DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO E TRANSPORTES

LABORATÓRIO DE SISTEMAS DE TRANSPORTE

PROJETO PONTO DE PARTIDA

PARTE II

EDIÇÃO UFRGS 2021/1

Daniel Sergio Presta Garcia
Ângelo Cunha Turelly
Caroline da Luz Soares
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DEPARTAMENTO DE ENGENHARIA DE PRODUÇÃO E TRANSPORTES
LABORATÓRIO DE SISTEMA DE TRANSPORTE

PROJETO PONTO DE PARTIDA

EDIÇÃO UFRGS 2021/1

PORTO ALEGRE
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
2022

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Recursos de Desenvolvimento Tecnológico - RDT,
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sob regulação da Agência Nacional de Transportes Terrestres - ANTT

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CAPÍTULO I

AC1 ROTAS

Dariane Lemos Amaral
Sabrina de Castro Zorzo
Daniel Sergio Presta Garcia

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

PROJETO BÁSICO PARA IMPLANTAÇÃO DE TRECHO RODOVIÁRIO ENTRE ITAARA E SILVEIRA MARTINS

Rodovia: PPP-2021/1
Norma Técnica: DNER/1999
Classe da rodovia: CLASSE III
Região: Região Central do RS
Configuração: pista simples com acostamentos
Classificação do solo: 1ª Categoria
Faixa de exploração: 2 x 250m
Extensão aproximada: 6,929280 km em diretriz; 8,384757 km em corpo estradal

VOLUME 2 – PROJETO EXECUTIVO

EQUIPE AC1 – AC1 ROTAS

NOVEMBRO/2021

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 2021/1**

Ano: **2021**

Semestre: **1º**

Disciplina: **RODOVIAS**

Turma: **A**

Código da Equipe: **AC1**

Nome: **AC1 ROTAS**

Integrantes do grupo:

Dariane Lemos Amaral

Sabrina de Castro Zorzo

SUMÁRIO

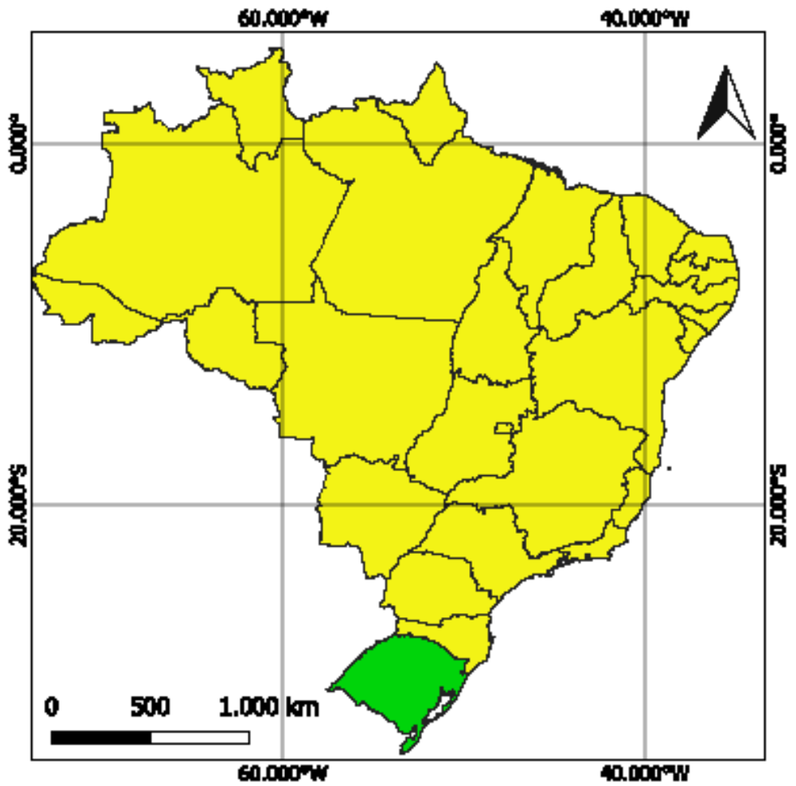
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1.2 Quadro de Características Técnicas 12
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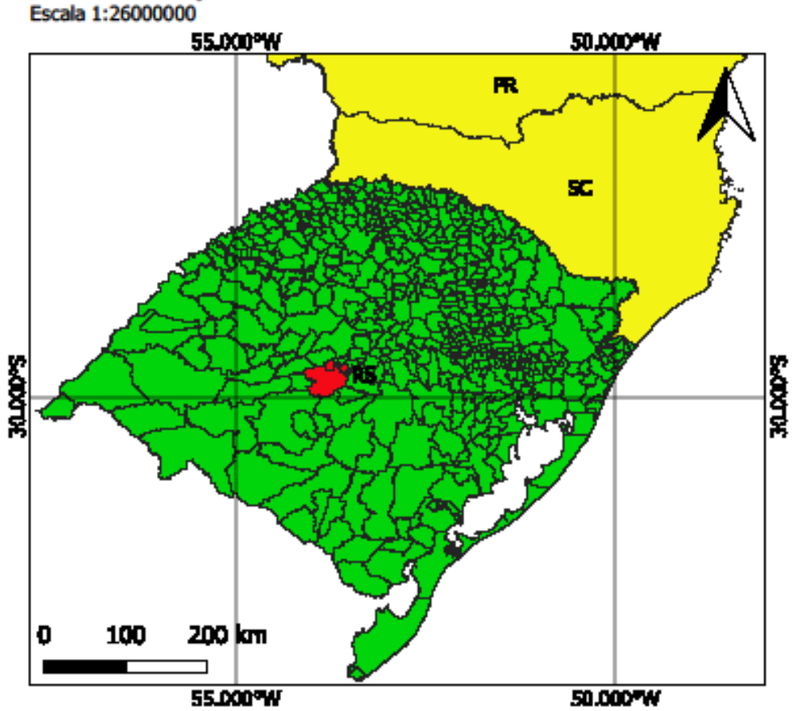
APRESENTAÇÃO

1. APRESENTAÇÃO

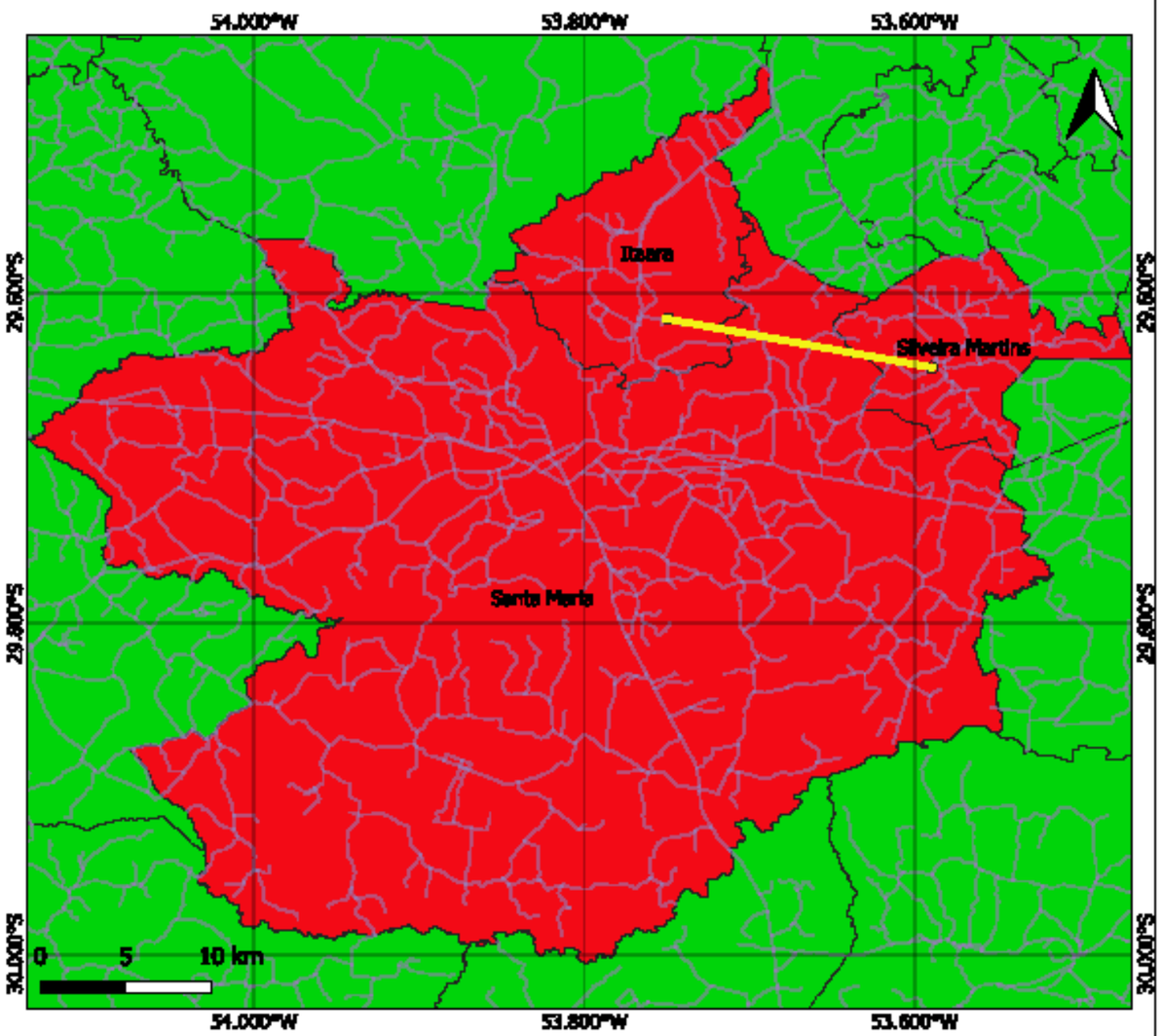
1.1. Mapa de Situação e Localização



PLANTA DE SITUAÇÃO
Escala 1:26000000



PLANTA DE SITUAÇÃO
Escala 1:5600000



PLANTA DE LOCALIZAÇÃO
Escala 1:250000

- DIRETRIZ
- COORDENADAS
- SISTEMA VIÁRIO EXISTENTE
- ITAARA-SANTA MARIA-SILVEIRA MARTINS
- MUNICÍPIOS
- RIO GRANDE DO SUL
- BRASIL

PROJETO TRECHO RODOVIÁRIO
Base de dados: IBGE, FEPAN
Sistema de Coordenadas Geográficas - Datun: SIRGAS 2000
Autores: Dariane, Sabrina, Guilherme
Grupo: AC1 ROTAS
Semestre Letivo: 2021/1

AC1 ROTAS

1.2. Quadro de Características Técnicas

CARACTERÍSTICAS TÉCNICAS

Rodovia: Grupo de Eixos 1
Trecho: traçado
Segmento: km: 0+000,00 ao km: 8+384,76

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	8384,757	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	153,250	1,83	80,000	0,95
A	100,000	< R ≤	100,000					
N	100,000	< R ≤	200,000	15	913,945	10,90	1280,000	15,27
S	200,000	< R ≤	300,000	1	37,127	0,44	80,000	0,95
I	300,000	< R ≤	500,000					
Ç	R >		500,000					
.	TOTAL EM TRANSIÇÃO			17	1104,322	13,17	1440,000	17,17
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				17	1104,322	13,17	3648,643	43,52

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
25,712	0,31	811,017	9,67	5840,436	69,66

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
4,707	0,561	6929,280	21,005

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1					0 < i ≤ 1		
1 < i ≤ 2	568,383	6,78			1 < i ≤ 2		
2 < i ≤ 3					2 < i ≤ 3	1601,853	19,10
3 < i ≤ 4					3 < i ≤ 4		
4 < i ≤ 5					4 < i ≤ 5	686,697	8,19
5 < i ≤ 6					5 < i ≤ 6		
6 < i ≤ 7					6 < i ≤ 7		
7 < i ≤ 8	967,102	11,53			7 < i ≤ 8	3335,874	39,78
8 < i ≤ 9					8 < i ≤ 9		
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	1535,485	18,31			TOTAL	5624,424	67,08

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
7159,909	85,39	864,839	10,31	360,010	4,29	1224,848	14,61

PARÂMETROS K MÍNIMOS ADOTADOS

EM CURVA CÔNCAVA	30,540	EM CURVA CONVEXA	37,605

PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
13335,635	159,05	25185,637	300,37	19260,636	229,71

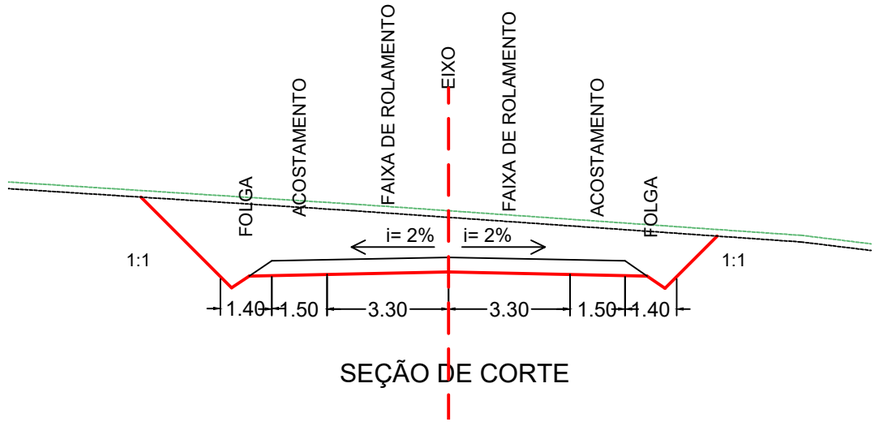
CARACTERÍSTICAS OPERACIONAIS

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

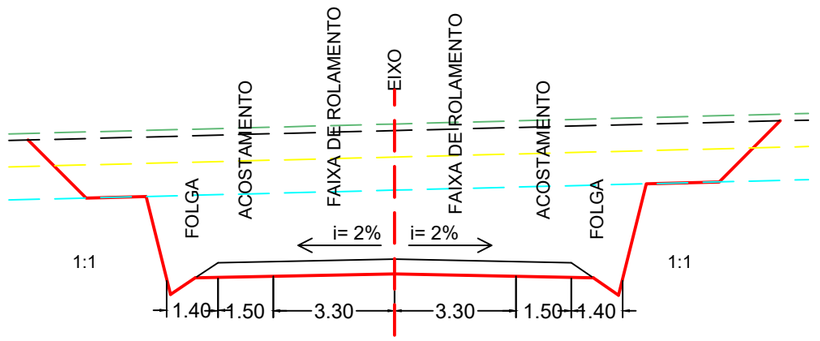
PROJETO GEOMÉTRICO

2. PROJETO GEOMÉTRICO

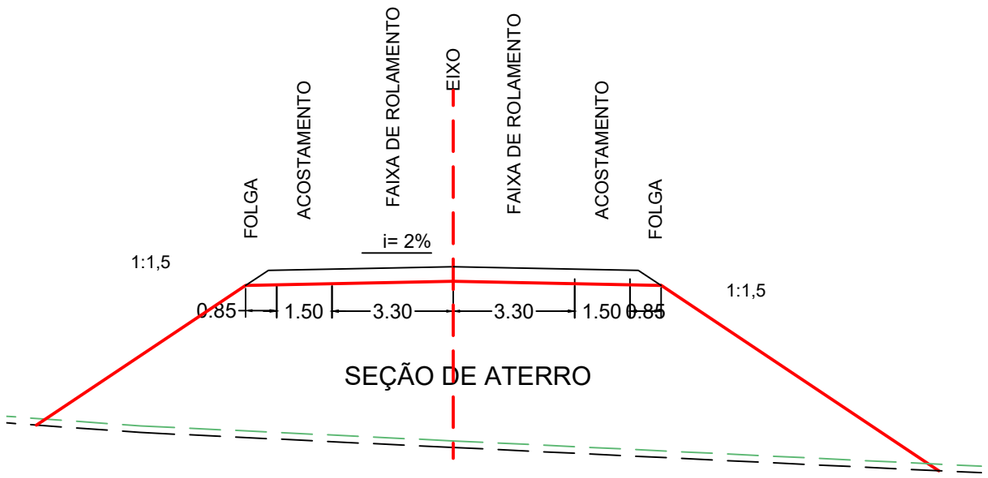
2.1. Seções Transversais Tipo



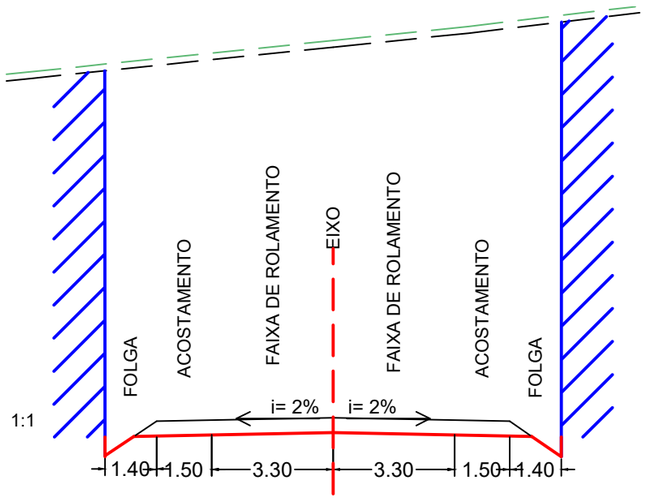
SEÇÃO DE CORTE



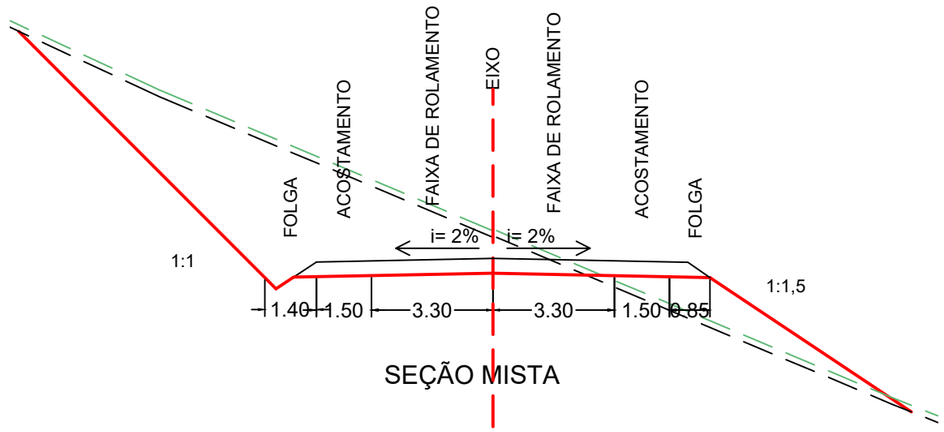
SEÇÃO COM
CORTE EM ROCHA



SEÇÃO DE ATERRO



SEÇÃO DE CORTE COM
MURO DE ARRIMO LD E LE



SEÇÃO MISTA

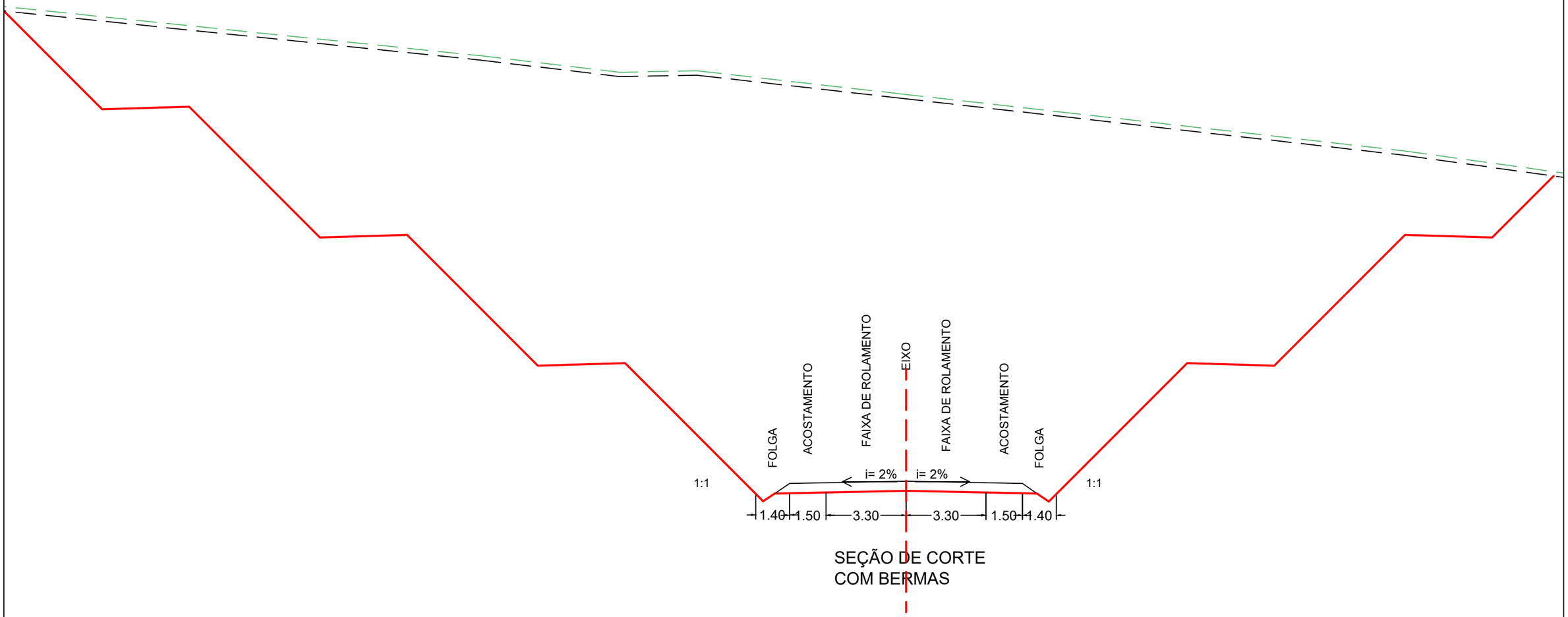
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Departamento de Engenharia de Produção e Transportes
Laboratório de Sistemas de Transportes - LASTRAN

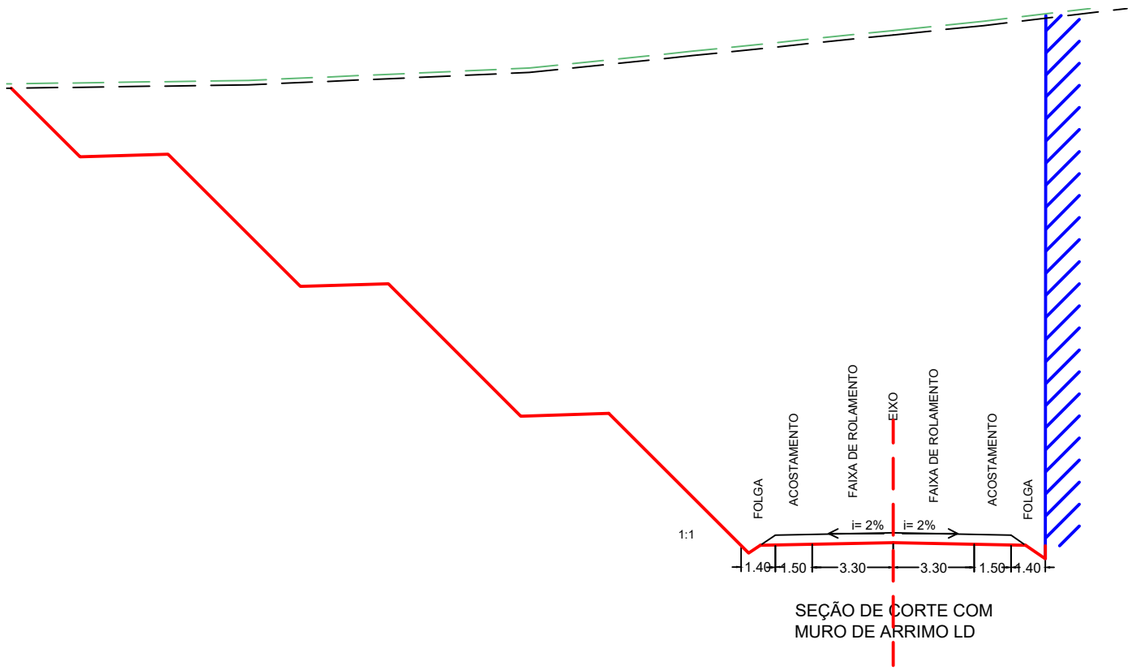
Rodovia: PPP - UFRGS - 2021/1
Trecho: ITAARA-SILVEIRA MARTINS - LOTE 1
Data: 10/11/2021

SEÇÕES TIPO

Código: S/01



SEÇÃO DE CORTE
COM BERMAS



SEÇÃO DE CORTE COM
MURO DE ARRIMO LD

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

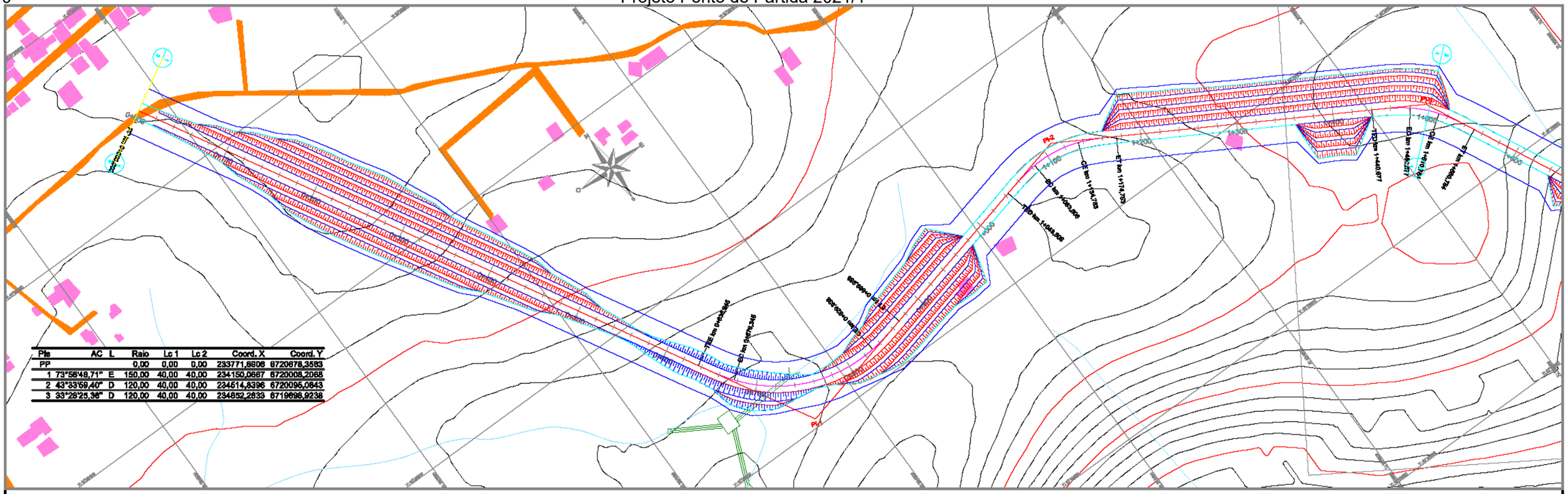
Rodovia: PPP - UFRGS - 2021/1
Trecho: ITAARA-SILVEIRA MARTINS - LOTE 1
Data: 10/11/2021

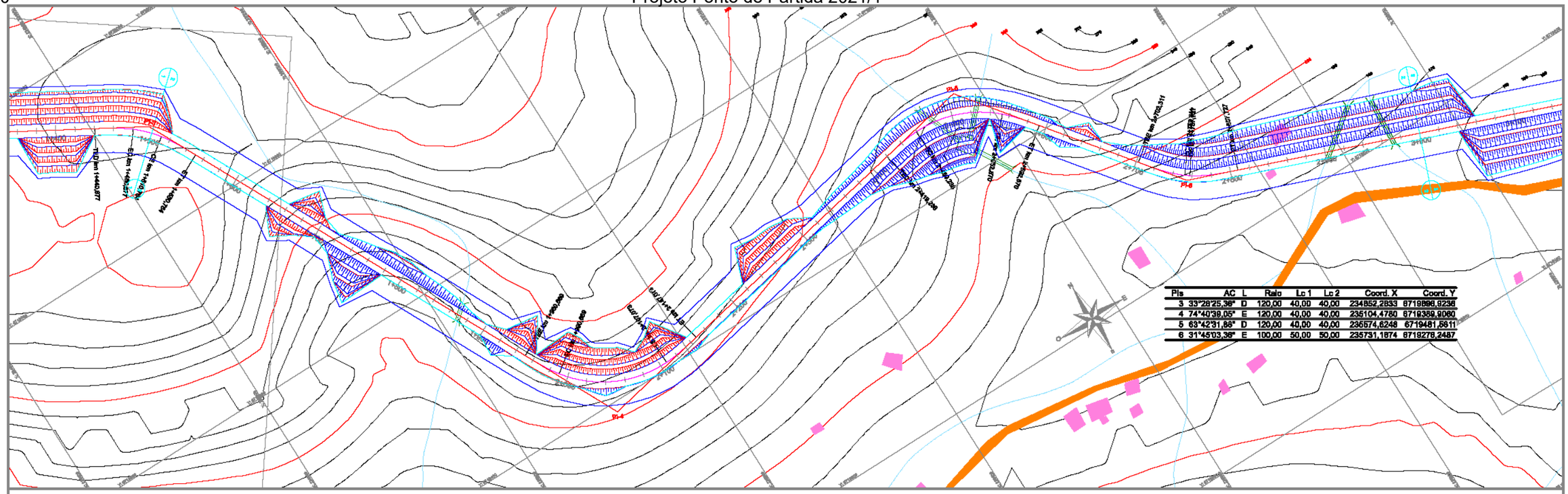
SEÇÕES TIPO

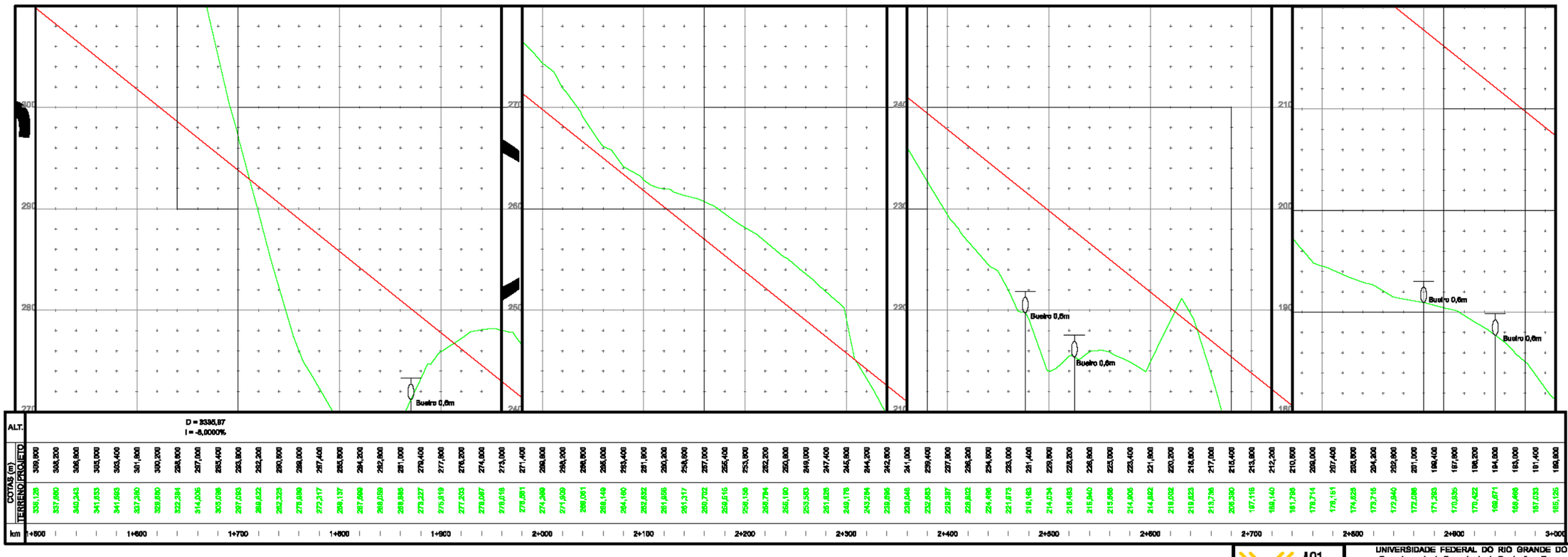
Código: S/02

2.2. Linha Geral

Projeto Ponto de Partida 2021/1





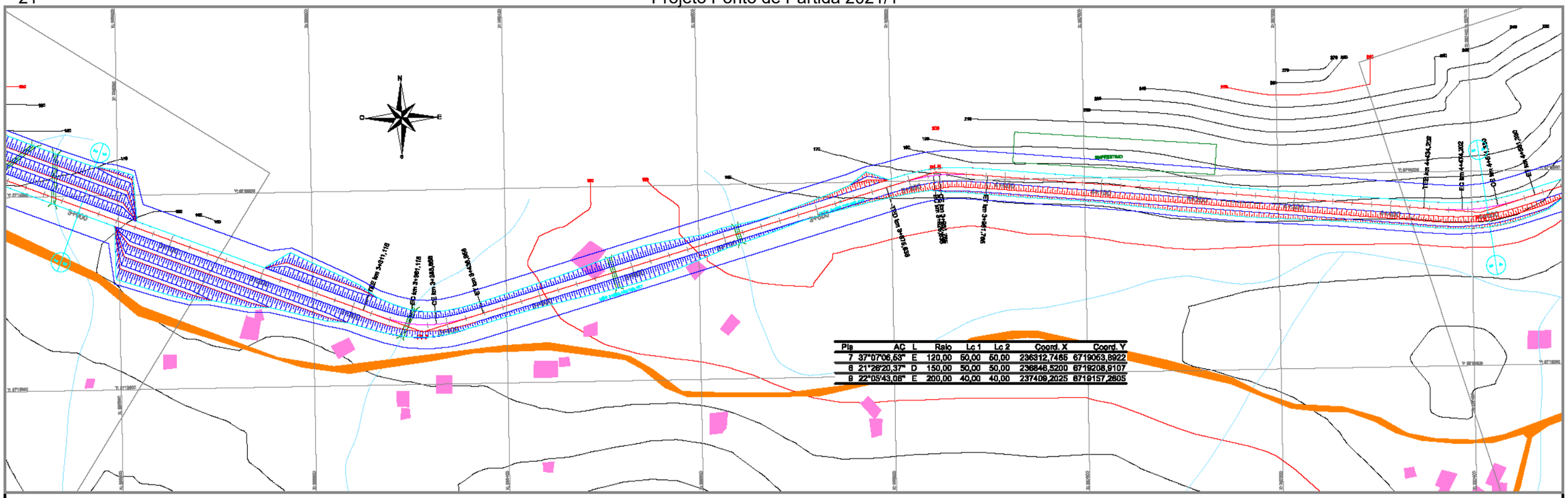


ALT. D = 3335,87 I = -5,0000%

km	COTAS (m) TERRENO	COTAS (m) PROJETO
1+600	358,126	309,000
	357,690	308,200
	340,243	306,800
	341,633	305,000
	341,685	303,400
1+600	337,280	301,800
	329,690	300,200
	322,394	298,600
	314,206	297,000
	305,098	295,400
1+700	297,093	293,800
	289,822	292,200
	282,325	290,600
	276,899	289,000
	272,317	287,400
1+800	268,137	285,800
	267,999	284,200
	268,059	282,600
	269,885	281,000
	273,227	279,400
1+900	275,819	277,800
	277,203	276,200
	279,097	274,600
	279,018	273,000
	278,851	271,400
2+000	274,399	269,800
	271,939	268,200
	269,051	266,600
	268,149	265,000
	264,160	263,400
2+100	262,632	261,800
	261,456	260,200
	261,317	258,600
	260,702	257,000
	259,616	255,400
2+200	258,156	253,800
	256,794	252,200
	255,190	250,600
	253,503	249,000
	251,825	247,400
2+300	249,176	245,800
	246,294	244,200
	243,896	242,600
	239,048	241,000
	232,803	239,400
2+400	230,387	237,800
	229,822	236,200
	224,498	234,600
	221,873	233,000
	219,163	231,400
2+500	214,034	229,800
	215,483	228,200
	215,940	226,600
	215,668	225,000
	214,906	223,400
2+600	214,882	221,800
	218,002	220,200
	218,823	218,600
	213,736	217,000
	209,390	215,400
2+700	197,116	213,800
	188,140	212,200
	181,788	210,600
	178,714	209,000
	176,151	207,400
2+800	174,828	205,800
	173,716	204,200
	172,940	202,600
	172,086	201,000
	171,293	199,400
2+900	170,935	197,800
	170,422	196,200
	169,671	194,600
	168,466	193,000
	167,033	191,400
3+000	165,125	189,800

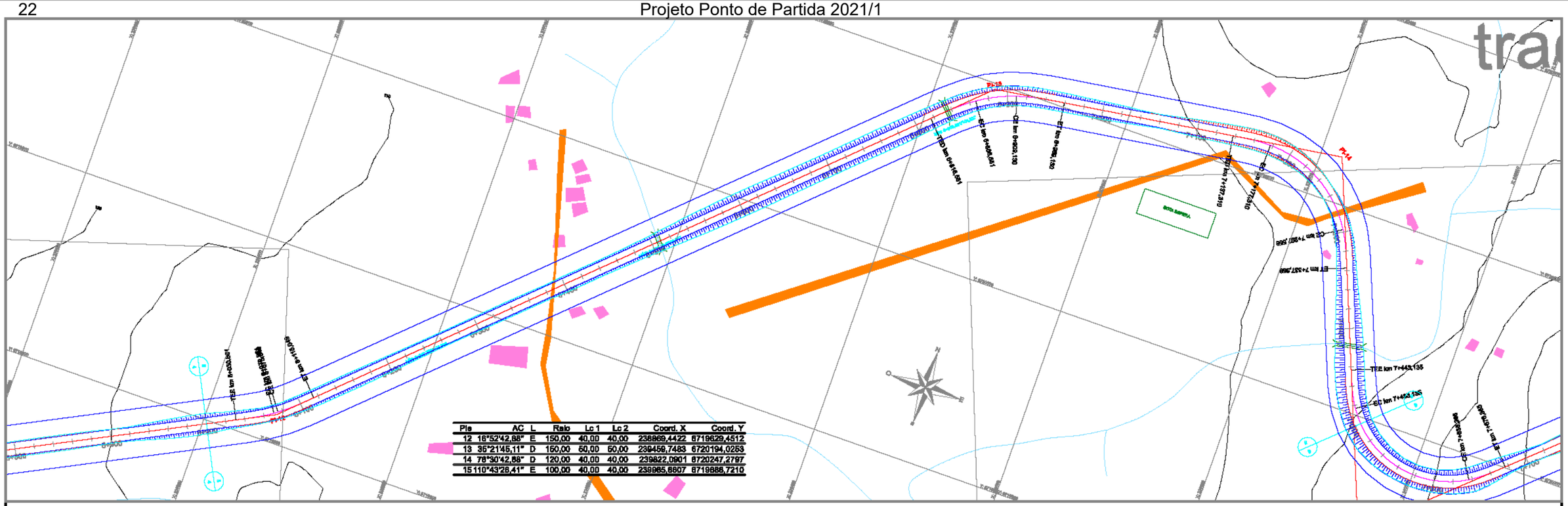
AC1 ROTAS	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
	Rodovia: PPP - UFRGS - 2021/1 Trecho: ITAARA-SILVEIRA MARTINS - LOTE 1 Data: 11/2021	
Escala: 1:2000	PROJETO GEOMÉTRICO	Código: PG/02

Projeto Ponto de Partida 2021/1

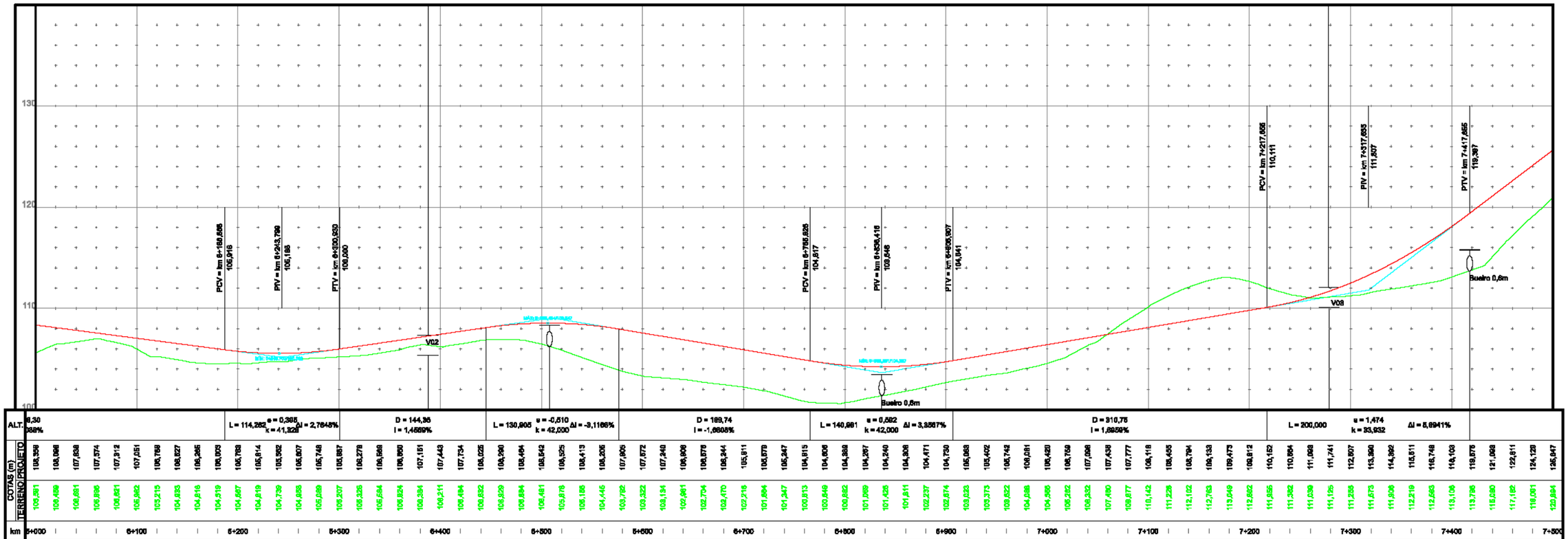


Pis	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
7	37°07'06,53"	E	120,00	50,00	50,00	236312,7455	6719063,8922
8	21°26'20,37"	D	150,00	50,00	50,00	236846,5200	6719208,9107
9	22°05'43,06"	E	200,00	40,00	40,00	237409,2025	6719157,2805

| | | |

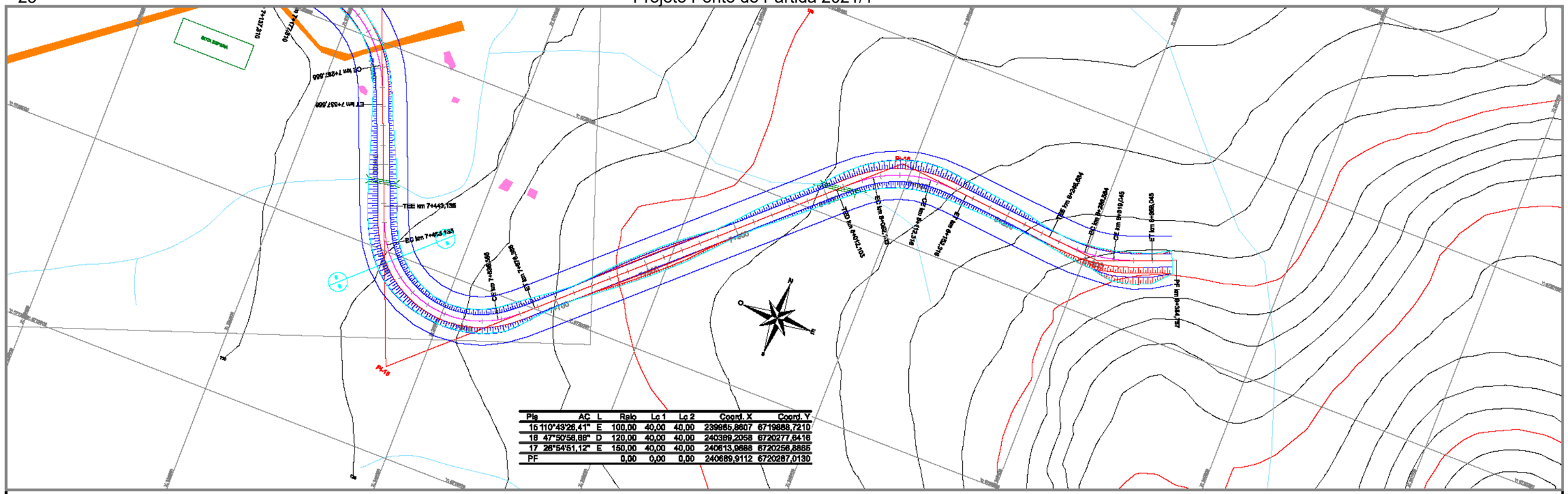


Pto	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
12	18°52'42,88"	E	150,00	40,00	40,00	238869,4422	6719629,4512
13	35°21'45,11"	D	150,00	50,00	50,00	239459,7483	6720194,0253
14	78°30'42,58"	D	120,00	40,00	40,00	239822,0901	6720247,2797
15	110°43'26,41"	E	100,00	40,00	40,00	239985,6807	6719885,7210

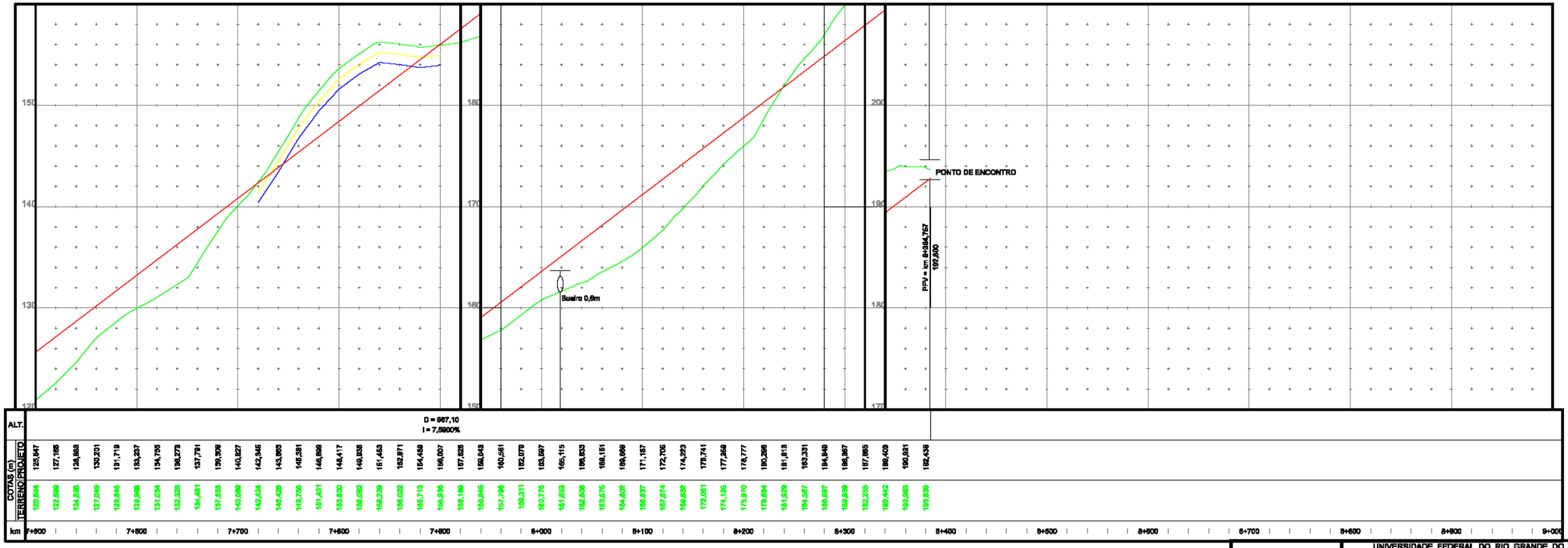


| | | |

Projeto Ponto de Partida 2021/1



PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
16	110°43'26,41"	E	100,00	40,00	40,00	239955,8807	6719888,7210
18	47°50'56,86"	D	120,00	40,00	40,00	240389,2058	6720277,8416
17	26°54'51,12"	E	150,00	40,00	40,00	240613,9888	6720258,8885
PF			0,00	0,00	0,00	240689,9112	6720287,0130

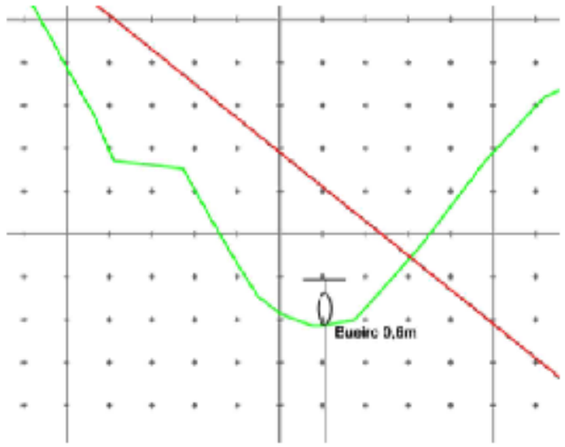


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Escala: 1:2000	PROJETO GEOMÉTRICO — Código: PG/05

traçado-PG 06

2.3. Detalhamento do Projeto Planialtimétrico



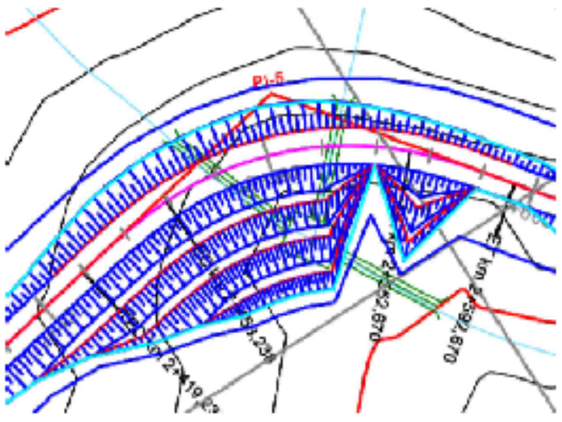


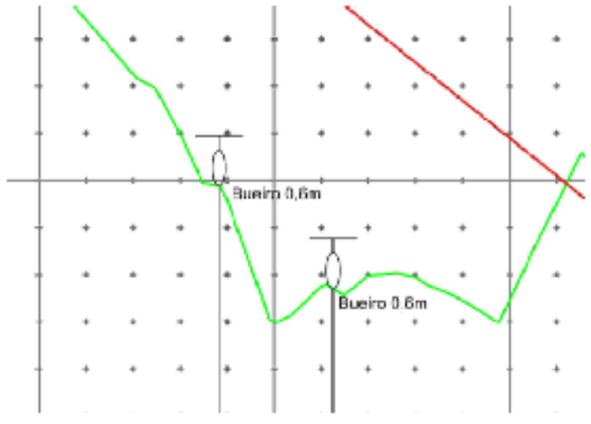
BUEIRO 1

Bueiro com solução de projeto para córregos

Estaca: 0+721,399m
Cota terreno: 365,692m
Cota projeto: 372,088m

Obs.: para o orçamento da solução, foram somados os comprimentos das 3 ramificações e adotadas 6 bocas





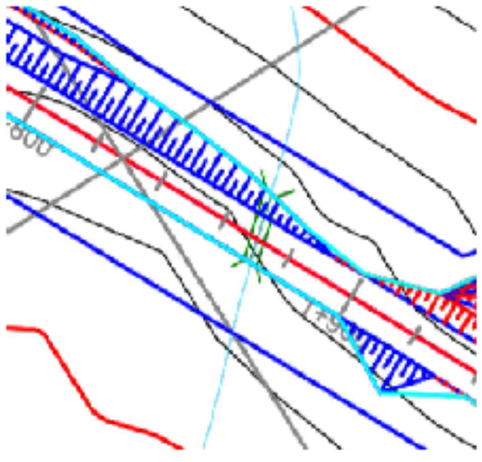
BUEIROS 3 e 4

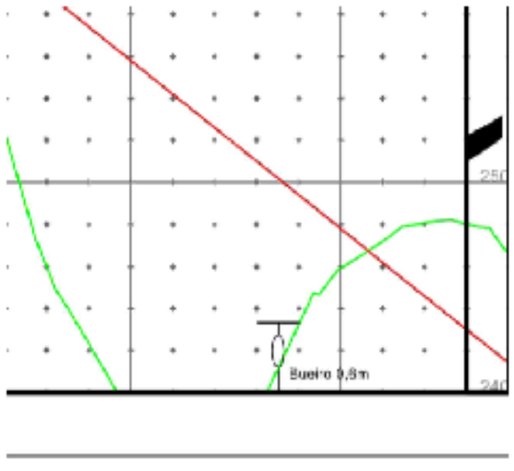
Bueiros com solução de projeto para córregos

Estaca: 2+476,536m
Cota terreno: 219,907m
Cota projeto: 231,677m

Estaca: 2+524,813m
Cota terreno: 215,541m
Cota projeto: 227,815m

Obs.: para o orçamento da solução, foram somados os comprimentos das 3 ramificações e adotadas 6 bocas





BUEIRO 2

Bueiro simples para córrego

Estaca: 1+870,106m
Cota terreno: 270,993m
Cota projeto: 280,192m

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Trecho: Itaara - Silveira Martins - lote 1
Data: 10/11/2021

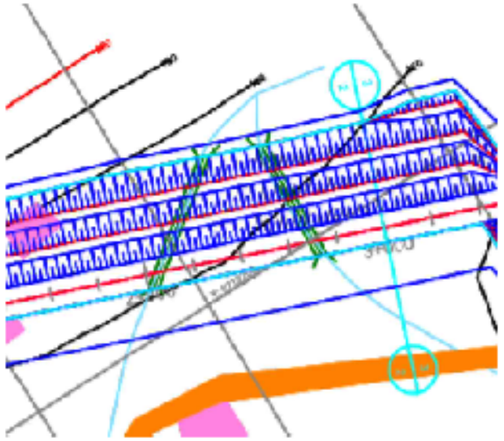
AC1 ROTAS

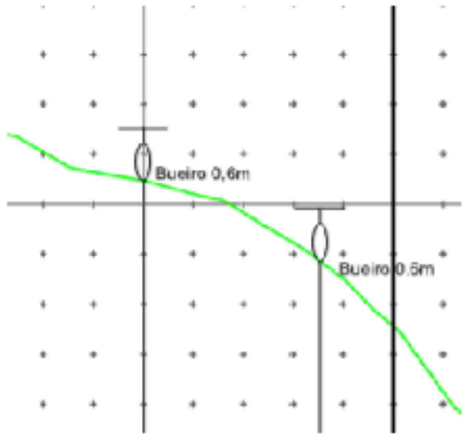
PROJETO GEOMÉTRICO

Detalhamento de interferências com córregos

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES



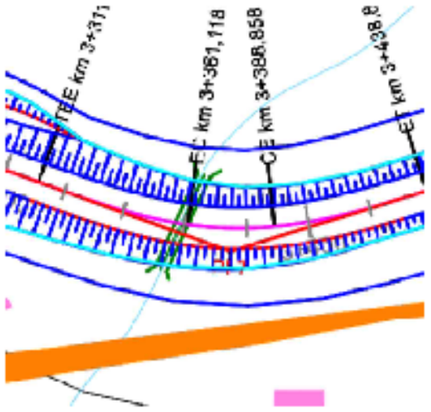


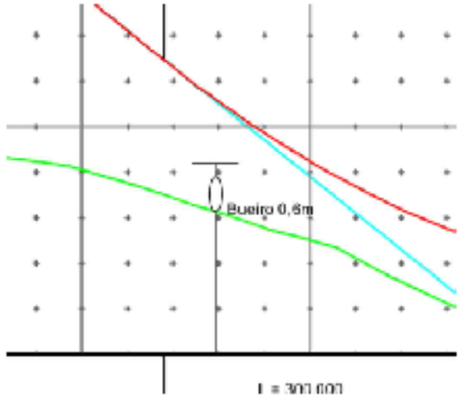
BUEIROS 5 e 6

Bueiros simples para córregos

Estaca: 2+902,838m
Cota terreno: 170,761m
Cota projeto: 197,573m

Estaca: 2+970,349m
Cota terreno: 167,811m
Cota projeto: 192,172m

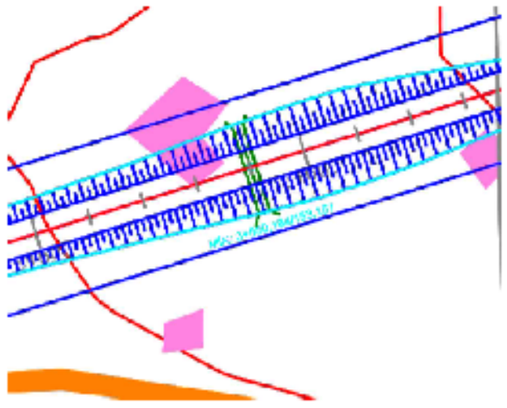


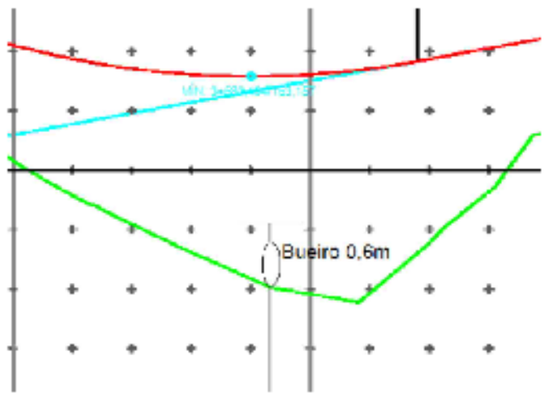


BUEIRO 7

Bueiro simples para córrego

Estaca: 3+359,100m
Cota terreno: 156,311m
Cota projeto: 161,160m





BUEIRO 8

Bueiro simples para
ponto de cota mínima

Estaca: 3+580,194m
Cota terreno: 146,276m
Cota projeto: 153,157m

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Trecho: Itaara - Silveira Martins - lote 1
Data: 10/11/2021

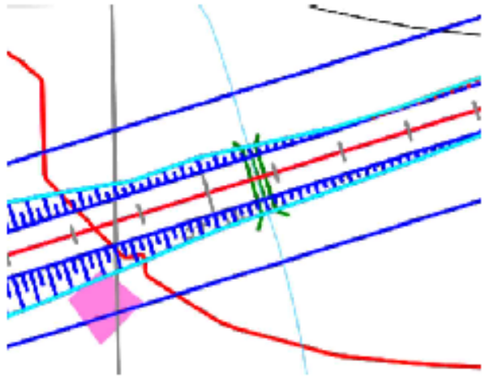
AC1 ROTAS

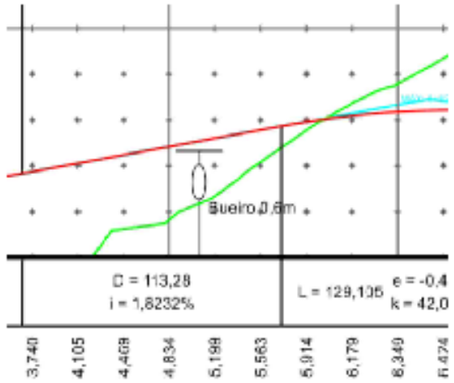
PROJETO GEOMÉTRICO

Detalhamento de interferências com córregos

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

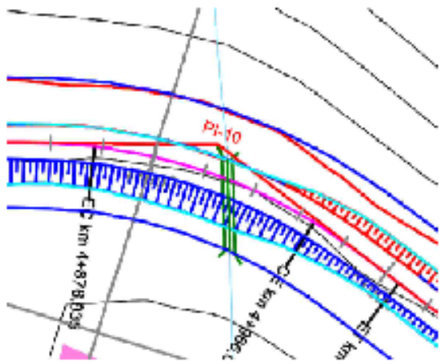


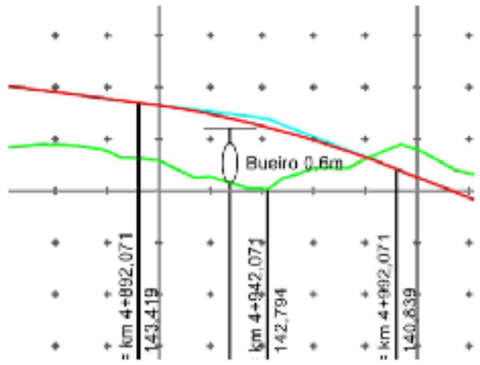


BUEIRO 9

Bueiro simples para córrego

Estaca: 3+713,449m
Cota terreno: 152,305m
Cota projeto: 155,079m

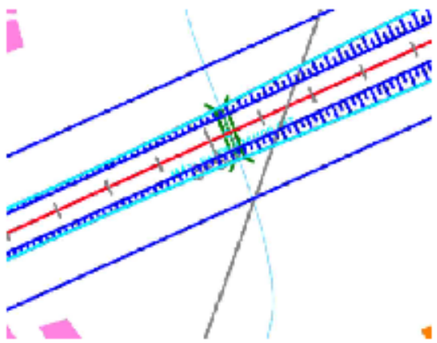


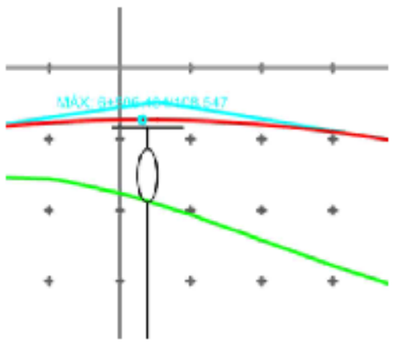


BUEIRO 10

Bueiro simples para córrego

Estaca: 4+927,257m
Cota terreno: 140,410m
Cota projeto: 142,815m





BUEIRO 11

Bueiro simples para córrego

Estaca: 6+506,434m
Cota terreno:106,157m
Cota projeto: 108,546m

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Trecho: Itaara - Silveira Martins - lote 1
Data: 10/11/2021

AC1 ROTAS

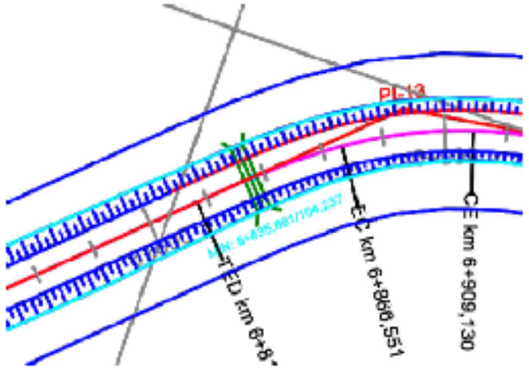
PROJETO GEOMÉTRICO

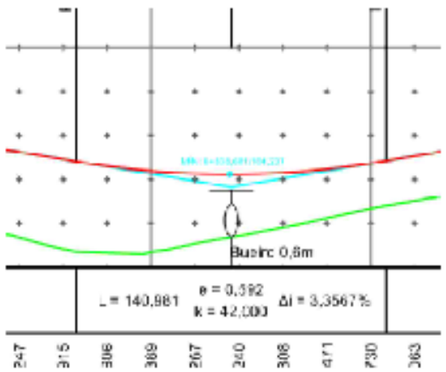
Detalhamento de interferências com córregos

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

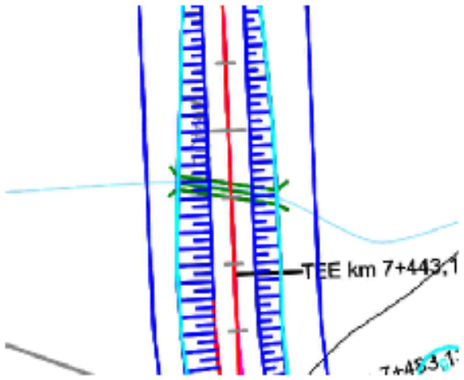
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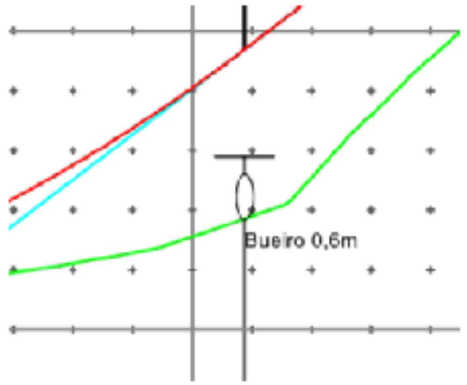




BUEIRO 12

Bueiro simples para ponto de cota mínima
Estaca: 6+336,180m
Cota terreno: 101,351m
Cota projeto: 104,237m

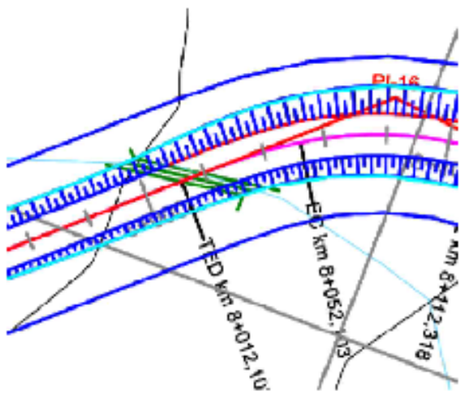


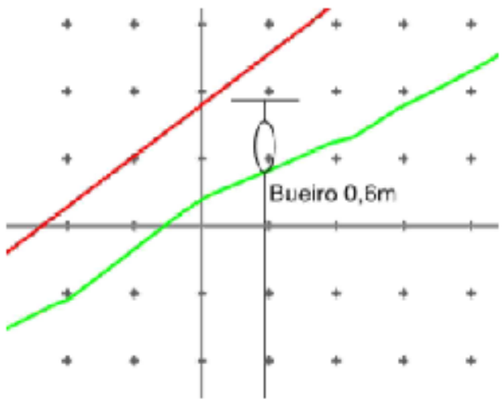


BUEIRO 13

Bueiro simples para córrego

Estaca: 7+417,927m
Cota terreno: 113,699m
Cota projeto: 119,418m





BUEIRO 14

Bueiro simples para córrego

Estaca: 8+019,989m
Cota terreno:161,602m
Cota projeto: 165,114m

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Trecho: Itaara - Silveira Martins - lote 1
Data: 10/11/2021

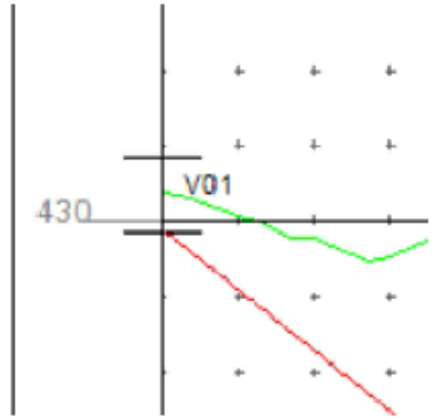
AC1 ROTAS

PROJETO GEOMÉTRICO

Detalhamento de interferências com córregos

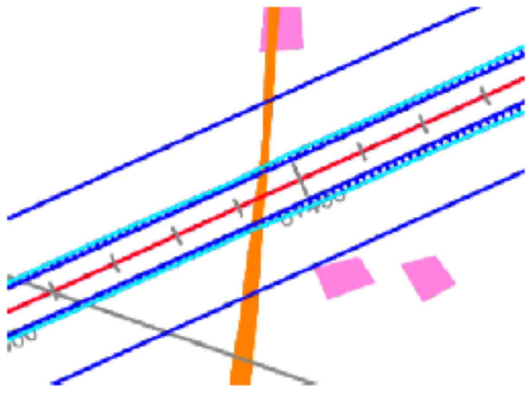
PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

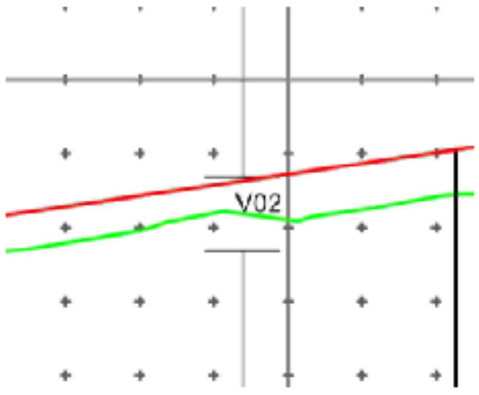




VIA EXISTENTE - V01

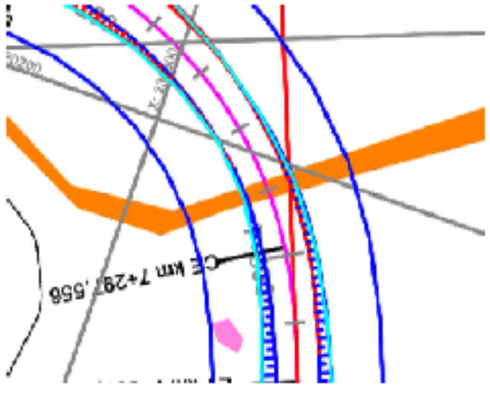
Estaca: 0+000,000m
Cota terreno: 430,757m
Cota projeto: 429,800m

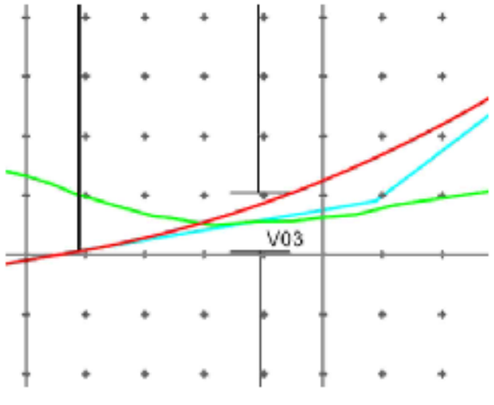




VIA EXISTENTE - V02

Estaca: 6+388,133m
Cota terreno: 106,320m
Cota projeto: 107,270m





VIA EXISTENTE - V03

Estaca: 7+ 279,172m
Cota terreno: 111,136m
Cota projeto: 111,712m

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Trecho: Itaara - Silveira Martins - lote 1
Data: 10/11/2021

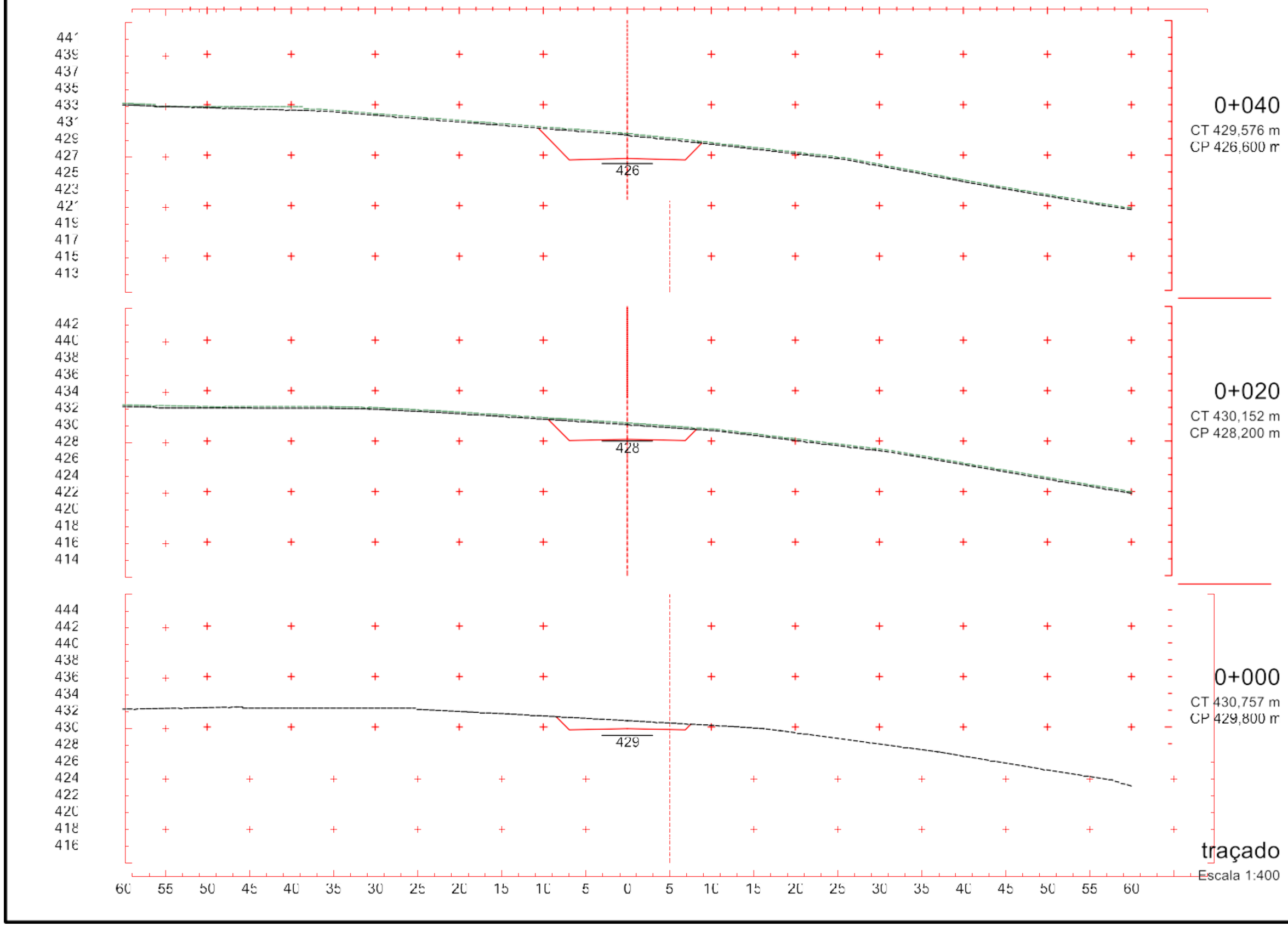
AC1 ROTAS

PROJETO GEOMÉTRICO

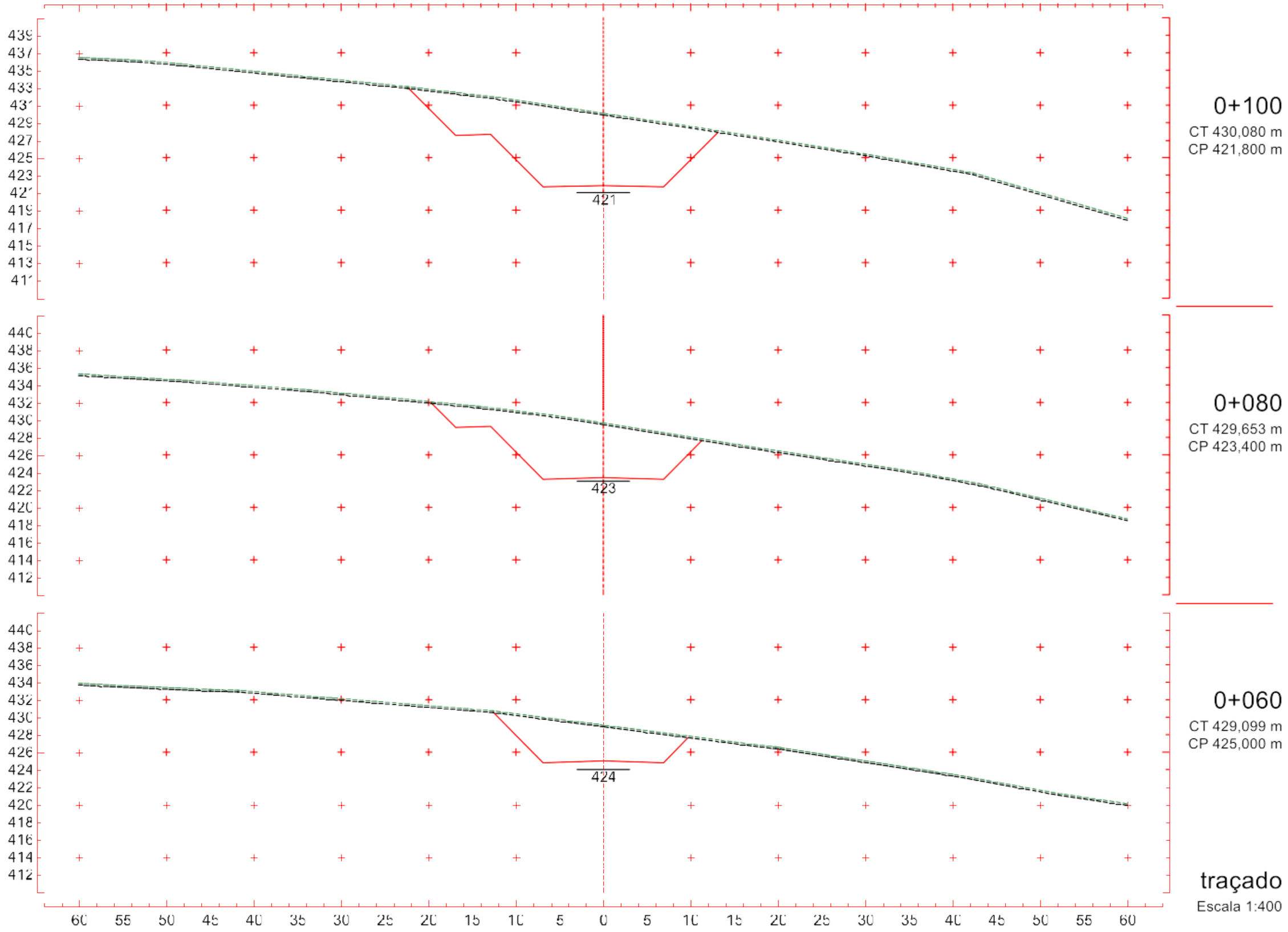
Detalhamento de interferências com vias existentes

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

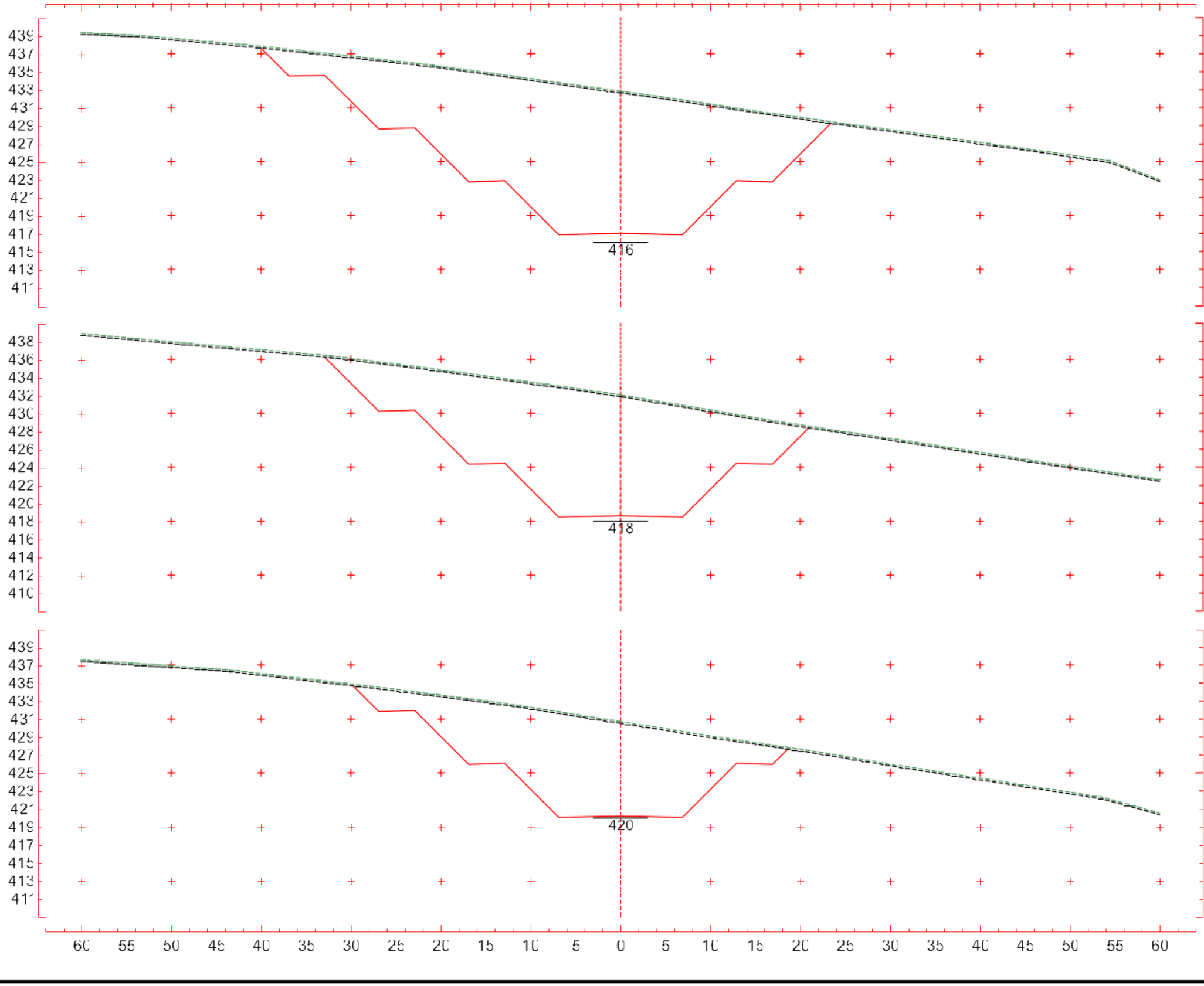
2.4. Seções Transversais


0+040
CT 429,576 m
CP 426,600 m
426
0+020
CT 430,152 m
CP 428,200 m
428
0+000
CT 430,757 m
CP 429,800 m
429
traçado
Escala 1:400

