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
Thales Mezzacasa Brum

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

PROJETO PONTO DE PARTIDA

EDIÇÃO UFRGS 2021/2

PORTO ALEGRE
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
2022

DADOS INTERNACIONAIS PARA CATALOGAÇÃO NA PUBLICAÇÃO (CIP)

P964

Projeto Ponto de Partida : edição 2021/2 [recurso eletrônico] / Daniel Sergio Presta Garcia ... [et al.] - Porto Alegre: UFRGS, 2022. v.2

454 p. : il.

ISBN 978-65-5973-177-0 (v. 1)
978-65-5973-175-6 (v. 2)

1. Rodovias. 2. Engenharia de transportes. 3. Ensino e aprendizagem. 4. Sistemas de transportes. I. Garcia, Daniel Sergio Presta. II. Warken, Gabriel. III. Bertoglio, Magno Vargas. IV. Azevedo, Júlia Martins Rodriguez de. VI. Brum, Thales Mezzacasa.

CDU 625.7

CATALOGAÇÃO NA FONTE: AMANDA DE ABREU GULARTE CRB10/2500

O presente trabalho foi realizado com apoio dos
Recursos de Desenvolvimento Tecnológico - RDT,
da Concessionária das Rodovias Integradas do Sul S.A. - VIA SUL,
sob regulação da Agência Nacional de Transportes Terrestres - ANTT

Sumário

1. Capítulo I – ConectSul 5
1.1. Projeto Executivo 6
2. Capítulo II – EPTG Sul 160
2.1. Projeto Executivo 161
3. Capítulo III – Equipe Nexum Brasil 277
3.1. Projeto Executivo 278
4. Capítulo IV – GLE Empreendimentos 381
4.1. Projeto Executivo 382

CAPÍTULO I

ConnectSul

Ártur Oldra Paliosa
Bernardo Silva Ransolin
Nathália Fátima da Silva Dias
Morvana Machado
Daniel Sergio Presta Garcia

R E P Ú B L I C A F E D E R A T I V A D O B R A S I L
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL – UFRGS
E S C O L A D E E N G E N H A R I A – 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

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

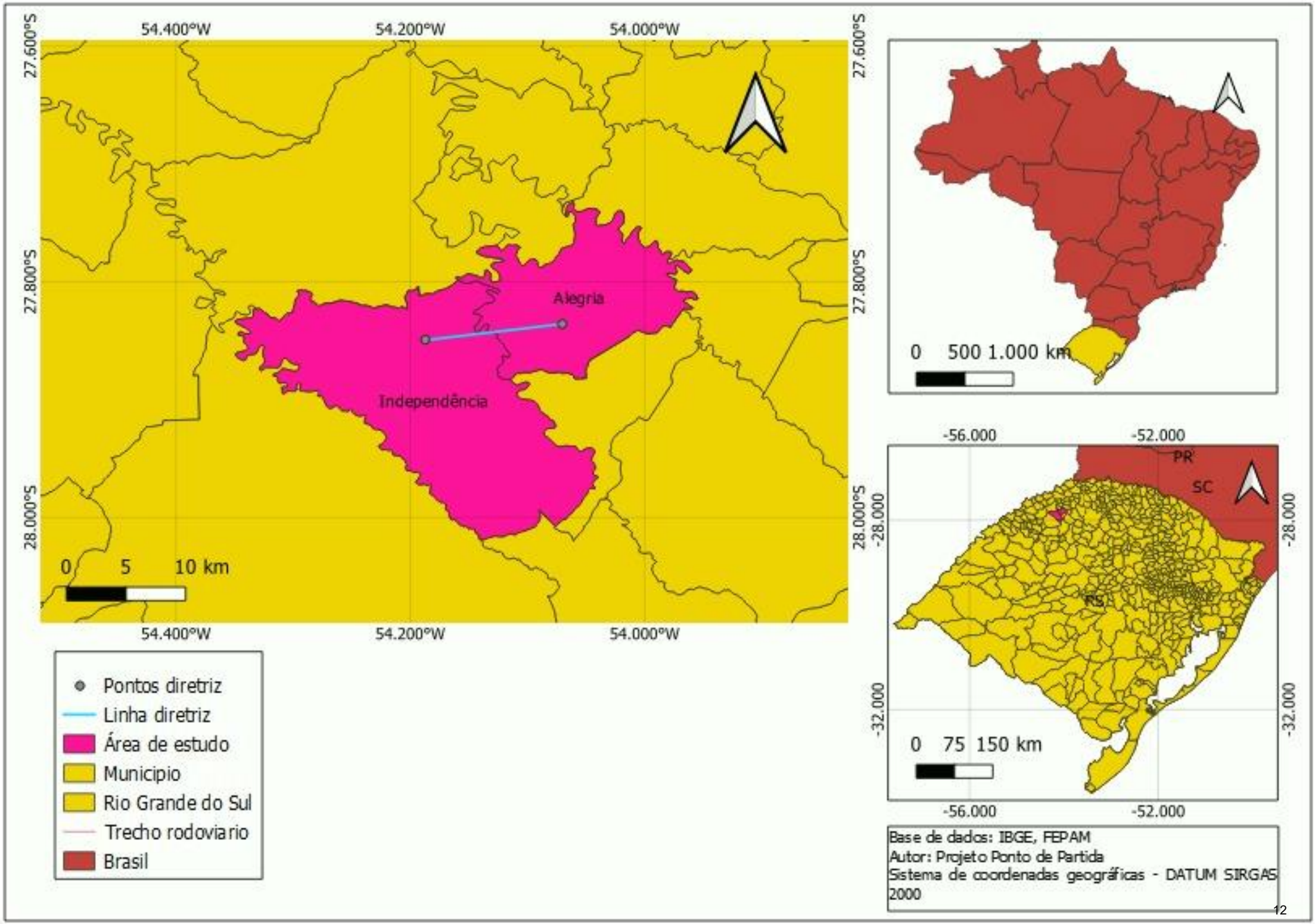
Quadro de Origem e Destino 16

Esquema Linear de Distribuição dos Materiais 17

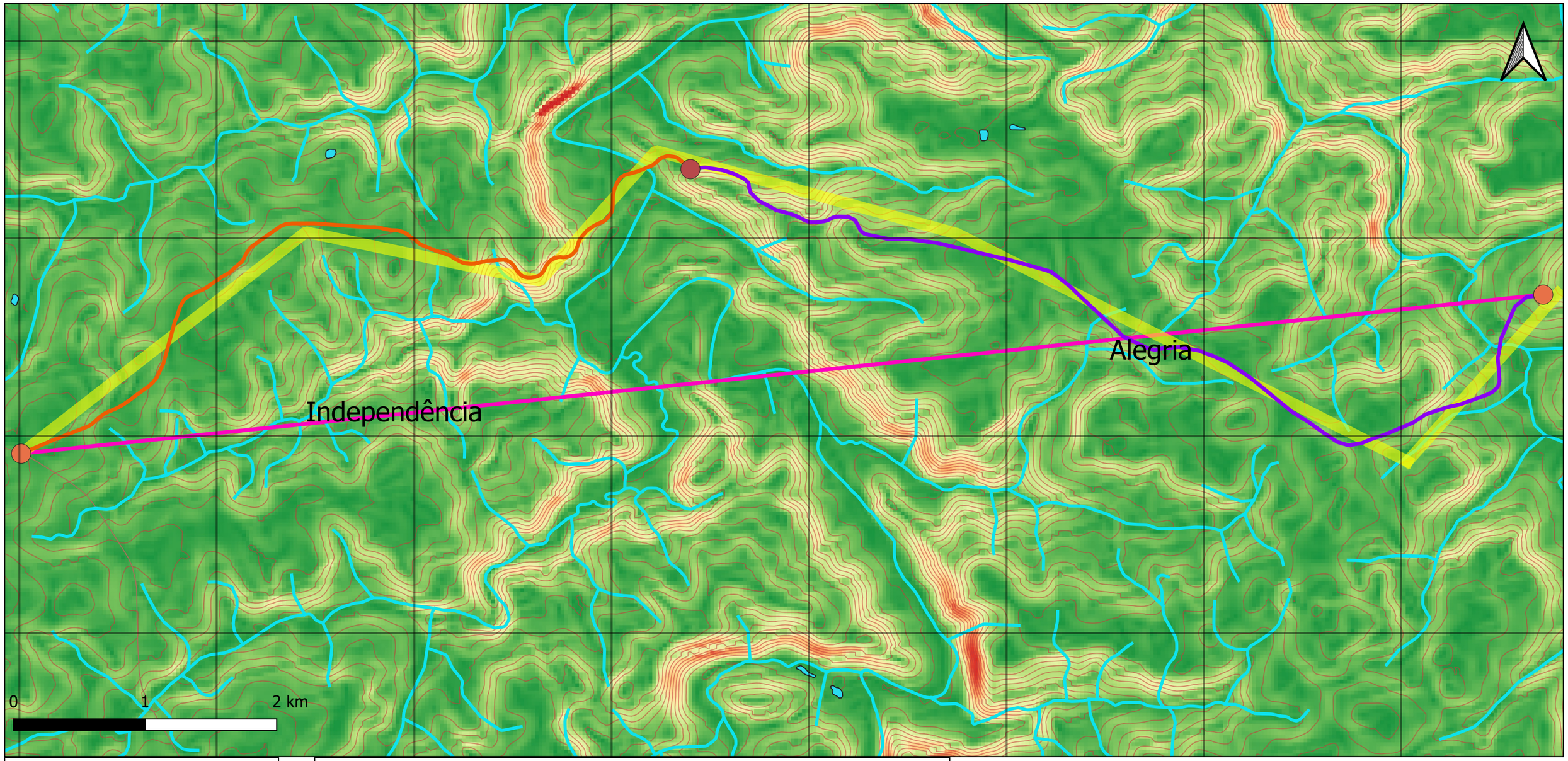
APRESENTAÇÃO

1 APRESENTAÇÃO

Mapa de Situação


54.400°W
54.200°W
54.000°W
27.600°S
27.800°S
28.000°S
Alegria
Independência
0 5 10 km
0 500 1.000 km
-56.000
-52.000
-28.000
-32.000
PR
SC
RS
0 75 150 km
Pontos diretriz
Linha diretriz
Área de estudo
Municipio
Rio Grande do Sul
Trecho rodoviario
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´agua

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		PLANIALTIMETRICAS				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	SUPERELEVAÇÃO 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 ADOTADOS

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

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

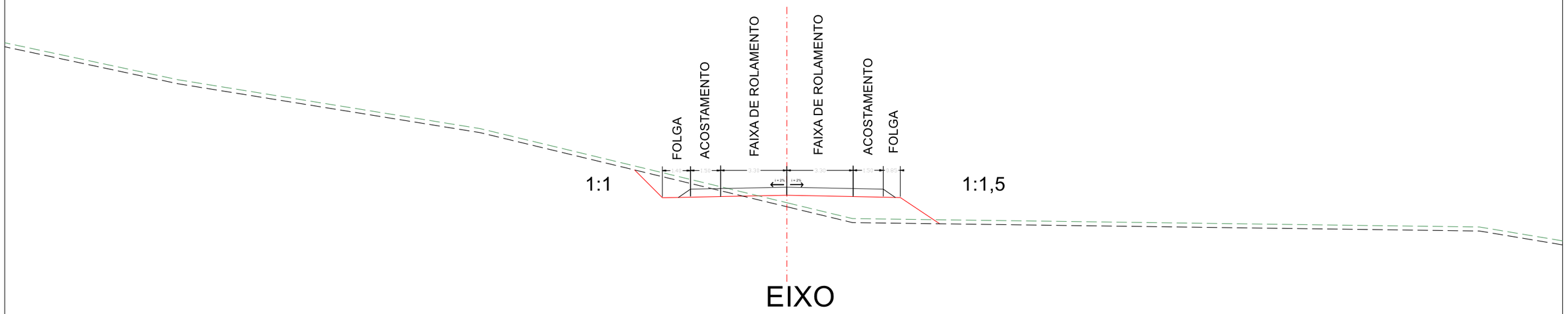
CARACTERÍSTICAS OPERACIONA IS

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

2 PROJETO GEOMÉTRICO

Seções Transversais Tipo

SEÇÃO MISTA



ConnectSul

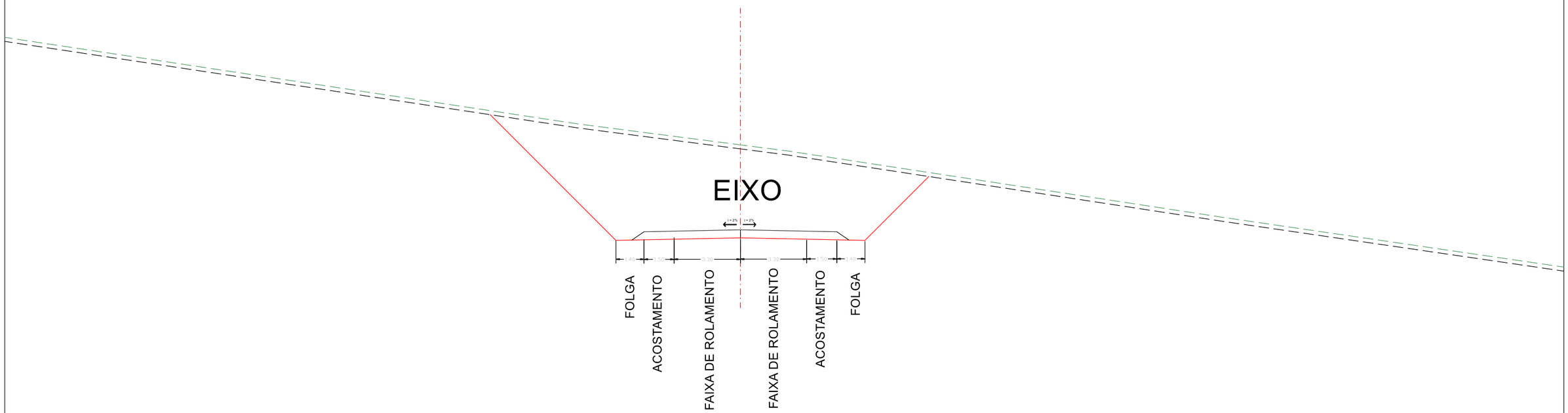
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 1
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

SEÇÃO DE CORTE



ConnectSul

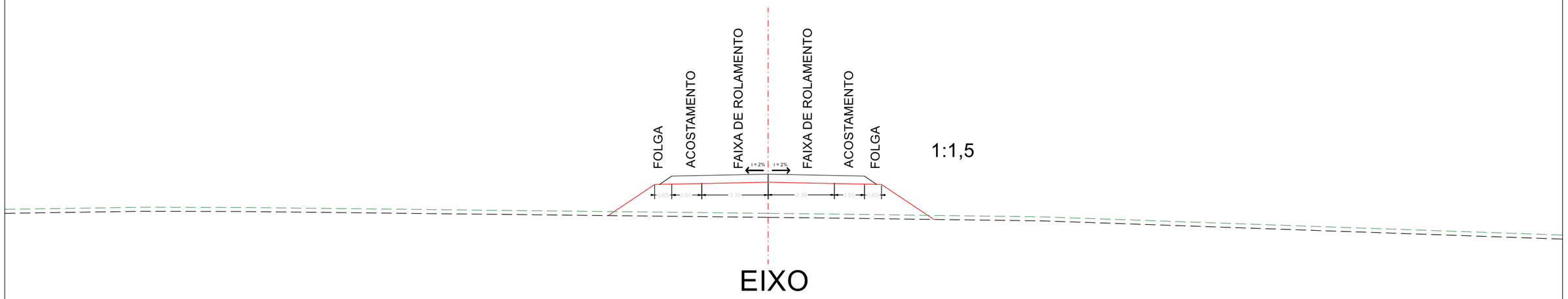
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 1
Data: 04/05/2022

Escala: 1:4000

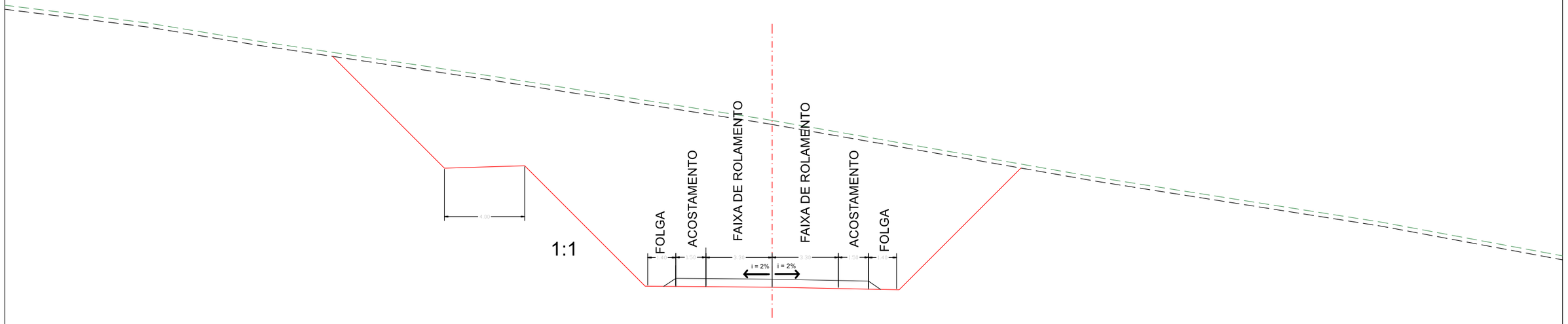
SEÇÕES TRANSVERSAIS TIPO

SEÇÃO DE ATERRO



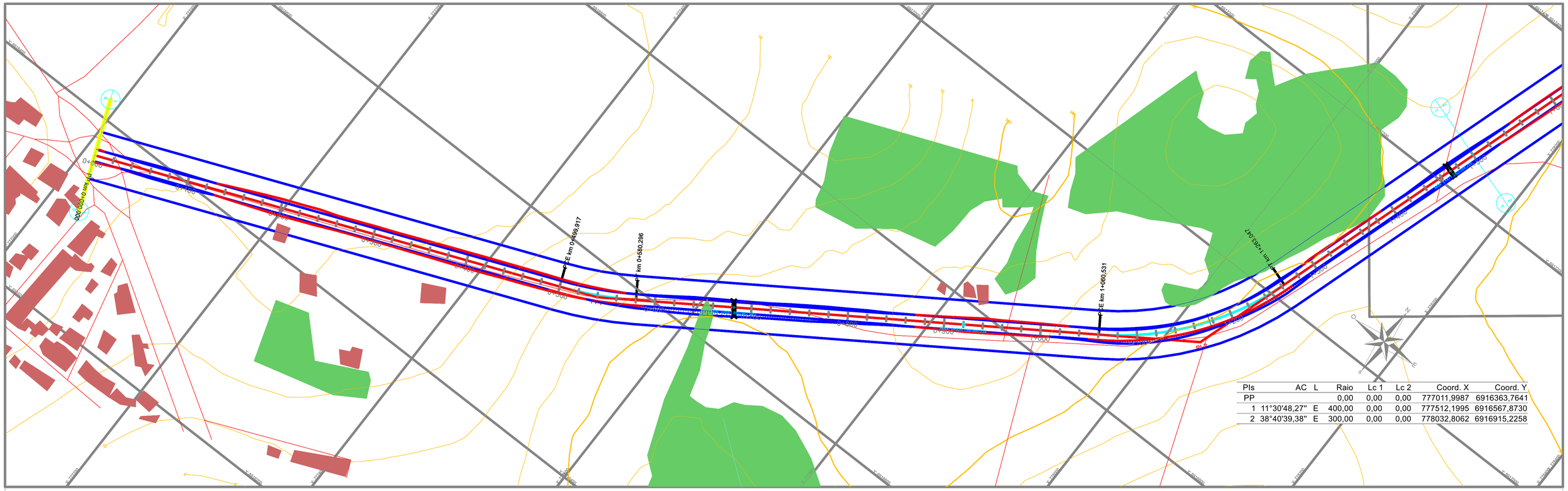
ConnectSul	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN
	Rodovia: PPP - UFRGS - 2021/2 Trecho: Lote 1 Data: 04/05/2022
Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO

SEÇÃO DE CORTE COM BANQUETAS

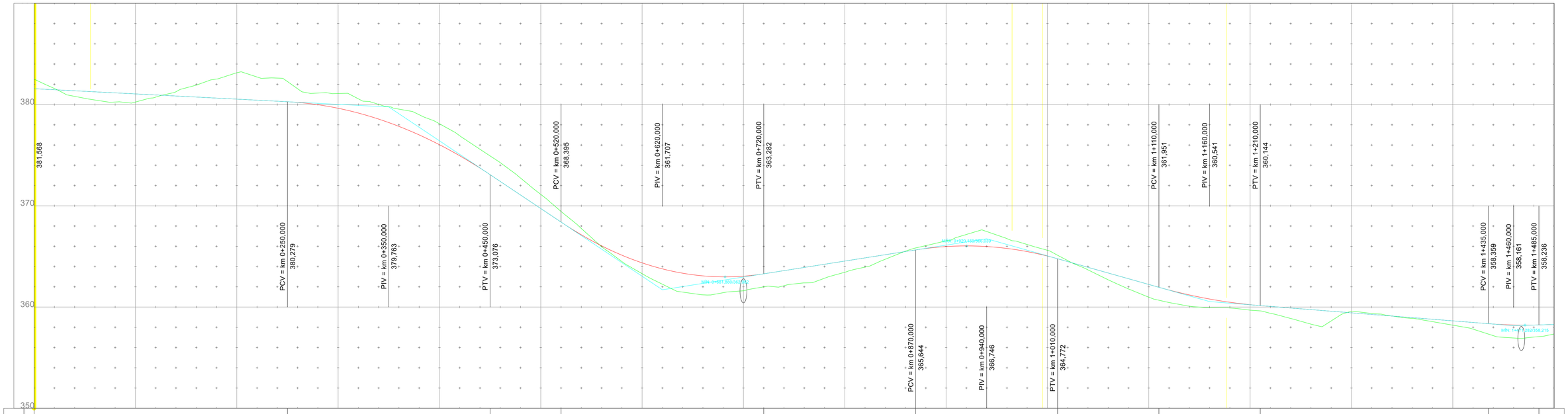


ConnectSul	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: PPP - UFRGS - 2021/2 Trecho: Lote 1 Data: 04/05/2022	
Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO	

Linha Geral

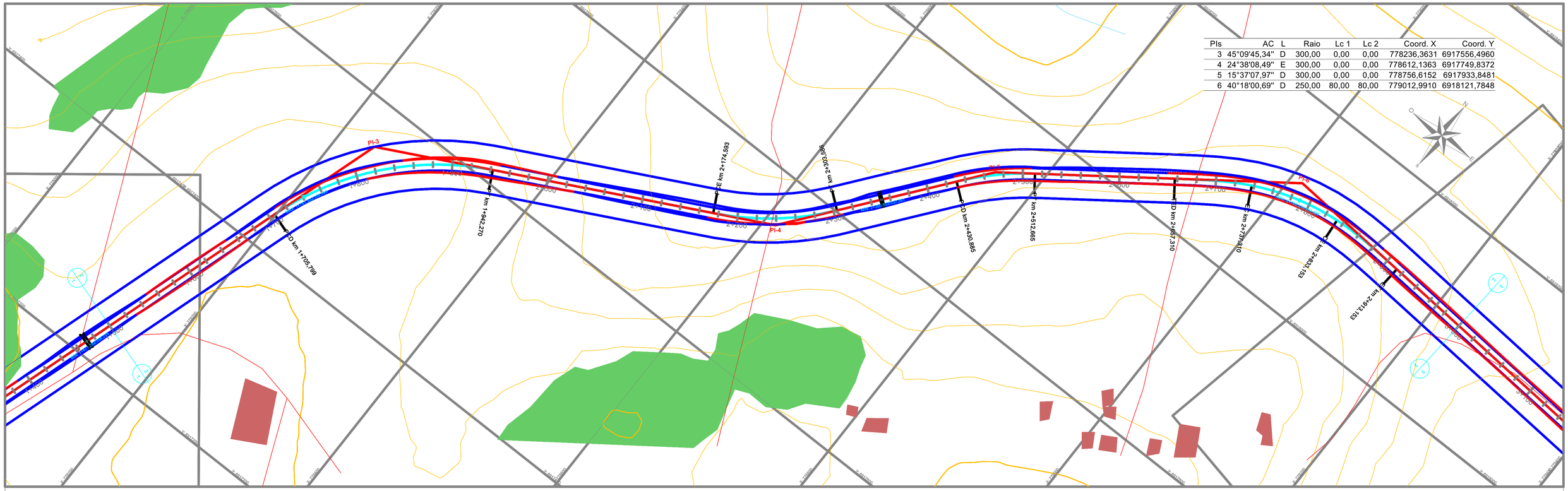


PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
PP			0,00	0,00	0,00	777011,9987	6916363,7641
1	11°30'48,27"	E	400,00	0,00	0,00	777512,1995	6916567,8730
2	38°40'39,38"	E	300,00	0,00	0,00	778032,8062	6916915,2258

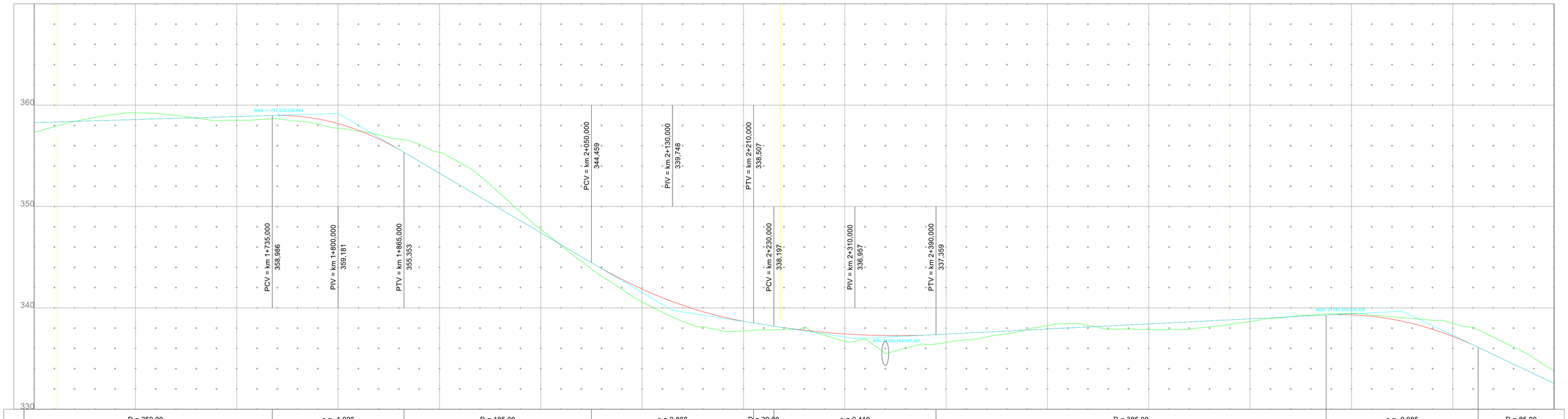


ALT.	D = 250,00 i = -0,5156%	L = 200,000	e = -1,543 k = 32,405	Δi = -6,1720%	D = 70,00 i = -6,6875%	L = 200,000	e = 2,066 k = 24,206	Δi = 8,2624%	D = 150,00 i = 1,5748%	L = 140,000	e = -0,769 k = 31,851	Δi = -4,3955%	D = 100,00 i = -2,8207%	L = 100,000	e = 0,253 k = 49,328	Δi = 2,0273%	D = 225,00 i = -0,7934%	L = 50,000	e = 0,068 k = 45,727	Δi = 1,0934%

| | | |

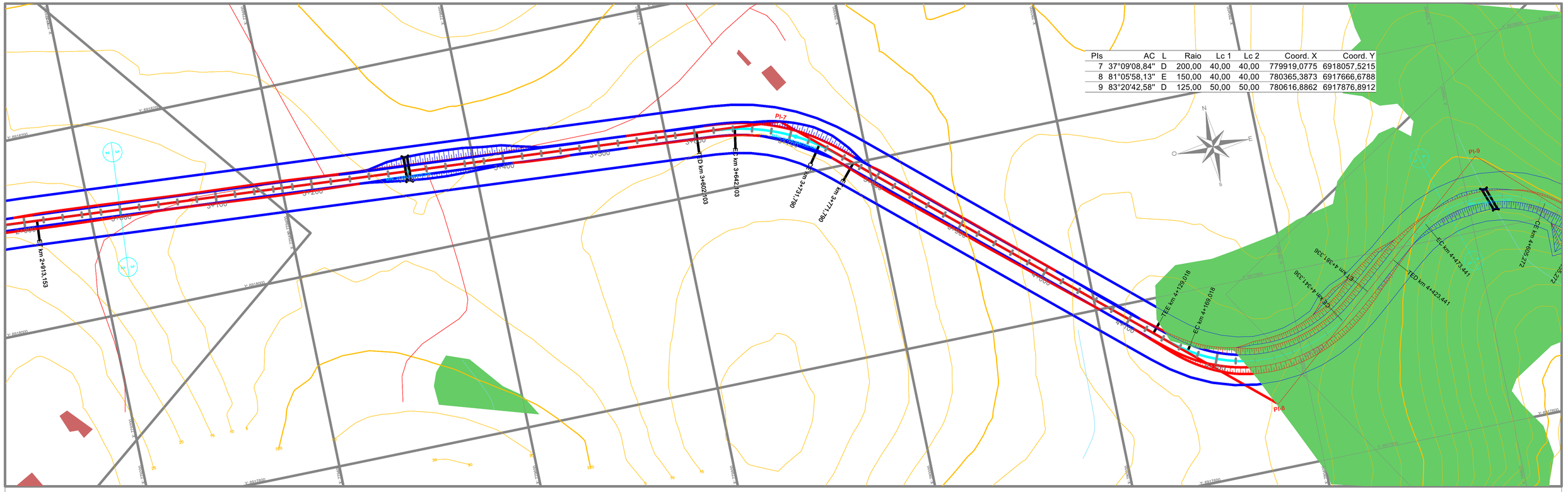


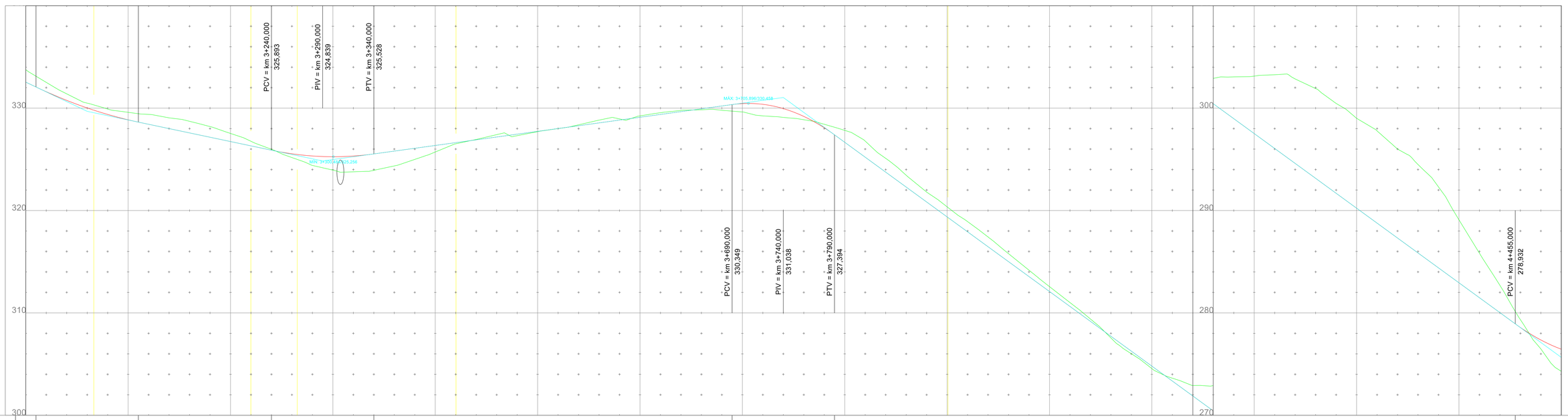
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
3	45°09'45,34"	D	300,00	0,00	0,00	778236,3631	6917556,4960
4	24°38'08,49"	E	300,00	0,00	0,00	778612,1363	6917749,8372
5	15°37'07,97"	D	300,00	0,00	0,00	778756,6152	6917933,8481
6	40°18'00,69"	D	250,00	80,00	80,00	779012,9910	6918121,7848



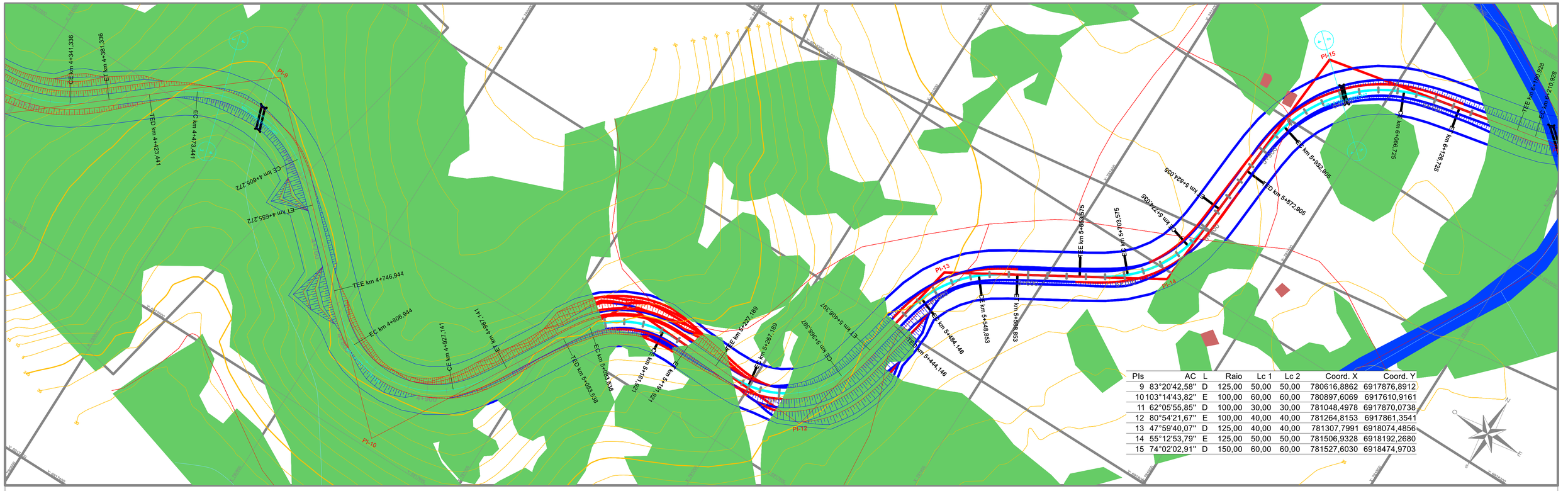
| ALT. % | D = 250,00 i = 0,3000% | | | | | | | | | | | | L = 130,000 e = -1,006 k = 21,006 Δi = -6,1888% | | | | | | | | | | | | D = 185,00 i = -5,8888% | | | | | | | | | | | | L = 160,000 e = 0,868 k = 36,878 Δi = 4,3386% | | | | | | | | | | | | D = 20,00 i = -1,5502% | L = 160,000 e = 0,410 k = 77,960 Δi = 2,0523% | | | | | | | | | | | | D = 385,00 i = 0,5021% | | | | | | | | | | | | | | | | | | | | | | | | L = 150,000 e = -0,985 k = 28,546 Δi = -5,2547% | | | | | | | | | | | | D = 85,00 i = -4,7526% | | | | | |
|---|---|---|---|---|---|---|---

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	6917666,6788
9	83°20'42,58"	D	125,00	50,00	50,00	780616,8862	6917876,8912

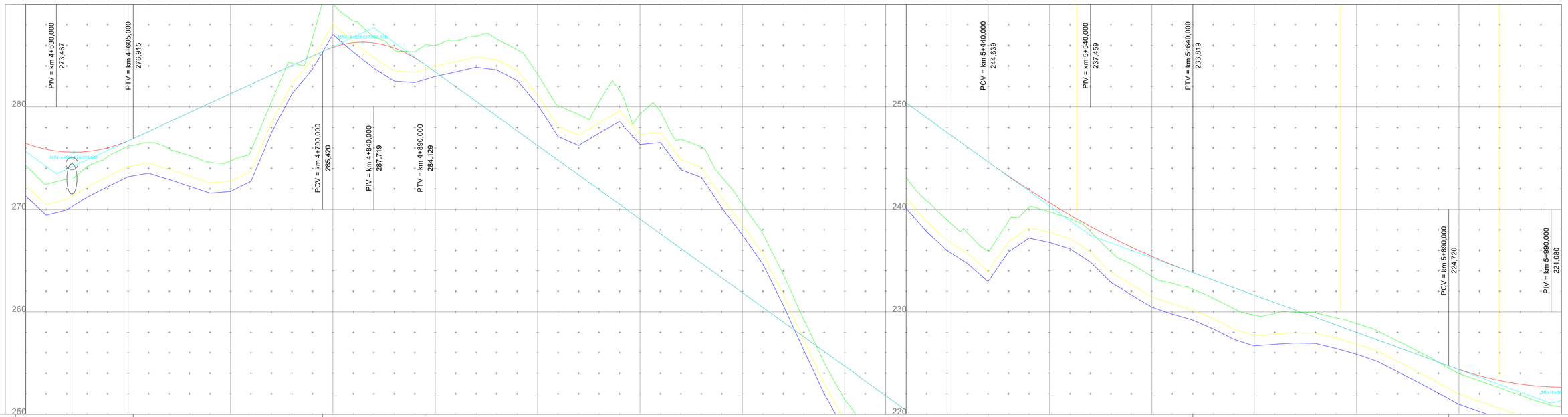




| | | |



PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
9	83°20'42,58"	D	125,00	50,00	50,00	780616,8862	6917876,8912
10	103°14'43,82"	E	100,00	60,00	60,00	780897,6069	6917610,9161
11	62°05'55,85"	D	100,00	30,00	30,00	781048,4978	6917870,0738
12	80°54'21,67"	E	100,00	40,00	40,00	781264,8153	6917861,3541
13	47°59'40,07"	D	125,00	40,00	40,00	781307,7991	6918074,4856
14	55°12'53,79"	E	125,00	50,00	50,00	781506,9328	6918192,2680
15	74°02'02,91"	D	150,00	60,00	60,00	781527,6030	6918474,9703

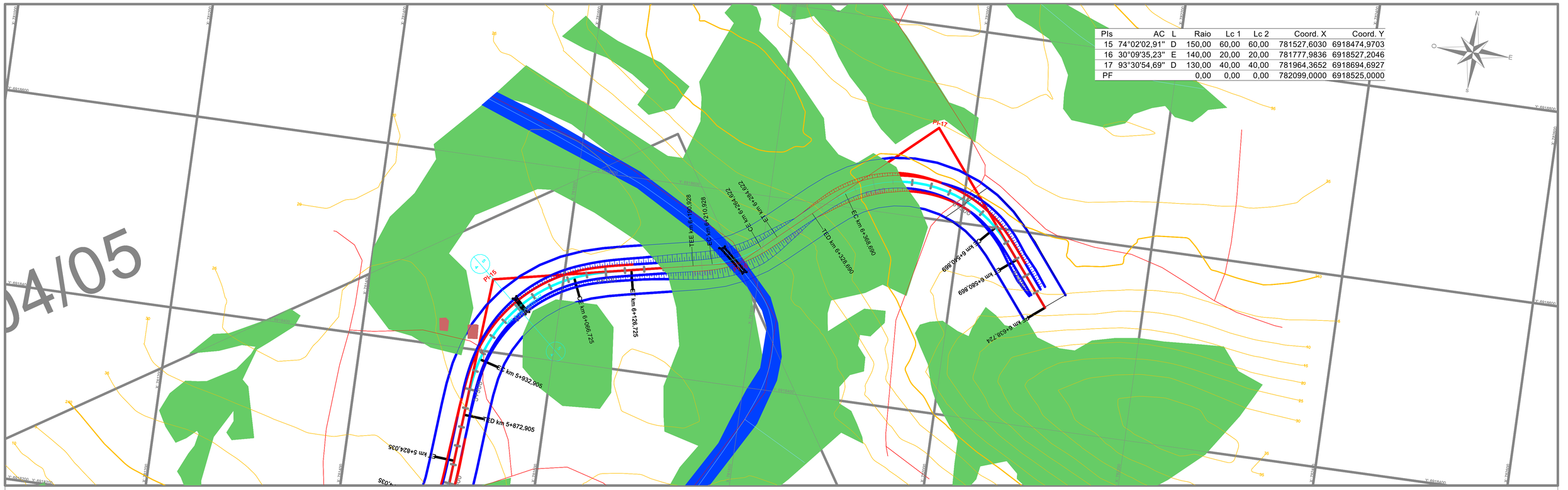


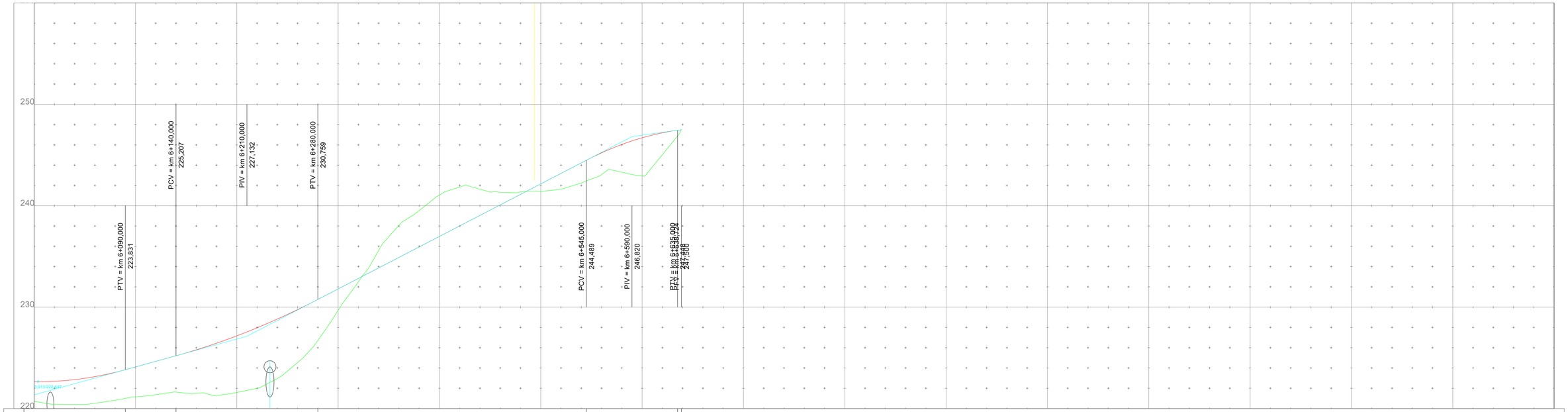
ALT. .000 e = 2,228 k = 12,621 Δi = 11,8850% | D = 185,00 i = 4,5976% | L = 100,000 e = -1,472 k = 8,491 Δi = -11,7776% | D = 550,00 i = -7,1800% | L = 200,000 e = 0,885 k = 56,491 Δi = 3,5404% | D = 250,00 i = -3,6397% | L = 200,000 e = 1,598 k = 31,296

km		4+500			4+600			4+700			4+800			4+900			5+000			5+100			5+200			5+300			5+400			5+500			5+600			5+700			5+800			5+900			6+000
COTAS (m)	PROJETO	276,455	275,869	275,600	275,648	276,013	276,695	277,604	278,524	279,443	280,363	281,282	282,202	283,122	284,041	284,961	285,821	286,270	286,247	285,753	284,788	283,411	281,975	280,539	279,103	277,667	276,231	274,795	273,359	271,923	270,487	269,051	267,615	266,179	264,743	263,307	261,871	260,435	258,999	257,563	256,127	254,691	253,255	251,819	250,383	248,947	247,511	246,075	244,639	243,238	241,909	240,650	239,461	238,344	237,297	236,322	235,417	234,583	233,819	233,091	232,363	231,635	230,908	230,180	229,452	228,724	227,996	227,268	226,540	225,812	225,084	224,372	223,772	223,300	222,955	222,739	222,650
	TERRENO	274,293	272,448	272,951	274,187	275,199	276,184	276,522	275,904	275,242	274,573	274,736	275,727	280,467	284,261	286,672	290,049	288,361	286,783	285,517	285,377	285,979	286,415	286,877	286,611	285,572	283,180	280,116	279,247	280,443	281,573	279,338	279,535	276,868	276,119	273,151	270,495	267,652	263,635	259,251	255,007	251,423	248,396	245,310	243,110	240,831	238,969	237,698	235,944	238,846	240,200	239,778	239,147	237,853	235,871	234,655	233,451	232,786	232,195	231,328	230,323	229,674	229,828	229,953	229,910	229,422	228,856	228,168	227,157	226,134	225,071	223,973	223,277	222,588	221,872	221,192	220,716

	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN
ConnectSul	Rodovia: PPP-UFRGS 2021/2 Trecho: Independência - Alegria Lote 1 Data: 05/22
Escala: 1:2000	PROJETO GEOMÉTRICO — Código: PG-04

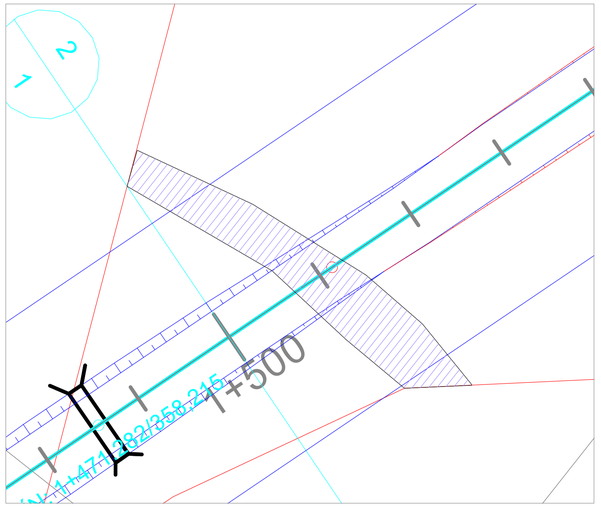
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
15	74°02'02,91"	D	150,00	60,00	60,00	781527,6030	6918474,9703
16	30°09'35,23"	E	140,00	20,00	20,00	781777,9836	6918527,2046
17	93°30'54,69"	D	130,00	40,00	40,00	781964,3652	6918694,6927
PF			0,00	0,00	0,00	782099,0000	6918525,0000

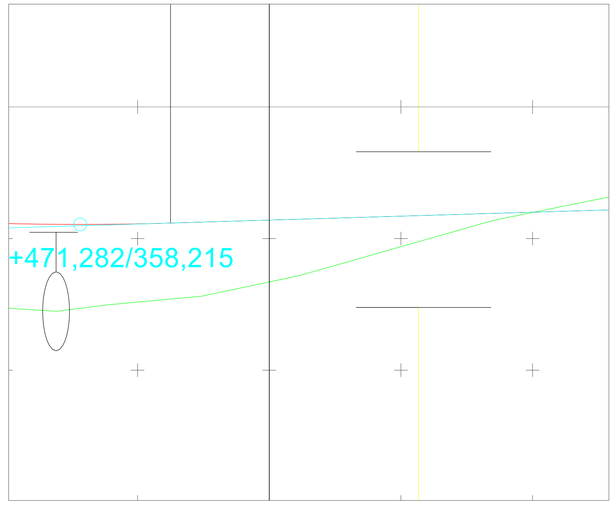




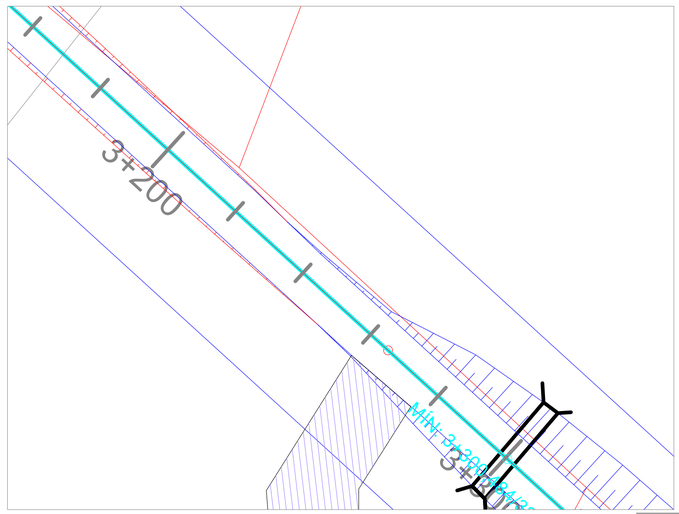
| | | |

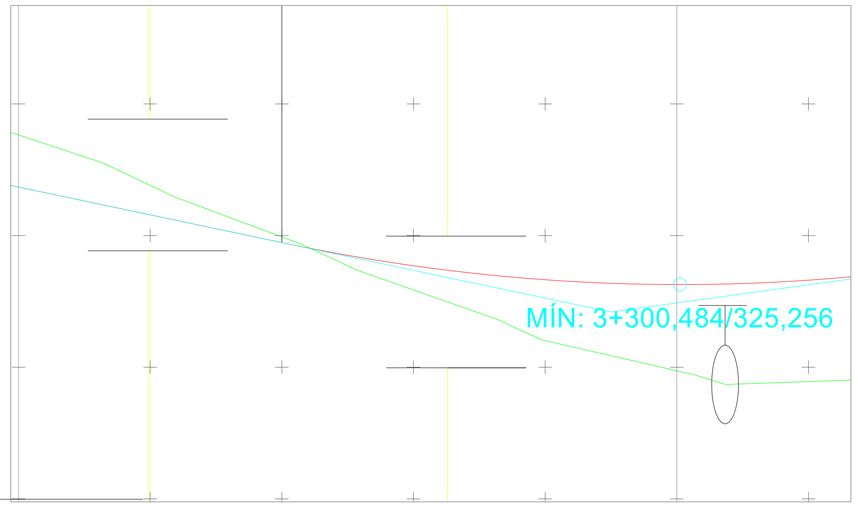
Detalhamento do Projeto Planialtimétrico





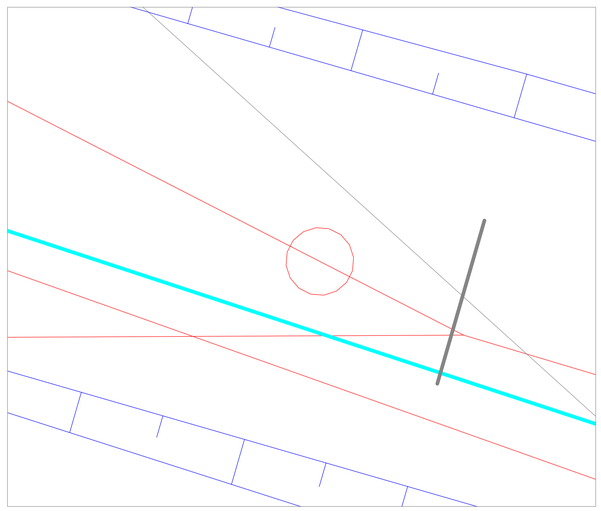
Realocação de estrada existente km 1+522

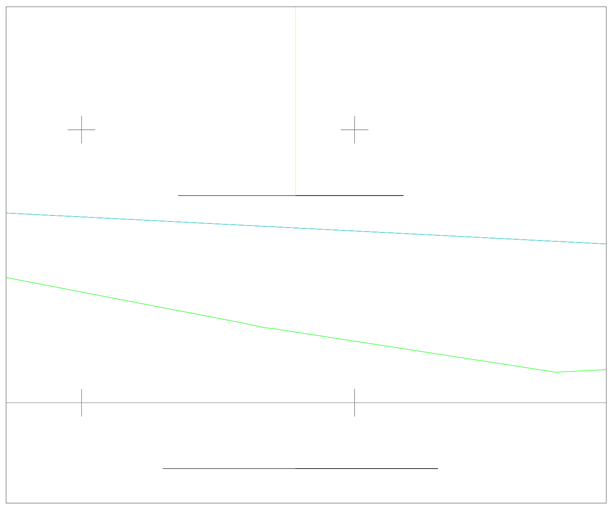




Realocação de estrada existente-km 3+265

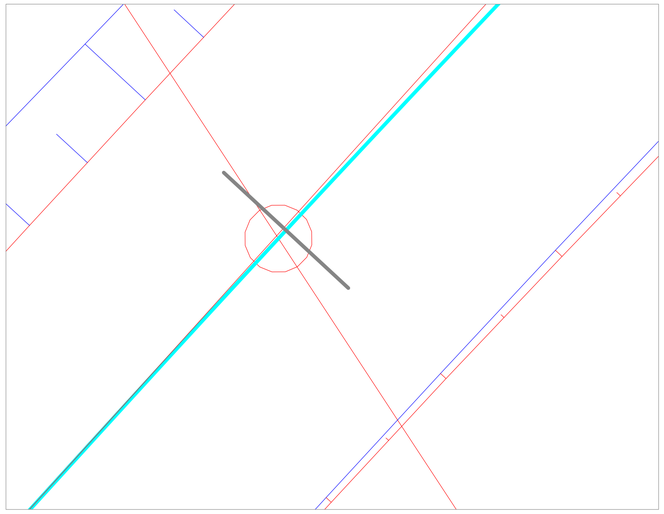
Interferência com via existente km 3+220

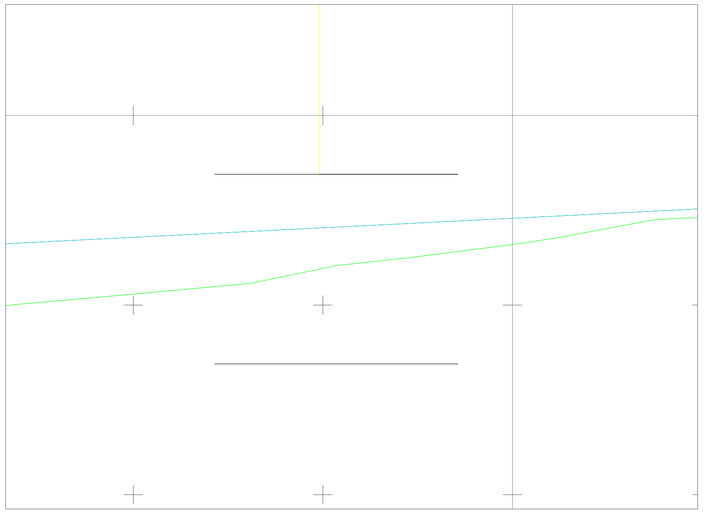




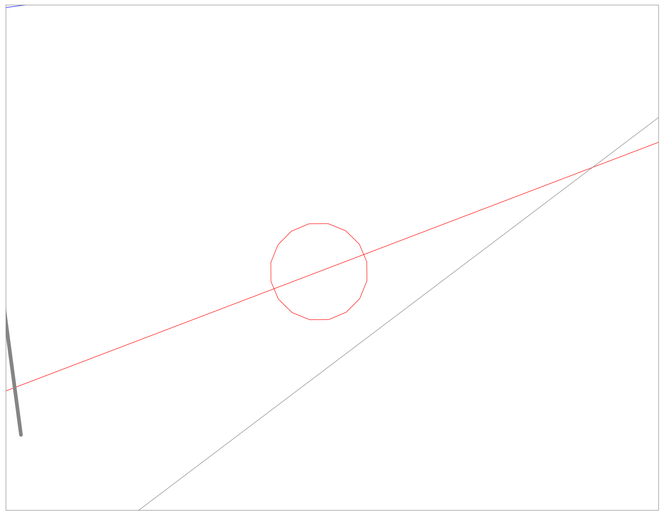
Interferência com via existente km 0+055

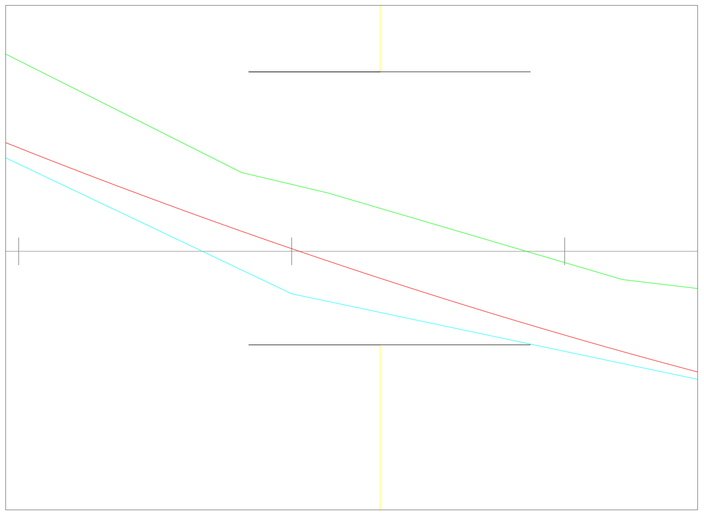
ConnectSul	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22	
Sem escala	PROJETO GEOMÉTRICO	



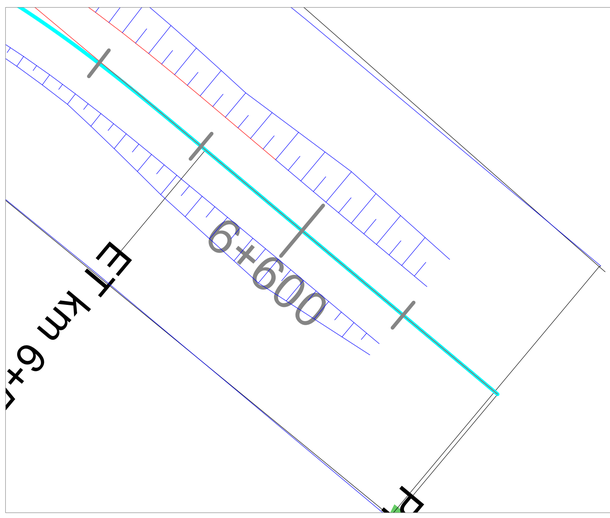


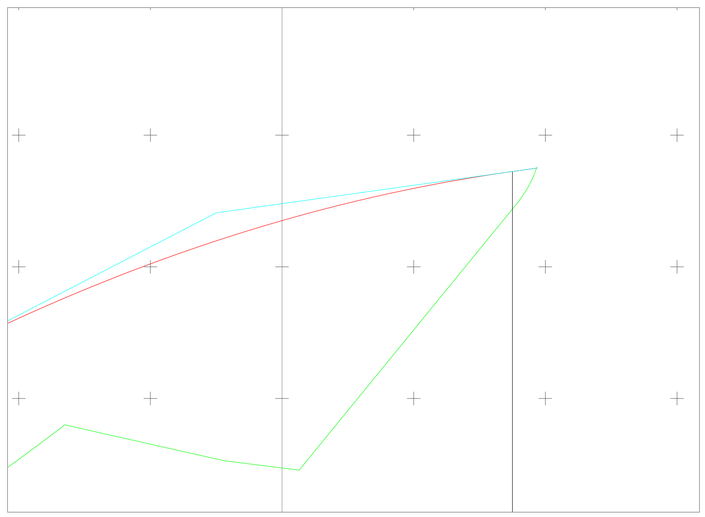
Interferência com via existente
km 2+260





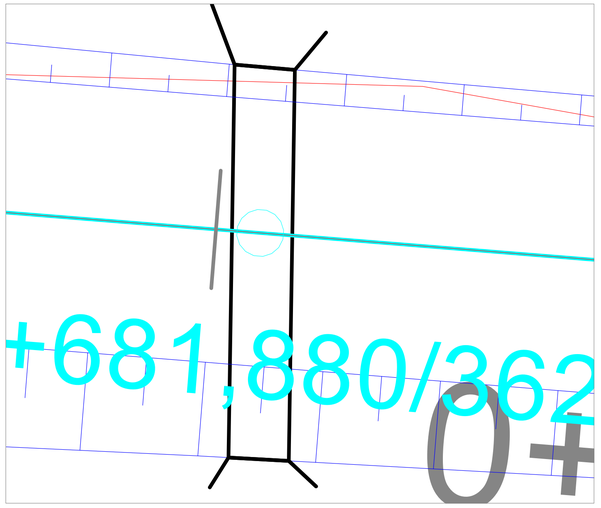
Interferência com via existente
km 3+066

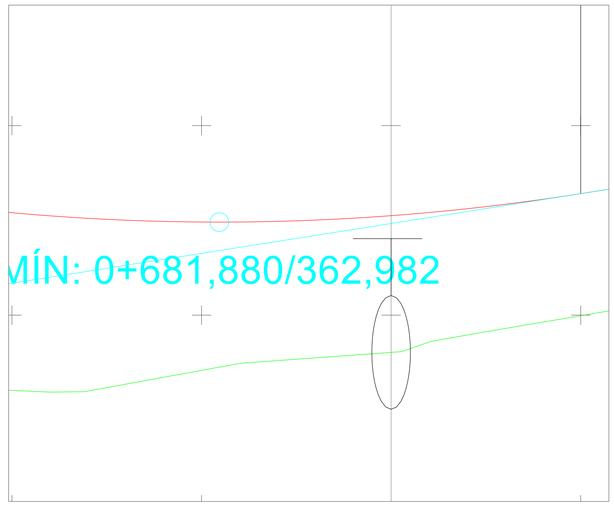




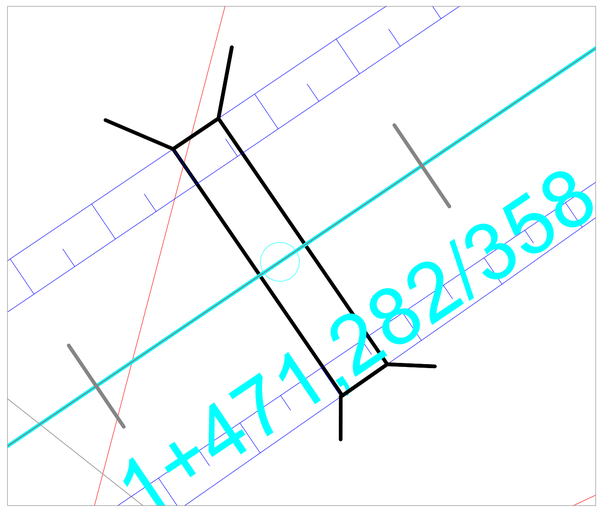
Ponto de encontro

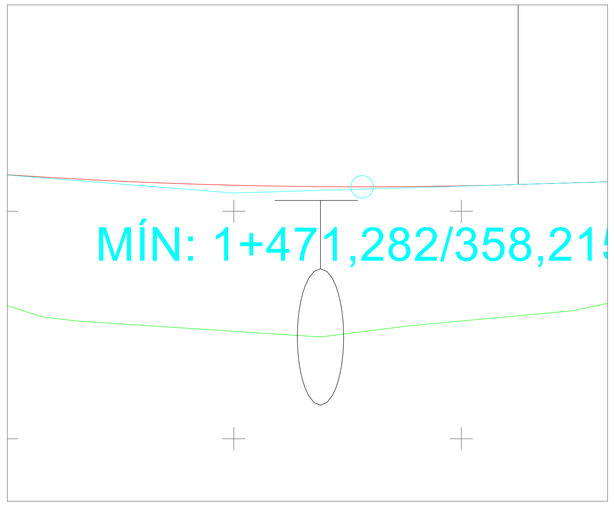
ConnectSul	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22	
Sem escala	PROJETO GEOMÉTRICO	



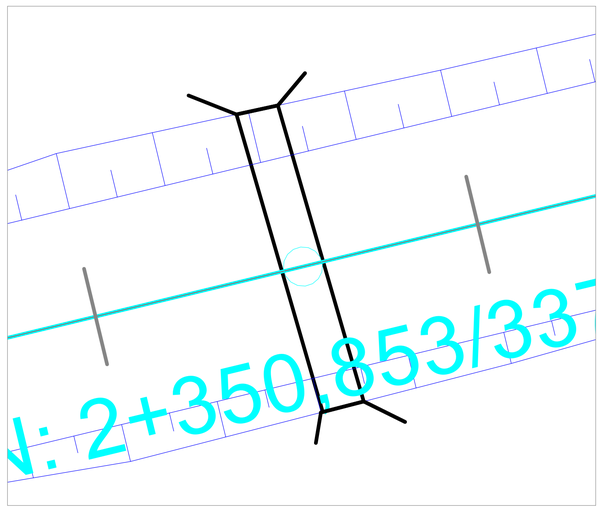


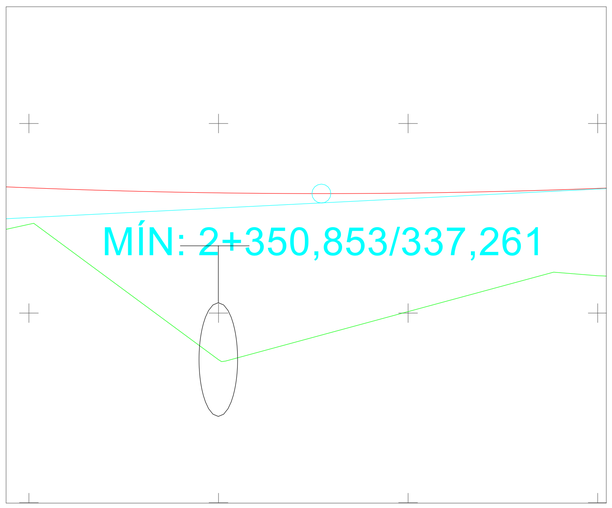
Bueiro 1 – cota mínima
Diâmetro: 1,2m
Recobrimento: 0,6m





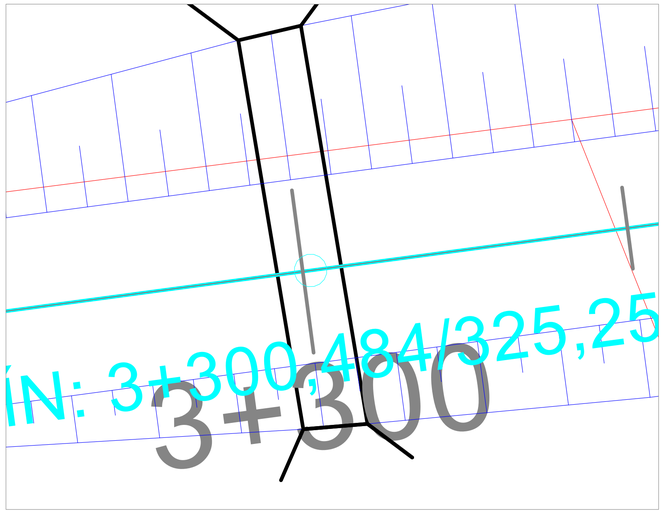
Bueiro 2 – cota mínima
Diâmetro: 1,2m
Recobrimento: 0,6m

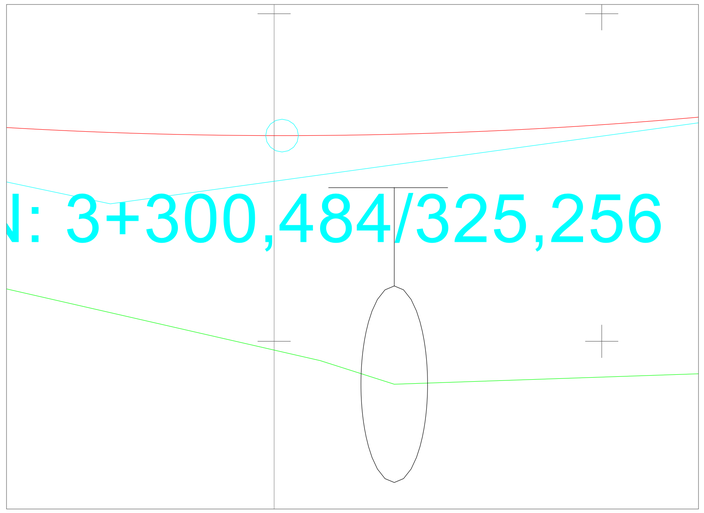




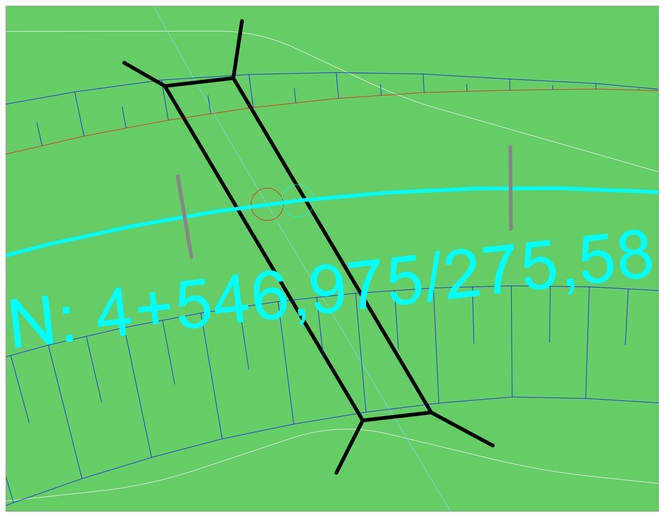
Bueiro 3 – cota mínima
Diâmetro: 1,2m
Recobrimento: 0,6m

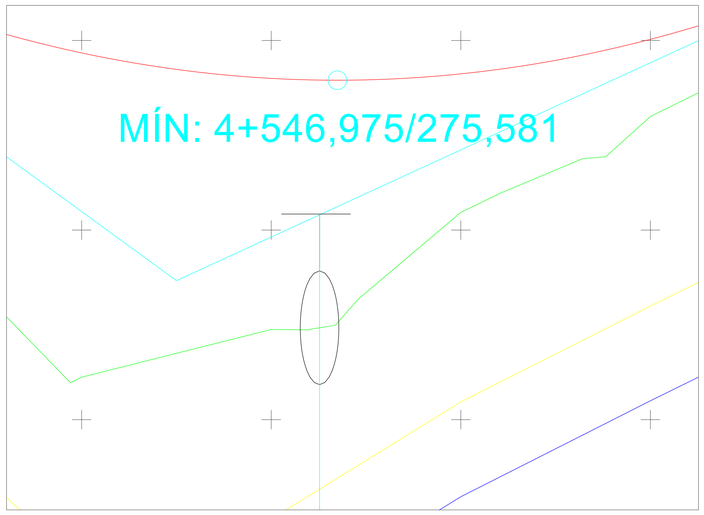
ConnectSul	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: UFRGS PPP 2021/2 Trecho: Independência - Alegria Lote 1 Data: maio/22	
Sem escala	PROJETO GEOMÉTRICO	



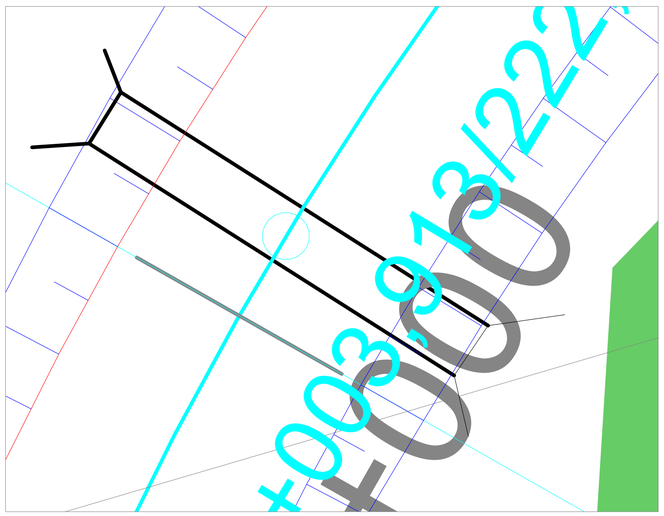


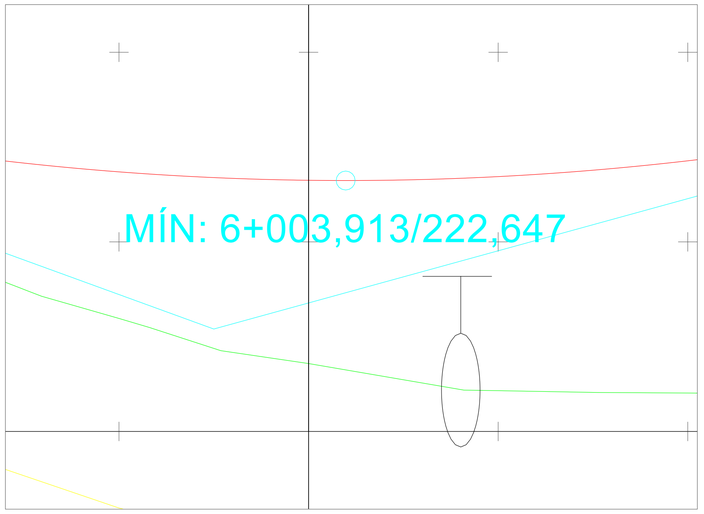
Bueiro 4 – cota mínima
Diâmetro: 1,2m
Recobrimento: 0,6m





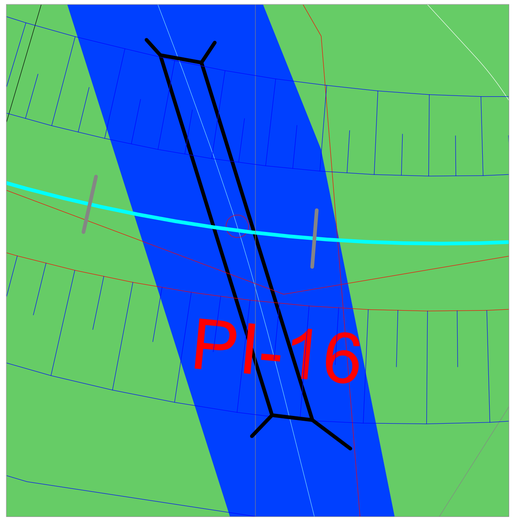
Bueiro 5 – córrego
Diâmetro: 1,2m
Recobrimento: 0,6m

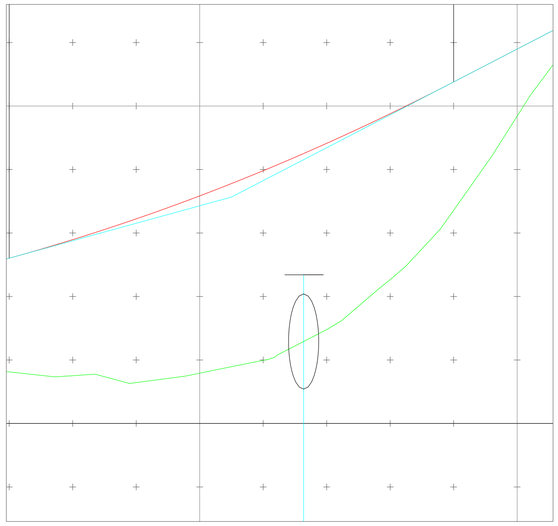




Bueiro 6 – cota mínima
Diâmetro: 1,2m
Recobrimento: 0,6m

ConnectSul	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	



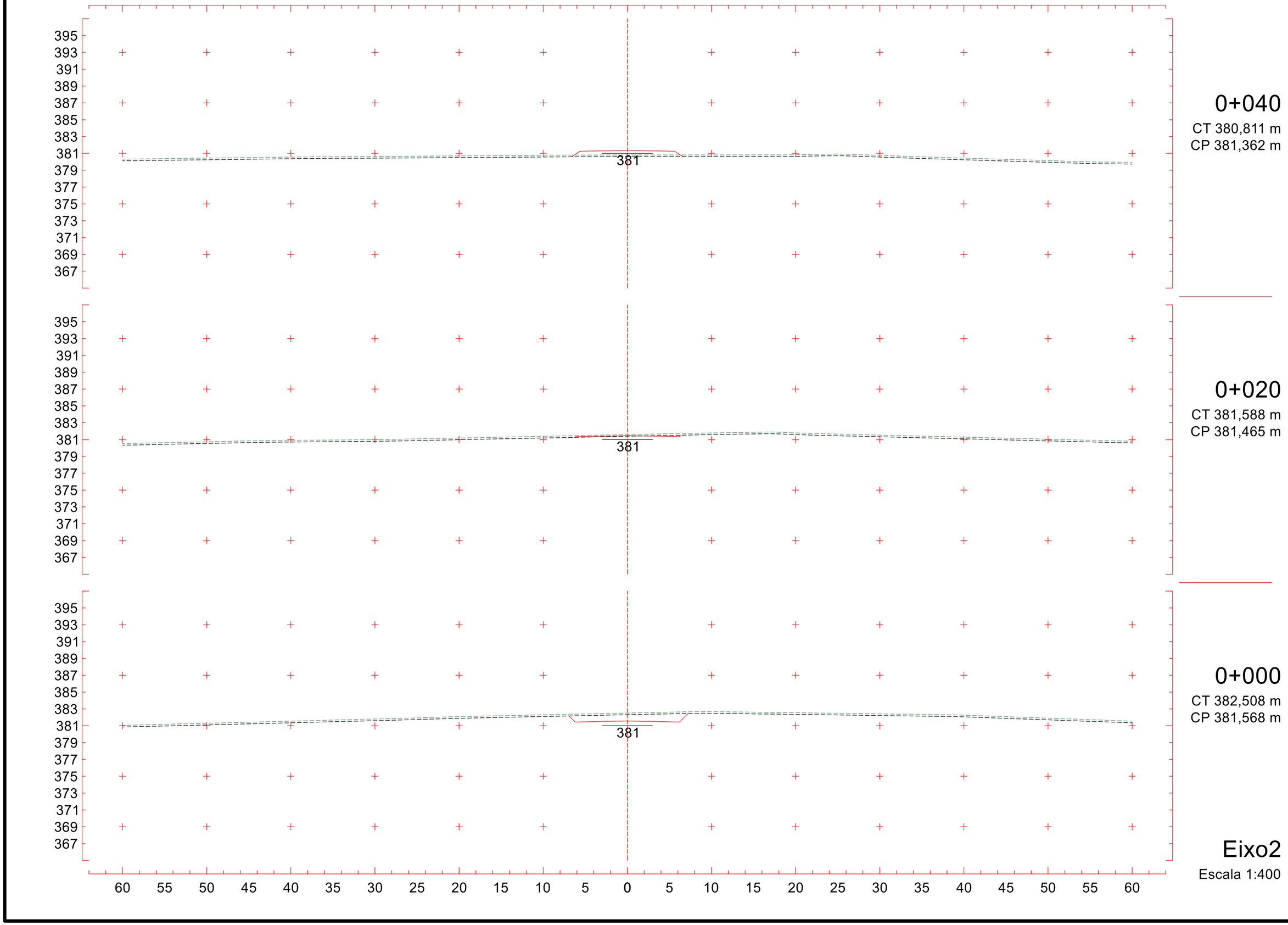


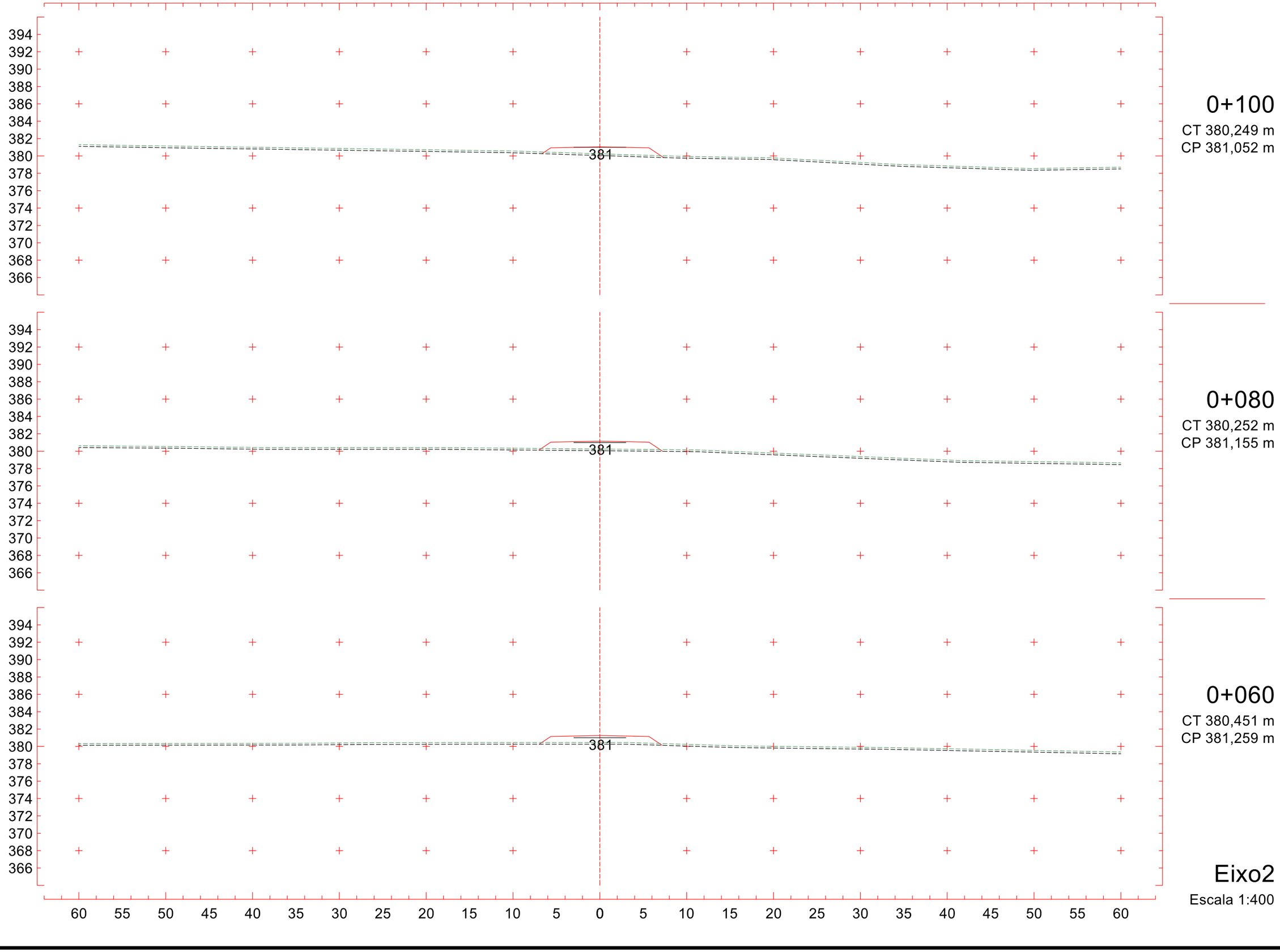
Bueiro 3 – Rio
Diâmetro: 1,5m
Recobrimento: 0,6m

PG

ConnectSul	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	

Seções Transversais


395
393
391
389
387
385
383
381
379
377
375
373
371
369
367
381
0+040
CT 380,811 m
CP 381,362 m
381
0+020
CT 381,588 m
CP 381,465 m
381
0+000
CT 382,508 m
CP 381,568 m
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
Eixo2
Escala 1:400

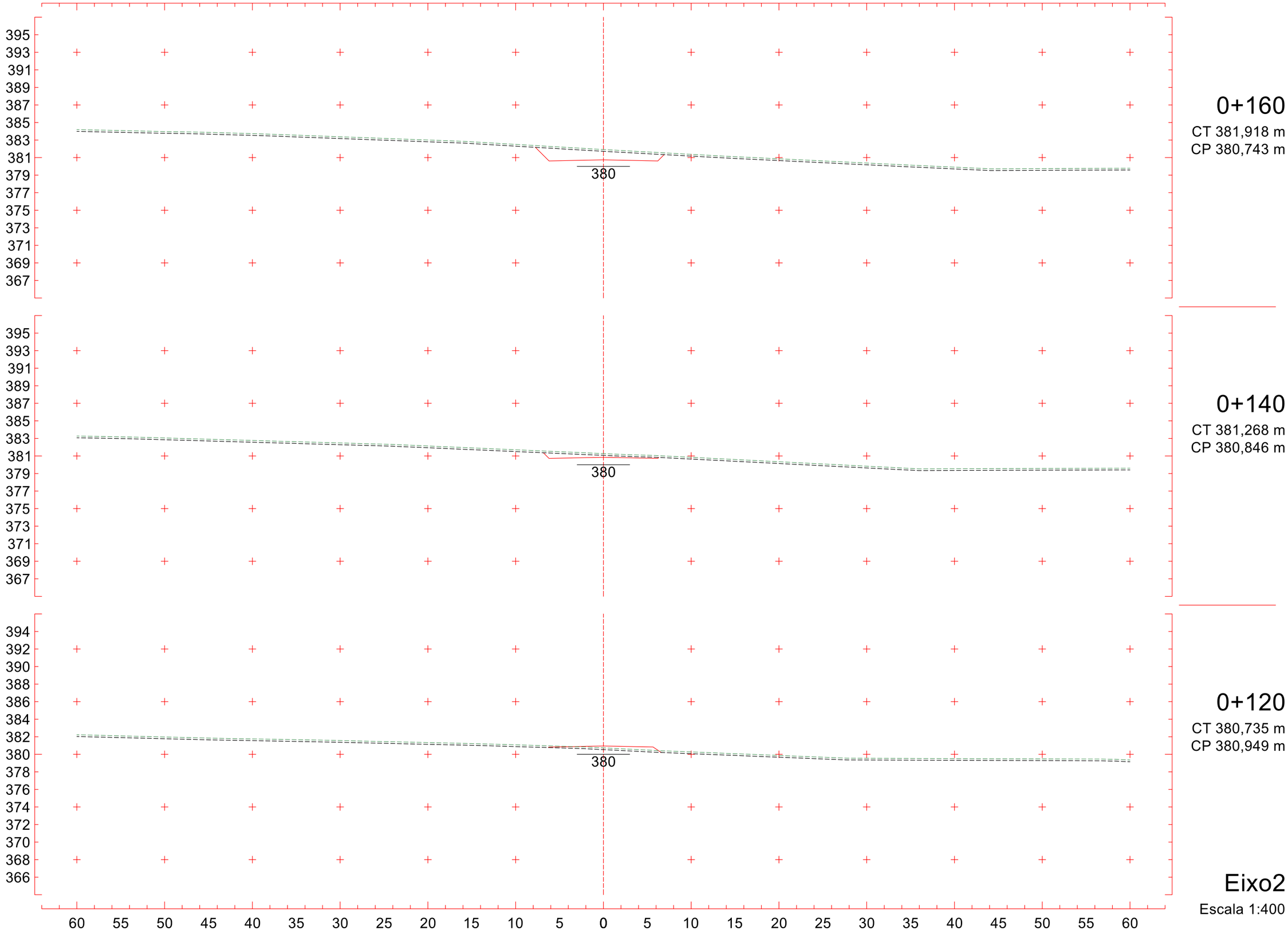


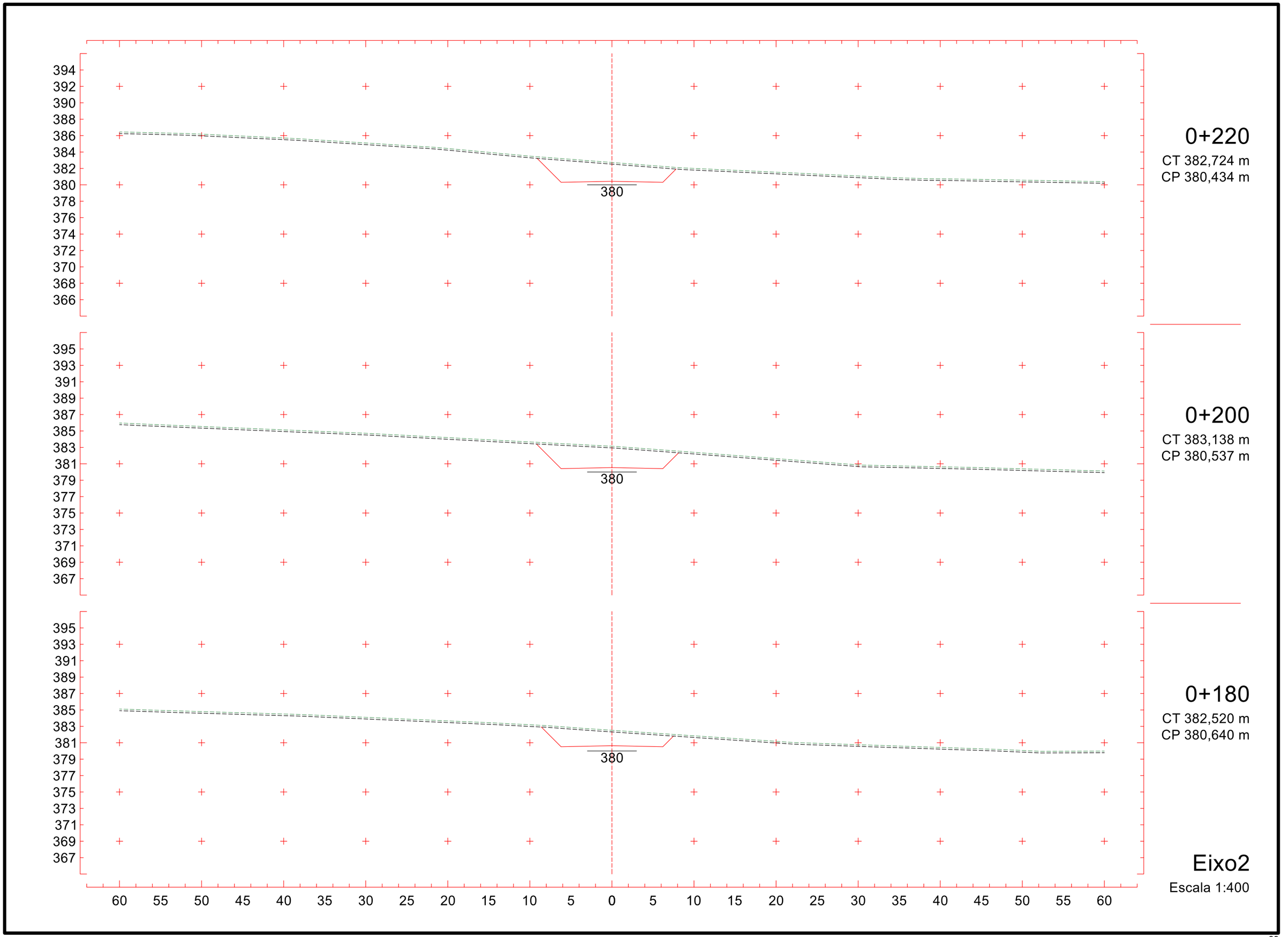
0+100
CT 380,249 m
CP 381,052 m

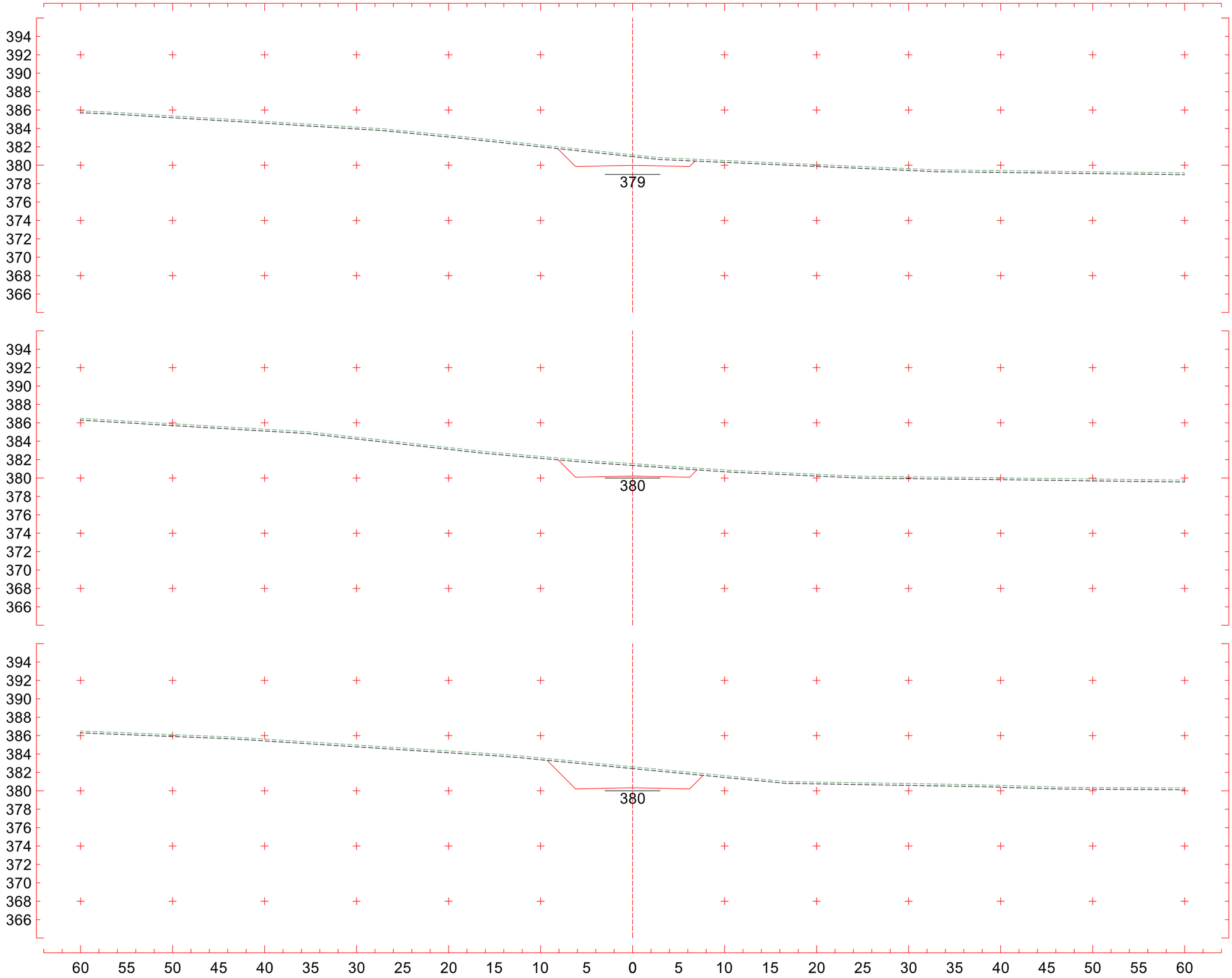
0+080
CT 380,252 m
CP 381,155 m

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

Eixo2
Escala 1:400


395
393
391
389
387
385
383
381
379
377
375
373
371
369
367
380
0+160
CT 381,918 m
CP 380,743 m
395
393
391
389
387
385
383
381
379
377
375
373
371
369
367
380
0+140
CT 381,268 m
CP 380,846 m
394
392
390
388
386
384
382
380
378
376
374
372
370
368
366
380
0+120
CT 380,735 m
CP 380,949 m
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
Eixo2
Escala 1:400


394
392
390
388
386
384
382
380
378
376
374
372
370
368
366
380
0+220
CT 382,724 m
CP 380,434 m
395
393
391
389
387
385
383
381
379
377
375
373
371
369
367
380
0+200
CT 383,138 m
CP 380,537 m
395
393
391
389
387
385
383
381
379
377
375
373
371
369
367
380
0+180
CT 382,520 m
CP 380,640 m
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
Eixo2
Escala 1:400

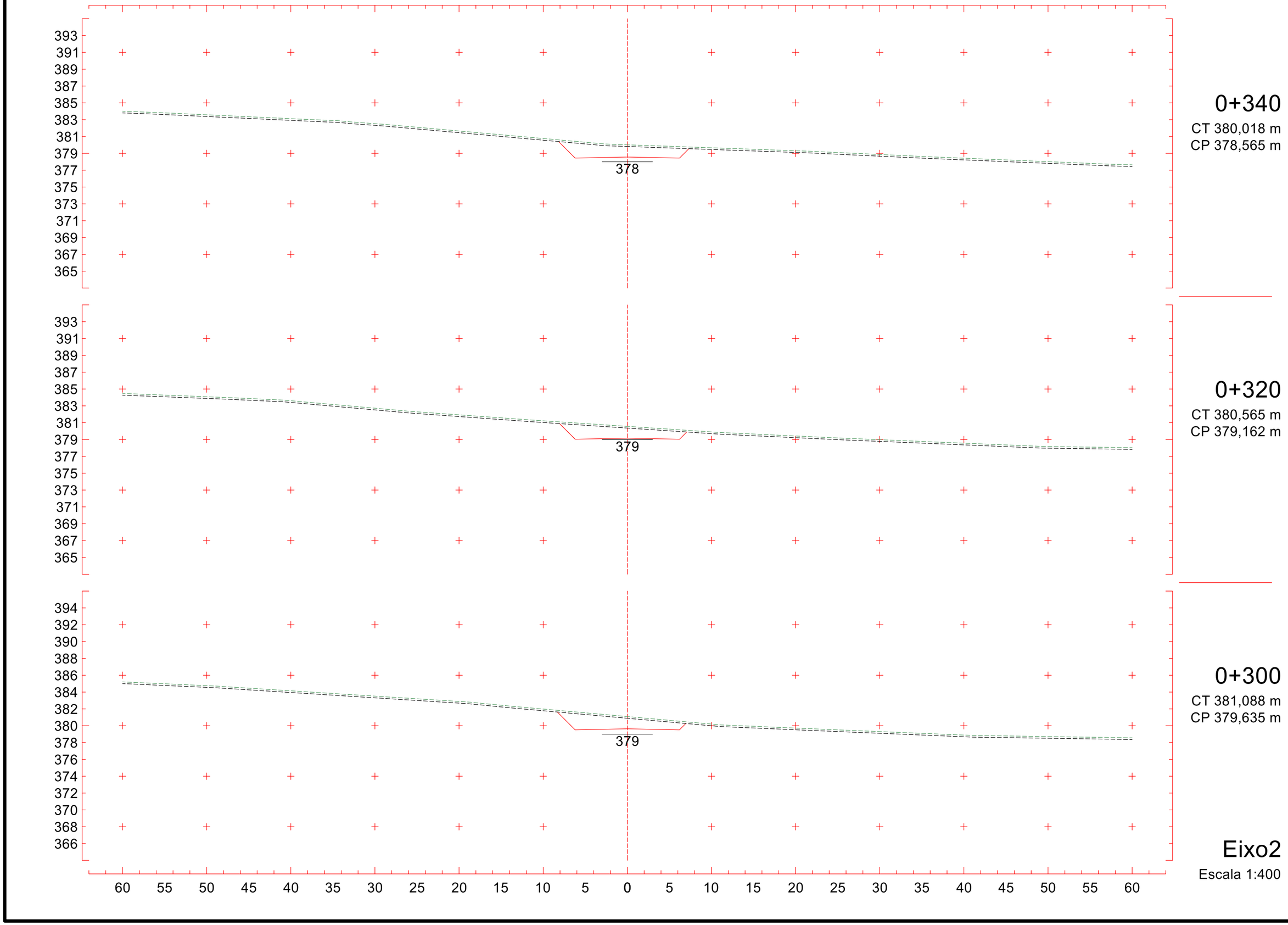


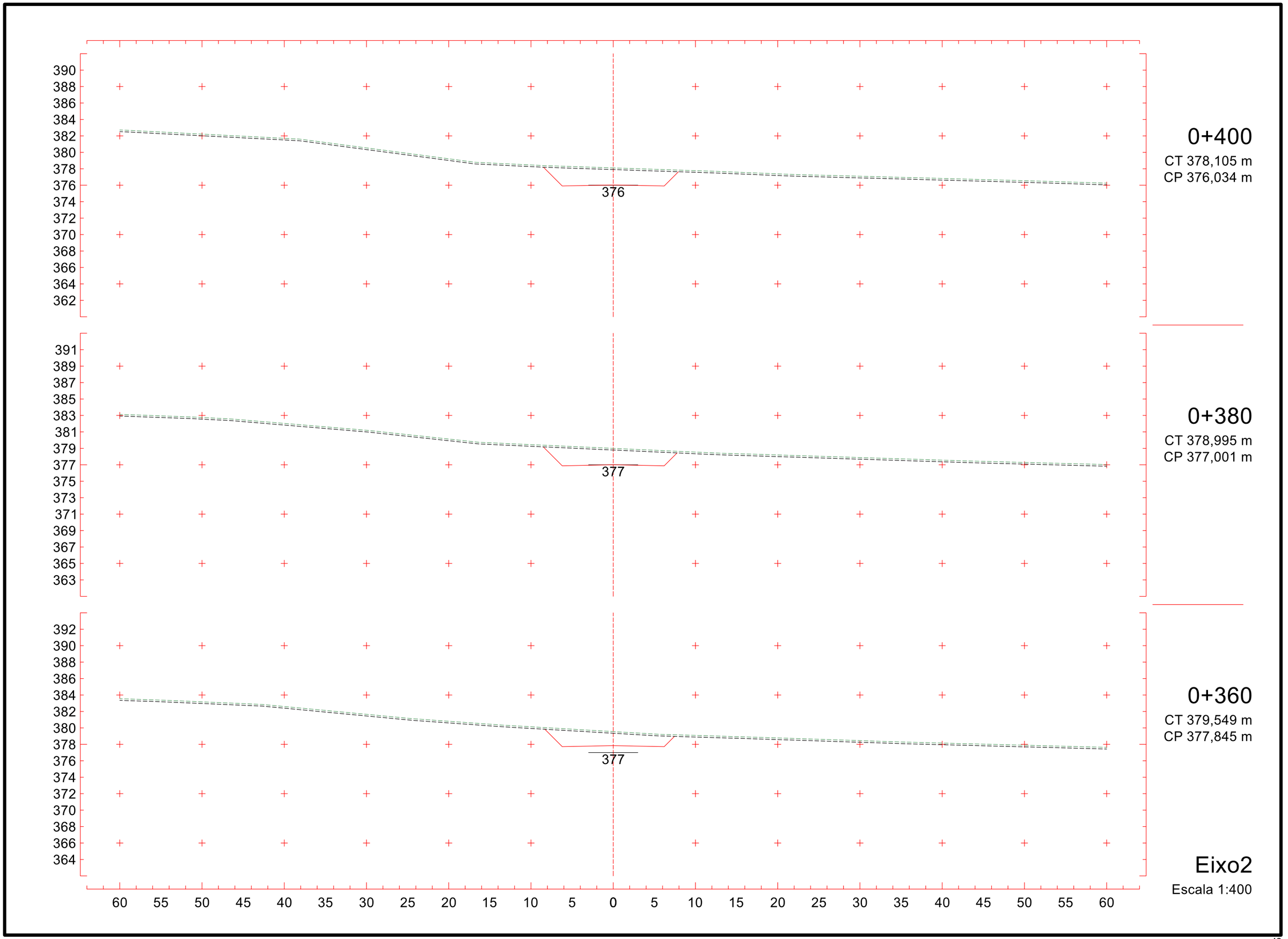
0+280
CT 381,136 m
CP 379,985 m

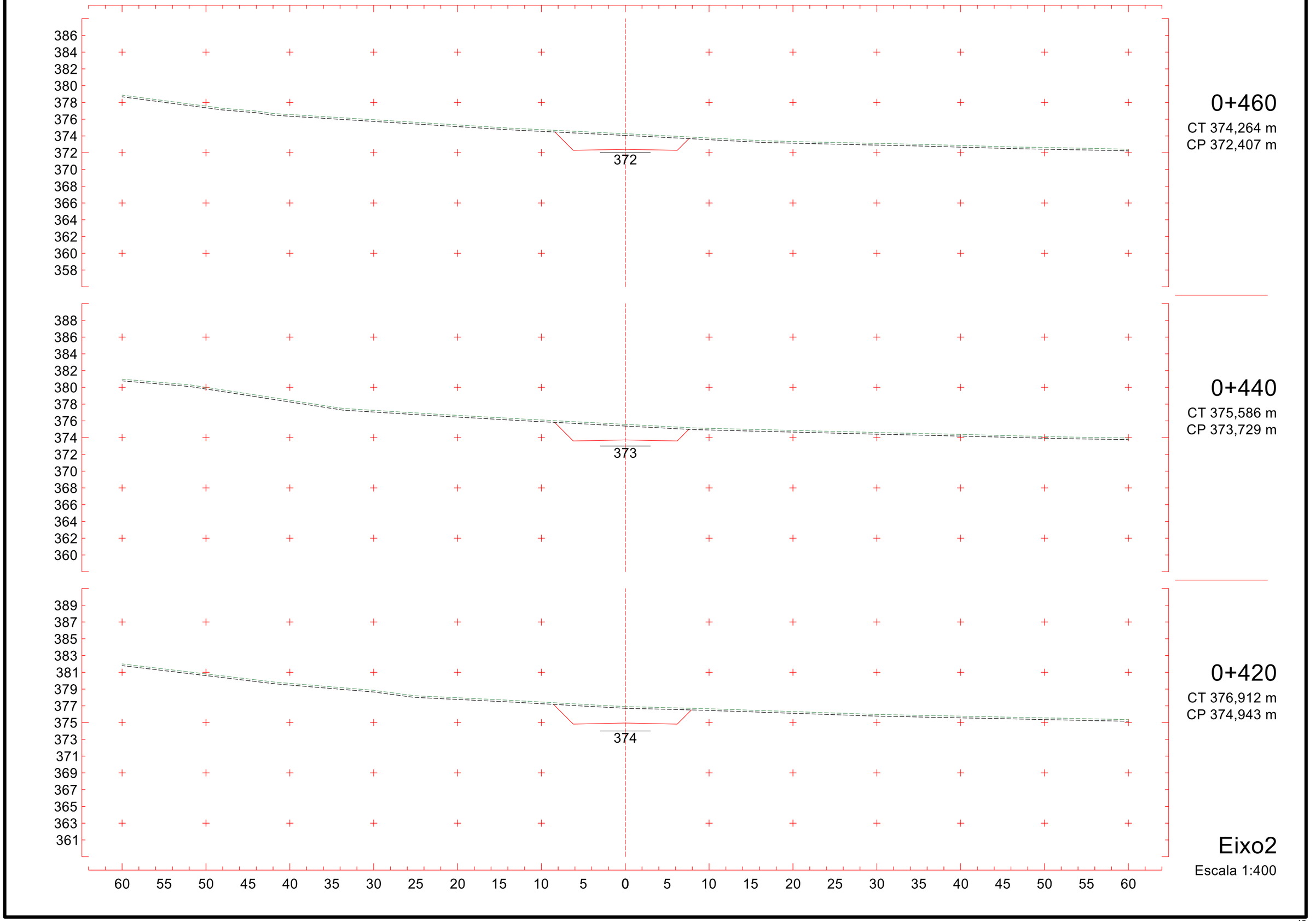
0+260
CT 381,565 m
CP 380,212 m

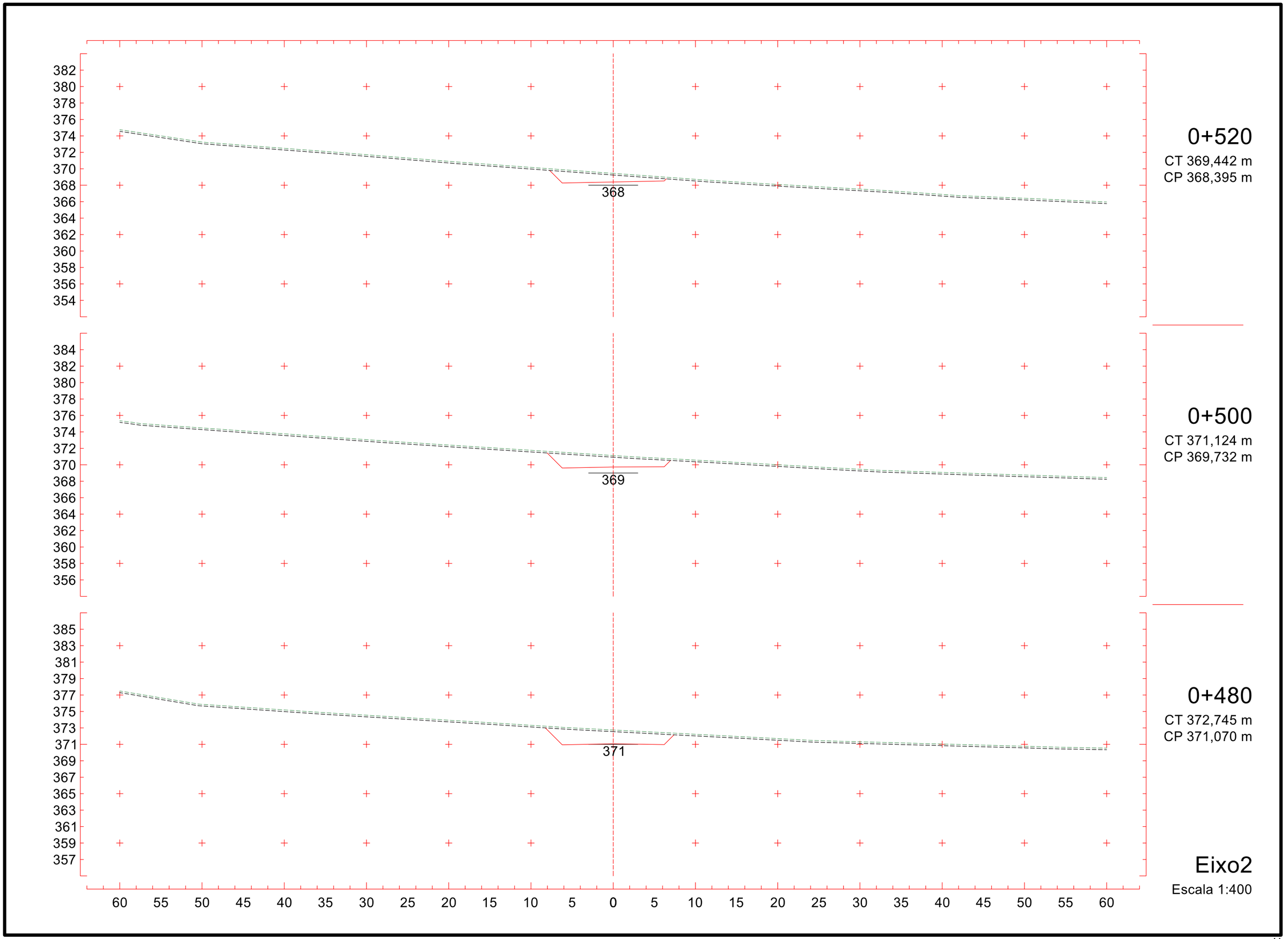
0+240
CT 382,615 m
CP 380,330 m

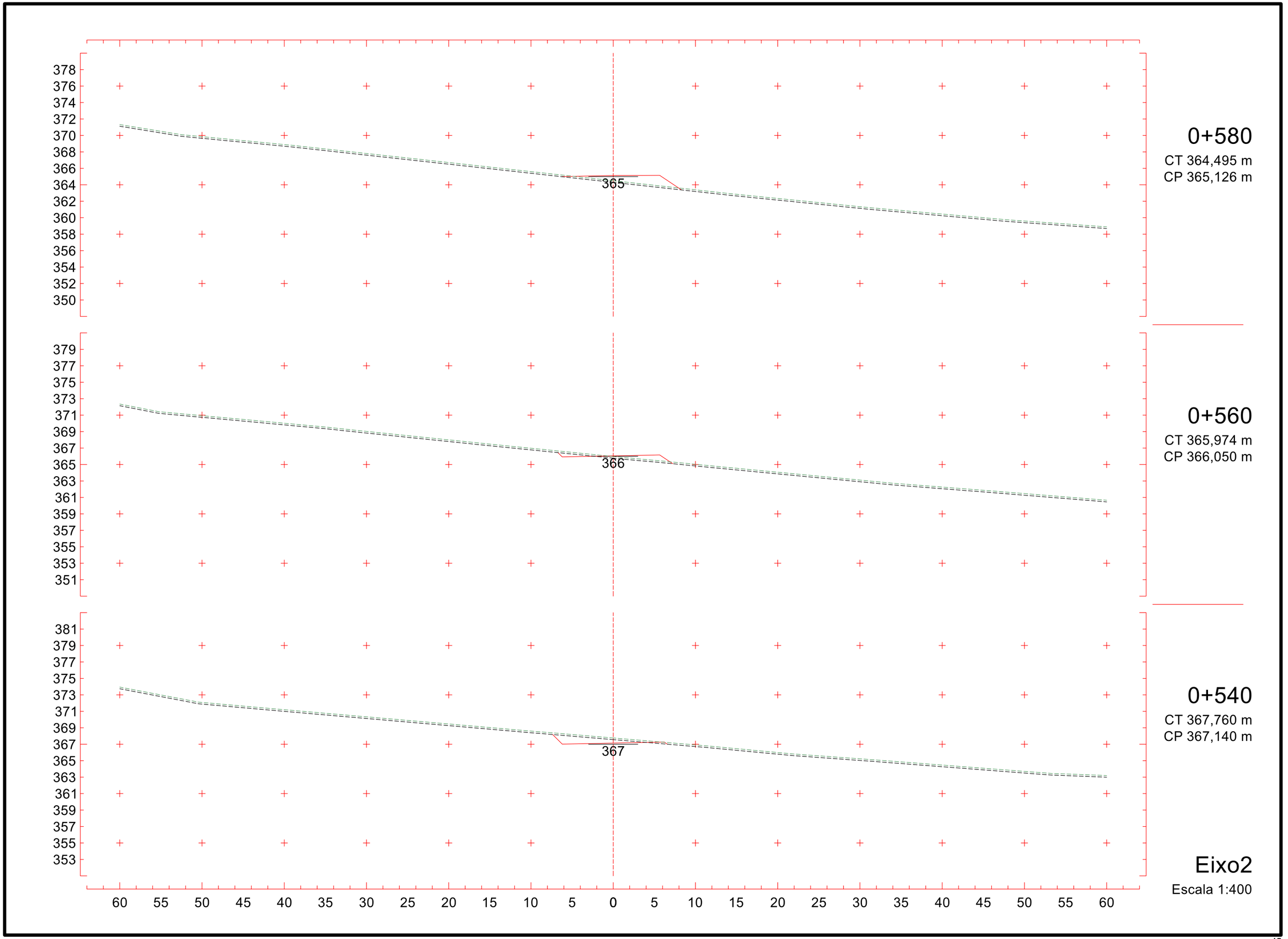
Eixo2
Escala 1:400

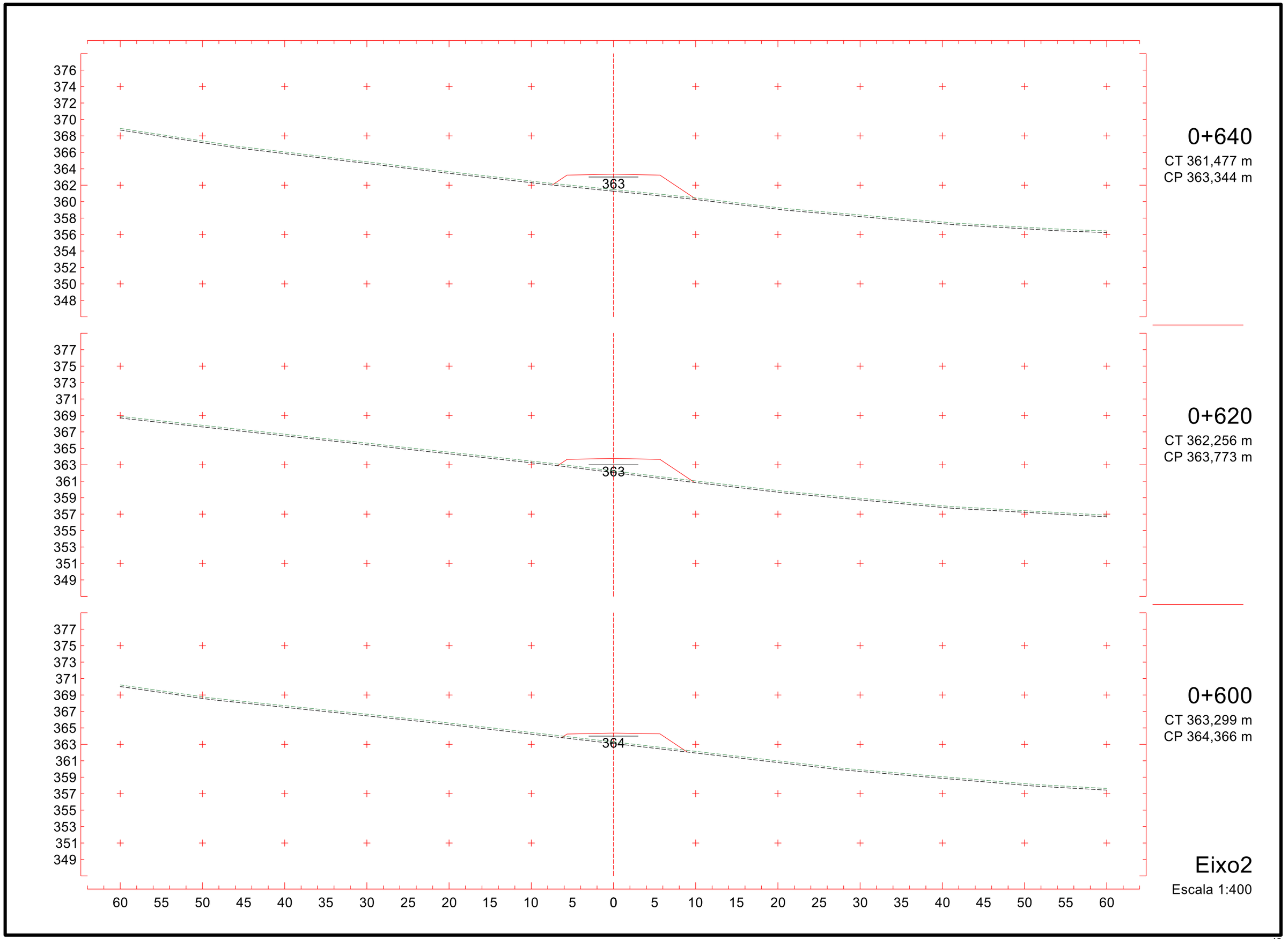

393
391
389
387
385
383
381
379
377
375
373
371
369
367
365
378
0+340
CT 380,018 m
CP 378,565 m
393
391
389
387
385
383
381
379
377
375
373
371
369
367
365
379
0+320
CT 380,565 m
CP 379,162 m
394
392
390
388
386
384
382
380
378
376
374
372
370
368
366
379
0+300
CT 381,088 m
CP 379,635 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

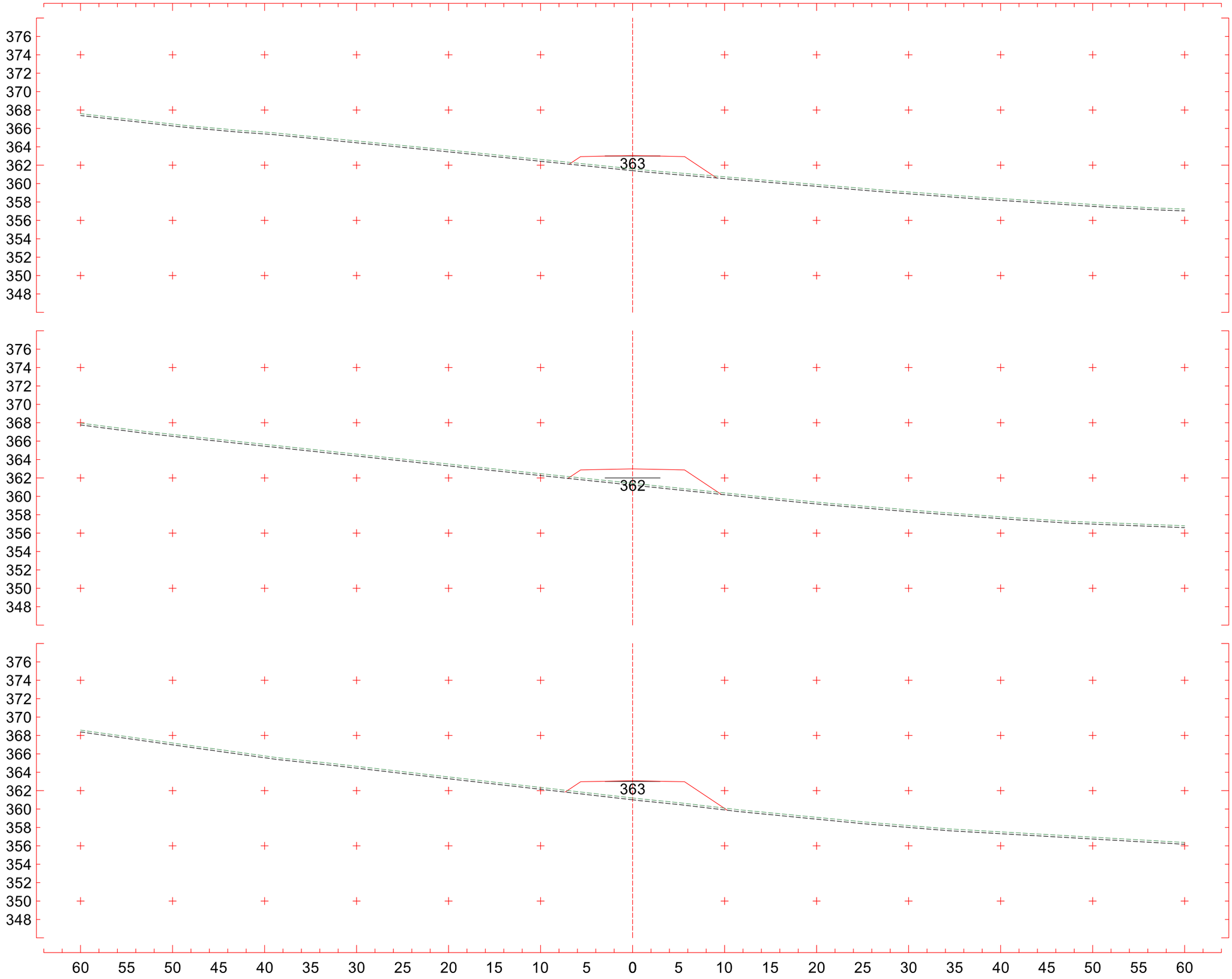

390
388
386
384
382
380
378
376
374
372
370
368
366
364
362
376
0+400
CT 378,105 m
CP 376,034 m
391
389
387
385
383
381
379
377
375
373
371
369
367
365
363
377
0+380
CT 378,995 m
CP 377,001 m
392
390
388
386
384
382
380
378
376
374
372
370
368
366
364
377
0+360
CT 379,549 m
CP 377,845 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

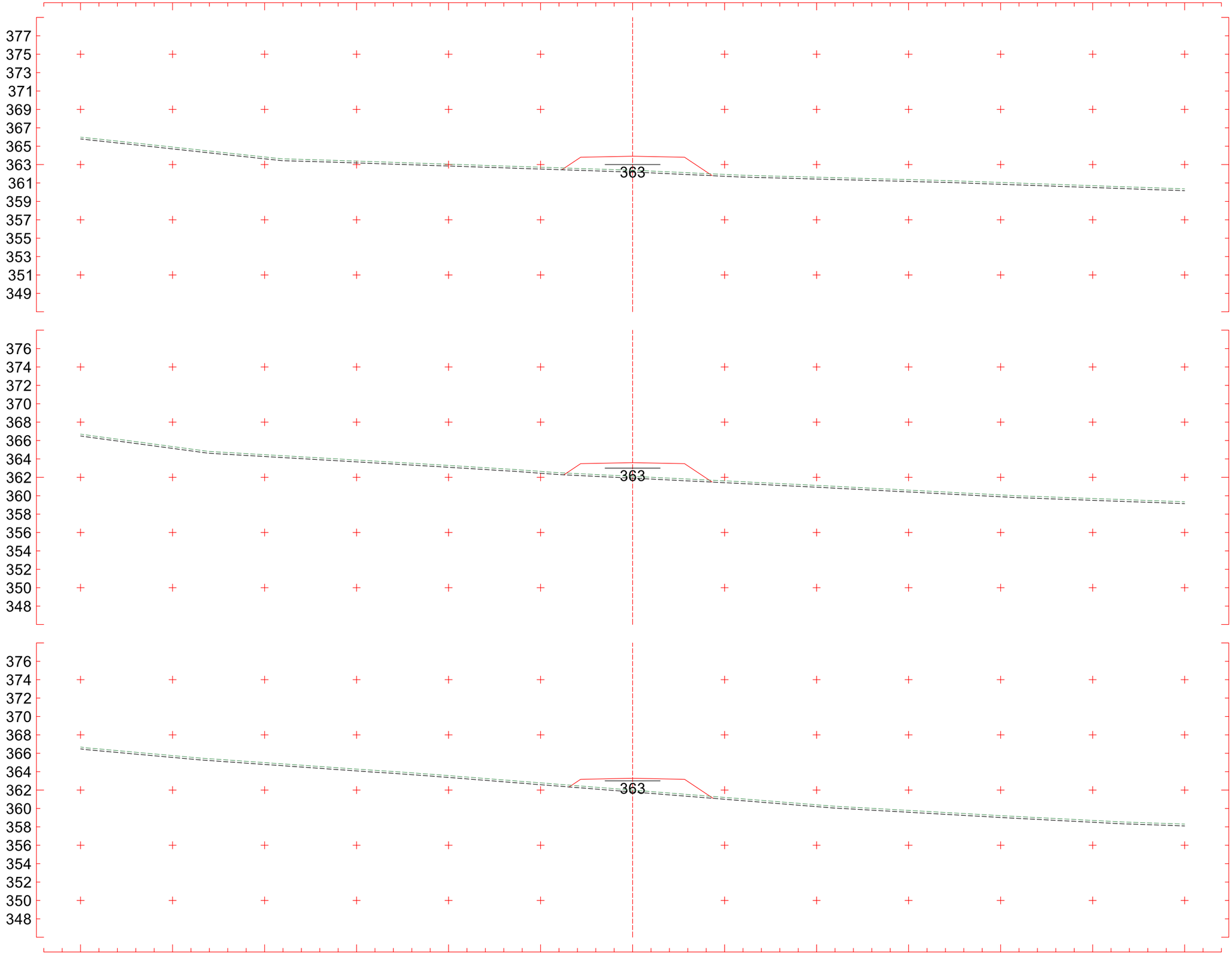

386
384
382
380
378
376
374
372
370
368
366
364
362
360
358
372
0+460
CT 374,264 m
CP 372,407 m
388
386
384
382
380
378
376
374
372
370
368
366
364
362
360
373
0+440
CT 375,586 m
CP 373,729 m
389
387
385
383
381
379
377
375
373
371
369
367
365
363
361
374
0+420
CT 376,912 m
CP 374,943 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

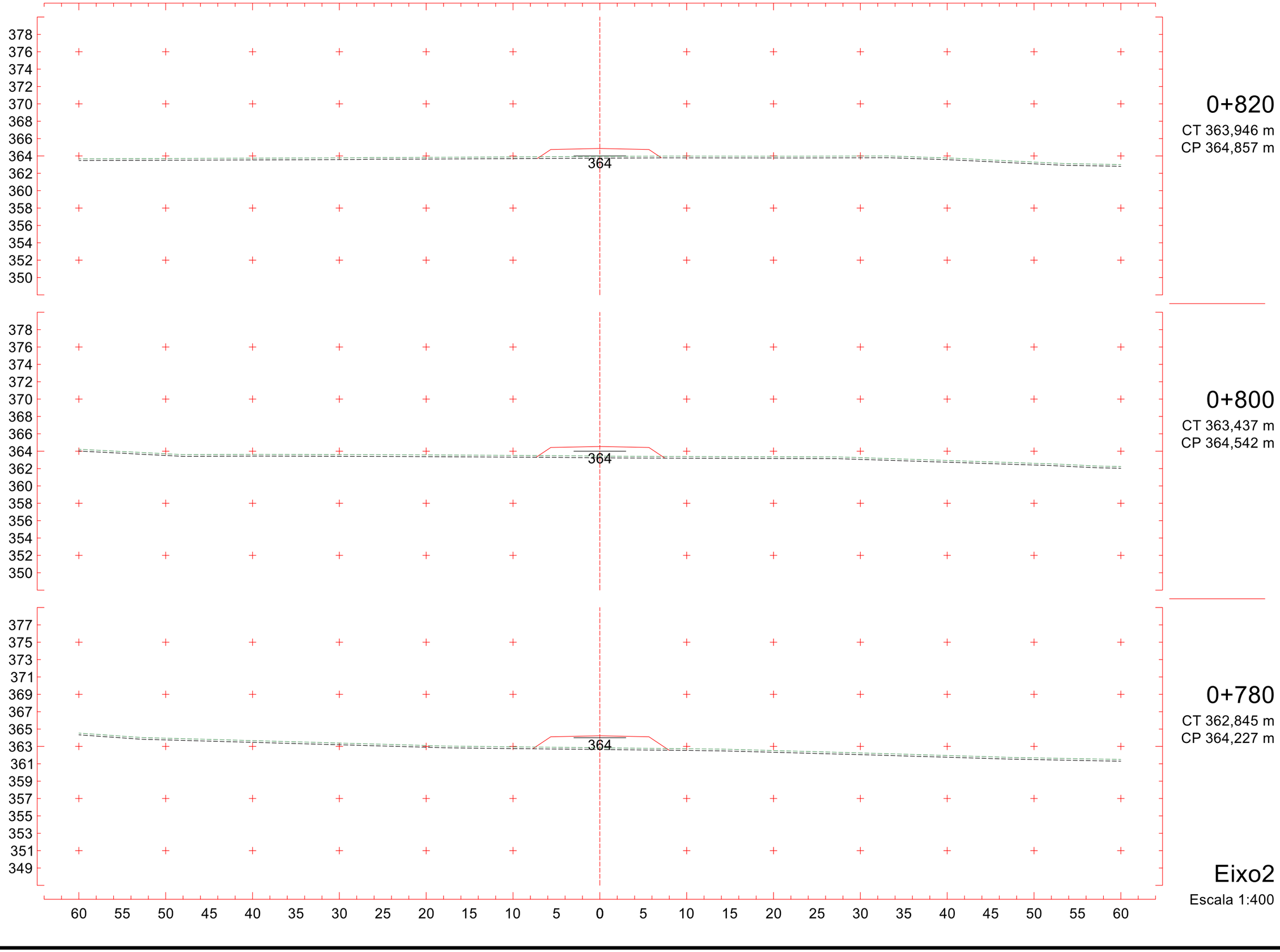

382
380
378
376
374
372
370
368
366
364
362
360
358
356
354
368
0+520
CT 369,442 m
CP 368,395 m
384
382
380
378
376
374
372
370
368
366
364
362
360
358
356
369
0+500
CT 371,124 m
CP 369,732 m
385
383
381
379
377
375
373
371
369
367
365
363
361
359
357
371
0+480
CT 372,745 m
CP 371,070 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

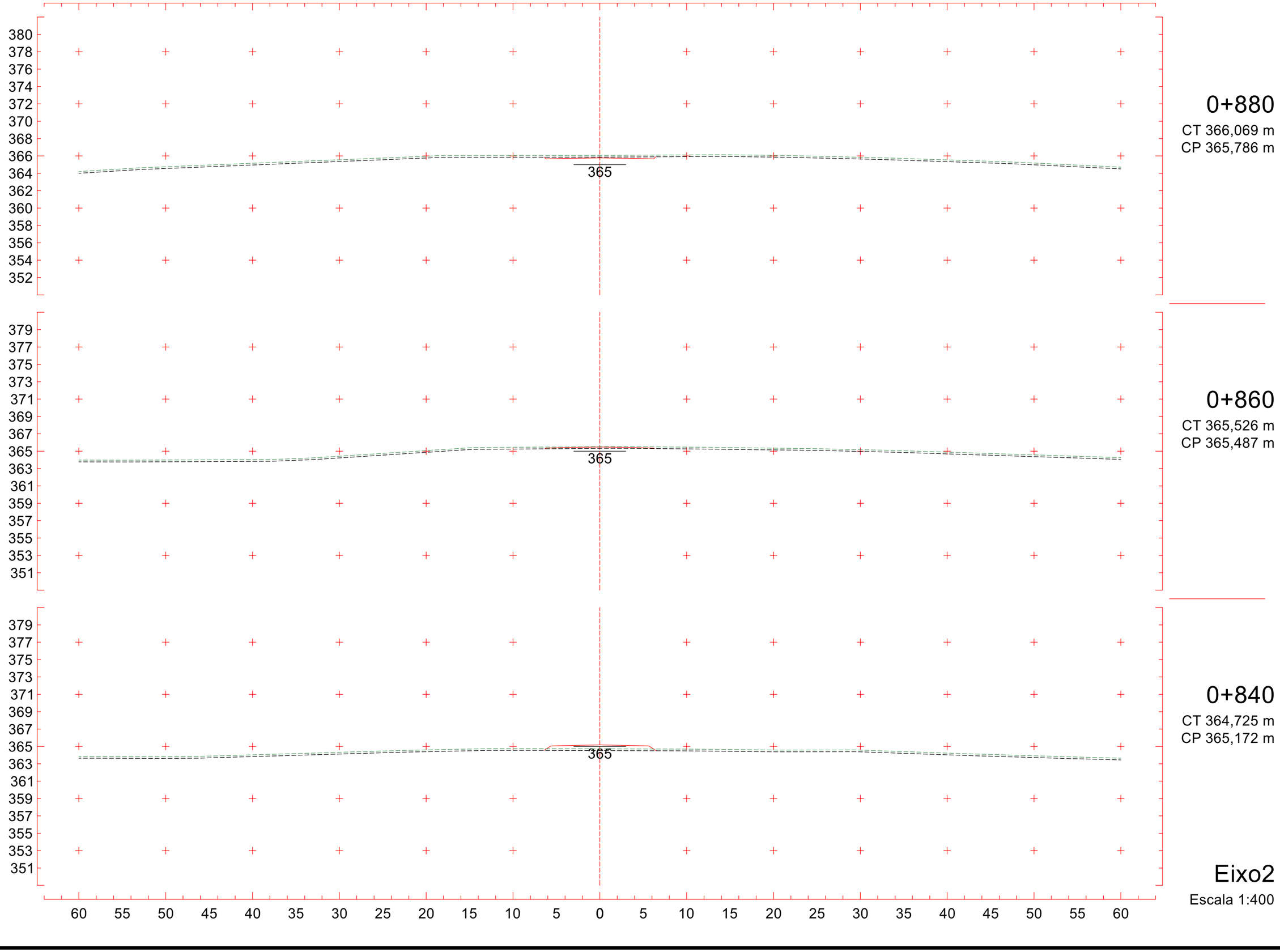

0+580
CT 364,495 m
CP 365,126 m
365
0+560
CT 365,974 m
CP 366,050 m
366
0+540
CT 367,760 m
CP 367,140 m
367
Eixo2
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

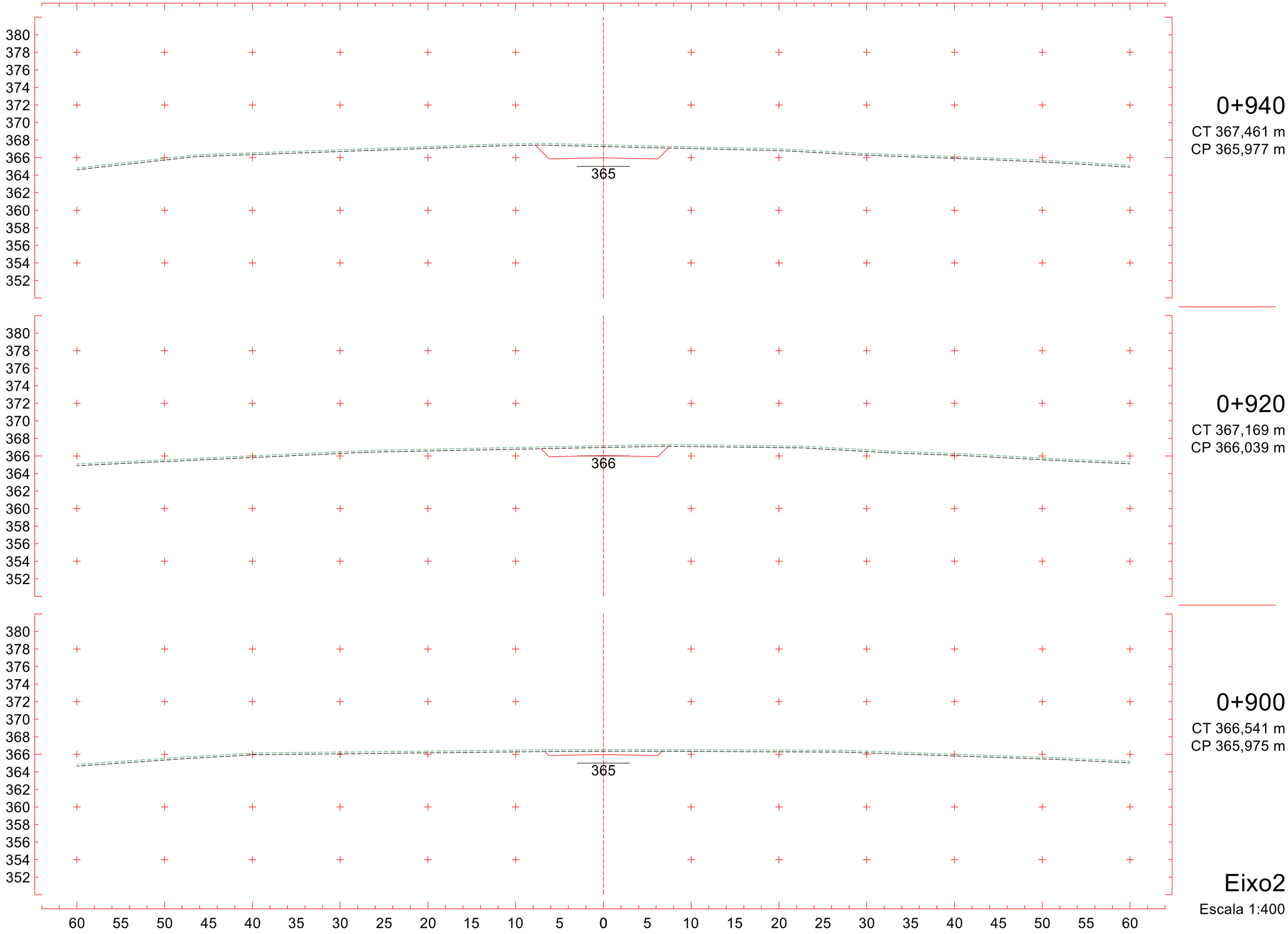

376
374
372
370
368
366
364
362
360
358
356
354
352
350
348
363
0+640
CT 361,477 m
CP 363,344 m
377
375
373
371
369
367
365
363
361
359
357
355
353
351
349
363
0+620
CT 362,256 m
CP 363,773 m
377
375
373
371
369
367
365
363
361
359
357
355
353
351
349
364
0+600
CT 363,299 m
CP 364,366 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

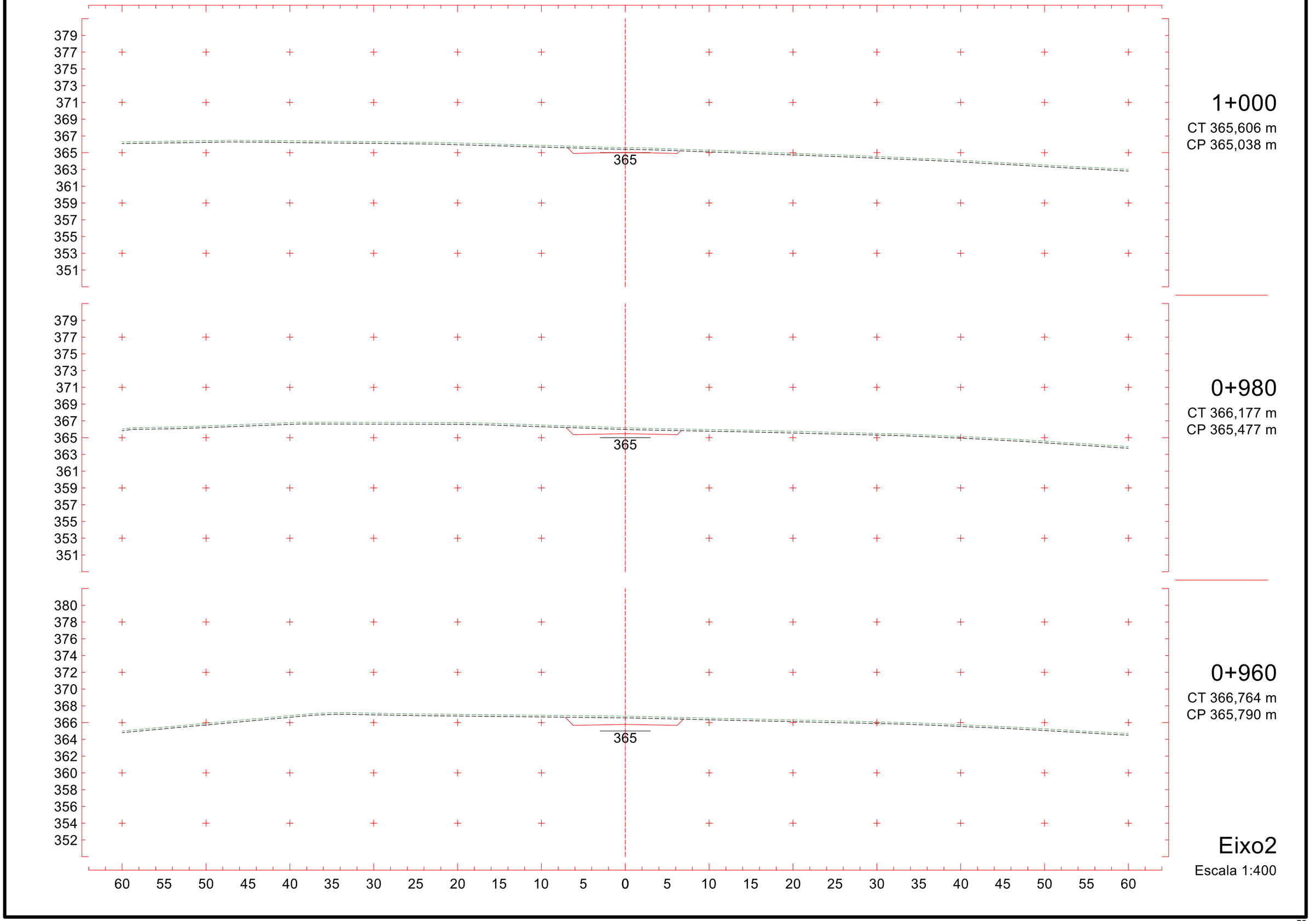

376
374
372
370
368
366
364
362
360
358
356
354
352
350
348
363
0+700
CT 361,607 m
CP 363,049 m
362
0+680
CT 361,417 m
CP 362,982 m
363
0+660
CT 361,206 m
CP 363,081 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

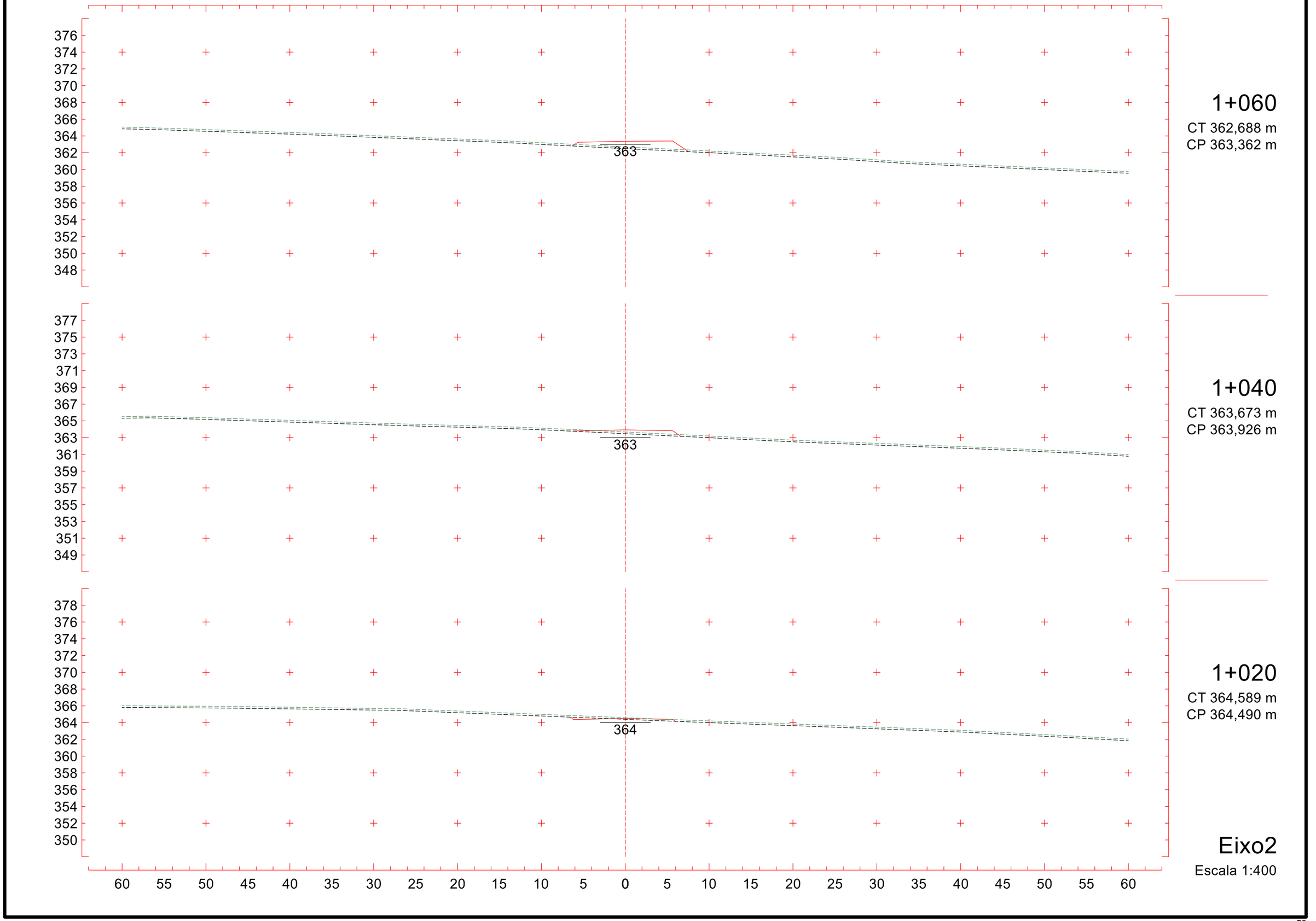

377
375
373
371
369
367
365
363
361
359
357
355
353
351
349
363
0+760
CT 362,383 m
CP 363,912 m
376
374
372
370
368
366
364
362
360
358
356
354
352
350
348
363
0+740
CT 362,109 m
CP 363,597 m
376
374
372
370
368
366
364
362
360
358
356
354
352
350
348
363
0+720
CT 361,994 m
CP 363,282 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

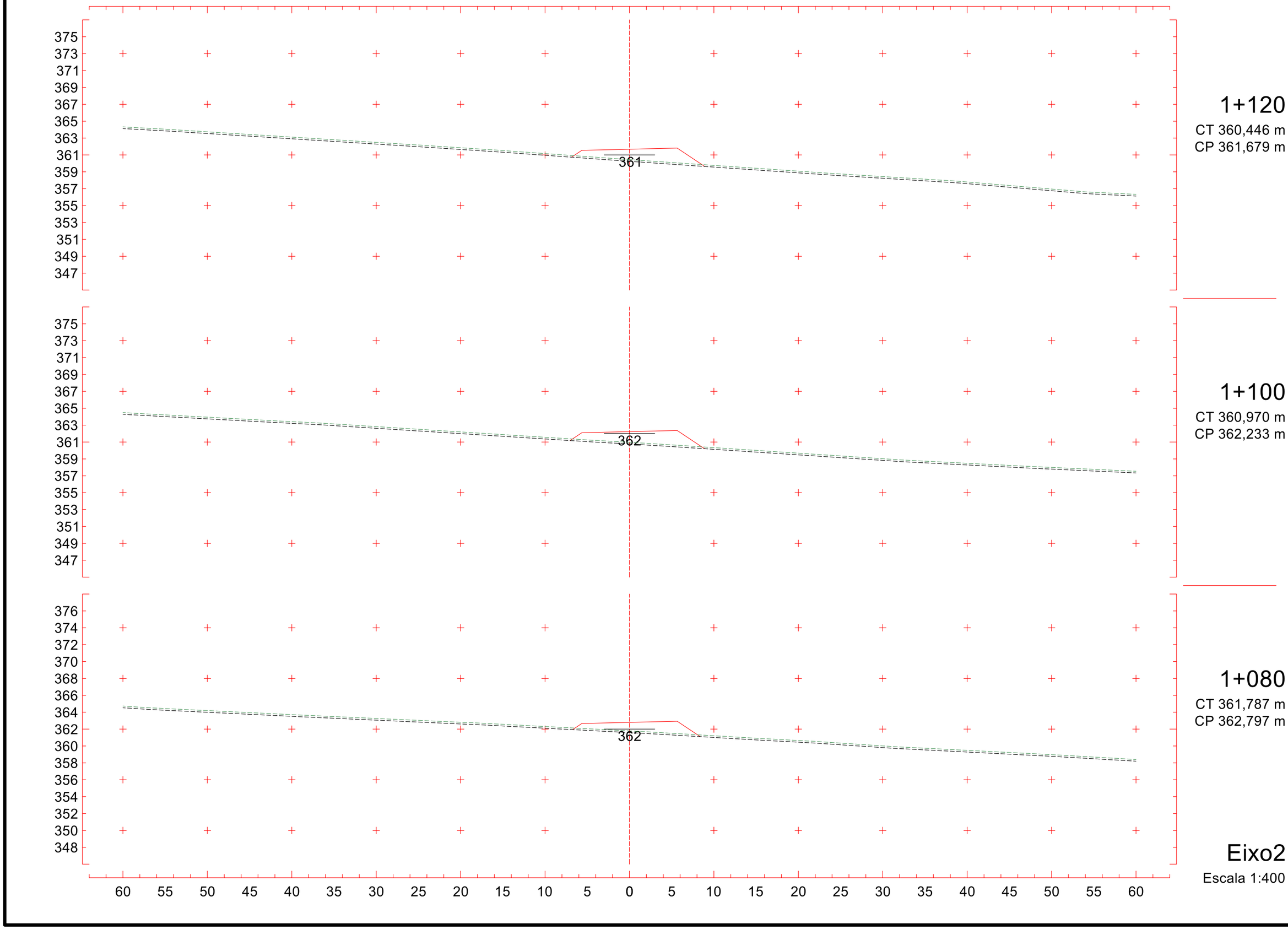

0+820
CT 363,946 m
CP 364,857 m
0+800
CT 363,437 m
CP 364,542 m
0+780
CT 362,845 m
CP 364,227 m
Eixo2
Escala 1:400
364
364
364
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

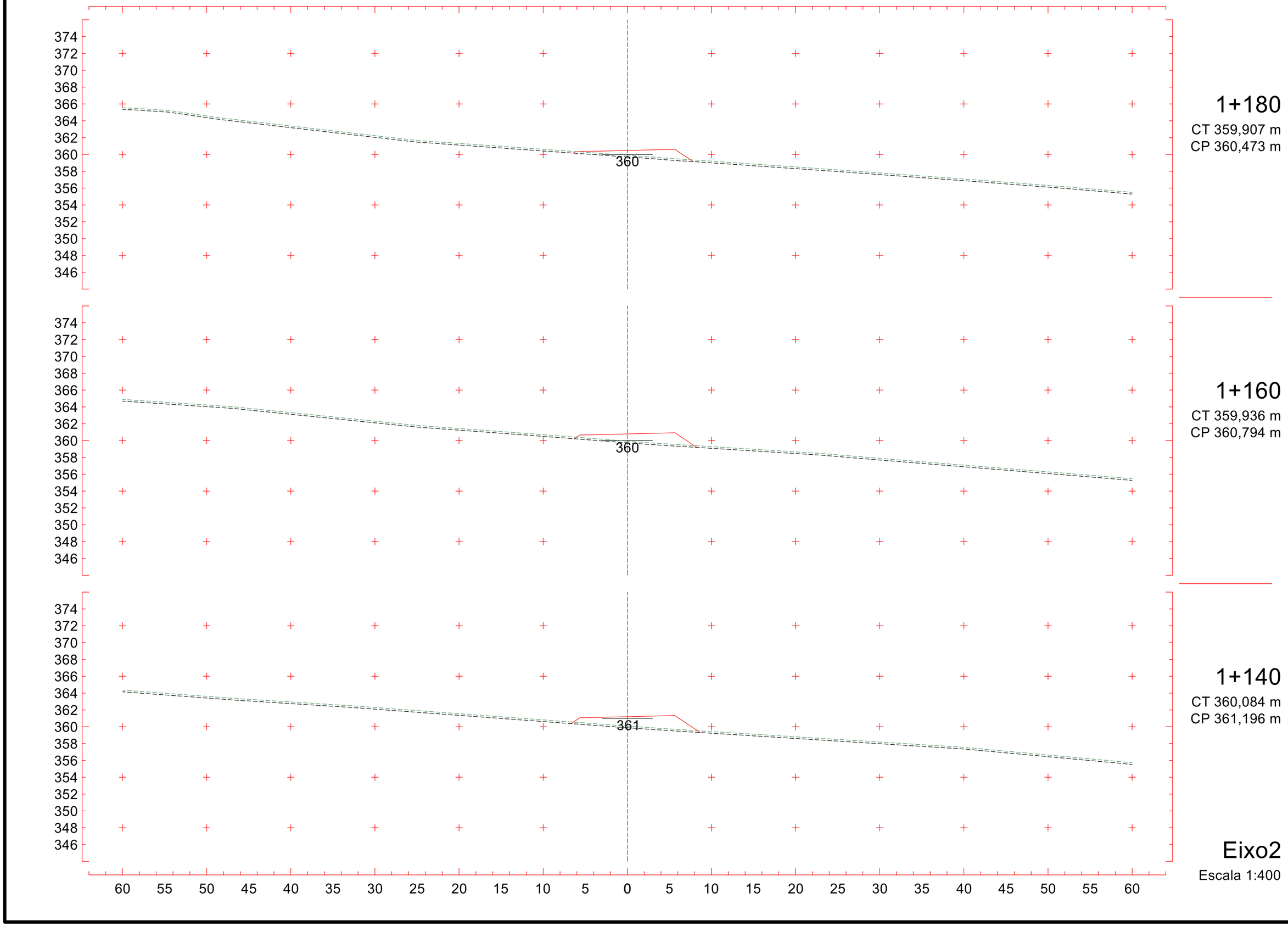

380
378
376
374
372
370
368
366
364
362
360
358
356
354
352
365
379
377
375
373
371
369
367
365
363
361
359
357
355
353
351
365
379
377
375
373
371
369
367
365
363
361
359
357
355
353
351
365
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
0+880
CT 366,069 m
CP 365,786 m
0+860
CT 365,526 m
CP 365,487 m
0+840
CT 364,725 m
CP 365,172 m
Eixo2
Escala 1:400

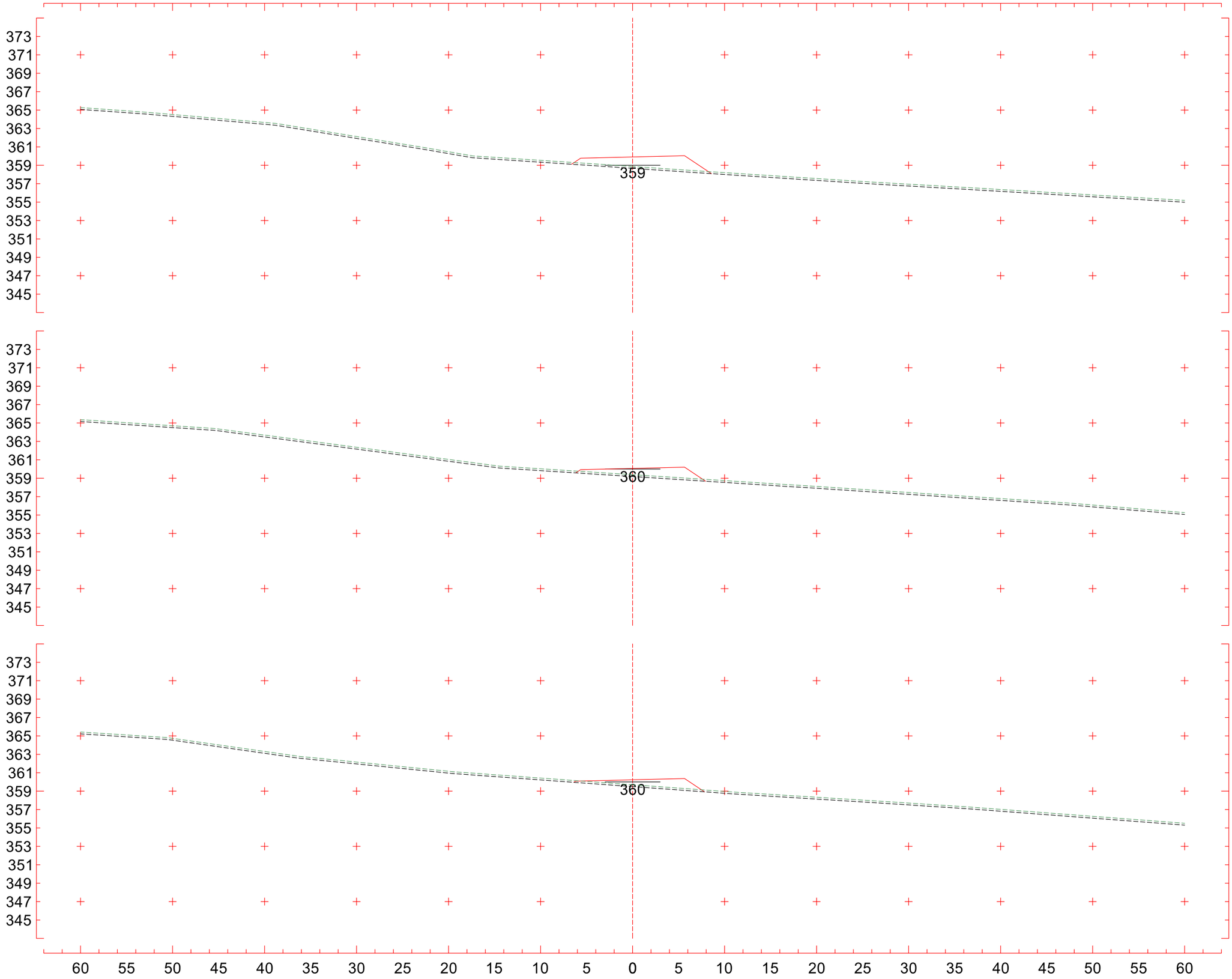

380
378
376
374
372
370
368
366
364
362
360
358
356
354
352
365
0+940
CT 367,461 m
CP 365,977 m
366
0+920
CT 367,169 m
CP 366,039 m
365
0+900
CT 366,541 m
CP 365,975 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

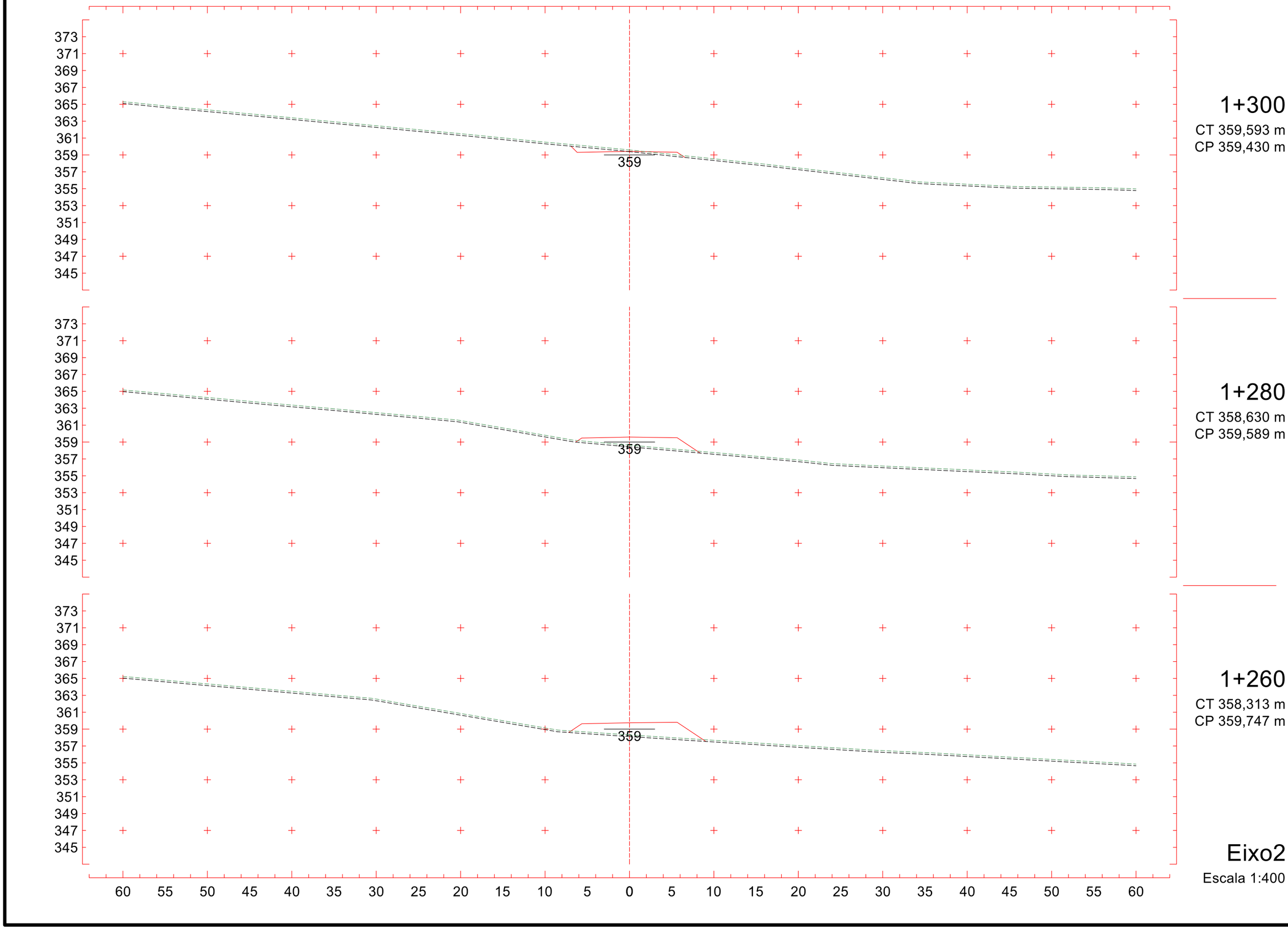

379
377
375
373
371
369
367
365
363
361
359
357
355
353
351
365
1+000
CT 365,606 m
CP 365,038 m
379
377
375
373
371
369
367
365
363
361
359
357
355
353
351
365
0+980
CT 366,177 m
CP 365,477 m
380
378
376
374
372
370
368
366
364
362
360
358
356
354
352
365
0+960
CT 366,764 m
CP 365,790 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

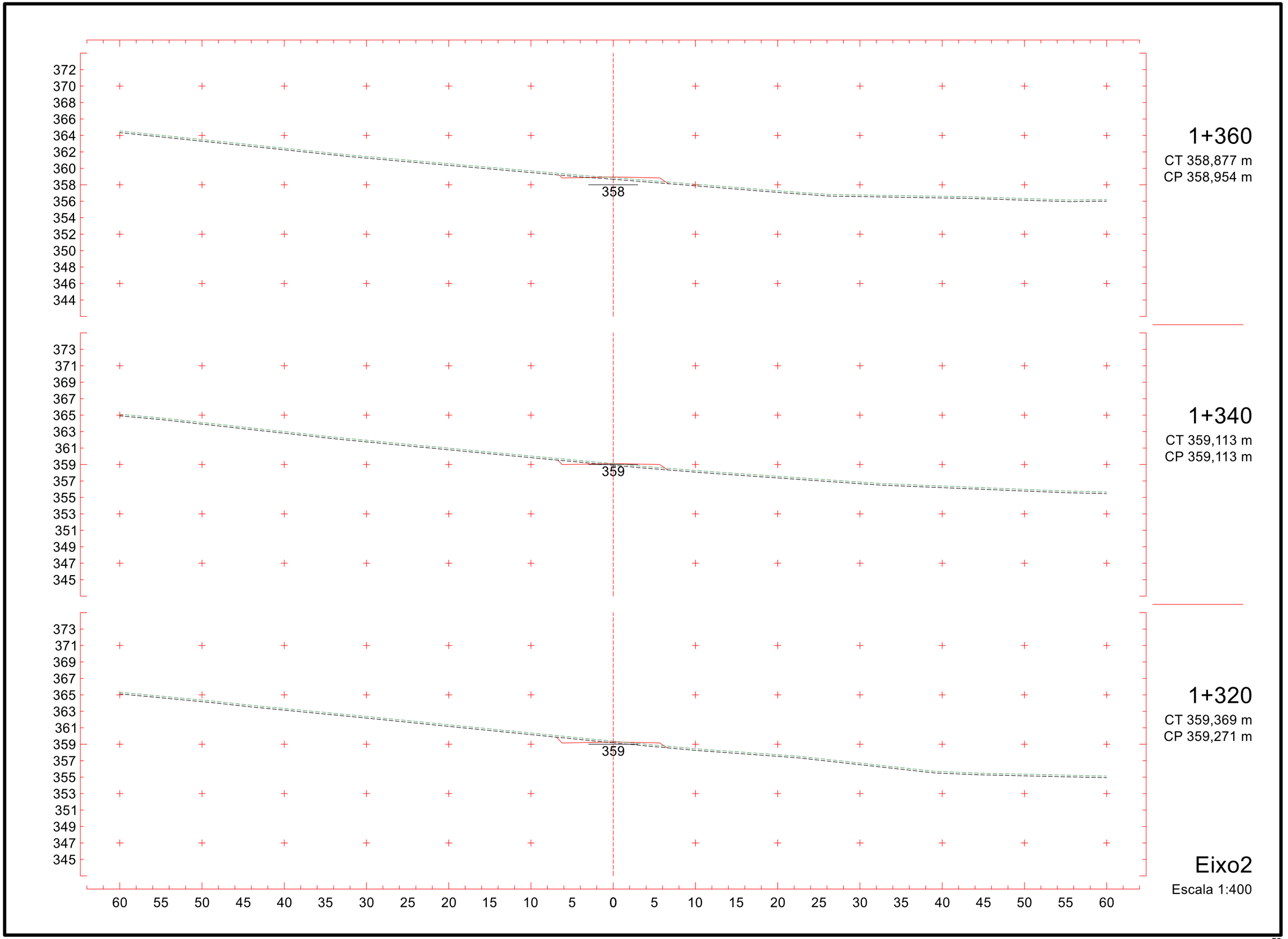

376
374
372
370
368
366
364
362
360
358
356
354
352
350
348
363
1+060
CT 362,688 m
CP 363,362 m
377
375
373
371
369
367
365
363
361
359
357
355
353
351
349
363
1+040
CT 363,673 m
CP 363,926 m
378
376
374
372
370
368
366
364
362
360
358
356
354
352
350
364
1+020
CT 364,589 m
CP 364,490 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

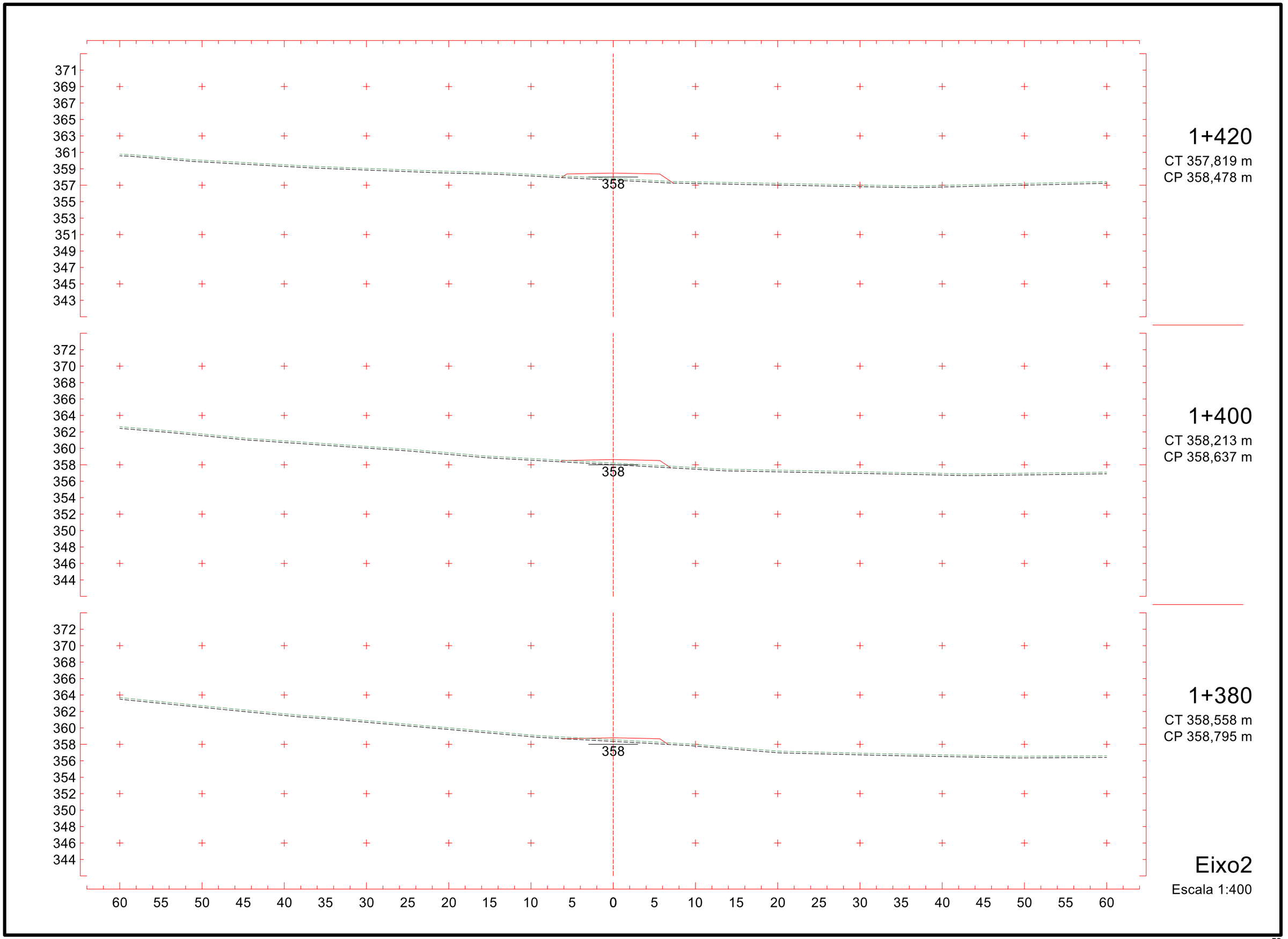

375
373
371
369
367
365
363
361
359
357
355
353
351
349
347
361
1+120
CT 360,446 m
CP 361,679 m
375
373
371
369
367
365
363
361
359
357
355
353
351
349
347
362
1+100
CT 360,970 m
CP 362,233 m
376
374
372
370
368
366
364
362
360
358
356
354
352
350
348
362
1+080
CT 361,787 m
CP 362,797 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

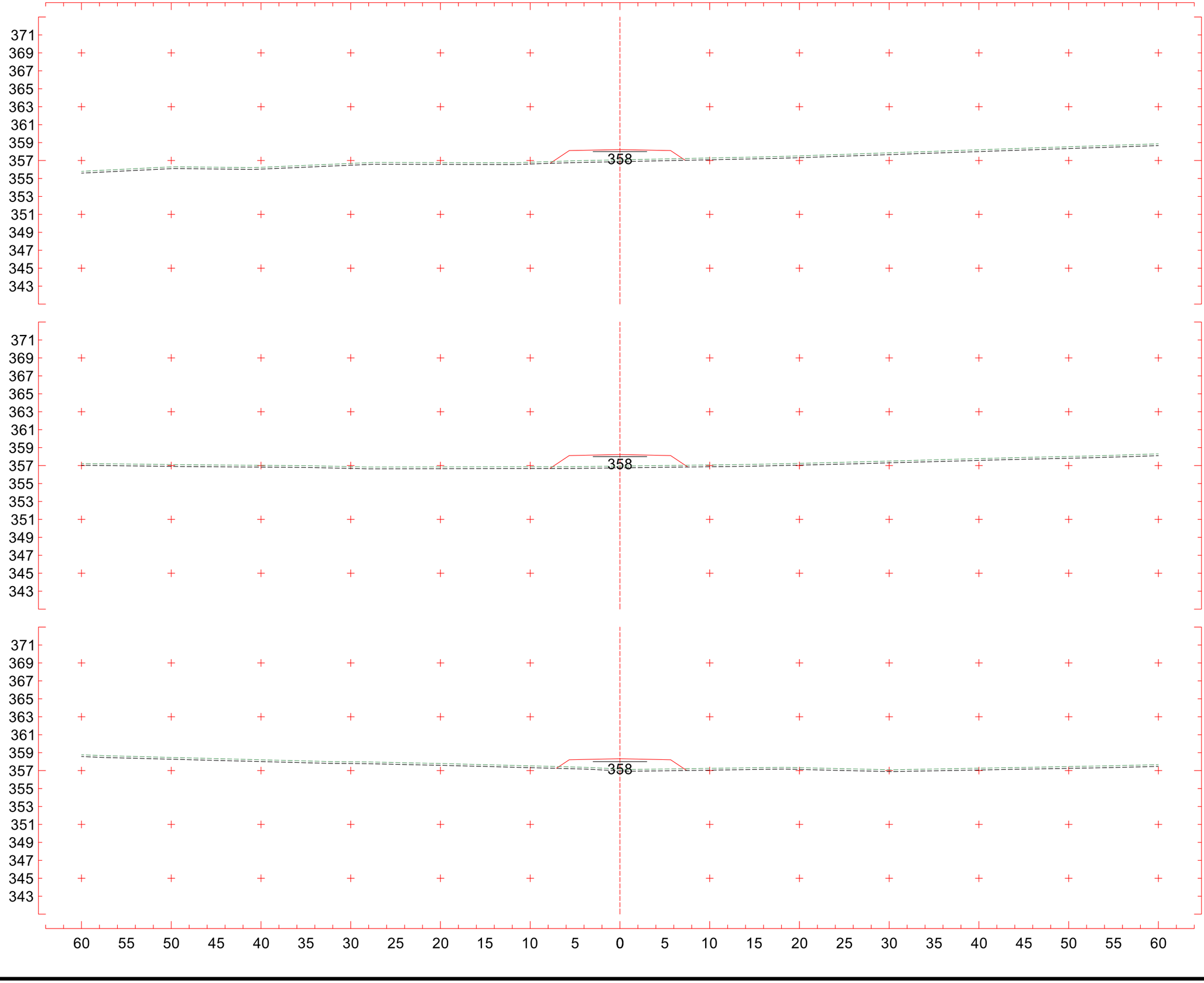

374
372
370
368
366
364
362
360
358
356
354
352
350
348
346
360
1+180
CT 359,907 m
CP 360,473 m
374
372
370
368
366
364
362
360
358
356
354
352
350
348
346
360
1+160
CT 359,936 m
CP 360,794 m
374
372
370
368
366
364
362
360
358
356
354
352
350
348
346
361
1+140
CT 360,084 m
CP 361,196 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
359
1+240
CT 358,871 m
CP 359,906 m
360
1+220
CT 359,383 m
CP 360,065 m
360
1+200
CT 359,694 m
CP 360,234 m
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
Eixo2
Escala 1:400


373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
359
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
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

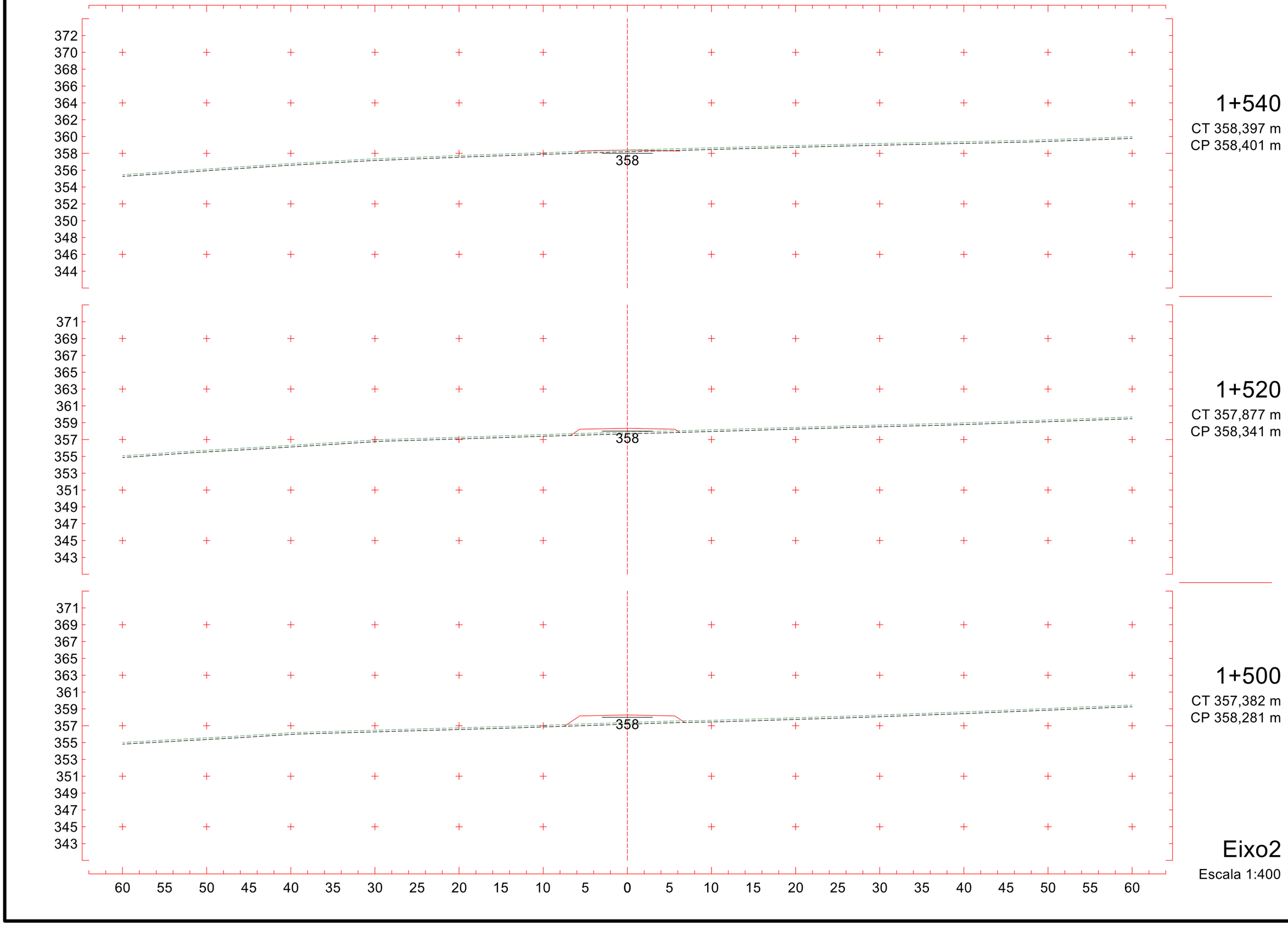

372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+360
CT 358,877 m
CP 358,954 m
373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
359
1+340
CT 359,113 m
CP 359,113 m
373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
359
1+320
CT 359,369 m
CP 359,271 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

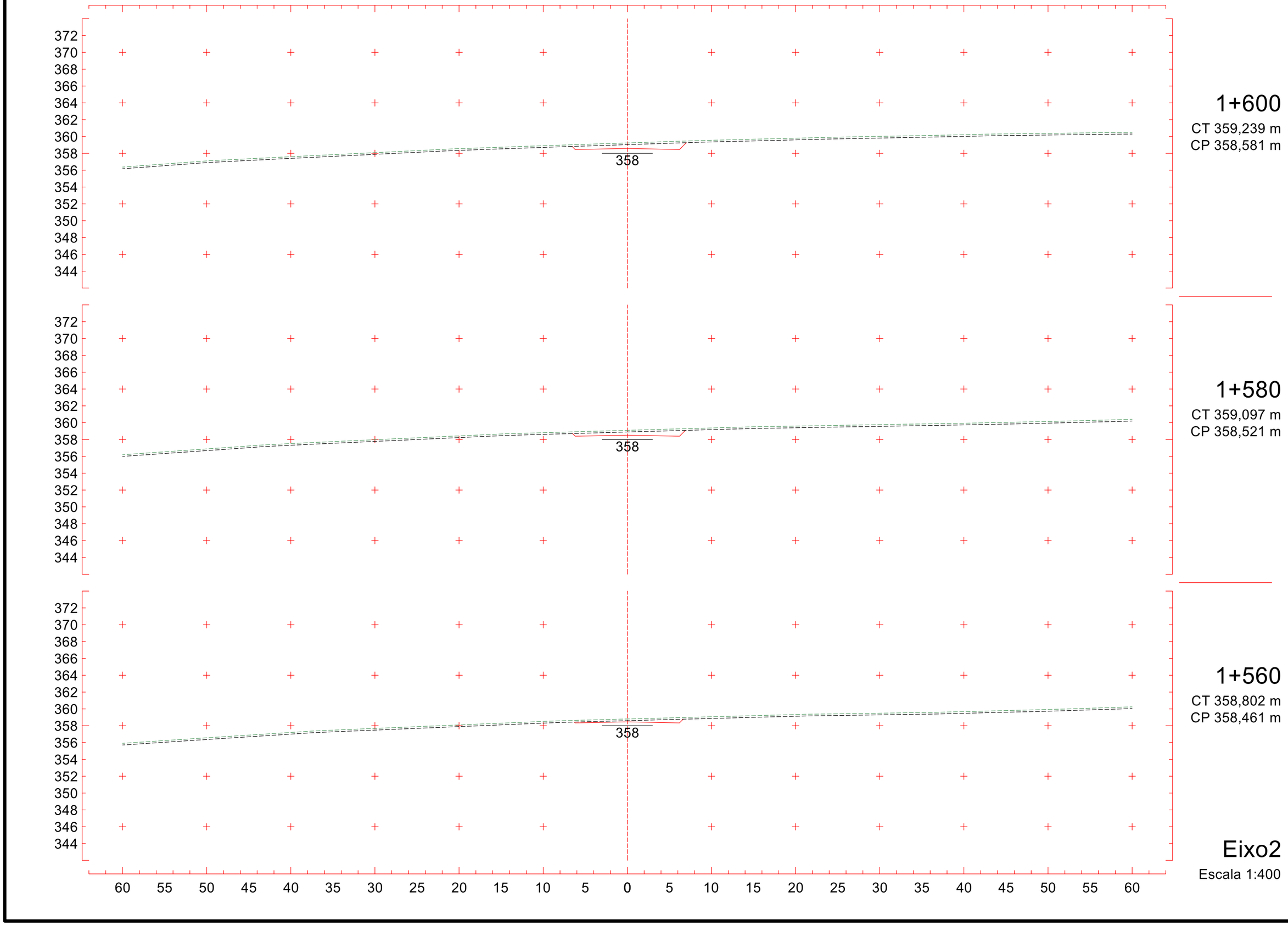

371
369
367
365
363
361
359
357
355
353
351
349
347
345
343
358
1+420
CT 357,819 m
CP 358,478 m
372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+400
CT 358,213 m
CP 358,637 m
372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+380
CT 358,558 m
CP 358,795 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

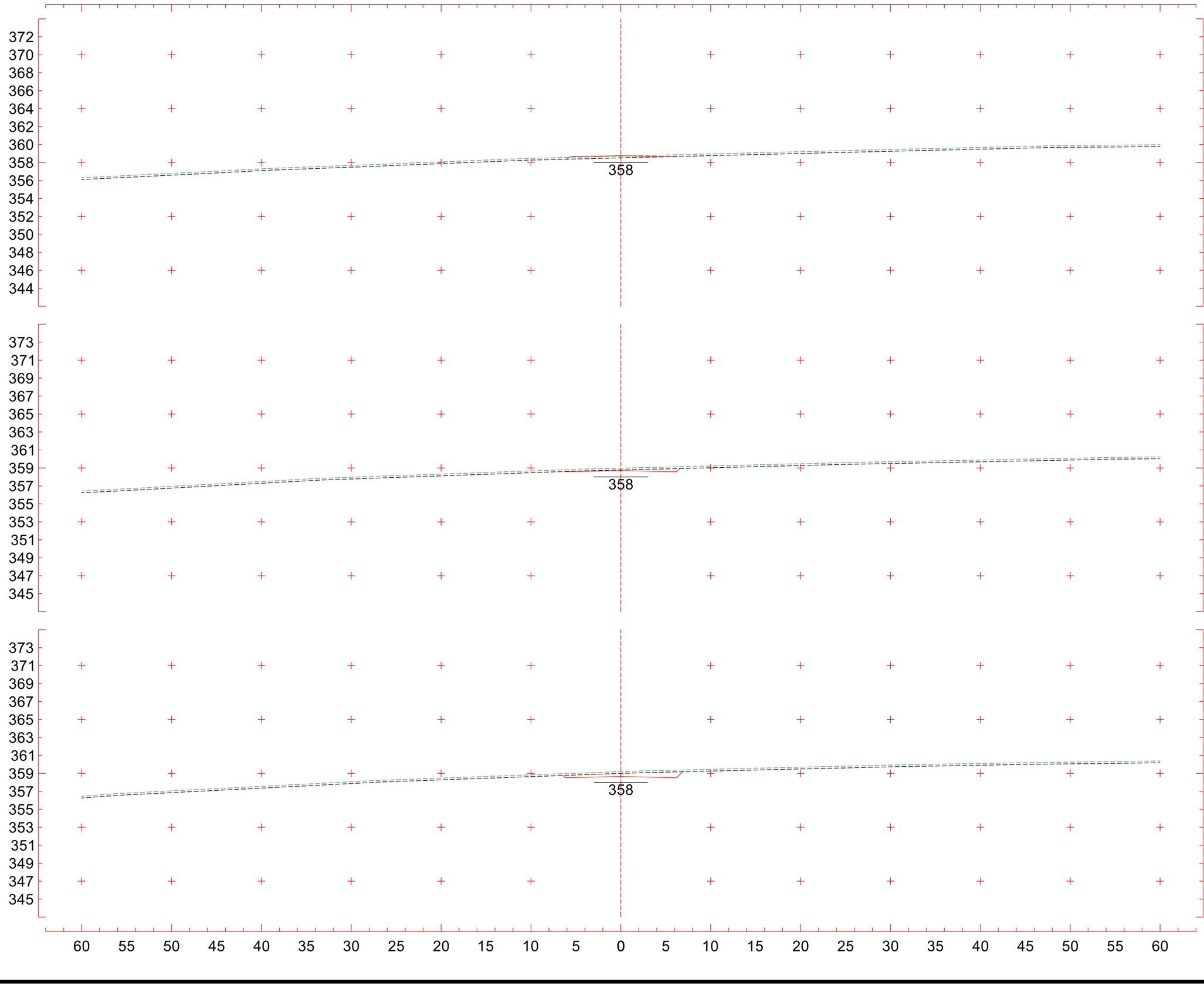


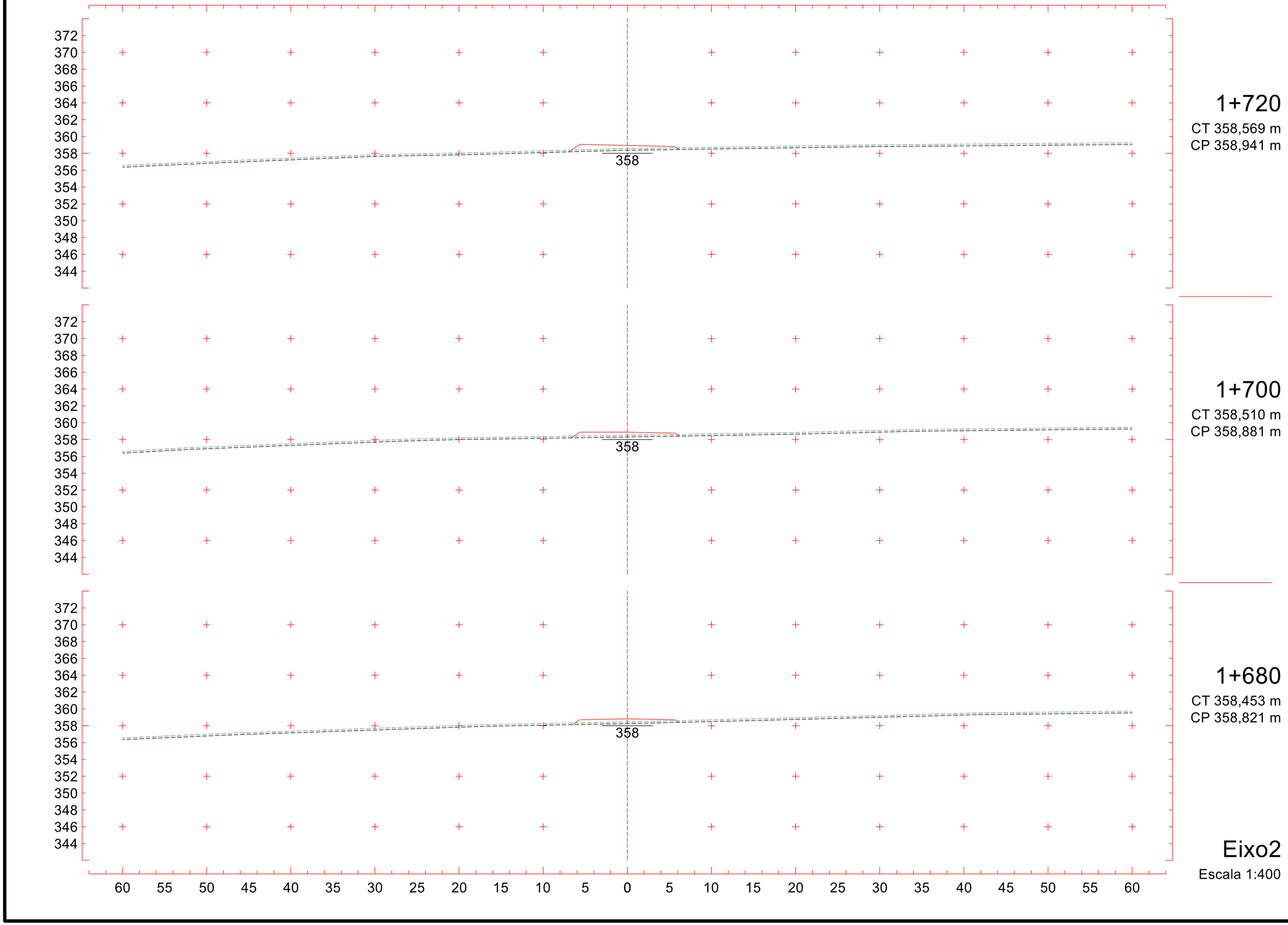
Eixo2

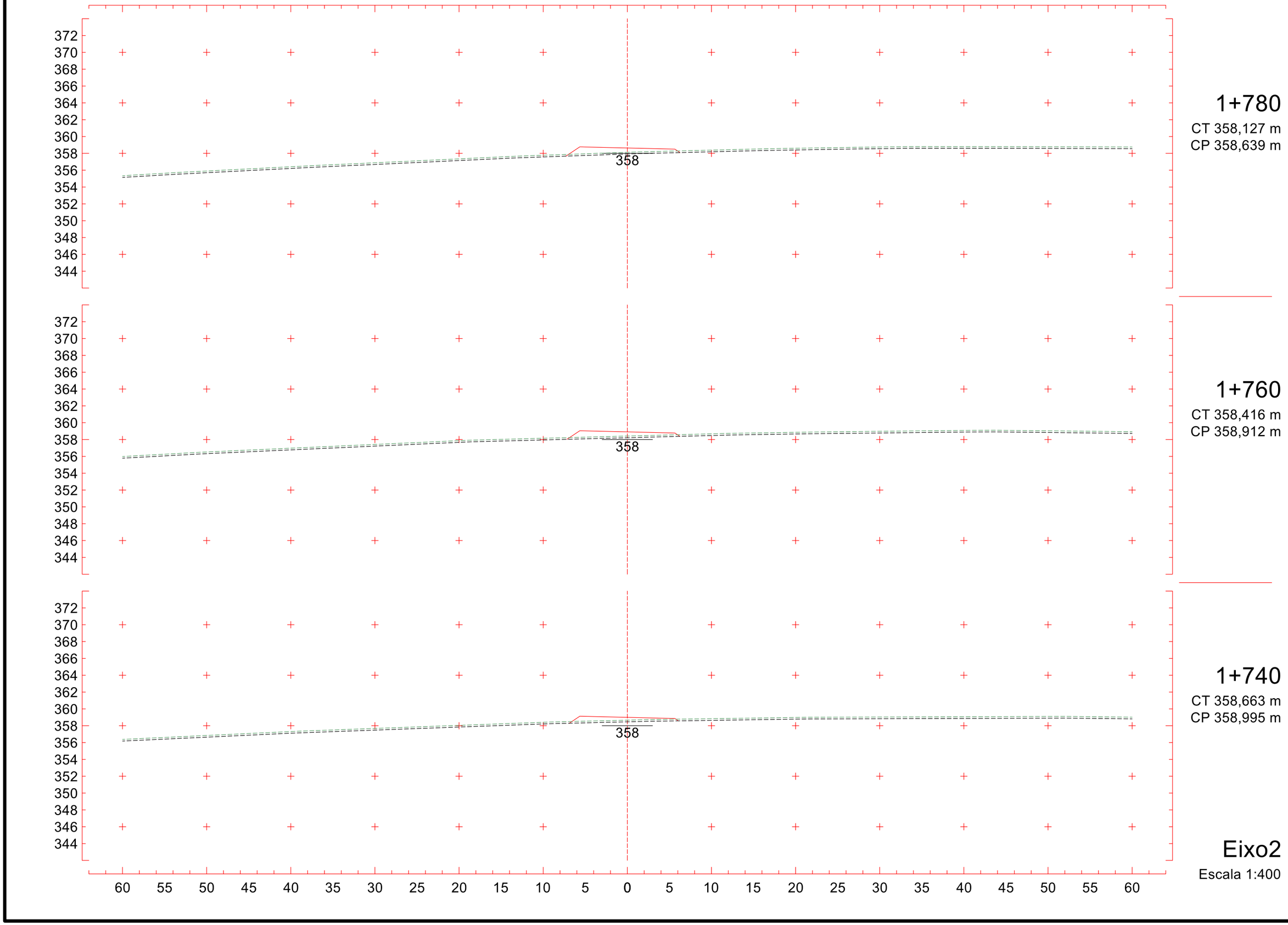
Escala 1:400

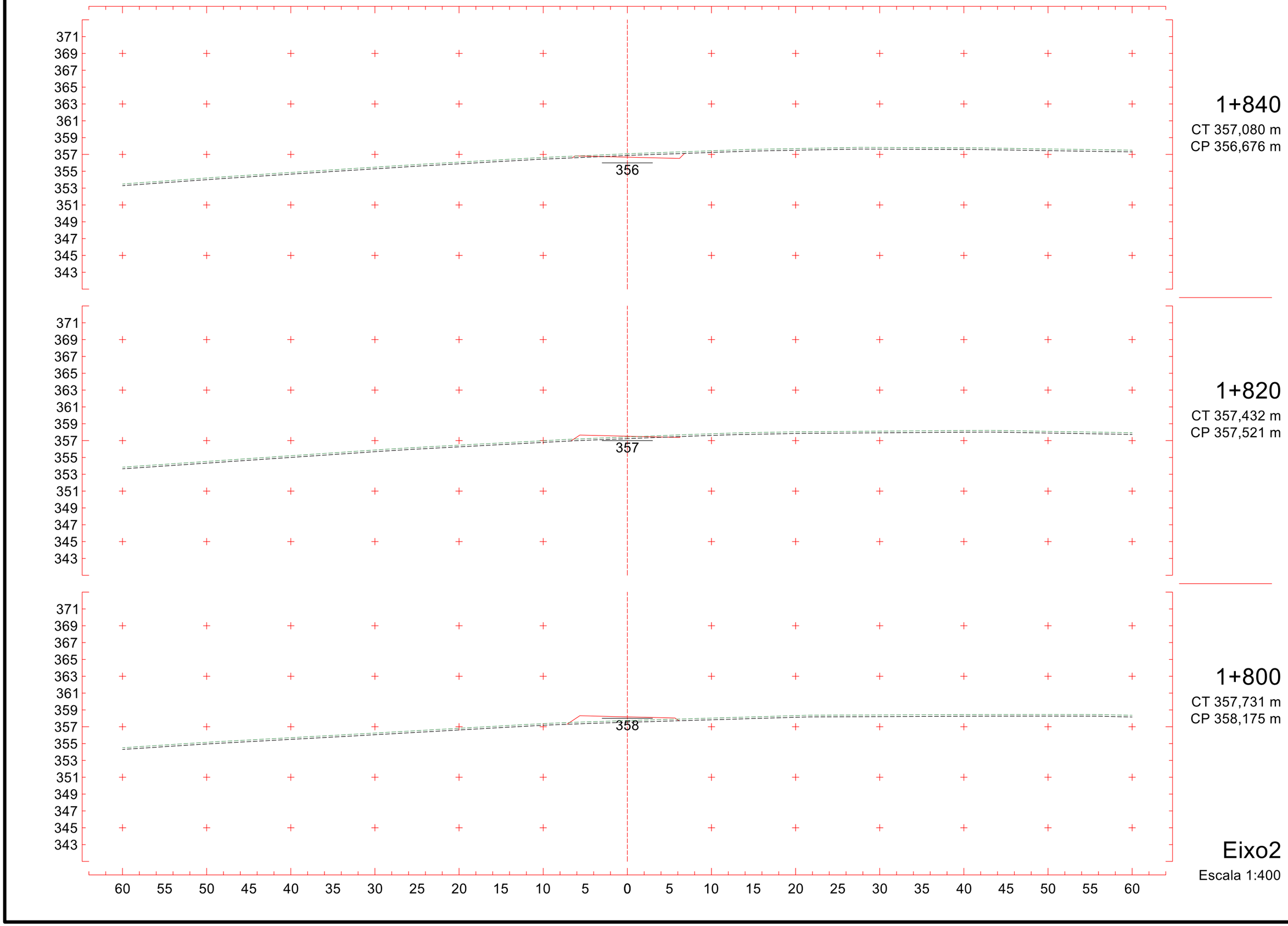

372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+540
CT 358,397 m
CP 358,401 m
371
369
367
365
363
361
359
357
355
353
351
349
347
345
343
358
1+520
CT 357,877 m
CP 358,341 m
371
369
367
365
363
361
359
357
355
353
351
349
347
345
343
358
1+500
CT 357,382 m
CP 358,281 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

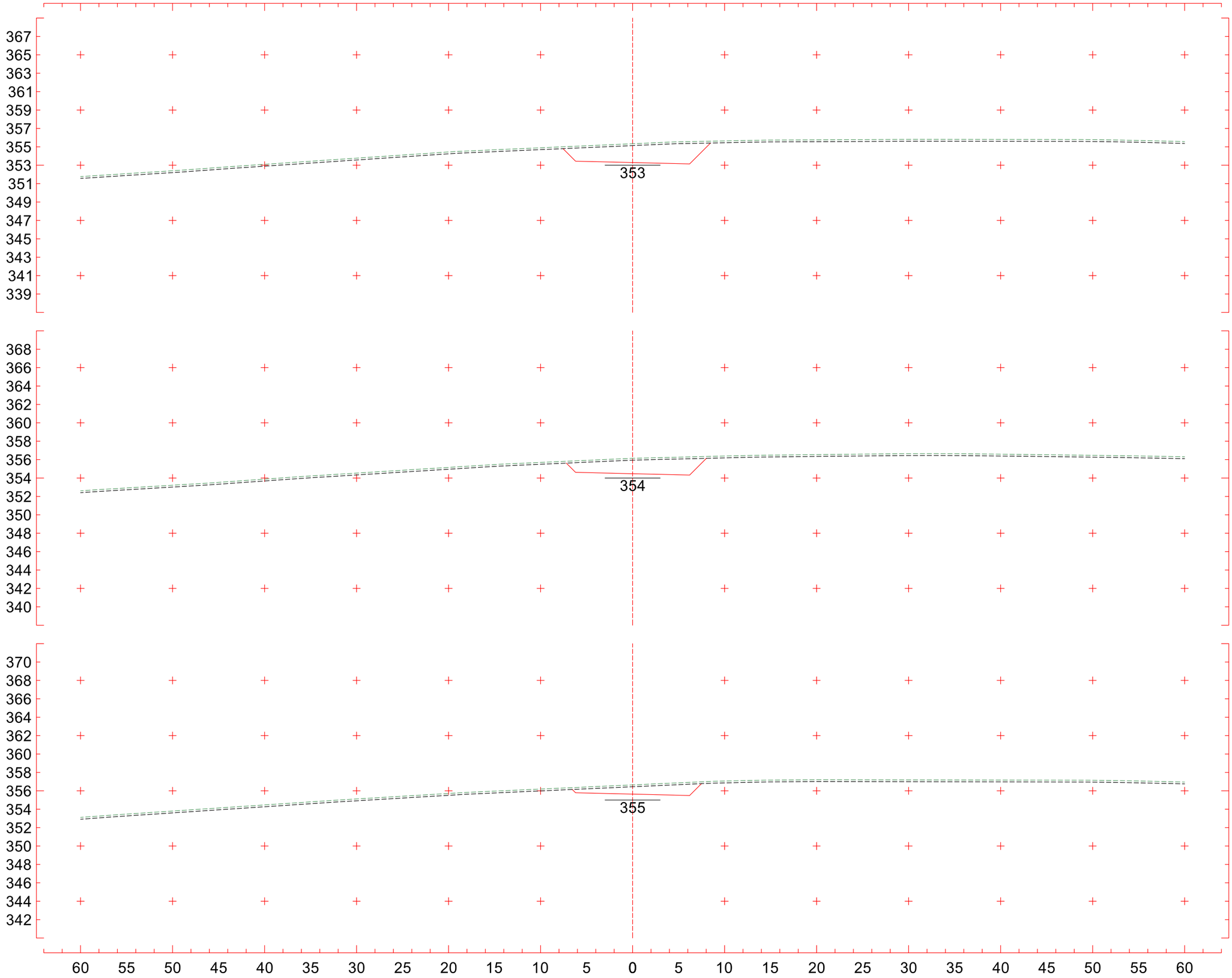

372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+600
CT 359,239 m
CP 358,581 m
1+580
CT 359,097 m
CP 358,521 m
1+560
CT 358,802 m
CP 358,461 m
Eixo2
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

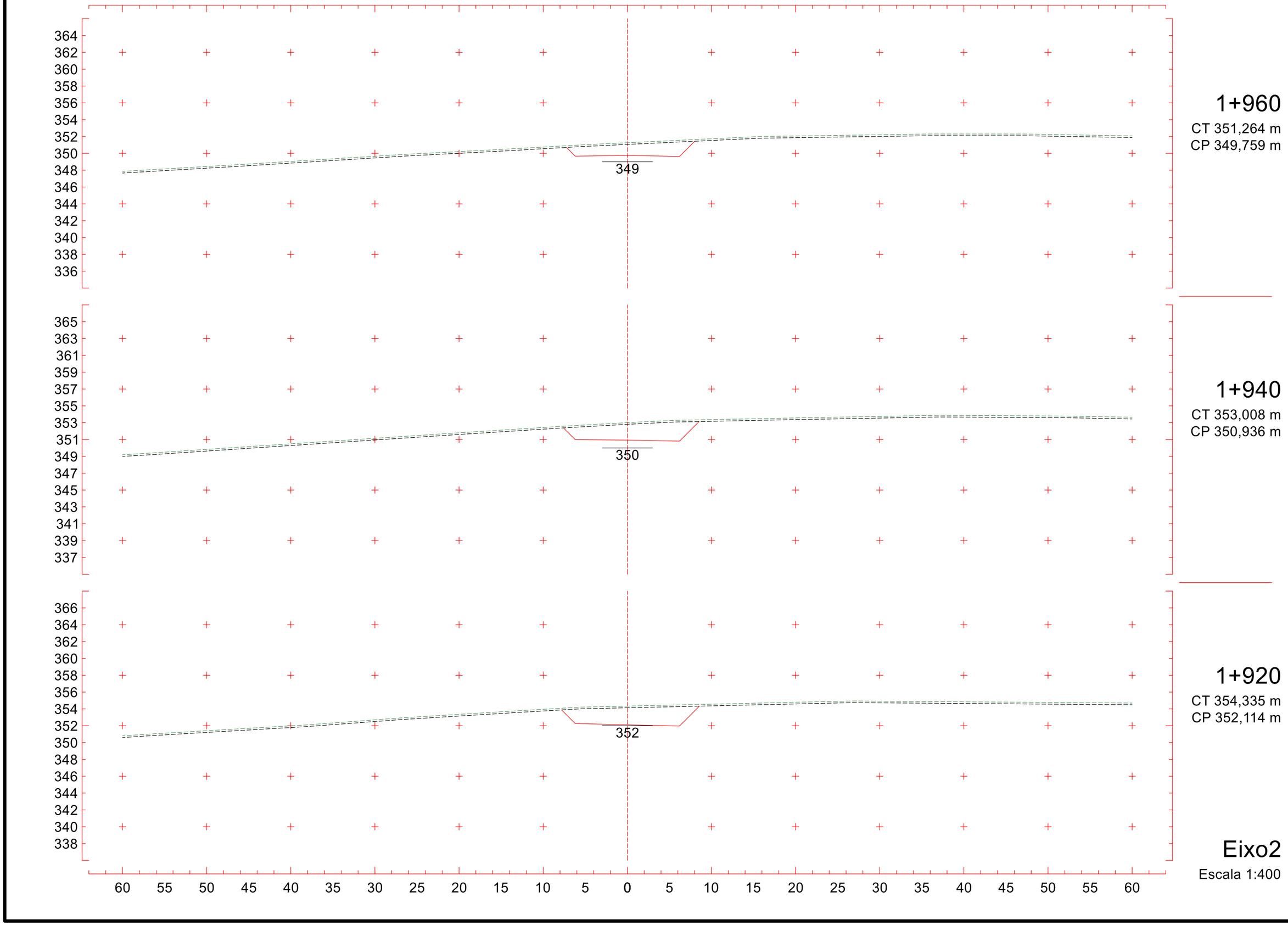

372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+660
CT 358,717 m
CP 358,761 m
373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
358
1+640
CT 358,974 m
CP 358,701 m
373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
358
1+620
CT 359,190 m
CP 358,641 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

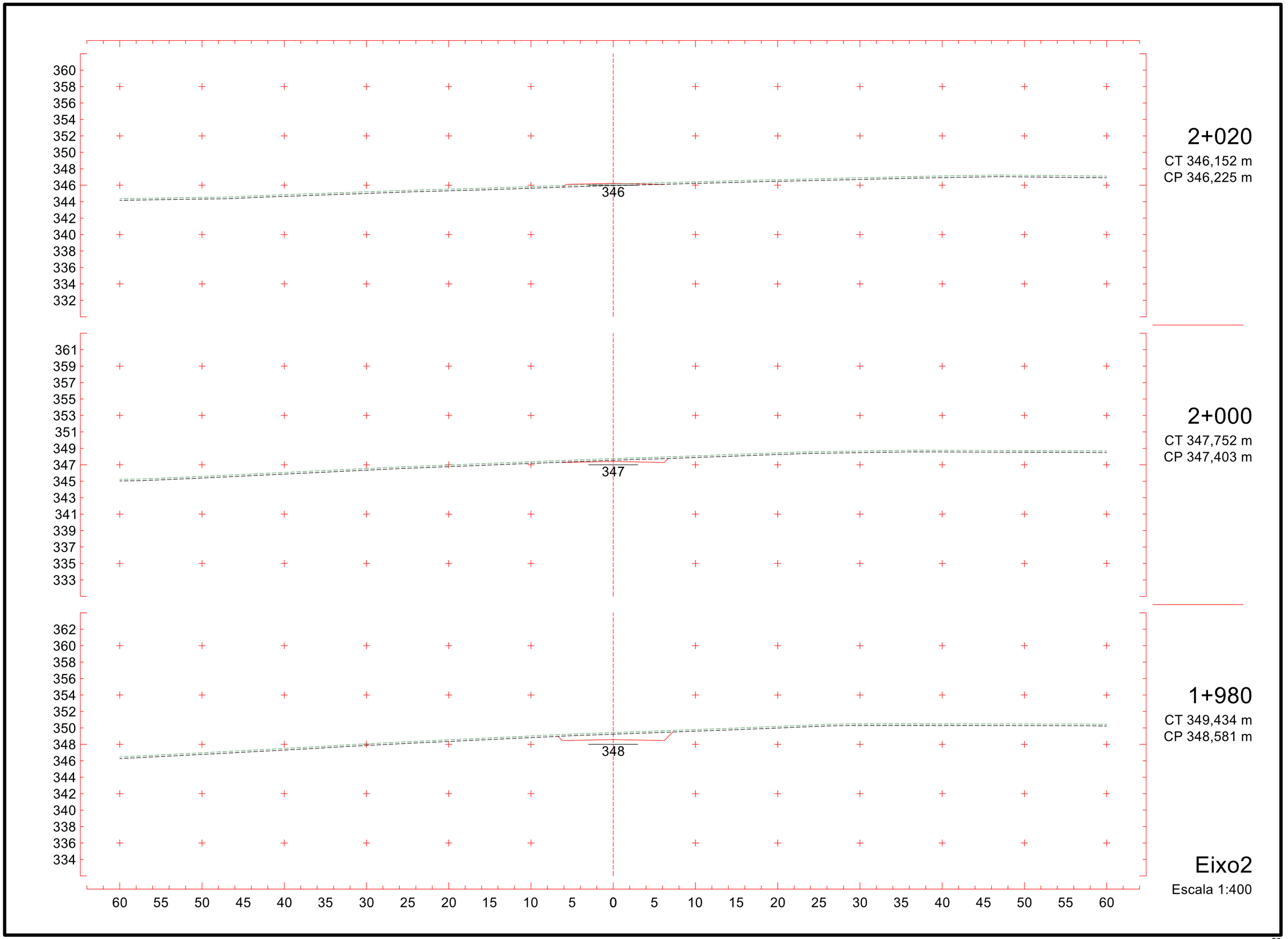

372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+720
CT 358,569 m
CP 358,941 m
1+700
CT 358,510 m
CP 358,881 m
1+680
CT 358,453 m
CP 358,821 m
Eixo2
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

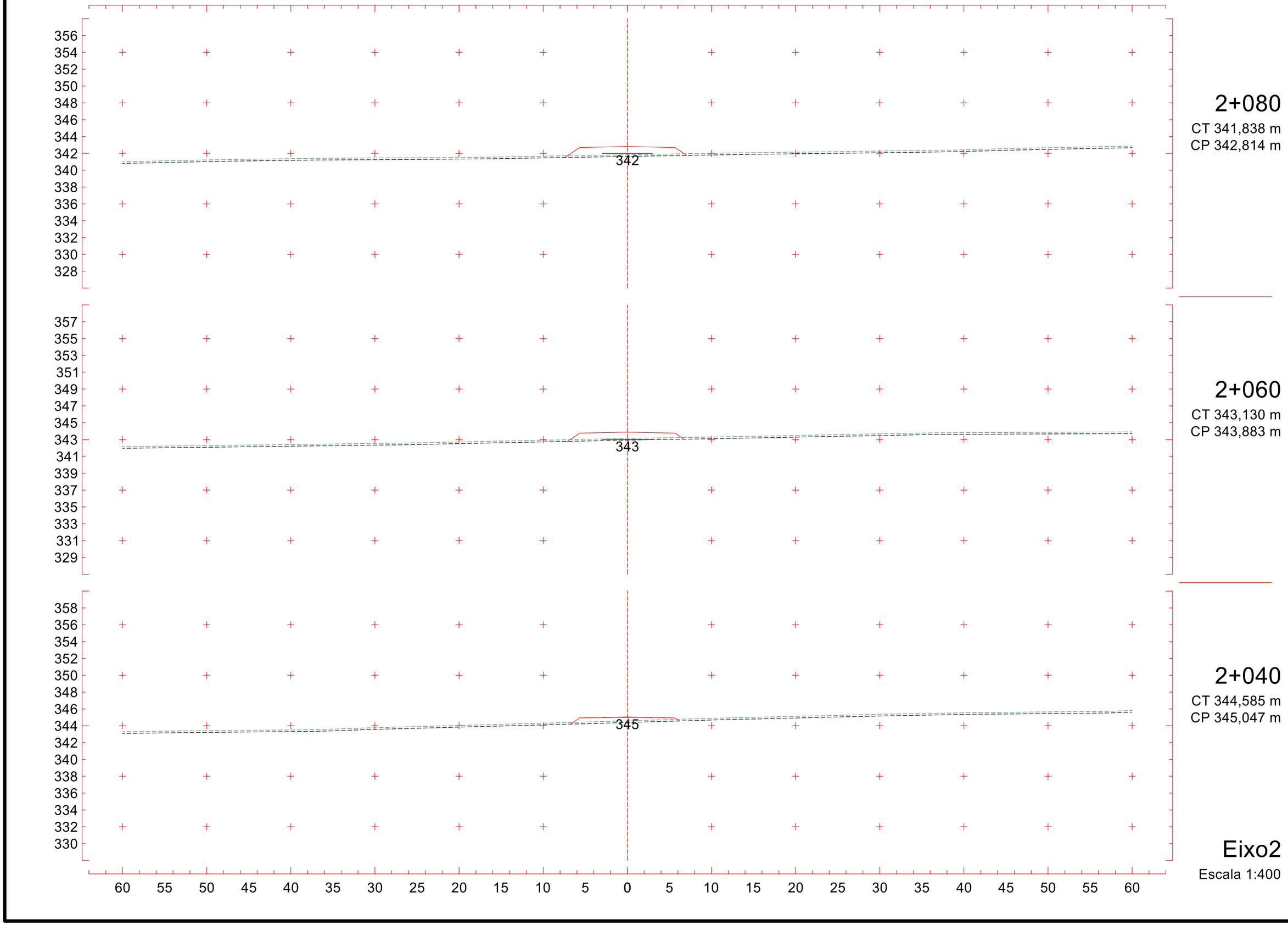

372
370
368
366
364
362
360
358
356
354
352
350
348
346
344
358
1+780
CT 358,127 m
CP 358,639 m
1+760
CT 358,416 m
CP 358,912 m
1+740
CT 358,663 m
CP 358,995 m
Eixo2
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

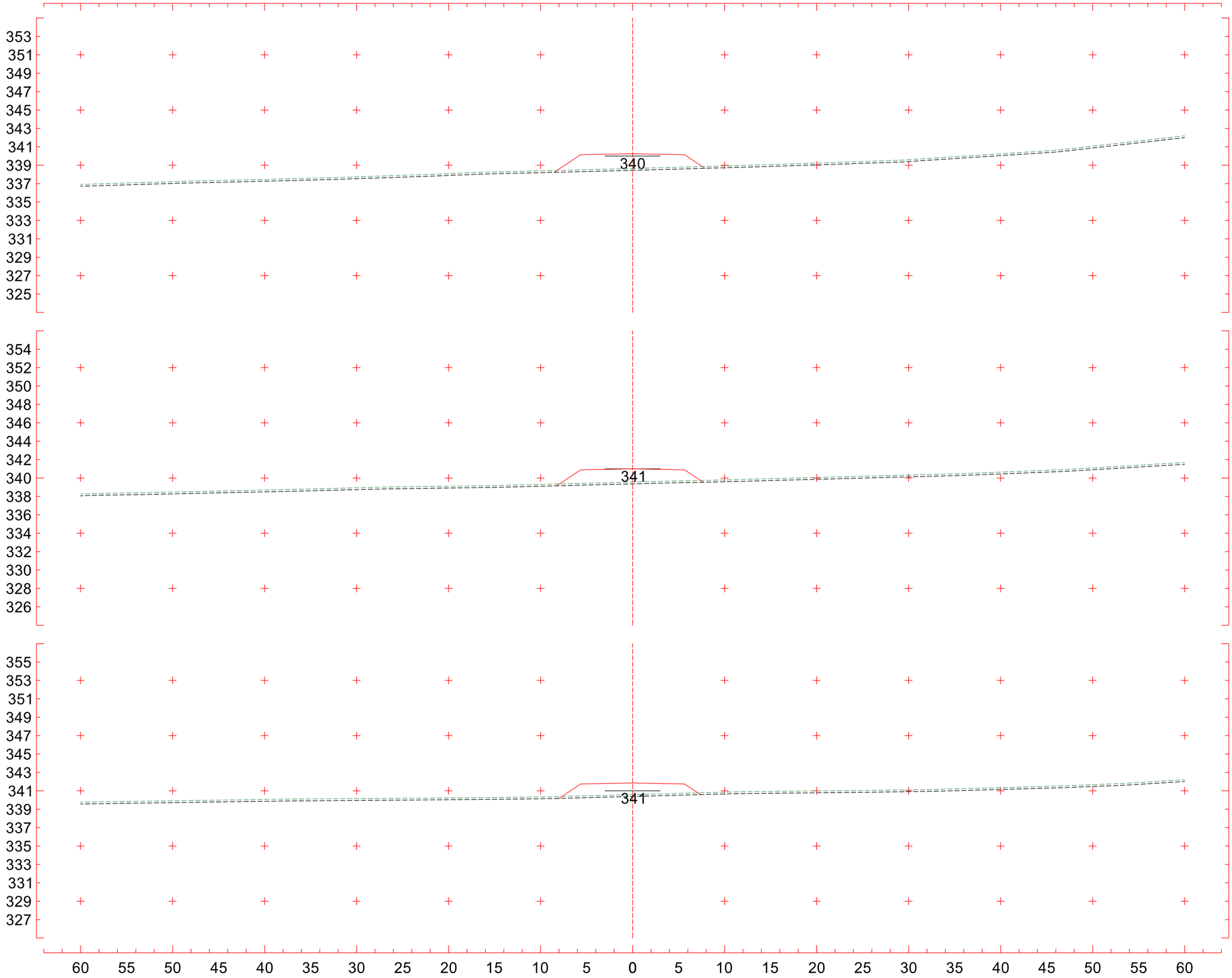

371
369
367
365
363
361
359
357
355
353
351
349
347
345
343
356
1+840
CT 357,080 m
CP 356,676 m
357
1+820
CT 357,432 m
CP 357,521 m
358
1+800
CT 357,731 m
CP 358,175 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


