEDIO BIÓTICO

La solución óptima para corregir la afección a la **vegetación** de la ubicación de la planta, por las ventajas que comporta a los problemas planteados, es la revegetación de la zona de actuación mediante siembras y plantaciones, dados los múltiples efectos positivos que proporciona, como son:

- El recubrimiento vegetal contribuye, por la cohesión que proporciona el sistema radical de las plantas, a mantener la estabilidad de los suelos sobre los que se implanta.
- Permite la regeneración del medio existente previo a la ejecución de la obra, destruido al romper la capa superficial y quedar los suelos desnudos.
- Efectúa una labor de compensación de la superficie vegetal afectada, facilitando la reinstauración de la vegetación autóctona y su progreso en la evolución climática.
- Dota a la obra de un valor añadido de carácter ornamental.

Se empleará la tierra vegetal retirada en el desbroce de la superficie, con el objetivo de aprovechar la capa superior y fértil de los terrenos. Con ello se conserva el manto edáfico y se favorece la revegetación posterior, recreando de la forma lo más fiel posible las condiciones ecológicas del lugar, sin necesidad de aportar tierras procedentes del exterior de la obra. Sólo se utilizará como tal tierra vegetal la procedente de los horizontes superiores edáficos del terreno.

Las plantaciones arbóreas y arbustivas deberán tener las siguientes características dependiendo de la función que cumplirán:

- Plantación en hilera o de cerramiento: Plantación lineal cuyo fin es evitar las vistas directas sobre las instalaciones, sirviendo además de tránsito entre el exterior y el interior. Si situarán en las zonas perimetral de las instalaciones. Su fin primordial es el cerramiento de la zona, para lo cual se utilizarán especies arbóreas y arbustivas autóctonas.
- Siembras y plantaciones interiores: Se ubicarán en las zonas interiores de la central termosolar, principalmente en la isla de potencia, donde se emplazarán las balsas de regulación, la turbina, torres de refrigeración, depuradora, edificio de control, etc. También se emplearán especies arbóreas y arbustivas autóctonas.

La elección de especies se realizará estudiando las principales condiciones ecológicas de la zona, como son el clima, el suelo y la vegetación existente, con lo que se podrá definir con precisión el entorno. A partir de ello, se analizará el conjunto de especies arbóreas, arbustivas, subarbustivas y herbáceas para que sus características ecológicas se adapten perfectamente a las condiciones medioambientales de la zona, con la salvedad de un posible aporte de agua a través del riego, además de que introduzcan un alto valor estético y que reúnan las características anatómicas precisas para la función que cumplirán.

Para el cuidado de la **fauna** presente en la zona de actuación, se tomarán las siguientes medidas preventivas:

- Se identificarán especies protegidas de fauna, especialmente de aves, que puedan aparecer durante la ejecución de las obras
- Se consultará con los organismos ambientales con el objetivo de identificar las especies amenazadas, así como acordar el paro de las obras durante el período de reproducción si así se requiere
- Igualmente, se acordará con estos organismos la realización de medidas compensatorias con el objetivo de intentar alejar dichas especies de la zona de actuación, reduciendo su afección.

6.3. MEDIDAS REFERENTES AL PAISAJE

Respecto a las medidas preventivas y correctoras referentes al paisaje, cabe señalar que las relacionadas con el medio físico y el biótico, tienen como objetivo secundario reducir el impacto visual y paisajístico de la planta. Con las plantaciones realizadas en los límites de la explanación, se evita que las líneas de visión intercepten con las instalaciones, de forma que estas queden ocultas para el entorno próximo, logrando con ello, la integración en la unidad paisajística de la zona.

7. PLAN DE VIGILANCIA Y SEGUIMIENTO AMBIENTAL

El Plan de Vigilancia y Seguimiento Ambiental, tiene por función básica establecer un sistema que garantice el cumplimiento de las indicaciones y medidas cautelares, protectoras y correctoras, contenidas en los capítulos precedentes.

7.1. VIGILANCIA AMBIENTAL DURANTE LA FASE DE CONSTRUCCIÓN

Durante esta fase, la vigilancia se centrará en garantizar y verificar la correcta ejecución de las obras en lo que respecta a su incidencia ambiental. Se realizarán dos visitas mensuales en las que se llevarán a cabo los siguientes controles por parte del Coordinador Ambiental:

Se comprobará que la maquinaria y las instalaciones auxiliares se ubican en los puntos especificados para tal fin y que deberán ser aprobados por la dirección de obra previamente al inicio de las obras. En caso de no ser correcta la ubicación, se procederá a corregirlo de inmediato. Igualmente, se acreditará que la maquinaria empleada en las obras está homologada por los servicios técnicos autorizados.

Se confirmará el riego de los viales de obra, con el objetivo de mantener la atmósfera libre de polvo. Se actuará principalmente durante el periodo estival, aunque si se diera un período seco en cualquier otra estación, se actuará de igual manera.

Se comprobará que se está efectuando una correcta gestión de los residuos peligrosos generados en la obra (aceites usados, baterías, aerosoles, pinturas, suelo contaminado, envases contaminados, trapos contaminados, etc.). Para ello, en el momento que considere oportuno se exigirá al Contratista la presentación de documentos acreditativos de la entrega de los mismos a gestor autorizado. Se comprobará que el contratista se ha dado de alta como pequeño productor de residuos peligrosos. Además, se comprobará que todos los residuos peligrosos están sobre una superficie impermeabilizada, en recipientes etiquetados adecuadamente y que no se vierten al suelo o a los cauces. Si esta situación no se estuviera dando se procederá a paralizar las actividades generadoras de la afección hasta la retirada y limpieza del área afectada por los residuos y tras acreditar que se ha solventado. También se comprobará que el material inerte sobrante de la obra y los residuos no peligrosos se envían a los gestores autorizados.

Se comprobará que el contratista tiene la autorización de la Confederación Hidrográfica del Guadiana, para realizar el vertido procedente de los sanitarios instalados en las obras, al cauce más próximo a las mismas.

Se comprobará que los acopios de material y tierra vegetal están en los lugares indicados para tal fin y que están protegidos para evitar su contaminación o su deterioro.

7.2. VIGILANCIA AMBIENTAL DURANTE LA FASE DE EXPLOTACIÓN

Durante la fase de explotación de la central termosolar, los controles se limitarán a comprobar que las medidas ejecutadas cumplen su función, además de corroborar el correcto funcionamiento de la planta, de tal manera que no se produzcan vertidos del fluido de alta temperatura (HTF), que el sistema de depuración elimine todas las partículas perjudiciales, etc.

7.3. INFORMES

Durante toda la fase de construcción de las obras, que comprende desde la fecha del acta de replanteo hasta la de recepción, se redactará periódicamente unos informes para asegurar e informar del cumplimiento del Programa de Vigilancia y Seguimiento Ambiental. Se redactará uno al inicio de las obras, durante la fase de construcción y uno final. El informe inicial recogerá todos los estudios, muestreos o análisis que pudieran precisarse y que deban ser previos al inicio de las obras. También recogerá la ubicación del parque de maquinaria y zona de instalaciones, préstamos y vertederos o zonas de acopios temporales. Los informes ordinarios se realizarán se realizan para reflejar el desarrollo de las distintas labores de vigilancia y seguimiento ambiental La periodicidad de estos dependerá de los impactos previstos y de los valores naturales de la zona. A partir del Acta de Recepción y durante la duración de la obra, se elaborarán una serie de informes, de periodicidad semestral, en los que se detallarán los controles realizados, con los resultados obtenidos, referidos al seguimiento de las medidas de protección ambiental, cumpliendo así con lo establecido en la Declaración de Impacto Ambiental. Los informes extraordinarios se redactarán en el caso de que exista alguna afección no prevista o cualquier aspecto que precise una actuación inmediata y que por su importancia, merezca la emisión de un informe especial. Finalmente, se realizará un informa al concluir las obras que incluirá un resumen del conjunto de las obras realizadas y la restauración de las mismas, donde se identificarán los impactos reales durante la ejecución y los impactos residuales tras la aplicación de las medidas correctoras previstas. Se detallarán las tareas realizadas, describiendo de forma pormenorizada la revegetación efectuada y las labores de mantenimiento previstas.

8. CONCLUSIONES DEL ESTUDIO

Este proyecto contempla la construcción de una planta termosolar de colectores cilindro-parabólicos en el término municipal de Llerena (Badajoz). Esta planta generará energía eléctrica de forma limpia y renovable.

Inicialmente, la construcción de la central supondrá afecciones al medio físico (suelo, atmósfera, etc.), al medio biótico (vegetación y fauna), al paisaje y al medio socioeconómico. Algunos de estos efectos serán negativos, ya que se eliminará suelo cultivado y se retirarán algunas plantaciones, y se podrá afectar a la fauna existente en la zona. Sin embargo, otros son positivos, como los efectos en el empleo, comercio e industria de la zona y, sobre todo, la reducción de la emisión de gases de efecto invernadero a una escala algo mayor.

Para reducir e incluso revertir algunos de las afecciones generadas por la ejecución de la planta, se han elaborado una serie de medidas preventivas y compensatorias, como la revegetación de algunas zonas de la explanación, el riego de caminos y viales, una gestión de residuos responsable, etc.

Con todo esto se puede considerar la obra contemplada en este proyecto como COMPATIBLE con el medioambiente por lo que se pedirá a los organismos correspondientes las autorizaciones pertinentes para la obtención de la Declaración de Impacto Ambiental positiva y, posteriormente, para el inicio de las obras.

ANEJO Nº 12

GESTIÓN DE RESIDUOS

ÍNDICE

1. INTRODUCCIÓN

Este anejo se ha redactado de acuerdo con el Real Decreto 105/2008, de 1 de febrero, por el que se regula la producción y gestión de los residuos de construcción y demolición, y en particular por la imposición establecida en el artículo 4, apartado 1 - a), donde se determina la obligación de "*incluir en el proyecto de ejecución de la obra un estudio de gestión de residuos de construcción y demolición*". En el presente estudio de realiza una estimación de los residuos que se prevé vayan a producirse durante la ejecución de la obra, además de determinar su destino y elaborar el correspondiente presupuesto para la correcta gestión de los mismos.

2. CARACTERÍSTICAS DE LAS OBRAS

Este estudio de gestión de residuos se ha realizado para las obras derivadas del "Estudio de implantación de una planta termosolar de colectores cilindro-parabólicos en la Campiña Sur". Dicha actuación se sitúa íntegramente en el término municipal de Llerena, en la provincia de Badajoz, y las principales actividades son:

- Actuaciones previas (desbroce)
- Adecuación del camino de acceso
- Creación de la explanación
- Excavación de las balsas de regulación
- Construcción de los colectores
- Cerramientos
- Integración ambiental

3. IDENTIFICACIÓN Y ESTIMACIÓN DE LA CANTIDAD DE RESIDUOS QUE SE GENERARÁN EN LA OBRA

Los residuos se clasifican en dos tipos: RCD de Nivel I y RCD de Nivel II.

RCD de Nivel I: Son residuos generados por el desarrollo de las obras de infraestructura de ámbito local o supramunicipal contenidas en los diferentes planes de actuación urbanística o planes de desarrollo de carácter regional, siendo resultado de los excedentes de excavación de los movimientos de tierra generados en el transcurso de dichas obras. Se trata, por tanto, de las tierras y materiales pétreos, no contaminados, procedentes de obras de excavación.

RCD de Nivel II: Son residuos generados principalmente en las actividades propias del sector de la construcción, de la demolición, de la reparación domiciliaria y de la implantación de servicios. Son residuos no peligrosos que no experimentan transformaciones físicas, químicas o biológicas significativas. Conforman una mezcla de materiales pétreos y otros entre los que habitualmente figuran madera, plástico, metales, papel, etc.

En el caso del proyecto que nos ocupa, se estima la siguiente producción de residuos, que están marcados y codificados según la Lista Europea de Residuos (LER) publicada por la Orden MAM/304/2002, de 8 de febrero. No se consideran incluidos en el cómputo general los materiales que no superen 1 m^3 de aporte y no sean considerados peligrosos y requieran por tanto un tratamiento especial.

Cód. LER	Residuo	Estimación
RCD de Nivel I		
17 05 04	Tierras y piedras distintas de las especificadas en el código 17 05 03	s/ mediciones
RCD de Nivel II		
Naturaleza pétrea		
17 01 01	Hormigón	0,0001 m^3/m^2 obra
Naturaleza no pétrea		
17 02 01	Madera	0,0004 m^3/m^2 obra
17 02 03	Plástico	0,0002 m^3/m^2 obra
17 04 05	Metales (Hierro y acero)	0,0003 m^3/m^2 obra
20 01 01	Papel	0,0001 m^3/m^2 obra

Tal y como se especifica en el Anejo nº 9 – Movimientos de tierra, la superficie de ocupación de esta obra es de 1.644.801,732 m^2, por lo que la estimación de residuos será:

Cód. LER	Residuo		Volumen (m^3)	Densidad	Toneladas
RCD de Nivel I					
17 05 04	Tierras y piedras distintas de 17 05 03	Desbroce	411.200,433	2,0 t/m^3	822.400.866 t
		Desmonte	2.268.957,070	2,0 t/m^3	4.537.914,14 t
RCD de Nivel II					
Naturaleza pétrea					
17 01 01	Hormigón		164,480	2,5 t/m^3	411,200 t
Naturaleza no pétrea					
17 02 01	Madera		657,921	0,6 t/m^3	394,752 t
17 02 03	Plástico		328,960	0,8 t/m^3	263,168 t
17 04 05	Metales (Hierro y acero)		493,440	4,0 t/m^3	1.973,762 t
20 01 01	Papel		164,480	0,8 t/m^3	131,584 t

4. MEDIDAS PARA LA PREVENCIÓN DE RESIDUOS EN OBRA

A continuación se plantean las medidas recomendadas dirigidas a la prevención en la generación de residuos de construcción y demolición. Además se describe la manera más conveniente de almacenar las materias primas de obra. Su aplicación contribuirá a reducir la cantidad de residuos por desperdicio o deterioro innecesario de materiales.

La mayor parte de los residuos que se generarán en la obra son de naturaleza no peligrosa. Para este tipo de residuos no se prevé ninguna medida específica de prevención más allá de las que implican un manejo cuidadoso. Con respecto a las moderadas cantidades de residuos contaminantes o peligrosos, se tratarán con precaución y preferiblemente se retirarán de la obra conforme se vayan empleando. El constructor se encargará de almacenar separadamente estos residuos hasta su entrega al gestor de residuos correspondiente y, en su caso, especificará en los contratos a formalizar con los subcontratistas la obligación de estos de retirar de la obra todos los residuos generados por su actividad, así como de responsabilizarse de su gestión posterior.

Gracias a la gran extensión de terreno que ocupa este proyecto se podrán instalar sin problemas todos los contenedores e instalaciones necesarias para una correcta separación y almacenamiento de los residuos generados.

Tierras y pétreos de la excavación: Se ajustarán las dimensiones especificadas en el proyecto y siguiendo las pautas marcadas en el estudio geotécnico del suelo donde se excavará. Estos residuos se almacenarán sobre una base dura o un contenedor para reducir desperdicios, separando los residuos contaminados.

Residuos de naturaleza pétrea: Se evitará la generación de los mismos como sobrantes en el proceso de fabricación, devolviendo en lo posible al suministrador las partidas de material que no se fueran a colocar. Se almacenarán sobre una base dura o contenedores para reducir desperdicios y para su segregación, separando los contaminantes potenciales.

Residuos de grava, rocas trituradas, arena y arcilla: Se intentará en la medida de lo posible reducirlos a fin de economizar la forma de su colocación y ejecución. Se reutilizará la mayor parte posible dentro de la propia obra. Se almacenarán sobre una base dura o contenedores para reducir desperdicios y para su segregación, separando los contaminantes potenciales.

Hormigón: Se intentará utilizar todas las partidas suministradas, por lo que se deberá calcular con precisión las necesidades de la construcción para evitar sobrantes. En el caso de que la obra dispusiera de planta propia de hormigonado, se tratará de ajustar la producción a lo estrictamente necesario según las previsiones del proyecto. Se almacenarán sobre una base dura o contenedores para reducir desperdicios y para su segregación, separando los contaminantes potenciales.

Metales: Se aportarán a la obra y se ejecutarán según lo dispuesto en el proyecto, para evitar recortes y elementos sobrantes. Se almacenarán en un lugar cubierto, usando los embalajes originales hasta el momento de uso. Se dispondrá en obra de contenedores para su separación.

5. OPERACIONES DE REUTILIZACIÓN, VALORACIÓN O ELIMINACIÓN DE LOS RESIDUOS GENERADOS

5.1. OPERACIONES IN SITU

Son operaciones de deconstrucción y de separación y recogida selectiva de los residuos en el mismo lugar donde se producen. Estas operaciones consiguen mejorar las posibilidades de valorización de los residuos, facilitando el reciclaje o reutilización posterior, También se muestran imprescindibles, cuando se deben separar residuos potencialmente peligrosos para su tratamiento.

La deconstrucción es un conjunto de operaciones coordinadas de recuperación de residuos de derribo con el fin de minimizar el volumen destinado al vertedero. La deconstrucción no tiene un único modelo de definición, ya que admite diversos métodos y grados de intensidad en cada una de las operaciones, y estos vendrán determinados por las características materiales de la construcción objeto de deconstrucción por el incremento del coste del derribo a fin de que este sea más selectivo, por la repercusión que ejercen estas operaciones en el valor de los residuos resultantes y por el coste final del producto, al cual ha de poder competir en el mercado con el de un material equivalente pero nuevo.

La separación y recogida selectiva son acciones que tienen por objetivo disponer de residuos de composición homogénea, clasificados por su naturaleza (hormigones, metales, plásticos, etc.) de manera que faciliten los procesos de valorización o de tratamiento especial. El objetivo común de estas acciones se centra en facilitar la valorización de los residuos de composición homogénea, sobre todo exentos de materiales potencialmente peligrosos. Por esta razón deben ser separados de otros materiales con los que van mezclados y clasificados por su diferente naturaleza. Es asimismo objetivo de estas acciones recuperar en el mejor estado posible los elementos de construcción que sean reutilizables.

A continuación se indican las alternativas de gestión dentro de una obra.

5.2. VALORIZACIÓN

La valorización es la recuperación o reciclado de determinadas sustancias o materiales contenidos en los residuos, incluyendo la reutilización directa, el reciclado y la incineración con aprovechamiento energético. La valorización de los residuos evita la necesidad de enviarles a un vertedero controlado. Una gestión responsable de los residuos debe perseguir la máxima valorización para reducir tanto como sea posible el impacto medioambiental. La gestión será más eficaz si se incorporan las operaciones de separación selectiva en el mismo lugar donde se producen, mientras que las de reciclaje y reutilización se pueden hacer en ese mismo lugar o en otros más especializados.

5.3. DEPOSICIÓN DE LOS RESIDUOS

Los residuos que no son valorizables son, en general, depositados en vertederos. Los residuos en algunos casos son de naturaleza tóxica o contaminante y, por lo tanto, resultan potencialmente peligrosos. Por esta razón los residuos deben disponerse de tal manera que no puedan causar daños a las personas no a la naturaleza y que no se conviertan en elementos agresivos para el paisaje. Si no son valorizables y están formados por materiales inertes, se han de depositar en un vertedero controlado a fin de que al menos no alteren el paisaje. Pero si son peligrosos, han de ser depositados adecuadamente en un vertedero específico para productos de este tipo y, en algunos, casos, sometidos previamente a un tratamiento especial para que no sean una amenaza para el medio.

5.4. REUTILIZACIÓN

Es la recuperación de elementos constructivos completos con las mínimas transformaciones posibles. La reutilización no solamente reporta ventajas medioambientales sino también económicas. Los elementos constructivos valorados en función del peso de los residuos poseen un valor bajo, pero si con pequeñas transformaciones o sin ellas, pueden ser regenerados o reutilizados directamente, su valor económico es más alto. En este sentido, la reutilización es una manera de minimizar los residuos originados de forma menos compleja y costosa que el reciclaje.

5.5. RECICLAJE

Es la recuperación de algunos materiales que componen los residuos, sometidos a un proceso de transformación en la composición de nuevos productos. La naturaleza de los materiales que componen los residuos de la construcción determina cuáles son sus posibilidades de ser reciclados y su utilidad potencial. Los residuos pétreos, como hormigones y obras de fábrica principalmente, pueden ser reintroducidos en las obras como granulados, una vez han pasado un proceso de criba y machaqueo. Los residuos limpios de hormigón, debido a sus características físicas, tienen más aplicaciones y son más útiles que los escombros de albañilería

5.6. TRATAMIENTO ESPECIAL

Consiste en la recuperación de los residuos potencialmente peligrosos susceptibles de contener sustancias contaminantes o tóxicas a fin de aislarlos y de facilitar el tratamiento específico o la deposición controlada. También forma parte de los residuos de construcción algunos materiales que pueden contener sustancias contaminantes e incluso tóxicas, que los llegan a convertir en irrecuperables. Además la deposición no controlada de estos materiales en el suelo constituye un riesgo potencial importante para el medio natural. Los materiales potencialmente peligrosos deben ser separados del resto de los residuos para facilitar el tratamiento específico o la deposición controlada a que deben ser sometidos. Siempre es necesario prever las operaciones de desmontaje selectivo de los elementos que contienen estos materiales, la separación previa en la misma obra y su recogida selectiva.

5.7. DESTINO PREVISTO PARA LOS RESIDUOS DE LA OBRA

Las empresas de gestión y tratamiento de residuos estarán en todo caso autorizadas por la Comunidad Autónoma de Extremadura. Por cercanía a la ubicación de la obra, se proponen los siguientes gestores (datos de enero de 2016):

Razón social	Nº autorización	Dirección	Teléfono	Tipo de instalación
Martín Antonio Chacón Crisóstomo	AAU 12/119	Polígono 12, parcela 407 Ctra. EX-103 P.K. 174 , Llerena	606 823 403	Planta de reciclaje de RCD
Emilio Morillo Mejías	AAU 10/005	Ctra. N-432, P.K. 141, Paraje “Mina La Oscuridad”, Azuaga	670 403 936	Planta de reciclaje de RCD

Como punto limpio se propone el situado en Llerena en el Camino del Pocito, s/n. En cuanto a gestor de residuos peligrosos, los más cercanos son:

Razón social	Nº autorización	Código NIMA	Dirección	Teléfono
Bru Cortés Hermanos, SL	AAU 11/165	0603010192	Polígono 10, parcela 146, Zafra	924 55 21 01
FECA Gestión, SL	AAU 13/017	0603010151	Pol. Ind. Las Moreras, nave 3, Monesterio	924 14 91 55

A continuación se incluye el destino de los residuos previstos en la obra:

Cód. LER	Residuo		Tratamiento	Destino
RCD de Nivel I				
17 05 04	Tierras y piedras distintas de 17 05 03	Desbroce	Reutilización/Gestor	Obra/Planta de reciclaje RCD
		Desmonte	Reutilización/Gestor	Obra/Planta de reciclaje RCD
RCD de Nivel II				
Naturaleza pétrea				
17 01 01	Hormigón		Gestor	Planta de reciclaje RCD
Naturaleza no pétrea				
17 02 01	Madera		Gestor	Gestor residuos no peligrosos
17 02 03	Plástico		Gestor	Gestor residuos no peligrosos
17 04 05	Metales (Hierro y acero)		Gestor	Gestor residuos no peligrosos
20 01 01	Papel		Gestor	Gestor residuos no peligrosos

Cód. LER	Residuo	Destino
Residuos potencialmente peligrosos		
13 01 11*	Aceites hidráulicos sintéticos	Gestor residuos peligrosos
13 01 13*	Otros aceites hidráulicos	Gestor residuos peligrosos
13 02 04*	Aceites minerales clorados de motor, de transmisión mecánica y lubricantes	Gestor residuos peligrosos

Cód. LER	Residuo	Destino
13 02 05*	Aceites minerales no clorados de motor, de transmisión mecánica y lubricantes	Gestor residuos peligrosos
13 02 06*	Aceites sintéticos de motor, de transmisión mecánica y lubricantes	Gestor residuos peligrosos
13 02 07*	Aceites fácilmente biodegradables de motor, de transmisión mecánica y lubricantes	Gestor residuos peligrosos
13 02 08*	Otros aceites de motor, de transmisión mecánica y lubricantes	Gestor residuos peligrosos
13 07 01*	Fuel oil y gasóleo	Gestor residuos peligrosos
13 07 02*	Gasolina	Gestor residuos peligrosos
13 07 03*	Otros combustibles (incluidas mezclas)	Gestor residuos peligrosos
15 01 10*	Envases que contienen restos de sustancias peligrosas o están contaminadas por ellas	Gestor residuos peligrosos
15 02 02*	Absorbentes, materiales de filtración (incluidos los filtros de aceite no especificados en otra categoría), trapos de limpieza y ropas protectoras contaminados por sustancias peligrosas	Gestor residuos peligrosos
16 01 07*	Filtros de aceite	Gestor residuos peligrosos
16 01 21*	Componentes peligrosos distintos de los especificados en los códigos 16 01 07 a 16 01 11, 16 01 13 y 16 01 14	Gestor residuos peligrosos
17 09 03*	Otros residuos de construcción y demolición incluidos los residuos mezclados) que contienen sustancias peligrosas	Gestor residuos peligrosos
20 01 27*	Pinturas, tintas, adhesivos y resinas que contienen sustancias peligrosas	Gestor residuos peligrosos
20 01 33*	Baterías y acumuladores especificados en los códigos 16 06 01, 16 06 02 o 16 06 03 y baterías y acumuladores sin clasificar que contienen esas baterías	Gestor residuos peligrosos
20 01 34	Baterías y acumuladores distintos de los especificados en el código 20 01 33*	Gestor residuos peligrosos

6. MEDIDAS PARA LA SEPARACIÓN DE RESIDUOS EN OBRA

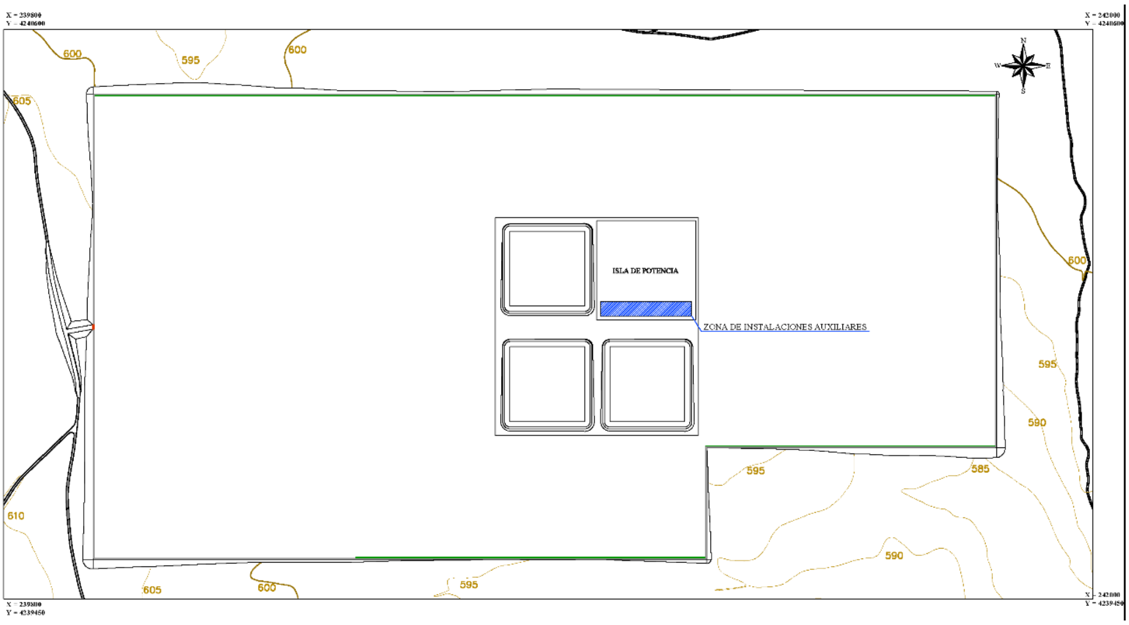
En base al artículo 5.5 del Real Decreto 105/2008, los residuos de construcción y demolición deberán separarse en las siguientes fracciones, cuando de forma individualizada para cada una de dichas fracciones, la cantidad prevista de generación para el total de la obra supere las siguientes cantidades:

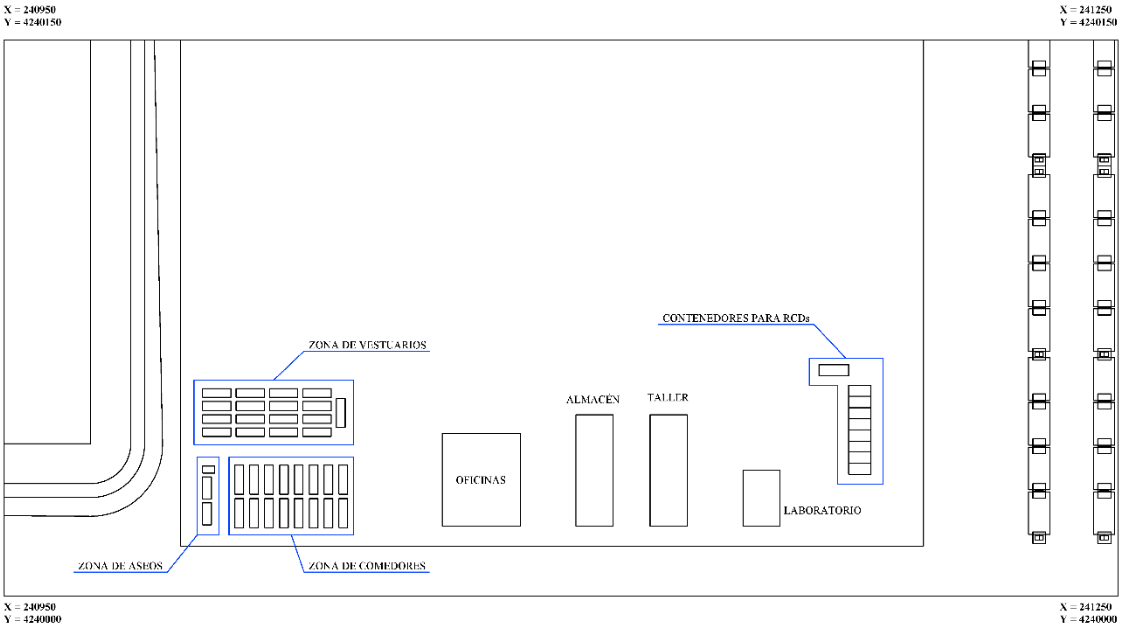
La separación de fracciones se llevará a cabo preferentemente por el poseedor de los residuos de construcción y demolición dentro de la obra en que se produzcan. Cuando por falta de espacio físico en la obra no resulte técnicamente viable efectuar dicha separación en origen, el poseedor podrá encomendar la separación de fracciones a un gestor de residuos en una instalación de tratamiento de residuos de construcción y demolición externa a la obra. En este caso el poseedor deberá obtener del gestor de la instalación documentación acreditativa de que este ha cumplido, en su nombre, la obligación citada.

Respecto a las medidas de separación in situ previstas dentro de los conceptos de la clasificación propia de los RCD de la obra como su selección, se indican a continuación las operaciones que se tendrán que llevar a cabo en la obra:

- Eliminación previa de elementos desmontables yo peligrosos
- Derribo separativo/segregación en obra nueva (pétreos, madera, metales, plásticos, cartón, envases, orgánicos, peligrosos). Solo en caso de superar las fracciones establecidas en el artículo 5.5 del RD 105/2008
- Derribo integral o recogida de escombros en obra nueva “todo mezclado” y posterior tratamiento en planta

7. PLANOS DE LAS INSTALACIONES PREVISTAS





8. PRESCRIPCIONES EN RELACIÓN A LA GESTIÓN DE LOS RESIDUOS

Las determinaciones particulares a incluir en el Pliego de Prescripciones Técnicas Particulares del proyecto, en relación con el almacenamiento, manejo y, en su caso, otras operaciones de gestión de los residuos de construcción y demolición en obra, se describen a continuación:

- El depósito temporal para RCD valorizables (maderas, plásticos, chatarra…), que se realice en contenedores o en acopios, se deberá señalizar y segregar del resto de residuos de un modo adecuado.
- Los contenedores deberán estar pintados en colores que destaquen su visibilidad, especialmente durante la noche, y contar con una banda de material reflectante a lo largo de su perímetro. En los mismos deberá figurar la siguiente información: Razón social, CIF, teléfono del titular del contenedor/envase y el número de inscripción en el Registro de Transportistas de Residuos, del titular del contenedor. Dicha información también deberá quedar reflejado en los sacos

industriales u otros elementos de contención y almacenaje de residuos a travñes de adhesivos, placas, etc.

- El responsable de la obra a la que presta servicio el contenedor adoptará las medidas necesarias para evitar el depósito de residuos ajenos a la misma. Los contenedores permanecerán cerrados o cubiertos, al menos, fuera del horario de trabajo, para evitar esta circunstancia.
- En el equipo de obra se deberán establecer los medios humanos, técnicos y procedimientos de separación que se dedicarán a cada tipo de RCD
- Se deberán atender los criterios municipales establecidos (ordenanzas, condiciones de licencias de obra), especialmente su obligan a la separación en origen de determinadas materias objeto del reciclaje o deposición. En este último caso se deberá asegurar por parte del contratista realizar una evaluación económica de las condiciones en las que es viable esta operación, y también, considerar las posibilidades reales de llevarla a cabo: que la obra lo permita y que se disponga de plantas de reciclaje/gestores autorizados. La dirección de las obras será la responsable última de la decisión a tomar y su justificación ante las autoridades locales o autonómicas pertinentes.
- Se deberá asegurar en la contratación de la gestión de los RCD que el destino final (Planta de reciclaje, vertedero, cantera, incineradora, centro de reciclaje, etc.) son centros con la autorización correspondiente, así mismo se deberá contratar solo transportistas o gestores autorizados e inscritos en los registros correspondientes. Igualmente, se realizará un estricto control documental de modo que los transportistas y gestores de RCD deberán aportar los avales de cada retirada y entrega en destino final. Para aquellos RCD (tierras, pétreos…) que sean reutilizados en otras obras o proyectos de restauración, se deberá aportar evidencia documental del destino final.
- La gestión, tanto documental como operativa, de los residuos peligrosos que se hallen o generen en la obra se regirá conforma a la legislación nacional y autonómica vigente, y a los requisitos de las ordenanzas municipales.

Asimismo los residuos de carácter urbano generados en las obras serán gestionados acorde con los preceptos marcados por la legislación y autoridad municipal correspondiente.

- Para el caso de los residuos con amianto, se seguirán los pasos marcados por la Orden MAM/304/2002, de 8 de febrero, por la que se publican las operaciones de valorización y eliminación de residuos y la lista europea de residuos. En cualquier caso, se cumplirán los preceptos dictados por el Real Decreto 108/1991, de 1 de febrero, sobre la prevención y reducción de la contaminación medioambiental producida por el amianto, así como la legislación laboral de aplicación.
- Los restos de lavado de canaletas y las cubas de hormigón, serán tratados como residuos de escombro.
- Se evitará en todo momento la contaminación con productos tóxicos o peligrosos de los plásticos y restos de madera para su adecuada segregación, así como la contaminación de los acopios o contenedores de escombros con componentes peligrosos.
- Se retirará la tierra vegetal de la superficie del terreno afectada por las excavaciones o terraplenes de la obra, según las profundidades definidas en proyecto.
- Las tierras superficiales que puedan tener un uso posterior para jardinería o recuperación de suelos degradados, debe ser dispuesta en su emplazamiento definitivo en el menor intervalo de tiempo posible. En caso de que no sea posible utilizarla directamente, deberá ser retirada y almacenada en un espacio libre de riesgos ambientales, según las indicaciones del Director de Obras, alejada de los extremos de la traza y dispuesta en caballones de altura no superior a dos metros, evitando la humedad excesiva, la manipulación y la contaminación con otros materiales.

9. VALORACIÓN DEL COSTE DE LA GESTIÓN DE RESIDUOS

Residuo	Estimación (m^3)	Precio gestión (€/m^3)	Precio transporte (€/m^3)	Importe total (€)
RCD Nivel I				
Tierras y pétreos del desbroce	391.763,797	1,80	1,50	1.057.762,25
Tierras y pétreos de la excavación	50.110,48	1,80	1,50	90.198,86
RCD Nivel II				
Naturaleza pétrea				
Hormigón	164,480	3,50	1,50	8.635,20
Naturaleza no pétrea				
Madera	657,921	5,20	1,50	5.131,78
Plástico	328,960	4,85	1,50	2.393,18
Metales	493,440	6,10	1,50	4.514,98
Papel	164,480	4,10	1,50	1.011,55
Residuos potencialmente peligrosos				
Residuos pot. peligrosos	82,240	15,25	3,80	4.765.81
Resto de costes de gestión				
Costes de gestión, tramitación documental, alquileres, etc.				6.500,00

TOTAL	**1.181.084,34 €**

ANEJO Nº 13

TERRENOS AFECTADOS

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad localizar los terrenos que se ven afectados por la construcción de la planta termosolar, calculando la inversión aproximada necesaria para su adquisición. Para una mejor definición de los mismos también se incluyen las fichas catastrales, además de los planos correspondientes.

2. DESCRIPCIÓN DE LA ADQUISICIÓN DE TERRENOS

Para el caso contemplado en este proyecto, todas las adquisiciones serán definitivas, ya que derivado de la extensión que ocupa la central termosolar, se obtiene área suficiente para todas las instalaciones auxiliares, zonas de contenedores, acopios, etc.

Además de los terrenos incluidos en este anejo, para una total estimación de los gastos de adquisición de suelo, habría que considerar el coste para la reposición de los caminos públicos afectados, además del colector citado en el apartado de servicios afectados de la memoria. Por falta de información, no se ha incluido el coste de estos elementos.

3. RELACIÓN DE TERRENOS AFECTADOS

Para la realización de la relación de terrenos afectados, se han empleado los datos obtenidos de la sede electrónica del catastro, dependiente del Ministerio de Hacienda y Administraciones Públicas (http://www.sedecatastro.gob.es/). Las fichas catastrales incluidas en el anexo 13.1 también han sido obtenidas desde esta aplicación. En la siguiente tabla se muestran las referencias catastrales, el polígono, parcela y subparcela, la naturaleza y la superficie afectada de cada una de las porciones de terreno a adquirir para la construcción de la central termosolar.

Referencia catastral	Polígono	Parcela	Subparcela	Naturaleza	Superfice (m^2)
06074A003000040000BS	3	4	a	C-2	10.608
			b	C-3	748
06074A003000050000BZ	3	5		C-2	13.465
06074A003000060000BU	3	6		C-2	20.226
06074A003000070000BH	3	7		C-2	6.283
06074A003000080000BW	3	8		C-2	10.017
06074A003000090000BA	3	9		C-2	7.978
06074A003000100000BH	3	10		C-2	39.538
06074A003000110000BW	3	11		C-2	3.532
06074A003000120000BA	3	12		C-2	8.730
06074A003000130000BB	3	13		C-2	15.427
06074A003000140000BY	3	14		C-2	15.241
06074A003000150000BG	3	15		C-2	15.549
06074A003000160000BQ	3	16		C-2	73.435
06074A003000170000BP	3	17		C-2	14.862
06074A003000180000BL	3	18		C-2	19.431
06074A003000190000BT	3	19		C-2	14.587
06074A003000200000BP	3	20		C-2	40.682
06074A003000210000BL	3	21		C-2	25.894
06074A003000220000BT	3	22		C-2	19.200
06074A003000230000BF	3	23		C-2	50.441
06074A003000240000BM	3	24		C-2	24.965
06074A003000250000BO	3	25		C-2	16.423
06074A003000260000BK	3	26		C-2	22.841
06074A003000270000BR	3	27		C-2	17.617
06074A003000280000BD	3	28	a	C-2	24.442
06074A003000290000BX	3	29		C-2	46.020
06074A003000310000BD	3	31		C-2	18.792
06074A003000320000BX	3	32		C-2	26.861
06074A003000330000BI	3	33		C-2	6.048
06074A003000340000BJ	3	34	a	C-2	11.750
			b	C-3	48.205
06074A003000350000BE	3	35	a	C-3	20.008
			b	C-4	108.102
			c	C-5	13.998
06074A003000380000BU	3	38	a	C-4	140.745
			g	C-3	3.117
			i	C-3	15.274
			j	C-2	46.967
06074A003000390000BH	3	39	a	C-3	51.070
			b	C-2	51.813

Referencia catastral	Polígono	Parcela	Subparcela	Naturaleza	Superfice (m^2)
06074A003000400000BZ	3	40	a	C-3	214
			b	C-2	9.135
06074A003000410000BU	3	41		O-2	20.164
06074A003000420000BH	3	42		C-2	89.049
06074A003000430000BW	3	43		C-2	81.414
06074A003000440000BA	3	44		C-2	17.259
06074A003000450000BB	3	45		C-2	498
06074A003000460000BY	3	46		C-2	1.290
06074A003000470000BG	3	47		C-2	2.369
06074A003000530000BL	3	53	a	C-2	4.068
06074A003000680000BS	3	68	f	C-4	89.721
			g	I-0	521
			h	C-5	4.258
06074A003000790000BG	3	79		C-4	30.432
06074A003000820000BG	3	82		C-2	17.279
06074A003000950000BD	3	95		C-2	107
06074A003000960000BX	3	96		C-2	2.185
06074A003000970000BI	3	97		C-2	37.355
06074A003000980000BJ	3	98		C-2	2.902
06074A003000990000BE	3	99		C-2	28.221
06074A003001000000BE	3	100		C-2	20.293
06074A003001010000BS	3	101		C-2	1.196
06074A003001020000BZ	3	102		C-2	51
06074A003001030000BU	3	103		C-2	8.737
06074A003001170000BF	3	117		C-2	689
06074A005000020000BQ	5	2		C-2	150
06074A005000030000BP	5	3		C-2	184
06074A005000040000BL	5	4		C-2	1.975
06074A005000050000BT	5	5		C-2	480
06074A005000070000BM	5	7		C-2	779
06074A005000090000BK	5	9		C-2	467

4. PRESUPUESTO DE ADQUISICIÓN DE TERRENOS

Para la estimación de la inversión necesaria para la adquisición de los terrenos necesarios para la construcción de la central termosolar, se ha utilizado los valores de coste de expropiación publicados en la Orden de 23 de diciembre de 2015, por la que se aprueban los precios medios en el mercado para estimar el valor real de determinados bienes inmuebles de naturaleza rústica, radicados en la Comunidad Autónoma de Extremadura, a efectos de la liquidación de los hechos imponibles de los impuestos sobre Transmisiones Patrimoniales y Actos Jurídicos Documentados y sobre Sucesiones y Donaciones, que se devenguen en el año 2016, se establecen las reglas para su aplicación y se publica la metodología para su obtención. A pesar de que no se trata de expropiaciones, ya que este proyecto es de promoción privada, se han adoptado como valores correctos. A continuación se incluye la relación de los tipos de suelo que se pueden encontrar en Llerena y que sirven de base para la valoración de los terrenos.

Clase de cultivo		**Intensidad productiva**	**Precio (€/ha)**
RI	Árboles de ribera	00	1254
FE	Encinar	01	5131
FE	Encinar	02	4404
FE	Encinar	03	3673
FE	Encinar	04	2398
EU	Eucliptus	01	1560
EU	Eucliptus	02	1175
EU	Eucliptus	03	881
F-	Frutales secano	01	6368
F-	Frutales secano	02	4691
CR	Labor o labradío regadío	01	16335
CR	Labor o labradío regadío	02	14847
C-	Labor o labradío secano	01	5124
C-	Labor o labradío secano	02	4772
C-	Labor o labradío secano	03	4215
C-	Labor o labradío secano	04	3913
C-	Labor o labradío secano	05	3610
C-	Labor o labradío secano	06	3459
MB	Monte bajo	01	932
MB	Monte bajo	02	878
OR	Olivos regadío	01	13954
OR	Olivos regadío	02	13247
O-	Olivos secano	01	6646
O-	Olivos secano	02	5190
O-	Olivos secano	03	4226
O-	Olivos secano	04	3984
E-	Pastos	01	2417
E-	Pastos	02	2130
E-	Pastos	03	1733
VO	Viña olivar secano	00	6032
V-	Viña secano	01	7568
V-	Viña secano	02	7194
I-	Improductivo	00	500

Con todos estos datos, se obtienen los siguientes resultados:

Polígono	Parcela	Subparcela	Naturaleza	Superfice (m^2)	Valor unitario (€/ha)	Coste de adquisición (€)
3	4	a	C-2	10.608	4.772	5.062,14
		b	C-3	748	4.215	315,28
3	5		C-2	13.465	4.772	6.425,50
3	6		C-2	20.226	4.772	9.651,85
3	7		C-2	6.283	4.772	2.998,25
3	8		C-2	10.017	4.772	4.780,11
3	9		C-2	7.978	4.772	3.807,10
3	10		C-2	39.538	4.772	18.867,53
3	11		C-2	3.532	4.772	1.685,47
3	12		C-2	8.730	4.772	4.165,96
3	13		C-2	15.427	4.772	7.361,76
3	14		C-2	15.241	4.772	7.273,01
3	15		C-2	15.549	4.772	7.419,98
3	16		C-2	73.435	4.772	35.043,18
3	17		C-2	14.862	4.772	7.092,15
3	18		C-2	19.431	4.772	9.272,47
3	19		C-2	14.587	4.772	6.960,92
3	20		C-2	40.682	4.772	19.413,45
3	21		C-2	25.894	4.772	12.356,62
3	22		C-2	19.200	4.772	9.162,24
3	23		C-2	50.441	4.772	24.070,45
3	24		C-2	24.965	4.772	11.913,30
3	25		C-2	16.423	4.772	7.837,06
3	26		C-2	22.841	4.772	10.899,73
3	27		C-2	17.617	4.772	8.406,83
3	28	a	C-2	24.442	4.772	11.663,72
3	29		C-2	46.020	4.772	21.960,74
3	31		C-2	18.792	4.772	8.967,54
3	32		C-2	26.861	4.772	12.818,07
3	33		C-2	6.048	4.772	2.886,11
3	34	a	C-2	11.750	4.772	5.607,10
		b	C-3	48.205	4.215	20.318,41
3	35	a	C-3	20.008	4.215	8.433,37
		b	C-4	108.102	3.913	42.300,31
		c	C-5	13.998	3.610	5.053,28
3	38	a	C-4	140.745	3.913	55.073,52
		g	C-3	3.117	4.215	1.313,82
		i	C-3	15.274	4.215	6.437,99
		j	C-2	46.967	4.772	22.412,65
3	39	a	C-3	51.070	4.215	21.526,01
		b	C-2	51.813	4.772	24.725,16
3	40	a	C-3	214	4.215	90,20
		b	C-2	9.135	4.772	4.359,22
3	41		O-2	20.164	5.190	10.465,12
3	42		C-2	89.049	4.772	42.494,18
3	43		C-2	81.414	4.772	38.850,76
3	44		C-2	17.259	4.772	8.235,99
3	45		C-2	498	4.772	237,65

Polígono	Parcela	Subparcela	Naturaleza	Superfice (m²)	Valor unitario (€/ha)	Coste de adquisición (€)
3	46		C-2	1.290	4.772	615,59
3	47		C-2	2.369	4.772	1.130,49
3	53	a	C-2	4.068	4.772	1.941,25
3	68	f	C-4	89.721	3.913	35.107,83
		g	I-0	521	500	26,05
		h	C-5	4.258	3.610	1.537,14
3	79		C-4	30.432	3.913	11.908,04
3	82		C-2	17.279	4.772	8.245,54
3	95		C-2	107	4.772	51,06
3	96		C-2	2.185	4.772	1.042,68
3	97		C-2	37.355	4.772	17.825,81
3	98		C-2	2.902	4.772	1.384,83
3	99		C-2	28.221	4.772	13.467,06
3	100		C-2	20.293	4.772	9.683,82
3	101		C-2	1.196	4.772	570,73
3	102		C-2	51	4.772	24,34
3	103		C-2	8.737	4.772	4.169,30
3	117		C-2	689	4.772	328,79
5	2		C-2	150	4.772	71,58
5	3		C-2	184	4.772	87,80
5	4		C-2	1.975	4.772	942,47
5	5		C-2	480	4.772	229,06
5	7		C-2	779	4.772	371,74
5	9		C-2	467	4.772	222,85

TOTAL	**729.459,08 €**

Por lo que el presupuesto estimado de adquisición de terrenos será de **SETECIENTOS VEINTINUEVE MIL CUATROCIENTOS CINCUENTA Y NUEVE EUROS con OCHO CÉNTIMOS (729.459,08 €)**.

ANEXO 13.1

FICHAS CATASTRALES

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000040000BS

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 4

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

Polígono 3 Parcela 4

SANTIAGA. LLERENA [BADAJOZ]

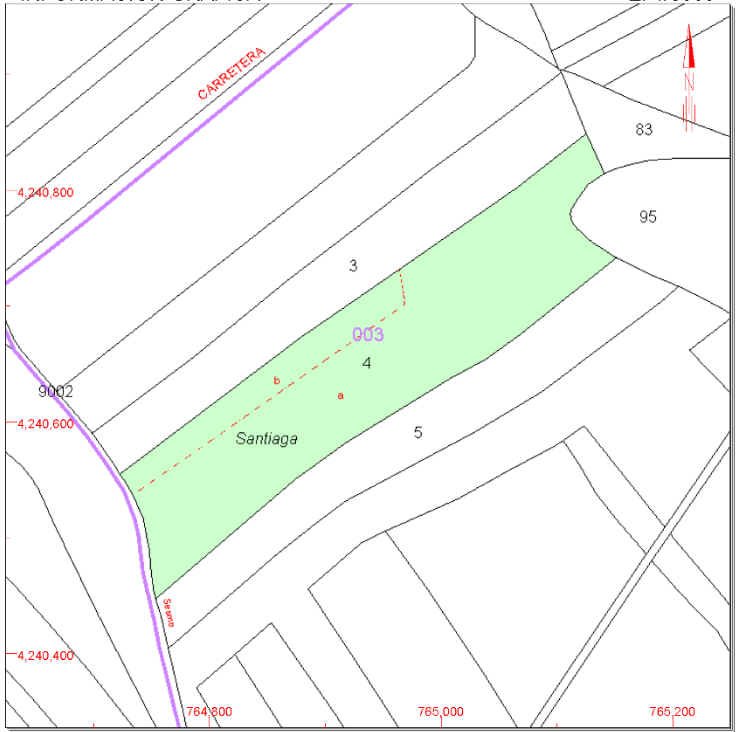
SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	48.250	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	02	4,0760
b	C-	Labor o Labradío secano	03	0,7490

INFORMACIÓN GRÁFICA

E: 1/5000



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Lunes , 18 de Enero de 2016

765,200 Coordenadas U.T.M. Huso 29 ETRS89

- Límite de Manzana
- Límite de Parcela
- Límite de Construcciones
- Mobiliario y aceras
- Límite zona verde
- Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000050000BZ

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 5

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

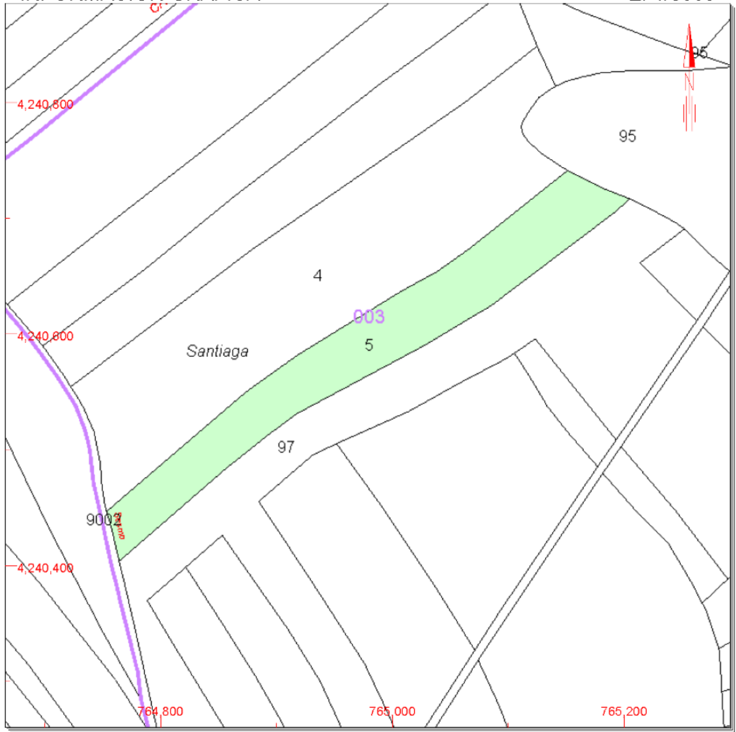
SITUACIÓN

Polígono 3 Parcela 5

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	23.197	--

INFORMACIÓN GRÁFICA E: 1/5000



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Lunes , 18 de Enero de 2016

765,200 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA
MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS
SECRETARÍA DE ESTADO DE HACIENDA
DIRECCIÓN GENERAL DEL CATASTRO
Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000060000BU

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 6
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

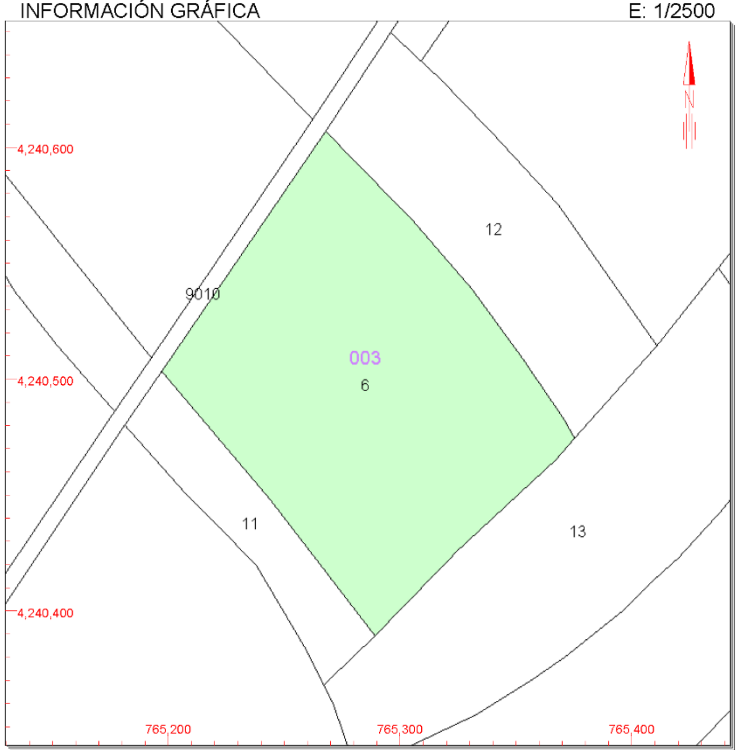
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 6
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	20.226	--

INFORMACIÓN GRÁFICA E: 1/2500



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Lunes , 18 de Enero de 2016

765,400 Coordenadas U.T.M. Huso 29 ETRS89
Limite de Manzana
Limite de Parcela
Limite de Construcciones
Mobiliario y aceras
Limite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000070000BH

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 7
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL
Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN

COEFICIENTE DE PARTICIPACIÓN
100,000000

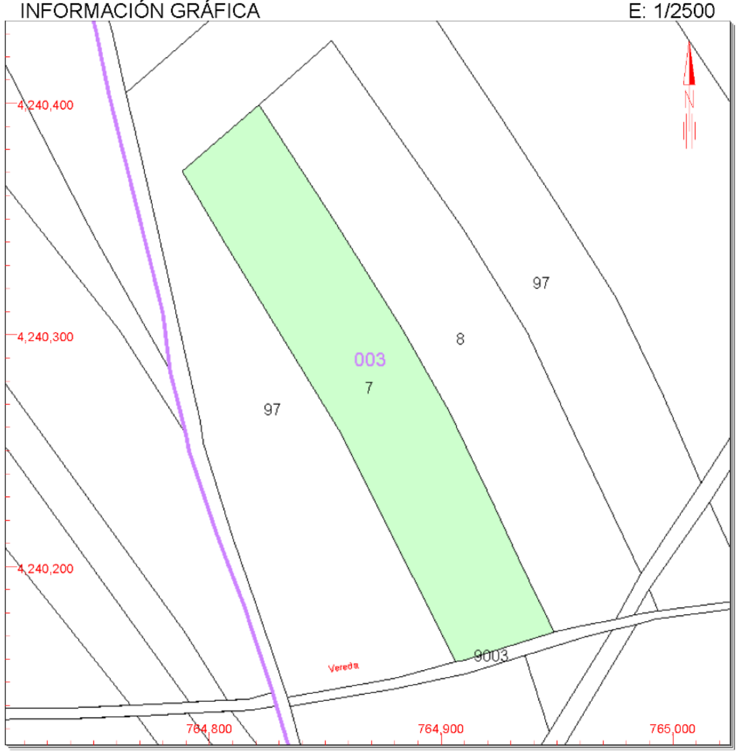
SUPERFICIE CONSTRUIDA [m²]
--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 7
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	11.275	--

INFORMACIÓN GRÁFICA E: 1/2500



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Lunes , 18 de Enero de 2016

765,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000080000BW

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 8
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

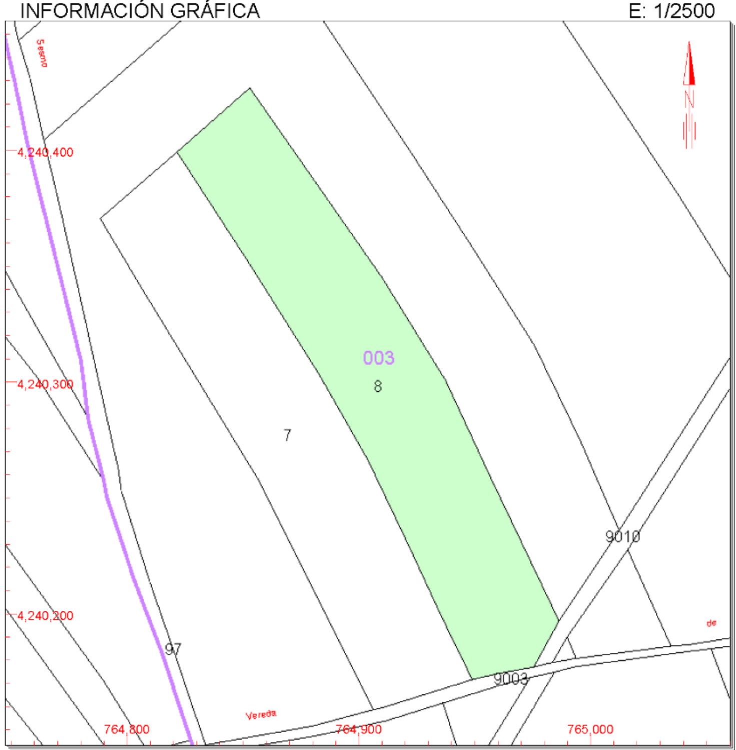
DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 8
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	12.167	--

INFORMACIÓN GRÁFICA

E: 1/2500



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Lunes , 18 de Enero de 2016

765,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000090000BA

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 9
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

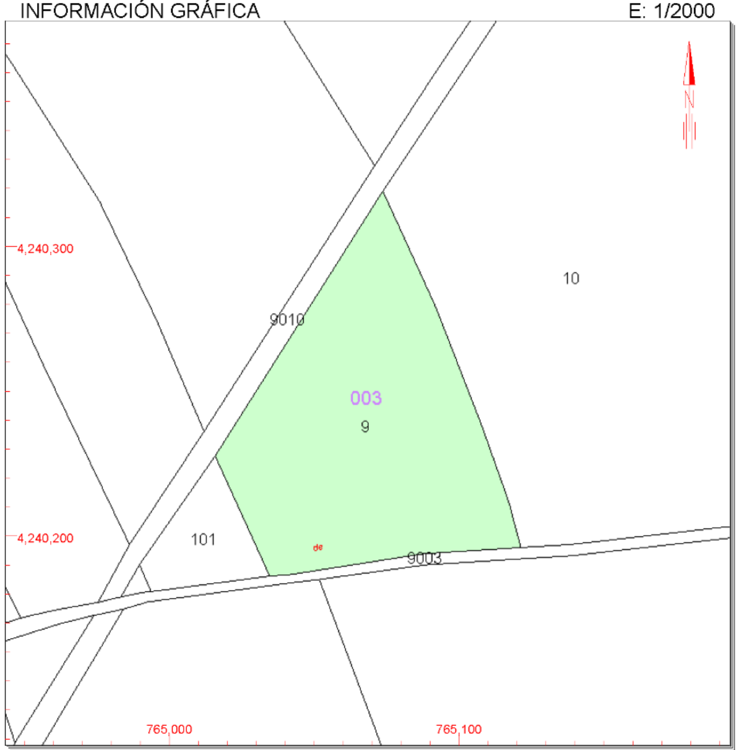
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 9
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	7.978	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

765,100 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000100000BH

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 10

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

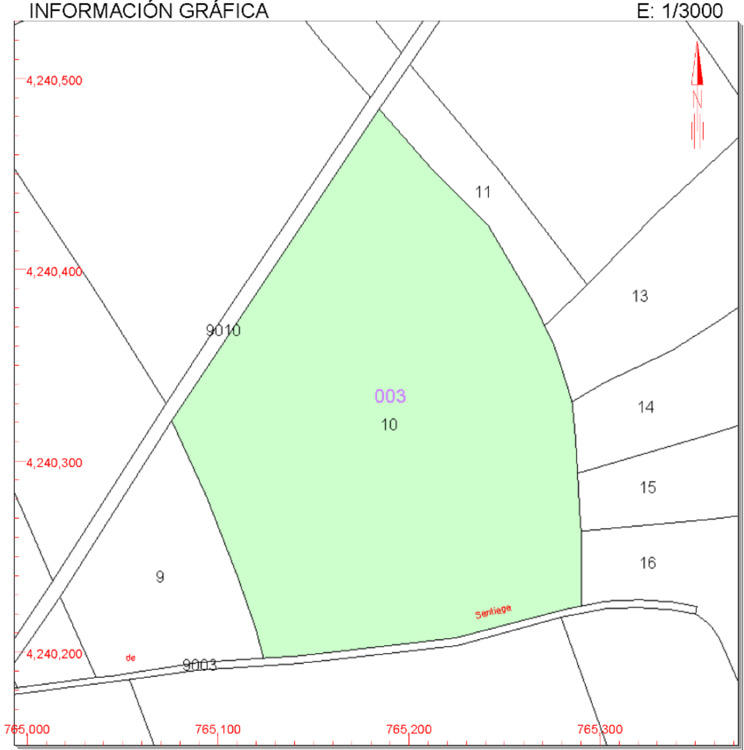
Polígono 3 Parcela 10

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	39.538	--

INFORMACIÓN GRÁFICA

E: 1/3000



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Lunes , 18 de Enero de 2016

765,300 Coordenadas U.T.M. Huso 29 ETRS89

Límite de Manzana

Límite de Parcela

Límite de Construcciones

Mobiliario y aceras

Límite zona verde

Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000110000BW

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 11
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

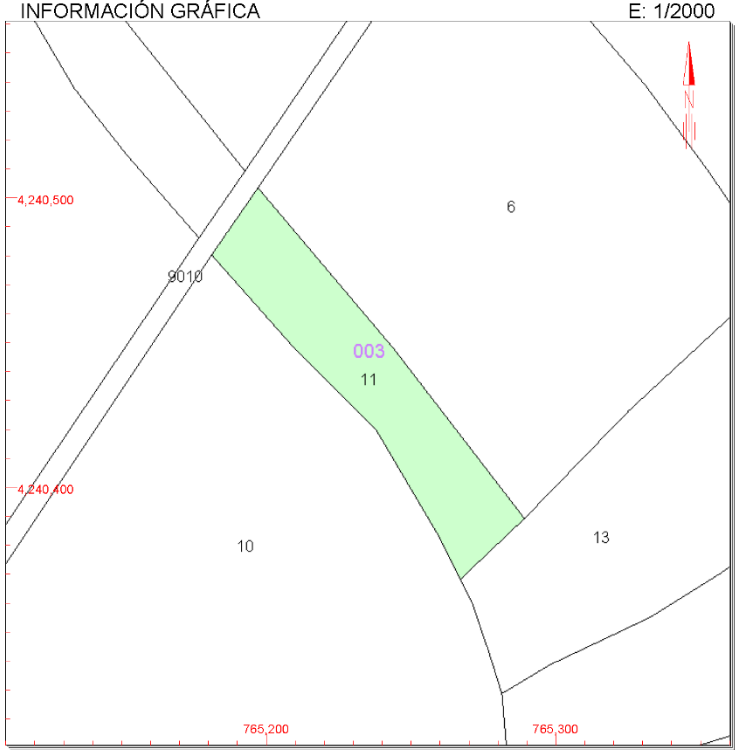
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 11
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	3.532	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

765,300 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000120000BA

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 12

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

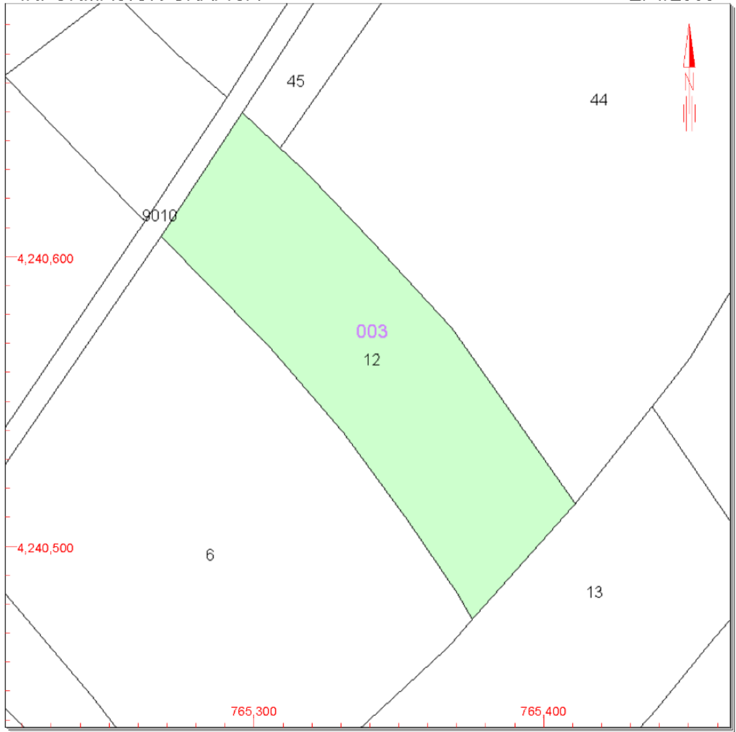
SITUACIÓN

Polígono 3 Parcela 12

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	8.730	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

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Mobiliario y aceras
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Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000130000BB

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 13
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

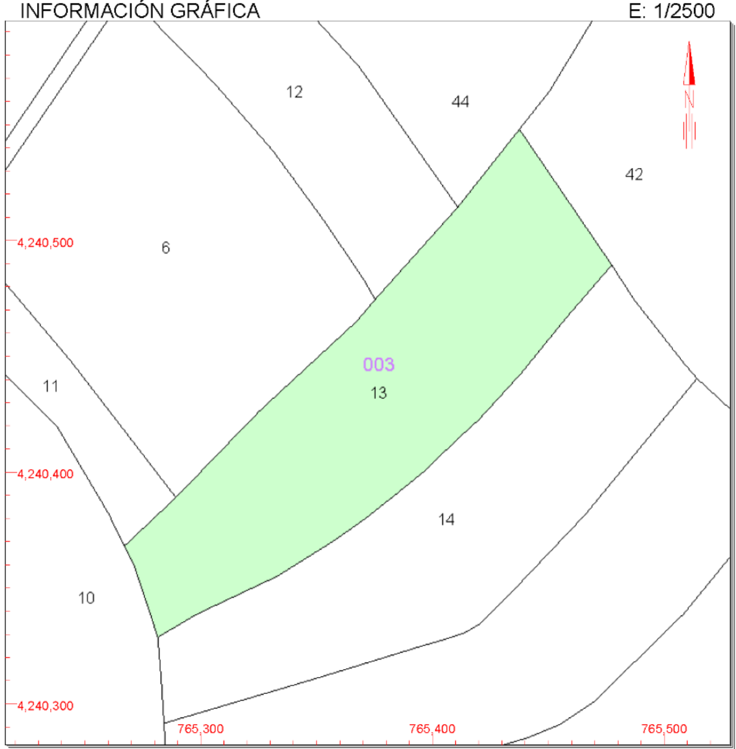
DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 13
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	15.427	--

INFORMACIÓN GRÁFICA

E: 1/2500



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Lunes , 18 de Enero de 2016

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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000140000BY

DATOS DEL INMUEBLE

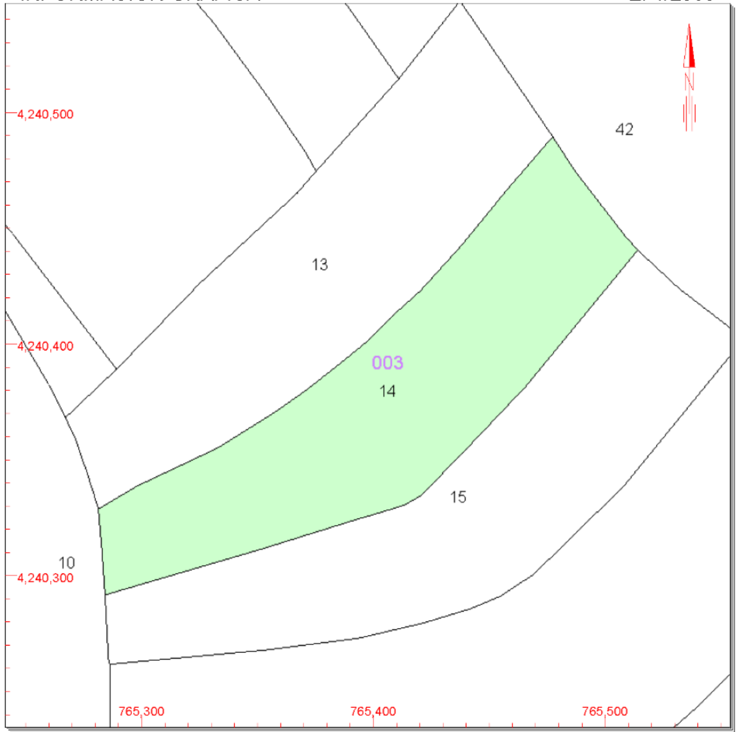
LOCALIZACIÓN	Polígono 3 Parcela 14 SANTIAGA. LLERENA [BADAJOZ]
USO LOCAL PRINCIPAL	Agrario [Labor o Labradío secano 02]
AÑO CONSTRUCCIÓN	
COEFICIENTE DE PARTICIPACIÓN	100,000000
SUPERFICIE CONSTRUIDA [m²]	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN	Polígono 3 Parcela 14 SANTIAGA. LLERENA [BADAJOZ]
SUPERFICIE CONSTRUIDA [m²]	--
SUPERFICIE SUELO [m²]	15.241
TIPO DE FINCA	--

INFORMACIÓN GRÁFICA

E: 1/2500



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Lunes , 18 de Enero de 2016

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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000150000BG

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 15
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

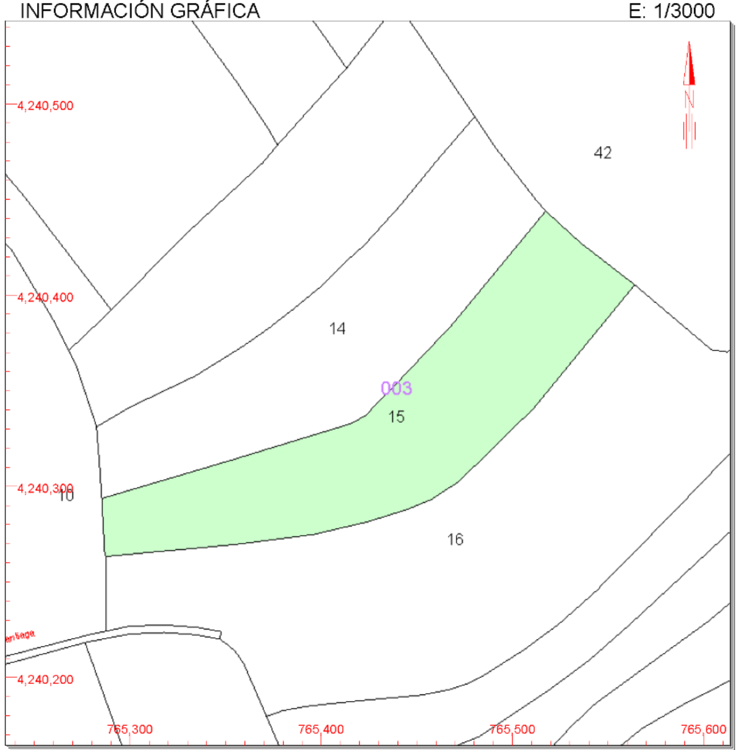
SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 15
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	15.549	--

INFORMACIÓN GRÁFICA E: 1/3000



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Lunes , 18 de Enero de 2016

765,600 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000160000BQ

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 16

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

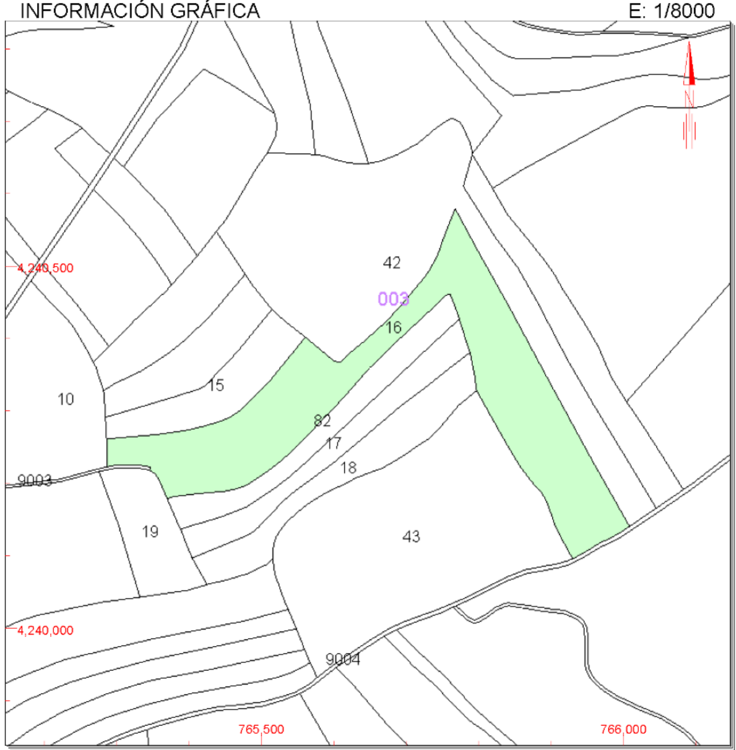
Polígono 3 Parcela 16

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	73.435	--

INFORMACIÓN GRÁFICA

E: 1/8000



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Lunes , 18 de Enero de 2016

766,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000170000BP

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 17

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

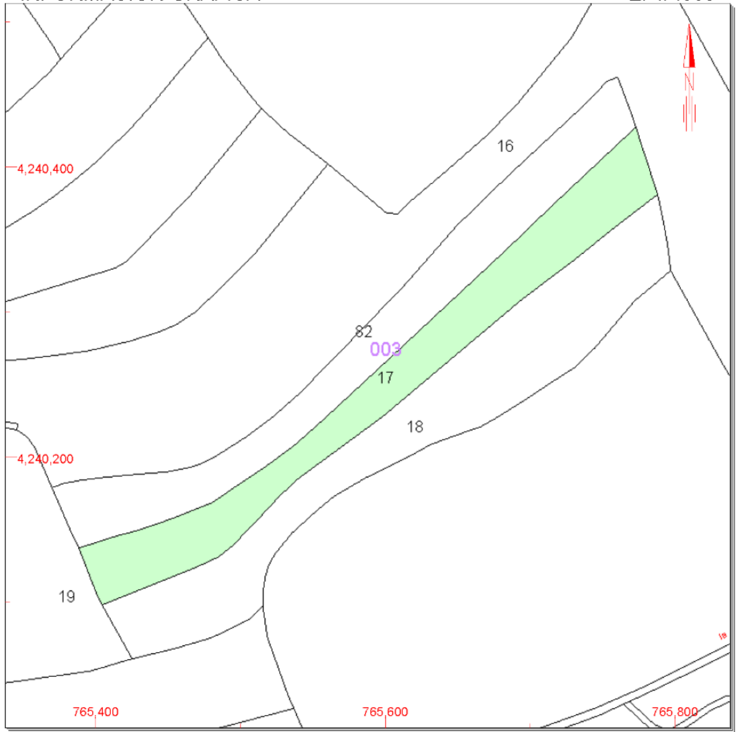
SITUACIÓN

Polígono 3 Parcela 17

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	14.862	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000180000BL

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 18
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL
Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN

COEFICIENTE DE PARTICIPACIÓN
100,000000

SUPERFICIE CONSTRUIDA [m²]
--

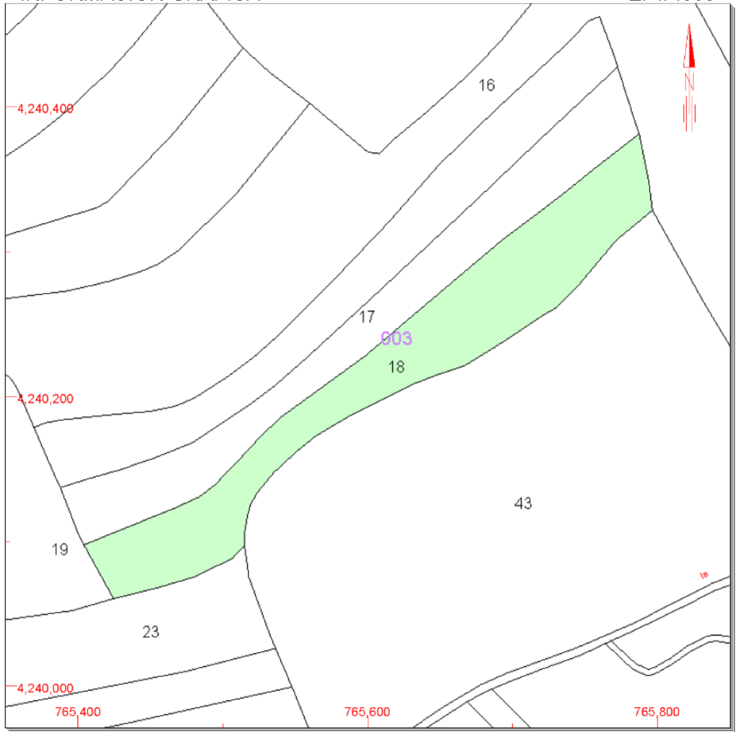
DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 18
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	19.431	--

INFORMACIÓN GRÁFICA

E: 1/4000



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Lunes , 18 de Enero de 2016

765,800 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000190000BT

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 19
SANTIAGA. LLERENA [BADAJOZ]

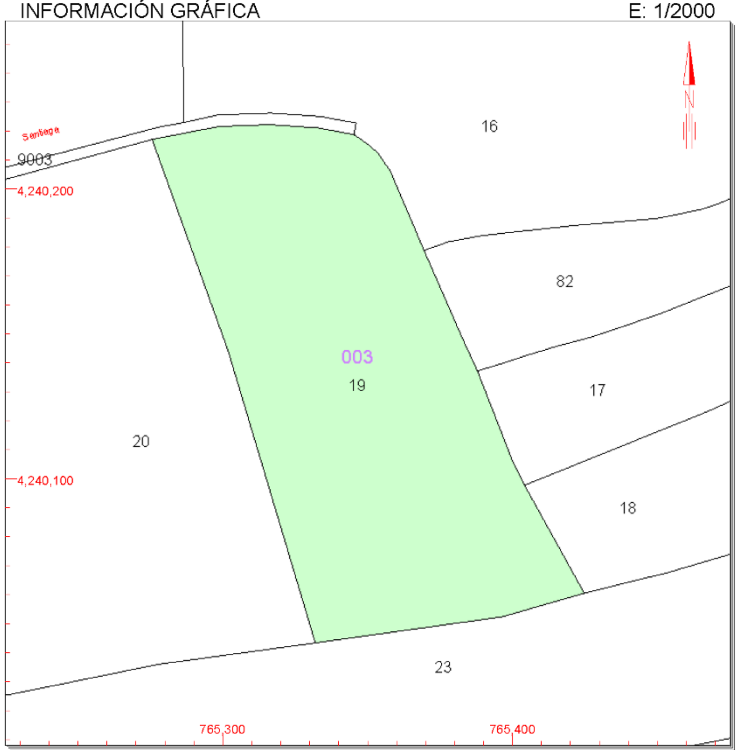
USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]
AÑO CONSTRUCCIÓN:
COEFICIENTE DE PARTICIPACIÓN: 100,000000
SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 19
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	14.587	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

765,400 Coordenadas U.T.M. Huso 29 ETRS89
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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000200000BP

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 20
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

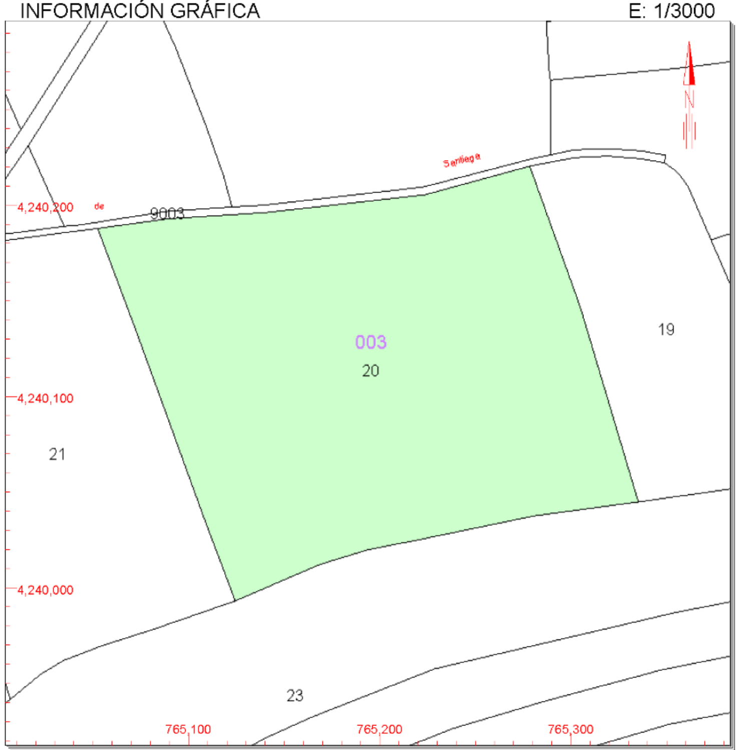
SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 20
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	40.682	--

INFORMACIÓN GRÁFICA E: 1/3000



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Lunes , 18 de Enero de 2016

765,300 Coordenadas U.T.M. Huso 29 ETRS89
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Mobiliario y aceras
Límite zona verde
Hidrografía

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000210000BL

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 21

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

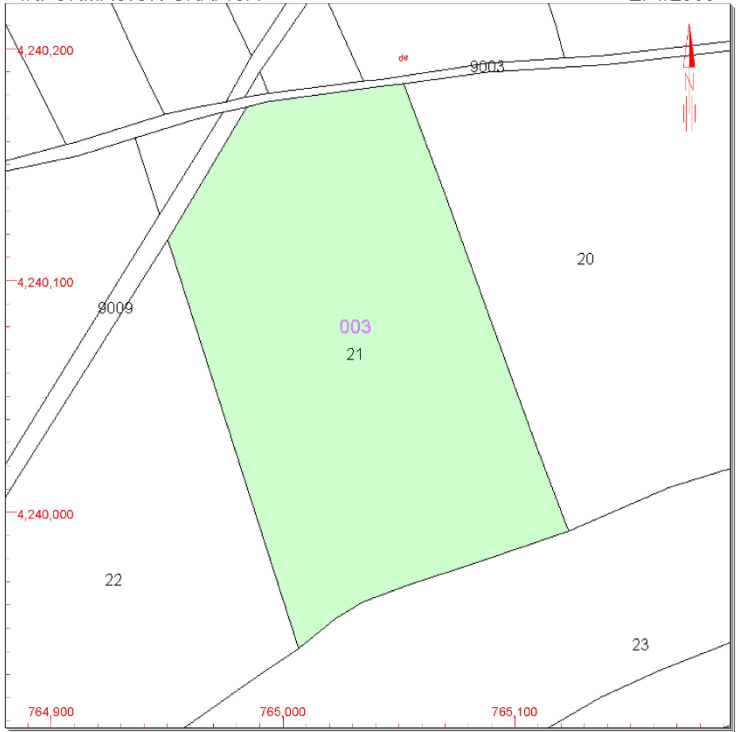
Polígono 3 Parcela 21

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	25.894	--

INFORMACIÓN GRÁFICA

E: 1/2500



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Lunes , 18 de Enero de 2016

765,100 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
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Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000220000BT

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 22
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

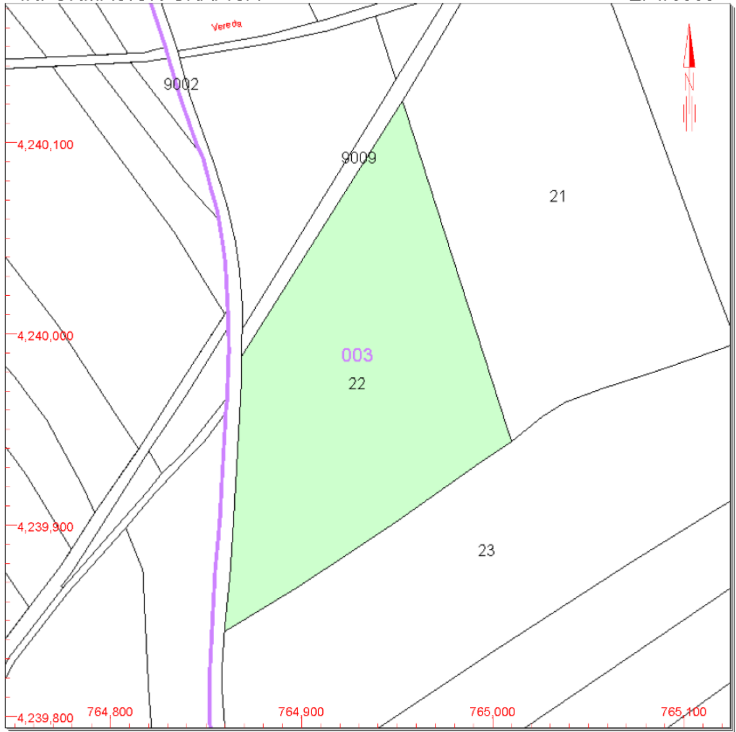
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 22
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	22.137	--

INFORMACIÓN GRÁFICA E: 1/3000



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Lunes , 18 de Enero de 2016

765,100 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA
MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS
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DIRECCIÓN GENERAL DEL CATASTRO
Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000230000BF

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 23
SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

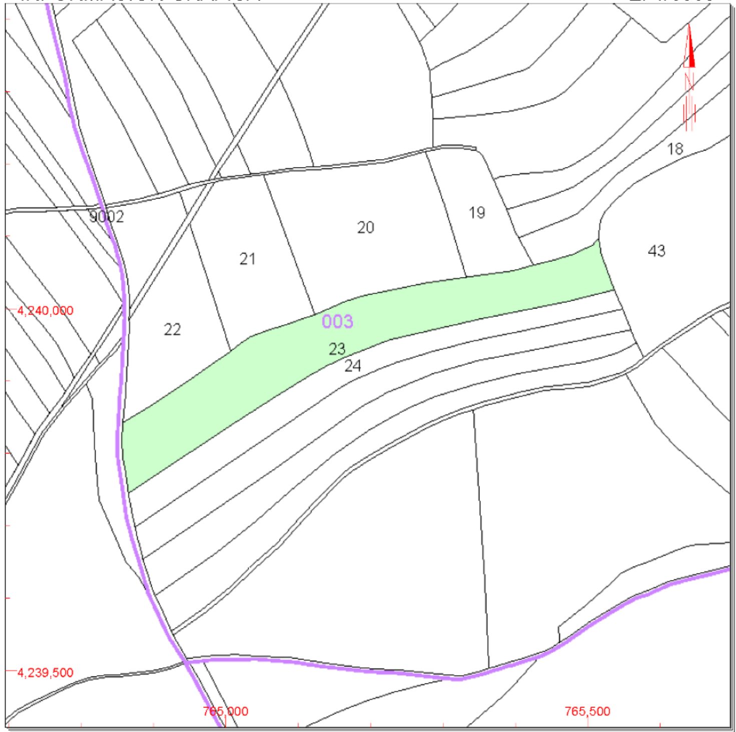
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 23
SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	52.302	--