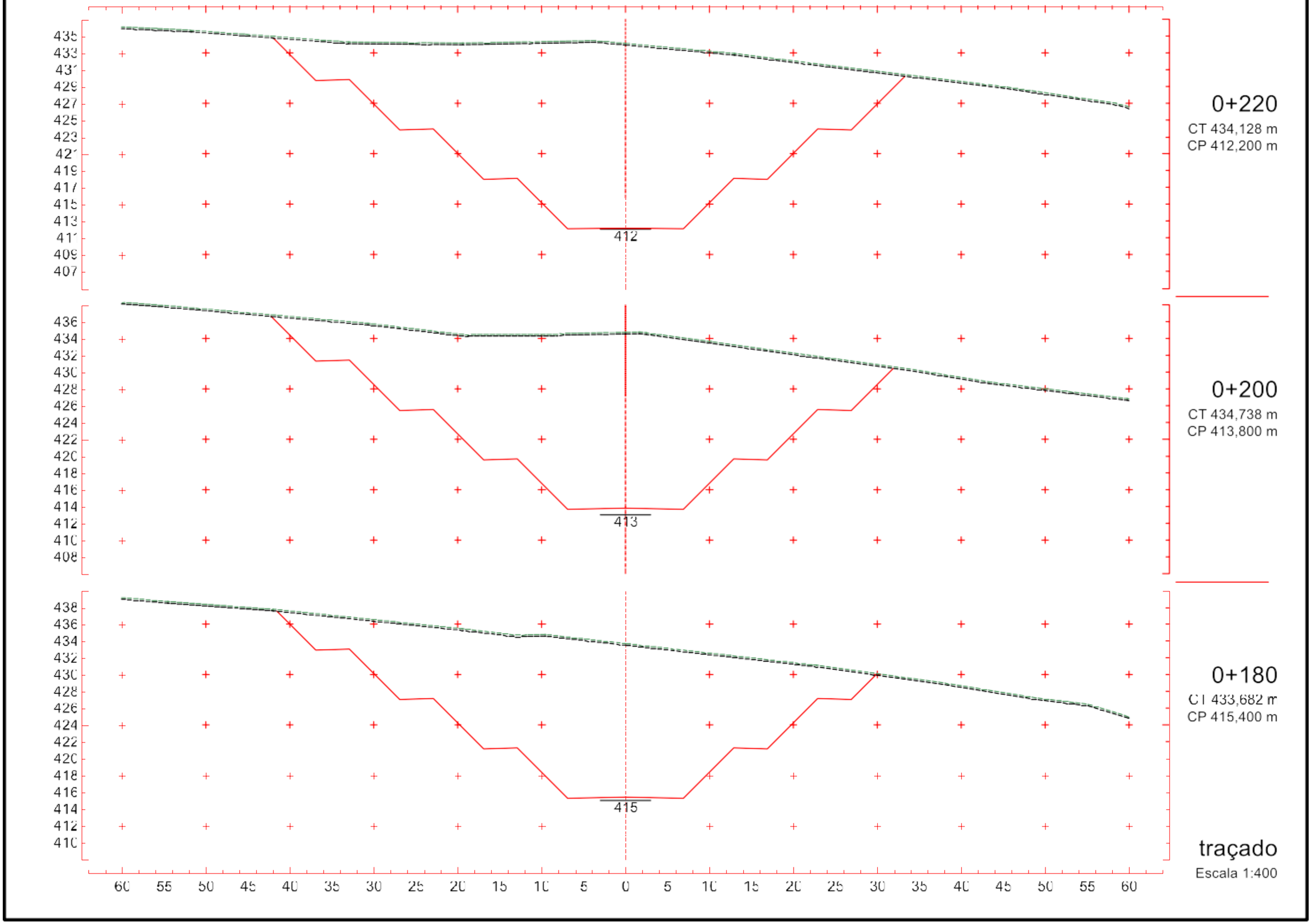
Projeto Ponto de Partida 2021/1

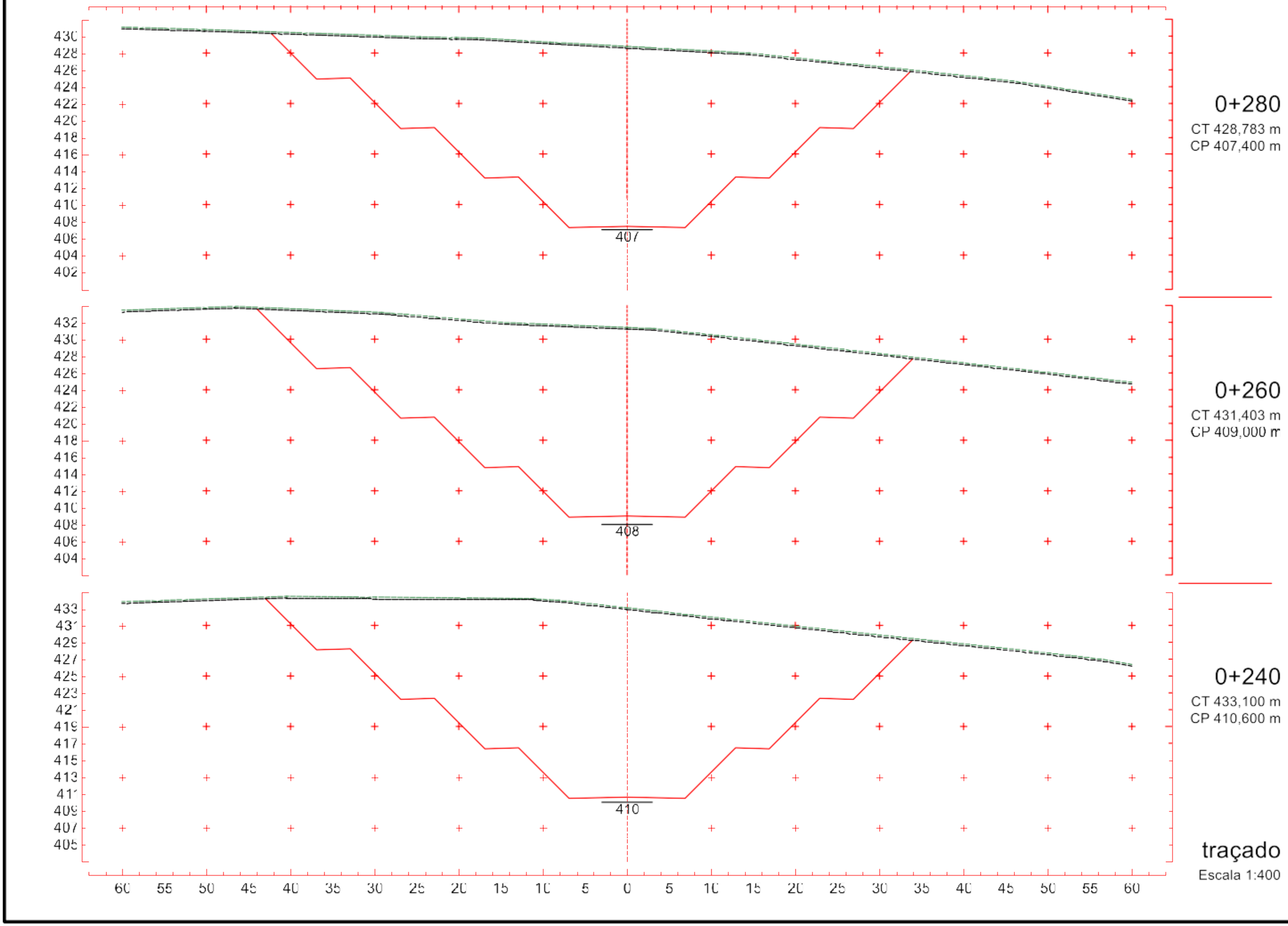


Projeto Ponto de Partida 2021/1

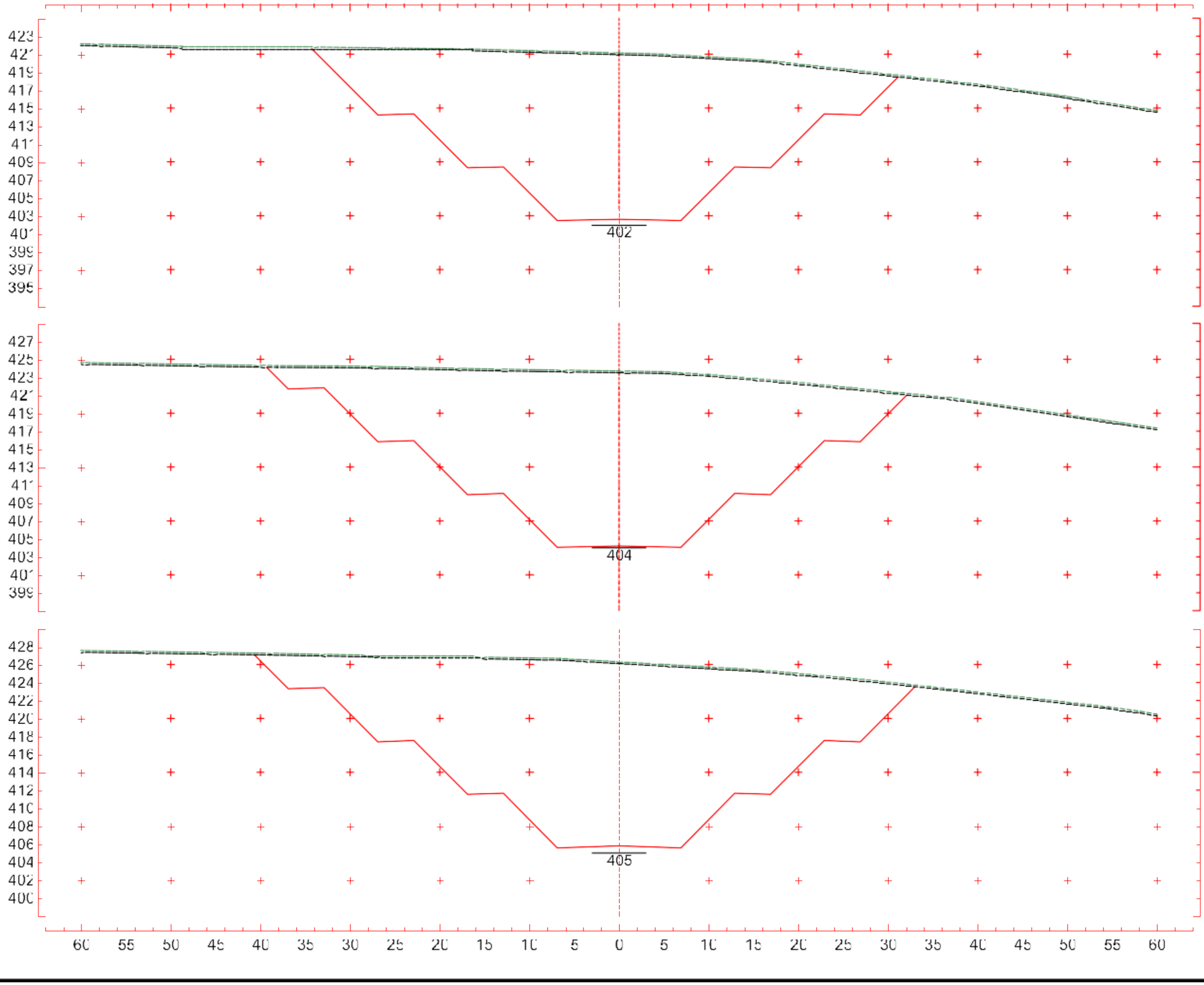


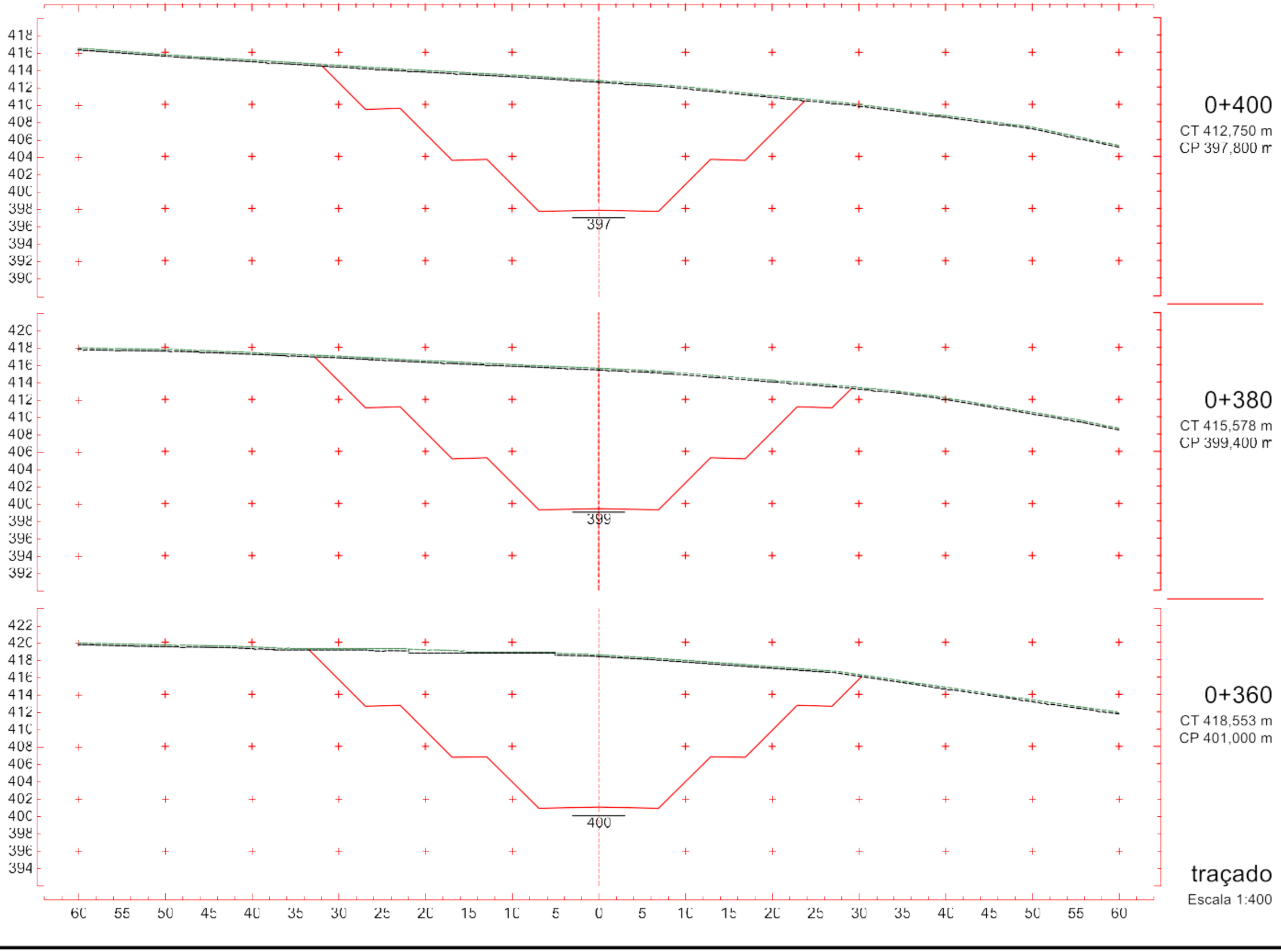
Projeto Ponto de Partida 2021/1



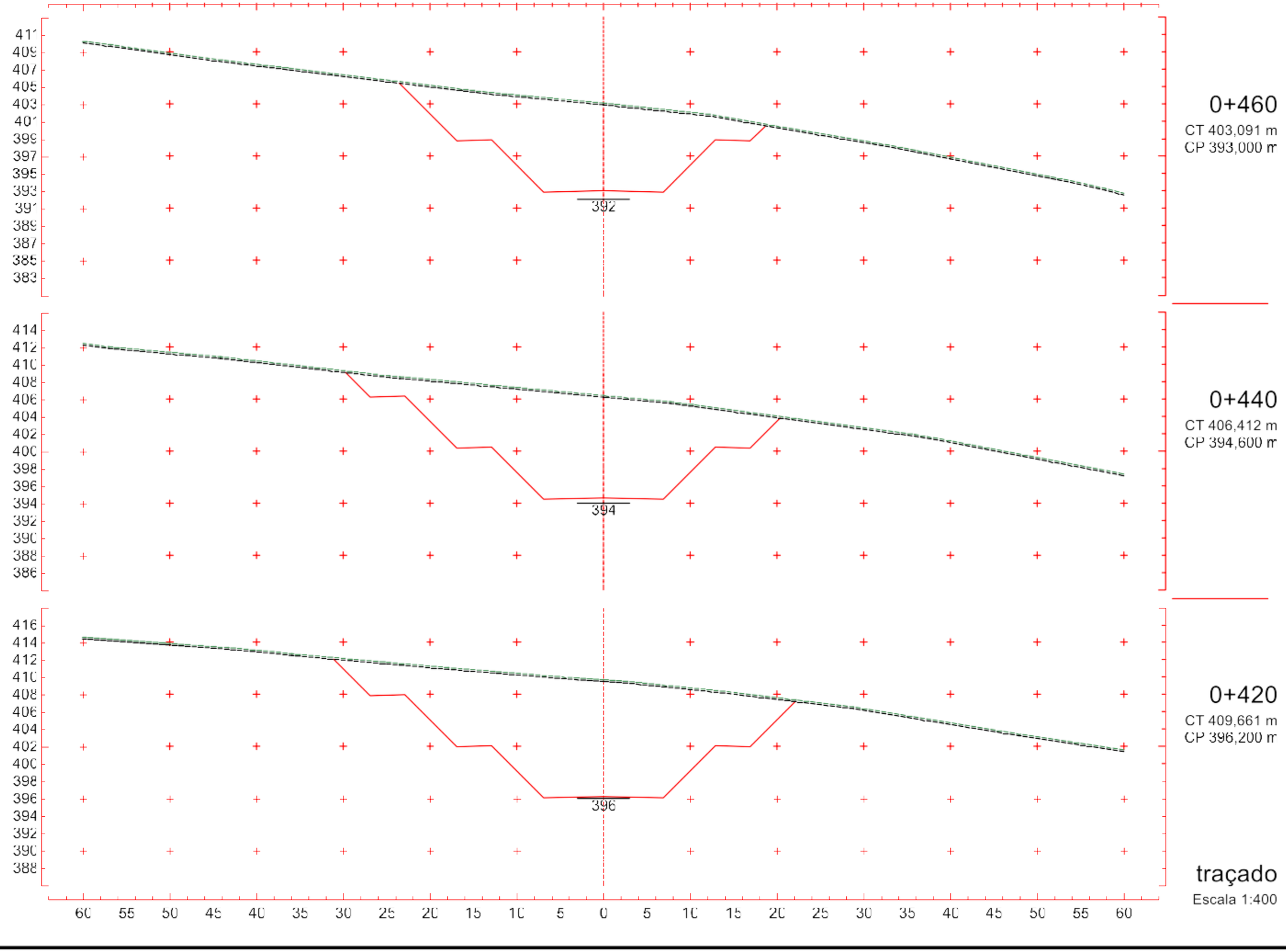

0+280
CT 428,783 m
CP 407,400 m
0+260
CT 431,403 m
CP 409,000 m
0+240
CT 433,100 m
CP 410,600 m
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

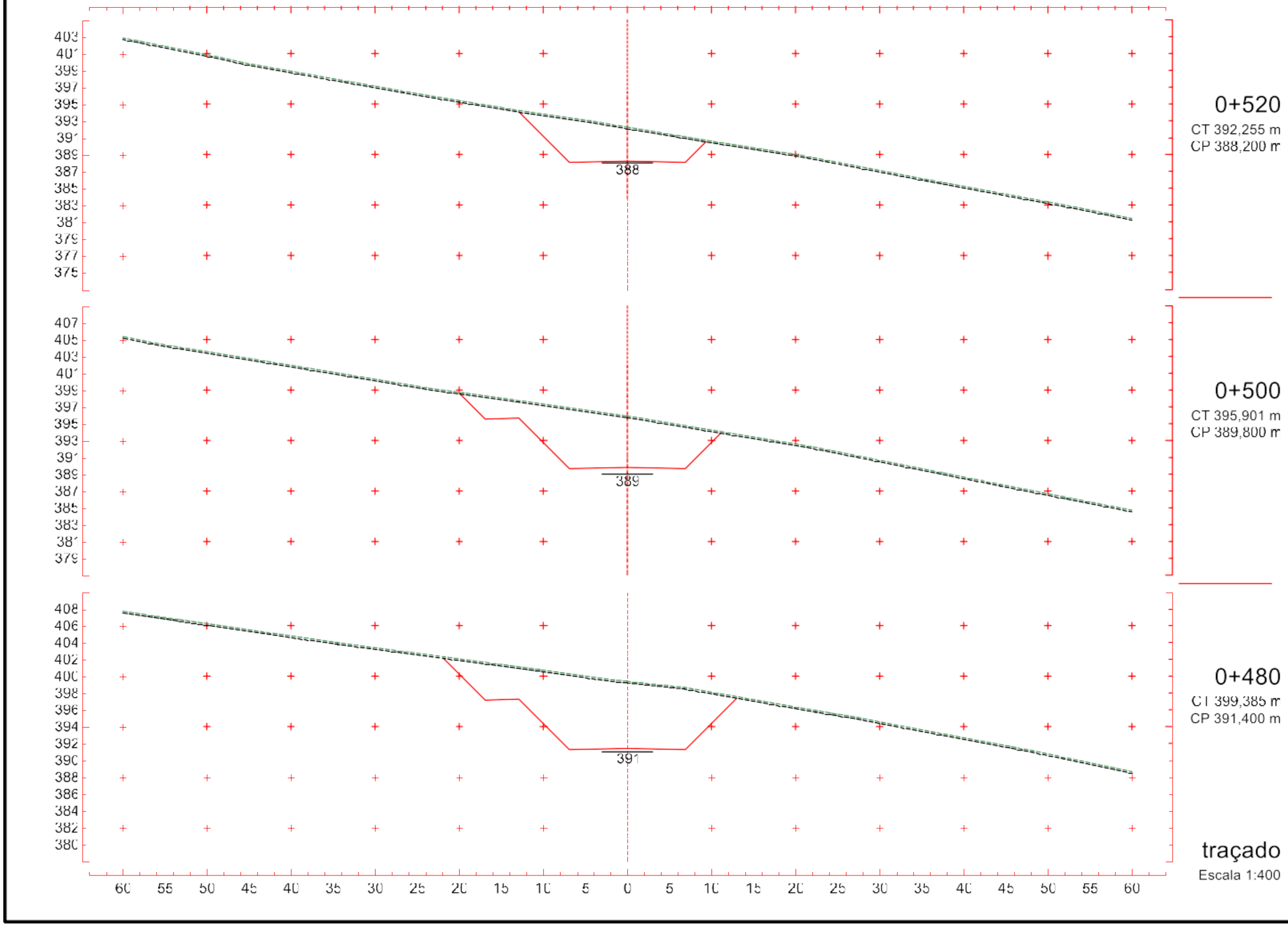



418
416
414
412
410
408
406
404
402
400
398
396
394
392
390
397
0+400
CT 412,750 m
CP 397,800 m
420
418
416
414
412
410
408
406
404
402
400
398
396
394
392
399
0+380
CT 415,578 m
CP 399,400 m
422
420
418
416
414
412
410
408
406
404
402
400
398
396
394
400
0+360
CT 418,553 m
CP 401,000 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

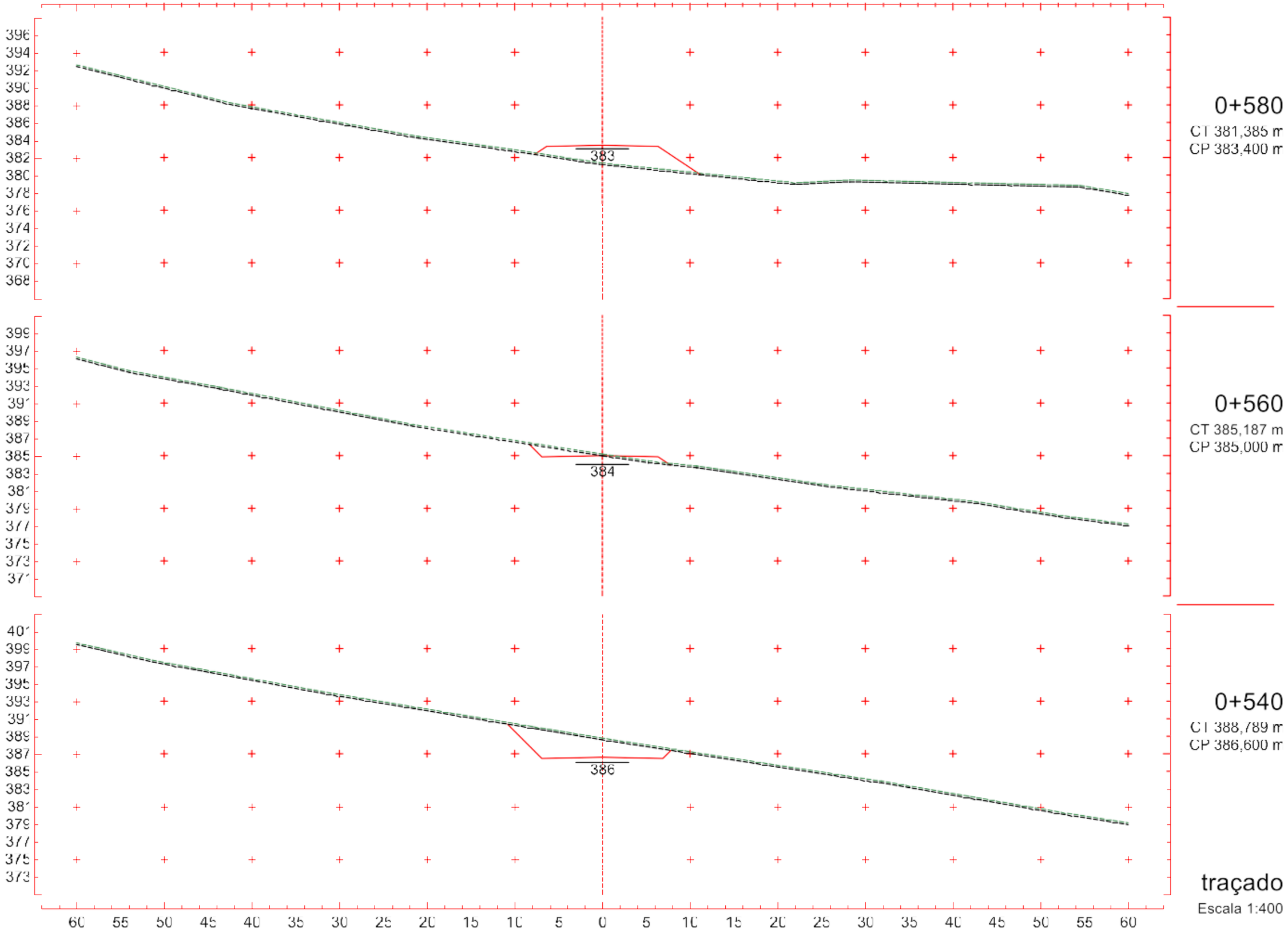
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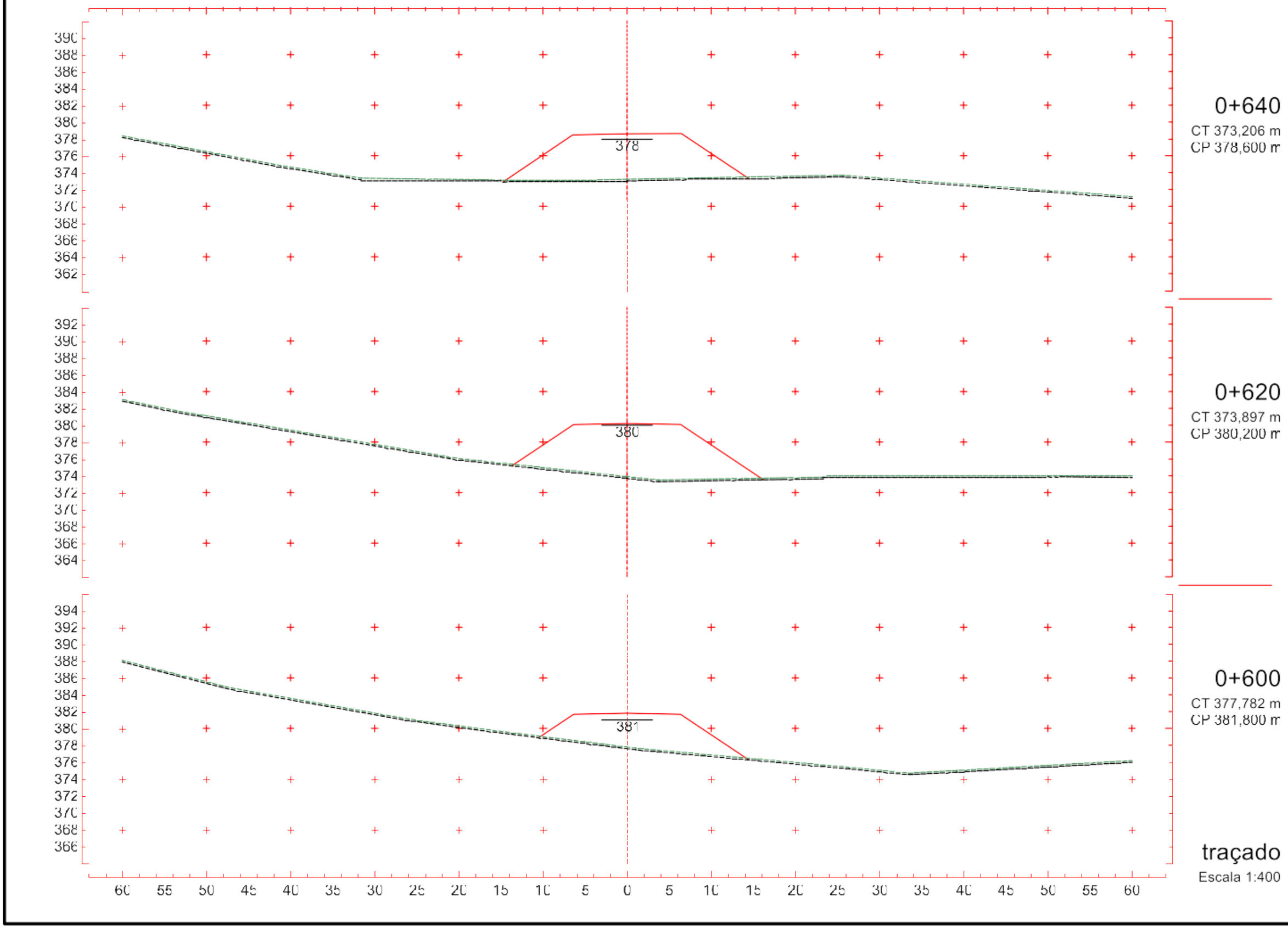


Projeto Ponto de Partida 2021/1

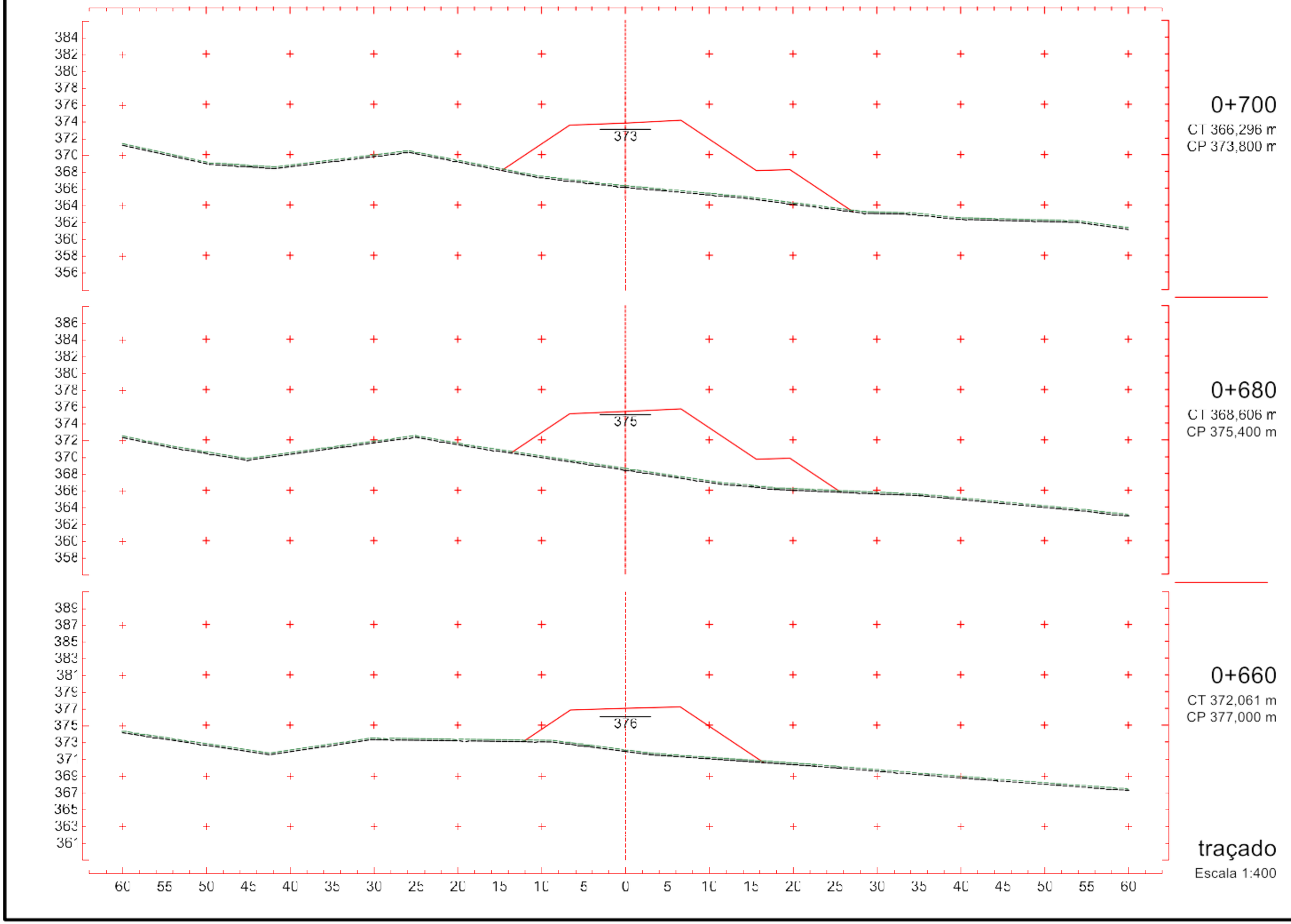


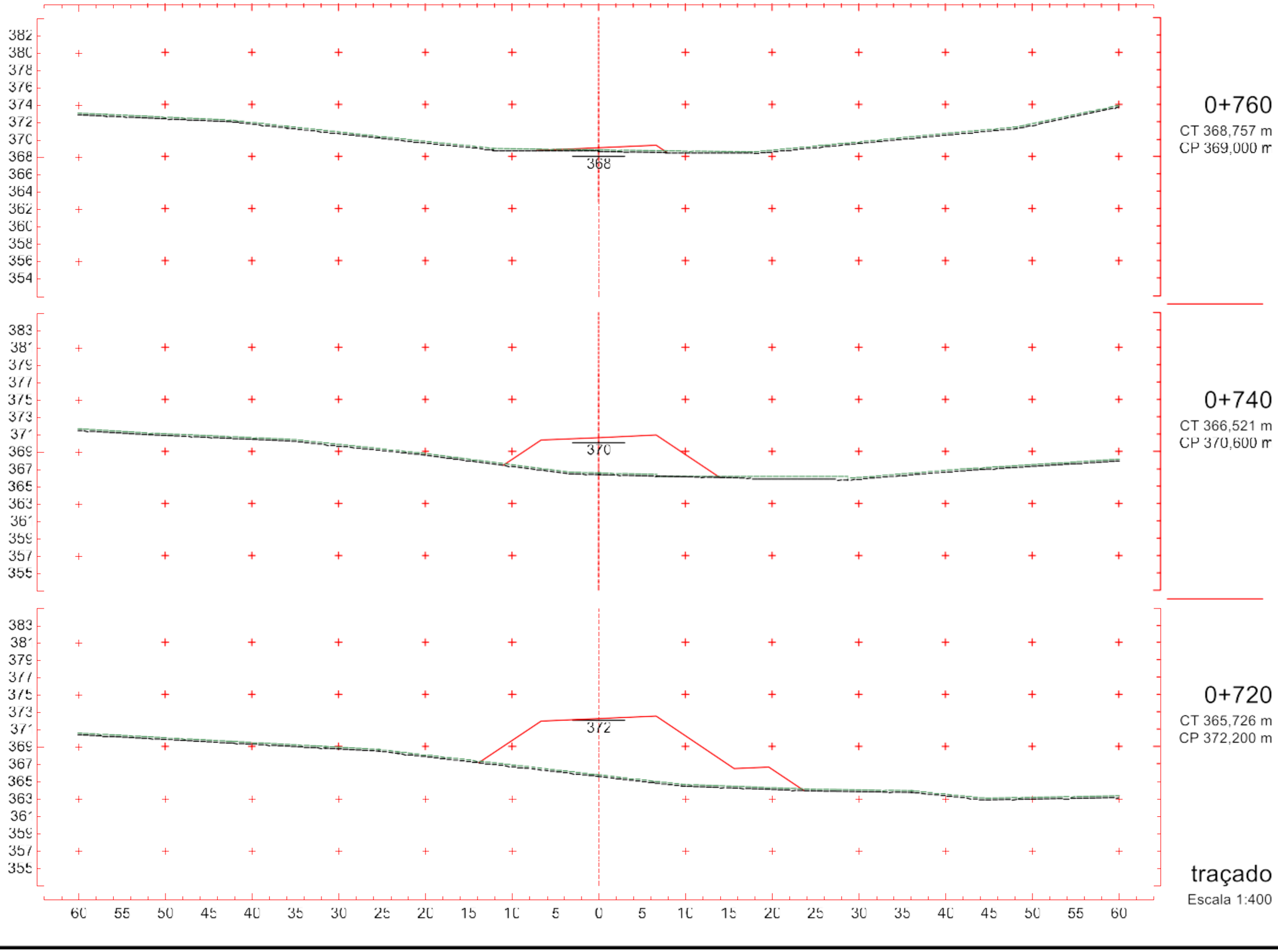
Projeto Ponto de Partida 2021/1



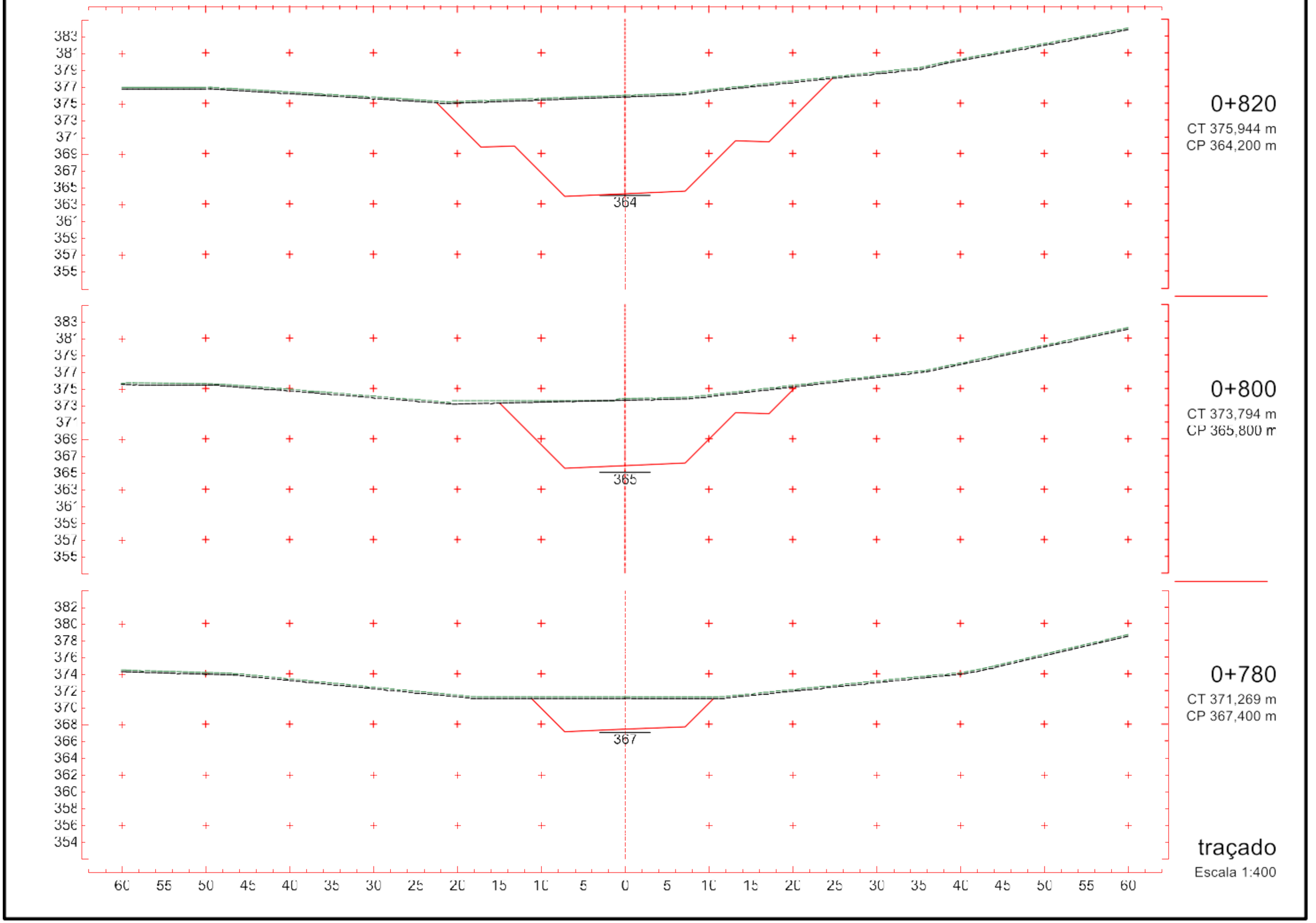

0+640
CT 373,206 m
CP 378,600 m
0+620
CT 373,897 m
CP 380,200 m
0+600
CT 377,782 m
CP 381,800 m
traçado
Escala 1:400

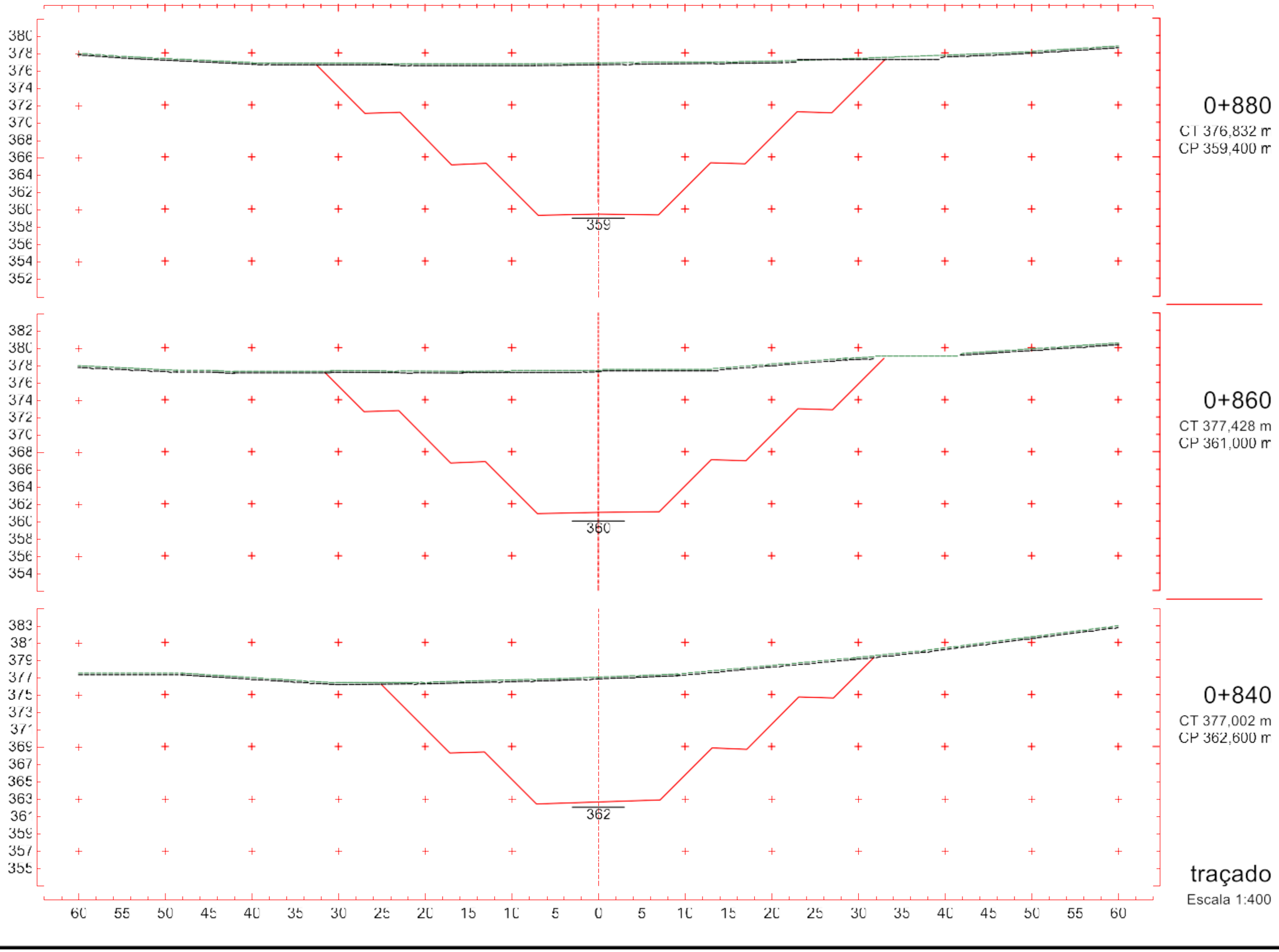
Projeto Ponto de Partida 2021/1



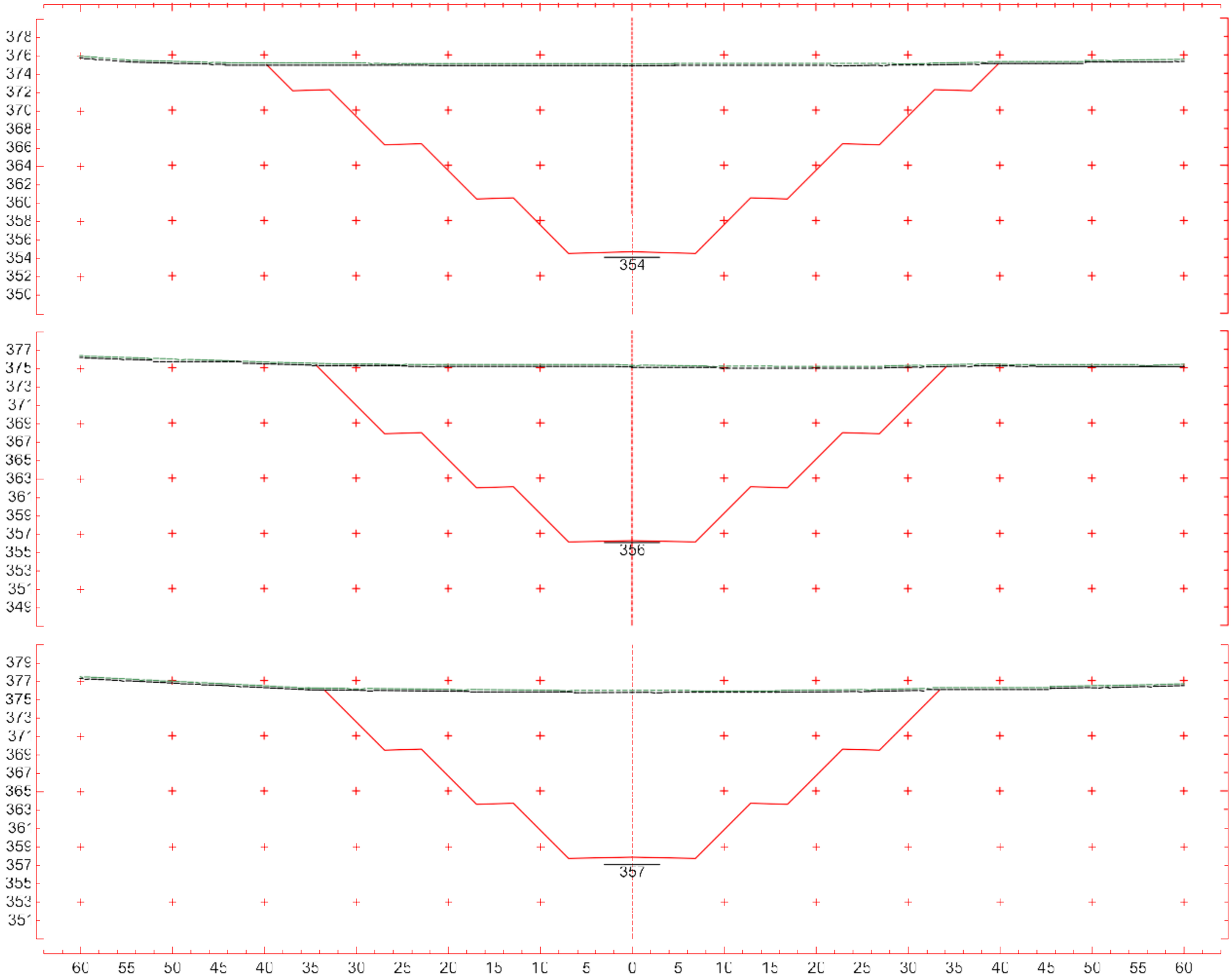

382
380
378
376
374
372
370
368
366
364
362
360
358
356
354
368
0+760
CT 368,757 m
CP 369,000 m
383
381
379
377
375
373
371
369
367
365
363
361
359
357
355
370
0+740
CT 366,521 m
CP 370,600 m
372
0+720
CT 365,726 m
CP 372,200 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1




0+880
CT 376,832 m
CP 359,400 m
359
0+860
CT 377,428 m
CP 361,000 m
360
0+840
CT 377,002 m
CP 362,600 m
362
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

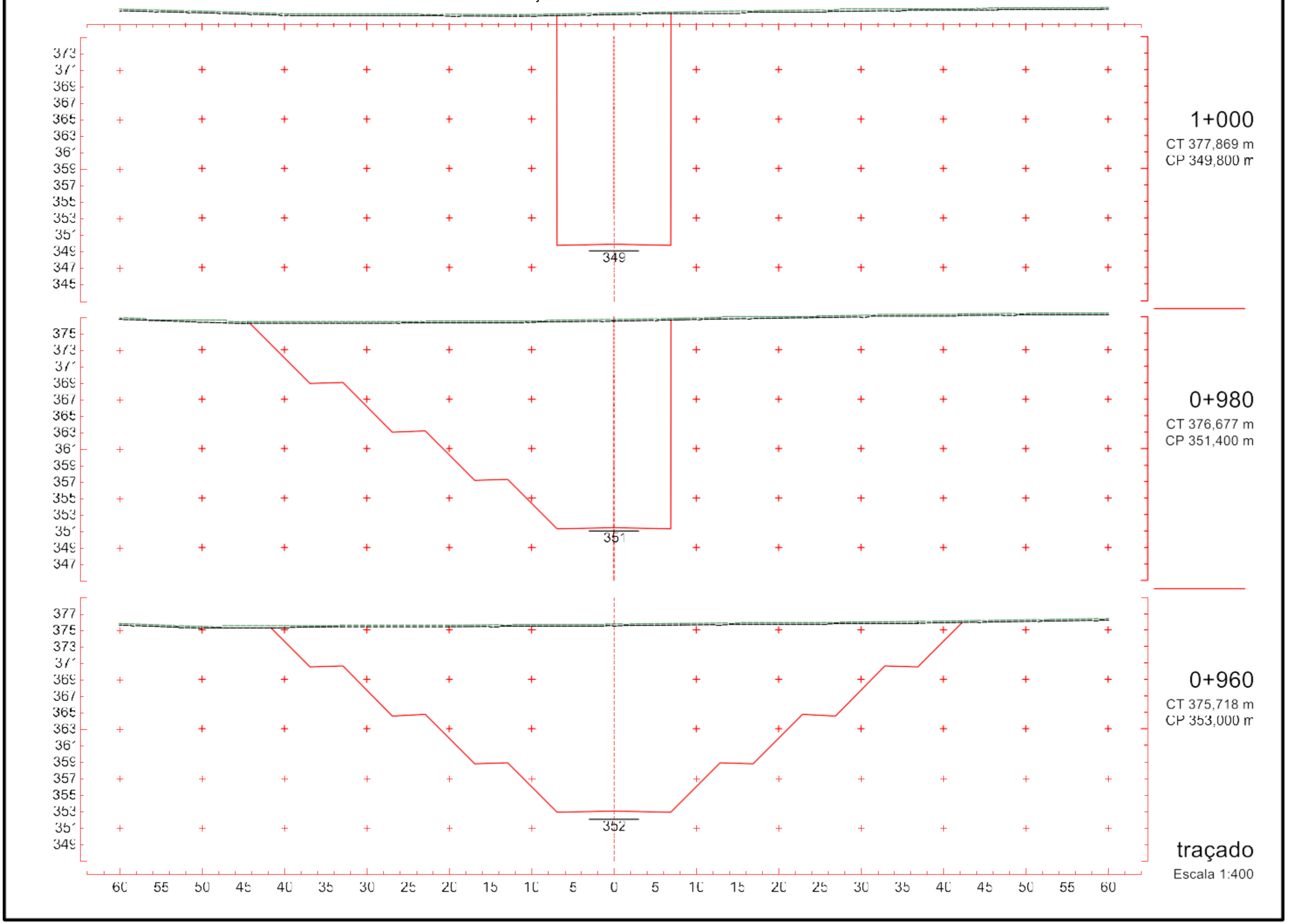


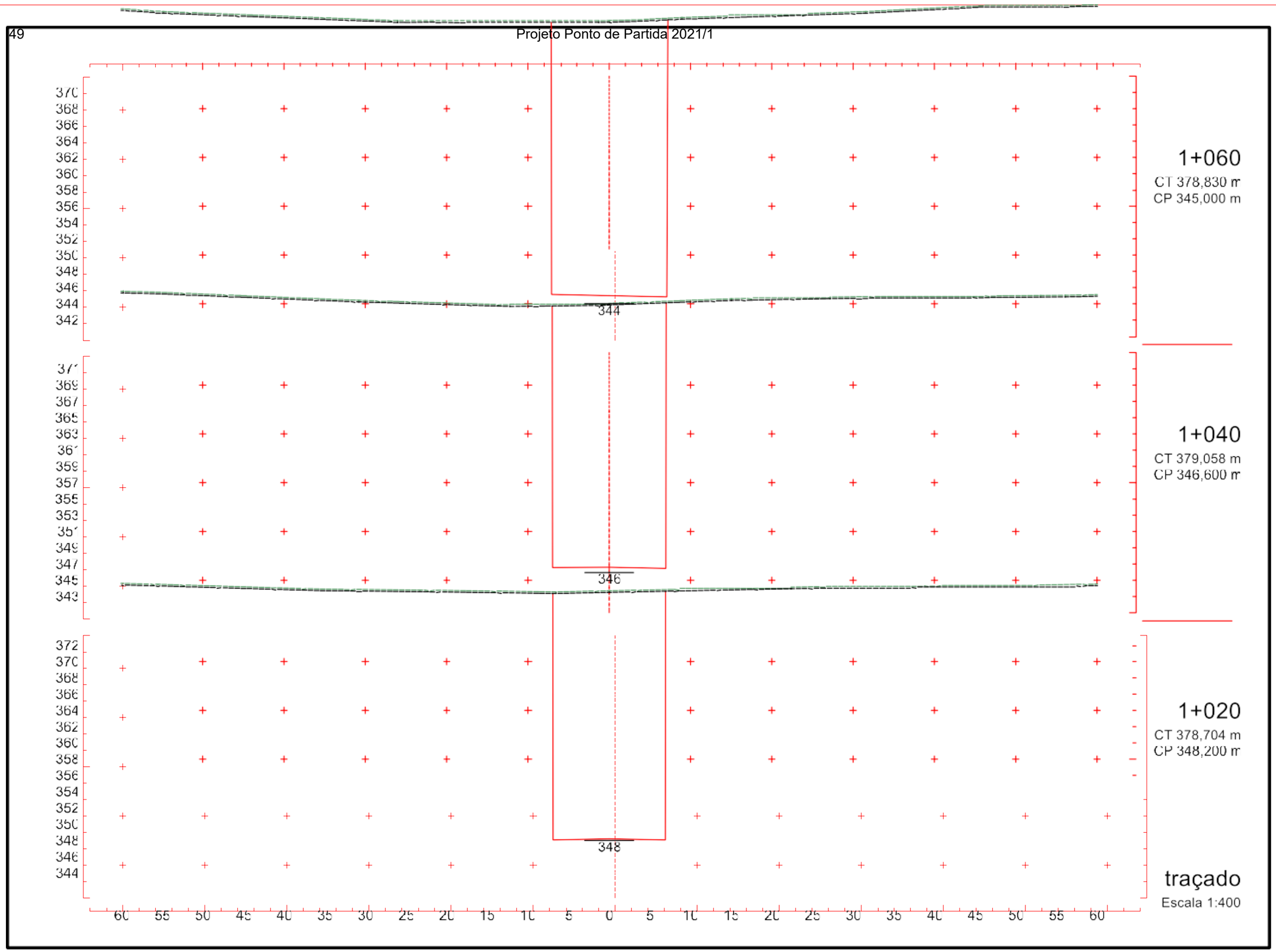
0+940
CT 375,020 m
CP 354,600 m

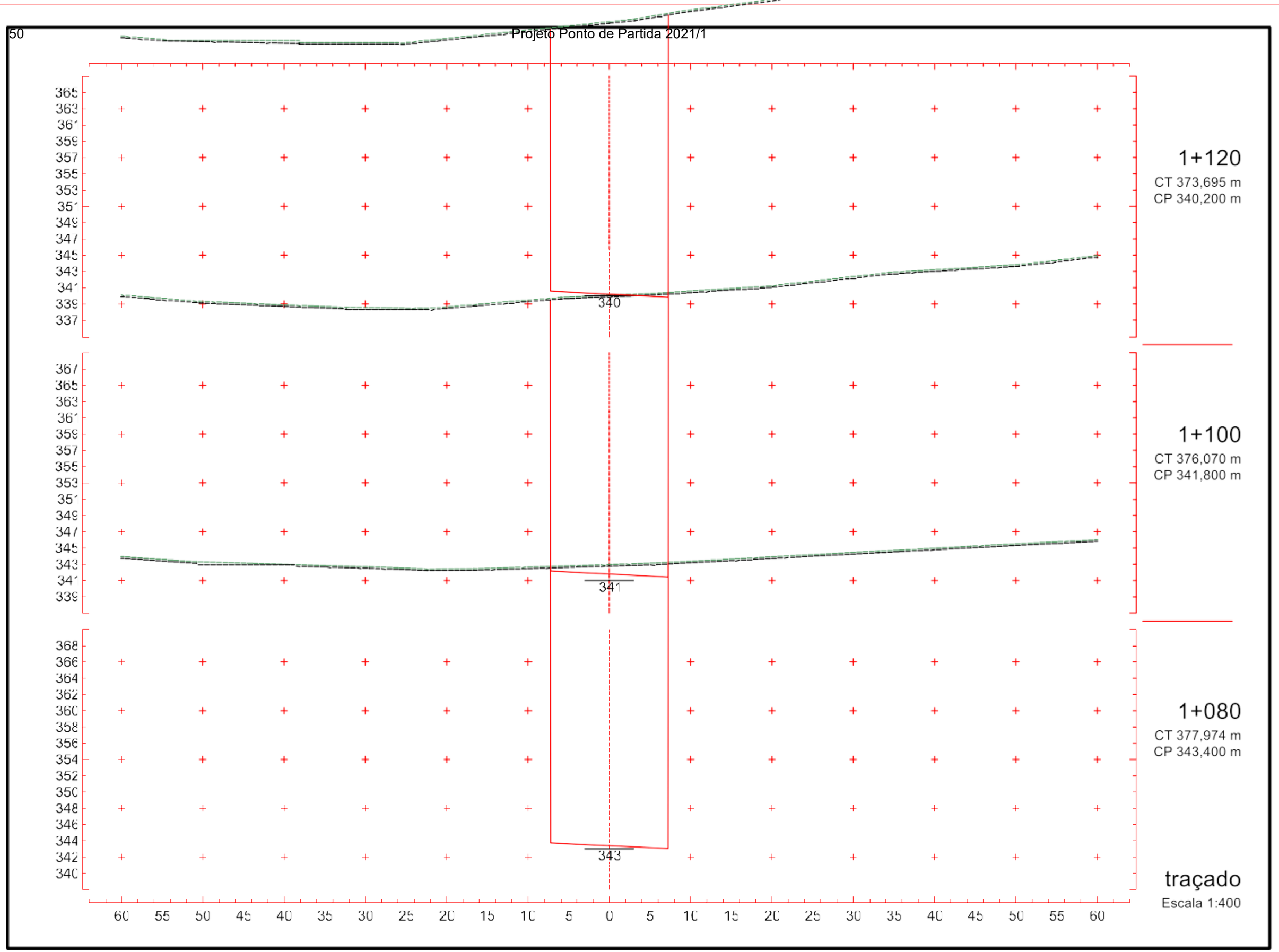
0+920
CT 375,291 m
CP 356,200 m

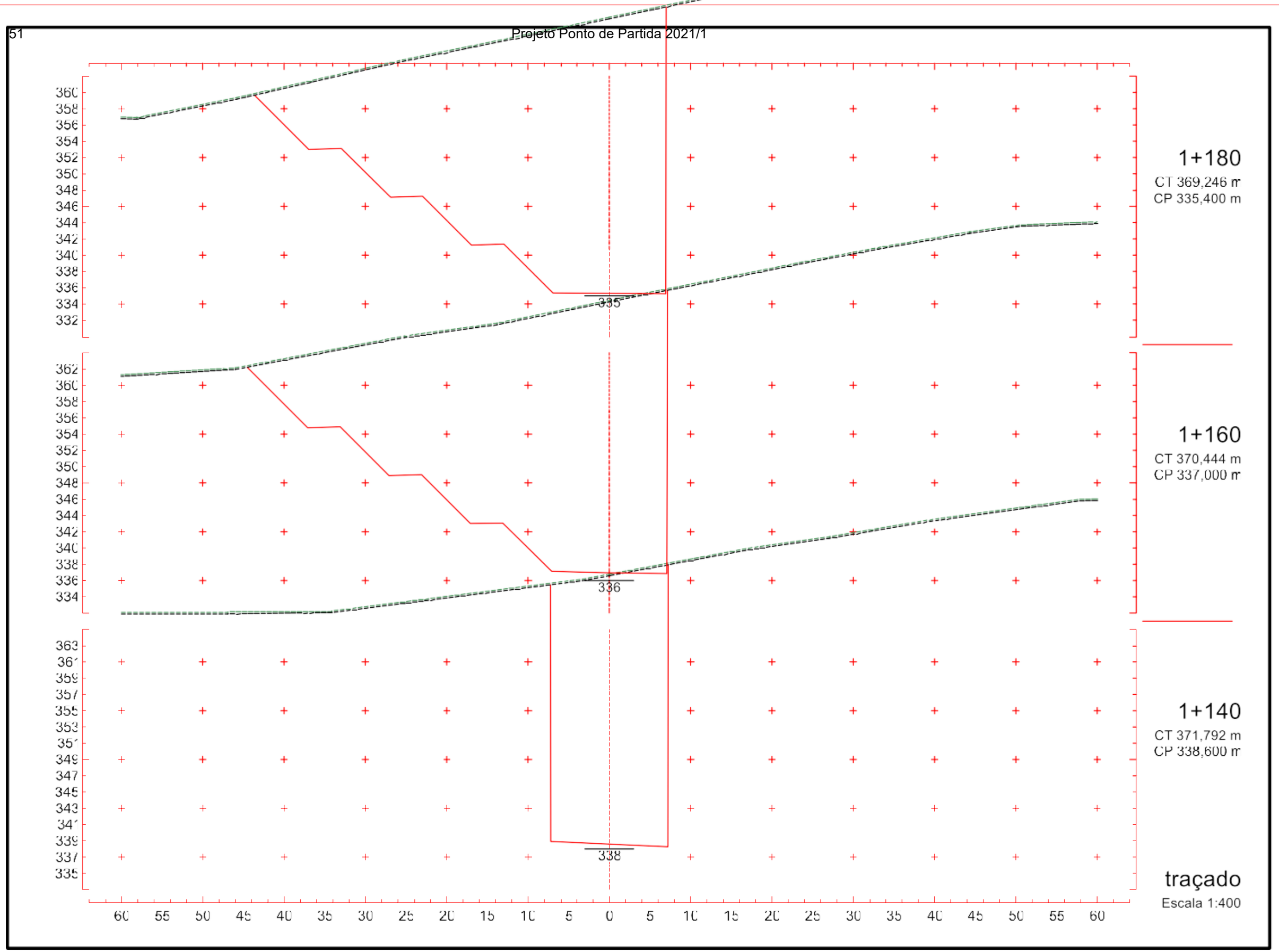
0+900
CT 375,924 m
CP 357,800 m

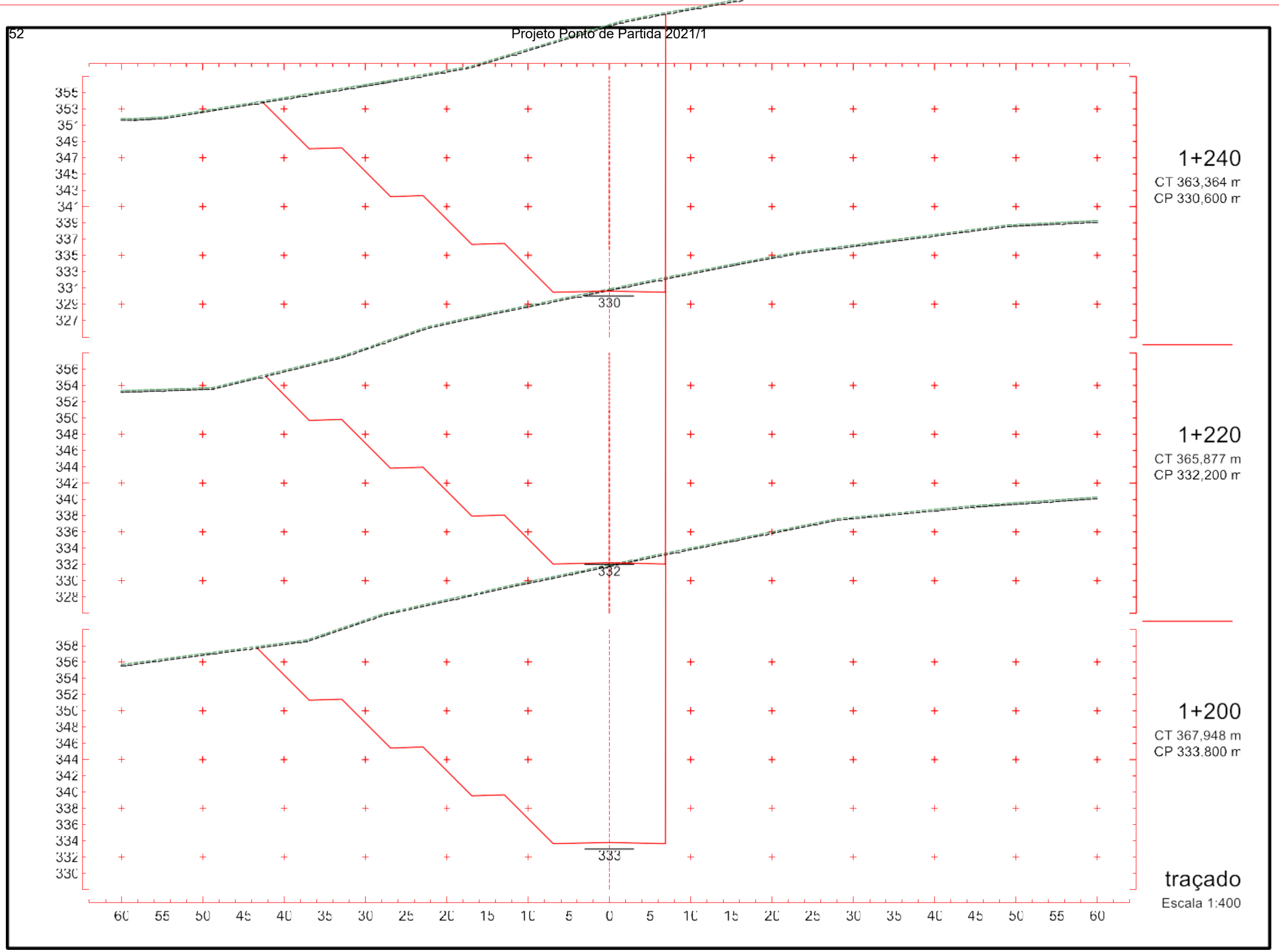
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Escala 1:400

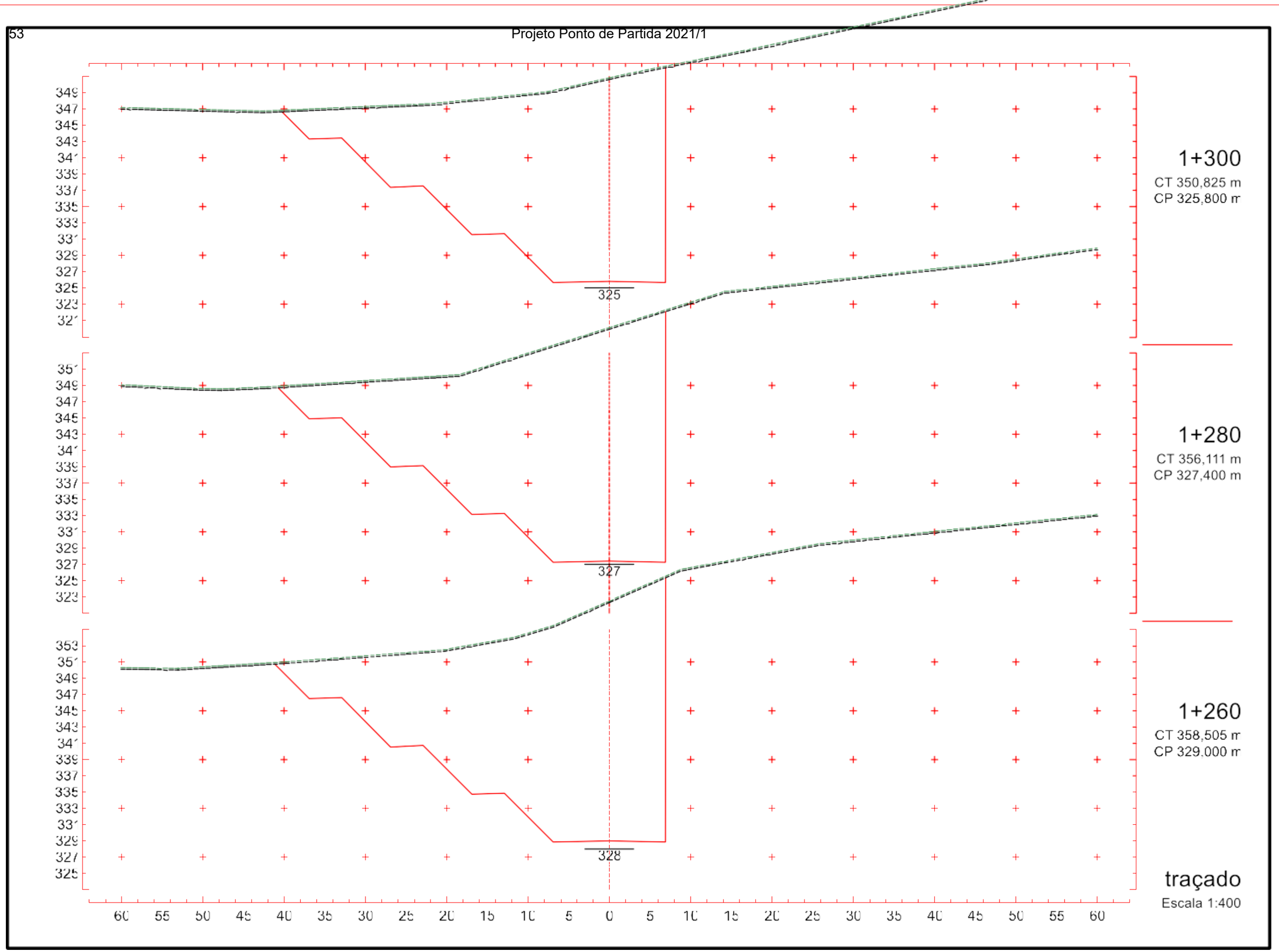

373
371
369
367
365
363
361
359
357
355
353
351
349
347
345
349
1+000
CT 377,869 m
CP 349,800 m
375
373
371
369
367
365
363
361
359
357
355
353
351
349
347
351
0+980
CT 376,677 m
CP 351,400 m
377
375
373
371
369
367
365
363
361
359
357
355
353
351
349
352
0+960
CT 375,718 m
CP 353,000 m
traçado
Escala 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


1+060
CT 378,830 m
CP 345,000 m
344
1+040
CT 379,058 m
CP 346,600 m
346
1+020
CT 378,704 m
CP 348,200 m
348
traçado
Escala 1:400

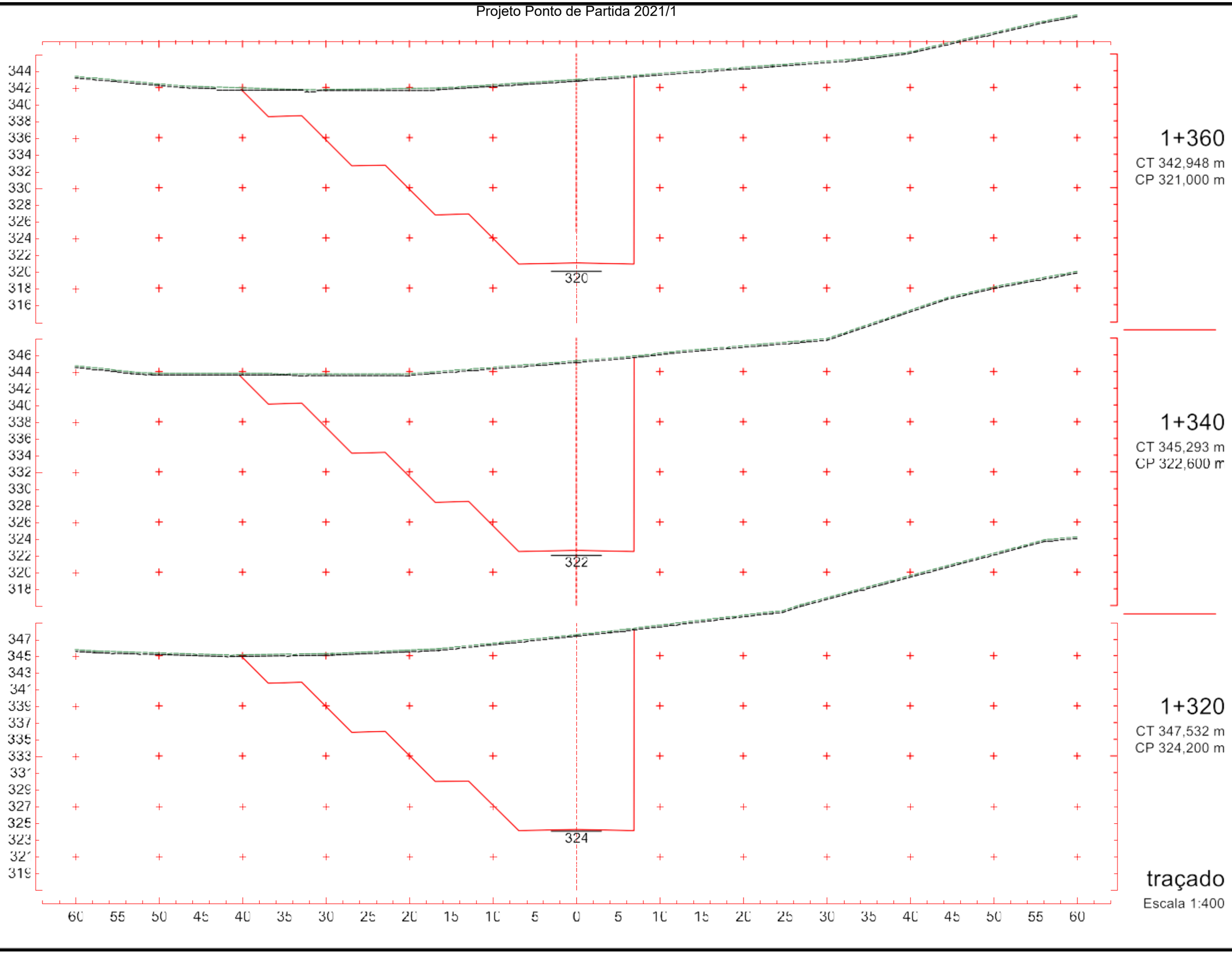

1+120
CT 373,695 m
CP 340,200 m
1+100
CT 376,070 m
CP 341,800 m
1+080
CT 377,974 m
CP 343,400 m
340
341
343
traçado
Escala 1:400


360
358
356
354
352
350
348
346
344
342
340
338
336
334
332
335
1+180
CT 369,246 m
CP 335,400 m
362
360
358
356
354
352
350
348
346
344
342
340
338
336
334
336
1+160
CT 370,444 m
CP 337,000 m
363
361
359
357
355
353
351
349
347
345
343
341
339
337
335
338
1+140
CT 371,792 m
CP 338,600 m
traçado
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

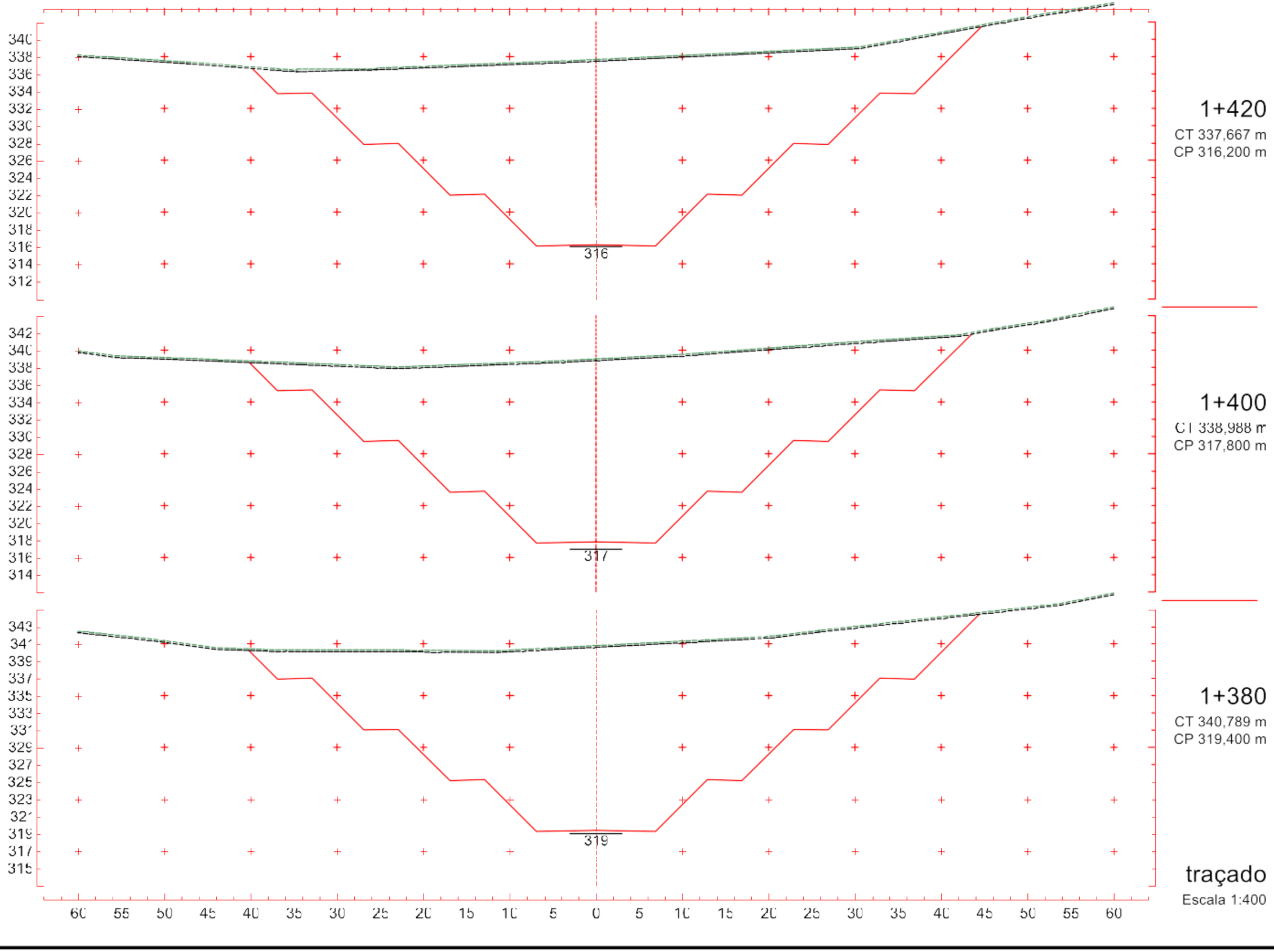

355
353
351
349
347
345
343
341
339
337
335
333
331
329
327
330
1+240
CT 363,364 m
CP 330,600 m
356
354
352
350
348
346
344
342
340
338
336
334
332
330
328
332
1+220
CT 365,877 m
CP 332,200 m
358
356
354
352
350
348
346
344
342
340
338
336
334
332
330
333
1+200
CT 367,948 m
CP 333,800 m
traçado
Escala 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

