

DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO E TRANSPORTES
LABORATÓRIO DE SISTEMAS DE TRANSPORTE

PROJETO PONTO DE PARTIDA

PARTE II

EDIÇÃO UFRGS 2021/2

Daniel Sergio Presta Garcia
Gabriel Warken
Magno Vargas Bertoglio
Júlia Martins Rodríguez de Azevedo
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PORTO ALEGRE

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL

2022

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Mezzacasa.

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CAPÍTULO I

ConnectSul

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Bernardo Silva Ransolin
Nathália Fátima da Silva Dias

Morvana Machado
Daniel Sergio Presta Garcia

REPÚBLICA FEDERATIVA DO BRASIL
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL – UFRGS
ESCOLA DE ENGENHARIA – EE
DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO E TRANSPORTES – DEPROT
LABORATÓRIO DE SISTEMAS DE TRANSPORTE – PROGRAMA ProINFRA – PROJETO PONTO DE PARTIDA

PROJETO BÁSICO PARA IMPLANTAÇÃO DE TRECHO RODOVIÁRIO
ENTRE INDEPENDÊNCIA/RS E ALEGRIA/RS

Rodovia:	PPP-212
Norma Técnica:	DNER/1999
Classe da rodovia:	III
Região:	Montanhosa
Configuração:	pista simples com acostamentos
Classificação do solo:	1ª Categoria
Faixa de exploração:	2 x 250m
Extensão aproximada:	6,638 km

VOLUME 2 – PROJETO EXECUTIVO

EQUIPE BD1 - CONNECTSUL
MAIO/2022

DADOS DE IDENTIFICAÇÃO

Instituição: **Universidade Federal do Rio Grande do Sul – UFRGS**

Unidade: **Escola de Engenharia – EE**

Departamento: **Departamento de Engenharia de Produção e Transportes – DEPROT**

Laboratório: **Laboratório de Sistemas de Transportes – LASTRAN**

Programa: **Programa de Desenvolvimento Tecnológico em Infraestrutura de Transportes – ProINFRA**

Projeto: **Ponto de Partida (Trabalho de Graduação da Disciplina de Rodovias)**

Edição: **2021/2**

Ano: **2021**

Semestre: **2**

Disciplina: **Rodovias**

Turma: **b**

Código da Equipe: **BD1**

Nome:

Integrantes do grupo:

Nathália Fátima da Silva Dias

Bernardo Silva Ransolin

Ártur Oldra Paliosa

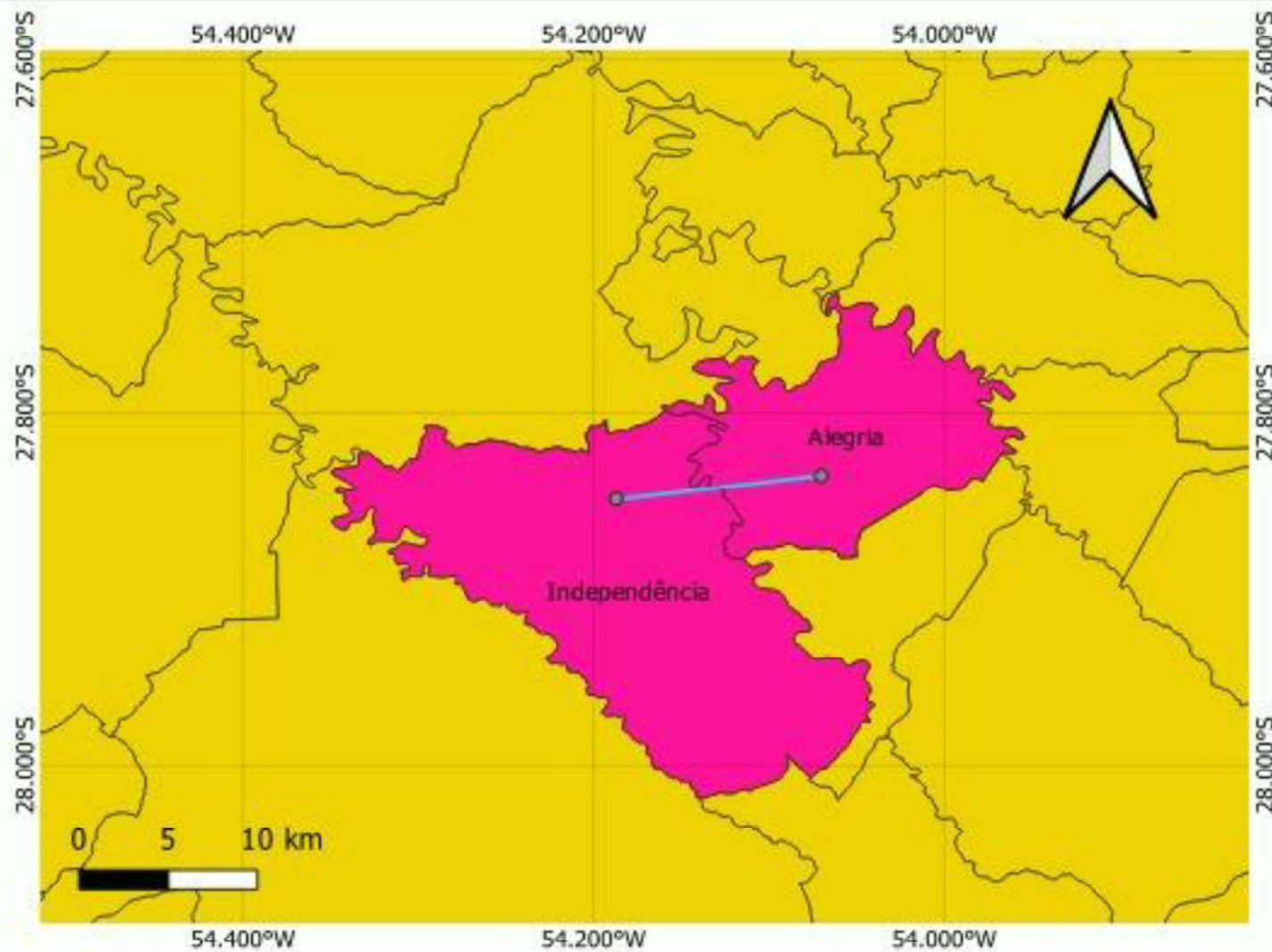
Morvana Machado

SUMÁRIO

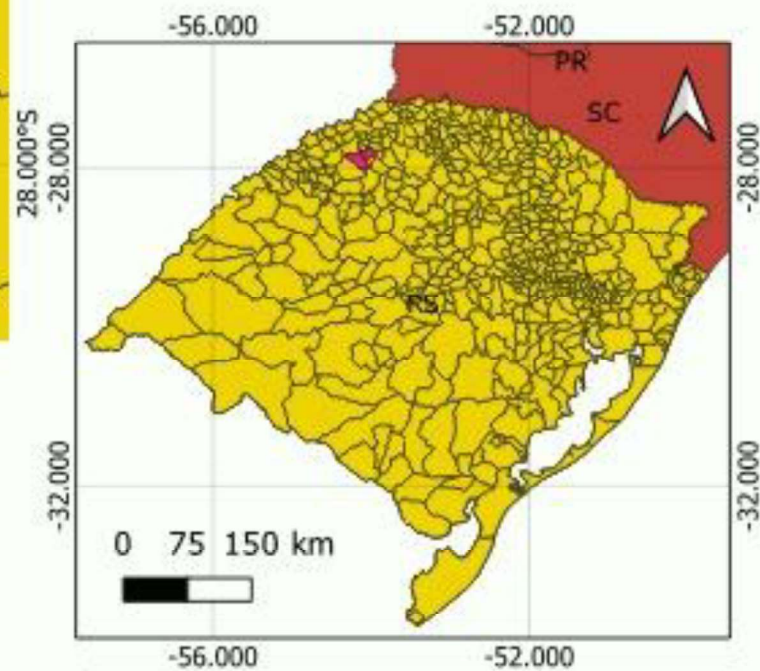
1 APRESENTAÇÃO	6
■ Mapa de Situação	6
■ Mapa de Localização	7
■ Quadro de Características Técnicas.....	8
2 PROJETO GEOMÉTRICO	10
■ Seções Transversais Tipo	10
■ Linha Geral	11
■ Detalhamento do Projeto Planialtimétrico	12
■ Seções Transversais.....	13
3 PROJETO DE TERRAPLENAGEM.....	15
■ Diagrama de Massa	15
■ Quadro de Origem e Destino.....	16
■ Esquema Linear de Distribuição dos Materiais	17

1 APRESENTAÇÃO

■ Mapa de Situação

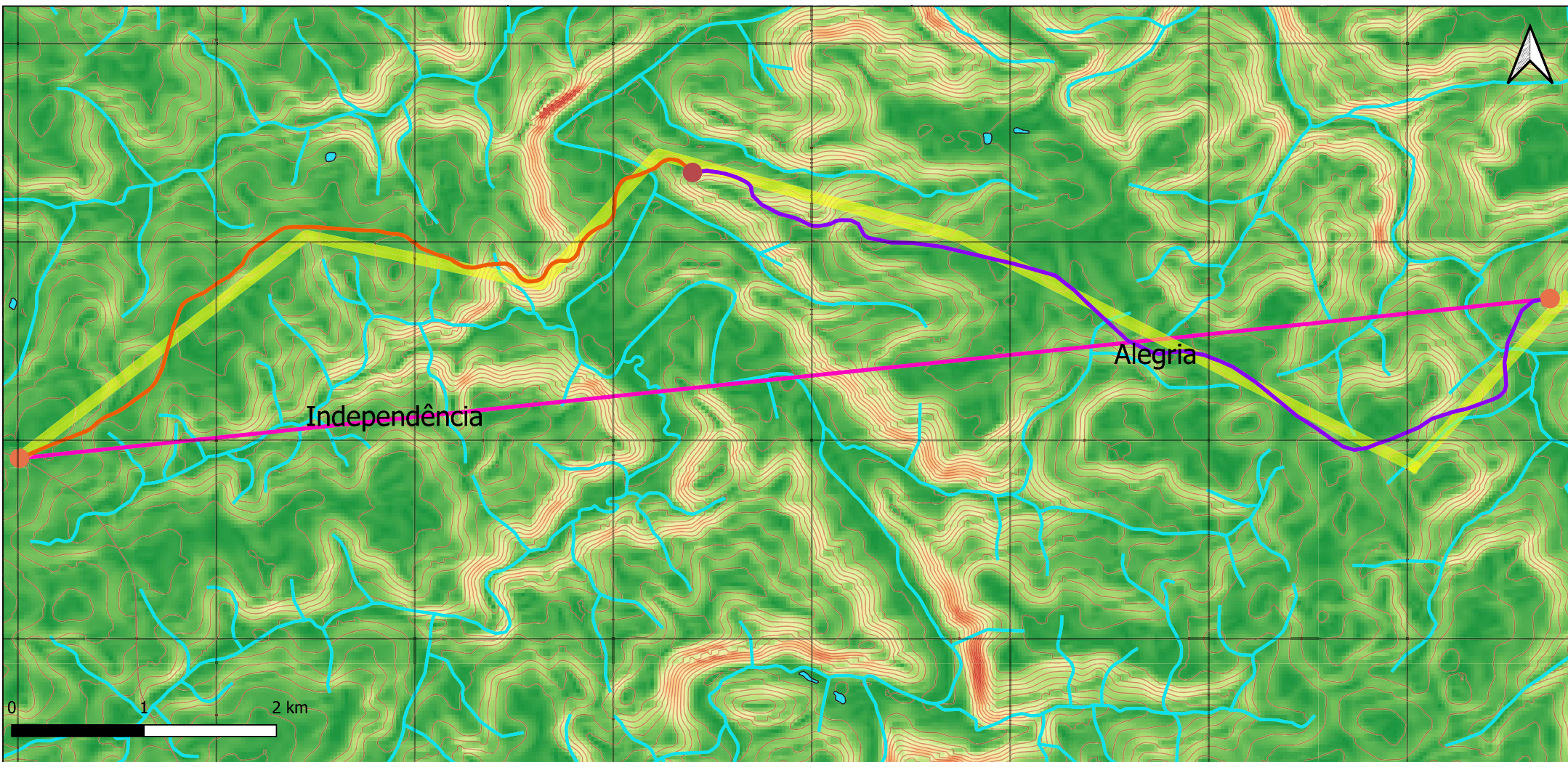


- Pontos diretriz
- Linha diretriz
- Área de estudo
- Município
- Rio Grande do Sul
- Trecho rodoviário
- Brasil



Base de dados: IBGE, FEPAM
 Autor: Projeto Ponto de Partida
 Sistema de coordenadas geográficas - DATUM SIRGAS 2000

■ Mapa de Localização



Legenda

- Ponto de saída
- Ponto de encontro
- Traçado Lote 1
- Traçado Lote 2
- Plano de voo
- Diretriz
- Curvas de nível
- Corpos d'água

Base de dados: IBGE, FEPAM

Autor: Equipe BD1 - ConnectSul

Sistema de Coordenadas Geográficas -

Datum: SIRGAS 2000

■ Quadro de Características Técnicas

CARACTERÍSTICAS TÉCNICAS

Rodovia: Grupo de Eixos 1
 Trecho: Eixo2
 Segmento: km: 0+000,00 ao km: 6+638,72

CARACTERÍSTICAS GERAIS

DE PROJETO		PLANIALTIMÉTRICAS				SEÇÕES TRANSVERSAIS			
NORMA	DNIT	RAIO MIN. COM TRANS.	50,000	K MIN/DES CÔNCAVA	7 / 7	LARG. PISTA DE ROL.		PLATAFORMA ATERRO	
CLASSE DA RODOVIA	III	RAIO MIN. SIMPLES	300,000	K MIN/DES CONVEXA	5 / 5	LARG. ACOST. INT.		PLATAFORMA CORTE	
REGIÃO	Montanhosa	RAMPA MÁXIMA	8,000	DIST. VIS. PARADA		LARG. ACOST. EXT.		TALUDE ATERRO	
VELOCIDADE DIRETRIZ	40	RAMPA MÍNIMA	0,300	DIST. VIS. ULTRAP.		ABAULAMENTO		TALUDE CORTE 1ª CAT.	
		EXTENSÃO TOTAL	6638,724	FAIXA DOM. (LE/LD+OFF)	25 / 25 + 5	SUPERELEVÇÃO MÁX.		TALUDE CORTE 3ª CAT.	

PLANIMETRIA

DISTRIBUIÇÃO DE CURVAS

T	RAIOS (m)	FREQ.	Dc (m)	%	Lc1+Lc2 (m)	%
R	R mínimo = 100,000	1	101,208	1,52	80,000	1,21
A	100,000 < R ≤ 100,000	1	120,197	1,81	120,000	1,81
N	100,000 < R ≤ 200,000	9	967,081	14,57	740,000	11,15
S	200,000 < R ≤ 300,000	1	95,843	1,44	160,000	2,41
I	300,000 < R ≤ 500,000					
Ç	R > 500,000					
.	TOTAL EM TRANSIÇÃO	12	1284,329	19,35	1100,000	16,57
S	RAIOS (m)	FREQ.	Dc (m)	%		
I	R mínimo = 300,000	1	81,780	1,23		
M	300,000 < R ≤ 500,000	4	648,357	9,77		
P	500,000 < R ≤ 700,000					
L	700,000 < R ≤ 1000,000					
E	1000,000 < R ≤ 1500,000					
S	R > 1500,000					
	TOTAL SIMPLES	5	730,137	11,00		
	TOTAL EM CURVA	17	2014,466	30,34	4398,795	66,26

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
35,268	0,53	688,950	10,38	3524,258	53,09

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
5,488	0,827	5527,072	20,113

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1	635,000	9,57			0 < i ≤ 1		
1 < i ≤ 2	503,724	7,59			1 < i ≤ 2	475,000	7,15
2 < i ≤ 3	50,000	0,75			2 < i ≤ 3	20,000	0,30
3 < i ≤ 4					3 < i ≤ 4	230,000	3,46
4 < i ≤ 5	185,000	2,79			4 < i ≤ 5	250,000	3,77
5 < i ≤ 6	265,000	3,99			5 < i ≤ 6	85,000	1,28
6 < i ≤ 7					6 < i ≤ 7	185,000	2,79
7 < i ≤ 8					7 < i ≤ 8	70,000	1,05
8 < i ≤ 9					8 < i ≤ 9	1215,000	18,30
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	1638,724	24,68			TOTAL	2530,000	38,11

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
4168,724	62,79	1560,000	23,50	910,000	13,71	2470,000	37,21

PARÂMETROS K MÍNIMOS ADOPTADOS

EM CURVA CÔNCAVA	12,621	EM CURVA CONVEXA	8,491
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PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
9420,788	141,91	16124,180	242,88	12772,484	192,39

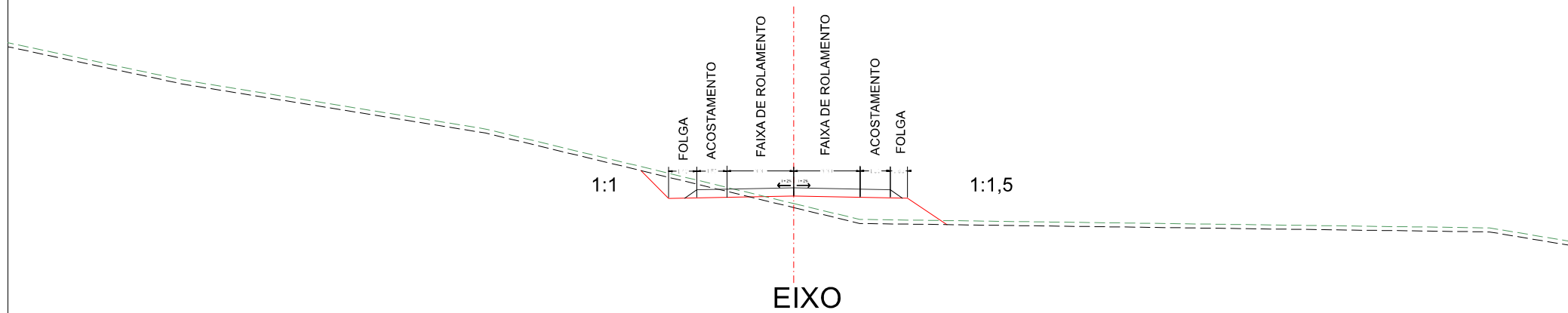
CARACTERÍSTICAS OPERACIONAIS

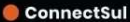
ANO DE ABERTURA		VDM ABERTURA		PARÂMETRO					
ANO FINAL DA VIDA ÚTIL		VDM FINAL							

2 PROJETO GEOMÉTRICO

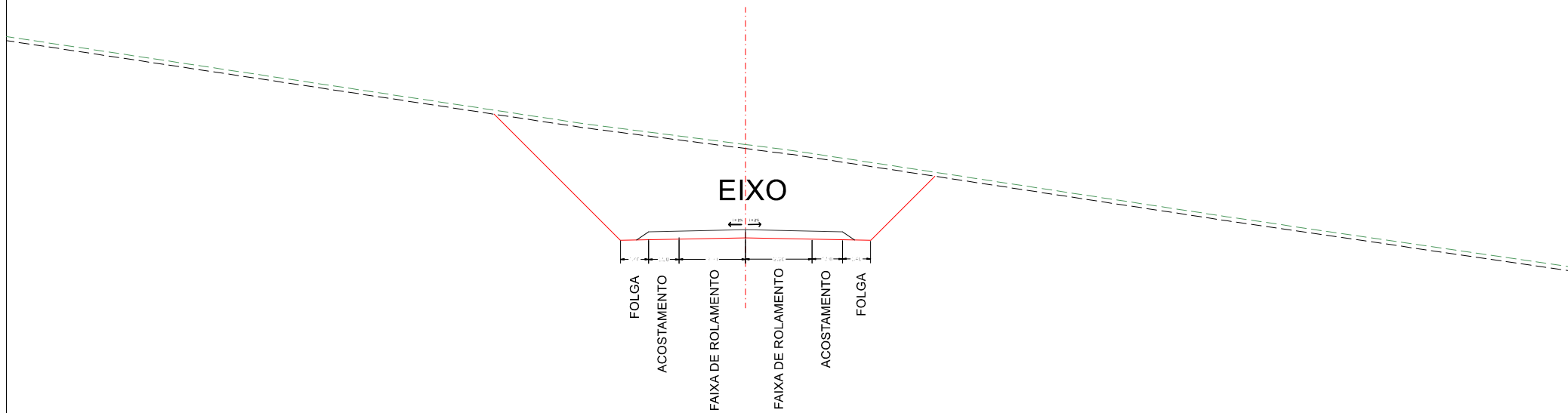
■ Seções Transversais Tipo

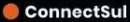
SEÇÃO MISTA



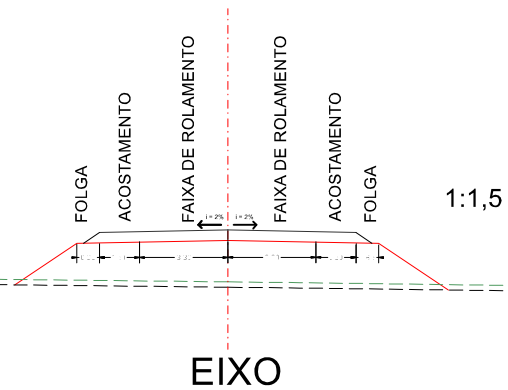
	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: PPP - UFRGS - 2021/2 Trecho: Lote 1 Data: 04/05/2022	
Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO	


SEÇÃO DE CORTE



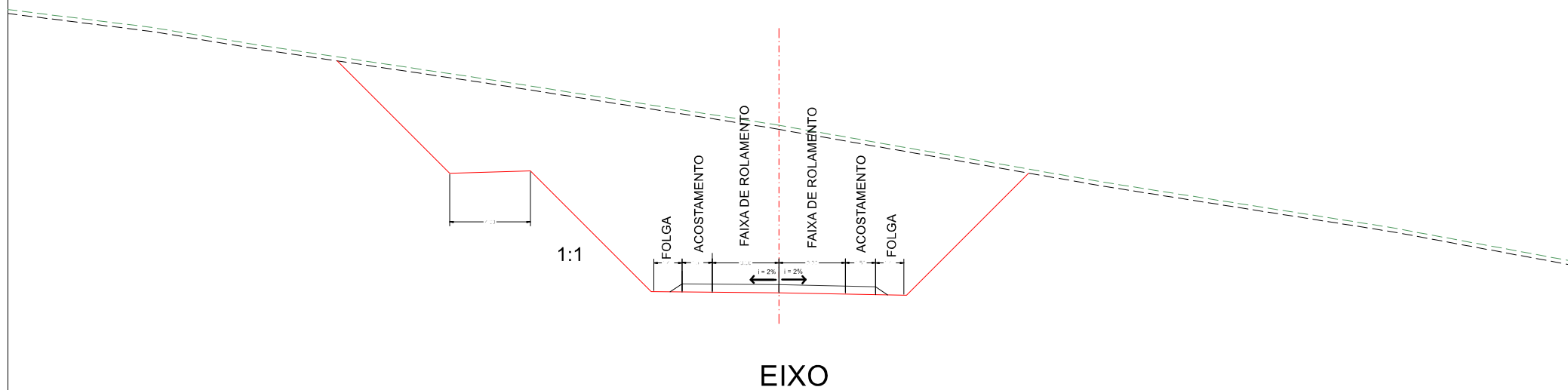
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	Rodovia: PPP - UFRGS - 2021/2 Trecho: Lote 1 Data: 04/05/2022	
Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO	


SEÇÃO DE ATERRO

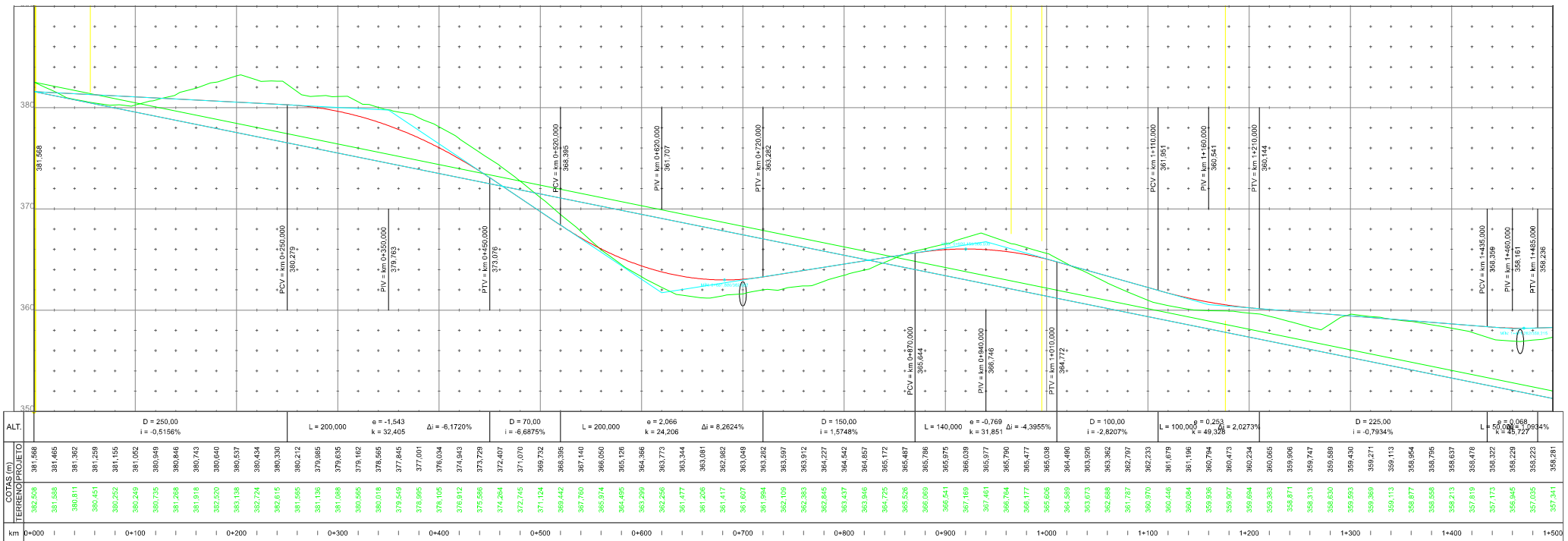
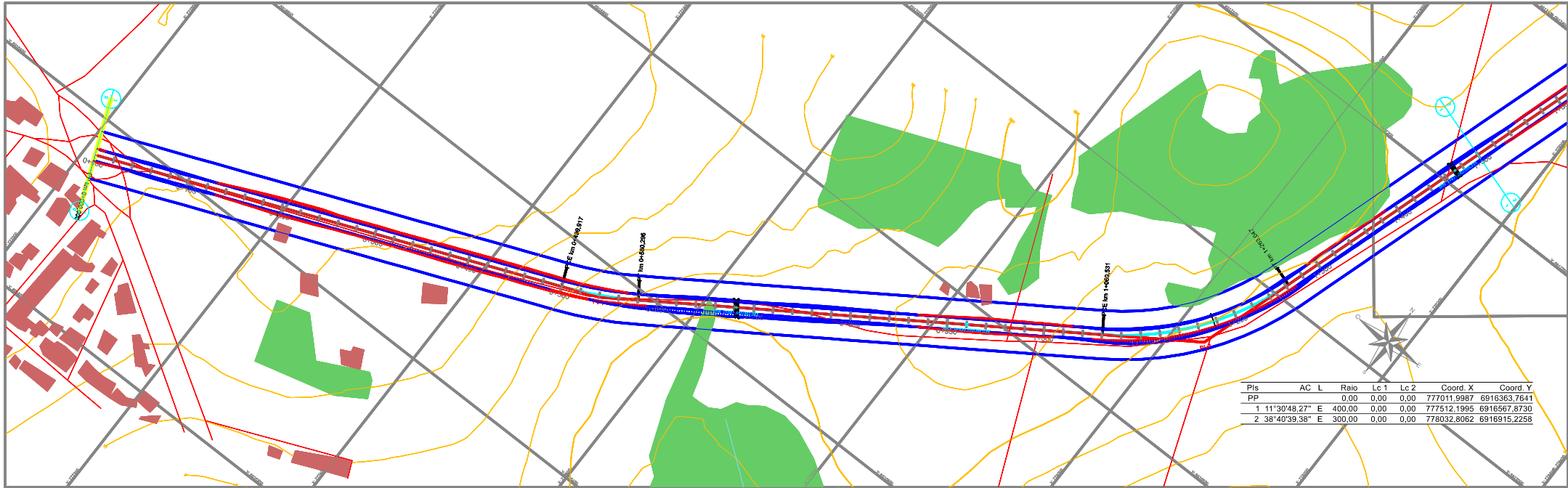


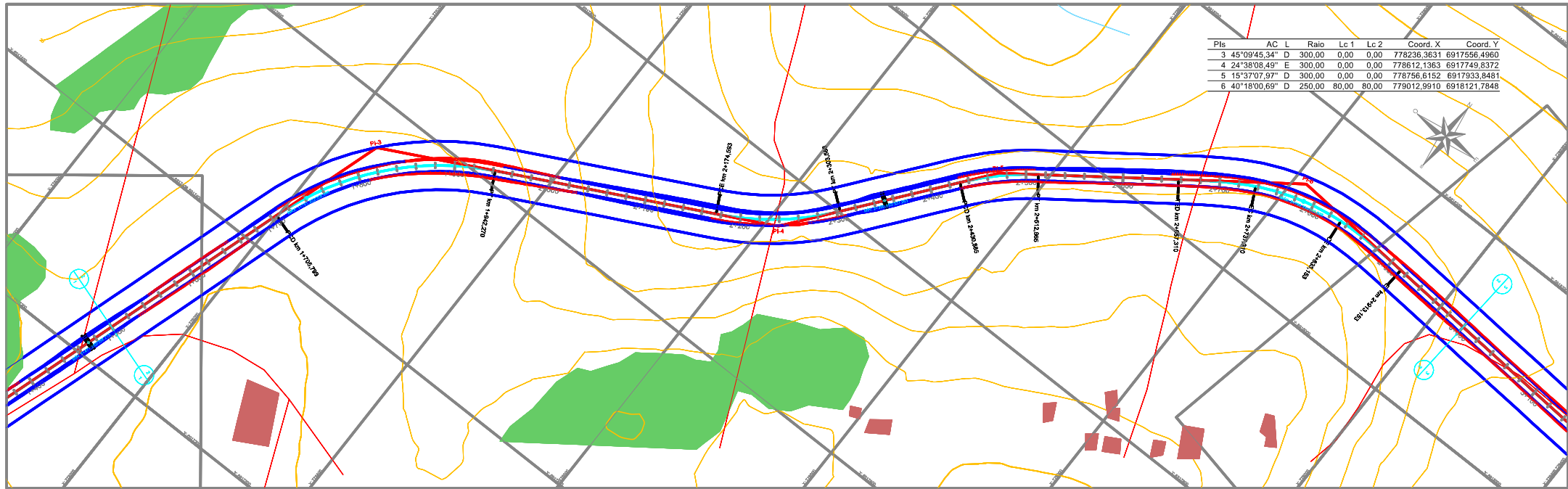
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	Rodovia: PPP - UFRGS - 2021/2 Trecho: Lote 1 Data: 04/05/2022	
Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO	

SEÇÃO DE CORTE COM BANQUETAS

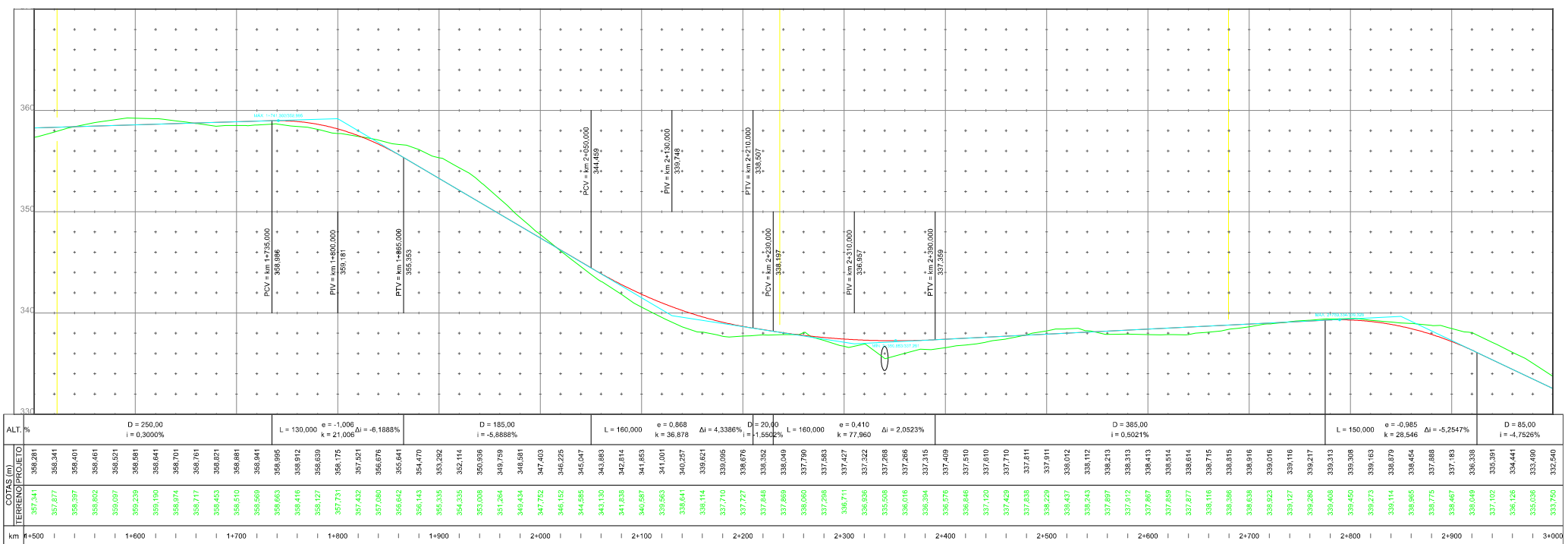


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Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO	

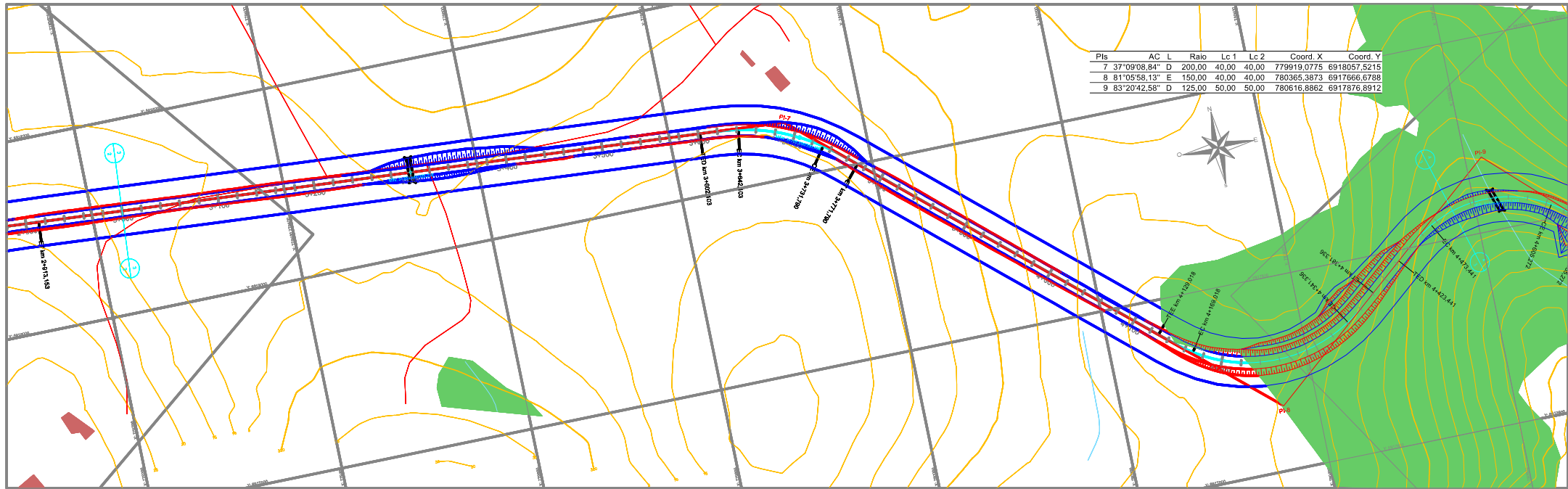




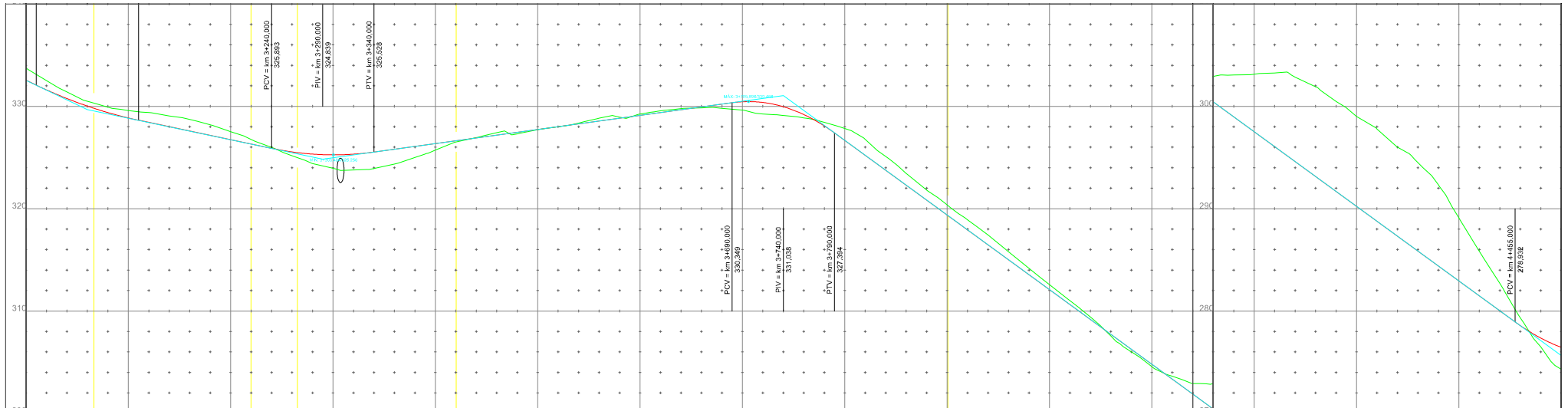
Pls	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
3	45°09'45,34"	D	300,00	0,00	0,00	778236,3631	6917556,4960
4	24°38'08,49"	E	300,00	0,00	0,00	778612,1363	6917749,8372
5	15°37'07,97"	D	300,00	0,00	0,00	778756,6152	6917933,8481
6	40°18'00,69"	D	250,00	80,00	80,00	779012,9910	6918121,7848



km	ALT. %	D = 250,00 i = 0,3000%	L = 130,000 e = -1,000 k = 21,006 Δi = -6,1888%	D = 185,00 i = -5,8898%	L = 160,000 e = 0,868 k = 36,878 Δi = 4,3386%	D = 20,00 i = -1,5502%	L = 160,000 e = 0,410 k = 77,960 Δi = 2,0523%	D = 365,00 i = 0,5021%	L = 150,000 e = -0,985 k = 28,546 Δi = -5,2547%	D = 85,00 i = -4,7526%
1+500	357,341	359,281								
	357,877	358,941								
	358,397	359,401								
	358,802	359,461								
	359,097	359,521								
	359,239	359,581								
	359,190	359,641								
	358,974	359,701								
	358,717	359,761								
	358,453	359,821								
	358,510	359,881								
	358,569	359,941								
	358,663	359,995								
	358,616	359,912								
	358,127	358,639								
	357,731	358,175								
	357,432	357,821								
	357,080	356,676								
	356,642	356,641								
	356,143	356,470								
	355,335	355,292								
	354,335	354,114								
	353,038	350,898								
	351,264	349,759								
	349,434	348,881								
	347,752	347,403								
	346,152	346,225								
	344,585	345,647								
	343,130	343,883								
	341,838	342,614								
	340,587	341,853								
	339,563	341,001								
	338,641	340,257								
	338,114	339,621								
	337,710	339,095								
	337,727	338,676								
	337,648	338,352								
	337,689	338,049								
	337,298	337,790								
	337,283	337,583								
	336,711	337,427								
	336,936	337,322								
	335,508	337,268								
	336,016	337,266								
	336,394	337,315								
	336,576	337,409								
	336,646	337,510								
	337,120	337,610								
	337,429	337,710								
	337,638	337,811								
	338,229	337,911								
	338,457	338,012								
	338,243	338,112								
	337,897	338,213								
	337,972	338,313								
	337,867	338,413								
	337,659	338,514								
	337,877	338,614								
	338,116	338,715								
	338,386	338,815								
	338,638	338,916								
	338,923	339,016								
	339,127	339,116								
	339,280	339,217								
	339,408	339,313								
	339,450	339,398								
	339,273	339,163								
	339,114	338,879								
	338,965	338,654								
	338,775	337,888								
	338,467	337,183								
	338,049	336,338								
	337,102	335,381								
	336,126	334,441								
	335,038	333,490								
	333,750	332,540								

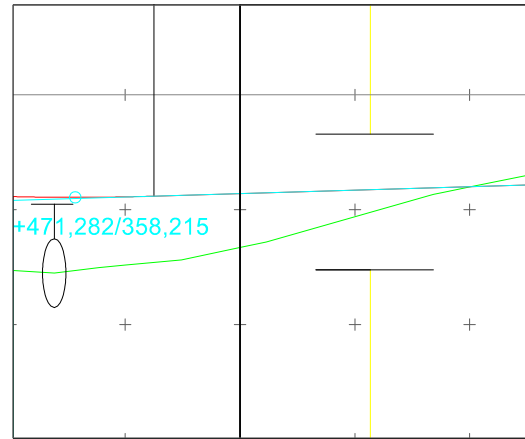
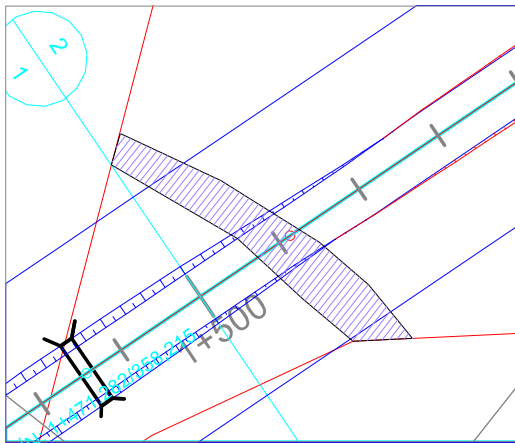


PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
7	37°09'08,84"	D	200,00	40,00	40,00	779919,0775	6918057,5215
8	81°05'58,13"	E	150,00	40,00	40,00	780365,3873	6917666,6789
9	83°20'42,58"	D	125,00	50,00	50,00	780616,8862	6917876,8912

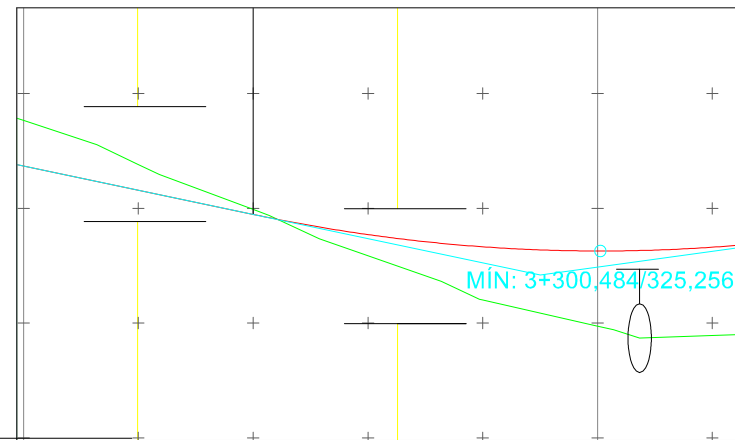
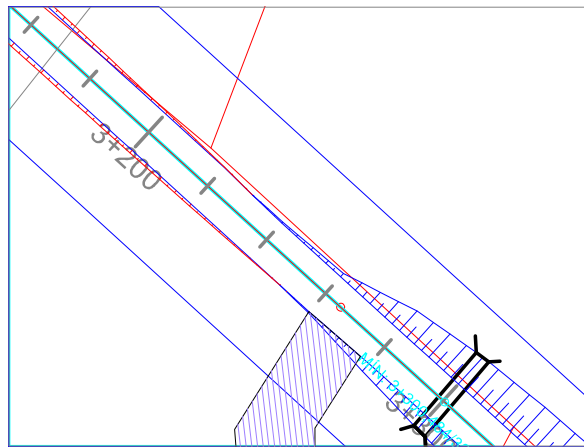


ALT.	L = 100,00	D = 130,00	L = 100,00	D = 350,00	L = 100,00	D = 665,00	L = 150,00
TERRENO/PROJETO	$\theta = 0,331\%$ $i = 37,81\%$	$\theta = 2,6443\%$ $i = -2,1083\%$	$\theta = 0,436\%$ $i = 28,88\%$	$\theta = 3,4857\%$ $i = 1,3774\%$	$\theta = -1,093\%$ $i = 11,54\%$	$\theta = -8,6649\%$ $i = -7,2875\%$	
333,750	332,540	332,540	332,540	332,540	332,540	332,540	332,540
332,516	331,603	331,603	331,603	331,603	331,603	331,603	331,603
331,387	330,759	330,759	330,759	330,759	330,759	330,759	330,759
330,450	330,019	329,386	328,859	328,423	328,002	327,580	327,158
329,517	328,386	327,529	326,737	326,011	325,291	324,576	323,866
328,592	327,859	327,158	326,483	325,823	325,177	324,544	323,923
327,683	327,315	326,993	326,683	326,393	326,113	325,843	325,583
326,803	326,543	326,293	326,053	325,823	325,603	325,393	325,193
326,014	325,764	325,504	325,254	325,014	324,784	324,564	324,354
325,246	325,006	324,776	324,546	324,316	324,086	323,856	323,626
324,499	324,259	324,029	323,799	323,569	323,339	323,109	322,879
323,772	323,532	323,302	323,072	322,842	322,612	322,382	322,152
323,065	322,825	322,595	322,365	322,135	321,905	321,675	321,445
322,378	322,138	321,908	321,678	321,448	321,218	320,988	320,758
321,711	321,471	321,241	321,011	320,781	320,551	320,321	320,091
321,064	320,824	320,594	320,364	320,134	319,904	319,674	319,444
320,437	320,197	319,967	319,737	319,507	319,277	319,047	318,817
319,830	319,590	319,360	319,130	318,900	318,670	318,440	318,210
319,243	319,003	318,773	318,543	318,313	318,083	317,853	317,623
318,676	318,436	318,206	317,976	317,746	317,516	317,286	317,056
318,129	317,889	317,659	317,429	317,199	316,969	316,739	316,509
317,602	317,362	317,132	316,902	316,672	316,442	316,212	315,982
317,095	316,855	316,625	316,395	316,165	315,935	315,705	315,475
316,608	316,368	316,138	315,908	315,678	315,448	315,218	314,988
316,141	315,901	315,671	315,441	315,211	314,981	314,751	314,521
315,694	315,454	315,224	314,994	314,764	314,534	314,304	314,074
315,267	315,027	314,797	314,567	314,337	314,107	313,877	313,647
314,860	314,620	314,390	314,160	313,930	313,700	313,470	313,240
314,473	314,233	314,003	313,773	313,543	313,313	313,083	312,853
314,106	313,866	313,636	313,406	313,176	312,946	312,716	312,486
313,759	313,519	313,289	313,059	312,829	312,599	312,369	312,139
313,432	313,192	312,962	312,732	312,502	312,272	312,042	311,812
313,125	312,885	312,655	312,425	312,195	311,965	311,735	311,505
312,838	312,598	312,368	312,138	311,908	311,678	311,448	311,218
312,571	312,331	312,101	311,871	311,641	311,411	311,181	310,951
312,324	312,084	311,854	311,624	311,394	311,164	310,934	310,704
312,097	311,857	311,627	311,397	311,167	310,937	310,707	310,477
311,890	311,650	311,420	311,190	310,960	310,730	310,500	310,270
311,703	311,463	311,233	311,003	310,773	310,543	310,313	310,083
311,536	311,296	311,066	310,836	310,606	310,376	310,146	309,916
311,389	311,149	310,919	310,689	310,459	310,229	309,999	309,769
311,262	311,022	310,792	310,562	310,332	310,102	309,872	309,642
311,155	310,915	310,685	310,455	310,225	309,995	309,765	309,535
311,068	310,828	310,598	310,368	310,138	309,908	309,678	309,448
311,001	310,761	310,531	310,301	310,071	309,841	309,611	309,381
310,954	310,714	310,484	310,254	310,024	309,794	309,564	309,334
310,927	310,687	310,457	310,227	309,997	309,767	309,537	309,307
310,910	310,670	310,440	310,210	309,980	309,750	309,520	309,290
310,903	310,663	310,433	310,203	309,973	309,743	309,513	309,283
310,906	310,666	310,436	310,206	309,976	309,746	309,516	309,286
310,919	310,679	310,449	310,219	309,989	309,759	309,529	309,299
310,942	310,702	310,472	310,242	310,012	309,782	309,552	309,322
310,975	310,735	310,505	310,275	310,045	309,815	309,585	309,355
311,028	310,788	310,558	310,328	310,098	309,868	309,638	309,408
311,091	310,851	310,621	310,391	310,161	309,931	309,701	309,471
311,164	310,924	310,694	310,464	310,234	310,004	309,774	309,544
311,247	311,007	310,777	310,547	310,317	310,087	309,857	309,627
311,340	311,100	310,870	310,640	310,410	310,180	309,950	309,720
311,443	311,203	310,973	310,743	310,513	310,283	310,053	309,823
311,556	311,316	311,086	310,856	310,626	310,396	310,166	309,936
311,689	311,449	311,219	310,989	310,759	310,529	310,299	310,069
311,842	311,602	311,372	311,142	310,912	310,682	310,452	310,222
312,005	311,765	311,535	311,305	311,075	310,845	310,615	310,385
312,178	311,938	311,708	311,478	311,248	311,018	310,788	310,558
312,361	312,121	311,891	311,661	311,431	311,201	310,971	310,741
312,554	312,314	312,084	311,854	311,624	311,394	311,164	310,934
312,757	312,517	312,287	312,057	311,827	311,597	311,367	311,137
312,980	312,740	312,510	312,280	312,050	311,820	311,590	311,360
313,223	312,983	312,753	312,523	312,293	312,063	311,833	311,603
313,486	313,246	313,016	312,786	312,556	312,326	312,096	311,866
313,769	313,529	313,299	313,069	312,839	312,609	312,379	312,149
314,072	313,832	313,602	313,372	313,142	312,912	312,682	312,452
314,395	314,155	313,925	313,695	313,465	313,235	313,005	312,775
314,738	314,498	314,268	314,038	313,808	313,578	313,348	313,118
315,101	314,861	314,631	314,401	314,171	313,941	313,711	313,481
315,484	315,244	315,014	314,784	314,554	314,324	314,094	313,864
315,887	315,647	315,417	315,187	314,957	314,727	314,497	314,267
316,310	316,070	315,840	315,610	315,380	315,150	314,920	314,690
316,753	316,513	316,283	316,053	315,823	315,593	315,363	315,133
317,216	316,976	316,746	316,516	316,286	316,056	315,826	315,596
317,699	317,459	317,229	316,999	316,769	316,539	316,309	316,079
318,202	317,962	317,732	317,502	317,272	317,042	316,812	316,582
318,725	318,485	318,255	318,025	317,795	317,565	317,335	317,105
319,268	319,028	318,798	318,568	318,338	318,108	317,878	317,648
319,831	319,591	319,361	319,131	318,901	318,671	318,441	318,211
320,414	320,174	319,944	319,714	319,484	319,254	319,024	318,794
321,027	320,787	320,557	320,327	320,097	319,867	319,637	319,407
321,670	321,430	321,200	320,970	320,740	320,510	320,280	320,050
322,343	322,103	321,873	321,643	321,413	321,183	320,953	320,723
323,046	322,806	322,576	322,346	322,116	321,886	321,656	321,426
323,779	323,539	323,309	323,079	322,849	322,619	322,389	322,159
324,542	324,302	324,072	323,842	323,612	323,382	323,152	322,922
325,335	325,095	324,865	324,635	324,405	324,175	323,945	323,715
326,158	325,918	325,688	325,458	325,228	324,998	324,768	324,538
327,011	326,771	326,541	326,311	326,081	325,851	325,621	325,391
327,894	327,654	327,424	327,194	326,964	326,734	326,504	326,274
328,807	328,567	328,337	328,107	327,877	327,647	327,417	327,187
329,750	329,510	329,280	329,050	328,820	328,590	328,360	328,130
330,723	330,483	330,253	330,023	329,793	329,563	329,333	329,103
331,726	331,486	331,256	331,026	330,796	330,566	330,336	330,106
332,759	332,519	332,289	332,059	331,829	331,599	331,369	331,139
333,822	333,582	333,352	333,122	332,892	332,662	332,432	332,202

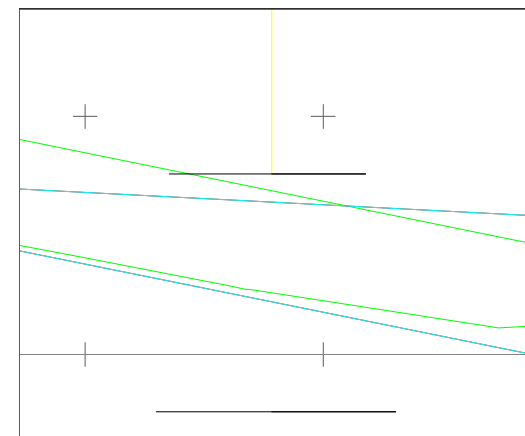
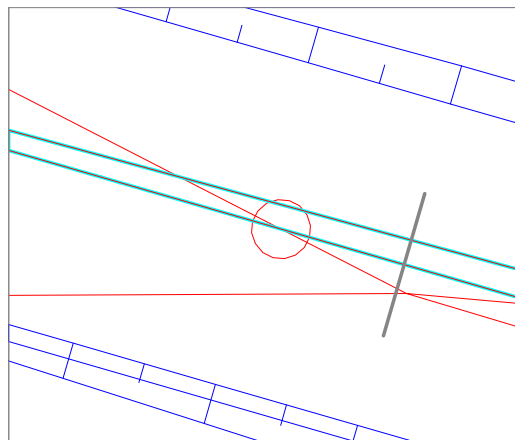
■ Detalhamento do Projeto Planialtimétrico



Realocação de estrada existente
km 1+522

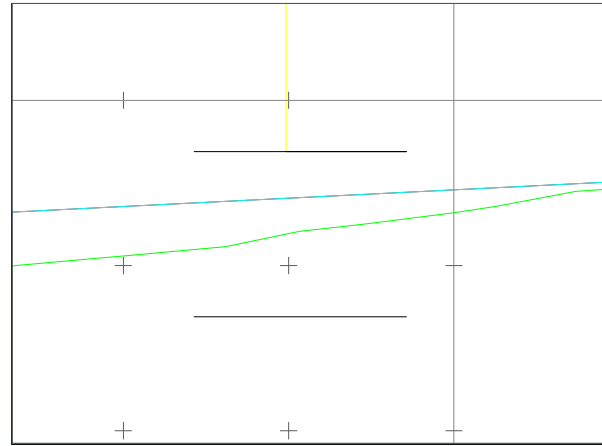
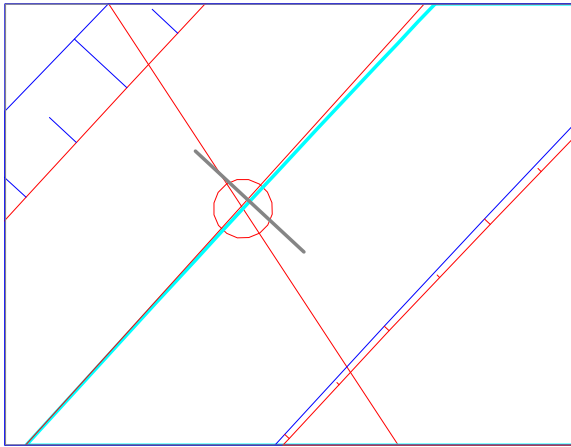


Realocação de estrada
existente-km 3+265
Interferência com via
existente km 3+220

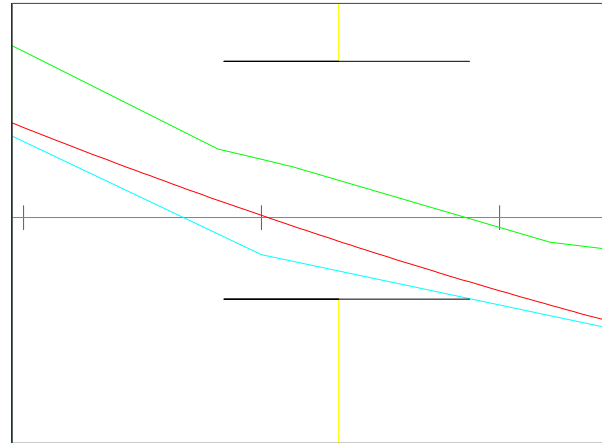
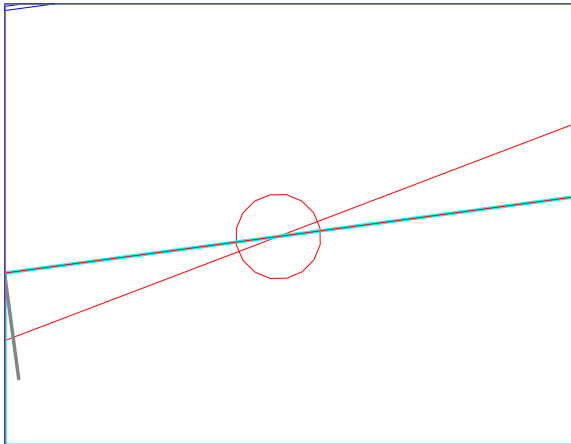


Interferência com via existente
km 0+055

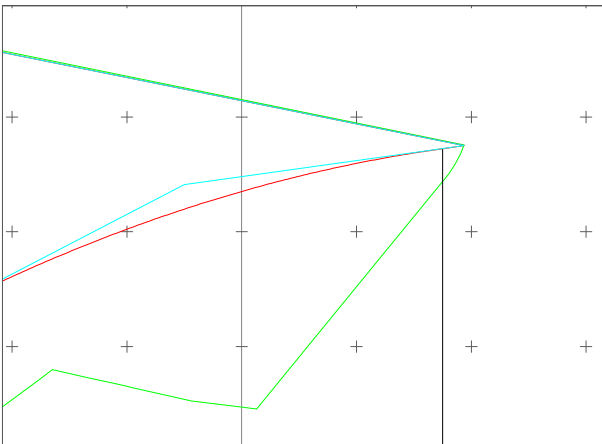
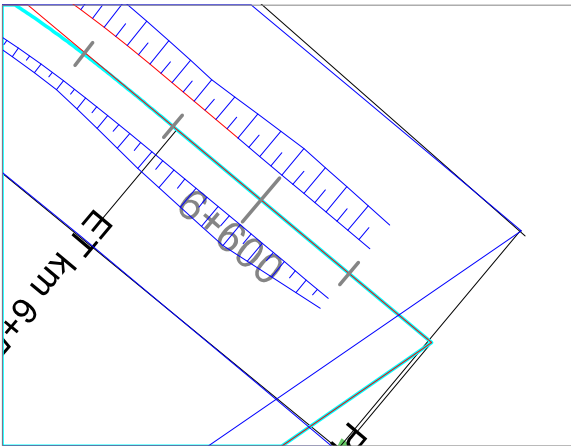
	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22	
	Sem escala	PROJETO GEOMÉTRICO



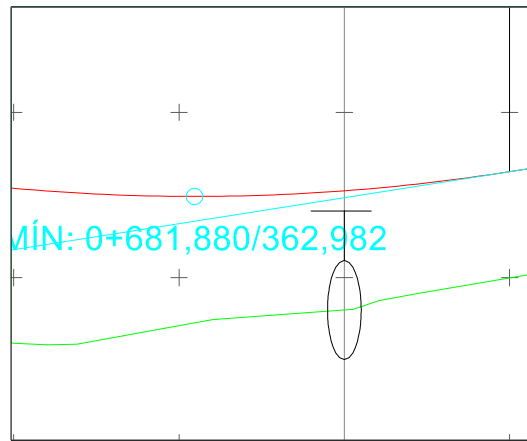
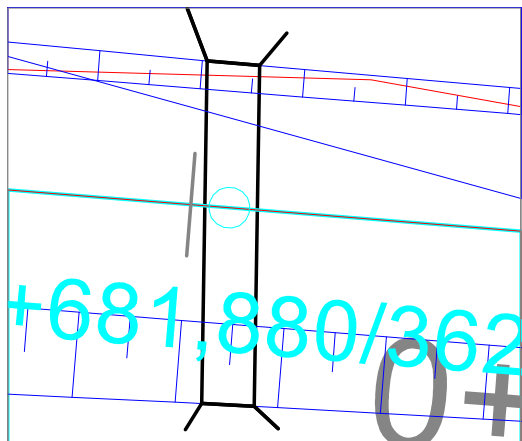
Interferência com via existente
km 2+260



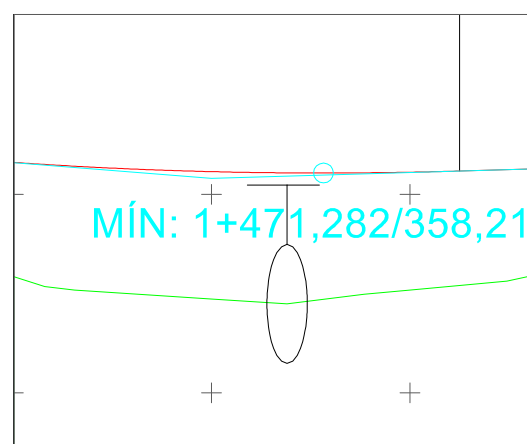
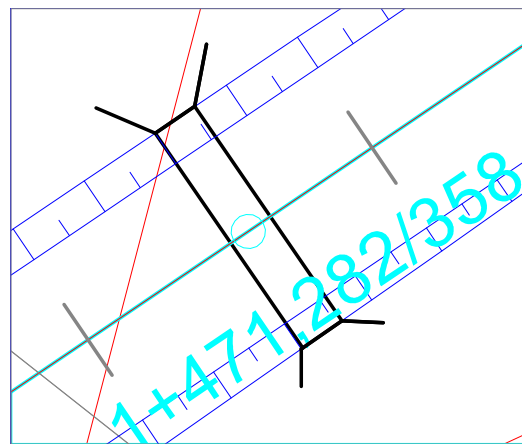
Interferência com via existente
km 3+066



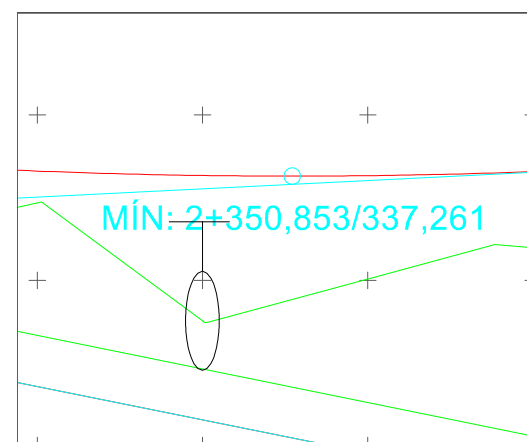
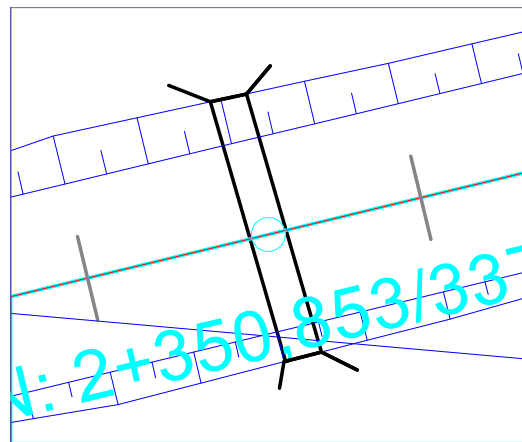
Ponto de encontro



Bueiro 1 – cota mínima
 Diâmetro: 1,2m
 Recobrimento: 0,6m

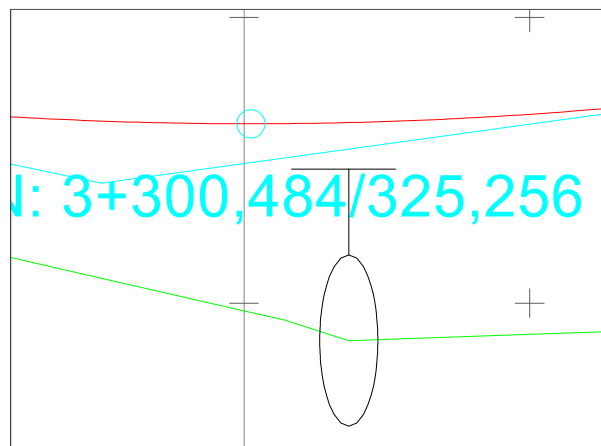
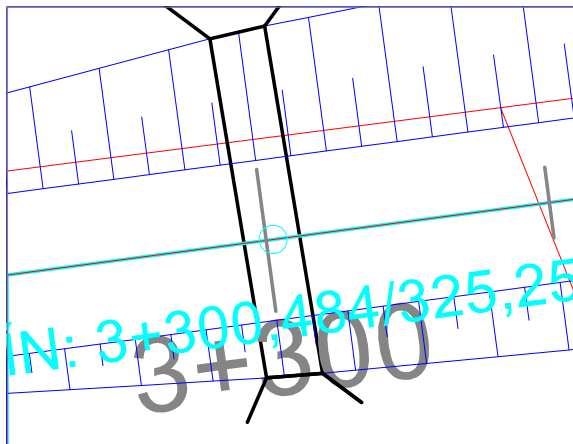


Bueiro 2 – cota mínima
 Diâmetro: 1,2m
 Recobrimento: 0,6m

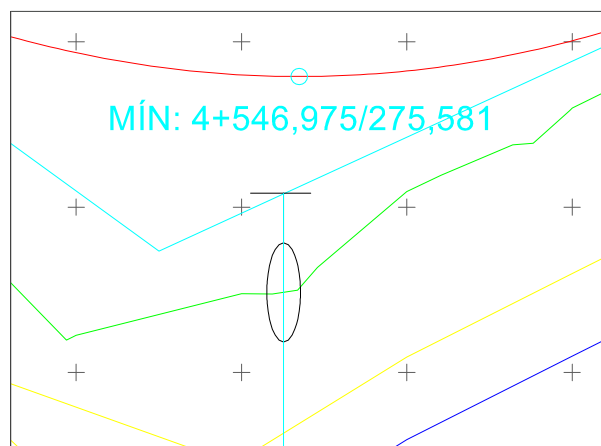
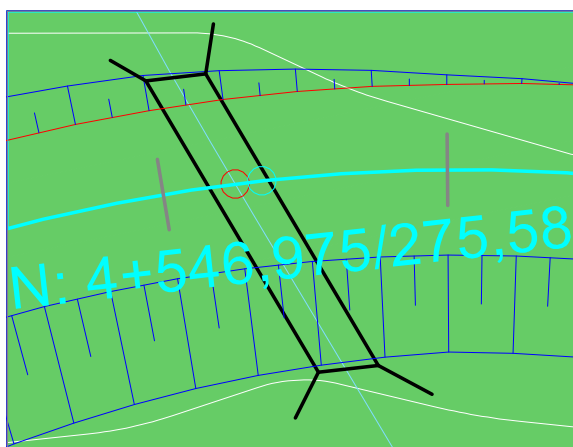


Bueiro 3 – cota mínima
 Diâmetro: 1,2m
 Recobrimento: 0,6m

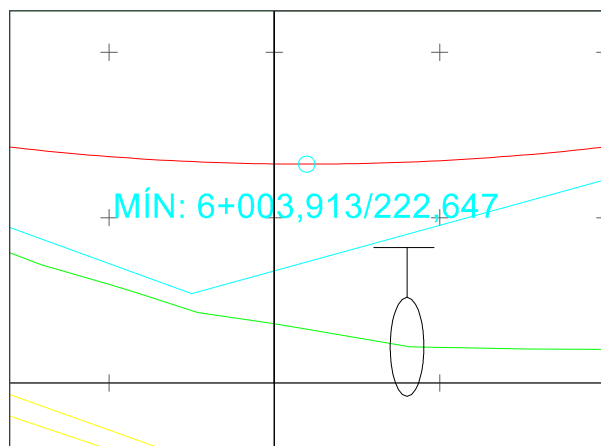
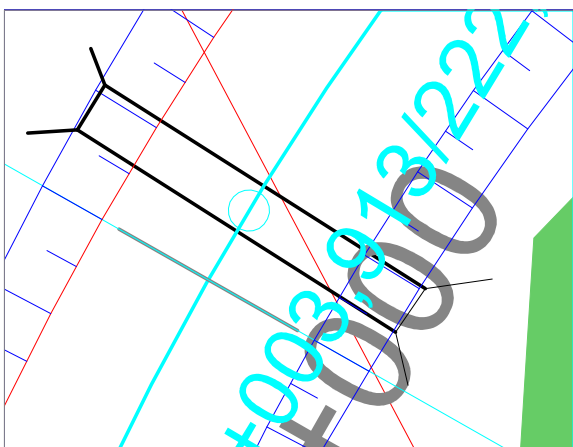
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	Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22	
Sem escala	PROJETO GEOMÉTRICO	



Bueiro 4 – cota mínima
 Diâmetro: 1,2m
 Recobrimento: 0,6m

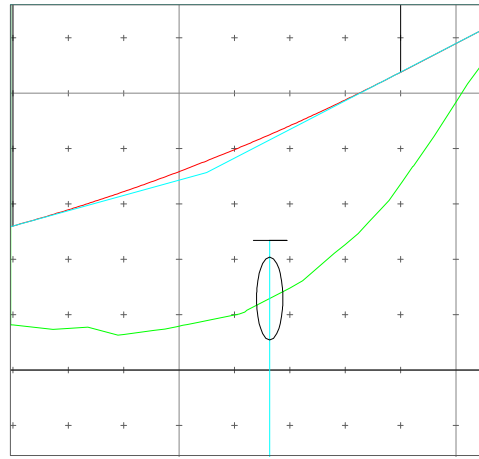


Bueiro 5 – córrego
 Diâmetro: 1,2m
 Recobrimento: 0,6m



Bueiro 6 – cota mínima
 Diâmetro: 1,2m
 Recobrimento: 0,6m

	<small>UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN</small>	
	<small>Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22</small>	
	Sem escala	PROJETO GEOMÉTRICO