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

765,500 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000240000BM

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 24

SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

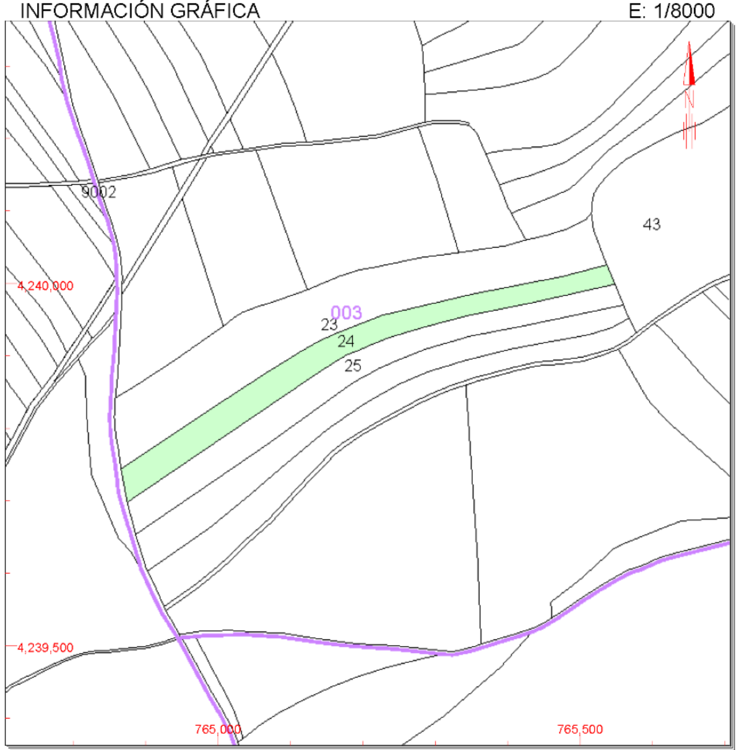
SITUACIÓN

Polígono 3 Parcela 24

SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	26.000	--

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

765,500 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000250000BO

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 25

SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

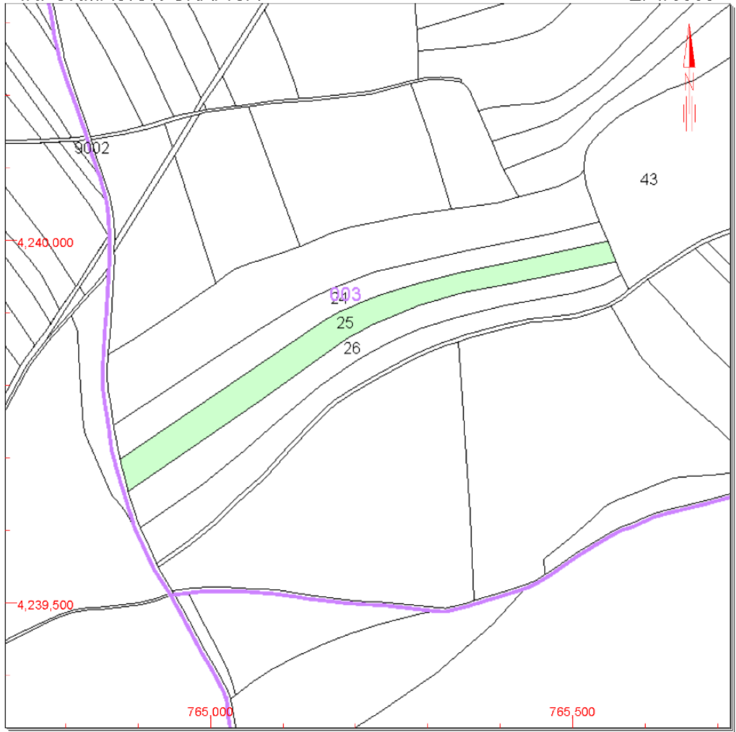
SITUACIÓN

Polígono 3 Parcela 25

SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	26.515	--

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000260000BK

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 26

SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

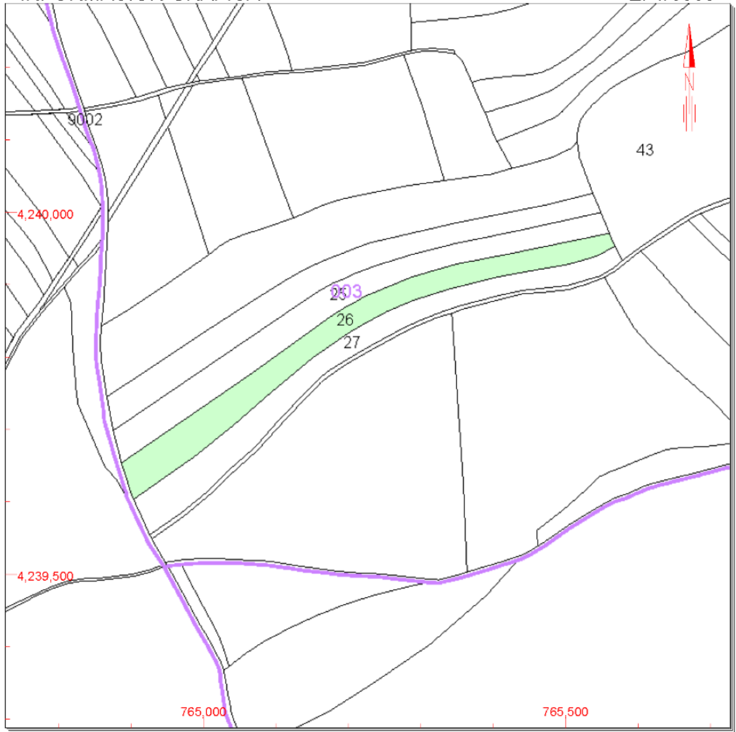
Polígono 3 Parcela 26

SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	26.798	--

INFORMACIÓN GRÁFICA

E: 1/8000



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Lunes , 18 de Enero de 2016

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Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000270000BR

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 27
SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

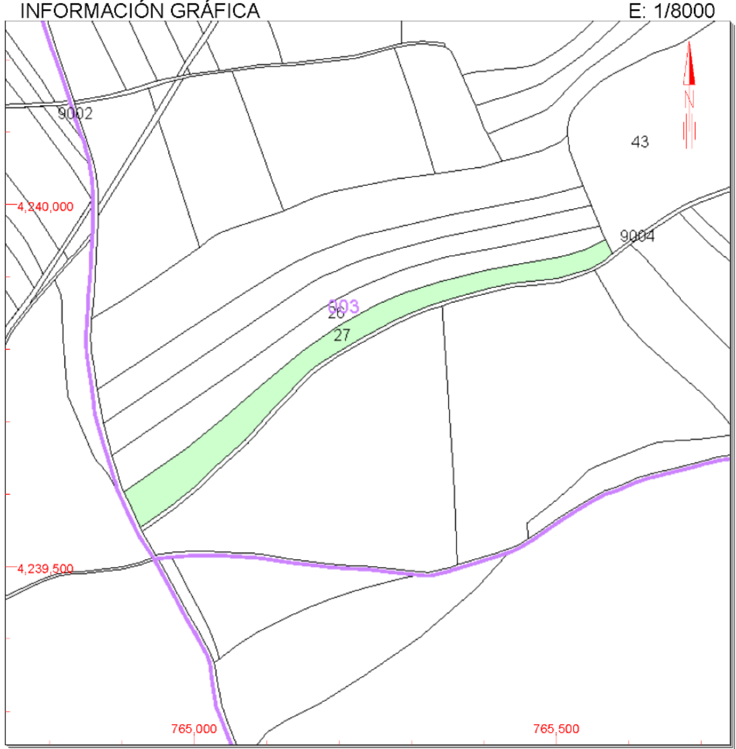
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 27
SUERTE DE LA VIRGEN. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	26.012	--

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

765,500 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000280000BD

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 28
CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

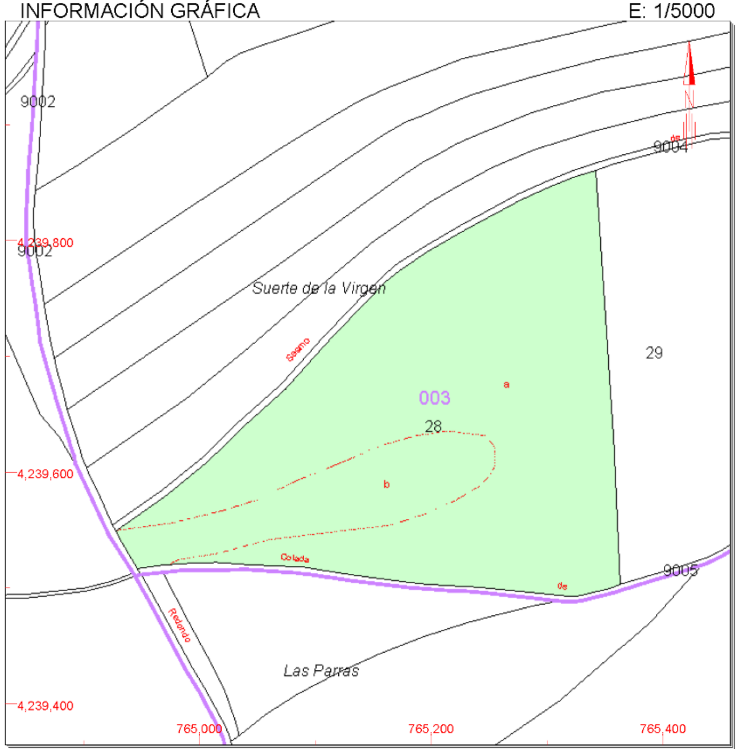
SITUACIÓN
Polígono 3 Parcela 28
CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	94.214	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	02	7,8243
b	C-	Labor o Labradío secano	03	1,5971

INFORMACIÓN GRÁFICA E: 1/5000



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Lunes , 18 de Enero de 2016

765,400 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000290000BX

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 29

CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

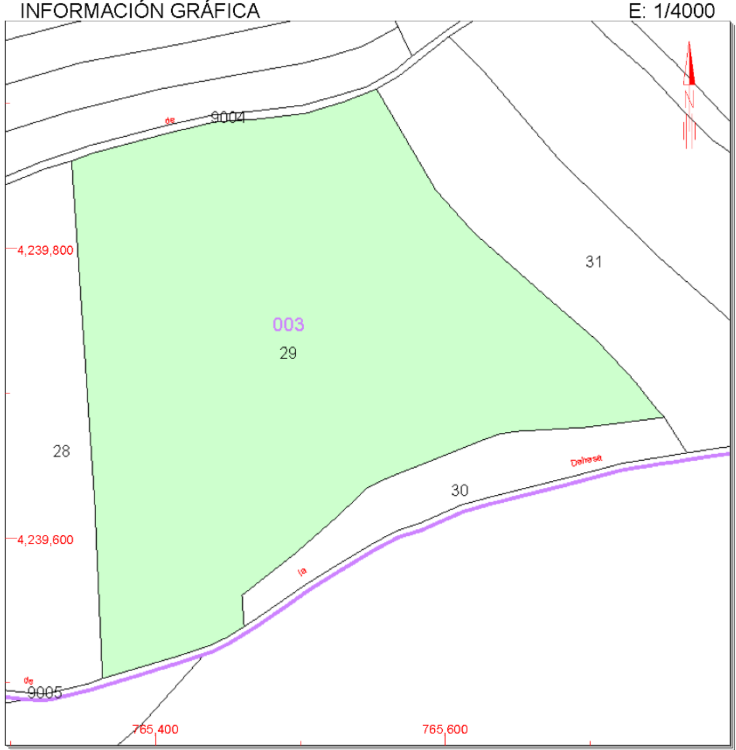
SITUACIÓN

Polígono 3 Parcela 29

CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	88.627	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

765,600 Coordenadas U.T.M. Huso 29 ETRS89
Limite de Manzana
Limite de Parcela
Limite de Construcciones
Mobiliario y aceras
Limite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000310000BD

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 31

CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

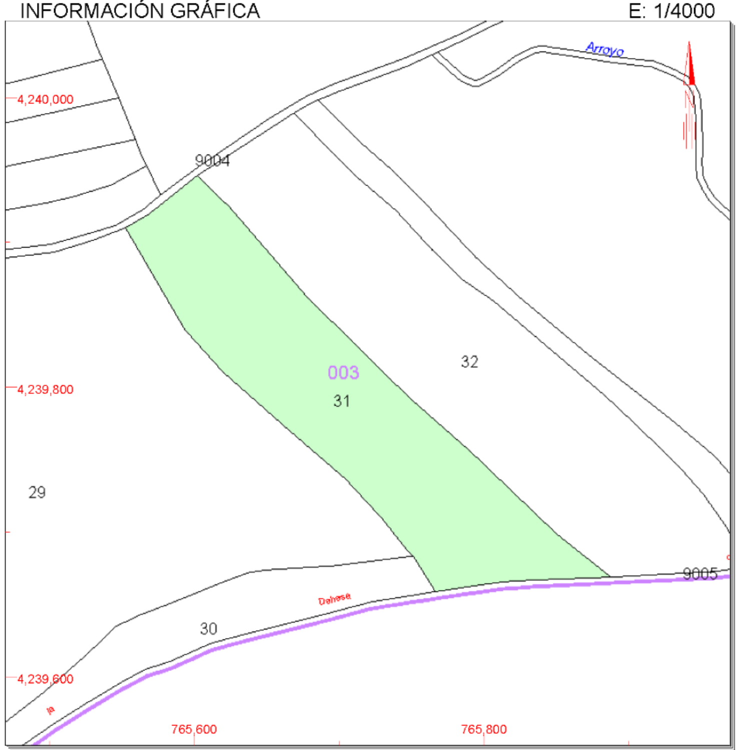
SITUACIÓN

Polígono 3 Parcela 31

CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	27.531	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

765,800 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000320000BX

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 32

CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

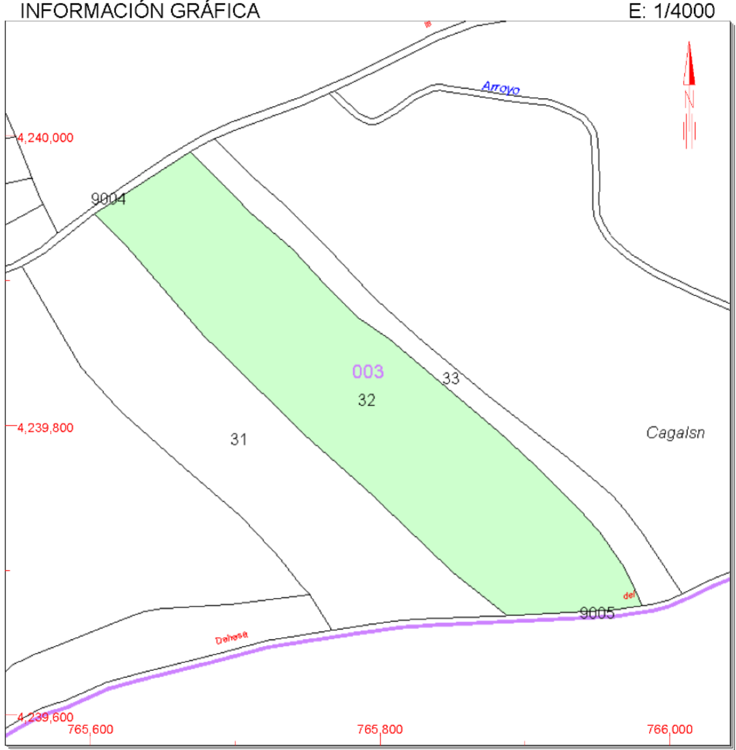
Polígono 3 Parcela 32

CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	35.558	--

INFORMACIÓN GRÁFICA

E: 1/4000



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Lunes , 18 de Enero de 2016

766,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA
MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS
SECRETARÍA DE ESTADO DE HACIENDA
DIRECCIÓN GENERAL DEL CATASTRO
Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000330000BI

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 33
CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

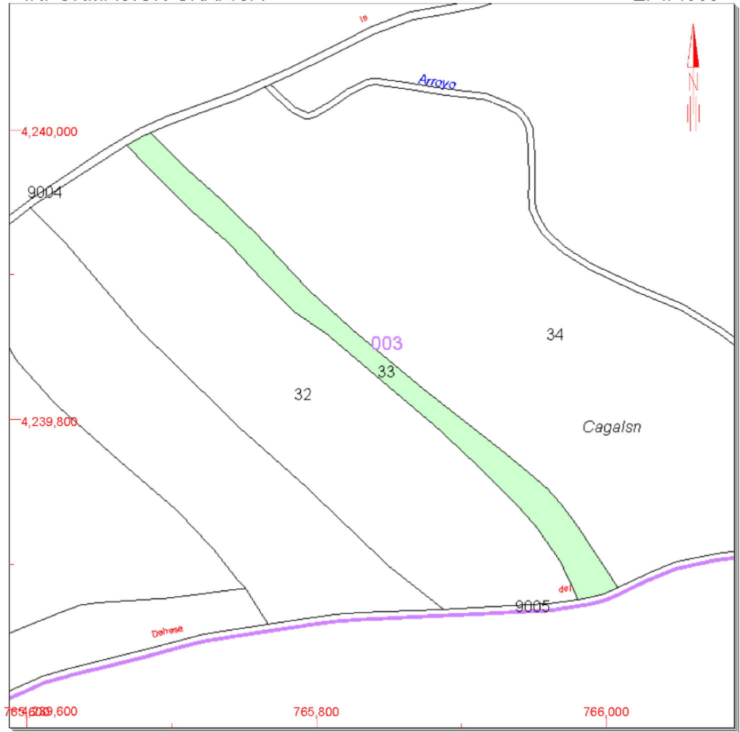
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 33
CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	8.322	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

766,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000340000BJ

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 34
CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

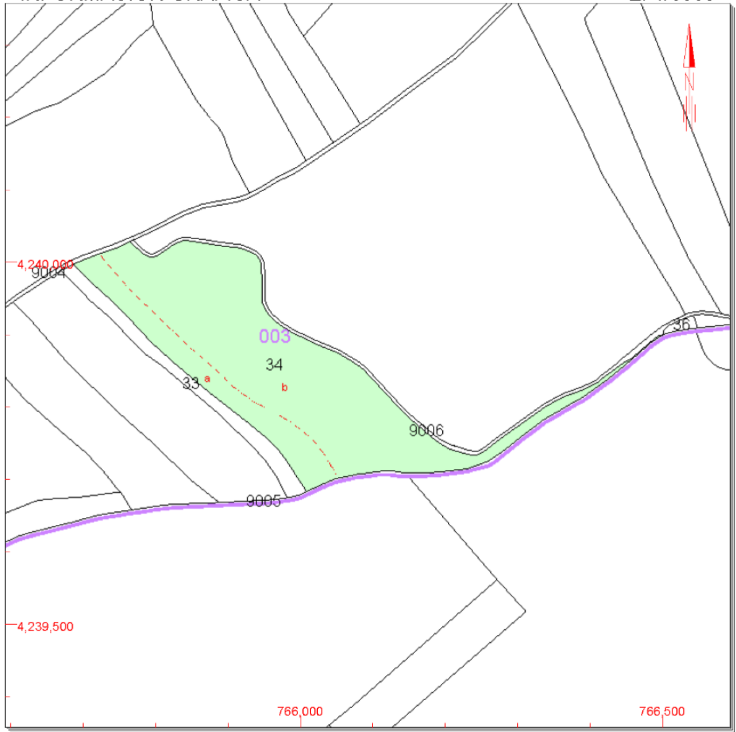
SITUACIÓN
Polígono 3 Parcela 34
CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	76.095	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	02	1,6197
b	C-	Labor o Labradío secano	03	5,9898

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

766,500 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000350000BE

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 35

CAGALON. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

Polígono 3 Parcela 35

CAGALON. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]: --

SUPERFICIE SUELO [m²]: 212.972

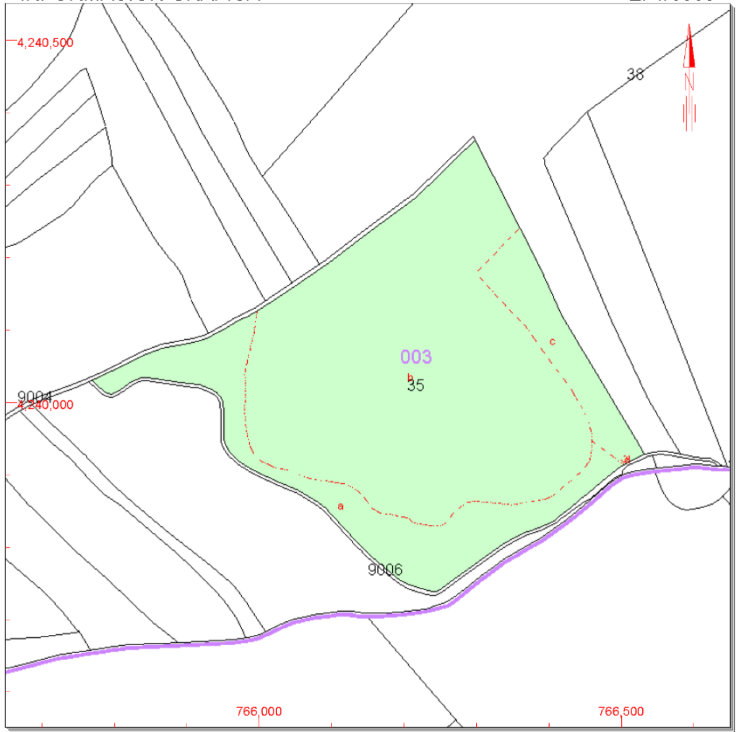
TIPO DE FINCA: --

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	03	4,2525
b	C-	Labor o Labradío secano	04	15,1745
c	C-	Labor o Labradío secano	05	1,8650
d	I-	Improductivo	00	0,0052

INFORMACIÓN GRÁFICA

E: 1/8000



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766,500 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
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Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000380000BU

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 38

LOS PEDROSILLOS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

Polígono 3 Parcela 38

LOS PEDROSILLOS. LLERENA [BADAJOZ]

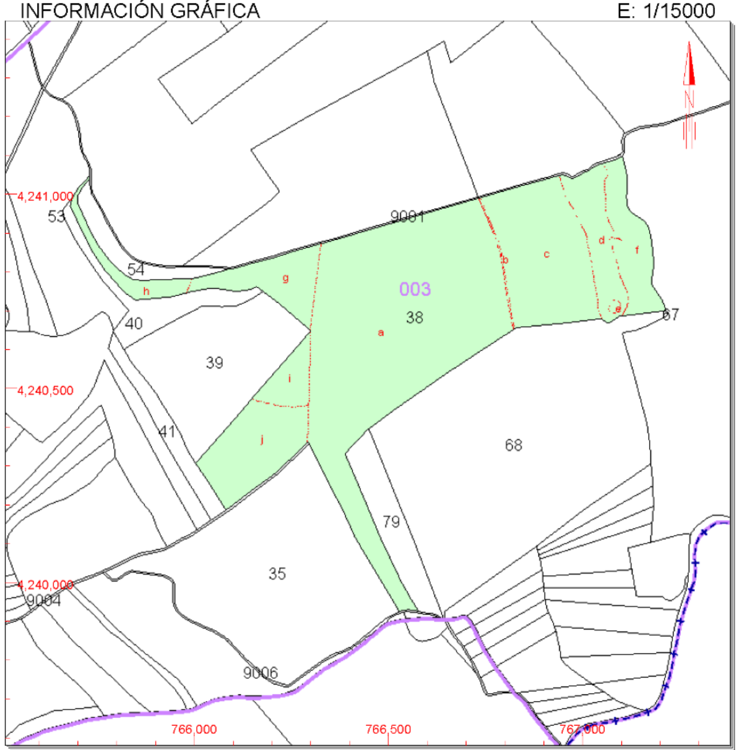
SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	505.049	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	04	25,6250
b	I-	Improductivo	00	0,1297
c	C-	Labor o Labradío secano	04	8,0306
d	E-	Pastos	02	2,9461
e	I-	Improductivo	00	0,0771
f	C-	Labor o Labradío secano	04	3,0487
g	C-	Labor o Labradío secano	03	3,1128
h	C-	Labor o Labradío secano	02	1,3447
i	C-	Labor o Labradío secano	03	1,5290
j	C-	Labor o Labradío secano	02	4,6612

INFORMACIÓN GRÁFICA

E: 1/15000



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Lunes , 18 de Enero de 2016

767,000 Coordenadas U.T.M. Huso 29 ETRS89

Límite de Manzana

Límite de Parcela

Límite de Construcciones

Mobiliario y aceras

Límite zona verde

Hidrografía

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DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000390000BH

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 39

LOS PEDROSILLOS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

Polígono 3 Parcela 39

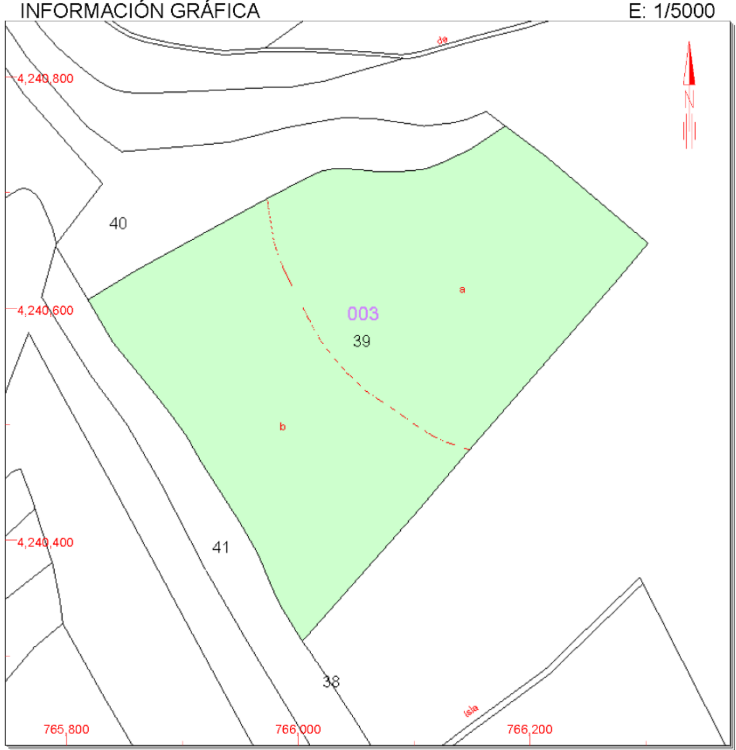
LOS PEDROSILLOS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	105.698	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	03	5,3460
b	C-	Labor o Labradío secano	02	5,2238

INFORMACIÓN GRÁFICA E: 1/5000



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Lunes , 18 de Enero de 2016

766,200 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000400000BZ

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 40

LOS PEDROSILLOS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

Polígono 3 Parcela 40

LOS PEDROSILLOS. LLERENA [BADAJOZ]

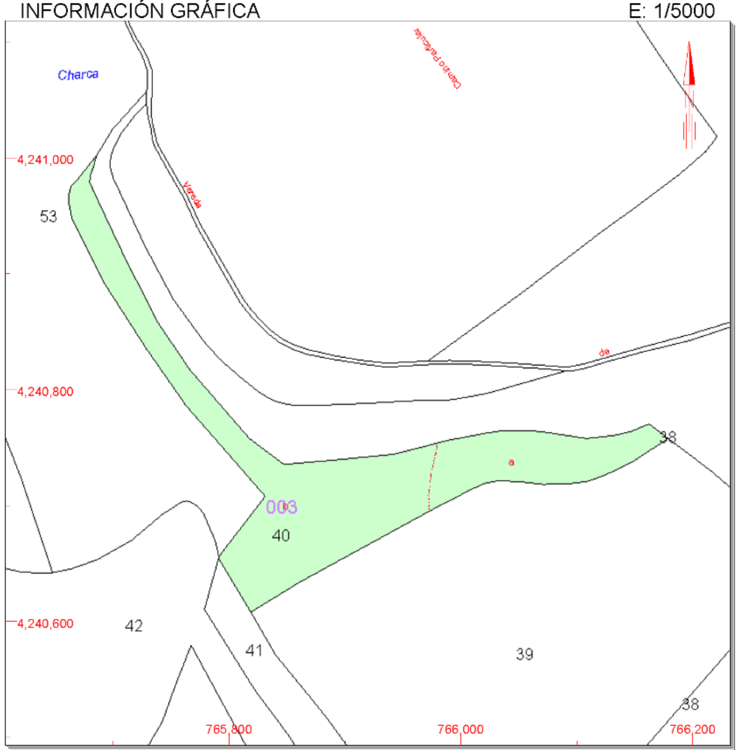
SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	28.289	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	03	0,7311
b	C-	Labor o Labradío secano	02	2,0978

INFORMACIÓN GRÁFICA

E: 1/5000



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Lunes , 18 de Enero de 2016

766,200 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000410000BU

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 41

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Olivos secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

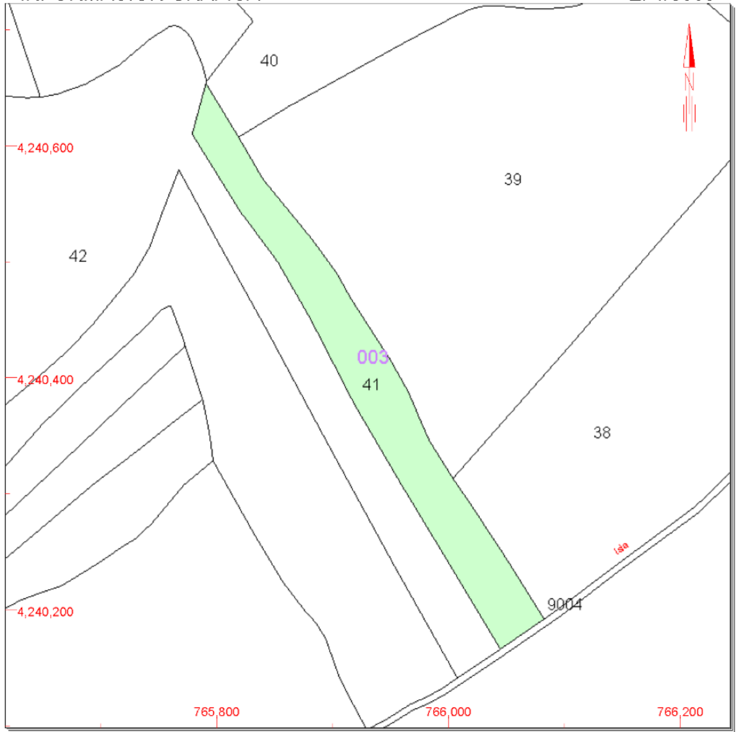
SITUACIÓN

Polígono 3 Parcela 41

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	20.164	--

INFORMACIÓN GRÁFICA E: 1/5000



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Lunes , 18 de Enero de 2016

766,200 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA
MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS
SECRETARÍA DE ESTADO DE HACIENDA
DIRECCIÓN GENERAL DEL CATASTRO
Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000420000BH

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 42
SANTIAGA. LLERENA [BADAJOZ]

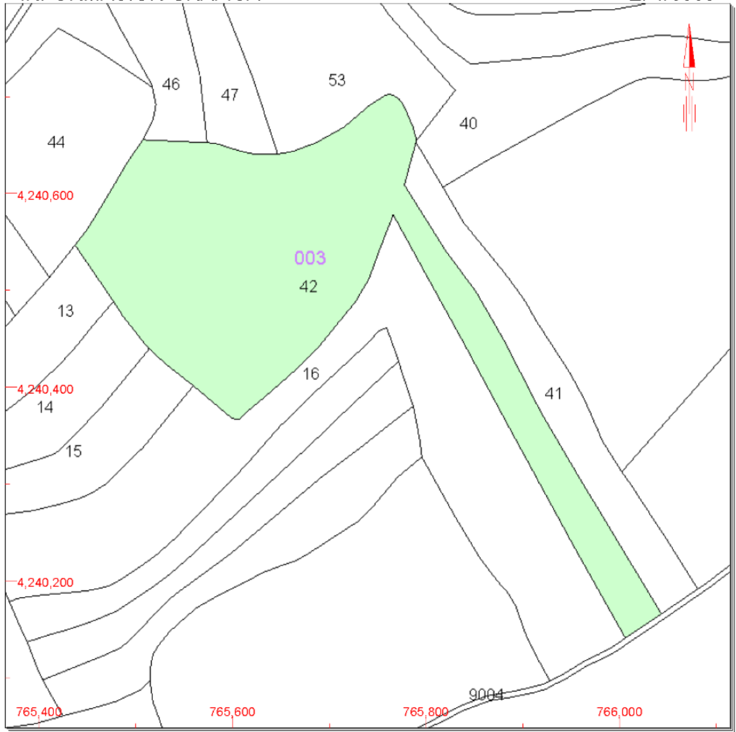
USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]
AÑO CONSTRUCCIÓN:
COEFICIENTE DE PARTICIPACIÓN: 100,000000
SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 42
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	89.049	--

INFORMACIÓN GRÁFICA E: 1/6000



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Lunes , 18 de Enero de 2016

766,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA
MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS
SECRETARÍA DE ESTADO DE HACIENDA
DIRECCIÓN GENERAL DEL CATASTRO
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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES
BIENES INMUEBLES DE NATURALEZA RÚSTICA
Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000430000BW

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 43
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

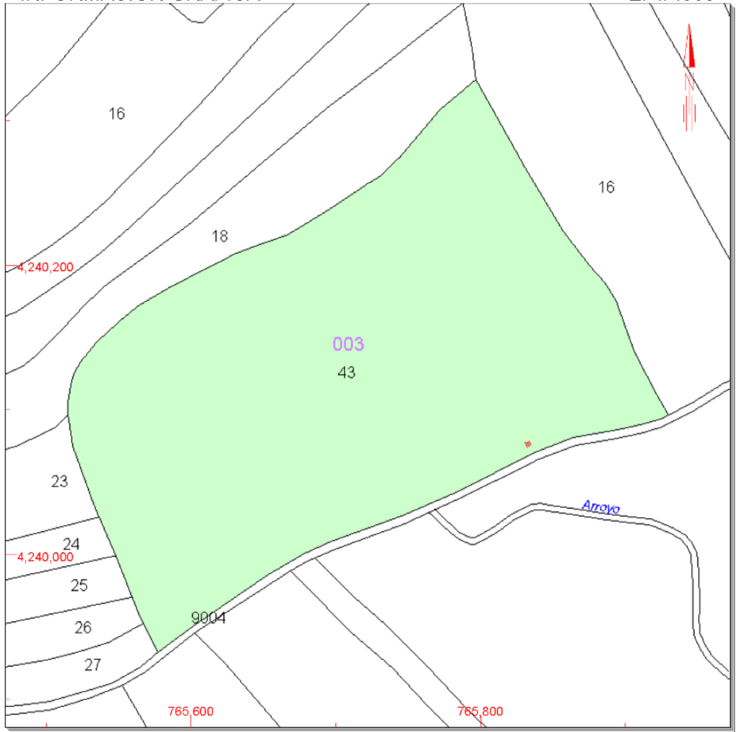
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 43
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	81.414	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

765,800 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000440000BA

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 44
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL
Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN

COEFICIENTE DE PARTICIPACIÓN
100,000000

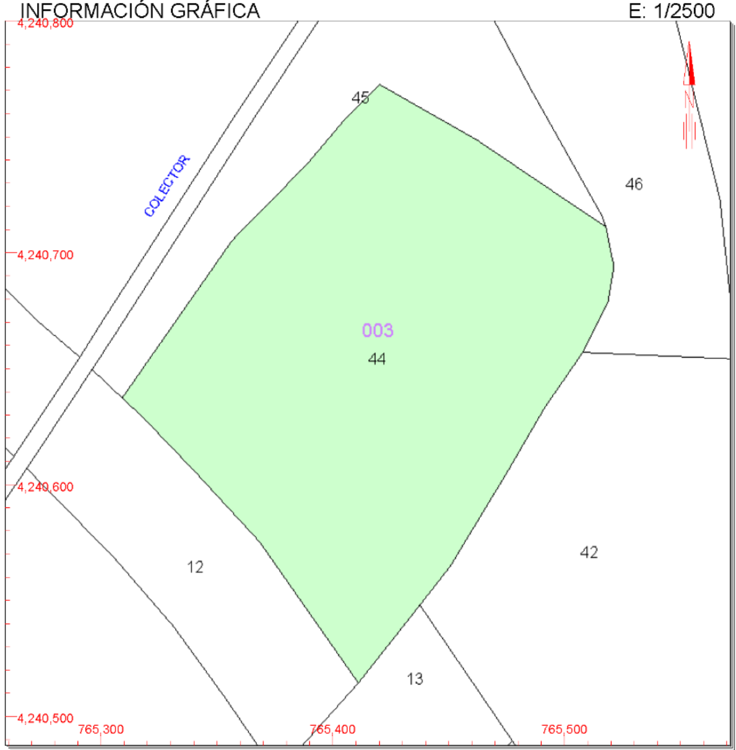
SUPERFICIE CONSTRUIDA [m²]
--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 44
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	29.035	--

INFORMACIÓN GRÁFICA E: 1/2500



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Lunes , 18 de Enero de 2016

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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
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Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000450000BB

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 45
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

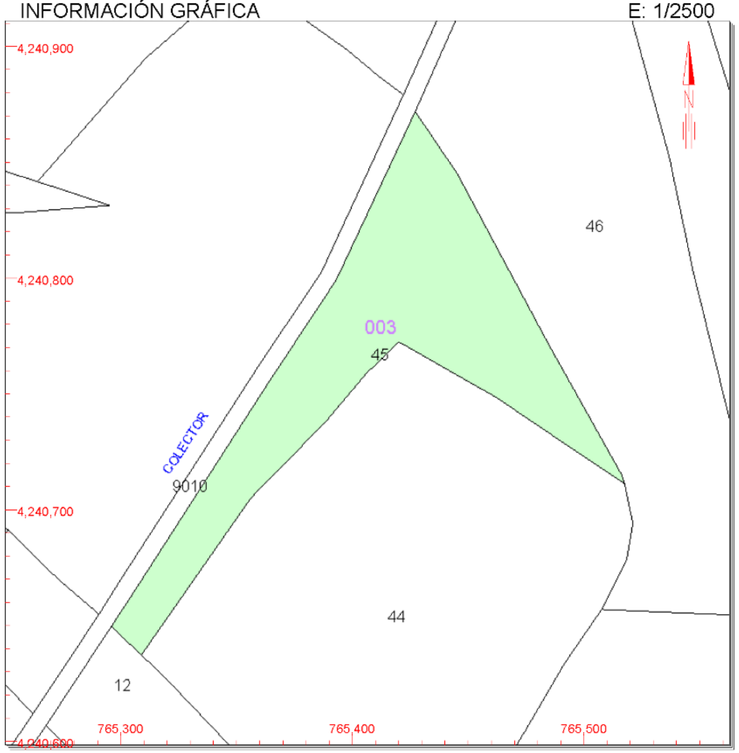
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 45
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	10.999	--

INFORMACIÓN GRÁFICA E: 1/2500



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Lunes , 18 de Enero de 2016

765,500 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000460000BY

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 46

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

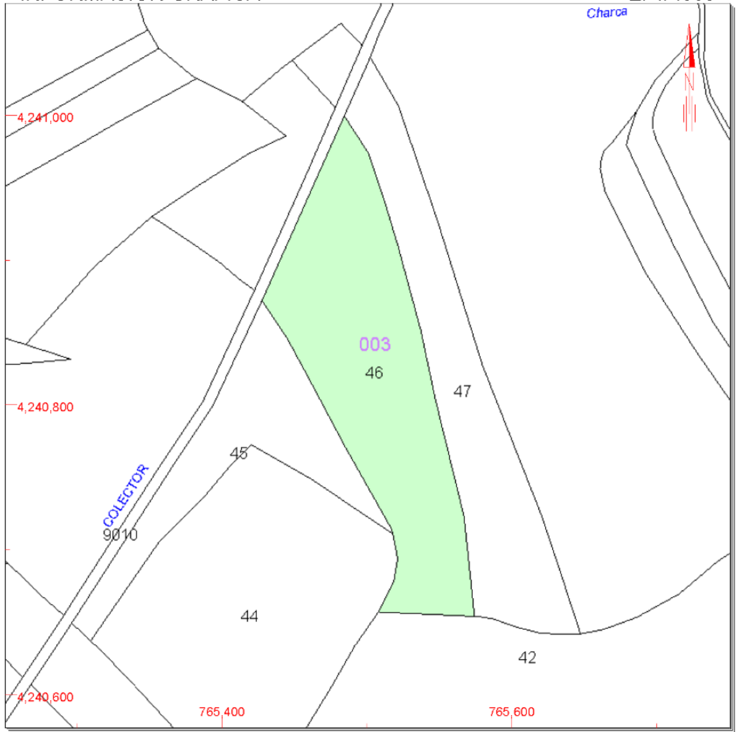
SITUACIÓN

Polígono 3 Parcela 46

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	22.480	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

765,600 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000470000BG

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 47

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

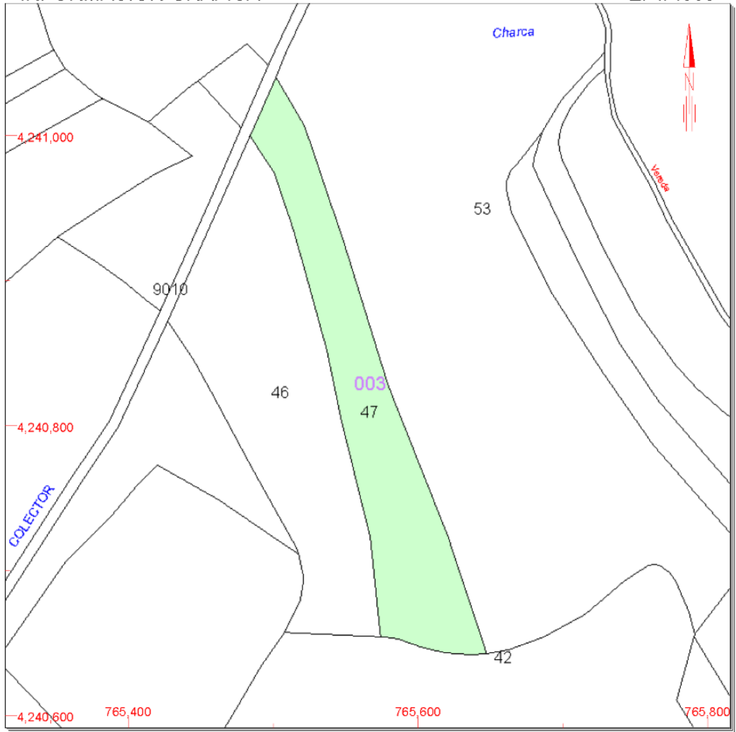
SITUACIÓN

Polígono 3 Parcela 47

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	15.997	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

765,800 Coordenadas U.T.M. Huso 29 ETRS89
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Hidrografía

GOBIERNO DE ESPAÑA
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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000530000BL

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 53
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario
AÑO CONSTRUCCIÓN:
COEFICIENTE DE PARTICIPACIÓN: 100,000000
SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

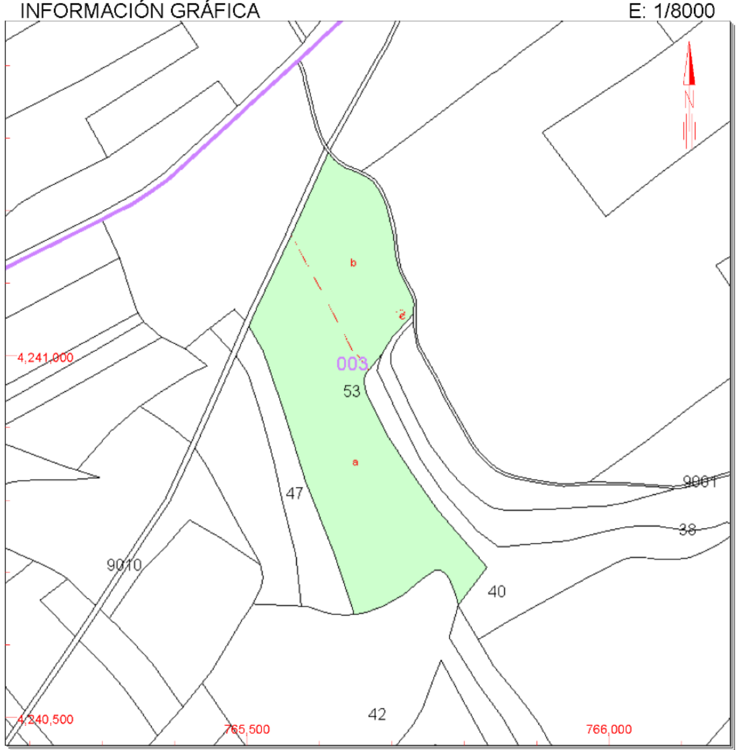
SITUACIÓN
Polígono 3 Parcela 53
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	90.089	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	02	6,3111
b	C-	Labor o Labradío secano	03	2,6900
c	I-	Improductivo	00	0,0078

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

766,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000680000BS

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 68
LOS PEDROSILLOS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario	--

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

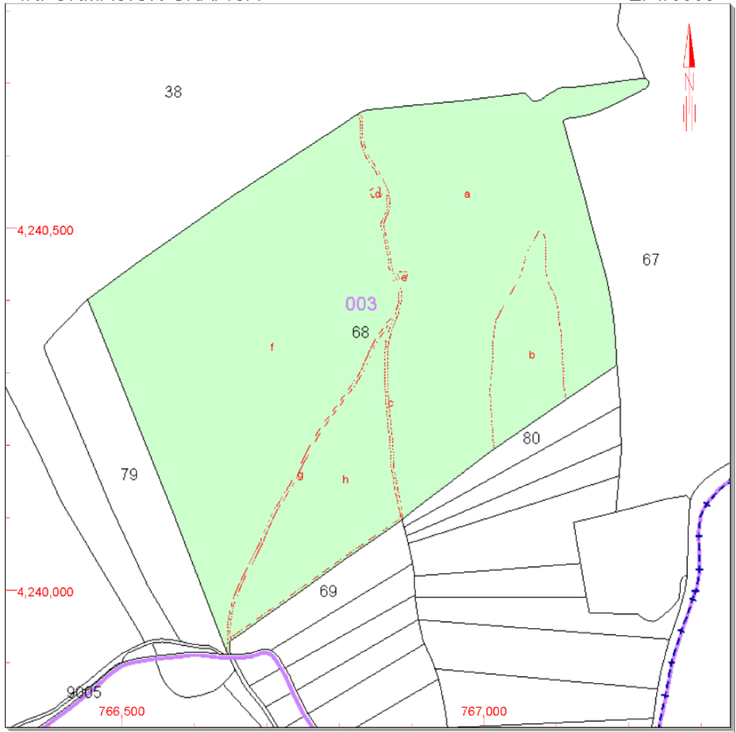
SITUACIÓN
Polígono 3 Parcela 68
LOS PEDROSILLOS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
0	336.689	--

SUBPARCELAS

Subparcela	CC	Cultivo	IP	Superficie [Ha]
a	C-	Labor o Labradío secano	04	12,2472
b	E-	Pastos	01	1,9553
c	I-	Improductivo	00	0,3136
d	I-	Improductivo	00	0,0158
e	I-	Improductivo	00	0,0117
f	C-	Labor o Labradío secano	04	15,1997
g	I-	Improductivo	00	0,1860
h	C-	Labor o Labradío secano	05	3,7396

INFORMACIÓN GRÁFICA E: 1/8000



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Lunes , 18 de Enero de 2016

767,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000790000BG

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 79

LOS PEDROSILLOS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 04]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

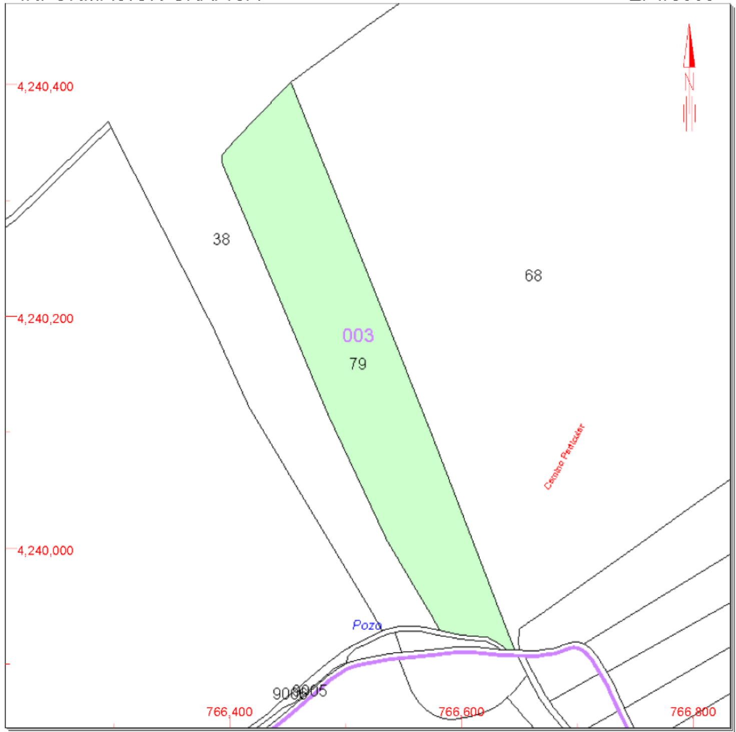
Polígono 3 Parcela 79

LOS PEDROSILLOS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	36.029	--

INFORMACIÓN GRÁFICA

E: 1/5000



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Lunes , 18 de Enero de 2016

766,800 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000820000BG

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 82

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

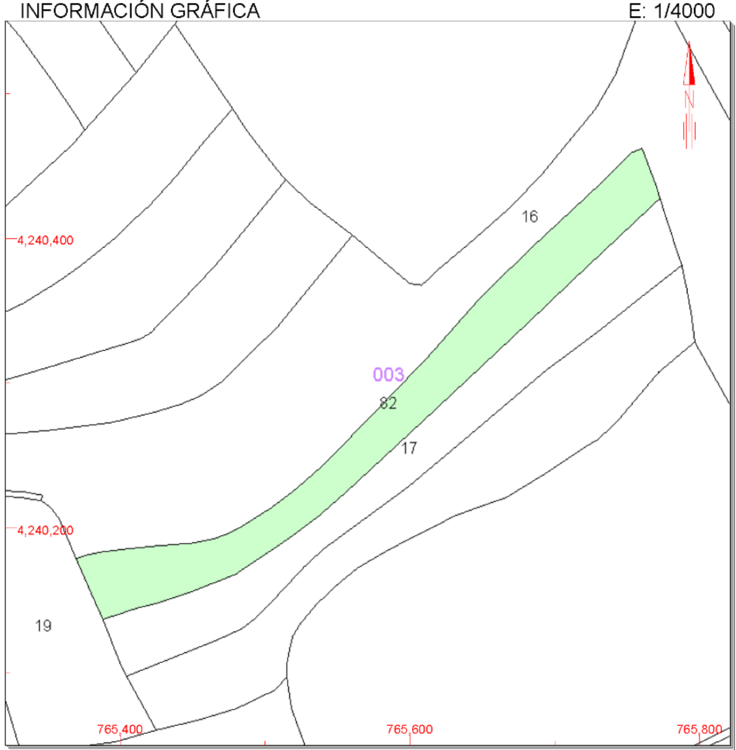
SITUACIÓN

Polígono 3 Parcela 82

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	17.279	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

765,800 Coordenadas U.T.M. Huso 29 ETRS89
Limite de Manzana
Limite de Parcela
Limite de Construcciones
Mobiliario y aceras
Limite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000950000BD

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 95

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

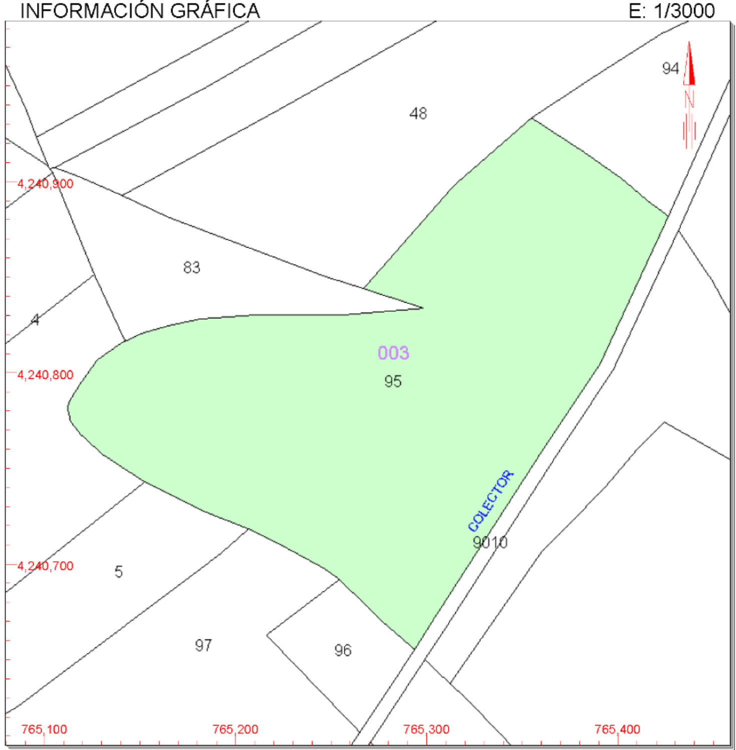
SITUACIÓN

Polígono 3 Parcela 95

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	38.521	--

INFORMACIÓN GRÁFICA E: 1/3000



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Lunes , 18 de Enero de 2016

765,400 Coordenadas U.T.M. Huso 29 ETRS89
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Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000960000BX

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 96

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

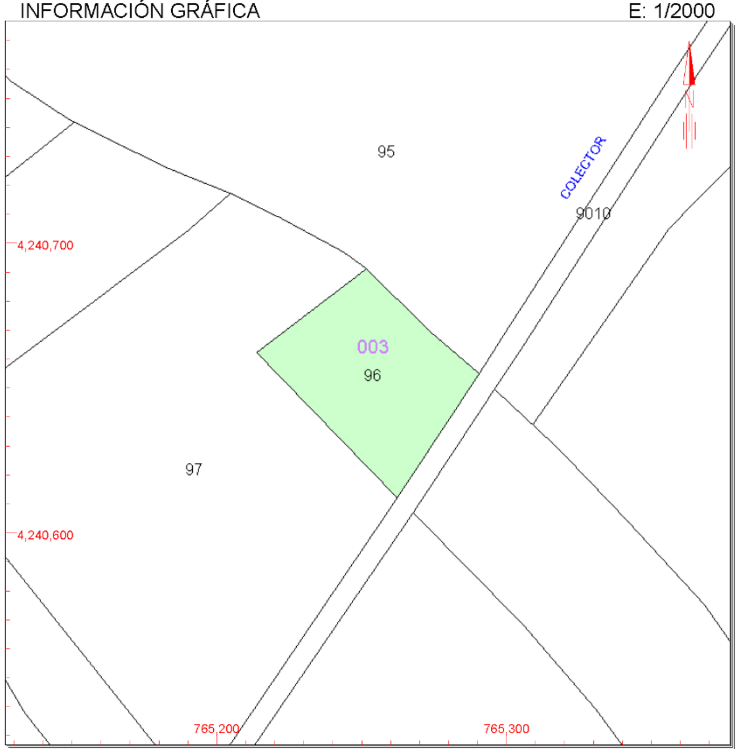
Polígono 3 Parcela 96

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	2.872	--

INFORMACIÓN GRÁFICA

E: 1/2000



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Lunes , 18 de Enero de 2016

765,300 Coordenadas U.T.M. Huso 29 ETRS89
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Hidrografía

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Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003000970000BI

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 97
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

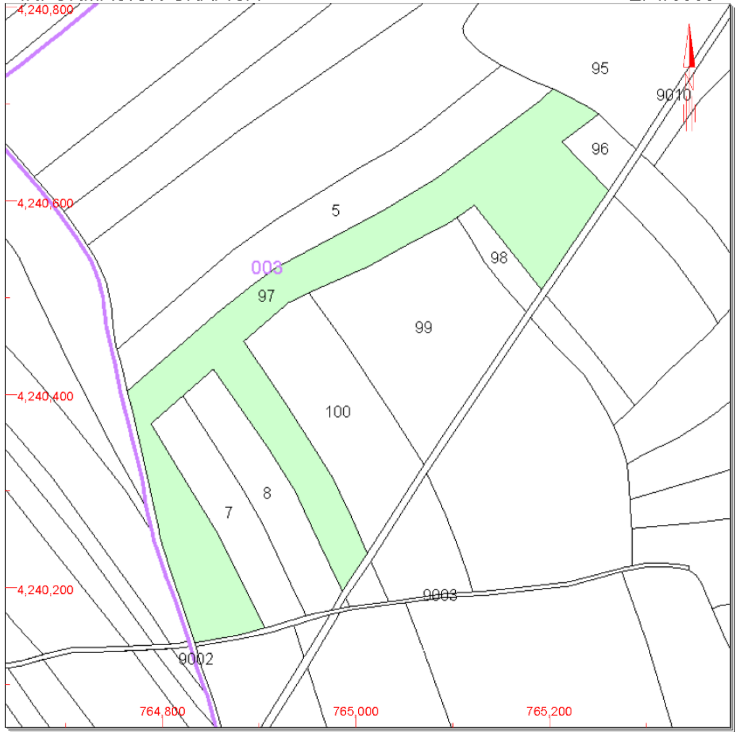
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 97
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	56.381	--

INFORMACIÓN GRÁFICA E: 1/6000



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Lunes , 18 de Enero de 2016

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Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000980000BJ

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 98
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

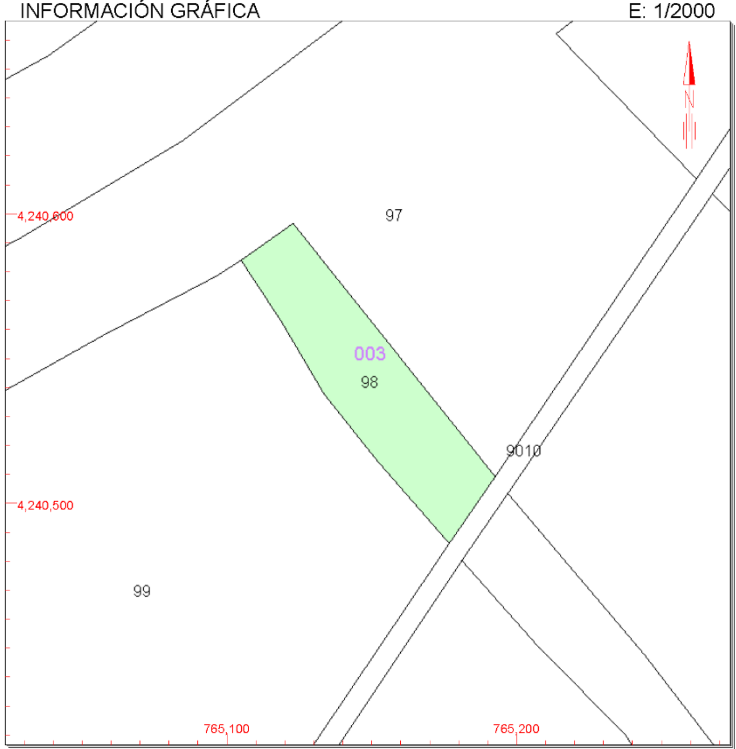
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 98
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	2.902	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

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Límite de Construcciones
Mobiliario y aceras
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Hidrografía

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003000990000BE

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 99
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

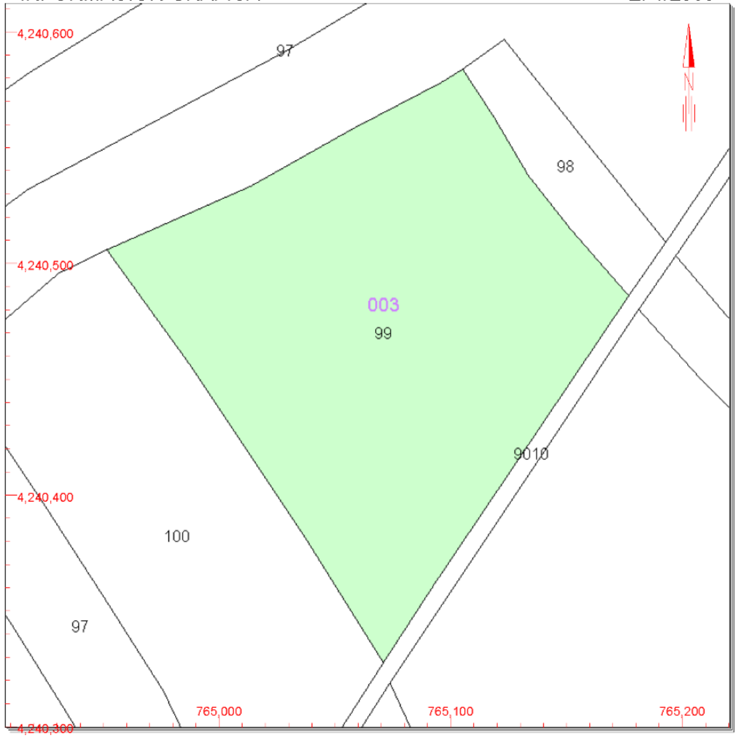
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 99
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	28.221	--

INFORMACIÓN GRÁFICA E: 1/2500



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Lunes , 18 de Enero de 2016

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Límite de Construcciones
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Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003001000000BE

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 100

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL: Agrario [Labor o Labradío secano 02]

AÑO CONSTRUCCIÓN:

COEFICIENTE DE PARTICIPACIÓN: 100,000000

SUPERFICIE CONSTRUIDA [m²]: --

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

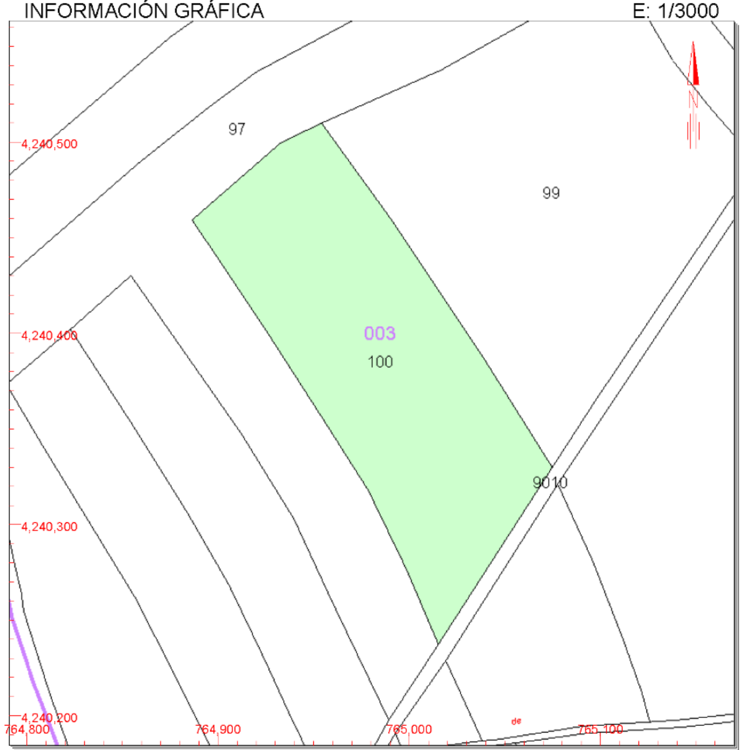
SITUACIÓN

Polígono 3 Parcela 100

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	20.293	--

INFORMACIÓN GRÁFICA — E: 1/3000



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Lunes , 18 de Enero de 2016

765,100 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Construcciones
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Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003001010000BS

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 101
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

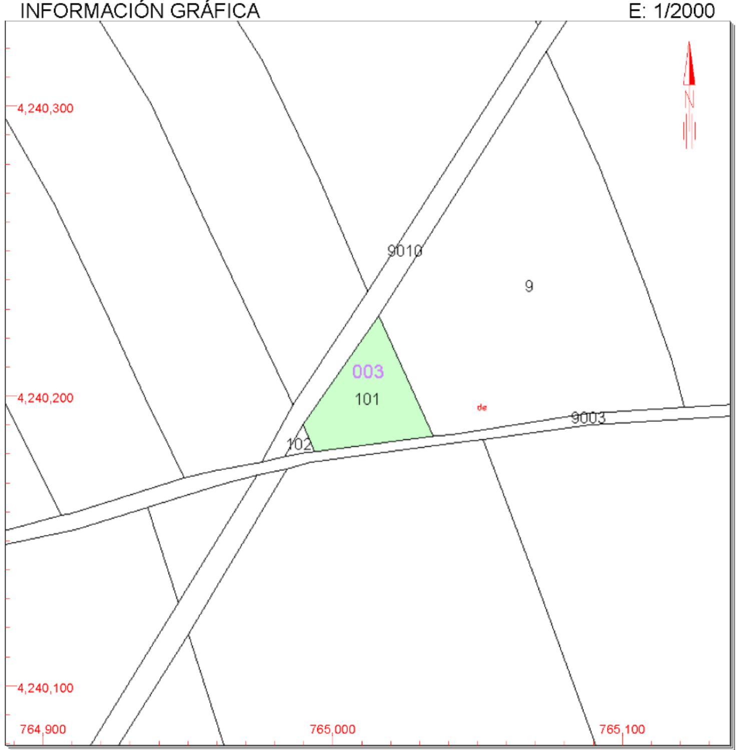
DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 101
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	1.196	--

INFORMACIÓN GRÁFICA

E: 1/2000



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Lunes , 18 de Enero de 2016

765,100 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003001020000BZ

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 102

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	--

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

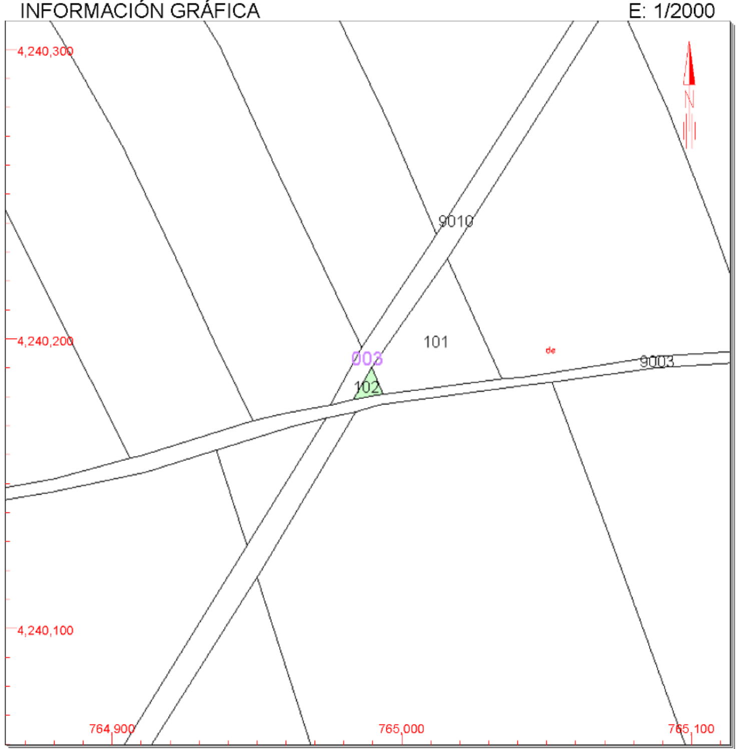
SITUACIÓN

Polígono 3 Parcela 102

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	51	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

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Límite de Construcciones
Mobiliario y aceras
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Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A003001030000BU

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 3 Parcela 103

SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	--

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

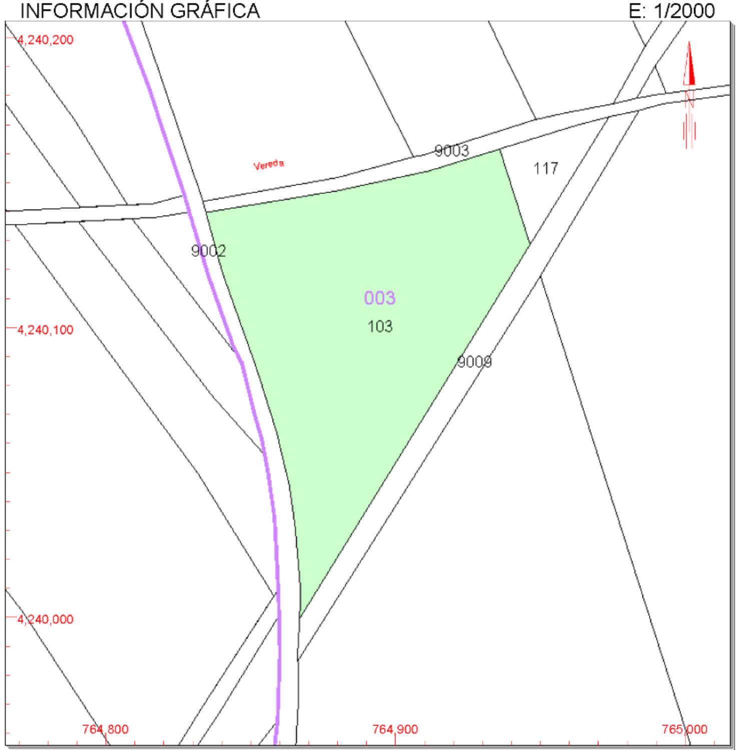
Polígono 3 Parcela 103

SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	8.737	--

INFORMACIÓN GRÁFICA

E: 1/2000



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Lunes , 18 de Enero de 2016

765,000 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE
06074A003001170000BF

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 3 Parcela 117
SANTIAGA. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

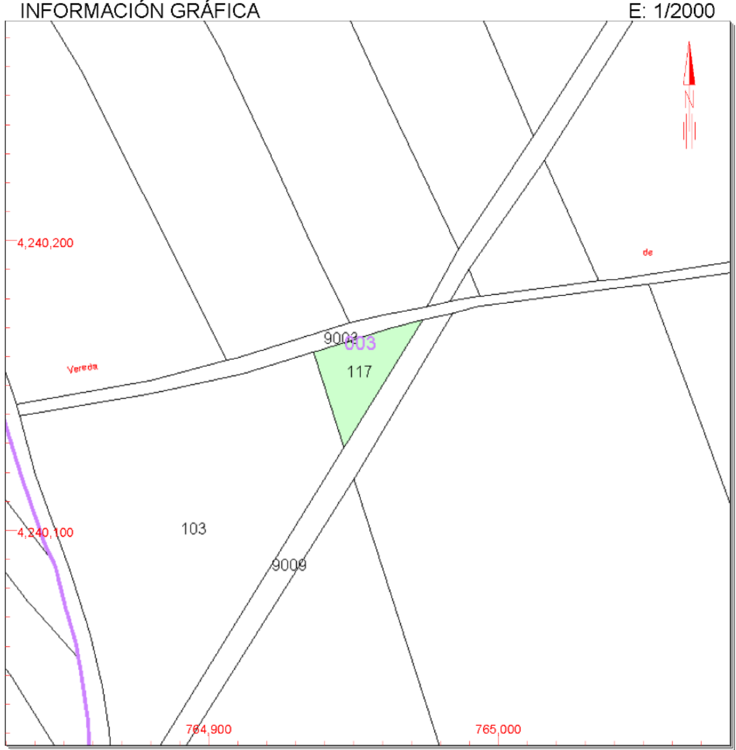
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 3 Parcela 117
SANTIAGA. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	689	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

765,000 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

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Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A005000020000BQ

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 5 Parcela 2

QUINTERIAS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

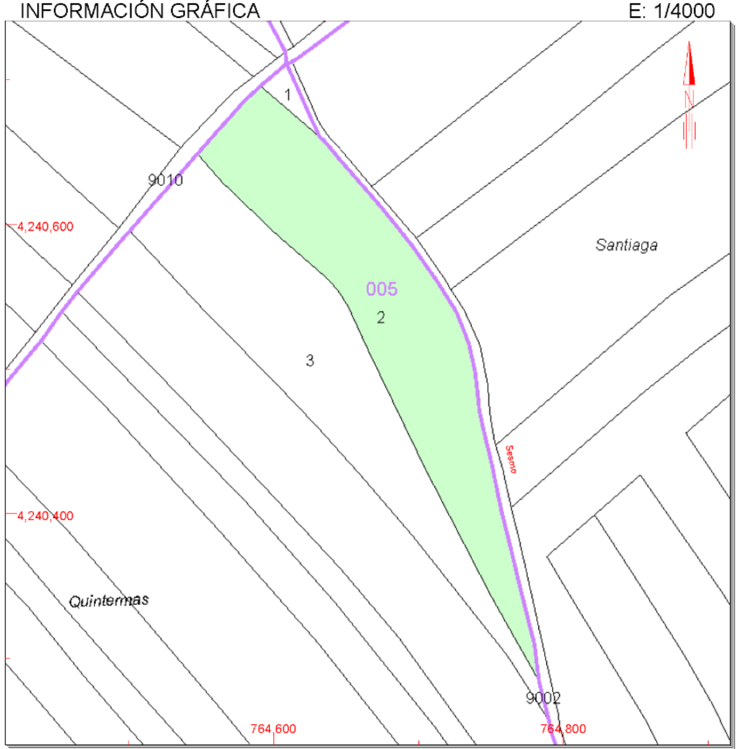
SITUACIÓN

Polígono 5 Parcela 2

QUINTERIAS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	22.467	--

INFORMACIÓN GRÁFICA   E: 1/4000



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Lunes , 18 de Enero de 2016

764,800 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

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Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A005000030000BP

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 5 Parcela 3

QUINTERIAS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

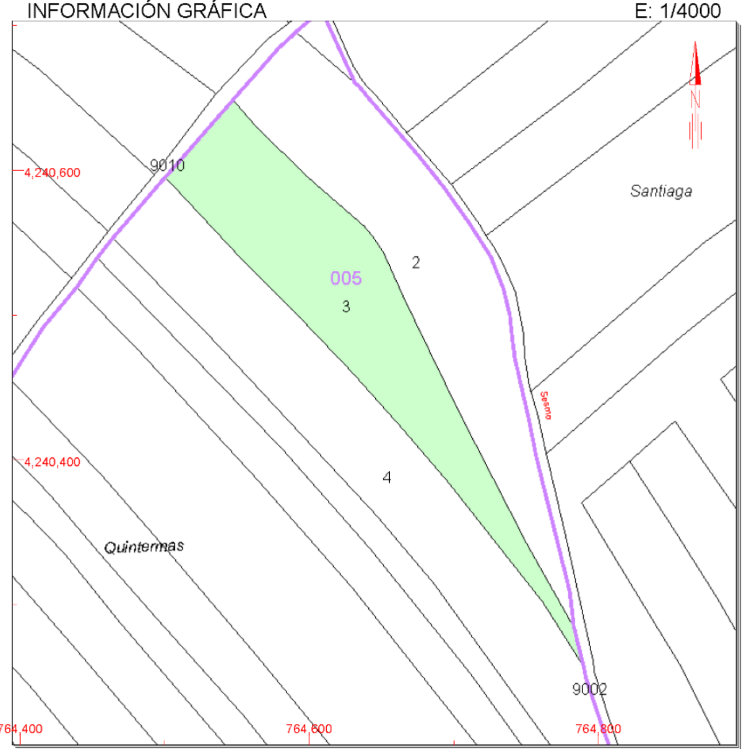
SITUACIÓN

Polígono 5 Parcela 3

QUINTERIAS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	21.128	--

INFORMACIÓN GRÁFICA E: 1/4000



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Lunes , 18 de Enero de 2016

764,800 Coordenadas U.T.M. Huso 29 ETRS89
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Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO | Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A005000040000BL

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 5 Parcela 4

QUINTERIAS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

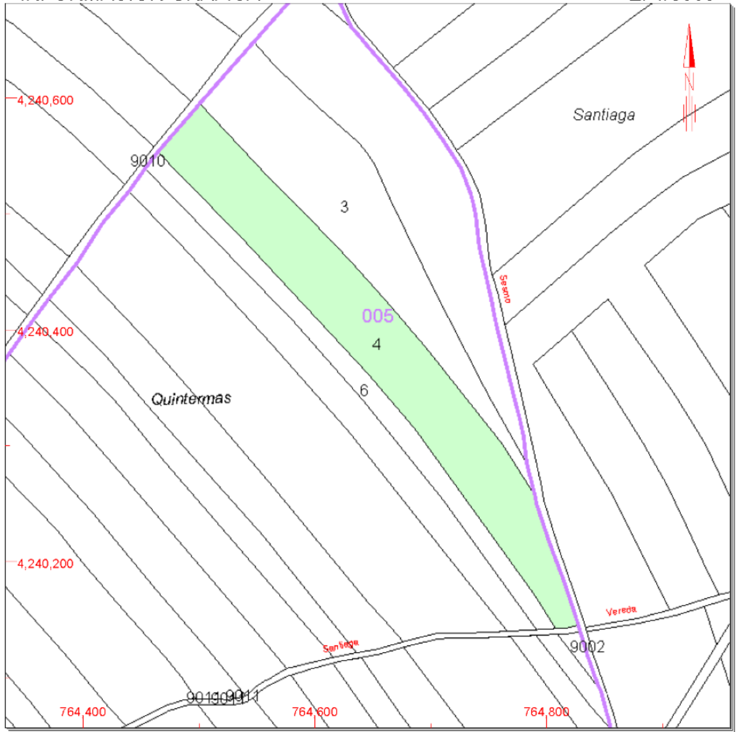
SITUACIÓN

Polígono 5 Parcela 4

QUINTERIAS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	27.095	--

INFORMACIÓN GRÁFICA E: 1/5000



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Lunes , 18 de Enero de 2016

764,800 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A005000050000BT

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 5 Parcela 5

QUINTERIAS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

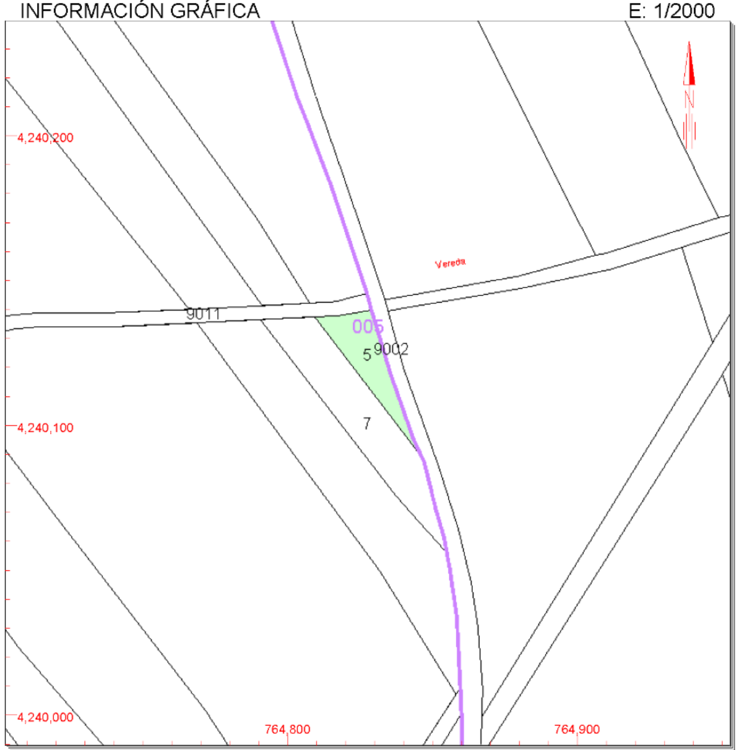
Polígono 5 Parcela 5

QUINTERIAS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	480	--

INFORMACIÓN GRÁFICA

E: 1/2000



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Lunes , 18 de Enero de 2016

764,900 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA | MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS | SECRETARÍA DE ESTADO DE HACIENDA | DIRECCIÓN GENERAL DEL CATASTRO | Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A005000070000BM

DATOS DEL INMUEBLE

LOCALIZACIÓN
Polígono 5 Parcela 7
QUINTERIAS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

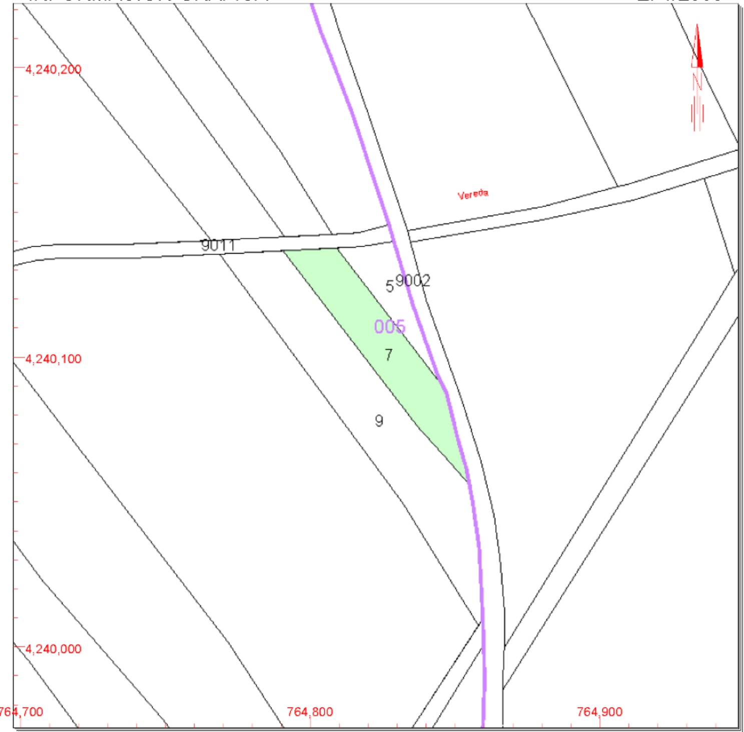
COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN
Polígono 5 Parcela 7
QUINTERIAS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	1.268	--

INFORMACIÓN GRÁFICA E: 1/2000



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Lunes , 18 de Enero de 2016

764,900 Coordenadas U.T.M. Huso 29 ETRS89
Límite de Manzana
Límite de Parcela
Límite de Construcciones
Mobiliario y aceras
Límite zona verde
Hidrografía

GOBIERNO DE ESPAÑA

MINISTERIO DE HACIENDA Y ADMINISTRACIONES PÚBLICAS

SECRETARÍA DE ESTADO DE HACIENDA

DIRECCIÓN GENERAL DEL CATASTRO

Sede Electrónica del Catastro

CONSULTA DESCRIPTIVA Y GRÁFICA DE DATOS CATASTRALES BIENES INMUEBLES DE NATURALEZA RÚSTICA

Municipio de LLERENA Provincia de BADAJOZ

REFERENCIA CATASTRAL DEL INMUEBLE

06074A005000090000BK

DATOS DEL INMUEBLE

LOCALIZACIÓN

Polígono 5 Parcela 9

QUINTERIAS. LLERENA [BADAJOZ]

USO LOCAL PRINCIPAL	AÑO CONSTRUCCIÓN
Agrario [Labor o Labradío secano 02]	

COEFICIENTE DE PARTICIPACIÓN	SUPERFICIE CONSTRUIDA [m²]
100,000000	--

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

SITUACIÓN

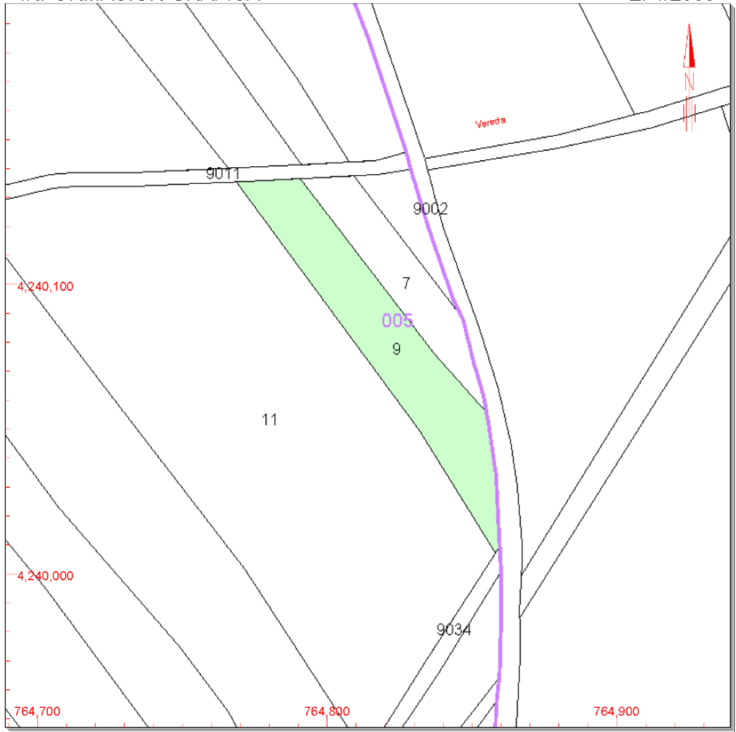
Polígono 5 Parcela 9

QUINTERIAS. LLERENA [BADAJOZ]

SUPERFICIE CONSTRUIDA [m²]	SUPERFICIE SUELO [m²]	TIPO DE FINCA
--	2.676	--

INFORMACIÓN GRÁFICA

E: 1/2000



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Lunes , 18 de Enero de 2016

764,900 Coordenadas U.T.M. Huso 29 ETRS89

- Límite de Manzana
- Límite de Parcela
- Límite de Construcciones
- Mobiliario y aceras
- Límite zona verde
- Hidrografía

ANEXO 13.2

PLANO DE LOS TERRENOS AFECTADOS

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
LÍMITES DE ADQUISICIÓN DE TERRENOS

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** **A13.1**
ESCALAS E= 1:8.000		**HOJA Nº 1 DE 1**

ANEJO Nº 14

JUSTIFICACIÓN DE PRECIOS

ÍNDICE

1. OBJETO

Este anejo tiene como finalidad definir la justificación no contractual del importe de los precios unitarios que figuran en los Cuadros de Precios nº 1 y nº 2 del Documento nº 4 – Presupuesto de este proyecto. Para lo cual se ha empleado las directrices marcadas en el Real Decreto 1098/2001, aun al ser un proyecto que se ha supuesto de iniciativa privada.

2. PORCENTAJE DE COSTES INDIRECTOS

Para el cálculo de los precios de las distintas unidades de obra, se han determinado sus costes directos e indirectos. Son costes directos, todas las unidades de obra subcontratadas, y aquellas que el contratista principal ejecuta con su personal. Se consideran costes directos la mano de obra con sus pluses, cargos y seguros sociales, que intervienen directamente en la ejecución de la unidad de obra, los gastos de transporte, mano de obra en carga y descarga, pérdidas por mermas, rotura y manipulación, los materiales a los precios resultantes a pie de obra que quedan integrados en la unidad o que sean necesarios para su ejecución, los gastos de amortización y conservación de la maquinaria, así como los gastos del personal, combustible y energía que tengan lugar por el accionamiento de la maquinaria.

Son costes indirectos todos aquellos que no son imputables directamente a unidades concretas sino al conjunto de la obra, comunicaciones, almacenes, talleres, pabellones temporales para obreros, laboratorios, los de personal técnico y los imprevistos. A la vista de las condiciones de la obra a ejecutar y del programa indicativo del posible desarrollo de los trabajos se estima el coeficiente K que estará compuesto de dos sumandos:

$$K=K_1+K_2$$

En esta ecuación K_1 es el porcentaje resultante de la relación entre la valoración de los costes indirectos y el importe de los costes directos de la obra y K_2 es el porcentaje correspondiente a los imprevistos.

A continuación se adjunta el cálculo del coeficiente K_1, mediante la estimación de los costes indirectos supuestos. El coste de personal se ha obtenido de las tablas salariales publicadas en el DOE (29-10-2013) para el sector de la construcción y obras públicas del año 2013.

PERSONAL				
Trabajador	**Nº previsto**	**Duración obra (años)**	**Coste anual**	**Coste total**
Ingeniero Superior	2	6,5	43.272,26 €	562.539,38 €
Ingeniero Técnico	4	6,5	39.339,34 €	1.022.822,84 €
Topógrafos	4	6,5	39.339,34 €	1.022.822,84 €
Técnicos laboratorio	2	6,5	38.337,68 €	498.389,84 €
Encargados	2	6,5	37.208,93 €	483.716,09 €
Administrativos	1	6,5	39.011,82 €	253.576,83 €
Auxiliares de DO	5	6,5	37.208,93 €	483.716,09 €
INSTALACIONES				
Instalaciones	**Nº trabajadores**	**Superficie/trabajador**	**Coste m²**	**Coste final**
Oficinas	21	25 m²/trabajador	120 €	66.000 €
TRANSPORTE				
Nº vehículos previstos	**Km mensuales**	**Duración obra (meses)**	**Coste km**	**Coste final**
5	100	78	1,3 €	50.700 €
ALMACENES				
Superficie de almacén prevista (m²)		**Coste m² almacén**		**Coste final**
300 m²		100 €		30.000 €
TALLERES				
Superficie de taller prevista (m²)		**Coste m² taller**		**Coste final**
300 m²		100 €		30.000 €
LABORATORIOS				
Superficie de laboratorio prevista (m²)		**Coste m² laboratorio**		**Coste final**
150 m²		120 €		18.000 €
TOTAL COSTES INDIRECTOS				**5.717.109,69 €**
PORCENTAJE SOBRE COSTES DIRECTOS				**2,03%≈2%**

Como coeficiente K_2 de imprevistos, se ha supuesto un 1%, por lo que **los costes indirectos K serán de un 3%**.