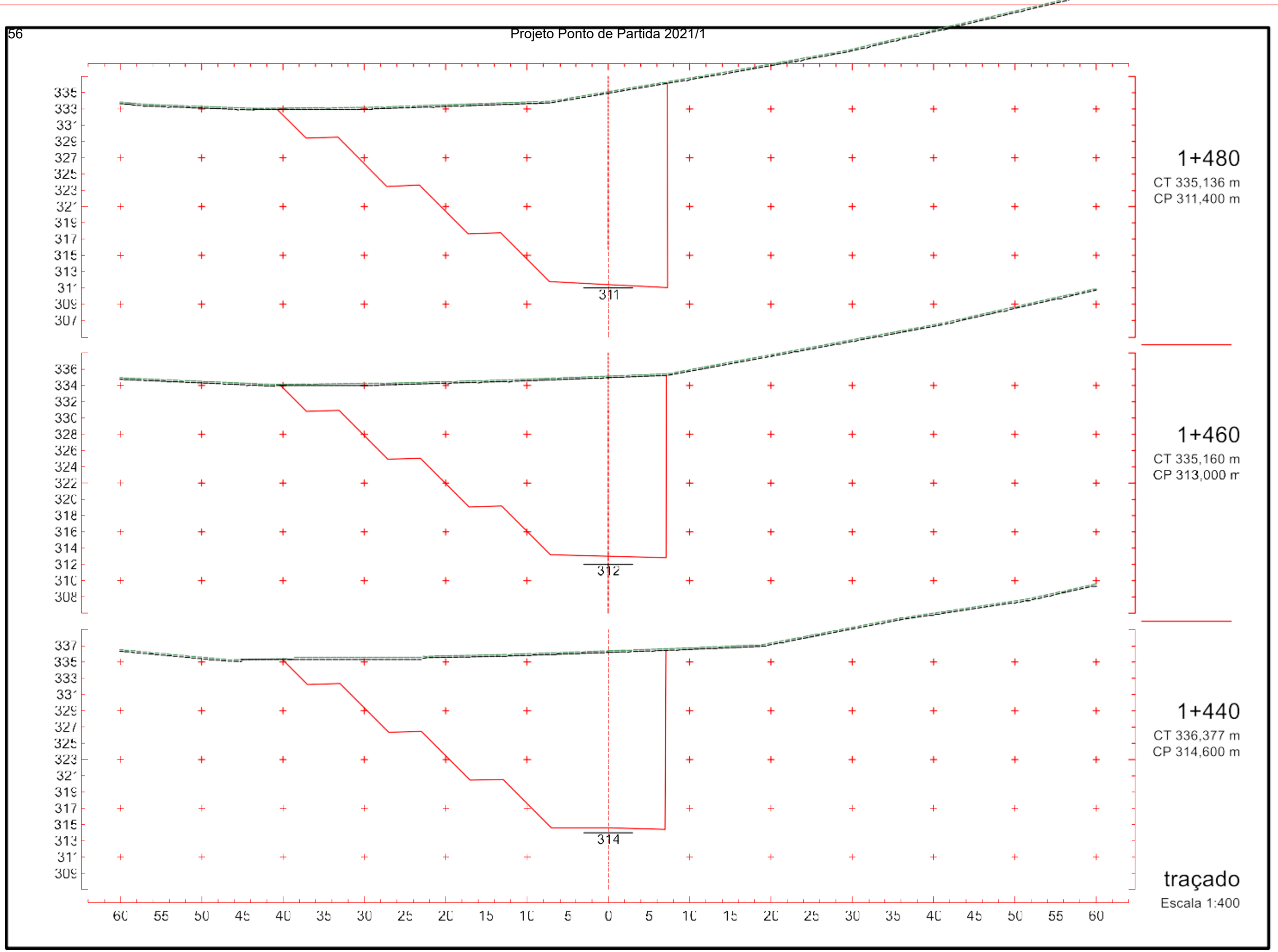

1+300
CT 350,825 m
CP 325,800 m
325
1+280
CT 356,111 m
CP 327,400 m
327
1+260
CT 358,505 m
CP 329,000 m
328
traçado
Escala 1:400

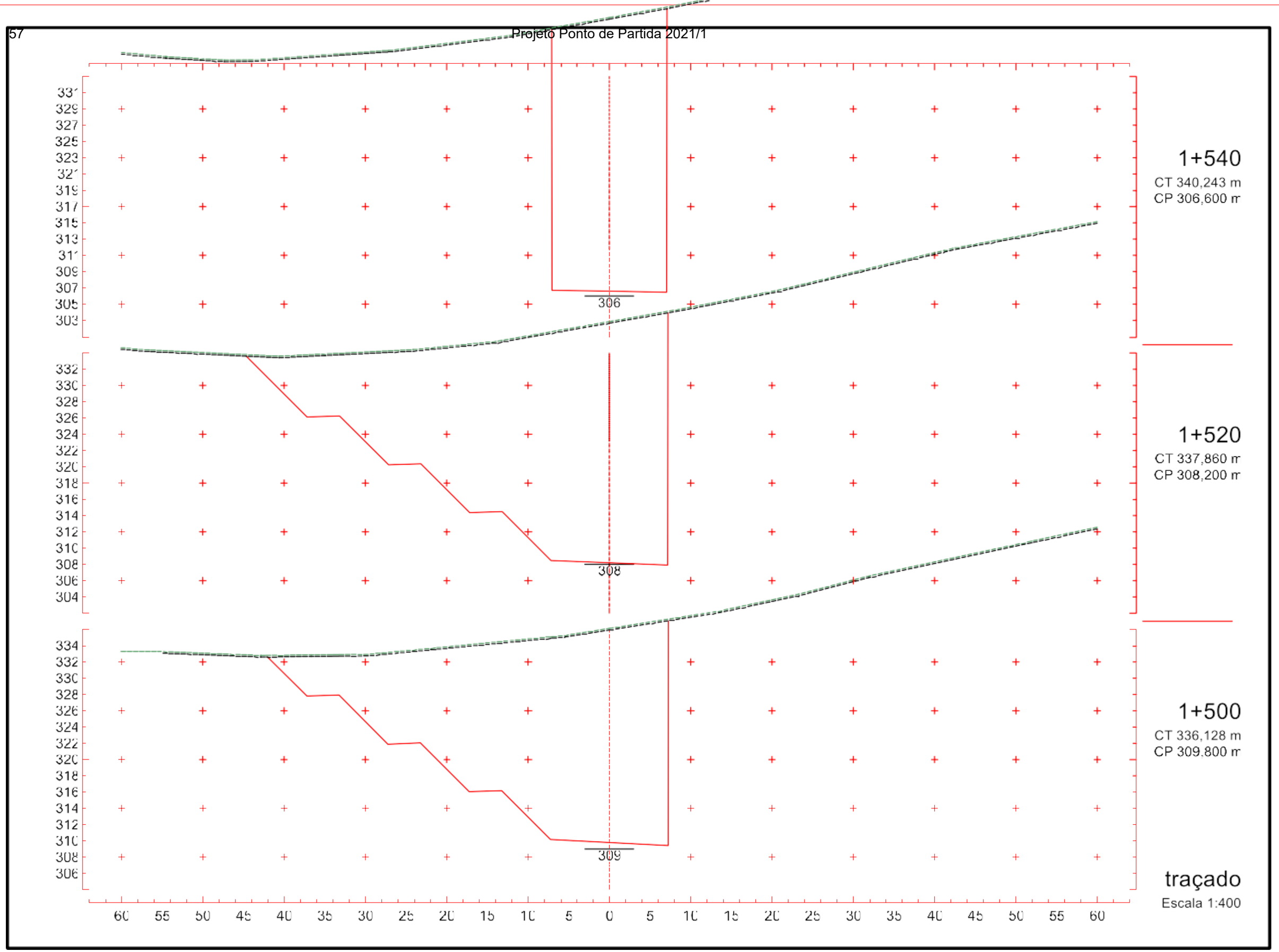
Projeto Ponto de Partida 2021/1

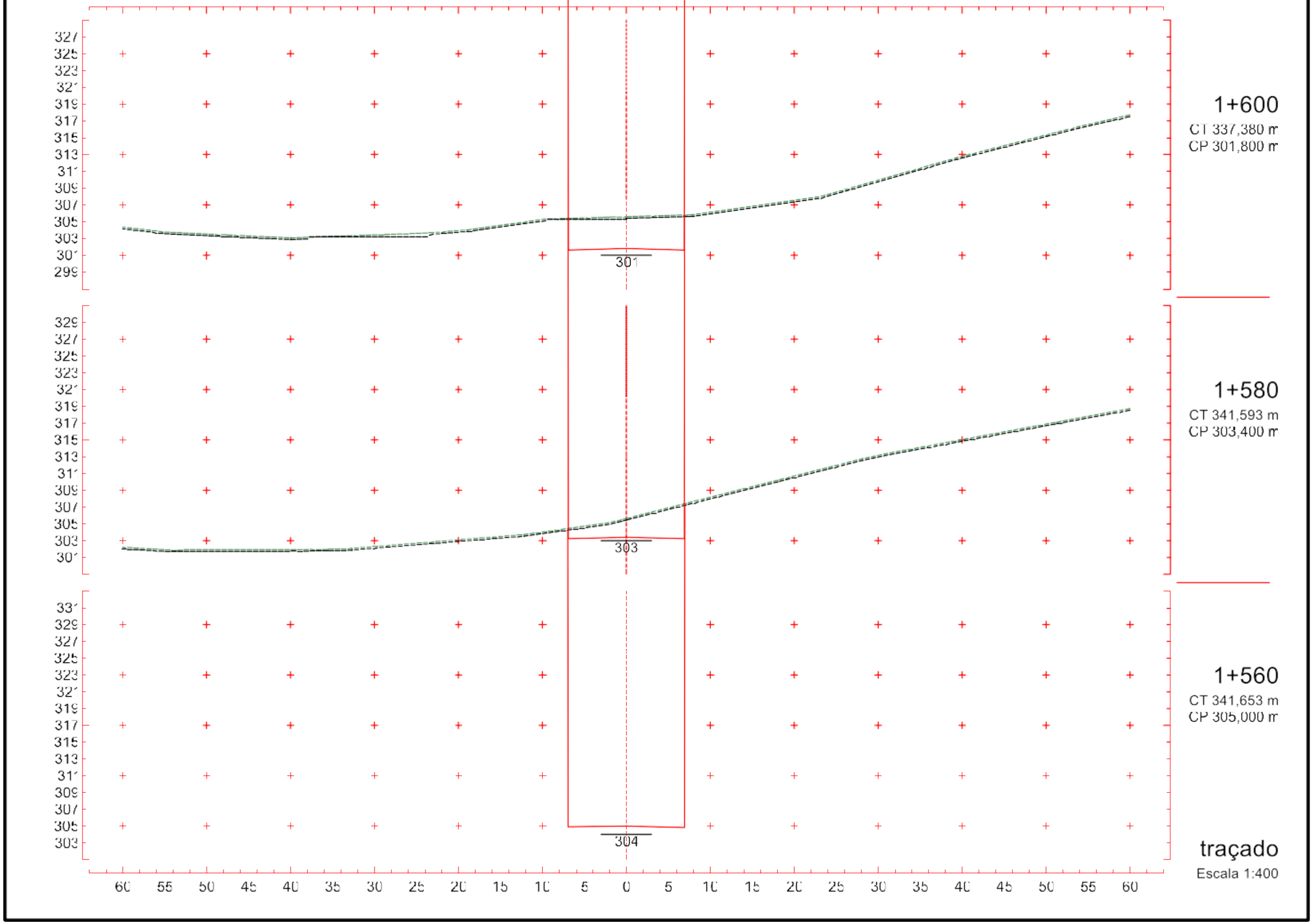


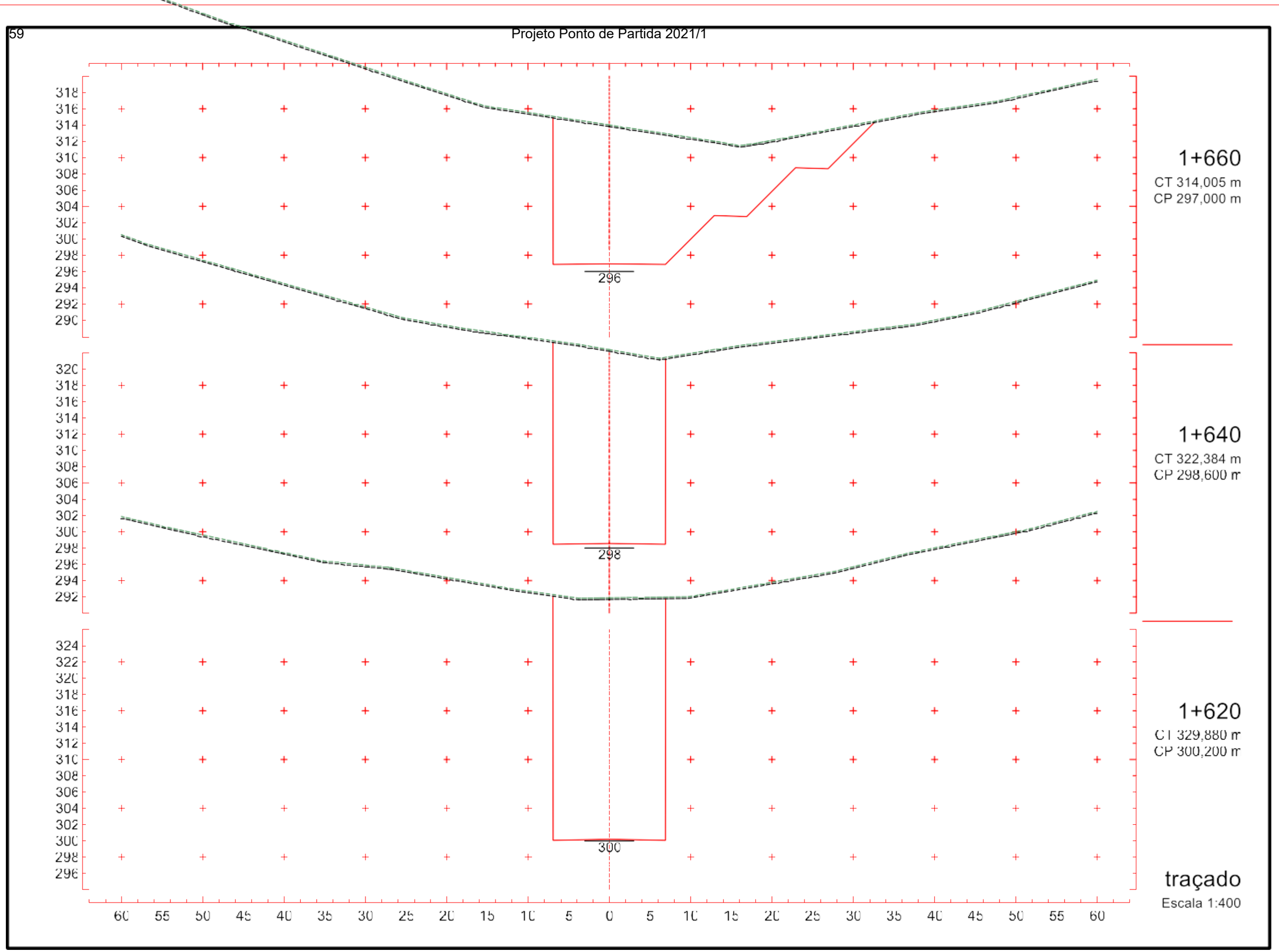
Projeto Ponto de Partida 2021/1

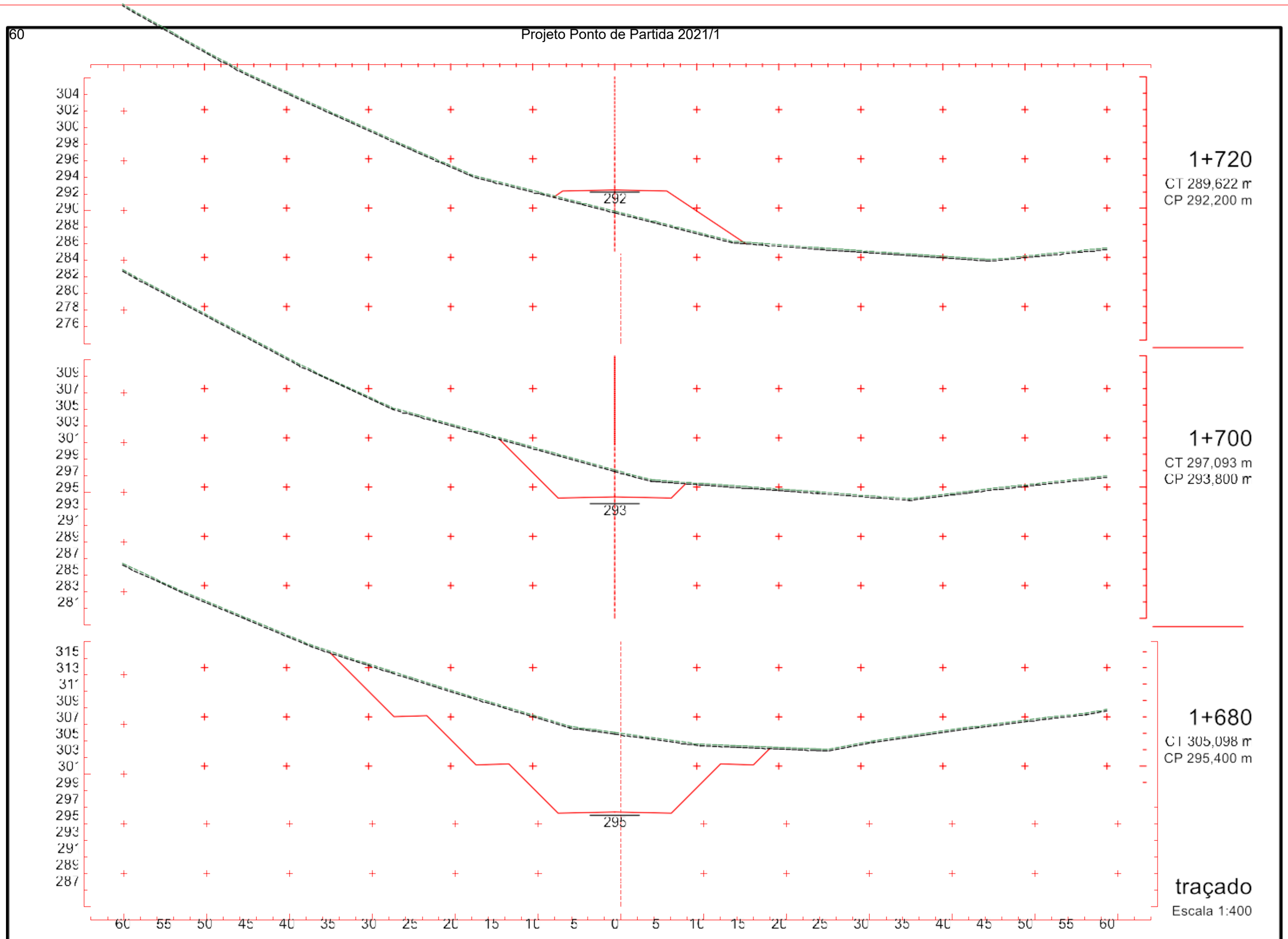



335
333
329
327
325
323
319
317
315
313
309
307
311
1+480
CT 335,136 m
CP 311,400 m
336
334
332
330
328
326
324
322
320
318
316
314
312
310
308
312
1+460
CT 335,160 m
CP 313,000 m
337
335
333
329
327
325
323
319
317
315
313
309
314
1+440
CT 336,377 m
CP 314,600 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

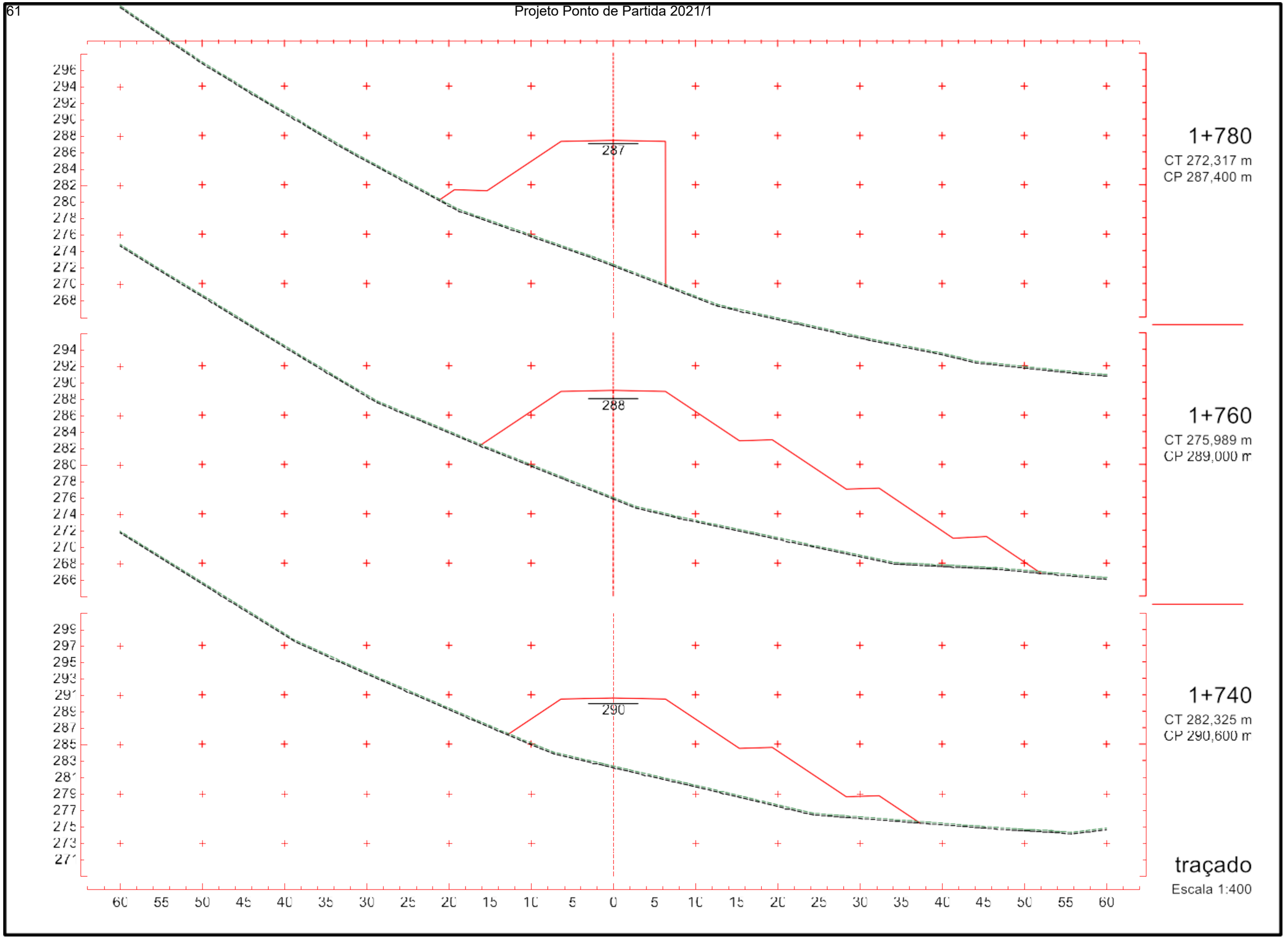

1+540
CT 340,243 m
CP 306,600 m
306
1+520
CT 337,860 m
CP 308,200 m
308
1+500
CT 336,128 m
CP 309,800 m
309
traçado
Escala 1:400

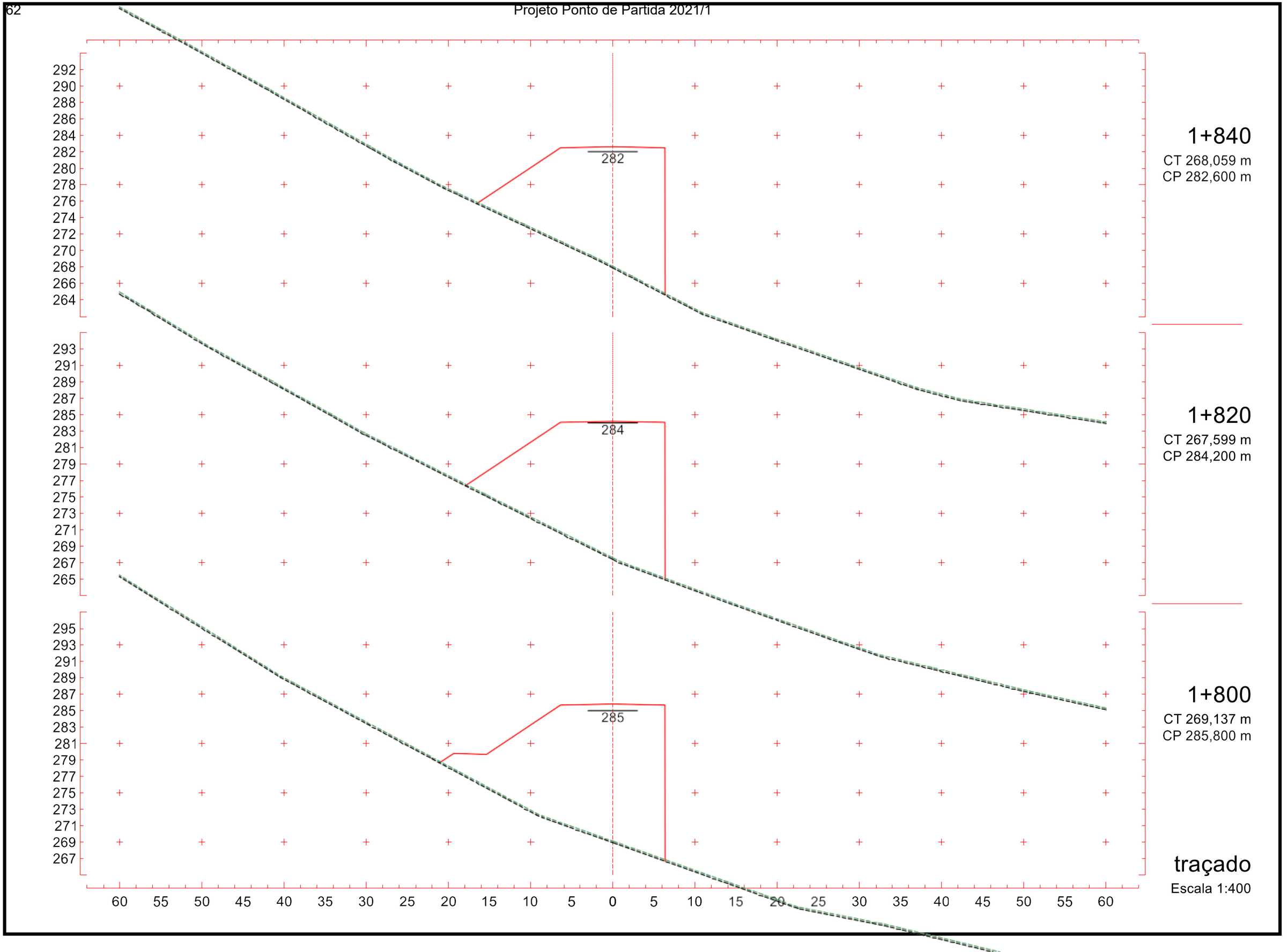

1+600
CT 337,380 m
CP 301,800 m
301
1+580
CT 341,593 m
CP 303,400 m
303
1+560
CT 341,653 m
CP 305,000 m
304
traçado
Escala 1:400


318
316
314
312
310
308
306
304
302
300
298
296
294
292
290
296
1+660
CT 314,005 m
CP 297,000 m
320
318
316
314
312
310
308
306
304
302
300
298
296
294
292
298
1+640
CT 322,384 m
CP 298,600 m
324
322
320
318
316
314
312
310
308
306
304
302
300
298
296
300
1+620
CT 329,880 m
CP 300,200 m
traçado
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

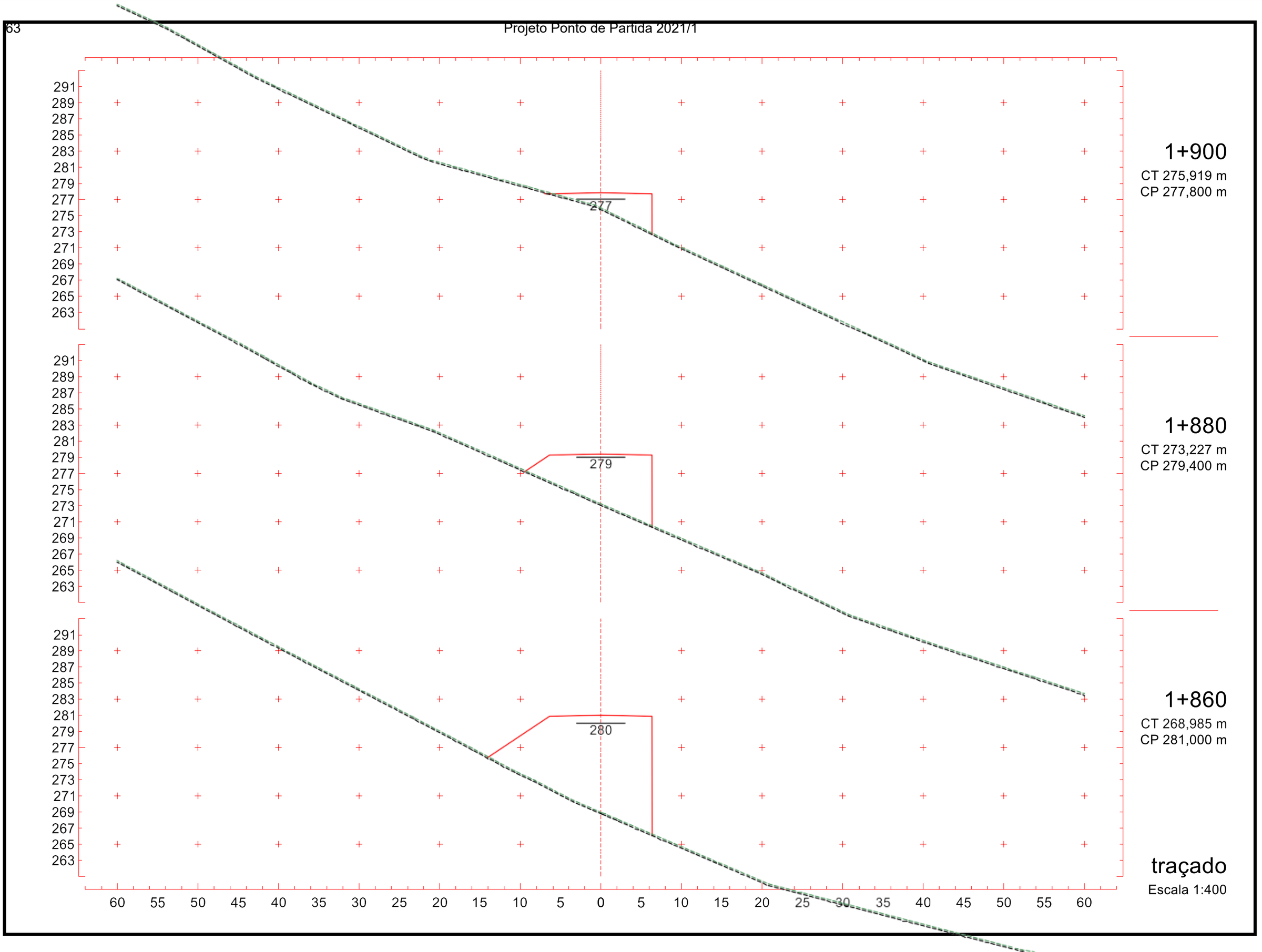

304
302
300
298
296
294
292
290
288
286
284
282
280
278
276
292
1+720
CT 289,622 m
CP 292,200 m
309
307
305
303
301
299
297
295
293
291
289
287
285
283
281
293
1+700
CT 297,093 m
CP 293,800 m
315
313
311
309
307
305
303
301
299
297
295
293
291
289
287
295
1+680
CT 305,098 m
CP 295,400 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1




292
290
288
286
284
282
280
278
276
274
272
270
268
266
264
282
293
291
289
287
285
283
281
279
277
275
273
271
269
267
265
284
295
293
291
289
287
285
283
281
279
277
275
273
271
269
267
285
60 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+840
CT 268,059 m
CP 282,600 m
1+820
CT 267,599 m
CP 284,200 m
1+800
CT 269,137 m
CP 285,800 m
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

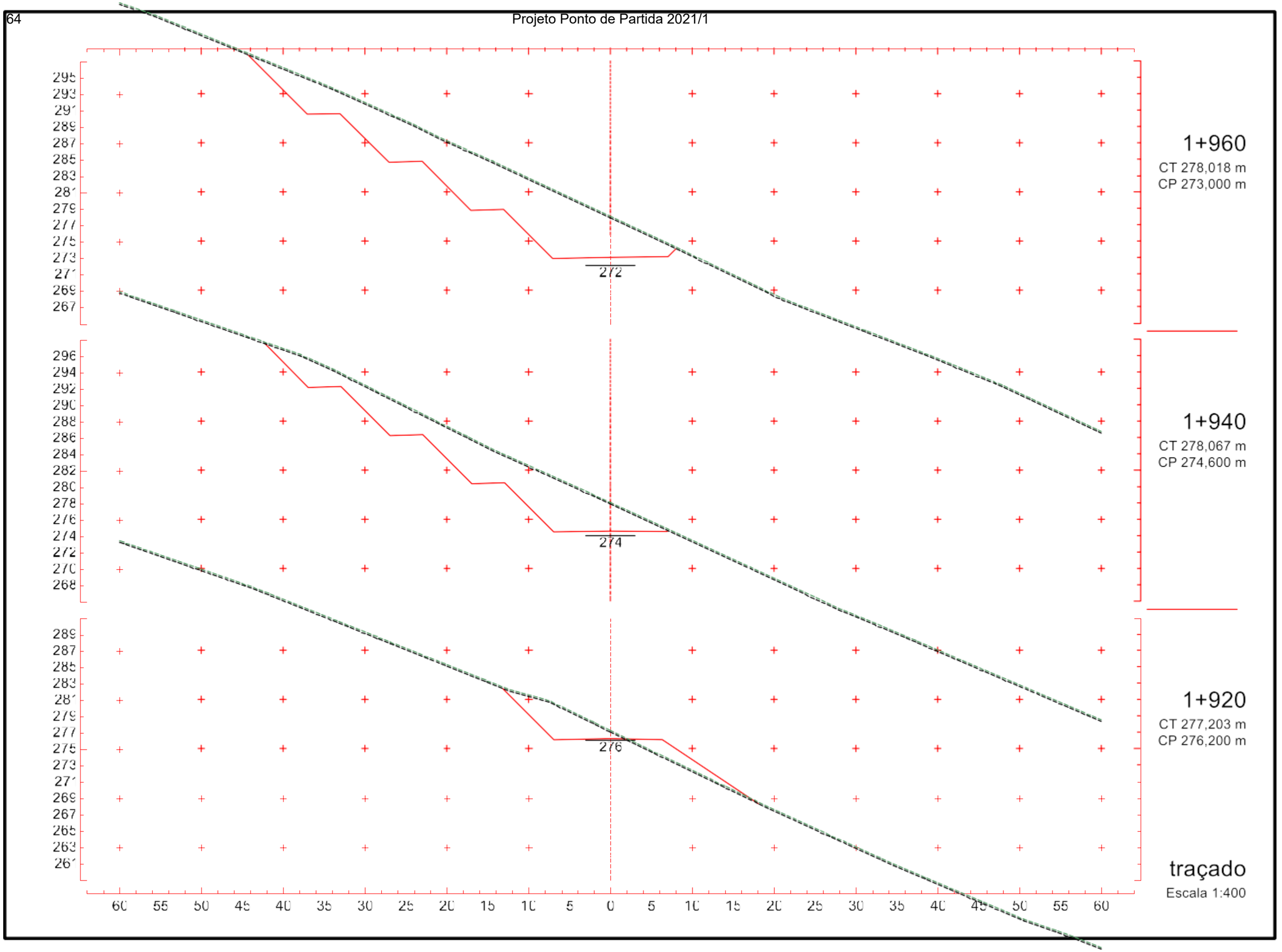


1+900
CT 275,919 m
CP 277,800 m

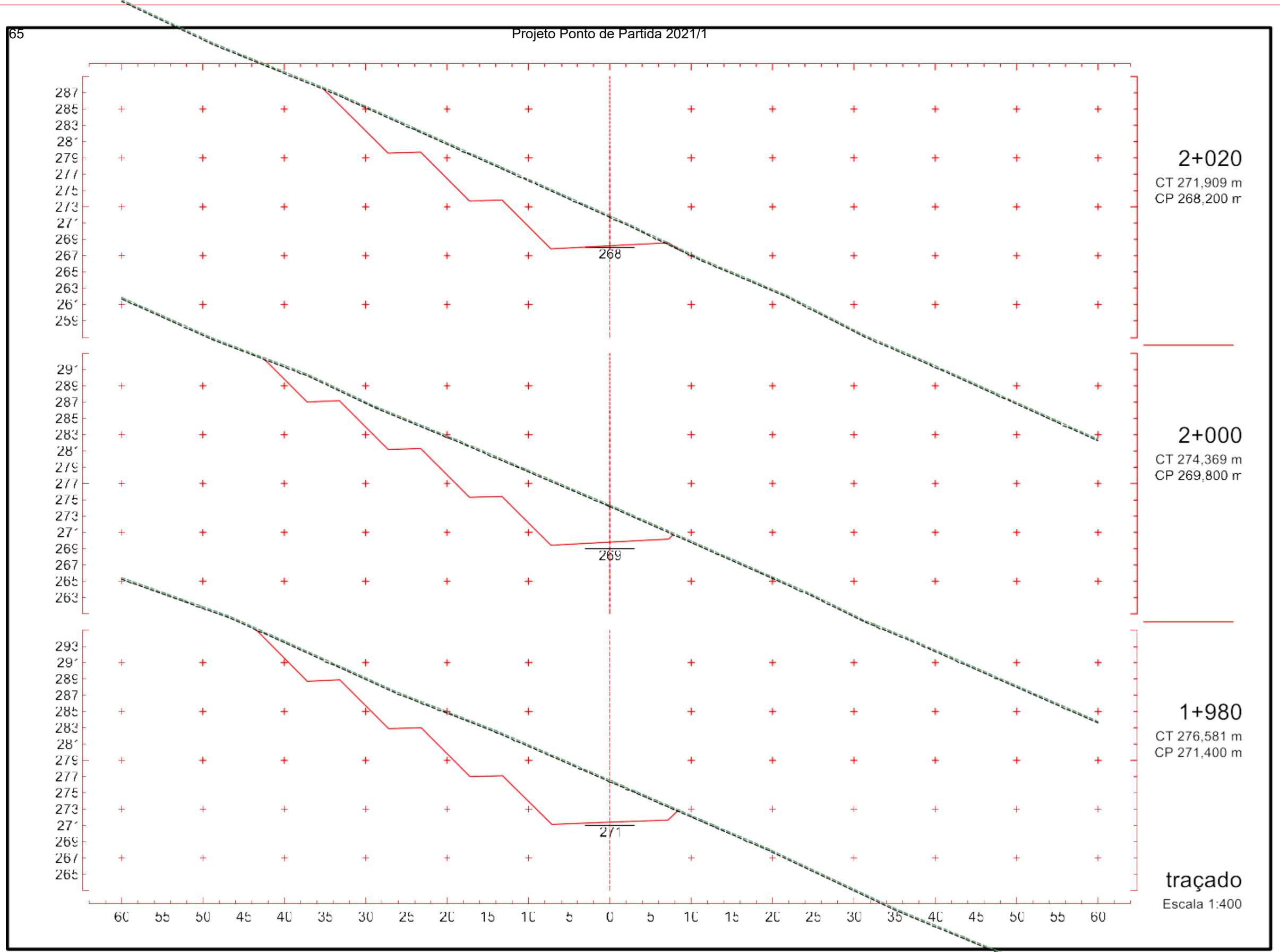
1+880
CT 273,227 m
CP 279,400 m

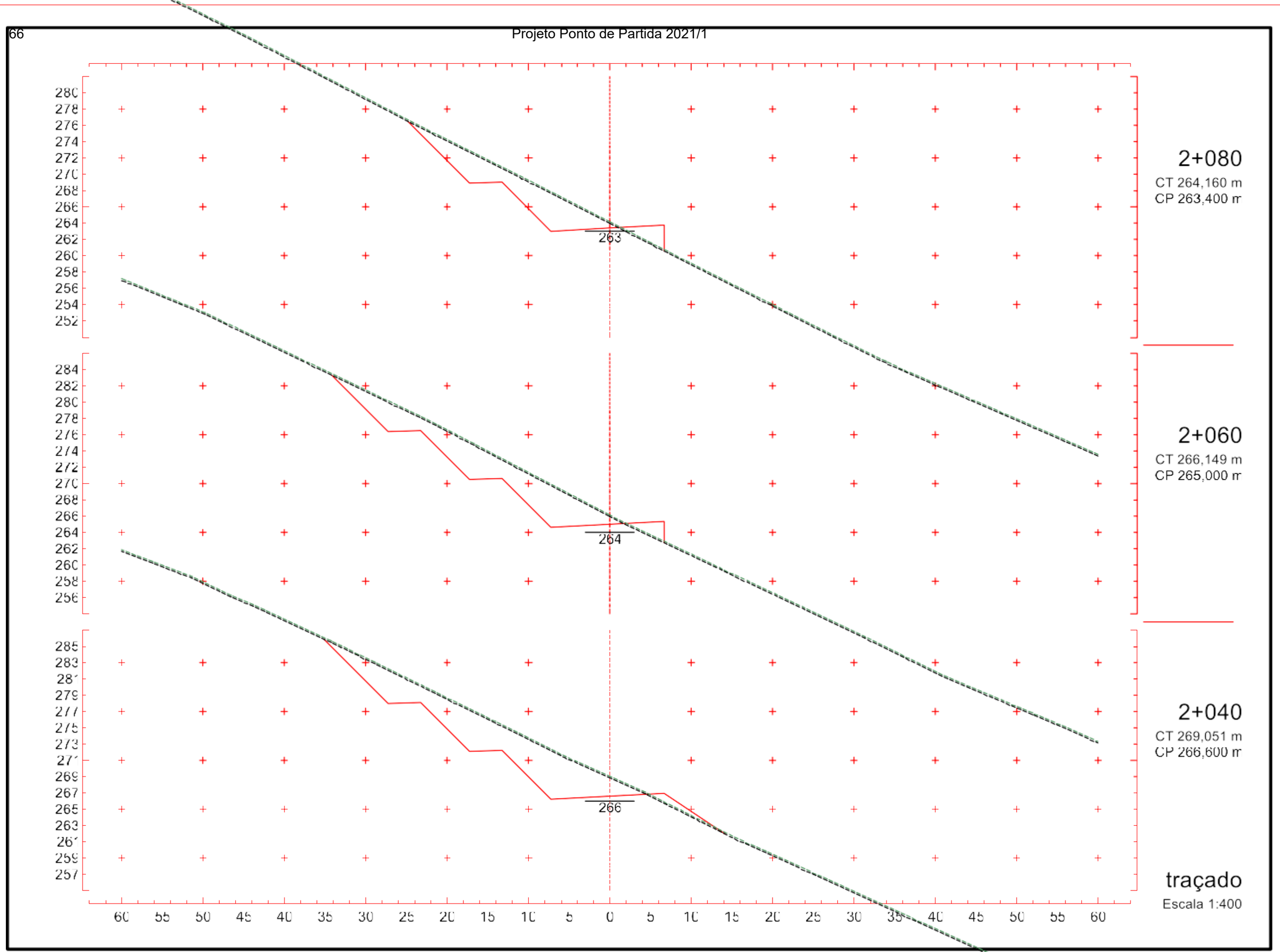
1+860
CT 268,985 m
CP 281,000 m

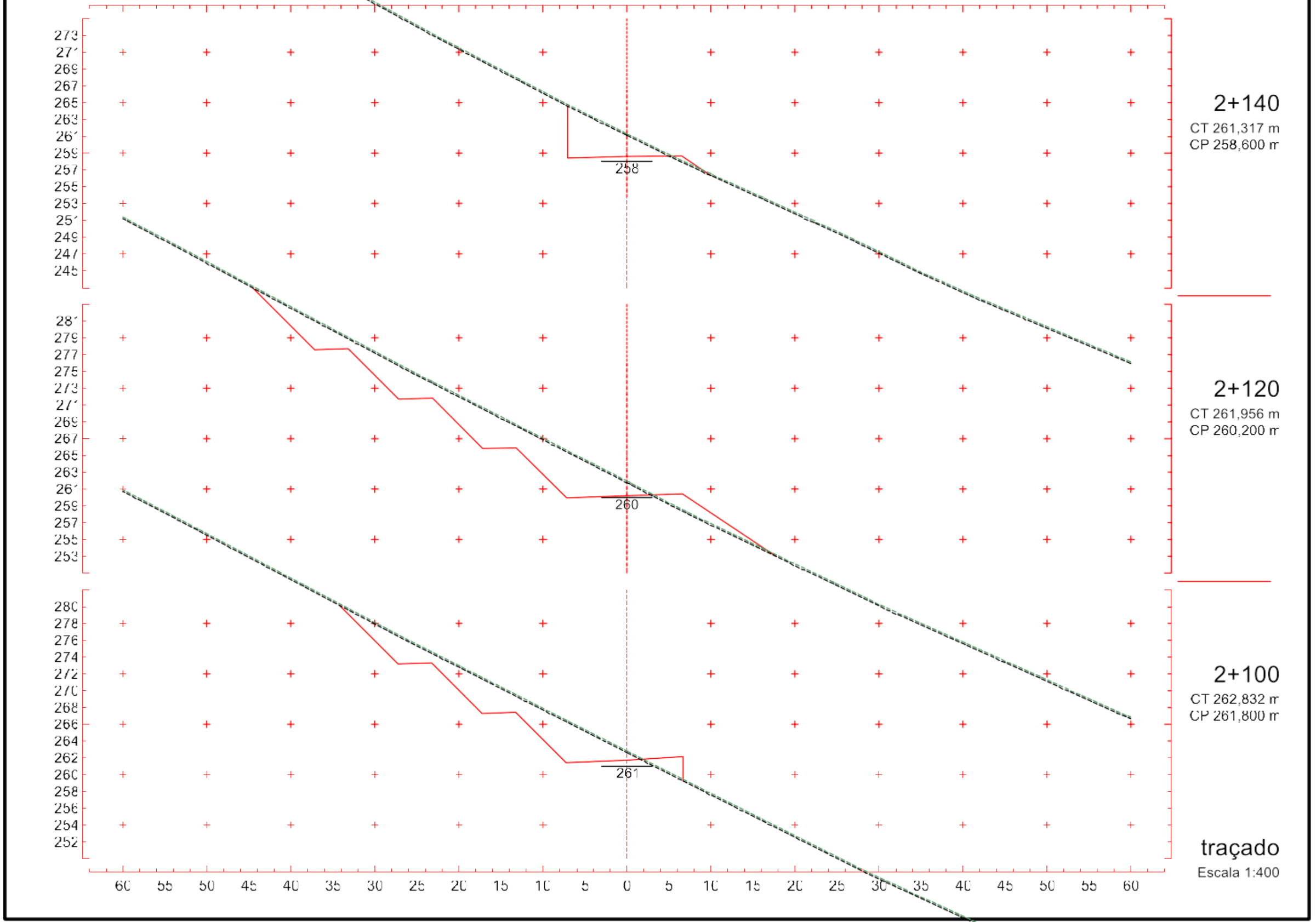
traçado
Escala 1:400


295
293
291
289
287
285
283
281
279
277
275
273
271
269
267
272
1+960
CT 278,018 m
CP 273,000 m
296
294
292
290
288
286
284
282
280
278
276
274
272
270
268
274
1+940
CT 278,067 m
CP 274,600 m
289
287
285
283
281
279
277
275
273
271
269
267
265
263
261
276
1+920
CT 277,203 m
CP 276,200 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
traçado
Escala 1:400

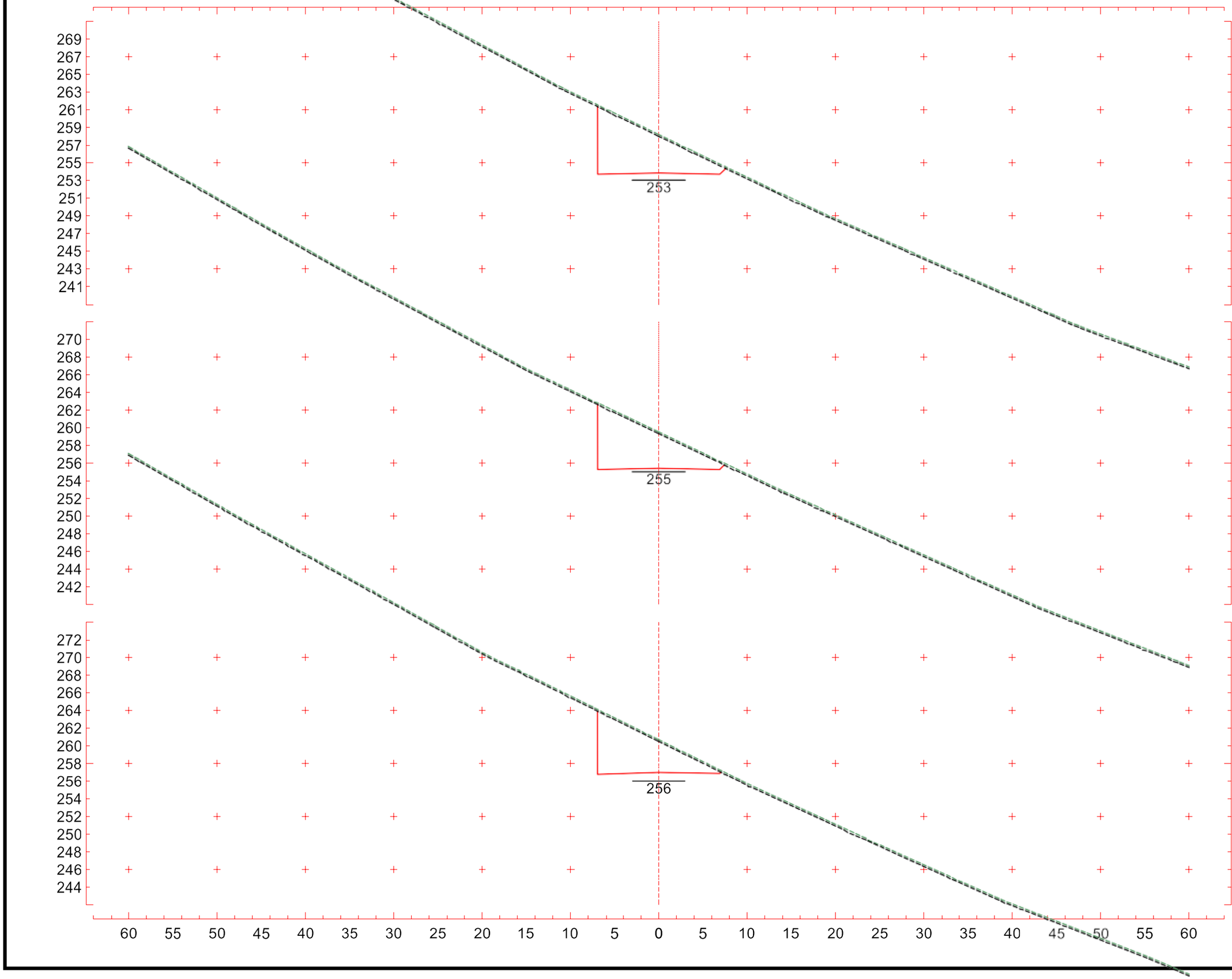
Projeto Ponto de Partida 2021/1




280
278
276
274
272
270
268
266
264
262
260
258
256
254
252
263
2+080
CT 264,160 m
CP 263,400 m
284
282
280
278
276
274
272
270
268
266
264
262
260
258
256
264
2+060
CT 266,149 m
CP 265,000 m
285
283
281
279
277
275
273
271
269
267
265
263
261
259
257
266
2+040
CT 269,051 m
CP 266,600 m
traçado
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


273
271
269
267
265
263
261
259
257
255
253
251
249
247
245
258
2+140
CT 261,317 m
CP 258,600 m
281
279
277
275
273
271
269
267
265
263
261
259
257
255
253
260
2+120
CT 261,956 m
CP 260,200 m
280
278
276
274
272
270
268
266
264
262
260
258
256
254
252
261
2+100
CT 262,832 m
CP 261,800 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
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1



2+200

CT 258,156 m
CP 253,800 m

2+180

CT 259,515 m
CP 255,400 m

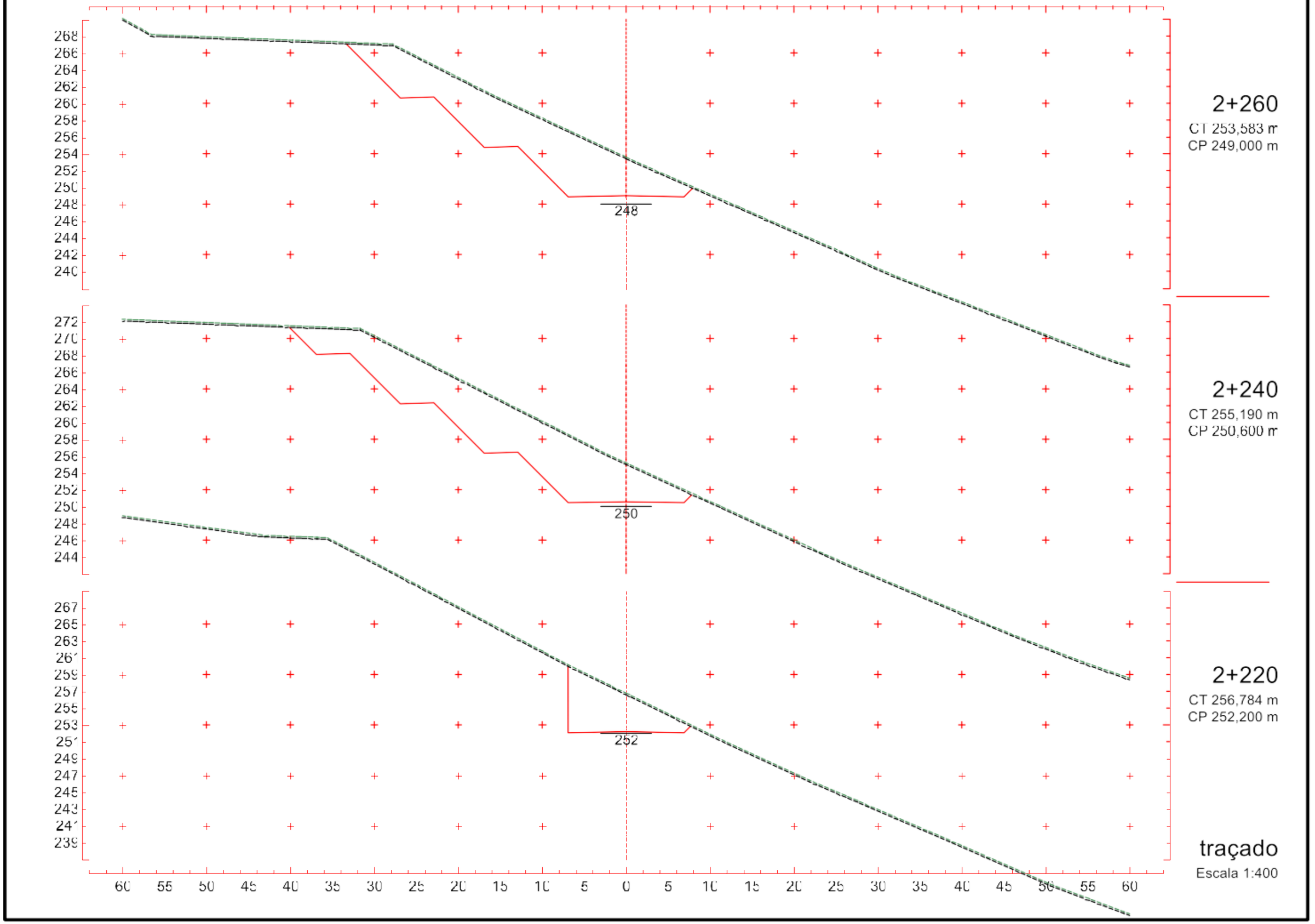
2+160

CT 260,702 m
CP 257,000 m

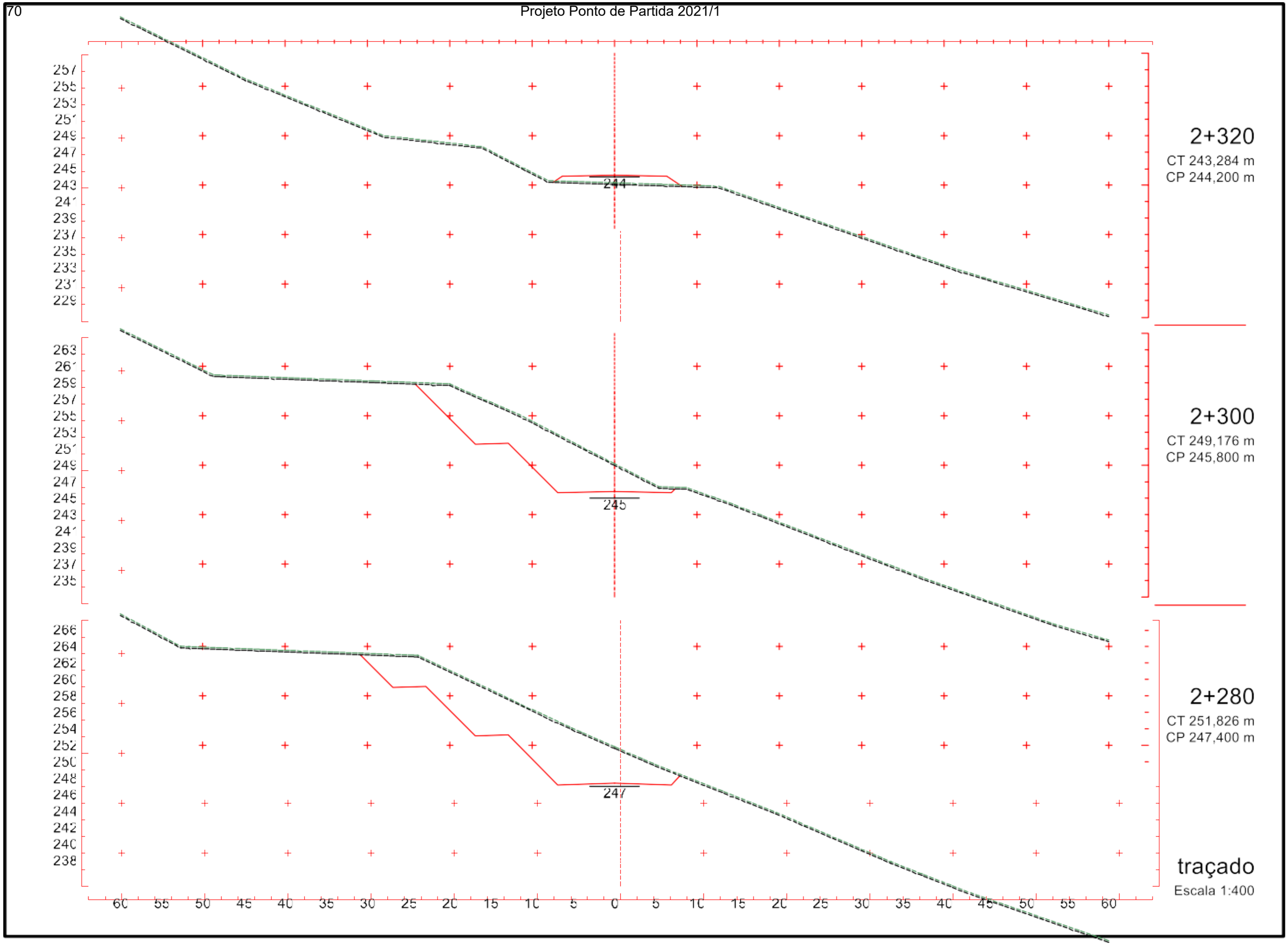
traçado

Escala 1:400

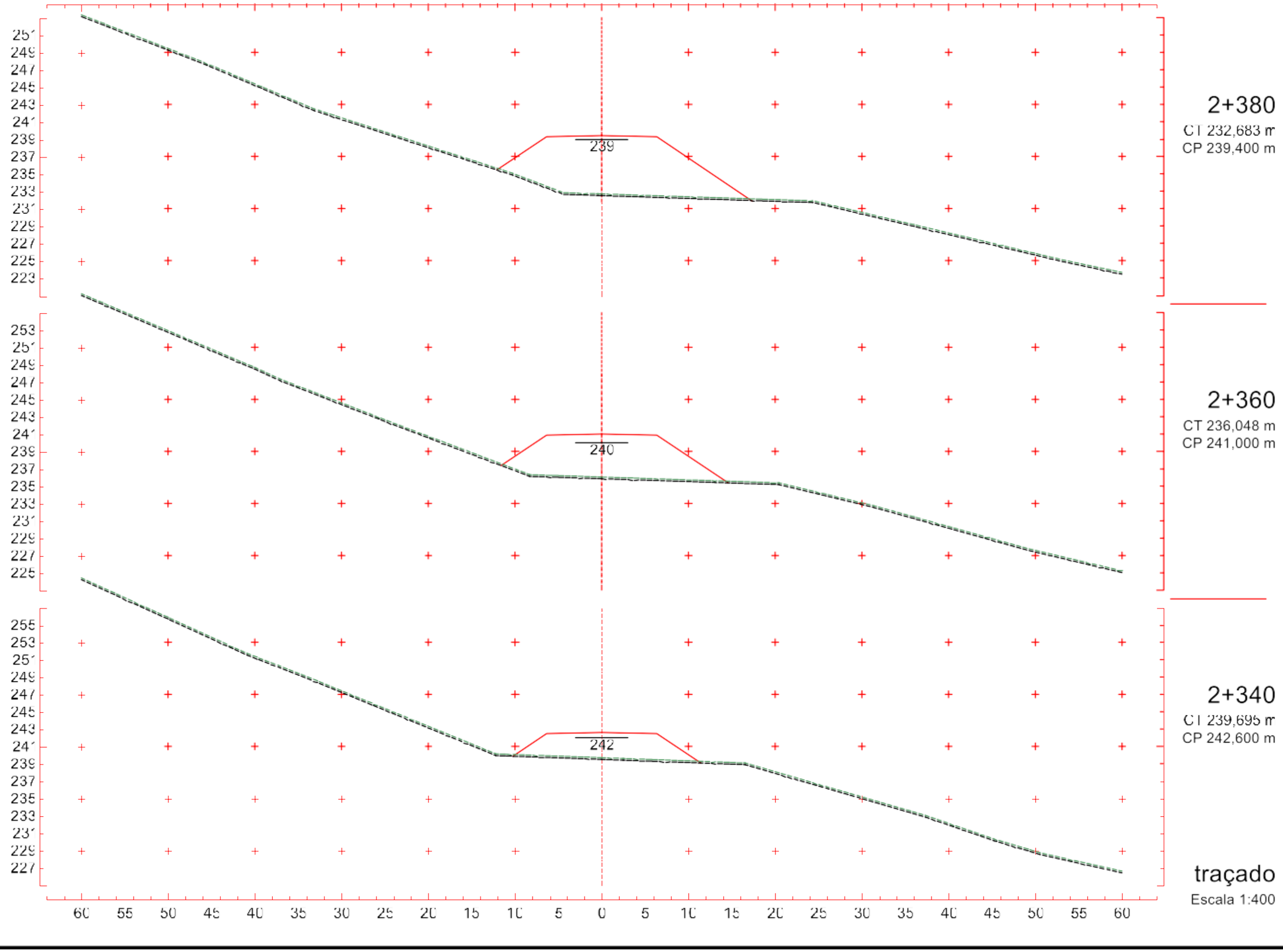
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1

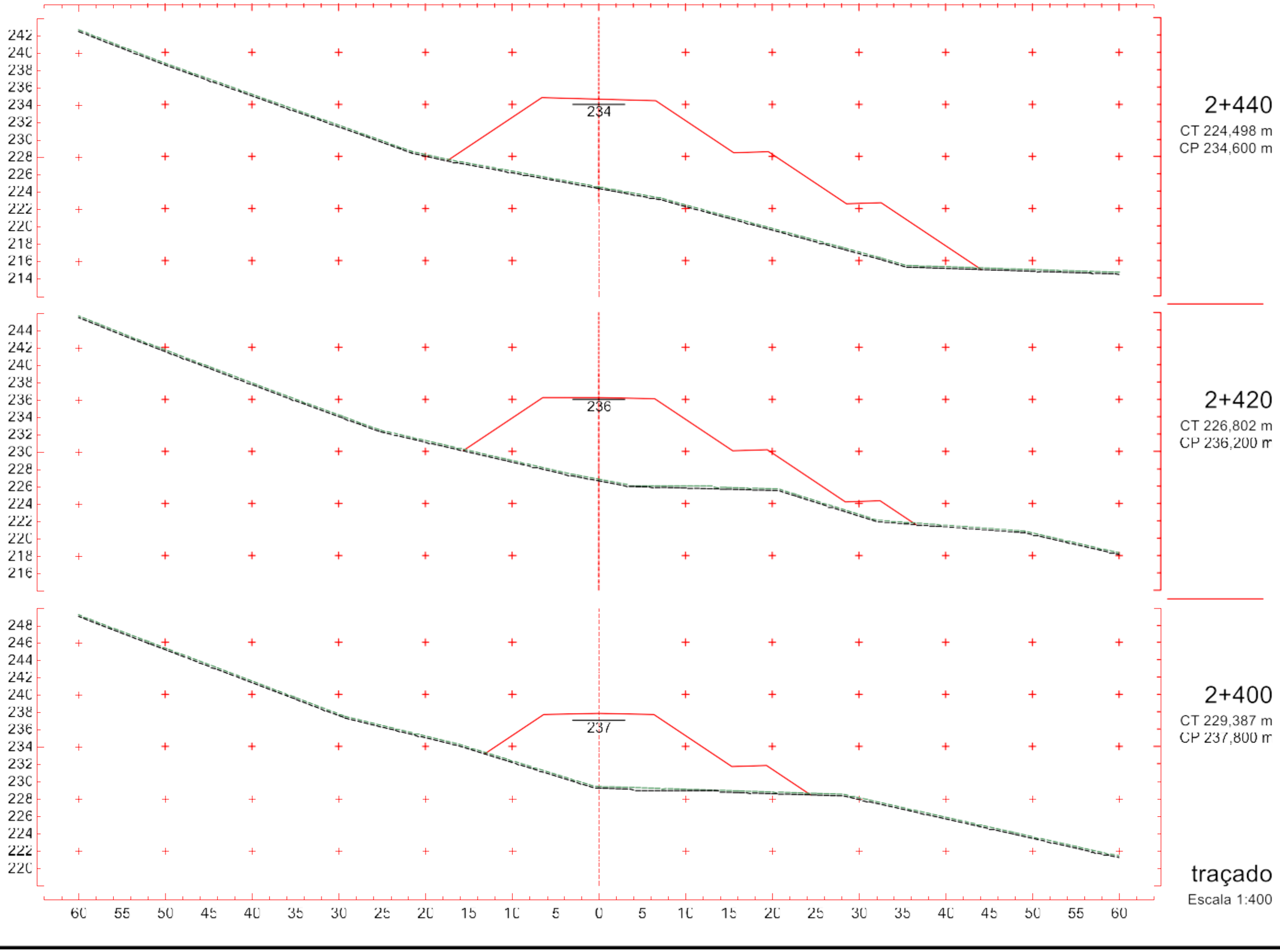


2+380
CT 232,683 m
CP 239,400 m

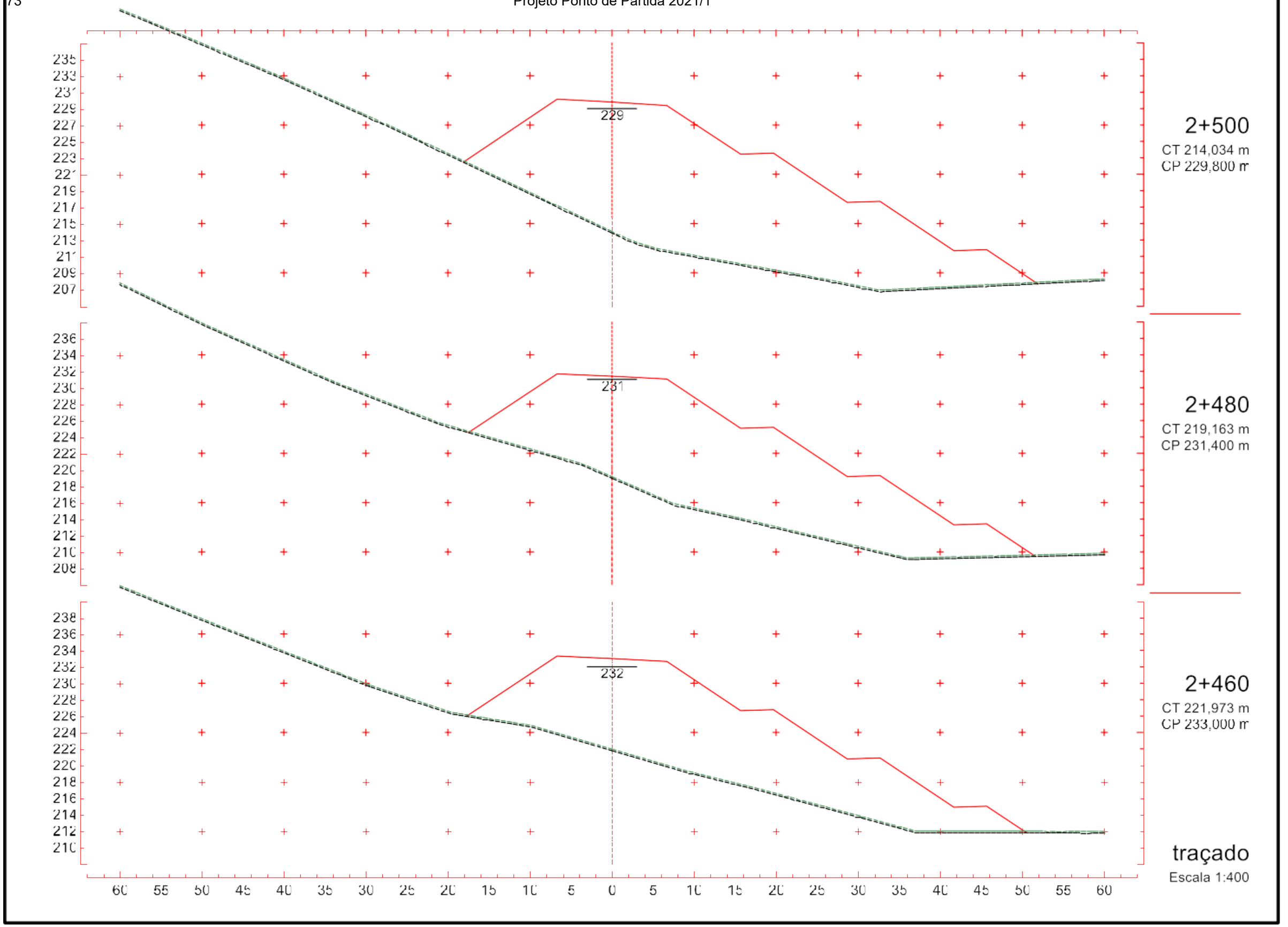
2+360
CT 236,048 m
CP 241,000 m

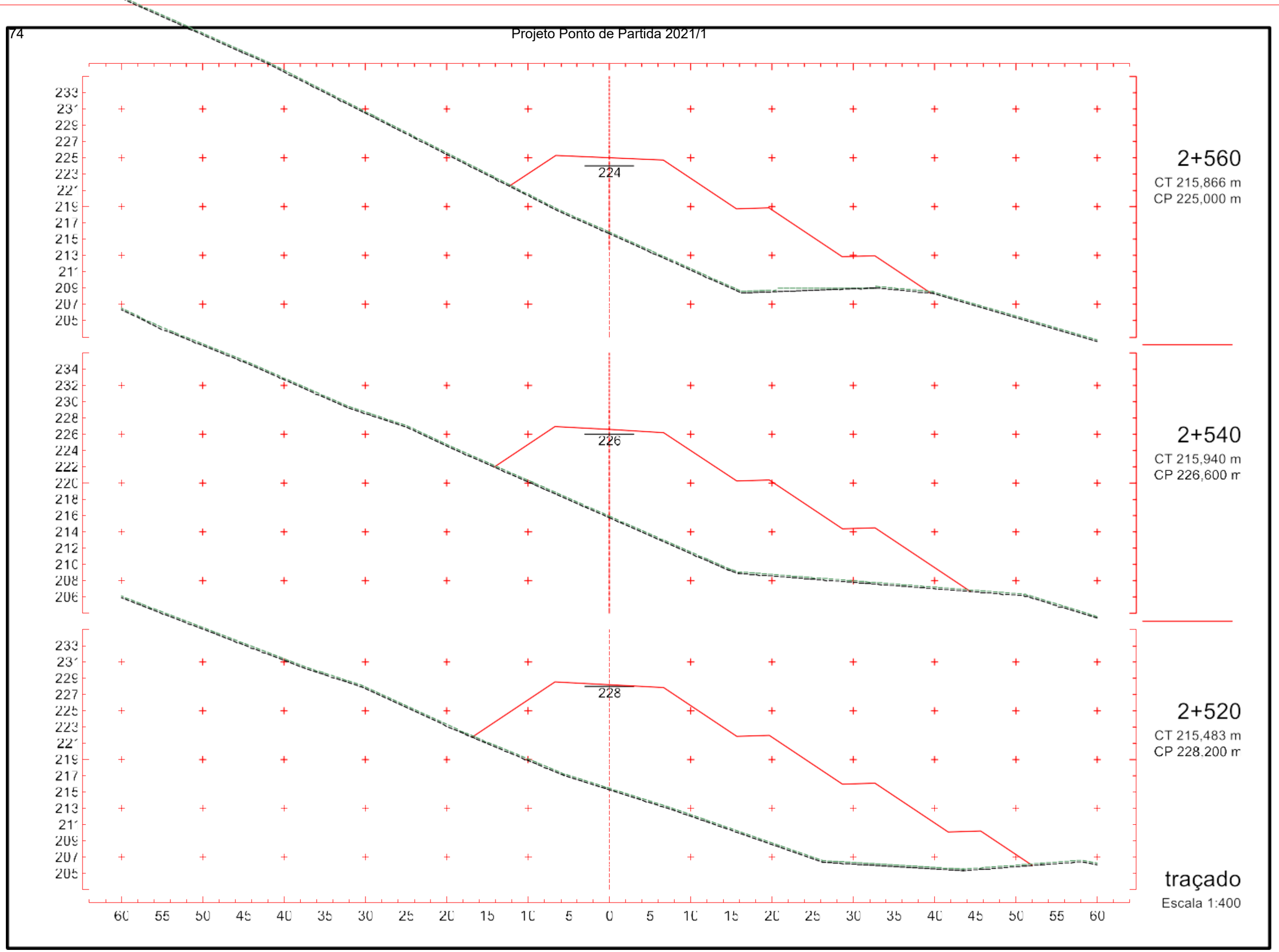
2+340
CT 239,695 m
CP 242,600 m

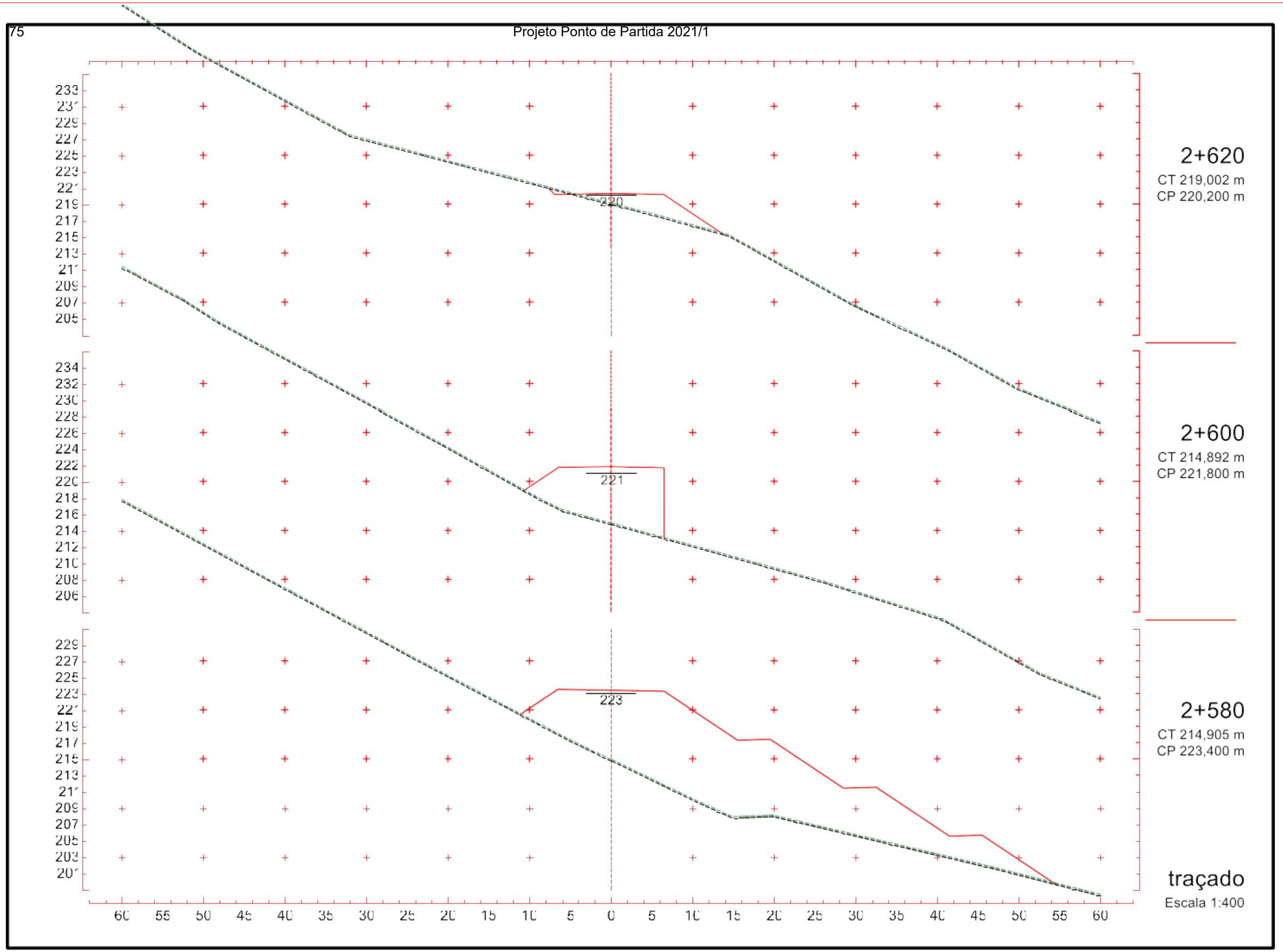
traçado
Escala 1:400


242
240
238
236
234
232
230
228
226
224
222
220
218
216
214
234
2+440
CT 224,498 m
CP 234,600 m
244
242
240
238
236
234
232
230
228
226
224
222
220
218
216
236
2+420
CT 226,802 m
CP 236,200 m
248
246
244
242
240
238
236
234
232
230
228
226
224
222
220
237
2+400
CT 229,387 m
CP 237,800 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
traçado
Escala 1:400