367
365
363
361
359
357
355
353
351
349
347
345
343
341
339
353
1+900
CT 355,335 m
CP 353,292 m
368
366
364
362
360
358
356
354
352
350
348
346
344
342
340
354
1+880
CT 356,143 m
CP 354,470 m
370
368
366
364
362
360
358
356
354
352
350
348
346
344
342
355
1+860
CT 356,642 m
CP 355,641 m
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
Eixo2
Escala 1:400


364
362
360
358
356
354
352
350
348
346
344
342
340
338
336
349
1+960
CT 351,264 m
CP 349,759 m
365
363
361
359
357
355
353
351
349
347
345
343
341
339
337
350
1+940
CT 353,008 m
CP 350,936 m
366
364
362
360
358
356
354
352
350
348
346
344
342
340
338
352
1+920
CT 354,335 m
CP 352,114 m
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
Eixo2
Escala 1:400


360
358
356
354
352
350
348
346
344
342
340
338
336
334
332
346
2+020
CT 346,152 m
CP 346,225 m
361
359
357
355
353
351
349
347
345
343
341
339
337
335
333
347
2+000
CT 347,752 m
CP 347,403 m
362
360
358
356
354
352
350
348
346
344
342
340
338
336
334
348
1+980
CT 349,434 m
CP 348,581 m
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
Eixo2
Escala 1:400


356
354
352
350
348
346
344
342
340
338
336
334
332
330
328
342
2+080
CT 341,838 m
CP 342,814 m
357
355
353
351
349
347
345
343
341
339
337
335
333
331
329
343
2+060
CT 343,130 m
CP 343,883 m
358
356
354
352
350
348
346
344
342
340
338
336
334
332
330
345
2+040
CT 344,585 m
CP 345,047 m
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
Eixo2
Escala 1:400



2+140

CT 338,641 m
CP 340,257 m

2+120

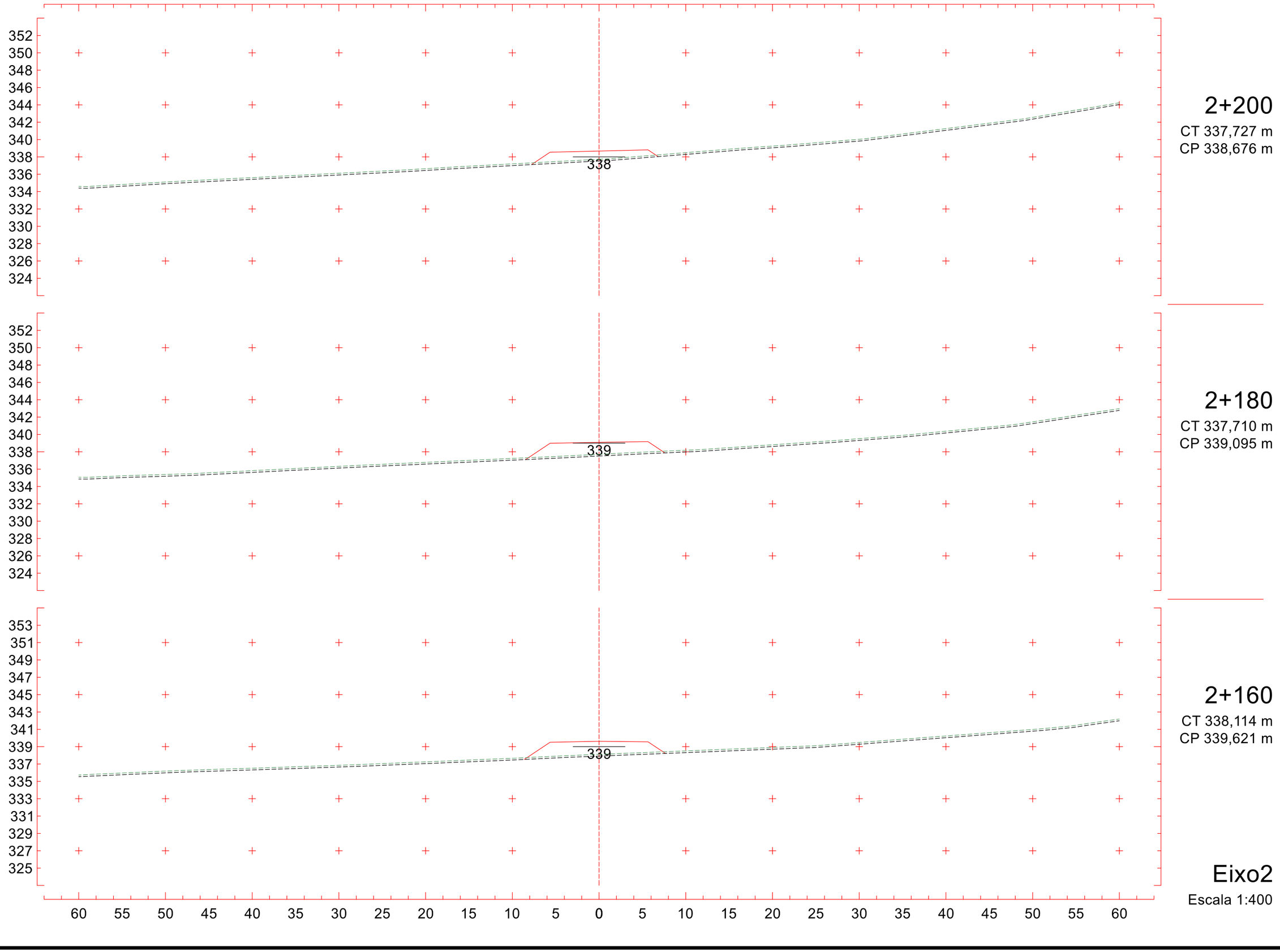
CT 339,563 m
CP 341,001 m

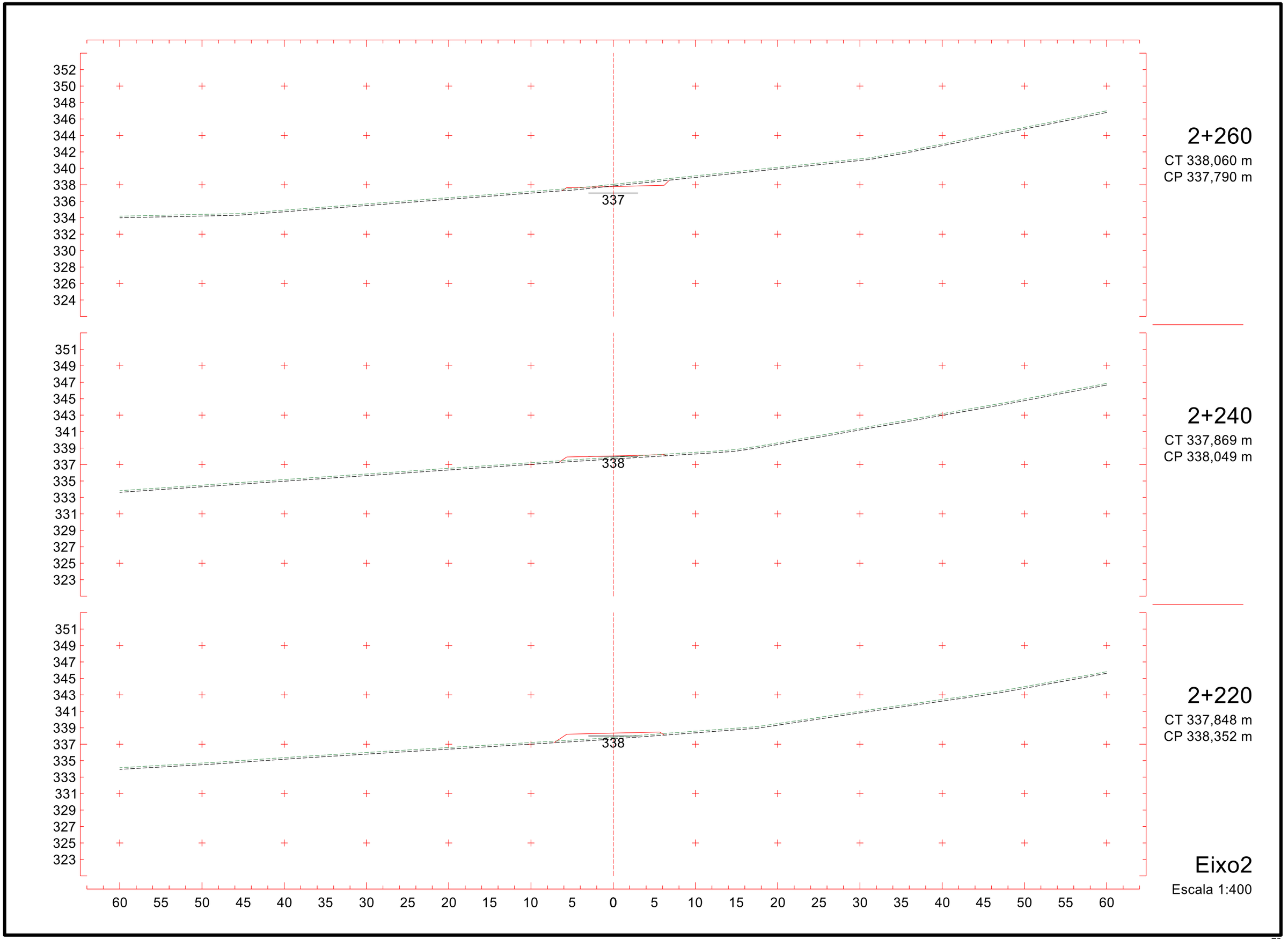
2+100

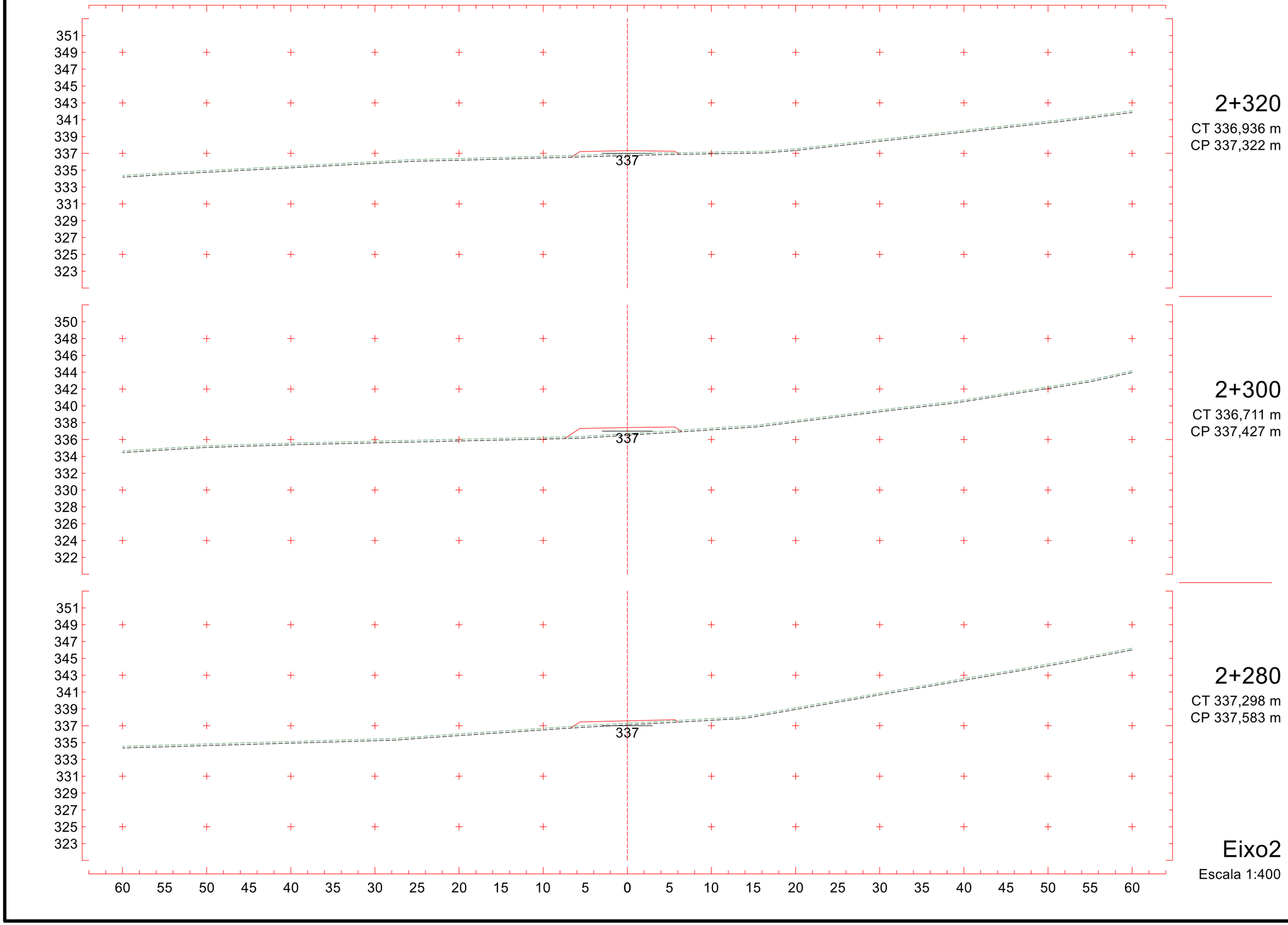
CT 340,587 m
CP 341,853 m

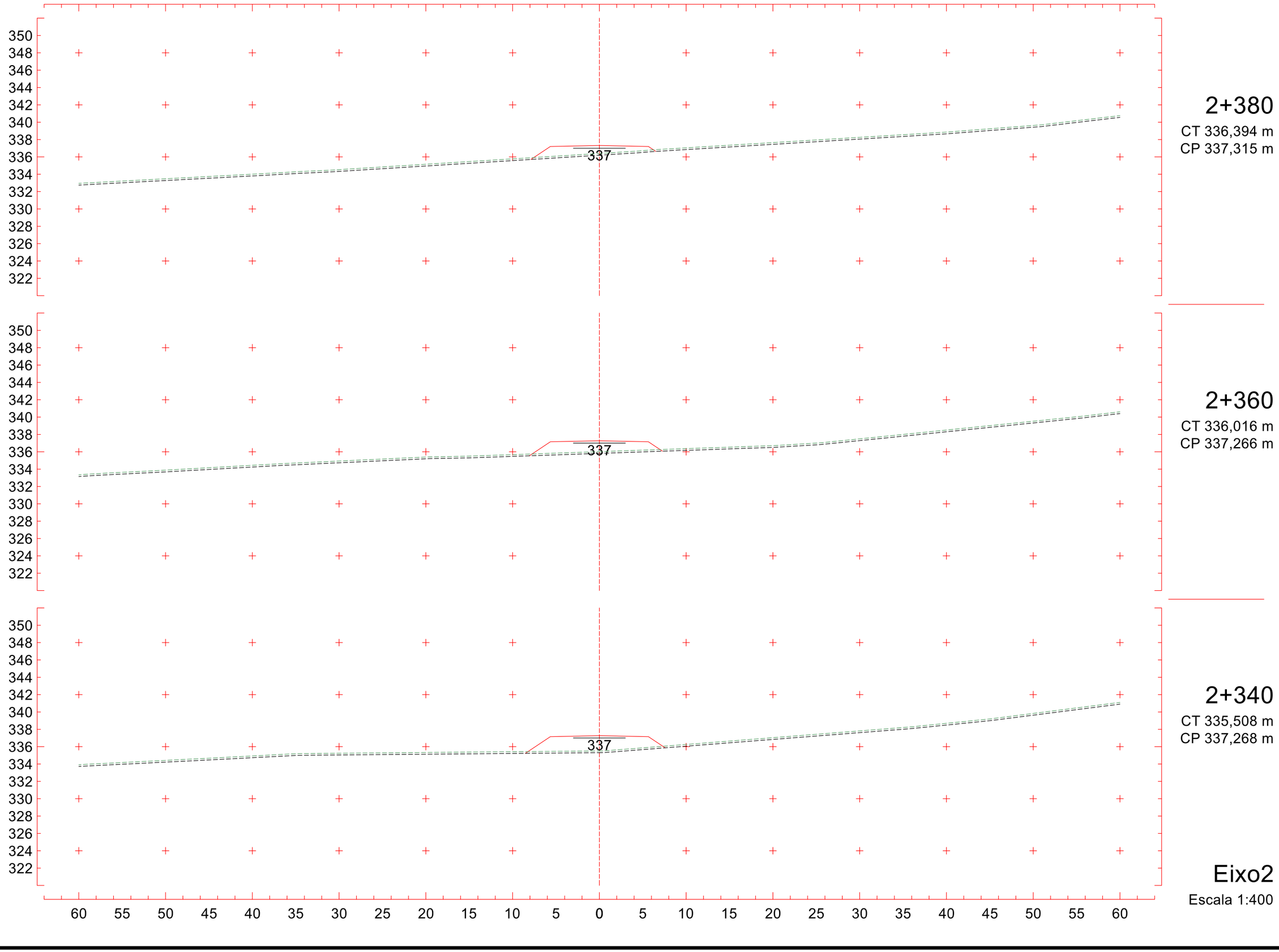
Eixo2

Escala 1:400


352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
338
2+200
CT 337,727 m
CP 338,676 m
352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
339
2+180
CT 337,710 m
CP 339,095 m
353
351
349
347
345
343
341
339
337
335
333
331
329
327
325
339
2+160
CT 338,114 m
CP 339,621 m
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
Eixo2
Escala 1:400


352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
337
2+260
CT 338,060 m
CP 337,790 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
338
2+240
CT 337,869 m
CP 338,049 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
338
2+220
CT 337,848 m
CP 338,352 m
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
Eixo2
Escala 1:400


351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+320
CT 336,936 m
CP 337,322 m
350
348
346
344
342
340
338
336
334
332
330
328
326
324
322
337
2+300
CT 336,711 m
CP 337,427 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+280
CT 337,298 m
CP 337,583 m
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
Eixo2
Escala 1:400

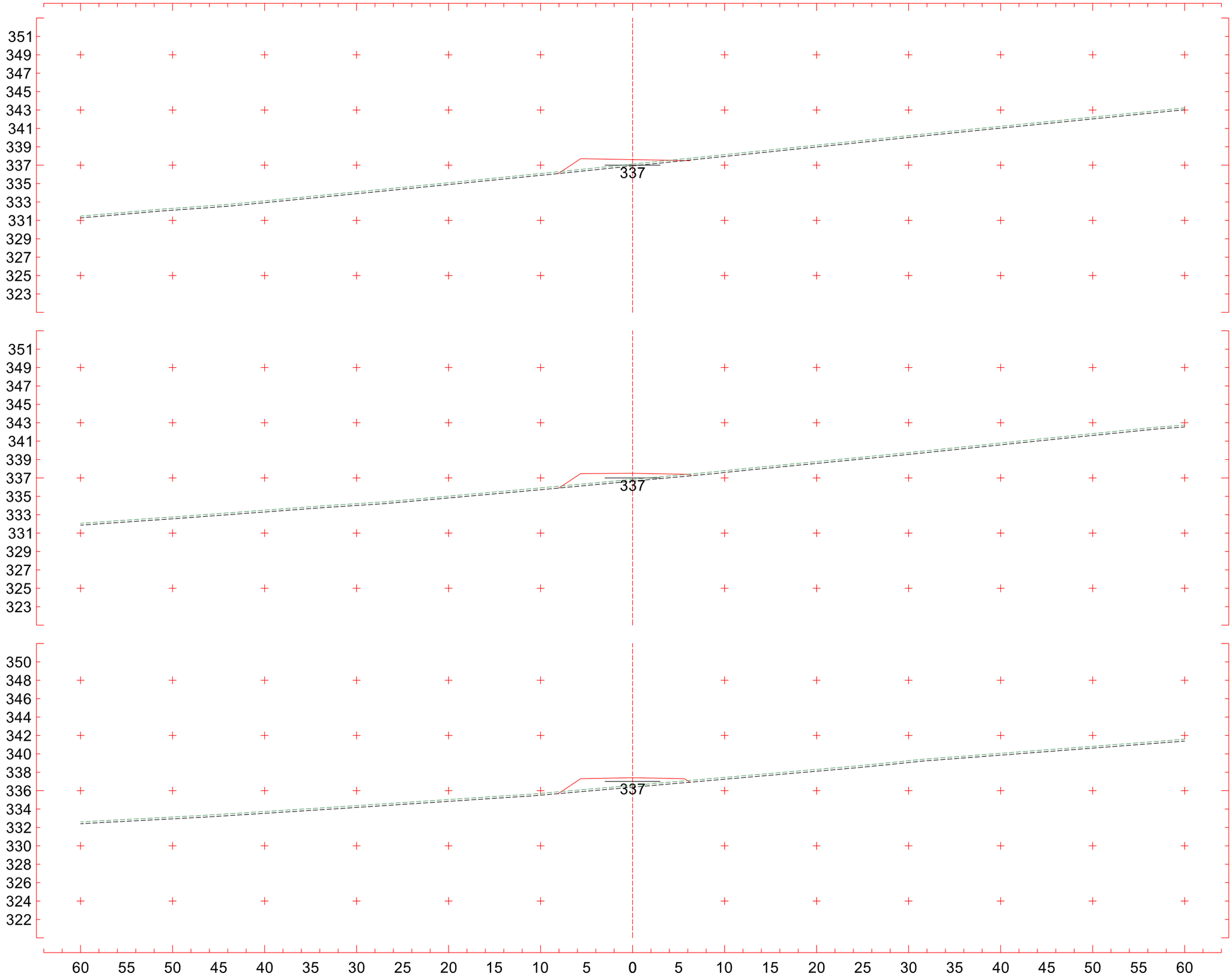


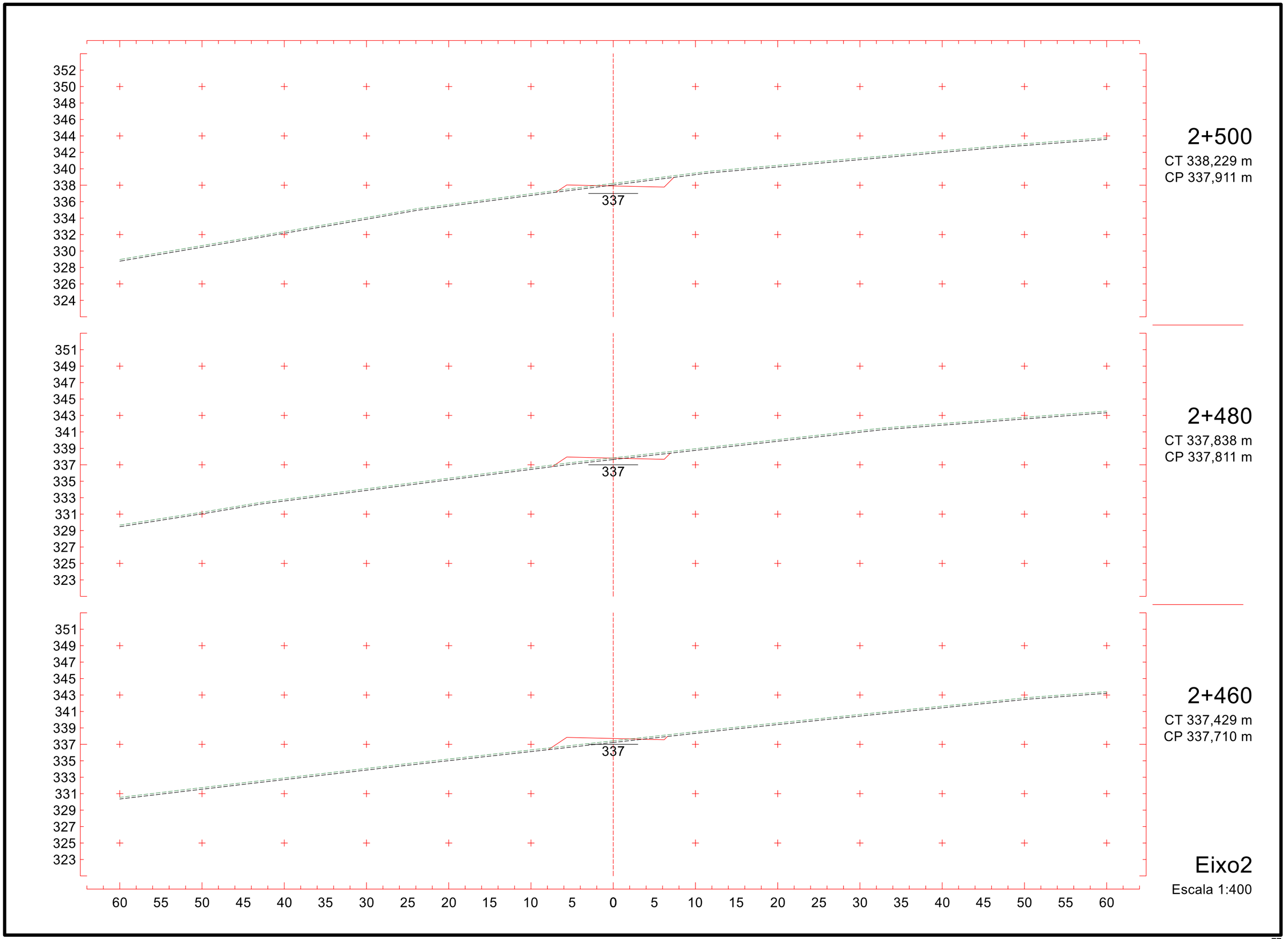
2+380
CT 336,394 m
CP 337,315 m

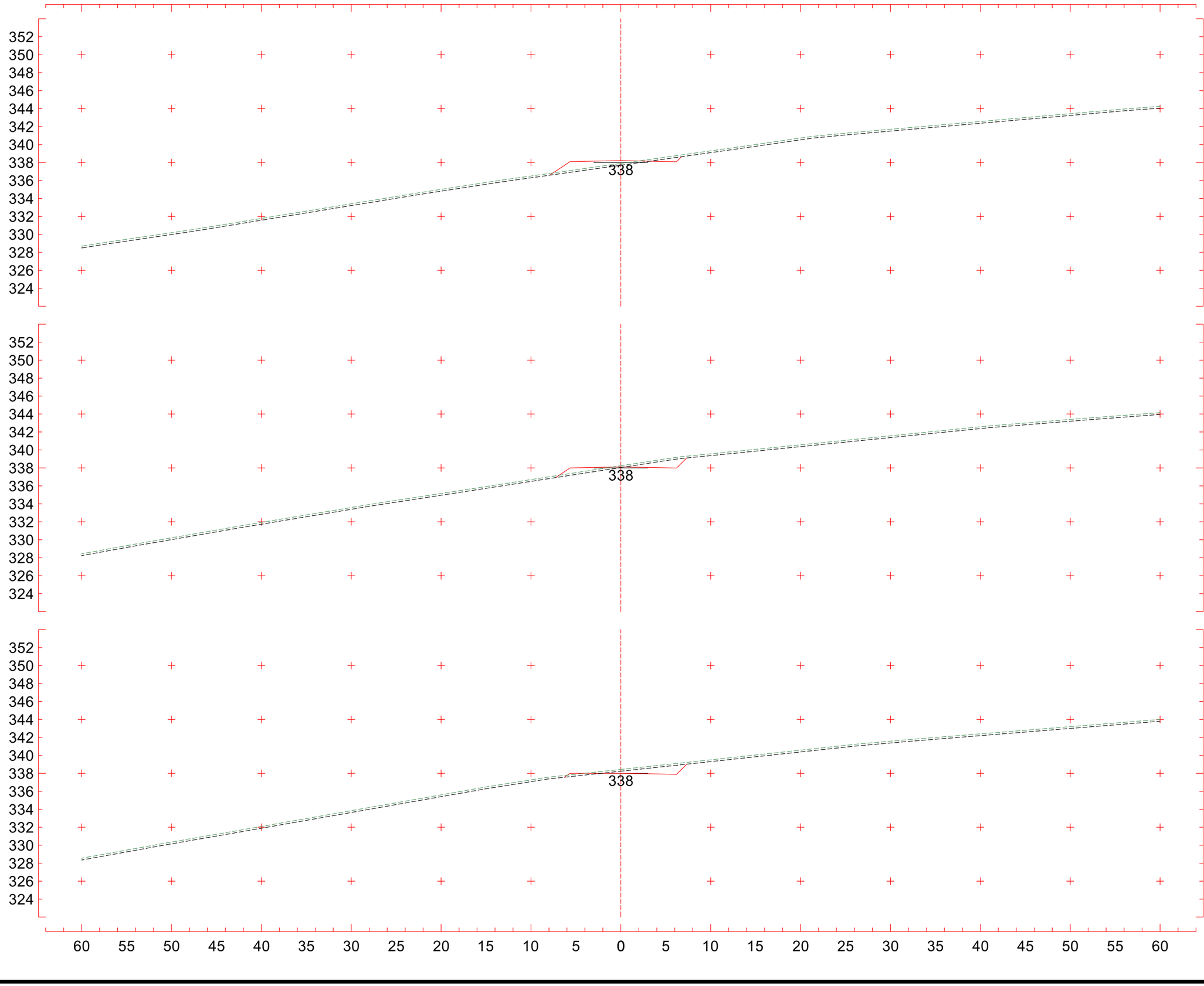
2+360
CT 336,016 m
CP 337,266 m

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

Eixo2
Escala 1:400


351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+440
CT 337,120 m
CP 337,610 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+420
CT 336,846 m
CP 337,510 m
350
348
346
344
342
340
338
336
334
332
330
328
326
324
322
337
2+400
CT 336,576 m
CP 337,409 m
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
Eixo2
Escala 1:400


352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
337
2+500
CT 338,229 m
CP 337,911 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+480
CT 337,838 m
CP 337,811 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+460
CT 337,429 m
CP 337,710 m
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
Eixo2
Escala 1:400

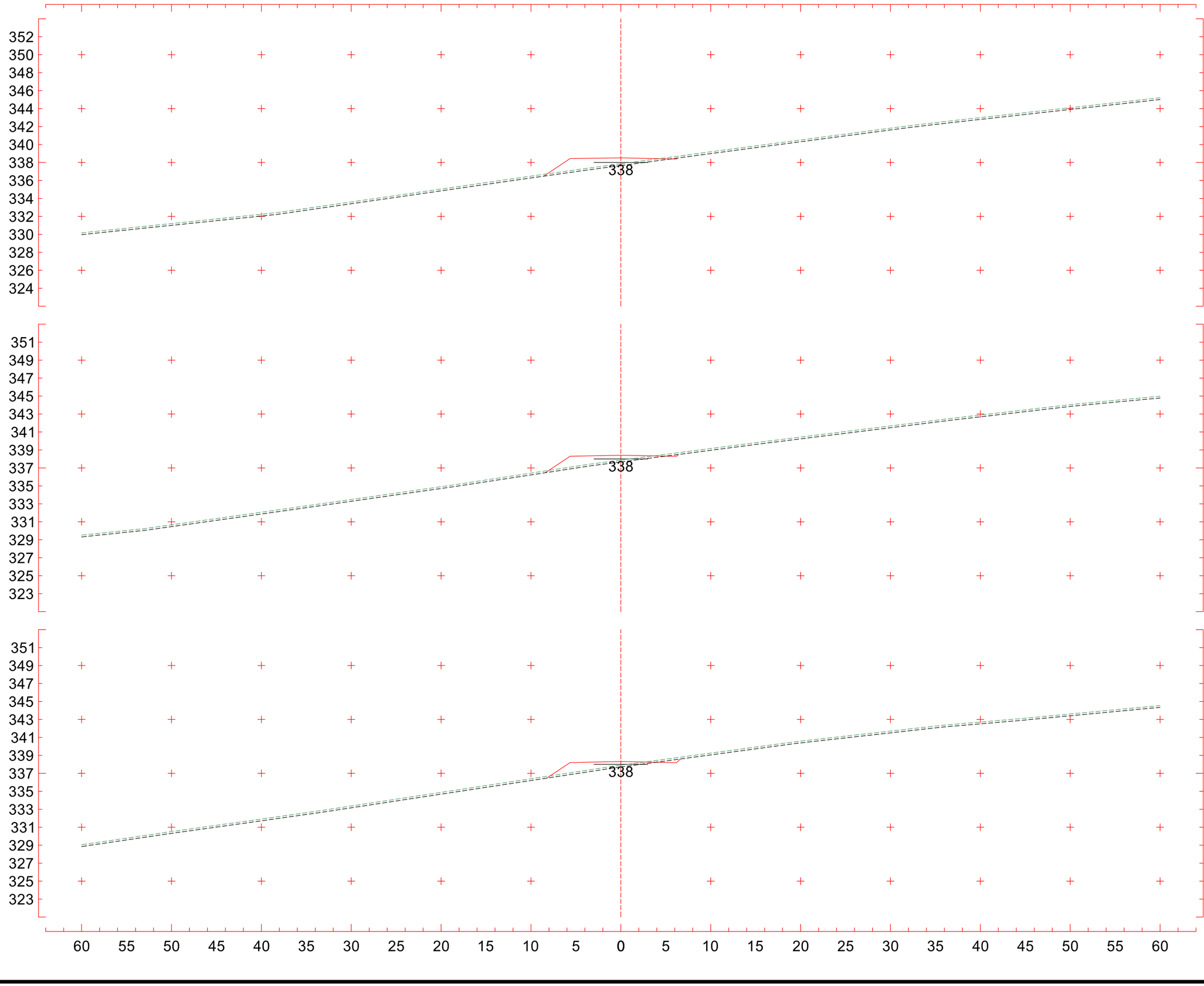


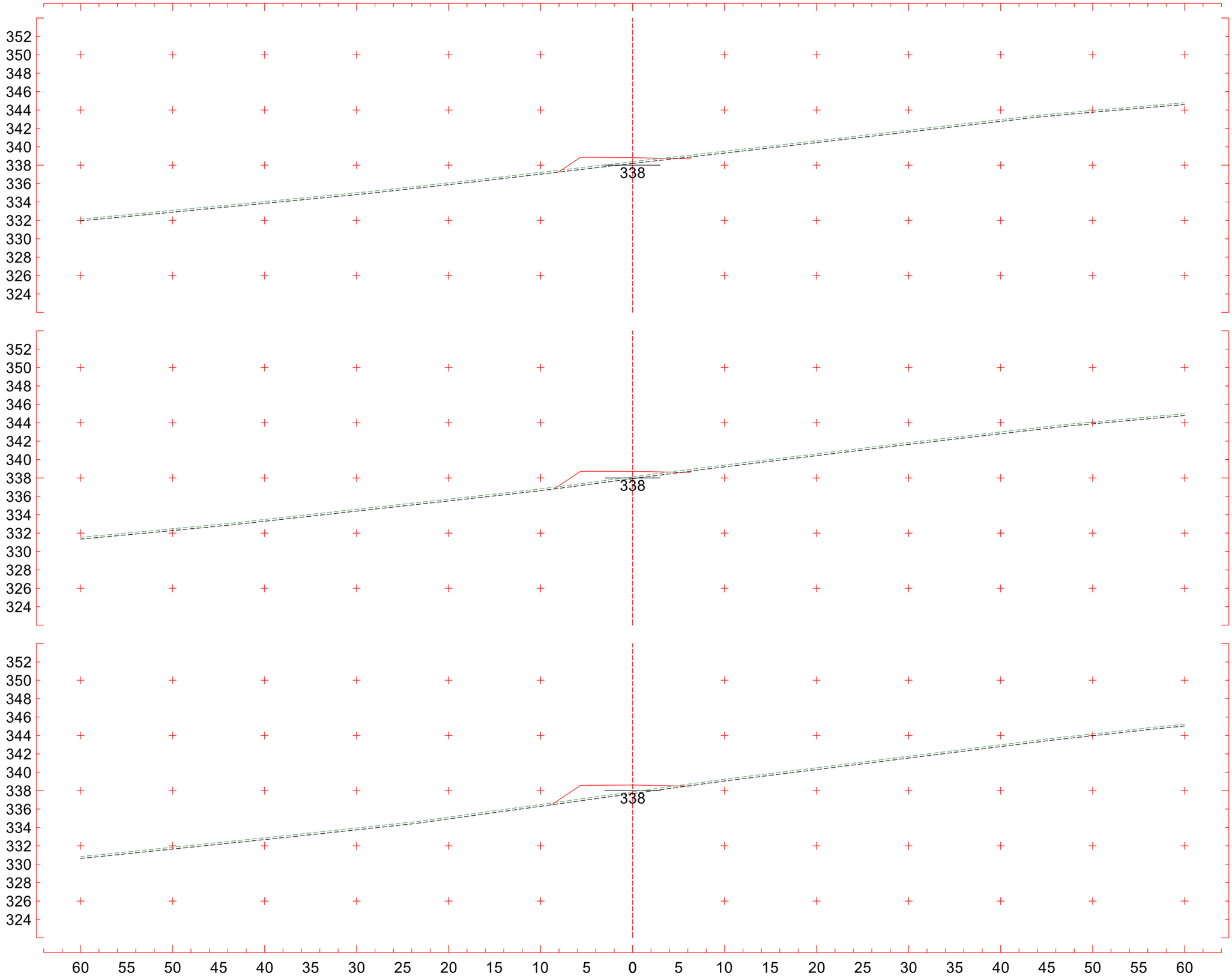
2+560
CT 337,897 m
CP 338,213 m

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

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

Eixo2
Escala 1:400


352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
338
2+620
CT 337,859 m
CP 338,514 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
338
2+600
CT 337,867 m
CP 338,413 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
338
2+580
CT 337,912 m
CP 338,313 m
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
Eixo2
Escala 1:400



2+680

CT 338,386 m
CP 338,815 m

2+660

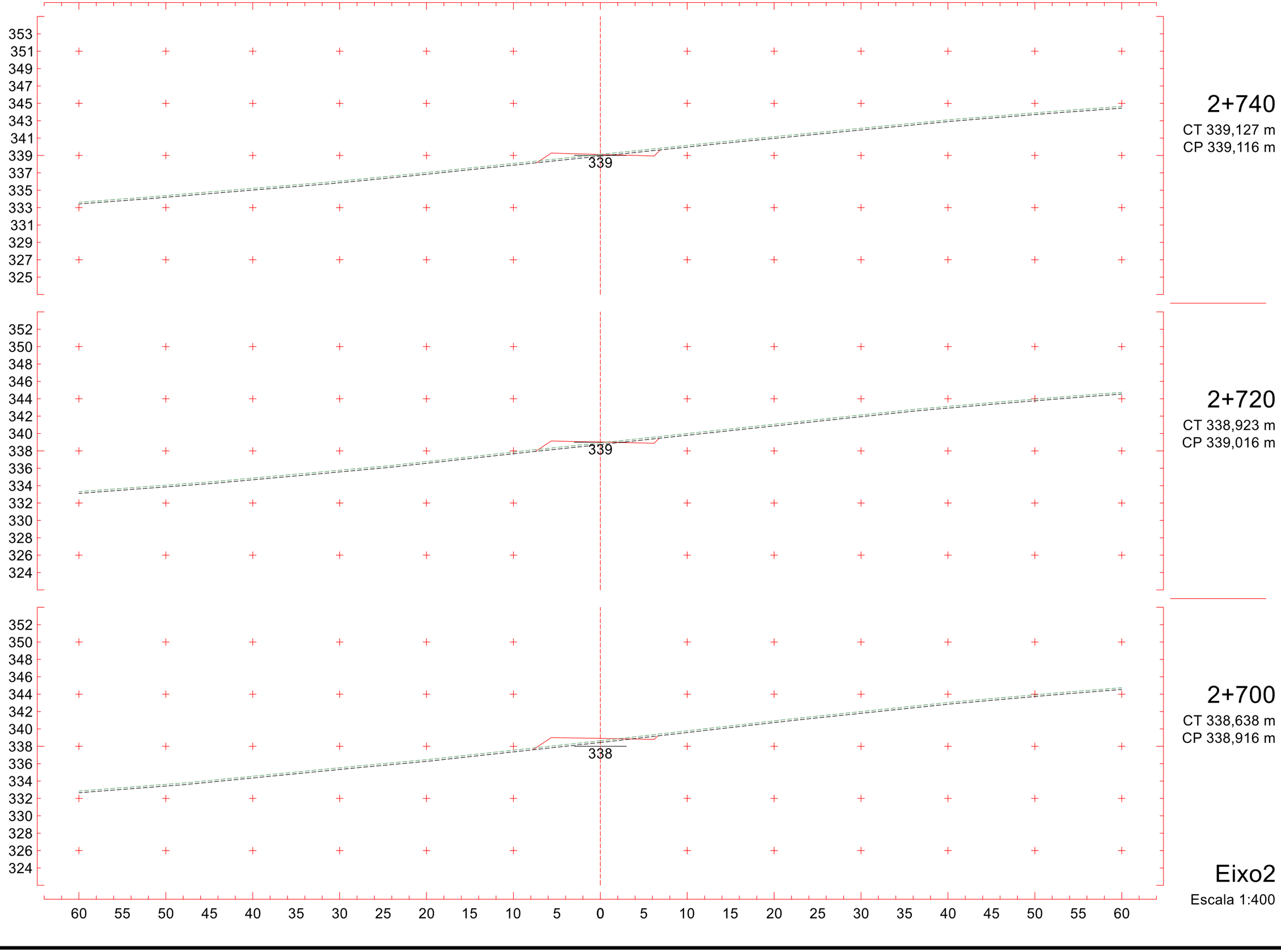
CT 338,116 m
CP 338,715 m

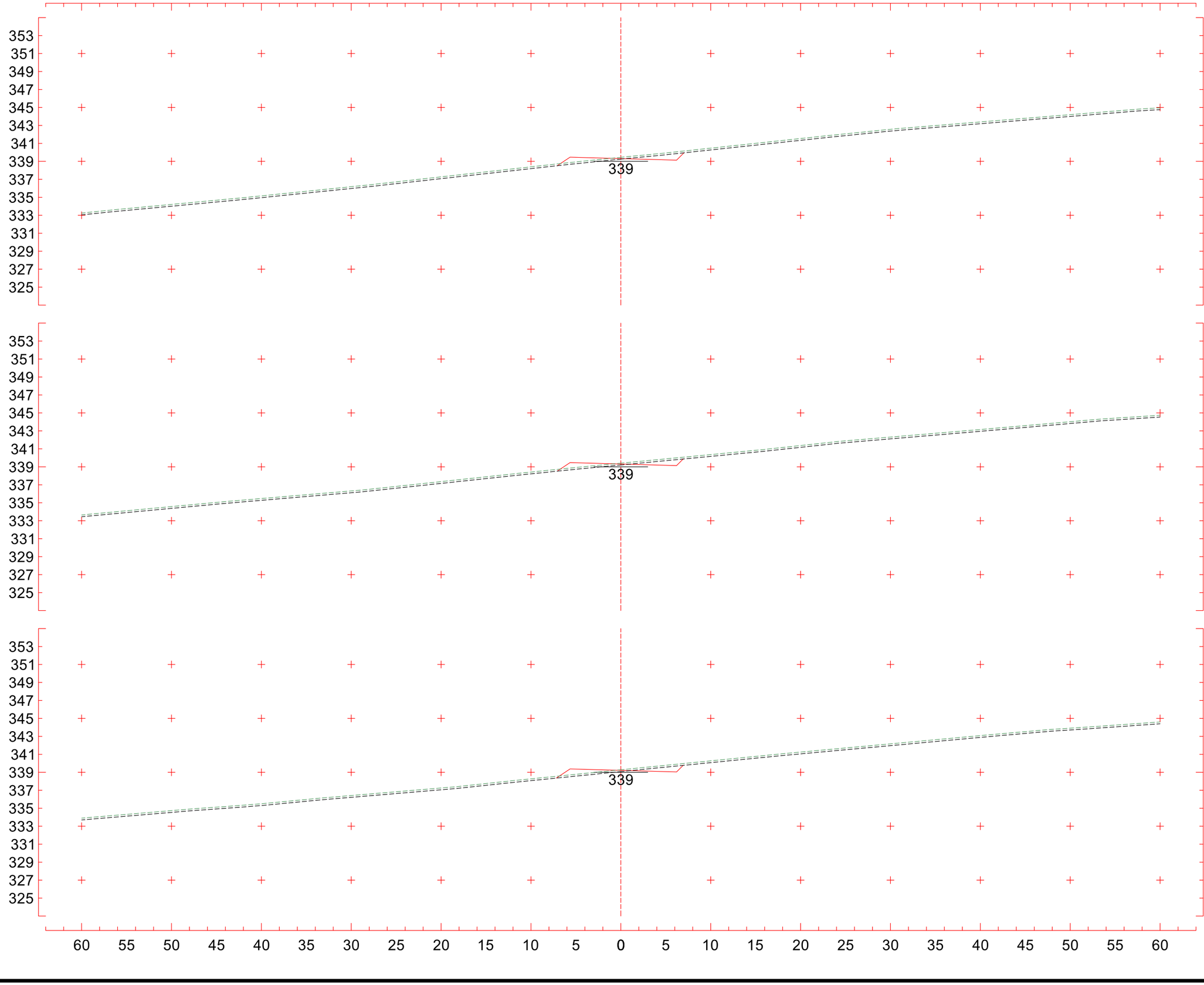
2+640

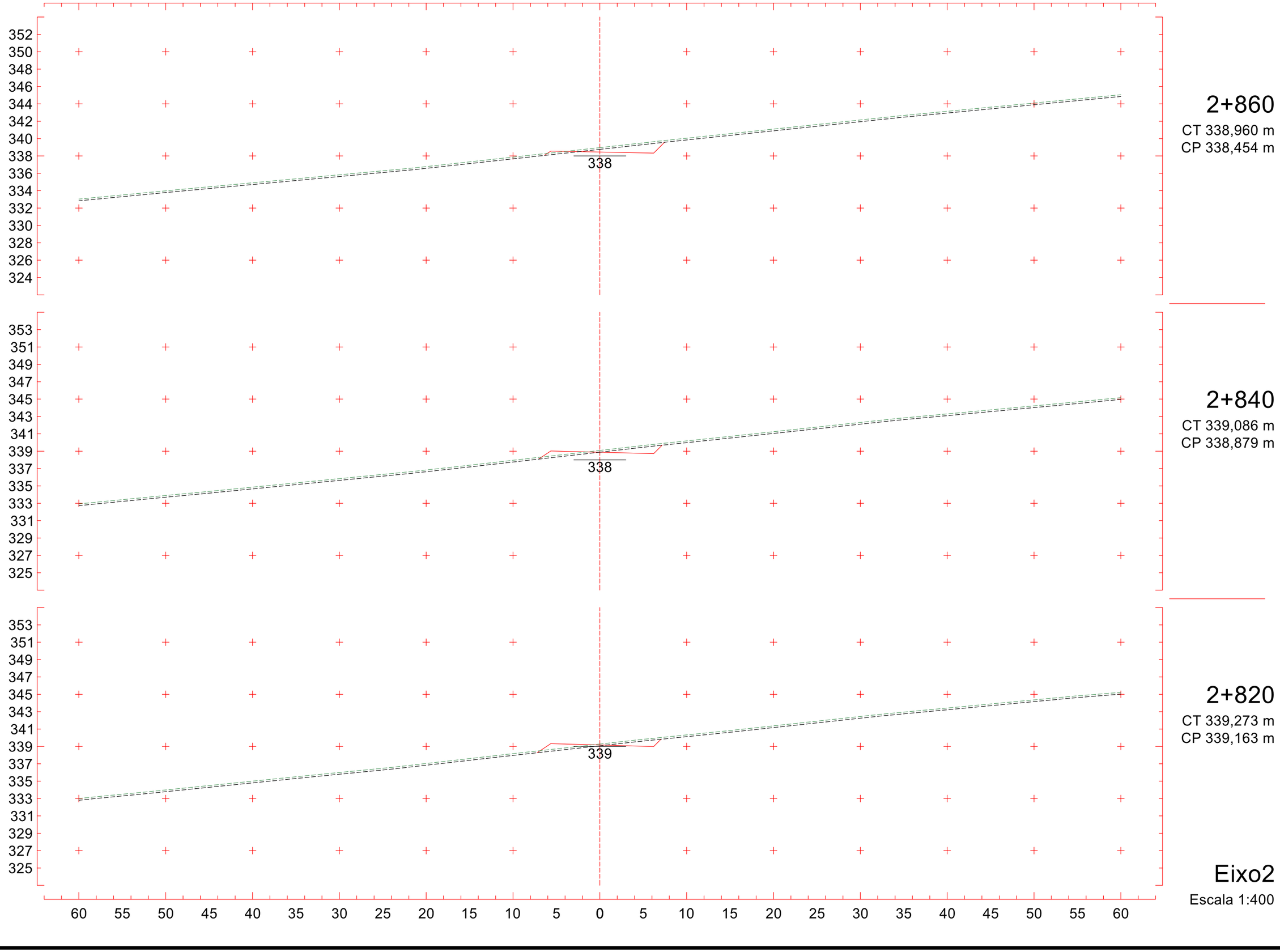
CT 337,877 m
CP 338,614 m

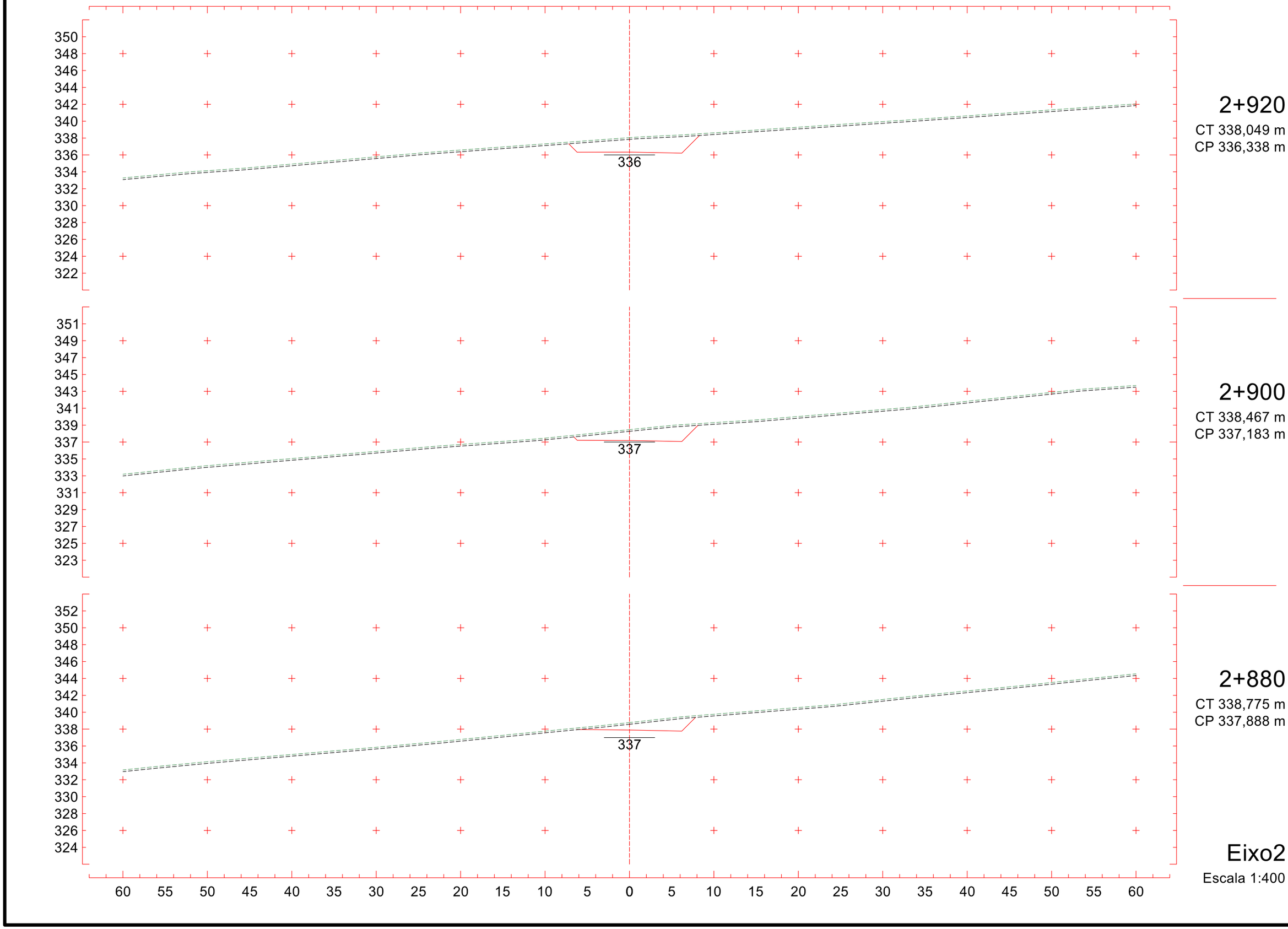
Eixo2

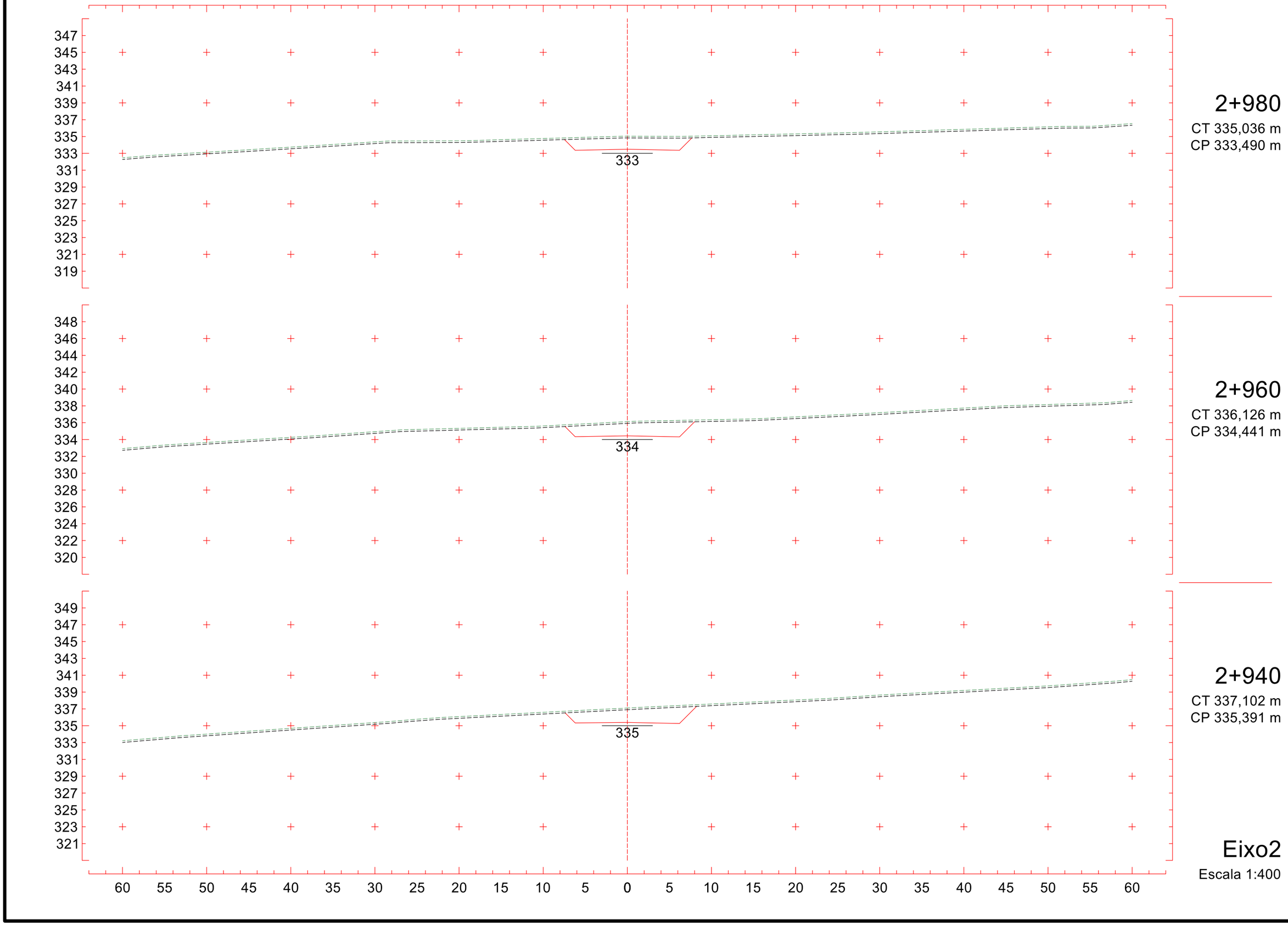
Escala 1:400

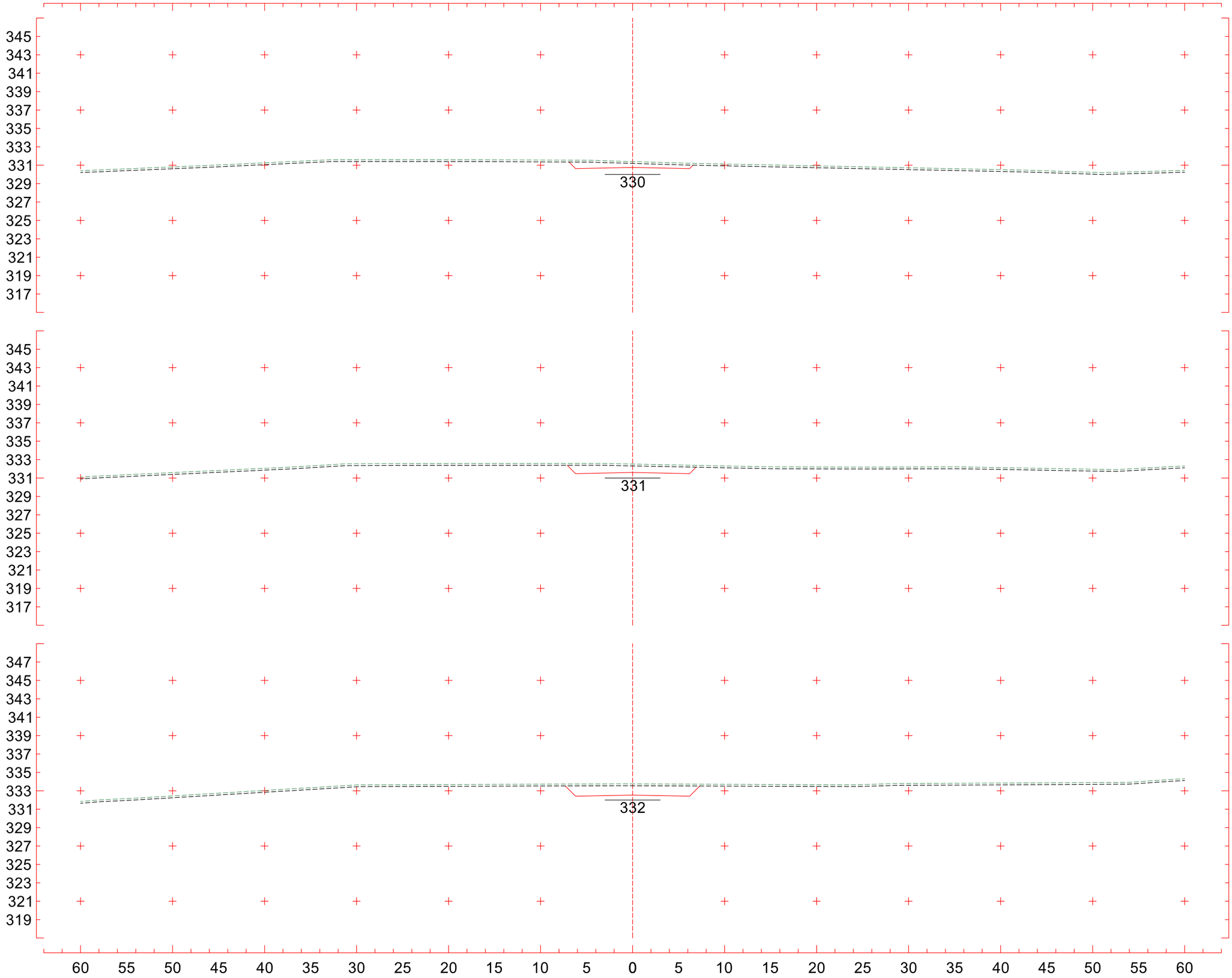

353
351
349
347
345
343
341
339
337
335
333
331
329
327
325
339
2+740
CT 339,127 m
CP 339,116 m
352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
339
2+720
CT 338,923 m
CP 339,016 m
352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
338
2+700
CT 338,638 m
CP 338,916 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

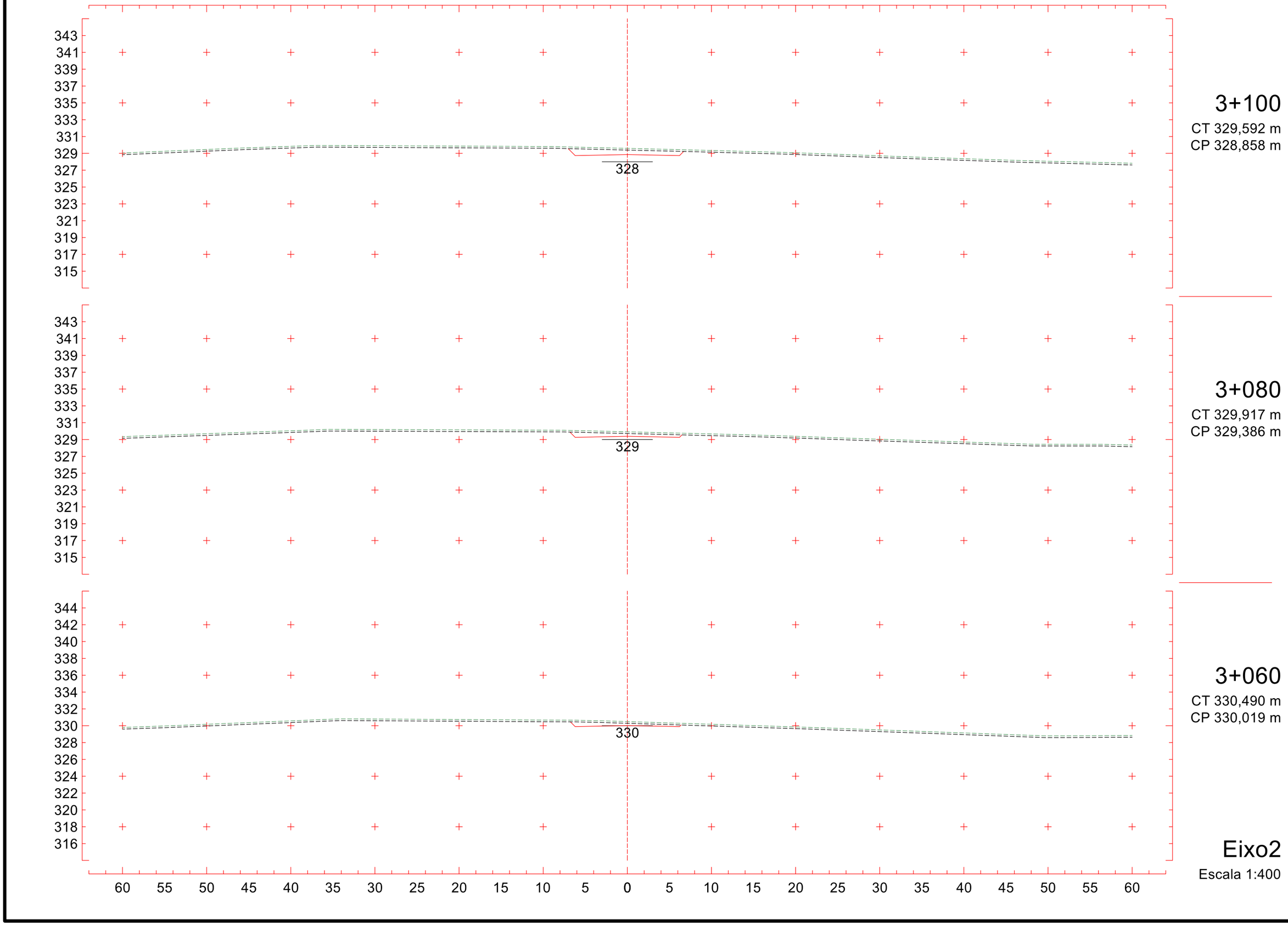

353
351
349
347
345
343
341
339
337
335
333
331
329
327
325
339
2+800
CT 339,450 m
CP 339,308 m
2+780
CT 339,408 m
CP 339,313 m
2+760
CT 339,280 m
CP 339,217 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

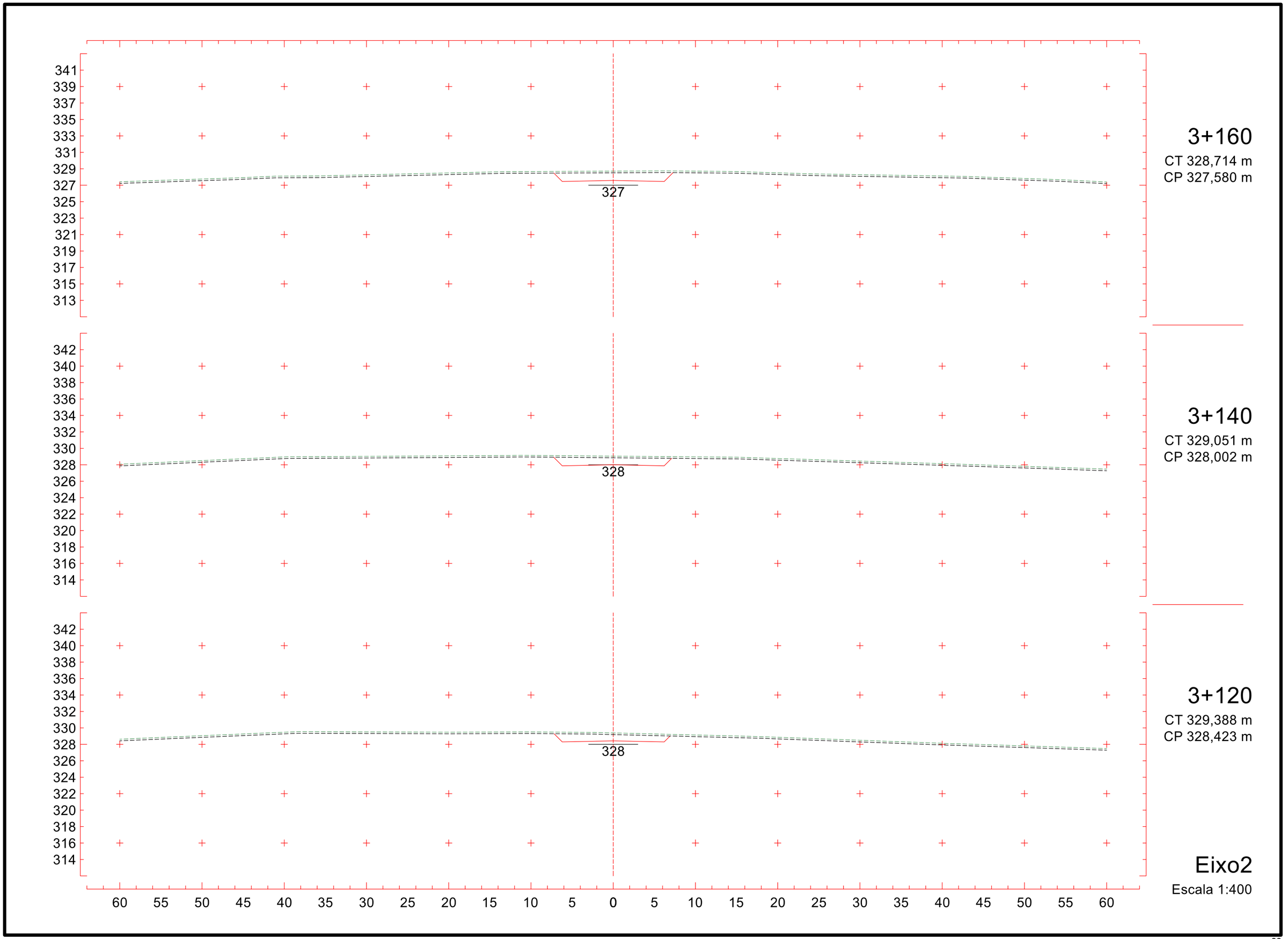

352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
338
2+860
CT 338,960 m
CP 338,454 m
353
351
349
347
345
343
341
339
337
335
333
331
329
327
325
338
2+840
CT 339,086 m
CP 338,879 m
353
351
349
347
345
343
341
339
337
335
333
331
329
327
325
339
2+820
CT 339,273 m
CP 339,163 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

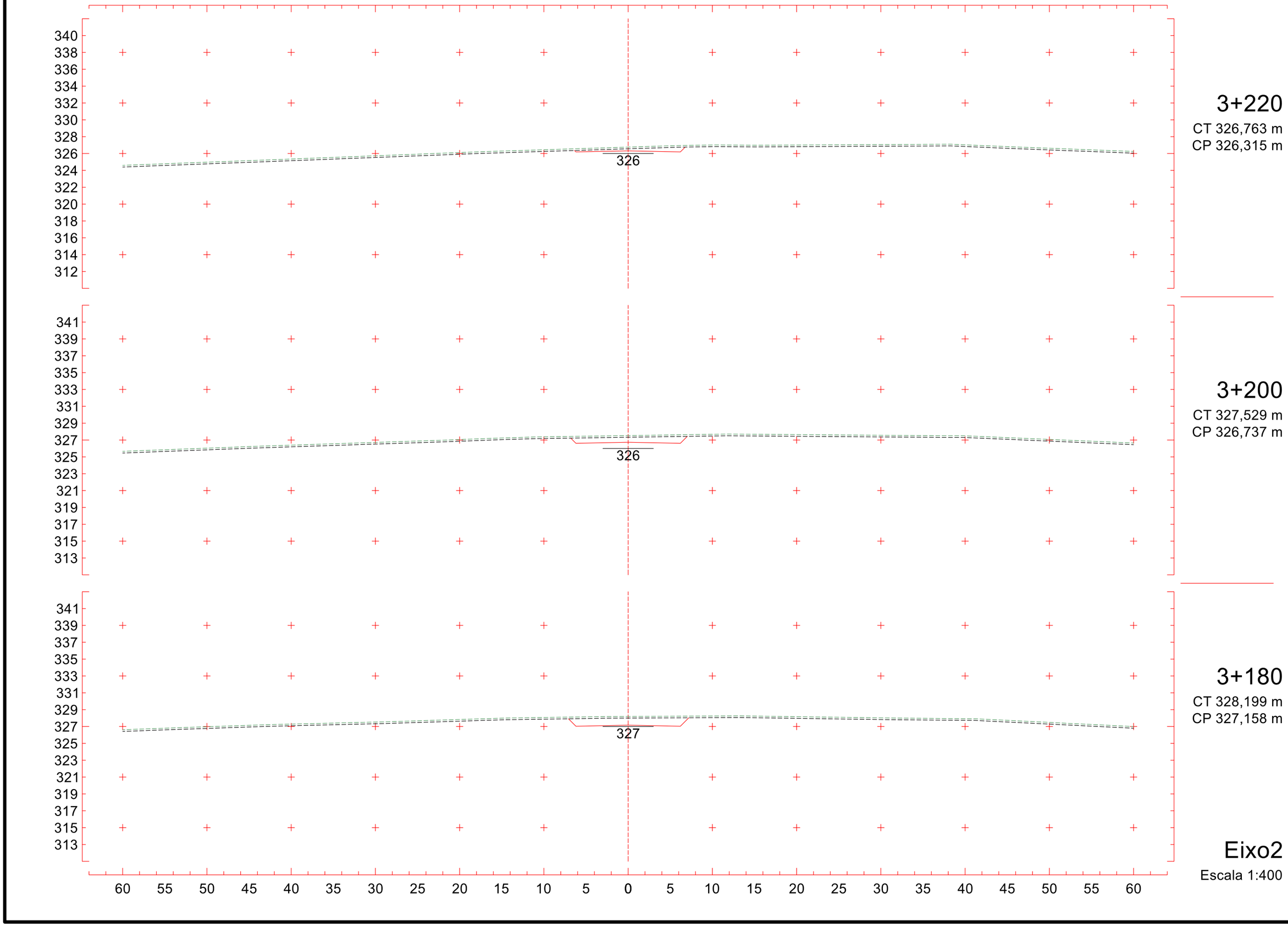

350
348
346
344
342
340
338
336
334
332
330
328
326
324
322
336
2+920
CT 338,049 m
CP 336,338 m
351
349
347
345
343
341
339
337
335
333
331
329
327
325
323
337
2+900
CT 338,467 m
CP 337,183 m
352
350
348
346
344
342
340
338
336
334
332
330
328
326
324
337
2+880
CT 338,775 m
CP 337,888 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

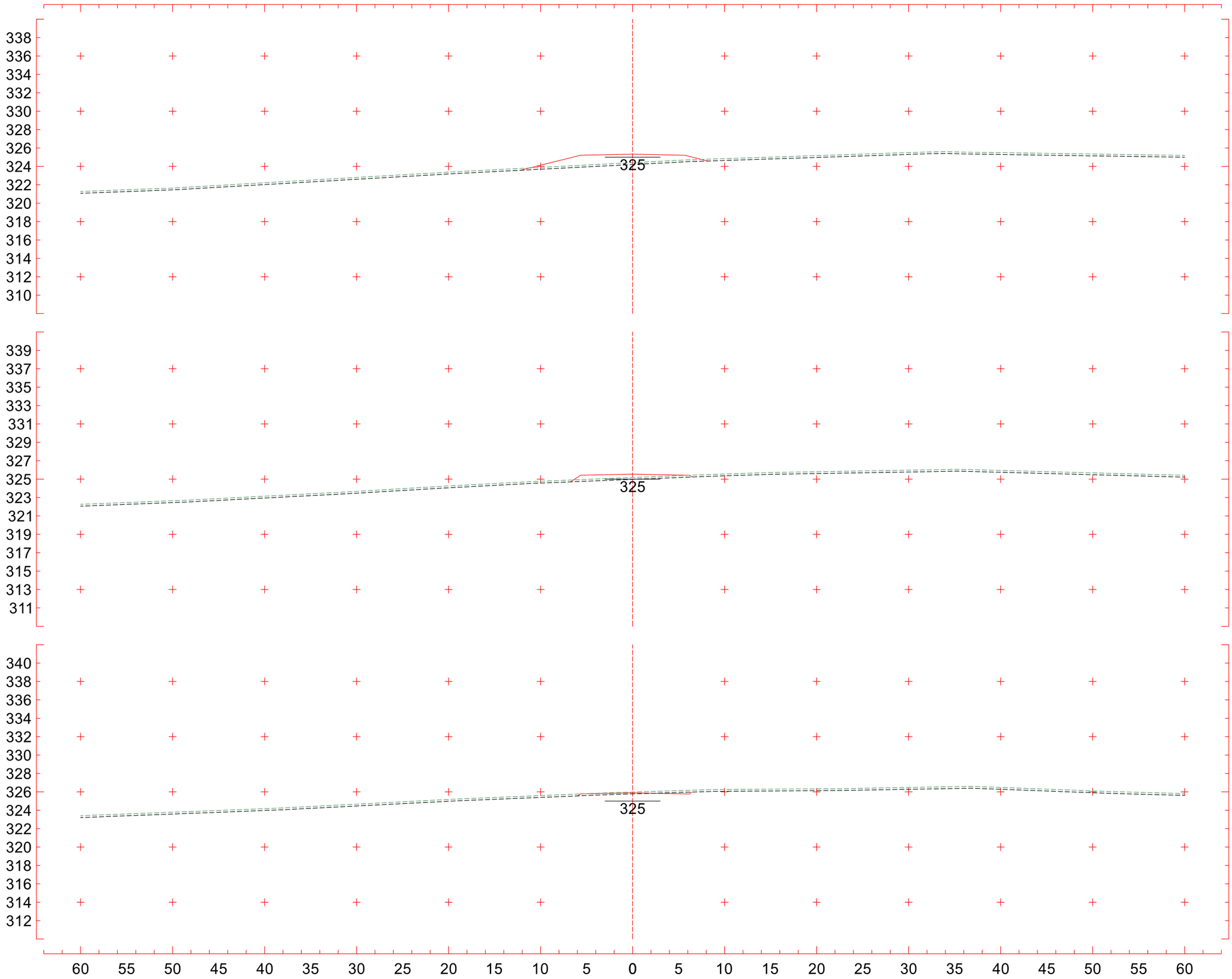

347
345
343
341
339
337
335
333
331
329
327
325
323
321
319
333
2+980
CT 335,036 m
CP 333,490 m
348
346
344
342
340
338
336
334
332
330
328
326
324
322
320
334
2+960
CT 336,126 m
CP 334,441 m
349
347
345
343
341
339
337
335
333
331
329
327
325
323
321
335
2+940
CT 337,102 m
CP 335,391 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


345
343
341
339
337
335
333
331
329
327
325
323
321
319
317
330
3+040
CT 331,397 m
CP 330,758 m
345
343
341
339
337
335
333
331
329
327
325
323
321
319
317
331
3+020
CT 332,518 m
CP 331,603 m
347
345
343
341
339
337
335
333
331
329
327
325
323
321
319
332
3+000
CT 333,750 m
CP 332,540 m
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
Eixo2
Escala 1:400


343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
328
3+100
CT 329,592 m
CP 328,858 m
343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
329
3+080
CT 329,917 m
CP 329,386 m
344
342
340
338
336
334
332
330
328
326
324
322
320
318
316
330
3+060
CT 330,490 m
CP 330,019 m
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
Eixo2
Escala 1:400


341
339
337
335
333
331
329
327
325
323
321
319
317
315
313
327
3+160
CT 328,714 m
CP 327,580 m
342
340
338
336
334
332
330
328
326
324
322
320
318
316
314
328
3+140
CT 329,051 m
CP 328,002 m
342
340
338
336
334
332
330
328
326
324
322
320
318
316
314
328
3+120
CT 329,388 m
CP 328,423 m
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
Eixo2
Escala 1:400


340
338
336
334
332
330
328
326
324
322
320
318
316
314
312
326
3+220
CT 326,763 m
CP 326,315 m
341
339
337
335
333
331
329
327
325
323
321
319
317
315
313
326
3+200
CT 327,529 m
CP 326,737 m
341
339
337
335
333
331
329
327
325
323
321
319
317
315
313
327
3+180
CT 328,199 m
CP 327,158 m
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
Eixo2
Escala 1:400



3+280

CT 324,404 m
CP 325,329 m

3+260

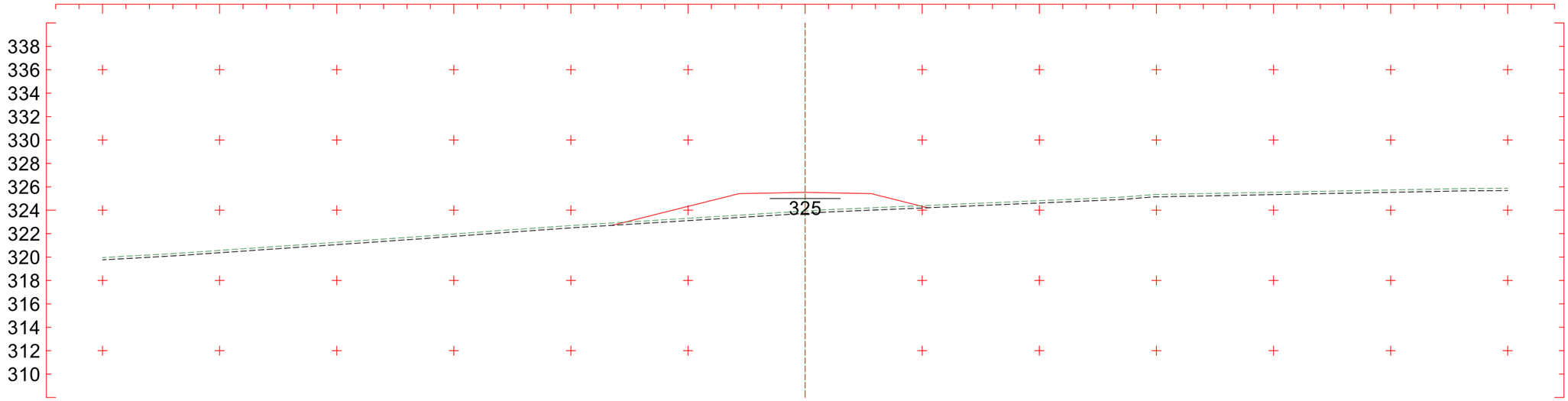
CT 325,174 m
CP 325,542 m

3+240

CT 325,980 m
CP 325,893 m

Eixo2

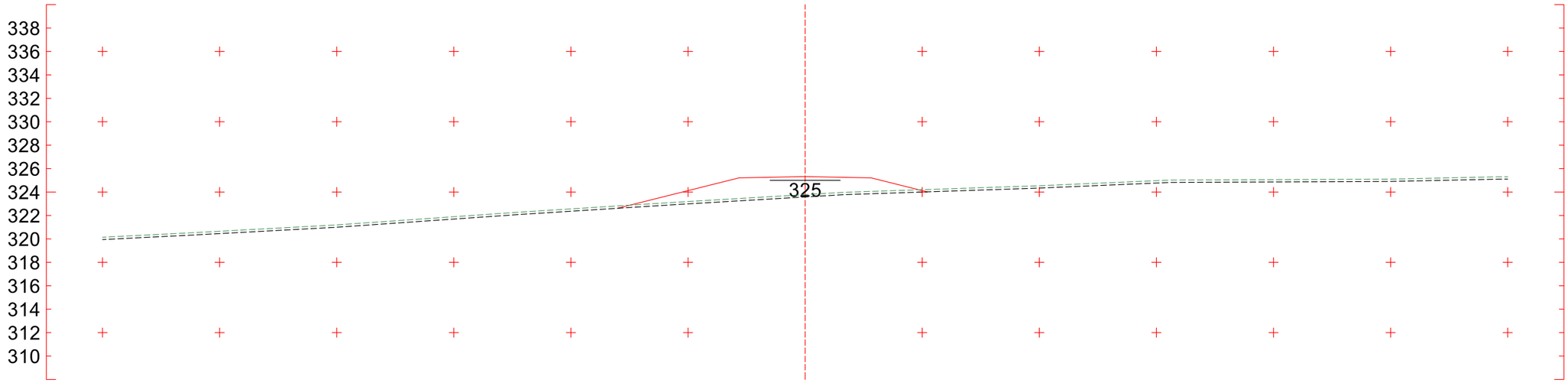
Escala 1:400



3+340

CT 323,927 m

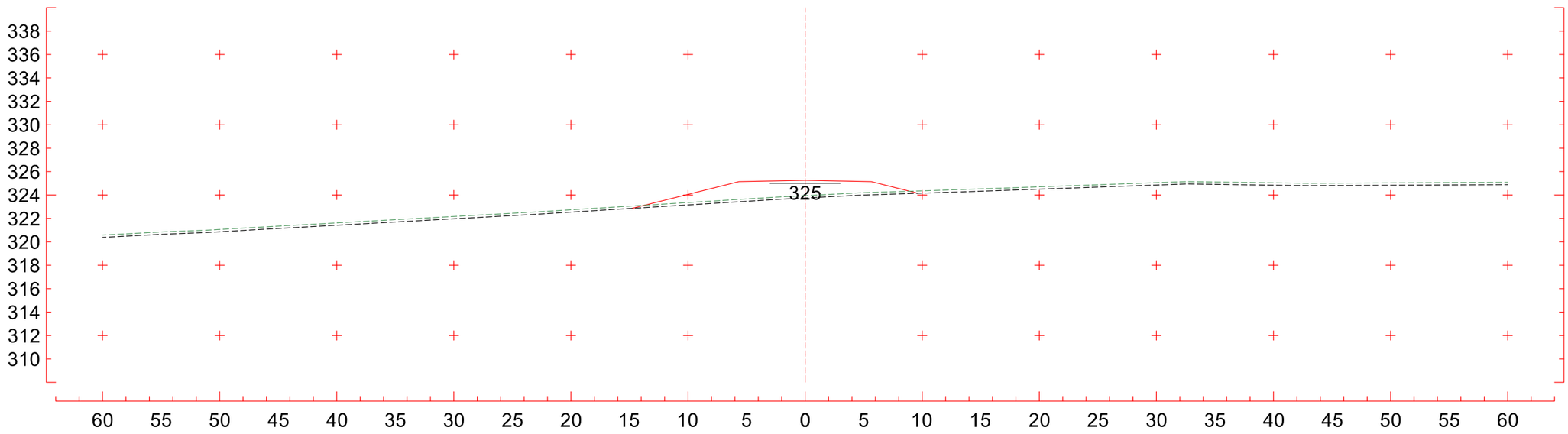
CP 325,528 m



3+320

CT 323,781 m

CP 325,322 m



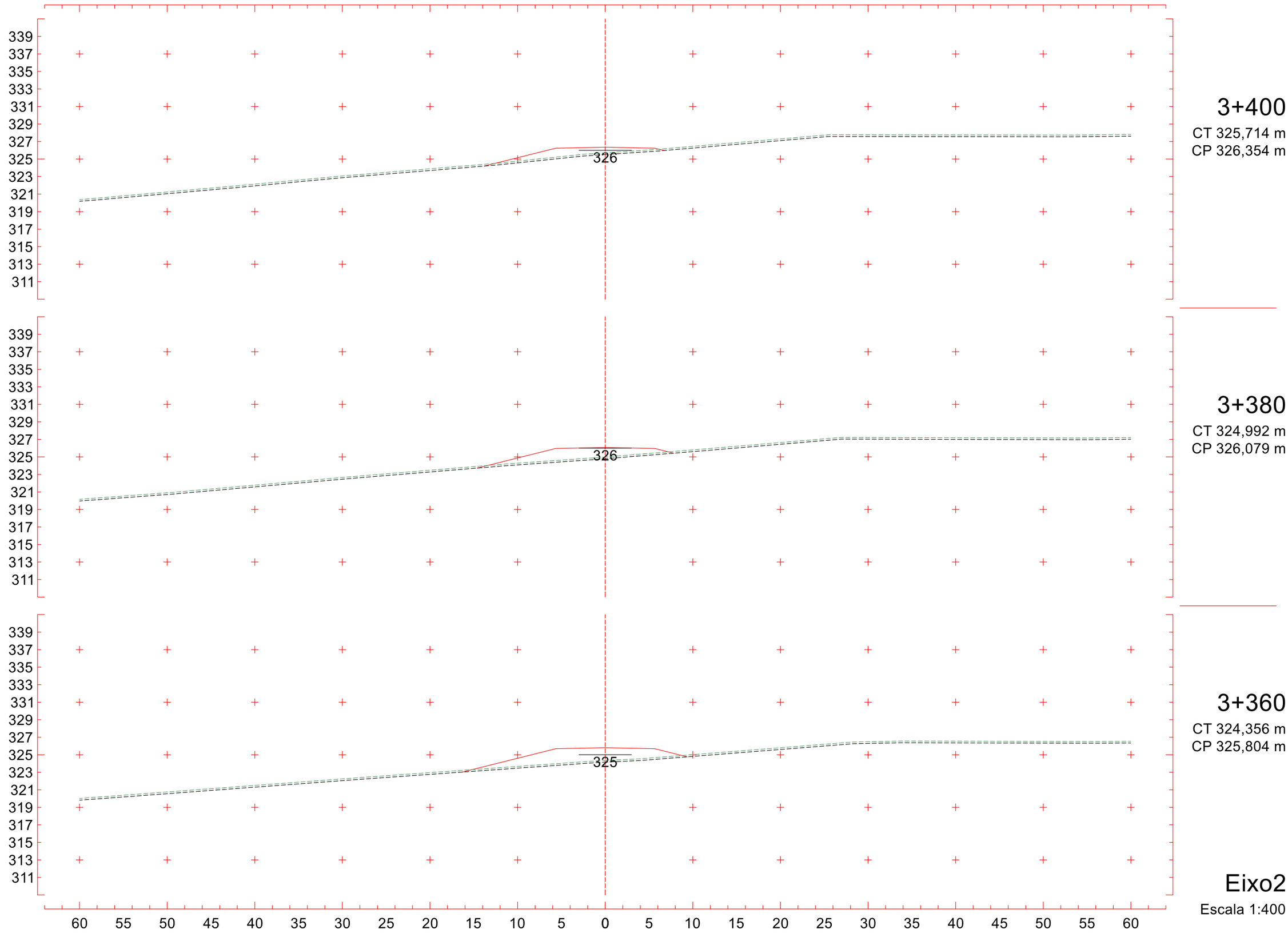
3+300

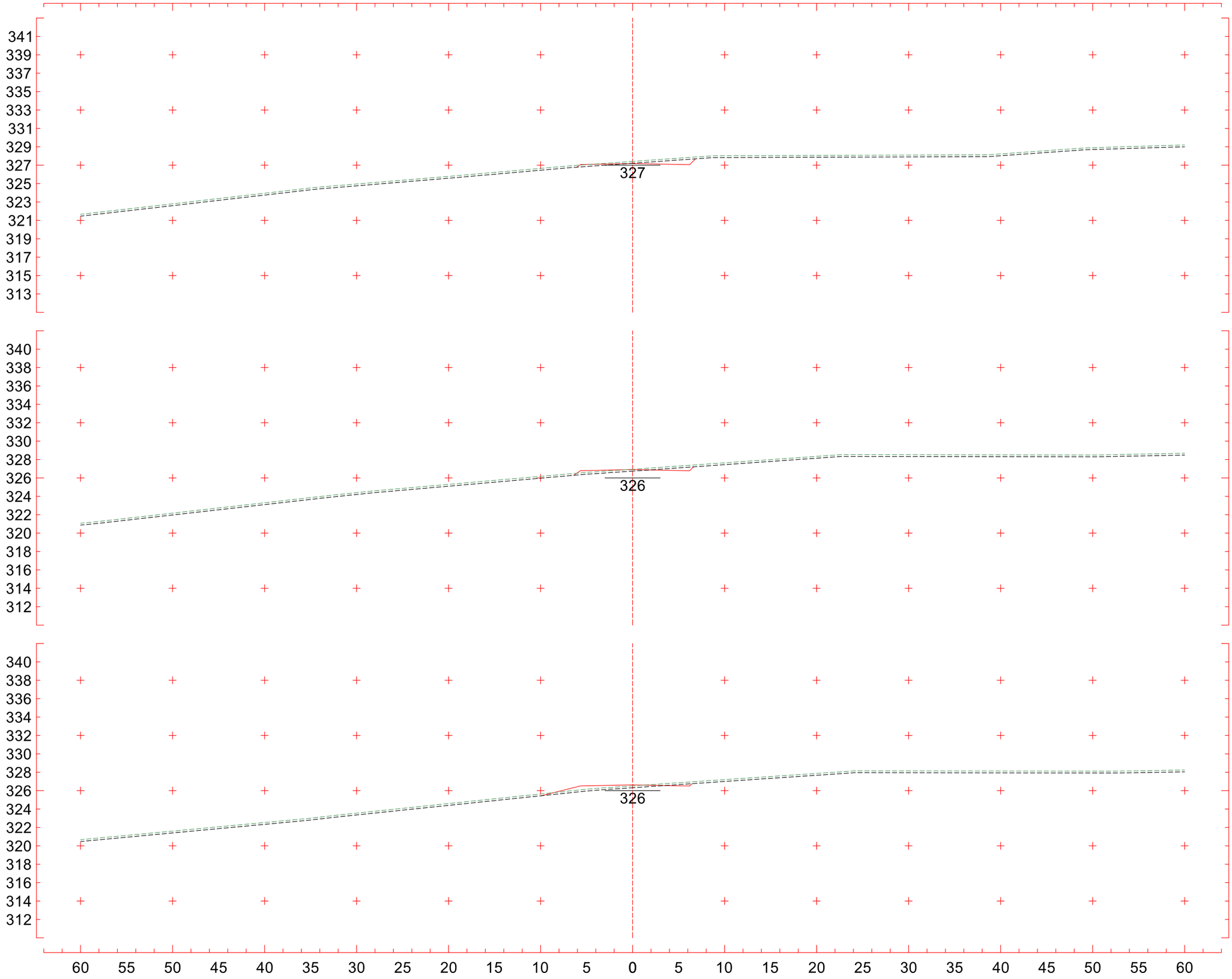
CT 323,946 m

CP 325,256 m

Eixo2

Escala 1:400


339
337
335
333
331
329
327
325
323
321
319
317
315
313
311
326
3+400
CT 325,714 m
CP 326,354 m
326
3+380
CT 324,992 m
CP 326,079 m
325
3+360
CT 324,356 m
CP 325,804 m
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
Eixo2
Escala 1:400

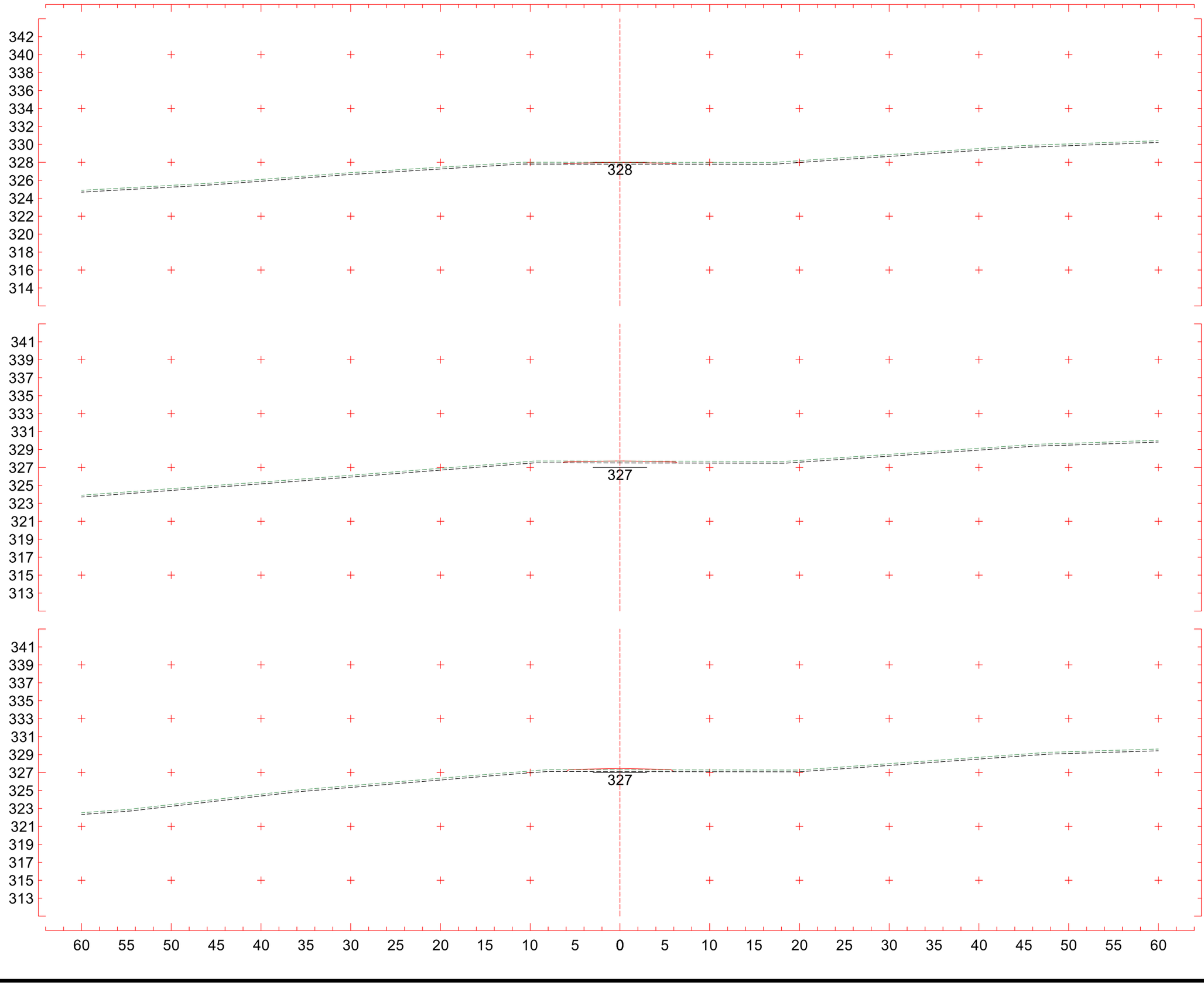


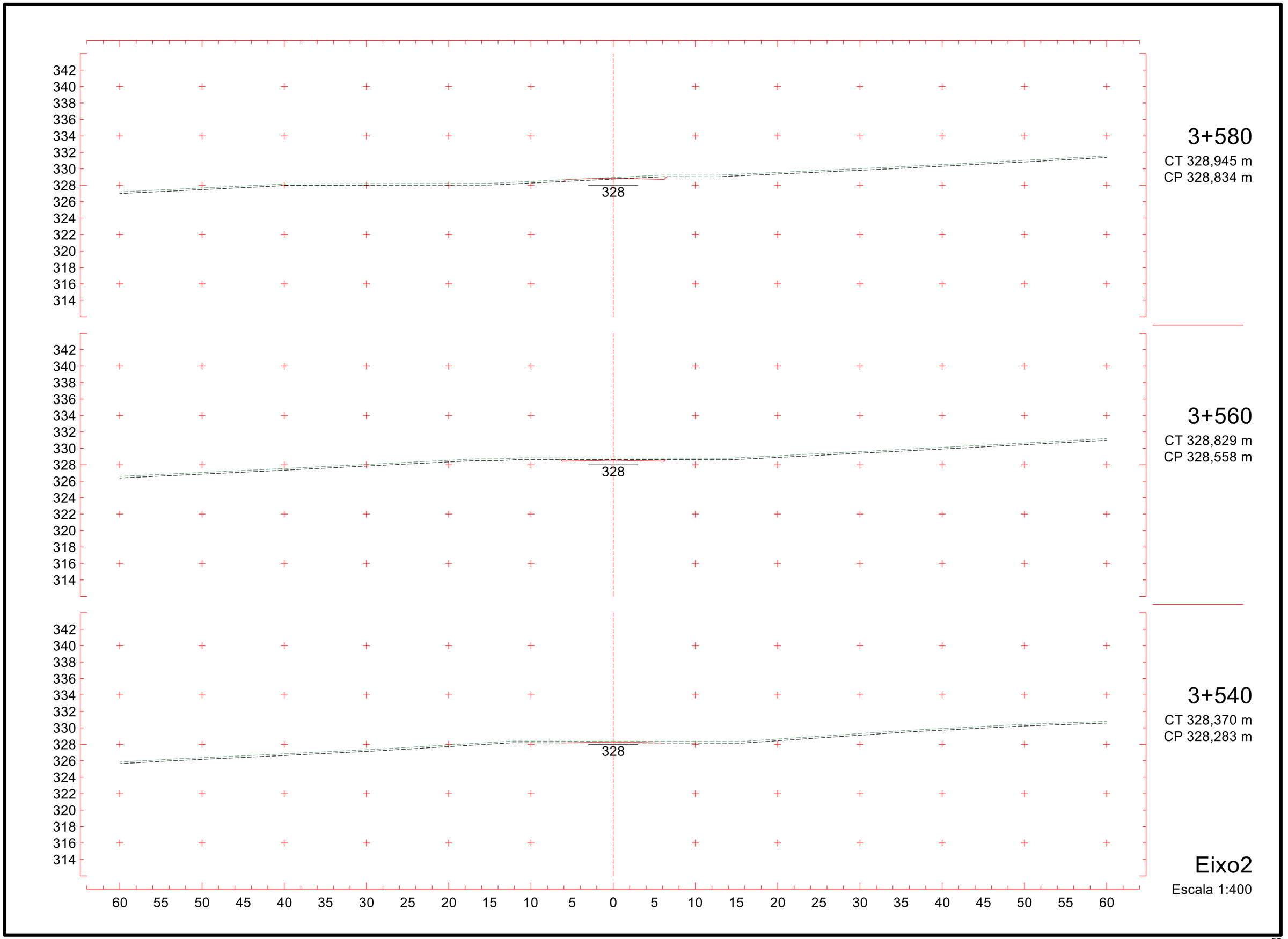
3+460
CT 327,411 m
CP 327,181 m

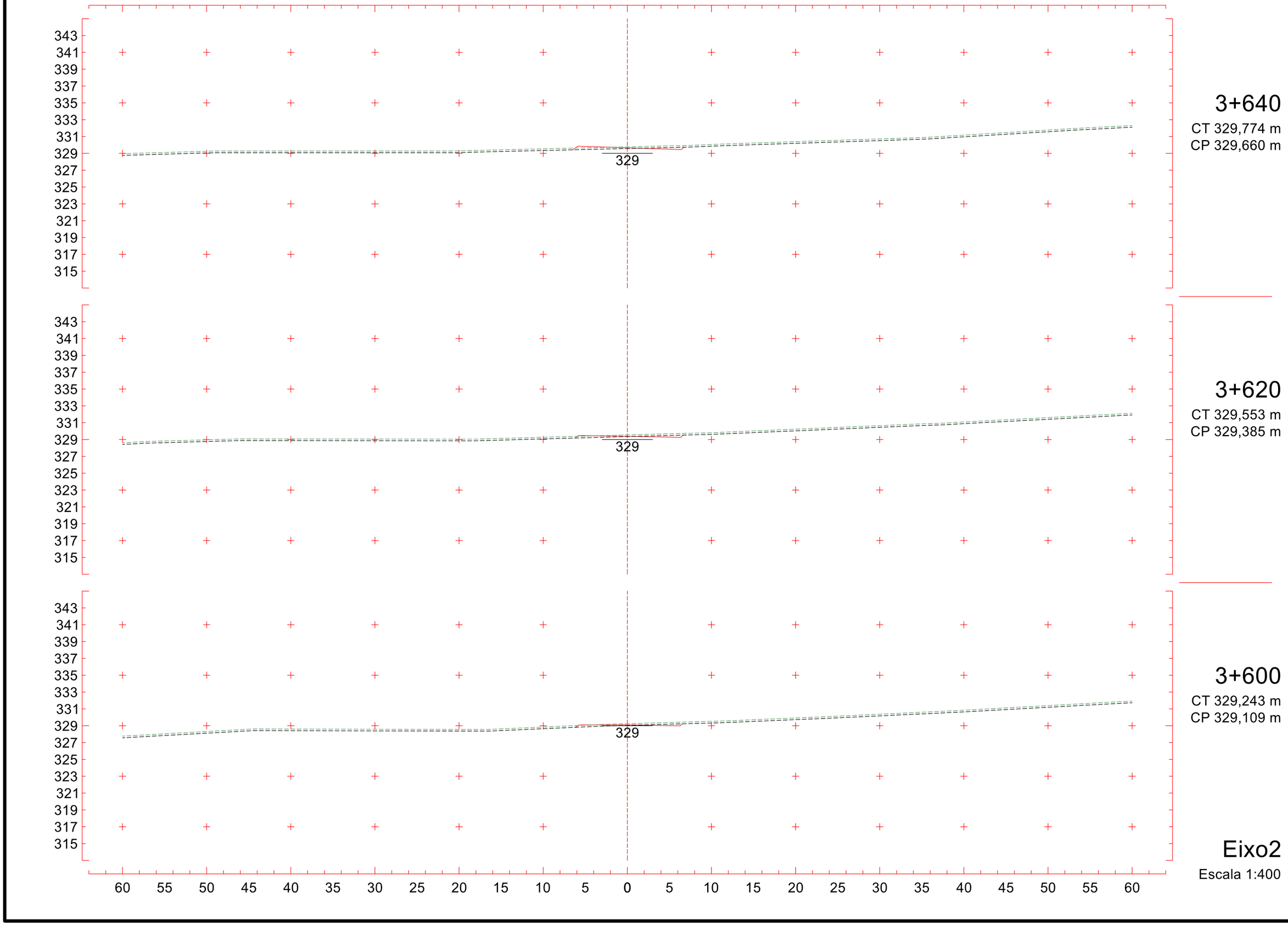
3+440
CT 326,942 m
CP 326,905 m

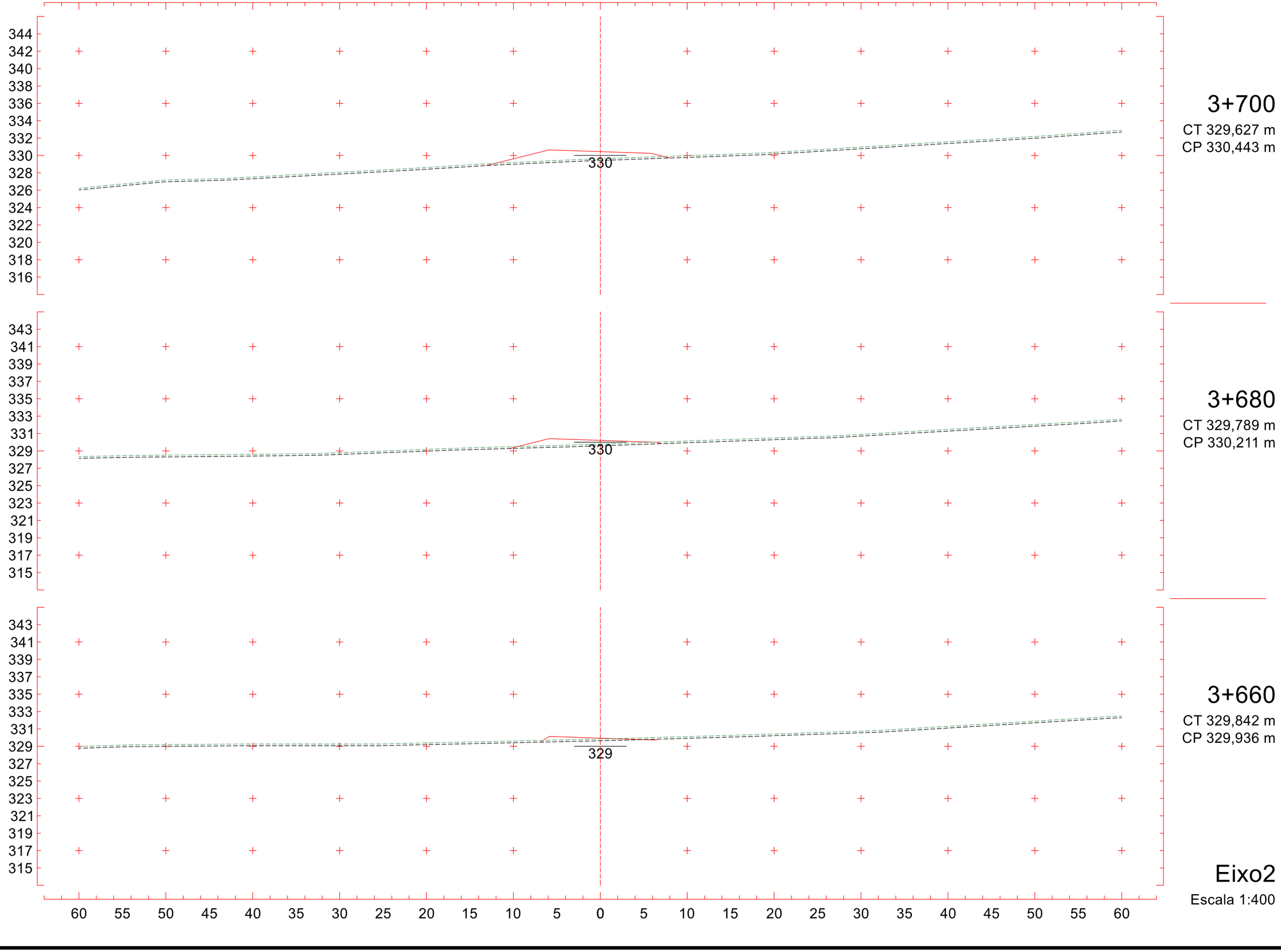
3+420
CT 326,518 m
CP 326,630 m

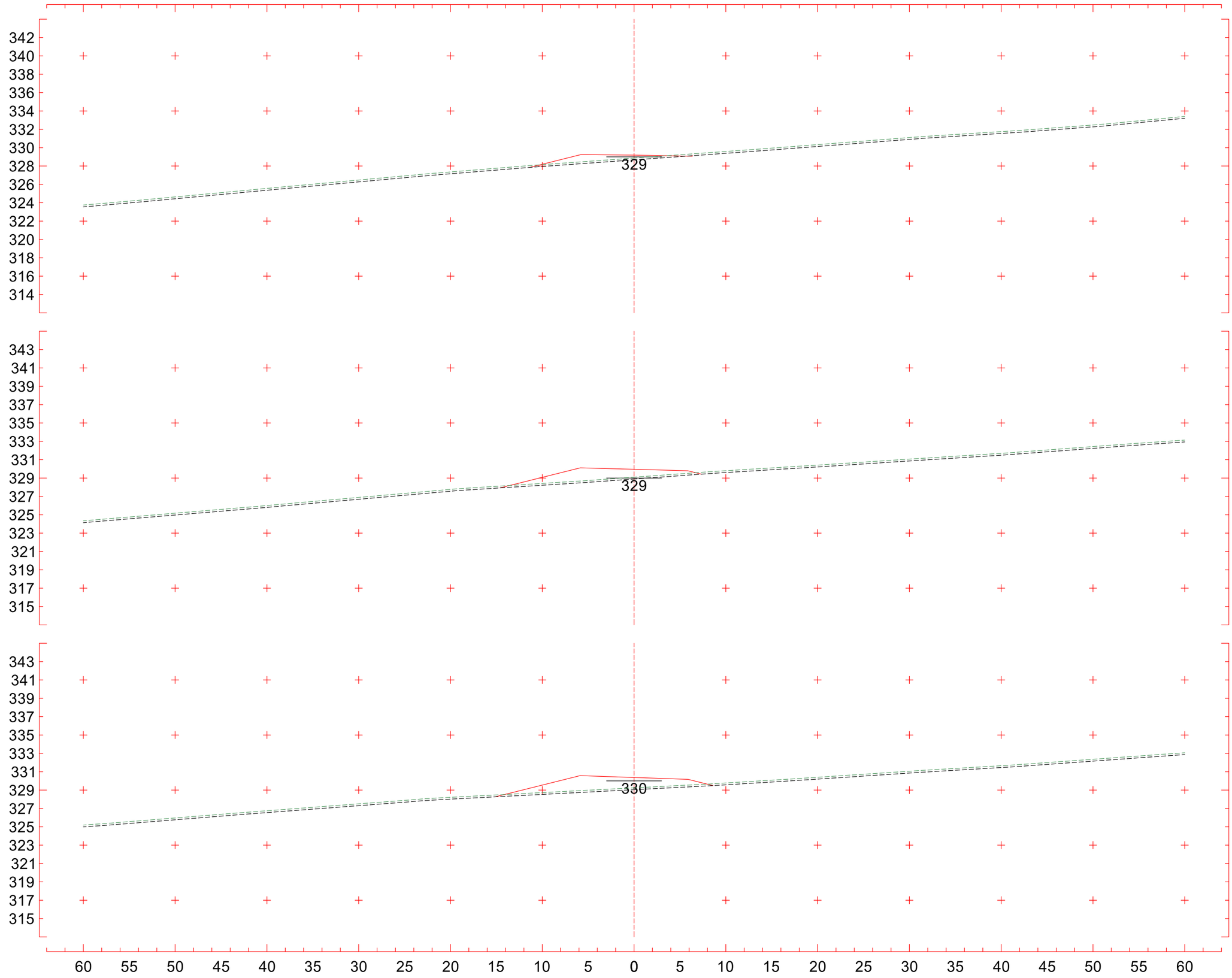
Eixo2
Escala 1:400

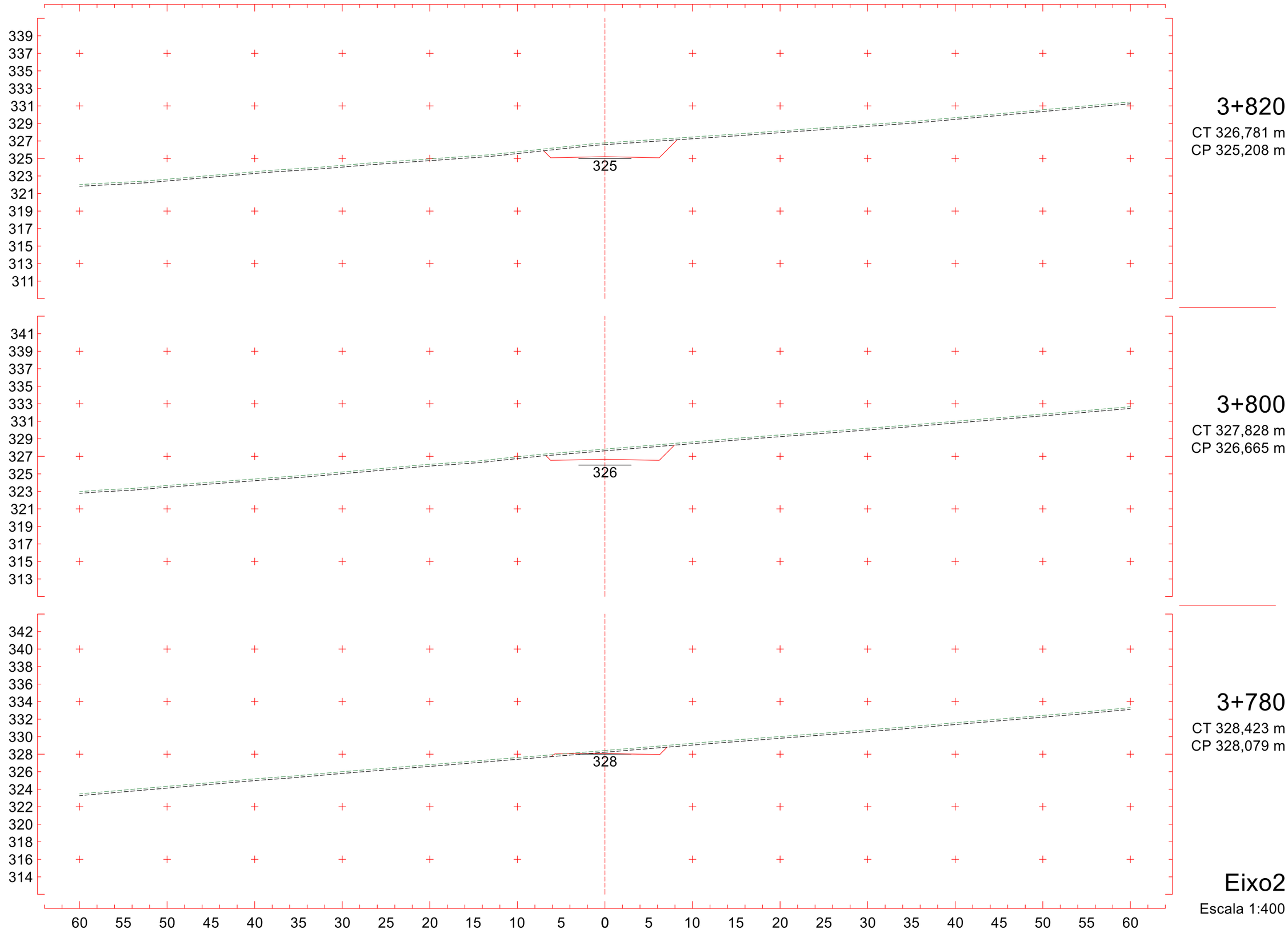

342
340
338
336
334
332
330
328
326
324
322
320
318
316
314
328
3+520
CT 328,001 m
CP 328,007 m
341
339
337
335
333
331
329
327
325
323
321
319
317
315
313
327
3+500
CT 327,704 m
CP 327,732 m
341
339
337
335
333
331
329
327
325
323
321
319
317
315
313
327
3+480
CT 327,312 m
CP 327,456 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

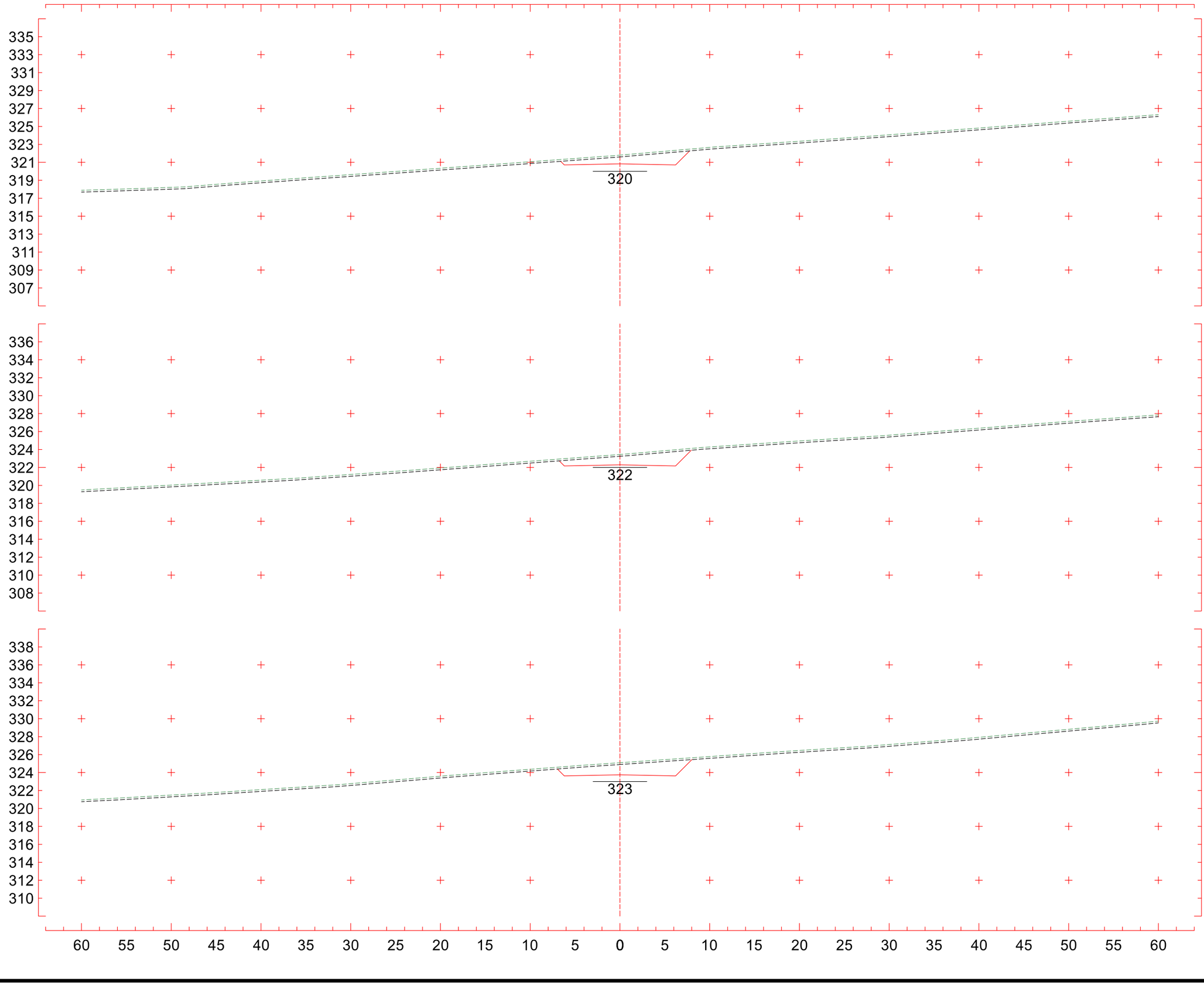

342
340
338
336
334
332
330
328
326
324
322
320
318
316
314
328
3+580
CT 328,945 m
CP 328,834 m
328
3+560
CT 328,829 m
CP 328,558 m
328
3+540
CT 328,370 m
CP 328,283 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

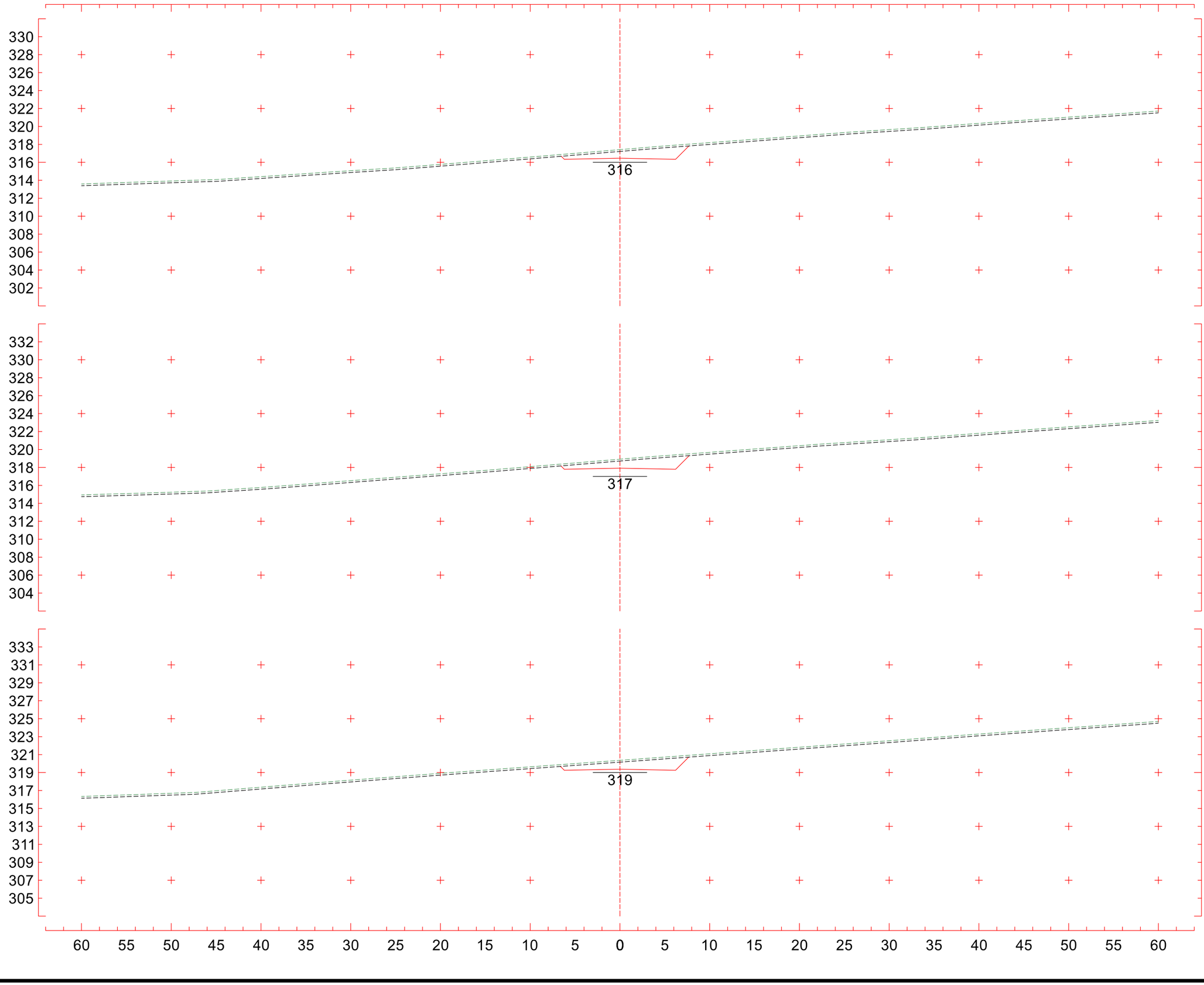

343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
329
3+640
CT 329,774 m
CP 329,660 m
3+620
CT 329,553 m
CP 329,385 m
3+600
CT 329,243 m
CP 329,109 m
Eixo2
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

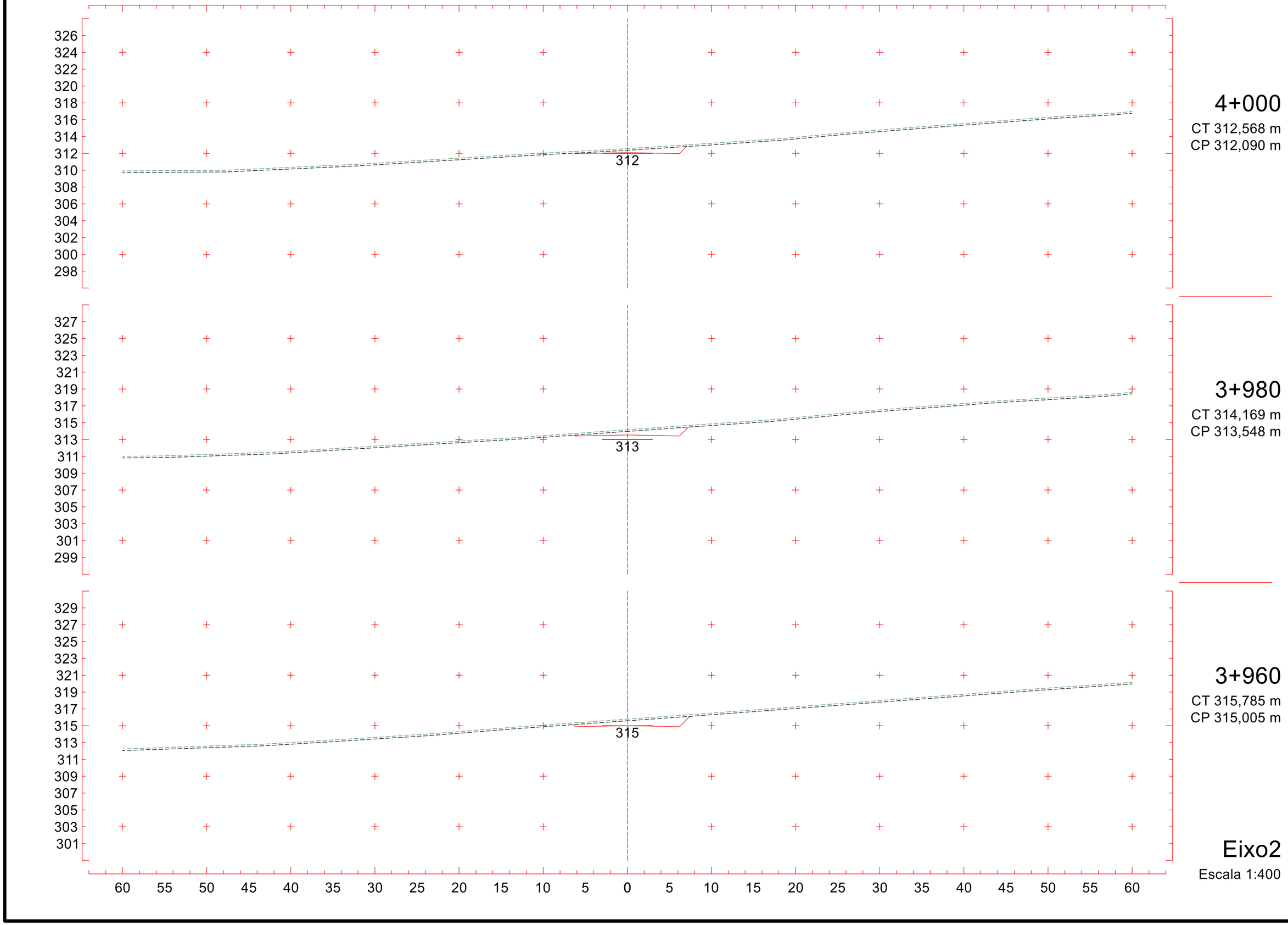

344
342
340
338
336
334
332
330
328
326
324
322
320
318
316
330
3+700
CT 329,627 m
CP 330,443 m
343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
330
3+680
CT 329,789 m
CP 330,211 m
343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
329
3+660
CT 329,842 m
CP 329,936 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

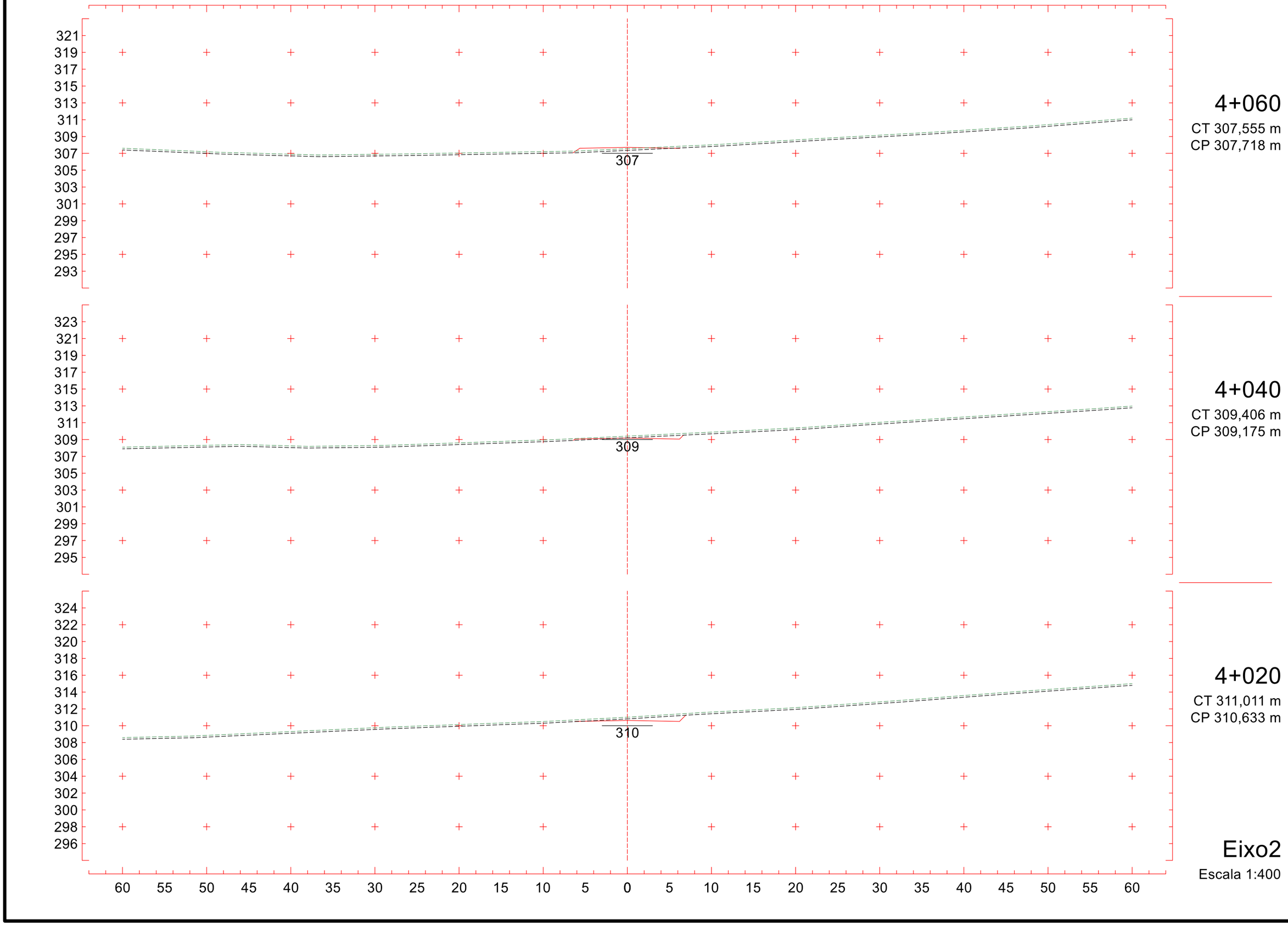

342
340
338
336
334
332
330
328
326
324
322
320
318
316
314
329
3+760
CT 328,869 m
CP 329,190 m
343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
329
3+740
CT 329,096 m
CP 329,955 m
343
341
339
337
335
333
331
329
327
325
323
321
319
317
315
330
3+720
CT 329,244 m
CP 330,372 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

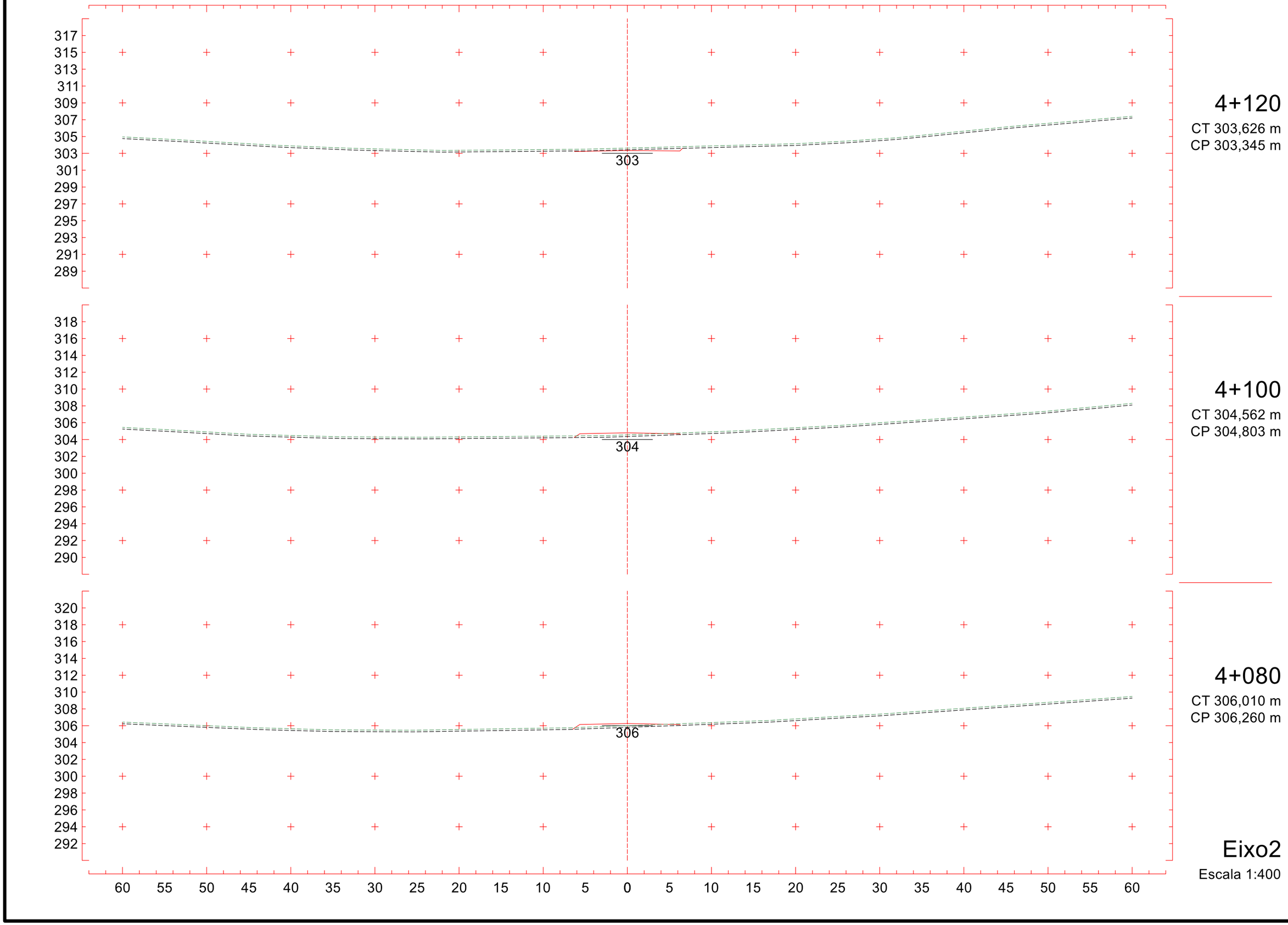

339
337
335
333
331
329
327
325
323
321
319
317
315
313
311
325
3+820
CT 326,781 m
CP 325,208 m
341
339
337
335
333
331
329
327
325
323
321
319
317
315
313
326
3+800
CT 327,828 m
CP 326,665 m
342
340
338
336
334
332
330
328
326
324
322
320
318
316
314
328
3+780
CT 328,423 m
CP 328,079 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

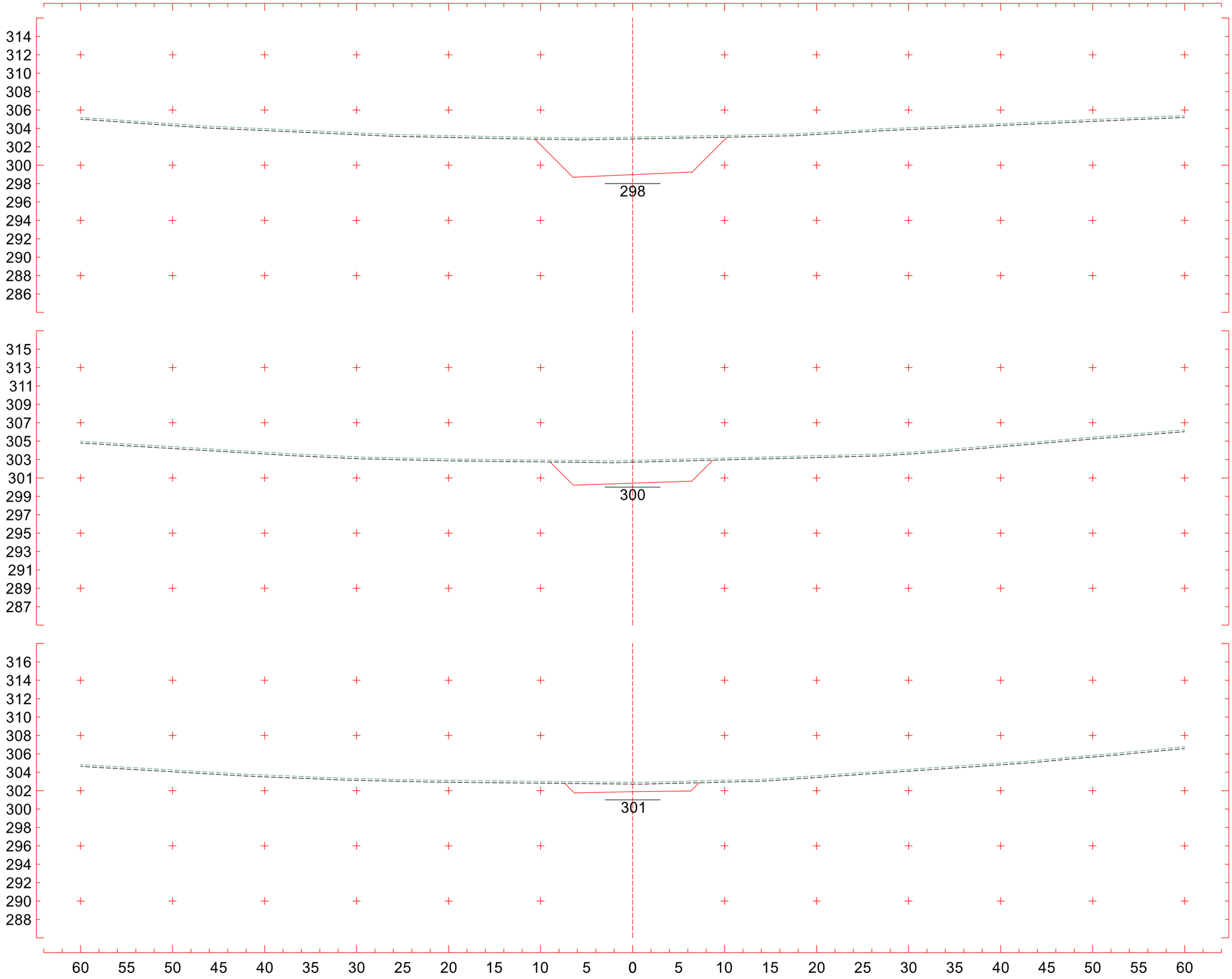

335
333
331
329
327
325
323
321
319
317
315
313
311
309
307
320
3+880
CT 321,803 m
CP 320,835 m
336
334
332
330
328
326
324
322
320
318
316
314
312
310
308
322
3+860
CT 323,444 m
CP 322,293 m
338
336
334
332
330
328
326
324
322
320
318
316
314
312
310
323
3+840
CT 325,096 m
CP 323,750 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


330
328
326
324
322
320
318
316
314
312
310
308
306
304
302
316
3+940
CT 317,416 m
CP 316,463 m
332
330
328
326
324
322
320
318
316
314
312
310
308
306
304
317
3+920
CT 318,917 m
CP 317,920 m
333
331
329
327
325
323
321
319
317
315
313
311
309
307
305
319
3+900
CT 320,361 m
CP 319,378 m
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
Eixo2
Escala 1:400


326
324
322
320
318
316
314
312
310
308
306
304
302
300
298
312
4+000
CT 312,568 m
CP 312,090 m
327
325
323
321
319
317
315
313
311
309
307
305
303
301
299
313
3+980
CT 314,169 m
CP 313,548 m
329
327
325
323
321
319
317
315
313
311
309
307
305
303
301
315
3+960
CT 315,785 m
CP 315,005 m
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
Eixo2
Escala 1:400


321
319
317
315
313
311
309
307
305
303
301
299
297
295
293
307
4+060
CT 307,555 m
CP 307,718 m
323
321
319
317
315
313
311
309
307
305
303
301
299
297
295
309
4+040
CT 309,406 m
CP 309,175 m
324
322
320
318
316
314
312
310
308
306
304
302
300
298
296
310
4+020
CT 311,011 m
CP 310,633 m
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
Eixo2
Escala 1:400


317
315
313
311
309
307
305
303
301
299
297
295
293
291
289
303
4+120
CT 303,626 m
CP 303,345 m
318
316
314
312
310
308
306
304
302
300
298
296
294
292
290
304
4+100
CT 304,562 m
CP 304,803 m
320
318
316
314
312
310
308
306
304
302
300
298
296
294
292
306
4+080
CT 306,010 m
CP 306,260 m
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
Eixo2
Escala 1:400



4+180

CT 303,054 m
CP 298,973 m

4+160

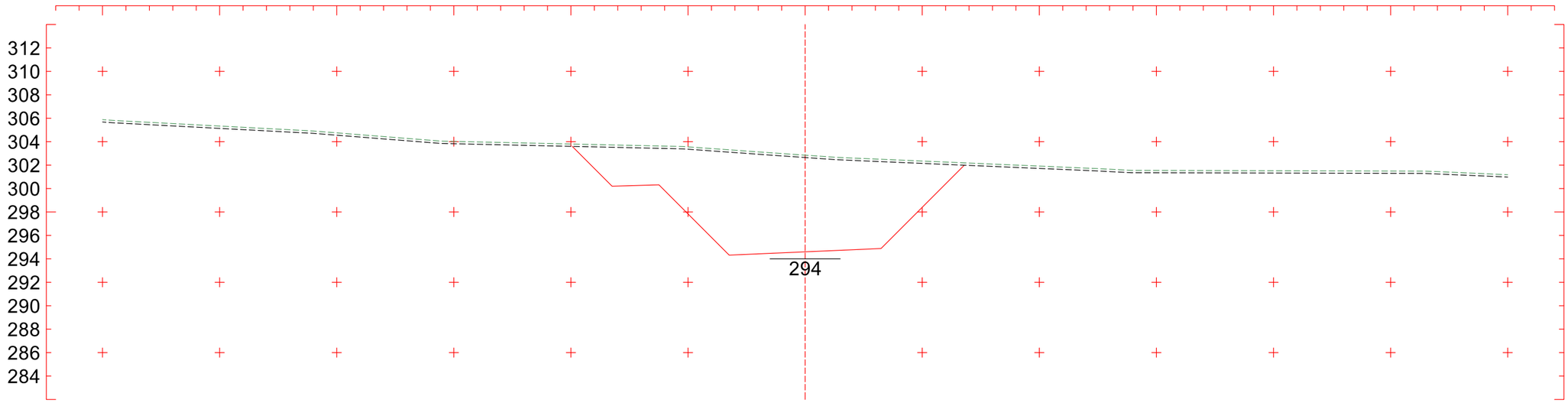
CT 302,907 m
CP 300,430 m

4+140

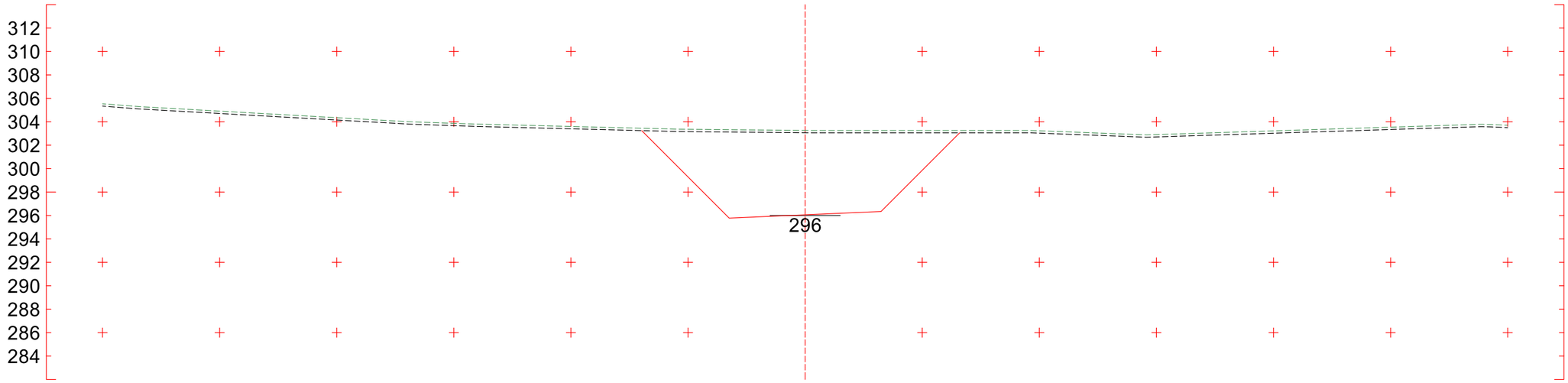
CT 302,910 m
CP 301,888 m

Eixo2

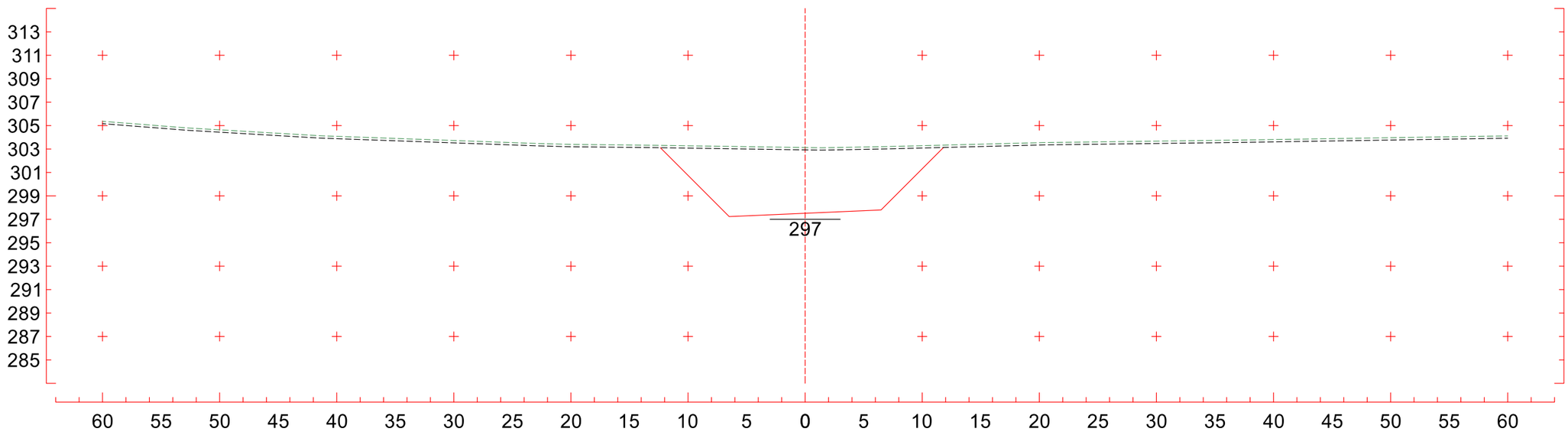
Escala 1:400



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

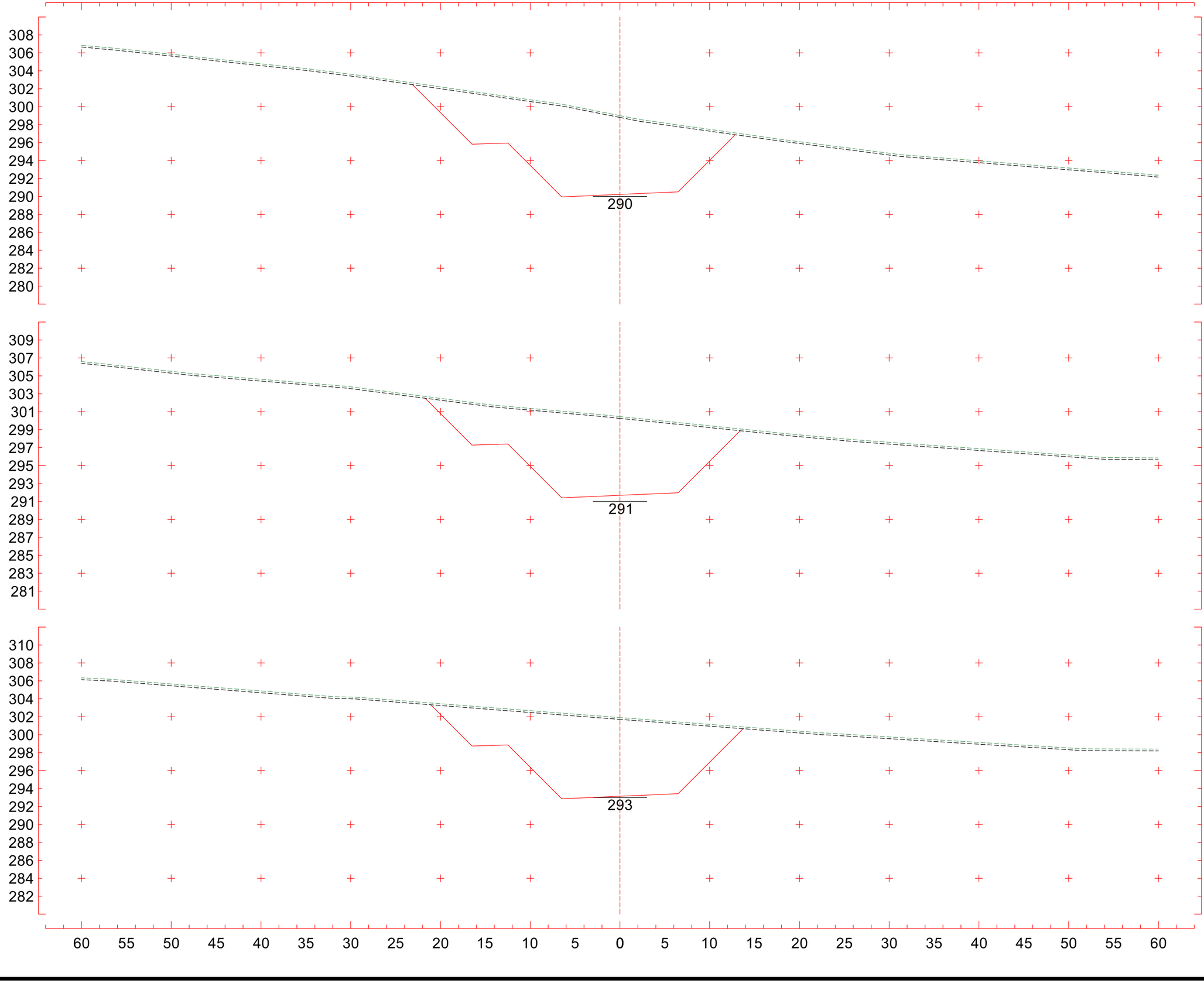


4+220
CT 303,260 m
CP 296,058 m



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

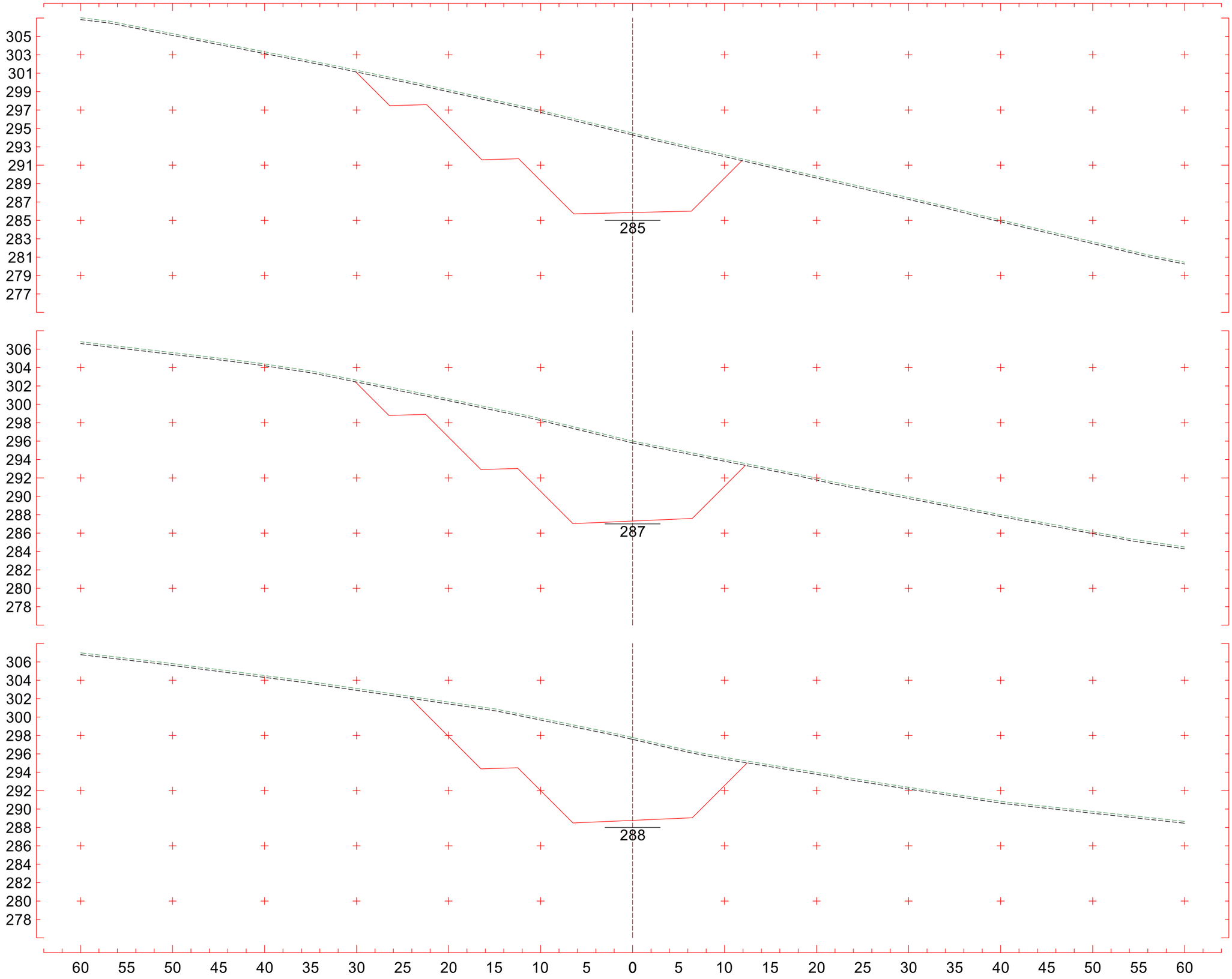
CT 300,460 m
CP 291,685 m

4+260

CT 301,911 m
CP 293,143 m

Eixo2

Escala 1:400



4+360

CT 294,493 m
CP 285,855 m

4+340

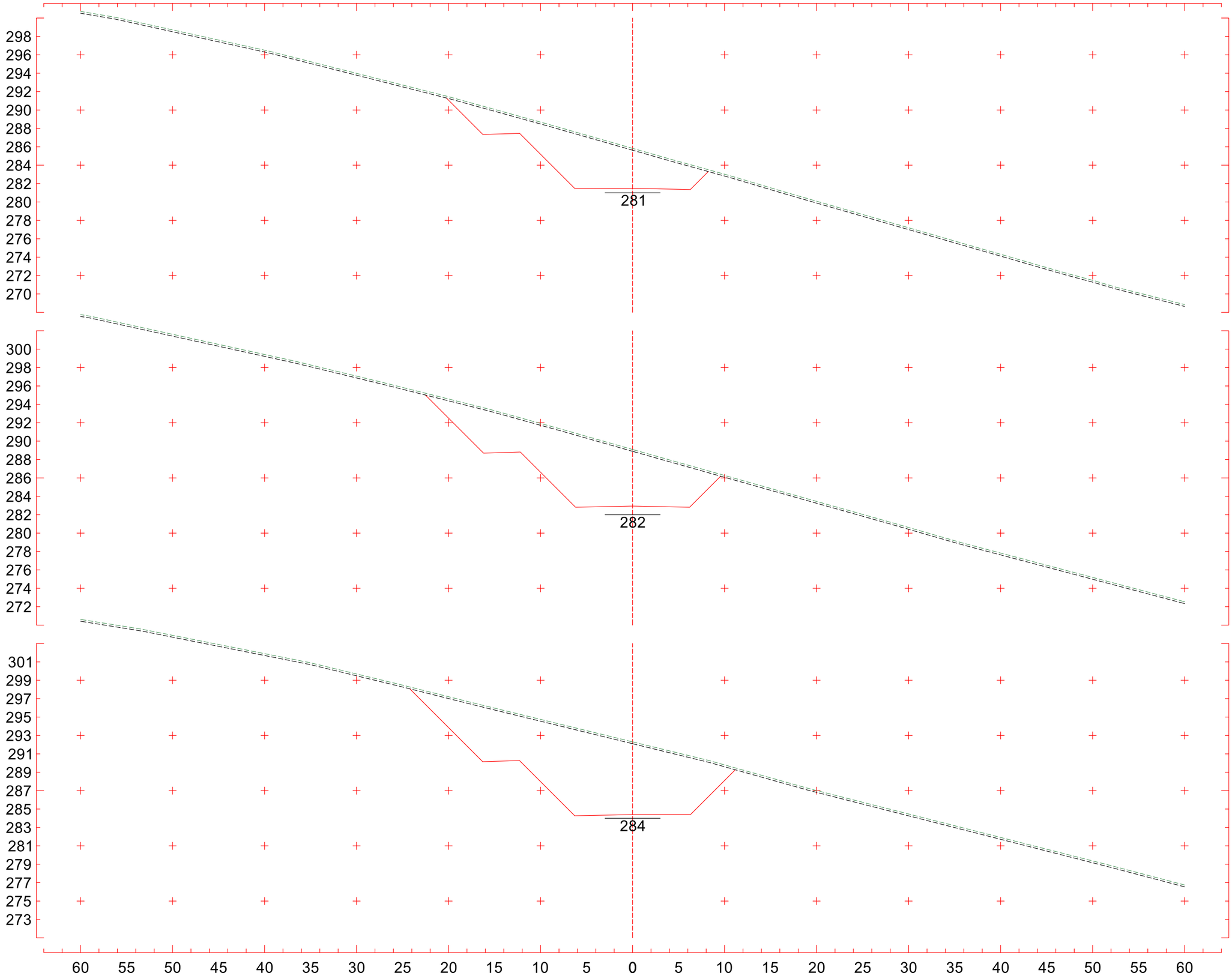
CT 296,008 m
CP 287,313 m

4+320

CT 297,775 m
CP 288,770 m

Eixo2

Escala 1:400



4+420

CT 285,830 m
CP 281,483 m

4+400

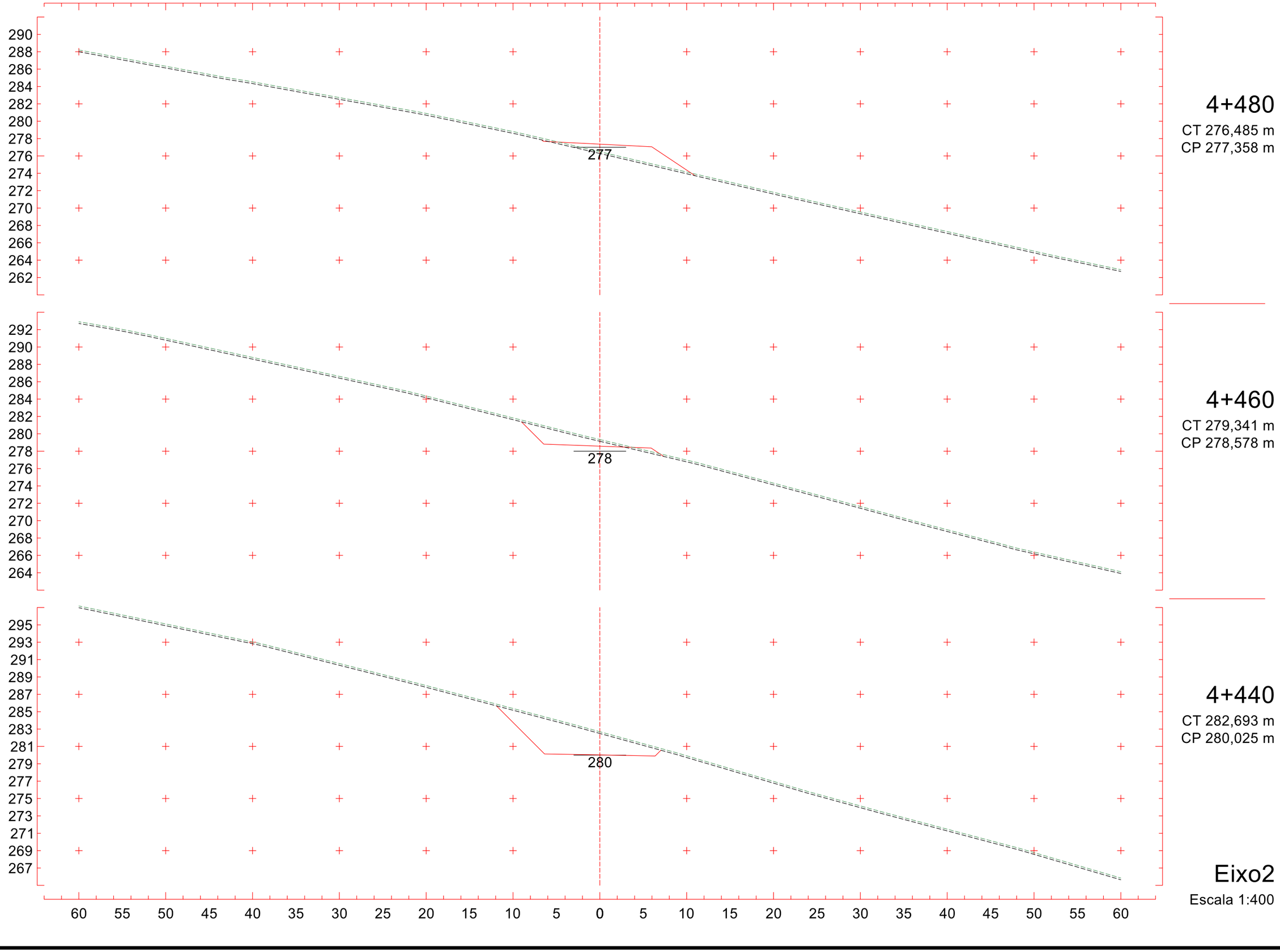
CT 289,090 m
CP 282,940 m

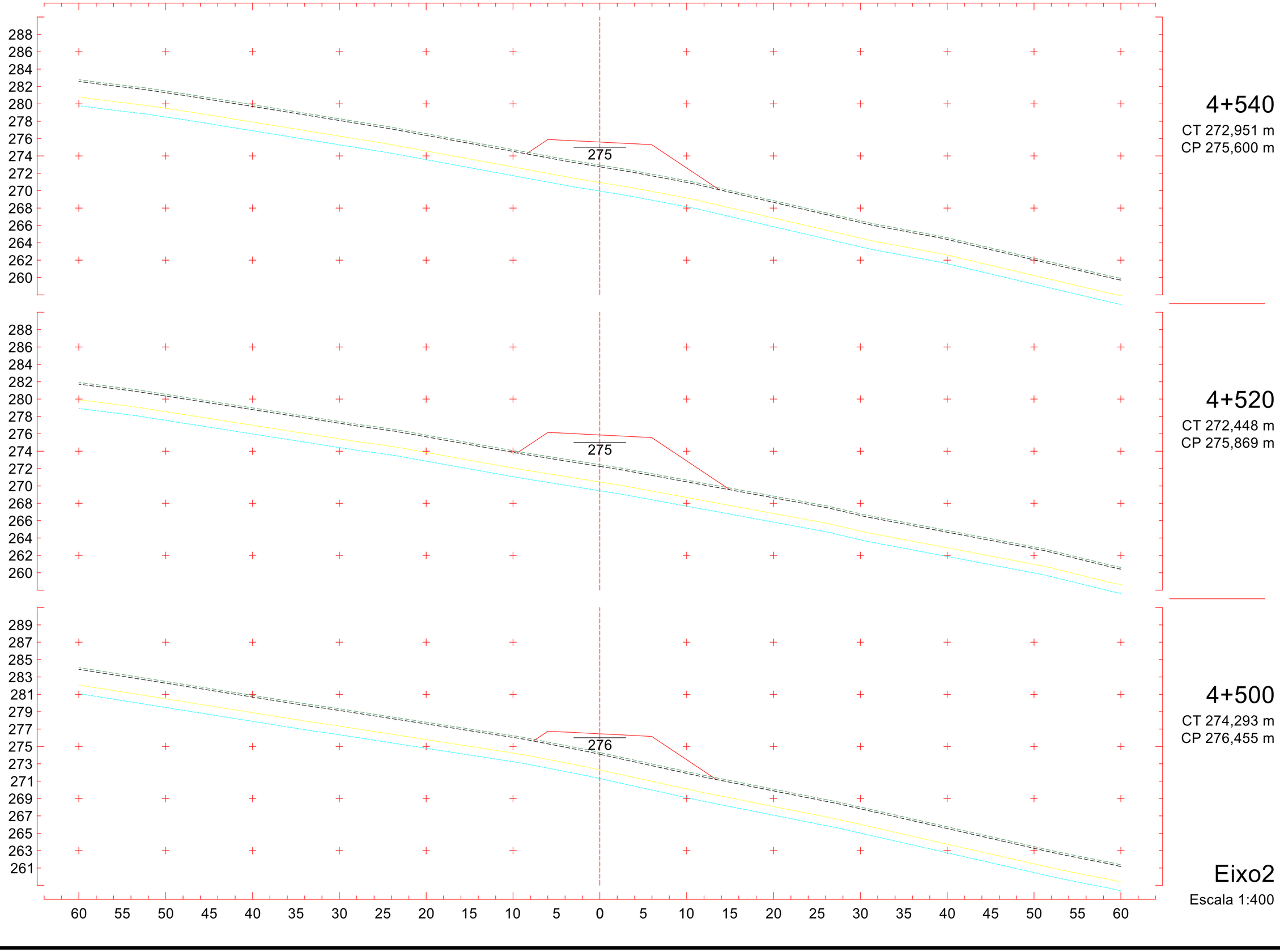
4+380

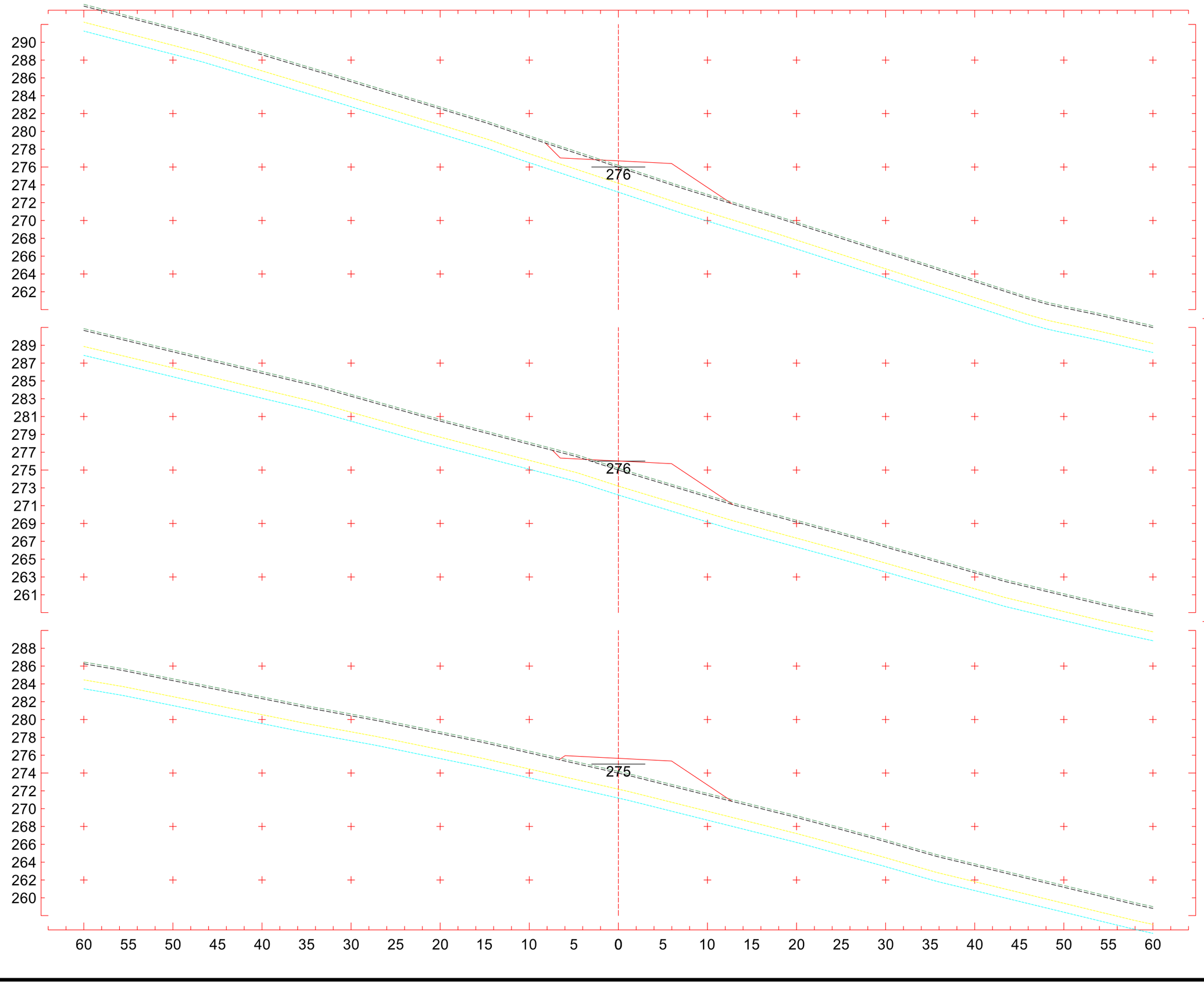
CT 292,304 m
CP 284,398 m

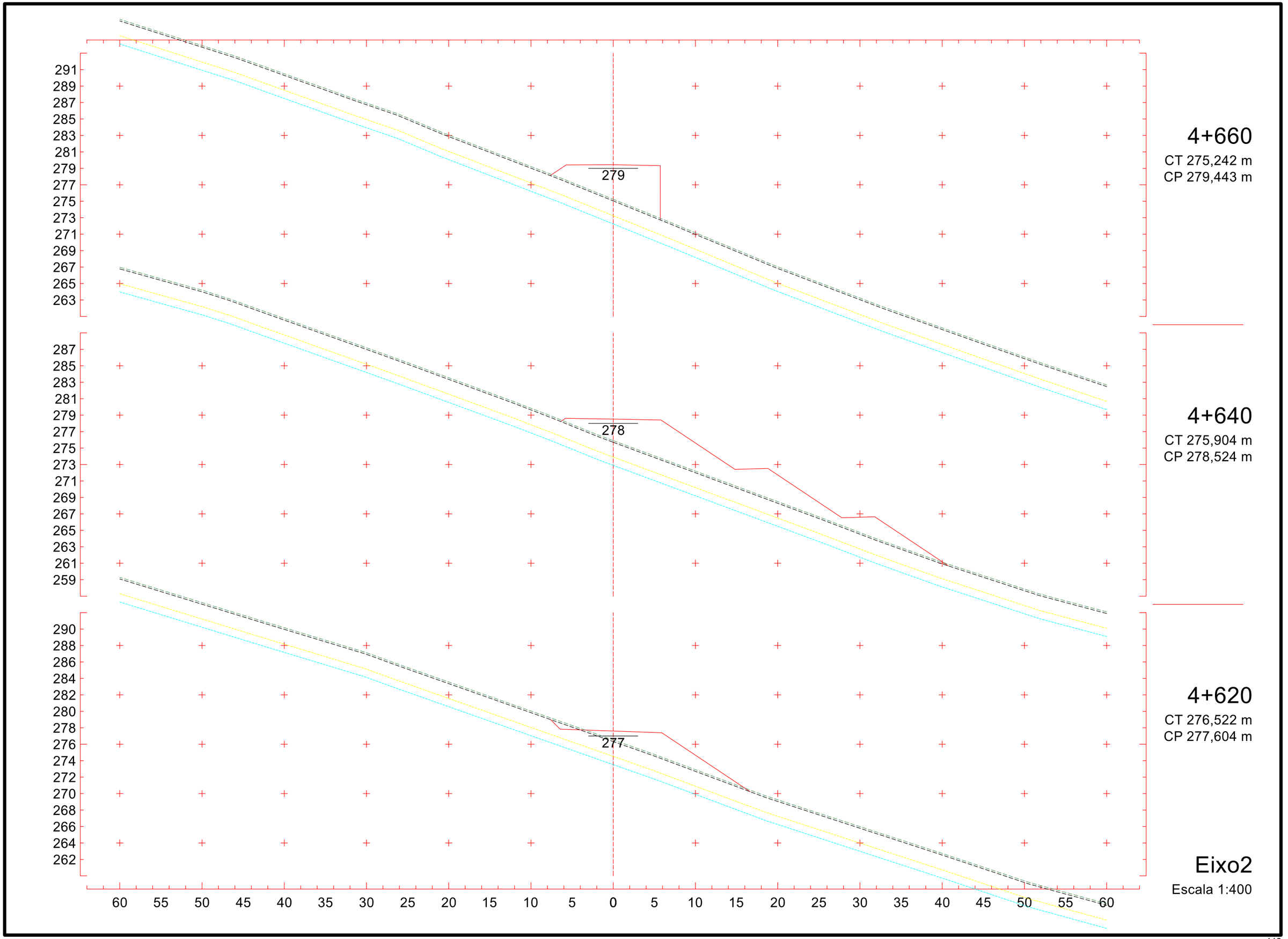
Eixo2

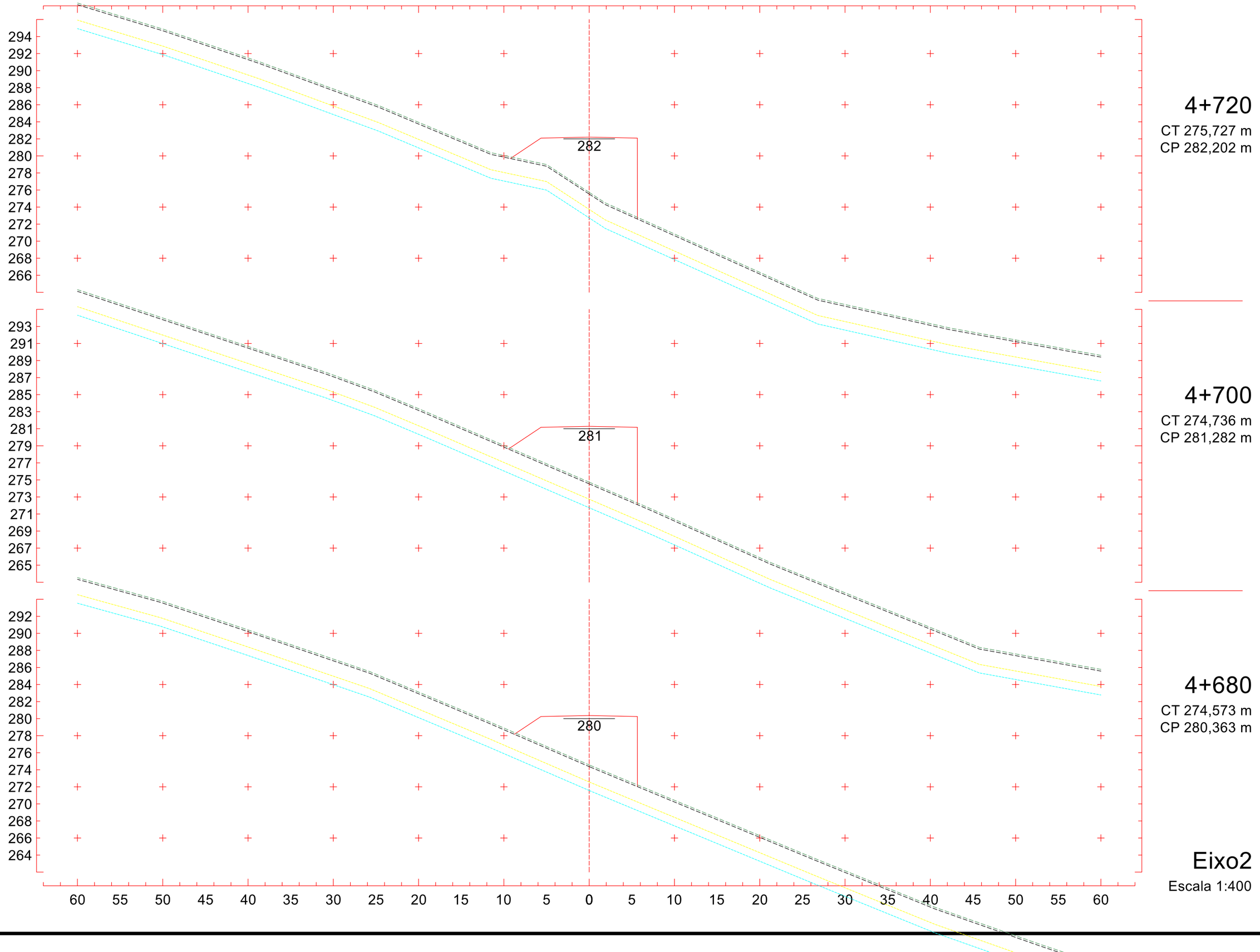
Escala 1:400

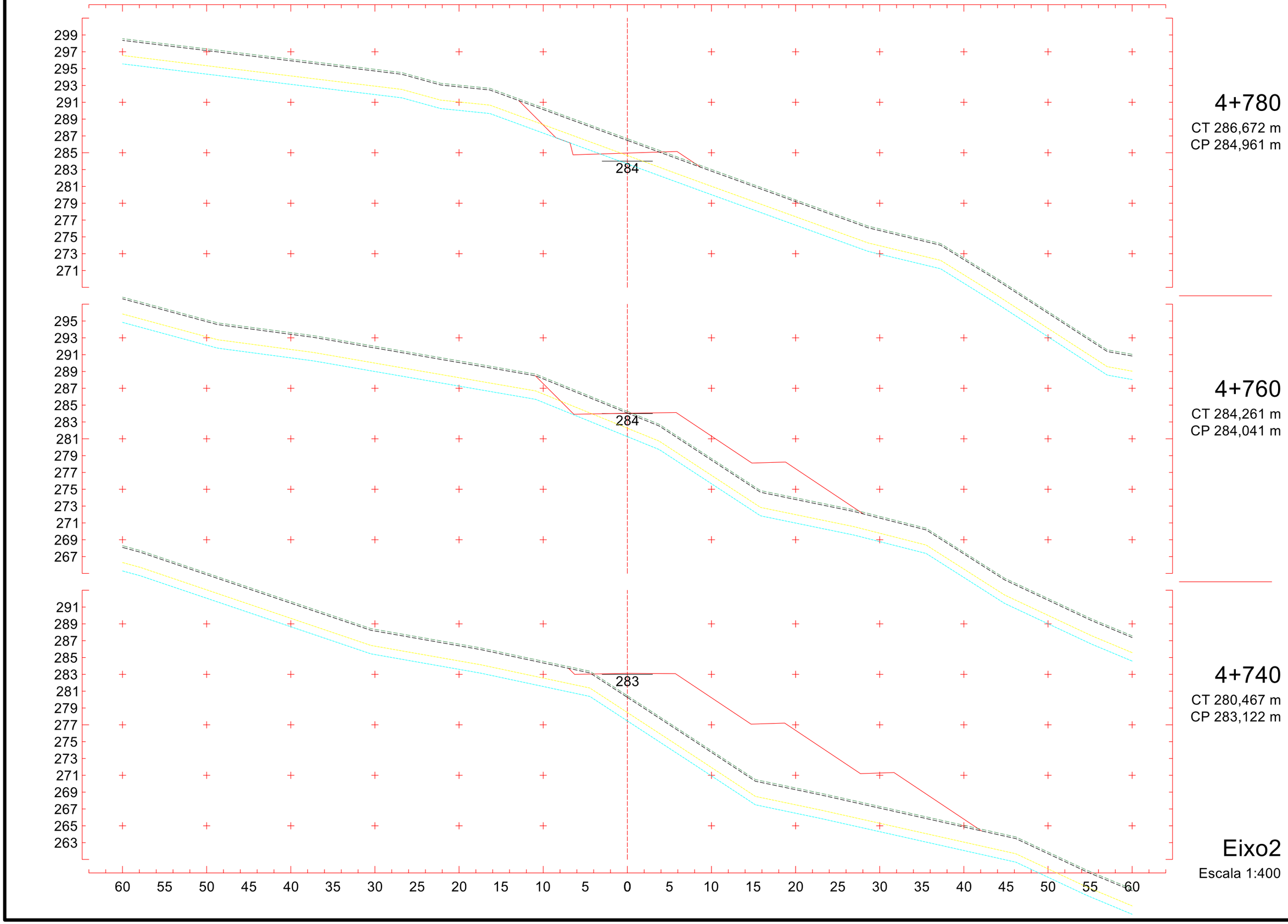

290
288
286
284
282
280
278
276
274
272
270
268
266
264
262
277
4+480
CT 276,485 m
CP 277,358 m
292
290
288
286
284
282
280
278
276
274
272
270
268
266
264
278
4+460
CT 279,341 m
CP 278,578 m
295
293
291
289
287
285
283
281
279
277
275
273
271
269
267
280
4+440
CT 282,693 m
CP 280,025 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

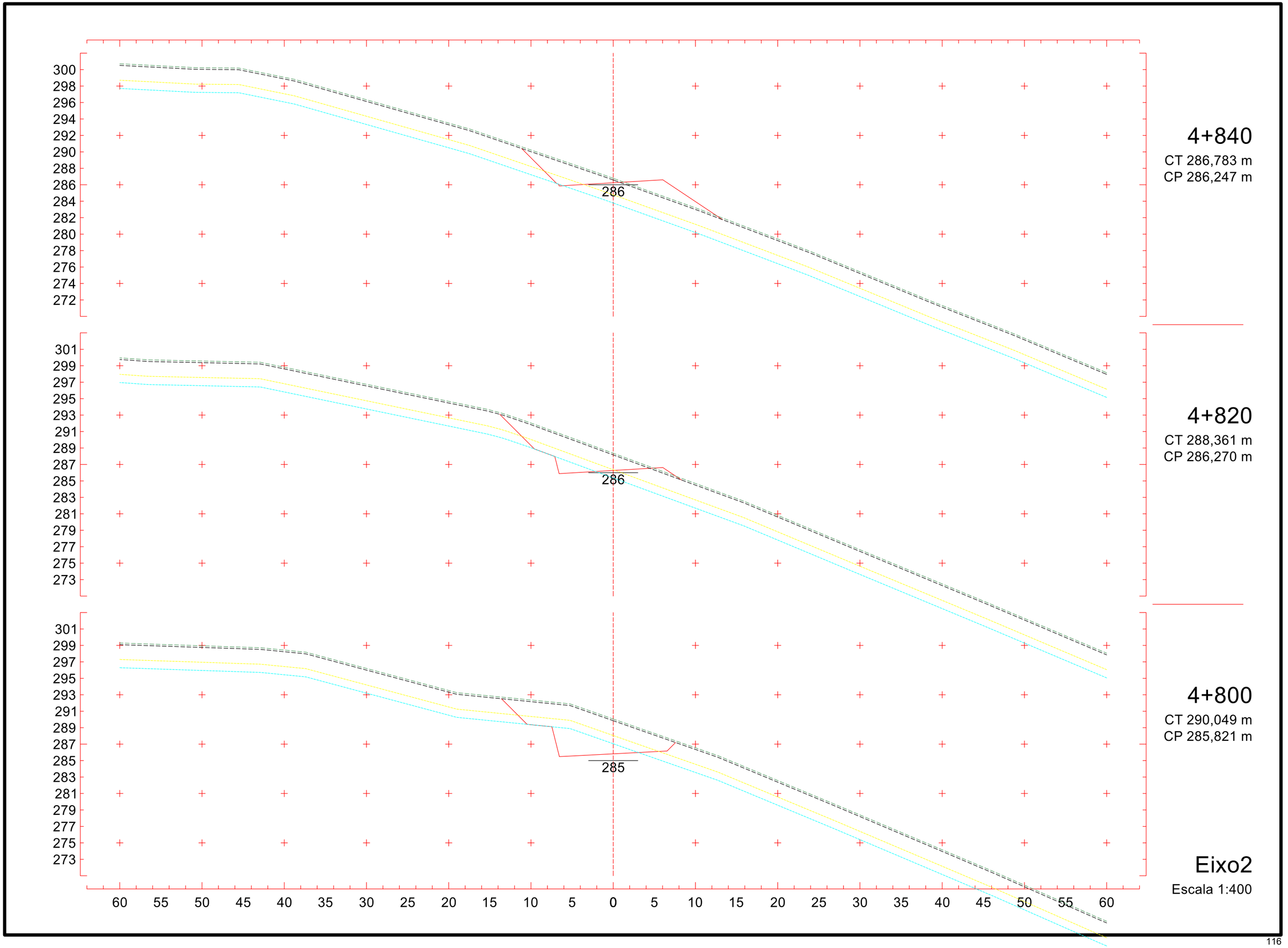

288
286
284
282
280
278
276
274
272
270
268
266
264
262
260
275
4+540
CT 272,951 m
CP 275,600 m
288
286
284
282
280
278
276
274
272
270
268
266
264
262
260
275
4+520
CT 272,448 m
CP 275,869 m
289
287
285
283
281
279
277
275
273
271
269
267
265
263
261
276
4+500
CT 274,293 m
CP 276,455 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

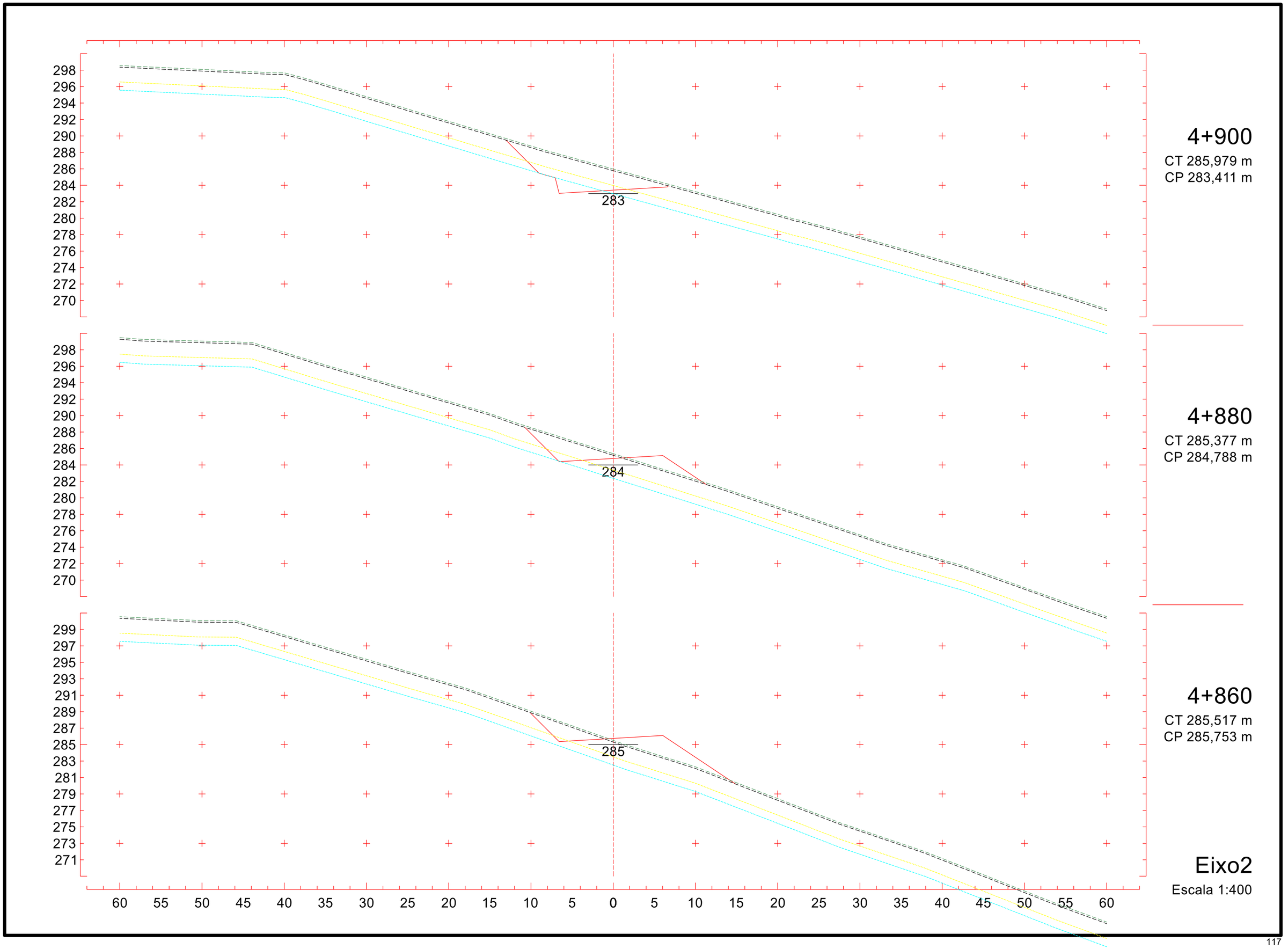

290
288
286
284
282
280
278
276
274
272
270
268
266
264
262
276
4+600
CT 276,184 m
CP 276,695 m
289
287
285
283
281
279
277
275
273
271
269
267
265
263
261
276
4+580
CT 275,199 m
CP 276,013 m
288
286
284
282
280
278
276
274
272
270
268
266
264
262
260
275
4+560
CT 274,187 m
CP 275,648 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

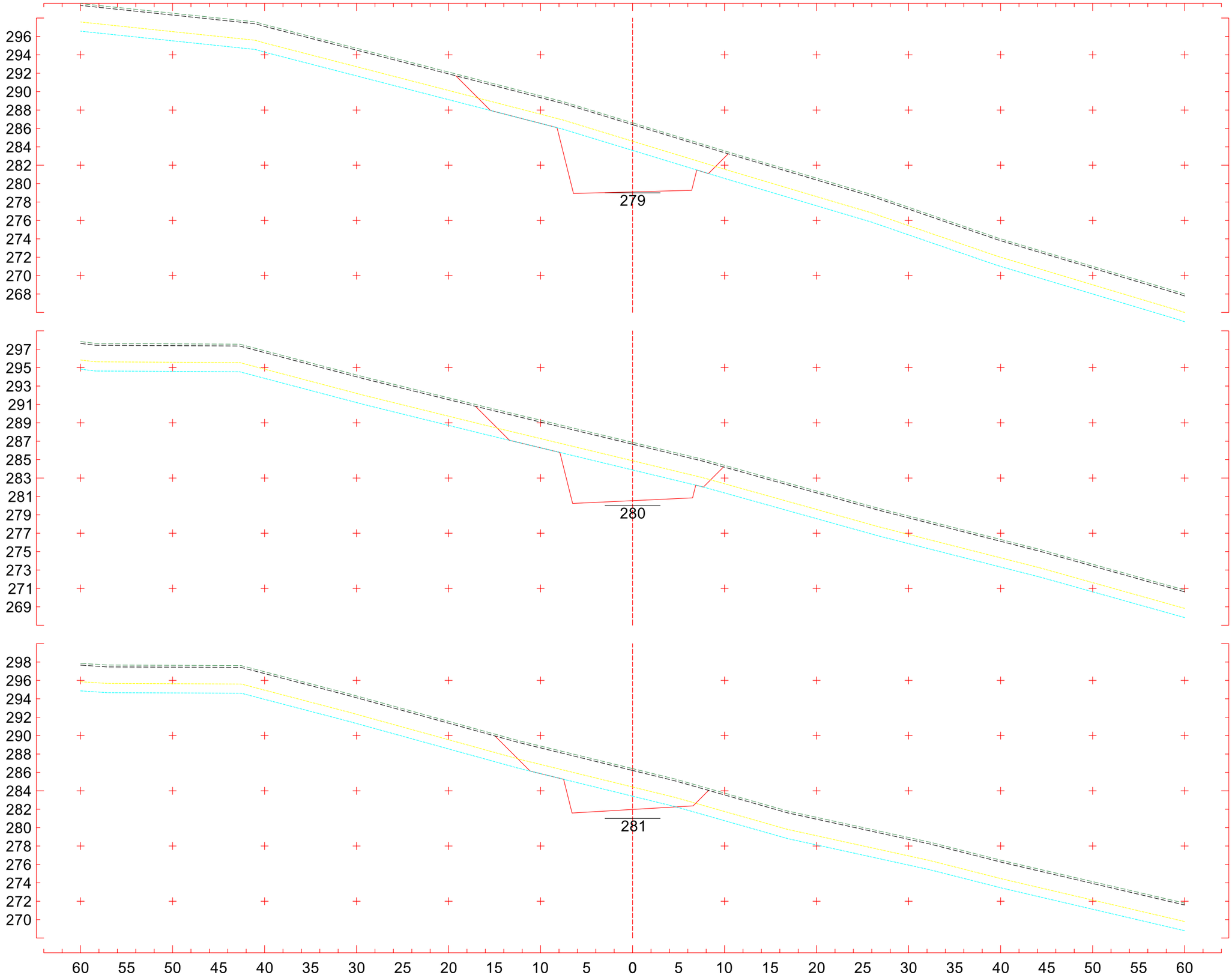

291
289
287
285
283
281
279
277
275
273
271
269
267
265
263
279
4+660
CT 275,242 m
CP 279,443 m
287
285
283
281
279
277
275
273
271
269
267
265
263
261
259
278
4+640
CT 275,904 m
CP 278,524 m
290
288
286
284
282
280
278
276
274
272
270
268
266
264
262
277
4+620
CT 276,522 m
CP 277,604 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

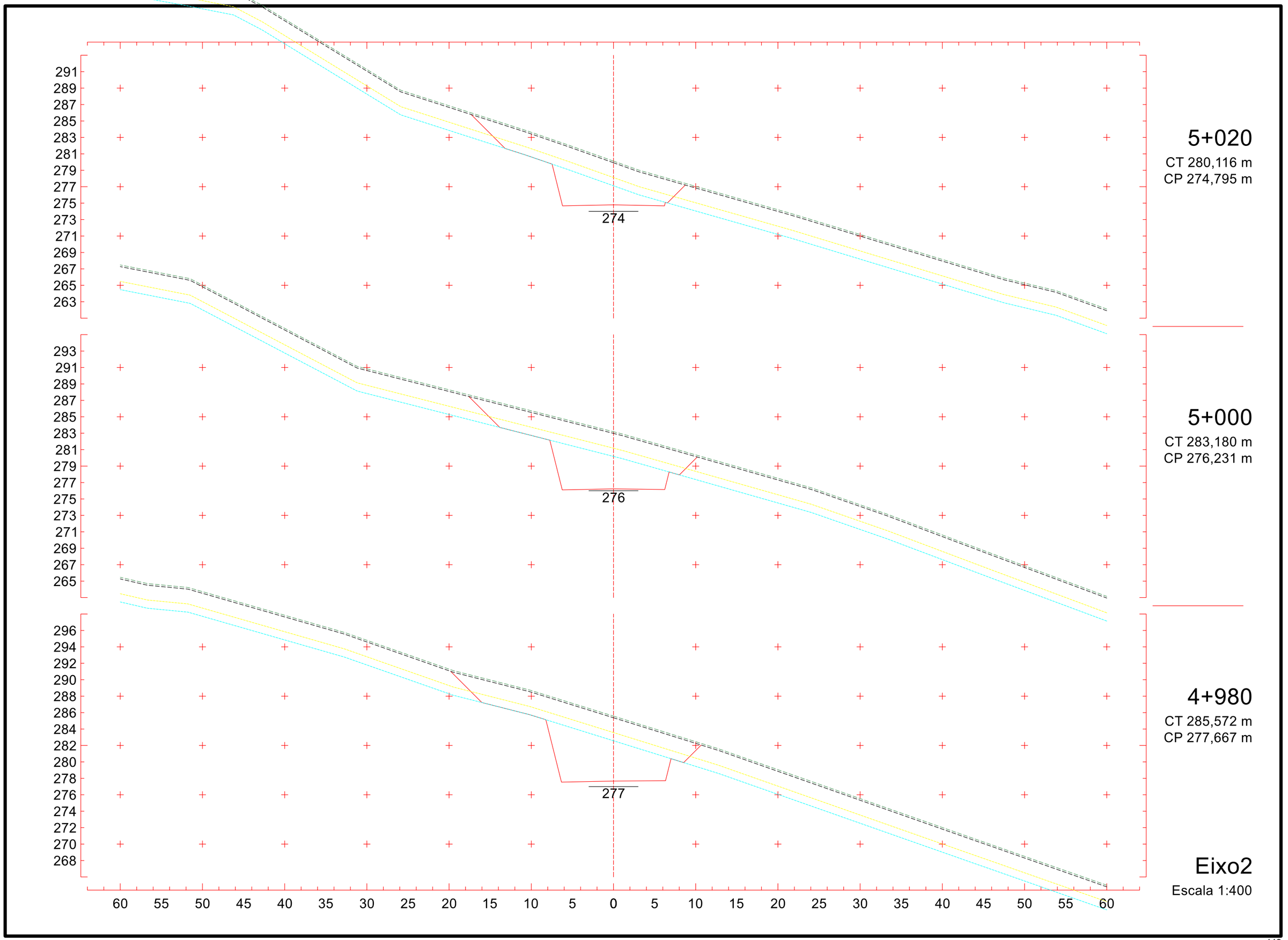

294
292
290
288
286
284
282
280
278
276
274
272
270
268
266
282
293
291
289
287
285
283
281
279
277
275
273
271
269
267
265
281
292
290
288
286
284
282
280
278
276
274
272
270
268
266
264
280
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
4+720
CT 275,727 m
CP 282,202 m
4+700
CT 274,736 m
CP 281,282 m
4+680
CT 274,573 m
CP 280,363 m
Eixo2
Escala 1:400

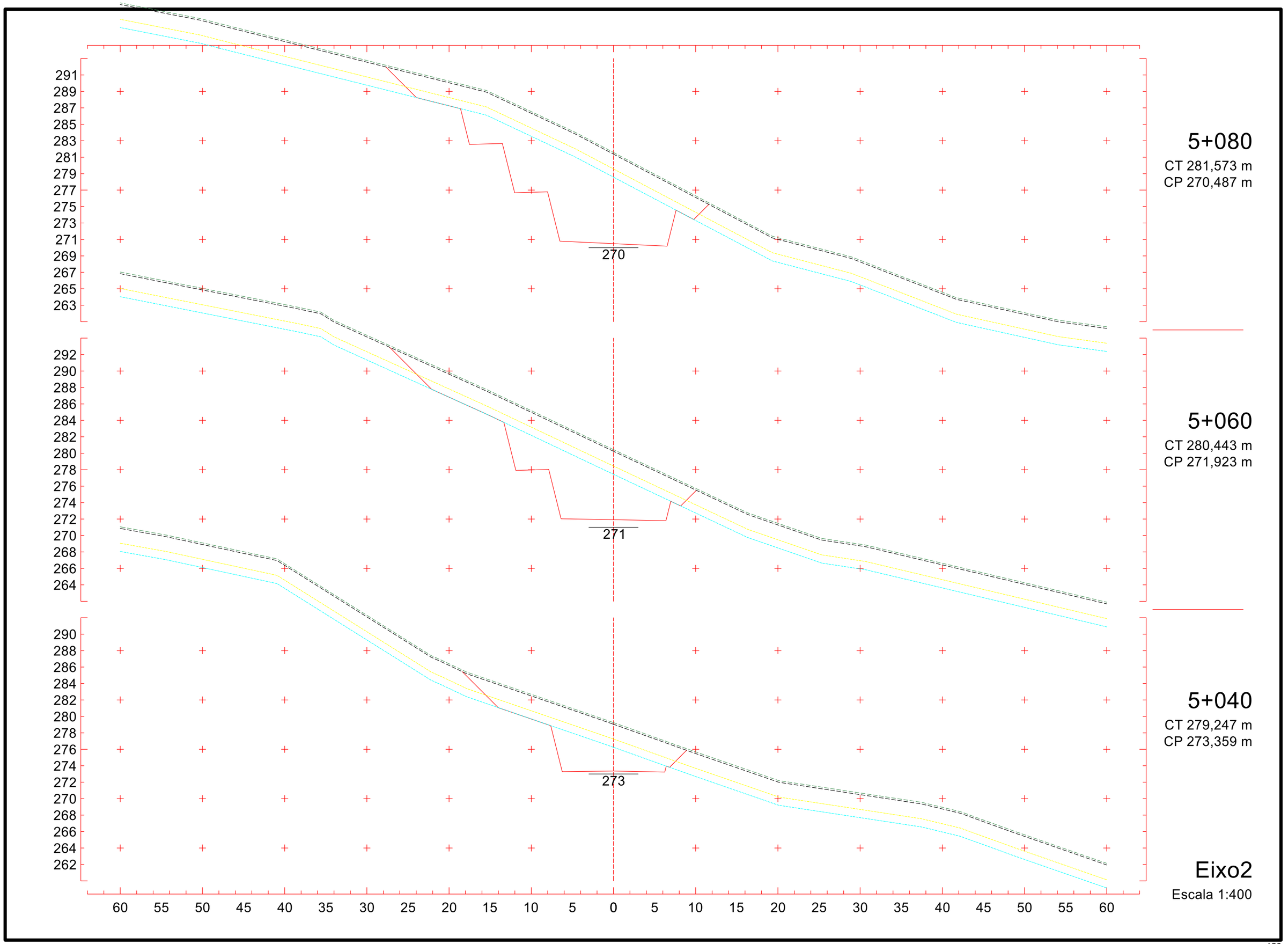

299
297
295
293
291
289
287
285
283
281
279
277
275
273
271
284
4+780
CT 286,672 m
CP 284,961 m
295
293
291
289
287
285
283
281
279
277
275
273
271
269
267
284
4+760
CT 284,261 m
CP 284,041 m
291
289
287
285
283
281
279
277
275
273
271
269
267
265
263
283
4+740
CT 280,467 m
CP 283,122 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


300
298
296
294
292
290
288
286
284
282
280
278
276
274
272
286
4+840
CT 286,783 m
CP 286,247 m
301
299
297
295
293
291
289
287
285
283
281
279
277
275
273
286
4+820
CT 288,361 m
CP 286,270 m
301
299
297
295
293
291
289
287
285
283
281
279
277
275
273
285
4+800
CT 290,049 m
CP 285,821 m
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
Eixo2
Escala 1:400

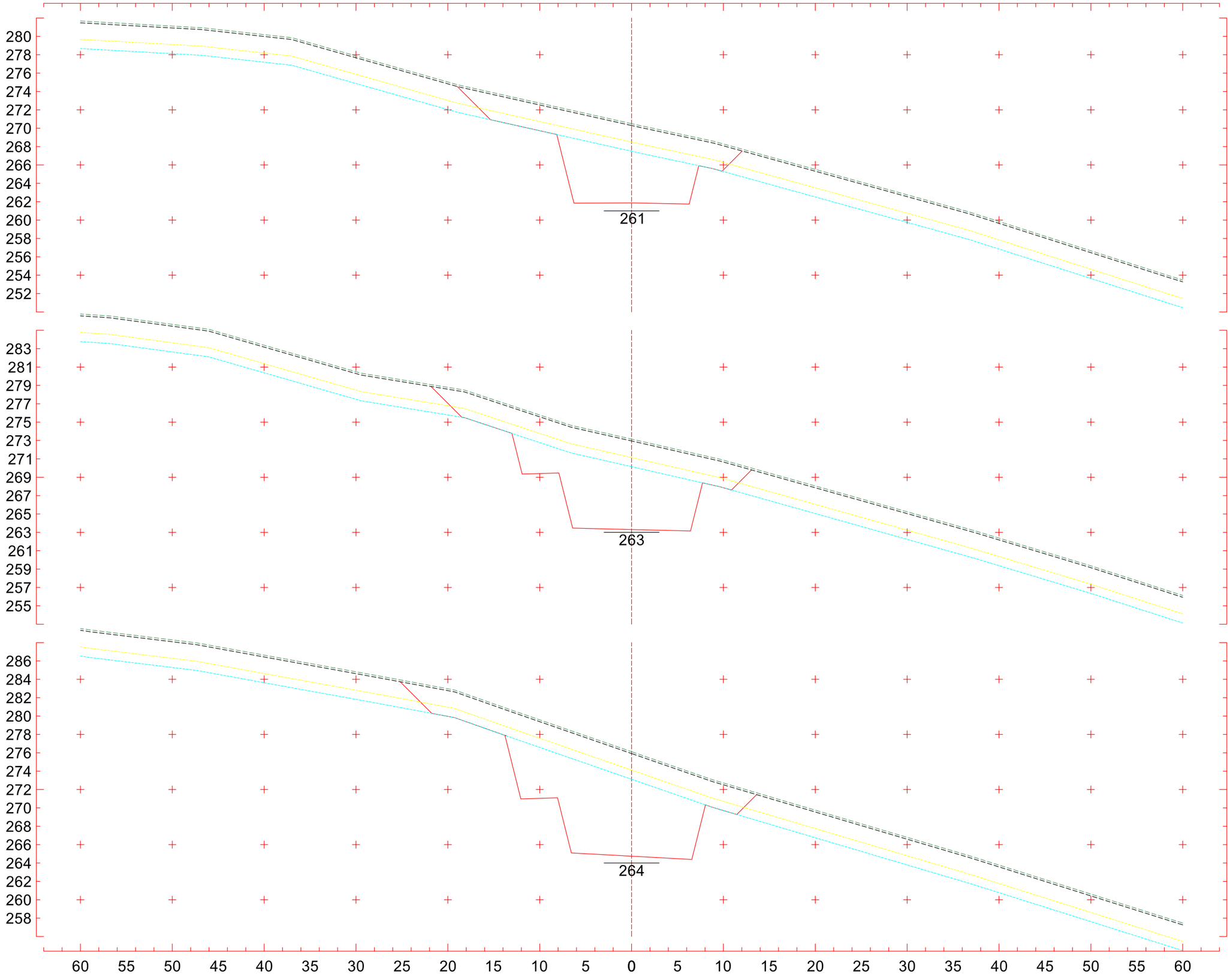

298
296
294
292
290
288
286
284
282
280
278
276
274
272
270
283
4+900
CT 285,979 m
CP 283,411 m
298
296
294
292
290
288
286
284
282
280
278
276
274
272
270
284
4+880
CT 285,377 m
CP 284,788 m
299
297
295
293
291
289
287
285
283
281
279
277
275
273
271
285
4+860
CT 285,517 m
CP 285,753 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


296
294
292
290
288
286
284
282
280
278
276
274
272
270
268
279
4+960
CT 286,611 m
CP 279,103 m
297
295
293
291
289
287
285
283
281
279
277
275
273
271
269
280
4+940
CT 286,877 m
CP 280,539 m
298
296
294
292
290
288
286
284
282
280
278
276
274
272
270
281
4+920
CT 286,415 m
CP 281,975 m
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
Eixo2
Escala 1:400


291
289
287
285
283
281
279
277
275
273
271
269
267
265
263
274
5+020
CT 280,116 m
CP 274,795 m
293
291
289
287
285
283
281
279
277
275
273
271
269
267
265
276
5+000
CT 283,180 m
CP 276,231 m
296
294
292
290
288
286
284
282
280
278
276
274
272
270
268
277
4+980
CT 285,572 m
CP 277,667 m
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
Eixo2
Escala 1:400


291
289
287
285
283
281
279
277
275
273
271
269
267
265
263
270
292
290
288
286
284
282
280
278
276
274
272
270
268
266
264
271
290
288
286
284
282
280
278
276
274
272
270
268
266
264
262
273
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
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


287
285
283
281
279
277
275
273
271
269
267
265
263
261
259
266
289
287
285
283
281
279
277
275
273
271
269
267
265
263
261
267
290
288
286
284
282
280
278
276
274
272
270
268
266
264
262
269
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
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