3. JUSTIFICACIÓN DE PRECIOS

El precio de ejecución material de las unidades de obra que componen el presupuesto del proyecto se obtiene a partir de aplicar a los precios de los materiales, la maquinaria y la mano de obra las mediciones necesarias. La suma de este producto, aumentada con el porcentaje de costes indirectos, dará el precio de ejecución material de las unidades de obra, que se reflejará directamente en el Cuadro de Precios Nº 1 del Documento nº 4 “Presupuesto”.

En los anexos adjuntos se incluye la mano de obra, la maquinaria y los materiales empleados en las distintas unidades de obra, y los precios descompuestos de estas.

ANEXO 14.1

MANO DE OBRA

1. LISTADO DE MANO DE OBRA

LISTADO DE MANO DE OBRA VALORADO (Pres)

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	IMPORTE
O01A020	58.542,817	h.	Capataz	13,31	779.204,90
O01A030	22.209,803	h.	Oficial primera	13,12	291.392,61
O01A070	62.877,790	h.	Peón ordinario	12,48	784.714,82
O01BC041	18.823,140	h.	Oficial 1ª Cerrajero	15,75	296.464,46
O01BC042	560,100	h.	Ayudante-Cerrajero	15,06	8.435,11
O01BE010	13.463,069	h.	Oficial 1ª Encofrador	15,27	205.581,06
O01BE020	18.071,141	h.	Ayudante- Encofrador	14,73	266.187,90
O01BF030	37.557,469	h.	Oficial 1ª Ferrallista	15,39	578.009,45
O01BF040	37.557,469	h.	Ayudante- Ferrallista	14,72	552.845,95
O01BJ270	1.560,000	h.	Oficial 1ª Jardinero	14,35	22.386,00
O01BP230	29.260,277	h.	Oficial 1ª Pintor	14,39	421.055,38
O01BS805	1.456.023,422	h.	Oficial 1ª Soldador	15,14	22.044.194,62

Grupo O01.. 26.250.472,26

TOTAL... 26.250.472,26

ANEXO 14.2

MAQUINARIA

1. LISTADO DE MAQUINARIA

LISTADO DE MAQUINARIA VALORADO (Pres)

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	IMPORTE
M05EC040	22.190,363	h.	Excav.hidr.cadenas 310 CV	86,54	1.920.354,01
M05EN030	3.581,935	h.	Excav.hidr.neumáticos 100 CV	47,57	170.392,65
M05PC040	30.414,372	h.	Pala carg.cadenas 300 CV/4,5m3	77,16	2.346.772,91
				Grupo M05....................................	**4.437.519,57**
M06VF120	11.095,181	h.	V.P.martillo en fondo hidr.150mm	212,24	2.354.841,31
				Grupo M06....................................	**2.354.841,31**
M07CB030	31.762,787	h.	Camión basculante 6x4 20 t.	37,95	1.205.397,77
M07CG010	487.213,141	h.	Camión con grúa 6 t.	50,94	24.818.637,39
				Grupo M07....................................	**26.024.035,16**
M08CA110	22.188,466	h.	Cisterna agua s/camión 10.000 l.	28,15	624.605,32
M08NM030	22.188,466	h.	Motoniveladora de 240 CV	63,27	1.403.864,24
M08RL010	262,500	h.	Rodillo v.dúplex 55cm 800 kg.man	5,64	1.480,50
M08RN050	22.188,466	h.	Rodillo vibr.autopr.mixto 17 t.	38,57	855.809,13
				Grupo M08....................................	**2.885.759,18**
M09MH010	77,760	h.	Hidrosembr. s/camión 6000 l.	81,96	6.373,21
				Grupo M09....................................	**6.373,21**
M10HV080	12.304,755	h.	Vibrador hormigón gasolina 75 mm	2,43	29.900,55
M10MM010	9.011,509	h.	Motosierra gasolina l=40cm.1,8CV	2,27	20.456,12
				Grupo M10....................................	**50.356,68**
M12EF020	10.225,730	m2	Encof.panel metal.5/10 m2. 50 p.	0,55	5.624,15
M12EF040	1.022,573	m.	Fleje para encofrado metálico	0,20	204,51
				Grupo M12....................................	**5.828,67**
				TOTAL...	**35.764.713,78**

ANEXO 14.3

MATERIALES

1. LISTADO DE MATERIALES

LISTADO DE MATERIALES VALORADO (Pres)

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	IMPORTE
P01CC275	393,600	m3	Mortero Cemento M-5 para nivelación	69,34	27.292,22
P01DC010	766,930	kg	Aditivo desencofrante	1,43	1.096,71
P01DW010	792,000	m3	Agua	0,91	720,72
P01HC088	48.495,176	m3	Hormigón HA-25/P/20/IIa central	60,79	2.948.021,75
P01HD035	8.064,126	m3	Hormlgón de limpieza HM-5/B/20	41,42	334.016,10
P01UC020	10.225,730	kg	Puntas 17x70	1,23	12.577,65
P01XC010	22.190,363	m.	Cordón detonante 12 gr.	0,50	11.095,18
P01XC030	332.855,444	m.	Hilo de conexión	0,11	36.614,10
P01XD010	22.190,363	ud	Detonador eléctrico	1,27	28.181,76
P01XG020	22.190,363	kg	Goma-2 D=55 mm.	3,26	72.340,58
P01XN010	44.380,726	kg	Nagolita a granel	1,20	53.256,87
				Grupo P01	**3.525.213,64**
P03AA020	16.160,232	kg	Alambre atar 1,30 mm.	1,41	22.785,93
P03AC200	3.447.336,154	kg	Acero corrugado B 500 S	1,78	6.136.258,35
P03AL095	94.464,000	ud	Tuerca acero D=16	0,20	18.892,80
P03AL160	625.682,304	kg	Acero laminado S 275 JR	1,14	713.277,83
P03AL210	101.921.639,568	kg	Acero laminado S 355 J2	1,20	122.305.967,48
				Grupo P03	**129.197.182,39**
P13VP115	220,840	ud	Poste galv. D=48 h=3 m. arranque	19,61	4.330,67
P13VP125	1.104,200	ud	Poste galv. D=48 h=3 m. escuadra	31,05	34.285,41
P13VP135	1.214,620	ud	Poste galv.D=48 h=3 m.intermedio	11,42	13.870,96
P13VP145	331,260	ud	Poste galv. D=48 h=3 m. jabalcón	31,05	10.285,62
P13VP155	331,260	ud	Poste galv.D=48 h=3 m.tornapunta	10,60	3.511,36
P13VS045	16.563,000	m2	Malla S/T galv, 15 mm paso, d=1,5 mm	4,22	69.895,86
P13VT135	1,000	ud	P.corred. c/carril tubo 30x30 pint. 8x2	3.641,63	3.641,63
				Grupo P13	**139.821,51**
P24OU020	126.794,532	l.	Imprim.antioxidante(poliuretano)	11,58	1.468.280,67
P24OU070	126.794,532	l.	Neutralizador de óxido	15,39	1.951.367,84
P24WW220	56.639,128	ud	Pequeño material	1,11	62.869,43
				Grupo P24	**3.482.517,95**
P26WI010	100.662,705	m2	Lámina impermeable PEAD e=1,5 mm	11,28	1.135.475,31
				Grupo P26	**1.135.475,31**
P28DA080	31.200,000	kg	Substrato vegetal fertilizado	0,06	1.872,00
P28DF050	2.592,000	kg	Abono micelios	1,57	4.069,44
P28EA200	6.240,000	ud	Cupressus semperv.stricta 2,5-3	80,83	504.379,20
P28MP055	2.268,000	kg	Mezcla semillas z.semiáridas	4,48	10.160,64
P28SM110	1.944,000	kg	Mulch de paja	0,25	486,00
P28SM120	5.508,000	kg	Mulch celulósico biodegradable	2,73	15.036,84
P28SM130	1.101,600	kg	Estabilizante orgánico de suelos	4,15	4.571,64
P28SM160	324,000	kg	Polímeros sint. absorbent.	16,97	5.498,28
				Grupo P28	**546.074,04**
				TOTAL..	**138.026.284,84**

ANEXO 14.4

PRECIOS DESCOMPUESTOS

1. PRECIOS DESCOMPUESTOS

CUADRO DE DESCOMPUESTOS

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	SUBTOTAL	IMPORTE
E04AP045		**ud**	**PLACA CIMEN.45x45x2,5cm. C/PERN.**			

Placa de anclaje de acero S 275 JR en perfil plano para atornillar en cimentación, de dimensiones 45x45x2,5 cm con seis patillas de redondo corrugado de 16 mm de diámetro, con longitud total de 0,60 m roscadas, i/taladro central, totalmente colocado. Según normas EHE-08 y DB-SE.

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	SUBTOTAL	IMPORTE
O01BC041	1,160	h.	Oficial 1ª Cerrajero	15,75	18,27	
P03AC200	4,266	kg	Acero corrugado B 500 S	1,78	7,59	
P03AL095	6,000	ud	Tuerca acero D=16	0,20	1,20	
P03AL160	39,741	kg	Acero laminado S 275 JR	1,14	45,30	
P01CC275	0,025	m3	Mortero Cemento M-5 para nivelación	69,34	1,73	
P24WW220	0,500	ud	Pequeño material	1,11	0,56	
			Suma la partida			74,65
			Costes indirectos		3,00%	2,24
			TOTAL PARTIDA			**76,89**

Asciende el precio total de la partida a la mencionada cantidad de SETENTA Y SEIS EUROS con OCHENTA Y NUEVE CÉNTIMOS

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	SUBTOTAL	IMPORTE
E04CM045		**m3**	**HORM.LIMPIEZA HM-5/B/20 V.MANUAL**			

Hormigón en masa HM-5/B/20, de 5 N/mm2., consistencia blanda, Tmáx.20 mm. elaborado en obra para limpieza y nivelado de fondos de cimentación, incluso vertido por medios manuales y colocación. Según EHE-08 y DB-SE-C.

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	SUBTOTAL	IMPORTE
O01BE020	0,600	h.	Ayudante- Encofrador	14,73	8,84	
M10HV080	0,400	h.	Vibrador hormigón gasolina 75 mm	2,43	0,97	
P01HD035	1,050	m3	HormIgón de limpieza HM-5/B/20	41,42	43,49	
			Suma la partida			53,30
			Costes indirectos		3,00%	1,60
			TOTAL PARTIDA			**54,90**

Asciende el precio total de la partida a la mencionada cantidad de CINCUENTA Y CUATRO EUROS con NOVENTA CÉNTIMOS

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	SUBTOTAL	IMPORTE
E05AS015		**kg**	**ACERO S355 ESTRUCTURA ESP.LAMINADO**			

Acero laminado S355, en perfiles, para estructuras espaciales con perfiles laminados sección rectangular; i/p.p. de nudos y piezas especiales, dos manos de imprimación de minio de plomo, totalmente montada y colocada. Según CTE-DB-SE-A y EAE.

CÓDIGO	CANTIDAD	UD	RESUMEN	PRECIO	SUBTOTAL	IMPORTE
O01BS805	0,015	h.	Oficial 1ª Soldador	15,14	0,23	
P03AL210	1,050	kg	Acero laminado S 355 J2	1,20	1,26	
M07CG010	0,005	h.	Camión con grúa 6 t.	50,94	0,25	
			Suma la partida			1,74
			Costes indirectos		3,00%	0,05
			TOTAL PARTIDA			**1,79**

Asciende el precio total de la partida a la mencionada cantidad de UN EUROS con SETENTA Y NUEVE CÉNTIMOS

E13JVAG060 **m** **VALLADO DE PARCELA**

Cerramiento de parcela formado por malla de simple torsión, de 15 mm de paso de malla y 1,5 mm de diámetro, acabado galvanizado y postes de acero galvanizado, de 48 mm de diámetro y 3 m de altura.

O01BC041	0,100	h.	Oficial 1ª Cerrajero	15,75	1,58
O01BC042	0,100	h.	Ayudante-Cerrajero	15,06	1,51
P01HC088	0,020	m3	Hormigón HA-25/P/20/IIa central	60,79	1,22
M10HV080	0,003	h.	Vibrador hormigón gasolina 75 mm	2,43	0,01
P13VS045	3,000	m2	Malla S/T galv, 15 mm paso, d=1,5 mm	4,22	12,66
P13VP115	0,040	ud	Poste galv. D=48 h=3 m. arranque	19,61	0,78
P13VP125	0,200	ud	Poste galv. D=48 h=3 m. escuadra	31,05	6,21
P13VP135	0,220	ud	Poste galv.D=48 h=3 m.intermedio	11,42	2,51
P13VP145	0,060	ud	Poste galv. D=48 h=3 m. jabalcón	31,05	1,86
P13VP155	0,060	ud	Poste galv.D=48 h=3 m.tornapunta	10,60	0,64

Suma la partida.. 28,98
Costes indirectos 3,00% 0,87

TOTAL PARTIDA.. 29,85

Asciende el precio total de la partida a la mencionada cantidad de VEINTINUEVE EUROS con OCHENTA Y CINCO CÉNTIMOS

E13JVPB115 **ud** **PUERTA CORR. S/CARRIL TUBO 8x3**

Puerta corredera sobre carril de una hoja de 8x3 m. formada por bastidor de tubo de acero laminado 80x40x1,5 mm. y barrotes de 30x30x1,5 mm. galvanizado en caliente por inmersión Z-275 provistas de cojinetes de fricción, carril de rodadura para empotrar en el pavimento, poste de tope y puente guía provistos de rodillos de teflón con ajuste lateral, orejitas para cerradura, elaborada en taller, ajuste y montaje en obra.

O01BC041	8,000	h.	Oficial 1ª Cerrajero	15,75	126,00
O01BC042	8,000	h.	Ayudante-Cerrajero	15,06	120,48
P13VT135	1,000	ud	P.corred. c/carril tubo 30x30 pint. 8x2	3.641,63	3.641,63

Suma la partida.. 3.888,11
Costes indirectos 3,00% 116,64

TOTAL PARTIDA.. 4.004,75

Asciende el precio total de la partida a la mencionada cantidad de CUATRO MIL CUATRO EUROS con SETENTA Y CINCO CÉNTIMOS

E15HS045 **m2** **PINTURA ANTIOXIDANTE ESTR. METÁLICA**

Pintura antioxidante sobre estructura metálica, i/limpieza y capa antioxidante.

O01BP230	0,030	h.	Oficial 1ª Pintor	14,39	0,43
P24OU020	0,130	l.	Imprim.antioxidante(poliuretano)	11,58	1,51
P24OU070	0,130	l.	Neutralizador de óxido	15,39	2,00
P24WW220	0,050	ud	Pequeño material	1,11	0,06

Suma la partida.. 4,00
Costes indirectos 3,00% 0,12

TOTAL PARTIDA.. 4,12

Asciende el precio total de la partida a la mencionada cantidad de CUATRO EUROS con DOCE CÉNTIMOS

U02CAB080 **ud** **TALADO ÁRBOL DIÁMETRO > 50 cm.**

Talado de árboles de diámetro mayor de 50 cm., troceado y apilado de los mismos en las zonas indicadas, incluso carga y transporte a vertedero de ramas y el resto de productos resultantes.

O01A070	2,000	h.	Peón ordinario	12,48	24,96
M10MM010	2,000	h.	Motosierra gasolina l=40cm.1,8CV	2,27	4,54
M07CB030	0,500	h.	Camión basculante 6x4 20 t.	37,95	18,98

Suma la partida.. 48,48
Costes indirectos 3,00% 1,45

TOTAL PARTIDA.. 49,93

Asciende el precio total de la partida a la mencionada cantidad de CUARENTA Y NUEVE EUROS con NOVENTA Y TRES CÉNTIMOS

U02CAB090 **ud** **DESTOCONADO ÁRBOL D > 50 cm.**

Destoconado de árboles de diámetro mayor de 50 cm., incluso carga y transporte a vertedero del tocón y relleno de tierra compactada del hueco resultante.

O01A070	0,750	h.	Peón ordinario	12,48	9,36
M05EN030	0,250	h.	Excav.hidr.neumáticos 100 CV	47,57	11,89
M10MM010	0,250	h.	Motosierra gasolina l=40cm.1,8CV	2,27	0,57
M08RL010	0,750	h.	Rodillo v.dúplex 55cm 800 kg.man	5,64	4,23
M07CB030	0,500	h.	Camión basculante 6x4 20 t.	37,95	18,98

Suma la partida..		45,03
Costes indirectos	3,00%	1,35
TOTAL PARTIDA..		**46,38**

Asciende el precio total de la partida a la mencionada cantidad de CUARENTA Y SEIS EUROS con TREINTA Y OCHO CÉNTIMOS

U02CAB110 **m2** **DESBROCE TERRENO SIN CLASIFICAR**

Desbroce y limpieza superficial de terreno sin clasificar, hasta 25 cm, por medios mecánicos, con carga y transporte de los productos resultantes a vertedero o lugar de empleo, incluyendo la retirada de arbolado menor de 10 cm.

O01A020	0,005	h.	Capataz	13,31	0,07
O01A070	0,005	h.	Peón ordinario	12,48	0,06
M05PC040	0,005	h.	Pala carg.cadenas 300 CV/4,5m3	77,16	0,39
M10MM010	0,005	h.	Motosierra gasolina l=40cm.1,8CV	2,27	0,01
M07CB030	0,005	h.	Camión basculante 6x4 20 t.	37,95	0,19

Suma la partida..		0,72
Costes indirectos	3,00%	0,02
TOTAL PARTIDA..		**0,74**

Asciende el precio total de la partida a la mencionada cantidad de CERO EUROS con SETENTA Y CUATRO CÉNTIMOS

U02CAD040 **m3** **DESMONTE TERRENO S/CLASIF.**

Desmonte en terreno sin clasificar a cielo abierto, con medios mecánicos incluso empleo de compresor y explosivos en caso necesario, con carga y transporte de los productos resultantes a vertedero o lugar de empleo.

O01A020	0,010	h.	Capataz	13,31	0,13
O01A030	0,010	h.	Oficial primera	13,12	0,13
O01A070	0,010	h.	Peón ordinario	12,48	0,12
M05EC040	0,010	h.	Excav.hidr.cadenas 310 CV	86,54	0,87
M06VF120	0,005	h.	V.P.martillo en fondo hidr.150mm	212,24	1,06
P01XG020	0,010	kg	Goma-2 D=55 mm.	3,26	0,03
P01XN010	0,020	kg	Nagolita a granel	1,20	0,02
P01XD010	0,010	ud	Detonador eléctrico	1,27	0,01
P01XC030	0,150	m.	Hilo de conexión	0,11	0,02
P01XC010	0,010	m.	Cordón detonante 12 gr.	0,50	0,01
M07CB030	0,010	h.	Camión basculante 6x4 20 t.	37,95	0,38
M05PC040	0,010	h.	Pala carg.cadenas 300 CV/4,5m3	77,16	0,77

Suma la partida..		3,55
Costes indirectos	3,00%	0,11
TOTAL PARTIDA..		**3,66**

Asciende el precio total de la partida a la mencionada cantidad de TRES EUROS con SESENTA Y SEIS CÉNTIMOS

U02CAD105 **m3** **EXCAVA. CIMIENTOS ESTRUCTURAS**

Excavación para los cimientos de las estructuras, incluso carga sobre camión de los productos resultantes de la excavación.

O01A020	0,009	h.	Capataz	13,31	0,12
M05EN030	0,045	h.	Excav.hidr.neumáticos 100 CV	47,57	2,14
M07CB030	0,020	h.	Camión basculante 6x4 20 t.	37,95	0,76

Suma la partida..		3,02
Costes indirectos	3,00%	0,09
TOTAL PARTIDA..		**3,11**

Asciende el precio total de la partida a la mencionada cantidad de TRES EUROS con ONCE CÉNTIMOS

U02CAT075 **m3** **TERRAPLÉN**

Terraplén con productos procedentes de la excavación, extendido en tongadas de 30 cm de espesor, humectación y compactación hasta el 95% del proctor modificado, incluso perfilado de taludes y rasanteo de la superficie de coronación, totalmente terminado.

O01A020	0,010	h.	Capataz	13,31	0,13
O01A070	0,010	h.	Peón ordinario	12,48	0,12
M08NM030	0,010	h.	Motoniveladora de 240 CV	63,27	0,63
M08CA110	0,010	h.	Cisterna agua s/camión 10.000 l.	28,15	0,28
M08RN050	0,010	h.	Rodillo vibr.autopr.mixto 17 t.	38,57	0,39

Suma la partida..		1,55
Costes indirectos	3,00%	0,05
TOTAL PARTIDA..		**1,60**

Asciende el precio total de la partida a la mencionada cantidad de UN EUROS con SESENTA CÉNTIMOS

U03CA020 **kg** **ACERO CORRUGADO B 500 S**

Acero corrugado B 500 S, cortado, doblado, armado y colocado en obra, incluso p.p. de despuntes. Según EHE.

O01BF030	0,012	h.	Oficial 1ª Ferrallista	15,39	0,18
O01BF040	0,012	h.	Ayudante- Ferrallista	14,72	0,18
P03AC200	1,080	kg	Acero corrugado B 500 S	1,78	1,92
P03AA020	0,005	kg	Alambre atar 1,30 mm.	1,41	0,01

Suma la partida..		2,29
Costes indirectos	3,00%	0,07
TOTAL PARTIDA..		**2,36**

Asciende el precio total de la partida a la mencionada cantidad de DOS EUROS con TREINTA Y SEIS CÉNTIMOS

U03CEF015 **m2** **ENCOF.MET.EN CIMENTACION**

Encofrado y desencofrado metálico en cimentación, hasta 50 posturas.

O01BE010	0,190	h.	Oficial 1ª Encofrador	15,27	2,90
O01BE020	0,190	h.	Ayudante- Encofrador	14,73	2,80
M12EF020	1,000	m2	Encof.panel metal.5/10 m2. 50 p.	0,55	0,55
P01DC010	0,075	kg	Aditivo desencofrante	1,43	0,11
M12EF040	0,100	m.	Fleje para encofrado metálico	0,20	0,02
P03AA020	0,050	kg	Alambre atar 1,30 mm.	1,41	0,07
P01UC020	1,000	kg	Puntas 17x70	1,23	1,23

Suma la partida..		7,68
Costes indirectos	3,00%	0,23
TOTAL PARTIDA..		**7,91**

Asciende el precio total de la partida a la mencionada cantidad de SIETE EUROS con NOVENTA Y UN CÉNTIMOS

U03CHC025 **m3** **HORM. HA-25/P/20/IIa CIM.V.MANUAL**

Hormigón para armar HA-25/P/40/IIa, de 25 N/mm2., consistencia blanda, Tmáx. 40 mm. y ambiente humedad alta, elaborado en central en relleno de zapatas y zanjas de cimentación, incluso encamillado de pilares y muros, vertido por medios manuales, vibrado, curado y colocado.Según EHE-08 y DB-SE-C.

O01BE010	0,250	h.	Oficial 1ª Encofrador	15,27	3,82
O01BE020	0,250	h.	Ayudante- Encofrador	14,73	3,68
M10HV080	0,200	h.	Vibrador hormigón gasolina 75 mm	2,43	0,49
P01HC088	1,050	m3	Hormigón HA-25/P/20/IIa central	60,79	63,83

Suma la partida..		71,82
Costes indirectos	3,00%	2,15
TOTAL PARTIDA..		**73,97**

Asciende el precio total de la partida a la mencionada cantidad de SETENTA Y TRES EUROS con NOVENTA Y SIETE CÉNTIMOS

U07WI010 **m2** **IMPERMEABILIZACIÓN BALSAS LÁMINA PEAD**

Impermeabilización del fondo y taludes de la balsa mediante lámina de polietileno de alta densidad de 1,5 cm de espesor, incluida instalación y parte proporcional de solapes y anclajes incluida.

O01A020	0,060	h.	Capataz	13,31	0,80
O01A070	0,060	h.	Peón ordinario	12,48	0,75
P26WI010	1,100	m2	Lámina impermeable PEAD e=1,5 mm	11,28	12,41

Suma la partida..		13,96
Costes indirectos	3,00%	0,42
TOTAL PARTIDA..		**14,38**

Asciende el precio total de la partida a la mencionada cantidad de CATORCE EUROS con TREINTA Y OCHO CÉNTIMOS

U09PA205 **ud** **CUPRESSUS SEMPERV.STRICTA 2,5-3**

Cupressus sempervirens stricta (Ciprés piramidal) de 2,50 a 3 m. de altura, suministrado en cepellón escayolado y plantación en hoyo de 1x1x1 m. con los medios indicados, abonado, formación de alcorque y primer riego.

O01BJ270	0,250	h.	Oficial 1ª Jardinero	14,35	3,59	
M07CG010	0,300	h.	Camión con grúa 6 t.	50,94	15,28	
P28EA200	1,000	ud	Cupressus semperv.stricta 2,5-3	80,83	80,83	
P01DW010	0,075	m3	Agua	0,91	0,07	
P28DA080	5,000	kg	Substrato vegetal fertilizado	0,06	0,30	
O01A070	0,600	h.	Peón ordinario	12,48	7,49	
M05EN030	0,200	h.	Excav.hidr.neumáticos 100 CV	47,57	9,51	
			Suma la partida			117,07
			Costes indirectos		3,00%	3,51
			TOTAL PARTIDA			**120,58**

Asciende el precio total de la partida a la mencionada cantidad de CIENTO VEINTE EUROS con CINCUENTA Y OCHO CÉNTIMOS

U12SS070 **ha** **HIDROSIEMBRA TALUD Z.SEMIÁRIDAS**

Hidrosiembra de taludes a base de una primera pasada con mezcla de semillas (25 % Agropyrum cristatum, 10% Agropyrum elongatum, 5 % Poa compressa, 25 % Lolium rigidum, 5 % Buchloe dactyloides, 10 % Medicago media, 15 % Melilotus officinalis, 5 % Melilotus alba), abono mineral complejo de liberación lenta 8-15-15,mulch orgánico, estabilizadores orgánicos y polímero absorbente de agua, tapado inmediatamente después con mulch y estabilizador orgánico.

O01A030	3,000	h.	Oficial primera	13,12	39,36	
O01A070	12,000	h.	Peón ordinario	12,48	149,76	
M09MH010	12,000	h.	Hidrosembr. s/camión 6000 l.	81,96	983,52	
P28MP055	350,000	kg	Mezcla semillas z.semiáridas	4,48	1.568,00	
P28SM130	170,000	kg	Estabilizante orgánico de suelos	4,15	705,50	
P28DF050	400,000	kg	Abono micelios	1,57	628,00	
P28SM110	300,000	kg	Mulch de paja	0,25	75,00	
P28SM120	850,000	kg	Mulch celulósico biodegradable	2,73	2.320,50	
P28SM160	50,000	kg	Polímeros sint. absorbent.	16,97	848,50	
P01DW010	50,000	m3	Agua	0,91	45,50	
			Suma la partida			7.363,64
			Costes indirectos		3,00%	220,91
			TOTAL PARTIDA			**7.584,55**

Asciende el precio total de la partida a la mencionada cantidad de SIETE MIL QUINIENTOS OCHENTA Y CUATRO EUROS con CINCUENTA Y
CINCO CÉNTIMOS

ANEJO Nº 15

PLAN DE OBRA

PLAN DE OBRA	MESES
1. ACTUACIONES PREVIAS	13
DESBROCE, TALADO Y DESTOCONADO	13
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3. MOVIMIENTO DE TIERRAS	34
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4. ESTRUCTURAS	45
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ESTRUCTURAS METÁLICAS	45
5. INTEGRACIÓN AMBIENTAL	6
6. VARIOS	39
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CERAMIENTO	7
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7. SEGURIDAD Y SALUD	78
8. GESTIÓN DE RESIDUOS	78

AÑO 1

	PRESUPUESTO MENSUAL	PRESUPUESTO ACUMULADO
E	122.719,52 €	122.719,52 €
F	122.719,52 €	245.439,05 €
M	122.719,52 €	368.158,57 €
A	122.719,52 €	490.878,09 €
M	122.719,52 €	613.597,61 €
Jn	122.719,52 €	736.317,14 €
Jl	122.719,52 €	859.036,66 €
A	122.719,52 €	981.756,18 €
S	122.719,52 €	1.104.475,70 €
O	122.719,52 €	1.227.195,23 €
N	122.719,52 €	1.349.914,75 €
D	481.560,09 €	1.831.474,84 €

AÑO 2

	PRESUPUESTO MENSUAL	PRESUPUESTO ACUMULADO
E	481.560,09 €	2.313.034,92 €
F	385.339,95 €	2.698.374,87 €
M	338.871,42 €	3.037.246,29 €
A	486.794,52 €	3.524.040,81 €
M	486.794,52 €	4.010.835,34 €
Jn	486.794,52 €	4.497.629,86 €
Jl	486.794,52 €	4.984.424,38 €
A	486.794,52 €	5.471.218,91 €
S	486.794,52 €	5.958.013,43 €
O	486.794,52 €	6.444.807,95 €
N	486.794,52 €	6.931.602,47 €
D	486.794,52 €	7.418.397,00 €

AÑO 3

	PRESUPUESTO MENSUAL	PRESUPUESTO ACUMULADO
E	486.794,52 €	7.905.191,52 €
F	486.794,52 €	8.391.986,04 €
M	486.794,52 €	8.878.780,57 €
A	486.794,52 €	9.365.575,09 €
M	486.794,52 €	9.852.369,61 €
Jn	486.794,52 €	10.339.164,14 €
Jl	486.794,52 €	10.825.958,66 €
A	4.437.250,96 €	15.263.209,62 €
S	4.437.250,96 €	19.700.460,58 €
O	4.437.250,96 €	24.137.711,54 €
N	4.437.250,96 €	28.574.962,50 €
D	4.452.776,32 €	33.027.738,83 €

PLAN DE OBRA	MESES
1. ACTUACIONES PREVIAS	13
DESBROCE, TALADO Y DESTOCONADO	13
2. REPOSICIÓN DE SERVICIOS	3
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DESMONTE	26
TERRAPLÉN	24
EXCAVACIÓN CIMENTACIONES	10
4. ESTRUCTURAS	45
CIMENTACIONES	22
ESTRUCTURAS METÁLICAS	45
5. INTEGRACIÓN AMBIENTAL	6
6. VARIOS	39
IMPERMEABILIZACIÓN BALSAS	3
CERAMIENTO	7
LIMPIEZA	2
7. SEGURIDAD Y SALUD	78
8. GESTIÓN DE RESIDUOS	78

AÑO 4

	PRESUPUESTO MENSUAL	PRESUPUESTO ACUMULADO
E	4.452.776,32 €	37.480.515,15 €
F	4.708.948,54 €	42.189.463,69 €
M	4.708.948,54 €	46.898.412,23 €
A	5.023.786,03 €	51.922.198,26 €
M	5.023.786,03 €	56.945.984,29 €
Jn	5.023.786,03 €	61.969.770,31 €
Jl	4.585.140,66 €	66.554.910,98 €
A	4.585.140,66 €	71.140.051,64 €
S	4.585.140,66 €	75.725.192,30 €
O	4.703.209,81 €	80.428.402,12 €
N	4.679.094,58 €	85.107.496,70 €
D	4.679.094,58 €	89.786.591,29 €

AÑO 5

	PRESUPUESTO MENSUAL	PRESUPUESTO ACUMULADO
E	4.679.094,58 €	94.465.685,87 €
F	4.679.094,58 €	99.144.780,46 €
M	4.679.094,58 €	103.823.875,04 €
A	4.545.500,07 €	108.369.375,11 €
M	4.545.500,07 €	112.914.875,18 €
Jn	4.545.500,07 €	117.460.375,26 €
Jl	4.545.500,07 €	122.005.875,33 €
A	4.545.500,07 €	126.551.375,40 €
S	4.545.500,07 €	131.096.875,47 €
O	4.545.500,07 €	135.642.375,54 €
N	4.545.500,07 €	140.187.875,61 €
D	3.976.955,82 €	144.164.831,44 €

AÑO 6

	PRESUPUESTO MENSUAL	PRESUPUESTO ACUMULADO
E	3.976.955,82 €	148.141.787,26 €
F	3.976.955,82 €	152.118.743,08 €
M	3.976.955,82 €	156.095.698,91 €
A	3.976.955,82 €	160.072.654,73 €
M	3.976.955,82 €	164.049.610,56 €
Jn	3.976.955,82 €	168.026.566,38 €
Jl	3.976.955,82 €	172.003.522,20 €
A	3.976.955,82 €	175.980.478,03 €
S	3.976.955,82 €	179.957.433,85 €
O	3.976.955,82 €	183.934.389,68 €
N	3.976.955,82 €	187.911.345,50 €
D	3.976.955,82 €	191.888.301,32 €

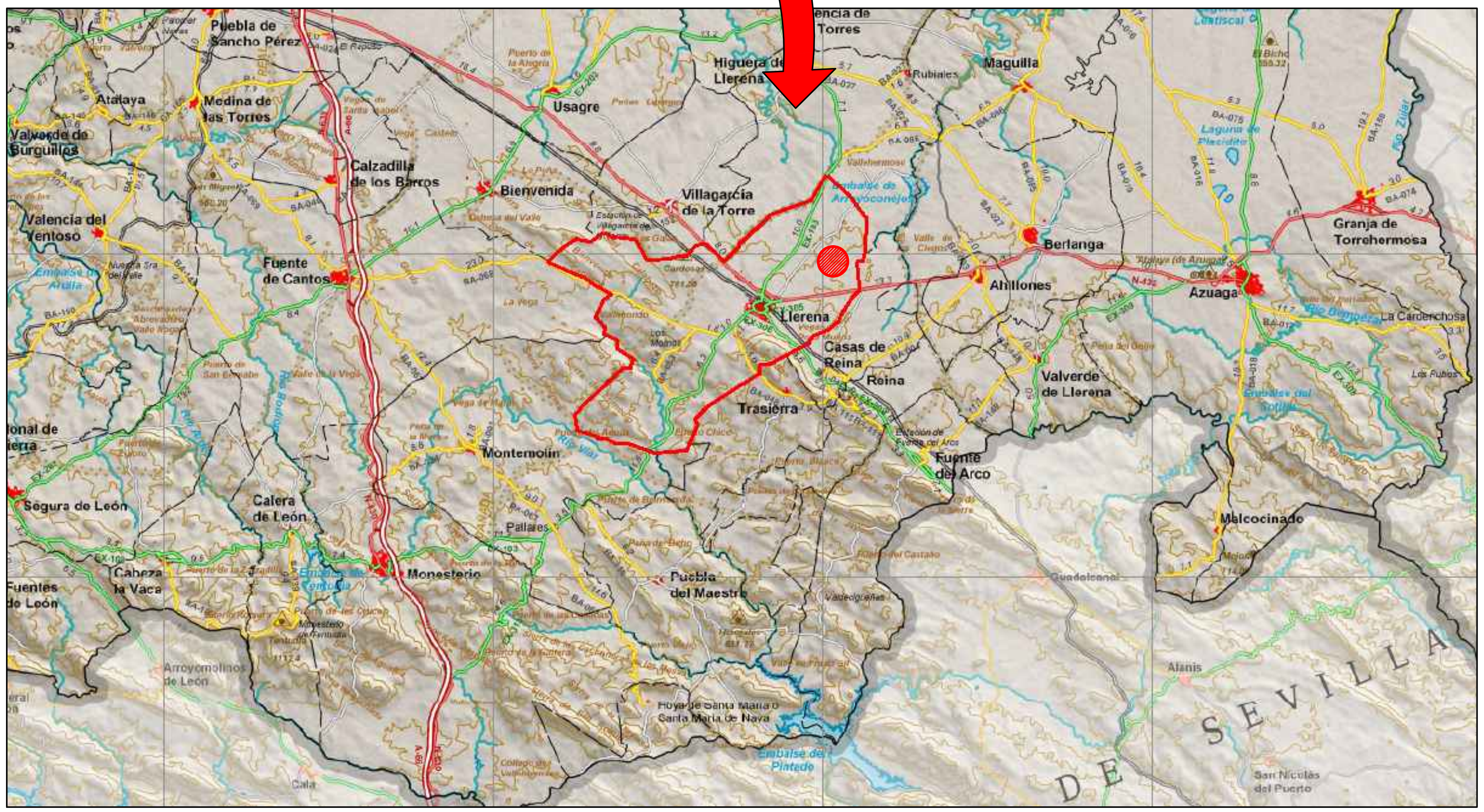
PLAN DE OBRA	MESES	AÑO 7						COSTE
		E	F	M	A	M	Jn	
1. ACTUACIONES PREVIAS	13							1.250.861,78 €
DESBROCE, TALADO Y DESTOCONADO	13							1.250.861,78 €
2. REPOSICIÓN DE SERVICIOS	3							139.405,60 €
3. MOVIMIENTO DE TIERRAS	34							11.827.080,99 €
DESMONTE	26							8.121.672,82 €
TERRAPLÉN	24							3.550.154,54 €
EXCAVACIÓN CIMENTACIONES	10							155.253,63 €
4. ESTRUCTURAS	45							190.278.513,17 €
CIMENTACIONES	22							12.507.973,45 €
ESTRUCTURAS METÁLICAS	45							177.770.539,72 €
5. INTEGRACIÓN AMBIENTAL	6							801.567,08 €
6. VARIOS	39							1.496.742,69 €
IMPERMEABILIZACIÓN BALSAS	3							1.315.936,09 €
CERAMIENTO	7							168.806,60 €
LIMPIEZA	2							12.000,00 €
7. SEGURIDAD Y SALUD	78							885.867,74 €
8. GESTIÓN DE RESIDUOS	78							1.181.084,34 €

PRESUPUESTO MENSUAL	3.976.955,82 €	3.976.955,82 €	3.976.955,82 €	3.976.955,82 €	32.499,39 €	32.499,39 €
PRESUPUESTO ACUMULADO	195.865.257,15 €	199.842.212,97 €	203.819.168,79 €	207.796.124,62 €	207.828.624,00 €	207.861.123,39 €

DOCUMENTO Nº 2

PLANOS

ÍNDICE DE PLANOS



UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO SITUACIÓN		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 1
ESCALAS S/ ESCALAS		**HOJA Nº** 1 **DE** 1

X = 232850
Y = 4241000

X = 243950
Y = 4241000

X = 232850
Y = 42353300

X = 243950
Y = 42353300

10 5 0 10 20 30 40 hm

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES	
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR	
DESIGNACIÓN DEL PLANO PERFIL LONGITUDINAL	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ / **FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO:** 2
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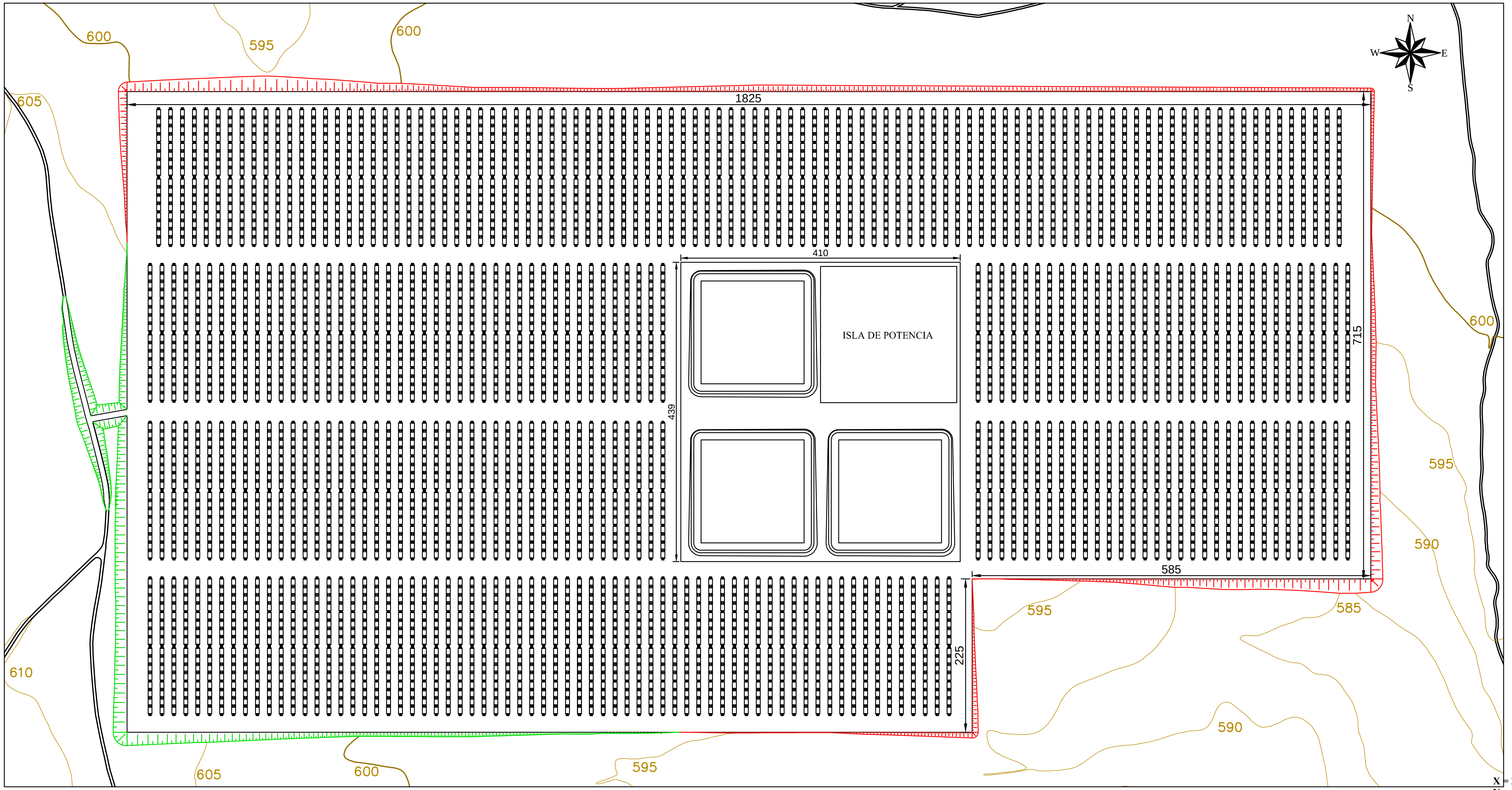

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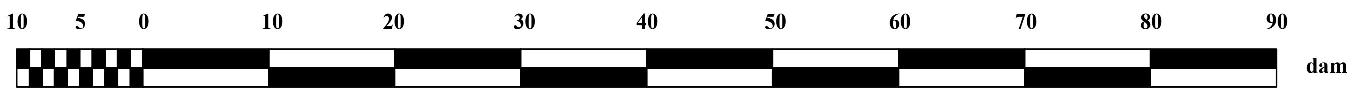

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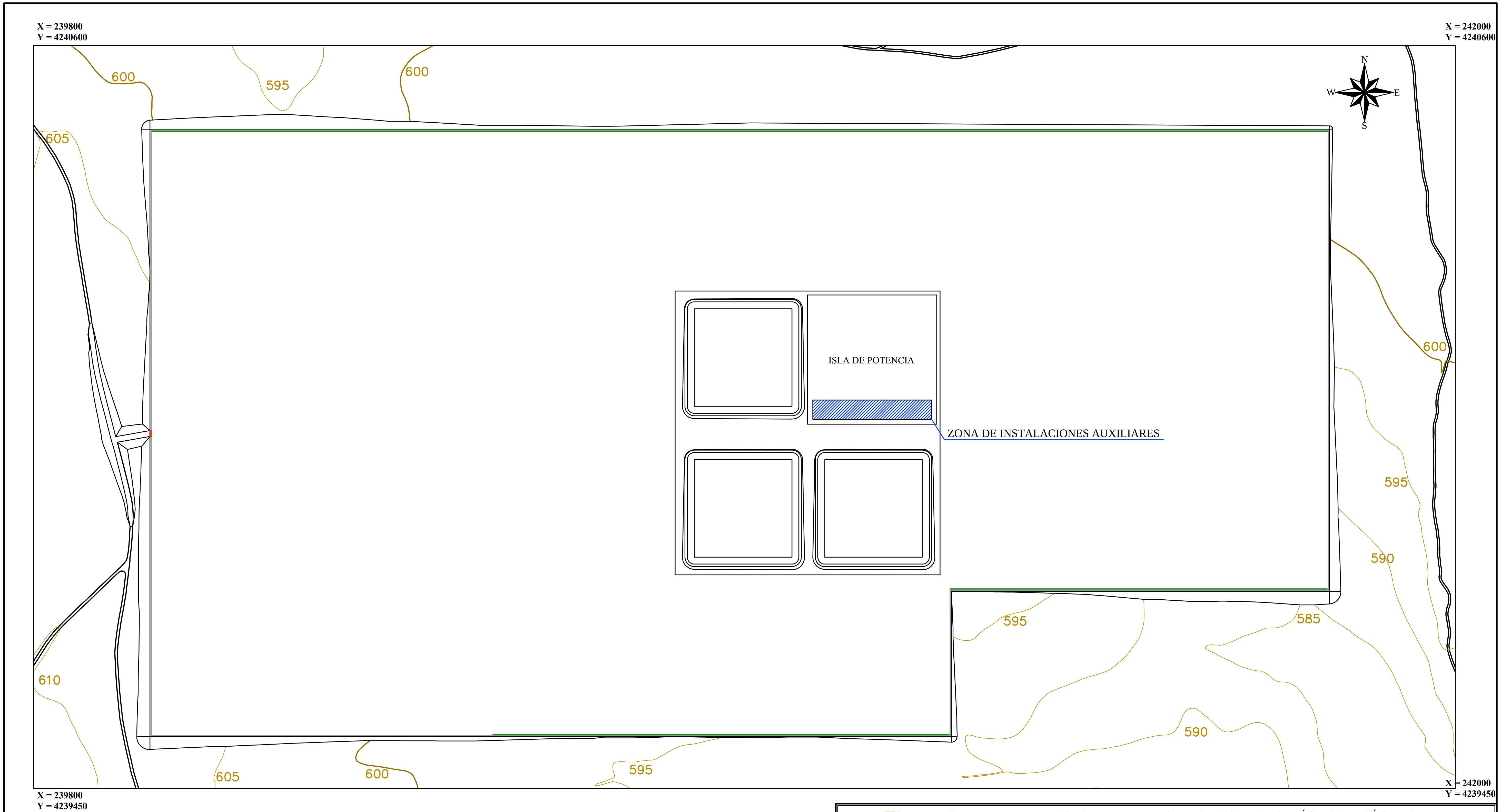
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO	PLANTA GENERAL		
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 3
ESCALAS	E = 1:6.000		**HOJA Nº** 1 **DE** 3



Malla de cerramiento

Puerta de cerramiento

Plantaciones

10 5 0 10 20 30 40 50 60 70 80 90 dam

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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO PLANTA GENERAL - CERRAMIENTOS Y PLANTACIONES		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 3
ESCALAS E = 1:6.000		**HOJA Nº** 2 **DE** 3

X = 240950
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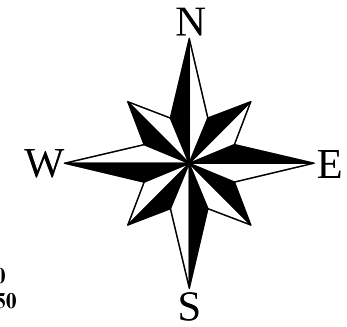
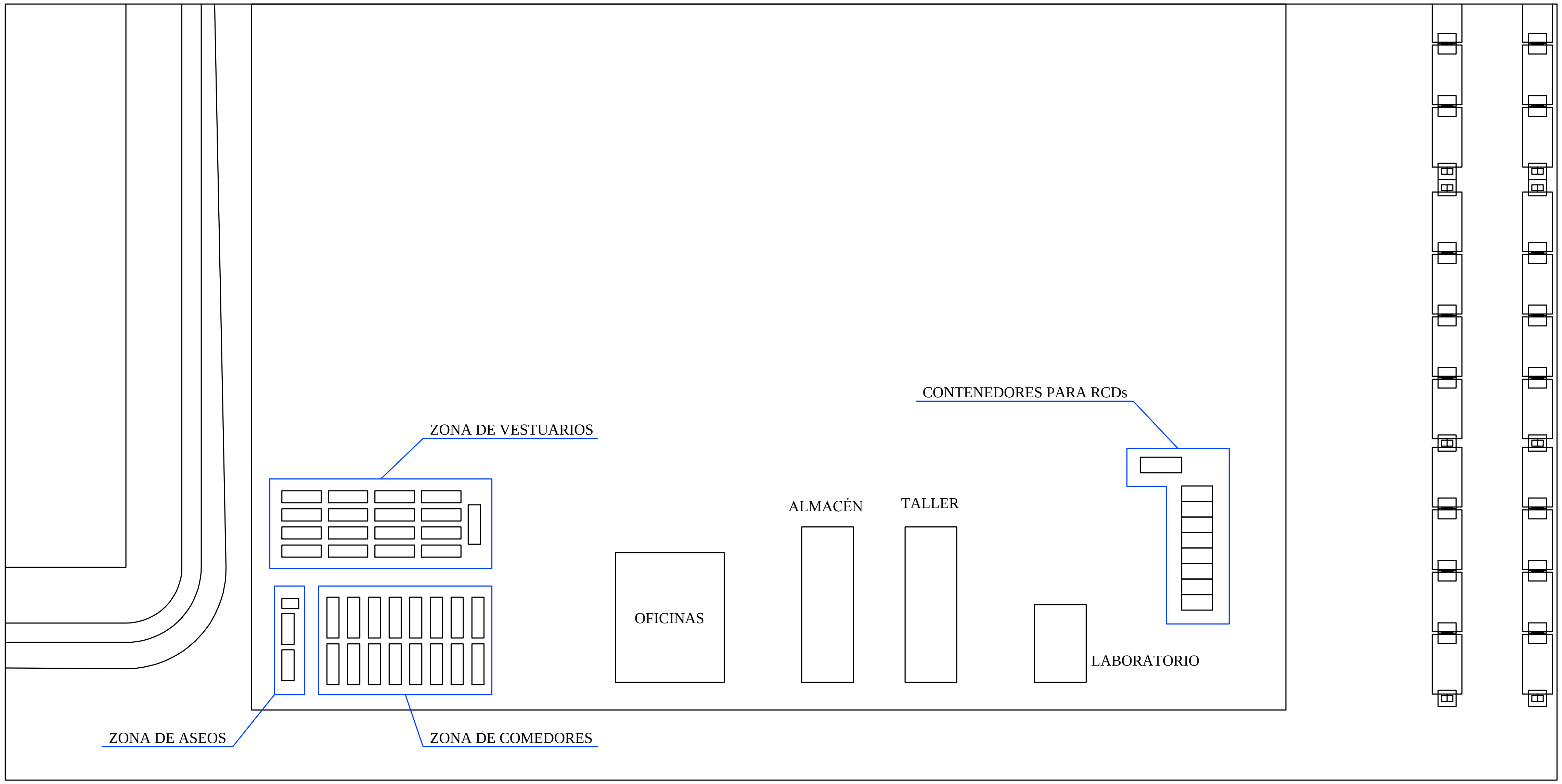
X = 241250
Y = 4240150





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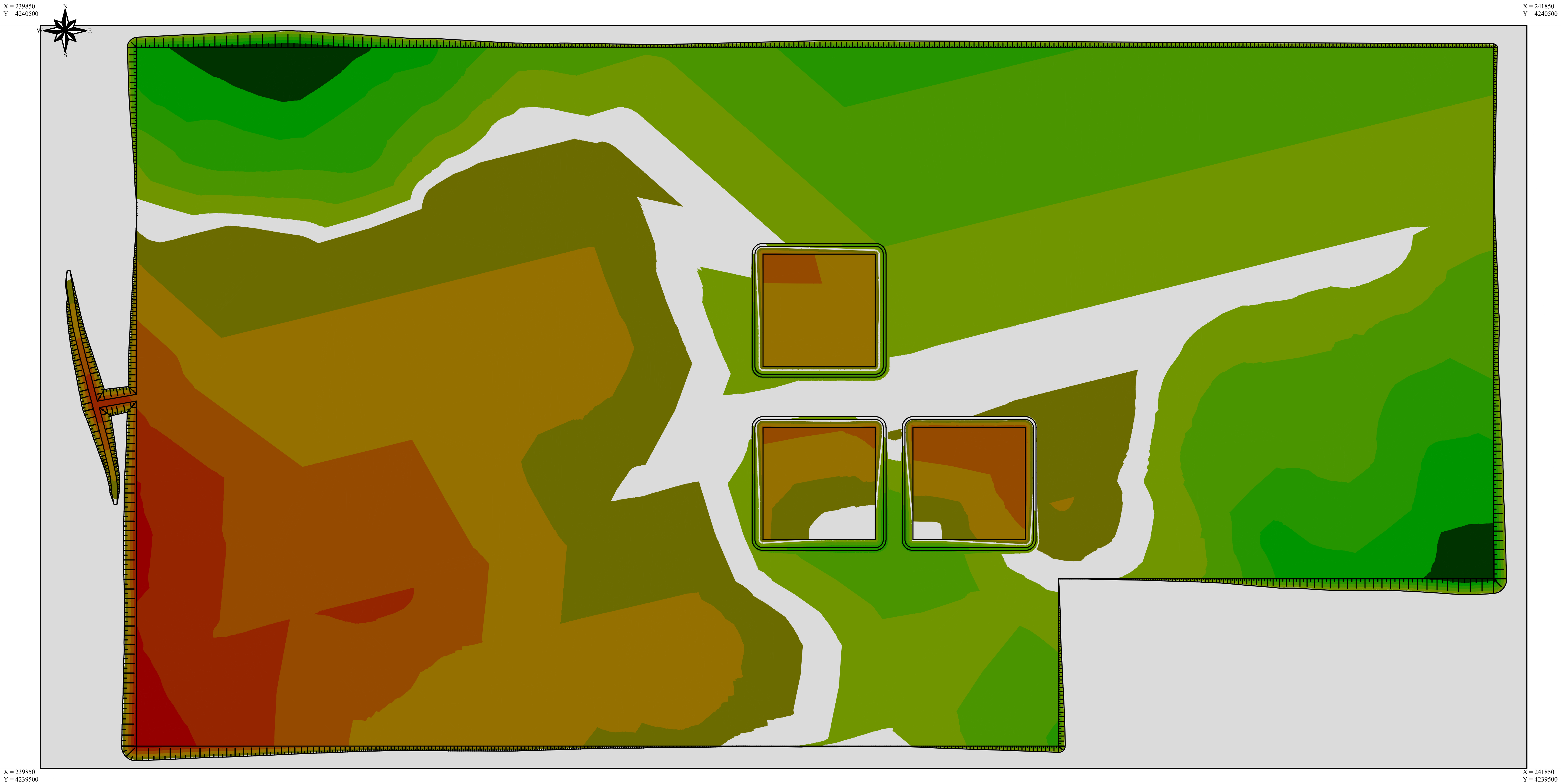
X = 241250
Y = 4240000

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
PLANTA GENERAL - INSTALACIONES AUXILIARES

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 3
ESCALAS E = 1:1.000		**HOJA Nº** 3 **DE** 3



DESMONTE	PLANO	TERRAPLÉN
-10 a -8 m	-0,5 a 0,5 m	0,5 a 2 m
-8 a -6 m		2 a 4 m
-6 a -4 m		4 a 6 m
-4 a -2 m		6 a 8 m
-2 a -0,5 m		8 a 11 m

10 5 0 10 20 30 40 50 60 dam

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ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
MOVIMIENTOS DE TIERRA

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

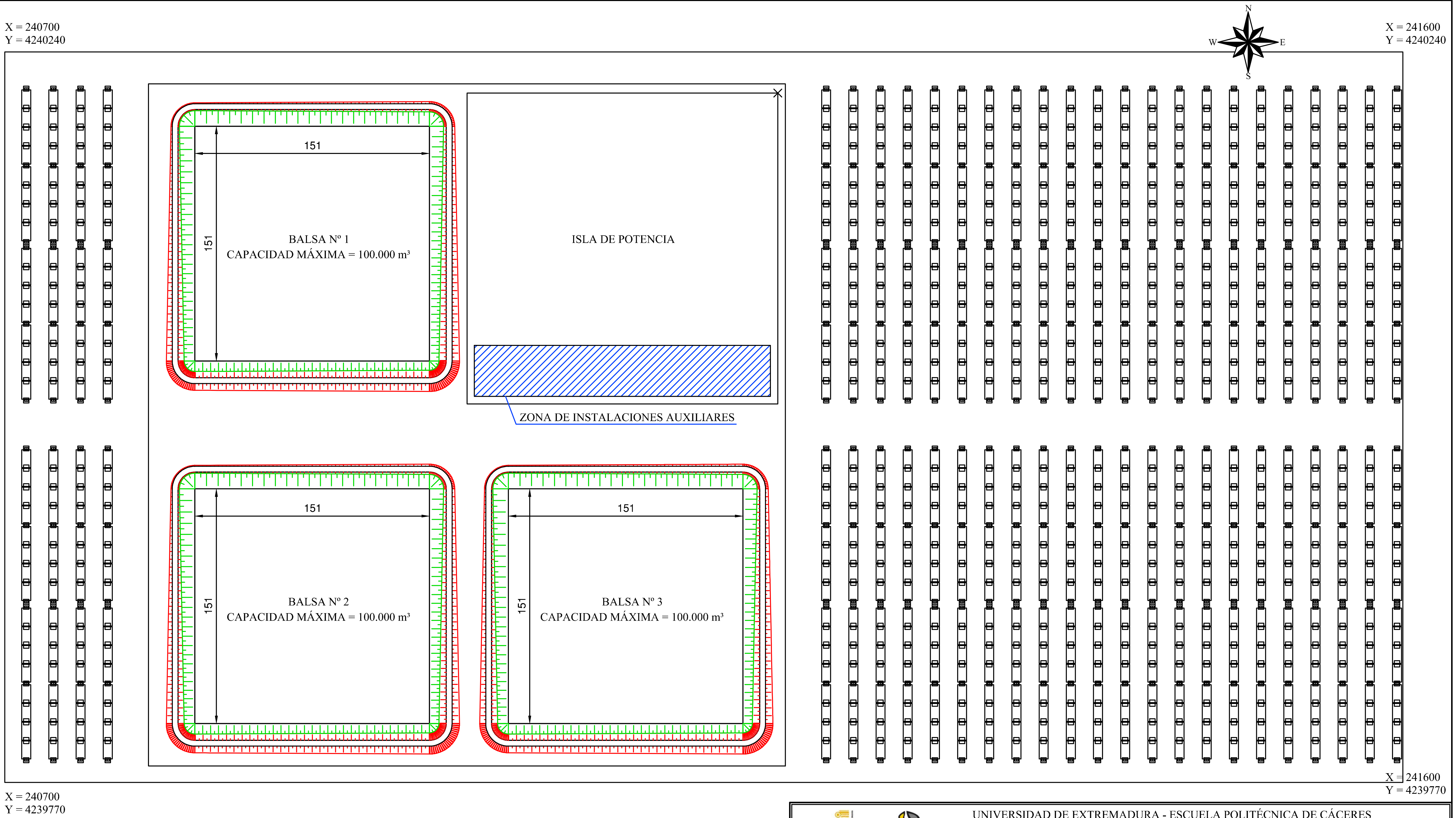
FECHA: FEBRERO 2016

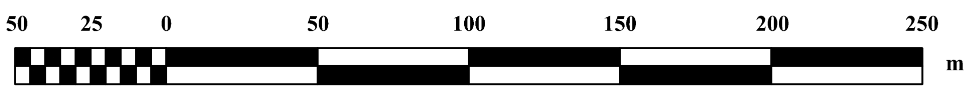
TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: 4

ESCALAS
E = 1:5.500

HOJA Nº 1 **DE** 1





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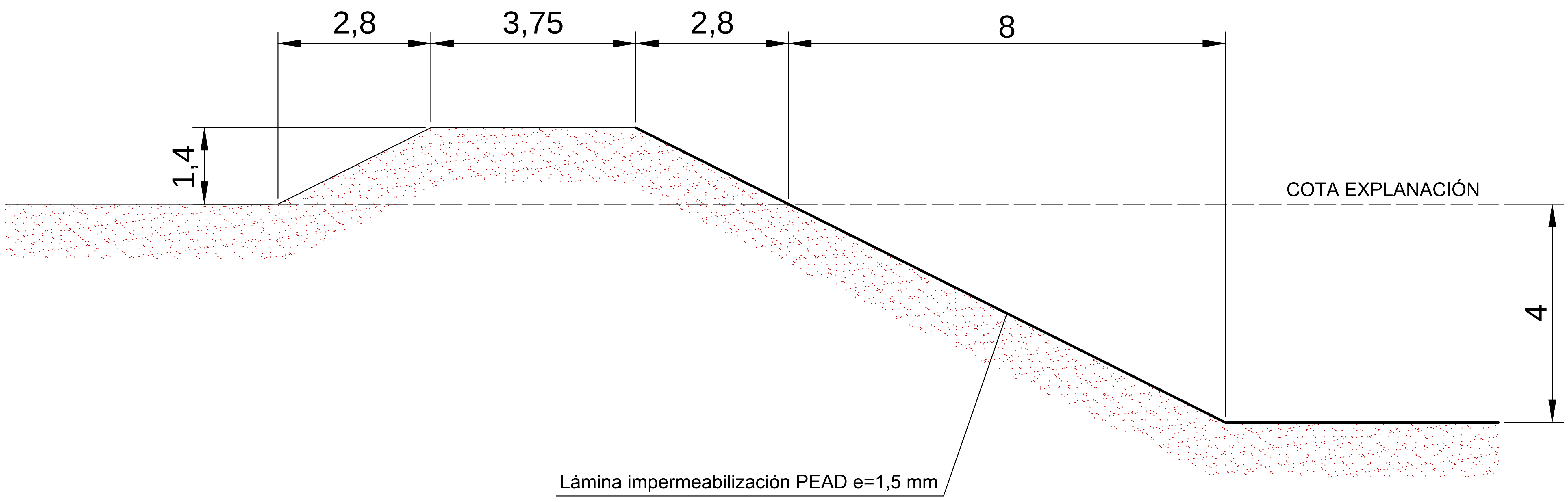
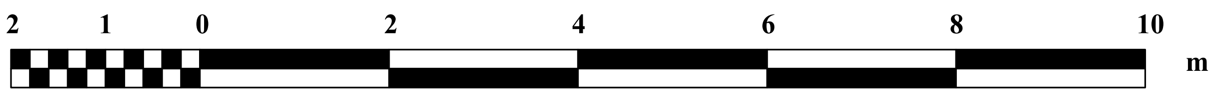
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
BALSAS - PLANTA

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 5
ESCALAS E = 1:2.500		**HOJA Nº** 1 **DE** 2





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GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
BALSAS - DETALLE SECCIÓN TIPO

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

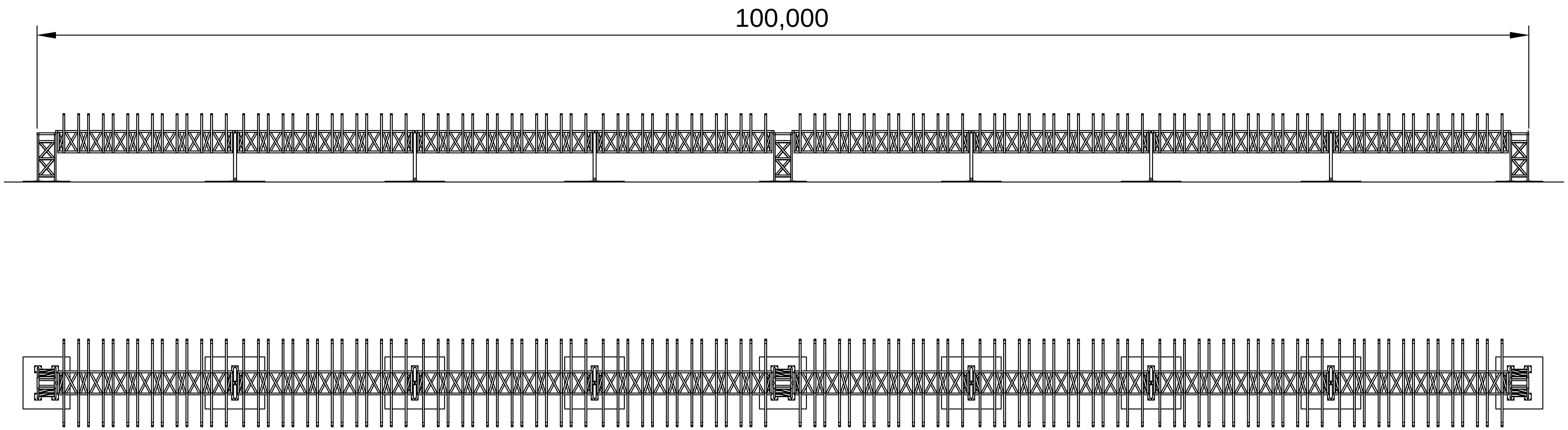
FECHA: FEBRERO 2016

TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: 5

ESCALAS
E = 1:80

HOJA Nº 2 **DE** 2



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GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

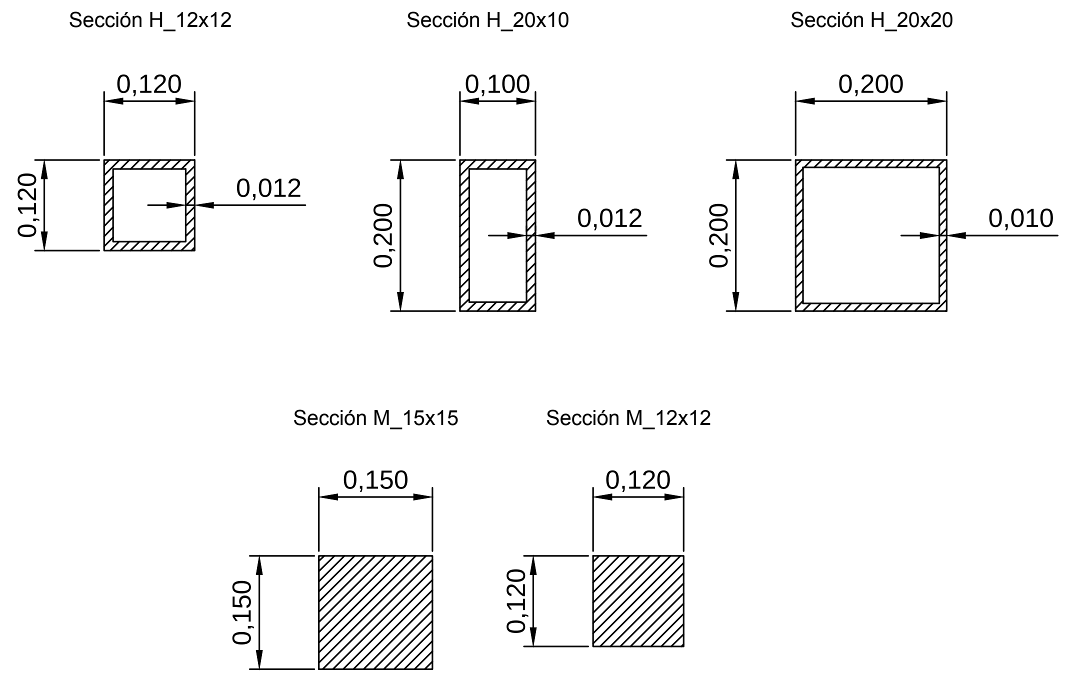
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
COLECTORES - MÓDULO 100 METROS

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 6
ESCALAS E = 1:300		**HOJA Nº** 1 **DE** 22

TIPO DE BARRA	UBICACIÓN	SECCIÓN	Nº BARRAS/ COLECTOR	Nº BARRAS/ MÓD. 100 M
0	Larguero	Sección H_12x12	4	32
1	Cara Superior/Inferior	Sección H_12x12	30	240
2	Cara Superior/Inferior	Sección H_12x12	4	32
3	Cara Superior/Inferior	Sección H_12x12	14	112
4	Cara Superior/Inferior	Sección H_12x12	12	96
5	Cara Superior	Sección M_12x12	2	16
6	Cara Lateral	Sección H_12x12	32	256
7	Cara Lateral	Sección H_12x12	4	32
8	Cara Lateral	Sección H_12x12	14	112
9	Cara Lateral	Sección H_12x12	12	96
B1	Brazo	Sección H_12x12	28	224
B2	Brazo	Sección H_12x12	28	224
B3	Brazo	Sección H_12x12	28	224
B4	Brazo	Sección H_12x12	28	224
A1	Apoyo Simple	Sección H_20x20	2	12
A2	Apoyo Simple	Sección H_20x10	1	6
A3	Apoyo Doble	Sección H_20x10	4	12
A4	Apoyo Doble	Sección H_20x10	2	6
A5	Apoyo Doble	Sección H_20x10	2	6
A6	Apoyo Doble	Sección H_12x12	6	18
A7	Apoyo Doble	Sección H_12x12	4	12
A8	Apoyo Doble	Sección H_12x12	2	6
A9	Apoyo Doble	Sección H_12x12	2	6
G1	Sistema Giro	Sección M_15x15	1	12
G2	Sistema Giro	Sección M_15x15	1	4
G3	Sistema Giro	Sección H_12x12	4	32
G4	Sistema Giro	Sección H_12x12	4	32

SECCIÓN	Nº BARRAS/ COLECTOR	LONGITUD/ COLECTOR	Nº BARRAS/ MÓD. 100 M	LONGITUD/ MÓD. 100 M	PESO/METRO	PESO BARRAS/ COLECTOR	PESO BARRAS/ MOD. 100 M
Sección H_12x12	260	437,746 m	2010	3.423,238 m	40,7 kg/m	17.816,262 kg	139.325,787 kg
Sección H_20x10	9	19,945 m	30	64,566 m	52,0 kg/m	1.037,140 kg	3.357,432 kg
Sección H_20x20	2	6,790 m	12	40,740 m	59,7 kg/m	405,363 kg	2.432,178 kg
Sección M_15x15	2	0,280 m	16	2,240 m	176,6 kg/m	49,448 kg	395,584 kg
Sección M_12x12	2	2,720 m	16	21,760 m	113,0 kg/m	307,360 kg	2.458,880 kg
						19.615,573 kg	147.969,861 kg



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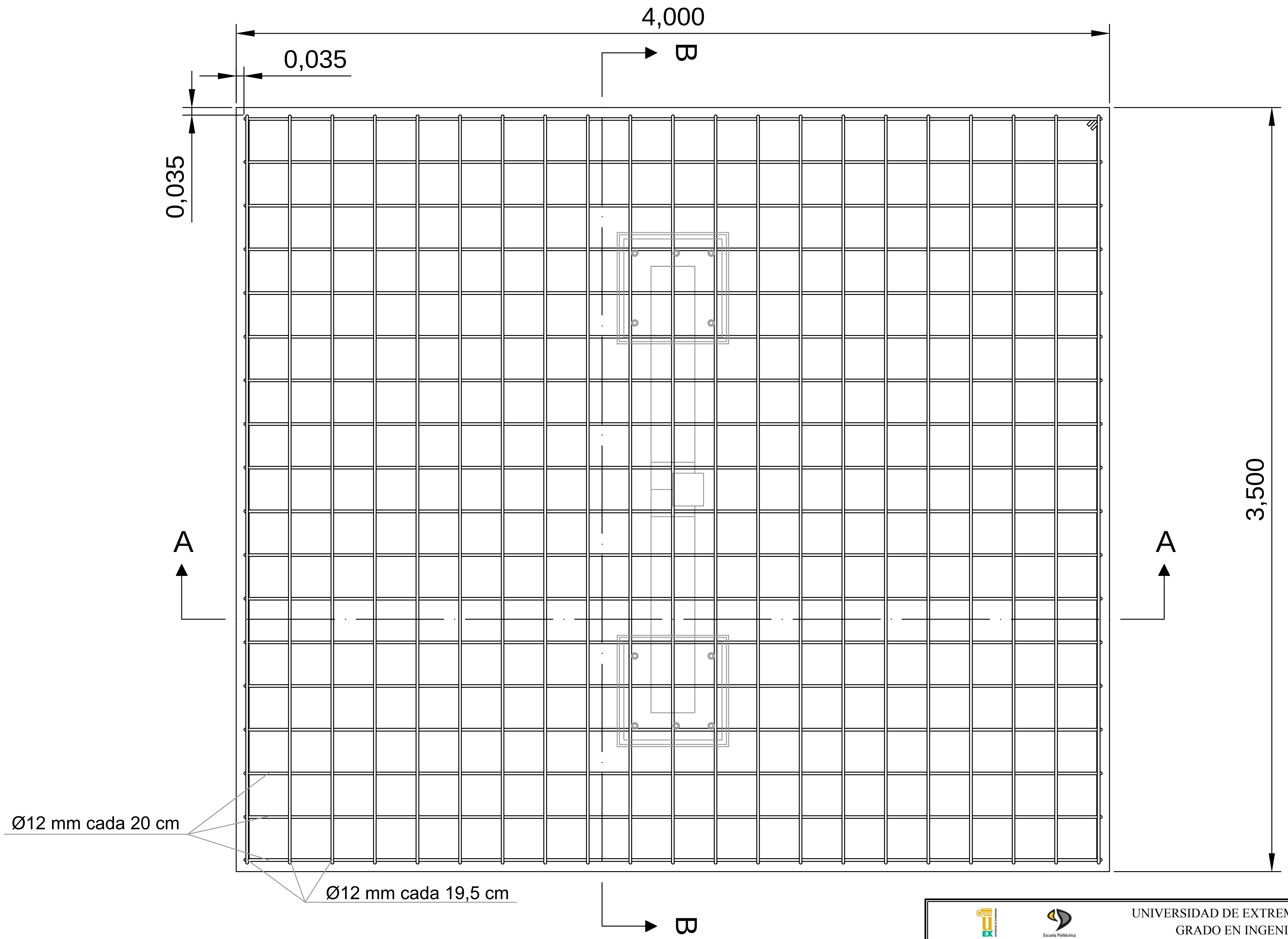
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
RESUMEN BARRAS Y SECCIONES UTILIZADAS EN EL COLECTOR

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 6
ESCALAS E = 1:10		**HOJA Nº** 10 **DE** 22



Hormigón Cimentación	Acero
HA-25/P/20/IIa	B500S
Hormigón de limpieza	
HM-5/B/20	

5 2,5 0 5 10 15 20 25 dm

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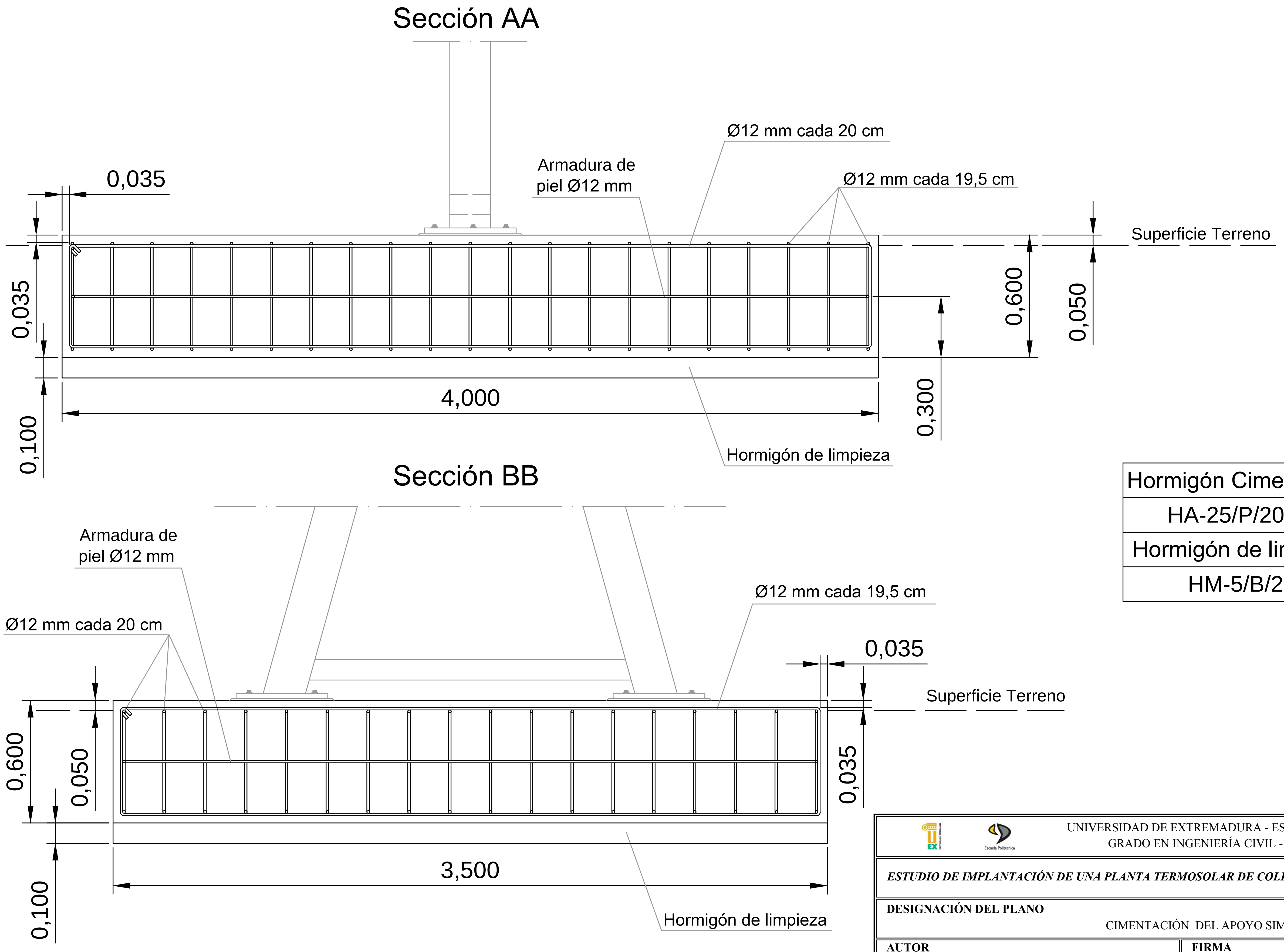
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
CIMENTACIÓN DEL APOYO SIMPLE

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 6
ESCALAS E = 1:20		**HOJA Nº** 11 **DE** 22



Hormigón Cimentación	Acero
HA-25/P/20/IIa	B500S
Hormigón de limpieza	
HM-5/B/20	

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

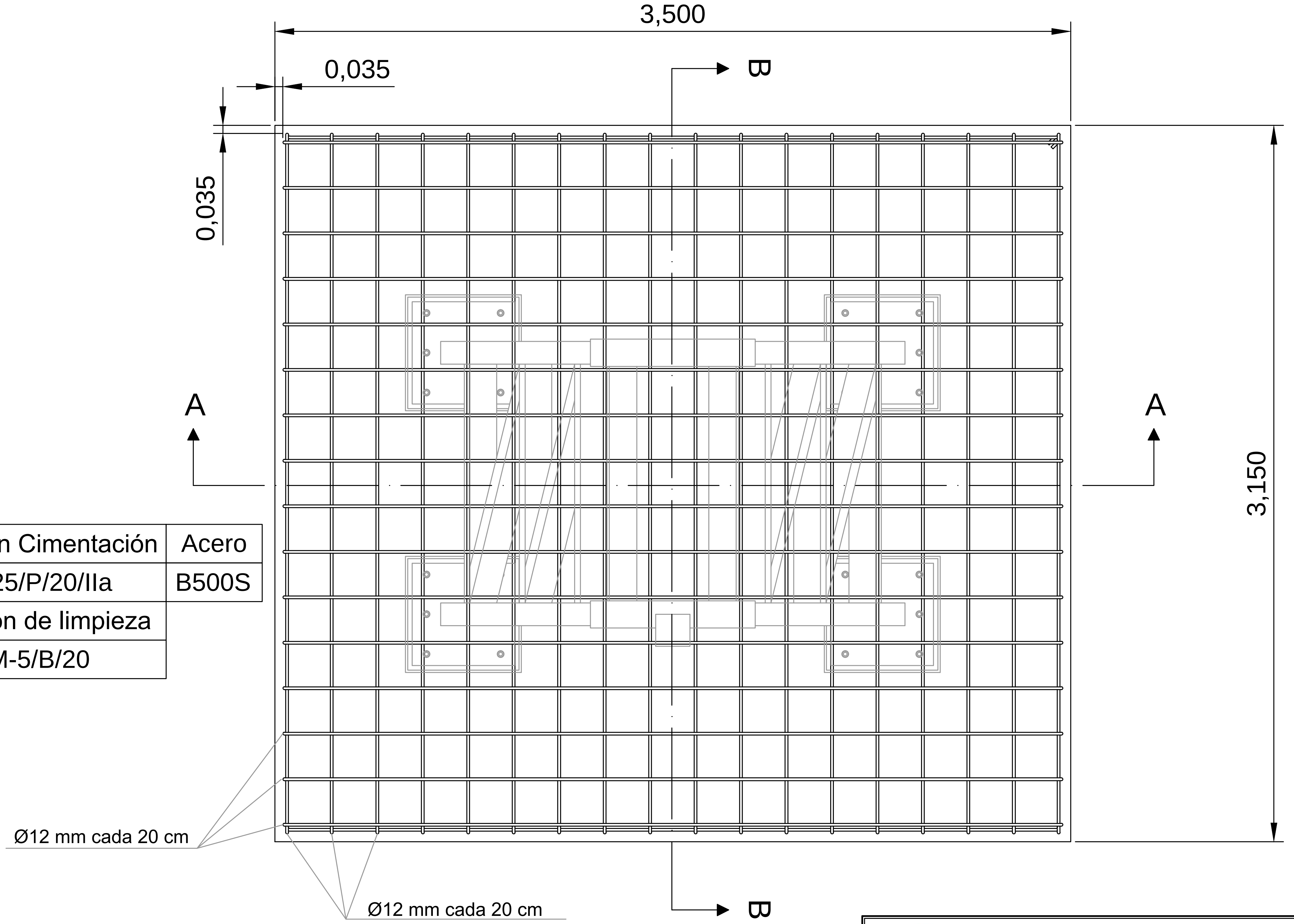
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
CIMENTACIÓN DEL APOYO SIMPLE - SECCIONES DE DETALLE

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ | **FIRMA** | **FECHA:** FEBRERO 2016

TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO | **Nº DE PLANO:** 6

ESCALAS E = 1:20 | **HOJA Nº** 12 **DE** 22



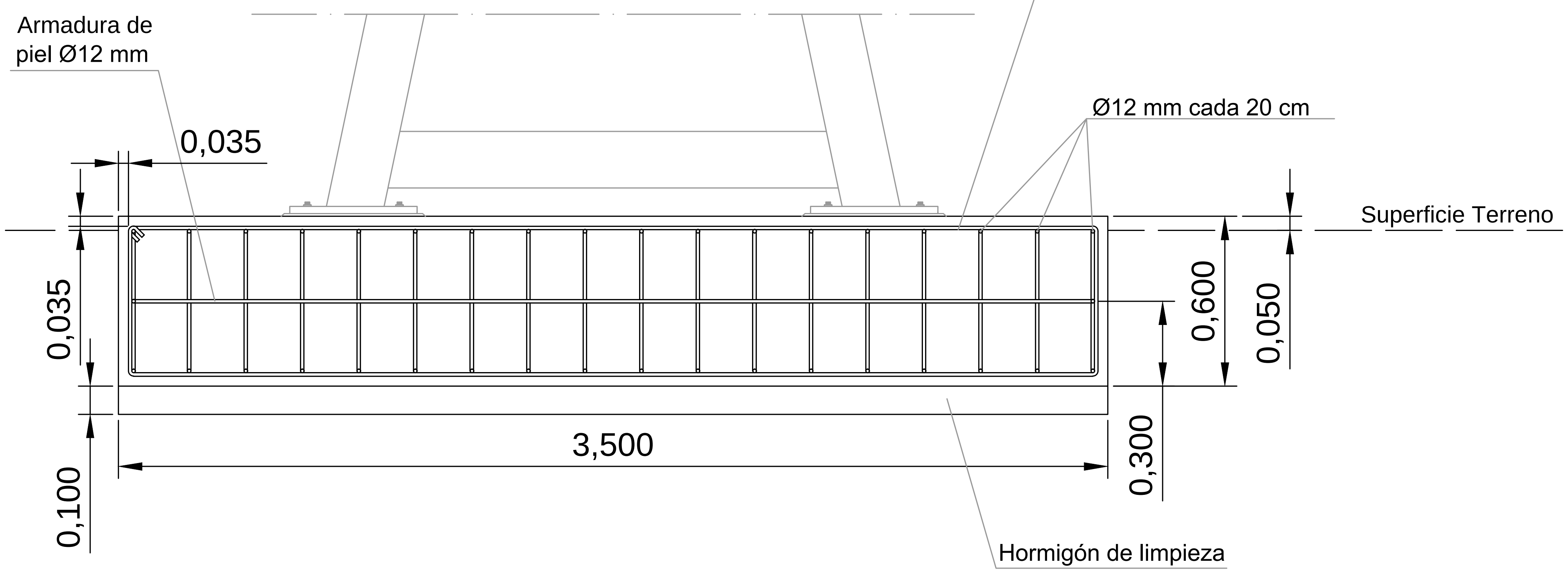
Hormigón Cimentación	Acero
HA-25/P/20/IIa	B500S
Hormigón de limpieza	
HM-5/B/20	

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

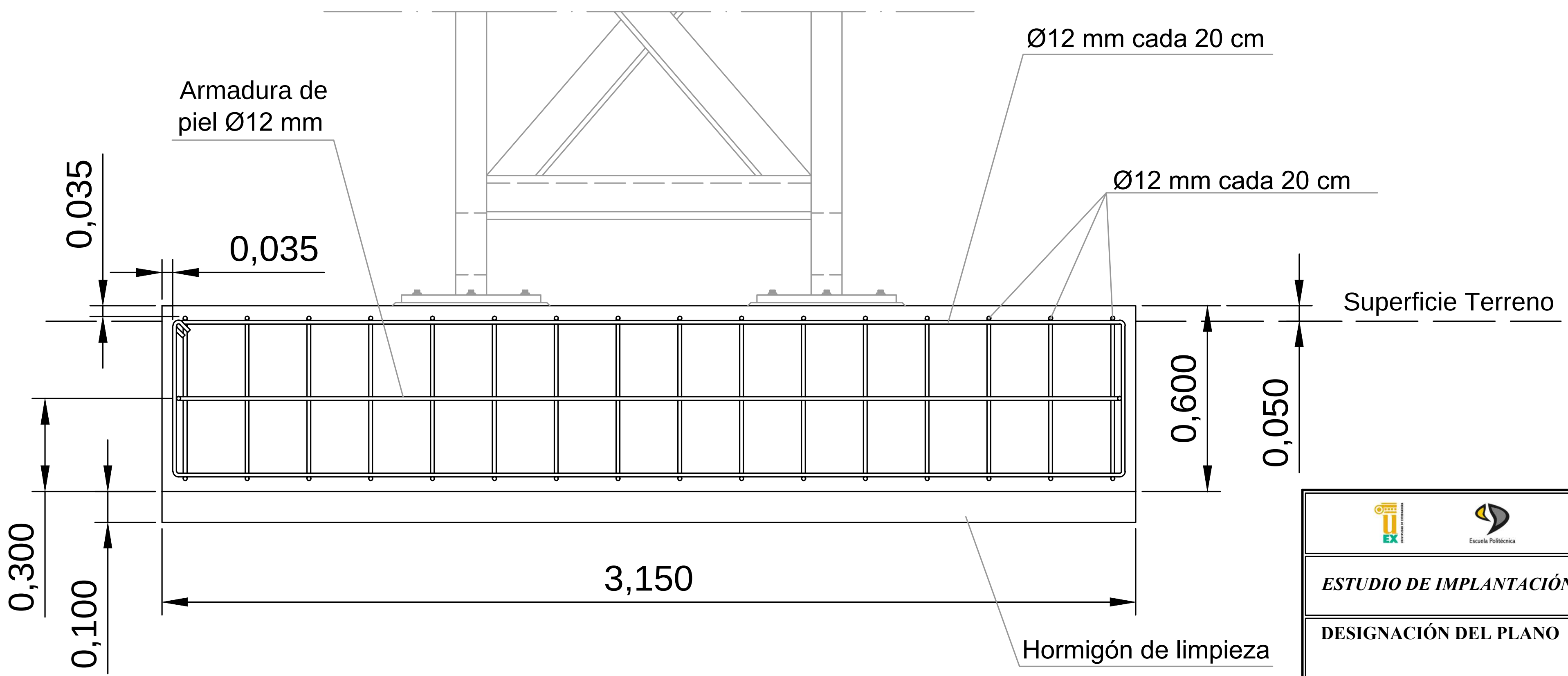
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO	CIMENTACIÓN DEL APOYO DOBLE
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ
FIRMA	
FECHA:	FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO
Nº DE PLANO:	**6**
ESCALAS	E = 1:20
HOJA Nº	**13 DE 22**