Bueiro 3 – Rio
 Diâmetro: 1,5m
 Recobrimento: 0,6m

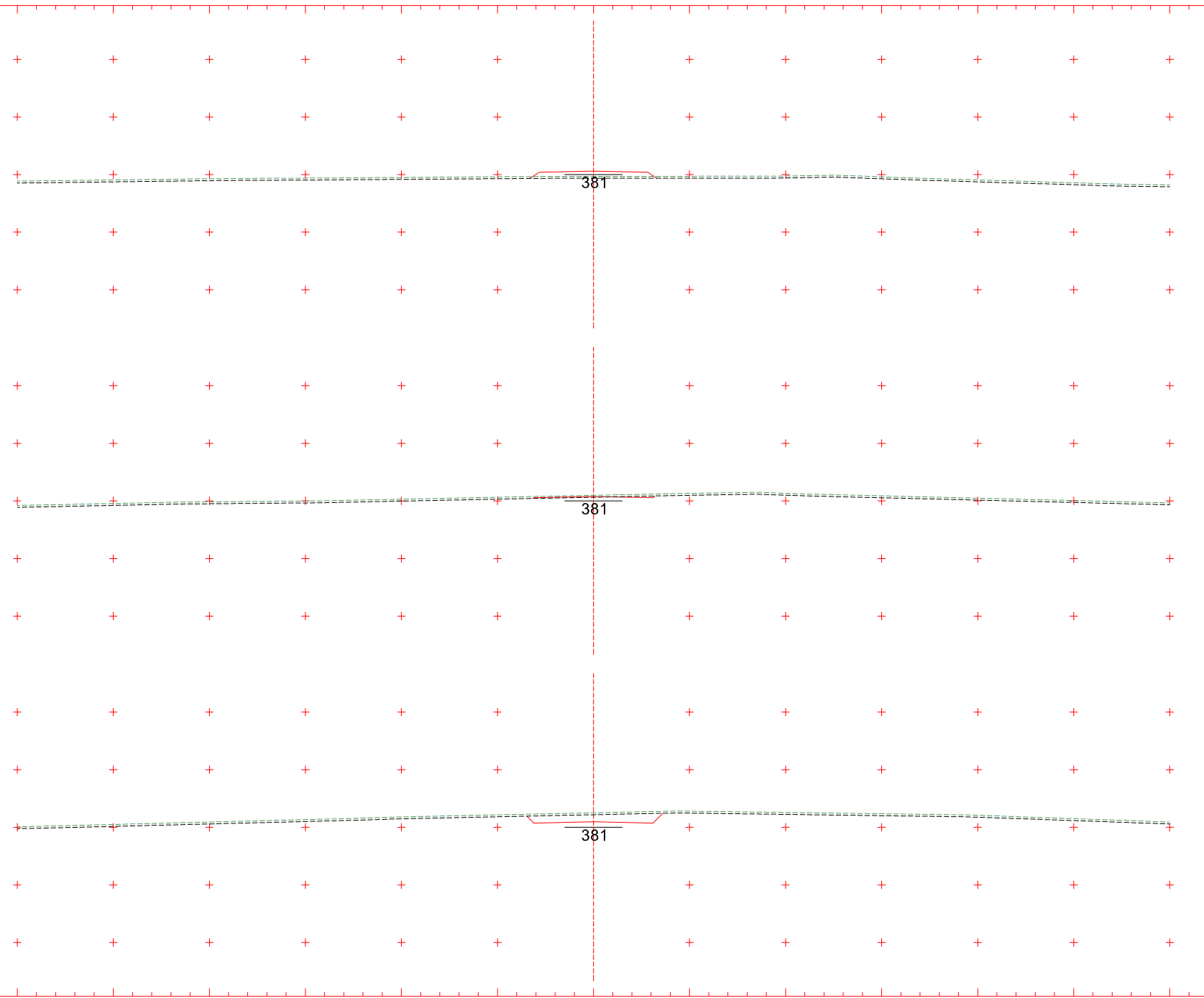
	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22	
Sem escala	PROJETO GEOMÉTRICO	

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60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60



0+040
CT 380,811 m
CP 381,362 m

0+020
CT 381,588 m
CP 381,465 m

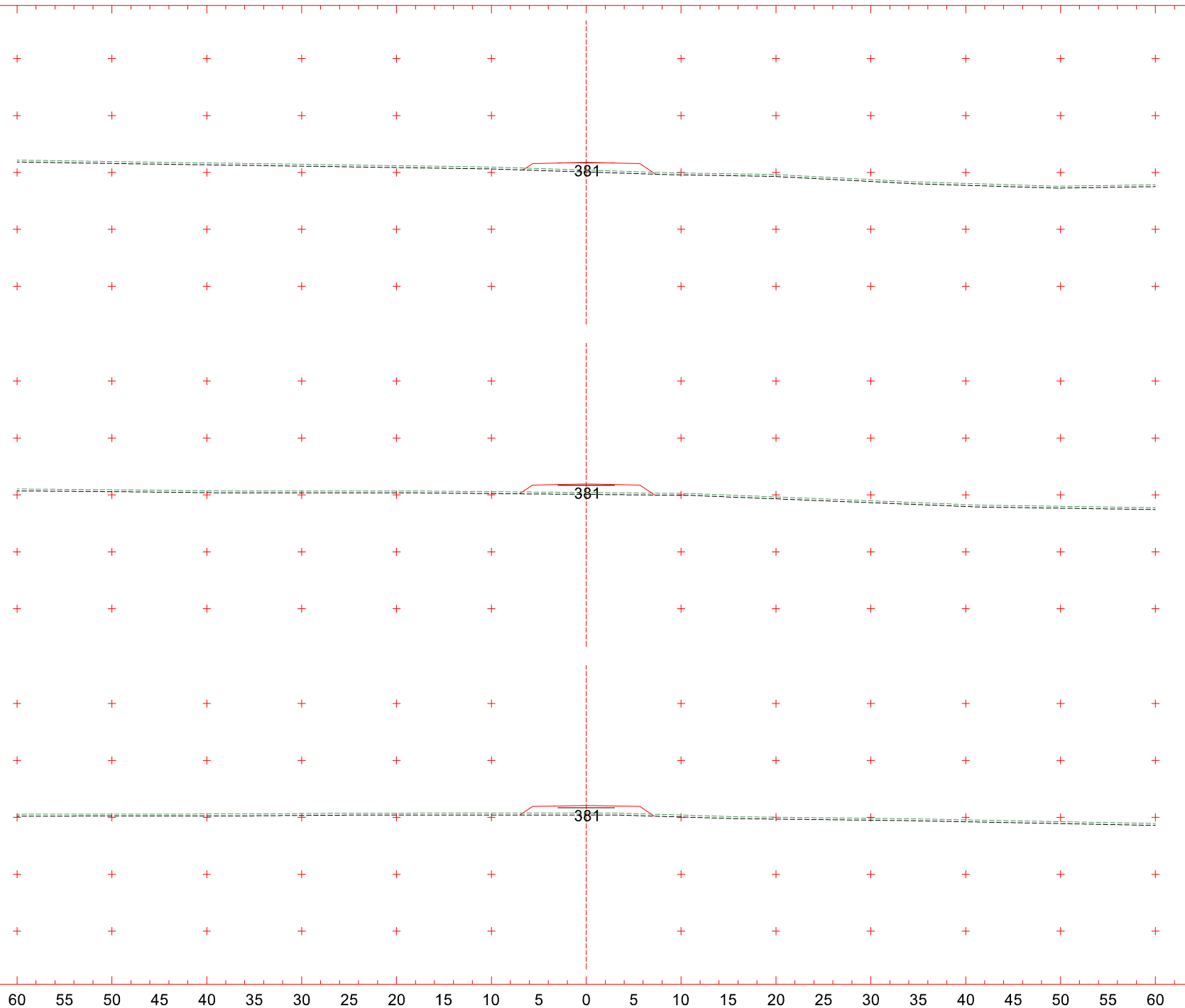
0+000
CT 382,508 m
CP 381,568 m

Eixo2
Escala 1:400

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0+100
CT 380,249 m
CP 381,052 m

0+080
CT 380,252 m
CP 381,155 m

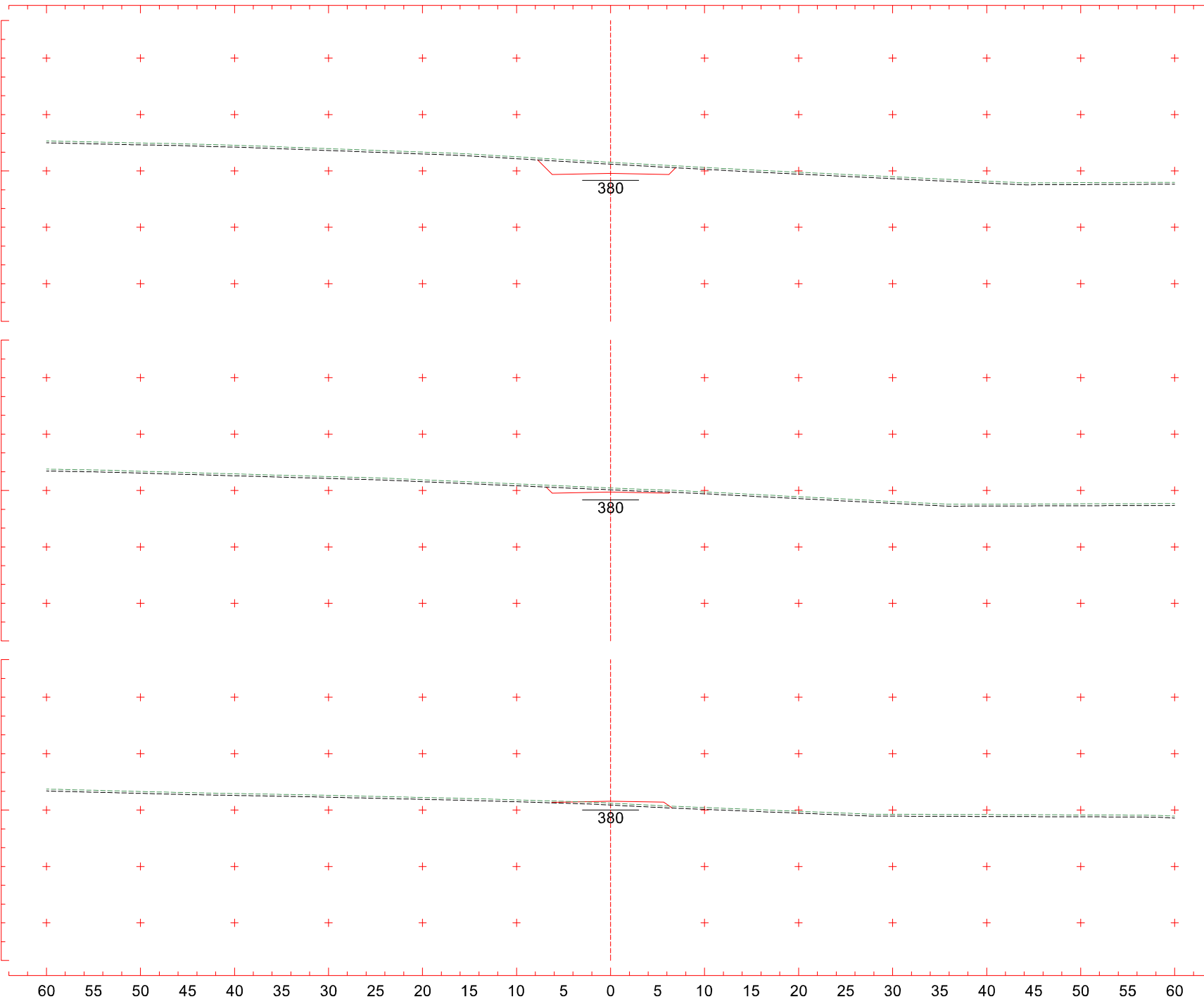
0+060
CT 380,451 m
CP 381,259 m

Eixo2
Escala 1:400

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0+160
CT 381,918 m
CP 380,743 m

0+140
CT 381,268 m
CP 380,846 m

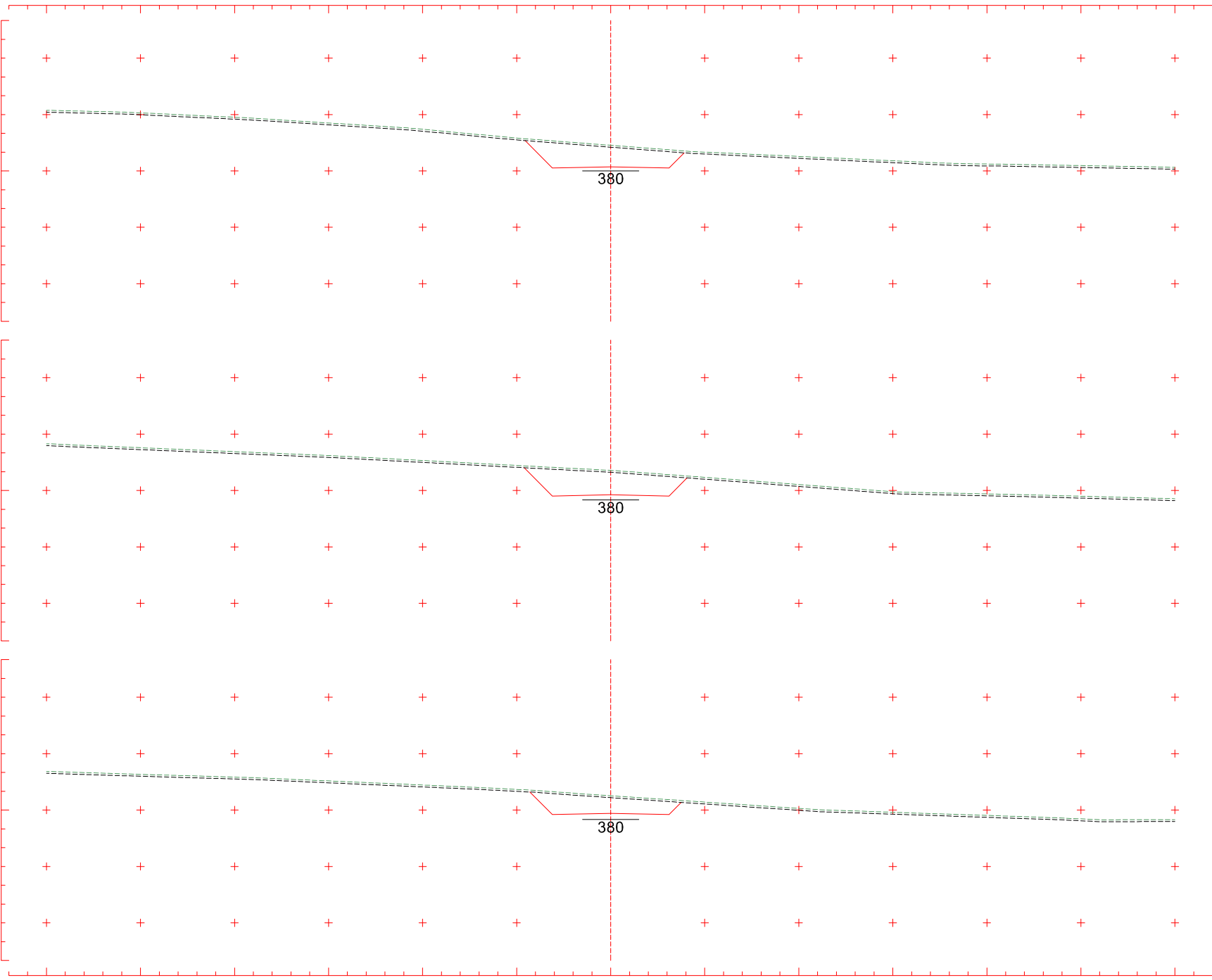
0+120
CT 380,735 m
CP 380,949 m

Eixo2
Escala 1:400

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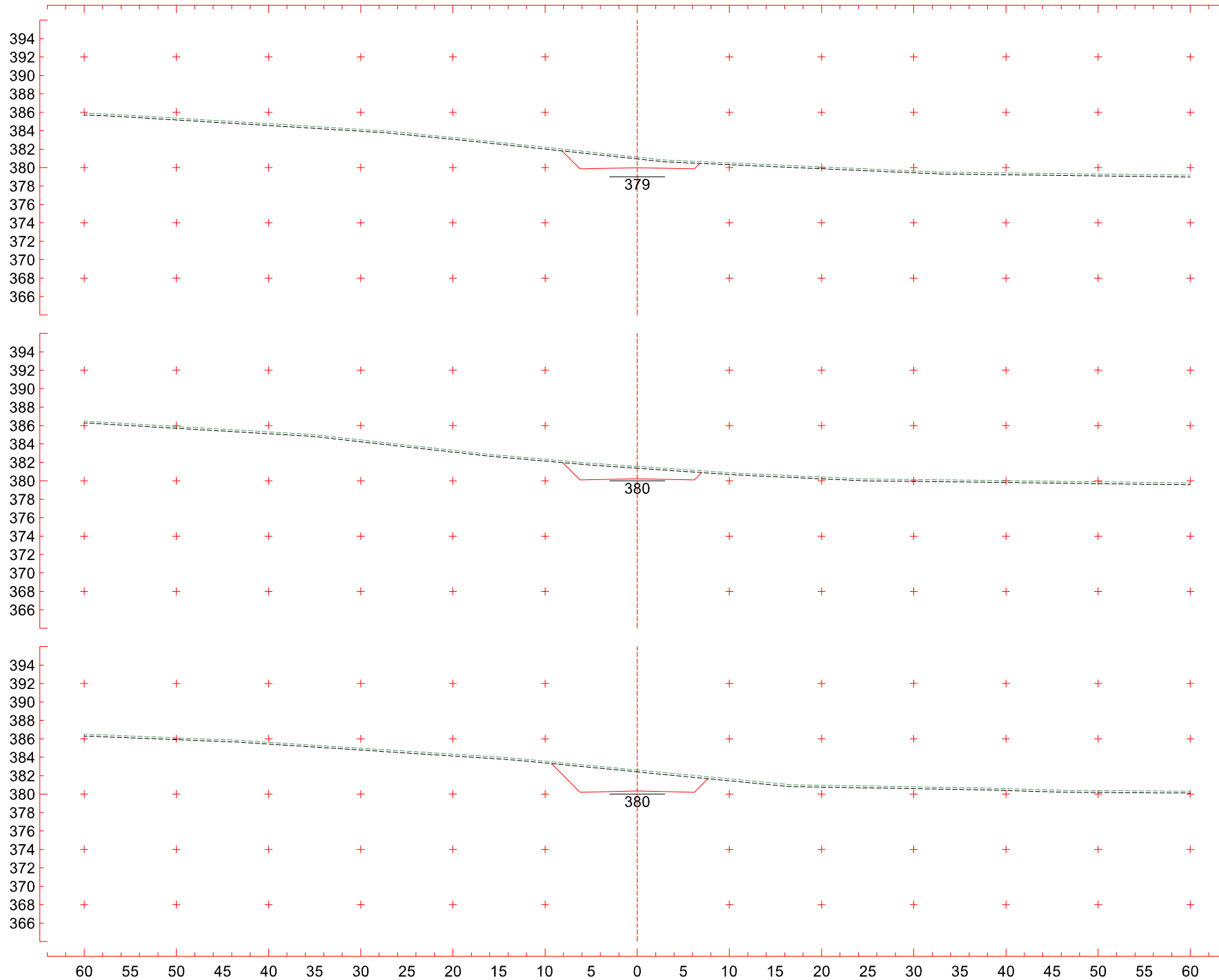


0+220
CT 382,724 m
CP 380,434 m

0+200
CT 383,138 m
CP 380,537 m

0+180
CT 382,520 m
CP 380,640 m

Eixo2
Escala 1:400



0+280
 CT 381,136 m
 CP 379,985 m

0+260
 CT 381,565 m
 CP 380,212 m

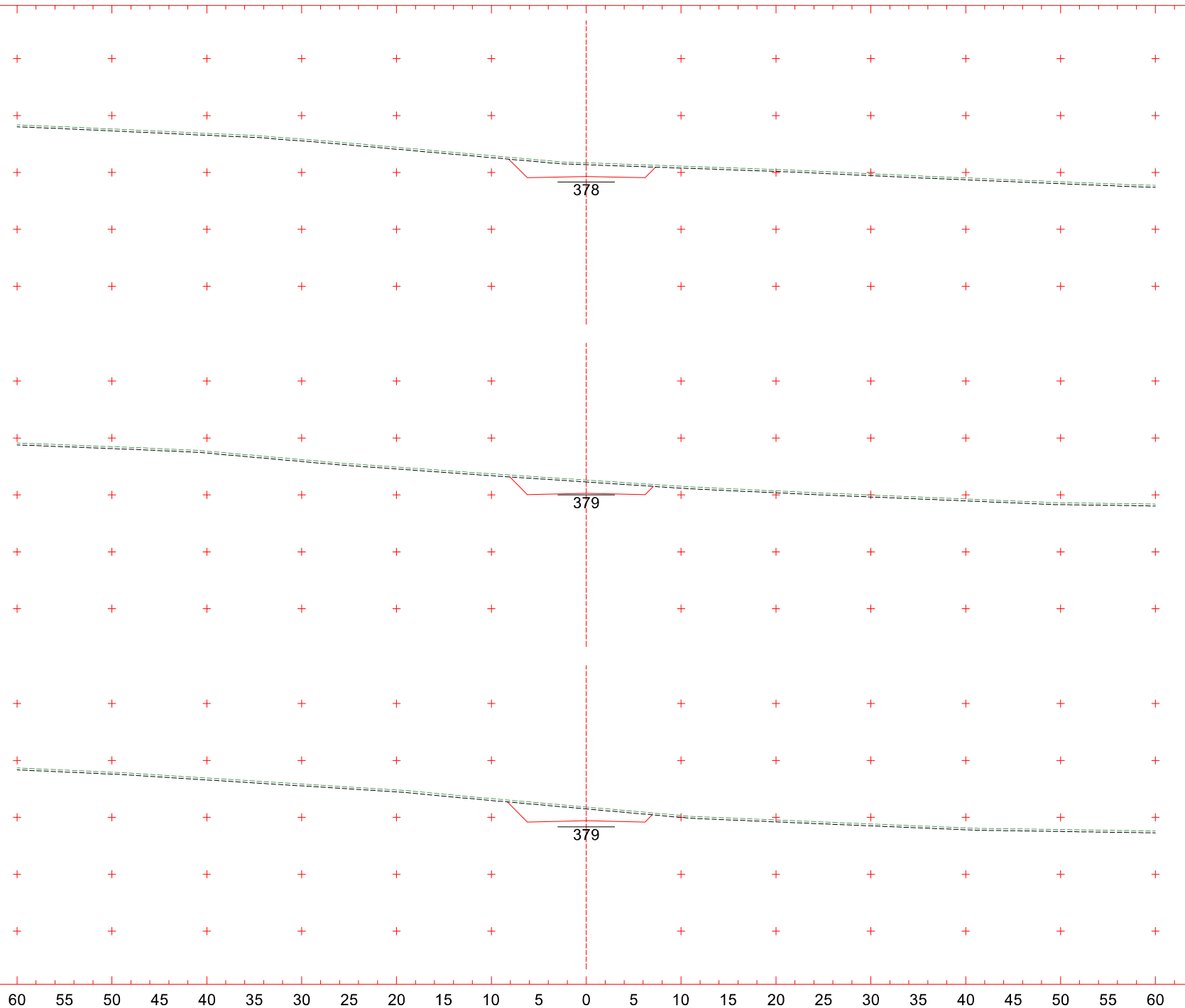
0+240
 CT 382,615 m
 CP 380,330 m

Eixo2
 Escala 1:400

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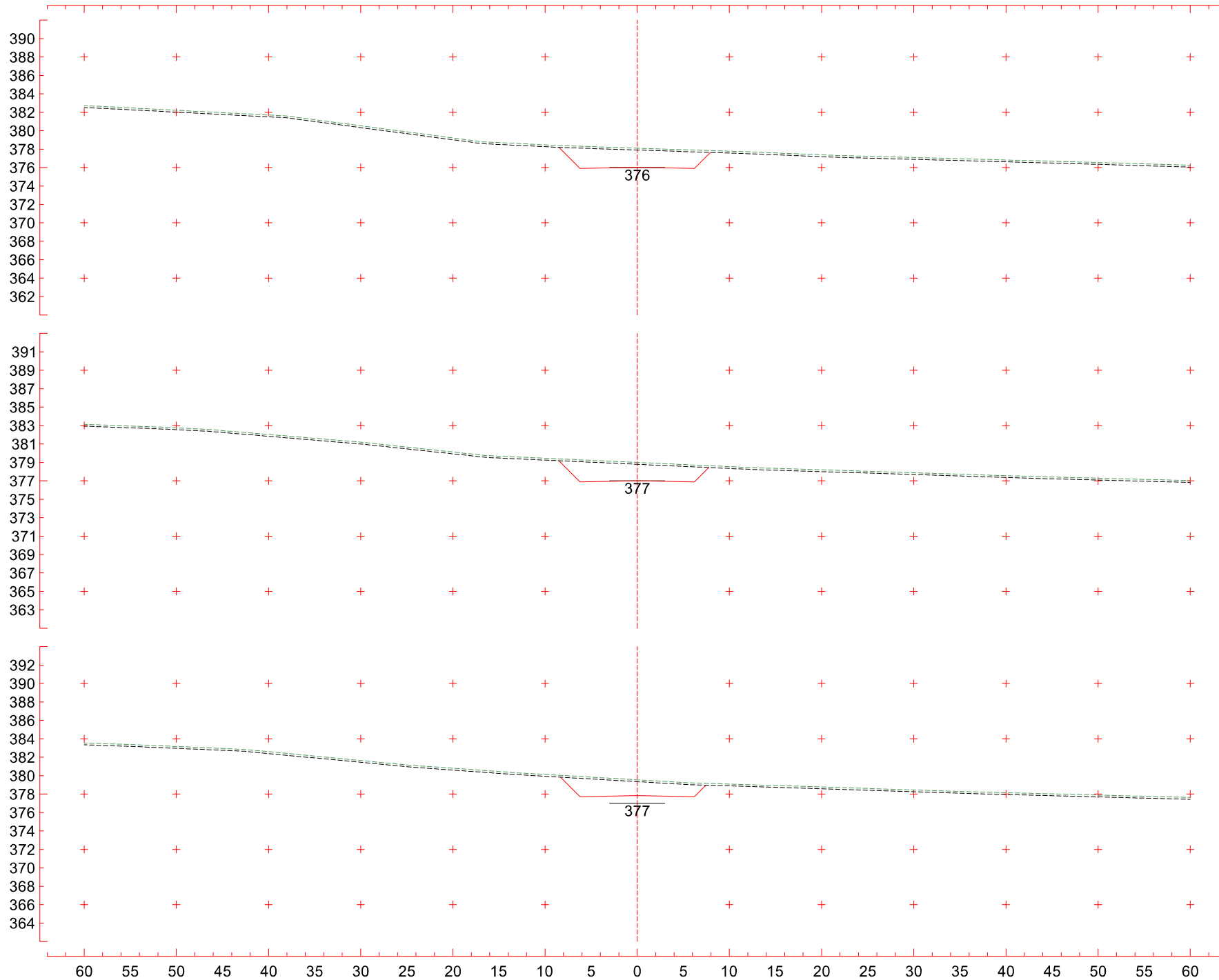


0+340
CT 380,018 m
CP 378,565 m

0+320
CT 380,565 m
CP 379,162 m

0+300
CT 381,088 m
CP 379,635 m

Eixo2
Escala 1:400

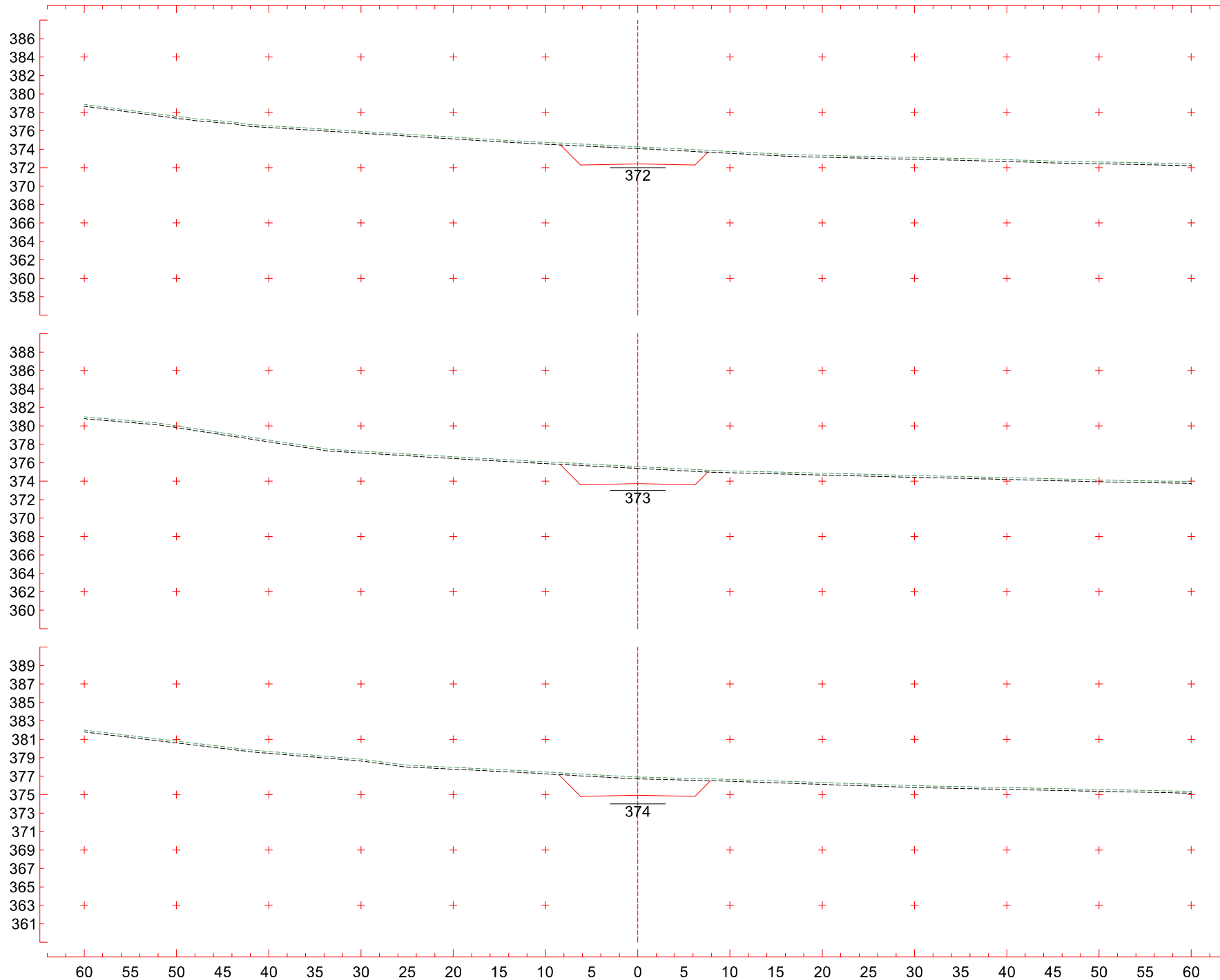


0+400
 CT 378,105 m
 CP 376,034 m

0+380
 CT 378,995 m
 CP 377,001 m

0+360
 CT 379,549 m
 CP 377,845 m

Eixo2
 Escala 1:400

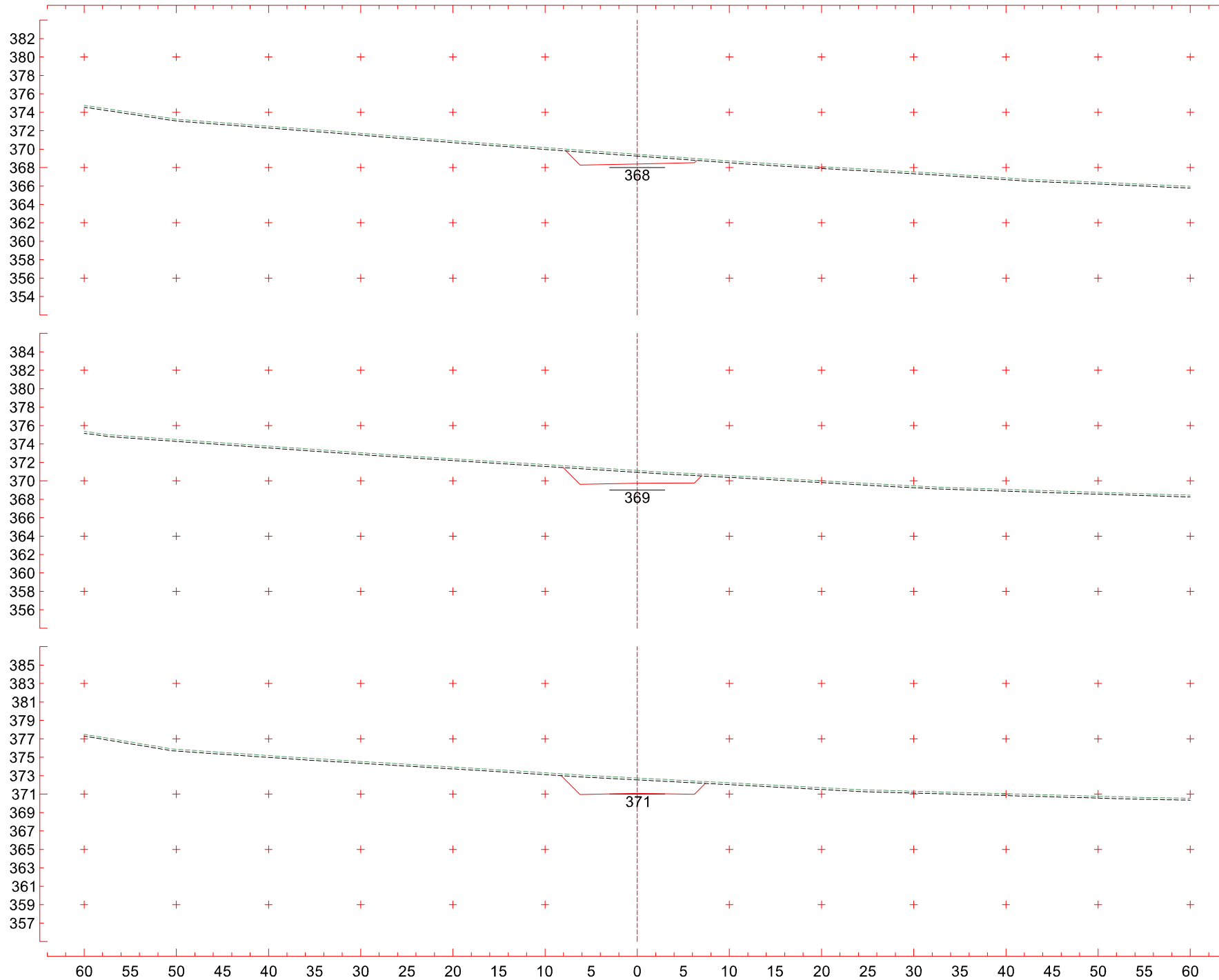


0+460
 CT 374,264 m
 CP 372,407 m

0+440
 CT 375,586 m
 CP 373,729 m

0+420
 CT 376,912 m
 CP 374,943 m

Eixo2
 Escala 1:400

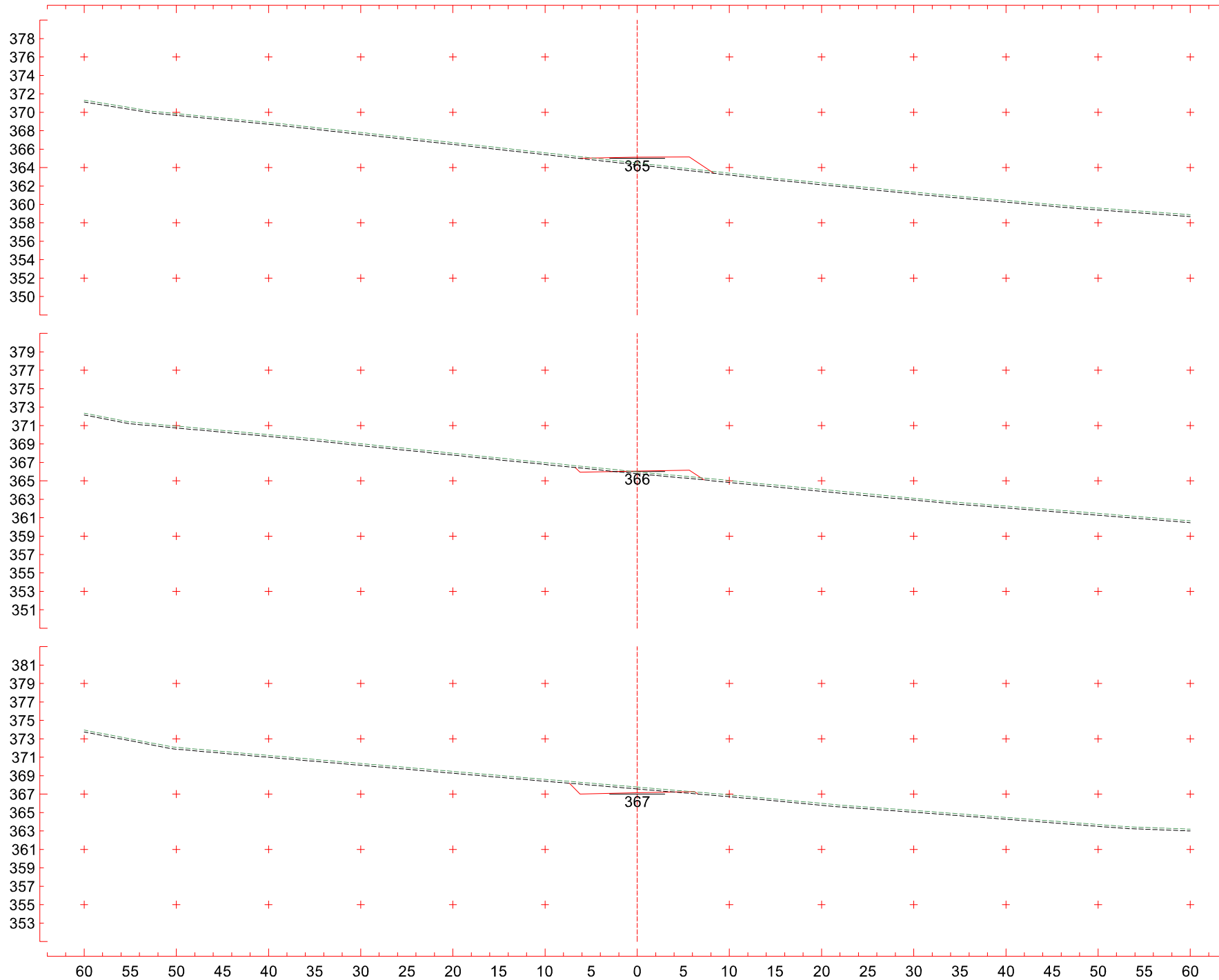


0+520
 CT 369,442 m
 CP 368,395 m

0+500
 CT 371,124 m
 CP 369,732 m

0+480
 CT 372,745 m
 CP 371,070 m

Eixo2
 Escala 1:400



0+580
 CT 364,495 m
 CP 365,126 m

0+560
 CT 365,974 m
 CP 366,050 m

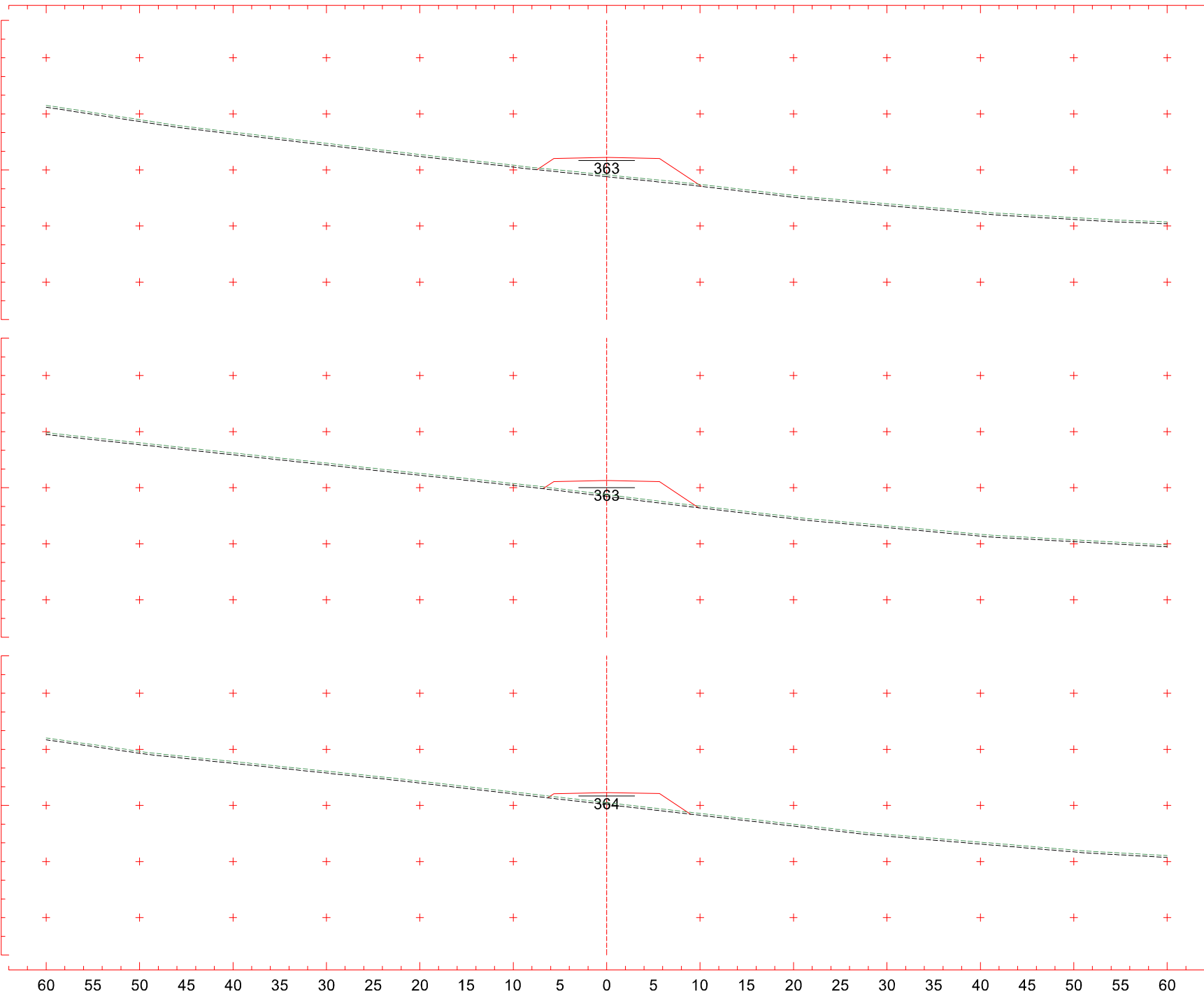
0+540
 CT 367,760 m
 CP 367,140 m

Eixo2
 Escala 1:400

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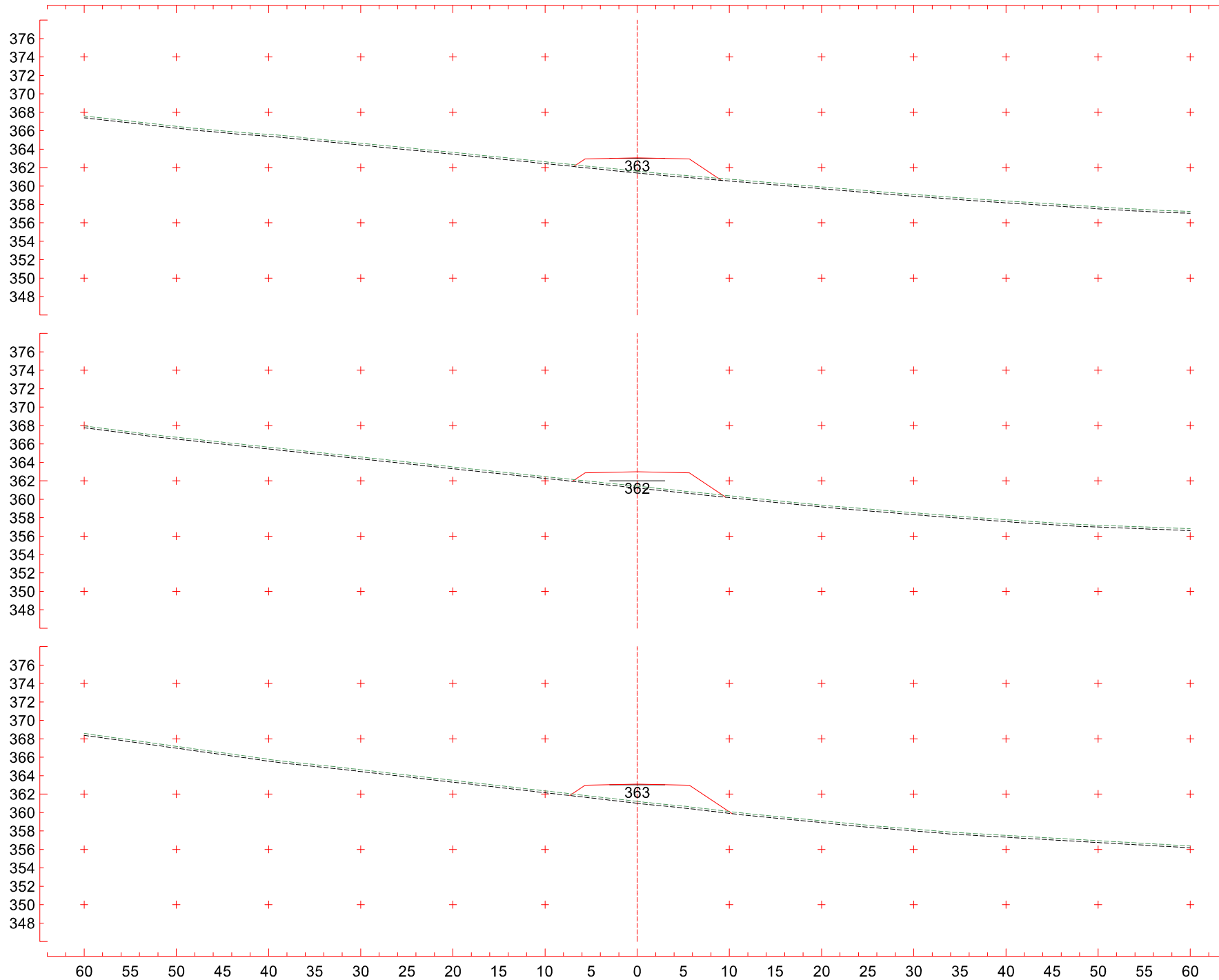


0+640
CT 361,477 m
CP 363,344 m

0+620
CT 362,256 m
CP 363,773 m

0+600
CT 363,299 m
CP 364,366 m

Eixo2
Escala 1:400



0+700
 CT 361,607 m
 CP 363,049 m

0+680
 CT 361,417 m
 CP 362,982 m

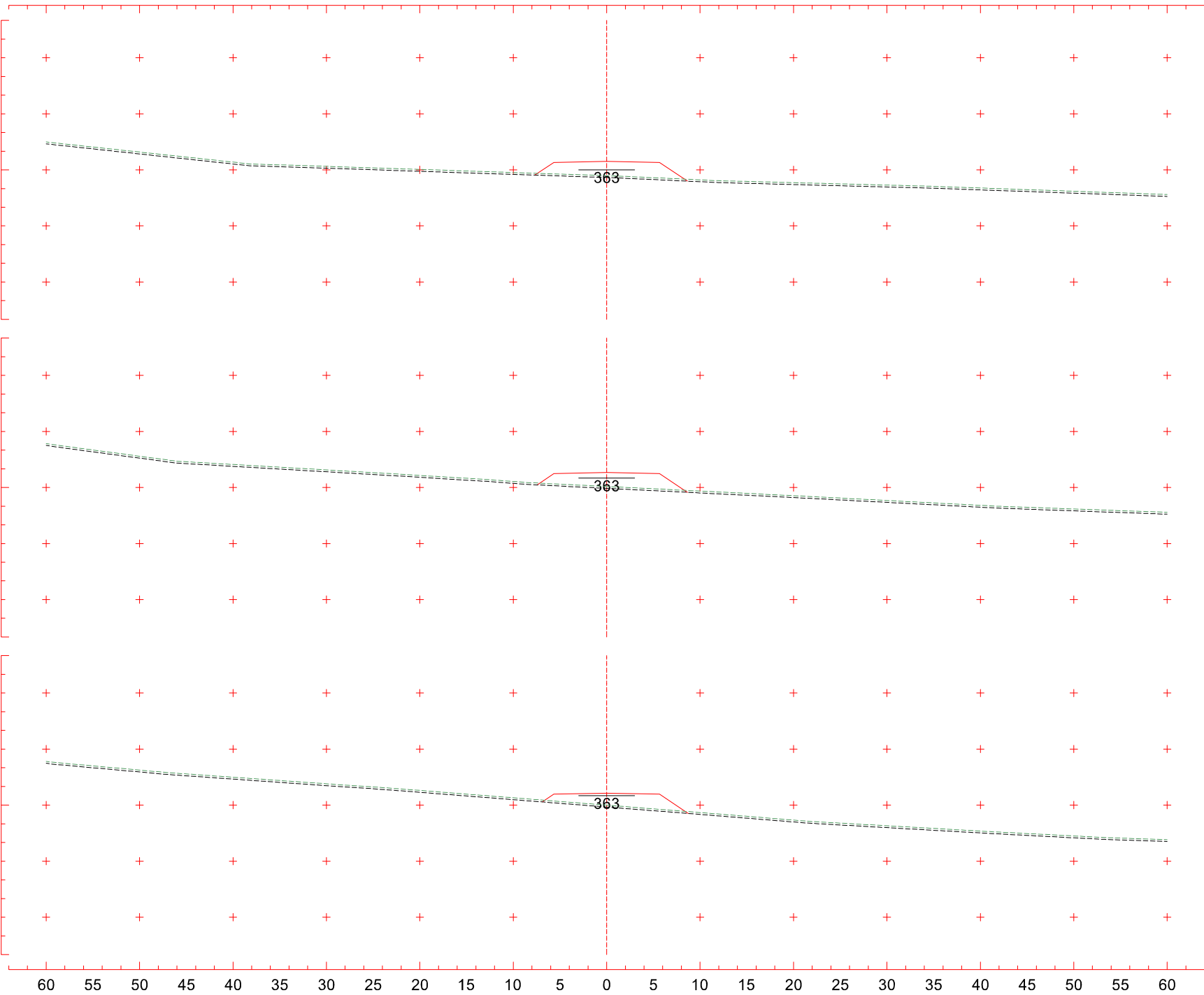
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 CT 361,206 m
 CP 363,081 m

Eixo2
 Escala 1:400

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0+760
CT 362,383 m
CP 363,912 m

0+740
CT 362,109 m
CP 363,597 m

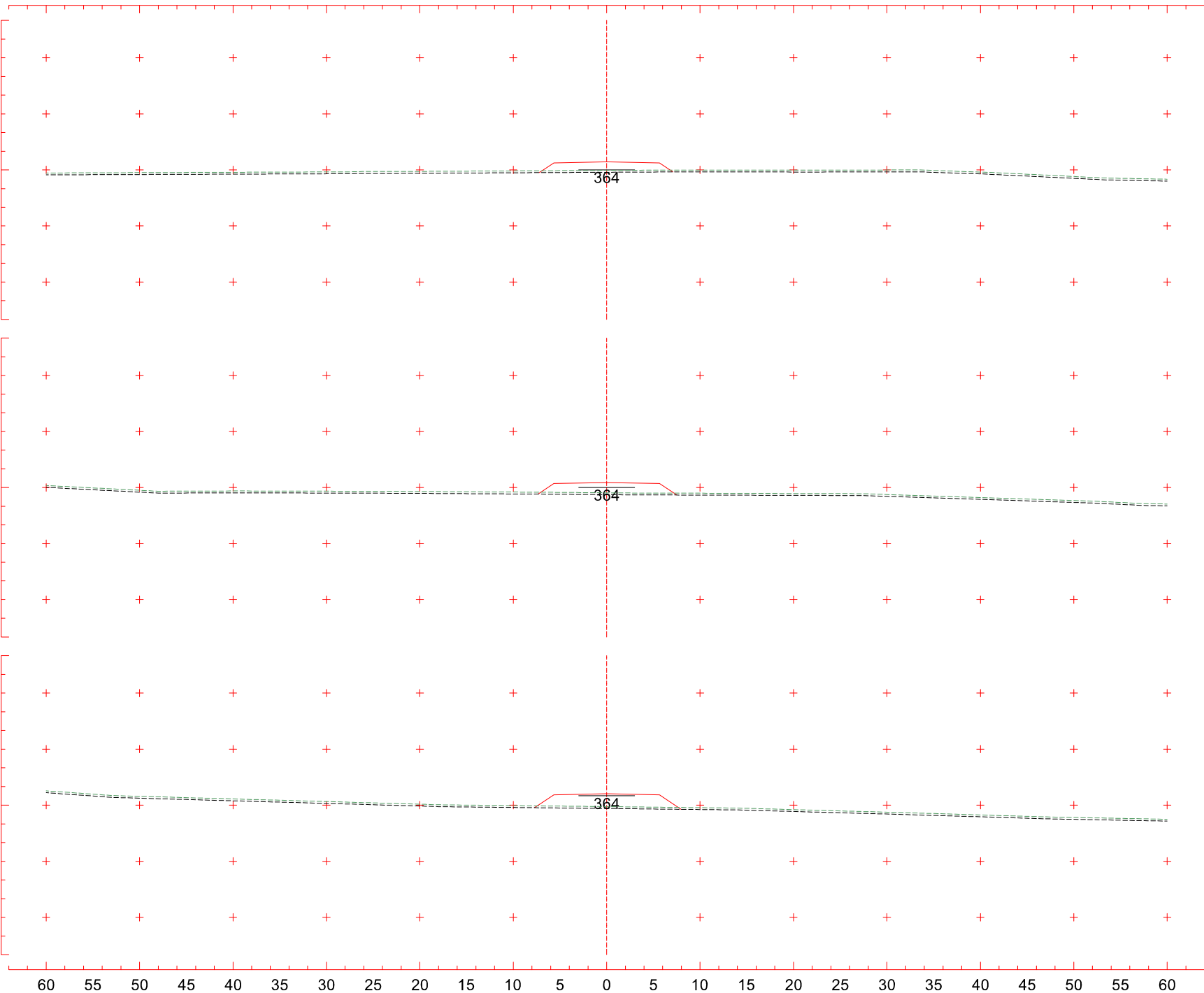
0+720
CT 361,994 m
CP 363,282 m

Eixo2
Escala 1:400

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0+820
CT 363,946 m
CP 364,857 m

0+800
CT 363,437 m
CP 364,542 m

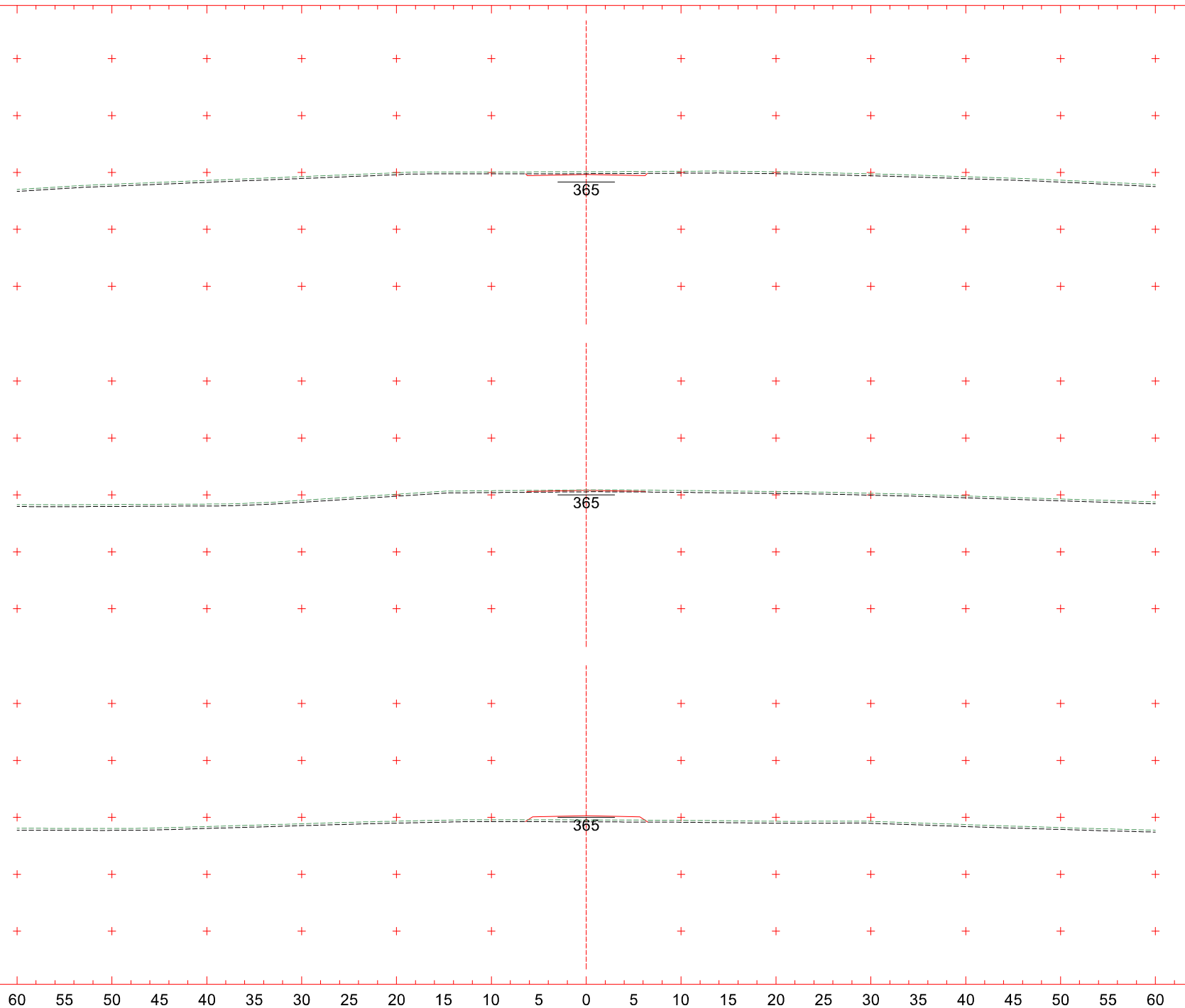
0+780
CT 362,845 m
CP 364,227 m

Eixo2
Escala 1:400

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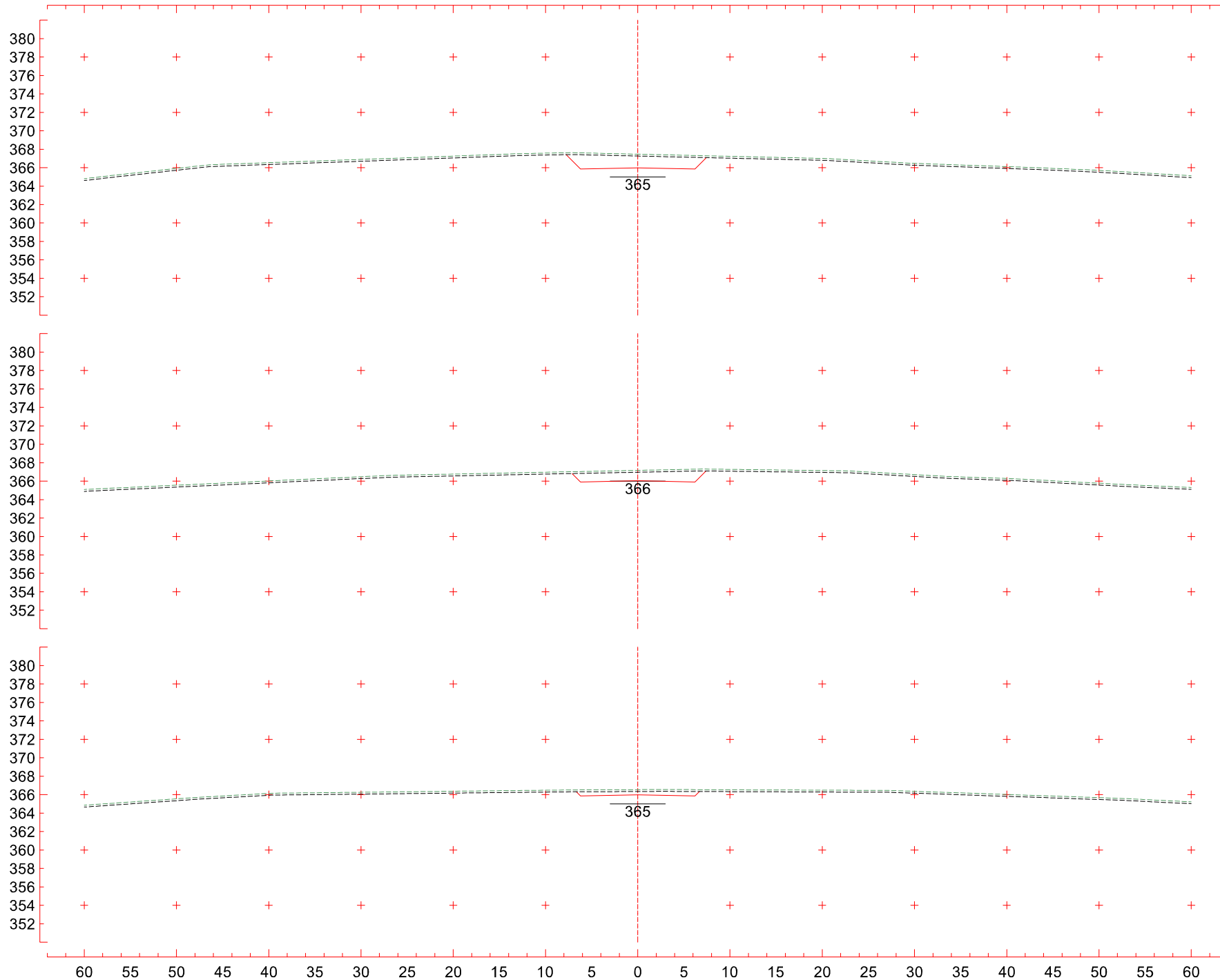


0+880
CT 366,069 m
CP 365,786 m

0+860
CT 365,526 m
CP 365,487 m

0+840
CT 364,725 m
CP 365,172 m

Eixo2
Escala 1:400



0+940
 CT 367,461 m
 CP 365,977 m

365

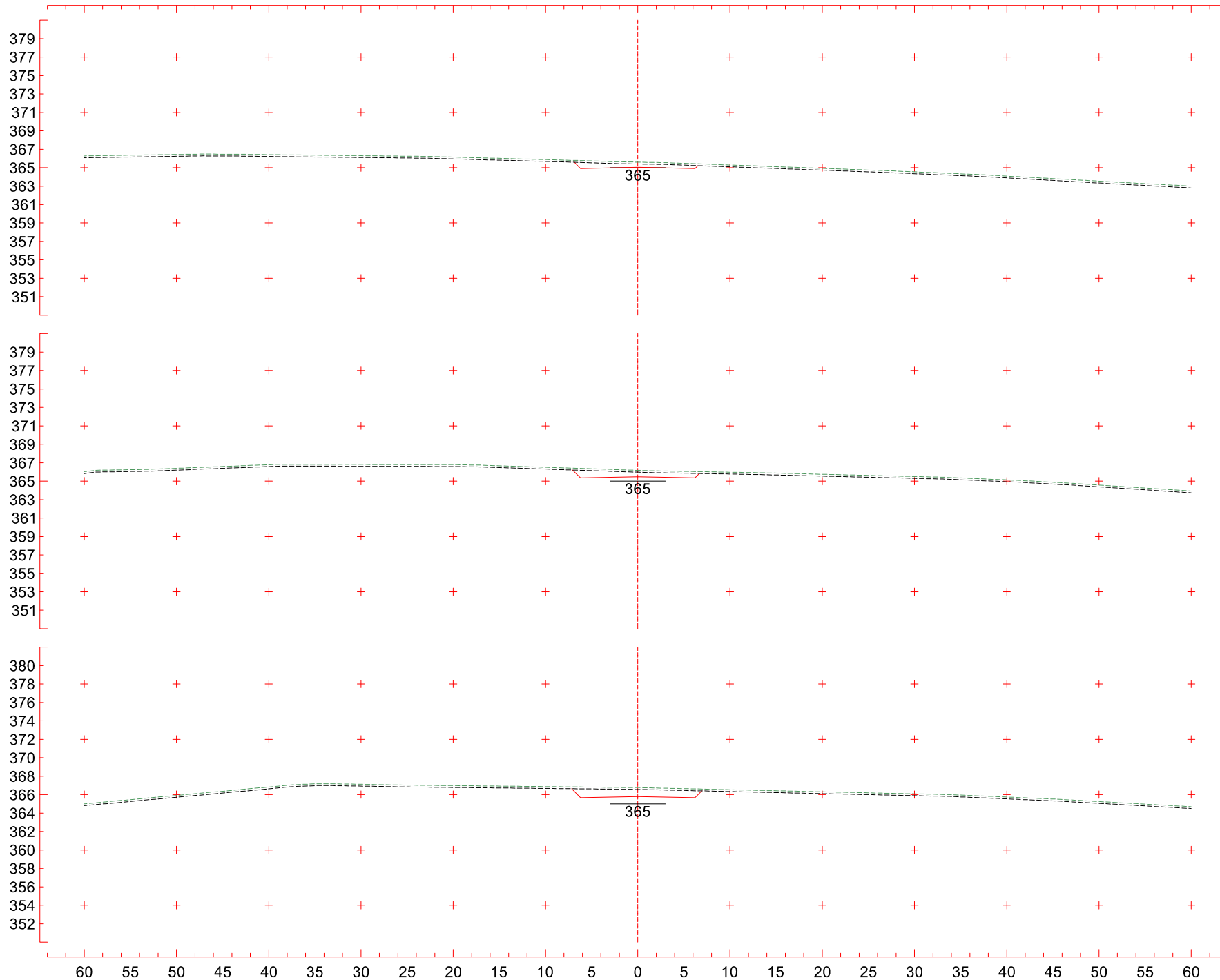
0+920
 CT 367,169 m
 CP 366,039 m

366

0+900
 CT 366,541 m
 CP 365,975 m

365

Eixo2
 Escala 1:400



1+000

CT 365,606 m
CP 365,038 m

0+980

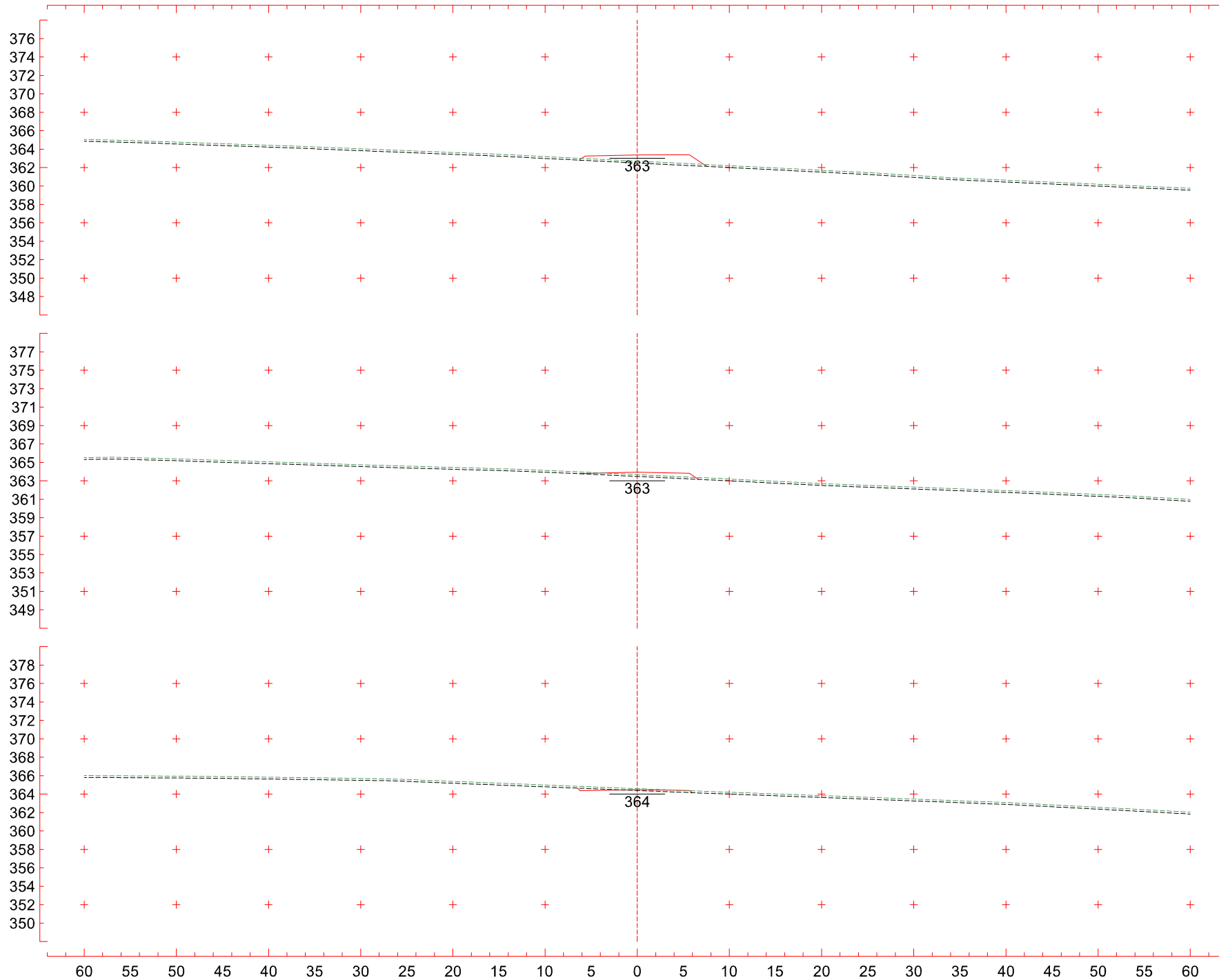
CT 366,177 m
CP 365,477 m

0+960

CT 366,764 m
CP 365,790 m

Eixo2

Escala 1:400



1+060

CT 362,688 m
CP 363,362 m

1+040

CT 363,673 m
CP 363,926 m

1+020

CT 364,589 m
CP 364,490 m

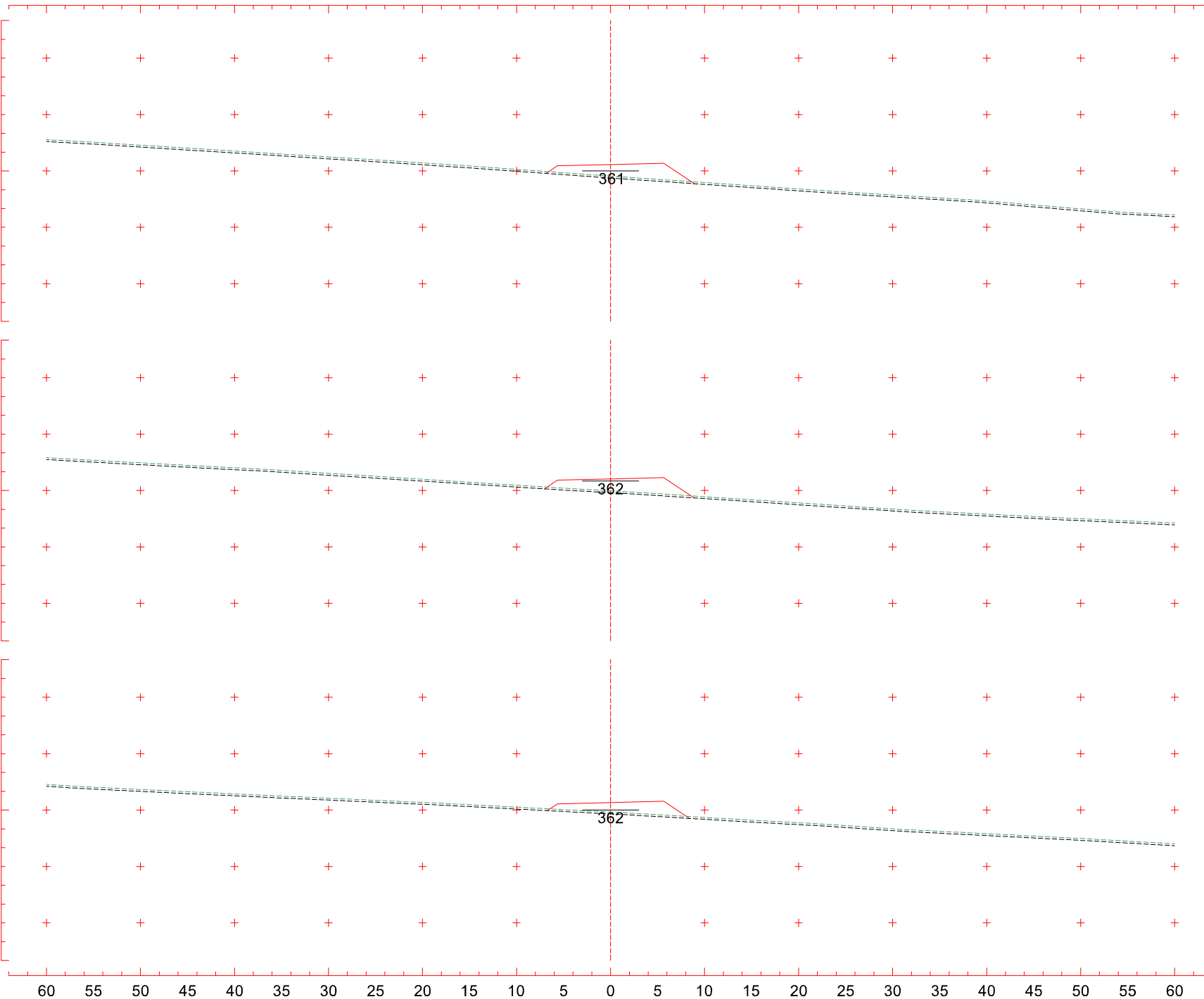
Eixo2

Escala 1:400

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1+120
CT 360,446 m
CP 361,679 m