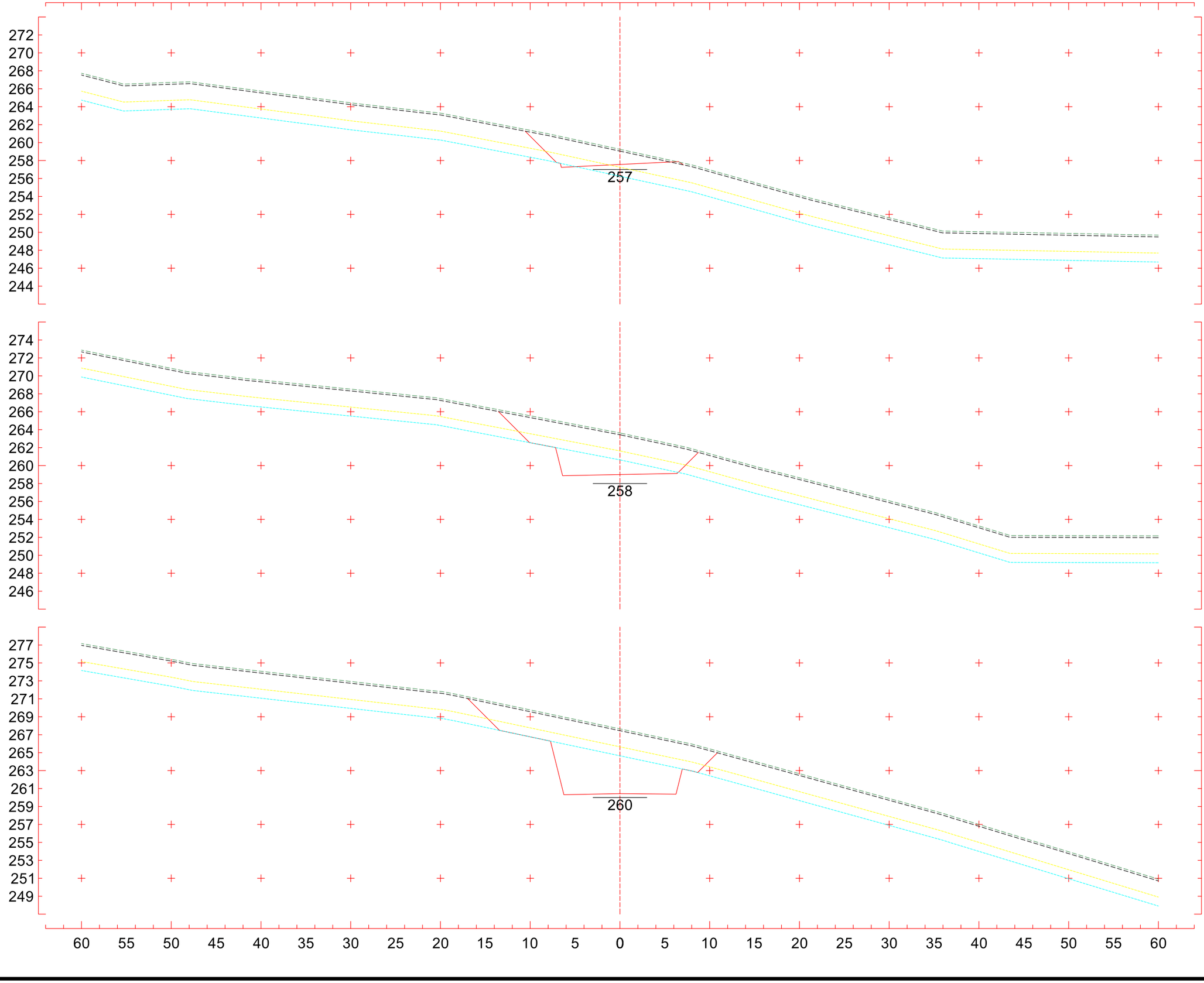
CT 273,151 m
CP 263,307 m

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

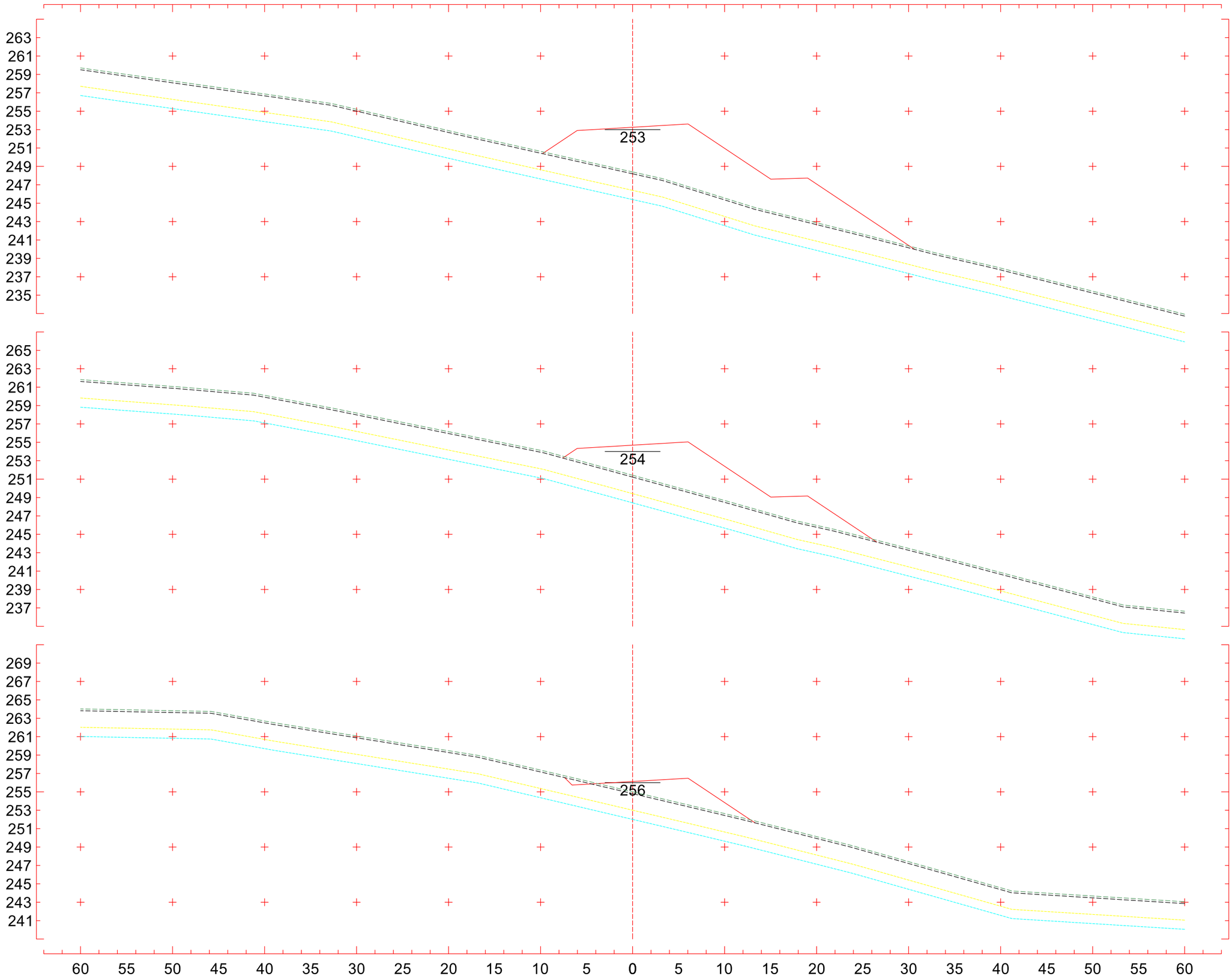
CT 263,635 m
CP 258,999 m

5+220

CT 267,652 m
CP 260,435 m

Eixo2

Escala 1:400



5+320

CT 248,396 m
CP 253,255 m

5+300

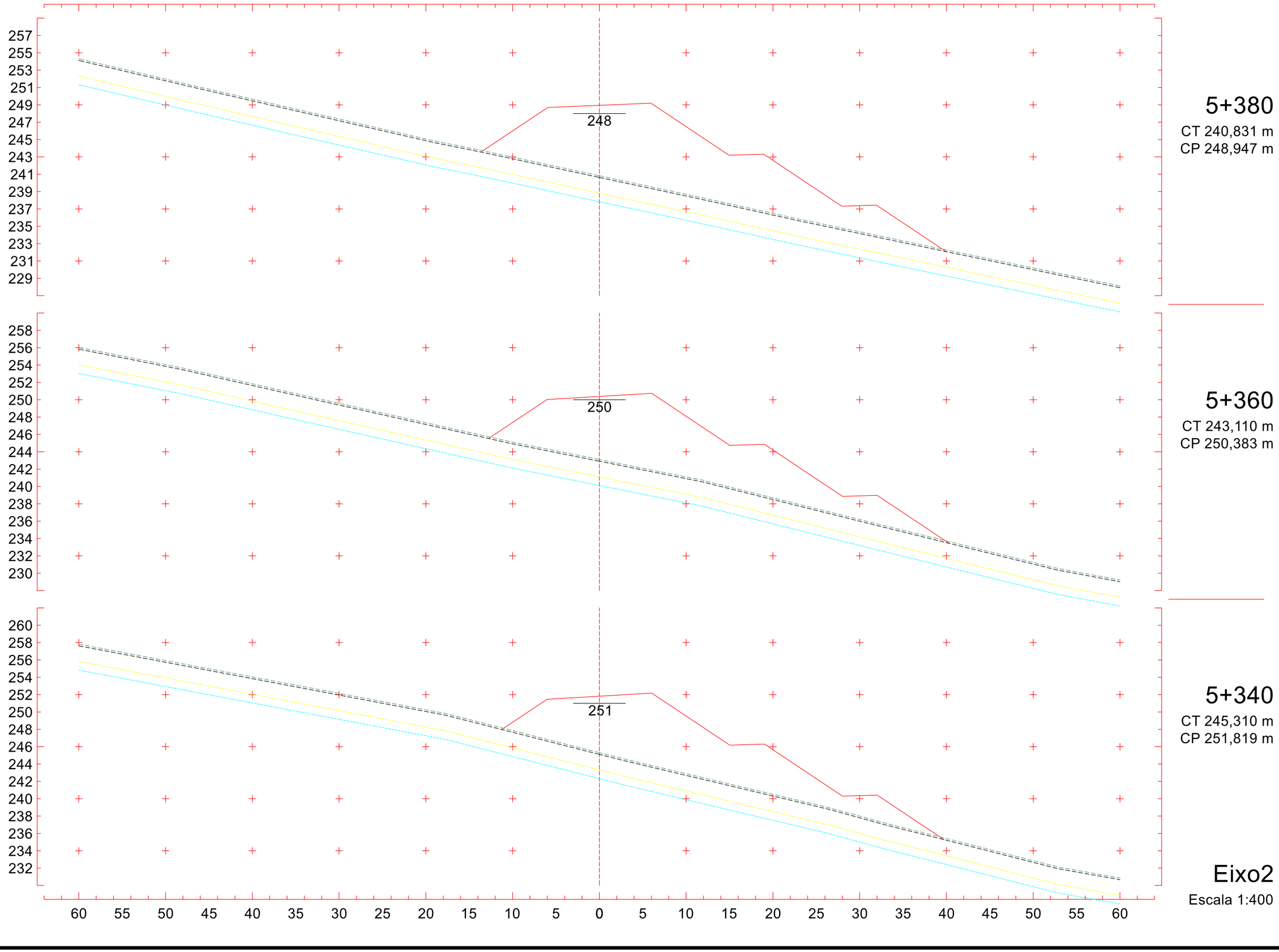
CT 251,423 m
CP 254,691 m

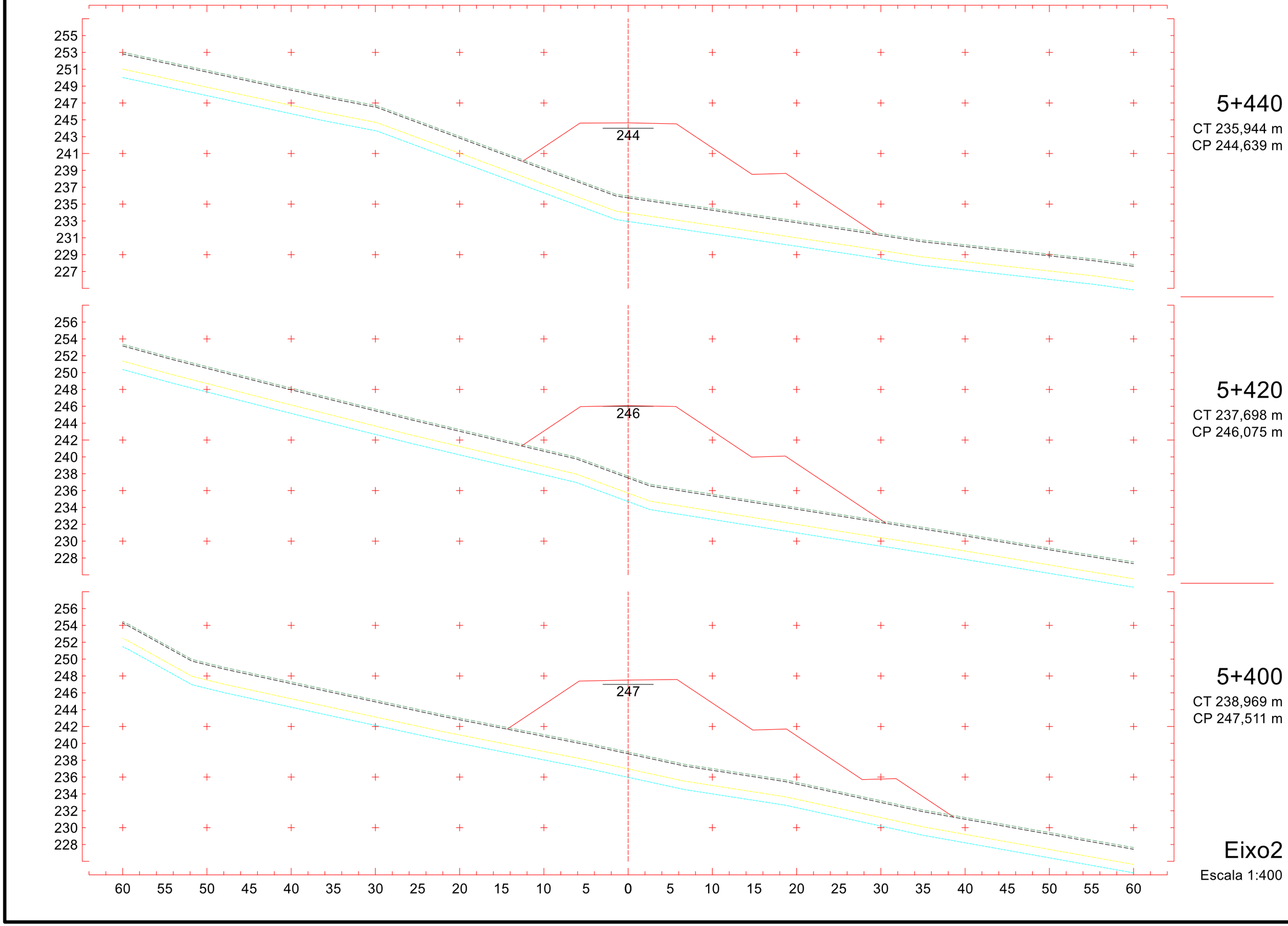
5+280

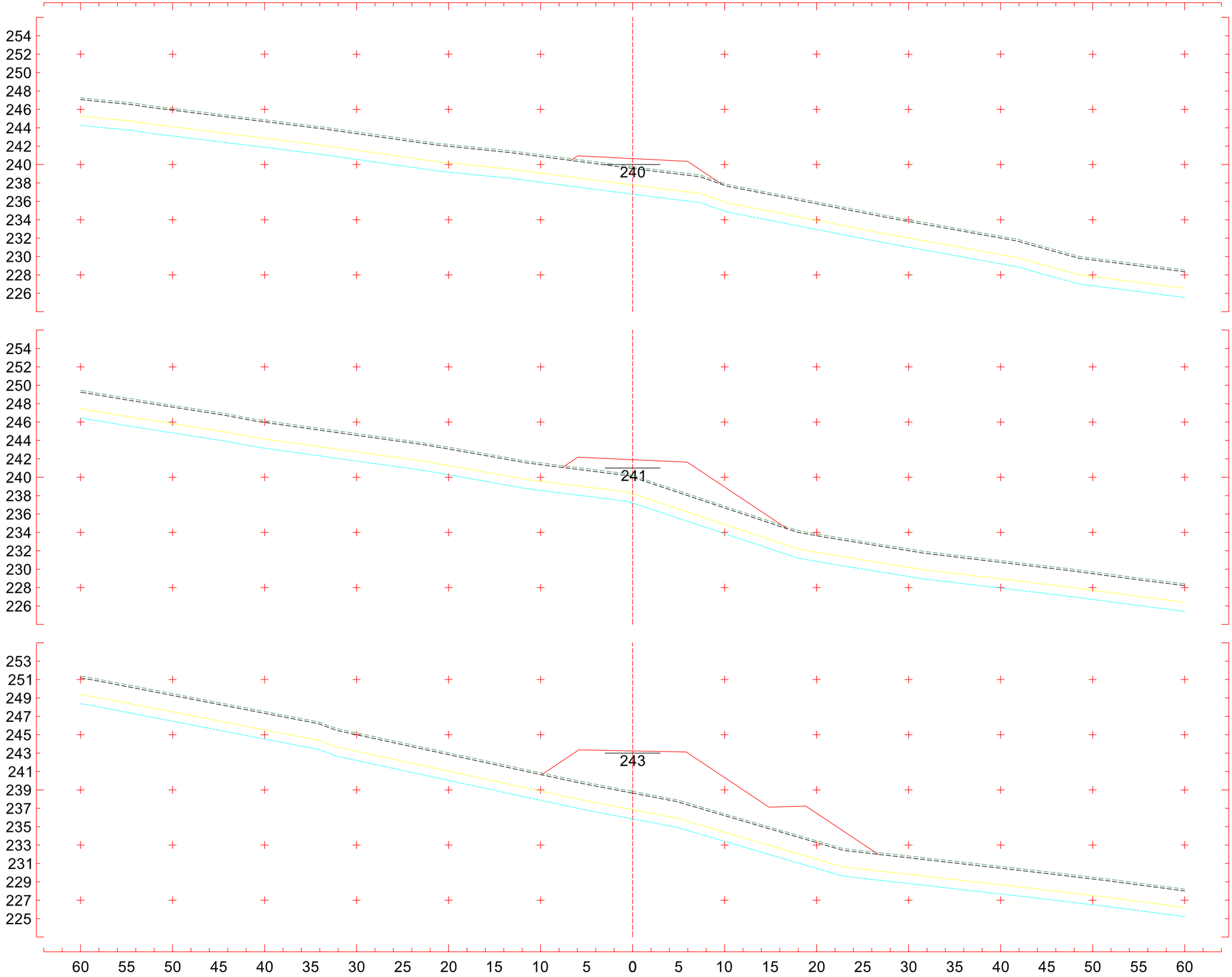
CT 255,007 m
CP 256,127 m

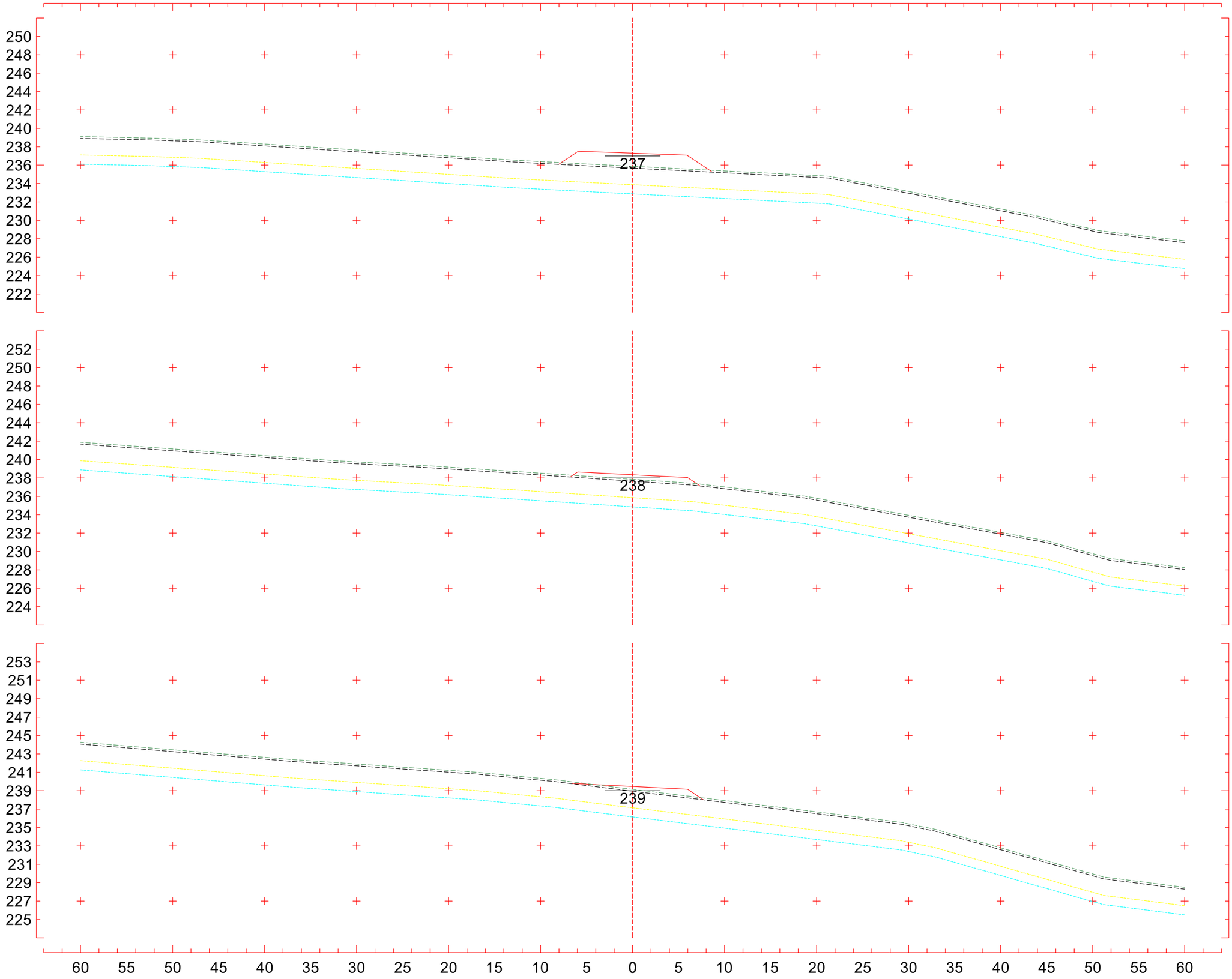
Eixo2

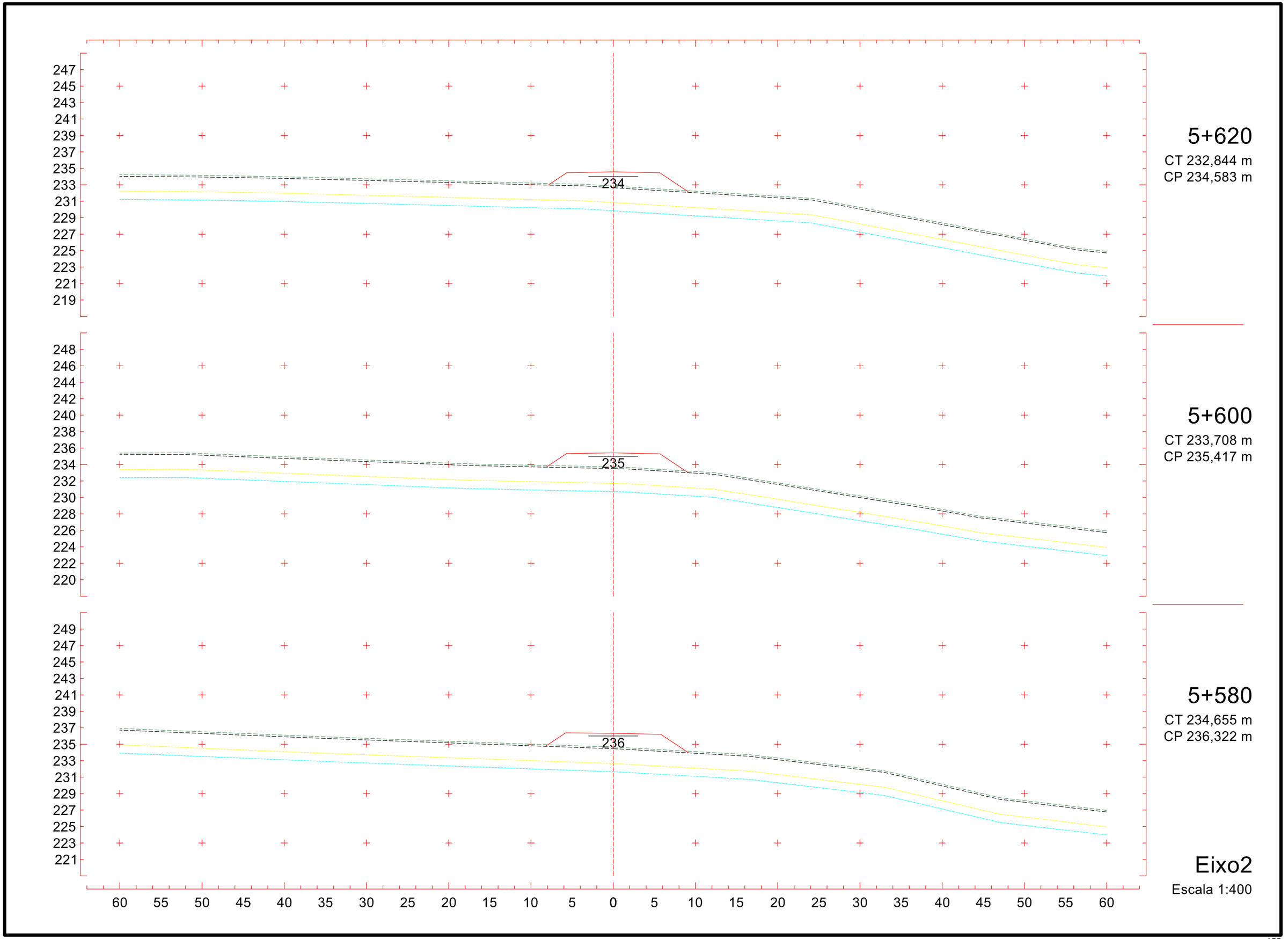
Escala 1:400

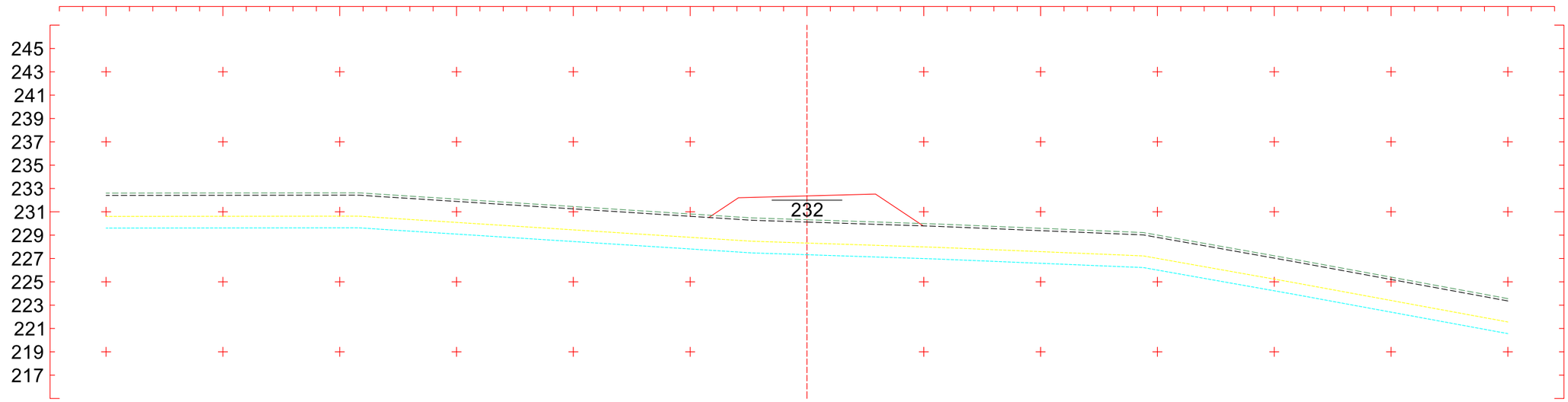

257
255
253
251
249
247
245
243
241
239
237
235
233
231
229
248
5+380
CT 240,831 m
CP 248,947 m
258
256
254
252
250
248
246
244
242
240
238
236
234
232
230
250
5+360
CT 243,110 m
CP 250,383 m
260
258
256
254
252
250
248
246
244
242
240
238
236
234
232
251
5+340
CT 245,310 m
CP 251,819 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


255
253
251
249
247
245
243
241
239
237
235
233
231
229
227
244
5+440
CT 235,944 m
CP 244,639 m
256
254
252
250
248
246
244
242
240
238
236
234
232
230
228
246
5+420
CT 237,698 m
CP 246,075 m
256
254
252
250
248
246
244
242
240
238
236
234
232
230
228
247
5+400
CT 238,969 m
CP 247,511 m
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
Eixo2
Escala 1:400

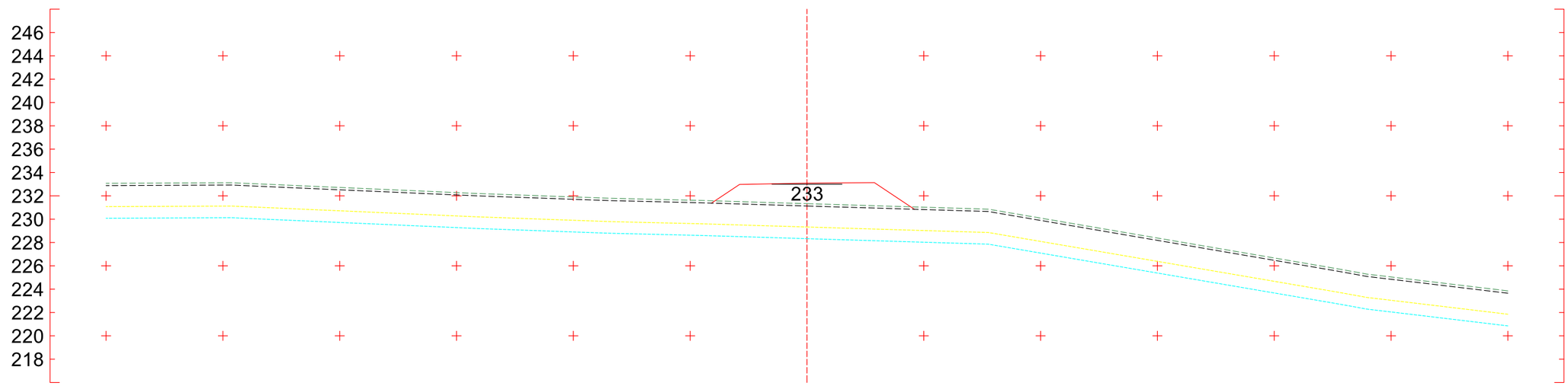

254
252
250
248
246
244
242
240
238
236
234
232
230
228
226
240
5+500
CT 239,778 m
CP 240,650 m
254
252
250
248
246
244
242
240
238
236
234
232
230
228
226
241
5+480
CT 240,200 m
CP 241,909 m
253
251
249
247
245
243
241
239
237
235
233
231
229
227
225
243
5+460
CT 238,846 m
CP 243,238 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


250
248
246
244
242
240
238
236
234
232
230
228
226
224
222
237
5+560
CT 235,871 m
CP 237,297 m
252
250
248
246
244
242
240
238
236
234
232
230
228
226
224
238
5+540
CT 237,853 m
CP 238,344 m
253
251
249
247
245
243
241
239
237
235
233
231
229
227
225
239
5+520
CT 239,147 m
CP 239,461 m
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
Eixo2
Escala 1:400

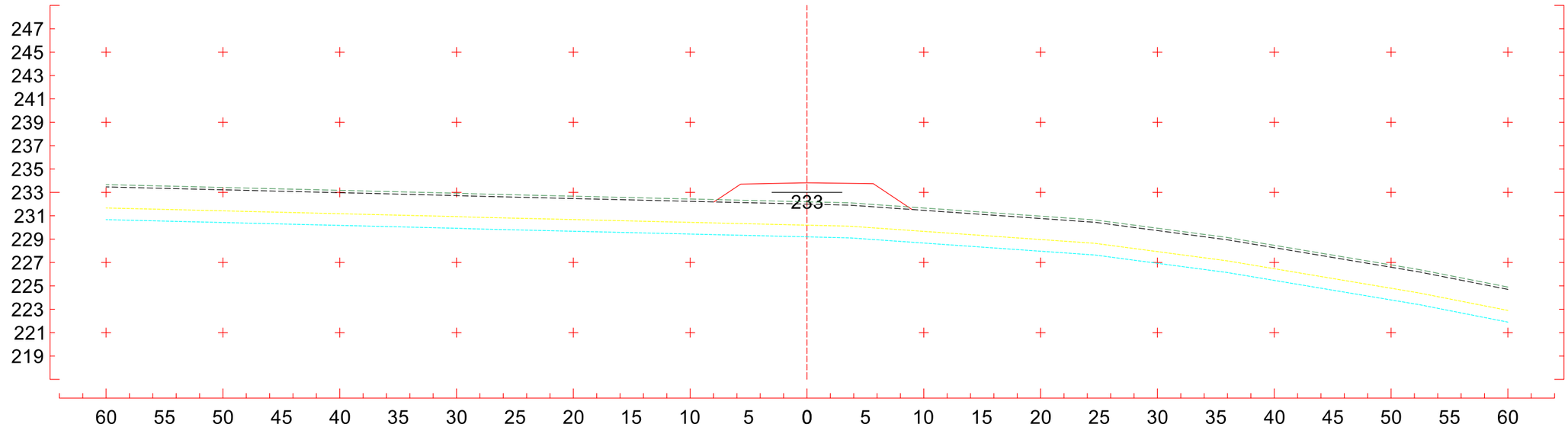

247
245
243
241
239
237
235
233
231
229
227
225
223
221
219
234
248
246
244
242
240
238
236
234
232
230
228
226
224
222
220
235
249
247
245
243
241
239
237
235
233
231
229
227
225
223
221
236
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
5+620
CT 232,844 m
CP 234,583 m
5+600
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

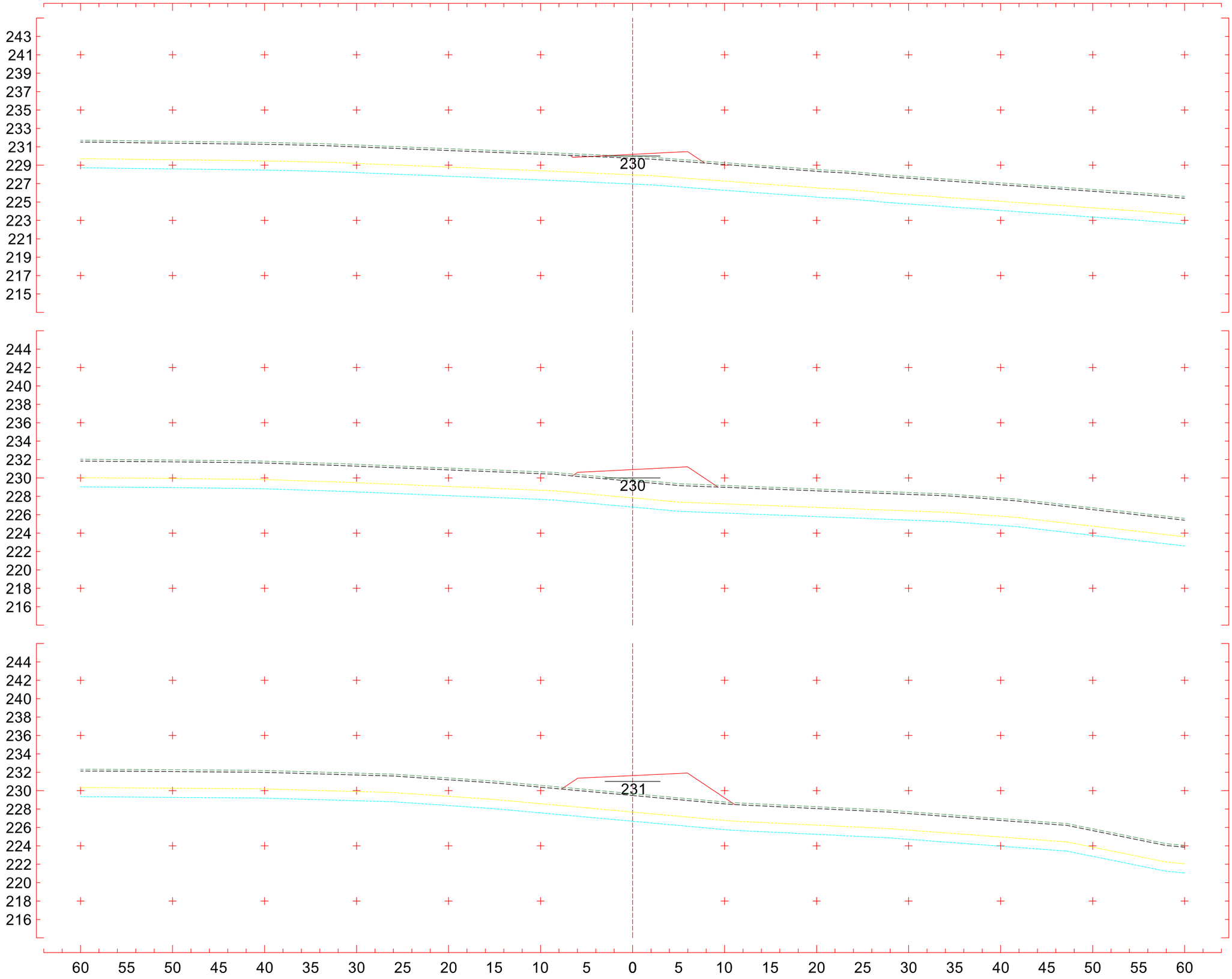


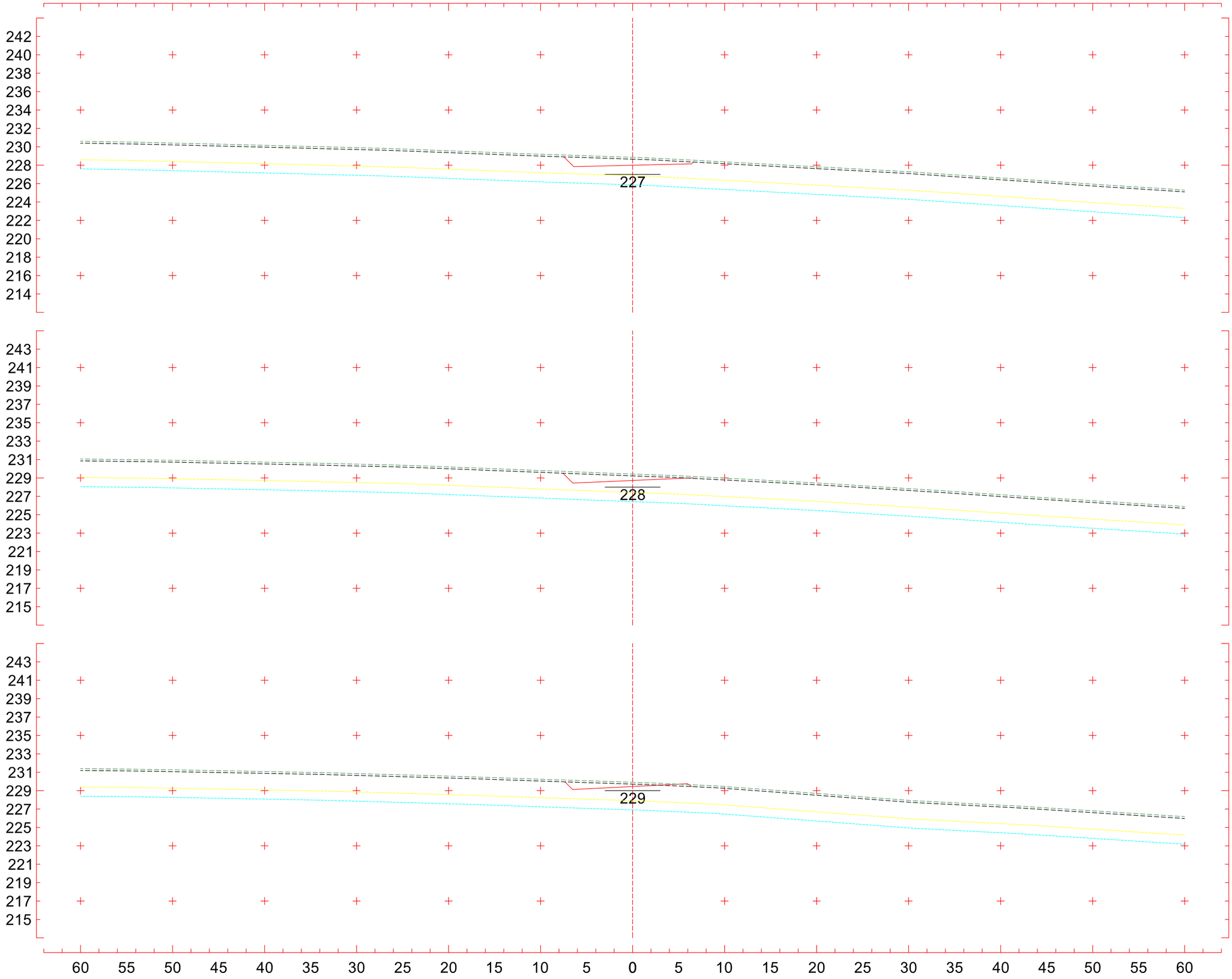
5+660
CT 231,328 m
CP 233,091 m



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

Eixo2
Escala 1:400


243
241
239
237
235
233
231
229
227
225
223
221
219
217
215
230
5+740
CT 229,953 m
CP 230,180 m
244
242
240
238
236
234
232
230
228
226
224
222
220
218
216
230
5+720
CT 229,828 m
CP 230,908 m
244
242
240
238
236
234
232
230
228
226
224
222
220
218
216
231
5+700
CT 229,674 m
CP 231,635 m
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
Eixo2
Escala 1:400

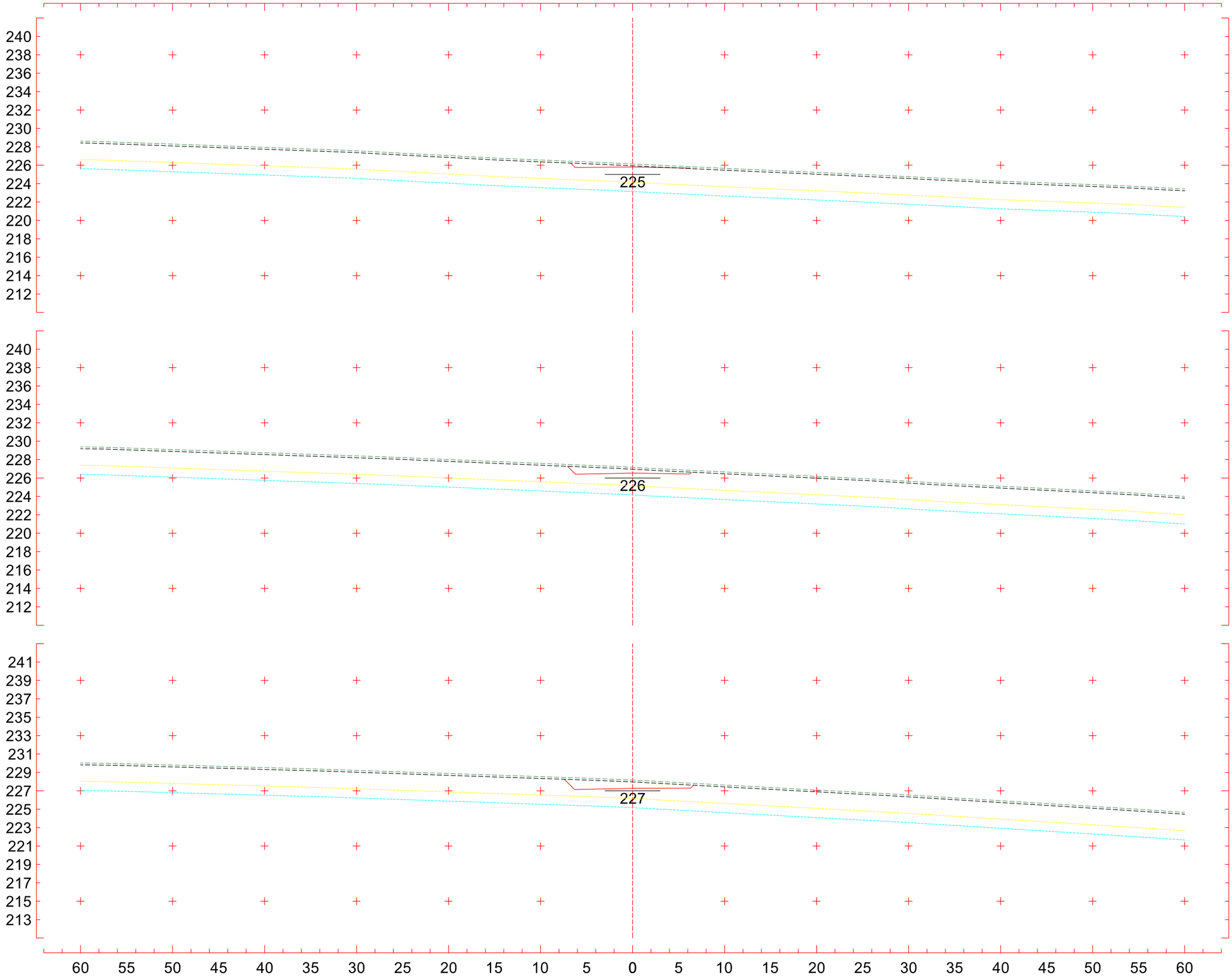


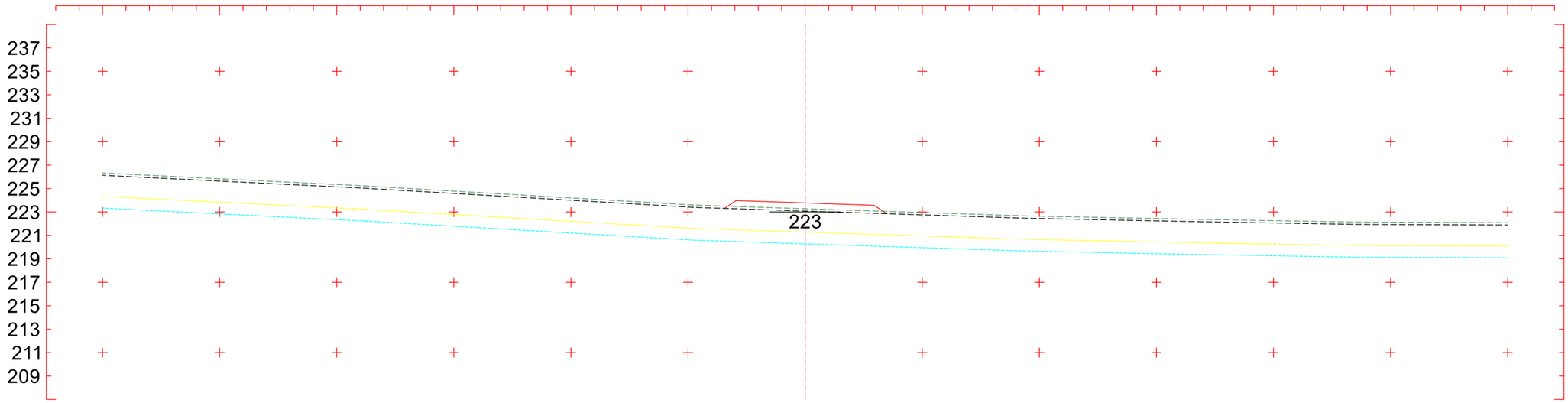
5+800
CT 228,856 m
CP 227,996 m

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

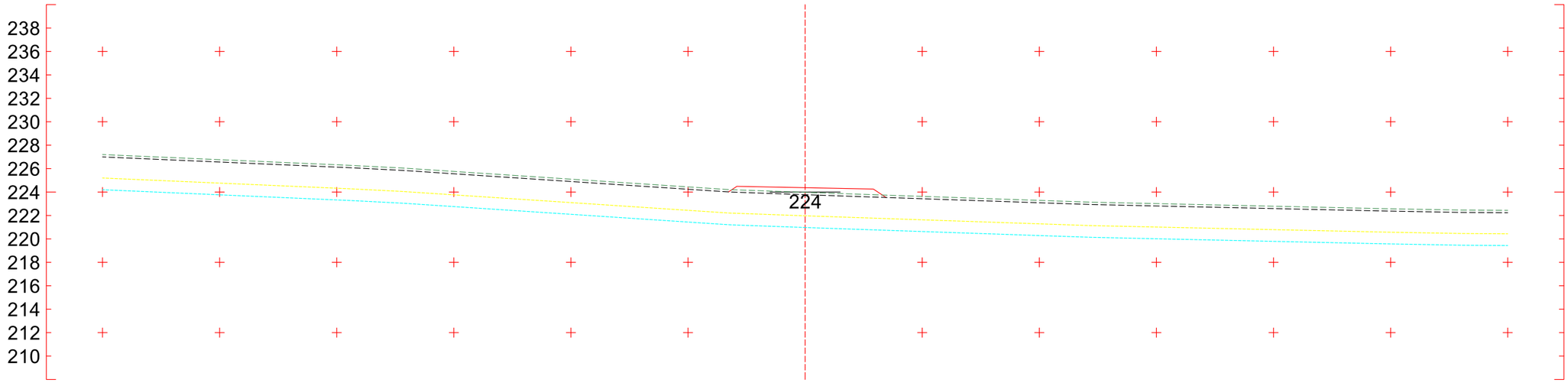
5+760
CT 229,910 m
CP 229,452 m

Eixo2
Escala 1:400

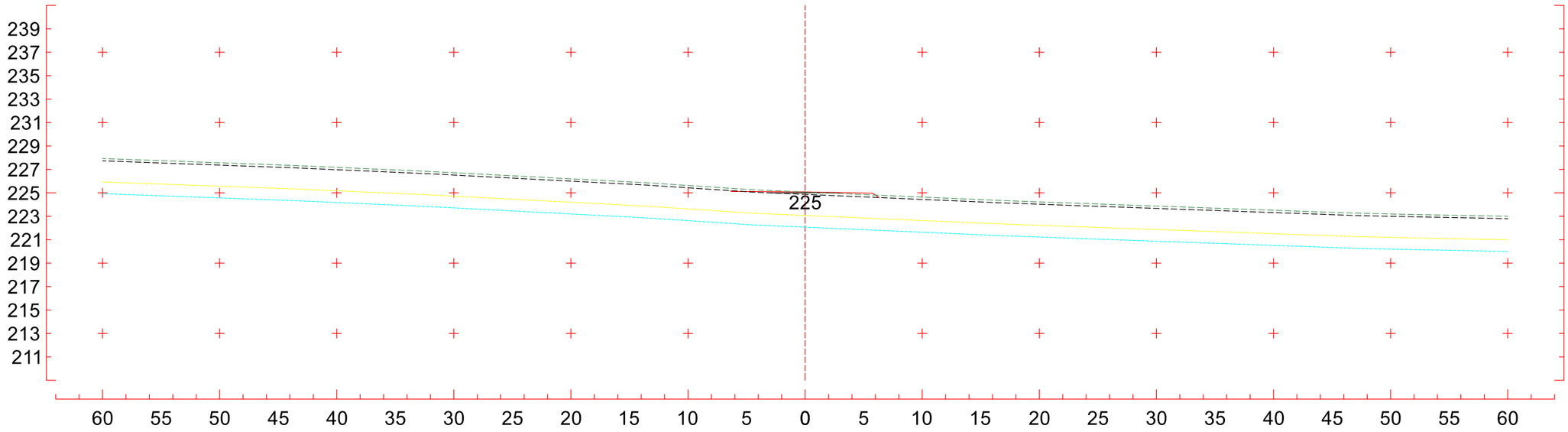

240
238
236
234
232
230
228
226
224
222
220
218
216
214
212
225
5+860
CT 226,134 m
CP 225,812 m
240
238
236
234
232
230
228
226
224
222
220
218
216
214
212
226
5+840
CT 227,157 m
CP 226,540 m
241
239
237
235
233
231
229
227
225
223
221
219
217
215
213
227
5+820
CT 228,168 m
CP 227,268 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400



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

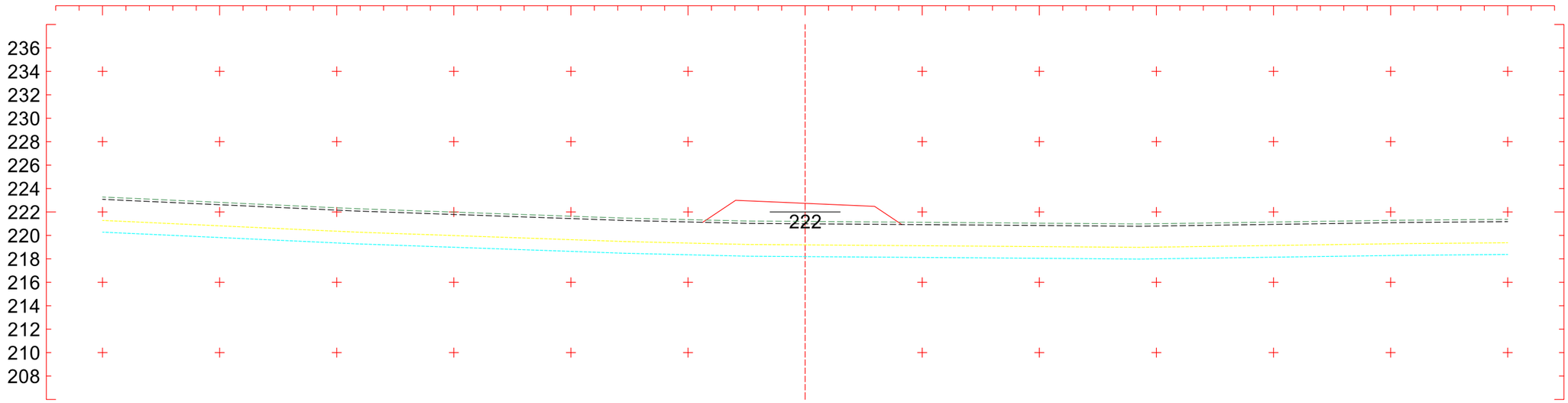


5+900
CT 223,973 m
CP 224,372 m

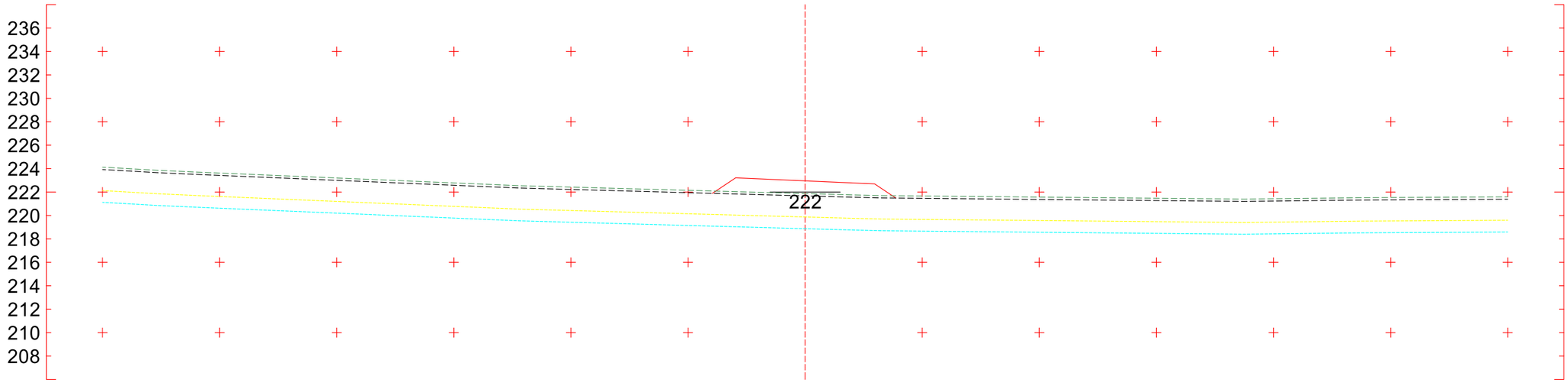


5+880
CT 225,071 m
CP 225,084 m

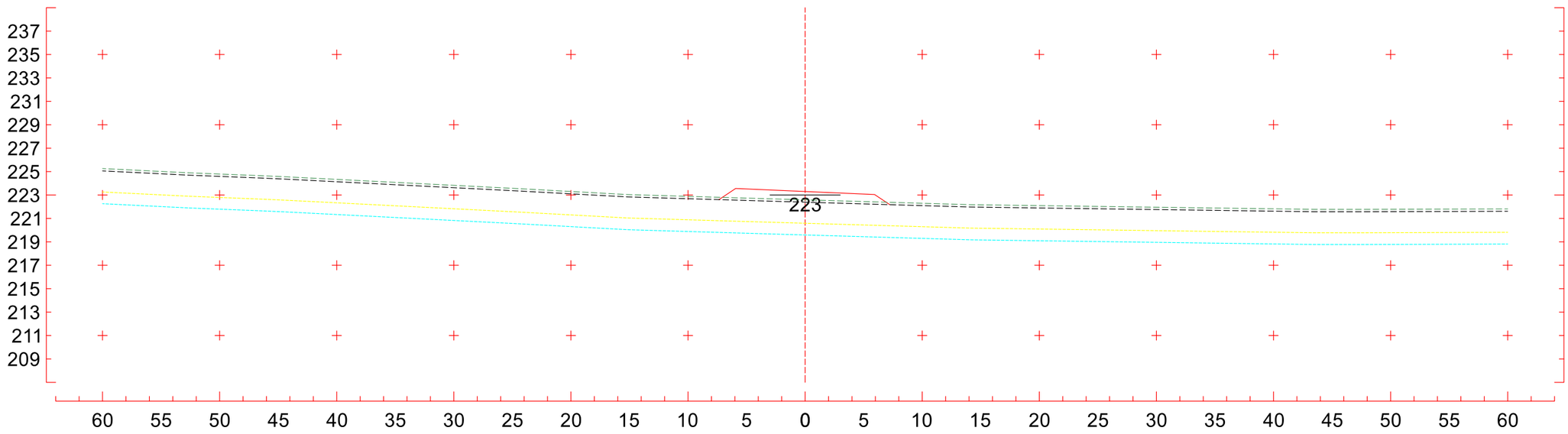
Eixo2
Escala 1:400



5+980
CT 221,192 m
CP 222,739 m

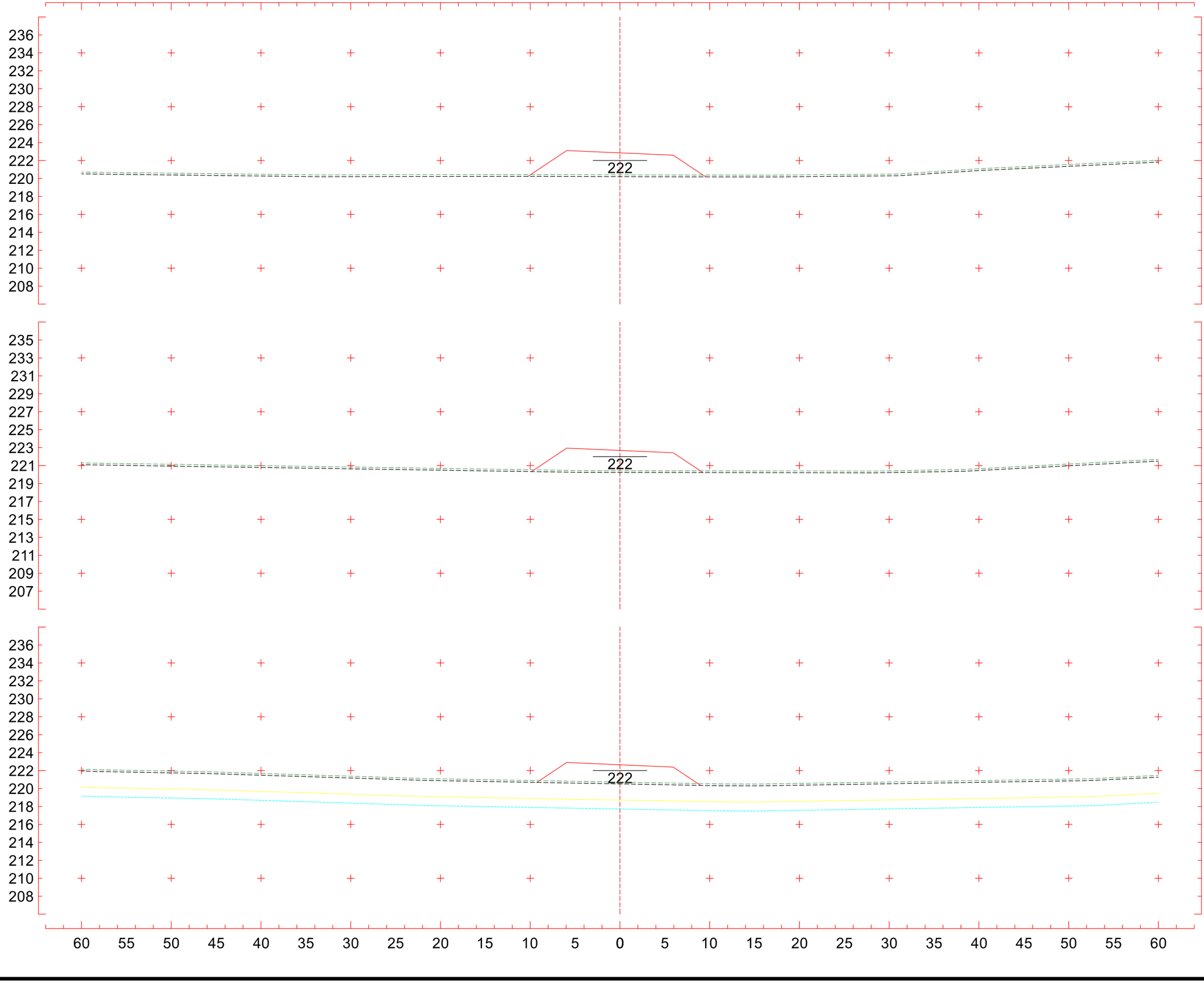


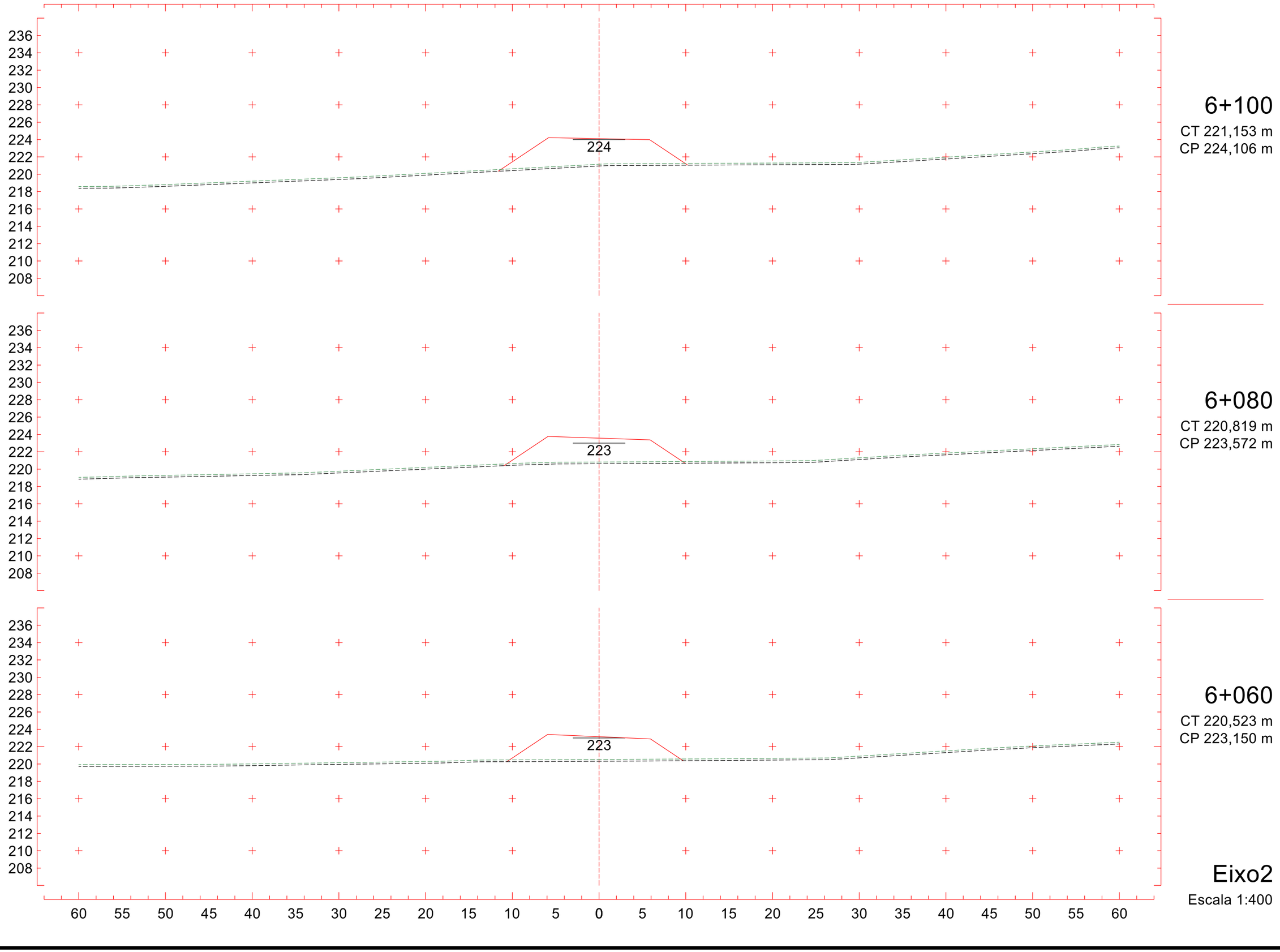
5+960
CT 221,872 m
CP 222,955 m

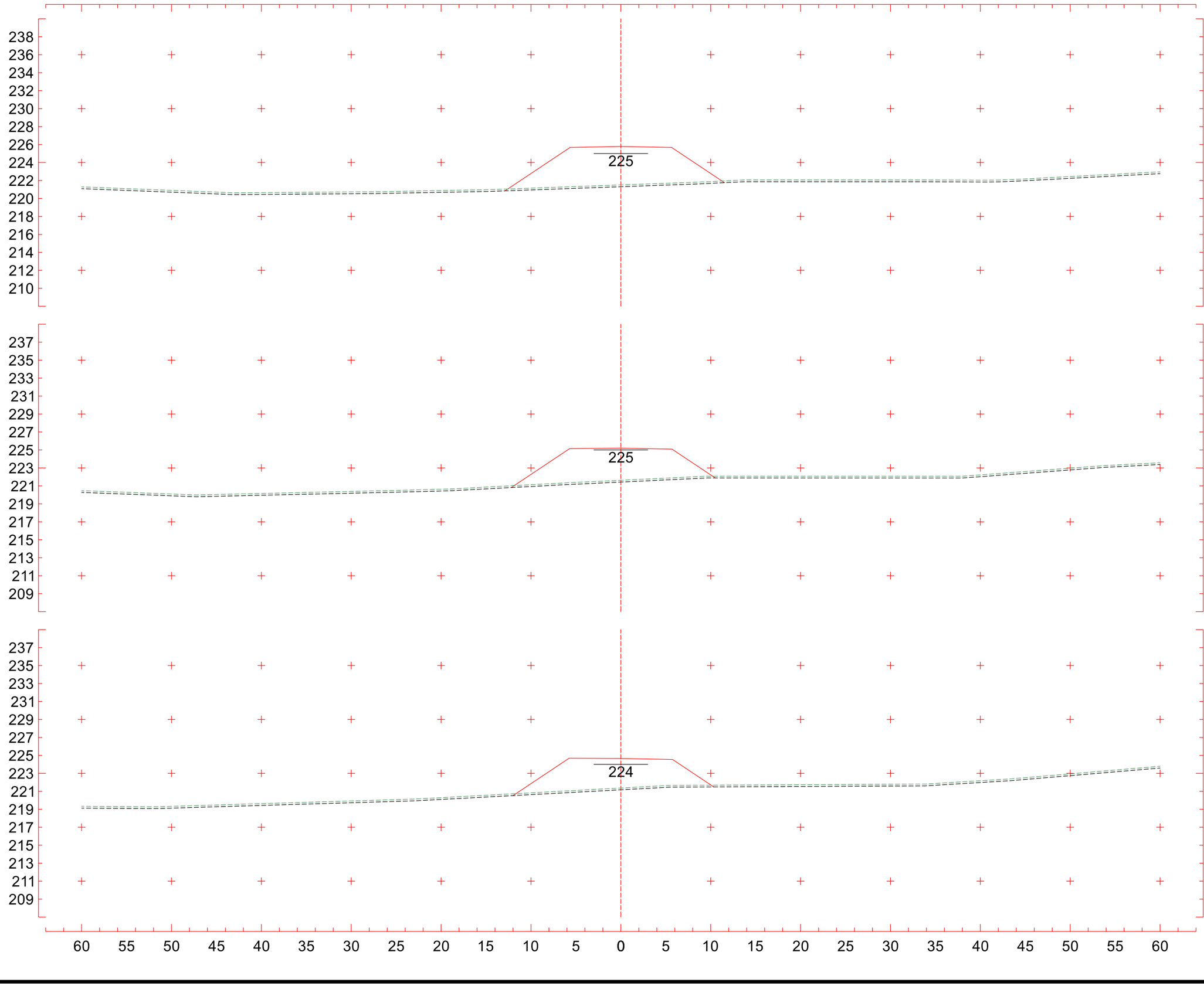


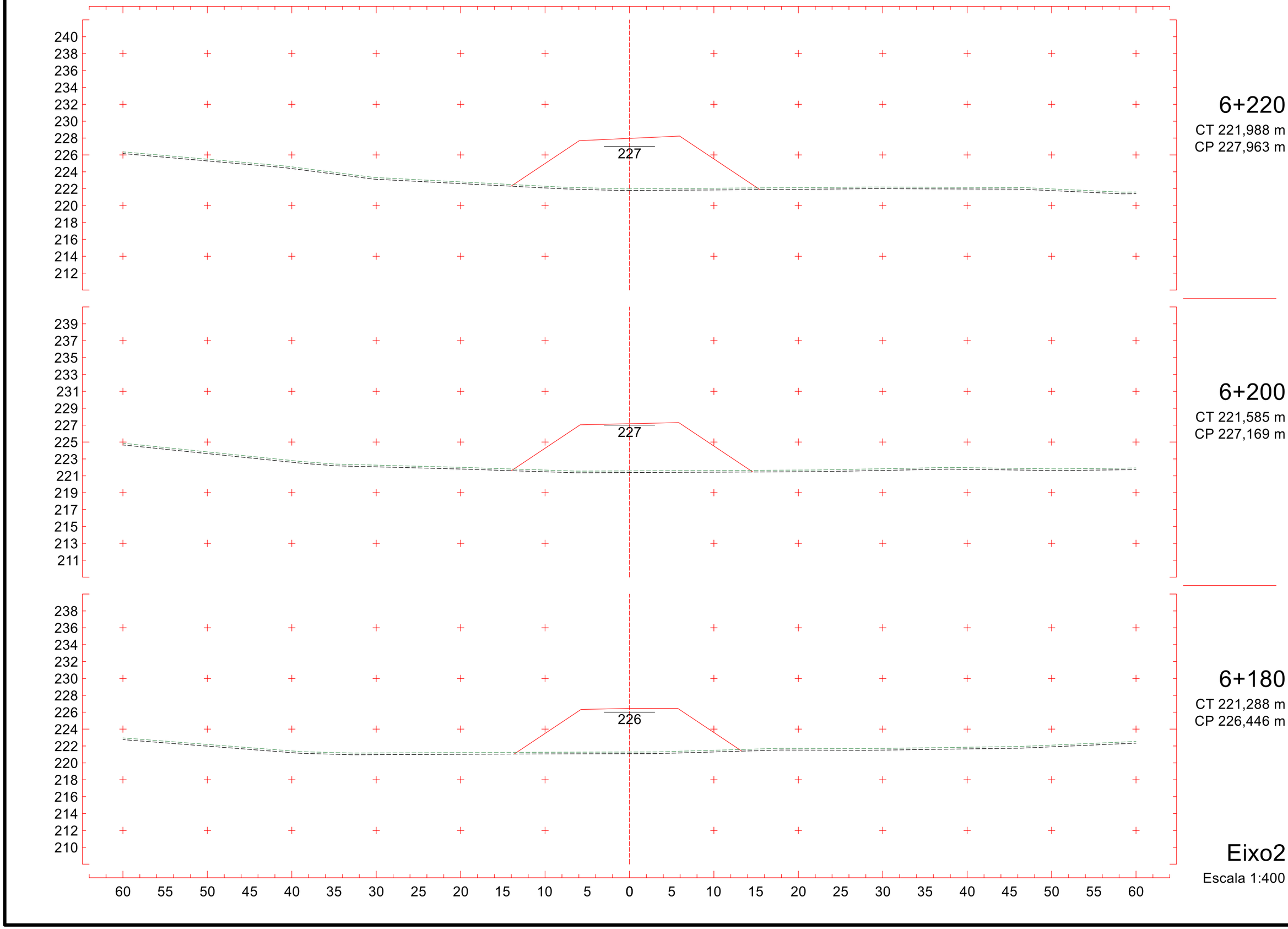
5+940
CT 222,588 m
CP 223,300 m

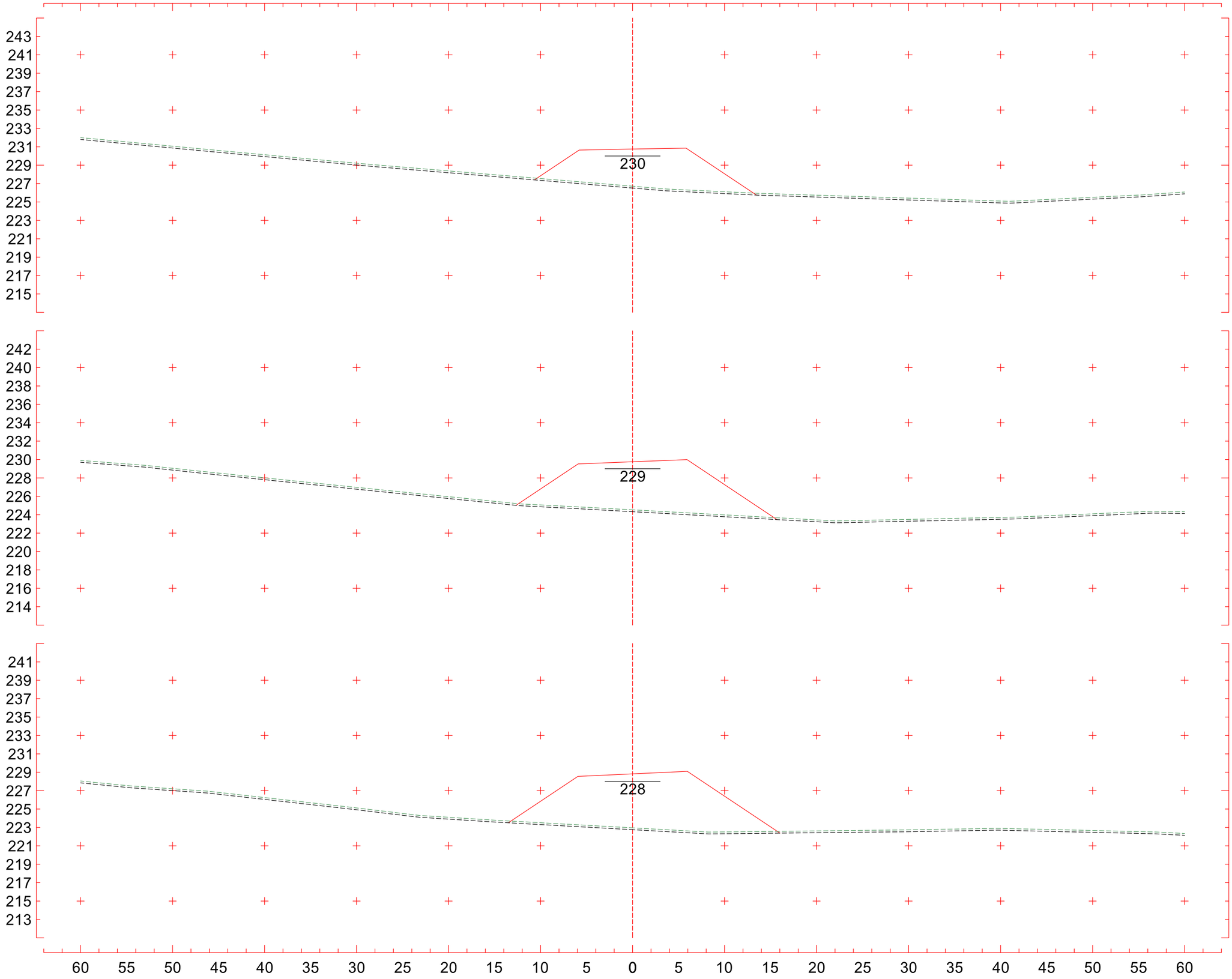
Eixo2
Escala 1:400

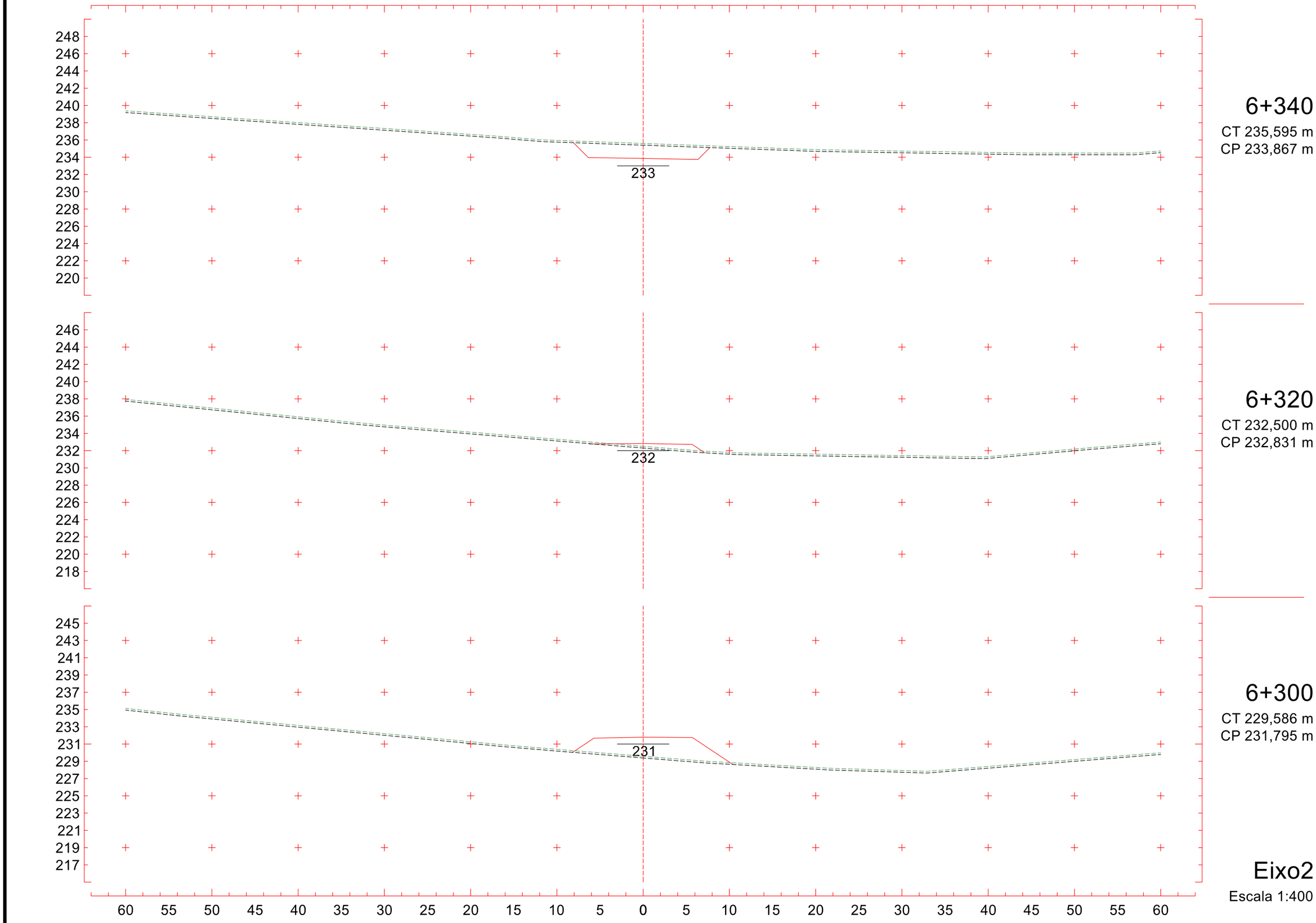

236
234
232
230
228
226
224
222
220
218
216
214
212
210
208
222
6+040
CT 220,405 m
CP 222,855 m
235
233
231
229
227
225
223
221
219
217
215
213
211
209
207
222
6+020
CT 220,430 m
CP 222,689 m
236
234
232
230
228
226
224
222
220
218
216
214
212
210
208
222
6+000
CT 220,716 m
CP 222,650 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

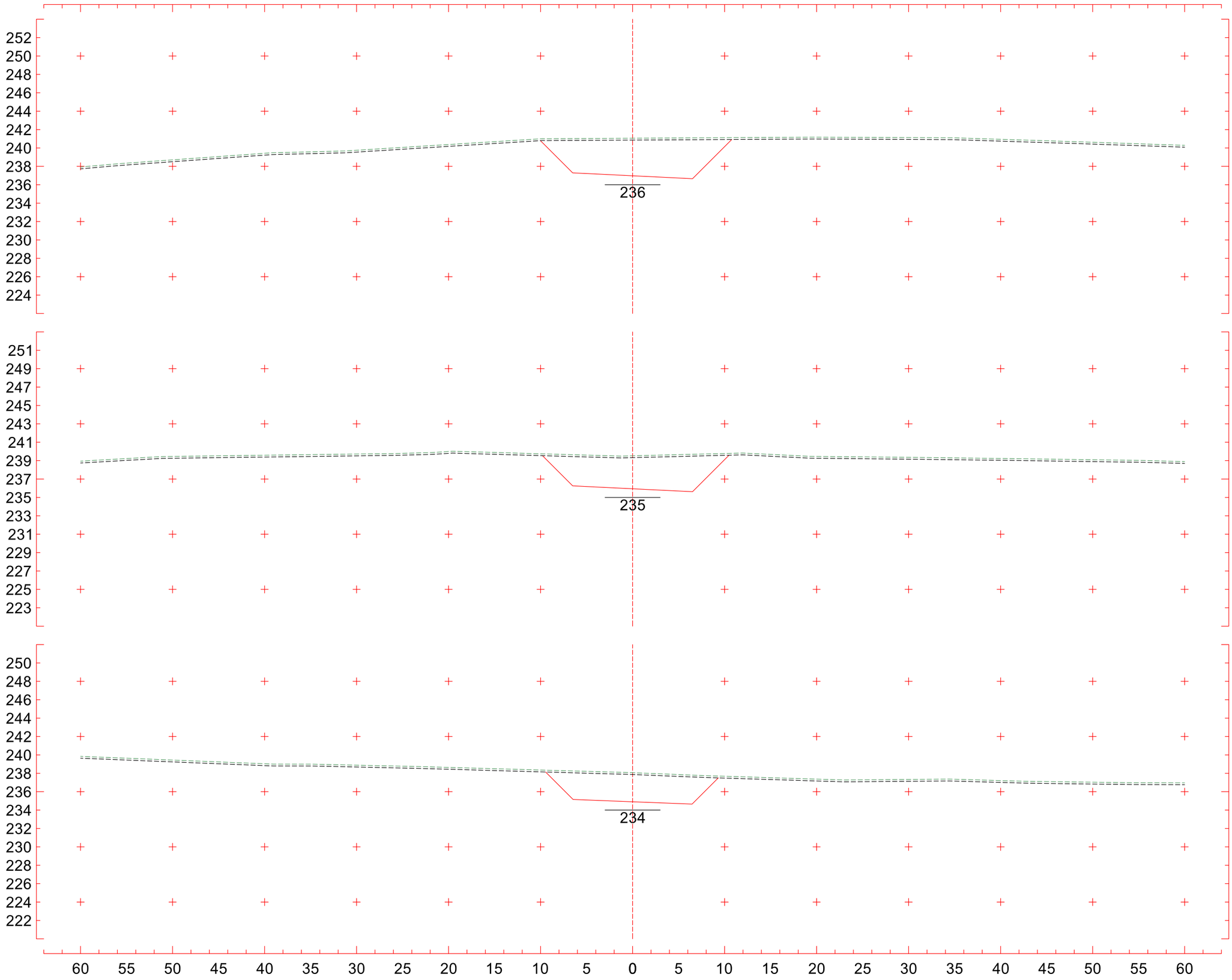

236
234
232
230
228
226
224
222
220
218
216
214
212
210
208
224
6+100
CT 221,153 m
CP 224,106 m
223
6+080
CT 220,819 m
CP 223,572 m
223
6+060
CT 220,523 m
CP 223,150 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

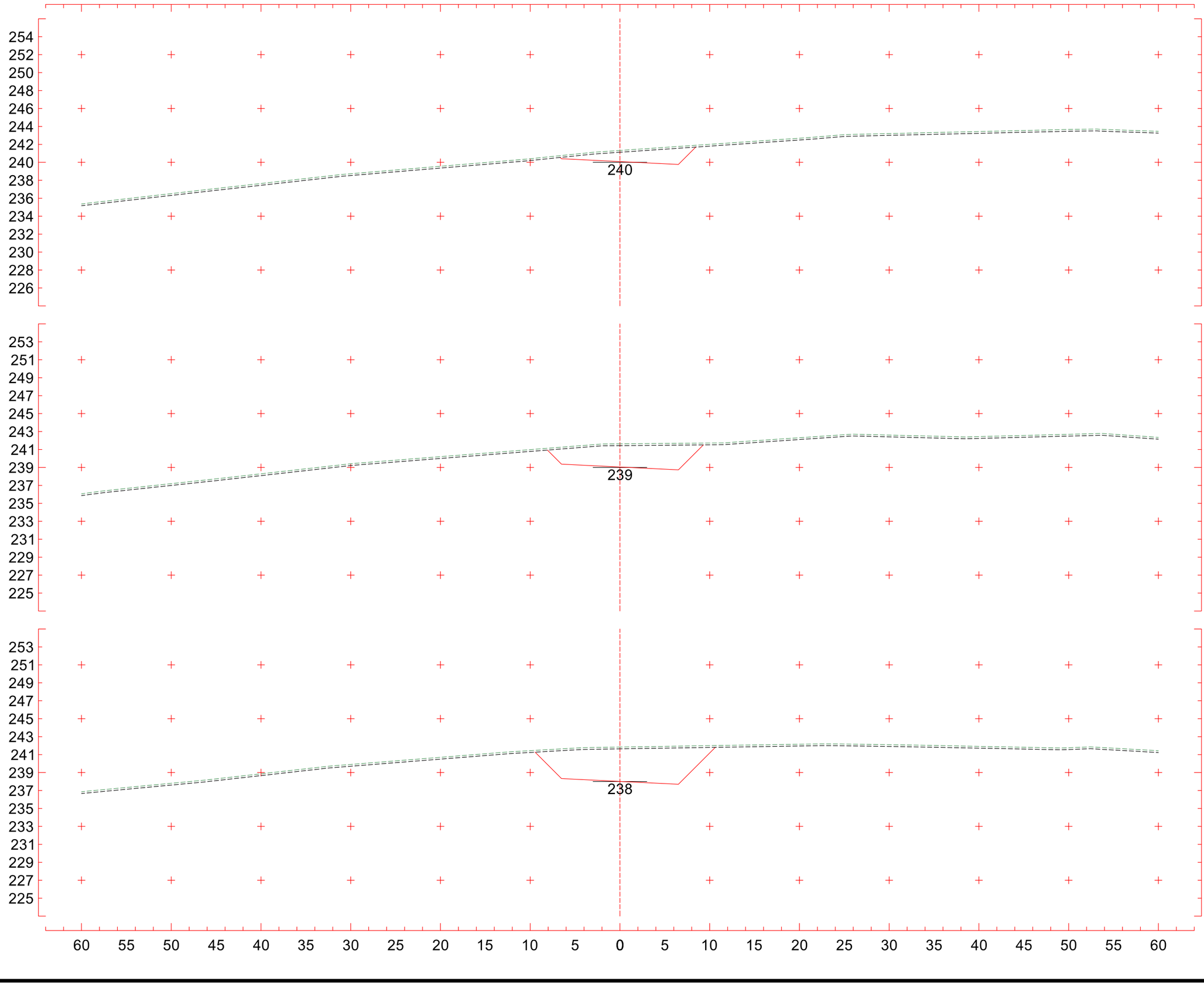

238
236
234
232
230
228
226
224
222
220
218
216
214
212
210
225
6+160
CT 221,505 m
CP 225,791 m
237
235
233
231
229
227
225
223
221
219
217
215
213
211
209
225
6+140
CT 221,625 m
CP 225,207 m
237
235
233
231
229
227
225
223
221
219
217
215
213
211
209
224
6+120
CT 221,368 m
CP 224,656 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400

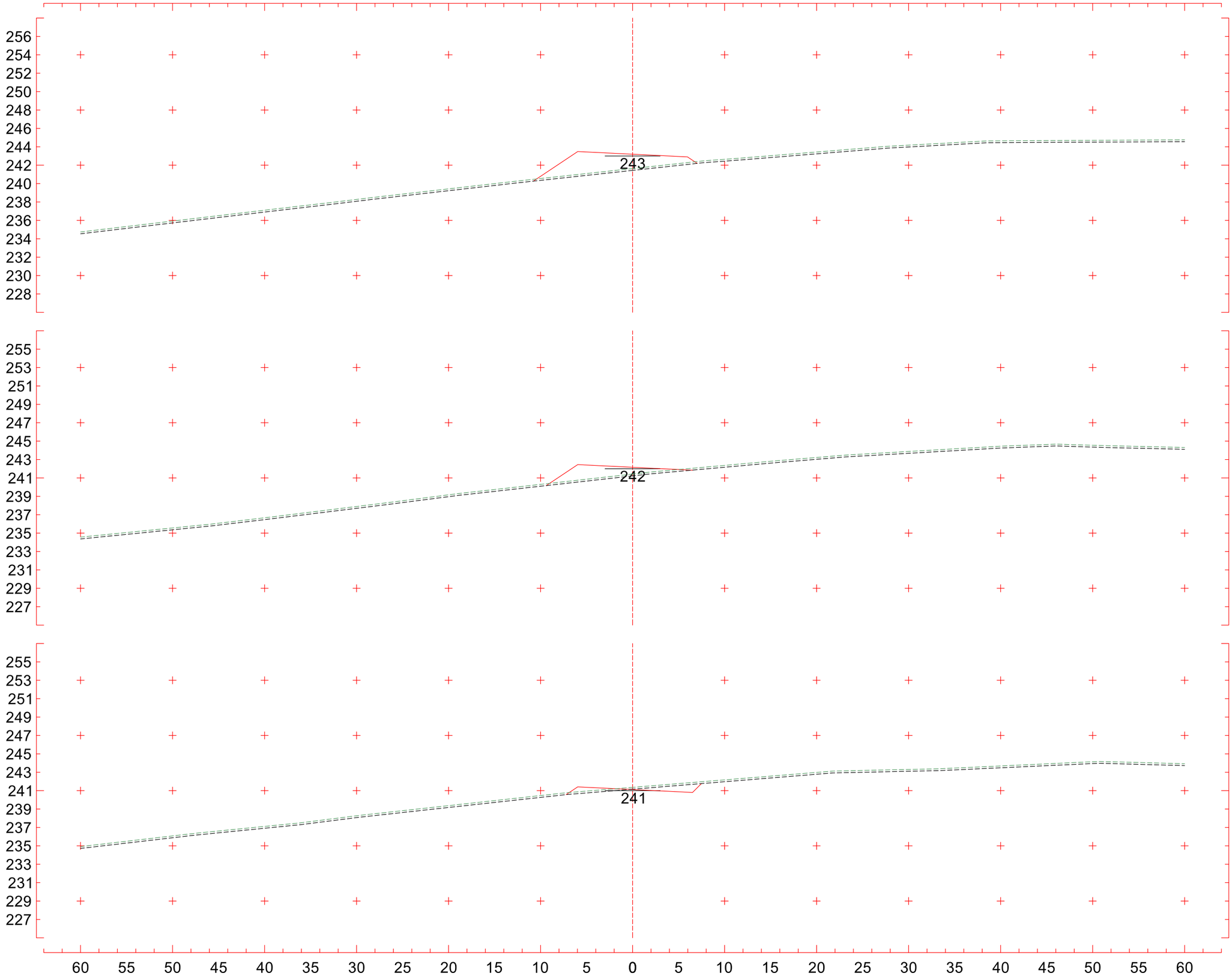

240
238
236
234
232
230
228
226
224
222
220
218
216
214
212
227
6+220
CT 221,988 m
CP 227,963 m
239
237
235
233
231
229
227
225
223
221
219
217
215
213
211
227
6+200
CT 221,585 m
CP 227,169 m
238
236
234
232
230
228
226
224
222
220
218
216
214
212
210
226
6+180
CT 221,288 m
CP 226,446 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo2
Escala 1:400


243
241
239
237
235
233
231
229
227
225
223
221
219
217
215
230
6+280
CT 226,717 m
CP 230,759 m
242
240
238
236
234
232
230
228
226
224
222
220
218
216
214
229
6+260
CT 224,530 m
CP 229,757 m
241
239
237
235
233
231
229
227
225
223
221
219
217
215
213
228
6+240
CT 222,957 m
CP 228,825 m
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
Eixo2
Escala 1:400


248
246
244
242
240
238
236
234
232
230
228
226
224
222
220
233
6+340
CT 235,595 m
CP 233,867 m
246
244
242
240
238
236
234
232
230
228
226
224
222
220
218
232
6+320
CT 232,500 m
CP 232,831 m
245
243
241
239
237
235
233
231
229
227
225
223
221
219
217
231
6+300
CT 229,586 m
CP 231,795 m
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
Eixo2
Escala 1:400


252
250
248
246
244
242
240
238
236
234
232
230
228
226
224
236
6+400
CT 241,060 m
CP 236,976 m
251
249
247
245
243
241
239
237
235
233
231
229
227
225
223
235
6+380
CT 239,525 m
CP 235,940 m
250
248
246
244
242
240
238
236
234
232
230
228
226
224
222
234
6+360
CT 238,067 m
CP 234,904 m
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
Eixo2
Escala 1:400


254
252
250
248
246
244
242
240
238
236
234
232
230
228
226
240
6+460
CT 241,324 m
CP 240,085 m
253
251
249
247
245
243
241
239
237
235
233
231
229
227
225
239
6+440
CT 241,632 m
CP 239,049 m
253
251
249
247
245
243
241
239
237
235
233
231
229
227
225
238
6+420
CT 241,841 m
CP 238,012 m
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
Eixo2
Escala 1:400



6+520

CT 241,635 m
CP 243,194 m

6+500

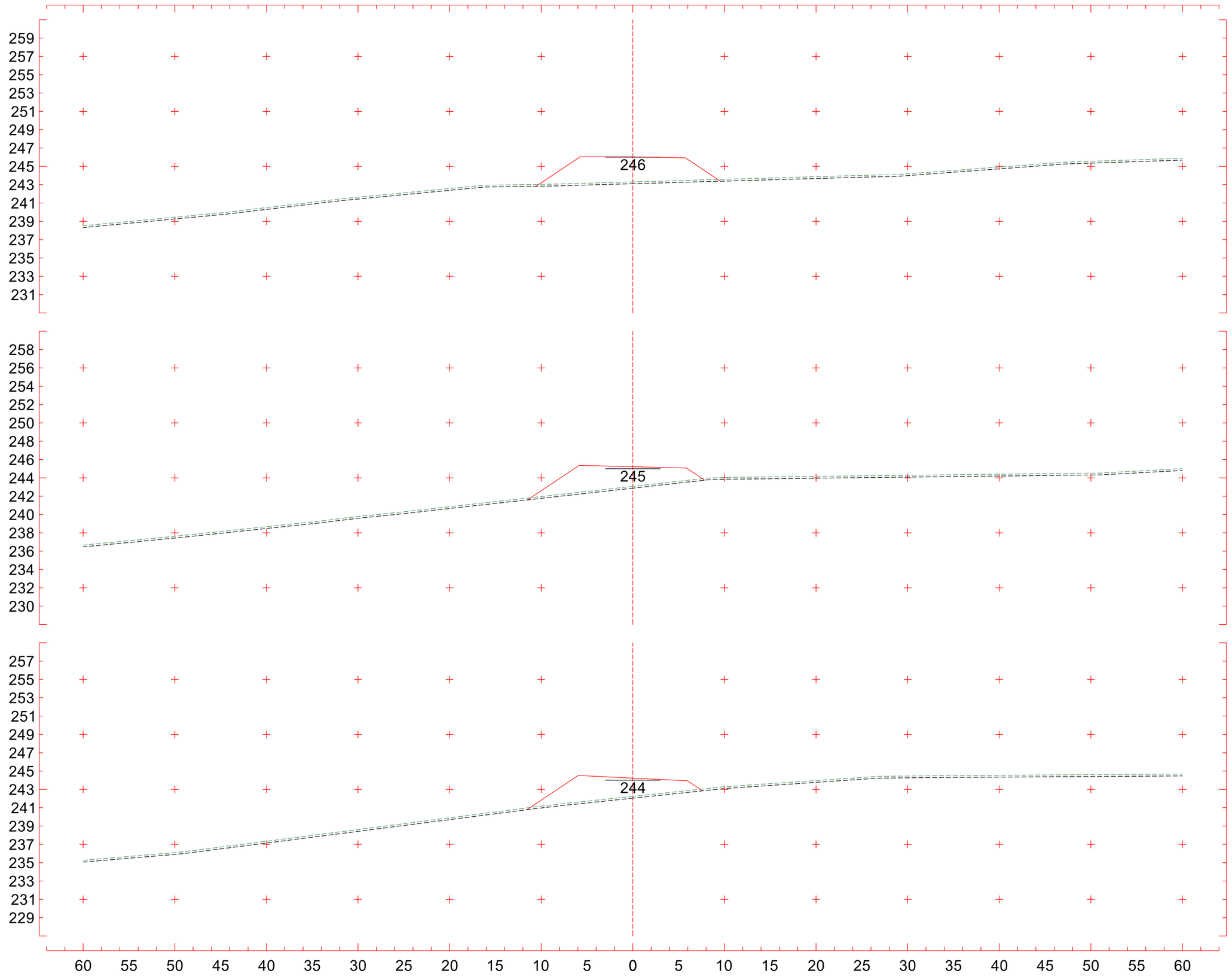
CT 241,419 m
CP 242,157 m

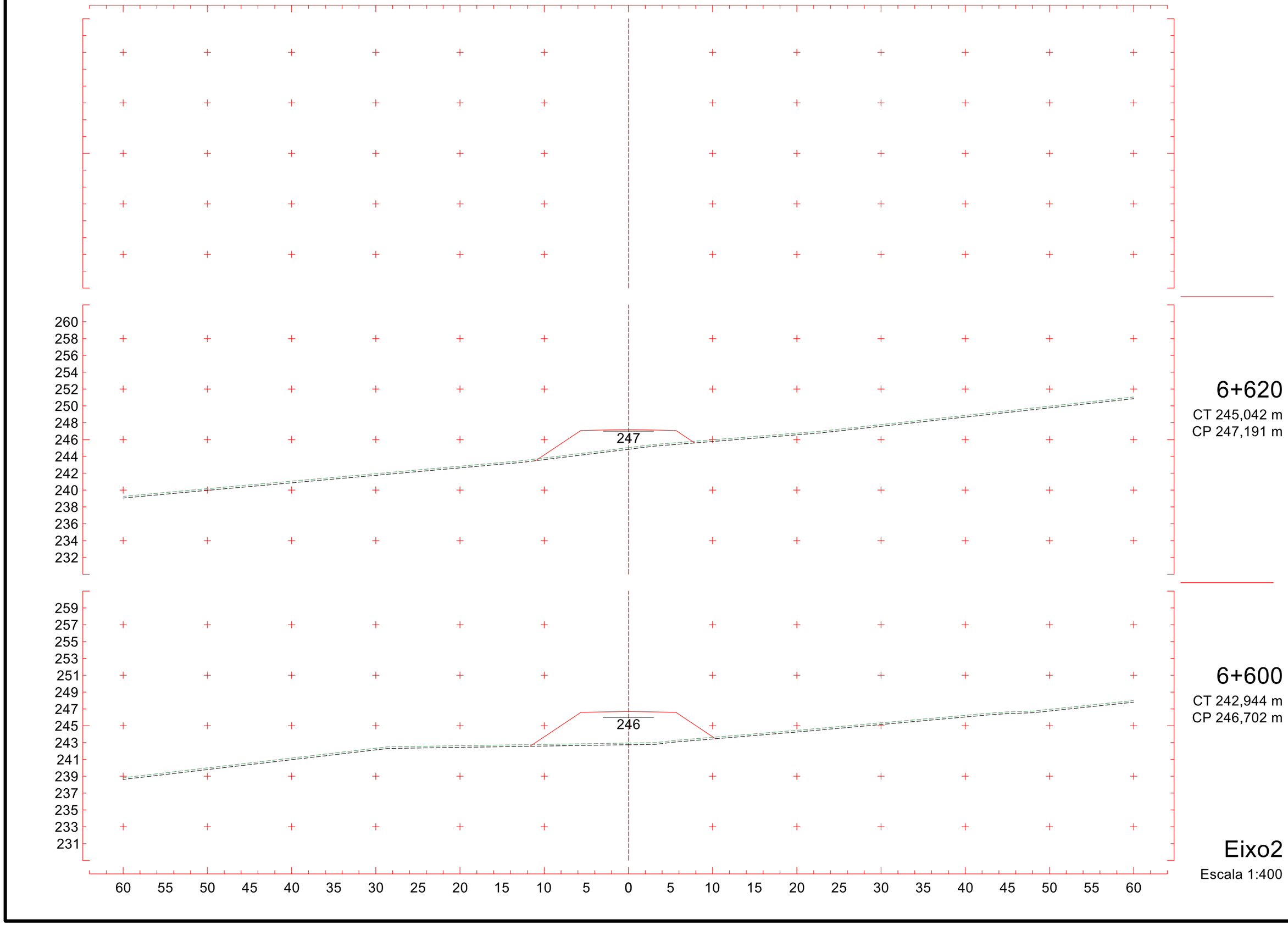
6+480

CT 241,359 m
CP 241,121 m

Eixo2

Escala 1:400


259
257
255
253
251
249
247
245
243
241
239
237
235
233
231
246
6+580
CT 243,306 m
CP 246,045 m
258
256
254
252
250
248
246
244
242
240
238
236
234
232
230
245
6+560
CT 243,075 m
CP 245,219 m
257
255
253
251
249
247
245
243
241
239
237
235
233
231
229
244
6+540
CT 242,242 m
CP 244,230 m
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
Eixo2
Escala 1:400


260
258
256
254
252
250
248
246
244
242
240
238
236
234
232
247
259
257
255
253
251
249
247
245
243
241
239
237
235
233
231
246
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

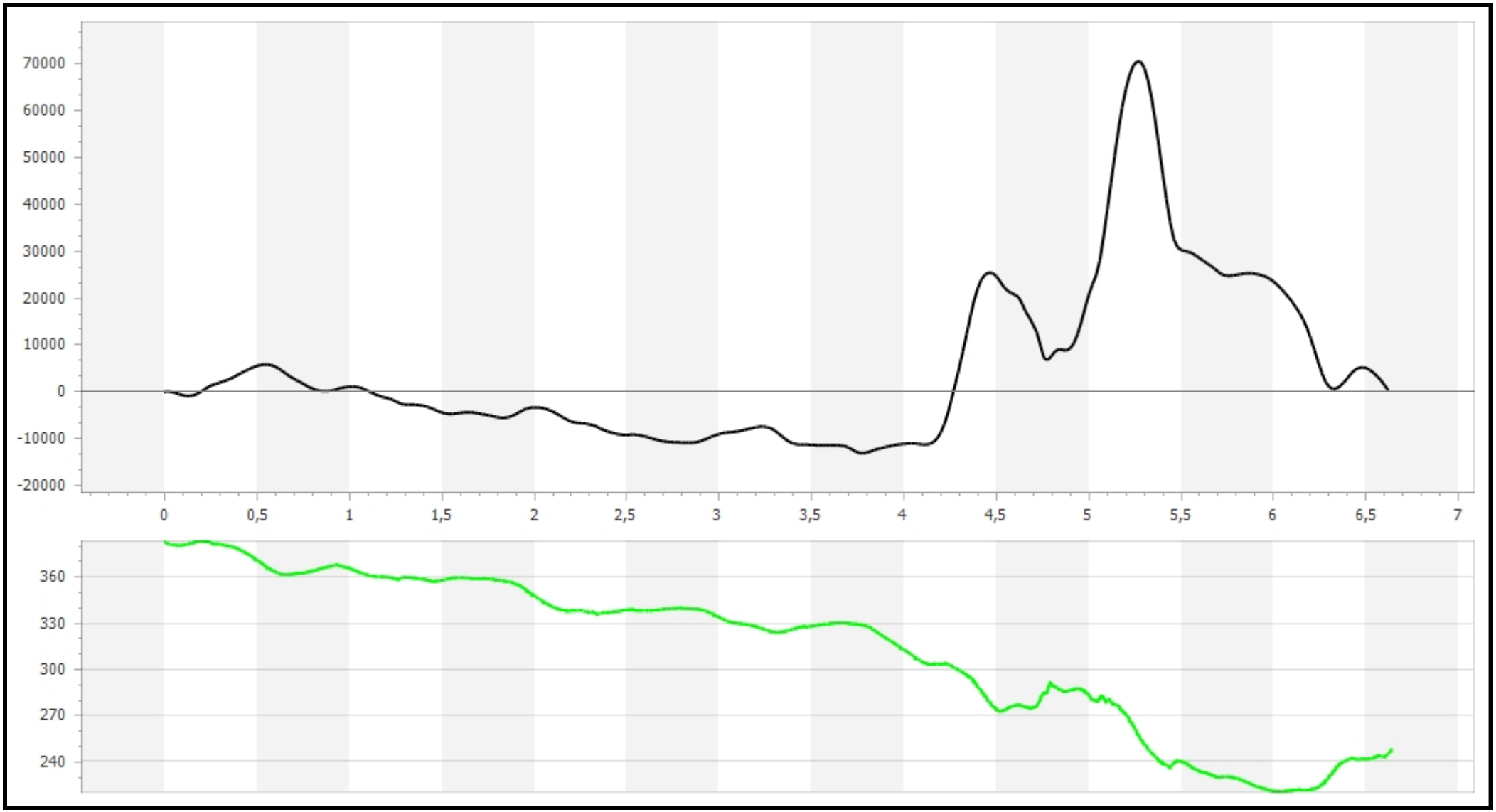
PROJETO DE TERRAPLENAGEM

3 PROJETO DE TERRAPLENAGEM

Diagrama de Massa

DIAGRAMA DE MASSAS (BRÜCKNER)

Rodovia:	Grupo de Eixos 1	Homogeneização:	- Corte 1ª Categoria: 1,300
Trecho:	Eixo2	- Aterro Camada Superior: 1,000	- Corte 2ª Categoria: 1,000
Segmento:	km: 0+000,00 ao km: 6+638,72	- Aterro Camada Inferior : 1,000	- Corte 3ª Categoria: 0,800



Quadro de Origem e Destino

QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

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

Vol. transp. : 151455,00m³
Momento tot.: 105970,42m³.m
DMT : 0,700km

ORIGEM										DESTINO							TRANSPORTE			OBSERVAÇÕES
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
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

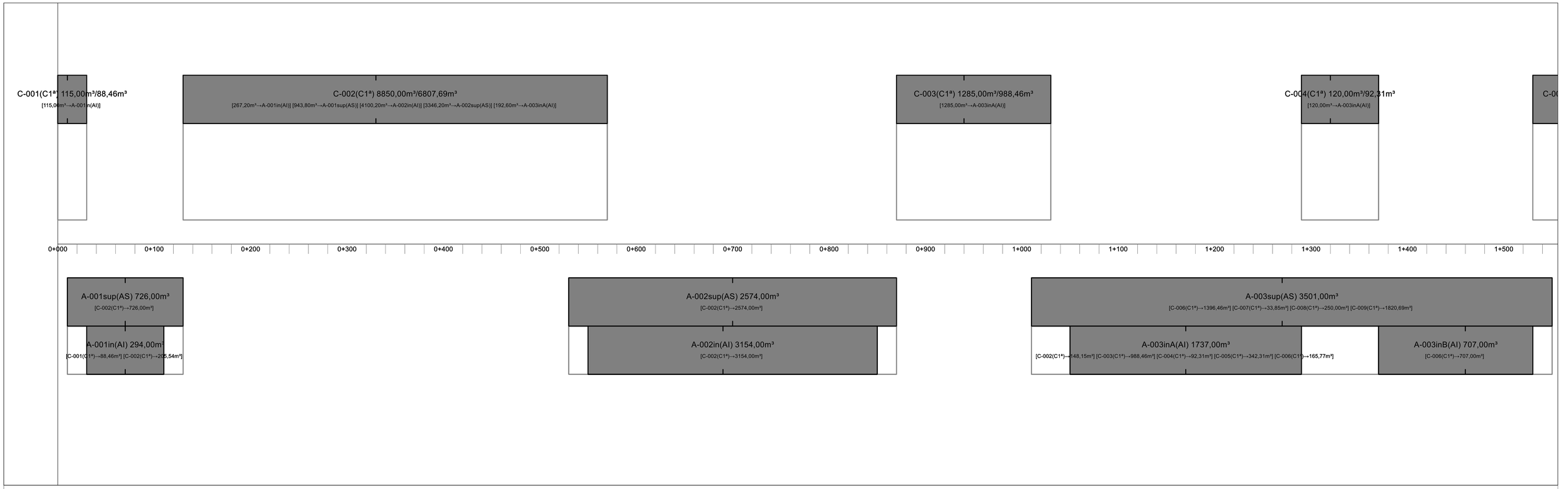
Rodovia: Grupo de Eixos 1
Trecho: Eixo2
Segmento: km: 0+000,00 ao km: 6+638,72

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

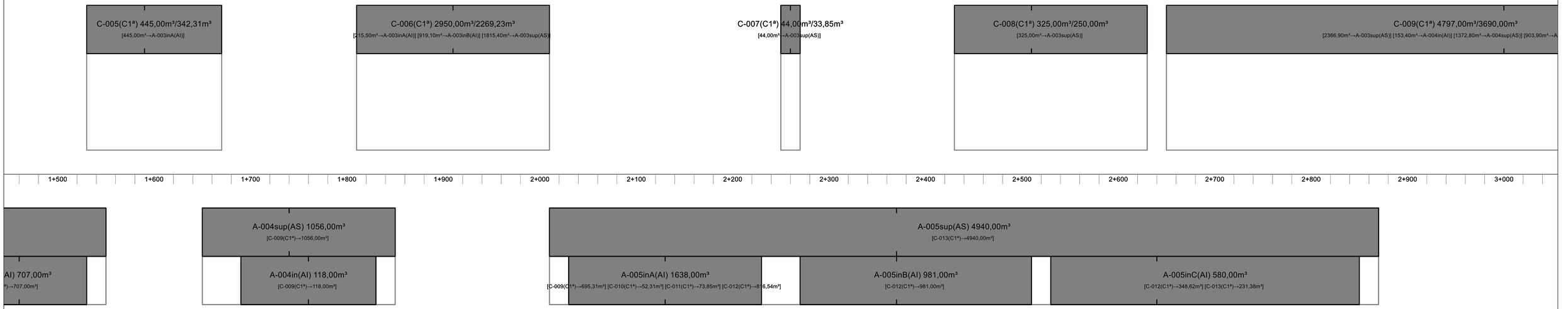
Vol. transp. : 151455,00m³
Momento tot.: 105970,42m³.m
DMT : 0,700km

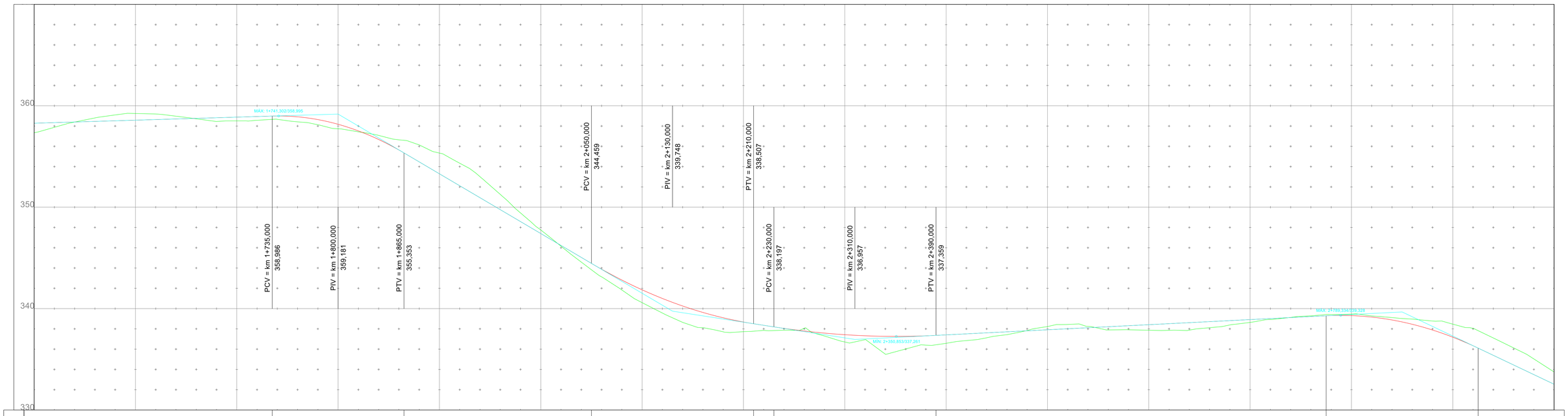
ORIGEM										DESTINO							TRANSPORTE			OBSERVAÇÕES
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
ID	TIPO	HOMO.	INÍCIO	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												
									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												
									1905,46	A-009in	AI	4+470	4+660	4+790			0,390	2477,10	966,069	
									3892,00	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												
									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												
									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												
									17155,50	A-011in	AI	5+270	5+400	5+750			0,310	13724,40	4254,564	
									19399,00	A-012in	AI	5+890	6+170	6+330		19399,00	1,080	15519,20	16760,736	
									885,50	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												
									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												
									340,08	A-012sup	AS	5+850	6+120	6+330			0,270	442,10	119,367	
									2831,50	A-013in	AI	6+470	6+570	6+628			0,180	3680,95	662,571	
									1540,73	A-013sup	AS	6+470	6+560	6+628		1541,00	0,170	2002,95	340,501	

Esquema Linear de Distribuição dos Materiais

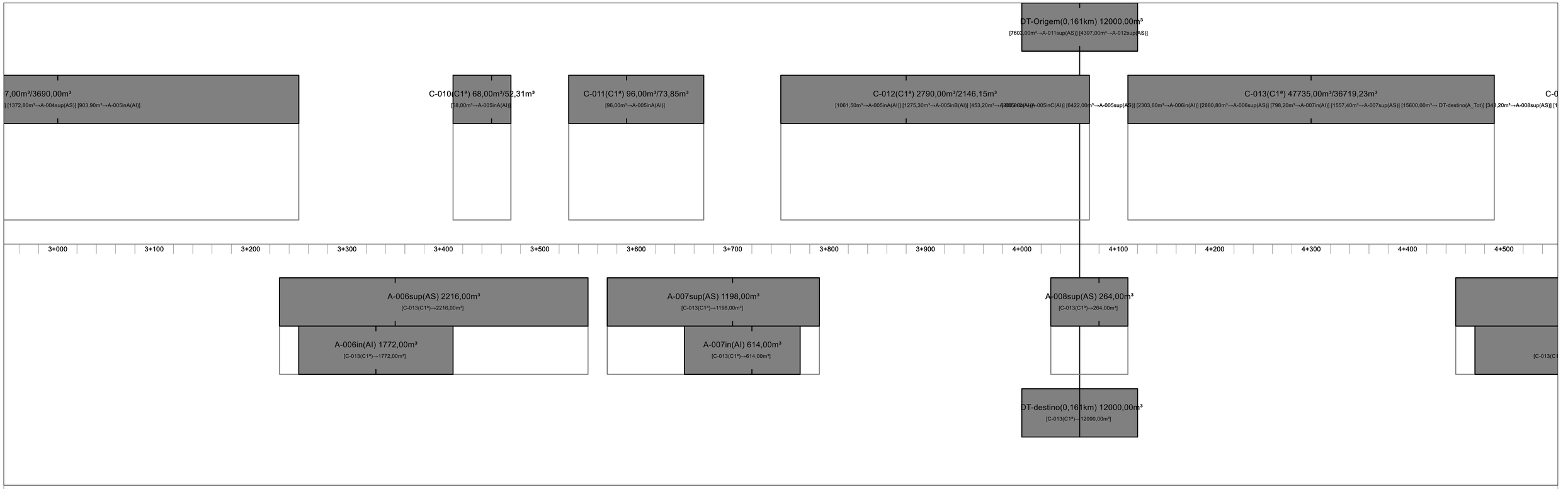

C-001(C1ª) 115,00m³/88,46m³
[115,00m³→A-001in(Al)]
C-002(C1ª) 8850,00m³/6807,69m³
[267,20m³→A-001in(Al)] [943,80m³→A-001sup(AS)] [4100,20m³→A-002in(Al)] [3346,20m³→A-002sup(AS)] [192,60m³→A-003inA(Al)]
C-003(C1ª) 1285,00m³/988,46m³
[1285,00m³→A-003inA(Al)]
C-004(C1ª) 120,00m³/92,31m³
[120,00m³→A-003inA(Al)]
0+000
0+100
0+200
0+300
0+400
0+500
0+600
0+700
0+800
0+900
1+000
1+100
1+200
1+300
1+400
1+500
A-001sup(AS) 726,00m³
[C-002(C1ª)→726,00m³]
A-001in(Al) 294,00m³
[C-001(C1ª)→88,46m³] [C-002(C1ª)→205,54m³]
A-002sup(AS) 2574,00m³
[C-002(C1ª)→2574,00m³]
A-002in(Al) 3154,00m³
[C-002(C1ª)→3154,00m³]
A-003sup(AS) 3501,00m³
[C-006(C1ª)→1396,46m³] [C-007(C1ª)→33,85m³] [C-008(C1ª)→250,00m³] [C-009(C1ª)→1820,69m³]
A-003inA(Al) 1737,00m³
[C-002(C1ª)→148,15m³] [C-003(C1ª)→988,46m³] [C-004(C1ª)→92,31m³] [C-005(C1ª)→342,31m³] [C-006(C1ª)→165,77m³]
A-003inB(Al) 707,00m³
[C-006(C1ª)→707,00m³]
380
370
360
350
381,568
PCV = km 0+250,000
380,279
PIV = km 0+350,000
379,763
PTV = km 0+450,000
373,076
PCV = km 0+520,000
368,395
PIV = km 0+620,000
361,707
PTV = km 0+720,000
363,282
MIN: 0+681,880/362,682
PCV = km 0+870,000
365,644
PIV = km 0+940,000
366,746
MAX: 0+920,186/366,839
PTV = km 1+010,000
364,772
PCV = km 1+110,000
361,951
PIV = km 1+160,000
360,541
PTV = km 1+210,000
360,144
PCV = km 1+435,000
358,359
PIV = km 1+460,000
358,161
PTV = km 1+485,000
358,236
MIN: 1+471,282/358,215

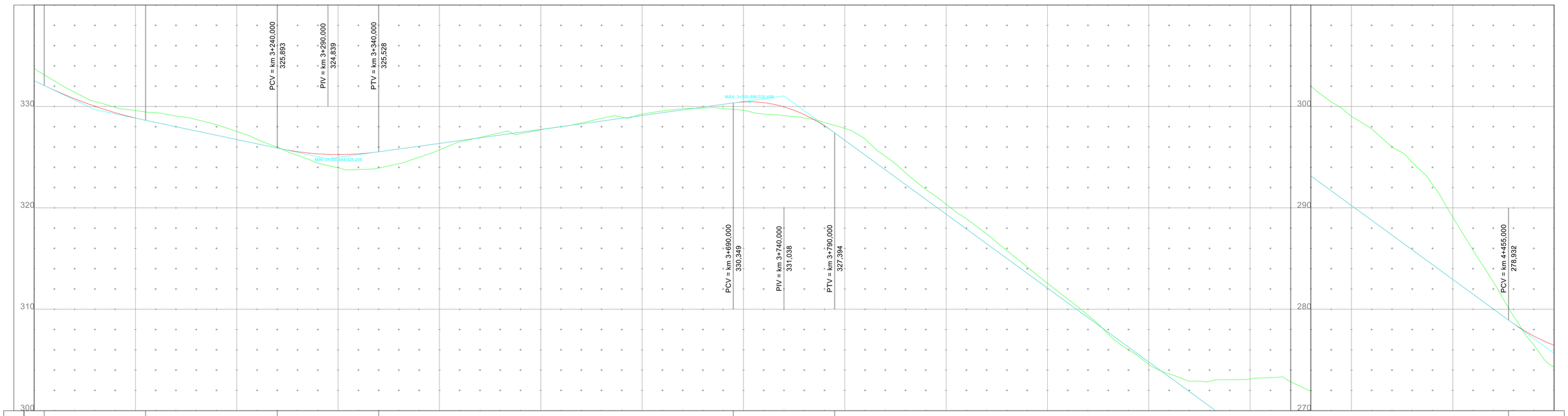
| | | |


C-005(C1ª) 445,00m³/342,31m³
[445,00m³→A-003inA(AI)]
C-006(C1ª) 2950,00m³/2269,23m³
[215,50m³→A-003inA(AI)] [919,10m³→A-003inB(AI)] [1815,40m³→A-003sup(AS)]
C-007(C1ª) 44,00m³/33,85m³
[44,00m³→A-003sup(AS)]
C-008(C1ª) 325,00m³/250,00m³
[325,00m³→A-003sup(AS)]
C-009(C1ª) 4797,00m³/3690,00m³
[2366,90m³→A-003sup(AS)] [153,40m³→A-004in(AI)] [1372,80m³→A-004sup(AS)] [903,90m³→A
1+500
1+600
1+700
1+800
1+900
2+000
2+100
2+200
2+300
2+400
2+500
2+600
2+700
2+800
2+900
3+000
AI) 707,00m³
[→707,00m³]
A-004sup(AS) 1056,00m³
[C-009(C1ª)→1056,00m³]
A-004in(AI) 118,00m³
[C-009(C1ª)→118,00m³]
A-005sup(AS) 4940,00m³
[C-013(C1ª)→4940,00m³]
A-005inA(AI) 1638,00m³
[C-009(C1ª)→695,31m³] [C-010(C1ª)→52,31m³] [C-011(C1ª)→73,85m³] [C-012(C1ª)→816,54m³]
A-005inB(AI) 981,00m³
[C-012(C1ª)→981,00m³]
A-005inC(AI) 580,00m³
[C-012(C1ª)→348,62m³] [C-013(C1ª)→231,38m³]


360
350
340
330
MÁX: 1+741,302/358,995
PCV = km 1+735,000
358,986
PIV = km 1+800,000
359,181
PTV = km 1+865,000
355,353
PCV = km 2+050,000
344,459
PIV = km 2+130,000
339,748
PTV = km 2+210,000
338,507
PCV = km 2+230,000
338,197
PIV = km 2+310,000
336,957
PTV = km 2+390,000
337,359
MÍN: 2+350,853/337,261
MÁX: 2+769,334/339,328

| | | |

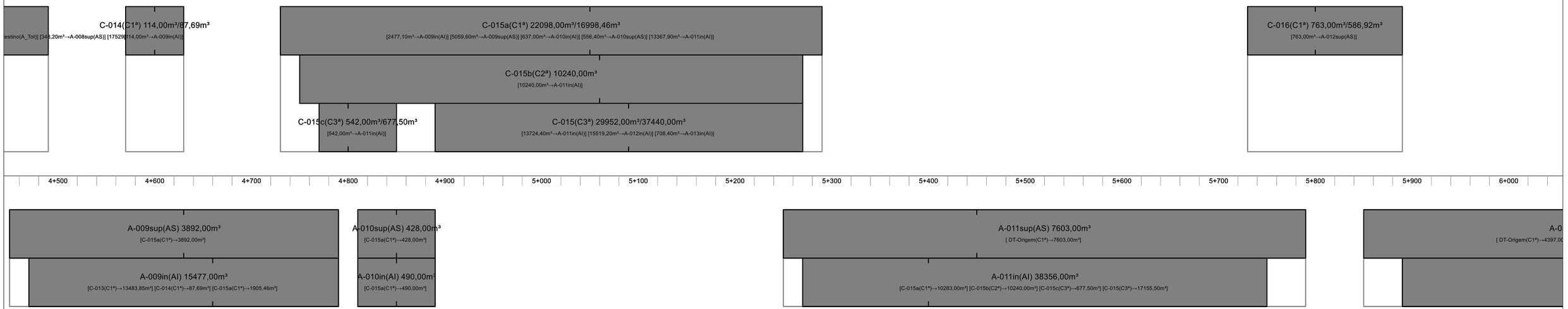




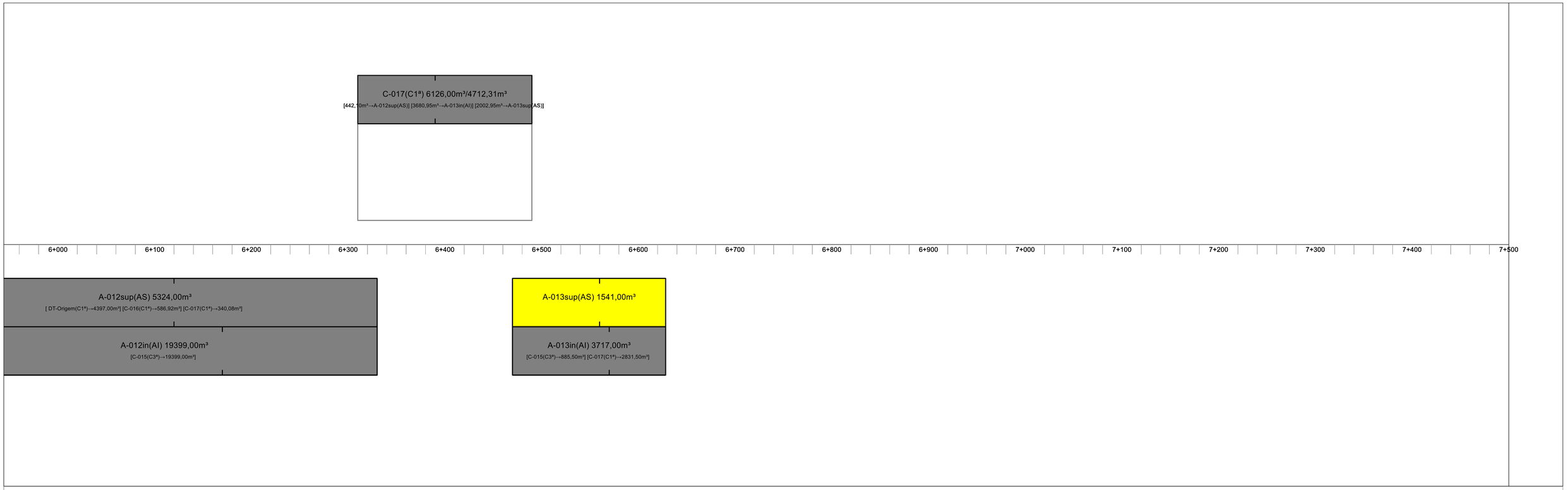
ALT.	L = 100,000 e = 0,331 Δ = 2,6443% k = 37,817	D = 130,00 i = -2,1083%	L = 100,000 e = 0,436 Δ = 3,4857% k = 28,689	D = 350,00 i = 1,3774%	L = 100,000 e = -1,083 Δ = -8,6649% k = 11,541	D = 665,00 i = -7,2875%	L = 150,000

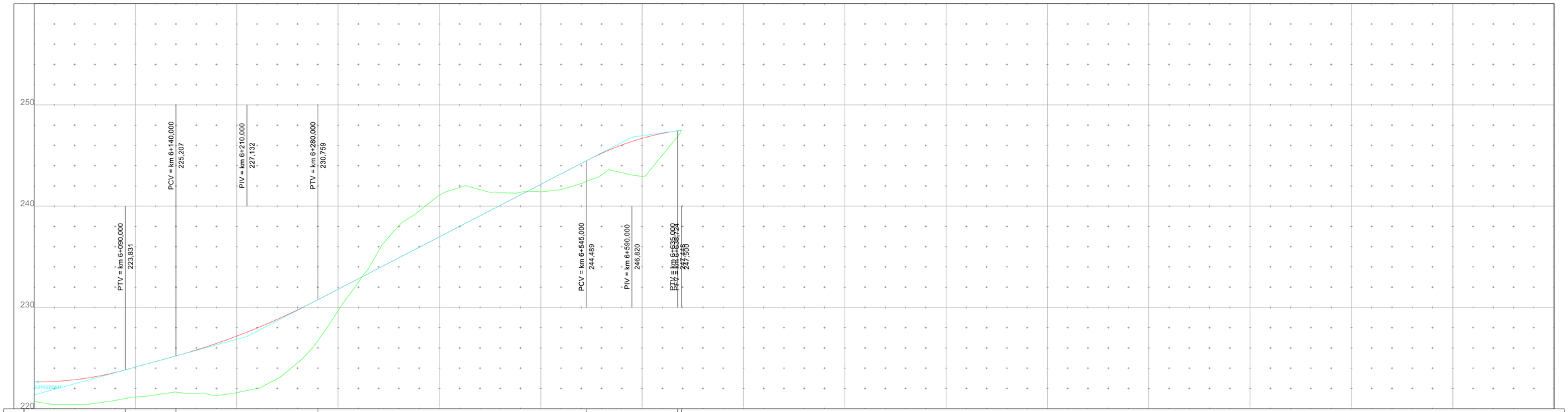
km		3+000			3+100			3+200			3+300			3+400			3+500			3+600			3+700			3+800			3+900			4+000			4+100			4+200			4+300			4+400			4+500
COTAS (m)	TERRENO	333,750	332,518	331,397	330,490	329,917	329,592	329,388	329,051	328,714	328,199	327,529	326,763	325,980	325,174	324,404	323,946	323,781	323,927	324,356	324,992	325,714	326,518	326,942	327,411	327,312	327,704	328,001	328,370	328,829	328,945	329,243	329,553	329,774	329,842	329,789	329,627	329,244	329,096	328,869	328,423	327,828	326,781	325,096	323,444	321,803	320,361	318,917	317,416	315,785	314,169	312,568	311,011	309,406	307,555	306,010	304,562	303,626	302,910	302,907	303,054	303,127	303,260	302,849	301,911	300,460	299,007	297,775	296,008	294,493	292,304	289,090	285,830	282,693	279,341	276,465	274,293
	PROJETO	332,540	331,603	330,758	330,019	329,386	328,858	328,423	328,002	327,580	327,158	326,737	326,315	325,893	325,542	325,329	325,266	325,322	325,528	325,804	326,079	326,354	326,630	326,905	327,181	327,456	327,732	328,007	328,283	328,558	328,834	329,109	329,385	329,660	329,936	330,211	330,443	330,372	329,955	329,190	328,079	326,665	325,208	323,750	322,293	320,835	319,378	317,920	316,463	315,005	313,548	312,090	310,633	309,175	307,718	306,260	304,803	303,345	301,888	300,430	298,973	297,515	296,058	294,600	293,143	291,685	290,228	288,770	287,313	285,855	284,398	282,940	281,483	280,025	278,578	277,356	276,455

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


estino(A_Tot)] [343,20m³→A-008sup(AS)] [17529,114,00m³→A-009in(AI)]
C-014(C1ª) 114,00m³/87,69m³
C-015a(C1ª) 22098,00m³/16998,46m³
[2477,10m³→A-009in(AI)] [5059,60m³→A-009sup(AS)] [637,00m³→A-010in(AI)] [556,40m³→A-010sup(AS)] [13367,90m³→A-011in(AI)]
C-015b(C2ª) 10240,00m³
[10240,00m³→A-011in(AI)]
C-015c(C3ª) 542,00m³/677,50m³
[542,00m³→A-011in(AI)]
C-015(C3ª) 29952,00m³/37440,00m³
[13724,40m³→A-011in(AI)] [15519,20m³→A-012in(AI)] [708,40m³→A-013in(AI)]
C-016(C1ª) 763,00m³/586,92m³
[763,00m³→A-012sup(AS)]
4+500
4+600
4+700
4+800
4+900
5+000
5+100
5+200
5+300
5+400
5+500
5+600
5+700
5+800
5+900
6+000
A-009sup(AS) 3892,00m³
[C-015a(C1ª)→3892,00m³]
A-009in(AI) 15477,00m³
[C-013(C1ª)→13483,85m³] [C-014(C1ª)→87,69m³] [C-015a(C1ª)→1905,46m³]
A-010sup(AS) 428,00m³
[C-015a(C1ª)→428,00m³]
A-010in(AI) 490,00m³
[C-015a(C1ª)→490,00m³]
A-011sup(AS) 7603,00m³
[DT-Origem(C1ª)→7603,00m³]
A-011in(AI) 38356,00m³
[C-015a(C1ª)→10283,00m³] [C-015b(C2ª)→10240,00m³] [C-015c(C3ª)→677,50m³] [C-015(C3ª)→17155,50m³]
A-0
[DT-Origem(C1ª)→4397,00
290
280
270
260
260
250
240
230
240
230
220
210
PIV = km 4+530,000
273,467
PTV = km 4+605,000
276,915
MAX: 4+629,037/285,378
MIN: 4+546,975/275,861
PCV = km 4+790,000
285,420
PIV = km 4+840,000
287,719
PTV = km 4+890,000
284,129
PCV = km 5+440,000
244,639
PIV = km 5+540,000
237,459
PTV = km 5+640,000
233,819
PCV = km 5+690,000
224,720
PIV = km 5+990,000
221,080
MIN: 6+00

| | | |


C-017(C1ª) 6126,00m³/4712,31m³
[442,10m³→A-012sup(AS)] [3680,95m³→A-013in(AI)] [2002,95m³→A-013sup(AS)]
6+000
6+100
6+200
6+300
6+400
6+500
6+600
6+700
6+800
6+900
7+000
7+100
7+200
7+300
7+400
7+500
A-012sup(AS) 5324,00m³
[DT-Origem(C1ª)→4397,00m³] [C-016(C1ª)→586,92m³] [C-017(C1ª)→340,08m³]
A-012in(AI) 19399,00m³
[C-015(C3ª)→19399,00m³]
A-013sup(AS) 1541,00m³
A-013in(AI) 3717,00m³
[C-015(C3ª)→885,50m³] [C-017(C1ª)→2831,50m³]


250
240
230
220
PTV = km 6+090,000
223,831
PCV = km 6+140,000
225,207
PIV = km 6+210,000
227,132
PTV = km 6+280,000
230,759
PCV = km 6+545,000
244,469
PIV = km 6+590,000
246,820
PTV = km 6+635,000
247,500
PTV = km 6+638,724
247,500

| | | |

7+500

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

CAPÍTULO II

EPTG Sul

Caroline Veduim Bevilacqua
Helena Pooli Barbosa
Júlia Martins Rodríguez de Azevedo
Victor Loes Fensterseifer
Daniel Sergio Presta Garcia

R E P Ú B L I C A F E D E R A T I V A D O B R A S I L
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL – UFRGS
E S C O L A D E E N G E N H A R I A – 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 AS CIDADES DE INDEPENDÊNCIA E ALEGRIA

Rodovia:	PPP - 2021/2
Norma Técnica:	DNER/1999
Classe da rodovia:	Classe III
Região:	Montanhosa
Configuração:	pista simples com acostamentos
Classificação do solo:	1ª Categoria
Faixa de exploração:	2 x 250m
Extensão aproximada:	7,004 km

VOLUME 2 – PROJETO EXECUTIVO

EQUIPE AE2 – EPTG Sul
MAIO/2022

Ponto de Partida
Lúdico-Real-Didático

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: **PPP UFRGS 2021/2**

Ano: **2021**

Semestre: **2**

Disciplina: **Rodovias**

Turma: **A**

Código da Equipe: **AE2**

Nome: **EPTG Sul**

Integrantes do grupo:

(assinatura)

Júlia Martins Rodríguez de Azevedo

(assinatura)

Helena Pooli Barbosa

(assinatura)

Caroline Veduim Bevilacqua

(assinatura)

Victor Lopes Fensterseifer

SUMÁRIO

SUMÁRIO

1 APRESENTAÇÃO **6**

1.1 Mapa de Situação 6

1.2 Mapa de Localização 8

1.3 Quadro de Características Técnicas 10

2 PROJETO GEOMÉTRICO **13**

2.1 Seções Transversais Tipo 13

2.2 Linha Geral 15

2.3 Detalhamento do Projeto Planialtimétrico 17

2.4 Seções Transversais 18

3 PROJETO DE TERRAPLENAGEM **20**

3.1 Diagrama de Massa 20

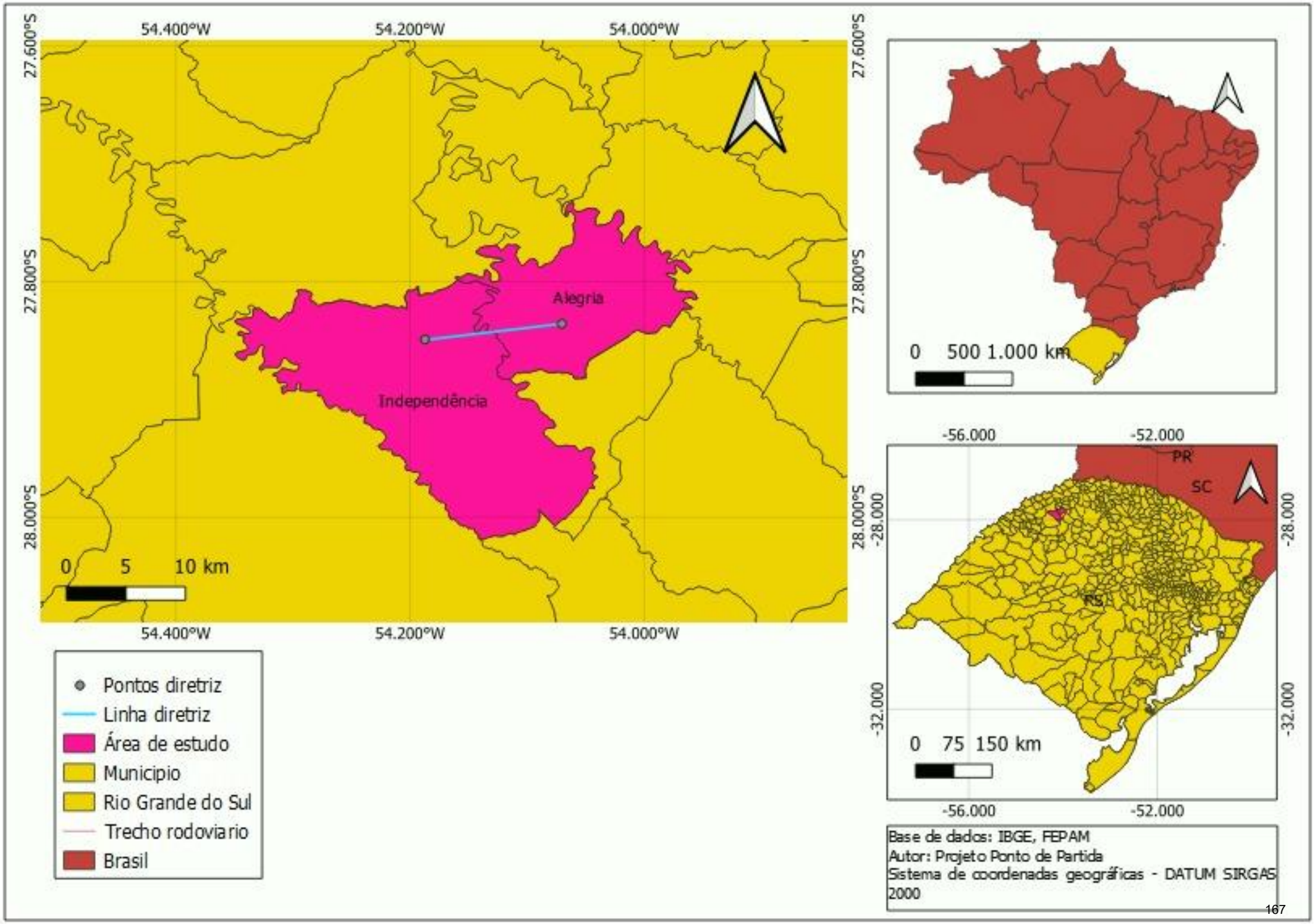
3.2 Quadro de Origem e Destino 22

3.3 Esquema Linear de Distribuição dos Materiais 24

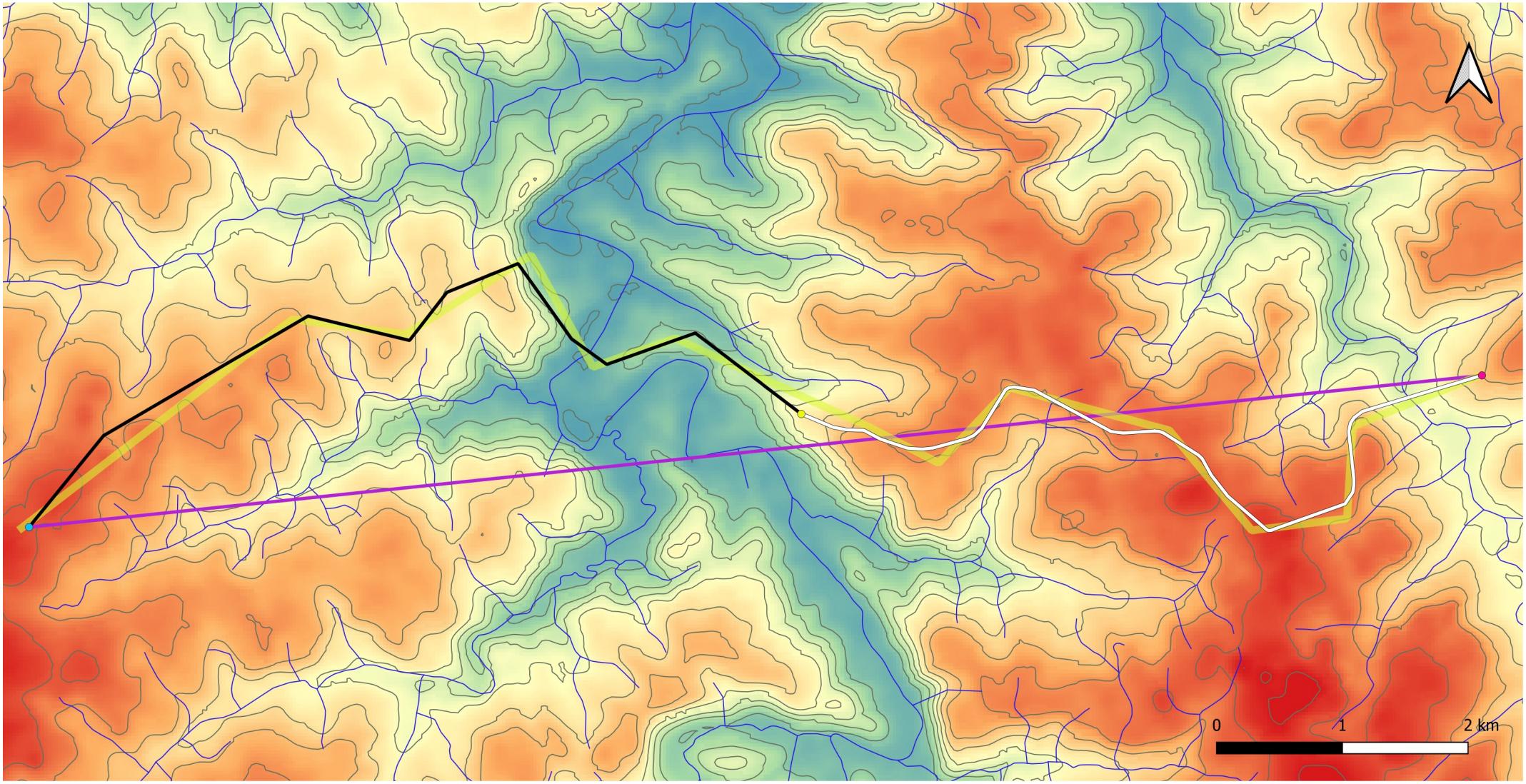
APRESENTAÇÃO

1 APRESENTAÇÃO

1.1 Mapa de Situação


54.400°W
54.200°W
54.000°W
27.600°S
27.800°S
28.000°S
Alegria
Independência
0 5 10 km
0 500 1.000 km
-56.000
-52.000
-28.000
-32.000
PR
SC
RS
0 75 150 km
Pontos diretriz
Linha diretriz
Área de estudo
Municipio
Rio Grande do Sul
Trecho rodoviario
Brasil
Base de dados: IBGE, FEPAM
Autor: Projeto Ponto de Partida
Sistema de coordenadas geográficas - DATUM SIRGAS 2000

1.2 Mapa de Localização



- Independência
- Ponto de Encontro
- Alegria - Ponto de Partida Lote 2
- Traçado Lote 1
- Traçado Lote 2
- Plano de Voo
- Diretriz
- Hidrografia
- Curvas de Nível

Elevação

400

200

Base de Dados: IBGE, FEPAM
Autor: Projeto Ponto de Partida / Equipe AE2 - EPTG Sul
Sistrema de Coordenadas Geográficas - Datum: SIRGAS 20000

1.3 Quadro de Características Técnicas

CARACTERÍSTICAS TÉCNICAS

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 7+004,30

CARACTERÍSTICAS GERAIS

DE PROJETO		PLANIALTIMETRICAS				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	7004,299	FAIXA DOM. (LE/LD+OFF)	25 / 25 + 5	SUPERELEVAÇÃO MÁX.		TALUDE CORTE 3ª CAT.	

PLANIMETRIA

DISTRIBUIÇÃO DE CURVAS

T	RAIOS (m)	FREQ.	Dc (m)	%	Lc1+Lc2 (m)	%
R	R mínimo = 125,000	1	36,732	0,52	70,000	1,00
A	125,000 < R ≤ 100,000					
N	100,000 < R ≤ 200,000	11	725,798	10,36	1420,000	20,27
S	200,000 < R ≤ 300,000	2	140,486	2,01	290,000	4,14
I	300,000 < R ≤ 500,000					
Ç	R > 500,000					
.	TOTAL EM TRANSIÇÃO	14	903,015	12,89	1780,000	25,41

S	RAIOS (m)	FREQ.	Dc (m)	%
I	R mínimo = 1000000,000			
M	1000000,000 < R ≤ 500,000			
P	500,000 < R ≤ 700,000			
L	700,000 < R ≤ 1000,000			
E	1000,000 < R ≤ 1500,000			
S	R > 1500,000			
	TOTAL SIMPLES			

TOTAL EM CURVA	14	903,015	12,89	3586,030	51,20

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
162,385	2,32	664,466	9,49	4321,284	61,69

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
2,854	0,408	5426,749	29,070

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1	851,557	12,16			0 < i ≤ 1		
1 < i ≤ 2					1 < i ≤ 2		
2 < i ≤ 3	480,000	6,85			2 < i ≤ 3	1482,355	21,16
3 < i ≤ 4	86,764	1,24			3 < i ≤ 4	343,771	4,91
4 < i ≤ 5					4 < i ≤ 5		
5 < i ≤ 6					5 < i ≤ 6	125,553	1,79
6 < i ≤ 7	105,000	1,50			6 < i ≤ 7		
7 < i ≤ 8	660,000	9,42			7 < i ≤ 8	598,855	8,55
8 < i ≤ 9					8 < i ≤ 9	370,444	5,29
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	2183,321	31,17			TOTAL	2920,978	41,70

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
5104,299	72,87	1030,000	14,71	870,000	12,42	1900,000	27,13

PARÂMETROS K MÍNIMOS ADOTADOS

EM CURVA CÔNCAVA	24,695	EM CURVA CONVEXA	20,850

PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
13000,425	185,61	14578,296	208,13	13789,360	196,87

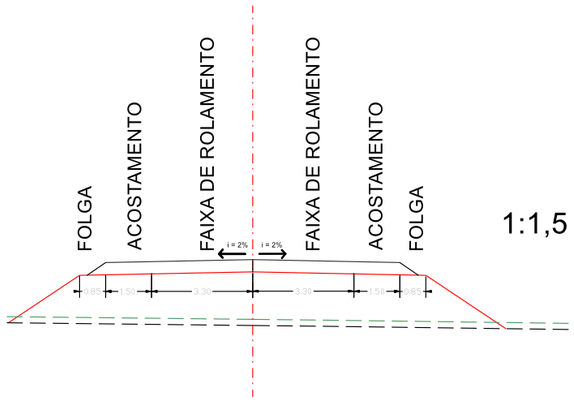
CARACTERÍSTICAS OPERACIONAIS

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

2 PROJETO GEOMÉTRICO

2.1 Seções Transversais Tipo

SEÇÃO DE ATERRO



1:1,5

EIXO



UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

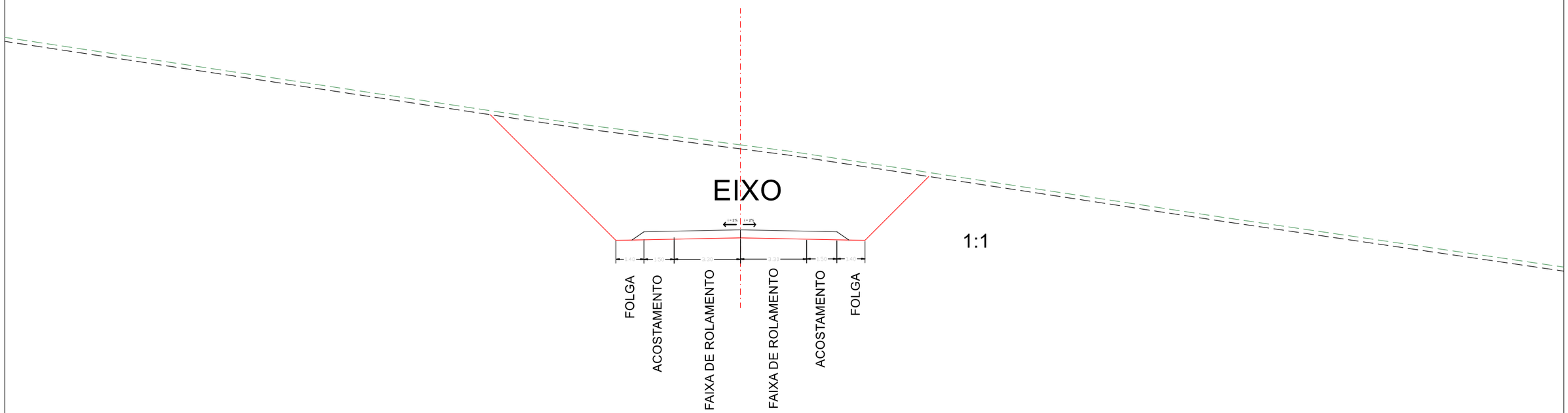
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

Código: 01/07

SEÇÃO DE CORTE





UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

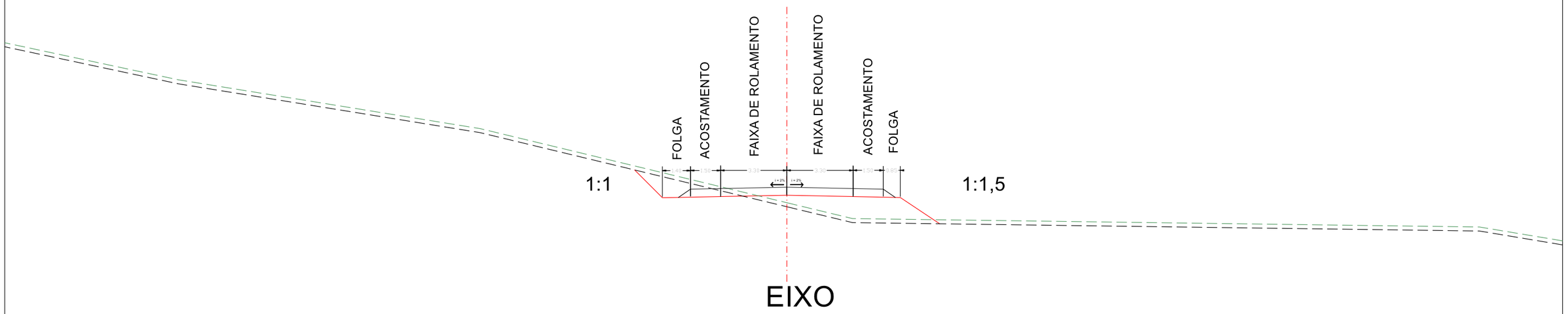
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

Código: 02/07

SEÇÃO MISTA





UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

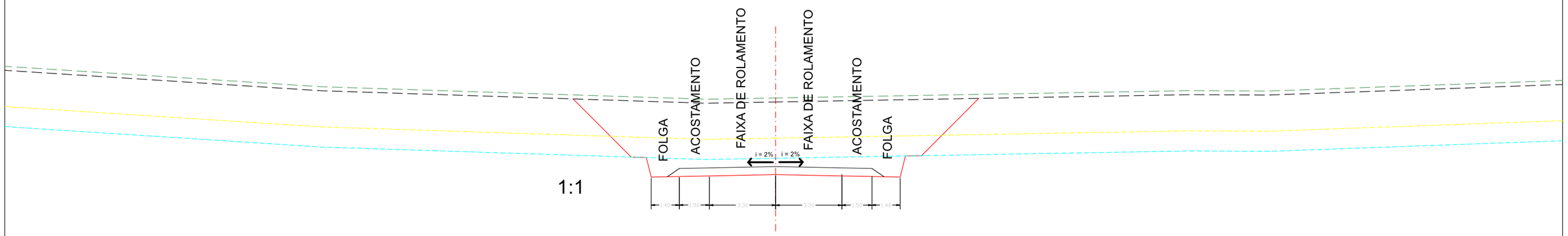
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

Código: 03/07

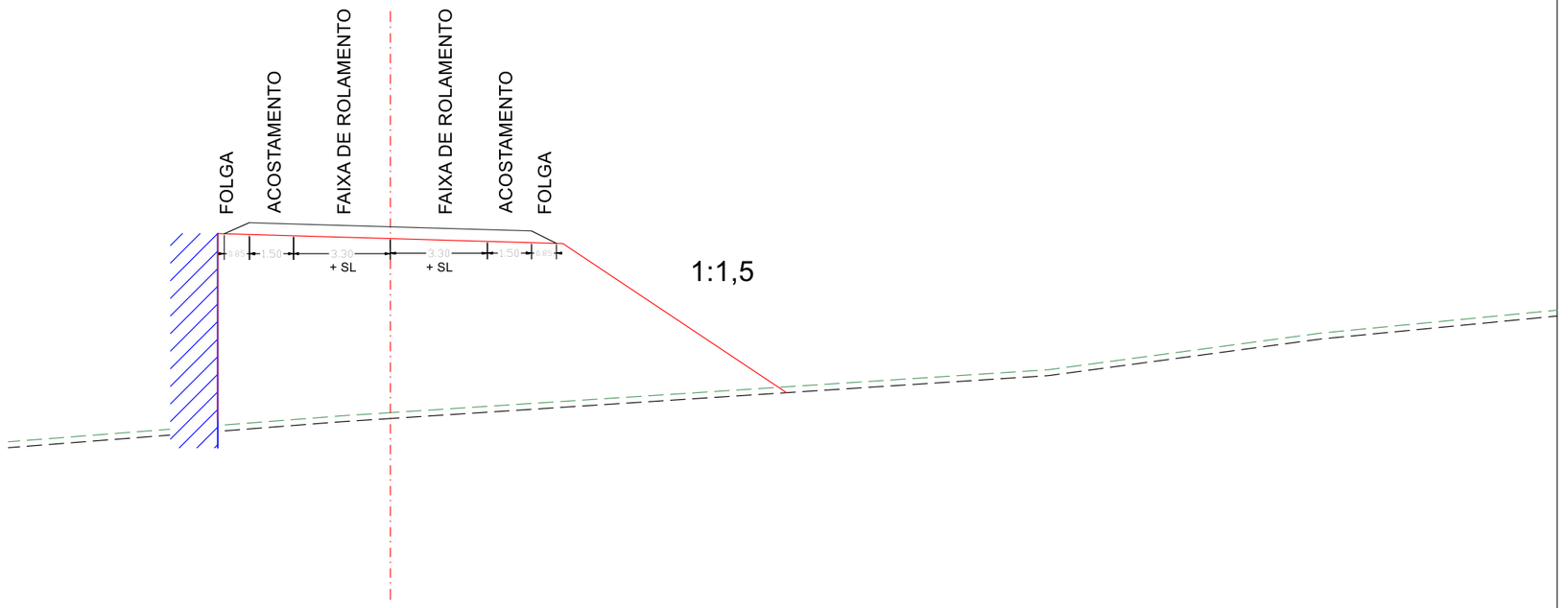
SEÇÃO COM CORTE EM ROCHA



EIXO

	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 2 Data: 04/05/2022	
Escala: 1:4000	SEÇÕES TRANSVERSAIS TIPO	Código: 04/07

SEÇÃO DE ATERRO COM MURO DE ARRIMO LE



UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

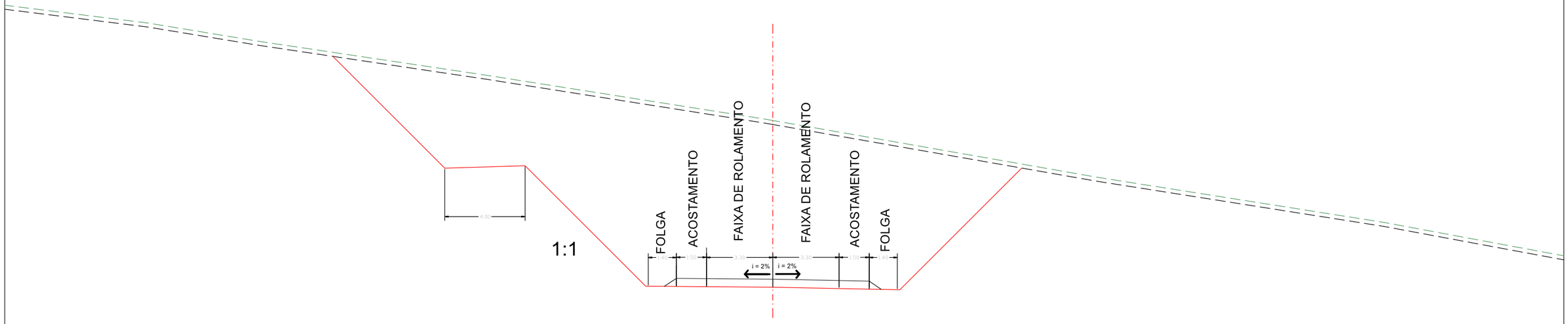
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

Código: 05/07

SEÇÃO DE CORTE COM BANQUETAS



UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

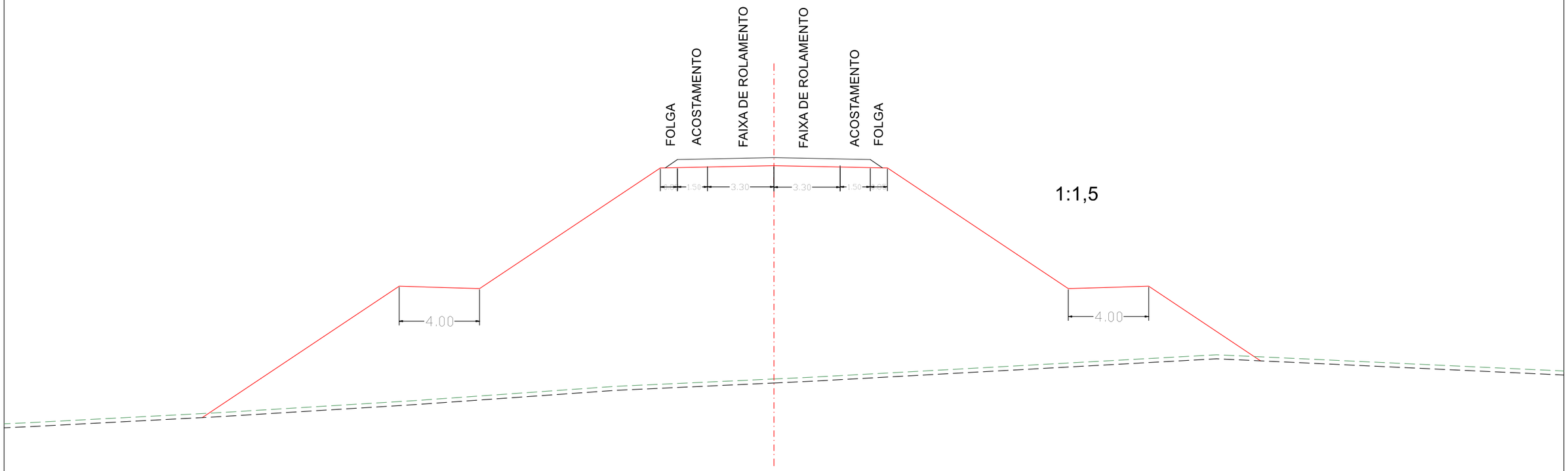
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

Código: 06/07

SEÇÃO DE ATERRO COM BANQUETAS



EIXO



UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

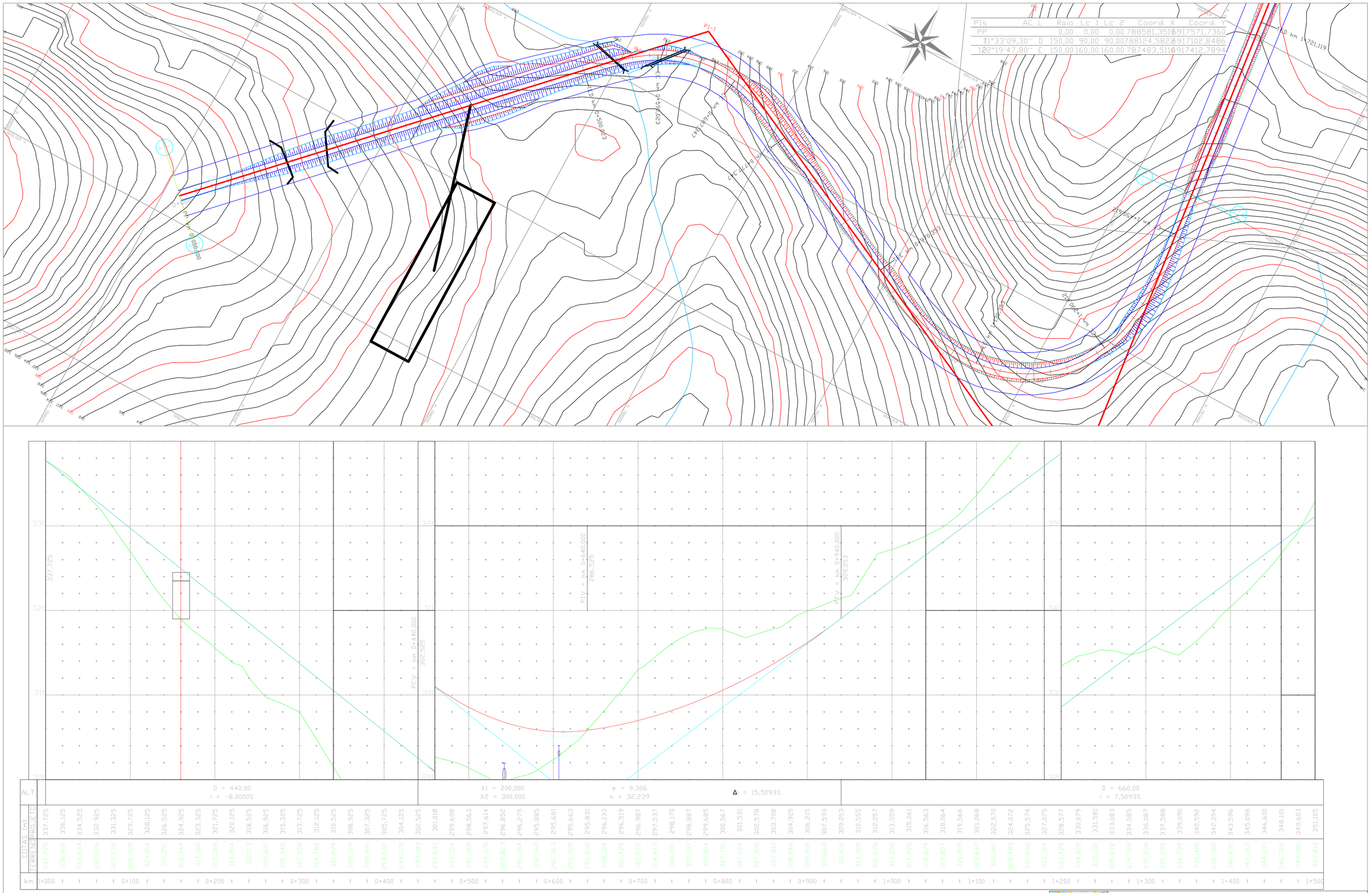
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

Escala: 1:4000

SEÇÕES TRANSVERSAIS TIPO

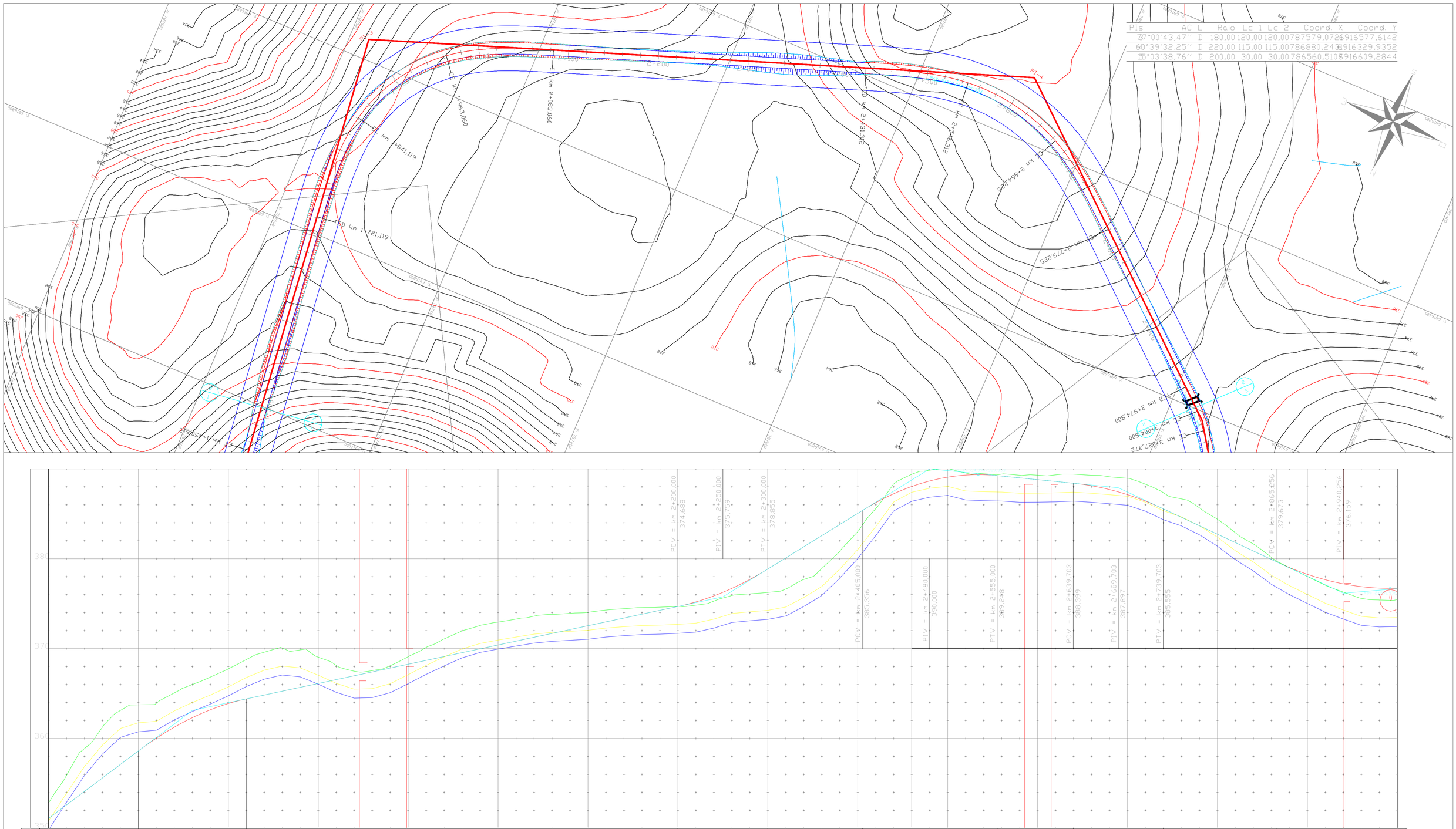
Código: 07/07

2.2 Linha Geral

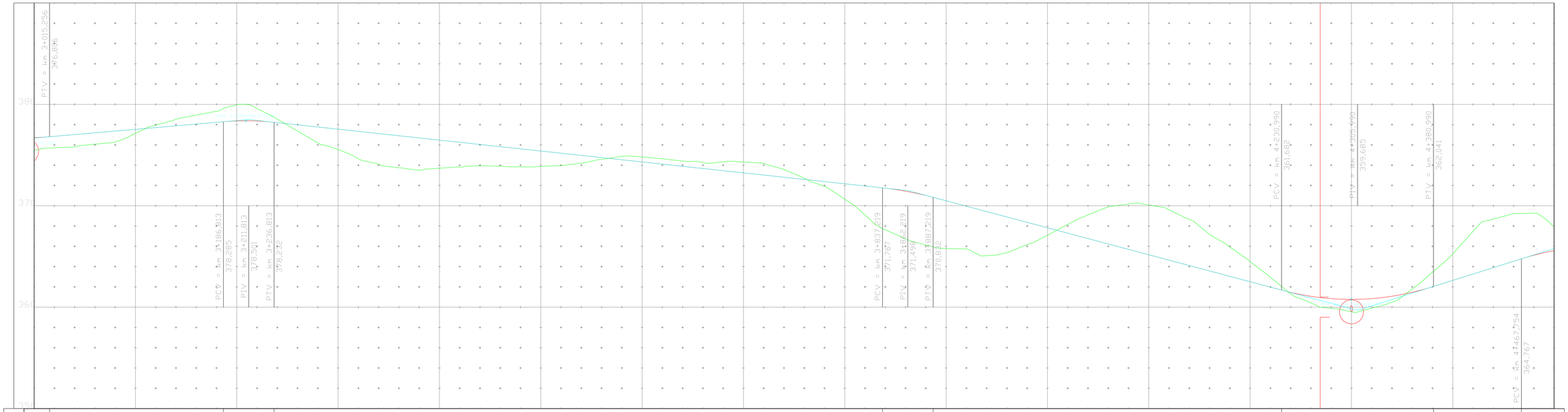


UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

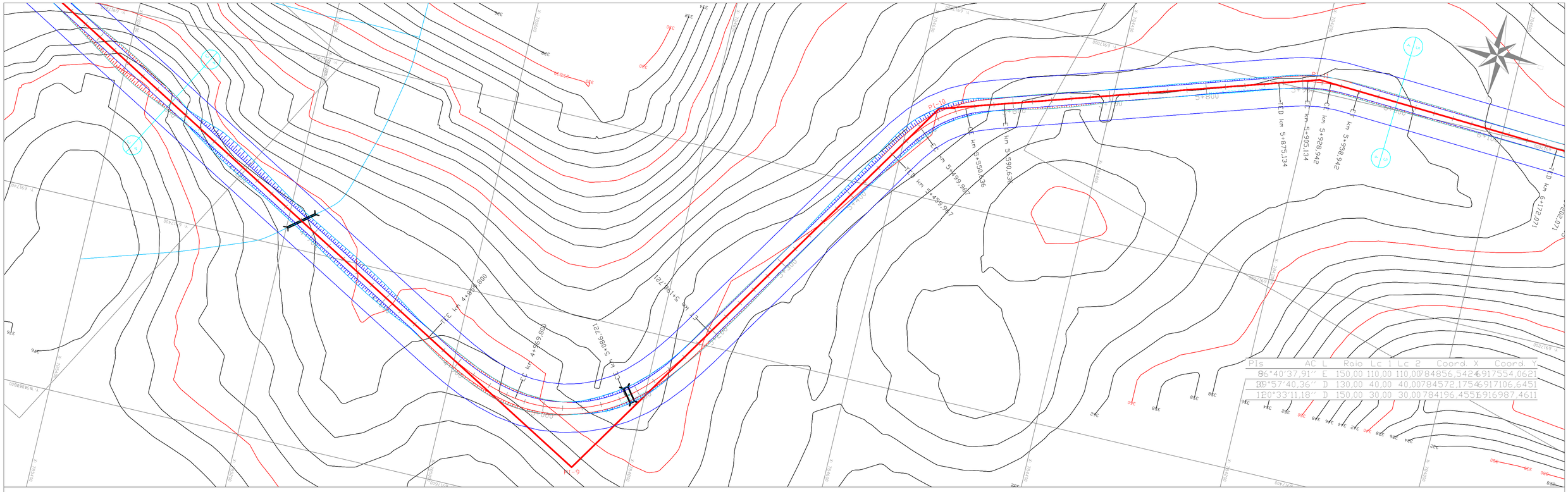
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

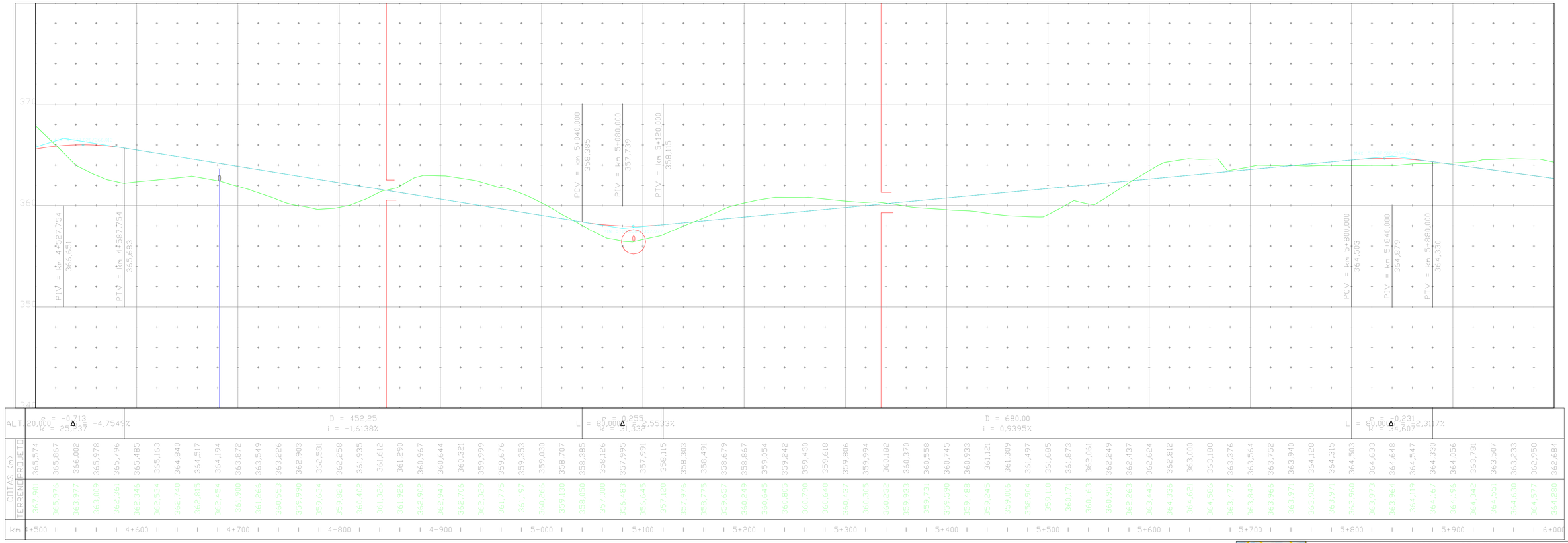

PIs | AC | L | Raio | Lc 1 | Lc 2 | Coord. X | Coord. Y
1 | 37°00'43,47" | D | 180,00 | 120,00 | 120,00 | 786757,072 | 9165577,6142
2 | 60°39'32,25" | D | 220,00 | 115,00 | 115,00 | 786880,243 | 9163293,9352
3 | 55°03'38,76" | D | 200,00 | 30,00 | 30,00 | 786560,510 | 9166092,2844
PI-1
PI-2
PI-3
PI-4
PI-5
PI-6
PI-7
PI-8
PI-9
PI-10
PI-11
PI-12
PI-13
PI-14
PI-15
PI-16
PI-17
PI-18
PI-19
PI-20
PI-21
PI-22
PI-23
PI-24
PI-25
PI-26
PI-27
PI-28
PI-29
PI-30
PI-31
PI-32
PI-33
PI-34
PI-35
PI-36
PI-37
PI-38
PI-39
PI-40

PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
1	55°03'38,76"	D	200,00	30,00	30,00	786560,5106	6916609,2844
2	85°05'17,94"	E	150,00	30,00	30,00	786341,8606	6916935,9540
3	74°52'45,45"	E	125,00	40,00	40,00	786018,9631	6917130,8617
4	92°52'45,98"	D	125,00	35,00	35,00	785658,8999	6917107,1784



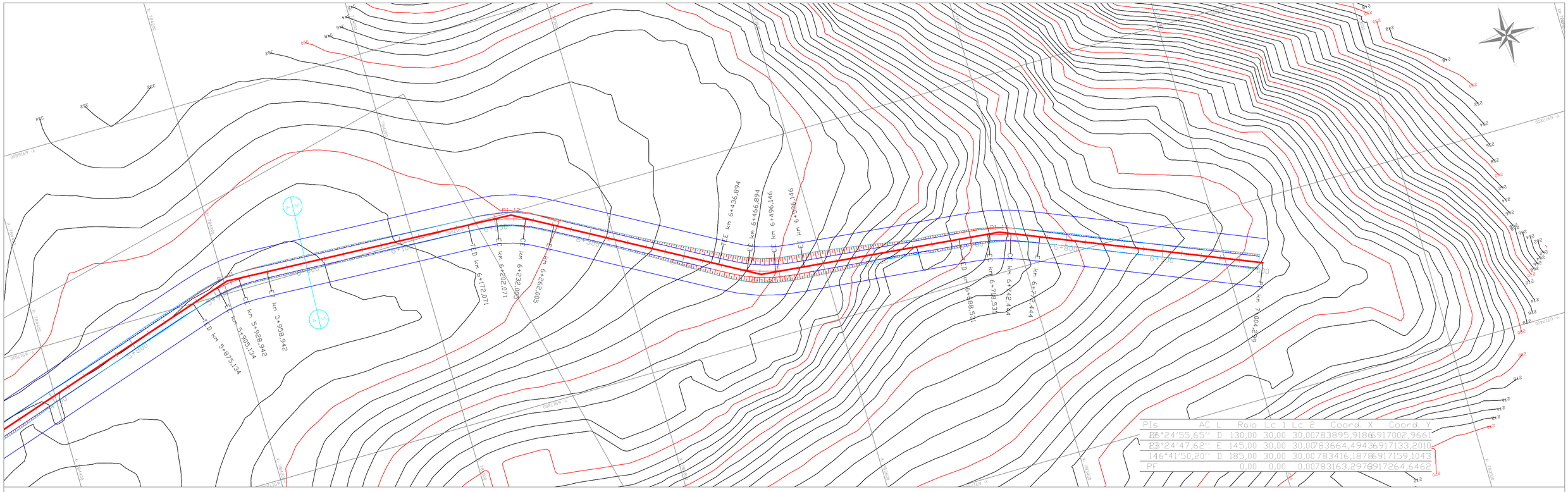
| | | |





UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

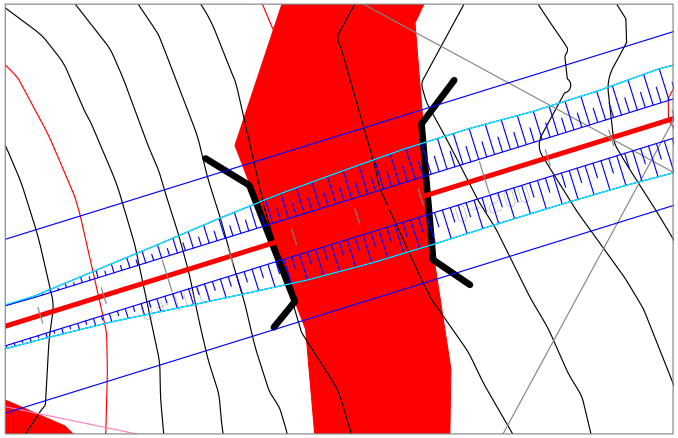
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

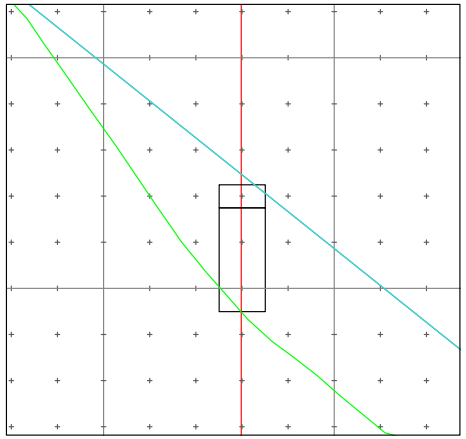


UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

2.3 Detalhamento do Projeto Planialtimétrico





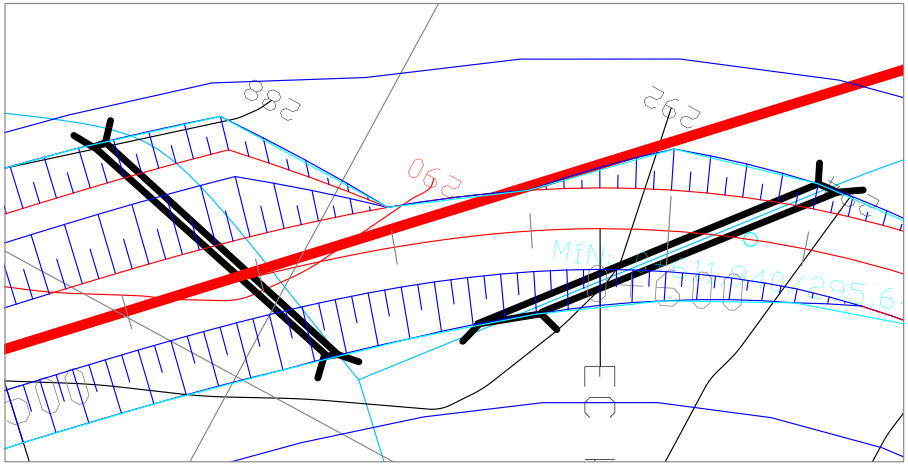
PASSAGEM SUPERIOR

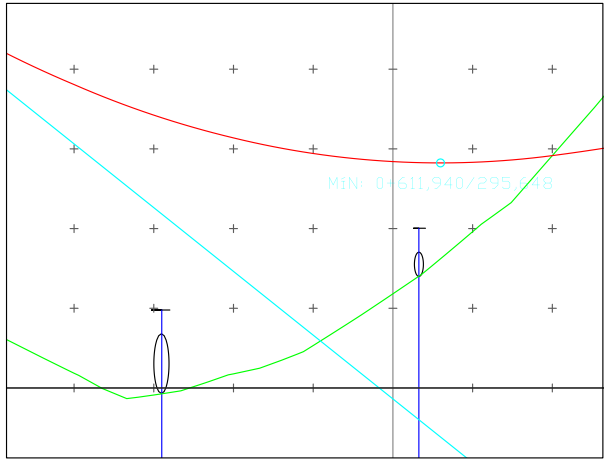
Solução para a passagem da via exisente
e da rodovia no mesmo local

Estaca: 0+160,00

Cota do terreno: 318,944

Cota do projeto: 324,925





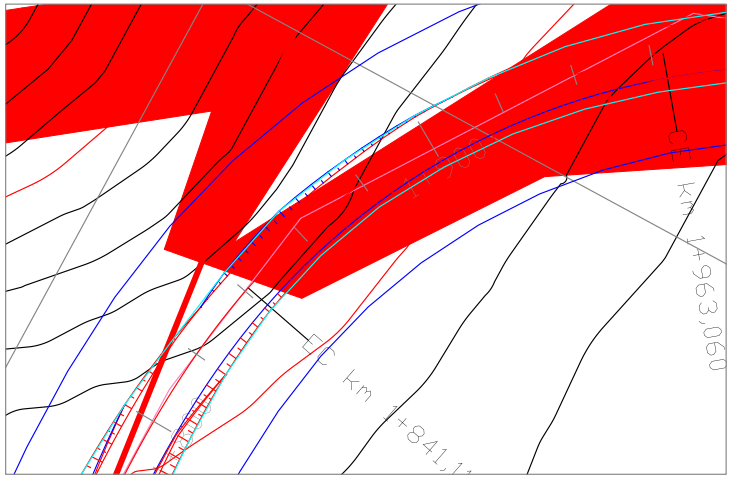
BUEIRO 1 e 2

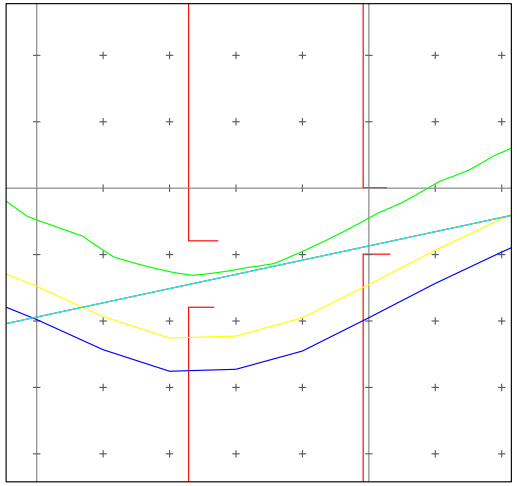
Bueiro com solução de projeto para córrego (esquerda) e bueiro com solução de projeto para córrego e ponto de cota mínima (direita)

Estaca: 0+542,001 (dir)
0+606,512 (esq)

Cota do terreno: 289,853 (esq)
e 289,853 (esq)

Cota do projeto: 296,786 (esq) e
295,655 (dir)





VIA EXISTENTE 1 e 2

Estaca: 1+845,741 (esq) e 1+900,00 (dir)

Cota do terreno: 367,393 (esq) e 369,005 (dir)

Cota do projeto: 367,009 (esq) e 368,225 (dir)

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

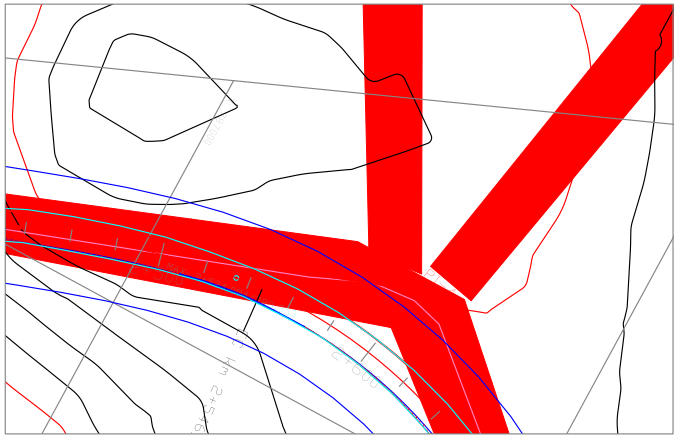
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

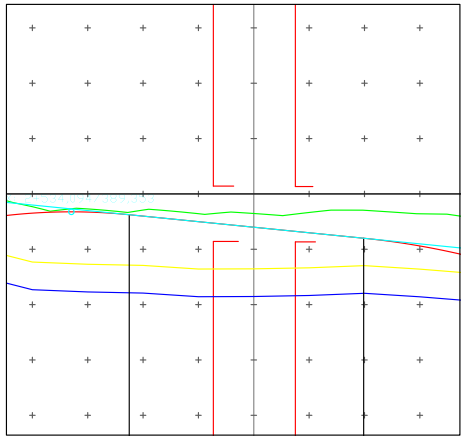
Escala: 1:2000

DETALHAMENTO DE INTERFERÊNCIAS

Código: 01/04

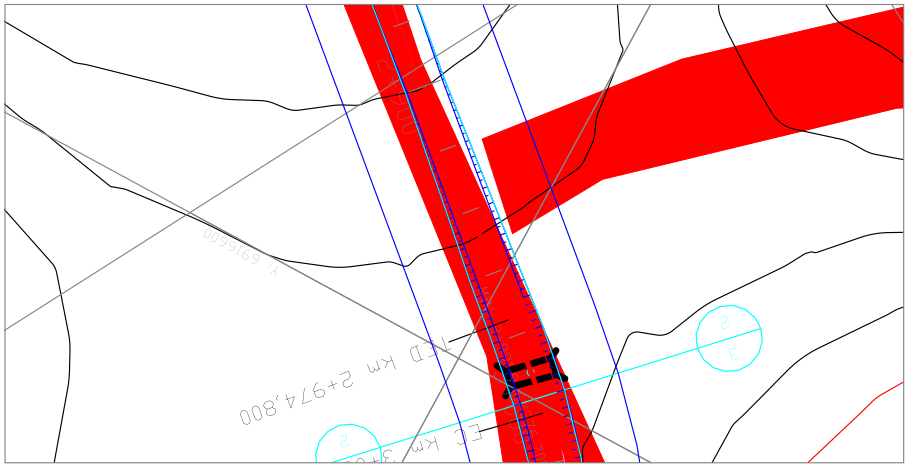
Eixo1-PG_01

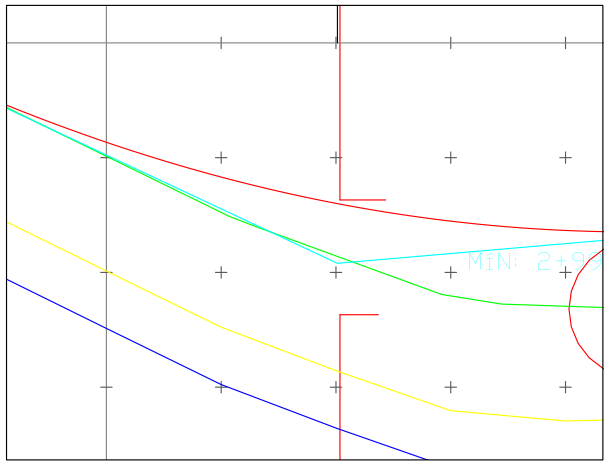




VIA EXISTENTE 3 e 4

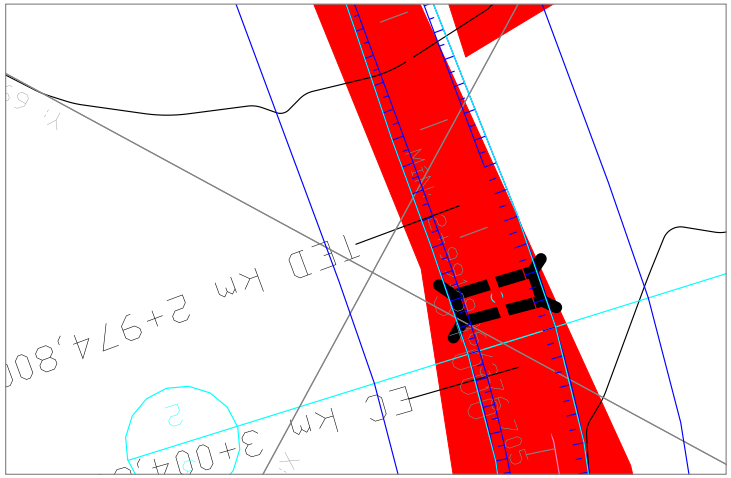
Estaca: 2 +585,393 (esq) e 2+615,022 (dir)
Cota do terreno: 389,293 (esq) e 389,271 (dir)
Cota do projeto: 388,943 (esq) e 388,646 (dir)

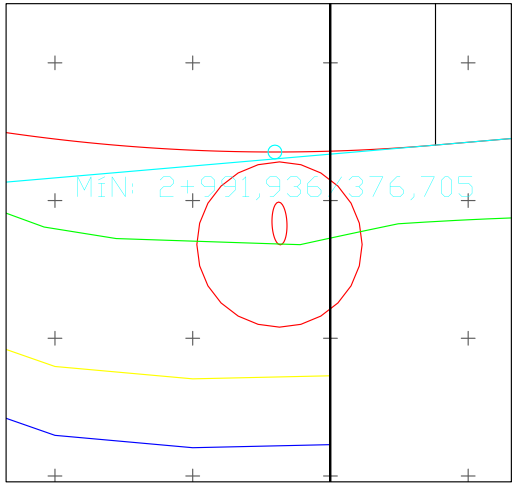




VIA EXISTENTE 5

Estaca: 2+940,00
Cota do terreno: 376,263
Cota do projeto: 377,191





BUEIRO 3

Bueiro com solução de projeto para ponto de cota mínima

Estaca: 2+991,936
Cota do terreno: 375,371
Cota do projeto: 376,705

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

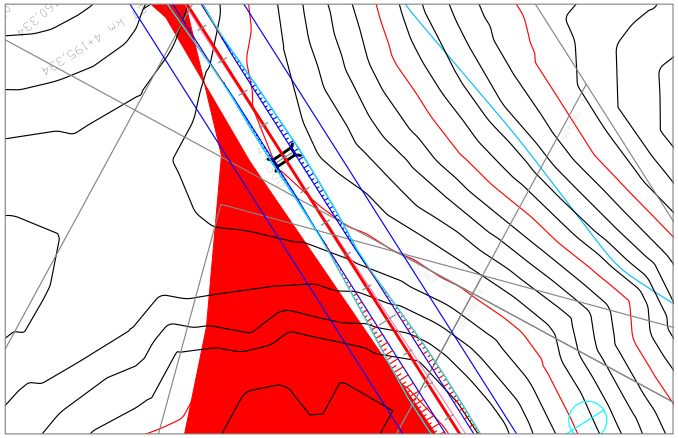
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

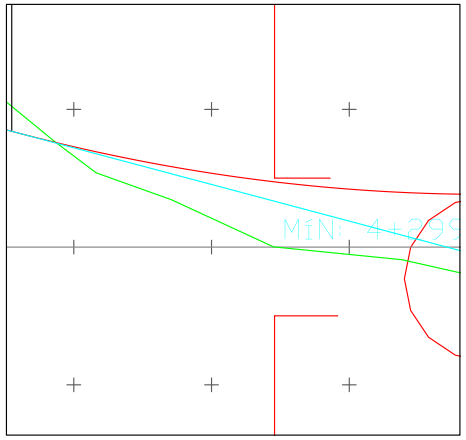
Escala: 1:2000

DETALHAMENTO DE INTERFERÊNCIAS

Código: 02/04

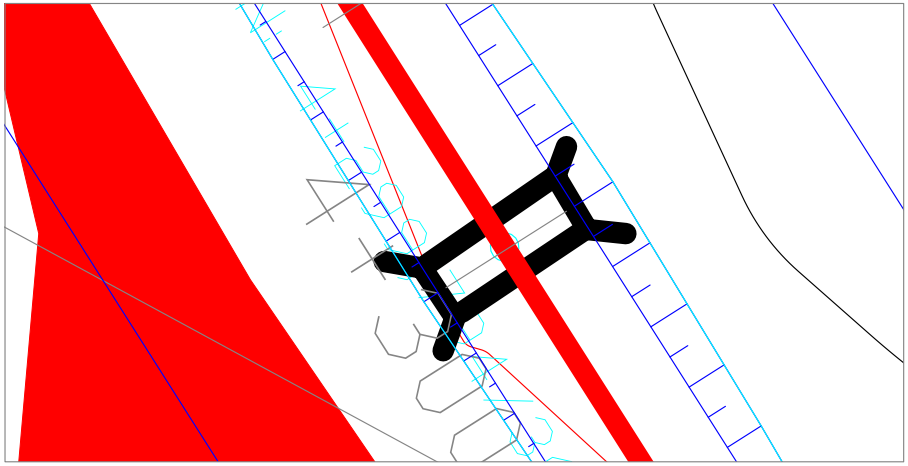
Eixo1-PG_01

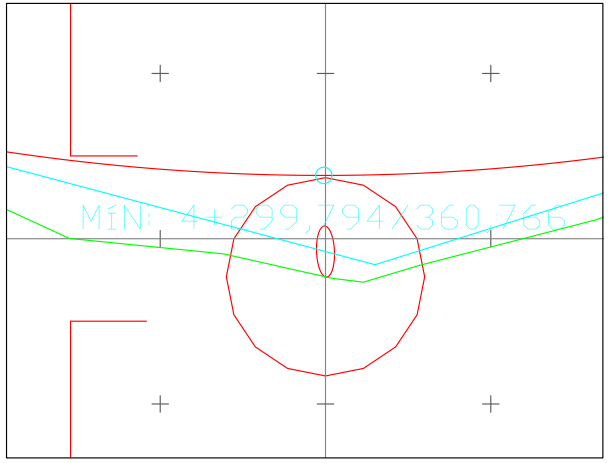




VIA EXISTENTE 6

Estaca: 4+269,151
Cota do terreno: 360,002
Cota do projeto: 360,948



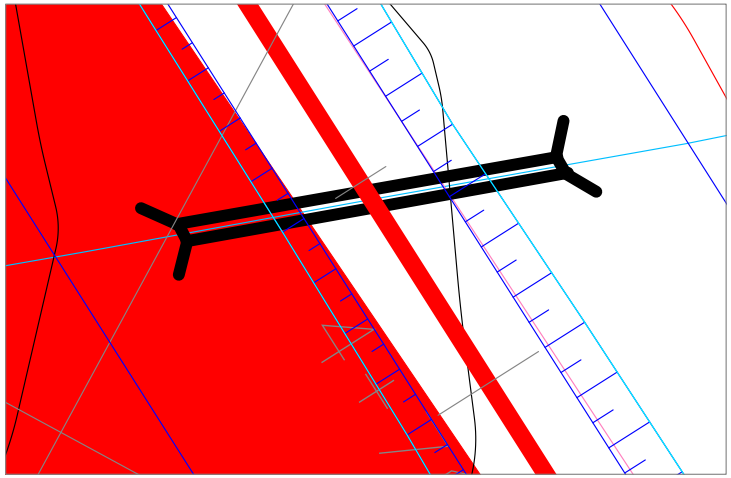


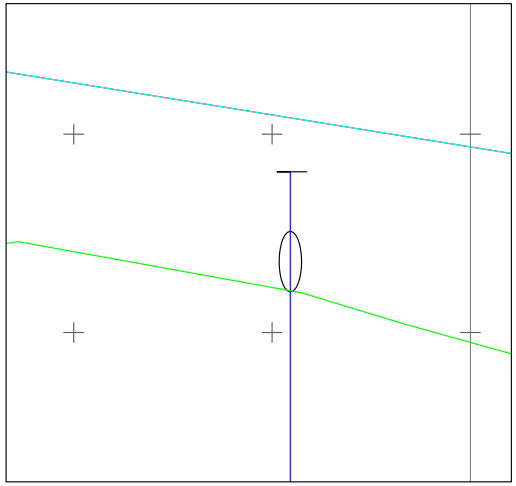
BUEIRO 4

Bueiro com solução de projeto para ponto de cota mínima

Estaca: 4+299,794

Cota do terreno: 359,539
Cota do projeto: 360,766





BUEIRO 5

Bueiro com solução de projeto para córrego

Estaca: 4+681,833
Cota de terreno: 362,421
Cota do projeto: 364,165

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

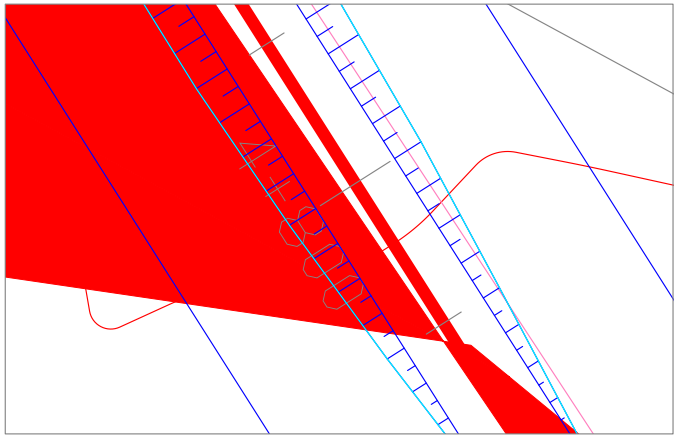
Rodovia: PPP - UFRGS - 2021/2
Trecho: Lote 2
Data: 04/05/2022

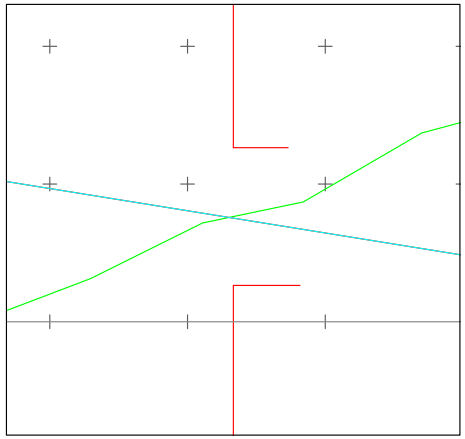
Escala: 1:2000

DETALHAMENTO DE INTERFERÊNCIAS

Código: 03/04

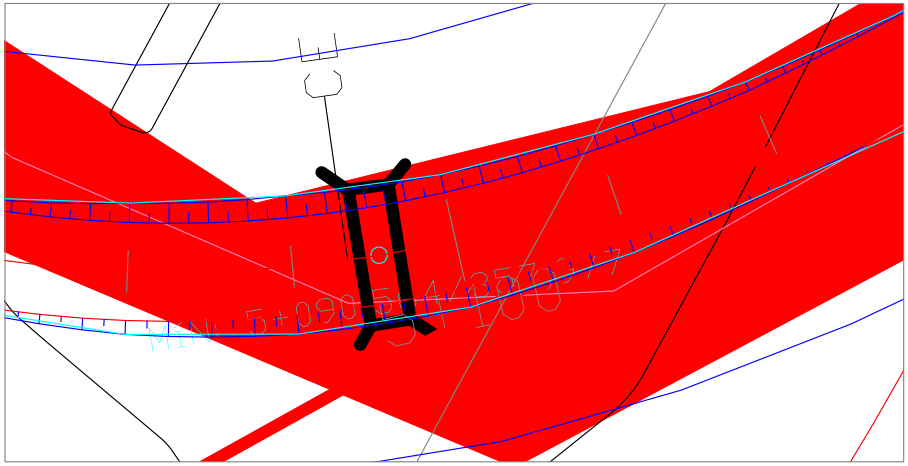
Eixo1-PG_01

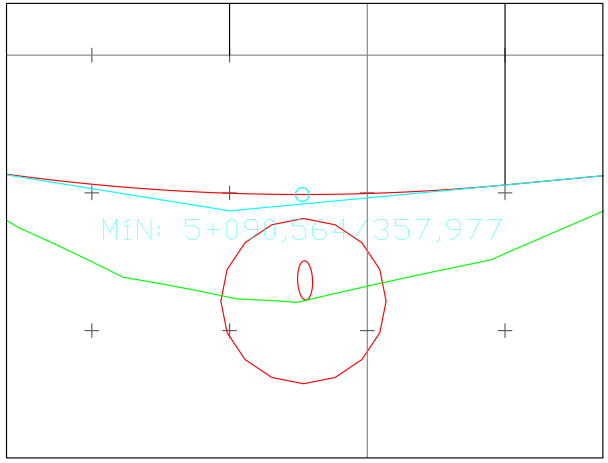




VIA EXISTENTE 7

Estaca: 4+846,653
Cota do terreno: 361,528
Cota do projeto: 361,505



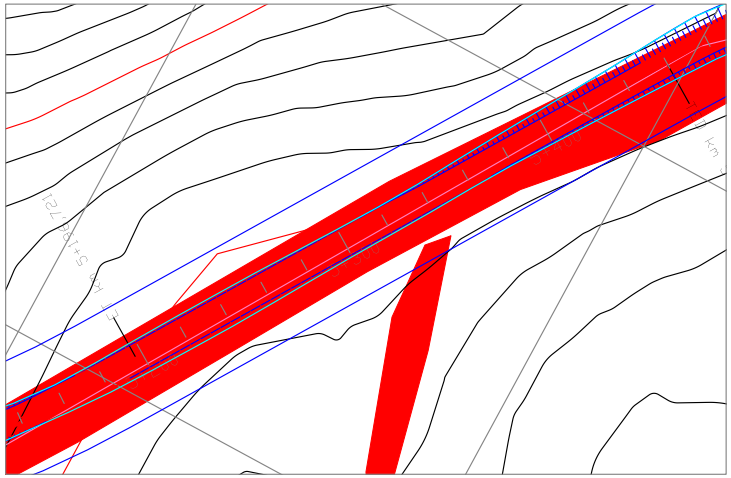


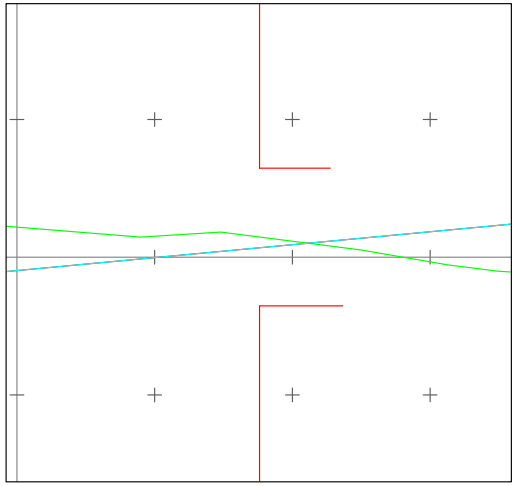
BUEIRO 6

Bueiro com solução de projeto para ponto de cota mínima

Estaca: 5+090,564

Cota do terreno: 356,429
Cota do projeto: 357,977





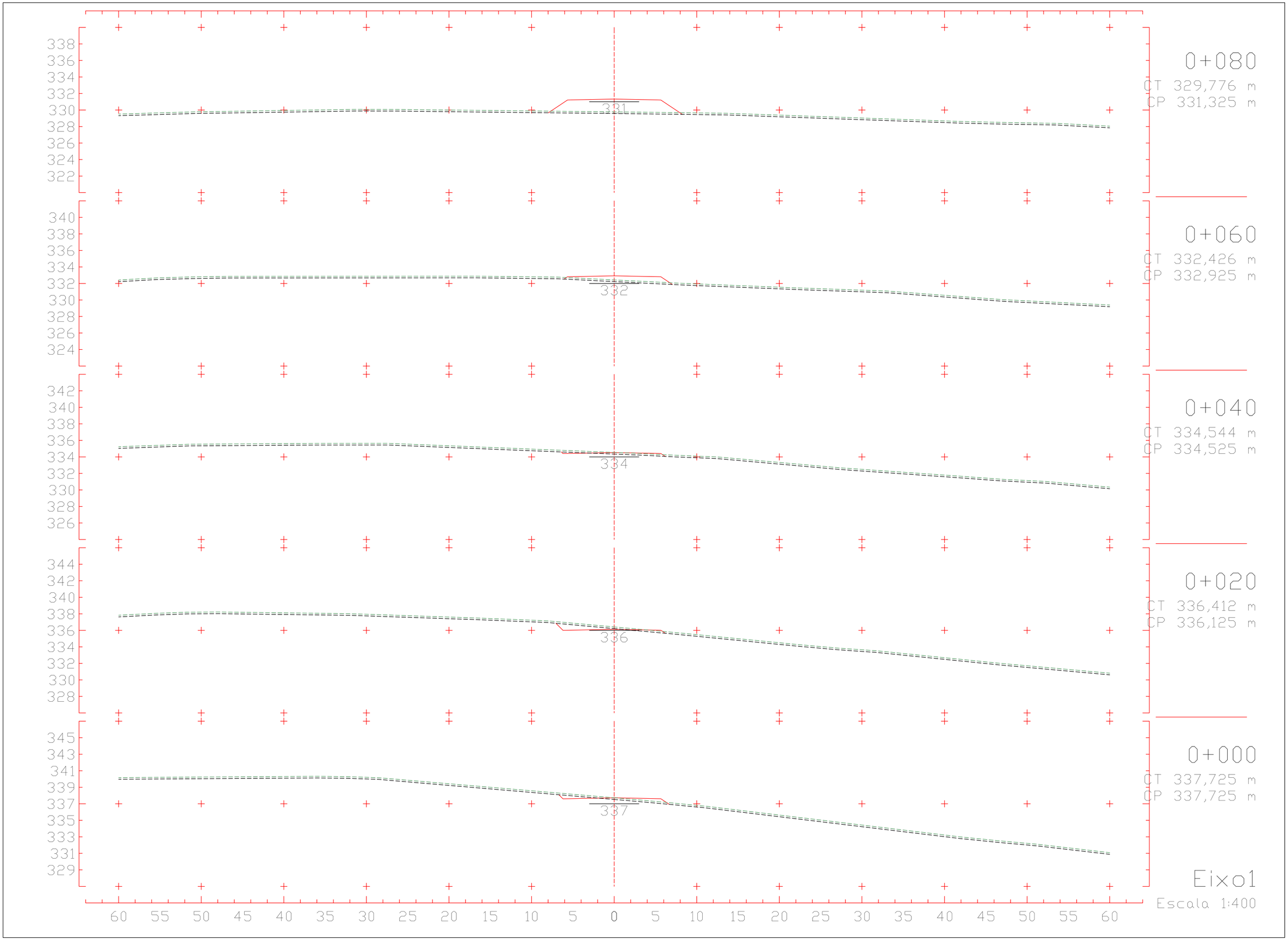
VIA EXISTENTE 8

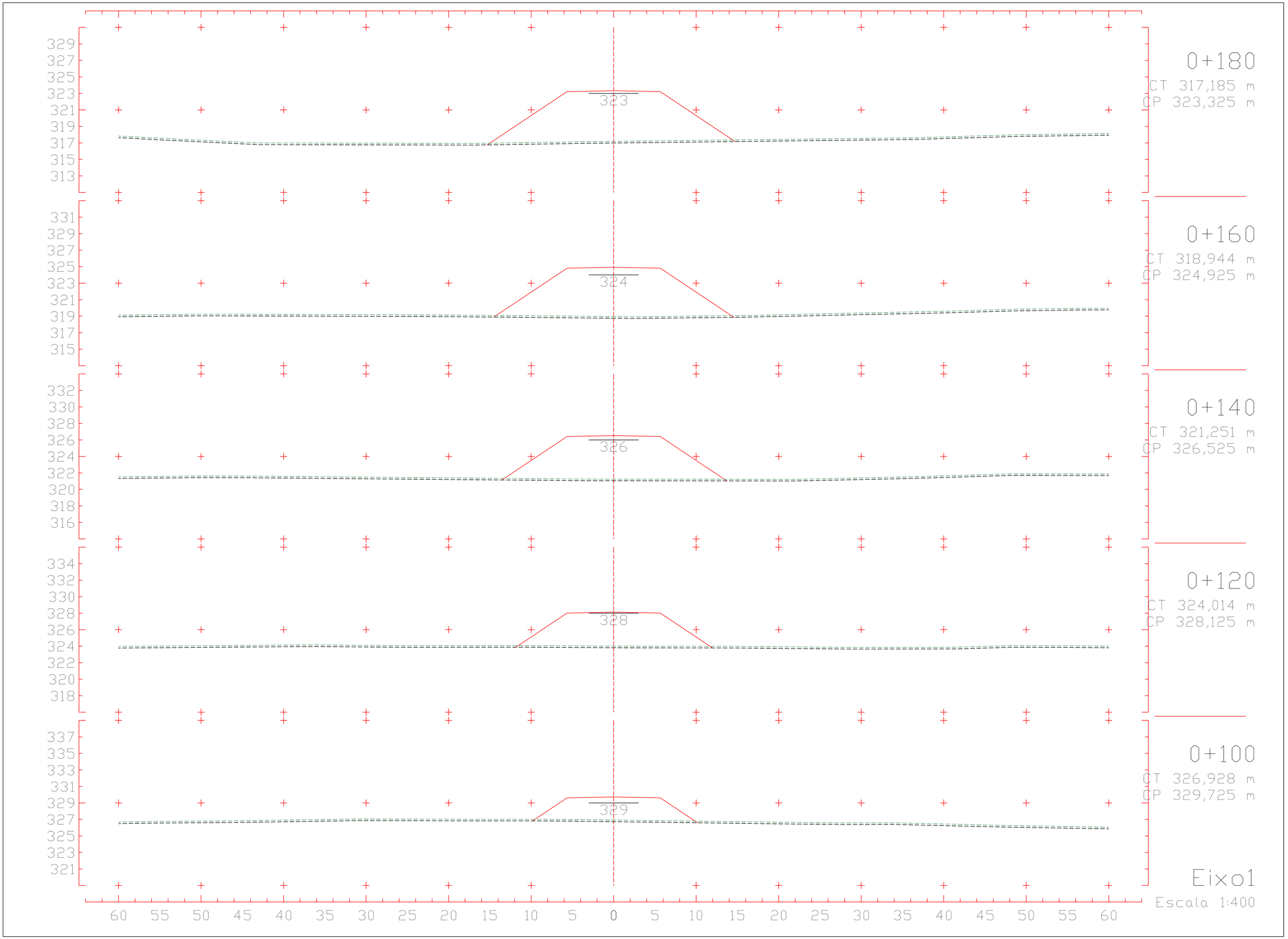
Estaca: 5+335,231
Cota do terreno: 360,293
Cota do projeto: 360,137

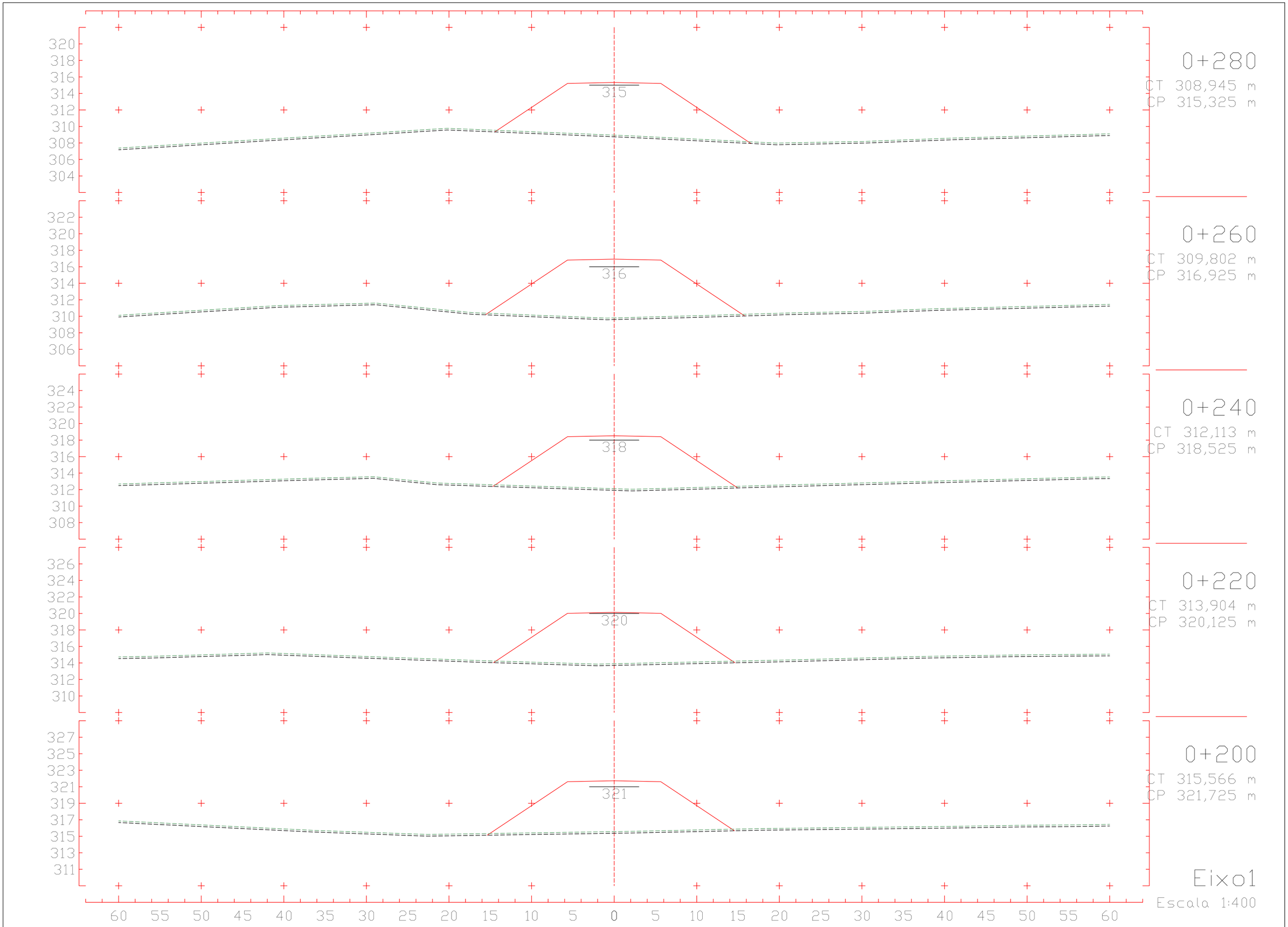
EPTG SUL	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN Rodovia: PPP - UFRGS - 2021/2 Trecho: Lote 2 Data: 04/05/2022	
Escala: 1:2000	DETALHAMENTO DE INTERFERÊNCIAS	Código: 04/04

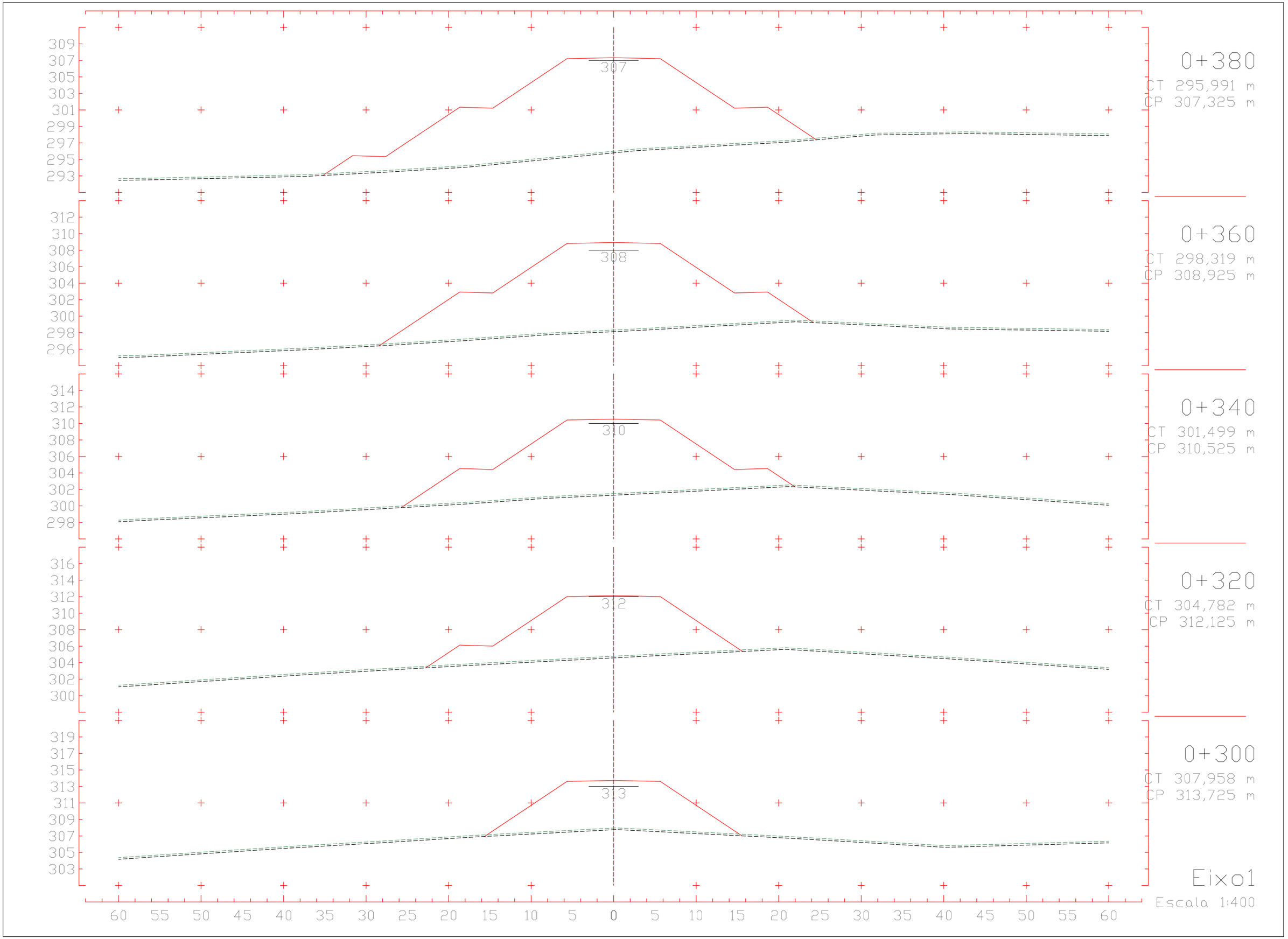
Eixo1-PG_01

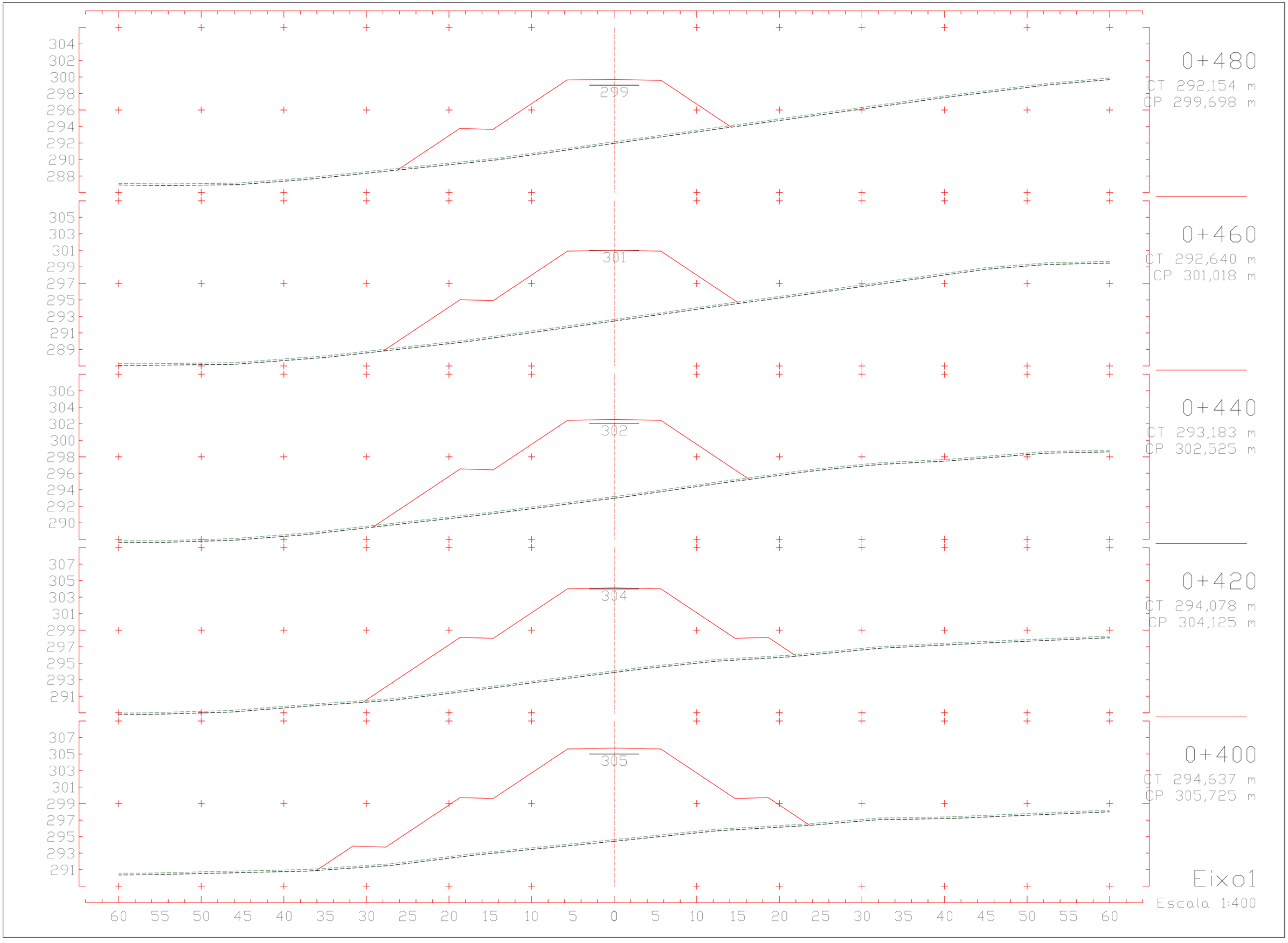
2.4 Seções Transversais

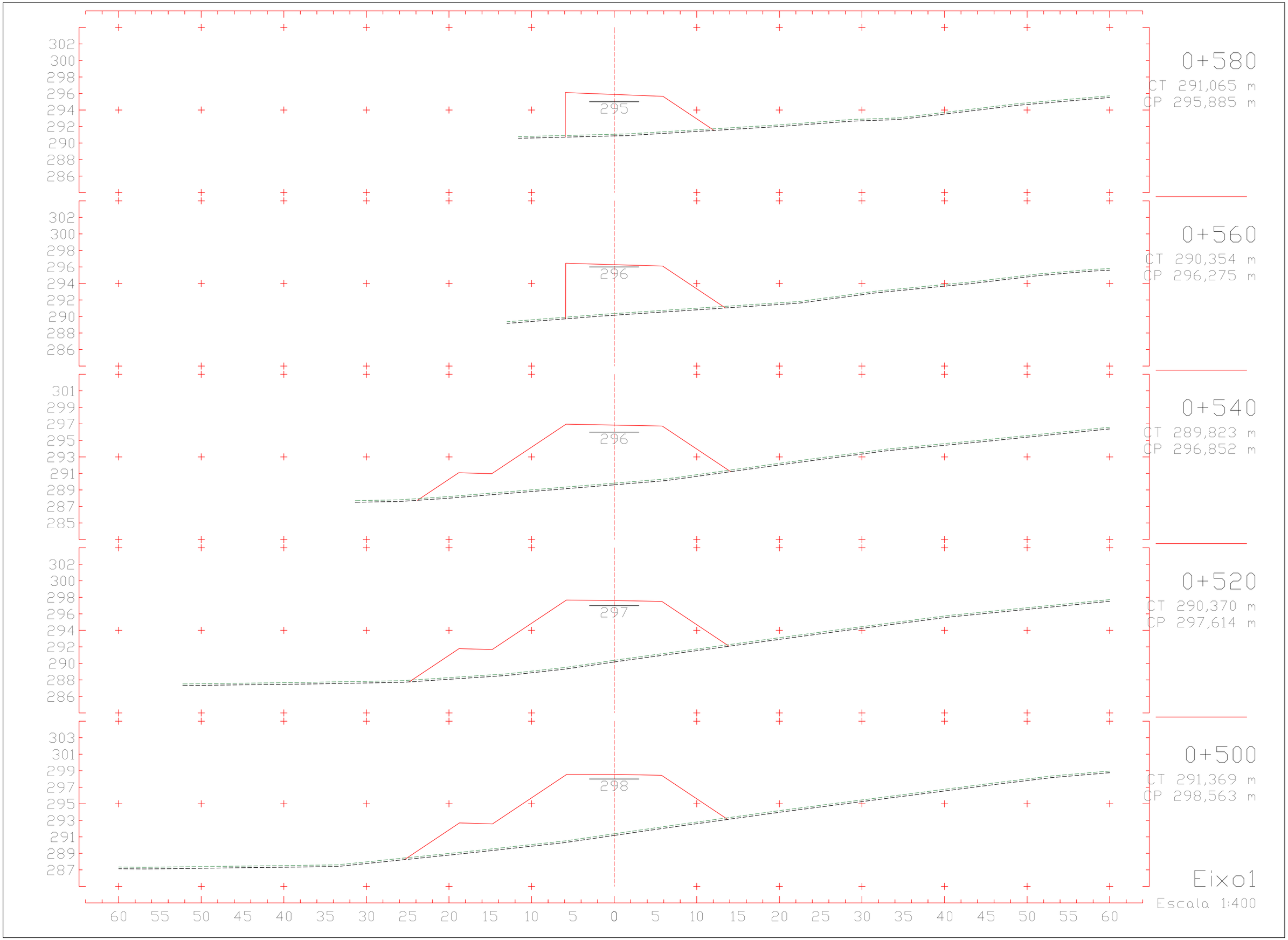

0+080
CT 329,776 m
CP 331,325 m
0+060
CT 332,426 m
CP 332,925 m
0+040
CT 334,544 m
CP 334,525 m
0+020
CT 336,412 m
CP 336,125 m
0+000
CT 337,725 m
CP 337,725 m
Eixo1
Escala 1:400