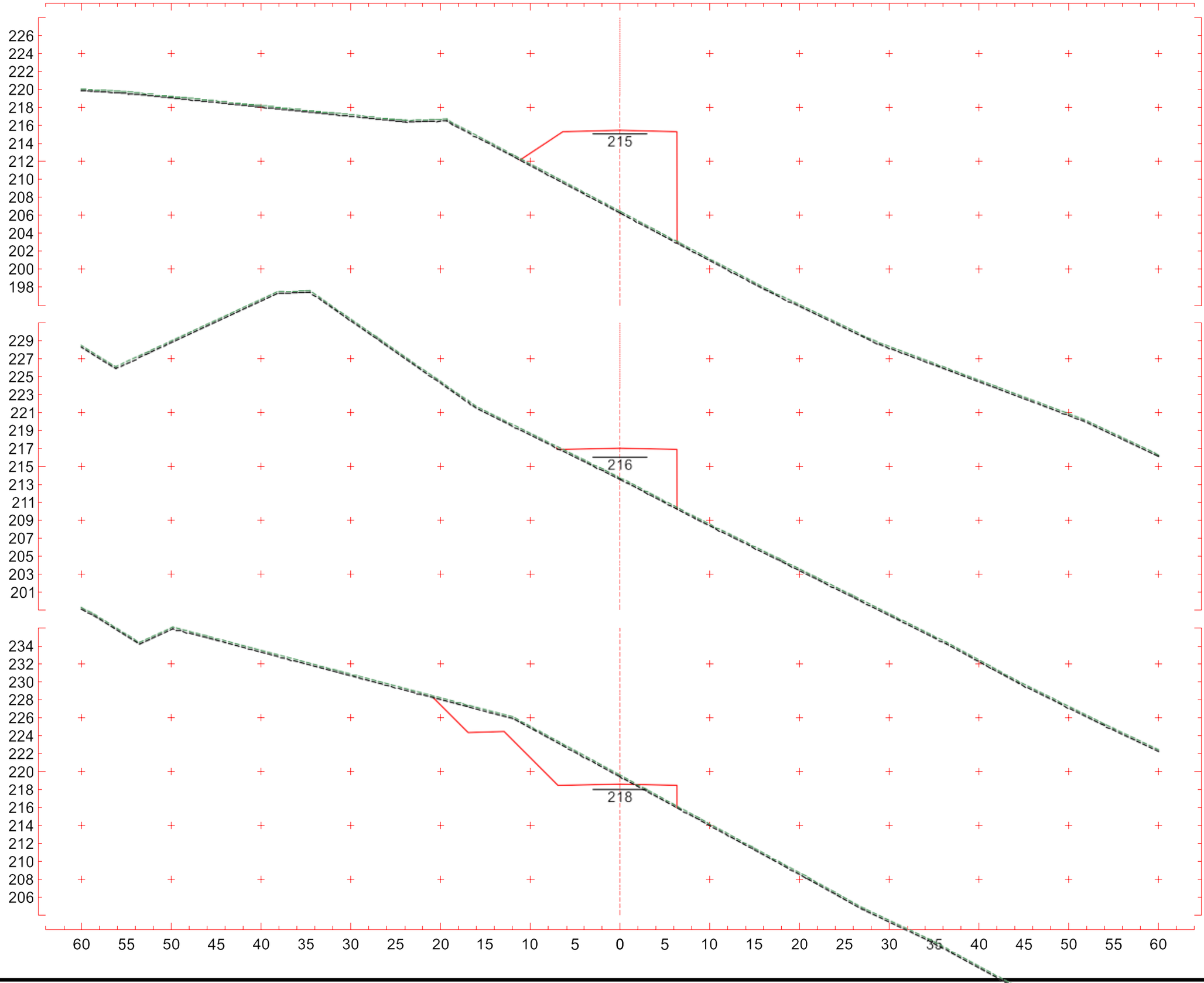
Projeto Ponto de Partida 2021/1




233
231
229
227
225
223
221
219
217
215
213
211
209
207
205
224
2+560
CT 215,866 m
CP 225,000 m
234
232
230
228
226
224
222
220
218
216
214
212
210
208
206
226
2+540
CT 215,940 m
CP 226,600 m
233
231
229
227
225
223
221
219
217
215
213
211
209
207
205
228
2+520
CT 215,483 m
CP 228,200 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
traçado
Escala 1:400


233
231
229
227
225
223
221
219
217
215
213
211
209
207
205
220
2+620
CT 219,002 m
CP 220,200 m
234
232
230
228
226
224
222
220
218
216
214
212
210
208
206
221
2+600
CT 214,892 m
CP 221,800 m
229
227
225
223
221
219
217
215
213
211
209
207
205
203
201
223
2+580
CT 214,905 m
CP 223,400 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
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1



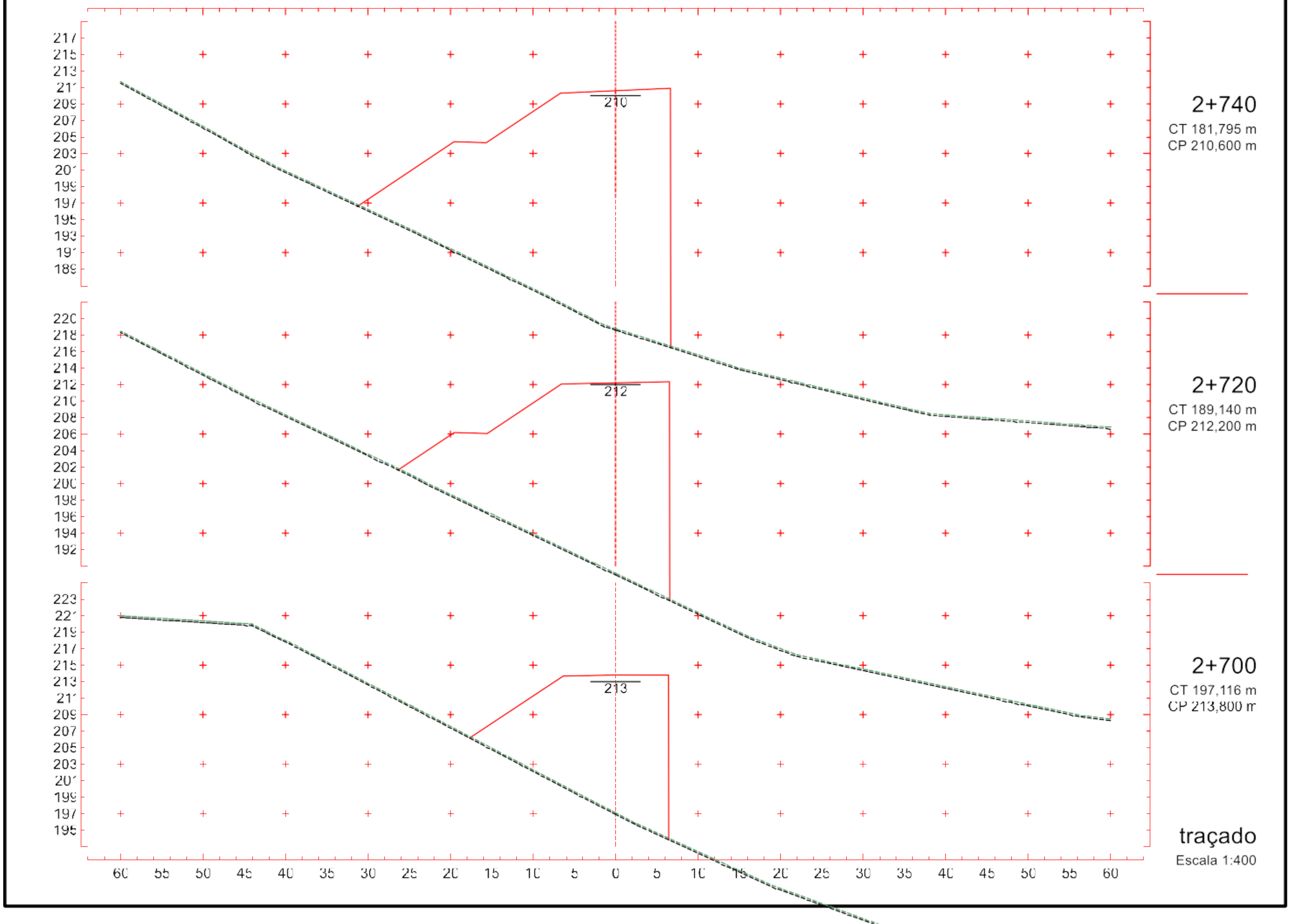
2+680
CT 206,390 m
CP 215,400 m

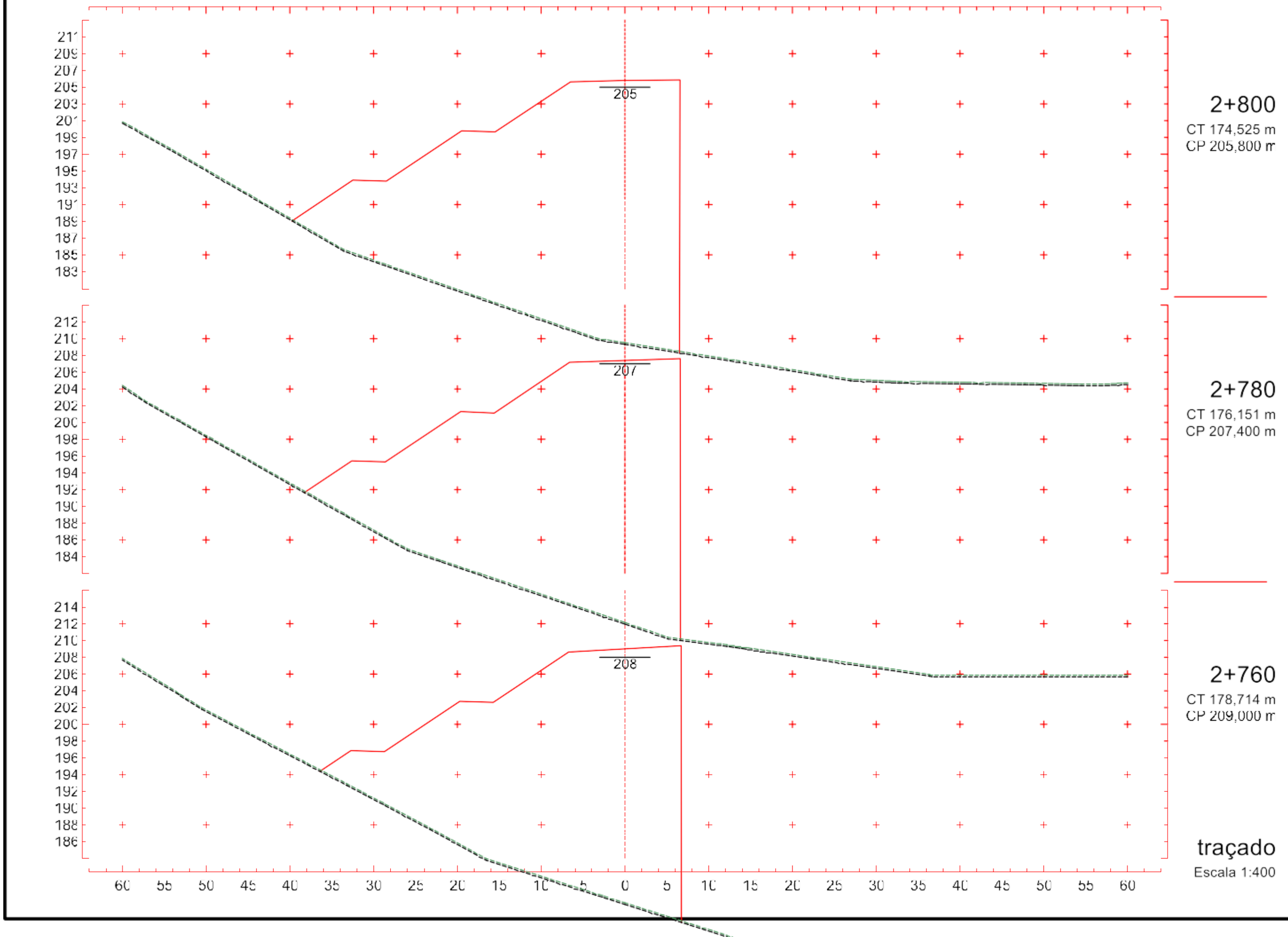
2+660
CT 213,736 m
CP 217,000 m

2+640
CT 219,623 m
CP 218,600 m

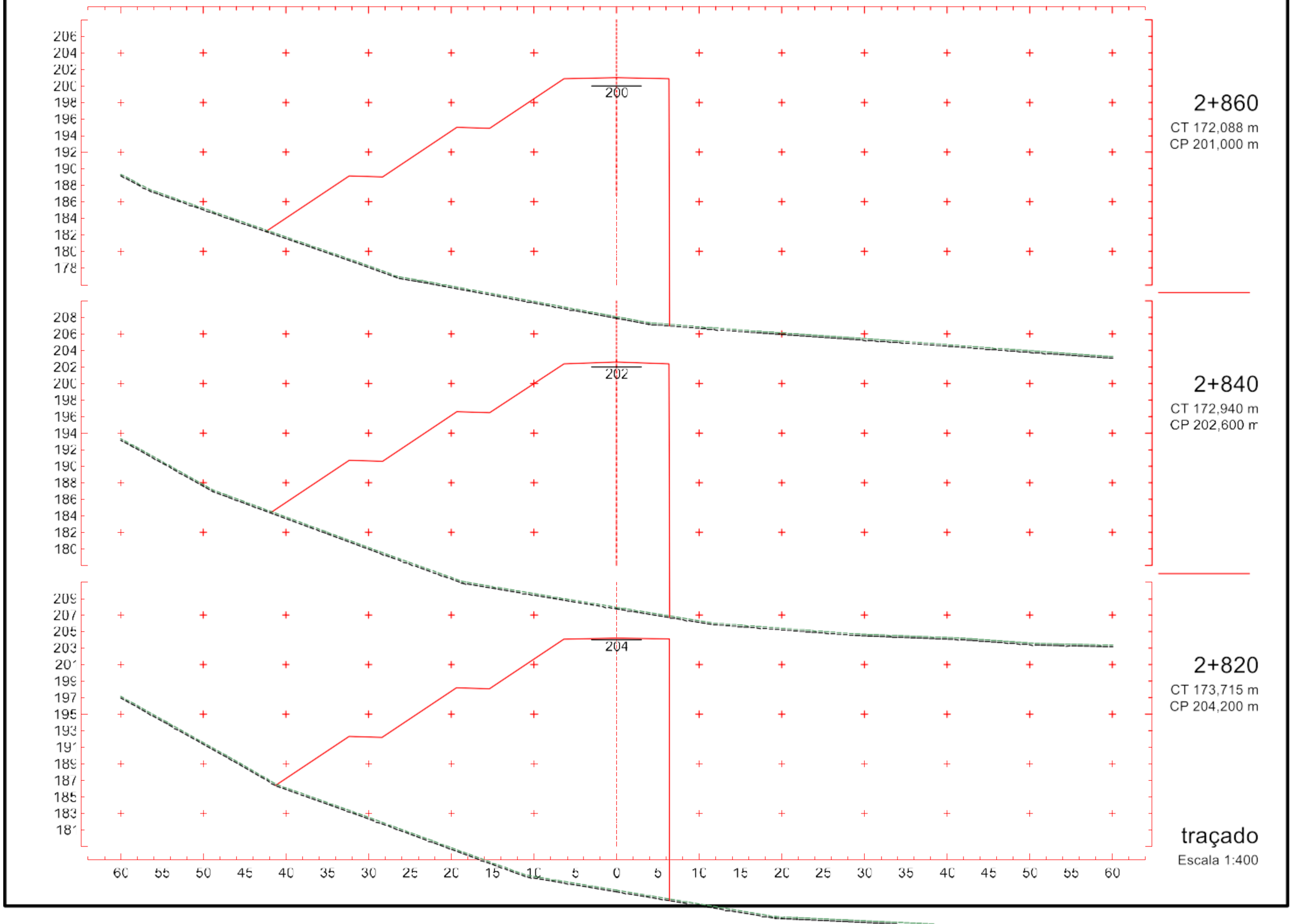
traçado
Escala 1:400

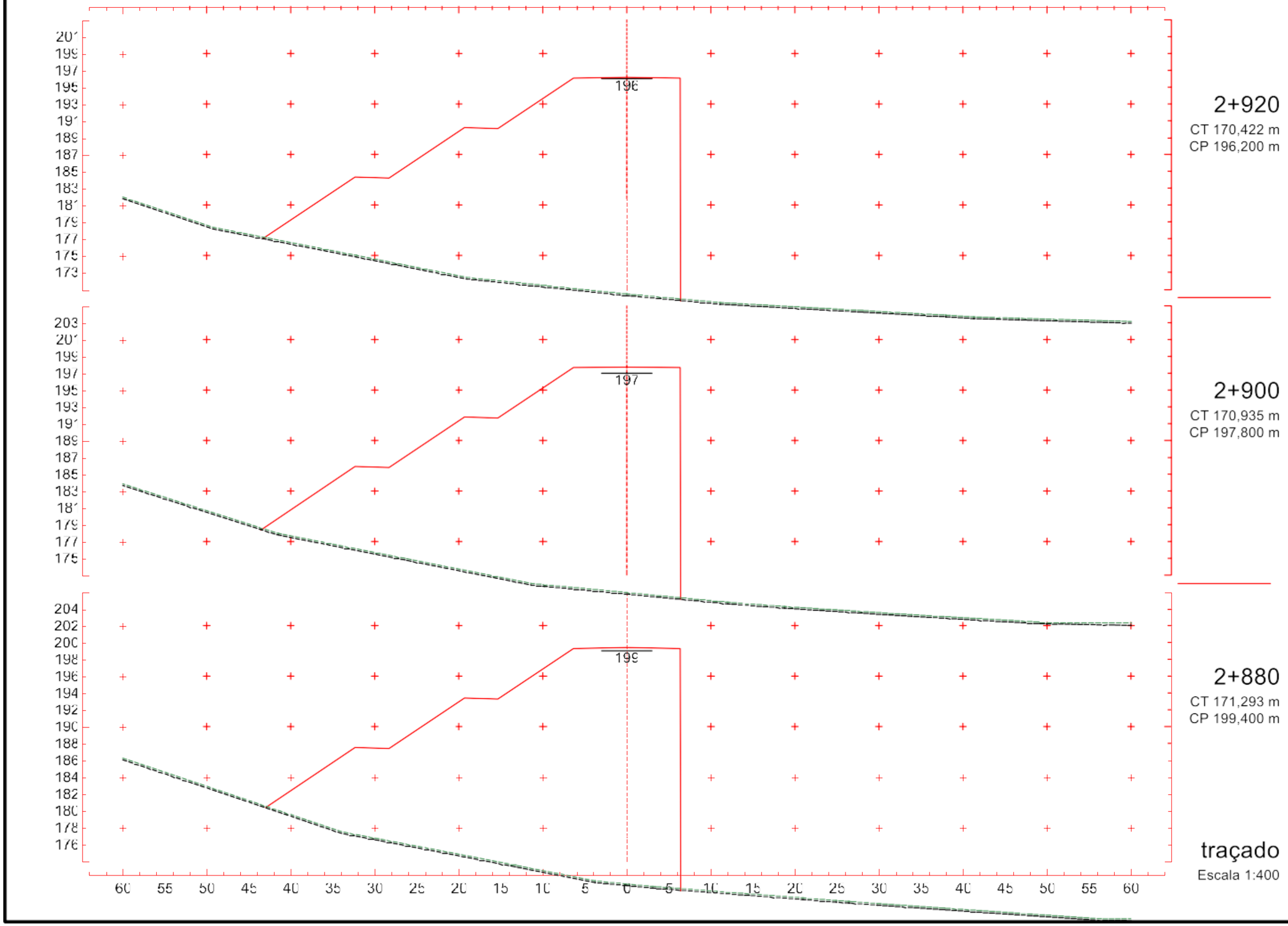
Projeto Ponto de Partida 2021/1



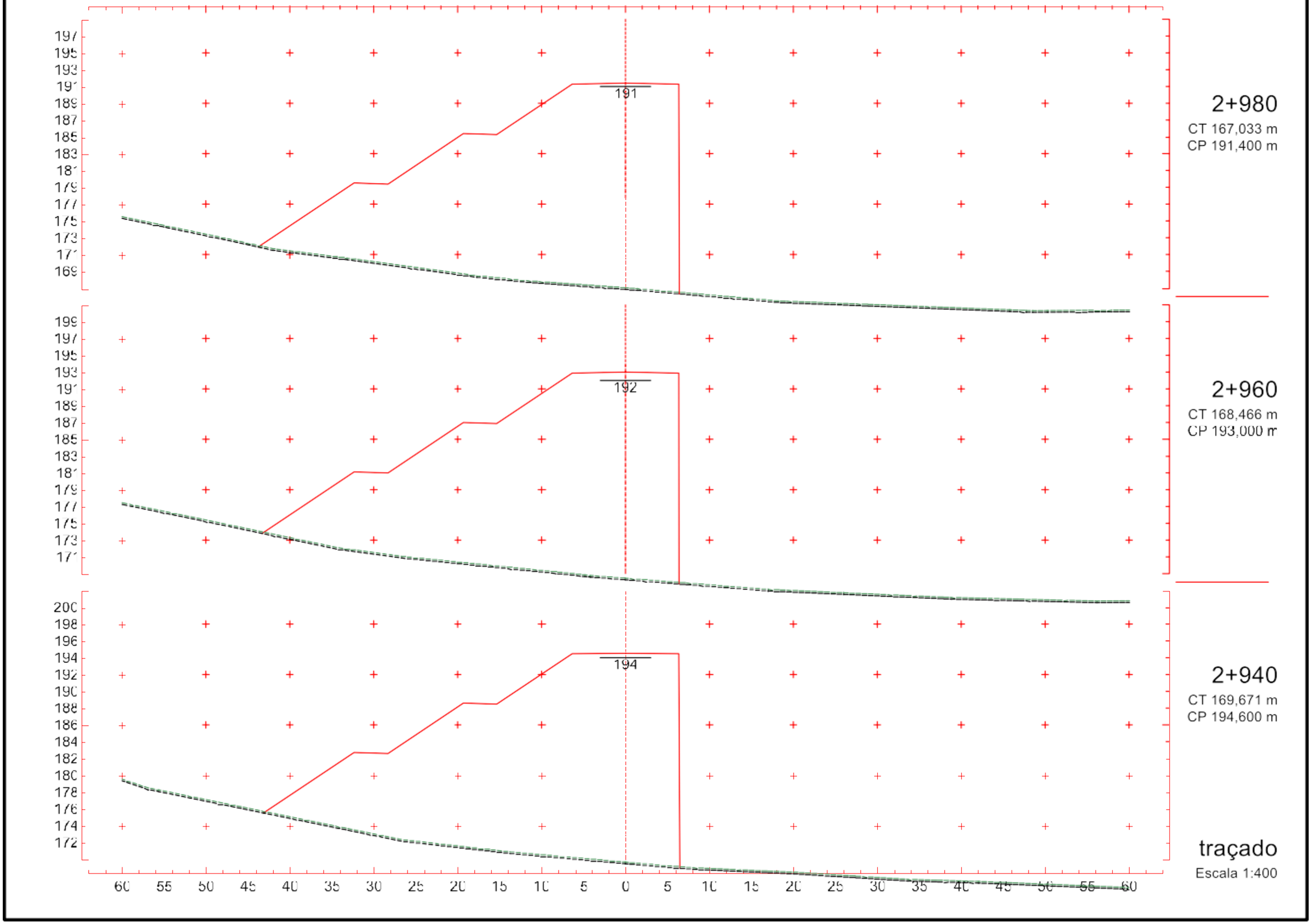

205
207
208
2+800
CT 174,525 m
CP 205,800 m
2+780
CT 176,151 m
CP 207,400 m
2+760
CT 178,714 m
CP 209,000 m
traçado
Escala 1:400

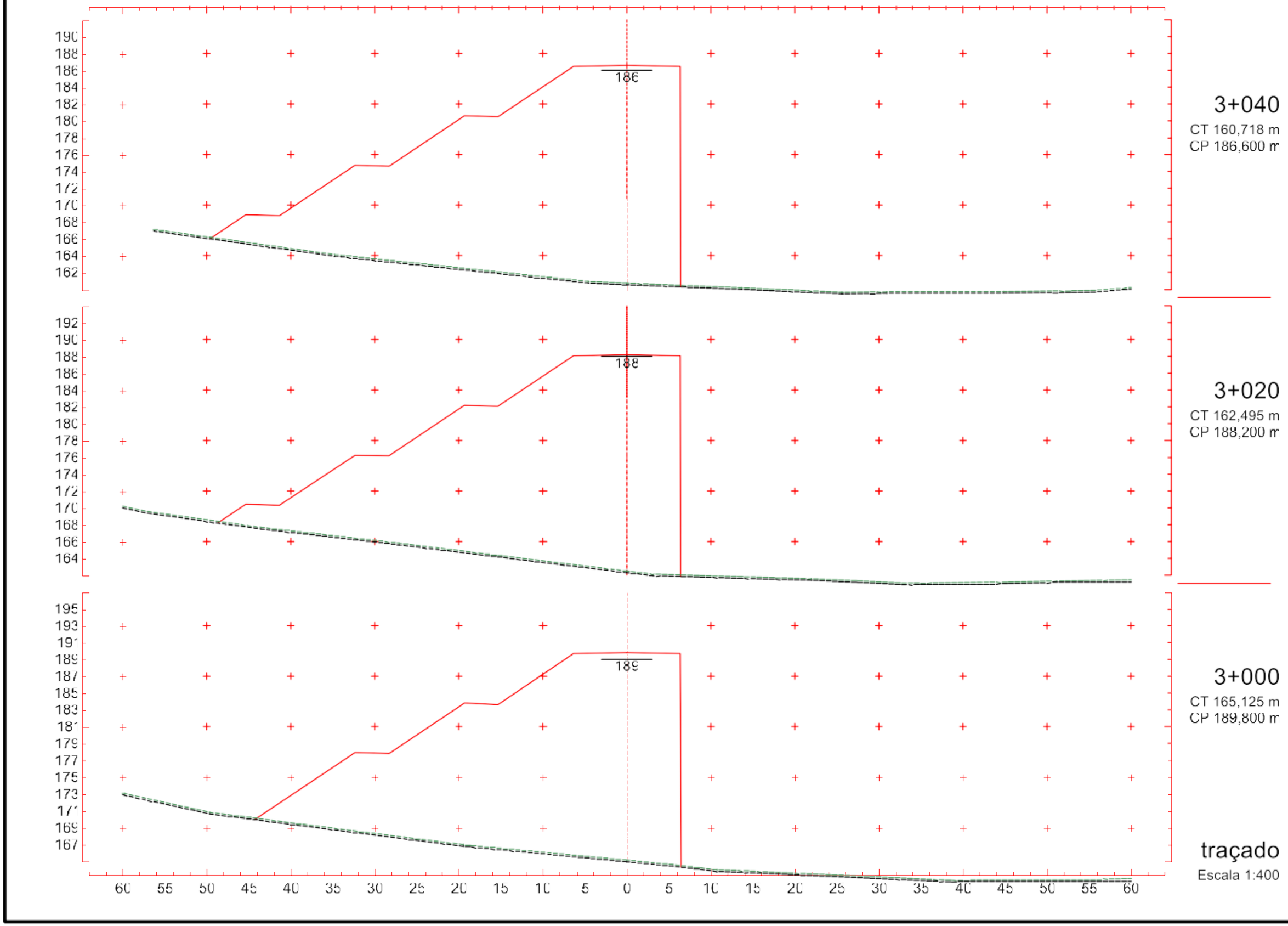
Projeto Ponto de Partida 2021/1

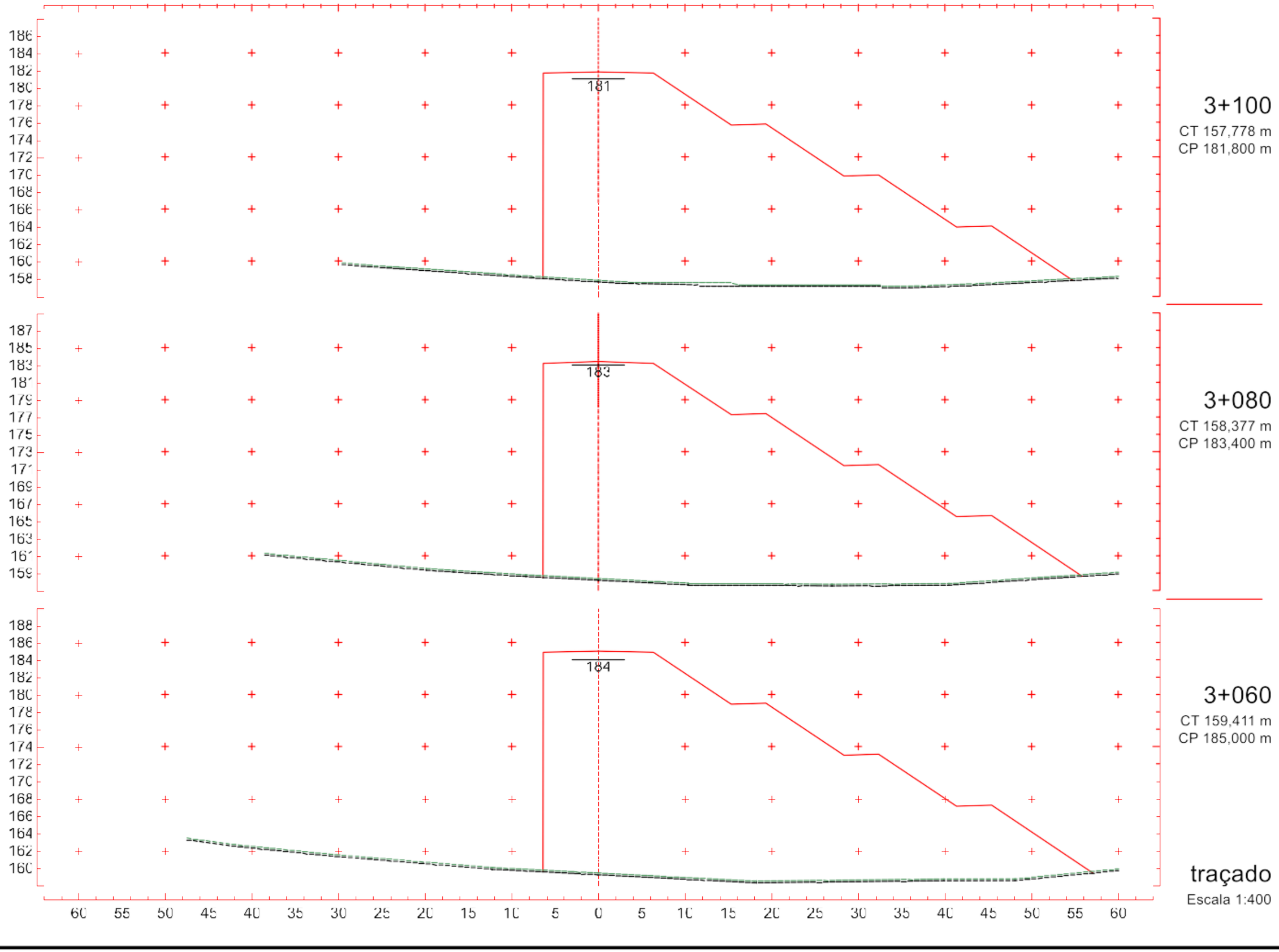


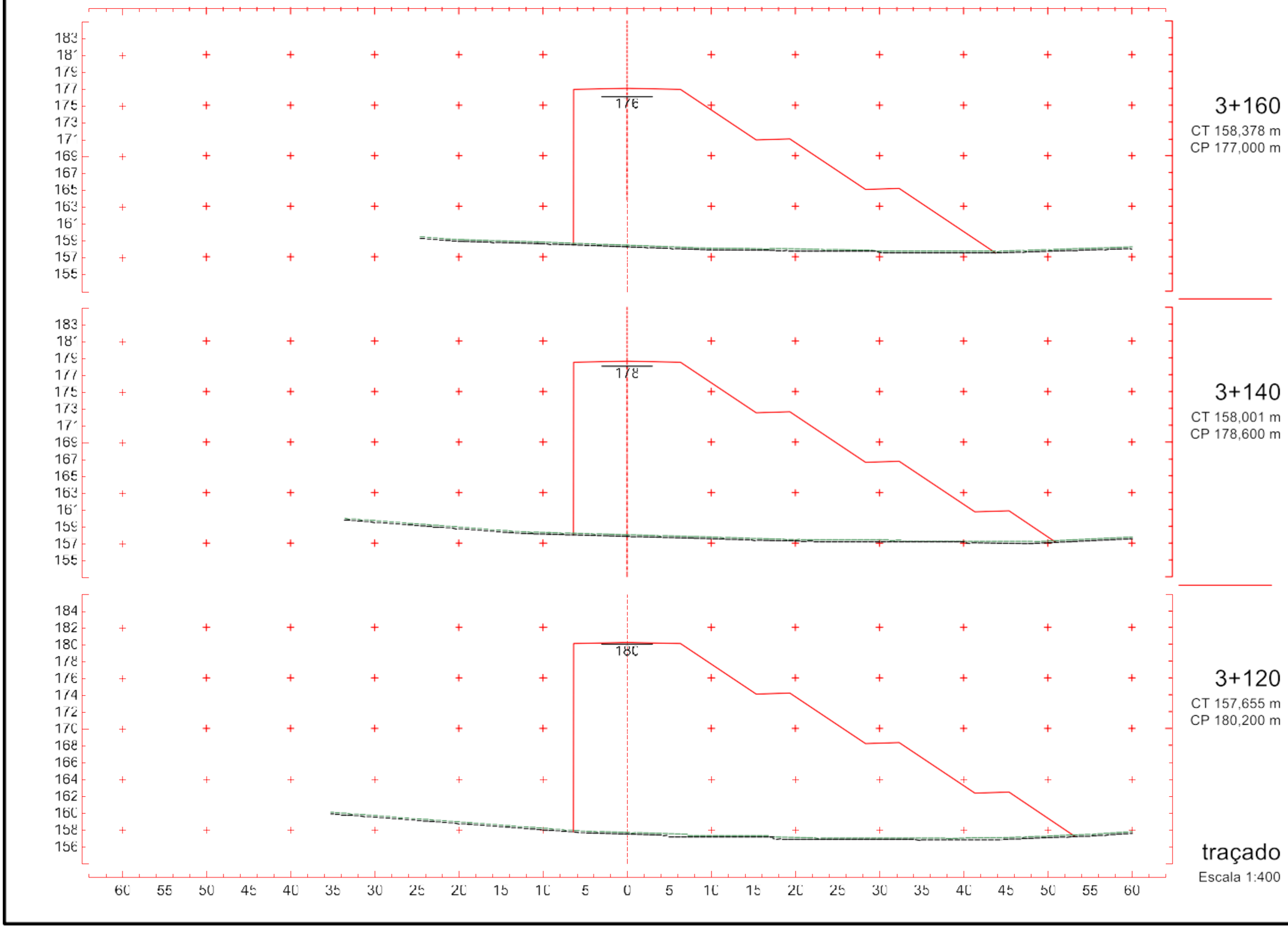

2+920
CT 170,422 m
CP 196,200 m
2+900
CT 170,935 m
CP 197,800 m
2+880
CT 171,293 m
CP 199,400 m
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

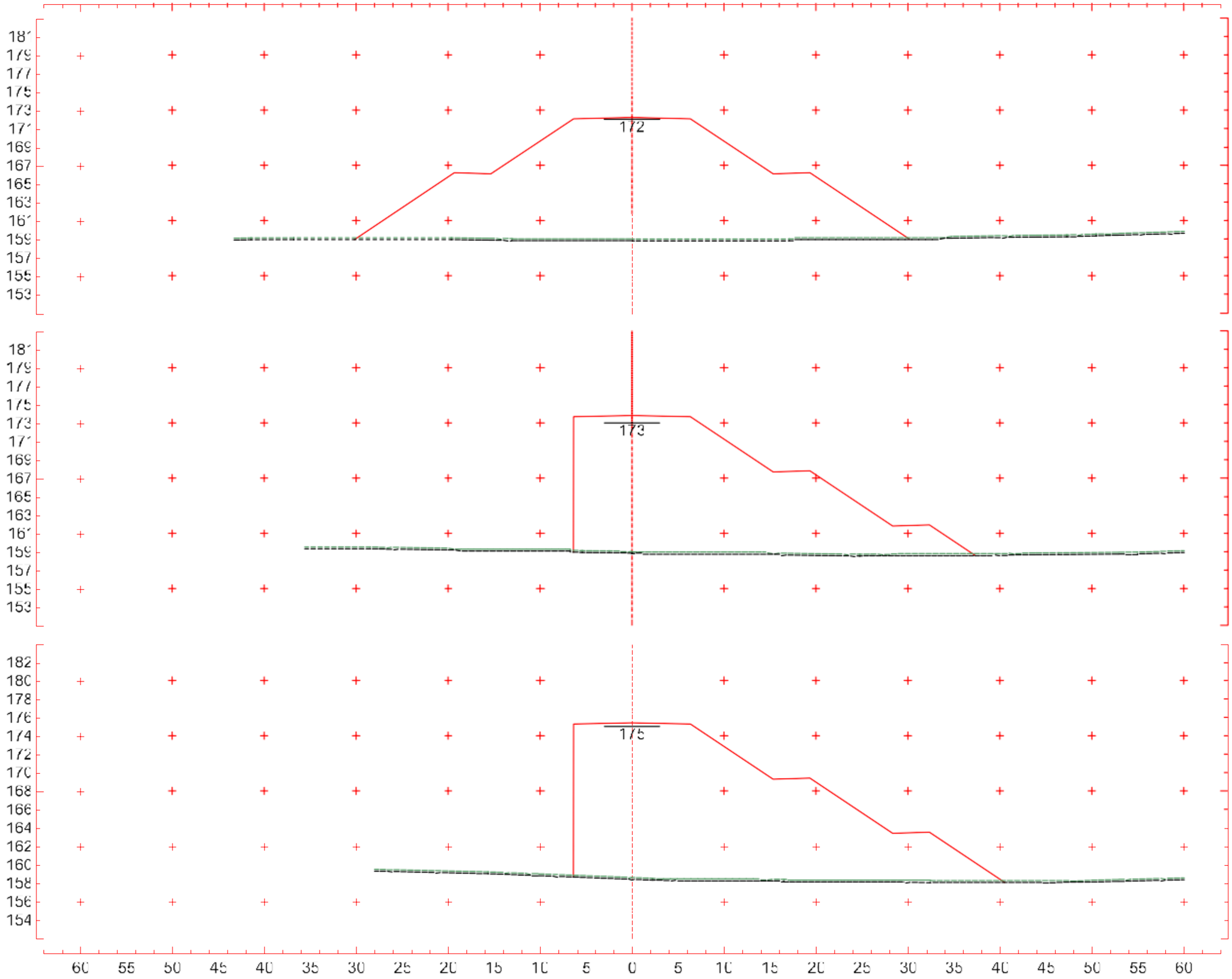


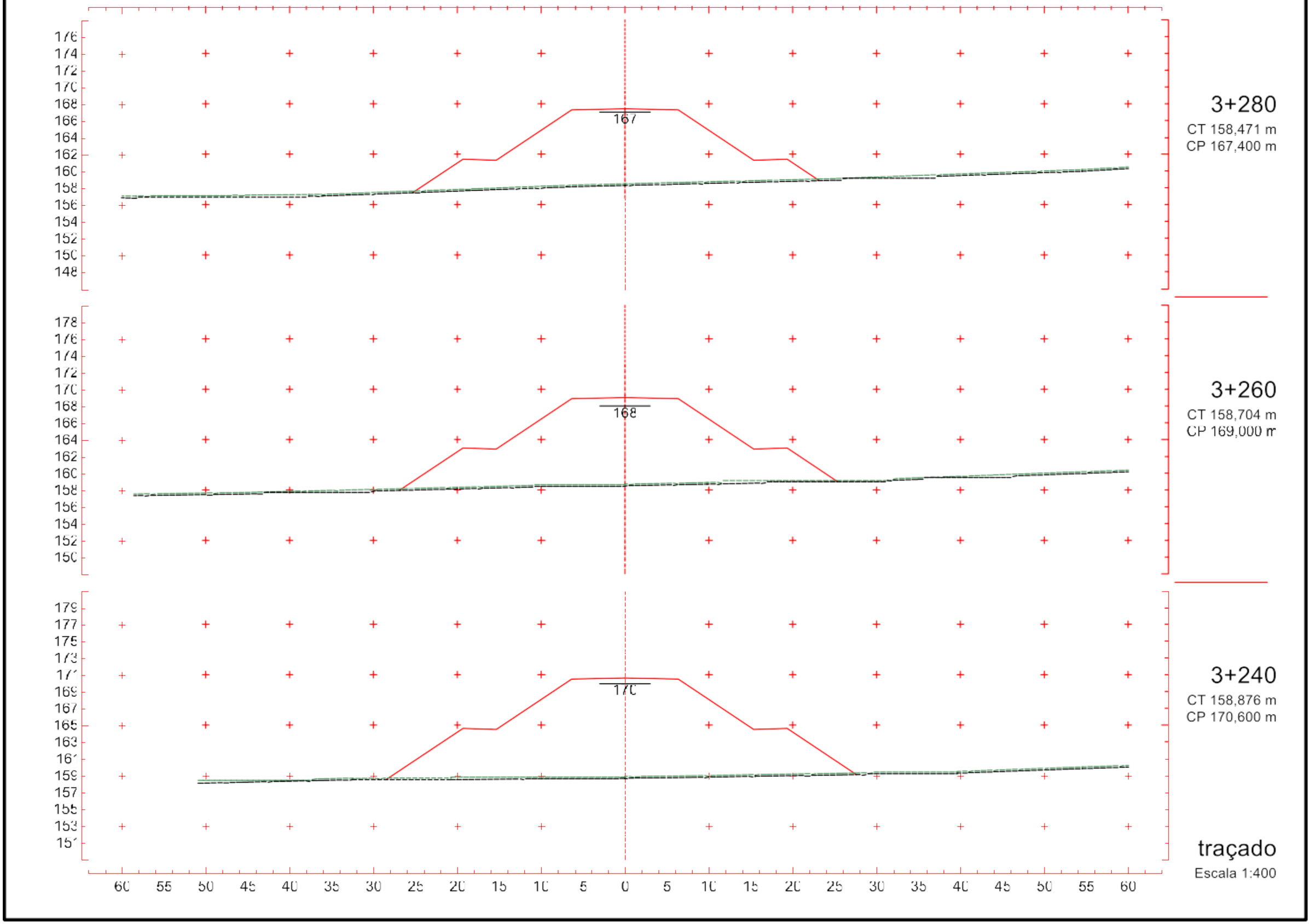

3+040
CT 160,718 m
CP 186,600 m
3+020
CT 162,495 m
CP 188,200 m
3+000
CT 165,125 m
CP 189,800 m
traçado
Escala 1:400


186
184
182
180
178
176
174
172
170
168
166
164
162
160
158
181
3+100
CT 157,778 m
CP 181,800 m
187
185
183
181
179
177
175
173
171
169
167
165
163
161
159
183
3+080
CT 158,377 m
CP 183,400 m
188
186
184
182
180
178
176
174
172
170
168
166
164
162
160
184
3+060
CT 159,411 m
CP 185,000 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
traçado
Escala 1:400

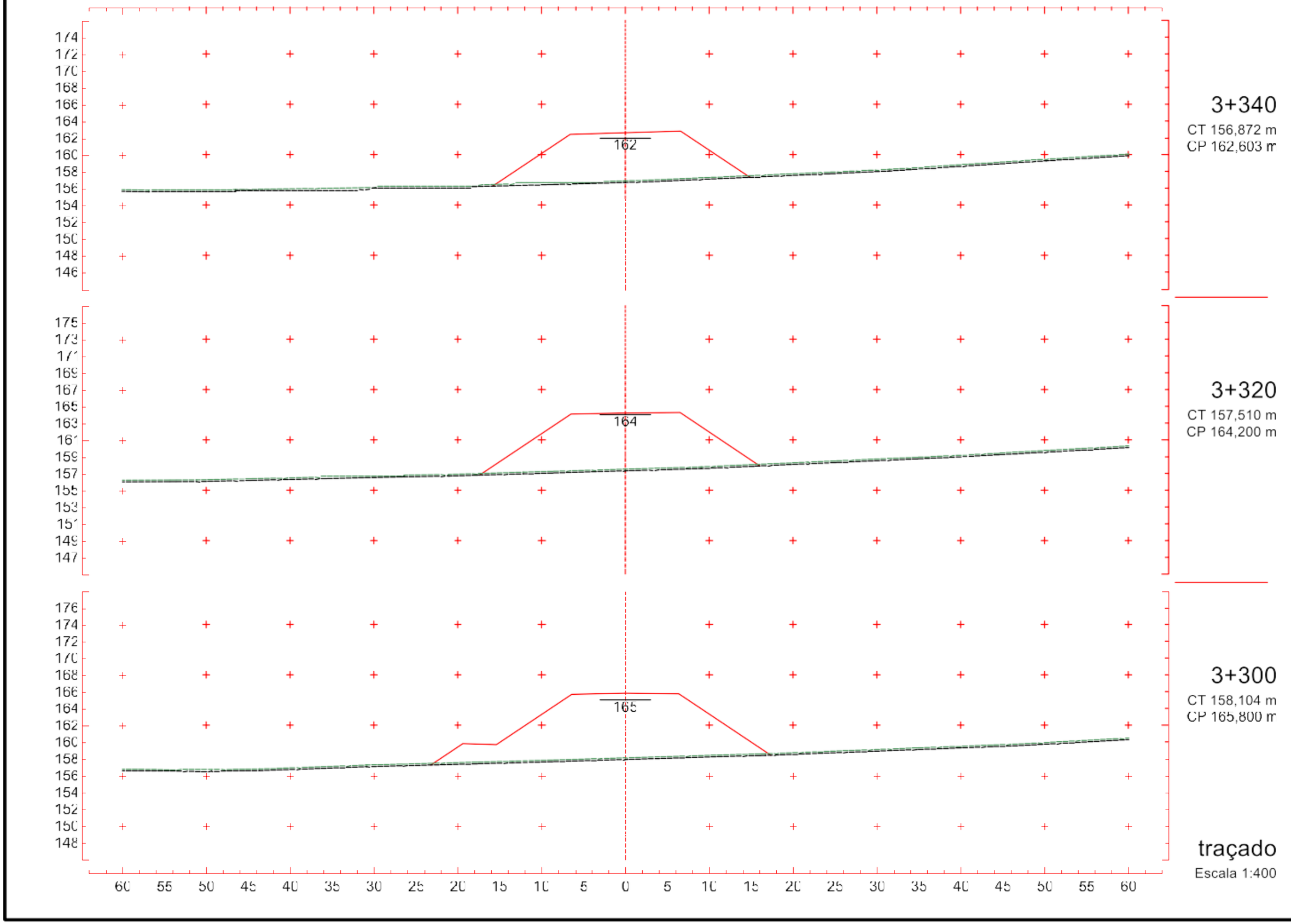

183
181
179
177
175
173
171
169
167
165
163
161
159
157
155
176
3+160
CT 158,378 m
CP 177,000 m
183
181
179
177
175
173
171
169
167
165
163
161
159
157
155
178
3+140
CT 158,001 m
CP 178,600 m
184
182
180
178
176
174
172
170
168
166
164
162
160
158
156
180
3+120
CT 157,655 m
CP 180,200 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

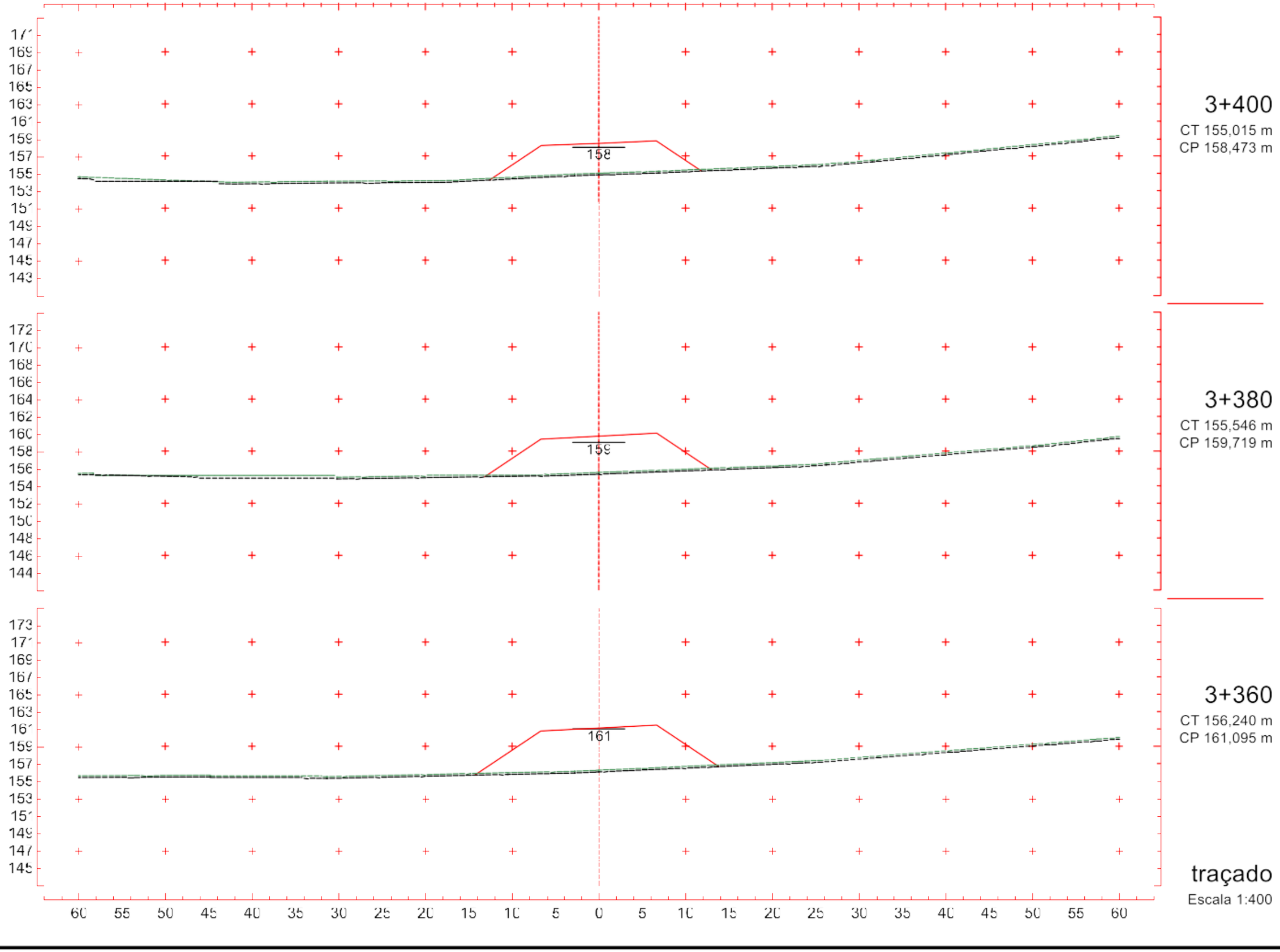
Projeto Ponto de Partida 2021/1

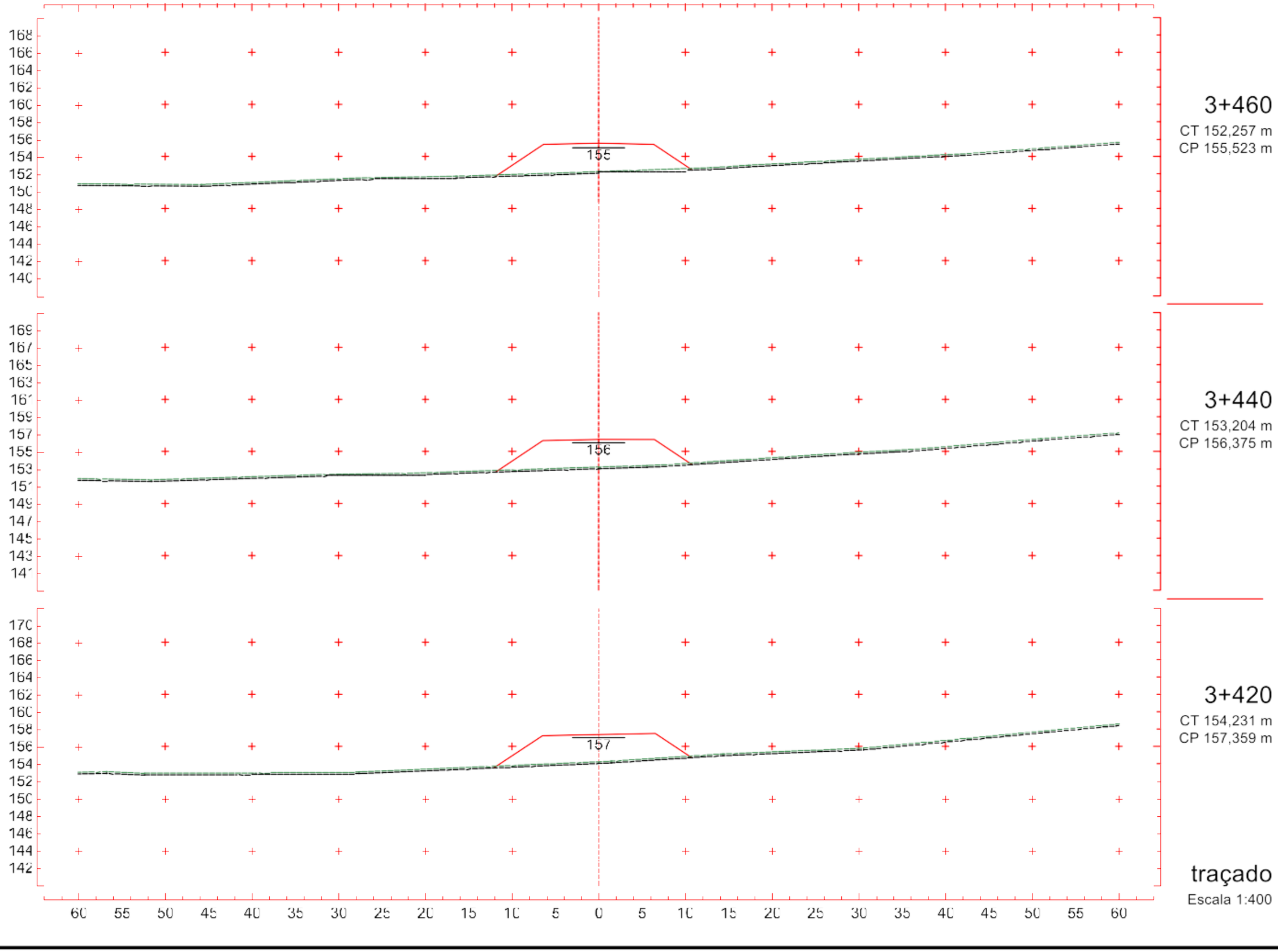


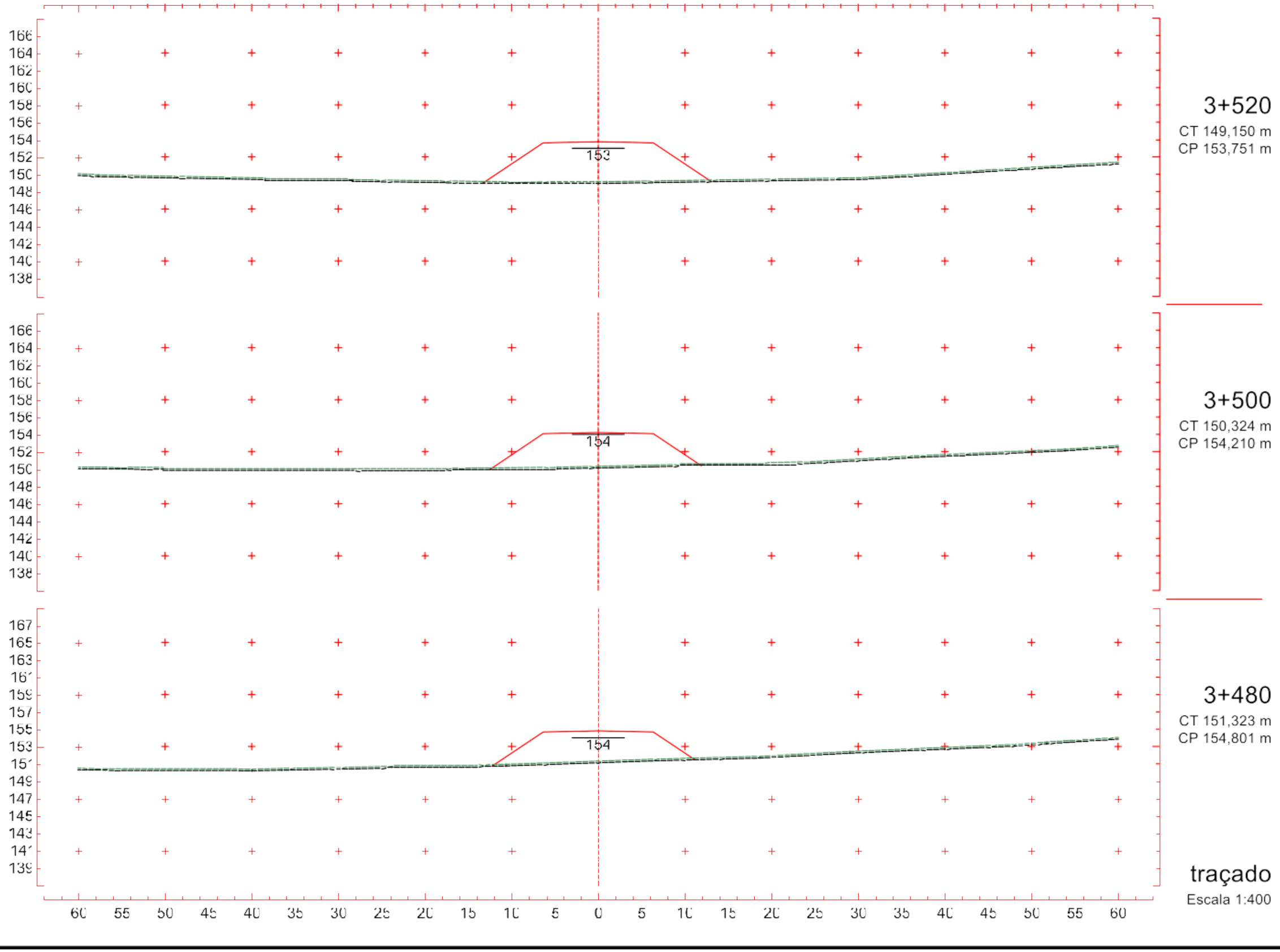

3+280
CT 158,471 m
CP 167,400 m
3+260
CT 158,704 m
CP 169,000 m
3+240
CT 158,876 m
CP 170,600 m
traçado
Escala 1:400

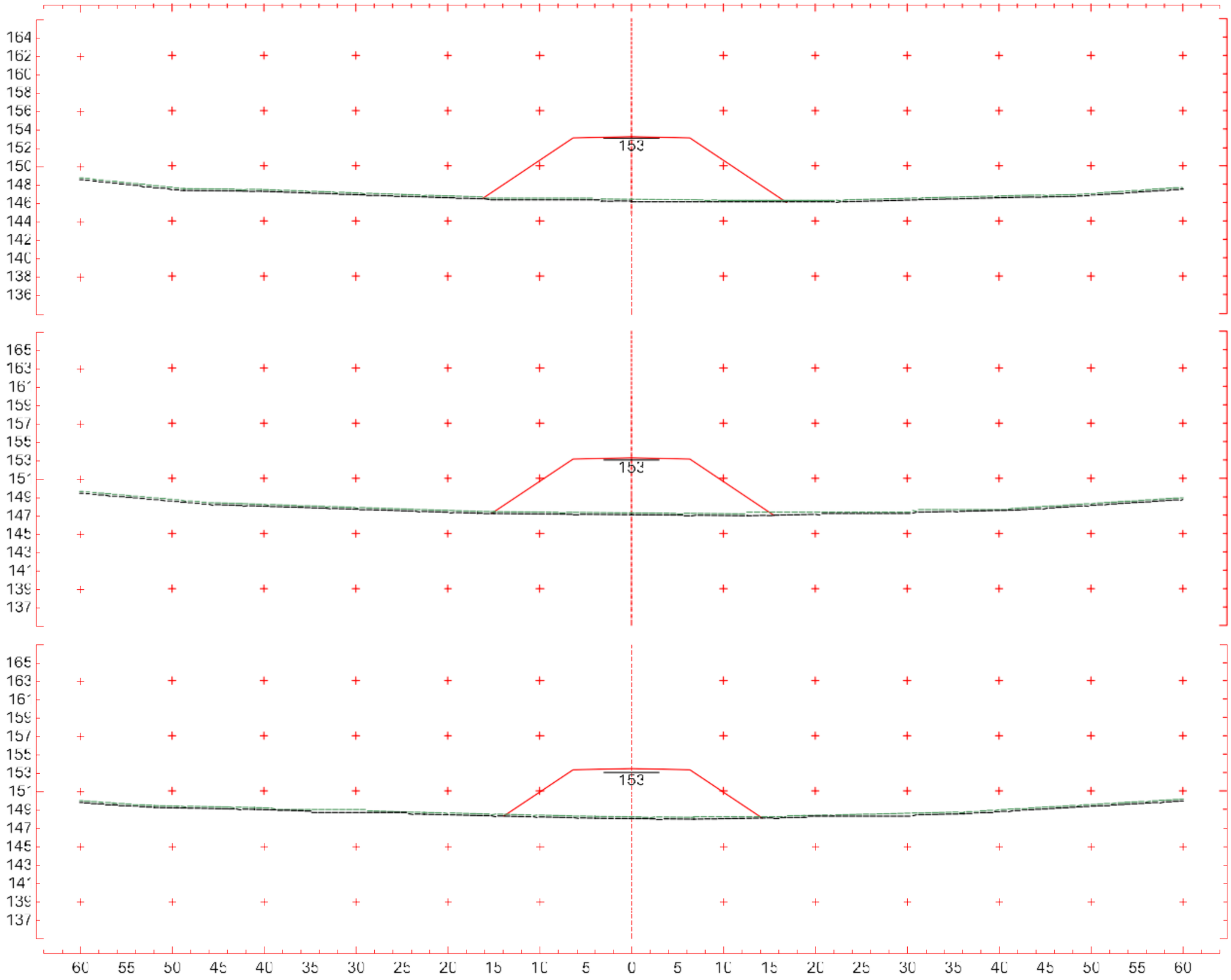
Projeto Ponto de Partida 2021/1

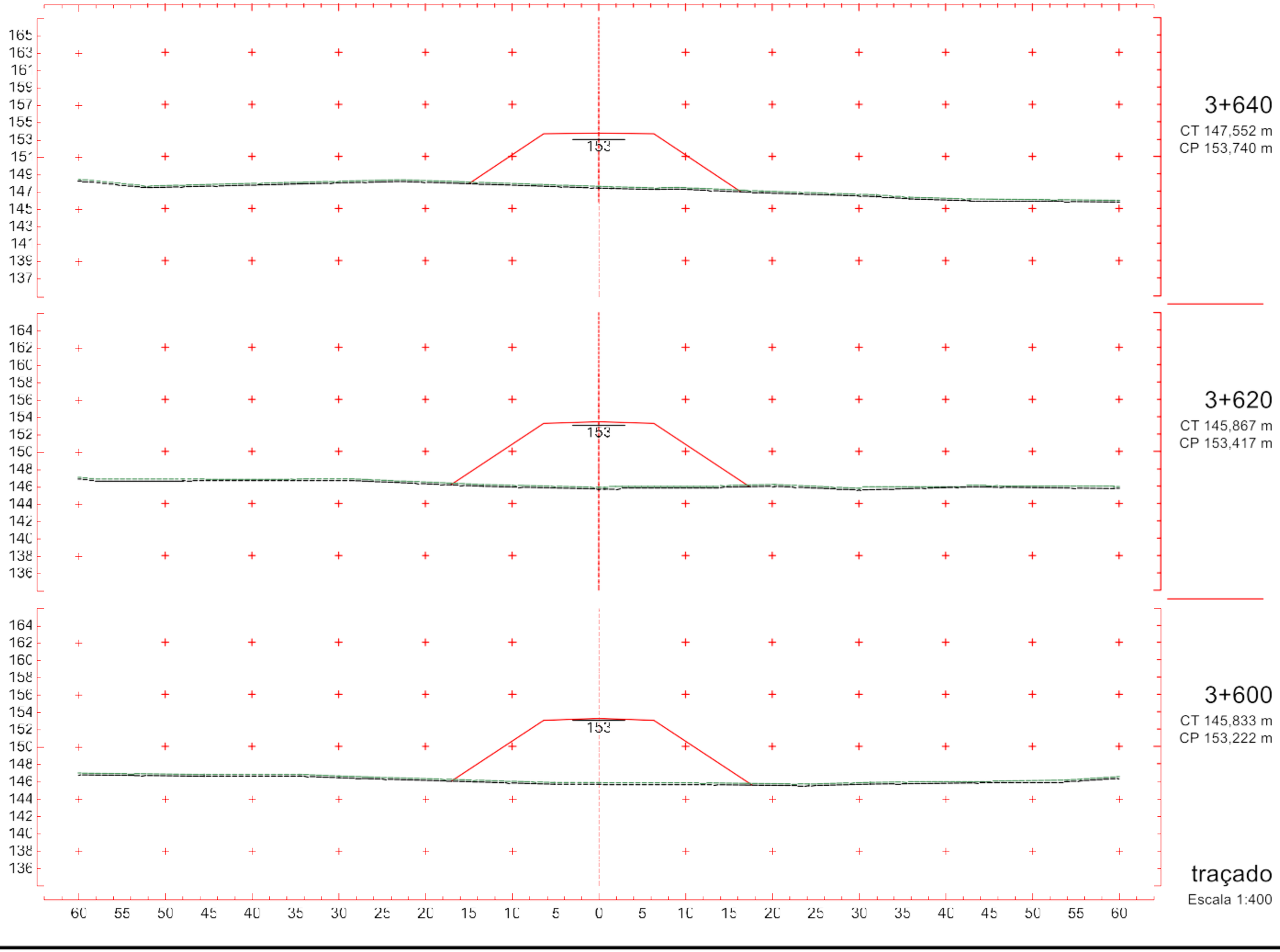


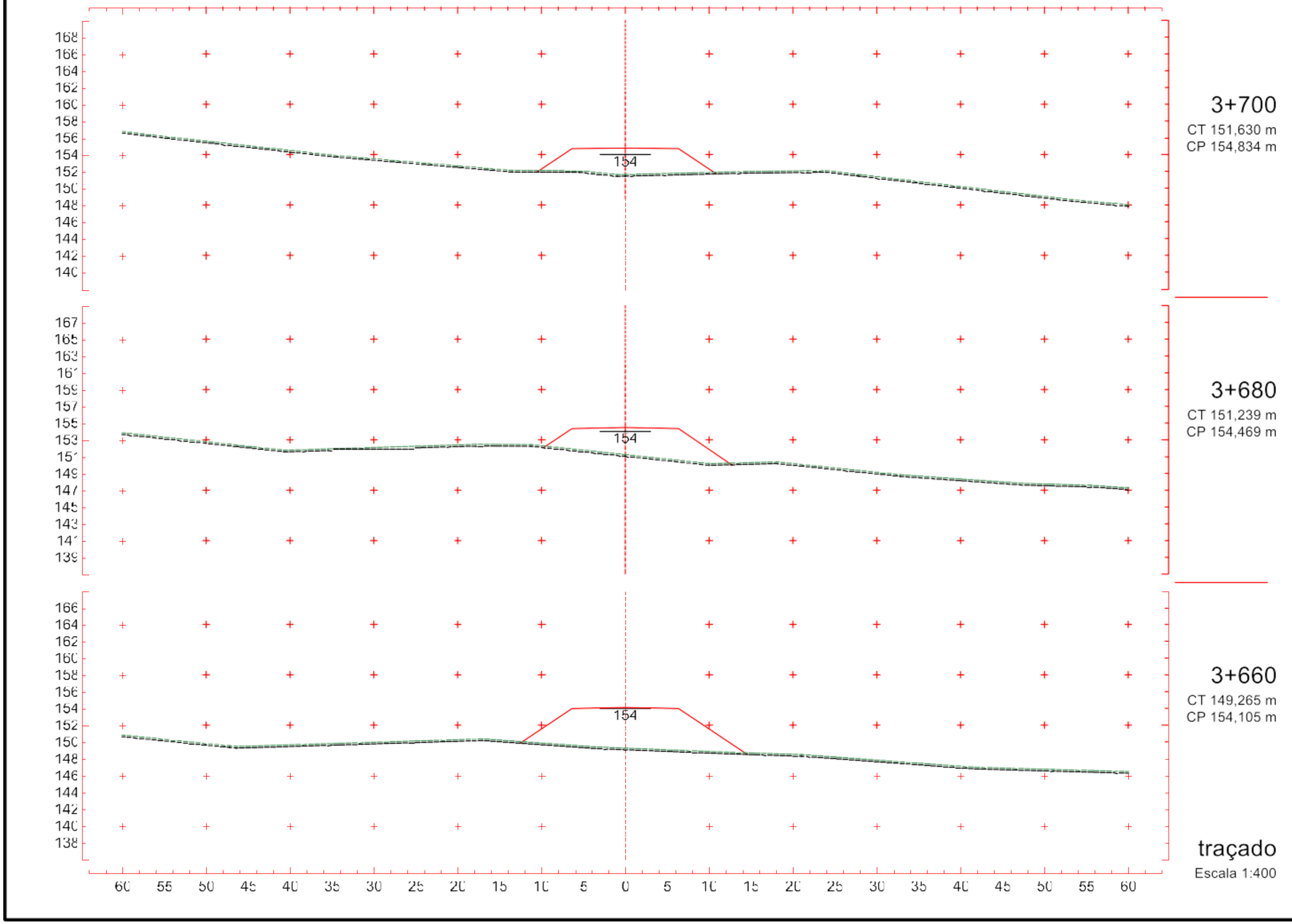

158
159
161
3+400
CT 155,015 m
CP 158,473 m
3+380
CT 155,546 m
CP 159,719 m
3+360
CT 156,240 m
CP 161,095 m
traçado
Escala 1:400

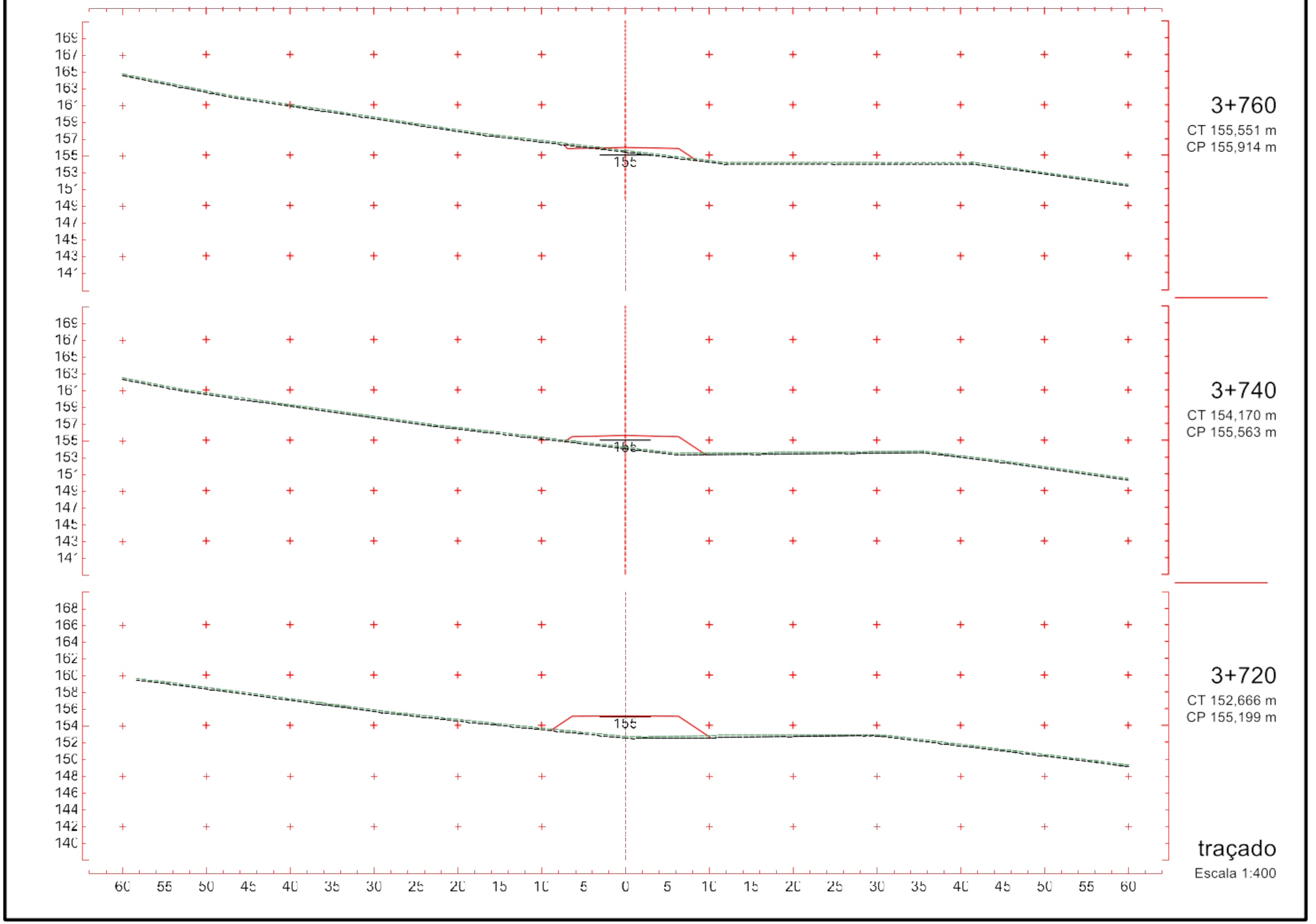

168
166
164
162
160
158
156
154
152
150
148
146
144
142
140
155
3+460
CT 152,257 m
CP 155,523 m
169
167
165
163
161
159
157
155
153
151
149
147
145
143
141
156
3+440
CT 153,204 m
CP 156,375 m
170
168
166
164
162
160
158
156
154
152
150
148
146
144
142
157
3+420
CT 154,231 m
CP 157,359 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400


166
164
162
160
158
156
154
152
150
148
146
144
142
140
138
153
3+520
CT 149,150 m
CP 153,751 m
166
164
162
160
158
156
154
152
150
148
146
144
142
140
138
154
3+500
CT 150,324 m
CP 154,210 m
167
165
163
161
159
157
155
153
151
149
147
145
143
141
139
154
3+480
CT 151,323 m
CP 154,801 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
traçado
Escala 1:400

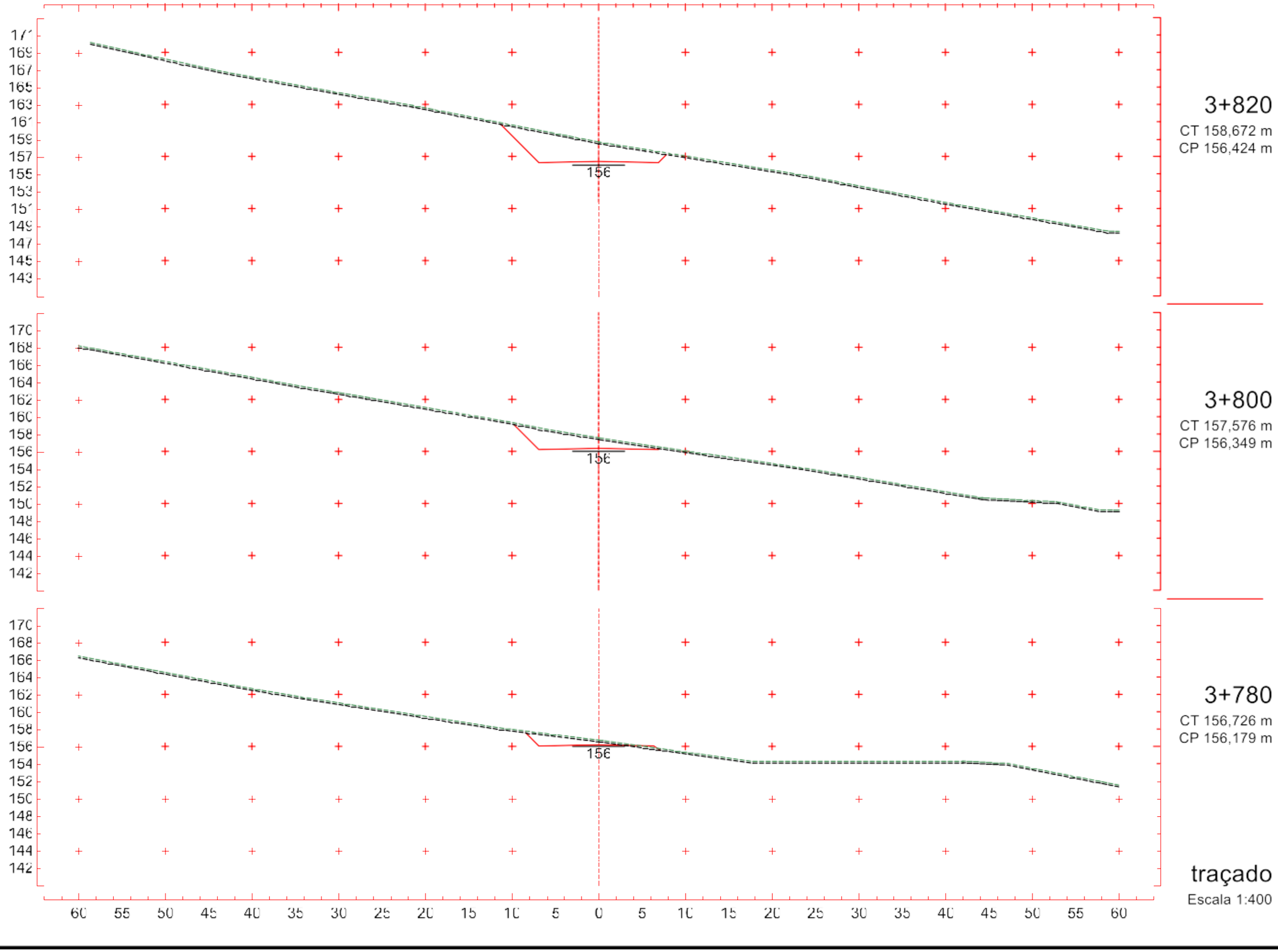

164
162
160
158
156
154
152
150
148
146
144
142
140
138
136
153
3+580
CT 146,355 m
CP 153,157 m
165
163
161
159
157
155
153
151
149
147
145
143
141
139
137
153
3+560
CT 147,240 m
CP 153,224 m
165
163
161
159
157
155
153
151
149
147
145
143
141
139
137
153
3+540
CT 148,186 m
CP 153,422 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400


165
163
161
159
157
155
153
151
149
147
145
143
141
139
137
153
3+640
CT 147,552 m
CP 153,740 m
164
162
160
158
156
154
152
150
148
146
144
142
140
138
136
153
3+620
CT 145,867 m
CP 153,417 m
164
162
160
158
156
154
152
150
148
146
144
142
140
138
136
153
3+600
CT 145,833 m
CP 153,222 m
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traçado
Escala 1:400

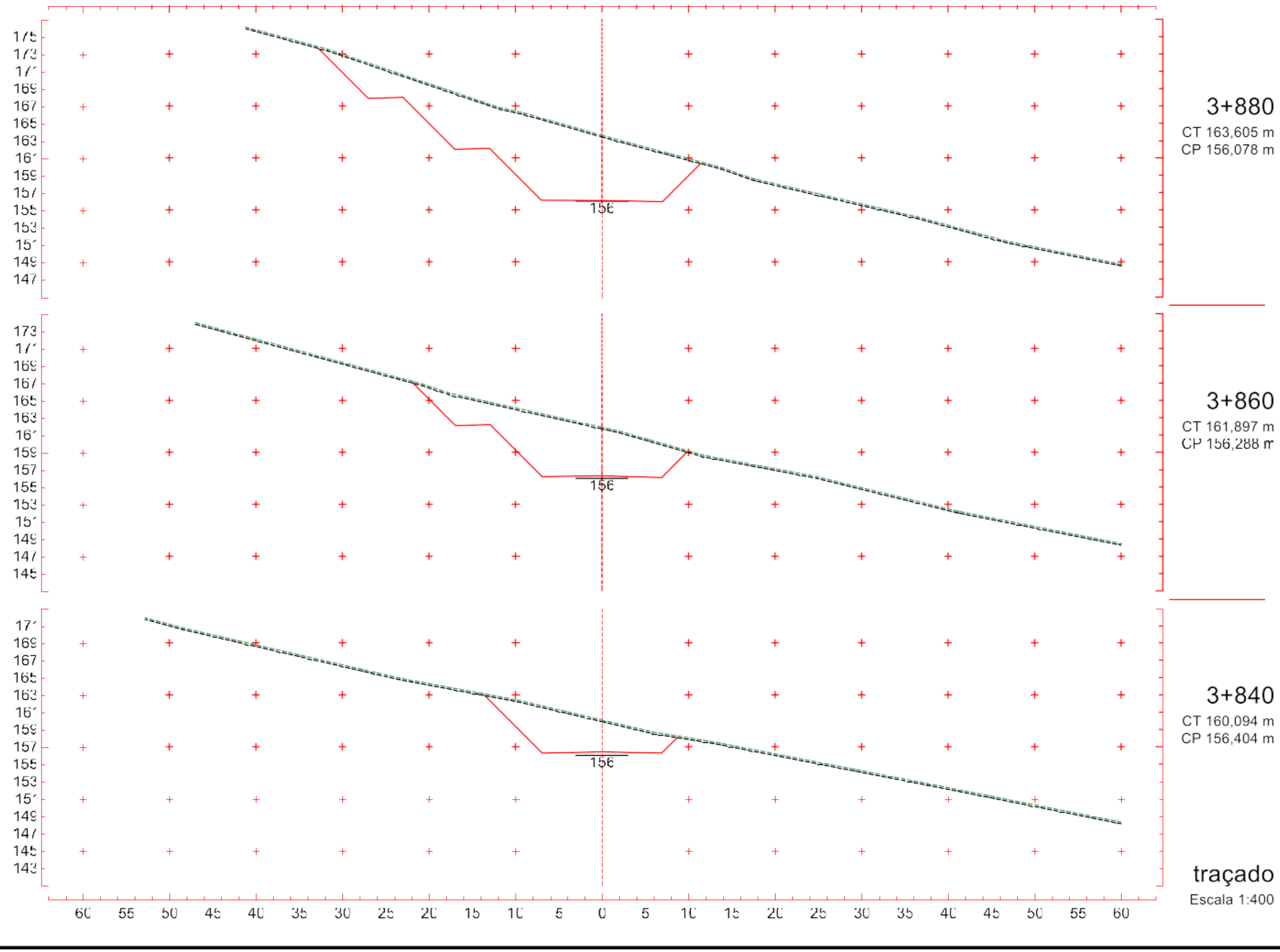

168
166
164
162
160
158
156
154
152
150
148
146
144
142
140
154
3+700
CT 151,630 m
CP 154,834 m
167
165
163
161
159
157
155
153
151
149
147
145
143
141
139
154
3+680
CT 151,239 m
CP 154,469 m
166
164
162
160
158
156
154
152
150
148
146
144
142
140
138
154
3+660
CT 149,265 m
CP 154,105 m
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traçado
Escala 1:400