1+100
CT 360,970 m
CP 362,233 m

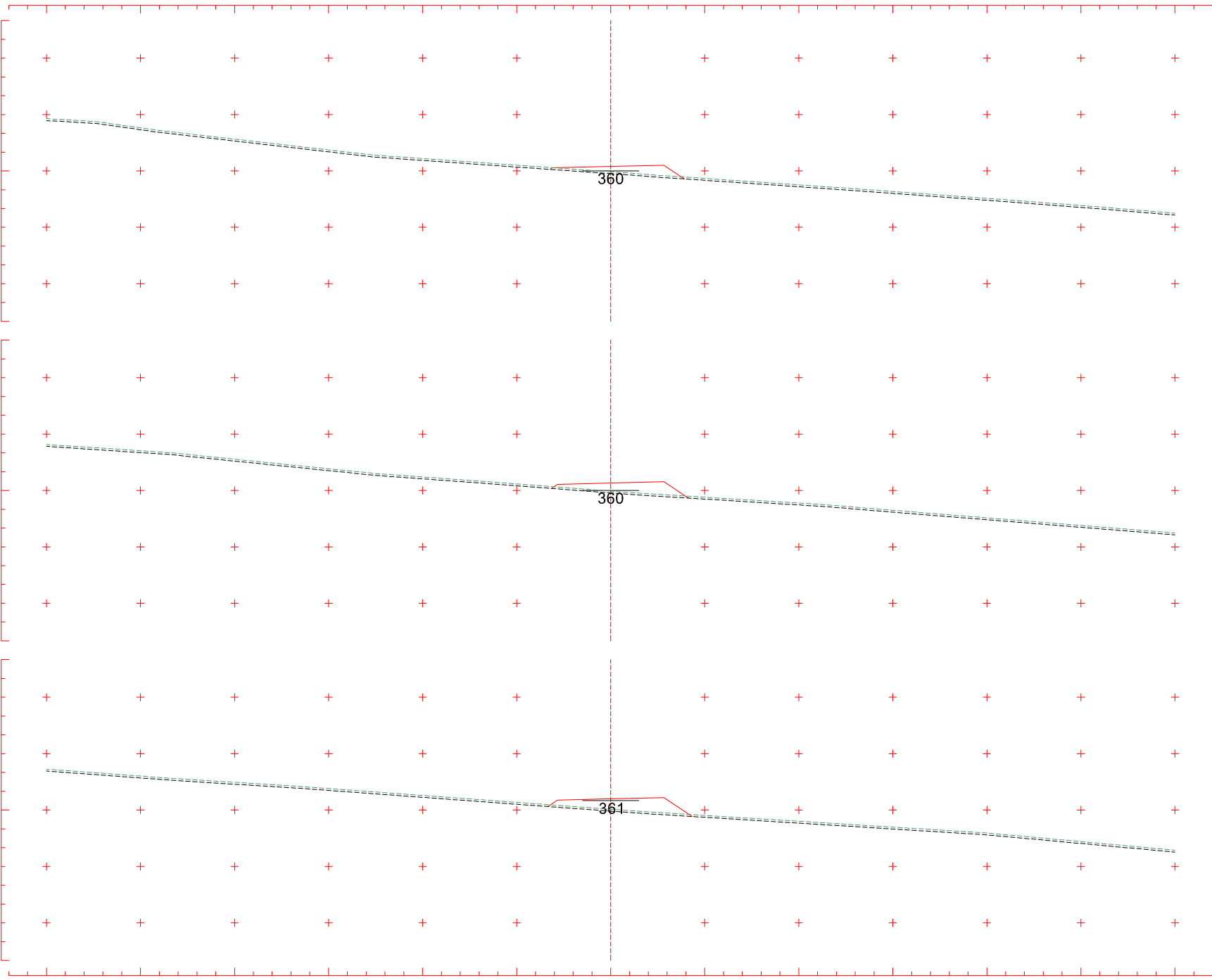
1+080
CT 361,787 m
CP 362,797 m

Eixo2
Escala 1:400

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1+180
CT 359,907 m
CP 360,473 m

1+160
CT 359,936 m
CP 360,794 m

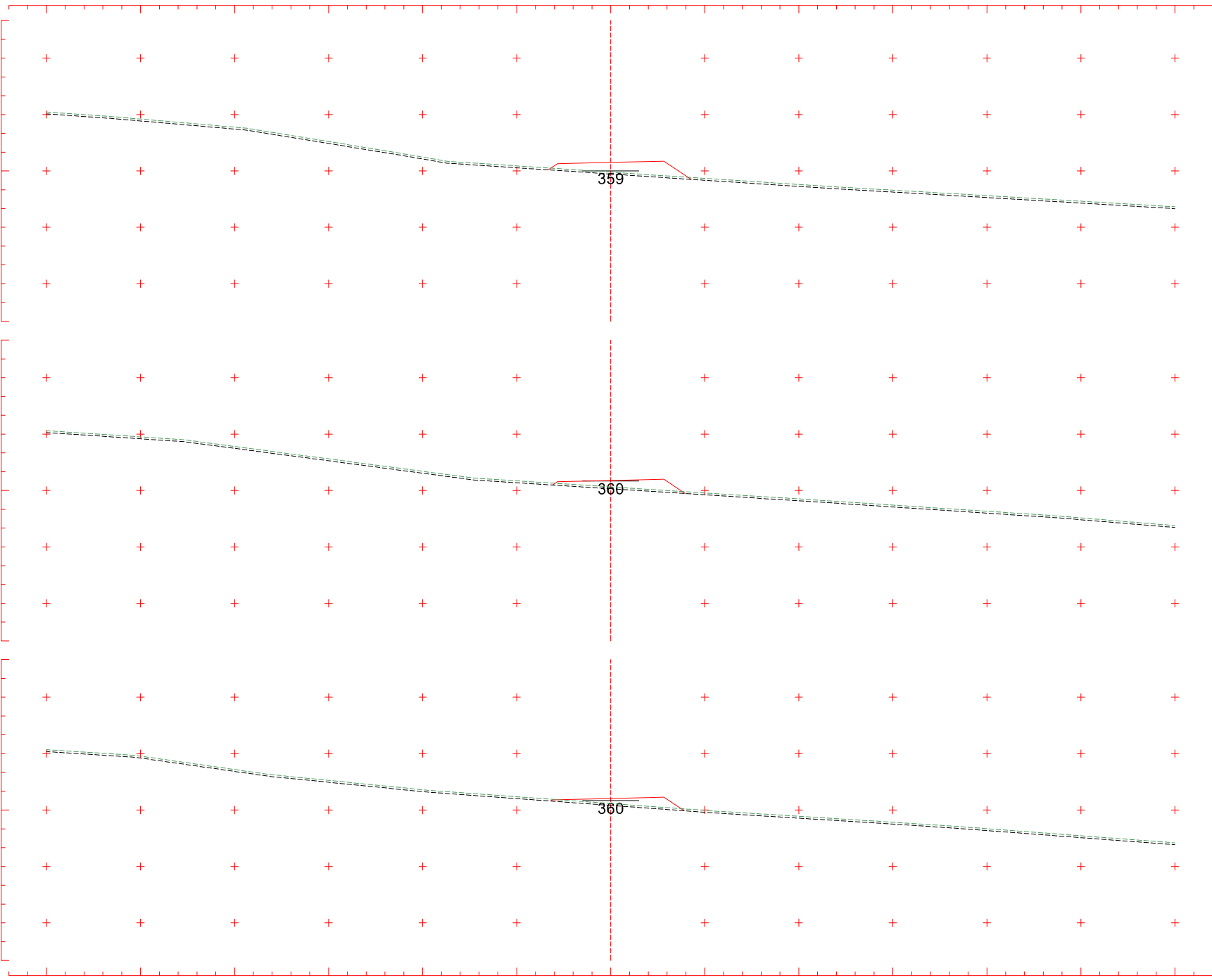
1+140
CT 360,084 m
CP 361,196 m

Eixo2
Escala 1:400

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1+240
CT 358,871 m
CP 359,906 m

1+220
CT 359,383 m
CP 360,065 m

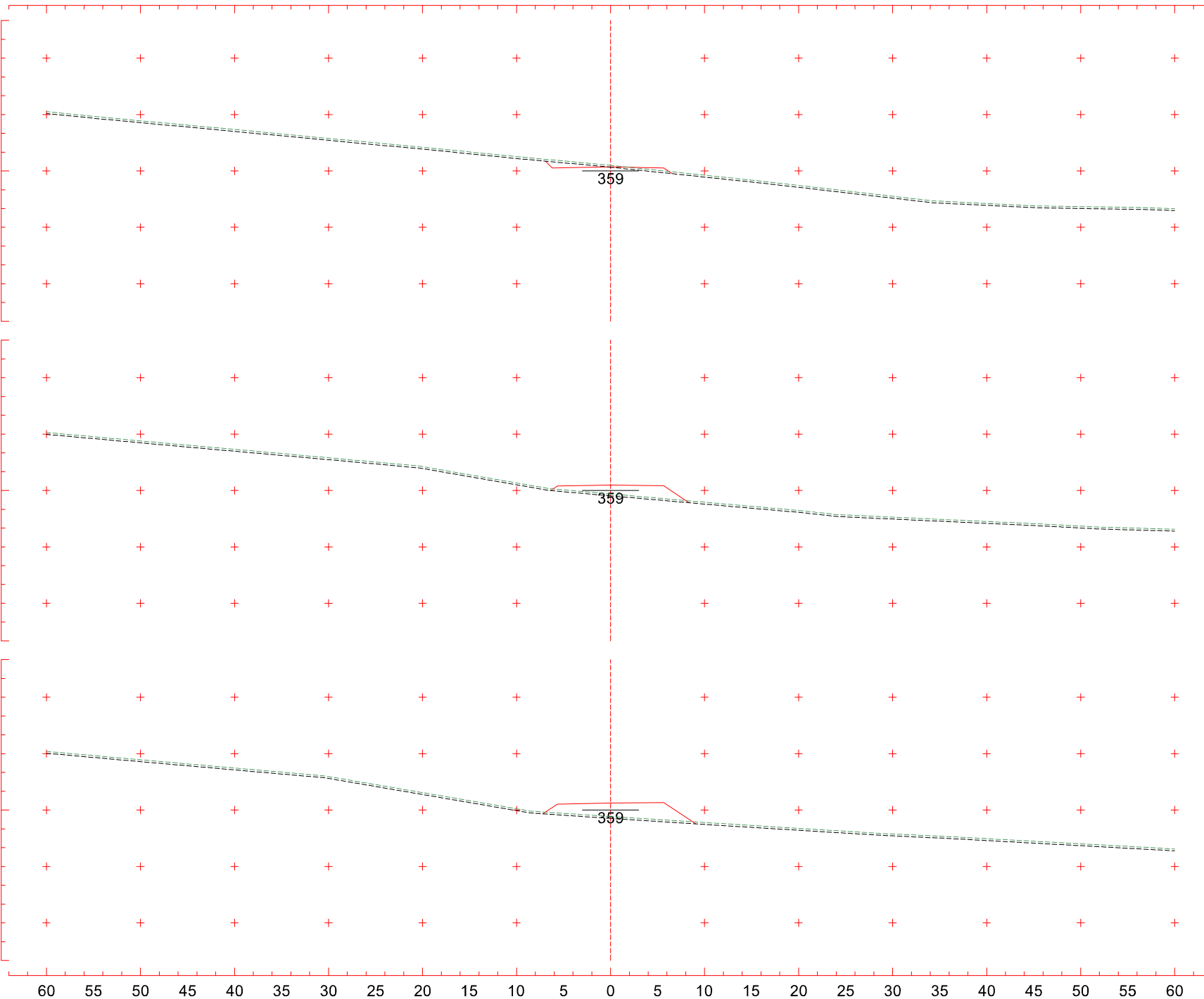
1+200
CT 359,694 m
CP 360,234 m

Eixo2
Escala 1:400

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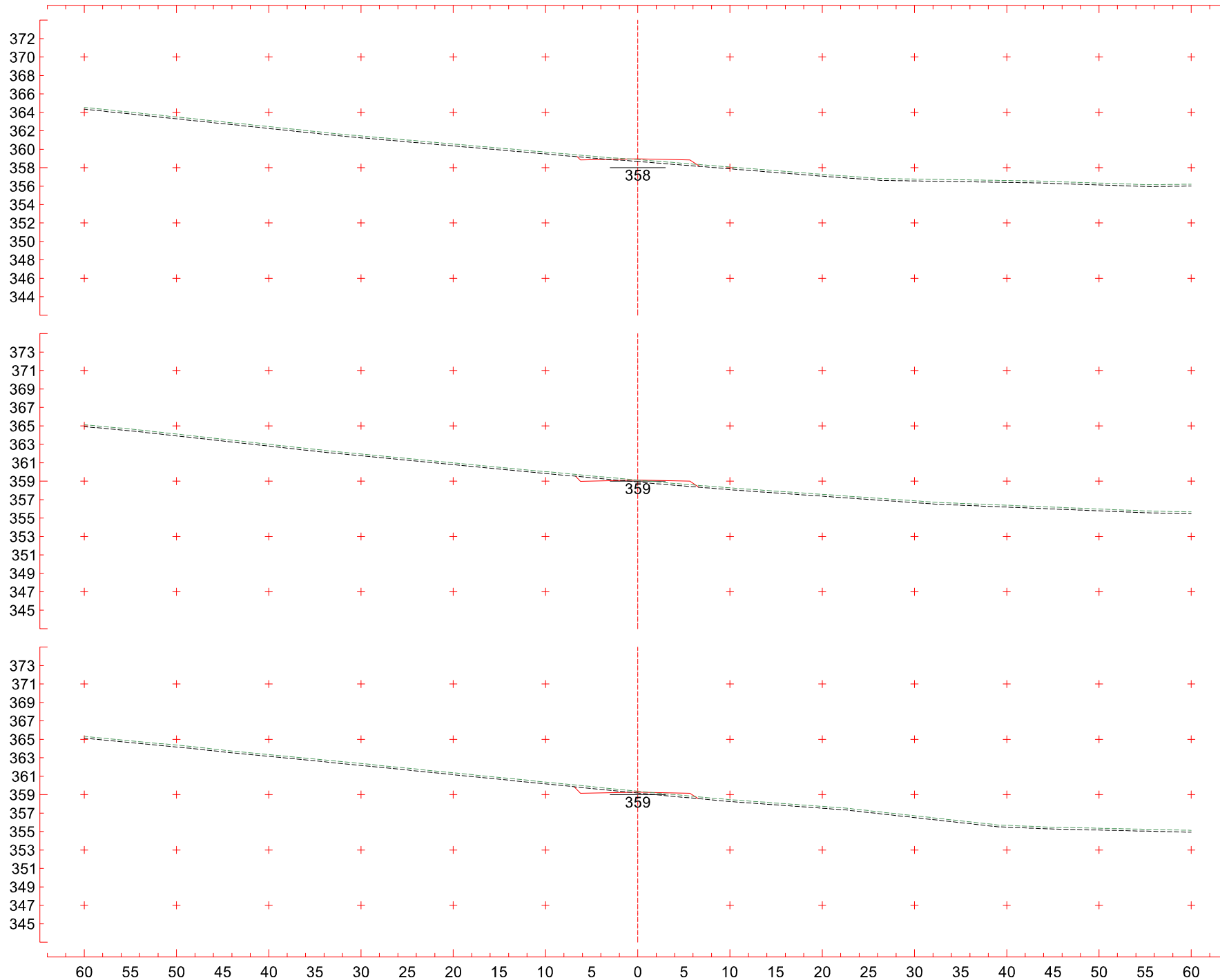


1+300
CT 359,593 m
CP 359,430 m

1+280
CT 358,630 m
CP 359,589 m

1+260
CT 358,313 m
CP 359,747 m

Eixo2
Escala 1:400



1+360
 CT 358,877 m
 CP 358,954 m

1+340
 CT 359,113 m
 CP 359,113 m

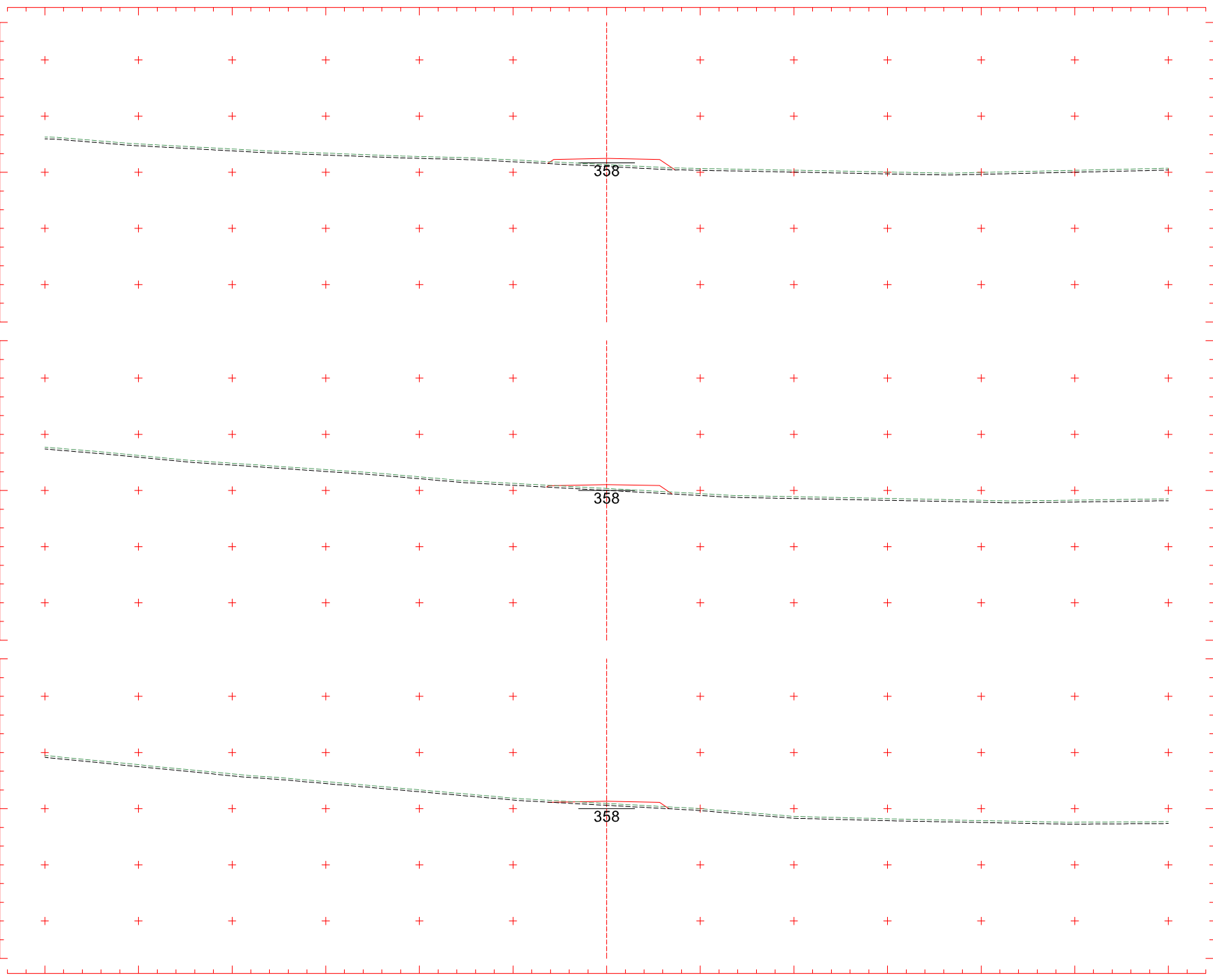
1+320
 CT 359,369 m
 CP 359,271 m

Eixo2
 Escala 1:400

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1+420
CT 357,819 m
CP 358,478 m

1+400
CT 358,213 m
CP 358,637 m

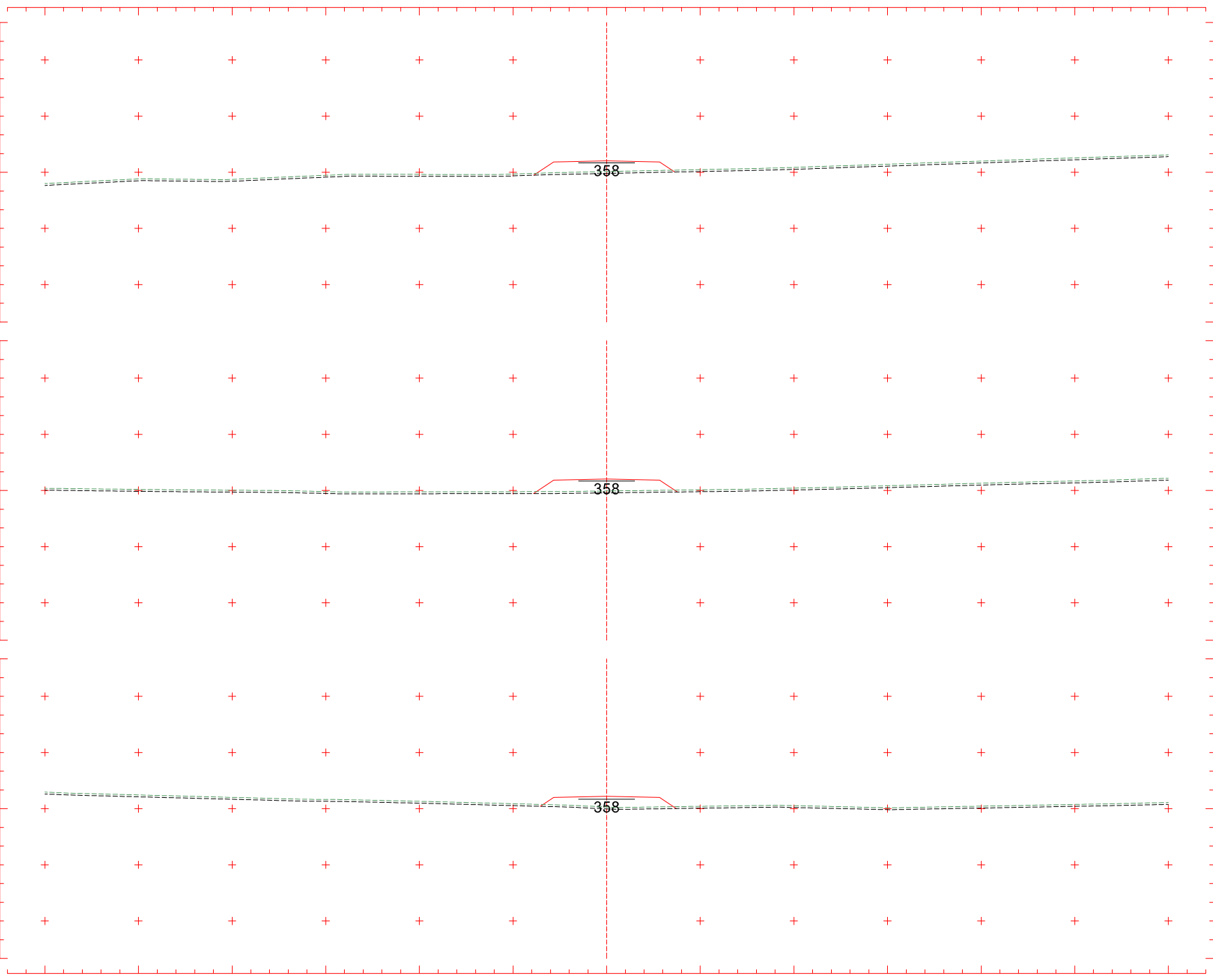
1+380
CT 358,558 m
CP 358,795 m

Eixo2
Escala 1:400

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1+480
CT 357,077 m
CP 358,223 m

1+460
CT 356,945 m
CP 358,229 m

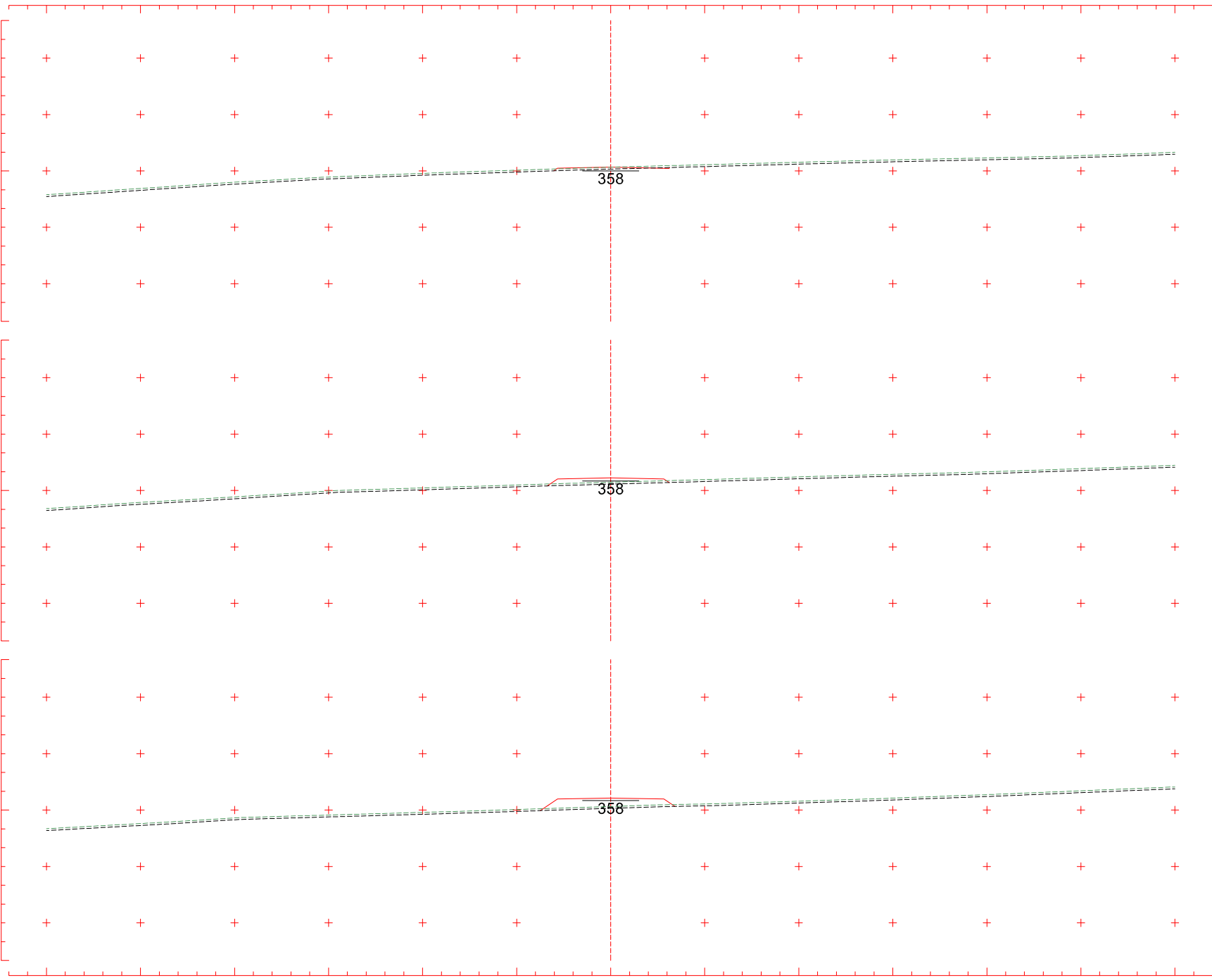
1+440
CT 357,173 m
CP 358,322 m

Eixo2
Escala 1:400

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1+540

CT 358,397 m
CP 358,401 m

1+520

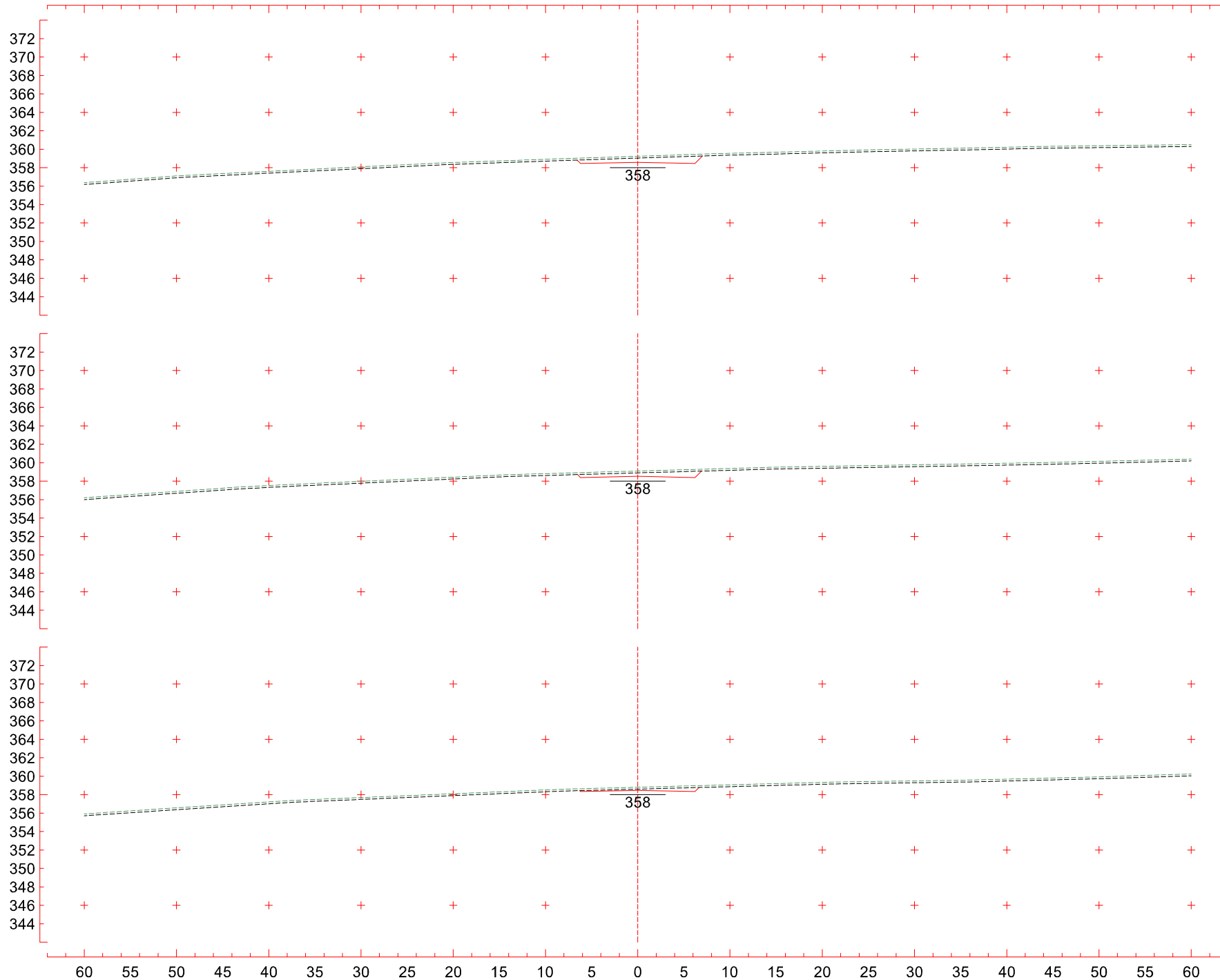
CT 357,877 m
CP 358,341 m

1+500

CT 357,382 m
CP 358,281 m

Eixo2

Escala 1:400



1+600
 CT 359,239 m
 CP 358,581 m

1+580
 CT 359,097 m
 CP 358,521 m

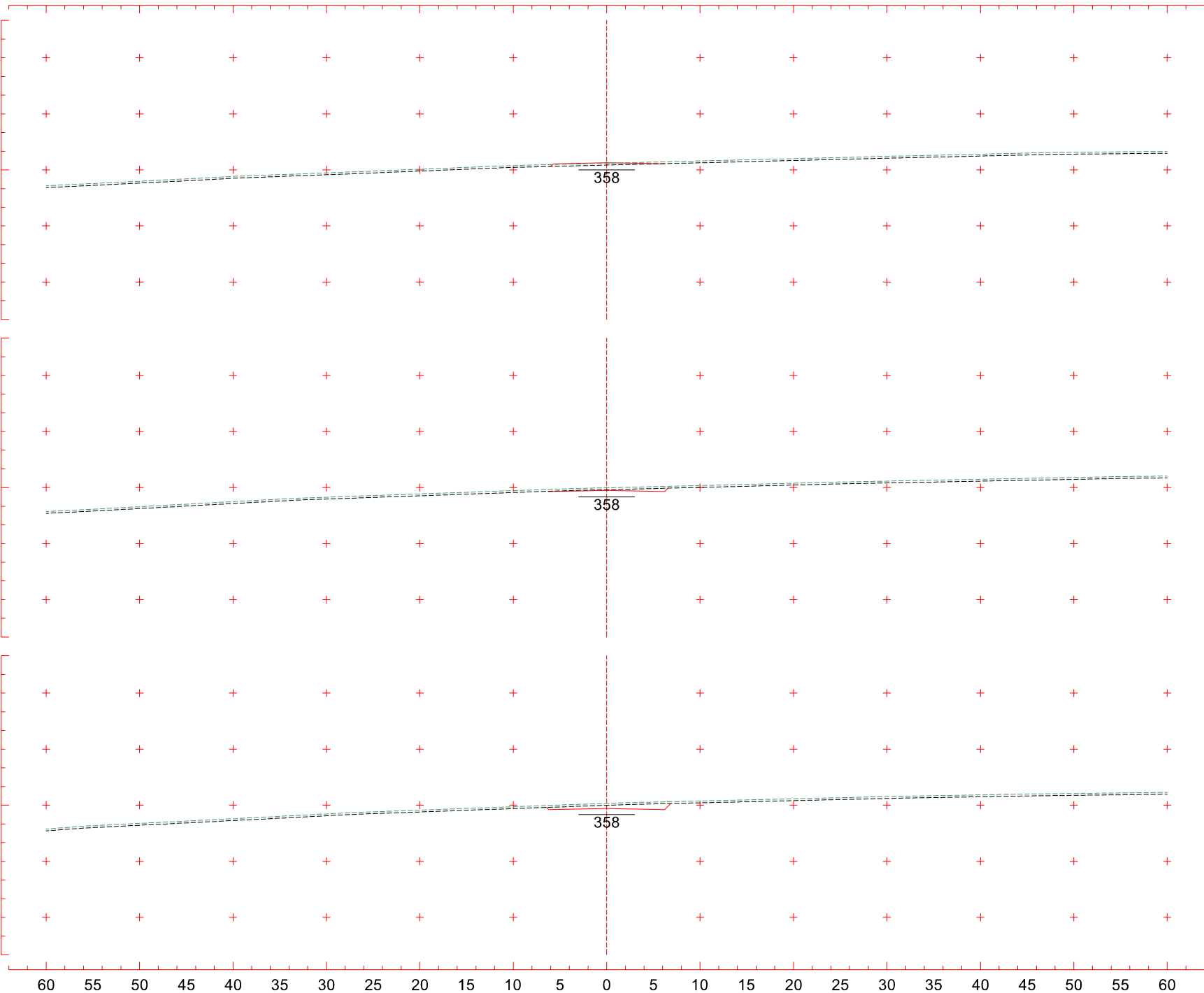
1+560
 CT 358,802 m
 CP 358,461 m

Eixo2
 Escala 1:400

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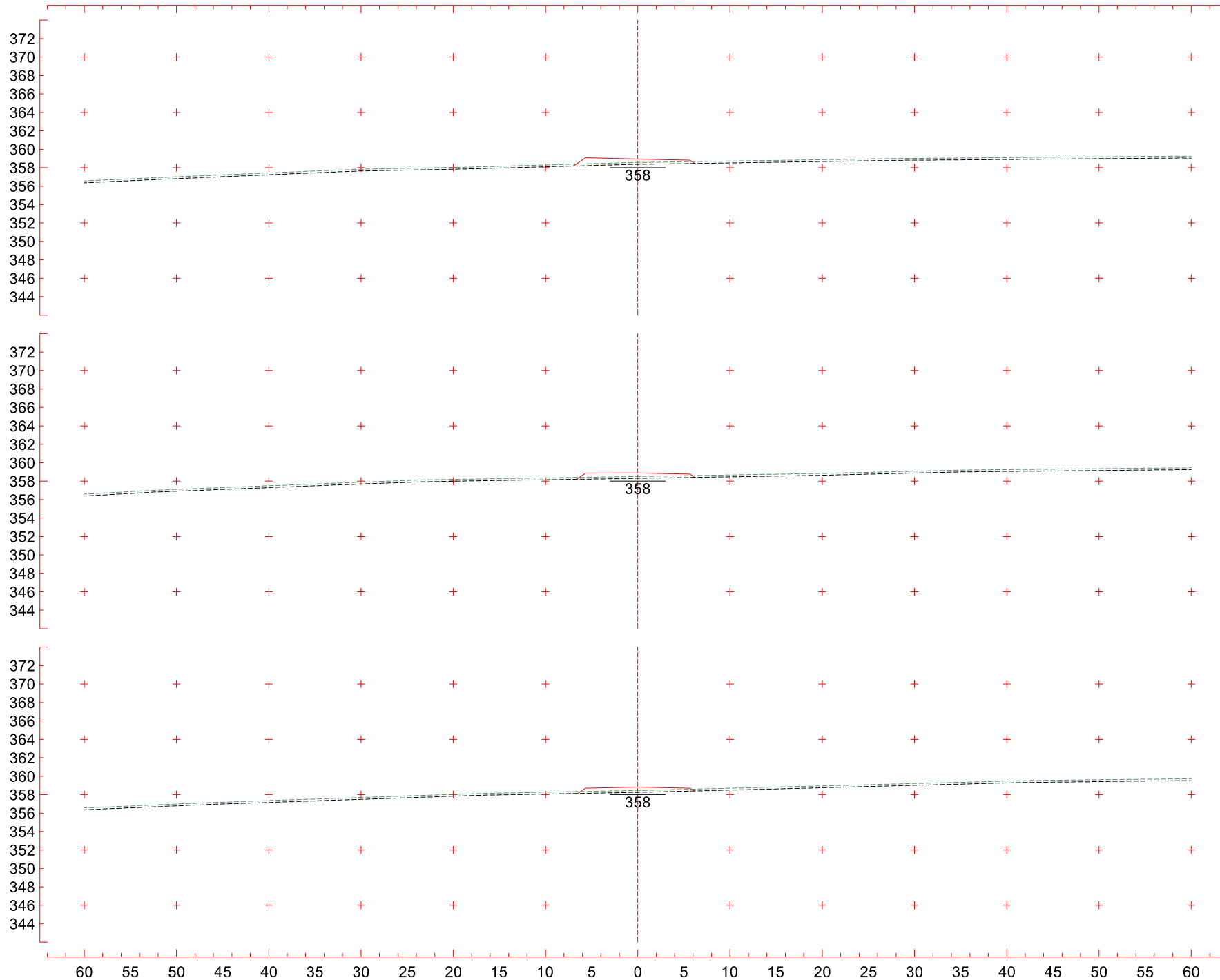


1+660
CT 358,717 m
CP 358,761 m

1+640
CT 358,974 m
CP 358,701 m

1+620
CT 359,190 m
CP 358,641 m

Eixo2
Escala 1:400

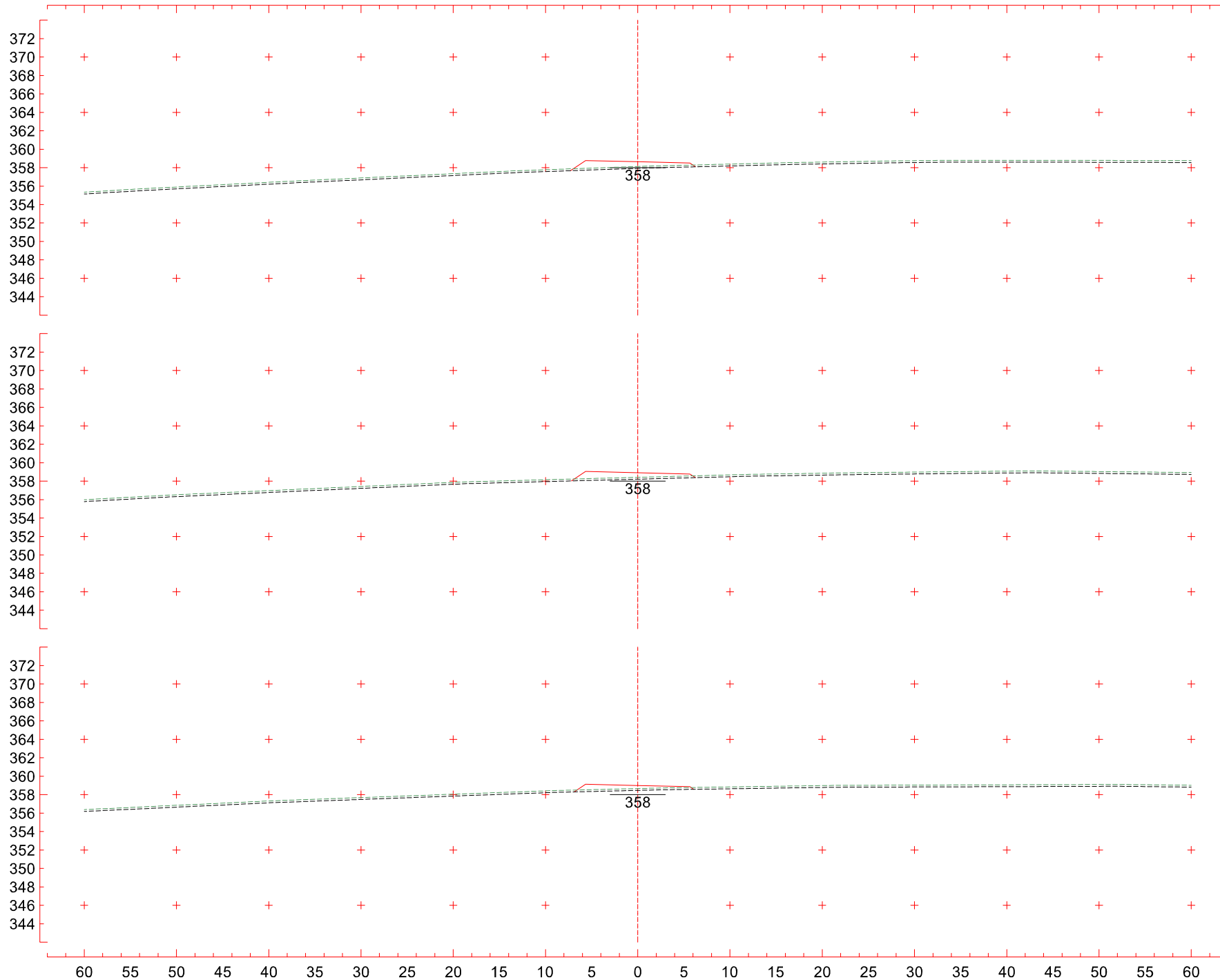


1+720
 CT 358,569 m
 CP 358,941 m

1+700
 CT 358,510 m
 CP 358,881 m

1+680
 CT 358,453 m
 CP 358,821 m

Eixo2
 Escala 1:400



1+780
 CT 358,127 m
 CP 358,639 m

1+760
 CT 358,416 m
 CP 358,912 m

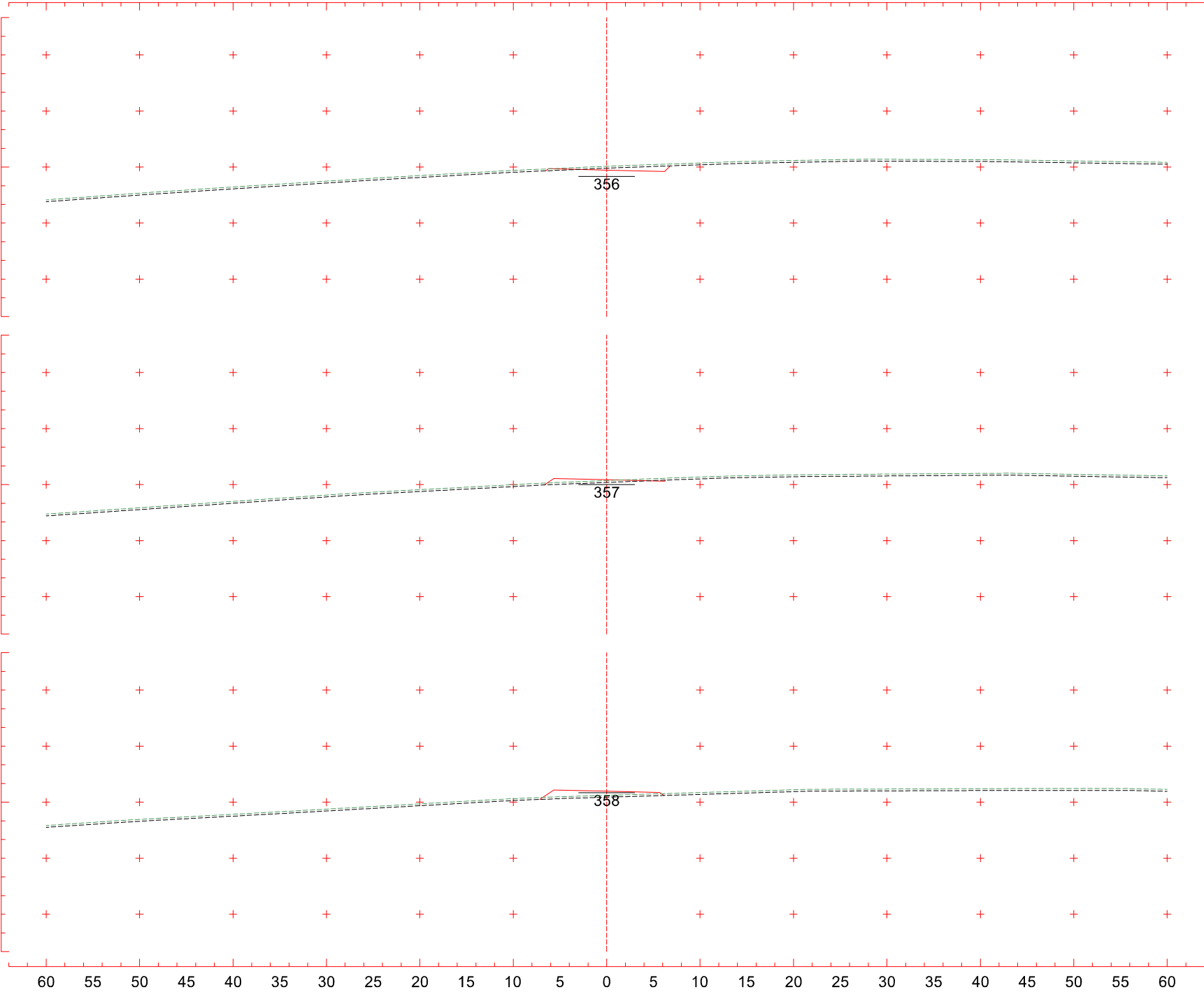
1+740
 CT 358,663 m
 CP 358,995 m

Eixo2
 Escala 1:400

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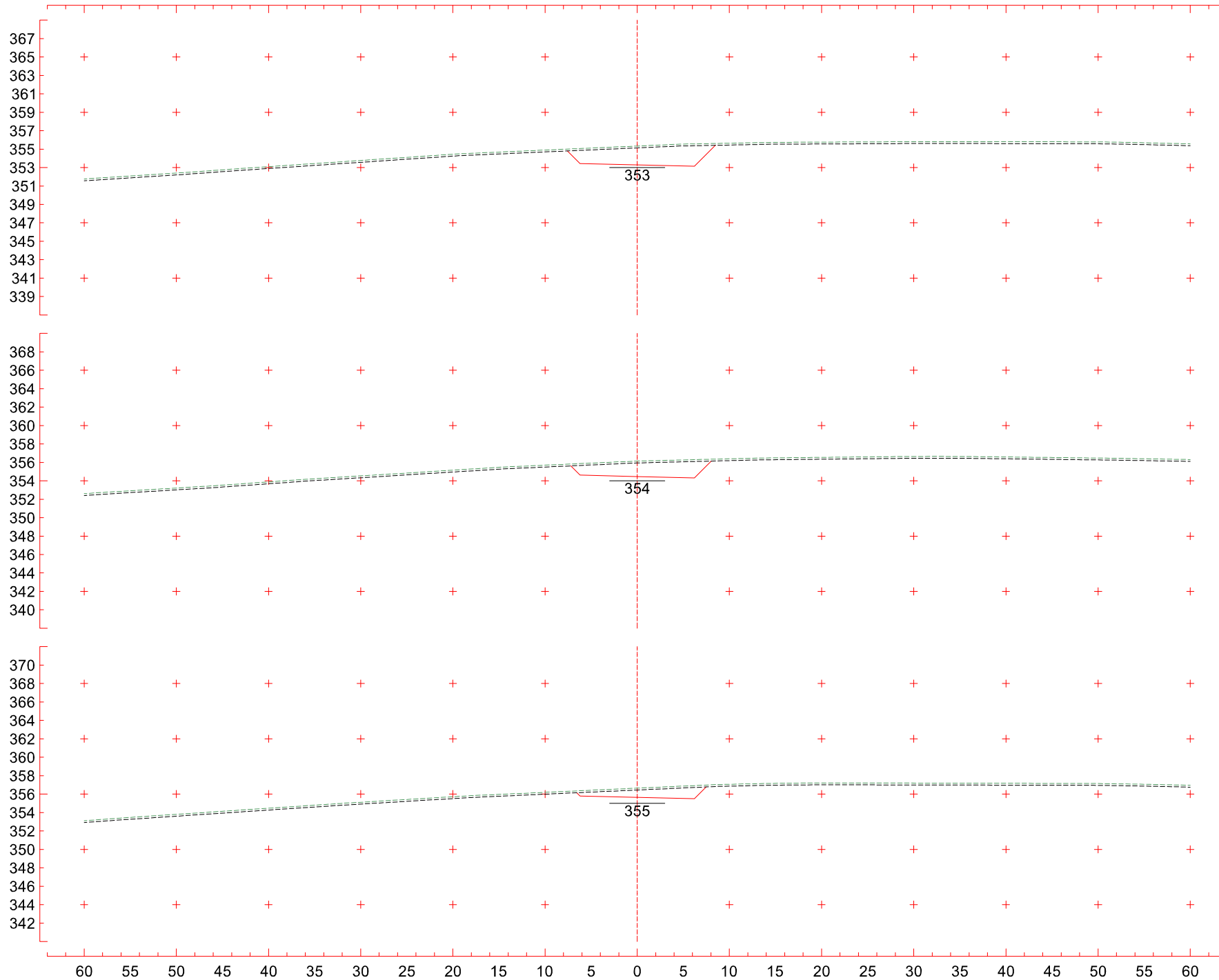


1+840
CT 357,080 m
CP 356,676 m

1+820
CT 357,432 m
CP 357,521 m

1+800
CT 357,731 m
CP 358,175 m

Eixo2
Escala 1:400



1+900
 CT 355,335 m
 CP 353,292 m

1+880
 CT 356,143 m
 CP 354,470 m

1+860
 CT 356,642 m
 CP 355,641 m

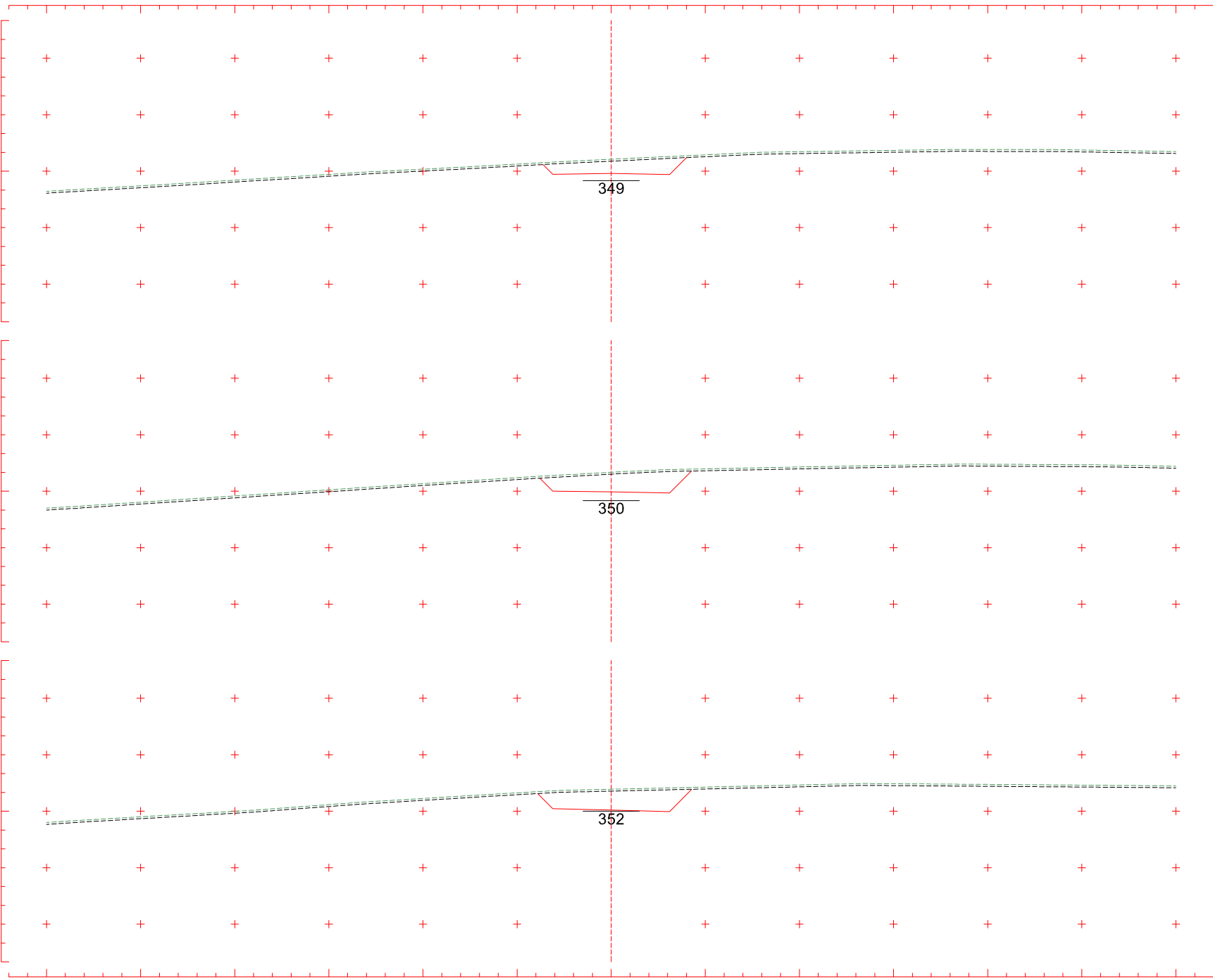
Eixo2
 Escala 1:400

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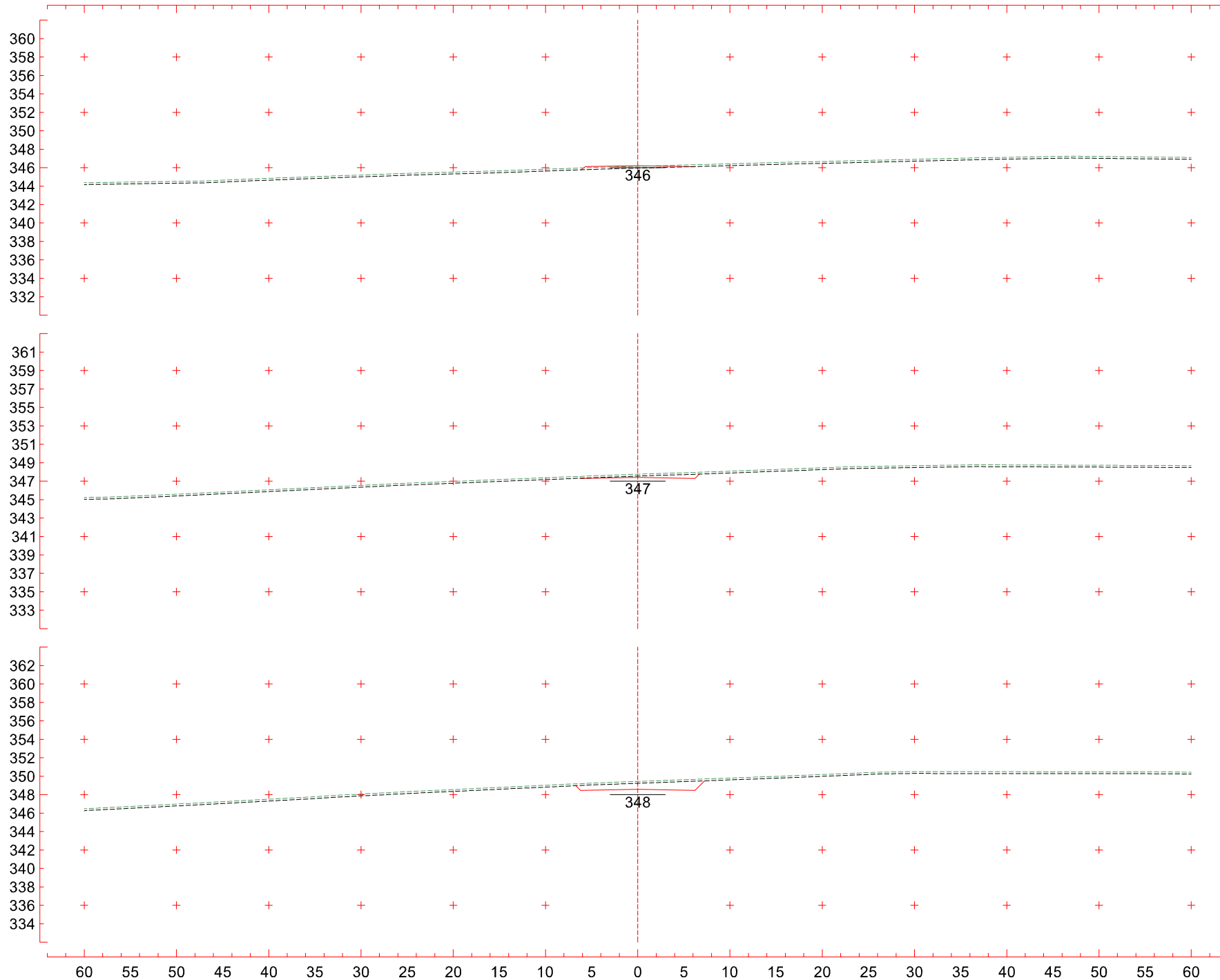


1+960
CT 351,264 m
CP 349,759 m

1+940
CT 353,008 m
CP 350,936 m

1+920
CT 354,335 m
CP 352,114 m

Eixo2
Escala 1:400



2+020
 CT 346,152 m
 CP 346,225 m

2+000
 CT 347,752 m
 CP 347,403 m

1+980
 CT 349,434 m
 CP 348,581 m

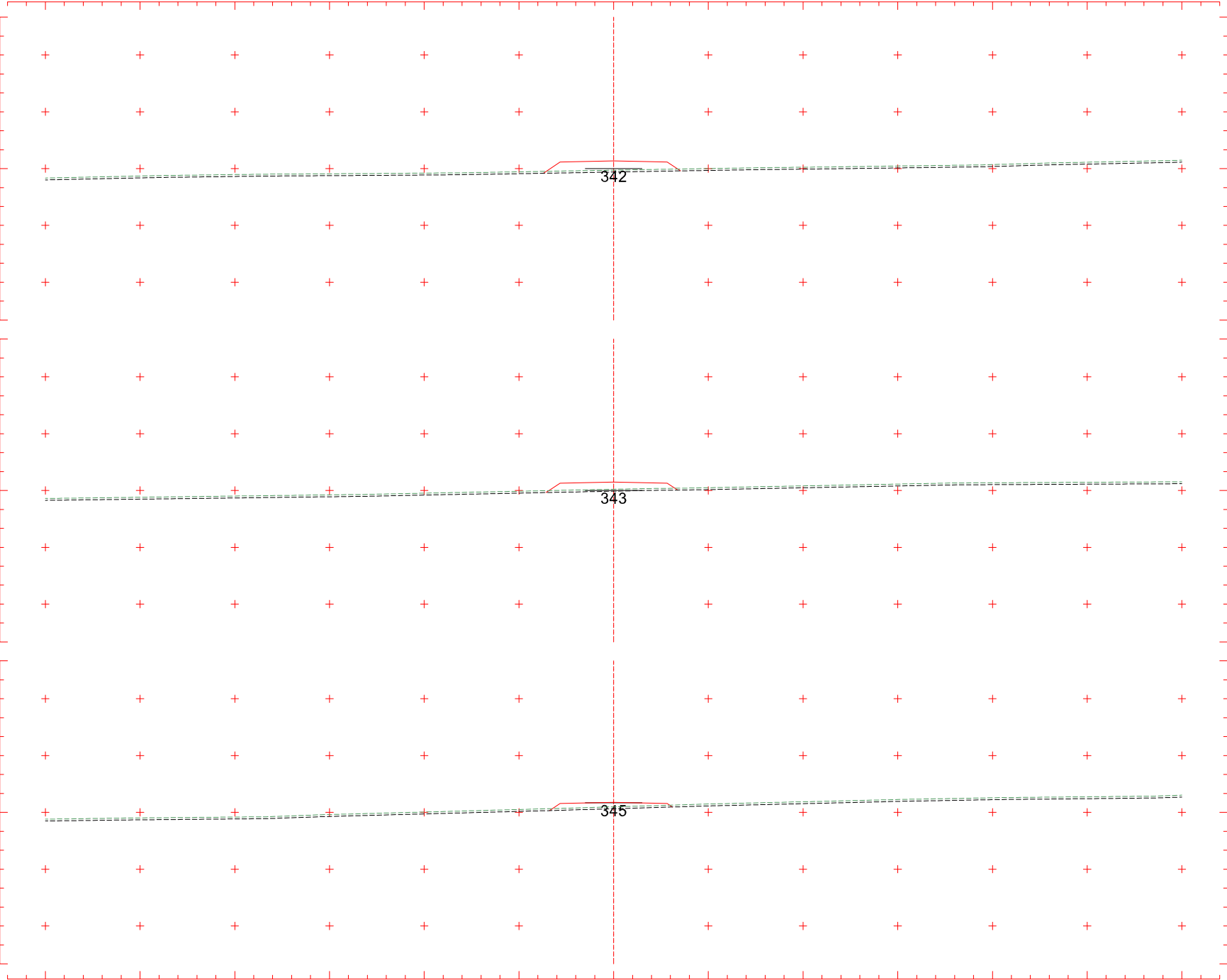
Eixo2
 Escala 1:400

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2+080
CT 341,838 m
CP 342,814 m