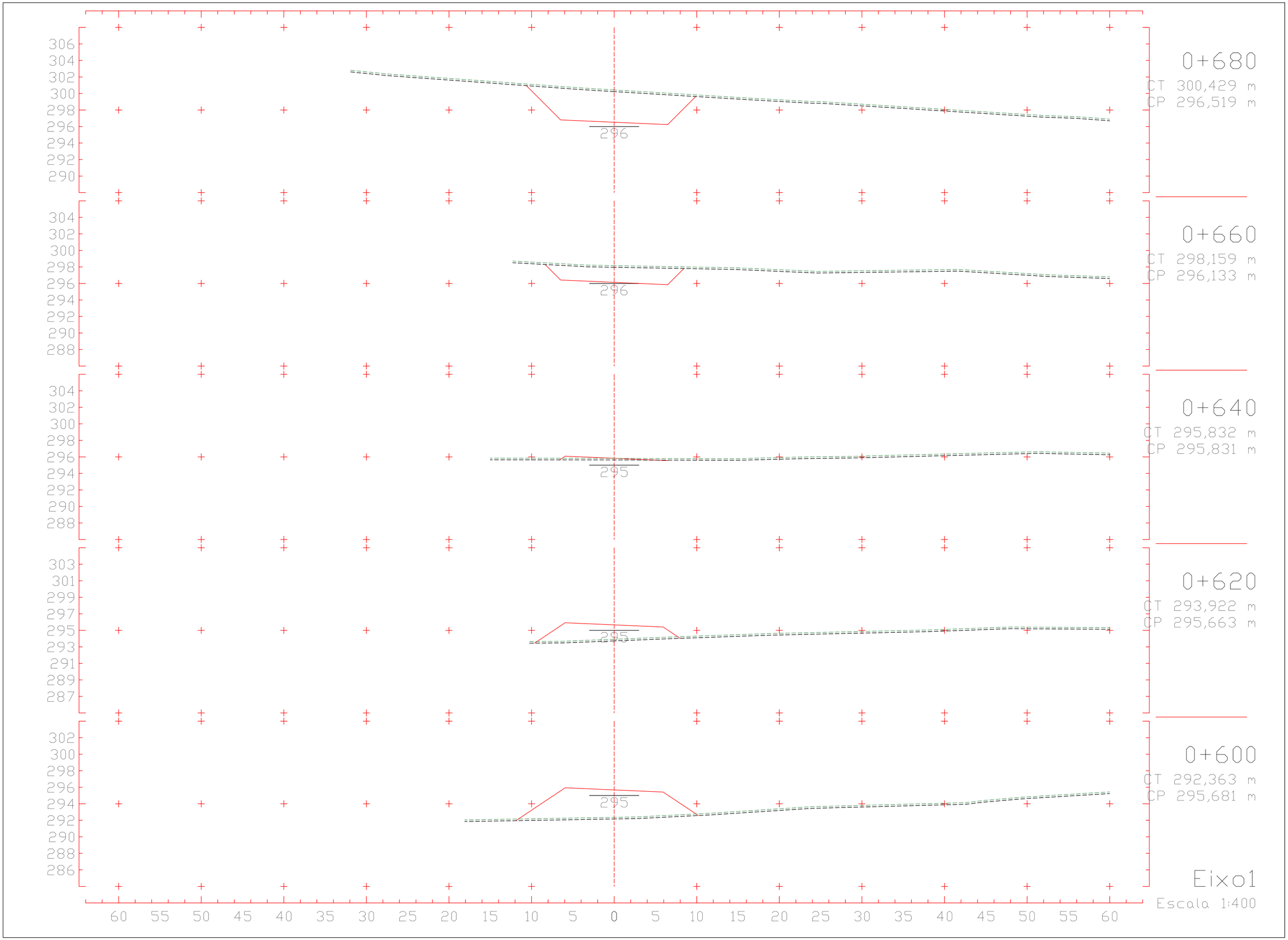

329
327
325
323
321
319
317
315
313
323
0+180
CT 317,185 m
CP 323,325 m
331
329
327
325
323
321
319
317
315
324
0+160
CT 318,944 m
CP 324,925 m
332
330
328
326
324
322
320
318
316
326
0+140
CT 321,251 m
CP 326,525 m
334
332
330
328
326
324
322
320
318
328
0+120
CT 324,014 m
CP 328,125 m
337
335
333
331
329
327
325
323
321
329
0+100
CT 326,928 m
CP 329,725 m
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
Eixo1
Escala 1:400

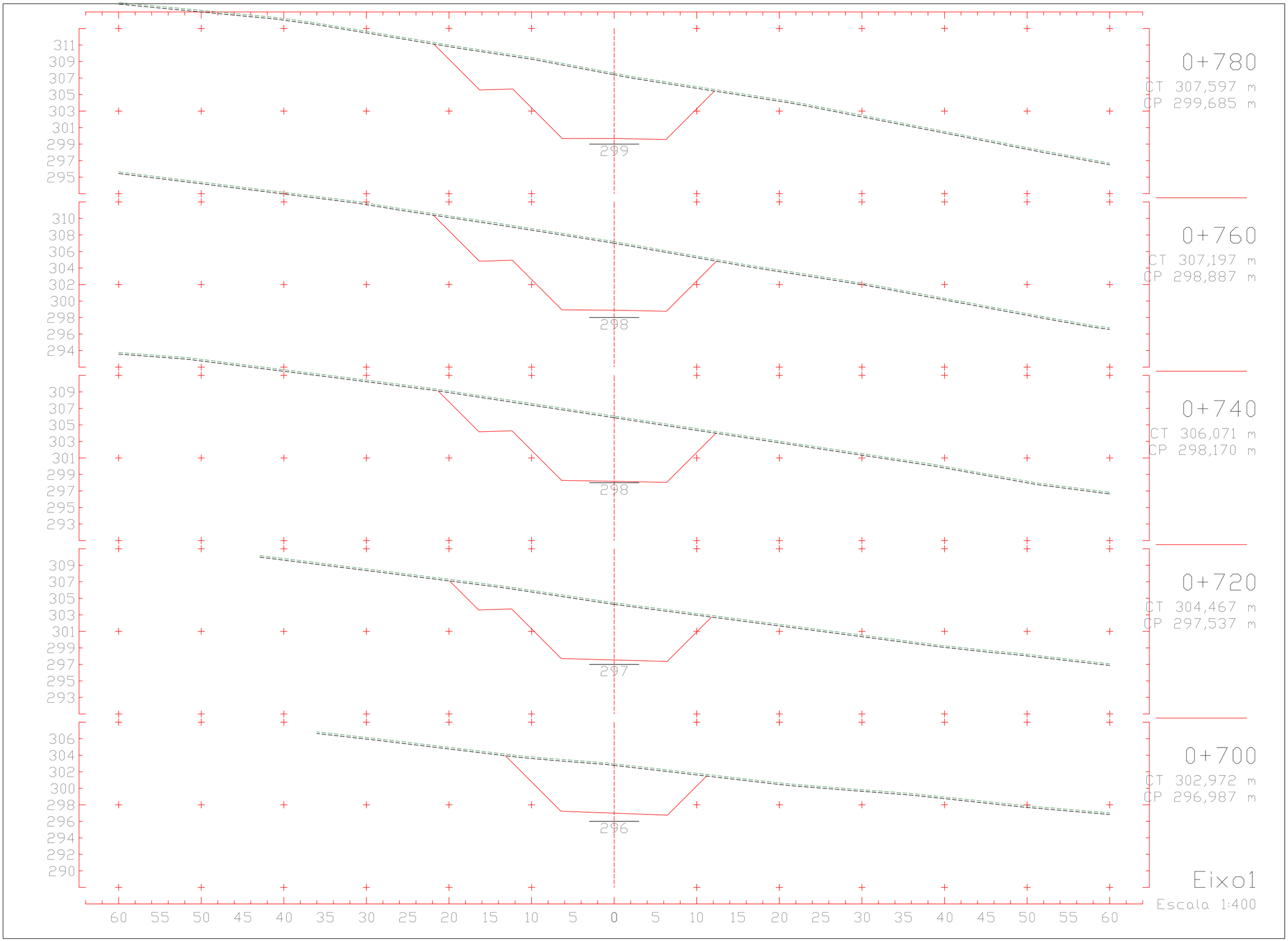

320
318
316
314
312
310
308
306
304
315
0+280
CT 308,945 m
CP 315,325 m
322
320
318
316
314
312
310
308
306
316
0+260
CT 309,802 m
CP 316,925 m
324
322
320
318
316
314
312
310
308
318
0+240
CT 312,113 m
CP 318,525 m
326
324
322
320
318
316
314
312
310
320
0+220
CT 313,904 m
CP 320,125 m
327
325
323
321
319
317
315
313
311
321
0+200
CT 315,566 m
CP 321,725 m
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
Eixo1
Escala 1:400

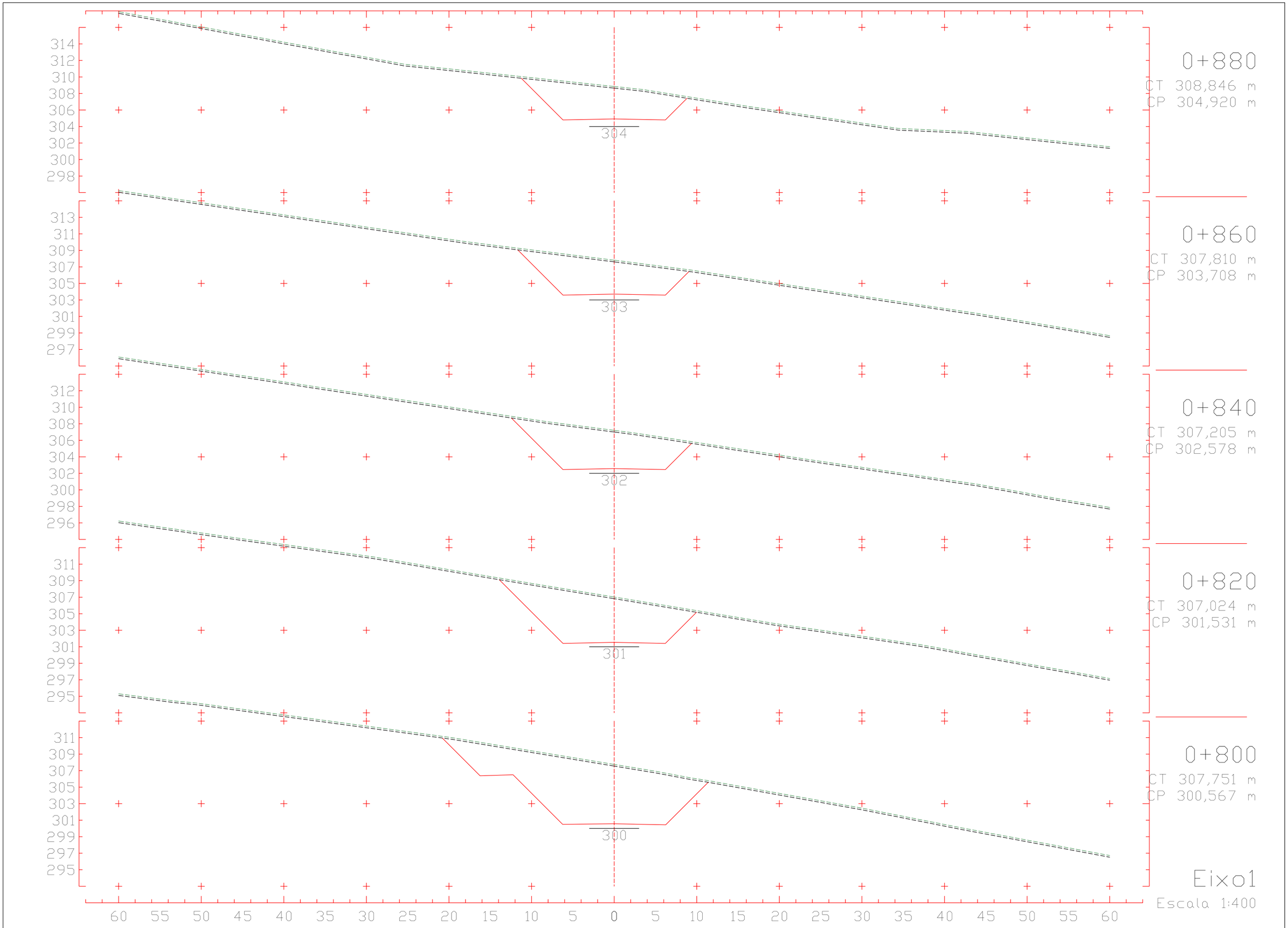

309
307
305
303
301
299
297
295
293
307
0+380
CT 295,991 m
CP 307,325 m
312
310
308
306
304
302
300
298
296
308
0+360
CT 298,319 m
CP 308,925 m
314
312
310
308
306
304
302
300
298
310
0+340
CT 301,499 m
CP 310,525 m
316
314
312
310
308
306
304
302
300
312
0+320
CT 304,782 m
CP 312,125 m
319
317
315
313
311
309
307
305
303
313
0+300
CT 307,958 m
CP 313,725 m
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
Eixo1
Escala 1:400

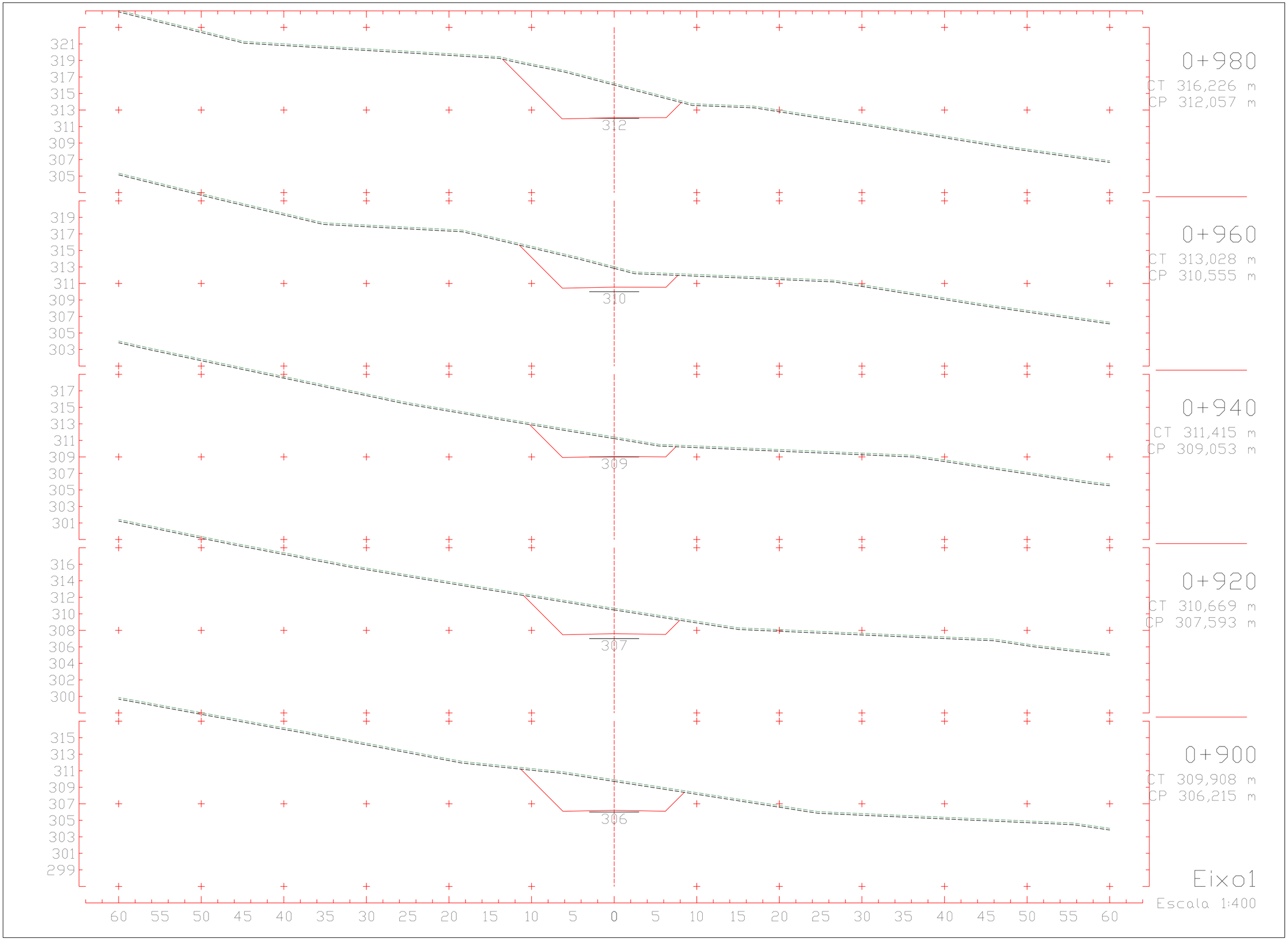

0+480
CT 292,154 m
CP 299,698 m
299
304
302
300
298
296
294
292
290
288
0+460
CT 292,640 m
CP 301,018 m
301
305
303
299
297
295
293
291
289
0+440
CT 293,183 m
CP 302,525 m
302
306
304
300
298
296
294
292
290
0+420
CT 294,078 m
CP 304,125 m
304
307
305
303
301
299
297
295
293
291
0+400
CT 294,637 m
CP 305,725 m
305
307
305
303
301
299
297
295
293
291
Eixo1
Escala 1:400
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

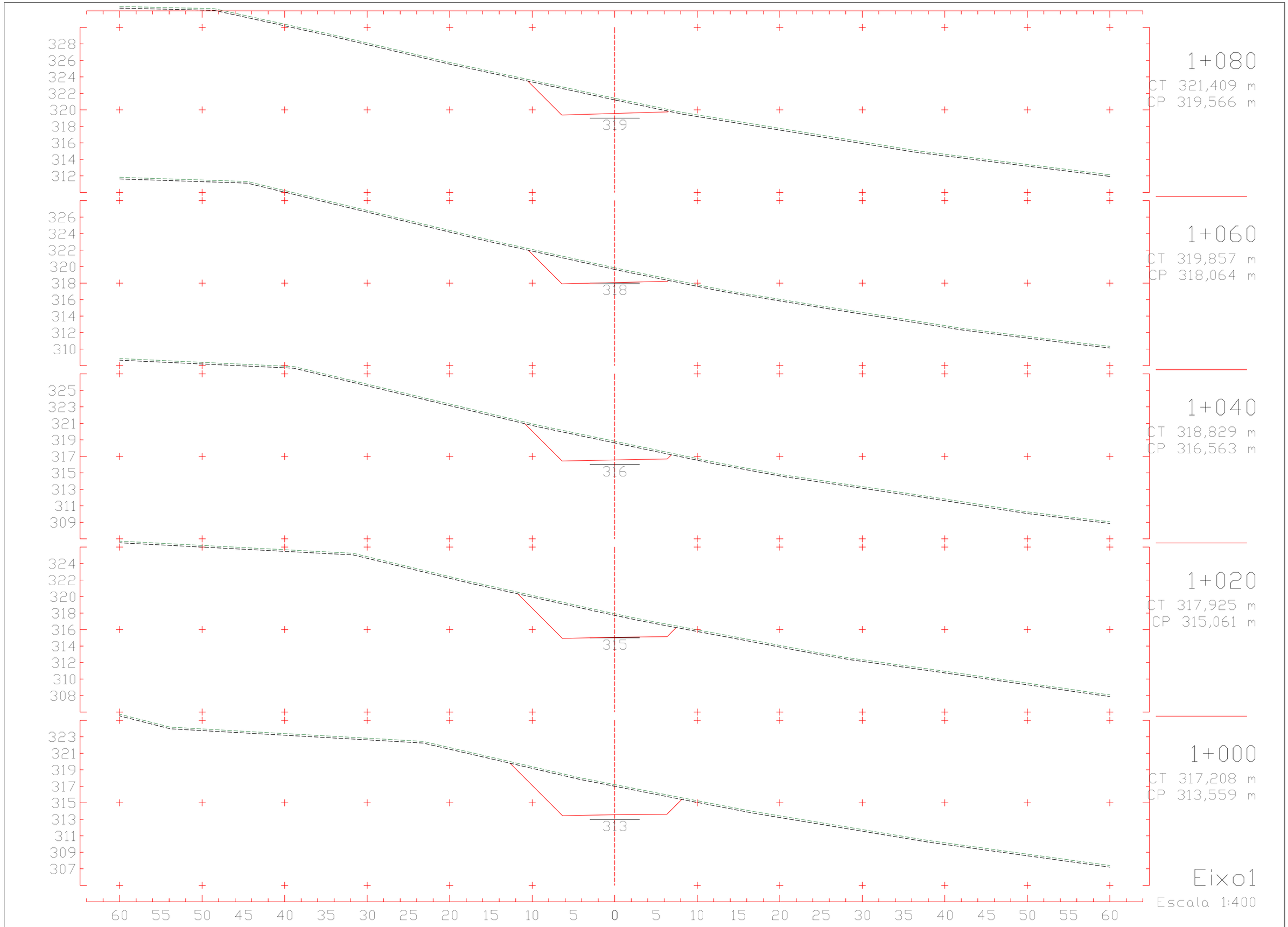

0+580
CT 291,065 m
CP 295,885 m
295
0+560
CT 290,354 m
CP 296,275 m
296
0+540
CT 289,823 m
CP 296,852 m
296
0+520
CT 290,370 m
CP 297,614 m
297
0+500
CT 291,369 m
CP 298,563 m
298
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

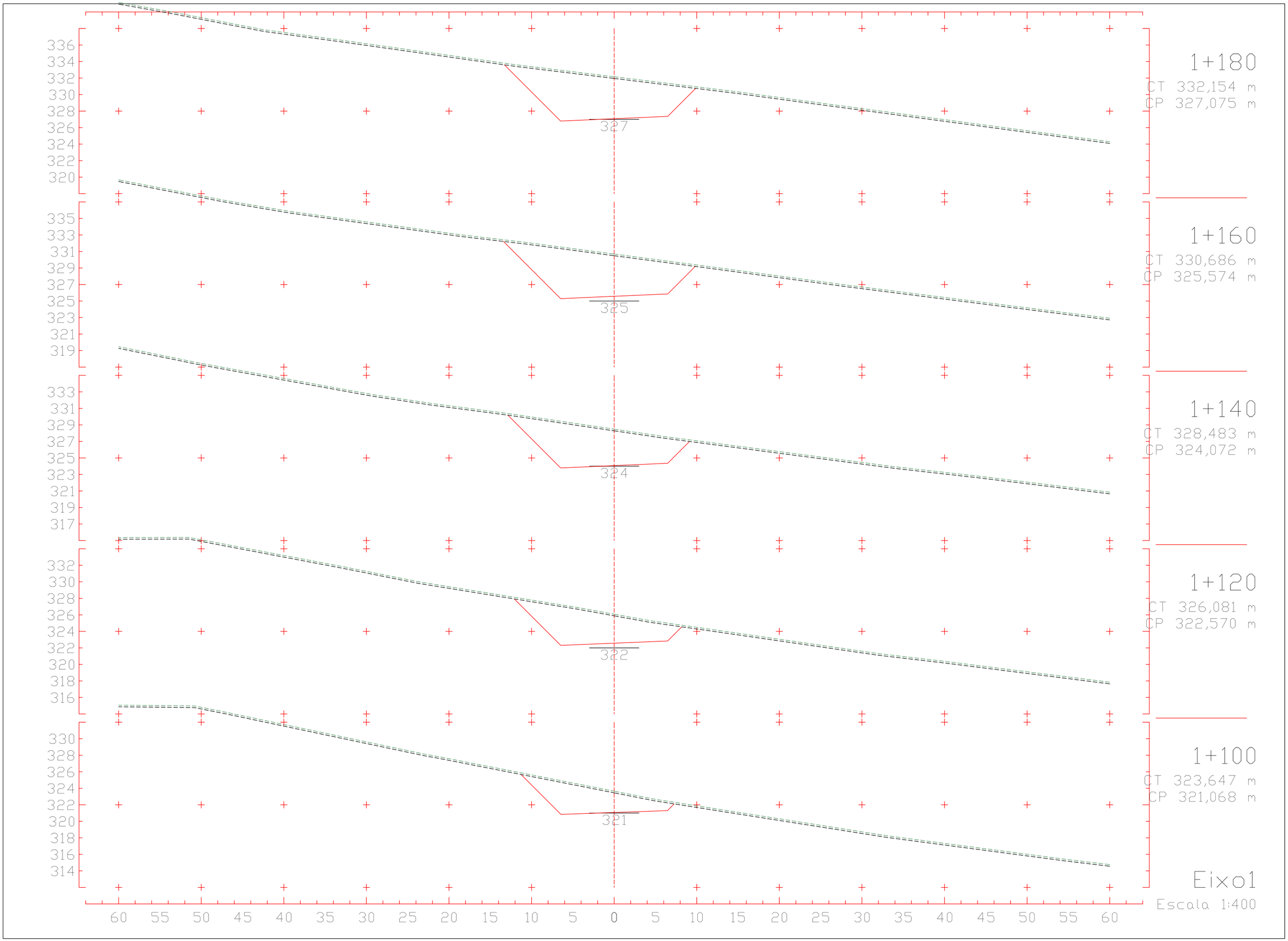

306
304
302
300
298
296
294
292
290
296
0+680
CT 300,429 m
CP 296,519 m
304
302
300
298
296
294
292
290
288
296
0+660
CT 298,159 m
CP 296,133 m
304
302
300
298
296
294
292
290
288
295
0+640
CT 295,832 m
CP 295,831 m
303
301
299
297
295
293
291
289
287
295
0+620
CT 293,922 m
CP 295,663 m
302
300
298
296
294
292
290
288
286
295
0+600
CT 292,363 m
CP 295,681 m
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
Eixo1
Escala 1:400

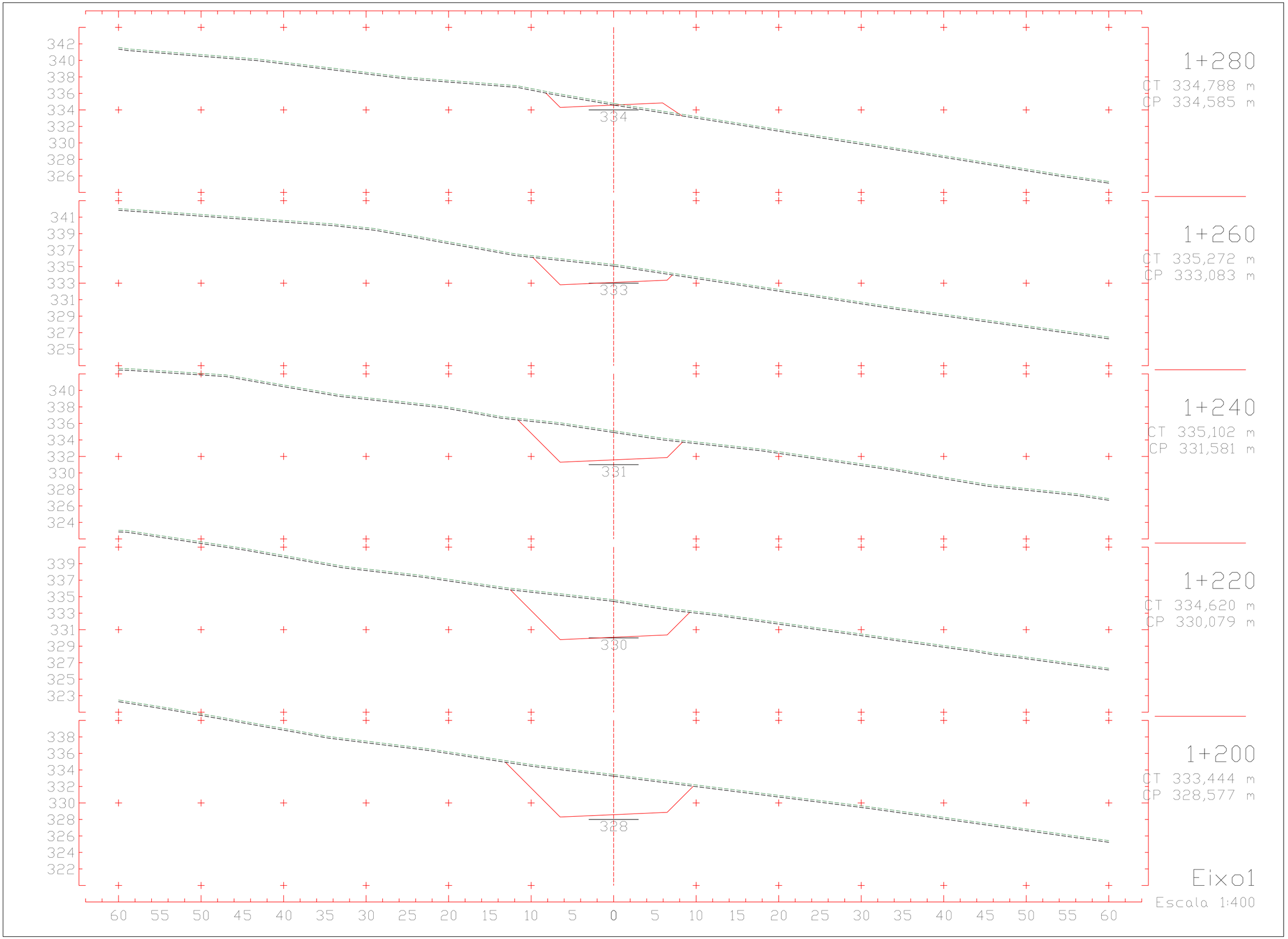

311
309
307
305
303
301
299
297
295
299
0+780
CT 307,597 m
CP 299,685 m
310
308
306
304
302
300
298
296
294
298
0+760
CT 307,197 m
CP 298,887 m
309
307
305
303
301
299
297
295
293
298
0+740
CT 306,071 m
CP 298,170 m
309
307
305
303
301
299
297
295
293
297
0+720
CT 304,467 m
CP 297,537 m
306
304
302
300
298
296
294
292
290
296
0+700
CT 302,972 m
CP 296,987 m
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
Eixo1
Escala 1:400

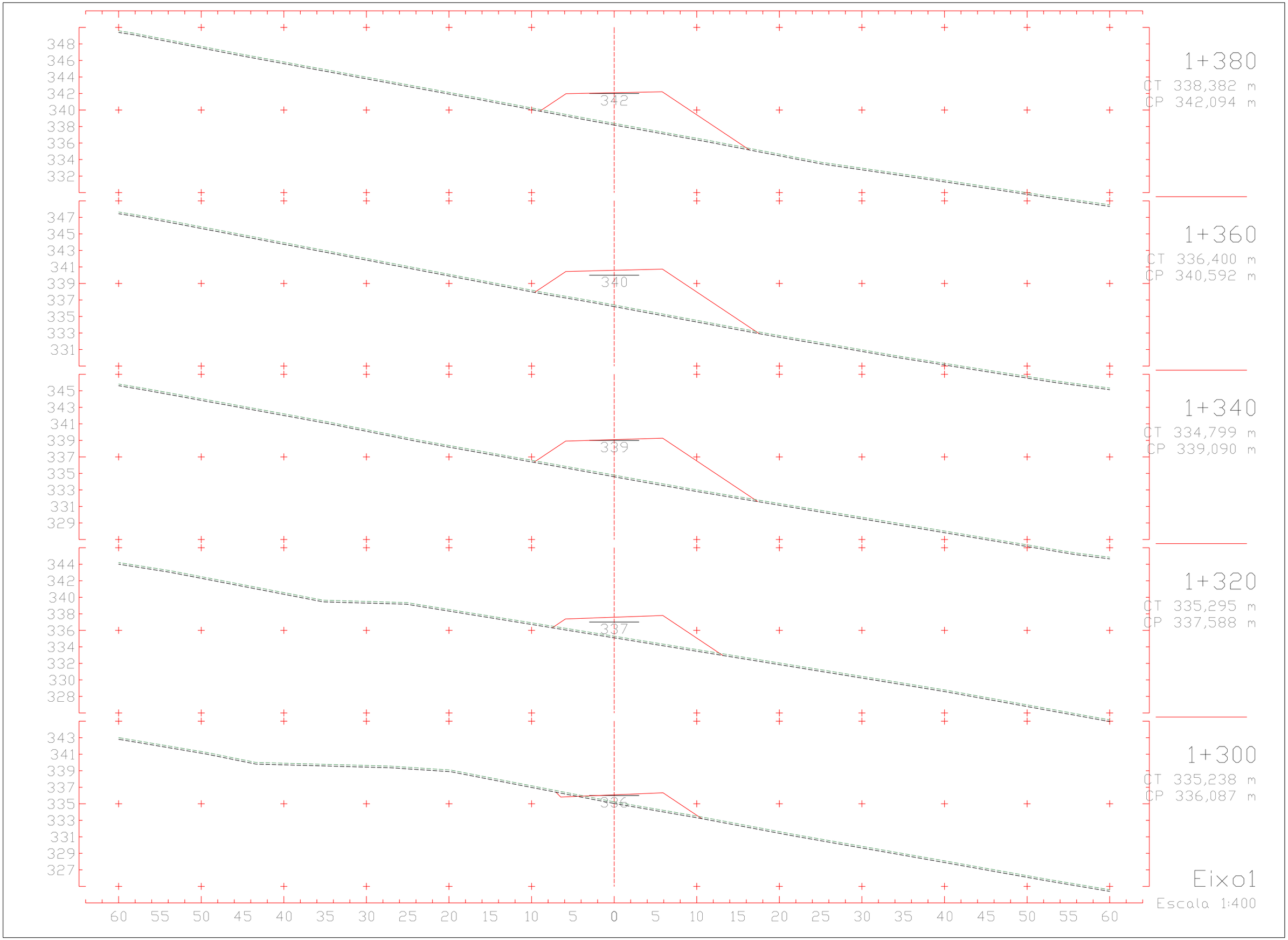

0+880
CT 308,846 m
CP 304,920 m
304
0+860
CT 307,810 m
CP 303,708 m
303
0+840
CT 307,205 m
CP 302,578 m
302
0+820
CT 307,024 m
CP 301,531 m
301
0+800
CT 307,751 m
CP 300,567 m
300
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

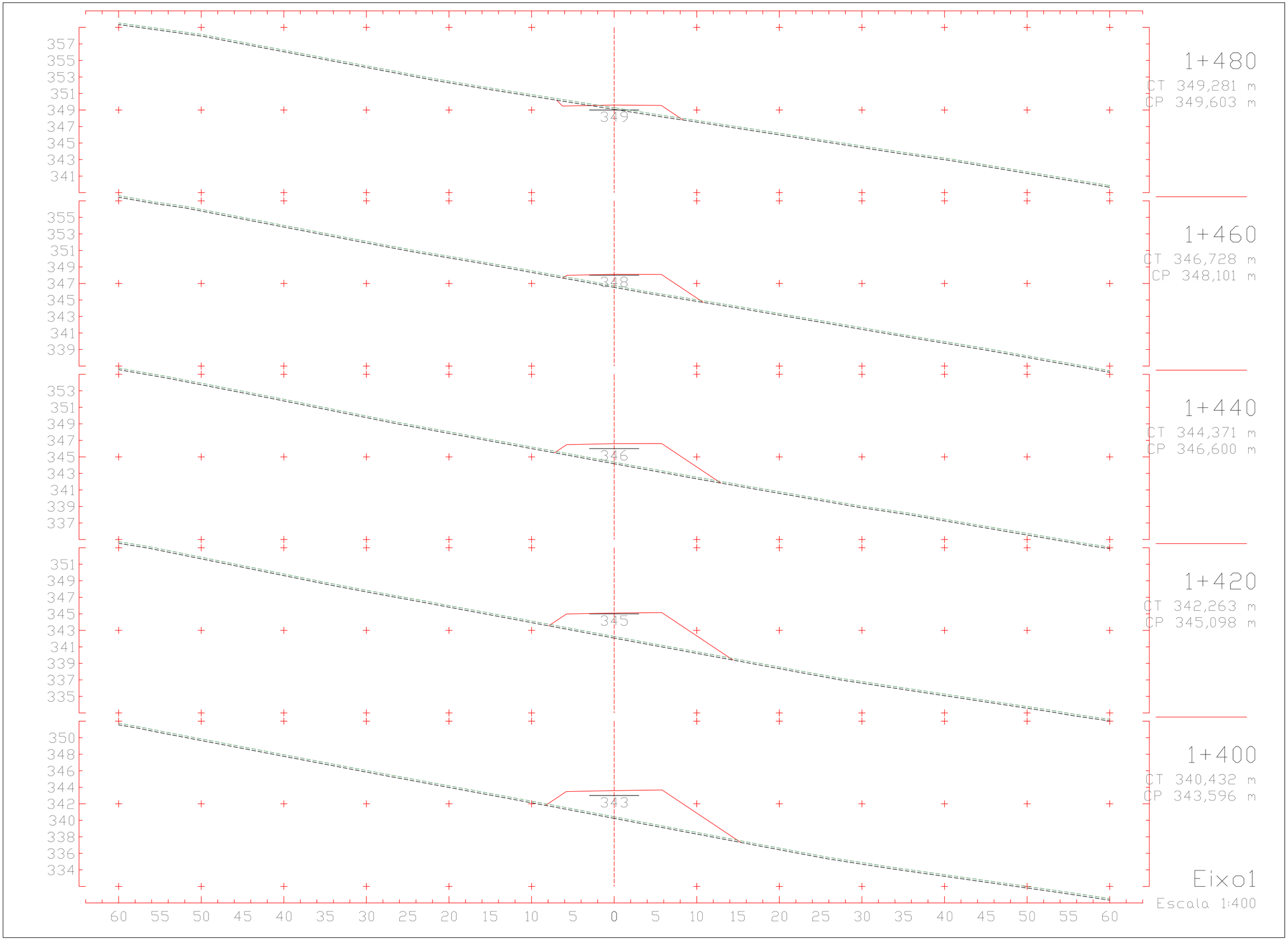

0+980
CT 316,226 m
CP 312,057 m
312
0+960
CT 313,028 m
CP 310,555 m
310
0+940
CT 311,415 m
CP 309,053 m
309
0+920
CT 310,669 m
CP 307,593 m
307
0+900
CT 309,908 m
CP 306,215 m
306
Eixo1
Escala 1:400

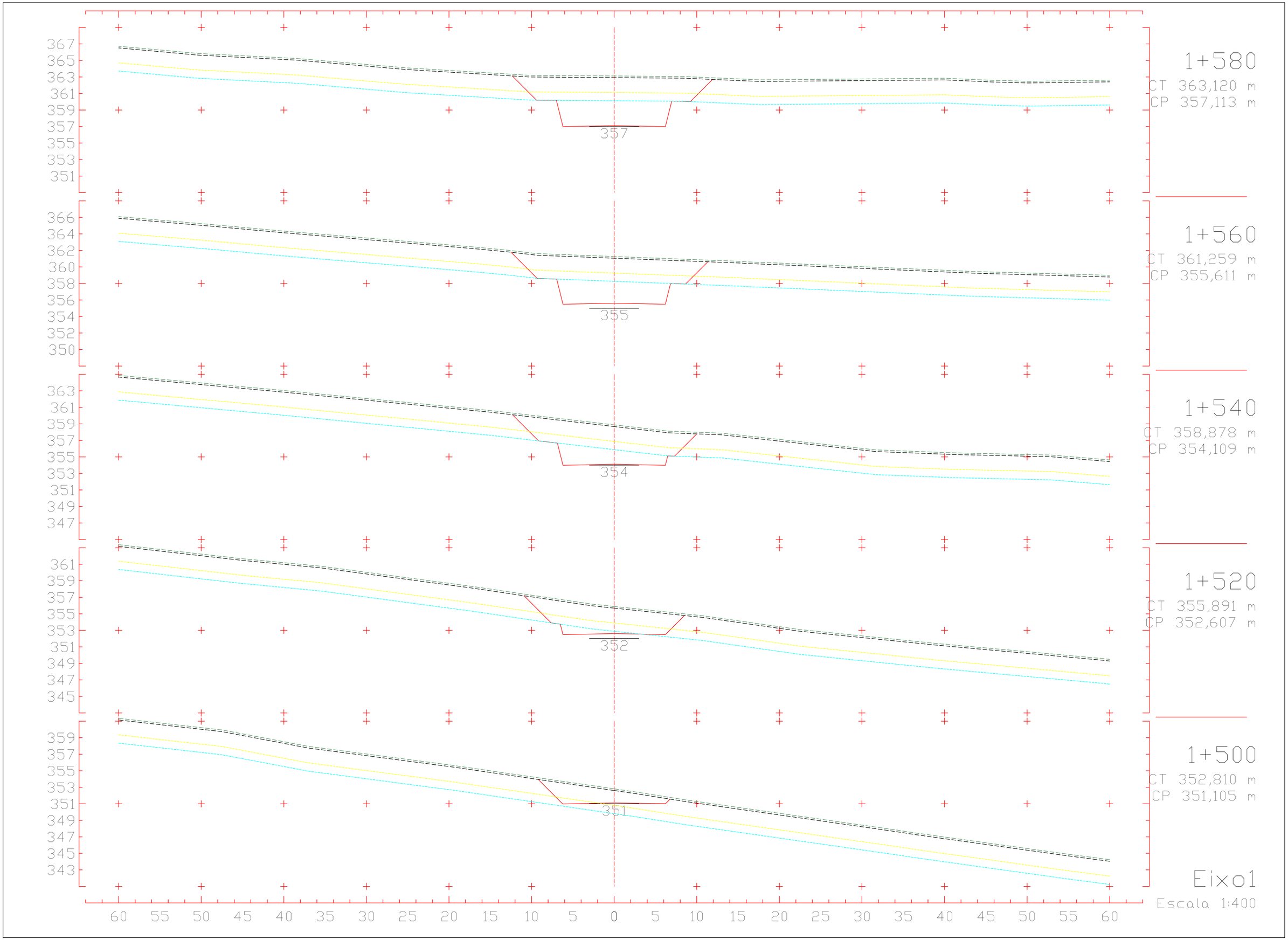

328
326
324
322
320
318
316
314
312
319
1+080
CT 321,409 m
CP 319,566 m
326
324
322
320
318
316
314
312
310
318
1+060
CT 319,857 m
CP 318,064 m
325
323
321
319
317
315
313
311
309
316
1+040
CT 318,829 m
CP 316,563 m
324
322
320
318
316
314
312
310
308
315
1+020
CT 317,925 m
CP 315,061 m
323
321
319
317
315
313
311
309
307
313
1+000
CT 317,208 m
CP 313,559 m
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
Eixo1
Escala 1:400

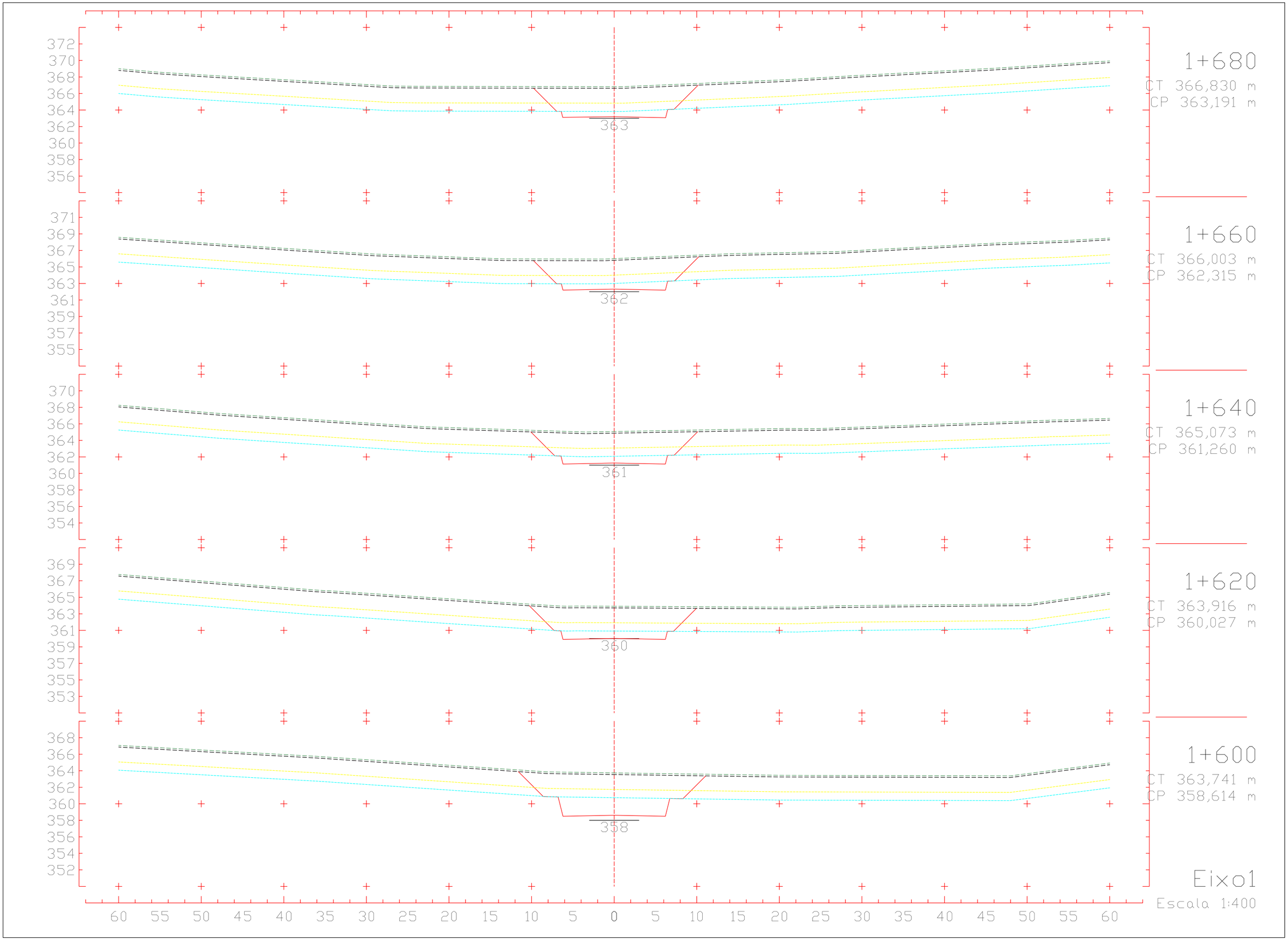

336
334
332
330
328
326
324
322
320
327
1+180
CT 332,154 m
CP 327,075 m
335
333
331
329
327
325
323
321
319
325
1+160
CT 330,686 m
CP 325,574 m
333
331
329
327
325
323
321
319
317
324
1+140
CT 328,483 m
CP 324,072 m
332
330
328
326
324
322
320
318
316
322
1+120
CT 326,081 m
CP 322,570 m
330
328
326
324
322
320
318
316
314
321
1+100
CT 323,647 m
CP 321,068 m
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
Eixo1
Escala 1:400

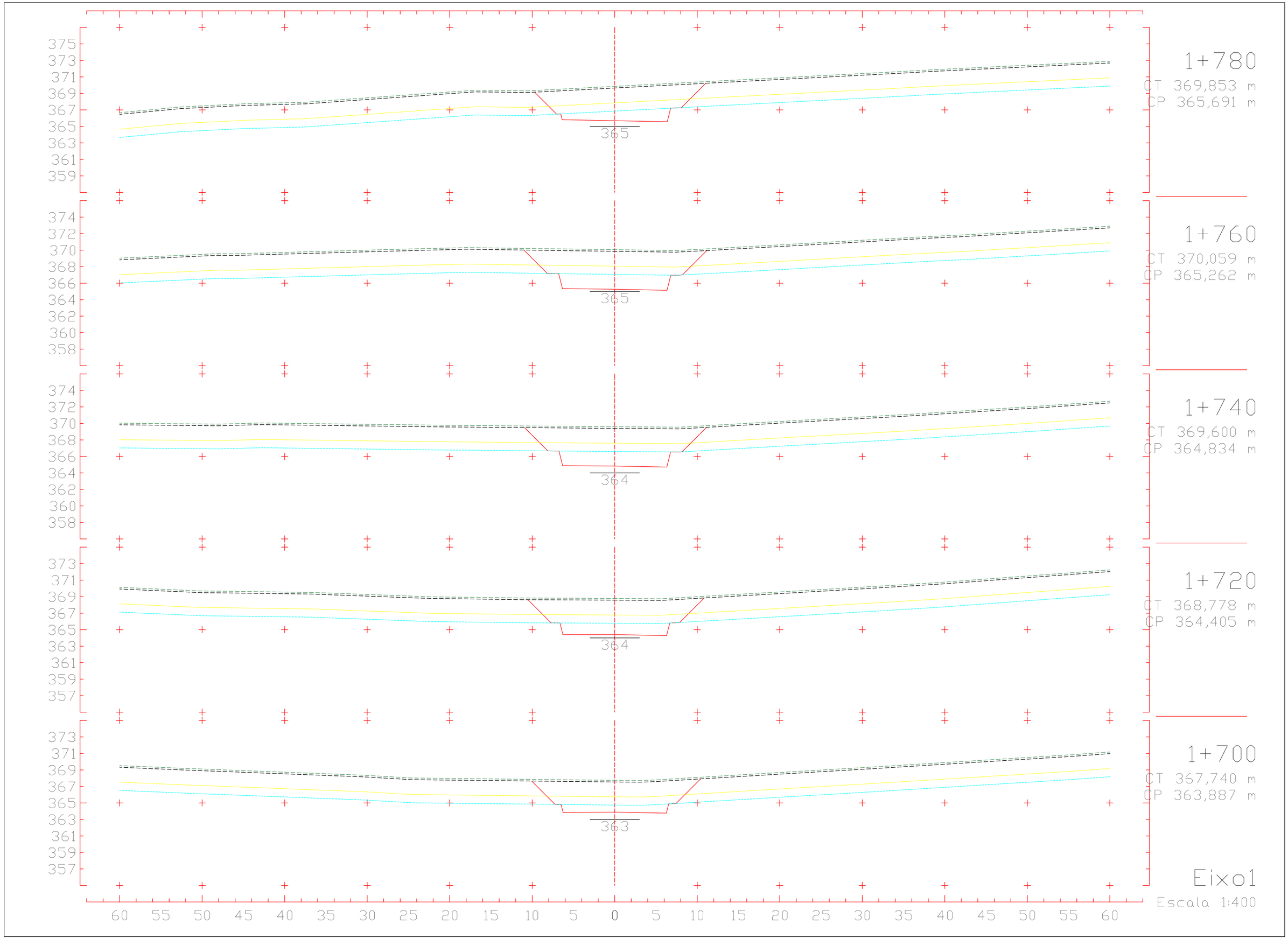

342
340
338
336
334
332
330
328
326
334
1+280
CT 334,788 m
CP 334,585 m
341
339
337
335
333
331
329
327
325
333
1+260
CT 335,272 m
CP 333,083 m
340
338
336
334
332
330
328
326
324
331
1+240
CT 335,102 m
CP 331,581 m
339
337
335
333
331
329
327
325
323
330
1+220
CT 334,620 m
CP 330,079 m
338
336
334
332
330
328
326
324
322
328
1+200
CT 333,444 m
CP 328,577 m
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
Eixo1
Escala 1:400

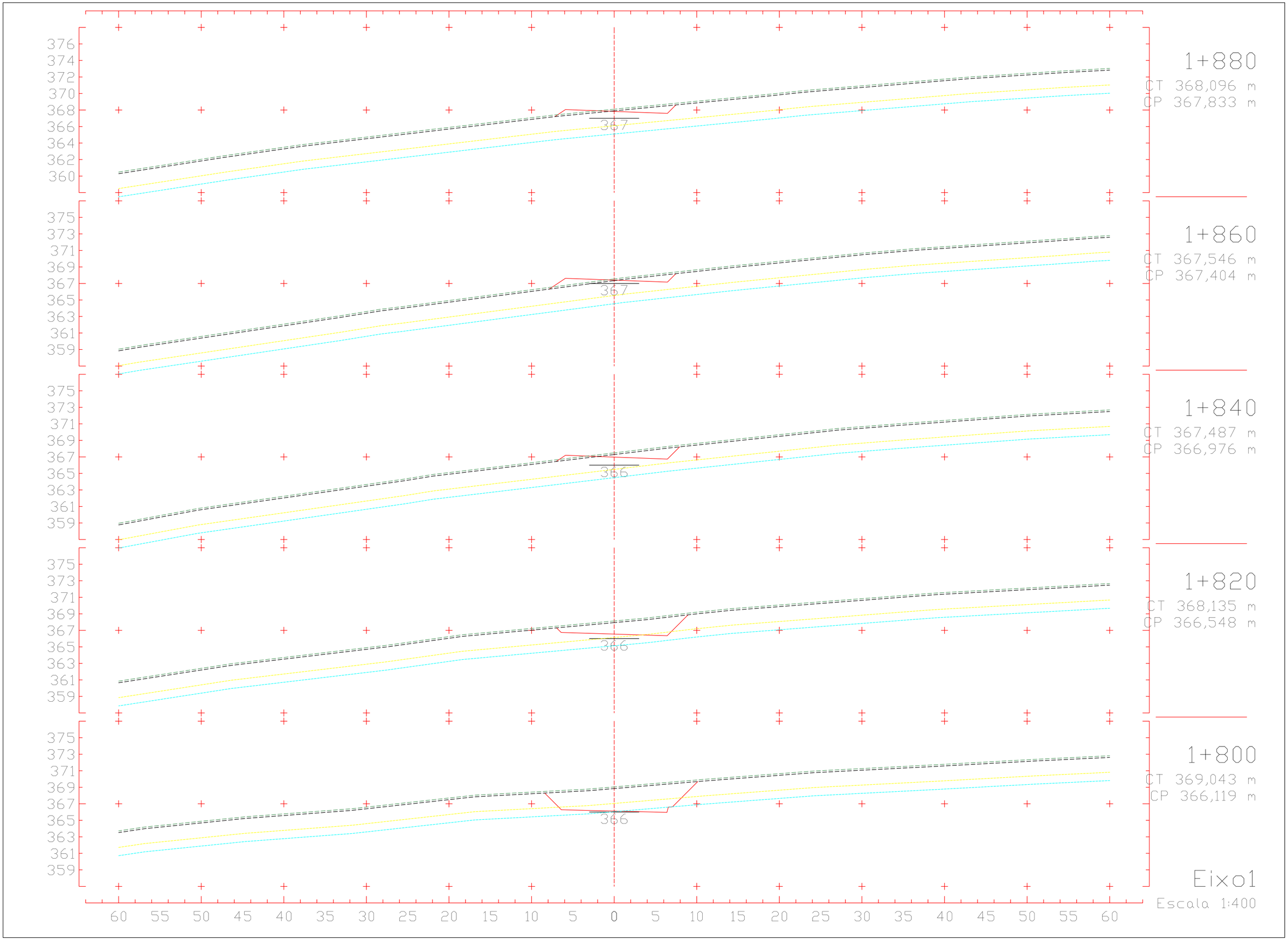

348
346
344
342
340
338
336
334
332
342
1+380
CT 338,382 m
CP 342,094 m
347
345
343
341
339
337
335
333
331
340
1+360
CT 336,400 m
CP 340,592 m
345
343
341
339
337
335
333
331
329
339
1+340
CT 334,799 m
CP 339,090 m
344
342
340
338
336
334
332
330
328
337
1+320
CT 335,295 m
CP 337,588 m
343
341
339
337
335
333
331
329
327
336
1+300
CT 335,238 m
CP 336,087 m
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
Eixo1
Escala 1:400

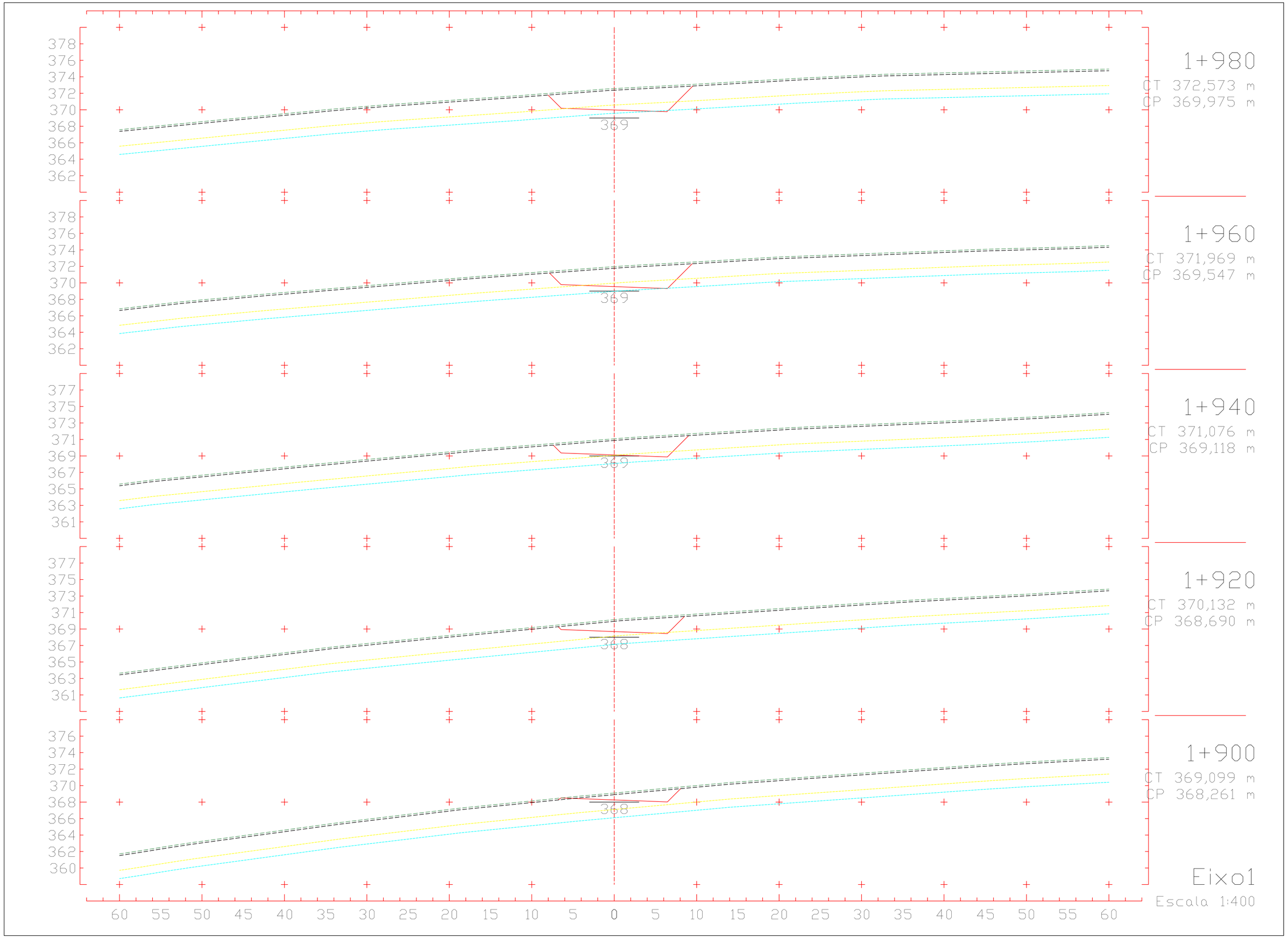

1+480
CT 349,281 m
CP 349,603 m
1+460
CT 346,728 m
CP 348,101 m
1+440
CT 344,371 m
CP 346,600 m
1+420
CT 342,263 m
CP 345,098 m
1+400
CT 340,432 m
CP 343,596 m
Eixo1
Escala 1:400

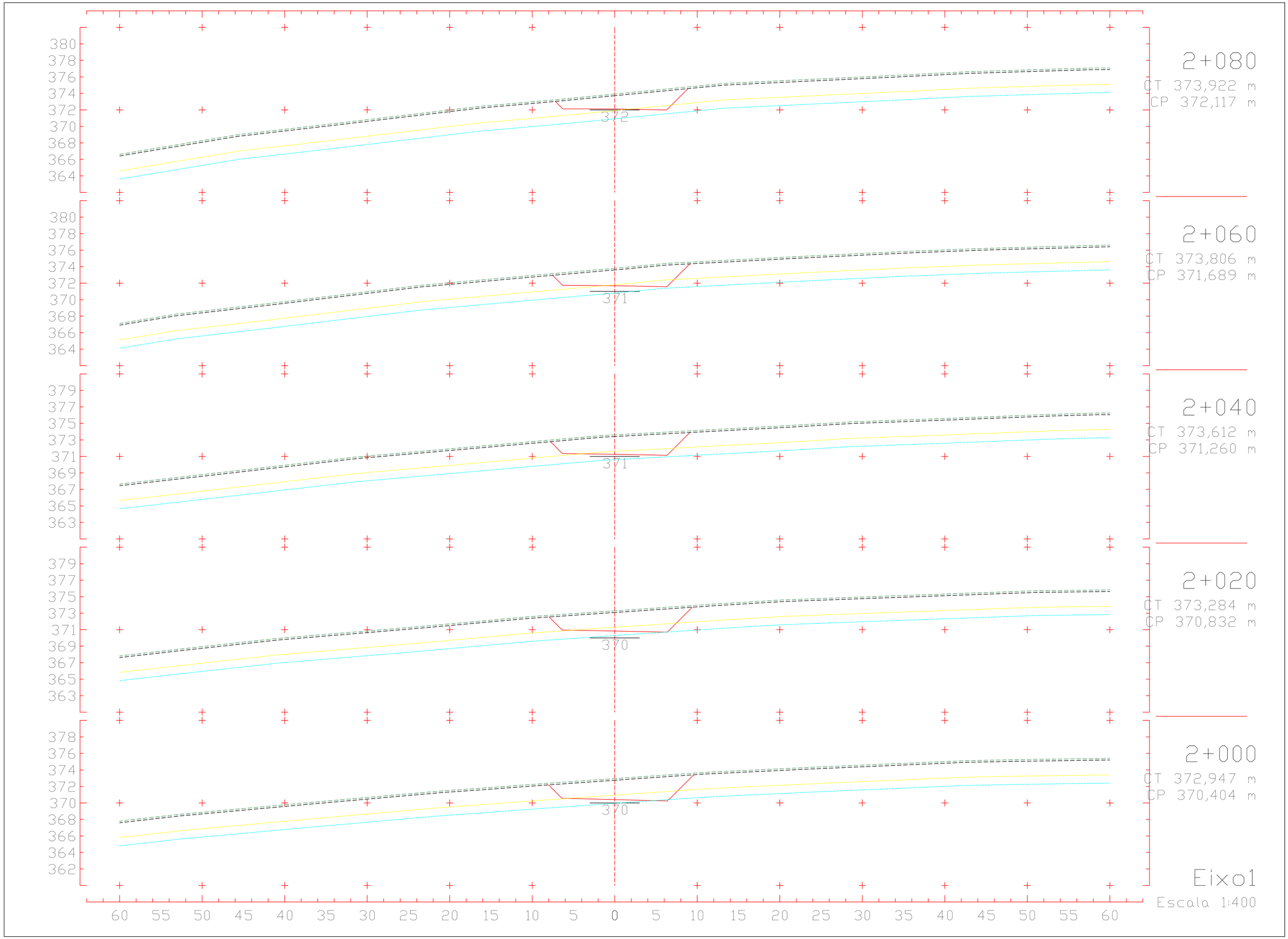

1+580
CT 363,120 m
CP 357,113 m
357
1+560
CT 361,259 m
CP 355,611 m
355
1+540
CT 358,878 m
CP 354,109 m
354
1+520
CT 355,891 m
CP 352,607 m
352
1+500
CT 352,810 m
CP 351,105 m
351
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

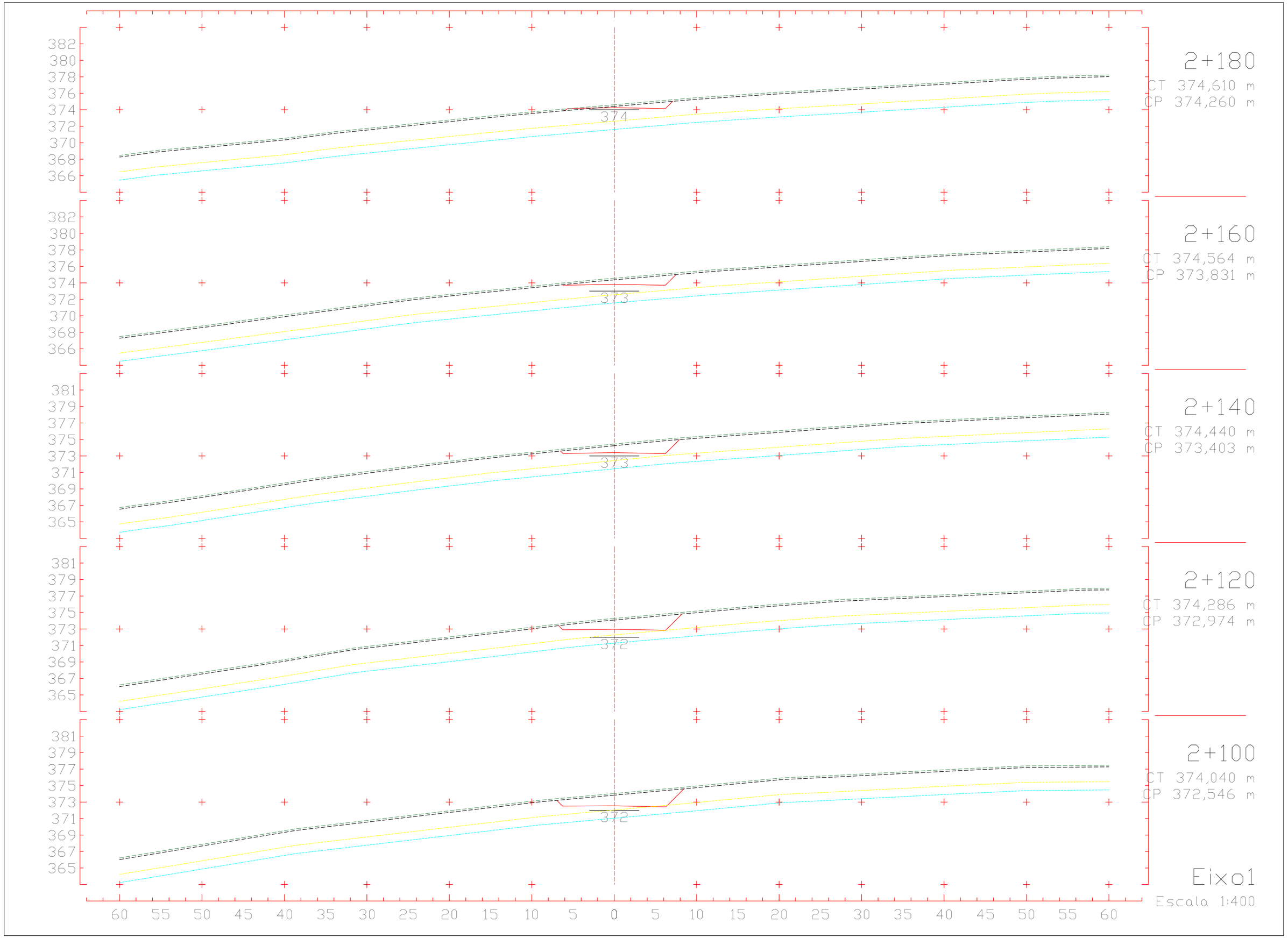

372
370
368
366
364
362
360
358
356
363
1+680
CT 366,830 m
CP 363,191 m
371
369
367
365
363
361
359
357
355
362
1+660
CT 366,003 m
CP 362,315 m
370
368
366
364
362
360
358
356
354
361
1+640
CT 365,073 m
CP 361,260 m
369
367
365
363
361
359
357
355
353
360
1+620
CT 363,916 m
CP 360,027 m
368
366
364
362
360
358
356
354
352
358
1+600
CT 363,741 m
CP 358,614 m
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
Eixo1
Escala 1:400

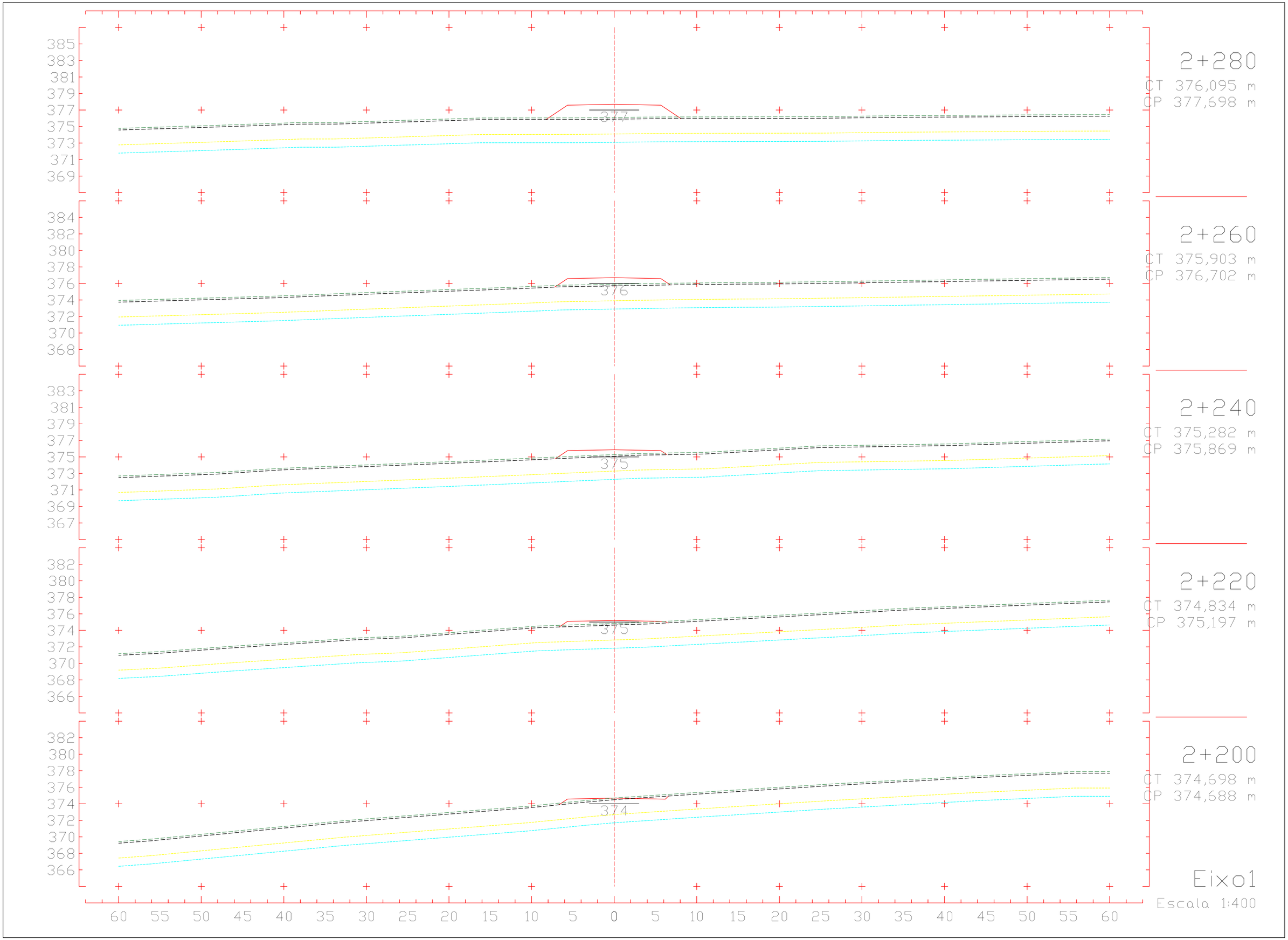

375
373
371
369
367
365
363
361
359
365
1+780
CT 369,853 m
CP 365,691 m
374
372
370
368
366
364
362
360
358
365
1+760
CT 370,059 m
CP 365,262 m
374
372
370
368
366
364
362
360
358
364
1+740
CT 369,600 m
CP 364,834 m
373
371
369
367
365
363
361
359
357
364
1+720
CT 368,778 m
CP 364,405 m
373
371
369
367
365
363
361
359
357
363
1+700
CT 367,740 m
CP 363,887 m
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
Eixo1
Escala 1:400

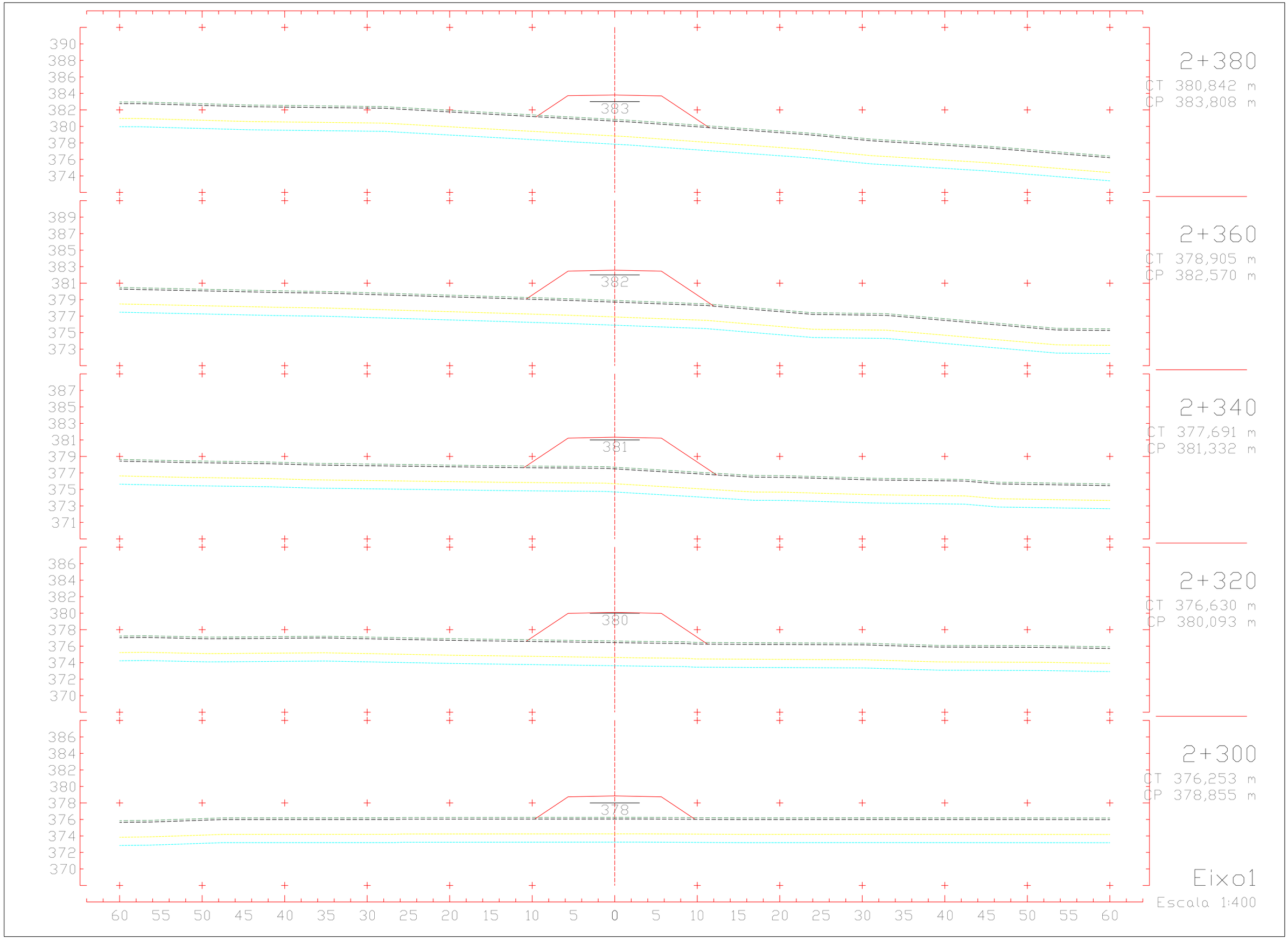

376
374
372
370
368
366
364
362
360
367
1+880
CT 368,096 m
CP 367,833 m
375
373
371
369
367
365
363
361
359
367
1+860
CT 367,546 m
CP 367,404 m
375
373
371
369
367
365
363
361
359
366
1+840
CT 367,487 m
CP 366,976 m
375
373
371
369
367
365
363
361
359
366
1+820
CT 368,135 m
CP 366,548 m
375
373
371
369
367
365
363
361
359
366
1+800
CT 369,043 m
CP 366,119 m
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
Eixo1
Escala 1:400

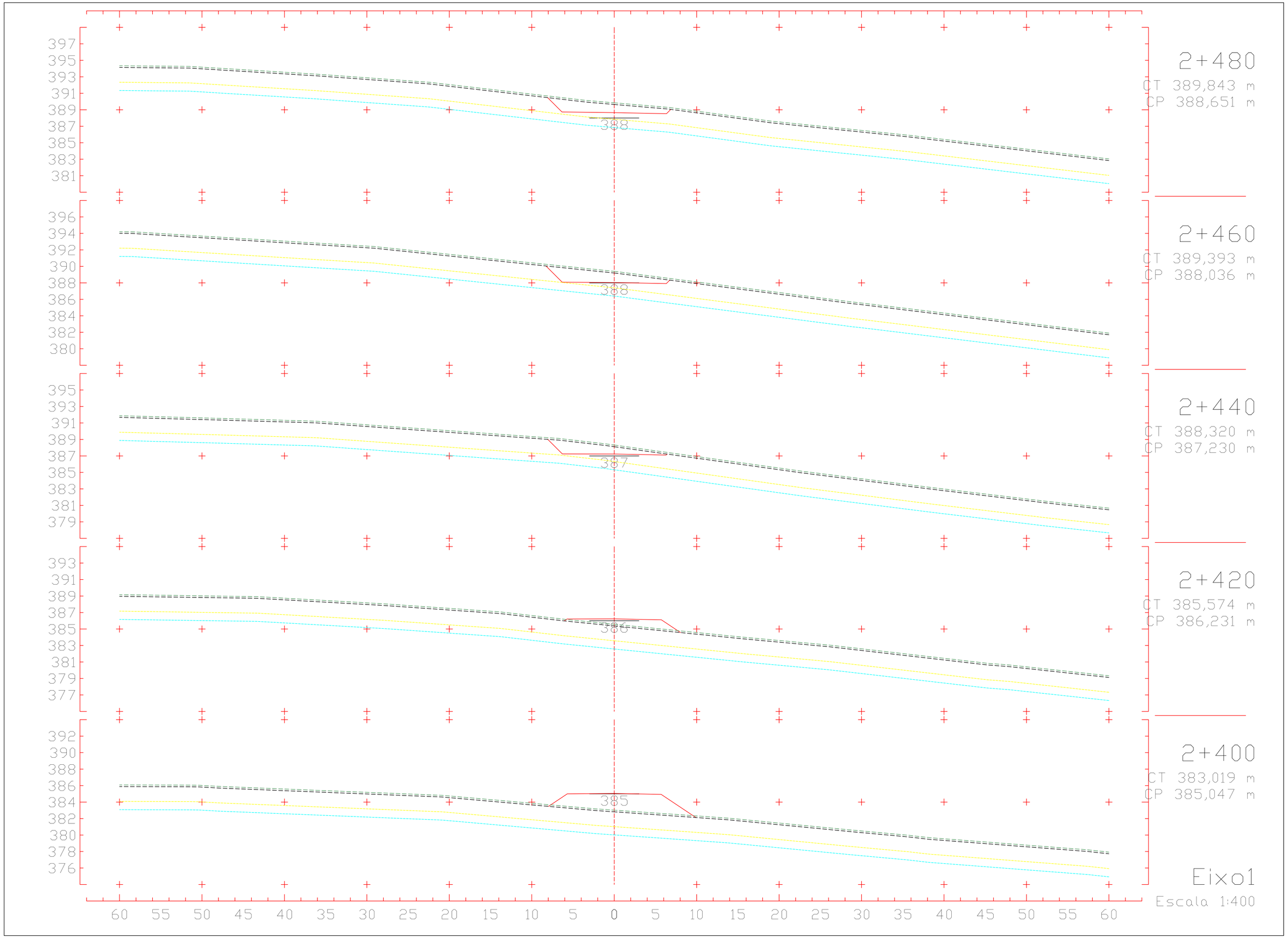

1+980
CT 372,573 m
CP 369,975 m
369
1+960
CT 371,969 m
CP 369,547 m
369
1+940
CT 371,076 m
CP 369,118 m
369
1+920
CT 370,132 m
CP 368,690 m
368
1+900
CT 369,099 m
CP 368,261 m
368
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

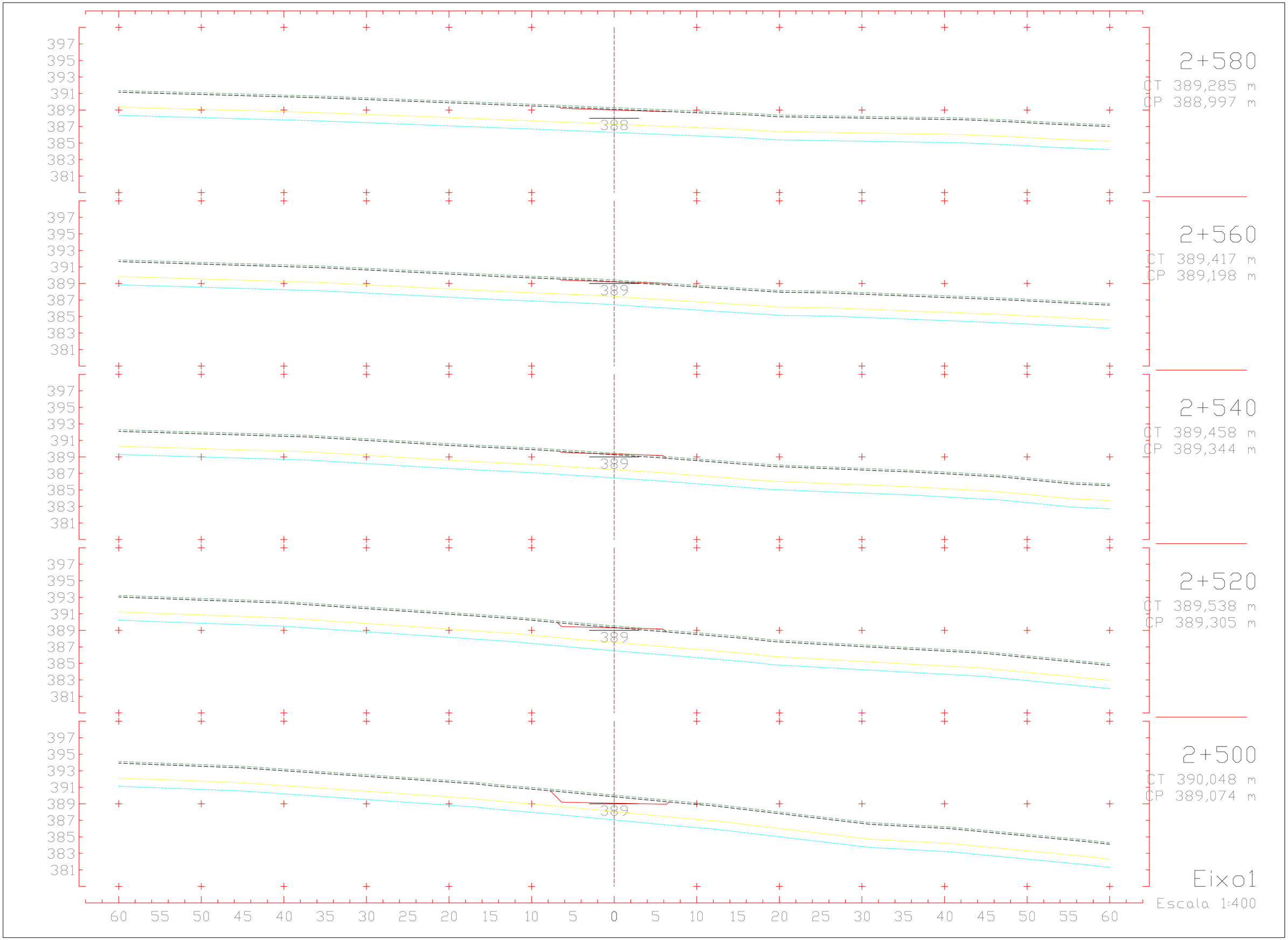

380
378
376
374
372
370
368
366
364
372
2+080
CT 373,922 m
CP 372,117 m
380
378
376
374
372
370
368
366
364
371
2+060
CT 373,806 m
CP 371,689 m
379
377
375
373
371
369
367
365
363
371
2+040
CT 373,612 m
CP 371,260 m
379
377
375
373
371
369
367
365
363
370
2+020
CT 373,284 m
CP 370,832 m
378
376
374
372
370
368
366
364
362
370
2+000
CT 372,947 m
CP 370,404 m
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
Eixo1
Escala 1:400

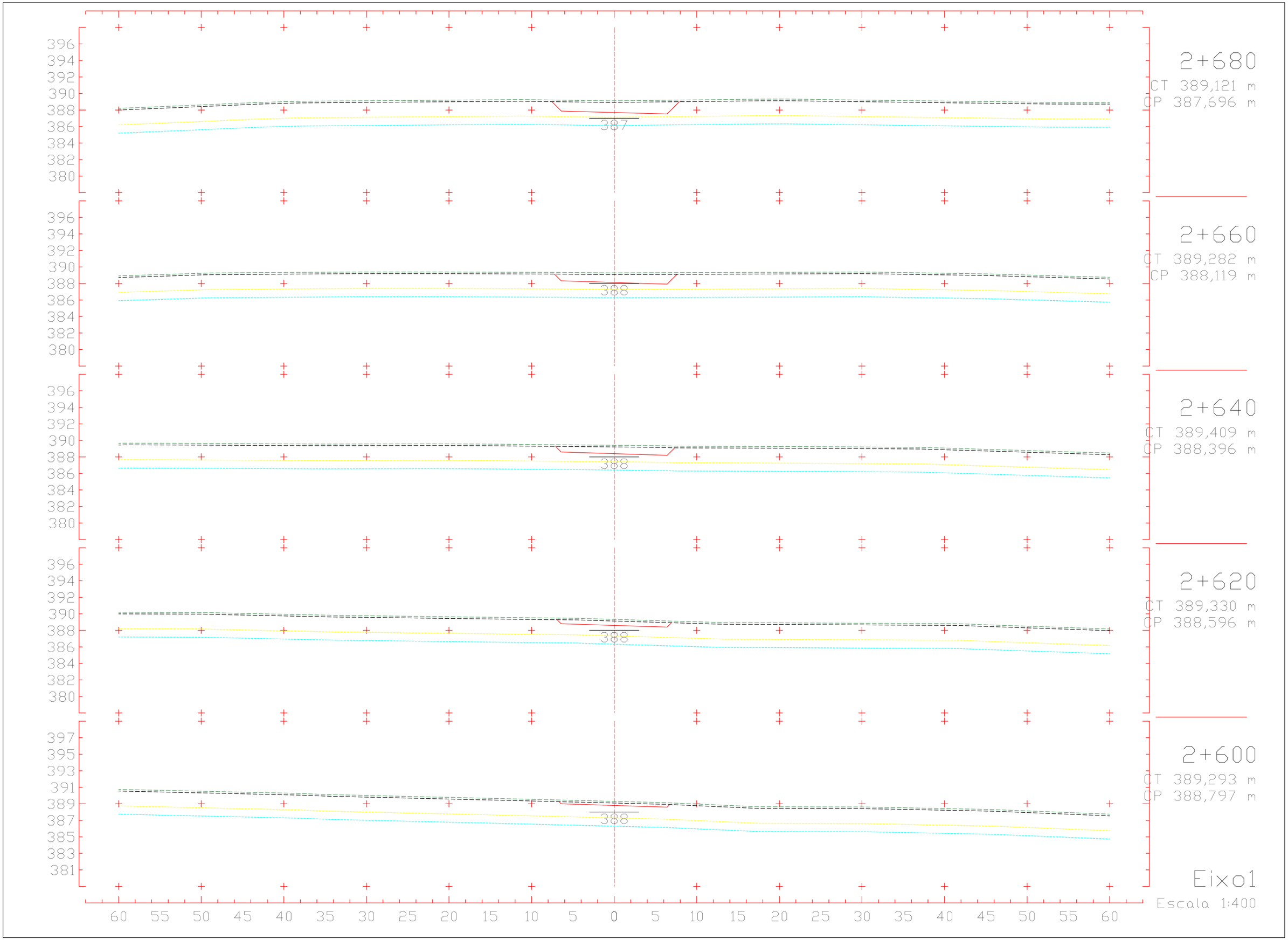

382
380
378
376
374
372
370
368
366
374
2+180
CT 374,610 m
CP 374,260 m
382
380
378
376
374
372
370
368
366
373
2+160
CT 374,564 m
CP 373,831 m
381
379
377
375
373
371
369
367
365
373
2+140
CT 374,440 m
CP 373,403 m
381
379
377
375
373
371
369
367
365
372
2+120
CT 374,286 m
CP 372,974 m
381
379
377
375
373
371
369
367
365
372
2+100
CT 374,040 m
CP 372,546 m
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
Eixo1
Escala 1:400

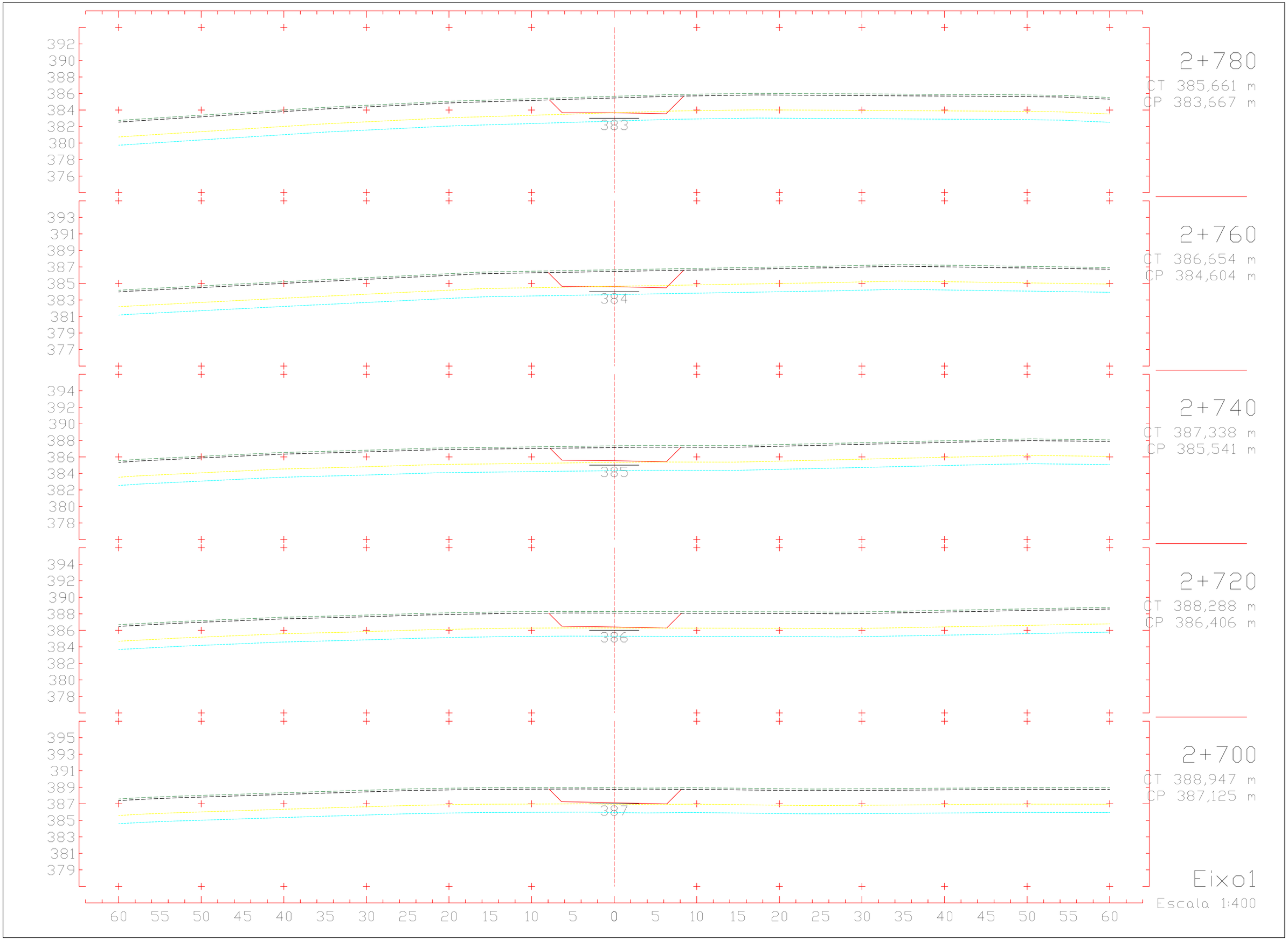

385
383
381
379
377
375
373
371
369
377
2+280
CT 376,095 m
CP 377,698 m
384
382
380
378
376
374
372
370
368
376
2+260
CT 375,903 m
CP 376,702 m
383
381
379
377
375
373
371
369
367
375
2+240
CT 375,282 m
CP 375,869 m
382
380
378
376
374
372
370
368
366
375
2+220
CT 374,834 m
CP 375,197 m
382
380
378
376
374
372
370
368
366
374
2+200
CT 374,698 m
CP 374,688 m
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
Eixo1
Escala 1:400

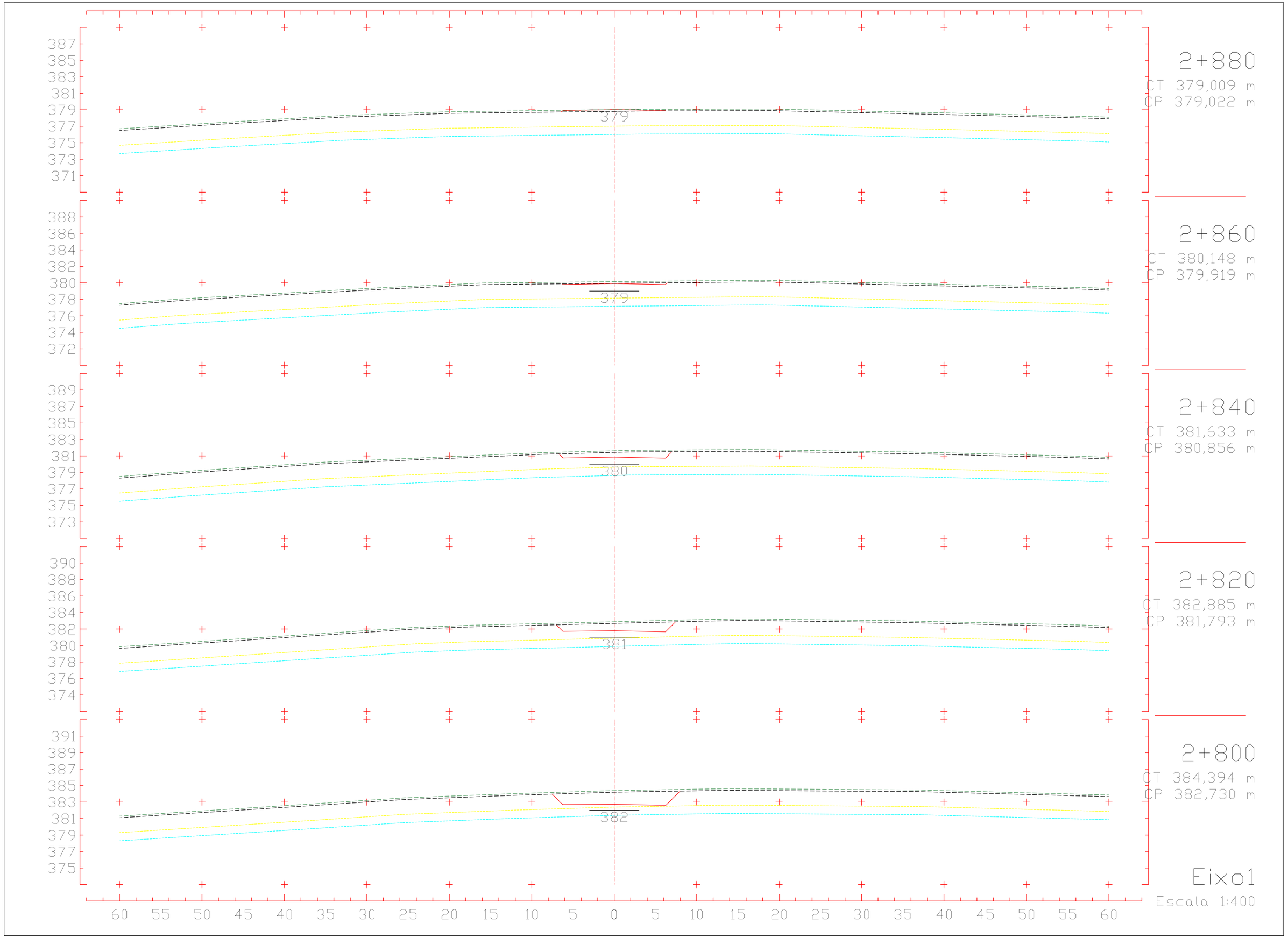

390
388
386
384
382
380
378
376
374
383
2+380
CT 380,842 m
CP 383,808 m
389
387
385
383
381
379
377
375
373
382
2+360
CT 378,905 m
CP 382,570 m
387
385
383
381
379
377
375
373
371
381
2+340
CT 377,691 m
CP 381,332 m
386
384
382
380
378
376
374
372
370
380
2+320
CT 376,630 m
CP 380,093 m
386
384
382
380
378
376
374
372
370
378
2+300
CT 376,253 m
CP 378,855 m
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
Eixo1
Escala 1:400

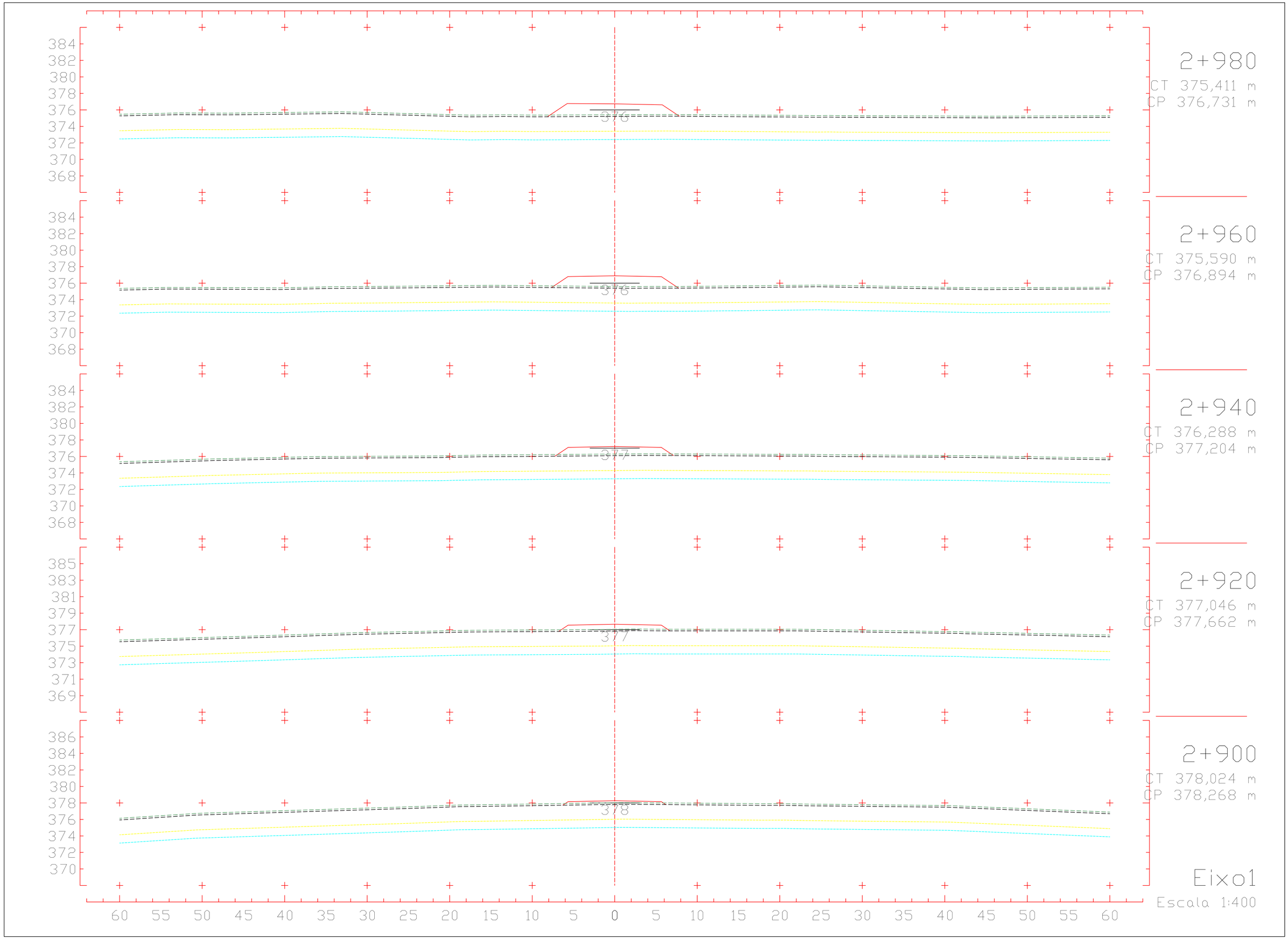

2+480
CT 389,843 m
CP 388,651 m
388
2+460
CT 389,393 m
CP 388,036 m
388
2+440
CT 388,320 m
CP 387,230 m
387
2+420
CT 385,574 m
CP 386,231 m
385
2+400
CT 383,019 m
CP 385,047 m
385
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

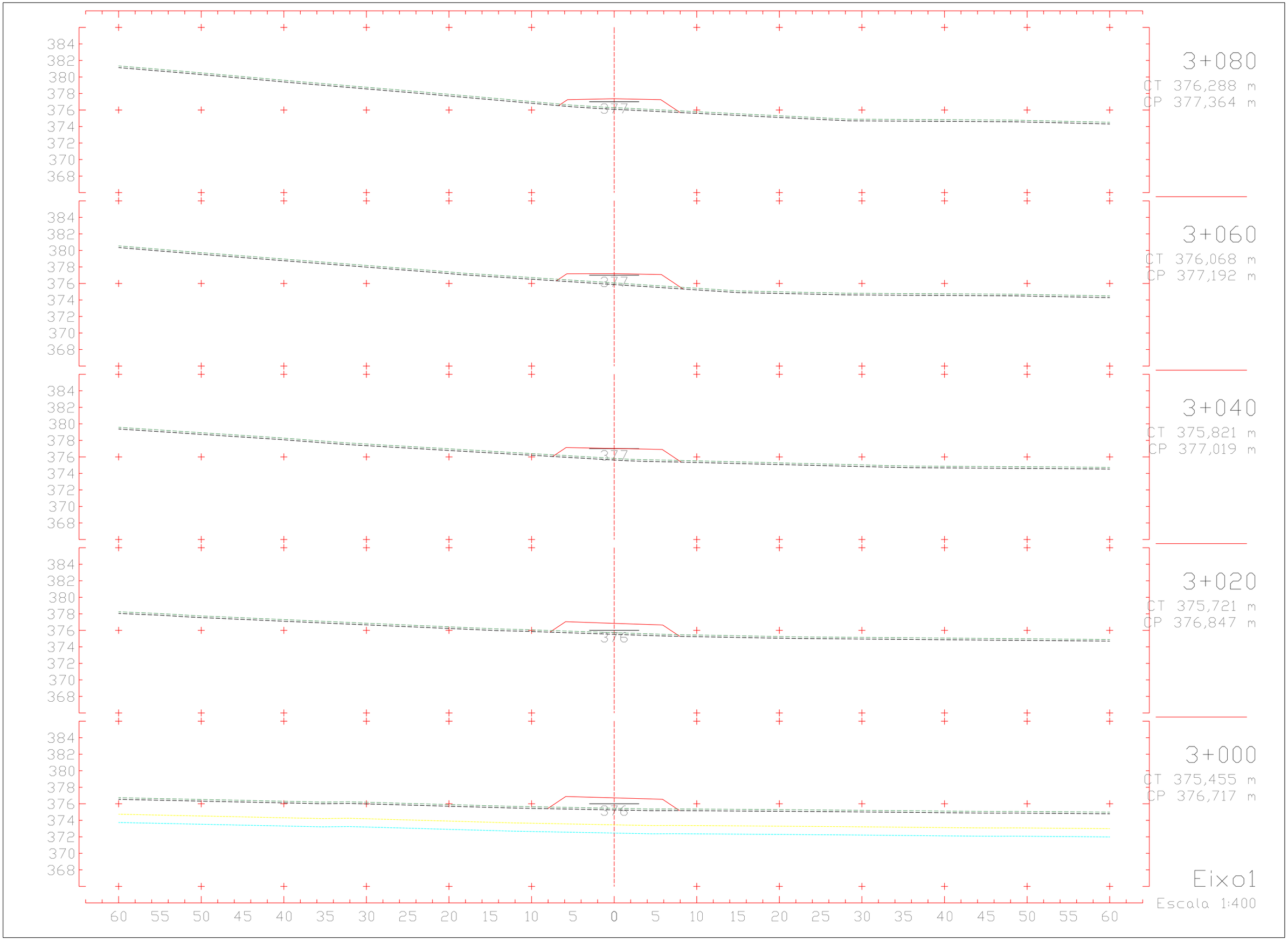

2+580
CT 389,285 m
CP 388,997 m
2+560
CT 389,417 m
CP 389,198 m
2+540
CT 389,458 m
CP 389,344 m
2+520
CT 389,538 m
CP 389,305 m
2+500
CT 390,048 m
CP 389,074 m
Eixo1
Escala 1:400
397
395
393
391
389
387
385
383
381
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

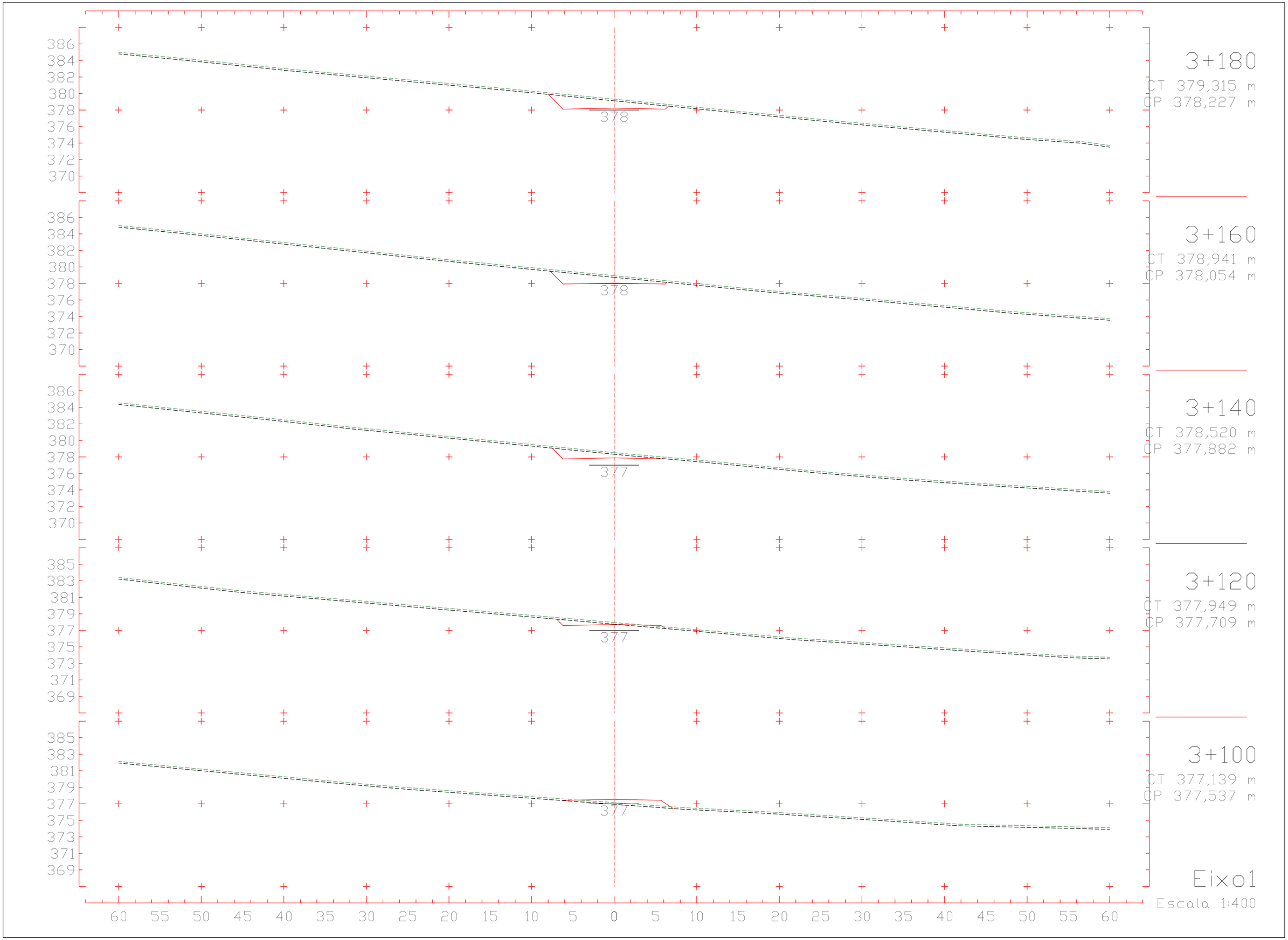

396
394
392
390
388
386
384
382
380
387
2+680
CT 389,121 m
CP 387,696 m
396
394
392
390
388
386
384
382
380
388
2+660
CT 389,282 m
CP 388,119 m
396
394
392
390
388
386
384
382
380
388
2+640
CT 389,409 m
CP 388,396 m
396
394
392
390
388
386
384
382
380
388
2+620
CT 389,330 m
CP 388,596 m
397
395
393
391
389
387
385
383
381
388
2+600
CT 389,293 m
CP 388,797 m
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
Eixo1
Escala 1:400

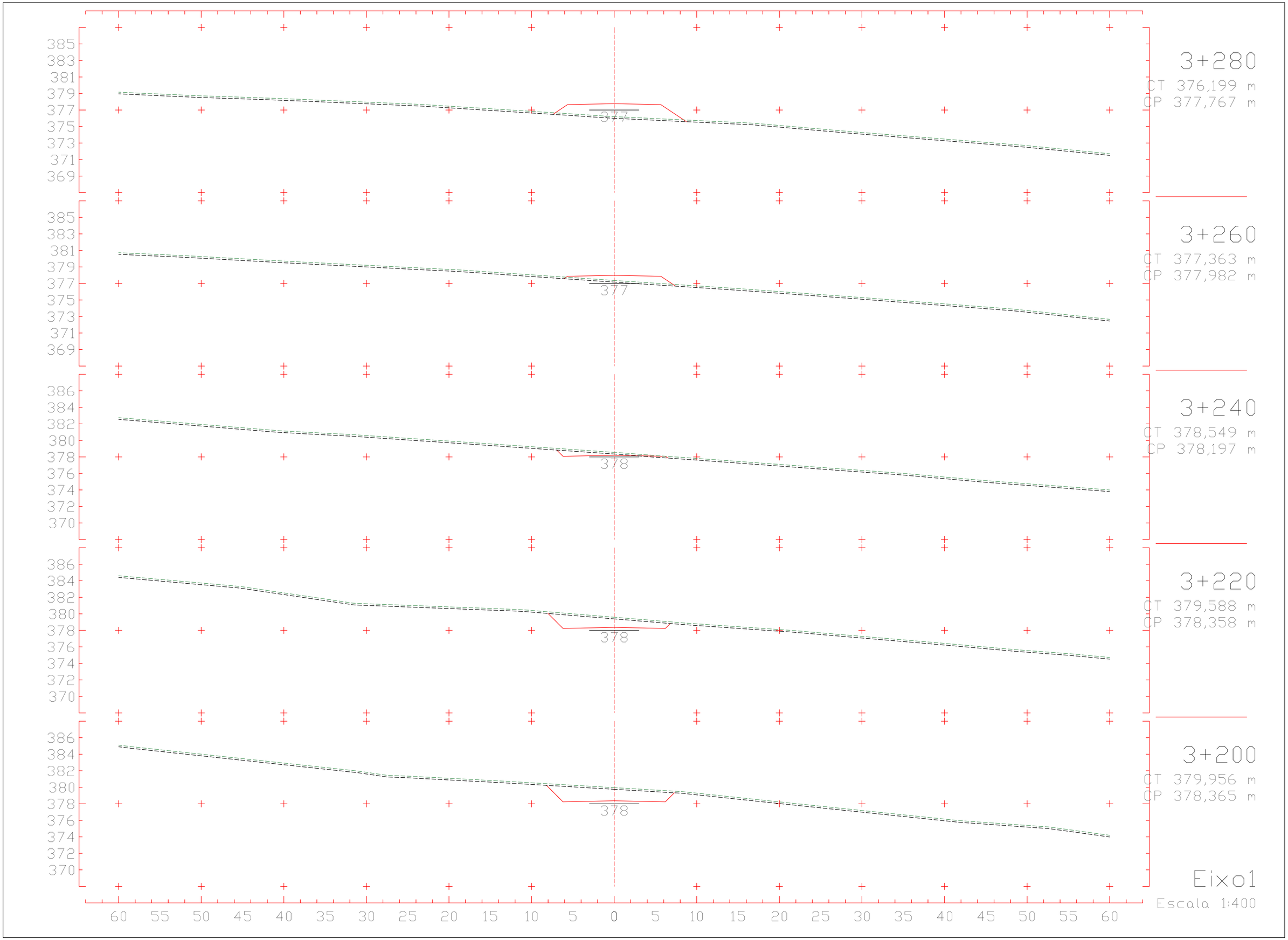

392
390
388
386
384
382
380
378
376
383
2+780
CT 385,661 m
CP 383,667 m
393
391
389
387
385
383
381
379
377
384
2+760
CT 386,654 m
CP 384,604 m
394
392
390
388
386
384
382
380
378
385
2+740
CT 387,338 m
CP 385,541 m
394
392
390
388
386
384
382
380
378
386
2+720
CT 388,288 m
CP 386,406 m
395
393
391
389
387
385
383
381
379
387
2+700
CT 388,947 m
CP 387,125 m
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
Eixo1
Escala 1:400

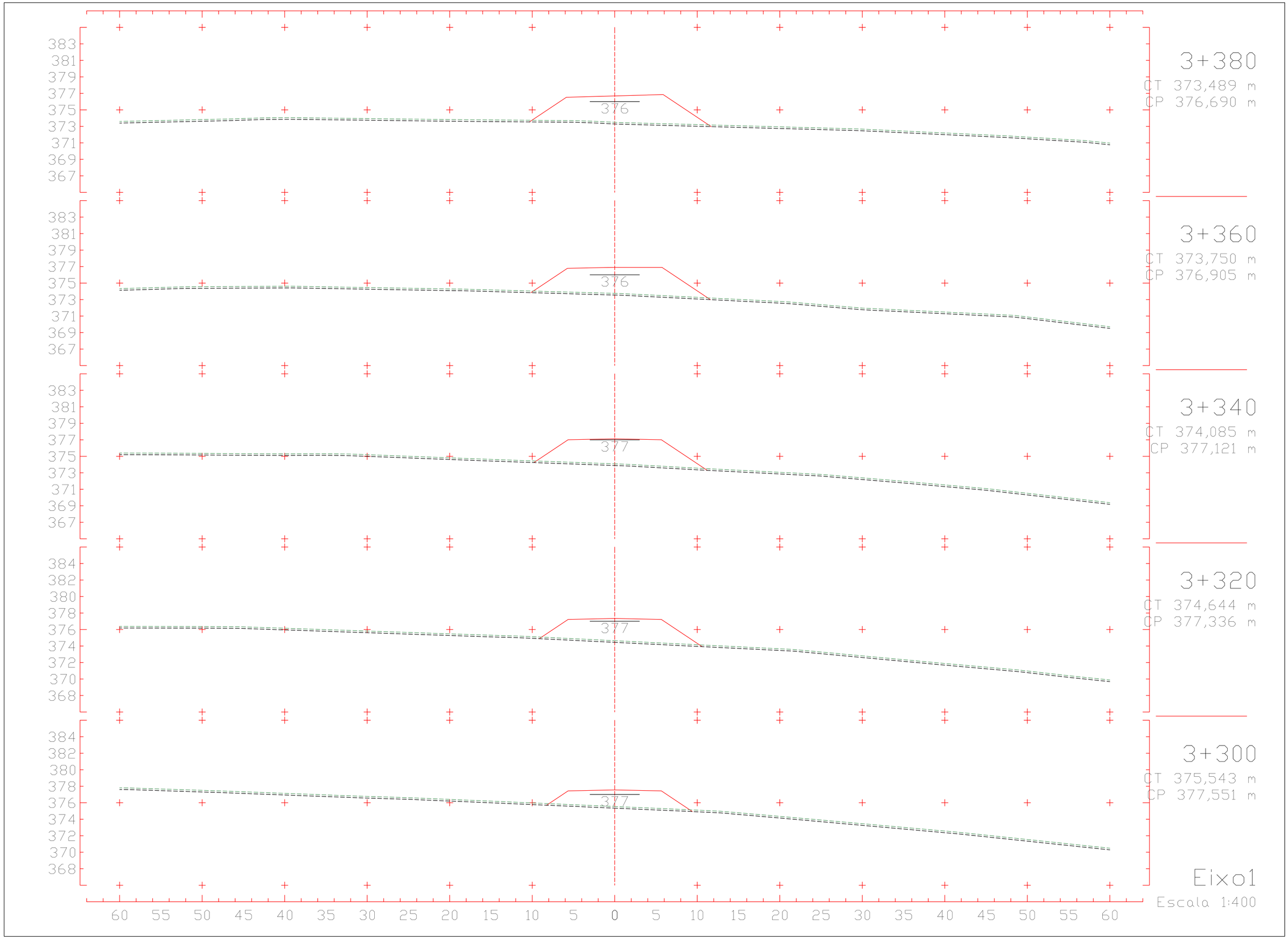

2+880
CT 379,009 m
CP 379,022 m
379
2+860
CT 380,148 m
CP 379,919 m
379
2+840
CT 381,633 m
CP 380,856 m
380
2+820
CT 382,885 m
CP 381,793 m
381
2+800
CT 384,394 m
CP 382,730 m
382
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

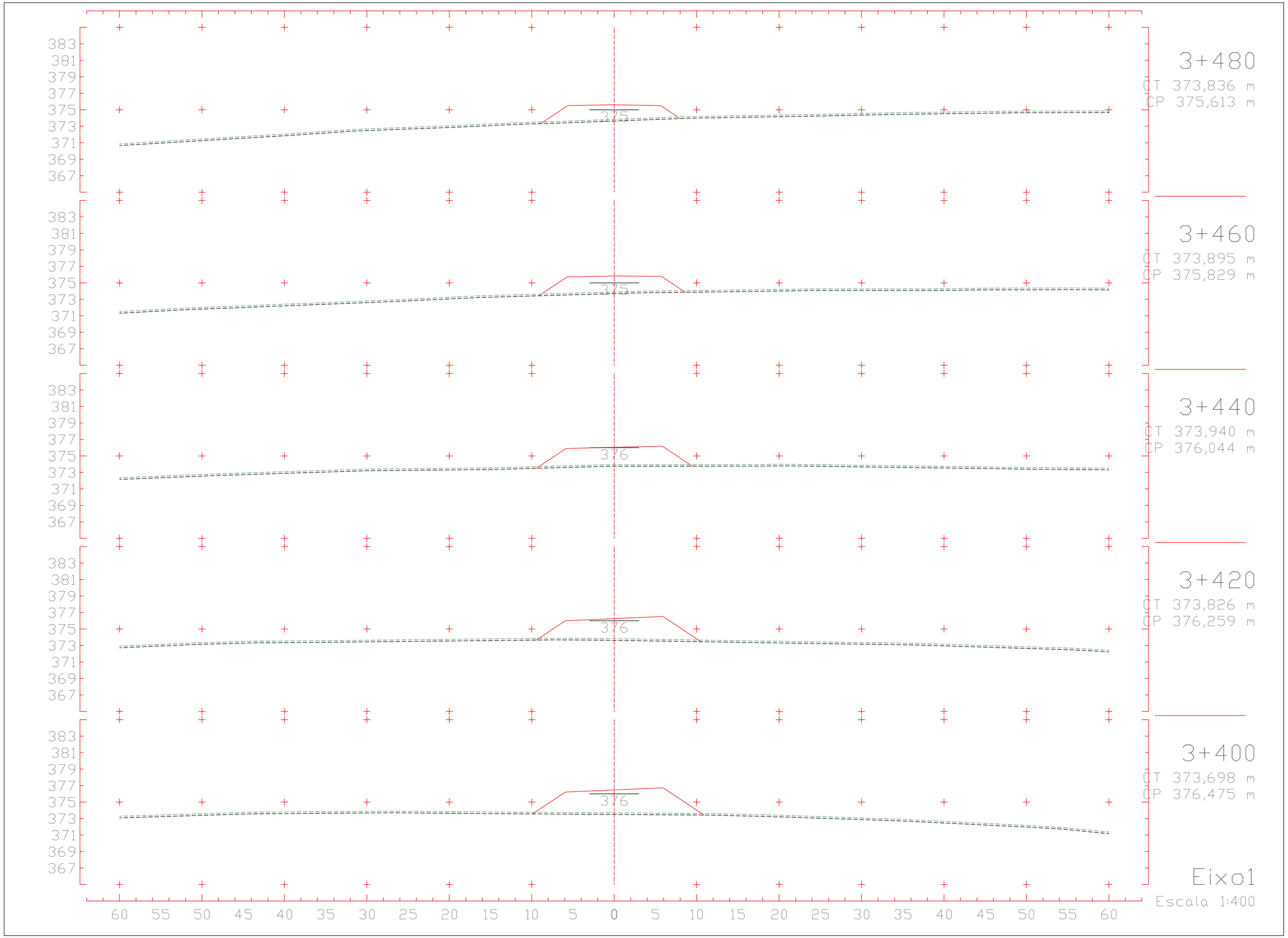

2+980
CT 375,411 m
CP 376,731 m
2+960
CT 375,590 m
CP 376,894 m
2+940
CT 376,288 m
CP 377,204 m
2+920
CT 377,046 m
CP 377,662 m
2+900
CT 378,024 m
CP 378,268 m
Eixo1
Escala 1:400

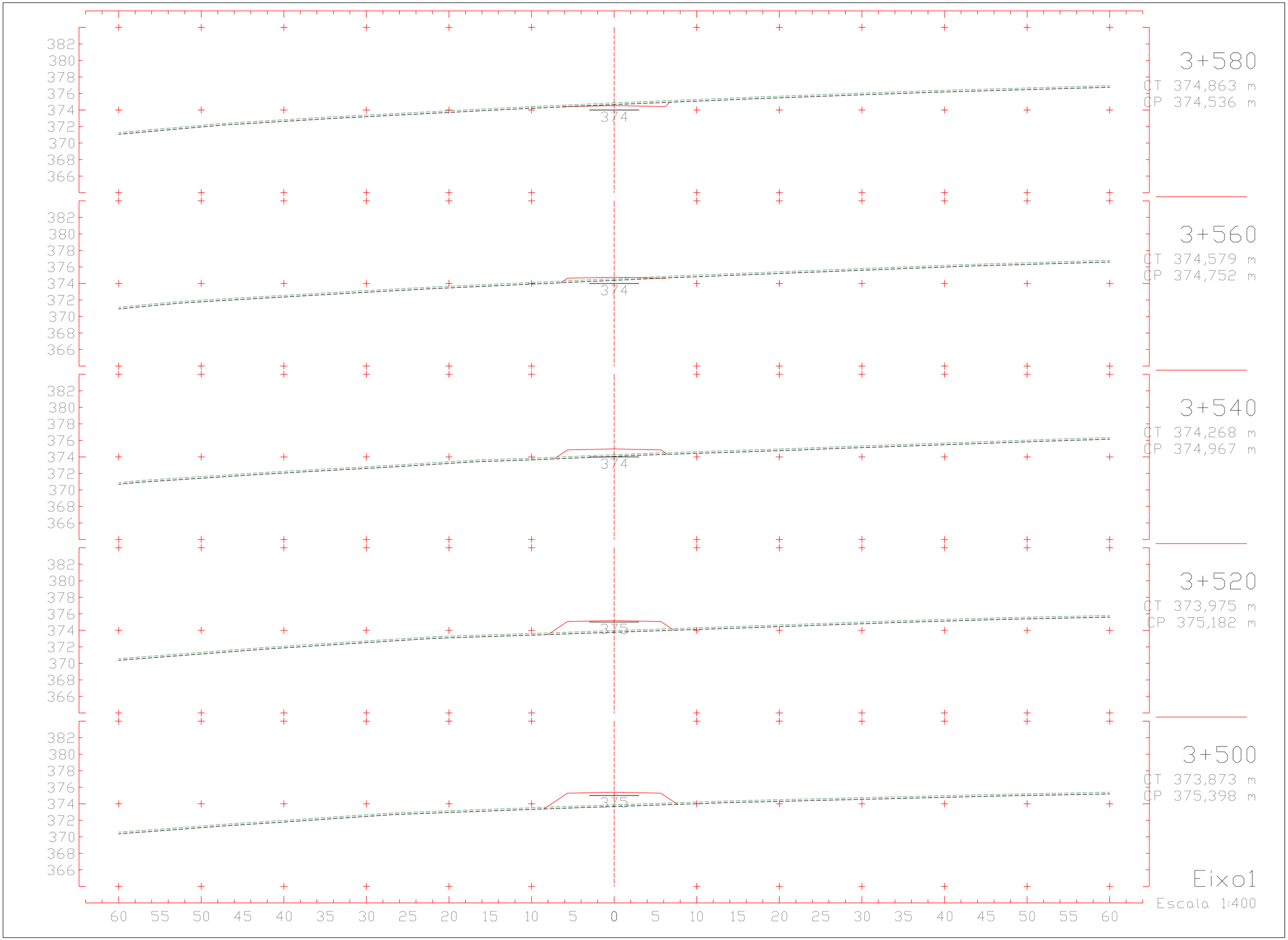

384
382
380
378
376
374
372
370
368
377
3+080
CT 376,288 m
CP 377,364 m
3+060
CT 376,068 m
CP 377,192 m
3+040
CT 375,821 m
CP 377,019 m
3+020
CT 375,721 m
CP 376,847 m
3+000
CT 375,455 m
CP 376,717 m
376
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

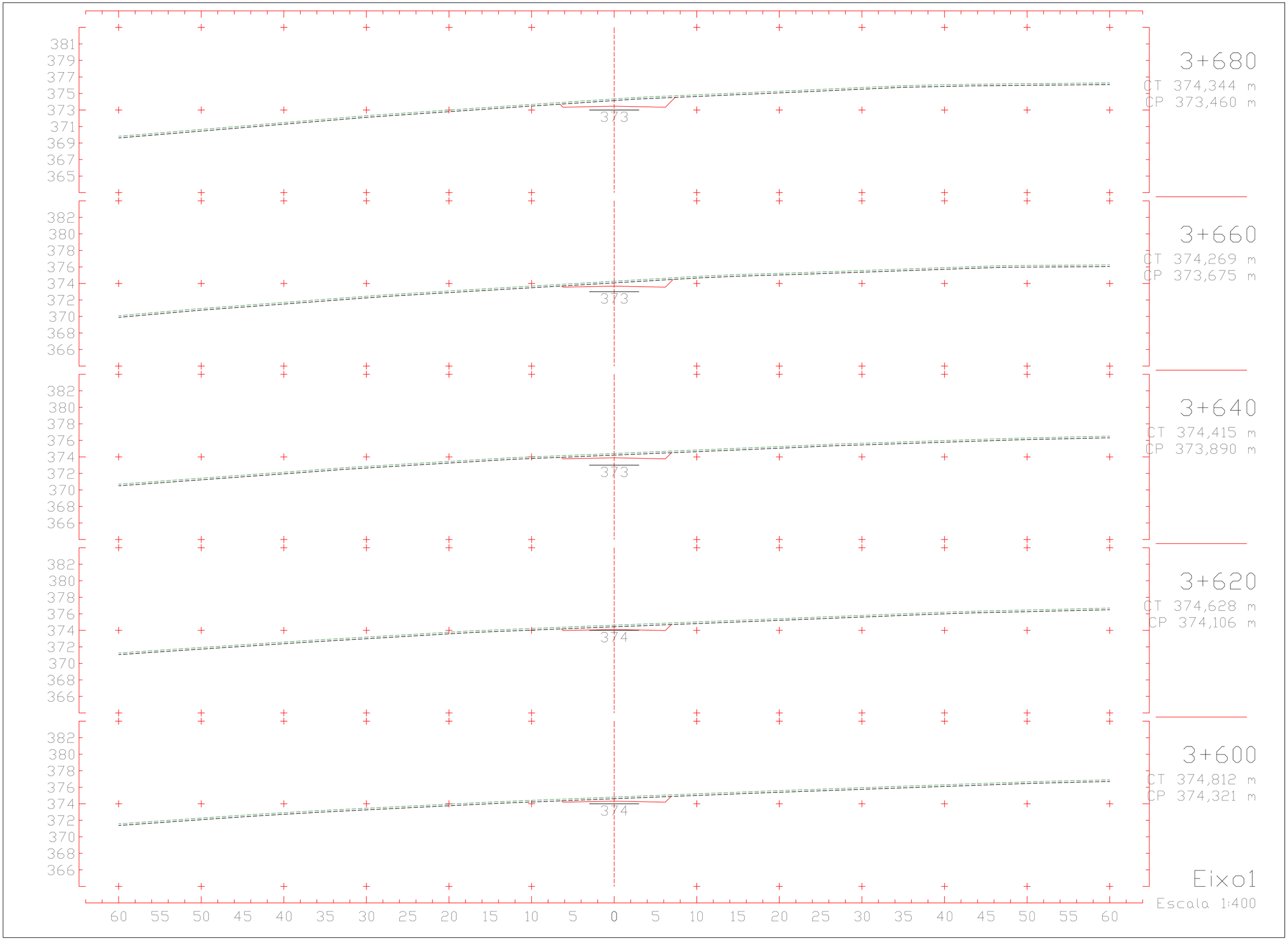

386
384
382
380
378
376
374
372
370
378
3+180
CT 379,315 m
CP 378,227 m
386
384
382
380
378
376
374
372
370
378
3+160
CT 378,941 m
CP 378,054 m
386
384
382
380
378
376
374
372
370
377
3+140
CT 378,520 m
CP 377,882 m
385
383
381
379
377
375
373
371
369
377
3+120
CT 377,949 m
CP 377,709 m
385
383
381
379
377
375
373
371
369
377
3+100
CT 377,139 m
CP 377,537 m
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
Eixo1
Escala 1:400

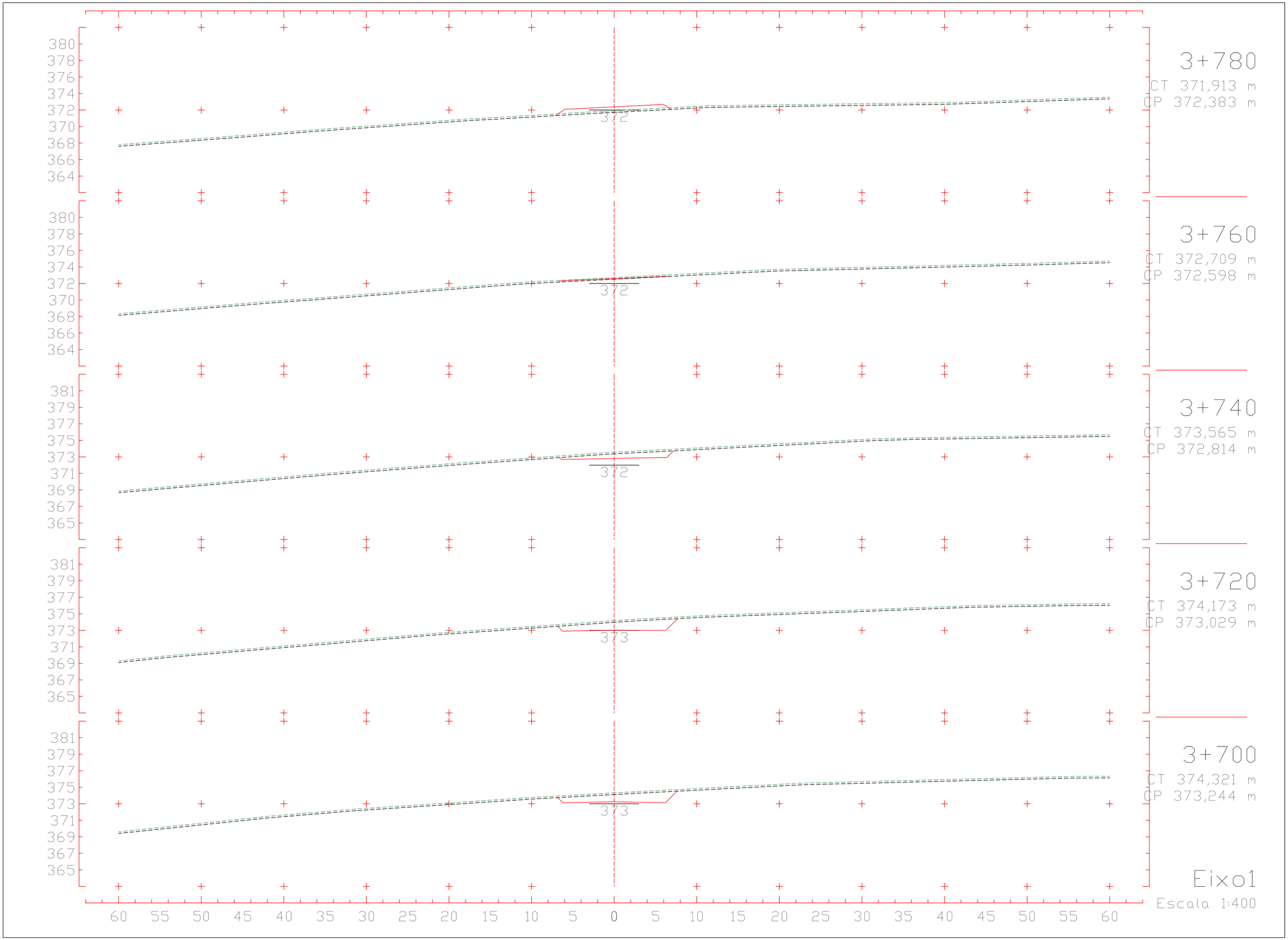

385
383
381
379
377
375
373
371
369
377
3+280
CT 376,199 m
CP 377,767 m
385
383
381
379
377
375
373
371
369
377
3+260
CT 377,363 m
CP 377,982 m
386
384
382
380
378
376
374
372
370
378
3+240
CT 378,549 m
CP 378,197 m
386
384
382
380
378
376
374
372
370
378
3+220
CT 379,588 m
CP 378,358 m
386
384
382
380
378
376
374
372
370
378
3+200
CT 379,956 m
CP 378,365 m
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
Eixo1
Escala 1:400

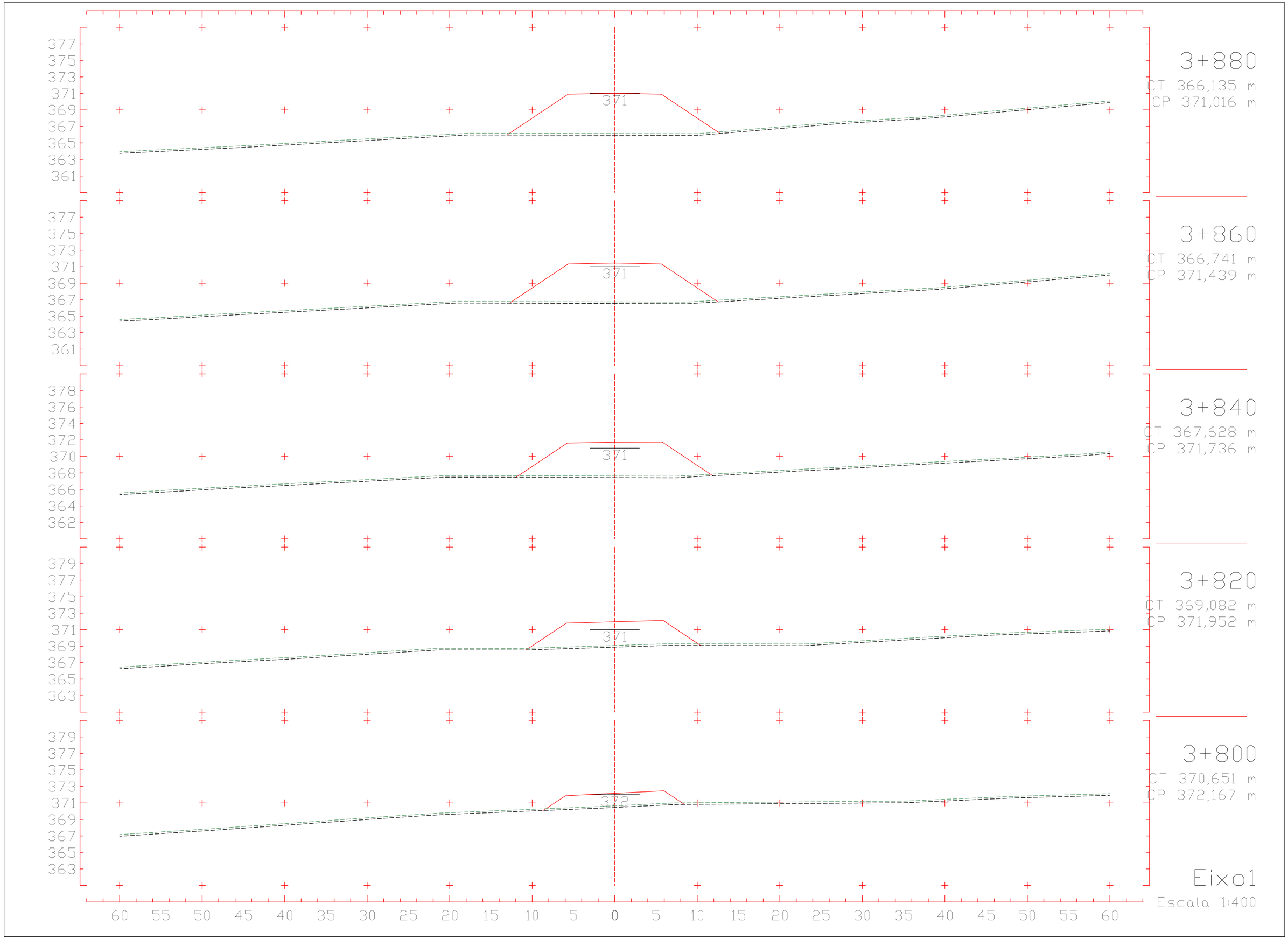

383
381
379
377
375
373
371
369
367
376
3+380
CT 373,489 m
CP 376,690 m
383
381
379
377
375
373
371
369
367
376
3+360
CT 373,750 m
CP 376,905 m
383
381
379
377
375
373
371
369
367
377
3+340
CT 374,085 m
CP 377,121 m
384
382
380
378
376
374
372
370
368
377
3+320
CT 374,644 m
CP 377,336 m
384
382
380
378
376
374
372
370
368
377
3+300
CT 375,543 m
CP 377,551 m
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
Eixo1
Escala 1:400

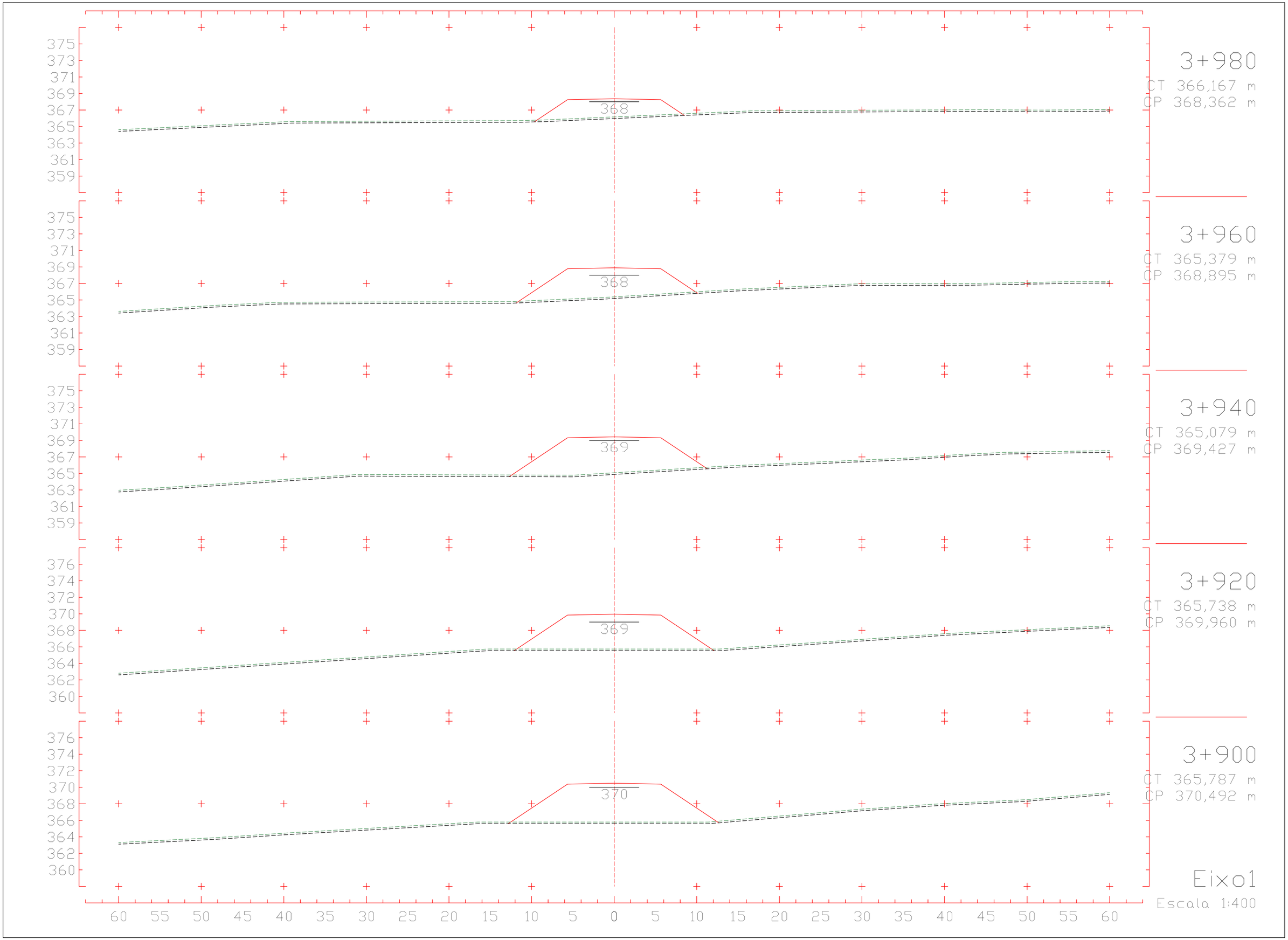

3+480
CT 373,836 m
CP 375,613 m
3+460
CT 373,895 m
CP 375,829 m
3+440
CT 373,940 m
CP 376,044 m
3+420
CT 373,826 m
CP 376,259 m
3+400
CT 373,698 m
CP 376,475 m
Eixo1
Escala 1:400
383
381
379
377
375
373
371
369
367
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

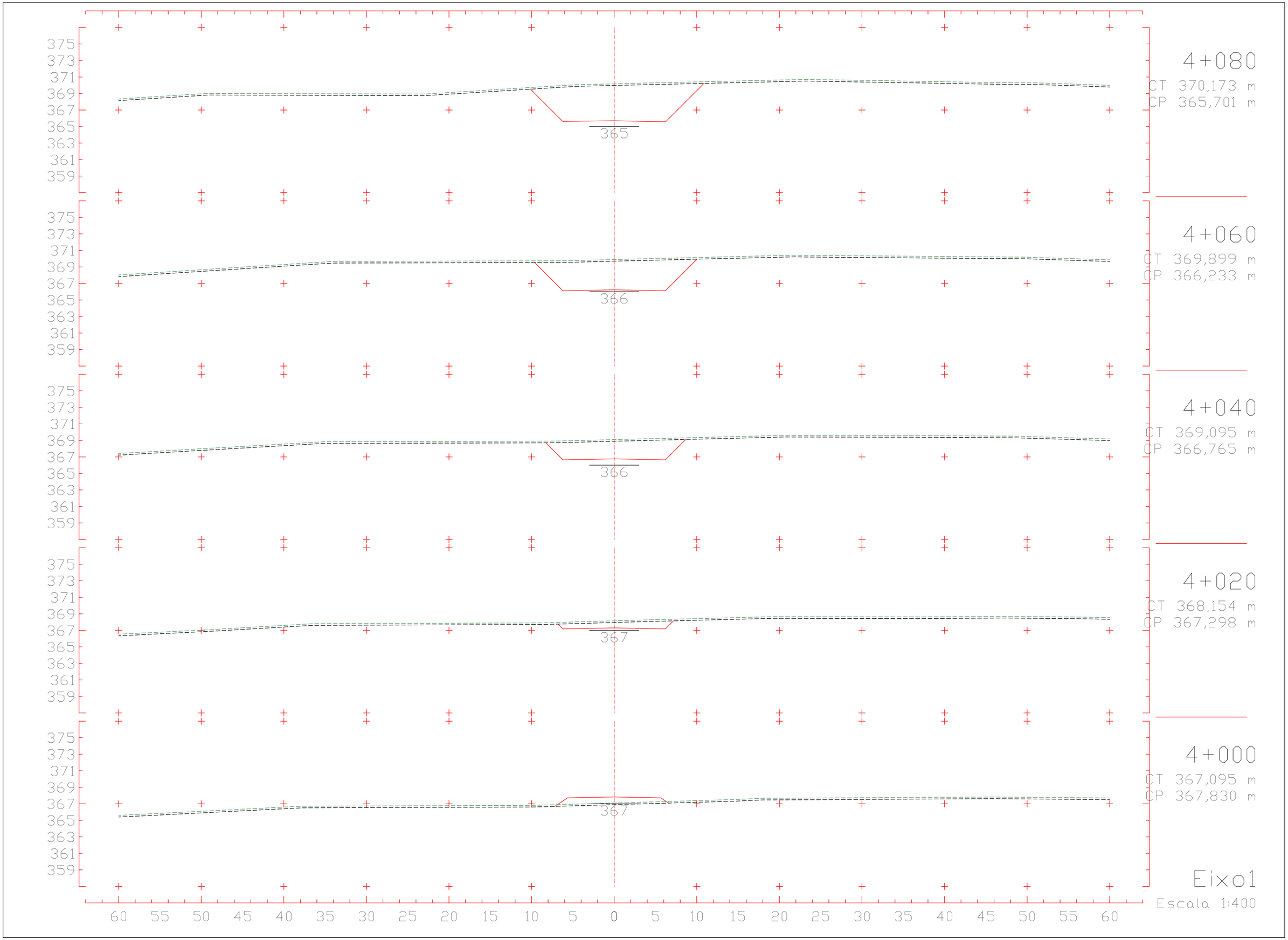

382
380
378
376
374
372
370
368
366
374
3+580
CT 374,863 m
CP 374,536 m
3+560
CT 374,579 m
CP 374,752 m
3+540
CT 374,268 m
CP 374,967 m
375
3+520
CT 373,975 m
CP 375,182 m
3+500
CT 373,873 m
CP 375,398 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

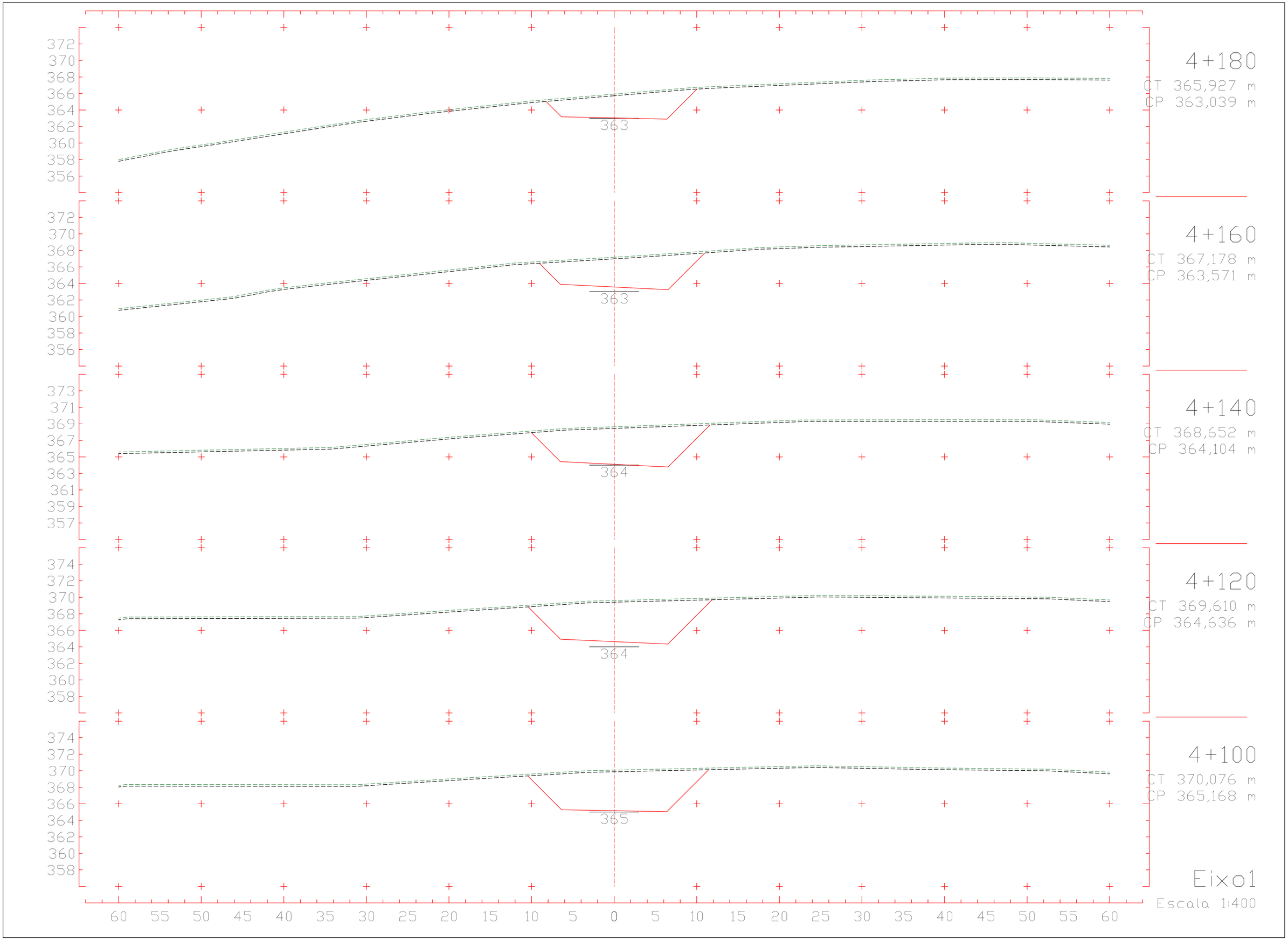

381
379
377
375
373
371
369
367
365
373
3+680
CT 374,344 m
CP 373,460 m
382
380
378
376
374
372
370
368
366
373
3+660
CT 374,269 m
CP 373,675 m
382
380
378
376
374
372
370
368
366
373
3+640
CT 374,415 m
CP 373,890 m
382
380
378
376
374
372
370
368
366
374
3+620
CT 374,628 m
CP 374,106 m
382
380
378
376
374
372
370
368
366
374
3+600
CT 374,812 m
CP 374,321 m
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
Eixo1
Escala 1:400

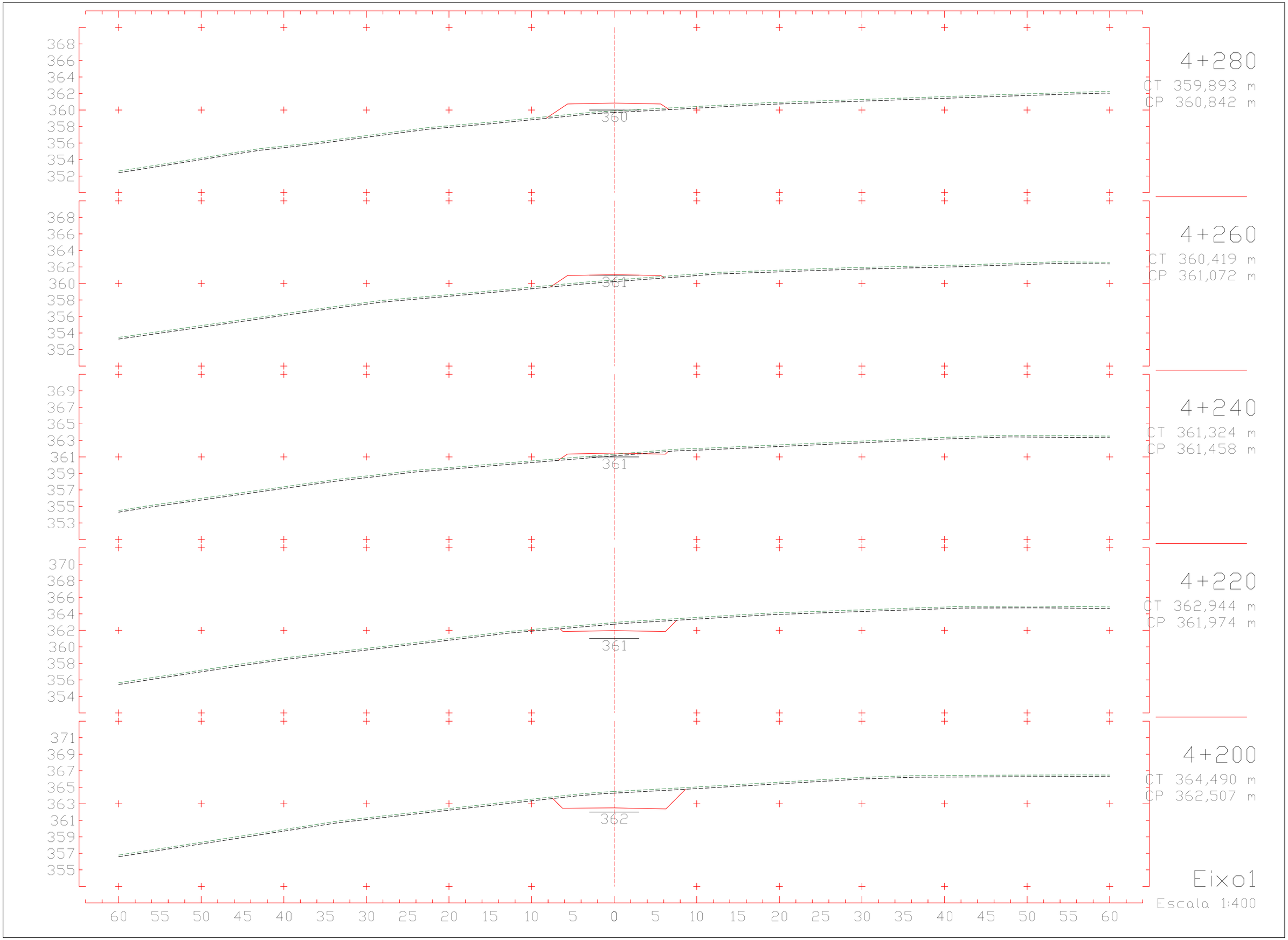

380
378
376
374
372
370
368
366
364
372
3+780
CT 371,913 m
CP 372,383 m
380
378
376
374
372
370
368
366
364
372
3+760
CT 372,709 m
CP 372,598 m
381
379
377
375
373
371
369
367
365
372
3+740
CT 373,565 m
CP 372,814 m
381
379
377
375
373
371
369
367
365
373
3+720
CT 374,173 m
CP 373,029 m
381
379
377
375
373
371
369
367
365
373
3+700
CT 374,321 m
CP 373,244 m
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
Eixo1
Escala 1:400

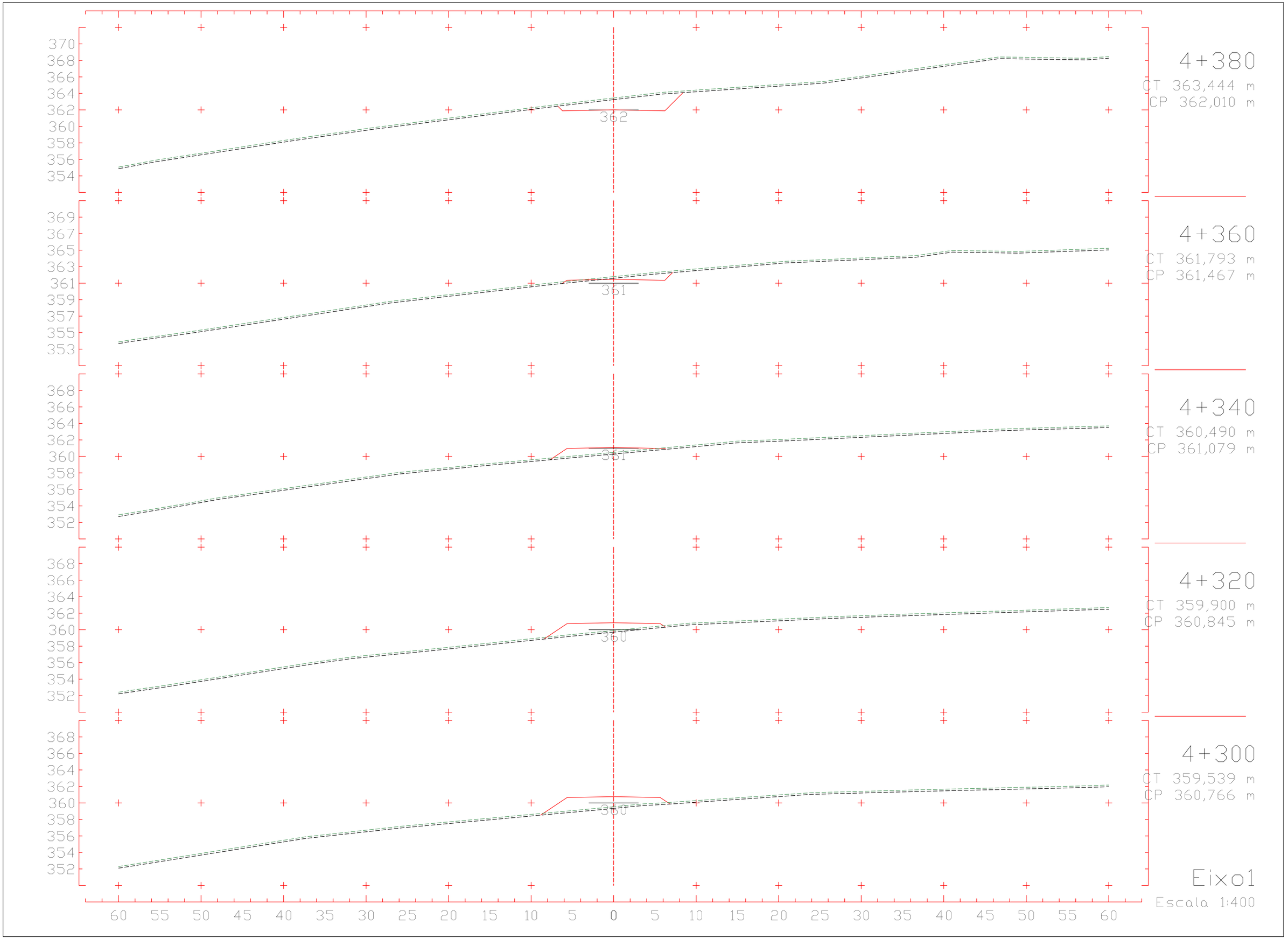

377
375
373
371
369
367
365
363
361
371
3+880
CT 366,135 m
CP 371,016 m
377
375
373
371
369
367
365
363
361
371
3+860
CT 366,741 m
CP 371,439 m
378
376
374
372
370
368
366
364
362
371
3+840
CT 367,628 m
CP 371,736 m
379
377
375
373
371
369
367
365
363
371
3+820
CT 369,082 m
CP 371,952 m
379
377
375
373
371
369
367
365
363
372
3+800
CT 370,651 m
CP 372,167 m
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
Eixo1
Escala 1:400

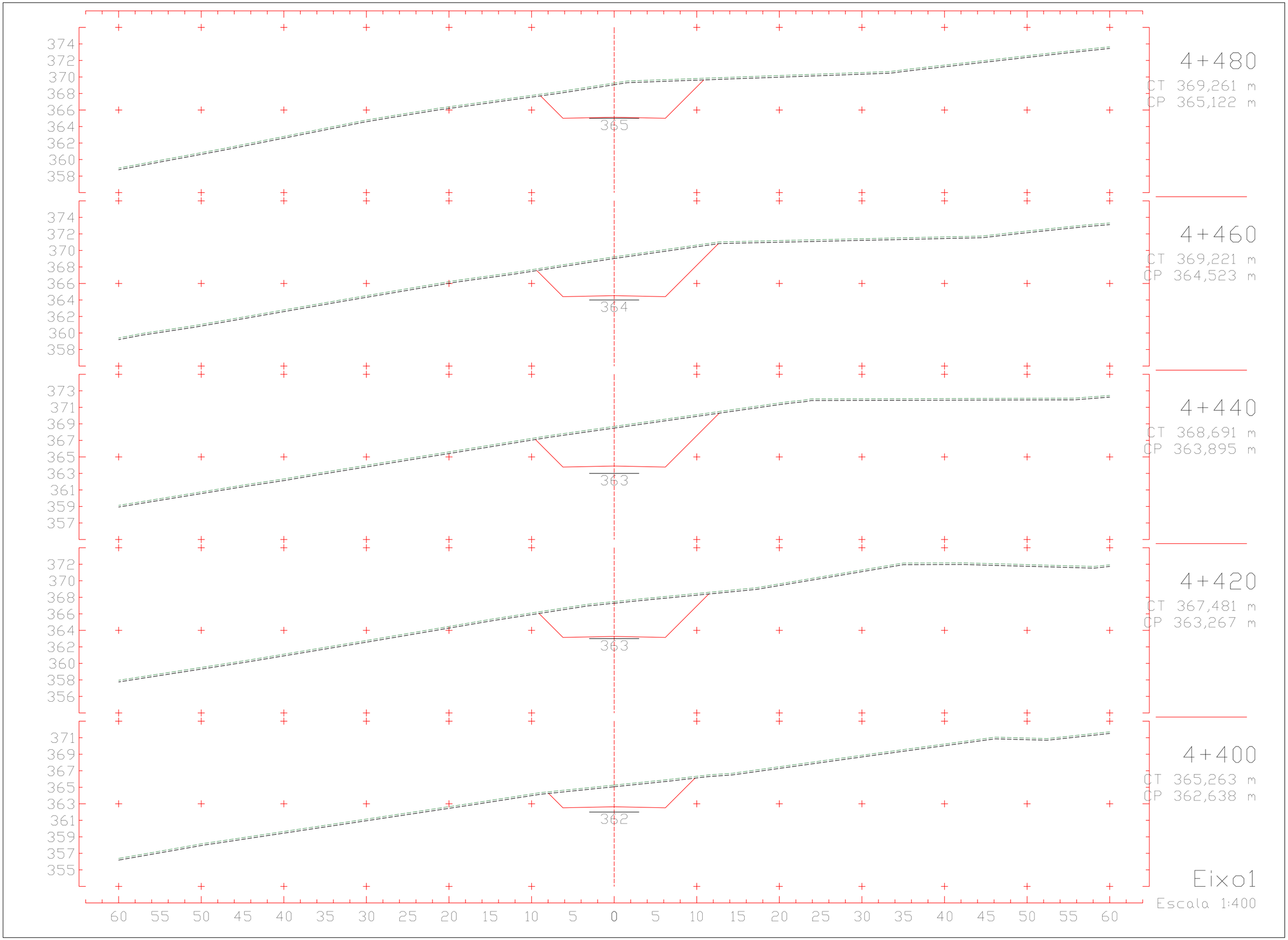

375
373
371
369
367
365
363
361
359
368
3+980
CT 366,167 m
CP 368,362 m
375
373
371
369
367
365
363
361
359
368
3+960
CT 365,379 m
CP 368,895 m
375
373
371
369
367
365
363
361
359
369
3+940
CT 365,079 m
CP 369,427 m
376
374
372
370
368
366
364
362
360
369
3+920
CT 365,738 m
CP 369,960 m
376
374
372
370
368
366
364
362
360
370
3+900
CT 365,787 m
CP 370,492 m
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
Eixo1
Escala 1:400

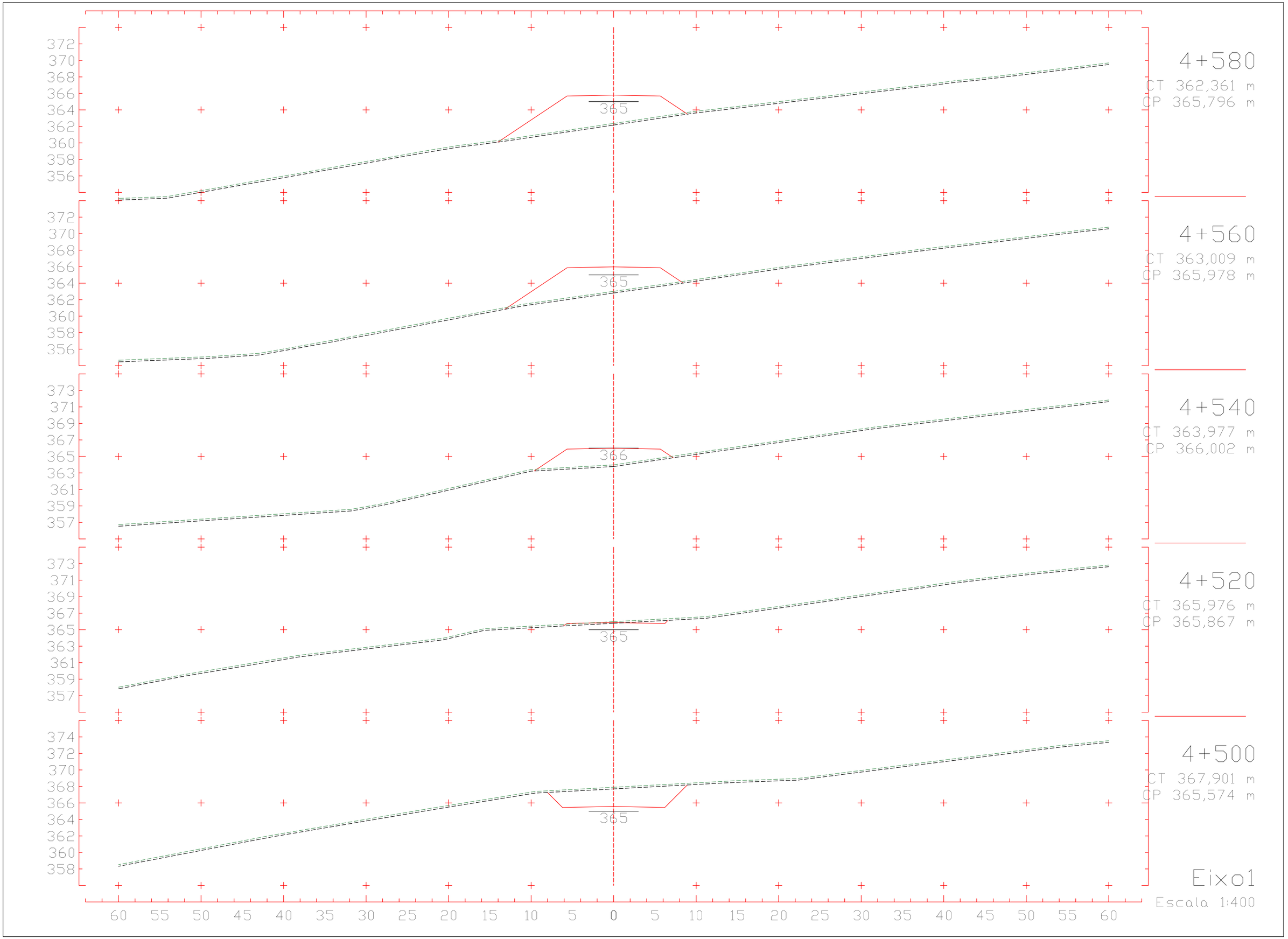

375
373
371
369
367
365
363
361
359
365
4+080
CT 370,173 m
CP 365,701 m
366
4+060
CT 369,899 m
CP 366,233 m
366
4+040
CT 369,095 m
CP 366,765 m
367
4+020
CT 368,154 m
CP 367,298 m
367
4+000
CT 367,095 m
CP 367,830 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

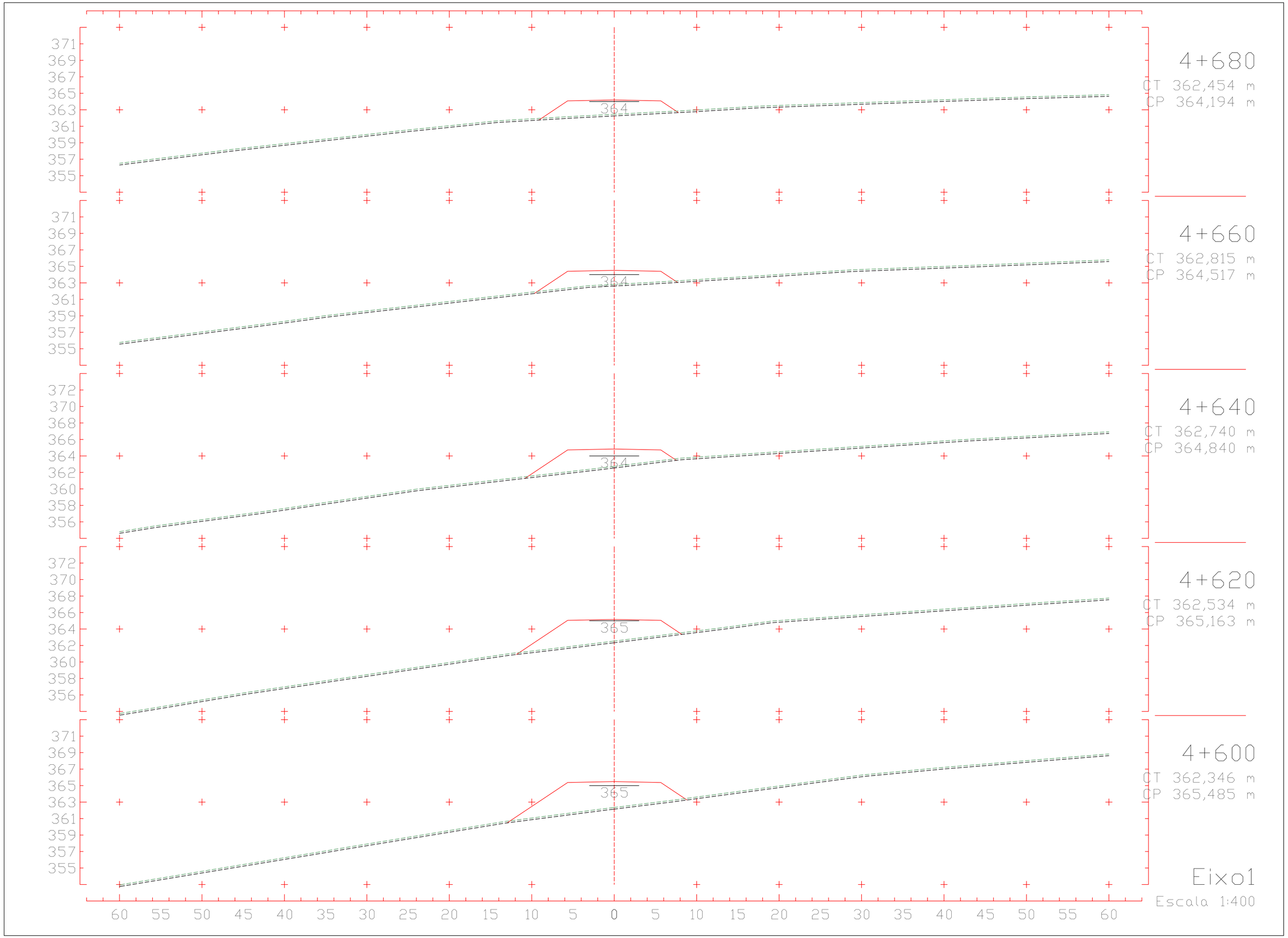

372
370
368
366
364
362
360
358
356
363
4+180
CT 365,927 m
CP 363,039 m
372
370
368
366
364
362
360
358
356
363
4+160
CT 367,178 m
CP 363,571 m
373
371
369
367
365
363
361
359
357
364
4+140
CT 368,652 m
CP 364,104 m
374
372
370
368
366
364
362
360
358
364
4+120
CT 369,610 m
CP 364,636 m
374
372
370
368
366
364
362
360
358
365
4+100
CT 370,076 m
CP 365,168 m
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
Eixo1
Escala 1:400

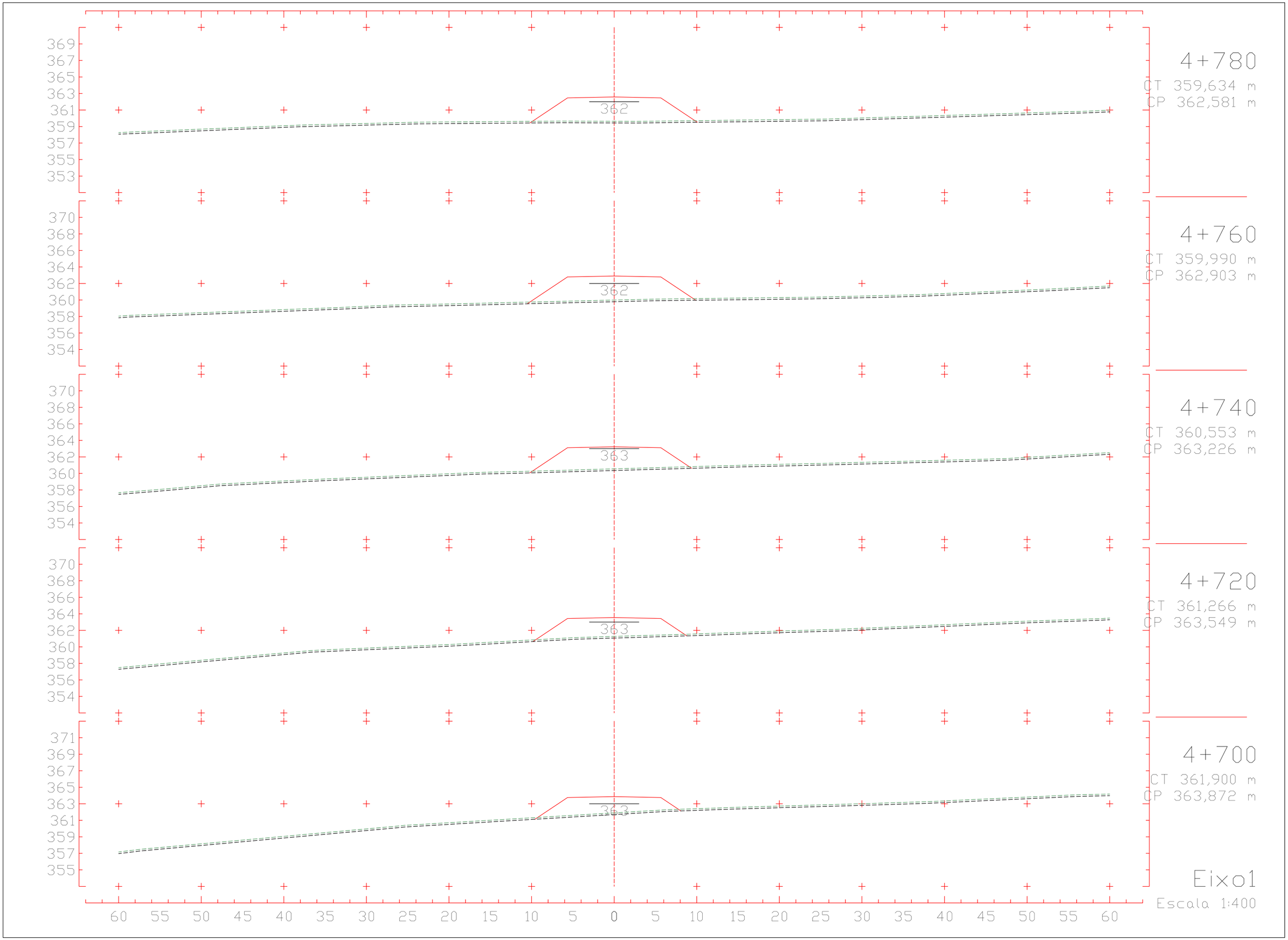

368
366
364
362
360
358
356
354
352
360
4+280
CT 359,893 m
CP 360,842 m
368
366
364
362
360
358
356
354
352
361
4+260
CT 360,419 m
CP 361,072 m
369
367
365
363
361
359
357
355
353
361
4+240
CT 361,324 m
CP 361,458 m
370
368
366
364
362
360
358
356
354
361
4+220
CT 362,944 m
CP 361,974 m
371
369
367
365
363
361
359
357
355
362
4+200
CT 364,490 m
CP 362,507 m
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
Eixo1
Escala 1:400

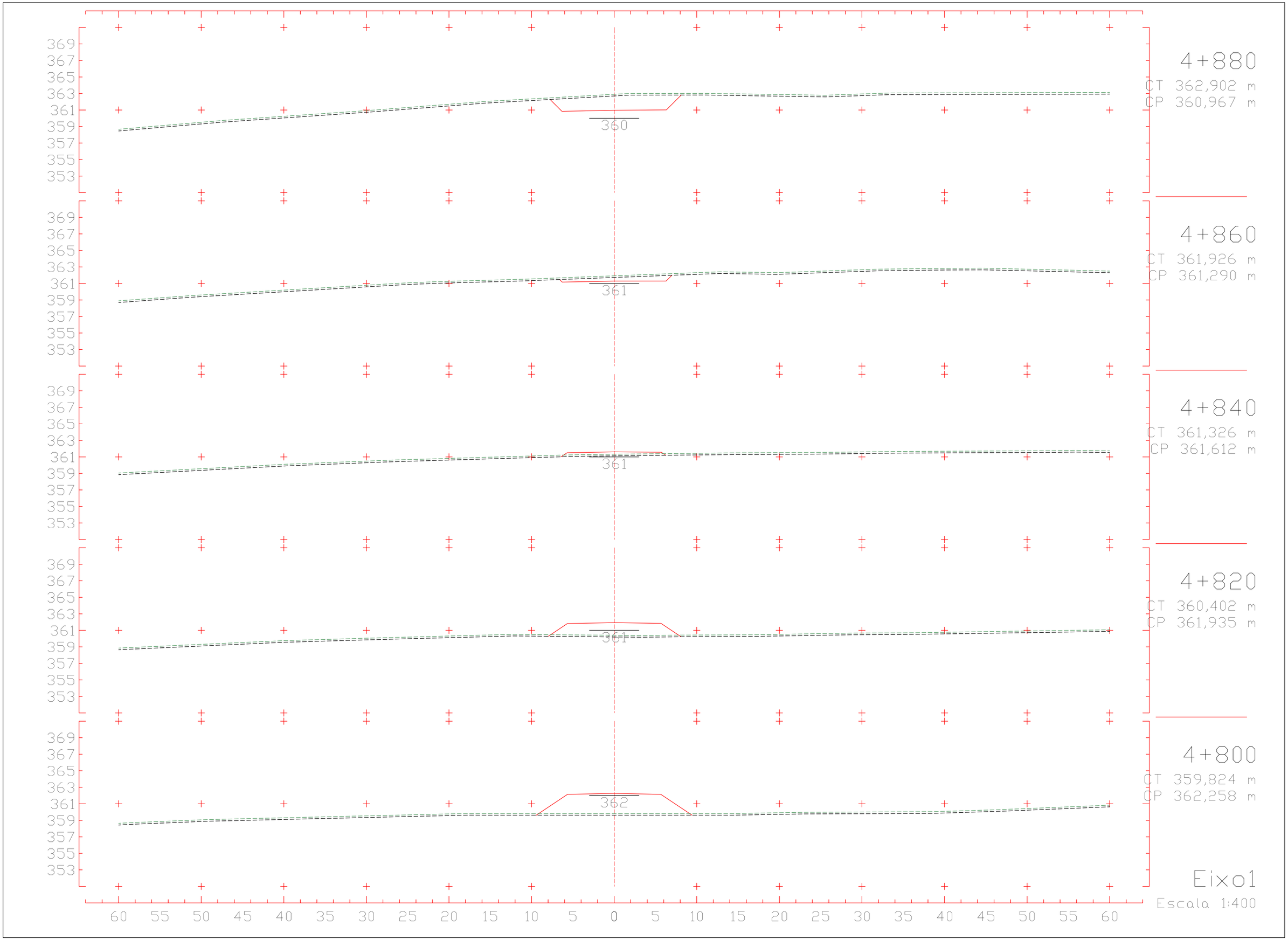

370
368
366
364
362
360
358
356
354
362
4+380
CT 363,444 m
CP 362,010 m
369
367
365
363
361
359
357
355
353
361
4+360
CT 361,793 m
CP 361,467 m
368
366
364
362
360
358
356
354
352
361
4+340
CT 360,490 m
CP 361,079 m
368
366
364
362
360
358
356
354
352
360
4+320
CT 359,900 m
CP 360,845 m
368
366
364
362
360
358
356
354
352
360
4+300
CT 359,539 m
CP 360,766 m
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
Eixo1
Escala 1:400

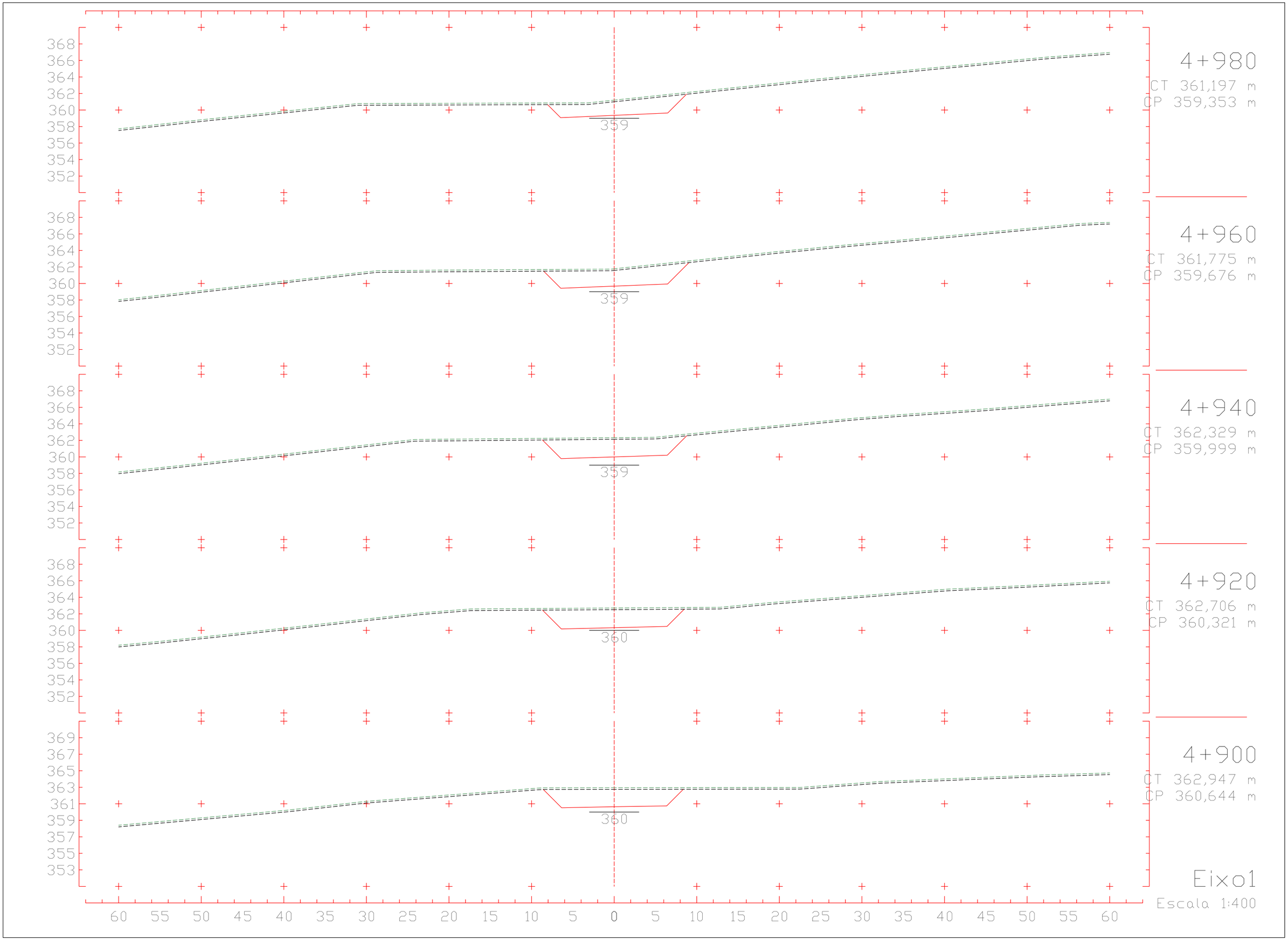

374
372
370
368
366
364
362
360
358
365
4+480
CT 369,261 m
CP 365,122 m
374
372
370
368
366
364
362
360
358
364
4+460
CT 369,221 m
CP 364,523 m
373
371
369
367
365
363
361
359
357
363
4+440
CT 368,691 m
CP 363,895 m
372
370
368
366
364
362
360
358
356
363
4+420
CT 367,481 m
CP 363,267 m
371
369
367
365
363
361
359
357
355
362
4+400
CT 365,263 m
CP 362,638 m
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
Eixo1
Escala 1:400

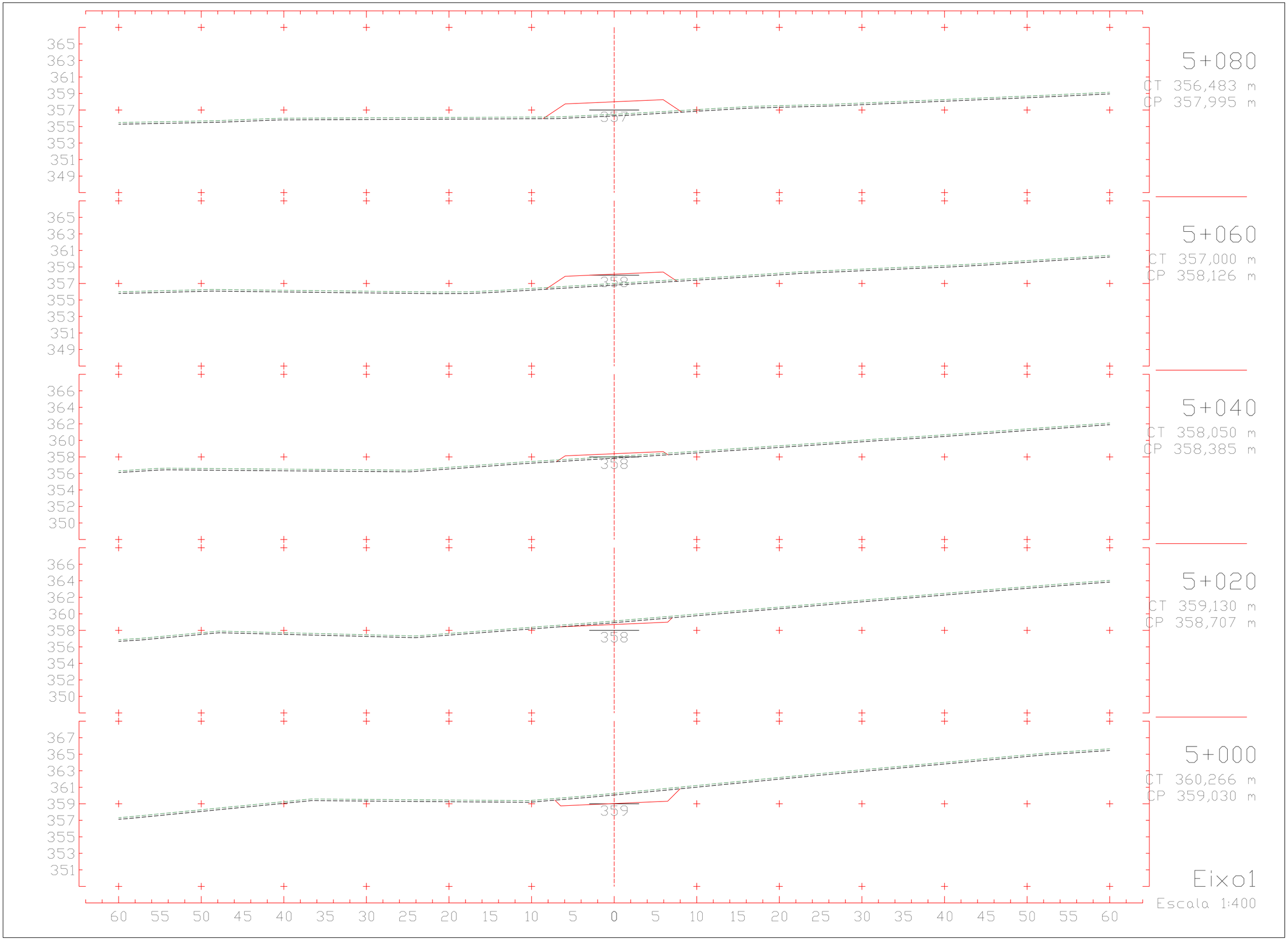

372
370
368
366
364
362
360
358
356
365
4+580
CT 362,361 m
CP 365,796 m
372
370
368
366
364
362
360
358
356
365
4+560
CT 363,009 m
CP 365,978 m
373
371
369
367
365
363
361
359
357
366
4+540
CT 363,977 m
CP 366,002 m
373
371
369
367
365
363
361
359
357
365
4+520
CT 365,976 m
CP 365,867 m
374
372
370
368
366
364
362
360
358
365
4+500
CT 367,901 m
CP 365,574 m
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
Eixo1
Escala 1:400

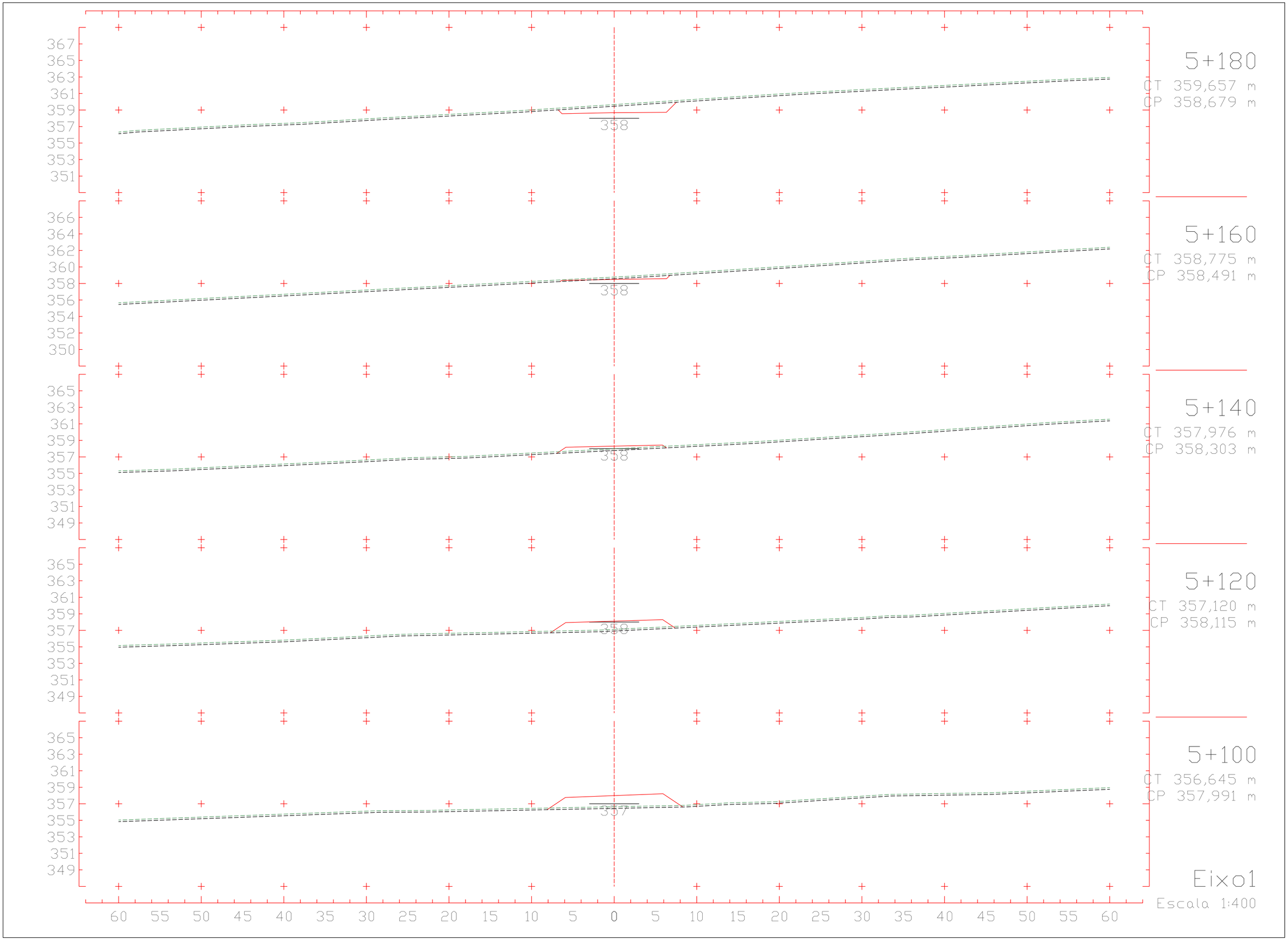

4+680
CT 362,454 m
CP 364,194 m
4+660
CT 362,815 m
CP 364,517 m
4+640
CT 362,740 m
CP 364,840 m
4+620
CT 362,534 m
CP 365,163 m
4+600
CT 362,346 m
CP 365,485 m
Eixo1
Escala 1:400

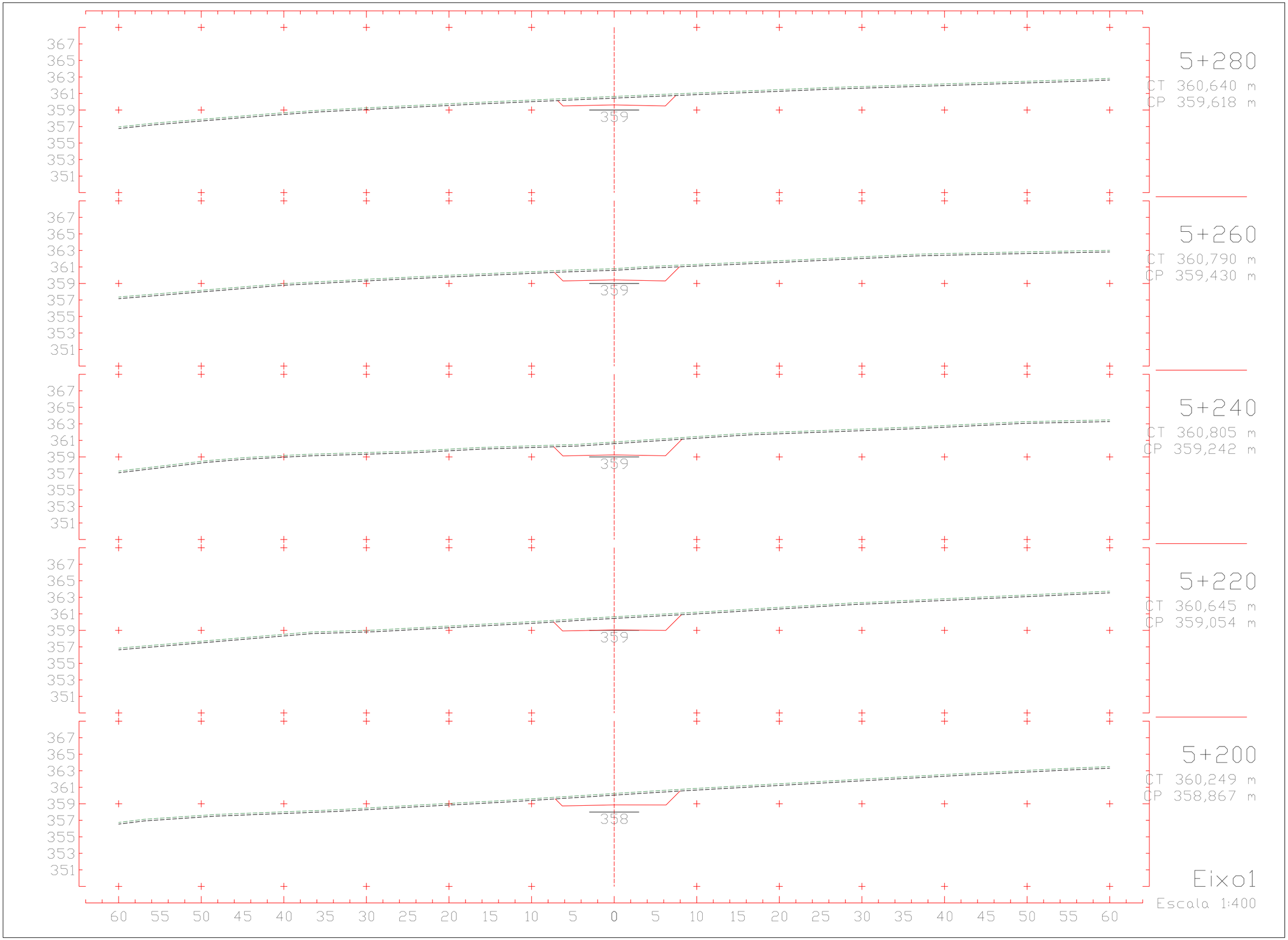

369
367
365
363
361
359
357
355
353
362
4+780
CT 359,634 m
CP 362,581 m
370
368
366
364
362
360
358
356
354
362
4+760
CT 359,990 m
CP 362,903 m
370
368
366
364
362
360
358
356
354
363
4+740
CT 360,553 m
CP 363,226 m
370
368
366
364
362
360
358
356
354
363
4+720
CT 361,266 m
CP 363,549 m
371
369
367
365
363
361
359
357
355
363
4+700
CT 361,900 m
CP 363,872 m
Eixo1
Escala 1:400
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

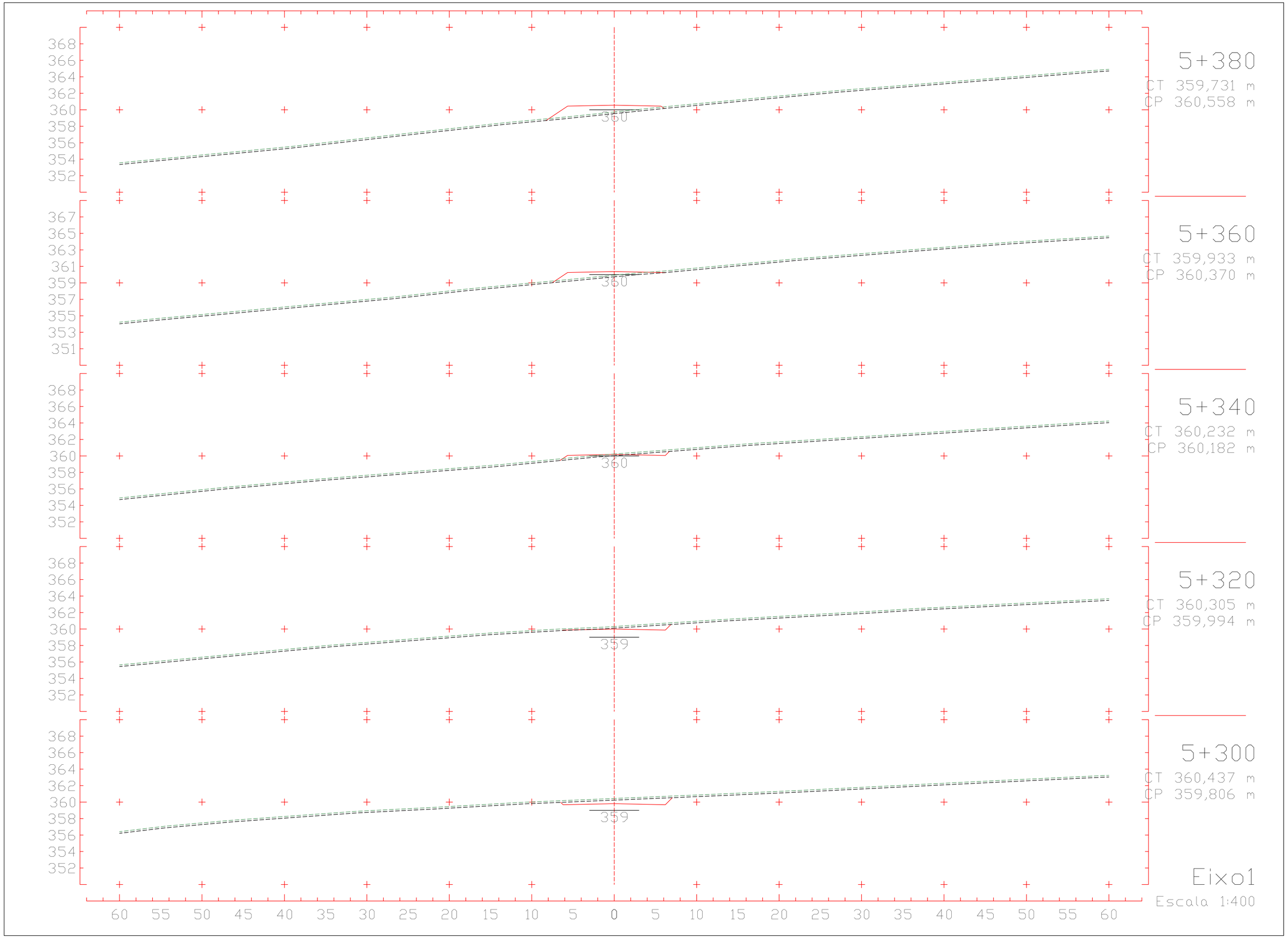

369
367
365
363
361
359
357
355
353
360
4+880
CT 362,902 m
CP 360,967 m
361
4+860
CT 361,926 m
CP 361,290 m
361
4+840
CT 361,326 m
CP 361,612 m
361
4+820
CT 360,402 m
CP 361,935 m
362
4+800
CT 359,824 m
CP 362,258 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

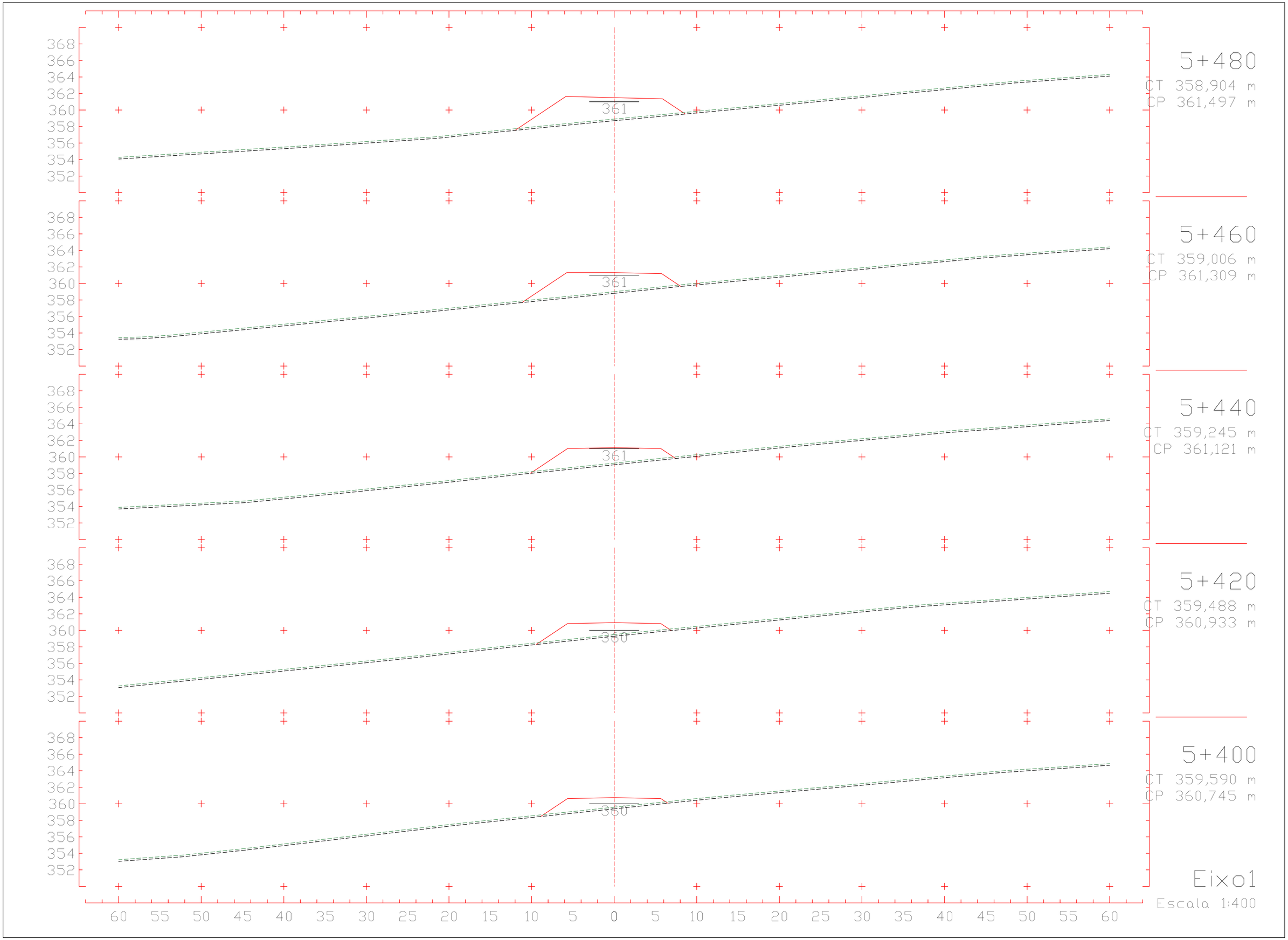

368
366
364
362
360
358
356
354
352
359
4+980
CT 361,197 m
CP 359,353 m
368
366
364
362
360
358
356
354
352
359
4+960
CT 361,775 m
CP 359,676 m
368
366
364
362
360
358
356
354
352
359
4+940
CT 362,329 m
CP 359,999 m
368
366
364
362
360
358
356
354
352
360
4+920
CT 362,706 m
CP 360,321 m
369
367
365
363
361
359
357
355
353
360
4+900
CT 362,947 m
CP 360,644 m
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
Eixo1
Escala 1:400

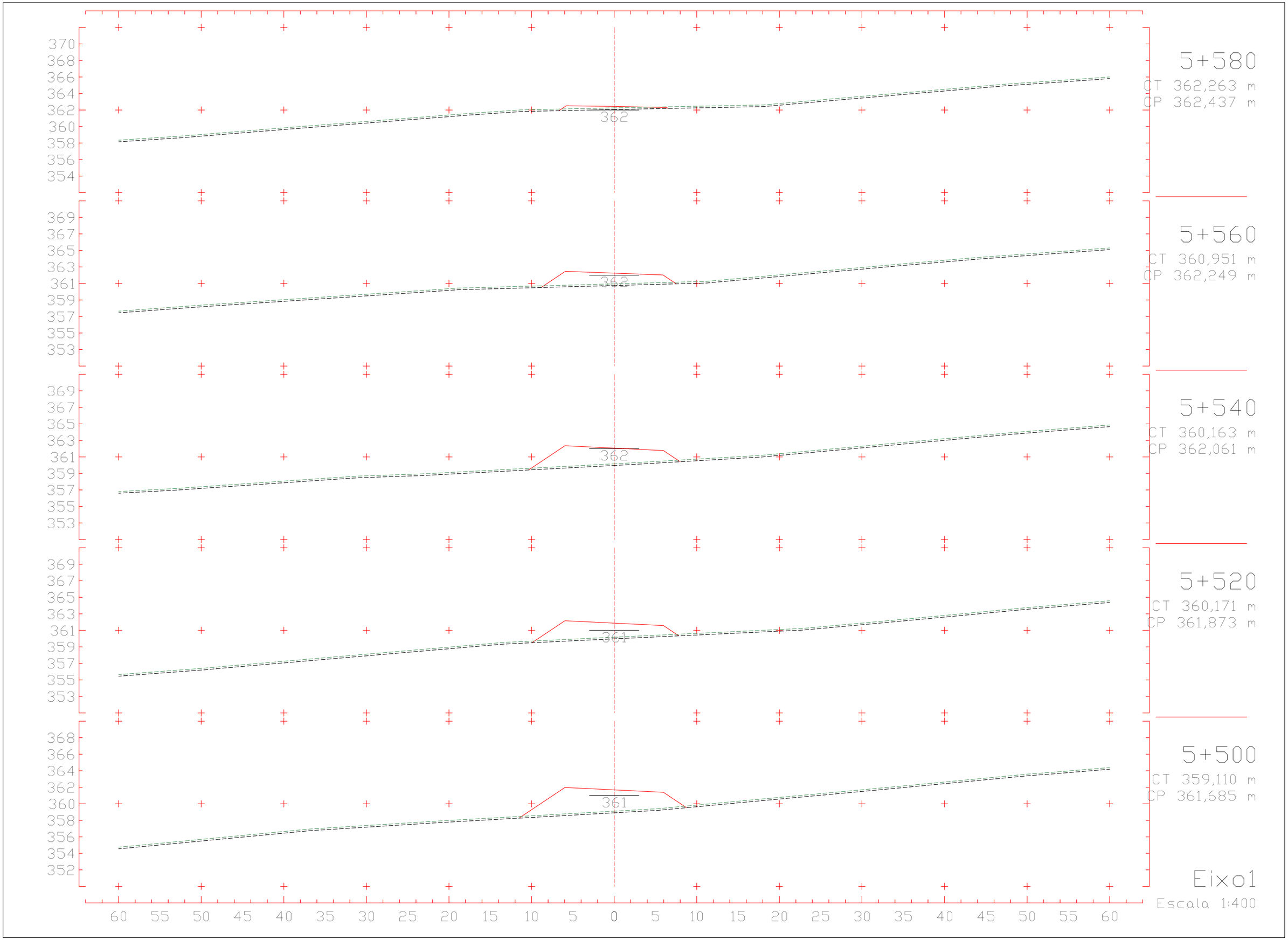

5+080
CT 356,483 m
CP 357,995 m
5+060
CT 357,000 m
CP 358,126 m
5+040
CT 358,050 m
CP 358,385 m
5+020
CT 359,130 m
CP 358,707 m
5+000
CT 360,266 m
CP 359,030 m
Eixo1
Escala 1:400

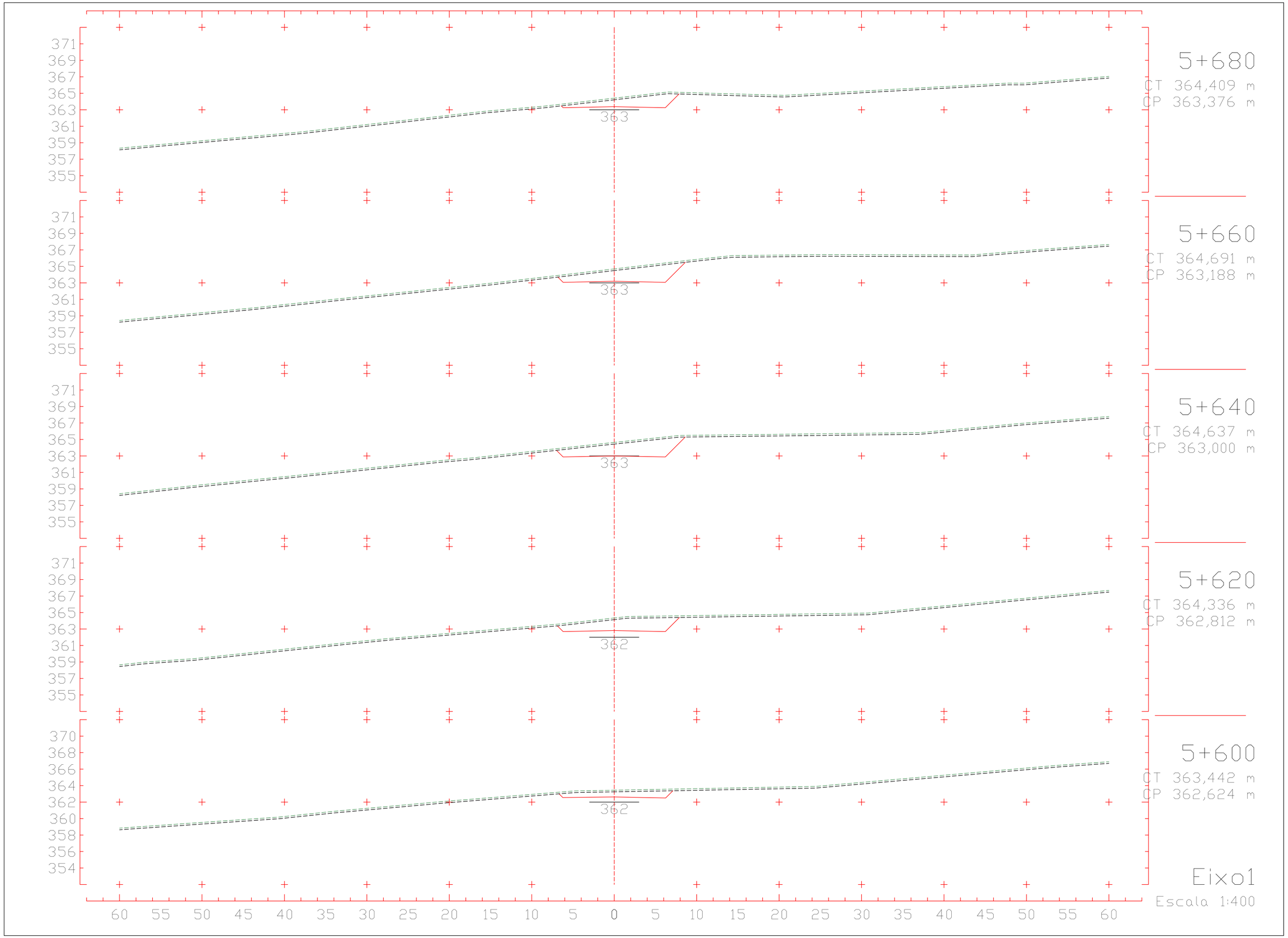

5+180
CT 359,657 m
CP 358,679 m
5+160
CT 358,775 m
CP 358,491 m
5+140
CT 357,976 m
CP 358,303 m
5+120
CT 357,120 m
CP 358,115 m
5+100
CT 356,645 m
CP 357,991 m
Eixo1
Escala 1:400