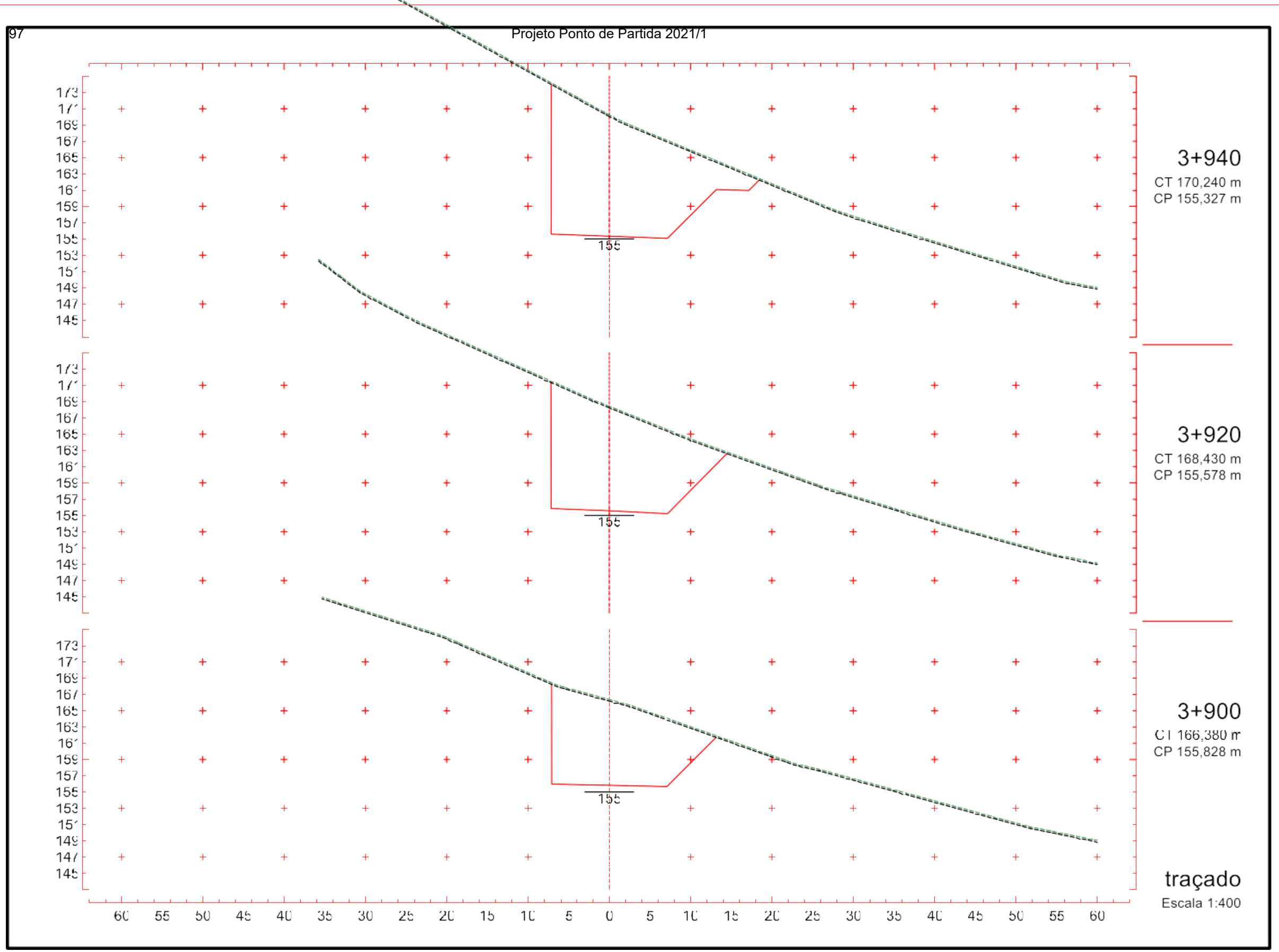

169
167
165
163
161
159
157
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153
151
149
147
145
143
141
155
3+760
CT 155,551 m
CP 155,914 m
169
167
165
163
161
159
157
155
153
151
149
147
145
143
141
155
3+740
CT 154,170 m
CP 155,563 m
168
166
164
162
160
158
156
154
152
150
148
146
144
142
140
155
3+720
CT 152,666 m
CP 155,199 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
traçado
Escala 1:400

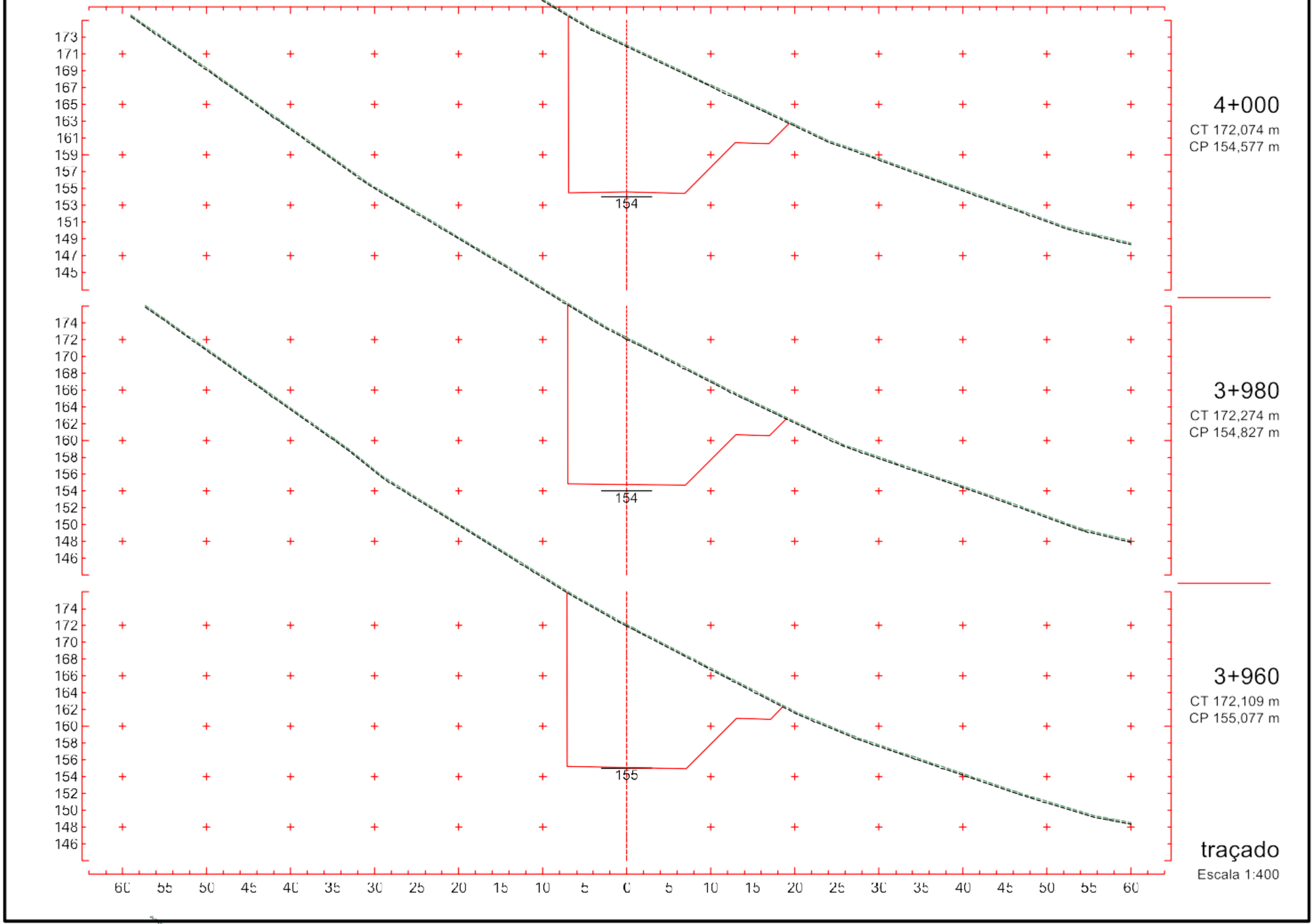
Projeto Ponto de Partida 2021/1

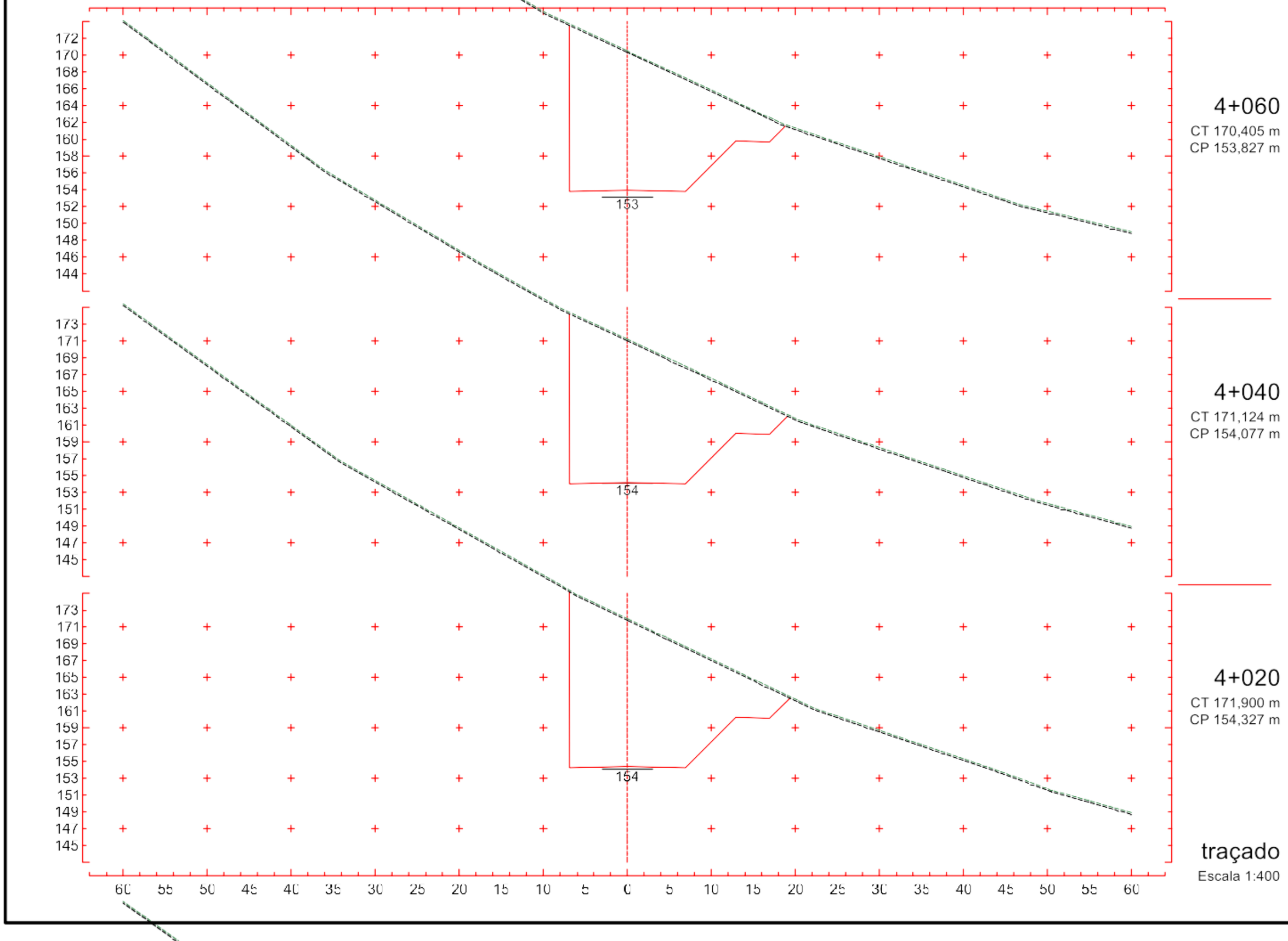


Projeto Ponto de Partida 2021/1

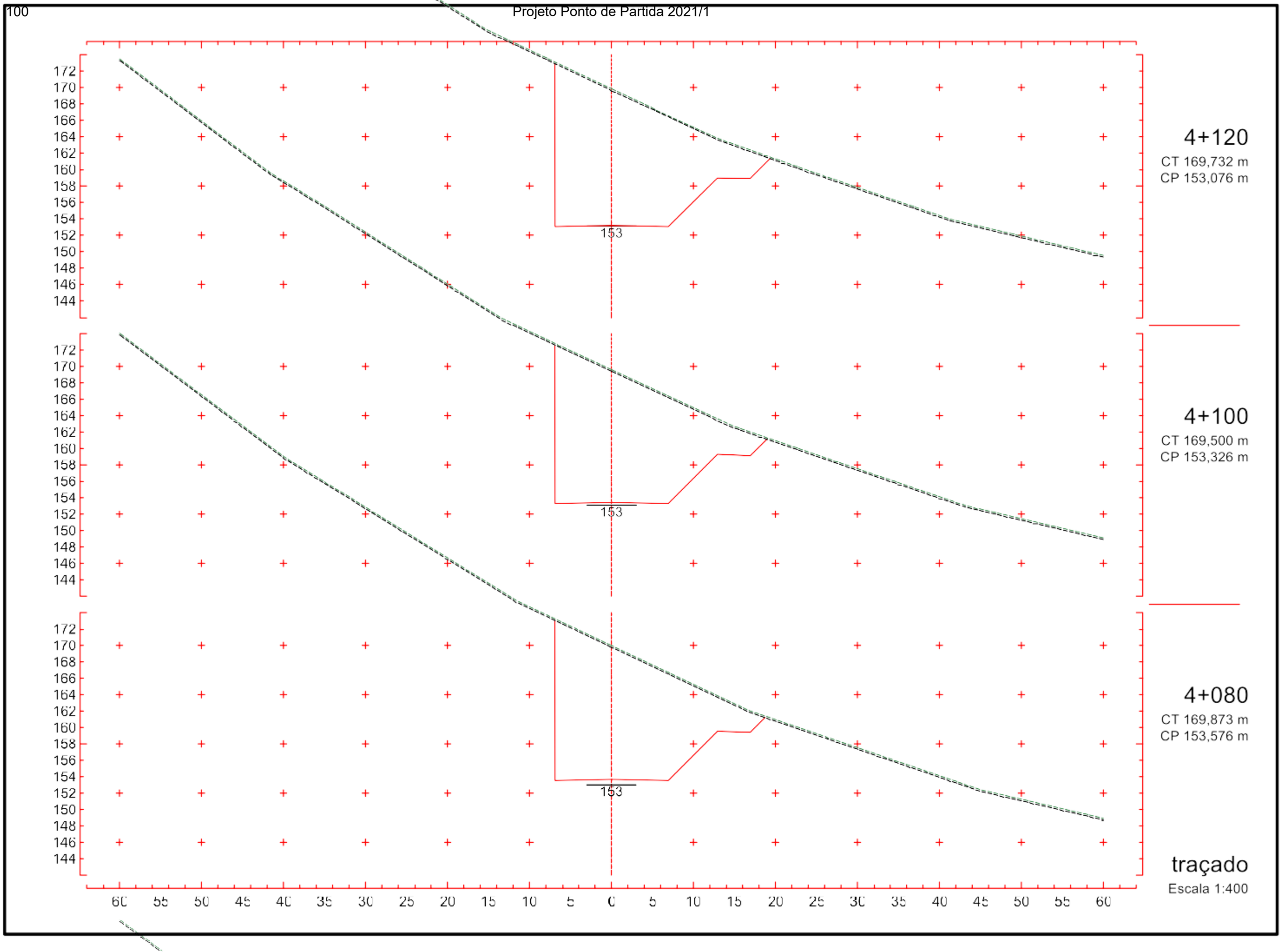



173
171
169
167
165
163
161
159
157
155
153
151
149
147
145
155
3+940
CT 170,240 m
CP 155,327 m
3+920
CT 168,430 m
CP 155,578 m
3+900
CT 166,380 m
CP 155,828 m
traçado
Escala 1:400
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60

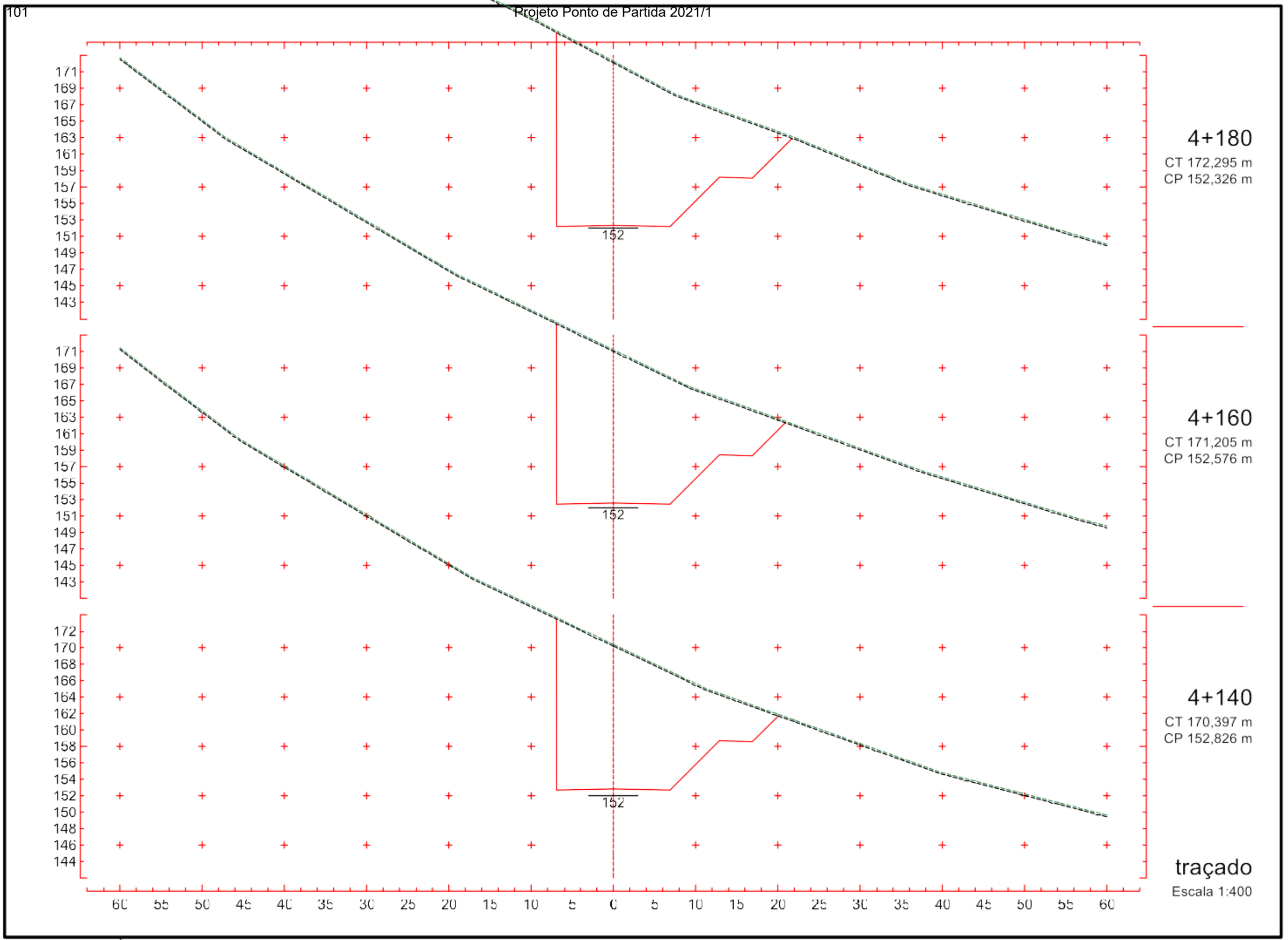

4+000
CT 172,074 m
CP 154,577 m
154
3+980
CT 172,274 m
CP 154,827 m
154
3+960
CT 172,109 m
CP 155,077 m
155
traçado
Escala 1:400


172
170
168
166
164
162
160
158
156
154
152
150
148
146
144
153
4+060
CT 170,405 m
CP 153,827 m
173
171
169
167
165
163
161
159
157
155
153
151
149
147
145
154
4+040
CT 171,124 m
CP 154,077 m
173
171
169
167
165
163
161
159
157
155
153
151
149
147
145
154
4+020
CT 171,900 m
CP 154,327 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
traçado
Escala 1:400

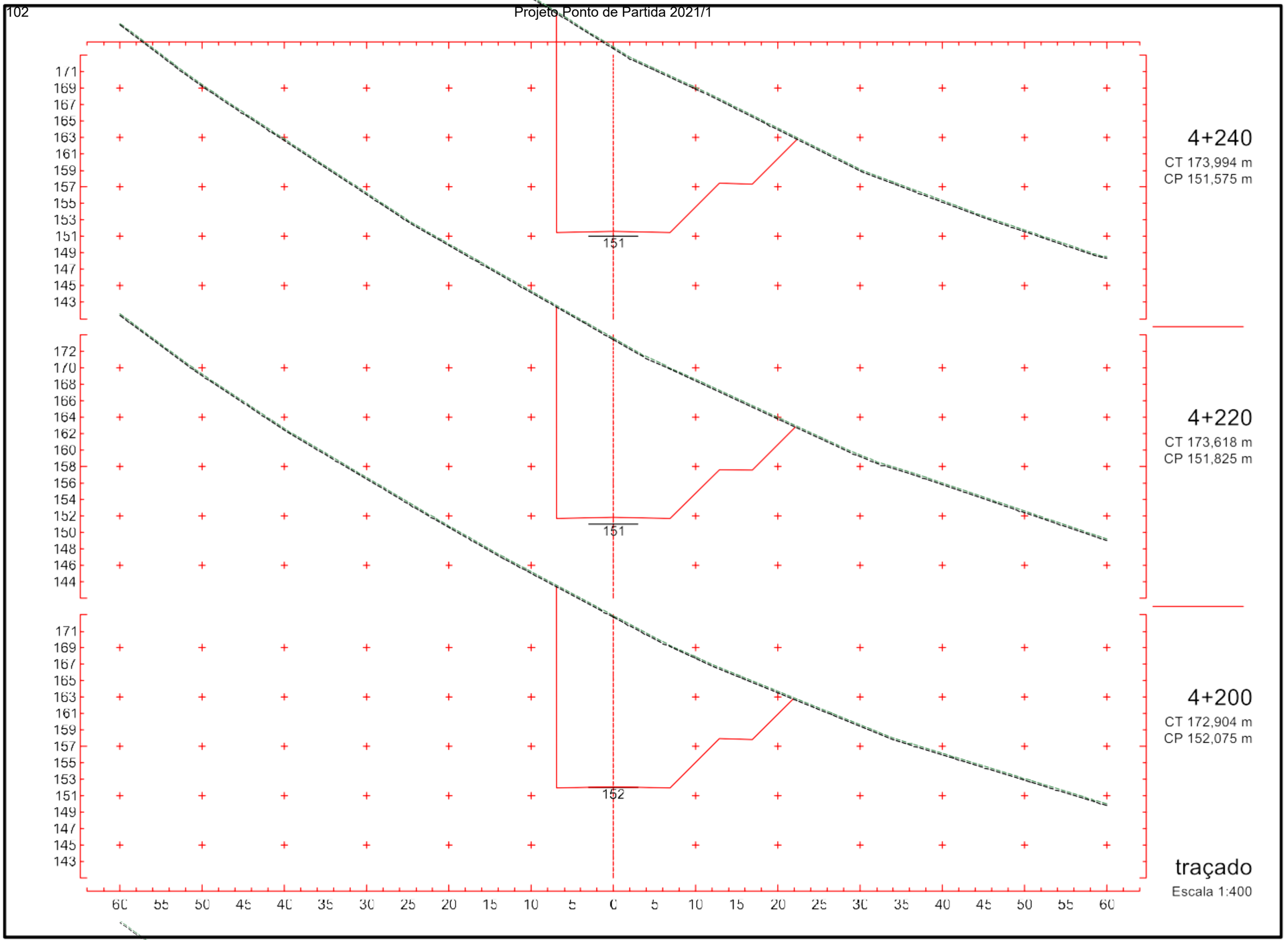
Projeto Ponto de Partida 2021/1

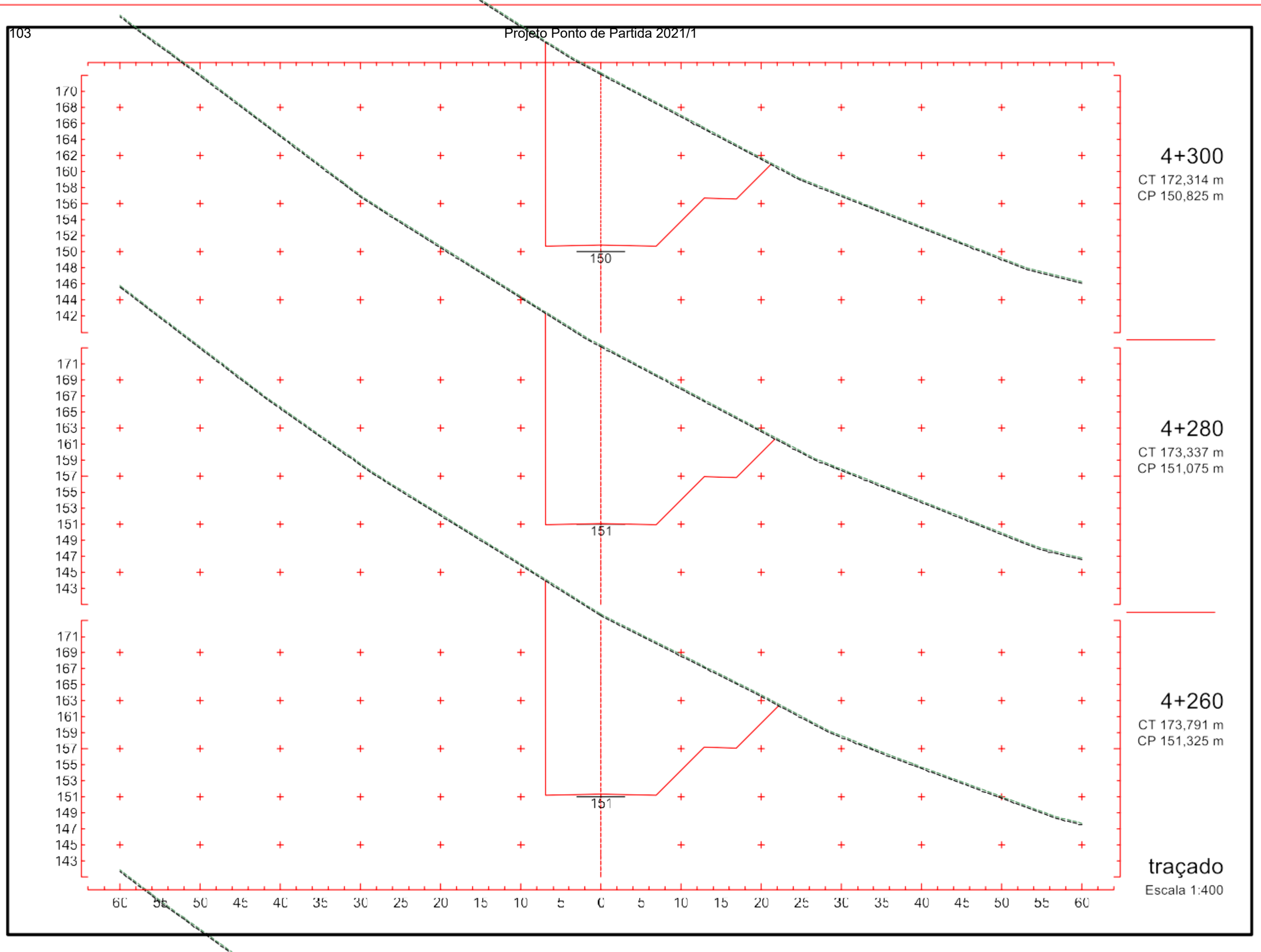


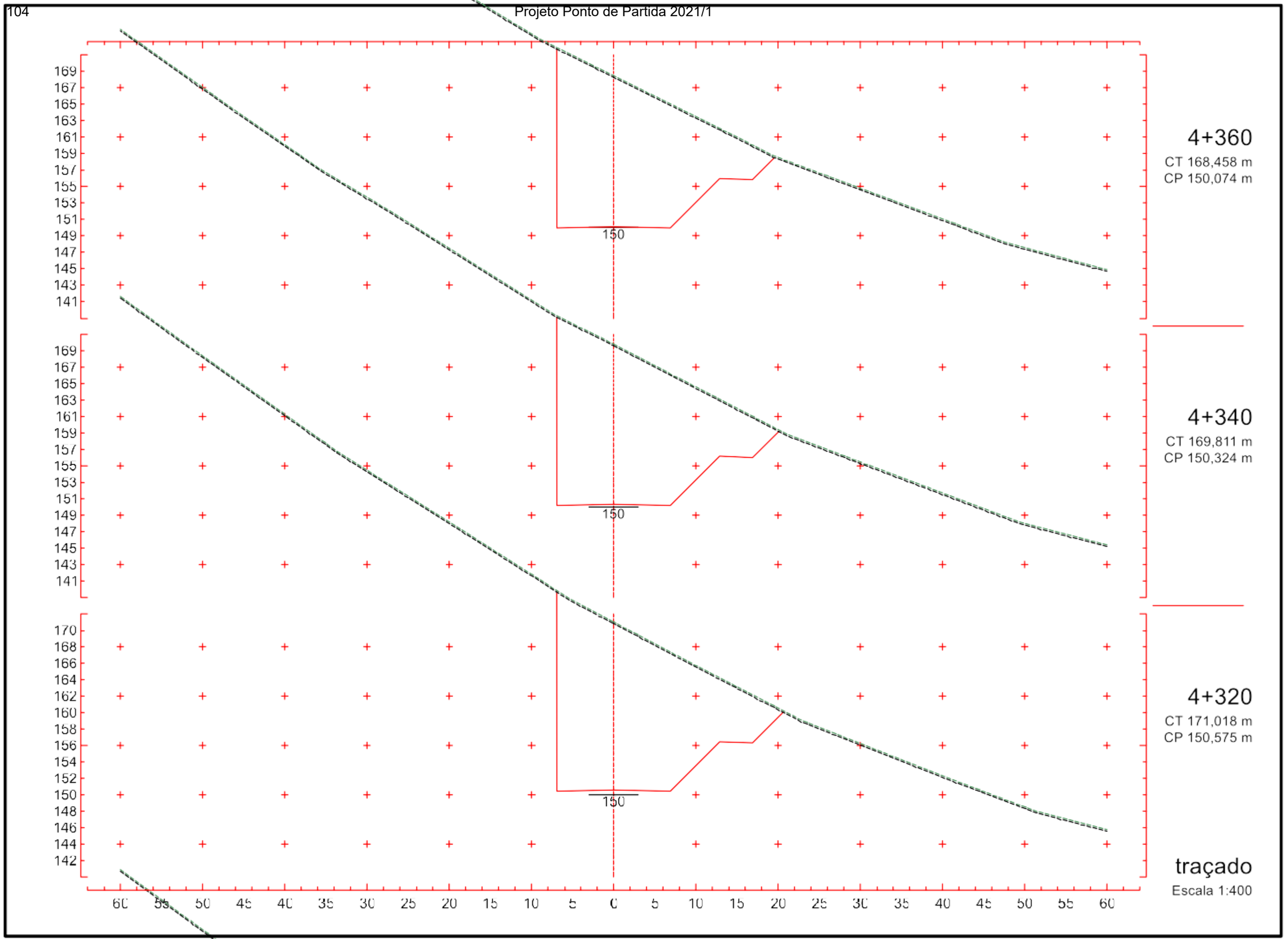
Projeto Ponto de Partida 2021/1

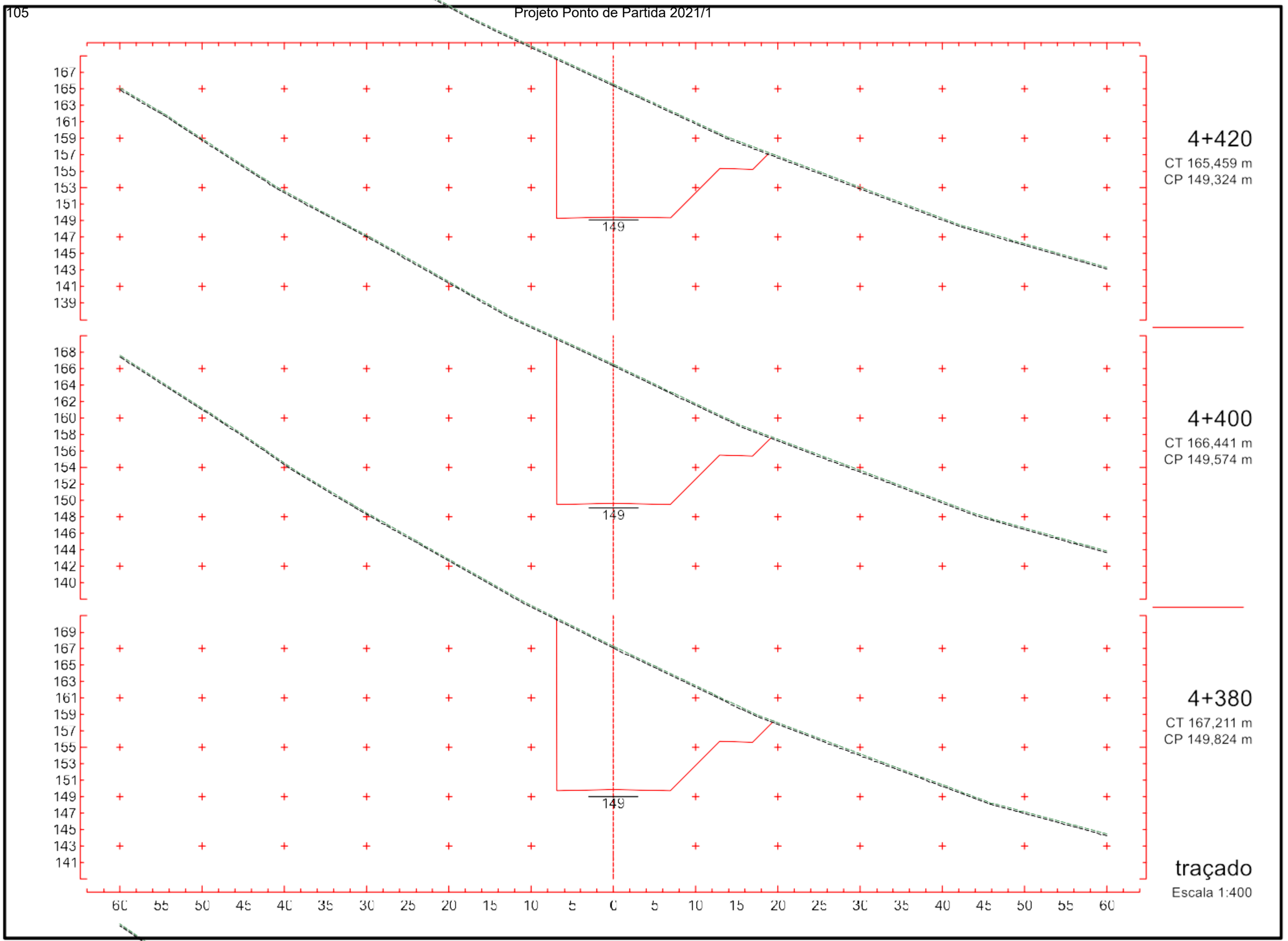


Projeto Ponto de Partida 2021/1

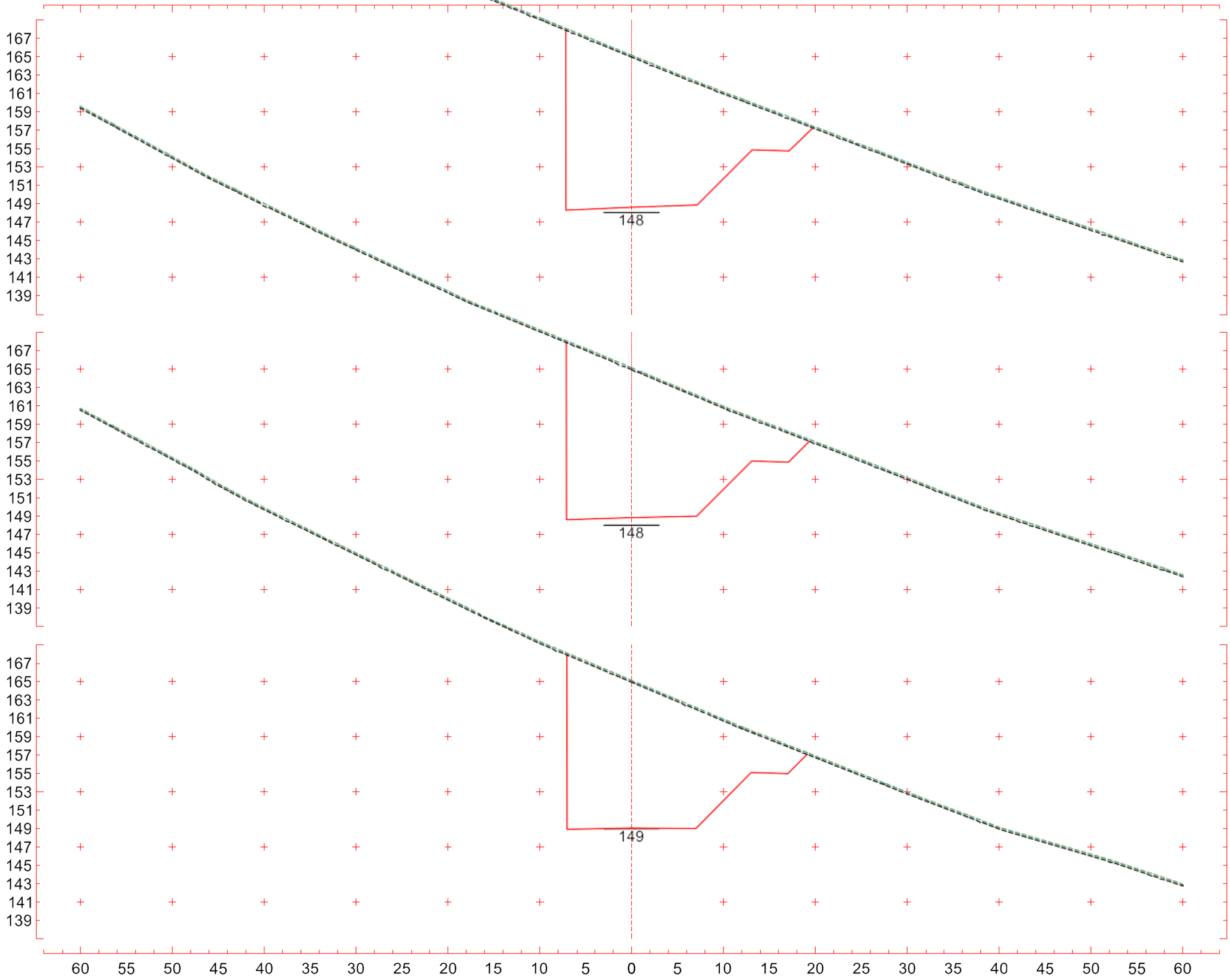



170
168
166
164
162
160
158
156
154
152
150
148
146
144
142
150
4+300
CT 172,314 m
CP 150,825 m
171
169
167
165
163
161
159
157
155
153
151
149
147
145
143
151
4+280
CT 173,337 m
CP 151,075 m
171
169
167
165
163
161
159
157
155
153
151
149
147
145
143
151
4+260
CT 173,791 m
CP 151,325 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400


169
167
165
163
161
159
157
155
153
151
149
147
145
143
141
150
4+360
CT 168,458 m
CP 150,074 m
169
167
165
163
161
159
157
155
153
151
149
147
145
143
141
150
4+340
CT 169,811 m
CP 150,324 m
170
168
166
164
162
160
158
156
154
152
150
148
146
144
142
150
4+320
CT 171,018 m
CP 150,575 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
traçado
Escala 1:400


4+420
CT 165,459 m
CP 149,324 m
4+400
CT 166,441 m
CP 149,574 m
4+380
CT 167,211 m
CP 149,824 m
traçado
Escala 1:400
149
149
149

Projeto Ponto de Partida 2021/1



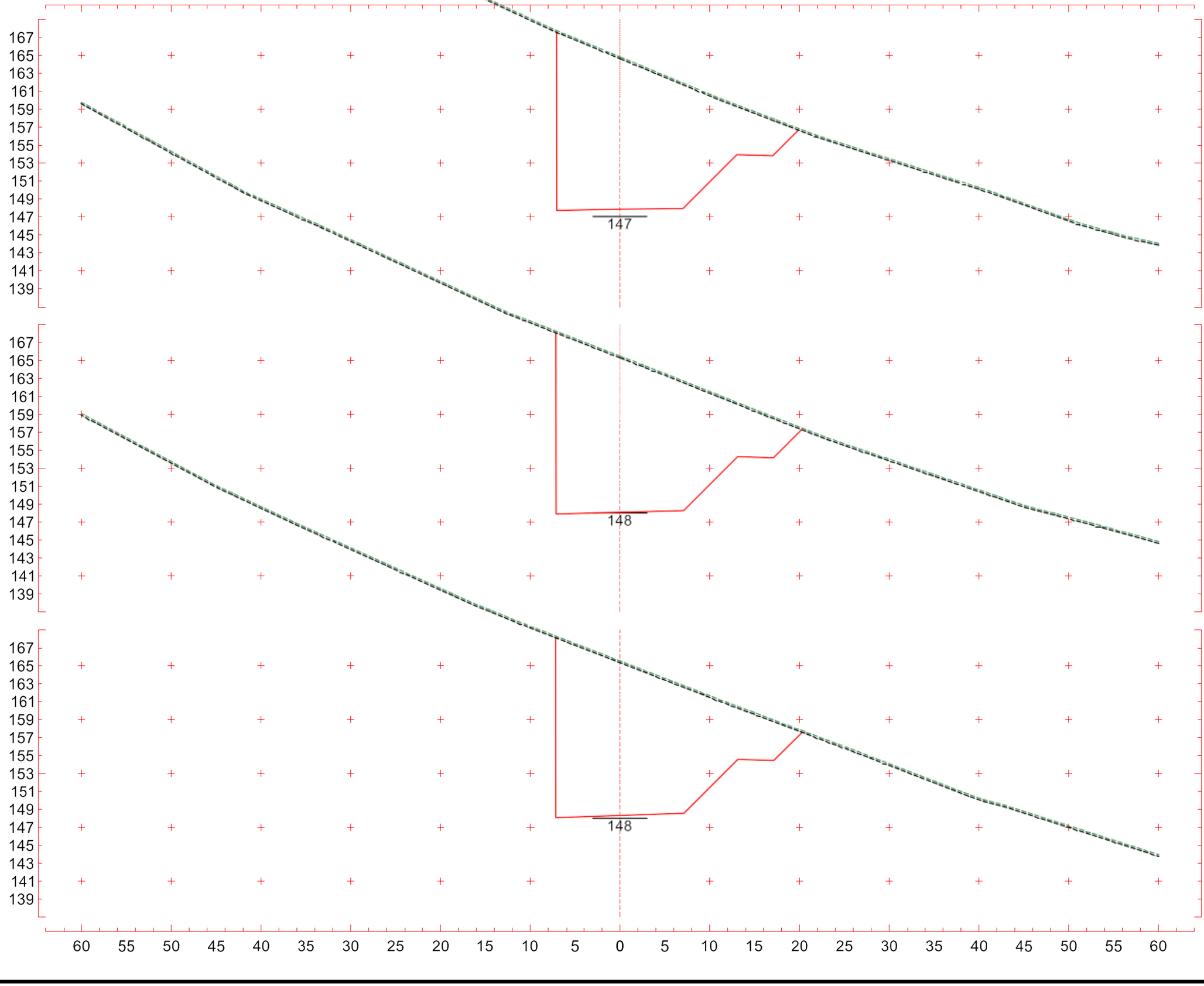
4+480
CT 165,105 m
CP 148,573 m

4+460
CT 165,124 m
CP 148,824 m

4+440
CT 165,135 m
CP 149,074 m

traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

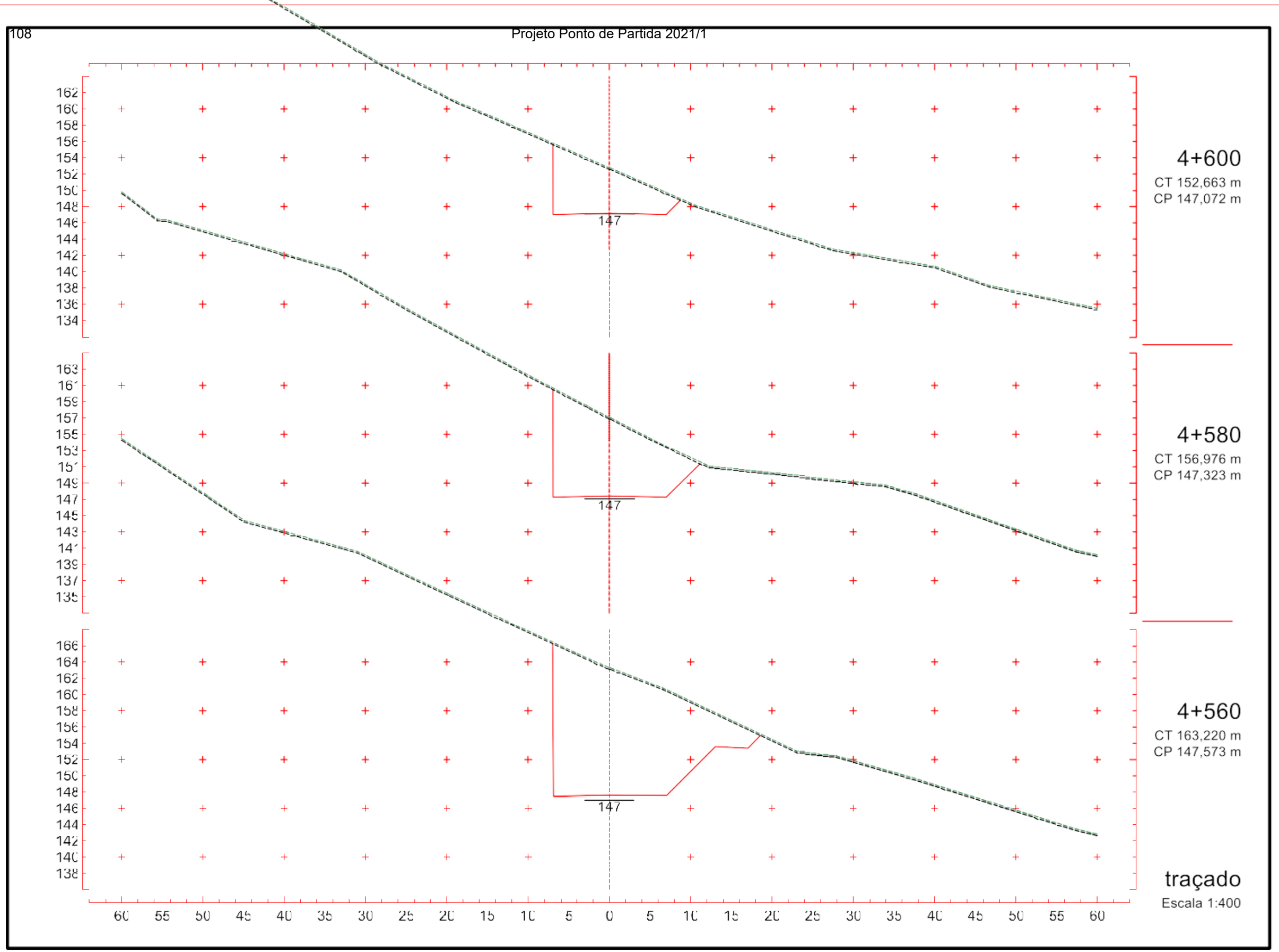


4+540
CT 164,785 m
CP 147,823 m

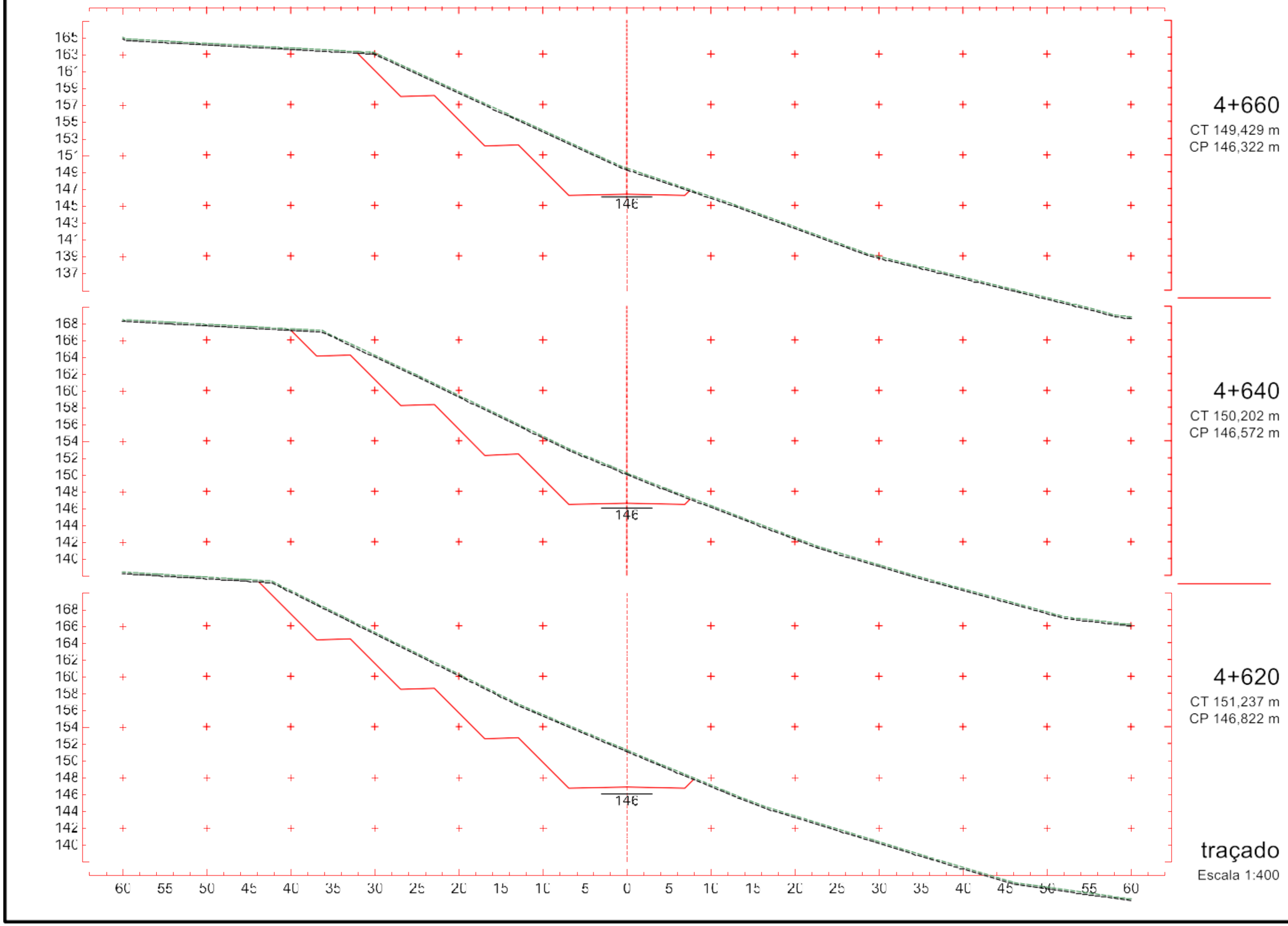
4+520
CT 165,474 m
CP 148,073 m

4+500
CT 165,535 m
CP 148,323 m

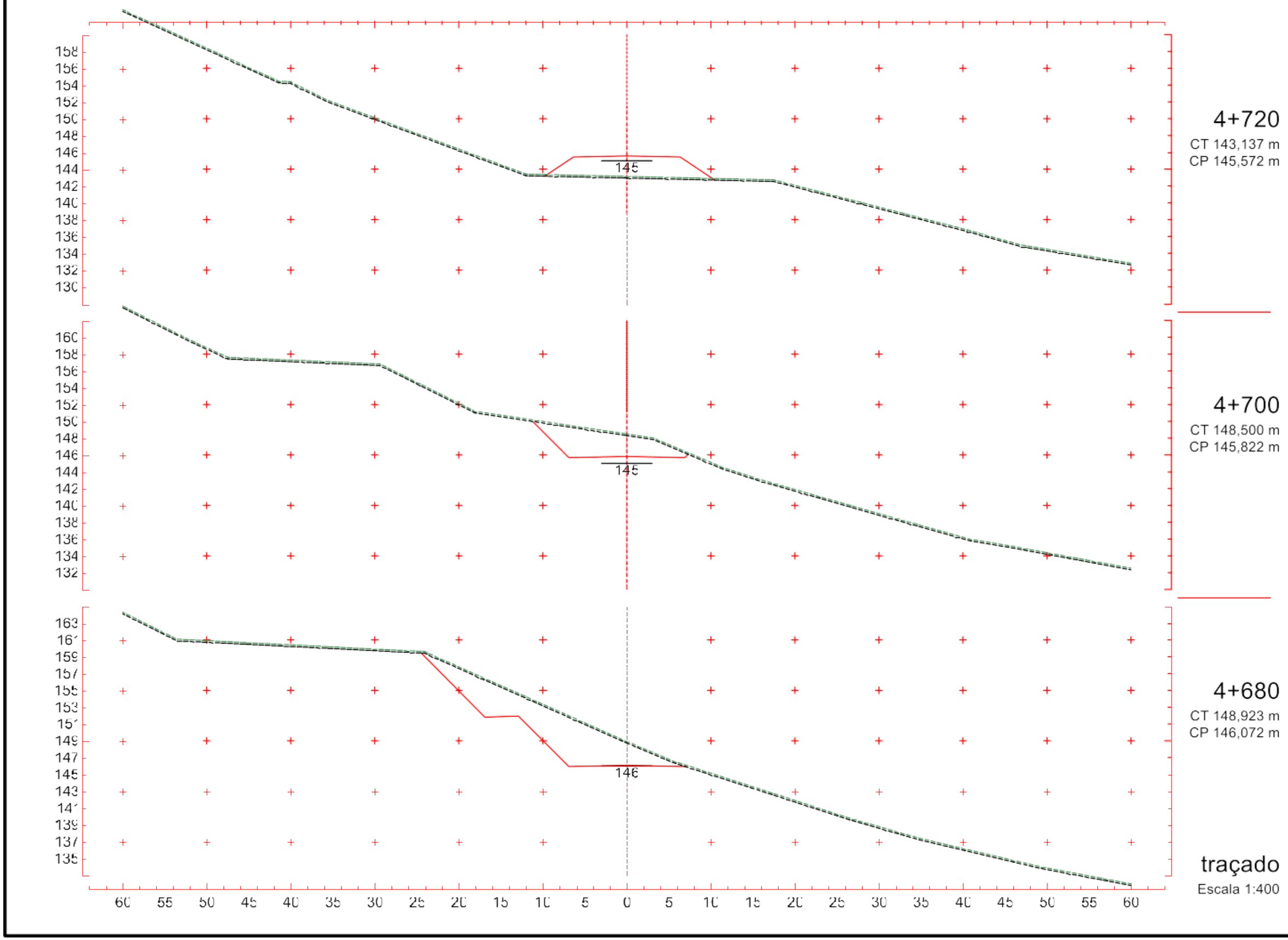
traçado
Escala 1:400


162
160
158
156
154
152
150
148
146
144
142
140
138
136
134
147
4+600
CT 152,663 m
CP 147,072 m
163
161
159
157
155
153
151
149
147
145
143
141
139
137
135
147
4+580
CT 156,976 m
CP 147,323 m
166
164
162
160
158
156
154
152
150
148
146
144
142
140
138
147
4+560
CT 163,220 m
CP 147,573 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
traçado
Escala 1:400

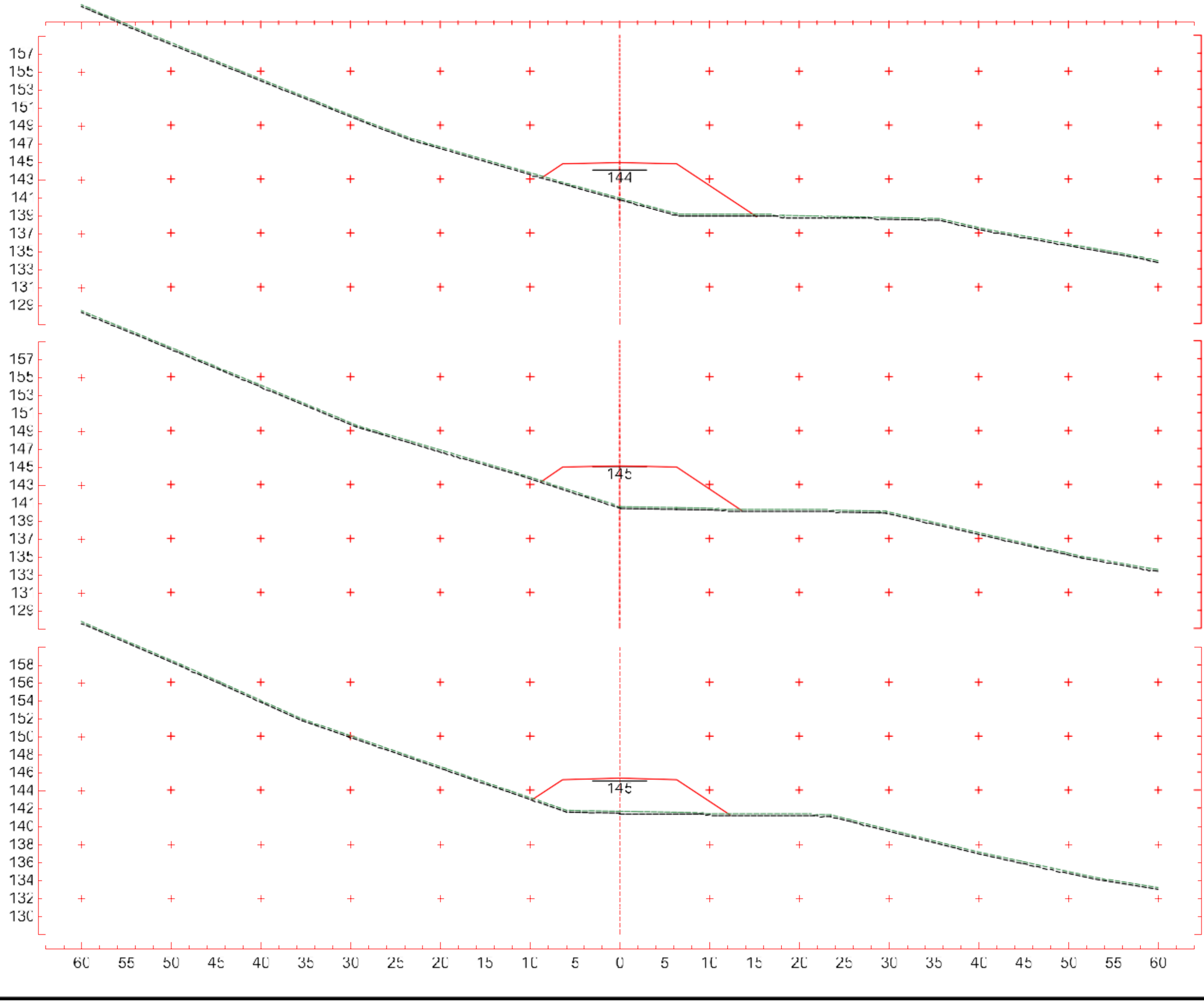
Projeto Ponto de Partida 2021/1



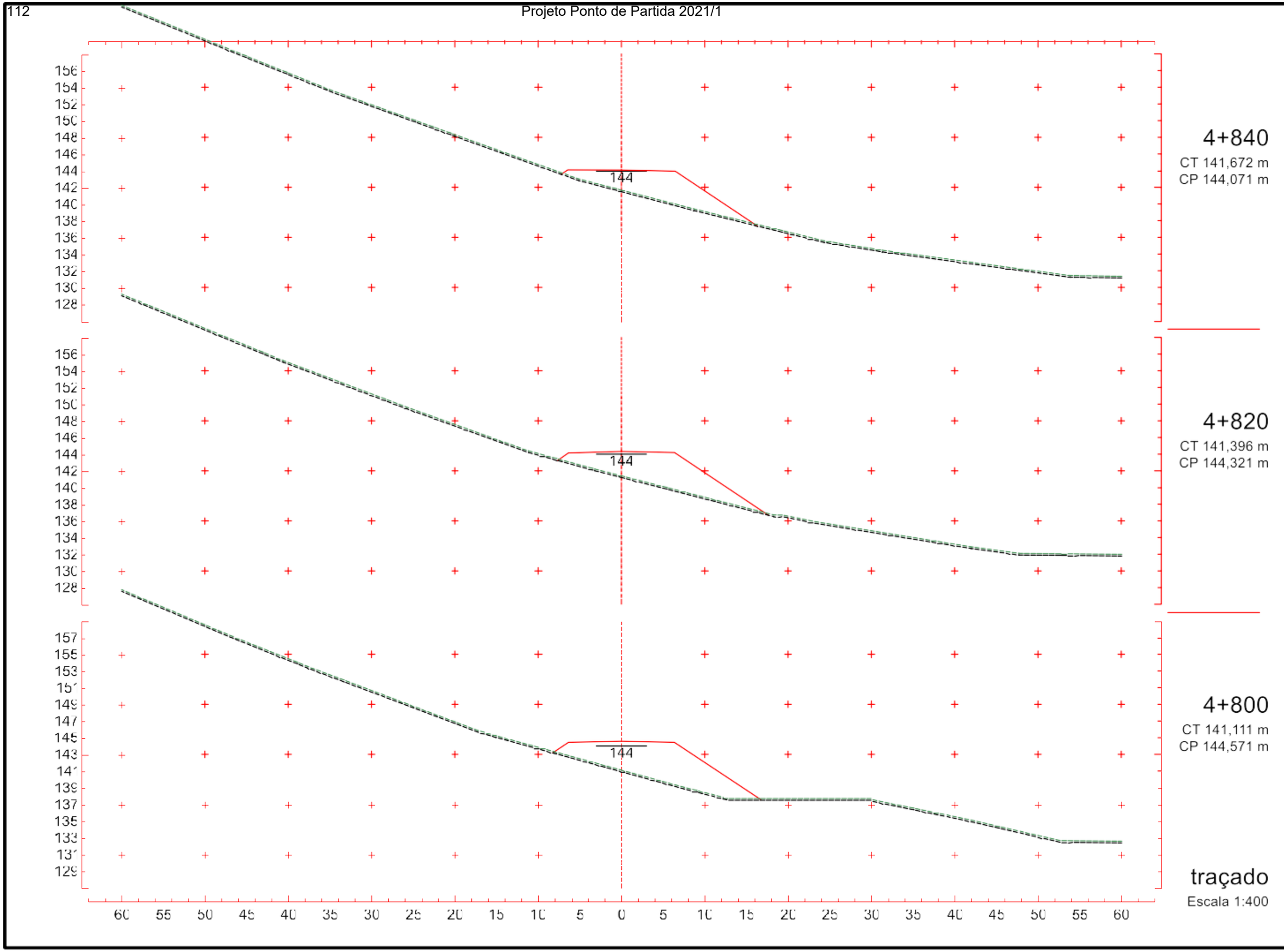
Projeto Ponto de Partida 2021/1



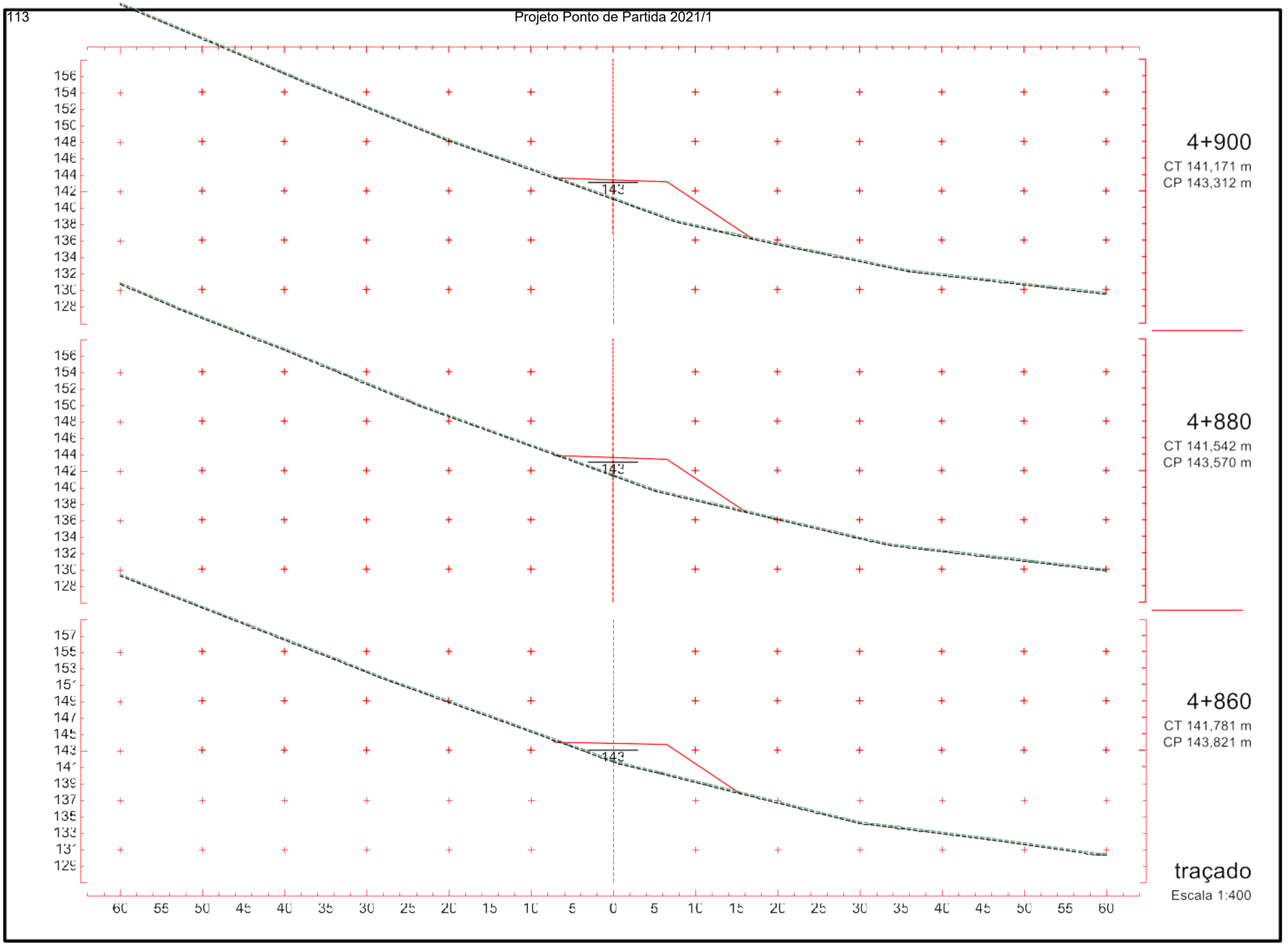
Projeto Ponto de Partida 2021/1



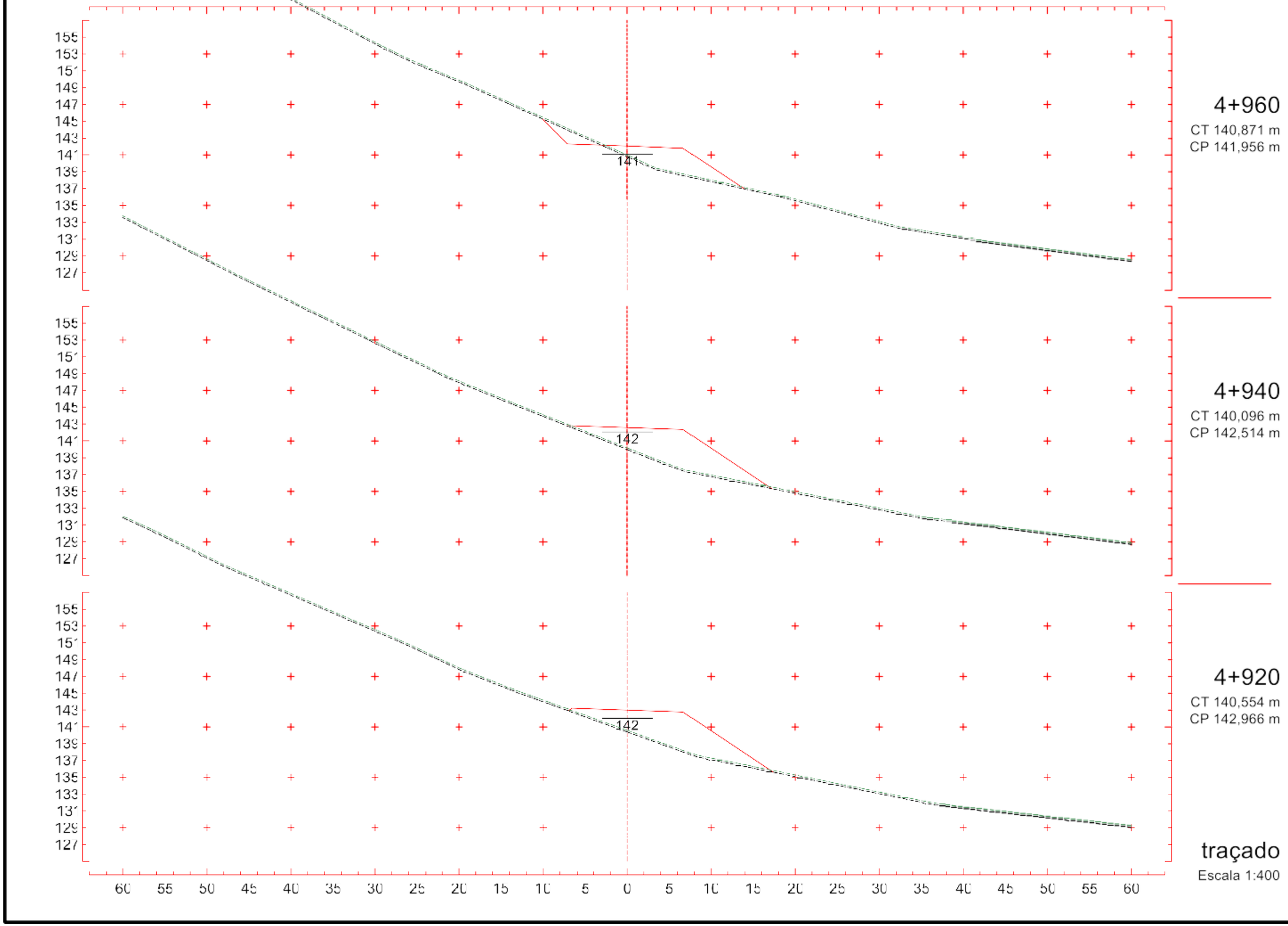
Projeto Ponto de Partida 2021/1



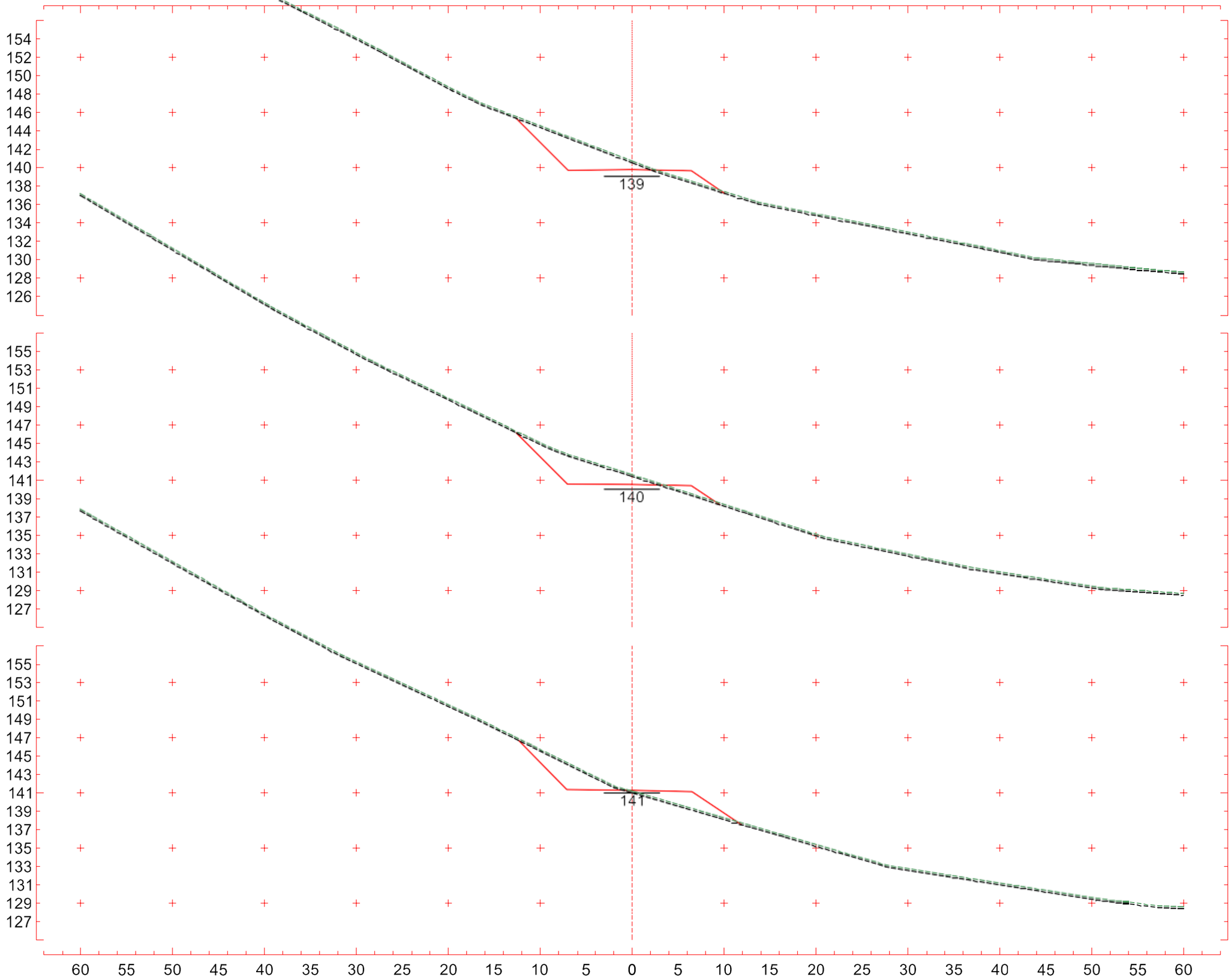
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1

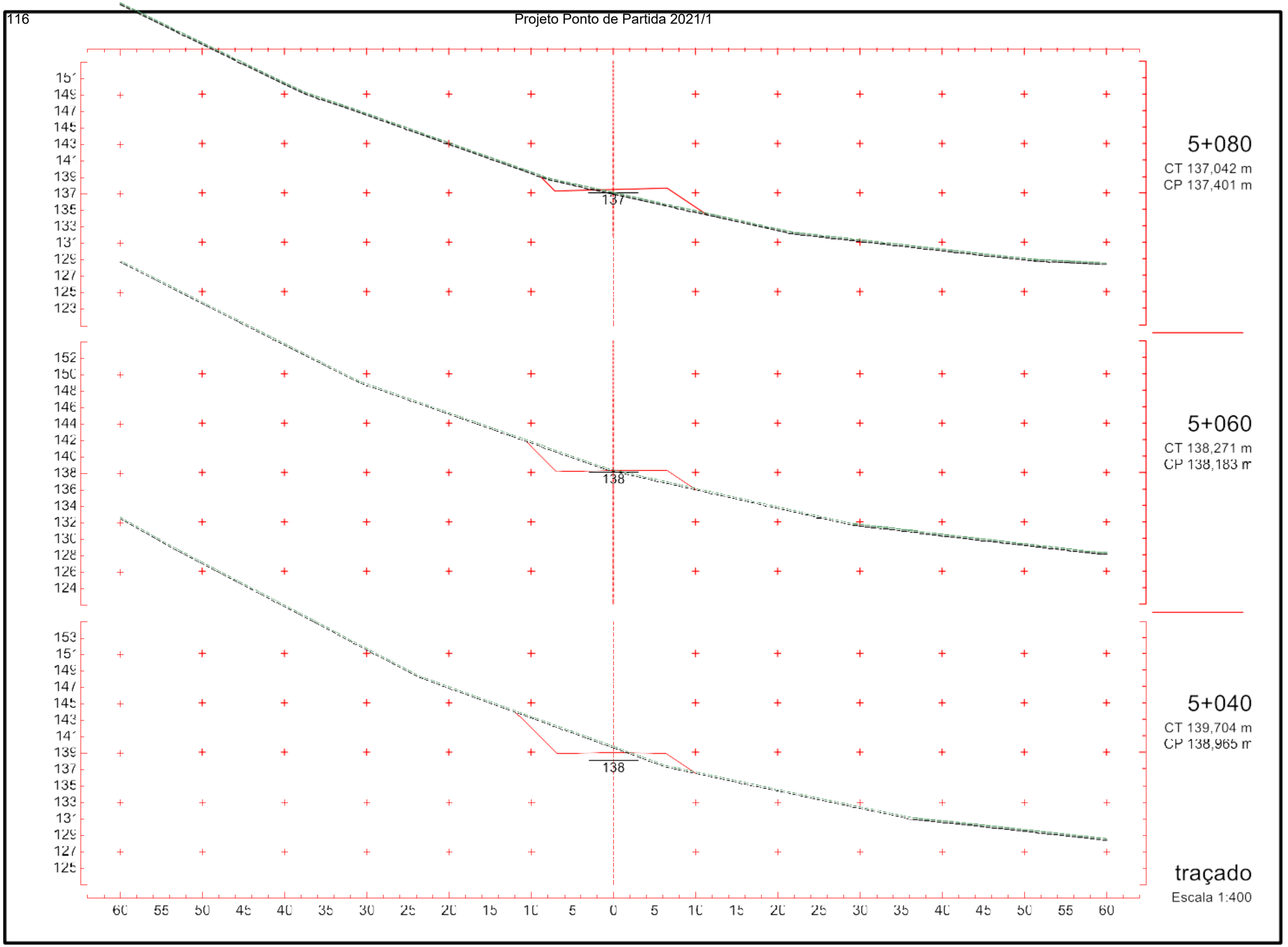


5+020
CT 140,687 m
CP 139,747 m

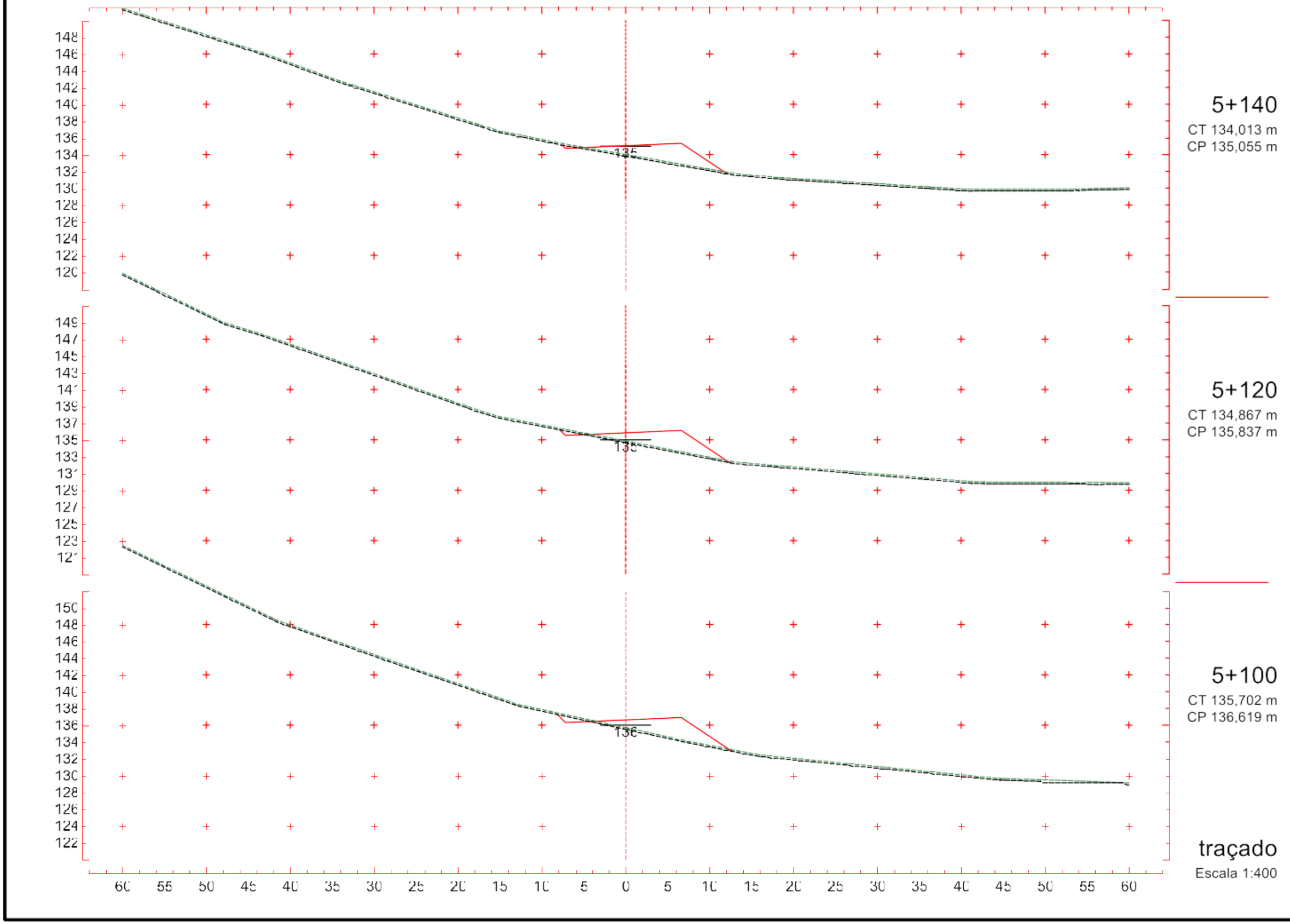
5+000
CT 141,607 m
CP 140,529 m

4+980
CT 141,214 m
CP 141,292 m

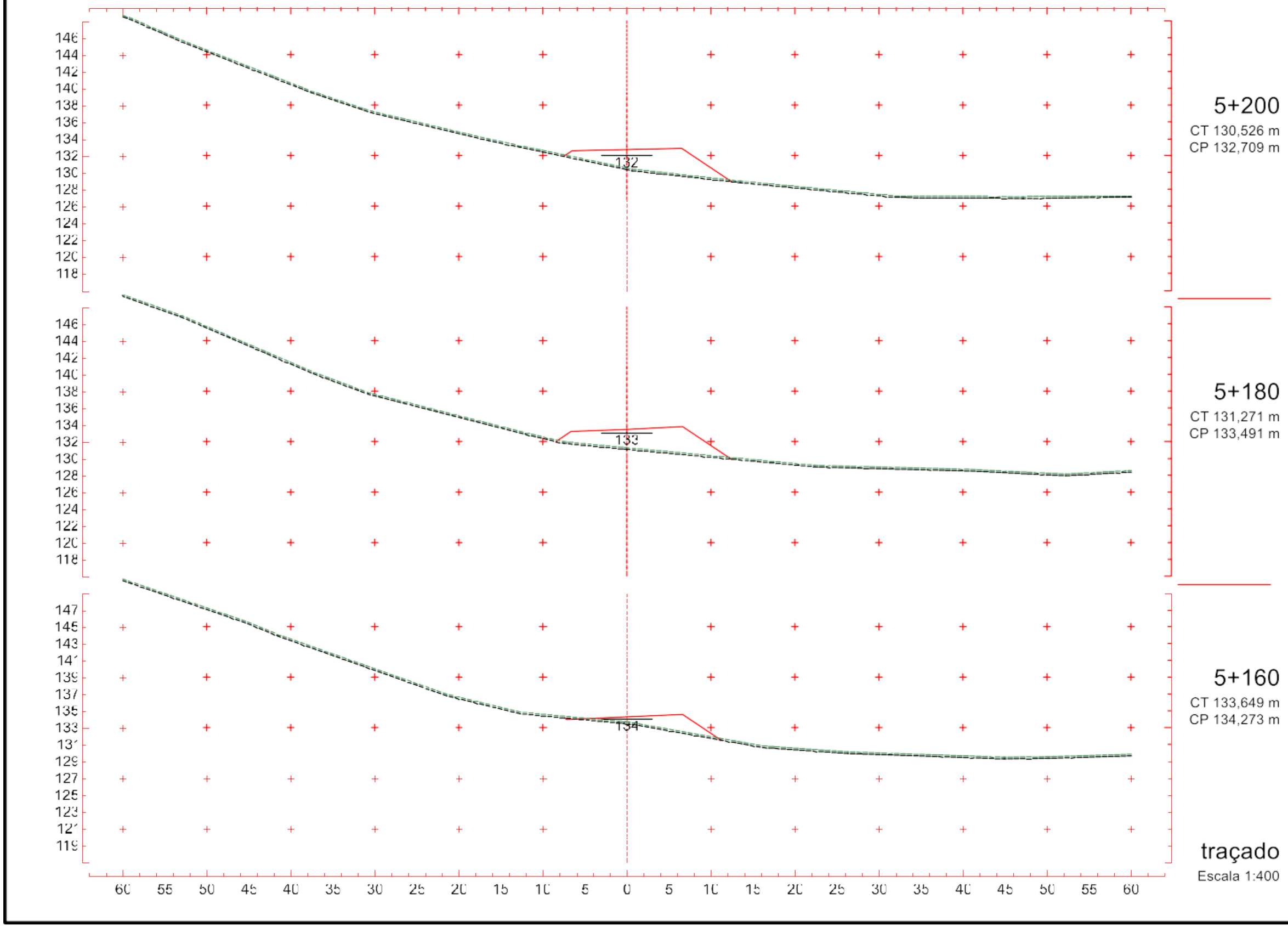
traçado
Escala 1:400


5+080
CT 137,042 m
CP 137,401 m
5+060
CT 138,271 m
CP 138,183 m
5+040
CT 139,704 m
CP 138,965 m
traçado
Escala 1:400