2+060
CT 343,130 m
CP 343,883 m

2+040
CT 344,585 m
CP 345,047 m

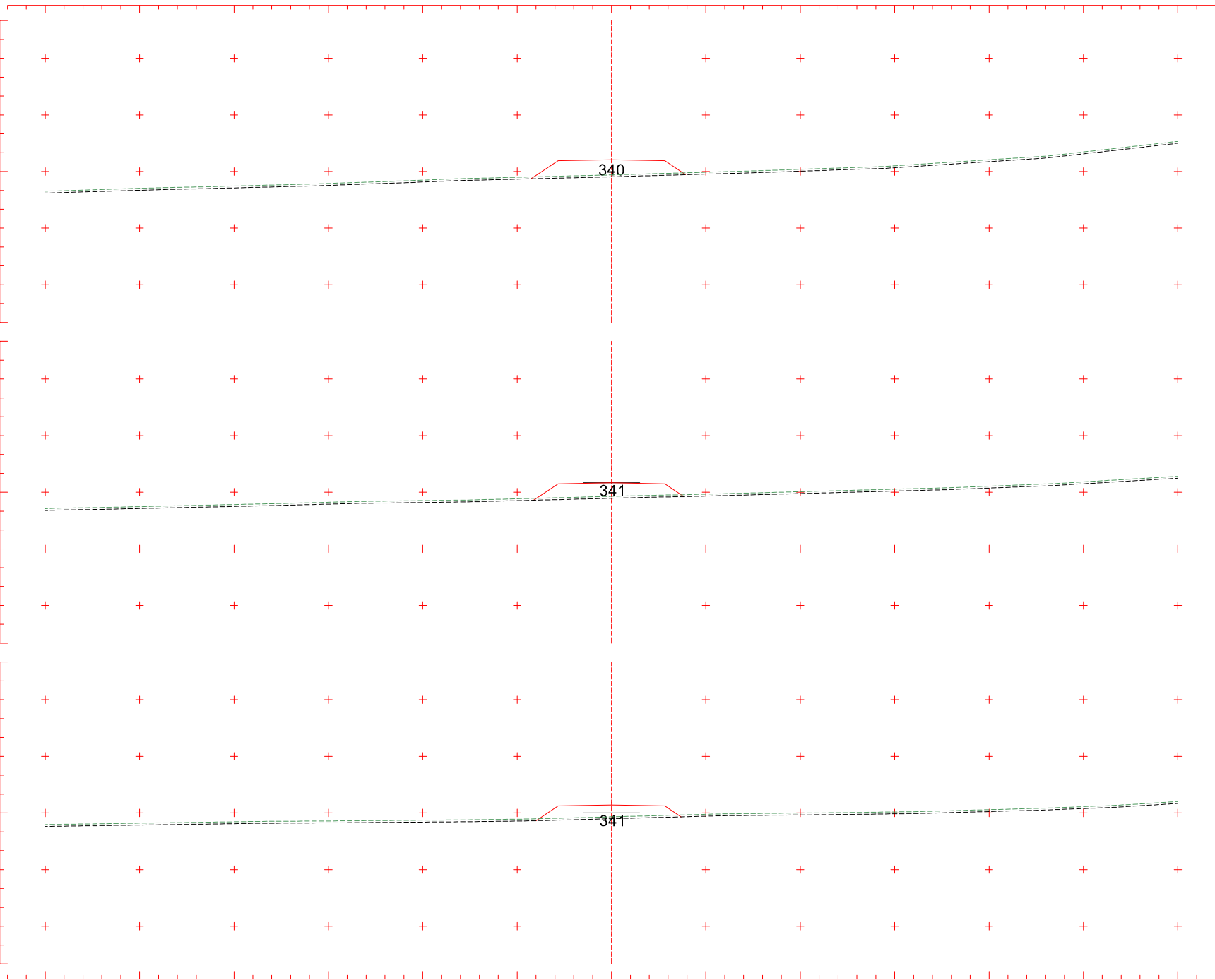
Eixo2
Escala 1:400

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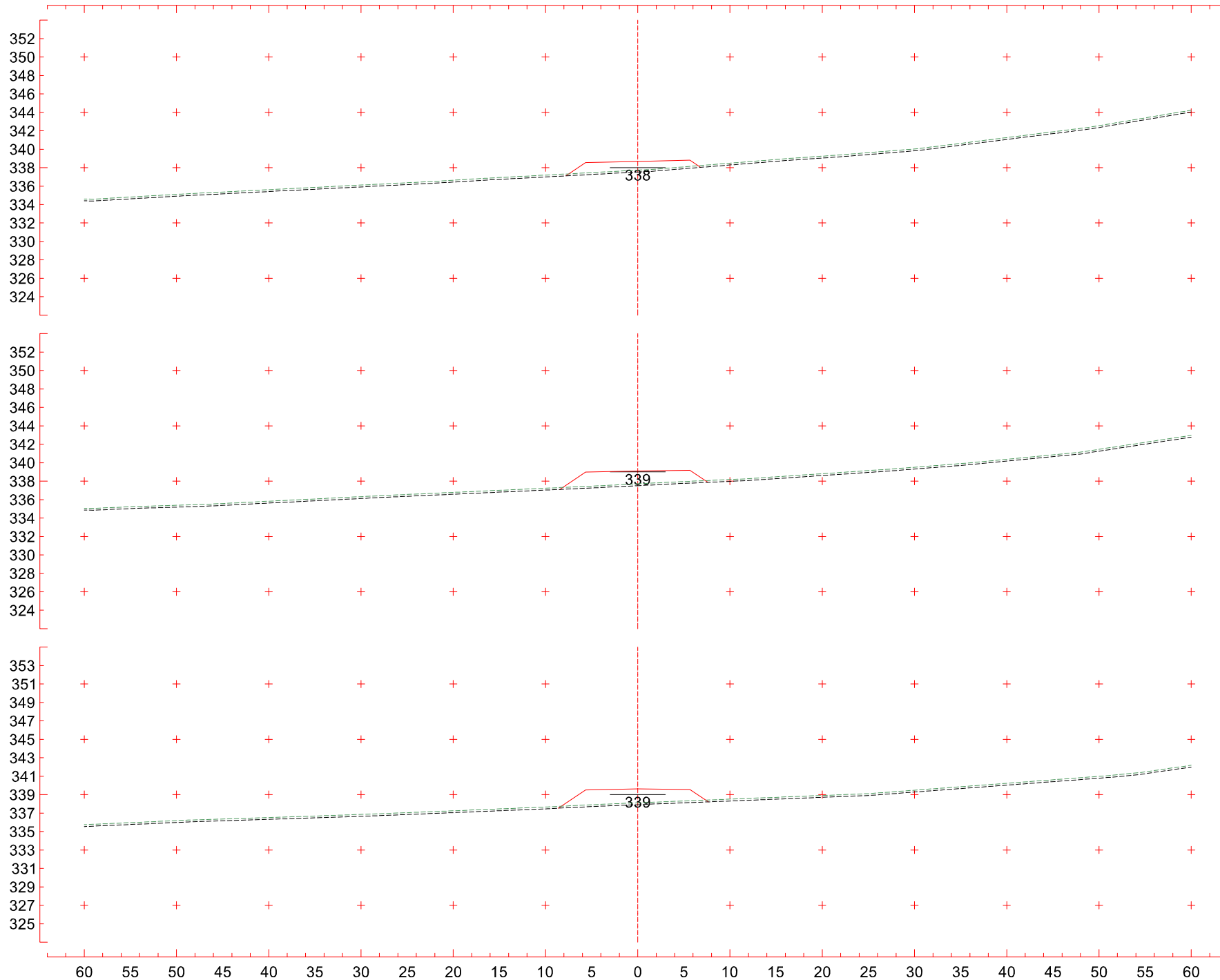


2+140
CT 338,641 m
CP 340,257 m

2+120
CT 339,563 m
CP 341,001 m

2+100
CT 340,587 m
CP 341,853 m

Eixo2
Escala 1:400

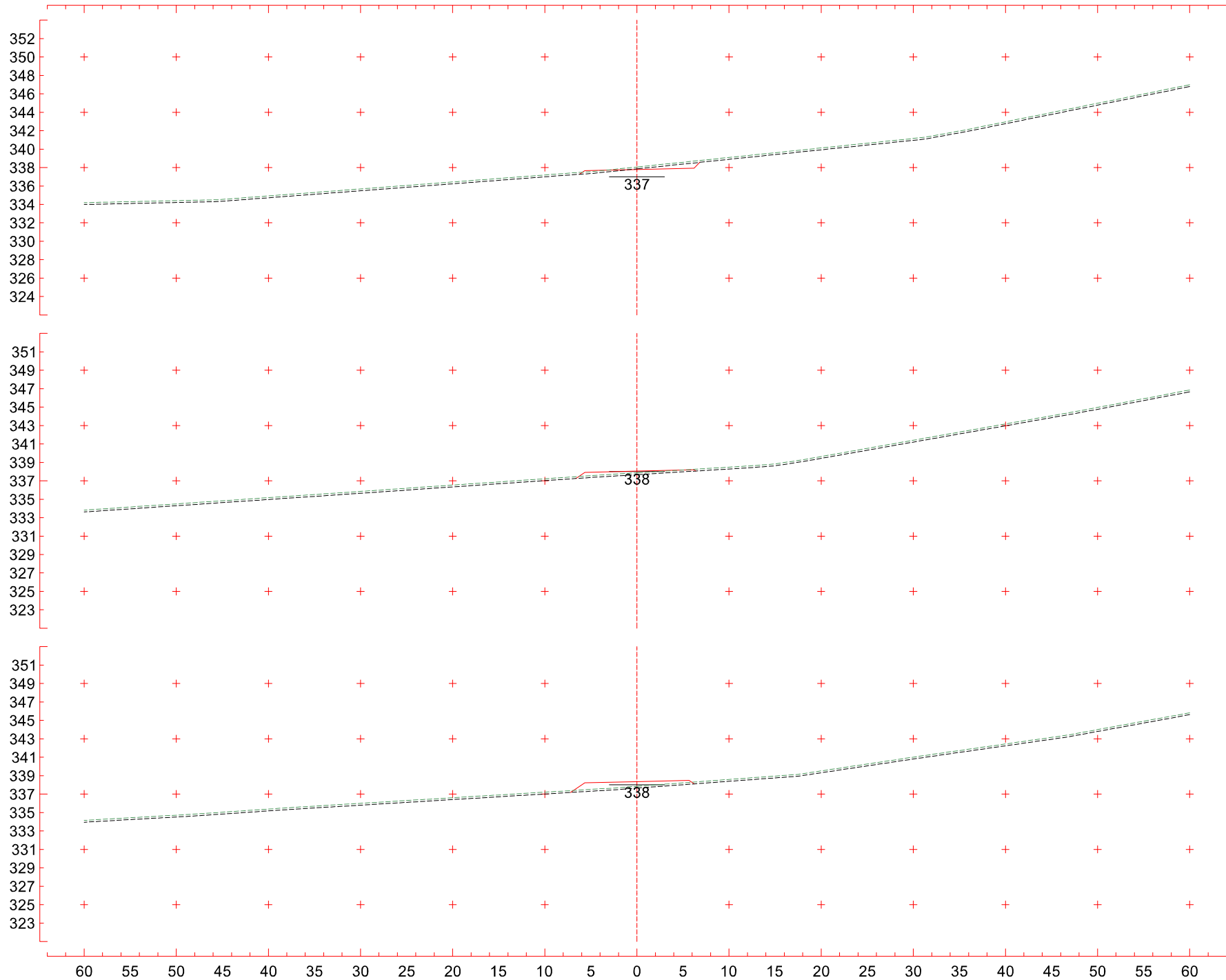


2+200
 CT 337,727 m
 CP 338,676 m

2+180
 CT 337,710 m
 CP 339,095 m

2+160
 CT 338,114 m
 CP 339,621 m

Eixo2
 Escala 1:400



2+260
 CT 338,060 m
 CP 337,790 m

2+240
 CT 337,869 m
 CP 338,049 m

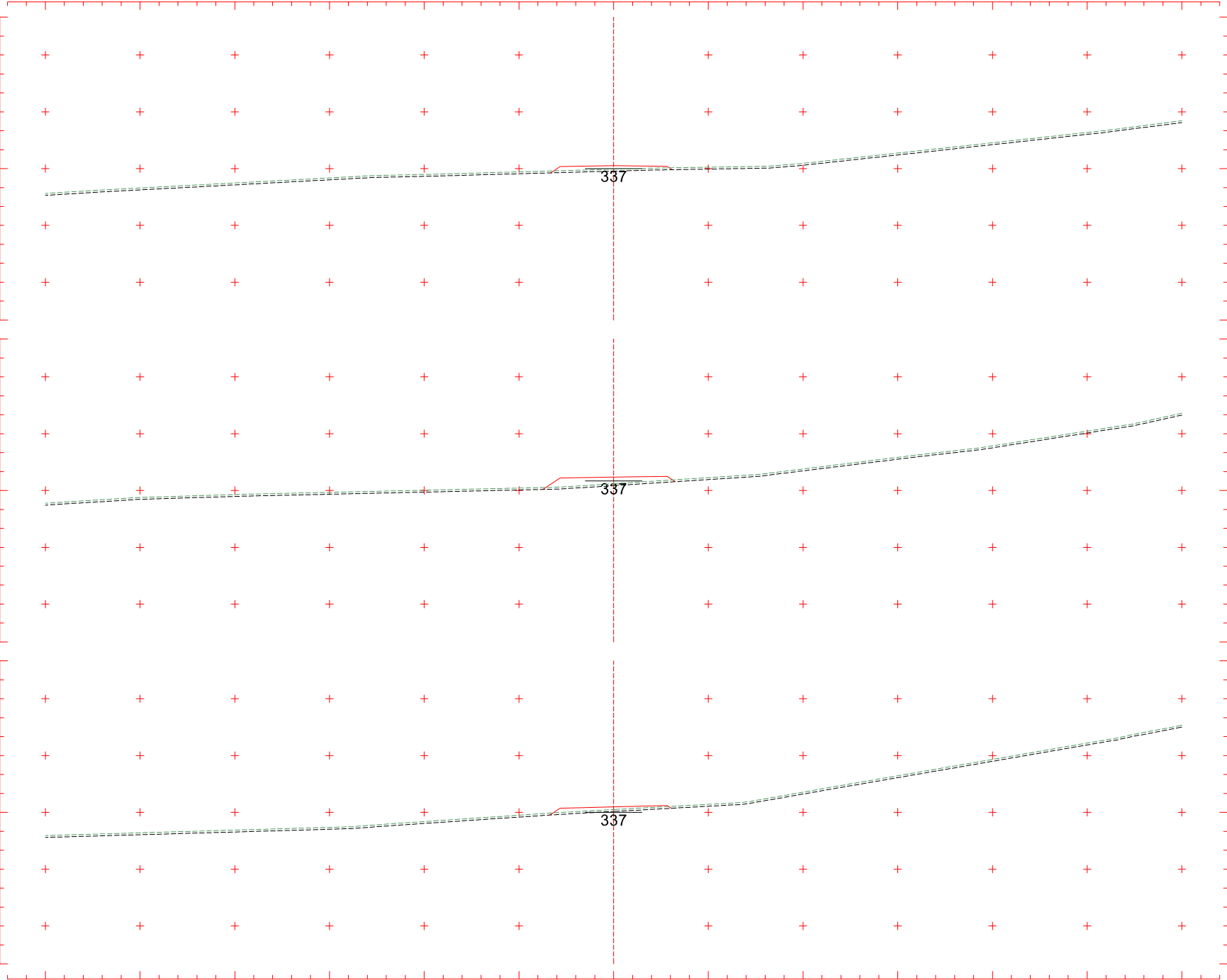
2+220
 CT 337,848 m
 CP 338,352 m

Eixo2
 Escala 1:400

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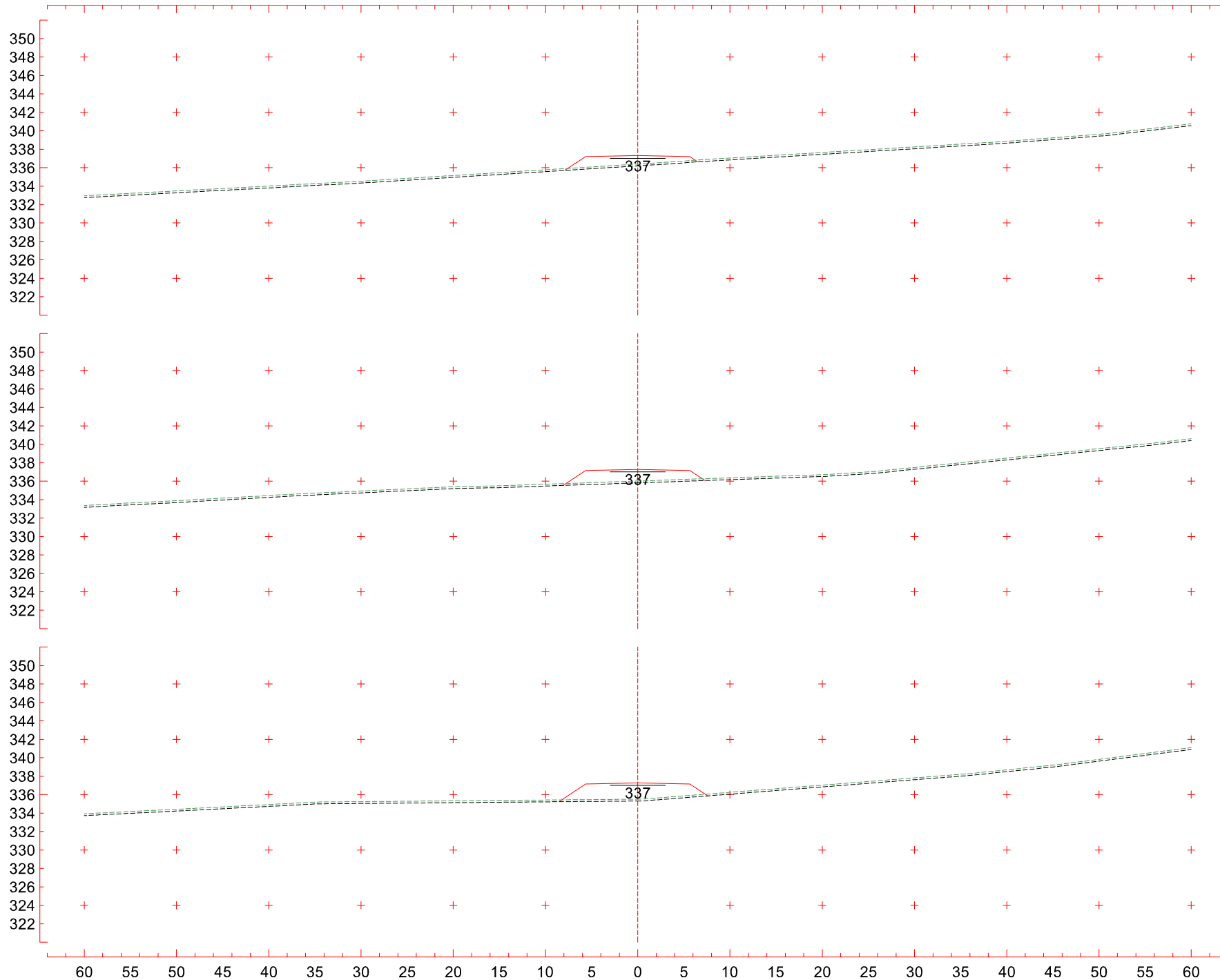


2+320
CT 336,936 m
CP 337,322 m

2+300
CT 336,711 m
CP 337,427 m

2+280
CT 337,298 m
CP 337,583 m

Eixo2
Escala 1:400



2+380
 CT 336,394 m
 CP 337,315 m

2+360
 CT 336,016 m
 CP 337,266 m

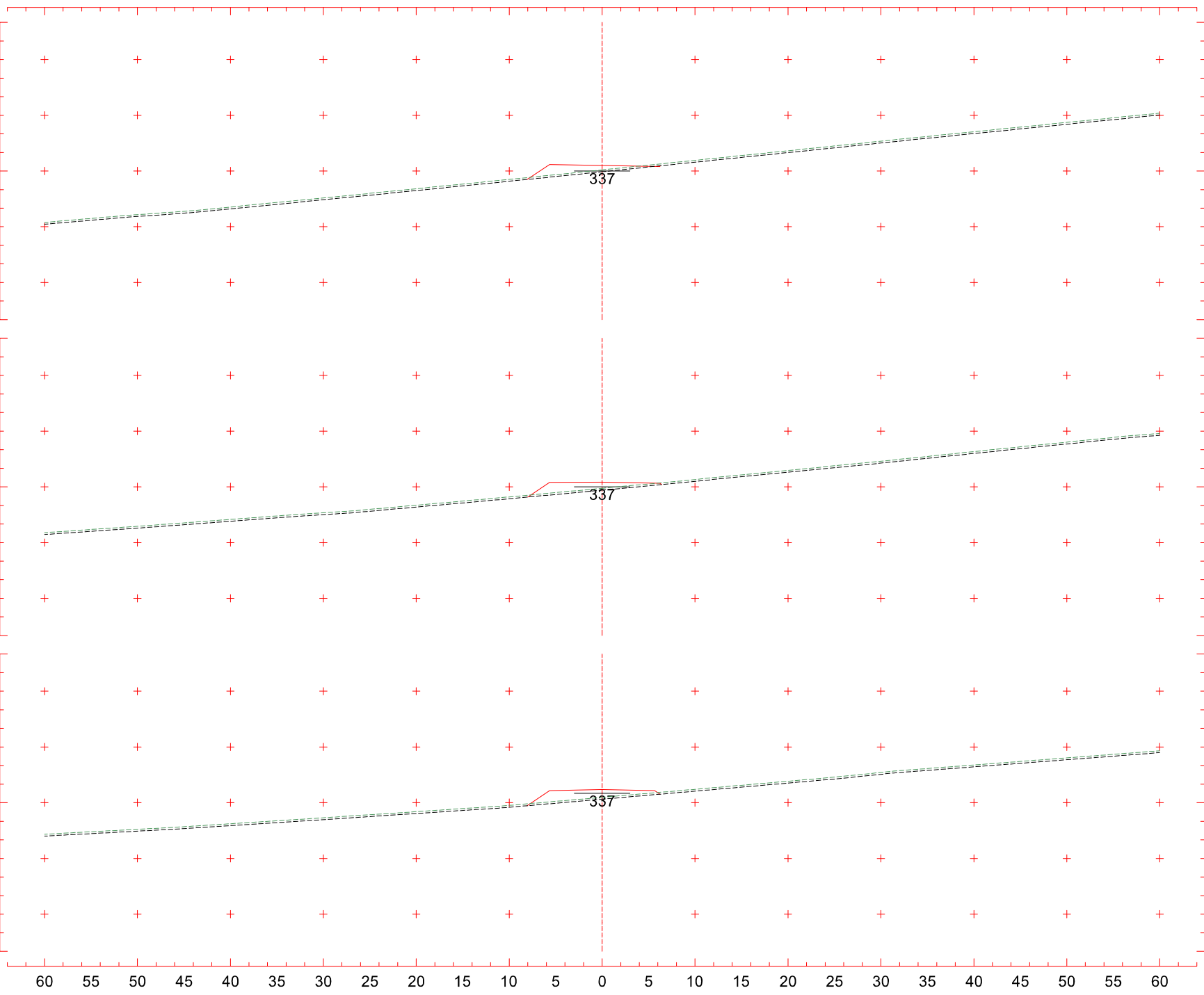
2+340
 CT 335,508 m
 CP 337,268 m

Eixo2
 Escala 1:400

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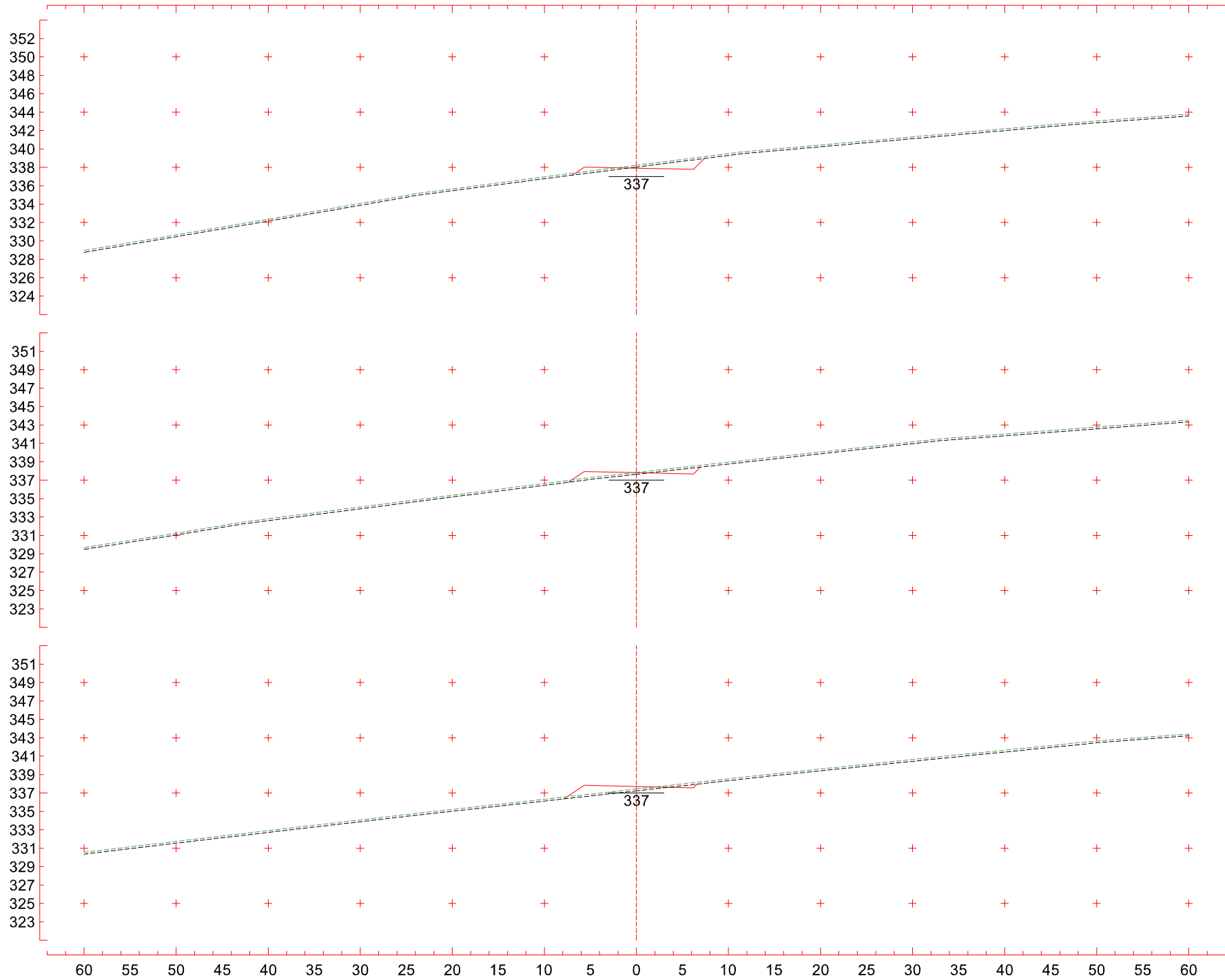


2+440
CT 337,120 m
CP 337,610 m

2+420
CT 336,846 m
CP 337,510 m

2+400
CT 336,576 m
CP 337,409 m

Eixo2
Escala 1:400



2+500

CT 338,229 m
CP 337,911 m

2+480

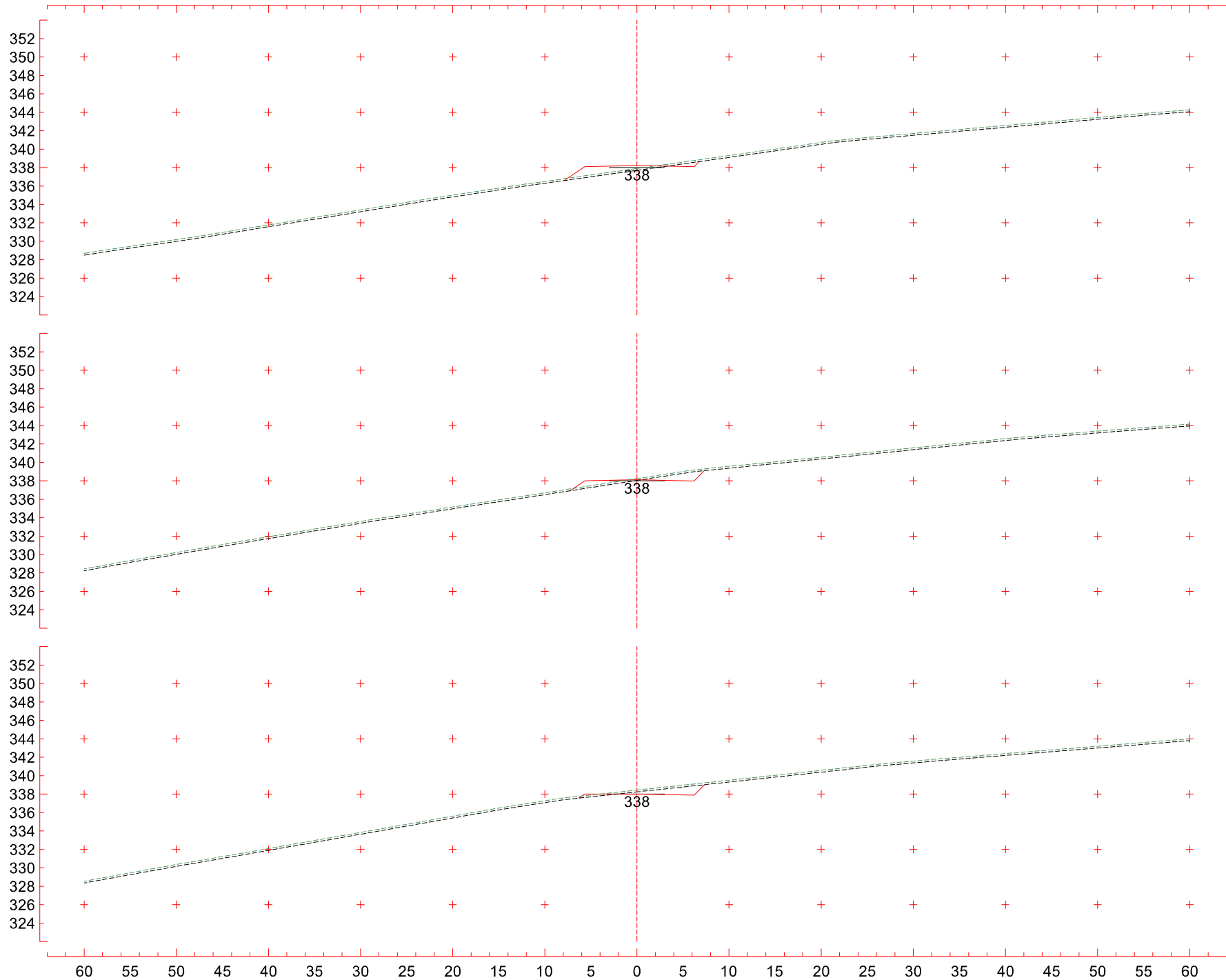
CT 337,838 m
CP 337,811 m

2+460

CT 337,429 m
CP 337,710 m

Eixo2

Escala 1:400

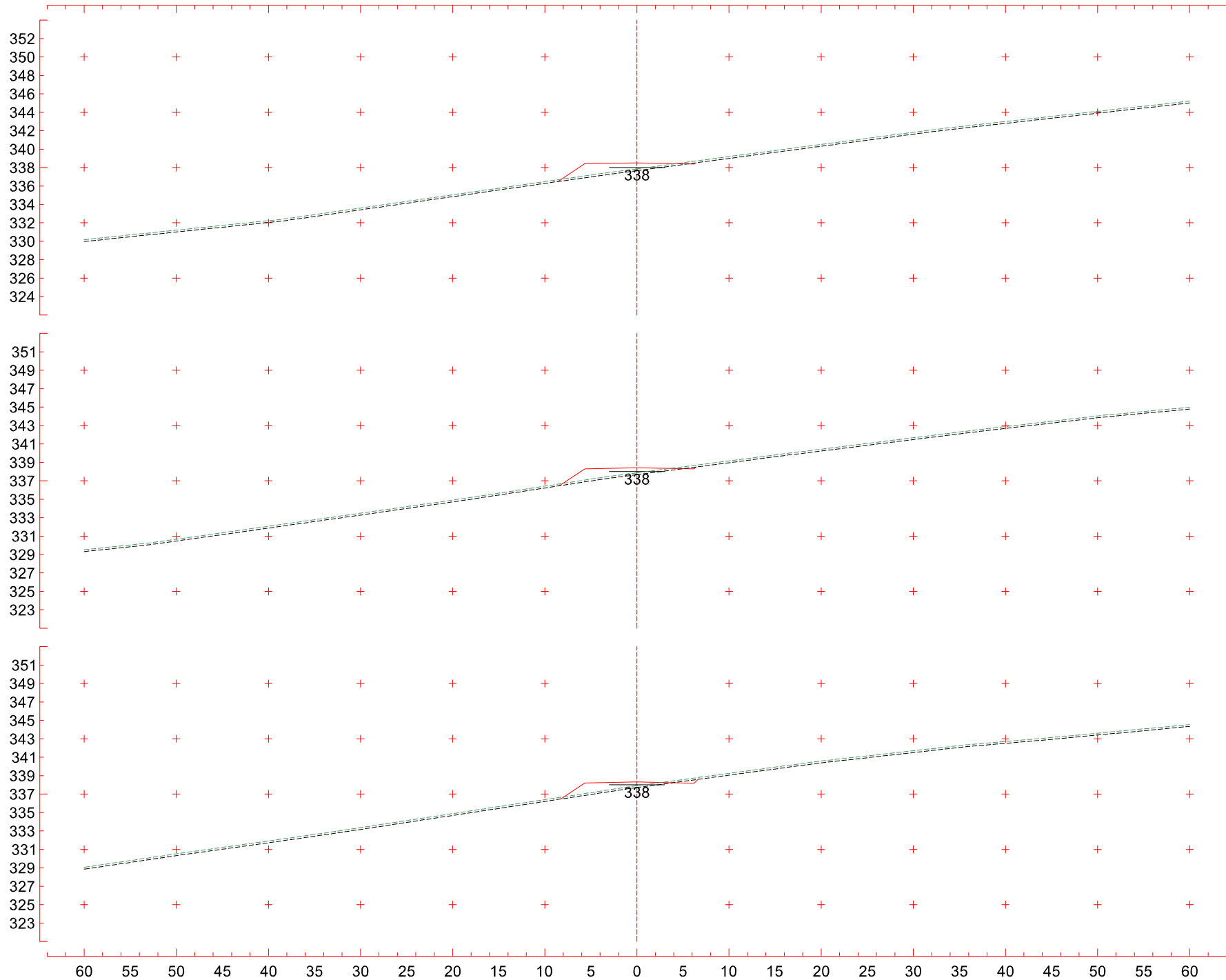


2+560
 CT 337,897 m
 CP 338,213 m

2+540
 CT 338,243 m
 CP 338,112 m

2+520
 CT 338,437 m
 CP 338,012 m

Eixo2
 Escala 1:400



2+620

CT 337,859 m
CP 338,514 m

2+600

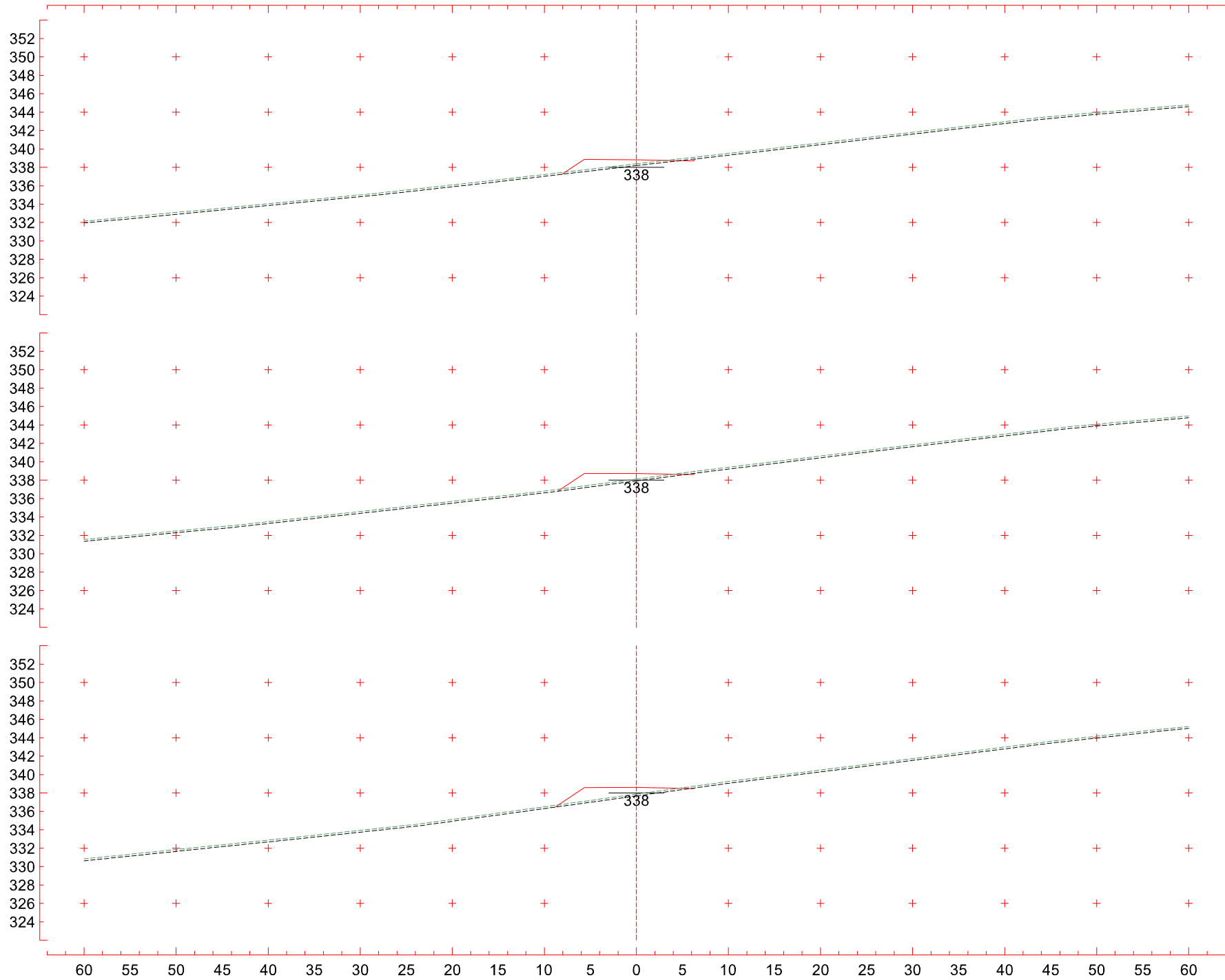
CT 337,867 m
CP 338,413 m

2+580

CT 337,912 m
CP 338,313 m

Eixo2

Escala 1:400



2+680

CT 338,386 m
CP 338,815 m

2+660

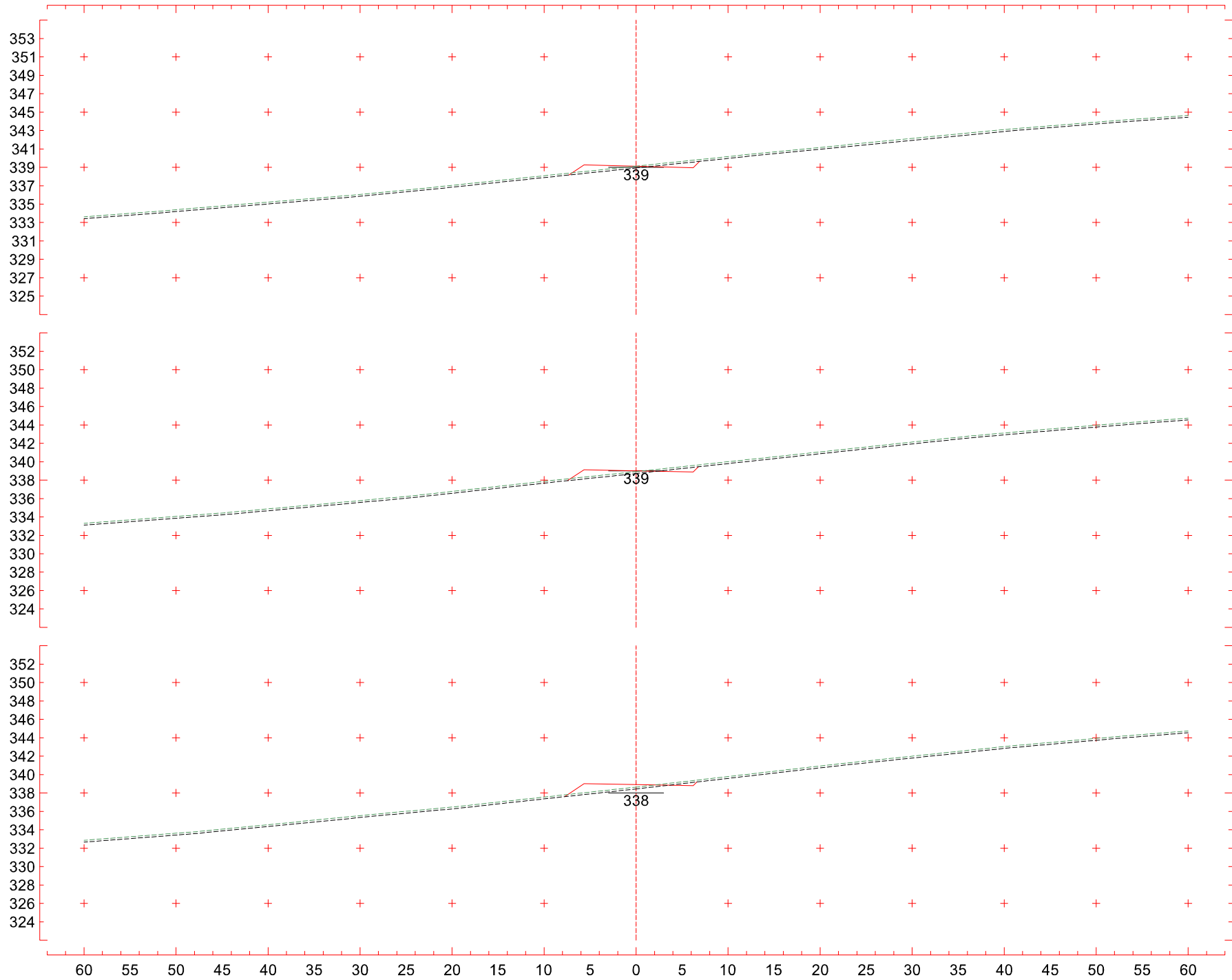
CT 338,116 m
CP 338,715 m

2+640

CT 337,877 m
CP 338,614 m

Eixo2

Escala 1:400

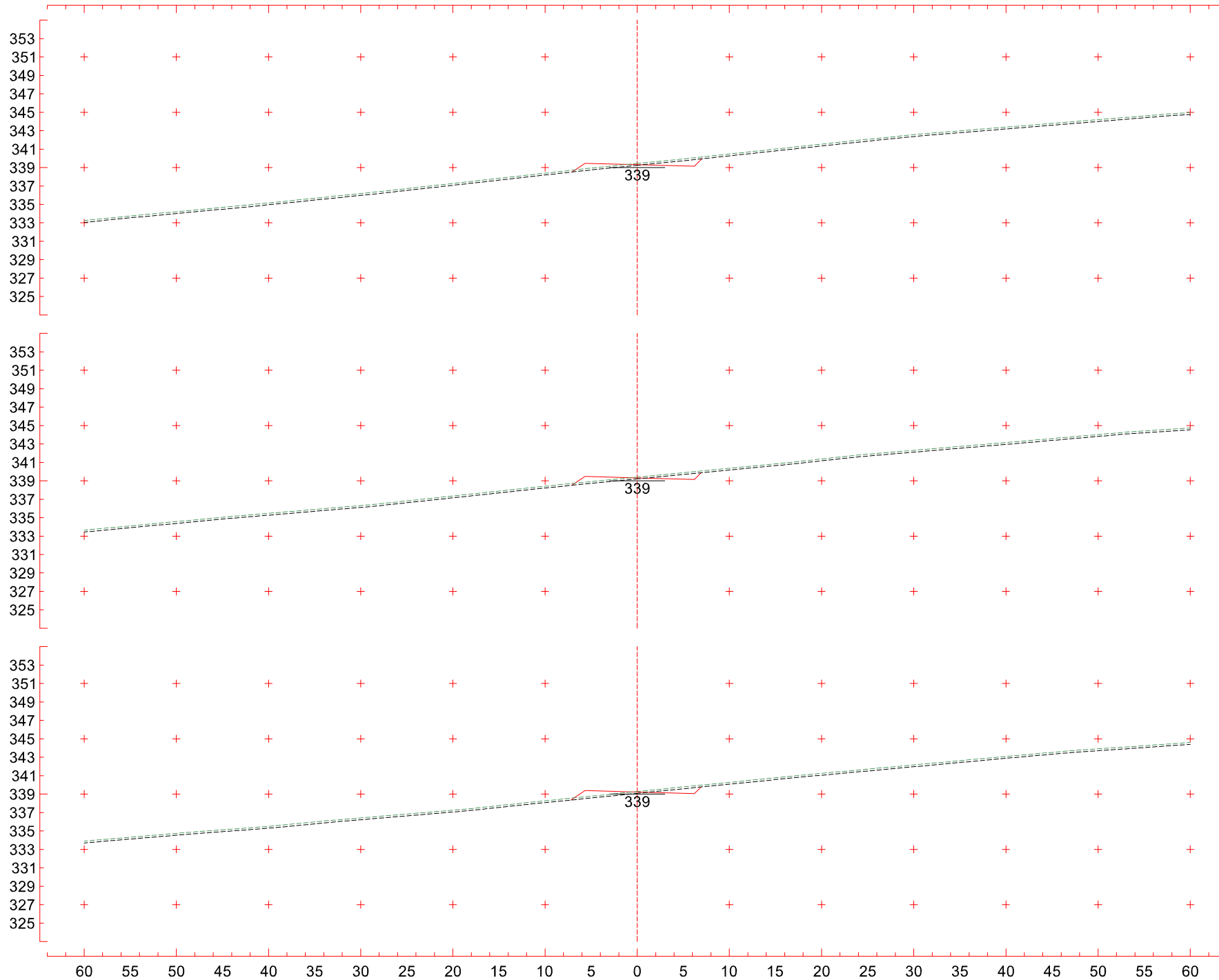


2+740
 CT 339,127 m
 CP 339,116 m

2+720
 CT 338,923 m
 CP 339,016 m

2+700
 CT 338,638 m
 CP 338,916 m

Eixo2
 Escala 1:400

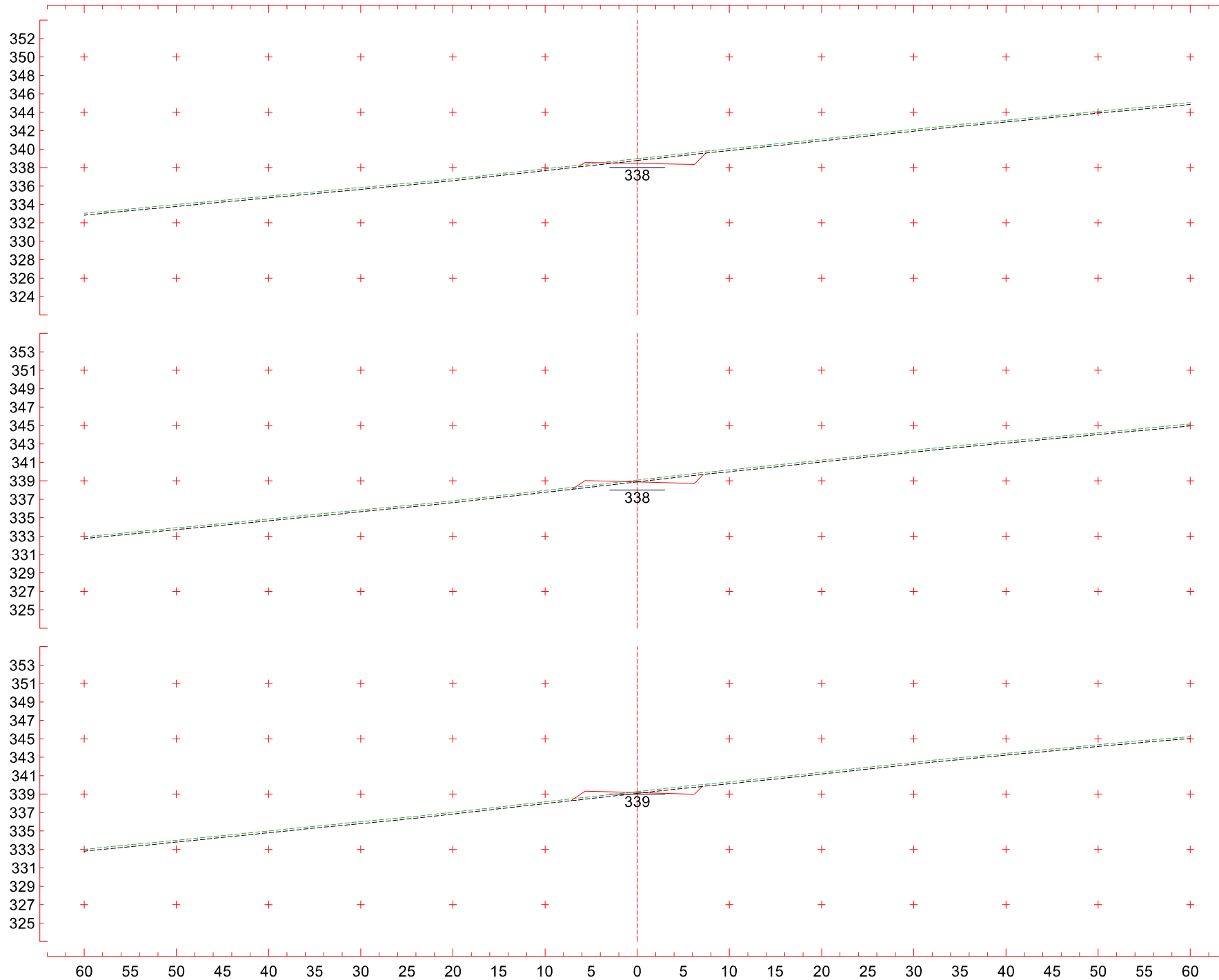


2+800
 CT 339,450 m
 CP 339,308 m

2+780
 CT 339,408 m
 CP 339,313 m

2+760
 CT 339,280 m
 CP 339,217 m

Eixo2
 Escala 1:400

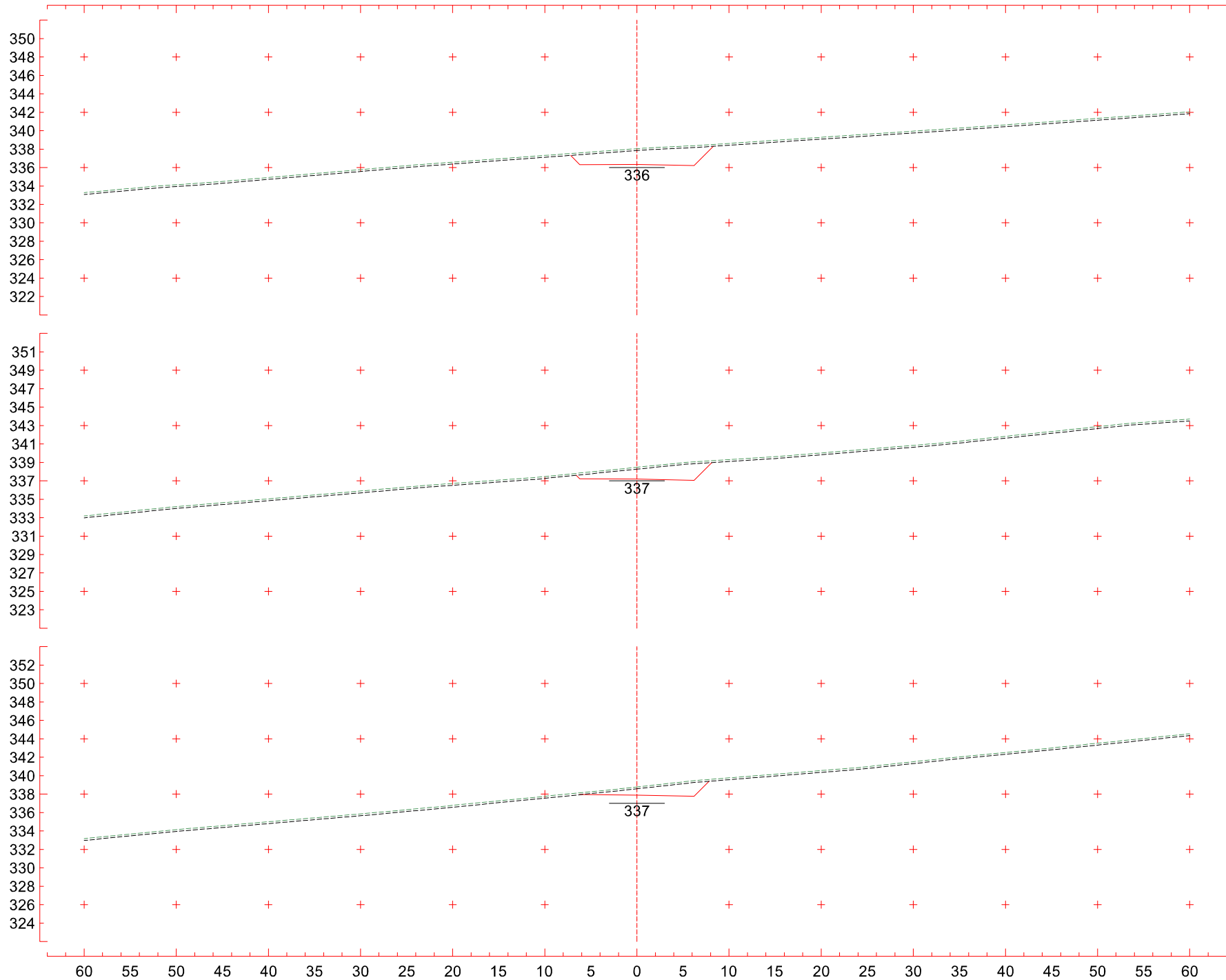


2+860
 CT 338,960 m
 CP 338,454 m

2+840
 CT 339,086 m
 CP 338,879 m

2+820
 CT 339,273 m
 CP 339,163 m

Eixo2
 Escala 1:400



2+920

CT 338,049 m
CP 336,338 m

2+900

CT 338,467 m
CP 337,183 m

2+880

CT 338,775 m
CP 337,888 m

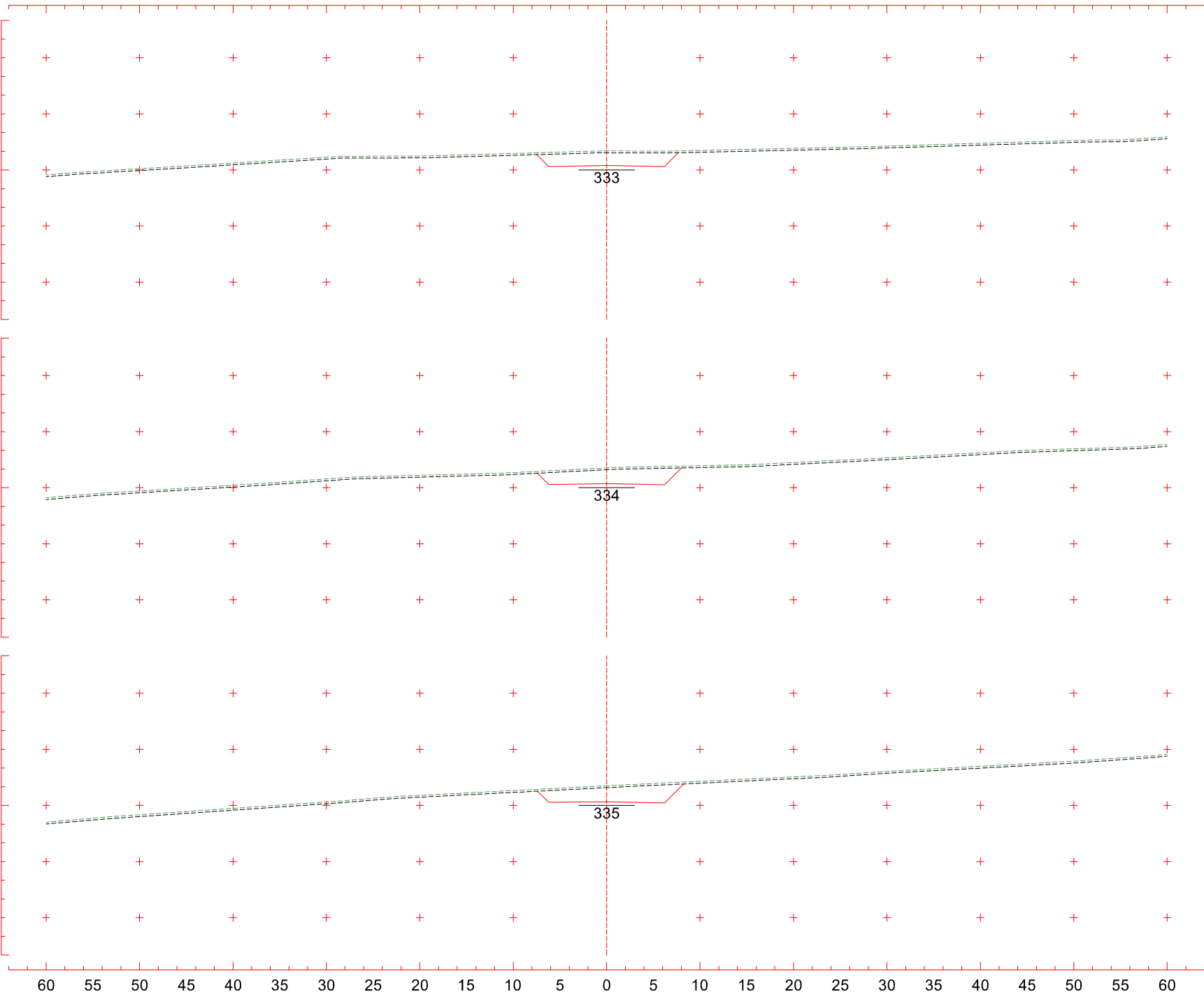
Eixo2

Escala 1:400

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2+980
CT 335,036 m
CP 333,490 m

2+960
CT 336,126 m
CP 334,441 m

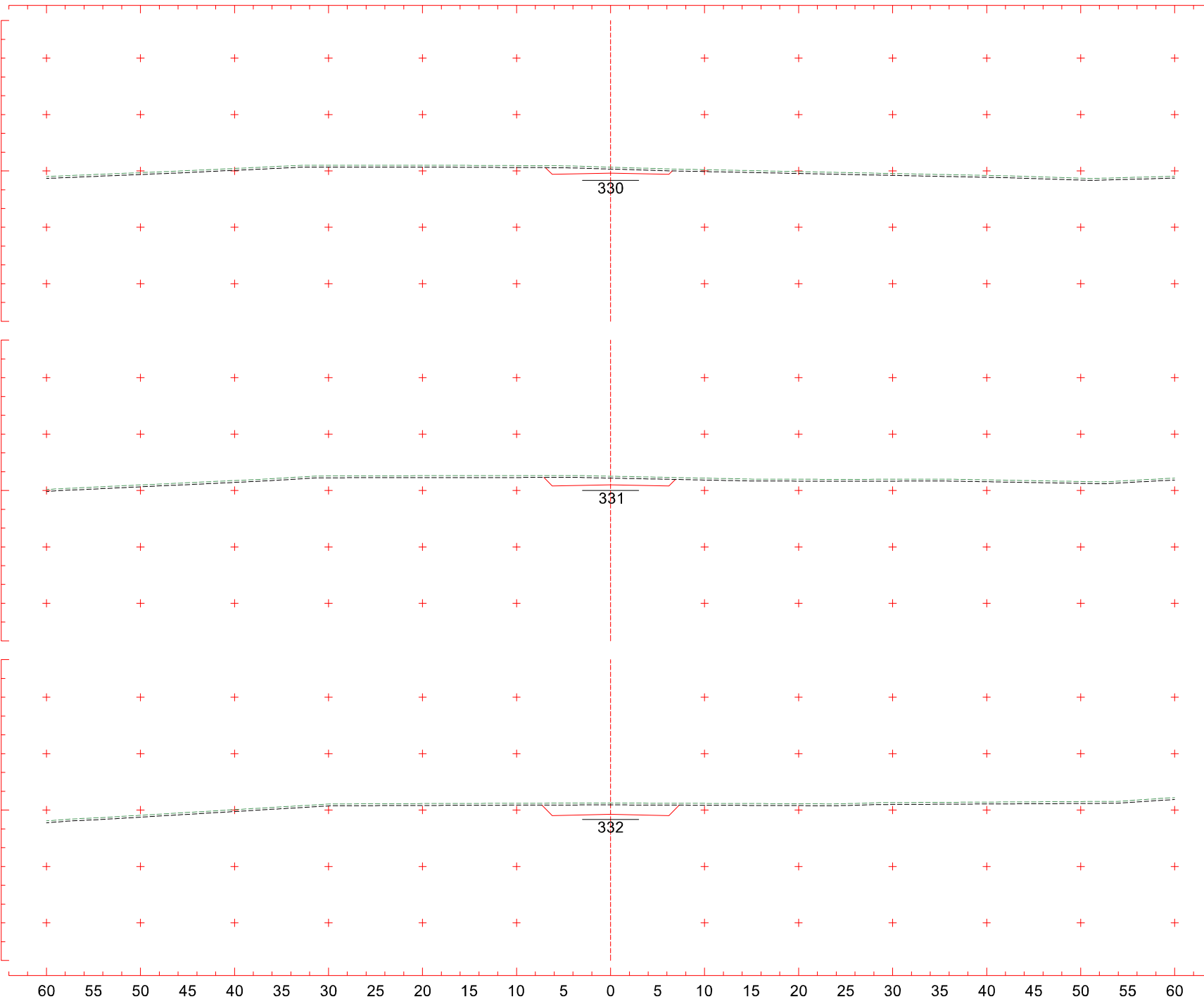
2+940
CT 337,102 m
CP 335,391 m

Eixo2
Escala 1:400

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3+040
CT 331,397 m
CP 330,758 m

3+020
CT 332,518 m
CP 331,603 m

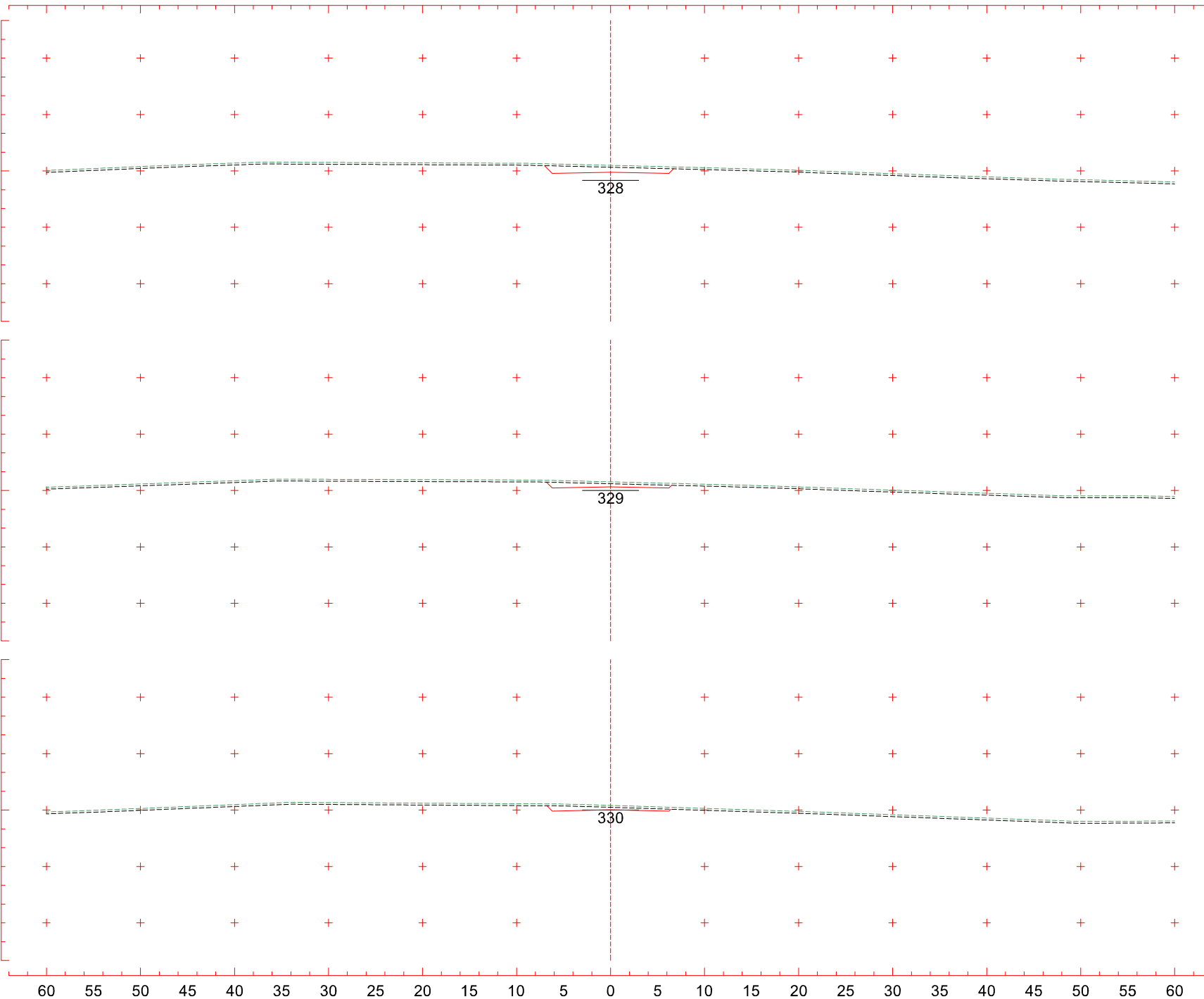
3+000
CT 333,750 m
CP 332,540 m

Eixo2
Escala 1:400

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3+100
CT 329,592 m
CP 328,858 m

3+080
CT 329,917 m
CP 329,386 m

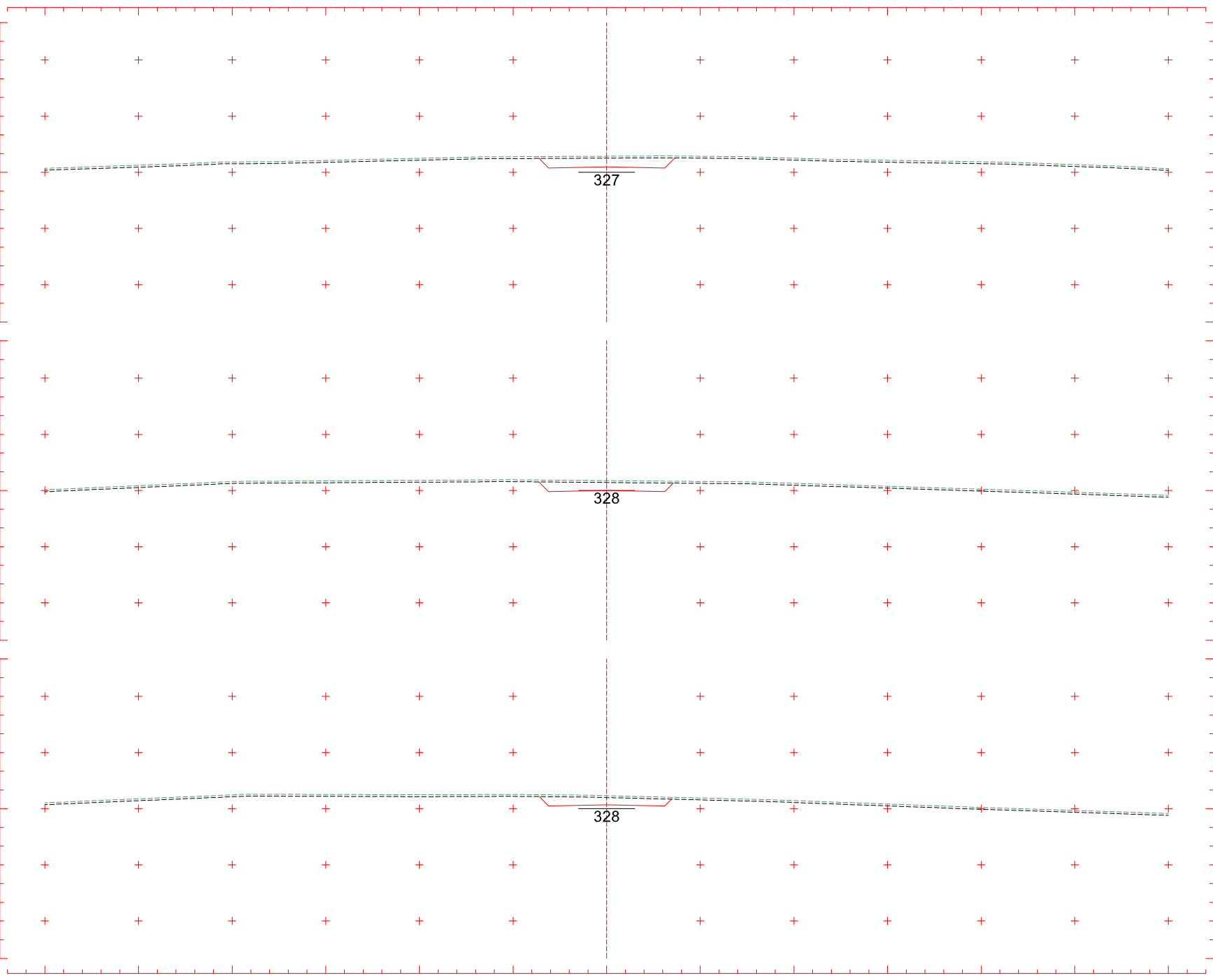
3+060
CT 330,490 m
CP 330,019 m

Eixo2
Escala 1:400

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3+160
CT 328,714 m
CP 327,580 m

3+140
CT 329,051 m
CP 328,002 m

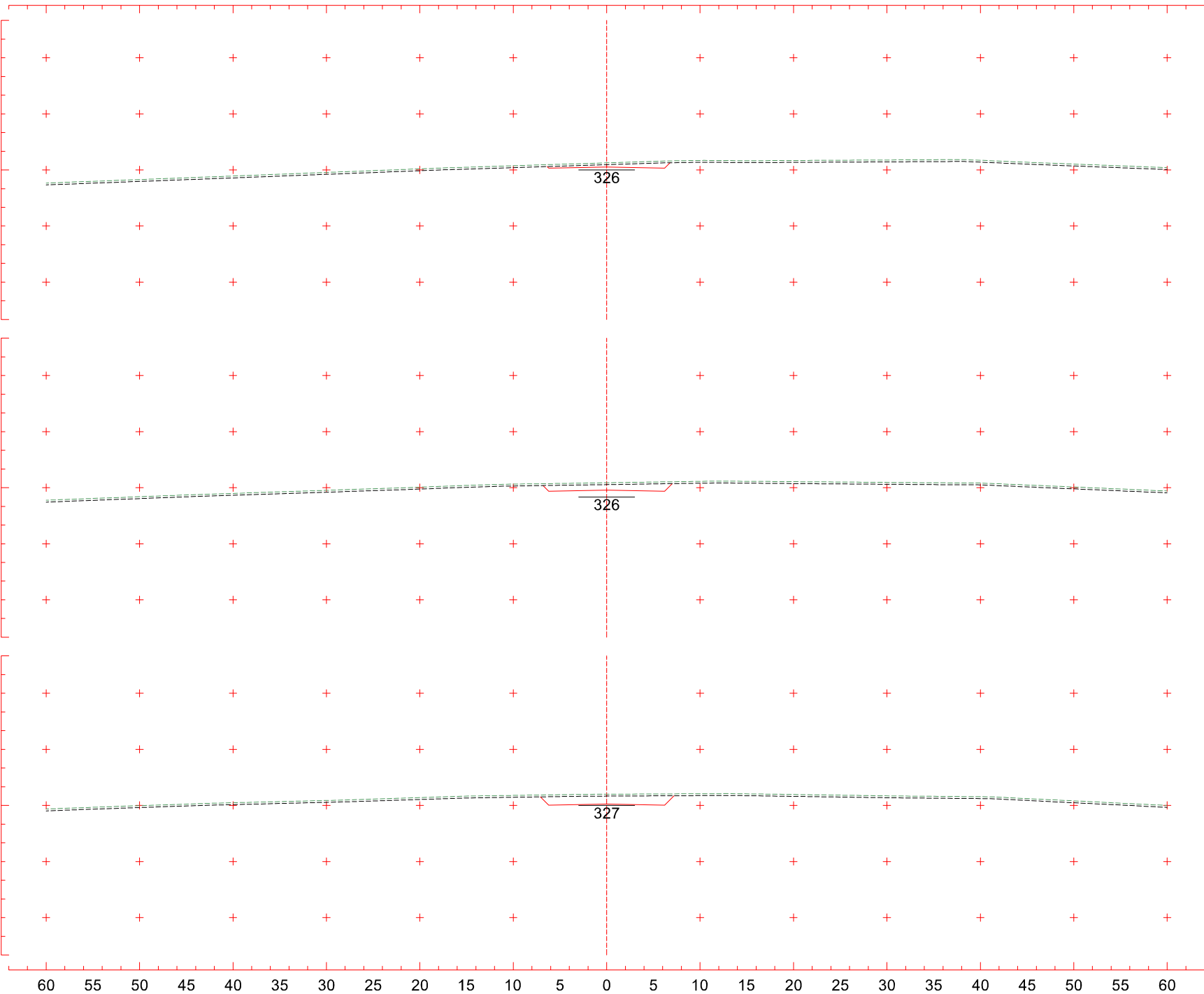
3+120
CT 329,388 m
CP 328,423 m

Eixo2
Escala 1:400

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3+220
CT 326,763 m
CP 326,315 m