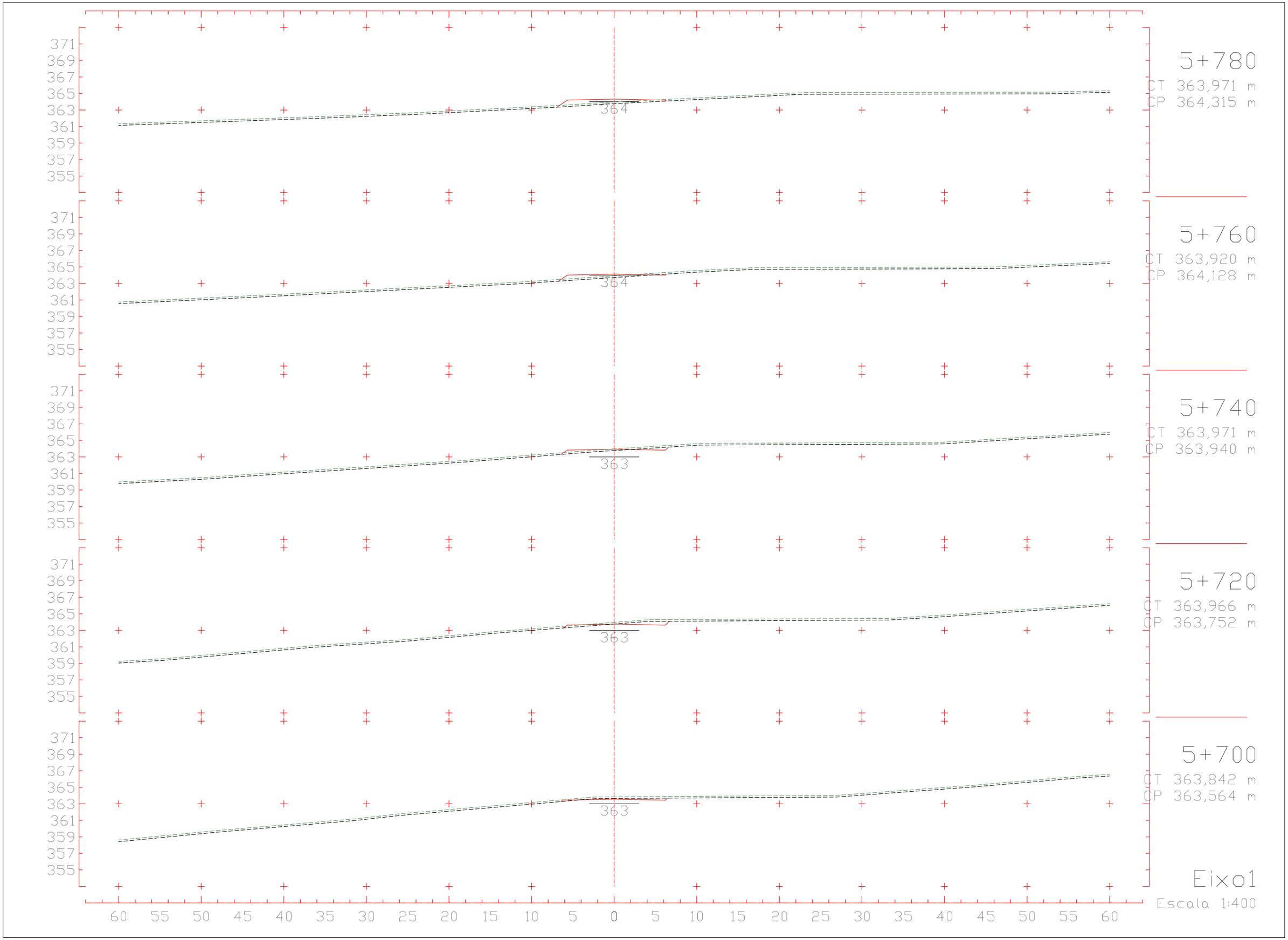

5+280
CT 360,640 m
CP 359,618 m
5+260
CT 360,790 m
CP 359,430 m
5+240
CT 360,805 m
CP 359,242 m
5+220
CT 360,645 m
CP 359,054 m
5+200
CT 360,249 m
CP 358,867 m
Eixo1
Escala 1:400
367
365
363
361
359
357
355
353
351
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

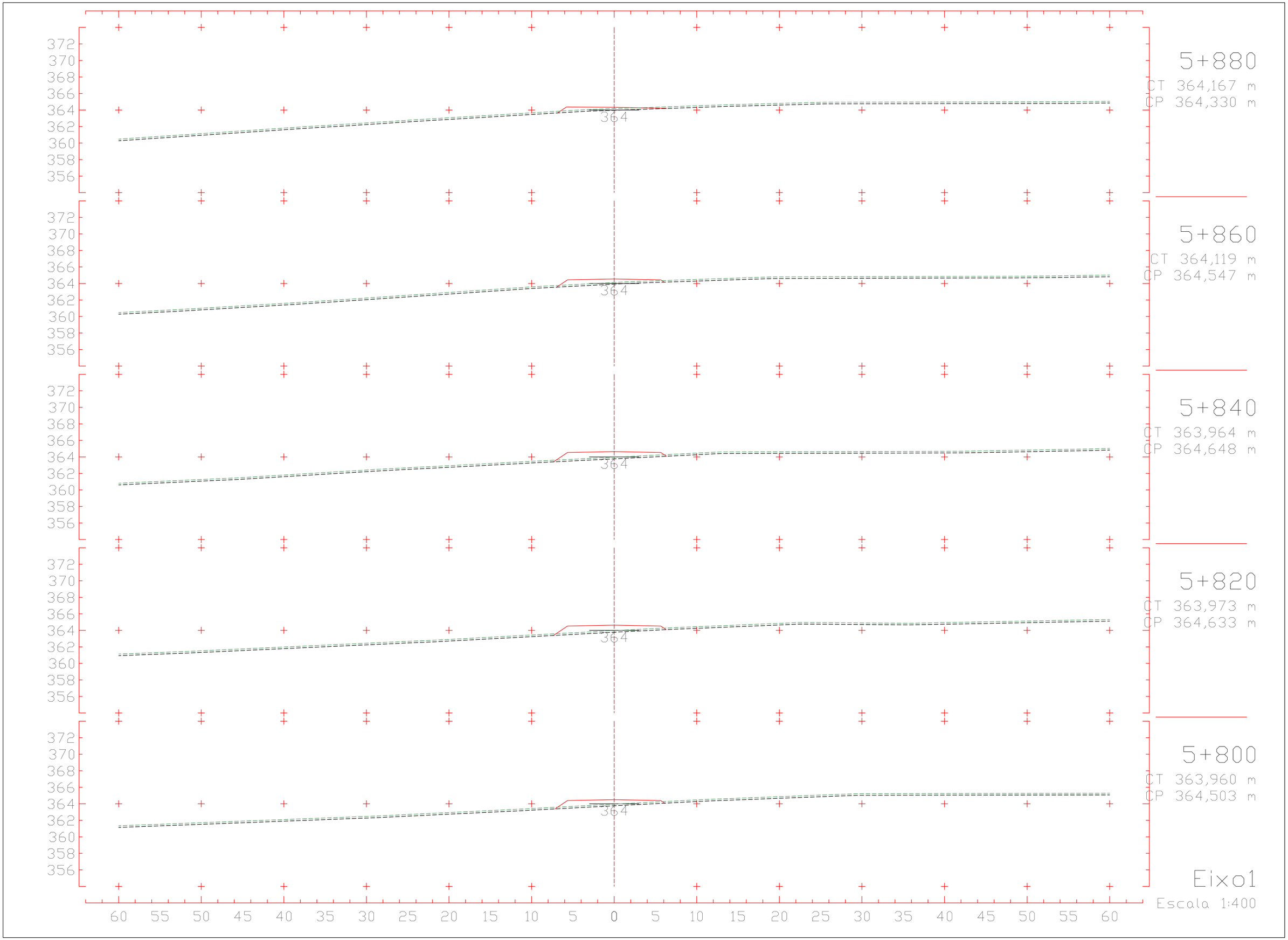

5+380
CT 359,731 m
CP 360,558 m
5+360
CT 359,933 m
CP 360,370 m
5+340
CT 360,232 m
CP 360,182 m
5+320
CT 360,305 m
CP 359,994 m
5+300
CT 360,437 m
CP 359,806 m
Eixo1
Escala 1:400

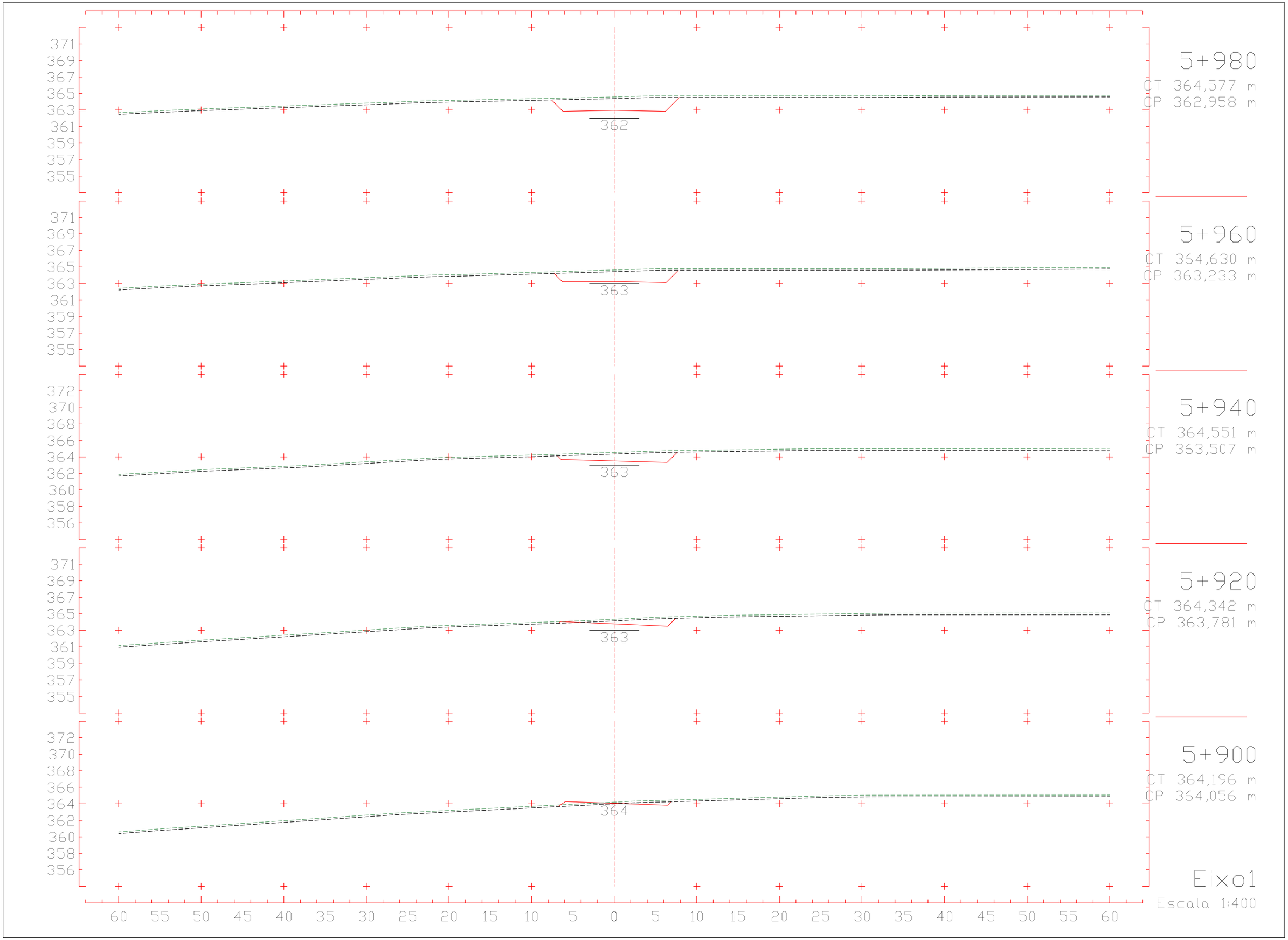

368
366
364
362
360
358
356
354
352
361
5+480
CT 358,904 m
CP 361,497 m
5+460
CT 359,006 m
CP 361,309 m
5+440
CT 359,245 m
CP 361,121 m
5+420
CT 359,488 m
CP 360,933 m
5+400
CT 359,590 m
CP 360,745 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

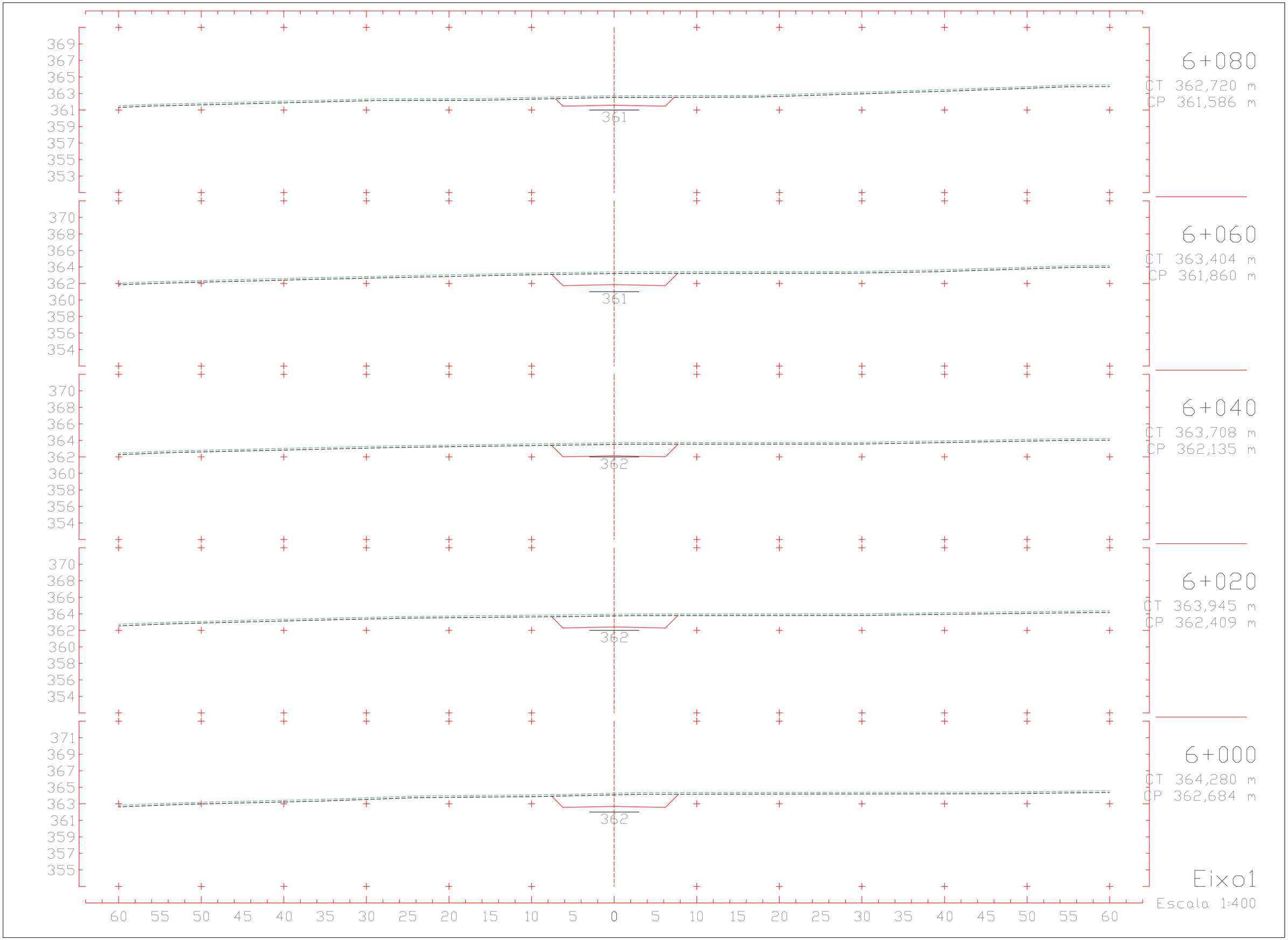

370
368
366
364
362
360
358
356
354
362
5+580
CT 362,263 m
CP 362,437 m
369
367
365
363
361
359
357
355
353
362
5+560
CT 360,951 m
CP 362,249 m
369
367
365
363
361
359
357
355
353
362
5+540
CT 360,163 m
CP 362,061 m
369
367
365
363
361
359
357
355
353
361
5+520
CT 360,171 m
CP 361,873 m
368
366
364
362
360
358
356
354
352
361
5+500
CT 359,110 m
CP 361,685 m
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
Eixo1
Escala 1:400

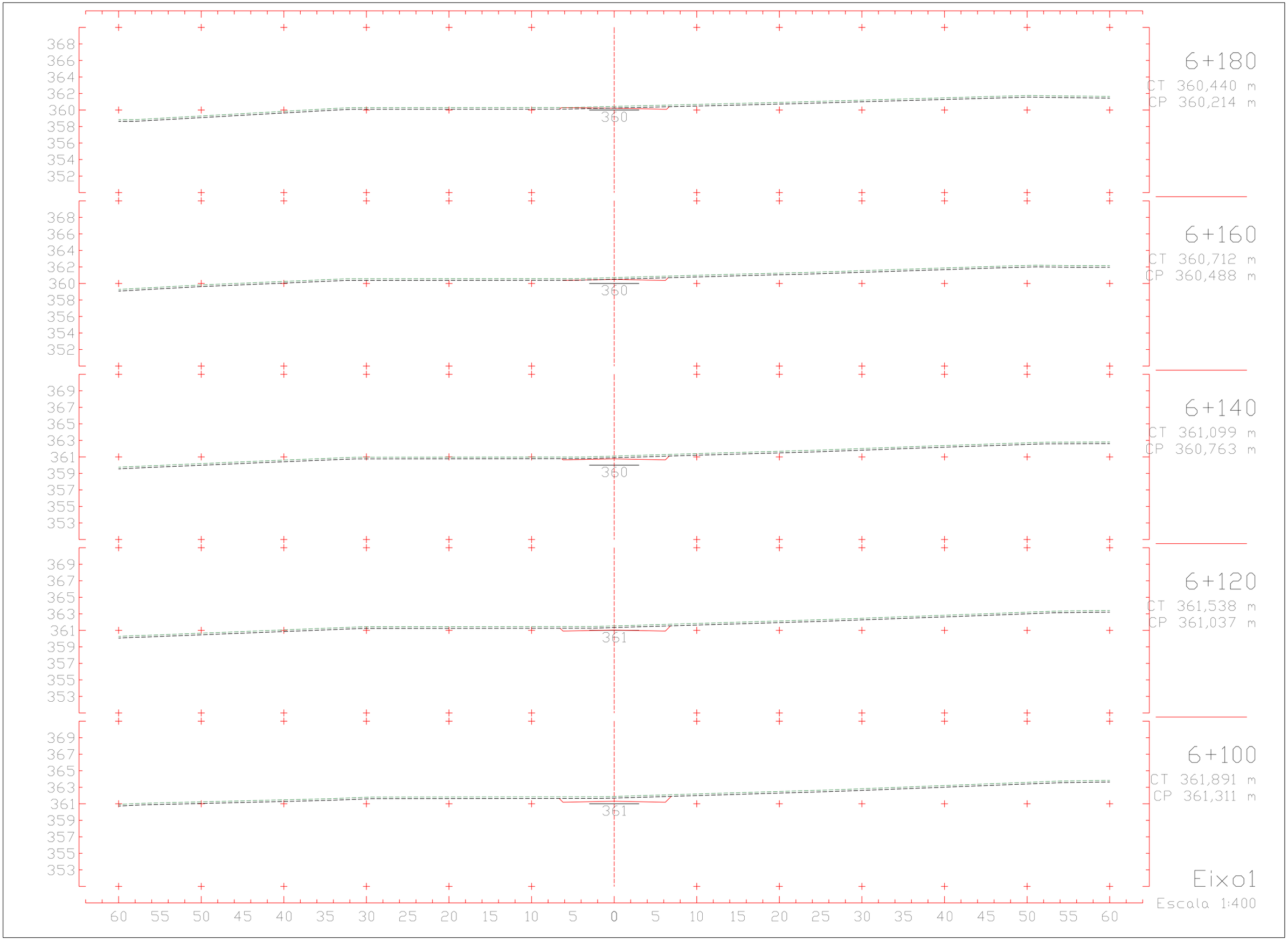

5+680
CT 364,409 m
CP 363,376 m
363
5+660
CT 364,691 m
CP 363,188 m
363
5+640
CT 364,637 m
CP 363,000 m
363
5+620
CT 364,336 m
CP 362,812 m
362
5+600
CT 363,442 m
CP 362,624 m
362
Eixo1
Escala 1:400
371 369 367 365 363 361 359 357 355
370 368 366 364 362 360 358 356 354
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

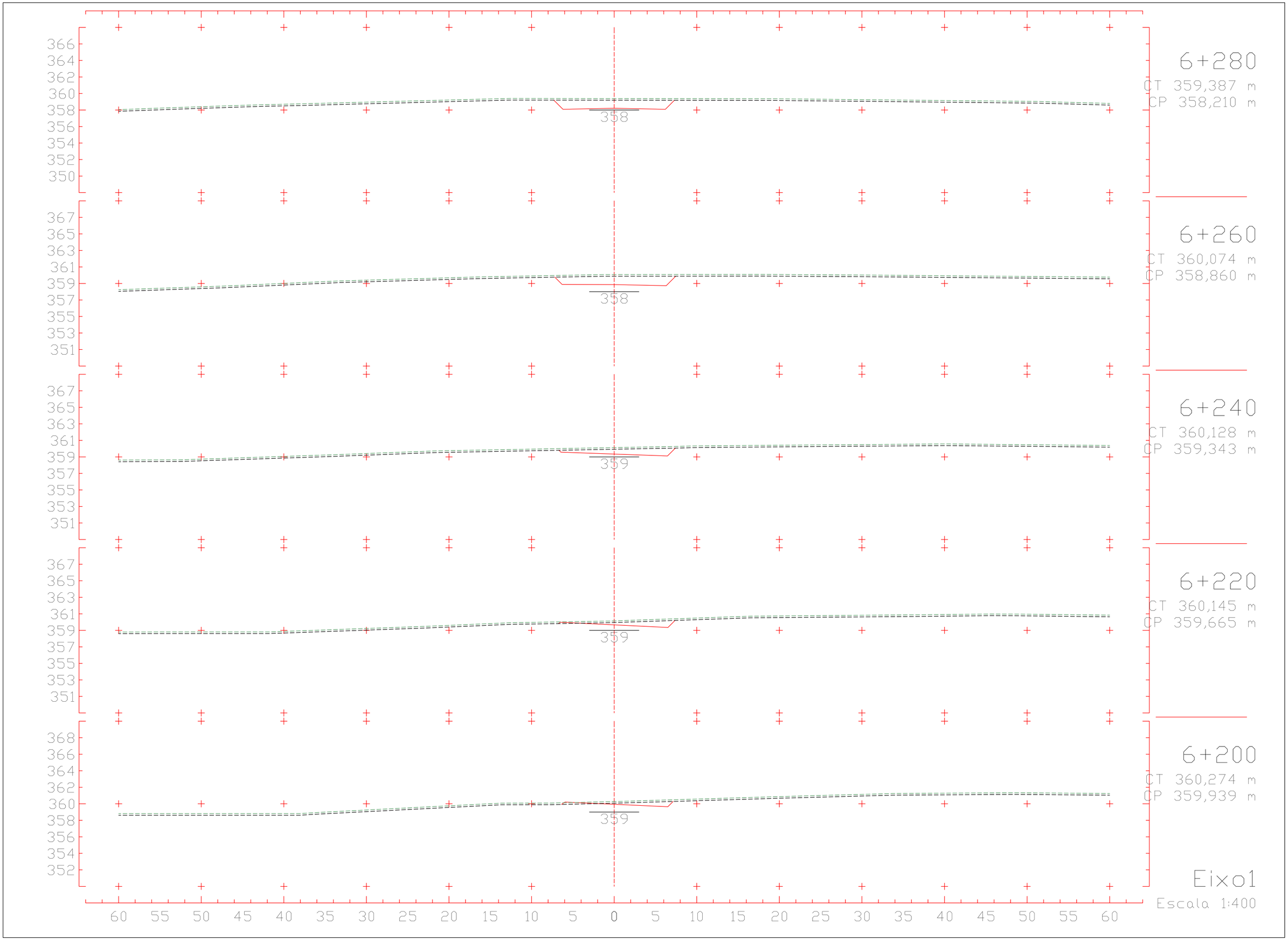

5+780
CT 363,971 m
CP 364,315 m
5+760
CT 363,920 m
CP 364,128 m
5+740
CT 363,971 m
CP 363,940 m
5+720
CT 363,966 m
CP 363,752 m
5+700
CT 363,842 m
CP 363,564 m
Eixo1
Escala 1:400
371
369
367
365
363
361
359
357
355
364
363
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

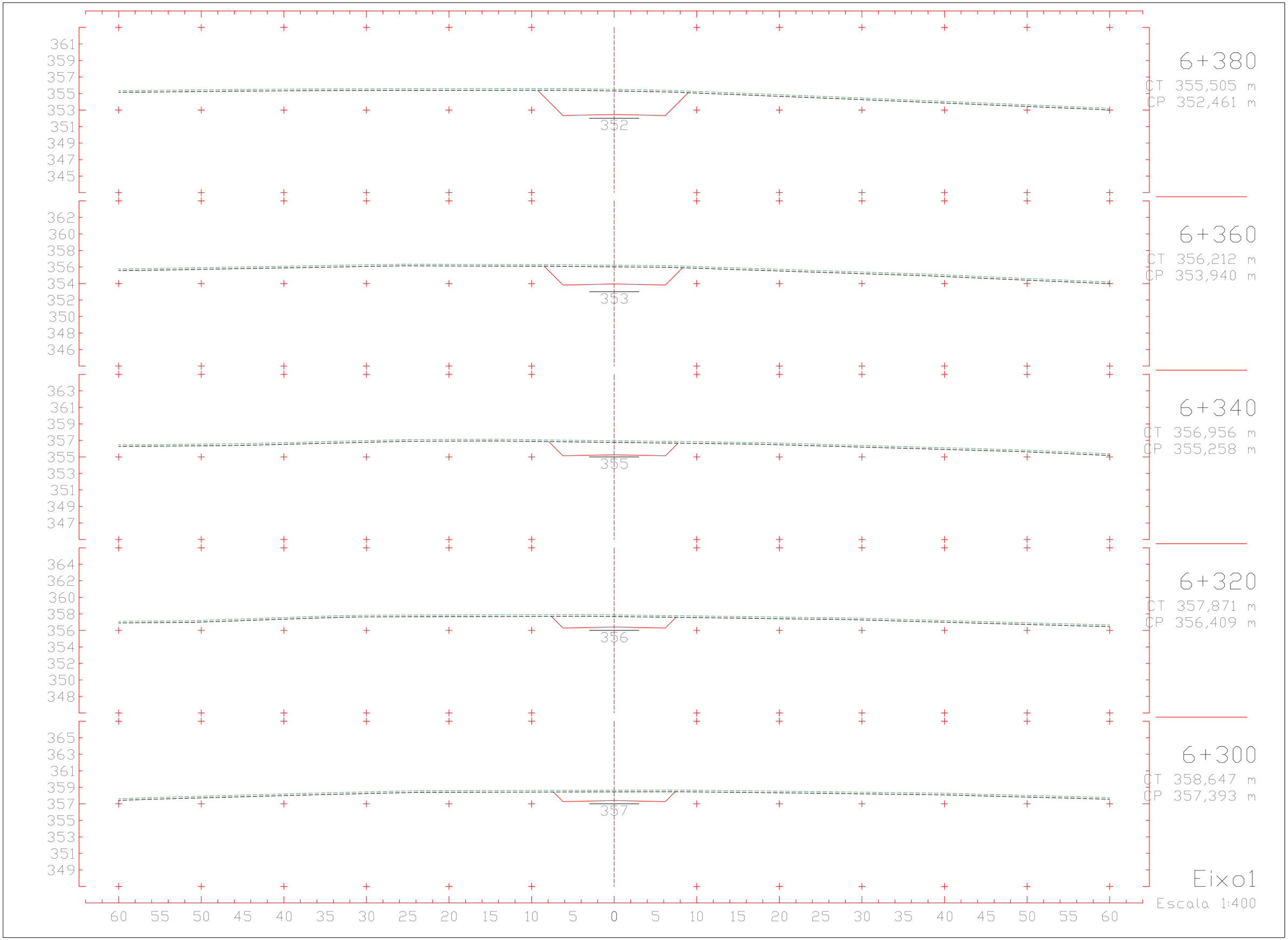

372
370
368
366
364
362
360
358
356
364
5+880
CT 364,167 m
CP 364,330 m
5+860
CT 364,119 m
CP 364,547 m
5+840
CT 363,964 m
CP 364,648 m
5+820
CT 363,973 m
CP 364,633 m
5+800
CT 363,960 m
CP 364,503 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

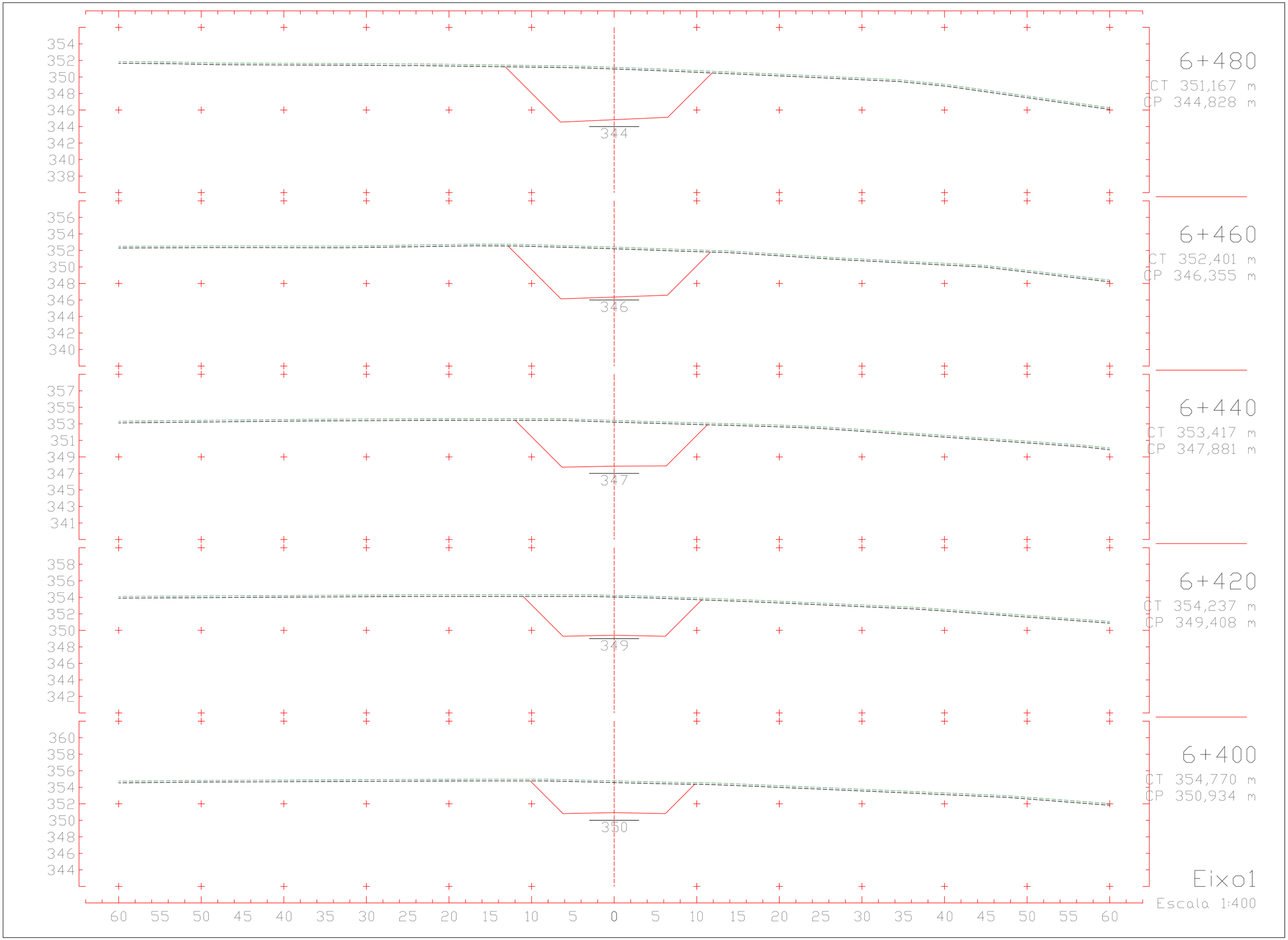

371
369
367
365
363
361
359
357
355
362
5+980
CT 364,577 m
CP 362,958 m
371
369
367
365
363
361
359
357
355
363
5+960
CT 364,630 m
CP 363,233 m
372
370
368
366
364
362
360
358
356
363
5+940
CT 364,551 m
CP 363,507 m
371
369
367
365
363
361
359
357
355
363
5+920
CT 364,342 m
CP 363,781 m
372
370
368
366
364
362
360
358
356
364
5+900
CT 364,196 m
CP 364,056 m
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
Eixo1
Escala 1:400

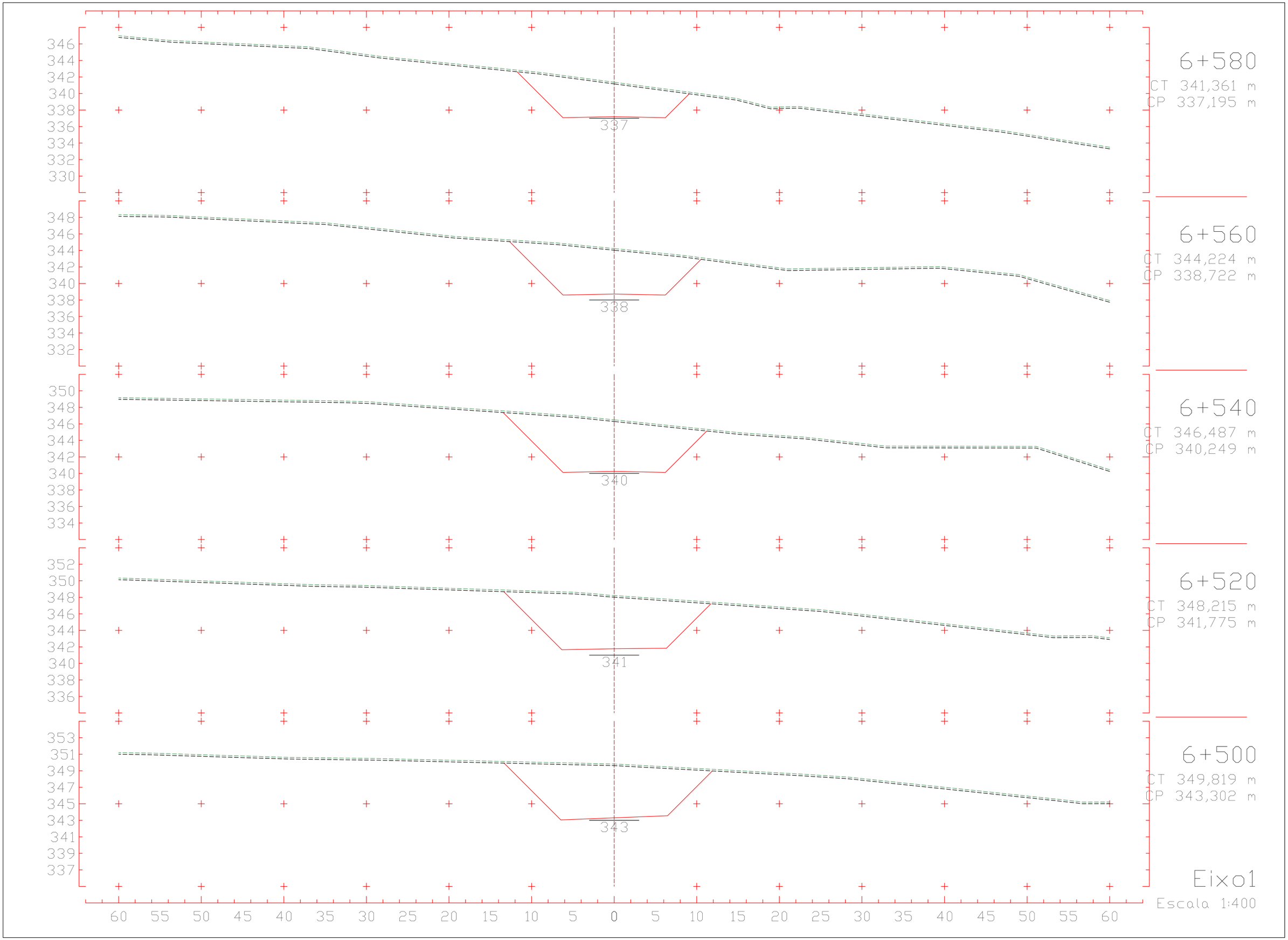

6+080
CT 362,720 m
CP 361,586 m
6+060
CT 363,404 m
CP 361,860 m
6+040
CT 363,708 m
CP 362,135 m
6+020
CT 363,945 m
CP 362,409 m
6+000
CT 364,280 m
CP 362,684 m
Eixo1
Escala 1:400

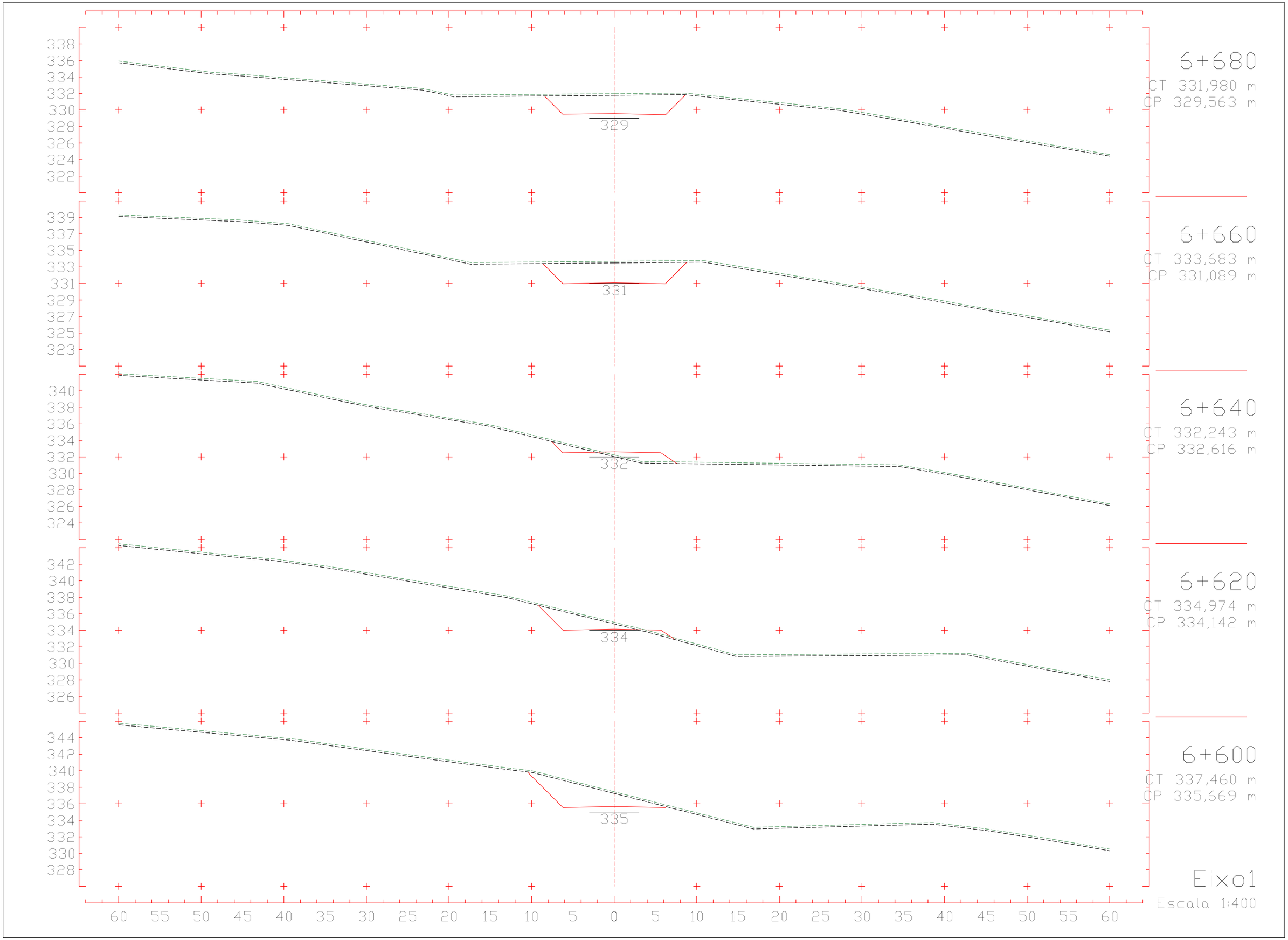

6+180
CT 360,440 m
CP 360,214 m
6+160
CT 360,712 m
CP 360,488 m
6+140
CT 361,099 m
CP 360,763 m
6+120
CT 361,538 m
CP 361,037 m
6+100
CT 361,891 m
CP 361,311 m
Eixo1
Escala 1:400

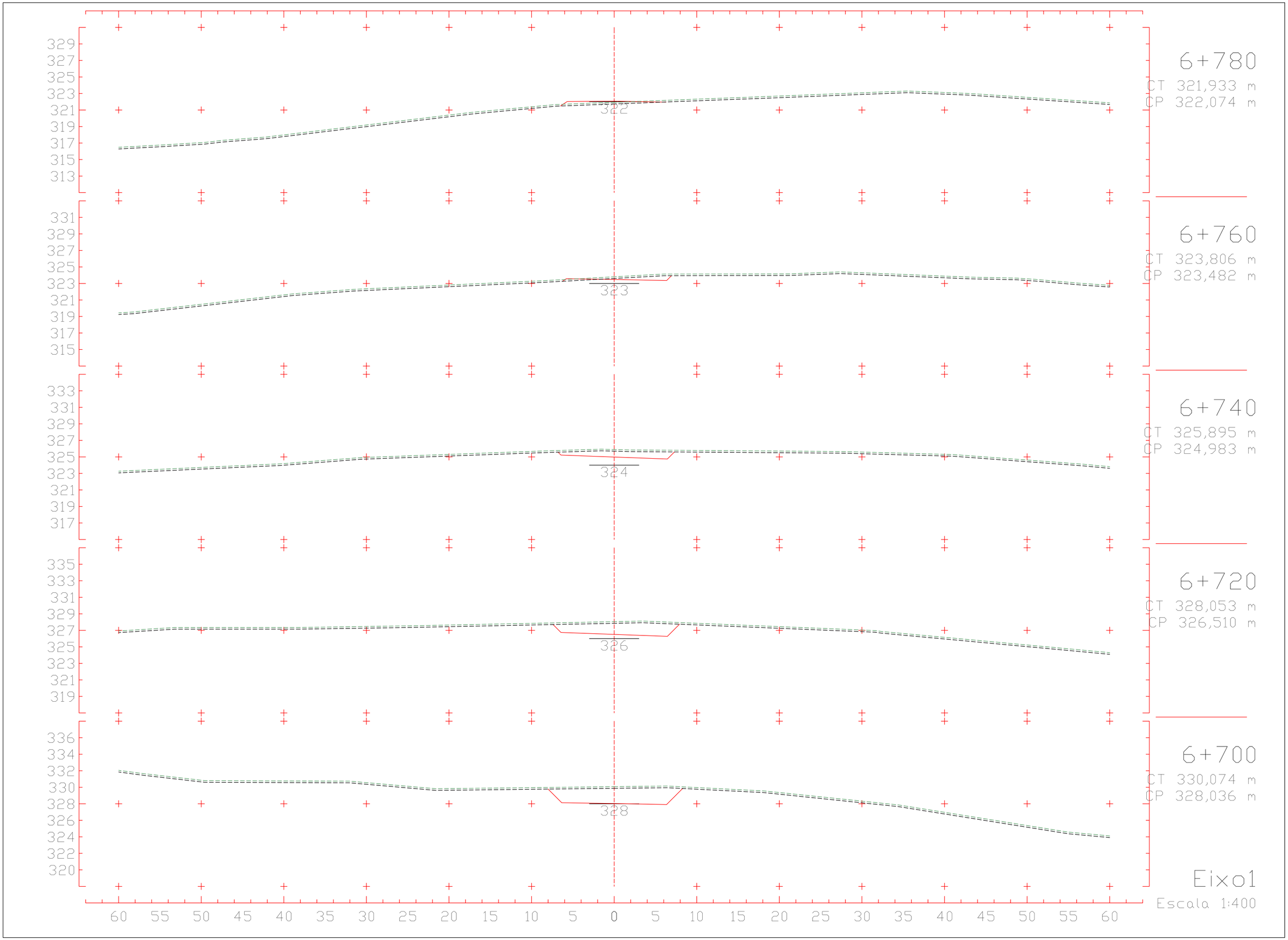

6+280
CT 359,387 m
CP 358,210 m
6+260
CT 360,074 m
CP 358,860 m
6+240
CT 360,128 m
CP 359,343 m
6+220
CT 360,145 m
CP 359,665 m
6+200
CT 360,274 m
CP 359,939 m
Eixo1
Escala 1:400

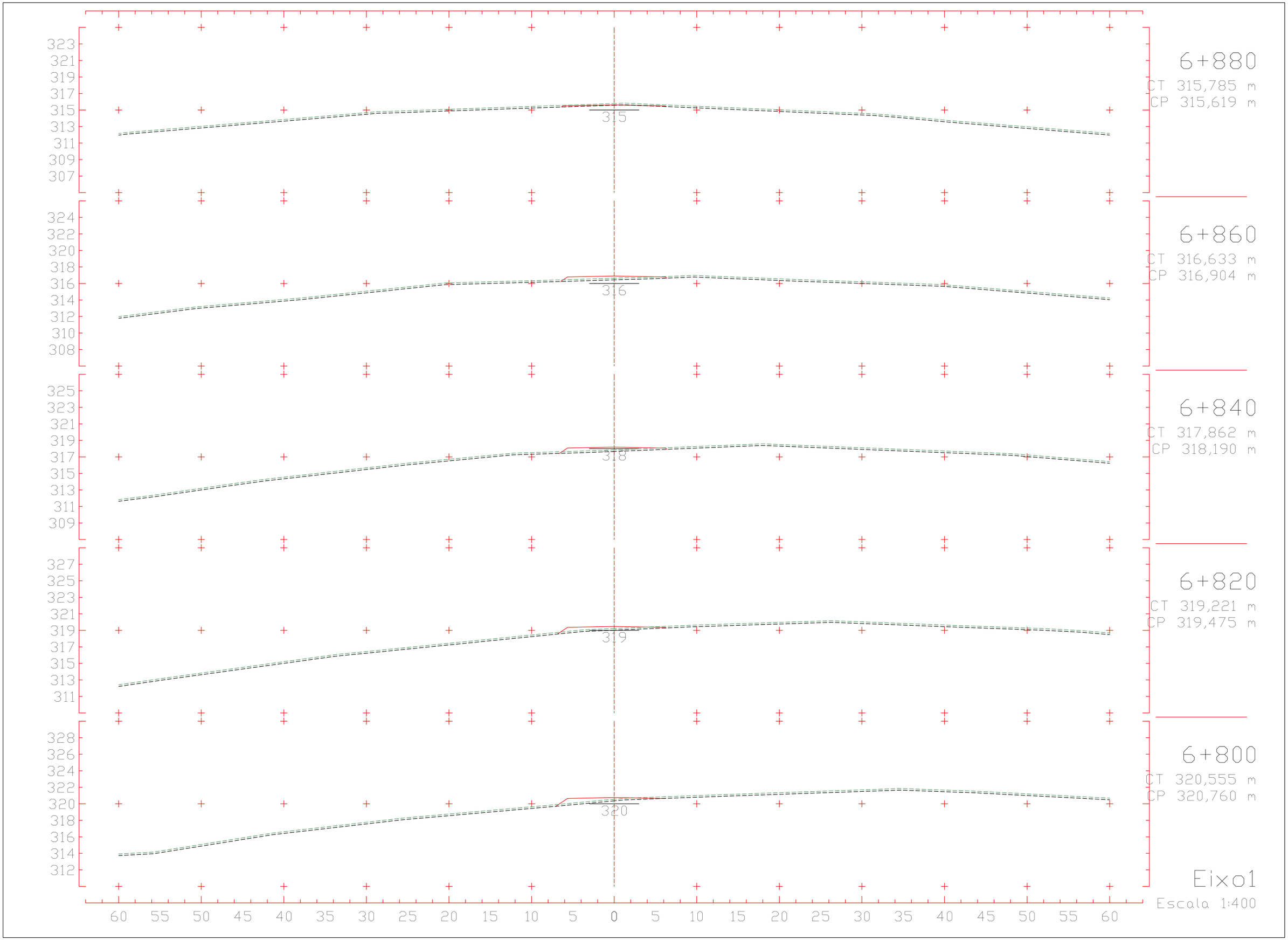

361
359
357
355
353
351
349
347
345
352
6+380
CT 355,505 m
CP 352,461 m
362
360
358
356
354
352
350
348
346
353
6+360
CT 356,212 m
CP 353,940 m
363
361
359
357
355
353
351
349
347
355
6+340
CT 356,956 m
CP 355,258 m
364
362
360
358
356
354
352
350
348
356
6+320
CT 357,871 m
CP 356,409 m
365
363
361
359
357
355
353
351
349
357
6+300
CT 358,647 m
CP 357,393 m
Eixo1
Escala 1:400
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

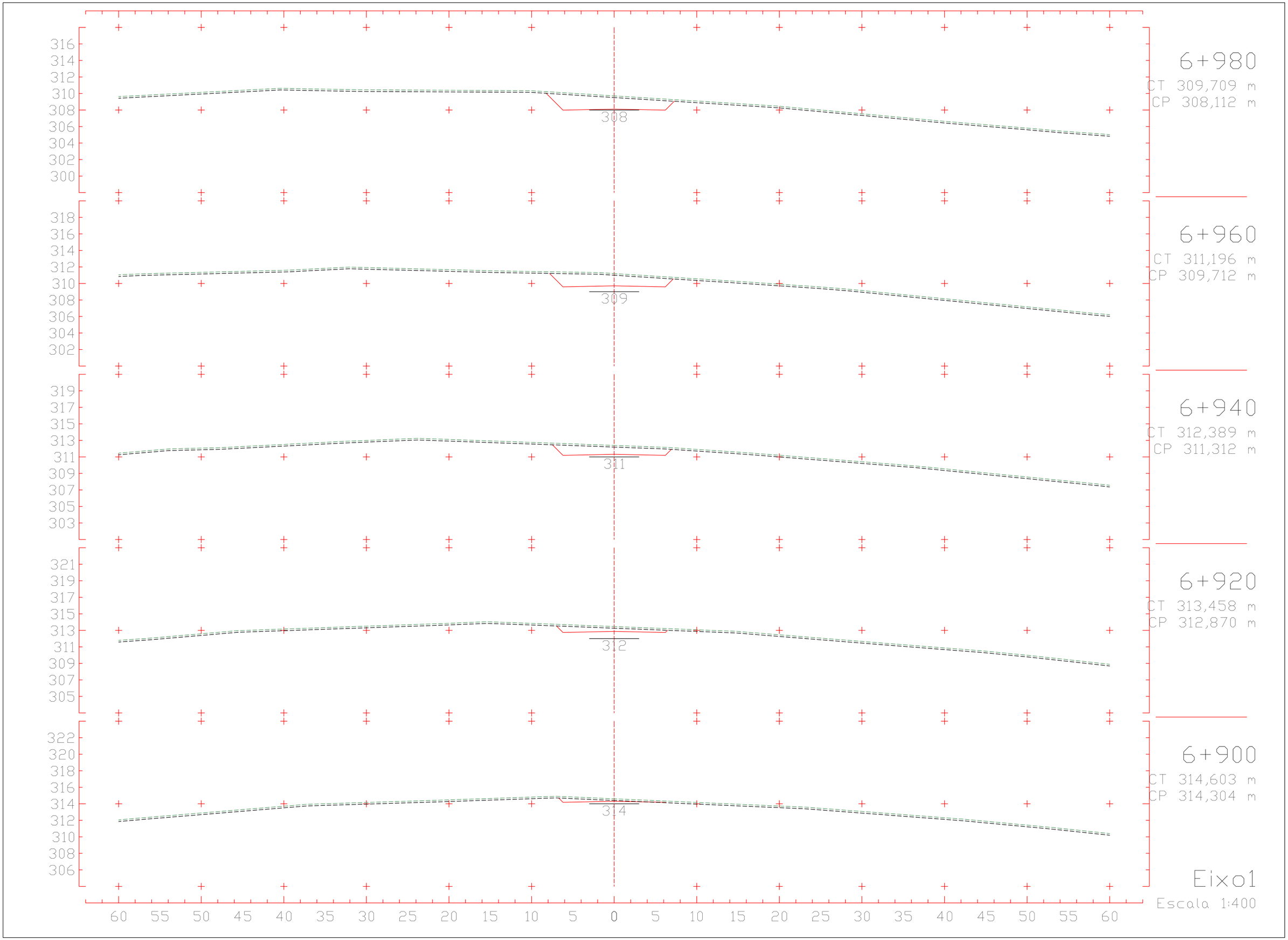

354
352
350
348
346
344
342
340
344
6+480
CT 351,167 m
CP 344,828 m
356
354
352
350
348
346
344
342
340
346
6+460
CT 352,401 m
CP 346,355 m
357
355
353
351
349
347
345
343
341
347
6+440
CT 353,417 m
CP 347,881 m
358
356
354
352
350
348
346
344
342
349
6+420
CT 354,237 m
CP 349,408 m
360
358
356
354
352
350
348
346
344
350
6+400
CT 354,770 m
CP 350,934 m
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
Eixo1
Escala 1:400


346
344
342
340
338
336
334
332
330
337
6+580
CT 341,361 m
CP 337,195 m
348
346
344
342
340
338
336
334
332
338
6+560
CT 344,224 m
CP 338,722 m
350
348
346
344
342
340
338
336
334
340
6+540
CT 346,487 m
CP 340,249 m
352
350
348
346
344
342
340
338
336
341
6+520
CT 348,215 m
CP 341,775 m
353
351
349
347
345
343
341
339
337
343
6+500
CT 349,819 m
CP 343,302 m
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
Eixo1
Escala 1:400


6+680
CT 331,980 m
CP 329,563 m
329
6+660
CT 333,683 m
CP 331,089 m
331
6+640
CT 332,243 m
CP 332,616 m
332
6+620
CT 334,974 m
CP 334,142 m
334
6+600
CT 337,460 m
CP 335,669 m
335
Eixo1
Escala 1:400
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


329
327
325
323
321
319
317
315
322
6+780
CT 321,933 m
CP 322,074 m
331
329
327
325
323
321
319
317
315
323
6+760
CT 323,806 m
CP 323,482 m
333
331
329
327
325
323
321
319
317
324
6+740
CT 325,895 m
CP 324,983 m
335
333
331
329
327
325
323
321
319
326
6+720
CT 328,053 m
CP 326,510 m
336
334
332
330
328
326
324
322
320
328
6+700
CT 330,074 m
CP 328,036 m
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
Eixo1
Escala 1:400


323
321
319
317
315
313
311
309
307
315
6+880
CT 315,785 m
CP 315,619 m
324
322
320
318
316
314
312
310
308
316
6+860
CT 316,633 m
CP 316,904 m
325
323
321
319
317
315
313
311
309
318
6+840
CT 317,862 m
CP 318,190 m
327
325
323
321
319
317
315
313
311
319
6+820
CT 319,221 m
CP 319,475 m
328
326
324
322
320
318
316
314
312
320
6+800
CT 320,555 m
CP 320,760 m
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
Eixo1
Escala 1:400


316
314
312
310
308
306
304
302
300
308
6+980
CT 309,709 m
CP 308,112 m
318
316
314
312
310
308
306
304
302
309
6+960
CT 311,196 m
CP 309,712 m
319
317
315
313
311
309
307
305
303
311
6+940
CT 312,389 m
CP 311,312 m
321
319
317
315
313
311
309
307
305
312
6+920
CT 313,458 m
CP 312,870 m
322
320
318
316
314
312
310
308
306
314
6+900
CT 314,603 m
CP 314,304 m
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
Eixo1
Escala 1:400

315
313
311
309
307
305
303
301
299

306

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

7+000

CT 308,188 m
CP 306,512 m

Eixo1

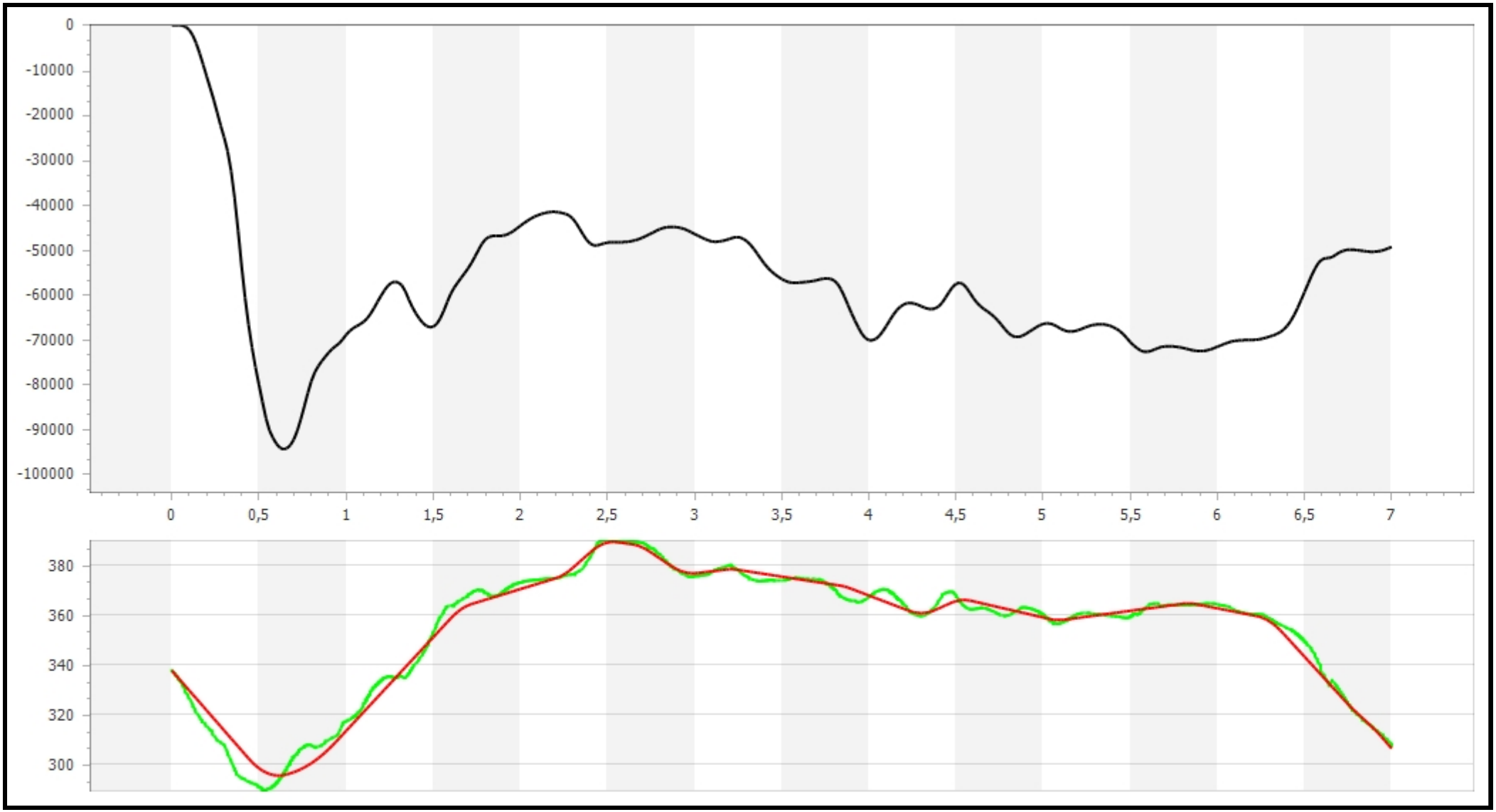
Escala 1:400

3 PROJETO DE TERRAPLENAGEM

3.1 Diagrama de Massa

DIAGRAMA DE MASSAS (BRÜCKNER)

Rodovia:	Grupo de Eixos 1	Homogeneização:	- Corte 1ª Categoria: 1,300
Trecho:	Eixo1	- Aterro Camada Superior: 1,000	- Corte 2ª Categoria: 1,000
Segmento:	km: 0+000,00 ao km: 7+004,30	- Aterro Camada Inferior : 1,000	- Corte 3ª Categoria: 0,800



3.2 Quadro de Origem e Destino

QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 7+004,30

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

Vol. transp. : 208012,91m³
Momento tot.: 134006,66m³.m
DMT : 0,644km

ORIGEM										DESTINO							TRANSPORTE			OBSERVAÇÕES
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
ID	TIPO	HOMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL	(km)	(m³)	(m³ x km)	
EC-01	C1ª	1,30	0+200	0+360	0+380	0,200	64268,91	49437,62												
									49437,62	A-001	AI	0+050	0+370	0+630		83138,00	0,210	64268,91	13496,471	
C-001	C1ª	1,30	0+000	0+020	0+050		78,00	60,00												
									60,00	A-001	AI	0+050	0+370	0+630			0,350	78,00	27,300	
C-002	C1ª	1,30	0+630	0+910	1+310		48708,00	37467,69												
									33640,38	A-001	AI	0+050	0+370	0+630			0,540	43732,49	23615,545	
									3827,32	A-001	AS	0+000	0+350	0+650		11519,00	0,560	4975,51	2786,286	
C-003	C1ª	1,30	1+470	1+780	2+210		17556,00	13504,62												
									7691,68	A-001	AS	0+000	0+350	0+650			1,430	9999,19	14298,842	
									5812,93	A-002	AI	1+270	1+370	1+490		7891,00	0,410	7556,81	3098,292	
C-003	C2ª	1,00	1+490	1+650	1+830		4945,00	4945,00												
									2078,07	A-002	AI	1+270	1+370	1+490			0,280	2078,07	581,859	
									2447,00	A-002	AS	1+270	1+380	1+490		2447,00	0,270	2447,00	660,690	
									18,00	A-003	AI	1+850	1+860	1+890		18,00	0,210	18,00	3,780	
									153,00	A-003	AS	1+830	1+860	1+910		153,00	0,210	153,00	32,130	
									248,93	A-004	AI	2+210	2+340	2+430		5345,00	0,690	248,93	171,762	
C-003	C2ª	1,00	1+910	2+000	2+110		804,00	804,00												
									804,00	A-004	AS	2+170	2+320	2+430		2273,00	0,320	804,00	257,280	
C-003	C3ª	0,80	1+510	1+640	1+810		5406,00	6757,50												
									5096,07	A-004	AI	2+210	2+340	2+430			0,700	4076,86	2853,799	
									1537,00	A-006	AI	2+910	3+000	3+110		1537,00	1,360	1229,60	1672,256	
									124,43	A-007	AI	3+250	3+380	3+550		7087,00	1,740	99,54	173,208	
C-003	C3ª	0,80	1+950	1+990	2+010		5,00	6,25												
									6,25	A-007	AI	3+250	3+380	3+550			1,390	5,00	6,950	
C-004	C1ª	1,30	2+430	2+670	2+870		5524,00	4249,23												
									1469,00	A-004	AS	2+170	2+320	2+430			0,350	1909,70	668,395	
									56,00	A-005	AS	2+510	2+530	2+570		56,00	0,140	72,80	10,192	
									1816,00	A-006	AS	2+870	3+000	3+130		1816,00	0,330	2360,80	779,064	
									908,23	A-007	AI	3+250	3+380	3+550			0,710	1180,70	838,297	
C-004	C2ª	1,00	2+750	2+760	2+790		43,00	43,00												
									43,00	A-007	AI	3+250	3+380	3+550			0,620	43,00	26,660	
C-005	C1ª	1,30	3+110	3+180	3+250		1446,00	1112,31												
									1112,31	A-007	AI	3+250	3+380	3+550			0,200	1446,00	289,200	
C-006	C1ª	1,30	3+550	3+670	3+750		1327,00	1020,77												
									1020,77	A-007	AI	3+250	3+380	3+550			0,290	1327,00	384,830	
C-007	C1ª	1,30	4+010	4+110	4+250		10987,00	8451,54												
									3872,01	A-007	AI	3+250	3+380	3+550			0,730	5033,62	3674,539	
									3172,00	A-007	AS	3+230	3+400	3+590		3172,00	0,710	4123,60	2927,756	
									1407,53	A-008	AI	3+770	3+890	4+010		10929,00	0,220	1829,78	402,553	
C-008	C1ª	1,30	4+350	4+440	4+530		7731,00	5946,92												
									5946,92	A-008	AI	3+770	3+890	4+010			0,550	7731,00	4252,050	
C-009	C1ª	1,30	4+850	4+930	5+030		4040,00	3107,69												
									3107,69	A-008	AI	3+770	3+890	4+010			1,040	4040,00	4201,600	

QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 7+004,30

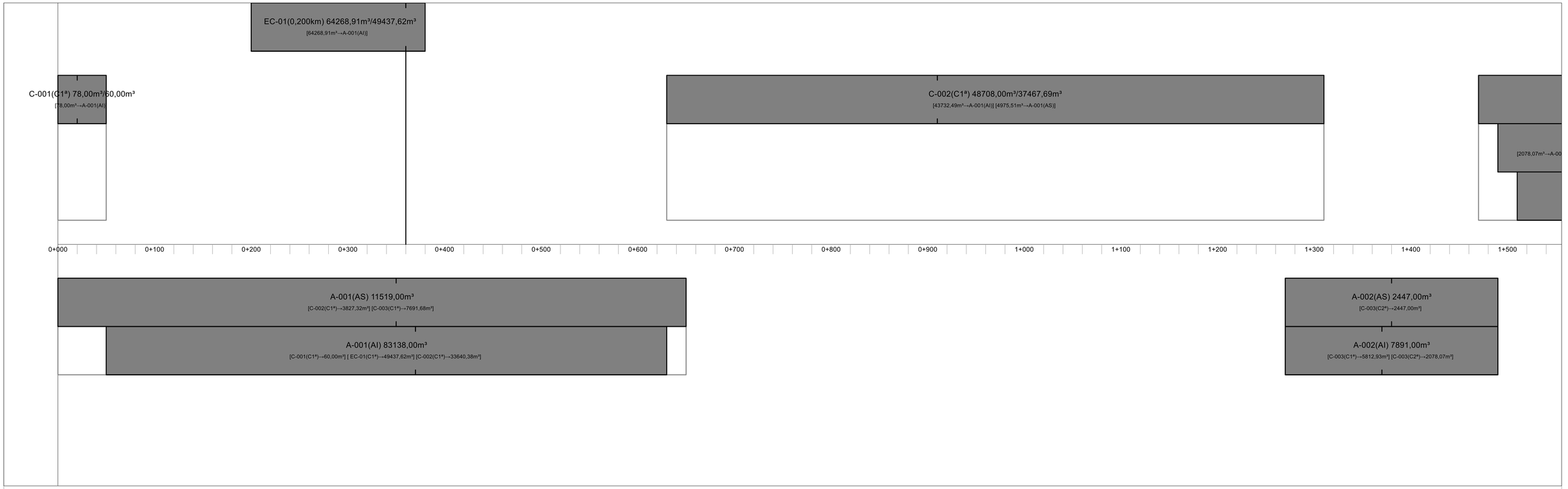
Homogeneização:
- Aterro Camada Superior: 1,000
- Aterro Camada Inferior : 1,000

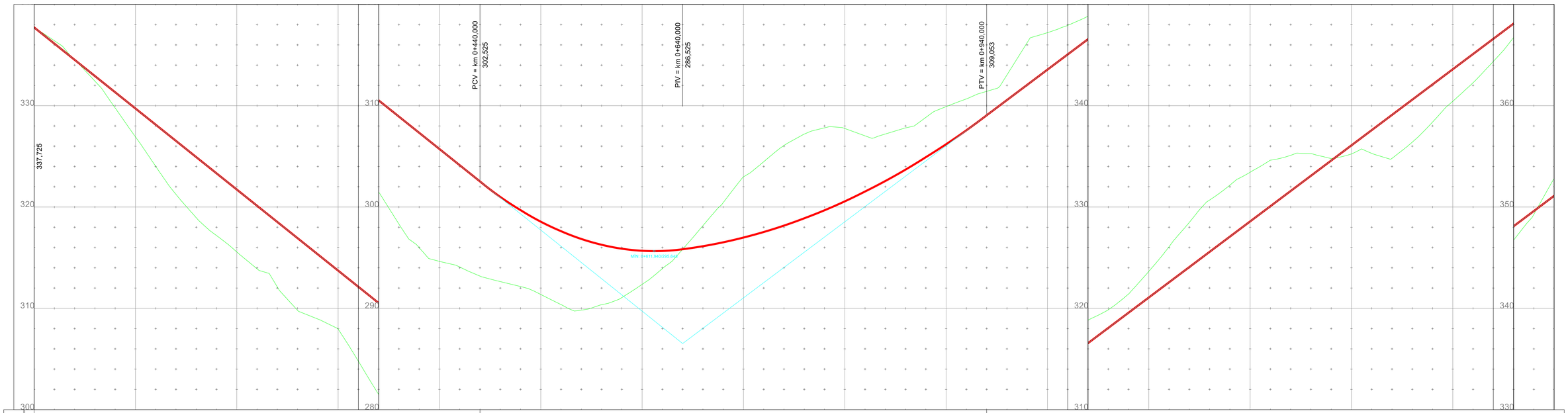
- Corte 1ª Categoria: 1,300
- Corte 2ª Categoria: 1,000
- Corte 3ª Categoria: 0,800

Vol. transp. : 208012,91m³
Momento tot.: 134006,66m³.m
DMT : 0,644km

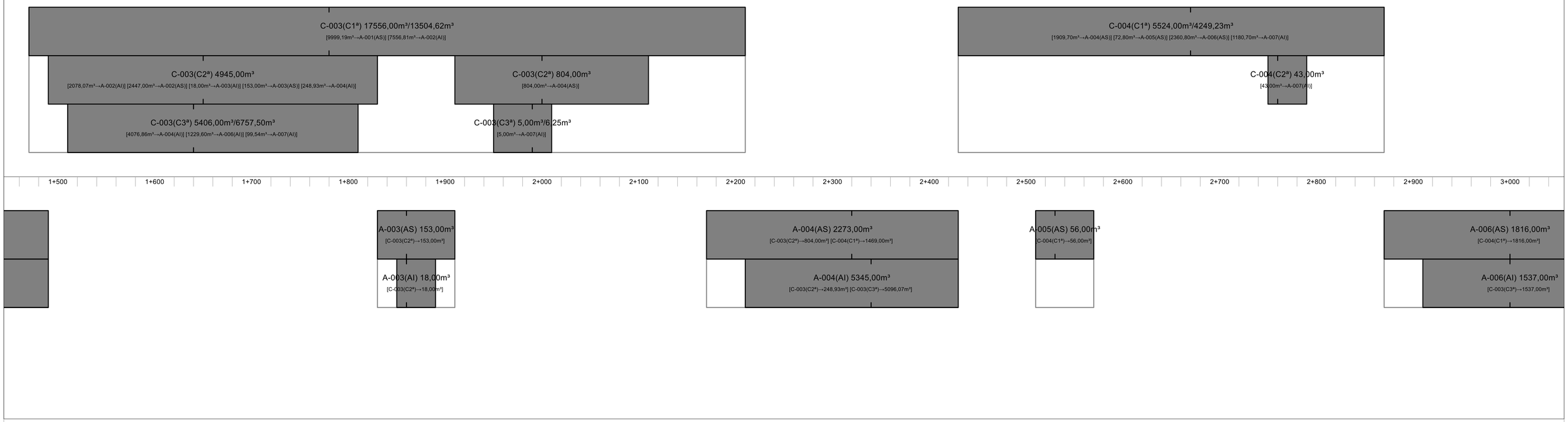
ORIGEM										DESTINO							TRANSPORTE			OBSERVAÇÕES
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
ID	TIPO	HOMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL	(km)	(m³)	(m³ x km)	
C-010	C1ª	1,30	5+150	5+230	5+350		2198,00	1690,77												
									466,86	A-008	AI	3+770	3+890	4+010			1,340	606,92	813,266	
									1223,91	A-008	AS	3+750	3+880	4+010		2955,00	1,350	1591,08	2147,965	
C-011	C1ª	1,30	5+590	5+640	5+770		1694,00	1303,08												
									1303,08	A-008	AS	3+750	3+880	4+010			1,760	1694,00	2981,440	
C-012	C1ª	1,30	5+890	6+440	6+770		29804,00	22926,15												
									428,01	A-008	AS	3+750	3+880	4+010			2,560	556,42	1424,422	
									578,00	A-009	AI	4+230	4+290	4+350		578,00	2,150	751,40	1615,510	
									887,00	A-009	AS	4+230	4+290	4+370		887,00	2,150	1153,10	2479,165	
									8737,00	A-010	AI	4+530	4+670	4+830		8737,00	1,770	11358,10	20103,837	
									3418,00	A-010	AS	4+510	4+680	4+850		3418,00	1,760	4443,40	7820,384	
									886,00	A-011	AI	5+030	5+080	5+150		886,00	1,360	1151,80	1566,448	
									1000,00	A-011	AS	5+030	5+080	5+170		1000,00	1,360	1300,00	1768,000	
									3965,00	A-012	AI	5+350	5+480	5+570		3965,00	0,960	5154,50	4948,320	
									2264,00	A-012	AS	5+310	5+460	5+590		2264,00	0,980	2943,20	2884,336	
									166,00	A-013	AI	5+750	5+820	5+890		166,00	0,620	215,80	133,796	
									597,14	A-013	AS	5+690	5+810	5+930		976,00	0,630	776,28	489,060	
C-013	C1ª	1,30	6+870	6+870	7+004		1448,00	1113,85												
									378,86	A-013	AS	5+690	5+810	5+930			1,060	492,52	522,066	
									28,00	A-014	AS	6+150	6+190	6+230		28,00	0,680	36,40	24,752	
									62,00	A-015	AI	6+610	6+640	6+650		62,00	0,230	80,60	18,538	
									128,00	A-015	AS	6+610	6+630	6+650		128,00	0,240	166,40	39,936	
									9,00	A-016	AI	6+790	6+800	6+850		9,00	0,070	11,70	0,819	
									507,99	A-016	AS	6+750	6+820	6+910		508,00	0,050	660,38	33,019	

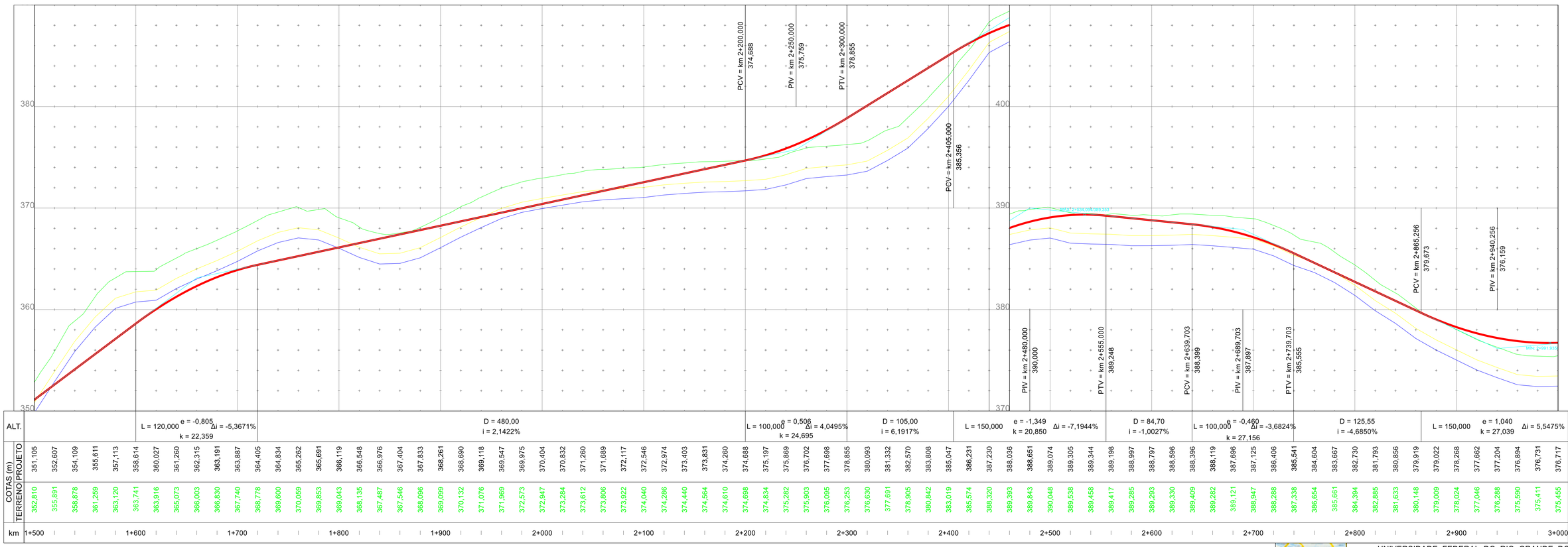
3.3 Esquema Linear de Distribuição dos Materiais


EC-01(0,200km) 64268,91m³/49437,62m³
[64268,91m³→A-001(AI)]
C-001(C1ª) 78,00m³/60,00m³
[78,00m³→A-001(AI)]
C-002(C1ª) 48708,00m³/37467,69m³
[43732,49m³→A-001(AI)] [4975,51m³→A-001(AS)]
[2078,07m³→A-00
0+000
0+100
0+200
0+300
0+400
0+500
0+600
0+700
0+800
0+900
1+000
1+100
1+200
1+300
1+400
1+500
A-001(AS) 11519,00m³
[C-002(C1ª)→3827,32m³] [C-003(C1ª)→7691,68m³]
A-001(AI) 83138,00m³
[C-001(C1ª)→60,00m³] [EC-01(C1ª)→49437,62m³] [C-002(C1ª)→33640,38m³]
A-002(AS) 2447,00m³
[C-003(C2ª)→2447,00m³]
A-002(AI) 7891,00m³
[C-003(C1ª)→5812,93m³] [C-003(C2ª)→2078,07m³]


337,725
PCV = km 0+440,000
302,525
PIV = km 0+640,000
286,525
PTV = km 0+940,000
309,053
MIN: 0+611,940/293,648
330
320
310
300
290
280
340
360
350

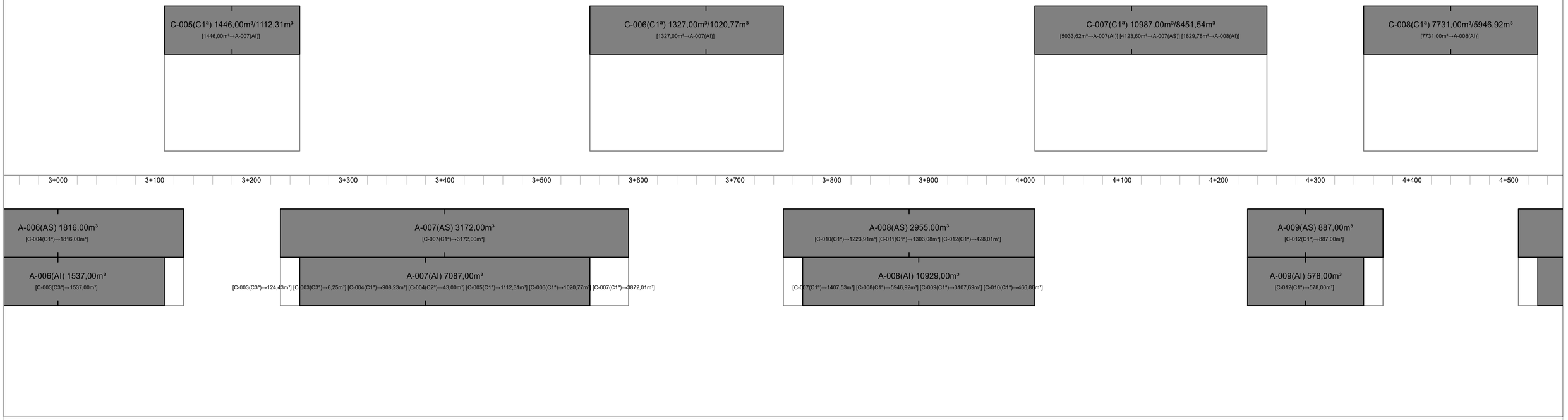
| | | |

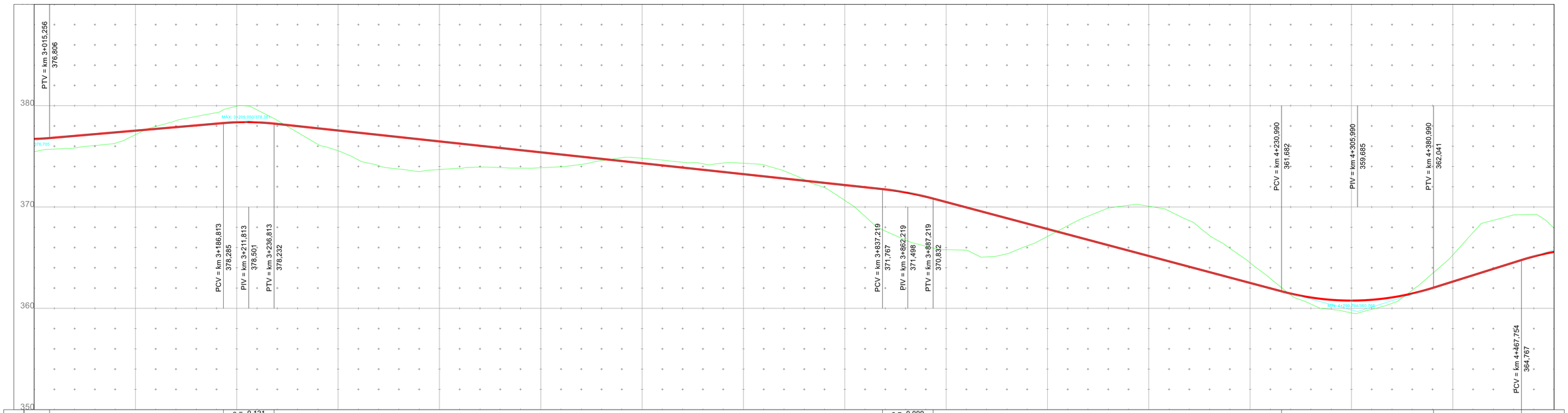




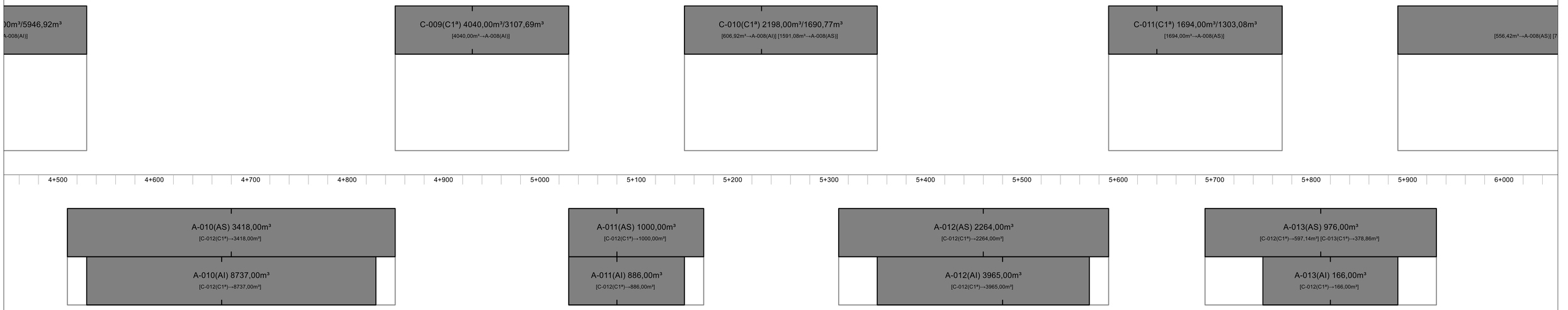
ALT.	L = 120,000 e = -0,805 Δi = -5,3671% k = 22,359	D = 480,00 i = 2,1422%	L = 100,000 e = 0,506 Δi = 4,0495% k = 24,695	D = 105,00 i = 6,1917%	L = 150,000 e = -1,349 Δi = -7,1944% k = 20,850	D = 84,70 i = -1,0027%	L = 100,000 e = -0,460 Δi = -3,6824% k = 27,156	D = 125,55 i = -4,6850%	L = 150,000 e = 1,040 Δi = 5,5475% k = 27,039

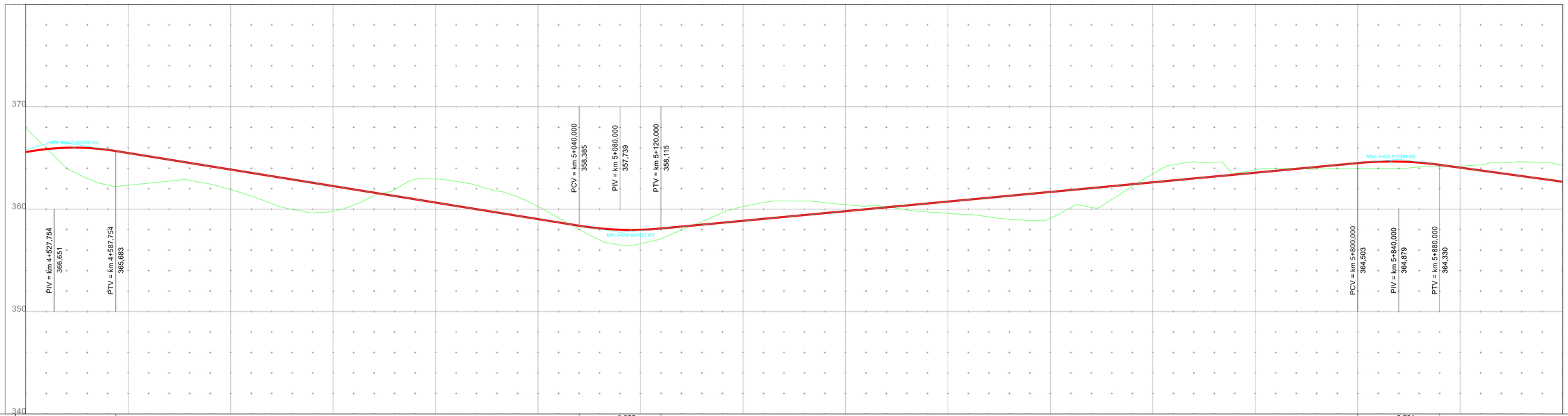
| COTAS (m) | | |


C-005(C1ª) 1446,00m³/1112,31m³
[1446,00m³→A-007(AI)]
C-006(C1ª) 1327,00m³/1020,77m³
[1327,00m³→A-007(AI)]
C-007(C1ª) 10987,00m³/8451,54m³
[5033,62m³→A-007(AI)] [4123,60m³→A-007(AS)] [1829,78m³→A-008(AI)]
C-008(C1ª) 7731,00m³/5946,92m³
[7731,00m³→A-008(AI)]
3+000
3+100
3+200
3+300
3+400
3+500
3+600
3+700
3+800
3+900
4+000
4+100
4+200
4+300
4+400
4+500
A-006(AS) 1816,00m³
[C-004(C1ª)→1816,00m³]
A-006(AI) 1537,00m³
[C-003(C3ª)→1537,00m³]
A-007(AS) 3172,00m³
[C-007(C1ª)→3172,00m³]
A-007(AI) 7087,00m³
[C-003(C3ª)→124,43m³] [C-003(C3ª)→6,25m³] [C-004(C1ª)→908,23m³] [C-004(C2ª)→43,00m³] [C-005(C1ª)→1112,31m³] [C-006(C1ª)→1020,77m³] [C-007(C1ª)→3872,01m³]
A-008(AS) 2955,00m³
[C-010(C1ª)→1223,91m³] [C-011(C1ª)→1303,08m³] [C-012(C1ª)→428,01m³]
A-008(AI) 10929,00m³
[C-007(C1ª)→1407,53m³] [C-008(C1ª)→5946,92m³] [C-009(C1ª)→3107,69m³] [C-010(C1ª)→466,86m³]
A-009(AS) 887,00m³
[C-012(C1ª)→887,00m³]
A-009(AI) 578,00m³
[C-012(C1ª)→578,00m³]

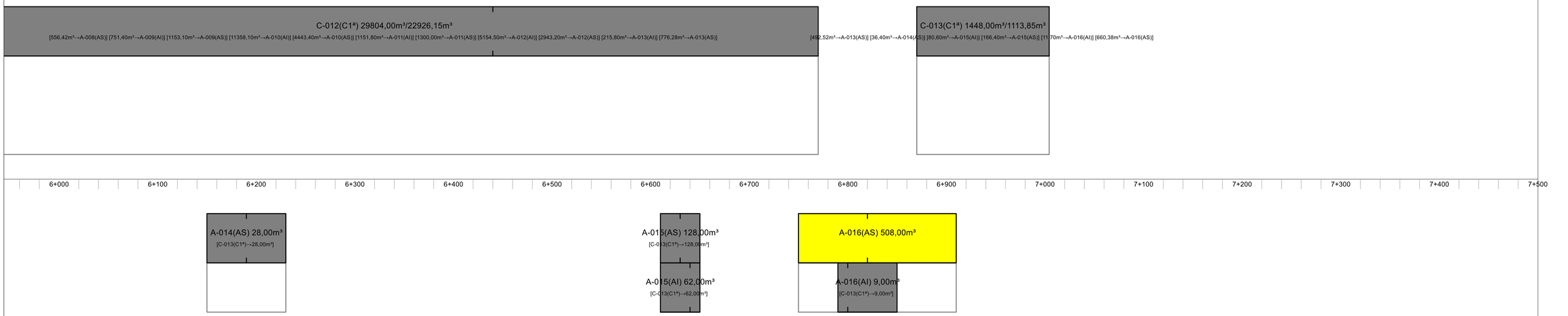

PTV = km 3+015,256
376,806
380
370
360
350
376,705
MAX: 3+209,050/378,383
PCV = km 3+186,813
378,285
PIV = km 3+211,813
378,501
PTV = km 3+236,813
378,232
PCV = km 3+837,219
371,767
PIV = km 3+862,219
371,498
PTV = km 3+887,219
370,832
PCV = km 4+230,990
361,682
PIV = km 4+305,990
359,685
PTV = km 4+380,990
362,041
PCV = km 4+467,754
364,767
MIN: 4+297,744/360,368

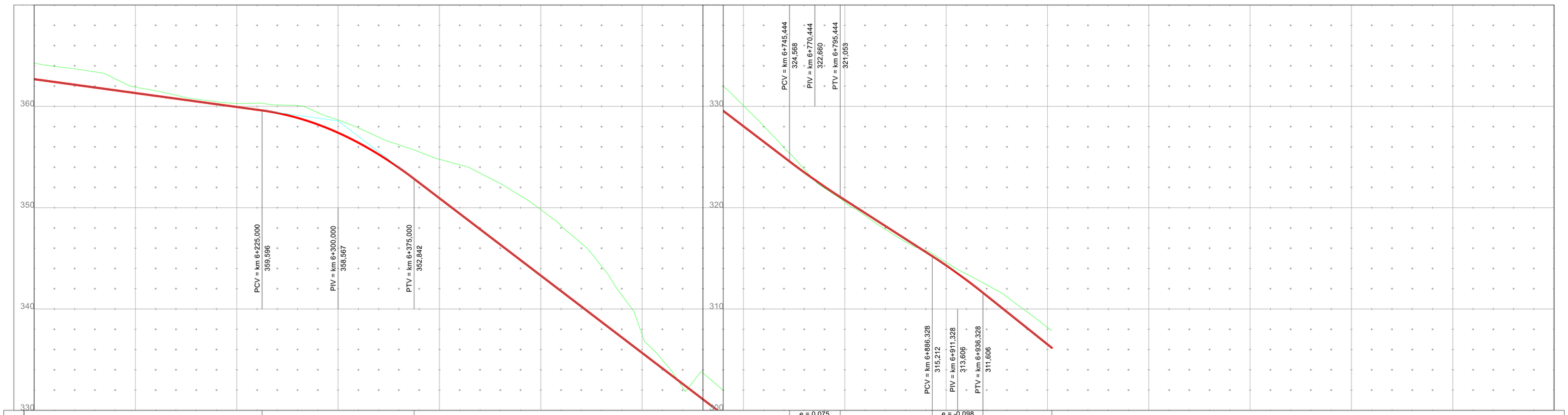
| | | |


)0m³/5946,92m³
A-008(AI)]
C-009(C1ª) 4040,00m³/3107,69m³
[4040,00m³→A-008(AI)]
C-010(C1ª) 2198,00m³/1690,77m³
[606,92m³→A-008(AI)] [1591,08m³→A-008(AS)]
C-011(C1ª) 1694,00m³/1303,08m³
[1694,00m³→A-008(AS)]
[556,42m³→A-008(AS)] [7
4+500
4+600
4+700
4+800
4+900
5+000
5+100
5+200
5+300
5+400
5+500
5+600
5+700
5+800
5+900
6+000
A-010(AS) 3418,00m³
[C-012(C1ª)→3418,00m³]
A-010(AI) 8737,00m³
[C-012(C1ª)→8737,00m³]
A-011(AS) 1000,00m³
[C-012(C1ª)→1000,00m³]
A-011(AI) 886,00m³
[C-012(C1ª)→886,00m³]
A-012(AS) 2264,00m³
[C-012(C1ª)→2264,00m³]
A-012(AI) 3965,00m³
[C-012(C1ª)→3965,00m³]
A-013(AS) 976,00m³
[C-012(C1ª)→597,14m³] [C-013(C1ª)→378,86m³]
A-013(AI) 166,00m³
[C-012(C1ª)→166,00m³]


370
360
350
340
MÁX: 4+547,026/366,012
MÍN: 5+090,564/357,977
MÁX: 5+832,512/364,656
PIV = km 4+527,754
366,651
PTV = km 4+587,754
365,683
PCV = km 5+040,000
358,385
PIV = km 5+080,000
357,739
PTV = km 5+120,000
358,115
PCV = km 5+800,000
364,503
PIV = km 5+840,000
364,879
PTV = km 5+880,000
364,330

| | | |


C-012(C1ª) 29804,00m³/22926,15m³
[556,42m³→A-008(AS)] [751,40m³→A-009(AI)] [1153,10m³→A-009(AS)] [11358,10m³→A-010(AI)] [4443,40m³→A-010(AS)] [1151,80m³→A-011(AI)] [1300,00m³→A-011(AS)] [5154,50m³→A-012(AI)] [2943,20m³→A-012(AS)] [215,80m³→A-013(AI)] [776,28m³→A-013(AS)]
[492,52m³→A-013(AS)] [36,40m³→A-014(AS)]
C-013(C1ª) 1448,00m³/1113,85m³
[80,60m³→A-015(AI)] [166,40m³→A-015(AS)] [1170m³→A-016(AI)] [660,38m³→A-016(AS)]
6+000 6+100 6+200 6+300 6+400 6+500 6+600 6+700 6+800 6+900 7+000 7+100 7+200 7+300 7+400 7+500
A-014(AS) 28,00m³
[C-013(C1ª)→28,00m³]
A-015(AS) 128,00m³
[C-013(C1ª)→128,00m³]
A-015(AI) 62,00m³
[C-013(C1ª)→62,00m³]
A-016(AS) 508,00m³
A-016(AI) 9,00m³
[C-013(C1ª)→9,00m³]


PCV = km 6+225,000
359,596
PIV = km 6+300,000
358,567
PTV = km 6+375,000
352,842
PCV = km 6+745,444
324,566
PIV = km 6+770,444
322,660
PTV = km 6+795,444
321,053
PCV = km 6+886,328
315,212
PIV = km 6+911,328
313,606
PTV = km 6+936,328
311,606

| | | |

7+500

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

CAPÍTULO III

EQUIPE NEXUM BRASIL

Ana Lucia Atarão Horn
Anthony da Silva Petri
Augusto Carré Sosa
Lucas Rossi

Alejandro Ruiz Padillo
Silvio Lisboa Schuster
Christine Tessele Nodari

R E P Ú B L I C A F E D E R A T I V A D O B R A S I L

UNIVERSIDADE FEDERAL DE SANTA MARIA – UFSM
CENTRO DE TECNOLOGIA - CT
CURSO DE ENGENHARIA CIVIL

LABORATÓRIO DE MOBILIDADE E LOGÍSTICA – *PROJECT-BASED LEARNING* – PROJETO PONTO DE PARTIDA

PROJETO BÁSICO PARA IMPLANTAÇÃO DE TRECHO RODOVIÁRIO

ENTRE INDEPENDÊNCIA E ALEGRIA

Rodovia:	PPP- 2022/01
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	15,8 Km, em diretriz km

Ponto de Partida
Lúdico-Real-Didático

GRUPO 22123 – NEXUM BR
AGOSTO/2022

DADOS DE IDENTIFICAÇÃO

Instituição: **Universidade Federal de Santa Maria – UFSM**

Unidade: **Centro de Tecnologia - CT**

Curso: **Engenharia Civil – EC**

Laboratório: **Laboratório de Mobilidade e Logística – LAMOT**

Projeto: **Aplicação de metodologias ativas e experiências inovadoras de ensino-aprendizagem tecnológico (Projeto Ponto de Partida)**

Disciplina: **Projeto Geométrico de Rodovias**

Edição: **2022/1**

Ano: **2022**

Semestre: **1**

Disciplina: **Rodovias I**

Turma: **12**

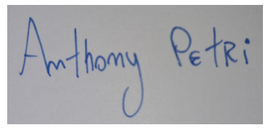
Número da Equipe: **22123**

Nome: **NEXUM B**

integrantes do grupo:



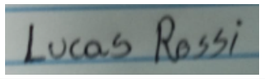
Ana Lúcia Atarão Horn



Anthony Da Silva Petri



Augusto Carre Sosa



Lucas Rossi

SUMÁRIO

SUMÁRIO

1 APRESENTAÇÃO **6**

Mapa de situação 6

Mapa de Localização 8

Quadro de características técnicas 10

2 PROJETO GEOMÉTRICO **13**

Seções transversais tipo 13

Linha geral 15

Detalhamento do Projeto Geométrico 17

Seções transversais 18

3 CRONOGRAMA PLANEJADO/REALIZADO **20**

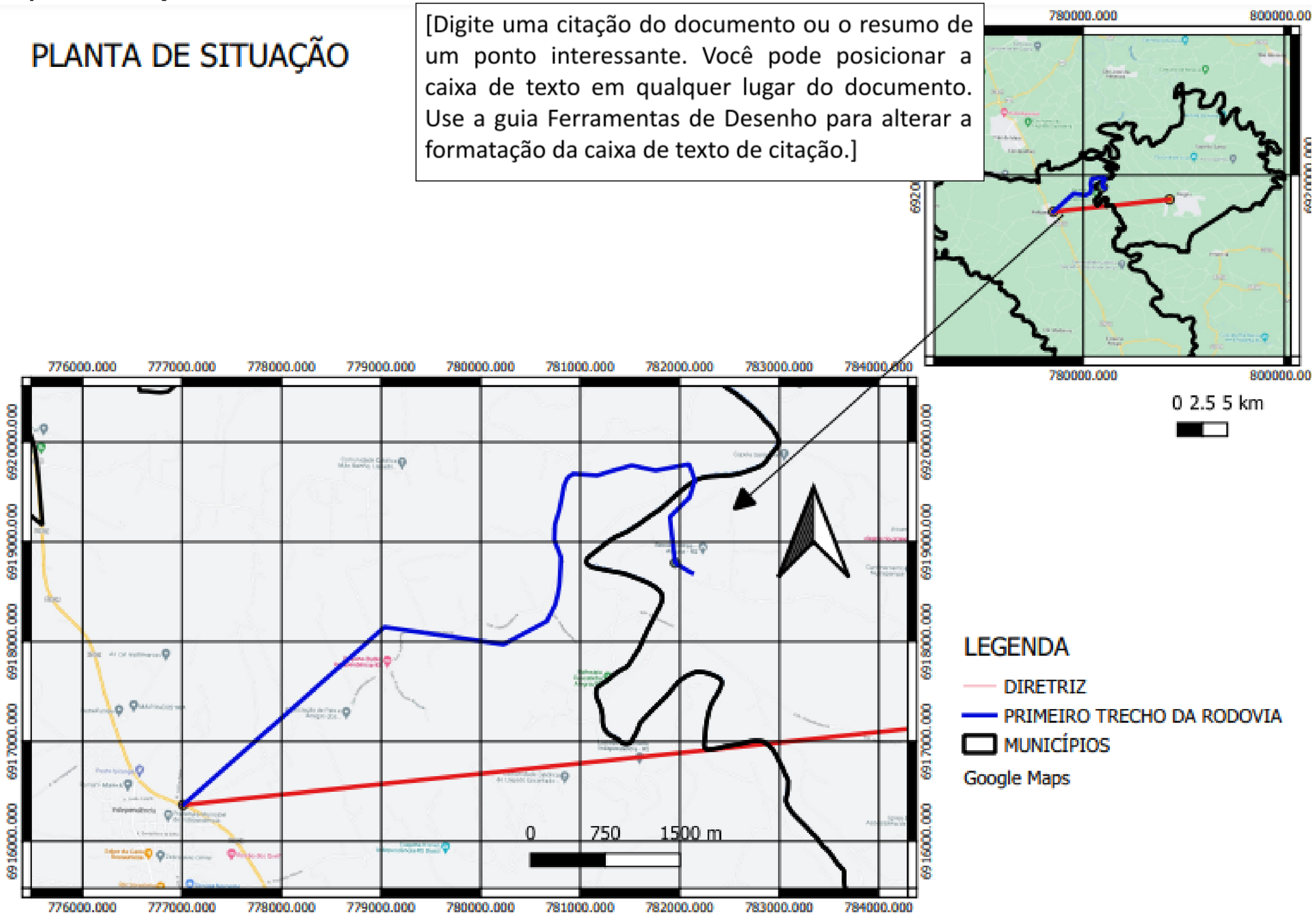
APRESENTAÇÃO

1 APRESENTAÇÃO

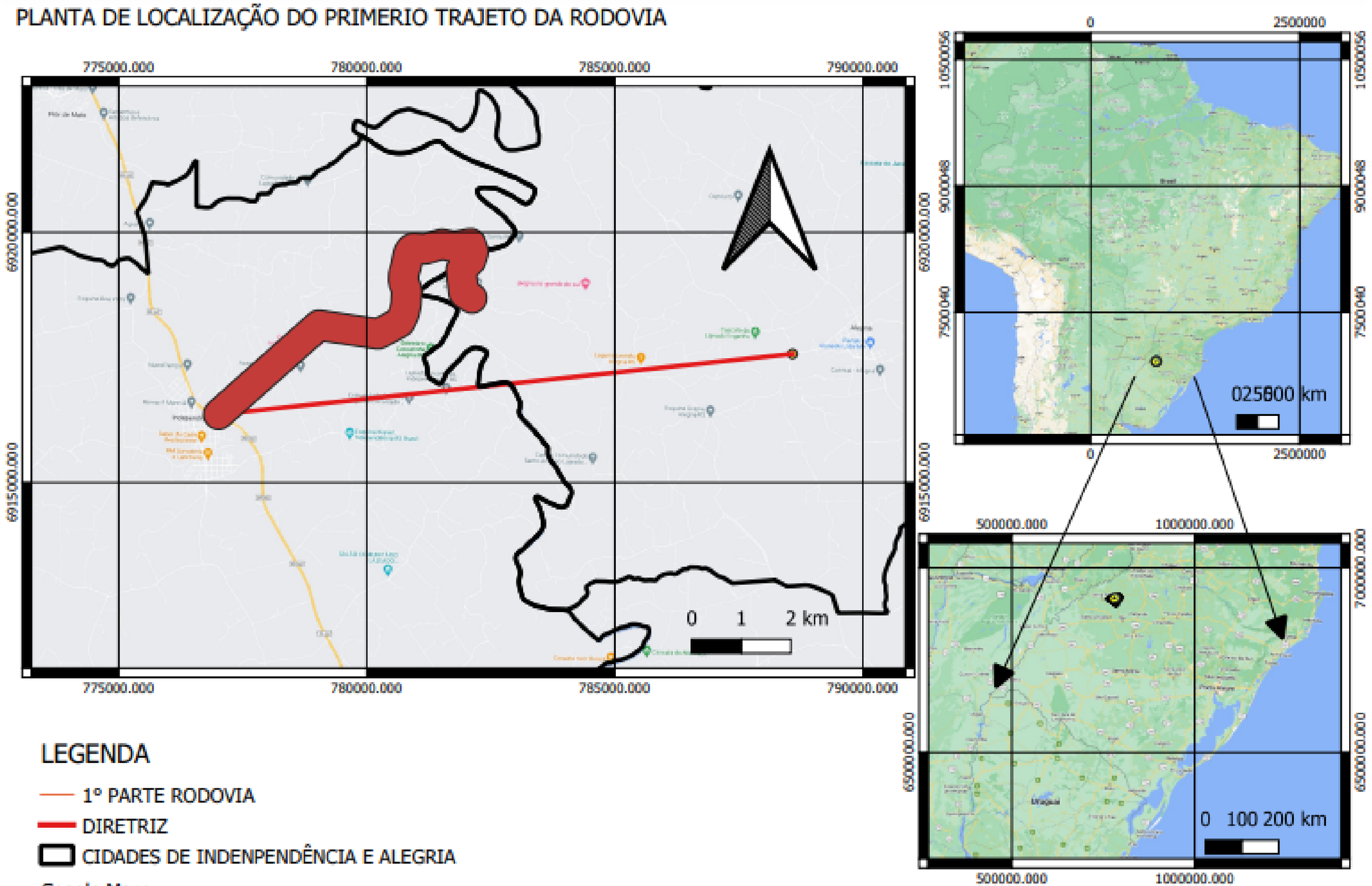
Mapa de situação

PLANTA DE SITUAÇÃO

[Digite uma citação do documento ou o resumo de um ponto interessante. Você pode posicionar a caixa de texto em qualquer lugar do documento. Use a guia Ferramentas de Desenho para alterar a formatação da caixa de texto de citação.]



MAPA DE LOCALIZAÇÃO



Quadro de características técnicas

CARACTERÍSTICAS TÉCNICAS

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 8+079,90

CARACTERÍSTICAS GERAIS

DE PROJETO		PLANIALTIMETRICAS				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	8079,905	FAIXA DOM. (LE/LD+OFF)	20 / 20 + 5	SUPERELEVAÇÃO MÁX.		TALUDE CORTE 3ª CAT.	

PLANIMETRIA

DISTRIBUIÇÃO DE CURVAS

T	RAIOS (m)	FREQ.	Dc (m)	%	Lc1+Lc2 (m)	%
R	R mínimo = 100,000	1	50,175	0,62	60,000	0,74
A	100,000 < R ≤ 100,000					
N	100,000 < R ≤ 200,000	10	624,368	7,73	720,000	8,91
S	200,000 < R ≤ 300,000					
I	300,000 < R ≤ 500,000					
Ç	R > 500,000					
-	TOTAL EM TRANSIÇÃO	11	674,543	8,35	780,000	9,65
S	RAIOS (m)	FREQ.	Dc (m)	%		
I	R mínimo = 1000000,000					
M	1000000,000 < R ≤ 500,000					
P	500,000 < R ≤ 700,000					
L	700,000 < R ≤ 1000,000					
E	1000,000 < R ≤ 1500,000					
S	R > 1500,000					
	TOTAL SIMPLES					
TOTAL EM CURVA		11	674,543	8,35	2129,086	26,35

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1					0 < i ≤ 1		
1 < i ≤ 2	51,915	0,64			1 < i ≤ 2	55,376	0,69
2 < i ≤ 3	467,476	5,79			2 < i ≤ 3	1166,332	14,43
3 < i ≤ 4	369,533	4,57			3 < i ≤ 4	707,000	8,75
4 < i ≤ 5	168,000	2,08			4 < i ≤ 5	730,843	9,05
5 < i ≤ 6					5 < i ≤ 6	112,949	1,40
6 < i ≤ 7					6 < i ≤ 7	261,195	3,23
7 < i ≤ 8	181,056	2,24			7 < i ≤ 8	741,179	9,17
8 < i ≤ 9					8 < i ≤ 9	517,051	6,40
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	1237,980	15,32			TOTAL	4291,925	53,12

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
5529,905	68,44	1340,000	16,58	1210,000	14,98	2550,000	31,56

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
152,856	1,89	956,378	11,84	6625,361	82,00

PARÂMETROS K MÍNIMOS ADOTADOS

EM CURVA CÔNCAVA	7,143	EM CURVA CONVEXA	5,457

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
2,903	0,359	5505,041	46,773

PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
12587,724	155,79	20351,065	251,87	16469,395	203,83

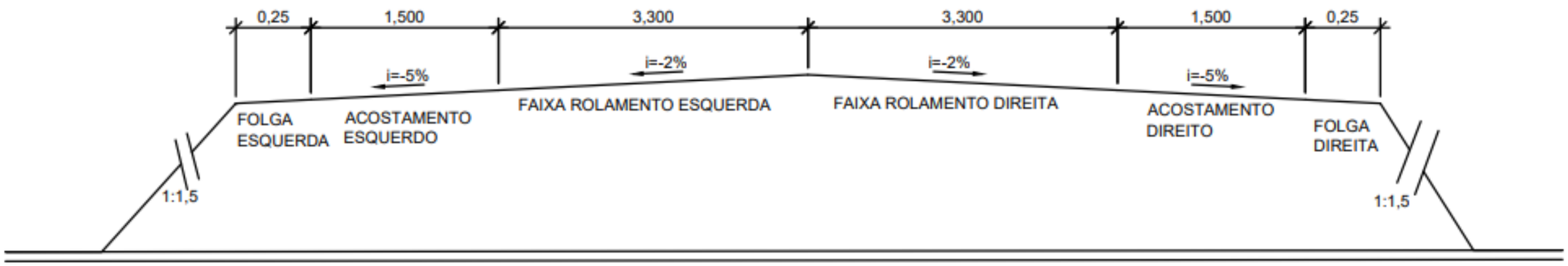
CARACTERÍSTICAS OPERACIONAIS

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

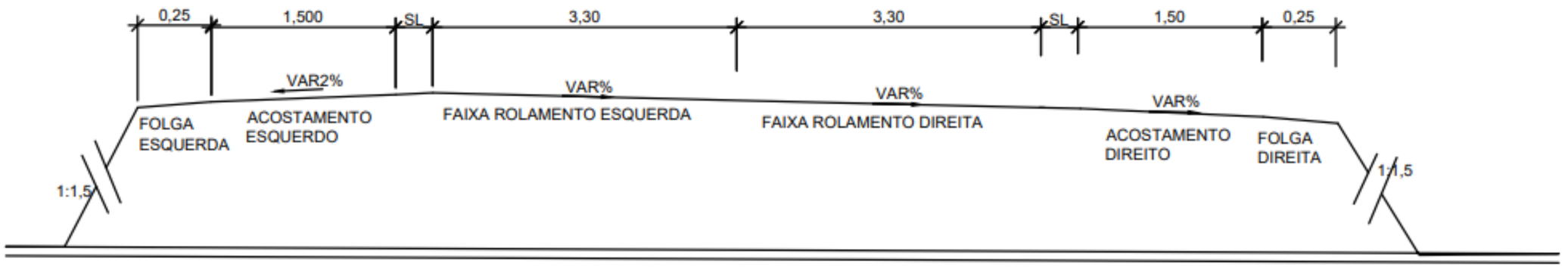
1/1

2 PROJETO GEOMÉTRICO

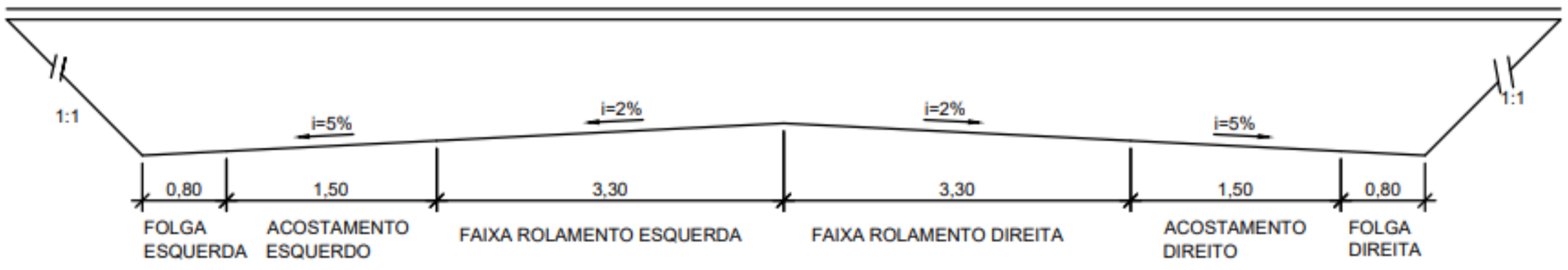
ATERRO EM TANGENTE



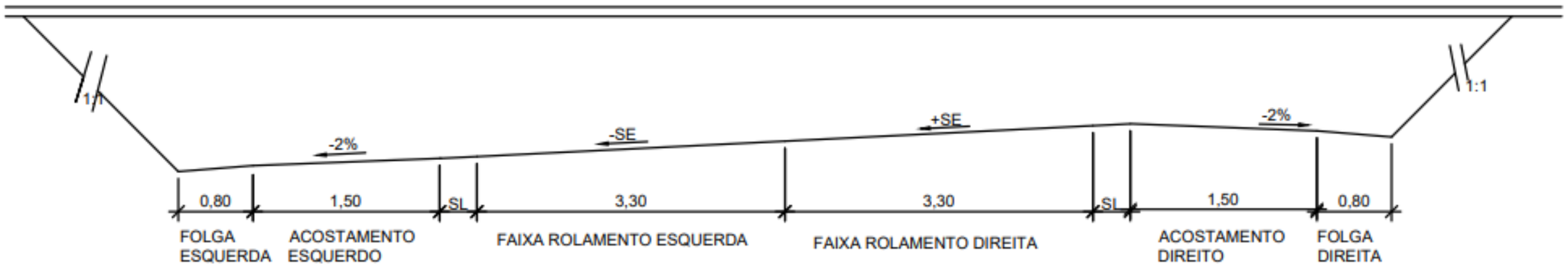
ATERRO EM CURVA (DIREITA)



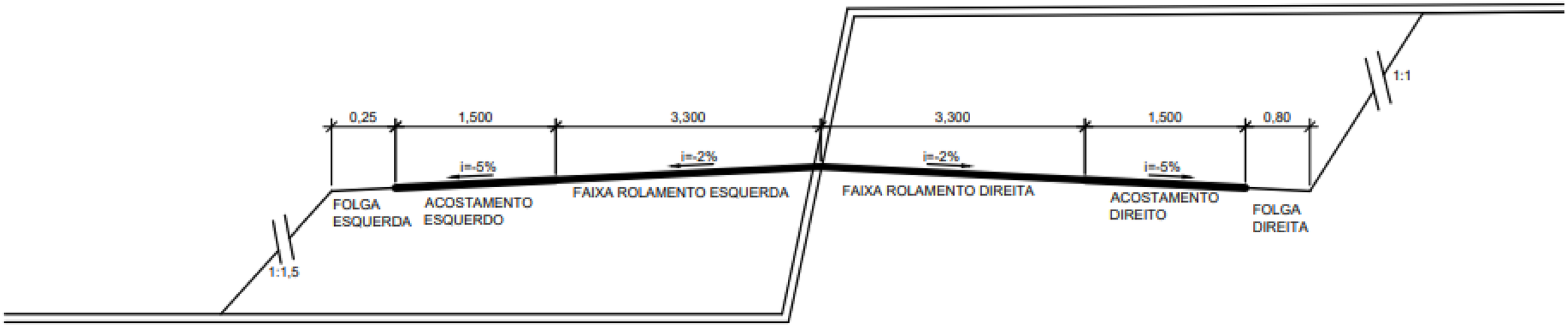
TIPO CORTE EM TANGENTE



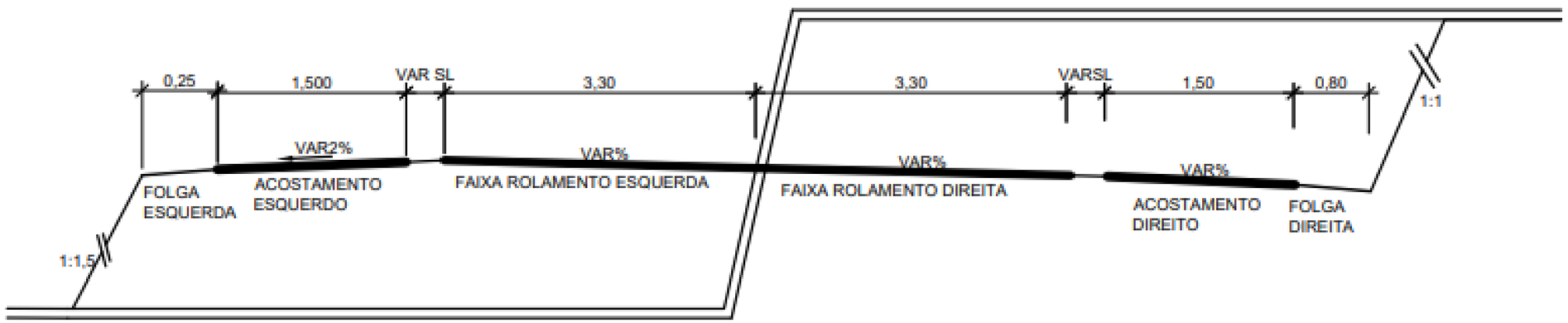
CORTE EM CURVA (ESQUERDA)



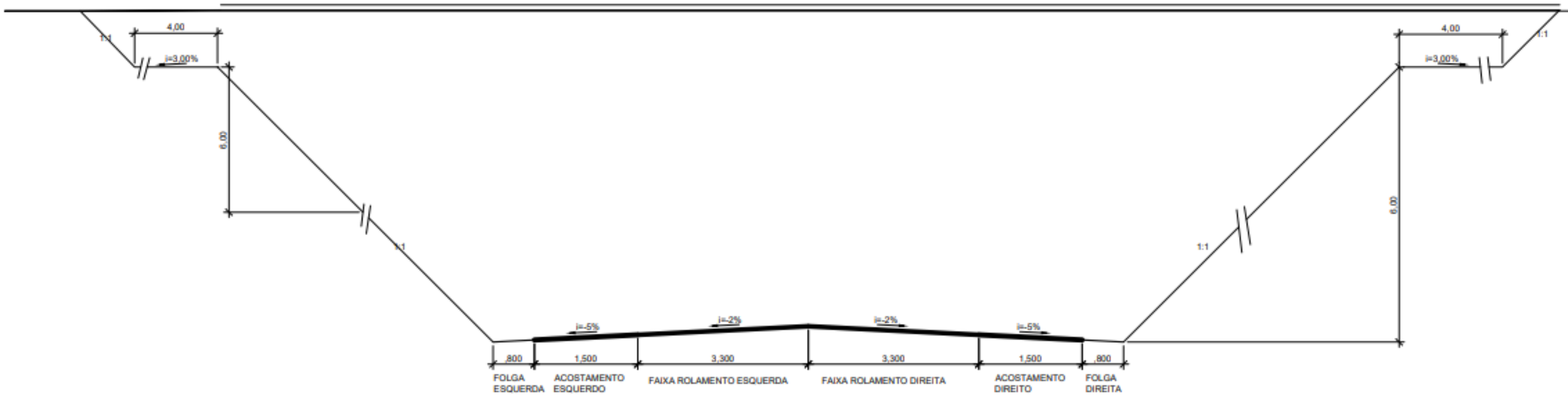
TIPO MISTA EM TANGENTE



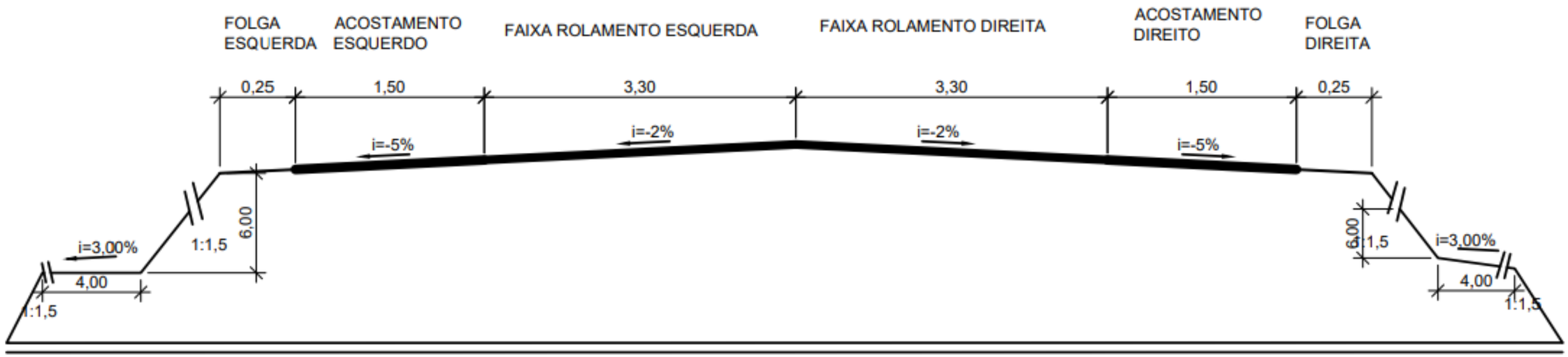
TIPO MISTA EM CURVA

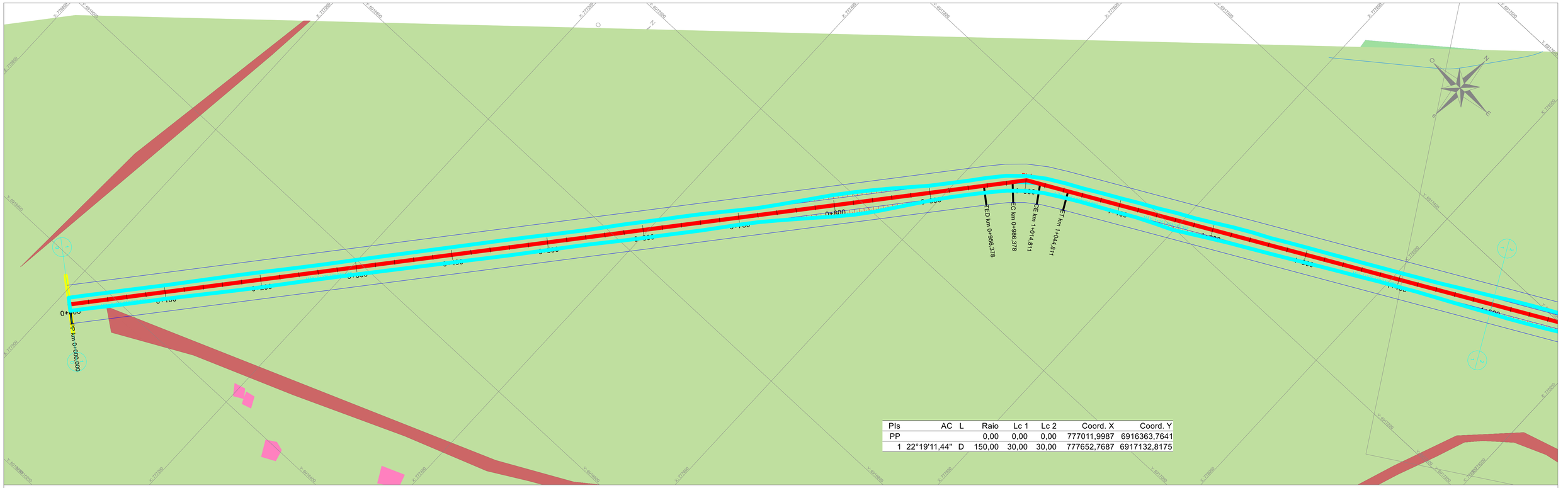


CORTE EM TANGENTE COM BANQUETAS

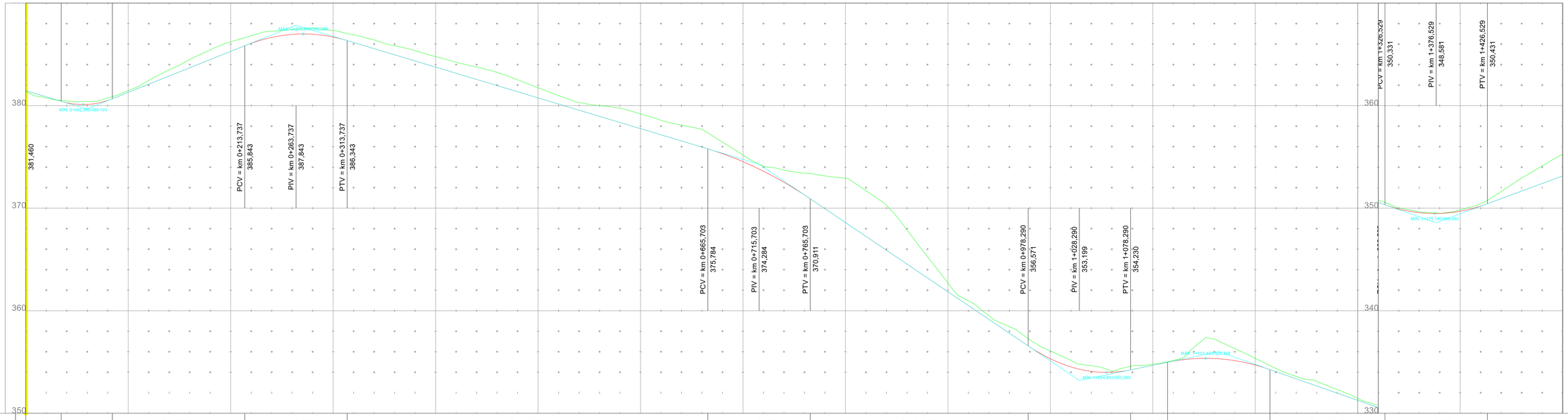


ATERRO COM BANQUETAS





PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
PP			0,00	0,00	0,00	777011,9987	6916363,7641
1	22°19'11,44"	D	150,00	30,00	30,00	777652,7687	6917132,8175

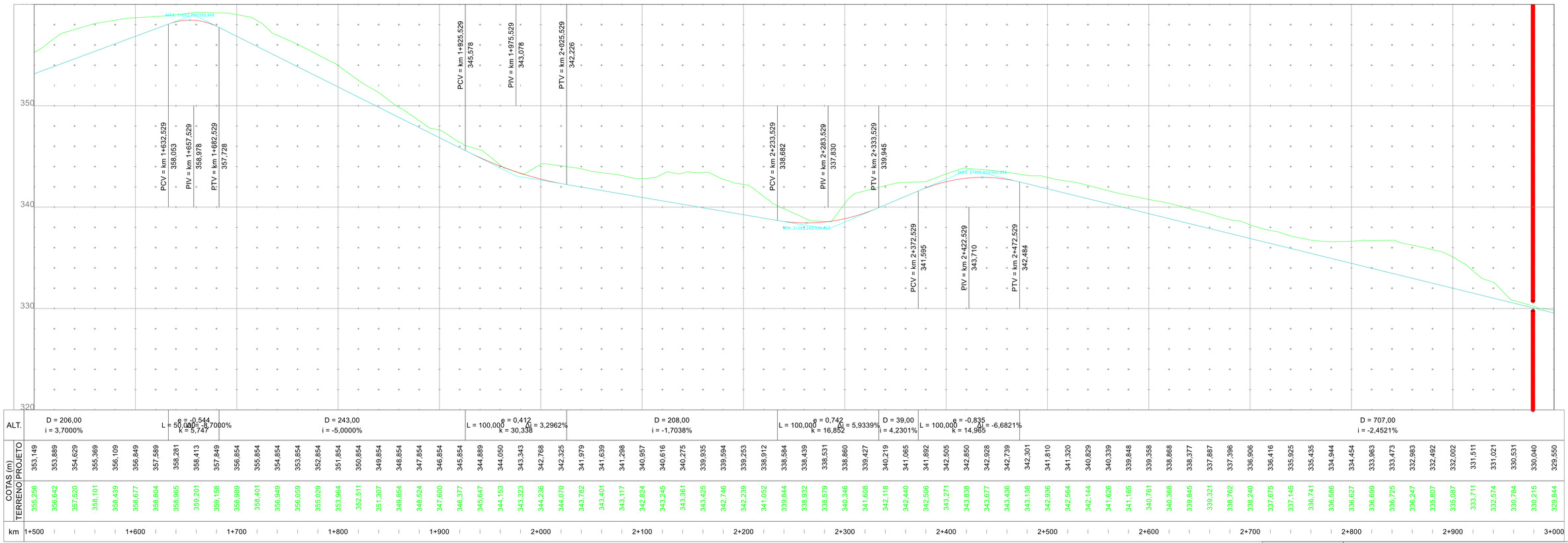


ALT.	D = 34,53 i = -3,0000%	L = 50,000	e = 0,438 i = 7,0000% k = 7,143	D = 129,21 i = 4,0000%	L = 100,000	e = -0,875 Δi = -7,0000% k = 14,286	D = 351,97 i = -3,0000%	L = 100,000	e = -0,468 Δi = -3,7454% k = 26,700	D = 212,59 i = -6,7454%	L = 100,000	e = 1,101 Δi = 8,8090% k = 11,352	D = 36,07 i = 2,0637%	L = 100,000	e = -0,695 Δi = -5,5637% k = 17,974	D = 112,17 i = -3,5000%	L = 100,000	e = 0,900 Δi = 7,2000% k = 13,889

| km | | 0+000 | | | | | 0+100 | | | | | 0+200 | | | | | 0+300 | | | | | 0+400 | | | | | 0+500 | | | | | 0+600 | | | | | 0+700 | | | | | 0+800 | | | | | 0+900 | | | | | 1+000 | | | | | 1+100 | | | | | 1+200 | | | | | 1+300 | | | | | 1+400 | | | | | 1+500 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---



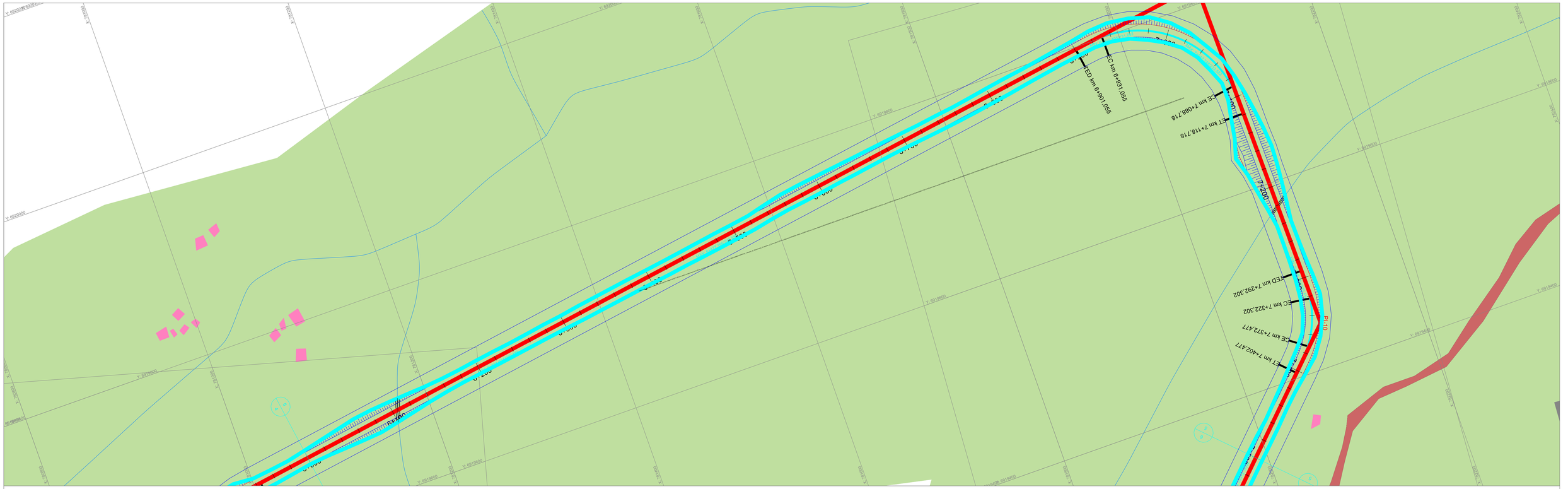
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
2	18°13'29,99"	E	150,00	30,00	30,00	778481,1053	6917571,0166
3	55°34'15,18"	D	150,00	50,00	50,00	779033,4026	6918145,0251

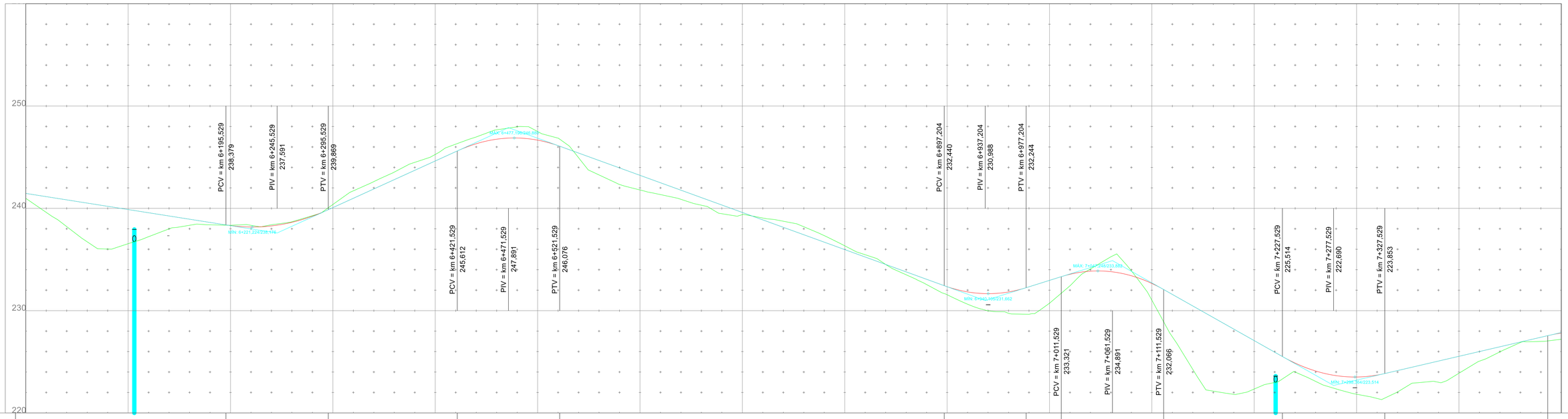


ALT.	D = 206,00 i = 3,7000%	L = 50,000 i = -3,7000%	e = -0,544 k = 5,747	D = 243,00 i = -5,0000%	L = 100,000	e = 0,412 k = 30,338	Gi = 3,2962%	D = 208,00 i = -1,7038%	L = 100,000	e = 0,742 k = 16,852	Gi = 5,9339%	D = 39,00 i = 4,2301%	L = 100,000	e = -0,835 k = 14,965	Gi = -6,6821%	D = 707,00 i = -2,4521%

km		1+500			1+600			1+700			1+800			1+900			2+000			2+100			2+200			2+300			2+400			2+500			2+600			2+700			2+800			2+900			3+000
COTAS (m)	TERRENO	355,256	356,642	357,520	358,101	358,439	358,677	358,804	358,965	359,201	359,158	358,989	358,401	356,949	356,059	355,029	353,964	352,511	351,307	349,854	348,524	347,600	346,377	345,647	344,153	343,323	344,236	344,070	343,782	343,401	343,117	342,824	343,245	343,361	343,425	342,746	342,239	341,052	339,844	338,932	338,579	340,346	341,608	342,118	342,440	342,506	343,271	343,838	343,677	343,436	343,138	342,936	342,564	342,144	341,626	341,165	340,761	340,368	339,845	339,321	338,762	338,240	337,675	337,145	336,741	336,586	336,627	336,699	336,725	336,247	335,807	335,087	333,711	332,574	330,784	330,215	329,844
	PROJETO	353,149	353,889	354,629	355,369	356,109	356,849	357,589	358,281	358,413	357,849	356,854	355,854	354,854	353,854	352,854	351,854	350,854	349,854	348,854	347,854	346,854	345,854	344,889	344,050	343,343	342,768	342,325	341,979	341,639	341,298	340,957	340,616	340,275	339,935	339,594	339,253	338,912	338,584	338,439	338,531	338,860	339,427	340,219	341,065	341,892	342,505	342,850	342,928	342,739	342,301	341,810	341,320	340,829	340,339	339,848	339,358	338,868	338,377	337,887	337,396	336,906	336,416	335,925	335,435	334,944	334,454	333,963	333,473	332,983	332,492	332,002	331,511	331,021	330,531	330,040	329,550

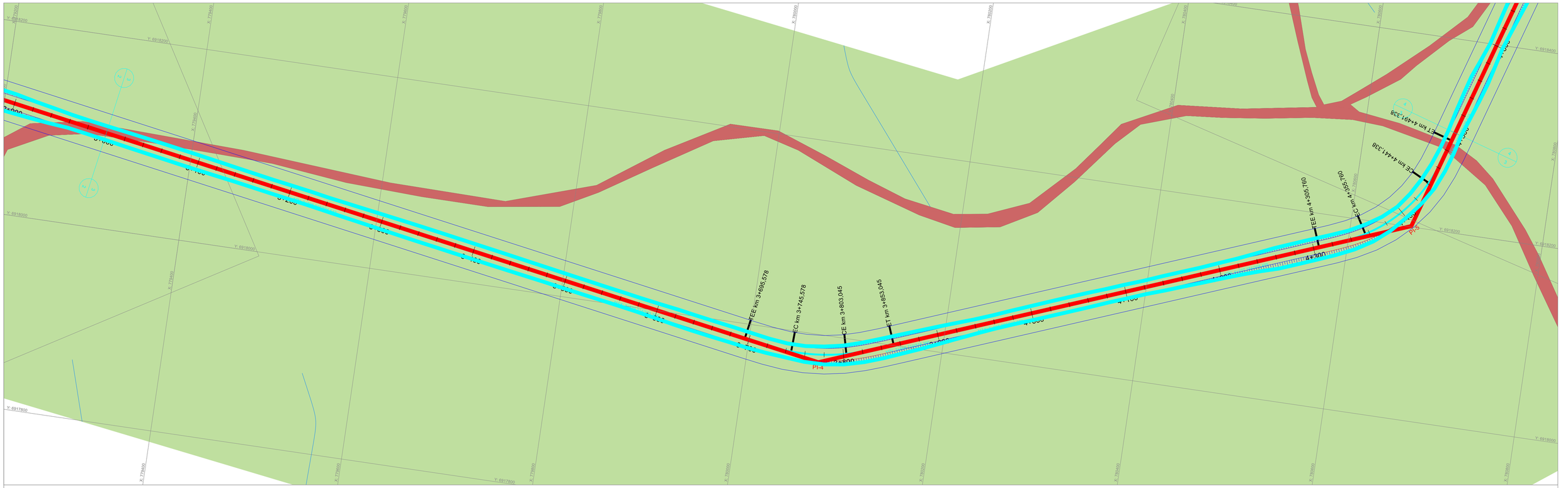
NEXUM BRASIL	UNIVERSIDADE FEDERAL DE SANTA MARIA Centro de Tecnologia Laboratório de Mobilidade e Logística - LAMOT	
	Rodovia: PPP-22123/1 Trecho: INDEPENDÊNCIA E ALEGRIA -RS Data: AGOSTO DE 2022	
Escala: 1:2000	PROJETO GEOMÉTRICO	Código: PG-02

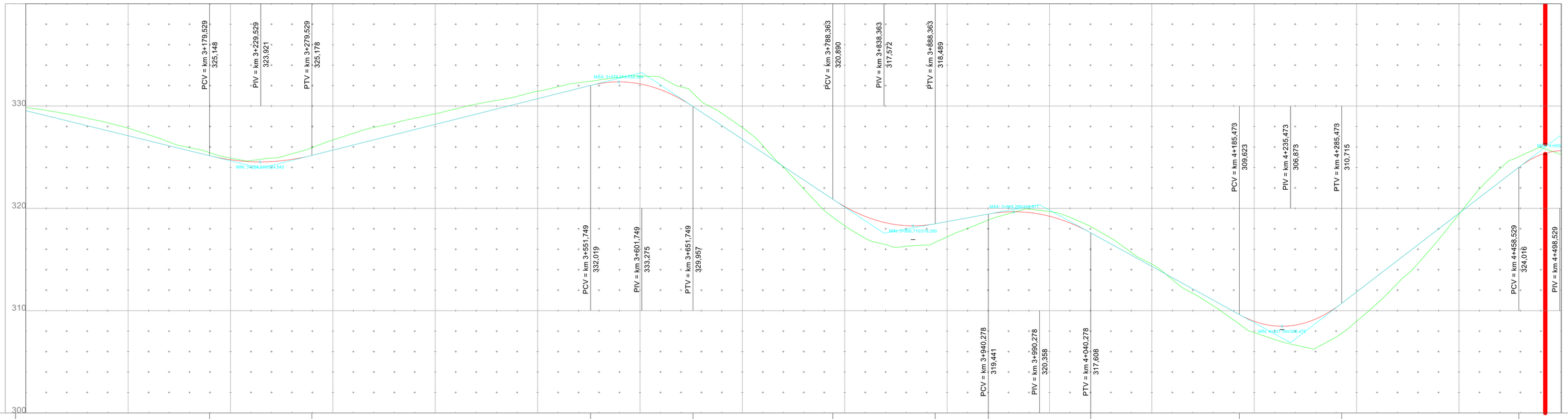




ALT.	D = 252,02 i = -1,5760%	L = 100,000 e = 0,767 k = 16,304 Δ = 6,1335%	D = 126,00 i = 4,5575%	L = 100,000 e = -1,023 k = 12,214 Δ = -8,1871%	D = 375,67 i = -3,6296%	L = 80,000 e = 0,677 k = 11,820 Δ = 6,7683%	D = 34,33 i = 3,1387%	L = 100,000 e = -1,098 k = 11,380 Δ = -8,7871%	D = 116,00 i = -5,6484%	L = 100,000 e = 0,997 k = 12,541 Δ = 7,9740%	D = 159,18 i = 2,3256%	L = 80,0

| COTAS (m) | | |


EE km 3+686,578
EC km 3+745,578
CE km 3+803,045
ET km 3+853,045
PI-4
EE km 4+050,160
EC km 4+355,160
CE km 4+444,338
ET km 4+491,338
PI-5

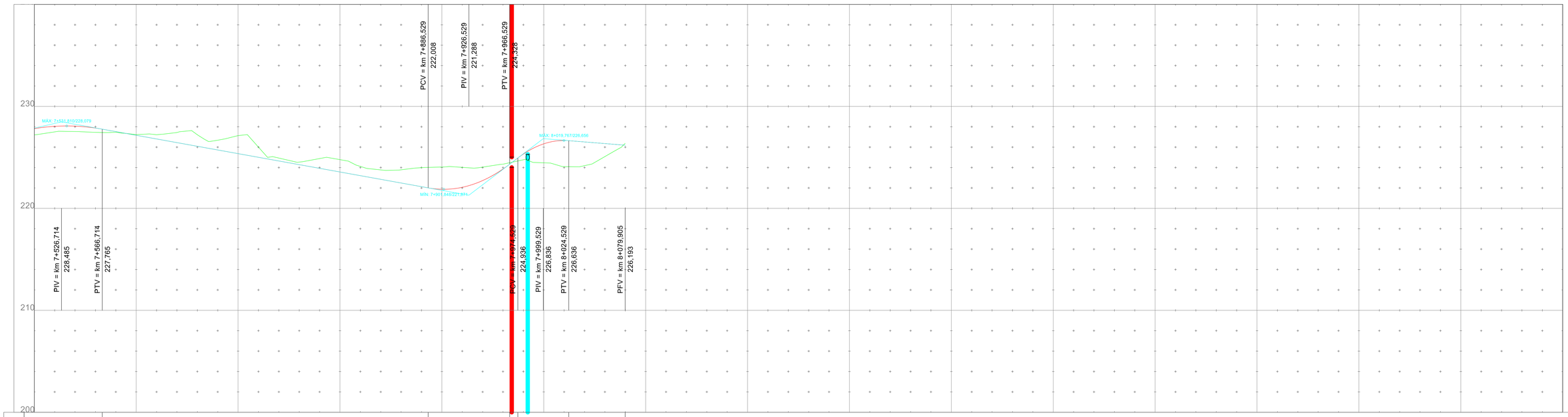

PCV = km 3+179,529
325,148
PIV = km 3+229,529
323,921
PTV = km 3+279,529
325,178
MAX: 3+529,314;332,348
MIN: 3+229,316;324,542
PCV = km 3+551,749
332,019
PIV = km 3+601,749
333,275
PTV = km 3+651,749
329,957
PCV = km 3+788,363
320,890
PIV = km 3+838,363
317,572
PTV = km 3+888,363
318,489
MIN: 3+856,710;318,290
MAX: 3+965,295;319,671
PCV = km 3+940,278
319,441
PIV = km 3+990,278
320,358
PTV = km 4+040,278
317,608
PCV = km 4+185,473
309,623
PIV = km 4+235,473
306,873
PTV = km 4+285,473
310,715
MIN: 4+372,760;306,478
PCV = km 4+458,529
324,016
PIV = km 4+498,529
MAX: 4+500
330
320
310
300

| | | |

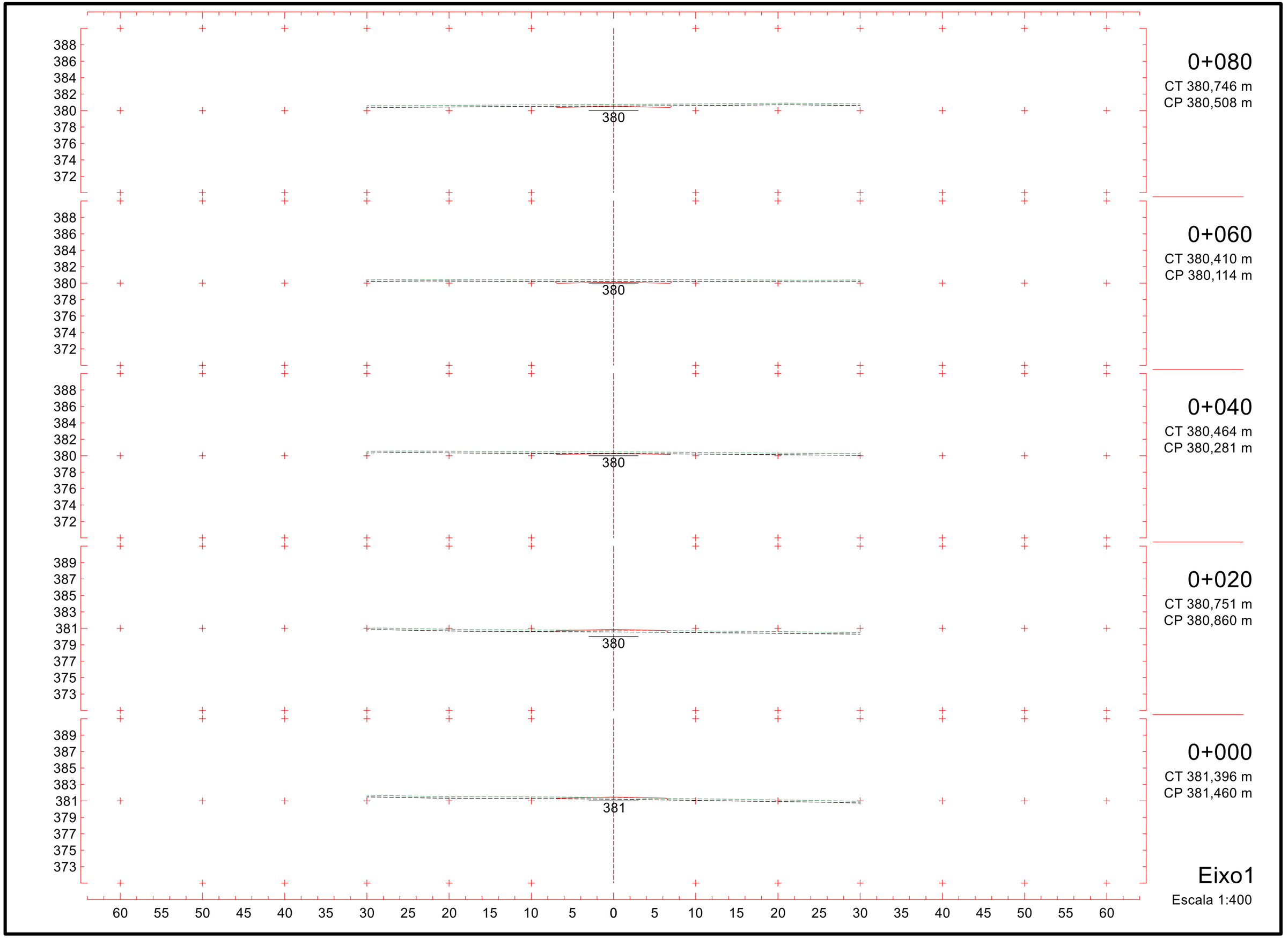

PI-8
TEE km 4+743,144
TEC km 4+778,144
TET km 4+808,698
TEC km 5+807,199
TET km 5+944,681
PCV km 4+772,529
307,983
PIV = km 4+797,529
306,240
PTV = km 4+822,529
304,382
PCV km 5+339,580
265,950
PIV = km 5+379,580
262,977
PTV = km 5+419,580
261,088
PCV km 5+532,529
255,752
PIV = km 5+582,529
253,391
PTV = km 5+632,529
255,818
PCV = km 5+635,529
255,963
PIV = km 5+685,529
258,391
PTV = km 5+735,529
255,033
PCV = km 5+893,507
244,423
PIV = km 5+918,507
242,744
PTV = km 5+943,507
242,350
MAX - 5+677,485/256,088
MIN - 5+581,846/254,566
ALT. i = -1,466 ΔL = -14,6593% L = 5,457
D = 234,00 i = -6,9735%
e = -0,029 L = 50,000 Δi = 3,4594% k = 108,846
D = 517,05 i = -7,4328%
e = 0,271 L = 80,000 Δi = 2,7093% k = 29,528
D = 112,95 i = -4,7235%
L = 100,000 e = 1,197 Δi = 9,5779% k = 10,441
D = 3,00 i = 4,8544%
e = -1,446 L = 100,000 Δi = -11,5701% k = 8,643
D = 157,98 i = -6,7158%
e = 0,321 L = 50,000 Δi = 3,1398% k = 9,726

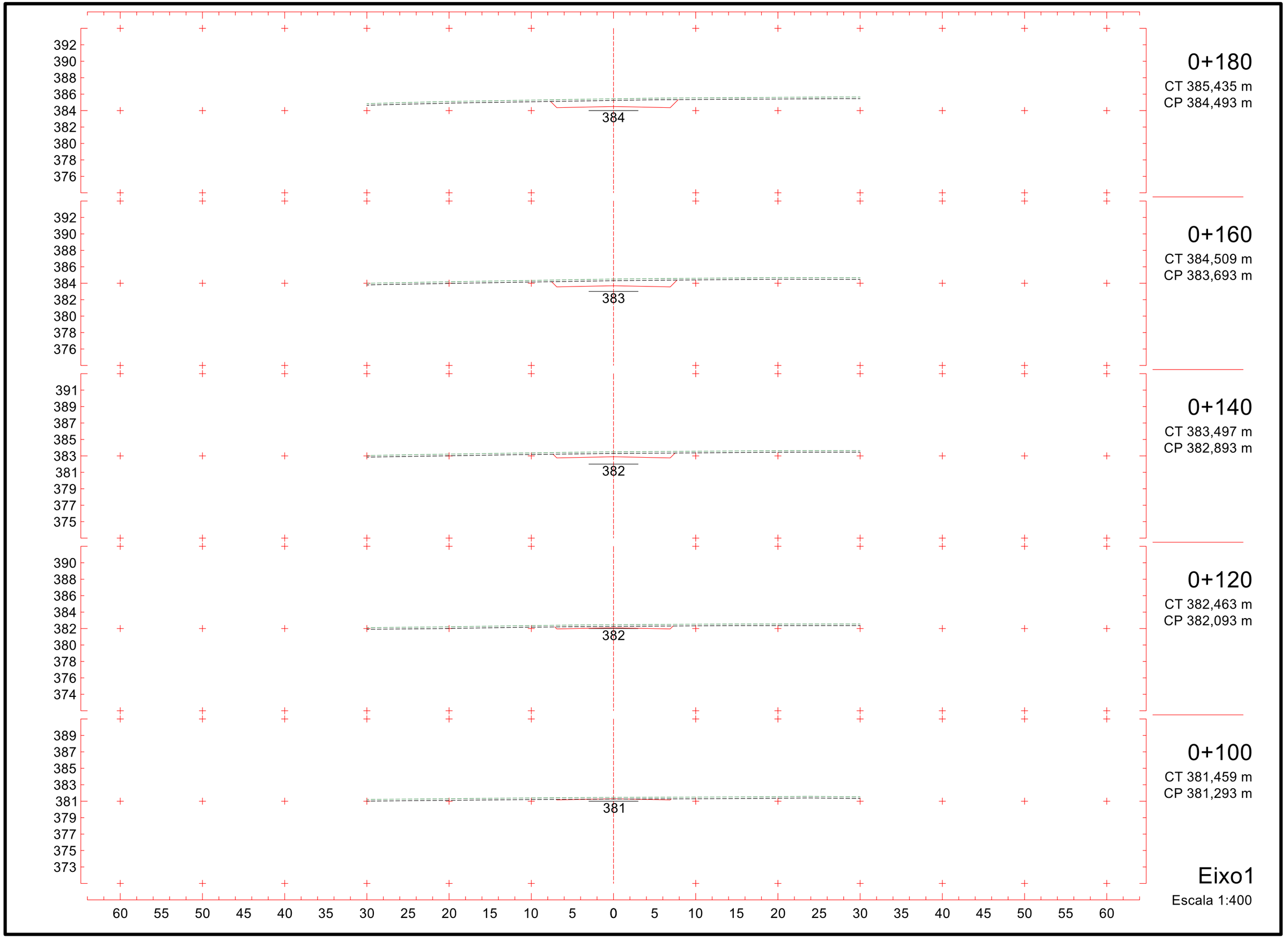
| | | |

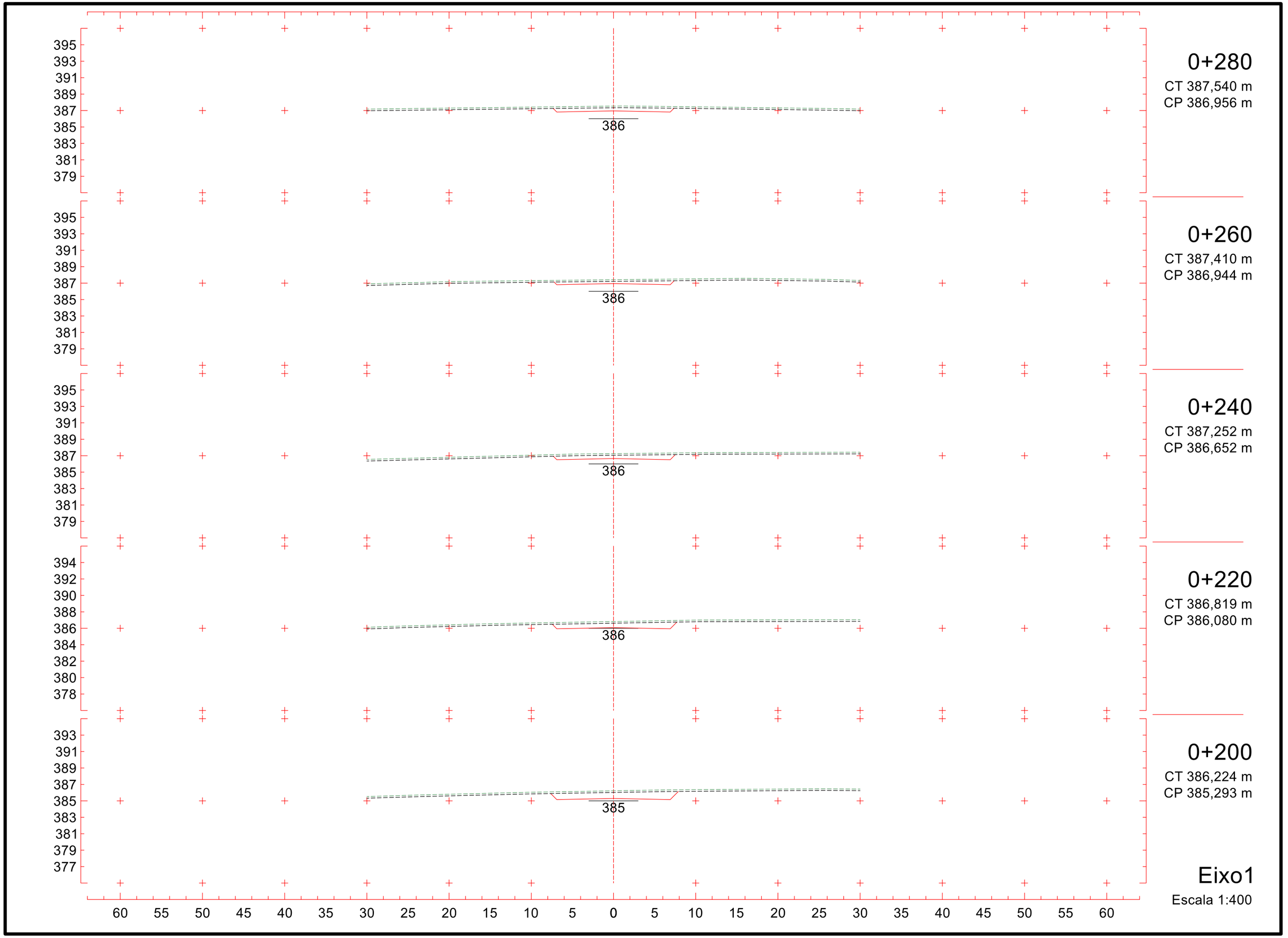

PI-9
PI-10
PI-11
7+200
EE km 7+085,718
ET km 7+118,718
ED km 7+292,302
EC km 7+322,302
EE km 7+372,477
ET km 7+402,477
EC km 6+931,055
ED km 6+901,055
EE km 7+555,333
EC km 7+585,333
EE km 7+854,994
ET km 7+884,994
PF km 8+079,905

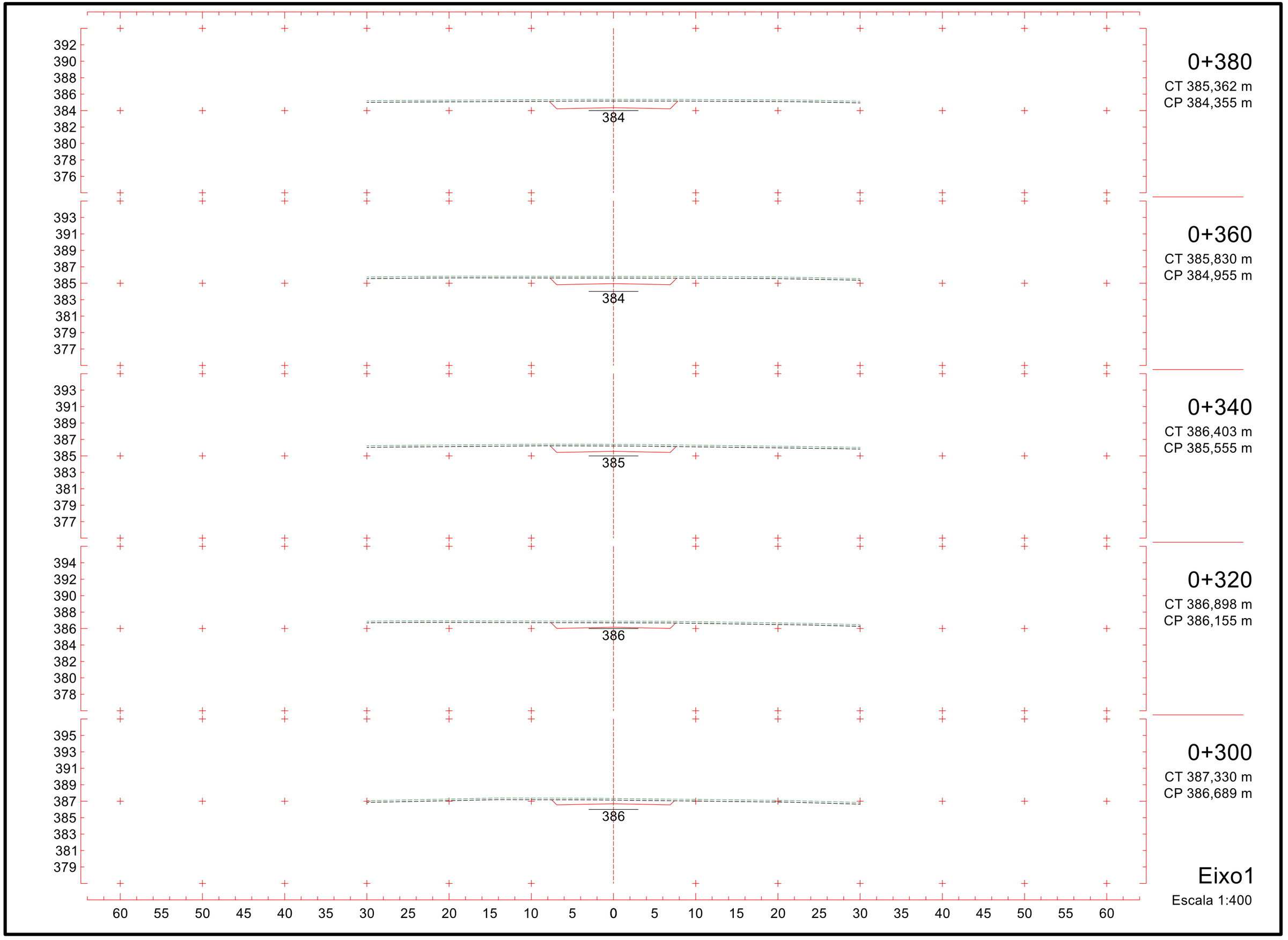

PCV = km 7+886,529
222,008
PIV = km 7+926,529
221,268
PTV = km 7+966,529
224,328
MÁX. 7+531,810/228,079
MÍN. 7+901,848/221,974
MÁX. 8+019,767/226,656
PIV = km 7+526,714
228,485
PTV = km 7+566,714
227,765
PCV = km 7+974,529
224,936
PIV = km 7+999,529
226,836
PTV = km 8+024,529
226,636
PFV = km 8+079,905
226,193
230
220
210
200

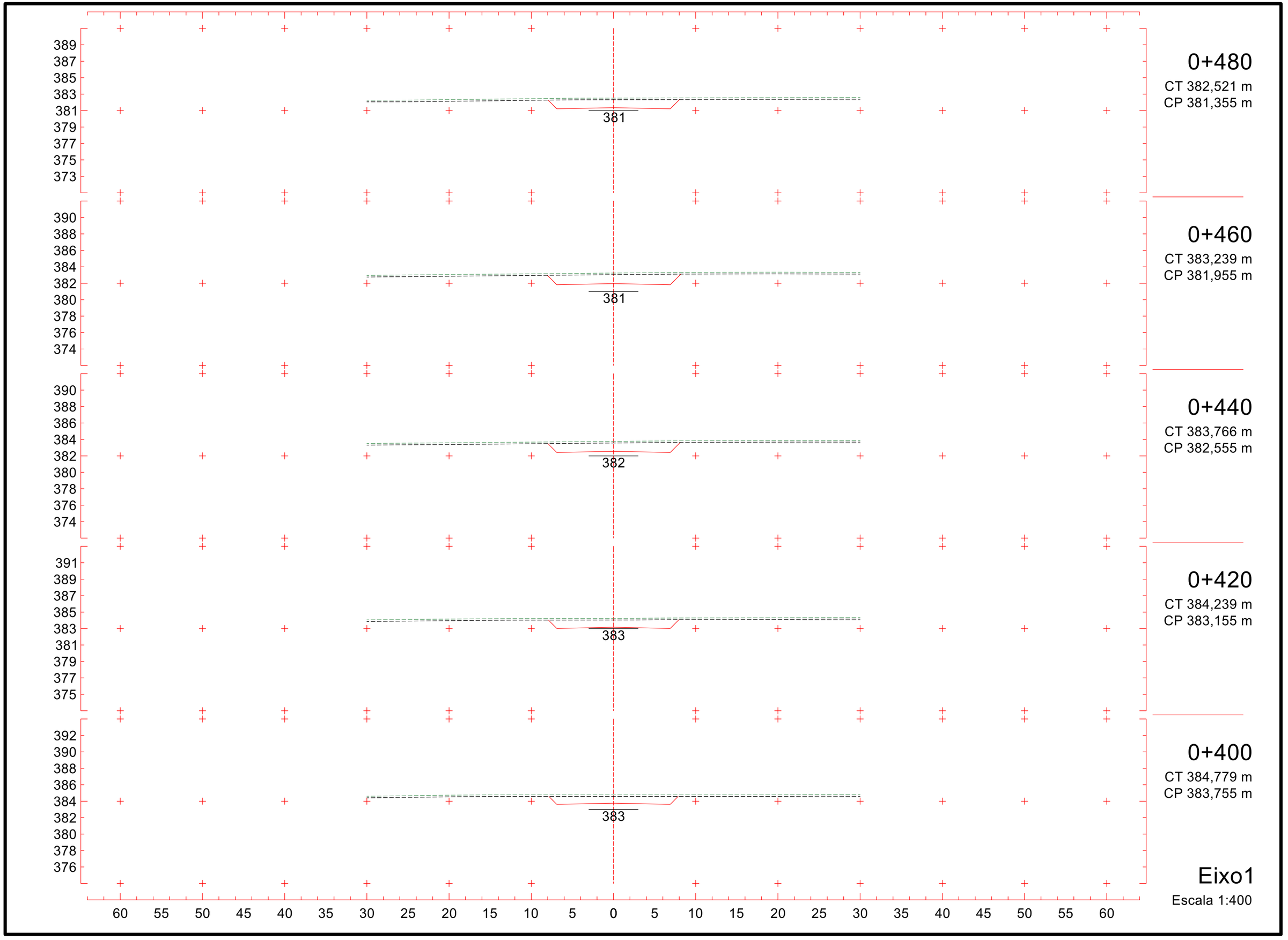
| | | |

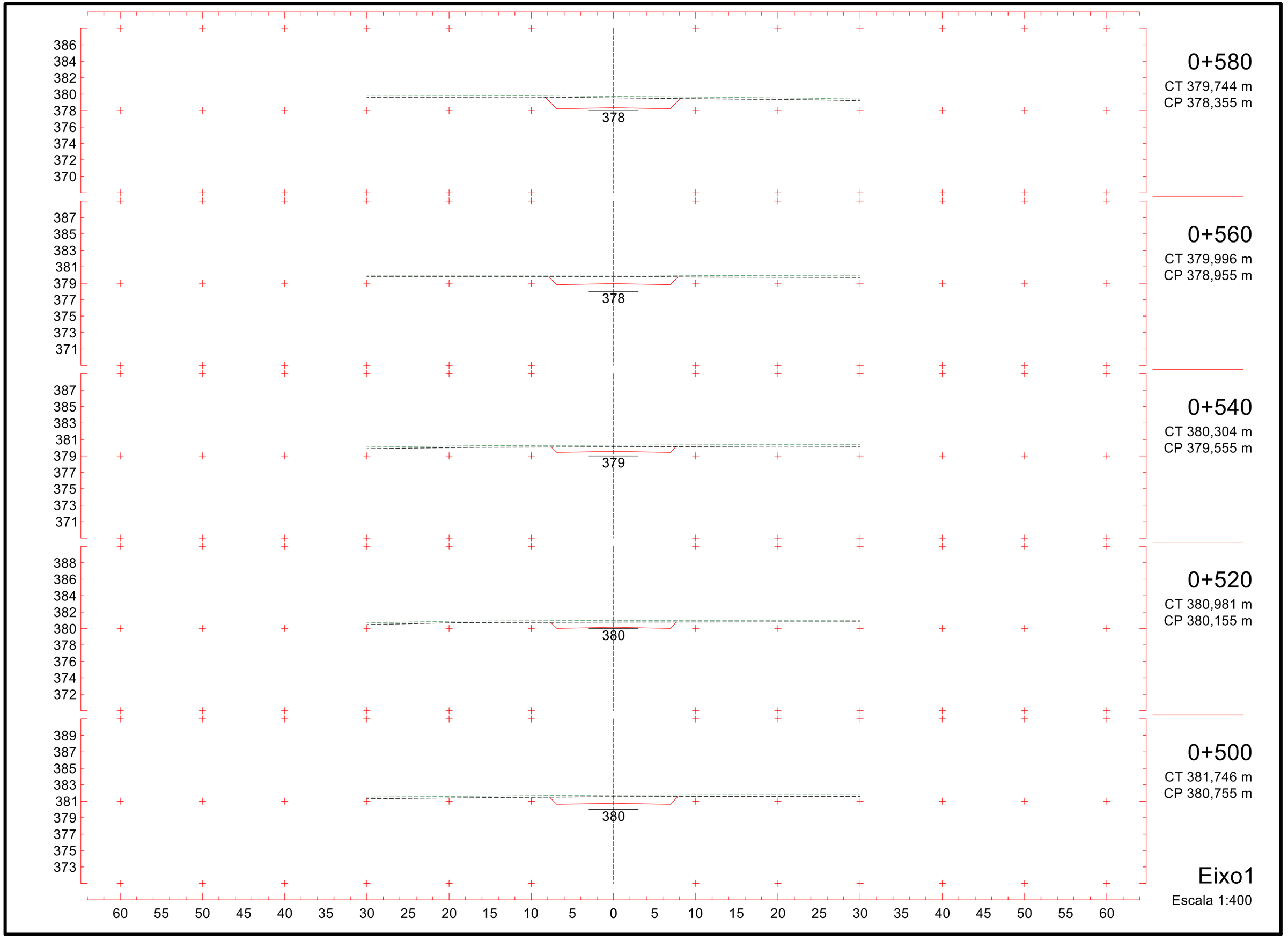

388
386
384
382
380
378
376
374
372
380
0+080
CT 380,746 m
CP 380,508 m
388
386
384
382
380
378
376
374
372
380
0+060
CT 380,410 m
CP 380,114 m
388
386
384
382
380
378
376
374
372
380
0+040
CT 380,464 m
CP 380,281 m
389
387
385
383
381
379
377
375
373
380
0+020
CT 380,751 m
CP 380,860 m
389
387
385
383
381
379
377
375
373
381
0+000
CT 381,396 m
CP 381,460 m
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
Eixo1
Escala 1:400

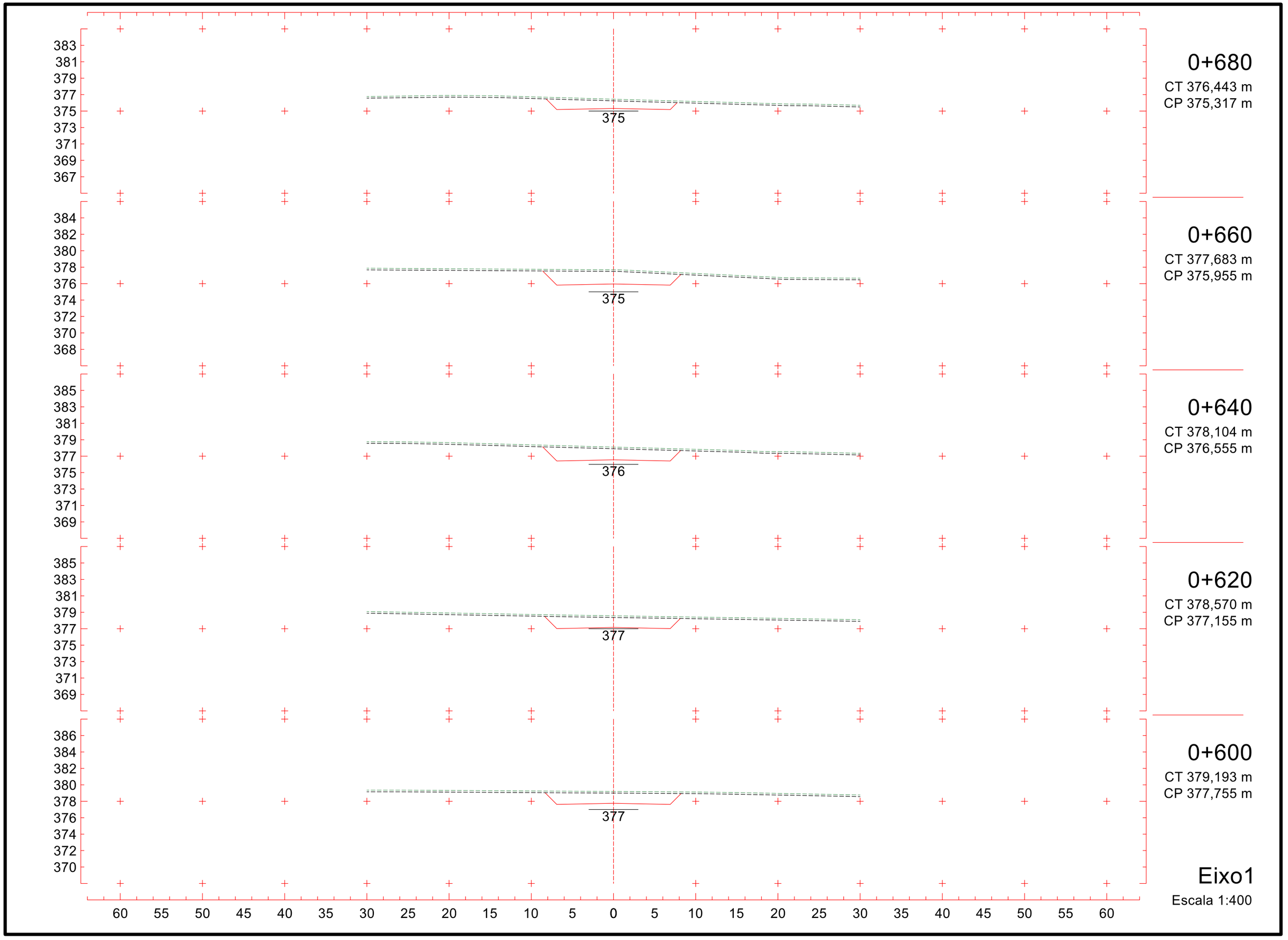

392
390
388
386
384
382
380
378
376
384
0+180
CT 385,435 m
CP 384,493 m
392
390
388
386
384
382
380
378
376
383
0+160
CT 384,509 m
CP 383,693 m
391
389
387
385
383
381
379
377
375
382
0+140
CT 383,497 m
CP 382,893 m
390
388
386
384
382
380
378
376
374
382
0+120
CT 382,463 m
CP 382,093 m
389
387
385
383
381
379
377
375
373
381
0+100
CT 381,459 m
CP 381,293 m
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
Eixo1
Escala 1:400

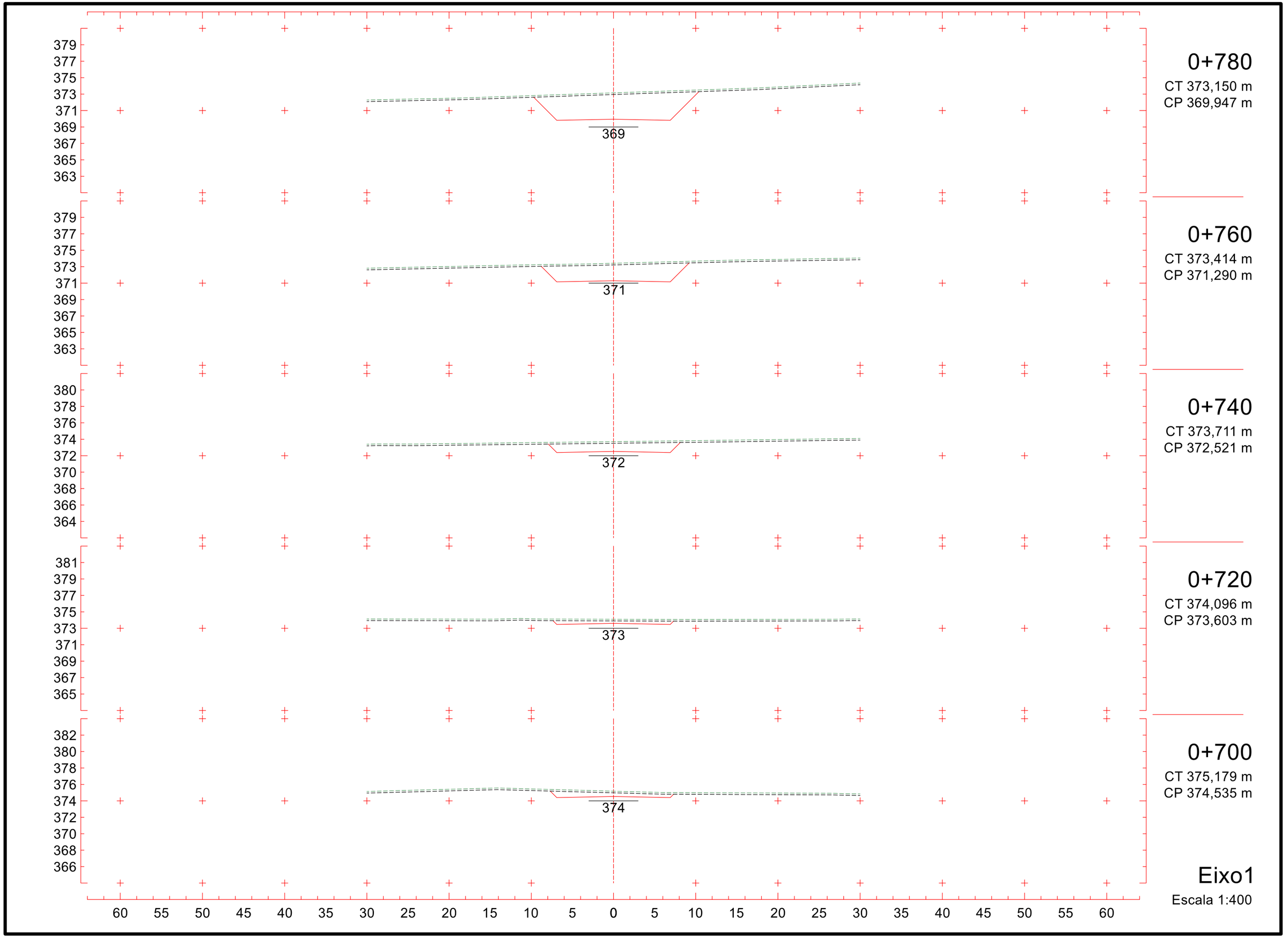

0+280
CT 387,540 m
CP 386,956 m
0+260
CT 387,410 m
CP 386,944 m
0+240
CT 387,252 m
CP 386,652 m
0+220
CT 386,819 m
CP 386,080 m
0+200
CT 386,224 m
CP 385,293 m
Eixo1
Escala 1:400

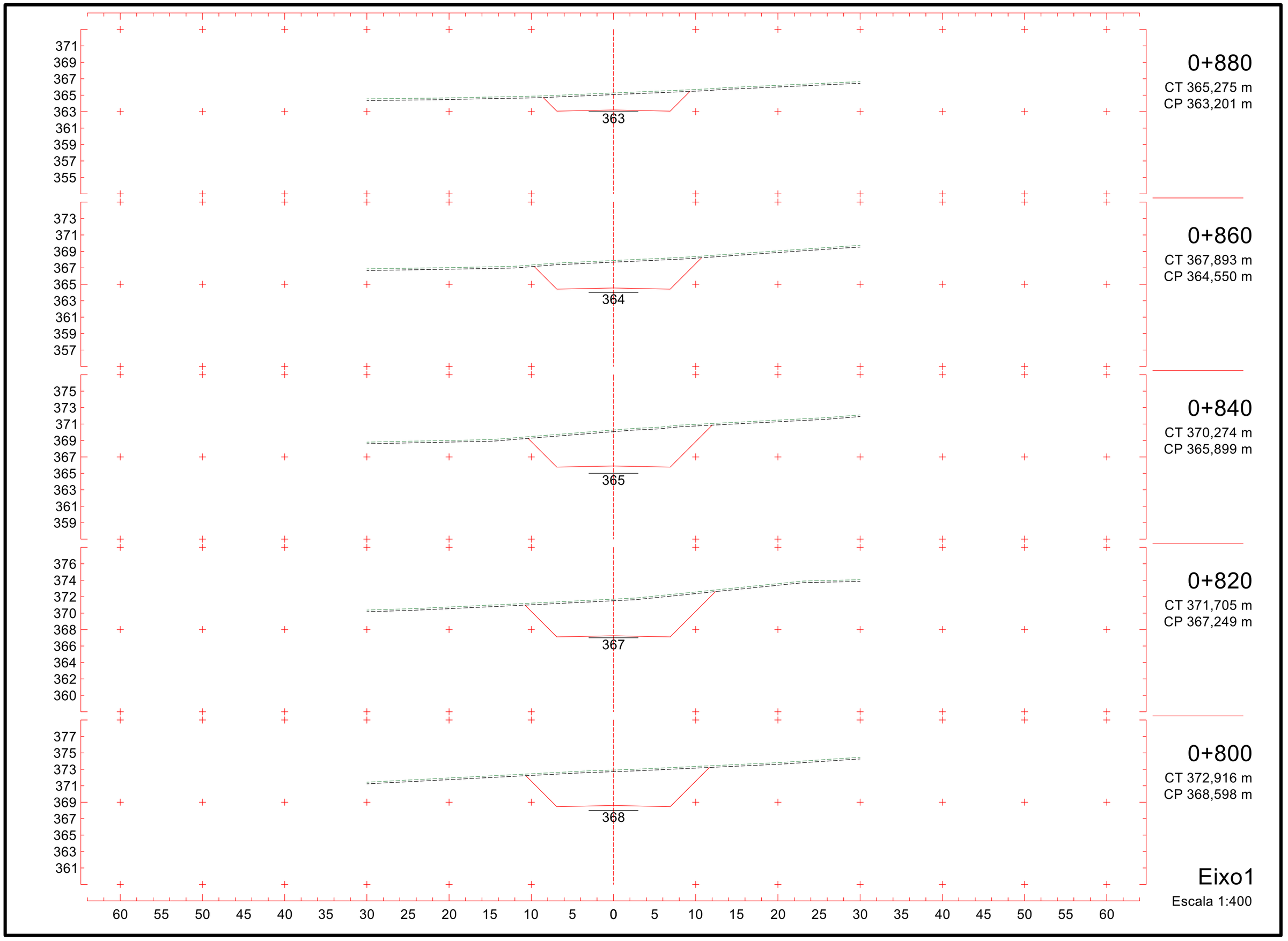

392
390
388
386
384
382
380
378
376
384
0+380
CT 385,362 m
CP 384,355 m
393
391
389
387
385
383
381
379
377
384
0+360
CT 385,830 m
CP 384,955 m
393
391
389
387
385
383
381
379
377
385
0+340
CT 386,403 m
CP 385,555 m
394
392
390
388
386
384
382
380
378
386
0+320
CT 386,898 m
CP 386,155 m
395
393
391
389
387
385
383
381
379
386
0+300
CT 387,330 m
CP 386,689 m
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
Eixo1
Escala 1:400

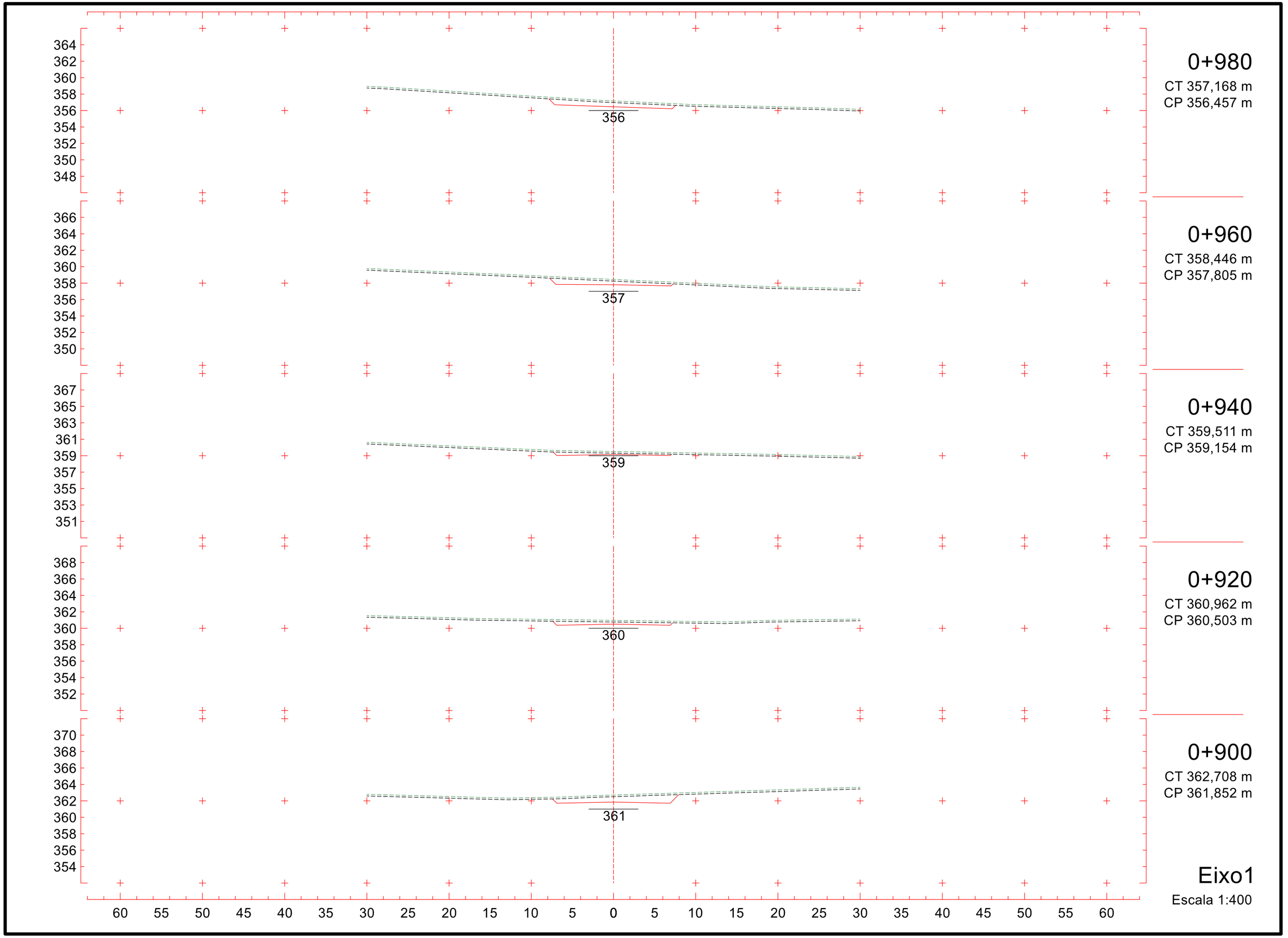

389
387
385
383
381
379
377
375
373
381
0+480
CT 382,521 m
CP 381,355 m
390
388
386
384
382
380
378
376
374
381
0+460
CT 383,239 m
CP 381,955 m
390
388
386
384
382
380
378
376
374
382
0+440
CT 383,766 m
CP 382,555 m
391
389
387
385
383
381
379
377
375
383
0+420
CT 384,239 m
CP 383,155 m
392
390
388
386
384
382
380
378
376
383
0+400
CT 384,779 m
CP 383,755 m
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
Eixo1
Escala 1:400

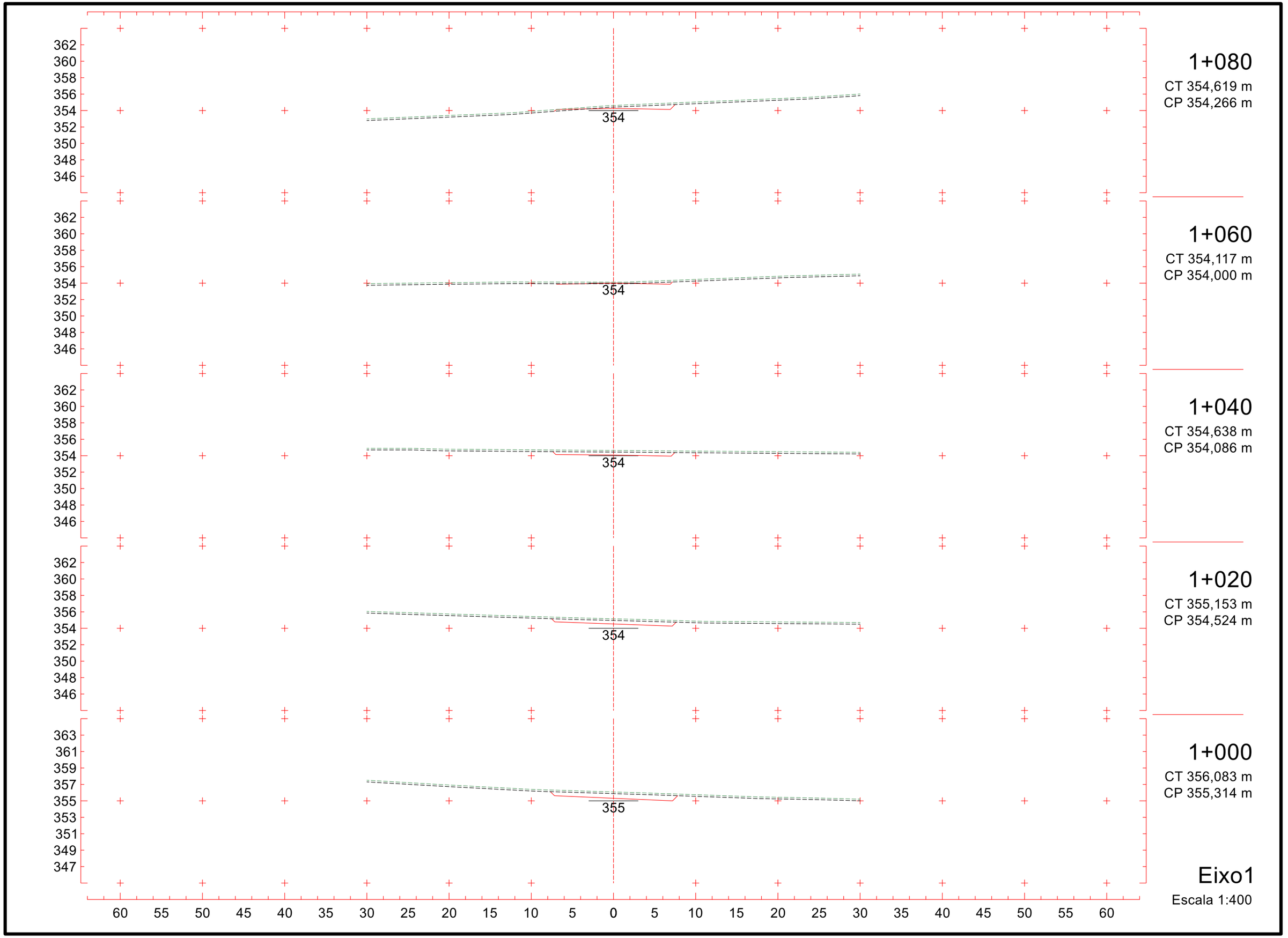

386
384
382
380
378
376
374
372
370
378
0+580
CT 379,744 m
CP 378,355 m
387
385
383
381
379
377
375
373
371
378
0+560
CT 379,996 m
CP 378,955 m
387
385
383
381
379
377
375
373
371
379
0+540
CT 380,304 m
CP 379,555 m
388
386
384
382
380
378
376
374
372
380
0+520
CT 380,981 m
CP 380,155 m
389
387
385
383
381
379
377
375
373
380
0+500
CT 381,746 m
CP 380,755 m
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
Eixo1
Escala 1:400

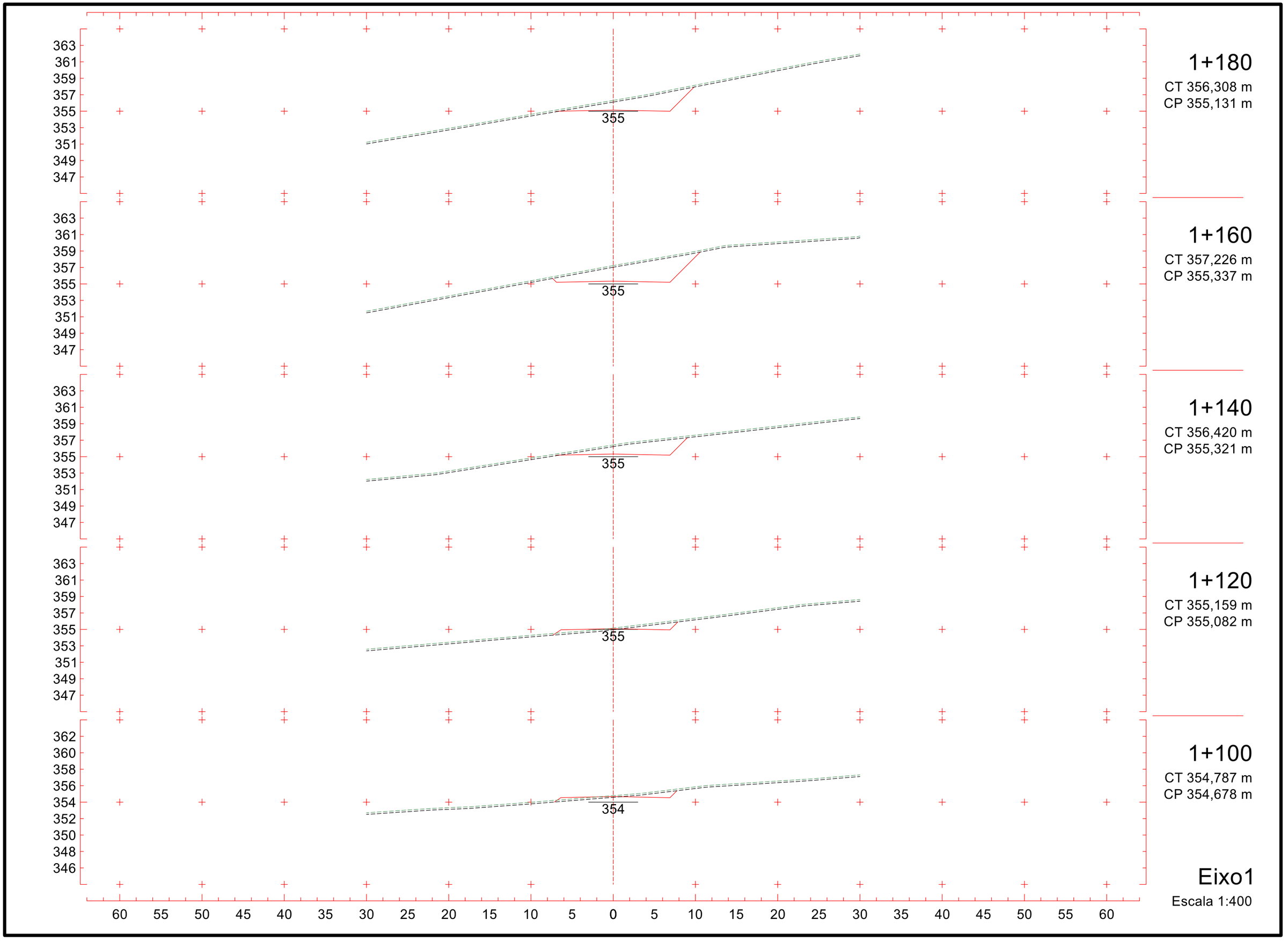

0+680
CT 376,443 m
CP 375,317 m
0+660
CT 377,683 m
CP 375,955 m
0+640
CT 378,104 m
CP 376,555 m
0+620
CT 378,570 m
CP 377,155 m
0+600
CT 379,193 m
CP 377,755 m
Eixo1
Escala 1:400
375
375
376
377
377
383 381 379 377 375 373 371 369 367
384 382 380 378 376 374 372 370 368
385 383 381 379 377 375 373 371 369
385 383 381 379 377 375 373 371 369
386 384 382 380 378 376 374 372 370
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

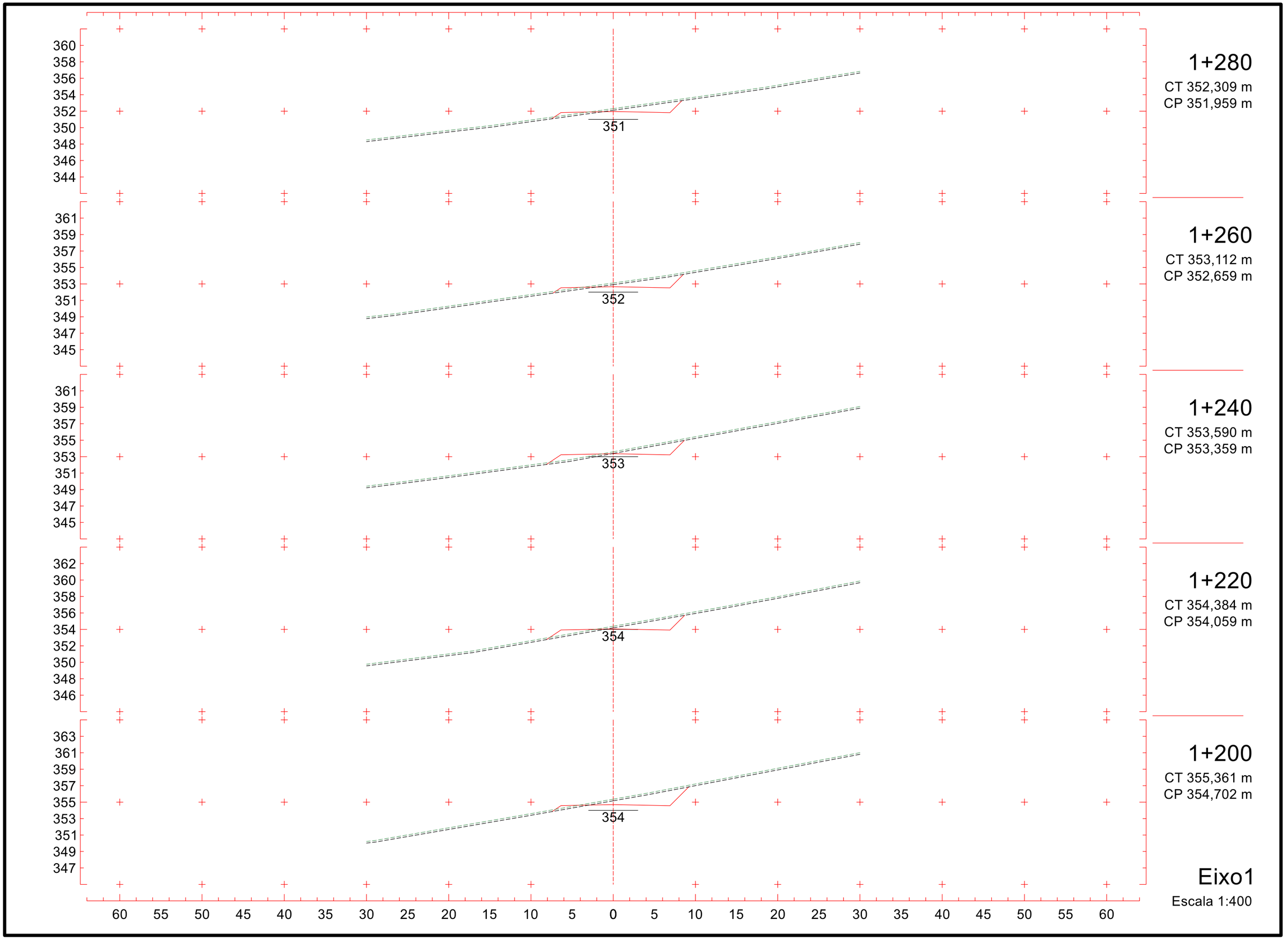

379
377
375
373
371
369
367
365
363
369
0+780
CT 373,150 m
CP 369,947 m
379
377
375
373
371
369
367
365
363
371
0+760
CT 373,414 m
CP 371,290 m
380
378
376
374
372
370
368
366
364
372
0+740
CT 373,711 m
CP 372,521 m
381
379
377
375
373
371
369
367
365
373
0+720
CT 374,096 m
CP 373,603 m
382
380
378
376
374
372
370
368
366
374
0+700
CT 375,179 m
CP 374,535 m
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
Eixo1
Escala 1:400

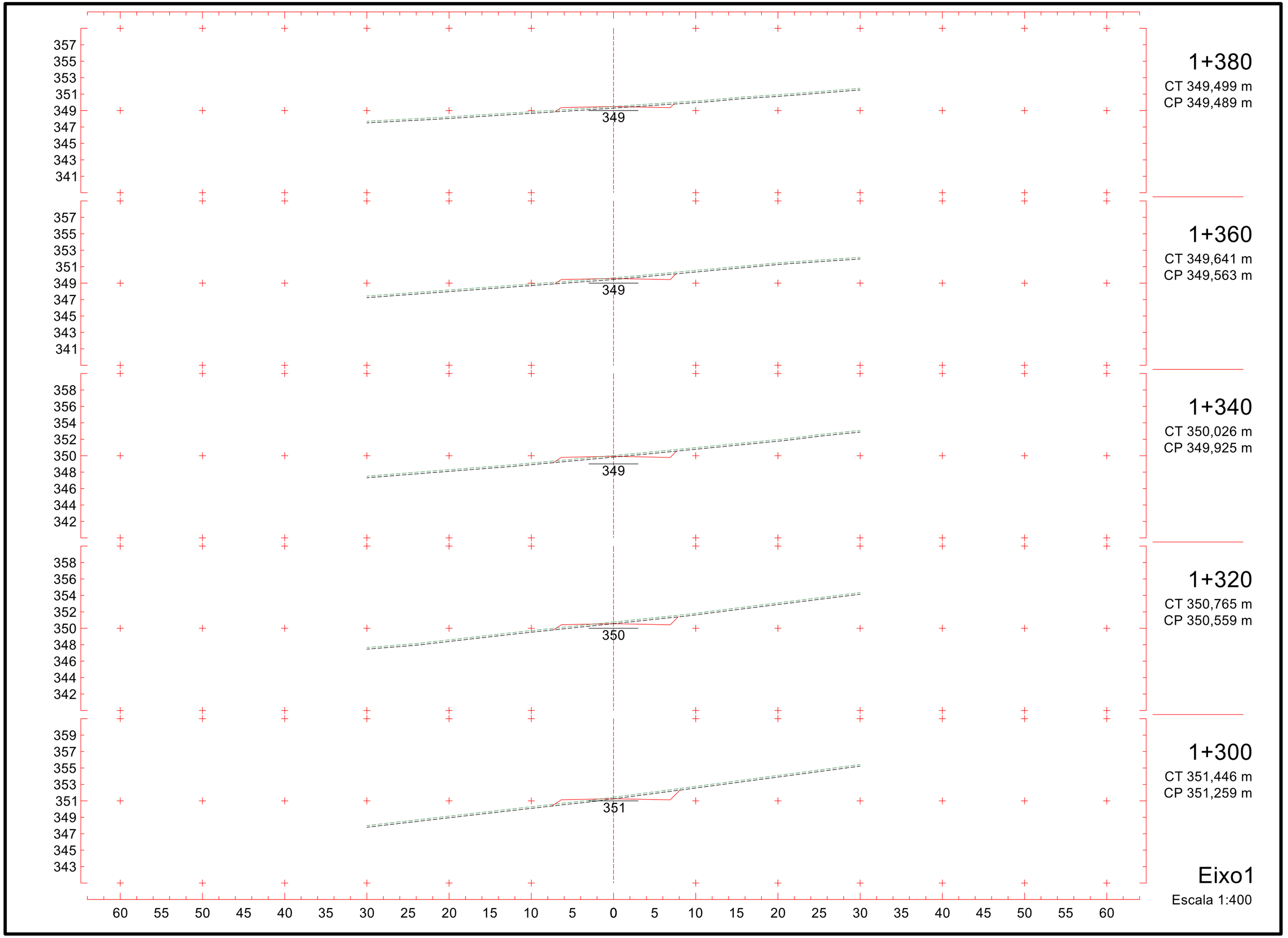

371
369
367
365
363
361
359
357
355
363
0+880
CT 365,275 m
CP 363,201 m
373
371
369
367
365
363
361
359
357
364
0+860
CT 367,893 m
CP 364,550 m
375
373
371
369
367
365
363
361
359
365
0+840
CT 370,274 m
CP 365,899 m
376
374
372
370
368
366
364
362
360
367
0+820
CT 371,705 m
CP 367,249 m
377
375
373
371
369
367
365
363
361
368
0+800
CT 372,916 m
CP 368,598 m
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
Eixo1
Escala 1:400

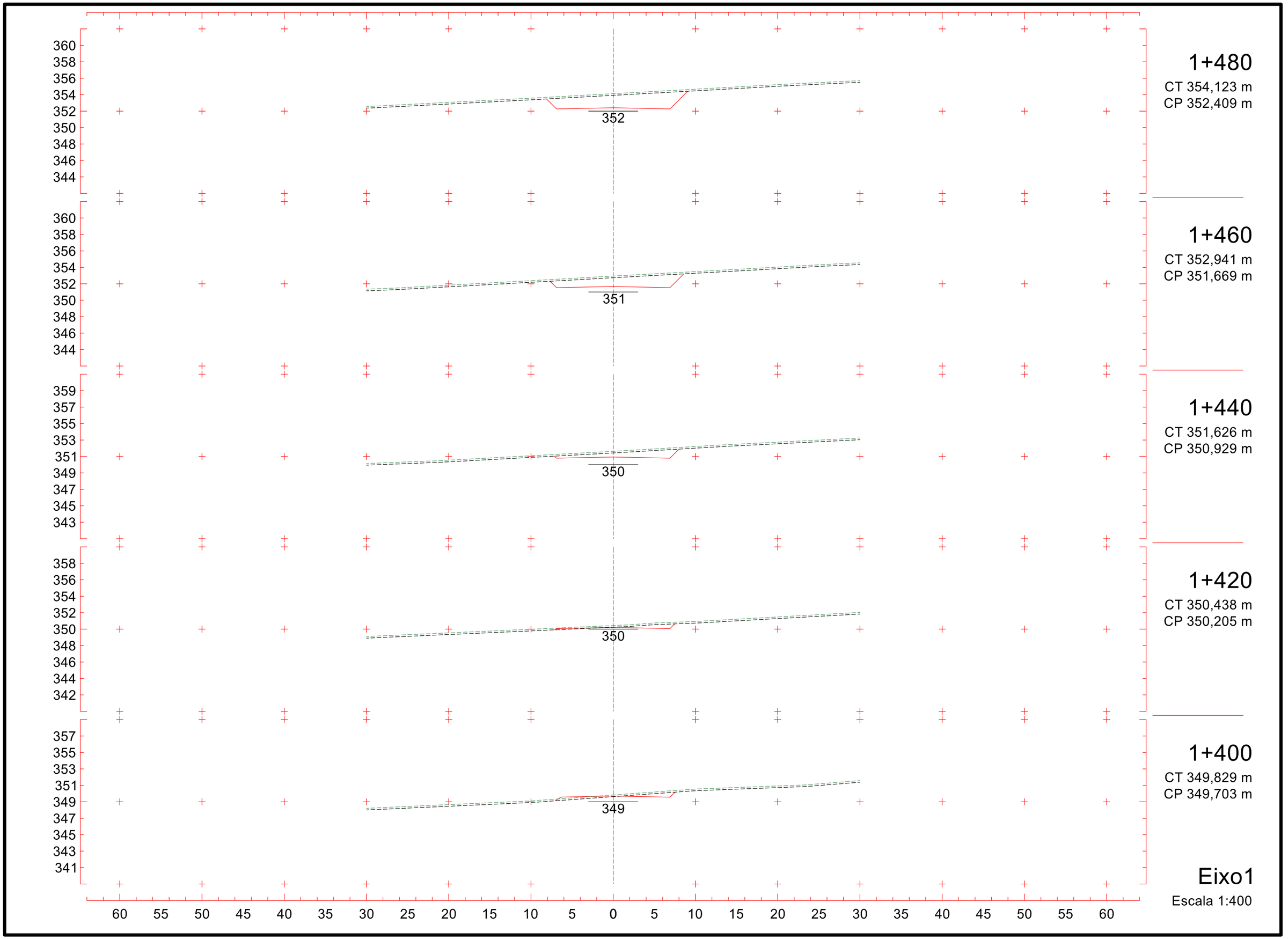

364
362
360
358
356
354
352
350
348
356
0+980
CT 357,168 m
CP 356,457 m
366
364
362
360
358
356
354
352
350
357
0+960
CT 358,446 m
CP 357,805 m
367
365
363
361
359
357
355
353
351
359
0+940
CT 359,511 m
CP 359,154 m
368
366
364
362
360
358
356
354
352
360
0+920
CT 360,962 m
CP 360,503 m
370
368
366
364
362
360
358
356
354
361
0+900
CT 362,708 m
CP 361,852 m
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
Eixo1
Escala 1:400

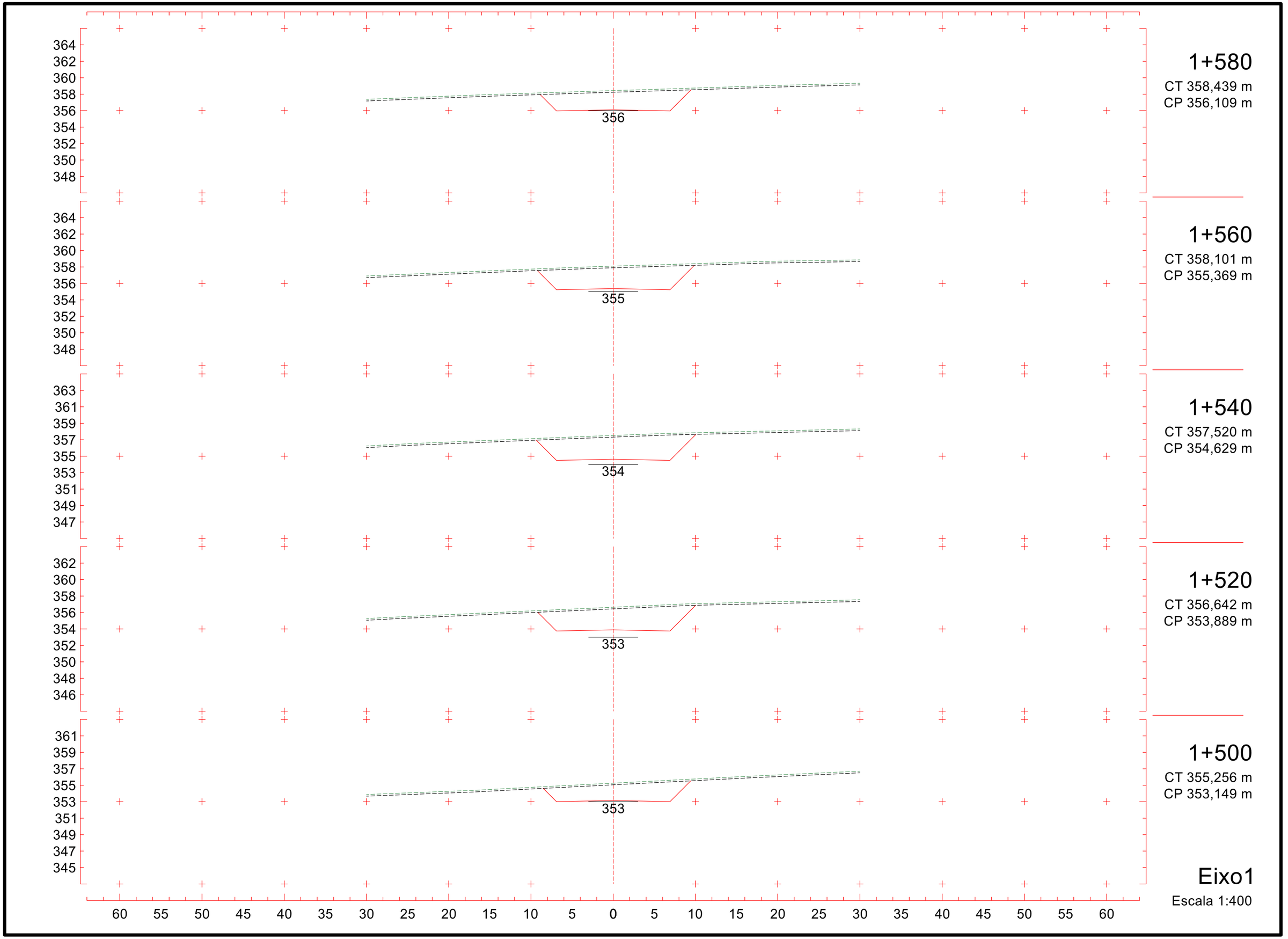

362
360
358
356
354
352
350
348
346
354
1+080
CT 354,619 m
CP 354,266 m
362
360
358
356
354
352
350
348
346
354
1+060
CT 354,117 m
CP 354,000 m
362
360
358
356
354
352
350
348
346
354
1+040
CT 354,638 m
CP 354,086 m
362
360
358
356
354
352
350
348
346
354
1+020
CT 355,153 m
CP 354,524 m
363
361
359
357
355
353
351
349
347
355
1+000
CT 356,083 m
CP 355,314 m
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
Eixo1
Escala 1:400

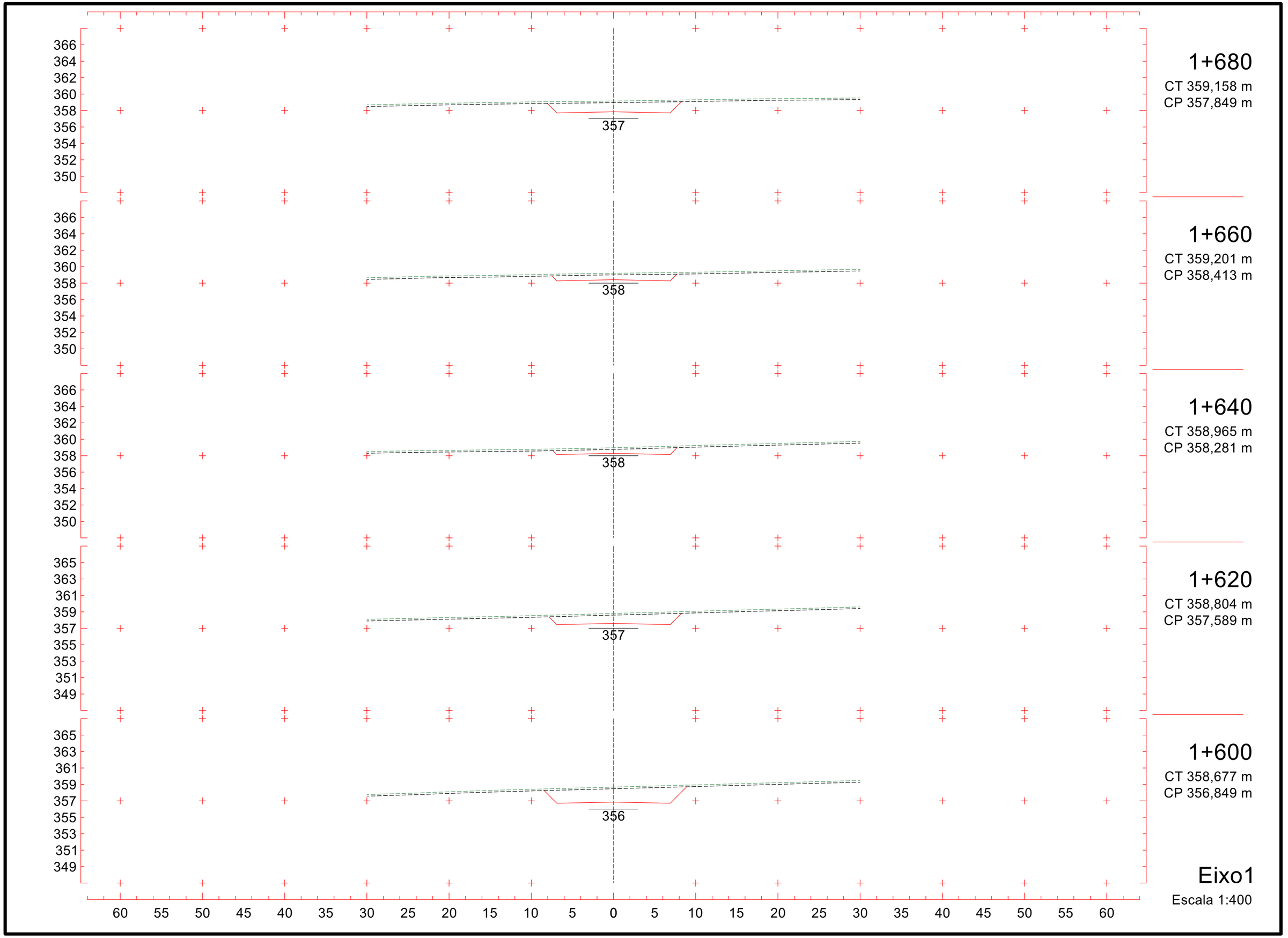

363
361
359
357
355
353
351
349
347
355
1+180
CT 356,308 m
CP 355,131 m
363
361
359
357
355
353
351
349
347
355
1+160
CT 357,226 m
CP 355,337 m
363
361
359
357
355
353
351
349
347
355
1+140
CT 356,420 m
CP 355,321 m
363
361
359
357
355
353
351
349
347
355
1+120
CT 355,159 m
CP 355,082 m
362
360
358
356
354
352
350
348
346
354
1+100
CT 354,787 m
CP 354,678 m
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
Eixo1
Escala 1:400