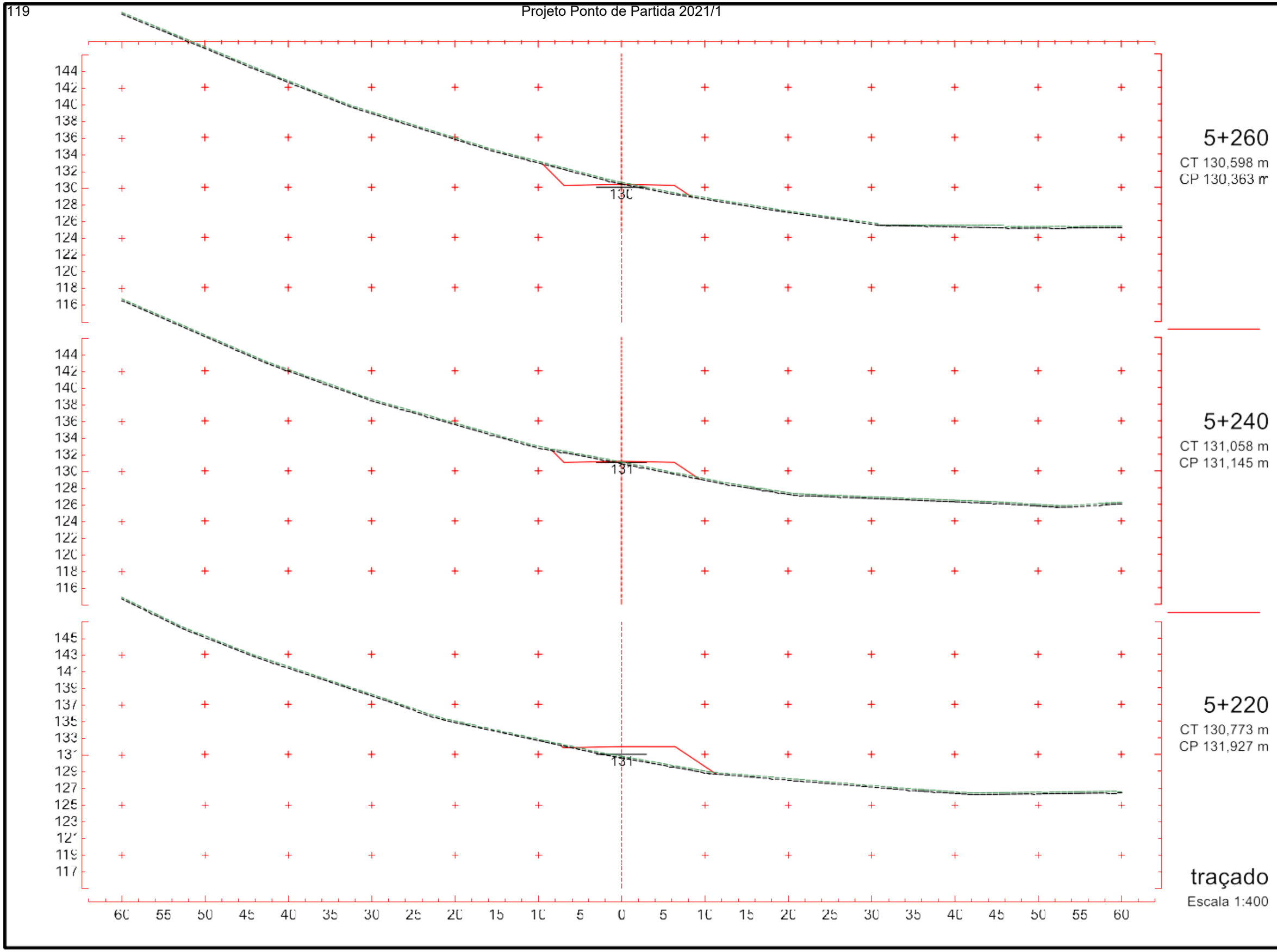
Projeto Ponto de Partida 2021/1



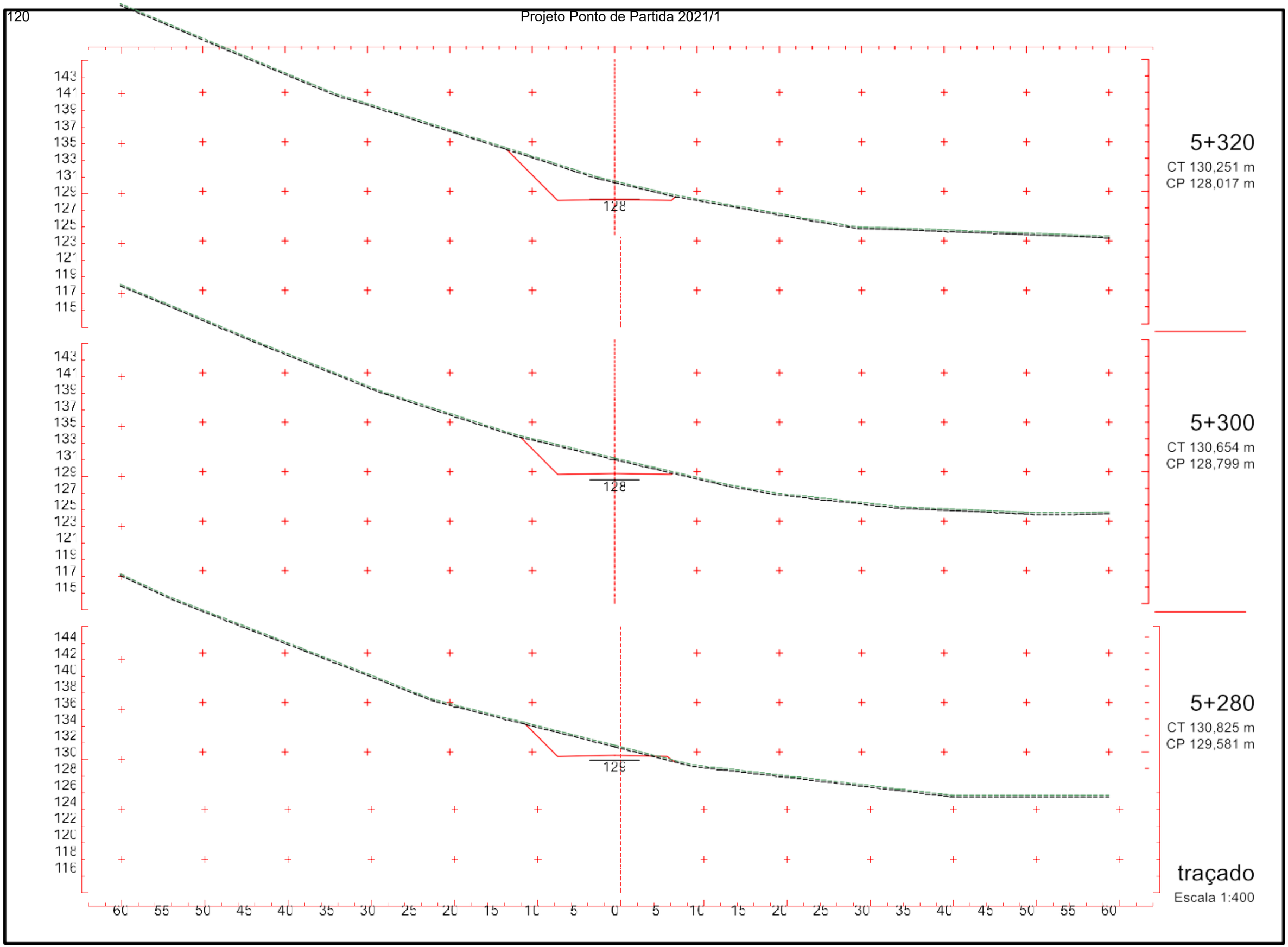
Projeto Ponto de Partida 2021/1



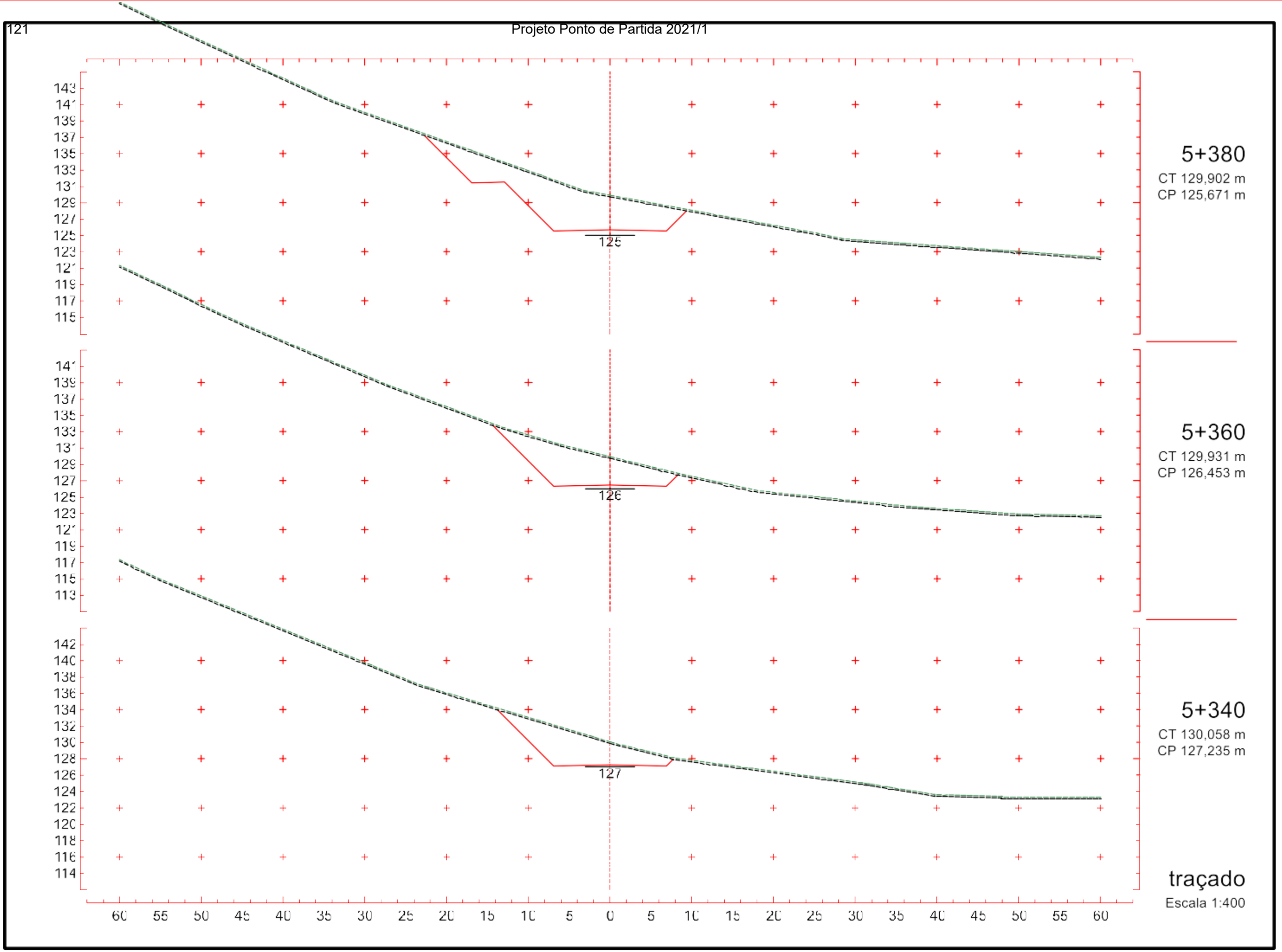
Projeto Ponto de Partida 2021/1



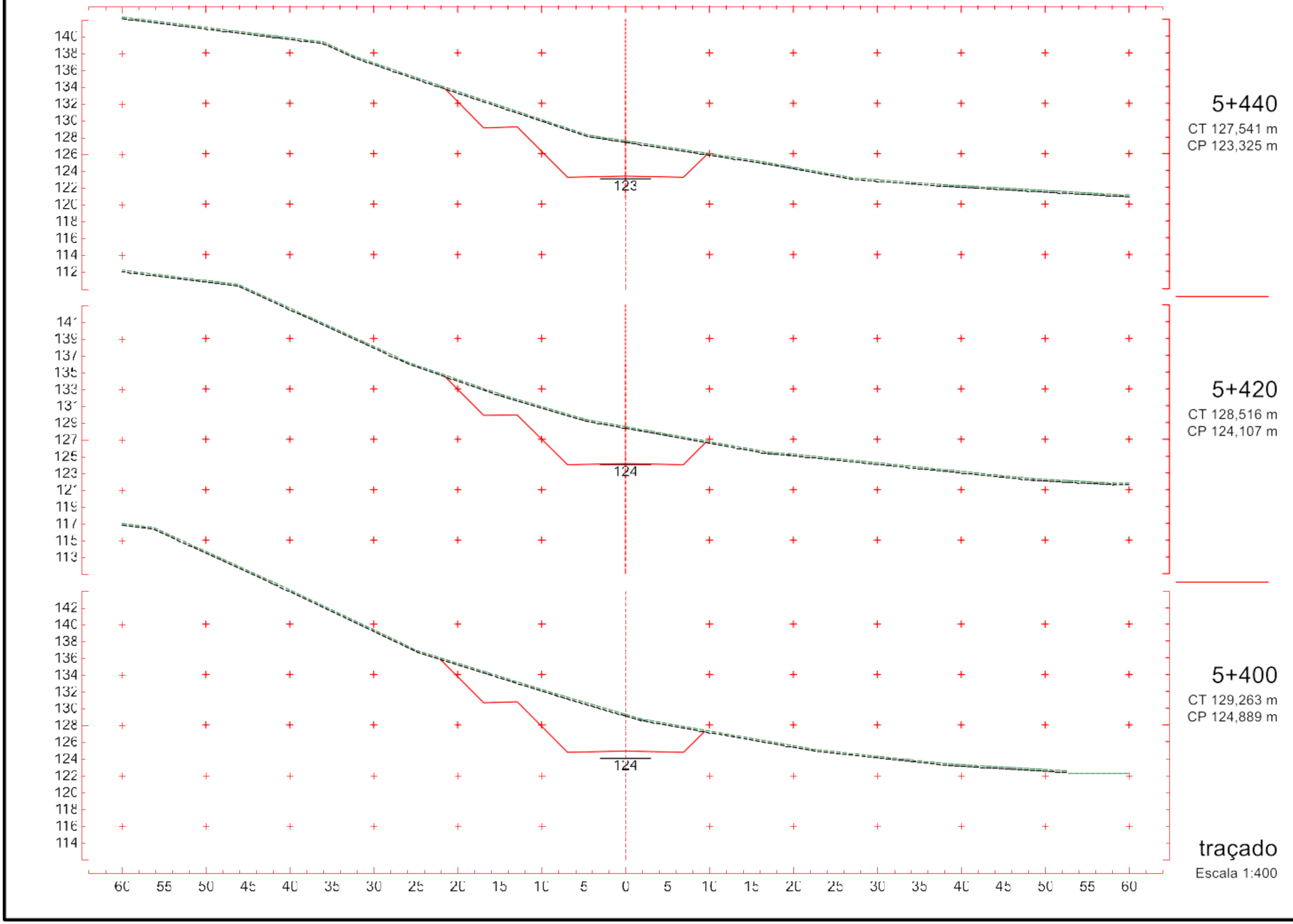
Projeto Ponto de Partida 2021/1



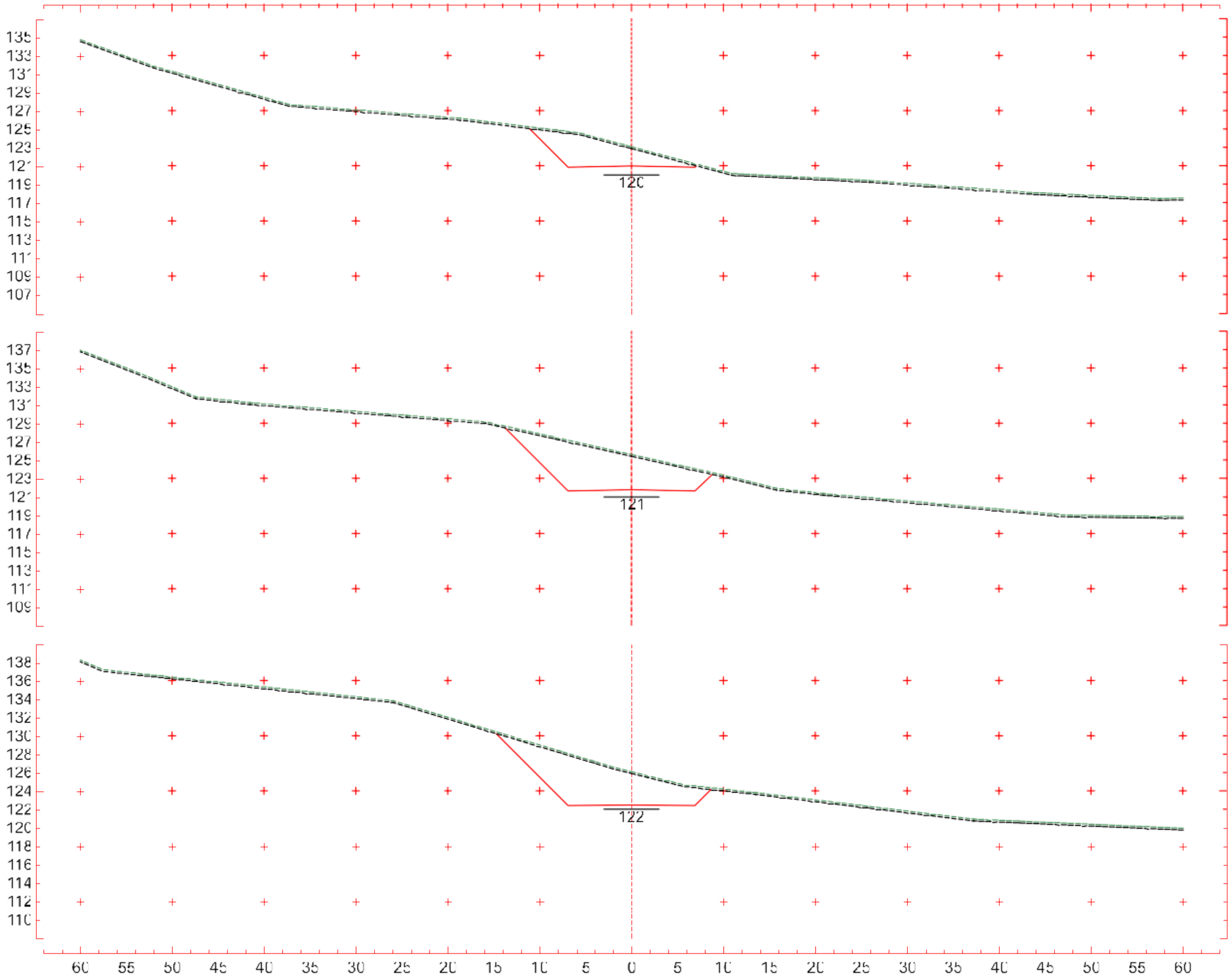
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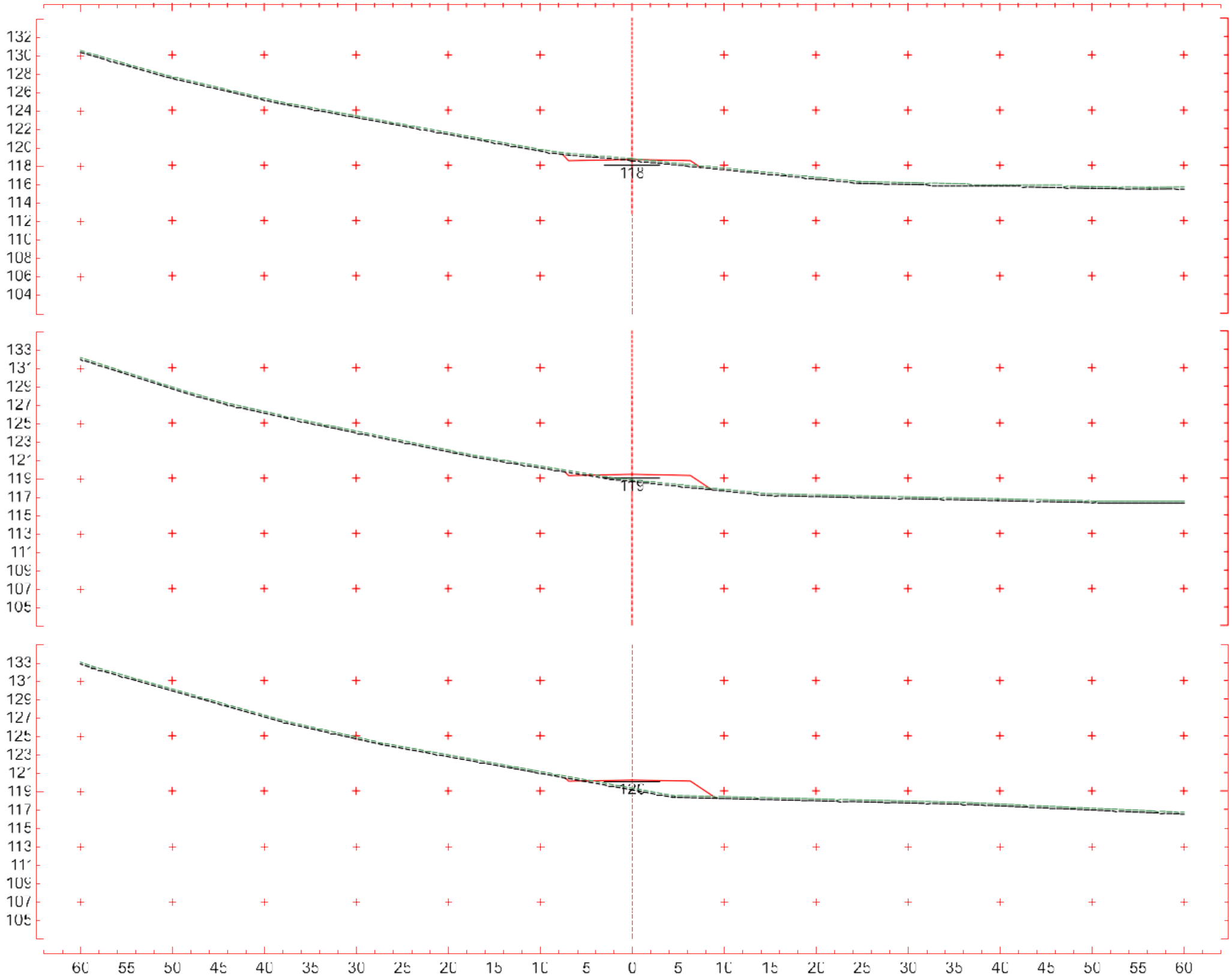
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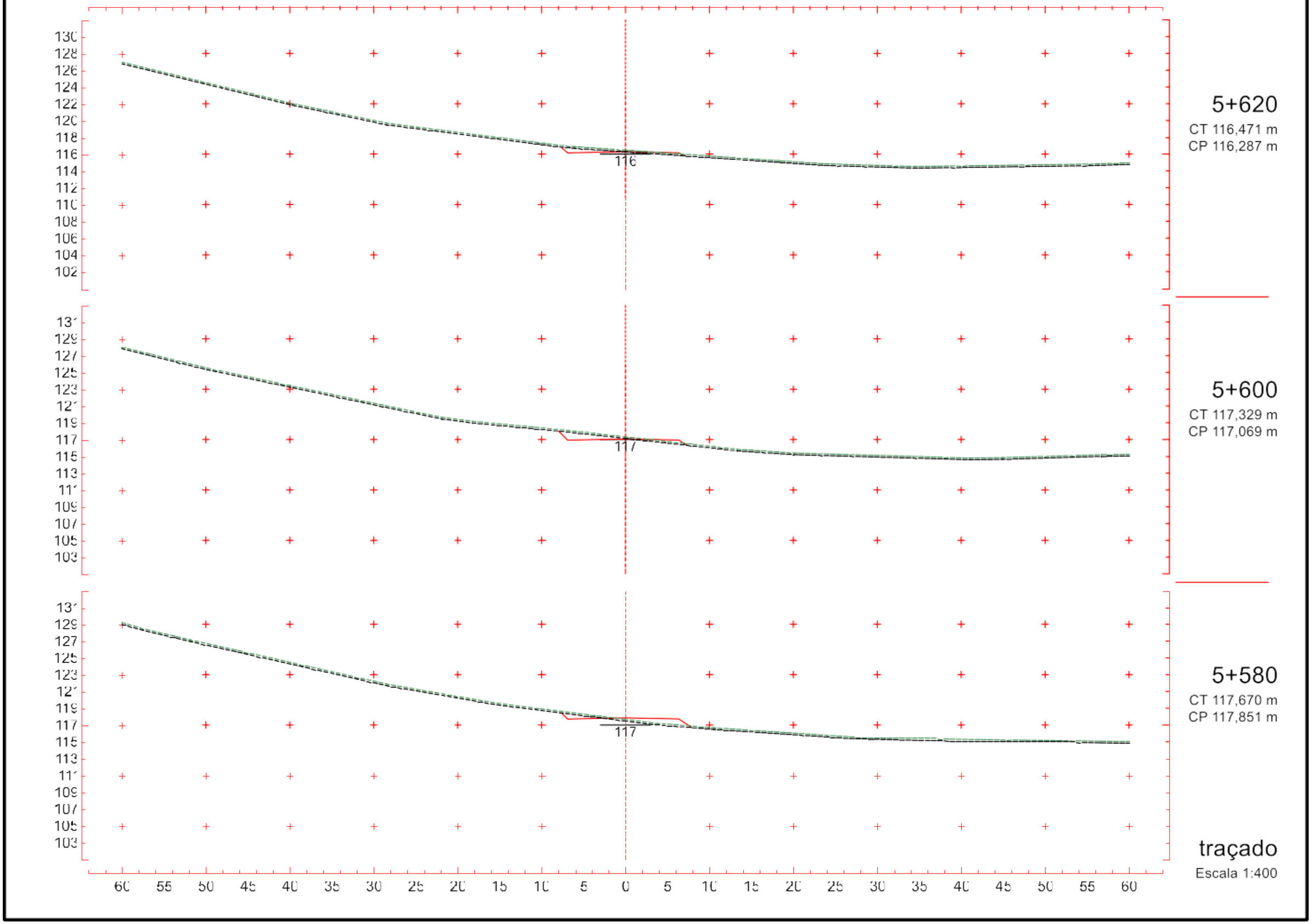
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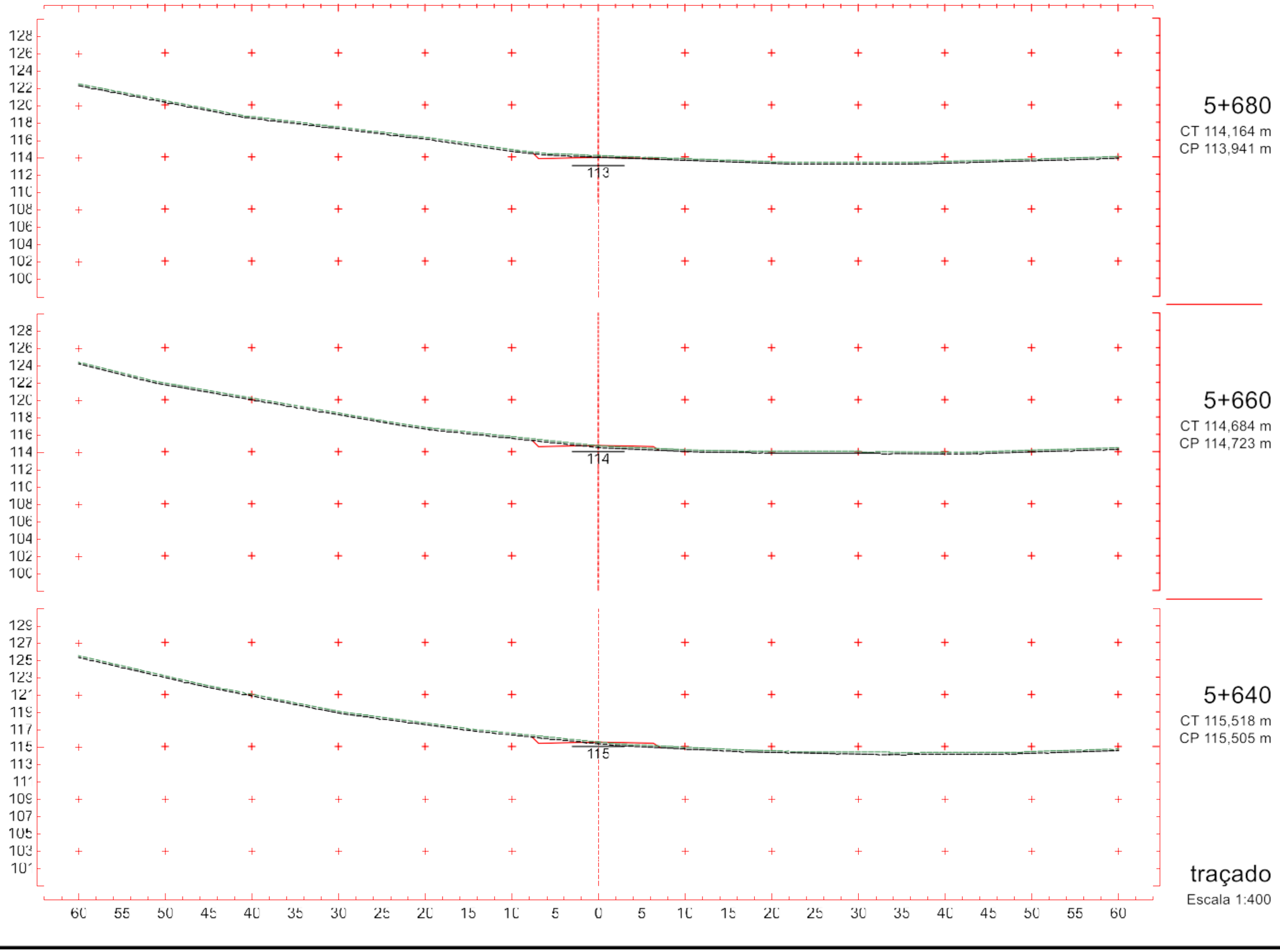
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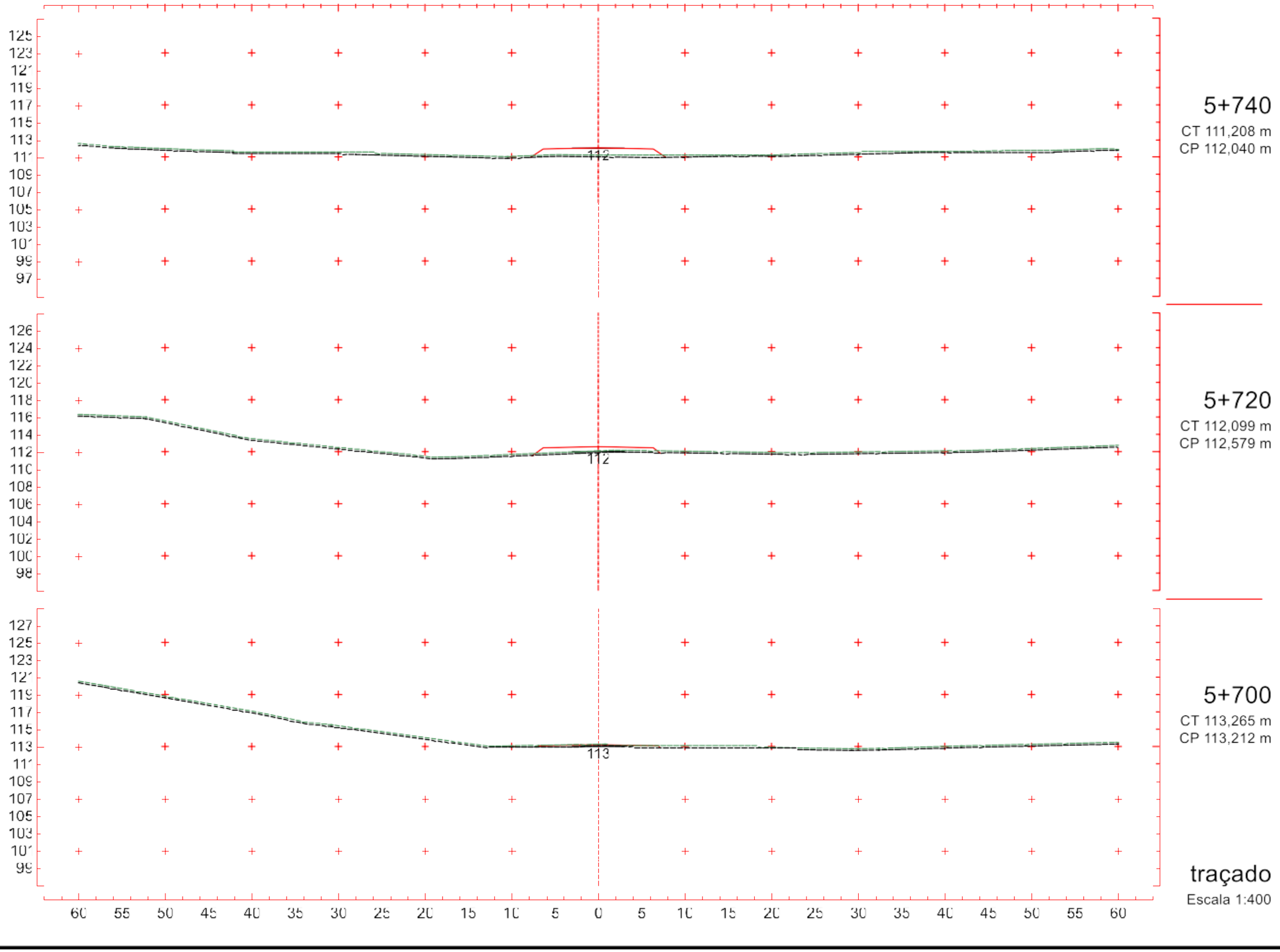
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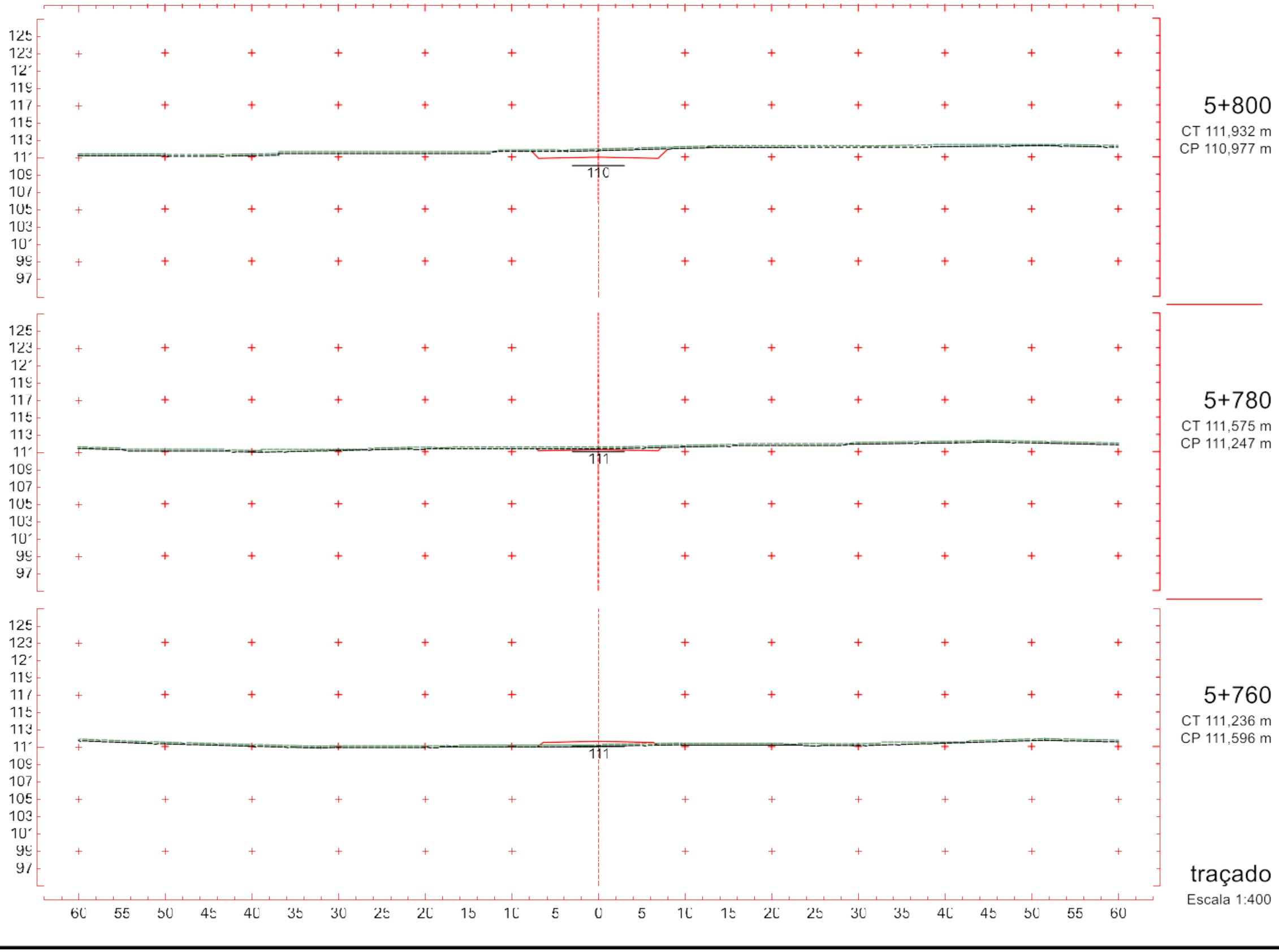
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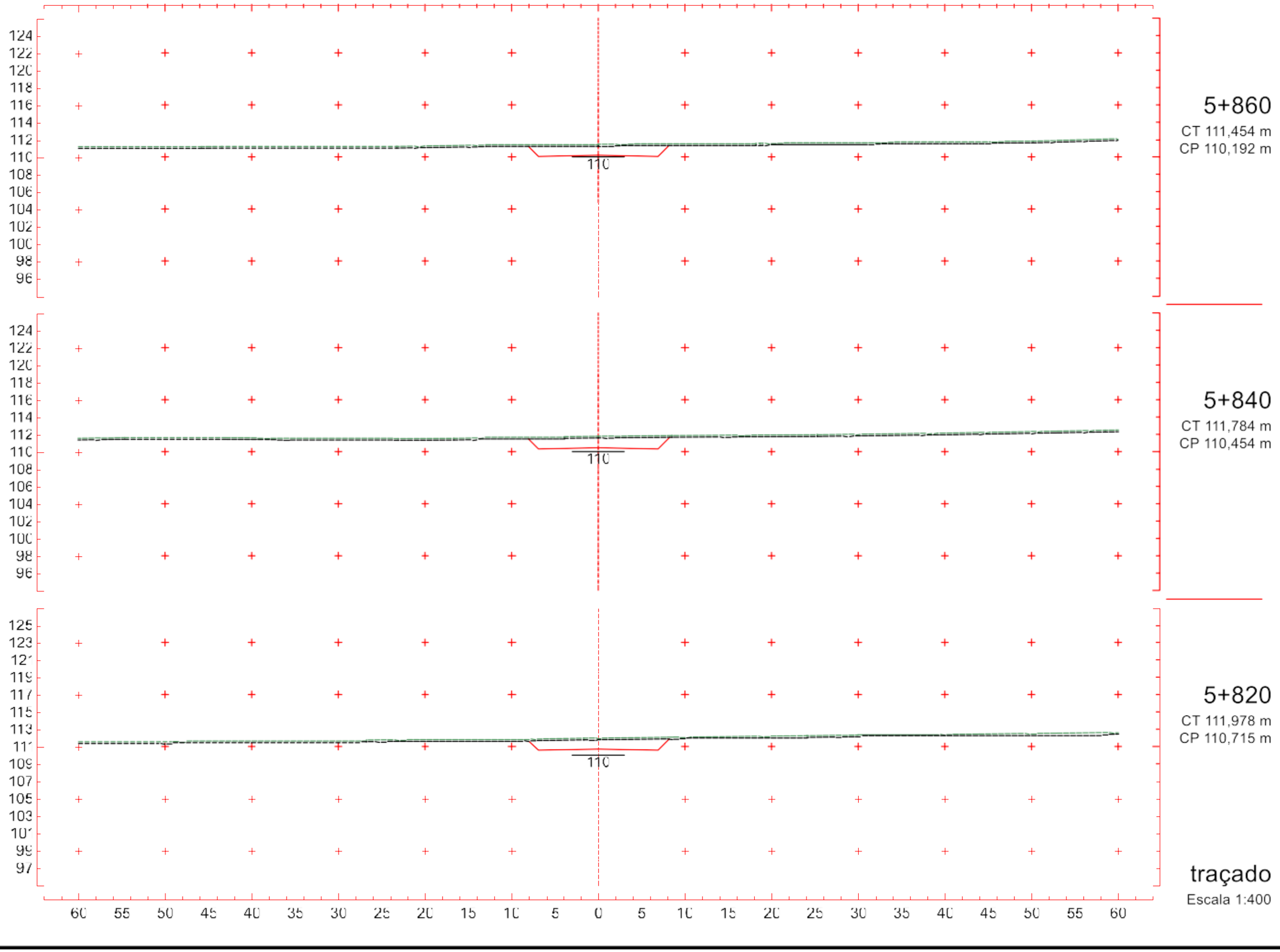
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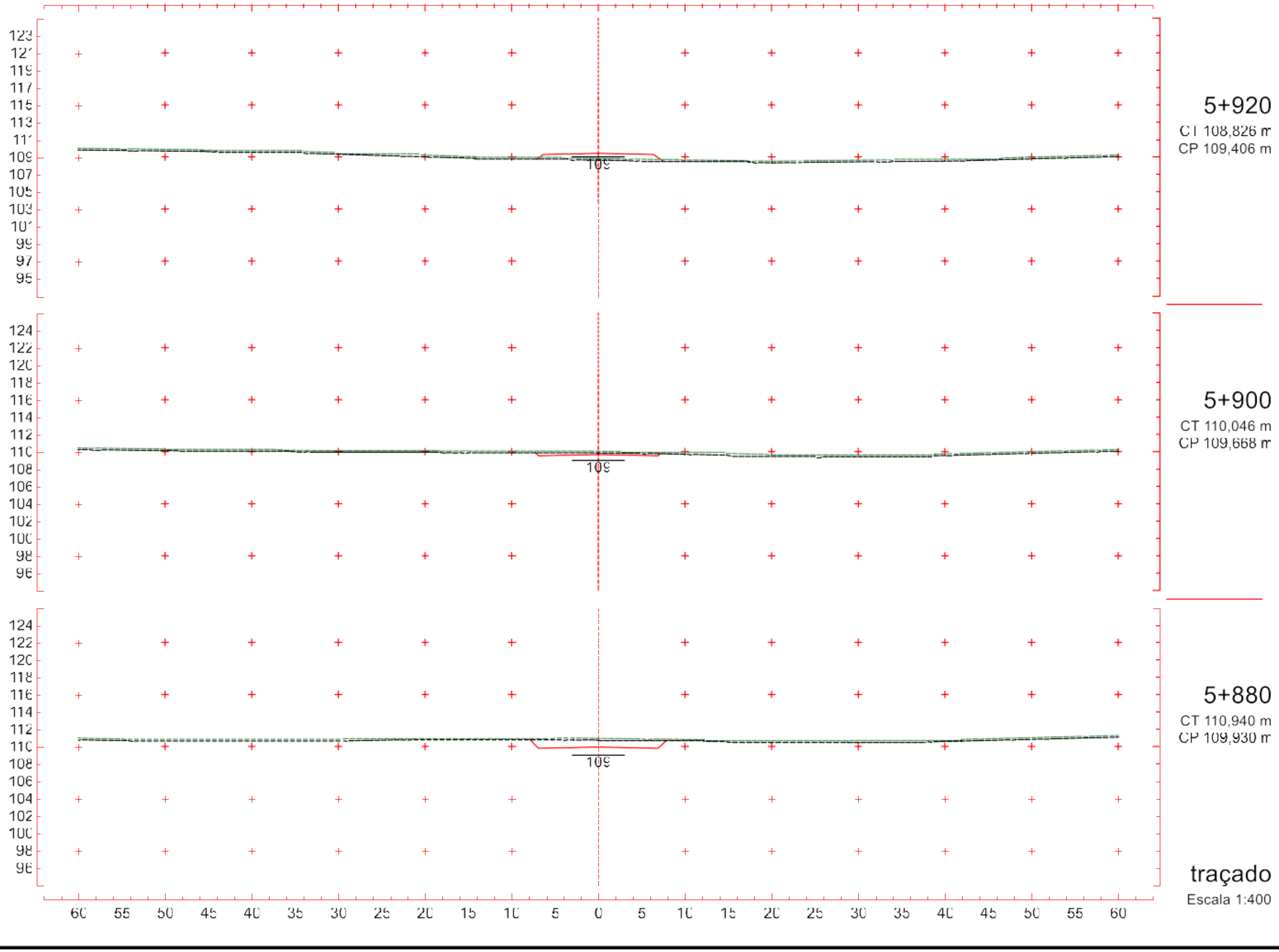
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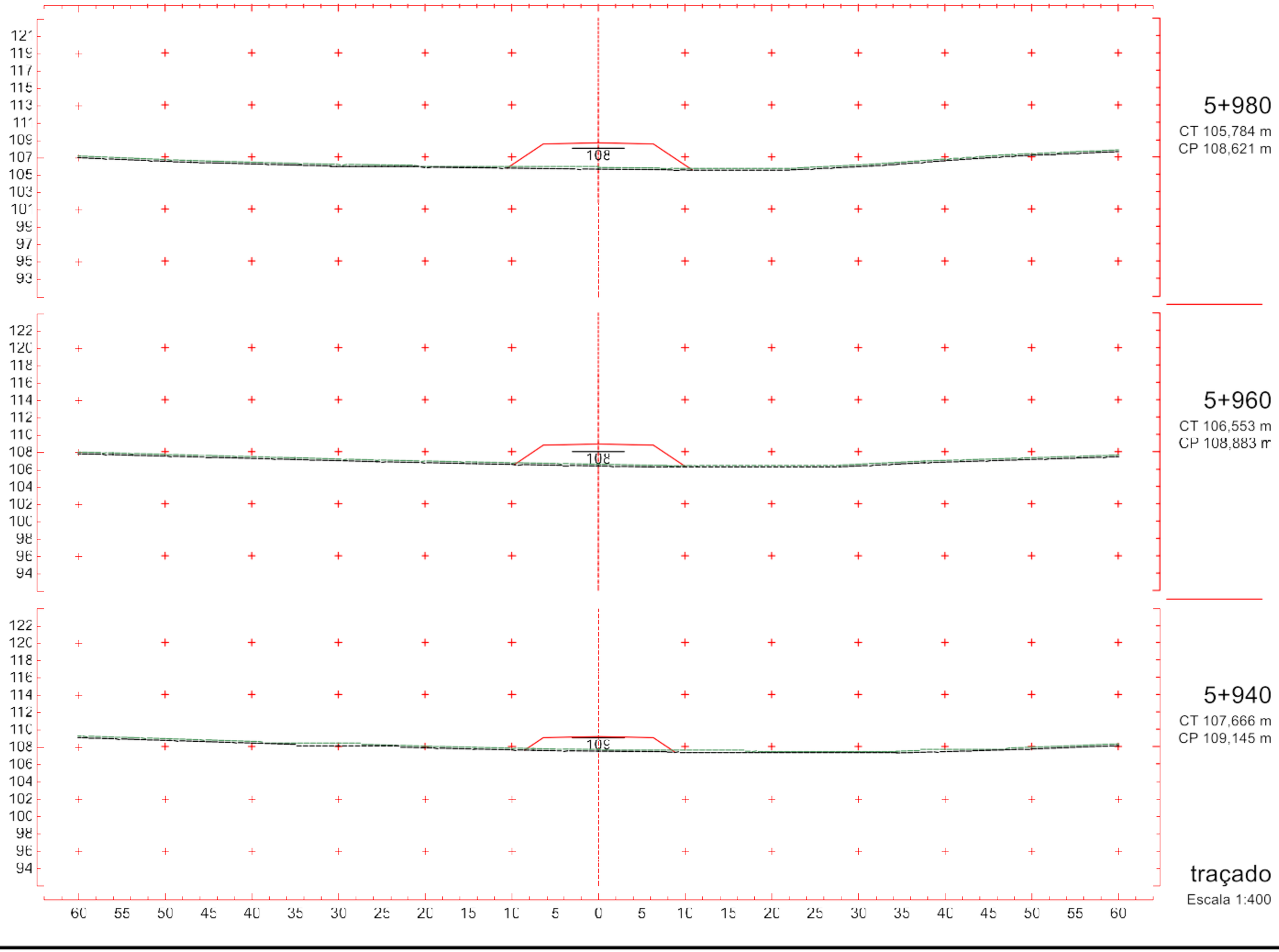
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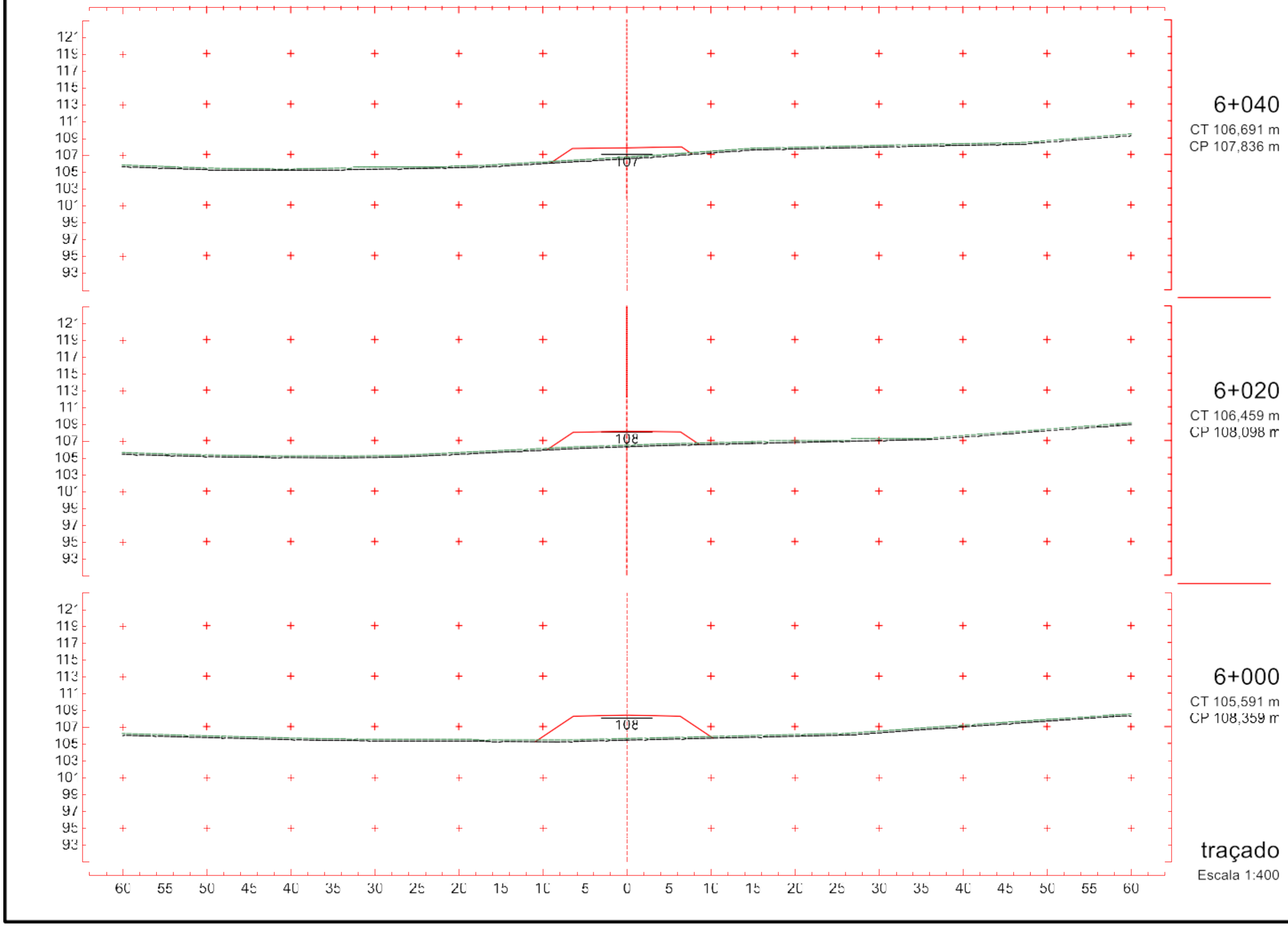
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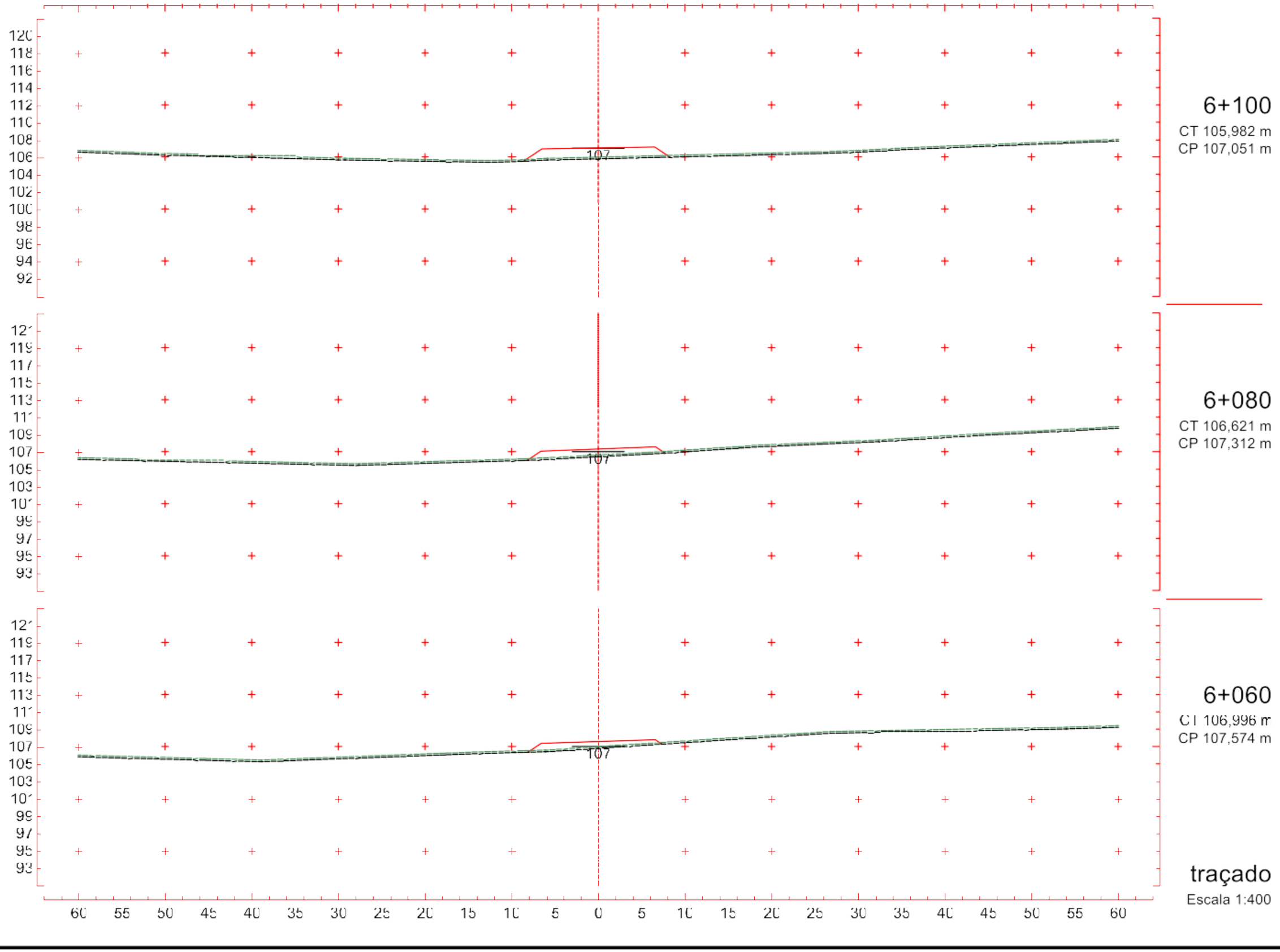
Projeto Ponto de Partida 2021/1



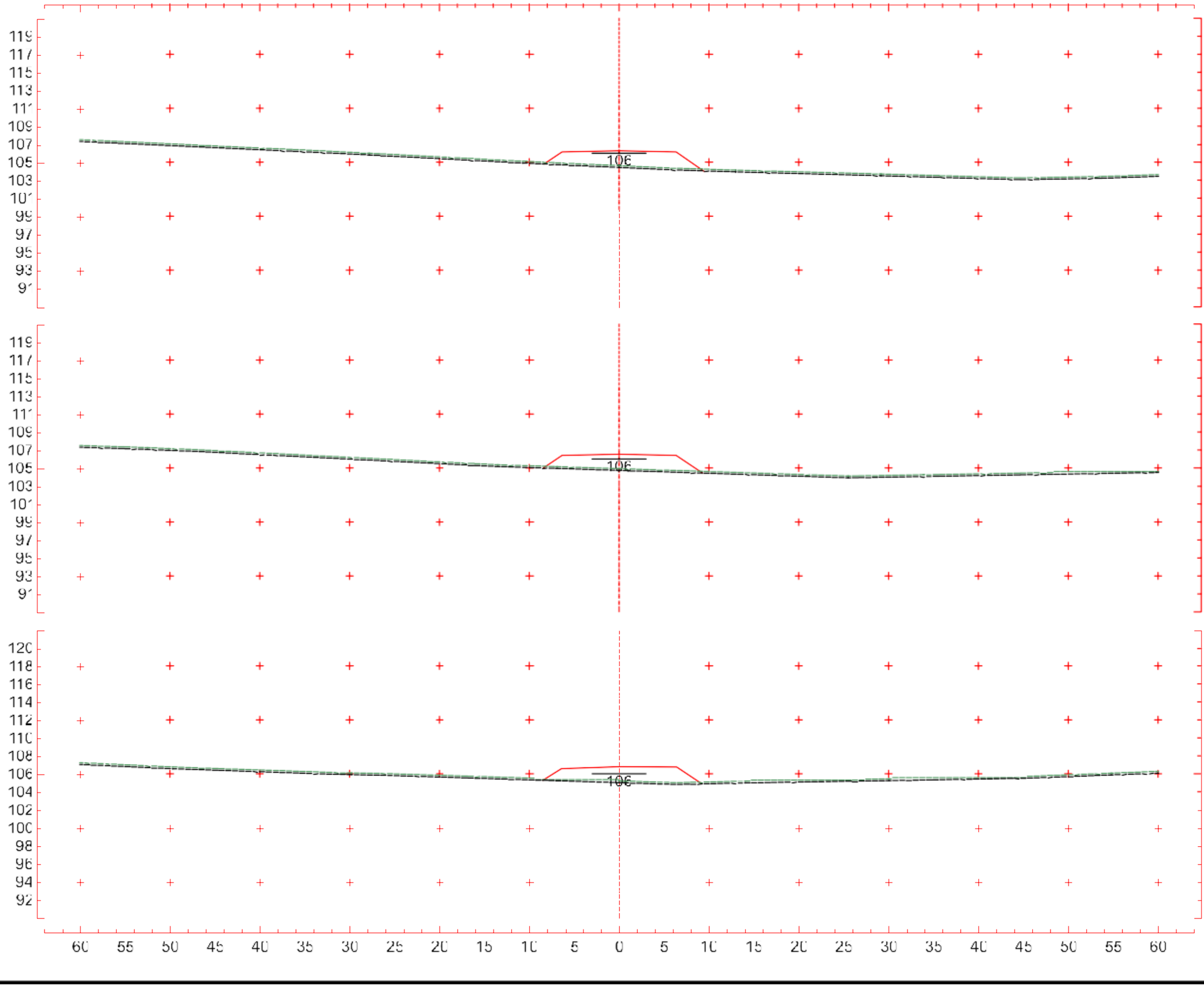
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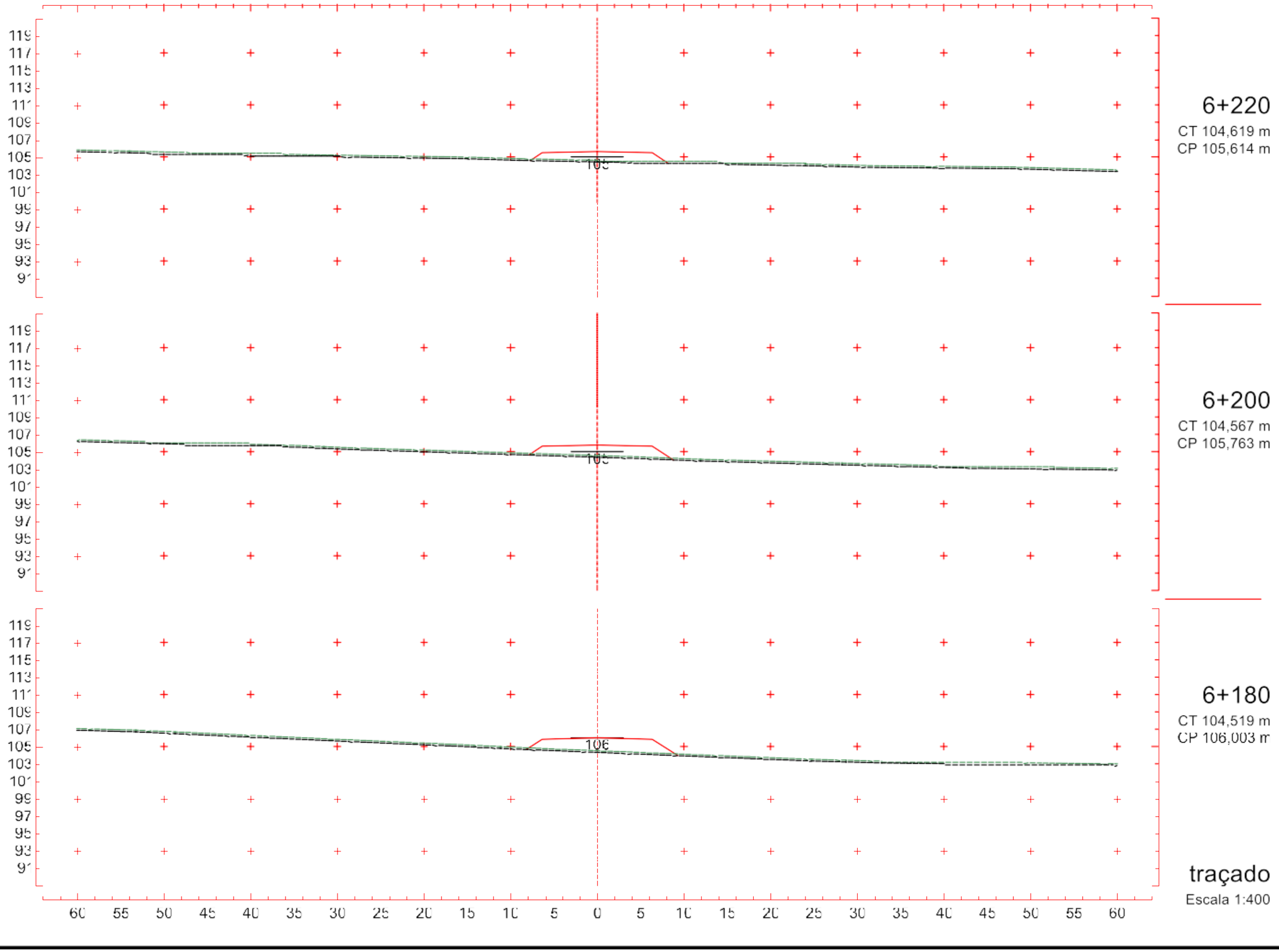
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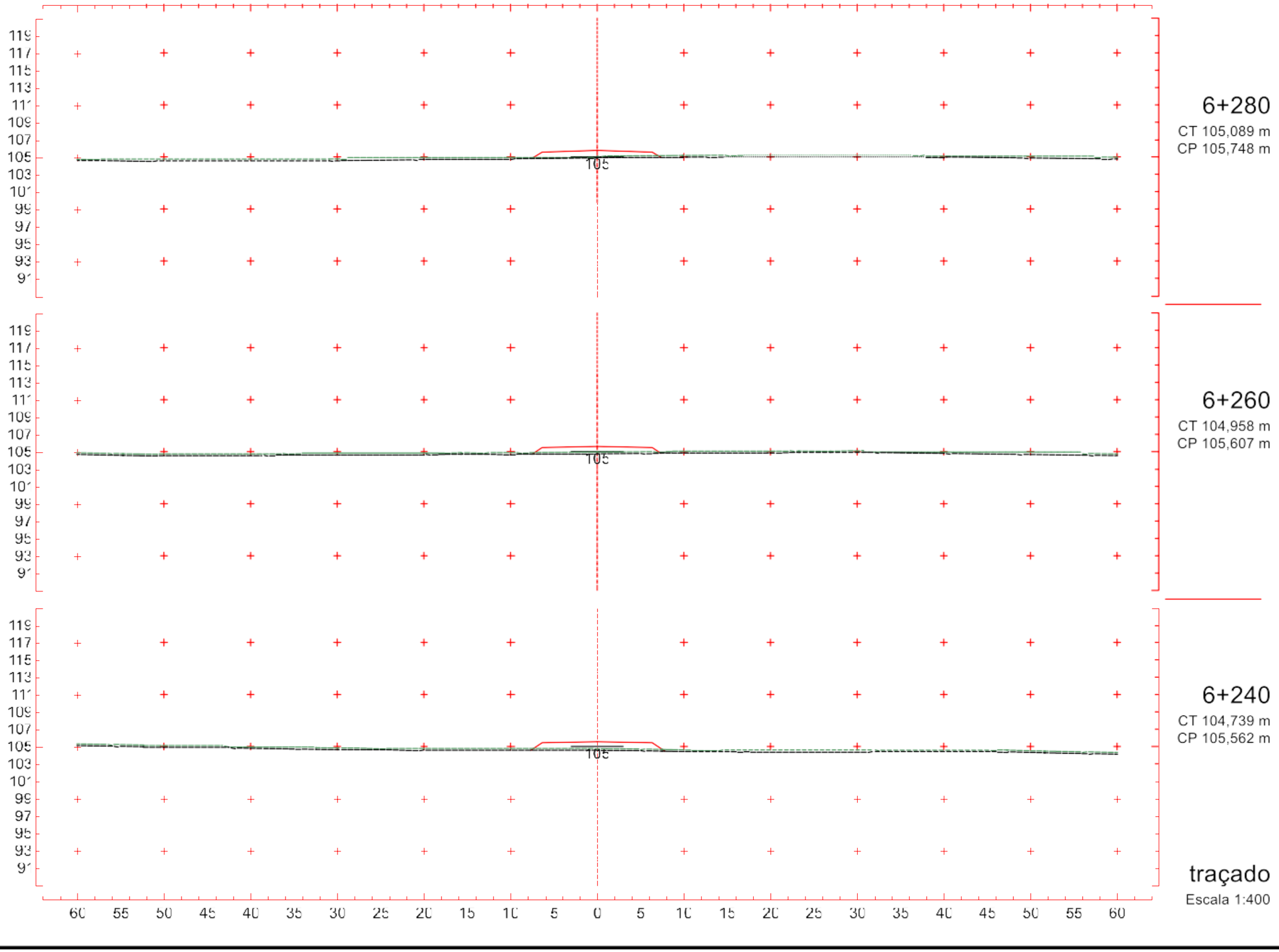
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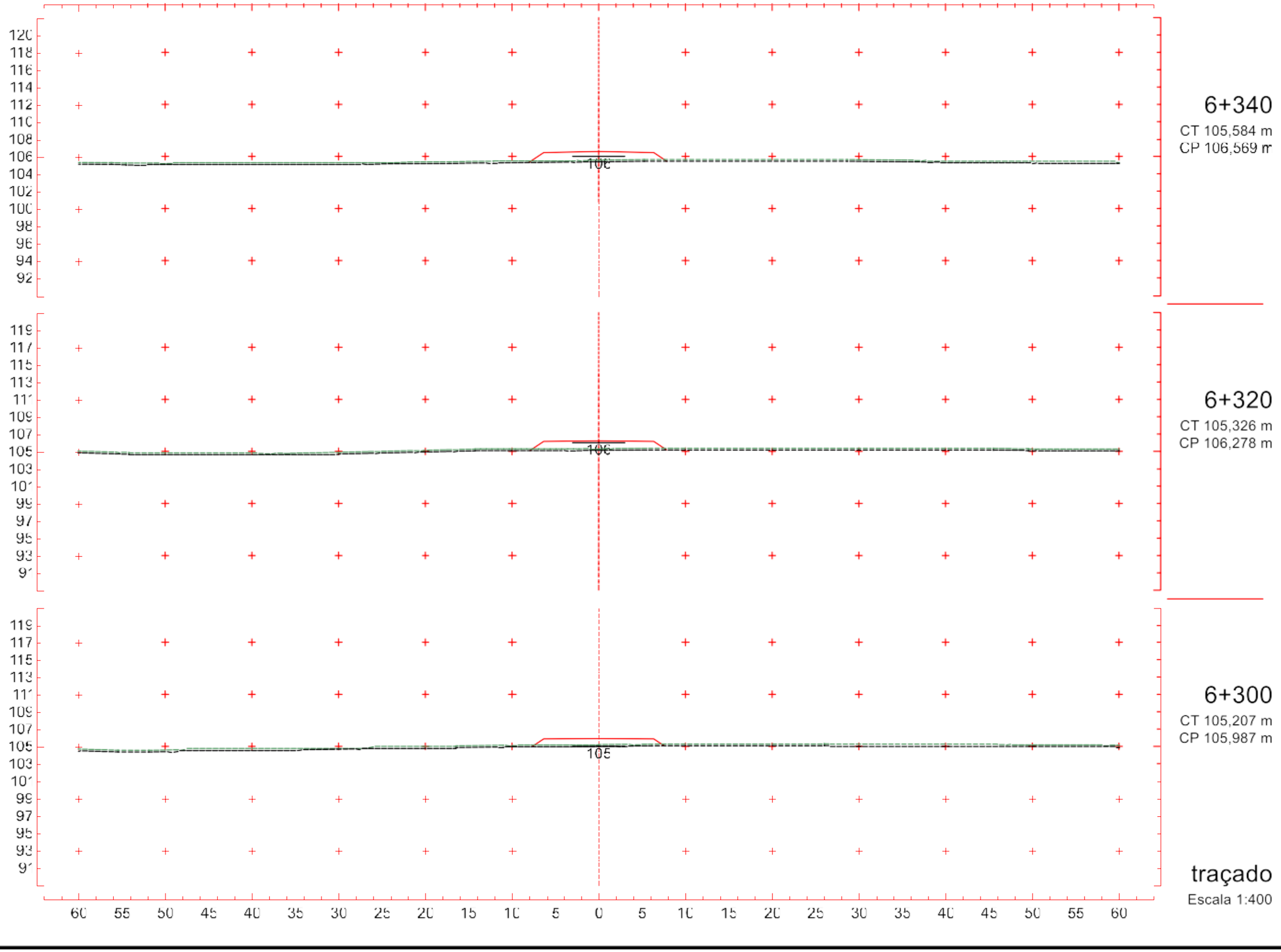
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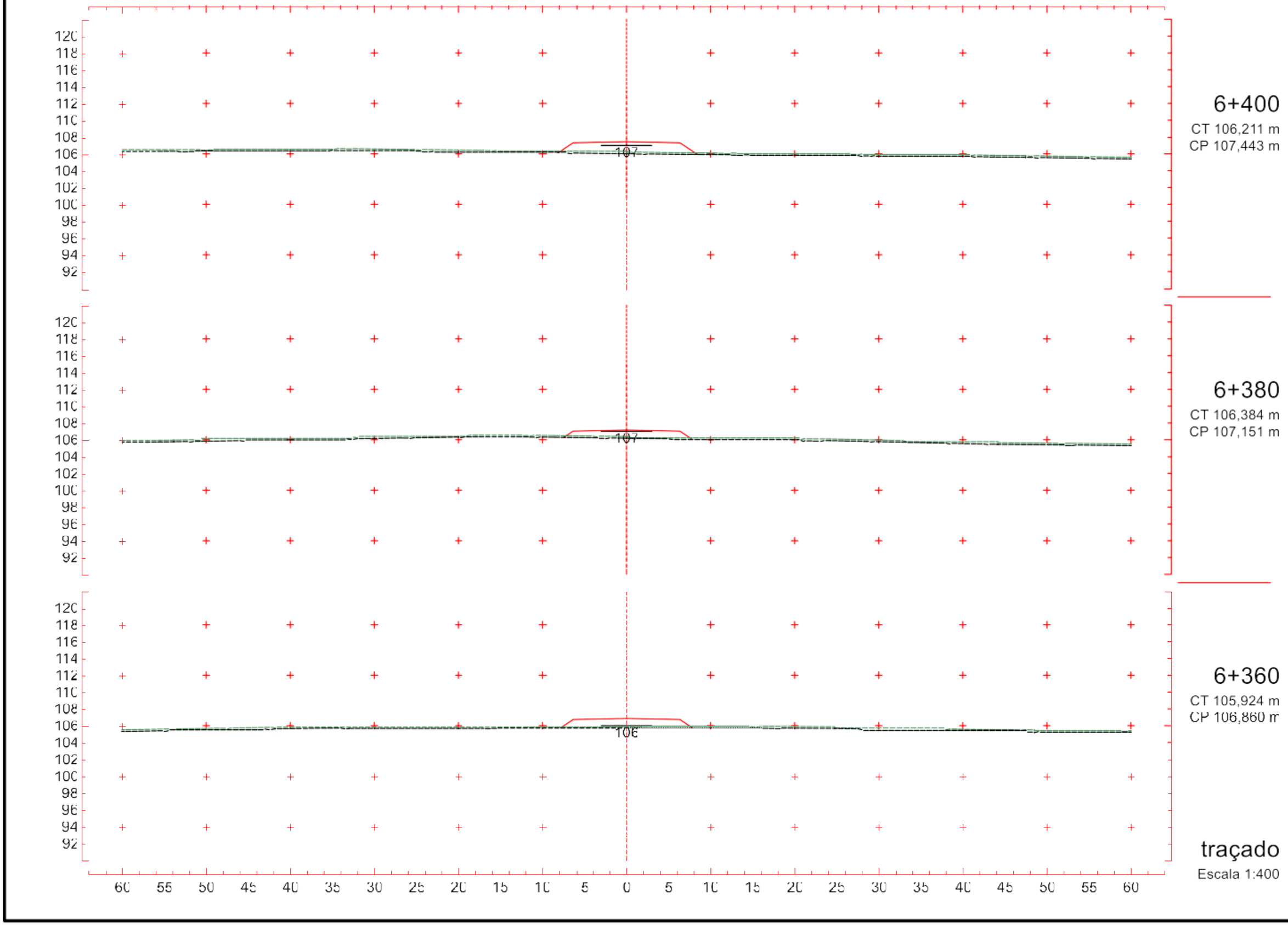