3+200
CT 327,529 m
CP 326,737 m

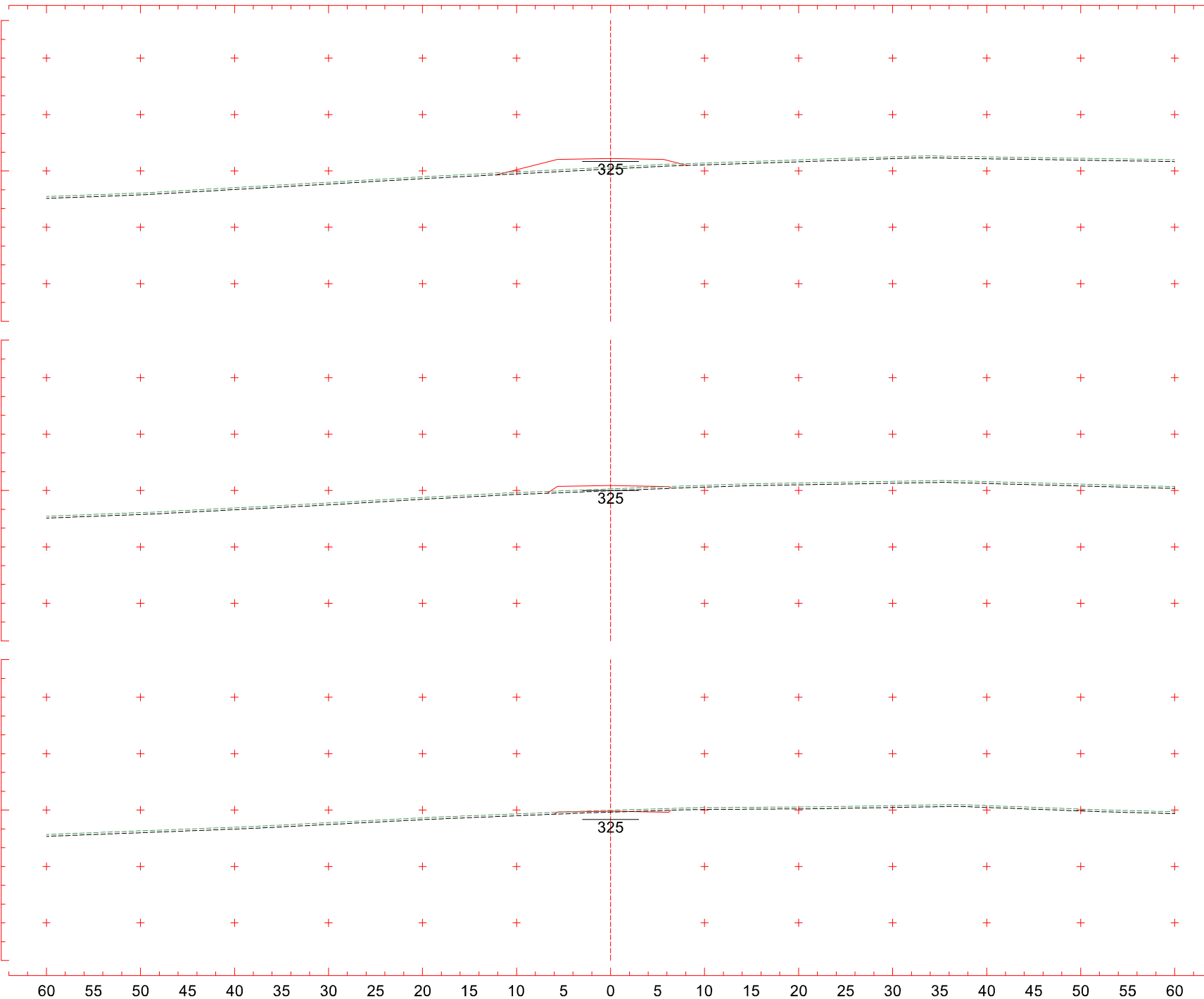
3+180
CT 328,199 m
CP 327,158 m

Eixo2
Escala 1:400

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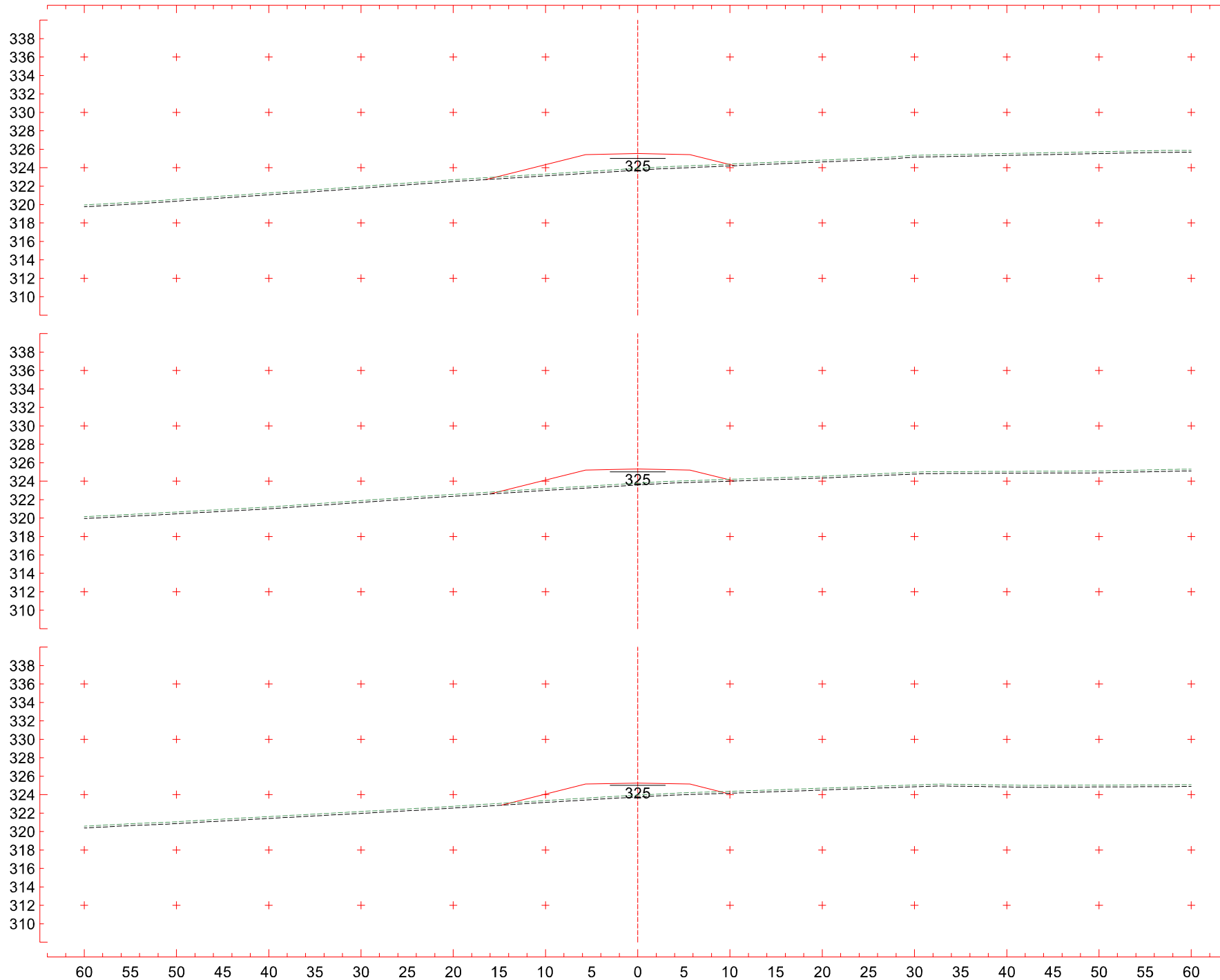


3+280
CT 324,404 m
CP 325,329 m

3+260
CT 325,174 m
CP 325,542 m

3+240
CT 325,980 m
CP 325,893 m

Eixo2
Escala 1:400



3+340

CT 323,927 m
CP 325,528 m

3+320

CT 323,781 m
CP 325,322 m

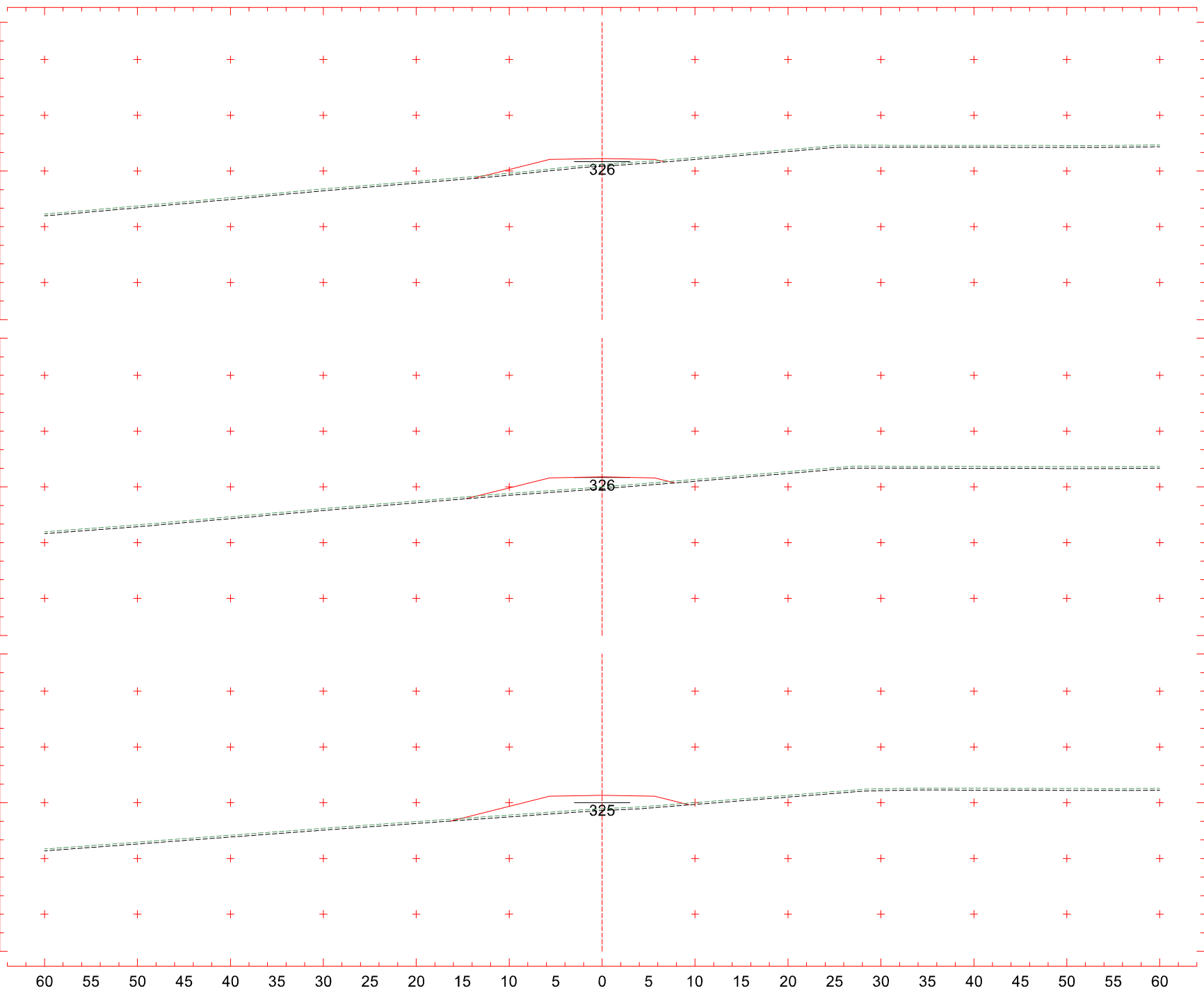
3+300

CT 323,946 m
CP 325,256 m

Eixo2

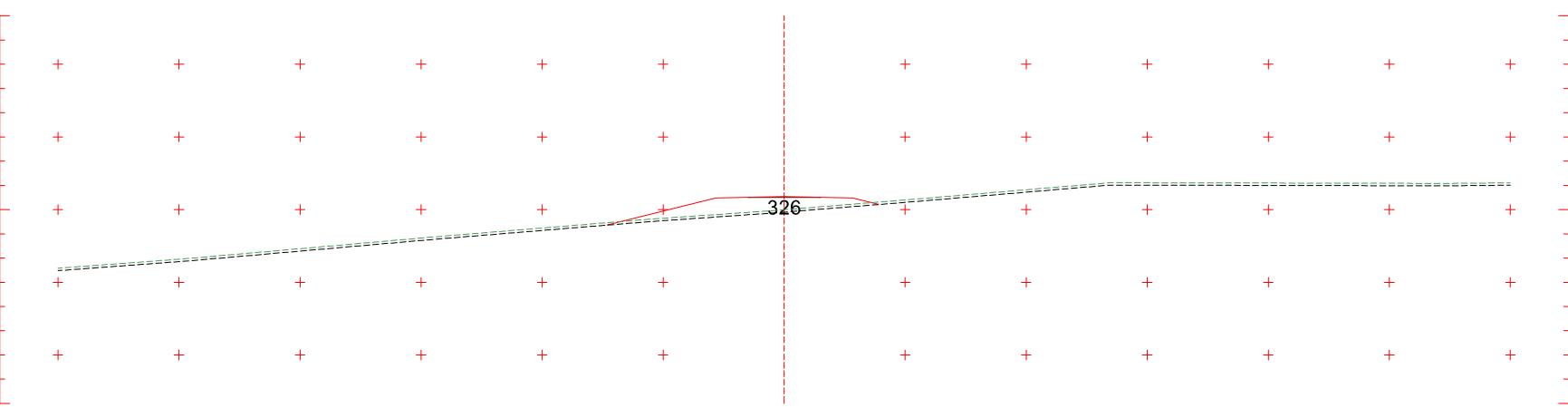
Escala 1:400

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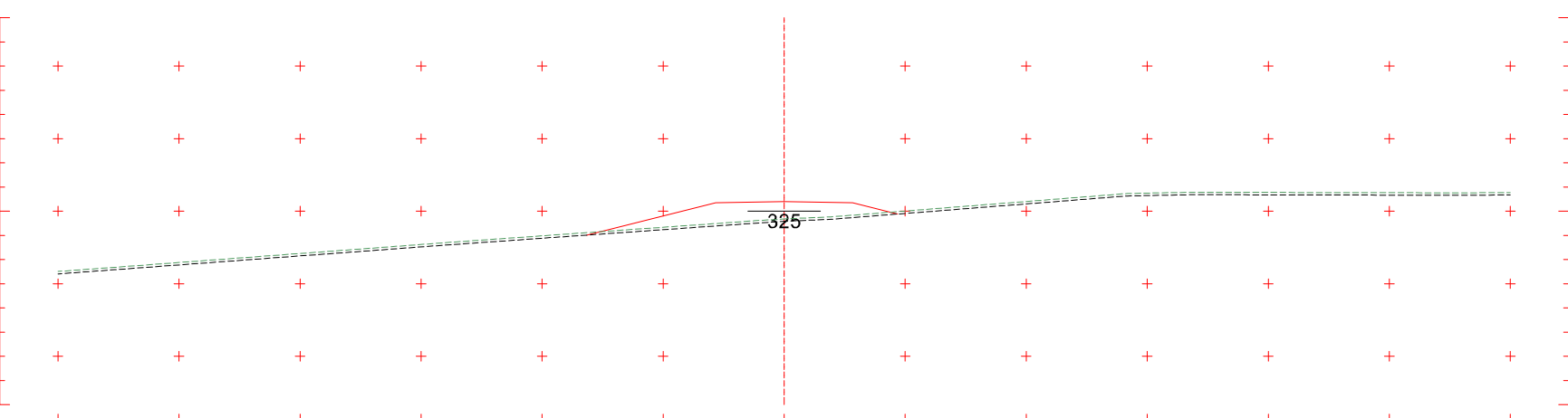
3+400
CT 325,714 m
CP 326,354 m

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3+380
CT 324,992 m
CP 326,079 m

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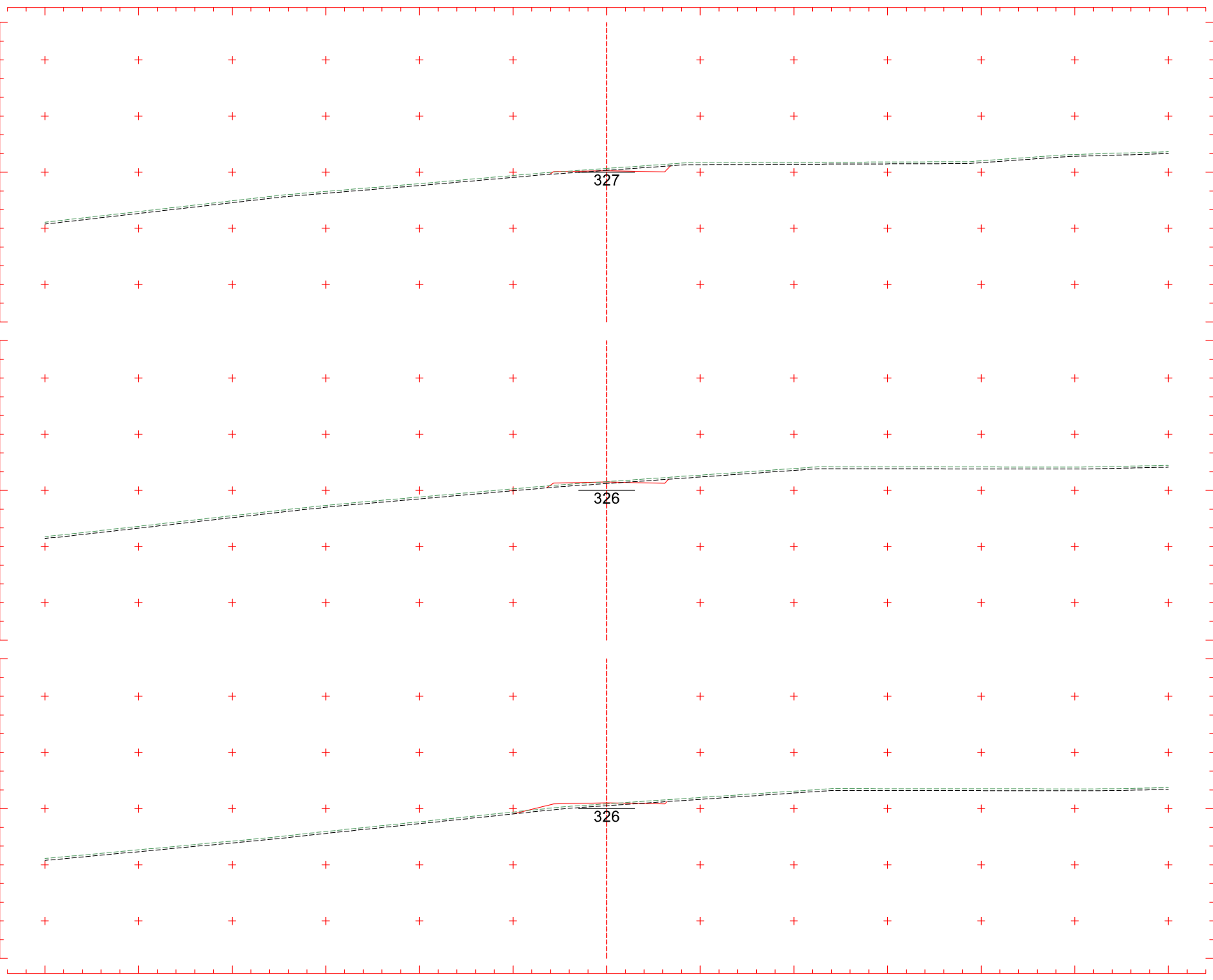
3+360
CT 324,356 m
CP 325,804 m

Eixo2
Escala 1:400

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3+460
CT 327,411 m
CP 327,181 m

3+440
CT 326,942 m
CP 326,905 m

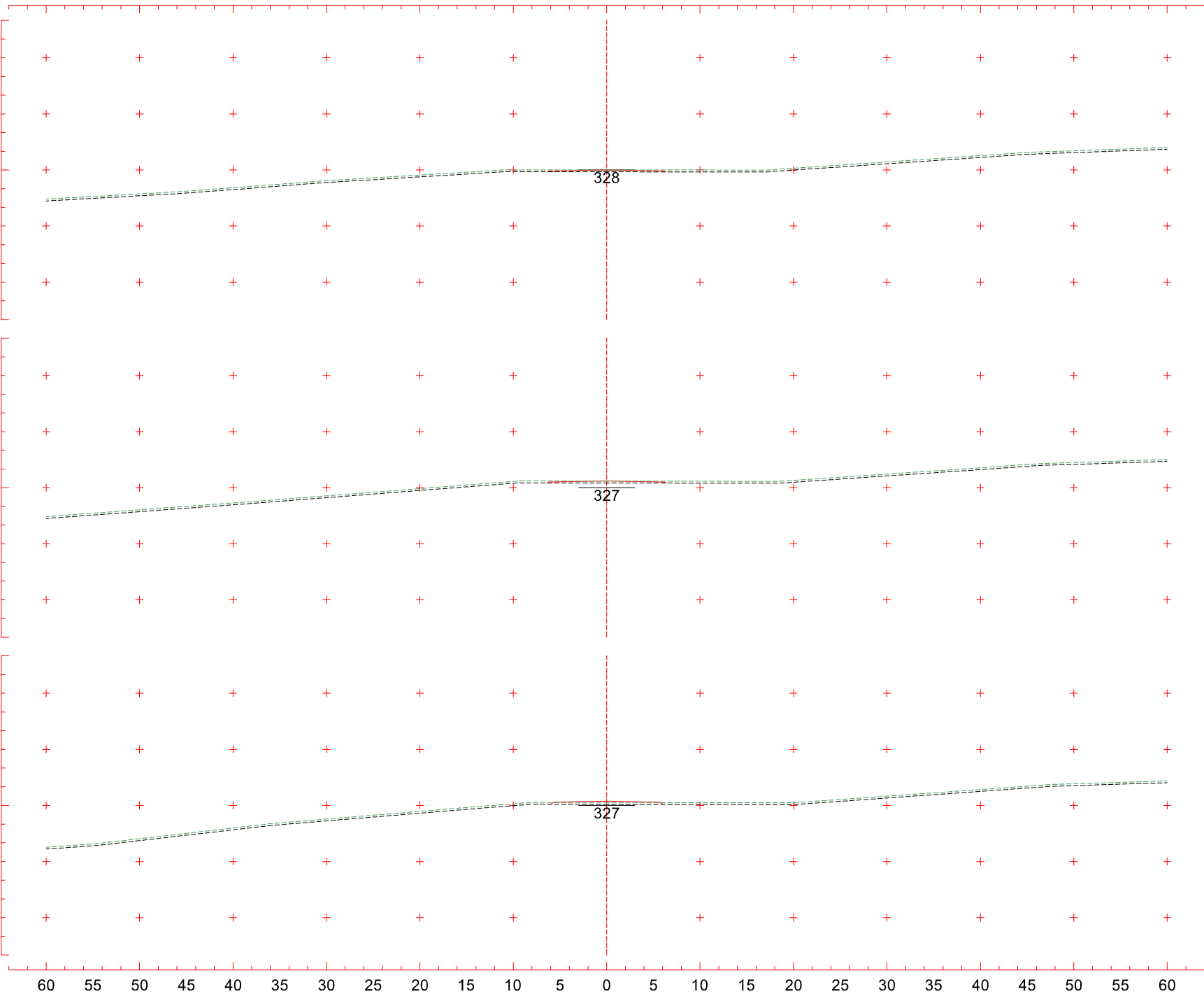
3+420
CT 326,518 m
CP 326,630 m

Eixo2
Escala 1:400

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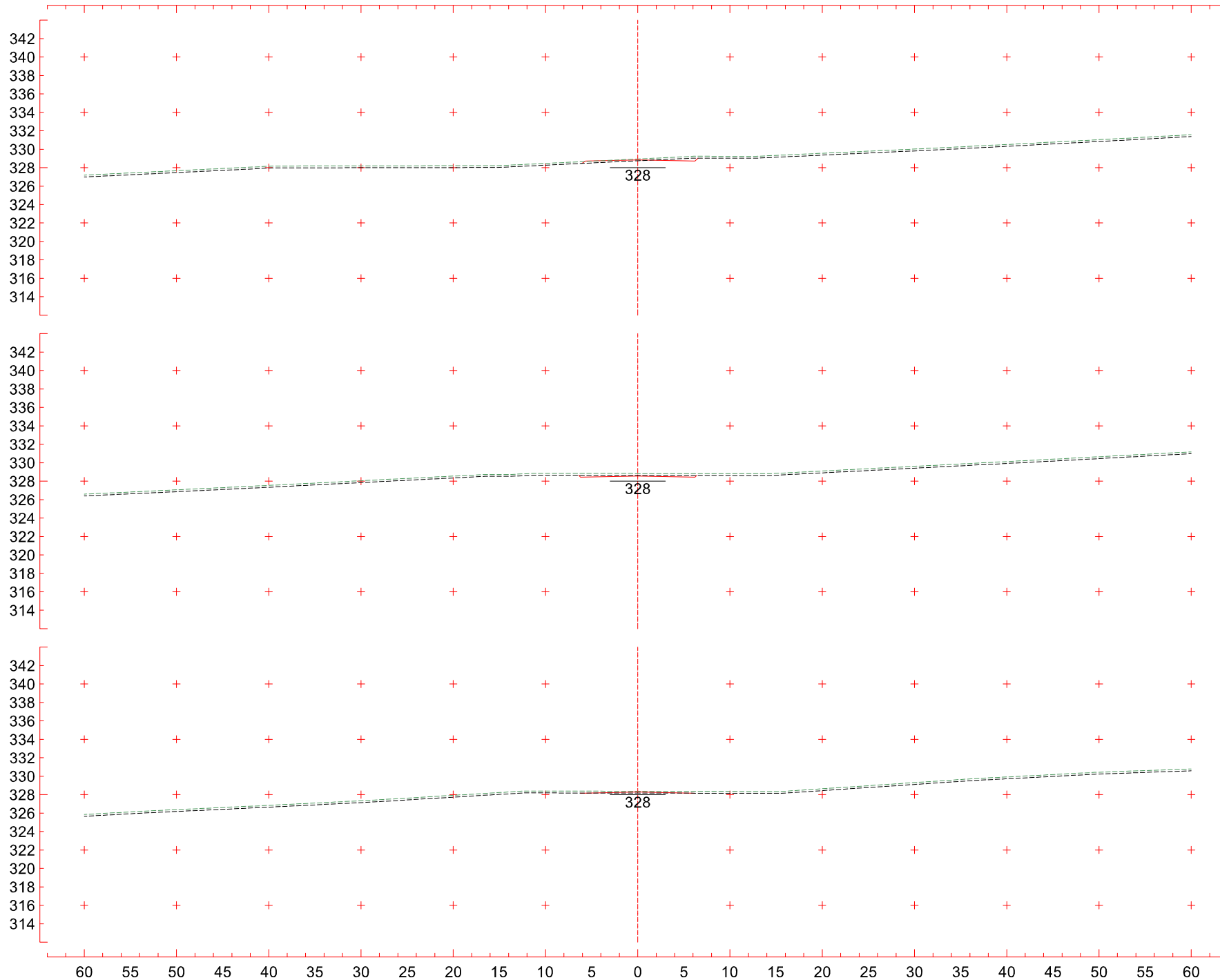


3+520
CT 328,001 m
CP 328,007 m

3+500
CT 327,704 m
CP 327,732 m

3+480
CT 327,312 m
CP 327,456 m

Eixo2
Escala 1:400



3+580

CT 328,945 m
CP 328,834 m

3+560

CT 328,829 m
CP 328,558 m

3+540

CT 328,370 m
CP 328,283 m

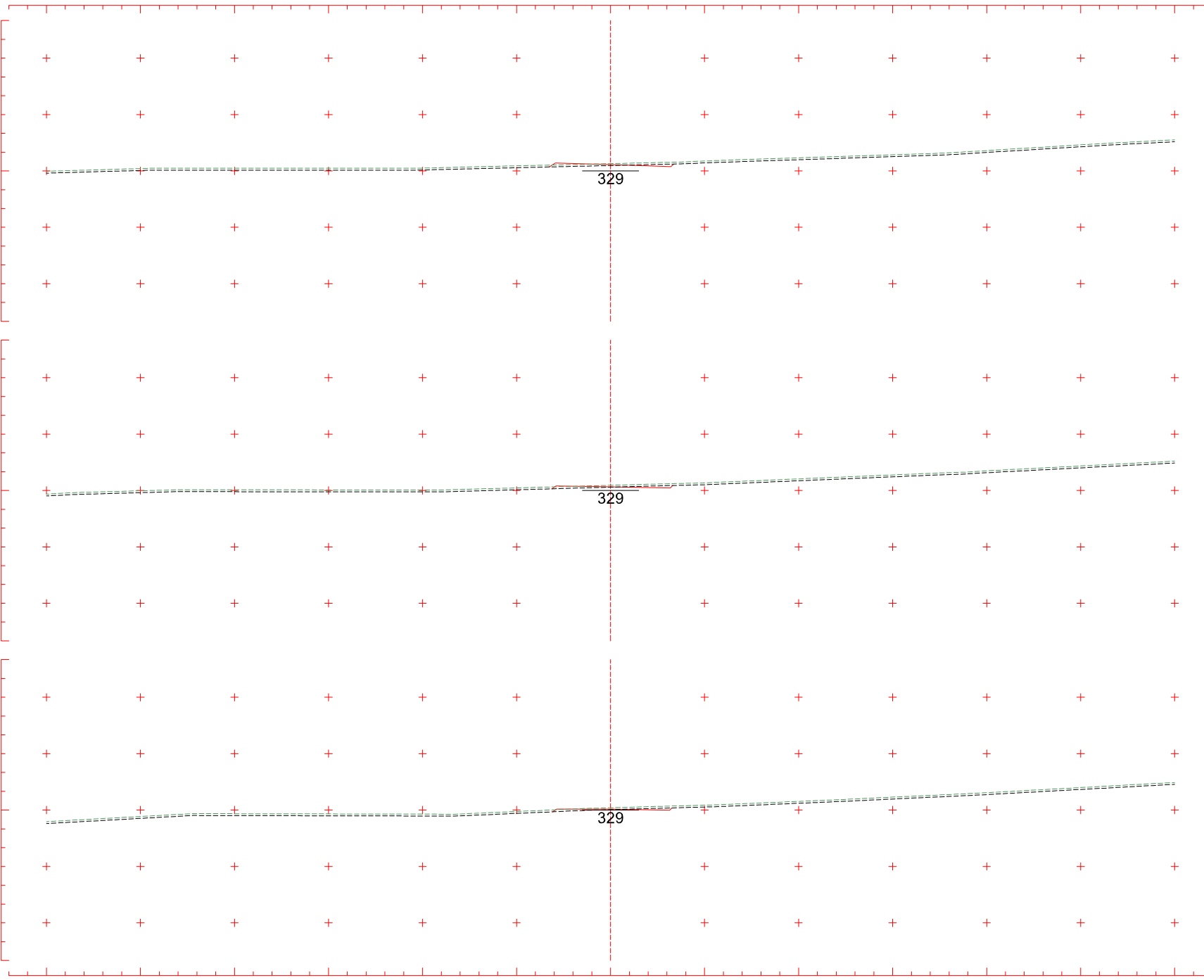
Eixo2

Escala 1:400

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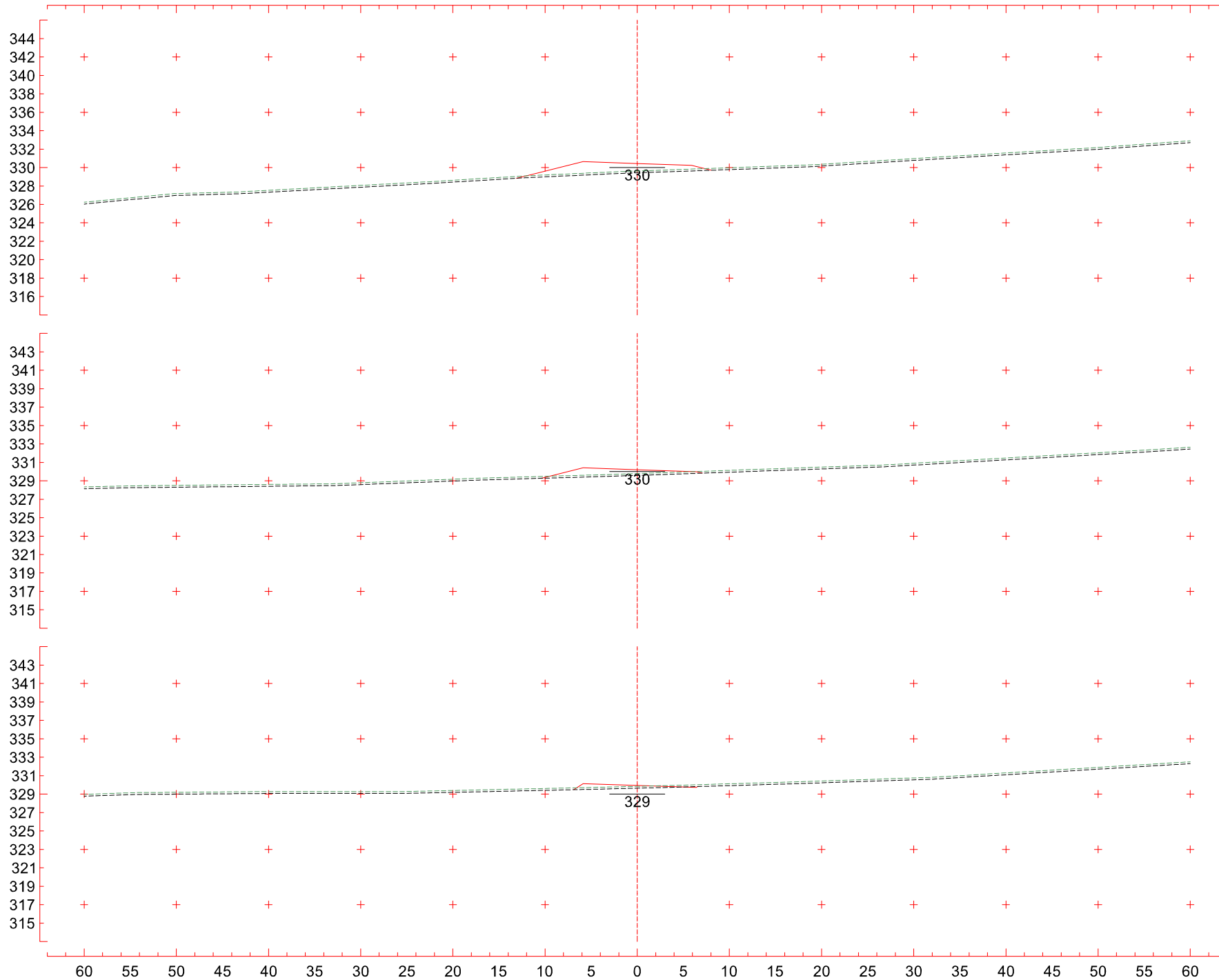


3+640
CT 329,774 m
CP 329,660 m

3+620
CT 329,553 m
CP 329,385 m

3+600
CT 329,243 m
CP 329,109 m

Eixo2
Escala 1:400



3+700

CT 329,627 m
CP 330,443 m

3+680

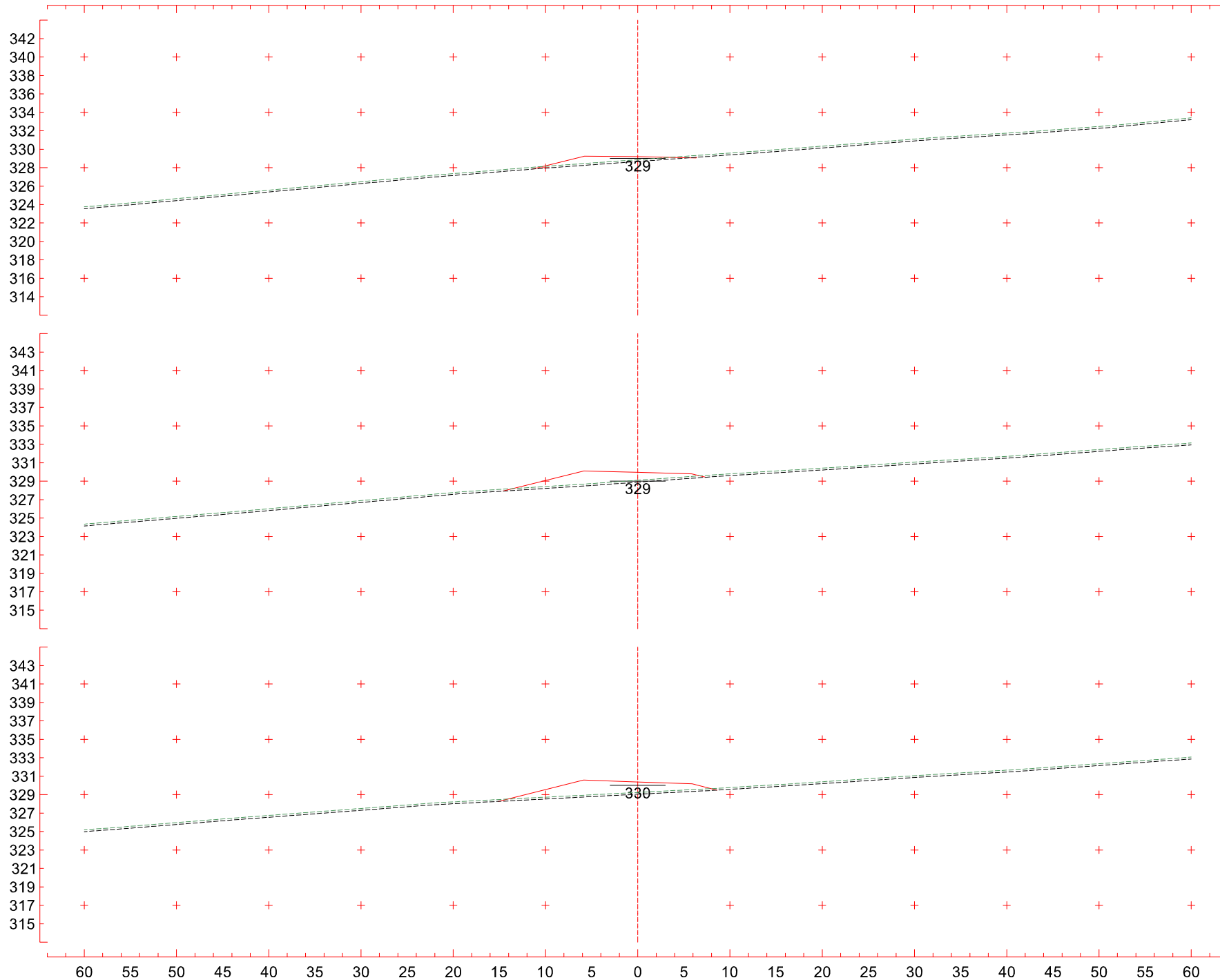
CT 329,789 m
CP 330,211 m

3+660

CT 329,842 m
CP 329,936 m

Eixo2

Escala 1:400



3+760
 CT 328,869 m
 CP 329,190 m

3+740
 CT 329,096 m
 CP 329,955 m

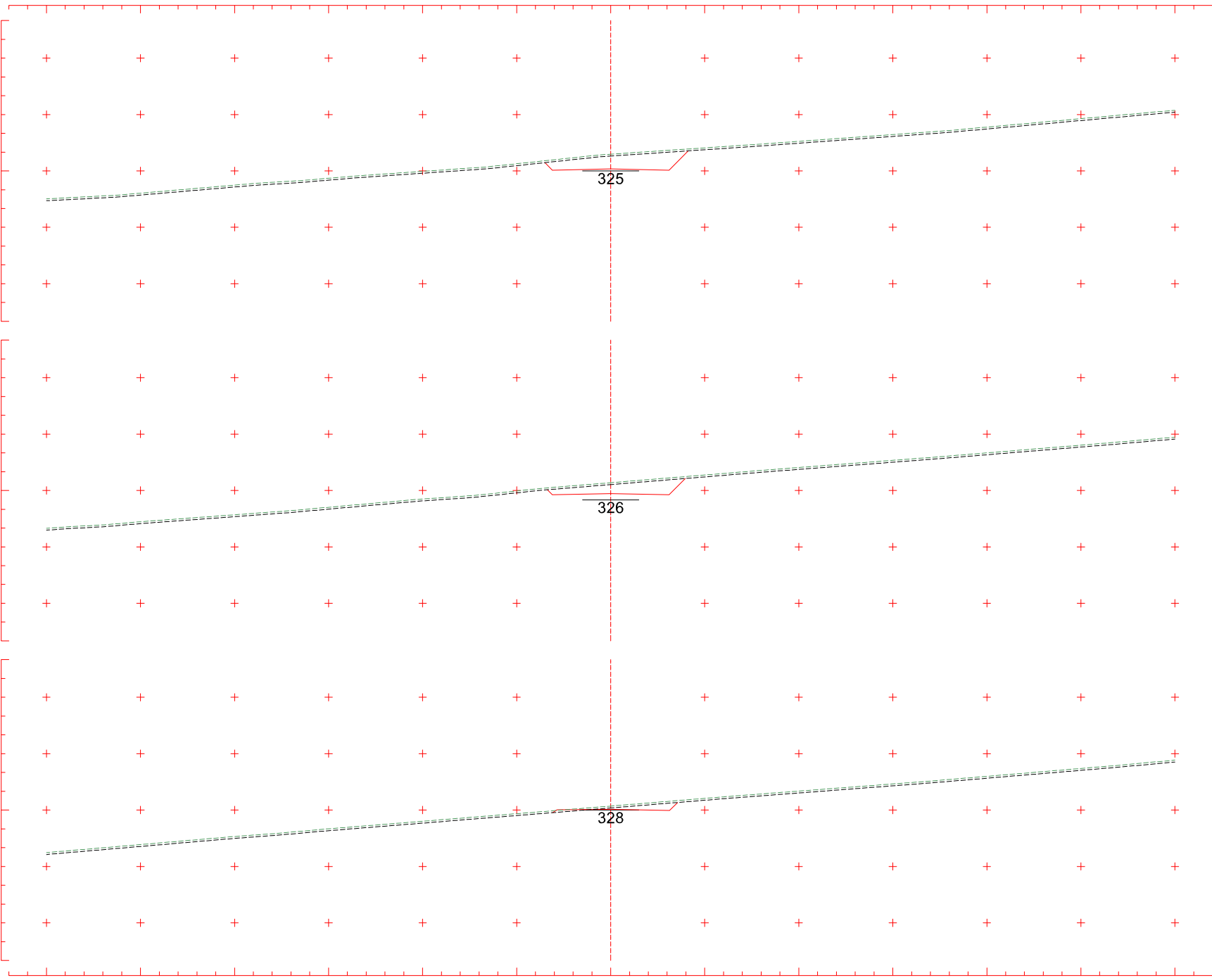
3+720
 CT 329,244 m
 CP 330,372 m

Eixo2
 Escala 1:400

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3+820
CT 326,781 m
CP 325,208 m

3+800
CT 327,828 m
CP 326,665 m

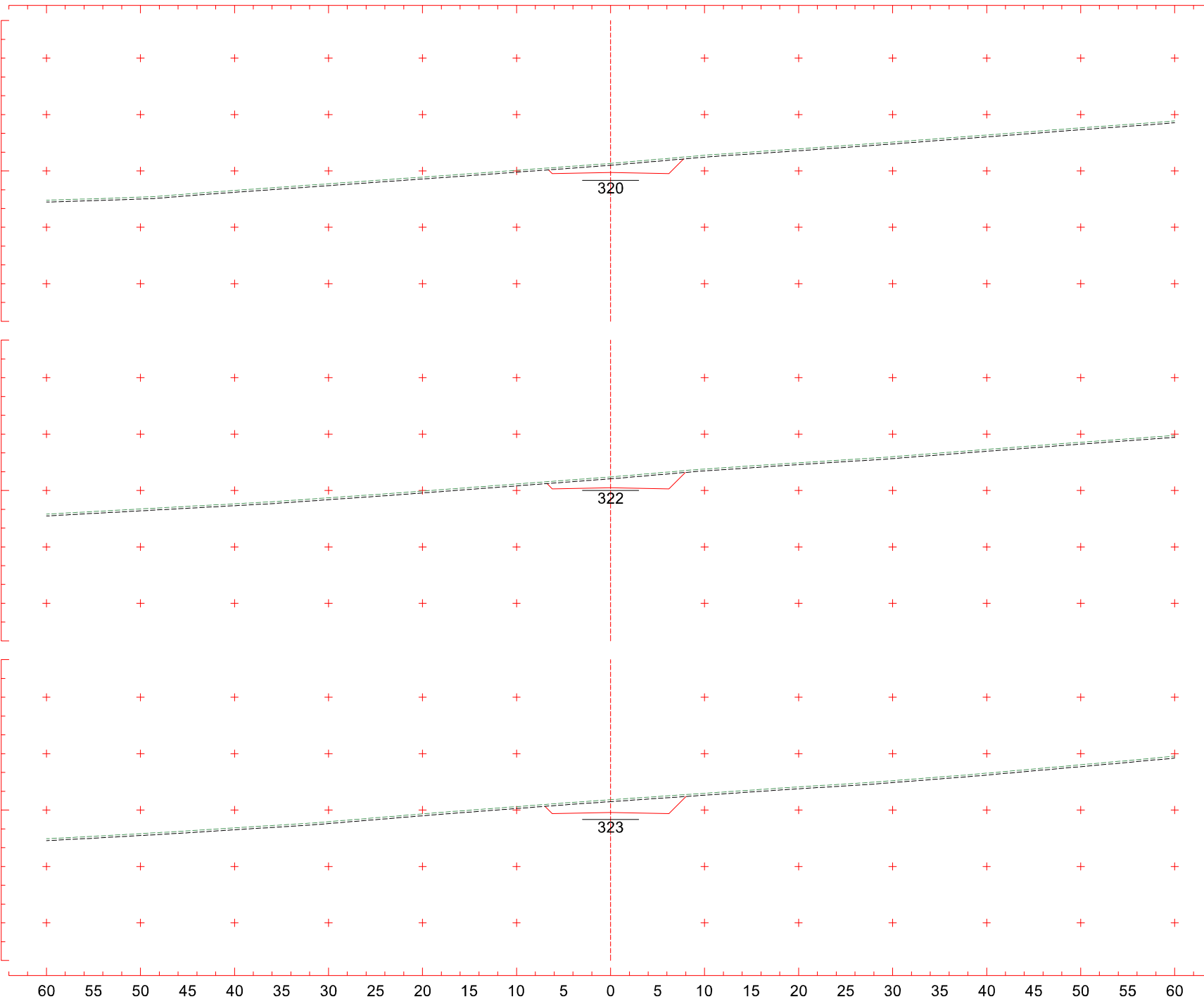
3+780
CT 328,423 m
CP 328,079 m

Eixo2
Escala 1:400

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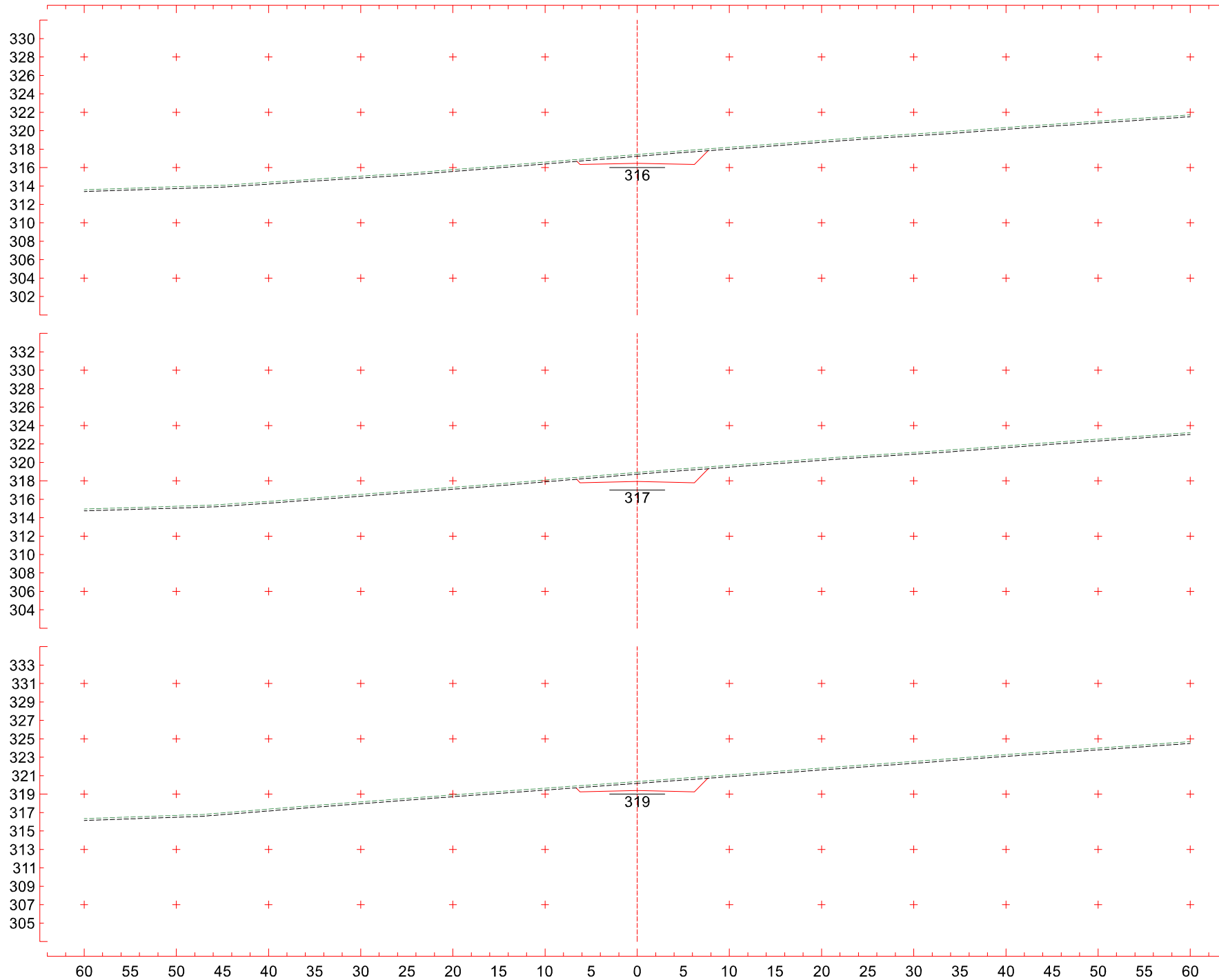


3+880
CT 321,803 m
CP 320,835 m

3+860
CT 323,444 m
CP 322,293 m

3+840
CT 325,096 m
CP 323,750 m

Eixo2
Escala 1:400

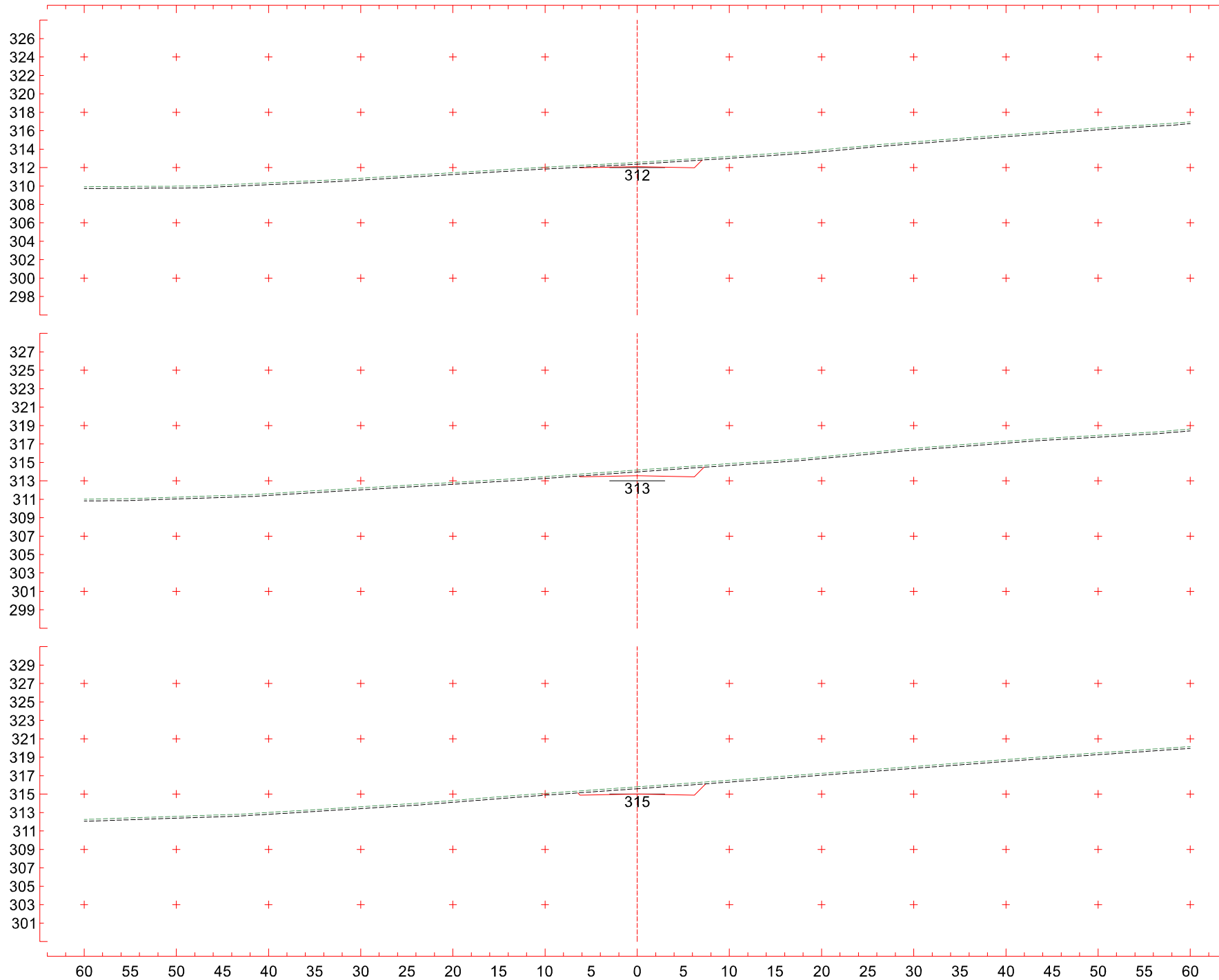


3+940
 CT 317,416 m
 CP 316,463 m

3+920
 CT 318,917 m
 CP 317,920 m

3+900
 CT 320,361 m
 CP 319,378 m

Eixo2
 Escala 1:400



4+000
 CT 312,568 m
 CP 312,090 m

3+980
 CT 314,169 m
 CP 313,548 m

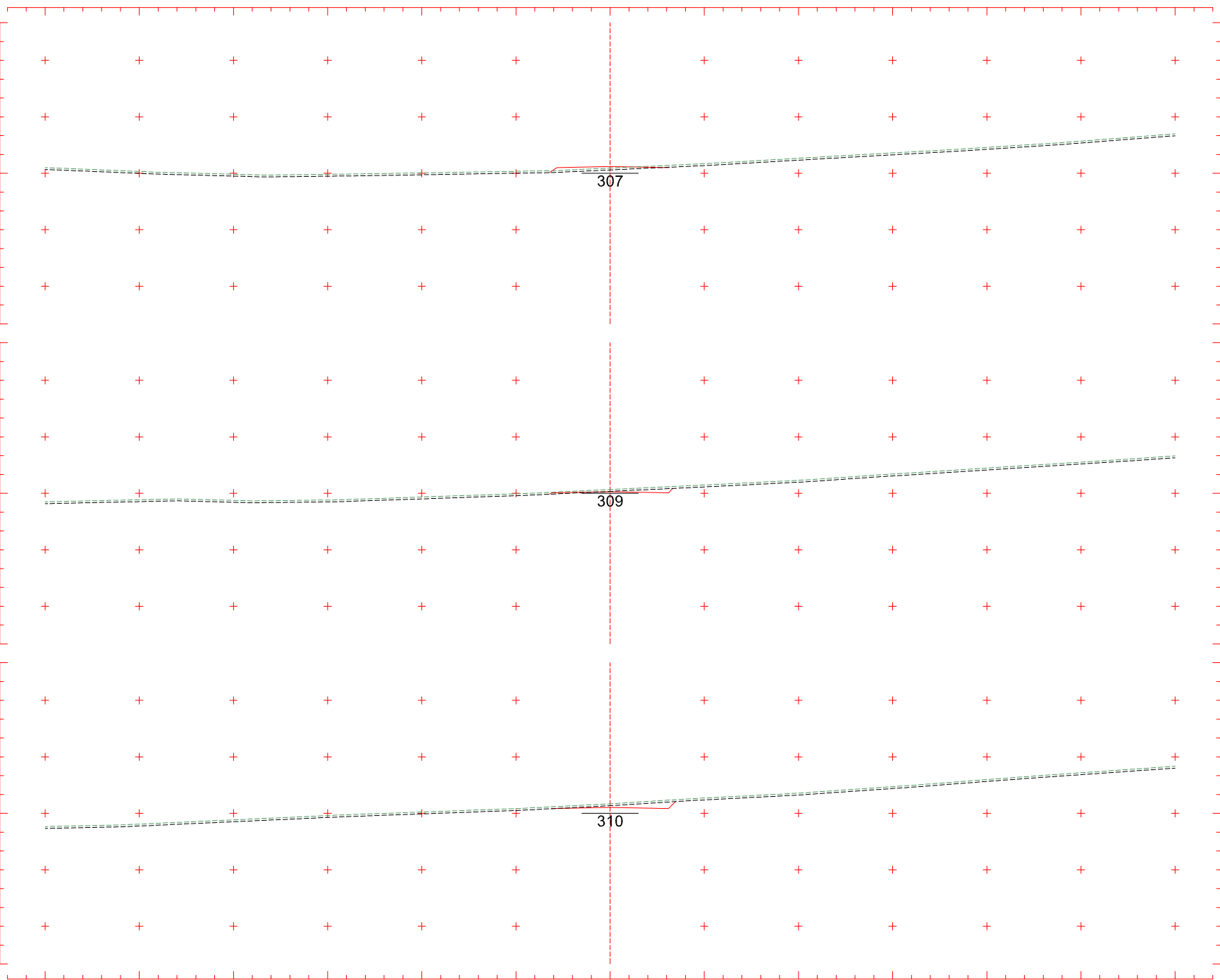
3+960
 CT 315,785 m
 CP 315,005 m

Eixo2
 Escala 1:400

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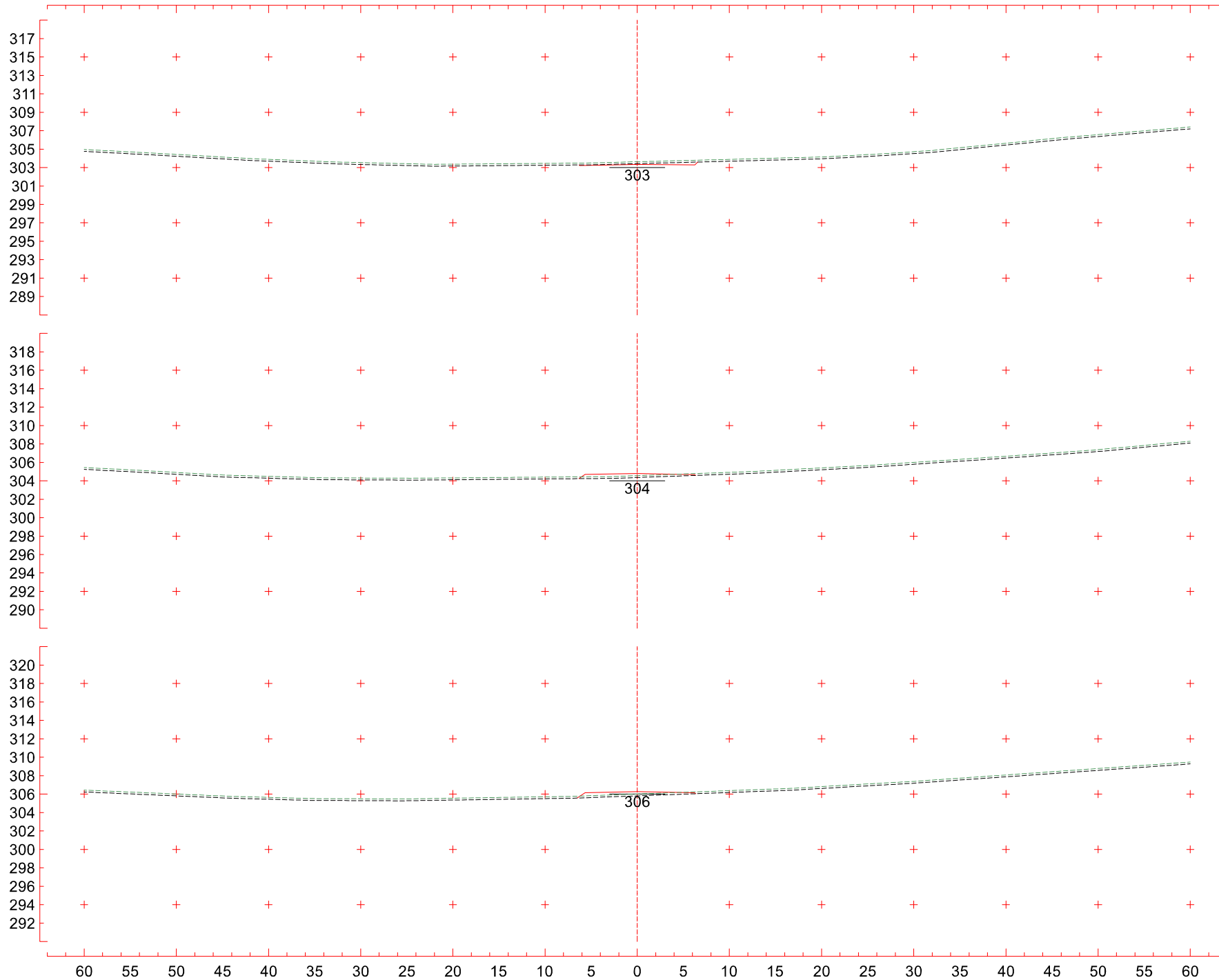