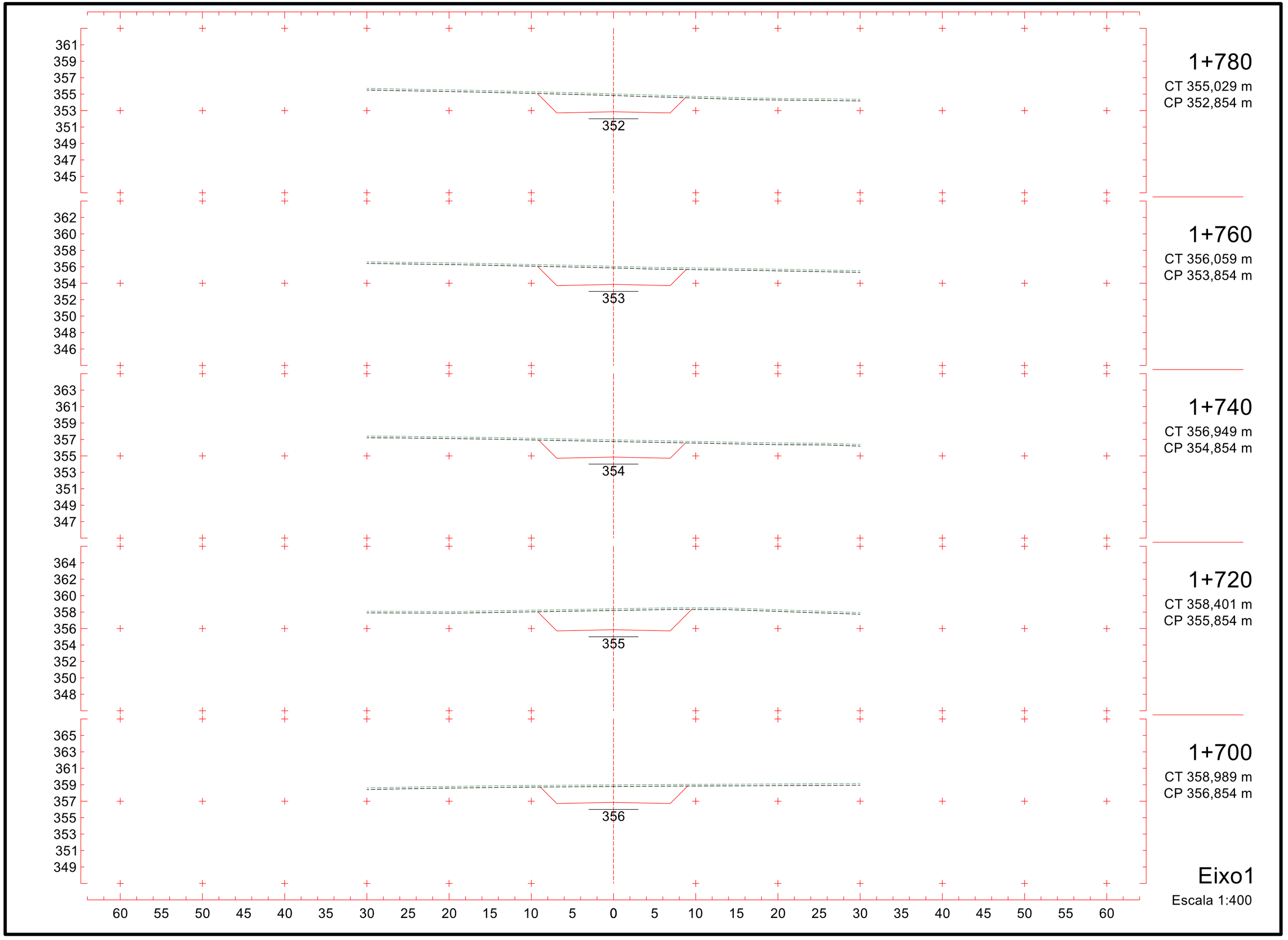

360
358
356
354
352
350
348
346
344
351
1+280
CT 352,309 m
CP 351,959 m
361
359
357
355
353
351
349
347
345
352
1+260
CT 353,112 m
CP 352,659 m
361
359
357
355
353
351
349
347
345
353
1+240
CT 353,590 m
CP 353,359 m
362
360
358
356
354
352
350
348
346
354
1+220
CT 354,384 m
CP 354,059 m
363
361
359
357
355
353
351
349
347
354
1+200
CT 355,361 m
CP 354,702 m
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
Eixo1
Escala 1:400

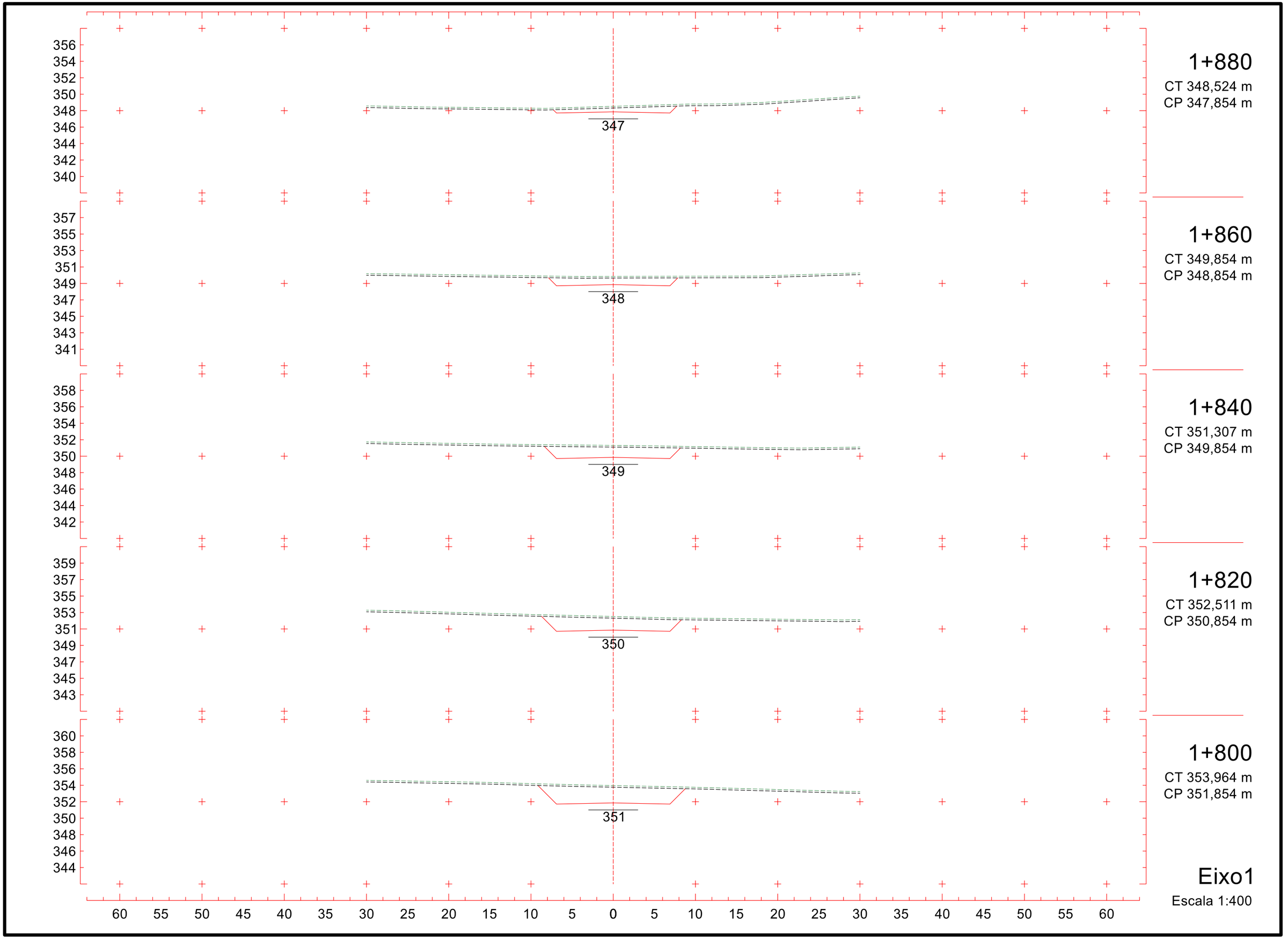

1+380
CT 349,499 m
CP 349,489 m
1+360
CT 349,641 m
CP 349,563 m
1+340
CT 350,026 m
CP 349,925 m
1+320
CT 350,765 m
CP 350,559 m
1+300
CT 351,446 m
CP 351,259 m
Eixo1
Escala 1:400
349
349
349
350
351
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

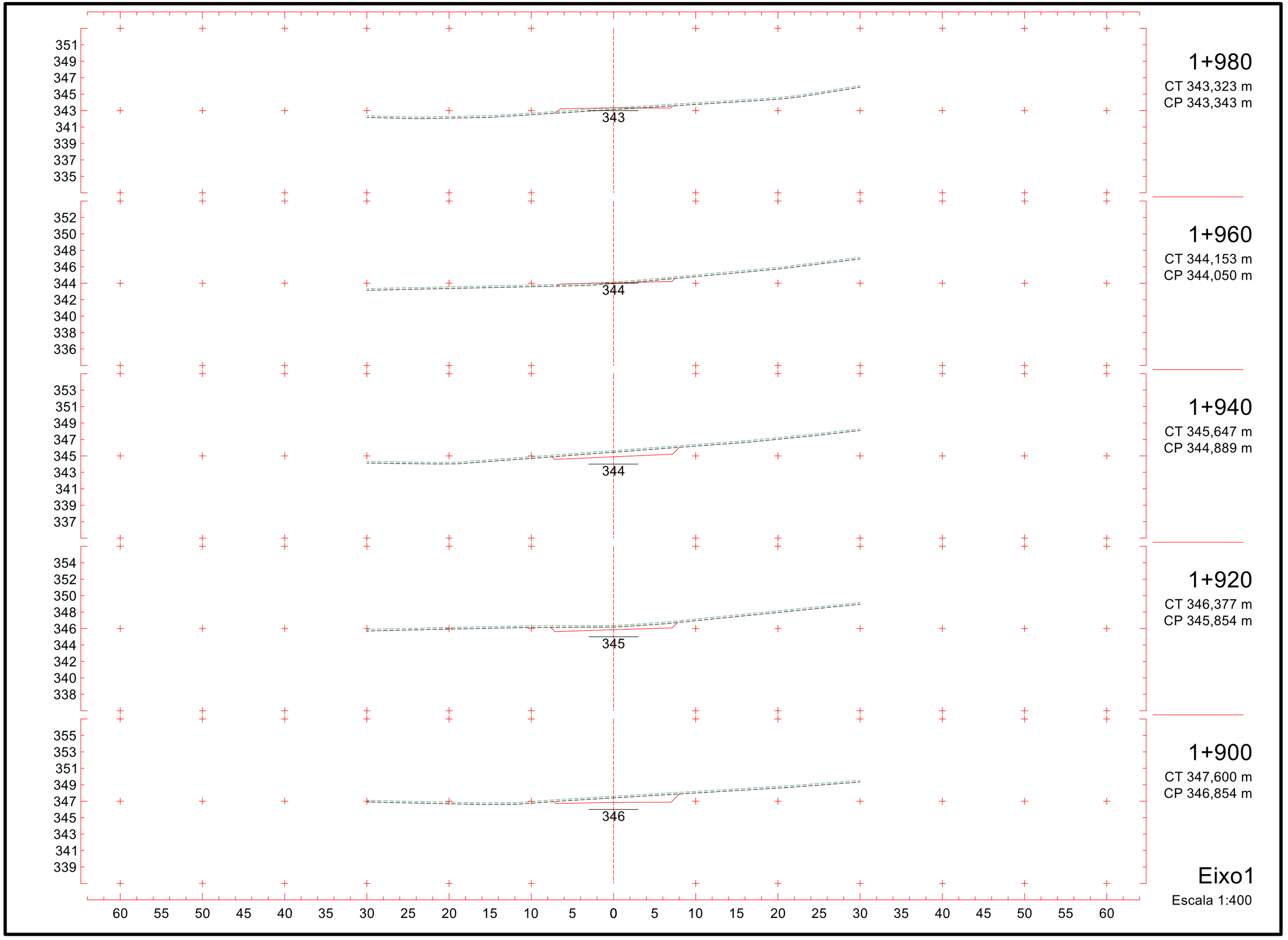

1+480
CT 354,123 m
CP 352,409 m
1+460
CT 352,941 m
CP 351,669 m
1+440
CT 351,626 m
CP 350,929 m
1+420
CT 350,438 m
CP 350,205 m
1+400
CT 349,829 m
CP 349,703 m
Eixo1
Escala 1:400

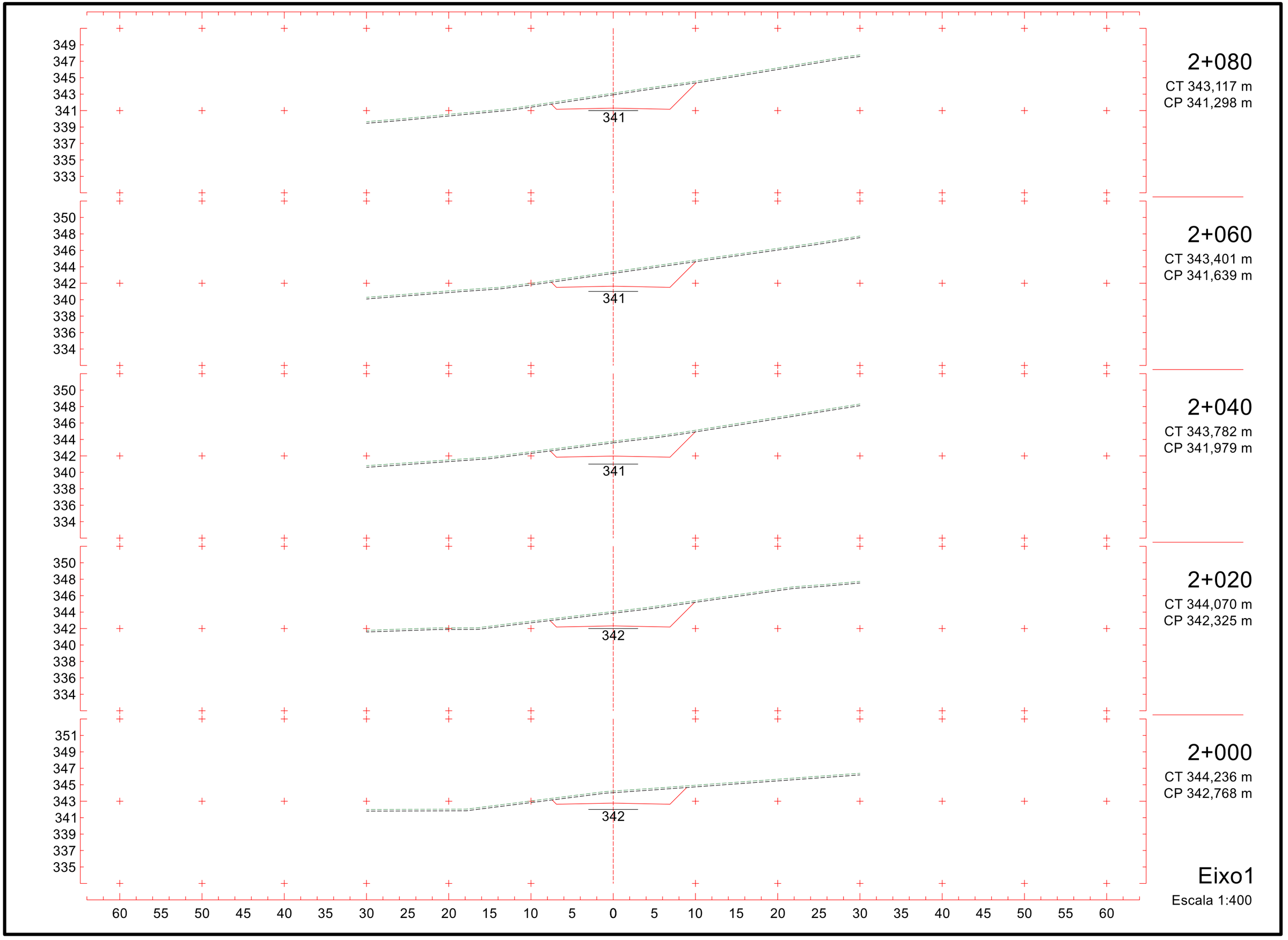

364
362
360
358
356
354
352
350
348
356
1+580
CT 358,439 m
CP 356,109 m
364
362
360
358
356
354
352
350
348
355
1+560
CT 358,101 m
CP 355,369 m
363
361
359
357
355
353
351
349
347
354
1+540
CT 357,520 m
CP 354,629 m
362
360
358
356
354
352
350
348
346
353
1+520
CT 356,642 m
CP 353,889 m
361
359
357
355
353
351
349
347
345
353
1+500
CT 355,256 m
CP 353,149 m
Eixo1
Escala 1:400
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

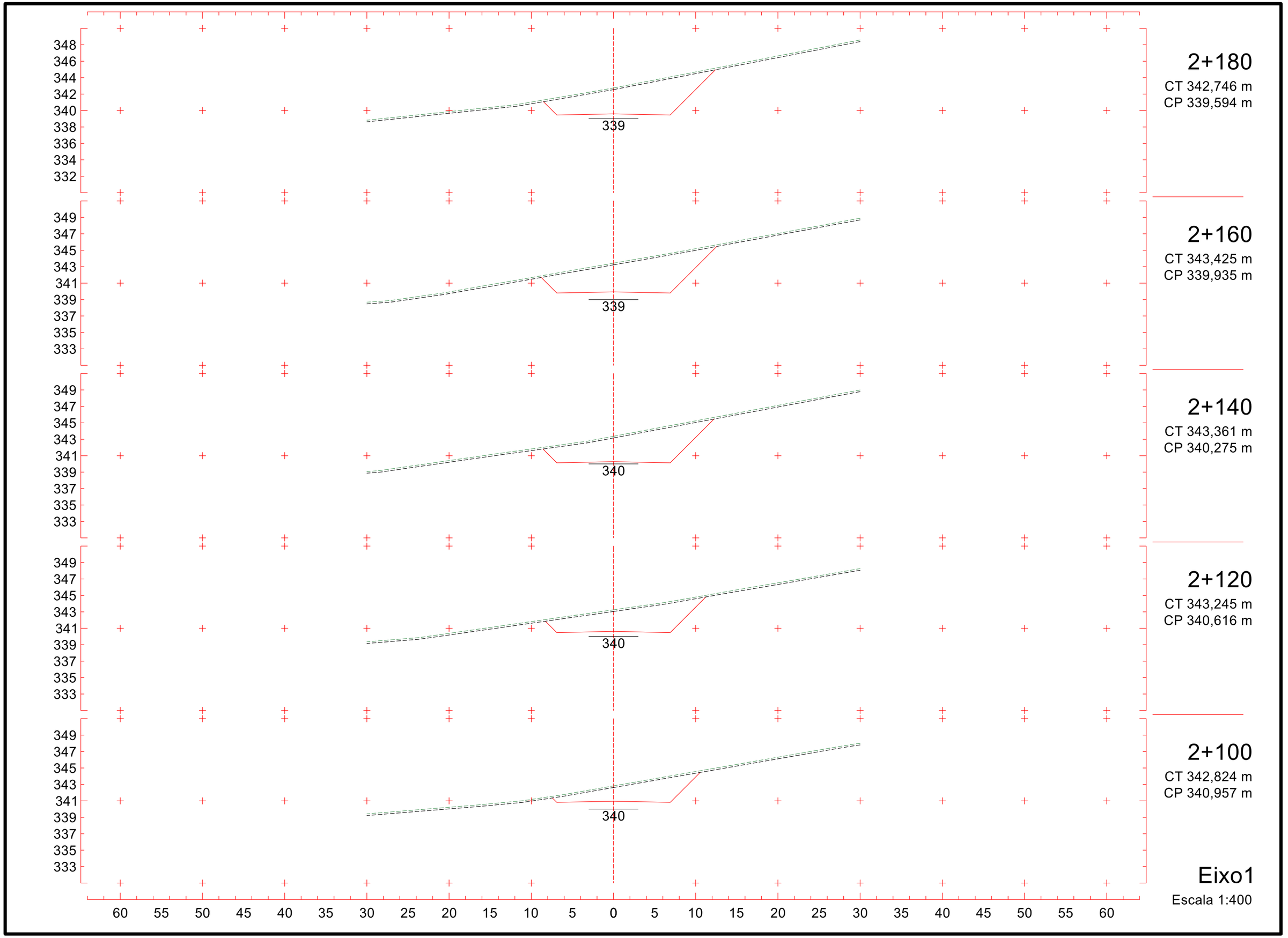

366
364
362
360
358
356
354
352
350
357
1+680
CT 359,158 m
CP 357,849 m
366
364
362
360
358
356
354
352
350
358
1+660
CT 359,201 m
CP 358,413 m
366
364
362
360
358
356
354
352
350
358
1+640
CT 358,965 m
CP 358,281 m
365
363
361
359
357
355
353
351
349
357
1+620
CT 358,804 m
CP 357,589 m
365
363
361
359
357
355
353
351
349
356
1+600
CT 358,677 m
CP 356,849 m
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
Eixo1
Escala 1:400

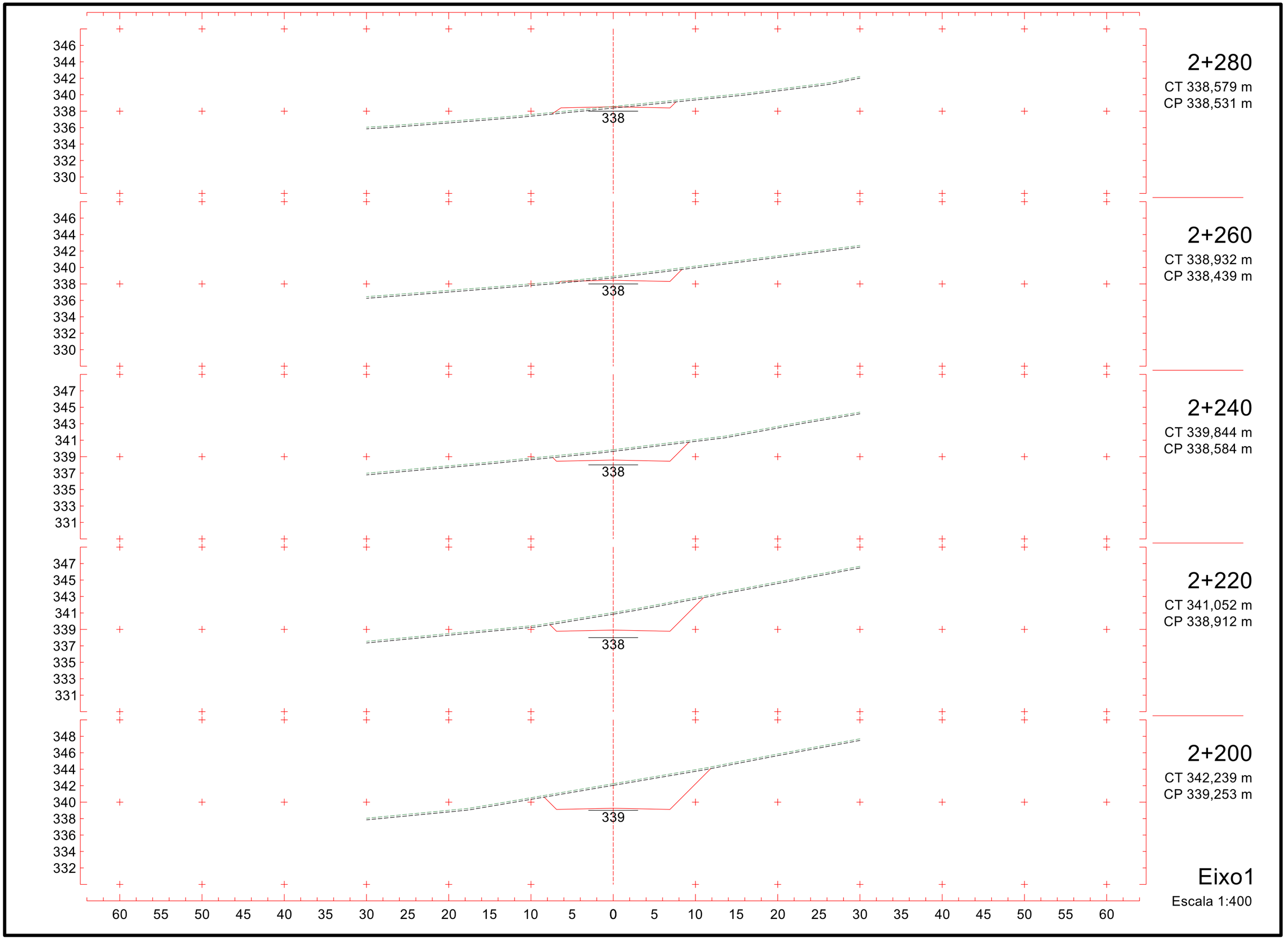

361
359
357
355
353
351
349
347
345
352
1+780
CT 355,029 m
CP 352,854 m
362
360
358
356
354
352
350
348
346
353
1+760
CT 356,059 m
CP 353,854 m
363
361
359
357
355
353
351
349
347
354
1+740
CT 356,949 m
CP 354,854 m
364
362
360
358
356
354
352
350
348
355
1+720
CT 358,401 m
CP 355,854 m
365
363
361
359
357
355
353
351
349
356
1+700
CT 358,989 m
CP 356,854 m
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
Eixo1
Escala 1:400

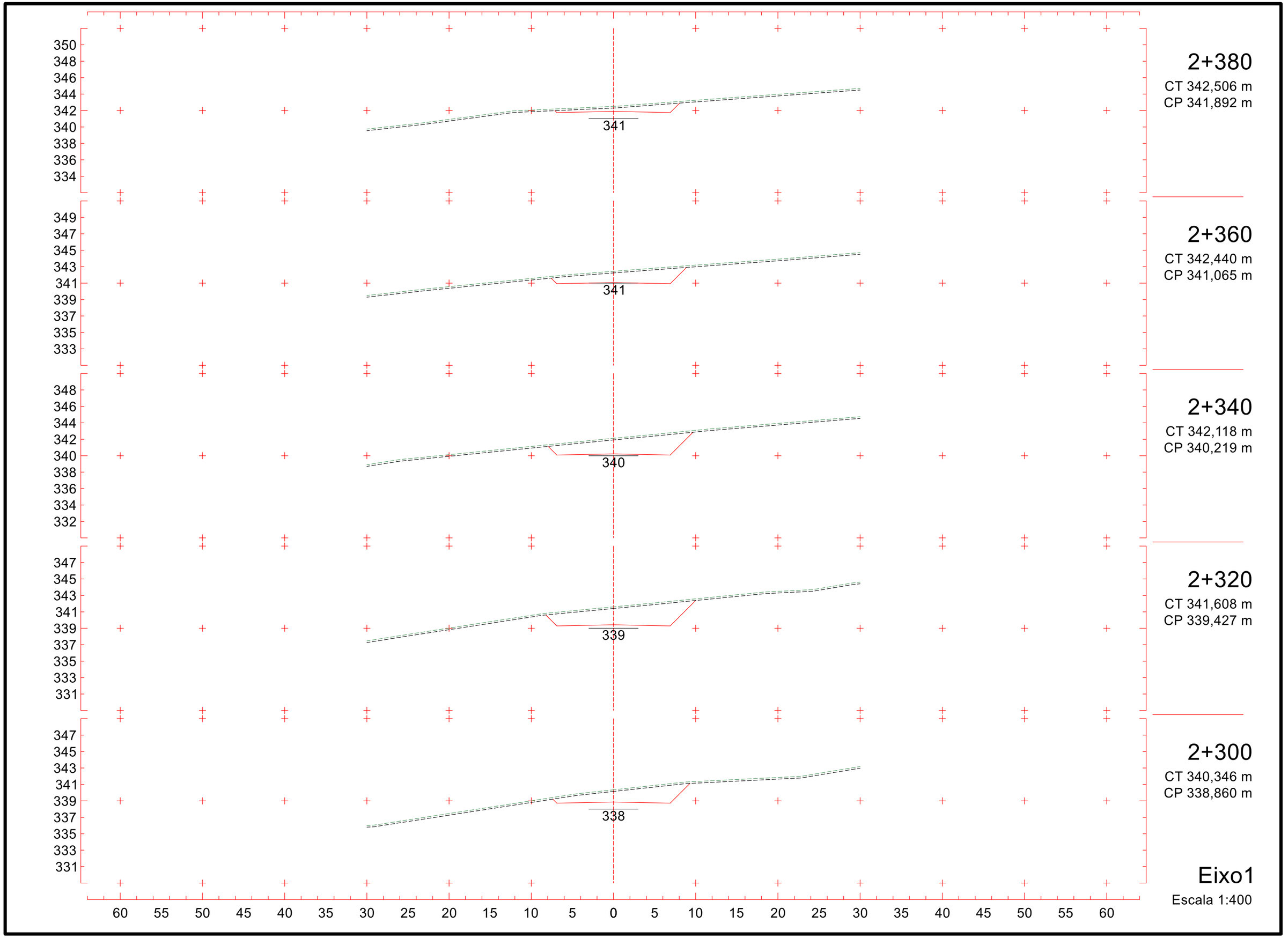

356
354
352
350
348
346
344
342
340
347
1+880
CT 348,524 m
CP 347,854 m
357
355
353
351
349
347
345
343
341
348
1+860
CT 349,854 m
CP 348,854 m
358
356
354
352
350
348
346
344
342
349
1+840
CT 351,307 m
CP 349,854 m
359
357
355
353
351
349
347
345
343
350
1+820
CT 352,511 m
CP 350,854 m
360
358
356
354
352
350
348
346
344
351
1+800
CT 353,964 m
CP 351,854 m
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
Eixo1
Escala 1:400

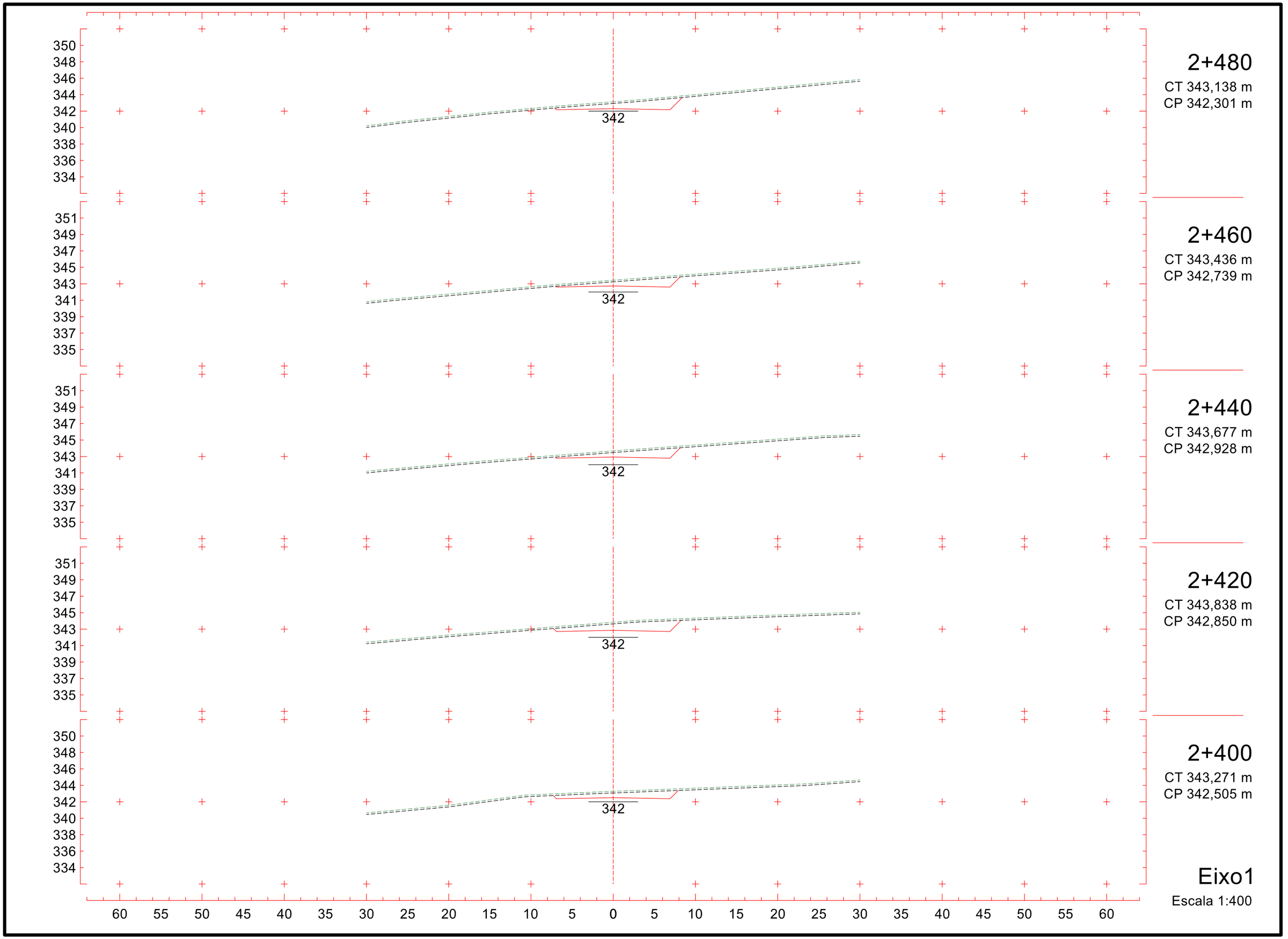

351
349
347
345
343
341
339
337
335
343
1+980
CT 343,323 m
CP 343,343 m
352
350
348
346
344
342
340
338
336
344
1+960
CT 344,153 m
CP 344,050 m
353
351
349
347
345
343
341
339
337
344
1+940
CT 345,647 m
CP 344,889 m
354
352
350
348
346
344
342
340
338
345
1+920
CT 346,377 m
CP 345,854 m
355
353
351
349
347
345
343
341
339
346
1+900
CT 347,600 m
CP 346,854 m
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
Eixo1
Escala 1:400

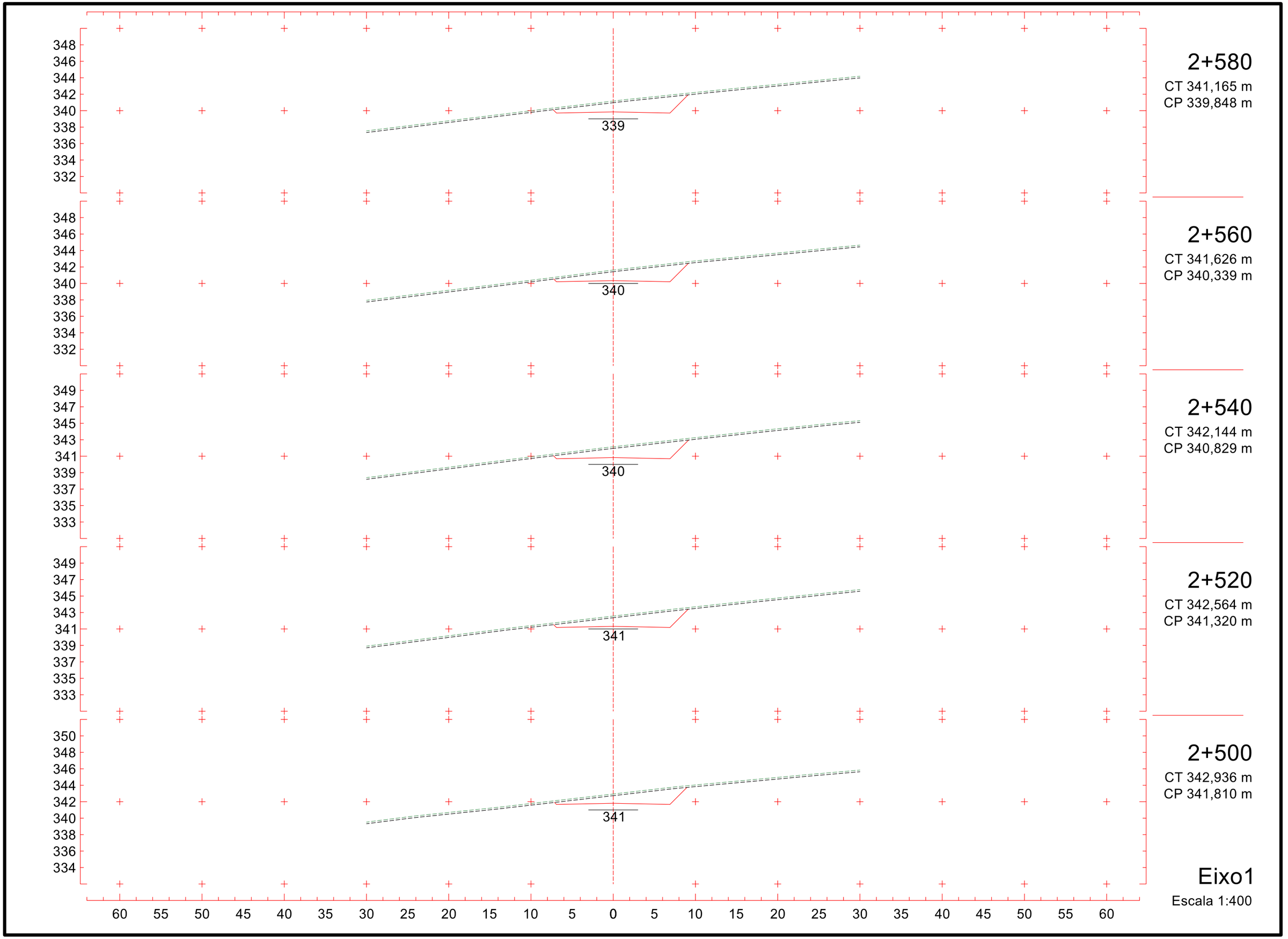

349
347
345
343
341
339
337
335
333
341
2+080
CT 343,117 m
CP 341,298 m
350
348
346
344
342
340
338
336
334
341
2+060
CT 343,401 m
CP 341,639 m
350
348
346
344
342
340
338
336
334
341
2+040
CT 343,782 m
CP 341,979 m
350
348
346
344
342
340
338
336
334
342
2+020
CT 344,070 m
CP 342,325 m
351
349
347
345
343
341
339
337
335
342
2+000
CT 344,236 m
CP 342,768 m
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
Eixo1
Escala 1:400

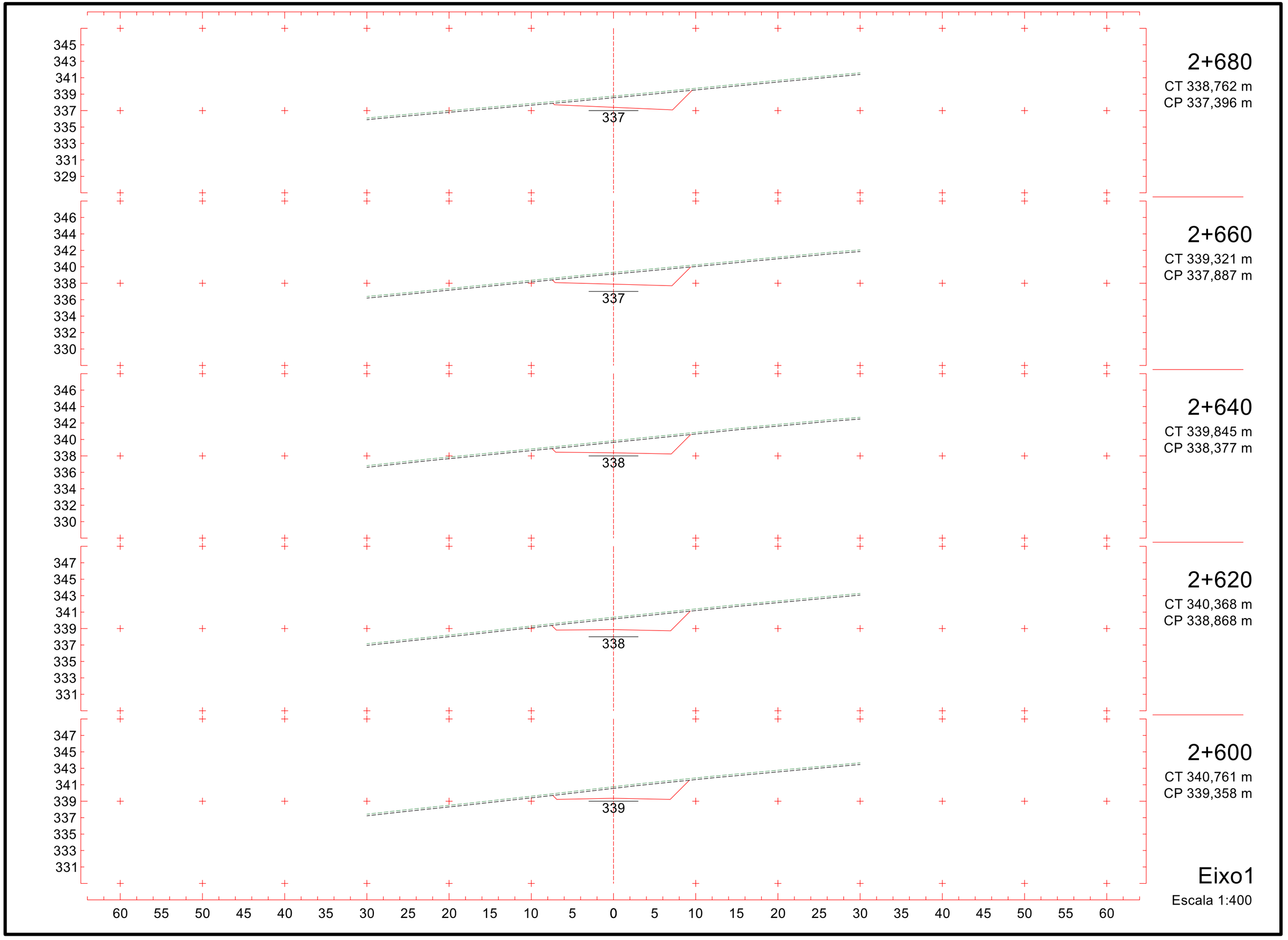

348
346
344
342
340
338
336
334
332
339
2+180
CT 342,746 m
CP 339,594 m
349
347
345
343
341
339
337
335
333
339
2+160
CT 343,425 m
CP 339,935 m
349
347
345
343
341
339
337
335
333
340
2+140
CT 343,361 m
CP 340,275 m
349
347
345
343
341
339
337
335
333
340
2+120
CT 343,245 m
CP 340,616 m
349
347
345
343
341
339
337
335
333
340
2+100
CT 342,824 m
CP 340,957 m
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
Eixo1
Escala 1:400

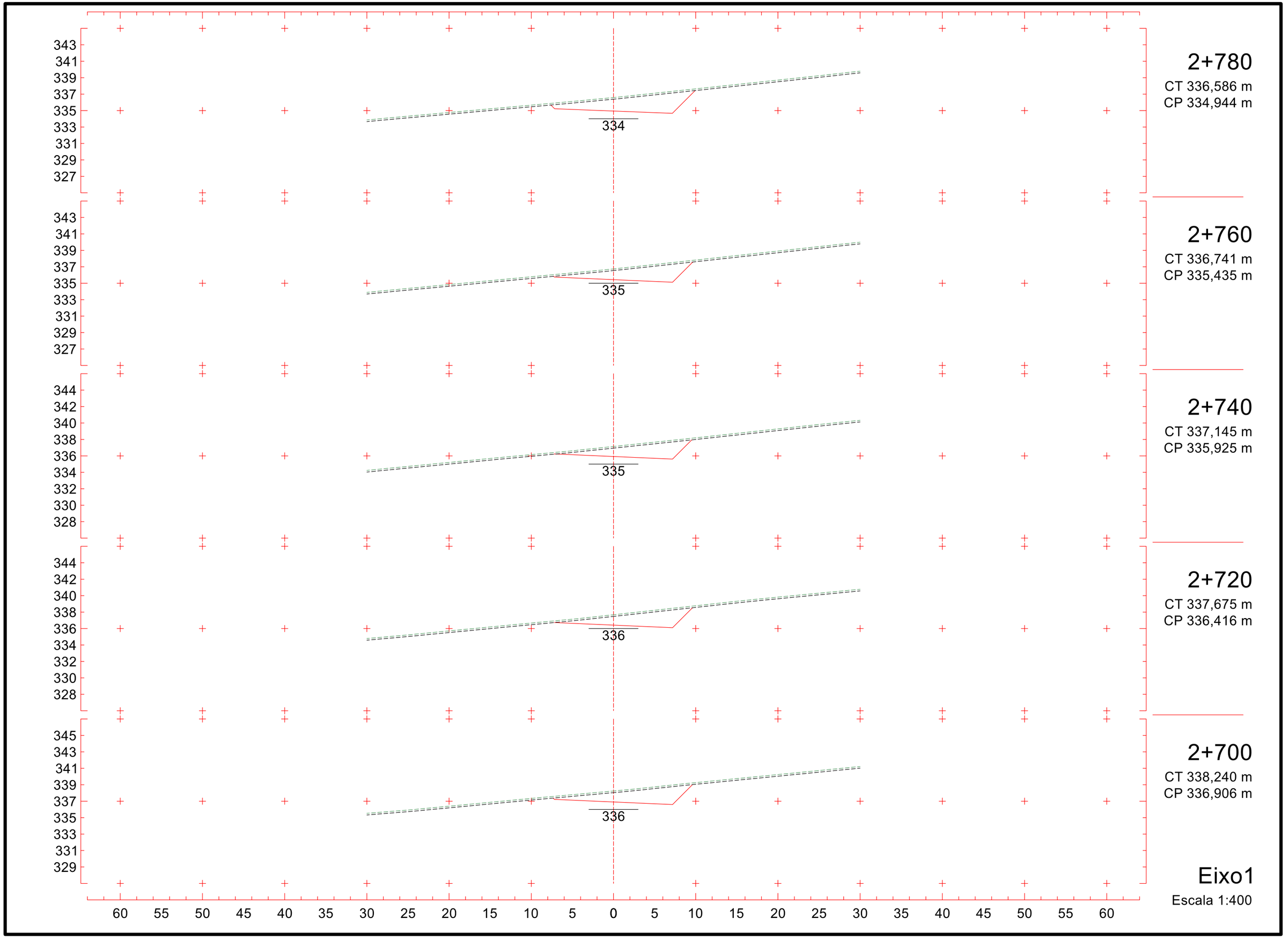

346
344
342
340
338
336
334
332
330
338
2+280
CT 338,579 m
CP 338,531 m
346
344
342
340
338
336
334
332
330
338
2+260
CT 338,932 m
CP 338,439 m
347
345
343
341
339
337
335
333
331
338
2+240
CT 339,844 m
CP 338,584 m
347
345
343
341
339
337
335
333
331
338
2+220
CT 341,052 m
CP 338,912 m
348
346
344
342
340
338
336
334
332
339
2+200
CT 342,239 m
CP 339,253 m
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
Eixo1
Escala 1:400

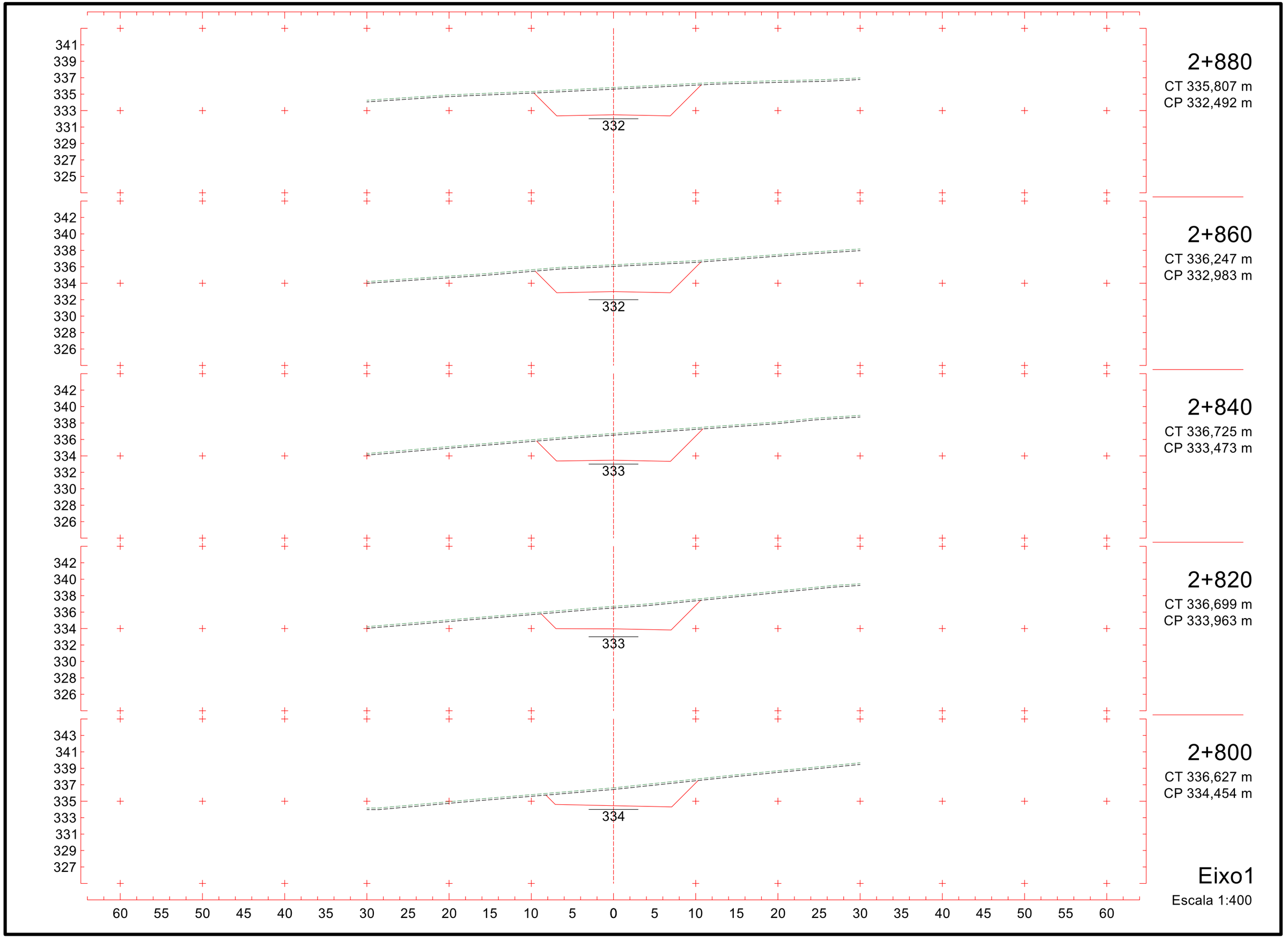

350 348 346 344 342 340 338 336 334
341
2+380
CT 342,506 m
CP 341,892 m
349 347 345 343 341 339 337 335 333
341
2+360
CT 342,440 m
CP 341,065 m
348 346 344 342 340 338 336 334 332
340
2+340
CT 342,118 m
CP 340,219 m
347 345 343 341 339 337 335 333 331
339
2+320
CT 341,608 m
CP 339,427 m
347 345 343 341 339 337 335 333 331
338
2+300
CT 340,346 m
CP 338,860 m
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
Eixo1
Escala 1:400

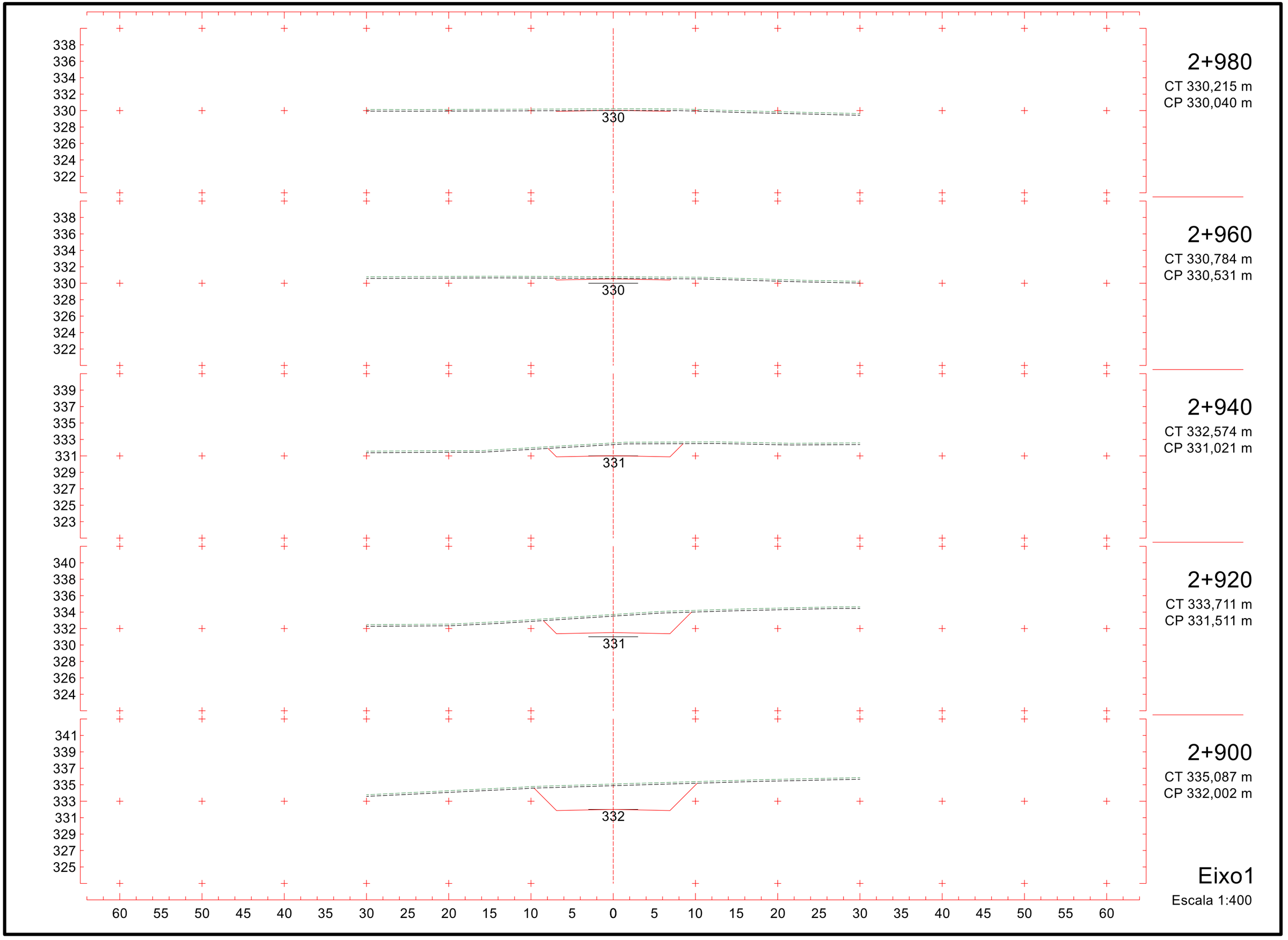

2+480
CT 343,138 m
CP 342,301 m
2+460
CT 343,436 m
CP 342,739 m
2+440
CT 343,677 m
CP 342,928 m
2+420
CT 343,838 m
CP 342,850 m
2+400
CT 343,271 m
CP 342,505 m
Eixo1
Escala 1:400
342
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

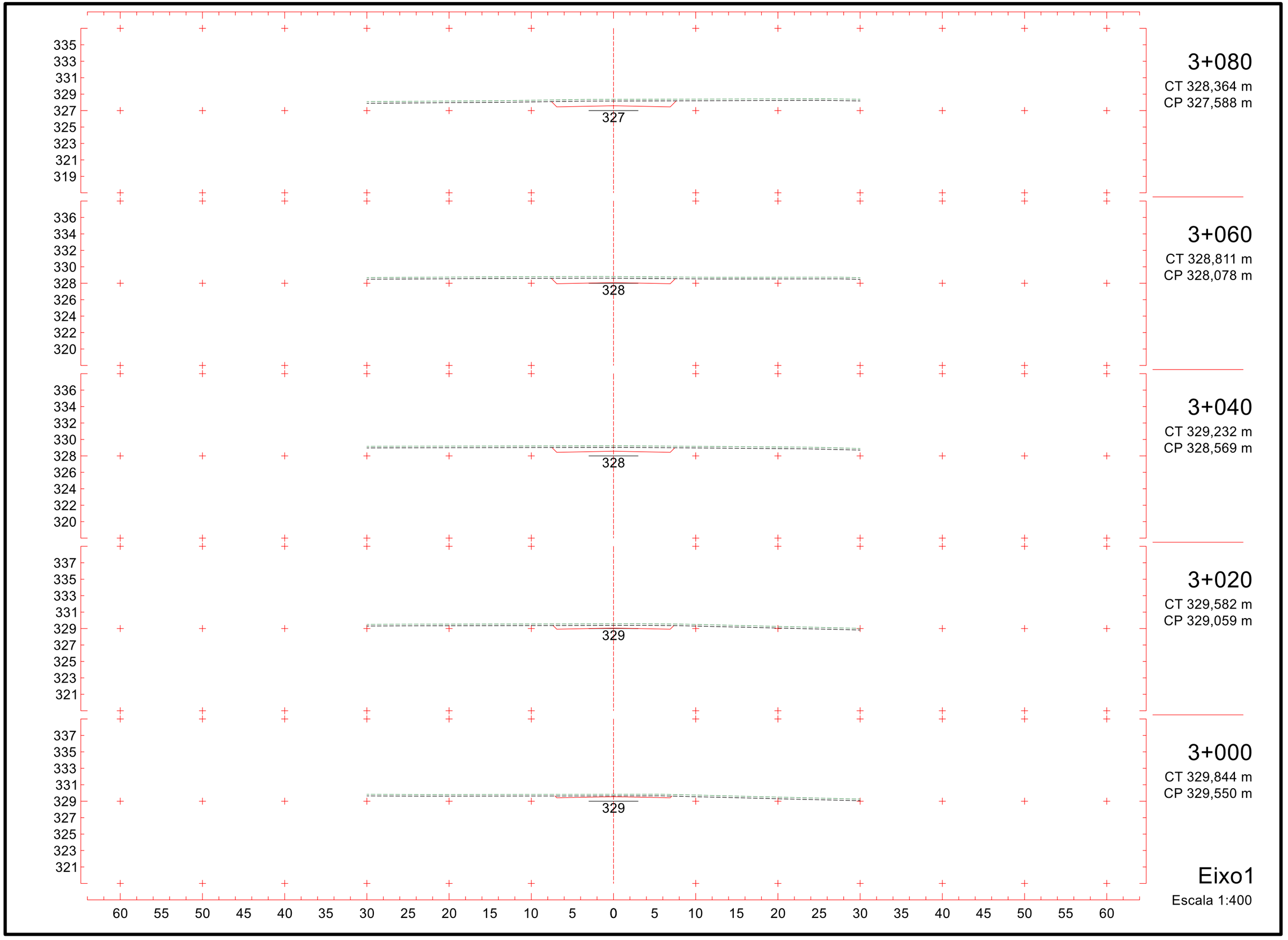

348
346
344
342
340
338
336
334
332
339
2+580
CT 341,165 m
CP 339,848 m
348
346
344
342
340
338
336
334
332
340
2+560
CT 341,626 m
CP 340,339 m
349
347
345
343
341
339
337
335
333
340
2+540
CT 342,144 m
CP 340,829 m
349
347
345
343
341
339
337
335
333
341
2+520
CT 342,564 m
CP 341,320 m
350
348
346
344
342
340
338
336
334
341
2+500
CT 342,936 m
CP 341,810 m
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
Eixo1
Escala 1:400

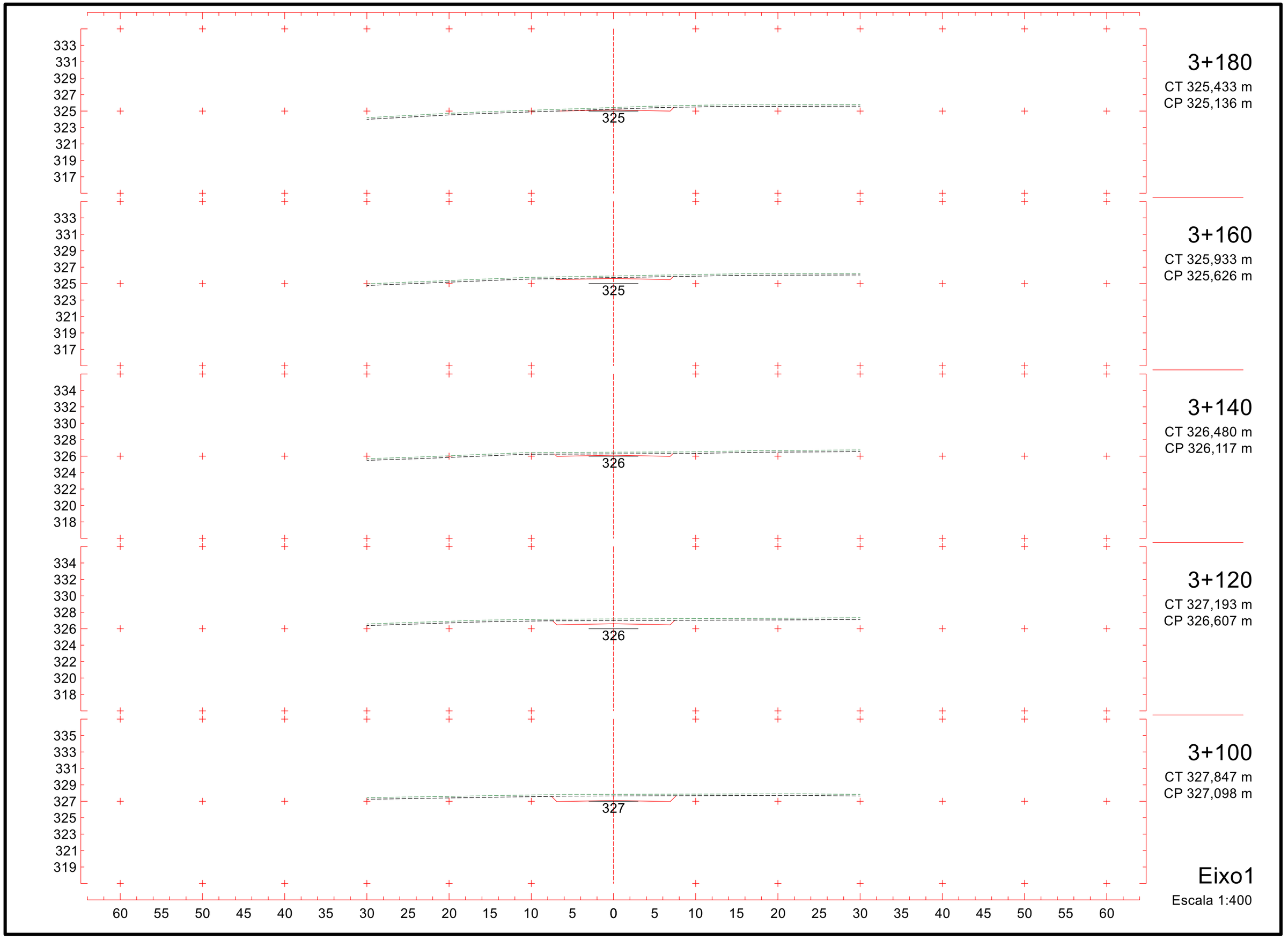

345
343
341
339
337
335
333
331
329
337
2+680
CT 338,762 m
CP 337,396 m
346
344
342
340
338
336
334
332
330
337
2+660
CT 339,321 m
CP 337,887 m
346
344
342
340
338
336
334
332
330
338
2+640
CT 339,845 m
CP 338,377 m
347
345
343
341
339
337
335
333
331
338
2+620
CT 340,368 m
CP 338,868 m
347
345
343
341
339
337
335
333
331
339
2+600
CT 340,761 m
CP 339,358 m
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
Eixo1
Escala 1:400

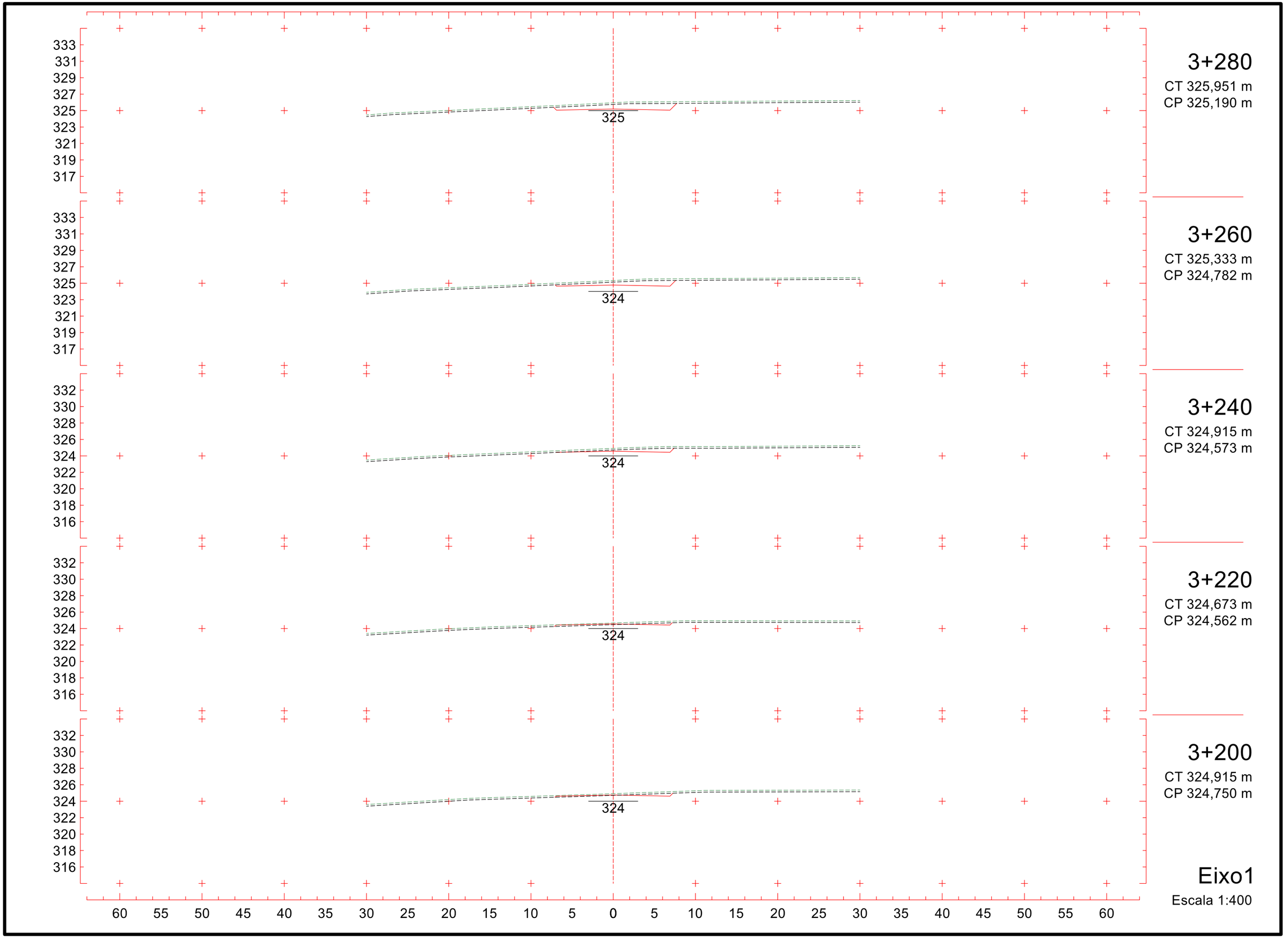

343
341
339
337
335
333
331
329
327
334
2+780
CT 336,586 m
CP 334,944 m
343
341
339
337
335
333
331
329
327
335
2+760
CT 336,741 m
CP 335,435 m
344
342
340
338
336
334
332
330
328
335
2+740
CT 337,145 m
CP 335,925 m
344
342
340
338
336
334
332
330
328
336
2+720
CT 337,675 m
CP 336,416 m
345
343
341
339
337
335
333
331
329
336
2+700
CT 338,240 m
CP 336,906 m
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
Eixo1
Escala 1:400

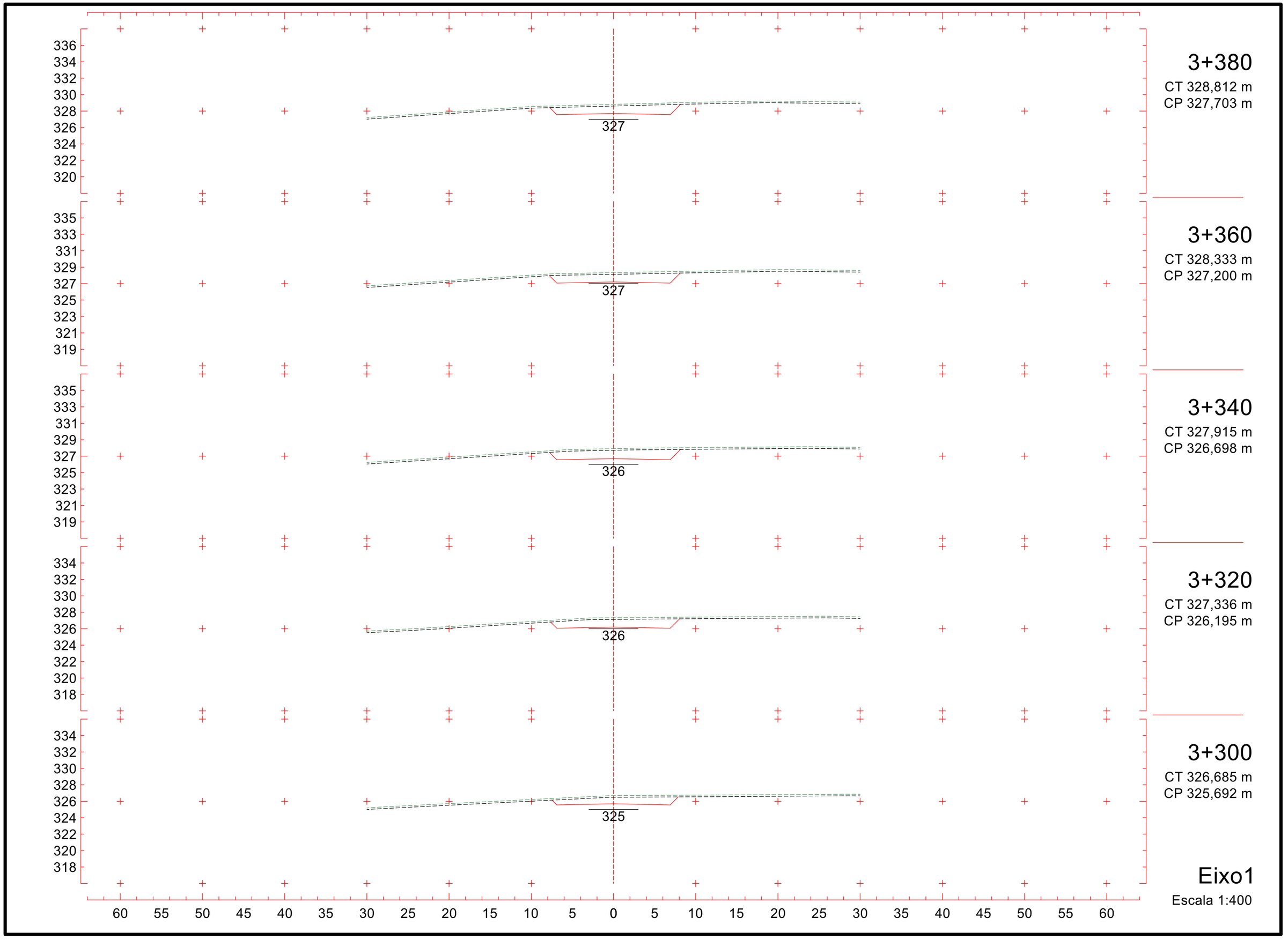

341
339
337
335
333
331
329
327
325
332
2+880
CT 335,807 m
CP 332,492 m
342
340
338
336
334
332
330
328
326
332
2+860
CT 336,247 m
CP 332,983 m
342
340
338
336
334
332
330
328
326
333
2+840
CT 336,725 m
CP 333,473 m
342
340
338
336
334
332
330
328
326
333
2+820
CT 336,699 m
CP 333,963 m
343
341
339
337
335
333
331
329
327
334
2+800
CT 336,627 m
CP 334,454 m
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
Eixo1
Escala 1:400

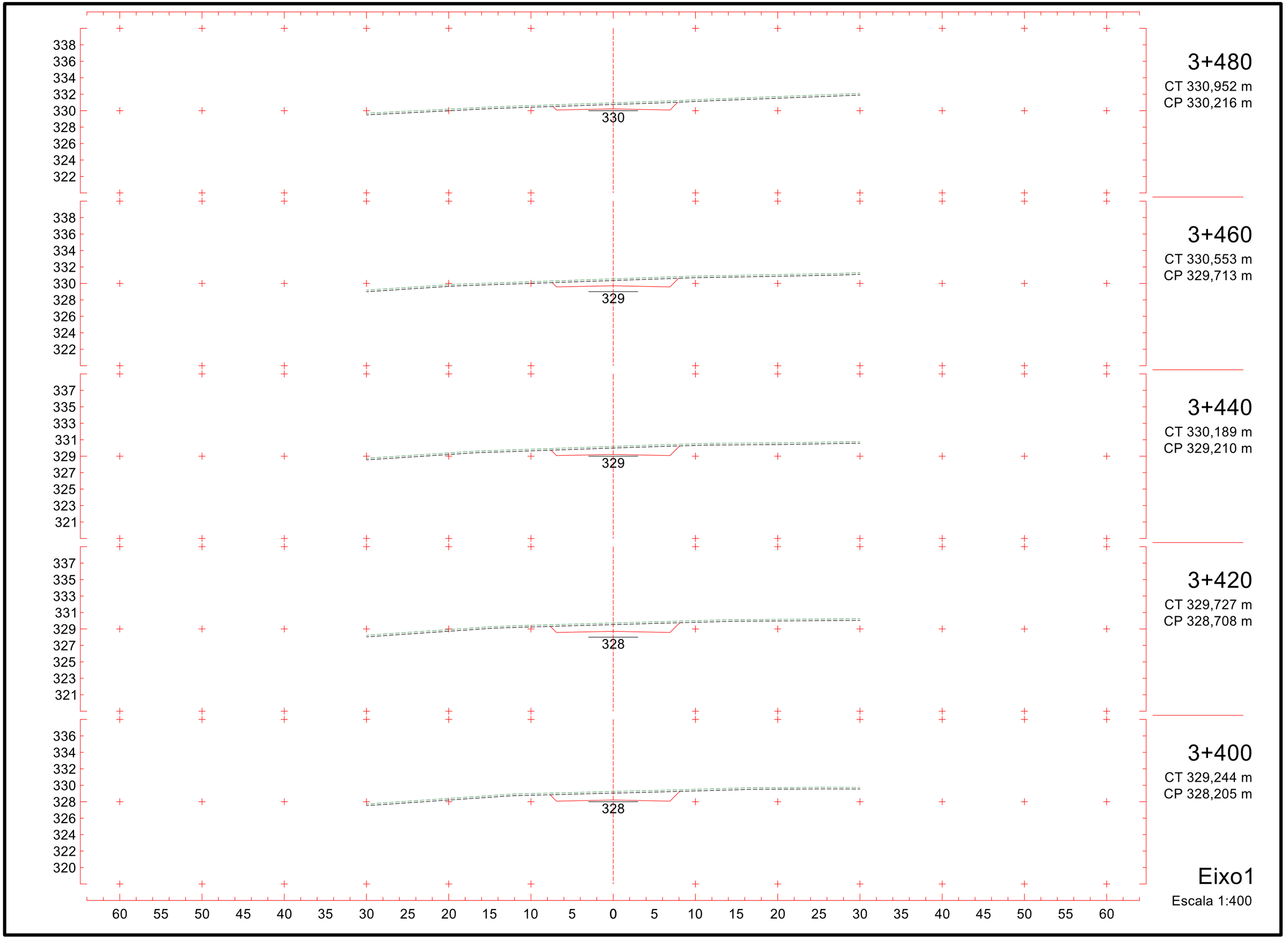

2+980
CT 330,215 m
CP 330,040 m
2+960
CT 330,784 m
CP 330,531 m
2+940
CT 332,574 m
CP 331,021 m
2+920
CT 333,711 m
CP 331,511 m
2+900
CT 335,087 m
CP 332,002 m
Eixo1
Escala 1:400
330
330
331
331
332
338 336 334 332 330 328 326 324 322
338 336 334 332 330 328 326 324 322
339 337 335 333 331 329 327 325 323
340 338 336 334 332 330 328 326 324
341 339 337 335 333 331 329 327 325
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

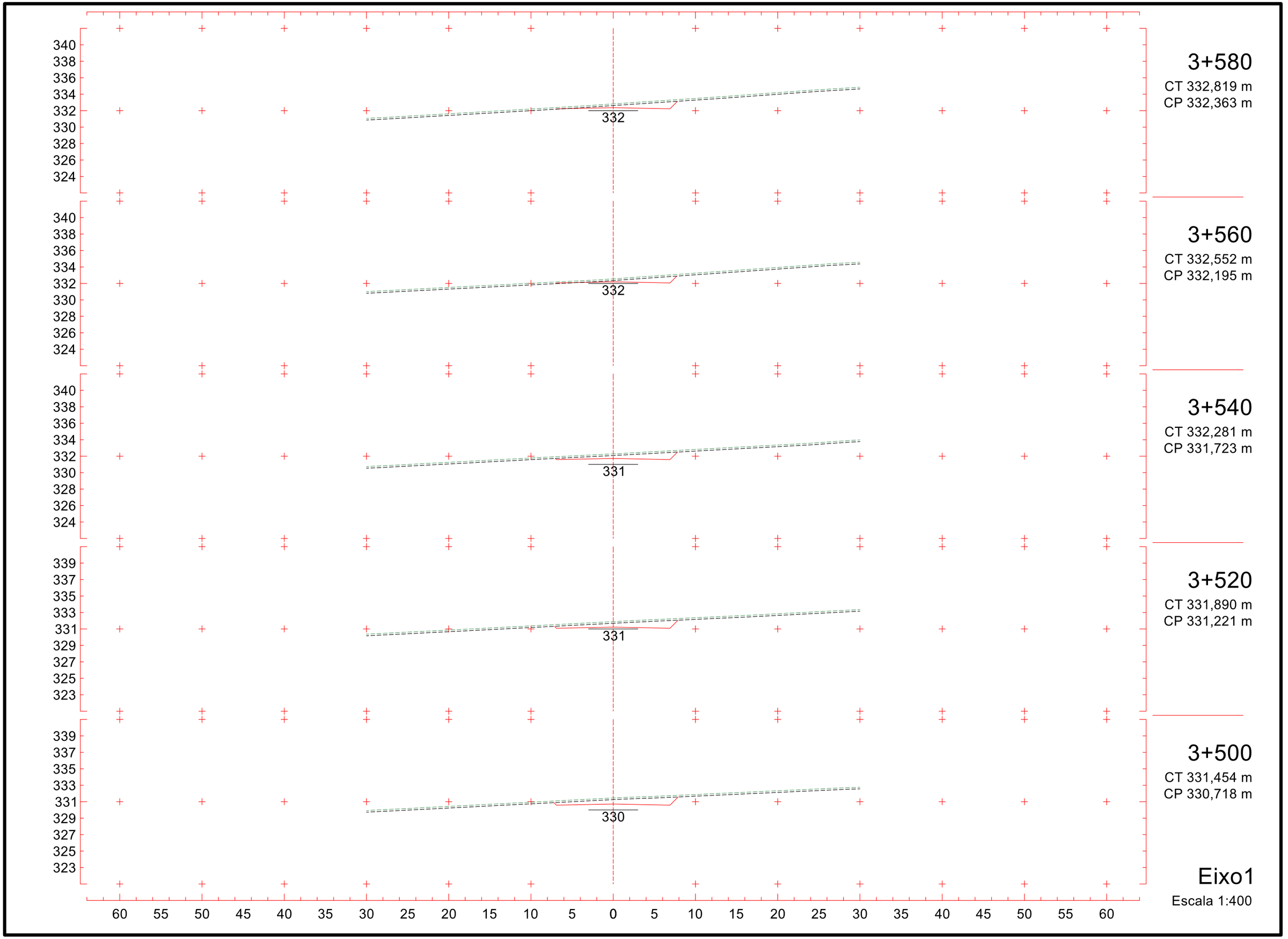

335
333
331
329
327
325
323
321
319
327
3+080
CT 328,364 m
CP 327,588 m
336
334
332
330
328
326
324
322
320
328
3+060
CT 328,811 m
CP 328,078 m
336
334
332
330
328
326
324
322
320
328
3+040
CT 329,232 m
CP 328,569 m
337
335
333
331
329
327
325
323
321
329
3+020
CT 329,582 m
CP 329,059 m
337
335
333
331
329
327
325
323
321
329
3+000
CT 329,844 m
CP 329,550 m
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
Eixo1
Escala 1:400

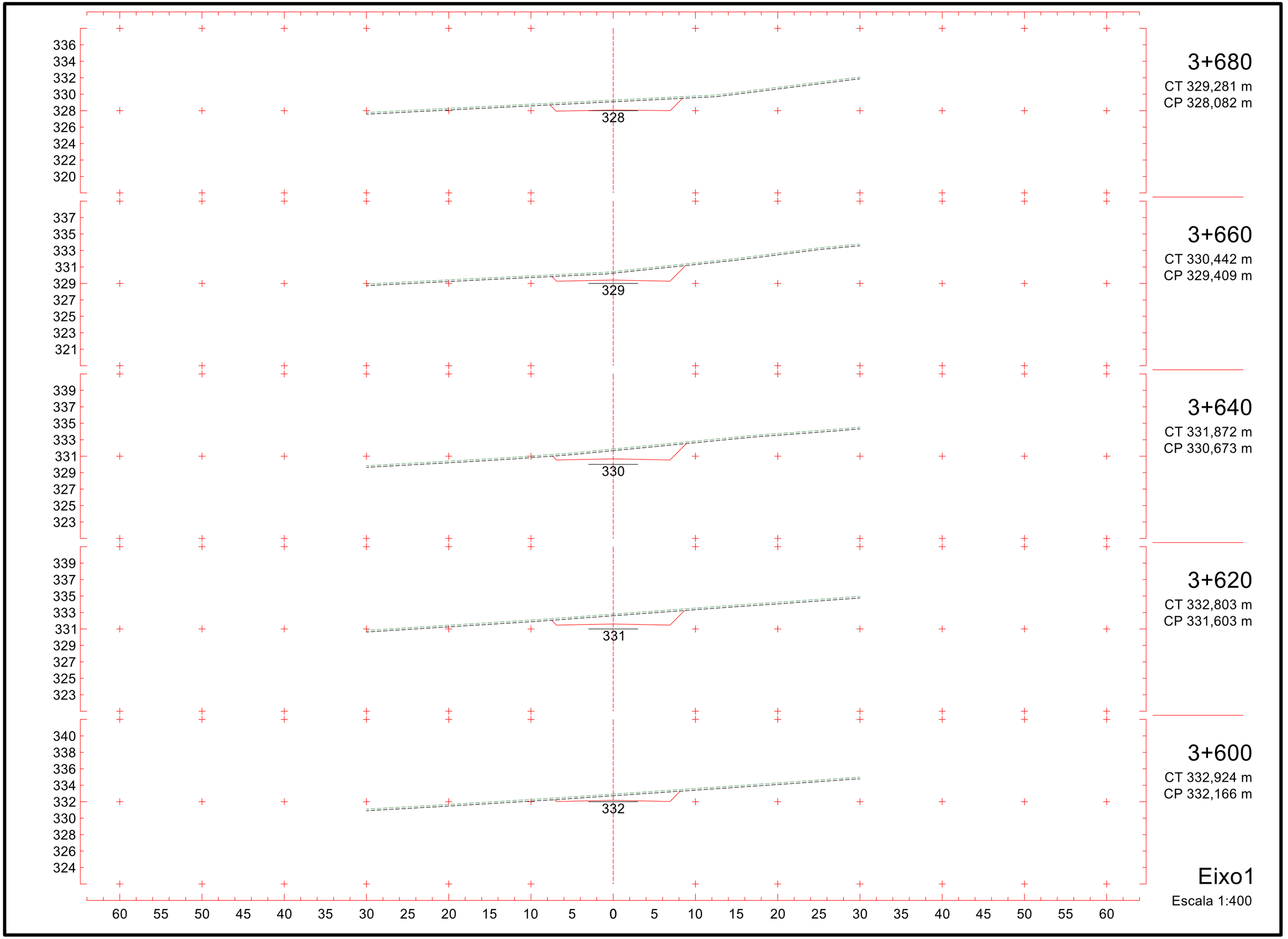

333
331
329
327
325
323
321
319
317
325
3+180
CT 325,433 m
CP 325,136 m
333
331
329
327
325
323
321
319
317
325
3+160
CT 325,933 m
CP 325,626 m
334
332
330
328
326
324
322
320
318
326
3+140
CT 326,480 m
CP 326,117 m
334
332
330
328
326
324
322
320
318
326
3+120
CT 327,193 m
CP 326,607 m
335
333
331
329
327
325
323
321
319
327
3+100
CT 327,847 m
CP 327,098 m
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
Eixo1
Escala 1:400

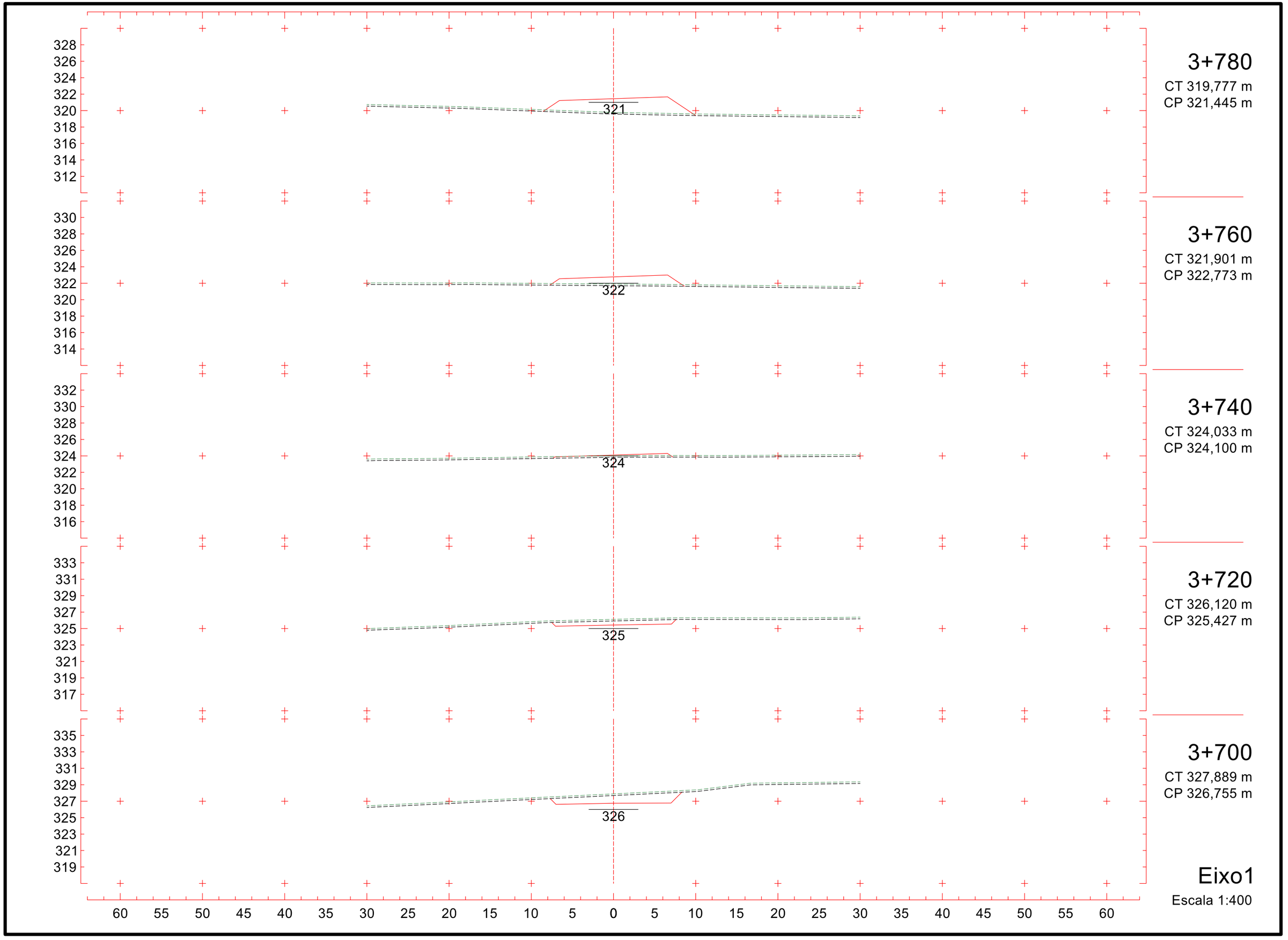

333
331
329
327
325
323
321
319
317
325
3+280
CT 325,951 m
CP 325,190 m
333
331
329
327
325
323
321
319
317
324
3+260
CT 325,333 m
CP 324,782 m
332
330
328
326
324
322
320
318
316
324
3+240
CT 324,915 m
CP 324,573 m
332
330
328
326
324
322
320
318
316
324
3+220
CT 324,673 m
CP 324,562 m
332
330
328
326
324
322
320
318
316
324
3+200
CT 324,915 m
CP 324,750 m
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
Eixo1
Escala 1:400

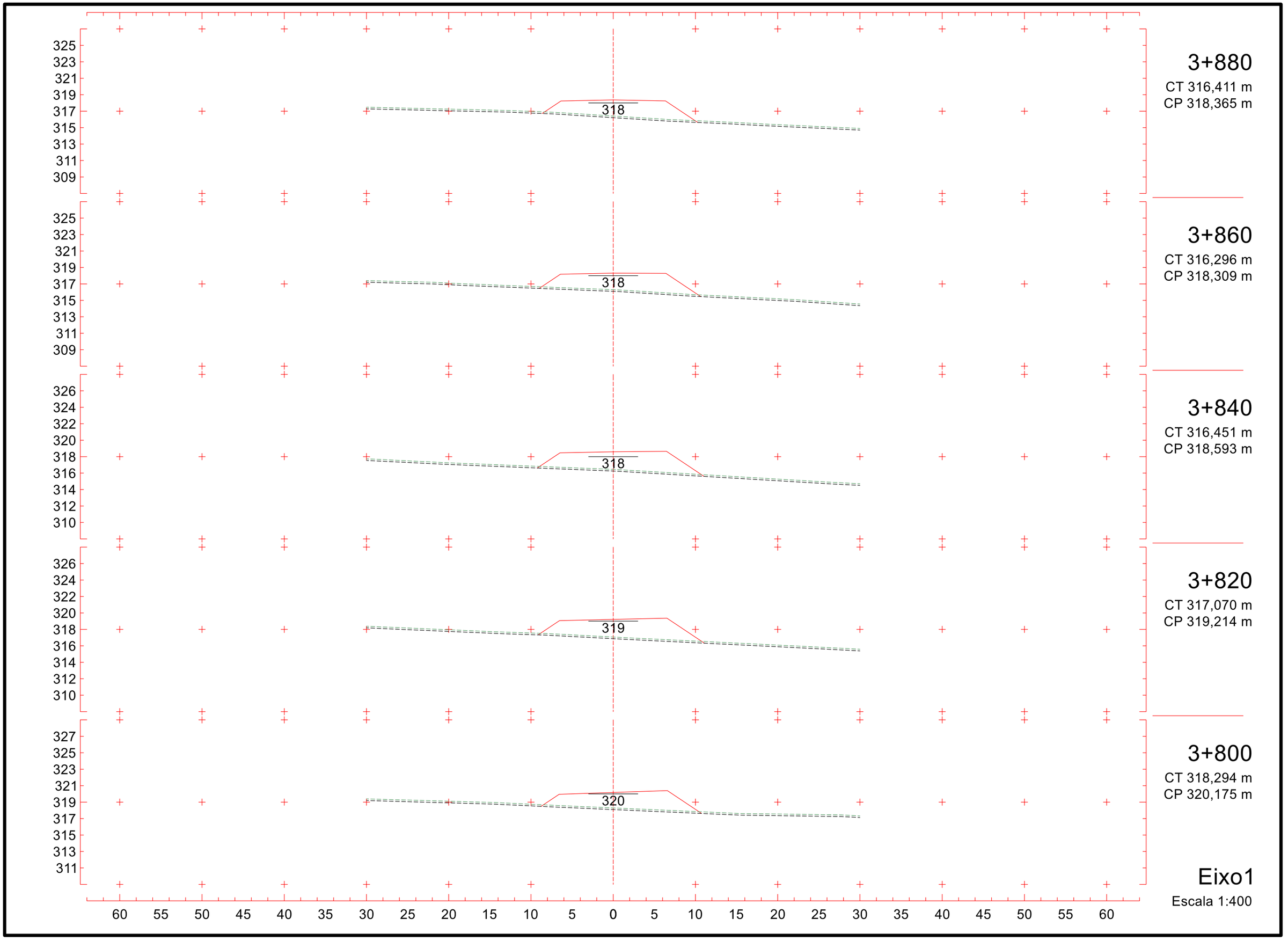

336
334
332
330
328
326
324
322
320
327
3+380
CT 328,812 m
CP 327,703 m
335
333
331
329
327
325
323
321
319
327
3+360
CT 328,333 m
CP 327,200 m
335
333
331
329
327
325
323
321
319
326
3+340
CT 327,915 m
CP 326,698 m
334
332
330
328
326
324
322
320
318
326
3+320
CT 327,336 m
CP 326,195 m
334
332
330
328
326
324
322
320
318
325
3+300
CT 326,685 m
CP 325,692 m
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
Eixo1
Escala 1:400

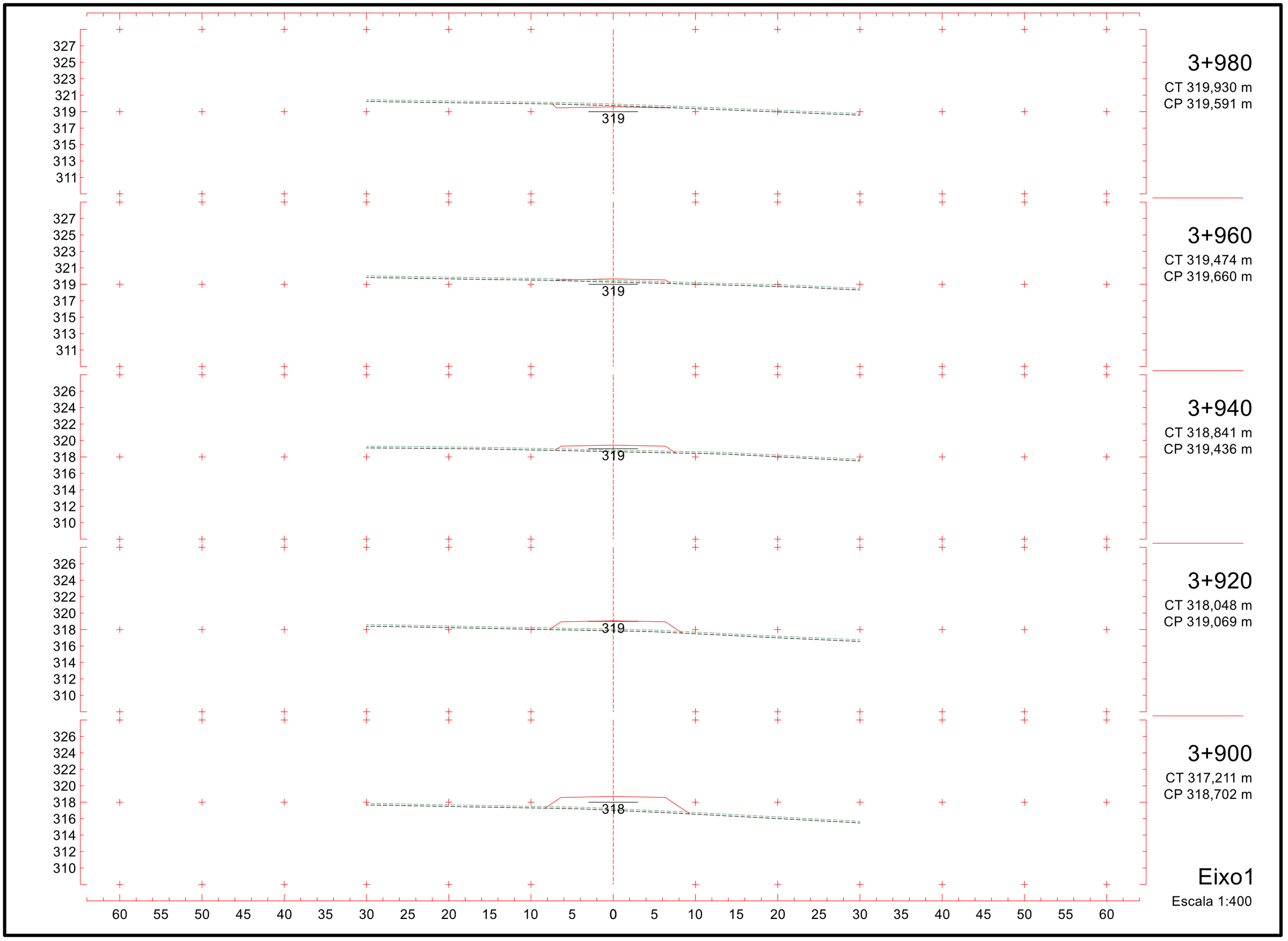

338
336
334
332
330
328
326
324
322
330
3+480
CT 330,952 m
CP 330,216 m
338
336
334
332
330
328
326
324
322
329
3+460
CT 330,553 m
CP 329,713 m
337
335
333
331
329
327
325
323
321
329
3+440
CT 330,189 m
CP 329,210 m
337
335
333
331
329
327
325
323
321
328
3+420
CT 329,727 m
CP 328,708 m
336
334
332
330
328
326
324
322
320
328
3+400
CT 329,244 m
CP 328,205 m
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
Eixo1
Escala 1:400

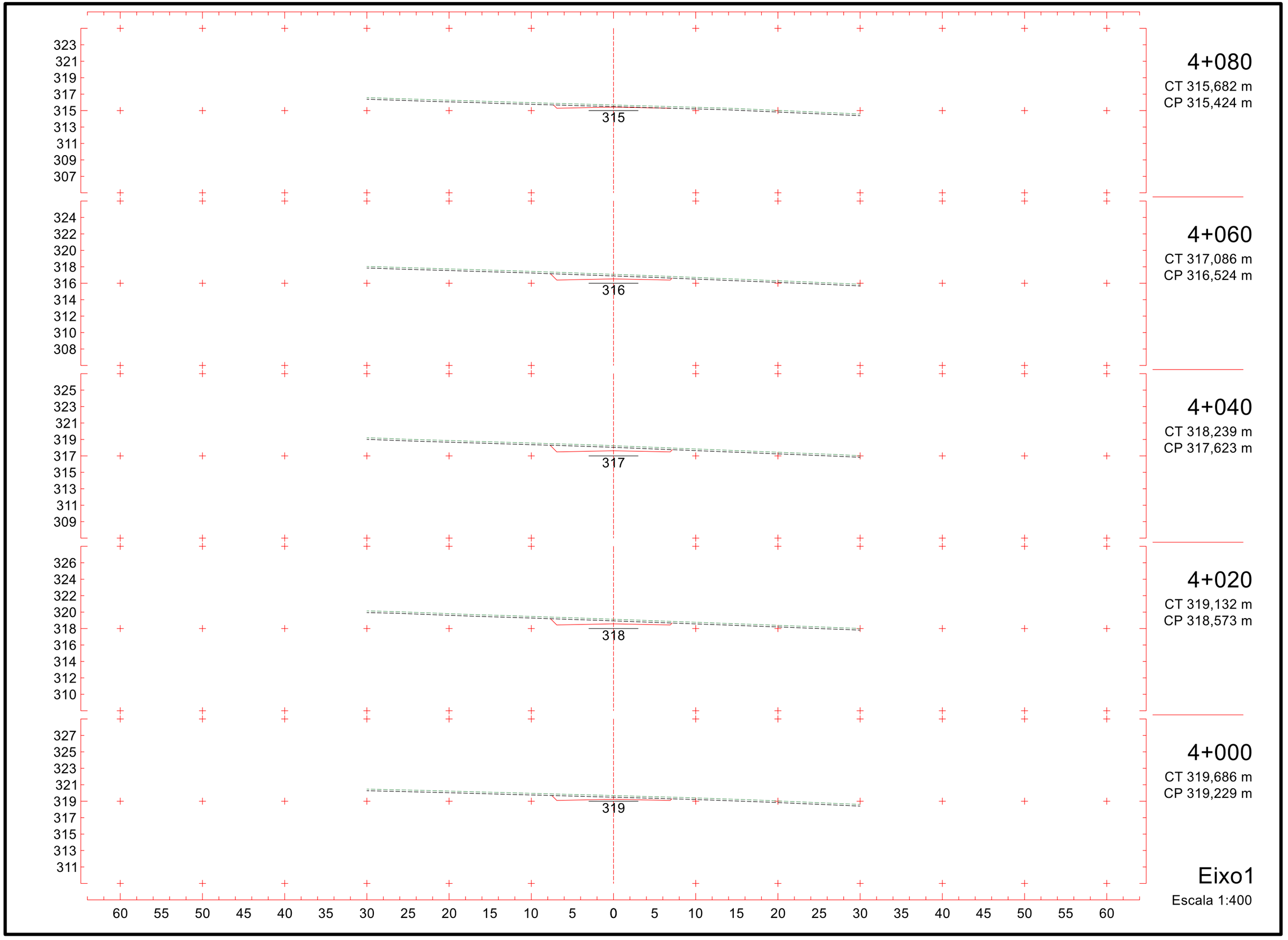

340
338
336
334
332
330
328
326
324
332
3+580
CT 332,819 m
CP 332,363 m
340
338
336
334
332
330
328
326
324
332
3+560
CT 332,552 m
CP 332,195 m
340
338
336
334
332
330
328
326
324
331
3+540
CT 332,281 m
CP 331,723 m
339
337
335
333
331
329
327
325
323
331
3+520
CT 331,890 m
CP 331,221 m
339
337
335
333
331
329
327
325
323
330
3+500
CT 331,454 m
CP 330,718 m
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
Eixo1
Escala 1:400

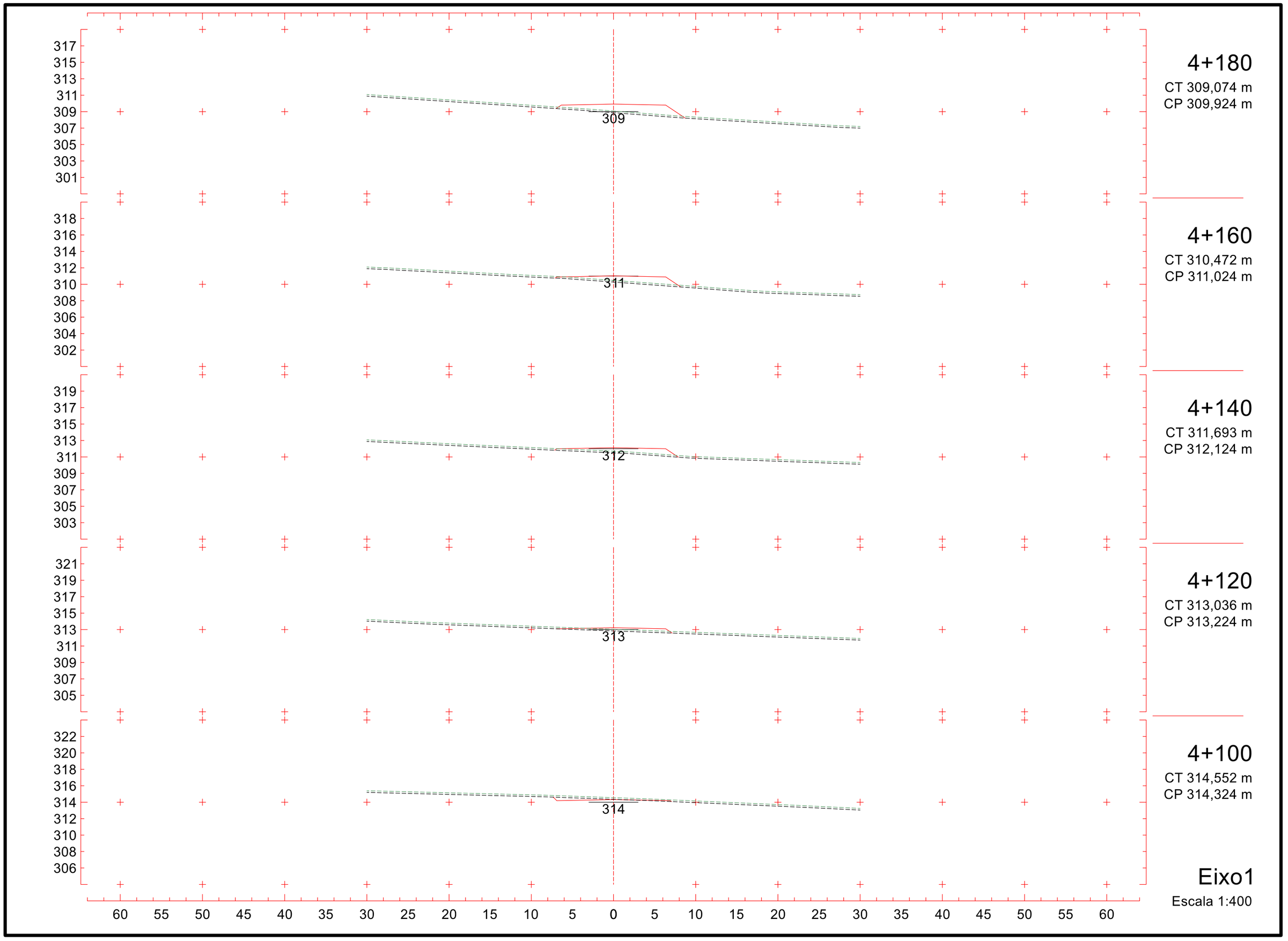

336
334
332
330
328
326
324
322
320
328
3+680
CT 329,281 m
CP 328,082 m
337
335
333
331
329
327
325
323
321
329
3+660
CT 330,442 m
CP 329,409 m
339
337
335
333
331
329
327
325
323
330
3+640
CT 331,872 m
CP 330,673 m
339
337
335
333
331
329
327
325
323
331
3+620
CT 332,803 m
CP 331,603 m
340
338
336
334
332
330
328
326
324
332
3+600
CT 332,924 m
CP 332,166 m
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
Eixo1
Escala 1:400

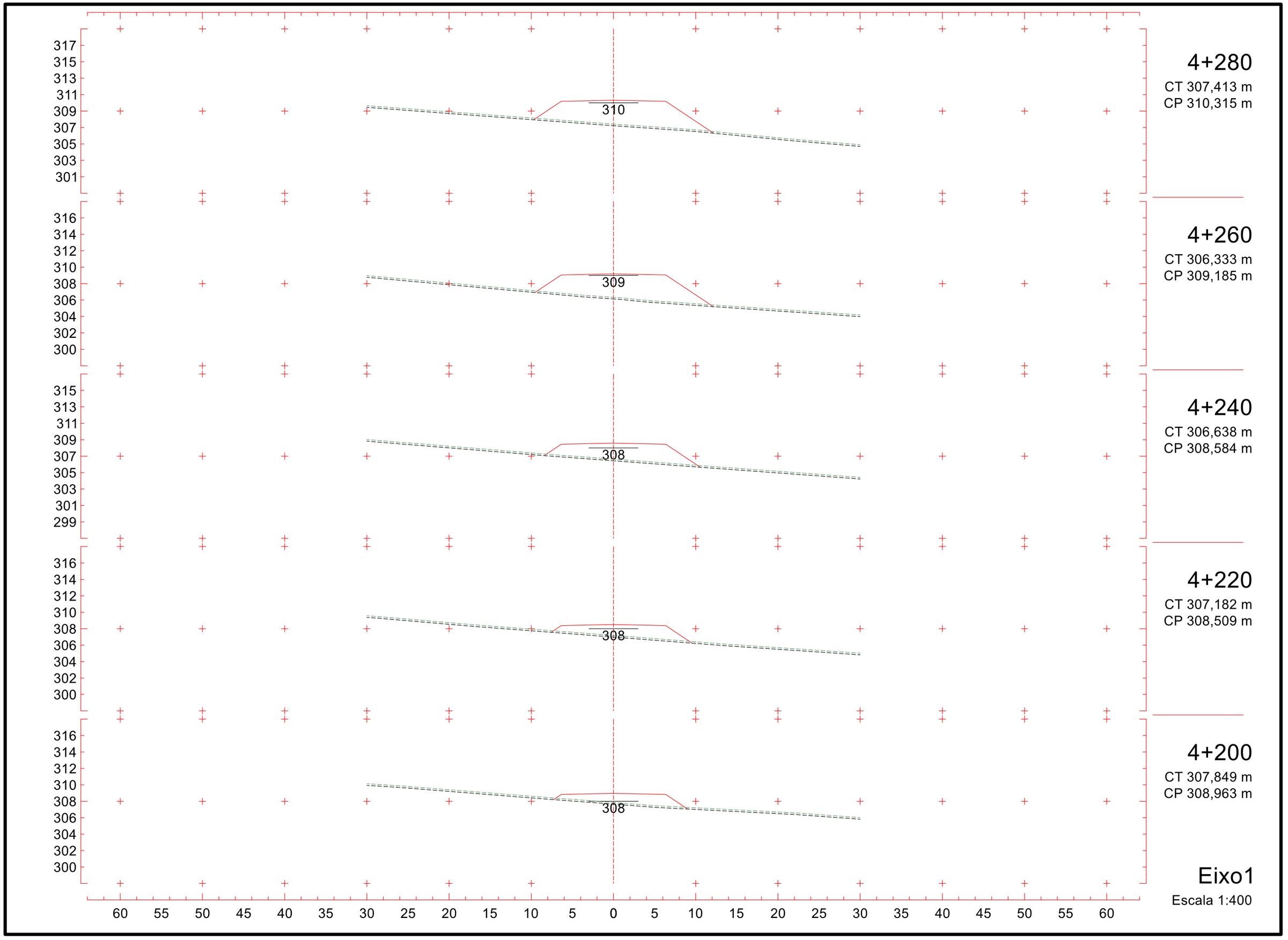

328
326
324
322
320
318
316
314
312
321
3+780
CT 319,777 m
CP 321,445 m
330
328
326
324
322
320
318
316
314
322
3+760
CT 321,901 m
CP 322,773 m
332
330
328
326
324
322
320
318
316
324
3+740
CT 324,033 m
CP 324,100 m
333
331
329
327
325
323
321
319
317
325
3+720
CT 326,120 m
CP 325,427 m
335
333
331
329
327
325
323
321
319
326
3+700
CT 327,889 m
CP 326,755 m
Eixo1
Escala 1:400
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

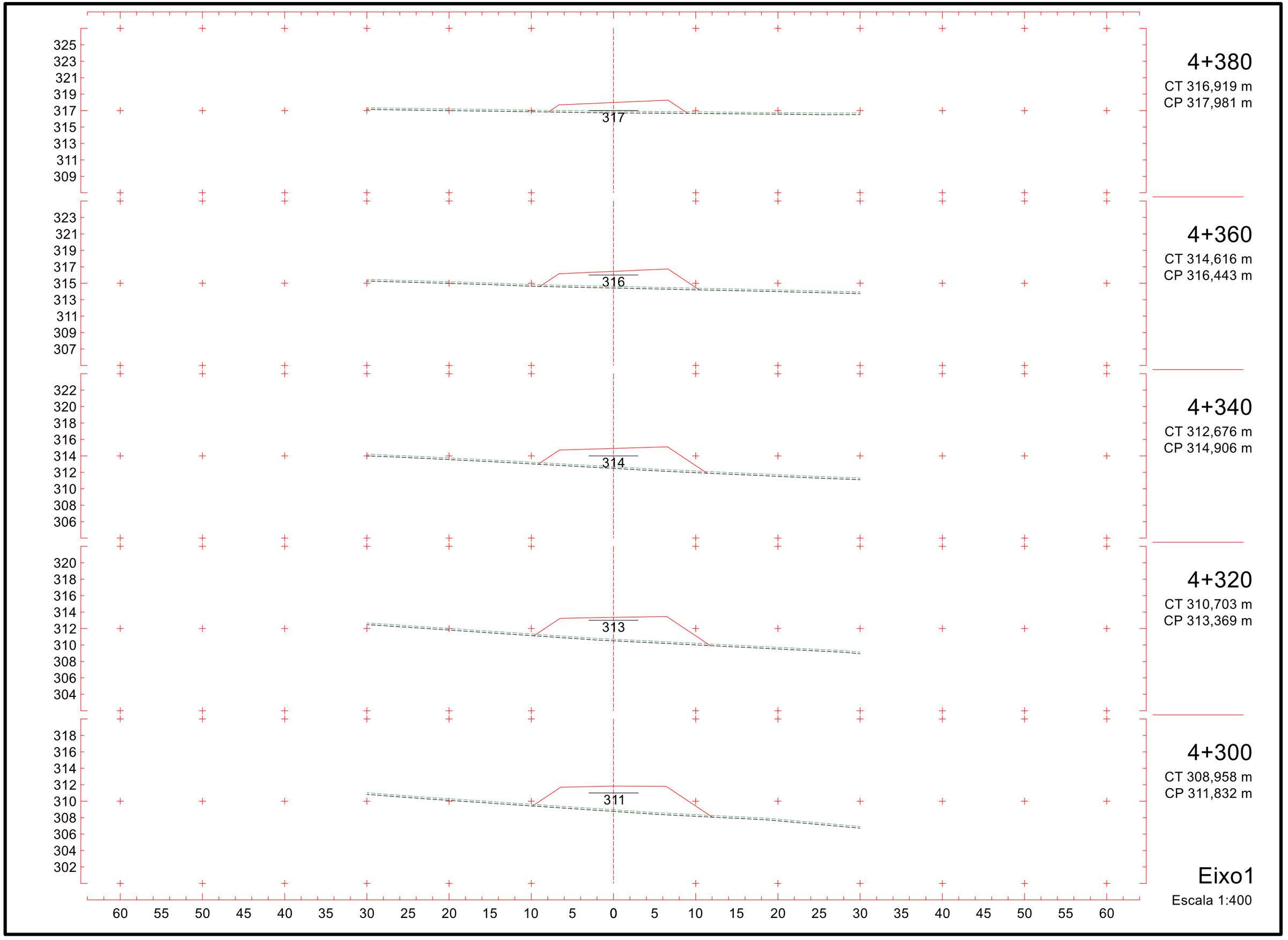

325
323
321
319
317
315
313
311
309
318
3+880
CT 316,411 m
CP 318,365 m
325
323
321
319
317
315
313
311
309
318
3+860
CT 316,296 m
CP 318,309 m
326
324
322
320
318
316
314
312
310
318
3+840
CT 316,451 m
CP 318,593 m
326
324
322
320
318
316
314
312
310
319
3+820
CT 317,070 m
CP 319,214 m
327
325
323
321
319
317
315
313
311
320
3+800
CT 318,294 m
CP 320,175 m
Eixo1
Escala 1:400
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

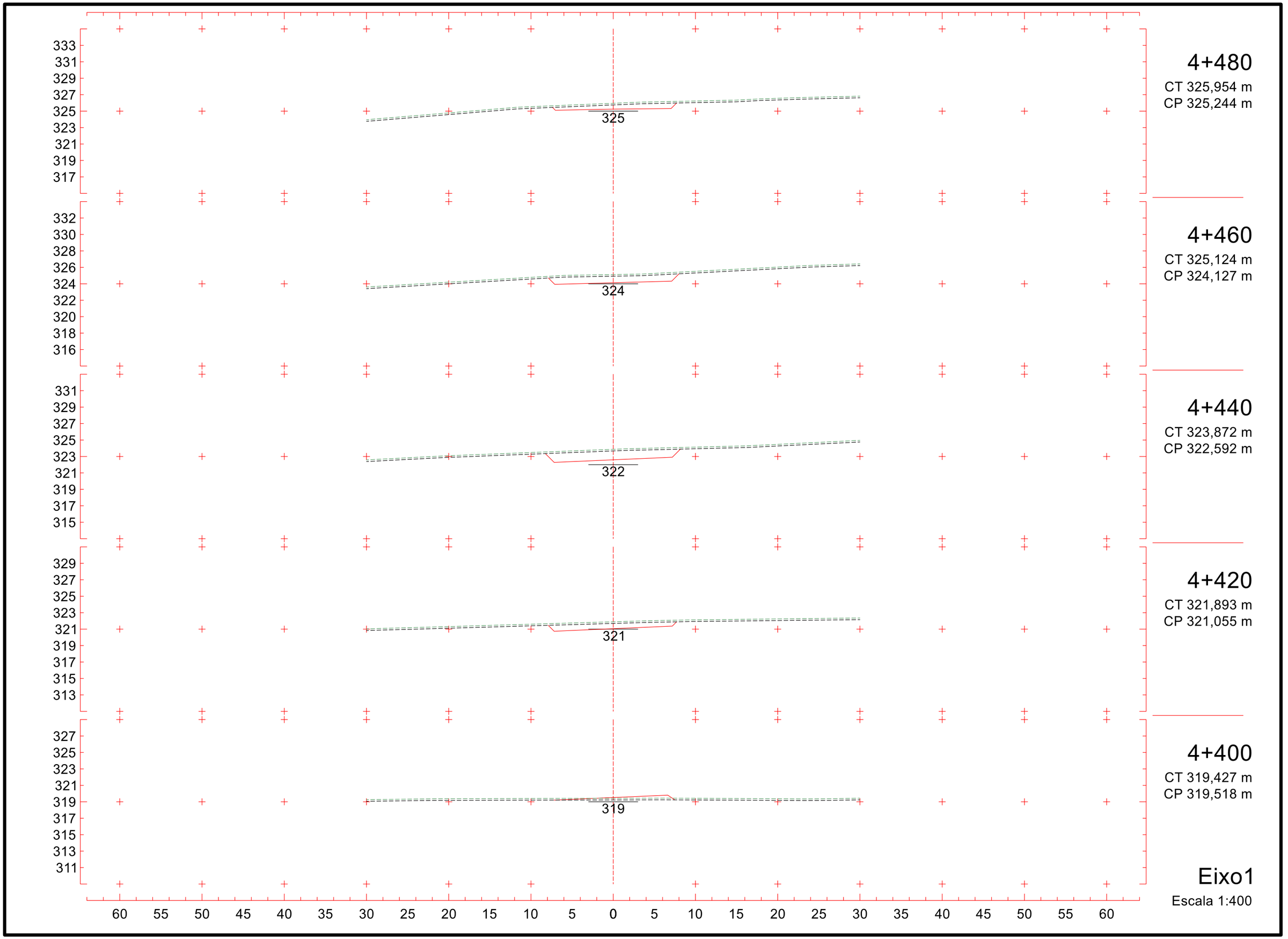

3+980
CT 319,930 m
CP 319,591 m
3+960
CT 319,474 m
CP 319,660 m
3+940
CT 318,841 m
CP 319,436 m
3+920
CT 318,048 m
CP 319,069 m
3+900
CT 317,211 m
CP 318,702 m
Eixo1
Escala 1:400
319
319
319
319
318
327 325 323 321 319 317 315 313 311
326 324 322 320 318 316 314 312 310
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

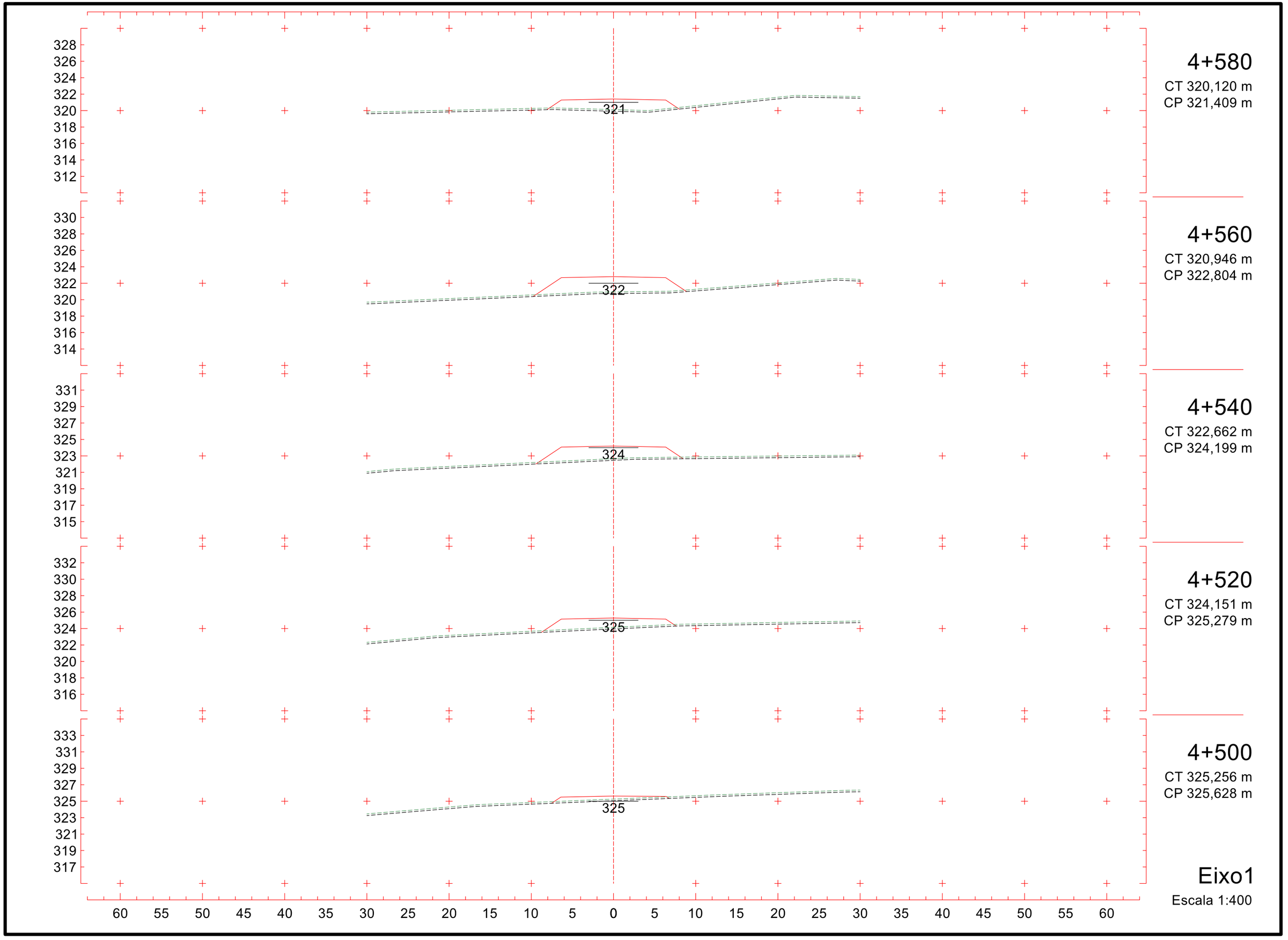

323 321 319 317 315 313 311 309 307
315
4+080
CT 315,682 m
CP 315,424 m
324 322 320 318 316 314 312 310 308
316
4+060
CT 317,086 m
CP 316,524 m
325 323 321 319 317 315 313 311 309
317
4+040
CT 318,239 m
CP 317,623 m
326 324 322 320 318 316 314 312 310
318
4+020
CT 319,132 m
CP 318,573 m
327 325 323 321 319 317 315 313 311
319
4+000
CT 319,686 m
CP 319,229 m
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
Eixo1
Escala 1:400

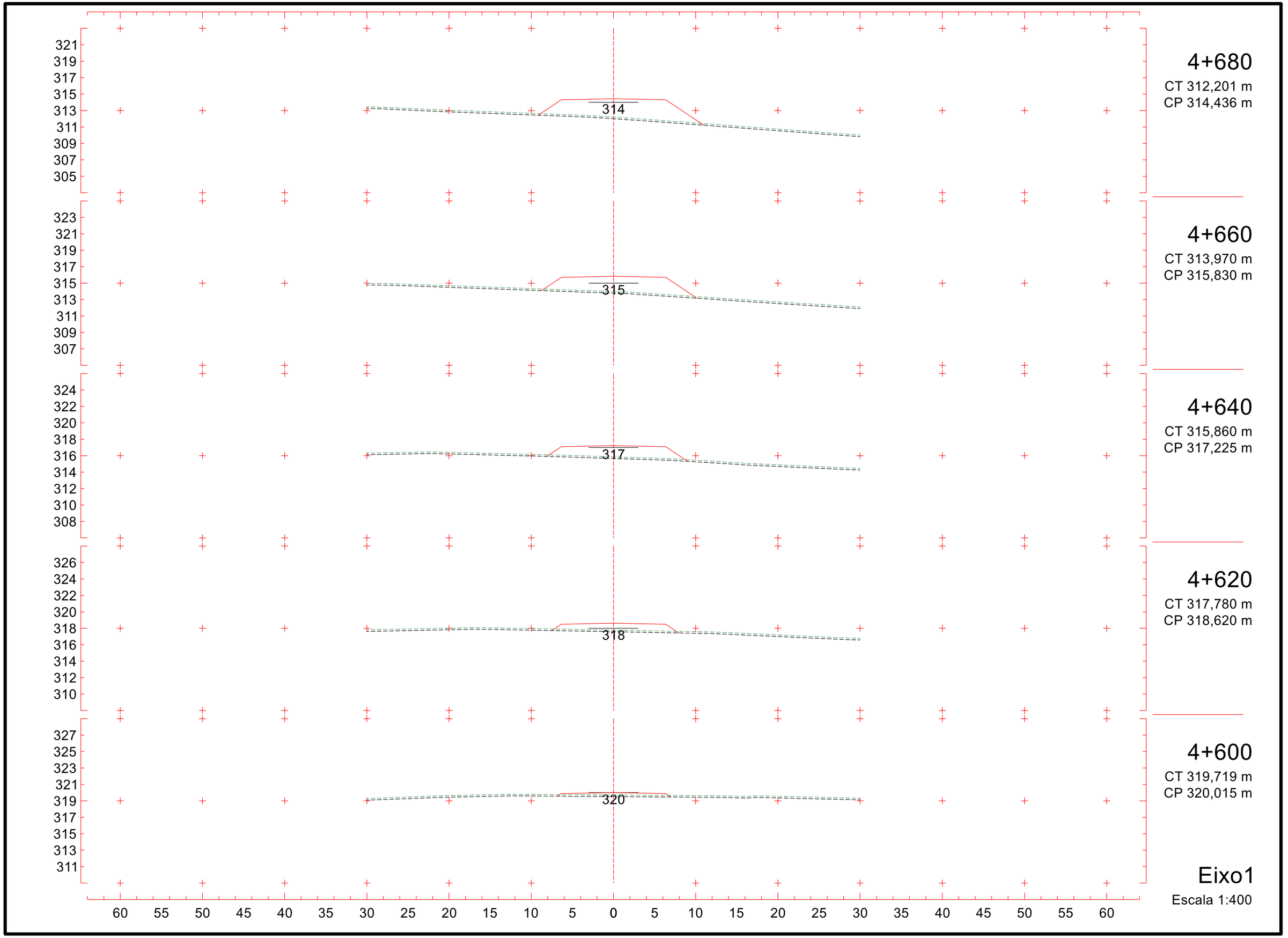

317
315
313
311
309
307
305
303
301
309
4+180
CT 309,074 m
CP 309,924 m
318
316
314
312
310
308
306
304
302
311
4+160
CT 310,472 m
CP 311,024 m
319
317
315
313
311
309
307
305
303
312
4+140
CT 311,693 m
CP 312,124 m
321
319
317
315
313
311
309
307
305
313
4+120
CT 313,036 m
CP 313,224 m
322
320
318
316
314
312
310
308
306
314
4+100
CT 314,552 m
CP 314,324 m
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
Eixo1
Escala 1:400

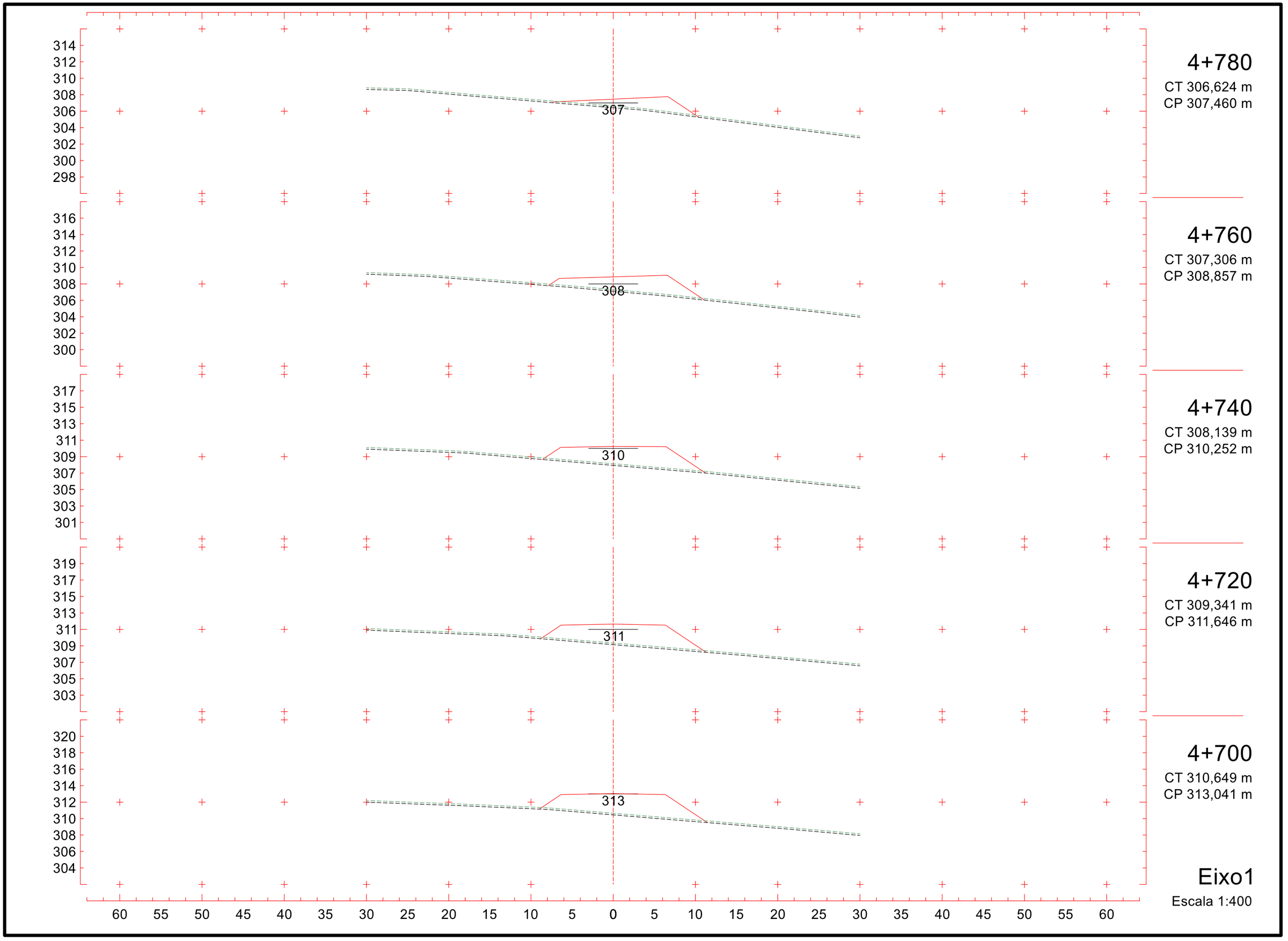

317
315
313
311
309
307
305
303
301
310
4+280
CT 307,413 m
CP 310,315 m
316
314
312
310
308
306
304
302
300
309
4+260
CT 306,333 m
CP 309,185 m
315
313
311
309
307
305
303
301
299
308
4+240
CT 306,638 m
CP 308,584 m
316
314
312
310
308
306
304
302
300
308
4+220
CT 307,182 m
CP 308,509 m
316
314
312
310
308
306
304
302
300
308
4+200
CT 307,849 m
CP 308,963 m
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
Eixo1
Escala 1:400

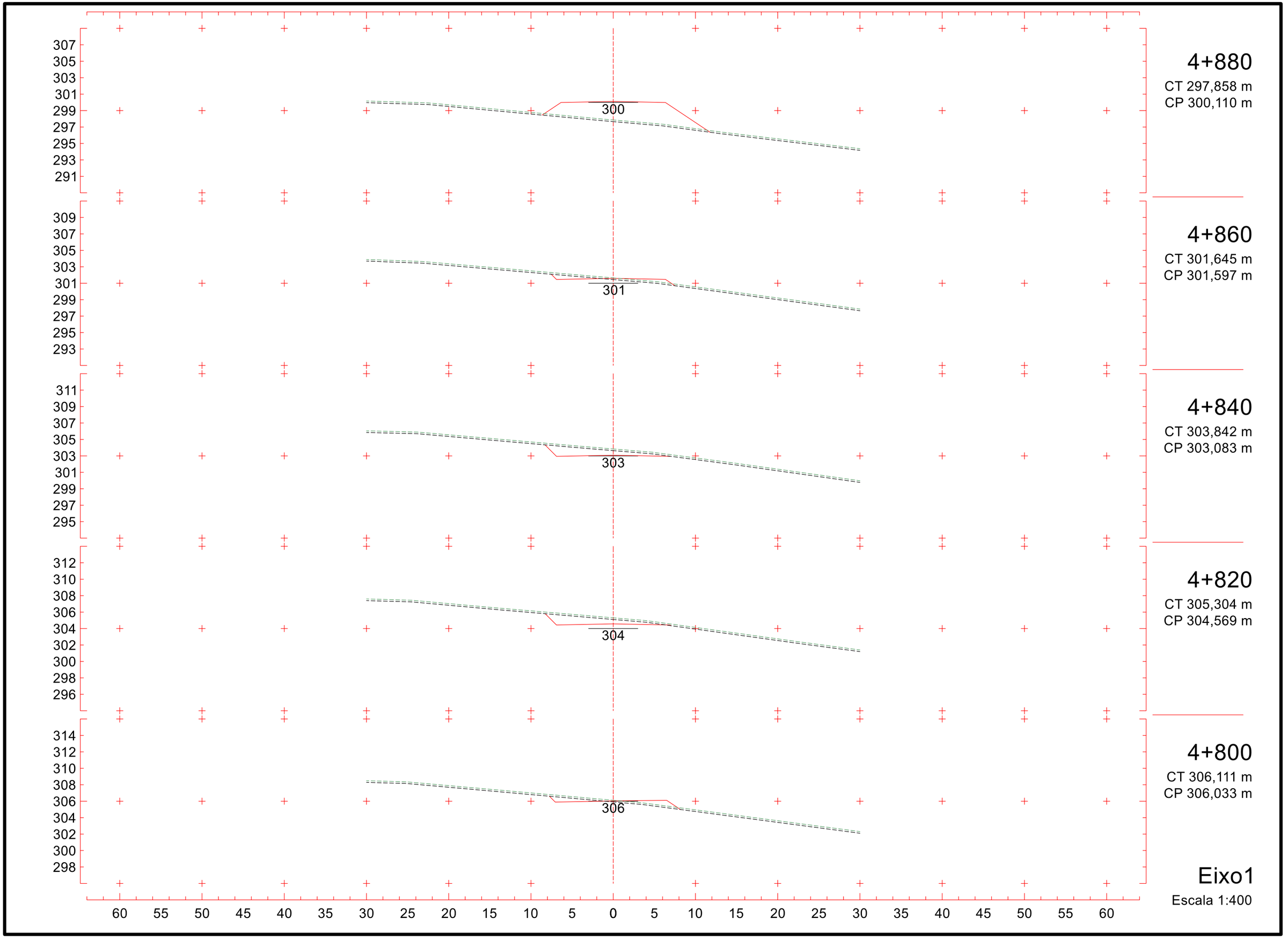

325
323
321
319
317
315
313
311
309
317
4+380
CT 316,919 m
CP 317,981 m
323
321
319
317
315
313
311
309
307
316
4+360
CT 314,616 m
CP 316,443 m
322
320
318
316
314
312
310
308
306
314
4+340
CT 312,676 m
CP 314,906 m
320
318
316
314
312
310
308
306
304
313
4+320
CT 310,703 m
CP 313,369 m
318
316
314
312
310
308
306
304
302
311
4+300
CT 308,958 m
CP 311,832 m
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
Eixo1
Escala 1:400

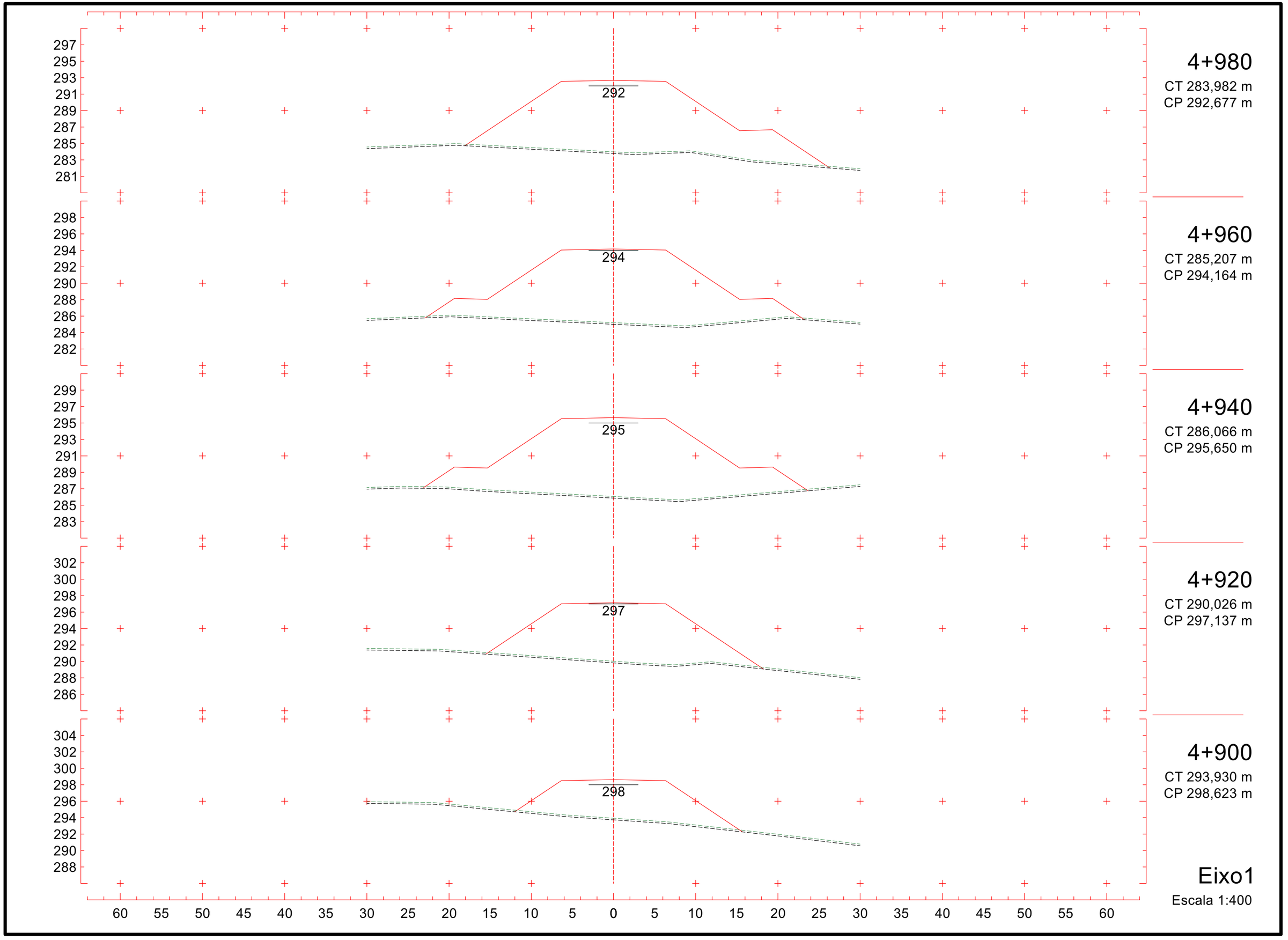

333
331
329
327
325
323
321
319
317
325
4+480
CT 325,954 m
CP 325,244 m
332
330
328
326
324
322
320
318
316
324
4+460
CT 325,124 m
CP 324,127 m
331
329
327
325
323
321
319
317
315
322
4+440
CT 323,872 m
CP 322,592 m
329
327
325
323
321
319
317
315
313
321
4+420
CT 321,893 m
CP 321,055 m
327
325
323
321
319
317
315
313
311
319
4+400
CT 319,427 m
CP 319,518 m
Eixo1
Escala 1:400
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

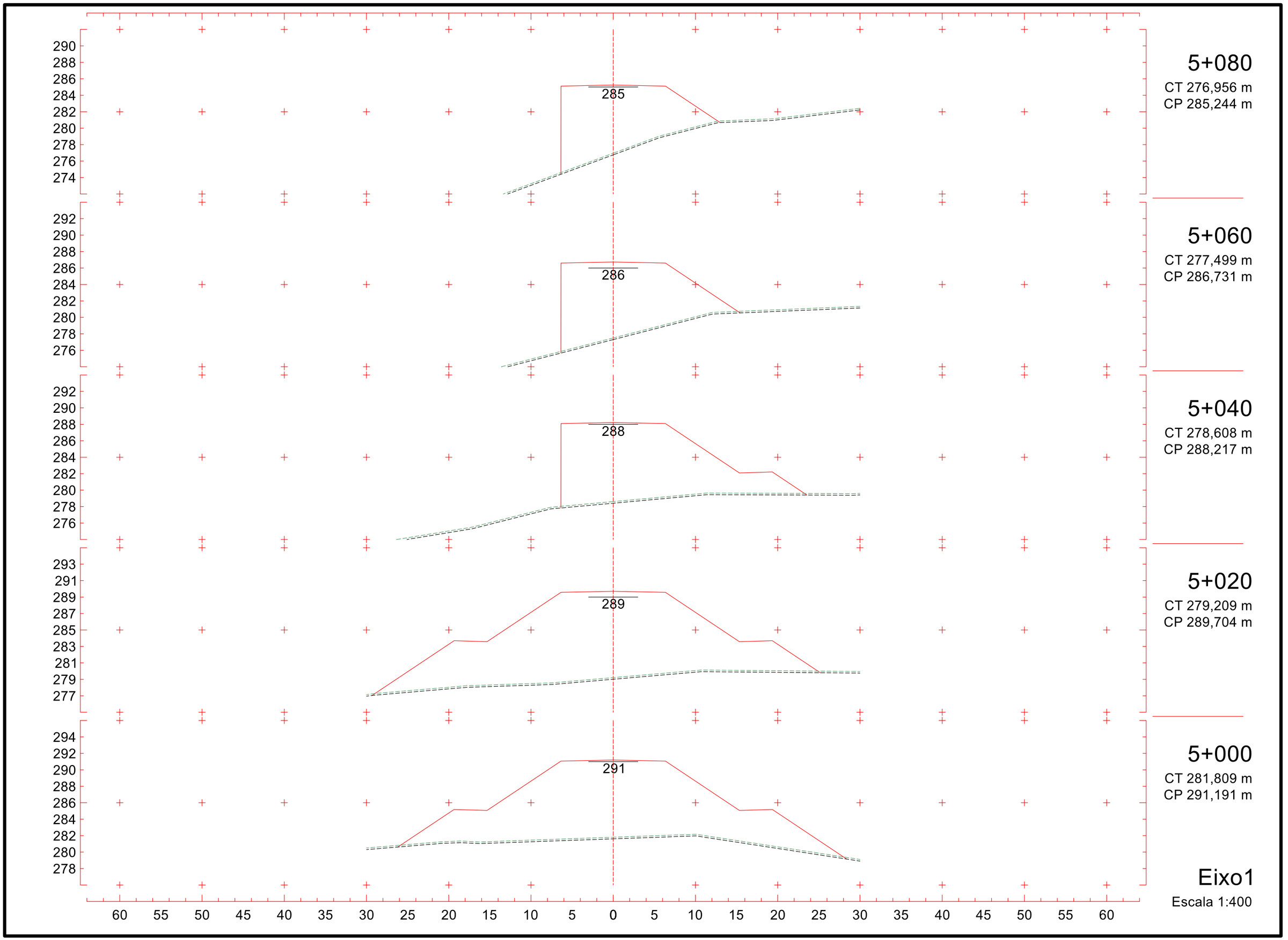

328
326
324
322
320
318
316
314
312
321
4+580
CT 320,120 m
CP 321,409 m
330
328
326
324
322
320
318
316
314
322
4+560
CT 320,946 m
CP 322,804 m
331
329
327
325
323
321
319
317
315
324
4+540
CT 322,662 m
CP 324,199 m
332
330
328
326
324
322
320
318
316
325
4+520
CT 324,151 m
CP 325,279 m
333
331
329
327
325
323
321
319
317
325
4+500
CT 325,256 m
CP 325,628 m
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
Eixo1
Escala 1:400

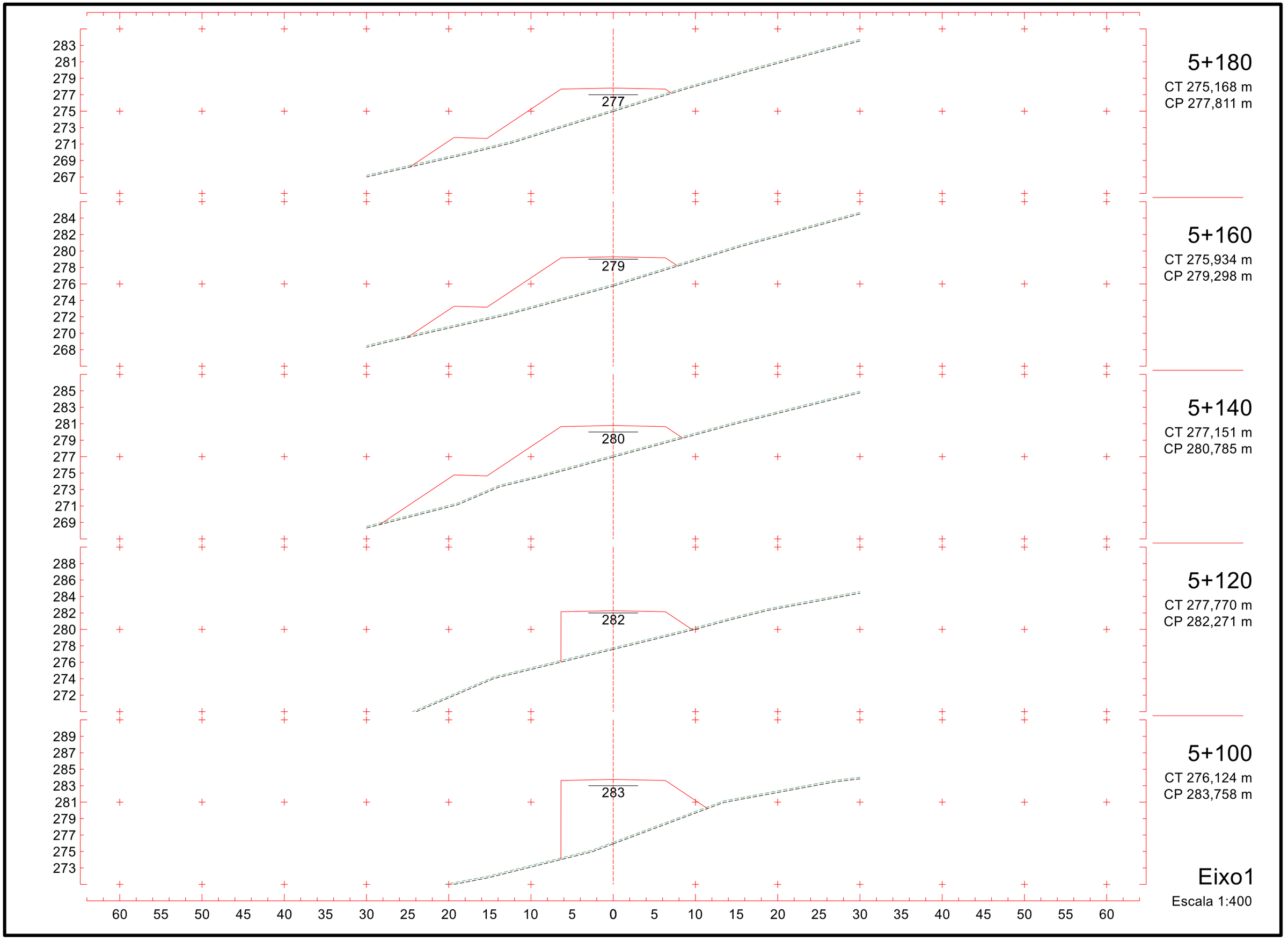

321
319
317
315
313
311
309
307
305
314
4+680
CT 312,201 m
CP 314,436 m
323
321
319
317
315
313
311
309
307
315
4+660
CT 313,970 m
CP 315,830 m
324
322
320
318
316
314
312
310
308
317
4+640
CT 315,860 m
CP 317,225 m
326
324
322
320
318
316
314
312
310
318
4+620
CT 317,780 m
CP 318,620 m
327
325
323
321
319
317
315
313
311
320
4+600
CT 319,719 m
CP 320,015 m
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
Eixo1
Escala 1:400

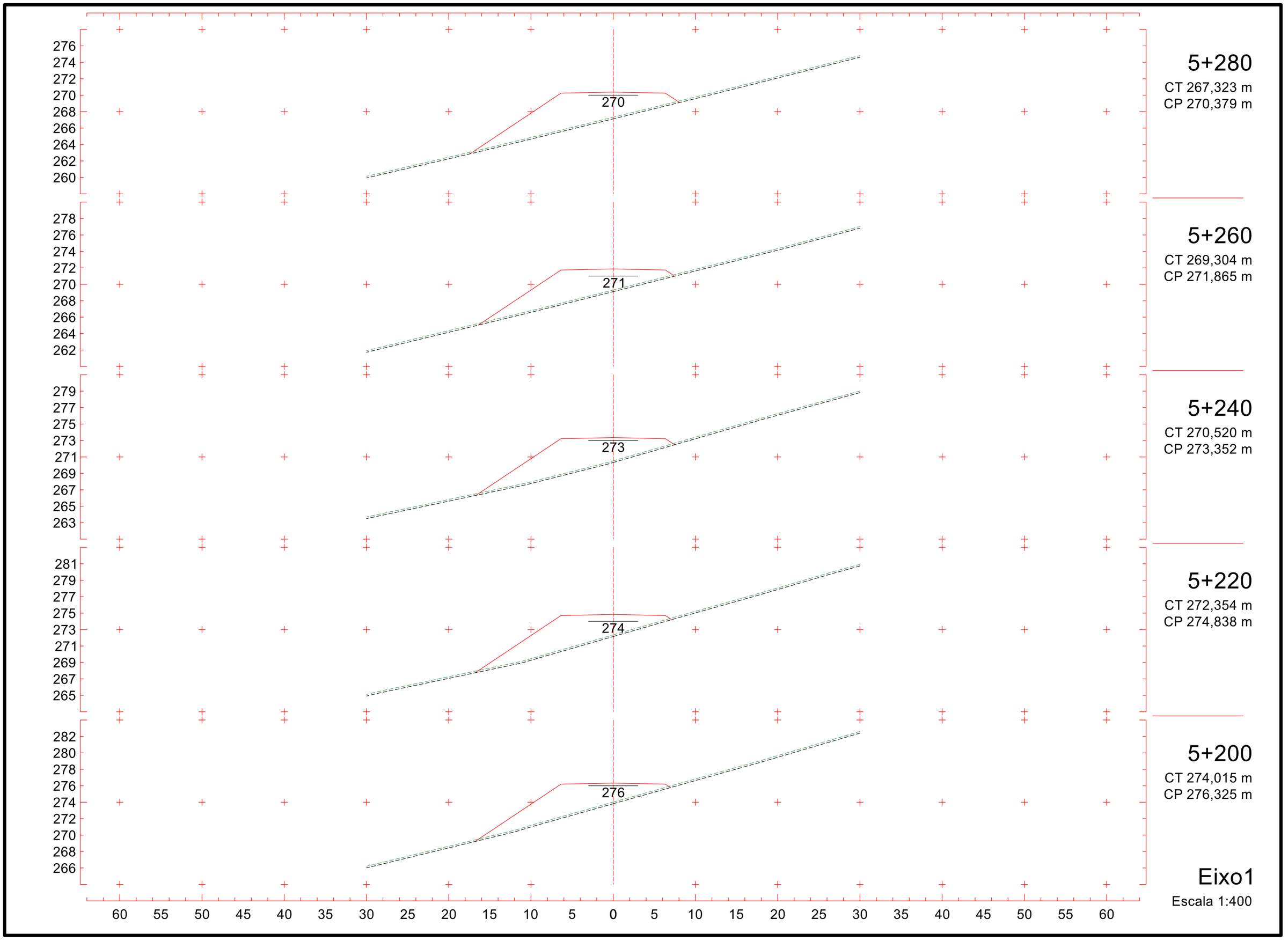

314
312
310
308
306
304
302
300
298
307
4+780
CT 306,624 m
CP 307,460 m
316
314
312
310
308
306
304
302
300
308
4+760
CT 307,306 m
CP 308,857 m
317
315
313
311
309
307
305
303
301
310
4+740
CT 308,139 m
CP 310,252 m
319
317
315
313
311
309
307
305
303
311
4+720
CT 309,341 m
CP 311,646 m
320
318
316
314
312
310
308
306
304
313
4+700
CT 310,649 m
CP 313,041 m
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
Eixo1
Escala 1:400

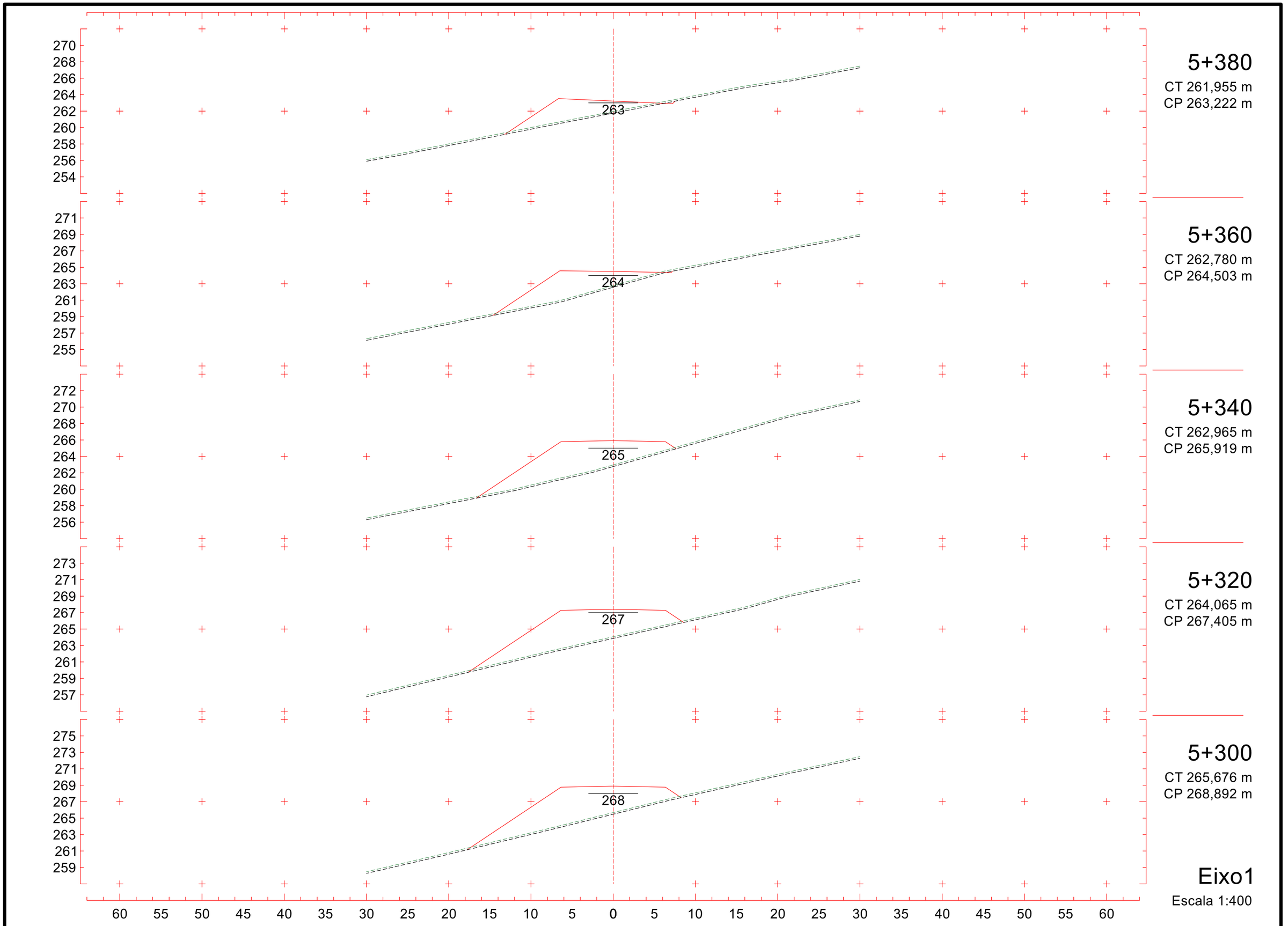

307
305
303
301
299
297
295
293
291
300
4+880
CT 297,858 m
CP 300,110 m
309
307
305
303
301
299
297
295
293
301
4+860
CT 301,645 m
CP 301,597 m
311
309
307
305
303
301
299
297
295
303
4+840
CT 303,842 m
CP 303,083 m
312
310
308
306
304
302
300
298
296
304
4+820
CT 305,304 m
CP 304,569 m
314
312
310
308
306
304
302
300
298
306
4+800
CT 306,111 m
CP 306,033 m
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
Eixo1
Escala 1:400

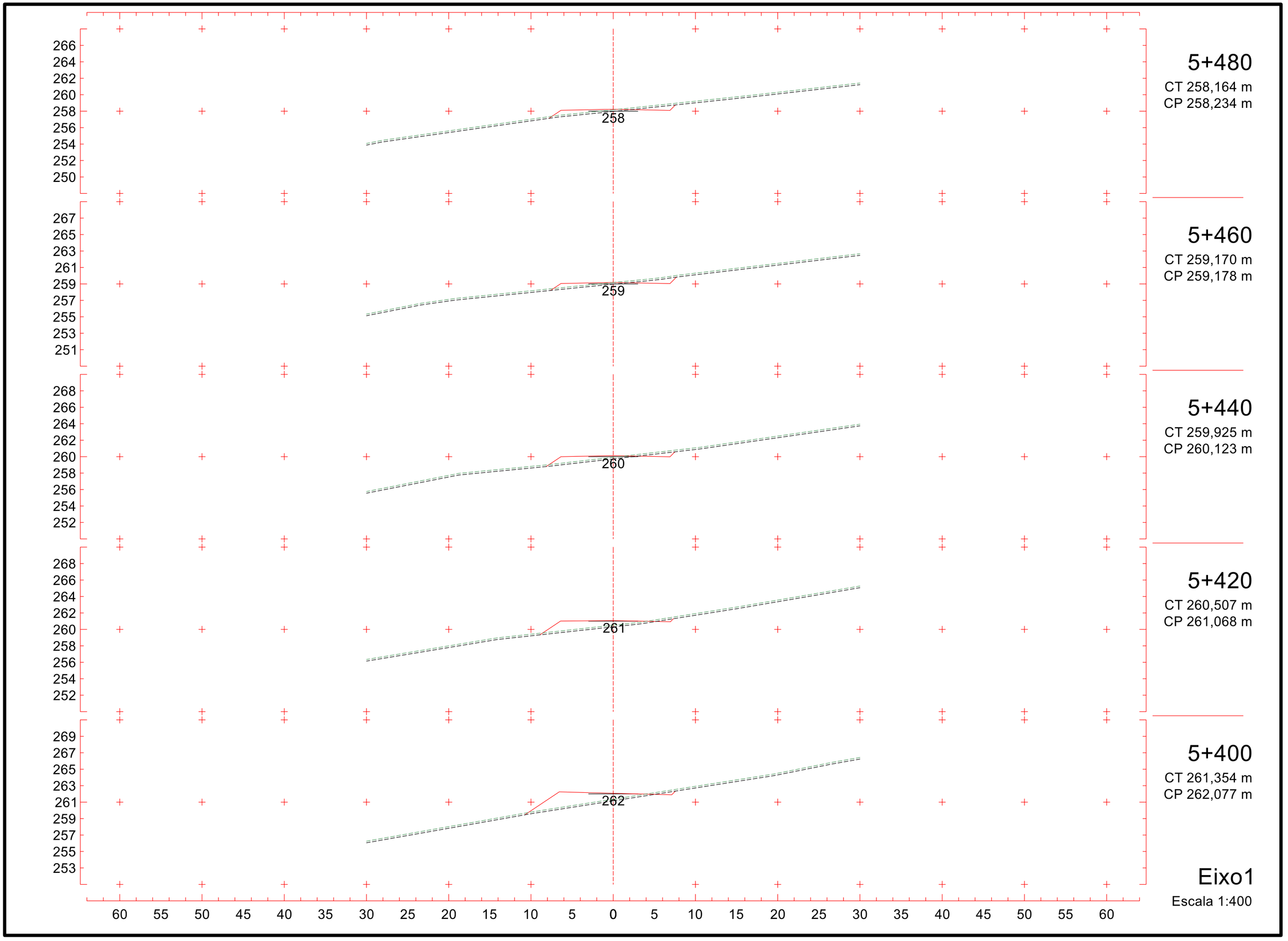

297
295
293
291
289
287
285
283
281
292
4+980
CT 283,982 m
CP 292,677 m
298
296
294
292
290
288
286
284
282
294
4+960
CT 285,207 m
CP 294,164 m
299
297
295
293
291
289
287
285
283
295
4+940
CT 286,066 m
CP 295,650 m
302
300
298
296
294
292
290
288
286
297
4+920
CT 290,026 m
CP 297,137 m
304
302
300
298
296
294
292
290
288
298
4+900
CT 293,930 m
CP 298,623 m
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
Eixo1
Escala 1:400

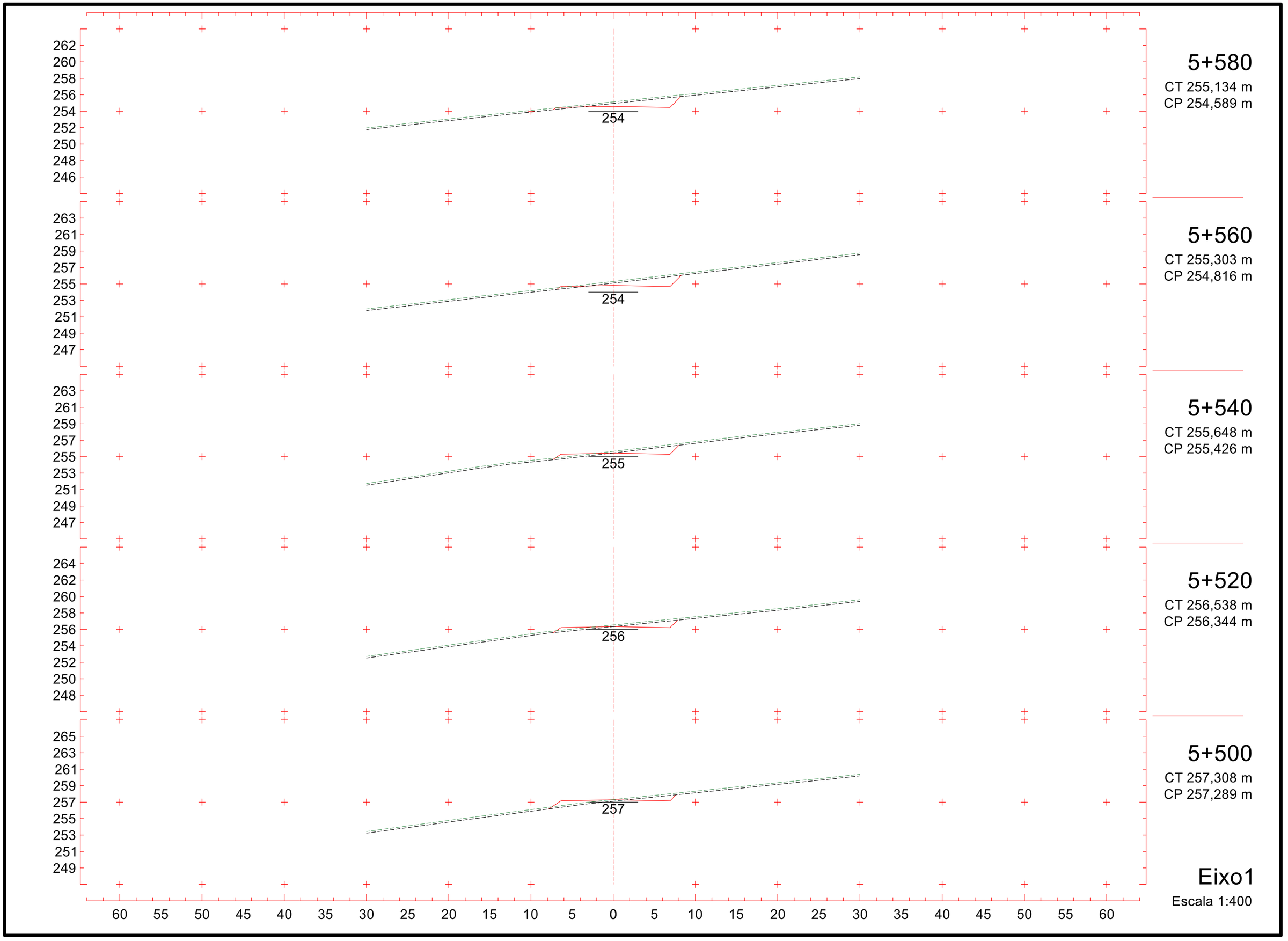

290
288
286
284
282
280
278
276
274
285
5+080
CT 276,956 m
CP 285,244 m
292
290
288
286
284
282
280
278
276
286
5+060
CT 277,499 m
CP 286,731 m
292
290
288
286
284
282
280
278
276
288
5+040
CT 278,608 m
CP 288,217 m
293
291
289
287
285
283
281
279
277
289
5+020
CT 279,209 m
CP 289,704 m
294
292
290
288
286
284
282
280
278
291
5+000
CT 281,809 m
CP 291,191 m
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
Eixo1
Escala 1:400

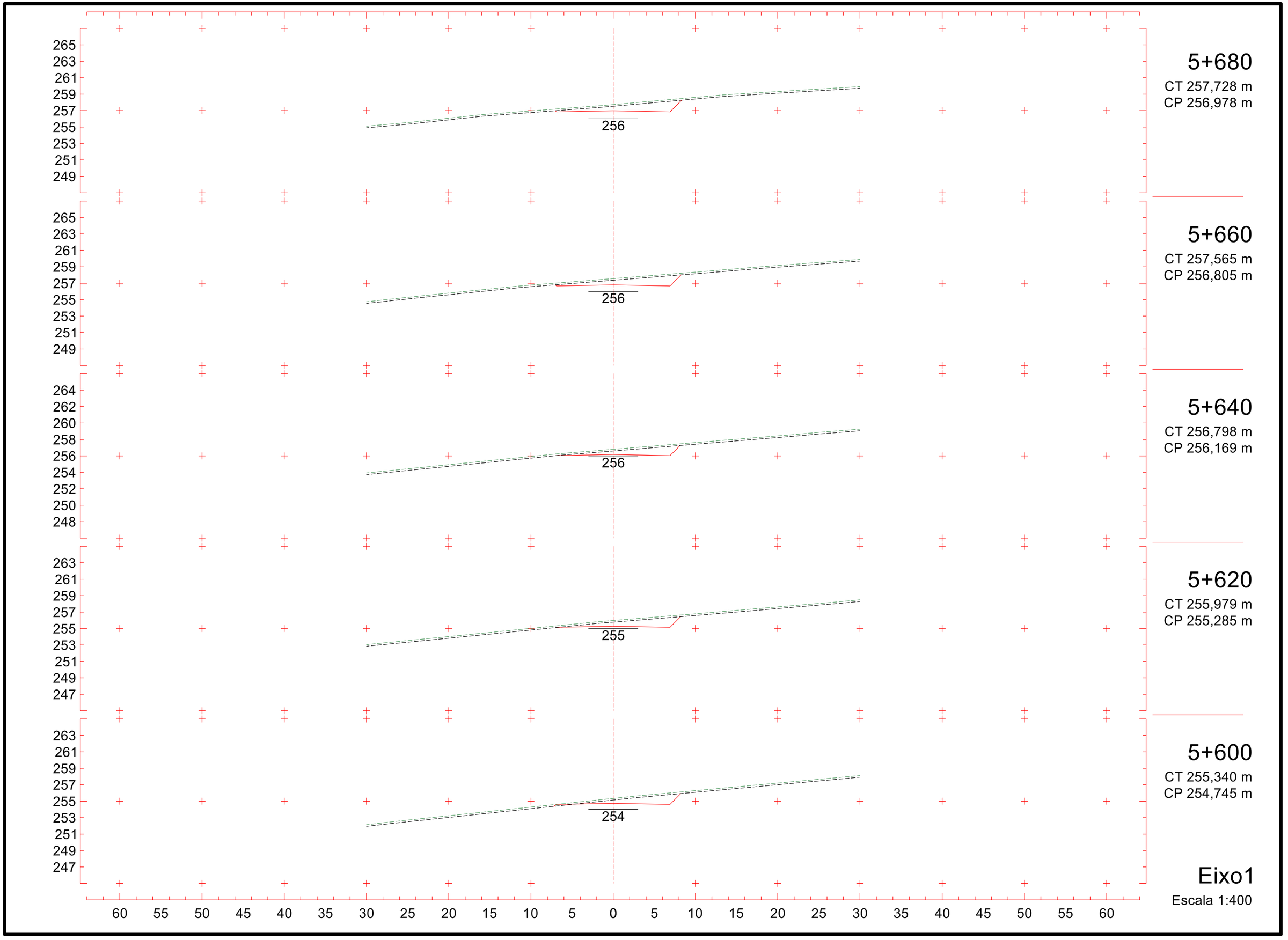

283
281
279
277
275
273
271
269
267
277
5+180
CT 275,168 m
CP 277,811 m
284
282
280
278
276
274
272
270
268
279
5+160
CT 275,934 m
CP 279,298 m
285
283
281
279
277
275
273
271
269
280
5+140
CT 277,151 m
CP 280,785 m
288
286
284
282
280
278
276
274
272
282
5+120
CT 277,770 m
CP 282,271 m
289
287
285
283
281
279
277
275
273
283
5+100
CT 276,124 m
CP 283,758 m
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
Eixo1
Escala 1:400

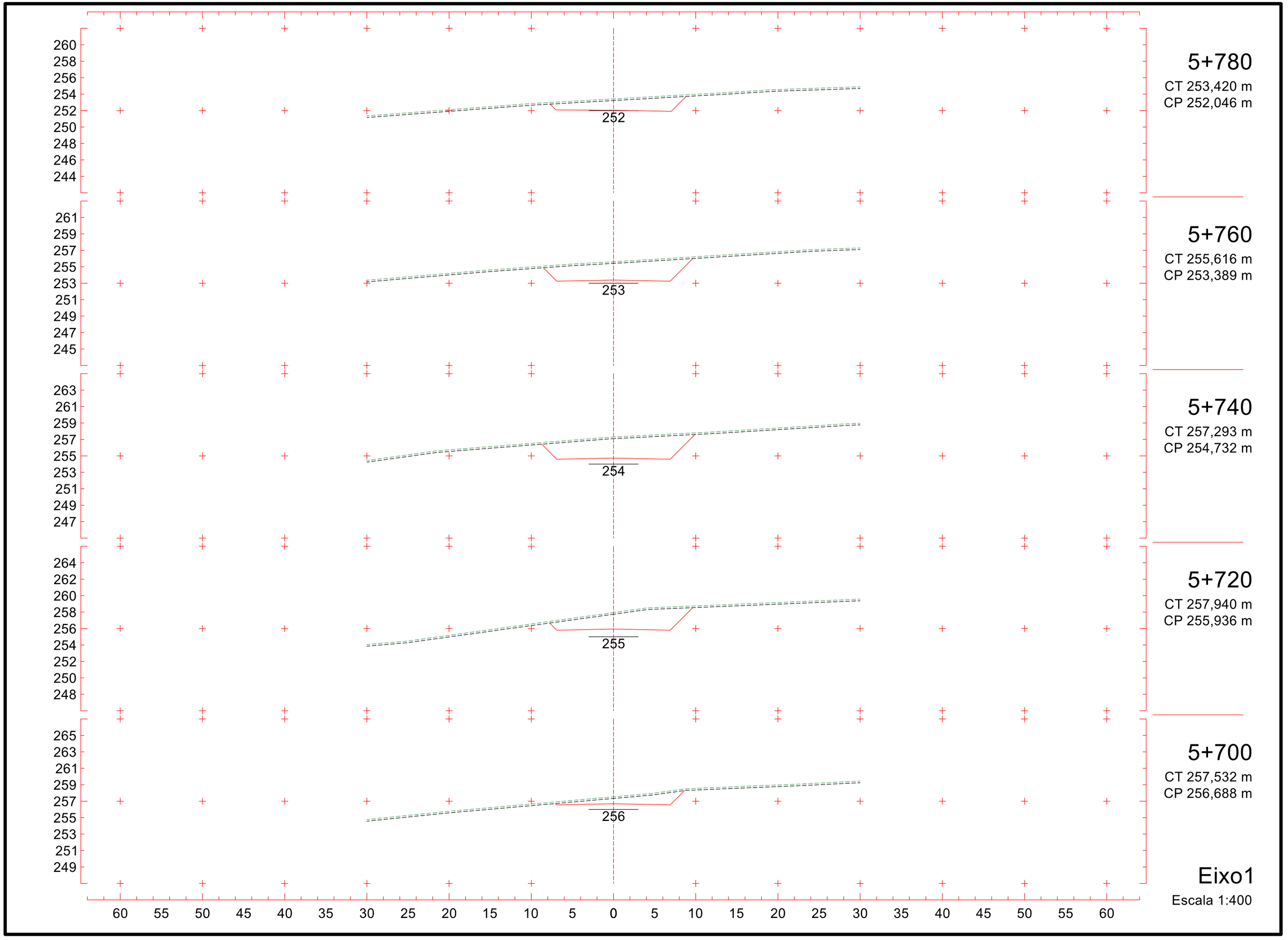

276
274
272
270
268
266
264
262
270
278
276
274
272
270
268
266
264
262
271
279
277
275
273
271
269
267
265
263
273
281
279
277
275
273
271
269
267
265
274
282
280
278
276
274
272
270
268
266
276
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
5+280
CT 267,323 m
CP 270,379 m
5+260
CT 269,304 m
CP 271,865 m
5+240
CT 270,520 m
CP 273,352 m
5+220
CT 272,354 m
CP 274,838 m
5+200
CT 274,015 m
CP 276,325 m
Eixo1
Escala 1:400

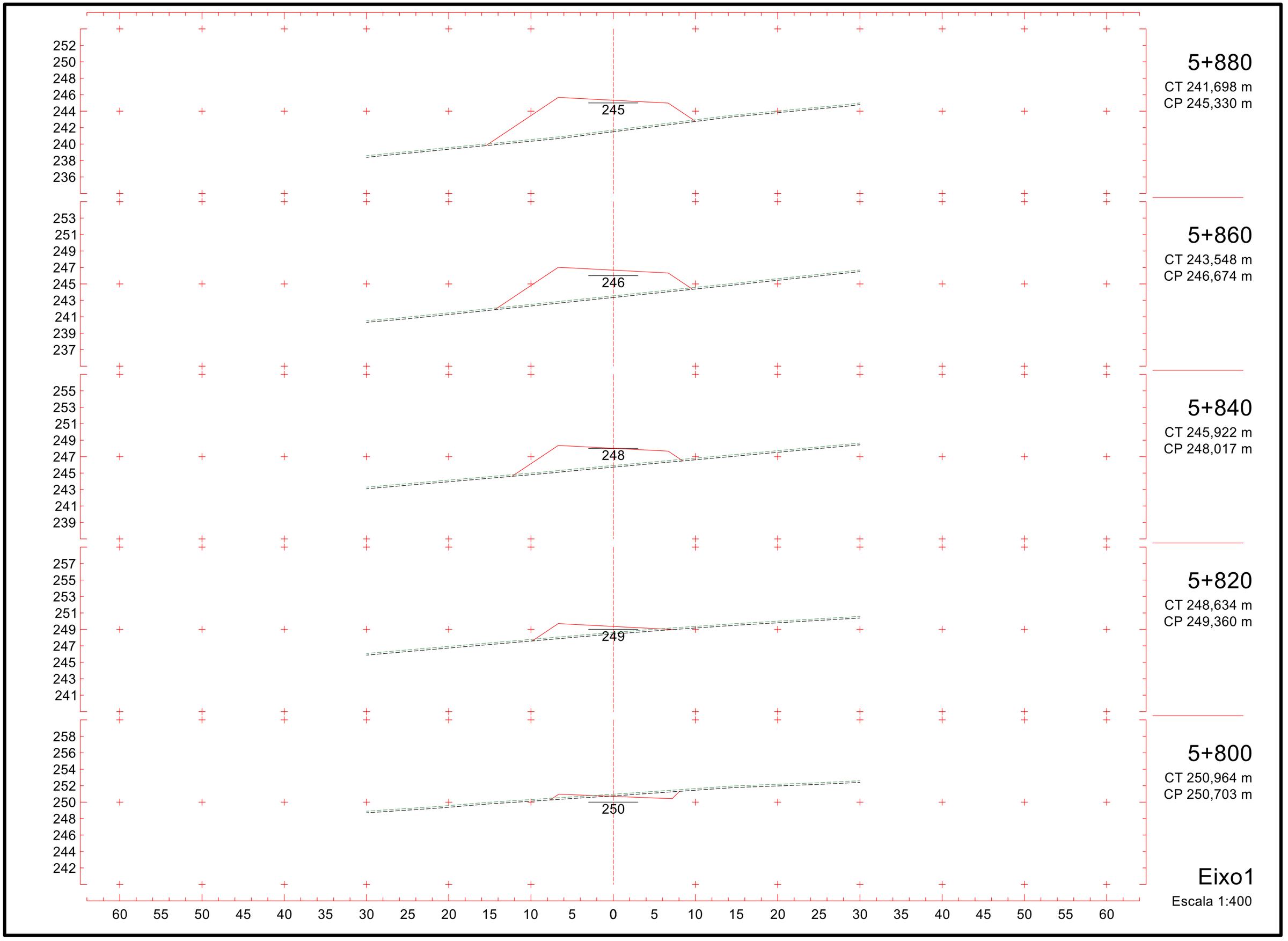

270
268
266
264
262
260
258
256
254
263
5+380
CT 261,955 m
CP 263,222 m
271
269
267
265
263
261
259
257
255
264
5+360
CT 262,780 m
CP 264,503 m
272
270
268
266
264
262
260
258
256
265
5+340
CT 262,965 m
CP 265,919 m
273
271
269
267
265
263
261
259
257
267
5+320
CT 264,065 m
CP 267,405 m
275
273
271
269
267
265
263
261
259
268
5+300
CT 265,676 m
CP 268,892 m
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
Eixo1
Escala 1:400

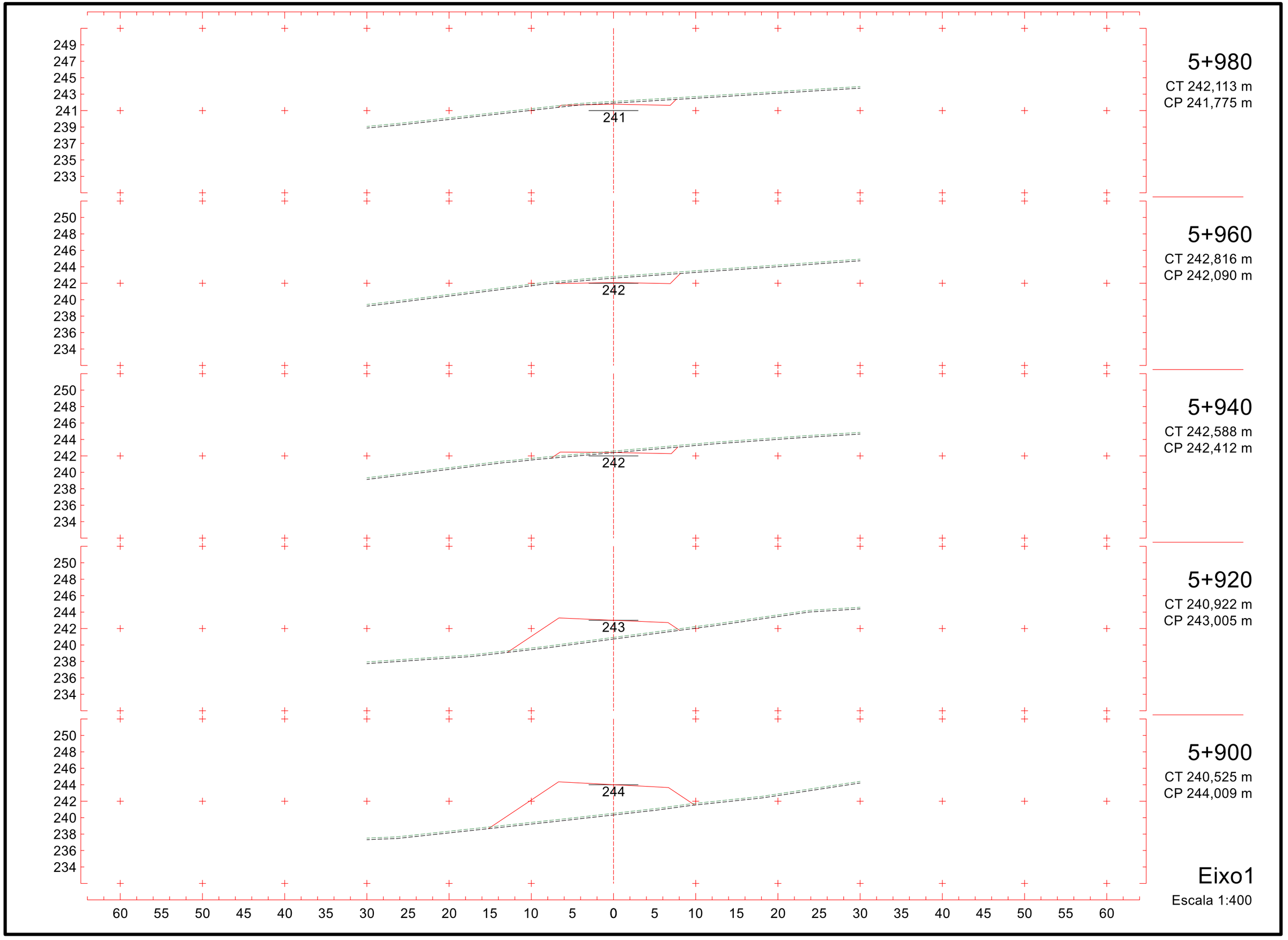

266
264
262
260
258
256
254
252
250
258
5+480
CT 258,164 m
CP 258,234 m
267
265
263
261
259
257
255
253
251
259
5+460
CT 259,170 m
CP 259,178 m
268
266
264
262
260
258
256
254
252
260
5+440
CT 259,925 m
CP 260,123 m
268
266
264
262
260
258
256
254
252
261
5+420
CT 260,507 m
CP 261,068 m
269
267
265
263
261
259
257
255
253
262
5+400
CT 261,354 m
CP 262,077 m
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
Eixo1
Escala 1:400

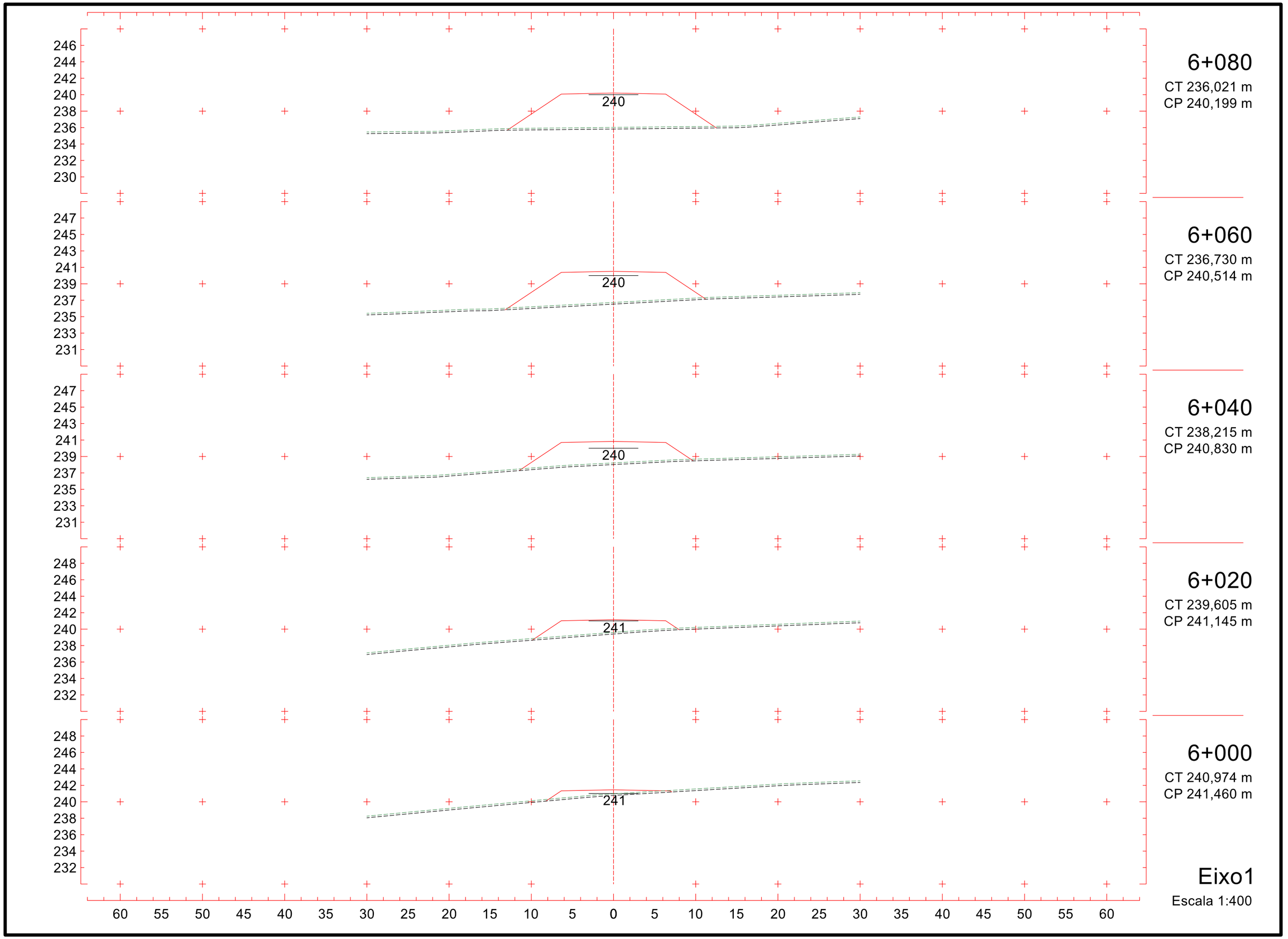

262
260
258
256
254
252
250
248
246
254
5+580
CT 255,134 m
CP 254,589 m
263
261
259
257
255
253
251
249
247
254
5+560
CT 255,303 m
CP 254,816 m
263
261
259
257
255
253
251
249
247
255
5+540
CT 255,648 m
CP 255,426 m
264
262
260
258
256
254
252
250
248
256
5+520
CT 256,538 m
CP 256,344 m
265
263
261
259
257
255
253
251
249
257
5+500
CT 257,308 m
CP 257,289 m
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
Eixo1
Escala 1:400

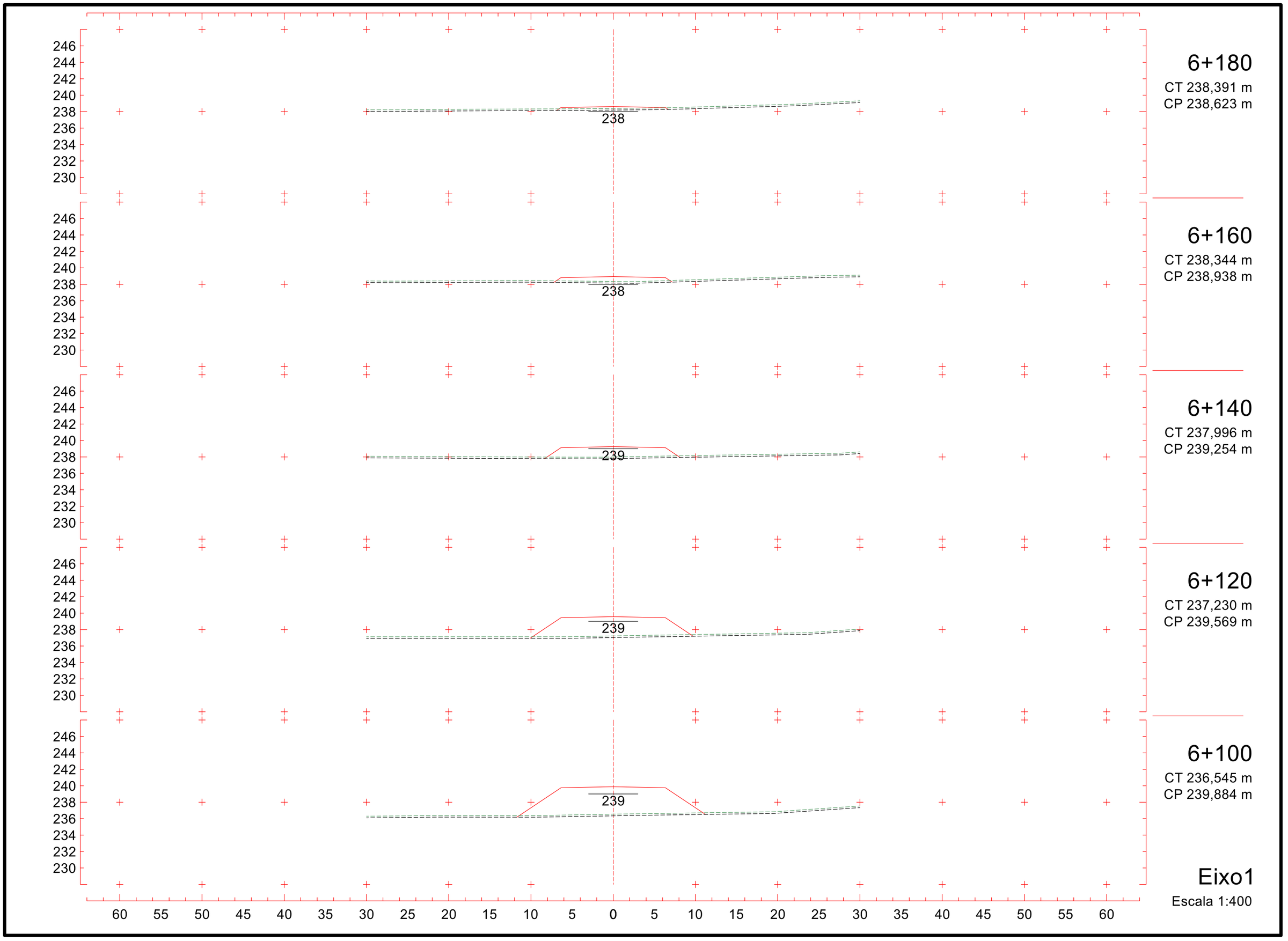

265
263
261
259
257
255
253
251
249
256
5+680
CT 257,728 m
CP 256,978 m
265
263
261
259
257
255
253
251
249
256
5+660
CT 257,565 m
CP 256,805 m
264
262
260
258
256
254
252
250
248
256
5+640
CT 256,798 m
CP 256,169 m
263
261
259
257
255
253
251
249
247
255
5+620
CT 255,979 m
CP 255,285 m
263
261
259
257
255
253
251
249
247
254
5+600
CT 255,340 m
CP 254,745 m
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
Eixo1
Escala 1:400

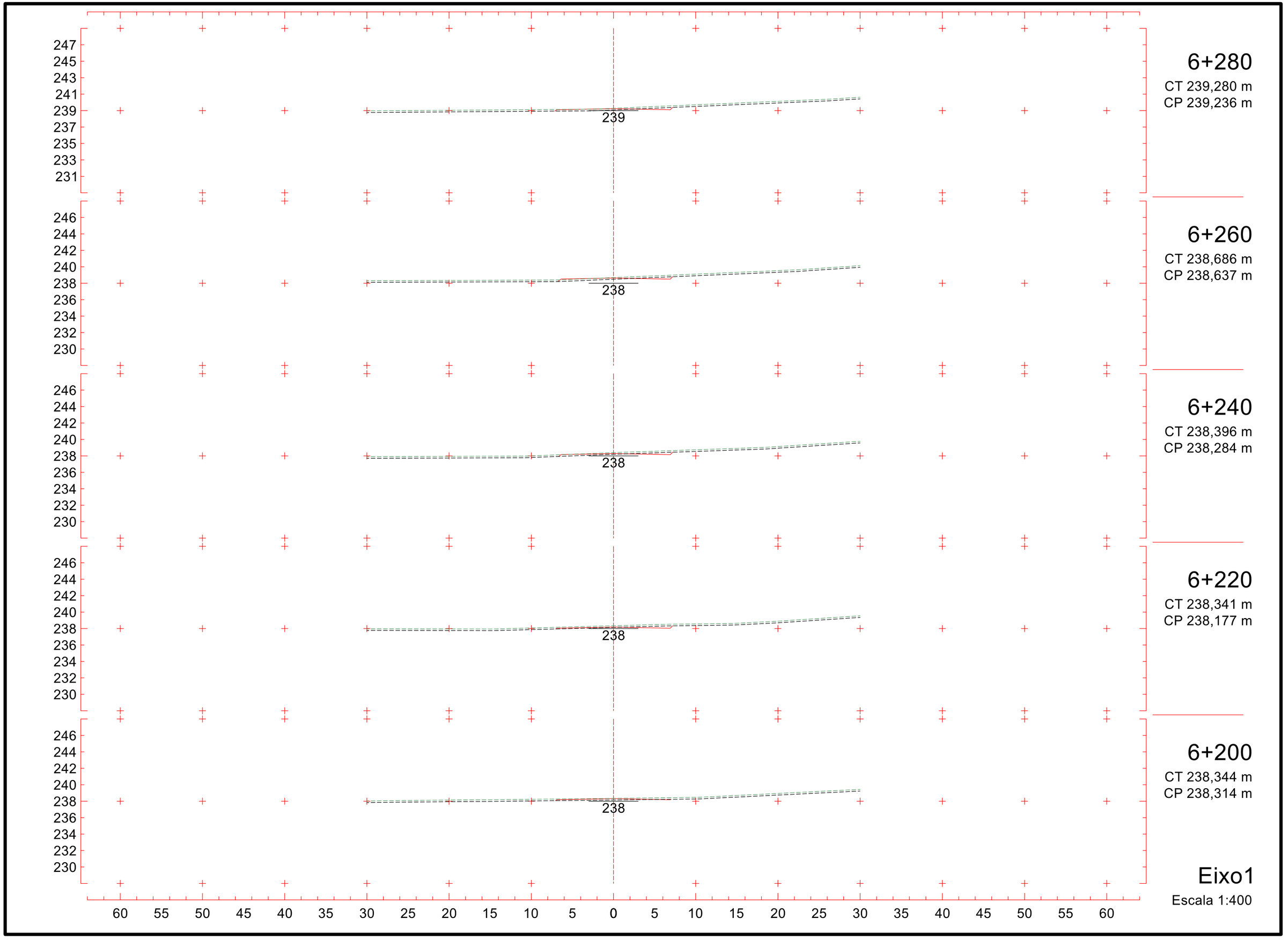

260
258
256
254
252
250
248
246
244
252
5+780
CT 253,420 m
CP 252,046 m
261
259
257
255
253
251
249
247
245
253
5+760
CT 255,616 m
CP 253,389 m
263
261
259
257
255
253
251
249
247
254
5+740
CT 257,293 m
CP 254,732 m
264
262
260
258
256
254
252
250
248
255
5+720
CT 257,940 m
CP 255,936 m
265
263
261
259
257
255
253
251
249
256
5+700
CT 257,532 m
CP 256,688 m
Eixo1
Escala 1:400
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

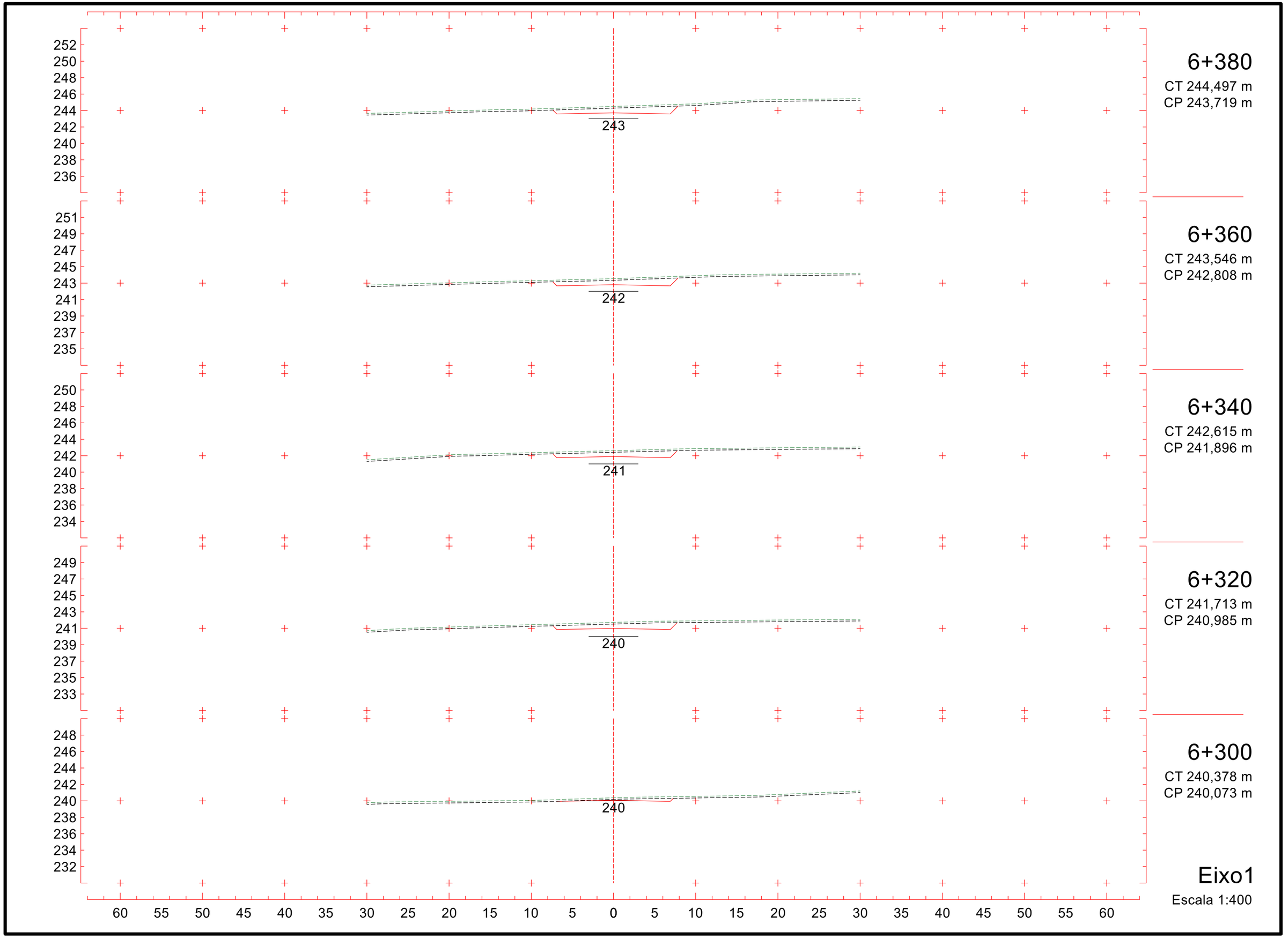

252 250 248 246 244 242 240 238 236
245
253 251 249 247 245 243 241 239 237
246
255 253 251 249 247 245 243 241 239
248
257 255 253 251 249 247 245 243 241
249
258 256 254 252 250 248 246 244 242
250
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
5+880
CT 241,698 m
CP 245,330 m
5+860
CT 243,548 m
CP 246,674 m
5+840
CT 245,922 m
CP 248,017 m
5+820
CT 248,634 m
CP 249,360 m
5+800
CT 250,964 m
CP 250,703 m
Eixo1
Escala 1:400

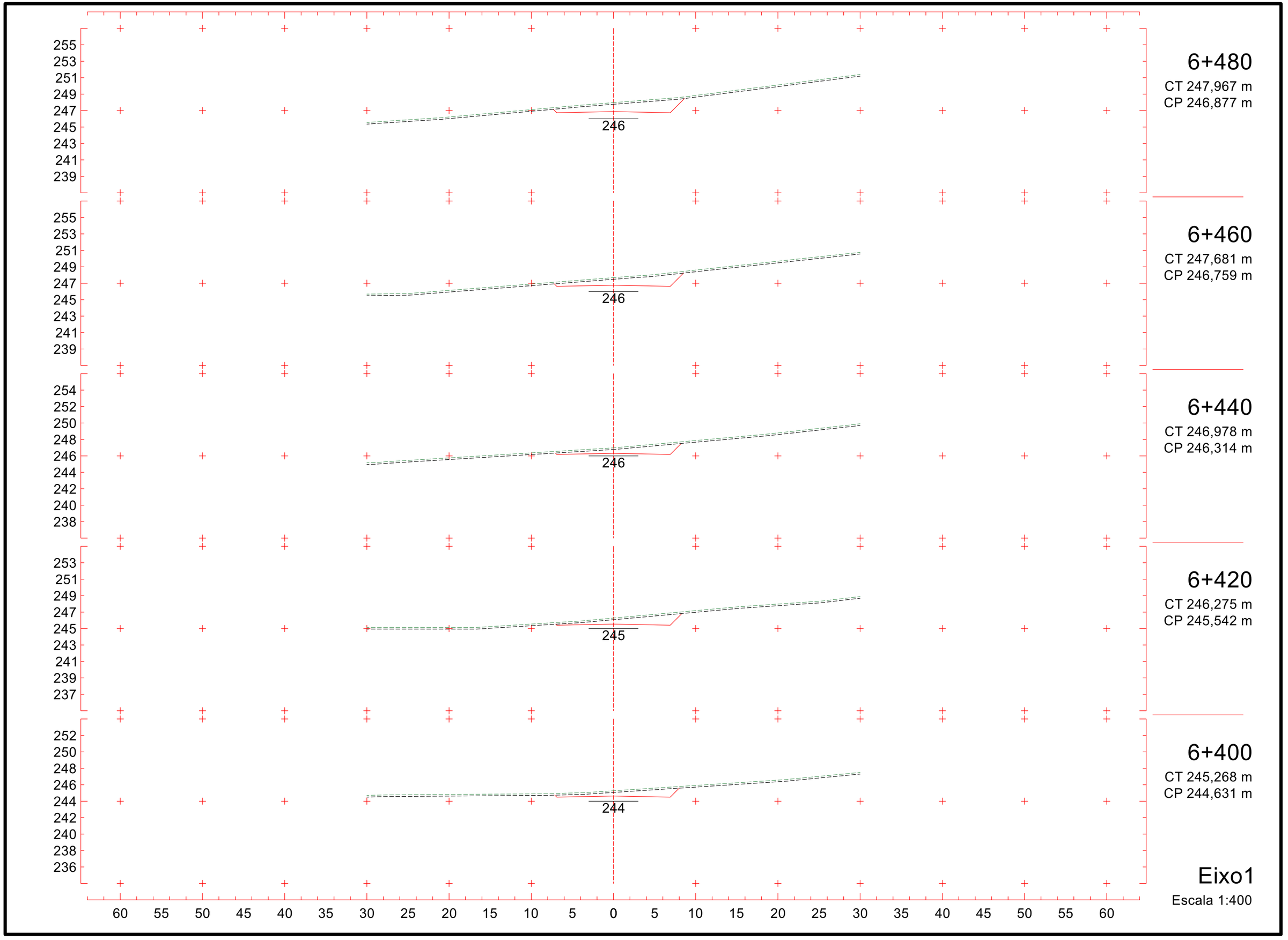

249
247
245
243
241
239
237
235
233
241
5+980
CT 242,113 m
CP 241,775 m
250
248
246
244
242
240
238
236
234
242
5+960
CT 242,816 m
CP 242,090 m
250
248
246
244
242
240
238
236
234
242
5+940
CT 242,588 m
CP 242,412 m
250
248
246
244
242
240
238
236
234
243
5+920
CT 240,922 m
CP 243,005 m
250
248
246
244
242
240
238
236
234
244
5+900
CT 240,525 m
CP 244,009 m
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
Eixo1
Escala 1:400

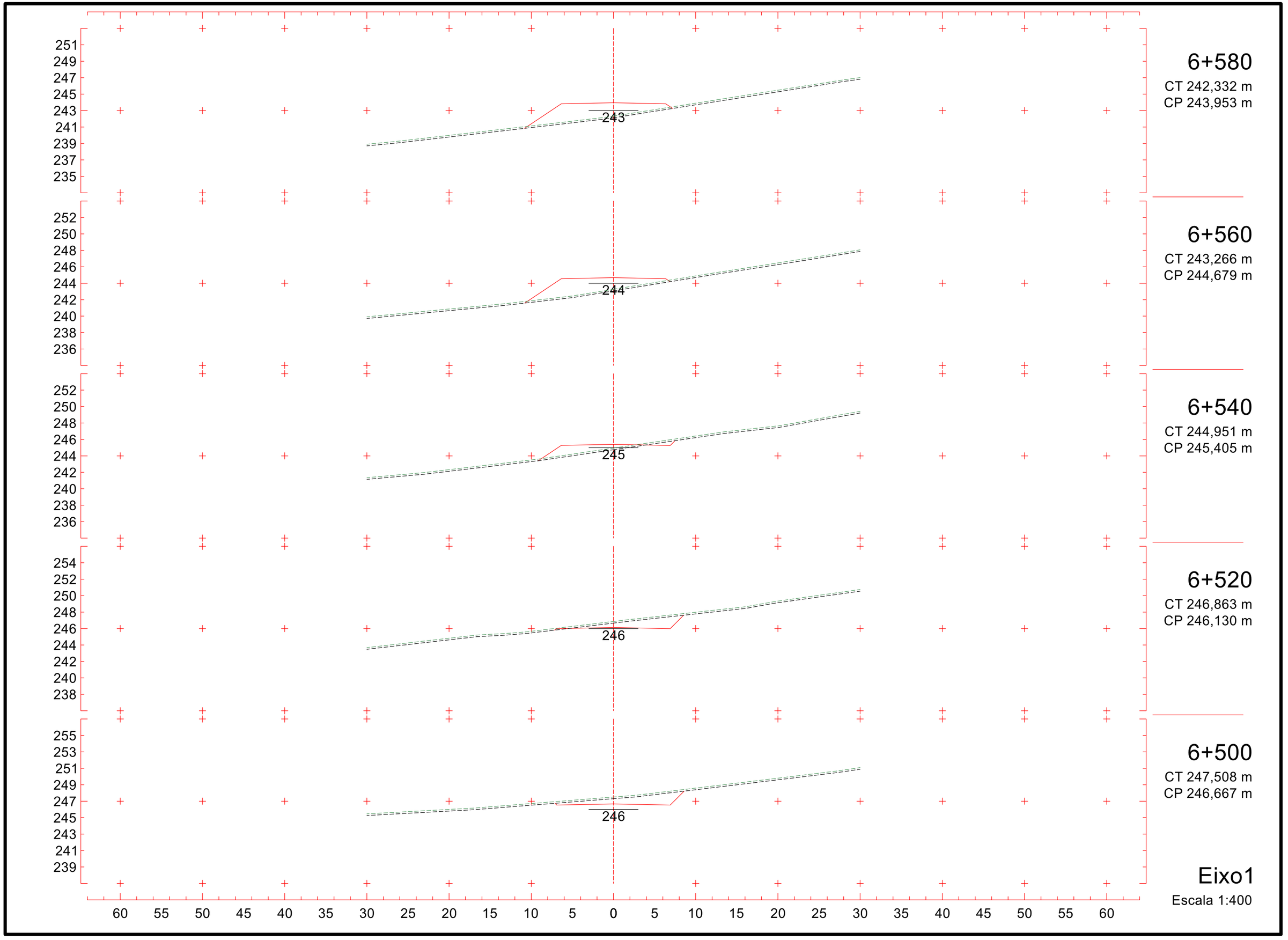

246
244
242
240
238
236
234
232
230
240
6+080
CT 236,021 m
CP 240,199 m
247
245
243
241
239
237
235
233
231
240
6+060
CT 236,730 m
CP 240,514 m
247
245
243
241
239
237
235
233
231
240
6+040
CT 238,215 m
CP 240,830 m
248
246
244
242
240
238
236
234
232
241
6+020
CT 239,605 m
CP 241,145 m
248
246
244
242
240
238
236
234
232
241
6+000
CT 240,974 m
CP 241,460 m
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
Eixo1
Escala 1:400

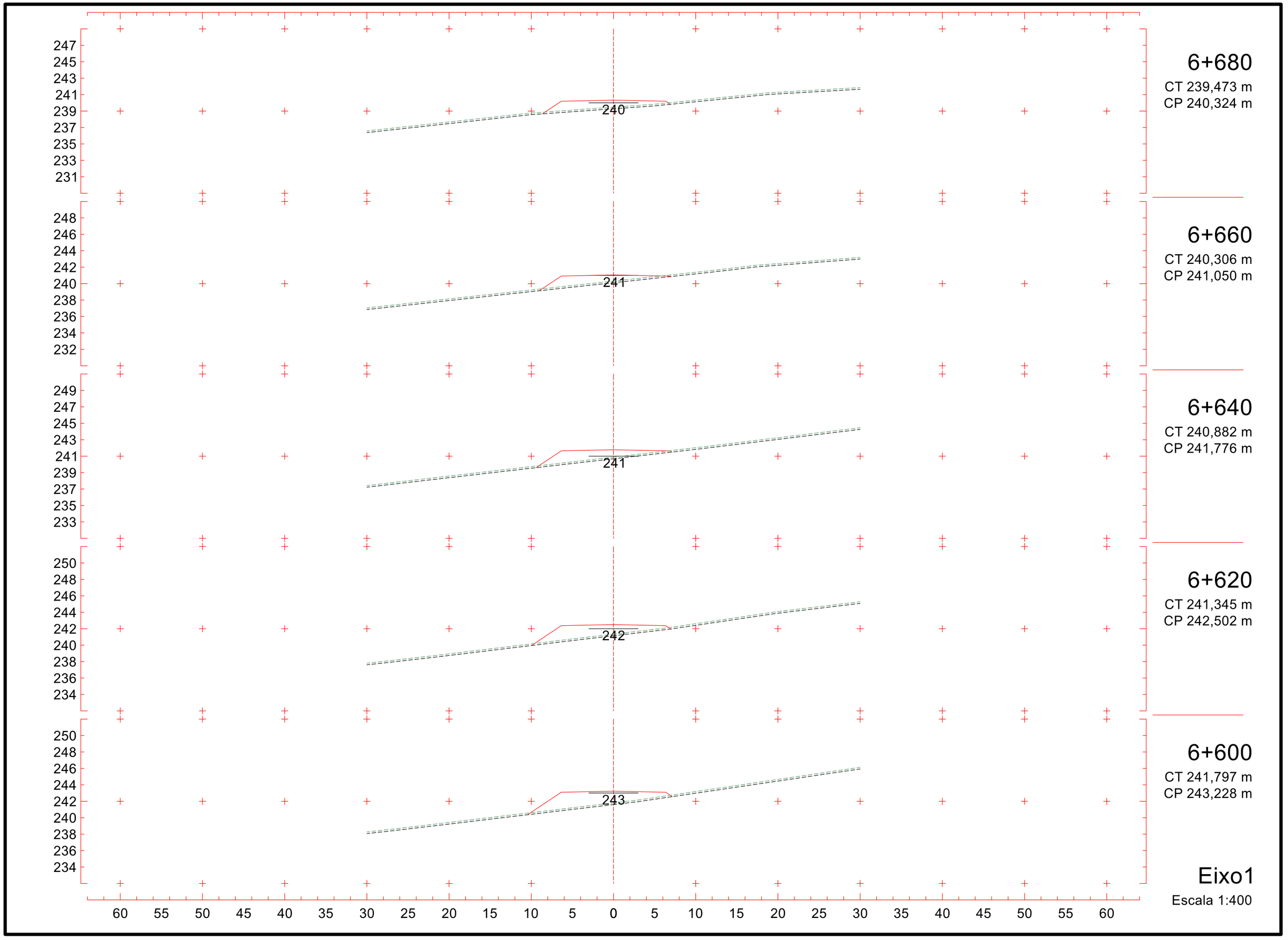

246
244
242
240
238
236
234
232
230
238
6+180
CT 238,391 m
CP 238,623 m
239
6+160
CT 238,344 m
CP 238,938 m
239
6+140
CT 237,996 m
CP 239,254 m
239
6+120
CT 237,230 m
CP 239,569 m
239
6+100
CT 236,545 m
CP 239,884 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

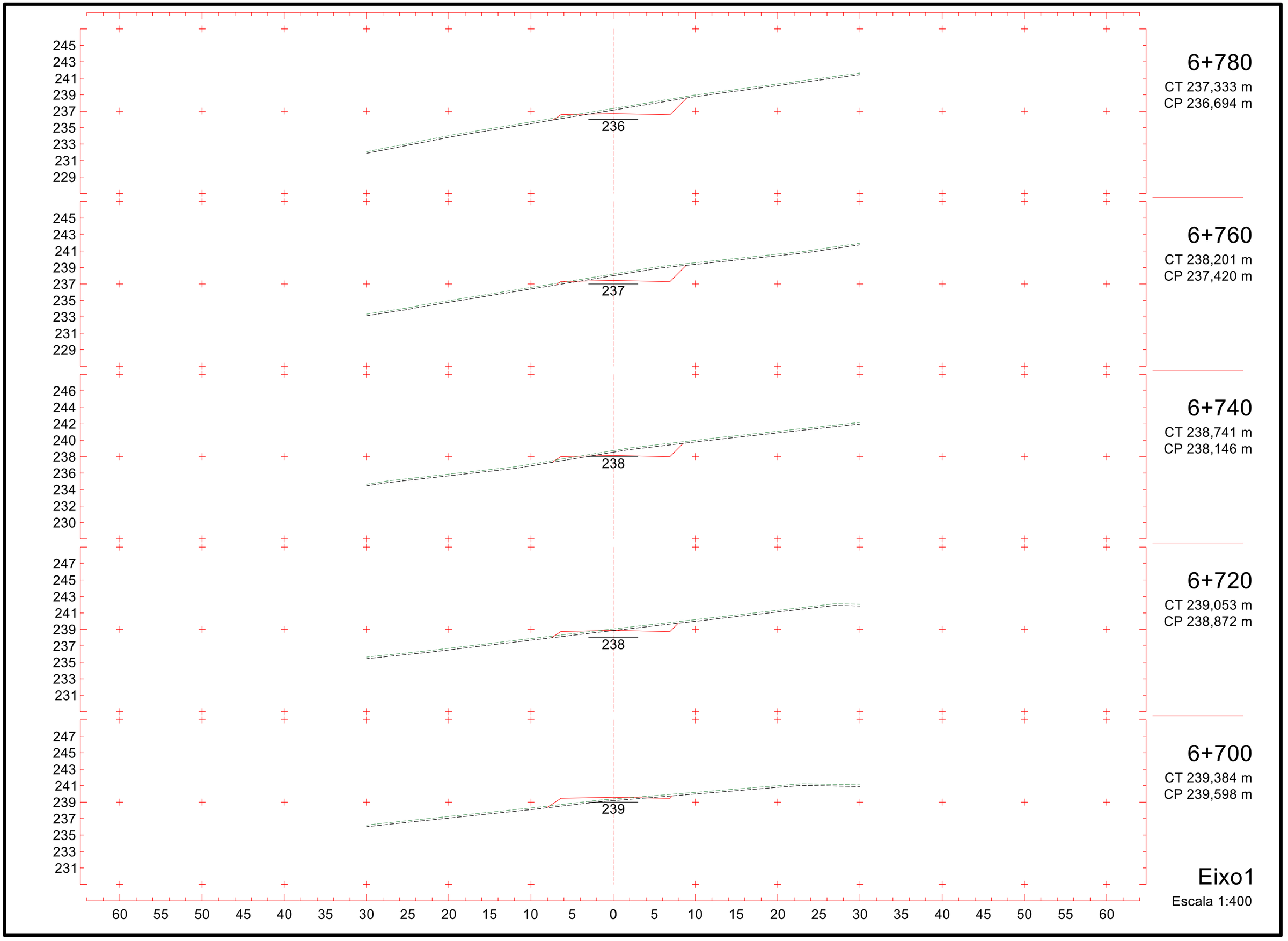

247
245
243
241
239
237
235
233
231
239
6+280
CT 239,280 m
CP 239,236 m
246
244
242
240
238
236
234
232
230
238
6+260
CT 238,686 m
CP 238,637 m
246
244
242
240
238
236
234
232
230
238
6+240
CT 238,396 m
CP 238,284 m
246
244
242
240
238
236
234
232
230
238
6+220
CT 238,341 m
CP 238,177 m
246
244
242
240
238
236
234
232
230
238
6+200
CT 238,344 m
CP 238,314 m
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
Eixo1
Escala 1:400