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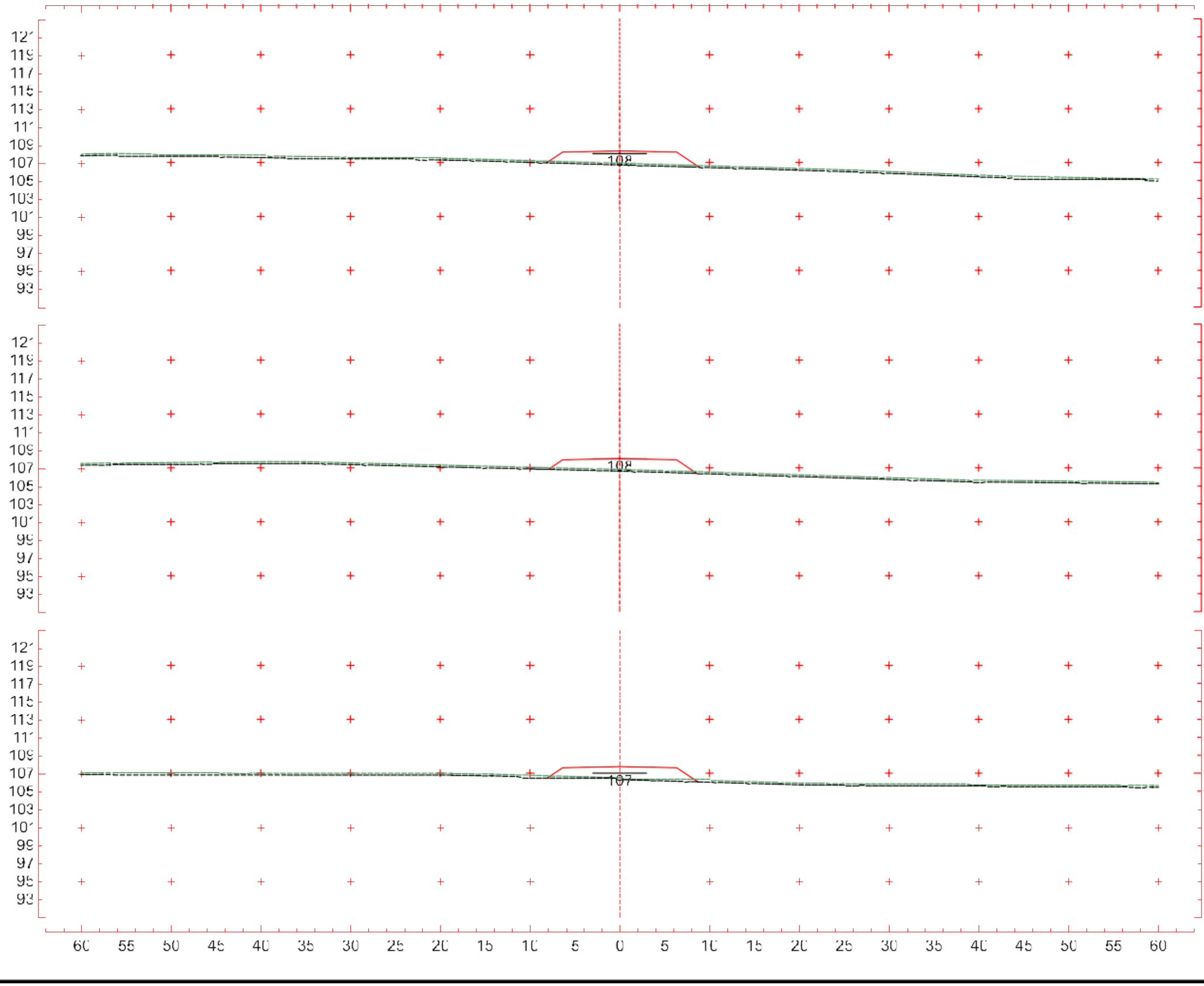


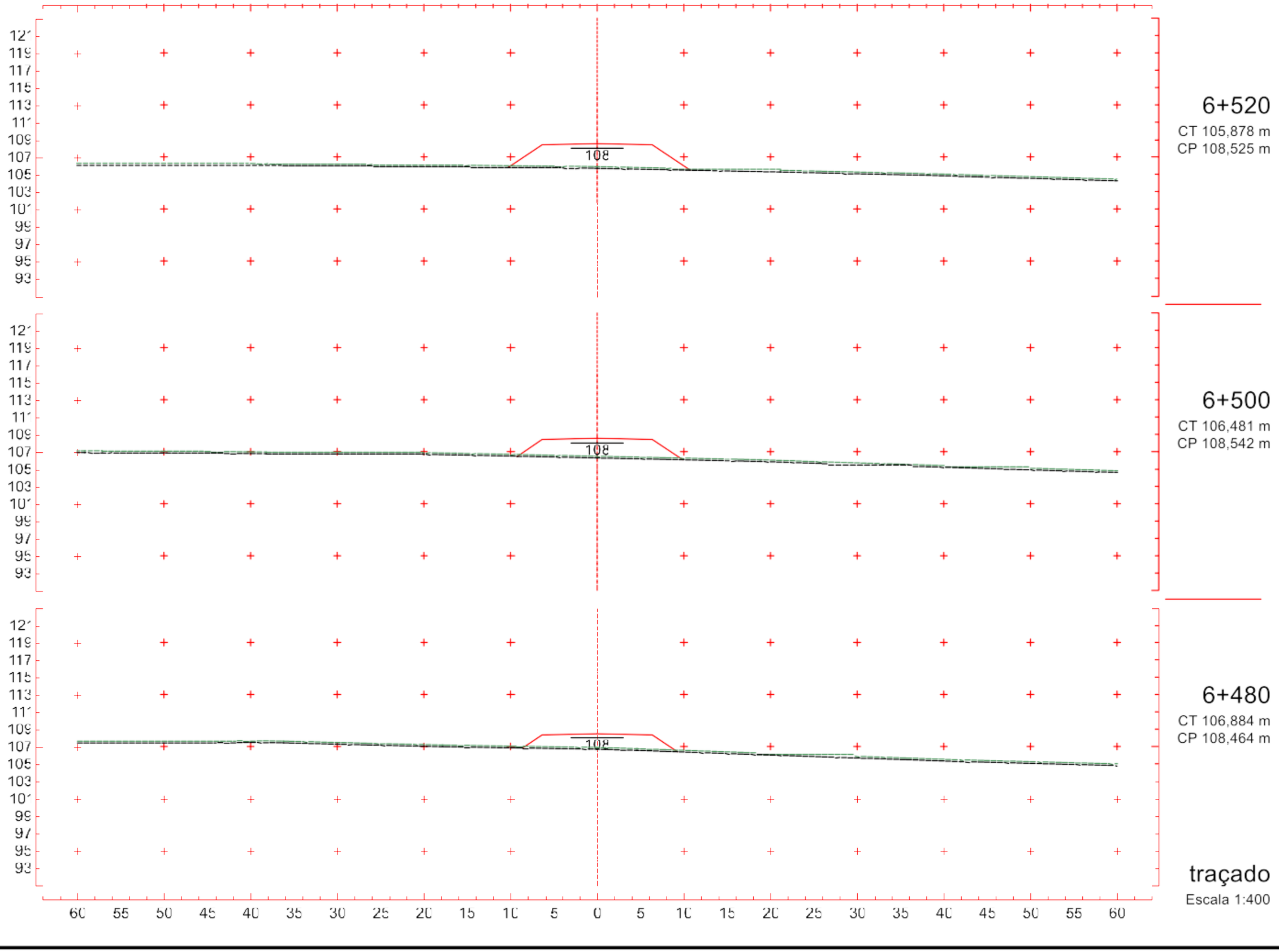
Projeto Ponto de Partida 2021/1



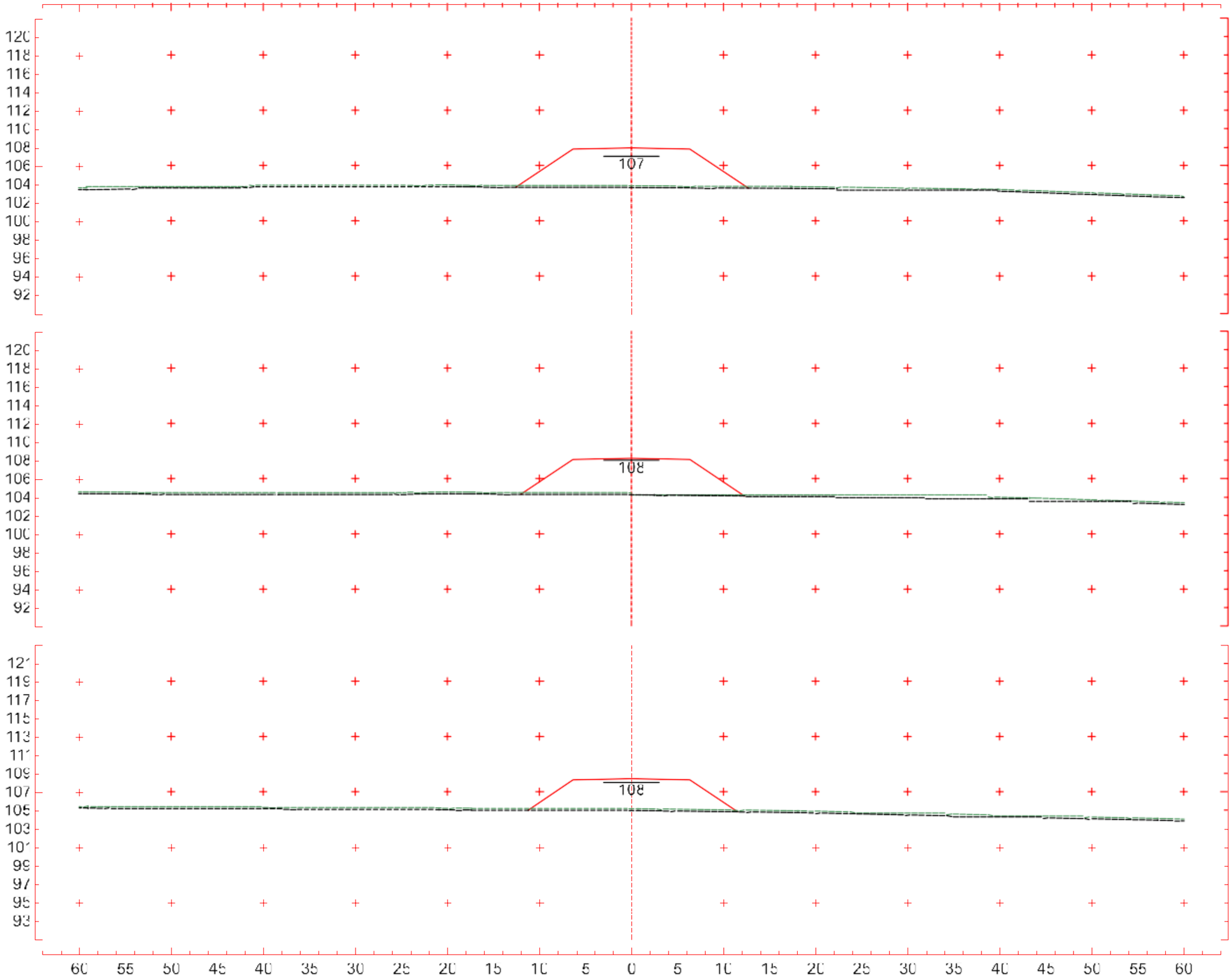

6+400
CT 106,211 m
CP 107,443 m
6+380
CT 106,384 m
CP 107,151 m
6+360
CT 105,924 m
CP 106,860 m
traçado
Escala 1:400

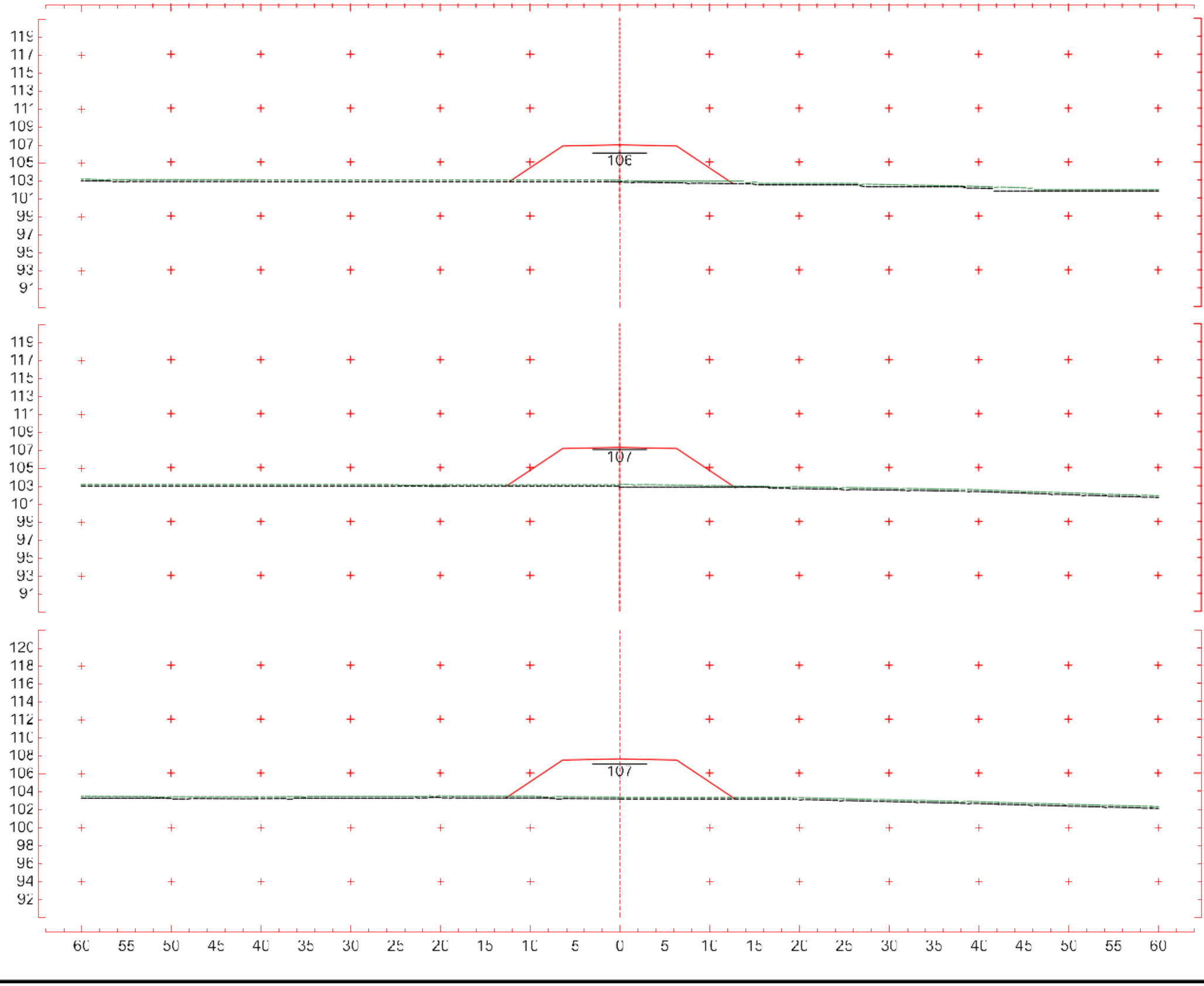
Projeto Ponto de Partida 2021/1

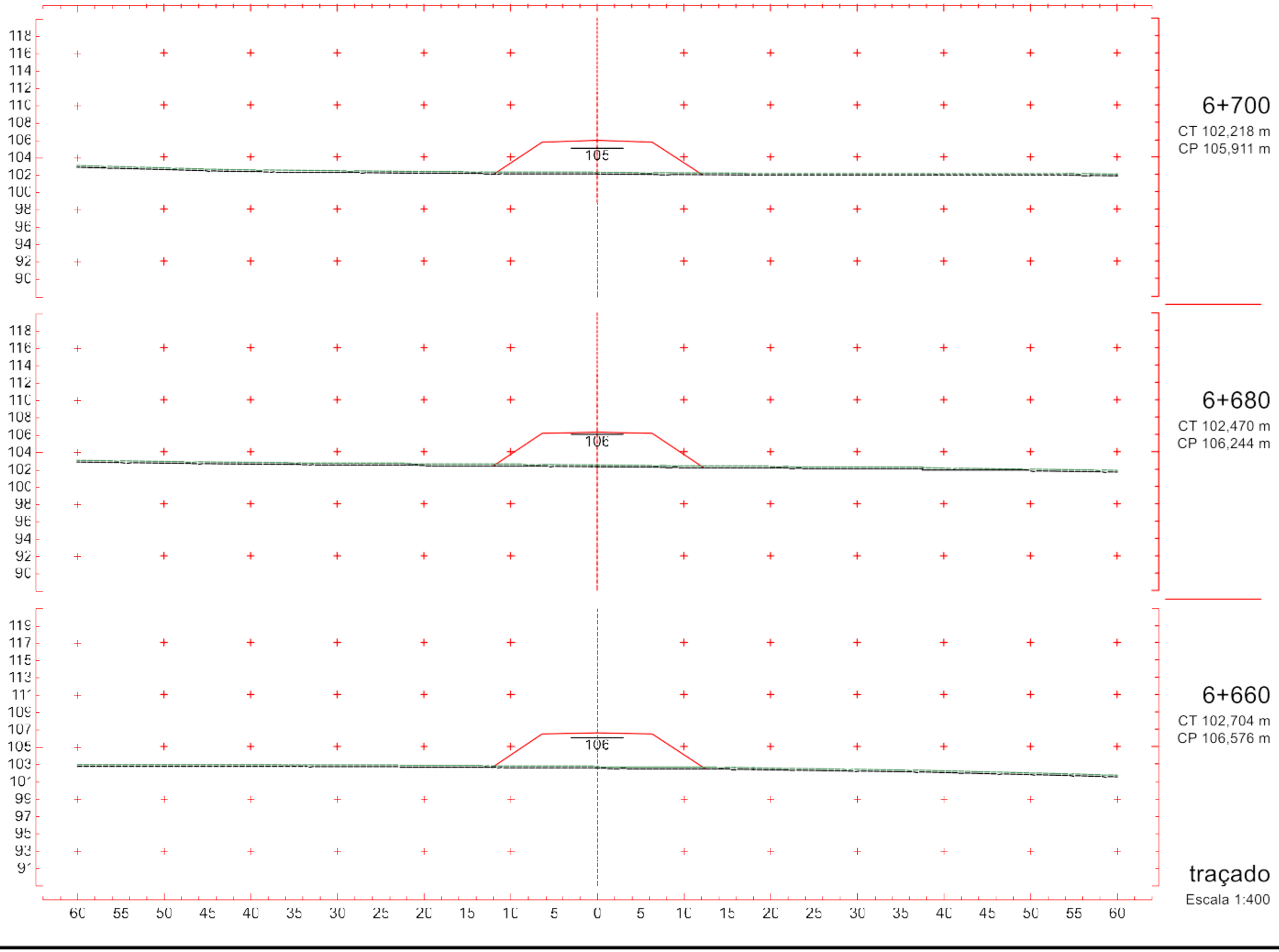


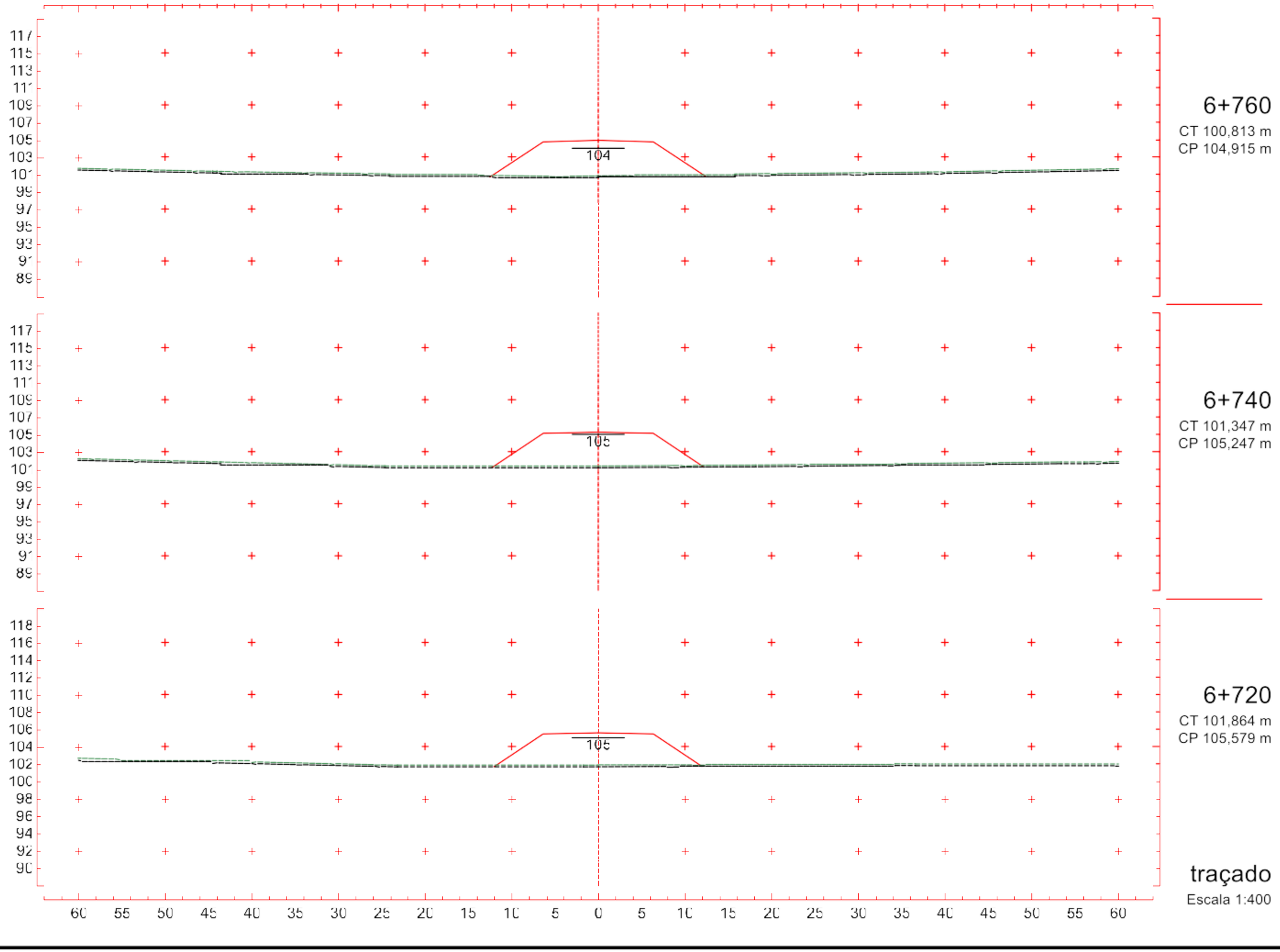

6+520
CT 105,878 m
CP 108,525 m
6+500
CT 106,481 m
CP 108,542 m
6+480
CT 106,884 m
CP 108,464 m
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

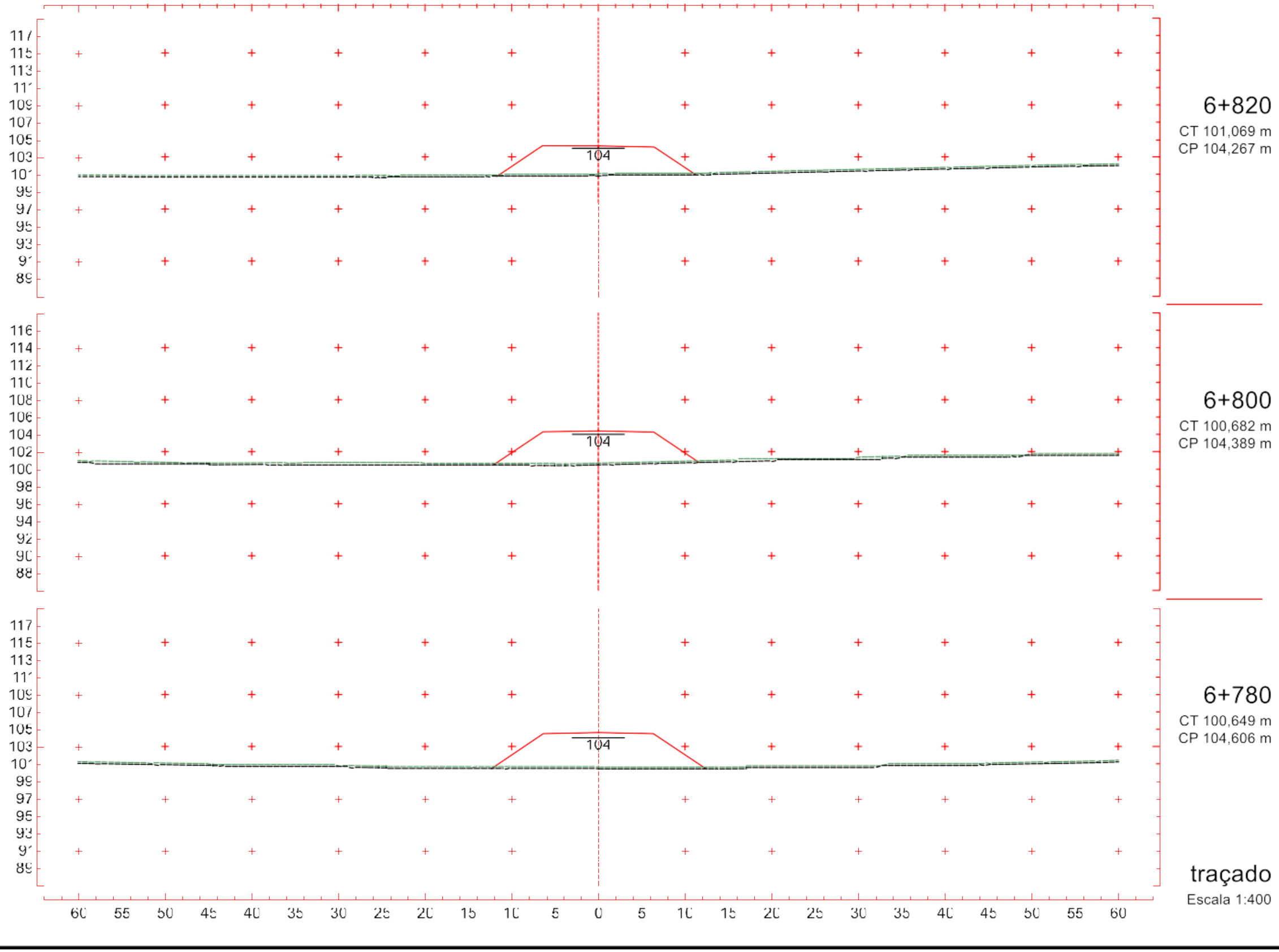


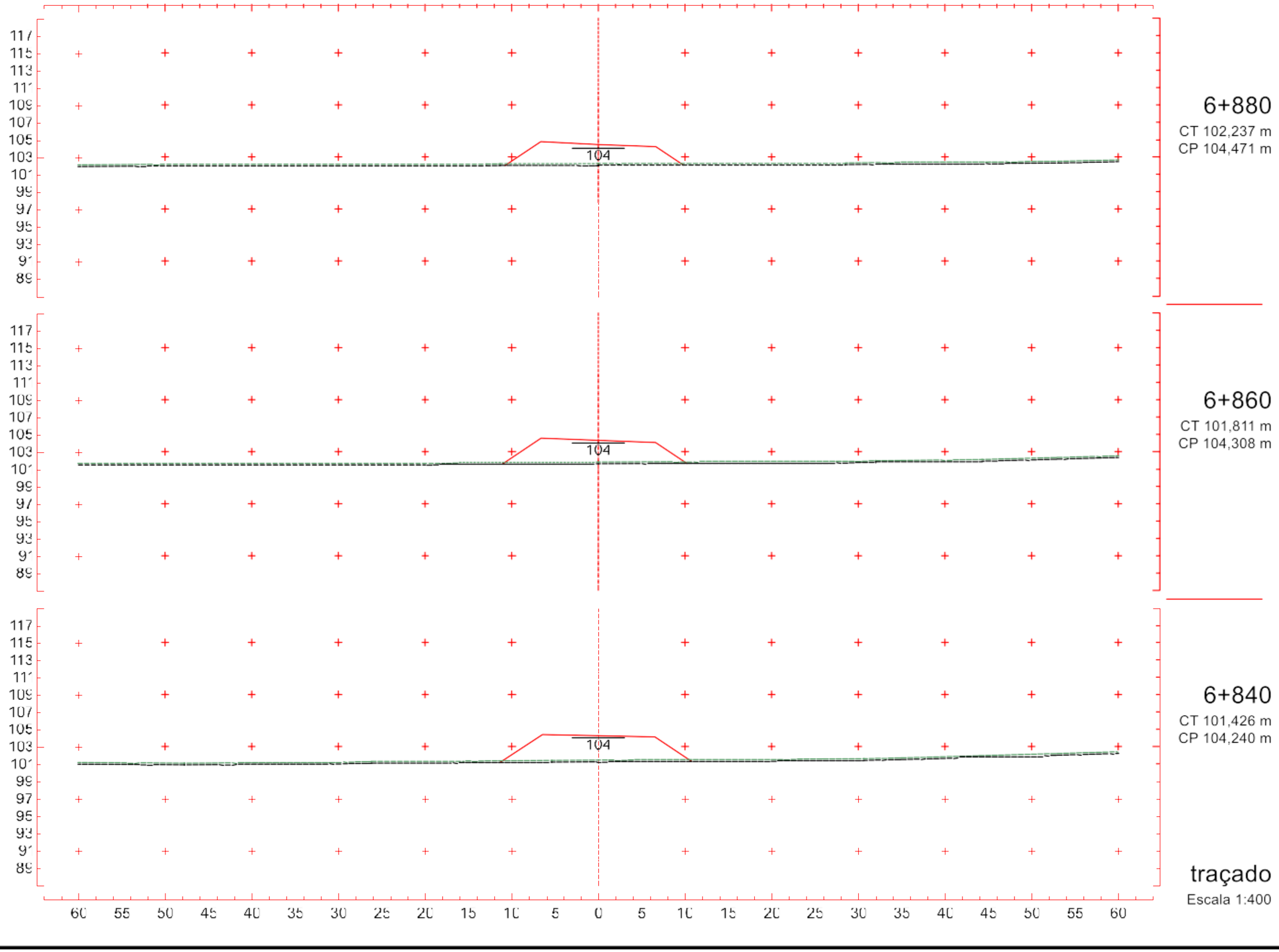

119
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103
101
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93
91
106
6+640
CT 102,981 m
CP 106,908 m
119
117
115
113
111
109
107
105
103
101
99
97
95
93
91
107
6+620
CT 103,134 m
CP 107,240 m
120
118
116
114
112
110
108
106
104
102
100
98
96
94
92
107
6+600
CT 103,322 m
CP 107,572 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
traçado
Escala 1:400

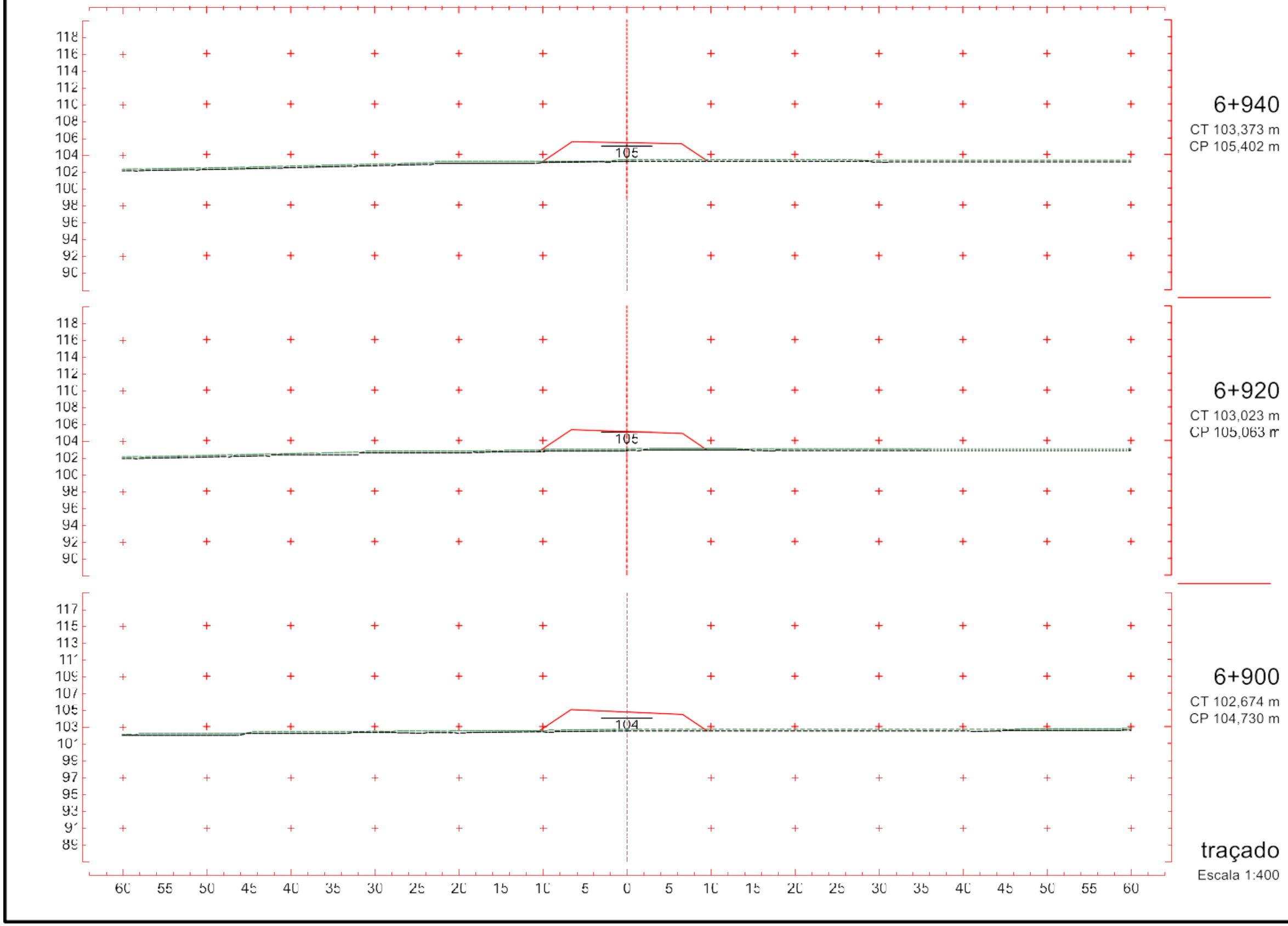

118
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92
90
105
6+700
CT 102,218 m
CP 105,911 m
106
6+680
CT 102,470 m
CP 106,244 m
119
117
115
113
111
109
107
105
103
101
99
97
95
93
91
106
6+660
CT 102,704 m
CP 106,576 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

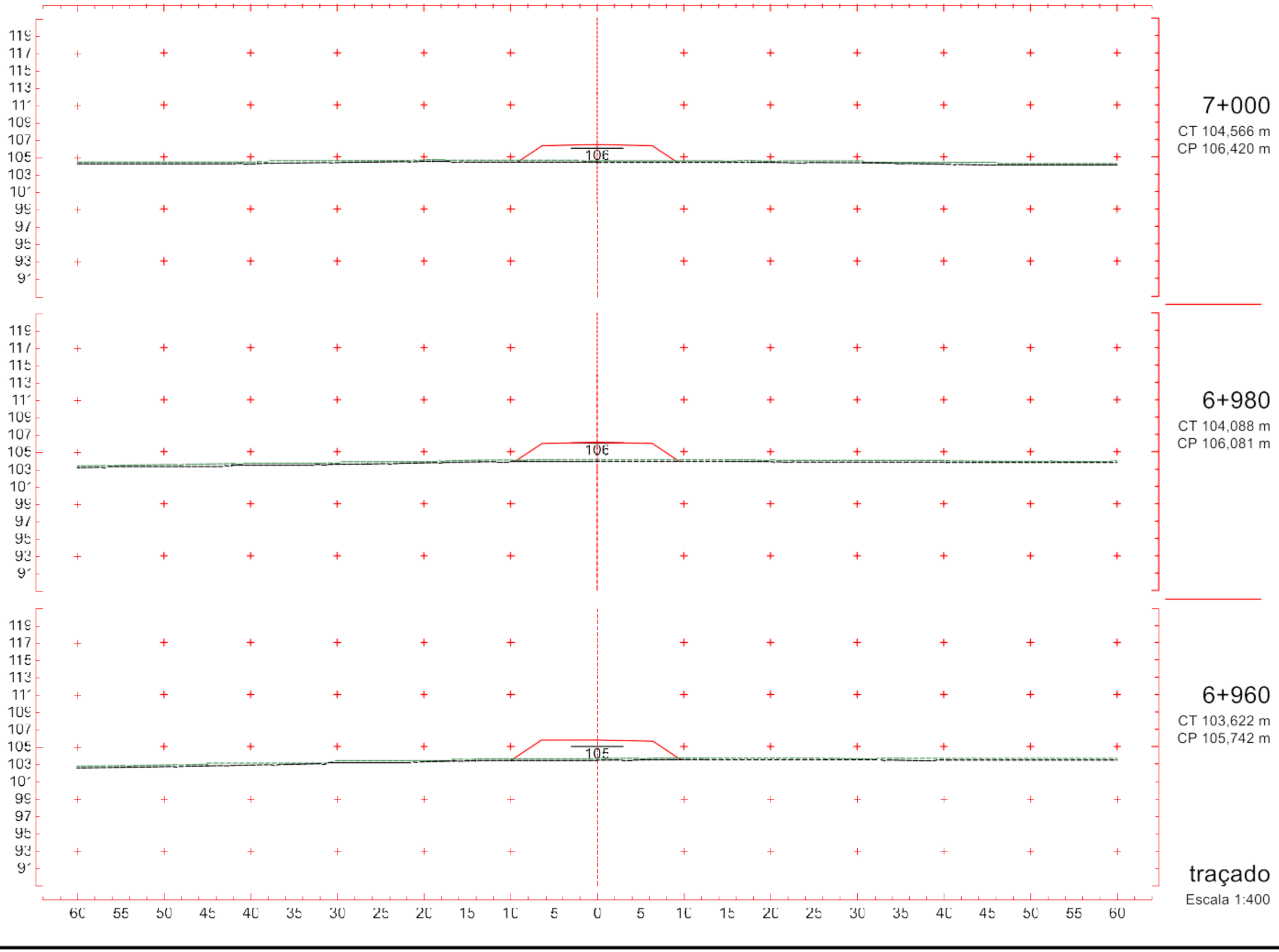

117
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103
101
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97
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93
91
89
104
6+760
CT 100,813 m
CP 104,915 m
117
115
113
111
109
107
105
103
101
99
97
95
93
91
89
105
6+740
CT 101,347 m
CP 105,247 m
118
116
114
112
110
108
106
104
102
100
98
96
94
92
90
105
6+720
CT 101,864 m
CP 105,579 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
traçado
Escala 1:400

Projeto Ponto de Partida 2021/1

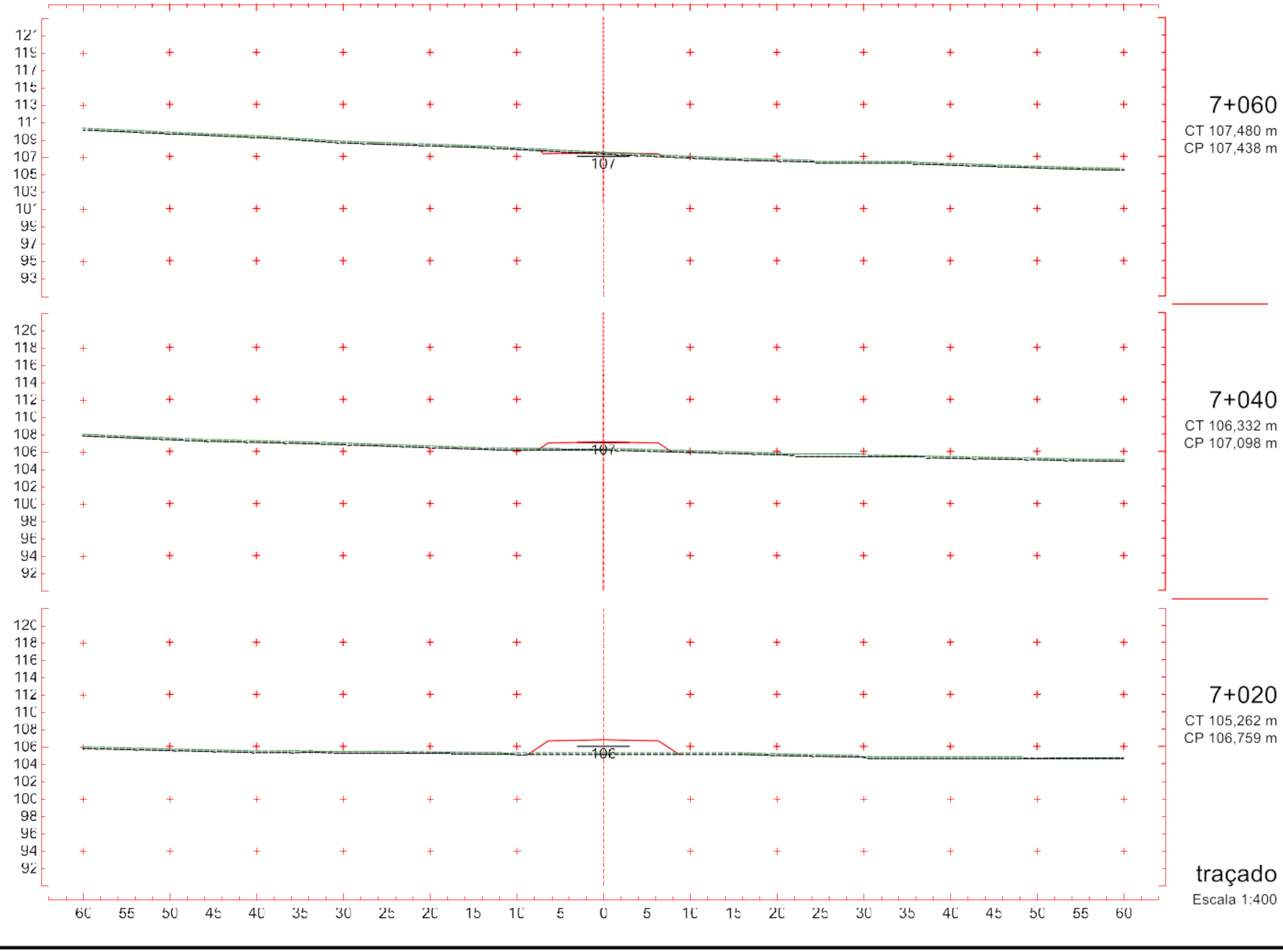



117
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101
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97
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93
91
89
104
6+880
CT 102,237 m
CP 104,471 m
6+860
CT 101,811 m
CP 104,308 m
6+840
CT 101,426 m
CP 104,240 m
60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60
traçado
Escala 1:400

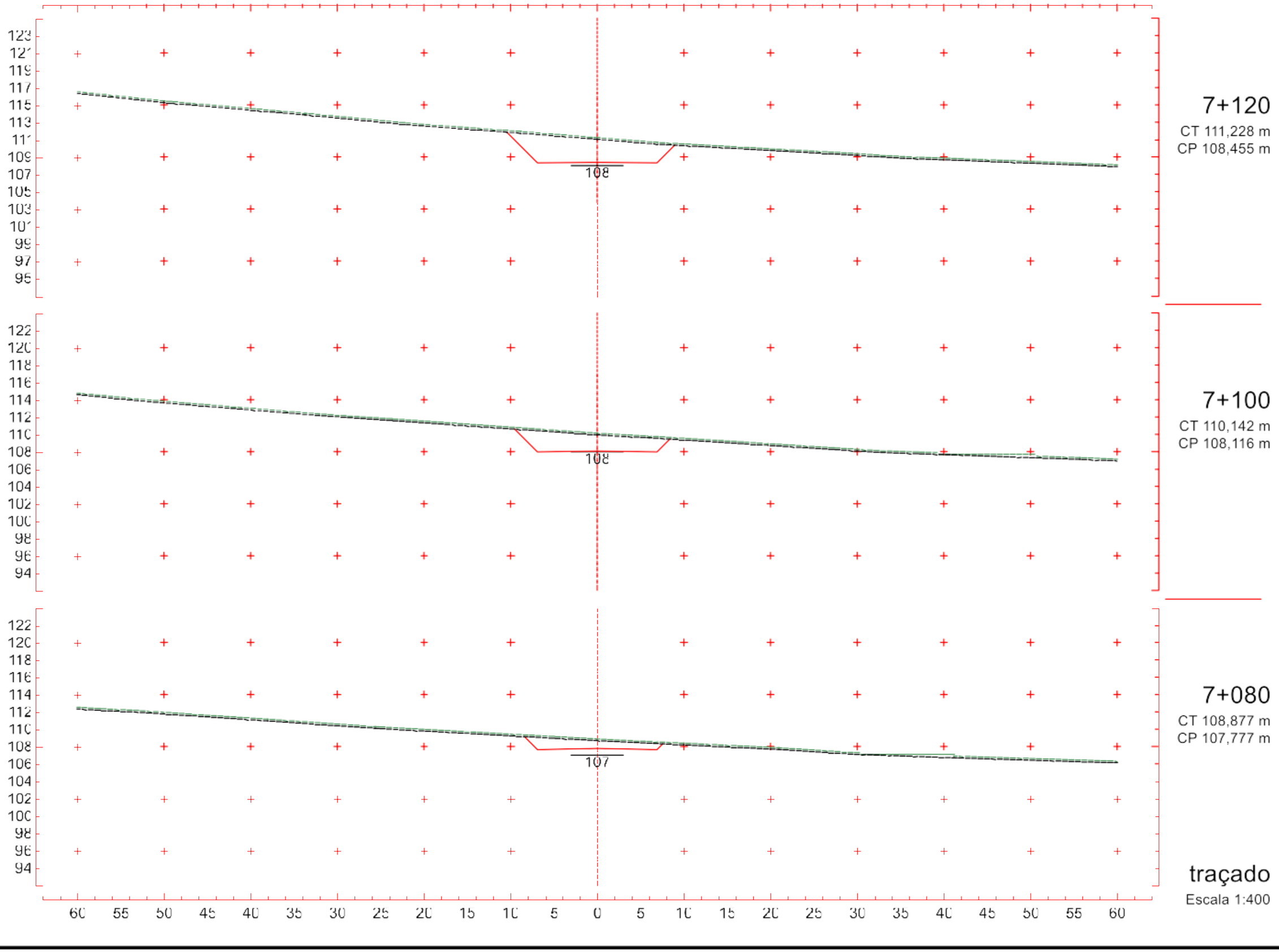

118
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102
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92
90
105
6+940
CT 103,373 m
CP 105,402 m
118
116
114
112
110
108
106
104
102
100
98
96
94
92
90
105
6+920
CT 103,023 m
CP 105,063 m
117
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113
111
109
107
105
103
101
99
97
95
93
91
89
104
6+900
CT 102,674 m
CP 104,730 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
traçado
Escala 1:400


119
117
115
113
111
109
107
105
103
101
99
97
95
93
91
106
7+000
CT 104,566 m
CP 106,420 m
106
6+980
CT 104,088 m
CP 106,081 m
105
6+960
CT 103,622 m
CP 105,742 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
traçado
Escala 1:400