Sección AA



Sección BB



Hormigón Cimentación	Acero
HA-25/P/20/IIa	B500S
Hormigón de limpieza	
HM-5/B/20	

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GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
CIMENTACIÓN DEL APOYO DOBLE - SECCIONES DE DETALLE

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ | **FIRMA** | **FECHA:** FEBRERO 2016

TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO | **Nº DE PLANO:** 6

ESCALAS E = 1:20 | **HOJA Nº** 14 **DE** 22

CIMENTACIÓN DEL APOYO SIMPLE

BARRA	LONGITUD TOTAL	Nº DE BARRAS	PESO UNITARIO	PESO TOTAL
0,37 / 3,9 / 0,37	4,64 m	36	1,58 kg/m	263,92 kg
0,37 / 3,4 / 0,37	4,14 m	42	1,58 kg/m	274,73 kg
0,5 / 3,9 / 0,5	4,90 m	2	1,58 kg/m	15,48 kg
0,5 / 3,4 / 0,5	4,40 m	2	1,58 kg/m	13,90 kg

CIMENTACIÓN DEL APOYO DOBLE

BARRA	LONGITUD TOTAL	Nº DE BARRAS	PESO UNITARIO	PESO TOTAL
0,37 / 3,1 / 0,37	3,84 m	36	1,58 kg/m	218,42 kg
0,37 / 3,4 / 0,37	4,14 m	32	1,58 kg/m	209,32 kg
0,5 / 3,4 / 0,5	4,40 m	2	1,58 kg/m	13,90 kg
0,5 / 3,0 / 0,5	4,00 m	2	1,58 kg/m	12,64 kg

CIMENTACIÓN	PESO TOTAL	CIMENTACIONES/MÓD. 100 m	PESO TOTAL/MÓD. 100 m
APOYO SIMPLE	568,03 kg	6	3.408,18 kg
APOYO DOBLE	454,28 kg	3	1.362,84 kg
			4.771,02 kg

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO RESUMEN BARRAS DE LAS CIMENTACIONES

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

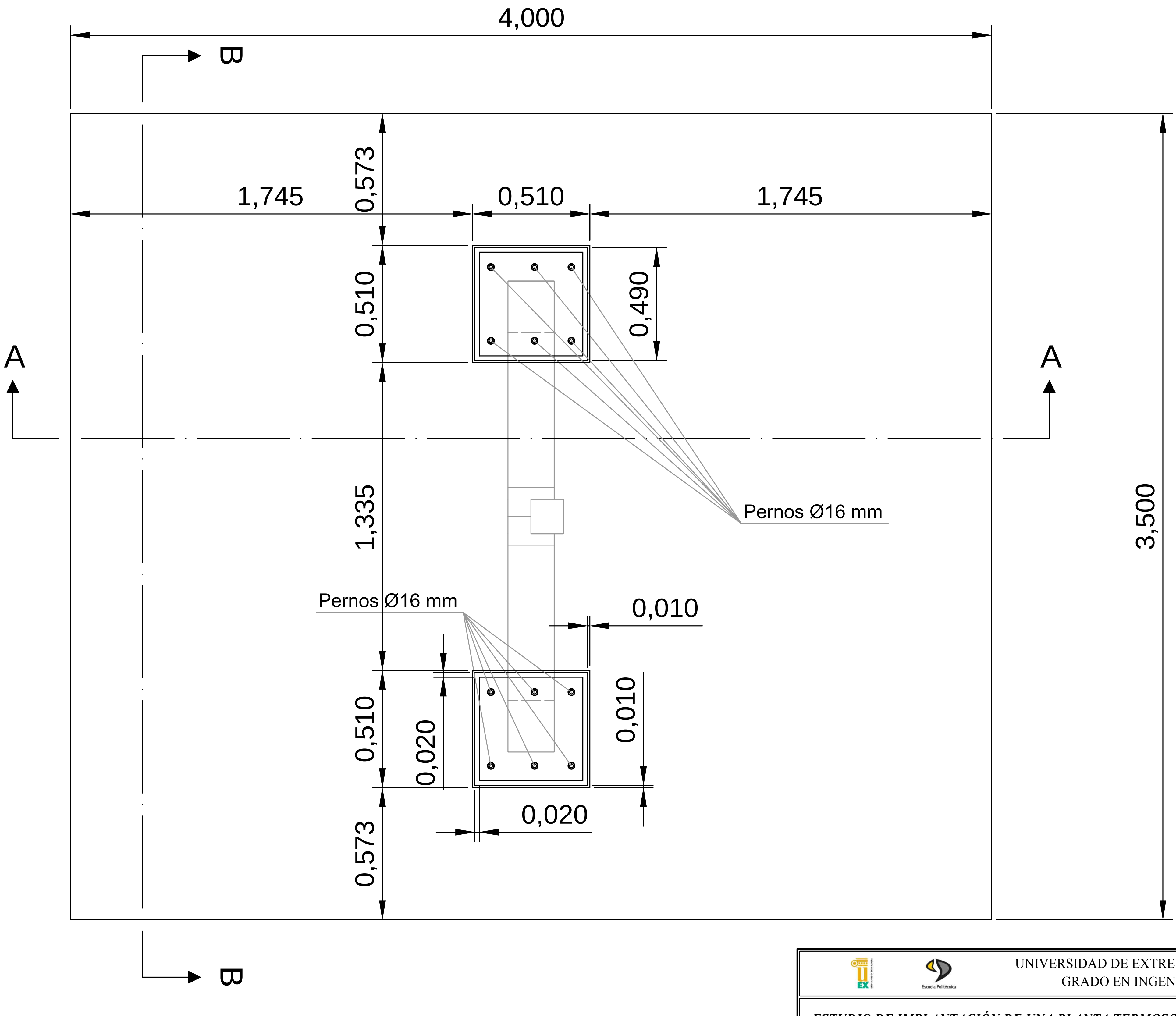
FECHA: FEBRERO 2016

TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: 6

ESCALAS S/ESCALA

HOJA Nº 15 **DE** 22



Placa de anclaje	Pernos
Acero S 275	Acero B 500 S

Mortero de nivelación
M-5

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
ANCLAJES DEL APOYO SIMPLE

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

FECHA: FEBRERO 2016

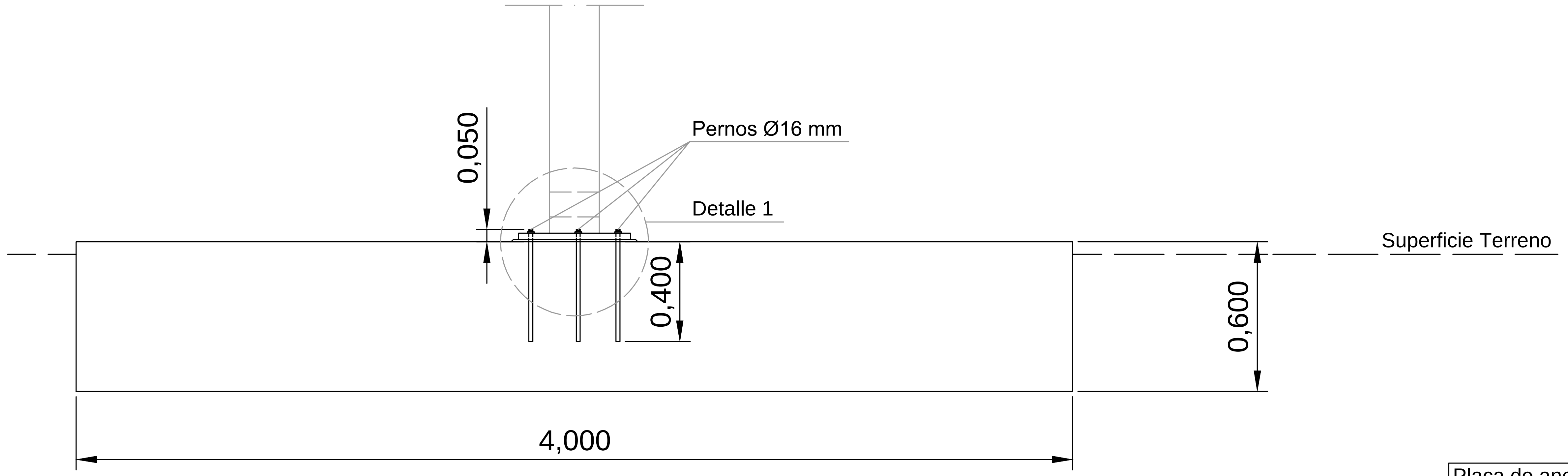
TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: 6

ESCALAS
E = 1:20

HOJA Nº 16 **DE** 22

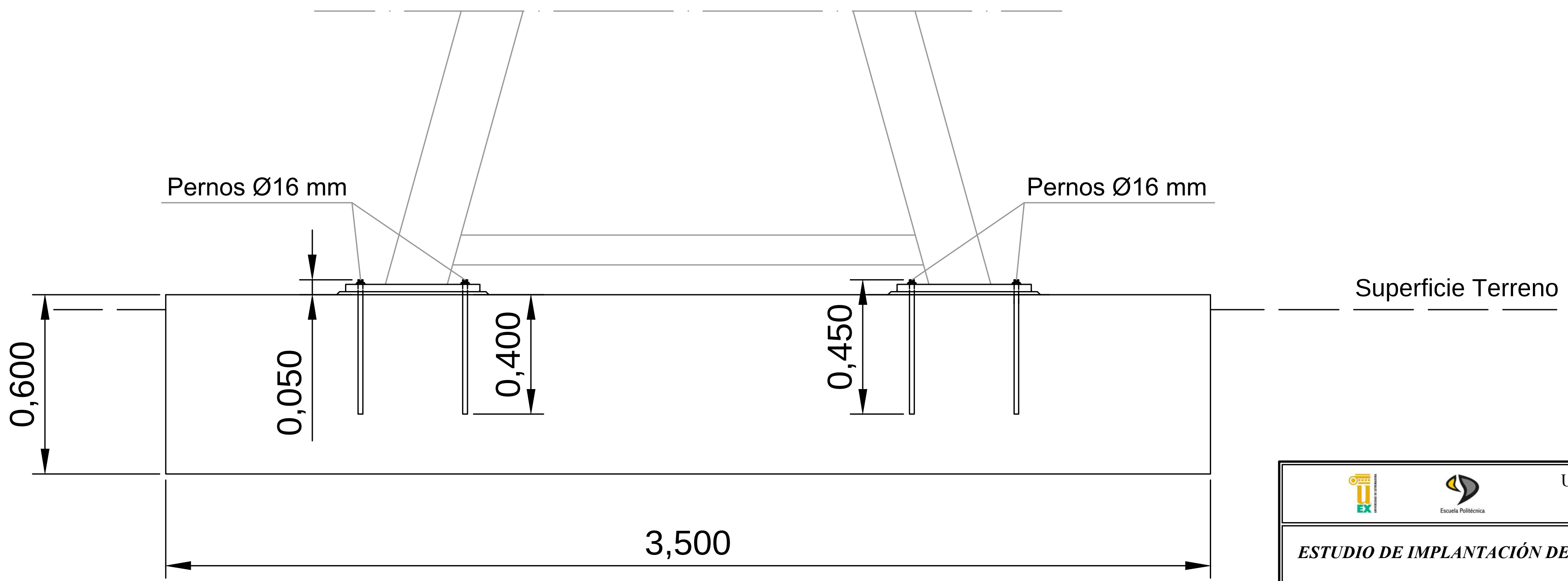
Sección AA



Placa de anclaje	Pernos
Acero S 275	Acero B 500 S

Mortero de nivelación
M-5

Sección BB

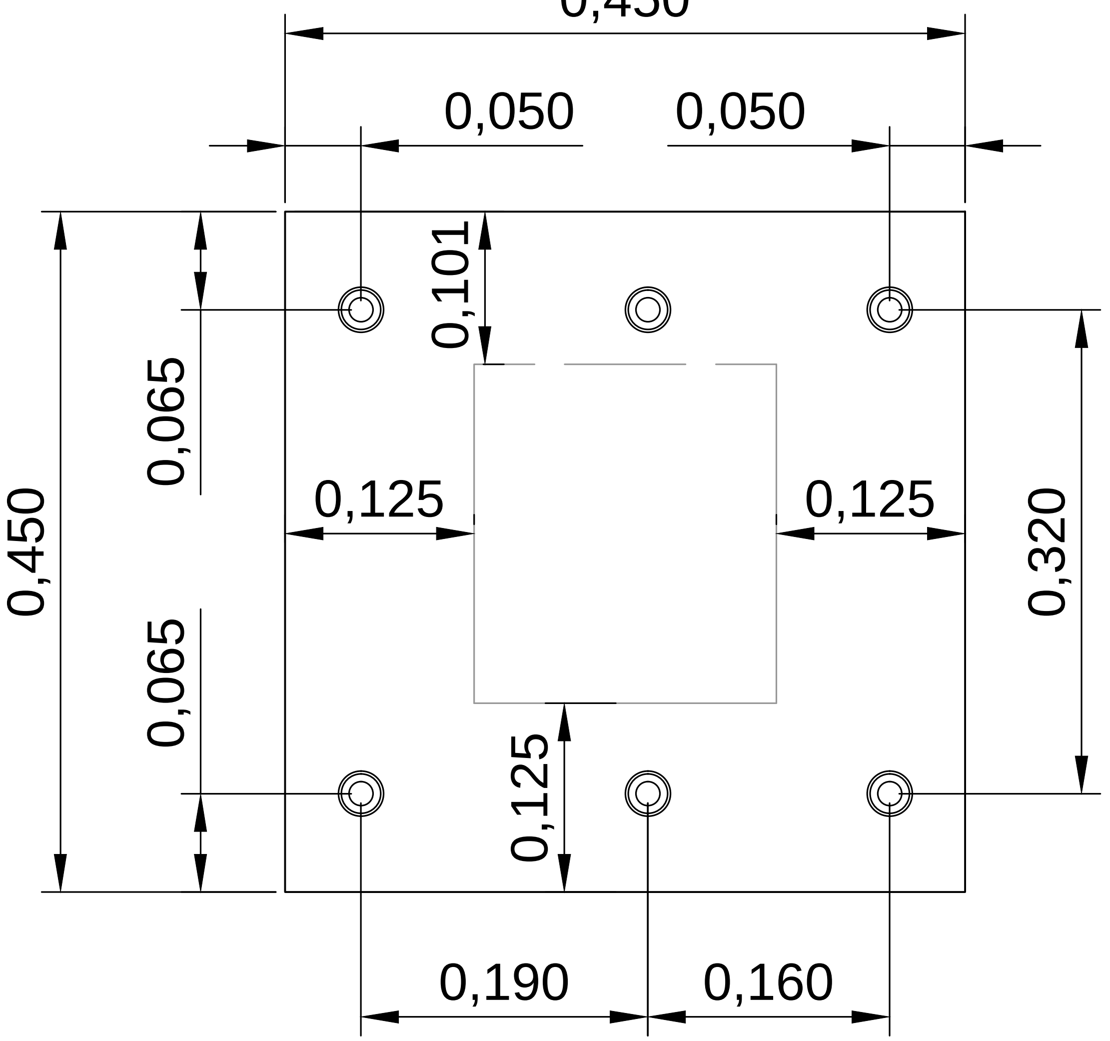


UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

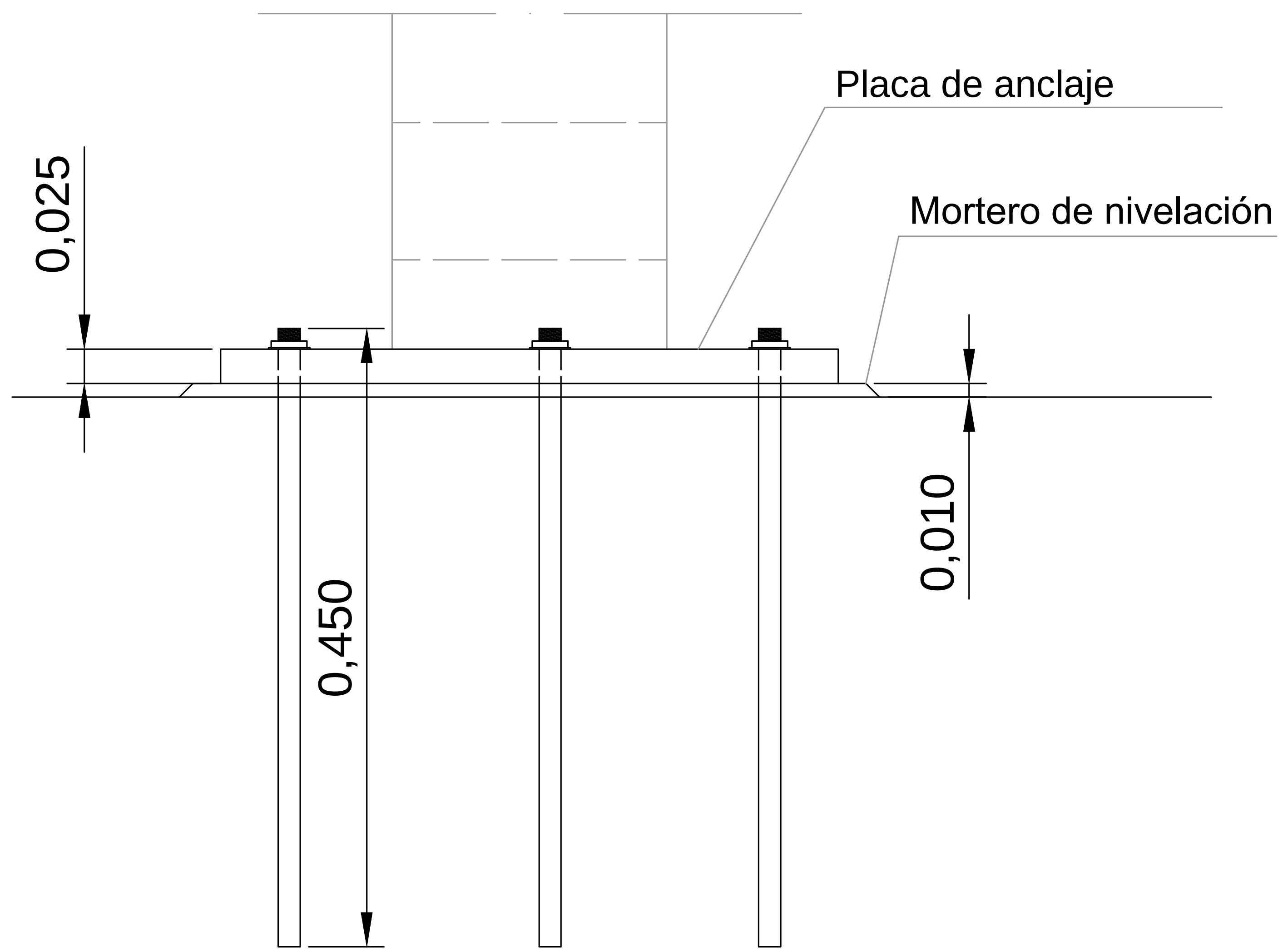
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO	ANCLAJES DEL APOYO SIMPLE - SECCIONES DE DETALLE
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ
FIRMA	
FECHA:	FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO
Nº DE PLANO:	**6**
ESCALAS	E = 1:20
HOJA Nº	**17** DE **22**

Planta Placa de anclaje

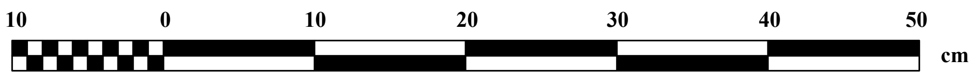


Detalle 1



Placa de anclaje	Pernos
Acero S 275	Acero B 500 S

Mortero de nivelación
M-5



UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
ANCLAJES DEL APOYO SIMPLE - DETALLES

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

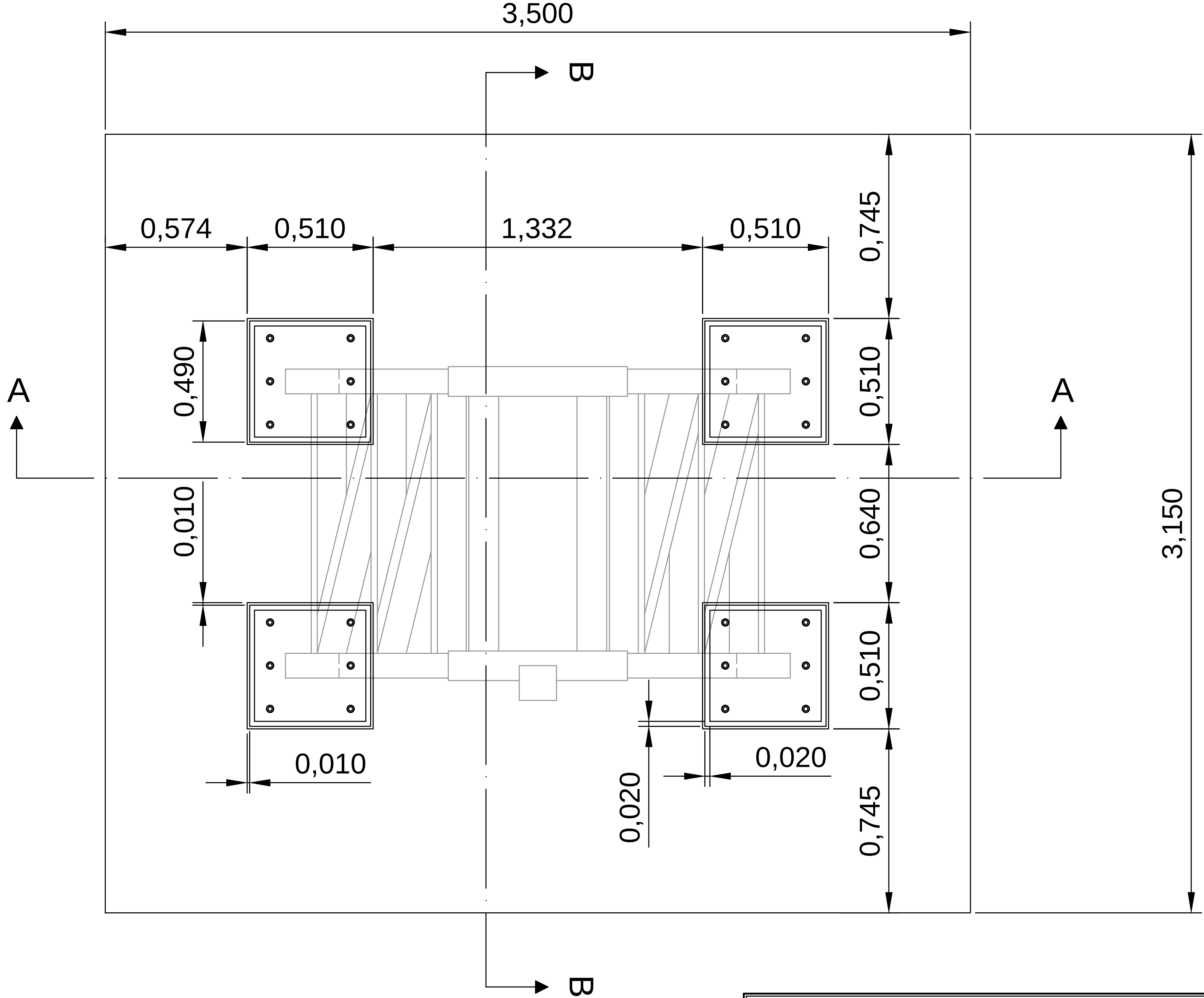
FECHA: FEBRERO 2016

TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: 6

ESCALAS
E = 1:5

HOJA Nº 18 **DE** 22



Placa de anclaje	Pernos
Acero S 275	Acero B 500 S

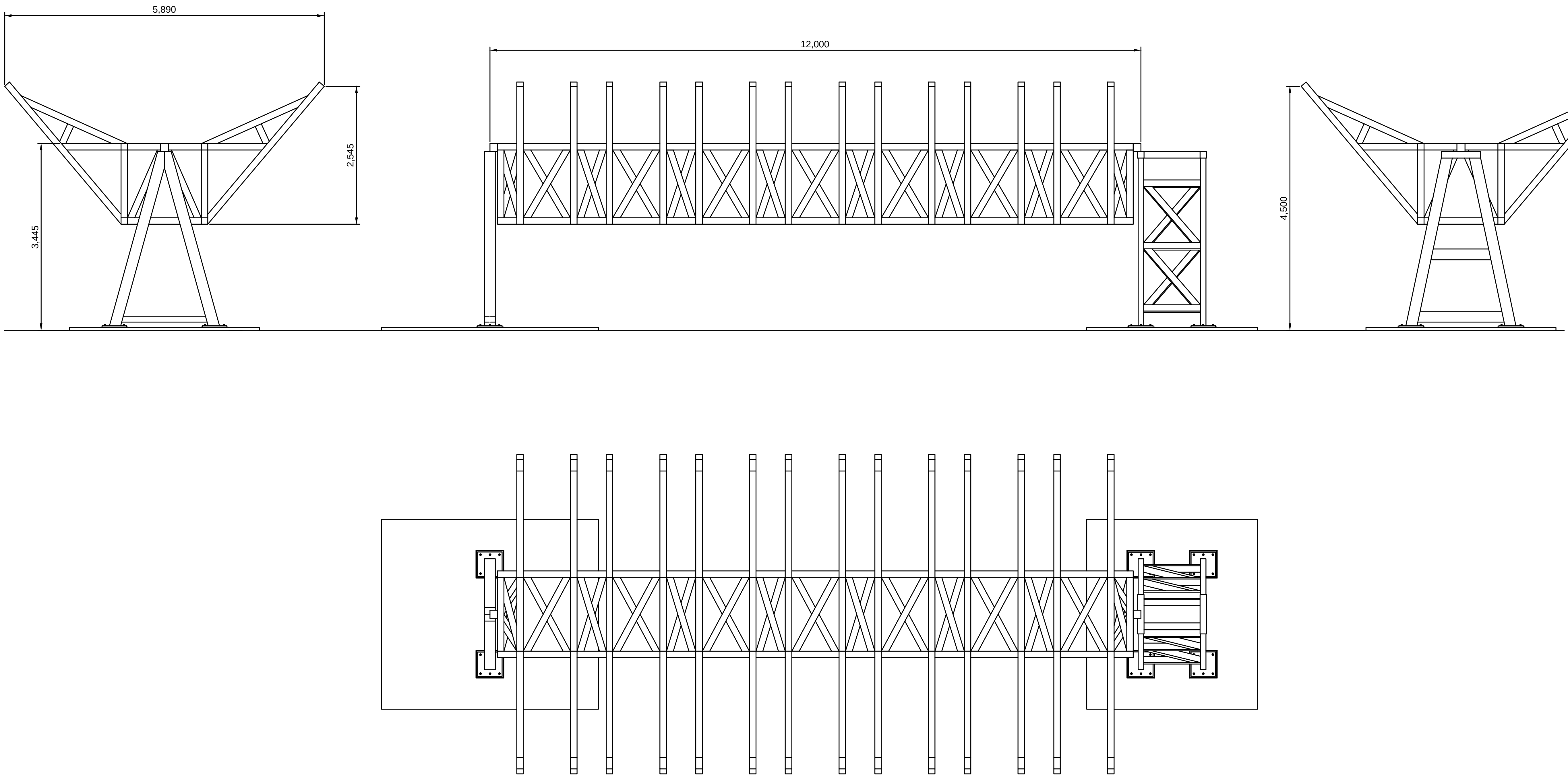
Mortero de nivelación
M-5

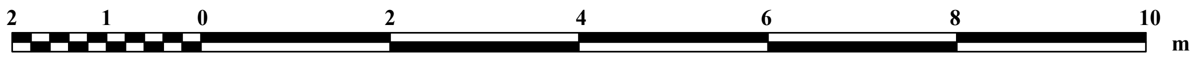
UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
ANCLAJES DEL APOYO DOBLE

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 6
ESCALAS E = 1:20		**HOJA Nº** 19 **DE** 22





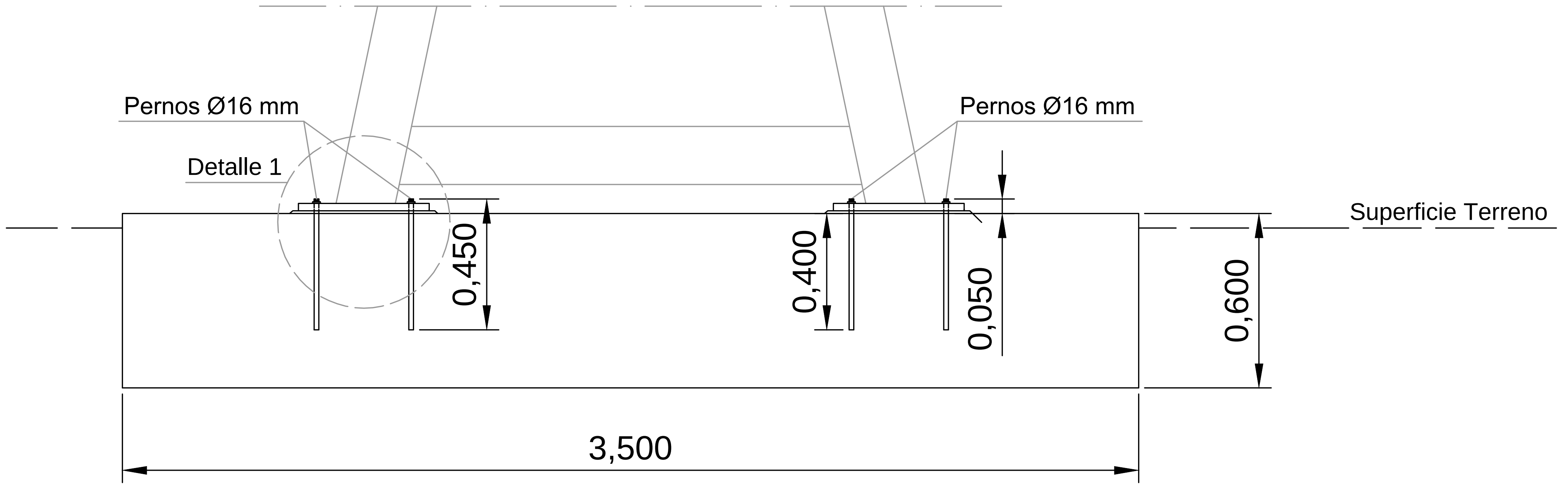
UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

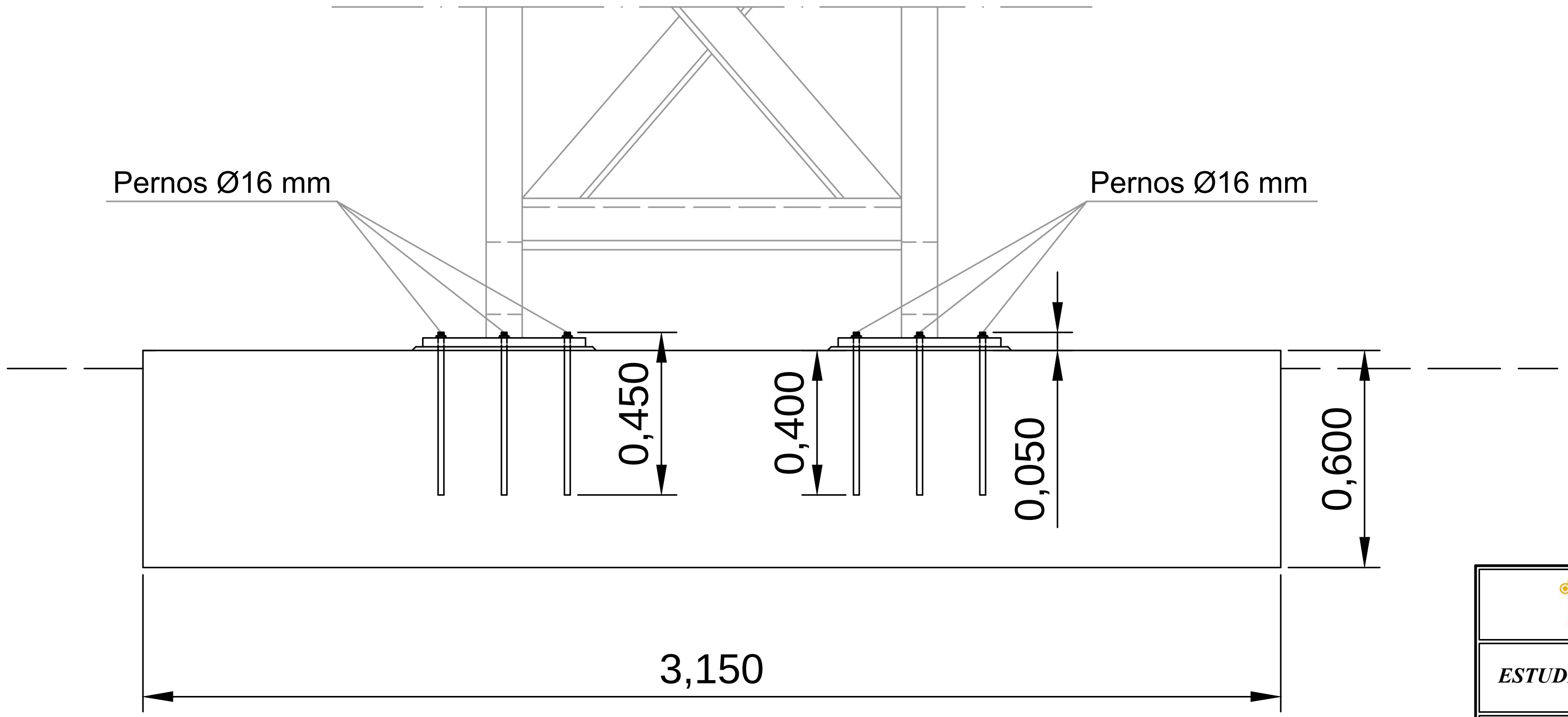
DESIGNACIÓN DEL PLANO
COLECTOR

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** 6
ESCALAS E = 1:80		**HOJA Nº** 2 **DE** 22

Sección AA



Sección BB



Placa de anclaje	Pernos
Acero S 275	Acero B 500 S

Mortero de nivelación
M-5

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
ANCLAJES DEL APOYO DOBLE - SECCIONES DE DETALLES

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

FECHA: FEBRERO 2016

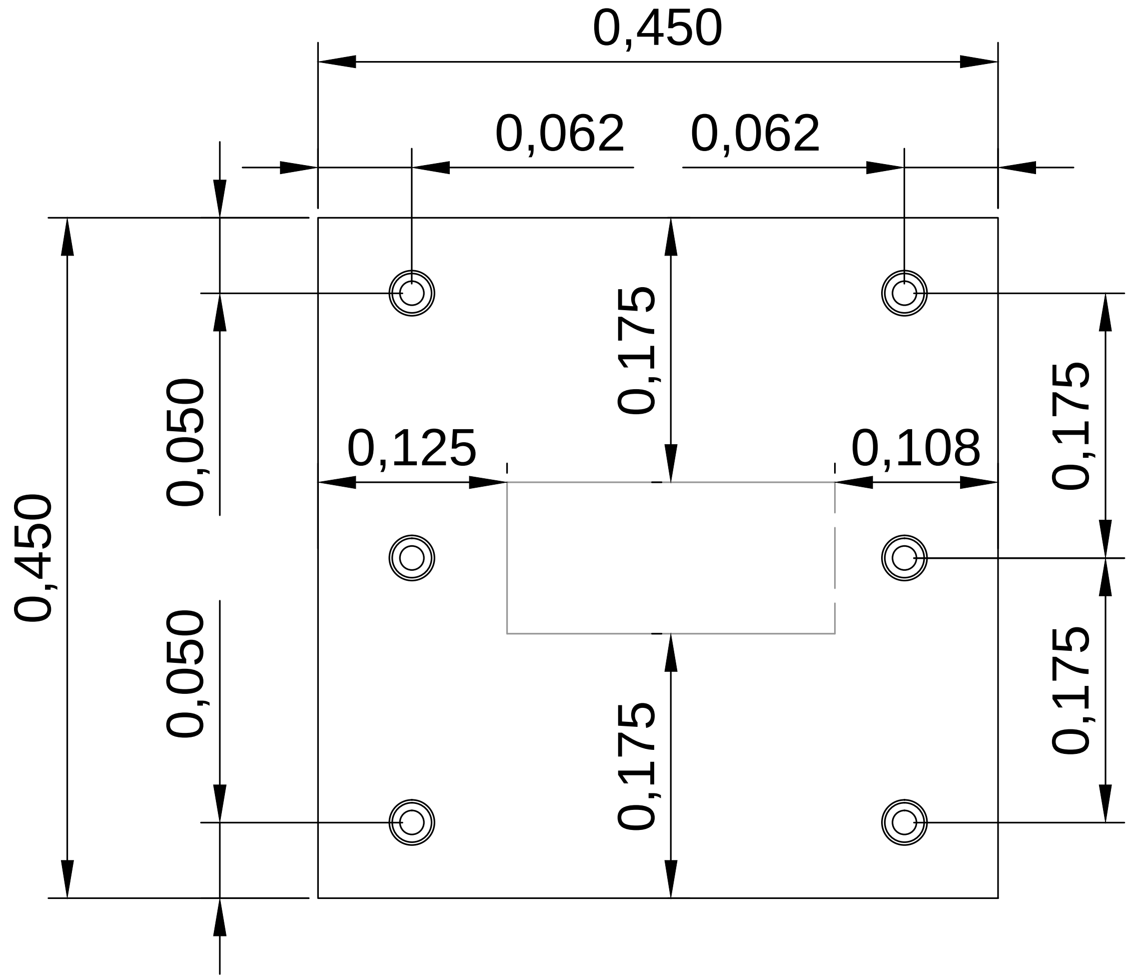
TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: **6**

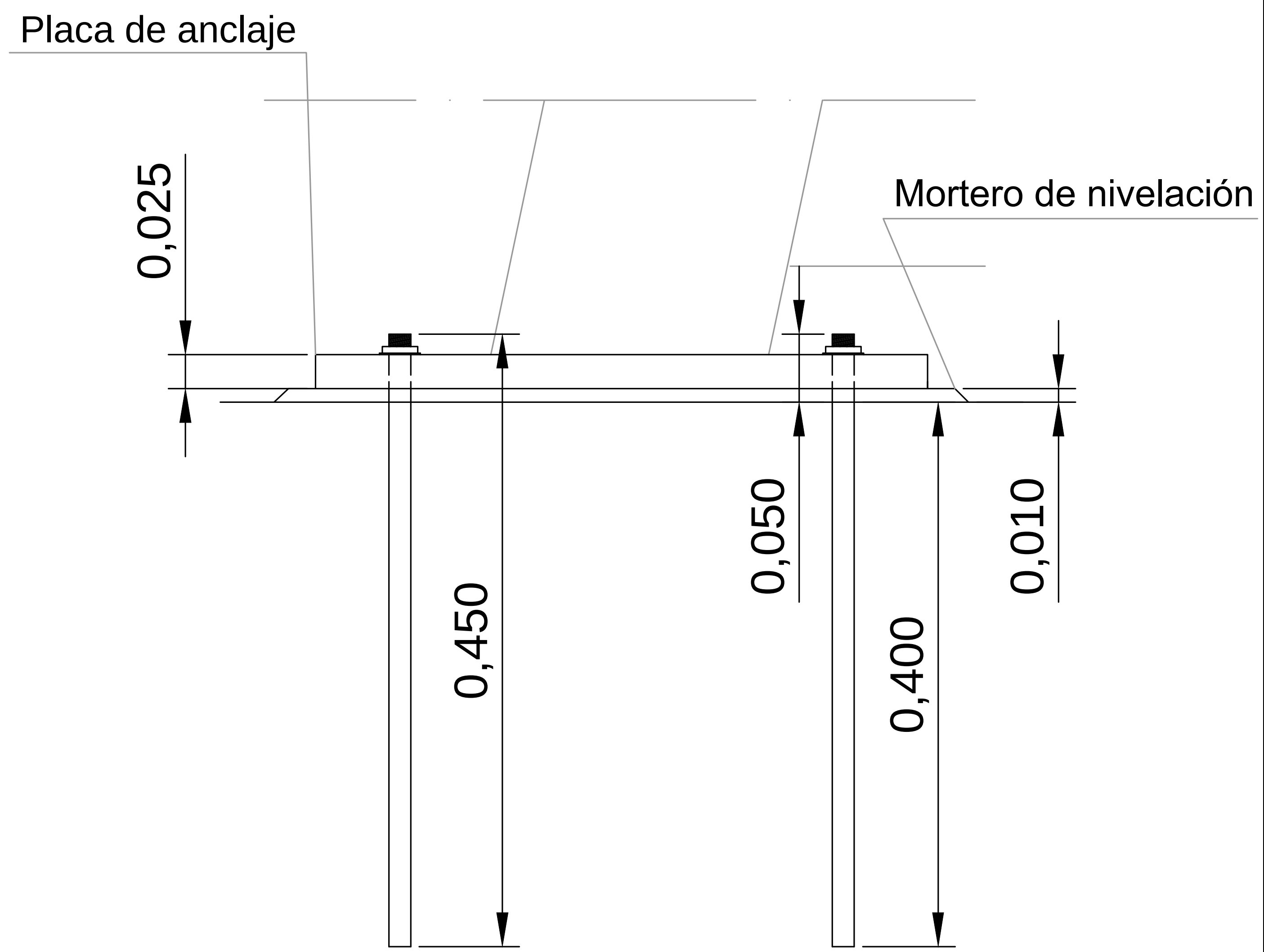
ESCALAS
E = 1:20

HOJA Nº **20** **DE** **22**

Planta Placa de anclaje

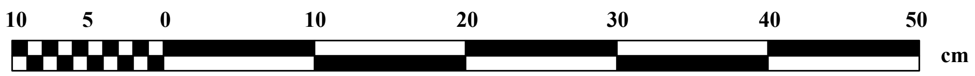


Detalle 1



Placa de anclaje	Pernos
Acero S 275	Acero B 500 S

Mortero de nivelación
M-5



UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

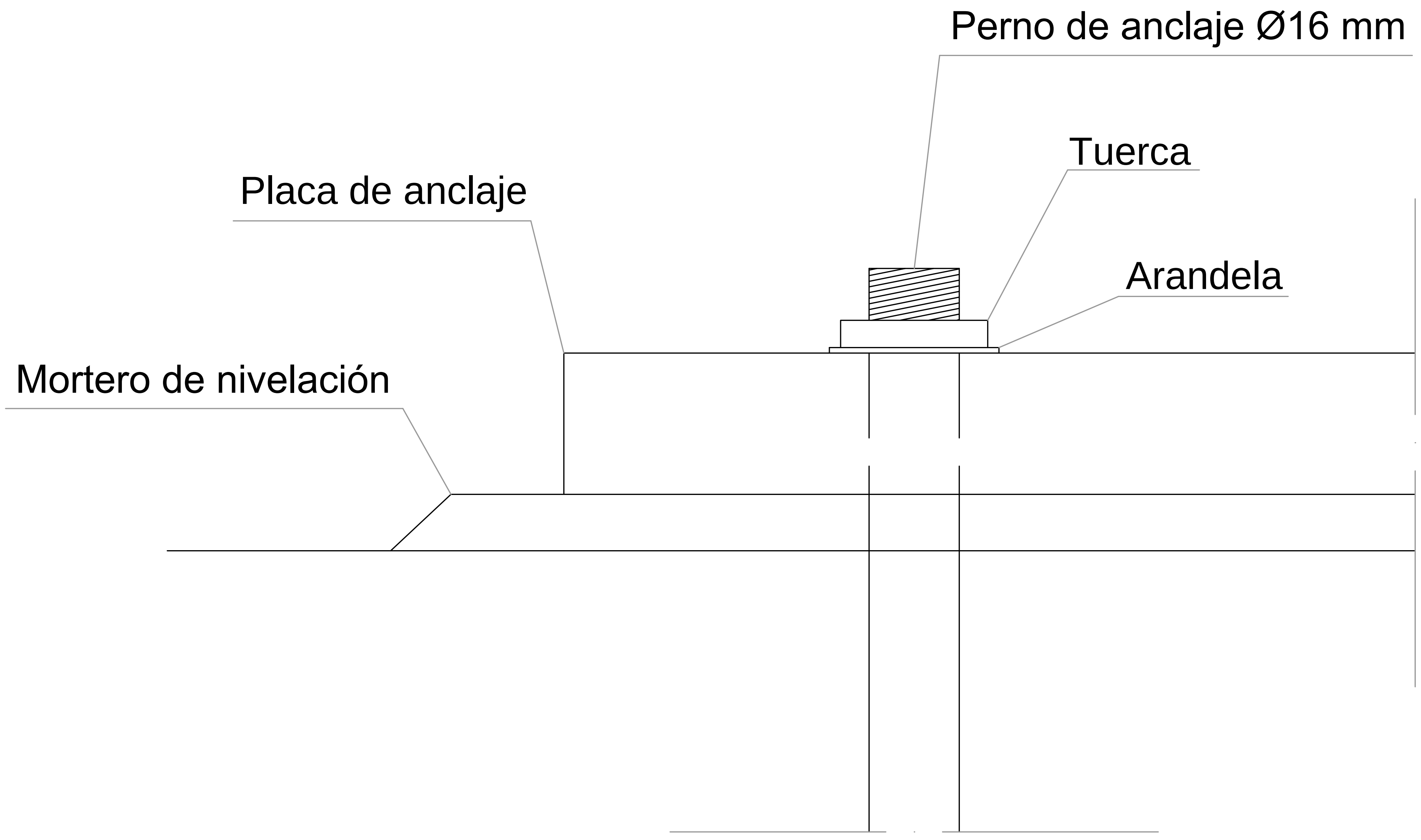
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
ANCLAJES DEL APOYO DOBLE - DETALLES

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ | **FIRMA** | **FECHA:** FEBRERO 2016

TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO | **Nº DE PLANO:** 6

ESCALAS E = 1:5 | **HOJA Nº** 21 **DE** 22



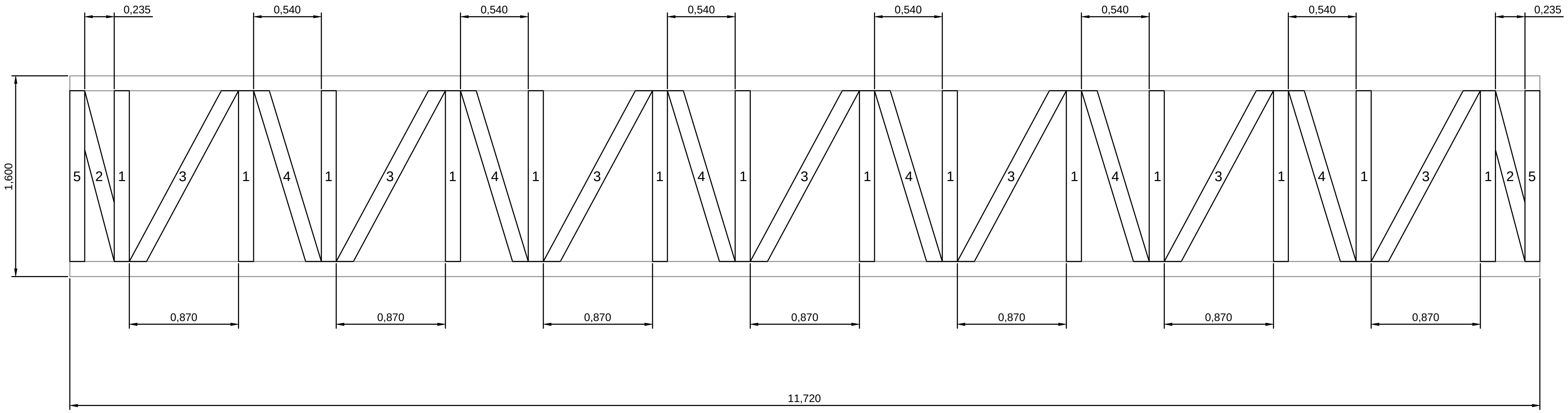
2 1 0 2 4 6 8 10 cm

UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

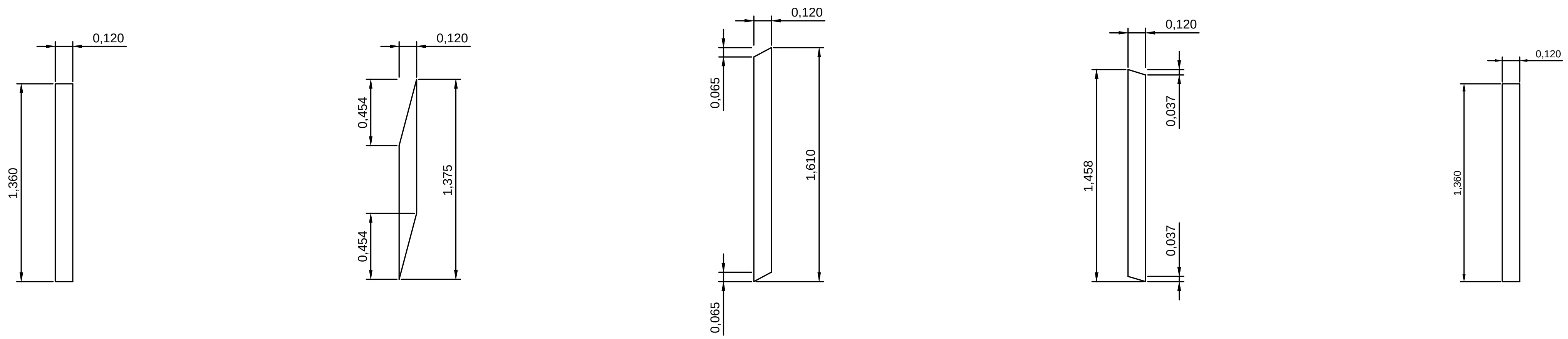
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

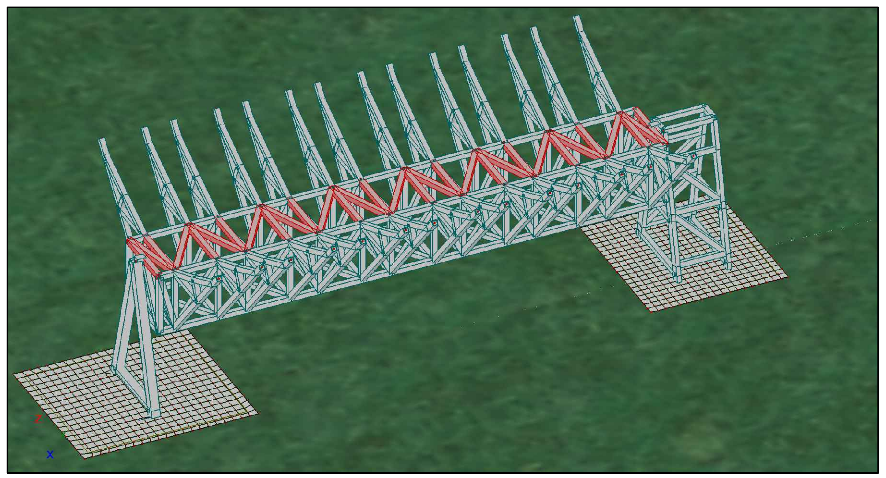
DESIGNACIÓN DEL PLANO ANCLAJES - DETALLES		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 6
ESCALAS S/ ESCALA		**HOJA Nº** 22 **DE** 22

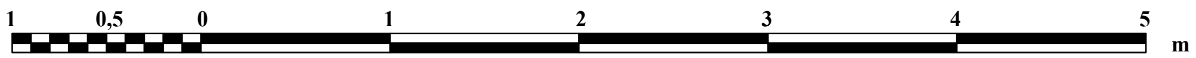
Celosía Cara Superior



Barra Tipo 1 | Barra Tipo 2 | Barra Tipo 3 | Barra Tipo 4 | Barra Tipo 5







UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

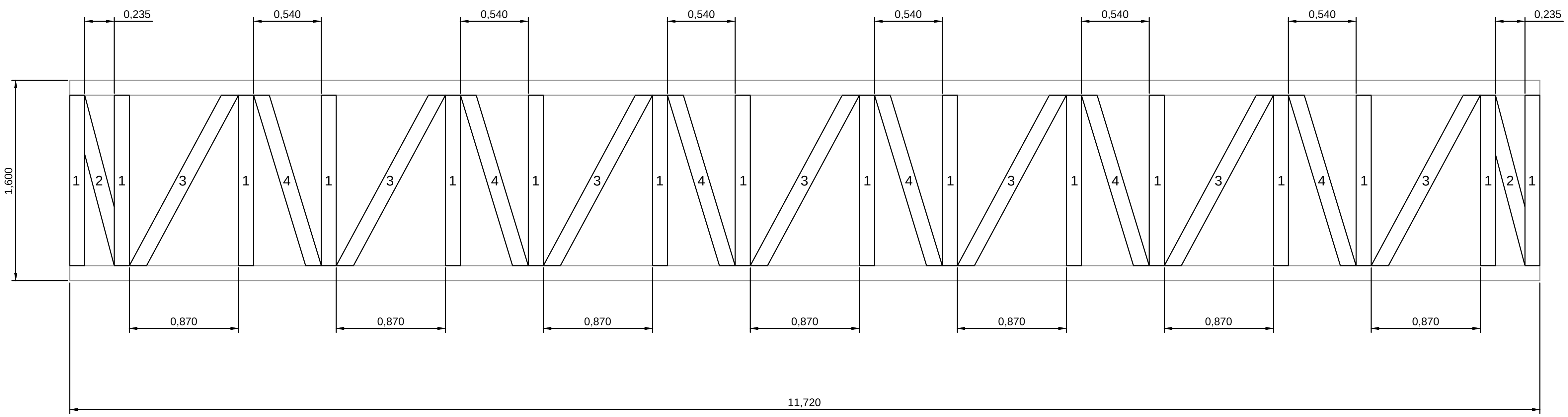
DESIGNACIÓN DEL PLANO
COLECTOR - DETALLE CELOSÍA CARA SUPERIOR

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ
FIRMA
FECHA FEBRERO 2016

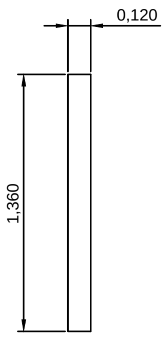
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO
Nº DE PLANO 6

ESCALAS E = 1:40
HOJA Nº 3 **DE** 22

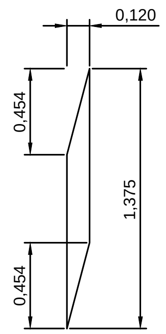
Celosía Cara Inferior



Barra Tipo 1



Barra Tipo 2



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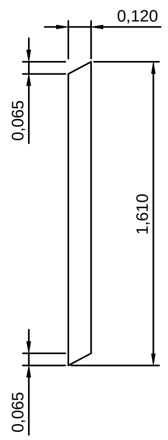

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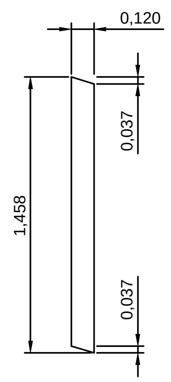

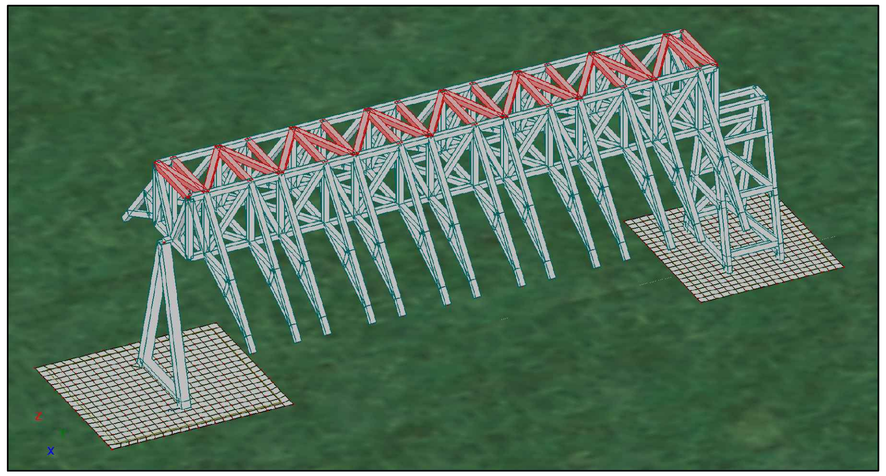

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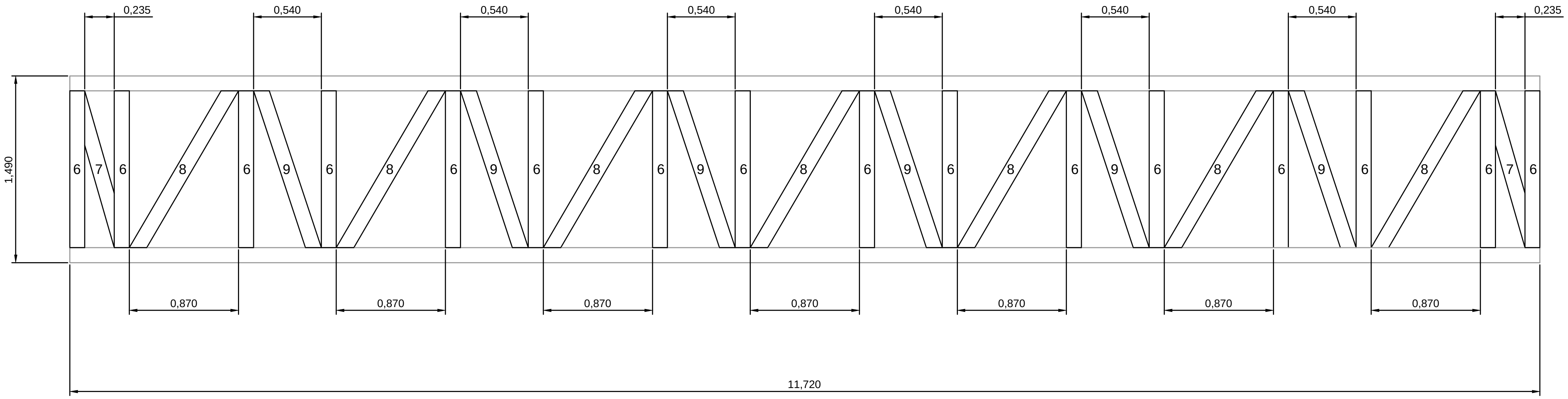
UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

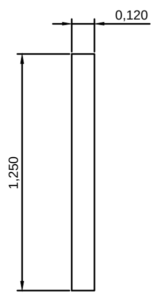
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO COLECTOR - DETALLE CELOSÍA CARA INFERIOR	
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**
FECHA FEBRERO 2016	
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO	**Nº DE PLANO** 6
ESCALAS E = 1:40	**HOJA Nº** 4 **DE** 22

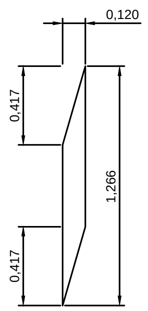
Celosía Cara Lateral



Barra Tipo 6



Barra Tipo 7



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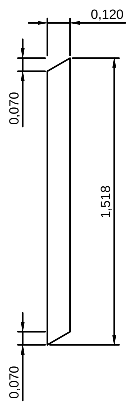

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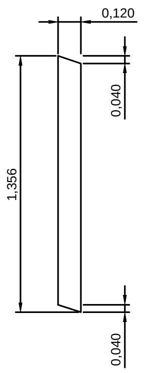
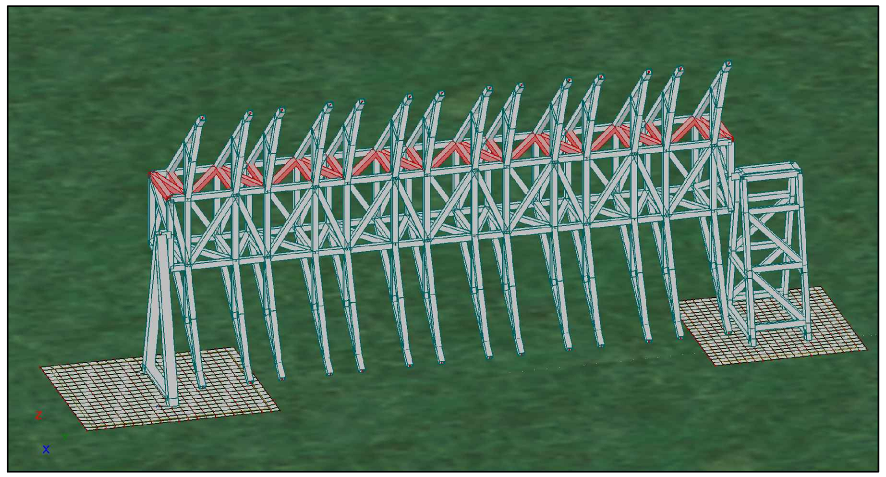
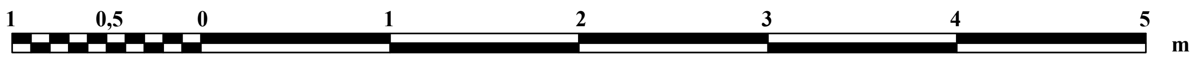






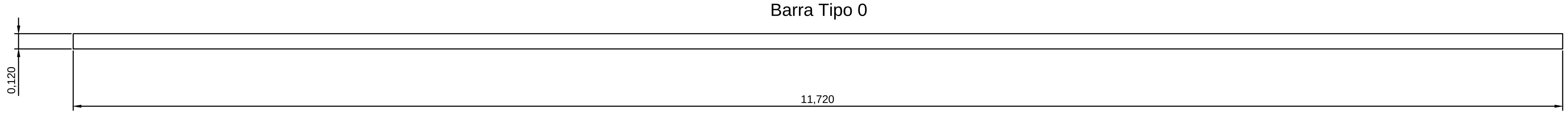
UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

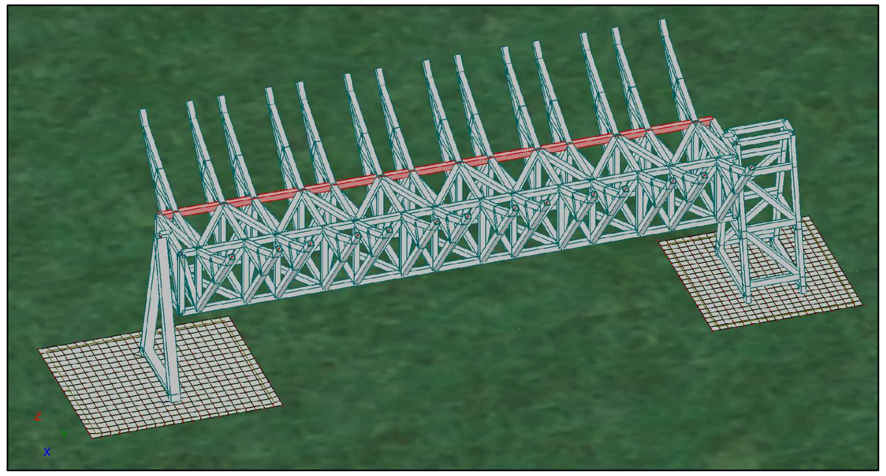
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO COLECTOR - DETALLE CELOSÍA CARA LATERAL		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** 6
ESCALAS E = 1:40		**HOJA Nº** 5 **DE** 22

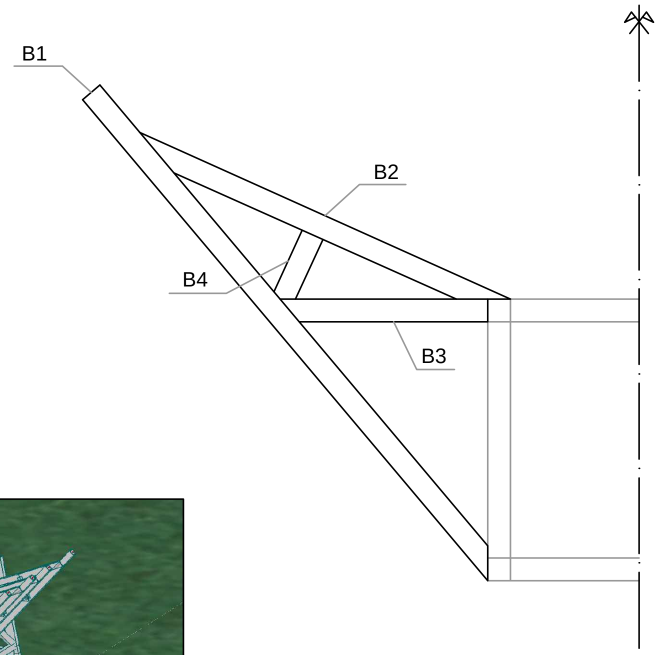
Barra Principal

Barra Tipo 0

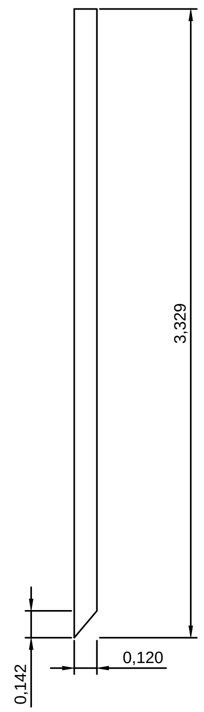




Brazo



Barra Tipo B1



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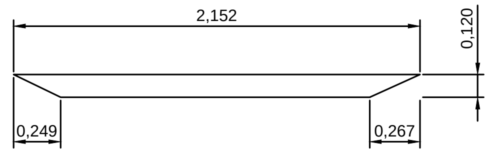

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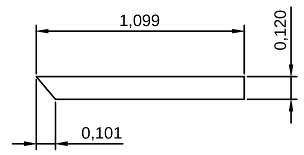

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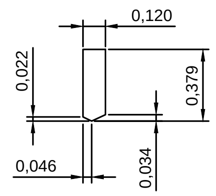
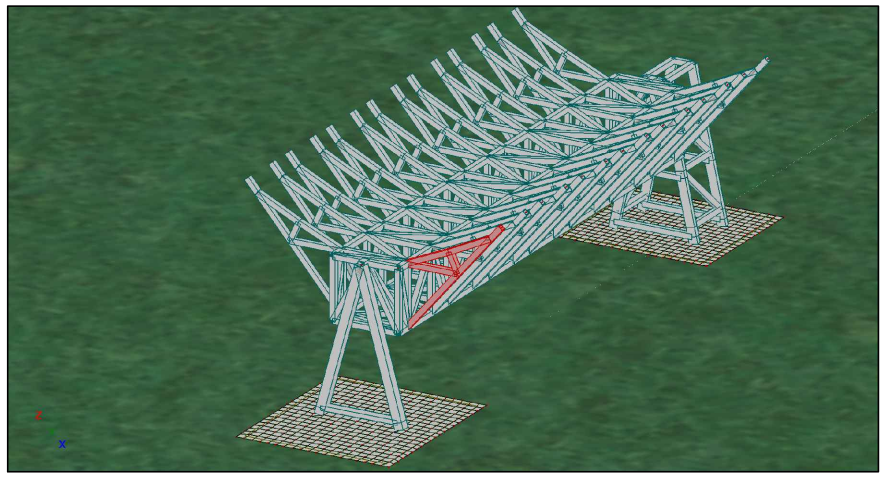
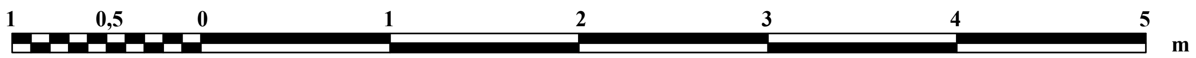




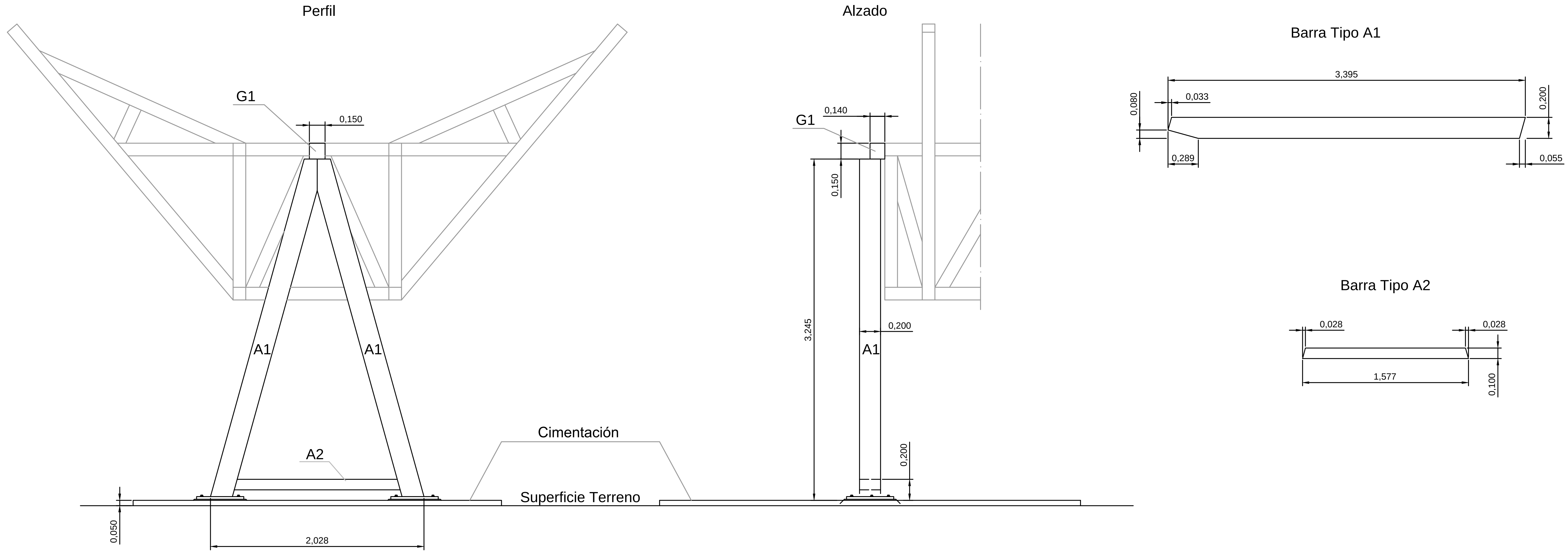


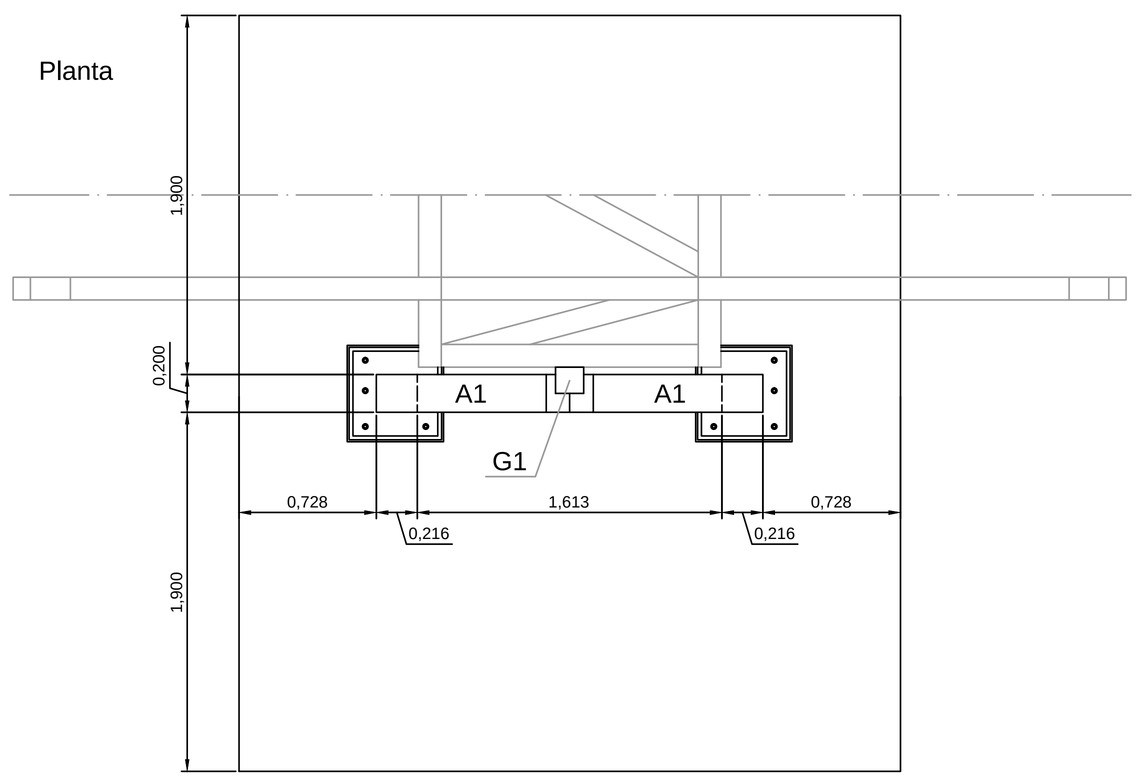
UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

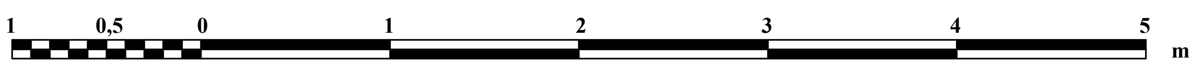
ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

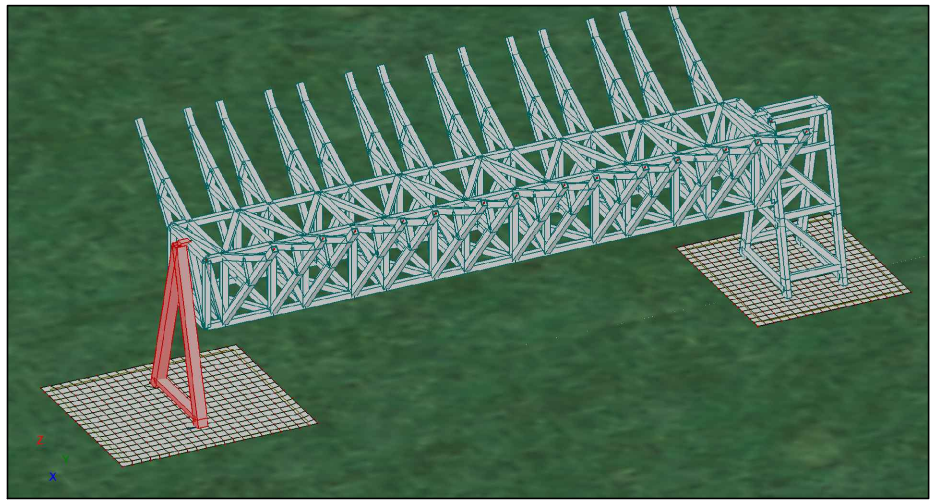
DESIGNACIÓN DEL PLANO
COLECTOR - DETALLE BRAZO Y BARRA PRINCIPAL

AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO** 6
ESCALAS E = 1:40		**HOJA Nº** 6 **DE** 22









UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
COLECTOR - DETALLE APOYO SIMPLE

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

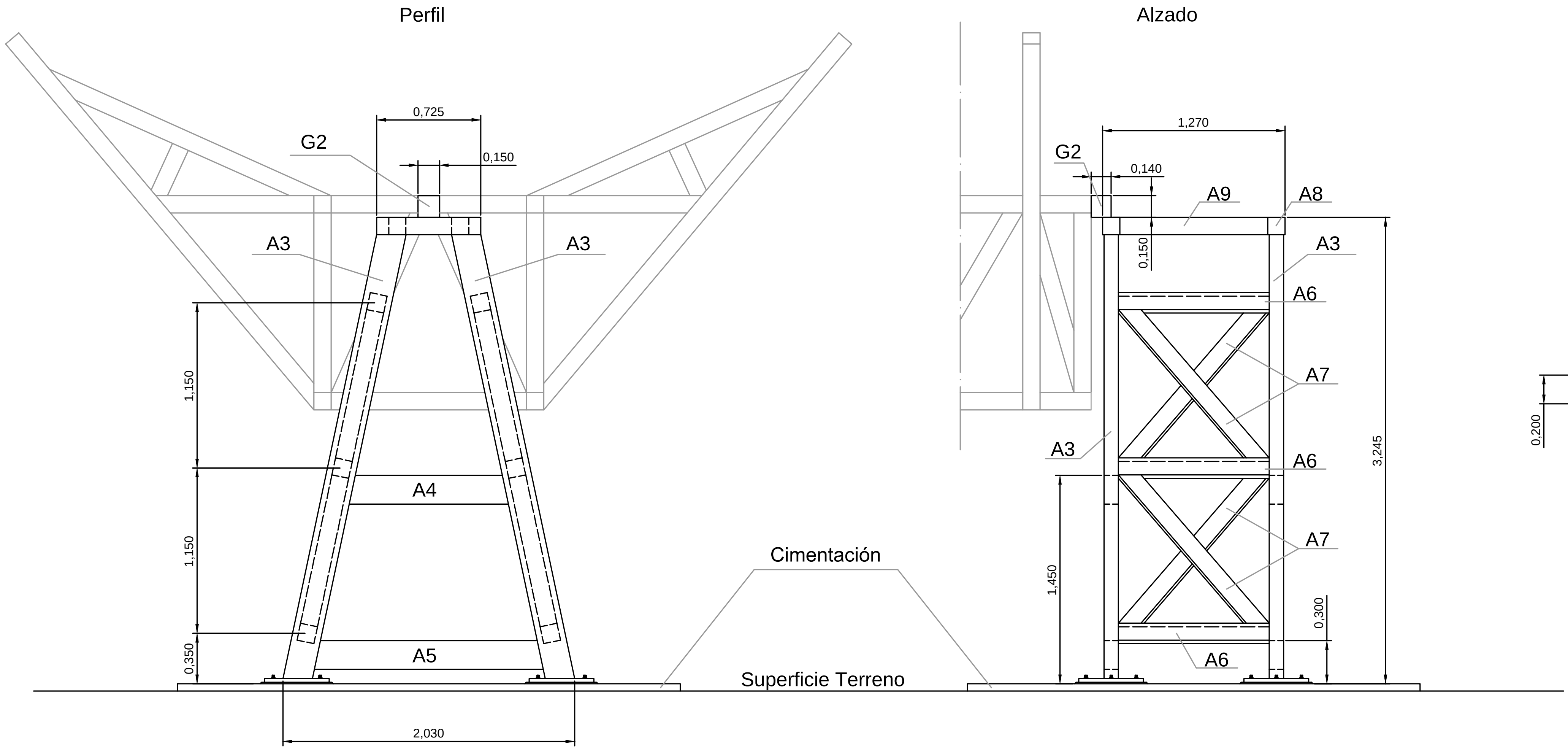
FECHA FEBRERO 2016

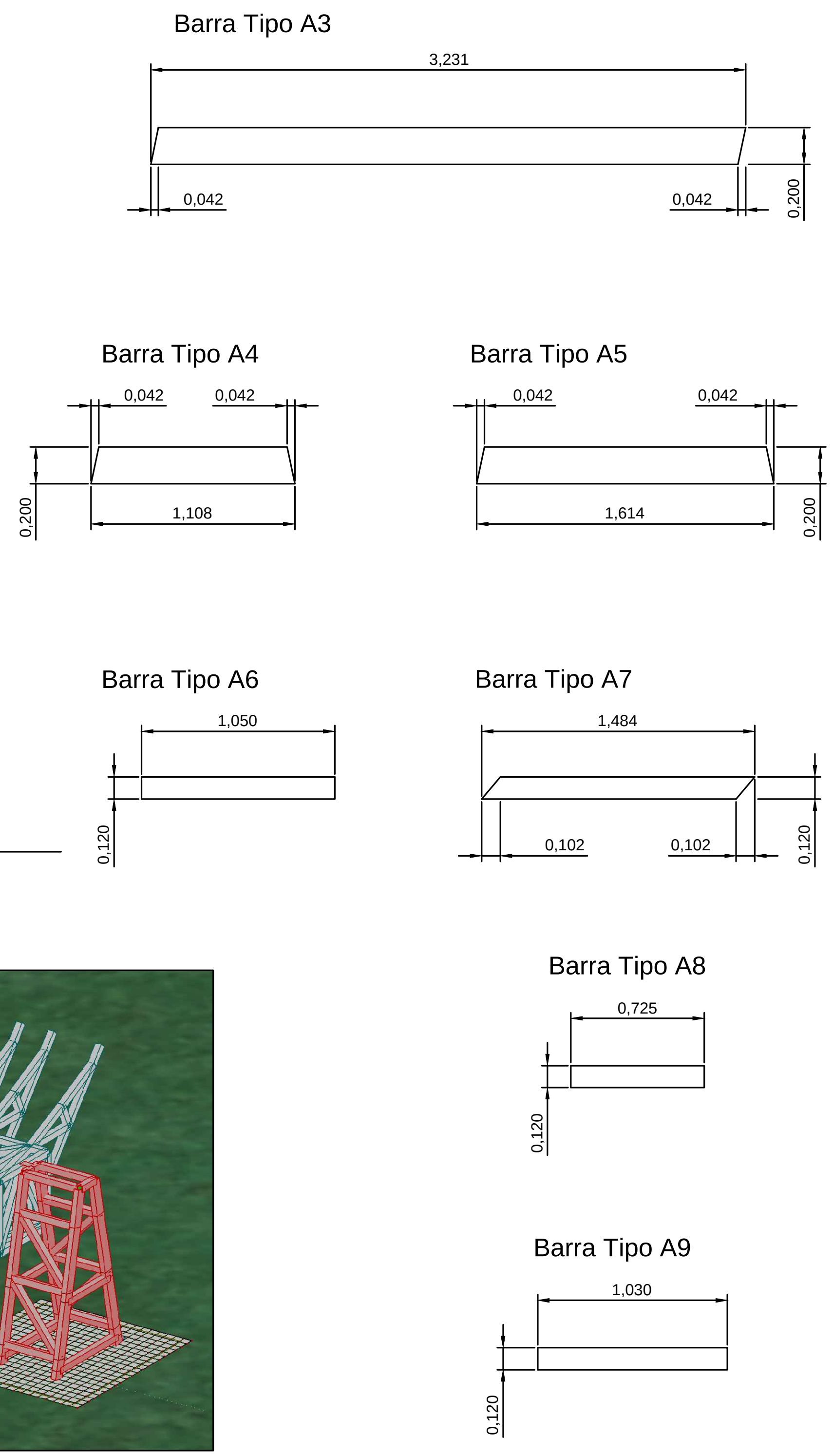
TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

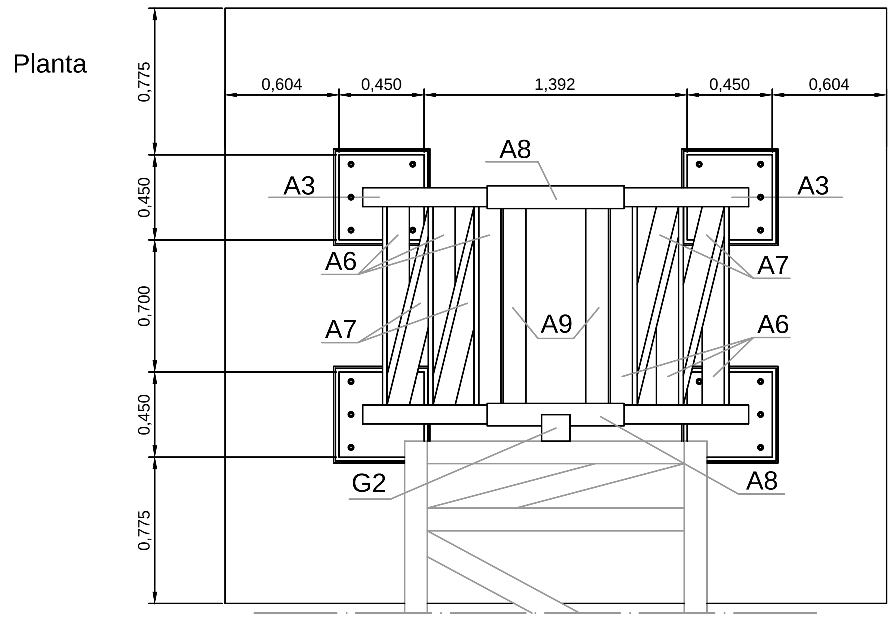
Nº DE PLANO 6

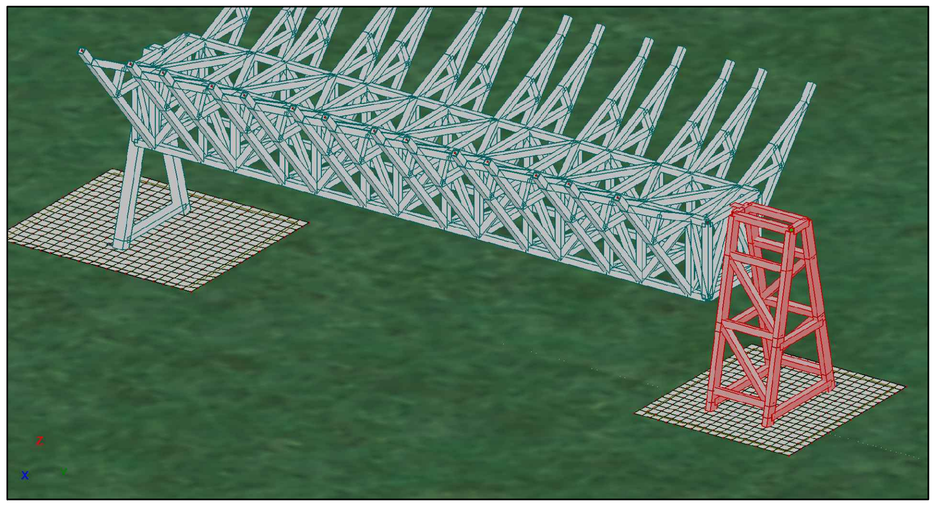
ESCALAS
E = 1:40

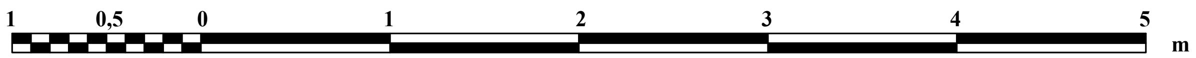
HOJA Nº 7 **DE** 22







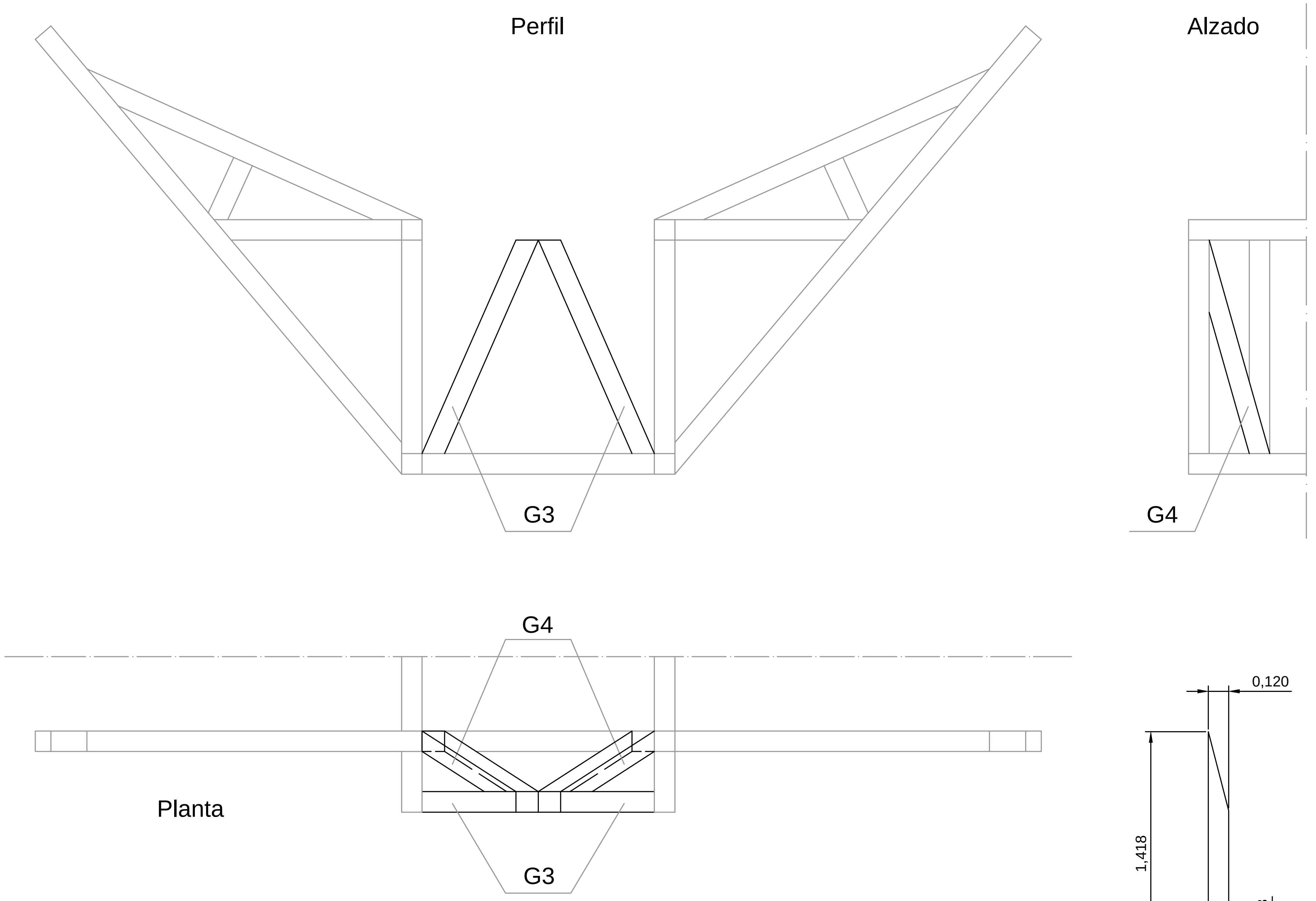




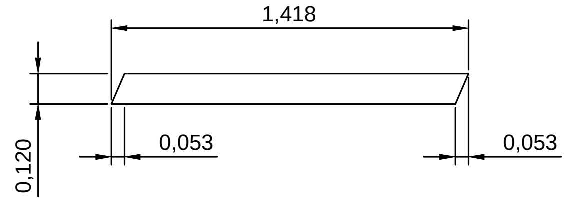
UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