4+060
CT 307,555 m
CP 307,718 m

4+040
CT 309,406 m
CP 309,175 m

4+020
CT 311,011 m
CP 310,633 m

Eixo2
Escala 1:400

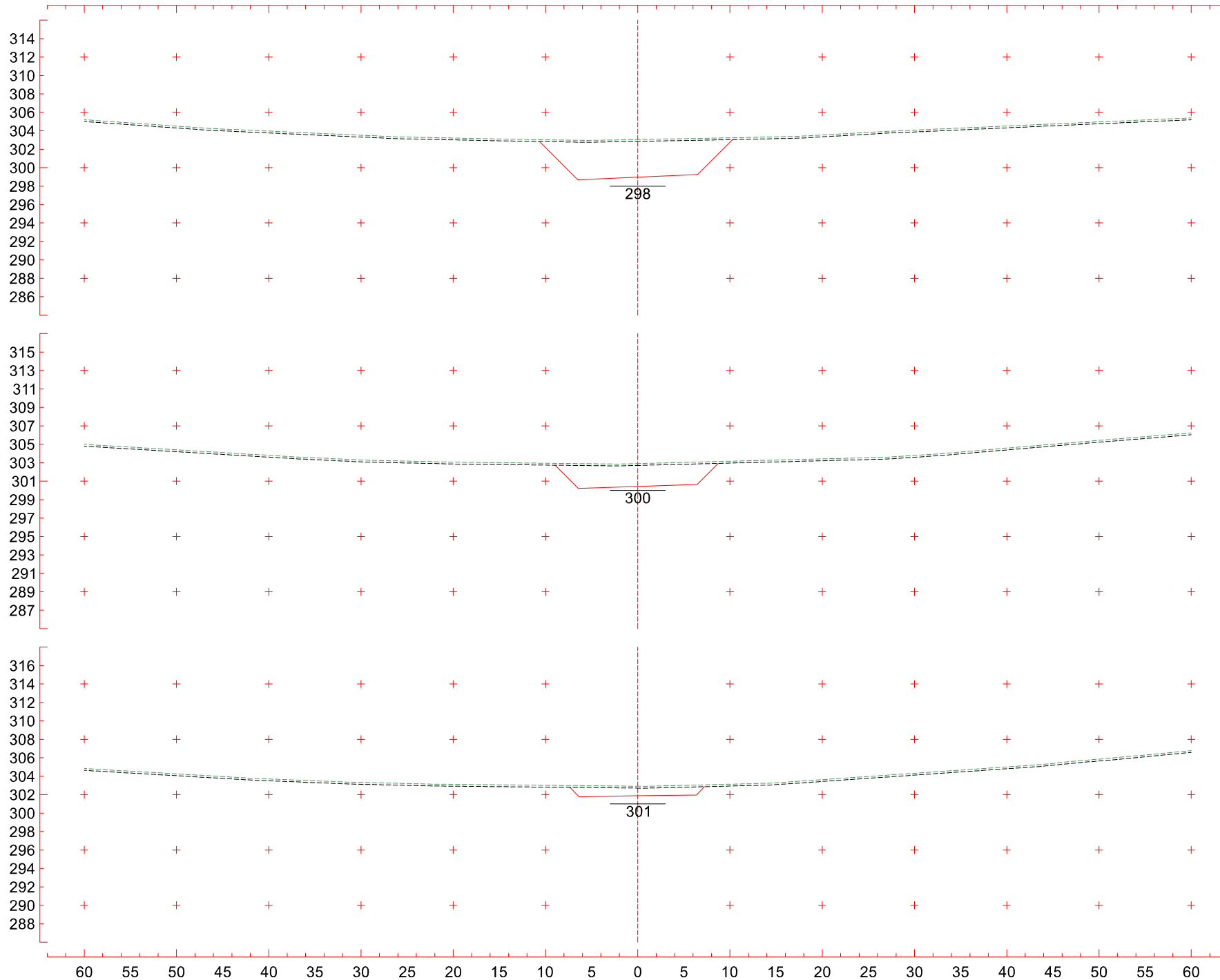


4+120
 CT 303,626 m
 CP 303,345 m

4+100
 CT 304,562 m
 CP 304,803 m

4+080
 CT 306,010 m
 CP 306,260 m

Eixo2
 Escala 1:400



4+180

CT 303,054 m
CP 298,973 m

4+160

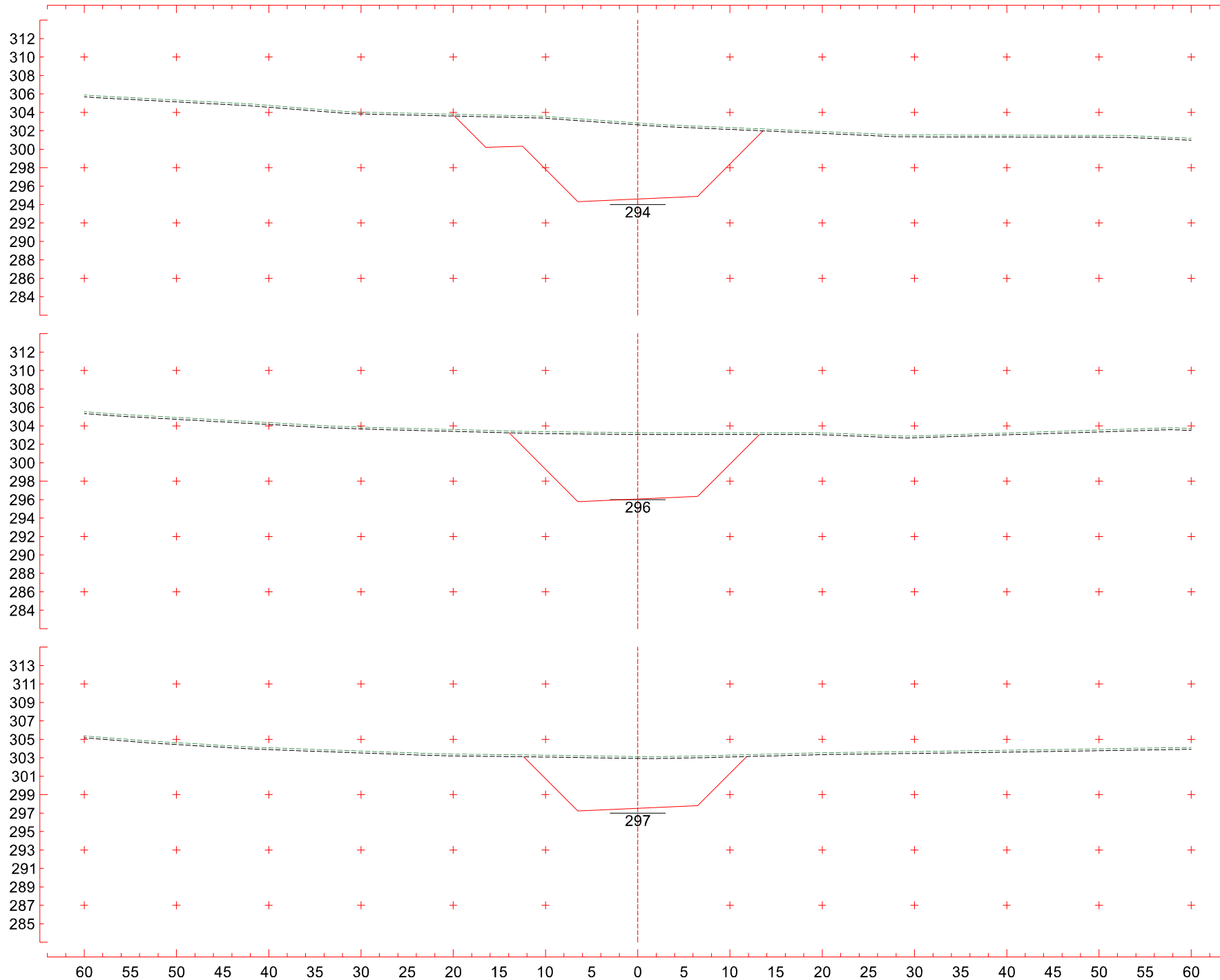
CT 302,907 m
CP 300,430 m

4+140

CT 302,910 m
CP 301,888 m

Eixo2

Escala 1:400

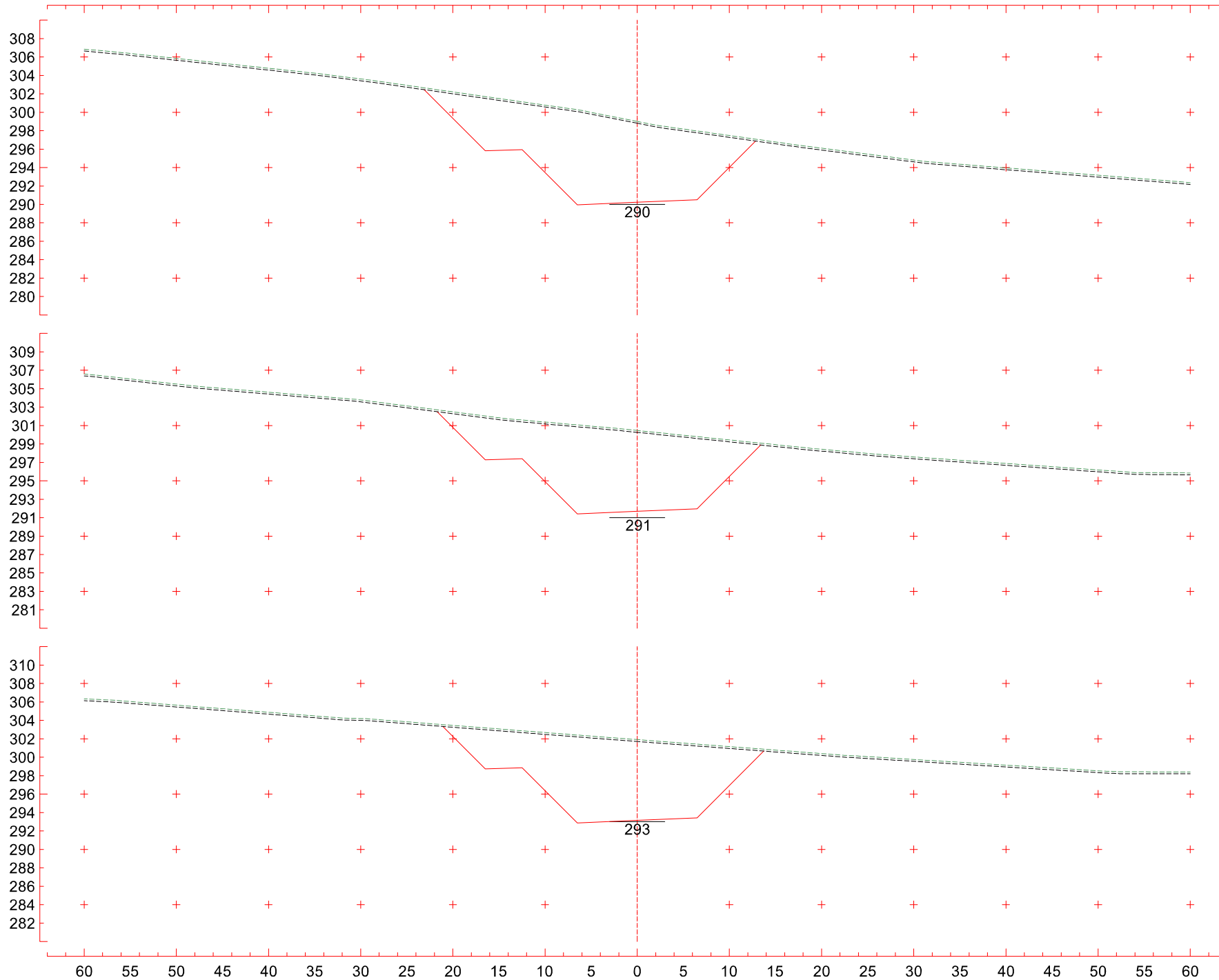


4+240
 CT 302,849 m
 CP 294,600 m

4+220
 CT 303,260 m
 CP 296,058 m

4+200
 CT 303,127 m
 CP 297,515 m

Eixo2
 Escala 1:400

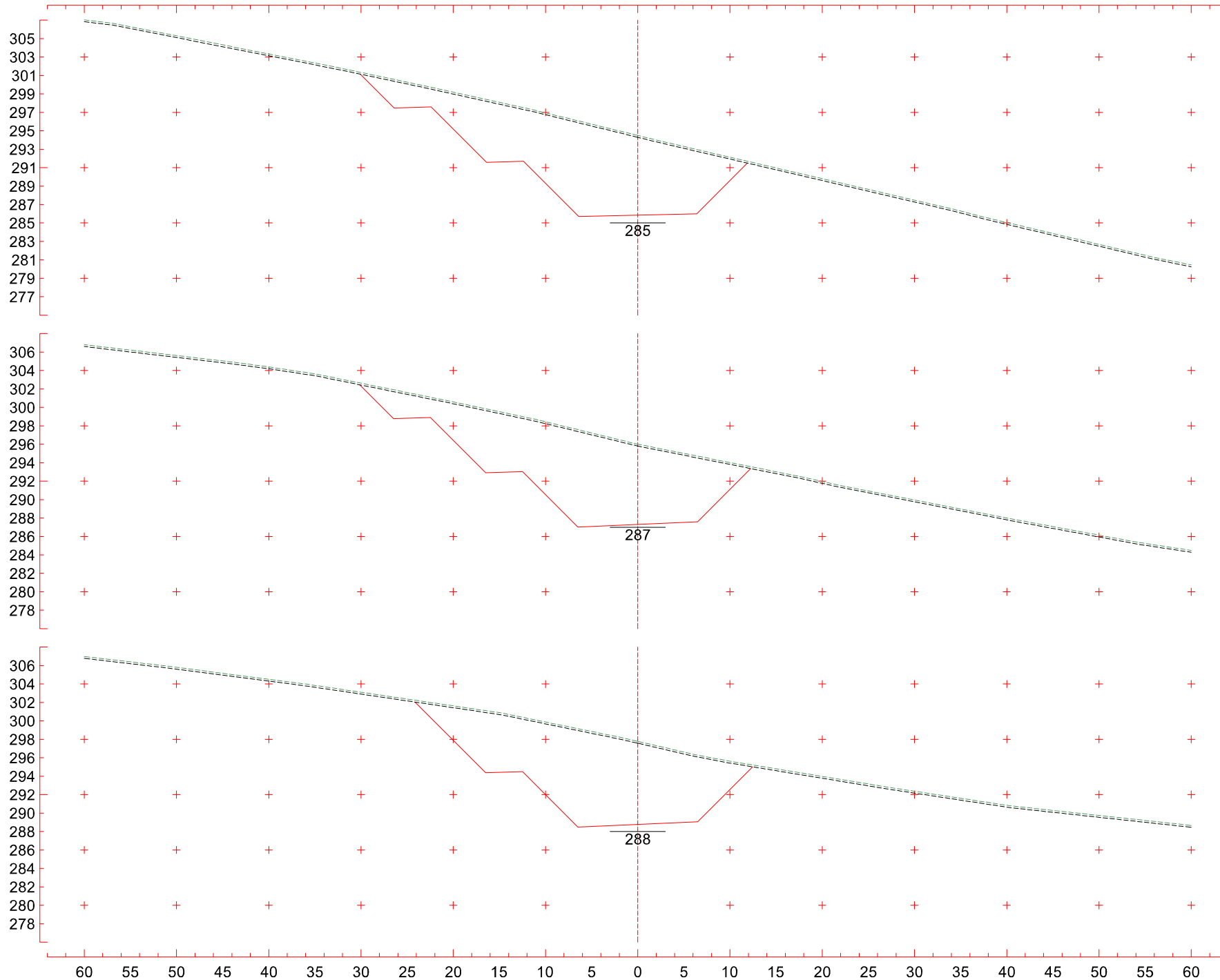


4+300
 CT 299,007 m
 CP 290,228 m

4+280
 CT 300,460 m
 CP 291,685 m

4+260
 CT 301,911 m
 CP 293,143 m

Eixo2
 Escala 1:400



4+360

CT 294,493 m
CP 285,855 m

285

4+340

CT 296,008 m
CP 287,313 m

287

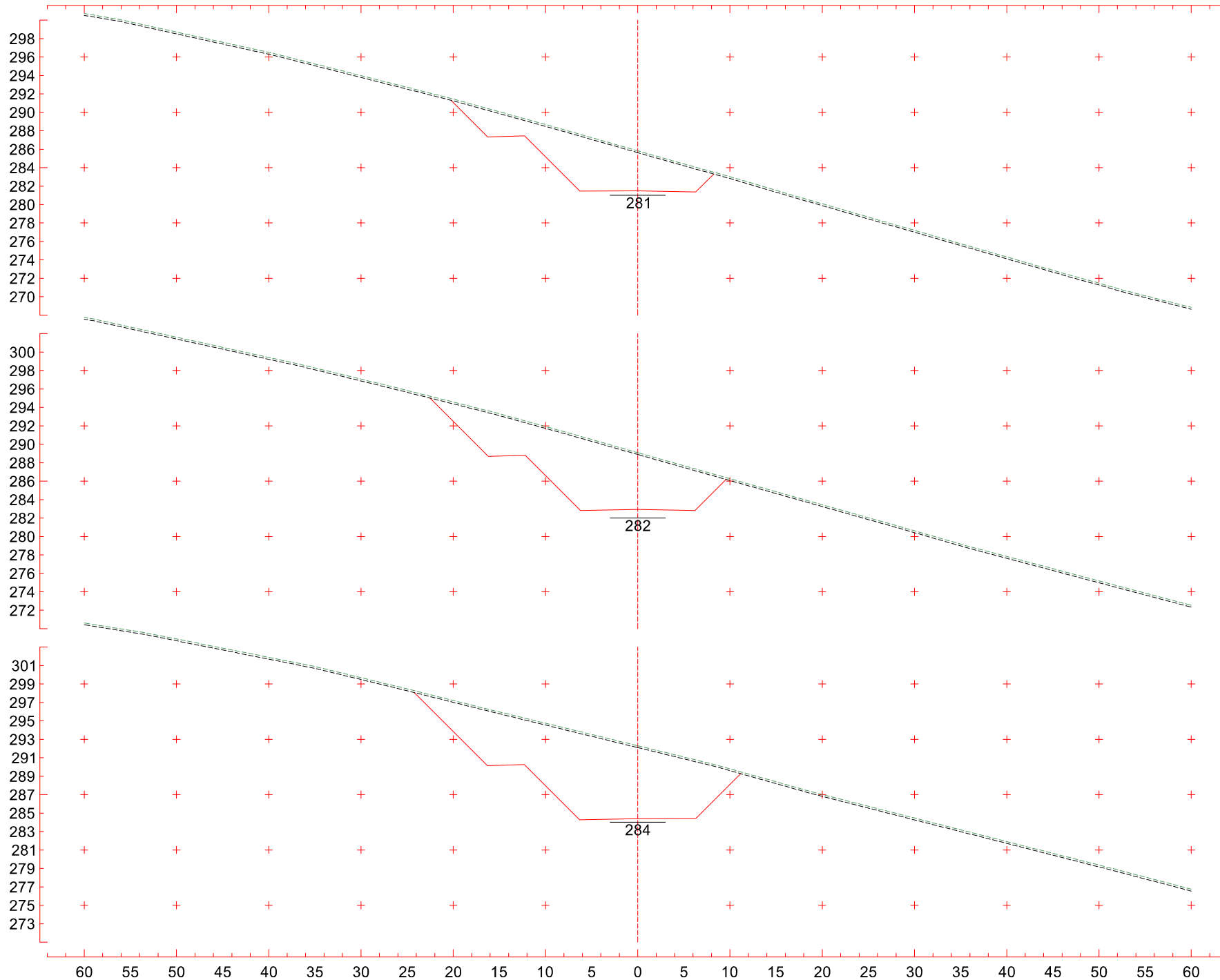
4+320

CT 297,775 m
CP 288,770 m

288

Eixo2

Escala 1:400

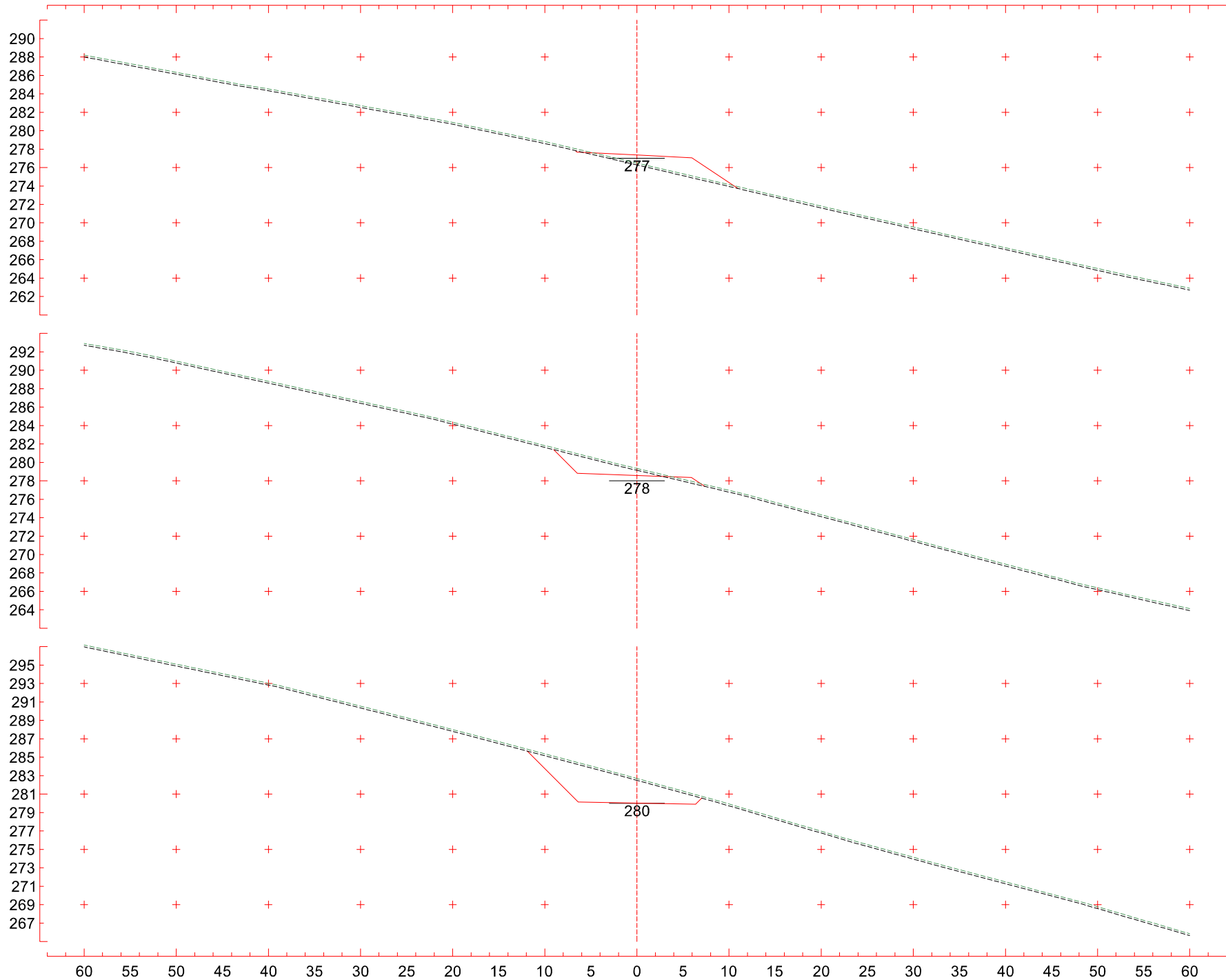


4+420
 CT 285,830 m
 CP 281,483 m

4+400
 CT 289,090 m
 CP 282,940 m

4+380
 CT 292,304 m
 CP 284,398 m

Eixo2
 Escala 1:400



4+480

CT 276,485 m
CP 277,358 m

4+460

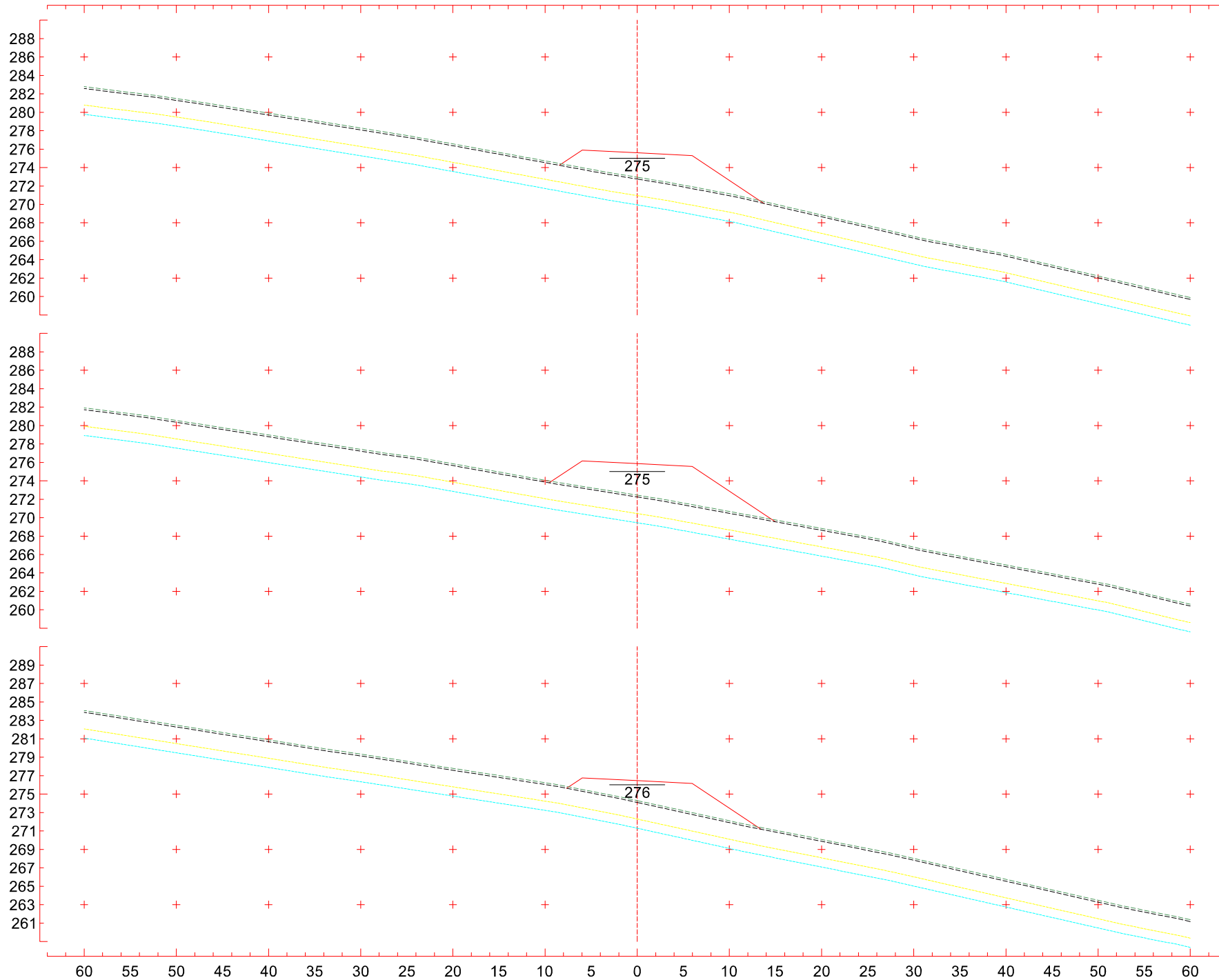
CT 279,341 m
CP 278,578 m

4+440

CT 282,693 m
CP 280,025 m

Eixo2

Escala 1:400

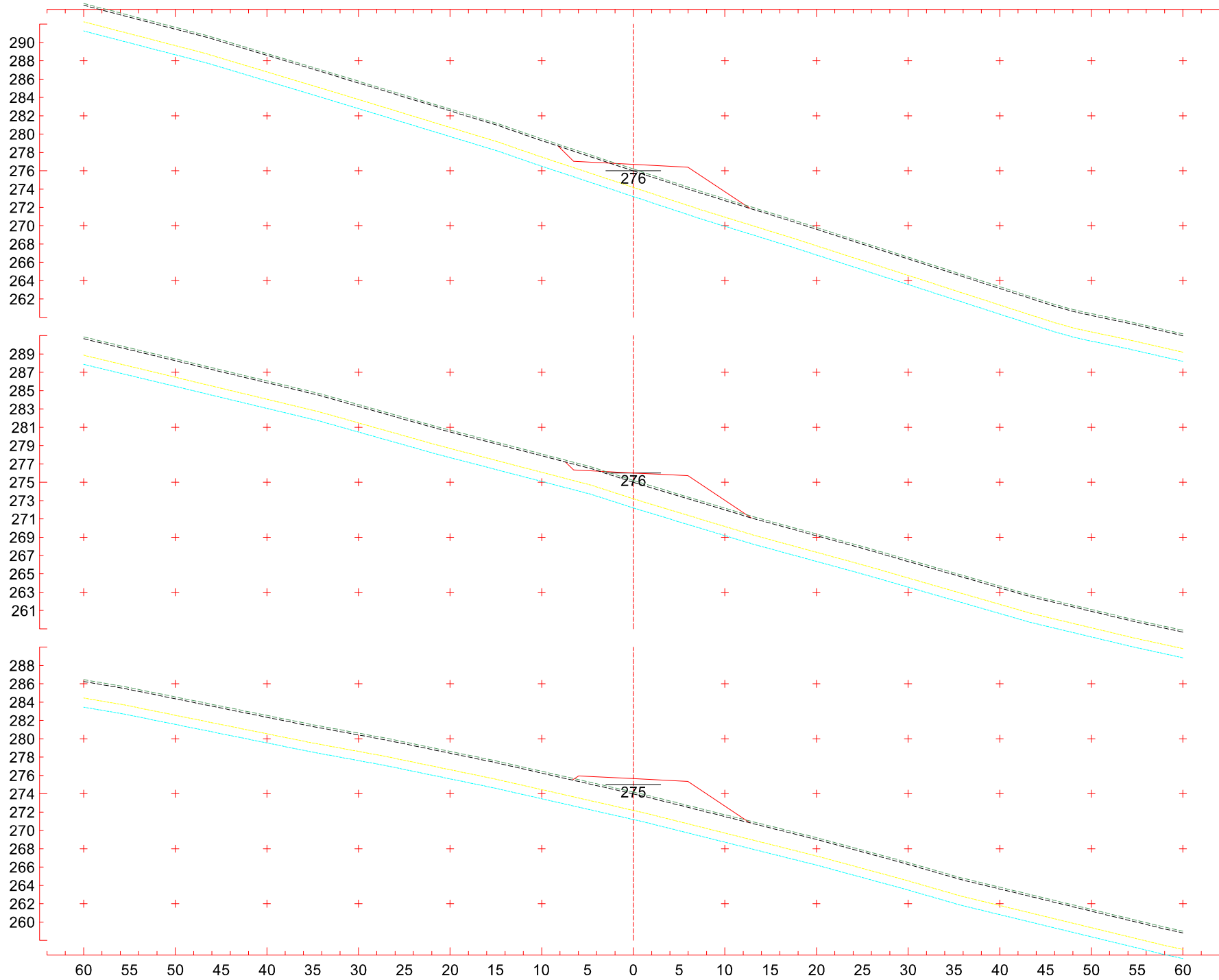


4+540
 CT 272,951 m
 CP 275,600 m

4+520
 CT 272,448 m
 CP 275,869 m

4+500
 CT 274,293 m
 CP 276,455 m

Eixo2
 Escala 1:400

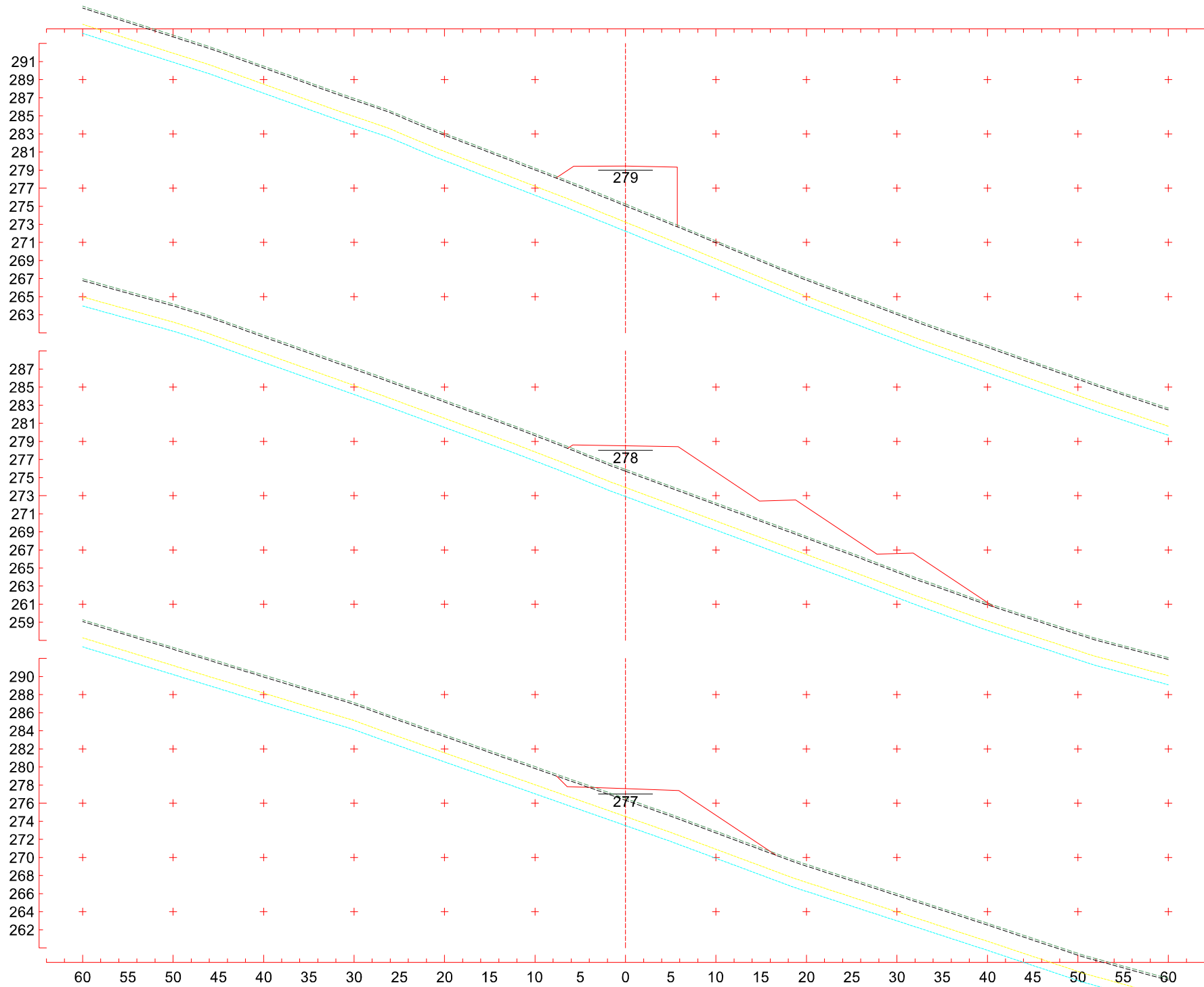


4+600
 CT 276,184 m
 CP 276,695 m

4+580
 CT 275,199 m
 CP 276,013 m

4+560
 CT 274,187 m
 CP 275,648 m

Eixo2
 Escala 1:400

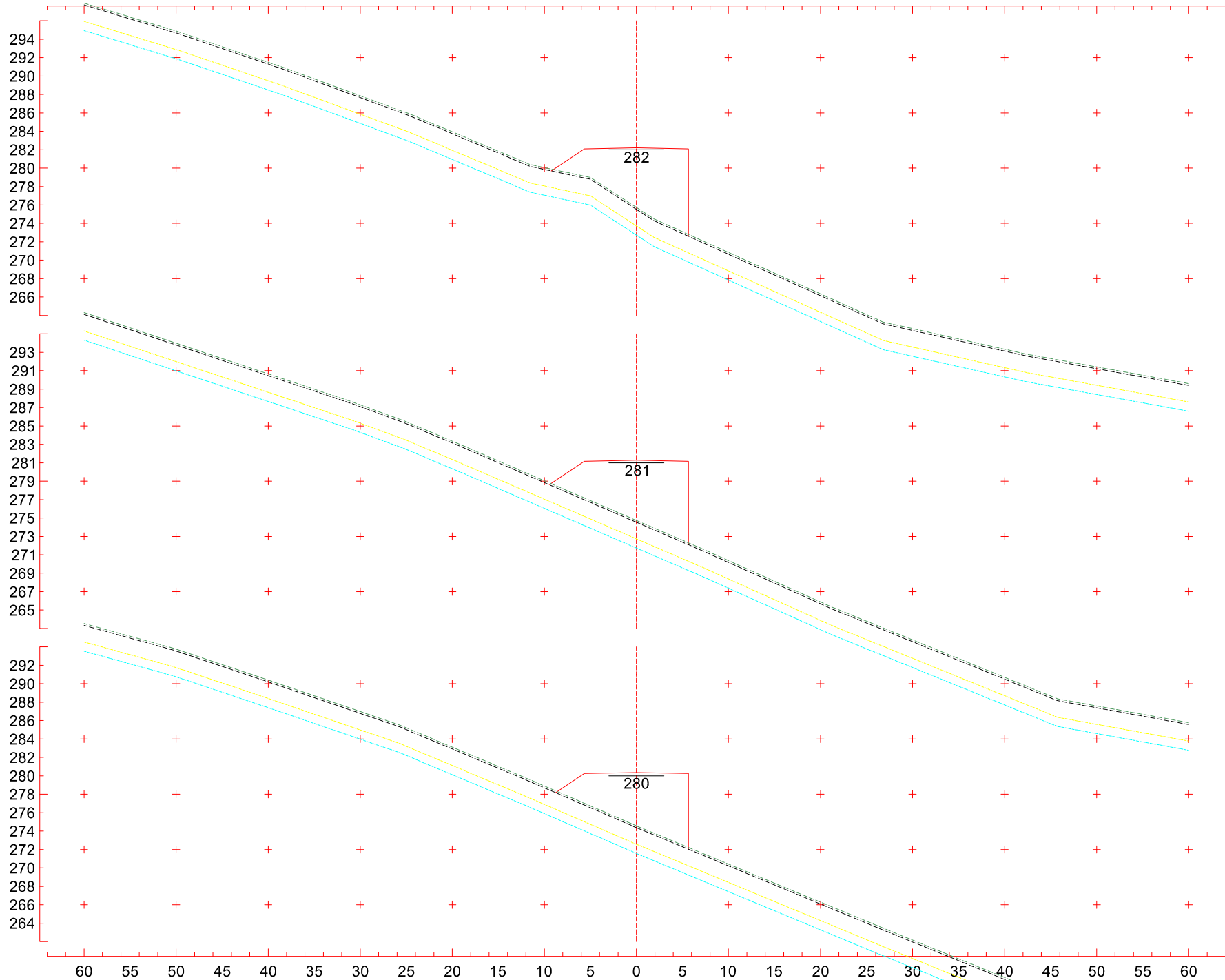


4+660
 CT 275,242 m
 CP 279,443 m

4+640
 CT 275,904 m
 CP 278,524 m

4+620
 CT 276,522 m
 CP 277,604 m

Eixo2
 Escala 1:400

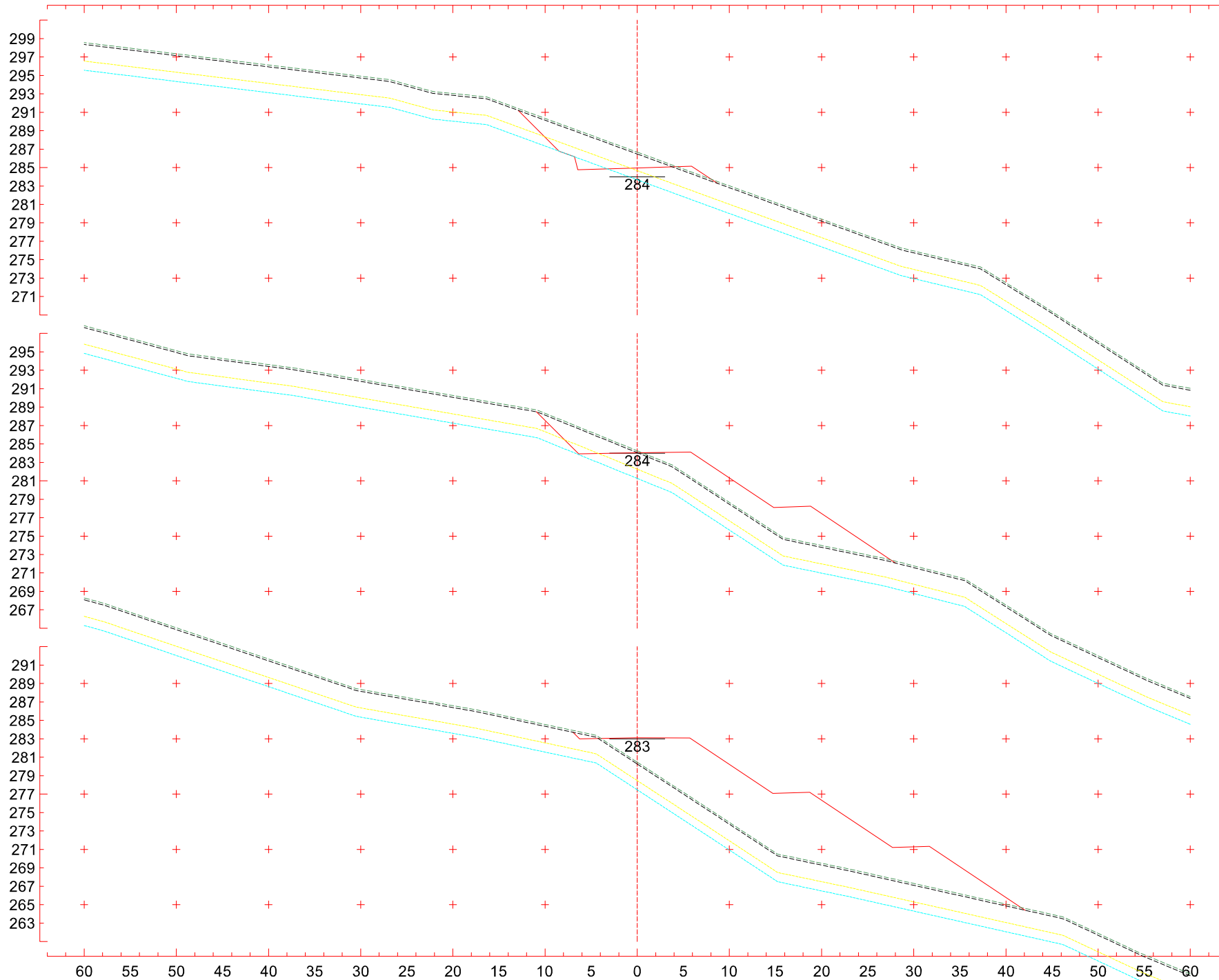


4+720
 CT 275,727 m
 CP 282,202 m

4+700
 CT 274,736 m
 CP 281,282 m

4+680
 CT 274,573 m
 CP 280,363 m

Eixo2
 Escala 1:400

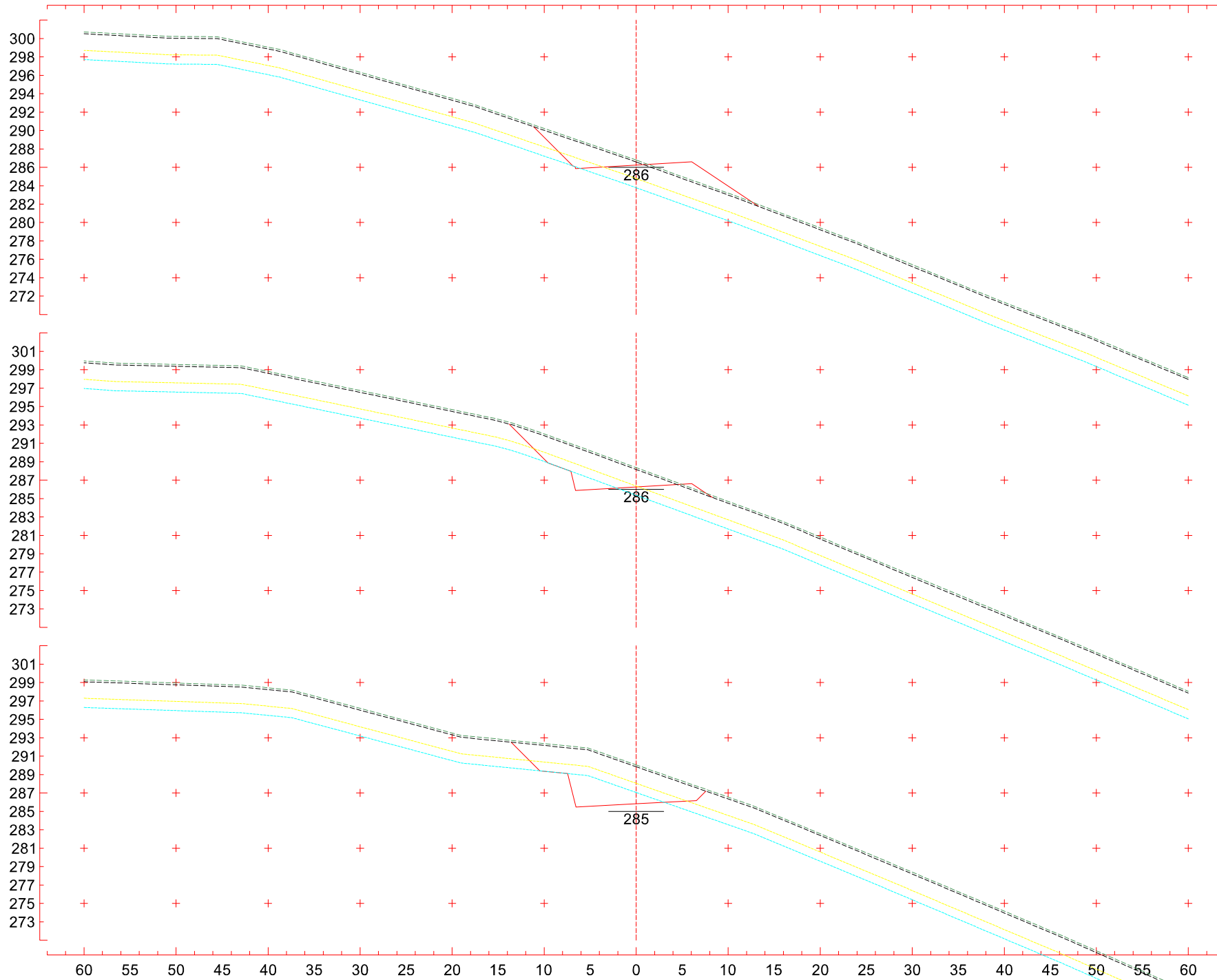


4+780
 CT 286,672 m
 CP 284,961 m

4+760
 CT 284,261 m
 CP 284,041 m

4+740
 CT 280,467 m
 CP 283,122 m

Eixo2
 Escala 1:400

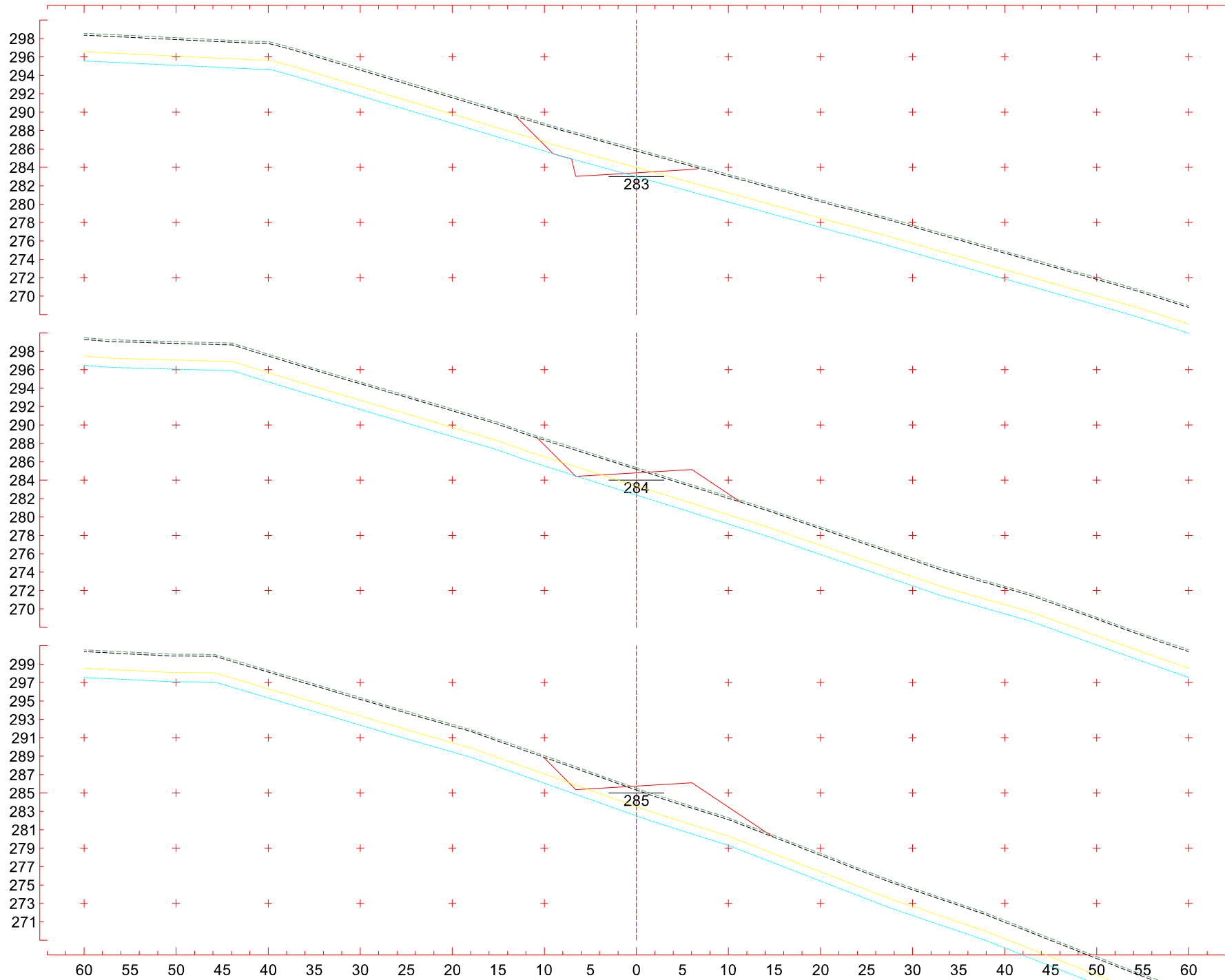


4+840
 CT 286,783 m
 CP 286,247 m

4+820
 CT 288,361 m
 CP 286,270 m

4+800
 CT 290,049 m
 CP 285,821 m

Eixo2
 Escala 1:400



4+900

CT 285,979 m
CP 283,411 m

4+880

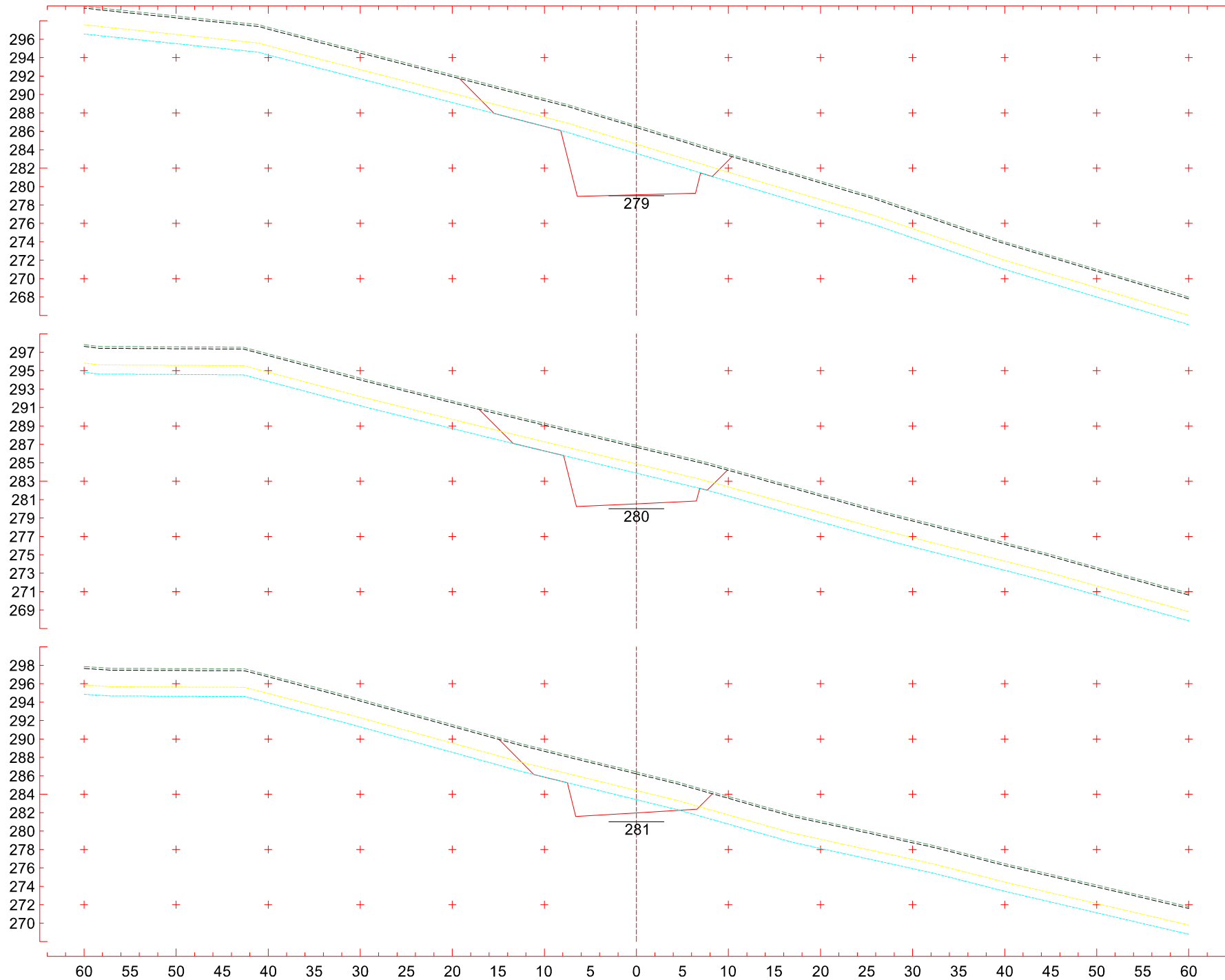
CT 285,377 m
CP 284,788 m

4+860

CT 285,517 m
CP 285,753 m

Eixo2

Escala 1:400



4+960

CT 286,611 m
CP 279,103 m

4+940

CT 286,877 m
CP 280,539 m

4+920

CT 286,415 m
CP 281,975 m

Eixo2

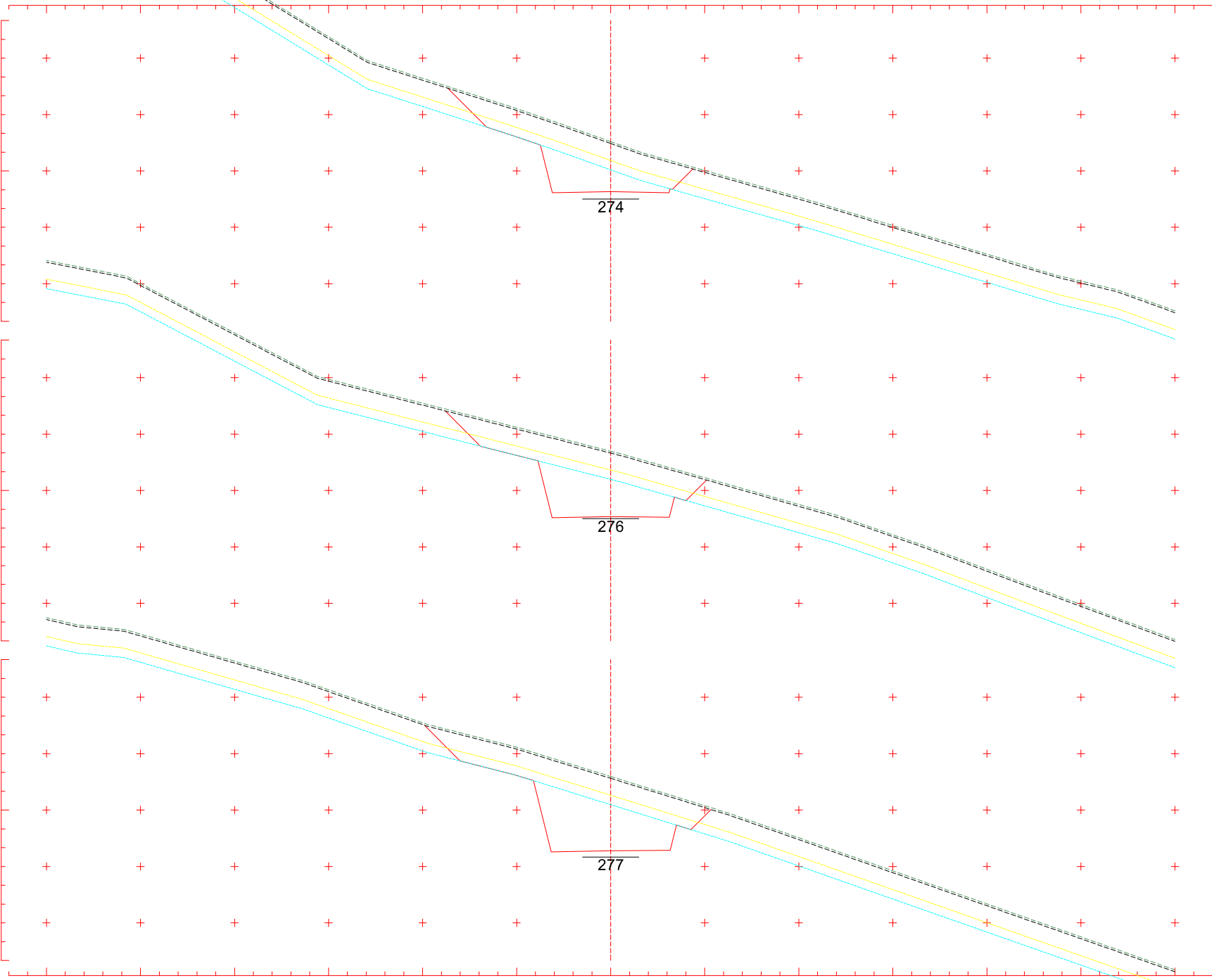
Escala 1:400

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5+020
CT 280,116 m
CP 274,795 m

5+000
CT 283,180 m
CP 276,231 m

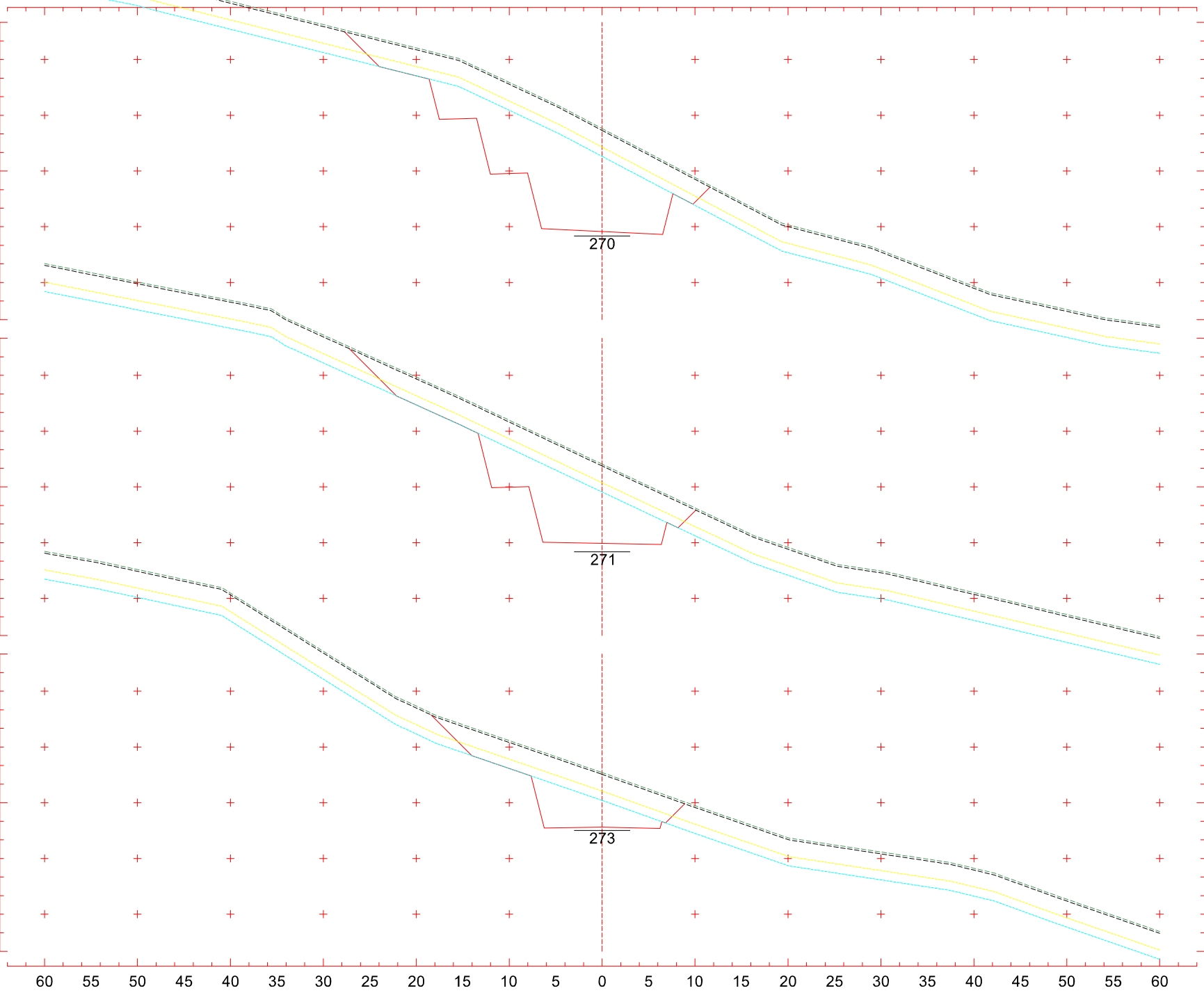
4+980
CT 285,572 m
CP 277,667 m

Eixo2
Escala 1:400

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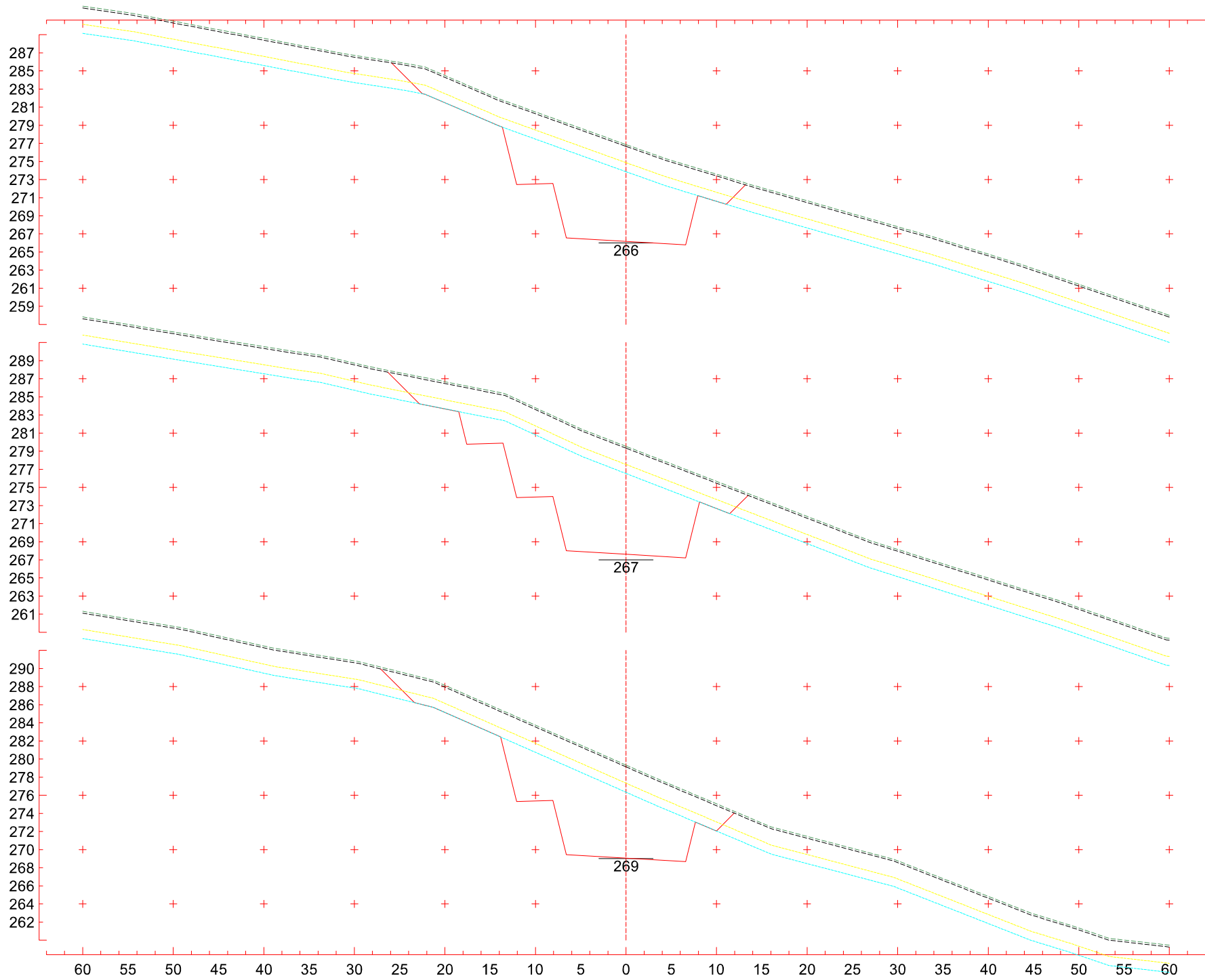