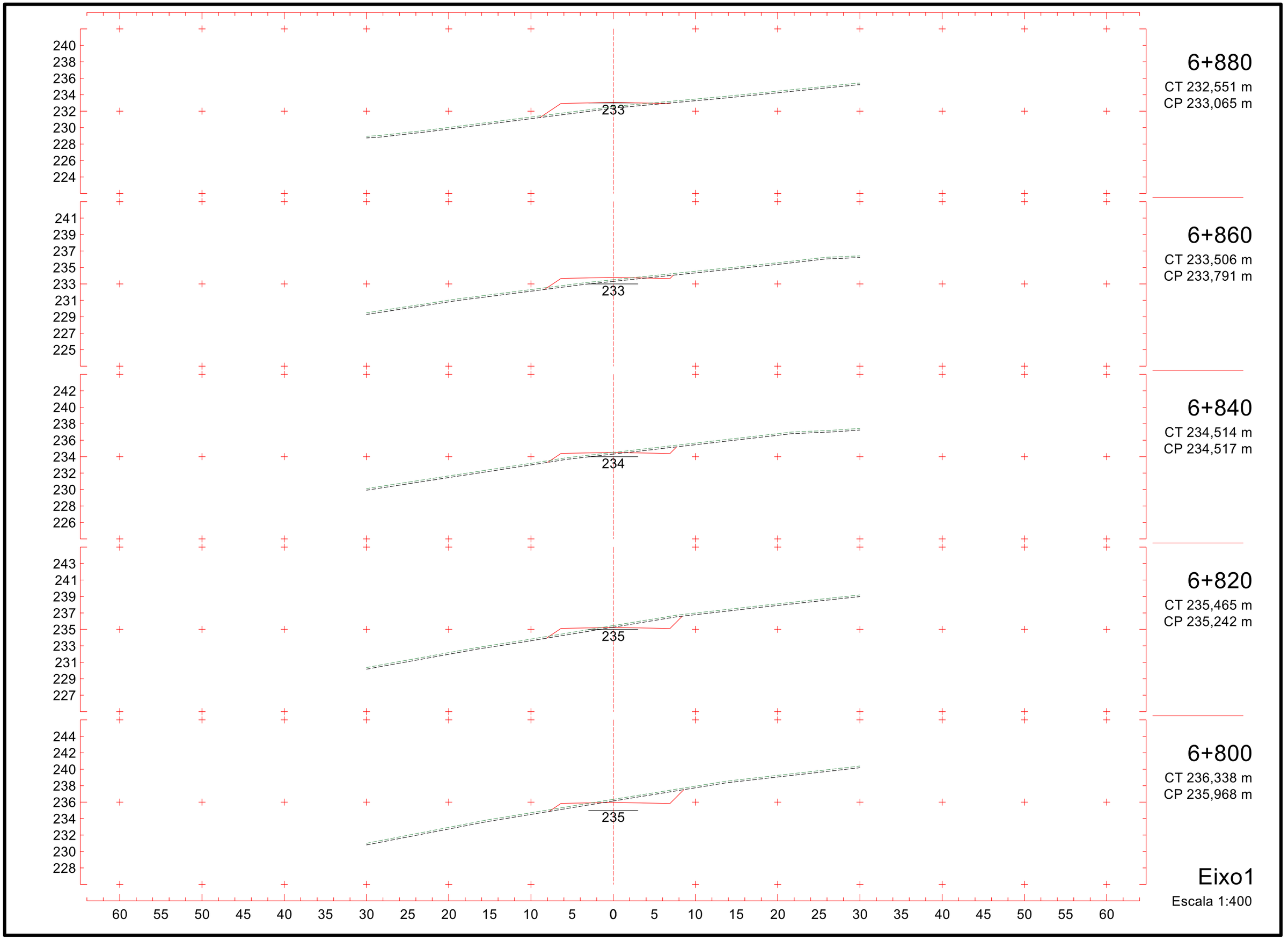

252
250
248
246
244
242
240
238
236
243
6+380
CT 244,497 m
CP 243,719 m
251
249
247
245
243
241
239
237
235
242
6+360
CT 243,546 m
CP 242,808 m
250
248
246
244
242
240
238
236
234
241
6+340
CT 242,615 m
CP 241,896 m
249
247
245
243
241
239
237
235
233
240
6+320
CT 241,713 m
CP 240,985 m
248
246
244
242
240
238
236
234
232
240
6+300
CT 240,378 m
CP 240,073 m
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
Eixo1
Escala 1:400

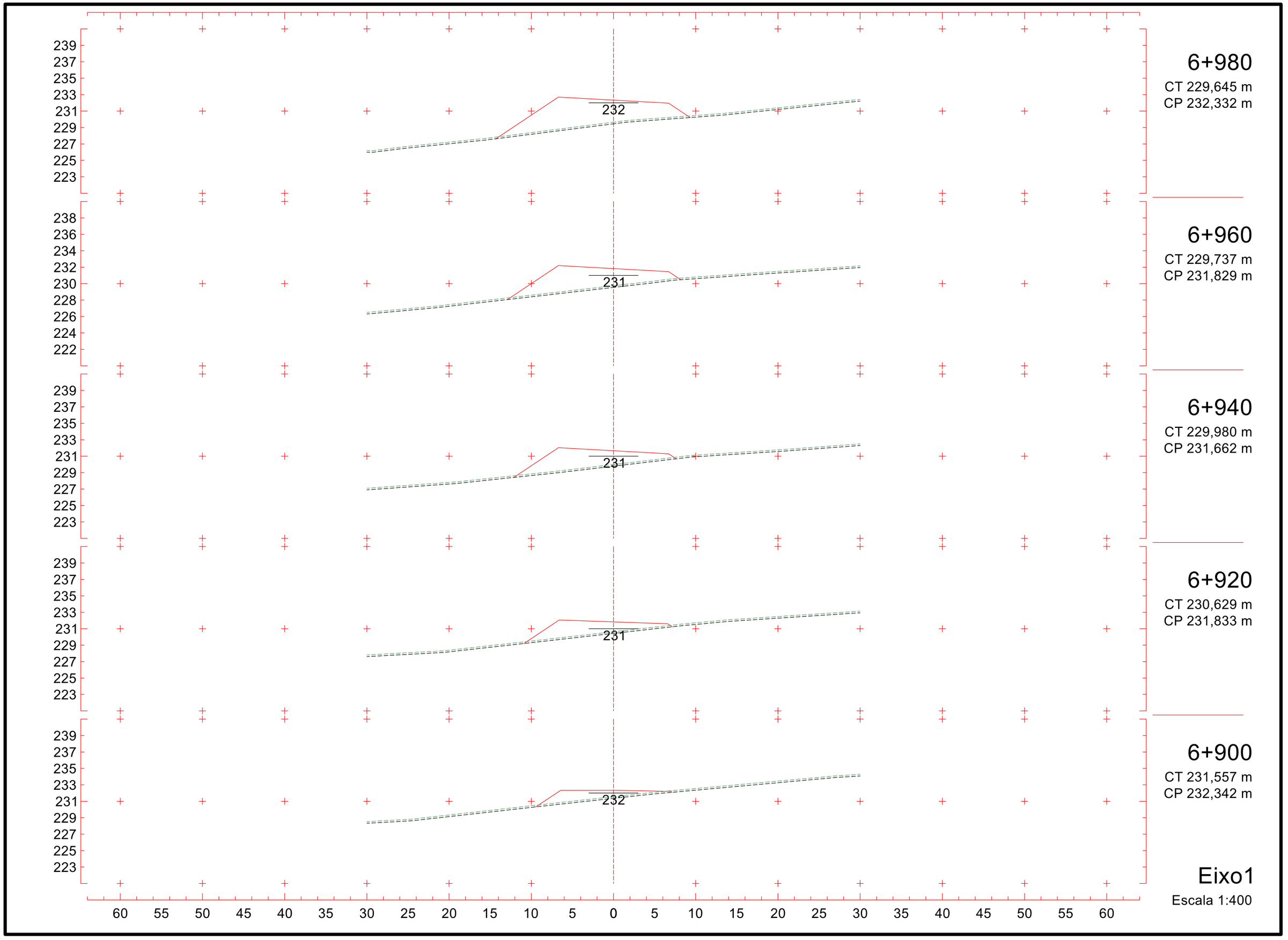

255
253
251
249
247
245
243
241
239
246
6+480
CT 247,967 m
CP 246,877 m
255
253
251
249
247
245
243
241
239
246
6+460
CT 247,681 m
CP 246,759 m
254
252
250
248
246
244
242
240
238
246
6+440
CT 246,978 m
CP 246,314 m
253
251
249
247
245
243
241
239
237
245
6+420
CT 246,275 m
CP 245,542 m
252
250
248
246
244
242
240
238
236
244
6+400
CT 245,268 m
CP 244,631 m
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
Eixo1
Escala 1:400

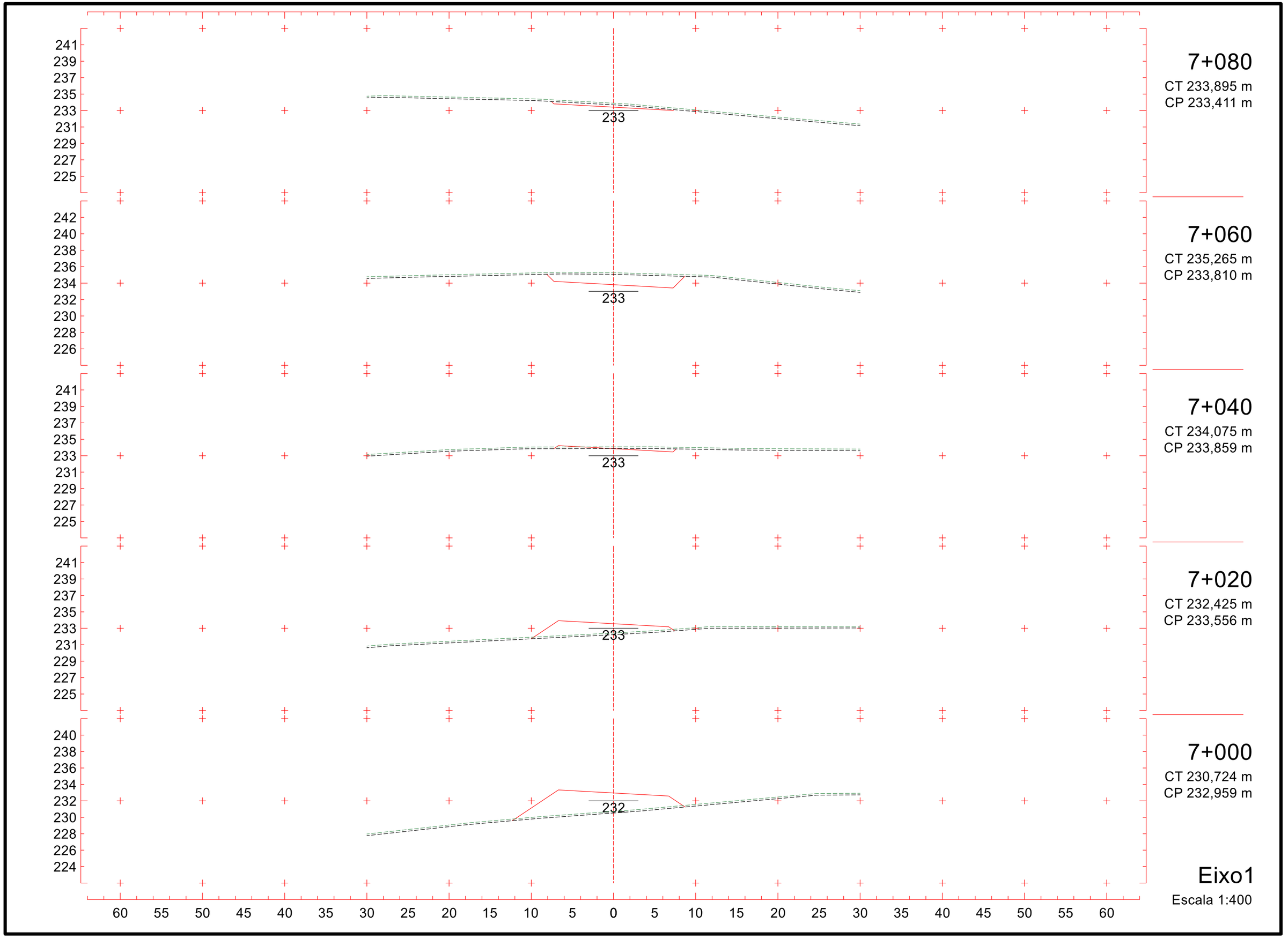

251
249
247
245
243
241
239
237
235
243
6+580
CT 242,332 m
CP 243,953 m
252
250
248
246
244
242
240
238
236
244
6+560
CT 243,266 m
CP 244,679 m
252
250
248
246
244
242
240
238
236
245
6+540
CT 244,951 m
CP 245,405 m
254
252
250
248
246
244
242
240
238
246
6+520
CT 246,863 m
CP 246,130 m
255
253
251
249
247
245
243
241
239
246
6+500
CT 247,508 m
CP 246,667 m
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
Eixo1
Escala 1:400

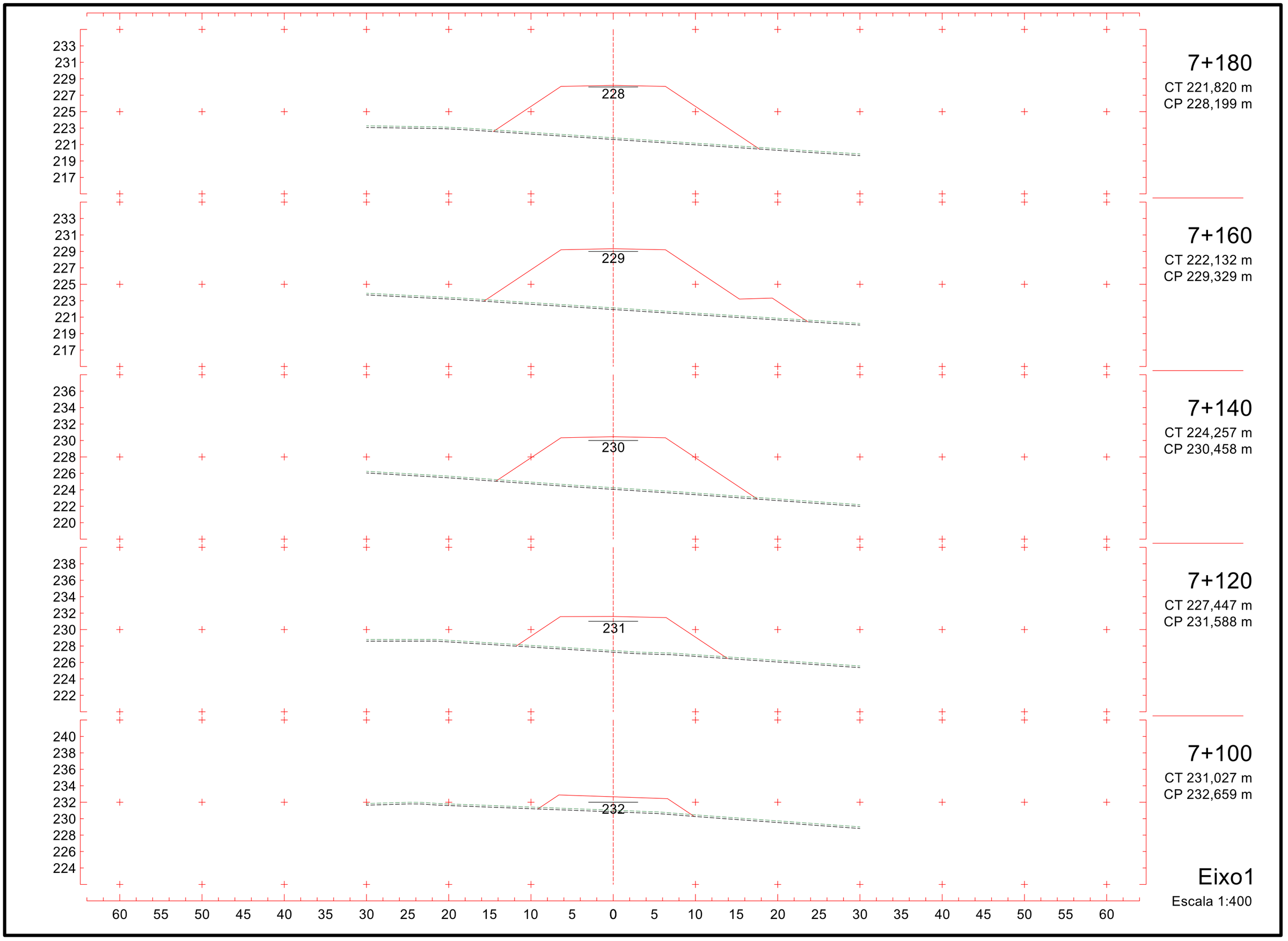

247
245
243
241
239
237
235
233
231
240
6+680
CT 239,473 m
CP 240,324 m
248
246
244
242
240
238
236
234
232
241
6+660
CT 240,306 m
CP 241,050 m
249
247
245
243
241
239
237
235
233
241
6+640
CT 240,882 m
CP 241,776 m
250
248
246
244
242
240
238
236
234
242
6+620
CT 241,345 m
CP 242,502 m
250
248
246
244
242
240
238
236
234
243
6+600
CT 241,797 m
CP 243,228 m
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
Eixo1
Escala 1:400

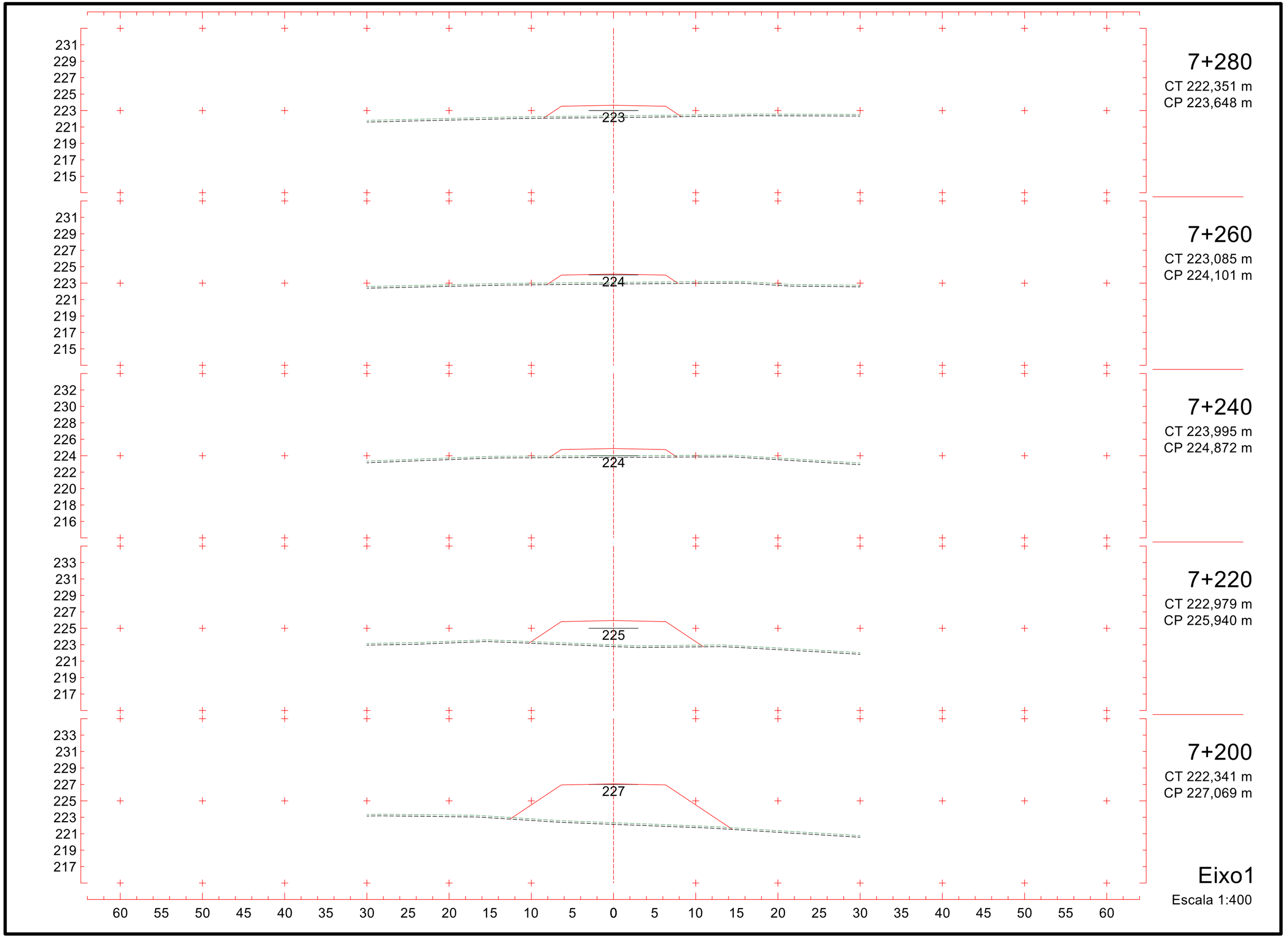

245
243
241
239
237
235
233
231
229
236
6+780
CT 237,333 m
CP 236,694 m
245
243
241
239
237
235
233
231
229
237
6+760
CT 238,201 m
CP 237,420 m
246
244
242
240
238
236
234
232
230
238
6+740
CT 238,741 m
CP 238,146 m
247
245
243
241
239
237
235
233
231
238
6+720
CT 239,053 m
CP 238,872 m
247
245
243
241
239
237
235
233
231
239
6+700
CT 239,384 m
CP 239,598 m
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
Eixo1
Escala 1:400

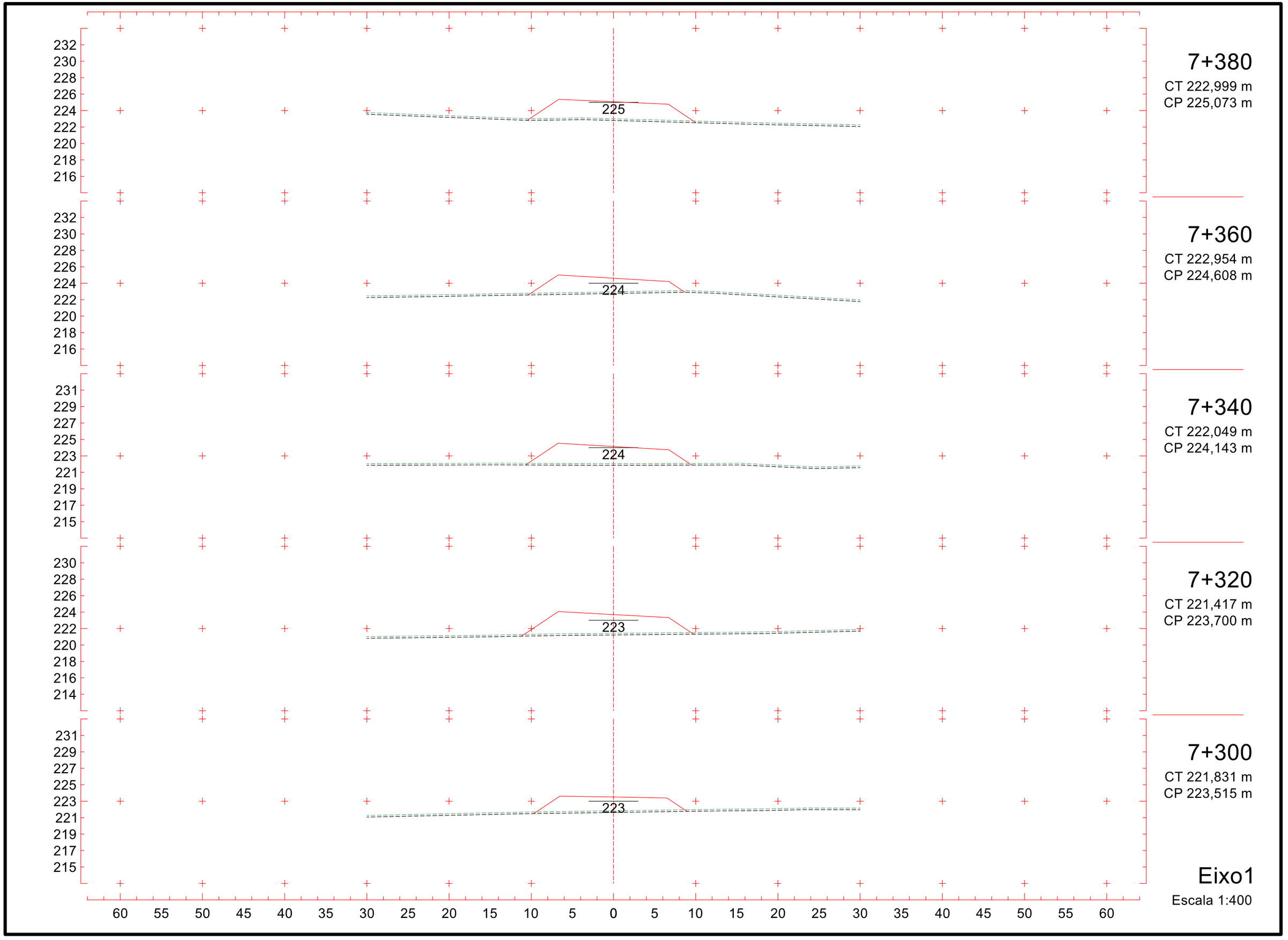

240 238 236 234 232 230 228 226 224
233
6+880
CT 232,551 m
CP 233,065 m
241 239 237 235 233 231 229 227 225
233
6+860
CT 233,506 m
CP 233,791 m
242 240 238 236 234 232 230 228 226
234
6+840
CT 234,514 m
CP 234,517 m
243 241 239 237 235 233 231 229 227
235
6+820
CT 235,465 m
CP 235,242 m
244 242 240 238 236 234 232 230 228
235
6+800
CT 236,338 m
CP 235,968 m
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
Eixo1
Escala 1:400

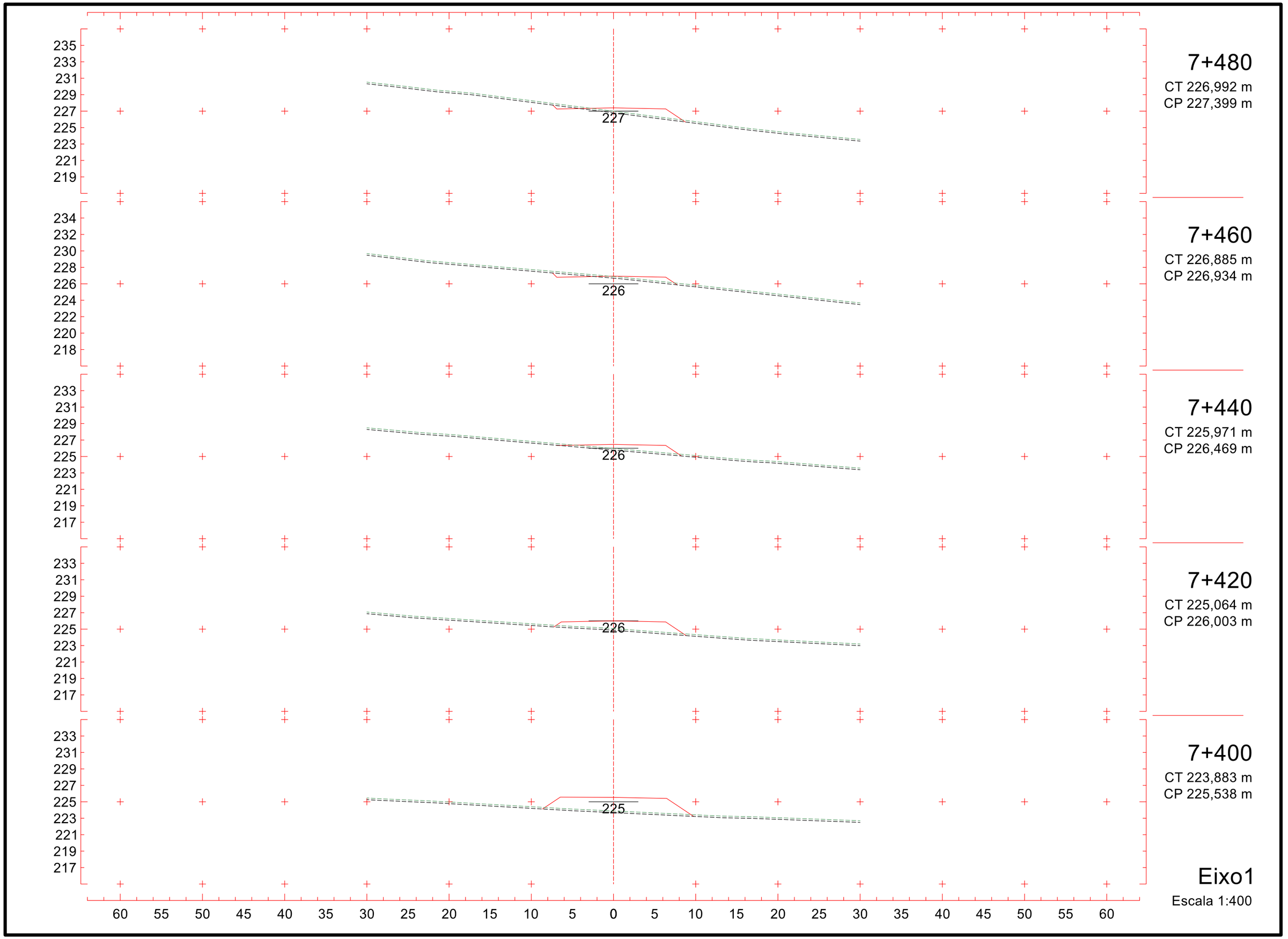

239
237
235
233
231
229
227
225
223
232
6+980
CT 229,645 m
CP 232,332 m
238
236
234
232
230
228
226
224
222
231
6+960
CT 229,737 m
CP 231,829 m
239
237
235
233
231
229
227
225
223
231
6+940
CT 229,980 m
CP 231,662 m
239
237
235
233
231
229
227
225
223
231
6+920
CT 230,629 m
CP 231,833 m
239
237
235
233
231
229
227
225
223
232
6+900
CT 231,557 m
CP 232,342 m
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
Eixo1
Escala 1:400

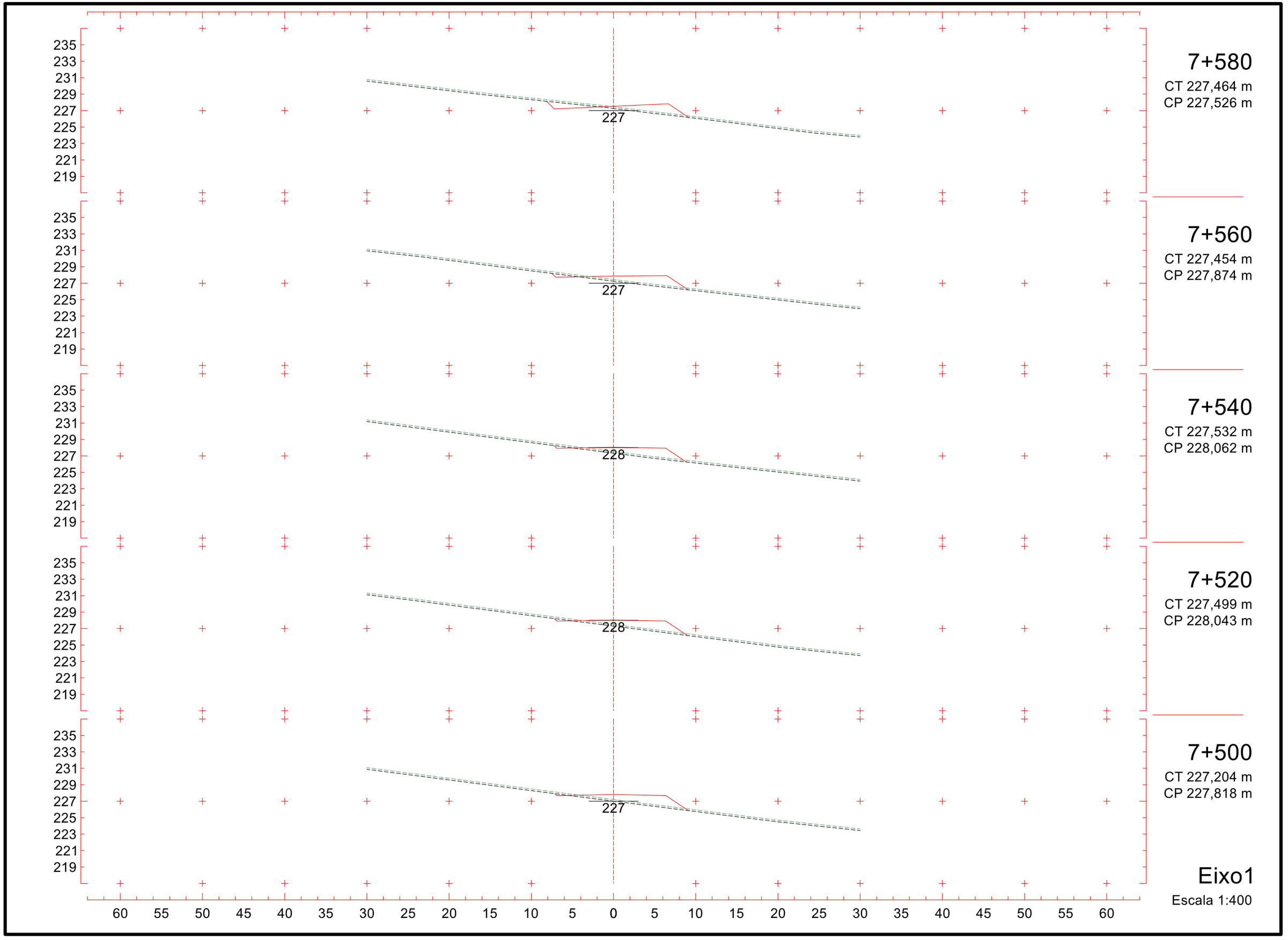

241
239
237
235
233
231
229
227
225
233
7+080
CT 233,895 m
CP 233,411 m
242
240
238
236
234
232
230
228
226
233
7+060
CT 235,265 m
CP 233,810 m
241
239
237
235
233
231
229
227
225
233
7+040
CT 234,075 m
CP 233,859 m
241
239
237
235
233
231
229
227
225
233
7+020
CT 232,425 m
CP 233,556 m
240
238
236
234
232
230
228
226
224
232
7+000
CT 230,724 m
CP 232,959 m
Eixo1
Escala 1:400
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

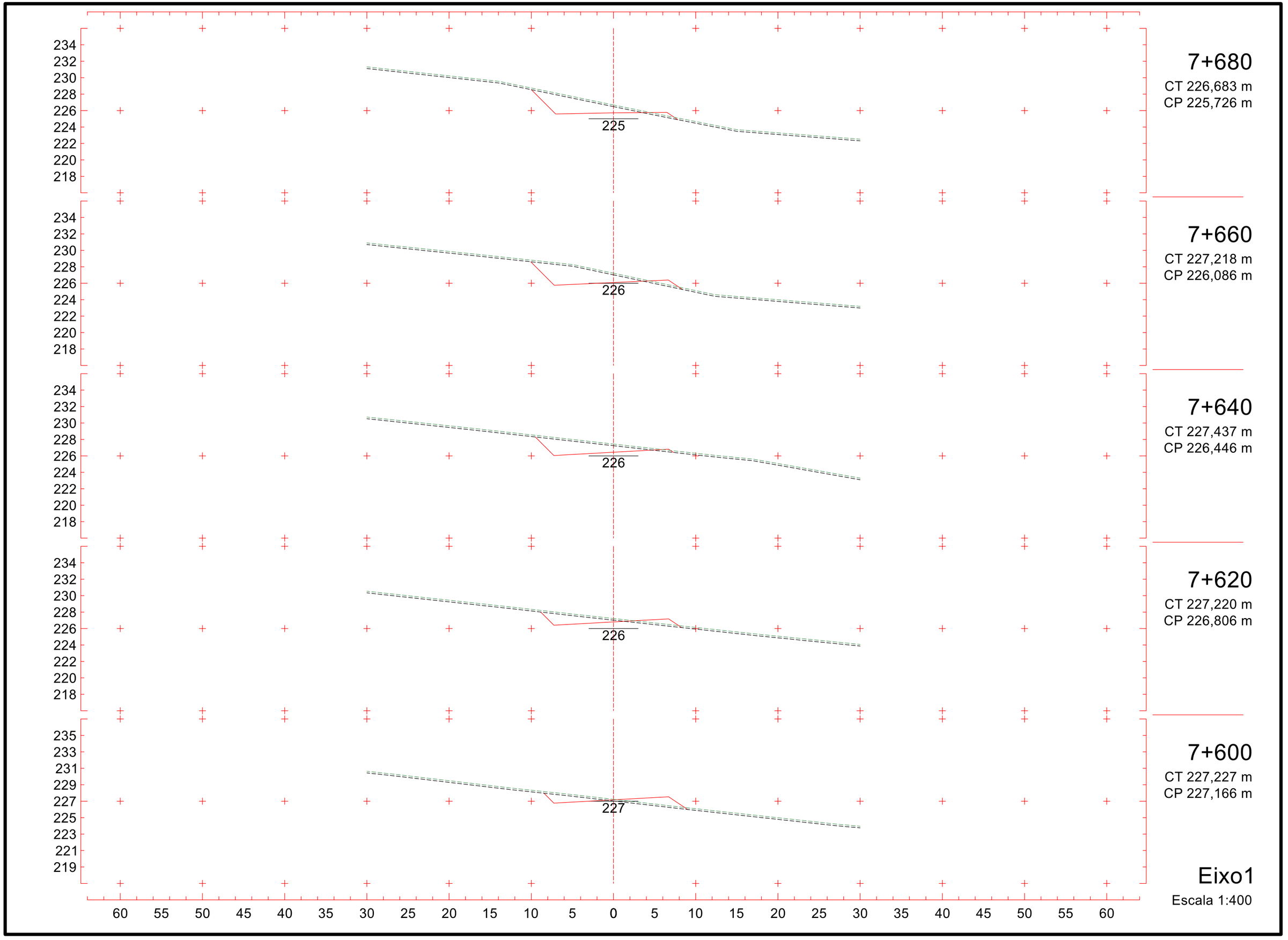

233
231
229
227
225
223
221
219
217
228
7+180
CT 221,820 m
CP 228,199 m
233
231
229
227
225
223
221
219
217
229
7+160
CT 222,132 m
CP 229,329 m
236
234
232
230
228
226
224
222
220
230
7+140
CT 224,257 m
CP 230,458 m
238
236
234
232
230
228
226
224
222
231
7+120
CT 227,447 m
CP 231,588 m
240
238
236
234
232
230
228
226
224
222
232
7+100
CT 231,027 m
CP 232,659 m
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
Eixo1
Escala 1:400

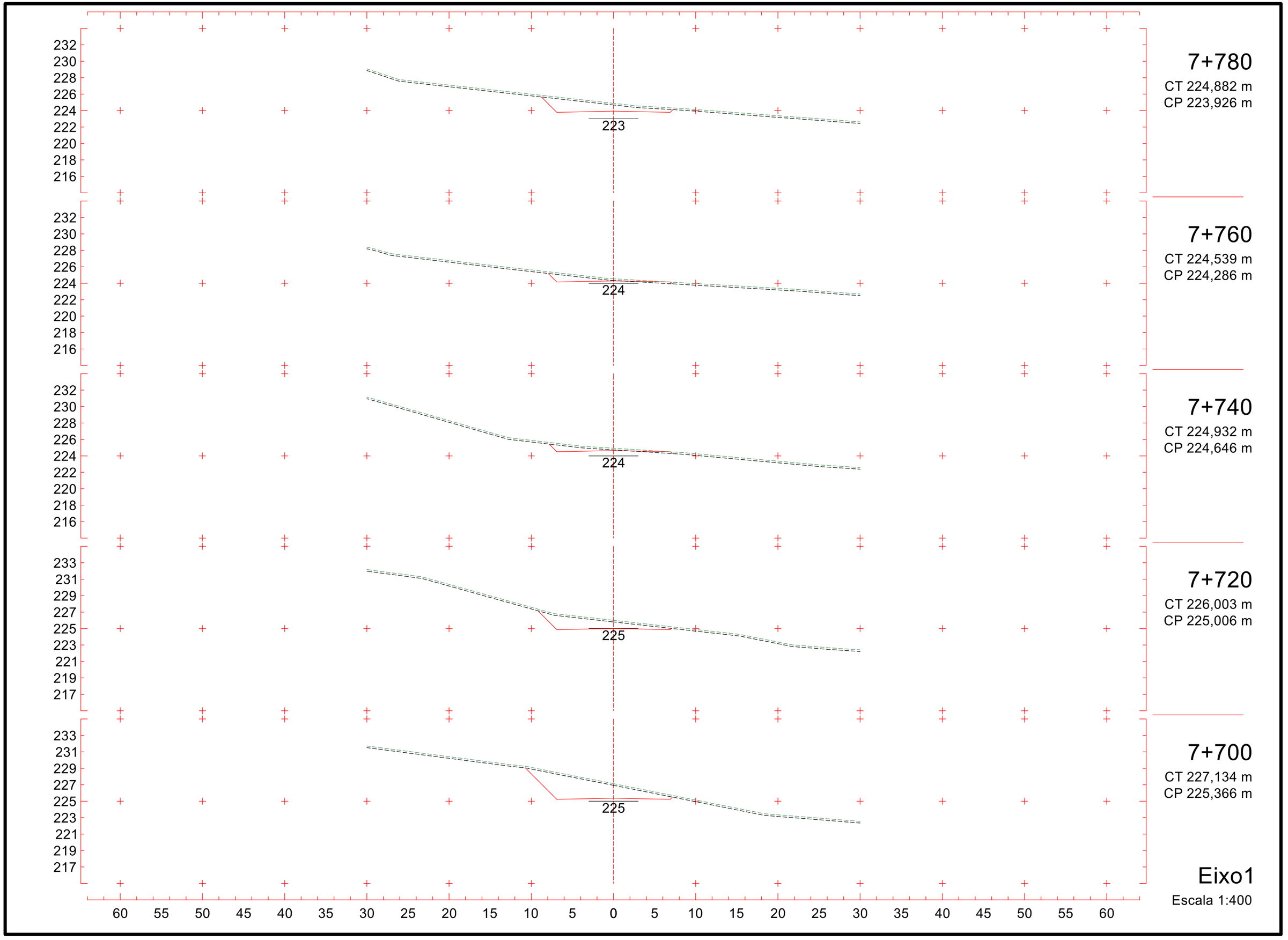

7+280
CT 222,351 m
CP 223,648 m
7+260
CT 223,085 m
CP 224,101 m
7+240
CT 223,995 m
CP 224,872 m
7+220
CT 222,979 m
CP 225,940 m
7+200
CT 222,341 m
CP 227,069 m
Eixo1
Escala 1:400
223
224
224
225
227
231 229 227 225 223 221 219 217 215
231 229 227 225 223 221 219 217 215
232 230 228 226 224 222 220 218 216
233 231 229 227 225 223 221 219 217
233 231 229 227 225 223 221 219 217
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

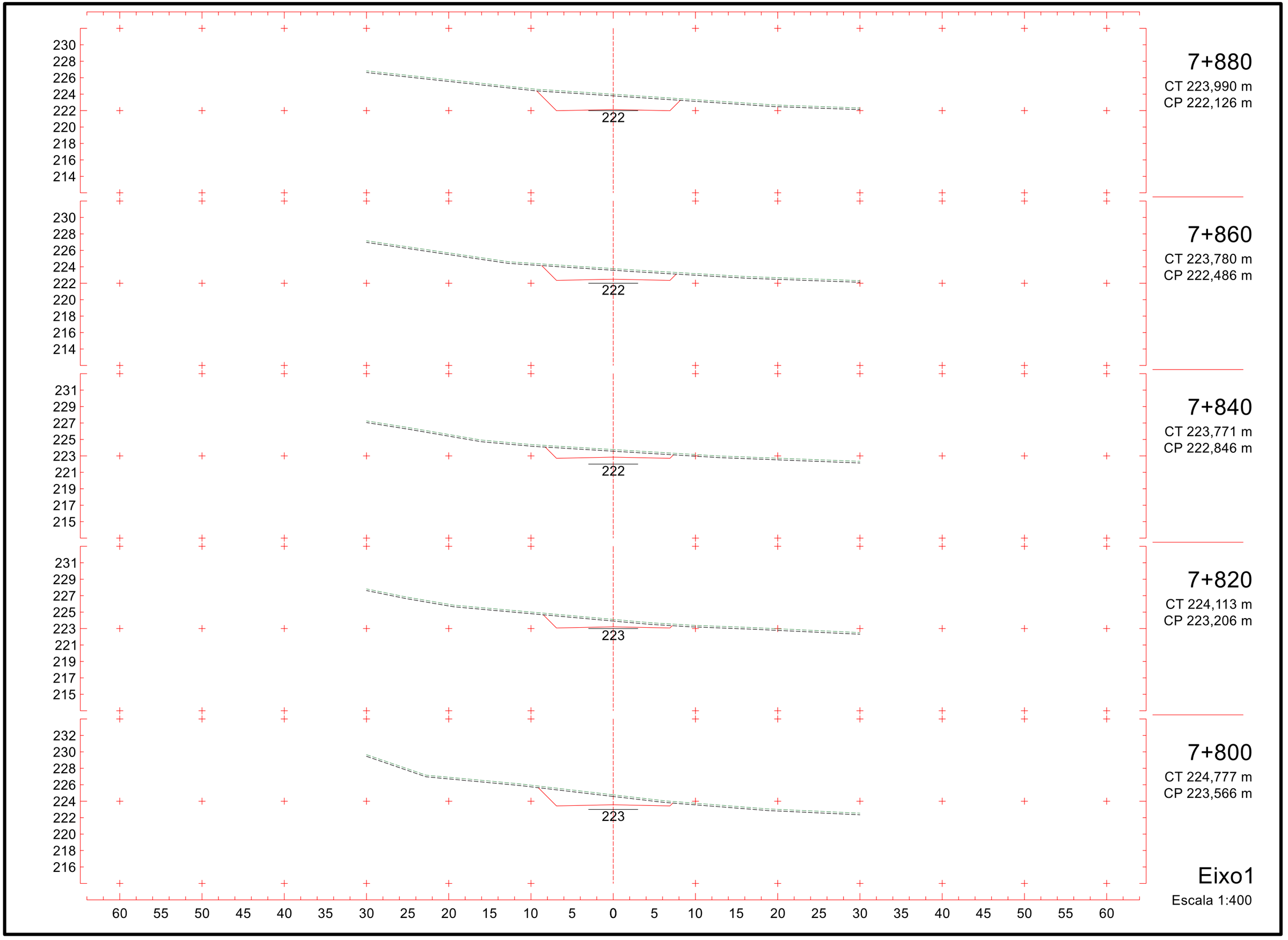

232
230
228
226
224
222
220
218
216
225
7+380
CT 222,999 m
CP 225,073 m
232
230
228
226
224
222
220
218
216
224
7+360
CT 222,954 m
CP 224,608 m
231
229
227
225
223
221
219
217
215
224
7+340
CT 222,049 m
CP 224,143 m
230
228
226
224
222
220
218
216
214
223
7+320
CT 221,417 m
CP 223,700 m
231
229
227
225
223
221
219
217
215
223
7+300
CT 221,831 m
CP 223,515 m
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
Eixo1
Escala 1:400

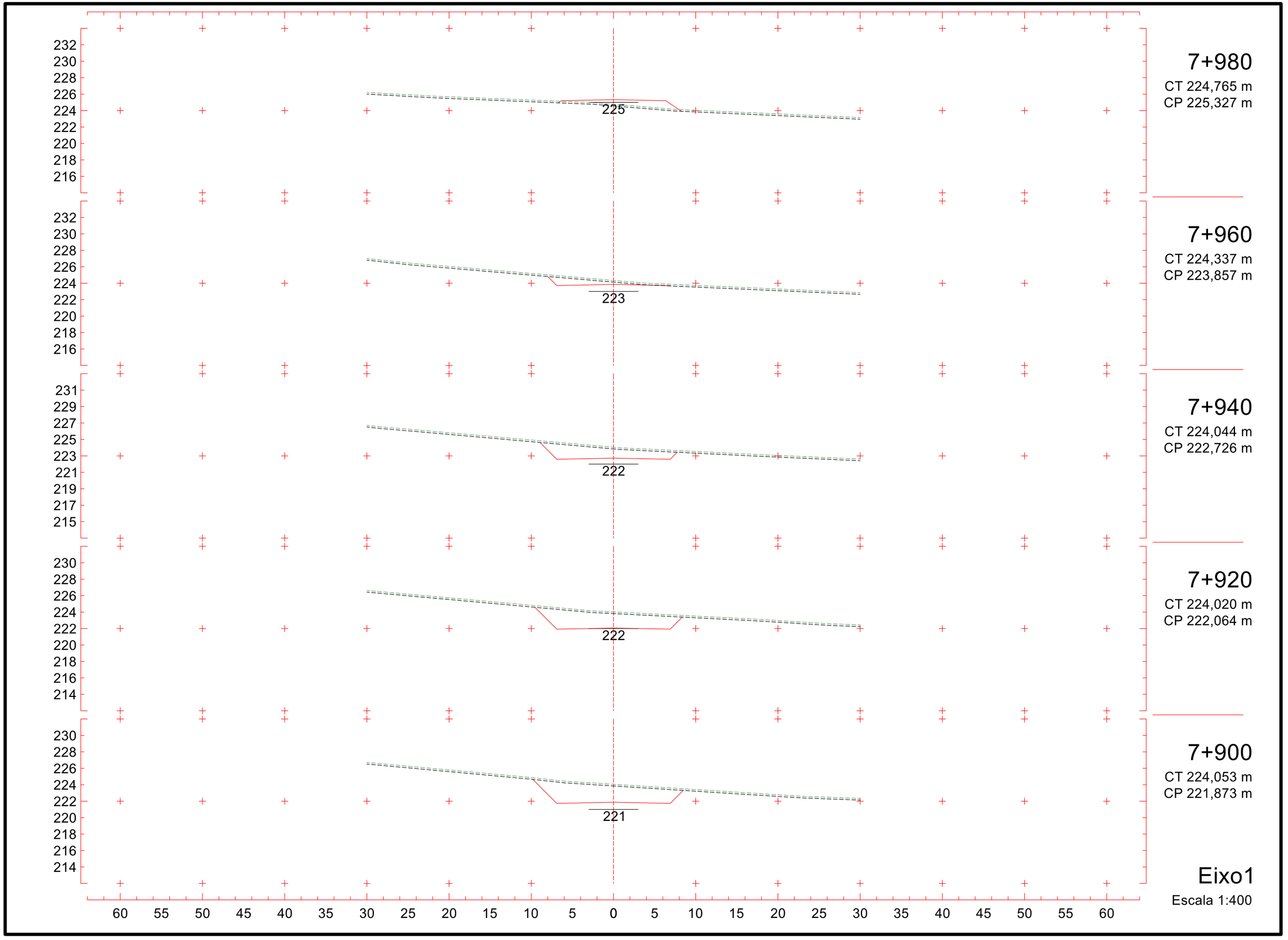

7+480
CT 226,992 m
CP 227,399 m
7+460
CT 226,885 m
CP 226,934 m
7+440
CT 225,971 m
CP 226,469 m
7+420
CT 225,064 m
CP 226,003 m
7+400
CT 223,883 m
CP 225,538 m
Eixo1
Escala 1:400

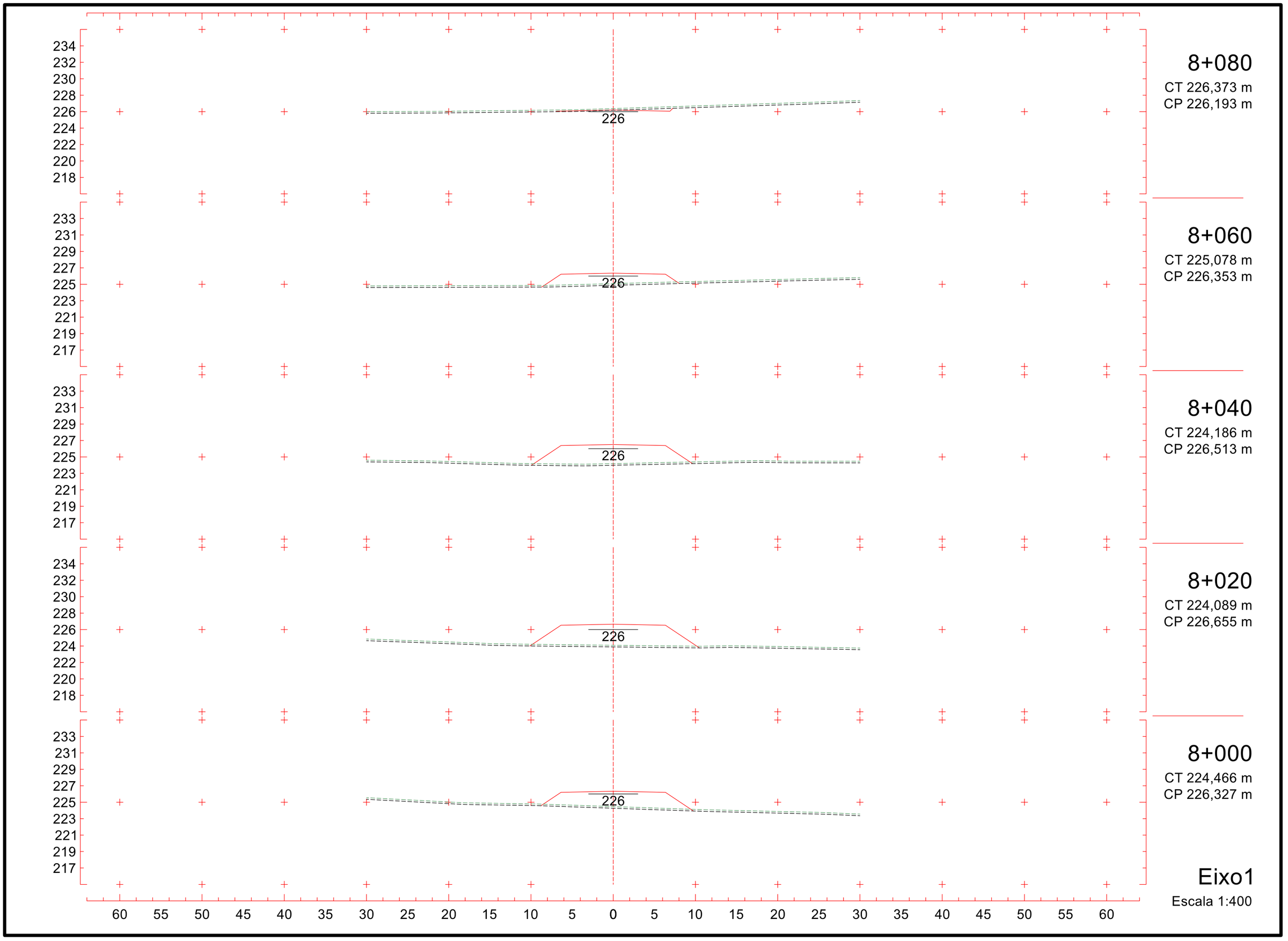

7+580
CT 227,464 m
CP 227,526 m
7+560
CT 227,454 m
CP 227,874 m
7+540
CT 227,532 m
CP 228,062 m
7+520
CT 227,499 m
CP 228,043 m
7+500
CT 227,204 m
CP 227,818 m
Eixo1
Escala 1:400
227
227
228
228
227
235
233
231
229
227
225
223
221
219
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60


234
232
230
228
226
224
222
220
218
225
7+680
CT 226,683 m
CP 225,726 m
234
232
230
228
226
224
222
220
218
226
7+660
CT 227,218 m
CP 226,086 m
234
232
230
228
226
224
222
220
218
226
7+640
CT 227,437 m
CP 226,446 m
234
232
230
228
226
224
222
220
218
226
7+620
CT 227,220 m
CP 226,806 m
235
233
231
229
227
225
223
221
219
227
7+600
CT 227,227 m
CP 227,166 m
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
Eixo1
Escala 1:400


7+780
CT 224,882 m
CP 223,926 m
223
7+760
CT 224,539 m
CP 224,286 m
224
7+740
CT 224,932 m
CP 224,646 m
224
7+720
CT 226,003 m
CP 225,006 m
225
7+700
CT 227,134 m
CP 225,366 m
225
Eixo1
Escala 1:400
232 230 228 226 224 222 220 218 216
233 231 229 227 225 223 221 219 217
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


230
228
226
224
222
220
218
216
214
222
7+880
CT 223,990 m
CP 222,126 m
230
228
226
224
222
220
218
216
214
222
7+860
CT 223,780 m
CP 222,486 m
231
229
227
225
223
221
219
217
215
222
7+840
CT 223,771 m
CP 222,846 m
231
229
227
225
223
221
219
217
215
223
7+820
CT 224,113 m
CP 223,206 m
232
230
228
226
224
222
220
218
216
223
7+800
CT 224,777 m
CP 223,566 m
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
Eixo1
Escala 1:400


232
230
228
226
224
222
220
218
216
225
7+980
CT 224,765 m
CP 225,327 m
232
230
228
226
224
222
220
218
216
223
7+960
CT 224,337 m
CP 223,857 m
231
229
227
225
223
221
219
217
215
222
7+940
CT 224,044 m
CP 222,726 m
230
228
226
224
222
220
218
216
214
222
7+920
CT 224,020 m
CP 222,064 m
230
228
226
224
222
220
218
216
214
221
7+900
CT 224,053 m
CP 221,873 m
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
Eixo1
Escala 1:400


234
232
230
228
226
224
222
220
218
226
8+080
CT 226,373 m
CP 226,193 m
233
231
229
227
225
223
221
219
217
226
8+060
CT 225,078 m
CP 226,353 m
233
231
229
227
225
223
221
219
217
226
8+040
CT 224,186 m
CP 226,513 m
234
232
230
228
226
224
222
220
218
226
8+020
CT 224,089 m
CP 226,655 m
233
231
229
227
225
223
221
219
217
226
8+000
CT 224,466 m
CP 226,327 m
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
Eixo1
Escala 1:400

ATIVIDADE/PRAZO

			Semanas																			Apropriação de horas		Penalizações pela entrega em atrazo (multa em pontos)		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Etapa	Ativ.	Código	Pot.	Atrib.
			INT	ET1	ET2	ET3	PG1	TR	PG2	PG2	PG3	AV	AV	PG4	PG5-PG'	PG'	PG6	PG7	AV	AV	TR					
			12/4 14/4	19/4 21/4	26/4 28/4	3/5 5/5	10/5 12/5	17/5 19/5	24/5 26/5	31/5 2/6	7/6 9/6	14/6 16/6	21/6 23/6	28/6 30/6	5/7 7/7	12/7 14/7	19/7 21/7	26/7 28/7	2/8 4/8	9/8 11/8	16/8 18/8					
			A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4	A1 A2 A3 A4					
Publicação do Edital	Início	Apresentação do Projeto Ponto de Partida																				0				
				1 1 1 1																		4	0	AT01	0,20	
	Capacitação	Softwares para Estudos de Traçado, Projetos Geométricos e de Terrap.			3 3 3 3	3 3 3 3																24				
Audiência Pública	EVTEA / Equipe	Construção do modelo digital do terreno para a etapa de Estudos			3 3 3 3																	12				
		Estudo de Traçados			5 5 5 5	20 20 20 20	4 4 4 4															116				
	EVTEA / Consórcio	Defesa da Opção das Equipes no Consórcio				2 2 2 2																8	252	AT02	0,20	
		Elaboração de recursos multimídia e relatório				2 2 2 2	3 3 3 3	20 20 20 20														100				
		Entrega e apresentação Relatório do Estudo						4 4 4 4														16		AT03	0,50	
Concorrência Pública	Projeto Geométrico / Planimetria	Construção do modelo digital do terreno para a etapa de Projeto							3 3 3 3													12				
		Lançamento dos alinhamentos do eixo planimétrico								2 2 2 2												8				
		Definição do eixo planimétrico (curvas horizontais)									4 4 4 4	6 6 6 6	3 3 3 3									52				
		Análise de conformidade do eixo										2 2 2 2	2 2 2 2									16		AT04	0,30	
	Projeto Geométrico / Altimetria	Captura do perfil longitudinal do terreno												2 2 2 2								8				
		Lançamento das rampas																				0				
		Definição do greide (curvas vertinais)													2 2 2 2							8				
		Análise de conformidade do greide													4 4 4 4							16				
		Análise das interferências																				0		AT05	0,30	
	Projeto Geométrico / Seções	Captura das seções transversais do terreno														3 3 3 3						12				
		Definição da seção tipo de terraplenagem														4 4 4 4						16				
		Cálculo e distribuição da superelevação e superlargura															3 3 3 3					12		AT06	0,20	
		Seções transversais de projeto															4 4 4 4	4 4 4 4				32		AT07	0,30	
	Relatórios	Volume 1 - Relatório de Projeto										3 3 3 3	1 1 1 1	1 1 1 1	1 1 1 1	2 2 2 2	1 1 1 1	2 2 2 2				44				
		Volume 2 - Projeto Executivo														6 6 6 6	3 3 3 3	20 20 20 20				116				
		Volume 3 - Documentos de Habilitação e Orçamento															20 20 20 20	4 4 4 4				96				
		Impressão e produção de mídia																5 5 5 5				20				
	Abertura dos envelopes	Apresentação das propostas técnicas e de preço																				0		AT08	0,50	
	Fase Recursal	Fiscalização																				0		AT09	0,30	
		Defesa																				0		AT10	0,20	
ARTs		Provas em Equipe									4 4 4 4				5 5 5 5	5 5 5 5	5 5 5 5					76	76			
Evento de Encerramento		Pesquisa de Satisfação																				0	0			
		Premiação																				0	0			

Apropriação de horas			Horas Total	Multa Total
Semanal	Individual	A1 A2 A3 A4 A1 A2 A3 A4 A1 A2 A3 A4

CAPÍTULO IV

GLE Empreendimentos

Ester Schmitt Duarte
Giovanna Barbosa Goulart
José Lorenzo Florczak Almeida
Luisa Maria Signori

Alejandro Ruiz Padillo
Silvio Lisboa Schuster
Christine Tessele Nodari

REPÚBLICA FEDERATIVA DO BRASIL
UNIVERSIDADE FEDERAL DE SANTA MARIA – UFSM
CENTRO DE TECNOLOGIA - CT
CURSO DE ENGENHARIA CIVIL

LABORATÓRIO DE MOBILIDADE E LOGÍSTICA – *PROJECT-BASED LEARNING* – PROJETO PONTO DE PARTIDA

PROJETO BÁSICO PARA IMPLANTAÇÃO DE TRECHO RODOVIÁRIO ENTRE INDEPENDÊNCIA E ALEGRIA

Rodovia:	PPP- 2022/01
Norma Técnica:	DNER/1999
Classe da rodovia:	III
Região:	Ondulada
Configuração:	pista simples com acostamentos
Classificação do solo:	1ª Categoria
Faixa de exploração:	2 x 250m
Extensão aproximada:	11,621 km em diretriz

VOLUME 2 – PROJETO EXECUTIVO

GRUPO GLE EMPREENDIMENTOS

AGOSTO/2022

DADOS DE IDENTIFICAÇÃO

Instituição: **Universidade Federal de Santa Maria – UFSM**

Unidade: **Centro de Tecnologia - CT**

Curso: **Engenharia Civil – EC**

Laboratório: **Laboratório de Mobilidade e Logística – LAMOT**

Projeto: **Aplicação de metodologias ativas e experiências inovadoras de ensino-aprendizagem tecnológico (Projeto Ponto de Partida)**

Disciplina: **Projeto Geométrico de Rodovias**

Edição: **2022/1**

Ano: **2022**

Semestre: **1**

Disciplina: **Rodovias I**

Turma: 11

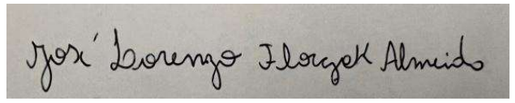
Número da Equipe: **22113**

Nome: **GLE Empreendimentos**

Integrantes do grupo:

Ester Schmitt Duarte

Giovanna Barbosa Goulart



José Lorenzo Florczak Almeida



Luisa Maria Signori

SUMÁRIO

SUMÁRIO

1 APRESENTAÇÃO 7
Mapa de Situação 7
Mapa de localização 9
Quadro de características técnicas 11
2 PROJETO GEOMÉTRICO 13
Seções transversais tipo 13
Linha geral 15
Detalhamento do Projeto Geométrico 23
Seções transversais 24
3 CRONOGRAMA PLANEJADO/REALIZADO 105

APRESENTAÇÃO

1 APRESENTAÇÃO

Mapa de situação da região de estudo, município de Santa Rosa-RS

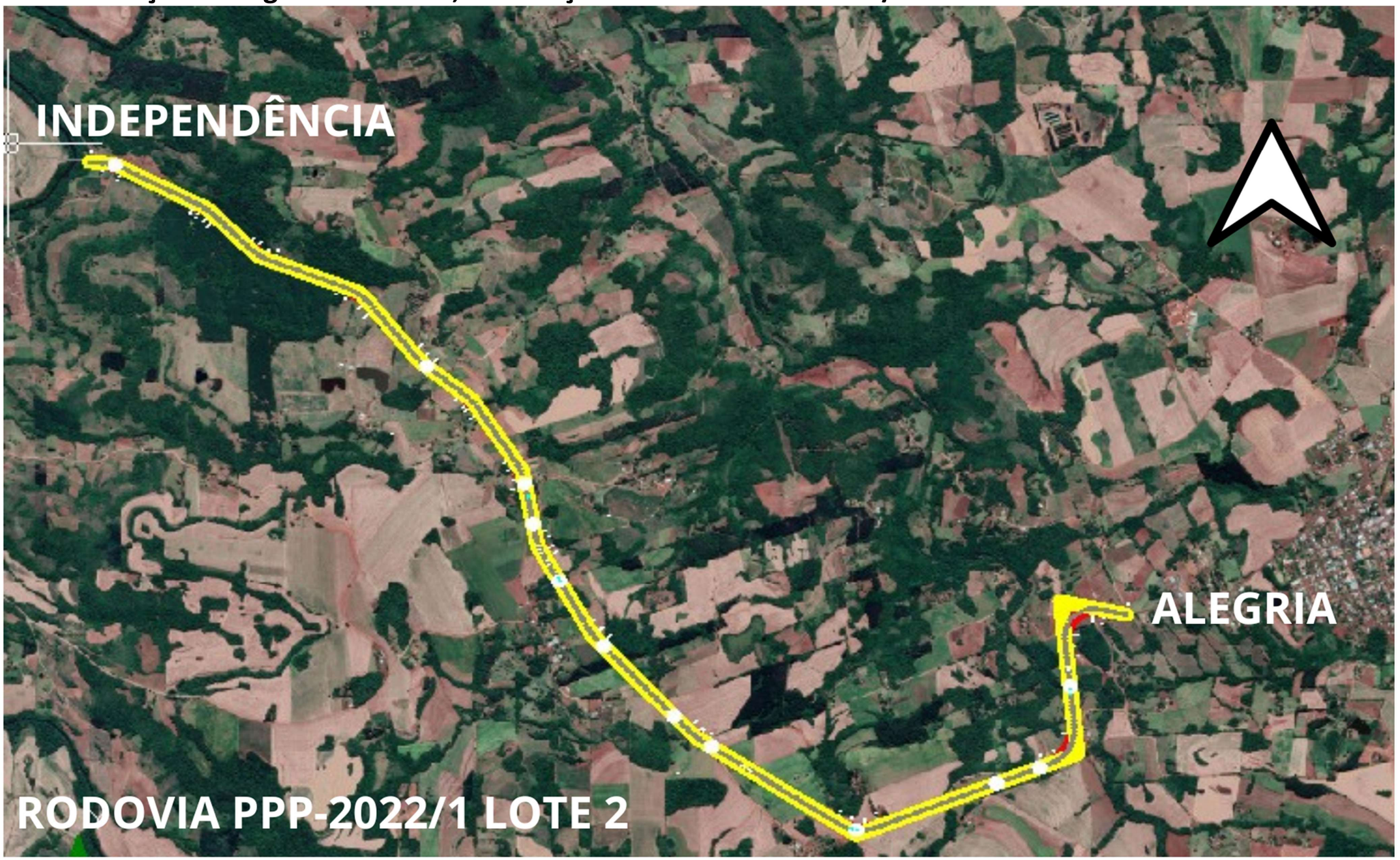


Fonte: Wikipedia

Mapa de situação da região de estudo, localização da rodovia PPP-2022/1



Mapa de localização da região de estudo, localização da rodovia PPP-2022/1 Lote 2



Quadro de características técnicas

A seguir, o relatório de características técnicas (RCA), em que apresenta valores como distancia total do traçado, distancia total da diretriz, acréscimo sobre a diretriz, tortuosidade, comprimento virtual, entre outros. Um dos relatórios que contém as principais informações sobre o traçado, sendo base de cálculo para futuros parâmetros. Pode-se observar um acréscimo sobre diretriz, devido à complexidade da região, visamos um trajeto objetivo e com menores declividades anômalas, dentro da viabilidade apresentada pelo terreno.

CARACTERÍSTICAS TÉCNICAS

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 7+864,00

CARACTERÍSTICAS GERAIS

DE PROJETO		PLANIALTIMETRICAS				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	7863,997	FAIXA DOM. (LE/LD+OFF)	15 / 15 + 5	SUPERELEVAÇÃO MÁX.		TALUDE CORTE 3ª CAT.	

PLANIMETRIA

DISTRIBUIÇÃO DE CURVAS

TIPO	RAIOS (m)	FREQ.	Dc (m)	%	Lc1+Lc2 (m)	%
TRANSIÇÃO	R mínimo = 150,000	1	212,598	2,70	140,000	1,78
	150,000 < R ≤ 100,000					
	100,000 < R ≤ 200,000	2	247,575	3,15	340,000	4,32
	200,000 < R ≤ 300,000	4	121,116	1,54	440,000	5,60
	300,000 < R ≤ 500,000	5	317,951	4,04	500,000	6,36
	R > 500,000					
	TOTAL EM TRANSIÇÃO	12	899,240	11,43	1420,000	18,06
SIMPLES	RAIOS (m)	FREQ.	Dc (m)	%		
	R mínimo = 310,000	1	111,737	1,42		
	310,000 < R ≤ 500,000					
	500,000 < R ≤ 700,000					
	700,000 < R ≤ 1000,000					
	1000,000 < R ≤ 1500,000					
	R > 1500,000					
	TOTAL SIMPLES	1	111,737	1,42		
TOTAL EM CURVA		13	1010,977	12,86	3330,217	42,35

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1					0 < i ≤ 1		
1 < i ≤ 2	422,417	5,37			1 < i ≤ 2	1160,944	14,76
2 < i ≤ 3	222,078	2,82			2 < i ≤ 3	1711,462	21,76
3 < i ≤ 4	425,017	5,40			3 < i ≤ 4		
4 < i ≤ 5					4 < i ≤ 5		
5 < i ≤ 6					5 < i ≤ 6	448,200	5,70
6 < i ≤ 7					6 < i ≤ 7		
7 < i ≤ 8	763,144	9,70			7 < i ≤ 8	648,732	8,25
8 < i ≤ 9					8 < i ≤ 9	1642,003	20,88
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	1832,656	23,30			TOTAL	5611,341	71,35

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
7443,997	94,66	200,000	2,54	220,000	2,80	420,000	5,34

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
68,545	0,87	925,016	11,76	5433,021	69,09

PARÂMETROS K MÍNIMOS ADOTADOS

EM CURVA CÔNCAVA	7,382	EM CURVA CONVEXA	6,338

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
1,527	0,194	6009,485	30,860

PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
12720,282	161,75	18692,181	237,69	15706,231	199,72

CARACTERÍSTICAS OPERACIONAIS

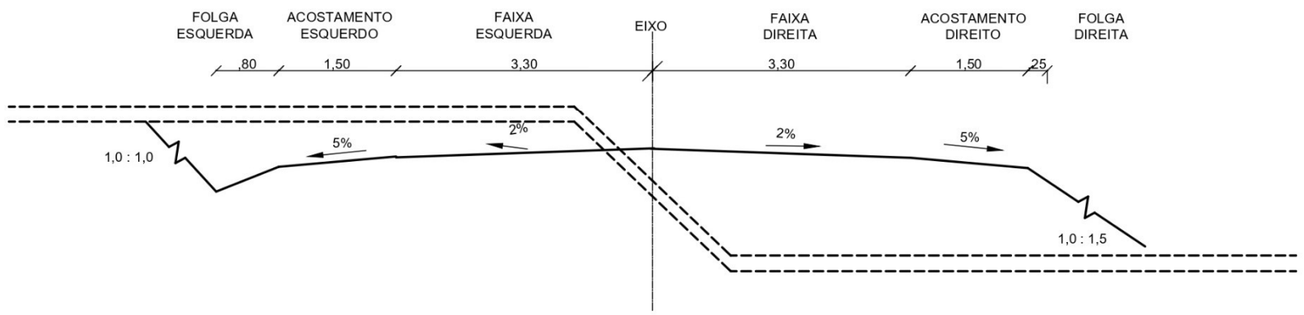
ANO DE ABERTURA		VDM ABERTURA		PARÂMETRO					
ANO FINAL DA VIDA ÚTIL		VDM FINAL							

PROJETO GEOMÉTRICO

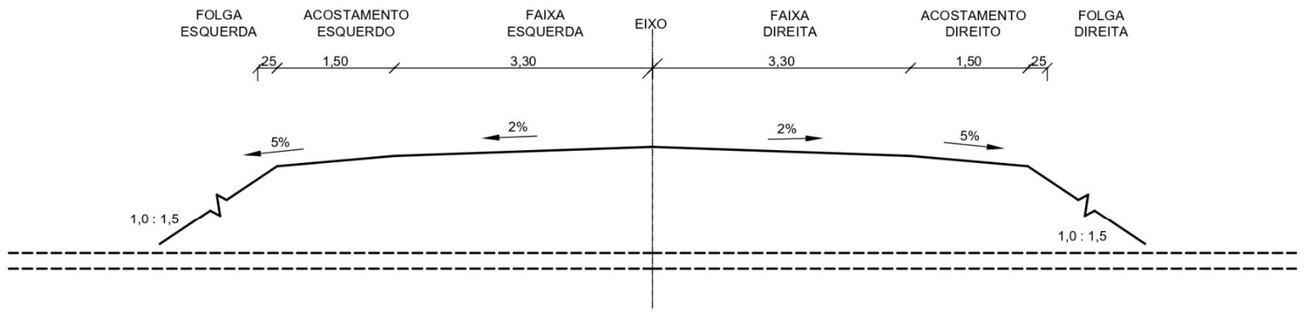
2 PROJETO GEOMÉTRICO

Seções transversais tipo

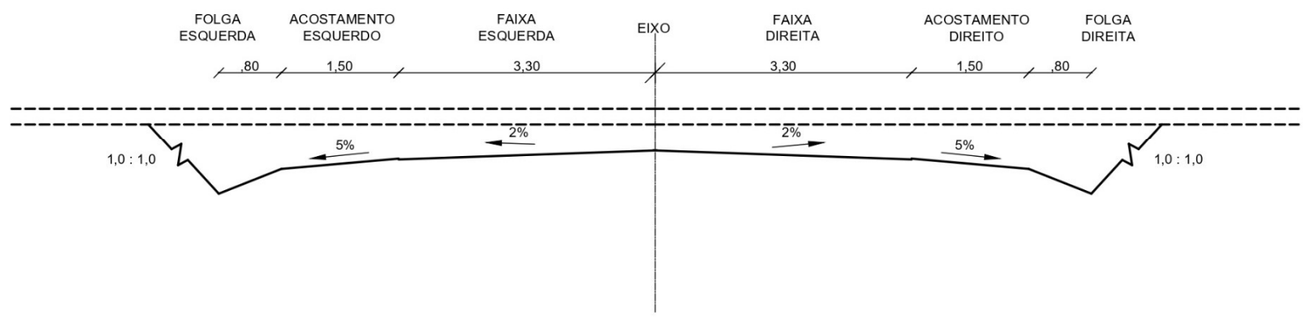
SEÇÃO TIPO MISTA EM TANGENTE



SEÇÃO TIPO ATERRO EM TANGENTE

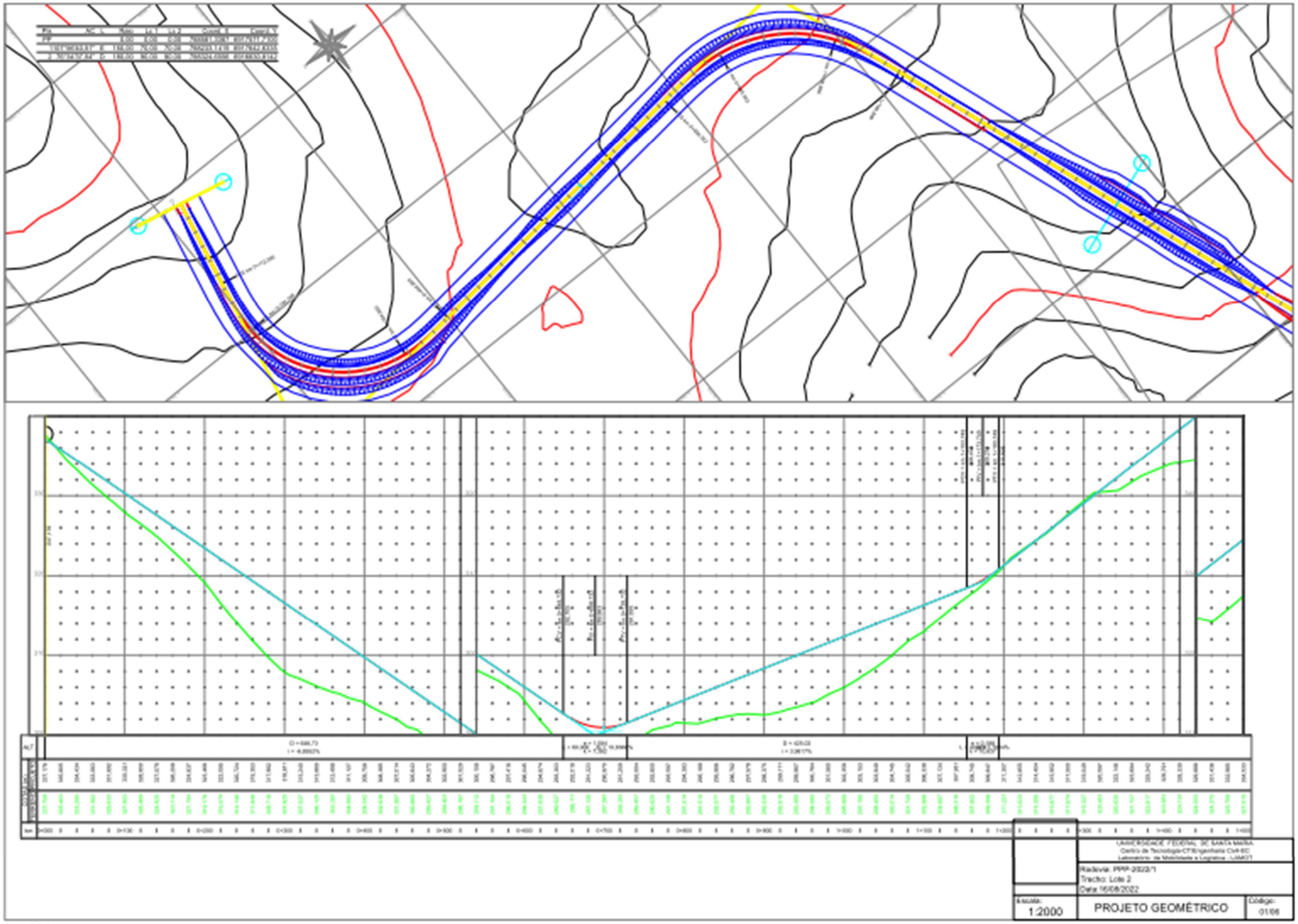


SEÇÃO TIPO CORTE EM TANGENTE

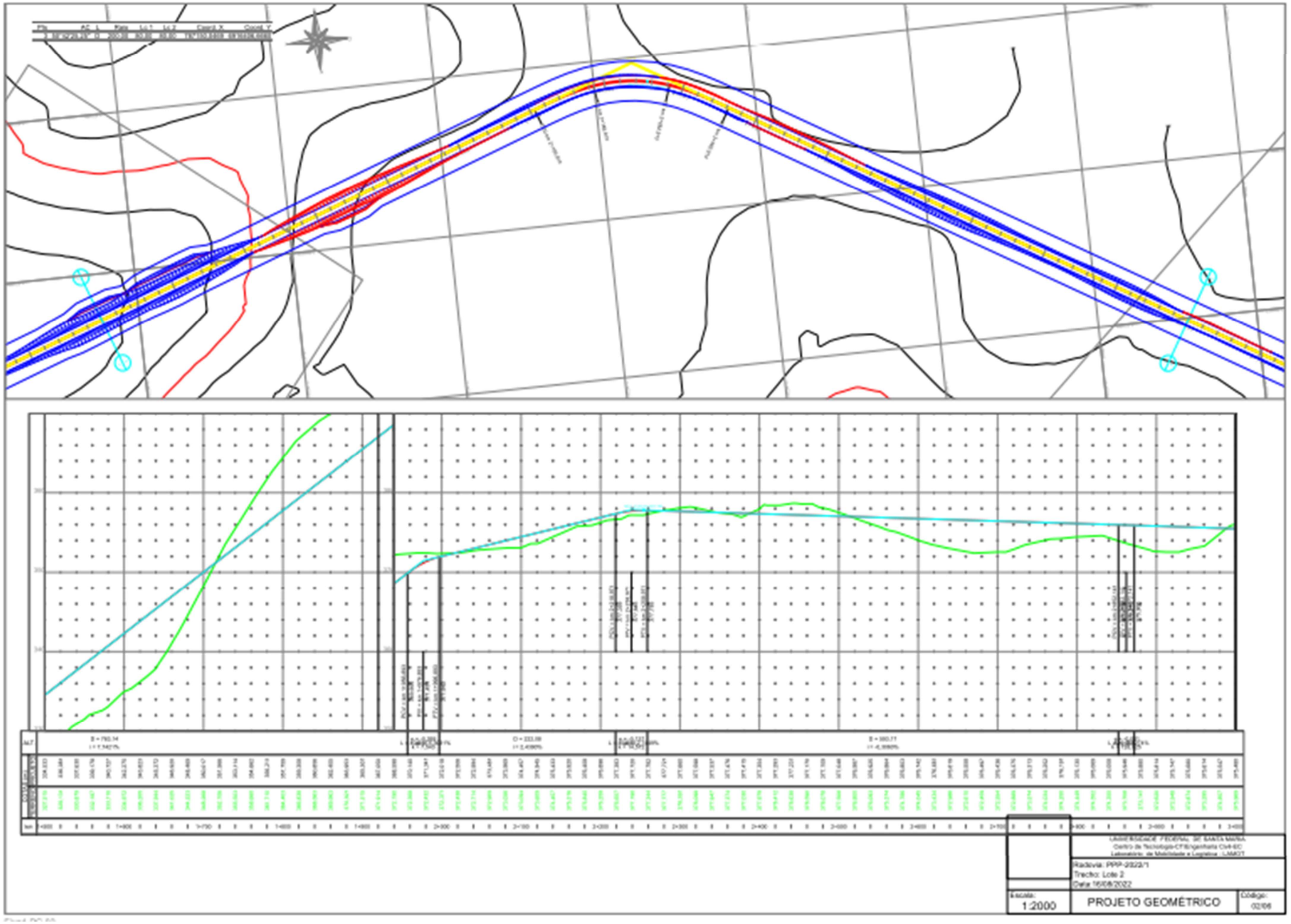


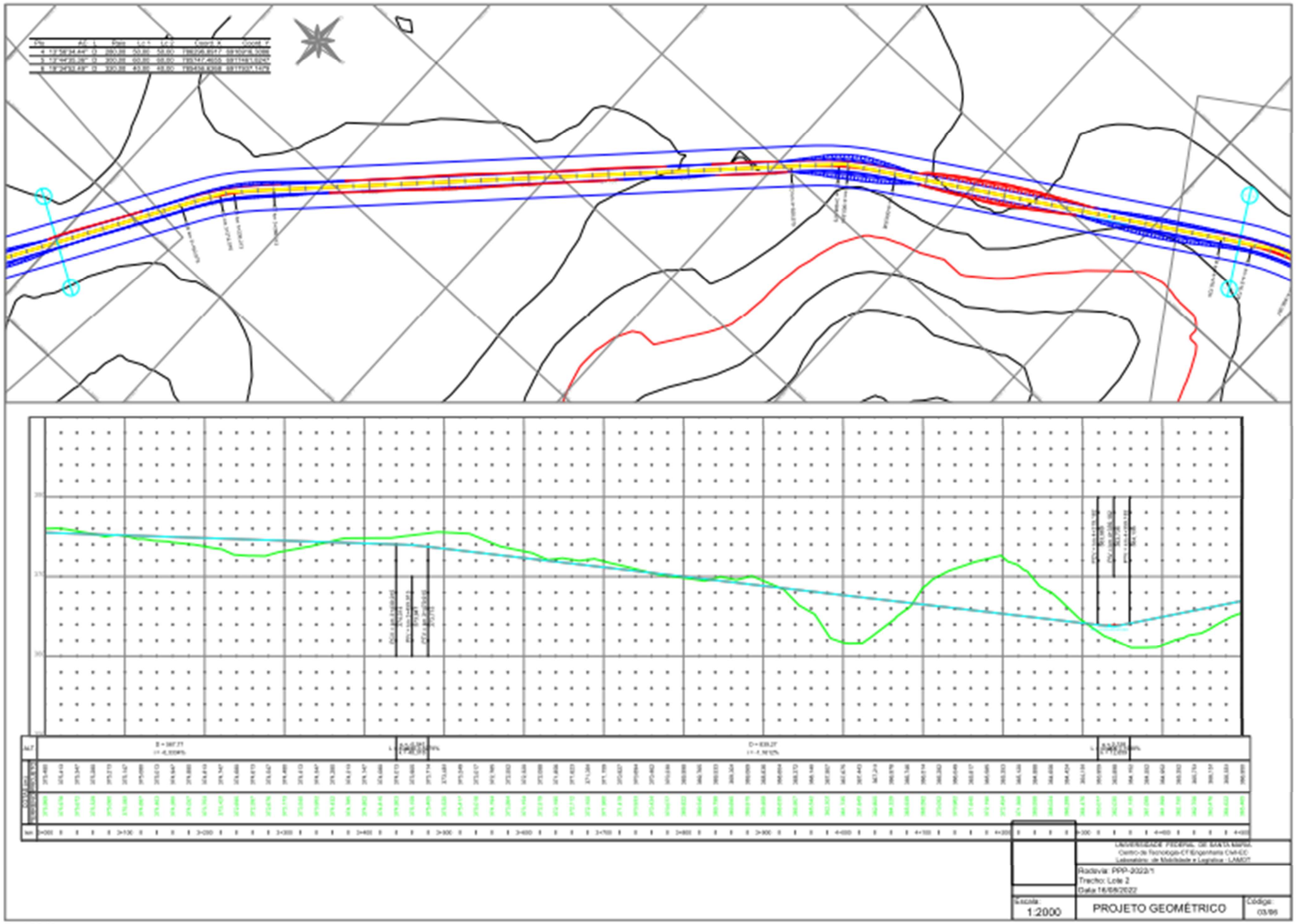
Linha geral

Pranchas planialtimétricas.

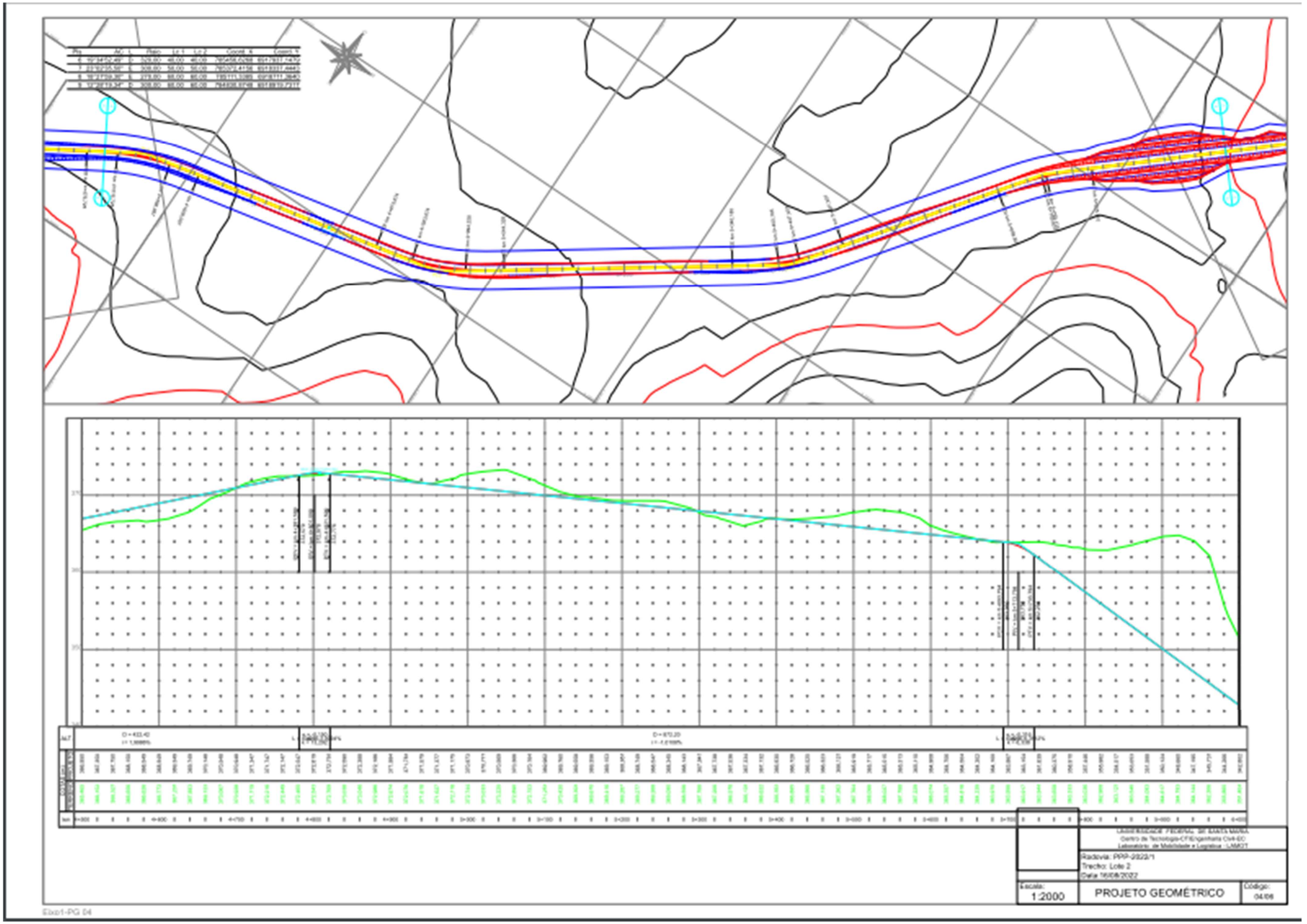

UNIVERSIDADE FEDERAL DE SANTA MARIA
Centro de Tecnologia-CT/Engenharia Civil-EC
Laboratório de Mobilidade e Logística - LAMOL
Rodovia: PPP-392/1
Trecho: Lote 2
Data: 16/06/2022
Escala:
1:2000
PROJETO GEOMÉTRICO
Código:
0106

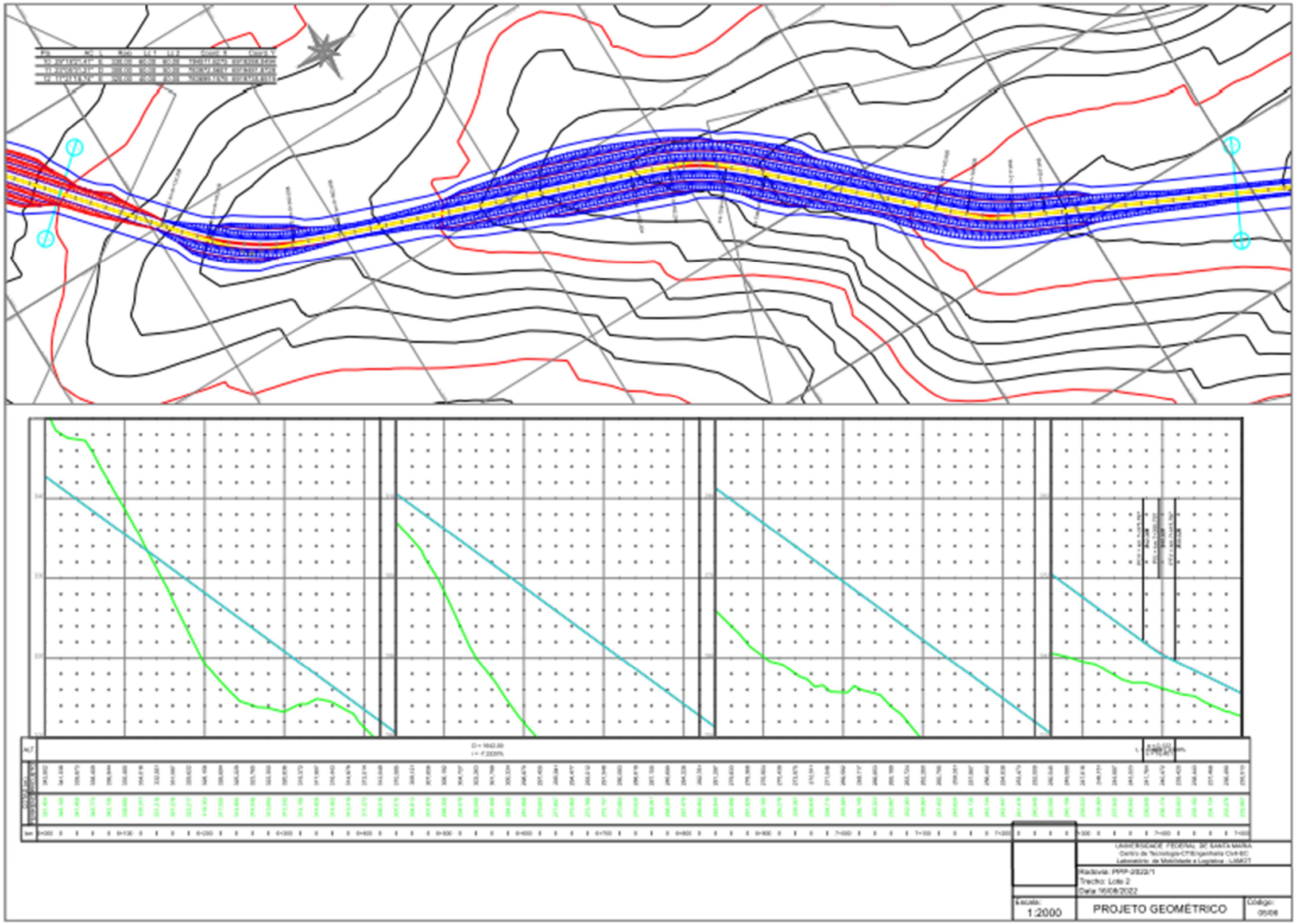
Eixo1-PG 01


UNIVERSIDADE FEDERAL DE SANTA MARIA
Centro de Tecnologia-CT/Engenharia Civil-EC
Laboratório de Mobilidade e Logística - LAMOT
Rodovia: PPP-232/2/1
Trecho: Lote 2
Data: 16/08/2022
Escala: 1:2000
PROJETO GEOMÉTRICO
Código: 02/06

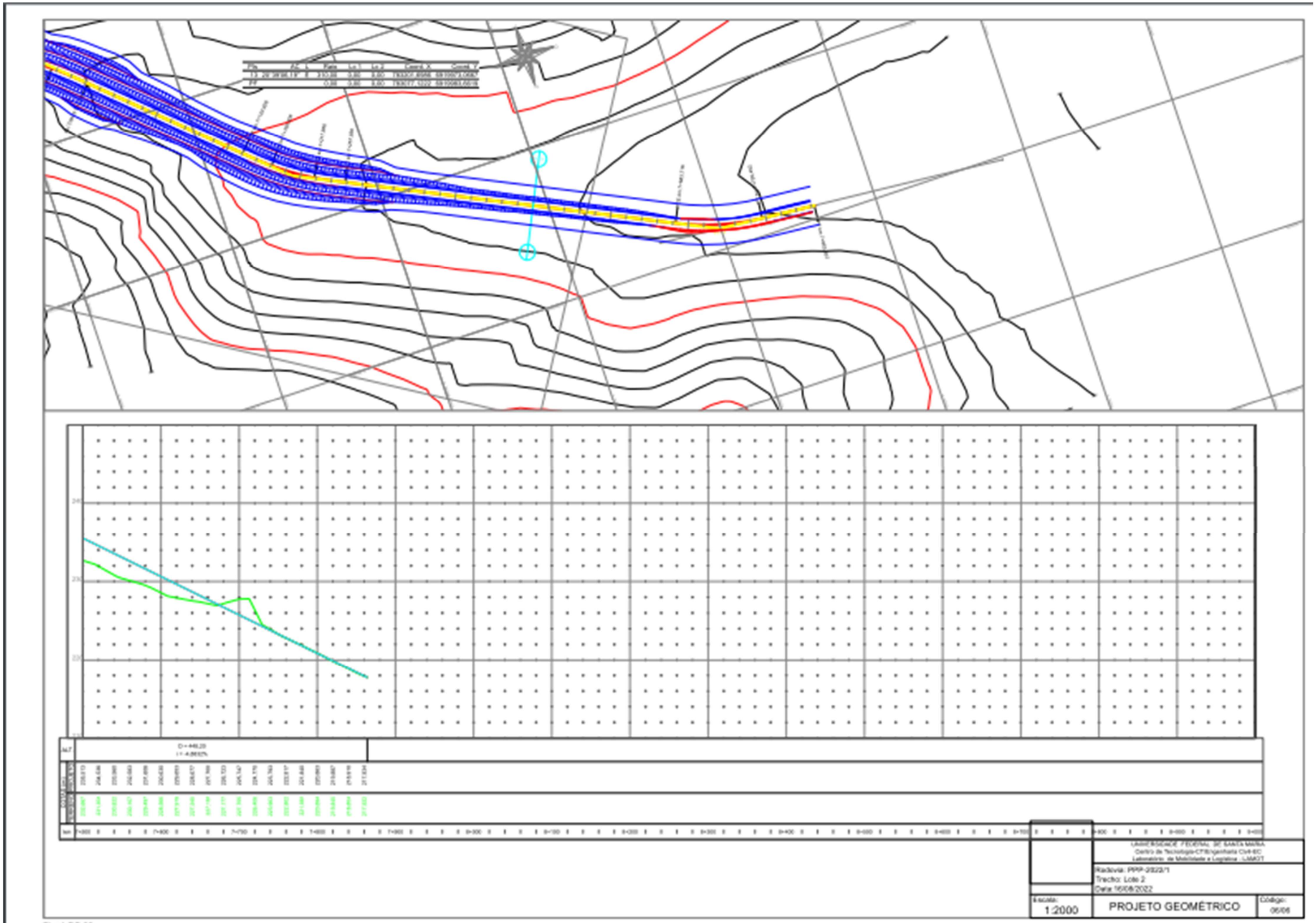

Rodovia: PPP-2022/1
Trecho: Lote 2
Data 16/08/2022
Escala:
1:2000
PROJETO GEOMÉTRICO
Código:
03/06

Eixo1-PG 03

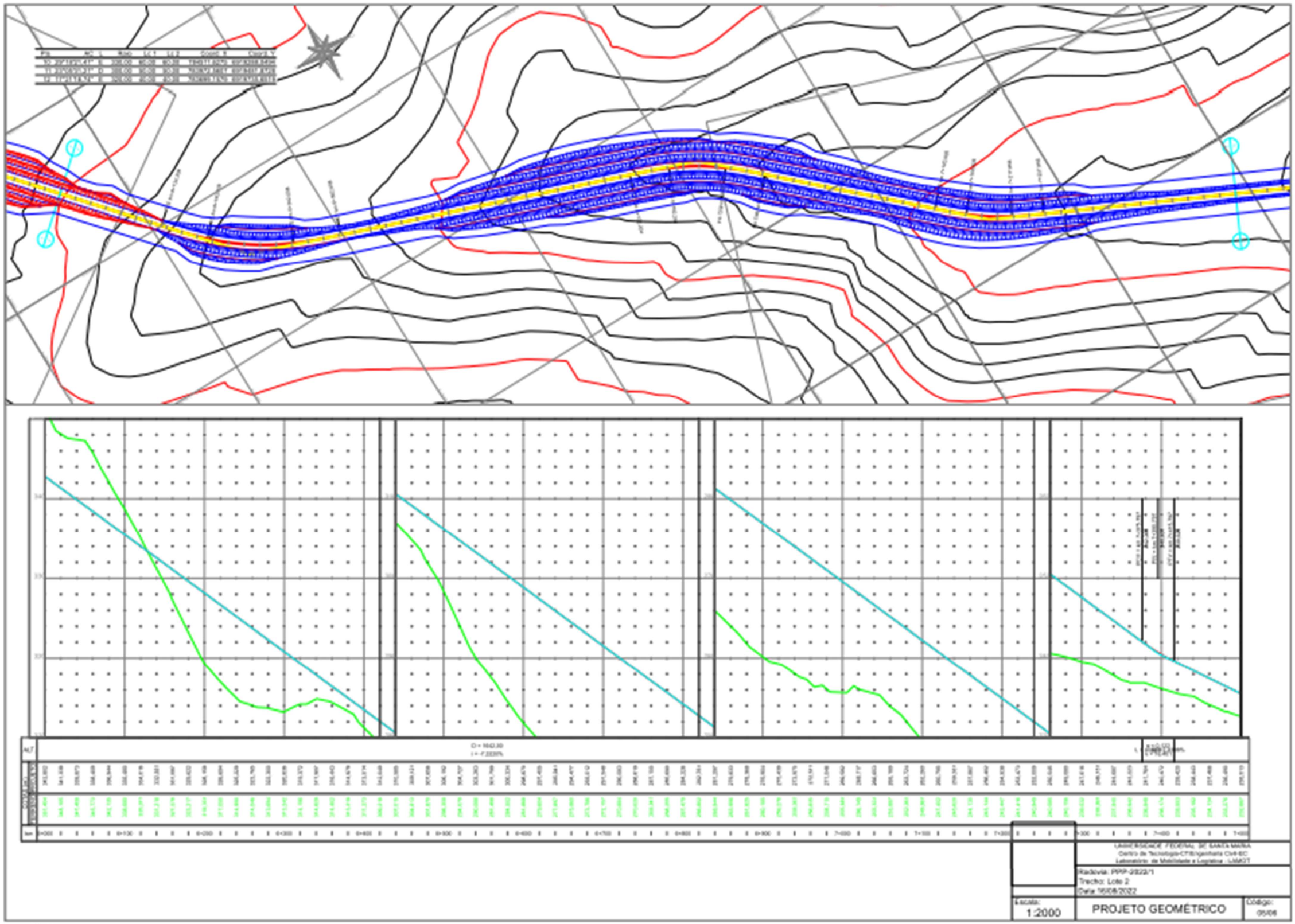

Radovia: PPP-2022/1
Trecho: Lote 2
Escala:
1:2000
PROJETO GEOMÉTRICO
Código:
04/06


UNIVERSIDADE FEDERAL DE SANTA MARIA
Centro de Tecnologia-CTB/Engenharia Civil-EC
Laboratório de Mobilidade e Logística - LAMOT
Rodovia: PPP-2022/1
Trecho: Lote 2
Data: 16/08/2022
Escala:
1:2000
PROJETO GEOMÉTRICO
Código:
05/06

Exo1-PG 05

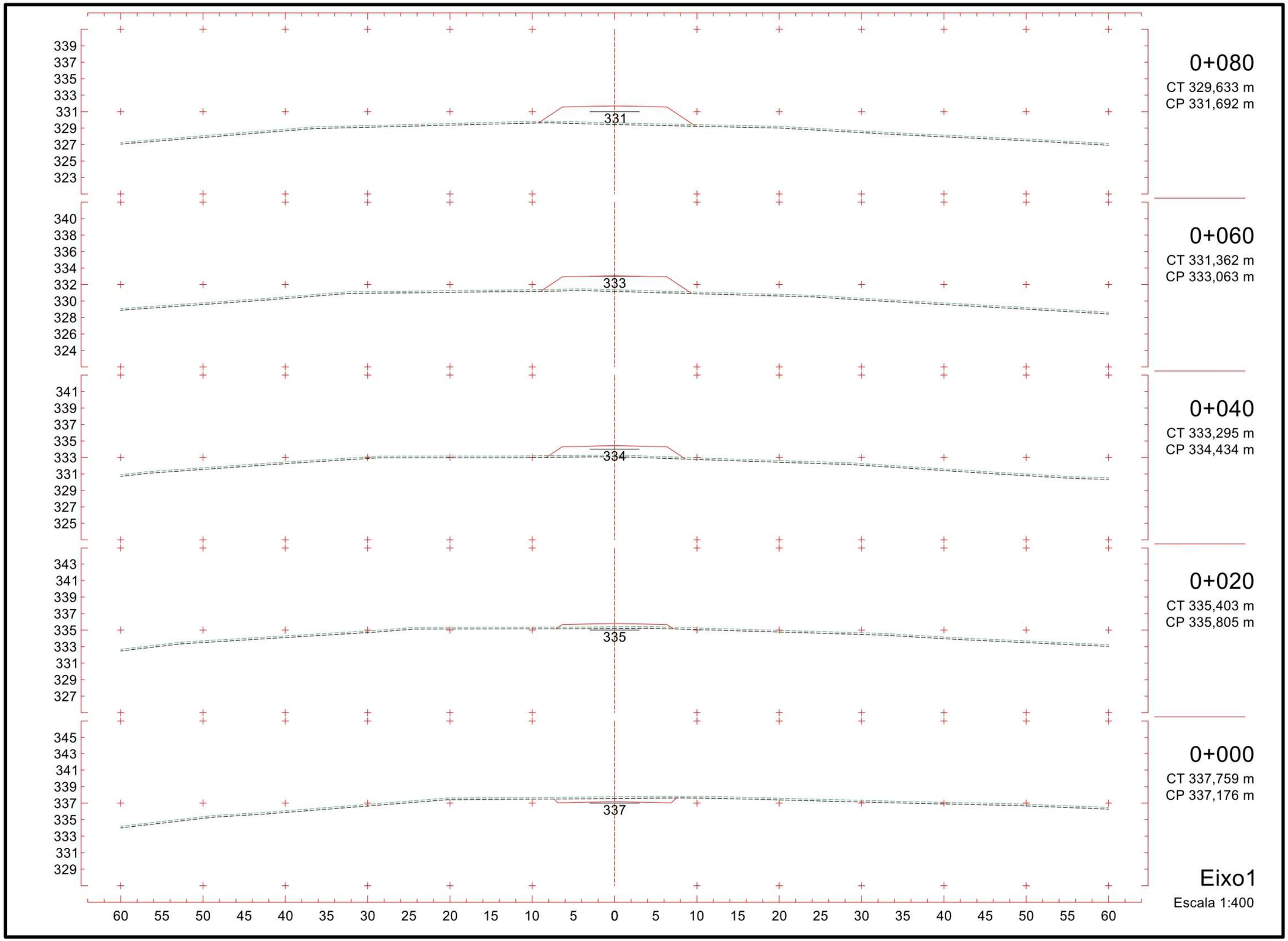

UNIVERSIDADE FEDERAL DE SANTA MARIA
Centro de Tecnologia-CT/Engenharia Civil-EC
Laboratório de Mobilidade e Logística - LMOT
Rodovia: PPP-2022/1
Trecho: Lote 2
Data: 16/08/2022
Escala:
1:2000
PROJETO GEOMÉTRICO
Código:
06/06

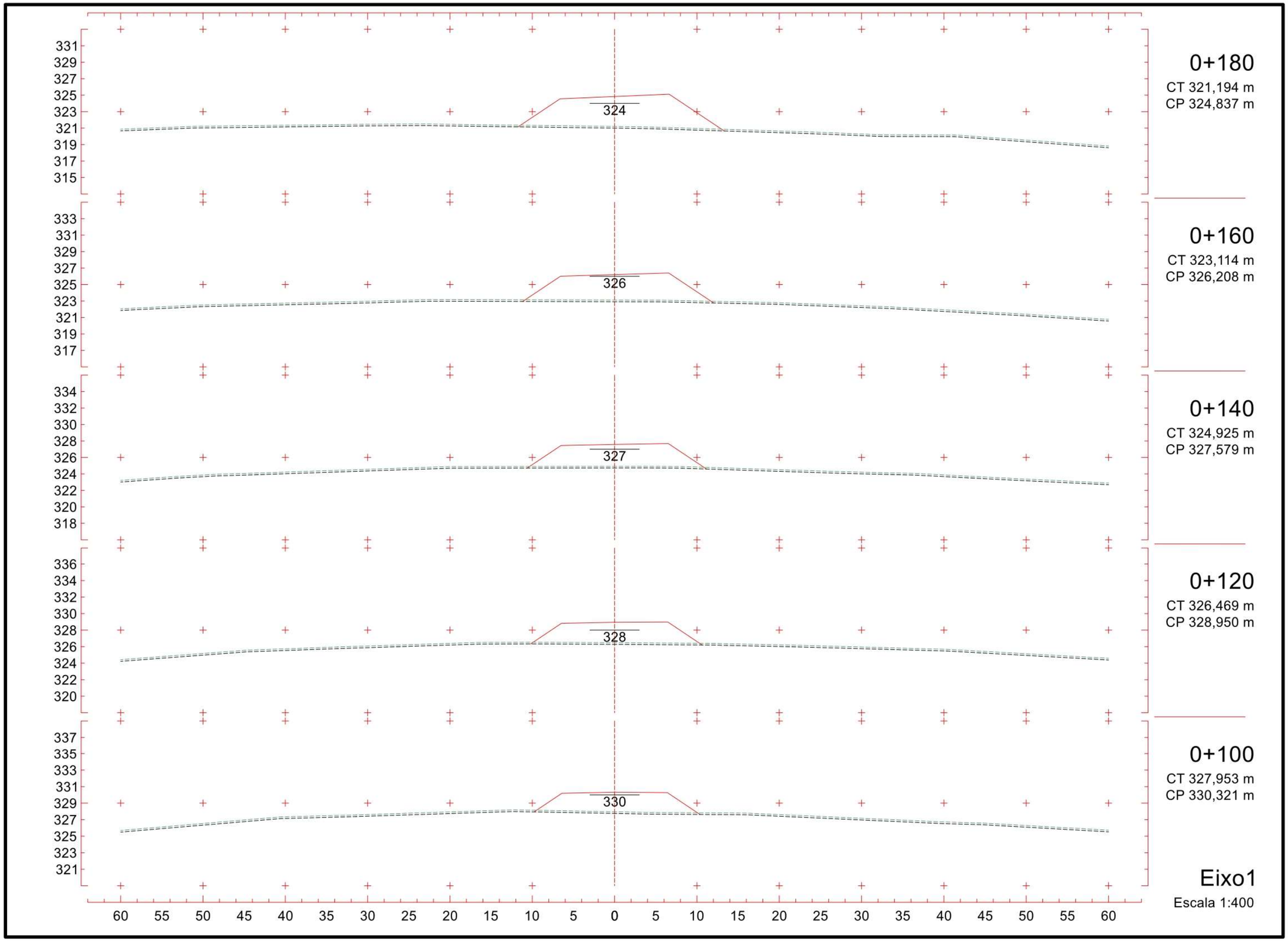
Detalhamento do Projeto Geométrico

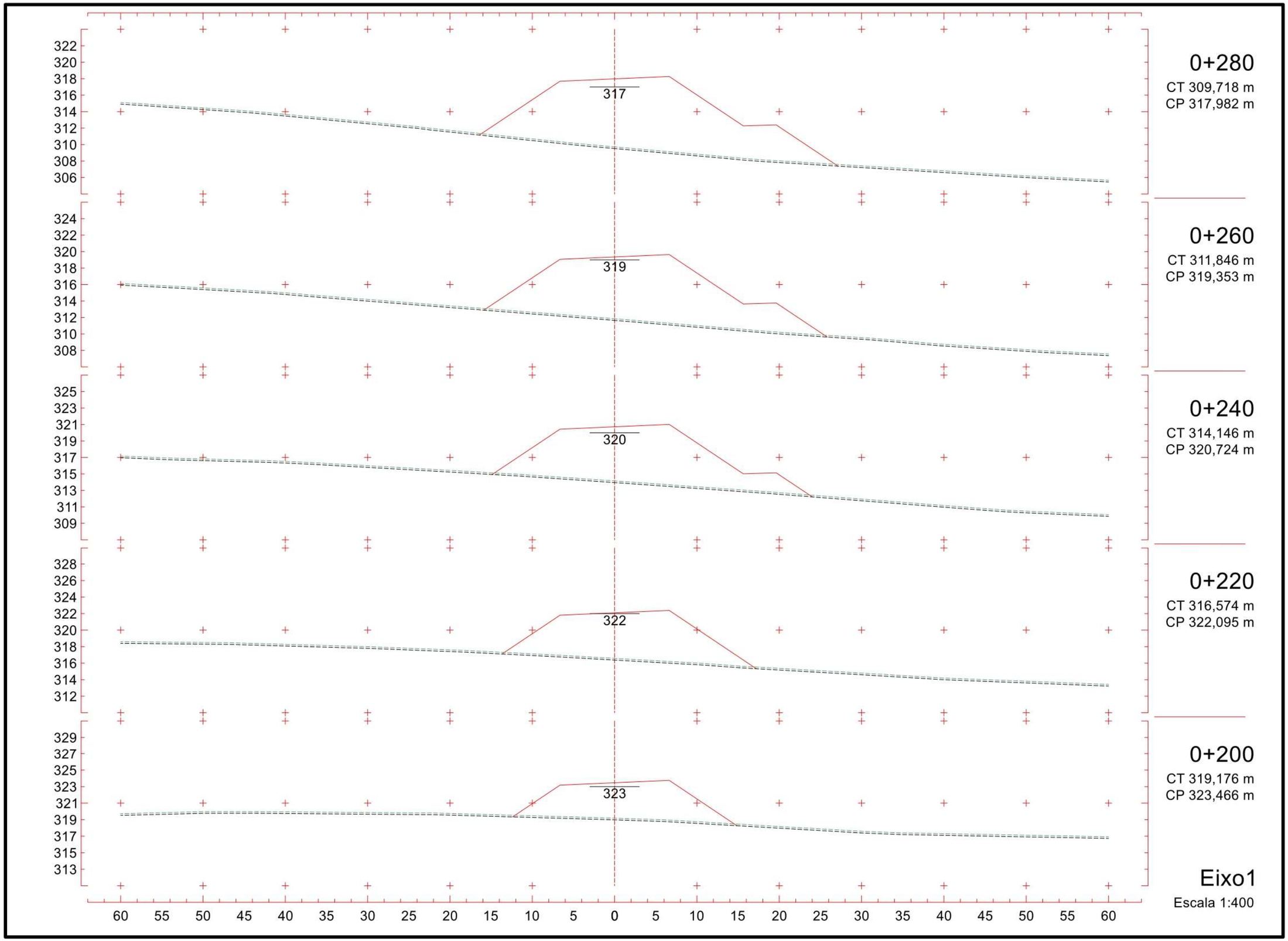

Universidade Federal de Santa Maria
Centro de Tecnologia-CT/Engenharia Civil-EC
Laboratório de Mobilidade e Logística - LAMOT
Rodovia: PPP-032/2/1
Trecho: Lote 2
Data: 16/08/2022
Escala:
1:2000
PROJETO GEOMÉTRICO
Código:
05/06

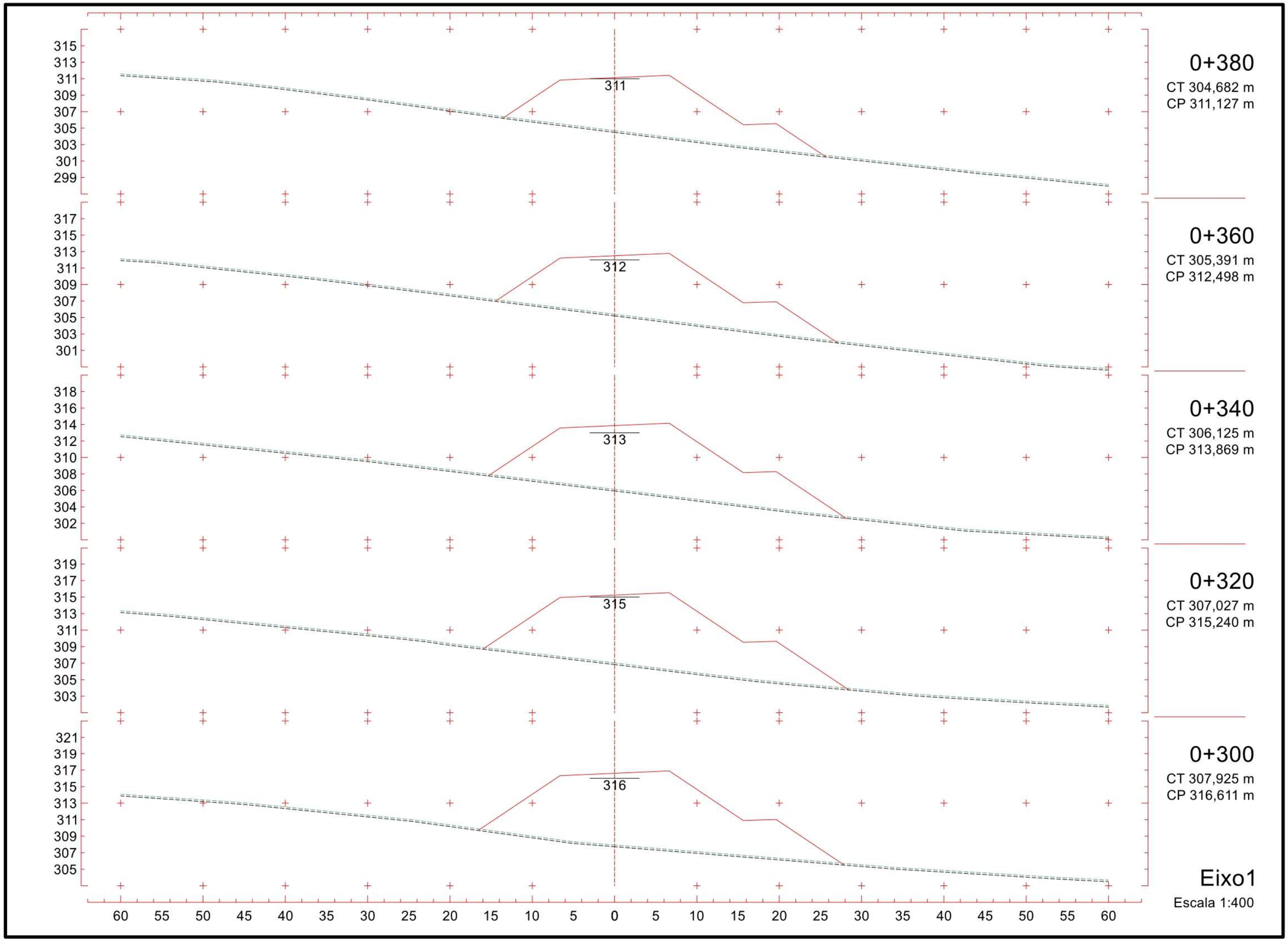
Seções transversais

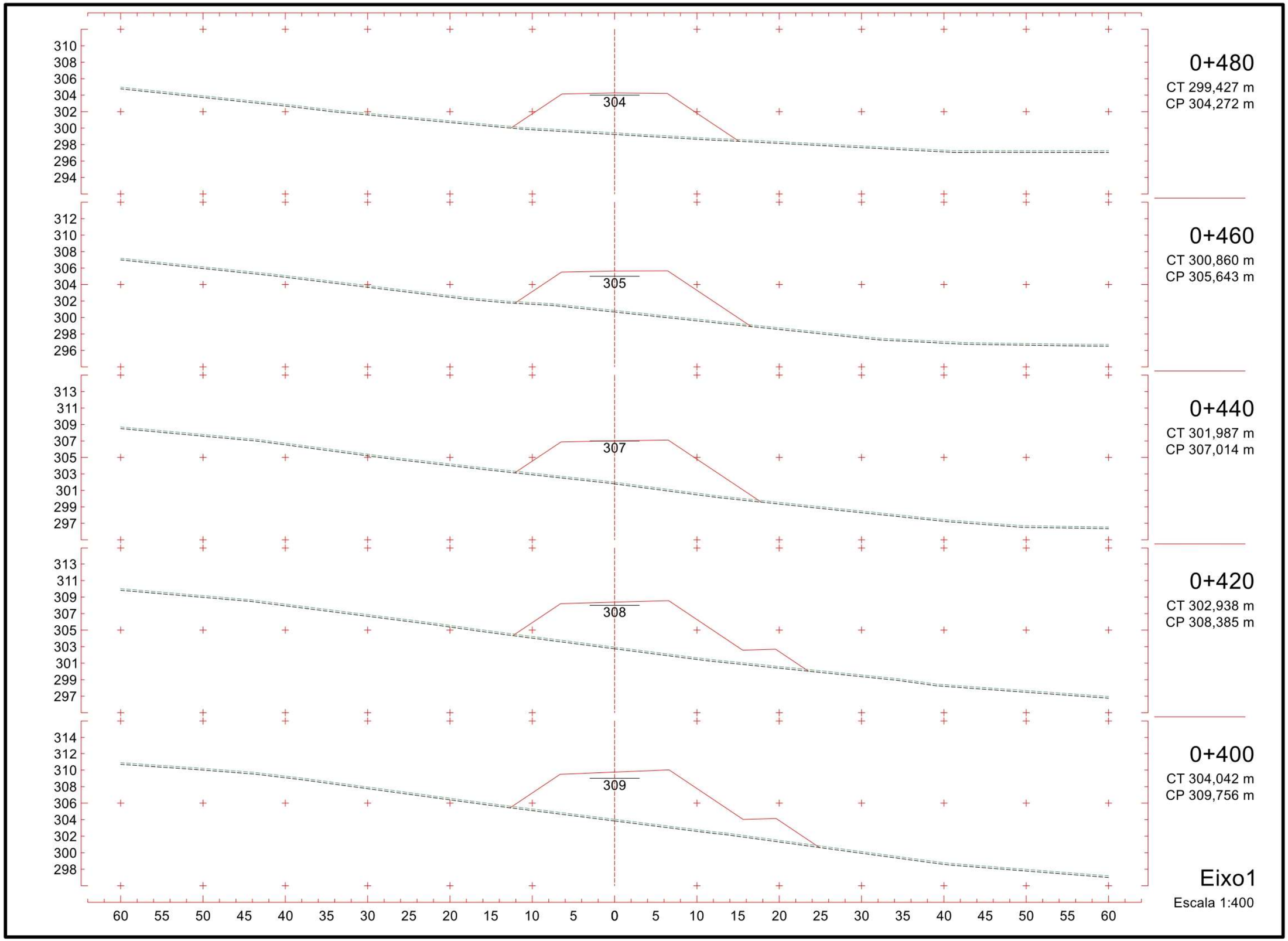
As imagens a seguir, mostram seções transversais para diferentes ocasiões durante a do lote 2 da rodovia. Apresenta situações em que é preciso ter aterro, corte e, inclusive, seções mistas. É de suma importância sua confecção, pois é um detalhamento apurado de inclinações de pistas, acostamentos e folgas. Todos dados foram retirados de normas pré-estipuladas, levando em conta equações e números tabelados, visando a segurança do tráfego.

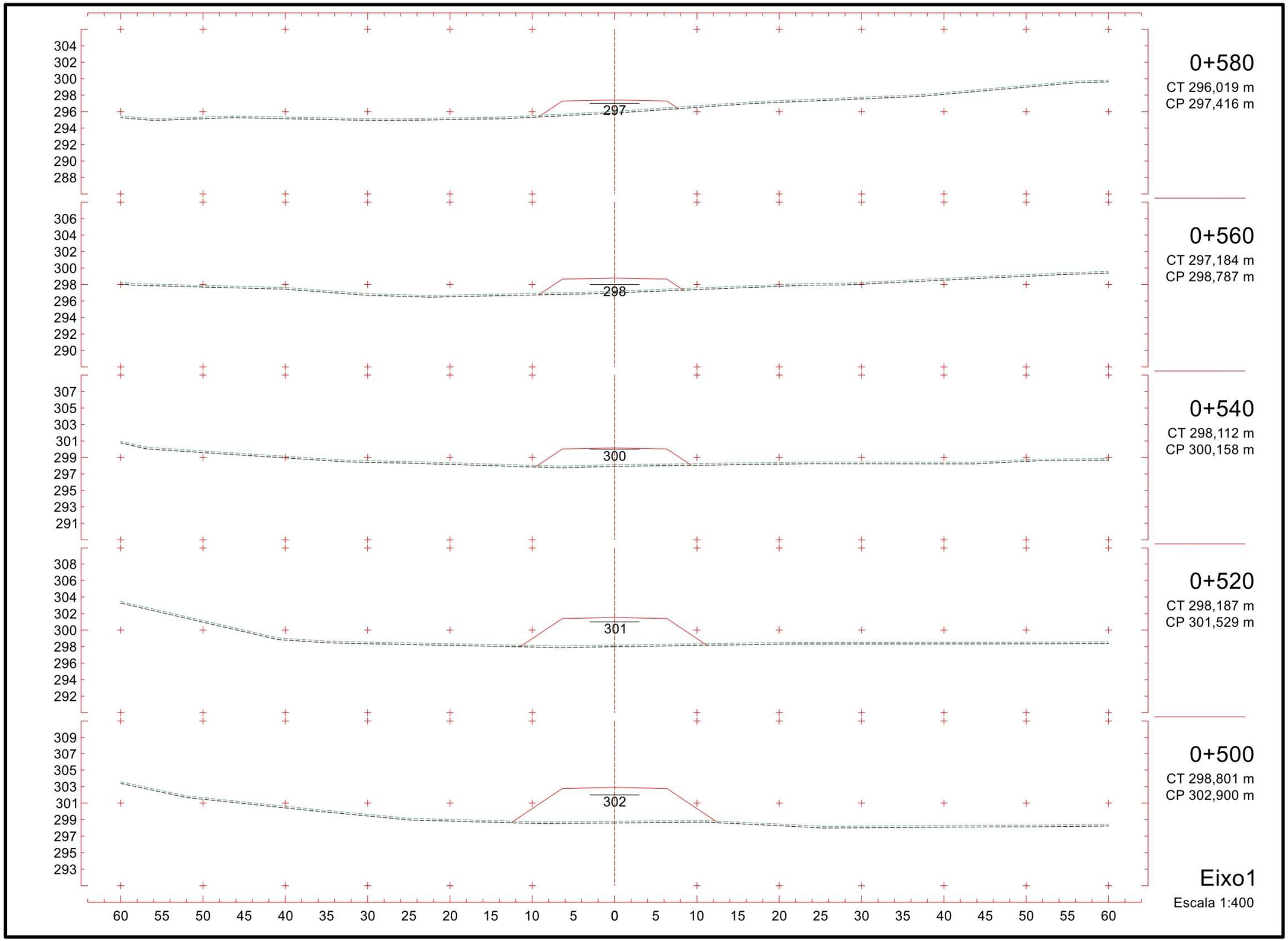

339
337
335
333
331
329
327
325
323
331
0+080
CT 329,633 m
CP 331,692 m
340
338
336
334
332
330
328
326
324
333
0+060
CT 331,362 m
CP 333,063 m
341
339
337
335
333
331
329
327
325
334
0+040
CT 333,295 m
CP 334,434 m
343
341
339
337
335
333
331
329
327
335
0+020
CT 335,403 m
CP 335,805 m
345
343
341
339
337
335
333
331
329
337
0+000
CT 337,759 m
CP 337,176 m
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
Eixo1
Escala 1:400

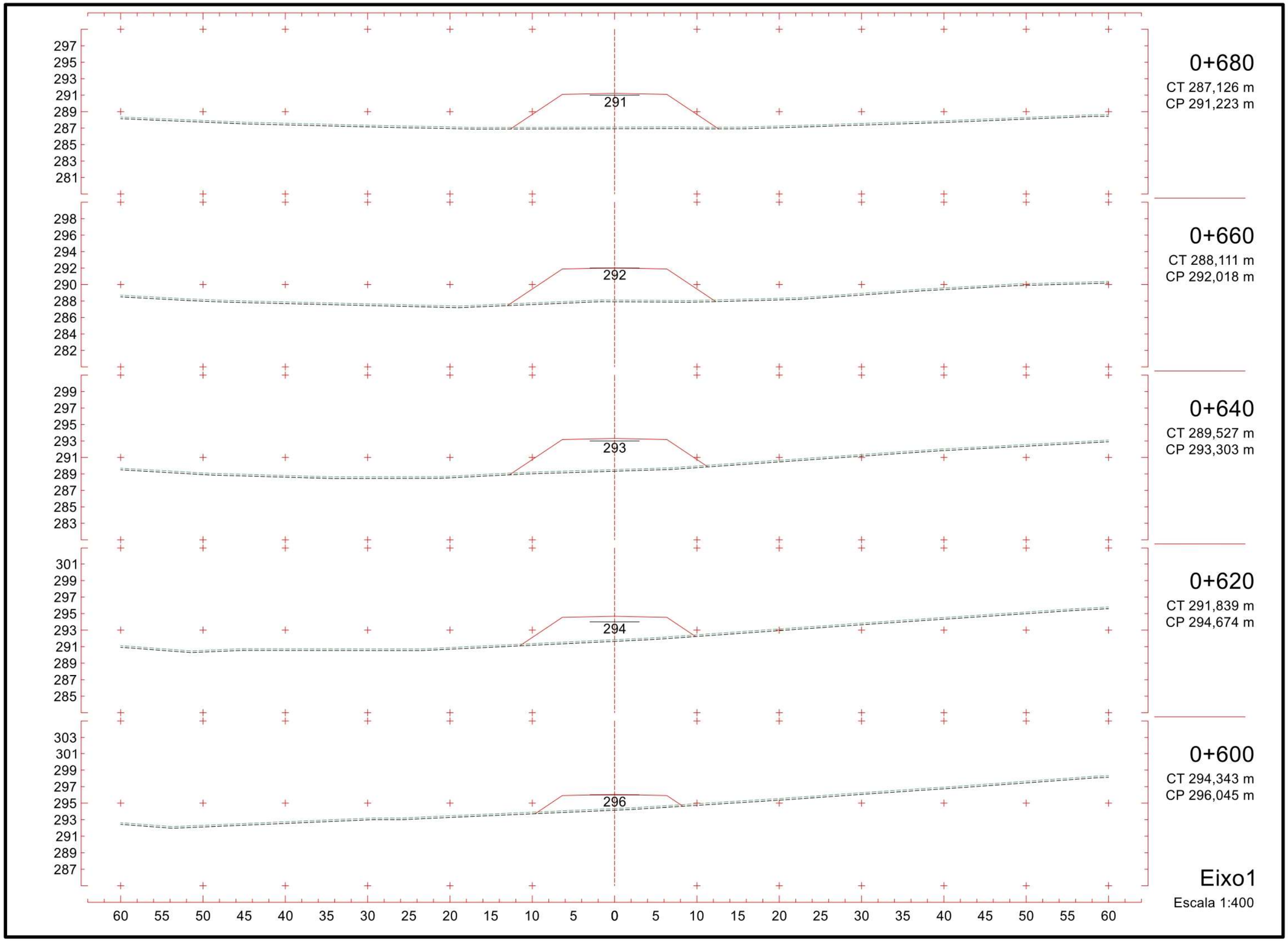

0+180
CT 321,194 m
CP 324,837 m
0+160
CT 323,114 m
CP 326,208 m
0+140
CT 324,925 m
CP 327,579 m
0+120
CT 326,469 m
CP 328,950 m
0+100
CT 327,953 m
CP 330,321 m
Eixo1
Escala 1:400
324
326
327
328
330
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

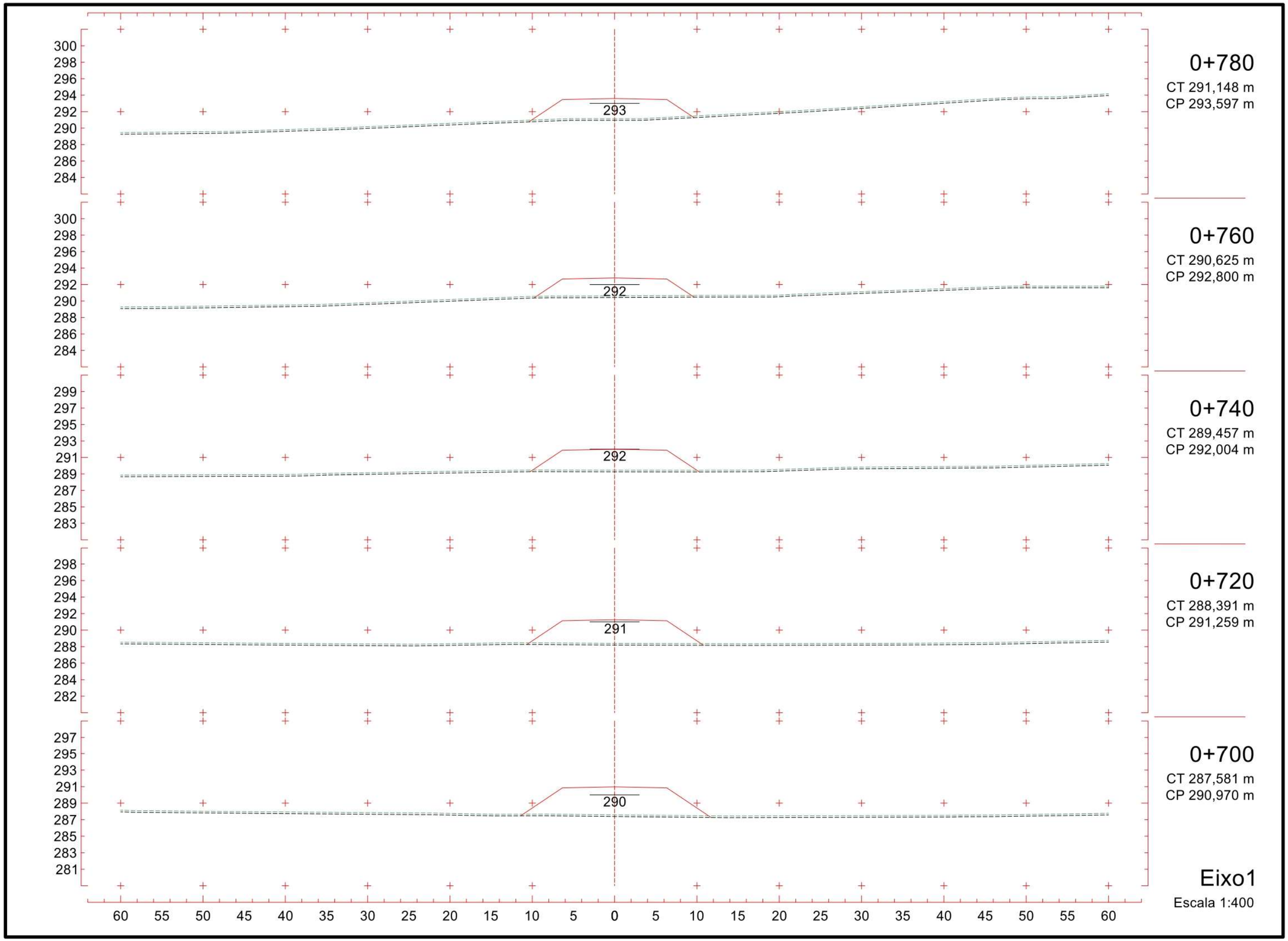

0+280
CT 309,718 m
CP 317,982 m
317
0+260
CT 311,846 m
CP 319,353 m
319
0+240
CT 314,146 m
CP 320,724 m
320
0+220
CT 316,574 m
CP 322,095 m
322
0+200
CT 319,176 m
CP 323,466 m
323
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

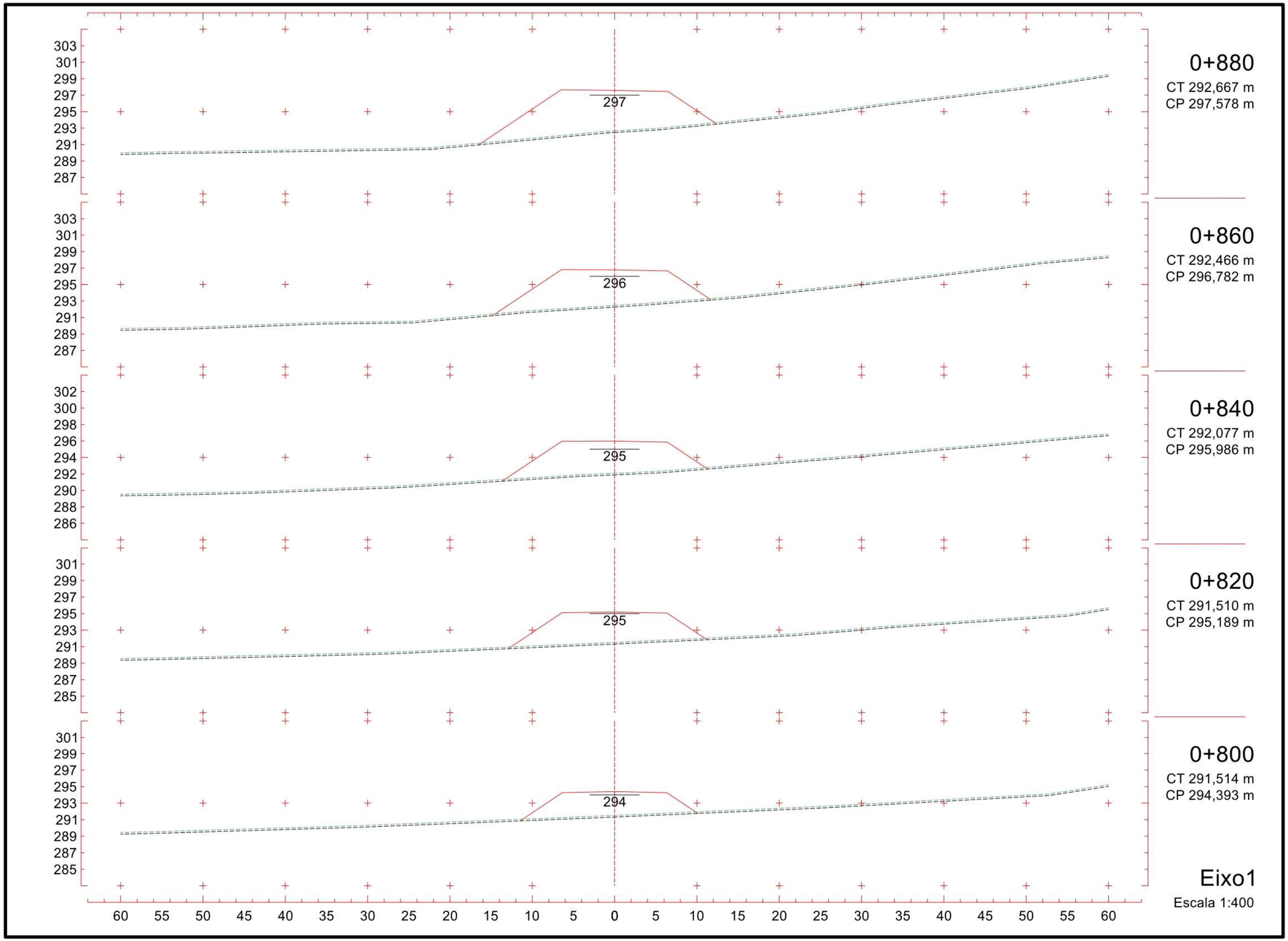

315
313
311
309
307
305
303
301
299
311
0+380
CT 304,682 m
CP 311,127 m
317
315
313
311
309
307
305
303
301
312
0+360
CT 305,391 m
CP 312,498 m
318
316
314
312
310
308
306
304
302
313
0+340
CT 306,125 m
CP 313,869 m
319
317
315
313
311
309
307
305
303
315
0+320
CT 307,027 m
CP 315,240 m
321
319
317
315
313
311
309
307
305
316
0+300
CT 307,925 m
CP 316,611 m
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
Eixo1
Escala 1:400

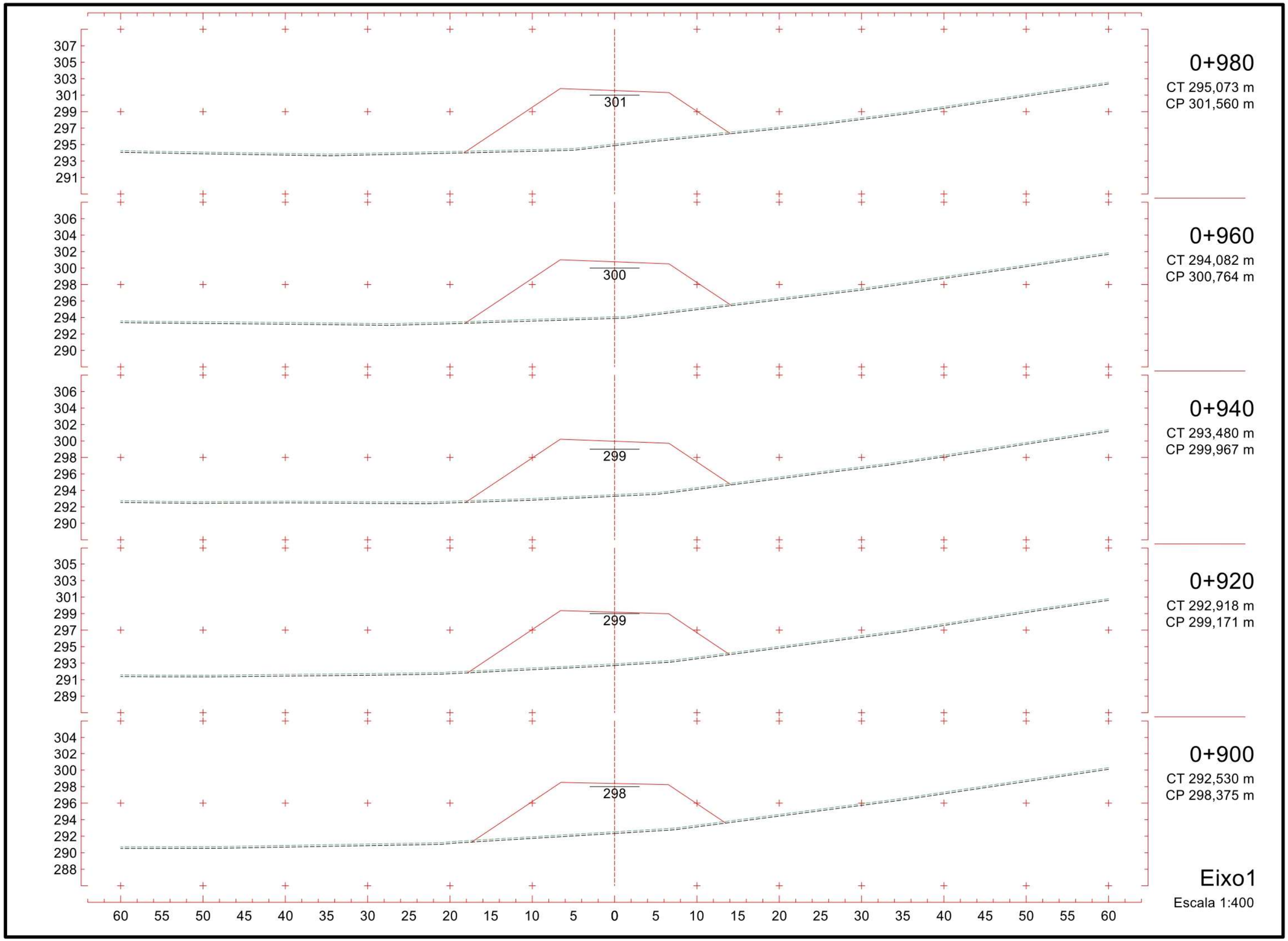

0+480
CT 299,427 m
CP 304,272 m
304
0+460
CT 300,860 m
CP 305,643 m
305
0+440
CT 301,987 m
CP 307,014 m
307
0+420
CT 302,938 m
CP 308,385 m
308
0+400
CT 304,042 m
CP 309,756 m
309
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

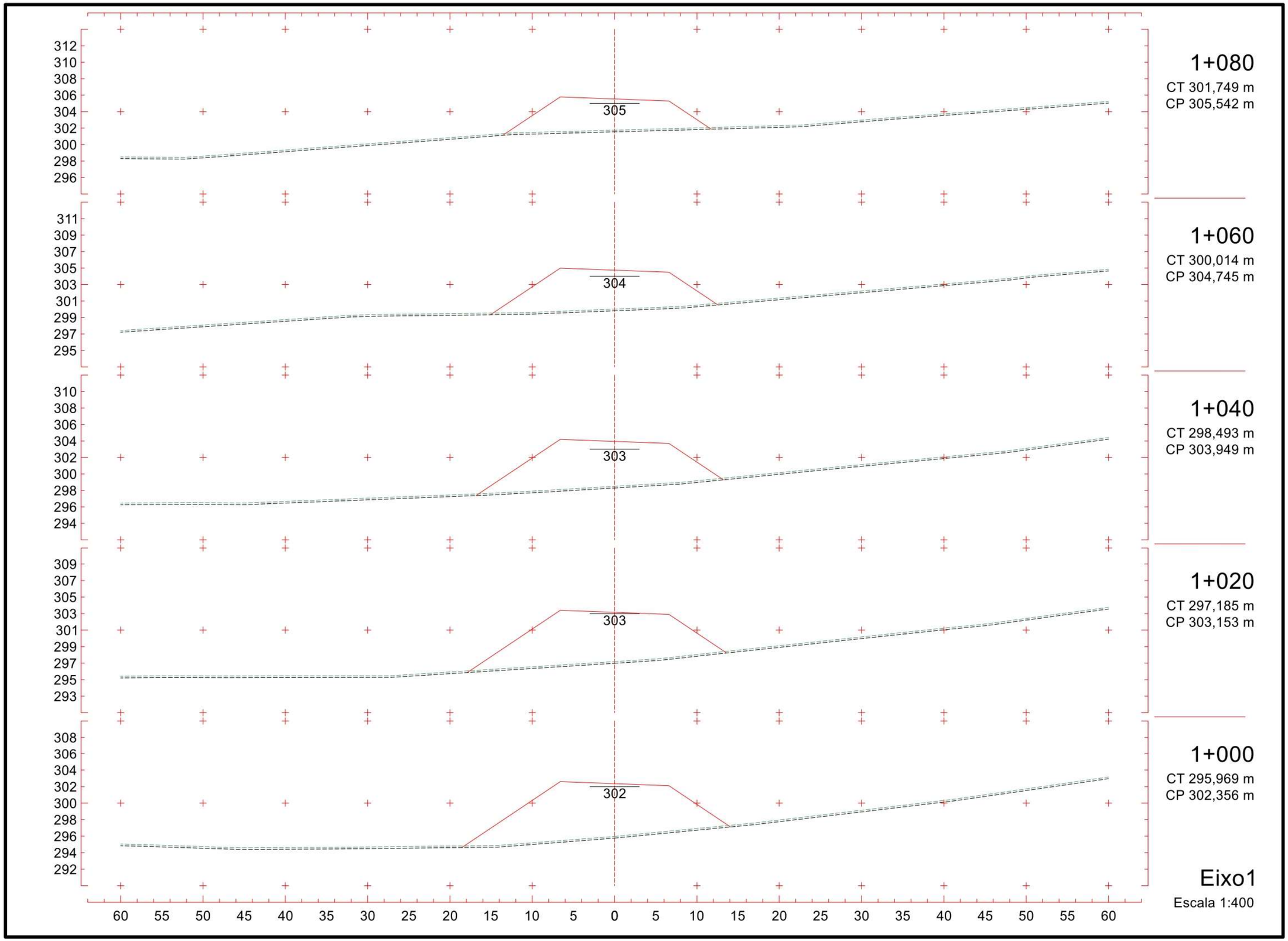

304
302
300
298
296
294
292
290
288
297
0+580
CT 296,019 m
CP 297,416 m
306
304
302
300
298
296
294
292
290
298
0+560
CT 297,184 m
CP 298,787 m
307
305
303
301
299
297
295
293
291
300
0+540
CT 298,112 m
CP 300,158 m
308
306
304
302
300
298
296
294
292
301
0+520
CT 298,187 m
CP 301,529 m
309
307
305
303
301
299
297
295
293
302
0+500
CT 298,801 m
CP 302,900 m
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
Eixo1
Escala 1:400

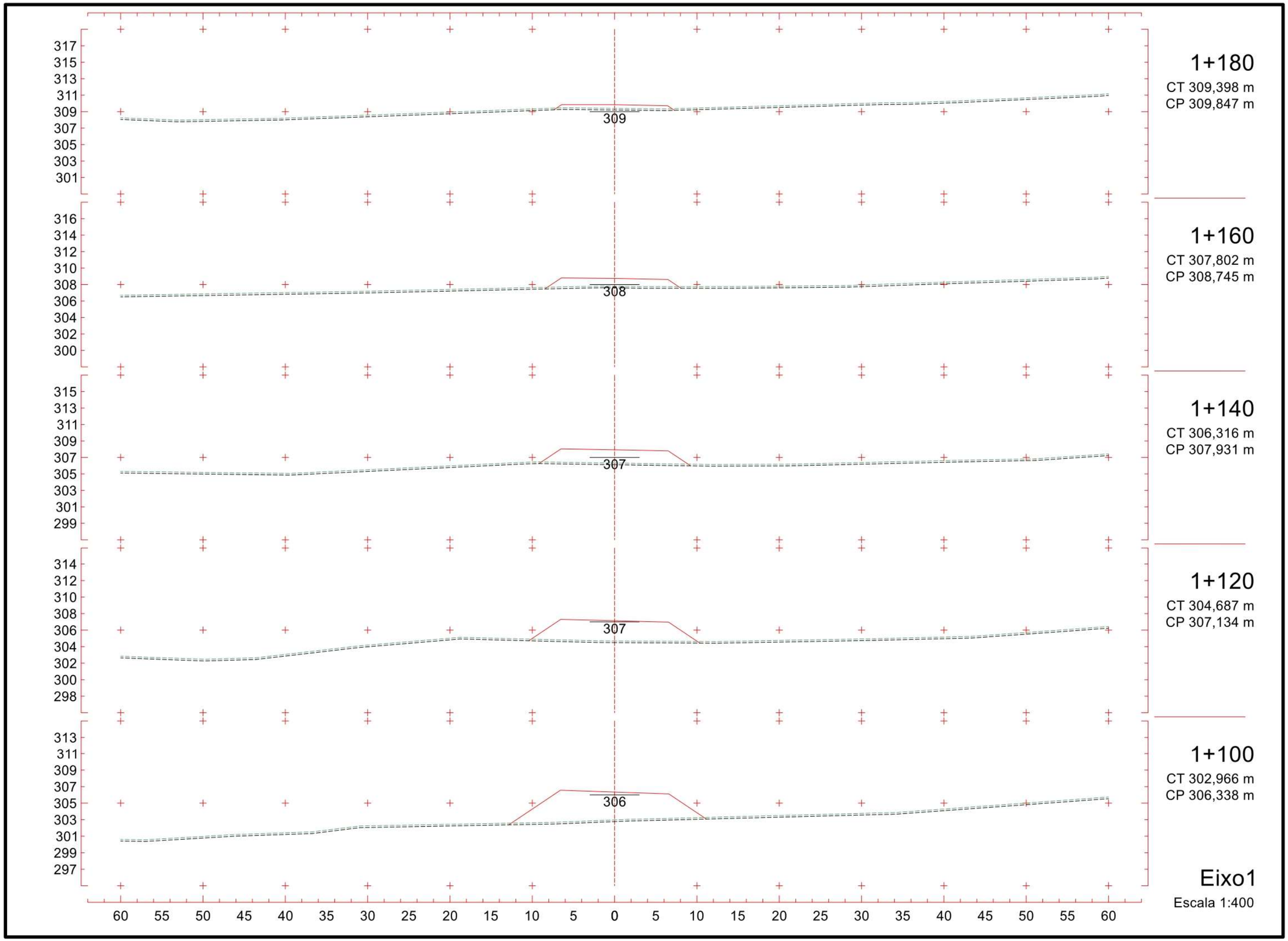

297
295
293
291
289
287
285
283
281
291
0+680
CT 287,126 m
CP 291,223 m
298
296
294
292
290
288
286
284
282
292
0+660
CT 288,111 m
CP 292,018 m
299
297
295
293
291
289
287
285
283
293
0+640
CT 289,527 m
CP 293,303 m
301
299
297
295
293
291
289
287
285
294
0+620
CT 291,839 m
CP 294,674 m
303
301
299
297
295
293
291
289
287
296
0+600
CT 294,343 m
CP 296,045 m
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
Eixo1
Escala 1:400

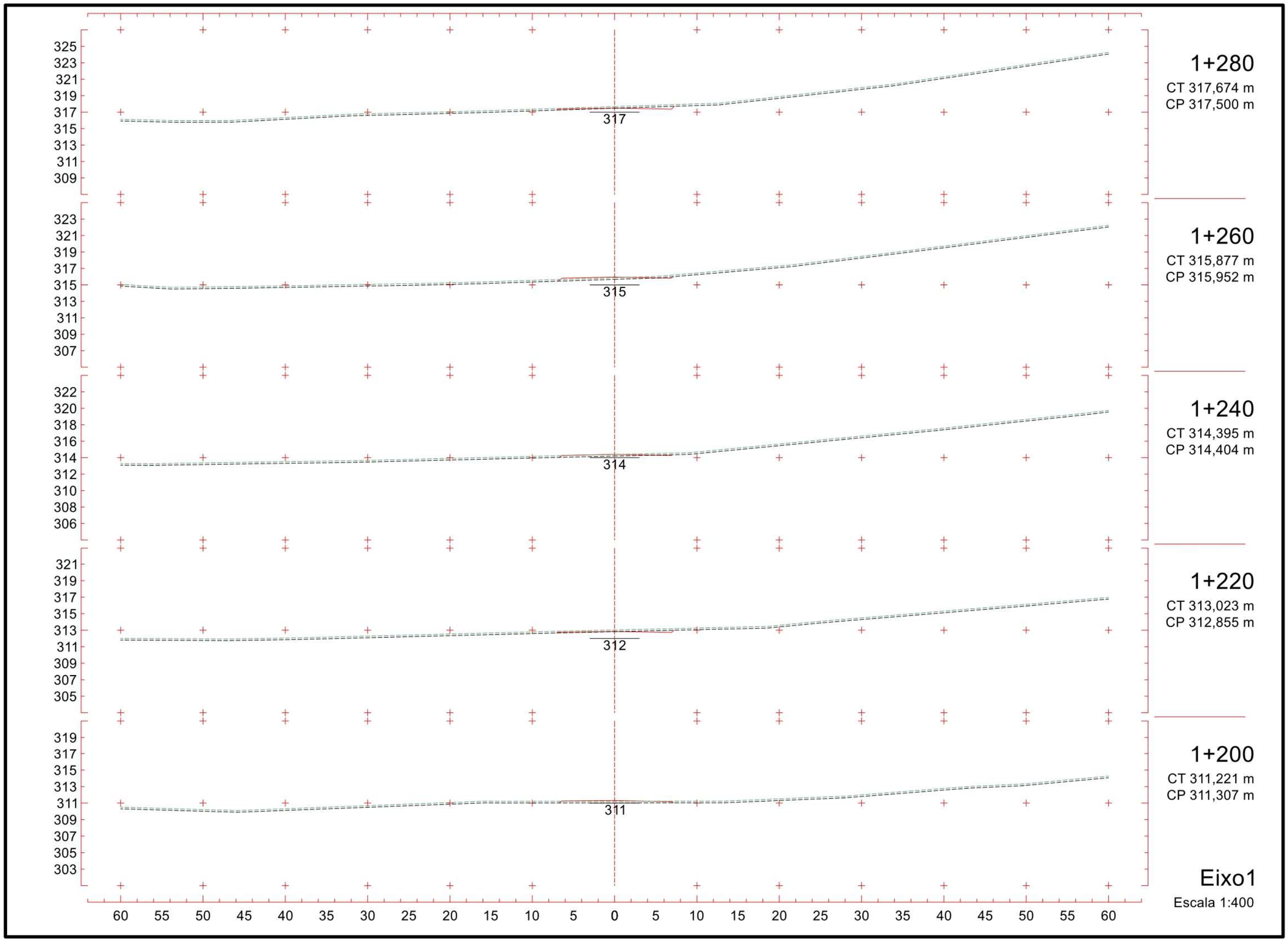

0+780
CT 291,148 m
CP 293,597 m
0+760
CT 290,625 m
CP 292,800 m
0+740
CT 289,457 m
CP 292,004 m
0+720
CT 288,391 m
CP 291,259 m
0+700
CT 287,581 m
CP 290,970 m
Eixo1
Escala 1:400

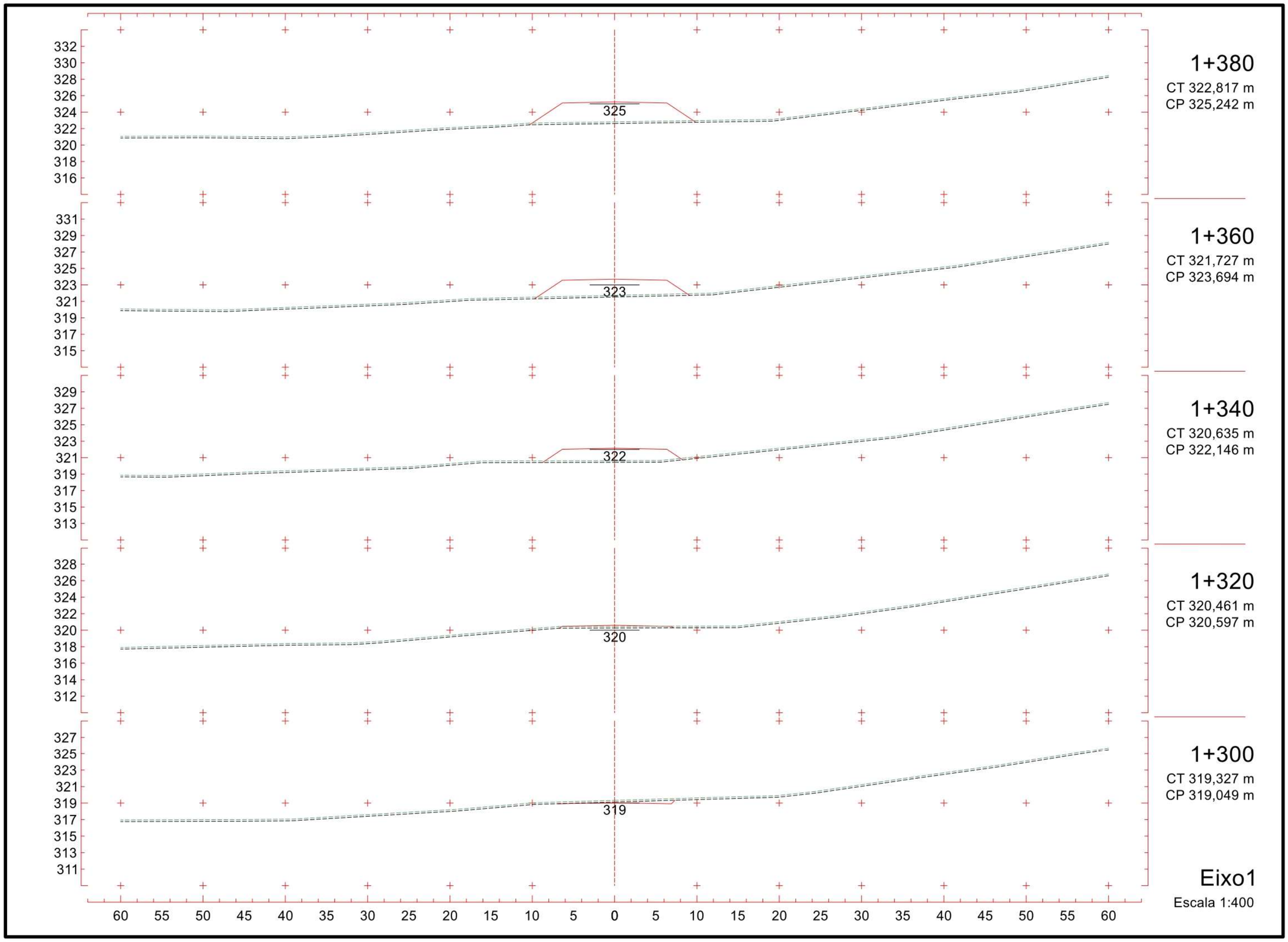

303
301
299
297
295
293
291
289
287
297
0+880
CT 292,667 m
CP 297,578 m
303
301
299
297
295
293
291
289
287
296
0+860
CT 292,466 m
CP 296,782 m
302
300
298
296
294
292
290
288
286
295
0+840
CT 292,077 m
CP 295,986 m
301
299
297
295
293
291
289
287
285
295
0+820
CT 291,510 m
CP 295,189 m
301
299
297
295
293
291
289
287
285
294
0+800
CT 291,514 m
CP 294,393 m
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
Eixo1
Escala 1:400

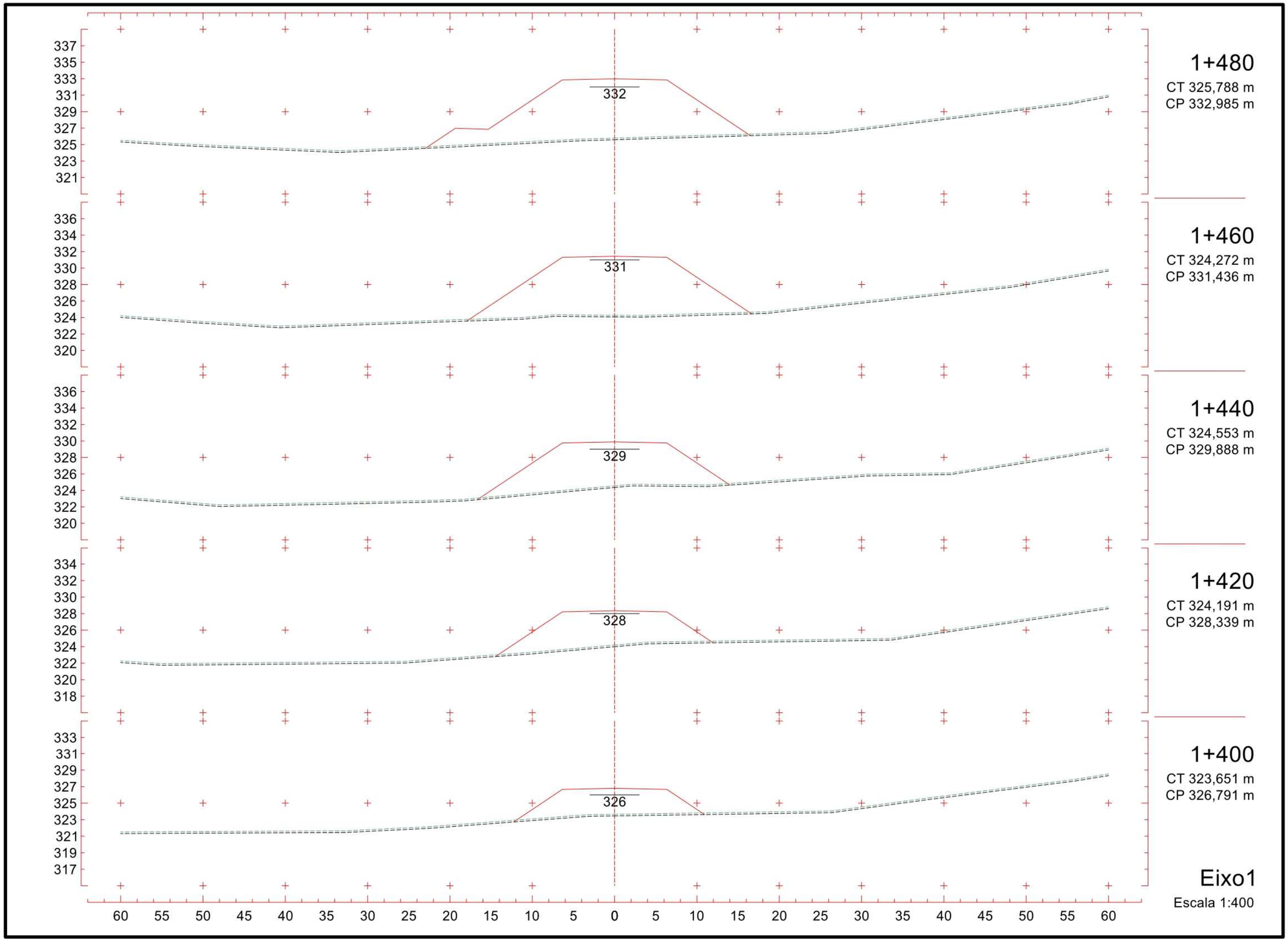

307
305
303
301
299
297
295
293
291
301
0+980
CT 295,073 m
CP 301,560 m
306
304
302
300
298
296
294
292
290
300
0+960
CT 294,082 m
CP 300,764 m
306
304
302
300
298
296
294
292
290
299
0+940
CT 293,480 m
CP 299,967 m
305
303
301
299
297
295
293
291
289
299
0+920
CT 292,918 m
CP 299,171 m
304
302
300
298
296
294
292
290
288
298
0+900
CT 292,530 m
CP 298,375 m
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
Eixo1
Escala 1:400


312
310
308
306
304
302
300
298
296
305
1+080
CT 301,749 m
CP 305,542 m
311
309
307
305
303
301
299
297
295
304
1+060
CT 300,014 m
CP 304,745 m
310
308
306
304
302
300
298
296
294
303
1+040
CT 298,493 m
CP 303,949 m
309
307
305
303
301
299
297
295
293
303
1+020
CT 297,185 m
CP 303,153 m
308
306
304
302
300
298
296
294
292
302
1+000
CT 295,969 m
CP 302,356 m
Eixo1
Escala 1:400
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

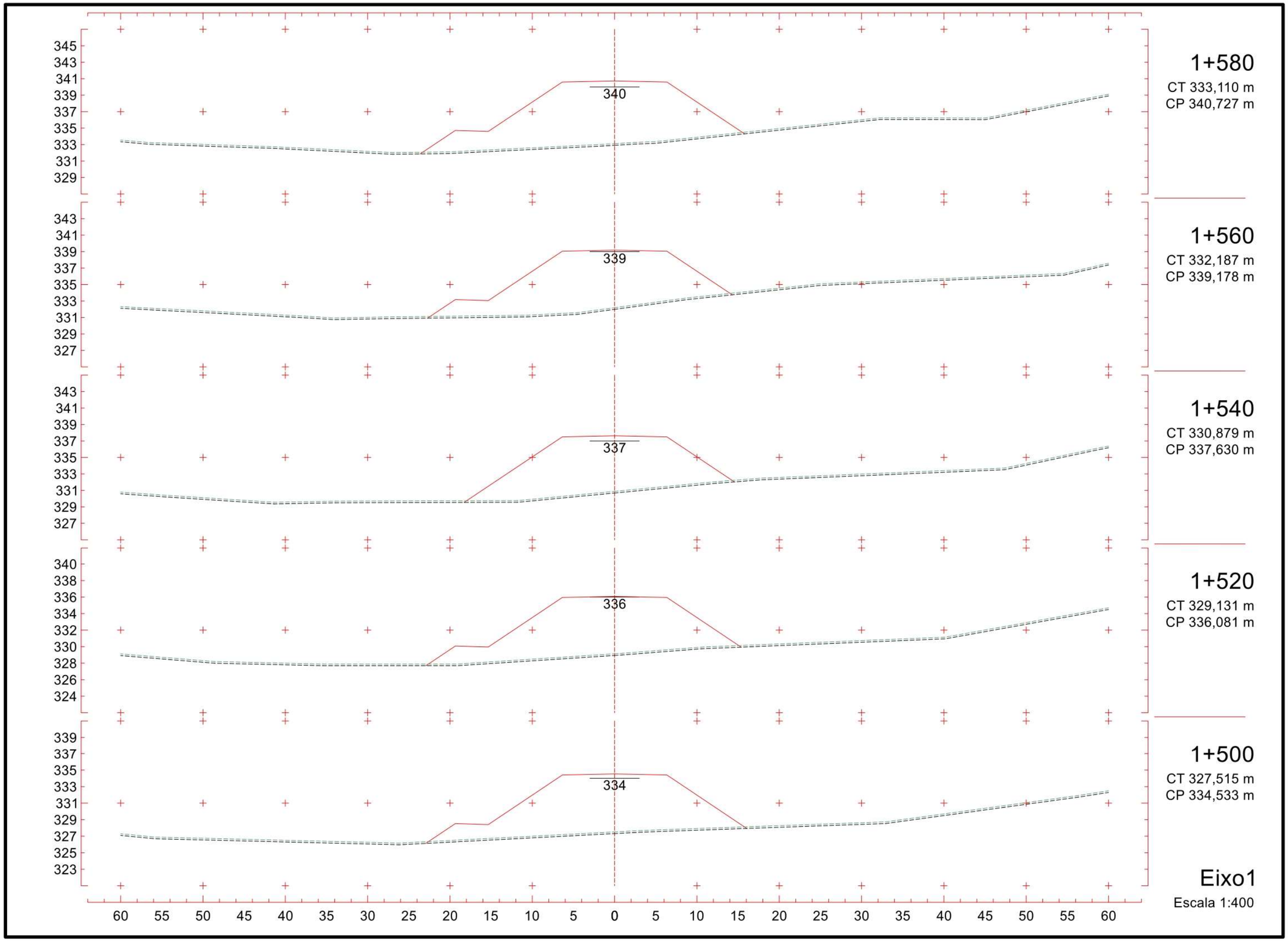

317
315
313
311
309
307
305
303
301
309
1+180
CT 309,398 m
CP 309,847 m
316
314
312
310
308
306
304
302
300
308
1+160
CT 307,802 m
CP 308,745 m
315
313
311
309
307
305
303
301
299
307
1+140
CT 306,316 m
CP 307,931 m
314
312
310
308
306
304
302
300
298
307
1+120
CT 304,687 m
CP 307,134 m
313
311
309
307
305
303
301
299
297
306
1+100
CT 302,966 m
CP 306,338 m
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
Eixo1
Escala 1:400

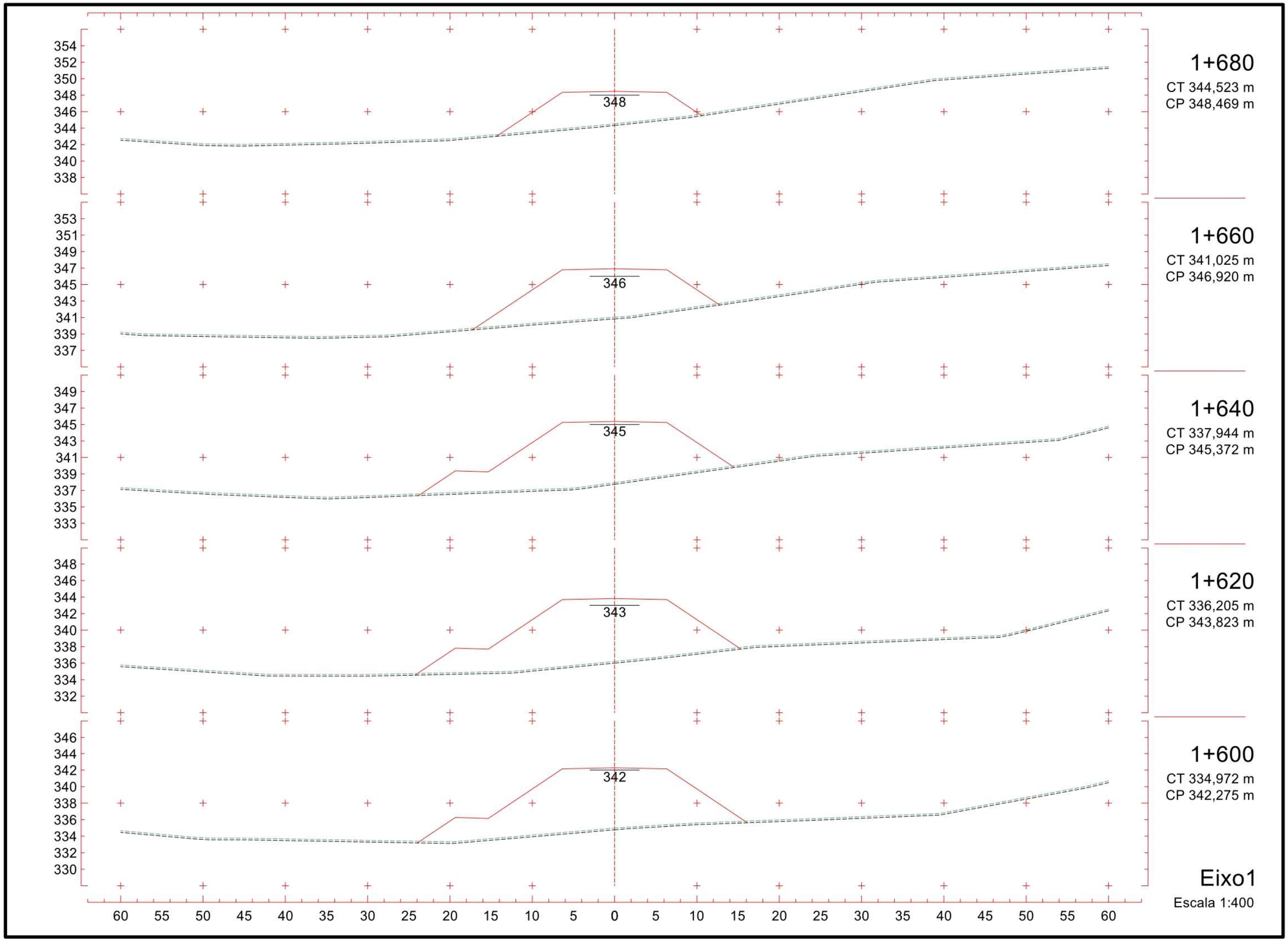

325
323
321
319
317
315
313
311
309
317
1+280
CT 317,674 m
CP 317,500 m
323
321
319
317
315
313
311
309
307
315
1+260
CT 315,877 m
CP 315,952 m
322
320
318
316
314
312
310
308
306
314
1+240
CT 314,395 m
CP 314,404 m
321
319
317
315
313
311
309
307
305
312
1+220
CT 313,023 m
CP 312,855 m
319
317
315
313
311
309
307
305
303
311
1+200
CT 311,221 m
CP 311,307 m
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
Eixo1
Escala 1:400

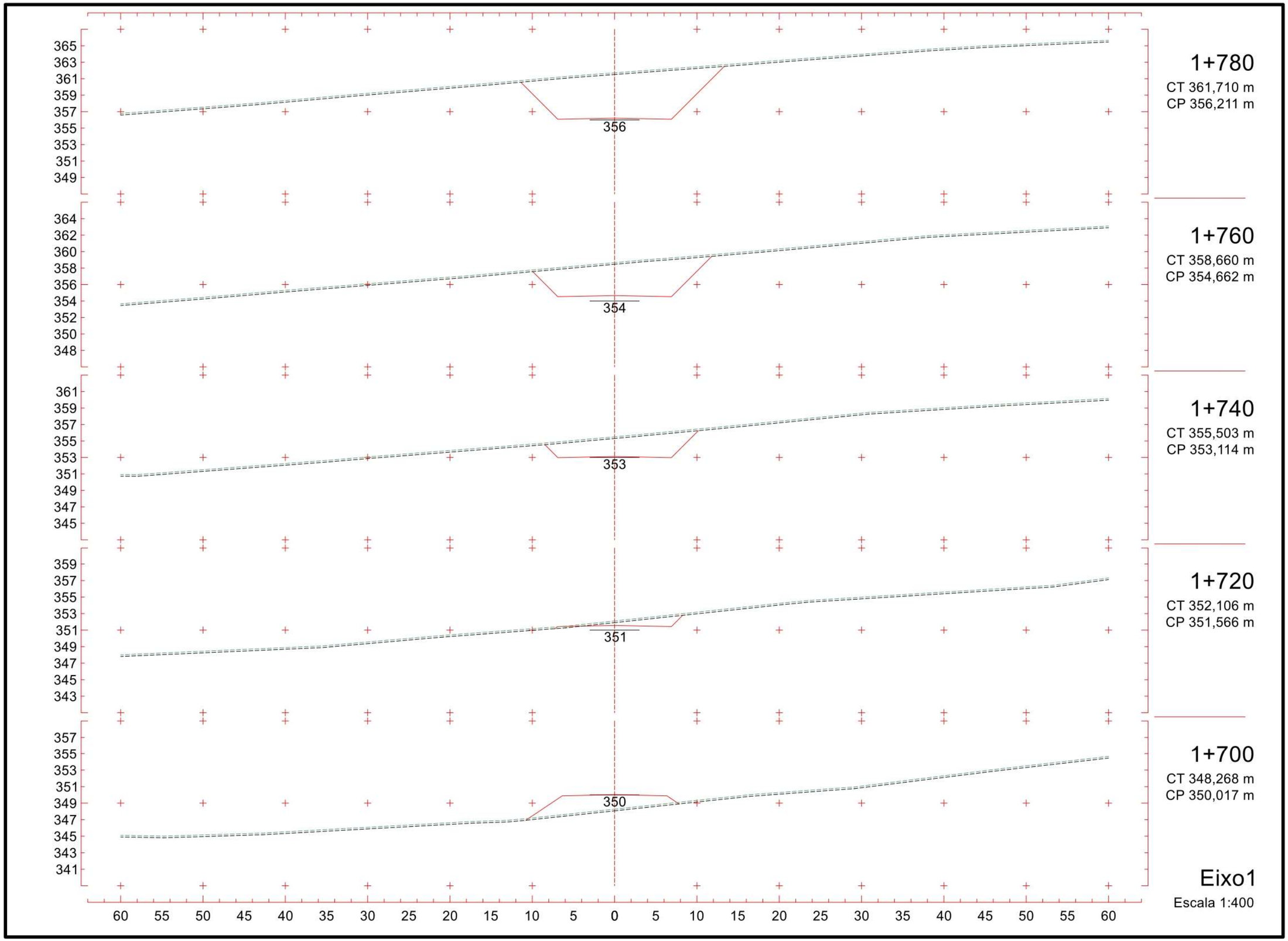

332
330
328
326
324
322
320
318
316
325
1+380
CT 322,817 m
CP 325,242 m
331
329
327
325
323
321
319
317
315
323
1+360
CT 321,727 m
CP 323,694 m
329
327
325
323
321
319
317
315
313
322
1+340
CT 320,635 m
CP 322,146 m
328
326
324
322
320
318
316
314
312
320
1+320
CT 320,461 m
CP 320,597 m
327
325
323
321
319
317
315
313
311
319
1+300
CT 319,327 m
CP 319,049 m
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
Eixo1
Escala 1:400

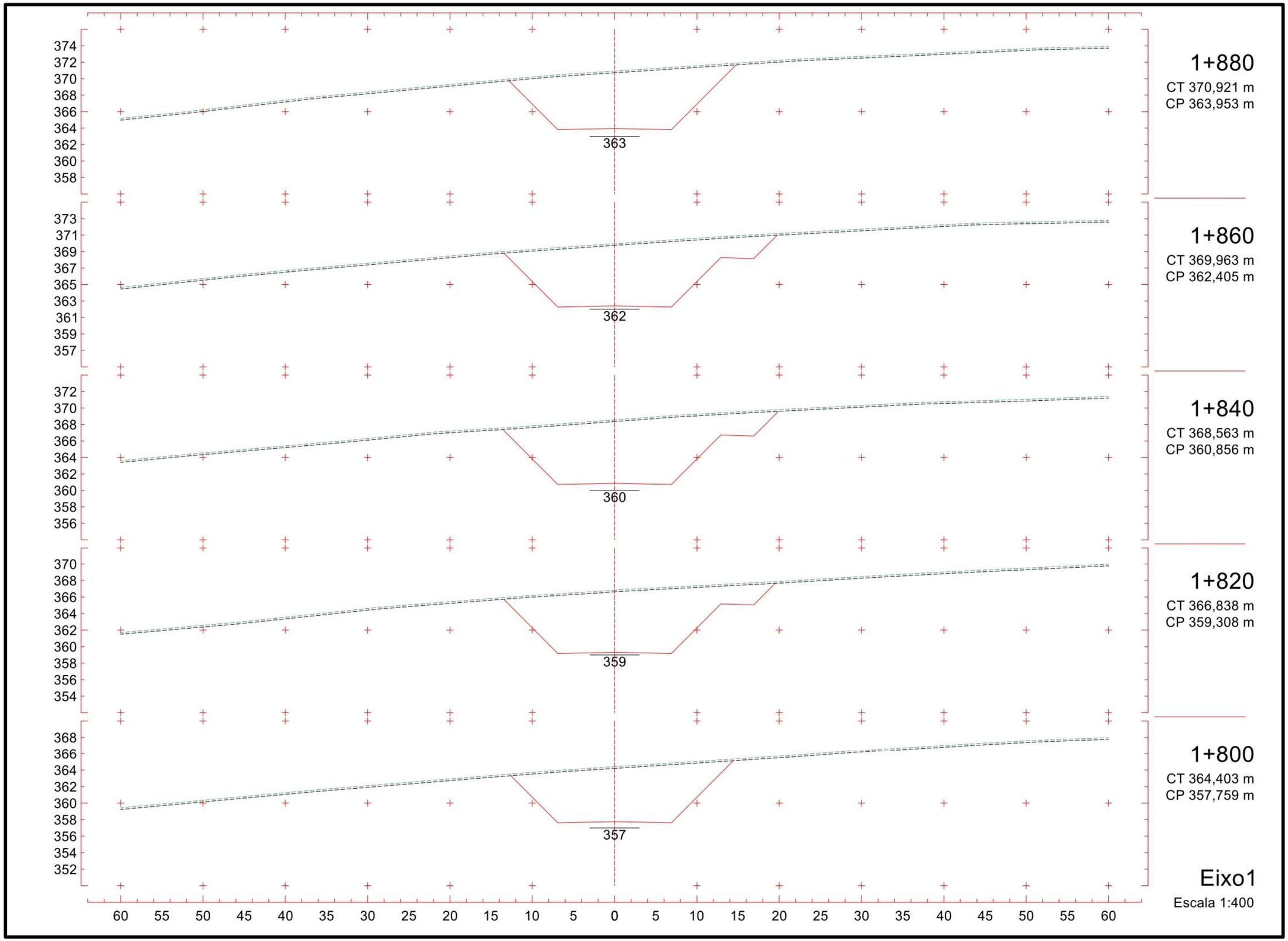

337
335
333
331
329
327
325
323
321
332
1+480
CT 325,788 m
CP 332,985 m
336
334
332
330
328
326
324
322
320
331
1+460
CT 324,272 m
CP 331,436 m
336
334
332
330
328
326
324
322
320
329
1+440
CT 324,553 m
CP 329,888 m
334
332
330
328
326
324
322
320
318
328
1+420
CT 324,191 m
CP 328,339 m
333
331
329
327
325
323
321
319
317
326
1+400
CT 323,651 m
CP 326,791 m
Eixo1
Escala 1:400
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

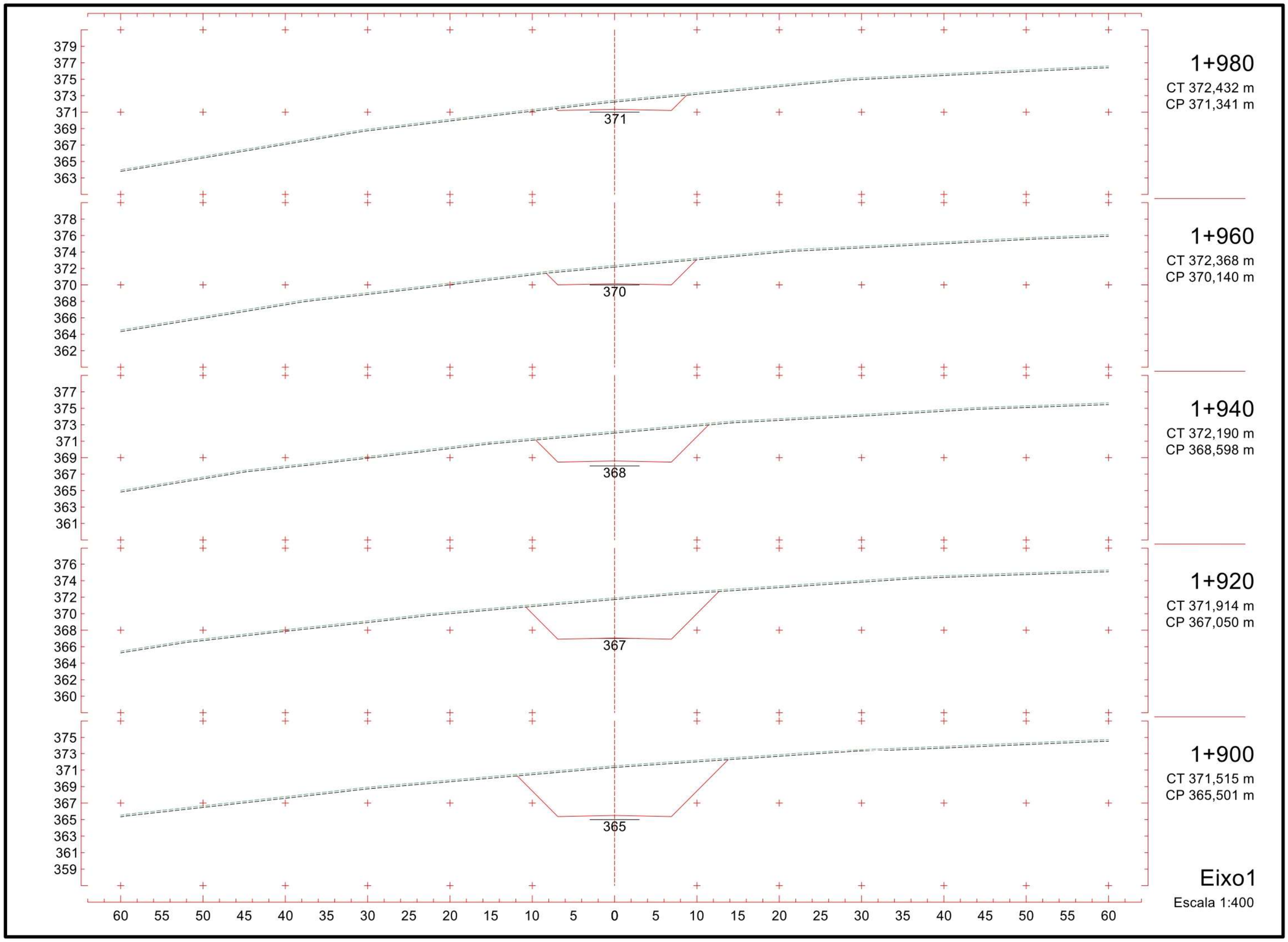
420

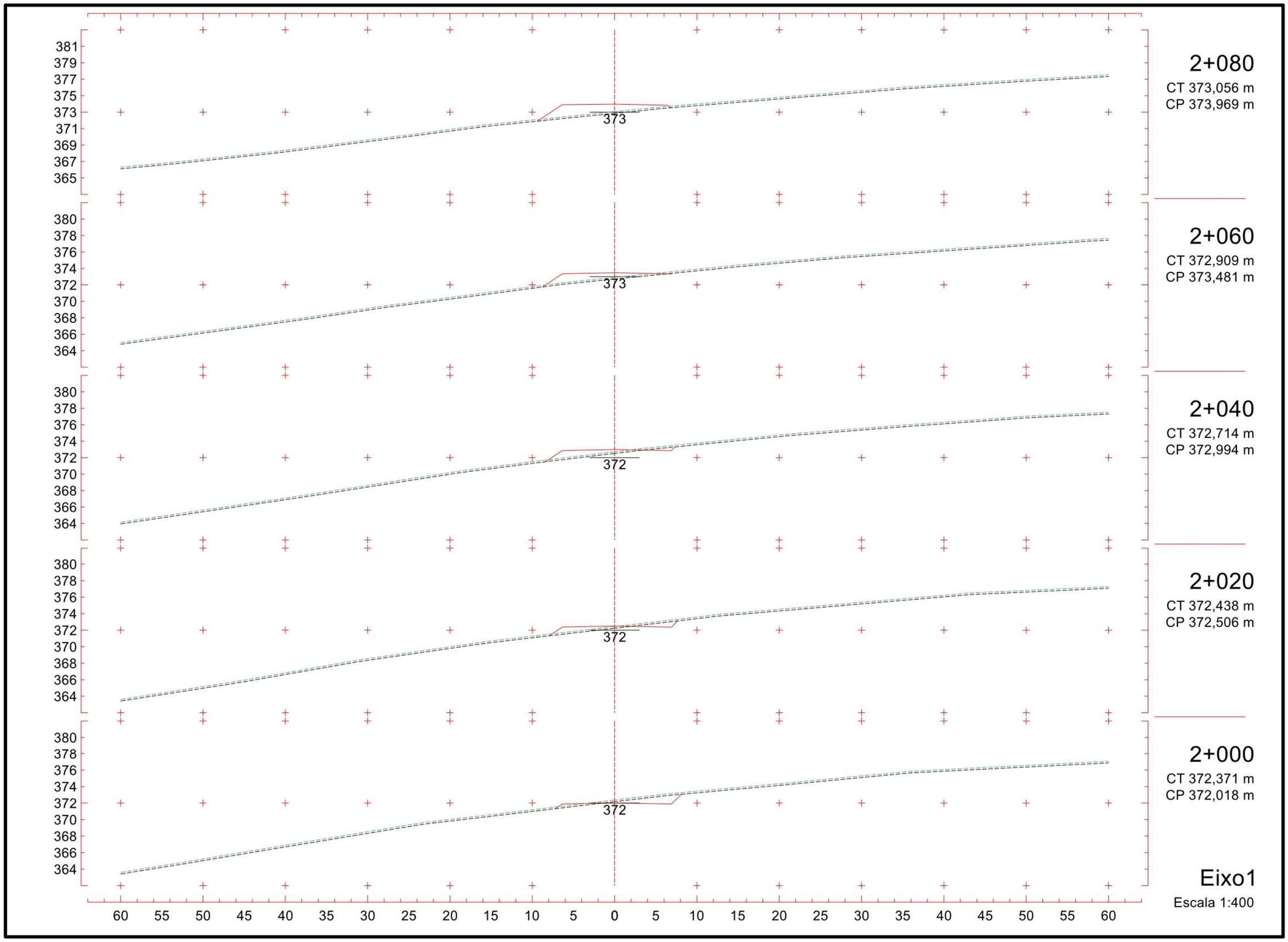

345
343
341
339
337
335
333
331
329
340
1+580
CT 333,110 m
CP 340,727 m
343
341
339
337
335
333
331
329
327
339
1+560
CT 332,187 m
CP 339,178 m
343
341
339
337
335
333
331
329
327
325
323
337
1+540
CT 330,879 m
CP 337,630 m
340
338
336
334
332
330
328
326
324
336
1+520
CT 329,131 m
CP 336,081 m
339
337
335
333
331
329
327
325
323
334
1+500
CT 327,515 m
CP 334,533 m
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
Eixo1
Escala 1:400

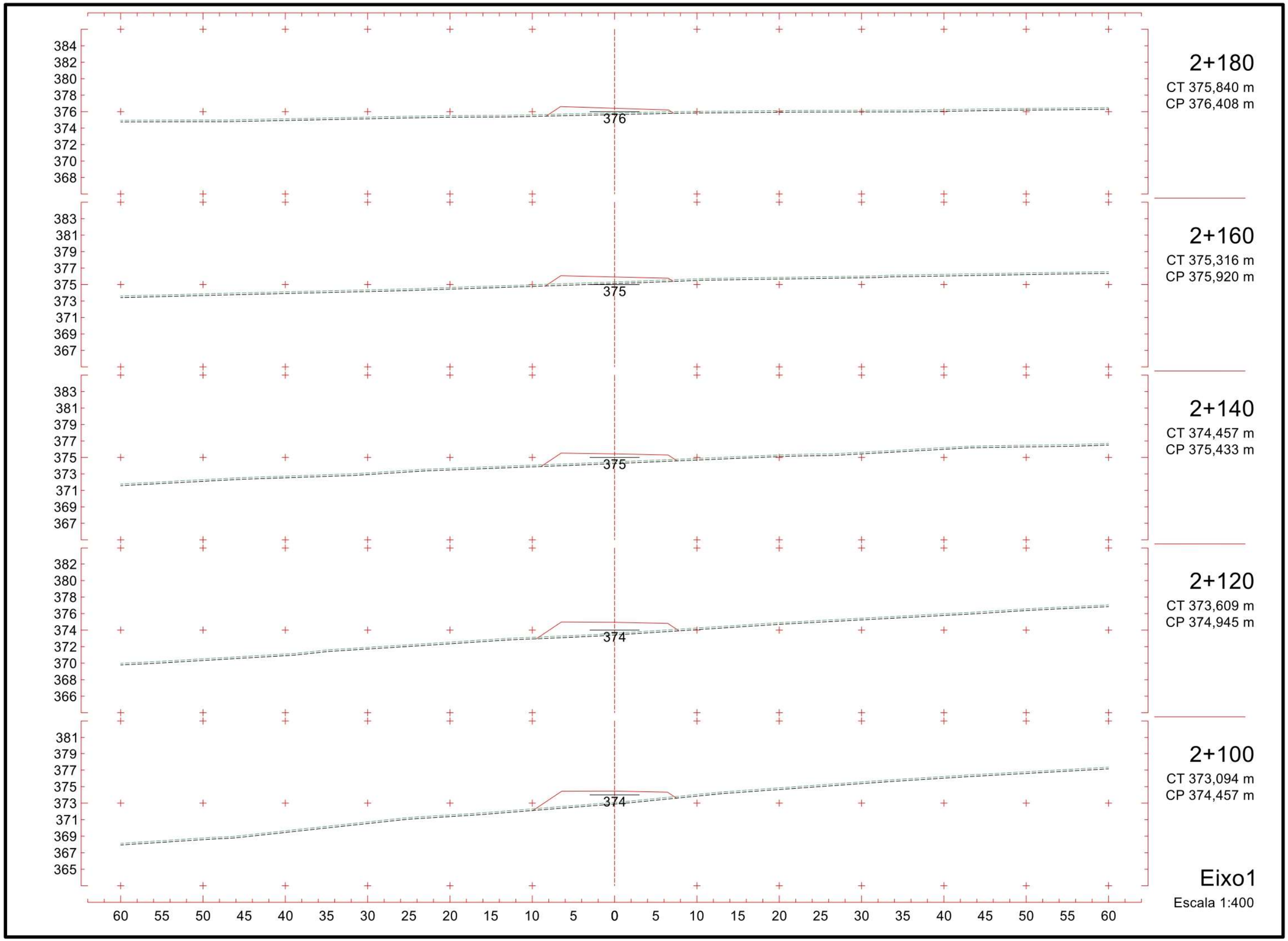

354
352
350
348
346
344
342
340
338
348
1+680
CT 344,523 m
CP 348,469 m
353
351
349
347
345
343
341
339
337
346
1+660
CT 341,025 m
CP 346,920 m
349
347
345
343
341
339
337
335
333
345
1+640
CT 337,944 m
CP 345,372 m
348
346
344
342
340
338
336
334
332
343
1+620
CT 336,205 m
CP 343,823 m
346
344
342
340
338
336
334
332
330
342
1+600
CT 334,972 m
CP 342,275 m
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
Eixo1
Escala 1:400

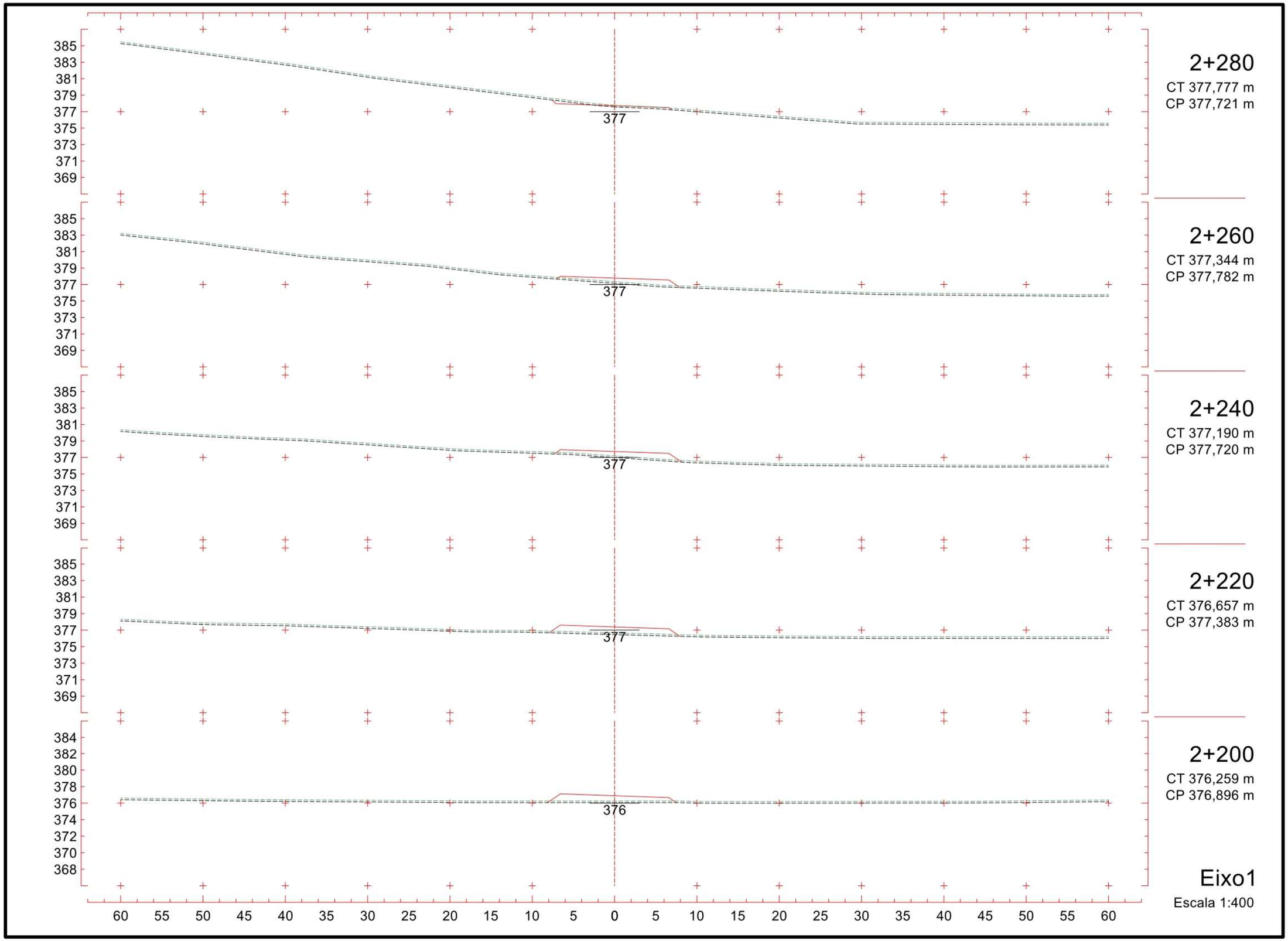

1+780
CT 361,710 m
CP 356,211 m
356
1+760
CT 358,660 m
CP 354,662 m
354
1+740
CT 355,503 m
CP 353,114 m
353
1+720
CT 352,106 m
CP 351,566 m
351
1+700
CT 348,268 m
CP 350,017 m
350
Eixo1
Escala 1:400

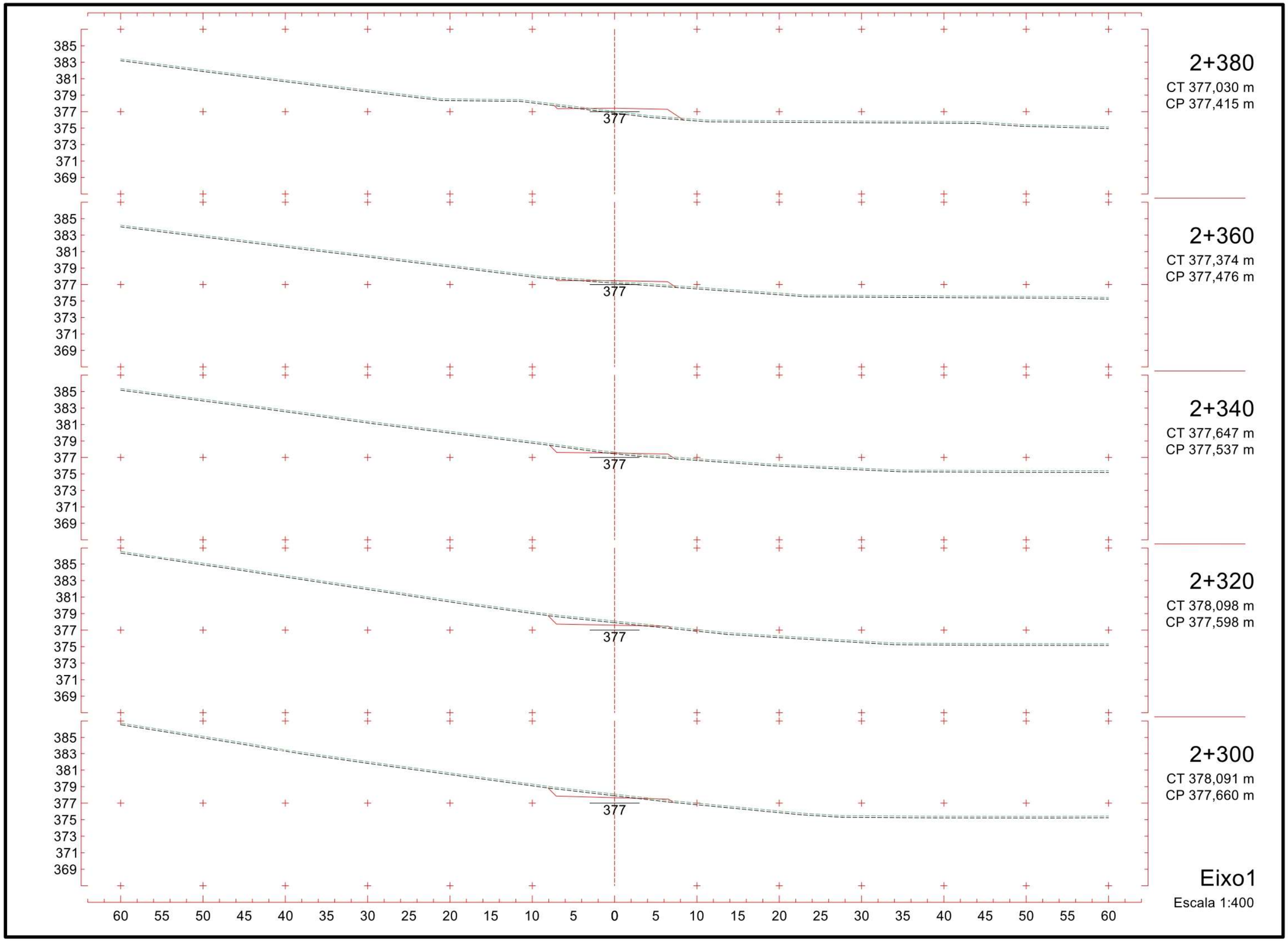

374
372
370
368
366
364
362
360
358
363
1+880
CT 370,921 m
CP 363,953 m
373
371
369
367
365
363
361
359
357
362
1+860
CT 369,963 m
CP 362,405 m
372
370
368
366
364
362
360
358
356
360
1+840
CT 368,563 m
CP 360,856 m
370
368
366
364
362
360
358
356
354
359
1+820
CT 366,838 m
CP 359,308 m
368
366
364
362
360
358
356
354
352
357
1+800
CT 364,403 m
CP 357,759 m
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
Eixo1
Escala 1:400

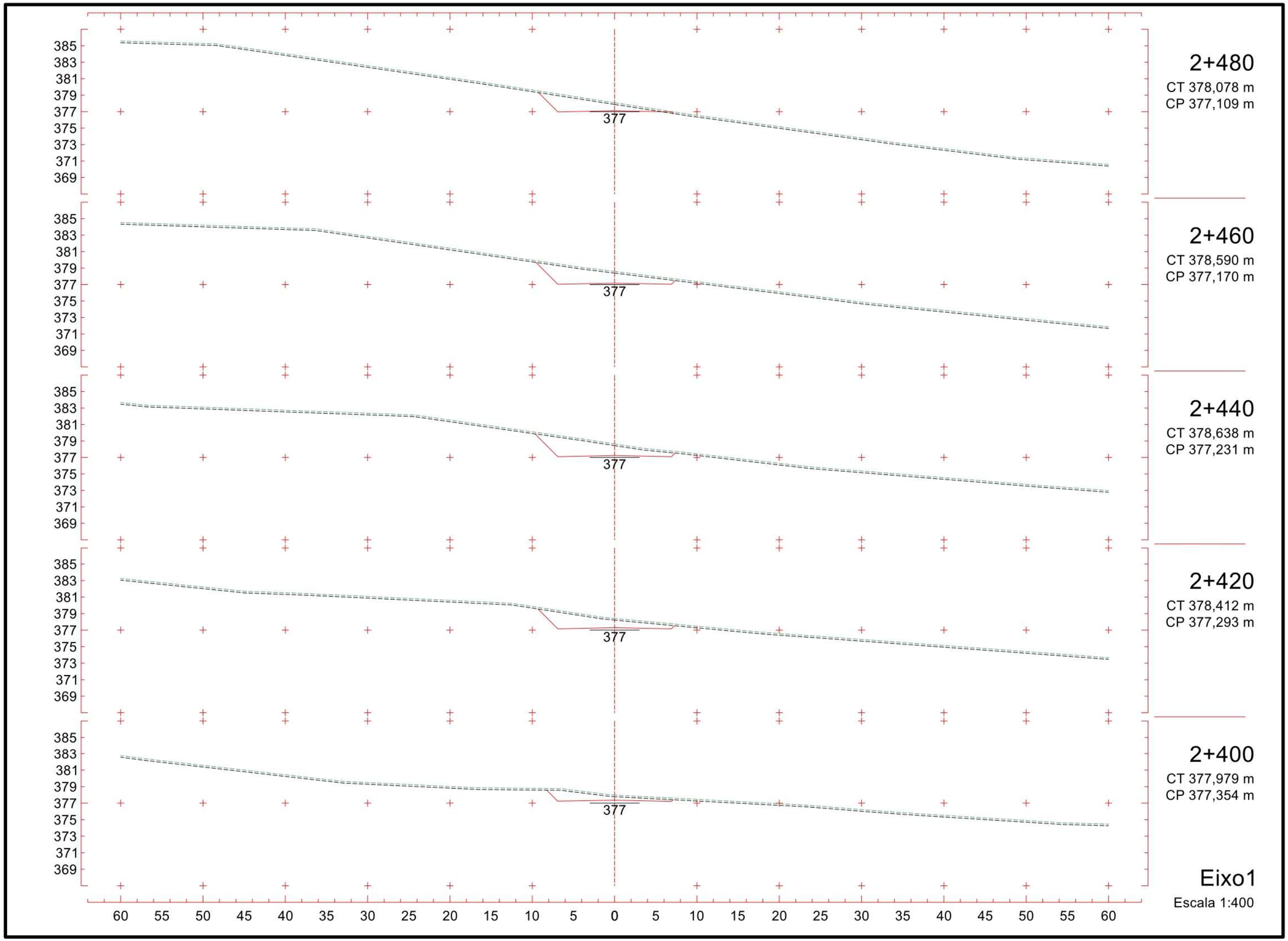

379
377
375
373
371
369
367
365
363
371
1+980
CT 372,432 m
CP 371,341 m
378
376
374
372
370
368
366
364
362
370
1+960
CT 372,368 m
CP 370,140 m
377
375
373
371
369
367
365
363
361
368
1+940
CT 372,190 m
CP 368,598 m
376
374
372
370
368
366
364
362
360
367
1+920
CT 371,914 m
CP 367,050 m
375
373
371
369
367
365
363
361
359
365
1+900
CT 371,515 m
CP 365,501 m
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
Eixo1
Escala 1:400

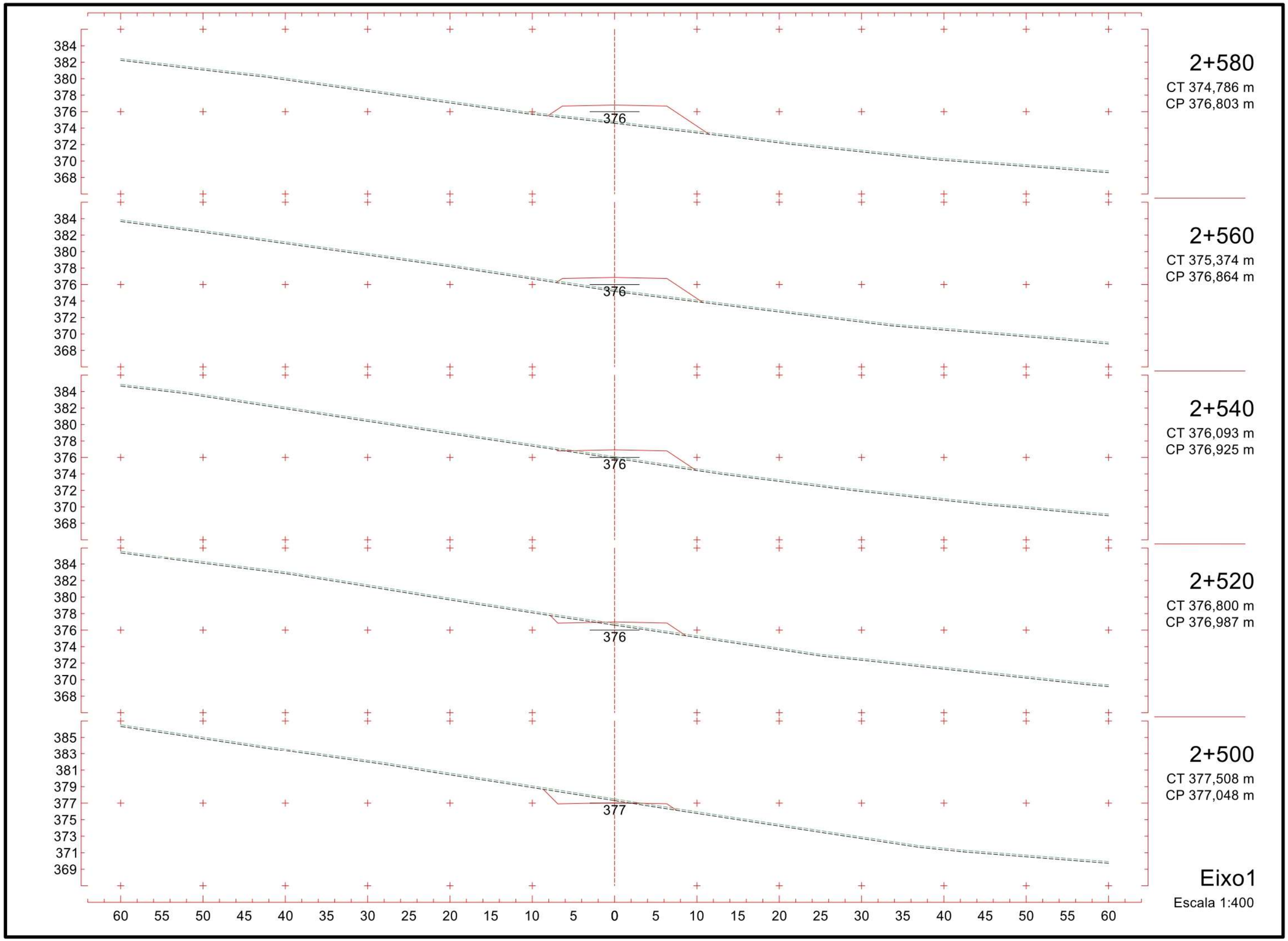

381
379
377
375
373
371
369
367
365
373
2+080
CT 373,056 m
CP 373,969 m
380
378
376
374
372
370
368
366
364
373
2+060
CT 372,909 m
CP 373,481 m
380
378
376
374
372
370
368
366
364
372
2+040
CT 372,714 m
CP 372,994 m
380
378
376
374
372
370
368
366
364
372
2+020
CT 372,438 m
CP 372,506 m
380
378
376
374
372
370
368
366
364
372
2+000
CT 372,371 m
CP 372,018 m
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
Eixo1
Escala 1:400

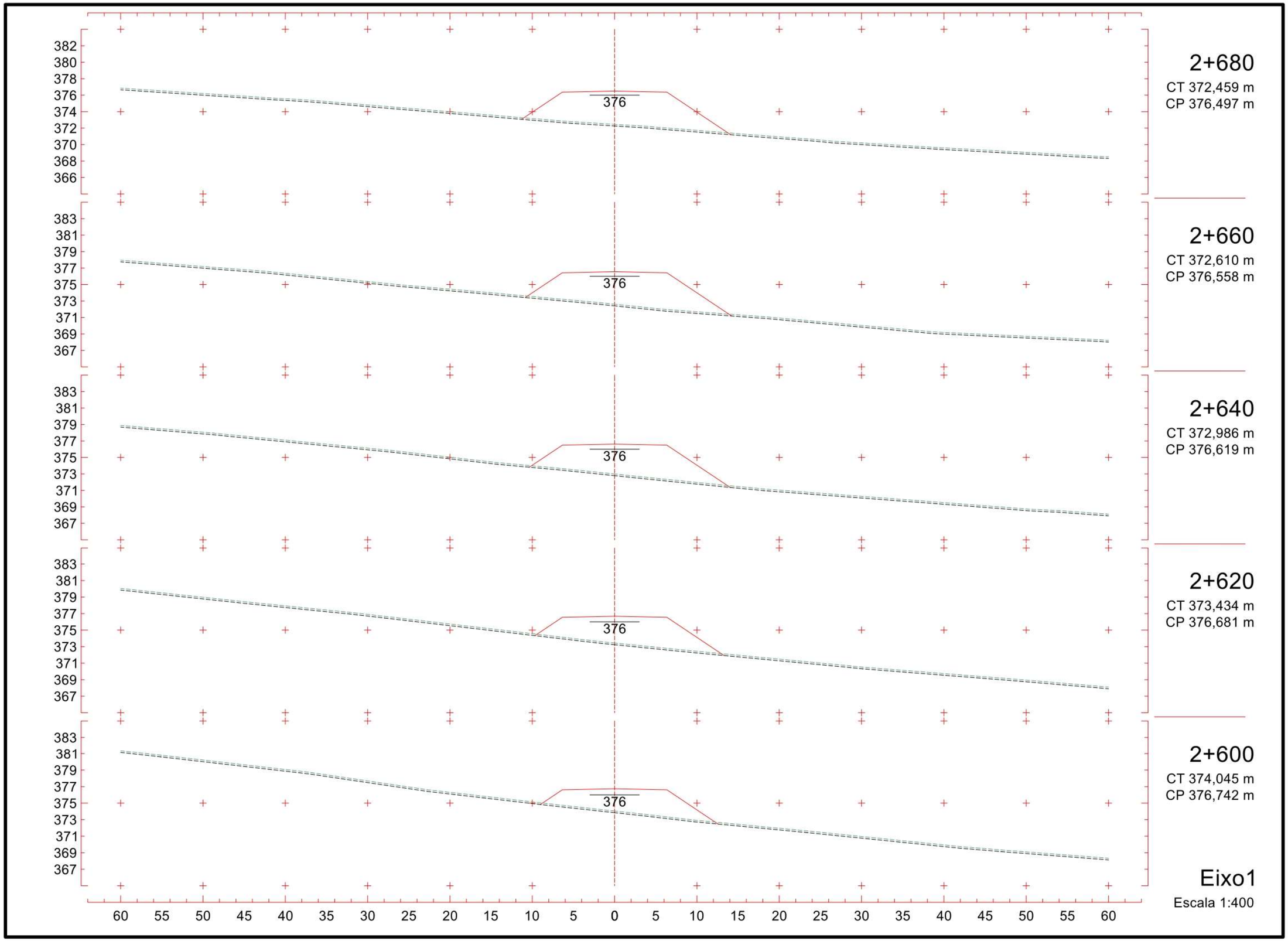

384
382
380
378
376
374
372
370
368
376
2+180
CT 375,840 m
CP 376,408 m
383
381
379
377
375
373
371
369
367
375
2+160
CT 375,316 m
CP 375,920 m
383
381
379
377
375
373
371
369
367
375
2+140
CT 374,457 m
CP 375,433 m
382
380
378
376
374
372
370
368
366
374
2+120
CT 373,609 m
CP 374,945 m
381
379
377
375
373
371
369
367
365
374
2+100
CT 373,094 m
CP 374,457 m
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
Eixo1
Escala 1:400

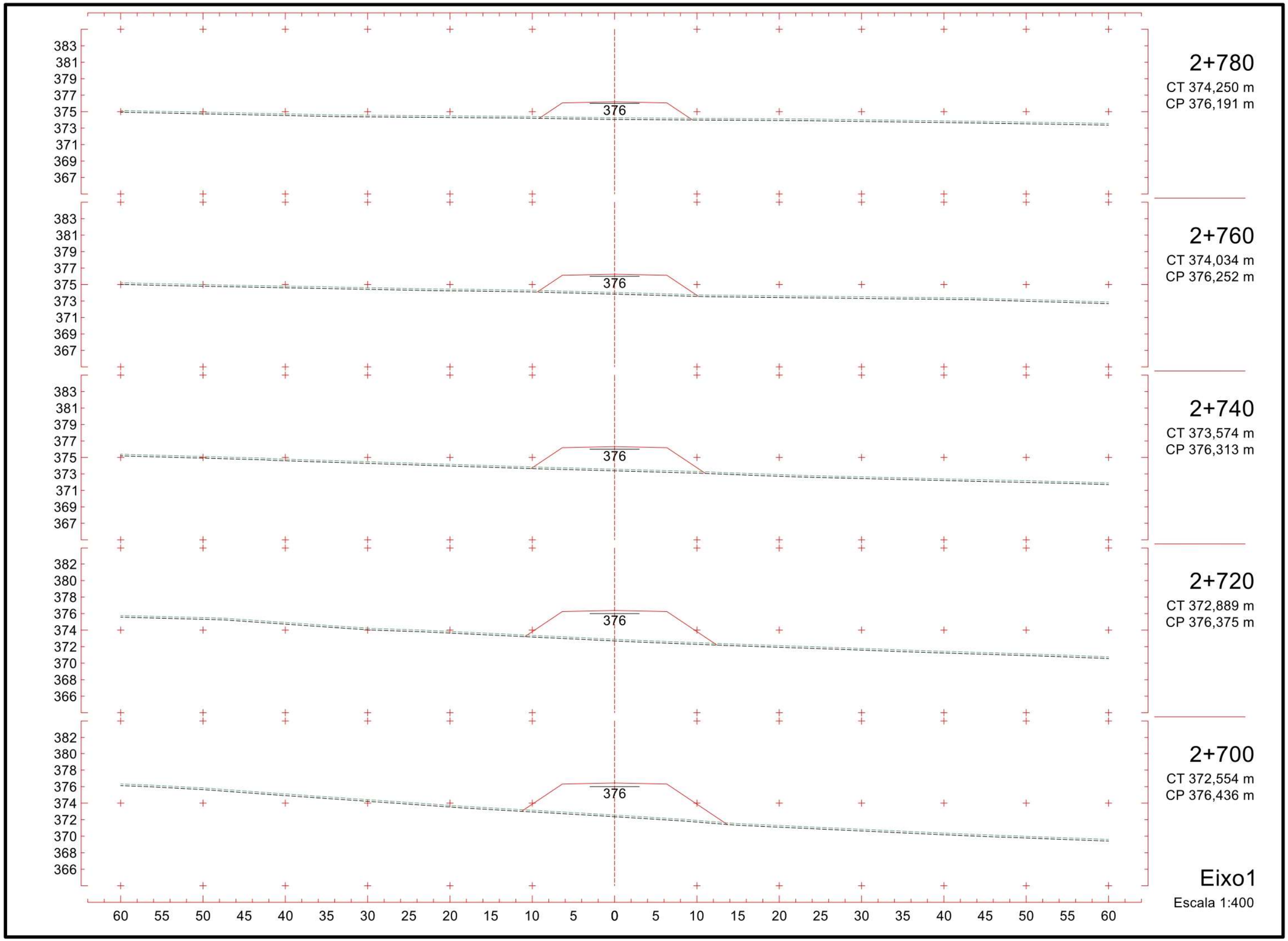

2+280
CT 377,777 m
CP 377,721 m
2+260
CT 377,344 m
CP 377,782 m
2+240
CT 377,190 m
CP 377,720 m
2+220
CT 376,657 m
CP 377,383 m
2+200
CT 376,259 m
CP 376,896 m
Eixo1
Escala 1:400
385 383 381 379 377 375 373 371 369
384 382 380 378 376 374 372 370 368
377
376
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