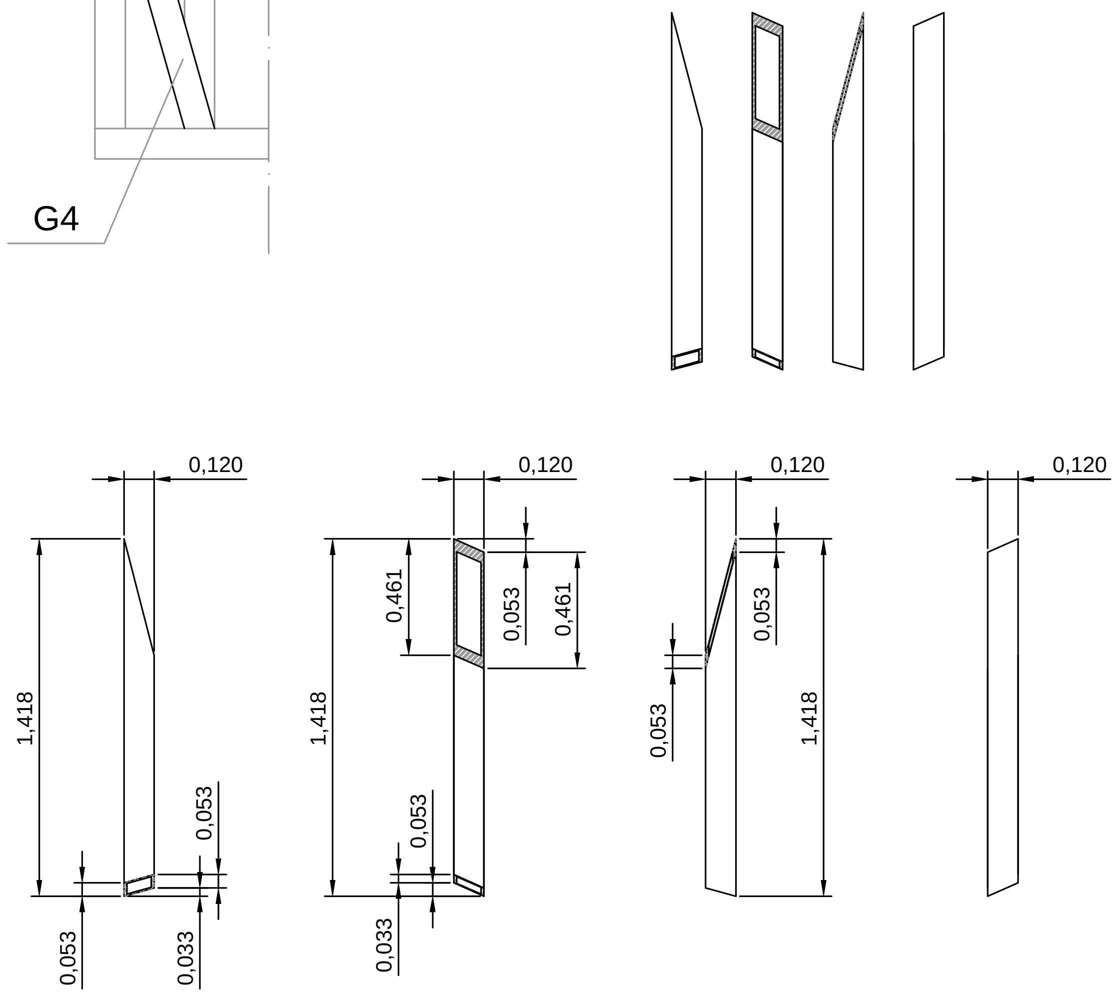
DESIGNACIÓN DEL PLANO	COLECTOR - DETALLE APOYO DOBLE
AUTOR	JESÚS FERNÁNDEZ GONZÁLEZ
FIRMA	
FECHA	FEBRERO 2016
TUTORES	JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO
Nº DE PLANO	6
ESCALAS	E = 1:40
HOJA Nº	8 **DE** 22

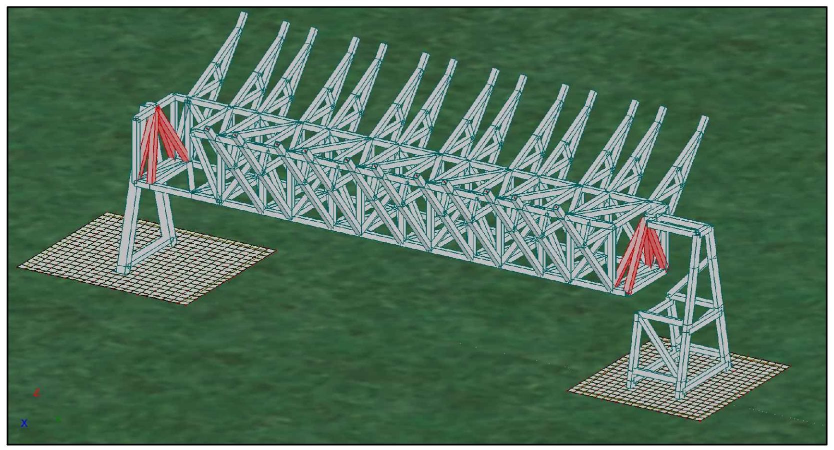


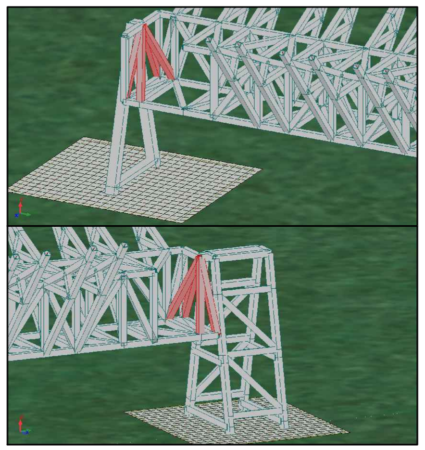
Barra Tipo G3

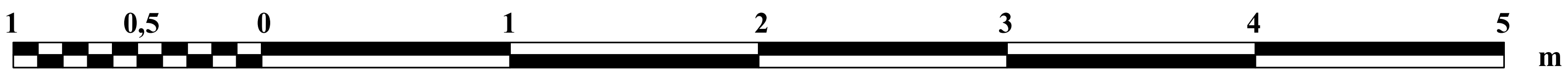


Barra Tipo G4 (Cuatro caras)









UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO
COLECTOR - DETALLE BARRAS MECANISMO DE GIRO

AUTOR
JESÚS FERNÁNDEZ GONZÁLEZ

FIRMA

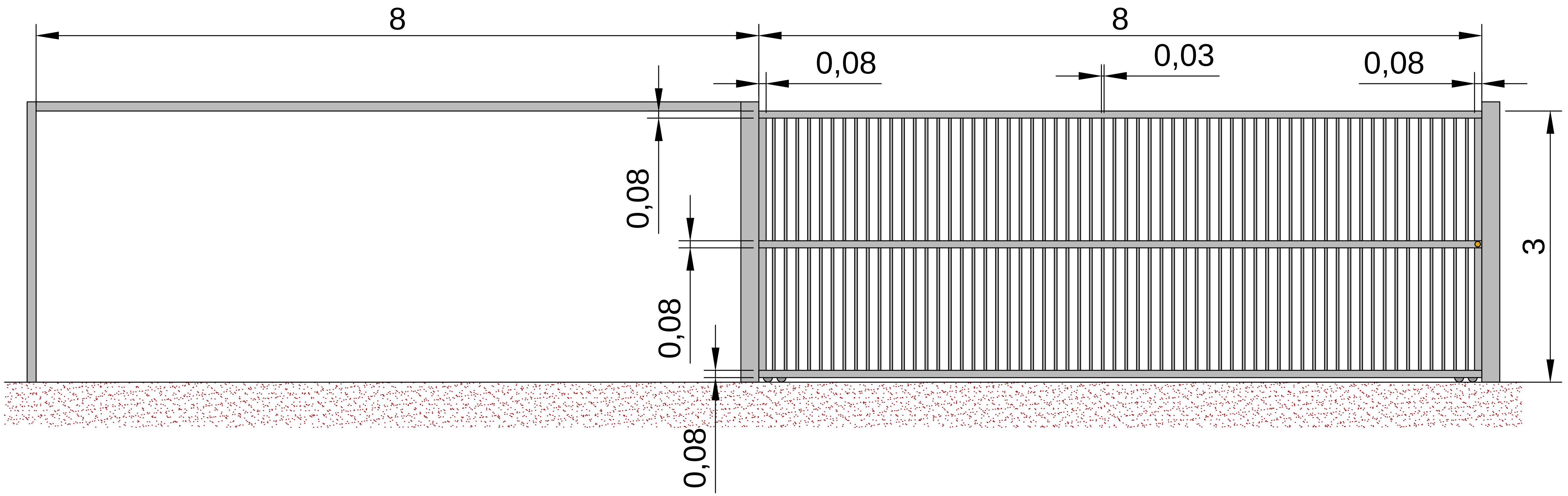
FECHA: FEBRERO 2016

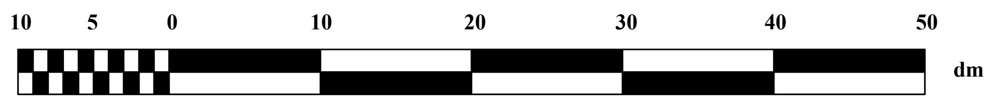
TUTORES
JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO

Nº DE PLANO: 6

ESCALAS
E = 1:30

HOJA Nº 9 **DE** 22

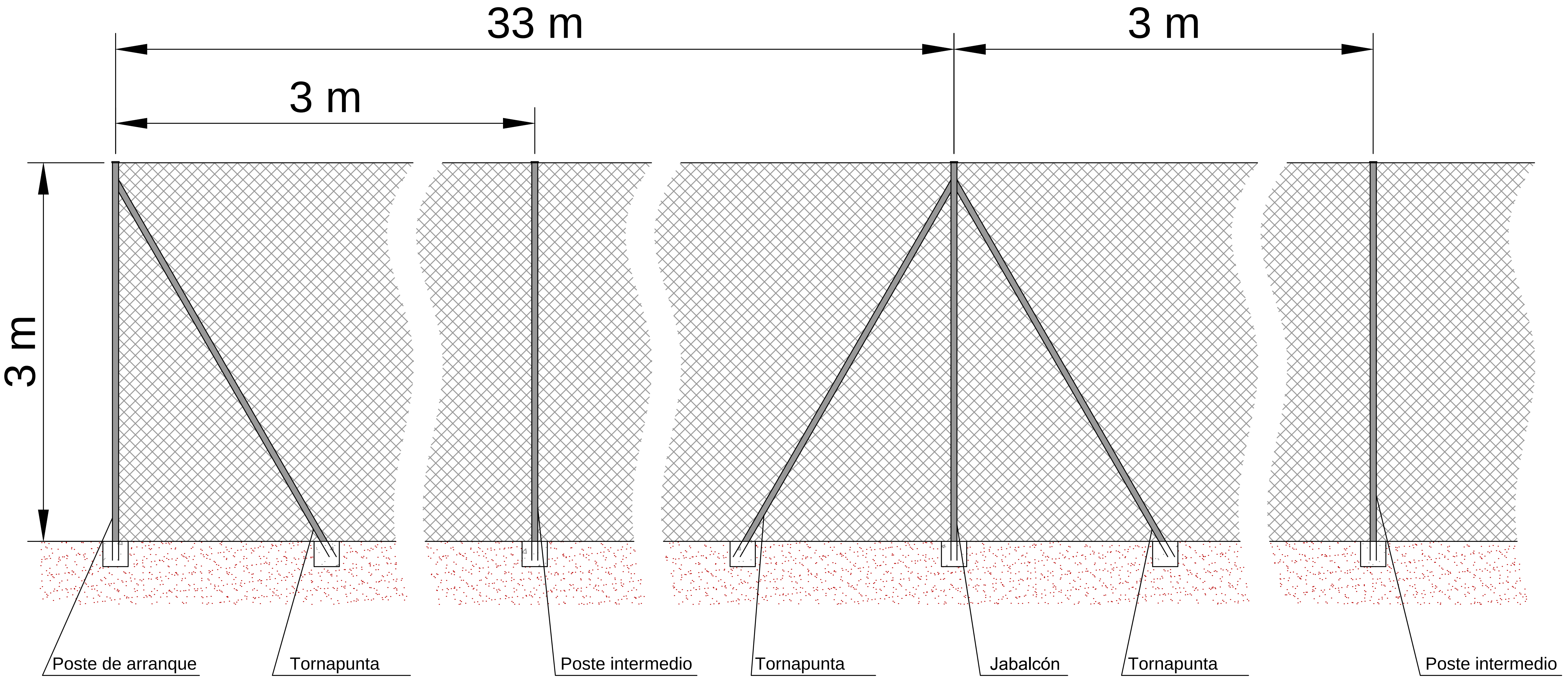




UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO PUERTA DE CERRAMIENTO		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 7
ESCALAS E = 1:50		**HOJA Nº** 1 **DE** 2



UNIVERSIDAD DE EXTREMADURA - ESCUELA POLITÉCNICA DE CÁCERES
GRADO EN INGENIERÍA CIVIL - CONSTRUCCIONES CIVILES

ESTUDIO DE IMPLANTACIÓN DE UNA PLANTA TERMOSOLAR DE COLECTORES CILIND.-PARAB. EN LA CAMPIÑA SUR

DESIGNACIÓN DEL PLANO MALLA DE CERRAMIENTO		
AUTOR JESÚS FERNÁNDEZ GONZÁLEZ	**FIRMA**	**FECHA:** FEBRERO 2016
TUTORES JOSÉ MARÍA CEBALLOS MARTÍNEZ - ELIA MARÍA QUIRÓS ROSADO		**Nº DE PLANO:** 7
ESCALAS S/ ESCALA		**HOJA Nº** 2 **DE** 2

DOCUMENTO Nº 3

PLIEGO DE PRESCRIPCIONES TÉCNICAS PARTICULARES

ÍNDICE

PARTE 1ª – PRESCRIPCIONES TÉCNICAS PARTICULARES

CAPÍTULO I – INTRODUCCIÓN

Artículo 100 – Naturaleza, contenido y ámbito de aplicación

El objeto del presente Pliego de Prescripciones Técnicas Particulares es fijar las disposiciones de tipo administrativo o legal y las condiciones que regularán la construcción de las obras en relación a los materiales, a la ejecución de las obras y al procedimiento de medición y abono para las diferentes unidades definidas en el presente proyecto: "***Estudio de implantación de una planta termosolar de colectores cilindro-parabólicos en la Campiña Sur***"

Artículo 101 – Disposiciones generales

Las obras se definen en los documentos incluidos en el presente proyecto, los cuales son:

Documento nº 1	Memoria y anejos
Documento nº 2	Planos
Documento nº 3	Pliego de Prescripciones Técnicas Particulares
Documento nº 4	Presupuesto

Lo mencionado en el Pliego y omitido en los Planos del Proyecto, o viceversa, será ejecutado como si estuviese contenido en ambos documentos. En caso de contradicción entre los Planos del Proyecto y el Pliego, el Director de Obras determinará el documento a seguir. Las omisiones en los Planos del Proyecto y en el Pliego o las descripciones erróneas de los detalles de la obra, que sean manifiestamente indispensables para llevar a cabo el espíritu o intención expuesto en los documentos del presente Proyecto o que, por uso y costumbre, deban ser realizados, no sólo no eximen al Contratista de la obligación de ejecutar estos detalles de obra omitidos o erróneamente descritos, sino que, por el contrario, serán ejecutados como si hubieran sido completa y correctamente especificados en los Planos del Proyecto y Pliego. El Contratista informará por escrito a la Dirección de la Obra, tan pronto como sea de su conocimiento, de toda discrepancia, error u omisión que encontrase. Cualquier corrección o modificación en los Planos del Proyecto o en las especificaciones del Pliego, sólo podrá ser realizada por la Dirección de Obra, siempre y cuando así lo juzgue conveniente para su interpretación o el fiel cumplimiento de su contenido. En caso de discrepancia entre los precios de una unidad, los Cuadros de Precios prevalecerán sobre el Presupuesto.

La licitación de las obras definidas por este Proyecto se regirá por las condiciones que al efecto establezca el Promotor. Una vez resuelta la adjudicación del Contrato de las obras, éste se regulará según la legislación actual pudiéndose aplicar lo preceptuado en las normas relativas a los contratos del sector público, como el Texto Refundido de la Ley de Contratos del Sector Público (aprobado por el Real Decreto Legislativo 3/2011, de 14 de noviembre, publicado en el BOE del 16 de noviembre de 2011), el Reglamento General de la Ley de Contratos de las Administraciones Públicas (aprobado por el Real Decreto 1098/2001, de 12 de octubre, publicado en el BOE del 26 de octubre de 2001) y la Relación de materiales básicos y las fórmulas-tipo generales de revisión de precios de los contratos de obras y de contratos de suministro de fabricación de armamento y equipamiento de las Administraciones Públicas (aprobado por el Real Decreto 1359/2011, de 7 de octubre, publicado en el BOE de 26 de octubre de 2011), entre otros.

Además, la ejecución de las obras quedará sujeta a las prescripciones legales en materia de prevención de riesgos laborales y de seguridad y salud, contenidas tanto en la Ley 31/1995, de 8 de noviembre, sobre Prevención de Riesgos Laborales, y en sus normas de desarrollo, como en el Real Decreto 1627/1997, de 24 de octubre, por el que se establecen las disposiciones mínimas en materia de seguridad y salud de las obras de construcción. Igualmente se tendrán en cuenta, cuantas disposiciones de carácter técnico, general y obligatorio estén vigentes, en materia de seguridad y salud en el momento de la adjudicación, o se publiquen durante la vigencia del contrato, si tienen trascendencia para la seguridad de las obras. En dicha normativa están incluidas las siguientes normas:

- Ley de Prevención de Riesgos Laborales, 31/1995, de 8 de noviembre, con las modificaciones realizadas por la Ley 54/2003 de 12 de diciembre, de reforma del marco normativo de la prevención de riesgos laborales.

- Reglamento de los Servicios de Prevención (Real Decreto 39/1997 de 17 de enero)
- Real Decreto 1627/1997, de 24 de octubre, por el que se establecen disposiciones mínimas de Seguridad y Salud en las Obras de Construcción
- Real Decreto 773/1997, de 30 de mayo, sobre disposiciones mínimas de seguridad y salud relativas a la utilización por los trabajadores de equipos de protección individual
- Real Decreto 1215/1997, de 18 de julio, por el que se establecen las disposiciones mínimas de seguridad y salud para la utilización por los trabajadores de los equipos de trabajo
- Real Decreto 485/1997, de 4 de abril, sobre disposiciones mínimas en materia de señalización de Seguridad y Salud en el trabajo
- Ordenanza laboral de la construcción de 28 de agosto de 1970
- Real Decreto 614/2001, de 8 de junio, sobre disposiciones mínimas para la protección de la salud y seguridad de los trabajadores frente al riesgo eléctrico
- Real Decreto 1316/1989, de 27 de octubre sobre protección de los trabajadores frente a los riesgos derivados de su exposición al ruido durante el trabajo (BOE 2/11/89)
- Real Decreto 1407/1992, de 20 de noviembre, por el que se regulan las condiciones para la comercialización y libre circulación intracomunitaria de los equipos de protección Individual. (BOE 28/12/92, corrección de erratas BOE 24/2/93)
- Real Decreto 159/1995, de 3 de febrero, por el que se modifica el Real Decreto 1407/1992, de 20 de noviembre, por el que se regulan las condiciones para la comercialización y libre circulación intracomunitaria de los equipos de protección individual
- Real Decreto 487/1997, de 14 de abril, sobre disposiciones mínimas de seguridad y salud relativas a la manipulación manual de cargas que entrañen riesgos, en particular dorsolumbares, para los trabajadores (BOE 23/4/97)

En aquellas cuestiones que no se hallen explícitamente reguladas en el presente Pliego, serán de aplicación aquellas prescripciones aplicables al tipo de obra contenidas en:

- Pliego de Licitación que se establezca para la contratación de estas obras
- Pliego de Prescripciones Técnicas Generales para Obras de Carreteras y Puentes (PG-3/75), de la Dirección General de Carreteras y Caminos Vecinales, aprobado por Orden Ministerial de 6 de febrero de 1976. Además, son de aplicación todas las modificaciones posteriores
- Instrucción de Hormigón Estructural (EHE), aprobada por Real Decreto 1247/2008, de 18 de julio, con las actualizaciones posteriores
- Instrucción de Acero Estructural (EAE), aprobada pro el Real Decreto 751/2011, de 27 de mayo, publicada en el BOE de 23/06/2011
- Código Técnico de la Edificación, aprobado por el Real Decreto 314/2006, de 17 de marzo, publicado en el BOE de 28/03/06
- Norma de Construcción Sismorresistente: Parte general y Edificación (NCSE-02) aprobada por Real Decreto nº 997/2002 de 27 de septiembre.
- Reglamento técnico sobre seguridad de presas y embalses (O.M. de 12 de mayo de 1996)
- Guías Técnicas de seguridad de presas (Comité Nacional Español de Grandes Presas)
- Ley 21/2013, de 9 de diciembre, de evaluación ambiental, publicada en el BOE de 11/12/13
- Real Decreto 105/2008, de 1 de febrero, por el que se regula la producción y gestión de los residuos de construcción y demolición

En general, cuantas prescripciones figuran en los Reglamentos, Normas e Instrucciones Oficiales que guarden relación con obras del presente Proyecto, con sus instalaciones complementarias o con los trabajos necesarios para realizarlas. Si alguna de las normas anteriormente relacionadas regula de modo distinto algún concepto, se entenderá de aplicación la más restrictiva. De manera análoga, si lo preceptuado para alguna materia por las citadas normas estuviera en contradicción con lo prescrito en el presente Documento, se resolverá por la Dirección de Obra, al igual que las contradicciones que puedan existir entre los distintos condicionados, que así mismo determinará, la normativa más restrictiva en caso de contradicción.

Las condiciones recogidas en este apartado que se aplicarán, serán las vigentes en el último día del plazo de licitación, entendiendo como tales, la última modificación o añadido a la norma sustitutoria.

El Promotor designará al Director de las Obras que será la persona, con titulación de Ingeniero de Caminos, Canales y Puertos, Ingeniero Técnico de Obras Públicas o Ingeniero Civil, directamente responsable de la comprobación y vigilancia de la correcta realización de las obras. Para desempeñar su función podrá contar con colaboradores que desarrollarán su labor en función de las atribuciones de sus títulos profesionales o de sus conocimientos específicos. El Promotor comunicará al Contratista el Director de Obras designado, antes de la fecha de comprobación del replanteo. De igual forma, el Director de las Obras pondrá en conocimiento al Contratista respecto de su personal colaborador. Si se produjesen variaciones de personal durante la ejecución de las obras, estas se pondrán en conocimiento del Contratista, por escrito. El adjudicatario asumirá las responsabilidades inherentes a la organización inmediata de los trabajos y al control y vigilancia de materiales y obras que ejecute, para dotarlas de las calidades definidas en el presente Pliego y normativa vigente en la materia. Las funciones del Director, en orden a la dirección, control y vigilancia de las obras que fundamentalmente afectan a sus relaciones con el Contratista, son las establecidas a continuación:

- Exigir al Contratista, directamente o a través del personal a sus órdenes, el cumplimiento de las condiciones contractuales
- Garantizar la ejecución de las obras con estricta sujeción al proyecto aprobado, o modificaciones debidamente autorizadas, y el cumplimiento del programa de trabajos
- Definir aquellas condiciones técnicas que los Pliegos de Prescripciones correspondientes dejan a su decisión
- Resolver todas las cuestiones técnicas que surjan en cuanto a interpretación de planos, condiciones de materiales y de ejecución de unidades de obra, siempre que no se modifiquen las condiciones del Contrato.

- Estudiar las incidencias o problemas planteados en las obras que impidan el normal cumplimiento del Contrato o aconsejen su modificación, tramitando, en su caso, las propuestas correspondientes
- Proponer las actuaciones procedentes para obtener, de los organismos oficiales y de los particulares, los permisos y autorizaciones necesarios para la ejecución de las obras y ocupación de los bienes afectados por ellas, y resolver los problemas planteados por los servicios y servidumbres relacionados con las mismas
- Asumir personalmente y bajo su responsabilidad, en casos de urgencia o gravedad, la dirección inmediata de determinadas operaciones o trabajos en curso; para lo cual el Contratista deberá poner a su disposición el personal y material de la obra
- Acreditar al Contratista las obras realizadas, conforme a lo dispuesto en los documentos del Contrato
- Participar en las recepciones provisional y definitiva y redactar la liquidación de las obras, conforme a las normas legales establecidas.

El Contratista estará obligado a prestar su colaboración al Director para el normal cumplimiento de las funciones a éste encomendadas.

El Delegado y Jefe de Obra del Contratista, adscrito a la obra con carácter exclusivo y con residencia a pie de obra, será una persona con titulación de Ingeniero de Caminos, Canales y Puertos, Ingeniero Técnico de Obras Públicas o Ingeniero Civil, elegida por el Contratista y aceptada por el Promotor, con capacidad suficiente para representar al Contratista siempre que sea necesario, como en otros actos derivados del cumplimiento de las obligaciones contractuales, siempre en orden a la ejecución y buena marcha de las obras, para organizar la ejecución de la obra e interpretar y poner en práctica las órdenes de la Dirección Facultativa o sus colaboradores, y para proponer a la Dirección o colaborar con ella en la resolución de los problemas que se planteen durante la ejecución. La Dirección Facultativa podrá suspender los trabajos o incluso solicitar la designación de un nuevo Delegado o colaborador de éste, siempre que se incurra en actos u omisiones que comprometan o perturben la buena marcha de las obras o el cumplimiento de los programas de trabajo, sin que de ello se deduzca alteración alguna de los términos y plazos del contrato. Dentro del personal del contratista existirán además el Jefe de Seguridad y Salud en el Trabajo (Ingeniero de Caminos, Canales y Puertos, Ingeniero Técnico de Obras Públicas o Ingeniero Civil con una formación mínima de Técnico Superior en Prevención de Riesgos Laborales y experiencia contrastada, preferentemente), y un Ingeniero de Caminos, Canales y Puertos, Ingeniero Técnico de Obras Públicas o Ingeniero Civil responsable de la Oficina Técnica del Contratista en la Obra. El Promotor podrá aceptar técnicos con otras titulaciones si lo solicita el Contratista y lo justifica adecuadamente.

El Delegado y Jefe de Obra será el interlocutor de la Dirección Facultativa, con obligación de recibir todas las comunicaciones verbales y/o escritas, que ordene el Director directamente o a través de otras personas; debiendo cerciorarse, en este caso, de que están autorizadas para ello y/o verificar el mensaje y confirmarlo, según su procedencia, urgencia e importancia. Todo ello sin perjuicio de que la Dirección Facultativa pueda comunicar directamente con el resto del personal oportunamente, que deberá informar seguidamente a su Jefe de Obra. El Delegado es responsable de que dichas comunicaciones lleguen fielmente, hasta las personas que deben ejecutarlas y de que se ejecuten. Es responsable de que todas las comunicaciones escritas de la Dirección de obra estén custodiadas, ordenadas cronológicamente y disponibles en obra para su consulta en cualquier momento. Se incluyen en este concepto los planos de obra, ensayos, mediciones, etc. El Delegado deberá acompañar a la Dirección Facultativa en todas sus visitas de inspección a la obra y transmitir inmediatamente a su personal las instrucciones que reciba de la Dirección Facultativa, incluso en presencia suya, (por ejemplo, para aclarar dudas), si así lo requiere dicha Dirección Facultativa. El Delegado tendrá obligación de estar enterado de todas las circunstancias y marcha de obras e informar a la Dirección Facultativa a su requerimiento en todo momento, o sin necesidad de requerimiento si fuese necesario o conveniente. Lo expresado vale también para los trabajos que efectuasen subcontratistas o destajistas, en el caso de que fuesen autorizados por la Dirección. Se entiende que la comunicación Dirección de Obra-Contratista, se canaliza entre la Dirección Facultativa y el Delegado Jefe de Obra, sin perjuicio de que para simplificación y eficacia especialmente en casos urgentes o rutinarios, pueda haber comunicación entre los respectivos personales; pero será en nombre de aquéllos y teniéndoles informados puntualmente, basadas en la buena voluntad y sentido común, y en la forma y materias que aquellos establezcan, de manera que si surgiese algún problema de interpretación o una decisión de mayor importancia, no valdrá sin la ratificación por los indicados Dirección Facultativa y Delegado, acorde con el cometido de cada uno. Se abrirá el "Libro de Órdenes" por la Dirección Facultativa y permanecerá custodiado en obra por el Contratista, en lugar seguro y de fácil disponibilidad para su consulta y uso. El Delegado deberá llevarlo consigo al acompañar en cada visita a la Dirección Facultativa. Se hará constar en él las instrucciones que la Dirección Facultativa estime convenientes para el correcto desarrollo de la obra. Asimismo, se hará constar en él, al iniciarse las obras o, en caso de modificaciones durante el curso de las mismas, con el carácter de orden, la relación de personas que, por el cargo que ostentan o la delegación que ejercen, tienen facultades para acceder a dicho Libro y transcribir en él órdenes, instrucciones y recomendaciones que se consideren necesarias comunicar al Contratista.

El Contratista obtendrá a su costa todos los permisos o licencias necesarios para la ejecución de las obras, con excepción de los correspondientes a la expropiación de las zonas de ubicación de las mismas o a permisos de ocupación temporal o permanente de las obras previstas en este proyecto así como en cualquier otro modificativo o adicional del presente. Será responsable, hasta la recepción definitiva, de los daños y perjuicios ocasionados a terceros como consecuencia de los actos, omisiones o negligencia del personal a su cargo, o de una deficiente organización de las obras. El Contratista está obligado previamente al comienzo de los trabajos a detectar, proteger, evitar o reponer en su caso, y a su cargo, salvo que esté expresamente recogido en Pliego y Presupuesto, todos los servicios existentes en uso o no, tales como redes subterráneas de telefonía, fibra óptica y cable, líneas eléctricas, conducciones de abastecimiento, colectores de saneamiento, gasoductos, oleoductos, etilenoductos, obras de drenaje, depósitos de agua, combustible o de cualquier otro tipo, cualquier construcción enterrada o no, estructuras, pilotajes, muros pantalla, zapatas, túneles, galerías, yacimientos arqueológicos y cualquier otro elemento, construcción o canalización que pudiera resultar dañado por la ejecución de cualquiera de los trabajos de la obra dentro de los límites de la misma. Serán por lo tanto a cargo del Contratista todos los daños, perjuicios e indemnizaciones consecuencia de la rotura, interrupción y posterior reposición de cualquier elemento y servicio público o privado de los arriba mencionados. El Contratista está obligado a detectar, proteger, evitar o reponer en las mismas condiciones anteriores cualquier servicio de los arriba mencionados fuera de los límites de la obra, siendo igualmente responsable de cualquier daño generado como consecuencia de actividades tales como el desvío de cauces, la ejecución de caminos provisionales de reposición de accesos y servidumbres, pistas de acceso a la obra, explotación de canteras, préstamos y vertederos, la implantación y explotación de cualquier instalación de obra, la derivación de caudales sin cumplir los requisitos correspondientes, y cualquier otra actividad que vaya a ser desarrollada por el Contratista. El Contratista dará cuenta de todos los objetos de interés que se encuentren o descubran en la obra durante la ejecución de los trabajos a la Dirección de Obra y los colocará bajo su custodia. También queda obligado al cumplimiento de lo establecido en las Reglamentaciones de Trabajo y disposiciones reguladoras de los Seguros Sociales y de Accidentes.

En el Libro de Incidencias constarán todas aquellas circunstancias y detalles relativos al desarrollo de las obras que la Dirección Facultativa considere oportuno y, entre otros, con carácter diario, los siguientes:

- Condiciones atmosféricas generales
- Relación de trabajos efectuados, con detalle de su localización dentro de la obra
- Relación de ensayos efectuados con resumen de los resultados o relación de los documentos que estos recogen
- Relación de maquinaria en obra, con expresión de cual ha estado activa y en qué tajo y cual meramente presente, y cual averiada y en reparación
- Cualquier otra circunstancia que pueda influir en la calidad o el ritmo de ejecución de obra

En el Libro de Incidencias se anotarán todas las órdenes formuladas por la Dirección de Obra o la Asistencia Técnica de la misma, que debe cumplir el Contratista. La custodia de éste libro será competencia de la Asistencia Técnica o persona delegada por la Dirección de las obras. Como simplificación, la Dirección Facultativa podrá disponer que estas incidencias figuren en partes de obra diarios, que se custodiarán como anejo al Libro de Incidencias.

En casos de contradicciones, dudas o discrepancias entre los distintos documentos del presente proyecto, el orden de prelación entre ellos será el siguiente:

- El Presupuesto y, dentro de éste, el siguiente orden: Definiciones y descripción de los precios unitarios; Unidades del Presupuesto y Partidas de Mediciones
- Los Planos
- El Pliego de Prescripciones Técnicas Particulares
- La Memoria y sus anejos

Lo mencionado en el Pliego de Condiciones y omitido en los Planos del Proyecto, o viceversa, será ejecutado como si estuviese contenido en ambos documentos. El Contratista informará por escrito a las Dirección de la Obra, tan pronto como sea de su conocimiento, de toda discrepancia, error u omisión que encontrase. Cualquier corrección o modificación en los Planos de Proyecto o en las especificaciones del Pliego de Condiciones, sólo podrá ser realizada por la Dirección de la Obra, siempre y cuando así lo juzgue conveniente para su interpretación o el fiel cumplimiento de su contenido. En caso de discrepancia entre los precios de una unidad, los Cuadros de precios prevalecerán sobre el Presupuesto.

Artículo 102 – Descripción de las obras

El objeto del presente proyecto es ubicar la localización idónea para implantar una central termosolar de colectores cilindro-parabólicos en la comarca de la Campiña Sur (Badajoz), además de definir la mayor parte de las obras civiles relacionadas con su construcción, como son:

- El movimiento de tierras (Desbroce, desmonte y terraplén)
- La estructura de los colectores (Cimentaciones y estructura metálica)
- Las balsas de regulación
- La reposición de servicios
- Las actuaciones de integración ambiental

- El cerramiento de la central

Quedan fuera del ámbito de este proyecto actuaciones como la impulsión de agua hasta las balsas, los viales internos, la depuración de las aguas empleadas en el ciclo de funcionamiento, el drenaje, la remodelación de la carretera de acceso, etc., además de otras cuya definición correría a cargo de profesionales con otra titulación, como son las conducciones internas de la planta, la turbina, las torres de refrigeración, la subestación transformadora, etc.

Tras realizar el estudio multicriterio detallado en el apartado siguiente, se ha ubicado la central termosolar en el término municipal de Llerena (Badajoz), a una distancia de 3,5 km del núcleo urbano hacia el noreste.

Se ha considerado que este proyecto es de iniciativa privada.

Artículo 103 – Iniciación de las obras

El acta de comprobación del replanteo reflejará la conformidad o disconformidad del mismo respecto de los documentos contractuales del Proyecto, con especial y expresa referencia a las características geométricas de la obra, a la autorización para la ocupación de los terrenos necesarios y a cualquier punto que pueda afectar al cumplimiento del Contrato. El Contratista transcribirá, y el Director autorizará con su firma, el texto del Acta en el Libro de Órdenes. Las bases de replanteo se marcarán mediante monumentos de carácter permanente. Los datos, cotas y puntos fijados se anotarán en un anejo al Acta de Comprobación del Replanteo; al cual se unirá el expediente de la obra, entregándose una copia al Contratista.

El Contratista presentará en tiempo y forma el Programa de Trabajos para el desarrollo de las obras de acuerdo con lo estipulado en el pliego de contratación con el Promotor, en el que se establecerá el orden a seguir de las obras, el número de tajos y orden de realización de las distintas unidades, debiéndose estudiar de forma que se asegure la mayor protección a los operarios y a terceros, además de tener en cuenta todos los condicionantes impuestos por los estudios geotécnicos y de impacto ambiental.

La Dirección Facultativa deberá ejercer de una manera continuada y directa la inspección de la obra durante su ejecución, sin perjuicio de que el Promotor pueda confiar tales funciones, de un modo complementario, a cualquier otro de sus representantes. El Contratista o su Delegado deberán, cuando se le solicite, acompañar en sus visitas de inspección a la Dirección Facultativa. El Contratista proporcionará a la Dirección de Obra y a sus delegados o subalternos, toda clase de facilidades para los replanteos, así como para la inspección de la obra en todos los trabajos, con objeto de comprobar el cumplimiento de las condiciones establecidas en este Pliego, permitiendo el acceso a cualquier parte de la obra, incluso a los talleres o fábricas donde se produzcan los materiales o se realicen trabajos o pruebas para las obras. En la obra deberá existir permanentemente a disposición de la Dirección de Obra, un Proyecto de la misma, un ejemplar del Plan de Obra y un Libro de Órdenes, el cual constará de 100 hojas foliadas por duplicado, numeradas, con el título impreso de la obra y con un espacio en su parte inferior para fecha y firma de la Dirección de Obra y del Jefe de Obra.

Artículo 104 – Desarrollo y control de las obras

Todos los aparatos de control y medida, maquinarias, herramientas y medios auxiliares que constituyen el equipo a aportar por el Contratista y responsabilidad de éste para la correcta ejecución de las Obras deberán reunir las debidas condiciones de idoneidad, pudiendo rechazar la Dirección de Obra cualquier elemento que, a su juicio, no reúna las referidas condiciones. Si durante la ejecución de las Obras, el Director estimara que, por cambio en las condiciones de trabajo o cualquier otro motivo, el equipo aprobado no es idóneo al fin propuesto, podrá exigir su refuerzo o sustitución por otro más adecuado. El equipo quedará adscrito a la Obra en tanto se hallen en ejecución las unidades en las que ha de utilizarse, no pudiéndose retirar elemento alguno del mismo sin consentimiento expreso del Director de Obra. En caso de avería, por causas meteorológicas, actos de vandalismo, robo o cualquier otra causa, deberán ser reparados los elementos averiados o inutilizados siempre que su reparación, por cuenta del Contratista, exija plazos que no alteren el Programa de Trabajo que fuera de aplicación. En caso contrario deberá ser sustituido el equipo completo. En todo caso, la conservación, vigilancia, reparación y/o sustitución de los elementos que integren el equipo aportado por el Contratista, será de la exclusiva cuenta y cargo del mismo. La maquinaria, herramientas y medios auxiliares que emplee el Contratista para la ejecución de los trabajos no serán nunca abonables, pues ya se ha tenido en cuenta al hacer la composición de los precios entendiéndose que, aunque en los Cuadros de Precios no figuren indicados de una manera explícita alguna o algunos de ellos, todos ellos se considerarán incluidos en el precio correspondiente. Los medios auxiliares que garanticen la seguridad del personal operario son de exclusiva responsabilidad y cargo del Contratista.

El Contratista estará obligado a realizar su propio "autocontrol" definido en el Plan de Aseguramiento de la Calidad de las Obras que está obligado a elaborar para cada unidad de obra mediante los ensayos que se especifican en este Pliego en las Instrucciones y Normativas vigentes relacionadas con el Proyecto y en el PG-3/75. Deberá asegurarse de que está cumpliendo todas las especificaciones. El Contratista deberá instalar a su costa un laboratorio auxiliar de obra dotado del personal especializado necesario y suficiente, en el que efectuará los ensayos necesarios para el autocontrol durante la ejecución de las obras al ritmo exigido por el Programa de Trabajo correspondiente. La frecuencia de estos ensayos se hará de acuerdo con lo acordado con el Promotor. El Contratista establecerá en la obra un conjunto de acciones, planificadas, sistemáticas y formalizadas que le capaciten para desarrollar unos métodos de ejecución que le permitan integrar la calidad en el sistema de ejecución de la obra y para establecer los métodos de verificación, que permitan a la empresa demostrar que puede obtener la calidad. Los gastos que produzca el funcionamiento de este laboratorio auxiliar correrán a cargo del Contratista y no corresponden ni se consideran incluidos en el límite del uno (1) por ciento (%) del presupuesto de ejecución material.

Los ensayos de contraste servirán de referencia a la Dirección de las Obras para su labor de "control", que, en su caso, los confrontará y completará con los ensayos que considere oportunos que se realicen en los laboratorios que a tal fin se designen. El importe de los ensayos de control, correrá a cargo del Contratista hasta un límite del uno (1) por ciento (%) del Presupuesto de Ejecución Material del Proyecto. Este uno (1) por ciento (%) corresponde a los ensayos que el Ingeniero Director de las Obras estime necesarios realizar para completar el control de calidad efectuado por el Contratista, de acuerdo con lo dispuesto en los párrafos anteriores. El resto del importe de estos ensayos por encima de dicho límite, si lo hubiese, será de abono al Contratista a los precios de tarifa que se acuerde con el Promotor. El Ingeniero Director podrá prohibir la ejecución de una unidad de obra si no están disponibles dichos elementos de autocontrol para la misma, siendo entera responsabilidad del Contratista las eventuales consecuencias de demora, cortes, etc.

Todos los materiales que se utilicen en las obras, deberán cumplir las condiciones que se establecen en los Pliegos de Prescripciones Técnicas, o en su defecto, las especificadas por el Director de Obra, pudiendo ser rechazados en caso contrario por éste último. Por ello, todos los materiales que se propongan ser utilizados en la obra deben ser examinados y ensayados antes de su aceptación en primera instancia mediante el Autocontrol del Contratista y, eventualmente, con el Control de la Dirección de Obra. El no rechazo de un material no implica su aceptación. El no rechazo o la aceptación de una procedencia no impide el posterior rechazo de cualquier partida de material de ella que no cumpla las prescripciones ni incluso la eventual prohibición de dicha procedencia. En cumplimiento de lo establecido en el Real Decreto 1630/1992 (modificado por el Real Decreto 1328/1995) por el que se dictan disposiciones para la libre circulación de productos de construcción, en aplicación de la Directiva 89/106/CEE (modificada por la Directiva 93/68/CE), los productos de construcción a los que sea de aplicación dicha Directiva deberán llevar obligatoriamente el marcado CE y la correspondiente información que debe acompañarle, conforme a lo establecido en el Anejo ZA de las normas armonizadas correspondientes. Los productos de construcción a los que son de aplicación las mencionadas Directivas, así como las normas armonizadas correspondientes se recogen en el Anexo I de la Orden de 29 de noviembre de 2001 del Ministerio de Ciencia y Tecnología y en las actualizaciones y ampliaciones posteriores de este Anexo. La garantía del cumplimiento de las especificaciones incluidas en el marcado CE, así como la calidad de los productos será exigible en cualquier circunstancia al contratista adjudicatario de las obras.

Queda terminantemente prohibido efectuar acopios de materiales, cualquiera que sea su naturaleza, sin haber solicitado previamente autorización al Director de Obra, sobre el lugar a efectuar dichos acopios y el motivo que lo justifique. Los materiales se acopiarán en forma tal, que se asegure la preservación de su calidad para su utilización en obra, y de la forma en que el Director de Obra prescriba. Los costes de acopio y estiba de los materiales acopiados están incluidos dentro de los precios de las unidades afectadas, no siendo por tanto de abono al contratista de forma separada. Si se detectasen anomalías en el suministro, los materiales se acopiarán por separado hasta confirmar su aceptabilidad. Esta misma medida se aplicará cuando se autorice un cambio de procedencia. Los daños que pudieran derivarse de la ocupación de terrenos, así como de los cánones que pudieran solicitarse por los propietarios de los mismos, al ser utilizados como lugares de acopio, serán a cargo del Contratista, no responsabilizándose el Promotor ni del abono de dichos cánones ni de los daños que pudieran derivarse de su uso.

Si el Contratista considera necesario establecer varios turnos de trabajo, deberá proponerlo previamente, para su autorización, al Director de Obra. Igualmente, cualquier trabajo nocturno de carácter excepcional deberá ser previamente autorizado por el Director de Obra y realizarse solamente en las unidades de obra que él indique. Asimismo, la Dirección de Obra podrá disponer la realización de trabajos nocturnos cuando lo considere conveniente para la correcta ejecución de los trabajos. Los gastos adicionales que puede conllevar el trabajo en turnos extra del horario normal de obra, iluminación, señalización complementaria, etc., serán de cuenta del Contratista, que someterá a la aprobación del Director de Obra las medidas complementarias necesarias a disponer. El Contratista dispondrá siempre a pie de obra una persona responsable, cuyas características, en función del trabajo que se esté desarrollando, serán fijadas por el Director de Obra.

El Contratista responderá de la ejecución de las obras y de las faltas que en ellas hubiere, hasta que se lleve a cabo la recepción de las obras. La Dirección Facultativa ordenará, antes de la recepción de las obras, la demolición y reposición de las unidades de obra mal ejecutadas o defectuosas. Los gastos que de estas operaciones se deriven, correrán por cuenta del Contratista. El Contratista sólo quedará exento de responsabilidad cuando la obra defectuosa o mal ejecutada se deba a alguna orden por parte del Promotor o a vicios del Proyecto. Si alguna obra no se hallase ejecutada con arreglo a las condiciones del contrato y fuera, sin embargo, admisible a juicio de la

Dirección Facultativa, podrá ser recibida provisionalmente y definitivamente en su caso, quedando el adjudicatario obligado a conformarse, sin derecho a reclamación, con la rebaja económica que la Dirección Facultativa estime, salvo en el caso en que el adjudicatario opte por la demolición a su costa y las rehaga con arreglo a las condiciones del Contrato.

El Contratista adoptará bajo su entera responsabilidad, todas las medidas necesarias para el cumplimiento de las disposiciones vigentes referentes a la prevención de accidentes, incendios y daños a terceros, y seguirá las instrucciones complementarias que diere, a este respecto, la Dirección de Obra. Especialmente, el Contratista adoptará las medidas necesarias para evitar la contaminación del agua por efecto de los combustibles, aceites, ligantes o cualquier otro material que pueda ser perjudicial. Además pondrá especial cuidado en implantar y cumplir todas y cada una de las medidas de Integración Ambiental durante la ejecución de las obras incluidas en el pres ente Proyecto. Se deberá tener en cuenta el Real Decreto 105/2008 de 1 de febrero, por el que se regula la producción y gestión de los residuos de construcción y demolición.

Cuando se teman heladas, el contratista protegerá todas las zonas de las obras que pudieran ser perjudicadas por ellas. Las partes dañadas se levantaran y reconstruirán a su costa, de acuerdo con el presente pliego.

El contratista deberá atenerse a las disposiciones vigentes para la prevención y control de incendios, y a las instrucciones complementarias que figuren en el pliego de prescripciones técnicas particulares, o que se dicten por el Director de las Obras. En todo caso, adoptará las medidas necesarias para evitar que se enciendan fuegos innecesarios, y será responsable de evitar la propagación de los que se requieran para la ejecución de las obras, así como de los daños y perjuicios que se pudieran producir.

En el anejo nº 10 del presente proyecto se adjunta el preceptivo Estudio de Seguridad y Salud en las obras en cumplimiento del Real Decreto 1627/1997, de 24 de octubre. Por aplicación del mencionado Decreto, el Contratista está obligado a elaborar un Plan de Seguridad y Salud en las obras en el que se analicen, estudien y contemplen, en función de su propio sistema de ejecución de la obra, las previsiones contenidas en el citado Estudio, con las alternativas de prevención que la empresa adjudicataria proponga y con la correspondiente valoración económica que no podrá implicar disminución de su importe total, ni de los niveles de protección previstos en dicho Estudio. Este Plan de Seguridad y Salud deberá ser aprobado antes del inicio de las obras. Para ello el Coordinador en materia de Seguridad y Salud durante la ejecución de la obra deberá realizar un informe, el cual elevará para su aprobación, al servicio correspondiente del Promotor. El Plan se considerará aprobado una vez que haya sido autorizado por el órgano competente de conceder la apertura del Centro de Trabajo. El abono del presupuesto del Estudio citado se realizará de acuerdo con los correspondientes Cuadros de Precios que figuran en este proyecto, o en su caso, en los del Plan de Seguridad y Salud aprobado por el Promotor y que se consideran documentos del Contrato a dichos efectos. También tiene consideración de documento contractual el Pliego del Estudio de Seguridad y Salud, por lo que es de obligado cumplimiento por parte del Contratista.

Para el mantenimiento de servidumbres y servicios existentes, el Contratista dispondrá todos los medios que sean necesarios, sometiéndose en caso preciso a lo que ordene la Dirección de Obra, cuyas resoluciones discrecionales a este respecto serán inapelables, siendo el Contratista responsable de los daños y perjuicios que por incumplimiento de esta prescripción puedan resultar exigibles. El abono de los gastos que este mantenimiento ocasione se encuentra comprendido en los precios de las distintas unidades de obra. La determinación, en la zona de las obras, de la situación exacta de las servidumbres y servicios públicos para su mantenimiento en su estado actual, es obligación del Contratista y serán de su cuenta todos los daños y perjuicios que el incumplimiento de esta prescripción ocasione. El Contratista está obligado a permitir a las compañías suministradoras de servicios la inspección de sus conducciones así como la instalación de nuevas conducciones en la zona de la obra, de acuerdo con las instrucciones que señale la Dirección de la Obra, con objeto de evitar futuras afecciones a la obra terminada.

El Contratista queda comprometido a conservar hasta que sean recibidas, todas las obras que integren el proyecto. El Contratista reparará las obras que hayan sufrido deterioro, por negligencia u otros motivos que le sean imputables, o por cualquier causa que pueda considerarse como evitable por los servicios de Conservación del propio

Contratista. No se ha previsto partida alzada para la conservación de las obras durante el plazo de ejecución ni durante el período de garantía, por considerarse incluido este concepto en los precios correspondientes de las distintas unidades de obra.

Una vez terminada la Obra y antes de su recepción, se procederá a su limpieza general, retirando los materiales sobrantes o desechados, escombros, obras auxiliares, instalaciones, almacenes y edificios que no sean precisos para la conservación durante el plazo de garantía. Esta actividad será objeto de abono con cargo a la Partida Alzada de abono integro para Limpieza y Terminación de las Obras, en el Documento nº 4 “Presupuesto”.

La ejecución de las unidades de obra del Presente Proyecto, cuyas especificaciones no figuren en este Pliego de Prescripciones Técnicas Particulares, se hará de acuerdo con lo especificado para las mismas en la normativa que indique el Ingeniero Director, dentro de la buena práctica para obras similares. Tendrán el mismo tratamiento las unidades de obra no desarrolladas en el presente Pliego pero que hayan sido definidos en los planos y/o presupuestadas.

Sin autorización del Director de Obra o personal en quien delegue, no podrá el Contratista proceder al relleno de las excavaciones abiertas para cimentación de las obras y, en general, al de todas las obras que queden ocultas. Cuando el Contratista haya procedido a dicho relleno sin la debida autorización, podrá el Director de Obra ordenar la ejecución, a cargo del contratista, de las labores necesarias para poder realizar la inspección de las obras así ejecutadas, y disponer la demolición de lo ejecutado, si no se ajusta a lo previsto en este proyecto, siendo los gastos de esta operación a cargo del Contratista que también será responsable de los eventuales errores de ejecución y acabado de dicha unidad y, en todo caso, el Contratista será responsable de las equivocaciones que hubiese cometido.

Las áreas de instalaciones deberán incluir todas las medidas necesarias para garantizar la ausencia de vertidos a los cauces, eliminar el riesgo de contaminación del suelo y acuíferos, y contemplar la adecuada gestión de los residuos sólidos y líquidos. El Contratista está obligado a elaborar y ejecutar un Plan de Gestión de los Residuos de Obra, que deberá someterse a la aprobación de la Dirección de Obra. Este plan se incluirá en el plan de calidad medioambiental que desarrollará el contratista y recogerá todos los procedimientos encaminados a disminuir los riesgos de contaminación. Entre estos procedimientos se incluirá el plan de gestión de residuos que deberá incluir las previsiones detalladas para la recogida, transporte y eliminación segura de todos los residuos generados en la obra, sean éstos inertes, asimilables a urbanos o industriales o peligrosos. El manejo de residuos urbanos, asimilables a urbanos y peligrosos, se ha de realizar de acuerdo a la Ley de 10/1998, de 21 de abril, de Residuos, desarrollada mediante el Real Decreto 833/1998, de 20de julio y 952/1997, de 20 de junio en el que se incluyen las demás normas básicas referentes a las obligaciones de los productores y gestores y a las operaciones de gestión. La eliminación de los residuos peligrosos deberá seguir un procedimiento distinto en función de su composición. Así mismo, deben ser retirados por Gestores autorizados para cada tipo de residuo, y los costes derivados de esta gestión irán a cargo del centro productor. Se prestará especial atención a la gestión de aceites usados, con legislación específica que le atañe. En cada una de las zonas de instalaciones se emplazarán los contenedores adecuados para cada tipo de residuo, procediendo posteriormente, a su traslado a vertedero autorizado o instalación de tratamiento o eliminación. Los contenedores que tengan por objeto el almacenamiento de residuos potencialmente contaminantes deberán situarse sobre terrenos impermeabilizados. La composición del material de cada contenedor estará de acuerdo con la clase, volumen y peso esperado de almacenamiento, así como con las condiciones de aislamiento necesarias. El sistema de colores a emplear con objeto de facilitar la distinción visual será:

- Verde para vidrio
- Azul para papel y cartón
- Amarillo para envases y plásticos
- Marrón para madera
- Negro para neumáticos
- Blanco para residuos orgánicos
- Rojo para residuos peligrosos
- Morado para pilas
- Gris para residuos inertes

Los puntos limpios se dispondrán sobre una superficie impermeabilizada, y su recogida será periódica y selectiva por gestores autorizados. Los residuos urbanos y asimilables a urbanos se deben depositar en contenedores adecuados e identificados, y proceder a su retirada y gestión de forma periódica. Dado que la obra no se encuentra en un núcleo urbano, puede optarse entre dos soluciones: solicitar el servicio de recogida de basuras al Ayuntamiento de la localidad más cercana y abonar las tasas correspondientes por retirada, o contratar los servicios de una empresa gestora de residuos urbanos, autorizada por la Comunidad Autónoma de Extremadura, archivando las facturas de retirada y gestión.

Según el Real Decreto 105/2008, la gestión de los RCD comprende un conjunto de actividades encaminadas a que estos residuos tengan un destino adecuado, en base a sus características y también basadas en la protección de la salud humana, de los recursos naturales y el medio ambiente en general. Deben depositarse en condiciones adecuadas en las obras donde se generan y, cuando sea posible, reutilizarlos. Los que sobren, deberán gestionarse mediante gestor autorizado que realizará el tratamiento correspondiente (llevarlo a vertedero autorizado, reutilizarlo, etc.). Debe identificarse y diferenciarse el conjunto de los residuos en función de las posibilidades de gestión en tres grandes grupos: los componentes de la construcción que pueden ser reutilizados en otras construcciones, los materiales de construcción que pueden ser reciclados y los elementos que, por su propia composición, son potencialmente peligrosos y sólo pueden ser destinados a una deposición controlada en el suelo.

Se consideran residuos peligrosos generados en la obra los aceites usados, los filtros de aceite, baterías, combustibles degradados, líquidos hidráulicos, disolventes... etc., así como las tierras contaminadas con aceites e hidrocarburos. Para todos ellos la normativa establece:

- Separar adecuadamente y no mezclar los residuos peligrosos, evitando particularmente aquellas mezclas que supongan un aumento de su peligrosidad o dificulten su gestión.
- Envasar y etiquetar los recipientes que contengan residuos peligrosos en la forma que reglamentariamente se determine.

- Llevar un registro de los residuos peligrosos producidos o importados y el destino de los mismos.
- Suministrar la información necesaria para su adecuado tratamiento y eliminación, a las empresas autorizadas de la gestión y tratamiento.
- Informar con celeridad a las autoridades competentes en caso de desaparición, pérdida o escape de residuos peligrosos.
- Cabe la posibilidad de que pudieran aparecer indicios de tierras y balasto contaminados. En tal caso, se procederá a su retirada y separación selectiva, almacenándolo y clasificándolo como residuo peligroso para su entrega a un gestor autorizado que lo gestione adecuadamente.

La eliminación de los residuos peligrosos deberá seguir un procedimiento distinto en función de su composición. Asimismo, deben ser retirados por Gestores Autorizados para cada tipo de residuo, y los costes derivados de esta gestión irán a cargo del centro productor. También el almacenamiento será diferente, según tipo y naturaleza del residuo, aunque en ningún caso el almacenamiento de RPs en las instalaciones sobrepasará los 6 meses. Una vez finalizadas las obras, se llevará a cabo una limpieza pormenorizada de la zona, retirando y transportando a vertedero o punto limpio de reciclaje todos aquellos residuos de carácter artificial existentes en la zona de actuación. Se prestará especial atención a los restos de excedentes derivados de los movimientos de tierra y los restos procedentes de las diferentes unidades de obra tales como embalajes, piezas o componentes de maquinaria, restos de utensilios, utillaje, herramientas o equipos manuales, etc. En todo caso, posteriormente a la finalización de las obras, todos los residuos y escombros serán gestionados adecuadamente, y no se abandonarán en las inmediaciones.

El Contratista está obligado a mantener un control efectivo de la generación de polvo en el entorno de las obras, adoptando las medidas pertinentes, entre ellas:

- Realizar periódicamente operaciones de riego sobre los caminos de rodadura y cuantos lugares estime necesarios la Dirección Ambiental de Obra, dos riegos diarios durante los períodos secos y un riego diario en la época más húmeda.

- Retirar los lechos de polvo y limpiar las calzadas del entorno de actuación, utilizadas para el tránsito de vehículos de obra.
- Emplear toldos de protección en los vehículos que transporten material pulverulento, o bien proporcionar a éste la humedad conveniente. Limitar su velocidad y evitar ese transporte en momentos de fuertes vientos.
- Los acopios de material pulverulento permanecerán tapados y en caso de resultar necesario serán estabilizados mediante la aplicación de riegos.
- Los vehículos que circulen en las zonas de obras, limitarán su velocidad a 30 km/h con objeto de minimizar la proyección de partículas a la atmósfera a su paso. Esta medida será de aplicación en aquellos lugares que no se encuentren pavimentados.

El cruce o el entronque de las pistas de obra con cualquier vía pública debe establecerse de acuerdo con la Administración responsable, y mantenerse limpios y en buen estado. En el caso de circulación de maquinaria y/o de camiones sobre obras de fábrica, el Contratista debe considerar si es necesario el reforzamiento de las estructuras y de los dispositivos de protección. Todo camino de obra que vadee directamente cursos de agua requerirá la construcción de pasos provisionales que eviten la turbidez de las aguas por el paso frecuente de maquinaria pesada. Dichos pasos deberán contar con la autorización pertinente del organismo regulador en cada caso. Con objeto de minimizar la emisión de gases contaminantes de la maquinaria de obra utilizada, se realizará un control de los plazos de revisión de motores de la misma. Antes del comienzo de las obras, el contratista se asegurará que todos estos vehículos y maquinaria garanticen, mediante las revisiones pertinentes, los siguientes aspectos:

- Ajuste correcto de los motores
- Potencia de la máquina adecuada al trabajo a realizar
- Estado correcto de los tubos de escape
- Empleo de catalizadores
- Revisión de maquinaria y vehículos (ITV)

Mientras dure la ejecución de las obras, se colocarán en todos los puntos donde sea necesario, y a fin de mantener la debida seguridad vial, las señales y el balizamiento preceptivos, de acuerdo con la Norma 8.3-IC así como con el Código de la Circulación y el Plan de Seguridad y Salud. La permanencia y eficacia de estas señales deberá estar garantizada por los vigilantes que fueran necesarios; tanto las señales como los jornales de éstos últimos, serán de cuenta del Contratista, teniendo éste derecho al abono de la correspondiente partida de acuerdo con el Presupuesto. La responsabilidad de los accidentes ocurridos por la inobservancia de lo exigido en este Artículo será, por entero, del Contratista, quien deberá, además reparar a su cargo los daños locales en las unidades de obra ejecutadas y sobre las que ha de pasar el tráfico, para garantizar la seguridad vial de éste y dejar la unidad correctamente terminada. Las obras se ejecutarán de forma que el tráfico ajeno a las mismas, en las zonas que afecte a calles y servicios existentes, encuentre en todo momento un paso en buenas condiciones de vialidad, ejecutándose, si fuera preciso, a expensas del Contratista, viales provisionales para desviarlo. Observará, además, el Contratista cuantas disposiciones le sean dictadas por el Ingeniero Director de las Obras, encaminadas a garantizar la seguridad del tráfico y acatará todas las disposiciones que dicte el facultativo arriba indicado por sí o por persona en quien delegue con objeto de asegurar la buena marcha del desarrollo de las obras desde este punto de vista.

Artículo 105 – Responsabilidades especiales del contratista

Será de cuenta del Contratista indemnizar todos los daños causados a terceros como consecuencia de las operaciones que requiera la ejecución de las obras, salvo cuando tales perjuicios hayan sido ocasionados por una orden del Promotor o por vicios de Proyecto, en cuyo caso el Promotor podrá exigir al Contratista la reposición material del daño producido por razones de urgencia, teniendo derecho el Contratista a que se le abonen los gastos que de tal reparación se deriven.

La Dirección de la Obra o, en su caso, el Contratista y antes de comenzar las obras contactarán para avisar del comienzo de la actividad a la instancia administrativa responsable del Patrimonio y estarán a lo que ella disponga sobre protección concreta de los elementos patrimoniales, monumentos, edificios de interés, áreas con restos, etc. El contratista tiene la obligación de emplear todas las precauciones que, para la extracción de tales objetos, le sean indicadas por la Dirección y derecho a que se le abone el exceso de gasto que tales trabajos le causen. El contratista está también obligado a advertir a su personal de los derechos del Estado sobre este extremo, siendo responsable subsidiario de las sustracciones o desperfectos que pueda ocasionar el personal empleado en la obra.

El Contratista deberá obtener todos los permisos y licencias necesarios para la ejecución de las obras con la excepción de los correspondientes a la ocupación de las zonas afectadas, y deberá abonar todas las cargas, tasas e impuestos derivados de la obtención de aquellos permisos.

El Contratista está obligado a cumplir los plazos parciales que fije el Programa de Trabajo aprobado al efecto, y el plazo total con las condiciones que en su caso se indiquen. La demora injustificada en el cumplimiento de dichos plazos acarreará la aplicación al Contratista de las sanciones previstas en el Pliego del contrato firmado con el Promotor.

Artículo 106 – Medición y abono

Todas las fases de obra se medirán por las unidades que figuran en los cuadros de precios, y se abonarán las que se hayan ejecutado según las órdenes e instrucciones del Ingeniero Director de las obras a los precios que aparecen en dichos cuadros. El Ingeniero Director de las obras, antes del inicio de los trabajos, señalará al Contratista el proceso que ha de seguirse para la ordenada toma de datos y consiguiente medición de las sucesivas fases de obra. Sin perjuicio de particularizaciones que se hagan en este Pliego, el sistema a seguir será tal que no se iniciará una fase de obra sin que previamente esté medida y conformada la anterior. Las formas y dimensiones de las distintas obras a ejecutar, serán las establecidas en los planos incluidos en el Proyecto. Las modificaciones que, sobre ellas, hayan de introducirse serán ordenadas por escrito, mediante la correspondiente orden de ejecución, por el Ingeniero Director de las obras o persona en quien delegue. En estos casos el Contratista firmará el Enterado en el original que quedará en poder del Ingeniero Director de las Obras, debiendo éste entregar a aquél una copia firmada por dicho Ingeniero Director, o persona en quien delegue. Finalizada una fase de obra y antes de pasar a la fase siguiente, el Contratista habrá de firmar el Conforme a la medición correspondiente, que inexcusablemente será consecuente con los planos del Proyecto o los entregados por el Ingeniero Director de las obras o persona en quien delegue, con la consiguiente orden de ejecución. Si el Contratista iniciara la fase de obra siguiente sin haber conformado la fase anterior, se entenderá que presta implícitamente su conformidad a las mediciones del Ingeniero Director de las Obras. Se hace especial advertencia al Contratista de que no será tenida en cuenta reclamación alguna que pueda hacer sobre modificaciones realizadas, aumentos de unidades, cambios en el tipo de unidad, obras complementarias o accesorias, exceso de volúmenes, etc., que no hayan sido ordenados por escrito por el Ingeniero Director de las Obras o persona en quien delegue, sea cualesquiera que sean los problemas o dificultades surgidos durante la construcción de una determinada clase de obra. El Contratista, antes de comenzar a ejecutar cualquier fase de obra, recabará del Ingeniero Director de las Obras o persona en quien delegue, la correspondiente orden de ejecución firmada por éste. Tan pronto se finalice esa fase de obra, y una vez conformadas las mediciones correspondientes, el Contratista recabará del Ingeniero Director de las obras una copia de dichas mediciones firmadas por dicho Ingeniero Director o persona en quien delegue. Este podrá ordenar, si lo estima oportuno, la paralización de un determinado tajo, hasta tanto el Contratista haya conformado las mediciones de la fase anterior, sin que dicho Contratista tenga derecho a reclamación alguna de daños y perjuicios. Las mediciones parciales así efectuadas, y aún en el caso antes considerado de aceptación implícita por parte del Contratista, tendrán carácter de definitivas. Como consecuencia, no procederá reclamación alguna por parte del Contratista con posterioridad a la conformación de la medición parcial correspondiente, o sobre la medición de una fase de obra en la que se haya iniciado la fase siguiente. Cualquier reclamación que sobre la medición correspondiente pretenda hacer el Contratista, ha de ser efectuada en el acto de la medición parcial. El medio normal para la transmisión e instrucciones al Contratista, será el Libro de Órdenes que se hallará bajo su custodia en la Oficina de obra.

Todos los precios unitarios a que se refieren las normas de medición y abono contenida en el presente Pliego de Prescripciones Técnicas Particulares, se entenderá que incluyen siempre el suministro, manipulación y empleo de todos los materiales necesarios para la ejecución de las unidades de obra correspondientes, a menos que específicamente se excluya alguno en el artículo correspondiente. Asimismo, se entenderá que todos los precios unitarios comprenden los gastos de maquinaria, mano de obra, elementos accesorios, transportes, herramientas y todas cuantas operaciones directas o incidentales sean necesarias para que las unidades de obra, terminadas con arreglo a lo especificado en este Pliego y en los Planos, sean aprobadas por el Promotor.

Las canteras, préstamos y vertederos incluidos dentro del presente proyecto únicamente tienen carácter orientativo, siendo a cuenta del contratista la búsqueda y adquisición de los materiales para la ejecución de la obra, sin que ello suponga derecho a modificación de los precios contemplados en el proyecto.

En caso de liquidación de obra por rescisión de contrato o cualquier otro motivo, de las partidas, excepto "materiales" que figuran en el Cuadro de Precios Nº 2, no se abonará nada al Contratista a no ser que se trate de una unidad de obra completa y acabada, en cuyo caso se abonará íntegramente. Tan sólo podrá ser objeto de abono la parte correspondiente a materiales básicos constitutivos de la unidad de obra, siempre que sean aceptados por el Ingeniero Director. En este caso al importe de dichos materiales aceptados les será de aplicación el porcentaje del 6% correspondiente a "medios auxiliares y coste indirecto", tal y como queda reflejado en el Cuadro de Precios nº 2.

El Contratista deberá realizar y abonar los ensayos y controles que estén dispuestos para las distintas unidades, en el presente Pliego o en el Pliego de Prescripciones Técnicas Generales. Deberá asimismo realizar los controles y ensayos que decida el Ingeniero Director de la Obra, cuyo coste será a cargo del Contratista, hasta un límite del 1% del Presupuesto de Ejecución por Material de las Obras.

Serán de cuenta del Contratista, siempre que en el Contrato no se prevea explícitamente lo contrario, los siguientes gastos, a título indicativo:

- Los gastos que originen el replanteo de las obras o su comprobación y los replanteos parciales de las mismas

- Los gastos de construcción, remoción y retirada de toda clase de construcciones auxiliares
- Los gastos de alquiler o adquisición de terrenos para depósitos de maquinaria y materiales.
- Los gastos de protección de acopios y de la propia obra contra todo deterioro, daño o incendio, cumpliendo los requisitos vigentes para el almacenamiento de explosivos y carburantes.
- Los gastos de limpieza y evacuación de desperdicios y basura.
- Los gastos de conservación de desagües.
- Los gastos de suministro, colocación y conservación de señales de tráfico y demás recursos necesarios para proporcionar seguridad dentro de las obras.
- Los gastos de remoción de las instalaciones, herramientas, materiales y limpieza general de la obra a su terminación.
- Los gastos de montaje, conservación y retirada de instalaciones para el suministro del agua y energía eléctrica necesarios para las obras.
- Los gastos de demolición de las instalaciones provisionales.
- Los gastos de retirada de los materiales rechazados y corrección de las deficiencias observadas y puestas de manifiesto por los correspondientes ensayos y pruebas.
- Los daños a terceros, con las excepciones señaladas en este Pliego

Asimismo, serán de cuenta del Contratista las indemnizaciones a que hubiera lugar por perjuicios que se ocasionen a terceros por interrupción de servicios públicos a particulares, daños causados en sus bienes por aperturas de zanja, desvíos de cauces, explotación de préstamos y canteras, establecimiento de almacenes, talleres, depósitos de materiales y maquinaria y cuantas operaciones requieran la ejecución de las obras. En los casos de rescisión de contrato, cualquiera que sea la causa que lo motive, serán de cuenta del Contratista los gastos originados por la liquidación, así como los de retirada de los medios auxiliares empleados o no en la ejecución de las obras.

Si se establecen modificaciones que supongan la introducción de unidades de obra no previstas en el proyecto o cuyas características difieran de las fijadas en éste, los precios aplicables a las mismas serán acordados por el Promotor y el Contratista. Si éste no aceptase realizar las nuevas unidades, el Promotor podrá contratarlas con otro empresario.

Las obras defectuosas no serán de abono. Deberán ser demolidas por el Contratista y reconstruidas en plazo, de acuerdo con las prescripciones del Proyecto. Si alguna obra no se hallase ejecutada con arreglo a las condiciones del Contrato y fuera, sin embargo, admisible a juicio del Director de la Obra, podrá ser recibida, quedando el adjudicatario obligado a conformarse, sin derecho a reclamación, con la rebaja económica que el Director de la Obra estime, salvo en el caso en que el adjudicatario la demuela a su costa y la rehaga con arreglo a las condiciones del contrato. Cuando se tenga algún indicio de la existencia de vicios ocultos de construcción o de materiales de calidad deficiente, la Dirección de Obra podrá ordenar la apertura de calas correspondientes, siendo de cuenta del Contratista todos los gastos de apertura, ensayos, y todas las demás operaciones que se originen de esta comprobación, en caso de confirmarse la existencia de dichos defectos.

Cuando por rescisión u otra causa fuera preciso valorar obras incompletas, se aplicarán los precios del presupuesto sin que pueda pretenderse la valoración de cada unidad de obra en forma distinta, ni que tenga derecho el Contratista a reclamación alguna por insuficiencia u omisión del costo de cualquier elemento que constituya el precio. Las partidas que componen la descomposición del precio serán de abono cuando esté acopiado en obra la totalidad del material, incluidos accesorios, o realizados en su totalidad las labores u operaciones que determina la definición de la partida, ya que el criterio a seguir ha de ser que sólo se consideran abonables fases con ejecución terminadas, perdiendo el adjudicatario todos los derechos en el caso de dejarlas incompletas.

Artículo 107 – Conservación de las obras

Se define como conservación de las obras los trabajos de limpieza, acabado, entretenimiento y reparación, así como cuantos otros trabajos sean necesarios para mantener las obras en perfecto estado de funcionamiento y policía. En todo momento se seguirá cualquier indicación del Director de la Obra en cuanto al mantenimiento de la limpieza y policía antes citada. El Contratista está obligado no sólo a la ejecución de la obra, sino también a su conservación hasta la recepción o conformidad y durante el plazo de garantía. La responsabilidad del Contratista por faltas que en la obra puedan advertirse se entiende en el supuesto de que tales faltas se deban exclusivamente a una indebida o defectuosa conservación de las unidades de obra, aunque éstas hayan sido examinadas y encontradas conformes por la Dirección, inmediatamente después de su construcción o en cualquier otro momento, dentro del periodo de vigencia del Contrato. Los trabajos de conservación, tanto durante la ejecución de las obras hasta su recepción como durante el plazo de garantía, no son de abono directo por considerarse prorrateado su importe en los precios unitarios.

El Contratista queda obligado a conservar, a su costa, durante la ejecución y hasta su recepción, todas las obras que integran el Proyecto o modificaciones autorizadas, así como las carreteras y servidumbres afectadas, desvíos provisionales, señalizaciones existentes y señalizaciones de obra, y elementos auxiliares, manteniéndolos en buenas condiciones de viabilidad, prestando un especial cuidado para la conservación de los caminos y mantenimiento de las servidumbres de paso así como evitar los arrastres de tierras procedentes de la explanación a fincas particulares. El Contratista queda obligado a la conservación de la obra durante el plazo de garantía, debiendo realizar cuantos trabajos sean necesarios para mantener todas las obras en perfecto estado de conservación. El Contratista responderá de los daños o deterioros que puedan producirse en la obra durante el plazo de garantía, a no ser que pruebe que los mismos han sido ocasionados por el mal uso que de aquella hubieran hecho los usuarios o la Entidad encargada de la explotación y no al cumplimiento de sus obligaciones de vigilancia y policía de la obra.

Los trabajos de construcción y conservación no obstaculizarán el uso público o servicio de la obra, ni de las carreteras o servidumbres colindantes y, de producir afectación, deberán ser previamente autorizados por escrito por el Director de obra y disponer de la oportuna señalización.

Artículo 108 – Plazo de garantía

El plazo de garantía será de dos (2) años a partir de la recepción de las obras.

PARTE 2ª – MATERIALES BÁSICOS

CAPÍTULO I – CONGLOMERANTES

Artículo 202 – Cementos

202.1 - Definición

Se definen como cementos los conglomerantes hidráulicos en cuya composición interviene como componente principal el clínker de cemento portland o, en su caso, el clínker de cemento de aluminato de calcio, los cuales, finamente molidos y convenientemente amasados con agua, forman pastas que fraguan y endurecen a causa de las reacciones de hidratación de sus constituyentes, dando lugar a productos hidratados mecánicamente resistentes y estables, tanto al aire como bajo agua.

202.2 – Condiciones generales

Lo dispuesto en este artículo se entenderá sin perjuicio de lo establecido en el Reglamento 305/2011 de 9 de marzo de 2011, del Parlamento Europeo y del Consejo, por el que se establecen las condiciones armonizadas para la comercialización de productos de construcción. Para los productos con marcado CE, el fabricante asumirá la responsabilidad sobre la conformidad de los mismos con las prestaciones declaradas, de acuerdo con el artículo 11 del mencionado Reglamento. Los productos que tengan el marcado CE deberán ir acompañados, además de dicho marcado, de la Declaración de Prestaciones, y de las instrucciones e información de seguridad del producto. Por su parte, el Contratista deberá verificar que los valores declarados en los documentos que acompañan al marcado CE permitan deducir el cumplimiento de las especificaciones contempladas en el Proyecto o, en su defecto, en este Pliego, debiendo adoptar, en el caso de que existan indicios de incumplimiento de las especificaciones declaradas, todas aquellas medidas que considere oportunas para garantizar la idoneidad del producto suministrado a la obra. Independientemente de lo anterior se estará además, en todo caso, a lo dispuesto en la legislación vigente en materia ambiental, de seguridad y salud, de producción, almacenamiento, gestión y transporte de productos de la construcción, de residuos de construcción y demolición, y de suelos contaminados. En este artículo será de aplicación todo lo dispuesto en la vigente Instrucción para la recepción de cementos (RC).

202.3 - Denominaciones

La denominación, composición, designación, prescripciones, durabilidad y normas de referencia de los cementos de uso en obras serán las que figuran en los anejos de la Instrucción para la recepción de cementos (RC) vigente: Anejo 1. Cementos sujetos al marcado CE, y Anejo 2. Cementos sujetos al Real Decreto 1313/1988.

202.4 – Transporte y almacenamiento

Para el transporte, almacenamiento y manipulación, será de aplicación lo dispuesto en la norma UNE 80402, así como en la vigente Instrucción para la recepción de cementos (RC). El cemento será transportado en cisternas presurizadas y dotadas de medios neumáticos para el trasvase rápido de su contenido a los silos de almacenamiento. El cemento se almacenará en uno o varios silos, adecuadamente aislados contra la humedad y provistos de sistemas de filtros. El almacenamiento del cemento no deberá ser muy prolongado para evitar su meteorización, por lo que se recomienda que el tiempo de almacenamiento máximo desde la fecha de expedición hasta su empleo no sea más de tres (3) meses para la clase de resistencia 32,5, de dos (2) meses para la clase de resistencia 42,5 y de un (1) mes para la clase de resistencia de 52,5. En cumplimiento de las precauciones en la manipulación de los cementos que establece la Instrucción para la recepción de cementos (RC) y la Orden del Ministerio de la Presidencia PRE/1954/2004, cuando se usen agentes reductores del cromo (VI) y sin perjuicio de la aplicación de otras disposiciones comunitarias sobre clasificación, envasado y etiquetado de sustancias y preparados peligrosos, el envase del cemento o de los preparados que contienen cemento deberá ir marcado de forma legible e indeleble con información sobre la fecha de envasado, así como sobre las condiciones de almacenamiento y el tiempo de almacenamiento adecuados para mantener la actividad del agente reductor y el contenido de cromo (VI) soluble por debajo del límite indicado en el apartado 202.4. El Director de las Obras podrá comprobar, en el uso de sus atribuciones, con la frecuencia que crea necesaria, las condiciones de almacenamiento, así como el estado de los sistemas de transporte y trasvase en todo cuanto pudiera afectar a la calidad del material; y de no ser de su conformidad, suspenderá la utilización del contenido del envase, silo o cisterna correspondiente hasta la comprobación de las características que estime convenientes de las exigidas en este artículo, en la vigente Instrucción para la recepción de cementos (RC).

202.5 - Recepción e identificación

Cada remesa de cemento que llegue a la obra, tanto a granel como envasado, deberá ir acompañada de la documentación que reglamentariamente dispone la vigente Instrucción para la recepción de cementos (RC).

202.6 – Control de calidad

Para el control de recepción será de aplicación lo dispuesto en la vigente Instrucción para la recepción de cementos (RC). El control de la recepción del cemento deberá incluir obligatoriamente, al menos una primera fase, de comprobación de la documentación y del etiquetado. En el caso de cementos sujetos al Real Decreto 1313/1988, deberá cumplir lo especificado en la vigente Instrucción para la recepción de cementos (RC). Y una segunda fase, consistente en una inspección visual del suministro. Adicionalmente, si así lo establece el Director de las Obras, se podrá llevar a cabo una tercera fase de control mediante la realización de ensayos de identificación y, en su caso, ensayos complementarios, según lo dispuesto en los anejos 5 y 6 de la Instrucción para la recepción de cementos (RC). Con independencia de lo anterior, el Director de las Obras, en el uso de sus atribuciones, podrá disponer en cualquier momento la realización de comprobaciones o ensayos sobre los materiales que se suministren a la obra. El Director de las Obras podrá fijar un tamaño de lote inferior al que se especifica en la Instrucción para la recepción de cementos (RC). En cumplimiento de la Orden del Ministerio de la Presidencia PRE/1954/2004, se comprobará (Anexo A de la norma UNE-EN 196-10), que el contenido de cromo (VI) soluble en el cemento a emplear en obras no sea superior a dos partes por millón (<2 ppm) del peso seco del cemento.

202.7 – Criterios de aceptación o rechazo

Los criterios de conformidad y la actuación en caso de rechazo de la remesa o lote recibido seguirán lo dispuesto en la vigente Instrucción para la recepción de cementos (RC). El Director de las Obras indicará las medidas a adoptar en el caso de que el cemento no cumpla alguna de las especificaciones establecidas en este artículo.

202.8 – Medición y abono

La medición y abono del cemento se realizará de acuerdo con lo indicado para las unidades de obra de las que forme parte.

CAPÍTULO IV – METALES

Artículo 240 – Barras corrugadas para hormigón estructural

240.1 – Definición

Se denominan barras corrugadas para hormigón estructural aquellos productos de acero de forma sensiblemente cilíndrica que presentan en su superficie resaltos o estrías con objeto de mejorar su adherencia al hormigón. Los distintos elementos que conforman la geometría exterior de estas barras (tales como corrugas, aletas y núcleo) se definen según se especifica en la UNE 36 068 y UNE 36 065. Los diámetros nominales de las barras corrugadas se ajustarán a la serie siguiente: 6-8-10-12-14-16-20-25-32 y 40 mm. La designación simbólica de estos productos se hará de acuerdo con lo indicado en la UNE 36 068.

240.2 – Materiales

Lo dispuesto en este artículo se entenderá sin perjuicio de lo establecido en el Real Decreto 1630/1992 (modificado por el Real Decreto 1328/1995), por el que se dictan disposiciones para la libre circulación, en aplicación de la Directiva 89/106 CE. En particular, en lo referente a los procedimientos especiales de reconocimiento, se estará a lo establecido en el artículo 9 del mencionado Real Decreto. Las características de las barras corrugadas para hormigón estructural cumplirán con las especificaciones indicadas en el apartado 31.2 de la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya, así como en la UNE 36 068 y UNE 36 065. Las barras no presentarán defectos superficiales, grietas ni sopladuras. La sección equivalente no será inferior al noventa y cinco y medio por ciento (95,5 por 100) de su sección nominal. La marca indeleble de identificación se realizará de acuerdo con las indicaciones del apartado 31.2 de la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya.

240.3 – Suministro

La calidad de las barras corrugadas estará garantizada por el fabricante a través del Contratista de acuerdo con lo indicado en el apartado 31.5 de la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya. La garantía de calidad de las barras corrugadas será exigible en cualquier circunstancia al Contratista adjudicatario de las obras.

240.4 – Almacenamiento

Serán de aplicación las prescripciones recogidas en el apartado 31.6 de la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya.

240.5 – Recepción

Para efectuar la recepción de las barras corrugadas será necesario realizar ensayos de control de calidad de acuerdo con las prescripciones recogidas en el artículo 90 de la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya. Serán de aplicación las condiciones de aceptación o rechazo de los aceros indicados en el apartado 90.5 de la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya. El Director de las Obras podrá, siempre que lo considere oportuno, identificar y verificar la calidad y homogeneidad de los materiales que se encuentren acopiados.

240.6 – Medición y abono

La medición y abono de las barras corrugadas para hormigón estructural se realizará por kilogramo de acero realmente ejecutado y colocado. En acopios, las barras corrugadas para hormigón estructural se abonarán por kilogramos (kg) realmente acopiados, medidos por pesada directa en báscula contrastada.

240.7 – Especificaciones técnicas y distintivos de calidad

A efectos del reconocimiento de marcas, sellos o distintivos de calidad, se estará a lo dispuesto en la vigente «Instrucción de Hormigón Estructural (EHE)» o normativa que la sustituya.

PARTE 3ª – EXPLANACIONES

CAPÍTULO I – TRABAJOS PRELIMINARES

Artículo 300 – Desbroce del terreno

300.1 – Definición

Consiste en extraer y retirar de las zonas designadas todos los árboles, tocones, plantas, maleza, broza, maderas caídas, escombros, basura o cualquier otro material indeseable según el Proyecto o a juicio del Director de las Obras. La ejecución de esta operación incluye las operaciones siguientes: Remoción de los materiales objeto de desbroce y Retirado y extendido de los mismos en su emplazamiento definitivo. La tierra vegetal deberá ser siempre retirada, excepto cuando vaya a ser mantenida según lo indicado en el Proyecto o por el Director de las Obras.

300.2 – Ejecución de las obras

300.2.1 – Remoción de los materiales de desbroce.

Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción. Debe retirarse la tierra vegetal de las superficies de terreno afectadas por excavaciones o terraplenes, según las profundidades definidas en el Proyecto y verificadas o definidas durante la obra. En zonas muy blandas o pantanosas la retirada de la capa de tierra vegetal puede ser inadecuada, por poder constituir una costra más resistente y menos deformable que el terreno subyacente. En estos casos y en todos aquellos en que, según el Proyecto o el Director de las Obras, el mantenimiento de dicha capa sea beneficioso, ésta no se retirará. Las operaciones de remoción se efectuarán con las precauciones necesarias para lograr unas condiciones de seguridad suficientes y evitar daños en las construcciones próximas existentes. El Contratista deberá disponer las medidas de protección adecuadas para evitar que la vegetación, objetos y servicios considerados como permanentes, resulten dañados. Cuando dichos elementos resulten dañados por el Contratista, éste deberá reemplazarlos, con la aprobación del Director de las Obras, sin costo para la Propiedad. Todos los tocones o raíces mayores de diez centímetros (10 cm) de diámetro serán eliminados hasta una profundidad no inferior a cincuenta centímetros (50 cm), por debajo de la rasante de la explanación. Fuera de la explanación, los tocones de la vegetación que a juicio del Director de las Obras sea necesario retirar, en función de las necesidades impuestas por la seguridad de la circulación y de la incidencia del posterior desarrollo radicular, podrán dejarse cortados a ras de suelo. Todas las oquedades causadas por la extracción de tocones y raíces se rellenarán con material análogo al suelo que ha quedado al descubierto al hacer el desbroce, y se compactarán conforme a lo indicado en este Pliego hasta que la superficie se ajuste a la del terreno existente. Todos los pozos y agujeros que queden dentro de la explanación se rellenarán conforme a las instrucciones del Director de las Obras. Los árboles susceptibles de aprovechamiento serán podados y limpiados, luego se cortarán en trozos adecuados y, finalmente, se almacenarán cuidadosamente, a disposición del Promotor y separados de los montones que hayan de ser quemados o desechados. Salvo indicación en contra del Director de las Obras, la madera no se troceará a longitud inferior a tres metros (3 m). Los trabajos se realizarán de forma que no se produzcan molestias a los ocupantes de las zonas próximas a la obra.

300.2.2 – Retirada y disposición de los materiales objeto del desbroce.