5+080
CT 281,573 m
CP 270,487 m

5+060
CT 280,443 m
CP 271,923 m

5+040
CT 279,247 m
CP 273,359 m

Eixo2
Escala 1:400



5+140

CT 276,868 m
CP 266,179 m

5+120

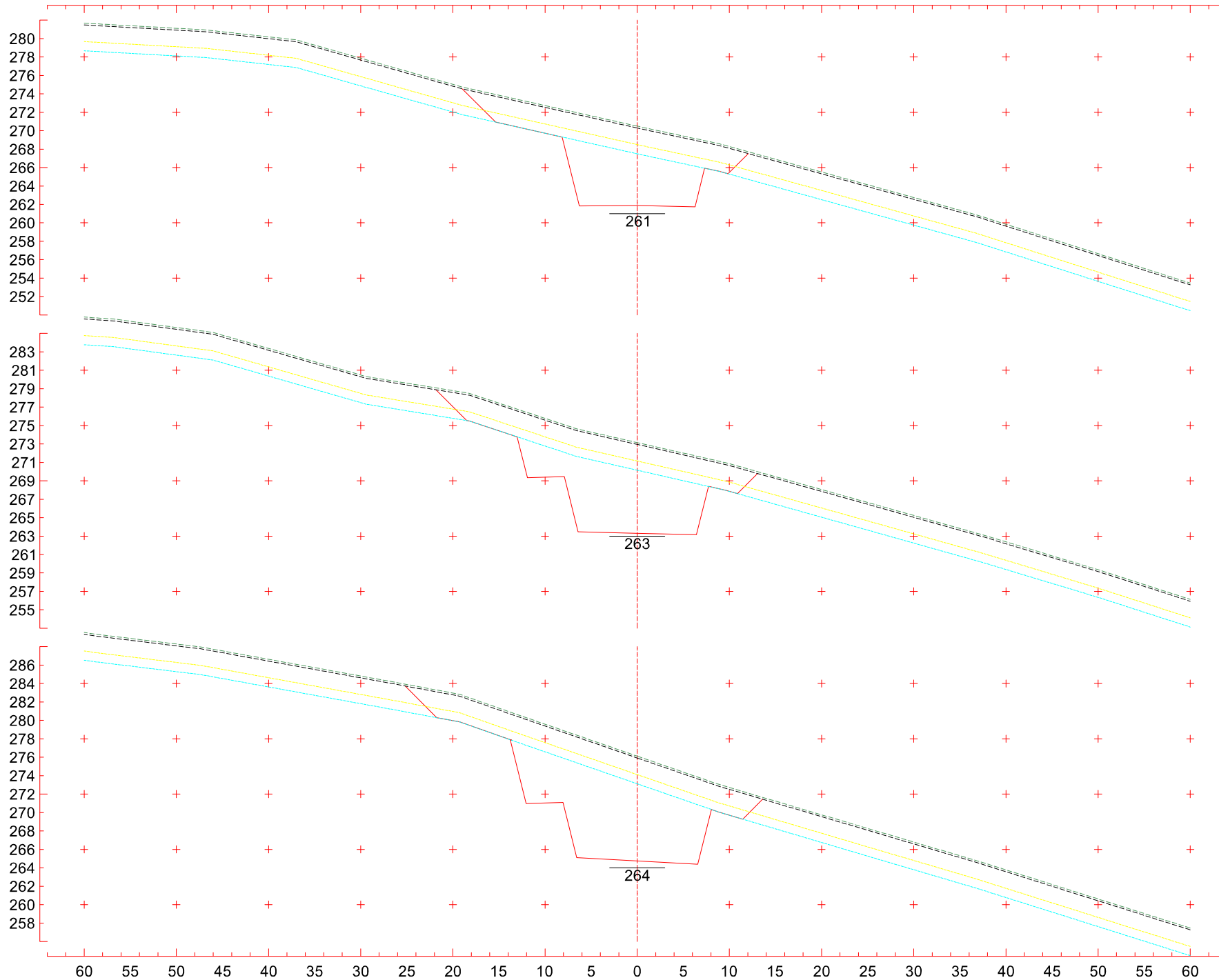
CT 279,535 m
CP 267,615 m

5+100

CT 279,338 m
CP 269,051 m

Eixo2

Escala 1:400

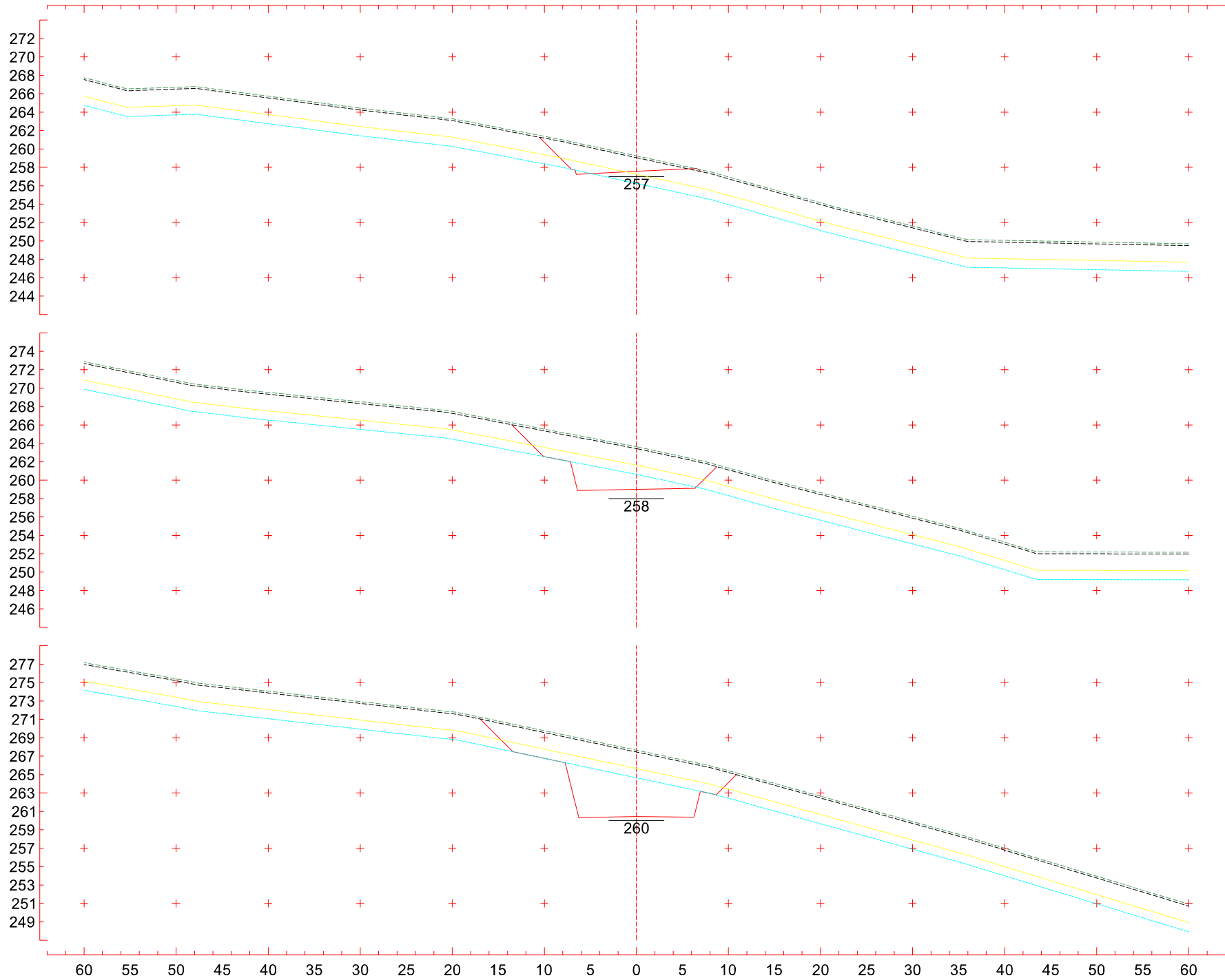


5+200
 CT 270,495 m
 CP 261,871 m

5+180
 CT 273,151 m
 CP 263,307 m

5+160
 CT 276,119 m
 CP 264,743 m

Eixo2
 Escala 1:400



5+260

CT 259,251 m
CP 257,563 m

5+240

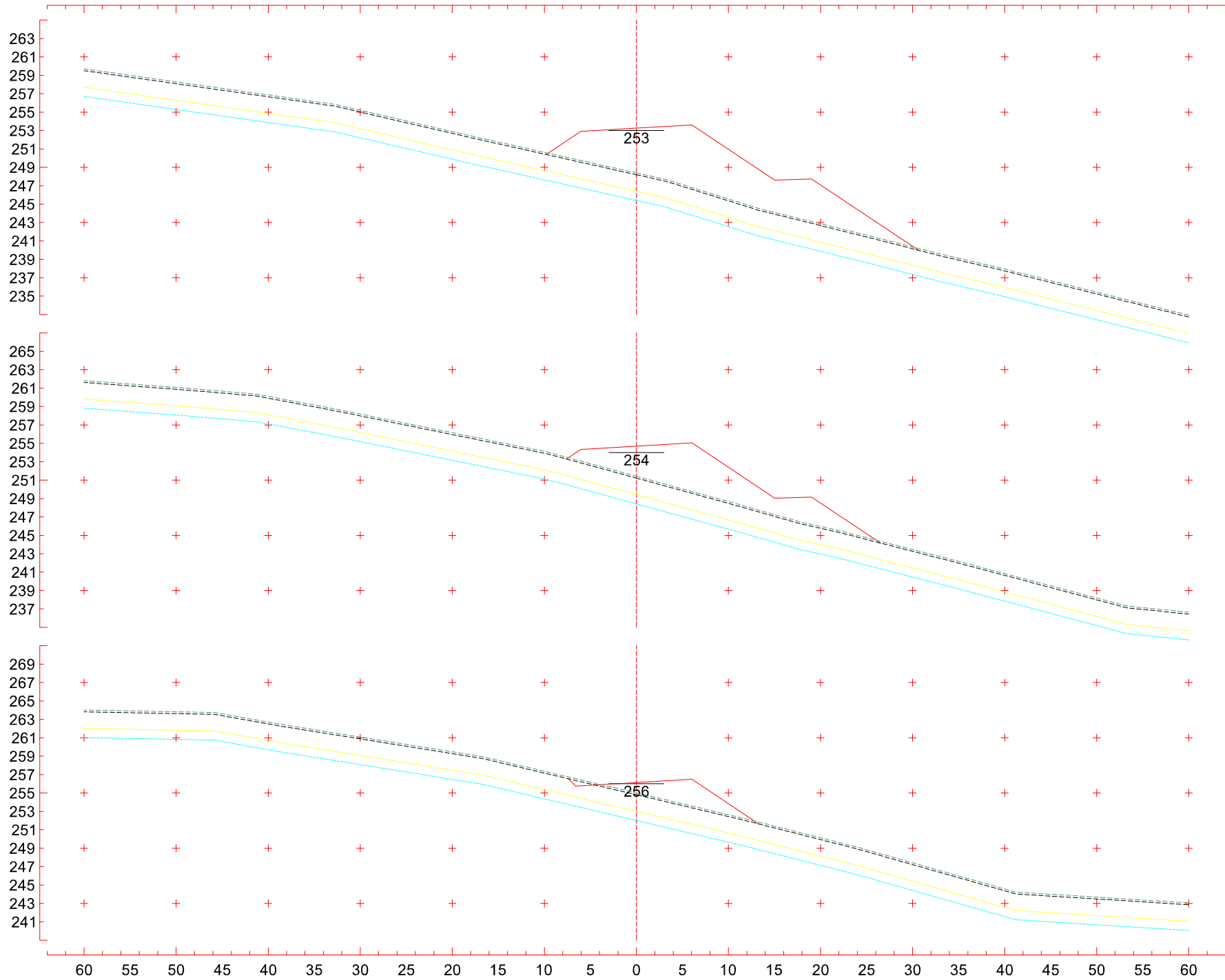
CT 263,635 m
CP 258,999 m

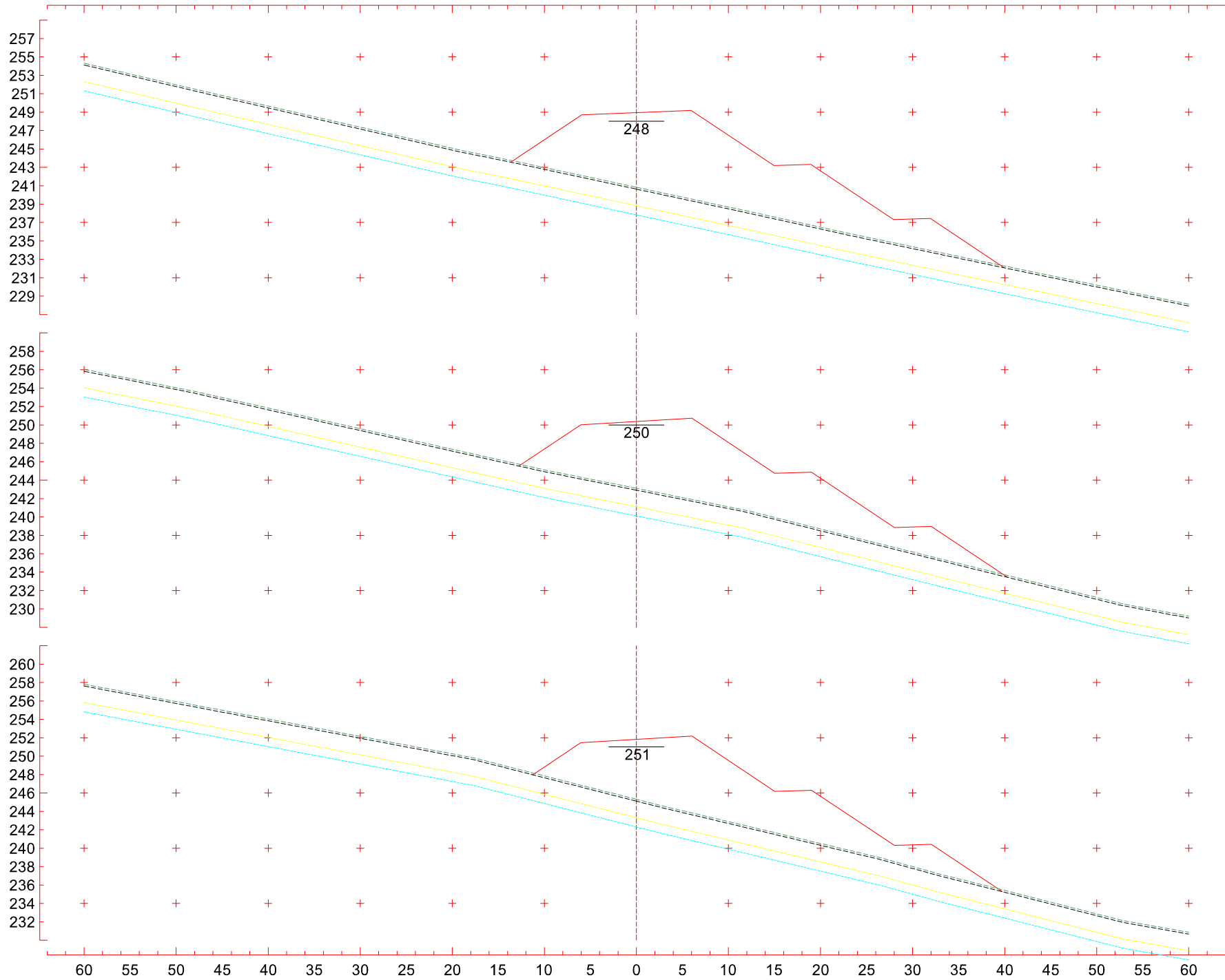
5+220

CT 267,652 m
CP 260,435 m

Eixo2

Escala 1:400



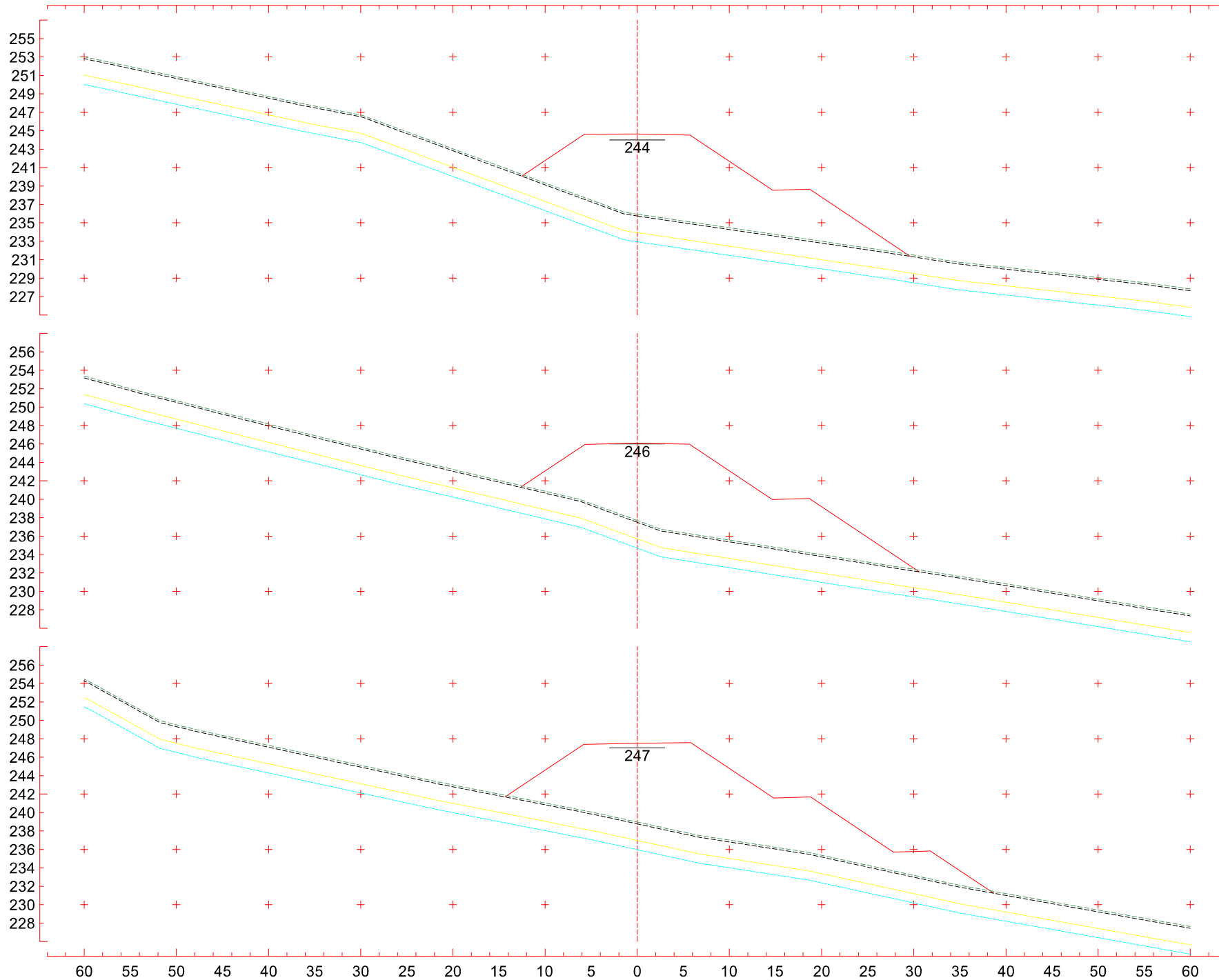


5+380
 CT 240,831 m
 CP 248,947 m

5+360
 CT 243,110 m
 CP 250,383 m

5+340
 CT 245,310 m
 CP 251,819 m

Eixo2
 Escala 1:400

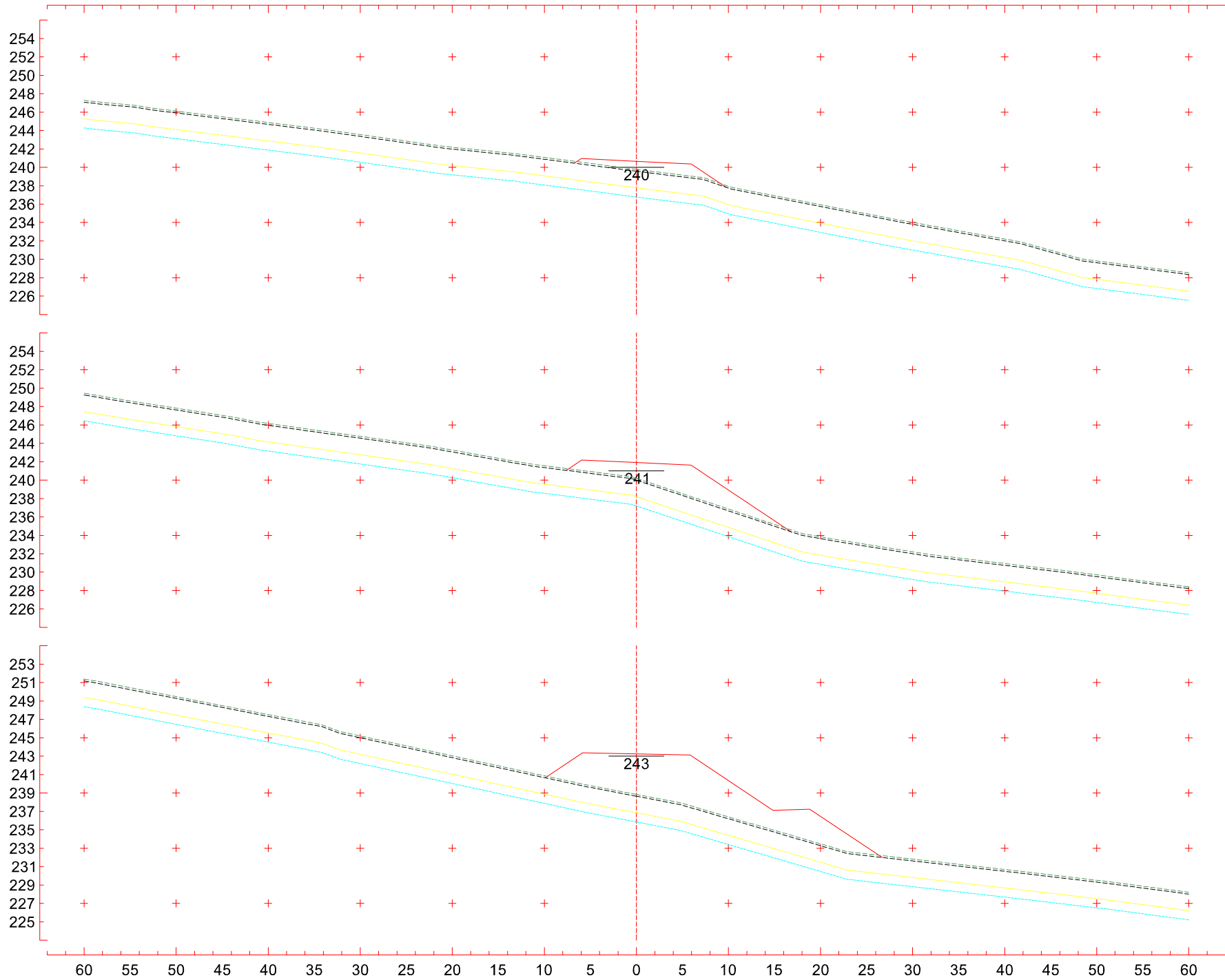


5+440
 CT 235,944 m
 CP 244,639 m

5+420
 CT 237,698 m
 CP 246,075 m

5+400
 CT 238,969 m
 CP 247,511 m

Eixo2
 Escala 1:400

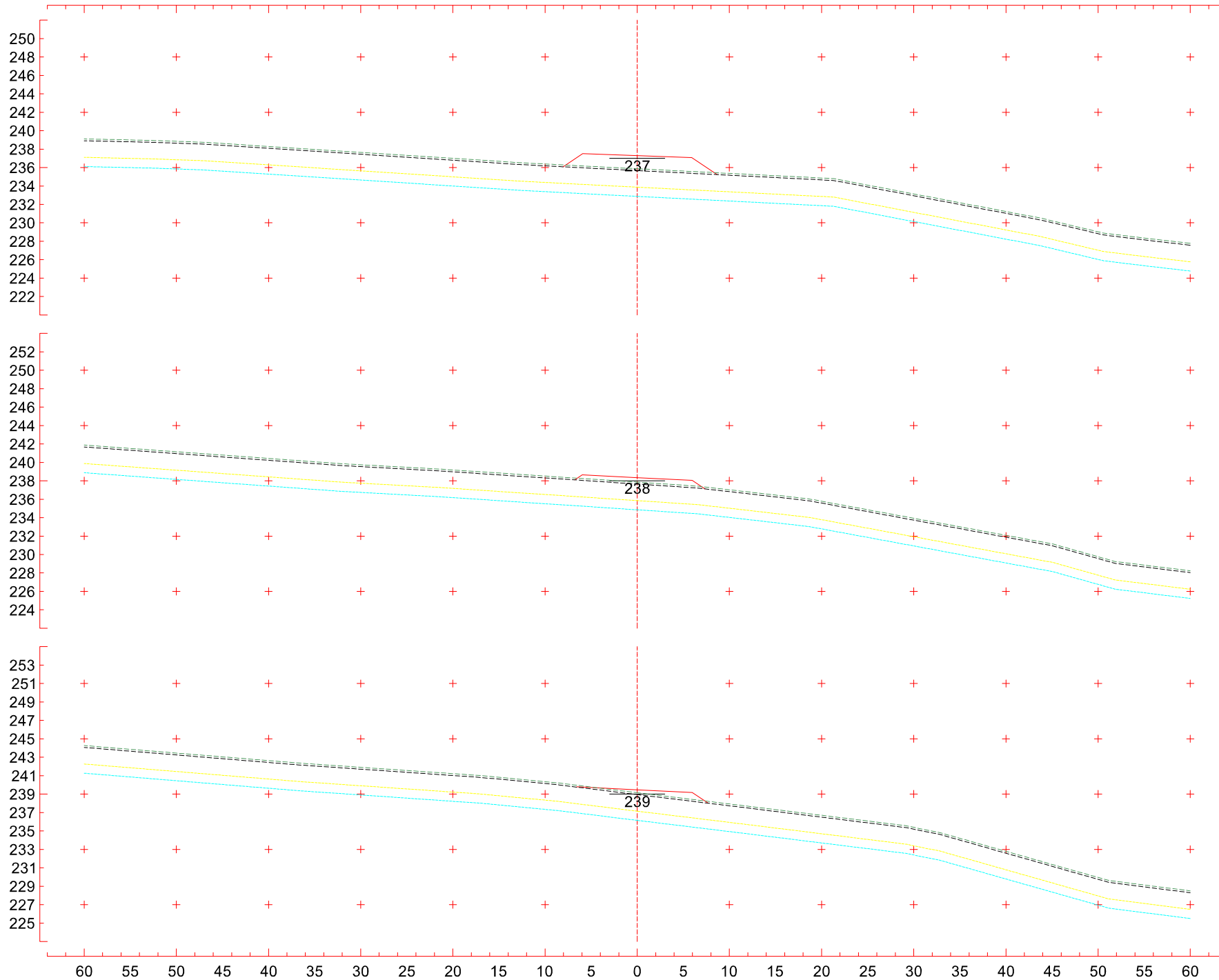


5+500
 CT 239,778 m
 CP 240,650 m

5+480
 CT 240,200 m
 CP 241,909 m

5+460
 CT 238,846 m
 CP 243,238 m

Eixo2
 Escala 1:400

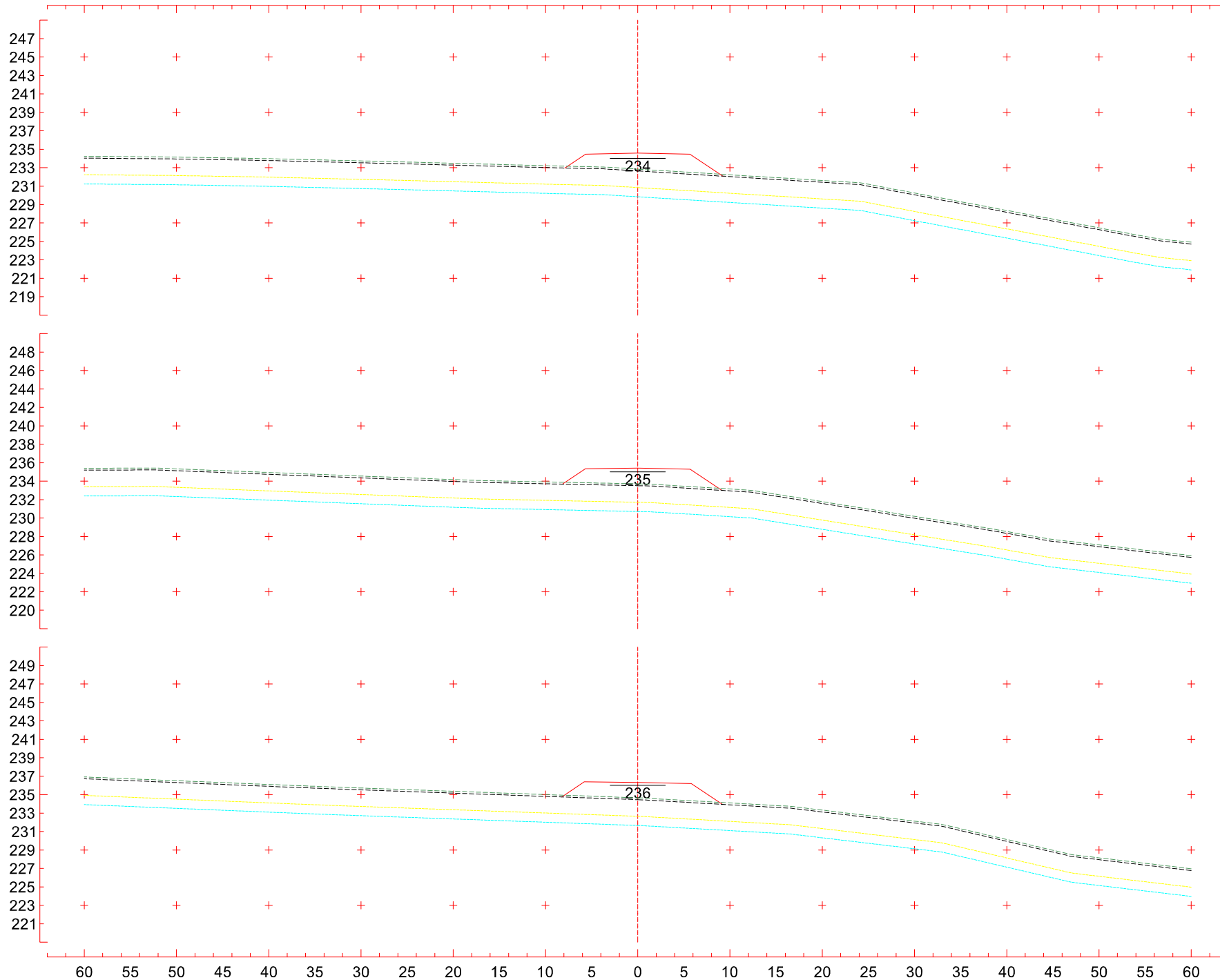


5+560
 CT 235,871 m
 CP 237,297 m

5+540
 CT 237,853 m
 CP 238,344 m

5+520
 CT 239,147 m
 CP 239,461 m

Eixo2
 Escala 1:400



5+620

CT 232,844 m
CP 234,583 m

5+600

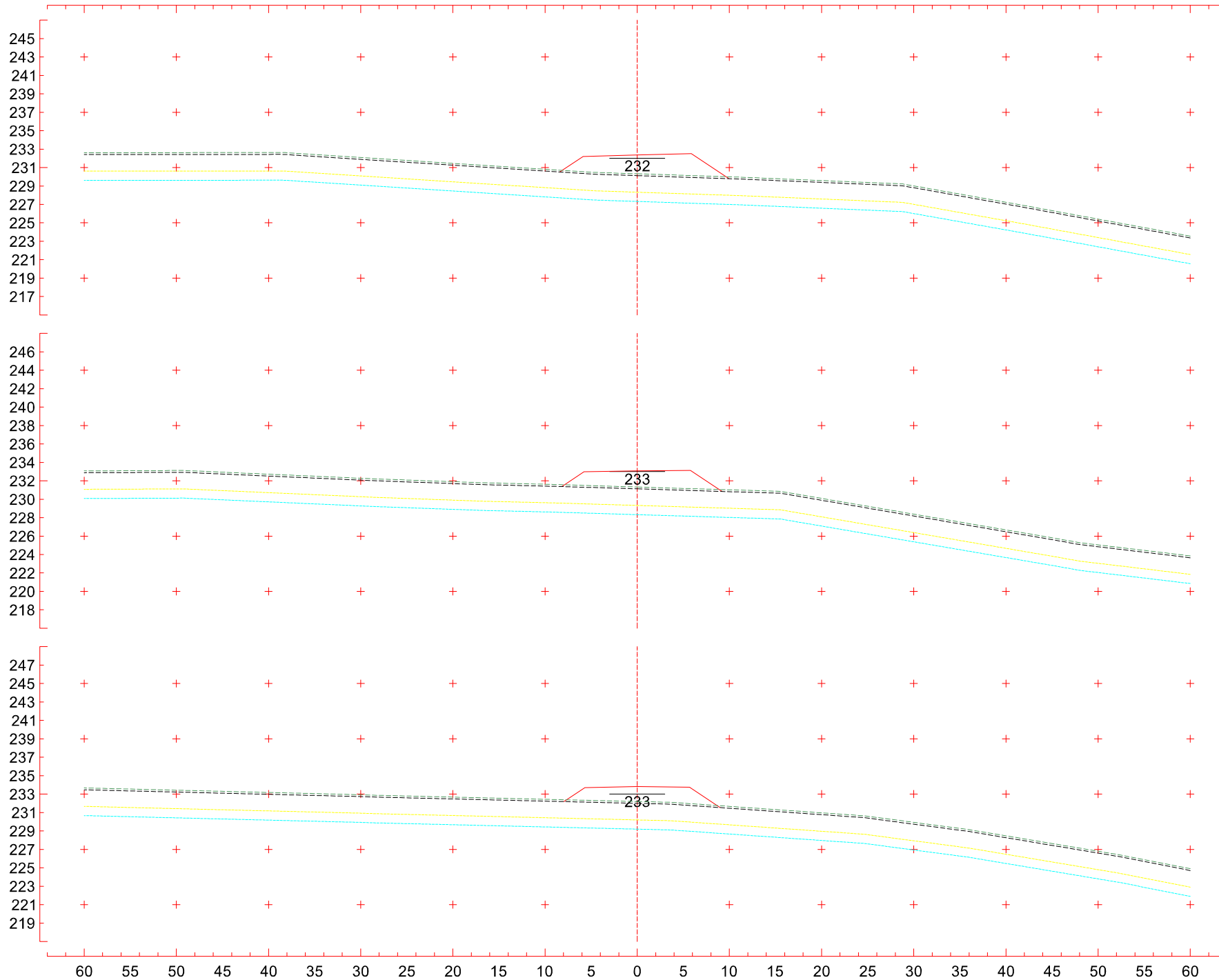
CT 233,708 m
CP 235,417 m

5+580

CT 234,655 m
CP 236,322 m

Eixo2

Escala 1:400

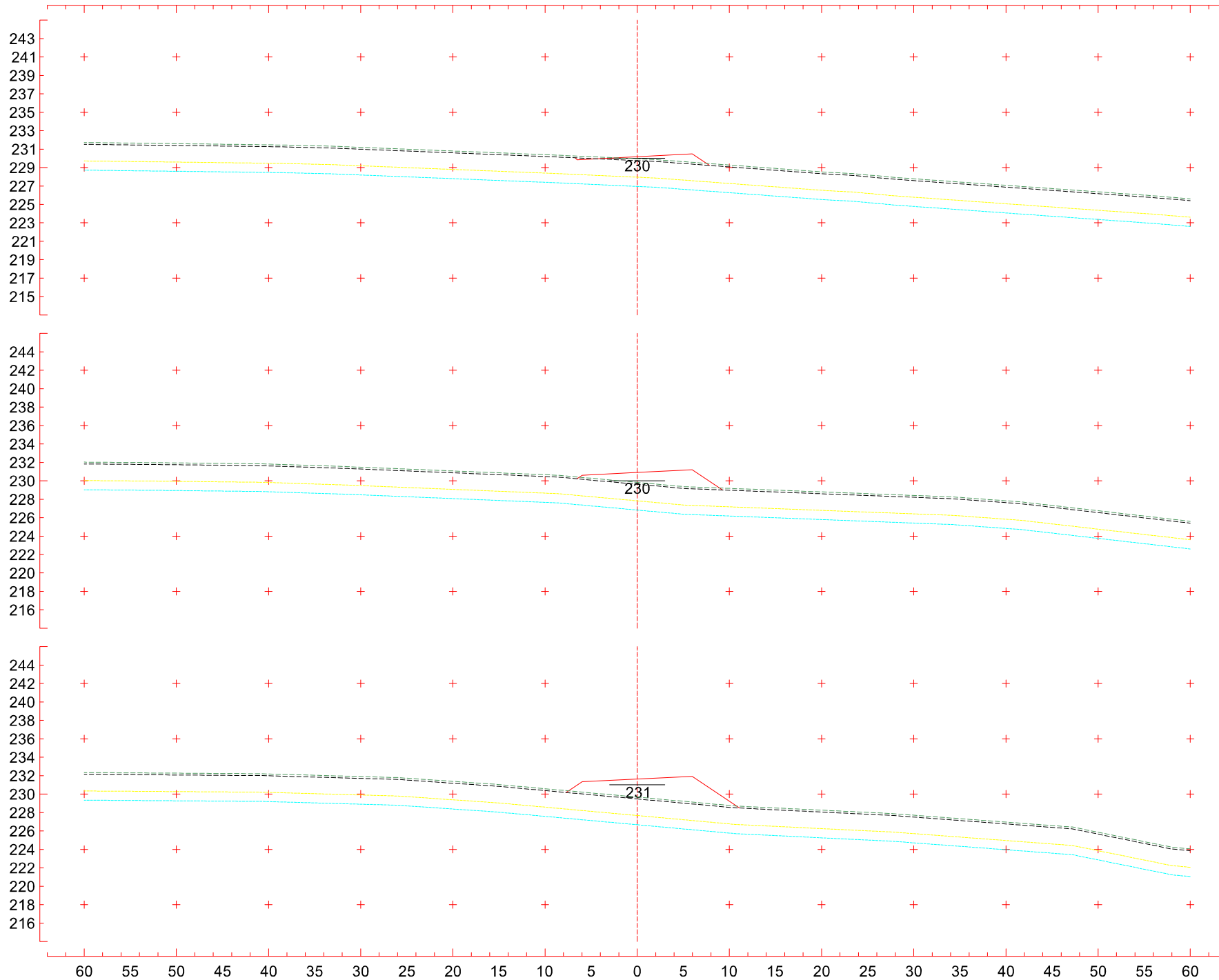


5+680
 CT 230,323 m
 CP 232,363 m

5+660
 CT 231,328 m
 CP 233,091 m

5+640
 CT 232,195 m
 CP 233,819 m

Eixo2
 Escala 1:400

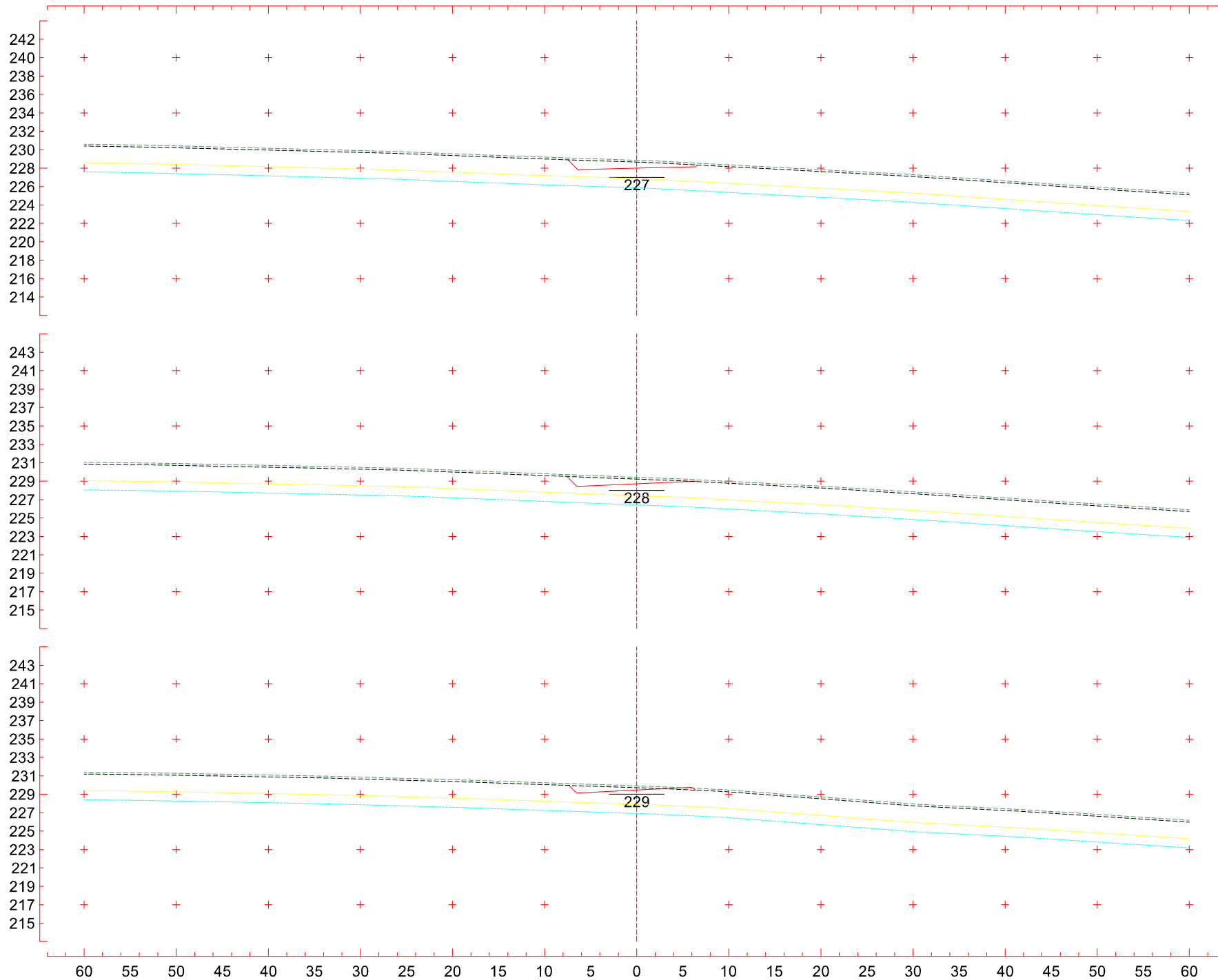


5+740
 CT 229,953 m
 CP 230,180 m

5+720
 CT 229,828 m
 CP 230,908 m

5+700
 CT 229,674 m
 CP 231,635 m

Eixo2
 Escala 1:400

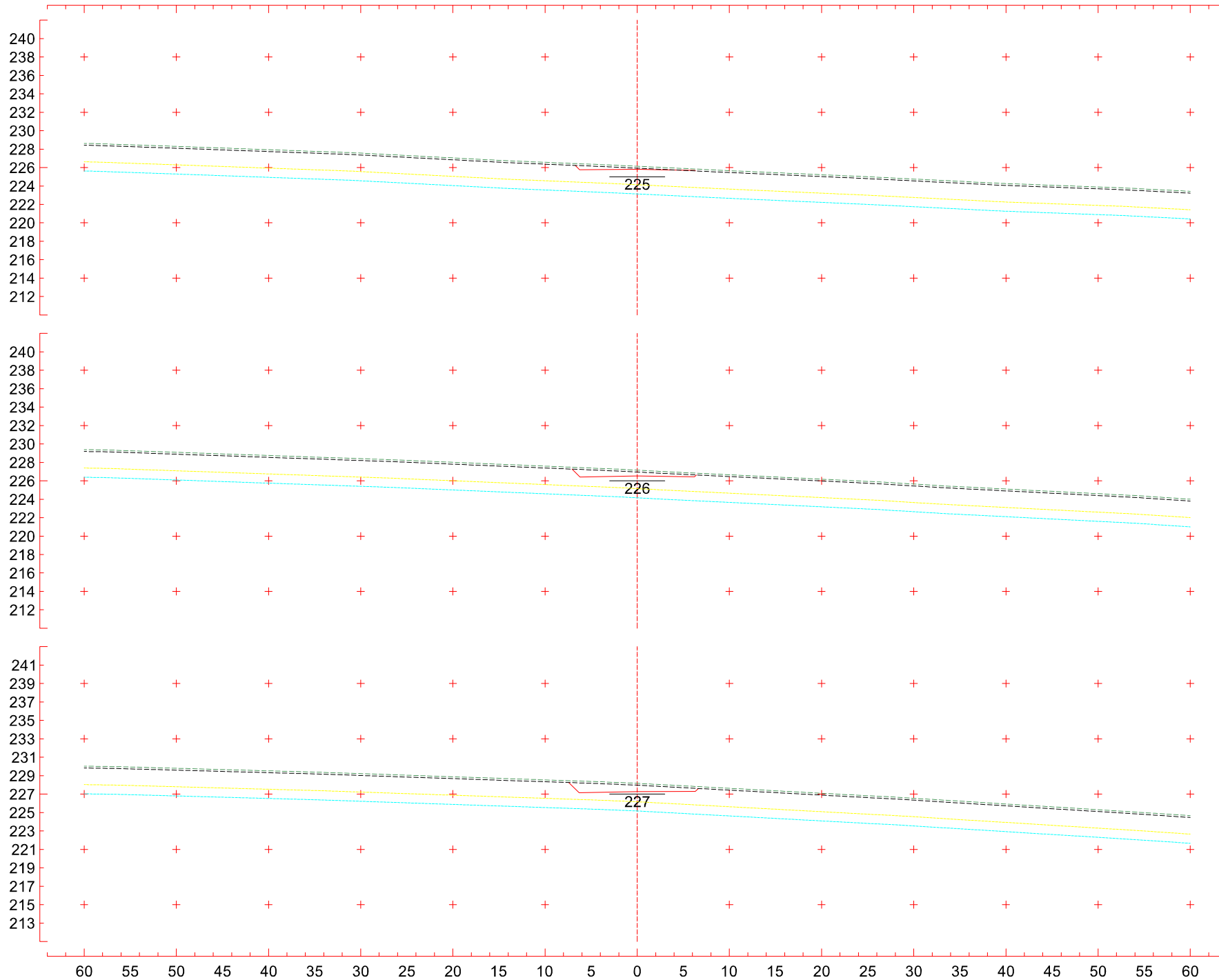


5+800
 CT 228,856 m
 CP 227,996 m

5+780
 CT 229,422 m
 CP 228,724 m

5+760
 CT 229,910 m
 CP 229,452 m

Eixo2
 Escala 1:400

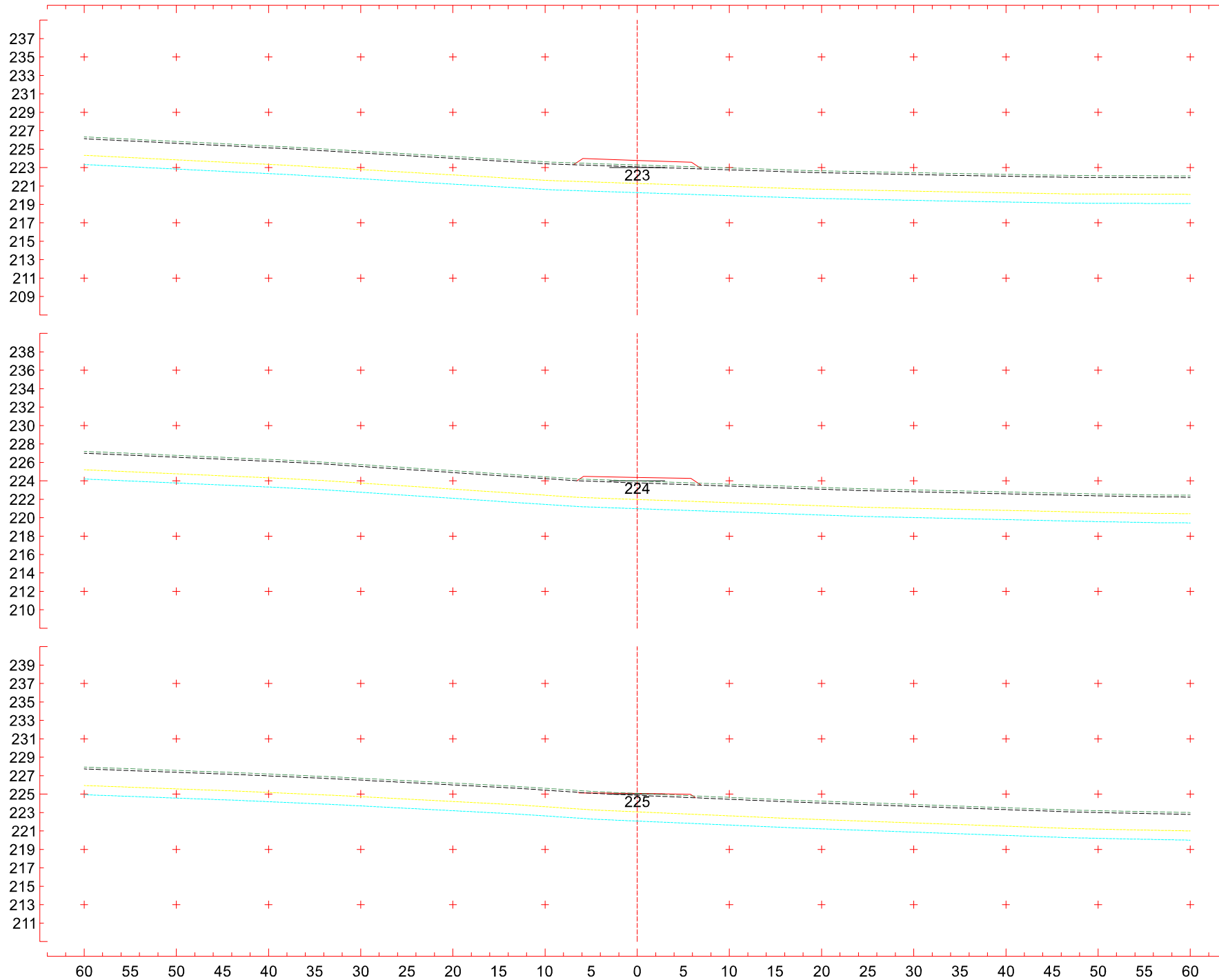


5+860
 CT 226,134 m
 CP 225,812 m

5+840
 CT 227,157 m
 CP 226,540 m

5+820
 CT 228,168 m
 CP 227,268 m

Eixo2
 Escala 1:400

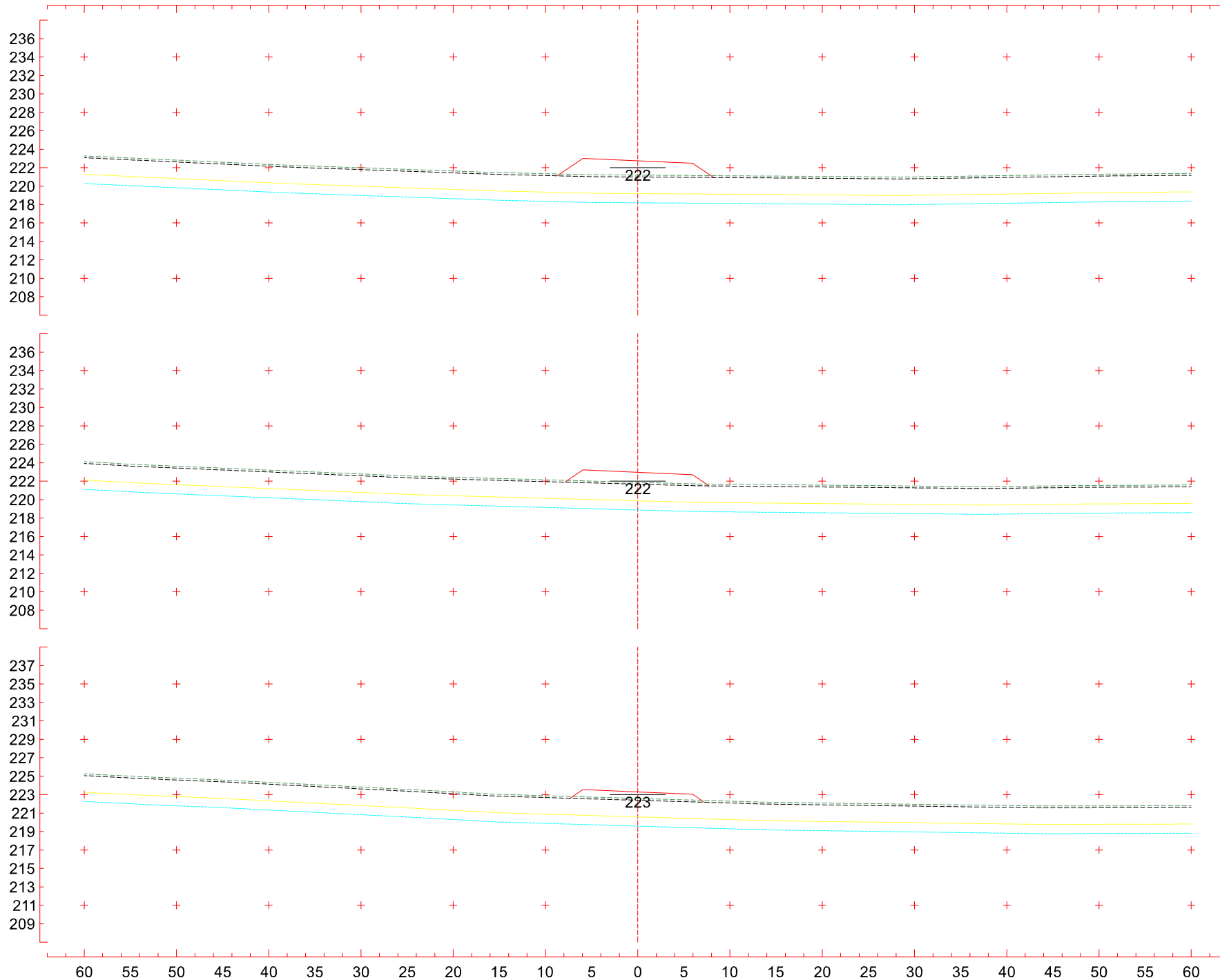


5+920
 CT 223,277 m
 CP 223,772 m

5+900
 CT 223,973 m
 CP 224,372 m

5+880
 CT 225,071 m
 CP 225,084 m

Eixo2
 Escala 1:400



5+980

CT 221,192 m
CP 222,739 m

5+960

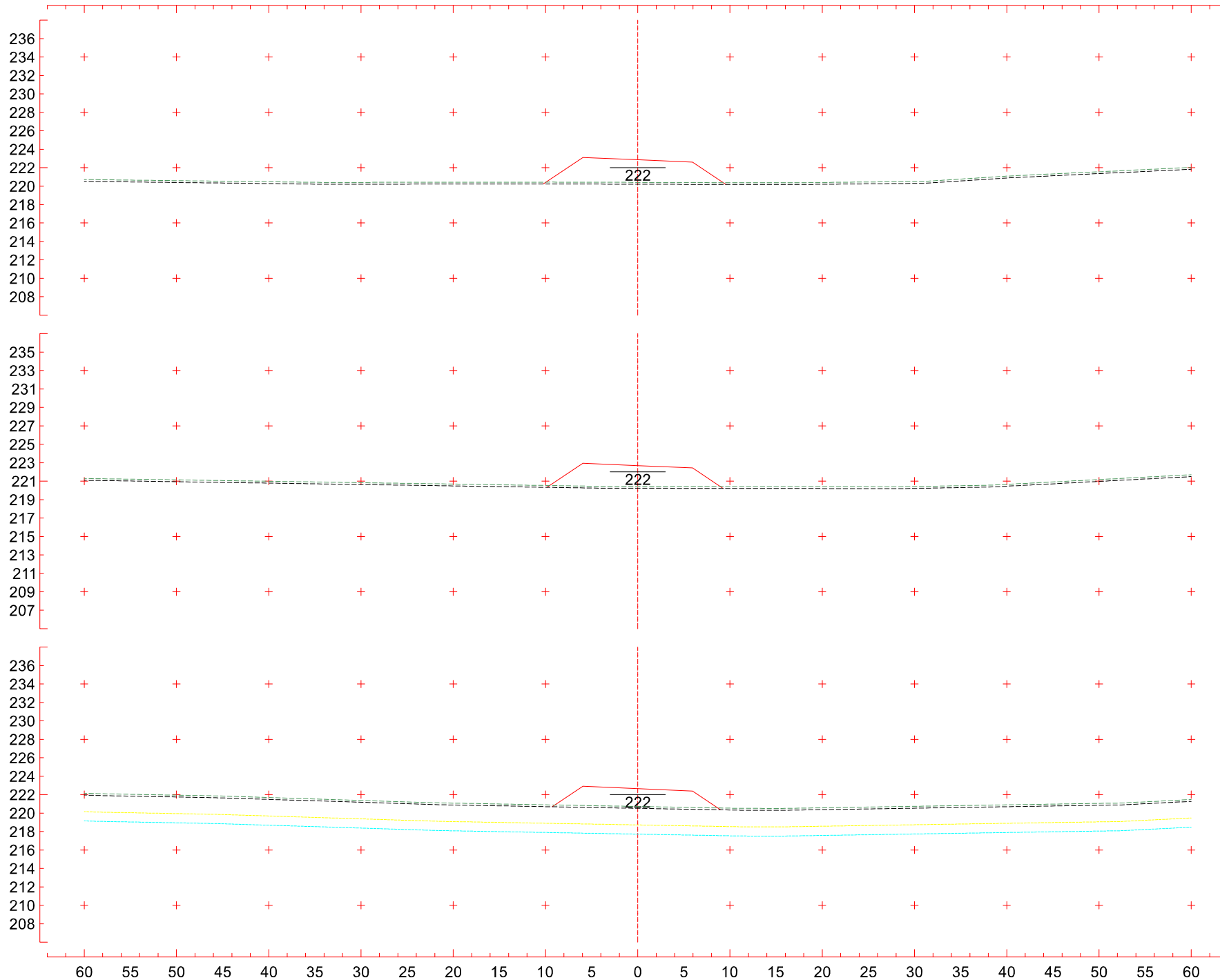
CT 221,872 m
CP 222,955 m

5+940

CT 222,588 m
CP 223,300 m

Eixo2

Escala 1:400

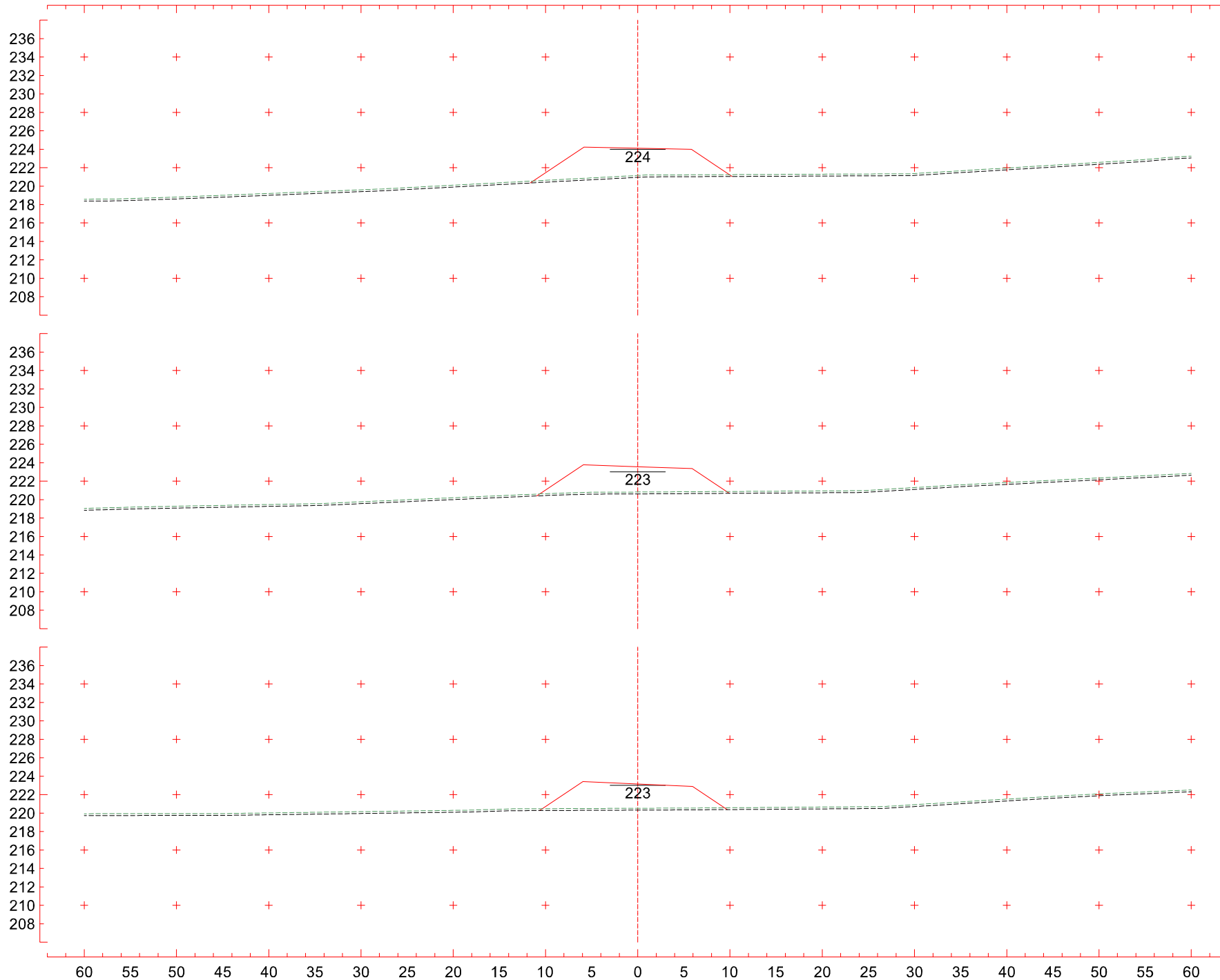


6+040
 CT 220,405 m
 CP 222,855 m

6+020
 CT 220,430 m
 CP 222,689 m

6+000
 CT 220,716 m
 CP 222,650 m

Eixo2
 Escala 1:400

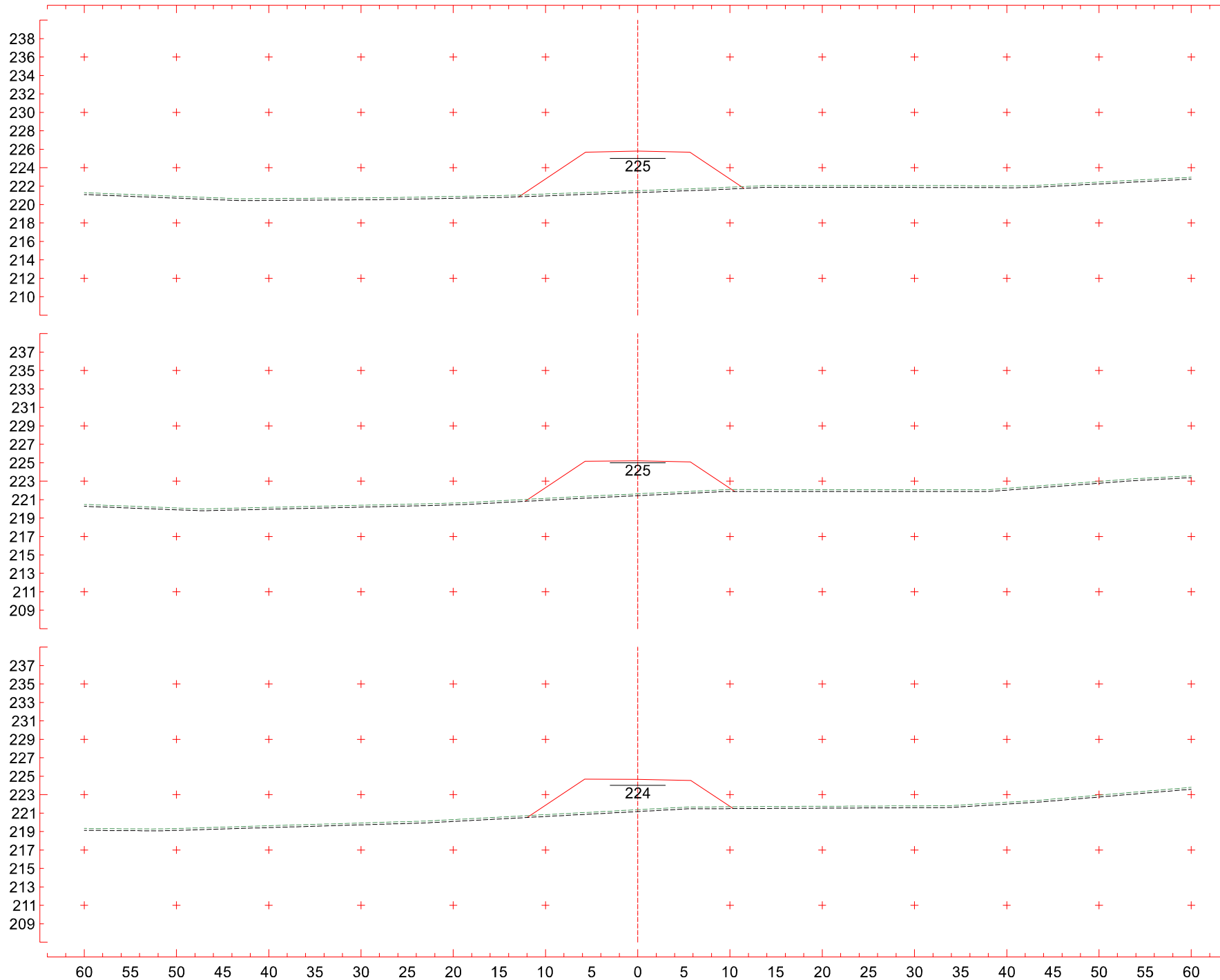


6+100
 CT 221,153 m
 CP 224,106 m

6+080
 CT 220,819 m
 CP 223,572 m

6+060
 CT 220,523 m
 CP 223,150 m

Eixo2
 Escala 1:400

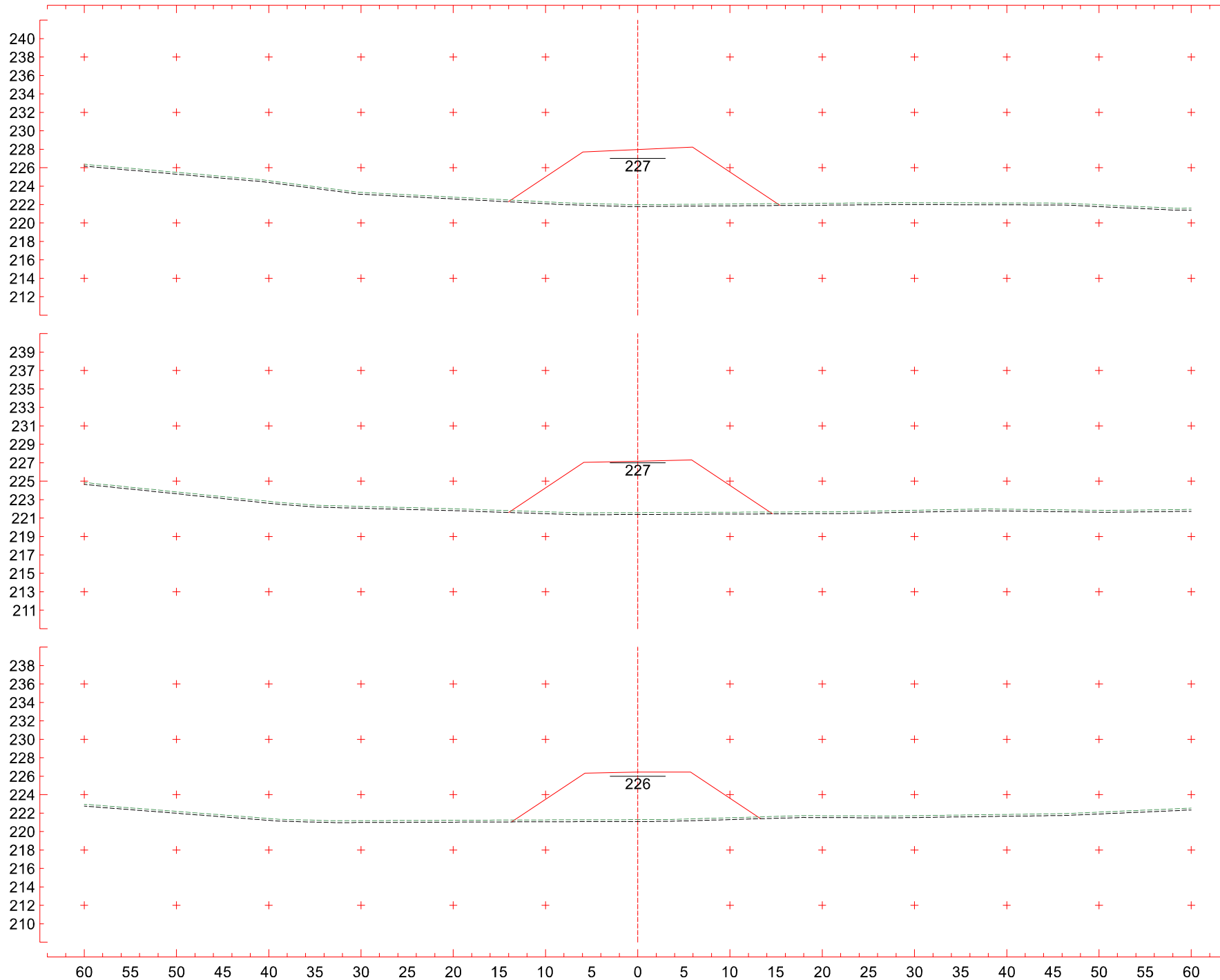


6+160
 CT 221,505 m
 CP 225,791 m

6+140
 CT 221,625 m
 CP 225,207 m

6+120
 CT 221,368 m
 CP 224,656 m

Eixo2
 Escala 1:400



6+220

CT 221,988 m
CP 227,963 m

6+200

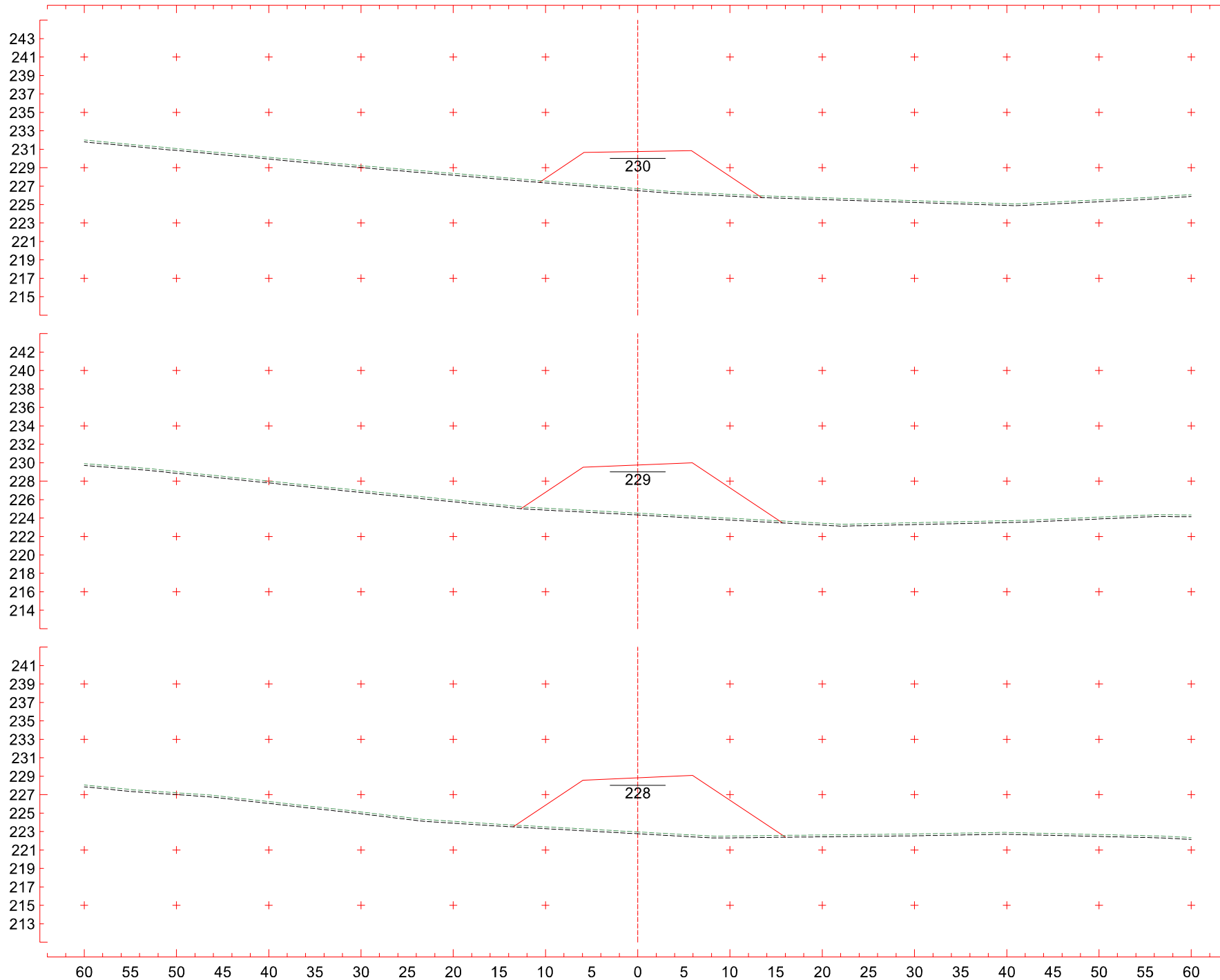
CT 221,585 m
CP 227,169 m

6+180

CT 221,288 m
CP 226,446 m

Eixo2

Escala 1:400

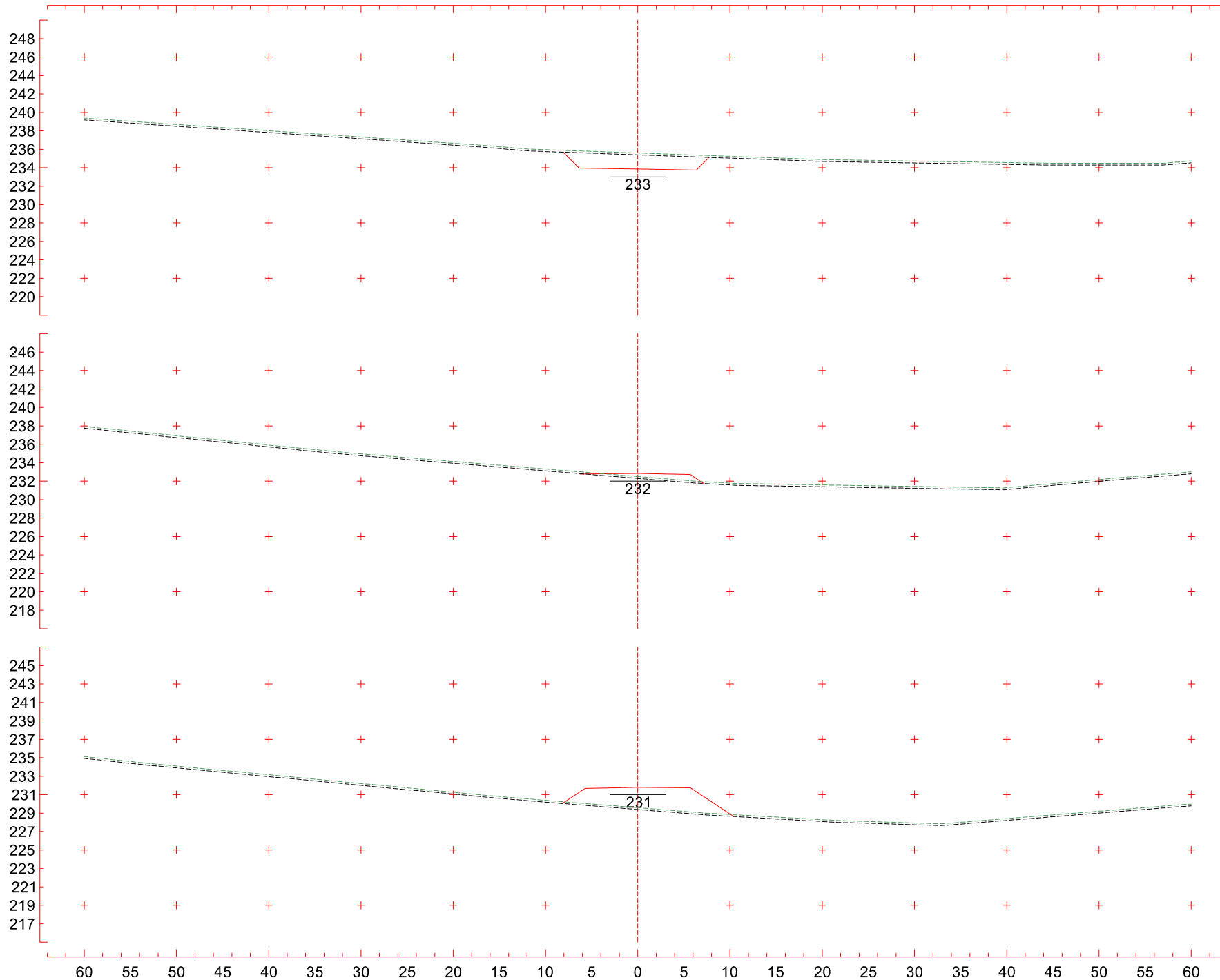


6+280
 CT 226,717 m
 CP 230,759 m

6+260
 CT 224,530 m
 CP 229,757 m

6+240
 CT 222,957 m
 CP 228,825 m

Eixo2
 Escala 1:400

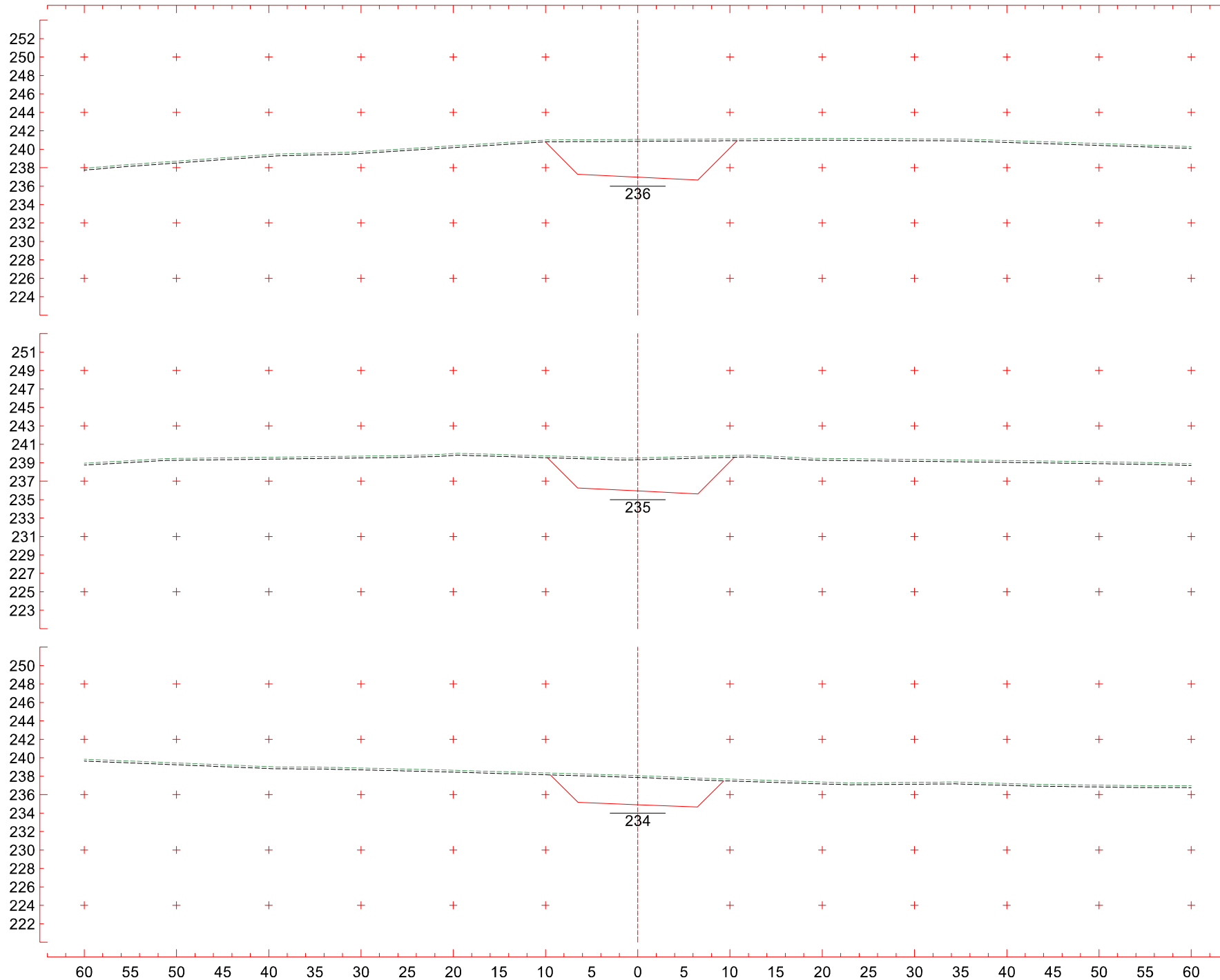


6+340
 CT 235,595 m
 CP 233,867 m

6+320
 CT 232,500 m
 CP 232,831 m

6+300
 CT 229,586 m
 CP 231,795 m

Eixo2
 Escala 1:400

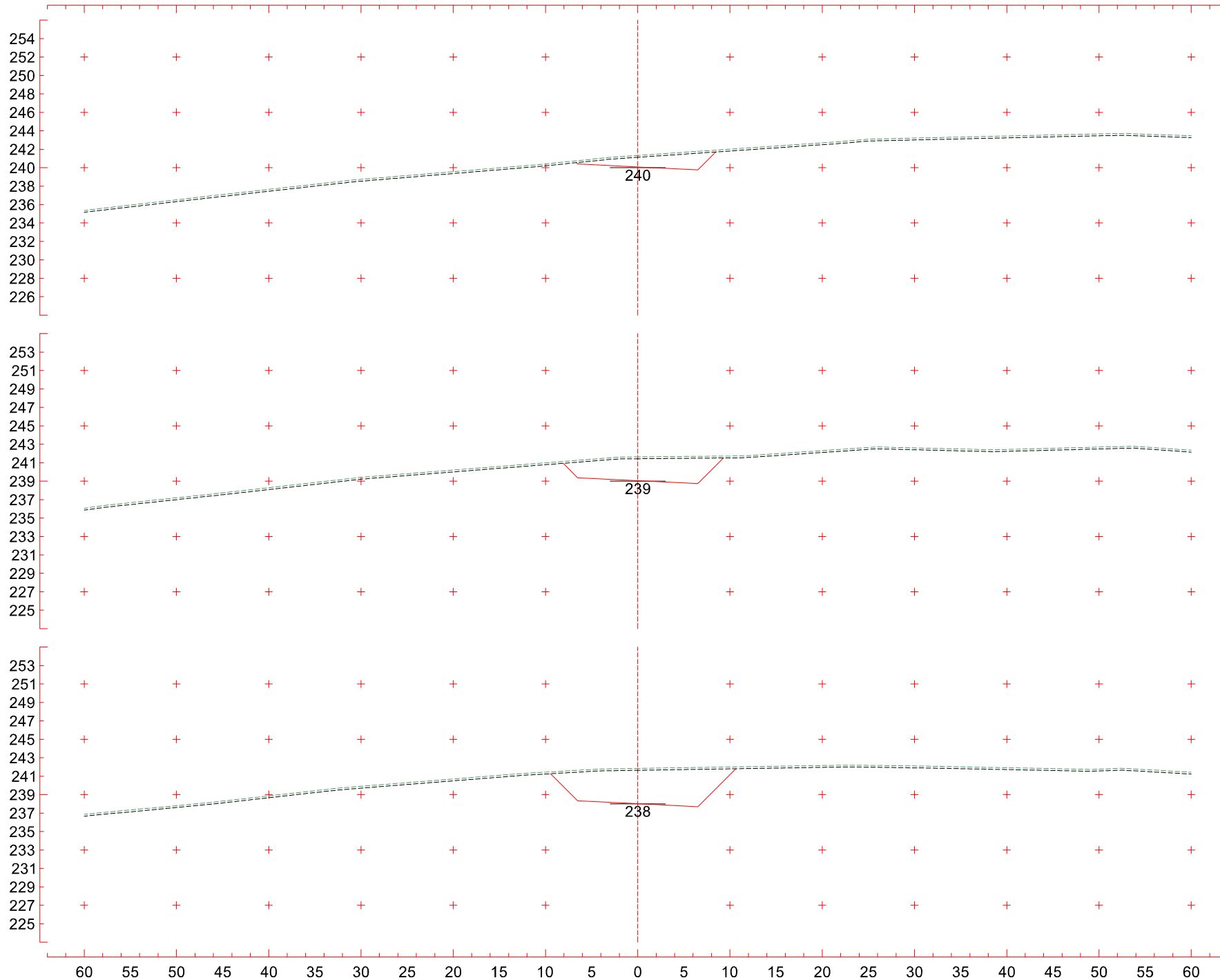


6+400
 CT 241,060 m
 CP 236,976 m

6+380
 CT 239,525 m
 CP 235,940 m

6+360
 CT 238,067 m
 CP 234,904 m

Eixo2
 Escala 1:400



6+460

CT 241,324 m
CP 240,085 m

6+440

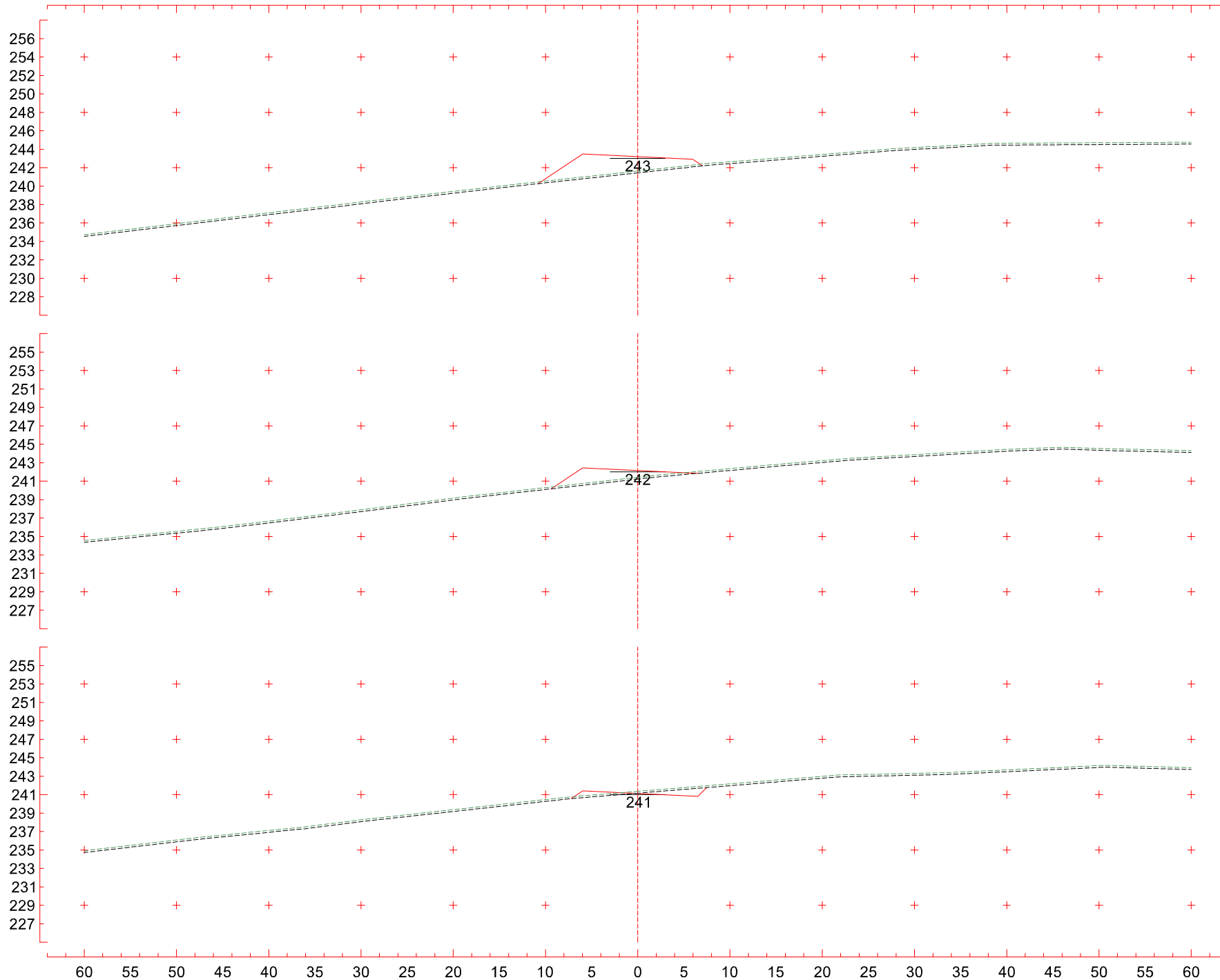
CT 241,632 m
CP 239,049 m

6+420

CT 241,841 m
CP 238,012 m

Eixo2

Escala 1:400

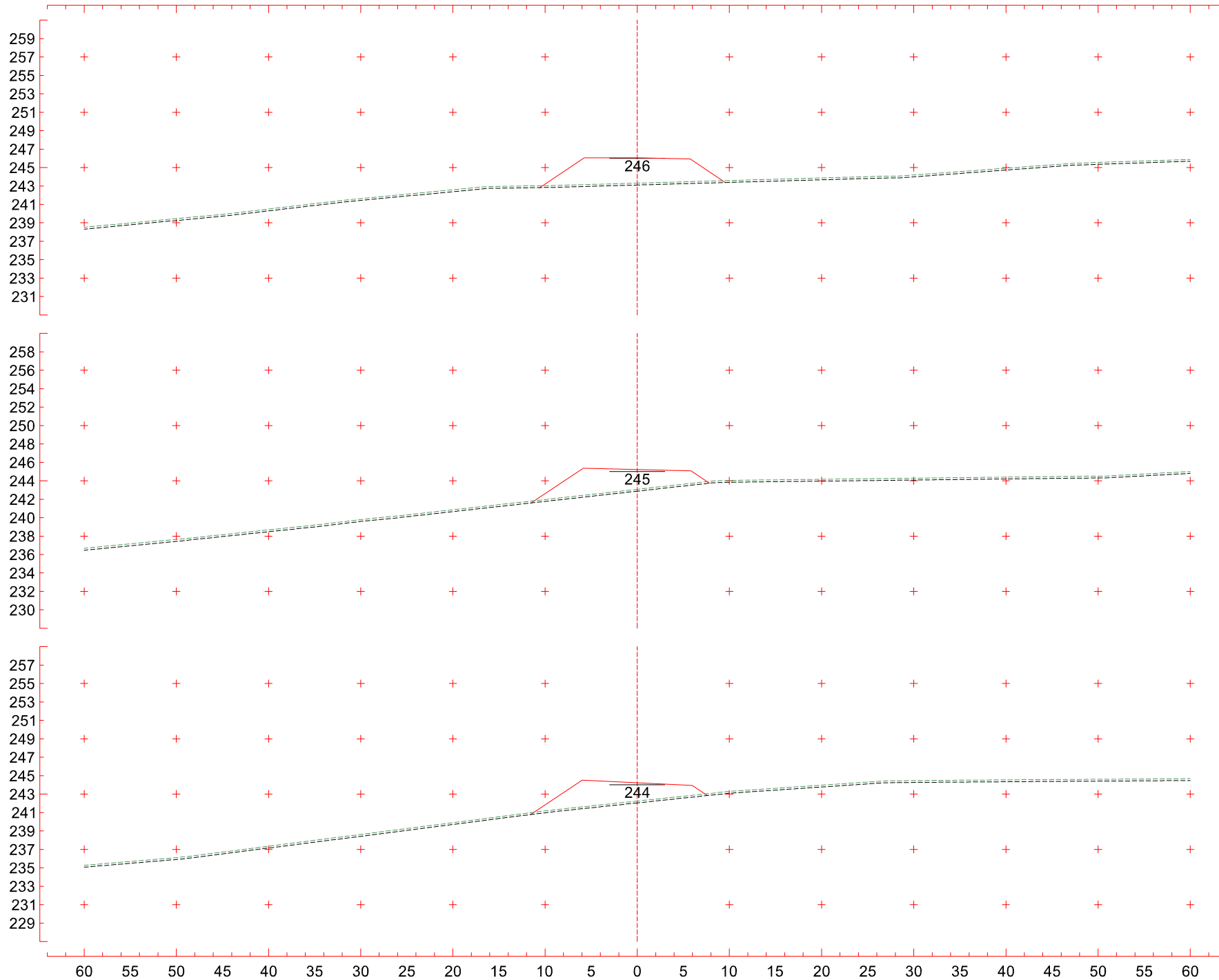


6+520
 CT 241,635 m
 CP 243,194 m

6+500
 CT 241,419 m
 CP 242,157 m

6+480
 CT 241,359 m
 CP 241,121 m

Eixo2
 Escala 1:400



6+580

CT 243,306 m
CP 246,045 m

6+560

CT 243,075 m
CP 245,219 m

6+540

CT 242,242 m
CP 244,230 m

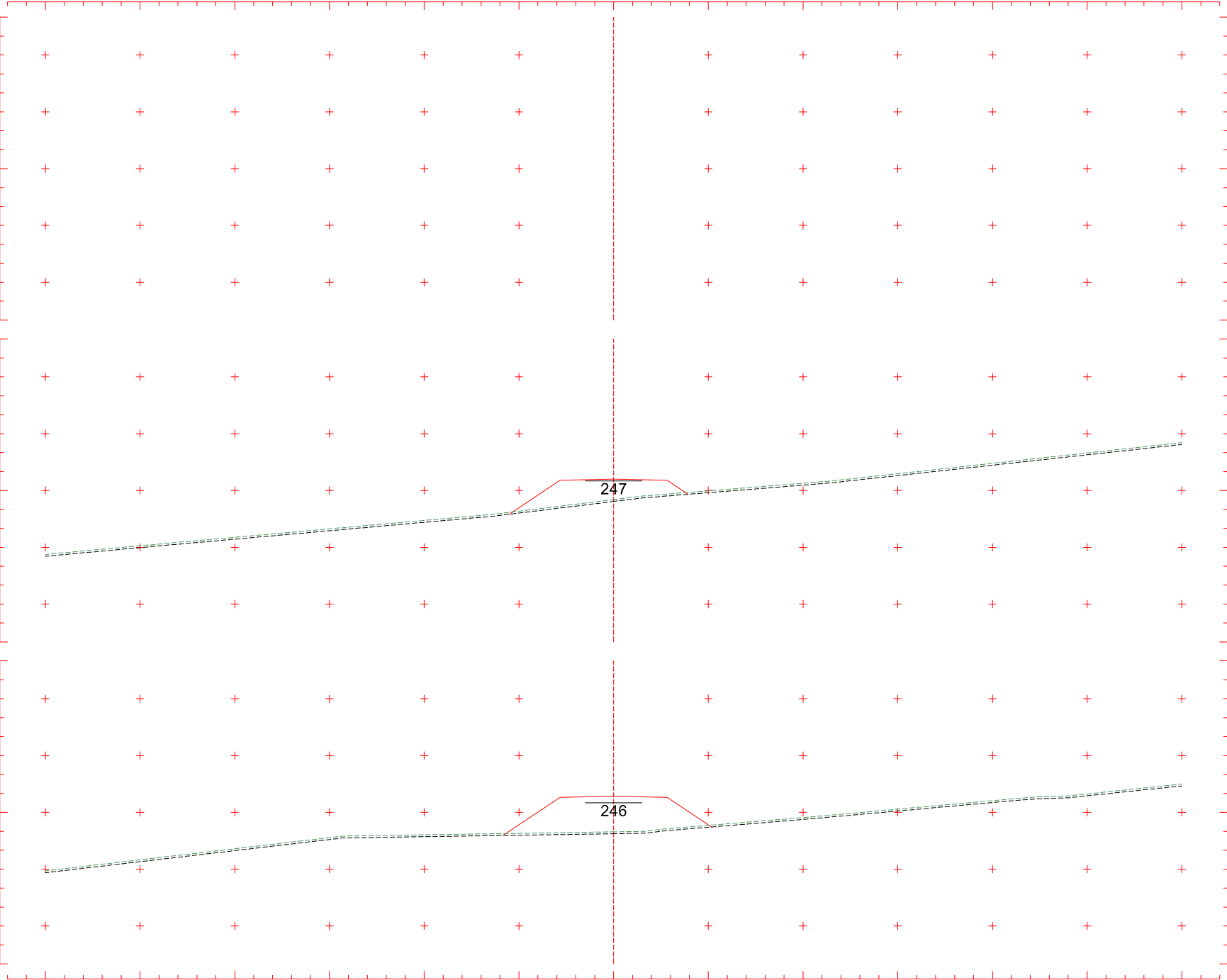
Eixo2

Escala 1:400

260
258
256
254
252
250
248
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244
242
240
238
236
234
232

259
257
255
253
251
249
247
245
243
241
239
237
235
233
231

60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60



6+620
CT 245,042 m
CP 247,191 m

6+600
CT 242,944 m
CP 246,702 m

Eixo2
Escala 1:400

3 PROJETO DE TERRAPLENAGEM

■ Diagrama de Massa

DIAGRAMA DE MASSAS (BRÜCKNER)

Rodovia: Grupo de Eixos 1

Trecho: Eixo2

Segmento: km: 0+000,00 ao km: 6+638,72

Homogeneização:

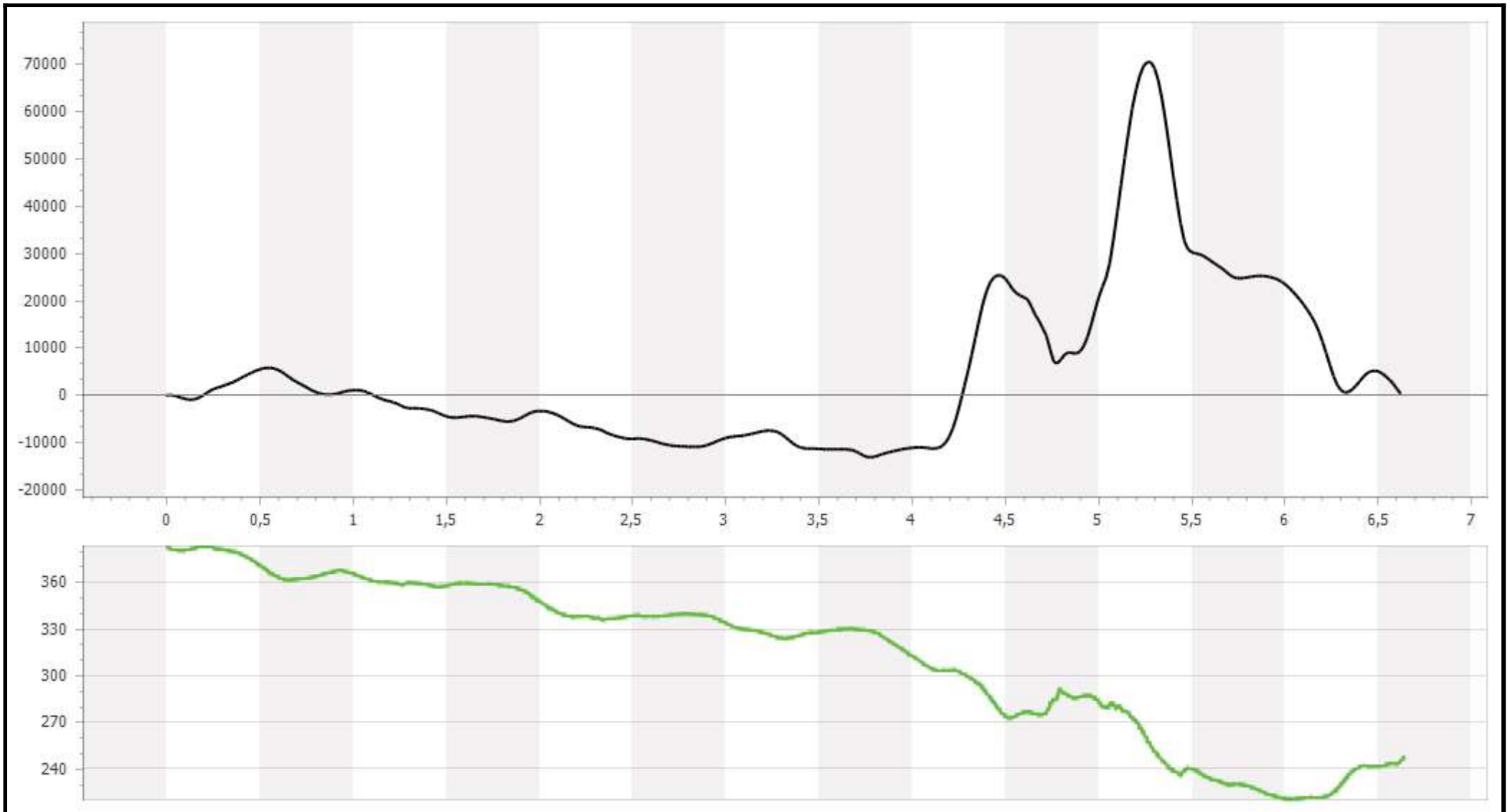
- Aterro Camada Superior: 1,000

- Aterro Camada Inferior : 1,000

- Corte 1ª Categoria: 1,300

- Corte 2ª Categoria: 1,000

- Corte 3ª Categoria: 0,800



■ Quadro de Origem e Destino

QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

Rodovia: Grupo de Eixos 1	Homogeneização:	- Corte 1ª Categoria: 1,300	Vol. transp. : 151455,00m³
Trecho: Eixo2	- Aterro Camada Superior: 1,000	- Corte 2ª Categoria: 1,000	Momento tot.: 105970,42m³.m
Segmento: km: 0+000,00 ao km: 6+638,72	- Aterro Camada Inferior : 1,000	- Corte 3ª Categoria: 0,800	DMT : 0,700km

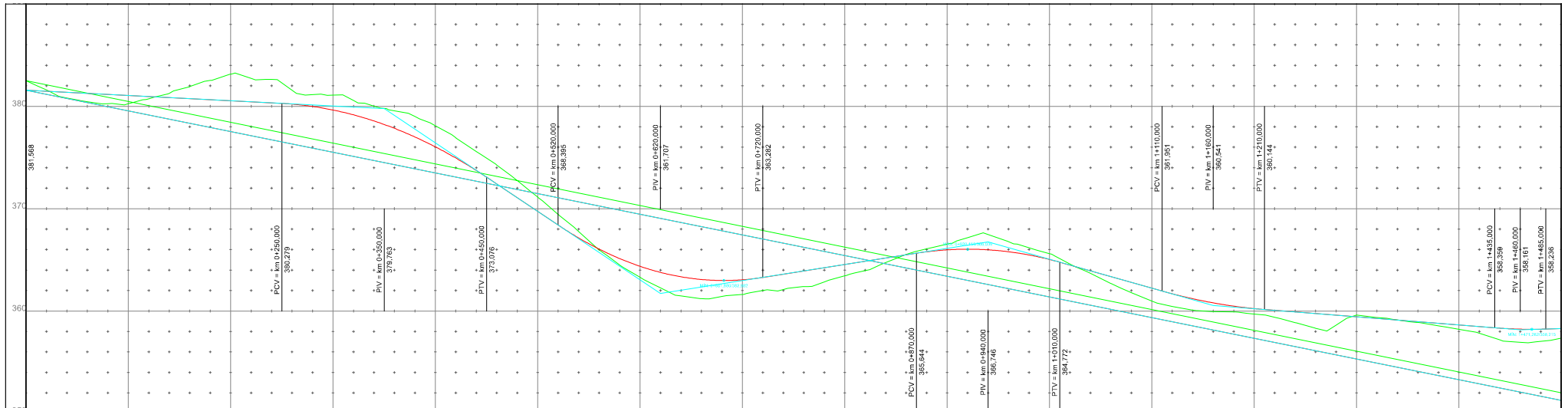
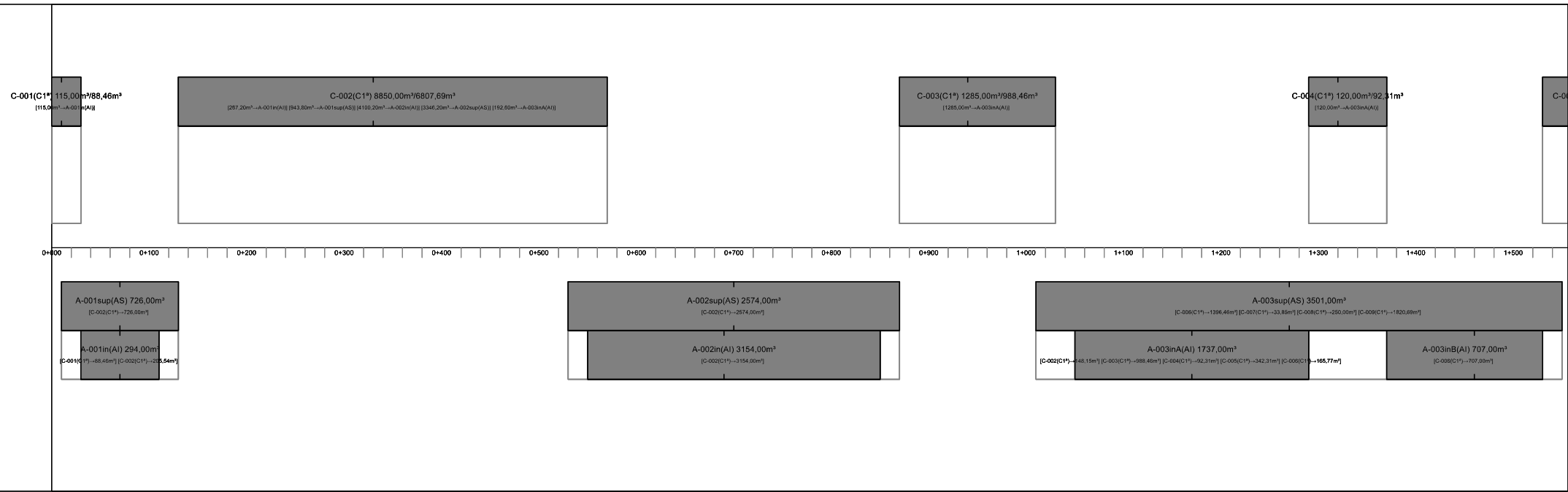
ORIGEM							DESTINO							TRANSPORTE			OBSERVAÇÕES				
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO			LOCALIZAÇÃO					VOLUME	DIST. TRANSP.	VOL. COMP.	MOM. DE TRANSP.
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.					
ID	TIPO	HOMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL		(km)	(m³)	(m³ x km)	
DT-Origem	C1ª	1,00	4+000	4+060	4+120	0,161	12000,00	12000,00													
								7603,00		A-011sup	AS	5+250	5+450	5+790		7603,00	1,551	7603,00	11792,253		
								4397,00		A-012sup	AS	5+850	6+120	6+330		5324,00	2,221	4397,00	9765,737		
C-001	C1ª	1,30	0+000	0+010	0+030		115,00	88,46													
								88,46		A-001in	AI	0+030	0+070	0+110		294,00	0,060	115,00	6,900		
C-002	C1ª	1,30	0+130	0+330	0+570		8850,00	6807,69													
								205,54		A-001in	AI	0+030	0+070	0+110			0,260	267,20	69,472		
								726,00		A-001sup	AS	0+010	0+070	0+130		726,00	0,260	943,80	245,388		
								3154,00		A-002in	AI	0+550	0+690	0+850		3154,00	0,360	4100,20	1476,072		
								2574,00		A-002sup	AS	0+530	0+700	0+870		2574,00	0,370	3346,20	1238,094		
								148,15		A-003inA	AI	1+050	1+170	1+290		1737,00	0,840	192,60	161,784		
C-003	C1ª	1,30	0+870	0+940	1+030		1285,00	988,46													
								988,46		A-003inA	AI	1+050	1+170	1+290			0,230	1285,00	295,550		
C-004	C1ª	1,30	1+290	1+320	1+370		120,00	92,31													
								92,31		A-003inA	AI	1+050	1+170	1+290			0,150	120,00	18,000		
C-005	C1ª	1,30	1+530	1+590	1+670		445,00	342,31													
								342,31		A-003inA	AI	1+050	1+170	1+290			0,420	445,00	186,900		
C-006	C1ª	1,30	1+810	1+910	2+010		2950,00	2269,23													
								165,77		A-003inA	AI	1+050	1+170	1+290			0,740	215,50	159,470		
								707,00		A-003inB	AI	1+370	1+460	1+530		707,00	0,450	919,10	413,595		
								1396,46		A-003sup	AS	1+010	1+270	1+550		3501,00	0,640	1815,40	1161,856		
C-007	C1ª	1,30	2+250	2+260	2+270		44,00	33,85													
								33,85		A-003sup	AS	1+010	1+270	1+550			0,990	44,00	43,560		
C-008	C1ª	1,30	2+430	2+510	2+630		325,00	250,00													
								250,00		A-003sup	AS	1+010	1+270	1+550			1,240	325,00	403,000		
C-009	C1ª	1,30	2+650	3+000	3+250		4797,00	3690,00													
								1820,69		A-003sup	AS	1+010	1+270	1+550			1,730	2366,90	4094,737		
								118,00		A-004in	AI	1+690	1+760	1+830		118,00	1,240	153,40	190,216		
								1056,00		A-004sup	AS	1+650	1+740	1+850		1056,00	1,260	1372,80	1729,728		
								695,31		A-005inA	AI	2+030	2+130	2+230		1638,00	0,870	903,90	786,393		
C-010	C1ª	1,30	3+410	3+450	3+470		68,00	52,31													
								52,31		A-005inA	AI	2+030	2+130	2+230			1,320	68,00	89,760		
C-011	C1ª	1,30	3+530	3+590	3+670		96,00	73,85													
								73,85		A-005inA	AI	2+030	2+130	2+230			1,460	96,00	140,160		
C-012	C1ª	1,30	3+750	3+880	4+070		2790,00	2146,15													
								816,54		A-005inA	AI	2+030	2+130	2+230			1,750	1061,50	1857,625		
								981,00		A-005inB	AI	2+270	2+370	2+510		981,00	1,510	1275,30	1925,703		
								348,62		A-005inC	AI	2+530	2+640	2+850		580,00	1,240	453,20	561,968		
C-013	C1ª	1,30	4+110	4+300	4+490		47735,00	36719,23													
								231,38		A-005inC	AI	2+530	2+640	2+850			1,660	300,80	499,328		
								4940,00		A-005sup	AS	2+010	2+370	2+870		4940,00	1,930	6422,00	12394,460		
								1772,00		A-006in	AI	3+250	3+330	3+410		1772,00	0,970	2303,60	2234,492		
								2216,00		A-006sup	AS	3+230	3+350	3+550		2216,00	0,950	2880,80	2736,760		

QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

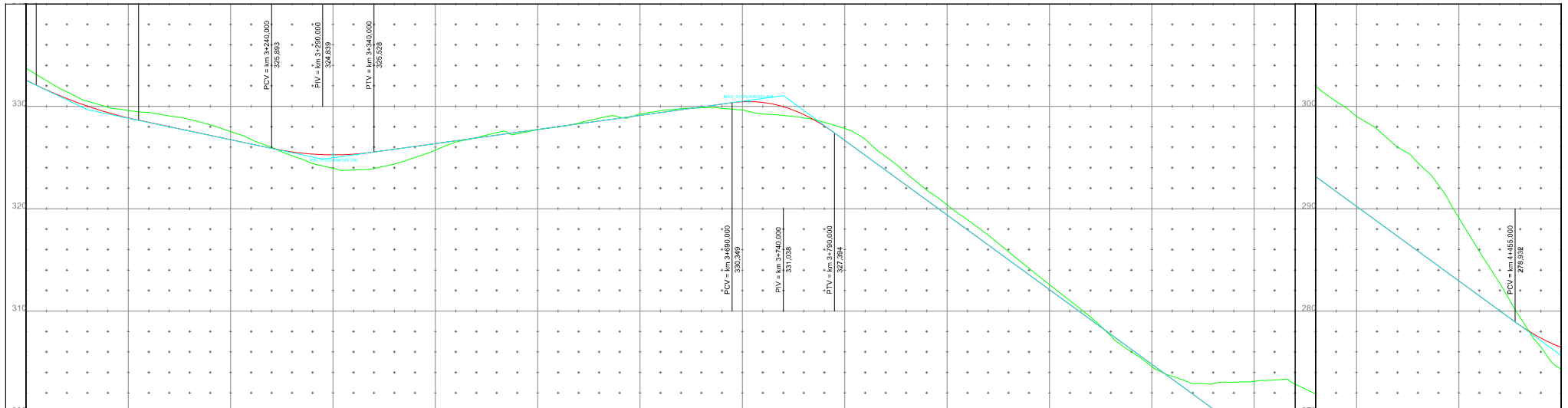
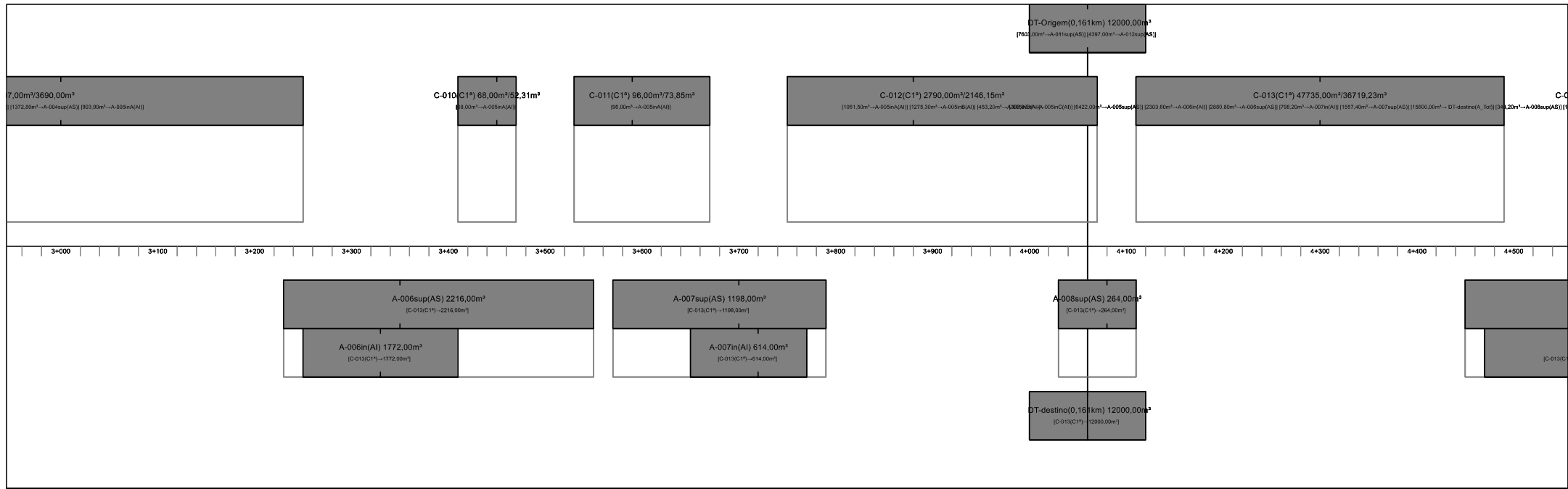
Rodovia: Grupo de Eixos 1	Homogeneização:	- Corte 1ª Categoria: 1,300	Vol. transp. : 151455,00m³
Trecho: Eixo2	- Aterro Camada Superior: 1,000	- Corte 2ª Categoria: 1,000	Momento tot.: 105970,42m³.m
Segmento: km: 0+000,00 ao km: 6+638,72	- Aterro Camada Inferior : 1,000	- Corte 3ª Categoria: 0,800	DMT : 0,700km

ORIGEM							DESTINO							TRANSPORTE			OBSERVAÇÕES				
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO			LOCALIZAÇÃO					VOLUME	DIST. TRANSP.	VOL. COMP.	MOM. DE TRANSP.
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.					
ID	TIPO	HOMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL		(km)	(m³)	(m³ x km)	
								614,00		A-007in	AI	3+650	3+720	3+770		614,00	0,580	798,20	462,956		
								1198,00		A-007sup	AS	3+570	3+700	3+790		1198,00	0,600	1557,40	934,440		
								12000,00		DT-destino	AS	4+000	4+060	4+120	0,161	12000,00	0,401	15600,00	6255,600		
								264,00		A-008sup	AS	4+030	4+080	4+110		264,00	0,220	343,20	75,504		
								13483,85		A-009in	AI	4+470	4+660	4+790		15477,00	0,360	17529,00	6310,440		
C-014	C1ª	1,30	4+570	4+600	4+630		114,00	87,69		A-009in	AI	4+470	4+660	4+790			0,060	114,00	6,840		
C-015a	C1ª	1,30	4+730	5+050	5+290		22098,00	16998,46		A-009in	AI	4+470	4+660	4+790			0,390	2477,10	966,069		
								1905,46		A-009sup	AS	4+450	4+630	4+790		3892,00	0,420	5059,60	2125,032		
								490,00		A-010in	AI	4+810	4+850	4+890		490,00	0,200	637,00	127,400		
								428,00		A-010sup	AS	4+810	4+850	4+890		428,00	0,200	556,40	111,280		
								10283,00		A-011in	AI	5+270	5+400	5+750		38356,00	0,350	13367,90	4678,765		
C-015b	C2ª	1,00	4+750	5+060	5+270		10240,00	10240,00		A-011in	AI	5+270	5+400	5+750			0,340	10240,00	3481,600		
C-015c	C3ª	0,80	4+770	4+800	4+850		542,00	677,50		A-011in	AI	5+270	5+400	5+750			0,600	542,00	325,200		
C-015	C3ª	0,80	4+890	5+090	5+270		29952,00	37440,00		A-011in	AI	5+270	5+400	5+750			0,310	13724,40	4254,564		
								17155,50		A-012in	AI	5+890	6+170	6+330		19399,00	1,080	15519,20	16760,736		
								19399,00		A-013in	AI	6+470	6+570	6+628		3717,00	1,480	708,40	1048,432		
C-016	C1ª	1,30	5+730	5+800	5+890		763,00	586,92		A-012sup	AS	5+850	6+120	6+330			0,320	763,00	244,160		
C-017	C1ª	1,30	6+310	6+390	6+490		6126,00	4712,31		A-012sup	AS	5+850	6+120	6+330			0,270	442,10	119,367		
								340,08		A-013in	AI	6+470	6+570	6+628			0,180	3680,95	662,571		
								2831,50		A-013sup	AS	6+470	6+560	6+628		1541,00	0,170	2002,95	340,501		
								1540,73													

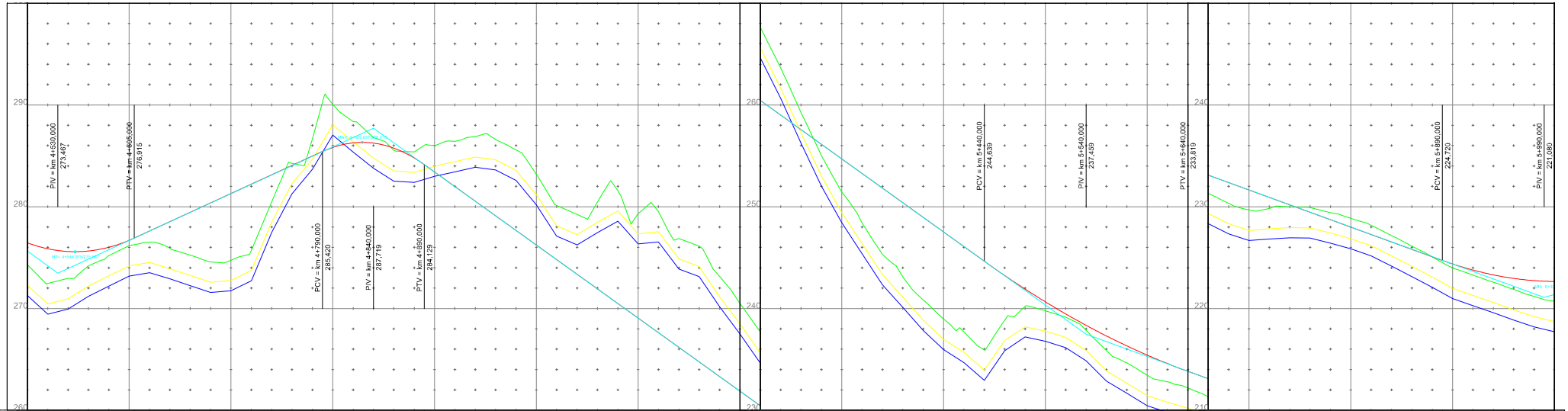
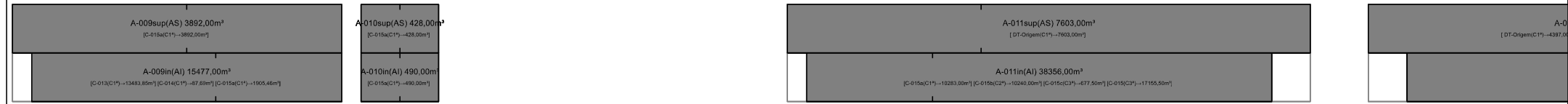
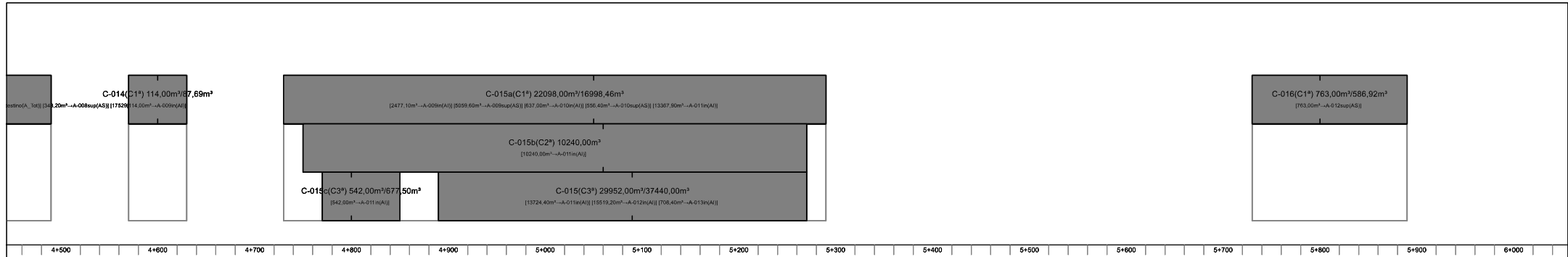
■ Esquema Linear de Distribuição dos Materiais



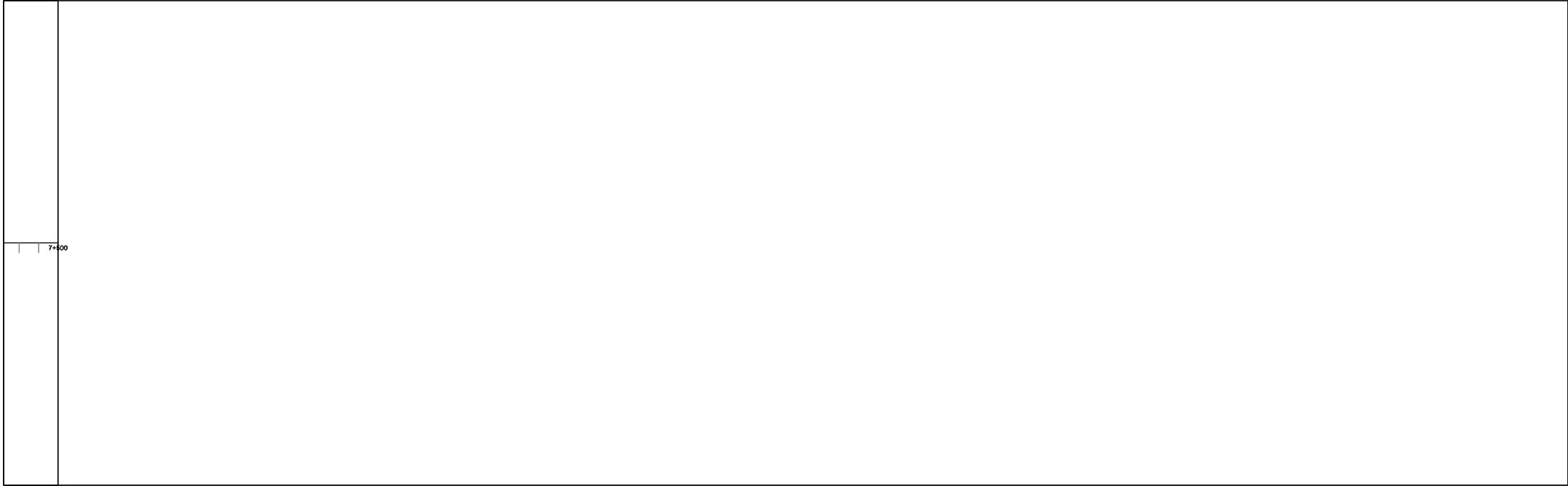
ALT.	D = 250,00 i = -0,5156%		L = 200,000 e = -1,543 k = 32,405 Δi = -6,1720%		D = 70,00 i = -6,6875%		L = 200,000 e = 2,066 k = 24,206 Δi = 8,2624%		D = 150,00 i = 1,5748%		L = 140,000 e = -0,769 k = 31,851 Δi = 4,3955%		D = 100,00 i = -2,8207%		L = 100,000 e = 0,253 k = 49,329 Δi = 2,0273%		D = 225,00 i = -0,7934%																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
382,568	381,568	381,485	381,362	381,259	381,155	381,052	380,949	380,846	380,743	380,640	380,537	380,434	380,330	380,227	380,124	380,021	379,918	379,815	379,712	379,609	379,506	379,403	379,300	379,197	379,094	378,991	378,888	378,785	378,682	378,579	378,476	378,373	378,270	378,167	378,064	377,961	377,858	377,755	377,652	377,549	377,446	377,343	377,240	377,137	377,034	376,931	376,828	376,725	376,622	376,519	376,416	376,313	376,210	376,107	376,004	375,901	375,798	375,695	375,592	375,489	375,386	375,283	375,180	375,077	374,974	374,871	374,768	374,665	374,562	374,459	374,356	374,253	374,150	374,047	373,944	373,841	373,738	373,635	373,532	373,429	373,326	373,223	373,120	373,017	372,914	372,811	372,708	372,605	372,502	372,399	372,296	372,193	372,090	371,987	371,884	371,781	371,678	371,575	371,472	371,369	371,266	371,163	371,060	370,957	370,854	370,751	370,648	370,545	370,442	370,339	370,236	370,133	370,030	369,927	369,824	369,721	369,618	369,515	369,412	369,309	369,206	369,103	369,000	368,897	368,794	368,691	368,588	368,485	368,382	368,279	368,176	368,073	367,970	367,867	367,764	367,661	367,558	367,455	367,352	367,249	367,146	367,043	366,940	366,837	366,734	366,631	366,528	366,425	366,322	366,219	366,116	366,013	365,910	365,807	365,704	365,601	365,498	365,395	365,292	365,189	365,086	364,983	364,880	364,777	364,674	364,571	364,468	364,365	364,262	364,159	364,056	363,953	363,850	363,747	363,644	363,541	363,438	363,335	363,232	363,129	363,026	362,923	362,820	362,717	362,614	362,511	362,408	362,305	362,202	362,099	361,996	361,893	361,790	361,687	361,584	361,481	361,378	361,275	361,172	361,069	360,966	360,863	360,760	360,657	360,554	360,451	360,348	360,245	360,142	360,039	359,936	359,833	359,730	359,627	359,524	359,421	359,318	359,215	359,112	359,009	358,906	358,803	358,700	358,597	358,494	358,391	358,288	358,185	358,082	357,979	357,876	357,773	357,670	357,567	357,464	357,361	357,258	357,155	357,052	356,949	356,846	356,743	356,640	356,537	356,434	356,331	356,228	356,125	356,022	355,919	355,816	355,713	355,610	355,507	355,404	355,301	355,198	355,095	354,992	354,889	354,786	354,683	354,580	354,477	354,374	354,271	354,168	354,065	353,962	353,859	353,756	353,653	353,550	353,447	353,344	353,241	353,138	353,035	352,932	352,829	352,726	352,623	352,520	352,417	352,314	352,211	352,108	352,005	351,902	351,799	351,696	351,593	351,490	351,387	351,284	351,181	351,078	350,975	350,872	350,769	350,666	350,563	350,460	350,357	350,254	350,151	350,048	349,945	349,842	349,739	349,636	349,533	349,430	349,327	349,224	349,121	349,018	348,915	348,812	348,709	348,606	348,503	348,400	348,297	348,194	348,091	347,988	347,885	347,782	347,679	347,576	347,473	347,370	347,267	347,164	347,061	346,958	346,855	346,752	346,649	346,546	346,443	346,340	346,237	346,134	346,031	345,928	345,825	345,722	345,619	345,516	345,413	345,310	345,207	345,104	345,001	344,898	344,795	344,692	344,589	344,486	344,383	344,280	344,177	344,074	343,971	343,868	343,765	343,662	343,559	343,456	343,353	343,250	343,147	343,044	342,941	342,838	342,735	342,632	342,529	342,426	342,323	342,220	342,117	342,014	341,911	341,808	341,705	341,602	341,499	341,396	341,293	341,190	341,087	340,984	340,881	340,778	340,675	340,572	340,469	340,366	340,263	340,160	340,057	339,954	339,851	339,748	339,645	339,542	339,439	339,336	339,233	339,130	339,027	338,924	338,821	338,718	338,615	338,512	338,409	338,306	338,203	338,100	337,997	337,894	337,791	337,688	337,585	337,482	337,379	337,276	337,173	337,070	336,967	336,864	336,761	336,658	336,555	336,452	336,349	336,246	336,143	336,040	335,937	335,834	335,731	335,628	335,525	335,422	335,319	335,216	335,113	335,010	334,907	334,804	334,701	334,598	334,495	334,392	334,289	334,186	334,083	333,980	333,877	333,774	333,671	333,568	333,465	333,362	333,259	333,156	333,053	332,950	332,847	332,744	332,641	332,538	332,435	332,332	332,229	332,126	332,023	331,920	331,817	331,714	331,611	331,508	331,405	331,302	331,199	331,096	330,993	330,890	330,787	330,684	330,581	330,478	330,375	330,272	330,169	330,066	329,963	329,860	329,757	329,654	329,551	329,448	329,345	329,242	329,139	329,036	328,933	328,830	328,727	328,624	328,521	328,418	328,315	328,212	328,109	328,006	327,903	327,800	327,697	327,594	327,491	327,388	327,285	327,182	327,079	326,976	326,873	326,770	326,667	326,564	326,461	326,358	326,255	326,152	326,049	325,946	325,843	325,740	325,637	325,534	325,431	325,328	325,225	325,122	325,019	324,916	324,813	324,710	324,607	324,504	324,401	324,298	324,195	324,092	323,989	323,886	323,783	323,680	323,577	323,474	323,371	323,268	323,165	323,062	322,959	322,856	322,753	322,650	322,547	322,444	322,341	322,238	322,135	322,032	321,929	321,826	321,723	321,620	321,517	321,414	321,311	321,208	321,105	321,002	320,899	320,796	320,693	320,590	320,487	320,384	320,281	320,178	320,075	319,972	319,869	319,766	319,663	319,560	319,457	319,354	319,251	319,148	319,045	318,942	318,839	318,736	318,633	318,530	318,427	318,324	318,221	318,118	318,015	317,912	317,809	317,706	317,603	317,500	317,397	317,294	317,191	317,088	316,985	316,882	316,779	316,676	316,573	316,470	316,367	316,264	316,161	316,058	315,955	315,852	315,749	315,646	315,543	315,440	315,337	315,234	315,131	315,028	314,925	314,822	314,719	314,616	314,513	314,410	314,307	314,204	314,101	314,000	313,897	313,794	313,691	313,588	313,485	313,382	313,279	313,176	313,073	312,970	312,867	312,764	312,661	312,558	312,455	312,352	312,249	312,146	312,043	311,940	311,837	311,734	311,631	311,528	311,425	311,322	311,219	311,116	311,013	310,910	310,807	310,704	310,601	310,498	310,395	310,292	310,189	310,086	309,983	309,880	309,777	309,674	309,571	309,468	309,365	309,262	309,159	309,056	308,953	308,850	308,747	308,644	308,541	308,438	308,335	308,232	308,129	308,026	307,923	307,820	307,717	307,614	307,511	307,408	307,305	307,202	307,099	306,996	306,893	306,790	306,687	306,584	306,481	306,378	306,275	306,172	306,069	305,966	305,863	305,760	305,657	305,554	305,451	305,348	305,245	305,142	305,039	304,936	304,833	304,730	304,627	304,524	304,421	304,318	304,215	304,112	304,009	303,906	303,803	303,700	303,597	303,494	303,391	303,288	303,185	303,082	302,979	302,876	302,773	302,670	302,567	302,464	302,361	302,258	302,155	302,052	301,949	301,846	301,743	301,640	301,537	301,434	301,331	301,228	301,125	301,022	300,919	300,816	300,713	300,610	300,507	300,404	300,301	300,198	300,095	299,992	299,889	299,786	299,683	299,580	299,477	299,374	299,271	299,168	299,065	298,962	298,859	298,756	298,653	298,550	298,447	298,344	298,241	298,138	298,035	297,932	297,829	297,726	297,623	297,520	297,417	297,314	297,211	297,108	297,005	296,902	296,799	296,696	296,593	296,490	296,387	296,284	296,181	296,078	295,975	295,872	295,769	295,666	295,563	295,460	295,357	295,254	295,151	295,048	294,945	294,842	294,739	294,636	294,533	294,430	294,327	294,224	294,121	294,018	293,915	293,812	293,709	293,606	293,503	293,400	293,297	293,194	293,091	292,988	292,885	292,782	292,679	292,576	292,473	292,370	292,267	292,164	292,061	291,958	291,855	291,752	291,649	291,546	291,443	291,340	291,237	291,134	291,031	290,928	