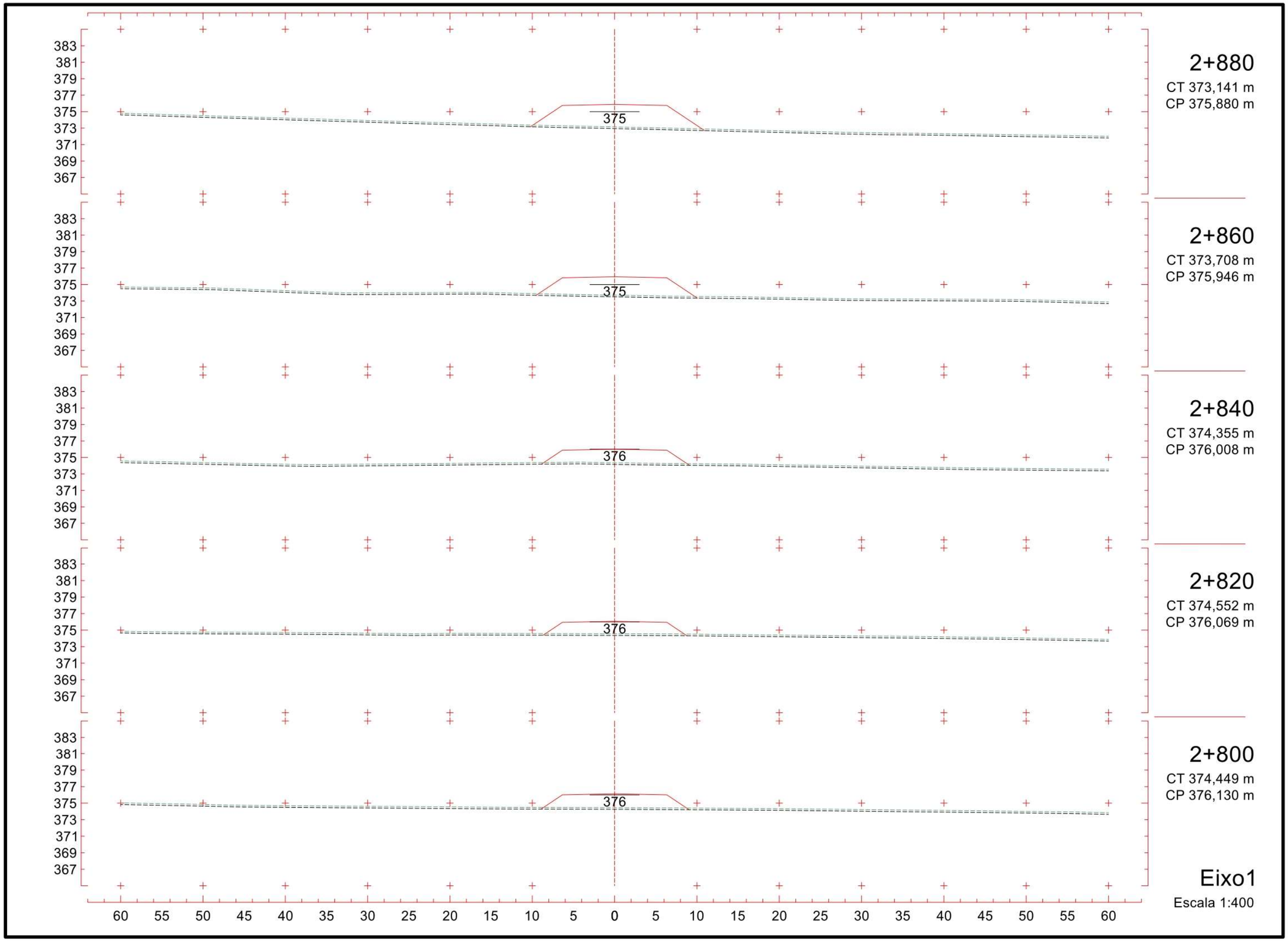

2+380
CT 377,030 m
CP 377,415 m
2+360
CT 377,374 m
CP 377,476 m
2+340
CT 377,647 m
CP 377,537 m
2+320
CT 378,098 m
CP 377,598 m
2+300
CT 378,091 m
CP 377,660 m
Eixo1
Escala 1:400
385
383
381
379
377
375
373
371
369
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

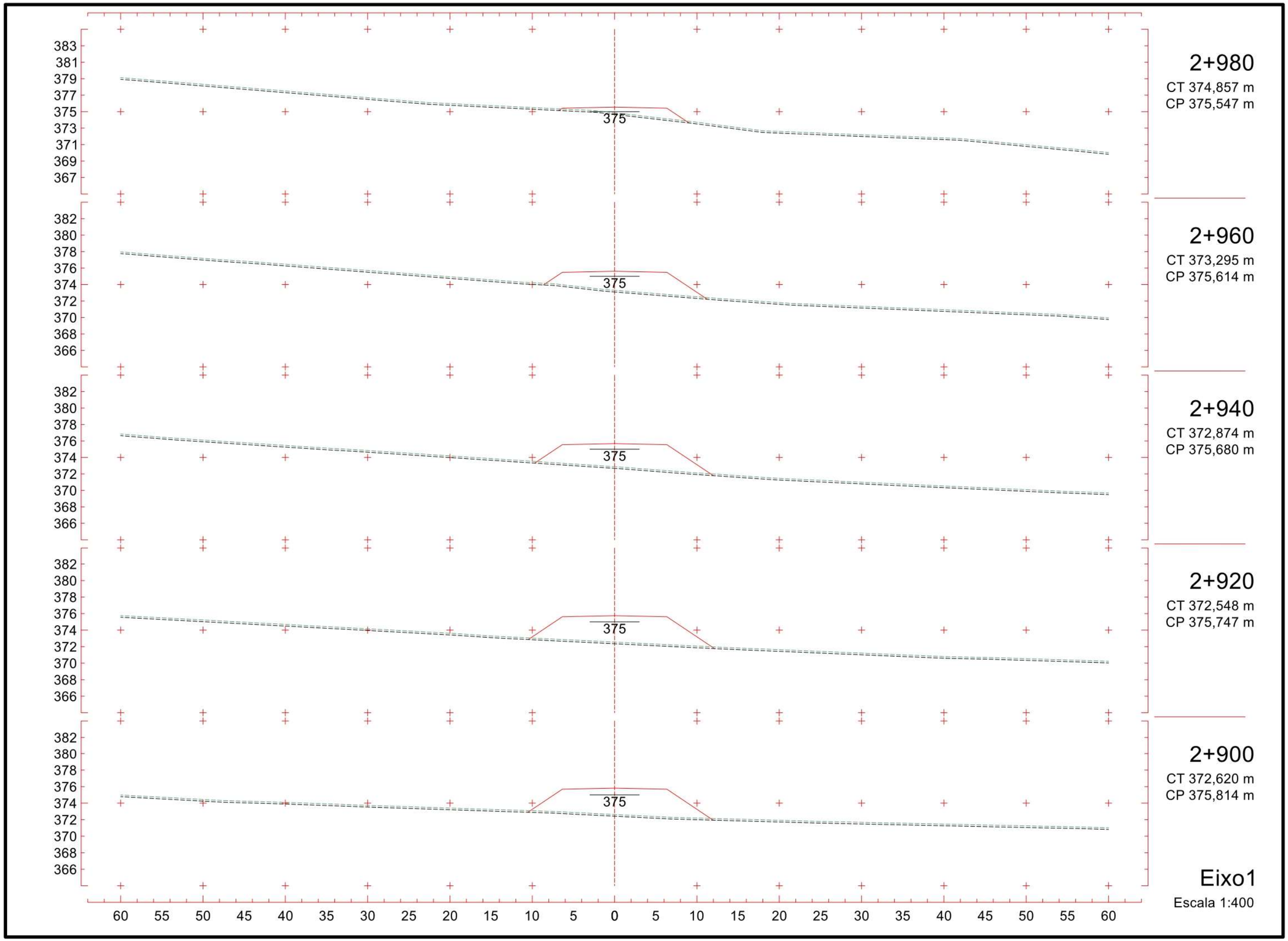

385
383
381
379
377
375
373
371
369
377
2+480
CT 378,078 m
CP 377,109 m
2+460
CT 378,590 m
CP 377,170 m
2+440
CT 378,638 m
CP 377,231 m
2+420
CT 378,412 m
CP 377,293 m
2+400
CT 377,979 m
CP 377,354 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

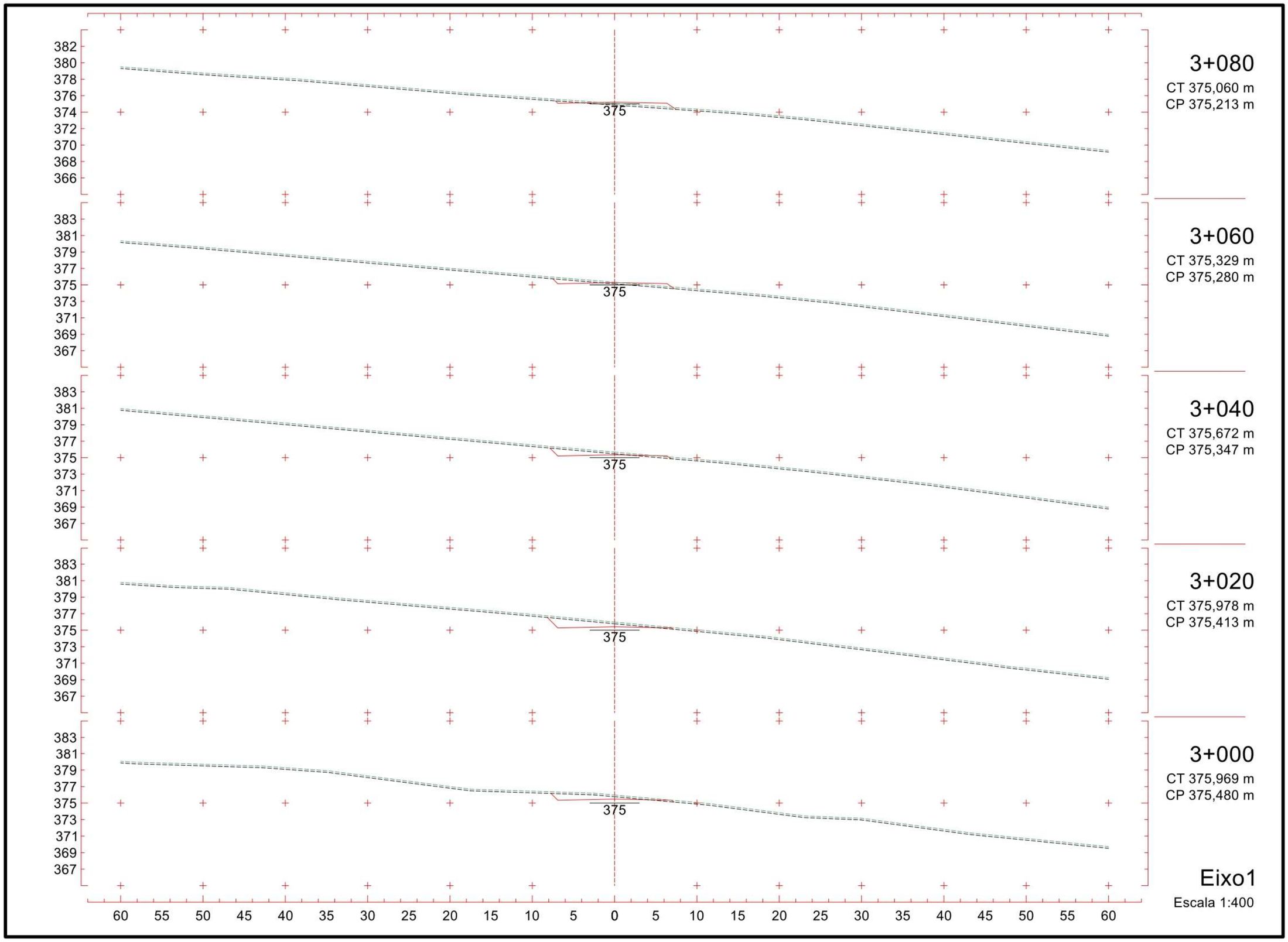

2+580
CT 374,786 m
CP 376,803 m
2+560
CT 375,374 m
CP 376,864 m
2+540
CT 376,093 m
CP 376,925 m
2+520
CT 376,800 m
CP 376,987 m
2+500
CT 377,508 m
CP 377,048 m
Eixo1
Escala 1:400
384
382
380
378
376
374
372
370
368
385
383
381
379
377
375
373
371
369
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

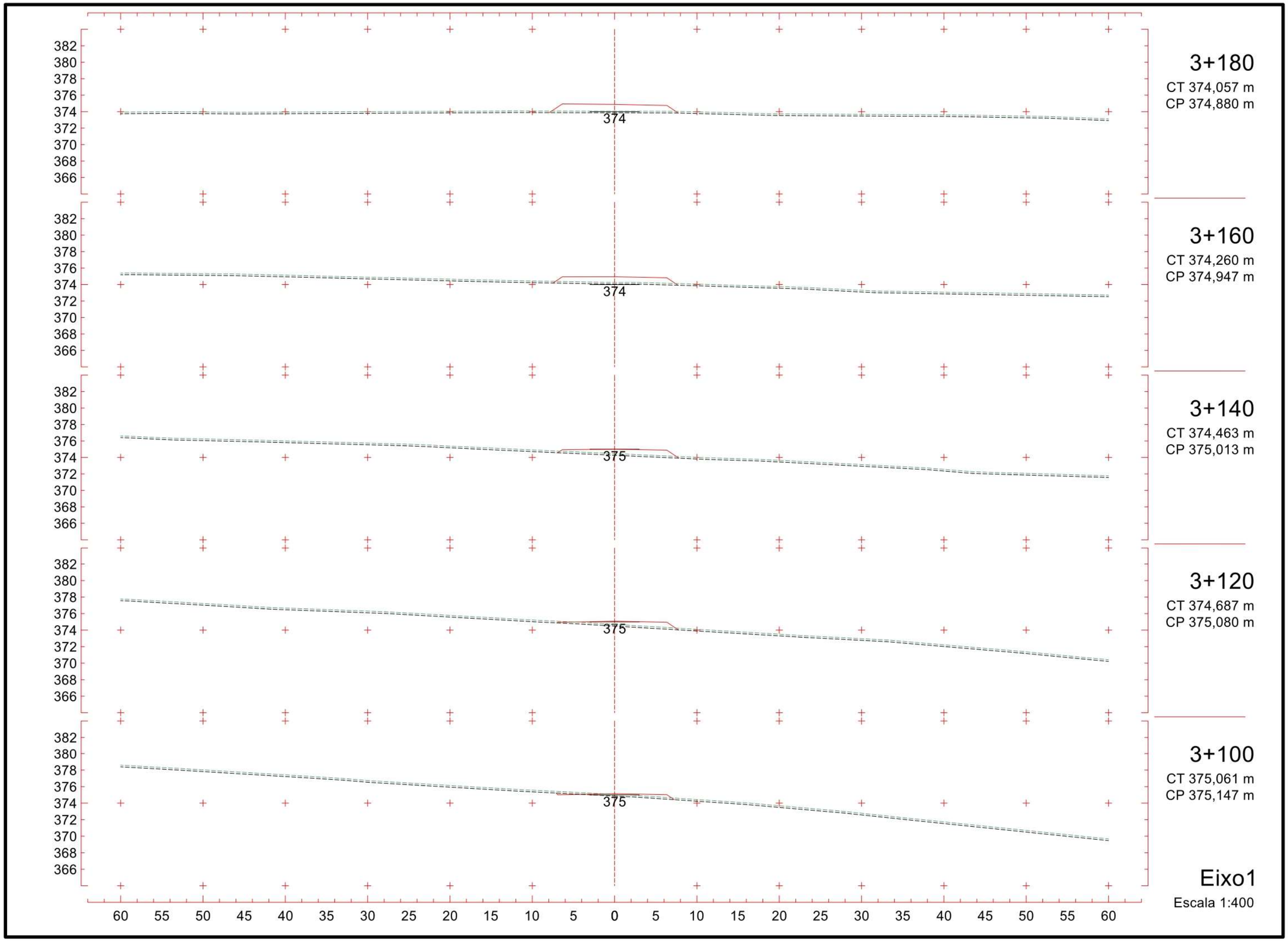

382
380
378
376
374
372
370
368
366
376
2+680
CT 372,459 m
CP 376,497 m
383
381
379
377
375
373
371
369
367
376
2+660
CT 372,610 m
CP 376,558 m
383
381
379
377
375
373
371
369
367
376
2+640
CT 372,986 m
CP 376,619 m
383
381
379
377
375
373
371
369
367
376
2+620
CT 373,434 m
CP 376,681 m
383
381
379
377
375
373
371
369
367
376
2+600
CT 374,045 m
CP 376,742 m
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
Eixo1
Escala 1:400

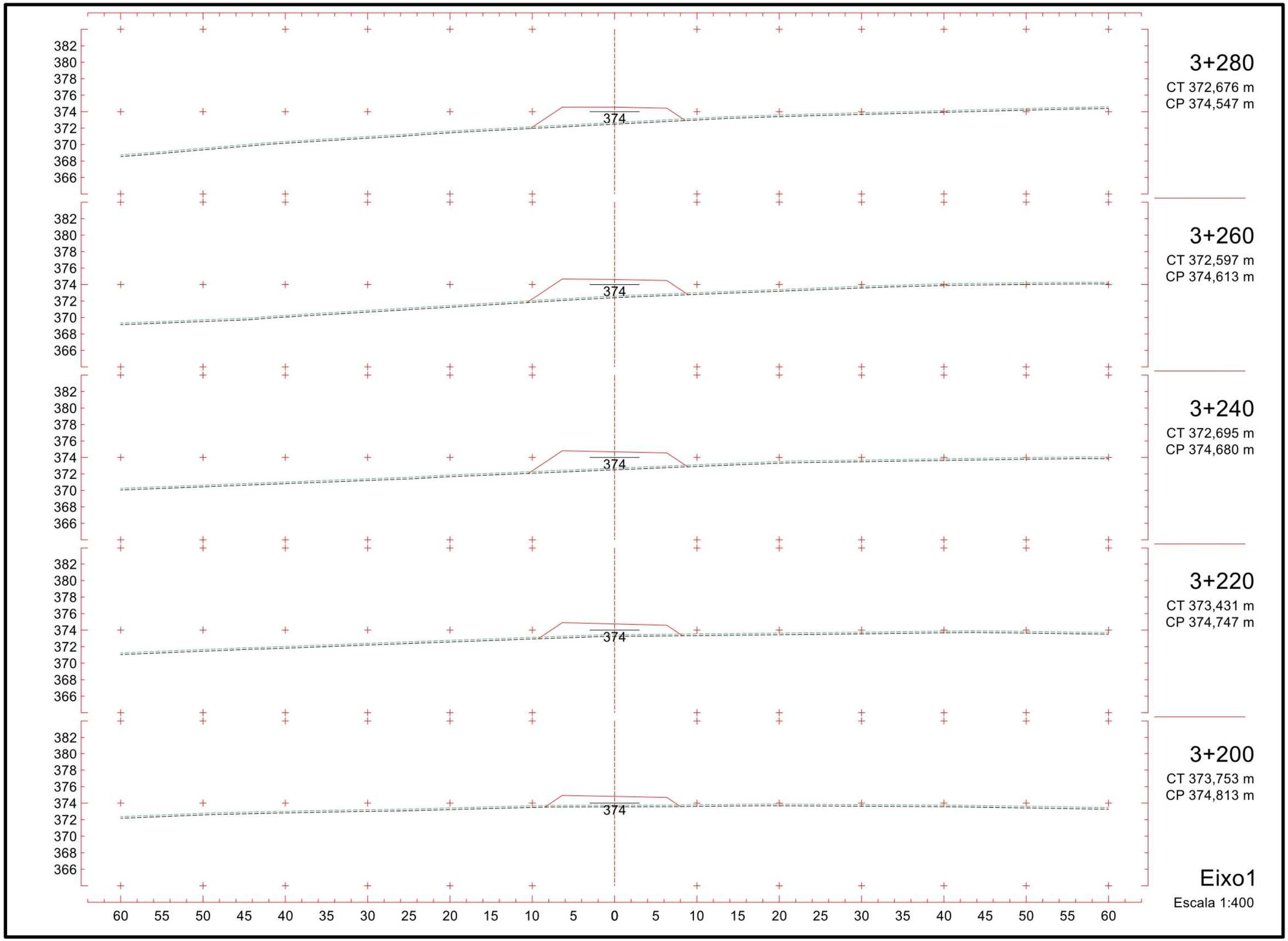

2+780
CT 374,250 m
CP 376,191 m
2+760
CT 374,034 m
CP 376,252 m
2+740
CT 373,574 m
CP 376,313 m
2+720
CT 372,889 m
CP 376,375 m
2+700
CT 372,554 m
CP 376,436 m
376
Eixo1
Escala 1:400

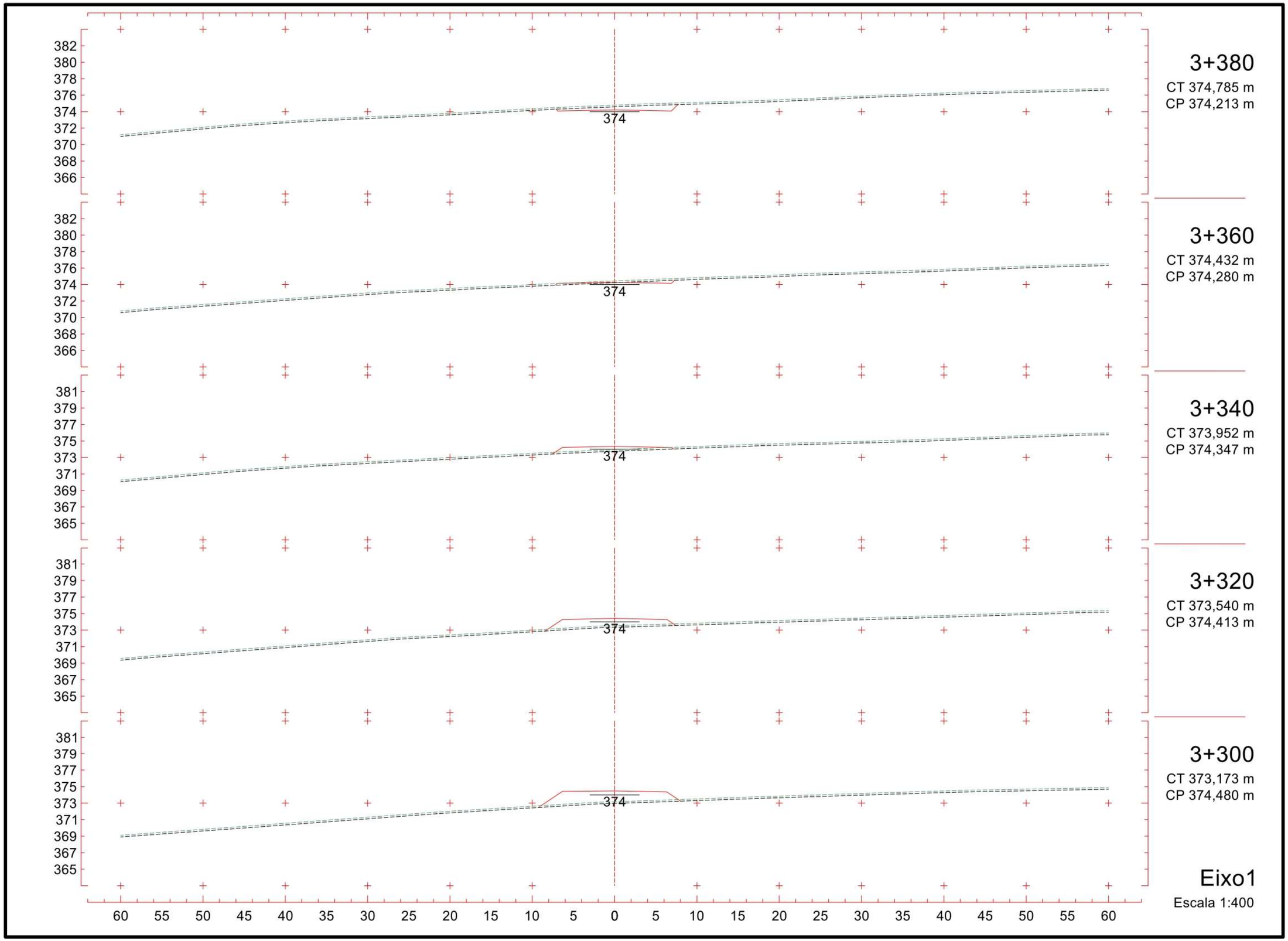

2+880
CT 373,141 m
CP 375,880 m
2+860
CT 373,708 m
CP 375,946 m
2+840
CT 374,355 m
CP 376,008 m
2+820
CT 374,552 m
CP 376,069 m
2+800
CT 374,449 m
CP 376,130 m
Eixo1
Escala 1:400
383
381
379
377
375
373
371
369
367
375
376
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

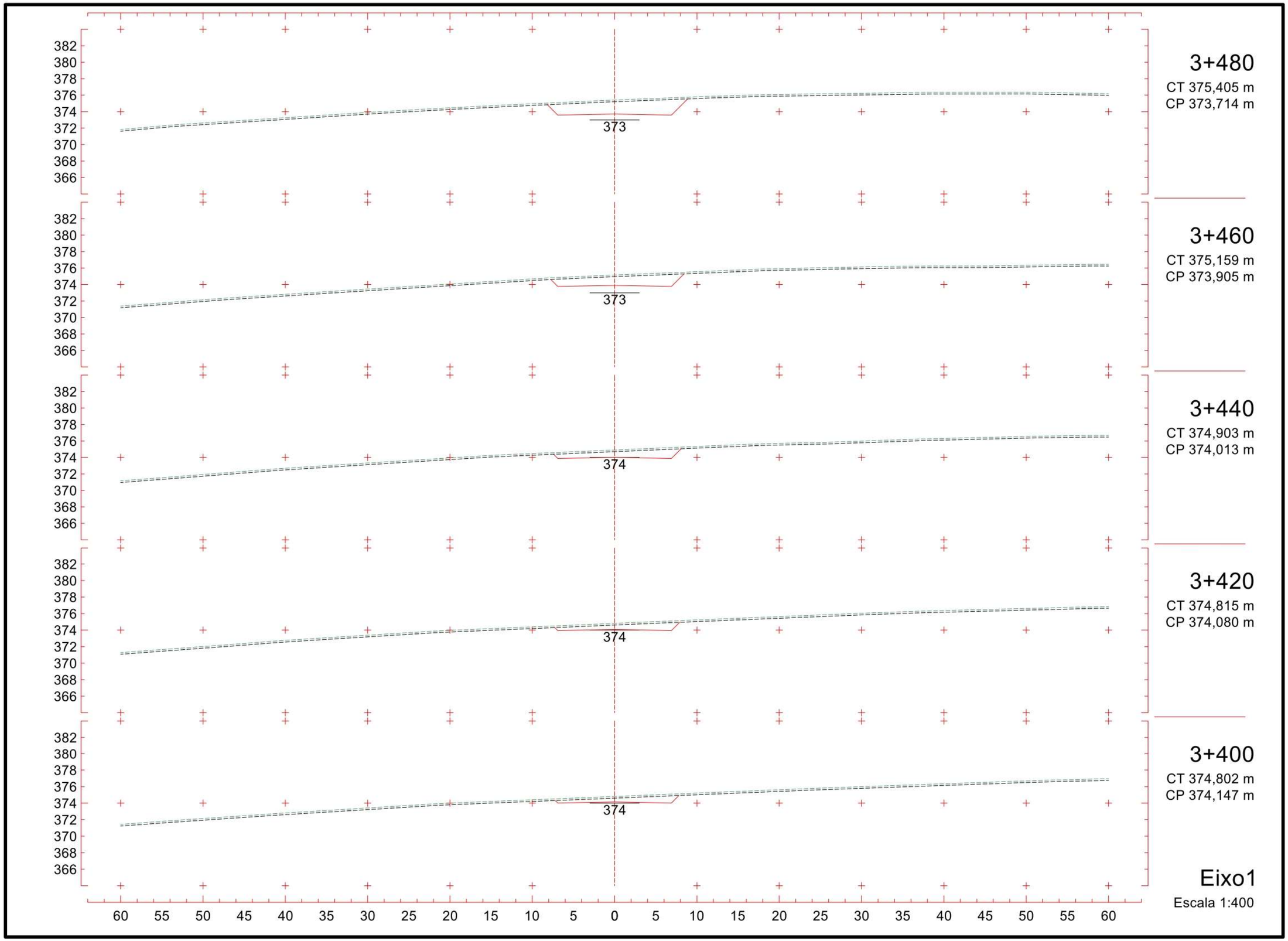

2+980
CT 374,857 m
CP 375,547 m
2+960
CT 373,295 m
CP 375,614 m
2+940
CT 372,874 m
CP 375,680 m
2+920
CT 372,548 m
CP 375,747 m
2+900
CT 372,620 m
CP 375,814 m
375
Eixo1
Escala 1:400

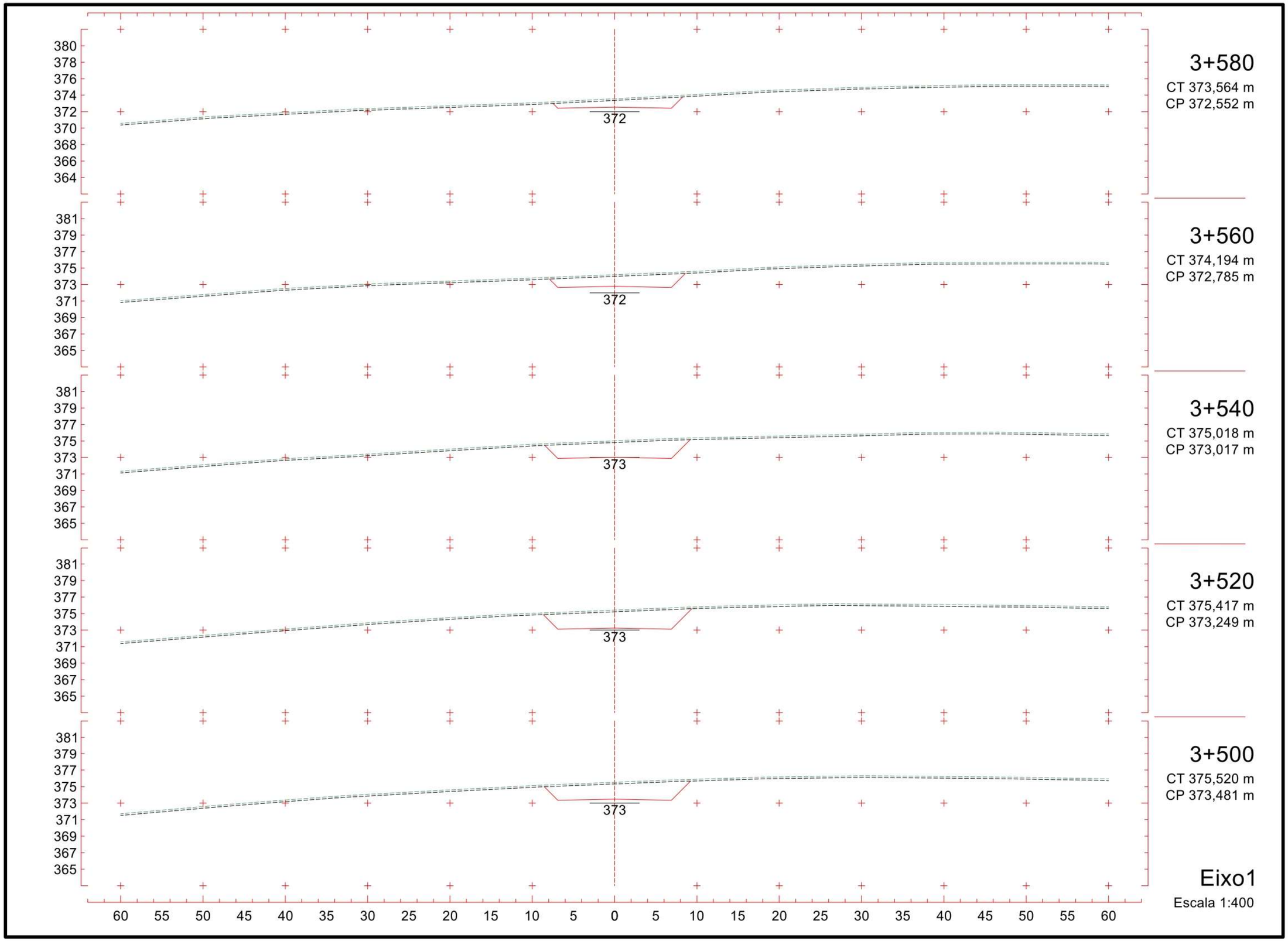

382
380
378
376
374
372
370
368
366
375
3+080
CT 375,060 m
CP 375,213 m
383
381
379
377
375
373
371
369
367
375
3+060
CT 375,329 m
CP 375,280 m
383
381
379
377
375
373
371
369
367
375
3+040
CT 375,672 m
CP 375,347 m
383
381
379
377
375
373
371
369
367
375
3+020
CT 375,978 m
CP 375,413 m
383
381
379
377
375
373
371
369
367
375
3+000
CT 375,969 m
CP 375,480 m
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
Eixo1
Escala 1:400

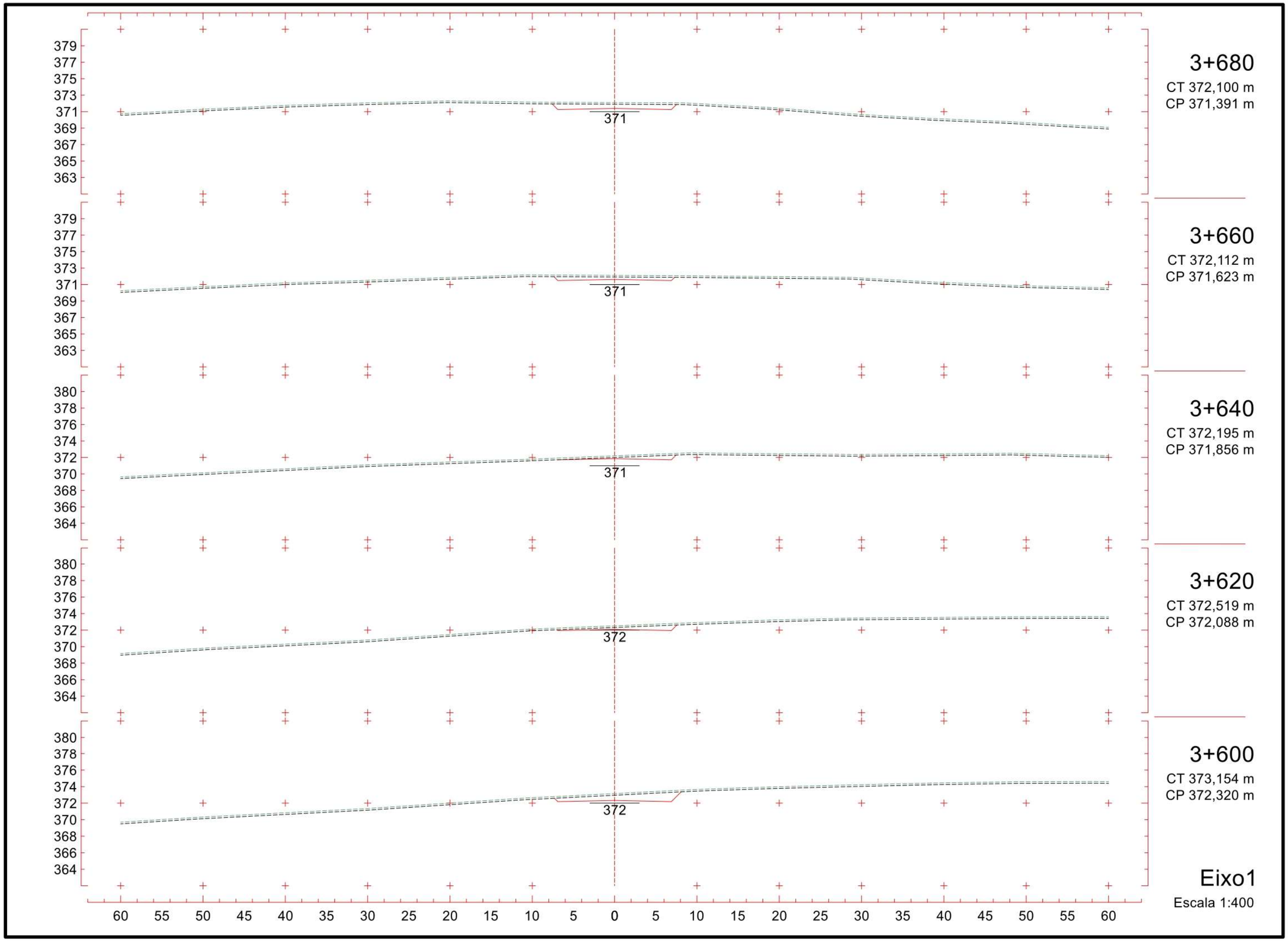

382
380
378
376
374
372
370
368
366
374
3+180
CT 374,057 m
CP 374,880 m
3+160
CT 374,260 m
CP 374,947 m
375
3+140
CT 374,463 m
CP 375,013 m
3+120
CT 374,687 m
CP 375,080 m
3+100
CT 375,061 m
CP 375,147 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

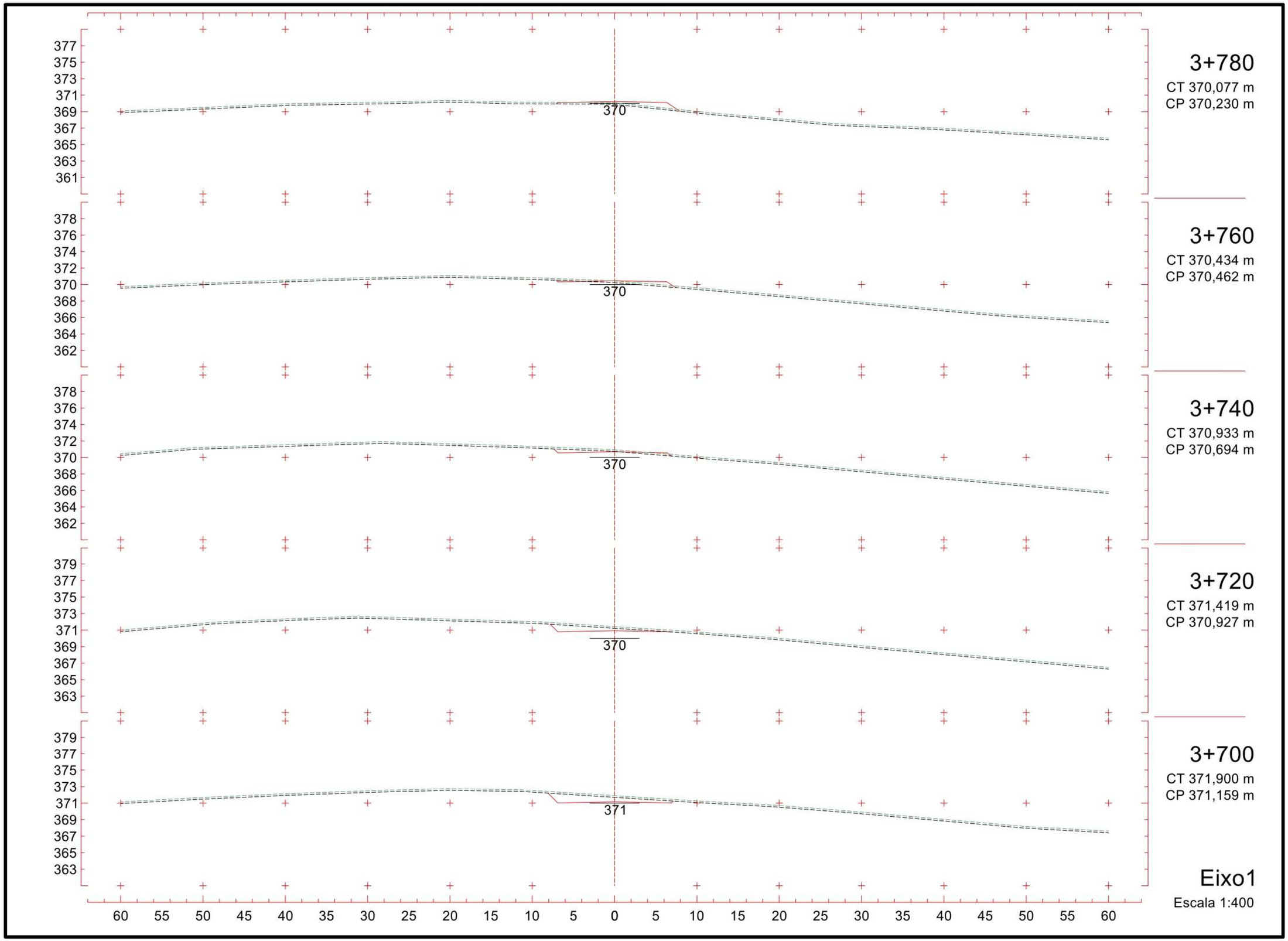

382
380
378
376
374
372
370
368
366
374
3+280
CT 372,676 m
CP 374,547 m
3+260
CT 372,597 m
CP 374,613 m
3+240
CT 372,695 m
CP 374,680 m
3+220
CT 373,431 m
CP 374,747 m
3+200
CT 373,753 m
CP 374,813 m
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

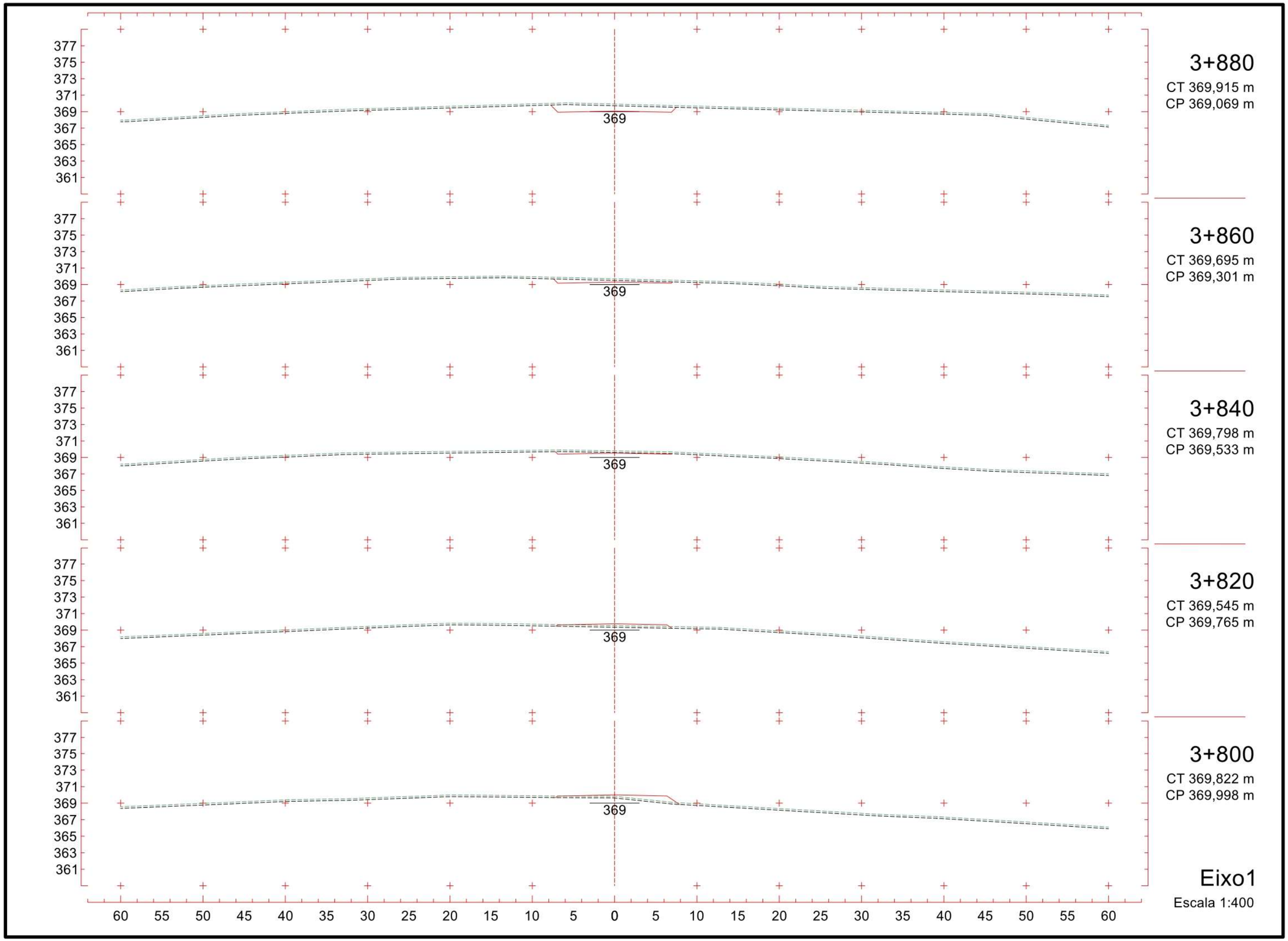

382
380
378
376
374
372
370
368
366
374
3+380
CT 374,785 m
CP 374,213 m
382
380
378
376
374
372
370
368
366
374
3+360
CT 374,432 m
CP 374,280 m
381
379
377
375
373
371
369
367
365
374
3+340
CT 373,952 m
CP 374,347 m
381
379
377
375
373
371
369
367
365
374
3+320
CT 373,540 m
CP 374,413 m
381
379
377
375
373
371
369
367
365
374
3+300
CT 373,173 m
CP 374,480 m
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
Eixo1
Escala 1:400

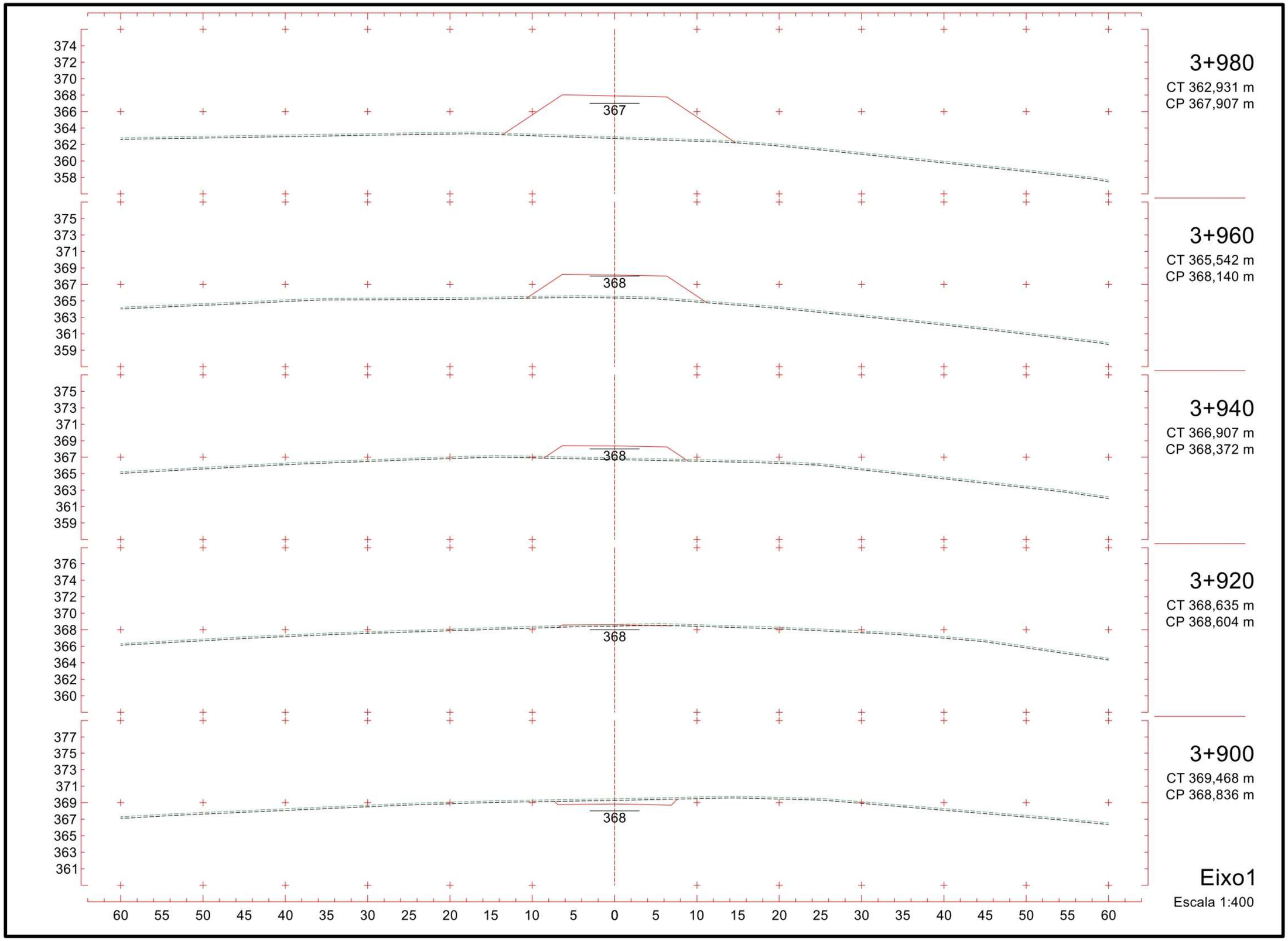

382
380
378
376
374
372
370
368
366
373
3+480
CT 375,405 m
CP 373,714 m
373
3+460
CT 375,159 m
CP 373,905 m
374
3+440
CT 374,903 m
CP 374,013 m
374
3+420
CT 374,815 m
CP 374,080 m
374
3+400
CT 374,802 m
CP 374,147 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

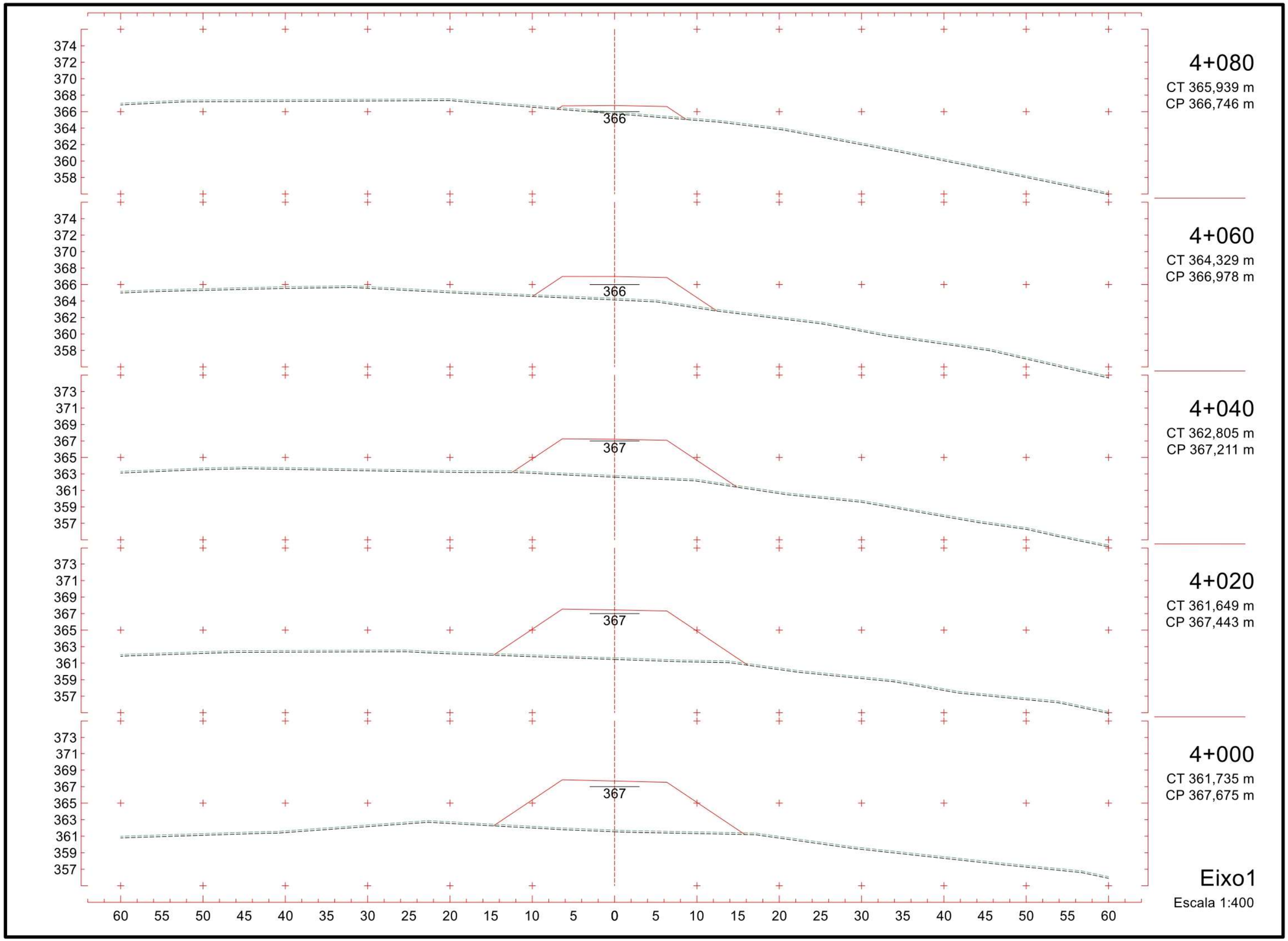

380
378
376
374
372
370
368
366
364
372
3+580
CT 373,564 m
CP 372,552 m
381
379
377
375
373
371
369
367
365
372
3+560
CT 374,194 m
CP 372,785 m
381
379
377
375
373
371
369
367
365
373
3+540
CT 375,018 m
CP 373,017 m
381
379
377
375
373
371
369
367
365
373
3+520
CT 375,417 m
CP 373,249 m
381
379
377
375
373
371
369
367
365
373
3+500
CT 375,520 m
CP 373,481 m
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
Eixo1
Escala 1:400

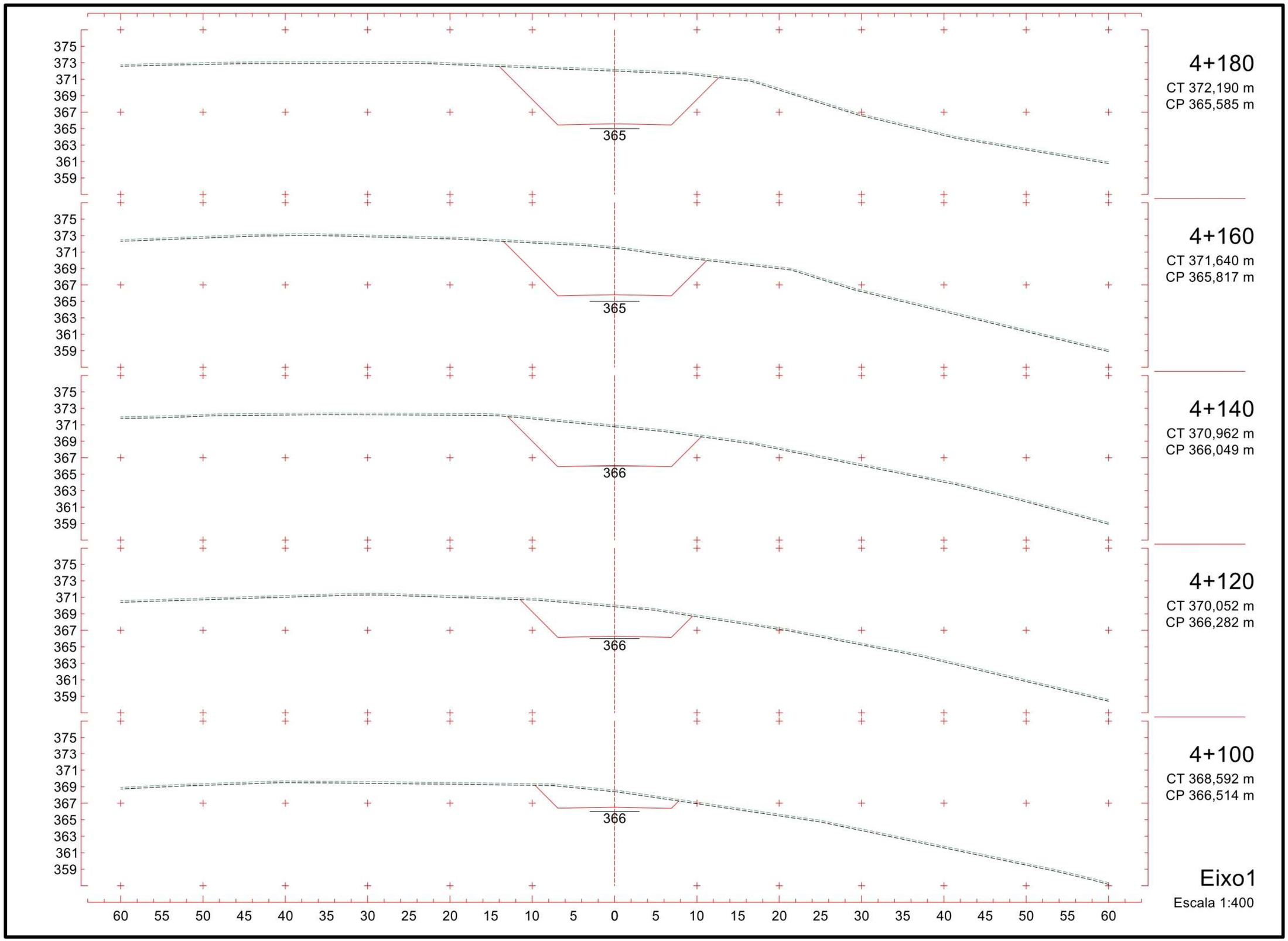

379
377
375
373
371
369
367
365
363
371
3+680
CT 372,100 m
CP 371,391 m
379
377
375
373
371
369
367
365
363
371
3+660
CT 372,112 m
CP 371,623 m
380
378
376
374
372
370
368
366
364
371
3+640
CT 372,195 m
CP 371,856 m
380
378
376
374
372
370
368
366
364
372
3+620
CT 372,519 m
CP 372,088 m
380
378
376
374
372
370
368
366
364
372
3+600
CT 373,154 m
CP 372,320 m
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
Eixo1
Escala 1:400

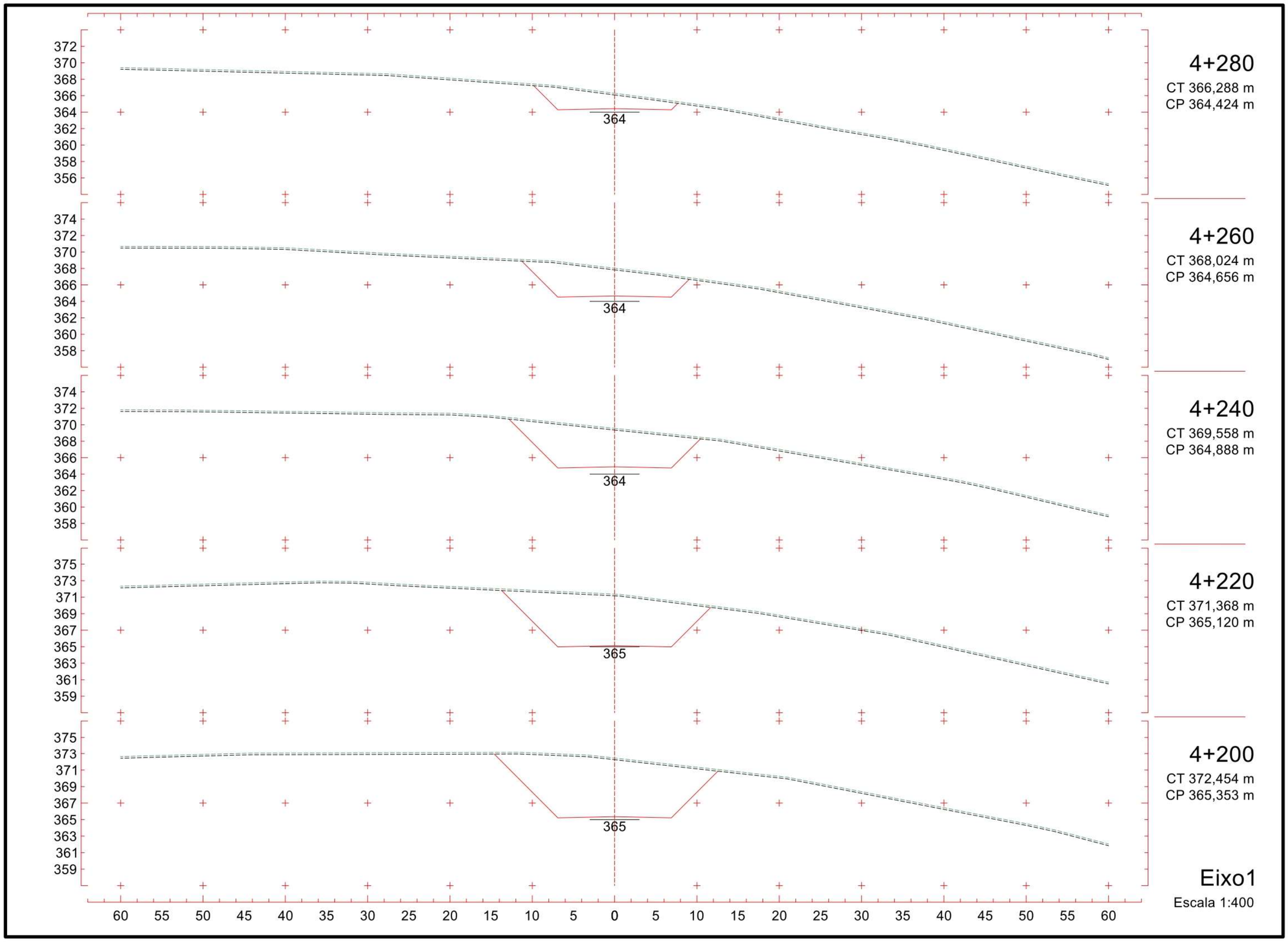

377
375
373
371
369
367
365
363
361
370
3+780
CT 370,077 m
CP 370,230 m
378
376
374
372
370
368
366
364
362
370
3+760
CT 370,434 m
CP 370,462 m
378
376
374
372
370
368
366
364
362
370
3+740
CT 370,933 m
CP 370,694 m
379
377
375
373
371
369
367
365
363
370
3+720
CT 371,419 m
CP 370,927 m
379
377
375
373
371
369
367
365
363
371
3+700
CT 371,900 m
CP 371,159 m
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
Eixo1
Escala 1:400

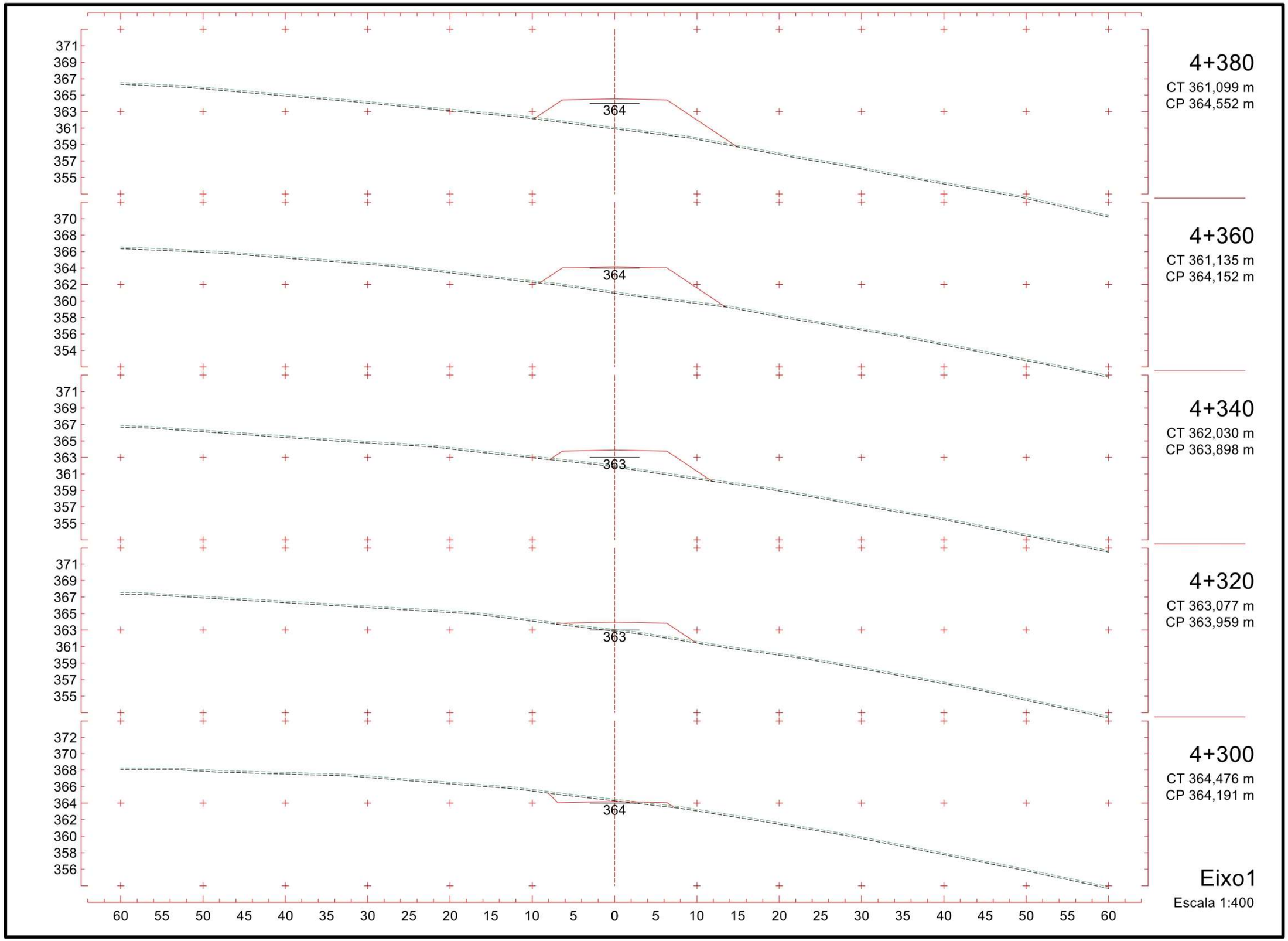

377
375
373
371
369
367
365
363
361
369
3+880
CT 369,915 m
CP 369,069 m
3+860
CT 369,695 m
CP 369,301 m
3+840
CT 369,798 m
CP 369,533 m
3+820
CT 369,545 m
CP 369,765 m
3+800
CT 369,822 m
CP 369,998 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

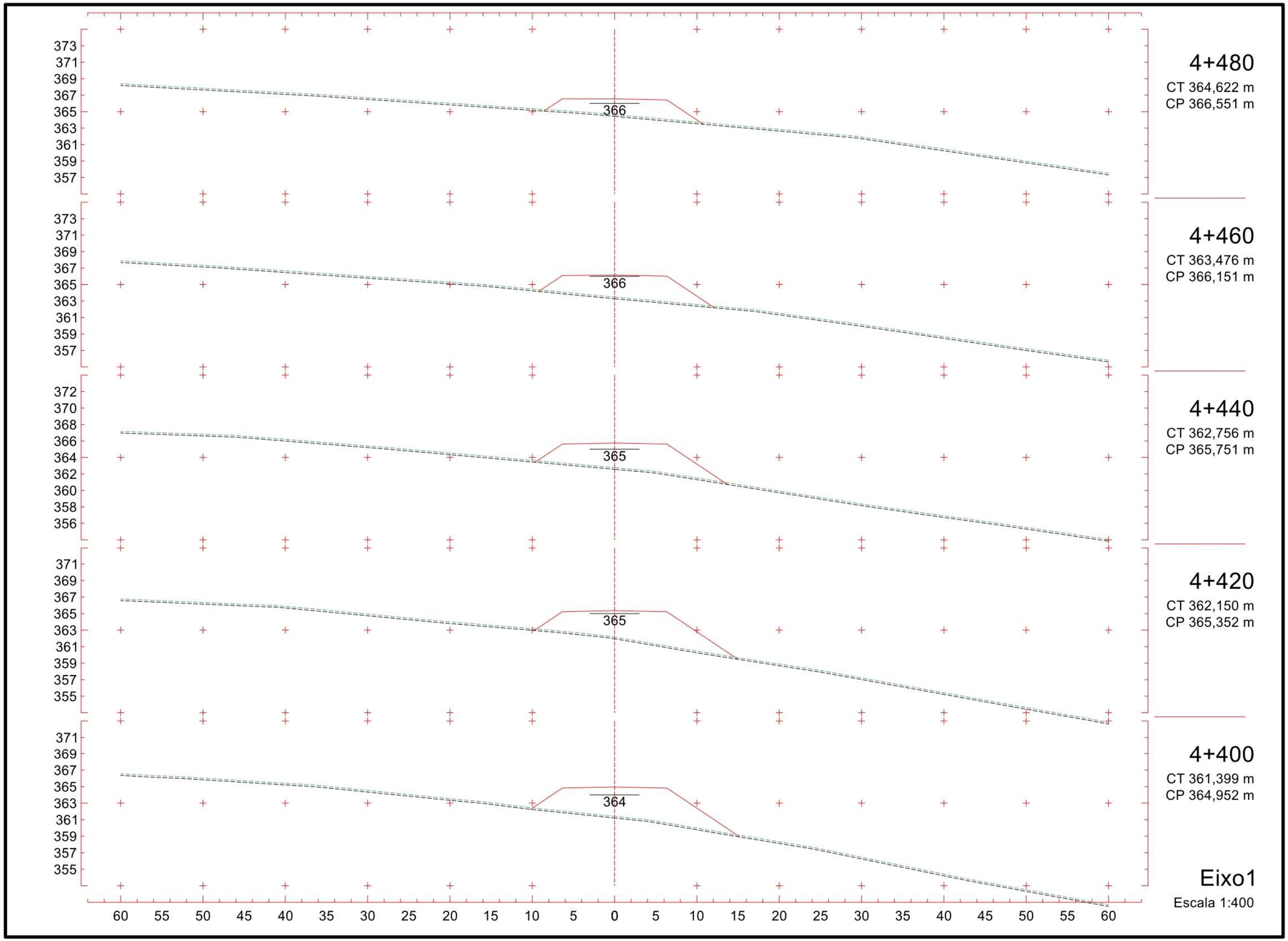

374
372
370
368
366
364
362
360
358
367
3+980
CT 362,931 m
CP 367,907 m
375
373
371
369
367
365
363
361
359
368
3+960
CT 365,542 m
CP 368,140 m
375
373
371
369
367
365
363
361
359
368
3+940
CT 366,907 m
CP 368,372 m
376
374
372
370
368
366
364
362
360
368
3+920
CT 368,635 m
CP 368,604 m
377
375
373
371
369
367
365
363
361
368
3+900
CT 369,468 m
CP 368,836 m
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
Eixo1
Escala 1:400

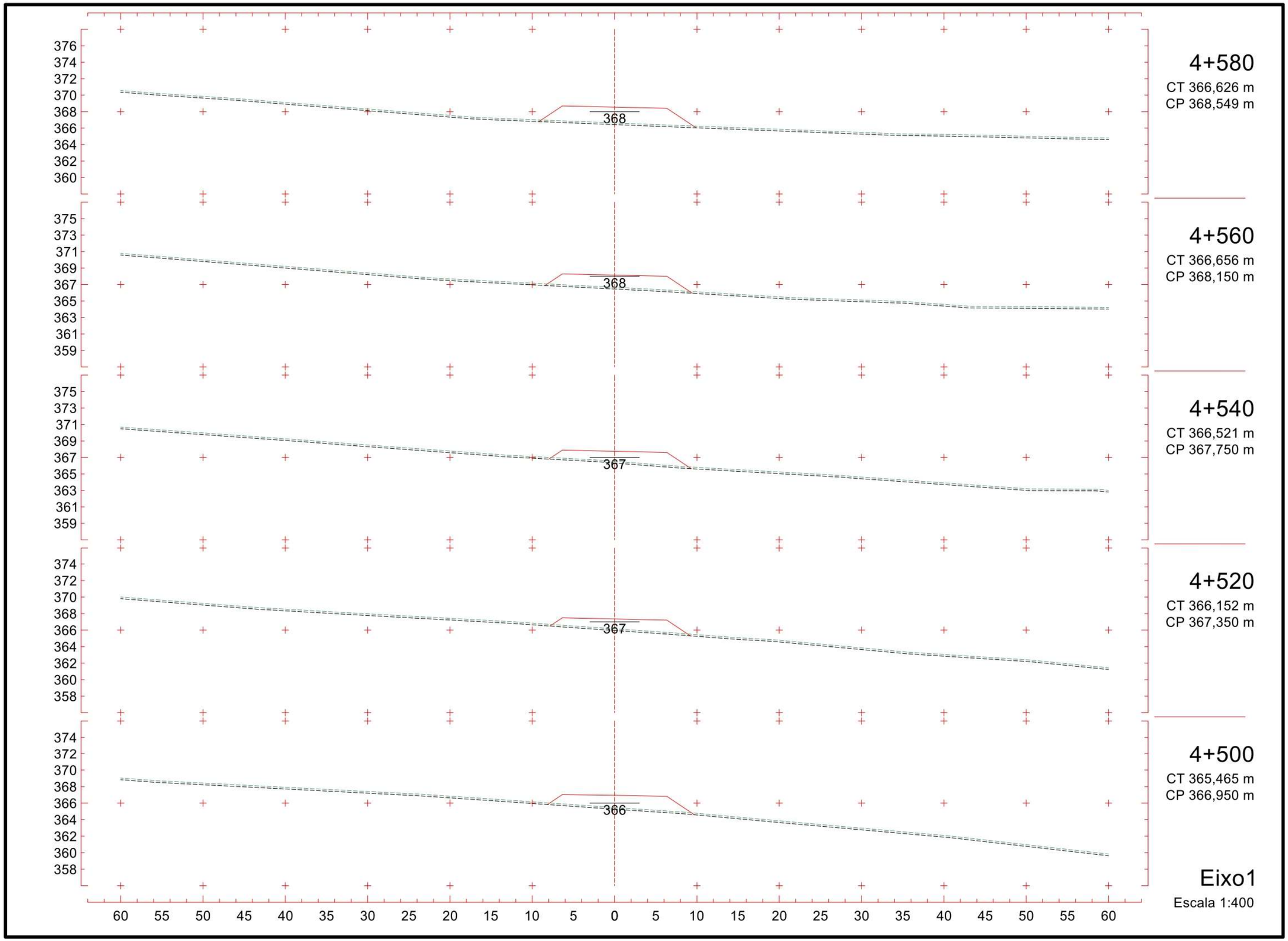

374
372
370
368
366
364
362
360
358
366
4+080
CT 365,939 m
CP 366,746 m
374
372
370
368
366
364
362
360
358
366
4+060
CT 364,329 m
CP 366,978 m
373
371
369
367
365
363
361
359
357
367
4+040
CT 362,805 m
CP 367,211 m
373
371
369
367
365
363
361
359
357
367
4+020
CT 361,649 m
CP 367,443 m
373
371
369
367
365
363
361
359
357
367
4+000
CT 361,735 m
CP 367,675 m
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
Eixo1
Escala 1:400

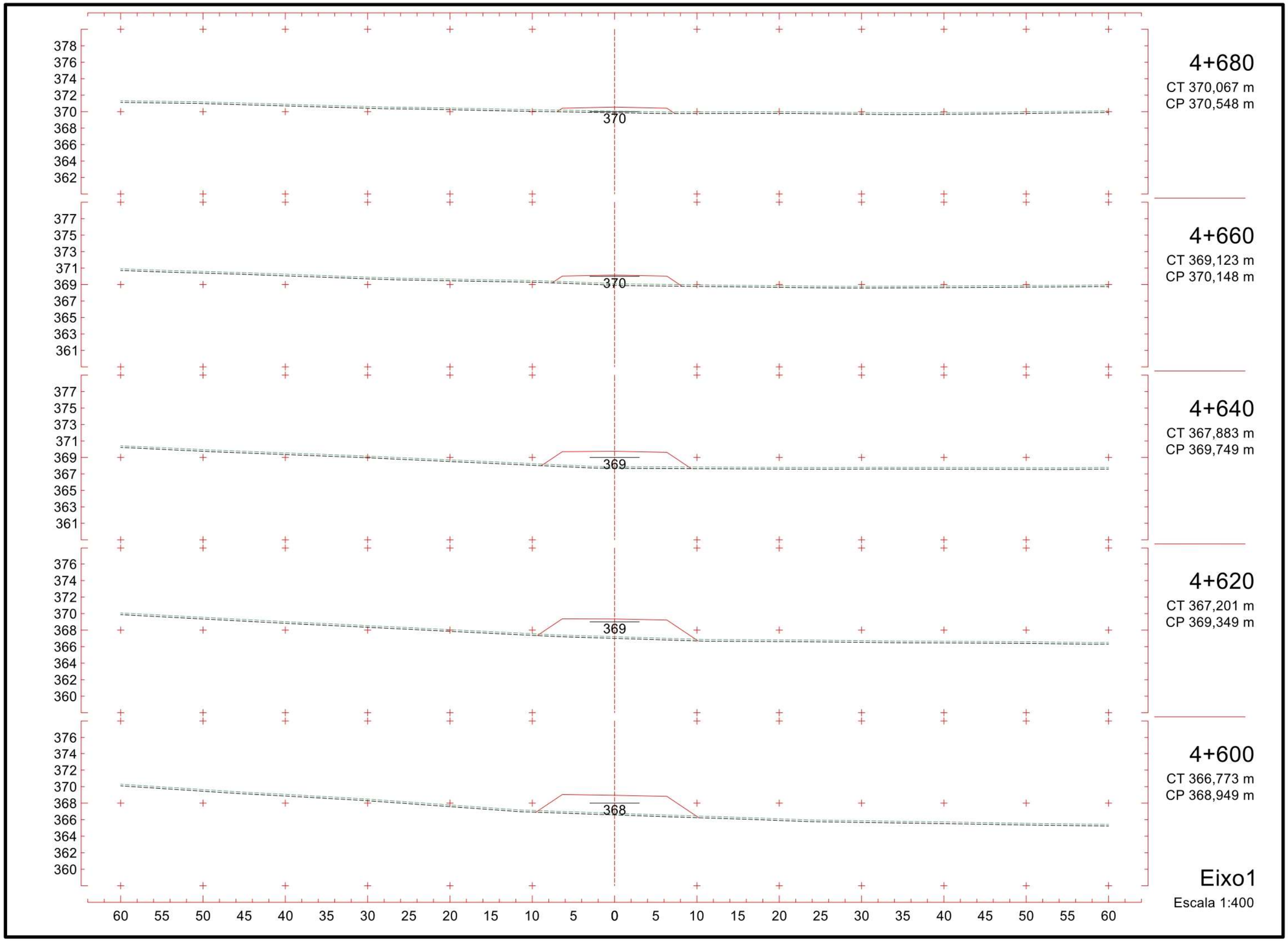

375
373
371
369
367
365
363
361
359
365
4+180
CT 372,190 m
CP 365,585 m
4+160
CT 371,640 m
CP 365,817 m
4+140
CT 370,962 m
CP 366,049 m
366
4+120
CT 370,052 m
CP 366,282 m
4+100
CT 368,592 m
CP 366,514 m
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

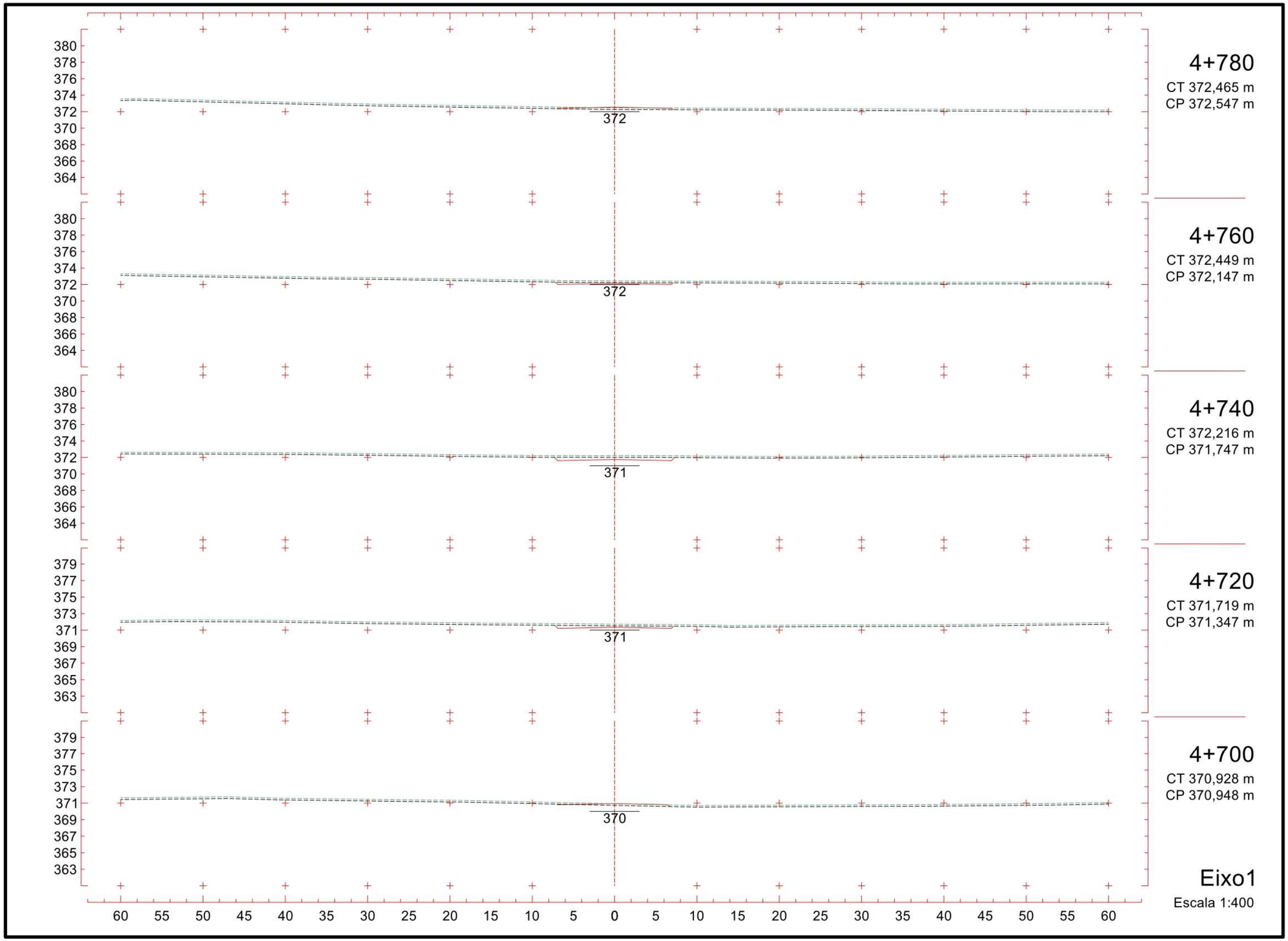

372
370
368
366
364
362
360
358
356
364
4+280
CT 366,288 m
CP 364,424 m
374
372
370
368
366
364
362
360
358
364
4+260
CT 368,024 m
CP 364,656 m
374
372
370
368
366
364
362
360
358
364
4+240
CT 369,558 m
CP 364,888 m
375
373
371
369
367
365
363
361
359
365
4+220
CT 371,368 m
CP 365,120 m
375
373
371
369
367
365
363
361
359
365
4+200
CT 372,454 m
CP 365,353 m
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
Eixo1
Escala 1:400

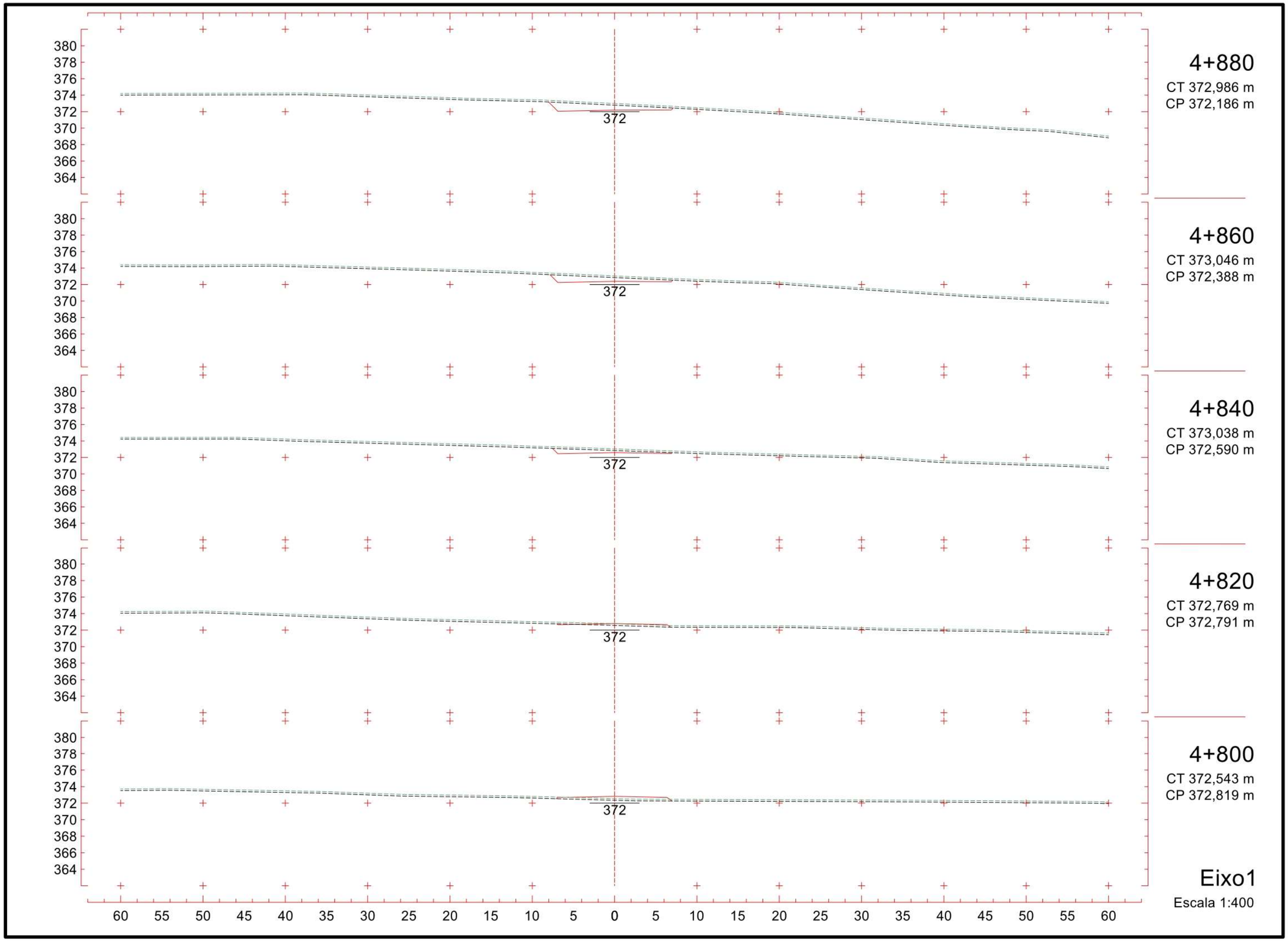

371
369
367
365
363
361
359
357
355
364
4+380
CT 361,099 m
CP 364,552 m
370
368
366
364
362
360
358
356
354
364
4+360
CT 361,135 m
CP 364,152 m
371
369
367
365
363
361
359
357
355
363
4+340
CT 362,030 m
CP 363,898 m
371
369
367
365
363
361
359
357
355
363
4+320
CT 363,077 m
CP 363,959 m
372
370
368
366
364
362
360
358
356
364
4+300
CT 364,476 m
CP 364,191 m
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
Eixo1
Escala 1:400

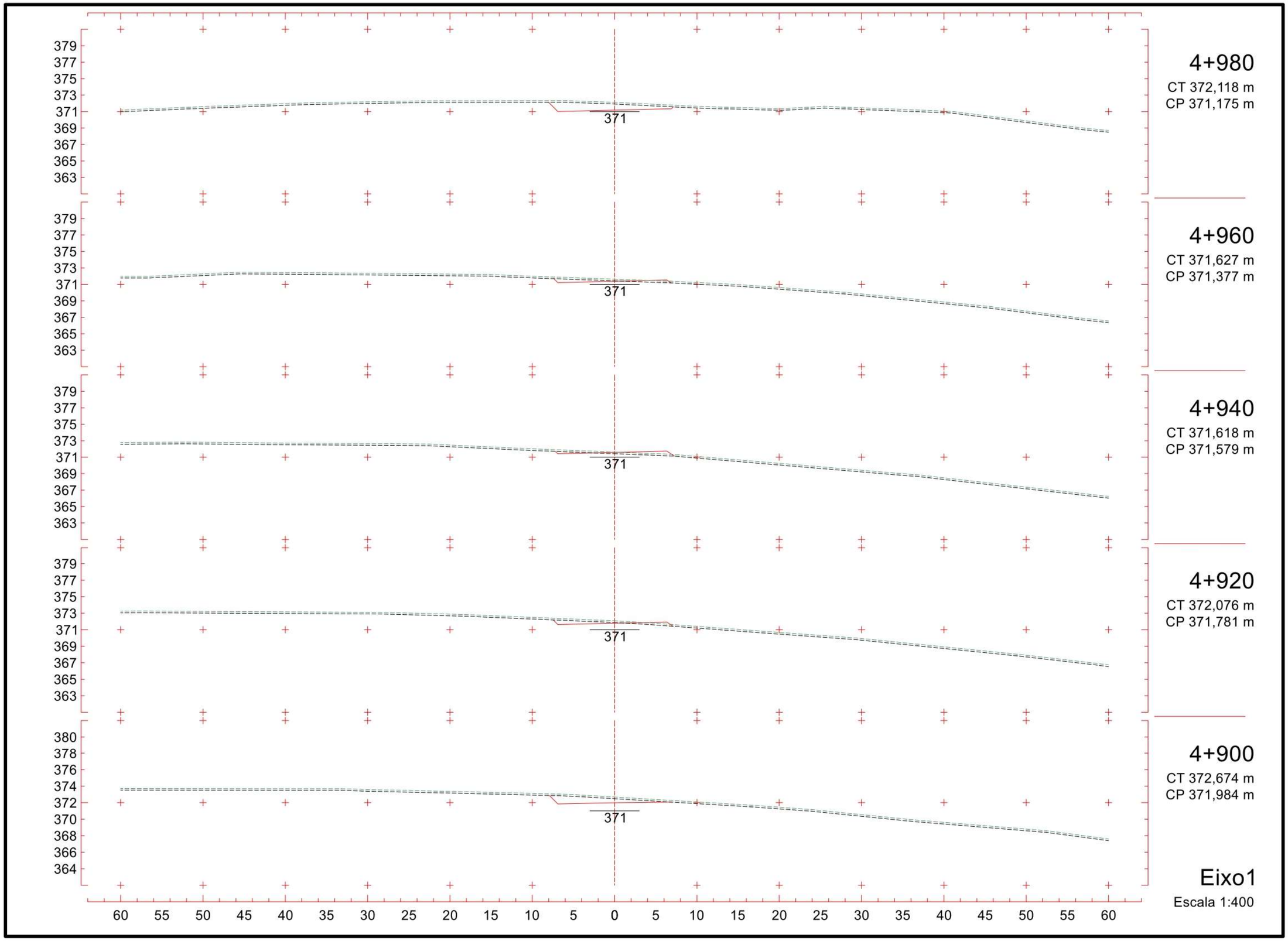

4+480
CT 364,622 m
CP 366,551 m
366
4+460
CT 363,476 m
CP 366,151 m
366
4+440
CT 362,756 m
CP 365,751 m
365
4+420
CT 362,150 m
CP 365,352 m
365
4+400
CT 361,399 m
CP 364,952 m
364
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
450

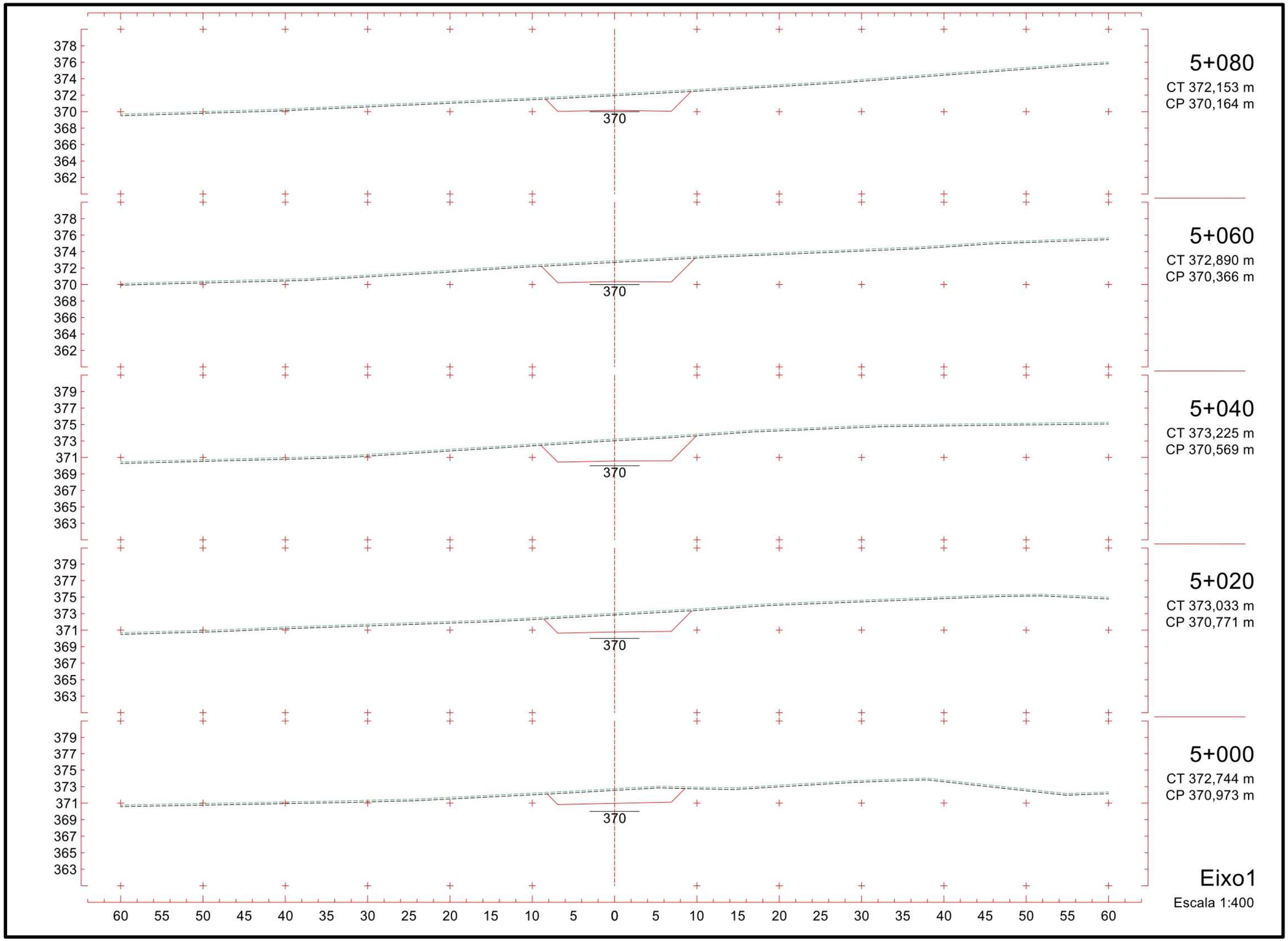

376
374
372
370
368
366
364
362
360
368
4+580
CT 366,626 m
CP 368,549 m
375
373
371
369
367
365
363
361
359
368
4+560
CT 366,656 m
CP 368,150 m
375
373
371
369
367
365
363
361
359
367
4+540
CT 366,521 m
CP 367,750 m
374
372
370
368
366
364
362
360
358
367
4+520
CT 366,152 m
CP 367,350 m
374
372
370
368
366
364
362
360
358
366
4+500
CT 365,465 m
CP 366,950 m
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
Eixo1
Escala 1:400

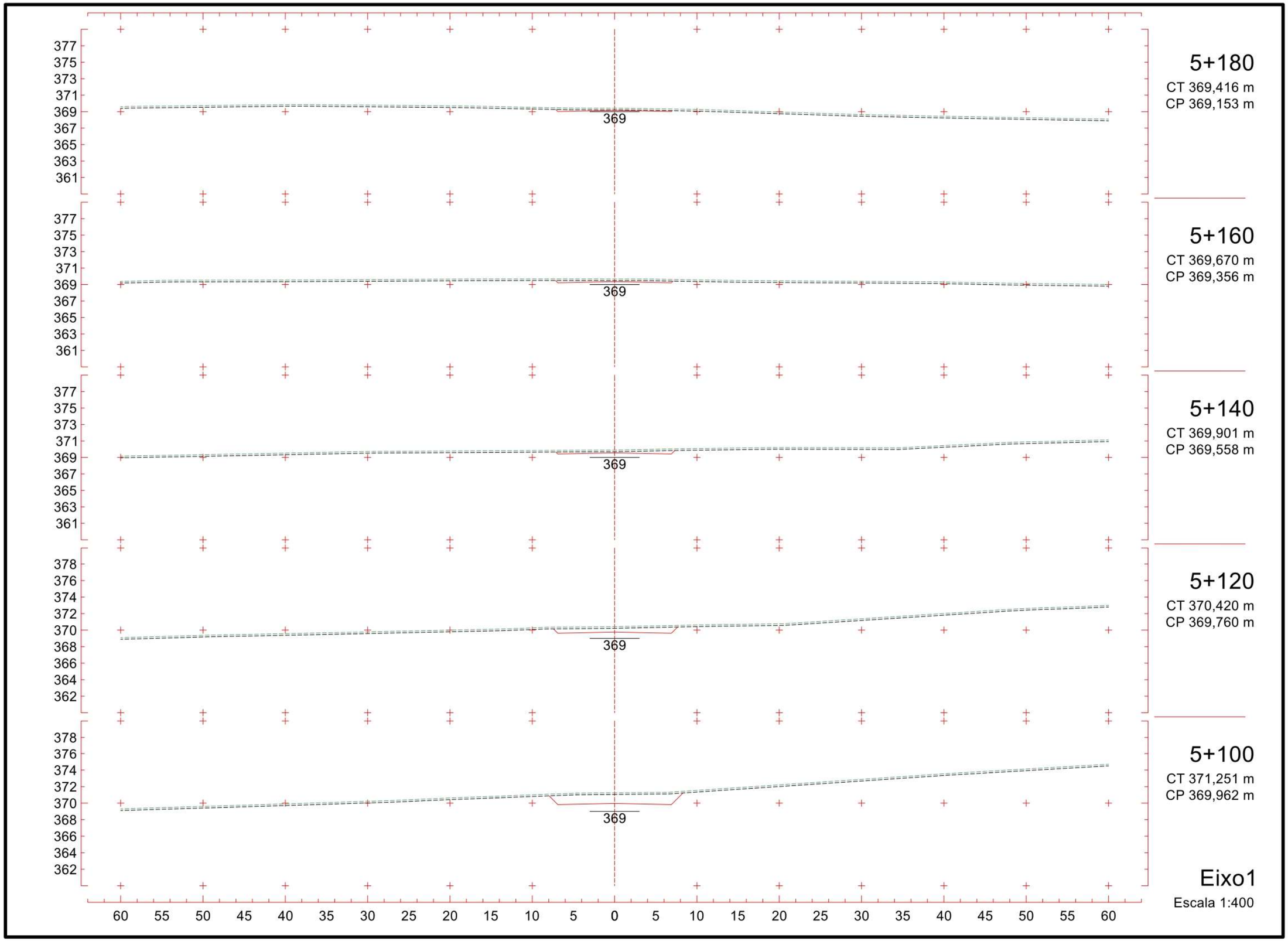

4+680
CT 370,067 m
CP 370,548 m
370
4+660
CT 369,123 m
CP 370,148 m
370
4+640
CT 367,883 m
CP 369,749 m
369
4+620
CT 367,201 m
CP 369,349 m
369
4+600
CT 366,773 m
CP 368,949 m
368
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

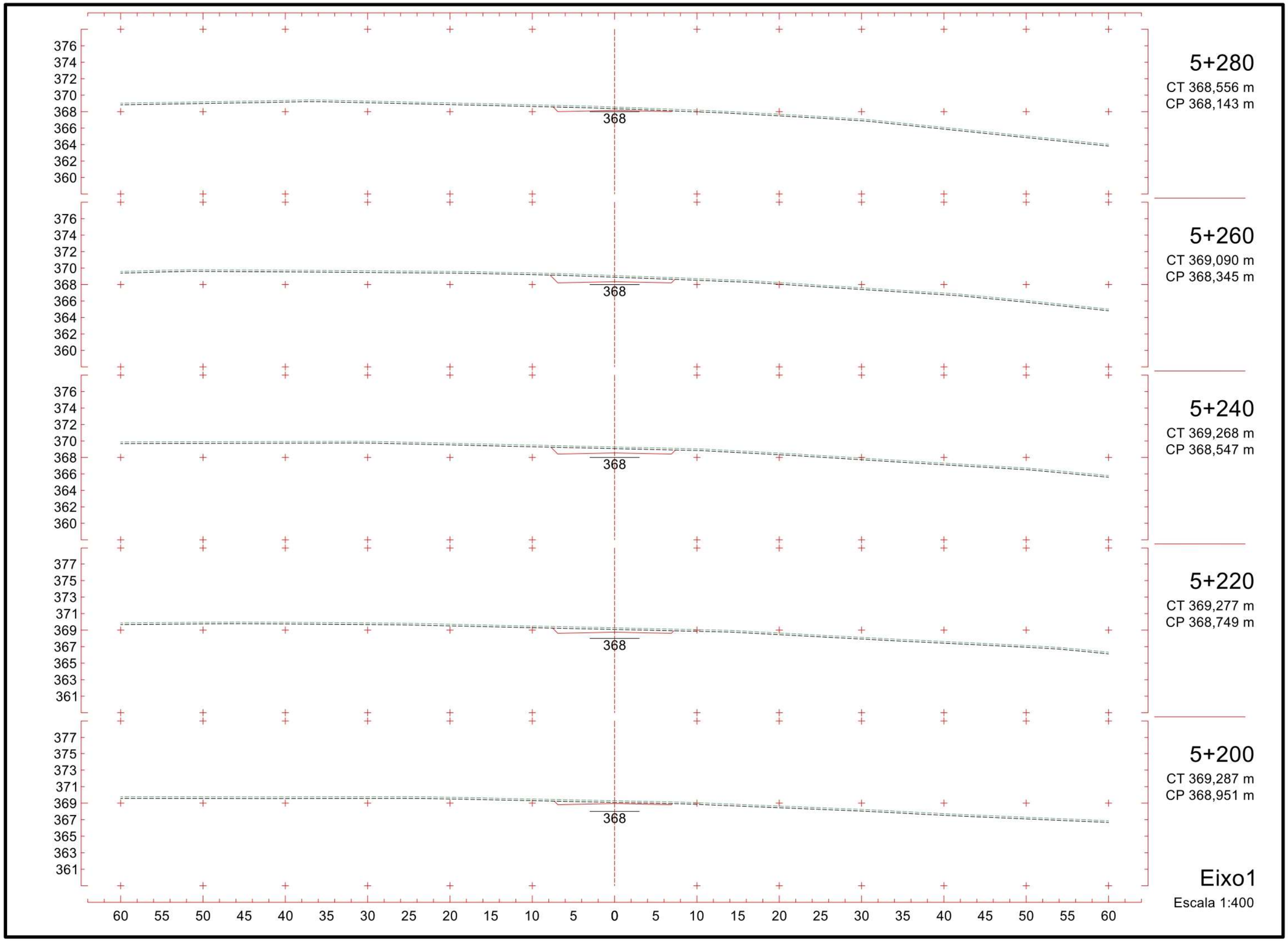

4+780
CT 372,465 m
CP 372,547 m
4+760
CT 372,449 m
CP 372,147 m
4+740
CT 372,216 m
CP 371,747 m
4+720
CT 371,719 m
CP 371,347 m
4+700
CT 370,928 m
CP 370,948 m
Eixo1
Escala 1:400

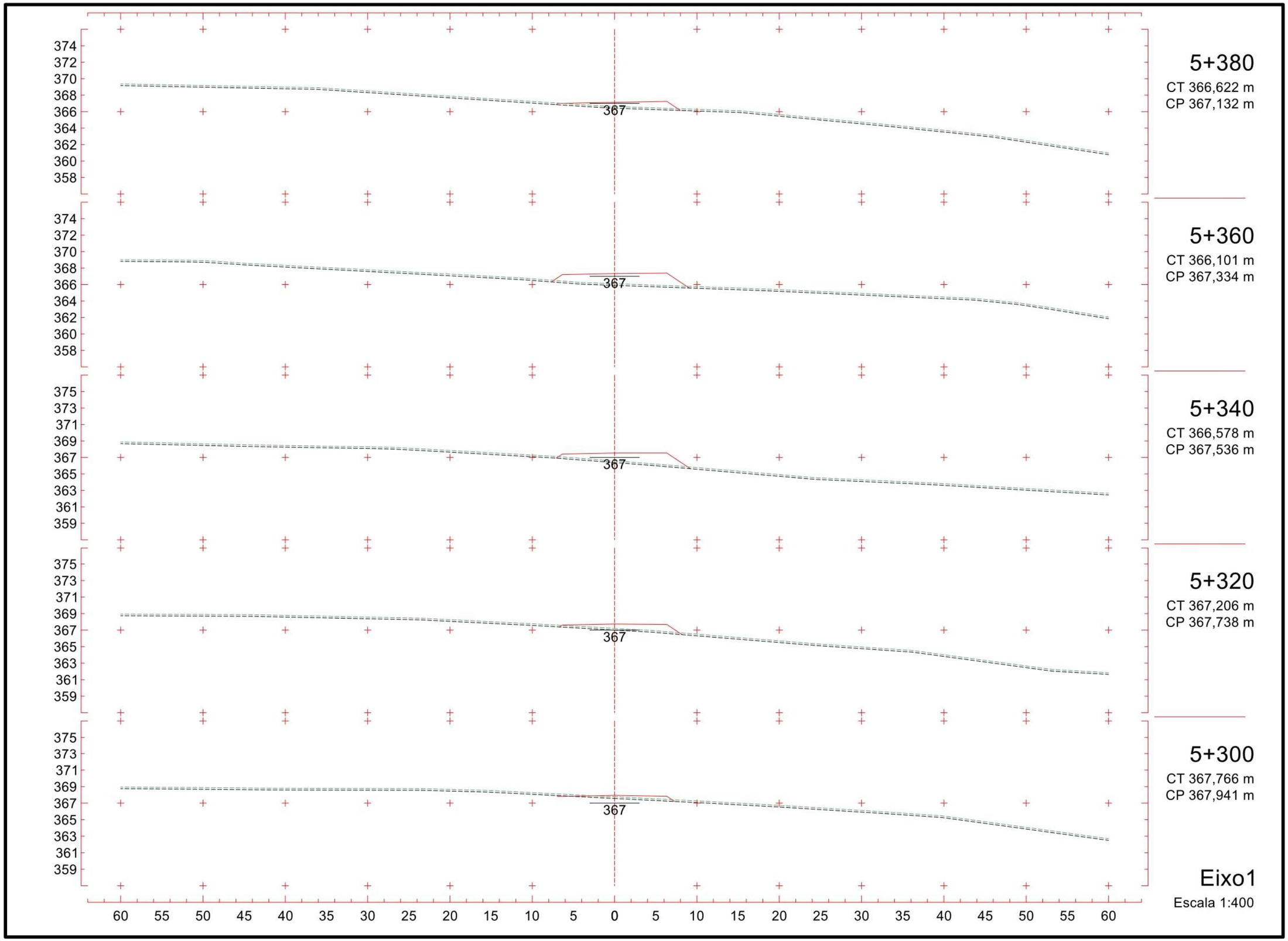

380
378
376
374
372
370
368
366
364
372
4+880
CT 372,986 m
CP 372,186 m
4+860
CT 373,046 m
CP 372,388 m
4+840
CT 373,038 m
CP 372,590 m
4+820
CT 372,769 m
CP 372,791 m
4+800
CT 372,543 m
CP 372,819 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
Eixo1
Escala 1:400

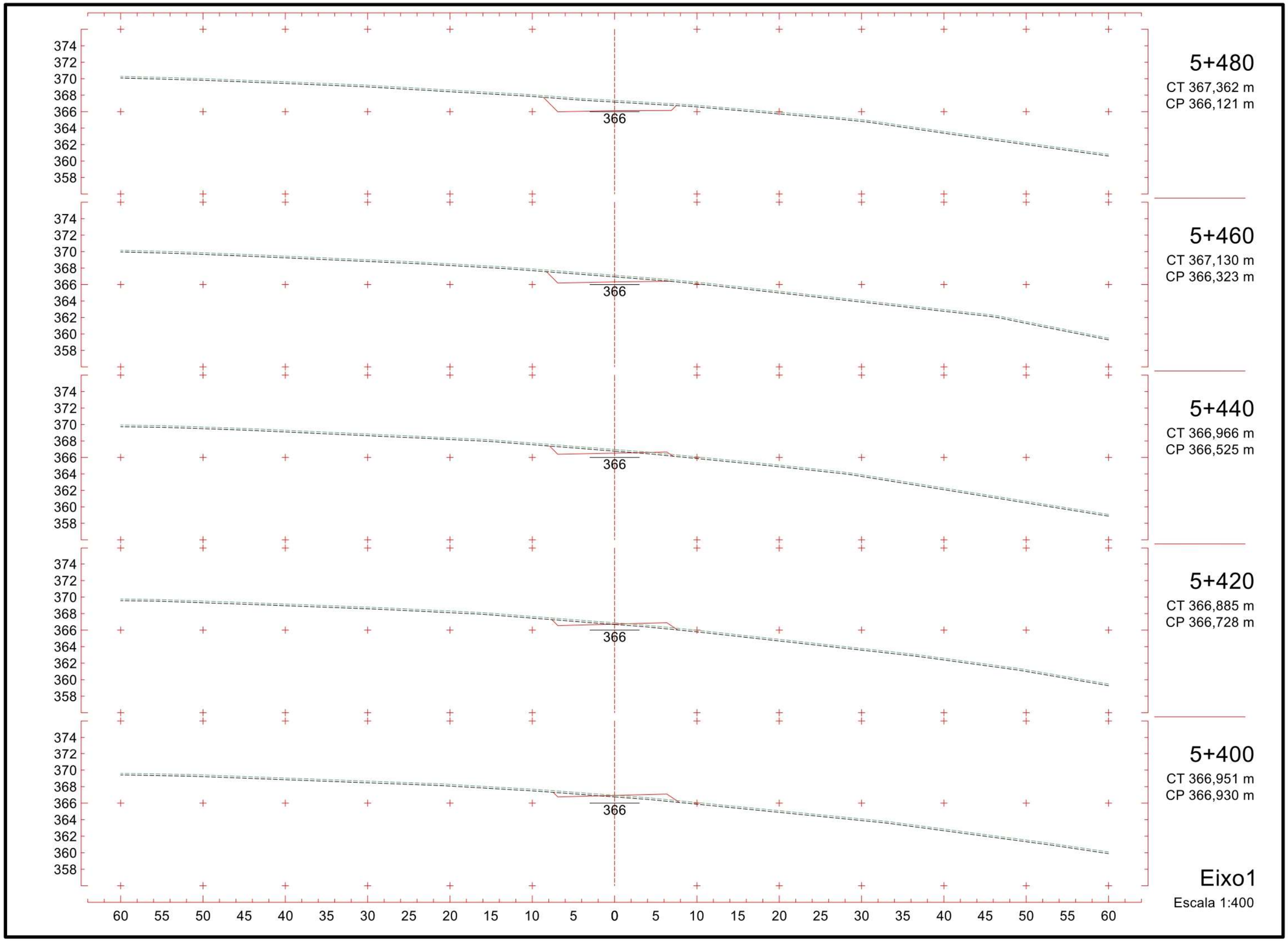

379
377
375
373
371
369
367
365
363
371
4+980
CT 372,118 m
CP 371,175 m
379
377
375
373
371
369
367
365
363
371
4+960
CT 371,627 m
CP 371,377 m
379
377
375
373
371
369
367
365
363
371
4+940
CT 371,618 m
CP 371,579 m
379
377
375
373
371
369
367
365
363
371
4+920
CT 372,076 m
CP 371,781 m
380
378
376
374
372
370
368
366
364
371
4+900
CT 372,674 m
CP 371,984 m
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
Eixo1
Escala 1:400


5+080
CT 372,153 m
CP 370,164 m
5+060
CT 372,890 m
CP 370,366 m
5+040
CT 373,225 m
CP 370,569 m
5+020
CT 373,033 m
CP 370,771 m
5+000
CT 372,744 m
CP 370,973 m
Eixo1
Escala 1:400
370
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

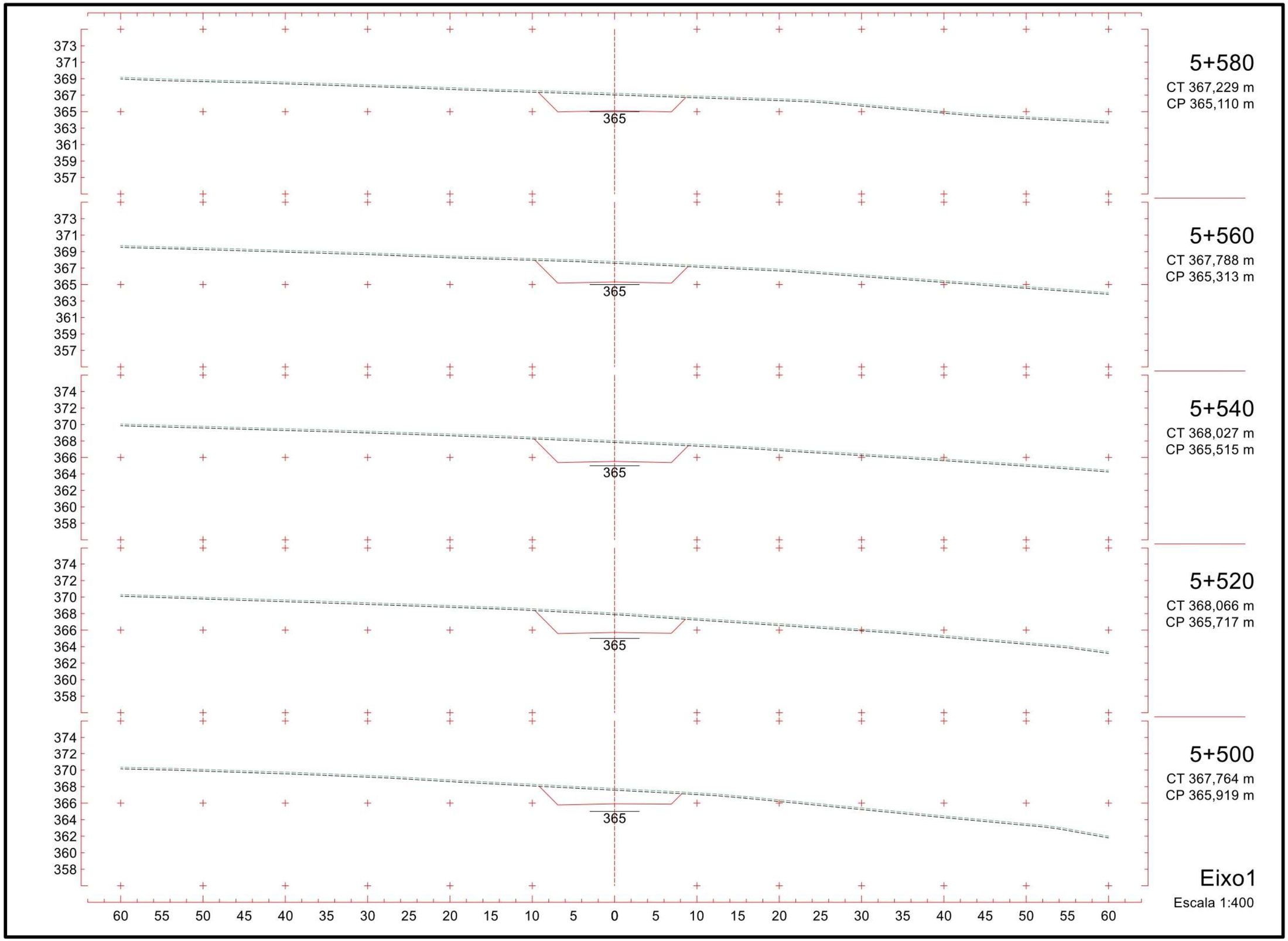

377
375
373
371
369
367
365
363
361
369
5+180
CT 369,416 m
CP 369,153 m
377
375
373
371
369
367
365
363
361
369
5+160
CT 369,670 m
CP 369,356 m
377
375
373
371
369
367
365
363
361
369
5+140
CT 369,901 m
CP 369,558 m
378
376
374
372
370
368
366
364
362
369
5+120
CT 370,420 m
CP 369,760 m
378
376
374
372
370
368
366
364
362
369
5+100
CT 371,251 m
CP 369,962 m
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
Eixo1
Escala 1:400

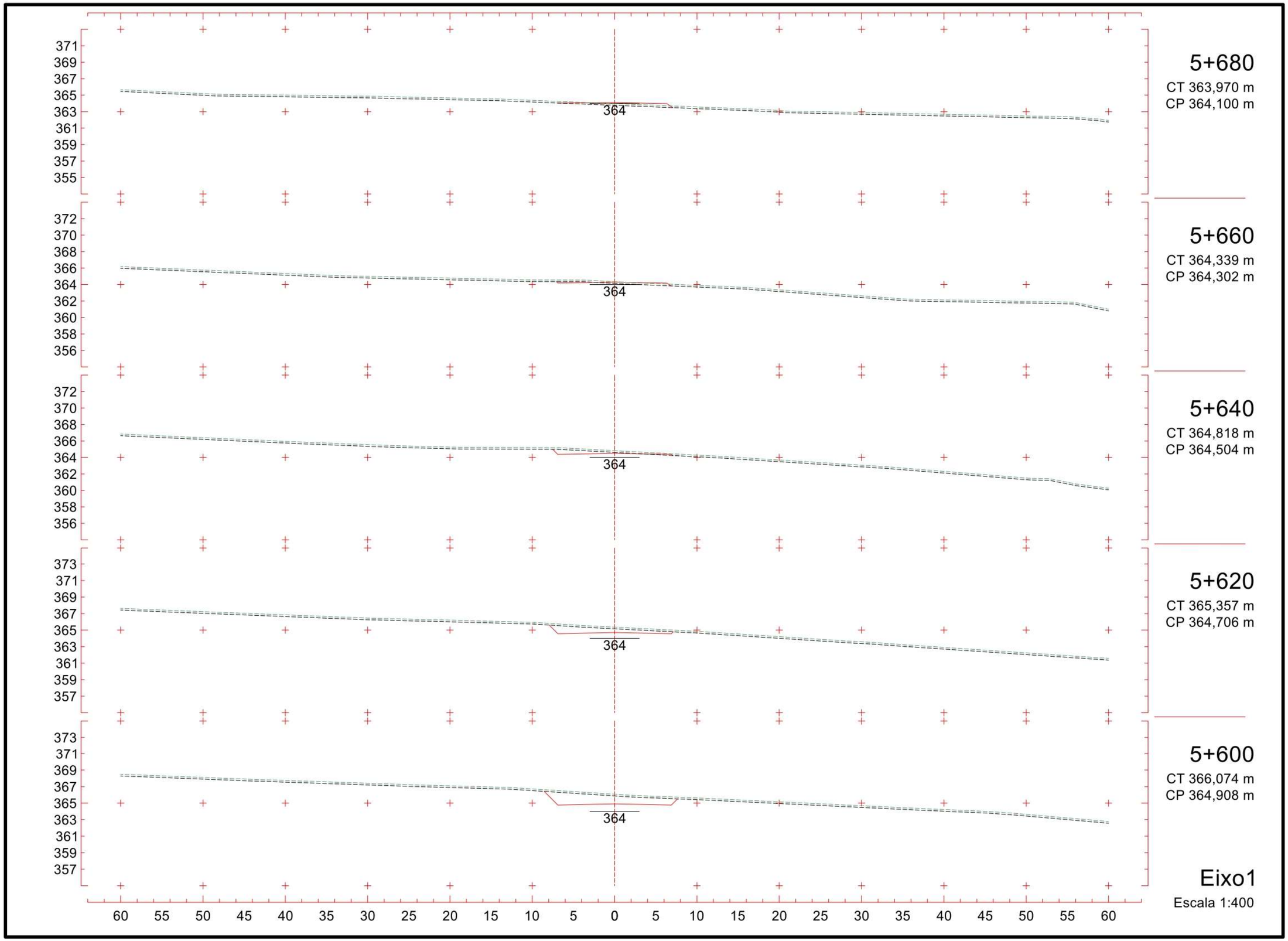

5+280
CT 368,556 m
CP 368,143 m
5+260
CT 369,090 m
CP 368,345 m
5+240
CT 369,268 m
CP 368,547 m
5+220
CT 369,277 m
CP 368,749 m
5+200
CT 369,287 m
CP 368,951 m
Eixo1
Escala 1:400
368
376 374 372 370 368 366 364 362 360
377 375 373 371 369 367 365 363 361
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

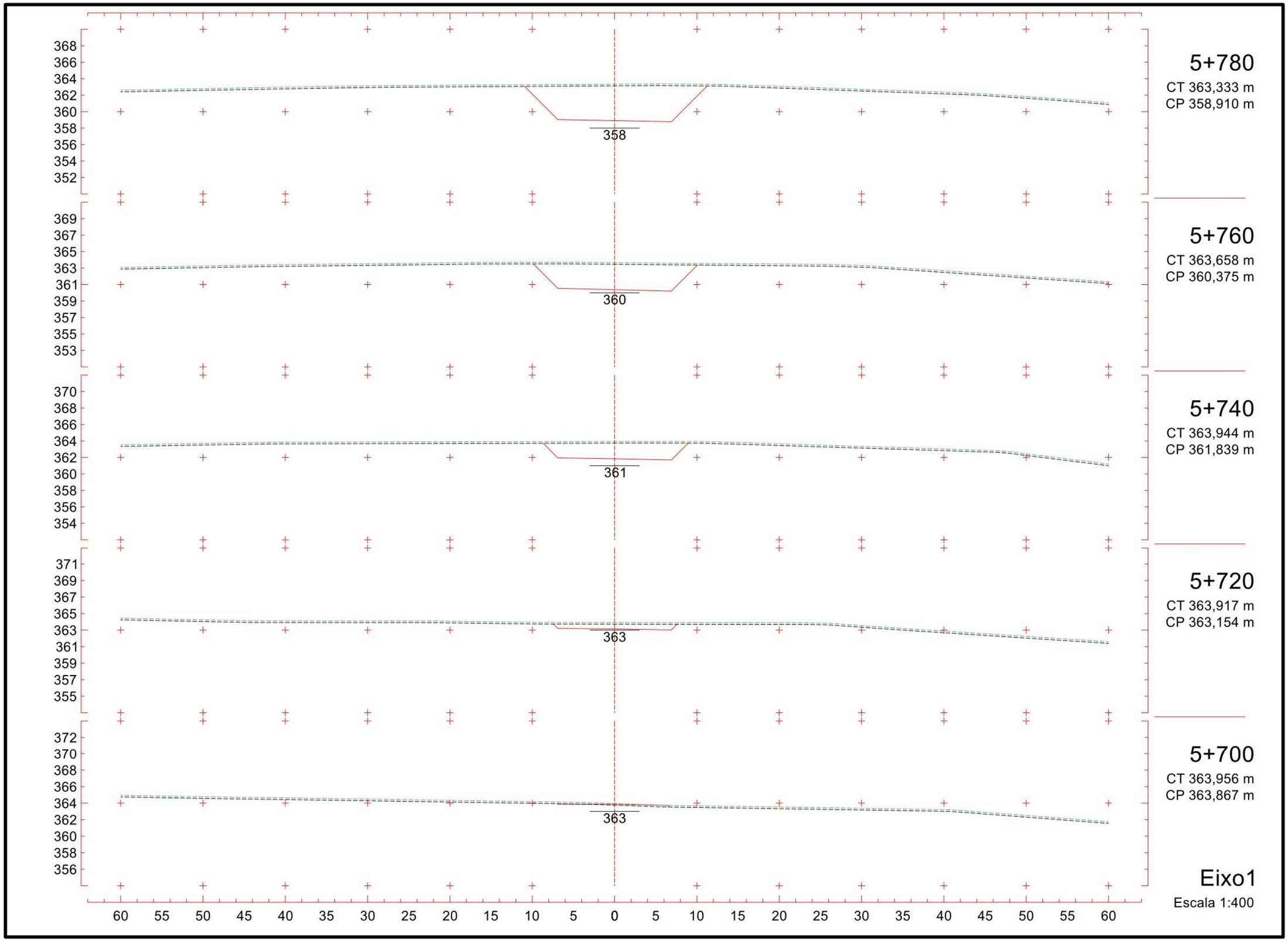

374
372
370
368
366
364
362
360
358
367
5+380
CT 366,622 m
CP 367,132 m
374
372
370
368
366
364
362
360
358
367
5+360
CT 366,101 m
CP 367,334 m
375
373
371
369
367
365
363
361
359
367
5+340
CT 366,578 m
CP 367,536 m
375
373
371
369
367
365
363
361
359
367
5+320
CT 367,206 m
CP 367,738 m
375
373
371
369
367
365
363
361
359
367
5+300
CT 367,766 m
CP 367,941 m
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
Eixo1
Escala 1:400


374
372
370
368
366
364
362
360
358
366
5+480
CT 367,362 m
CP 366,121 m
5+460
CT 367,130 m
CP 366,323 m
5+440
CT 366,966 m
CP 366,525 m
5+420
CT 366,885 m
CP 366,728 m
5+400
CT 366,951 m
CP 366,930 m
Eixo1
Escala 1:400
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

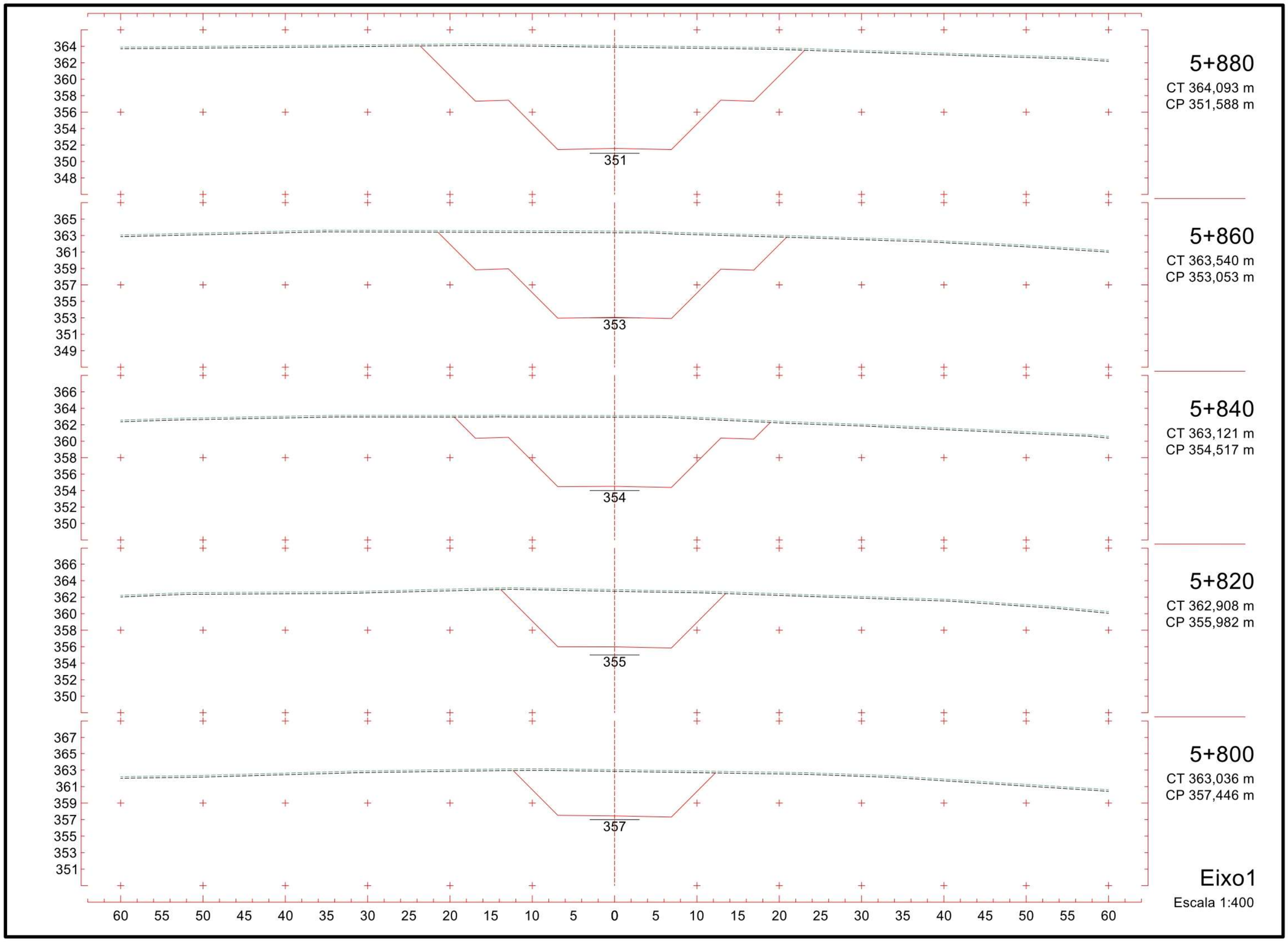
460

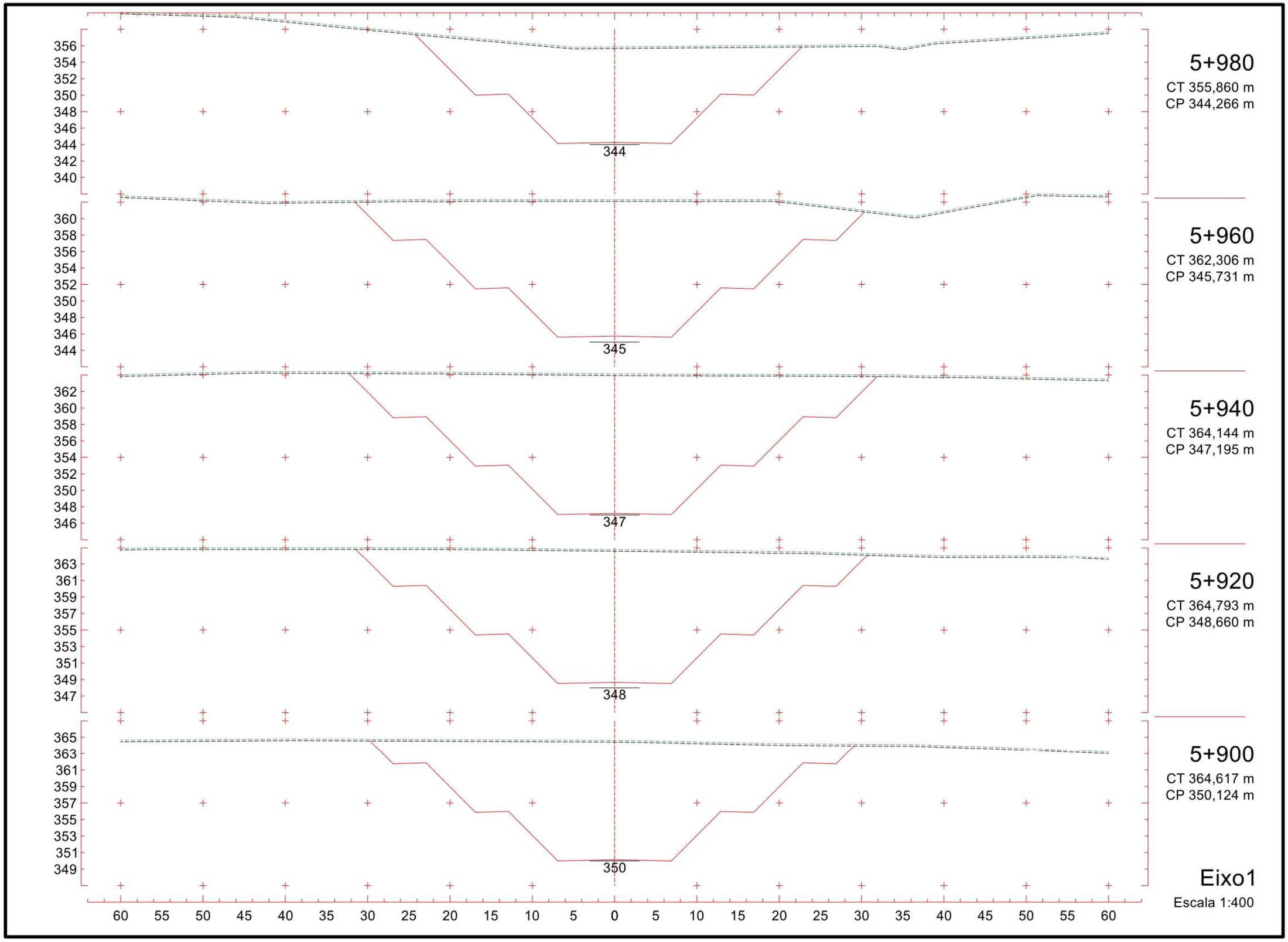

373
371
369
367
365
363
361
359
357
365
5+580
CT 367,229 m
CP 365,110 m
373
371
369
367
365
363
361
359
357
365
5+560
CT 367,788 m
CP 365,313 m
374
372
370
368
366
364
362
360
358
365
5+540
CT 368,027 m
CP 365,515 m
374
372
370
368
366
364
362
360
358
365
5+520
CT 368,066 m
CP 365,717 m
374
372
370
368
366
364
362
360
358
365
5+500
CT 367,764 m
CP 365,919 m
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
Eixo1
Escala 1:400

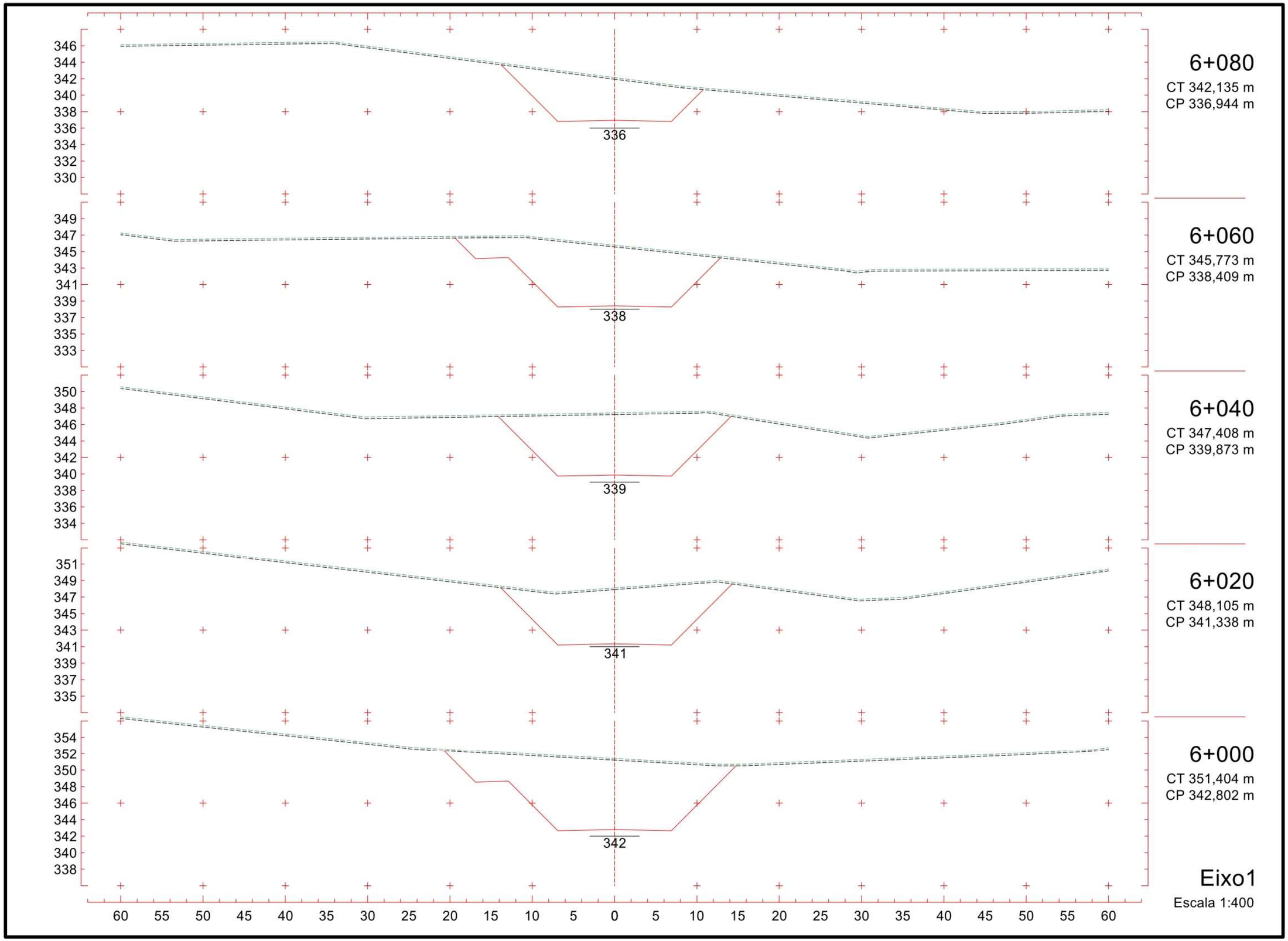

5+680
CT 363,970 m
CP 364,100 m
5+660
CT 364,339 m
CP 364,302 m
5+640
CT 364,818 m
CP 364,504 m
5+620
CT 365,357 m
CP 364,706 m
5+600
CT 366,074 m
CP 364,908 m
Eixo1
Escala 1:400
364
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

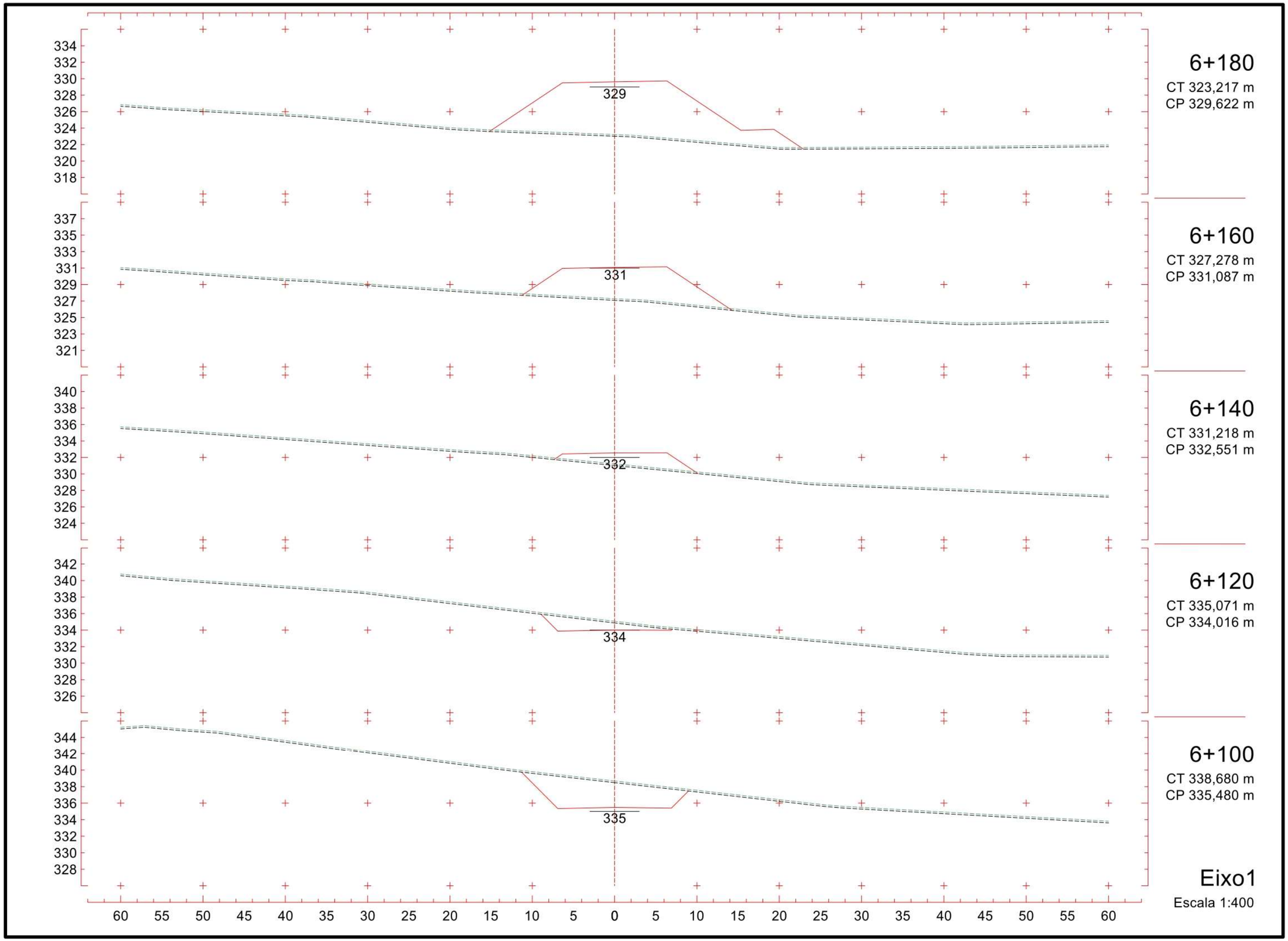

5+780
CT 363,333 m
CP 358,910 m
358
5+760
CT 363,658 m
CP 360,375 m
360
5+740
CT 363,944 m
CP 361,839 m
361
5+720
CT 363,917 m
CP 363,154 m
363
5+700
CT 363,956 m
CP 363,867 m
363
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

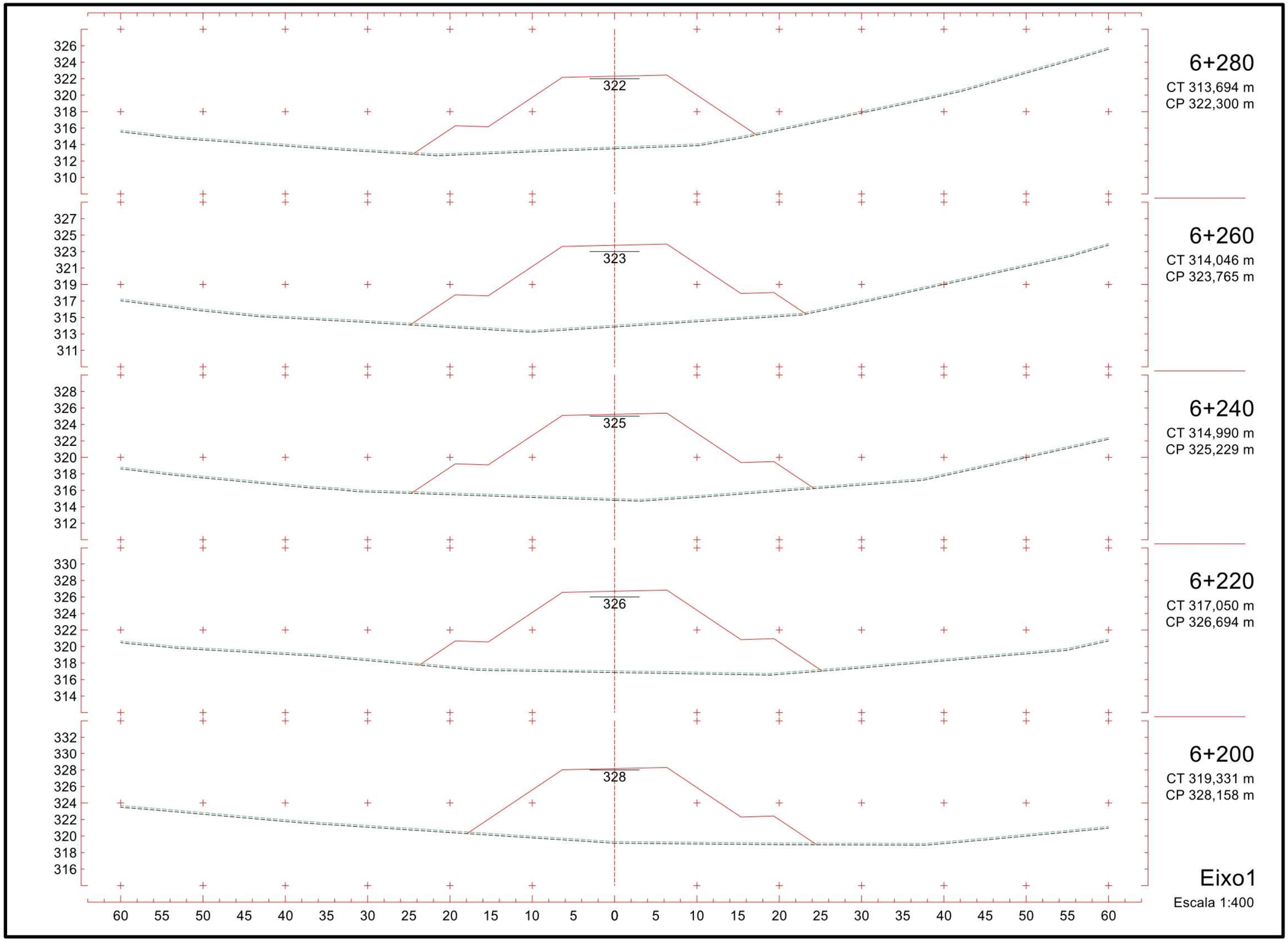
463

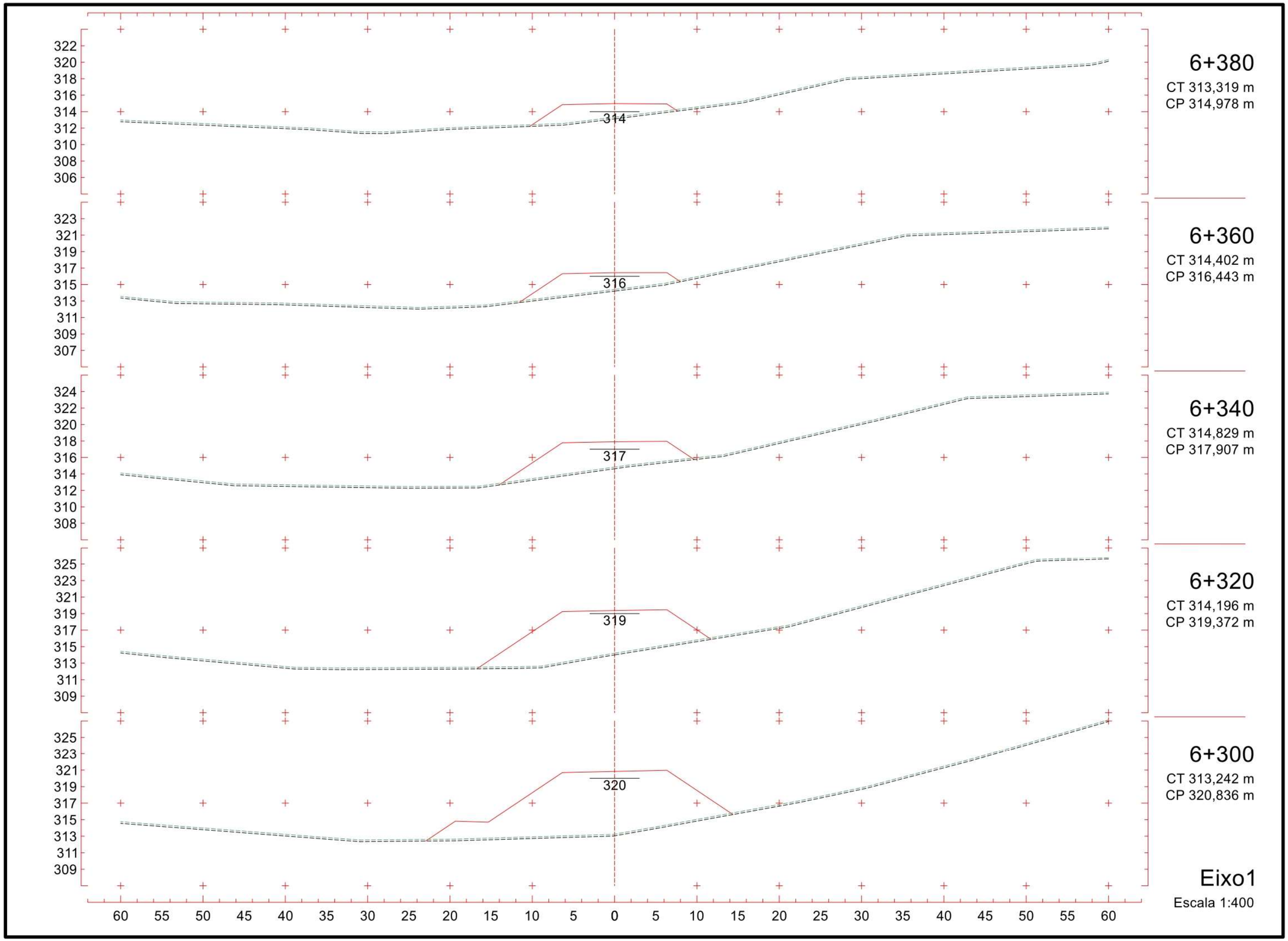

5+880
CT 364,093 m
CP 351,588 m
351
5+860
CT 363,540 m
CP 353,053 m
353
5+840
CT 363,121 m
CP 354,517 m
354
5+820
CT 362,908 m
CP 355,982 m
355
5+800
CT 363,036 m
CP 357,446 m
357
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

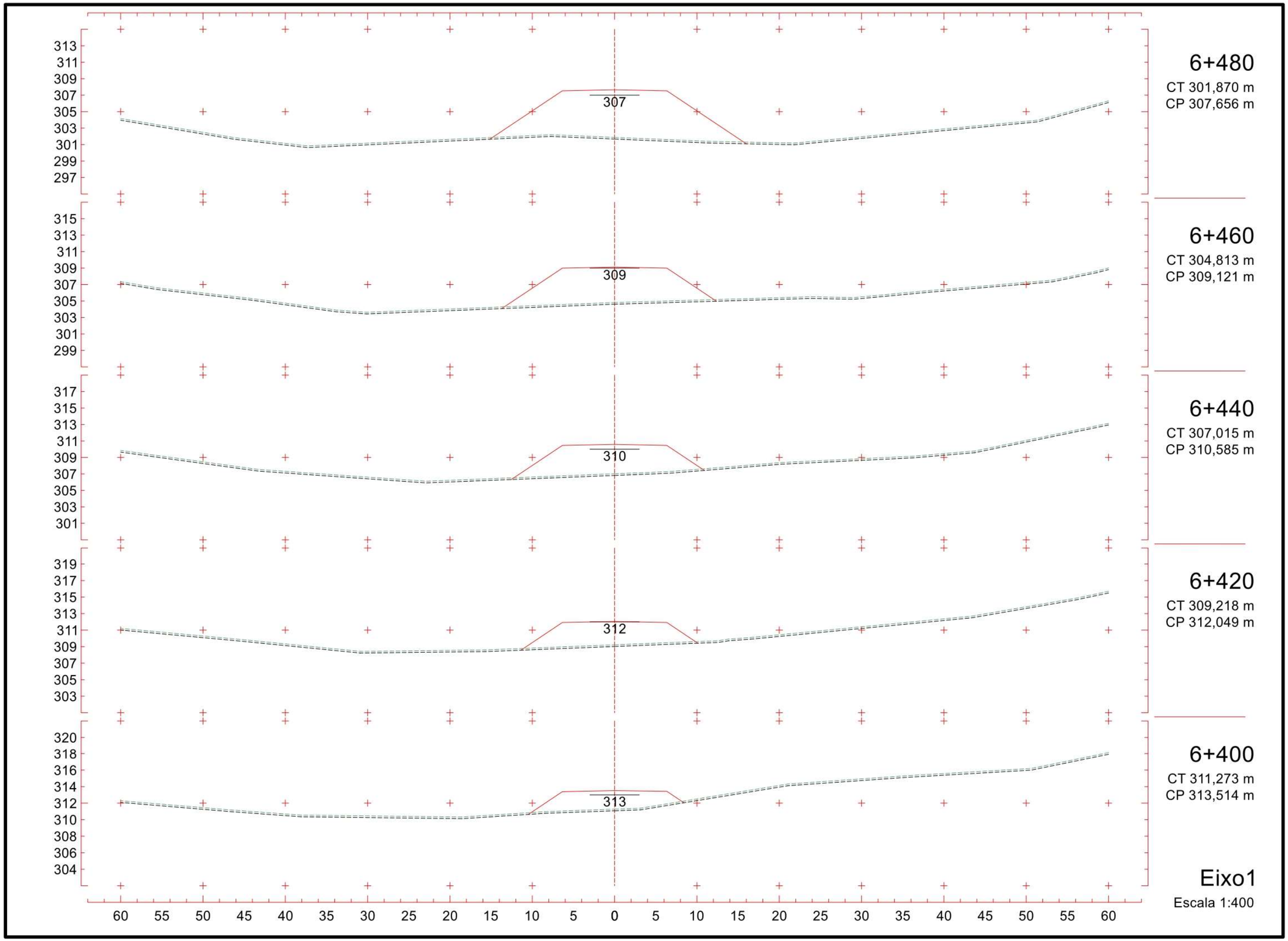

5+980
CT 355,860 m
CP 344,266 m
344
5+960
CT 362,306 m
CP 345,731 m
345
5+940
CT 364,144 m
CP 347,195 m
347
5+920
CT 364,793 m
CP 348,660 m
348
5+900
CT 364,617 m
CP 350,124 m
350
Eixo1
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

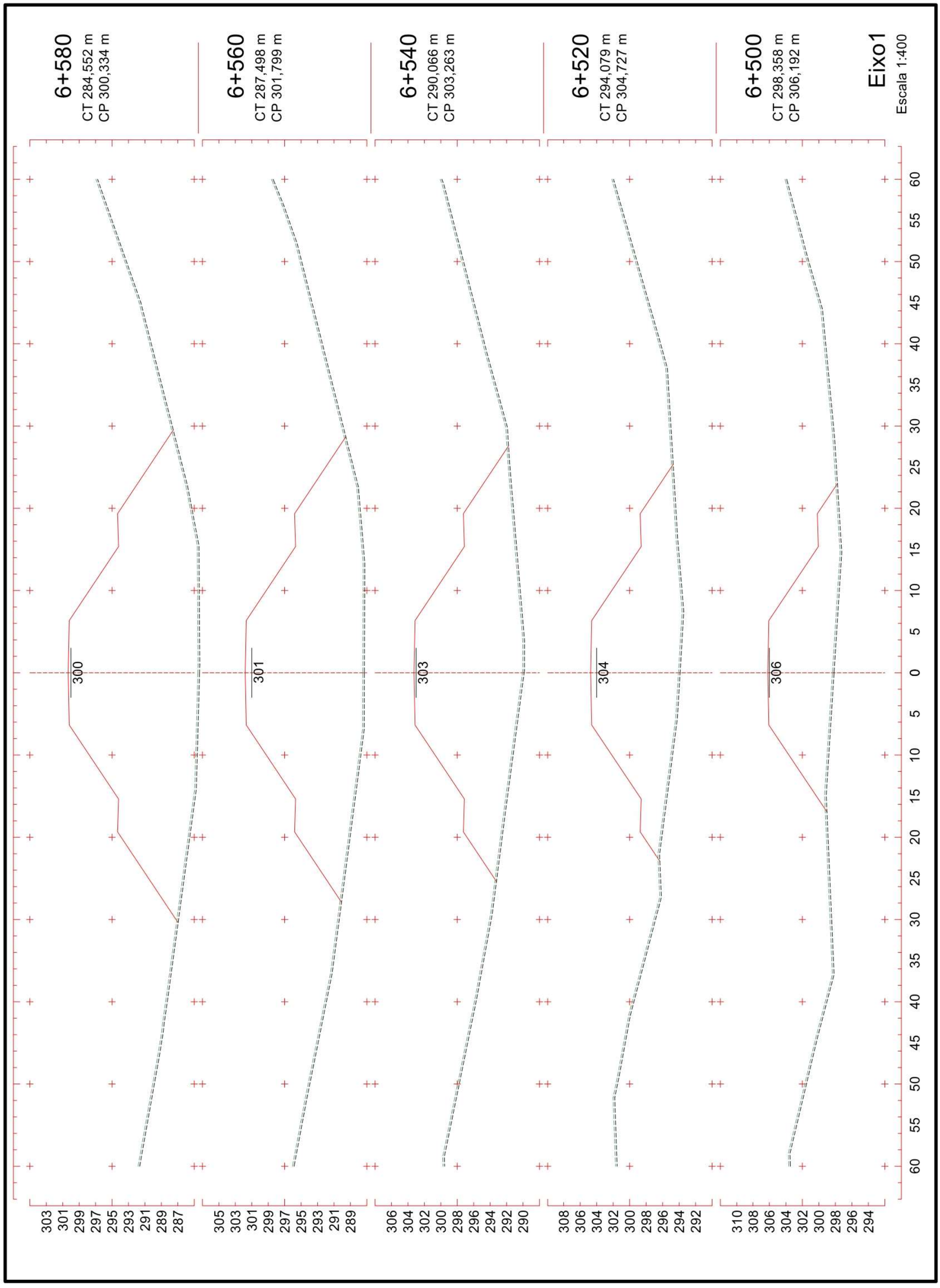

346
344
342
340
338
336
334
332
330
336
6+080
CT 342,135 m
CP 336,944 m
349
347
345
343
341
339
337
335
333
338
6+060
CT 345,773 m
CP 338,409 m
350
348
346
344
342
340
338
336
334
339
6+040
CT 347,408 m
CP 339,873 m
351
349
347
345
343
341
339
337
335
341
6+020
CT 348,105 m
CP 341,338 m
354
352
350
348
346
344
342
340
338
342
6+000
CT 351,404 m
CP 342,802 m
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
Eixo1
Escala 1:400

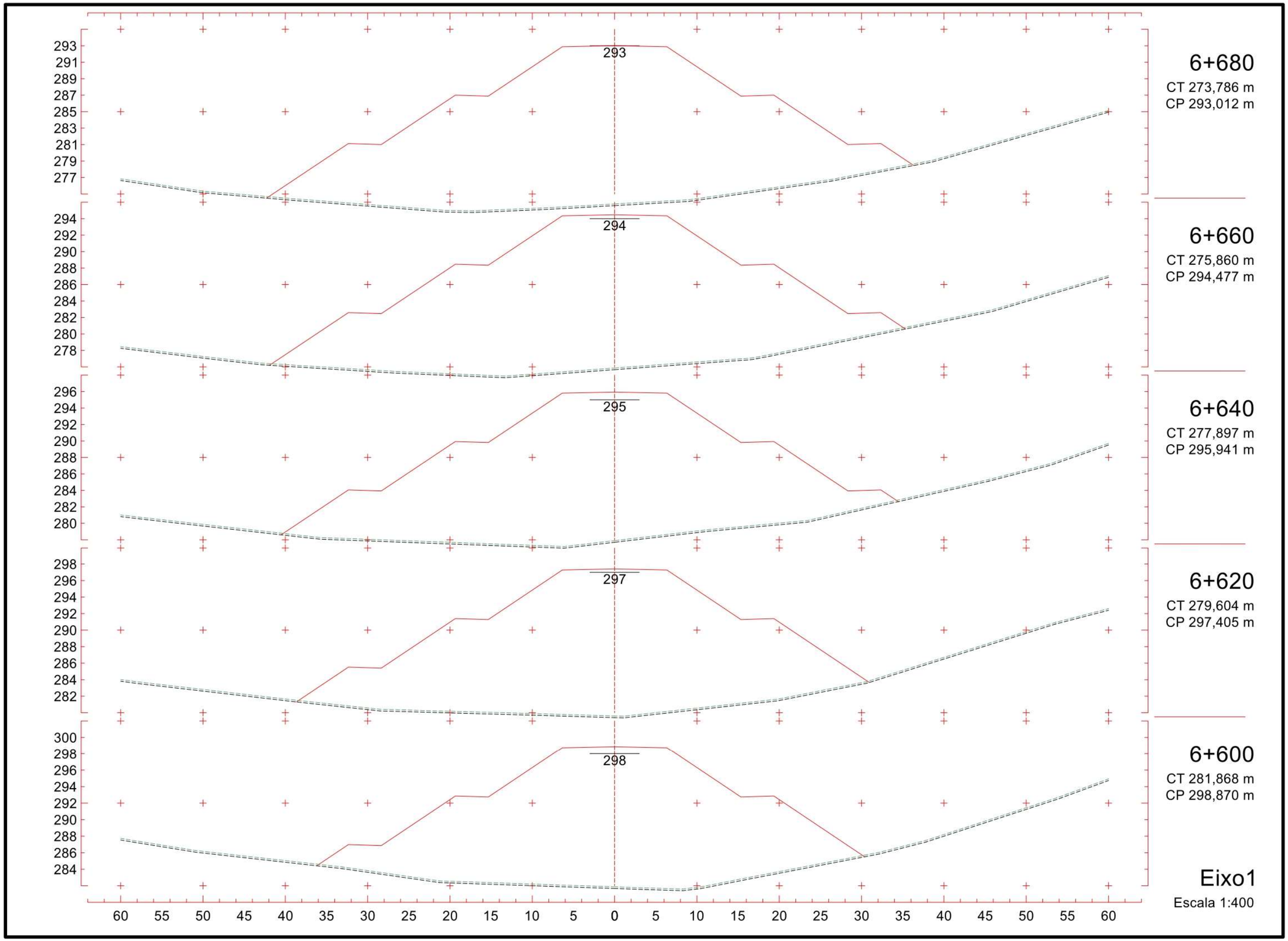

6+180
CT 323,217 m
CP 329,622 m
329
6+160
CT 327,278 m
CP 331,087 m
331
6+140
CT 331,218 m
CP 332,551 m
332
6+120
CT 335,071 m
CP 334,016 m
334
6+100
CT 338,680 m
CP 335,480 m
335
Eixo1
Escala 1:400

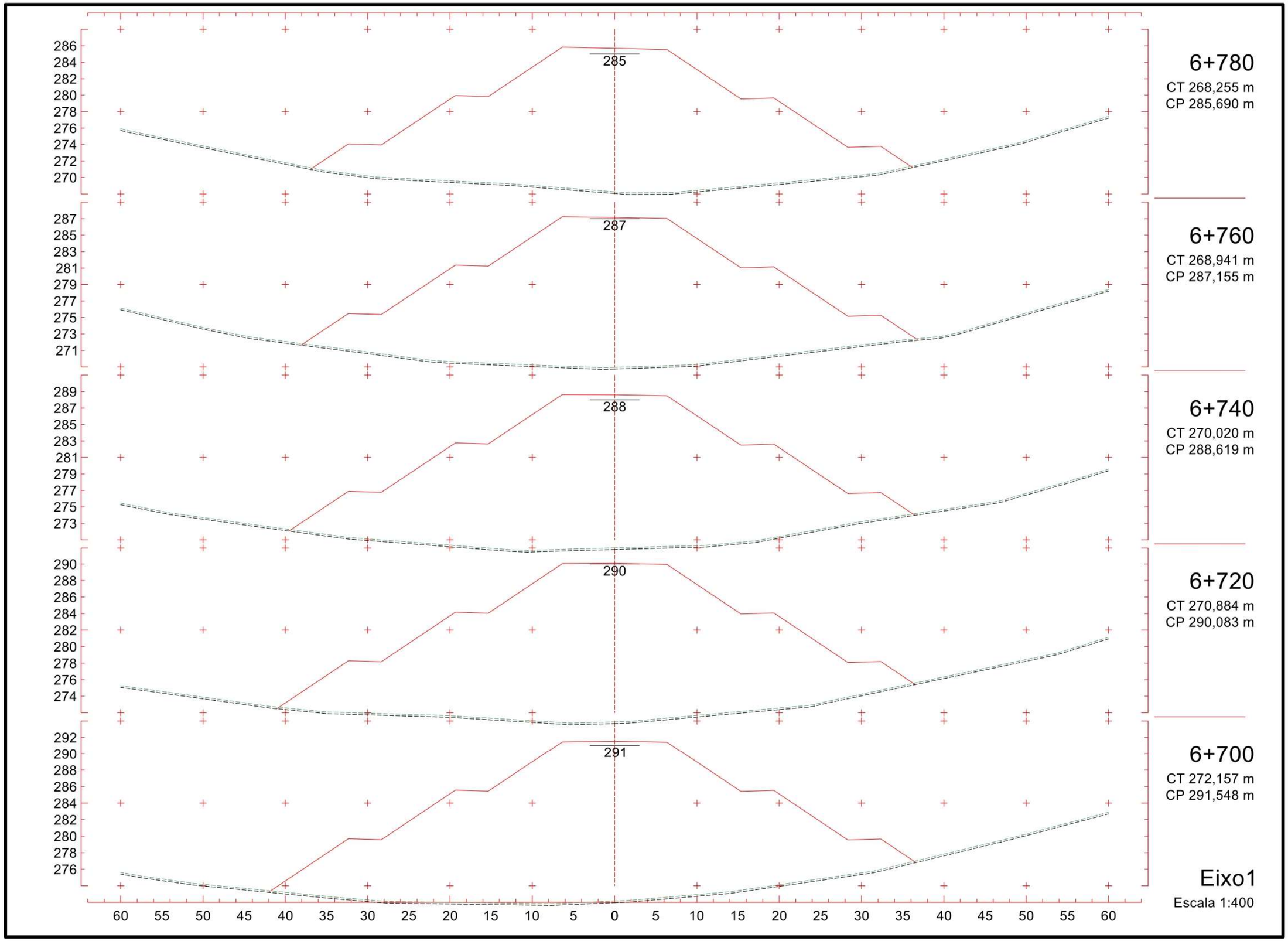

326
324
322
320
318
316
314
312
310
322
6+280
CT 313,694 m
CP 322,300 m
327
325
323
321
319
317
315
313
311
323
6+260
CT 314,046 m
CP 323,765 m
328
326
324
322
320
318
316
314
312
325
6+240
CT 314,990 m
CP 325,229 m
330
328
326
324
322
320
318
316
314
326
6+220
CT 317,050 m
CP 326,694 m
332
330
328
326
324
322
320
318
316
328
6+200
CT 319,331 m
CP 328,158 m
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
Eixo1
Escala 1:400

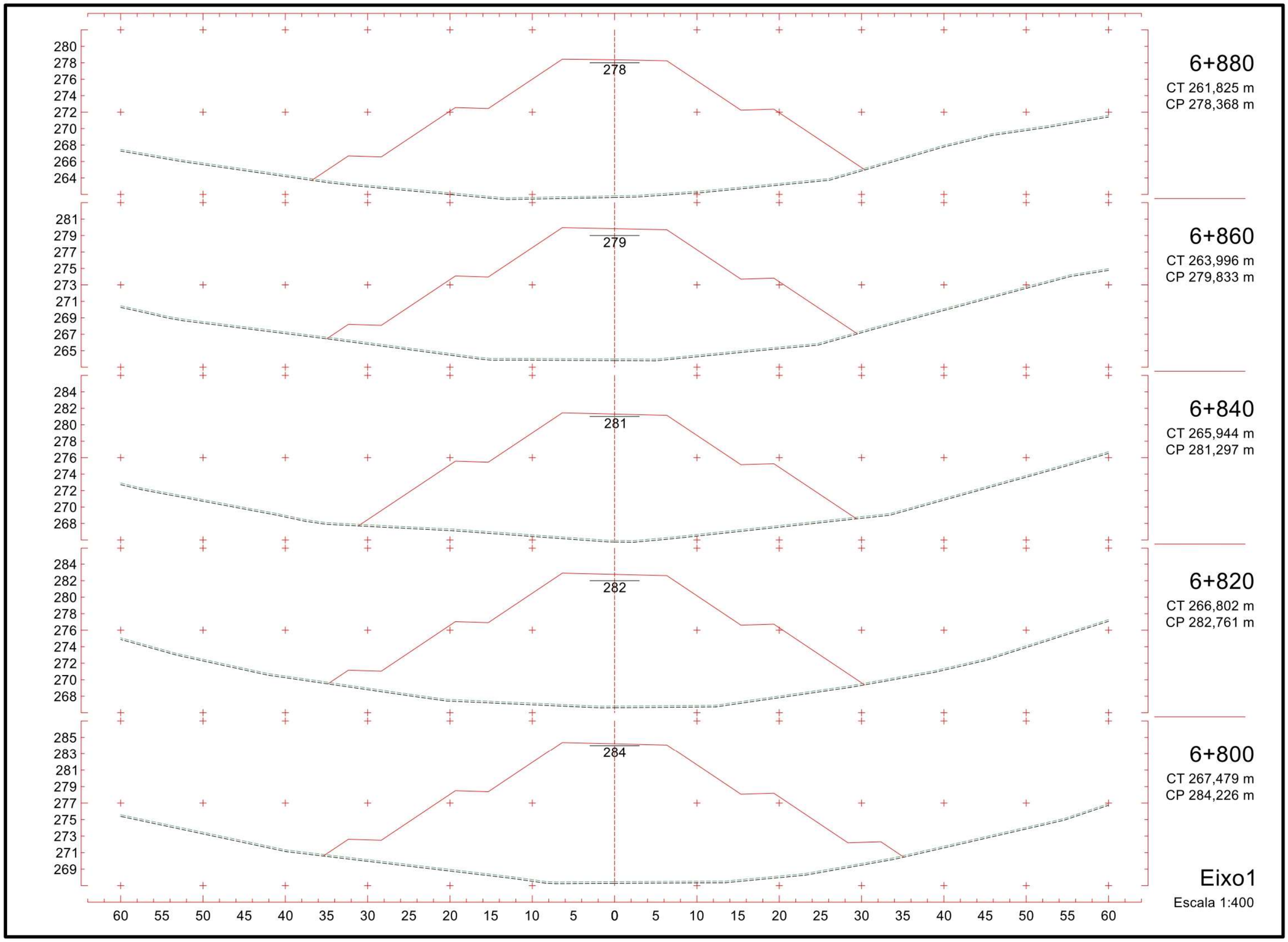

322
320
318
316
314
312
310
308
306
314
6+380
CT 313,319 m
CP 314,978 m
323
321
319
317
315
313
311
309
307
316
6+360
CT 314,402 m
CP 316,443 m
324
322
320
318
316
314
312
310
308
317
6+340
CT 314,829 m
CP 317,907 m
325
323
321
319
317
315
313
311
309
319
6+320
CT 314,196 m
CP 319,372 m
325
323
321
319
317
315
313
311
309
320
6+300
CT 313,242 m
CP 320,836 m
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
Eixo1
Escala 1:400

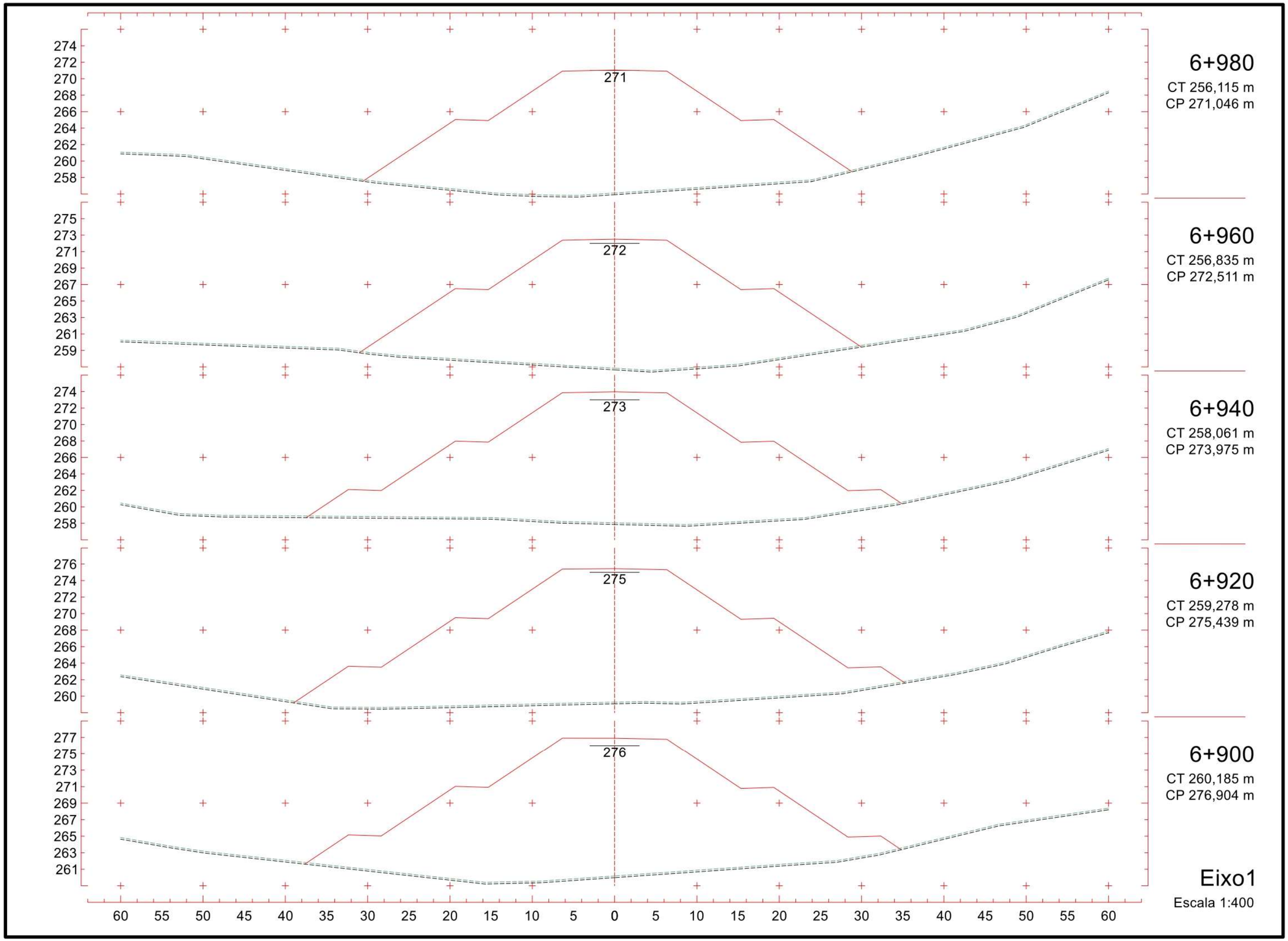

313
311
309
307
305
303
301
299
297
307
6+480
CT 301,870 m
CP 307,656 m
315
313
311
309
307
305
303
301
299
309
6+460
CT 304,813 m
CP 309,121 m
317
315
313
311
309
307
305
303
301
310
6+440
CT 307,015 m
CP 310,585 m
319
317
315
313
311
309
307
305
303
312
6+420
CT 309,218 m
CP 312,049 m
320
318
316
314
312
310
308
306
304
313
6+400
CT 311,273 m
CP 313,514 m
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
Eixo1
Escala 1:400

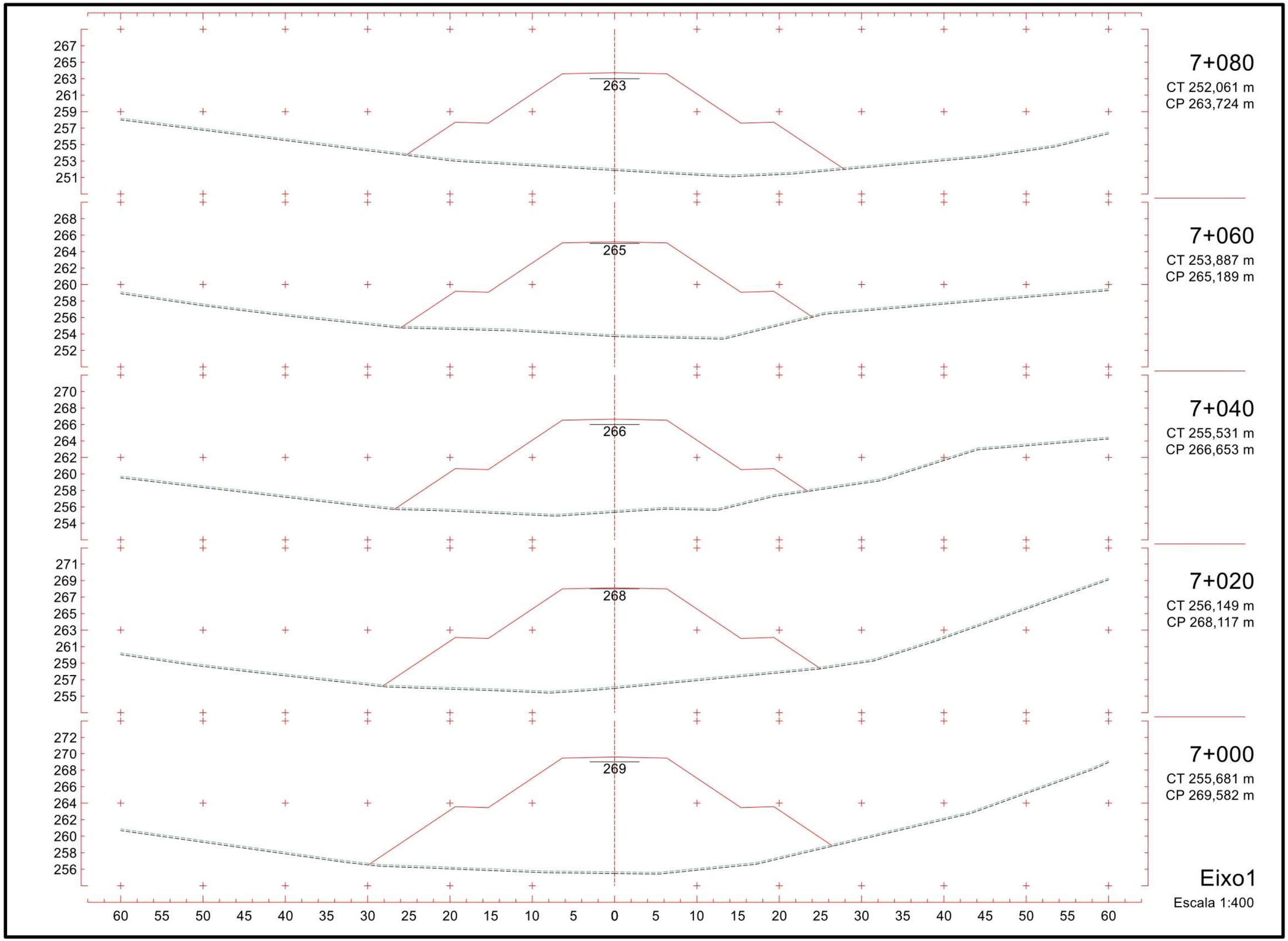

6+580
CT 284,552 m
CP 300,334 m
6+560
CT 287,498 m
CP 301,799 m
6+540
CT 290,066 m
CP 303,263 m
6+520
CT 294,079 m
CP 304,727 m
6+500
CT 298,358 m
CP 306,192 m
Eixo1
Escala 1:400
300
301
303
304
306
5 10 15 20 25 30 35 40 45 50 55 60
0
303 301 299 297 295 293 291 289 287
305 303 301 299 297 295 293 291 289
306 304 302 300 298 296 294 292 290
308 306 304 302 300 298 296 294 292
310 308 306 304 302 300 298 296 294

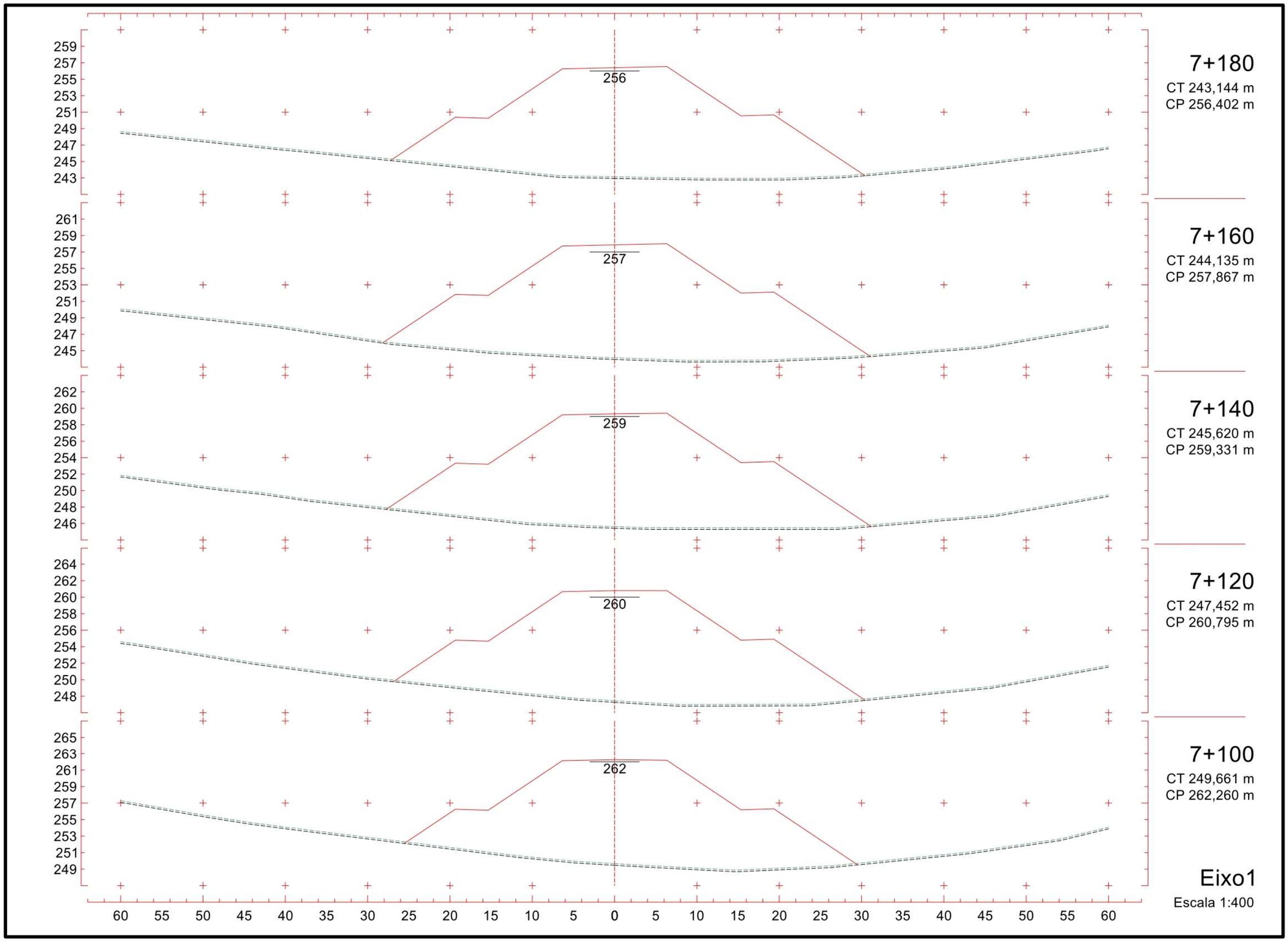

293
291
289
287
285
283
281
279
277
293
6+680
CT 273,786 m
CP 293,012 m
294
292
290
288
286
284
282
280
278
294
6+660
CT 275,860 m
CP 294,477 m
296
294
292
290
288
286
284
282
280
295
6+640
CT 277,897 m
CP 295,941 m
298
296
294
292
290
288
286
284
282
297
6+620
CT 279,604 m
CP 297,405 m
300
298
296
294
292
290
288
286
284
298
6+600
CT 281,868 m
CP 298,870 m
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
Eixo1
Escala 1:400

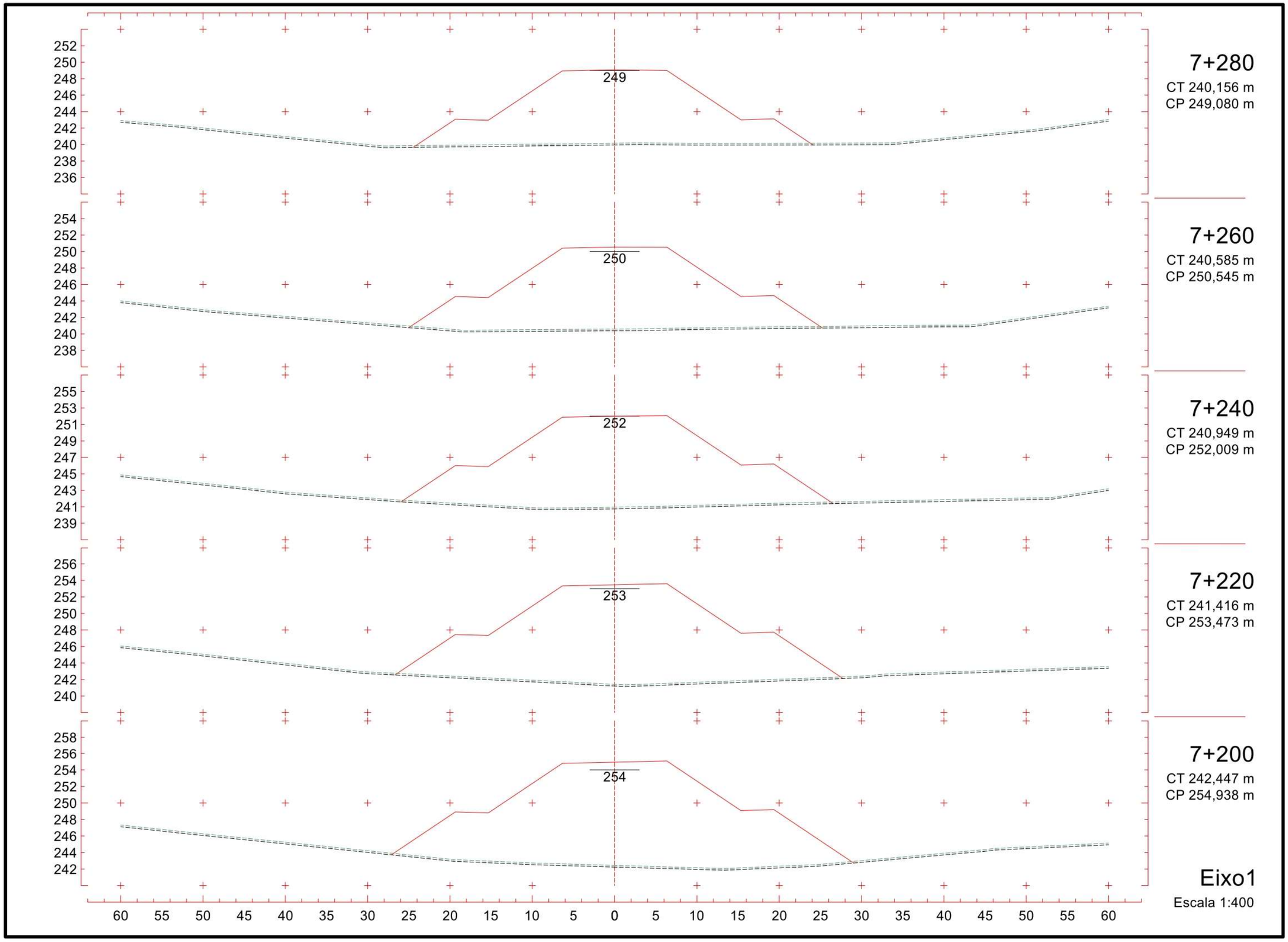

286
284
282
280
278
276
274
272
270
285
6+780
CT 268,255 m
CP 285,690 m
287
285
283
281
279
277
275
273
271
287
6+760
CT 268,941 m
CP 287,155 m
289
287
285
283
281
279
277
275
273
288
6+740
CT 270,020 m
CP 288,619 m
290
288
286
284
282
280
278
276
274
290
6+720
CT 270,884 m
CP 290,083 m
292
290
288
286
284
282
280
278
276
291
6+700
CT 272,157 m
CP 291,548 m
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
Eixo1
Escala 1:400

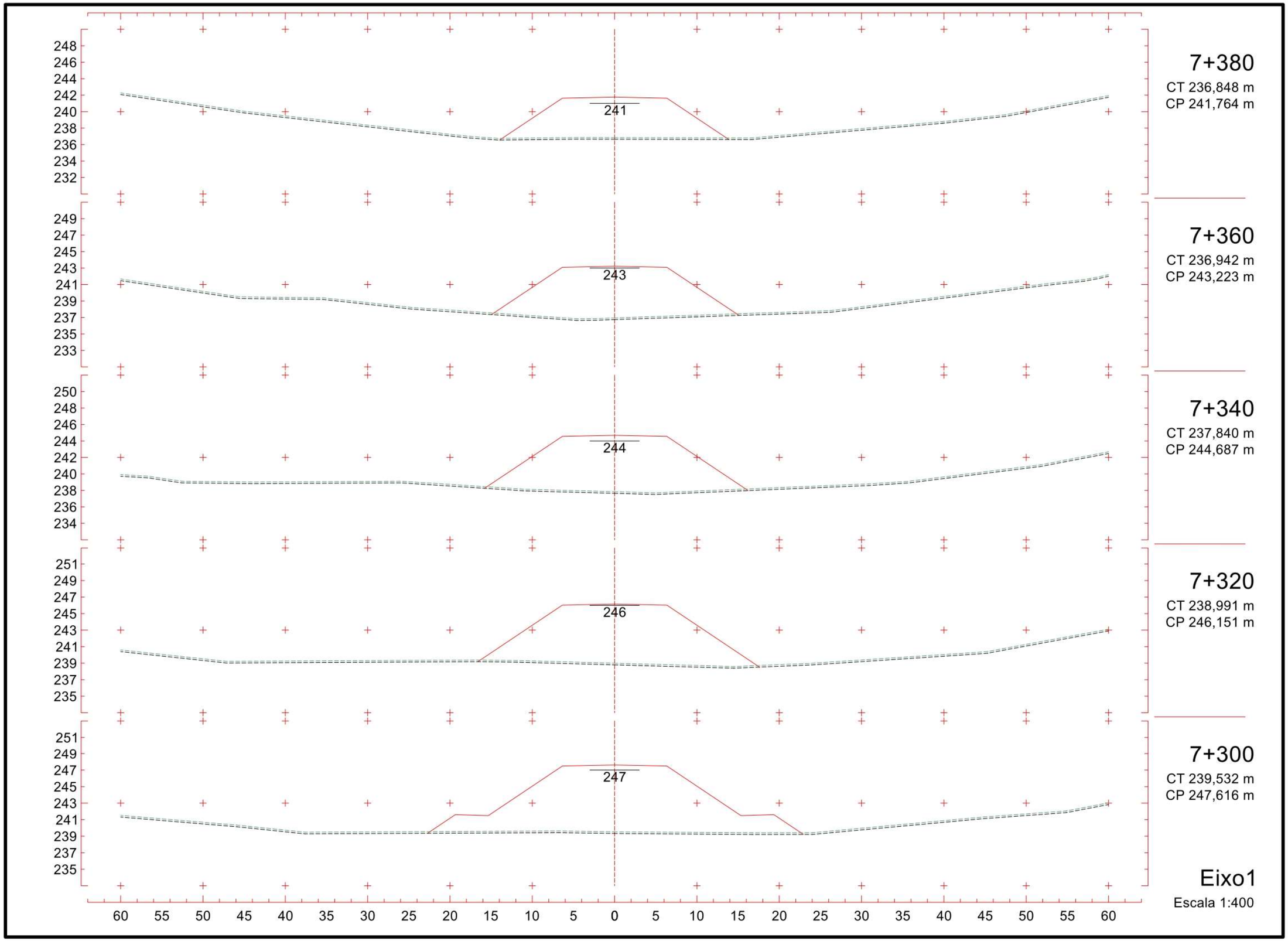

280
278
276
274
272
270
268
266
264
278
6+880
CT 261,825 m
CP 278,368 m
281
279
277
275
273
271
269
267
265
279
6+860
CT 263,996 m
CP 279,833 m
284
282
280
278
276
274
272
270
268
281
6+840
CT 265,944 m
CP 281,297 m
284
282
280
278
276
274
272
270
268
282
6+820
CT 266,802 m
CP 282,761 m
285
283
281
279
277
275
273
271
269
284
6+800
CT 267,479 m
CP 284,226 m
Eixo1
Escala 1:400
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

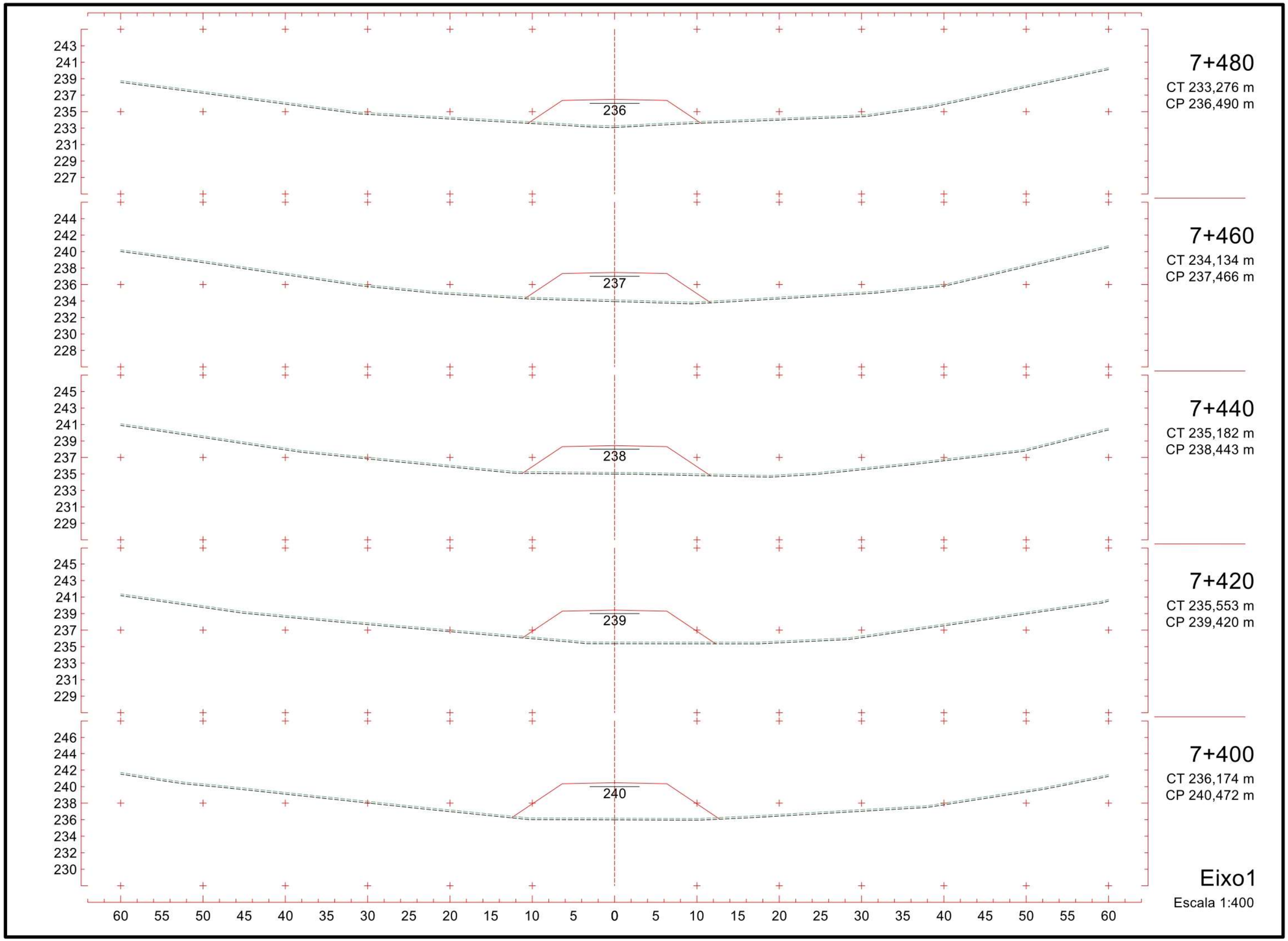

6+980
CT 256,115 m
CP 271,046 m
6+960
CT 256,835 m
CP 272,511 m
6+940
CT 258,061 m
CP 273,975 m
6+920
CT 259,278 m
CP 275,439 m
6+900
CT 260,185 m
CP 276,904 m
Eixo1
Escala 1:400


7+080
CT 252,061 m
CP 263,724 m
7+060
CT 253,887 m
CP 265,189 m
7+040
CT 255,531 m
CP 266,653 m
7+020
CT 256,149 m
CP 268,117 m
7+000
CT 255,681 m
CP 269,582 m
Eixo1
Escala 1:400

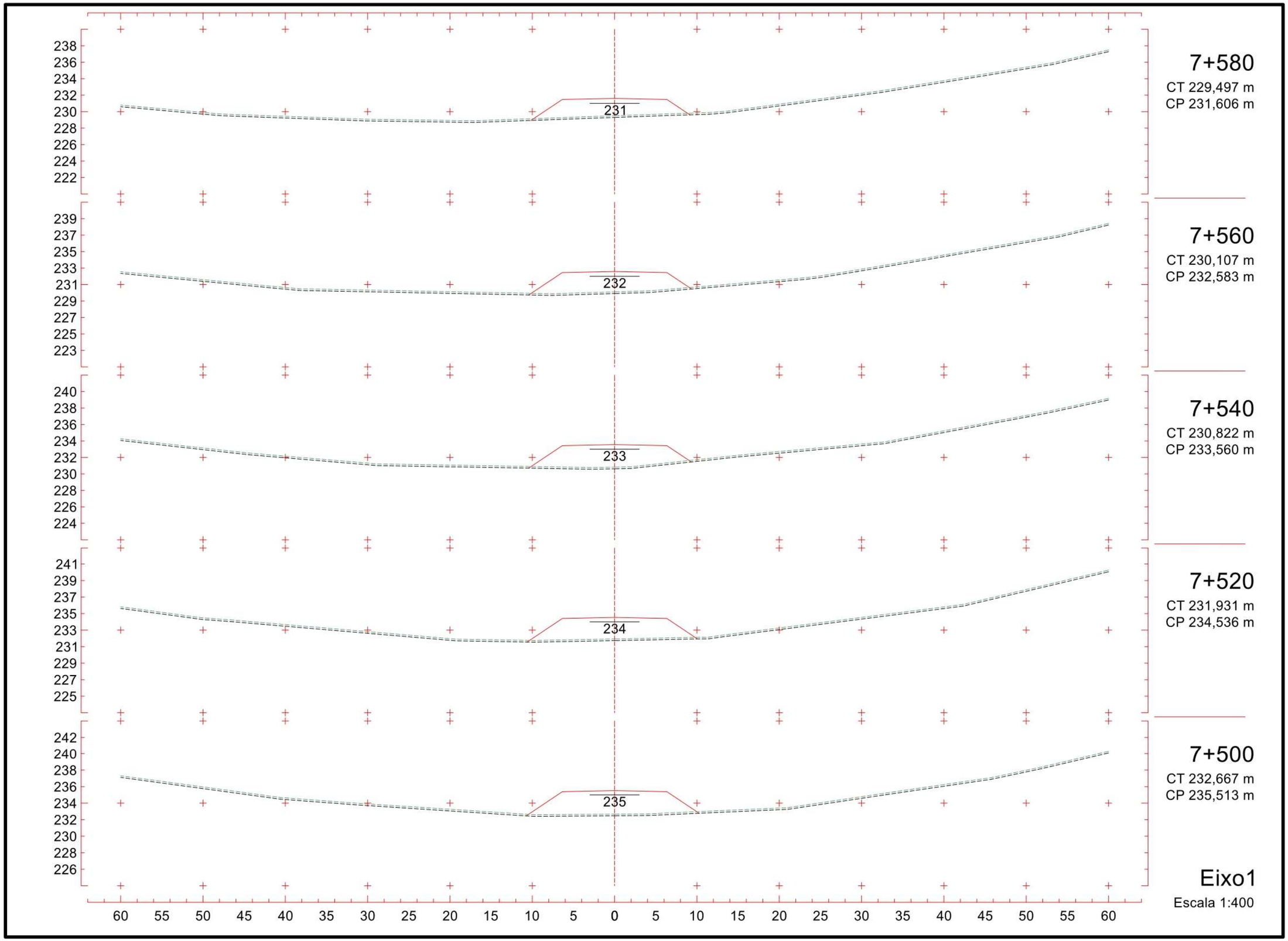

259
257
255
253
251
249
247
245
243
256
7+180
CT 243,144 m
CP 256,402 m
261
259
257
255
253
251
249
247
245
257
7+160
CT 244,135 m
CP 257,867 m
262
260
258
256
254
252
250
248
246
259
7+140
CT 245,620 m
CP 259,331 m
264
262
260
258
256
254
252
250
248
260
7+120
CT 247,452 m
CP 260,795 m
265
263
261
259
257
255
253
251
249
262
7+100
CT 249,661 m
CP 262,260 m
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
Eixo1
Escala 1:400

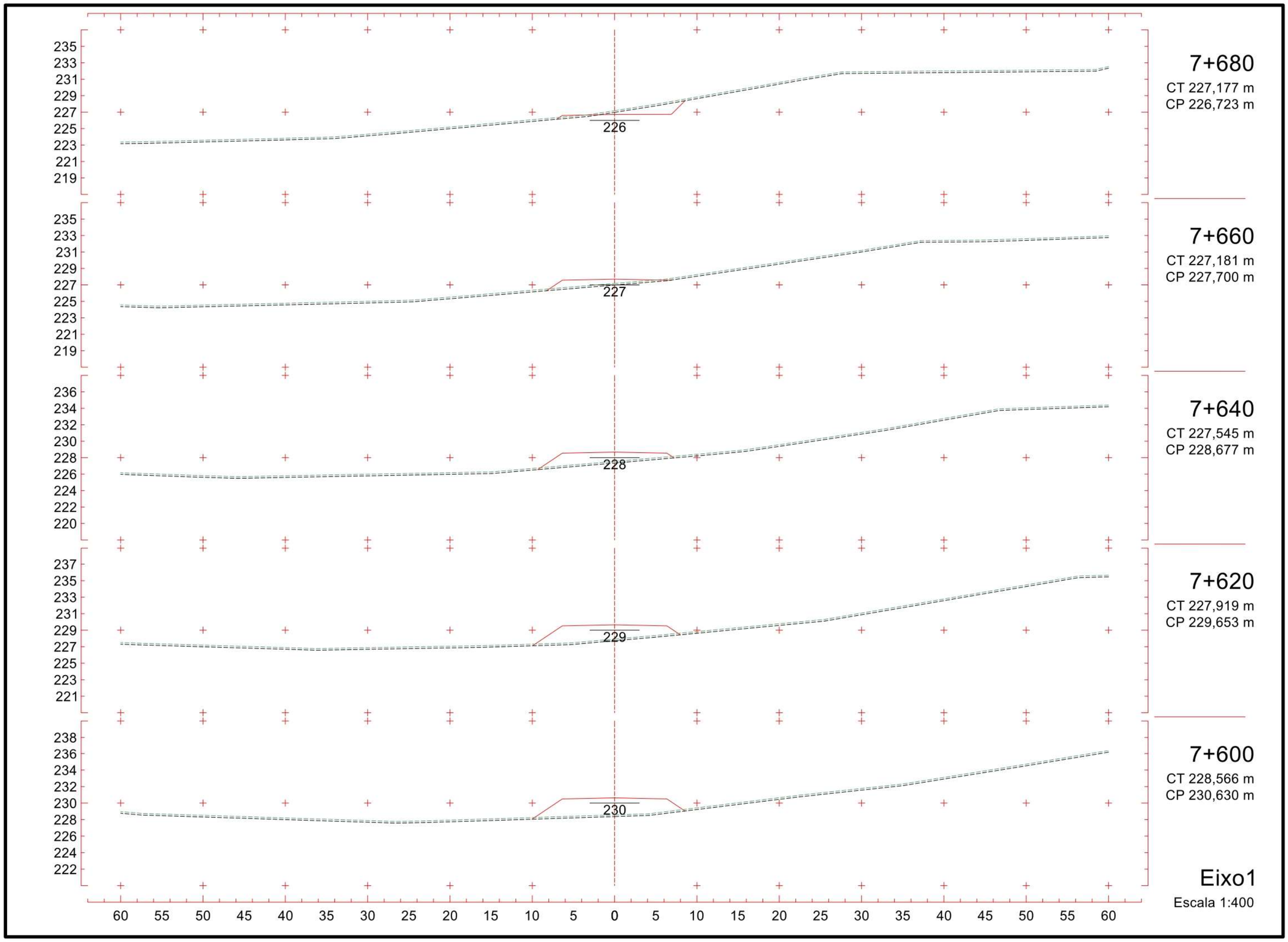

252
250
248
246
244
242
240
238
236
249
7+280
CT 240,156 m
CP 249,080 m
254
252
250
248
246
244
242
240
238
250
7+260
CT 240,585 m
CP 250,545 m
255
253
251
249
247
245
243
241
239
252
7+240
CT 240,949 m
CP 252,009 m
256
254
252
250
248
246
244
242
240
253
7+220
CT 241,416 m
CP 253,473 m
258
256
254
252
250
248
246
244
242
254
7+200
CT 242,447 m
CP 254,938 m
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
Eixo1
Escala 1:400

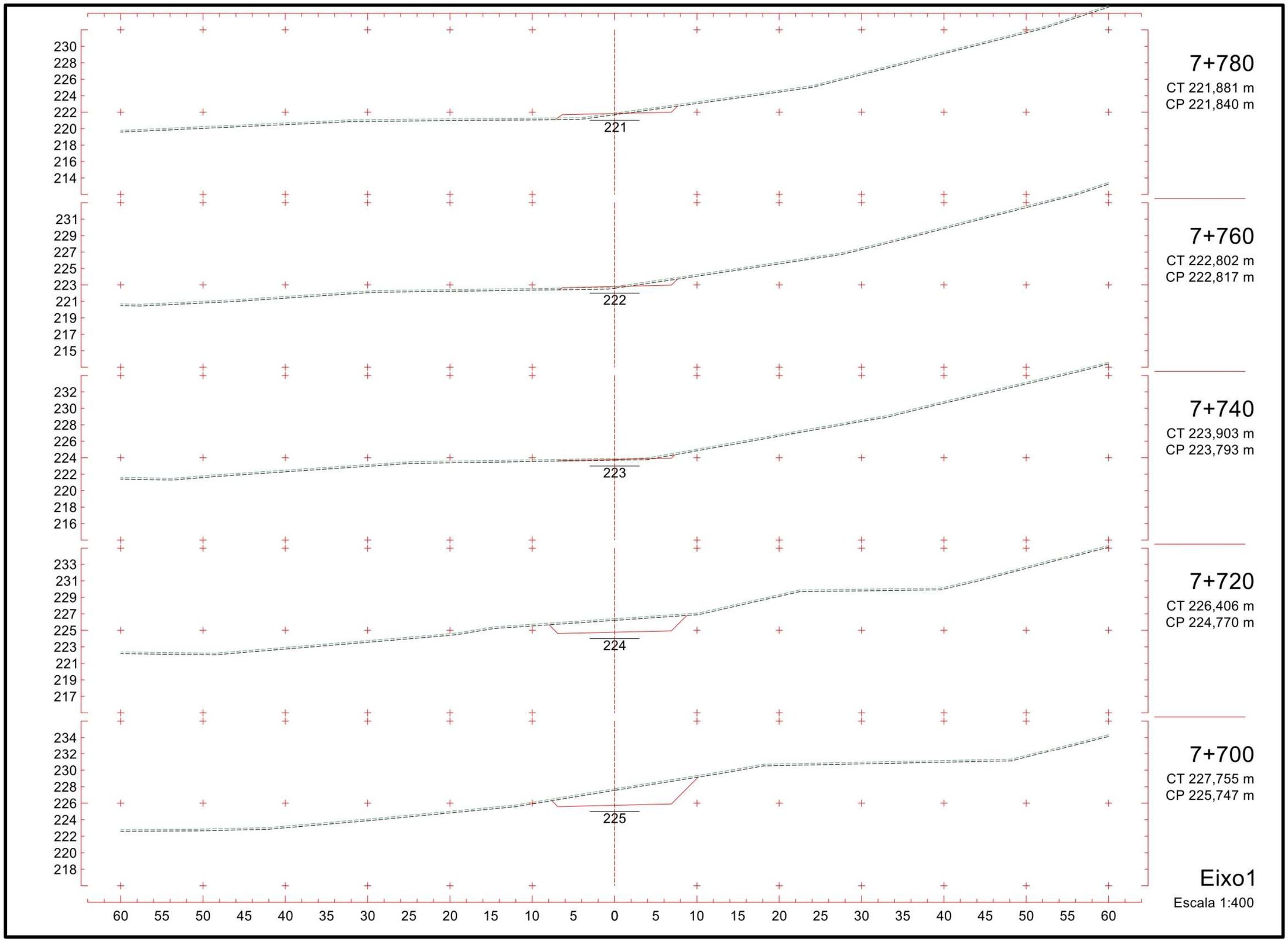

248
246
244
242
240
238
236
234
232
241
7+380
CT 236,848 m
CP 241,764 m
249
247
245
243
241
239
237
235
233
243
7+360
CT 236,942 m
CP 243,223 m
250
248
246
244
242
240
238
236
234
244
7+340
CT 237,840 m
CP 244,687 m
251
249
247
245
243
241
239
237
235
246
7+320
CT 238,991 m
CP 246,151 m
251
249
247
245
243
241
239
237
235
247
7+300
CT 239,532 m
CP 247,616 m
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
Eixo1
Escala 1:400

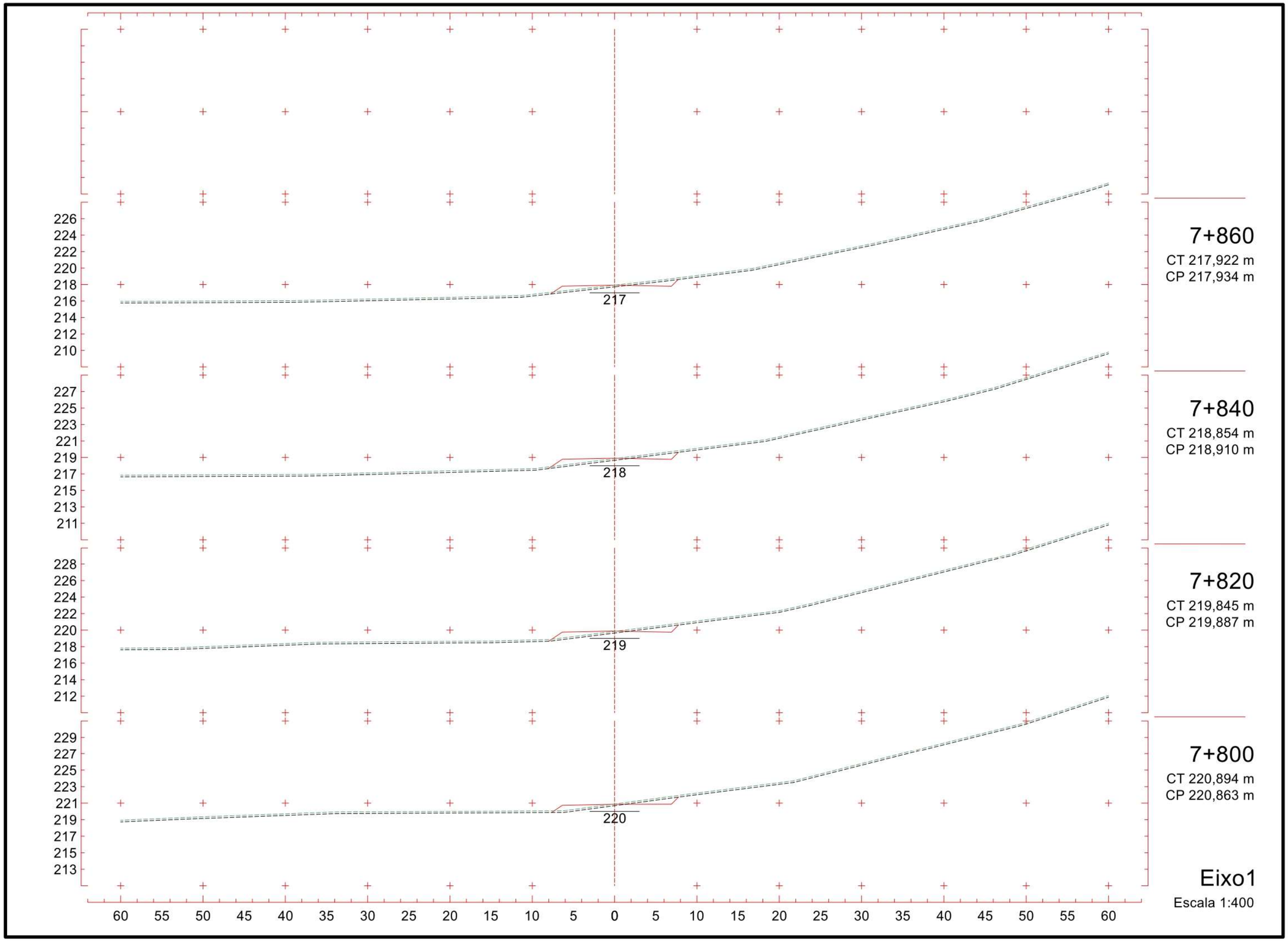

243
241
239
237
235
233
231
229
227
236
7+480
CT 233,276 m
CP 236,490 m
244
242
240
238
236
234
232
230
228
237
7+460
CT 234,134 m
CP 237,466 m
245
243
241
239
237
235
233
231
229
238
7+440
CT 235,182 m
CP 238,443 m
245
243
241
239
237
235
233
231
229
239
7+420
CT 235,553 m
CP 239,420 m
246
244
242
240
238
236
234
232
230
240
7+400
CT 236,174 m
CP 240,472 m
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
Eixo1
Escala 1:400

480


238
236
234
232
230
228
226
224
222
231
7+580
CT 229,497 m
CP 231,606 m
239
237
235
233
231
229
227
225
223
232
7+560
CT 230,107 m
CP 232,583 m
240
238
236
234
232
230
228
226
224
233
7+540
CT 230,822 m
CP 233,560 m
241
239
237
235
233
231
229
227
225
234
7+520
CT 231,931 m
CP 234,536 m
242
240
238
236
234
232
230
228
226
235
7+500
CT 232,667 m
CP 235,513 m
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
Eixo1
Escala 1:400


235
233
231
229
227
225
223
221
219
226
7+680
CT 227,177 m
CP 226,723 m
235
233
231
229
227
225
223
221
219
227
7+660
CT 227,181 m
CP 227,700 m
236
234
232
230
228
226
224
222
220
228
7+640
CT 227,545 m
CP 228,677 m
237
235
233
231
229
227
225
223
221
229
7+620
CT 227,919 m
CP 229,653 m
238
236
234
232
230
228
226
224
222
230
7+600
CT 228,566 m
CP 230,630 m
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
Eixo1
Escala 1:400


230
228
226
224
222
220
218
216
214
221
7+780
CT 221,881 m
CP 221,840 m
231
229
227
225
223
221
219
217
215
222
7+760
CT 222,802 m
CP 222,817 m
232
230
228
226
224
222
220
218
216
223
7+740
CT 223,903 m
CP 223,793 m
233
231
229
227
225
223
221
219
217
224
7+720
CT 226,406 m
CP 224,770 m
234
232
230
228
226
224
222
220
218
225
7+700
CT 227,755 m
CP 225,747 m
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
Eixo1
Escala 1:400


226
224
222
220
218
216
214
212
210
217
7+860
CT 217,922 m
CP 217,934 m
227
225
223
221
219
217
215
213
211
218
7+840
CT 218,854 m
CP 218,910 m
228
226
224
222
220
218
216
214
212
219
7+820
CT 219,845 m
CP 219,887 m
229
227
225
223
221
219
217
215
213
220
7+800
CT 220,894 m
CP 220,863 m
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
Eixo1
Escala 1:400

CRONOGRAMA PLANEJADO/REALIZADO

3 CRONOGRAMA PLANEJADO/REALIZADO

A tabela, na próxima página, refere-se ao cronograma de toda atividade exercida no semestre 2022/1, em que contabiliza as horas totais dos autores deste projeto. Totalizando em 456 horas totais de atividades, em que cada componente corresponde a 114 horas individuais. Esta equipe obteve total sucesso nos prazos, em que não houve nenhuma multa ou atraso de entrega de obrigações. Dedicação e comprometimento trouxeram um resultado com dados incríveis, sendo este traçado a melhor opção, das inúmeras analisadas, apresentada neste documento.

ATIVIDADE/PRAZO

| | | | Semanas | | |