Todos los productos o subproductos forestales, no susceptibles de aprovechamiento, serán eliminados de acuerdo con lo que, sobre el particular, establezca el Proyecto u ordene el Director de las Obras. En principio estos elementos serán quemados, cuando esta operación esté permitida y sea aceptada por el Director de las Obras. El Contratista deberá disponer personal especializado para evitar los daños tanto a la vegetación como a bienes próximos. Al finalizar cada fase, el fuego debe quedar completamente apagado. Los restantes materiales serán utilizados por el Contratista, en la forma y en los lugares que señale el Director de las Obras. La tierra vegetal procedente del desbroce debe ser dispuesta en su emplazamiento definitivo en el menor intervalo de tiempo posible. En caso de que no sea posible utilizarla directamente, debe guardarse en montones de altura no superior a dos metros (2 m). Debe evitarse que sea sometida al paso de vehículos o a sobrecargas, ni antes de su remoción ni durante su almacenamiento, y los traslados entre puntos deben reducirse al mínimo. Si se proyecta enterrar los materiales procedentes del desbroce, estos deben extenderse en capas dispuestas de forma que se reduzca al máximo la formación de huecos. Cada capa debe cubrirse o mezclarse con suelo para rellenar los posibles huecos, y sobre la capa superior deben extenderse al menos treinta centímetros (30 cm) de suelo compactado adecuadamente. Estos materiales no se extenderán en zonas donde se prevean afluencias apreciables de agua. Si el vertido se efectúa fuera de la zona afectada por el Proyecto, el Contratista deberá conseguir, por sus medios, emplazamientos adecuados para este fin, no visibles desde la calzada, que deberán ser aprobados por el Director de las Obras, y deberá asimismo proporcionar al Director de las Obras copias de los contratos con los propietarios de los terrenos afectados.

300.3 – Medición y abono

El desbroce del terreno se abonará por metro cuadrado (m^2) realmente ejecutado. En esta unidad de obra se considera incluida la obtención de los permisos necesarios para el vertido del material procedente del desbroce. Las medidas de protección de la vegetación y bienes y servicios considerados como permanentes, no serán objeto de abono independiente. Tampoco, se abonará el desbroce de las zonas de préstamo.

Artículo 301 – Demoliciones

301.1 – Definición

Consiste en el derribo de todas las construcciones o elementos constructivos, tales como aceras, firmes, edificios, fábricas de hormigón u otros, que sea necesario eliminar para la adecuada ejecución de la obra. Incluye las siguientes operaciones: Trabajos de preparación y de protección; Derribo, fragmentación o desmontaje de construcciones; y Retirada de los materiales.

301.2 – Clasificación

Según el procedimiento de ejecución, las demoliciones pueden clasificarse del modo siguiente: Demolición con máquina excavadora, Demolición por fragmentación mecánica, Demolición con explosivos, Demolición por impacto de bola de gran masa, Desmontaje elemento a elemento, Demolición mixta y Demolición por otras técnicas.

301.3 – Estudio de la demolición

Previamente a los trabajos de demolición se elaborará un estudio de demolición, que deberá ser sometido a la aprobación del Director de las Obras, siendo el Contratista responsable del contenido de dicho estudio y de su correcta ejecución. En el estudio de demolición deberán definirse como mínimo: Métodos de demolición y etapas de su aplicación, Estabilidad de las construcciones remanentes en cada etapa, así como los apeos y cimbras necesarios, Estabilidad y protección de construcciones remanentes que no vayan a ser demolidas, Protección de las construcciones e instalaciones del entorno, Mantenimiento o sustitución provisional de servicios afectados por la demolición, Medios de evacuación y definición de zonas de vertido de los productos de la demolición, Cronogramas de trabajos, Pautas de control y Medidas de seguridad y salud. Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

301.4 – Ejecución de las obras

301.4.1 – Derribo de construcciones.

El Contratista será responsable de la adopción de todas las medidas de seguridad y del cumplimiento de las disposiciones vigentes al efectuar las operaciones de derribo, así como de evitar que se produzcan daños, molestias o perjuicios a las construcciones, bienes o personas próximas y del entorno, sin perjuicio de su obligación de cumplir las instrucciones que eventualmente dicte el Director de las Obras. Antes de iniciar la demolición se neutralizarán las acometidas de las instalaciones, de acuerdo con las entidades administradoras o propietarias de las mismas. Se deberá prestar especial atención a conducciones eléctricas y de gas enterradas. El empleo de explosivos estará condicionado a la obtención del permiso de la autoridad competente con jurisdicción en la zona de la obra, cuya obtención será de cuenta y responsabilidad del Contratista. La profundidad de demolición de los cimientos, será, como mínimo, de cincuenta centímetros (50 cm) por debajo de la cota más baja del relleno o desmonte, salvo indicación en contra del Proyecto o del Director de las Obras. En el caso particular de existir conducciones o servicios enterrados fuera de uso deberán ser excavados y eliminados hasta una profundidad no inferior a metro y medio (1,5 m) bajo el terreno natural o nivel final de excavación, cubriendo una banda de al menos metro y medio (1,5 m) alrededor de la obra, salvo especificación en contra del Proyecto o del Director de las Obras. Los extremos abiertos de dichas conducciones deberán ser sellados debidamente. La demolición con máquina excavadora, únicamente será admisible en construcciones, o parte de ellas, de altura inferior al alcance de la cuchara. Se prohíbe el derribo por empuje de edificaciones de altura superior a tres metros y medio (3,5 m). En la demolición de edificios elemento a elemento será de aplicación la Norma Tecnológica de Edificación correspondiente a demoliciones (NTE-ADD). En situaciones de demolición que aconsejaran el uso de explosivos y no fuesen éstos admisibles por su impacto ambiental, deberá recurrirse a técnicas alternativas tales como fracturación hidráulica o cemento expansivo. Al finalizar la jornada de trabajo no deberán quedar elementos de la obra en estado inestable o peligroso.

301.4.2 Retirada de los materiales de derribo.

El Director de las Obras establecerá el posterior empleo de los materiales procedentes de las demoliciones. Los materiales de derribo que hayan de ser utilizados en la obra se limpiarán, acopiarán y transportarán en la forma y a los lugares que señale el Director de las Obras. Los materiales no utilizables se llevarán a vertedero aceptado por el Director de las Obras, siendo responsabilidad del Contratista la obtención de las autorizaciones pertinentes, debiendo presentar al Director de las Obras copia de los correspondientes contratos. Dentro de los límites de expropiación no se podrán hacer vertidos no contemplados en el Proyecto, salvo especificación del Director de las Obras. En caso de eliminación de materiales mediante incinerado, deberán adoptarse las medidas de control necesarias para evitar cualquier posible afectación al entorno, dentro del marco de la normativa legal vigente.

301.5 – Medición y abono

Las demoliciones se abonarán por metros cúbicos (m^3). En el caso de edificaciones se considerará el volumen exterior demolido, hueco y macizo, realmente ejecutado en obra. En el caso de demolición de macizos se medirán por diferencia entre los datos iniciales, tomados inmediatamente antes de comenzar la demolición, y los datos finales, tomados inmediatamente después de finalizar la misma. Las demoliciones de firmes, aceras e isletas no contempladas explícitamente en el Proyecto se considerarán incluidas en la unidad de excavación, no dando por tanto lugar a medición o abono por separado. Se considera incluido en el precio, en todos los casos, la retirada de los productos resultantes de la demolición y su transporte a lugar de empleo, acopio o vertedero, según ordene el Director de las Obras. Si en el Proyecto no se hace referencia a la unidad de demoliciones, se entenderá que está comprendida en las de excavación, y por tanto, no habrá lugar a su medición ni abono por separado.

CAPÍTULO II – EXCAVACIONES

Artículo 320 – Excavación de la explanación y préstamos

320.1 - Definición

Consiste en el conjunto de operaciones para excavar y nivelar las zonas donde ha de asentarse la obra, incluyendo la plataforma, taludes y cunetas, así como las zonas de préstamos, previstos o autorizados, y el consiguiente transporte de los productos removidos al depósito o lugar de empleo. Se incluyen en esta unidad la ampliación de las trincheras, la mejora de taludes en los desmontes, y la excavación adicional en suelos inadecuados, ordenadas por el Director de las Obras. Se denominan "préstamos previstos" aquellos que proceden de las excavaciones de préstamos indicados en el Proyecto, en los que el Contratista queda exento de la obligación y responsabilidad de obtener la autorización legal, contratos y permisos, para tales excavaciones. Se denominan "préstamos autorizados" aquellos que proceden de las excavaciones de préstamos seleccionados por el Contratista y autorizados por el Director de las Obras, siendo responsabilidad del Contratista la obtención de la autorización legal, contratos y permisos, para tales excavaciones.

320.2 - Clasificación de las excavaciones

En este Proyecto la excavación será "no clasificada".

320.3 - Ejecución de las obras

320.3.1 - Generalidades

Una vez terminadas las operaciones de desbroce del terreno, se iniciarán las obras de excavación, ajustándose a las alineaciones, pendientes, dimensiones y demás información contenida en el Proyecto, y a lo que sobre el particular ordene el Director de las Obras. El Contratista deberá comunicar con suficiente antelación al Director de las Obras el comienzo de cualquier excavación, y el sistema de ejecución previsto, para obtener la aprobación del mismo. A este efecto no se deberá acudir al uso de sistemas de excavación que no correspondan a los incluidos en este Pliego sobre todo si la variación pretendida pudiera dañar excesivamente el terreno. Durante la ejecución de los trabajos se tomarán, en cualquier caso, las precauciones adecuadas para no disminuir la resistencia o estabilidad del terreno no excavado. En especial, se atenderá a las características tectónico-estructurales del entorno y a las alteraciones de su drenaje y se adoptarán las medidas necesarias para evitar los siguientes fenómenos: Inestabilidad de taludes en roca o de bloques de la misma, debida a voladuras inadecuadas, deslizamientos ocasionados por el descalce del pie de la excavación, encharcamientos debidos a un drenaje defectuoso de las obras, taludes provisionales excesivos, etc. Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

320.3.2 - Drenaje.

Durante las diversas etapas de la construcción de la explanación, las obras se mantendrán en perfectas condiciones de drenaje y las cunetas, bordillos, y demás elementos de desagüe, se dispondrán de modo que no se produzca erosión en los taludes.

320.3.3 - Tierra vegetal.

La tierra vegetal que se encuentre en las excavaciones, y que no se hubiera extraído en el desbroce, se removerá de acuerdo con lo que, al respecto, se señale en el Proyecto y con lo que especifique el Director de las Obras, en concreto, en cuanto a la extensión y profundidad que debe ser retirada. Se acopiará para su utilización posterior en protección de taludes o superficies erosionables, o donde ordene el Director de las Obras o indique el Proyecto. La tierra vegetal extraída se mantendrá separada del resto de los productos excavados. La retirada, acopio y disposición de la tierra vegetal se realizará cumpliendo las prescripciones del apartado 300.2.2 de este Pliego, y el lugar de acopio deberá ser aprobado por el Director de las Obras.

320.3.4 - Empleo de los productos de excavación.

Siempre que sea posible, los materiales que se obtengan de la excavación se utilizarán en la formación de rellenos y demás usos fijados en el Proyecto, y se transportarán directamente a las zonas previstas en el mismo, en su defecto, se estará a lo que, al respecto, disponga el Director de las Obras. En el caso de excavación por voladura en roca, el procedimiento de ejecución, deberá proporcionar un material adecuado al destino definitivo del mismo, no siendo de abono las operaciones de ajuste de la granulometría del material resultante, salvo que dichas operaciones se encuentren incluidas en otra unidad de obra. No se desechará ningún material excavado sin la previa autorización del Director de las Obras. Los fragmentos de roca y bolos de piedra que se obtengan de la excavación y que no vayan a ser utilizados directamente en las obras se acopiarán y emplearán, si procede, en la protección de taludes, canalizaciones de agua, defensas contra la posible erosión, o en cualquier otro uso que señale el Director de las Obras. Las rocas o bolos de piedra que aparezcan en la explanada, en zonas de desmonte en tierra, deberán eliminarse, a menos que el Contratista prefiera triturarlos al tamaño que se le ordene. El material extraído en exceso podrá utilizarse en la ampliación de terraplenes, si así está definido en el Proyecto o lo autoriza el Director de las Obras, debiéndose cumplir las mismas condiciones de acabado superficial que el relleno sin ampliar. Los materiales excavados no aprovechables se transportarán a vertedero autorizado, sin que ello dé derecho a abono independiente. Las áreas de vertedero de estos materiales serán las definidas en el Proyecto o, en su defecto, las autorizadas por el Director de las Obras a propuesta del Contratista, quien deberá obtener a su costa los oportunos permisos y facilitar copia de los mismos al Director de las Obras.

320.3.5 - Excavación en roca

Las excavaciones en roca se ejecutarán de forma que no se dañe, quebrante o desprenda la roca no excavada. Se pondrá especial cuidado en evitar dañar los taludes del desmonte y la cimentación de la futura explanada de la obra. Cuando los taludes excavados tengan zonas inestables o la cimentación de la futura explanada presente cavidades, el Contratista adoptará las medidas de corrección necesarias, con la aprobación del Director de las Obras. Se cuidará especialmente la subrasante que se establezca en los desmontes en roca debiendo ésta presentar una superficie que permita un perfecto drenaje sin encharcamientos, y en los casos en que por efecto de la voladura se generen zonas sin desagüe se deberán eliminar éstas mediante la aplicación de hormigón de saneo que genere la superficie de la subrasante de acuerdo con los planos establecidos para las mismas y con las tolerancias previstas en el Proyecto, no siendo estas operaciones de abono. Cuando se prevea el empleo de los productos de la excavación en roca, en la formación de pedraplenes, se seguirán además las prescripciones del artículo 331, "Pedraplenes", del PG-3. Cuando interese de manera especial que las superficies de los taludes excavados presenten una buena terminación y se requiera, por tanto, realizar las operaciones precisas para tal fin, se seguirán las prescripciones del artículo 322, "Excavación especial de taludes en roca" del PG-3. El Director de las Obras podrá prohibir la utilización de métodos de voladura que considere peligrosos o dañinos, aunque la autorización no exime al Contratista de la responsabilidad por los daños ocasionados como consecuencia de tales trabajos.

320.3.6 - Préstamos y caballeros.

Si se hubiese previsto o se estimase necesaria, durante la ejecución de las obras, la utilización de préstamos, el Contratista comunicará al Director de las Obras, con suficiente antelación, la apertura de los citados préstamos, a fin de que se pueda medir su volumen y dimensiones sobre el terreno natural no alterado y, en el caso de préstamos autorizados, realizar los oportunos ensayos para su aprobación, si procede. No se tomarán préstamos en la zona de apoyo de la obra, ni se sustituirán los terrenos de apoyo de la obra por materiales admisibles de peores características o que empeoren la capacidad portante de la superficie de apoyo. Se tomarán perfiles, con cotas y mediciones, de la superficie de la zona de préstamo después del desbroce y, asimismo, después de la excavación. El Contratista no excavará más allá de las dimensiones y cotas establecidas. Los préstamos deberán excavarse disponiendo las oportunas medidas de drenaje que impidan que se pueda acumular agua en ellos. El material inadecuado se depositará de acuerdo con lo que el Director de las Obras ordene al respecto. Los taludes de los préstamos deberán ser estables, y una vez terminada su explotación, se acondicionarán de forma que no dañen el aspecto general del paisaje. No deberán ser visibles desde la obra terminada, ni desde cualquier otro punto con especial impacto paisajístico negativo, debiéndose cumplir la normativa existente respecto a su posible impacto ambiental. Los caballeros, o depósitos de tierra, que se formen deberán tener forma regular, superficies lisas que favorezcan la escorrentía de las aguas y un grado de estabilidad que evite cualquier derrumbamiento. Deberán situarse en los lugares que, al efecto, señale el Director de las Obras, se cuidará de evitar sus arrastres hacia las obras de desagüe, y de que no se obstaculice la circulación por los caminos que haya establecidos, ni el curso de los ríos, arroyos o acequias que haya en las inmediaciones de la obra. El material vertido en caballeros no se podrá colocar de forma que represente un peligro para construcciones existentes, por presión directa o por sobrecarga sobre el terreno contiguo. Cuando tras la excavación de la explanación aparezca suelo inadecuado en los taludes o en la explanada, el Director de las Obras podrá requerir del Contratista que retire esos materiales y los sustituya por material de relleno apropiado. Antes y después de la excavación y de la colocación de este relleno se tomarán perfiles transversales.

320.3.7 - Taludes

La excavación de los taludes se realizará adecuadamente para no dañar su superficie final, evitar la decompresión prematura o excesiva de su pie e impedir cualquier otra causa que pueda comprometer la estabilidad de la excavación final. En el caso que la excavación del talud sea definitiva y se realice mediante perforación y voladura de roca, se cumplirá lo dispuesto en el artículo 322, "Excavación especial de taludes en roca" del PG-3. Las zanjas que, de acuerdo con el Proyecto, deban ser ejecutadas en el pie del talud, se excavarán de forma que el terreno afectado no pierda resistencia debido a la deformación de las paredes de la zanja o a un drenaje defectuoso de ésta. La zanja se mantendrá abierta el tiempo mínimo indispensable, y el material de relleno se compactará cuidadosamente. Asimismo se tendrá especial cuidado en limitar la longitud de la zanja abierta al mismo tiempo, a efectos de disminuir los efectos antes citados. Cuando sea preciso adoptar medidas especiales para la protección superficial del talud, tales como bulones, gunitado, plantaciones superficiales, revestimiento, cunetas de guarda, etc., dichos trabajos deberán realizarse tan pronto como la excavación del talud lo permita. Se procurará dar un aspecto a las superficies finales de los taludes, tanto si se recubren con tierra vegetal como si no, que armonice en lo posible con el paisaje natural existente. En el caso de emplear gunita, se le añadirán colorantes a efectos de que su acabado armonice con el terreno circundante. La transición de desmonte a terraplén se realizará de forma gradual, ajustando y suavizando las pendientes, y adoptándose las medidas de drenaje necesarias para evitar aporte de agua a la base del terraplén. En el caso de que los taludes presenten desperfectos antes de la recepción de las obras, el Contratista eliminará los materiales desprendidos o movidos y realizará urgentemente las reparaciones complementarias ordenadas por el Director de las Obras. Si dichos desperfectos son imputables a ejecución inadecuada o a incumplimiento de las instrucciones del Director de las Obras, el Contratista será responsable de los daños y sobrecostes ocasionados.

320.3.8 - Contactos entre desmontes y terraplenes.

Se cuidarán especialmente estas zonas de contacto en las que la excavación se ampliará hasta que la coronación del terraplén penetre en ella en toda su sección, no admitiéndose secciones en las que el apoyo de la coronación del terraplén y el fondo de excavación estén en planos distintos. En estos contactos se estudiarán especialmente en el Proyecto el drenaje de estas zonas y se contemplarán las medidas necesarias para evitar su inundación o saturación de agua.

320.3.9 - Tolerancia geométrica de terminación de las obras.

Las tolerancias del acabado serán definidas por el Director de las Obras. Con la precisión que se considere admisible en función de los medios previstos para la ejecución de las obras y en base a los mismos serán fijados al menos las siguientes tolerancias: Tolerancia máxima admisible, expresada en centímetros (cm), entre los planos o superficies de los taludes previstos en el Proyecto y los realmente construidos, quedando fijada la zona en la que el talud sería admisible y en la que sería rechazado debiendo volver el Contratista a reperfilar el mismo. Tolerancia máxima admisible, expresada en centímetros (cm), en la desviación sobre los planos o superficies de la explanación entre los previstos en el Proyecto y los realmente construidos, quedando definida la zona en la que la superficie de la explanación sería admisible y en la que sería rechazada debiendo el Contratista proceder a su rectificación de acuerdo con lo que para ello ordene el Director de las Obras. Tolerancia máxima admisible en pendientes y fondos de cunetas, así como de su situación en planta, expresada en centímetros (cm), sobre los planos previstos en el Proyecto y los realmente construidos, quedando definida la obra admisible y la que sería rechazada debiendo el Contratista proceder a su rectificación de acuerdo con lo que para ello ordene el Director de las Obras. Tolerancia máxima en drenajes, tanto en cuanto a pendiente y fondos de los mismos como en planta, expresada en centímetros (cm), sobre los planos previstos en el Proyecto y lo realmente construido, quedando definida la obra admisible y la que sería rechazada debiendo el Contratista proceder a su rectificación de acuerdo con lo que para ello ordene el Director de las Obras. Todo tipo de operaciones de rectificación por incumplimiento de tolerancias no será de abono al Contratista corriendo todas estas operaciones de su cuenta.

320.4 - MEDICIÓN Y ABONO

En el caso de explanaciones, la excavación se abonará por metros cúbicos (m^3) medidos sobre planos de perfiles transversales, una vez comprobado que dichos perfiles son correctos. En el precio se incluyen los procesos de formación de los posibles caballeros, el pago de cánones de ocupación, y todas las operaciones necesarias y costos asociados para la completa ejecución de la unidad. Los préstamos no se medirán en origen, ya que su ubicación se deducirá de los correspondientes perfiles de terraplén, si es que existe precio independiente en el Cuadro de Precios nº 1 del Proyecto para este concepto. De no ser así, esta excavación se considerará incluida dentro de la unidad de terraplén. Las medidas especiales para la protección superficial del talud se medirán y abonarán siguiendo el criterio establecido en el Proyecto para las unidades respectivas. No serán de abono los excesos de excavación sobre las secciones definidas en el Proyecto, o las ordenes escritas del Director de las Obras, ni los rellenos compactados que fueran precisos para reconstruir la sección ordenada o proyectada. El Director de las Obras podrá obligar al Contratista a rellenar las sobreexcavaciones realizadas, con las especificaciones que aquél estime oportunas, no siendo esta operación de abono. Todas las excavaciones se medirán una vez realizadas y antes de que sobre ellas se efectúe ningún tipo de relleno. En el caso de que el Contratista cerrase la excavación antes de conformada la medición se entenderá que se aviene a lo que unilateralmente determine el Director de las Obras.

Artículo 321 – Excavación en zanjas y pozos

321.1 - Definición

Consiste en el conjunto de operaciones necesarias para abrir zanjas y pozos. Su ejecución incluye las operaciones de excavación, entibación, posibles agotamientos, nivelación y evacuación del terreno, y el consiguiente transporte de los productos removidos a depósito o lugar de empleo.

321.2 - Clasificación de las excavaciones

Serán aplicables las prescripciones del artículo 320, "Excavación de la explanación y préstamos" de este Pliego.

321.3 - Ejecución de las obras

321.3.1 - Principios generales.

El Contratista notificará al Director de las Obras, con la antelación suficiente, el comienzo de cualquier excavación, a fin de que éste pueda efectuar las mediciones necesarias sobre el terreno inalterado. El terreno natural adyacente al de la excavación no se modificará ni removerá sin autorización del Director de las Obras. Una vez efectuado el replanteo de las zanjas o pozos, el Director de las Obras autorizará la iniciación de las obras de excavación. La excavación continuará hasta llegar a la profundidad señalada en el Proyecto y obtenerse una superficie firme y limpia a nivel o escalonada, según se ordene. No obstante, el Director de las Obras podrá modificar tal profundidad si, a la vista de las condiciones del terreno, lo estima necesario a fin de asegurar una cimentación satisfactoria. Se vigilarán con detalle las franjas que bordean la excavación, especialmente si en su interior se realizan trabajos que exijan la presencia de personas. También estará obligado el Contratista a efectuar la excavación de material inadecuado para la cimentación, y su sustitución por material apropiado, siempre que se lo ordene el Director de las Obras. Para la excavación de tierra vegetal se seguirá lo indicado en el apartado 320.3.3 de este Pliego. Se tomarán las precauciones necesarias para impedir la degradación del terreno de fondo de excavación en el intervalo de tiempo que medie entre la excavación y la ejecución de la cimentación u obra de que se trate. Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

321.3.2 - Entibación.

En aquellos casos en que se hayan previsto excavaciones con entibación, el Contratista podrá proponer al Director de las Obras efectuarlas sin ella, explicando y justificando de manera exhaustiva las razones que apoyen su propuesta. El Director de las Obras podrá autorizar tal modificación, sin que ello suponga responsabilidad subsidiaria alguna. Si en el Contrato no figurasen excavaciones con entibación y el Director de las Obras, por razones de seguridad, estimase conveniente que las excavaciones se ejecuten con ella, podrá ordenar al Contratista la utilización de entibaciones, sin considerarse esta operación de abono independiente.

321.3.3 - Drenaje.

Cuando aparezca agua en las zanjas o pozos que se están excavando, se utilizarán los medios e instalaciones auxiliares necesarias para agotarla. El agotamiento desde el interior de una cimentación deberá ser hecho de forma que no provoque la segregación de los materiales que han de componer el hormigón de cimentación, y en ningún caso se efectuará desde el interior del encofrado antes de transcurridas veinticuatro horas desde el hormigonado. El Contratista someterá a la aprobación del Director de las Obras los planos de detalle y demás documentos que expliquen y justifiquen los métodos de construcción propuestos.

321.3.4 - Taludes.

En el caso de que los taludes de las zanjas o pozos, ejecutados de acuerdo con los planos y órdenes del Director de las Obras, resulten inestables y, por tanto, den origen a desprendimientos antes de la recepción de las obras, el Contratista eliminará los materiales desprendidos.

321.3.5 - Limpieza del fondo.

Los fondos de las excavaciones se limpiarán de todo el material suelto o flojo y sus grietas y hendiduras se rellenarán adecuadamente. Asimismo, se eliminarán todas las rocas sueltas o desintegradas y los estratos excesivamente delgados. Cuando los cimientos apoyen sobre material cohesivo, la excavación de los últimos treinta centímetros (30 cm) no se efectuará hasta momentos antes de construir aquéllos, y previa autorización del Director de las Obras.

321.3.6 - Empleo de los productos de excavación.

Serán aplicables las prescripciones del apartado 320.3.4 de este Pliego.

321.3.7 - Caballeros.

Serán aplicables las prescripciones del apartado 320.3.6 de este Pliego.

321.4 Excesos inevitables

Los sobreanchos de excavación necesarios para la ejecución de la obra deberán estar contemplados en el Proyecto o, en su defecto, aprobados, en cada caso, por el Director de las Obras.

321.5 Tolerancias de las superficies acabadas

El fondo y paredes laterales de las zanjas y pozos terminados tendrán la forma y dimensiones exigidas en los Planos, con las modificaciones debidas a los excesos inevitables autorizados, y deberán refinarse hasta conseguir una diferencia inferior a cinco centímetros (5 cm) respecto de las superficies teóricas. Las sobreexcavaciones no autorizadas deberán rellenarse de acuerdo con las especificaciones definidas por el Director de las Obras, no siendo esta operación de abono independiente.

321.6 - Medición y abono

La excavación en zanjas o pozos se abonará por metros cúbicos (m^3) deducidos a partir de las secciones en planta y de la profundidad ejecutada. Se abonarán los excesos autorizados e inevitables. El precio incluye las entibaciones, agotamientos, transportes de productos a vertedero, posibles cánones, y el conjunto de operaciones y costes necesarios para la completa ejecución de la unidad. No serán de abono los excesos de excavación no autorizados, ni el relleno necesario para reconstruir la sección tipo teórica, por defectos imputables al Contratista, ni las excavaciones y movimientos de tierra considerados en otras unidades de obra.

CAPÍTULO III – RELLENOS

Artículo 330 – Terraplenes

330.1 - Definición

Esta unidad consiste en la extensión y compactación, por tongadas, de los materiales cuyas características se definen en el apartado 330.3 de este artículo, en zonas de tales dimensiones que permitan de forma sistemática la utilización de maquinaria pesada con destino a crear una plataforma sobre la que se asiente el firme de una carretera. Su ejecución comprende las operaciones siguientes: Preparación de la superficie de apoyo del relleno tipo terraplén, Extensión de una tongada, Humectación o desecación de una tongada y Compactación de una tongada. Las tres últimas operaciones se reiterarán cuantas veces sea preciso.

330.2 - Zonas de los rellenos tipo terraplén

En los rellenos tipo terraplén se distinguirán las cuatro zonas siguientes, cuya geometría se definirá en el Proyecto: Coronación: Es la parte superior del relleno tipo terraplén, sobre la que se apoya el firme, con un espesor mínimo de dos tongadas y siempre mayor de cincuenta centímetros (50 cm); Núcleo: Es la parte del relleno tipo terraplén comprendida entre el cimiento y la coronación; Espaldón: Es la parte exterior del relleno tipo terraplén que, ocasionalmente, constituirá o formará parte de los taludes del mismo. No se considerarán parte del espaldón los revestimientos sin misión estructural en el relleno entre los que se consideran, plantaciones, cubierta de tierra vegetal, encachados, protecciones antierosión, etc.; Cimiento: Es la parte inferior del terraplén en contacto con la superficie de apoyo. Su espesor será como mínimo de un metro (1 m).

330.3 - Materiales

330.3.1 - Criterios generales

Los materiales a emplear en rellenos tipo terraplén serán, con carácter general, suelos o materiales locales que se obtendrán de las excavaciones realizadas en obra, de los préstamos que se definan en el Proyecto o que se autoricen por el Director de las Obras. Los criterios para conseguir un relleno tipo terraplén que tenga las debidas condiciones irán encaminados a emplear los distintos materiales, según sus características, en las zonas más apropiadas de la obra, según las normas habituales de buena práctica en las técnicas de puesta en obra. En todo caso, se utilizarán materiales que permitan cumplir las condiciones básicas siguientes: Puesta en obra en condiciones aceptables, Estabilidad satisfactoria de la obra, Deformaciones tolerables a corto y largo plazo, para las condiciones de servicio que se definan en Proyecto. El Proyecto o, en su defecto, el Director de las Obras, especificará el tipo de material a emplear y las condiciones de puesta en obra, de acuerdo con la clasificación que en los apartados siguientes se define, así como las divisiones adicionales que en el mismo se establezcan, según los materiales locales disponibles.

330.3.2 - Características de los materiales.

A los efectos de este artículo, los rellenos tipo terraplén estarán constituidos por materiales que cumplan alguna de las dos condiciones granulométricas siguientes: Cernido, o material que pasa, por el tamiz 20 UNE mayor del 70 por 100 por ciento (# 20 > 70%), según UNE 103101; o Cernido o material que pasa, por el tamiz 0,080 UNE mayor o igual del treinta y cinco por ciento (# 0,080 > 35%), según UNE 103101.

Además de los suelos naturales, se podrán utilizar en terraplenes los productos procedentes de procesos industriales o de manipulación humana, siempre que cumplan las especificaciones de este artículo y que sus características físico-químicas garanticen la estabilidad presente y futura del conjunto. En todo caso se estará a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción. El Director de las Obras tendrá facultad para rechazar como material para terraplenes, cualquiera que así lo aconseje la experiencia local. Dicho rechazo habrá de ser justificado expresamente en el Libro de Órdenes.

330.3.3 - Clasificación de los materiales.

Desde el punto de vista de sus características intrínsecas los materiales se clasificarán en los tipos siguientes (cualquier valor porcentual que se indique, salvo que se especifique lo contrario, se refiere a porcentaje en peso):

330.3.3.1 - Suelos seleccionados.

Se considerarán como tales aquellos que cumplen las siguientes condiciones:

- Contenido en materia orgánica inferior al cero con dos por ciento (MO < 0,2%), según UNE 103204.
- Contenido en sales solubles en agua, incluido el yeso, inferior al cero con dos por ciento (SS < 0,2%), según NLT 114.
- Tamaño máximo no superior a cien milímetros ($D_{max} \leq 100$ mm).
- Cernido por el tamiz 0,40 UNE menor o igual que el quince por ciento (# 0,40 ≤ 15%) o que en caso contrario cumpla todas y cada una de las condiciones siguientes:
  - Cernido por el tamiz 2 UNE, menor del ochenta por ciento (# 2 < 80%).
  - Cernido por el tamiz 0,40 UNE, menor del setenta y cinco por ciento (# 0,40 < 75%).
  - Cernido por el tamiz 0,080 UNE inferior al veinticinco por ciento (# 0,080 < 25%).
  - Límite líquido menor de treinta (LL < 30), según UNE 103103.

  - Índice de plasticidad menor de diez (IP < 10), según UNE 103103 y UNE 103104.

330.3.3.2 - Suelos adecuados.

Se considerarán como tales los que no pudiendo ser clasificados como suelos seleccionados cumplan las condiciones siguientes:

- Contenido en materia orgánica inferior al uno por ciento (MO < 1%), según UNE 103204.
- Contenido en sales solubles, incluido el yeso, inferior al cero con dos por ciento (SS < 0,2%), según NLT 114.
- Tamaño máximo no superior a cien milímetros (Dmax ≤ 100 mm).
- Cernido por el tamiz 2 UNE, menor del ochenta por ciento (# 2 < 80%).
- Cernido por el tamiz 0,080 UNE inferior al treinta y cinco por ciento (# 0,080 < 35%).
- Límite líquido inferior a cuarenta (LL < 40), según UNE 103103.
- Si el límite líquido es superior a treinta (LL > 30) el índice de plasticidad será superior a cuatro (IP > 4), según UNE 103103 y UNE 103104.

330.3.3.3 - Suelos tolerables.

Se considerarán como tales los que no pudiendo ser clasificados como suelos seleccionados ni adecuados, cumplen las condiciones siguientes:

- Contenido en materia orgánica inferior al dos por ciento (MO < 2%), según UNE 103204.
- Contenido en yeso inferior al cinco por ciento (yeso < 5%), según NLT 115.
- Contenido en otras sales solubles distintas del yeso inferior al uno por ciento (SS < 1%), según NLT 114.
- Límite líquido inferior a sesenta y cinco (LL < 65), según UNE 103103.
- Si el límite líquido es superior a cuarenta (LL > 40) el índice de plasticidad será mayor del setenta y tres por ciento del valor que resulta de restar veinte al límite líquido (IP > 0,73 (LL-20)).

- Asiento en ensayo de colapso inferior al uno por ciento (1%), según NLT 254, para muestra remoldeada según el ensayo Próctor normal UNE 103500, y presión de ensayo de dos décimas de megapascal (0,2 MPa).
- Hinchamiento libre según UNE 103601 inferior al tres por ciento (3%), para muestra remoldeada según el ensayo Próctor normal UNE 103500.

330.3.3.4 Suelos marginales.

Se considerarán como tales los que no pudiendo ser clasificados como suelos seleccionados, ni adecuados, ni tampoco como suelos tolerables, por el incumplimiento de alguna de las condiciones indicadas para éstos, cumplan las siguientes condiciones:

- Contenido en materia orgánica inferior al cinco por ciento (MO < 5%), según UNE 103204.
- Hinchamiento libre según UNE 103601 inferior al cinco por ciento (5%), para muestra remoldeada según el ensayo Próctor normal UNE 103500.
- Si el límite líquido es superior a noventa (LL > 90) el índice de plasticidad será inferior al setenta y tres por ciento del valor que resulta de restar veinte al límite líquido (IP < 0,73 (LL-20)).

330.3.3.5 - Suelos inadecuados.

Se considerarán suelos inadecuados:

- Los que no se puedan incluir en las categorías anteriores.
- Las turbas y otros suelos que contengan materiales perecederos u orgánicos tales como tocones, ramas, etc.
- Los que puedan resultar insalubres para las actividades que sobre los mismos se desarrollen.

330.4 - Empleo

330.4.1 Uso por zonas.

Teniendo en cuenta las condiciones básicas indicadas en el apartado 330.3 de este artículo, se utilizarán, en las diferentes zonas del relleno tipo terraplén, los suelos que en este apartado se indican.

330.4.1.1 Coronación.

Se utilizarán suelos adecuados o seleccionados siempre que su capacidad de soporte sea la requerida para el tipo de explanada previsto en el Pliego de Prescripciones Técnicas Particulares y su índice CBR, correspondiente a las condiciones de compactación de puesta en obra, sea como mínimo de cinco (CBR ≥ 5), según UNE 103502. Se podrán utilizar otros materiales en forma natural o previo tratamiento, siempre que cumplan las condiciones de capacidad de soporte exigidas, y previo estudio justificativo aprobado por el Director de las Obras. No se usarán en esta zona suelos expansivos o colapsables, según lo indicado en el apartado 330.4.4 de este artículo. Cuando bajo la coronación exista material expansivo o colapsable o con contenido de sulfatos solubles según UNE 103201 mayor del dos por ciento (2%), la coronación habrá de evitar la infiltración de agua hacia el resto del relleno tipo terraplén, bien por el propio tipo de material o bien mediante la utilización de medidas complementarias.

330.4.1.2 Cimiento.

En el cimiento se utilizarán suelos tolerables, adecuados o seleccionados siempre que las condiciones de drenaje o estanqueidad lo permitan, que las características del terreno de apoyo sean adecuadas para su puesta en obra y siempre que el índice CBR, correspondiente a las condiciones de compactación de puesta en obra, sea igual o superior a tres (CBR ≥ 3), según UNE 103502.

330.4.1.3 Núcleo.

Se utilizarán suelos tolerables, adecuados ó seleccionados, siempre que su índice CBR, correspondiente a las condiciones de compactación de puesta en obra, sea igual o superior a tres (CBR ≥ 3), según UNE 103502. La utilización de suelos marginales o de suelos con índice CBR menor de tres (CBR < 3) puede venir condicionada por problemas de resistencia, deformabilidad y puesta en obra, por lo que su empleo queda desaconsejado y en todo caso habrá de justificarse mediante un estudio especial, aprobado por el Director de las Obras, conforme a lo indicado en el apartado 330.4.4 de este artículo. Asimismo la posible utilización de suelos colapsables, expansivos, con yesos, con otras sales solubles, con materia orgánica o de cualquier otro tipo de material marginal (según la clasificación del apartado 330.3.3), se regirá por lo indicado en el apartado 330.4.4 de este artículo.

330.4.1.4 Espaldones.

Se utilizarán materiales que satisfagan las condiciones que defina el Proyecto en cuanto a impermeabilidad, resistencia, peso estabilizador y protección frente a la erosión. No se usarán en estas zonas suelos expansivos o colapsables, según lo definido en el apartado 330.4.4 de este artículo. Cuando en el núcleo exista material expansivo o colapsable o con contenido en sulfatos solubles según UNE 103201 mayor del dos por ciento (2%), los espaldones evitarán la infiltración de agua hacia el mismo, bien por el propio tipo de material, bien mediante la adopción de medidas complementarias.

330.4.2 Grado de compactación.

El Proyecto, o en su defecto el Director de las Obras, señalará, entre el Próctor normal según UNE 103500 o el Próctor modificado según UNE 103501, el ensayo a considerar como Próctor de referencia. En caso de omisión se considerará como ensayo de referencia el Próctor modificado; sin embargo en el caso de suelos expansivos se aconseja el uso del ensayo Próctor normal. Los suelos clasificados como tolerables, adecuados y seleccionados podrán utilizarse según lo indicado en el punto anterior de forma que su densidad seca después de la compactación no sea inferior: En la zona de coronación, a la máxima obtenida en el ensayo Próctor de referencia y En las zonas de cimiento, núcleo y espaldones al noventa y cinco por ciento (95%) de la máxima obtenida en dicho ensayo. El Proyecto o, en su defecto, el Director de las Obras, podrán especificar justificadamente valores mínimos, superiores a los indicados, de las densidades después de la compactación en cada zona de terraplén en función de las características de los materiales a utilizar y de las propias de la obra.

330.4.3 Humedad de puesta en obra.

La humedad de puesta en obra se establecerá teniendo en cuentaLa necesidad de obtener la densidad y el grado de saturación exigidos, El comportamiento del material a largo plazo ante posibles cambios de dicha humedad (por ejemplo expansividad o colapso) y La humedad del material al excavarlo (en su yacimiento original) y su evolución durante la puesta en obra (condiciones climáticas y manipulación). Salvo justificación especial o especificación en contra del Proyecto, la humedad, inmediatamente después de la compactación, será tal que el grado de saturación en ese instante se encuentre comprendido entre los valores del grado de saturación correspondientes, en el ensayo Próctor de referencia, a humedades de menos dos por ciento (-2%) y de más uno por ciento (+1%) de la óptima de dicho ensayo Próctor de referencia. En el caso de suelos expansivos o colapsables, los límites de saturación indicados serán los correspondientes a humedades de menos uno por ciento (-1%) y de más tres por ciento (+3%) de la óptima del ensayo Próctor de referencia. Para el mejor aprovechamiento de los materiales desde el punto de vista de su contenido de humedad, se usarán las técnicas de extracción, transporte, acopio, riego u oreo, y extensión adecuadas para mejorar las condiciones del material en su yacimiento original. En el caso de humedades naturales muy bajas y suelos muy plásticos el cumplimiento de la condición anterior, relativa al grado de saturación, puede conseguirse tanto aumentando el contenido de agua como aumentando la energía de compactación.

330.4.4 Precauciones especiales con distintos tipos de suelos.

Los suelos marginales, definidos en el apartado 330.3.3 de este artículo, podrán utilizarse en algunas zonas de la obra siempre que su uso se justifique mediante estudio especial, aprobado por el Director de las Obras. Este "Estudio de usos de materiales marginales" deberá contemplar explícitamente y con detalle al menos los siguientes aspectos: Determinación y valoración de las propiedades que confieren al suelo su carácter de marginal, Influencia de dichas características en los diferentes usos del suelo dentro de la obra, Posible influencia en el comportamiento o evolución de otras zonas u elementos de la obra, Estudio pormenorizado en donde se indique las características resistentes del material y los asientos totales y diferenciales esperados, así como la evolución futura de estas características, Conclusión justificada de los posibles usos del material en estudio y Cuidados, disposiciones constructivas y prescripciones técnicas a adoptar para los diferentes usos del suelo dentro de la obra. A continuación se expresan algunas consideraciones sobre el uso de distintos tipos de suelos.

330.4.4.1 Suelos colapsables.

A los efectos de este artículo, se considerarán suelos colapsables aquellos en los que una muestra remoldeada y compactada con la densidad y humedad remoldeada del ensayo Próctor normal según UNE 103500, sufra un asiento superior al uno por ciento (1%) de la altura inicial de la muestra cuando se ensaye según NLT 254 y presión de ensayo de dos décimas de megapascal (0,2 MPa). Los suelos colapsables no se usarán en coronación ni espaldones. Su uso en núcleo y en cimiento estará sujeto a un estudio especial que teniendo en cuenta la funcionalidad del terraplén, el grado de colapsabilidad del suelo, las condiciones climáticas y de niveles freáticos, defina las disposiciones y cuidados a adoptar para su uso. Estos suelos deberán compactarse del lado húmedo, con relación a la humedad óptima del ensayo Próctor de referencia. A falta de otro criterio, convenientemente justificado del Proyecto, se estará a lo indicado en el apartado 330.4.3 de este artículo.

330.4.4.2 Suelos expansivos.

A los efectos de este artículo, se consideran suelos expansivos aquellos en los que en una muestra remoldeada y compactada con la densidad y humedad óptimas del ensayo Próctor normal según UNE 103500, supere un hinchamiento libre del tres por ciento (3%), cuando se ensaye según UNE 103601. Los suelos expansivos así definidos, no se utilizarán en coronación ni en los espaldones ya que en estas zonas se acusan especialmente las variaciones estacionales de humedad. Si resultara inevitable su empleo en el núcleo se realizará un estudio especial, que teniendo en cuenta la funcionalidad del relleno tipo terraplén, las características de permeabilidad de la coronación y espaldones, el hinchamiento libre y las condiciones climáticas, defina las disposiciones y cuidados a adoptar durante la construcción. Sin embargo no podrán usarse en ningún caso aquellos suelos cuyo hinchamiento libre, según UNE 103601 sea superior al cinco por ciento (5%). Estos suelos deben compactarse ligeramente del lado húmedo, con relación a la humedad óptima del ensayo Próctor de referencia. A falta de otro criterio, convenientemente justificado, del Proyecto se estará a lo indicado en el apartado 330.4.3 de este artículo en lo relativo a los grados de saturación y se preferirá la elección del Próctor normal como Próctor de referencia.

330.4.4.3 Suelos con yesos.

La utilización, siempre justificada y autorizada por el Director de las Obras, de materiales con yesos será función del contenido de dicha sustancia determinado según NLT 115, tal como se indica a continuación:

- Menor del cero con dos por ciento (0,2%): Utilización en cualquier zona del terraplén.
- Entre el cero con dos y el dos por ciento (0,2 y 2%): Utilización en el núcleo del terraplén. No se necesitará tomar ninguna precaución especial en la ejecución de la coronación y los espaldones.
- Entre el dos y el cinco por ciento (2 y 5%): Utilización en el núcleo del terraplén con adopción de cuidados y materiales de características especiales en coronación y en los espaldones, que vendrán explícitamente indicados en el Proyecto.
- Entre el cinco y el veinte por ciento (5 y 20%): Utilización limitada al núcleo del terraplén y siempre que se tomen, entre otras, las siguientes medidas para evitar la disolución con posible producción de asientos o pérdida de resistencia:
    - El núcleo deberá constituir una masa compacta e impermeable.
    - Disponer medidas de drenaje e impermeabilizaciones para impedir el acceso al relleno de las aguas tanto superficiales como profundas. Habrá de justificarse la eficacia de las medidas adoptadas a este respecto mediante estudio especial, aprobado por el Director de las Obras.
- Mayor del veinte por ciento (20%): Este tipo de suelos no debe utilizarse en ninguna zona del relleno. Su uso se limitará a aquellos casos en que no existan otros suelos disponibles y siempre que el mismo venga contemplado y convenientemente justificado en el Proyecto.

Con frecuencia, los suelos con yeso van acompañados de suelos inadecuados o marginales por criterios de plasticidad, arcillas muy plásticas o limos colapsables. Por ello para porcentajes de yeso superiores al dos por ciento (yeso > 2%) se determinará el posible carácter expansivo o colapsable del suelo y se adoptarán, en su caso, las medidas oportunas según se indica en los apartados 330.4.4.1 y 330.4.4.2 de este artículo.

También se tendrá en cuenta la posible agresividad de estas sales al hormigón y la posible contaminación que puedan originar en los terrenos colindantes.

330.4.4.4 Suelos con otras sales solubles.

La utilización de materiales con sales solubles en agua distintas del yeso, según sea su contenido, será la siguiente:

- Menor del cero con dos por ciento (0,2%): Utilización en cualquier zona del terraplén.
- Entre el cero con dos y el uno por ciento (0,2 y 1%): Utilización en el núcleo del terraplén, sin necesidad de tomar precauciones especiales en coronación y espaldones.
- Mayor del uno por ciento (1%): Se requiere un estudio especial, aprobado expresamente por el Director de las Obras.

330.4.4.5 Suelos con materia orgánica.

Cuando se sospeche que un suelo pueda contener materia orgánica, ésta se determinará según UNE 103204. Esta norma incluye como materia orgánica todas las sustancias oxidables existentes en la muestra ensayada, por tanto, cuando las sustancias oxidables no orgánicas puedan influir de forma importante sobre los resultados obtenidos, el Director de las Obras podrá autorizar que el contenido de materia orgánica se obtenga descontando los materiales oxidables no orgánicos, determinados según método explícitamente aprobado por él. En rellenos tipo terraplén de hasta cinco metros (5 m) de altura, se podrán admitir en el núcleo materiales con hasta un cinco por ciento (5%) de materia orgánica, siempre que las deformaciones previsibles se hayan tenido en cuenta en el Proyecto. Para terraplenes de más de cinco metros (5 m) de altura el uso de suelos con porcentaje de materia orgánica superior al dos por ciento (MO > 2%) habrá de justificarse con un estudio especial, aprobado por el Director de las Obras. En coronación el contenido de materia orgánica será inferior al uno por ciento (1%).

330.5 - Equipo necesario para la ejecución de las obras

Los equipos de extendido, humectación y compactación serán suficientes para garantizar la ejecución de la obra de acuerdo con las exigencias de este artículo.

Previamente a la ejecución de los rellenos, el Contratista presentará un programa de trabajos en que se especificará, al menos: maquinaria prevista, sistemas de arranque y transporte, equipo de extendido y compactación, y procedimiento de compactación, para su aprobación por el Director de las Obras.

330.6 - EJECUCIÓN DE LAS OBRAS

Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

330.6.1 - Preparación de la superficie de apoyo del relleno tipo terraplén.

Si el relleno tipo terraplén se construye sobre terreno natural, se efectuará en primer lugar, de acuerdo con lo estipulado en los artículos 300, "Desbroce del terreno" y 320, "Excavación de la explanación y préstamos" de este Pliego, el desbroce del citado terreno y la eliminación de la capa de tierra vegetal. Sin embargo el Proyecto o el Director de las Obras, de acuerdo con lo indicado en el apartado 300.2.1 de este Pliego, podrán eximir de la eliminación de la capa de tierra vegetal en rellenos tipo terraplén de más de diez metros (10 m) de altura, donde los asientos a que pueden dar lugar, en particular los diferidos, sean pequeños comparados con los totales del relleno y siempre que su presencia no implique riesgo de inestabilidad. En rellenos tipo terraplén sobre suelos compresibles y de baja resistencia, sobre todo en el caso de suelos orgánicos o en zonas pantanosas, la vegetación podrá mejorar la sustentación de la maquinaria de movimiento de tierras y facilitar las operaciones de compactación de las primeras tongadas. En estos casos el Proyecto o el Director de las Obras, podrán indicar su posible conservación. Tras el desbroce, se procederá a la excavación y extracción del terreno natural en la extensión y profundidad especificada en el Proyecto. Una vez alcanzada la cota del terreno sobre la que finalmente se apoyará el relleno tipo terraplén, se escarificará el terreno de acuerdo con la profundidad prevista en el Proyecto y se tratará conforme a las indicaciones relativas a esta unidad de obra, dadas en el artículo 302, "Escarificación y compactación" de este Pliego, siempre que estas operaciones no empeoren la calidad del terreno de apoyo en su estado natural. Cuando lo indique el Proyecto, se extenderán capas de materiales granulares gruesos o láminas geotextiles que permitan o faciliten la puesta en obra de las primeras tongadas del relleno. Si el relleno tipo terraplén debe construirse sobre un firme preexistente, éste se escarificará y compactará según lo indicado en el artículo 303 "Escarificación y compactación del firme existente" de este Pliego. En las zonas de ensanche o recrecimiento de antiguos rellenos tipo terraplén se prepararán éstos, mediante banquetas u otras actuaciones pertinentes, a fin de conseguir la adecuada unión con el nuevo relleno. Las operaciones encaminadas a tal objeto serán las indicadas en el Proyecto o, en su defecto, por el Director de las Obras. Cuando el relleno tipo terraplén haya de asentarse sobre un terreno en el que exista agua superficial, se conducirá el agua fuera del área donde vaya a construirse, antes de comenzar su ejecución, mediante obras que podrán tener el carácter de accesorias, y que se ejecutarán con arreglo a lo previsto para tal tipo de obras en el Proyecto o, en su defecto, siguiendo las instrucciones del Director de las Obras. Las tongadas susceptibles de saturarse durante la vida del relleno tipo terraplén se construirán, de acuerdo con el Proyecto, con un material en el que la granulometría impida el arrastre de partículas y en el que las deformaciones que puedan producirse al saturarse sean aceptables para las condiciones de servicio definidas en el Proyecto. Las transiciones de desmonte a relleno tipo terraplén se realizarán, tanto transversal como longitudinalmente, de la forma más suave posible según lo indicado en el Proyecto o en su defecto, excavando el terreno de apoyo hasta conseguir una pendiente no mayor de un medio (1V:2H). Dicha pendiente se mantendrá hasta alcanzar una profundidad por debajo de la explanada de al menos un metro (1 m). En los rellenos tipo terraplén situados a media ladera, se escalonará la pendiente natural del terreno de acuerdo con lo indicado en el Proyecto. Las banquetas así originadas deberán quedar apoyadas en terreno suficientemente firme. Su anchura y pendiente deberán ser tales que la maquinaria pueda trabajar con facilidad en ellas. En general y especialmente en las medias laderas donde, a corto y largo plazo, se prevea la presencia de agua en la zona de contacto del terreno con el relleno, se deberán ejecutar las obras necesarias, recogidas en el Proyecto, para mantener drenado dicho contacto. Dado que las operaciones de desbroce, escarificado y escalonado de las pendientes dejan la superficie de terreno fácilmente erosionable por los agentes atmosféricos, estos trabajos no deberán llevarse a cabo hasta el momento previsto y en las condiciones oportunas para reducir al mínimo el tiempo de exposición, salvo que se recurra a protecciones de la superficie. La posibilidad de aterramientos de los terrenos del entorno y otras afecciones indirectas deberá ser contemplada en la adopción de estas medidas de protección.

330.6.2 Extensión de las tongadas.

Una vez preparado el apoyo del relleno tipo terraplén, se procederá a la construcción del mismo, empleando los materiales, que se han definido anteriormente, los cuales serán extendidos en tongadas sucesivas, de espesor uniforme y sensiblemente paralelas a la explanada final. El espesor de estas tongadas será el adecuado para que, con los medios disponibles, se obtenga en todo su espesor el grado de compactación exigido. Dicho espesor, en general y salvo especificación en contra del Proyecto o del Director de las Obras, será de treinta centímetros (30 cm). En todo caso, el espesor de tongada ha de ser superior a tres medios (3/2) del tamaño máximo del material a utilizar. El extendido se programará y realizará de tal forma que los materiales de cada tongada sean de características uniformes y, si no lo fueran, se conseguirá esta uniformidad mezclándolos convenientemente con maquinaria adecuada para ello. No se extenderá ninguna tongada mientras no se haya comprobado que la superficie subyacente cumple las condiciones exigidas y sea autorizada su extensión por el Director de las Obras. Los rellenos tipo terraplén sobre zonas de escasa capacidad de soporte se iniciarán vertiendo las primeras capas con el espesor mínimo necesario para soportar las cargas que produzcan los equipos de movimiento y compactación de tierras. Durante la ejecución de las obras, la superficie de las tongadas deberá tener la pendiente transversal necesaria, en general en torno al cuatro por ciento (4%), para asegurar la evacuación de las aguas sin peligro de erosión y evitar la concentración de vertidos. En rellenos de más de cinco metros (5 m) de altura, y en todos aquellos casos en que sea previsible una fuerte erosión de la superficie exterior del relleno, se procederá a la construcción de caballones de tierra en los bordes de las tongadas que, ayudados por la correspondiente pendiente longitudinal, lleven las aguas hasta bajantes dispuestas para controlar las aguas de escorrentía. Se procederá asimismo a la adopción de las medidas protectoras del entorno, previstas en el Proyecto o indicadas por el Director de las Obras, frente a la acción, erosiva o sedimentaria, del agua de escorrentía. Salvo prescripción en contra del Proyecto o del Director de las Obras, los equipos de transporte de tierras y extensión de las mismas operarán sobre todo el ancho de cada capa y, en general, en el sentido longitudinal de la vía. Deberá conseguirse que todo el perfil del relleno tipo terraplén quede debidamente compactado, para lo cual, se podrá dar un sobreancho a la tongada del orden de un metro (1 m) que permita el acercamiento del compactador al borde, y después recortar el talud. En todo caso no serán de abono estos sobreanchos.

330.6.3 Humectación o desecación.

En el caso de que sea preciso añadir agua para conseguir el grado de compactación previsto, se efectuará esta operación humectando uniformemente los materiales, bien en las zonas de procedencia (canteras, préstamos), bien en acopios intermedios o bien en la tongada, disponiendo los sistemas adecuados para asegurar la citada uniformidad (desmenuzamiento previo, uso de rodillos "pata de cabra", etc.). En los casos especiales en que la humedad natural del material sea excesiva, se tomarán las medidas adecuadas, para conseguir la compactación prevista, pudiéndose proceder a la desecación por oreo, o a la adición y mezcla de materiales secos o sustancias apropiadas.

330.6.4 Compactación.

Conseguida la humectación más conveniente, se procederá a la compactación mecánica de la tongada. Los valores de densidad y humedad a alcanzar serán los que se indican en los apartados 330.4.2 y 330.4.3 de este artículo, o los que, en su caso, fijen el Proyecto o el Director de las Obras. Las zonas de trasdós de obra de fábrica, zanjas y aquellas, que por reducida extensión, u otras causas, no puedan compactarse con los medios habituales tendrá la consideración de rellenos localizados y se estará a lo dispuesto en el artículo 332, "Rellenos localizados" de este Pliego.

330.6.5 Control de la compactación.

330.6.5.1 Generalidades.

El Control de la compactación tendrá por objeto comprobar por un lado que cada tongada cumple las condiciones de densidad seca y humedad, según lo establecido en el apartado 330.6.4 de este artículo así como por el Proyecto y el Director de las Obras, y por otro lado, que las características de deformabilidad sean las adecuadas para asegurar un comportamiento aceptable del relleno. A este efecto, el control se efectuará por el método de "Control de producto terminado", a través de determinaciones "in situ" en el relleno compactado, comparándose los resultados obtenidos con los correspondientes valores de referencia. En circunstancias especiales, el Proyecto o el Director de las Obras podrán prescribir, además, la realización de ensayos complementarios para caracterizar las propiedades geotécnicas del relleno (resistencia al corte, expansividad, colapso, etc.). Con este método de "Control de producto terminado" se considerará que la compactación de una tongada es aceptable siempre que se cumplan las dos condiciones siguientes:

- La densidad seca "in situ" es superior al máximo valor mínimo establecido en este Pliego, en el Proyecto o por el Director de las Obras, y el grado de saturación se encuentra dentro de los límites establecidos en el Proyecto, o en su defecto en este Pliego. Estos aspectos se comprobarán conforme a lo indicado en el apartado 330.6.5.4 de este artículo.
- El módulo de deformación vertical en el segundo ciclo de carga del ensayo de carga con placa (Ev2) según NLT 357 es como mínimo, según el tipo de material y en función de la zona de obra de que se disponga, el siguiente:
    - En cimiento, núcleo y espaldones, cincuenta megapascales (Ev2 ³ 50 MPa) para los suelos seleccionados y treinta megapascales (Ev2 ³ 30 MPa) para el resto.
    - En coronación, cien megapascales (Ev2 ³ 100 MPa) para los suelos seleccionados y sesenta megapascales (Ev2 ³ 60 MPa) para el resto.
    - En este ensayo de carga sobre placa ejecutado conforme a NLT 357, la relación, K, entre el módulo de deformación obtenido en el segundo ciclo de carga, Ev2 y el módulo de deformación obtenido en el primer ciclo de carga, Ev1, no puede ser superior a dos con dos (K £ 2,2).

Cuando lo indique el Proyecto o lo aconsejen las características del material o de la obra, y previa autorización del Director de las Obras, las determinaciones "in situ" de densidad, humedad, y módulo de deformación se complementarán por otras, como los ensayos de huella ejecutados según NLT 256 o el método de "Control de procedimiento" a partir de bandas de ensayo previas. En estas últimas deberán quedar definidas, para permitir su control posterior, las operaciones de ejecución, equipos de extendido y compactación, espesores de tongada, humedad del material y número de pasadas, debiendo comprobarse en esas bandas de ensayo que se cumplen las condiciones de densidad, saturación, módulo de deformación y relación de módulos que se acaban de establecer. En estas bandas o terraplenes de ensayo el número de tongadas a realizar será, al menos, de tres (3). El Proyecto o el Director de las Obras podrán establecer la utilización de ensayos complementarios para la comprobación del comportamiento del relleno o de determinadas características del mismo (como los ensayos de Cross-hole, ondas superficiales, ensayos penetrométricos, asentómetros, células de presión total o intersticial, etc.).

330.6.5.2 Ensayos de referencia.

a) Ensayo de compactación Próctor: El Proyecto, o en su defecto el Director de las Obras, señalará, entre el Próctor normal (UNE 103500) o el Próctor modificado (UNE 103501), el ensayo a considerar como Próctor de referencia. En caso de omisión se considerará como ensayo de referencia el Próctor modificado. En este sistema de control, se clasificarán los materiales a utilizar en grupos cuyas características sean similares. A estos efectos se consideran similares aquellos materiales en los que se cumpla, en un mínimo de tres (3) muestras ensayadas, lo siguiente:

- Pertenencia al mismo tipo de clasificación definida en el apartado 330.3.3 de este artículo.
- Rangos de variación de la densidad seca máxima en el ensayo Próctor de referencia no superiores al tres por ciento (3%).
- Rangos de variación de la humedad óptima en el ensayo Próctor de referencia no superiores al dos por ciento (2%).

Dentro de cada grupo se establecerán los correspondientes valores medios de la densidad seca máxima y de la humedad óptima que servirán de referencia para efectuar el análisis de los resultados del control. Se determinará asimismo la zona de validez indicada en el apartado 330.6.5.4 de este artículo. El volumen de cada uno de esos grupos será mayor de veinte mil metros cúbicos (20.000 m3). En caso contrario se recurrirá a otro procedimiento de control. En el caso de que los materiales procedentes de una misma zona de extracción no puedan agruparse de la forma anteriormente descrita ni sea posible separarlos para su aprovechamiento, no será aplicable el método de control de producto terminado mediante ensayos Próctor, debiéndose recurrir al empleo intensivo del ensayo de carga con placa según NLT 357, con alguno complementario como el de huella según NLT 256, o el método de control de procedimiento, según determine el Director de las Obras.

b) Ensayo de carga con placa: Para determinar el módulo de deformación del relleno tipo terraplén se utilizará el ensayo de carga con placa. Las dimensiones de dicha placa serán tales que su diámetro o lado sea al menos cinco (5) veces superior al tamaño máximo del material utilizado. En ningún caso la superficie de la placa será inferior a setecientos centímetros cuadrados (700 cm2). El ensayo se realizará según la metodología NLT 357 aplicando la presión, por escalones, en dos ciclos consecutivos de carga. En caso de necesidad, el Proyecto podrá fijar otras condiciones de ensayo que las de la norma indicada, en cuyo caso deberá establecer los valores correspondientes a exigir para el módulo de deformación del segundo ciclo de carga Ev2, y para la relación K entre módulos de segundo y primer ciclos de carga.

c) Ensayo de la huella: En el caso de realizar el ensayo de la huella se utilizará la norma NLT 256, en la que se indica el control de asientos, sobre diez (10) puntos separados un metro (1 m), antes y después del paso del camión normalizado. El ensayo de huella se efectuará correlacionado con el ensayo de placa de carga NLT 357 y por tanto los valores de huella admisibles serán aquellos que garanticen el resultado de la placa de carga. Los mismos serán establecidos por el Director de las Obras a propuesta del Contratista apoyada por los correspondientes ensayos de contraste. En todo caso los valores de huella admisible no serán superiores a los siguientes:

- En cimiento, núcleo y espaldones: cinco milímetros (5 mm).
- En coronación: tres milímetros (3 mm).

330.6.5.3 Determinación "in situ".

a) Definición de lote: Dentro del tajo a controlar se define como "lote", que se aceptará o rechazará en conjunto, al menor que resulte de aplicar a una sola tongada de terraplén los siguientes criterios:

- Una longitud de carretera (una sola calzada en el caso de calzadas separadas) igual a quinientos metros (500 m).
- En el caso de la coronación una superficie de tres mil quinientos metros cuadrados (3.500 m2) y en el resto de las zonas, una superficie de cinco mil metros cuadrados (5.000 m2) si el terraplén es de menos de cinco metros (5 m) de altura y de diez mil metros cuadrados (10.000 m2) en caso contrario. Descontando siempre en el conjunto de estas superficies unas franjas de dos metros (2 m) de ancho en los bordes de la calzada y los rellenos localizados según lo definido en el artículo 332, "Rellenos localizados" de este pliego.
- La fracción construida diariamente.
- La fracción construida con el mismo material, del mismo préstamo y con el mismo equipo y procedimiento de compactación.

Nunca se escogerá un lote compuesto de fracciones correspondientes a días ni tongadas distintas, siendo por tanto entero el número de lotes escogido por cada día y tongada.

b) Muestras y ensayos a realizar en cada lote: Dentro de la zona definida por el lote se escogen las siguientes muestras independientes:

- Muestra de superficie: Conjunto de cinco (5) puntos, tomados en forma aleatoria de la superficie definida como lote. En cada uno de estos puntos se determinará su humedad y densidad.
- Muestra de borde: En cada una de las bandas de borde se fijará un (1) punto por cada cien metros (100 m) o fracción. Estas muestras son independientes de las anteriores e independientes entre sí. En cada uno de estos puntos se determinará su humedad y densidad.
- Determinación de deformaciones: En coronación se hará un ensayo de carga con placa según NLT 357 por cada uno de los lotes definidos con anterioridad. En el resto de las zonas el Director de las Obras podrá elegir entre hacer un ensayo de placa de carga por cada lote o bien hacer otro tipo de ensayo en cada lote, como puede ser el de huella, de forma que estando convenientemente correlacionadas

se exijan unos valores que garanticen los resultados del ensayo de placa de carga, aspecto este que se comprobará, al menos, cada cinco (5) lotes.

La determinación de deformaciones habrá de realizarse siempre sobre material en las condiciones de densidad y grado de saturación exigidas, aspecto que en caso de duda, y en cualquier caso que el Director de las Obras así lo indique, habrá de comprobarse. Incluso se podrá obligar a eliminar la costra superior de material desecado antes de realizar el ensayo. Para medir la densidad seca "in situ" podrán emplearse procedimientos de sustitución (método de la arena UNE 103503, método del densómetro, etcétera), o preferentemente métodos de alto rendimiento como los métodos nucleares con isótopos radiactivos. En todo caso, antes de utilizar estos últimos, se calibrarán sus resultados con las determinaciones dadas por los procedimientos de sustitución. Esta calibración habrá de ser realizada para cada uno de los grupos de materiales definidos en el apartado 330.6.5.3 a) de este artículo y se comprobará al menos una vez por cada diez (10) lotes ensayados. De forma análoga se procederá con los ensayos de humedad, por secado según UNE 103300 y nucleares. Para espesores de tongada superiores a treinta centímetros (30 cm) habrá de garantizarse que la densidad y humedad medidas se corresponden con las del fondo de la tongada.

330.6.5.4 Análisis de los resultados.

Las determinaciones de humedad y densidad "in situ" se compararán con los valores de referencia definidos en el apartado 330.6.5.2 de este artículo. Para la aceptación de la compactación de una muestra el valor medio de la densidad de la muestra habrá de cumplir las condiciones mínimas impuestas en este artículo y en particular en sus apartados 330.4.2, 330.4.3 y 330.6.4. Además al menos el sesenta por 100 (60 %) de los puntos representativos de cada uno de los ensayos individuales en un diagrama humedad-densidad seca, han de encontrarse dentro de la zona de validez que a continuación se define, y el resto de los puntos no podrán tener una densidad inferior en más de treinta kilogramos por metro cúbico (30 kg/m3) a las admisibles según lo indicado en este Pliego, en el Proyecto o por el Director de las Obras. La zona de validez es la situada por encima de la curva Próctor de referencia, normal o modificado según el caso, y entre las líneas de isosaturación correspondientes a los límites impuestos al grado de saturación, en el Proyecto o en su defecto en este pliego. Dichas líneas límite, según lo indicado en el apartado 330.4.3 de este artículo y salvo indicación en contra del Proyecto, serán aquellas que pasen por los puntos de la curva Próctor de referencia correspondientes a humedades de menos dos por ciento (-2 %) y más 1 por 100 (+1 %) de la óptima. En el caso de suelos expansivos o colapsables los puntos de la curva Próctor de referencia serán los correspondientes a humedades de menos uno por ciento (-1 %) y más 3 por 100 (+3 %) de la óptima de referencia. Se recuerda que el grado de saturación viene dado por: Sr = w · (Ps / Pw) · [Pd / (Ps-Pd)] y que las líneas de igual saturación vienen definidas por la expresión: Pd = Ps· {Sr/ [w · (Ps/Pw)+Sr]} donde: Sr = Grado de saturación (%), w = Humedad del suelo (%), Pd = Densidad seca (kg/m3), Pw = Densidad del agua (puede tomarse igual a mil kilogramos por metro cúbico 1.000 kg/m3) y Ps = Densidad de las partículas de suelo según UNE 103302 (kg/m3). El incumplimiento de lo anterior dará lugar a la recompactación de la zona superficial o de borde de la cual la muestra sea representativa. En casos dudosos puede ser aconsejable aumentar la intensidad del control para disminuir la frecuencia e incidencia de situaciones inaceptables o los tramos de lotes a rechazar. En caso de no cumplirse los valores de placa de carga indicados en el apartado 330.6.5 de este artículo o los valores aceptables indicados por el Director de las Obras para el ensayo alternativo de correlación con el de placa de carga, se procederá asimismo a recompactar el lote.

330.7 Limitaciones a la ejecución

Los rellenos tipo terraplén se ejecutarán cuando la temperatura ambiente, a la sombra, sea superior a dos grados Celsius (2ºC), debiendo suspenderse los trabajos cuando la temperatura descienda por debajo de dicho límite, salvo que se justifique adecuadamente la viabilidad de la puesta en obra y la consecución de las características exigidas y esta justificación fuese aceptada por el Director de las Obras. El Director de las Obras deberá tener en cuenta la influencia de las lluvias antes de aprobar el extendido y compactación del relleno. Sobre las capas en ejecución debe prohibirse la acción de todo tipo de tráfico hasta que se haya completado su compactación. Si ello no es factible se eliminará el espesor de las tongadas afectado por el paso del tráfico.

330.8 Medición y abono

Los rellenos tipo terraplén se abonarán por metros cúbicos (m3), medidos sobre los planos de perfiles transversales, siempre que los asientos medios del cimiento debido a su compresibilidad sean inferiores, según los cálculos del Proyecto, al dos por ciento (2 %) de la altura media del relleno tipo terraplén. En caso contrario podrá abonarse el volumen de relleno correspondiente al exceso ejecutado sobre el teórico, siempre que este asiento del cimiento haya sido comprobado mediante la instrumentación adecuada, cuya instalación y coste correrá a cargo del Contratista. No serán de abono los rellenos que fuesen necesarios para restituir la explanación a las cotas proyectadas debido a un exceso de excavación o cualquier otro caso de ejecución incorrecta imputable al Contratista ni las creces no previstas en este Pliego, en el Proyecto o previamente autorizadas por el Director de las Obras, estando el Contratista obligado a corregir a su costa dichos defectos sin derecho a percepción adicional alguna. Se aplicará el mismo precio unitario a todas las zonas del terraplén

Artículo 332 – Rellenos localizados

332.1 Definición

Esta unidad consiste en la extensión y compactación de suelos, procedentes de excavaciones o préstamos, en relleno de zanjas, trasdós de obras de fábrica, cimentación o apoyo de estribos o cualquier otra zona, que por su reducida extensión, compromiso estructural u otra causa no permita la utilización de los mismos equipos de maquinaria con que se lleva a cabo la ejecución del resto del relleno, o bien exija unos cuidados especiales en su construcción. No se consideran incluidos dentro de esta unidad los rellenos localizados de material con misión específica drenante, a los que hace referencia el artículo 421, "Rellenos localizados de material drenante" del PG3 y que se realizarán de acuerdo a este último.

332.2 Zonas de los rellenos

En los rellenos localizados que formen parte de la infraestructura de la carretera se distinguirán las mismas zonas que en los terraplenes, según el apartado 330.2 de este Pliego.

332.3 Materiales

Se utilizarán solamente suelos adecuados y seleccionados según el apartado 330.3 de este Pliego. Se emplearán suelos adecuados o seleccionados, siempre que su CBR según UNE 103502, correspondiente a las condiciones de compactación exigidas, sea superior a diez (10) y en el caso de trasdós de obra de fábrica superior a veinte (20). Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

332.4 - Equipo necesario para la ejecución de las obras

Los equipos de extendido, humectación y compactación serán los apropiados para garantizar la ejecución de la obra de acuerdo con las exigencias de este Pliego, del Proyecto y las indicaciones del Director de las Obras.

332.5 - Ejecución de las obras

Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

332.5.1 - Preparación de la superficie de asiento de los rellenos localizados.

En las zonas de ensanche o recrecimiento de antiguos rellenos se prepararán éstos a fin de conseguir su unión con el nuevo relleno. Las operaciones encaminadas a tal objeto serán las indicadas en el Proyecto o, en su defecto, por el Director de las Obras. Si el material procedente del antiguo talud, cuya remoción sea necesaria, es del mismo tipo que el nuevo y cumple las condiciones exigidas para la zona de relleno de que se trate, se mezclará con el del nuevo relleno para su compactación simultánea; en caso contrario, el Director de las Obras decidirá si dicho material debe transportarse a vertedero. Cuando el relleno haya de asentarse sobre un terreno en el que existan corrientes de agua superficial o subálvea, se desviarán las primeras y captarán y conducirán las últimas fuera del área donde vaya a construirse el relleno antes de comenzar la ejecución. Estas obras, que tendrán el carácter de accesorias, se ejecutarán con arreglo a lo previsto para tal tipo de obras en el Proyecto o, en su defecto, a las instrucciones del Director de las Obras. Salvo en el caso de zanjas de drenaje, si el relleno hubiera de construirse sobre terreno inestable, turba o arcilla blanda, se asegurará la eliminación de este material o su estabilización.

332.5.2 Extensión y compactación.

Los materiales de relleno se extenderán en tongadas sucesivas de espesor uniforme y sensiblemente paralelas a la explanada. El espesor de estas tongadas será lo suficientemente reducido para que, con los medios disponibles, se obtenga en todo su espesor el grado de compactación exigido. Salvo especificación en contra del Proyecto o del Director de las Obras, el espesor de las tongadas medido después de la compactación no será superior a veinticinco centímetros (25 cm). Los espesores finales de las tongadas se señalarán y numerarán con pintura, según el caso, en el trasdós de la obra de fábrica, paramentos o cuerpo de la tubería, para el adecuado control de extendido y compactación. Únicamente se podrá utilizar la compactación manual en los casos previstos en el Proyecto, y en aquellos que sean expresamente autorizados por el Director de las Obras. Salvo que el Director de las Obras lo autorice, en base a estudio firmado por técnico competente, el relleno junto a obras de fábrica o entibaciones se efectuará de manera que las tongadas situadas a uno y otro lado de la misma se hallen al mismo nivel. En el caso de obras de fábrica con relleno asimétrico, los materiales del lado más alto no podrán extenderse ni compactarse antes de que hayan transcurrido siete días (7 d) desde la terminación de la fábrica contigua, salvo indicación del Proyecto o autorización del Director de las Obras y siempre previa comprobación del grado de resistencia alcanzado por la obra de fábrica. Junto a las estructuras porticadas no se iniciará el relleno hasta que el dintel no haya sido terminado y haya alcanzado la resistencia que indique el Proyecto o, en su defecto, el Director de las Obras. El drenaje de los rellenos contiguos a obras de fábrica se ejecutará simultáneamente a dicho relleno, para lo cual el material drenante estará previamente acopiado de acuerdo con las órdenes del Director de las Obras. Los materiales de cada tongada serán de características uniformes y si no lo fueran, se conseguirá esta uniformidad mezclándolos convenientemente con los medios adecuados. Durante la ejecución de las obras, la superficie de las tongadas deberá tener la pendiente transversal necesaria para asegurar la evacuación de las aguas sin peligro de erosión. Una vez extendida cada tongada, se procederá a su humectación, si es necesario. El contenido óptimo de humedad se determinará en obra, a la vista de la maquinaria disponible y de los resultados que se obtengan de los ensayos realizados. En los casos especiales en que la humedad del material sea excesiva para conseguir la compactación prevista, se tomarán las medidas adecuadas, pudiéndose proceder a la desecación por oreo o a la adición y mezcla de materiales secos o sustancias apropiadas. Conseguida la humectación más conveniente, se procederá a la compactación mecánica de la tongada. Las zonas que, por su forma, pudieran retener agua en su superficie, serán corregidas inmediatamente por el Contratista. Se exigirá una densidad después de la compactación, en coronación, no inferior al 100 por 100 (100%) de la máxima obtenida en el ensayo Próctor modificado según UNE 103501 y, en el resto de las zonas, no inferior al 95 por 100 (95%) de la misma. En todo caso la densidad obtenida habrá de ser igual o mayor que la de las zonas contiguas del relleno.

332.5.3 Relleno de zanjas para instalación de tuberías.

En el caso de zanja serán de aplicación los apartados anteriores en tanto en cuanto no contraríen a lo expuesto en este apartado, en otro caso será de aplicación lo aquí expuesto. La decisión sobre la cama de apoyo de la tubería en el terreno, granular o de hormigón, y su espesor, dependerá del tipo de tubo y sus dimensiones, la clase de juntas y la naturaleza del terreno, vendrá definida en el Proyecto o, en su defecto, será establecida por el Director de las Obras. Una vez realizadas, si procede, las pruebas de la tubería instalada, para lo cual se habrá hecho un relleno parcial de la zanja dejando visibles las juntas, se procederá al relleno definitivo de la misma, previa aprobación del Director de las Obras. El relleno de la zanja se subdividirá en dos zonas: la zona baja, que alcanzará una altura de unos treinta centímetros (30 cm) por encima de la generatriz superior del tubo y la zona alta que corresponde al resto del relleno de la zanja. En la zona baja el relleno será de material no plástico, preferentemente granular, y sin materia orgánica. El tamaño máximo admisible de las partículas será de cinco centímetros (5 cm), y se dispondrán en capas de quince a veinte centímetros (15 a 20 cm) de espesor, compactadas mecánicamente hasta alcanzar un grado de compactación no menor del 95 por 100 (95 %) del Próctor modificado según UNE 103501. En la zona alta de la zanja el relleno se realizará con un material que no produzca daños en la tubería. El tamaño máximo admisible de las partículas será de diez centímetros (10 cm) y se colocará en tongadas pseudoparalelas a la explanada, hasta alcanzar un grado de compactación no menor del 100 por 100 (100 %) del Próctor modificado, según UNE

103501. En el caso de zanjas excavadas en terraplenes o en rellenos todo-uno la densidad obtenida después de compactar el relleno de la zanja habrá de ser igual o mayor que la de los materiales contiguos. En el caso de zanjas sobre terrenos naturales o sobre pedraplenes, este objetivo habrá de alcanzarse si es posible. En caso contrario, se estará a lo indicado por el Proyecto o, en su defecto, por el Director de las Obras, pero en ningún caso, por debajo de los valores mínimos de densidad indicados en los párrafos anteriores de este Pliego. Se prestará especial cuidado durante la compactación de los rellenos, de modo que no se produzcan ni movimientos ni daños en la tubería, a cuyo efecto se reducirá, si fuese necesario, el espesor de las tongadas y la potencia de la maquinaria de compactación. Cuando existan dificultades en la obtención de los materiales indicados o de los niveles de compactación exigidos para la realización de los rellenos, el Contratista podrá proponer al Director de las Obras, una solución alternativa sin sobrecoste adicional.

332.6 Limitaciones de la ejecución

Los rellenos localizados se ejecutarán cuando la temperatura ambiente, a la sombra, sea superior a dos grados Celsius (2ºC); debiendo suspenderse los trabajos cuando la temperatura descienda por debajo de dicho límite. Sobre las capas en ejecución debe prohibirse la acción de todo tipo de tráfico hasta que se haya completado su compactación.

332.7 Medición y abono

Los rellenos localizados se abonarán por metros cúbicos (m^3) medidos sobre los planos de perfiles transversales. El precio incluye la obtención del suelo, cualquiera que sea la distancia del lugar de procedencia, carga y descarga, transporte, colocación, compactación y cuantos medios, materiales y operaciones intervienen en la completa y correcta ejecución del relleno, no siendo, por lo tanto, de abono como suelo procedente de préstamos, salvo especificación en contra. El precio será único, cualquiera que sea la zona del relleno y el material empleado.

Artículo 340 – Termino y refino de la explanada

340.1 Definición

Consiste en el conjunto de operaciones necesarias para conseguir el acabado geométrico de la explanada.

340.2 Ejecución de las obras

Las obras de terminación y refino de la explanada, se ejecutarán con posterioridad a la explanación y construcción de drenes y obras de fábrica que impidan o dificulten su realización. La terminación y refino de la explanada se realizará inmediatamente antes de iniciar la construcción del firme, pavimentación u otras obras de superestructura. Cuando haya de procederse a un recrecido de espesor inferior a un medio (1/2) de la tongada compactada, se procederá previamente a un escarificado de todo el espesor de la misma, con objeto de asegurar la trabazón entre el recrecido y su asiento. La capa de coronación de la explanada tendrá como mínimo el espesor indicado en el Proyecto, no siendo admisible en ningún punto de la misma, espesores inferiores. No se extenderá ninguna capa del firme sobre la explanada sin que se comprueben las condiciones de calidad y características geométricas de ésta. Una vez terminada la explanada, deberá conservarse con sus características y condiciones hasta la colocación de la primera capa de firme o hasta la recepción de las obras cuando no se dispongan otras capas sobre ella. Las cunetas deberán estar en todo momento limpias y en perfecto estado de funcionamiento. Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

340.3 Tolerancias de acabado

En la explanada se dispondrán estacas de refino a lo largo del eje y en ambos bordes de la misma, con una distancia entre perfiles transversales no superior a veinte metros (20 m), y niveladas con precisión milimétrica con arreglo a los planos. Entre estacas, los puntos de la superficie de explanación no estarán, en ningún punto más de tres centímetros (3 cm) por encima ni por debajo de la superficie teórica definida por las estacas. La superficie acabada no deberá variar en más de quince milímetros (15 mm), cuando se compruebe con la regla de tres metros (3 m), estática según NLT 334 aplicada tanto paralela como normalmente al eje de la carretera. Tampoco podrá haber zonas capaces de retener agua. Las irregularidades que excedan de las tolerancias antedichas serán corregidas por el Contratista a su cargo, de acuerdo con lo que señala este Pliego.

340.4 - Medición y abono

La terminación y refino de la explanada se considerará incluida dentro de las unidades de excavación, terraplén, relleno todo-uno o pedraplén, según sea el caso.

Artículo 341 – Refino de taludes

341.1 Definición

Consiste en las operaciones necesarias para conseguir el acabado geométrico de los taludes de terraplenes y capa de coronación de rellenos todo-uno y pedraplenes, así como de los taludes de desmonte no incluidos en el artículo 322, "Excavación especial de taludes en roca", de este Pliego.

341.2 Ejecución de las obras

Las obras de refino de taludes se ejecutarán con posterioridad a la construcción de drenes y obras de fábrica que impidan o dificulten su realización. Asimismo, en general y cuando así sea posible, se ejecutarán con posterioridad a la explanación. Cuando la explanación se halle muy avanzada y el Director de las Obras lo ordene, se procederá a la eliminación de la superficie de los taludes de cualquier material blando, inadecuado o inestable, que no se pueda compactar debidamente o no sirva a los fines previstos. Los huecos resultantes se rellenarán con materiales adecuados, de acuerdo con las indicaciones del Director de las Obras. En caso de producirse un deslizamiento o proceso de inestabilidad en el talud de un relleno, deberá retirarse y sustituirse el material afectado por el mismo, y reparar el daño producido en la obra. La superficie de contacto entre el material sustituido y el remanente en el talud, deberá perfilarse de manera que impida el desarrollo de inestabilidades a favor de la misma. Posteriormente deberá perfilarse la superficie del talud de acuerdo con los criterios definidos en este artículo. Los taludes de la explanación deberán quedar, en toda su extensión, conformados de acuerdo con el Proyecto y las órdenes complementarias del Director de las Obras, debiendo mantenerse en perfecto estado hasta la recepción de las obras, tanto en lo que se refiere a los aspectos funcionales como a los estéticos. Los perfilados de taludes que se efectúen para armonizar con el paisaje circundante deben hacerse con una transición gradual, cuidando especialmente las transiciones entre taludes de distinta inclinación. En las intersecciones entre desmonte y relleno, los taludes se alabearán para unirse entre sí y con la superficie natural del terreno, sin originar una discontinuidad visible. Los fondos y cimas de los taludes, excepto en desmontes en roca dura, se redondearán, ajustándose al Proyecto e instrucciones del Director de las Obras. Las monteras de tierra sobre masas de roca se redondearán por encima de éstas. El refino de taludes de rellenos en cuyo borde de coronación se haya permitido embeber material de tamaño grueso, deberá realizarse sin descalzarlo permitiendo así que el drenaje superficial se encargue de seguir fijando dicho material grueso. El acabado de los taludes será suave, uniforme y totalmente acorde con la superficie del terreno y la carretera, sin grandes contrastes, y ajustándose al Proyecto, procurando evitar daños a árboles existentes o rocas que tengan pátina, para lo cual deberán hacerse los ajustes necesarios. Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

341.3 Medición y abono

Se considerará incluida dentro de las unidades de excavación, relleno tipo terraplén, todo-uno o pedraplén, según sea el caso.

PARTE 4ª – DRENAJE

CAPÍTULO II – TUBOS, ARQUETAS Y SUMIDEROS

Artículo 410 – Arquetas y pozos de registro

410.1 Definiciones

Arqueta es un recipiente prismático para la recogida de agua de las cunetas o de las tuberías de drenaje y posterior entrega a un desagüe. El material constituyente podrá ser hormigón, materiales cerámicos, piezas prefabricadas o cualquier otro previsto en el Proyecto o aprobado por el Director de las Obras. Normalmente estará cubierta por una tapa o rejilla. Pozo de registro es una arqueta visitable de más de metro y medio (1,5 m) de profundidad.

410.2 Forma y dimensiones

La forma y dimensiones de las arquetas y de los pozos de registro, así como los materiales a utilizar, serán los definidos en el Proyecto. Las dimensiones mínimas interiores serán de ochenta centímetros por cuarenta centímetros (80 cm x 40 cm) para profundidades menores a un metro y medio (1,5 m). Para profundidades superiores, estos elementos serán visitables, con dimensión mínima interior de un metro (1 m) y dimensión mínima de tapa o rejilla de sesenta centímetros (60 cm). Las tapas o rejillas ajustarán al cuerpo de la obra, y se colocarán de forma que su cara exterior quede al mismo nivel que las superficies adyacentes. Se diseñarán para que puedan soportar el paso del tráfico y se tomarán precauciones para evitar su robo o desplazamiento. Tanto las arquetas como los pozos de registro deberán ser fácilmente limpiables, proscribiéndose las arquetas no registrables. El fondo deberá adaptarse a las necesidades hidráulicas y, en su caso, de visitabilidad. Se deberá asegurar la continuidad, de la corriente de agua. Se dispondrán areneros donde sea necesario, y en caso de no existir, se deberá asegurar que las aguas arrastren los sedimentos.

410.3 Materiales

Con carácter general todos los materiales utilizados en la construcción de las arquetas y de los pozos de registro cumplirán con lo especificado en las instrucciones y normas vigentes que les afecten, así como en los artículos correspondientes de este Pliego. En todo caso, se estará, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción. Lo dispuesto en este artículo se entenderá sin perjuicio de lo establecido en el Real Decreto 1630/92 (modificado por el R.D. 1328/95), por el que se dictan disposiciones para la libre circulación de productos de construcción, en aplicación de la Directiva 89/106 CEE. En particular, en lo referente a los procedimientos especiales de reconocimiento, se estará a lo establecido en el artículo 9 del mencionado Real Decreto. Habrán de cumplirse además las siguientes prescripciones específicas:

- Hormigón:
    - Instrucción de Hormigón Estructural (EHE).
    - Instrucción para la Recepción de Cementos.
    - Artículos 610 "Hormigones" y 630: "Obras de hormigón en masa o armado" del PG3.
    - Los hormigones de limpieza y relleno deberán tener una resistencia característica mínima a compresión de doce megapascales y medio (12,5 MPa) a veintiocho días (28 d)
- Fábrica de ladrillo:
    - Artículo 657, "Fábricas de ladrillo" del PG3.
    - Pliego General de Condiciones para la Recepción de ladrillos cerámicos en las obras de construcción.
    - Los ladrillos a emplear serán macizos.
- Bloques de hormigón:
    - Pliego de Prescripciones Técnicas Generales para la Recepción de bloques de hormigón en las obras de construcción.
- Piezas prefabricadas de hormigón:
    - Instrucción de Hormigón Estructural (EHE).
    - Resistencia característica mínima a compresión: veinticinco megapascales (25 MPa), a veintiocho días (28 d).
    - El transporte, descarga y almacenamiento se realizarán cuidadosamente, siendo rechazadas aquellas piezas que presenten defectos.
- Fundición para tapas y cercos:
    - UNE EN 1561 y UNE EN 1563.

410.4 Ejecución

Las tolerancias en las dimensiones del cuerpo de las arquetas y pozos de registro no serán superiores a diez milímetros (10 mm) respecto de lo especificado en los planos de Proyecto. Las conexiones de tubos y cunetas se efectuarán a las cotas indicadas en los planos de Proyecto, de forma que los extremos de los conductos queden enrasados con las caras interiores de los muros. La parte superior de la obra se dispondrá de tal manera que se eviten los derrames del terreno circundante sobre ella o a su interior. Las tapas o rejillas ajustarán al cuerpo de la obra, y se colocarán de forma que su cara exterior quede al mismo nivel que las superficies adyacentes. Se diseñarán para que puedan soportar el paso del tráfico y se tomarán precauciones para evitar su robo o desplazamiento. En el caso que el Proyecto lo considere necesario se realizará una prueba de estanqueidad. El relleno del trasdós de la fábrica se ejecutará, en general, con material procedente de la excavación, de acuerdo con el artículo 332, "Rellenos localizados" de este Pliego, o con hormigón, según se indique en el Proyecto. Se estará, en todo caso, a lo dispuesto en la legislación vigente en materia medioambiental, de seguridad y salud, y de almacenamiento y transporte de productos de construcción.