ALT.	L = 100,00 e = 0,331 k = 37,814	D = 130,00 i = -2,1083%	L = 100,00 e = 0,436 k = 28,689	D = 350,00 i = 1,3774%	L = 100,00 e = -1,093 k = 11,541	D = 665,00 i = -7,2875%	L = 150,000
333,750	332,540	331,603	330,759	330,019	329,386	328,859	328,423
332,516	331,603	330,759	330,019	329,386	328,859	328,423	328,002
330,690	330,019	329,386	328,859	328,423	328,002	327,588	327,198
329,017	328,423	327,917	327,411	326,904	326,397	325,891	325,384
327,344	326,835	326,328	325,821	325,314	324,807	324,300	323,793
325,671	325,164	324,657	324,150	323,643	323,136	322,629	322,122
324,000	323,493	322,986	322,479	321,972	321,465	320,958	320,451
322,327	321,820	321,313	320,806	320,299	319,792	319,285	318,778
320,654	320,147	319,640	319,133	318,626	318,119	317,612	317,105
318,981	318,474	317,967	317,460	316,953	316,446	315,939	315,432
317,308	316,801	316,294	315,787	315,280	314,773	314,266	313,759
315,635	315,128	314,621	314,114	313,607	313,100	312,593	312,086
313,962	313,455	312,948	312,441	311,934	311,427	310,920	310,413
312,289	311,782	311,275	310,768	310,261	309,754	309,247	308,740
310,616	310,109	309,602	309,095	308,588	308,081	307,574	307,067
308,943	308,436	307,929	307,422	306,915	306,408	305,901	305,394
307,270	306,763	306,256	305,749	305,242	304,735	304,228	303,721
305,597	305,090	304,583	304,076	303,569	303,062	302,555	302,048
303,924	303,417	302,910	302,403	301,896	301,389	300,882	300,375
302,251	301,744	301,237	300,730	300,223	299,716	299,209	298,702
300,578	300,071	299,564	299,057	298,550	298,043	297,536	297,029
298,905	298,398	297,891	297,384	296,877	296,370	295,863	295,356
297,232	296,725	296,218	295,711	295,204	294,697	294,190	293,683
295,559	295,052	294,545	294,038	293,531	293,024	292,517	292,010
293,886	293,379	292,872	292,365	291,858	291,351	290,844	290,337
292,213	291,706	291,199	290,692	290,185	289,678	289,171	288,664
290,540	290,033	289,526	289,019	288,512	288,005	287,498	286,991
288,867	288,360	287,853	287,346	286,839	286,332	285,825	285,318
287,194	286,687	286,180	285,673	285,166	284,659	284,152	283,645
285,521	285,014	284,507	284,000	283,493	282,986	282,479	281,972
283,848	283,341	282,834	282,327	281,820	281,313	280,806	280,299
282,175	281,668	281,161	280,654	280,147	279,640	279,133	278,626
280,502	279,995	279,488	278,981	278,474	277,967	277,460	276,953
278,829	278,322	277,815	277,308	276,801	276,294	275,787	275,280
277,156	276,649	276,142	275,635	275,128	274,621	274,114	273,607
275,483	274,976	274,469	273,962	273,455	272,948	272,441	271,934
273,810	273,303	272,796	272,289	271,782	271,275	270,768	270,261
272,137	271,630	271,123	270,616	270,109	269,602	269,095	268,588
270,464	269,957	269,450	268,943	268,436	267,929	267,422	266,915
268,791	268,284	267,777	267,270	266,763	266,256	265,749	265,242
267,118	266,611	266,104	265,597	265,090	264,583	264,076	263,569
265,445	264,938	264,431	263,924	263,417	262,910	262,403	261,896
263,772	263,265	262,758	262,251	261,744	261,237	260,730	260,223
262,099	261,592	261,085	260,578	260,071	259,564	259,057	258,550
260,426	259,919	259,412	258,905	258,398	257,891	257,384	256,877
258,753	258,246	257,739	257,232	256,725	256,218	255,711	255,204
257,080	256,573	256,066	255,559	255,052	254,545	254,038	253,531
255,407	254,900	254,393	253,886	253,379	252,872	252,365	251,858
253,734	253,227	252,720	252,213	251,706	251,199	250,692	250,185
252,061	251,554	251,047	250,540	250,033	249,526	249,019	248,512
250,388	249,881	249,374	248,867	248,360	247,853	247,346	246,839
248,715	248,208	247,701	247,194	246,687	246,180	245,673	245,166
247,042	246,535	246,028	245,521	245,014	244,507	244,000	243,493
245,369	244,862	244,355	243,848	243,341	242,834	242,327	241,820
243,696	243,189	242,682	242,175	241,668	241,161	240,654	240,147
242,023	241,516	241,009	240,502	240,000	239,493	238,986	238,479
240,350	239,843	239,336	238,829	238,322	237,815	237,308	236,801
238,677	238,170	237,663	237,156	236,649	236,142	235,635	235,128
236,004	235,497	234,990	234,483	233,976	233,469	232,962	232,455
234,331	233,824	233,317	232,810	232,303	231,796	231,289	230,782
232,658	232,151	231,644	231,137	230,630	230,123	229,616	229,109
230,985	230,478	229,971	229,464	228,957	228,450	227,943	227,436
228,312	227,805	227,298	226,791	226,284	225,777	225,270	224,763
226,639	226,132	225,625	225,118	224,611	224,104	223,597	223,090
224,966	224,459	223,952	223,445	222,938	222,431	221,924	221,417
223,293	222,786	222,279	221,772	221,265	220,758	220,251	219,744
221,620	221,113	220,606	220,099	219,592	219,085	218,578	218,071
219,947	219,440	218,933	218,426	217,919	217,412	216,905	216,398
218,274	217,767	217,260	216,753	216,246	215,739	215,232	214,725
217,601	217,094	216,587	216,080	215,573	215,066	214,559	214,052
215,928	215,421	214,914	214,407	213,900	213,393	212,886	212,379
214,255	213,748	213,241	212,734	212,227	211,720	211,213	210,706
212,582	212,075	211,568	211,061	210,554	210,047	209,540	209,033
210,909	210,402	209,895	209,388	208,881	208,374	207,867	207,360
208,236	207,729	207,222	206,715	206,208	205,701	205,194	204,687
206,563	206,056	205,549	205,042	204,535	204,028	203,521	203,014
204,890	204,383	203,876	203,369	202,862	202,355	201,848	201,341
203,217	202,710	202,203	201,696	201,189	200,682	200,175	199,668
201,544	201,037	200,530	200,023	199,516	199,009	198,502	197,995
199,871	199,364	198,857	198,350	197,843	197,336	196,829	196,322
198,198	197,691	197,184	196,677	196,170	195,663	195,156	194,649
196,525	196,018	195,511	195,004	194,497	193,990	193,483	192,976
194,852	194,345	193,838	193,331	192,824	192,317	191,810	191,303
193,179	192,672	192,165	191,658	191,151	190,644	190,137	189,630
191,506	190,999	190,492	189,985	189,478	188,971	188,464	187,957
189,833	189,326	188,819	188,312	187,805	187,298	186,791	186,284
188,160	187,653	187,146	186,639	186,132	185,625	185,118	184,611
186,487	185,980	185,473	184,966	184,459	183,952	183,445	182,938
184,814	184,307	183,800	183,293	182,786	182,279	181,772	181,265
183,141	182,634	182,127	181,620	181,113	180,606	180,099	179,592
181,468	180,961	180,454	179,947	179,440	178,933	178,426	177,919
179,795	179,288	178,781	178,274	177,767	177,260	176,753	176,246
178,122	177,615	177,108	176,601	176,094	175,587	175,080	174,573
176,449	175,942	175,435	174,928	174,421	173,914	173,407	172,900
174,776	174,269	173,762	173,255	172,748	172,241	171,734	171,227
173,103	172,596	172,089	171,582	171,075	170,568	170,061	169,554
171,430	170,923	170,416	169,909	169,402	168,895	168,388	167,881
169,758	169,251	168,744	168,237	167,730	167,223	166,716	166,209
168,085	167,578	167,071	166,564	166,057	165,550	165,043	164,536
166,412	165,905	165,398	164,891	164,384	163,877	163,370	162,863
164,739	164,232	163,725	163,218	162,711	162,204	161,697	161,190
163,066	162,559	162,052	161,545	161,038	160,531	160,024	159,517
161,393	160,886	160,379	159,872	159,365	158,858	158,351	157,844
159,720	159,213	158,706	158,199	157,692	157,185	156,678	156,171
158,047	157,540	157,033	156,526	156,019	155,512	155,005	154,498
156,374	155,8						



ALT. 000	$e = 2,228$ $k = 12,621$	$\Delta i = 11,8850\%$	$D = 185,00$ $i = 4,5076\%$	$L = 100,000$	$e = -1,472$ $k = 8,491$	$\Delta i = -11,7776\%$	$D = 550,00$ $i = -7,1800\%$	$L = 200,000$	$e = 0,885$ $k = 56,491$	$\Delta i = 3,5404\%$	$D = 250,00$ $i = -3,6397\%$	$L = 200,000$	$e = 1,598$ $k = 31,2996$
274,483	276,485	275,889	275,600	275,524	275,443	280,363	281,282	282,202	283,122	284,041	284,961	285,881	286,801
272,468	272,951	274,187	275,169	276,184	276,622	277,604	278,524	279,443	280,363	281,282	282,202	283,122	284,041
271,887	272,807	273,727	274,647	275,567	276,487	277,407	278,327	279,247	280,167	281,087	282,007	282,927	283,847
270,302	271,222	272,142	273,062	273,982	274,902	275,822	276,742	277,662	278,582	279,502	280,422	281,342	282,262
268,717	269,637	270,557	271,477	272,397	273,317	274,237	275,157	276,077	276,997	277,917	278,837	279,757	280,677
267,132	268,052	268,972	269,892	270,812	271,732	272,652	273,572	274,492	275,412	276,332	277,252	278,172	279,092
265,547	266,467	267,387	268,307	269,227	270,147	271,067	271,987	272,907	273,827	274,747	275,667	276,587	277,507
263,962	264,882	265,802	266,722	267,642	268,562	269,482	270,402	271,322	272,242	273,162	274,082	275,002	275,922
262,377	263,297	264,217	265,137	266,057	266,977	267,897	268,817	269,737	270,657	271,577	272,497	273,417	274,337
260,792	261,712	262,632	263,552	264,472	265,392	266,312	267,232	268,152	269,072	270,000	270,920	271,840	272,760
259,207	260,127	261,047	261,967	262,887	263,807	264,727	265,647	266,567	267,487	268,407	269,327	270,247	271,167
257,622	258,542	259,462	260,382	261,302	262,222	263,142	264,062	264,982	265,902	266,822	267,742	268,662	269,582
256,037	256,957	257,877	258,797	259,717	260,637	261,557	262,477	263,397	264,317	265,237	266,157	267,077	267,997
254,452	255,372	256,292	257,212	258,132	259,052	260,000	260,920	261,840	262,760	263,680	264,600	265,520	266,440
252,867	253,787	254,707	255,627	256,547	257,467	258,387	259,307	260,227	261,147	262,067	262,987	263,907	264,827
251,282	252,202	253,122	254,042	254,962	255,882	256,802	257,722	258,642	259,562	260,482	261,402	262,322	263,242
249,697	250,617	251,537	252,457	253,377	254,297	255,217	256,137	257,057	257,977	258,897	259,817	260,737	261,657
248,112	249,032	249,952	250,872	251,792	252,712	253,632	254,552	255,472	256,392	257,312	258,232	259,152	260,072
246,527	247,447	248,367	249,287	250,207	251,127	252,047	252,967	253,887	254,807	255,727	256,647	257,567	258,487
244,942	245,862	246,782	247,702	248,622	249,542	250,462	251,382	252,302	253,222	254,142	255,062	255,982	256,902
243,357	244,277	245,197	246,117	247,037	247,957	248,877	249,797	250,717	251,637	252,557	253,477	254,397	255,317
241,772	242,692	243,612	244,532	245,452	246,372	247,292	248,212	249,132	250,052	250,972	251,892	252,812	253,732
240,187	241,107	242,027	242,947	243,867	244,787	245,707	246,627	247,547	248,467	249,387	250,307	251,227	252,147
238,602	239,522	240,442	241,362	242,282	243,202	244,122	245,042	245,962	246,882	247,802	248,722	249,642	250,562
237,017	237,937	238,857	239,777	240,697	241,617	242,537	243,457	244,377	245,297	246,217	247,137	248,057	248,977
235,432	236,352	237,272	238,192	239,112	240,032	240,952	241,872	242,792	243,712	244,632	245,552	246,472	247,392
233,847	234,767	235,687	236,607	237,527	238,447	239,367	240,287	241,207	242,127	243,047	243,967	244,887	245,807
232,262	233,182	234,102	235,022	235,942	236,862	237,782	238,702	239,622	240,542	241,462	242,382	243,302	244,222
230,677	231,597	232,517	233,437	234,357	235,277	236,197	237,117	238,037	238,957	239,877	240,797	241,717	242,637
229,092	229,992	230,912	231,832	232,752	233,672	234,592	235,512	236,432	237,352	238,272	239,192	240,112	241,032
227,507	228,427	229,347	230,267	231,187	232,107	233,027	233,947	234,867	235,787	236,707	237,627	238,547	239,467
225,922	226,842	227,762	228,682	229,602	230,522	231,442	232,362	233,282	234,202	235,122	236,042	236,962	237,882
224,337	225,257	226,177	227,097	228,017	228,937	229,857	230,777	231,697	232,617	233,537	234,457	235,377	236,297
222,752	223,672	224,592	225,512	226,432	227,352	228,272	229,192	230,112	231,032	231,952	232,872	233,792	234,712
221,167	222,087	223,007	223,927	224,847	225,767	226,687	227,607	228,527	229,447	230,367	231,287	232,207	233,127
219,582	220,502	221,422	222,342	223,262	224,182	225,102	226,022	226,942	227,862	228,782	229,702	230,622	231,542
217,997	218,917	219,837	220,757	221,677	222,597	223,517	224,437	225,357	226,277	227,197	228,117	229,037	230,000
216,412	217,332	218,252	219,172	220,092	221,012	221,932	222,852	223,772	224,692	225,612	226,532	227,452	228,372
214,827	215,747	216,667	217,587	218,507	219,427	220,347	221,267	222,187	223,107	224,027	224,947	225,867	226,787
213,242	214,162	215,082	216,002	216,922	217,842	218,762	219,682	220,602	221,522	222,442	223,362	224,282	225,202
211,657	212,577	213,497	214,417	215,337	216,257	217,177	218,097	219,017	219,937	220,857	221,777	222,697	223,617
210,072	210,992	211,912	212,832	213,752	214,672	215,592	216,512	217,432	218,352	219,272	220,192	221,112	222,032
208,487	209,407	210,327	211,247	212,167	213,087	214,007	214,927	215,847	216,767	217,687	218,607	219,527	220,447
206,902	207,822	208,742	209,662	210,582	211,502	212,422	213,342	214,262	215,182	216,102	217,022	217,942	218,862
205,317	206,237	207,157	208,077	208,997	209,917	210,837	211,757	212,677	213,597	214,517	215,437	216,357	217,277
203,732	204,652	205,572	206,492	207,412	208,332	209,252	210,172	211,092	212,012	212,932	213,852	214,772	215,692
202,147	203,067	203,987	204,907	205,827	206,747	207,667	208,587	209,507	210,427	211,347	212,267	213,187	214,107
200,562	201,482	202,402	203,322	204,242	205,162	206,082	207,002	207,922	208,842	209,762	210,682	211,602	212,522
198,977	199,897	200,817	201,737	202,657	203,577	204,497	205,417	206,337	207,257	208,177	209,097	210,017	210,937
197,392	198,312	199,232	200,152	201,072	201,992	202,912	203,832	204,752	205,672	206,592	207,512	208,432	209,352
195,807	196,727	197,647	198,567	199,487	200,407	201,327	202,247	203,167	204,087	205,007	205,927	206,847	207,767
194,222	195,142	196,062	196,982	197,902	198,822	199,742	200,662	201,582	202,502	203,422	204,342	205,262	206,182
192,637	193,557	194,477	195,397	196,317	197,237	198,157	199,077	200,000	200,920	201,840	202,760	203,680	204,600
191,052	191,972	192,892	193,812	194,732	195,652	196,572	197,492	198,412	199,332	200,252	201,172	202,092	203,012
189,467	190,387	191,307	192,227	193,147	194,067	194,987	195,907	196,827	197,747	198,667	199,587	200,507	201,427
187,882	188,802	189,722	190,642	191,562	192,482	193,402	194,322	195,242	196,162	197,082	198,002	198,922	199,842
186,297	187,217	188,137	189,057	189,977	190,897	191,817	192,737	193,657	194,577	195,497	196,417	197,337	198,257
184,712	185,632	186,552	187,472	188,392	189,312	190,232	191,152	192,072	192,992	193,912	194,832	195,752	196,672
183,127	184,047	184,967	185,887	186,807	187,727	188,647	189,567	190,487	191,407	192,327	193,247	194,167	195,087
181,542	182,462	183,382	184,302	185,222	186,142	187,062	187,982	188,902	189,822	190,742	191,662	192,582	193,502
179,957	180,877	181,797	182,717	183,637	184,557	185,477	186,397</						



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EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
LOGO	Rodovia: Trecho: Data:	
Escala: 1:2000	PROJETO GEOMÉTRICO	Código: XXX/XXX