410.5 Medición y abono

Las arquetas y los pozos de registro se abonarán por unidades realmente ejecutadas. El precio incluirá la unidad de obra completa y terminada incluyendo excavación, relleno del trasdós, elementos complementarios (tapa, cerco, pates, etc.).

Artículo 413 – Tubos de PVC

413.1 Definición

Esta unidad de obra consiste en el suministro, ejecución y tendido de las tuberías de PVC con junta elástica, incluso juntas y pequeño material, con todos los elementos necesarios para el completo acabado de la unidad.

413.2 Materiales

La calidad de los materiales a utilizar en la fabricación de estos tubos de PVC, así como de sus accesorios y juntas, se indican explícitamente en las Normas UNE 53114, 53144 y 53332.

413.3 Control materiales de tubos

El material básico para la fabricación de los tubos de P.V.C. será resina de policloruro de vinilo, técnicamente pura, es decir, con menos del 1% de sustancias extrañas. Al material básico no se le podrá añadir ninguna sustancia plastificante. Se podrá incluir otros ingredientes o aditivos en una proporción tal que, en su conjunto, no supere el cuatro por ciento (4%) del material que constituye la pared del tubo acabado. Estos ingredientes o aditivos pueden ser lubrificantes, estabilizadores, modificadores de las propiedades finales del producto y colorantes. El fabricante de los tubos establecerá las condiciones técnicas de la resina de policloruro de vinilo, de forma que pueda garantizar el cumplimiento de las características a corto plazo y a largo plazo (50 años) que se exigen en este pliego. En especial tendrá en cuenta las siguientes características de la resina:

- Peso específico aparente.
- Granulometría.
- Porosidad el grano.
- Índice de viscosidad.
- Colabilidad.
- Color.
- Contenido máximo de monómero libre.
- Humedad.

Estas características se determinarán de acuerdo con las normas UNE correspondientes o, en su defecto, con las normas ISO. El material que forma la pared del tubo tendrá las características que a continuación se expresan, con la indicación del método de ensayo para su determinación, en el siguiente cuadro:

TUBOS DE PVC – CARACTERÍSTICAS DEL MATERIAL DE TUBO A CORTO PLAZO			
Características	Valores	Método de ensayo	Observaciones
Densidad	1,35-1,46 kg/dm3	UNE 53020	De la pared del tubo
Coef. De dilatación térmica	60-80·10^{-6} ºC	UNE 53126	En la probeta obtenida del tubo
Temperatura de reblandecimiento VICAT mínima	79 ºC	UNE 53118	Bajo peso de 5 kg
Módulo de elasticidad lineal a 20ºC	2.800 MPa	Del diagrama tensión deformación del ensayo a tracción.	Módulo tangente inicial

Resistencia a tracción simple	50 MPa	UNE 53112	Se tomará el menor de las 5 probetas
Alargamiento en la rotura a tracción	80%	UNE 53112	Se tomará el menor de las 5 probetas
Absorción de agua máx.	40 g/cm2	UNE 53112	En prueba a presión hidráulica interior
Opacidad máx.	0,2%	UNE 53039	

Resistencia a corto plazo: Se tomará una muestra de (200 ± 5) milímetros de largo, y se colocará entre dos placas paralelas sometidas a una carga de 3 x D Kilopondios (siendo D, el diámetro exterior en centímetros), durante diez minutos (10 min.) a una temperatura de (23 ± 2) grados centígrados. La máxima deformación admisible será del veinte por ciento (20%) respecto del diámetro primitivo. Este ensayo se realizará con dos muestras.

Resistencia a largo plazo: Se tomará una muestra de (200 ± 5) milímetros de largo y se colocará entre dos placas paralelas sometidas a una carga de doce kilopondios (12 Kp) durante un mínimo de siete días (7), a una temperatura de (23 ± 2) grados centígrados. La relación entre el movimiento vertical de la placa y el diámetro interior del tubo, expresado en centímetros, será como máximo de 4 décimas (0,4).

Resistencia al impacto: Realizado el ensayo de impacto, según la norma DIN 1.187, se admitirá el fallo o rotura de como máximo una muestra entre veinte (20). Si más de una muestra se rompiese, el ensayo se realizará sobre otras cuarenta muestras de forma que sobre el total de sesenta muestras se admitirá un máximo de siete (7) fallos.

Resistencia a la tracción: La resistencia a la tracción se ensayará con probetas de (700 ± 2) milímetros de longitud, a una temperatura de (23 ± 2) grados centígrados. La probeta se fijará por ambos lados en unos casquillos cónicos de cien milímetros (100 mm.) de longitud, colgándose el tubo y soportando el peso de veinticinco kilopondios (25 Kp), que actúan sobre la placa de impacto que se cuelga del extremo inferior. No se admitirán más del cinco por ciento (5%) de roturas. El fabricante especificará y garantizará los valores de las características geométricas, incluidas las mecánicas, que se fijan en los apartados anteriores.

413.4 Recepción y almacenamiento en obra de los tubos y accesorios

Cada partida o entrega del material irá acompañada de una hoja de ruta que especifique la naturaleza, número, tipo y referencia de las piezas que la componen. Deberá hacerse con el ritmo y plazos señalados por la Dirección de las Obras. Las piezas que hayan sufrido averías durante el transporte, o que presenten defectos no apreciados en la recepción de fábrica, serán rechazadas. La Dirección de las Obras, si lo estima necesario, podrá ordenar en cualquier momento la repetición de pruebas sobre las piezas ya ensayadas en fábrica. El Contratista, avisado previamente por escrito, facilitará los medios necesarios para realizar estas pruebas, de las que se levantará acta, y los resultados obtenidos en ellas prevalecerán sobre los de las primeras. Si los resultados de estas últimas pruebas fueran favorables, los gastos serán a cargo de la Propiedad; en caso contrario, corresponderán al Contratista que deberá además reemplazar los tubos, piezas, etc., previamente marcados como defectuosos procediendo a su retirada y sustitución en los plazos señalados por la Dirección de Obra. De no realizarlo el Contratista, lo hará la Propiedad a costa de aquél. Deberá tenerse en cuenta que la resistencia al impacto de los tubos de PVC disminuye de forma acusada a temperaturas inferiores a cero grados centígrados. No obstante pueden ser manejadas y acopiadas satisfactoriamente sí las operaciones se realizan con cuidado.

413.5 Aceptación o rechazo de los tubos

Clasificado el material por lotes de 200 unidades o fracción, las pruebas se efectuarán sobre muestras tomadas de cada lote, de forma que los resultados que se obtengan se asignarán al total del lote. Los tubos que no satisfagan las condiciones generales fijadas en este pliego, así como las pruebas fijadas para cada tipo de tubo y las dimensiones y tolerancias definidas en este pliego, serán rechazados. Cuando una muestra no satisfaga una prueba, se repetirá esta misma sobre dos muestras más del lote ensayado. Si también falla una de estas pruebas, se rechazará el lote ensayado, aceptándose si el resultado de ambas es bueno. La aceptación de un lote no excluye la obligación del Contratista de efectuar los ensayos de tubería instalada y el poner a su costa los tubos o piezas que pueden sufrir deterioro o rotura durante el montaje o las pruebas en la tubería instalada.

413.6 Medición y abono

Esta unidad de obra incluye los siguientes conceptos: La tubería y su puesta en obra, incluyendo juntas y pequeño material, Las juntas y los materiales que las componen, Las pruebas, Los anclajes de la tubería, Las piezas especiales, Cualquier trabajo, maquinaria, material o elemento auxiliar necesario para la correcta y rápida ejecución de esta unidad de obra. Esta unidad se medirá por metros (m) realmente colocados, realizados de forma que cumplan todas las prescripciones del presente Pliego, según los ejes de las tuberías.

PARTE 6ª – ESTRUCTURAS

CAPÍTULO I – COMPONENTES

Artículo 600 – Armaduras a emplear en hormigón armado

600.1 Definición

Se definen como armaduras a emplear en hormigón armado al conjunto de barras de acero que se colocan en el interior de la masa de hormigón para ayudar a éste a resistir los esfuerzos a que está sometido.

600.2 Materiales

Ver Artículo 240, "Barras corrugadas para hormigón armado".

600.3 Forma y dimensiones

La forma y dimensiones de las armaduras serán las señaladas en los Planos. No se aceptarán las barras que presenten grietas, sopladuras o mermas de sección superiores al cinco por Ciento (5 %).

600.4 Doblado

Salvo indicación en contrario, los radios interiores de doblado de las armaduras no serán inferiores, a 7Ø. Los cercos o estribos podrán doblarse con radios menores a los indicados con tal de que ello no origine en dichas zonas de las barras un principio de fisuración. El doblado se realizará, en general, en frío y a velocidad moderada, no admitiéndose ninguna excepción en el caso de aceros endurecidos por deformación en frío o sometidos a tratamientos térmicos especiales. Como norma general, deberá evitarse el doblado de barras a temperaturas inferiores a cinco grados centígrados (5º C). En el caso del acero tipo AE22L, se admitirá el doblado en caliente, cuidando de no alcanzar la temperatura correspondiente al rojo cereza oscuro, aproximadamente ochocientos grados centígrados (800º C), y dejando luego enfriar lentamente las barras calentadas.

600.5 Colocación

Las armaduras se colocarán limpias, exentas de toda suciedad y óxido no adherente. Se dispondrán de acuerdo con las indicaciones de los Planos y Pliego de Prescripciones Técnicas Particulares y se fijarán entre sí mediante las oportunas sujeciones, manteniéndose mediante piezas adecuadas la distancia al encofrado, de modo que quede impedido todo movimiento de las armaduras durante el vertido y compactación del hormigón, y permitiendo a éste envolverlas sin dejar coqueras. Estas precauciones deberán extremarse con los cercos de los soportes y armaduras del trasdós de placas, losas o voladizos, para evitar su descenso. La distancia horizontal libre entre dos barras consecutivas, salvo que estén en contacto, será igual o superior al mayor de los tres valores siguientes:

- Un centímetro (1 cm).
- El diámetro de la mayor.
- Los seis quintos (6/5) del tamaño tal que el ochenta y cinco por ciento (85 %) del árido total sea inferior a ese tamaño.

La distancia vertical entre dos barras consecutivas, salvo que estén en contacto, será igual o superior al mayor de los dos valores siguientes:

- Un centímetro (1 cm).
- Setenta y cinco centésimas (0,75) del diámetro de la mayor.

En forjadas, vigas y elementos similares, se podrán colocar dos barras de la armadura principal en contacto, una sobre otra, siempre que sean corrugadas. En soportes y otros elementos verticales, se podrán colocar dos o tres barras de la armadura principal en contacto, siempre que sean corrugadas. La distancia libre entre cualquier punto de la superficie de una barra de armadura y el paramento más próximo de la pieza, será igual o superior al diámetro de dicha barra. En las estructuras no expuestas a ambientes agresivos dicha distancia será además igual o superior a:

- Un centímetro (1 cm), si los paramentos de la pieza van a ir protegidos.
- Dos centímetros (2 cm), si los paramentos de la pieza van a estar expuestos a la intemperie, a condensaciones o en contacto permanente con el agua.
- Dos centímetros (2 cm) en las partes curvas de las barras.

Los empalmes y solapes deberán venir expresamente indicados en los Planos, o en caso contrario se dispondrán de acuerdo con las órdenes del Director de las Obras. Antes de comenzar las operaciones de hormigonado, el Contratista deberá obtener del Director la aprobación por escrito de las armaduras colocadas.

600.6 Control de calidad

El control de calidad se realizará de acuerdo con lo prescrito en la instrucción EH-73. Los niveles de control de calidad, de acuerdo con lo previsto en la citada Instrucción, serán los indicados en el Pliego de Prescripciones Técnicas Particulares y en la zona inferior derecha de cada Plano.

600.7 Medición y abono

Las armaduras de acero empleadas en hormigón armado se abonarán por su peso en kilogramos (kg) deducido de los Planos, aplicando para cada tipo de acero los pesos unitarios correspondientes a las longitudes deducidas de dichos Planos. El abono de las mermas y despuntes se considerará incluido en el del kilogramo (kg) de armadura.

Artículo 610 – Hormigones

610.1 Definición

Se define como hormigón la mezcla en proporciones adecuadas de cemento, árido grueso, árido fino y agua, con o sin la incorporación de aditivos o adiciones, que desarrolla sus propiedades por endurecimiento de la pasta de cemento (cemento y agua). Los hormigones que aquí se definen cumplirán las especificaciones indicadas en la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya, así como las especificaciones adicionales contenidas en este artículo. A efectos de aplicación de este artículo, se contemplan todo tipo de hormigones.

610.2 Materiales

Lo dispuesto en este artículo se entenderá sin perjuicio de lo establecido en el Real Decreto 1630/92 (modificado por el Real Decreto 1328/95), por el que se dictan disposiciones para la libre circulación, en aplicación de la Directiva 89/166 CE. En particular, en lo referente a los procedimientos especiales de reconocimiento, se estará a lo establecido en el artículo 9 del mencionado Real Decreto. Los materiales componentes del hormigón cumplirán las prescripciones recogidas en el Artículo 202, Cementos. Los áridos, cuya definición será la que figura en el artículo 28 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya, cumplirán todas las especificaciones recogidas en la citada Instrucción. El Director de las Obras, fijará la frecuencia y el tamaño de los lotes para la realización de los ensayos previstos en el apartado 81.3.2 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya, para los casos en que varíen las condiciones de suministro, y si no se dispone de un certificado de idoneidad de los mismos emitido, con una antigüedad inferior a un año, por un laboratorio oficial u oficialmente acreditado. No se podrán utilizar áridos que no hayan sido aprobados previa y expresamente por el Director de las Obras. El Contratista adjudicatario de las obras será responsable de la calidad de los materiales utilizados y del cumplimiento de todas las especificaciones establecidas para los mismos en este artículo.

610.3 Tipos de hormigón y distintivos de la calidad

Los hormigones no fabricados en central sólo se podrán utilizar cuando así lo autorice el Director de las Obras, estando en cualquier caso limitada su utilización a hormigones de limpieza o unidades de obra no estructurales.

610.4 Dosificación del hormigón

La composición de la mezcla deberá estudiarse previamente, con el fin de asegurar que el hormigón resultante tendrá las características mecánicas y de durabilidad necesarias para satisfacer las exigencias del proyecto. Estos estudios se realizarán teniendo en cuenta, en todo lo posible, las condiciones de construcción previstas (diámetros, características superficiales y distribución de armaduras, modo de compactación, dimensiones de las piezas, etc). Se prestará especial atención al cumplimiento de la estrategia de durabilidad establecida en el capítulo VII de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya.

610.5 Estudio de la mezcla y obtención de la fórmula de trabajo

La puesta en obra del hormigón no deberá iniciarse hasta que el Director de las Obras haya aprobado la fórmula de trabajo a la vista de los resultados obtenidos en los ensayos previos y característicos. La fórmula de trabajo constará al menos:

- Tipificación del hormigón.
- Granulometría de cada fracción de árido y de la mezcla.
- Proporción por metro cúbico de hormigón fresco de cada árido (Kg/m3).
- Proporción por metro cúbico de hormigón fresco de agua.
- Dosificación de adiciones.
- Dosificación de aditivos.
- Tipo y clase de cemento.
- Consistencia de la mezcla.
- Proceso de mezclado y amasado.

Los ensayos deberán repetirse siempre que se produzca alguna de las siguientes circunstancias:

- Cambio de procedencia de alguno de los materiales componentes.
- Cambio en la proporción de cualquiera de los elementos de la mezcla.
- Cambio en el tipo o clase de cemento utilizado.
- Cambio en el tamaño máximo del árido.
- Variación en más de dos décimas (0,2) del módulo granulométrico del árido fino.
- Variación del procedimiento de puesta en obra.

Excepto en los casos en que la consistencia se consiga mediante la adición de fluidificantes o superfluidificantes, no se utilizarán hormigones de consistencia fluida salvo justificación especial. Salvo que el Pliego de Prescripciones Técnicas Particulares indique otro procedimiento, la consistencia se determinará con cono de Abrams según la norma UNE 83 313. Los valores límite de los asientos correspondientes en el cono de Abrams y sus tolerancias serán los indicados en el apartado 30.6 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya.

610.6 Ejecución

610.6.1 Fabricación y transporte del hormigón

La fabricación y transporte del hormigón se realizará de acuerdo con las indicaciones del artículo 69 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya. En el caso de hormigonado en tiempo caluroso, se pondrá especial cuidado en que no se produzca desecación de las amasadas durante el transporte. A tal efecto, si éste dura más de treinta minutos (30 min) se adoptarán las medidas oportunas, tales como reducir el soleamiento de los elementos de transporte (pintándolos de blanco, etc.) o amasar con agua fría, para conseguir una consistencia adecuada en obra.

610.6.2 Entrega del hormigón

La entrega del hormigón deberá regularse de manera que su puesta en obra se efectúe de manera continua. El tiempo transcurrido entre entregas no podrá rebasar, en ningún caso, los treinta minutos (30 min), cuando el hormigón pertenezca a un mismo elemento estructural o fase de un elemento estructural. Se cumplirán las prescripciones indicadas en el apartado 69.2.9 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya.

610.6.3 Vertido del hormigón

Se cumplirán las prescripciones del artículo 70 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya. El Director de las Obras podrá modificar el tiempo de puesta en obra del hormigón fijado por la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya, si se emplean productos retardadores de fraguado; pudiendo aumentarlo además cuando se adopten las medidas necesarias para impedir la evaporación del agua, o cuando concurran condiciones favorables de humedad y temperatura. El Director de las Obras dará la autorización para comenzar el hormigonado, una vez verificado que las armaduras están correctamente colocadas en su posición definitiva. Asimismo, los medios de puesta en obra del hormigón propuestos por el Contratista deberán ser aprobados por el Director de las Obras antes de su utilización. No se permitirá el vertido libre del hormigón desde alturas superiores a dos metros (2 m) quedando prohibido verterlo con palas a gran distancia, distribuirlo con rastrillos, o hacerlo avanzar más de un metro (1 m) dentro de los encofrados. Se procurará siempre que la distribución del hormigón se realice en vertical, evitando proyectar el chorro de vertido sobre armaduras o encofrados. Al verter el hormigón, se vibrará para que las armaduras queden perfectamente envueltas, cuidando especialmente las zonas en que exista gran cantidad de ellas, y manteniendo siempre los recubrimientos y separaciones de las armaduras especificados en los planos. Cuando se coloque en obra hormigón proyectado mediante métodos neumáticos, se tendrá la precaución de que el extremo de la manguera no esté situado a más de tres metros (3 m) del punto de aplicación, que el volumen del hormigón lanzado en cada descarga sea superior a un quinto de metro cúbico (0,2 m3), que se elimine todo rebote excesivo del material y que el chorro no se dirija directamente sobre las armaduras. En el caso de hormigón pretensado, no se verterá el hormigón directamente sobre las vainas para evitar su posible desplazamiento. Si se trata de hormigonar una dovela sobre un carro de avance o un tramo continuo sobre una cimbra autoportante, se seguirá un proceso de vertido tal que se inicie el hormigonado por el extremo más alejado del elemento previamente hormigonado, y de este modo se hayan producido la mayor parte de las deformaciones del carro o autocimbra en el momento en que se hormigone la junta. En losas, el extendido del hormigón se ejecutará por tongadas, dependiendo del espesor de la losa, de forma que el avance se realice en todo el frente del hormigonado. En vigas, el hormigonado se efectuará avanzando desde los extremos, llenándolas en toda su altura, y procurando que el frente vaya recogido para que no se produzcan segregaciones ni la lechada escurra a lo largo del encofrado. Cuando esté previsto ejecutar de un modo continuo las pilas y los elementos horizontales apoyados en ellas, se dejarán transcurrir por lo menos dos horas (2 h) antes de proceder a construir dichos elementos horizontales, a fin de que el hormigón de los elementos verticales haya asentado definitivamente. En el hormigón ciclópeo se cuidará que éste envuelva los mampuestos, quedando entre ellos separaciones superiores a tres (3) veces el tamaño máximo del árido empleado, sin contar los mampuestos.

610.6.4 Compactación del hormigón

La compactación del hormigón se realizará de acuerdo con las indicaciones del apartado 70.2 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya. El Director de las Obras aprobará, a propuesta del Contratista, el espesor de las tongadas de hormigón, así como la secuencia, distancia y forma de introducción y retirada de los vibradores. Los vibradores se aplicarán siempre de modo que su efecto se extienda a toda la masa, sin que se produzcan segregaciones locales ni fugas importantes de lechada por las juntas de los encofrados. La compactación será más cuidadosa e intensa junto a los paramentos y rincones del encofrado y en las zonas de fuerte densidad de armaduras, hasta conseguir que la pasta refluya a la superficie. Si se emplean vibradores de superficie, se aplicarán moviéndolos lentamente, de modo que la superficie del hormigón quede totalmente humedecida. Si se emplean vibradores sujetos a los encofrados, se cuidará especialmente la rigidez de los encofrados y los dispositivos de anclaje a ellos de los vibradores. Si se emplean vibradores internos, deberán sumergirse verticalmente en la tongada, de forma que su punta penetre en la tongada adyacente ya vibrada, y se retirarán de forma inclinada. La aguja se introducirá y retirará lentamente y a velocidad constante, recomendándose a este efecto que no se superen los diez centímetros por segundo (10 cm/s). La distancia entre puntos de inmersión será la adecuada para dar a toda la superficie de la masa vibrada un aspecto brillante; como norma general será preferible vibrar en muchos puntos por poco tiempo a vibrar en pocos puntos prolongadamente. Cuando se empleen vibradores de inmersión deberá darse la última pasada de forma que la aguja no toque las armaduras. Antes de comenzar el hormigonado, se comprobará que existe un número de vibradores suficiente para que, en caso de que se averíe alguno de ellos, pueda continuarse el hormigonado hasta la próxima junta prevista. En el caso del hormigón pretensado la compactación se efectuará siempre mediante vibrado. Se pondrá el máximo cuidado en que los vibradores no toquen las vainas para evitar su desplazamiento o su rotura y consiguiente obstrucción. Durante el vertido y compactado del hormigón alrededor de los anclajes, deberá cuidarse de que la compactación sea eficaz, para que no se formen huecos ni coqueras y todos los elementos del anclaje queden bien recubiertos y protegidos.

610.6.5 Hormigonado en condiciones especiales

610.6.5.1 Hormigonado en tiempo frío

Se cumplirán las prescripciones del artículo 72 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya. El hormigonado se suspenderá, como norma general, siempre que se prevea que, dentro de las cuarenta y ocho horas (48 h) siguientes, la temperatura ambiente puede descender por debajo de los cero grados Celsius (0 °C). A estos efectos, el hecho de que la temperatura registrada a las nueve horas (9 h) de la mañana, hora solar, sea inferior a cuatro grados Celsius (4 °C), puede interpretarse como motivo suficiente para prever que el límite prescrito será alcanzado en el citado plazo. Las temperaturas podrán rebajarse en tres grados Celsius (3 °C) cuando se trate de elementos de gran masa; o cuando se proteja eficazmente la superficie del hormigón mediante sacos, paja u otros recubrimientos aislantes del frío, con espesor tal que pueda asegurarse que la acción de la helada no afectará al hormigón recién ejecutado; y de forma que la temperatura de su superficie no baje de un grado Celsius bajo cero (-1°C), la de la masa dé hormigón no baje de cinco grados Celsius (+5 °C), y no se vierta el hormigón sobre elementos (armaduras, moldes, etc.) cuya temperatura sea inferior a cero grados Celsius (0 °C). Las prescripciones anteriores serán aplicables en el caso en que se emplee cemento portland. Si se utiliza cemento de horno alto o puzolánico, las temperaturas mencionadas deberán aumentarse en cinco grados Celsius (5 °C); y, además, la temperatura de la superficie del hormigón no deberá bajar de cinco grados Celsius (5 °C). La utilización de aditivos anticongelantes requerirá autorización expresa del Director de las Obras. Nunca podrán utilizarse productos susceptibles de atacar a las armaduras, en especial los que contengan iones cloruro. En los casos en que por absoluta necesidad, y previa autorización del Director de las Obras, se hormigone en tiempo frío con riesgo de heladas, se adoptarán las medidas necesarias para que el fraguado de las masas se realice sin dificultad. En el caso de que se caliente el agua de amasado o los áridos, éstos deberán mezclarse previamente, de manera que la temperatura de la mezcla no sobrepase los cuarenta grados Celsius (40 °C), añadiéndose con posterioridad el cemento en la amasadora. El tiempo de amasado deberá prolongarse hasta conseguir una buena homogeneidad de la masa, sin formación de grumos. Si no puede garantizarse la eficacia de las medidas adoptadas para evitar que la helada afecte el hormigón, se realizarán los ensayos necesarios para comprobar las resistencias alcanzadas adoptándose, en su caso, las medidas que prescriba el Director de las Obras.

610.6.5.2 Hormigonado en tiempo caluroso

Se cumplirán las prescripciones del artículo 73 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya.Los sistemas propuestos por el Contratista para reducir la temperatura de la masa de hormigón deberán ser aprobados el Director de las Obras previamente a su utilización.

610.6.5.3 Hormigonado en tiempo lluvioso

Si se prevé la posibilidad de lluvia, el Contratista dispondrá, toldos u otros medios que protejan al hormigón fresco. Como norma general, el hormigonado se suspenderá en caso de lluvia, adoptándose las medidas necesarias para impedir la entrada del agua a las masas de hormigón fresco. El Director de las Obras aprobará, en su caso, las medidas a adoptar en caso de tiempo lluvioso. Asimismo, ordenará la suspensión del hormigonado cuando estime que no existe garantía de que el proceso se realice correctamente.

610.6.6 Juntas

Las juntas podrán ser de hormigonado, contracción y/o dilatación. Las de dilatación deberán venir definidas en los Planos del Proyecto. Las de contracción y hormigonado se fijarán de acuerdo con el plan de obra y las condiciones climatológicas, pero siempre con antelación al hormigonado. El Director de las Obras aprobará, previamente a su ejecución, la localización de las juntas que no aparezcan en los Planos. Se cumplirán las prescripciones del artículo 71 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya. Las juntas creadas por las interrupciones del hormigonado deberán ser perpendiculares a la dirección de los máximos esfuerzos de compresión, y deberán estar situadas donde sus efectos sean menos perjudiciales. Si son muy tendidas se vigilará especialmente la segregación de la masa durante el vibrado de las zonas próximas, y si resulta necesario, se encofrarán. Si el plano de la junta presenta una mala orientación, se demolerá la parte de hormigón que sea necesario para dar a la superficie la dirección apropiada. Cuando sean de temer los efectos debidos a la retracción, se dejarán las juntas abiertas durante algún tiempo, para que las masas contiguas puedan deformarse libremente. La apertura de tales juntas será la necesaria para que, en su día, se puedan hormigonar correctamente. Al reanudar el hormigonado, se limpiarán las juntas de toda suciedad, lechada o árido suelto y se picarán convenientemente. A continuación, y con la suficiente antelación al hormigonado, se humedecerá la superficie del hormigón endurecido, saturándolo sin encharcarlo. Seguidamente se reanudará el hormigonado, cuidando especialmente la compactación en las proximidades de la junta. En el caso de elementos de hormigón pretensado, no se dejarán más juntas que las previstas expresamente en los Planos y solamente podrá interrumpirse el hormigonado cuando por razones imprevistas sea absolutamente necesario. En ese caso, las juntas deberán hacerse perpendiculares a la resultante del trazado de las armaduras activas. No podrá reanudarse el hormigonado sin el previo examen de las juntas y autorización del Director de las Obras, que fijará las disposiciones que estime necesarias sobre el tratamiento de las mismas.

610.6.7 Curado del hormigón

Durante el fraguado y primer período de endurecimiento, se someterá al hormigón a un proceso de curado que se prolongará a lo largo del plazo que resulte de aplicar las indicaciones del artículo 74 de la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya. Durante el fraguado y primer período de endurecimiento, deberá asegurarse el mantenimiento de la humedad del hormigón, para lo cual deberá curarse mediante procedimientos que no produzcan ningún tipo de daño en superficie, cuando esta haya de quedar vista, ni suponga la aportación de sustancias perjudiciales para el hormigón. Podrán utilizarse como procedimientos de curado, el riego directo con agua (evitando que se produzca el deslavado del hormigón), la disposición de arpilleras, esterillas de paja u otros tejidos análogos de alto poder de retención de humedad, láminas de plástico y productos filmógenos de curado, de forma que la velocidad de evaporación no supere en ningún caso el medio litro por metro cuadrado y hora (0,50 l/m2/h). Cuando el hormigonado se efectúe a temperatura superior a cuarenta grados Celsius (40 °C), deberá curarse el hormigón por vía húmeda. El proceso de curado deberá prolongarse sin interrupción durante al menos diez días (10 d). Las superficies de hormigón cubiertas por encofrados de madera o de metal expuestos al soleamiento se mantendrán húmedas hasta que puedan ser desmontadas, momento en el cual se comenzará a curar el hormigón. En el caso de utilizar el calor como agente de curado para acelerar el endurecimiento, se vigilará que la temperatura no sobrepase los setenta y cinco grados Celsius (75 °C), y que la velocidad de calentamiento y enfriamiento no exceda de veinte grados Celsius por hora (20°C/h). Este ciclo deberá ser ajustado experimentalmente de acuerdo con el tipo de cemento utilizado. Cuando para el curado se utilicen productos filmógenos, las superficies del hormigón se recubrirán, por pulverización, con un producto que cumpla las condiciones estipuladas por el Director de Obra. La aplicación del producto se efectuará tan pronto como haya quedado acabada la superficie, antes del primer endurecimiento del hormigón. No se utilizará el producto de curado sobre superficies de hormigón sobre las que se vaya a adherir hormigón adicional u otro material, salvo que! se demuestre que el producto de curado no perjudica la adherencia, o a menos que se tomen medidas para eliminar el producto de las zonas de adherencia. El Director de las Obras autorizará en su caso la utilización de técnicas especiales de curado, que se aplicarán de acuerda a las normas de buena práctica de dichas técnicas. El Director de las Obras dará la autorización previa para la utilización de curado al vapor, así como el procedimiento que se vaya a seguir, de acuerdo con las prescripciones incluidas en este apartado. Si el rigor de la temperatura lo requiere, el Director de las Obras podrá exigir la colocación de protecciones suplementarias, que proporcionen el debido aislamiento térmico al hormigón y garanticen un correcto proceso de curado.

610.7 Control de calidad

No se admitirá el control a nivel reducido para los hormigones contemplados en este artículo. Se establecerá un Plan de Control de la ejecución en el que figuren los lotes en que queda dividida la obra, indicando para cada uno de ellos los distintos aspectos que serán objeto de control.

610.8 Especificaciones de la unidad terminada

610.8.1 Tolerancias

El Director de las Obras establecerá un sistema de tolerancias, así como las decisiones y sistemática a seguir en caso de incumplimientos.

610.8.2 Reparación de defectos

Los defectos que hayan podido producirse al hormigonar deberán ser comunicados al Director de las Obras, junto con el método propuesto para su reparación. Una vez aprobado éste, se procederá a efectuar la reparación en el menor tiempo posible. Las zonas reparadas deberán curarse rápidamente. Si es necesario, se protegerán con lienzos o arpilleras para que el riego no perjudique el acabado superficial de esas zonas.

610.9 Recepción

No se procederá a la recepción de la unidad de obra terminada hasta que se satisfaga el cumplimiento de las tolerancias exigidas, el resultado de los ensayos de control sea favorable y se haya efectuado, en su caso, la reparación adecuada de los defectos existentes.

610.10 Medición y abono

El hormigón se abonará por metros cúbicos (m^3) medidos sobre los Planos del proyecto, de las unidades de obra realmente ejecutadas. El cemento, áridos, agua, aditivos y adiciones, así como la fabricación y transporte y vertido del hormigón, quedan incluidos en el precio unitario del hormigón, así como su compactación, ejecución de juntas, curado y acabado. No se abonarán las operaciones que sea preciso efectuar para la reparación de defectos.

610.11 Especificaciones técnicas y distintivos de calidad

A efectos del reconocimiento de marcas, sellos o distintivos de calidad, se estará a lo dispuesto en la vigente "Instrucción de Hormigón Estructural (EHE)" o normativa que la sustituya.

Artículo 611 – Morteros de cemento

611.1 Definición

Se definen los morteros de cemento como la masa constituida por árido fino, cemento y agua. Eventualmente, puede contener algún producto de adición para mejorar alguna de sus propiedades, cuya utilización deberá haber sido previamente aprobada por el Director de las obras.

611.2 Materiales

611.2.1 Cemento

Ver Artículo 202, "Cementos".

611.2.2 Agua

Ver "Instrucción de Hormigón Estructural (EHE)" o normativa que le sustituya

611.2.3 Productos de adición

Ver "Instrucción de Hormigón Estructural (EHE)" o normativa que le sustituya

611.2.4 Árido fino

Ver apartado 610.2.3, Árido fino, del Artículo 610, "Hormigones".

611.3 Tipos y dosificaciones

Para su empleo en las distintas clases de obra, se establecen los siguientes tipos y dosificaciones de morteros de cemento portland:

- M 250 para fábricas de ladrillo y mampostería: doscientos cincuenta kilogramos de cemento P-350 por metro cúbico do mortero (250 kg/m3).
- M 450 para fábricas de ladrillo especiales y capas de asiento de piezas prefabricadas, adoquinados y bordillos: cuatrocientos cincuenta kilogramos de cemento P-350 por metro cúbico de mortero (450 kg/m3).
- M 600 para enfoscados, enlucidos, corrido de cornisas e impostas: seiscientos kilogramos de cemento P-350 por metro cúbico de mortero (600 kg/m3)
- M 700 para enfoscados exteriores: setecientos kilogramos de cemento P-350 por metro cúbico de mortero (700 kg/m3).

El Director podrá modificar la dosificación en más o en menos, cuando las circunstancias de la obra lo aconsejen.

611.4 Fabricación

La mezcla del mortero podrá realizarse a mano o mecánicamente: en el primer caso se hará sobre un piso impermeable. El cemento y la arena se mezclarán en seco hasta conseguir un producto homogéneo de color uniforme. A continuación se añadirá la cantidad de agua estrictamente necesaria para que, una vez batida la masa, tenga la consistencia adecuada para su aplicación en obra. Solamente se fabricará el mortero preciso para uso inmediato, rechazándose todo aquel que haya empezado a fraguar y el que no haya sido empleado dentro de los cuarenta y cinco minutos (45 min) que sigan a su amasadura.

611.5 Limitaciones de empleo

Si es necesario poner en contacto el mortero con otros morteros y hormigones que difieran de él en la especie del cemento, se evitará la circulación de agua entre ellos; bien mediante una capa intermedia muy compacta de mortero fabricado con cualquiera de los dos cementos, bien esperando que el mortero u hormigón primeramente fabricado esté seco, o bien impermeabilizando superficialmente el mortero más reciente. Se ejercerá especial vigilancia en el caso de hormigones con cementos siderúrgicos.

611.6 Medición y abono

El mortero no será de abono directo, ya que se considera incluido en el precio de la unidad correspondiente.

Artículo 620 – Perfiles y chapas de acero laminados en caliente, para estructuras metálicas

620.1 Definición

Se definen como perfiles y chapas de acero laminados en caliente, a los productos laminados en caliente, de espesor mayor que tres milímetros (3 mm), de sección transversal constante, distintos según ésta, empleados en las estructuras y elementos de acero estructural.

620.2 Tipos

Lo dispuesto en este artículo se entenderá sin perjuicio de lo establecido en el Real Decreto 1630/92 (modificado por el Real Decreto 1328/95), por el que se dictan disposiciones para la libre circulación, en aplicación de la Directiva 89/106 CE. En particular, en lo referente a los procedimientos especiales de reconocimiento, se estará a lo establecido en el artículo 9 del mencionado Real Decreto. Los perfiles y chapas de acero laminados en caliente, para estructuras metálicas, se clasificarán en función de:

- Su geometría: Los productos de acero laminados en caliente se agrupan en series por las características geométricas de su sección. Las series utilizadas actualmente se indican en la tabla 620.1. Con carácter indicativo se citan las normas relativas a las dimensiones y términos de sección.

Serie	Normas: Dimensiones y términos de sección
Perfil IPN	UNE 36 521
Perfil IPE	UNE 36 526
Perfil HEB (serie normal)	UNE 36 524
Perfil HEA (serie ligera)	UNE 36 524
Perfil HEM (serie pesada)	UNE 36 524
Perfil U normal (UPN)	UNE 36 522
Perfil L	UNE-EN-10056(1)
Perfil LD	UNE-EN-10056(1)
Perfil T	UNE-EN-10055
Perfil U comercial	UNE 36 525
Redondo	UNE 36 541
Cuadrado	UNE 36 542
Rectangular	UNE 36 543
Hexagonal	UNE 36 547

Tabla 620.1 Series de productos de acero laminados en caliente

- Su tipo y grado de acero: Los tipos y grados de acero habitualmente empleados para la fabricación de estos productos, designados según la norma UNE-EN-10027 parte 1, son los que figuran en la tabla 620.2.También está permitido el empleo de los tipos y grados de acero de construcción de alto límite elástico (según UNE-EN-10137, partes 1,2 y 3), los de grano fino para construcción soldada (según UNE-EN-10113, Partes 1, 2 y 3), los aceros de construcción con resistencia mejorada a la corrosión atmosférica (según UNE-EN-10155) y los aceros con resistencia mejorada a la deformación en la dirección perpendicular a la superficie del producto (según UNE-EN-10164).

- Estados de desoxidación admisibles: FN (no se admite acero efervescente) y FF (acero calmado).

S 235 JR	S 275 JR	S 355 JR
S 235 J0	S 275 J0	S 355 J0
S 235 J2	S 275 J2	S 355 J2
		S 355 K2

Tabla 620.2 Tipos y grados de acero habituales para perfiles y chapas, según UNE-EN-10025

620.3 Características

Lo dispuesto en este artículo se entenderá sin perjuicio de lo establecido en el Real Decreto 1630/92 (modificado por el Real Decreto 1328/95), por el que se dictan disposiciones para la libre circulación de productos de construcción, en aplicación de la Directiva 89/106 CEE, y en particular, en lo referente a los procedimientos especiales de reconocimiento se estará a lo establecido en su artículo 9. La garantía de calidad de los perfiles y chapas de acero laminados en caliente, para estructuras metálicas, será exigible en cualquier circunstancia al Contratista adjudicatario de las obras.

620.3.1 Características de los aceros

620.3.1.1 Composición química

La composición química de los aceros utilizados para la fabricación de los perfiles, secciones y chapas, será la especificada en la norma UNE-EN 10025, o en su caso, la especificada en la norma de condiciones técnicas de suministro que en cada caso corresponda (UNE-EN 10113, UNE-EN 10137, UNE-EN 10155 o UNE-EN 10164). Para la verificación de la composición química sobre el producto, se deberán utilizar los métodos físicos o químicos analíticos descritos en las normas UNE al efecto en vigor.

620.3.1.2 Características mecánicas

Las características mecánicas de los aceros utilizados para la fabricación de los perfiles, secciones y chapas, serán las especificadas en la norma UNE-EN 10025, o en su caso, las especificadas en la norma de condiciones técnicas de suministro que en cada caso corresponda (UNE-EN 10113, UNE-EN 10137, UNE-EN 10155 o UNE-EN 10164). Límite elástico ReH: Es la carga unitaria, referida a la sección inicial de la probeta, que corresponde a la cedencia en el ensayo a tracción según la norma UNE 7 474(1), determinada por la detención de la aguja de lectura de la máquina de ensayo. Esta definición corresponde al límite superior de cedencia. Resistencia a la tracción Rm: Es la carga unitaria máxima, soportada durante el ensayo a tracción según la norma UNE 7474(1). Alargamiento de rotura A: Es el aumento de la distancia inicial entre puntos, en el ensayo de tracción según la norma UNE 7474(1), después de producida la rotura de la probeta, y reconstruida ésta, expresado en tanto por ciento de la distancia inicial. Resiliencia KV: Es la energía absorbida en el ensayo de flexión por choque, con probeta entallada, según la norma UNE 7 475(1).

620.3.1.3 Características tecnológicas.

Soldabilidad: En el caso de productos fabricados con aceros conforme a las normas UNE-EN 10025 o UNE-EN 10113, debe determinarse el valor del carbono equivalente (CEV), y dicho valor, debe cumplir lo especificado al respecto en la norma de condiciones técnicas de suministro que en cada caso corresponda. En el caso de productos fabricados con aceros conforme a las normas UNE-EN 10137, UNE-EN 10155 o UNE-EN 10164, se estará a lo dispuesto en las propias normas. Para la verificación del CEV sobre el producto, se deberán utilizar los métodos físicos o químicos analíticos descritos en las normas UNE al efecto en vigor. Dado que en este artículo solo contemplan aceros soldables, el suministrador, a través del Contratista, facilitará al Director de las Obras los procedimientos y condiciones recomendados para realizar, cuando sea necesario, las soldaduras. Los aceros de los grados JR, J0, J2G3, J2G4, K2G3 y K2G4, generalmente, son aptos para el soldeo por todos los procedimientos. La soldabilidad es creciente desde el grado JR hasta K2. El riesgo de que se produzcan grietas en frío en la zona soldada aumenta con el espesor del producto, con el nivel de resistencia y con el carbono equivalente. El agrietamiento en frío puede producirse por la acción combinada de los siguientes factores:

- Cantidad de hidrógeno difusible en el metal de aportación.
- Una estructura frágil de la zona afectada térmicamente.
- Concentraciones importantes de tensiones de tracción en la unión soldada.

Cuando se prescriba la utilización de ciertas recomendaciones, tales como las recogidas en la norma UNE-EN-1011 o en normas nacionales que sean aplicables, las condiciones de soldeo y los distintos niveles de soldabilidad recomendados, para cada tipo de acero, pueden estar determinados en función del espesor del producto, de la energía aportada a la soldadura, de los requisitos de producto, de la eficiencia de los electrodos, del proceso de soldeo y de las características del metal de aportación. Doblado: Es un índice de la ductilidad del material, definido por la ausencia o presencia de fisuras en el ensayo de doblado, según la norma UNE 7 472, efectuado sobre el mandril que se indica en la tabla de características, de las normas de condiciones técnicas de suministro, para cada una de las distintas clases de acero. Esta característica es opcional y su verificación solo es exigible si expresamente así se indica en el pedido.

620.3.2 Características de los perfiles y chapas

Las tolerancias dimensionales, de forma y de masa de cada producto son las especificadas en la norma correspondiente que figura en la tabla 620.3.

Productos	**Norma de producto**	
	Medidas	**Tolerancias**
Perfiles IPN	UNE 36 521	UNE-EN-10024
Perfiles IPE	UNE 36 526	UNE-EN-10034
Perfiles HEB, HEA, HEM	UNE 36 524	UNE-EN-10034
Perfiles UPN	UNE 36 522	UNE-EN-10279
Perfiles L	UNE-EN-10056 (1)	UNE-EN-10056 (2)
Perfiles LD	UNE-EN-10056 (1)	UNE-EN-10056 (2)
Perfiles T	UNE-EN-10055	
Perfiles U comercial	UNE 36 525	UNE-EN-10279
Redondos	UNE 36 541	
Cuadrados	UNE 36 542	
Rectangulares	UNE 36 543	
Hexagonales	UNE 36 547	
Chapas y planos anchos de espesor ≥ 3 mm y ancho ≥ 1500mm	UNE 36 559	

Tabla 620.3 Medidas y tolerancias. Normas aplicables para cada producto

620.4 Ejecución

El Contratista comunicará por escrito al Director de las Obras, antes de transcurridos treinta días (30d) desde la fecha de firma del acta de comprobación del replanteo, la relación completa de las empresas suministradoras de los perfiles y chapas laminados en caliente, para estructuras metálicas, objeto del proyecto; así como la marca comercial, o referencia que dichas empresas dan a esa clase y calidad.

620.5 Control de calidad

620.5.1 Suministro

A los efectos del control del suministro de los productos de acero laminados en caliente para estructuras metálicas, se denomina partida al material que simultáneamente cumpla las siguientes condiciones:

- Que pertenezca a una de las series de productos citados en la tabla 620.1.
- Que corresponda al mismo tipo y grado de acero.
- Que proceda de un mismo fabricante.
- Que haya sido suministrado de una vez.

No podrán utilizarse productos de acero laminados en caliente para estructuras metálicas que no lleguen acompañados de la documentación indicada a continuación. A la entrega de cada suministro se aportará un albarán, con documentación anexa, conteniendo, entre otros, los siguientes datos:

- Nombre y dirección de la empresa suministradora.
- Fecha de suministro.
- Identificación del vehículo que lo transporta.
- Numero de partidas que componen el suministro, identificando, para cada partida, al fabricante y su contenido (peso, número de perfiles o chapas, tipo de producto según se indica en la tabla 620.1, tipo y grado de acero según se indica en la tabla 620.2).

Además, cada partida deberá llegar acompañada de la siguiente documentación, según el caso:

Si se trata de una partida con una marca, sello o distintivo de calidad reconocido (620.8):

- Documento acreditativo de que la partida está en posesión de una marca, sello o distintivo de calidad reconocido.
- Certificado del fabricante, firmado por persona física, en el que se indiquen los valores de las diferentes características según se especifica en el apartado 620.3, que justifiquen que los productos de acero laminados en caliente para estructuras metálicas cumplen las exigencias contenidas en este artículo.

Si se trata de una partida sin una marca, sello o distintivo de calidad reconocido (620.8):

- Certificado del fabricante, firmado por persona física, en el que se indiquen los valores de las diferentes características según se especifica en el apartado 620.3, que justifiquen que los productos de acero laminados en caliente para estructuras metálicas cumplen las exigencias contenidas en este artículo.
- Resultados de los ensayos, que justifiquen que los productos de acero laminados en caliente de esa partida cumplen las exigencias establecidas en el apartado 620.3, efectuados por un laboratorio autorizado conforme al Real Decreto 2200/95, de 28 de diciembre.

Una vez comprobada la documentación que debe acompañar al suministro, se deberá proceder a comprobar el correcto marcado de los productos según los criterios siguientes:

- Los perfiles y secciones de los tipos U normal (UPN), IPE, I con alas inclinadas (antiguo IPN) y HE de ajas anchas y caras paralelas (HEB, HEA, HEM), llevarán la identificación del fabricante estampada en caliente, mediante los rodillos de laminación, a intervalos de dos mil quinientos milímetros (2.500 mm) como máximo, además deberá marcarse la designación abreviada del producto y del tipo y grado de acero, así como la identificación de la colada de procedencia, mediante pintado o grabado. Esta información, completa y fácilmente identificable, deberá figurar en todos y cada uno de los perfiles individuales.
- Los perfiles y secciones de los tipos U comercial, T con alas iguales y aristas redondeadas, los angulares de lados iguales o desiguales, los redondos, los cuadrados, los hexagonales y los perfiles rectangulares de canto vivo, llevarán la

identificación del fabricante, la designación abreviada del producto y del tipo y grado de acero, así como la identificación de la colada de procedencia, mediante un método a elección del fabricante.

- Las chapas y planos anchos de espesor ³3 mm y ancho ³1500 mm llevarán la marca de identificación del fabricante, el número de la pieza, el número de colada, las dimensiones, y la designación del tipo y grado del acero, pintados y troquelados.
- No podrán utilizarse productos de acero laminados en caliente para estructuras metálicas que no estén correctamente marcados.

620.5.2 Acopio

Se comprobará que los perfiles y chapas laminados en caliente, para estructuras metálicas, acopiados se corresponden con todo lo previamente comunicado al Director de las Obras, según se especifica en el apartado 620.4. A los efectos del control de los acopios, se denomina unidad de inspección al material que simultáneamente cumpla las siguientes condiciones:

- Corresponde al mismo tipo y grado de acero.
- Procede de un mismo fabricante.
- Pertenece a una de las siguientes series en función del espesor máximo de la sección:
    - Serie ligera (e £ 16 mm).
    - Serie media (16 mm < e £ 40 mm).
    - Serie pesada (e > 40 mm).

El tamaño máximo de la unidad de inspección será de:

- Ochenta toneladas (80 t), en el caso de acopios con una marca, sello o distintivo de calidad reconocido (620.8)
- Cuarenta toneladas (40 t), en el caso de acopios sin una marca, sello o distintivo de calidad reconocido (620.8)

Los criterios que se describen a continuación para realizar el control de calidad de los acopios serán sin perjuicio de las facultades que corresponden al Director de las Obras. Se distinguen dos niveles distintos de intensidad para el control de los acopios de estos productos:

- Control de acopios con una marca, sello o distintivo de calidad reconocido (620.8). En este caso, los resultados del control deben disponerse antes de la puesta en obra de la unidad de obra de la que formen parte.
- Control de acopios sin una marca, sello o distintivo de calidad reconocido (620.8). En este caso los ensayos deben realizarse y obtenerse los resultados, previamente a la ejecución de la unidad de obra de la que vayan a formar parte, de tal forma que todos los productos de acero laminados en caliente para estructuras metálicas que se empleen en cada unidad de obra deben estar previamente totalmente identificados.

Los criterios de aceptación y rechazo serán:

- Composición química (620.3.1.1) y características tecnológicas (620.3.1.3): Cada unidad de inspección será controlada mediante un ensayo de cada una de las características, según se especifica en la norma UNE-EN-10025 o en la norma de condiciones técnicas de suministro que en cada caso corresponda (UNE-EN-10113, UNE-EN-10137, UNE-EN-10155 o UNE-EN-10164). Si los resultados de todos los ensayos son satisfactorios, la unidad de inspección será aceptada. Si el resultado, para alguna de las características, no es satisfactorio, se efectuará un nuevo ensayo de esa característica sobre cuatro (4) nuevas probetas de la unidad de inspección correspondiente. Cualquier fallo registrado en estos nuevos ensayos obligará a rechazar la unidad de inspección.
- Tolerancias dimensionales, de forma y de masa (620.3:2): Cada unidad de inspección será controlada mediante ensayos sobre un producto muestra. Si los resultados de todos los ensayos son satisfactorios, la unidad de inspección será aceptada. Si el resultado, para alguna de las características, no es satisfactorio, se efectuará un nuevo ensayo de esa característica sobre cuatro (4) nuevos

productos muestra de la unidad de inspección correspondiente. Cualquier fallo registrado en estos nuevos ensayos obligará a rechazar la unidad de inspección.

- Características mecánicas (620.3.1.2): Cada unidad de inspección será controlada mediante ensayos sobre dos (2) juegos de probetas, que se tomarán, según se especifica en la norma UNE-EN-10025 o en la norma de condiciones técnicas de suministro que en cada caso corresponda (UNE-EN-10113, UNE-EN-10137, UNE-EN-10155 o UNE-EN-10164). Si los resultados de ambos ensayos son satisfactorios, la unidad de inspección será aceptada. Si los dos resultados fuesen no satisfactorios, la unidad de inspección será rechazada, y si solamente uno de ellos resulta no satisfactorio, se efectuará un nuevo ensayo completo de todas las características mecánicas sobre dieciséis (16) juegos de probetas de la unidad de inspección correspondiente. El resultado se considerará satisfactorio si la media aritmética de los resultados obtenidos supera el valor mínimo garantizado y todos los resultados superen el noventa y cinco por ciento (95%) de dicho valor. En caso contrario la unidad de inspección será rechazada. En el caso de Rm además de lo citado anteriormente, la media aritmética será inferior al valor máximo garantizado y todos los resultados serán inferiores al 105 por 100 de dicho valor.

620.6 Almacenamiento

Los perfiles y chapas de acero laminados en caliente para estructuras metálicas, se almacenarán de forma que no se perjudique su estado de conservación.

620.7 Medición y abono

La medición y abono de los perfiles y chapas de acero laminados en caliente, para estructuras metálicas, se realizará de acuerdo con lo específicamente indicado en la unidad de obra de la que formen parte. En acopios se medirán por kilogramos (kg) realmente acopiados, medidos por pesada en báscula debidamente contrastada.

620.8 Especificaciones técnicas y distintivos de la calidad

El cumplimiento de las especificaciones técnicas obligatorias requeridas a los productos contemplados en el presente artículo, se podrá acreditar por medio del correspondiente certificado que, cuando dichas especificaciones estén establecidas exclusivamente por referencia a normas, podrá estar constituido por un certificado de conformidad a dichas normas. El certificado acreditativo del cumplimiento de las especificaciones técnicas obligatorias establecidas en este artículo podrá ser otorgado por los Organismos españoles -públicos y privados- autorizados para realizar tareas de certificación en el ámbito de los materiales, sistemas y procesos industriales, conforme al Real Decreto 2200/95, de 28 de diciembre. El alcance de la certificación en este caso, estará limitado a los materiales para los que tales Organismos posean la correspondiente acreditación. Si los productos, a los que se refiere este artículo, disponen de una marca, sello o distintivo de calidad que asegure el cumplimiento de las especificaciones técnicas que se exigen en este artículo, se reconocerá como tal cuando dicho distintivo esté reconocido por la Dirección General de Carreteras del Ministerio de Fomento.

CAPÍTULO III – ESTRUCTURAS METÁLICAS

Artículo 640 – Estructuras de acero

640.1 Definición

Se define como estructura de acero los elementos o conjuntos de elementos de acero que forman la parte resistente y sustentante de una construcción. Las obras consistirán en la ejecución de las estructuras de acero, y de las partes de acero correspondientes a las estructuras mixtas de acero y hormigón. No es aplicable este Artículo a las armaduras de las obras de hormigón, ni a las estructuras o elementos construidos con perfiles ligeros de chapa plegada.

640.2 Materiales

Para las chapas y perfiles laminados, en cuanto a dimensiones y tolerancias se refiere, véase lo previsto en el Artículo 620

640.3 Forma y dimensiones

La forma y dimensiones de la estructura serán las señaladas en los Planos, no permitiéndose al Contratista modificaciones de los mismos, sin la previa autorización del Director de las obras.

640.4 Condiciones generales

En caso de que el Contratista principal solicite aprobación para subcontratar parte o la totalidad de estos trabajos, deberá demostrar, a satisfacción del Director, que la empresa propuesta para la subcontrata posee personal técnico y obrero experimentado en esta clase e obras, y además, los elementos materiales necesarios para realizarlas. Tanto en el período de montaje de la estructura, como en el de construcción en obra, estará presente en la misma de un modo permanente, durante la jornada de trabajo, un técnico responsable representante del Contratista. Dentro de la jornada laboral, el Contratista deberá permitir, sin limitaciones al efecto de la función inspectora, la entrada en su taller al Director o a sus representantes, a los que dará toda clase de facilidades, durante el período de construcción de la estructura. El Contratista viene obligado a comprobar en obra las cotas fundamentales de replanteo de la estructura metálica. Salvo indicación en contrario de los documentos de contrato, el Contratista viene obligado especialmente:

- A la ejecución en taller de la estructura.
- A la expedición, transporte y montaje de la misma.
- A la prestación y erección de todos los andamios y elementos de elevación y auxiliares que sean necesarios, tanto para el montaje como para la realización de la función inspectora.
- A la prestación del personal y materiales necesarios para la prueba de carga de la estructura, si ésta viniera impuesta por el Pliego de Prescripciones Técnicas Particulares.
- A enviar al Contratista de las fábricas u hormigones, en caso de ser otro distinto, dentro del plazo previsto en el contrato, todos aquellos elementos de la estructura que hayan de quedar anclados en la obra no metálica, incluidos los correspondientes espárragos o pernos de anclaje.

Cuando el Contratista que haya de realizar el montaje no sea el que se haya ocupado de la ejecución en taller, éste último vendrá especialmente obligado:

- A efectuar en su taller los montajes en blanco, parciales o totales, que estime necesarios para asegurar que el ensamble de las distintas partes de la estructura no presentará dificultades anormales en el momento de efectuar el montaje definitivo, haciéndose responsable de las que puedan surgir.
- A marcar en forma clara e indeleble todas las partes de la estructura, antes de expediría; registrando estas marcas en los planos e instrucciones que debe enviar a la entidad que haya de ocuparse del montaje.
- A suministrar y remitir con la estructura, debidamente embalados y clasificados, todos los elementos de las uniones de montaje, con excepción de los electrodos que se requieran para efectuar las soldaduras de obra, cuando éste sea el medio de unión proyectado; pero, en los planos e instrucciones de montaje, indicará la calidad y tipo de electrodos recomendados, previa aprobación del Director; pueden constituir también excepción, en el envío, los tornillos de alta resistencia necesarios para las uniones de montaje, debiendo indicar el Contratista, en este caso, en sus planos e instrucciones de montaje, los números y diámetros nominales de los tornillos necesarios, así como las calidades de los aceros con los que deban ser fabricados tanto los tornillos como sus tuercas y arandelas.
- A enviar un cinco por ciento (5 %) más del número de tornillos, o un diez por ciento (10 %) más del número de roblones, estrictamente necesarios, a fin de prevenir las posibles pérdidas y sustituciones de los dañados durante el montaje.

640.5 Uniones

En las uniones se distinguirá su clase, que puede ser:

- Unión de fuerza, la que tiene por misión transmitir, entre perfiles o piezas de la estructura, un esfuerzo calculado.
- Unión de atado, cuya misión es solamente mantener en posición perfiles de una pieza, y no transmite un esfuerzo calculado.

Entre las uniones de fuerza se incluyen los empalmes, que son las uniones de perfiles o barras en prolongación. No se permitirán otros empalmes que los indicados en los Planos o, en casos especiales, los señalados en los planos de taller aprobados por el Director. Se procurará reducir al mínimo el número de uniones en obra, a tal efecto, el Contratista estudiará, de acuerdo con el Director, la conveniente resolución de los problemas de transporte y montaje que aquella reducción de uniones pudiera acarrear. Tanto en las estructuras roblonadas como en las soldadas, se aconseja realizar atornilladas las uniones definitivas de montaje. Los tornillos serán de alta resistencia cuando se trate de puentes o estructuras sometidas a cargas dinámicas.

640.5.1 Uniones roblonadas y atornilladas

640.5.1.1 Agujeros

Como norma general, los agujeros para roblones y tornillos se ejecutaran con taladro. Queda prohibida su ejecución mediante soplete o arco eléctrico. Se permite el punzonado en espesores no superiores a quince milímetros (15 mm). Cuando la estructura haya de estar sometida a cargas predominantemente estáticas, el diámetro del agujero sea por lo menos igual a vez y media (1,5) el espesor, y se adopten las medidas oportunas para la coincidencia de los agujeros que deban corresponderse, se podrá efectuar el punzonado al tamaño definitivo, con tal de utilizar un punzón que ofrezca garantías de lograr un agujero de borde cilíndrico, sin grietas ni fisuras. En caso contrario, se punzonarán los agujeros con un diámetro máximo inferior en tres milímetros (3 mm) al definitivo, rectificándolos mediante escariado mecánico posterior; es preferible el realizar esta segunda operación después de unidas las piezas que han de roblonarse juntas y fijadas, mediante tornillos provisionales, en su posición relativa definitiva. Análogamente, se procederá con los agujeros taladrados cuando haya de rectificarse su coincidencia. Queda terminantemente prohibido el uso de la broca pasante para agrandar o rectificar los agujeros. Los agujeros destinados a alojar tornillos calibrados se ejecutarán siempre con taladro, cualesquiera que sean su diámetro y los espesores de las piezas a unir. Siempre que sea posible, se taladrarán de una sola vez los agujeros que atraviesen dos o más piezas, después de armadas, engrapándolas o atornillándolas fuertemente. Después de taladradas las piezas, se separarán para eliminar las rebabas. En cada estructura, los roblones o tornillos utilizados se procurara sean solamente dos tipos, o como máximo de tres, de diámetros bien diferenciados. Los diámetros de los agujeros, Salvo excepciones justificadas, estarán dentro de los límites de la Tabla 640.1, y se acercarán lo más posible a los valores óptimos consignados en los catálogos para cada perfil.

TABLA 640.1

LIMITACIONES PARA AGUJEROS			
Diámetro del agujero (mm)	Espesor de cada pieza		Máxima suma de espesores de las piezas unidas (mm)
	Mínimo (mm)	Máximo (mm)	
11	4	10	45
13	4	12	55
15	5	14	65
17	6	16	70
19	7	18	80
21	8	20	90
23	10	24	100
25	12	28	115
28	14	36	130

Las distancias t entre los centros de agujeros de diámetro a, que unan piezas, cuyo espesor mínimo es e, cumplirán las condiciones siguientes:

- Valor mínimo:
  - Para roblones: S > 3,0 a
  - Para Tornillos: S > 3,5 a
- Valor máximo:
  - En general: S < 8,0 a / S < 15,0 e
  - En uniones de armado de barras a tracción: S < 15,0 a / S < 25,0 e

En barras de gran anchura, con más de dos filas paralelas de roblones o tornillos en dirección del esfuerzo, en las filas interiores el valor máximo de la distancia s, en esta dirección, puede ser doble del indicado. Las distancias t entre los centros de los agujeros y los bordes cumplirán las condiciones siguientes:

- Valor mínimo: Al borde frontal t1 >2,0 a y Al borde latera1 t2 >1,5 a
- Valor máximo: A cualquier borde t < 3,0 a / t < 6,0 e

Cuando se empleen roblones o, tornillos ordinarios, la coincidencia de los agujeros se comprobará introduciendo un calibre cilíndrico, de diámetro un milímetro y medio (1,5 mm) menor que el diámetro nominal del agujero. Si el calibre no pasa suavemente, se rectificará el agujero. Cuando se empleen tornillos calibrados, es preceptiva la rectificación del agujero, y se comprobará que el diámetro rectificado es igual que el de la espiga del tornillo.

640.5.1.2 Colocación de los roblones

Los roblones deben calentarse, preferentemente, en hornos adecuados de atmósfera reductora; aunque, en defecto de aquéllos, se permite el uso de la fragua tradicional. Queda prohibida la utilización del soplete para este fin. El calentamiento debe ser uniforme, salvo en las técnicas de calentamiento diferencial para la colocación de roblones de gran longitud. Al ser colocados deberán estar a la temperatura del rojo cereza claro, sin que ésta haya bajado del rojo sombra al terminarse de formar la cabeza de cierre. Antes de colocar el roblón se eliminarán de su superficie la cascarilla o escorias que pueda llevar adheridas; y, después de colocado, deberá llenar completamente el agujero. La cabeza de cierre del roblón debe ser de las dimensiones mínimas correspondientes a su diámetro, quedar centrada con la espiga, apoyar perfectamente en toda su superficie sobre el perfil unido y no presentar grietas ni astillas. Las rebabas que, eventualmente, puedan quedar alrededor de la cabeza deberán eliminarse. No se tolerarán huellas de la estampa sobre la superficie de los perfiles. Las piezas que hayan de roblonarse juntas, se unirán previamente con los tornillos de montaje, cuyo diámetro no debe ser inferior en más de dos milímetros (2 mm) al del agujero. Se colocará el número necesario de tornillos para que, fuertemente apretados con llave manual, aseguren la inmovilidad relativa de las piezas a unir y un mínimo contacto entre sus superficies. La formación de las cabezas de cierre deberá hacerse con prensa o martillo neumático, quedando prohibida la colocación de roblones con maza de mano. En casos excepcionales en que, por falta de espacio, no pueda utilizarse la herramienta adecuada, se permitirá la colocación a mano si el roblón es de mero atado. Si se trata de un roblón de fuerza es preferible, en estos casos, sustituirlo por un tornillo calibrado o, mejor, por un tornillo de alta resistencia. Los roblones colocados, después de fríos, deberán comprobarse al rebote con un martillo de bola pequeño. Todos aquellos cuya apretadura resulte débil o dudosa se levantarán y sustituirán, sin excusa alguna; prohibiéndose expresamente el repaso en frío de los roblones que hayan podido quedar flojos. El proceso de colocación de los roblones que constituyen la costura, se llevará con tal forma que se evite la introducción de tensiones parásitas y el curvado o alabeo de las piezas.

640.5.1.3 Colocación de tornillos ordinarios y calibrados

El diámetro nominal del tornillo ordinario es el de su espiga. El diámetro del agujero será un milímetro (1 mm) mayor que el de su espiga. Los asientos de las cabezas y tuercas estarán perfectamente planos y limpios. Es preceptivo en las uniones de fuerza, y siempre recomendable, la colocación de arandela bajo la tuerca. Si las superficies exteriores de las partes unidas son inclinadas, se empleará arandela de espesor variable, con el ángulo conveniente para que la apretadura sea uniforme. Esta arandela de espesor variable se colocará también bajo la cabeza del tornillo, si ésta apoya sobre una cara inclinada. Si por alguna circunstancia no se coloca arandela, la parte roscada de la espiga penetrará en la unión, por lo menos, en un filete. Las tuercas se apretarán a fondo, preferentemente con medios mecánicos. Es recomendable bloquear las tuercas en las estructuras no desmontables, empleando un sistema adecuado: arandelas de seguridad, punto de soldadura, etc. Es preceptivo el bloqueo cuando la estructura esté sometida a cargas dinámicas o vibraciones, y en aquellos tornillos que estén sometidos a esfuerzos de tracción en dirección de su eje. Los tornillos calibrados se designarán por los mismos diámetros nominales que los tornillos ordinarios, diámetros que corresponden, en este caso, al borde exterior del fileteado; su espiga será torneada con diámetro igual al del agujero, con las tolerancias que se indican en el Artículo 622. Con estos tornillos se colocarán siempre arandelas bajo la cabeza y bajo la tuerca. En todo lo demás, se aplicará a estos tornillos lo dicho para los ordinarios.

640.5.1.4 Colocación de tornillos de alta resistencia

Las superficies de las piezas a unir deberán acoplar perfectamente entre sí después de realizada la unión. Estas superficies estarán suficientemente limpias, y sin pintar. La grasa se eliminará con disolventes adecuados. Para eliminar la cascarilla de laminación de estas superficies, se someterán al tratamiento de limpieza: chorro de arena, chorro de gravilla de acero, decapado por llama, etc.; realizándose de acuerdo con las instrucciones del fabricante. Se colocará siempre arandela bajo la cabeza y bajo la tuerca. En una cara de la arandela se achaflanará el borde interno para poder alojar el redondeo de acuerdo entre cabeza y espiga; el borde externo de la misma cara se biselará también con el objeto de acreditar la debida colocación de la arandela. La parte roscada de la espiga sobresaldrá de la tuerca, por lo menos, en un filete, y puede penetrar dentro de la unión. En tornillos de alta resistencia, el diámetro del agujero será, como norma general, un milímetro (1 mm) mayor que el nominal del tornillo, pudiendo aceptarse una holgura máxima de dos milímetros (2 mm). Las tuercas se apretarán mediante llaves taradas, que midan el momento torsor aplicado hasta alcanzar el valor prescrito para éste, que figurará en las instrucciones de los planos de taller. También pueden emplearse métodos de apretado en los que se midan ángulos de giro. Los tornillos de una unión deben apretarse inicialmente al ochenta por ciento (80 %) del momento torsor final, empezando por los situados en el centro, y terminar de apretarse en una segunda vuelta.

640.5.2 Uniones soldadas

Las uniones soldadas podrán ejecutarse mediante los procedimientos que se citan a continuación:

- Procedimiento I: Soldeo eléctrico, manual, por arco descubierto, con electrodo fusible revestido.
- Procedimiento II: Soldeo eléctrico, semiautomático o automático, por arco en atmósfera gaseosa, con alambre-electrodo fusible.
- Procedimiento III: Soldeo eléctrico, automático, por arco sumergido. con alambre-electrodo fusible desnudo.
- Procedimiento IV: Soldeo eléctrico por resistencia.
- Otros procedimientos no mencionados, o que pudieran desarrollarse en el futuro, requerirán norma especial.

El Contratista presentará, si el Director lo estima necesario, una Memoria de soldeo, detallando las técnicas operatorias a utilizar dentro del procedimiento o procedimientos elegidos. Las soldaduras se definirán en los planos de proyecto o de taller, según la notación recogida en la Norma UNE 14009: "Signos convencionales en soldadura". Las soldaduras a tope serán continuas en toda la longitud de la unión, y de penetración completa. Se saneará la raíz antes de depositar el cordón de cierre, o el primer cordón de la cara posterior. Cuando el acceso por la cara posterior no sea posible, se realizará la soldadura con chapa dorsal u otro dispositivo para conseguir penetración completa. Para unir dos piezas de distinta sección, la de mayor sección se adelgazará en la zona de contacto, con pendientes no superiores al veinticinco por ciento (25 %), para obtener una transición suave de la sección. El espesor de garganta mínimo de los cordones de soldaduras de ángulo será de tres milímetros (3 mm). El espesor máximo será igual a siete décimas (0,7) emin, siendo emin el menor de los espesores de las dos chapas o perfiles unidos por el cordón. Respetada la limitación de mínimo establecida, se recomienda que el espesor del cordón no sea superior al exigido por los cálculos de comprobación. Los cordones laterales de soldadura de ángulo que transmitan esfuerzos axiles de barras, tendrán una longitud no inferior a quince (15) veces su espesor de garganta, ni inferior al ancho del perfil que unen. La longitud máxima no será superior a sesenta (60) veces el espesor de garganta, ni a doce (12) veces el ancho del perfil unido. En las estructuras solicitadas por cargas predominantemente estáticas, podrán utilizarse cordones discontinuos en las soldaduras de ángulo, cuando el espesor de garganta requerido por los cálculos de comprobación resulte inferior al mínimo admitido más arriba. Deberán evitarse los cordones discontinuos en estructuras a la intemperie, o expuestas a atmósferas agresivas. En los cordones discontinuos, la longitud de cada uno de los trozos elementales, no será inferior a cinco (5) veces su espesor de garganta, ni a cuarenta milímetros (40 mm). La distancia libre entre cada dos (2) trozos consecutivos del cordón, no excederá de quince (15) veces el espesor del elemento unido que lo tenga menor si se trata de barras comprimidas, ni de veinticinco (25) veces dicho espesor si la barra es traccionada. En ningún caso, aquella distancia libre excederá de trescientos milímetros (300 mm). Los planos que hayan de unirse, mediante soldaduras de ángulo en sus bordes longitudinales, a otro plano, o a un perfil, para constituir una barra compuesta, no deberán tener una anchura superior a treinta (30) veces su espesor. En general, quedan prohibidas las soldaduras de tapón y de ranura. Sólo se permitirán, excepcionalmente, las soldaduras de ranura para asegurar contra el pandeo local a los planos anchos que forman parte de una pieza comprimida, cuando no pueda cumplirse, a causa de alguna circunstancia especial, la condición indicada anteriormente. En este caso, el ancho de la ranura debe ser, por lo menos, igual a dos veces y media (2,5) el espesor de la chapa cosida; la distancia libre en cualquier dirección entre dos ranuras consecutivas no será inferior a dos (2) veces el ancho de la ranura, ni superior a treinta (33) veces el espesor de la chapa; la dimensión máxima de la ranura no excederá de diez (10) veces el espesor de la chapa. Queda prohibido el rellenar con soldaduras los agujeros practicados en la estructura para los roblones o tornillos provisionales de montaje. Se dispondrán, por consiguiente, dichos agujeros en forma que no afecten a la resistencia de las barras o de las uniones de la estructura. La preparación de las piezas que hayan de unirse mediante soldaduras se ajustará estrictamente, en su forma y dimensiones, a lo indicado en los Planos. La preparación de bordes para las soldaduras por fusión se deberá ejecutar de acuerdo con las prescripciones contenidas en las Tablas 640.2.1 a 640.2.11. La preparación de las uniones que hayan de realizarse en obra se efectuará en taller. Las piezas que hayan de unirse con soldadura se presentarán y fijarán en su posición relativa mediante dispositivos adecuados que aseguren, sin una coacción excesiva, la inmovilidad durante el soldeo y el enfriamiento subsiguiente. El orden de ejecución de los cordones y la secuencia de soldeo dentro de cada uno de ellos, y del conjunto, se elegirán con vistas a conseguir que, después de unidas las piezas, obtengan su forma y posición relativas definitivas sin necesidad de un enderezado o rectificación posterior, al mismo tiempo que se mantengan dentro de límites aceptables las tensiones residuales. Entre los medios de fijación provisional pueden utilizarse puntos de soldadura depositados entre los bordes de las piezas a unir; el número e importancia de estos puntos se limitará al mínimo compatible con la inmovilización de las piezas. Se permite englobar estos puntos en la soldadura definitiva, con tal que no presenten fisuras ni otros defectos y hayan quedado perfectamente limpios de escoria. Se prohíbe la práctica viciosa de fijar las piezas a los gálibos de armado con puntos de soldadura. Antes del soldeo se limpiarán los bordes de la costura, eliminando cuidadosamente toda la cascarilla, herrumbre o suciedad y, muy especialmente, las manchas de grasa o de pintura. Durante el soldeo se mantendrán bien secos, y protegidos de la lluvia, tanto los bordes de la costura como las piezas a soldar, por lo menos en una superficie suficientemente amplia alrededor de la zona en que se está soldando. Después de ejecutar cada cordón elemental, y antes de depositar el siguiente, se limpiará su superficie con piqueta y cepillo de alambres, eliminando todo rastro de escorias. Para facilitar esta operación, y el depósito de los cordones posteriores, se procurará que las superficies exteriores de tales cordones no formen ángulos diedros demasiado agudos, ni entre si ni con los bordes de las piezas; y, también, que las superficies de los cordones sean lo más regulares posibles. Se tomarán las debidas precauciones para proteger los trabajos de soldeo contra el viento y, especialmente, contra el frío. Se suspenderá el trabajo cuando la temperatura baje de los cero grados centígrados (0º C), si bien en casos excepcionales de urgencia, y previa aprobación del Director, se podrá seguir soldando con temperaturas comprendidas entre cero y menos cinco grados centígrados (0ºC y -5ºC) siempre que se adopten medidas especiales para evitar un enfriamiento excesivamente rápido de la soldadura. Queda prohibido el acelerar el enfriamiento de las soldaduras con medios artificiales. Debe procurarse que el depósito de los cordones de soldadura se efectúe, siempre que sea posible, en posición horizontal. Con este fin, el Contratista debe proporcionarse los dispositivos necesarios para poder voltear las piezas y orientarlas en la posición más conveniente para la ejecución de las distintas costuras, sin provocar en ellas, no obstante, solicitaciones excesivas que puedan dañar la débil resistencia de las primeras capas depositadas. En todas las costuras soldadas que se ejecuten en las estructuras se asegurará la penetración completa, incluso en la zona de raíz. El examen y calificación de los operarios que hayan de realizar las soldaduras se efectuará de acuerdo con lo previsto en la Norma UNE 14010.

640.6 Deformaciones y tensiones residuales

En el Proyecto deberán estudiarse las disposiciones de las uniones, de modo que las tensiones residuales inevitables que proceden de las deformaciones coartadas en las soldaduras, al combinarse con las originadas por las cargas, no den lugar a estados tensionales que resulten peligrosos. Igualmente figurarán en el Proyecto, cuando sea preciso, los procedimientos de atenuación de tensiones residuales: recocido, calentamiento previo, etc. Para conseguir una soldadura con coacciones mínimas, y reducir tensiones residuales al mínimo posible, se operará de acuerdo con las siguientes prescripciones:

- El volumen de metal depositado tendrá en todo momento la máxima simetría posible.
- Las piezas a soldar se dispondrán de modo que puedan seguir los movimientos producidos en el soldeo con la máxima libertad posible.

- El soldador tendrá en todo momento acceso fácil y posición óptima de trabajo, para asegurar el depósito limpio y perfecto del material de aportación.
- La disposición de las piezas y el orden de los cordones será tal que se reduzca al mínimo la acumulación de calor en zonas locales.

640.7 Planos de taller

Para la ejecución de toda estructura metálica el Contratista, basándose en los Planos del Proyecto, realizará los planos de taller precisos para definir completamente todos los elementos de aquélla. Los planos de taller contendrán forma completa:

- Las dimensiones necesarias para definir inequívocamente todos los elementos de la estructura.
- Las contraflechas de vigas, cuando estén previstas.
- La disposición de las uniones, incluso las provisionales de armado, distinguiendo las dos clases: de fuerza y de atado.
- El diámetro de los agujeros de roblones y tornillos, con indicación de la forma de mecanizado.
- Las clases y diámetros de roblones y tornillos.
- La forma y dimensiones de las uniones soldadas, la preparación de los cordones, el procedimiento, métodos y posiciones de soldeo, los materiales de aportación a utilizar y el orden de ejecución.
- Las indicaciones sobre mecanizado o tratamiento de los elementos que los precisen.

Todo plano de taller llevará indicados los perfiles, las clases de los aceros, los pesos y las marcas de cada uno de los elementos de la estructura representados en él. El Contratista, antes de comenzar la ejecución en taller, entregará dos copias de los planos de taller al Director, quien los revisará y devolverá una copia autorizada con su firma, en la que, si se precisan, señalará las correcciones a efectuar. En este caso, el Contratista entregará nuevas copias de los planos de taller corregidas para su aprobación definitiva. Si durante la ejecución fuese necesario introducir modificaciones de detalle respecto a lo definido en los planos de taller, se harán con la aprobación del Director, y se anotarán en los planos de taller todas las modificaciones.

640.8 Ejecución en taller

En todos los perfiles y planos que se utilicen en la construcción de las estructuras se eliminarán las rebabas de laminación; asimismo se eliminarán las marcas de laminación en relieve, en todas aquellas zonas de un perfil que hayan de entrar en contacto con otro en alguna de las uniones de la estructura. El aplanado y el enderezado de las chapas, planos y perfiles, se ejecutarán con prensa, o con máquinas de rodillos. Cuando, excepcionalmente, se utilice la maza o el martillo, se tomarán las precauciones necesarias para evitar un endurecimiento excesivo del material. Tanto las operaciones anteriores, como las de encorvadura o conformación de los perfiles, cuando sean necesarias, se realizarán preferentemente en frío; pero con temperaturas del material no inferiores a cero grados centígrados (0º C). Las deformaciones locales permanentes se mantendrán dentro de límites prudentes, considerándose que esta condición se cumple cuando aquéllas no exceden en ningún punto del dos y medio por ciento (2,5 %); a menos que se sometan las piezas deformadas en frío a un recocido de normalización posterior. Asimismo, en las operaciones de curvado y plegada en frío, se evitará la aparición de abolladuras en el alma o en el cordón comprimido del perfil que se curva; o de grietas en la superficie en tracción durante la deformación. Cuando las operaciones de conformación u otras necesarias hayan de realizarse en caliente, se ejecutarán siempre a la temperatura del rojo cereza claro, alrededor de los 950ºC, interrumpiéndose el trabajo, si es preciso, cuando el color del metal baje al rojo sombra, alrededor de los 700ºC, para volver a calentar la pieza. Deberán tomarse todas las precauciones necesarias para no alterar la estructura del metal, ni introducir tensiones parásitas, durante las fases de calentamiento y enfriamiento. El calentamiento se efectuará, a ser posible, en horno; y el enfriamiento al aire en calma, sin acelerarlo artificialmente. Todas aquellas piezas de acero forjado necesarias en una estructura deberán ser recocidas después de la forja. Cuando no sea posible el eliminar completamente, mediante las precauciones adoptadas a priori, las deformaciones residuales debidas a las operaciones de soldeo, y éstas resultasen inadmisibles para el servicio o para el buen aspecto de la estructura, se permitirá corregirlas en frío, con prensa o máquina de rodillos, siempre que con esta operación no se excedan los límites de deformaciones indicados anteriormente, y se someta la pieza corregida a un examen cuidadoso para descubrir cualquier fisura que hubiese podido aparecer en el material de aportación, o en la zona de transición del metal de base. Antes de proceder al trazado se comprobará que los distintos planos y perfiles presentan la forma exacta, recta o curva, deseada, y que están exentos de torceduras. El trazado se realizará por personal especializado, respetándose escrupulosamente las cotas de los planos de taller y las tolerancias máximas permitidas por los Planos de Proyecto. Se procurará no dejar huellas de granete que no sean eliminadas por operaciones posteriores, especialmente en estructuras que hayan de estar sometidas a cargas dinámicas. El corte puede efectuarse con sierra, cizalla o mediante oxicorte, debiendo eliminarse posteriormente con piedra esmeril las rebabas, estrías o irregularidades de borde inherentes a las operaciones de corte. Deberán observarse, además, las prescripciones siguientes:

- El corte con cizalla sólo se permite para chapas, perfiles planos y angulares, hasta un espesor máximo de quince milímetros (15 mm).
- En el oxicorte, se tomarán las precauciones necesarias para no introducir la pieza tensiones parásitas de tipo térmico.
- Los bordes cortados con cizalla o por oxicorte, que hayan de quedar en las proximidades de uniones soldadas, se mecanizarán mediante piedra esmeril, buril con esmerilado posterior, o fresa, en una profundidad no inferior a dos milímetros (2 mm), a fin de levantar toda la capa de metal alterado por el corte; la mecanización se llevará, por lo menos, hasta una distancia de treinta milímetros (30 mm) del extremo de la soldadura. Esta operación no es necesaria cuando los bordes cortados hayan de ser fundidos, en aquella profundidad, durante el soldeo.
- La eliminación de todas las desigualdades e irregularidades de borde, debidas al corte, se efectuará con mucho mayor esmero en las piezas destinadas a la construcción de estructuras que hayan de estar sometidas a la acción de cargas predominantemente dinámicas.

Se ejecutarán todos los chaflanes o biselados de aristas que se indiquen en los Planos, ajustándose a las dimensiones e inclinaciones fijadas en los mismos. Se recomienda ejecutar el bisel o la acanaladura mediante oxicorte automático, o con máquinas-herramientas, observándose, respecto al primer procedimiento, las prescripciones dictadas anteriormente. Se permite también la utilización del buril neumático siempre que se eliminen posteriormente, con fresa o piedra esmeril, las irregularidades del corte, no siendo necesaria esta segunda operación en los chaflanes que forman parte de la preparación de bordes para el soldeo. Aunque en los Planos no pueda apreciarse el detalle correspondiente, no se cortarán nunca las chapas o perfiles de la estructura en forma que queden ángulos entrantes con arista viva. Estos ángulos, cuando no se puedan eludir, se redondearán siempre en su arista con el mayor radio posible. Los elementos provisionales que por razones de montaje, u otras, sea necesario soldar a las barras de la estructura, se desguazarán posteriormente con soplete, y no a golpes, procurando no dañar a la propia estructura. Los restos de cordones de soldadura, ejecutados para la fijación de aquellos elementos, se eliminarán con ayuda de piedra esmeril, fresa o lima.

640.9 Montaje en blanco

La estructura metálica será, provisional y cuidadosamente, montada en blanco en el taller, para asegurarse de la perfecta coincidencia en el taladro de los diversos elementos que han de unirse, o de la exacta configuración geométrica de los elementos concurrentes. Excepcionalmente, el Director podrá autorizar que no se monte en blanco por completo en alguno de los casos siguientes:

- Cuando la estructura sea de tamaño excepcional, no siendo suficientes los medios habituales y corrientes de que se puede disponer para el manejo y colocación de los diversos elementos de la misma; pudiéndose, en este caso, autorizar el montaje por separado de los elementos principales y secundarios.
- Sí se trata de un lote de varios tramos idénticos. En ese caso, será preceptivo el montaje de uno por cada diez, o menos, tramos iguales; debiéndose montar en los demás solamente los elementos más importantes y delicados.
- Cuando las uniones de las piezas hayan de ir soldadas y no roblonadas, se presentarán en taller, a fin de asegurar la perfecta configuración geométrica de los elementos concurrentes.

Deberán señalarse en el taller, cuidadosamente, todos los elementos que han de montarse en obra; y, para facilitar este trabajo, se acompañarán planos y notas de montaje con suficiente detalle para que pueda realizar dicho montaje persona ajena al trabajo del taller.

640.10 Montaje

El proceso de montaje será el previsto en los Planos y Pliego de Prescripciones Técnicas Particulares; o, en su defecto, será fijado por el Director, ajustándose al Programa de Trabajo de la obra. El Contratista no podrá introducir por si solo ninguna modificación en el plan de montaje previsto, sin recabar la previa aprobación del citado Director. Antes del montaje en blanco en el taller, o del definitivo en obra, todas las piezas y elementos metálicos que constituyen la estructura serán fuertemente raspados con cepillos metálicos, para separar del metal toda huella de oxidación y cuantas materias extrañas pudiera tener adheridas. Todas las superficies que hayan de quedar ocultas, como consecuencia del roblonado o soldadura, bien en taller o en obra, se recubrirán de una capa de minio de hierro, diluido en aceite de linaza, con exclusión de esencia de trementina. Se cuidará de no pintar, ni engrasar en modo alguno, las superficies de contacto de uniones con tornillos de alta resistencia. Las manipulaciones necesarias para la carga, descarga, transporte, almacenamiento a pie de obra y montaje, se realizarán con el cuidado suficiente para no provocar solicitaciones excesivas en ningún elemento de la estructura, y para no dañar ni a las piezas ni a la pintura. Se cuidarán especialmente, protegiéndolas si fuera necesario, las partes sobre las que hayan de fijarse las cadenas, cables o ganchos a utilizar en la elevación o sujeción de las piezas de la estructura. Se corregirá cuidadosamente, antes de proceder al montaje, cualquier abolladura, comba o torcedura que haya podido provocarse en las operaciones de transporte. Si el defecto no puede ser corregido, o se presume que, después de corregido, puede afectar a la resistencia o estabilidad de la estructura, la pieza en cuestión será rechazada; marcándola debidamente para dejar constancia de ello. Durante su montaje, la estructura se asegurará provisionalmente mediante pernos, tornillos, calzos, apeos, o cualquier otro medio auxiliar adecuado; debiendo quedar garantizadas, con los que se utilicen, la estabilidad y resistencia de aquélla, hasta el momento de terminar las uniones definitivas. En el montaje, se prestará la debida atención al ensamble de las distintas piezas, con el objeto de que la estructura se adapte a la forma prevista en el Proyecto; debiéndose comprobar, cuantas veces fuese necesario, la exacta colocación relativa de sus diversas partes. No se comenzará el roblonado, atornillado definitivo, o soldeo de las uniones de montaje, hasta que no se haya comprobado que la posición de las piezas a que afecta cada unión coincide exactamente con la definitiva; o, si se han previsto elementos de corrección, que su posición relativa es la debida, y que la posible separación de la forma actual, respecto de la definitiva, podrá ser anulada con los medios de corrección disponibles. Las placas de asiento de los aparatos de apoyo sobre los macizos de fábrica y hormigón se harán descansar provisionalmente sobre cuñas, y se inmovilizarán una vez conseguidas las alineaciones y aplomos definitivos; no procediéndose a la fijación última de las placas mientras no se encuentren colocados un número de elementos suficientes para garantizar la correcta disposición del conjunto. El lecho de asiento de las placas se efectuará con mortero de cemento portland, de los tipos que se señalen en el Pliego de Prescripciones Técnicas Particulares. Se adoptarán las precauciones necesarias para que dicho mortero rellene perfectamente todo el espacio comprendido entre la superficie inferior de la placa y la superficie del macizo de apoyo. Se mantendrá el apoyo provisional de la estructura hasta que se haya alcanzado el suficiente endurecimiento. Los aparatos de apoyo móvil se montarán de forma tal que, con la temperatura ambiente media del lugar y actuando las cargas permanentes más la mitad de las sobrecargas de explotación, se obtenga su posición centrada; debiendo comprobarse debidamente el paralelismo de las placas inferior y superior del aparato. Se procurará ejecutar las uniones de montaje de forma tal que todos sus elementos sean accesibles a una inspección posterior. En los casos en que sea forzoso que queden algunos ocultos, no se procederá a colocar los elementos que los cubren hasta que no se hayan inspeccionado cuidadosamente los primeros. Cuando, a fin de corregir esfuerzos secundarios, o de conseguir en la estructura la forma de trabajo prevista en las hipótesis de cálculo, sea preciso tensar algunos elementos de la misma antes de ponerla en servicio, se indicará expresamente, en los Planos y en el Pliego de Prescripciones Técnicas Particulares, la forma de proceder a la introducción de estas tensiones previas, así como los medios de comprobación y medida de las mismas.

640.11 Protección

Las estructuras de acero se protegerán contra los fenómenos de oxidación y corrosión. Salvo especificación en contrario, la mano de imprimación, cuando se trate de una protección a base de pintura, se realizará por el Contratista, en taller, antes de expedir las piezas terminadas. No se efectuará la imprimación hasta que su ejecución haya sido autorizada por el Director, después de haber realizado la inspección de las superficies y uniones de la estructura terminada en taller. No se imprimarán, ni recibirán, en general, ninguna capa de protección, las superficies que hayan de soldarse, en tanto no se haya ejecutado la unión; ni tampoco las adyacentes en una anchura mínima de cincuenta milímetros (50 mm), contada desde el borde del cordón. Cuando por razones especiales, se juzgue conveniente efectuar una protección temporal, se elegirá un tipo de pintura fácilmente eliminable antes del soldeo. Las superficies a imprimar se limpiarán cuidadosamente con la rasqueta y el cepillo de alambre; eliminando todo rastro de suciedad y de óxido, así como las escorias y las cascarillas. En estructuras sometidas a ambientes agresivos, será obligatoria la limpieza con chorro de arena. Las manchas de grasa podrán eliminarse con lejía de sosa. Entre la limpieza y la aplicación de la primera capa de protección debe transcurrir el menor espacio de tiempo posible. Siempre que sea posible, la imprimación se efectuará en un local seco y cubierto, al abrigo del polvo. Si ello no es practicable podrá efectuarse la imprimación al aire libre; a condición de no trabajar en tiempo húmedo, ni en época de helada. Entre la aplicación de la capa de imprimación y la de las de acabado, deberá transcurrir un plazo mínimo de treinta y seis horas (36 h). Se adoptarán las medidas adecuadas para evitar la corrosión de los elementos que apoyen directamente sobre fábricas, o que se empotren en las mismas.

640.12 Tolerancias de forma

Las tolerancias máximas que se admitirán, respecto de las cotas de los Planos, en la ejecución y montaje de las estructuras metálicas, serán las siguientes:

- En el paso, gramiles y alineaciones de los agujeros destinados a roblones y tornillos, la décima parte (1/10) del diámetro de los roblones o tornillos.
- En las longitudes de soportes y vigas de las estructuras porticadas, cinco milímetros (± 5 mm); teniendo en cuenta que las diferencias acumuladas no

podrán exceder, en el conjunto de la estructura entre juntas de dilatación, de quince milímetros (15 mm).

- En las longitudes de las barras componentes de celosías triangulares, tres milímetros (± 3 mm).
- En la luz total de una viga armada o de celosía, entre ejes de apoyo, el límite menor de los dos siguientes:
    - Diez milímetros (10 mm).
    - Un dos mil quinientosavo (1/2.500) de la luz teórica.
- En la flecha de soportes, el límite menor de los dos siguientes:
    - Quince milímetros (15 mm)
    - Una milésima (1/1.000) de la altura teórica.
- En la flecha de barras rectas de estructuras de celosía, el límite menor de los dos siguientes:
    - Diez milímetros (10 mm).
    - Un mil quinientosavo (1/1.500) de la distancia teórica entre nudos.
- La flecha del cordón comprimido de una viga, medida perpendicularmente al plano medio de la misma, no excederá del menor de los límites siguientes:
    - Díez milímetros (10 mm).
    - Un mil quinientosavo (1/1.500) de la luz teórica.
- Los desplomes de soporte no excederán del menor de los límites siguientes:
    - Veinticinco milímetros (25 mm).
    - Una milésima (1/1000) de la altura teórica.
- Los desplomados de vigas en sus secciones de apoyo, sean de celosía o alma llena, no excederán de un doscientos cincuentavo (1/250) de su canto total: excepto para vigas carril, en las que la tolerancia anterior se reducirá a la mitad (1/2).

640.13 Medición y abono

Las estructuras de acero se abonarán, en general, por kilogramos (kg) de acero, medidos por pesada en báscula oficial, y en el precio irán incluidos todos los elementos de unión y secundarios necesarios para el enlace de las distintas partes de la estructura. No obstante, en caso que sea difícil o imposible la realización de las pesadas, se abonarán mediante medición teórica, en cuyo caso se tendrán en cuenta las siguientes prescripciones:

- La longitud de las piezas lineales de un determinado perfil se multiplicará por el peso unitario respectivo, que se reseña en las Normas UNE citadas en el Articulo 620 de este Pliego.
- Para el peso de las chapas se tornará como peso específico del acero el de siete kilogramos y ochocientos cincuenta gramos por decímetro cúbico (7,850 kg/dm3).
- La suma de los resultados parciales obtenidos por cada pieza lineal y chapa será la medición.
- Para otros perfiles especiales que pudieran emplearse, se fijarán los pesos unitarios que hayan de aplicarse mediante acuerdo entre el Contratista y el Director.
- El abono de los casquillos, tapajuntas, y demás elementos accesorios y auxiliares de montaje, se considerará incluido en el de la estructura, salvo que se especifique en el Pliego de Prescripciones Técnicas Particulares.
- Los roblones y tornillos utilizados, se abonarán por unidades, según sus tipos, medidos sobre los Planos.
- La soldadura se abonará por metros (m) de un determinado tipo, medidos sobre los Planos.
- Cuando en el Proyecto no se especifique precio para el abono de las soldaduras, roblones o tornillos, se considerará que dicho abono está incluido en el de la estructura.
- Los gastos de inspección radiográfica serán de cuenta del Contratista.
- Las tablas incluidas en el PG3

PARTE 8ª – INTEGRACIÓN AMBIENTAL

Artículo 800 – Integración ambiental

800.1 Disposiciones previas

El Contratista deberá contar con una asesoría cualificada o persona con titulación adecuada: Ingeniero de Montes, Ingeniero Agrónomo, Licenciado en Ciencias Biológicas o Licenciado en Ciencias Ambientales o similar, directamente responsable en temas medioambientales y procedimientos de revegetación. Tendrán un carácter meramente informativo los estudios específicos realizados para obtener la identificación y valoración de los impactos ambientales. No así las Medidas Correctoras y Programa de Vigilancia Ambiental recogidos en el Anejo de Integración Ambiental del Proyecto de Construcción. El Contratista estará obligado a presentar mensualmente un informe técnico a los Servicios Técnicos de la Dirección de Obra, en relación a las actuaciones y posibles incidencias con repercusión ambiental que se hayan producido. Asimismo se señalará el grado de ejecución de las medidas correctoras y la efectividad de dichas medidas. En caso de ser los resultados negativos, se estudiará y presentará una propuesta de nuevas medidas correctoras.

800.2 Protección a las aguas

800.2.1 Protección a los cursos de agua

Protección a los cursos de agua: Según el Art. 234, del R.D. 849/1986, de 11 de abril, queda prohibido con carácter general y sin perjuicio de lo dispuesto en la Ley de Aguas:

- Efectuar vertidos directos o indirectos que contaminen las aguas.
- Acumular residuos sólidos, escombros o sustancias, cualquiera que sea su naturaleza y el lugar en que se depositen, que constituyan o puedan constituir un peligro de contaminación de las aguas o de degradación de su entorno. No cubrir los cauces con materiales.
- Efectuar acciones sobre el medio físico o biológico al agua que constituyan o puedan constituir una degradación del mismo. Queda prohibida la circulación de maquinaria por los cauces.
- El ejercicio de actividades dentro de los perímetros de protección fijados en los Planes Hidrológicos, cuando pudiera constituir un peligro de contaminación o degradación del dominio público hidráulico. Para lo no definido en este apartado se regulará de acuerdo con el Real Decreto Legislativo 1/2001, de 20 de julio, por

el que se aprueba el texto refundido de la Ley de Aguas, así como por el Real Decreto 849/1986 que aprueba el reglamento del dominio público hidráulico.

El Contratista tiene las siguientes obligaciones:

- Se prevendrá con atención el derrame de materiales hacia los regatos o el mar.
- El Contratista tomará las medidas adecuadas, consistentes principalmente en crear una zona de limpieza de ruedas y camiones con agua a presión, para evitar que los vehículos que abandonen las zonas de obras depositen fuera de ellas restos de tierra, barro, etc. En caso de producirse algún depósito, lo eliminará rápidamente.
- Durante la ejecución de las obras se instalarán balsas de decantación en los puntos marcados en planos. Para poder ser vertidas estas aguas a los cauces naturales, siempre que se encuentren dentro de los rangos de calidad establecidos en la legislación vigente será necesario contar con la autorización del Organismo de Cuenca (Confederación Hidrográfica del Guadiana).

800.2.2. Protección de la hidrología superficial y subterránea.

800.2.2.1.- Localización de áreas de servicio y parques de maquinaria alejados de zonas de recargas de acuíferos.

El parque de maquinaria estará impermeabilizado y el almacenamiento de residuos, en caso de ser necesario, tendrá lugar sobre un foso impermeabilizado. Ambas medidas correrán a cargo del contratista. La ubicación de estas instalaciones será la establecida en el proyecto.

800.2.2.2.- Seguimiento de la calidad de las aguas

Las aguas residuales procedentes de las zonas de instalaciones, los parques de maquinaria, de la excavación de los estribos y pilas de los viaductos, se derivarán y someterán a un sistema de desbaste, decantación de sólidos y desengrasado. Se realizará un seguimiento analítico de las aguas procedentes de las balsas para evitar el impacto derivado de posibles vertidos contaminantes sobre los cursos de agua o sobre el terreno. Estas aguas sólo podrán ser vertidas a los cursos de agua o al terreno si no sobrepasan los valores establecidos por la legislación vigente relativa a vertidos y requerirán la correspondiente autorización del organismo competente. La periodicidad de los análisis de las aguas de los sistemas de depuración de las instalaciones auxiliares será quincenal. Se tendrán en cuenta factores como sólidos en suspensión, hidrocarburos, materia orgánica y oxígeno disuelto.

Ejecución de las obras: El Contratista presentará un Plan de Análisis en el que se detallarán su número, necesidad, localización, método del mismo, frecuencia, que deberá ser aprobado por la Dirección de Obra. Las medidas se ejecutarán con frecuencia quincenal. Los parámetros a tener en cuenta serán los análisis de sólidos en suspensión, la materia orgánica y oxígeno disuelto, efectuados en los sondeos realizados al efecto, según los parámetros de la legislación sobre aguas correspondientes al R.D. 849/1.986, de 11 de abril.

Medición y abono: El seguimiento de la calidad de las agua correrá íntegramente a cargo del Contratista incluyéndose su coste dentro de los gastos generales de la obra.

800.2.2.3.- Circulación de maquinaria y vehículos de obra

Con el objeto minimizar la afección sobre la hidrología, así como sobre la vegetación y los suelos, la circulación de maquinaria y vehículos se limitará a las zonas pertenecientes a la obra las cuales se encuentran claramente delimitadas mediante un jalonamiento perimetral continuo.

800.2.3.- Interrupción de captaciones de agua

Si en el momento de las obras hubiera captaciones de aguas superficiales o subterráneas en servicio, con fines de abastecimiento, el Contratista contactará con los Servicios Municipales responsables de su gestión o con los propietarios particulares para informarles de la fecha de comienzo y de las actuaciones que puedan alterar la calidad del agua, así como de las precauciones instaladas para reducir las afecciones. Junto con la Dirección de Obra y el promotor se tratará de discutir el tema del abastecimiento con los afectados, buscándose soluciones que impidan el desabastecimiento puntual. Las posibles reclamaciones e indemnizaciones por alteraciones no previstas o anunciadas en la calidad del agua de los abastecimientos, tanto para consumo urbano o industrial, correrán a cuenta del Contratista.

Antes del comienzo del desbroce se realizará el jalonamiento de la zona de ocupación estricta del trazado, con objeto de minimizar la ocupación de suelo y la afección a la vegetación. Las zonas de instalaciones auxiliares y caminos de acceso también se jalonarán para que la circulación de personal y maquinaria se restrinja a la zona acotada. La localización exacta de las instalaciones de obra, tales como, parques de maquinaria, almacenes de materiales, aceites y combustibles, etc., y plantas auxiliares de clasificación, machaqueo, hormigonado y asfálticas, debe ajustarse a las previstas en el Proyecto.

La preparación del terreno consiste en retirar de las zonas previstas para la ubicación de la obra, los árboles, plantas, tocones, maleza, maderas caídas, escombros, basuras o cualquier otro material existente, que estorben, que no sean compatibles con el Proyecto de Construcción o no sean árboles a proteger. Las operaciones de desbrozado deberán ser efectuadas con las debidas precauciones de seguridad, a fin de evitar daños en las construcciones existentes, propiedades colindantes, vías o servicios públicos y accidentes de cualquier tipo. Cuando los árboles que se derriben puedan ocasionar daños a otros árboles que deben ser conservados o a construcciones colindantes, se trocearán, desde la copa al pie, o se procurará que caigan hacia el centro de la zona de limpieza. En los desmontes, todos los tocones y raíces mayores de 10 cm de diámetro se eliminarán hasta una profundidad de 50 cm por debajo de lo explanado. Antes de efectuar el relleno, sobre un terreno natural, se procederá igualmente al desbroce del mismo, eliminándose los tocones y raíces, de forma que no quede ninguno dentro del cimiento de relleno ni a menos de 15 cm de profundidad bajo la superficie natural del terreno, eliminándose asimismo los que existan debajo de los terraplenes. Los huecos dejados con motivo de la extracción de tocones y raíces se rellenarán con tierras del mismo suelo, haciéndose la compactación necesaria para conseguir la del terreno existente. Cuando existan pozos o agujeros en el terreno, su tratamiento será el que fije la Dirección de Obra según el caso mediante la aprobación del plan correspondiente presentado por el Contratista. Todos los materiales que puedan ser destruidos por el fuego serán quemados o retirados a vertedero de acuerdo con lo que indique el Director de la Obra y las normas que sobre el particular existan en cada localidad. Cuando la acumulación de piedras y otros materiales obstaculice la función de las cunetas, éstas se limpiarán mecánica o manualmente. Se cuidará de no modificar el tamaño ni la forma de la cuneta en su estado inicial. Esta labor se considera incluida en todas las actuaciones que puedan ensuciar las cunetas. En ningún caso se permitirá utilizar al Contratista caminos de obra no definidos a tal efecto en el Proyecto, y para utilizar los así previstos será necesaria la aprobación de la Dirección de Obra.

800.3.2.- Protección y conservación de los suelos

Se recuperará la capa superior de suelo vegetal que pueda estar directa o indirectamente afectada por la obra para su posterior utilización en los procesos de restauración. Los suelos fértiles así obtenidos se acopiarán a lo largo de la traza o en zonas próximas a la misma, en montones de altura no superior a los 1,5 metros con objeto de facilitar su aireación y evitar la compactación.

800.4.- Protección de la Atmósfera

El Contratista preverá las operaciones de limpieza y los riegos necesarios para que el viento o el paso de vehículos levanten y arrastren a la atmósfera la menor cantidad posible de partículas, en las inmediaciones de lugares habitados o en las carreteras o viales de tránsito rodado. El riego será más frecuente en las áreas desprovistas de vegetación como consecuencia del desbroce, en especial en los sustratos que, por su fina granulometría, sean más susceptibles de producir polvo, y especialmente en las épocas en que se combinen altas temperaturas, pocas precipitaciones y fuertes vientos. El material de granulometría fina transportado en bañeras o volquetes deberá ser convenientemente cubierto.

800.5.- Cumplimiento del Programa de Vigilancia Ambiental

El Contratista deberá contar con una asesoría cualificada durante la fase de construcción y en el periodo de garantía en la persona de un Ingeniero de Montes, Ingeniero Agrónomo, Licenciado en Ciencias Biológicas, Licenciado en Ciencias Ambientales o similar, tal y como se especifica en el Programa de Vigilancia Ambiental del Anejo de Integración Ambiental del Proyecto de Construcción. Esta persona será la encargada de asistir a la Dirección de Obra en la realización del Plan de Revegetación, así como de la vigilancia sobre el entorno natural para comprobar que no se producen alteraciones no previstas y que se cumplen las indicaciones sobre normas, cuidados y operaciones establecidos en el EIA, así como que existe la necesaria coordinación temporal entre los trabajos de construcción y los de revegetación de superficies.

800.6.- Protección contra incendios

Dentro del plan de aseguramiento de la calidad (PAC), el adjudicatario de las obras deberá redactar y desarrollar un plan de prevención y extinción de incendios. Durante la construcción de la obra se prestará especial atención a las siguientes indicaciones:

- Durante la construcción de la obra se prestará especial atención a las actividades potencialmente más peligrosas, como los desbroces y las soldaduras. El plan incluirá el establecimiento de dispositivos de extinción a pie de obra como vehículos 4x4 disponibles, remolques motobomba, motosierras, herramientas de movimientos de tierras, etc.
- Durante las obras y el periodo de garantía, se adoptarán las medidas necesarias para evitar que se enciendan fuegos innecesarios, y se evitará la propagación de los que se requieran para la ejecución de las obras, así como de los daños y perjuicios que se pudieran producir.
- El personal estará formado en el manejo de los equipos de extinción y en el comportamiento a seguir en caso de incendio.
- No se encenderá fuego bajo ningún concepto a menos de 15 metros de distancia materiales inflamables, ni debajo de conductores eléctricos.
- Los líquidos inflamables y/o tóxicos deberán guardarse en envases apropiados con identificación de su contenido.
- Quedará prohibido fumar o encender fuego en todas las zonas de almacenamiento o empleo de líquidos o gases inflamables.
- El personal de la obra deberá conocer el teléfono de los bomberos forestales para avisar con rapidez en caso de incendio (112).

Artículo 801 – Hidrosiembra

La hidrosiembra consiste en la aplicación a gran presión, sobre la superficie del terreno, de una suspensión homogénea de agua semillas y otros aditivos (mulch, estabilizador, abonos, etc...). Para su realización es necesario un camión con hidrosembradora. Las hidrosiembras se realizarán en todas las áreas afectadas, de acuerdo a los criterios que se explicarán con posterioridad. Las tareas de revegetación (siembra y plantación) se deben realizar durante los meses de parada vegetativa, preferiblemente de febrero a abril o durante el otoño.

La elección de la firma comercial de productos y materiales, excepto semillas, se deja a iniciativa del Contratista, que deberá de someterse al visto bueno de la Dirección de la Obra. Los condicionantes previos que se establecen son los siguientes:

Agua: El agua a utilizar tanto para las siembras como para el riego de plantaciones como posteriores riegos de conservación, tiene que cumplir las siguientes especificaciones:

- El pH deberá estar comprendido entre 6 y 8.
- La conductividad eléctrica a 25 ºC debe ser menos de 2,25 mmhos/cm.
- El oxígeno disuelto será superior a 3 mg/l.
- El contenido en sales solubles debe ser inferior a 2 g/l.
- El contenido de sulfatos (S04-2) será menor de 0,9 g/l, el de cloruros (Cl-) estará por debajo de 0,29 g/l y el de boro no sobrepasará 2 mg/l.
- No debe contener bicarbonato ferroso, ácido sulfhídrico, plomo, selenio, arsénico, cromatos ni cianuros.
- En lo que se refiere a organismos patógenos, el límite de Escherichia Coli es de 100/cm3.
- La actividad relativa del Na+, no debe superar 26
- El valor de K, expresando los contenidos de los iones en g/l, debe ser superior a 1,2.
- El total de sólidos en suspensión en mg/l no deberá superar los 2.000.
- El contenido en calcio, en meq/l, será menor de –20.
- El contenido en otros iones será el siguiente:
    - Magnesio meq/l 0-5
    - Sodio meq/l 0-40
    - Carbonatos CO3-2 meq/l 0-0,1

- Bicarbonatos HCO_3^- meq/l 0-10
- Cloro meq/l 0-30

- Nutrientes
  - Nitrato-Nitrógeno mg/l 0-10
  - Amoni-nitrógeno mg/l 0-5
  - Fosfato-fósforo mg/l 0-2

De las anteriores especificaciones el Director podrá obligar a efectuar los ensayos de las que considere oportunas.

Mulch: Se define como mulch el material de origen orgánico o inorgánico que, utilizado con los otros componentes de la hidrosiembra, reduce las pérdidas de agua en el suelo por evaporación, conservando su humedad, incorpora elementos nutrientes utilizables por las plantas, disminuye la oscilación térmica del suelo, disminuye la probabilidad de que se produzcan heladas, ralentiza el flujo de escorrentía, aumenta la capacidad de infiltración, disminuye la erosión hídrica al absorber el impacto directo de las gotas de lluvia, y cubre las simientes para favorecer su germinación. Para cubrir la simiente y favorecer la germinación se utilizará un mulch comercial de fibras de madera virgen y coloreada. La sustitución de este mulch por algún otro de características similares deberá ser aprobada por el Director de la Obra, previa presentación de certificados de idoneidad, pruebas de campo y laboratorio y cualquier otra información que pueda garantizar comportamiento del producto en cuanto a retención de humedad, estabilidad y resistencia. Otros mulch comunes, y que bajo autorización expresa del Director de las Obras podrían ser utilizados en este caso son la celulosa (sustancia insoluble en agua obtenida por procedimientos químicos de las células vegetales), heno picado, hierba regada y seca que se trocea por procedimientos mecánicos, o paja de cereal picada (caña de cereal seca y separada del grano, troceada por procedimientos mecánicos). Cualquier modificación en el tipo o proporción del mulch deberá ser autorizada expresamente por la Dirección de la Obra.

Fijadores: Se entiende por fijador, estabilizador o condicionador del suelo cualquier material orgánico o inorgánico aplicado en solución acuosa, que penetrando a través de la superficie del terreno reduce la erosión por aglomeración física de las partículas del suelo, a la vez que liga las semillas y el mulch, generalmente a través de enlaces coloidales de naturaleza orgánica, pero sin llegar a crear una película impermeable. Este reticulado tiene que permitir la circulación del aire y el mantenimiento de la humedad del suelo mejorando su estructura y proporcionando un medio biológico más apropiado. Con objeto de mantener estable las fibras de mulch entre ellas y con la superficie del suelo, se utilizará un estabilizador ("tackifier”) de base orgánica, comercial y degradante. Se utilizarán preferentemente a base de celulosa y agar o de alginados. En los casos de poca estabilidad de la capa superficial del suelo y/o presencia de elementos grandes (piedras) poco estables el Director de Obra podrá establecer la utilización de productos sintéticos de acrilado, metacrilado y tripolicados. La dosificación dependerá del producto comercial y finalmente utilizado. Algunos productos se utilizan a razón de 3-7 g/m2 y otros como los alginados no son efectivos si no a dosis de 50-80 g/m2. Se utilizará un estabilizante formado por copolímeros de metacrilato y acrilatos/acetatos; la dosis de aplicación del mismo oscila entre 200 – 300 kg/ha en función de la pendiente del terreno. Antes del inicio de las obras el Contratista someterá a la conformidad de la Dirección de Obra el tipo de estabilizante que se pretende utilizar.

Los tipos de enmiendas orgánicas son los siguientes:

- Enmienda húmica sólida. Producto sólido que aplicado al suelo aporta humus, mejorando sus propiedades físicas, químicas y biológicas.
- Enmienda no húmica sólida. Producto sólido que aplicado al suelo preferentemente engendra humus, mejorando sus propiedades físicas, químicas y biológicas.
- Ácidos húmicos líquidos. Producto en solución o en suspensión obtenido por tratamiento o procesado de un material de origen animal o vegetal.
- Compost. Producto obtenido por fermentación aeróbica de residuos orgánicos.
- Turba ácida. Residuos vegetales procedentes de plantas desarrolladas y descompuestas en un medio saturado de agua y puede contener originalmente cierta cantidad de material terroso.
- Turba no ácida. Residuos vegetales procedentes de plantas desarrolladas y descompuestas en un medio saturado de agua y puede contener originalmente cierta cantidad de material terroso.

Almacenan el germen del progenitor o progenitores, protegido de diversas maneras contra el calor, el frío, la sequía y el agua, hasta que se presenta una situación favorable para su desarrollo. Las semillas son el vehículo que sirve para que la vida embrionaria, casi suspendida, renueve su desarrollo, luego de haberse separado de sus progenitores. Son, en definitiva, una forma de supervivencia de las especies vegetales. Las semillas pertenecerán a las especies indicadas en el Proyecto, procederán de casas comerciales acreditadas y serán del tamaño, aspecto y color de la especie botánica elegida. Para todas las partidas de semillas se exige el certificado de origen, y éste ha de ofrecer garantías suficientes a la Dirección de la Obra. El peso de la semilla pura y viva (Pr) contenida en cada lote no será inferior al setenta y cinco por ciento (75%) del peso del material envasado. El grado de pureza mínimo (Pp) de las semillas será al menos del ochenta y cinco por ciento (85%) de su peso, y el poder germinativo (Pg), tal que el valor real de las semillas sea el indicado más arriba. No estarán contaminadas por hongos, ni presentarán signos de haber sufrido alguna enfermedad micológica. No presentarán parasitismo de insectos. Cada especie deberá ser suministrada en envases individuales sellados o en sacos cosidos, aceptablemente identificados y rotulados, para certificar las características de la semilla.

La maquinaria que se utiliza es la hidrosembradora, que está compuesta por una cisterna metálica montada sobre un camión. Con una capacidad variable entre 5.000 y 12.000 litros, dispone en su interior de un agitador mecánico especial con varias paletas que sirven para mezclar homogéneamente los componentes de la hidrosiembra. Mediante una bomba de alta presión, que va conectada a un cañón distribuidor situado en la parte superior de la hidrosembradora, se proyecta la mezcla sobre el talud. Efectuando movimientos de rotación y de elevación del cañón, se puede variar el ángulo de lanzamiento para conseguir la distribución homogénea de la mezcla sobre el terreno. Dadas las características de esta siembra, se puede utilizar la operación para aportar otros elementos a la superficie tratada. Estos pueden ser, aportes de materia orgánica, de micronutrientes o productos antierosión fijantes del suelo.

Las hidrosiembras se harán siempre en dos pasadas, excepto en circunstancias particularmente adversas en las que se hará una tercera sin semillas ni abono de liberación lenta. En primer lugar se debe de cubrir las superficies con la mezcla de semillas, fertilizantes, parte del mulch y del estabilizador. Una vez concluida esta primera fase se procederá inmediatamente a la operación de tapado con la incorporación del resto del mulch y estabilizador, de este modo, la semilla que haya quedado en superficie será tapada y podrá germinar de forma adecuada. Las siembras se deben realizar durante los meses de parada vegetativa, preferiblemente de febrero a abril o durante el otoño.

Se introducirá agua en el tanque de la hidrosiembra hasta cubrir la mitad de las paletas del agitador, a continuación se incorporará el mulch, evitando que se formen bloques y grumos en la superficie del agua. Se añadirá agua hasta completar 3/4 partes de la capacidad total del tanque, manteniendo en movimiento las paletas del agitador. A la vez se incorporarán las simientes y abonos. Se removerá la mezcla durante 10 minutos, y a continuación se terminara de llenar con agua; también se incorporará el fijador o estabilizador. Antes de empezar la siembra se removerá durante 2 minutos la mezcla. No se empezará el proceso hasta que no se haya conseguido la mezcla homogénea de todos sus componentes.

La hidrosiembra conservada aceptablemente a juicio de la Dirección de Obra, se medirán por metros cuadrados (m²) realmente hidrosembrados y medidos directamente sobre el terreno al precio correspondiente que figura en los Cuadros de Precios.

Artículo 802 – Plantaciones

Esta unidad incluye el suministro de la planta a obra, la plantación y el primer riego. Se entiende por ejecución de las plantaciones, el conjunto de operaciones necesarias para el correcto establecimiento y el enraizamiento en el lugar definido en el proyecto de las especies objeto de revegetación procedentes de vivero. No se podrá iniciar la plantación, sin la previa aprobación por el Equipo Ambiental de Obra, del replanteo y de la concreta ubicación de cada especie. Para todas las plantas se exige el certificado de garantía en lo que se refiere a su procedencia e identificación. Así, cada planta vendrá individualmente identificada con etiquetas perfectamente legibles donde aparezca el nombre latino completo: género, especie, subespecie o variedad y cultivar. Además, toda recepción irá acompañada de una nota indicando la procedencia de la simiente o elemento vegetal utilizado en la multiplicación de la planta, el nombre y la situación geográfica del vivero (clima, suelo, altitud, y substrato utilizado). Conocidos los factores climáticos de la zona objeto del presente proyecto y los vegetales que tendrán que ser plantados, el lugar de procedencia de las plantas tiene que reunir condiciones parecidas o más rigurosas para su buen desarrollo, y será, como norma general, un vivero oficial o comerciante acreditado. Las plantas no habrán recibido riegos más abundantes de lo que por sus apetencias ecológicas y por las disponibilidades del lugar donde vayan a ser plantadas sea recomendable. Se considerará un valor preferente la procedencia de plantas nacidas a partir del material genético del área del proyecto. El Director de la Obra deberá en todo caso autorizar la procedencia de cada vegetal.

El Contratista estará obligado a sustituir todas las plantas rechazadas y correrán de su cargo todos los costes ocasionados por las substituciones, sin que el posible retardo pueda repercutir en el plazo de ejecución de la obra. Las plantas no presentarán síntoma alguno de ataque anterior o actual, debido a insecto pernicioso o enfermedad criptogámica. Tendrán aspecto normal y serán bien conformadas, sin síntomas de raquitismo, retardo, enfermedad o heridas. Todas ellas tendrán las dimensiones y savias (ciclos vegetativos) que se especifican en el presente apartado. Se deben corresponder el porte y desarrollo con la edad de las plantas y será la mínima necesaria para obtener el porte exigido, no admitiéndose aquellos ejemplares que, aun cumpliendo la condición de porte, sobrepasen en años la edad necesaria para alcanzarlo. Se exigirá el porte en altura total de la planta. Las plantas serán autoportantes, sin necesidad de tutor. La planta estará conformada de acuerdo con las características propias de la especie y su desarrollo estará en consonancia con su altura. Ninguna planta deberá venir con malas hierbas en su cepellón ni con síntomas evidentes de marchitamiento. Las plantas leñosas no deberán presentar desgarraduras ni heridas de ninguna clase en la corteza ni pérdida considerable de ramaje. Las yemas terminales de los tallos estarán sanas. Las plantas de hoja perenne presentarán el sistema foliar completo, sin síntomas de decoloración, clorosis o carencias. Los fustes serán, en general y salvo que se autorice expresamente, derechos, y no presentarán torceduras ni abultamientos anormales o antiestéticos. En todas las plantas habrá equilibrio entre la parte aérea y su sistema radical. Este último estará perfectamente constituido y desarrollado en razón a la edad del ejemplar, presentando de manera ostensible las características de haber sido repicado en vivero. Las raíces de las plantas en cepellón de tierra sin envolver presentarán cortes limpios y recientes, sin desgarrones ni heridas. Las de las restantes plantas enraizadas irán contenidas en contenedor, presentando un buen desarrollo del sistema radicular, no espiralizadas y con elevada densidad de raíces secundarias. Se rechazará todo envío de plantas que no cumpla con los requisitos anteriores. El Contratista correrá con todos los gastos que se originen por la retirada de las plantas en mal estado, estando obligado a reponerlas totalmente sanas, y abonar los nuevos gastos que se originen por este envío. La preparación de la planta para su transporte, se efectuará de acuerdo con las exigencias de la especie, edad de la planta, sistema de transporte elegido y duración del mismo. Las especies trasplantadas a raíz desnuda se protegerán en su zona radicular mediante el suficiente material orgánico humedecido. Este conjunto de raíces y material orgánico se introducirá en bolsas de plástico del tamaño apropiado que se amarrarán al cuello de la raíz.

No se realizarán plantaciones, siembras ni ningún tipo de tratamiento vegetal cuando la temperatura ambiente sea inferior a 1 ºC, o mientras el suelo siga helado. Si las plantas han sufrido congelación durante el transporte no tienen que plantarse ni tan siquiera desembalarse, y se pondrán así en un sitio bajo cubierto donde puedan descongelarse lentamente. Se evitará situarlas en locales con calefacción. Si los daños por la helada han sido tan intensos que han inutilizado la planta, se rechazarán. Si presentan síntomas de desecación, se introducirán en un recipiente con agua o con un caldo de tierra y agua durante unos días, hasta que los síntomas desaparezcan. O bien se depositarán en una zanja, cubriendo con tierra húmeda la totalidad de la planta. Si los daños persisten, dichas plantas se rechazarán y se eliminarán de la obra.

La plantación se realizará durante el periodo de descanso vegetativo de forma preceptiva. El trasplante realizado en el otoño presenta ventajas en los climas de larga sequedad estival y de inviernos suaves, porque al llegar el verano la planta ya ha emitidos raíces nuevas y está en mejores condiciones para soportar el calor y la falta de agua. Las plantaciones se realizarán entre los meses de diciembre y febrero. Cualquier variación de estas épocas deberá estar aprobada por la Dirección de la Obra. En todo caso, antes de iniciar cualquier tarea, se deberá obtener la autorización de la Dirección de Obra en cuanto a calendario.

Las plantaciones se abonarán por unidad de cada especie realmente plantada y mantenida, y que muestre condiciones fisiológicas y sanitarias satisfactorias. El precio de abono incluye el suministro de los ejemplares de vivero, la apertura del hoyo, la aportación de tierra vegetal y abono, el tutor, el primer riego, la reposición de marras y cuantas operaciones sean necesarias para la correcta ejecución de la unidad de obra.

PARTE 9ª – VARIOS

CAPÍTULO I – OBRAS COMPLEMENTARIAS

Artículo 901 – Cerramiento

Se define como valla de cerramiento al elemento de valla metálica que resguarda la central termosolar, contra la irrupción incontrolada de vehículos, personas o animales. La instalación de la valla incluye las operaciones siguientes:

- El replanteo de los postes de sujeción de la malla.
- La excavación de la cimentación, hormigonado de relleno y, en general, todas las labores que exige la cimentación.
- La instalación de los postes de la malla.
- La instalación y tensado de la malla.
- Cualquier trabajo u operación auxiliar necesaria para la correcta y rápida ejecución de esta unidad de obra.

La valla de cerramiento está formada por una retícula de alambres de acero galvanizado entrelazados horizontal y verticalmente formando cuadrículas. Esta malla irá sujeta por postes verticales conformados por tubos de acero galvanizado anclados al terreno mediante dados de hormigón HM-20. Tanto los postes intermedios, como los principales de extremo, los de ángulo y de centro tendrán un diámetro de 50 mm, y un espesor de 1,5 mm. La altura alcanzada sobre el terreno será de 2,20 m, teniendo un tramo enterrado de 40 cm. El arriostramiento está formado por dos tubos de 50 mm de diámetro, con una inclinación de 45º y un espesor de 1,5 mm. Se compone de un mallado de luz variable formado por alambres verticales a 15 cm y alambres horizontales a 2,5 cm cerca del suelo hasta 15 cm en la parte superior.

El terreno se deberá limpiar, antes de instalar los postes, de arbustos y piedras que impidan la colocación de la valla. Los postes principales se instalarán a lo largo del tronco de la autovía y de los accesos siguiendo un trazado en paralelo e interior a la línea de expropiación, de acuerdo con los planos y las órdenes del Ingeniero Director. Los postes complementarios se colocarán sobre la alineación previamente marcada. Los postes se colocarán verticales, salvo que en opinión del Ingeniero Director fuese conveniente colocarlos perpendicularmente al talud del terreno. No se procederá a la instalación de malla, hasta que el Ingeniero Director apruebe la instalación de los postes. La malla deberá tener la misma tensión en todos los puntos y no presentará zonas abombadas ni deterioradas por un montaje defectuoso. El Ingeniero Director podrá ordenar la sustitución de la malla, si en algún punto ya sea por defecto del material o por montaje defectuoso, ésta presentase deterioros que disminuyeran sensiblemente su resistencia a la coronación. La malla no deberá presentar zonas abombadas ni deterioradas por montaje defectuoso.

En la fabricación, transporte, colocación y control de los hormigones se seguirán las prescripciones de la Instrucción EHE y no se utilizarán aditivos que puedan favorecer la corrosión.

El cerramiento se medirá por metros lineales (m) medidos sobre el terreno, y se abonará según el precio definido en los cuadros de precios del proyecto.

CAPÍTULO II – GESTIÓN DE RESIDUOS DE CONSTRUCCIÓN Y DEMOLICIÓN

Artículo 902 – Plan de gestión de residuos

Tal como refleja el artículo 5.1 del Real Decreto 105/2008, de 1 de febrero, por el que se regula la producción y gestión de los residuos de construcción y demolición (en adelante RCD), el contratista adjudicatario de la obra está obligado, antes del inicio de las obras, a presentar a la Dirección de Obra del promotor, que se denominará Plan de Gestión de Residuos de Construcción y Demolición (en adelante el Plan). El Plan deberá concretar en detalle cómo se llevarán a cabo sus obligaciones en relación con los RCD así como las directrices y medidas contempladas en el Estudio de Gestión de Residuos de Construcción y Demolición del proyecto constructivo. Este Plan una vez aprobado por la Dirección de Obra pasará a formar parte de los documentos contractuales de la obra. Se reflejan a continuación las directrices para la elaboración del Plan de Gestión de Residuos de Construcción y Demolición:

- Definición del Responsable de la gestión de RCD (Organigrama, recursos humanos y materiales).
- Documentación de la gestión de los RCD (Copia de las autorizaciones de los gestores - transportistas, valorizadores y/o eliminadores- emitidas por los organismos competentes en materia de medio ambiente de las Comunidades Autónomas).
- Definición del formato de Libro-Registro de la Gestión de RCD y su contenido.
- Definición de la sistemática de control de subcontratistas.
- Definición del plan de formación medioambiental.
- Definición de la sistemática de recogida-clasificación selectiva y almacenamiento de RCD.
- Definición de los planos.

Responsable de la gestión de RCD: El contratista deberá designar un Responsable de la Gestión de RCD que será el encargado de la aplicación y puesta en marcha del Plan de Gestión de RCD así como de proporcionar la información y documentación que estime necesaria la Dirección de Obra en relación con el cumplimiento de las obligaciones de gestión de residuos. Se deberá adjuntar al Plan:

- Documento que acredite el nombramiento del Responsable de la gestión de los RCD firmado por el Jefe de obra.

- Organigrama o definición de otras personas que tengan responsabilidades en la gestión de RCD.
- Listado de herramientas, equipos o maquinaria destinada a la recogida, clasificación y almacenamiento de RCD.

Documentación de la gestión de los RCD: Tal como se recoge en el artículo 5.7 del Real Decreto 105/2008 el poseedor de los RCD, en este caso el contratista adjudicatario de la obra, estará obligado a entregar al productor de los RCD, en este caso el promotor y en particular al Director de Obra, los certificados y demás documentación acreditativa de la gestión de los RCD. El Responsable de la Gestión de los RCD llevará al día un Libro-Registro de la Gestión de RCD que será presentado, al menos, mensualmente al Director de Obra. En el Libro-Registro se indicarán y/o recogerá, al menos, la siguiente información en formato tabla:

- Identificación del residuo (Código de la LER -Lista Europea de Residuos publicada por la Orden MAM/304/2002).
- Fecha de la retirada.
- Cantidad (toneladas y/o m^3).
- Identificación del gestor transportista (matrícula del vehículo y código de su autorización).
- Identificación del gestor de tratamiento -valorizador/eliminador- (código de su autorización).
- Operación de gestión a la que se ha destinado el residuo (valorización o eliminación) según el Anejo 1 de la Orden MAM 304/2002.
- Operaciones de reutilización o valorización in situ.
- Referencia de los documentos de retirada-gestión (justificantes de entrega).
- Coste de la gestión del residuo.

Asimismo, formarán parte del Libro-Registro de RCD los siguientes documentos:

- Copia de las autorizaciones de los gestores (transportistas, valorizadores y/o eliminadores) emitidas por los organismos competentes en materia de medio ambiente de las Comunidades Autónomas.

- Documentos de aceptación de los residuos por parte de los gestores de tratamiento (valorización o eliminación).
- Justificantes de entrega de los residuos a los gestores de recogida, almacenamiento transportaste o transferencia.
- Documentos de control y seguimiento de los RCD (en el caso de los residuos peligrosos).
- Documentos acreditativos de la reutilización de materiales.

Registros derivados del control de subcontratistas.

- Registros de formación.
- Inscripción en el Registro de actividades de valorización de residuos no peligrosos de construcción y demolición en la propia obra en la que se han producido.

El Plan deberá contener:

- Formato de tabla para la recogida de la información anteriormente detallada.

Almacenamiento, entrega y destino de los RCD: Tal como establece el artículo 5.2 del Real Decreto 105/2008 el contratista poseedor de RCD:

- deberá mantenerlos en condiciones adecuadas de higiene y seguridad, así como a evitar la mezcla de fracciones ya seleccionadas que impida o dificulte su posterior valorización o eliminación.
- cuando no proceda a gestionarlos por sí mismo, y sin perjuicio de los requerimientos del proyecto aprobado, estará obligado a entregarlos a un gestor de residuos o a participar en un acuerdo voluntario o convenio de colaboración para su gestión.
- destinará los residuos de construcción y demolición preferentemente, y por este orden, a operaciones de reutilización, reciclado o a otras formas de valorización.

En este sentido, el contratista deberá atender al artículo 11 del Real Decreto 105/2008 en el que se recoge que “se prohíbe el depósito en vertedero de residuos de construcción y demolición que no hayan sido sometidos a alguna operación de tratamiento previo. Esta disposición no se aplicará a los residuos inertes cuyo tratamiento sea técnicamente inviable ni a los residuos de construcción y demolición cuyo tratamiento no contribuya a los objetivos establecidos en el artículo 1 ni a reducir los peligros para la salud humana o el medio ambiente.” Se considera “Tratamiento previo” lo establecido en el artículo 2.g) del Real Decreto 105/2008 “Tratamiento previo: proceso físico, térmico, químico o biológico, incluida la clasificación, que cambia las características de los residuos de construcción y demolición reduciendo su volumen o su peligrosidad, facilitando su manipulación, incrementando su potencial de valorización o mejorando su comportamiento en el vertedero.”

Control de subcontratistas: El contratista adjudicatario deberá asegurarse que los subcontratistas aceptan, conocen y cumplen el Plan de Gestión de RCD. Se deberán conservar los documentos firmados por los subcontratistas que han recibido la información en el Libro-Registro de la Gestión de RCD así como un listado con los subcontratistas identificando su actividad y periodo de trabajo. Se deberá adjuntar al Plan: el modelo de documento para acreditar la información suministrada al subcontratista.

Formación medioambiental: El contratista deberá asegurarse que todo el personal de la obra conoce sus responsabilidades para el cumplimiento del Plan de Gestión de RCD. Asimismo deberá elaborar y distribuir a todo el personal de obra, incluidos los subcontratistas, documentación formativa en la que se recojan las principales directrices del Plan de Gestión de RCD. Dicha documentación formativa deberá contener al menos:

- Las actividades de obra susceptibles de generar RCD.
- Identificación de los RCD que se generarán en la obra.
- Directrices para la clasificación y recogida selectiva de los residuos.
- Ubicación de las zonas recogida, clasificación, acopio y almacenamiento de residuos.
- Identificación y modo de contacto con el Responsable de la Gestión de RCD.
- Cartelería informativa asociada a la gestión de RCD.

Se adjuntará al Plan:

- Modelo para el registro de los trabajadores que han recibido la formación medioambiental relativa a la gestión de los RCD
- Contenido de los cursos de formación de gestión de RCD

Planos: El Plan deberá contener, en su caso, los siguientes planos de instalaciones previstas para el almacenamiento, manejo, separación y gestión de RCD:

- Localización de contenedores (tipo y tamaño)
- Localización de zonas de acopio de residuos
- Localización de zonas de materiales reutilizables
- Localización de zonas excluidas para almacenamiento de residuos
- Localización de planta machacadora o compactadora
- Localización de zonas de mantenimiento de equipos y maquinaria
- Flujograma de residuos en obra.

CAPÍTULO III – SEGURIDAD Y SALUD

Artículo 903 – Plan de seguridad y salud

En este Proyecto se incluye un Estudio de Seguridad y Salud con todos los documentos especificados en el Artículo 5 del Real Decreto1627/1997 de 24 de octubre de 1.997. El referido Documento será documento contractual del Proyecto y las prescripciones contenidas en su Pliego de Prescripciones Técnicas Particulares se consideran, a todos los efectos, como formando parte del presente Pliego. Asimismo, los precios de los Cuadros de Precios de dicha separata adicional, se consideran también, a todos los efectos, como integrantes de los correspondientes Cuadros de Precios 1 y 2, contenidos en el Documento Nº4 del presente Proyecto.

De acuerdo con el Decreto 1627/1997, de 24 de Octubre, el Contratista elaborará un Plan de

Seguridad y Salud, ajustado a su forma y medios de trabajo. La valoración de ese Plan no excederá del Presupuesto resultante del Estudio de Seguridad y Salud que forma parte del Proyecto; entendiéndose en otro caso, que cualquier exceso está comprendido en el porcentaje de coste indirecto que forma parte de los precios de su oferta. El abono del presupuesto correspondiente se realizará de acuerdo con el Cuadro de Precios del Estudio o, en su caso, del Plan de Seguridad y Salud redactado por el Contratista, una vez aprobado por el Promotor, que se considera documento del contrato a dichos efectos.

CAPÍTULO IV – SERVICIOS AFECTADOS

Artículo 904 – Saneamiento

Tal y como se ha indicado en la memoria del proyecto se ha detectado la presencia de un colector en la ubicación de la central, aunque no ha sido posible conocer más detalles del mismo. Por lo tanto, se ha presupuestado una partida alzada a justificar para la reposición de este servicio.

Para las excavaciones necesarias se seguirá lo dispuesto en el artículo 321 "Excavación en zanjas y pozos". Los tubos de saneamiento cumplirán con lo indicado en el artículo 413 "Tubos de PVC" y las arquetas y pozos, con lo indicado en el artículo 410. Para el relleno de las zanjas se seguirá lo dispuesto en el artículo 332 "Rellenos localizados.

El abono de esta unidad se hará mediante las unidades del Cuadro de Precios nº1, según sea excavación (m^3), tubo (m), arqueta o pozo (ud), o relleno (m^3).

Cáceres, febrero de 2016

El autor del proyecto,

Fdo.: Jesús Fernández González

DOCUMENTO Nº 4

PRESUPUESTO

ÍNDICE

1. MEDICIONES AUXILIARES

1.1. MOVIMIENTOS DE TIERRA

Según datos de AutoCAD Civil 3D:

Área de desbroce	1.644.801,732 m^2 (164,5 ha)
Volumen de desmonte	2.219.036,290 m^3
Volumen de terraplén	2.218.846,590 m^3

1.2. ACERO SECCIONES ESTRUCTURA

Según lo indicado en los planos y en el anejo nº 7:

Sección	**Nº barras/ módulo 12 m**	**Longitud barras/ módulo 12 m (m)**	**Nº barras/ módulo 100 m**	**Longitud barras/ módulo 100 m (m)**
H_12x12	260	437,476	2010	3.423,238
H_20x10	9	19,945	30	64,566
H_20x20	2	6,790	12	40,740
M_15x15	2	0,280	16	2,240
M_12x12	2	2,720	16	21,760
TOTAL	275	-	2084	-

Sección	**Peso barras/ módulo 12 m (kg)**	**Peso barras/ módulo 100 m (kg)**
H_12x12	17.816,262	139.325,787
H_20x10	1.037,140	3.357,432
H_20x20	405,363	2.432,178
M_15x15	49,448	395,584
M_12x12	307,360	2.458,880
TOTAL	19.615,573	147.969,861

1.3. ACERO CIMENTACIONES

Según lo indicado en los planos:

CIMENTACIÓN DEL APOYO SIMPLE				
BARRA	LONGITUD TOTAL	Nº DE BARRAS	PESO UNITARIO	PESO TOTAL
0,37 3,9 0,37	4,64 m	36	1,58 kg/m	263,92 kg
0,37 3,4 0,37	4,14 m	42	1,58 kg/m	274,73 kg
0,5 3,9 0,5	4,90 m	2	1,58 kg/m	15,48 kg
0,5 3,4 0,5	4,40 m	2	1,58 kg/m	13,90 kg

CIMENTACIÓN DEL APOYO DOBLE				
BARRA	LONGITUD TOTAL	Nº DE BARRAS	PESO UNITARIO	PESO TOTAL
0,37 3,1 0,37	3,84 m	36	1,58 kg/m	218,42 kg
0,37 3,4 0,37	4,14 m	32	1,58 kg/m	209,32 kg
0,5 3,4 0,5	4,40 m	2	1,58 kg/m	13,90 kg
0,5 3,0 0,5	4,00 m	2	1,58 kg/m	12,64 kg

CIMENTACIÓN	PESO TOTAL	CIMENTACIONES/MÓD. 100 m	PESO TOTAL/MÓD. 100 m
APOYO SIMPLE	568,03 kg	6	3.408,18 kg
APOYO DOBLE	454,28 kg	3	1.362,84 kg
			4.771,02 kg

2. MEDICIONES GENERALES

MEDICIONES

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	RESUMEN	UDS	LONGITUD	ANCHURA	ALTURA	PARCIALES	CANTIDAD
CAPÍTULO 1 ACTUACIONES PREVIAS							
U02CAB110	**m2 DESBROCE TERRENO SIN CLASIFICAR**						
	Desbroce y limpieza superficial de terreno sin clasificar, hasta 25 cm, por medios mecánicos, con carga y transporte de los productos resultantes a vertedero o lugar de empleo, incluyendo la retirada de arbolado menor de 10 cm.						
	Area Adquisicion Terrenos	1644801,732				1.644.801,73	
							1.644.801,73
U02CAB080	**ud TALADO ÁRBOL DIÁMETRO > 50 cm.**						
	Talado de árboles de diámetro mayor de 50 cm., troceado y apilado de los mismos en las zonas indicadas, incluso carga y transporte a vertedero de ramas y el resto de productos resultantes.						
	Según imagen satélite	350				350,00	
							350,00
U02CAB090	**ud DESTOCONADO ÁRBOL D > 50 cm.**						
	Destoconado de árboles de diámetro mayor de 50 cm., incluso carga y transporte a vertedero del tocón y relleno de tierra compactada del hueco resultante.						
	Según imagen satélite	350				350,00	
							350,00
CAPÍTULO 2 REPOSICIÓN SERVICIOS AFECTADOS							
PASA00001	**ud PARTIDA ALZADA PARA REPOSICIÓN COLECTOR**						
	Partida alzada para la reposición de colector detectado, incluye demolición, retirada, excavación, relleno, tubo y pozos.						
							1,00
CAPÍTULO 3 MOVIMIENTO DE TIERRAS							
U02CAD040	**m3 DESMONTE TERRENO S/CLASIF.**						
	Desmonte en terreno sin clasificar a cielo abierto, con medios mecánicos incluso empleo de compresor y explosivos en caso necesario, con carga y transporte de los productos resultantes a vertedero o lugar de empleo.						
	Según Anejo nº 9	2219036,29				2.219.036,29	
							2.219.036,29
U02CAT075	**m3 TERRAPLÉN**						
	Terraplén con productos procedentes de la excavación, extendido en tongadas de 30 cm de espesor, humectación y compactación hasta el 95% del proctor modificado, incluso perfilado de taludes y rasanteo de la superficie de coronación, totalmente terminado.						
	Según Anejo nº 9	2218846,59				2.218.846,59	
							2.218.846,59

U02CAD105 m3 **EXCAVA. CIMIENTOS ESTRUCTURAS**

Excavación para los cimientos de las estructuras, incluso carga sobre camión de los productos resultantes de la excavación.

Cimentación apoyo simple	3936	4,00	3,50	0,65	35.817,60
Cimentación apoyo doble	1968	3,50	3,15	0,65	14.103,18

49.920,78

CAPÍTULO 4 ESTRUCTURAS

SUBCAPÍTULO 3.1 CIMENTACIONES

U03CHC025 m3 **HORM. HA-25/P/20/IIa CIM.V.MANUAL**

Hormigón para armar HA-25/P/40/IIa, de 25 N/mm2., consistencia blanda, Tmáx. 40 mm. y ambiente humedad alta, elaborado en central en relleno de zapatas y zanjas de cimentación, incluso encamillado de pilares y muros, vertido por medios manuales, vibrado, curado y colocado.Según EHE-08 y DB-SE-C.

Cimentación apoyo simple	3936	4,00	3,50	0,60	33.062,40
Cimentación apoyo doble	1968	3,50	3,15	0,60	13.018,32

46.080,72

E04CM045 m3 **HORM.LIMPIEZA HM-5/B/20 V.MANUAL**

Hormigón en masa HM-5/B/20, de 5 N/mm2., consistencia blanda, Tmáx.20 mm. elaborado en obra para limpieza y nivelado de fondos de cimentación, incluso vertido por medios manuales y colocación. Según EHE-08 y DB-SE-C.

Cimentación apoyo simple	3936	4,00	3,50	0,10	5.510,40
Cimentación apoyo doble	1968	3,50	3,15	0,10	2.169,72

7.680,12

U03CA020 kg **ACERO CORRUGADO B 500 S**

Acero corrugado B 500 S, cortado, doblado, armado y colocado en obra, incluso p.p. de despuntes. Según EHE.

Cimentación apoyo simple	656	3.408,18	2.235.766,08
Cimentación apoyo doble	656	1.362,84	894.023,04

3.129.789,12

E04AP045 ud **PLACA CIMEN.45x45x2,5cm. C/PERN.**

Placa de anclaje de acero S 275 JR en perfil plano para atornillar en cimentación, de dimensiones 45x45x2,5 cm con seis patillas de redondo corrugado de 16 mm de diámetro, con longitud total de 0,60 m roscadas, i/taladro central, totalmente colocado. Según normas EHE-08 y DB-SE.

Cimentación apoyo simple	656	6,00	2,00	7.872,00
Cimentación apoyo doble	656	3,00	4,00	7.872,00

15.744,00

U03CEF015 m2 **ENCOF.MET.EN CIMENTACION**

Encofrado y desencofrado metálico en cimentación, hasta 50 posturas .

Cimentación apoyo simple	3936	0,20	9,00	7.084,80
Cimentación apoyo doble	1968	0,20	7,98	3.140,93

10.225,73

SUBCAPÍTULO 3.2 ESTRUCTURAS METÁLICAS

E05AS015 kg **ACERO S355 ESTRUCTURA ESP.LAMINADO**

Acero laminado S355, en perfiles, para estructuras espaciales con perfiles laminados sección rectangular; i/p.p. de nudos y piezas especiales, dos manos de imprimación de minio de plomo, totalmente montada y colocada. Según CTE-DB-SE-A y EAE.

Según mediciones auxiliares	656	147.969,86	97.068.228,16

97.068.228,16

E15HS045 **m2** **PINTURA ANTIOXIDANTE ESTR. METÁLICA**

Pintura antioxidante sobre estructura metálica, i/limpieza y capa antioxidante.

Sección H_12x12	565	1.643,15	928.379,75	
Sección H_20x10	565	38,74	21.888,10	
Sección H_20x20	565	32,59	18.413,35	
Sección M_15x15	565	1,34	757,10	
Sección M_12x12	565	10,45	5.904,25	
				975.342,55

CAPÍTULO 5 INTEGRACIÓN AMBIENTAL

U12SS070 **ha** **HIDROSIEMBRA TALUD Z.SEMIÁRIDAS**

Hidrosiembra de taludes a base de una primera pasada con mezcla de semillas (25 % Agropyrum cristatum, 10 % Agropyrum elongatum, 5 % Poa compressa, 25 % Lolium rigidum, 5 % Buchloe dactyloides, 10 % Medicago media, 15 % Melilotus officinalis, 5 % Melilotus alba), abono mineral complejo de liberación lenta 8-15-15, mulch orgánico, estabilizadores orgánicos y polímero absorbente de agua, tapado inmediatamente después con mulch y estabilizador orgánico.

Taludes explanación	1	6,48	6,48	
				6,48

U09PA205 **ud** **CUPRESSUS SEMPERV.STRICTA 2,5-3**

Cupressus sempervirens stricta (Ciprés piramidal) de 2,50 a 3 m. de altura, suministrado en cepellón escayolado y plantación en hoyo de 1x1x1 m. con los medios indicados, abonado, formación de alcorque y primer riego.

Dos unidades por metro de zona de plantación s/planos	2	3.120,00	6.240,00	
				6.240,00

CAPÍTULO 6 VARIOS

U07WI010 **m2** **IMPERMEABILIZACIÓN BALSAS LÁMINA PEAD**

Impermeabilización del fondo y taludes de la balsa mediante lámina de polietileno de alta densidad de 1,5 cm de espesor, incluida instalación y parte proporcional de solapes y anclajes incluida.

Taludes balsas	3	7.702,85	23.108,55	
Fondo balsas	3	22.801,00	68.403,00	
				91.511,55

E13JVAG060 **m** **VALLADO DE PARCELA**

Cerramiento de parcela formado por malla de simple torsión, de 15 mm de paso de malla y 1,5 mm de diámetro, acabado galvanizado y postes de acero galvanizado, de 48 mm de diámetro y 3 m de altura.

Límite explanación	1	5.521,00	5.521,00	
				5.521,00

E13JVPB115 **ud** **PUERTA CORR. S/CARRIL TUBO 8x3**

Puerta corredera sobre carril de una hoja de 8x3 m. formada por bastidor de tubo de acero laminado 80x40x1,5 mm. y barrotes de 30x30x1,5 mm. galvanizado en caliente por inmersión Z-275 provistas de cojinetes de fricción, carril de rodadura para empotrar en el pavimento, poste de tope y puente guía provistos de rodillos de teflón con ajuste lateral, orejitas para cerradura, elaborada en taller, ajuste y montaje en obra.

Puerta de entrada	1	1,00	
			1,00

PA0000002 **ud** **PARTIDA ALZADA PARA LIMPIEZA Y ACABADO DE LAS OBRAS**

Partida alzada a justificar para limpieza y acabado de las obras

1,00

CAPÍTULO 7 SEGURIDAD Y SALUD

PASS00001	**ud**	**PARTIDA ALZADA DE SEGURIDAD Y SALUD**	
		Partida alzada correspondiente al presupuesto de Seguridad y Salud justificado en el anejo	
			1,00

CAPÍTULO 8 GESTIÓN DE RESIDUOS

PARCD0001	**ud**	**PARTIDA ALZADA DE GESTIÓN DE RESIDUOS**	
		Partida alzada de gestión de residuos de construcción y demolición incluido el transporte de residuos desde la obra hasta la planta gestora autorizada, sin separación de los residuos en obra, incluso canon de solicitud y aceptación de RCDs. Según presupuesto en anejo correspondiente.	
			1,00

3. CUADRO DE PRECIOS Nº 1

CUADRO DE PRECIOS 1

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	UD	RESUMEN	PRECIO
CAPÍTULO 1 ACTUACIONES PREVIAS			
U02CAB110	**m2**	**DESBROCE TERRENO SIN CLASIFICAR**	**0,74**
		Desbroce y limpieza superficial de terreno sin clasificar, hasta 25 cm, por medios mecánicos, con carga y transporte de los productos resultantes a vertedero o lugar de empleo, incluyendo la retirada de arbolado menor de 10 cm.	
		CERO EUROS con SETENTA Y CUATRO CÉNTIMOS	
U02CAB080	**ud**	**TALADO ÁRBOL DIÁMETRO > 50 cm.**	**49,93**
		Talado de árboles de diámetro mayor de 50 cm., troceado y apilado de los mismos en las zonas indicadas, incluso carga y transporte a vertedero de ramas y el resto de productos resultantes.	
		CUARENTA Y NUEVE EUROS con NOVENTA Y TRES CÉNTIMOS	
U02CAB090	**ud**	**DESTOCONADO ÁRBOL D > 50 cm.**	**46,38**
		Destoconado de árboles de diámetro mayor de 50 cm., incluso carga y transporte a vertedero del tocón y relleno de tierra compactada del hueco resultante.	
		CUARENTA Y SEIS EUROS con TREINTA Y OCHO CÉNTIMOS	
CAPÍTULO 2 REPOSICIÓN SERVICIOS AFECTADOS			
PASA00001	**ud**	**PARTIDA ALZADA PARA REPOSICIÓN COLECTOR**	**139.405,60**
		Partida alzada para la reposición de colector detectado, incluye demolición, retirada, excavación, relleno, tubo y pozos.	
		CIENTO TREINTA Y NUEVE MIL CUATROCIENTOS CINCO EUROS con SESENTA CÉNTIMOS	

CAPÍTULO 3 MOVIMIENTO DE TIERRAS

U02CAD040 m3 **DESMONTE TERRENO S/CLASIF.** **3,66**

Desmonte en terreno sin clasificar a cielo abierto, con medios mecánicos incluso empleo de compresor y explosivos en caso necesario, con carga y transporte de los productos resultantes a vertedero o lugar de empleo.

TRES EUROS con SESENTA Y SEIS CÉNTIMOS

U02CAT075 m3 **TERRAPLÉN** **1,60**

Terraplén con productos procedentes de la excavación, extendido en tongadas de 30 cm de espesor, humectación y compactación hasta el 95% del proctor modificado, incluso perfilado de taludes y rasanteo de la superficie de coronación, totalmente terminado.

UN EURO con SESENTA CÉNTIMOS

U02CAD105 m3 **EXCAVA. CIMIENTOS ESTRUCTURAS** **3,11**

Excavación para los cimientos de las estructuras, incluso carga sobre camión de los productos resultantes de la excavación.

TRES EUROS con ONCE CÉNTIMOS

CAPÍTULO 4 ESTRUCTURAS

SUBCAPÍTULO 3.1 CIMENTACIONES

U03CHC025 m3 **HORM. HA-25/P/20/IIa CIM.V.MANUAL** **73,97**

Hormigón para armar HA-25/P/40/IIa, de 25 N/mm2., consistencia blanda, Tmáx. 40 mm. y ambiente humedad alta, elaborado en central en relleno de zapatas y zanjas de cimentación, incluso encamillado de pilares y muros, vertido por medios manuales, vibrado, curado y colocado.Según EHE-08 y DB-SE-C.

SETENTA Y TRES EUROS con NOVENTA Y SIETE CÉNTIMOS

E04CM045 m3 **HORM.LIMPIEZA HM-5/B/20 V.MANUAL** **54,90**

Hormigón en masa HM-5/B/20, de 5 N/mm2., consistencia blanda, Tmáx.20 mm. elaborado en obra para limpieza y nivelado de fondos de cimentación, incluso vertido por medios manuales y colocación. Según EHE-08 y DB-SE-C.

CINCUENTA Y CUATRO EUROS con NOVENTA CÉNTIMOS

U03CA020 kg **ACERO CORRUGADO B 500 S** **2,36**

Acero corrugado B 500 S, cortado, doblado, armado y colocado en obra, incluso p.p. de despuntes. Según EHE.

DOS EUROS con TREINTA Y SEIS CÉNTIMOS

E04AP045 ud **PLACA CIMEN.45x45x2,5cm. C/PERN.** **76,89**

Placa de anclaje de acero S 275 JR en perfil plano para atornillar en cimentación, de dimensiones 45x45x2,5 cm con seis patillas de redondo corrugado de 16 mm de diámetro, con longitud total de 0,60 m roscadas, i/taladro central, totalmente colocado. Según normas EHE-08 y DB-SE.

SETENTA Y SEIS EUROS con OCHENTA Y NUEVE CÉNTIMOS

U03CEF015 m2 **ENCOF.MET.EN CIMENTACION** **7,91**

Encofrado y desencofrado metálico en cimentación, hasta 50 posturas .

SIETE EUROS con NOVENTA Y UN CÉNTIMOS

SUBCAPÍTULO 3.2 ESTRUCTURAS METÁLICAS

E05AS015 kg **ACERO S355 ESTRUCTURA ESP.LAMINADO** **1,79**

Acero laminado S355, en perfiles, para estructuras espaciales con perfiles laminados sección rectangular; i/p.p. de nudos y piezas especiales, dos manos de imprimación de minio de plomo, totalmente montada y colocada. Según CTE-DB-SE-A y EAE.

UN EURO con SETENTA Y NUEVE CÉNTIMOS

E15HS045 m2 **PINTURA ANTIOXIDANTE ESTR. METÁLICA** **4,12**

Pintura antioxidante sobre estructura metálica, i/limpieza y capa antioxidante.

CUATRO EUROS con DOCE CÉNTIMOS

CAPÍTULO 5 INTEGRACIÓN AMBIENTAL

U12SS070 **ha** **HIDROSIEMBRA TALUD Z.SEMIÁRIDAS** **7.584,55**

Hidrosiembra de taludes a base de una primera pasada con mezcla de semillas (25 % Agropyrum cristatum, 10 % Agropyrum elongatum, 5 % Poa compressa, 25 % Lolium rigidum, 5 % Buchloe dactyloides, 10 % Medicago media, 15 % Melilotus officinalis, 5 % Melilotus alba), abono mineral complejo de liberación lenta 8-15-15, mulch orgánico, estabilizadores orgánicos y polímero absorbente de agua, tapado inmediatamente después con mulch y estabilizador orgánico.

SIETE MIL QUINIENTOS OCHENTA Y CUATRO EUROS con CINCUENTA Y CINCO CÉNTIMOS

U09PA205 **ud** **CUPRESSUS SEMPERV.STRICTA 2,5-3** **120,58**

Cupressus sempervirens stricta (Ciprés piramidal) de 2,50 a 3 m. de altura, suministrado en cepellón escayolado y plantación en hoyo de 1x1x1 m. con los medios indicados, abonado, formación de alcorque y primer riego.

CIENTO VEINTE EUROS con CINCUENTA Y OCHO CÉNTIMOS

CAPÍTULO 6 VARIOS

U07WI010 **m2** **IMPERMEABILIZACIÓN BALSAS LÁMINA PEAD** **14,38**

Impermeabilización del fondo y taludes de la balsa mediante lámina de polietileno de alta densidad de 1,5 cm de espesor, incluida instalación y parte proporcional de solapes y anclajes incluida.

CATORCE EUROS con TREINTA Y OCHO CÉNTIMOS

E13JVAG060 **m** **VALLADO DE PARCELA** **29,85**

Cerramiento de parcela formado por malla de simple torsión, de 15 mm de paso de malla y 1,5 mm de diámetro, acabado galvanizado y postes de acero galvanizado, de 48 mm de diámetro y 3 m de altura.

VEINTINUEVE EUROS con OCHENTA Y CINCO CÉNTIMOS

E13JVPB115 **ud** **PUERTA CORR. S/CARRIL TUBO 8x3** **4.004,75**

Puerta corredera sobre carril de una hoja de 8x3 m. formada por bastidor de tubo de acero laminado 80x40x1,5 mm. y barrotes de 30x30x1,5 mm. galvanizado en caliente por inmersión Z-275 provistas de cojinetes de fricción, carril de rodadura para empotrar en el pavimento, poste de tope y puente guía provistos de rodillos de teflón con ajuste lateral, orejitas para cerradura, elaborada en taller, ajuste y montaje en obra.

CUATRO MIL CUATRO EUROS con SETENTA Y CINCO CÉNTIMOS

PA0000002 **ud** **PARTIDA ALZADA PARA LIMPIEZA Y ACABADO DE LAS OBRAS** **12.000,00**

Partida alzada a justificar para limpieza y acabado de las obras

DOCE MIL EUROS

CAPÍTULO 7 SEGURIDAD Y SALUD

PASS00001 **ud** **PARTIDA ALZADA DE SEGURIDAD Y SALUD** **885.867,74**

Partida alzada correspondiente al presupuesto de Seguridad y Salud justificado en el anejo

OCHOCIENTOS OCHENTA Y CINCO MIL OCHOCIENTOS SESENTA Y SIETE EUROS con SETENTA Y CUATRO CÉNTIMOS

CAPÍTULO 8 GESTIÓN DE RESIDUOS

PARCD0001 **ud** **PARTIDA ALZADA DE GESTIÓN DE RESIDUOS** **1.181.084,34**

Partida alzada de gestión de residuos de construcción y demolición incluido el transporte de residuos desde la obra hasta la planta gestora autorizada, sin separación de los residuos en obra, incluso canon de solicitud y aceptación de RCDs. Según presupuesto en anejo correspondiente.

UN MILLÓN CIENTO OCHENTA Y UN MIL OCHENTA Y CUATRO EUROS con TREINTA Y CUATRO CÉNTIMOS

4. CUADRO DE PRECIOS Nº 2

CUADRO DE PRECIOS 2

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO	UD	RESUMEN		PRECIO
CAPÍTULO 1 ACTUACIONES PREVIAS				
U02CAB110	**m2**	**DESBROCE TERRENO SIN CLASIFICAR**		
		Desbroce y limpieza superficial de terreno sin clasificar, hasta 25 cm, por medios mecánicos, con carga y transporte de los productos resultantes a vertedero o lugar de empleo, incluyendo la retirada de arbolado menor de 10 cm.		
		Mano de obra		0,13
		Maquinaria		0,59
		Suma la partida		0,72
		Costes indirectos	3,00%	0,02
		TOTAL PARTIDA		**0,74**
U02CAB080	**ud**	**TALADO ÁRBOL DIÁMETRO > 50 cm.**		
		Talado de árboles de diámetro mayor de 50 cm., troceado y apilado de los mismos en las zonas indicadas, incluso carga y transporte a vertedero de ramas y el resto de productos resultantes.		
		Mano de obra		24,96
		Maquinaria		23,52
		Suma la partida		48,48
		Costes indirectos	3,00%	1,45
		TOTAL PARTIDA		**49,93**
U02CAB090	**ud**	**DESTOCONADO ÁRBOL D > 50 cm.**		
		Destoconado de árboles de diámetro mayor de 50 cm., incluso carga y transporte a vertedero del tocón y relleno de tierra compactada del hueco resultante.		
		Mano de obra		9,36
		Maquinaria		35,67
		Suma la partida		45,03
		Costes indirectos	3,00%	1,35
		TOTAL PARTIDA		**46,38**
CAPÍTULO 2 REPOSICIÓN SERVICIOS AFECTADOS				
PASA00001	**ud**	**PARTIDA ALZADA PARA REPOSICIÓN COLECTOR**		
		Partida alzada para la reposición de colector detectado, incluye demolición, retirada, excavación, relleno, tubo y pozos.		
PARTIDA		**TOTAL**	**139.405,60**	

CAPÍTULO 3 MOVIMIENTO DE TIERRAS

U02CAD040 **m3** **DESMONTE TERRENO S/CLASIF.**

Desmonte en terreno sin clasificar a cielo abierto, con medios mecánicos incluso empleo de compresor y explosivos en caso necesario, con carga y transporte de los productos resultantes a vertedero o lugar de empleo.

Mano de obra		0,38
Maquinaria		3,08
Resto de obra y materiales		0,09
Suma la partida		3,55
Costes indirectos	3,00%	0,11
TOTAL PARTIDA		**3,66**

U02CAT075 **m3** **TERRAPLÉN**

Terraplén con productos procedentes de la excavación, extendido en tongadas de 30 cm de espesor, humectación y compactación hasta el 95% del proctor modificado, incluso perfilado de taludes y rasanteo de la superficie de coronación, totalmente terminado.

Mano de obra		0,25
Maquinaria		1,30
Suma la partida		1,55
Costes indirectos	3,00%	0,05
TOTAL PARTIDA		**1,60**

U02CAD105 **m3** **EXCAVA. CIMIENTOS ESTRUCTURAS**

Excavación para los cimientos de las estructuras, incluso carga sobre camión de los productos resultantes de la excavación.

Mano de obra		0,12
Maquinaria		2,90
Suma la partida		3,02
Costes indirectos	3,00%	0,09
TOTAL PARTIDA		**3,11**

CAPÍTULO 4 ESTRUCTURAS

SUBCAPÍTULO 3.1 CIMENTACIONES

U03CHC025 **m3** **HORM. HA-25/P/20/IIa CIM.V.MANUAL**

Hormigón para armar HA-25/P/40/IIa, de 25 N/mm2., consistencia blanda, Tmáx. 40 mm. y ambiente humedad alta, elaborado en central en relleno de zapatas y zanjas de cimentación, incluso encamillado de pilares y muros, vertido por medios manuales, vibrado, curado y colocado.Según EHE-08 y DB-SE-C.

Mano de obra		7,50
Maquinaria		0,49
Resto de obra y materiales		63,83
Suma la partida		71,82
Costes indirectos	3,00%	2,15
TOTAL PARTIDA		**73,97**

E04CM045 **m3** **HORM.LIMPIEZA HM-5/B/20 V.MANUAL**

Hormigón en masa HM-5/B/20, de 5 N/mm2., consistencia blanda, Tmáx.20 mm. elaborado en obra para limpieza y nivelado de fondos de cimentación, incluso vertido por medios manuales y colocación. Según EHE-08 y DB-SE-C.

Mano de obra		8,84
Maquinaria		0,97
Resto de obra y materiales		43,49
Suma la partida		53,30
Costes indirectos	3,00%	1,60
TOTAL PARTIDA		**54,90**

U03CA020 **kg** **ACERO CORRUGADO B 500 S**

Acero corrugado B 500 S, cortado, doblado, armado y colocado en obra, incluso p.p. de despuntes. Según EHE.

Mano de obra		0,36
Resto de obra y materiales		1,93
Suma la partida		2,29
Costes indirectos	3,00%	0,07
TOTAL PARTIDA		**2,36**

E04AP045 **ud** **PLACA CIMEN.45x45x2,5cm. C/PERN.**

Placa de anclaje de acero S 275 JR en perfil plano para atornillar en cimentación, de dimensiones 45x45x2,5 cm con seis patillas de redondo corrugado de 16 mm de diámetro, con longitud total de 0,60 m roscadas, i/taladro central, totalmente colocado. Según normas EHE-08 y DB-SE.

Mano de obra		18,27
Resto de obra y materiales		56,38
Suma la partida		74,65
Costes indirectos	3,00%	2,24
TOTAL PARTIDA		**76,89**

U03CEF015 **m2** **ENCOF.MET.EN CIMENTACION**

Encofrado y desencofrado metálico en cimentación, hasta 50 posturas .

Mano de obra		5,70
Maquinaria		0,57
Resto de obra y materiales		1,41
Suma la partida		7,68
Costes indirectos	3,00%	0,23
TOTAL PARTIDA		**7,91**

SUBCAPÍTULO 3.2 ESTRUCTURAS METÁLICAS

E05AS015 **kg** **ACERO S355 ESTRUCTURA ESP.LAMINADO**

Acero laminado S355, en perfiles, para estructuras espaciales con perfiles laminados sección rectangular; i/p.p. de nudos y piezas especiales, dos manos de imprimación de minio de plomo, totalmente montada y colocada. Según CTE-DB-SE-A y EAE.

Mano de obra		0,23
Maquinaria		0,25
Resto de obra y materiales		1,26
Suma la partida		1,74
Costes indirectos	3,00%	0,05
TOTAL PARTIDA		**1,79**

E15HS045 **m2** **PINTURA ANTIOXIDANTE ESTR. METÁLICA**

Pintura antioxidante sobre estructura metálica, i/limpieza y capa antioxidante.

Mano de obra		0,43
Resto de obra y materiales		3,57
Suma la partida		4,00
Costes indirectos	3,00%	0,12
TOTAL PARTIDA		**4,12**

CAPÍTULO 5 INTEGRACIÓN AMBIENTAL

U12SS070 **ha** **HIDROSIEMBRA TALUD Z.SEMIÁRIDAS**

Hidrosiembra de taludes a base de una primera pasada con mezcla de semillas (25 % Agropyrum cristatum, 10 % Agropyrum elongatum, 5 % Poa compressa, 25 % Lolium rigidum, 5 % Buchloe dactyloides, 10 % Medicago media, 15 % Melilotus officinalis, 5 % Melilotus alba), abono mineral complejo de liberación lenta 8-15-15, mulch orgánico, estabilizadores orgánicos y polímero absorbente de agua, tapado inmediatamente después con mulch y estabilizador orgánico.

Mano de obra		189,12
Maquinaria		983,52
Resto de obra y materiales		6.191,00
Suma la partida		7.363,64
Costes indirectos	3,00%	220,91
TOTAL PARTIDA		**7.584,55**

U09PA205 **ud** **CUPRESSUS SEMPERV.STRICTA 2,5-3**

Cupressus sempervirens stricta (Ciprés piramidal) de 2,50 a 3 m. de altura, suministrado en cepellón escayolado y plantación en hoyo de 1x1x1 m. con los medios indicados, abonado, formación de alcorque y primer riego.

Mano de obra		11,08
Maquinaria		24,79
Resto de obra y materiales		81,20
Suma la partida		117,07
Costes indirectos	3,00%	3,51
TOTAL PARTIDA		**120,58**

CAPÍTULO 6 VARIOS

U07WI010 **m2** **IMPERMEABILIZACIÓN BALSAS LÁMINA PEAD**

Impermeabilización del fondo y taludes de la balsa mediante lámina de polietileno de alta densidad de 1,5 cm de espesor, incluida instalación y parte proporcional de solapes y anclajes incluida.

Mano de obra		1,55
Resto de obra y materiales		12,41
Suma la partida		13,96
Costes indirectos	3,00%	0,42
TOTAL PARTIDA		**14,38**

E13JVAG060 **m** **VALLADO DE PARCELA**

Cerramiento de parcela formado por malla de simple torsión, de 15 mm de paso de malla y 1,5 mm de diámetro, acabado galvanizado y postes de acero galvanizado, de 48 mm de diámetro y 3 m de altura.

Mano de obra		3,09
Maquinaria		0,01
Resto de obra y materiales		25,88
Suma la partida		28,98
Costes indirectos	3,00%	0,87
TOTAL PARTIDA		**29,85**

E13JVPB115 **ud** **PUERTA CORR. S/CARRIL TUBO 8x3**

Puerta corredera sobre carril de una hoja de 8x3 m. formada por bastidor de tubo de acero laminado 80x40x1,5 mm. y barrotes de 30x30x1,5 mm. galvanizado en caliente por inmersión Z-275 provistas de cojinetes de fricción, carril de rodadura para empotrar en el pavimento, poste de tope y puente guía provistos de rodillos de teflón con ajuste lateral, orejitas para cerradura, elaborada en taller, ajuste y montaje en obra.

Mano de obra		246,48
Resto de obra y materiales		3.641,63
Suma la partida		3.888,11
Costes indirectos	3,00%	116,64
TOTAL PARTIDA		**4.004,75**

PA0000002 **ud** **PARTIDA ALZADA PARA LIMPIEZA Y ACABADO DE LAS OBRAS**

Partida alzada a justificar para limpieza y acabado de las obras

TOTAL PARTIDA **12.000,00**

CAPÍTULO 7 SEGURIDAD Y SALUD

PASS00001 **ud** **PARTIDA ALZADA DE SEGURIDAD Y SALUD**

Partida alzada correspondiente al presupuesto de Seguridad y Salud justificado en el anejo

TOTAL PARTIDA **885.867,74**

CAPÍTULO 8 GESTIÓN DE RESIDUOS

PARCD0001	**ud**	**PARTIDA ALZADA DE GESTIÓN DE RESIDUOS**
		Partida alzada de gestión de residuos de construcción y demolición incluido el transporte de residuos desde la obra hasta la planta gestora autorizada, sin separación de los residuos en obra, incluso canon de solicitud y aceptación de RCDs. Según presupuesto en anejo correspondiente.

TOTAL PARTIDA **1.181.084,34**

5. PRESUPUESTOS PARCIALES

PRESUPUESTO

PLANTA TERMOSOLAR EN LLERENA

CÓDIGO		RESUMEN	CANTIDAD	PRECIO	IMPORTE
CAPÍTULO 1 ACTUACIONES PREVIAS					
U02CAB110	**m2**	**DESBROCE TERRENO SIN CLASIFICAR**			
		Desbroce y limpieza superficial de terreno sin clasificar, hasta 25 cm, por medios mecánicos, con carga y transporte de los productos resultantes a vertedero o lugar de empleo, incluyendo la retirada de arbolado menor de 10 cm.	1.644.801,73	0,74	1.217.153,28
U02CAB080	**ud**	**TALADO ÁRBOL DIÁMETRO > 50 cm.**			
		Talado de árboles de diámetro mayor de 50 cm., troceado y apilado de los mismos en las zonas indicadas, incluso carga y transporte a vertedero de ramas y el resto de productos resultantes.	350,00	49,93	17.475,50
U02CAB090	**ud**	**DESTOCONADO ÁRBOL D > 50 cm.**			
		Destoconado de árboles de diámetro mayor de 50 cm., incluso carga y transporte a vertedero del tocón y relleno de tierra compactada del hueco resultante.	350,00	46,38	16.233,00

TOTAL CAPÍTULO 1 ACTUACIONES PREVIAS **1.250.861,78**

CÓDIGO		RESUMEN	CANTIDAD	PRECIO	IMPORTE
CAPÍTULO 2 REPOSICIÓN SERVICIOS AFECTADOS					
PASA00001	**ud**	**PARTIDA ALZADA PARA REPOSICIÓN COLECTOR**			
		Partida alzada para la reposición de colector detectado, incluye demolición, retirada, excavación, relleno, tubo y pozos.	1,00	139.405,60	139.405,60

TOTAL CAPÍTULO 2 REPOSICIÓN SERVICIOS AFECTADOS **139.405,60**

CAPÍTULO 3 MOVIMIENTO DE TIERRAS

U02CAD040	m3	**DESMONTE TERRENO S/CLASIF.** Desmonte en terreno sin clasificar a cielo abierto, con medios mecánicos incluso empleo de compresor y explosivos en caso necesario, con carga y transporte de los productos resultantes a vertedero o lugar de empleo.	2.219.036,29	3,66	8.121.672,82
U02CAT075	m3	**TERRAPLÉN** Terraplén con productos procedentes de la excavación, extendido en tongadas de 30 cm de espesor, humectación y compactación hasta el 95% del proctor modificado, incluso perfilado de taludes y rasanteo de la superficie de coronación, totalmente terminado.	2.218.846,59	1,60	3.550.154,54
U02CAD105	m3	**EXCAVA. CIMIENTOS ESTRUCTURAS** Excavación para los cimientos de las estructuras, incluso carga sobre camión de los productos resultantes de la excavación.	49.920,78	3,11	155.253,63

TOTAL CAPÍTULO 3 MOVIMIENTO DE TIERRAS.. 11.827.080,99

CAPÍTULO 4 ESTRUCTURAS

SUBCAPÍTULO 3.1 CIMENTACIONES

U03CHC025	m3	**HORM. HA-25/P/20/IIa CIM.V.MANUAL** Hormigón para armar HA-25/P/40/IIa, de 25 N/mm2., consistencia blanda, Tmáx. 40 mm. y ambiente humedad alta, elaborado en central en relleno de zapatas y zanjas de cimentación, incluso encamillado de pilares y muros, vertido por medios manuales, vibrado, curado y colocado.Según EHE-08 y DB-SE-C.	46.080,72	73,97	3.408.590,86
E04CM045	m3	**HORM.LIMPIEZA HM-5/B/20 V.MANUAL** Hormigón en masa HM-5/B/20, de 5 N/mm2., consistencia blanda, Tmáx.20 mm. elaborado en obra para limpieza y nivelado de fondos de cimentación, incluso vertido por medios manuales y colocación. Según EHE-08 y DB-SE-C.	7.680,12	54,90	421.638,59
U03CA020	kg	**ACERO CORRUGADO B 500 S** Acero corrugado B 500 S, cortado, doblado, armado y colocado en obra, incluso p.p. de despuntes. Según EHE.	3.129.789,12	2,36	7.386.302,32
E04AP045	ud	**PLACA CIMEN.45x45x2,5cm. C/PERN.** Placa de anclaje de acero S 275 JR en perfil plano para atornillar en cimentación, de dimensiones 45x45x2,5 cm con seis patillas de redondo corrugado de 16 mm de diámetro, con longitud total de 0,60 m roscadas, i/taladro central, totalmente colocado. Según normas EHE-08 y DB-SE.	15.744,00	76,89	1.210.556,16
U03CEF015	m2	**ENCOF.MET.EN CIMENTACION** Encofrado y desencofrado metálico en cimentación, hasta 50 posturas .	10.225,73	7,91	80.885,52

TOTAL SUBCAPÍTULO 3.1 CIMENTACIONES.. 12.507.973,45

SUBCAPÍTULO 3.2 ESTRUCTURAS METÁLICAS

E05AS015	kg	**ACERO S355 ESTRUCTURA ESP.LAMINADO** Acero laminado S355, en perfiles, para estructuras espaciales con perfiles laminados sección rectangular; i/p.p. de nudos y piezas especiales, dos manos de imprimación de minio de plomo, totalmente montada y colocada. Según CTE-DB-SE-A y EAE.	97.068.228,16	1,79	173.752.128,41
E15HS045	m2	**PINTURA ANTIOXIDANTE ESTR. METÁLICA** Pintura antioxidante sobre estructura metálica, i/limpieza y capa antioxidante.	975.342,55	4,12	4.018.411,31

TOTAL SUBCAPÍTULO 3.2 ESTRUCTURAS METÁLICAS.. 177.770.539,72

TOTAL CAPÍTULO 4 ESTRUCTURAS 190.278.513,17

CAPÍTULO 5 INTEGRACIÓN AMBIENTAL

U12SS070 ha **HIDROSIEMBRA TALUD Z.SEMIÁRIDAS**

Hidrosiembra de taludes a base de una primera pasada con mezcla de semillas (25 % Agropyrum cristatum, 10 % Agropyrum elongatum, 5 % Poa compressa, 25 % Lolium rigidum, 5 % Buchloe dactyloides, 10 % Medicago media, 15 % Melilotus officinalis, 5 % Melilotus alba), abono mineral complejo de liberación lenta 8-15-15, mulch orgánico, estabilizadores orgánicos y polímero absorbente de agua, tapado inmediatamente después con mulch y estabilizador orgánico.

6,48 7.584,55 49.147,88

U09PA205 ud **CUPRESSUS SEMPERV.STRICTA 2,5-3**

Cupressus sempervirens stricta (Ciprés piramidal) de 2,50 a 3 m. de altura, suministrado en cepellón escayolado y plantación en hoyo de 1x1x1 m. con los medios indicados, abonado, formación de alcorque y primer riego.

6.240,00 120,58 752.419,20

TOTAL CAPÍTULO 5 INTEGRACIÓN AMBIENTAL 801.567,08

CAPÍTULO 6 VARIOS

U07WI010 m2 **IMPERMEABILIZACIÓN BALSAS LÁMINA PEAD**

Impermeabilización del fondo y taludes de la balsa mediante lámina de polietileno de alta densidad de 1,5 cm de espesor, incluida instalación y parte proporcional de solapes y anclajes incluida.

91.511,55 14,38 1.315.936,09

E13JVAG060 m **VALLADO DE PARCELA**

Cerramiento de parcela formado por malla de simple torsión, de 15 mm de paso de malla y 1,5 mm de diámetro, acabado galvanizado y postes de acero galvanizado, de 48 mm de diámetro y 3 m de altura.

5.521,00 29,85 164.801,85

E13JVPB115 ud **PUERTA CORR. S/CARRIL TUBO 8x3**

Puerta corredera sobre carril de una hoja de 8x3 m. formada por bastidor de tubo de acero laminado 80x40x1,5 mm. y barrotes de 30x30x1,5 mm. galvanizado en caliente por inmersión Z-275 provistas de cojinetes de fricción, carril de rodadura para empotrar en el pavimento, poste de tope y puente guía provistos de rodillos de teflón con ajuste lateral, orejitas para cerradura, elaborada en taller, ajuste y montaje en obra.

1,00 4.004,75 4.004,75

PA0000002 ud **PARTIDA ALZADA PARA LIMPIEZA Y ACABADO DE LAS OBRAS**

Partida alzada a justificar para limpieza y acabado de las obras

1,00 12.000,00 12.000,00

TOTAL CAPÍTULO 6 VARIOS 1.496.742,69

CAPÍTULO 7 SEGURIDAD Y SALUD

PASS00001 ud **PARTIDA ALZADA DE SEGURIDAD Y SALUD**

Partida alzada correspondiente al presupuesto de Seguridad y Salud justificado en el anejo

1,00 885.867,74 885.867,74

TOTAL CAPÍTULO 7 SEGURIDAD Y SALUD 885.867,74

CAPÍTULO 8 GESTIÓN DE RESIDUOS

PARCD0001 ud PARTIDA ALZADA DE GESTIÓN DE RESIDUOS

Partida alzada de gestión de residuos de construcción y demolición incluido el transporte de residuos desde la obra hasta la planta gestora autorizada, sin separación de los residuos en obra, incluso canon de solicitud y aceptación de RCDs. Según presupuesto en anejo correspondiente.

1,00 1.181.084,34 1.181.084,34

TOTAL CAPÍTULO 8 GESTIÓN DE RESIDUOS 1.181.084,34

TOTAL 207.861.123,39

6. RESUMEN DEL PRESUPUESTO

RESUMEN DE PRESUPUESTO

PLANTA TERMOSOLAR EN LLERENA

CAPITULO	RESUMEN	EUROS	%
1	ACTUACIONES PREVIAS	1.250.861,78	0,60
2	REPOSICIÓN SERVICIOS AFECTADOS	139.405,60	0,07
3	MOVIMIENTO DE TIERRAS	11.827.080,99	5,69
4	ESTRUCTURAS	190.278.513,17	91,54
5	INTEGRACIÓN AMBIENTAL	801.567,08	0,39
6	VARIOS	1.496.742,69	0,72
7	SEGURIDAD Y SALUD	885.867,74	0,43
8	GESTIÓN DE RESIDUOS	1.181.084,34	0,57
	TOTAL EJECUCIÓN MATERIAL	**207.861.123,39**	
	15,00 % GG + BI	31.179.168,51	
	21,00 % I.V.A.	50.198.461,30	
	TOTAL PRESUPUESTO CONTRATA	**289.238.753,20**	
	TOTAL PRESUPUESTO GENERAL	**289.238.753,20**	

Cáceres, febrero de 2016

El autor del proyecto,

Fdo: Jesús Fernández González