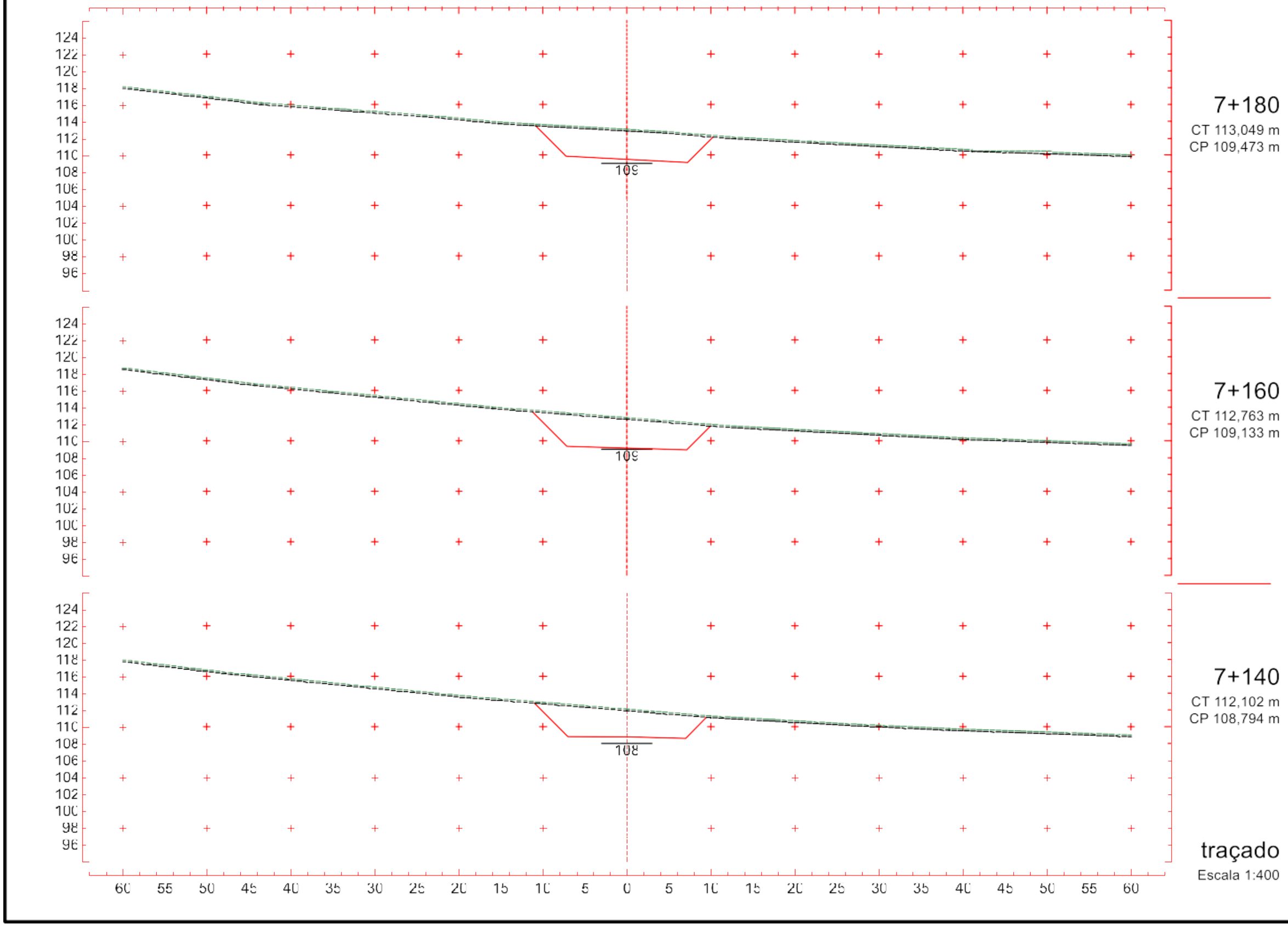
Projeto Ponto de Partida 2021/1



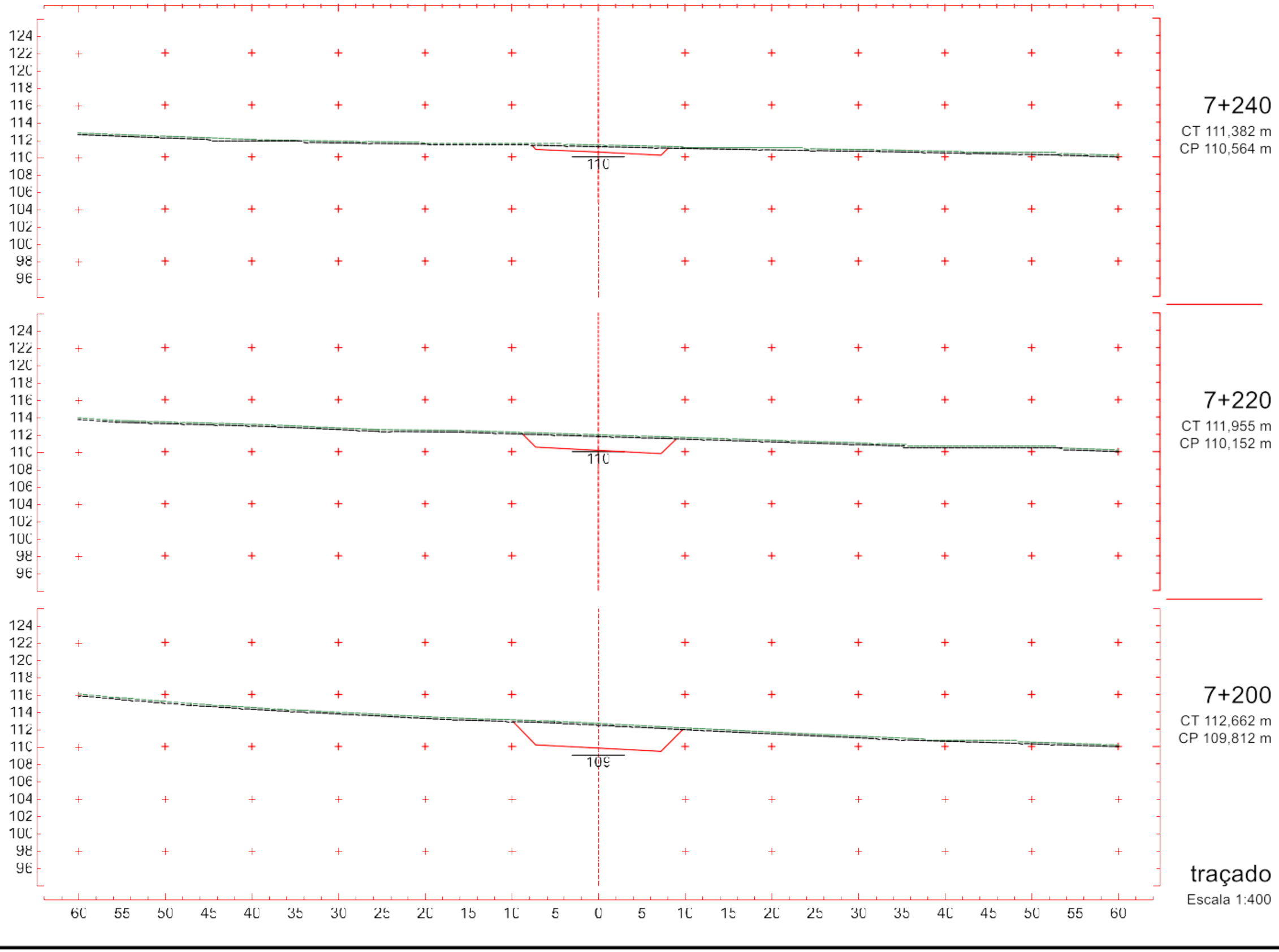
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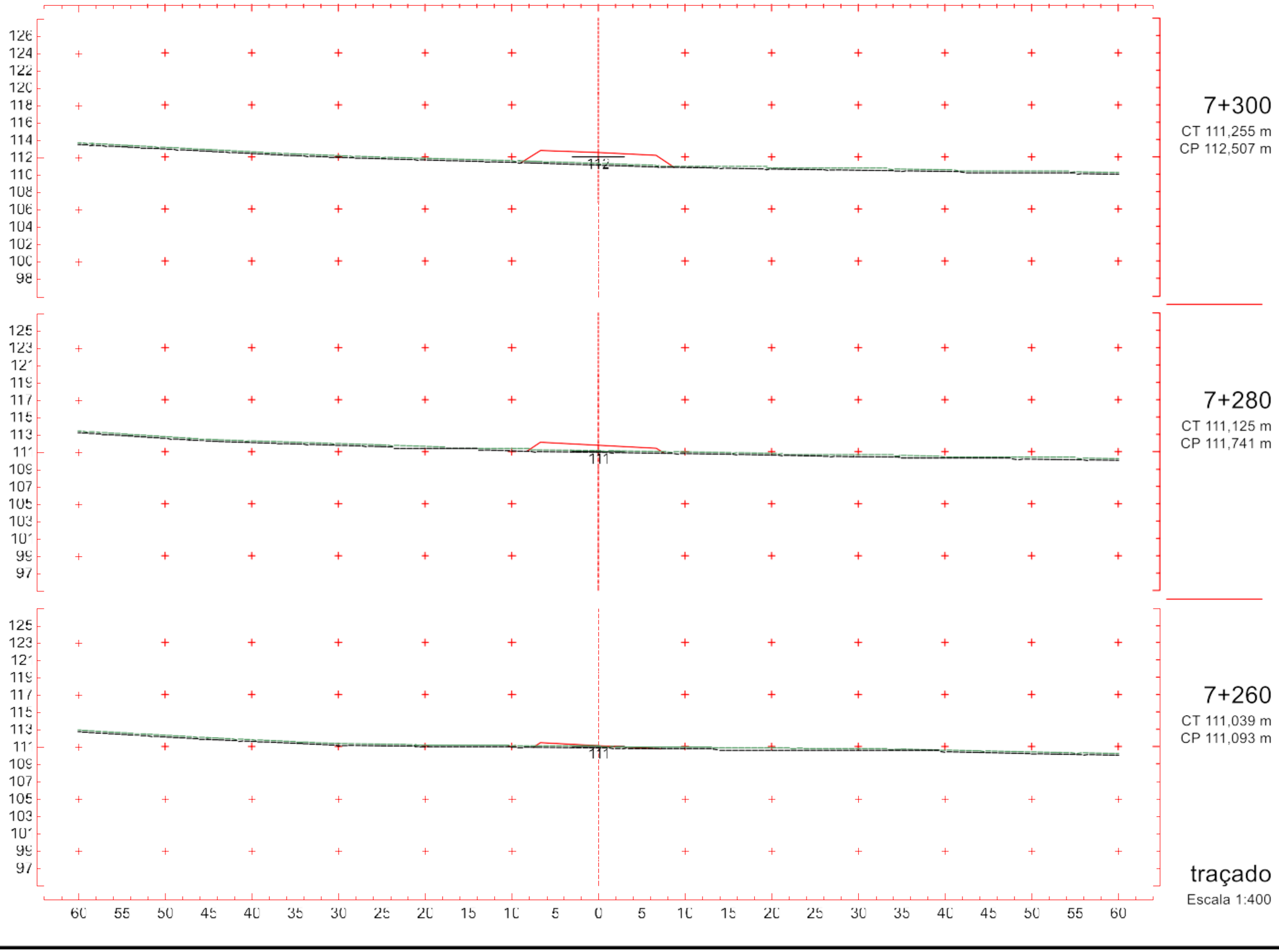
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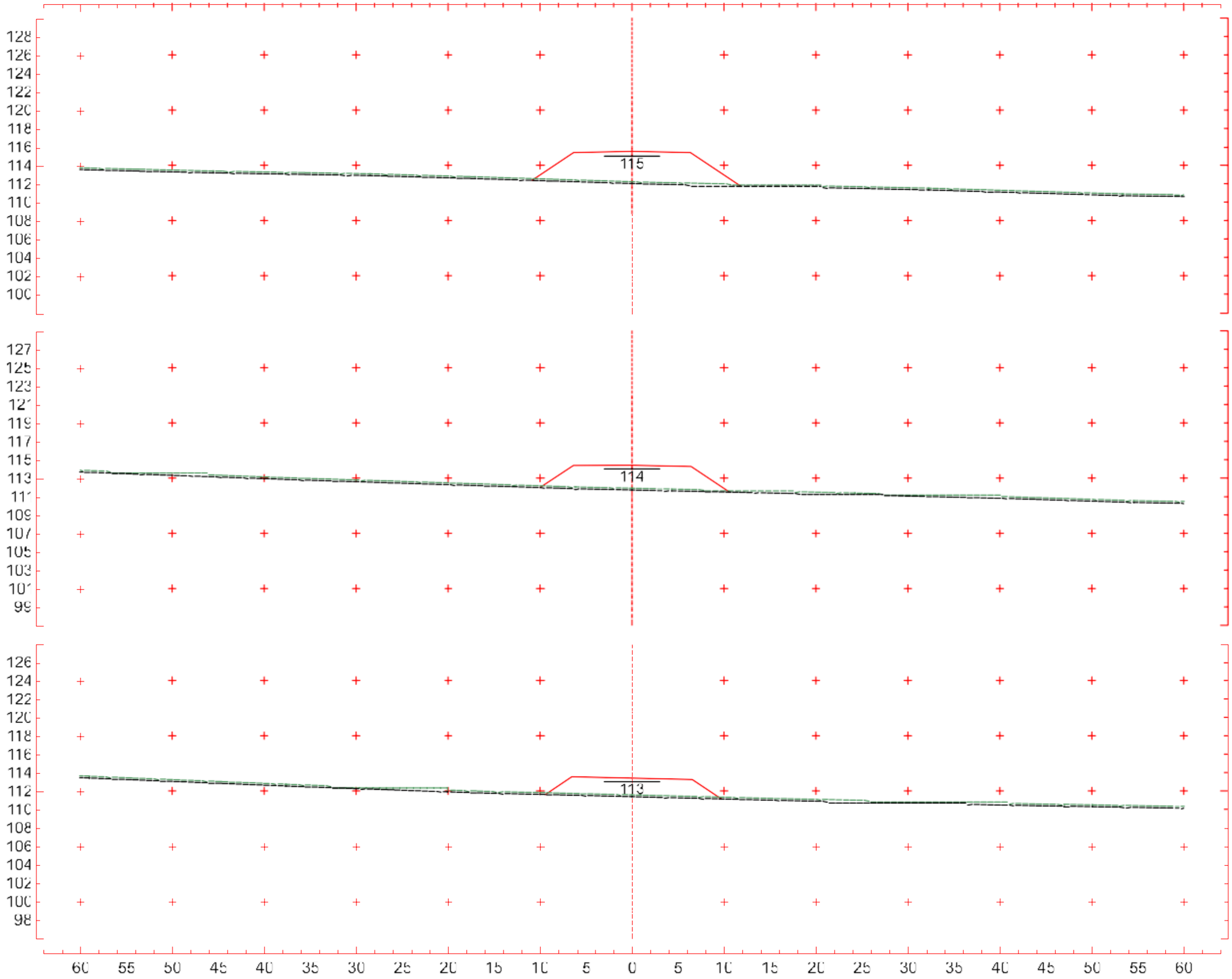
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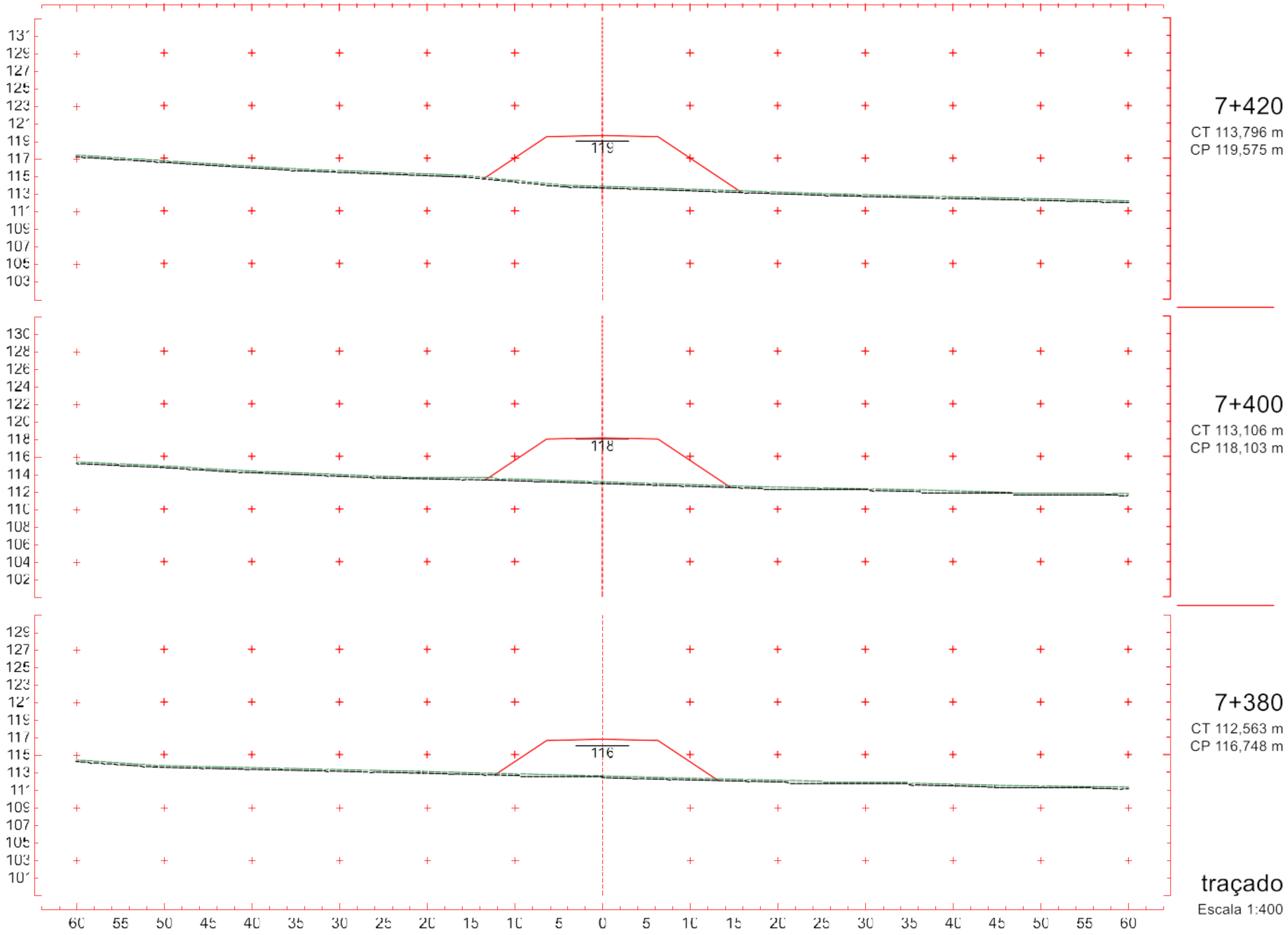
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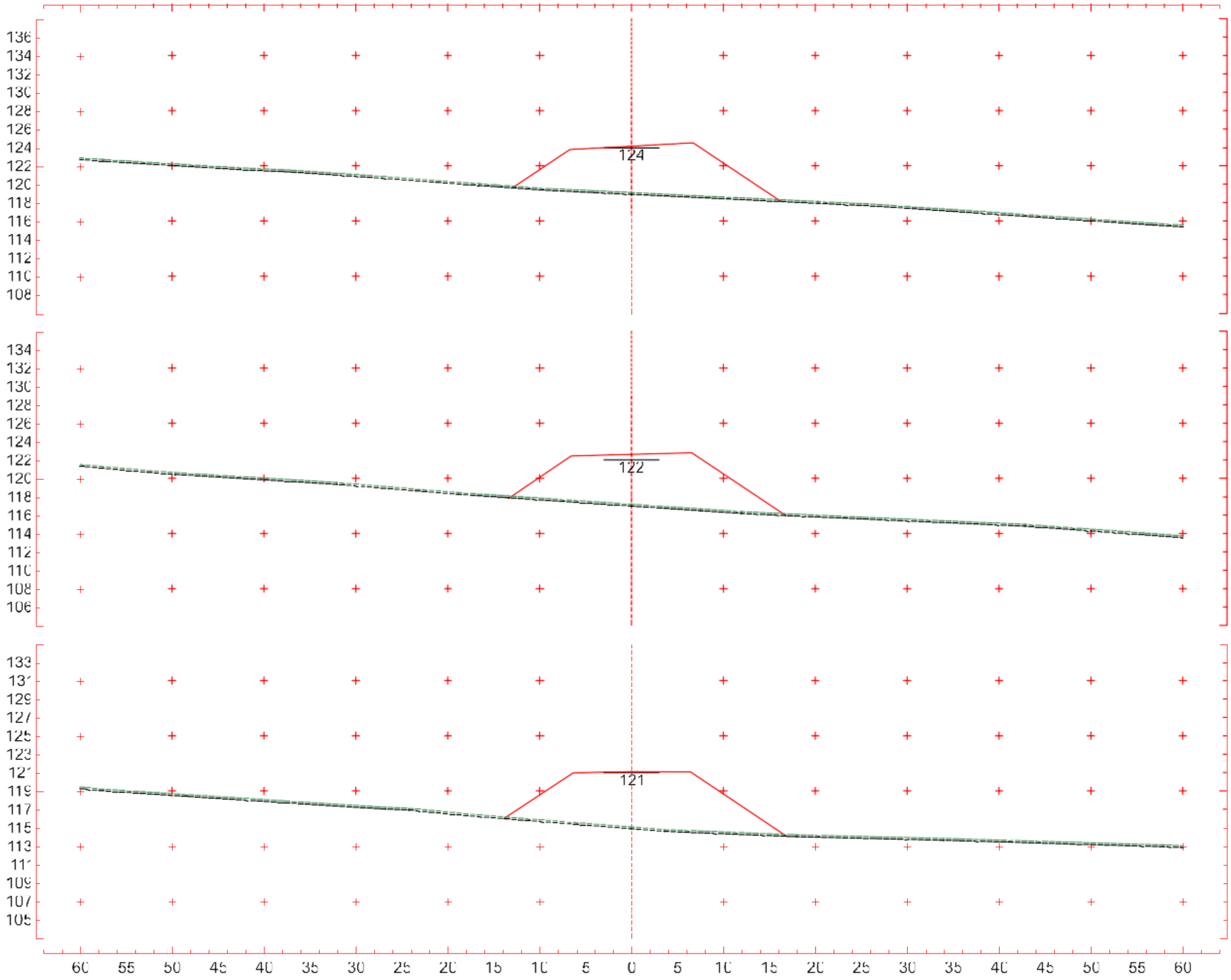
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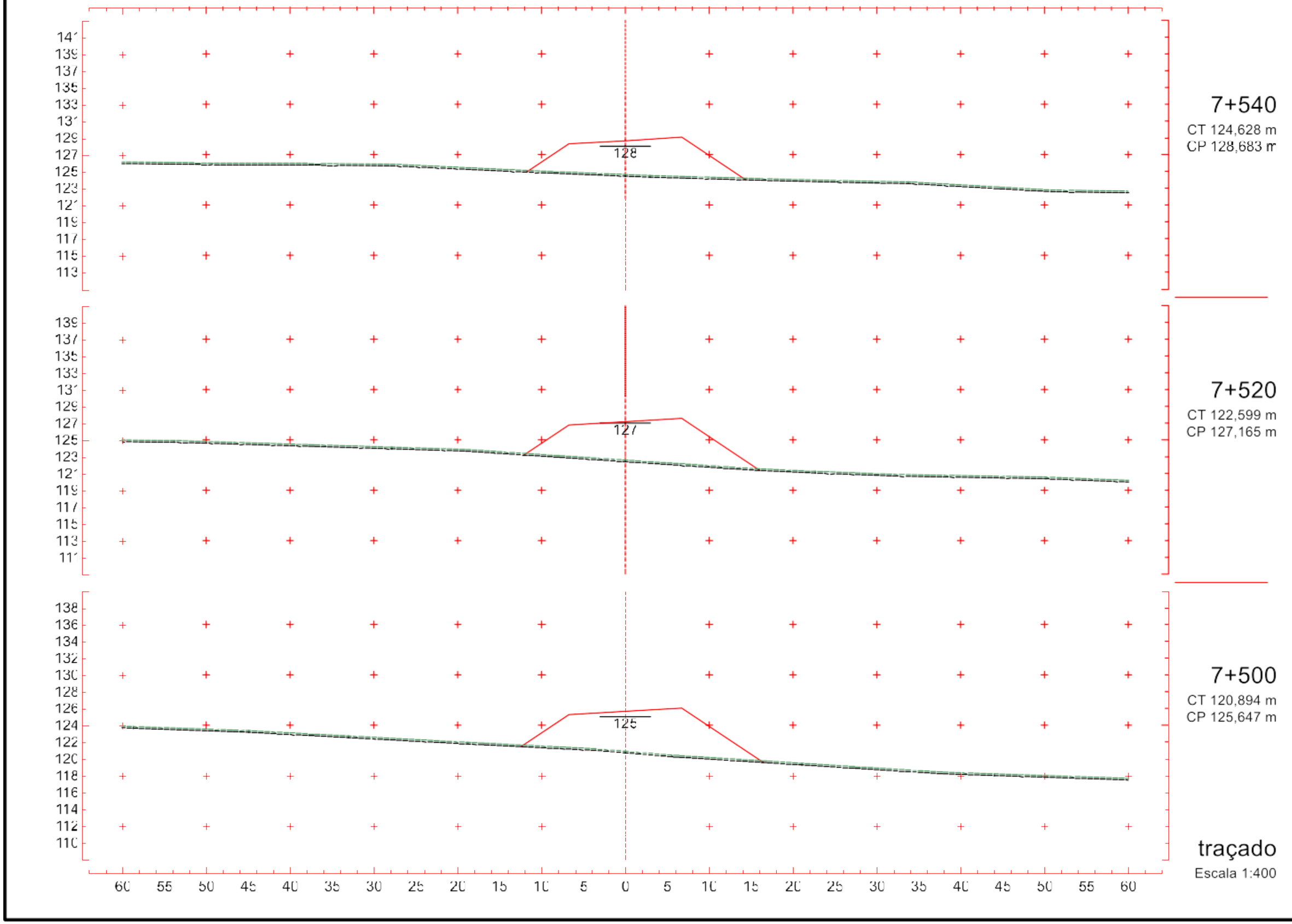
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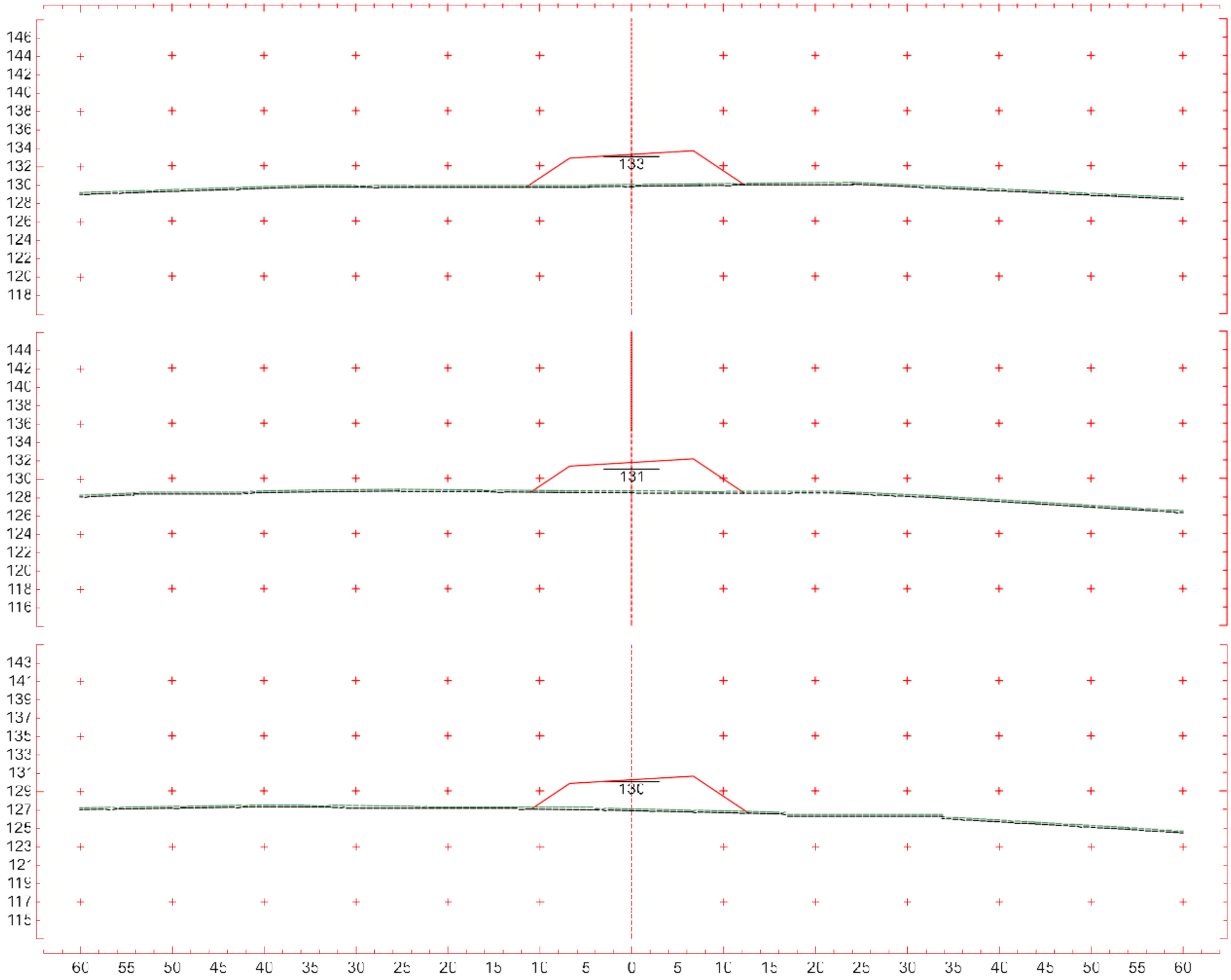
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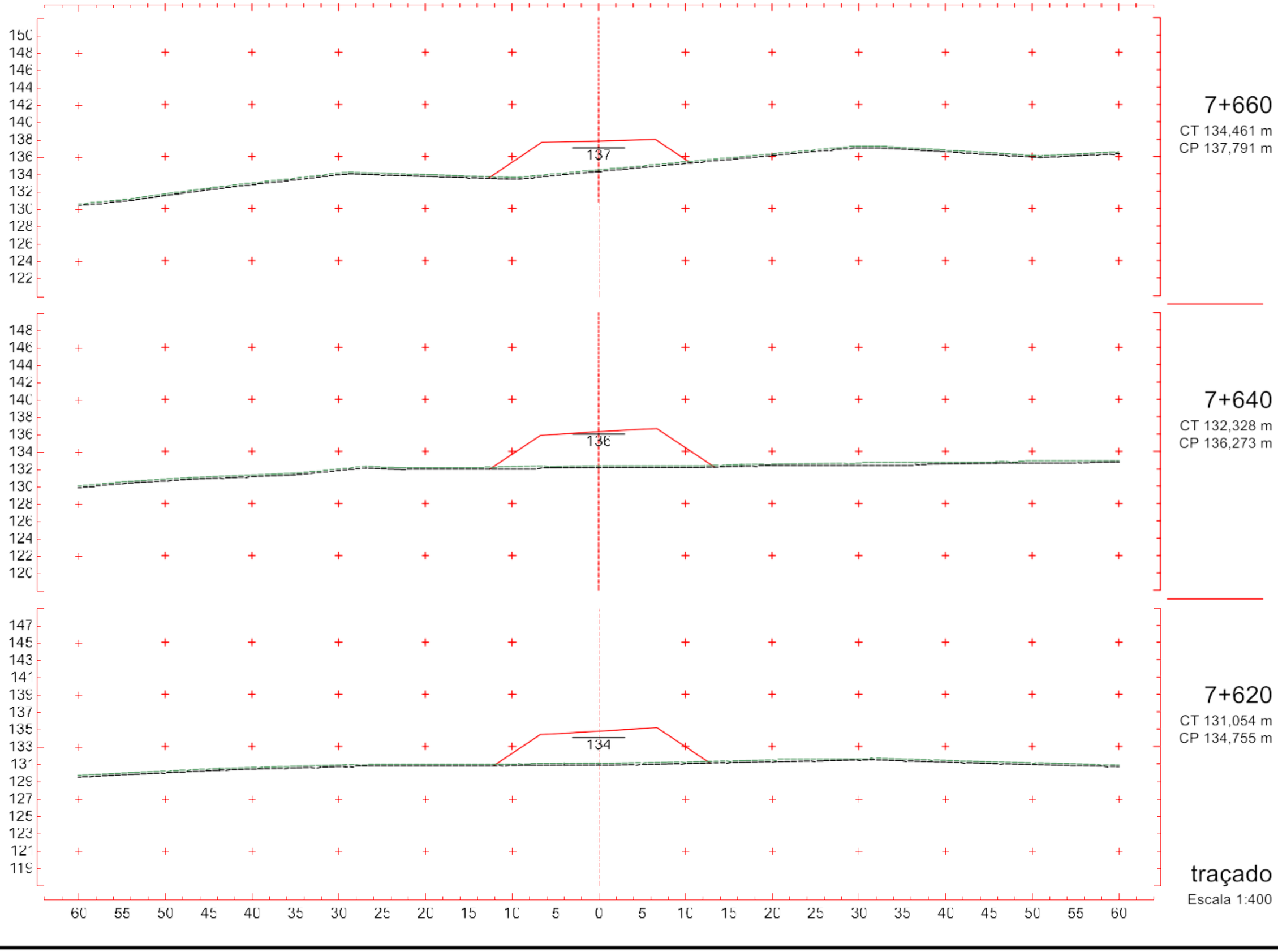
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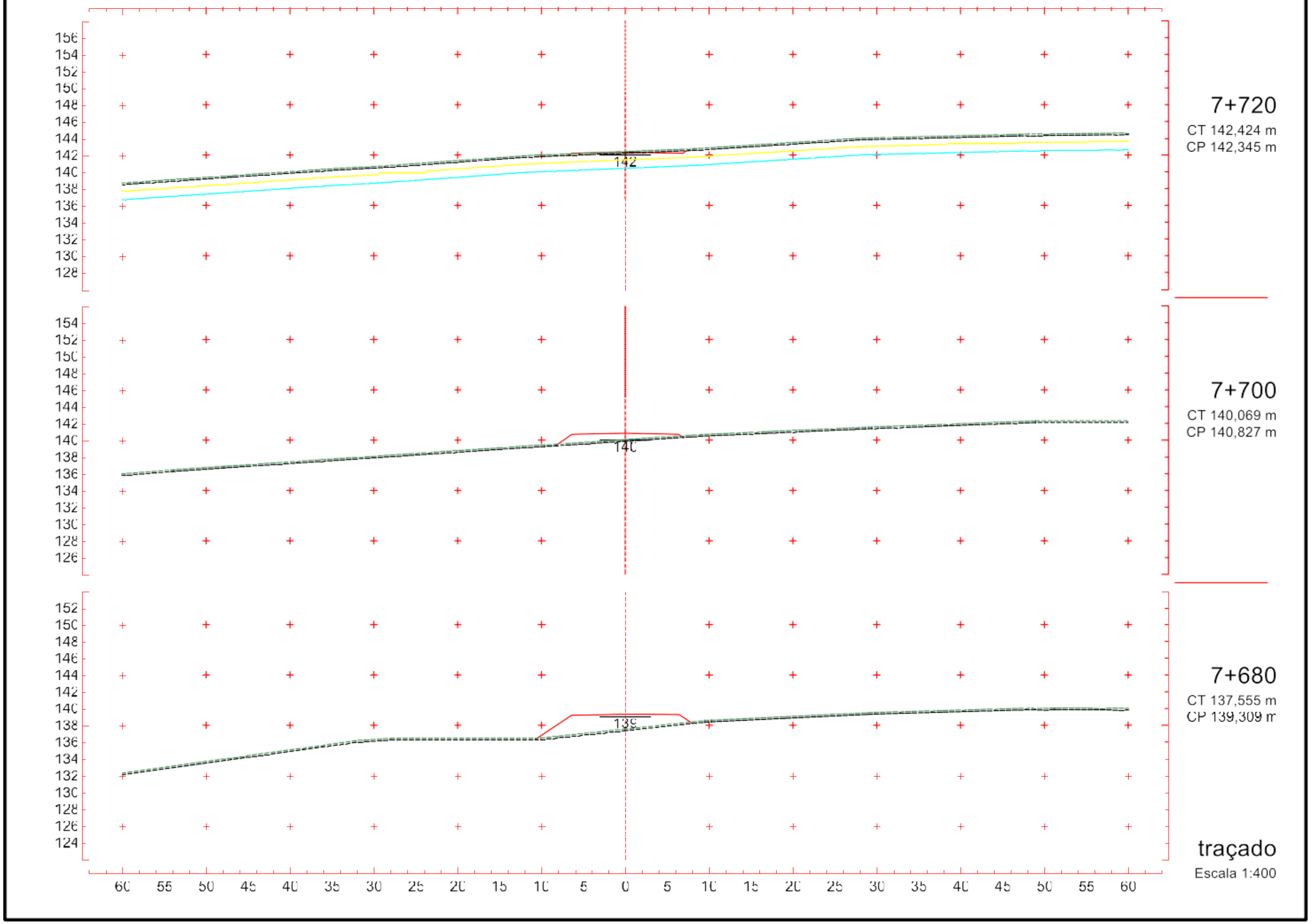
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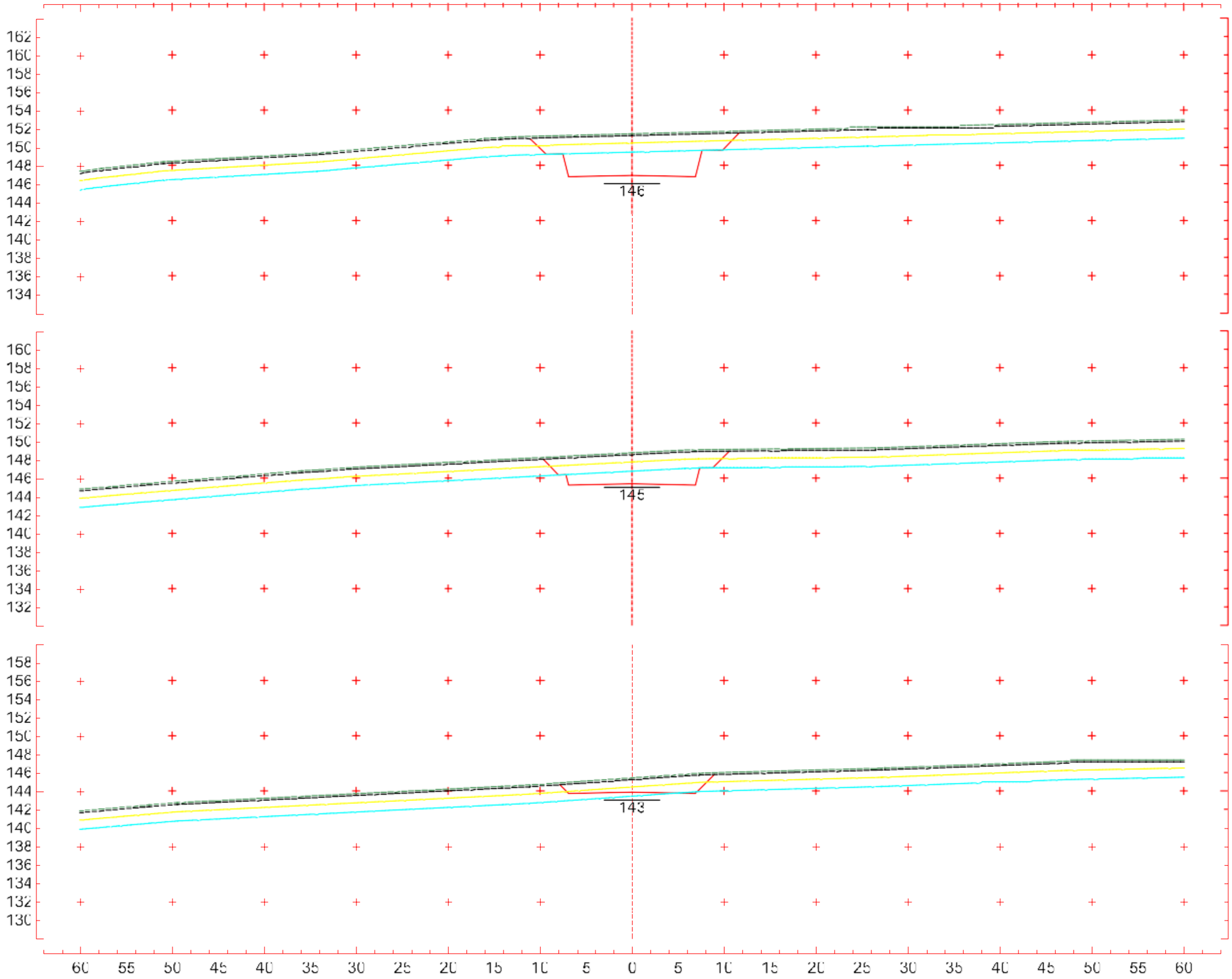
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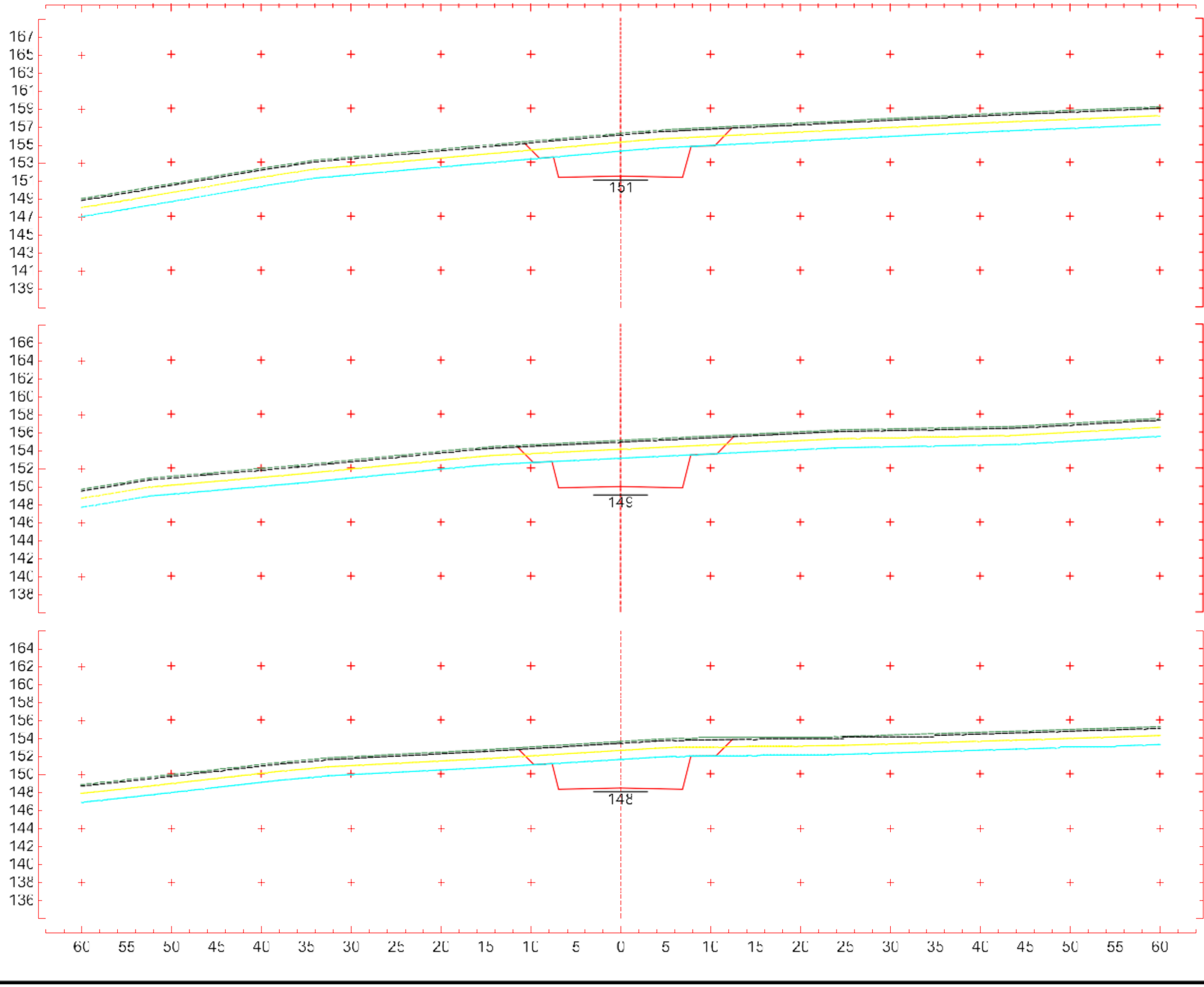
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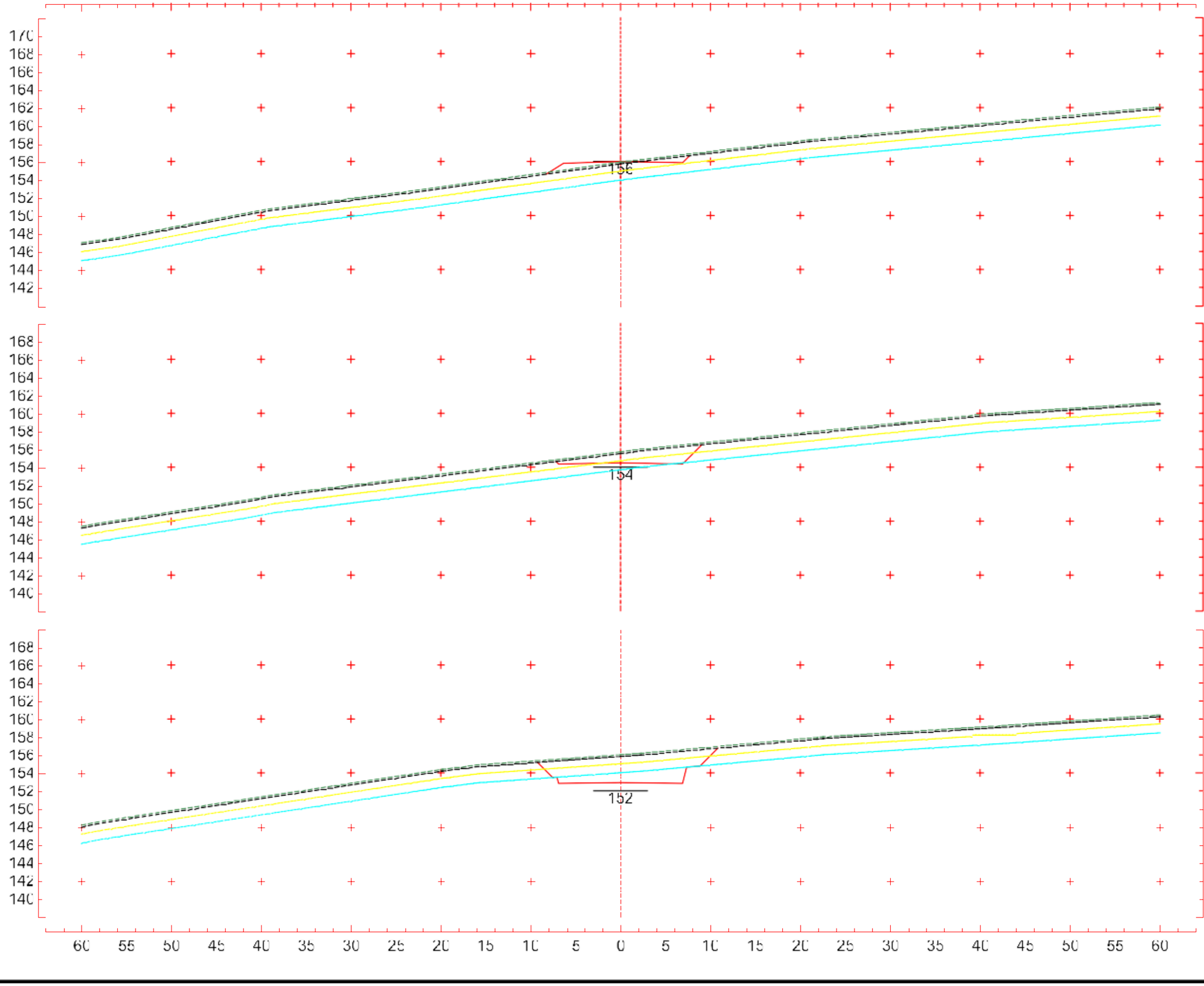
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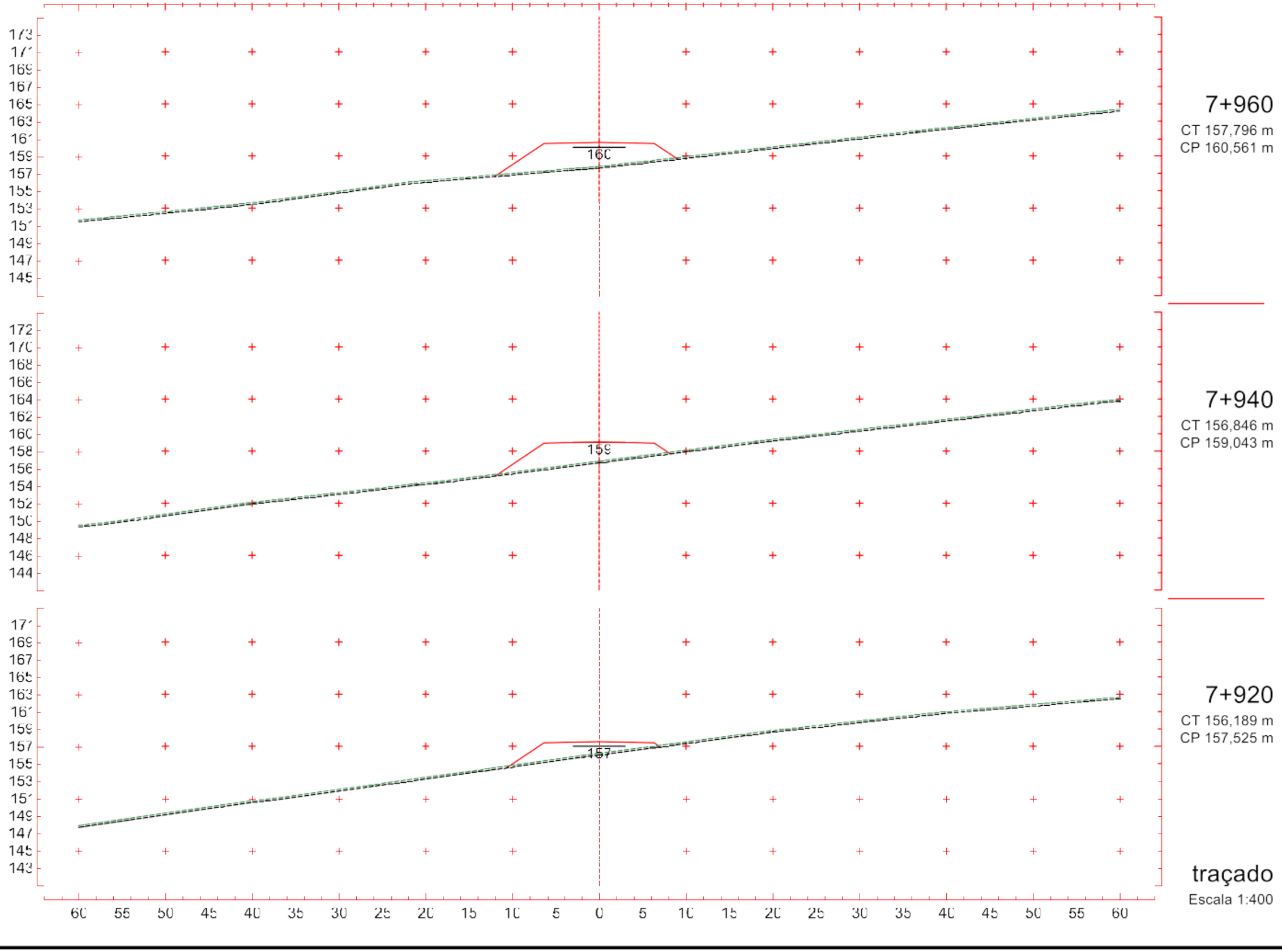
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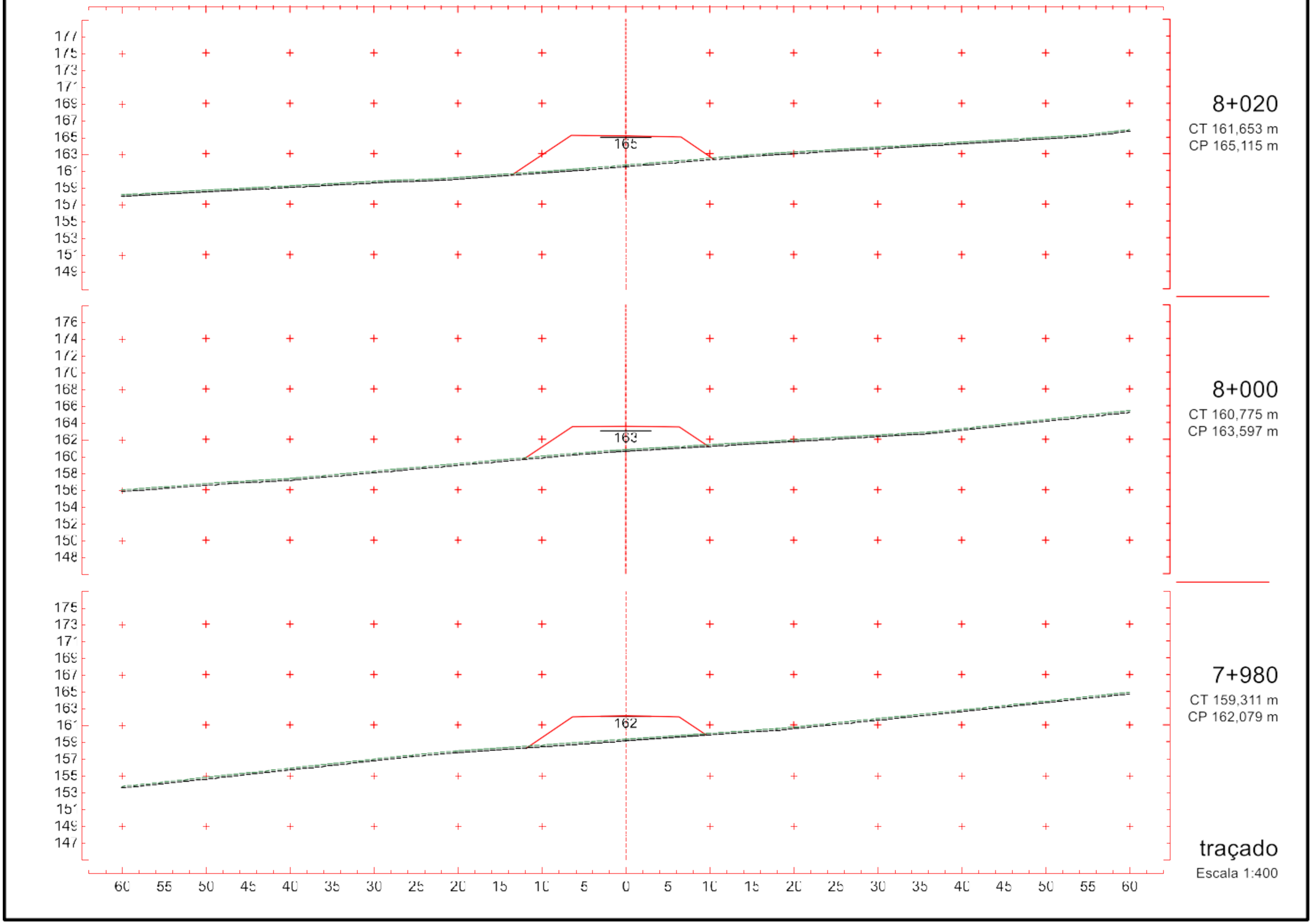
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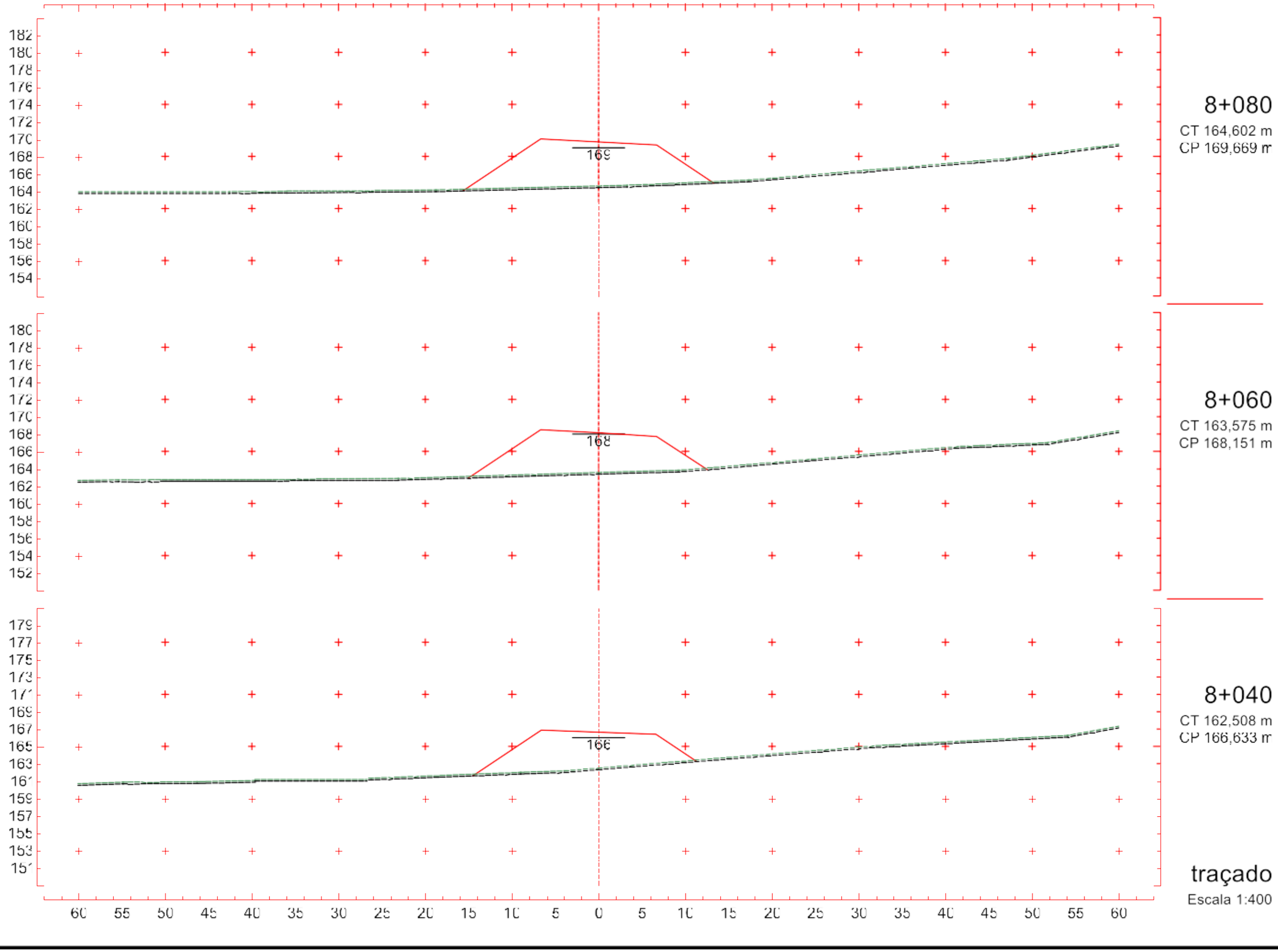
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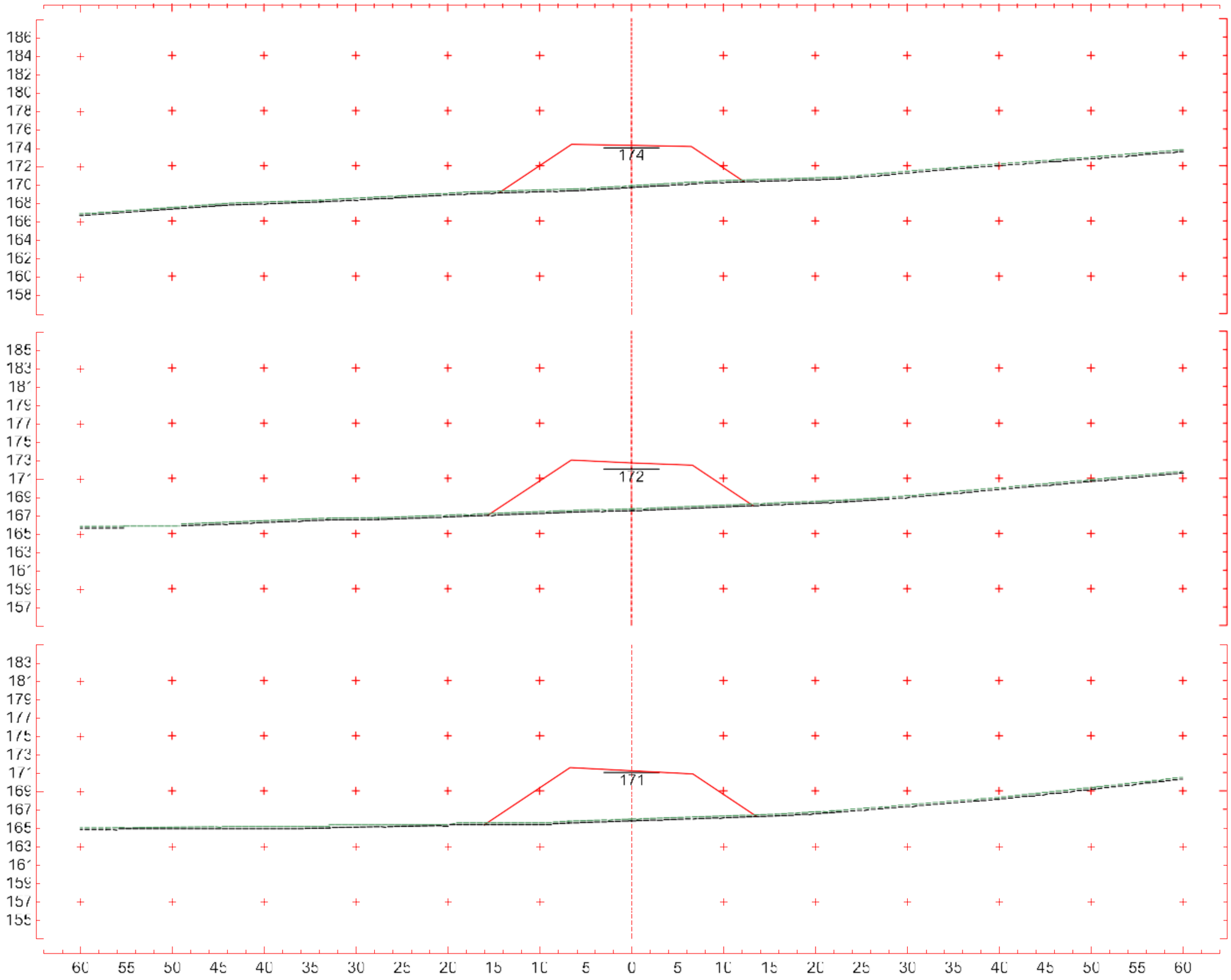
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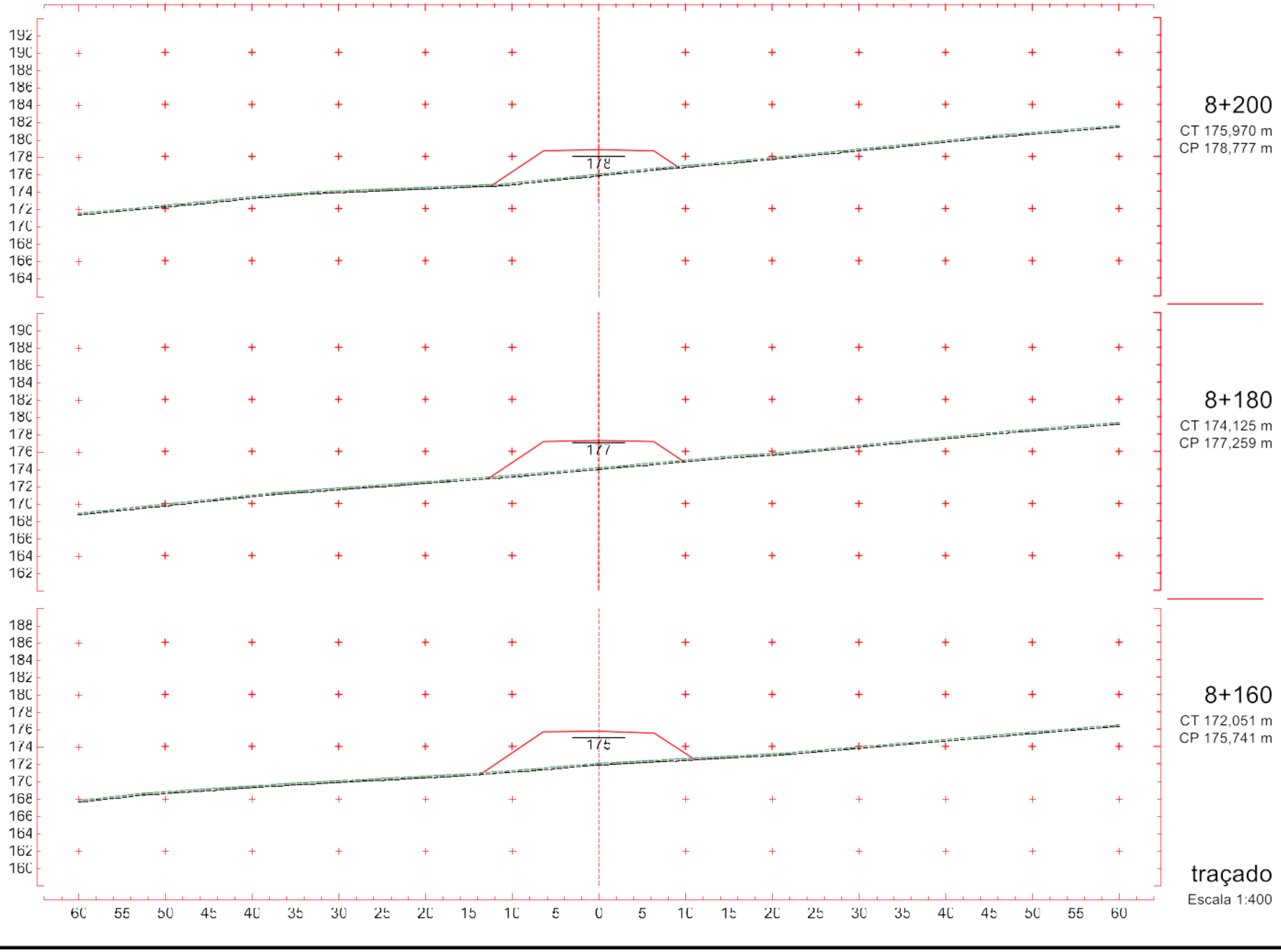


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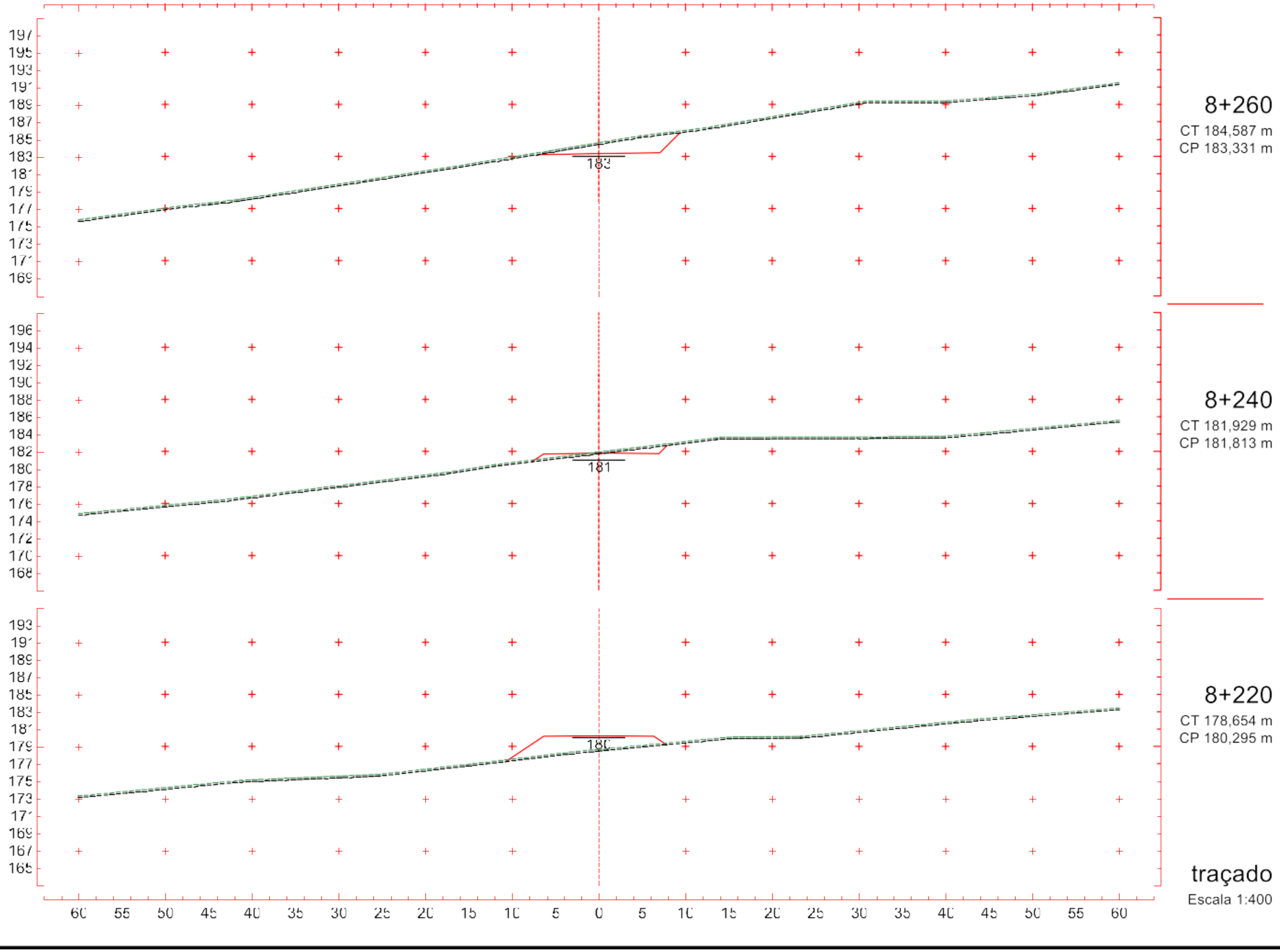


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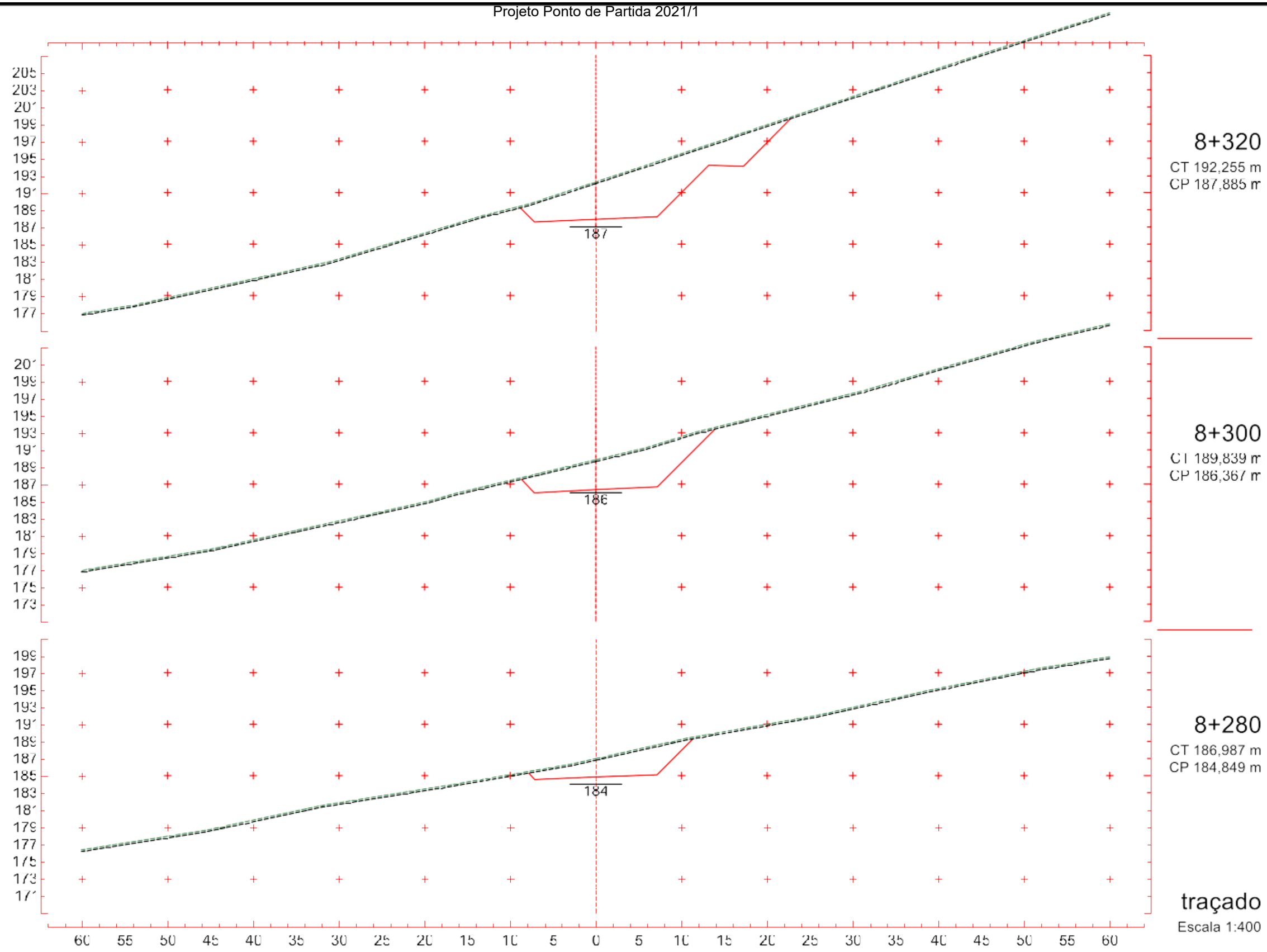


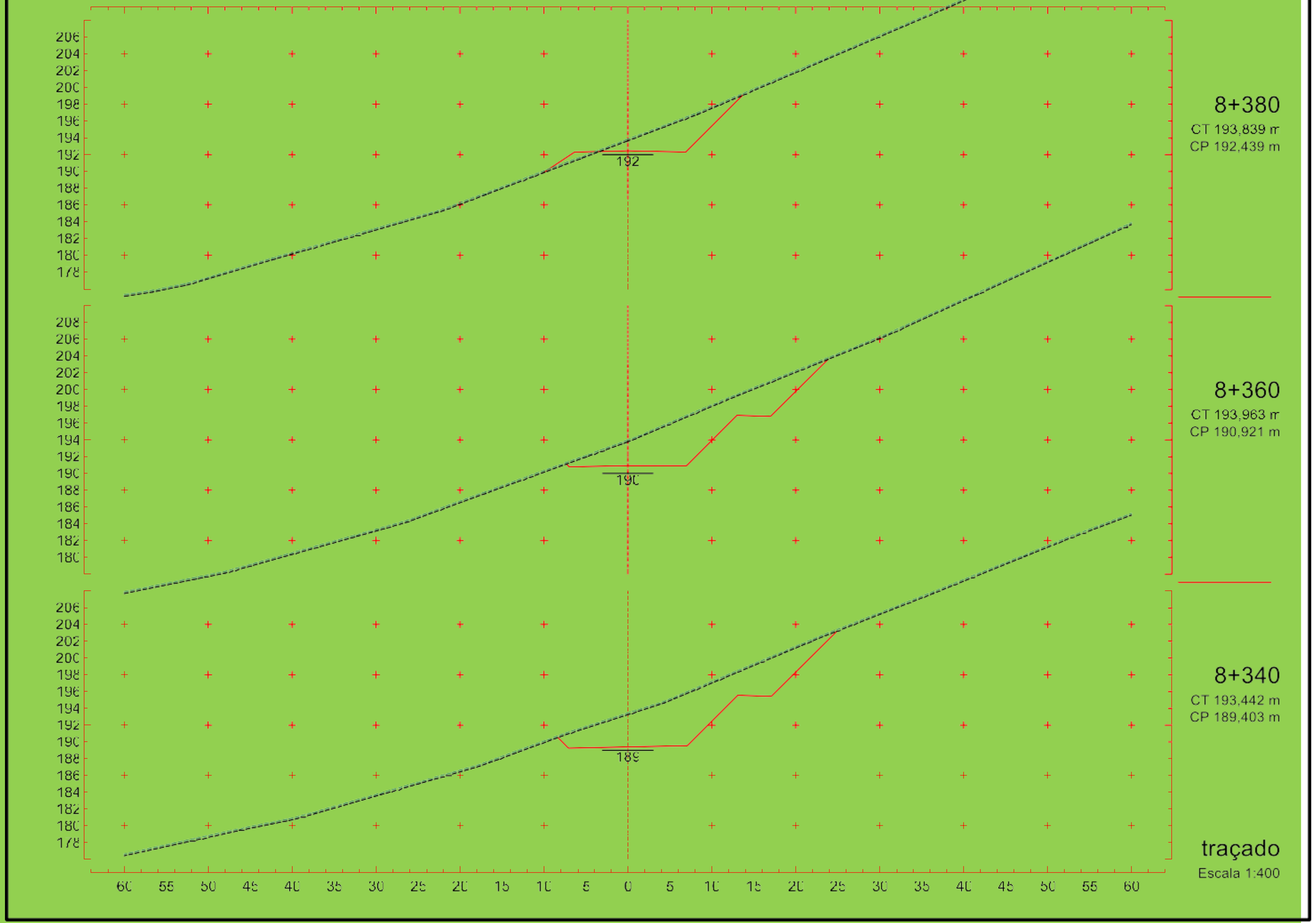

192
190
188
186
184
182
180
178
176
174
172
170
168
166
164
178
8+200
CT 175,970 m
CP 178,777 m
190
188
186
184
182
180
178
176
174
172
170
168
166
164
162
177
8+180
CT 174,125 m
CP 177,259 m
188
186
184
182
180
178
176
174
172
170
168
166
164
162
160
175
8+160
CT 172,051 m
CP 175,741 m
traçado
Escala 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

Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1




206
204
202
200
198
196
194
192
190
188
186
184
182
180
178
192
8+380
CT 193,839 m
CP 192,439 m
208
206
204
202
200
198
196
194
192
190
188
186
184
182
180
190
8+360
CT 193,963 m
CP 190,921 m
206
204
202
200
198
196
194
192
190
188
186
184
182
180
178
189
8+340
CT 193,442 m
CP 189,403 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
traçado
Escala 1:400

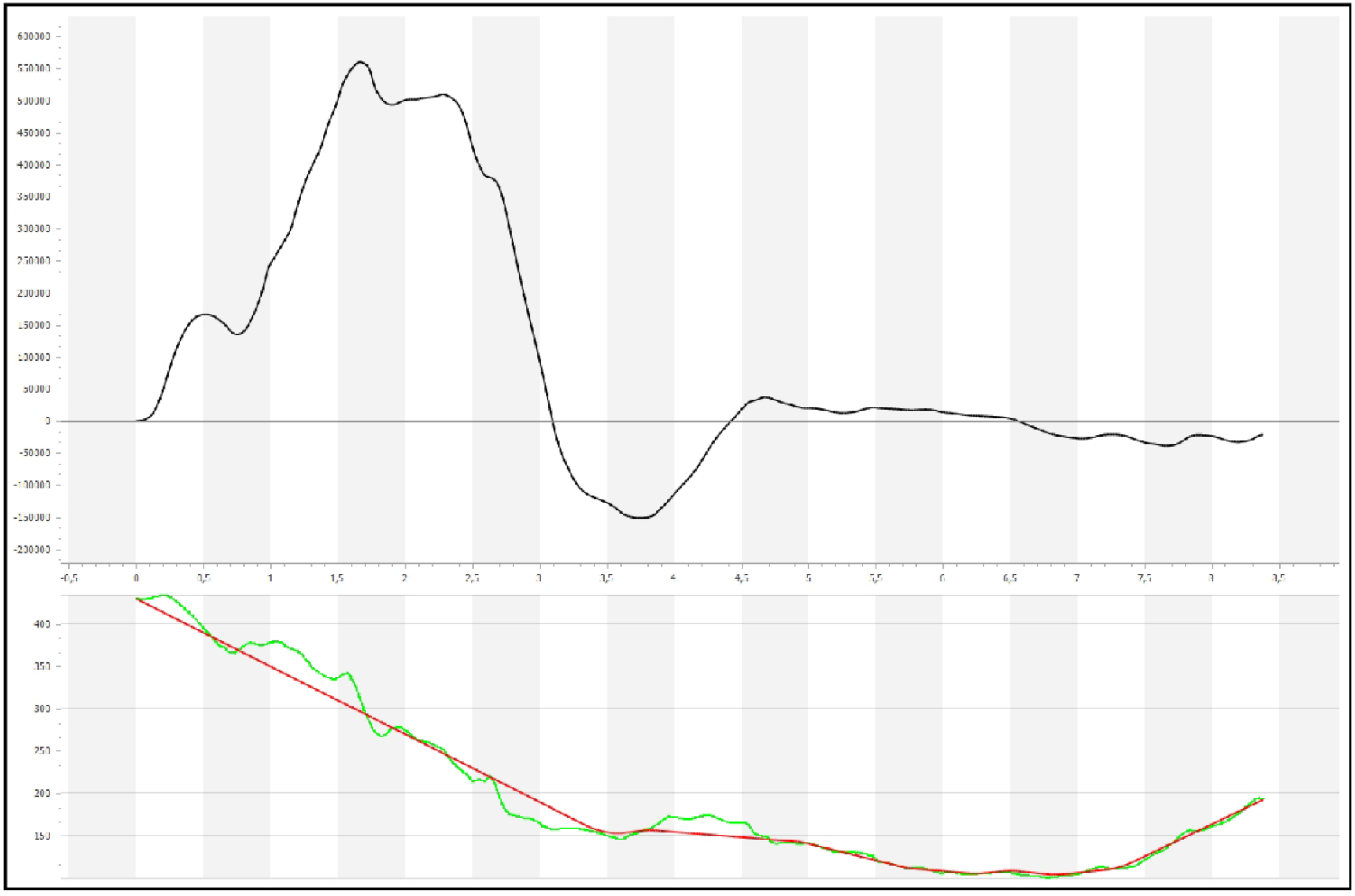
PROJETO DE TERRAPLENAGEM

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:	traçado	- Aterro Camada Superior: 1,000	- Corte 2ª Categoria: 1,000
Segmento:	km: 0+000,00 ao km: 8+384,76	- 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: traçado
Segmento: km: 0+000,00 ao km: 8+384,76

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

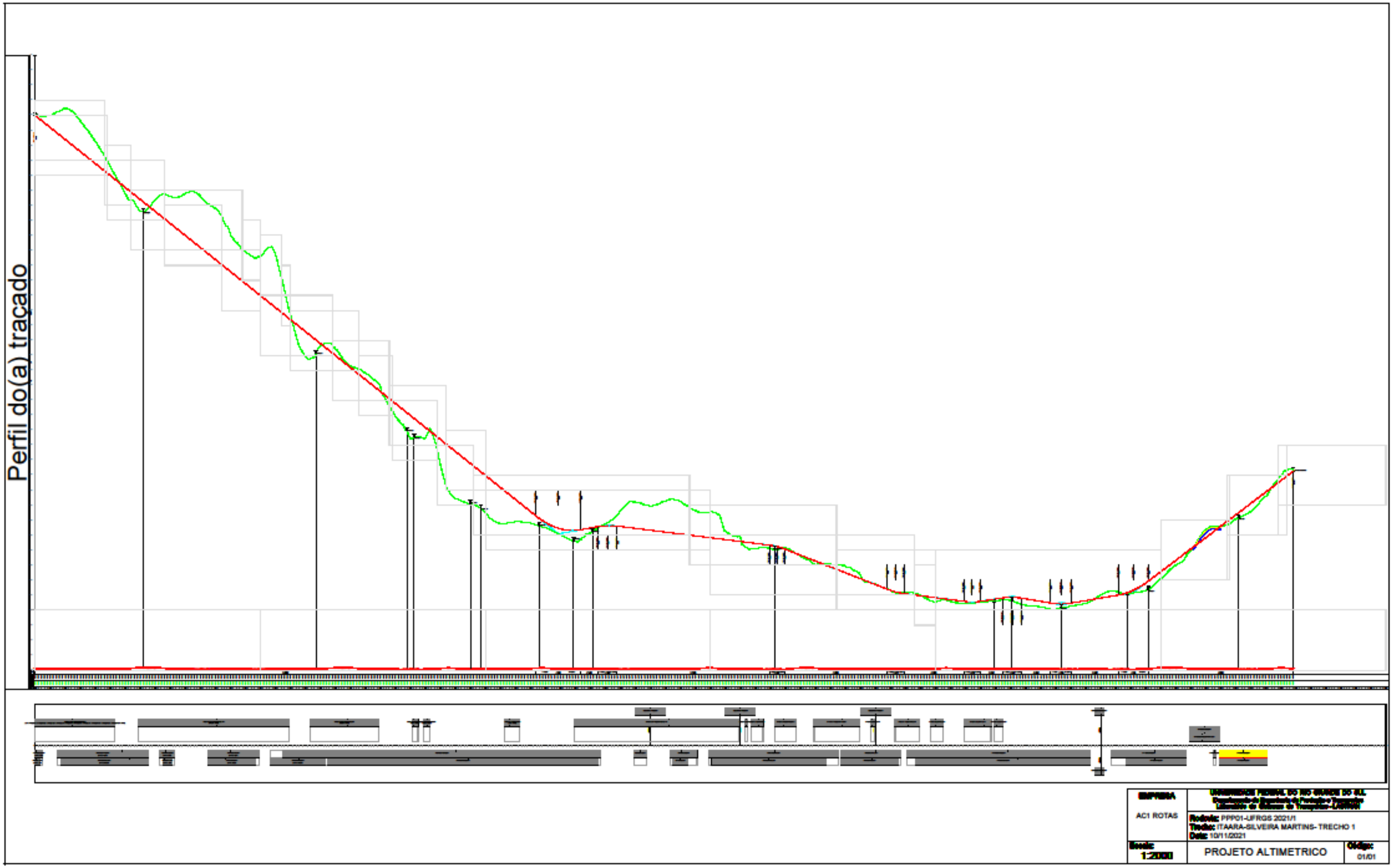
Vol. transp. : 1079933,00m³
Momento tot.: 1683253,63m³.m
DMT : 1,559km

ORIGEM										DESTINO							TRANSPORTE			
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m3)			IDENTIFICAÇÃO		LOCALIZAÇÃO								
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	HOMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	VOLUME GEO.	DIST. TRANSP.	VOL. COMP.	MOM. DE TRANSP.	OBS
ID	TIPO	HOMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL	(km)	(m³)	(m³ x km)	
C-16-2	C2ª	1	7+690	7+790	7+890		3523	3523,00												
									3523	A-11-I	AI	7+270	7+460	7+670		13796	0,33	3523	1162,59	
C-16-3	C3ª	0,8	7+690	7+780	7+890		8438	10547,50												
									2280,53	A-11-I	AI	7+270	7+460	7+670			0,32	1824,42	583,815	
									8266,97	A-13-I	AI	7+890	8+060	8+210		8429	0,28	6613,58	1851,802	
C-01	C1ª	1,3	0+000	0+250	0+530		220175	169365,38												
									1	A-01-I	AI	0+000	0+010	0+030		1	0,24	1,3	0,312	
									22	A-01-S	AS	0+000	0+010	0+050		22	0,24	28,6	6,864	
									29385	A-02-I	AI	0+170	0+630	0+750		29385	0,38	38200,5	14516,19	
									4740	A-02-S	AS	0+150	0+580	0+750		4740	0,33	6162	2033,46	
									14	A-03-I	AI	0+850	0+860	0+910		14	0,61	18,2	11,102	
									52	A-03-S	AS	0+830	0+870	0+930		52	0,62	67,6	41,912	
									326	A-04-I	AI	1+150	1+270	1+470		326	1,02	423,8	432,276	
									318	A-04-S	AS	1+150	1+300	1+490		318	1,05	413,4	434,07	
									65290	A-05-I	AI	1+570	1+760	1+930		65290	1,51	84877	128164,27	
									69217,38	A-05-I	AI	1+950	2+890	3+750			2,64	89982,6	237554,064	
C-02	C1ª	1,3	0+690	1+210	1+690		557415	428780,77												
									428780,77	A-05-I	AI	1+950	2+890	3+750			1,68	557415	936457,2	
C-03	C1ª	1,3	1+830	2+080	2+290		28085	21603,85												
									21603,85	A-05-I	AI	1+950	2+890	3+750			0,81	28085	22748,85	
C-04	C1ª	1,3	2+510	2+520	2+550		22	16,92												
									16,92	A-05-I	AI	1+950	2+890	3+750			0,37	22	8,14	
C-05	C1ª	1,3	2+590	2+610	2+630		299	230,00												
									230	A-05-I	AI	1+950	2+890	3+750			0,28	299	83,72	
C-06	C1ª	1,3	3+130	3+180	3+230		19	14,62												
									14,62	A-05-I	AI	1+950	2+890	3+750			0,27	19	5,13	
C-07	C1ª	1,3	3+590	4+220	4+690		247742	190570,77												
									111086,46	A-05-I	AI	1+950	2+890	3+750			1,33	144412,4	192068,492	
									40348	A-05-S	AS	1+650	2+800	3+770		40348	1,42	52452,4	74482,408	
									8	A-06-S	AS	3+990	4+030	4+070		8	0,19	10,4	1,976	
									6	A-07-I	AI	4+250	4+300	4+350		6	0,08	7,8	0,624	
									39	A-07-S	AS	4+230	4+310	4+410		39	0,09	50,7	4,563	
									20835	A-08-I	AI	4+510	4+890	5+270		20835	0,67	27085,5	18147,285	
									6918	A-08-S	AS	4+490	4+930	5+350		6918	0,71	8993,4	6385,314	
									2060	A-09-I	AI	5+370	5+580	5+750		2060	1,36	2678	3642,08	
									2431	A-09-S	AS	5+370	5+600	5+770		2431	1,38	3160,3	4361,214	
									6839,31	A-10-I	AI	5+870	6+550	7+030		32697	2,33	8891,1	20716,263	
C-08	C1ª	1,3	4+730	4+740	4+750		4	3,08												
									3,08	A-10-S	AS	5+810	6+480	7+030		12592	1,74	4	6,96	
C-09	C1ª	1,3	4+770	4+820	4+850		10	7,69												
									7,69	A-10-S	AS	5+810	6+480	7+030			1,66	10	16,6	
C-10	C1ª	1,3	4+930	4+990	5+070		1082	832,31												
									832,31	A-10-S	AS	5+810	6+480	7+030			1,49	1082	1612,18	
C-11	C1ª	1,3	5+190	5+380	5+490		11932	9178,46												
									8364,92	A-10-S	AS	5+810	6+480	7+030			1,1	10874,39	11961,829	
									813,55	BE-D	AS	7+060	7+100	7+120	0	8355	1,72	1057,81	1819,174	
C-12	C1ª	1,3	5+570	5+580	5+590		2	1,54												
									1,54	BE-D	C1ª	7+060	7+100	7+120	0		1,52	2	3,04	
C-13	C1ª	1,3	5+730	5+820	5+890		1139	876,15												
									876,15	A-11-I	AI	7+270	7+460	7+670			1,64	1139	1867,96	
C-14	C1ª	1,3	5+970	6+000	6+050		25	19,23												
									19,23	A-11-I	AI	7+270	7+460	7+670			1,46	25	36,5	
C-15	C1ª	1,3	6+190	6+320	6+370		15	11,54												
									11,54	A-11-I	AI	7+270	7+460	7+670			1,14	15	17,1	
C-16-1	C1ª	1,3	6+390	6+410	6+450		6	4,62												
									4,62	A-11-I	AI	7+270	7+460	7+670			1,05	6	6,3	

1/1

TOTAIS			1079933	835587,43	835587,44			248662	1079933	1683253,629
									DNT	1,55866487

3.3. Esquema Linear de Distribuição dos Materiais


Perfil do(a) traçado
EMPRESA
AC1 ROTAS
UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
Rodovia: PPP01-UFRGS 2021/1
Trecho: ITAARA-SILVEIRA MARTINS- TRECHO 1
Data: 10/11/2021
Escala: 1:2000
PROJETO ALTIMETRICO
Código: 01/01

CAPÍTULO II

RODOVISIONÁRIOS

João Francisco Dutra Dossin
Thaís Machado Garay

Vinícius Steffens Wontroba
Daniel Sergio Presta Garcia

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

PROJETO BÁSICO PARA IMPLANTAÇÃO DE TRECHO RODOVIÁRIO ENTRE ITAARA E SILVEIRA MARTINS

Rodovia: PPP-2021/1 – LOTE 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: 8,5 km em diretriz;11,5 km em corpo estradal km

VOLUME 2– PROJETO EXECUTIVO

EQUIPE AA2 – RODOVISIONÁRIOS
NOVEMBRO/2021

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 2021/1**

Ano: 2021

Semestre: 1

Disciplina: Rodovias

Turma: A

Código da Equipe: AA2

Nome: Rodovisionários

Integrantes do grupo:

(assinatura)

João Francisco Dutra Dossin

(assinatura)

Thaís Machado Garay

(assinatura)

Vinícius Steffens Wontroba

SUMÁRIO

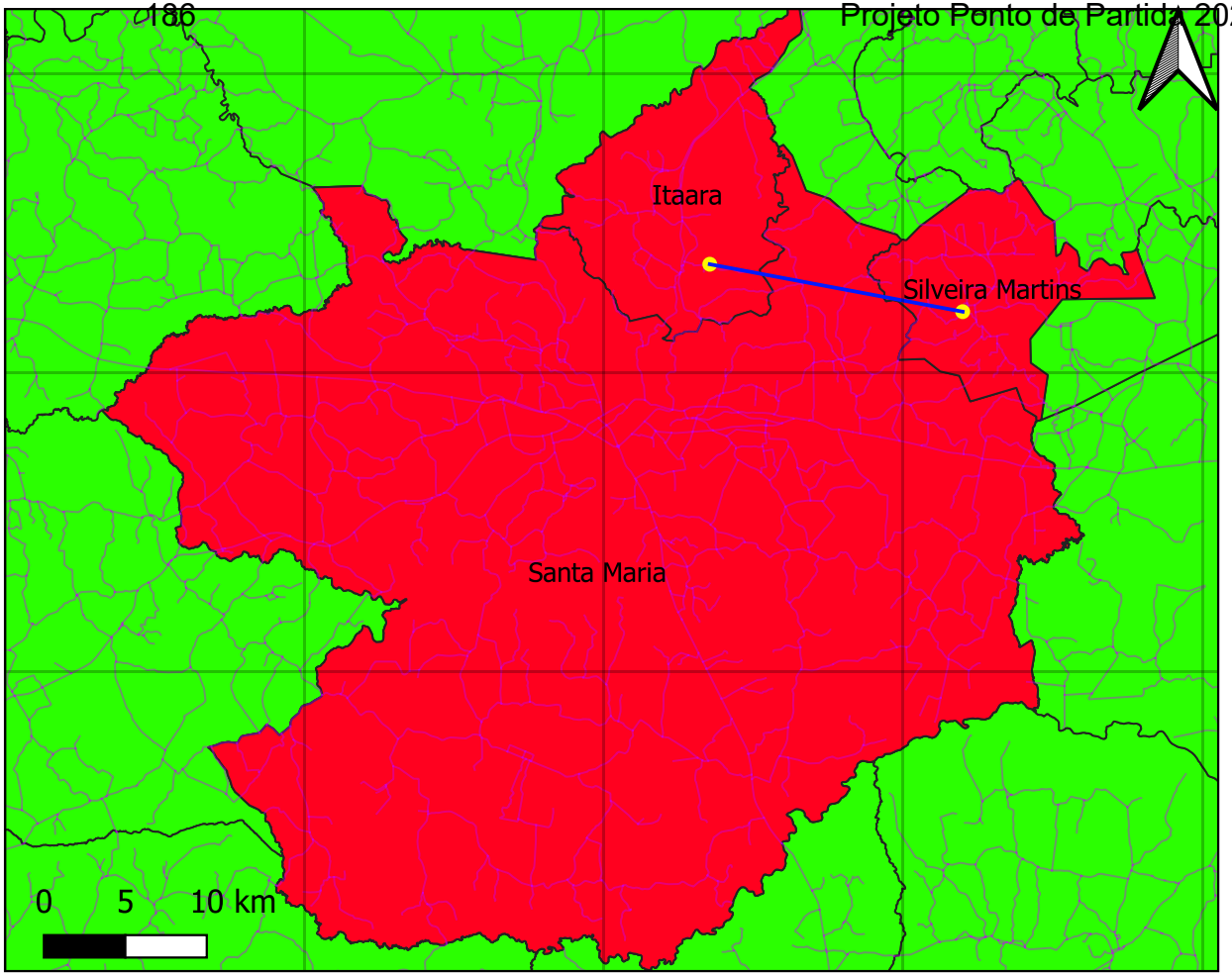
SUMÁRIO

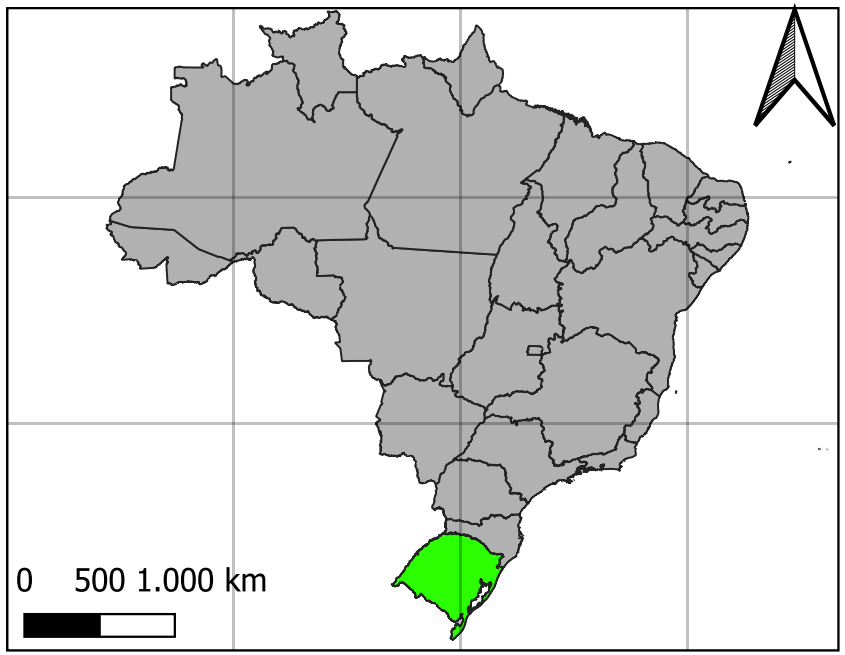
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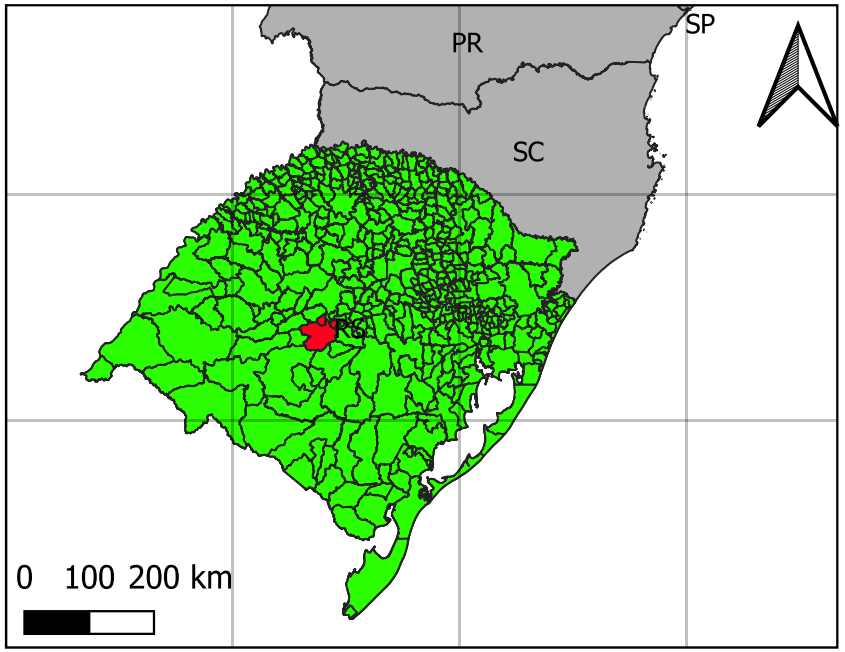
APRESENTAÇÃO

1 APRESENTAÇÃO

1.1 Mapa de Situação



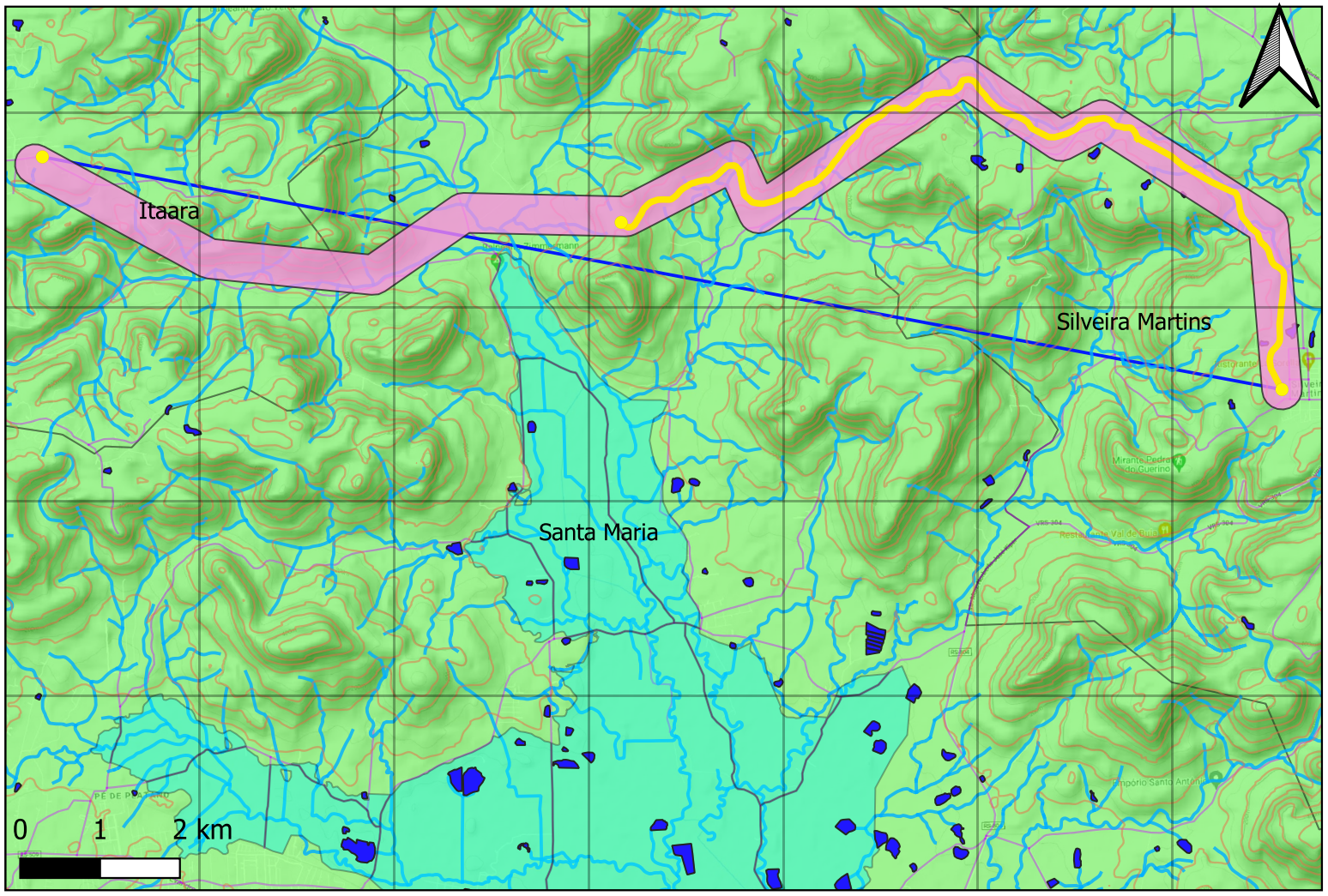




- Diretriz
- Coordenadas
- Trecho Rodoviário
- Santa Maria - Itaara - Silveira Martins
- Município
- Rio Grande do Sul
- Brasil

Base de Dados: IBGE, FEPAM
Autor: Projeto Ponto de Partida / Equipe AA2 - Rodovisionários
Sistema de Coordenadas Geográficas - Datum: SIRGAS 2000

1.2 Mapa de Localização



- Coordenadas
- Traçado AA2
- Plano de Voo
- Massa D'Água
- Contornos 50
- Terreno Sujeito à Inundação
- Trecho Drenagem
- Diretriz
- Trecho Rodoviário
- Município

Mapa de Situação
Base de Dados: IBGE, FEPAM
Autor: Projeto Ponto de Partida / Equpe AA2 - Rodovisionários
Sistema de Coordenadas Geográficas - Datum: SIRGAS 2000

1.3 Quadro de Características Técnicas

CARACTERÍSTICAS TÉCNICAS

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 11+448,04

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	11448,038	FAIXA DOM. (LE/LD+OFF)	15 / 15 + 5	SUPERELEVAÇÃO MÁX.		TALUDE CORTE 3ª CAT.	

PLANIMETRIA

DISTRIBUIÇÃO DE CURVAS

T	RAIOS (m)	FREQ.	Dc (m)	%	Lc1+Lc2 (m)	%
R	R mínimo = 300,000	1	171,156	1,50	140,000	1,22
A	300,000 < R ≤ 100,000					
N	100,000 < R ≤ 200,000					
S	200,000 < R ≤ 300,000					
I	300,000 < R ≤ 500,000	10	1963,072	17,15	1340,000	11,71
Ç	R > 500,000					
.	TOTAL EM TRANSIÇÃO	11	2134,228	18,64	1480,000	12,93
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	2134,228	18,64	5748,456	50,21

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1	966,702	8,44			0 < i ≤ 1		
1 < i ≤ 2	1636,757	14,30			1 < i ≤ 2	28,468	0,25
2 < i ≤ 3					2 < i ≤ 3	578,803	5,06
3 < i ≤ 4	689,206	6,02			3 < i ≤ 4		
4 < i ≤ 5					4 < i ≤ 5		
5 < i ≤ 6	500,087	4,37			5 < i ≤ 6		
6 < i ≤ 7					6 < i ≤ 7	1336,149	11,67
7 < i ≤ 8	867,387	7,58			7 < i ≤ 8	2994,479	26,16
8 < i ≤ 9					8 < i ≤ 9		
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	4660,139	40,71			TOTAL	4937,899	43,13

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
9598,038	83,84	800,000	6,99	1050,000	9,17	1850,000	16,16

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
106,038	0,93	1527,084	13,34	7833,810	68,43

PARÂMETROS K MÍNIMOS ADOTADOS

EM CURVA CÔNCAVA	18,456	EM CURVA CONVEXA	5,899

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
1,071	0,094	8445,788	35,547

PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
20523,688	179,28	29094,464	254,14	24809,076	216,71

CARACTERÍSTICAS OPERACIONAIS

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

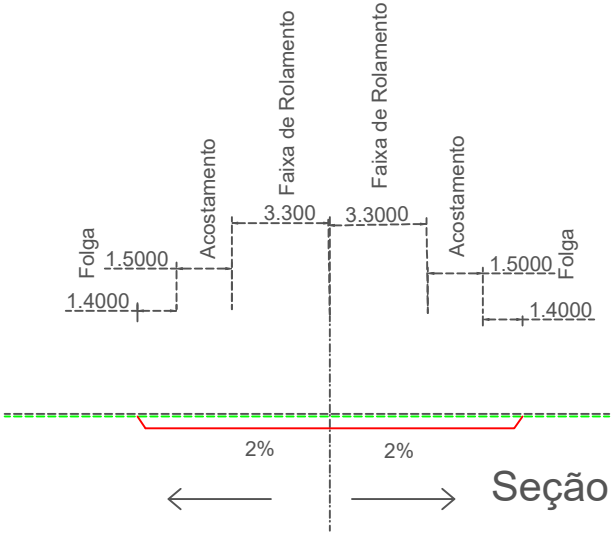
PROJETO GEOMÉTRICO

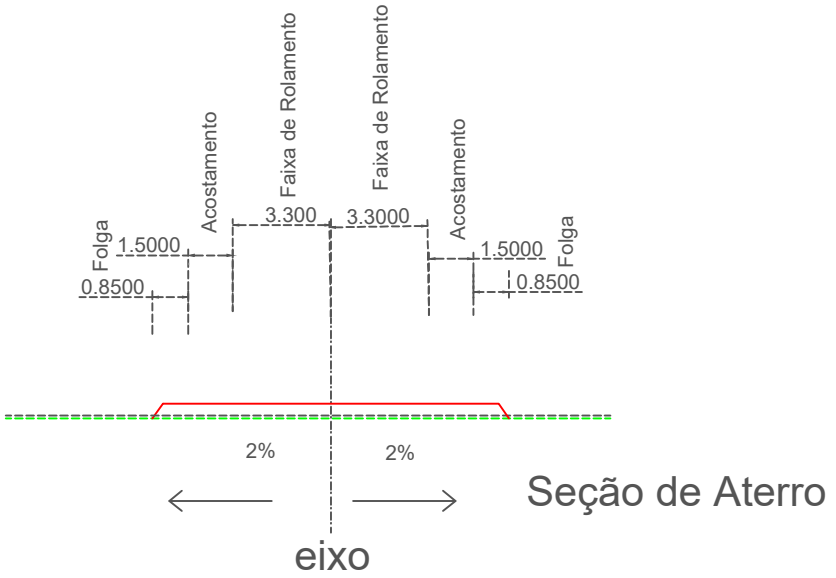
2 PROJETO GEOMÉTRICO

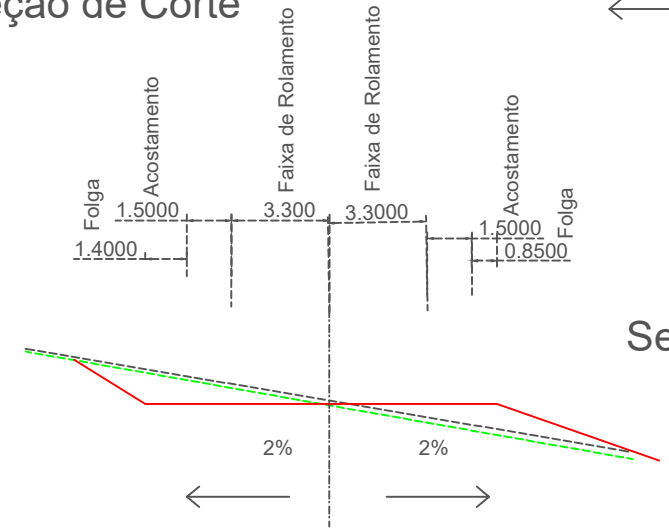
2.1 Seções Transversais Tipo

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES



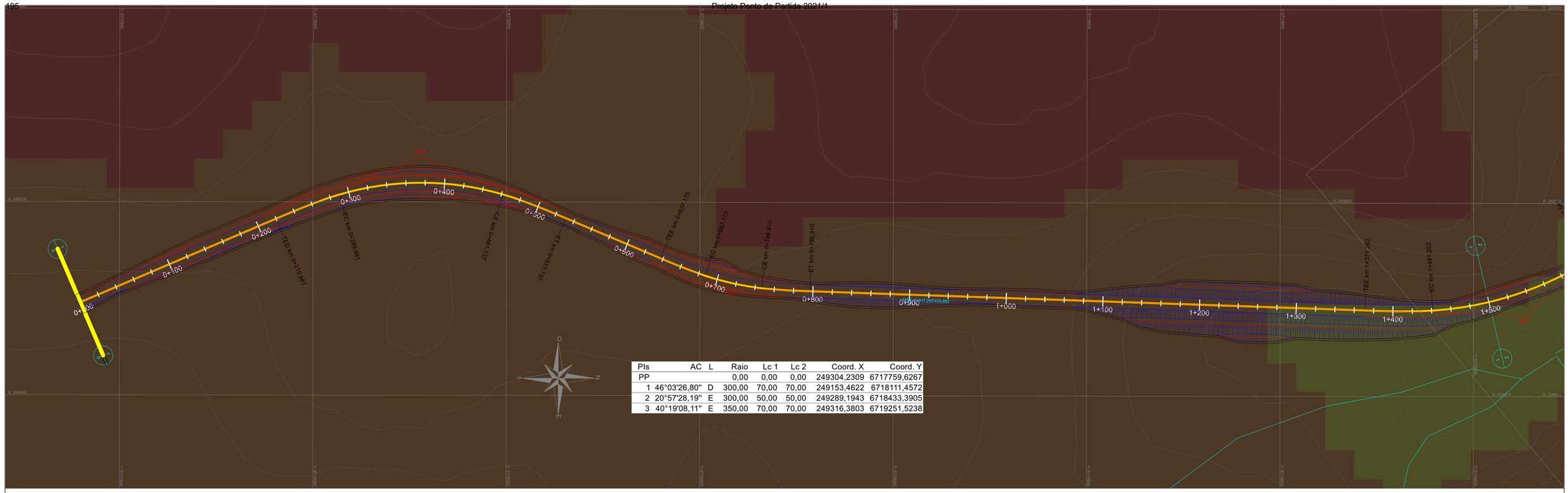




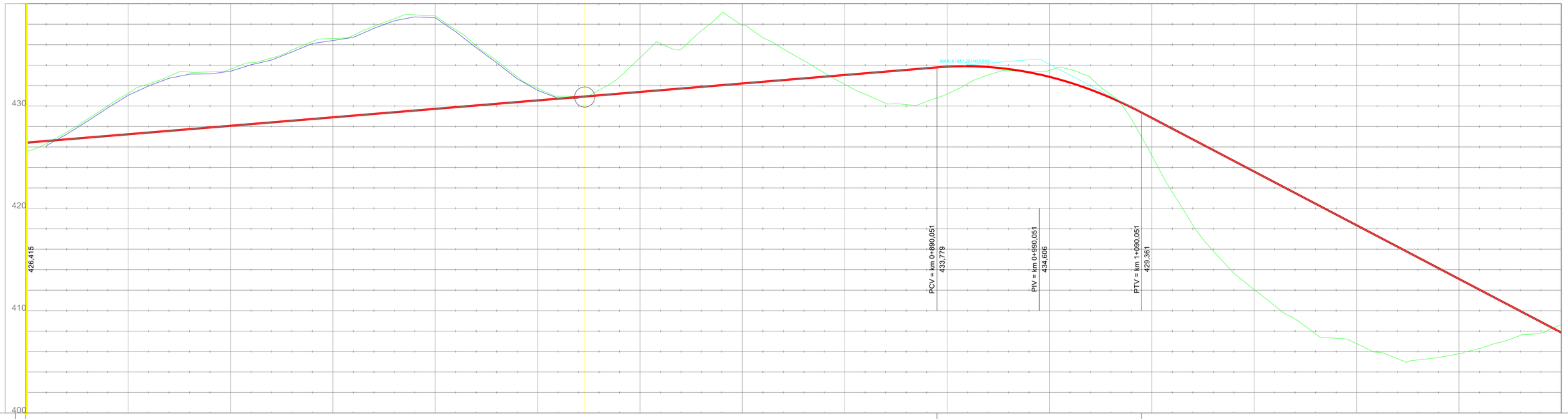
	Univesidade Federal do Rio Grande do Sul
	Rodovia: PPP-2021/1 **Trecho**: Lote 2 **Data**: 10/11/2021
Escala: sem escala	SEÇÕES TIPO

PRODUZIDO POR UMA VERSÃO DO AUTODESK PARA ESTUDANTES

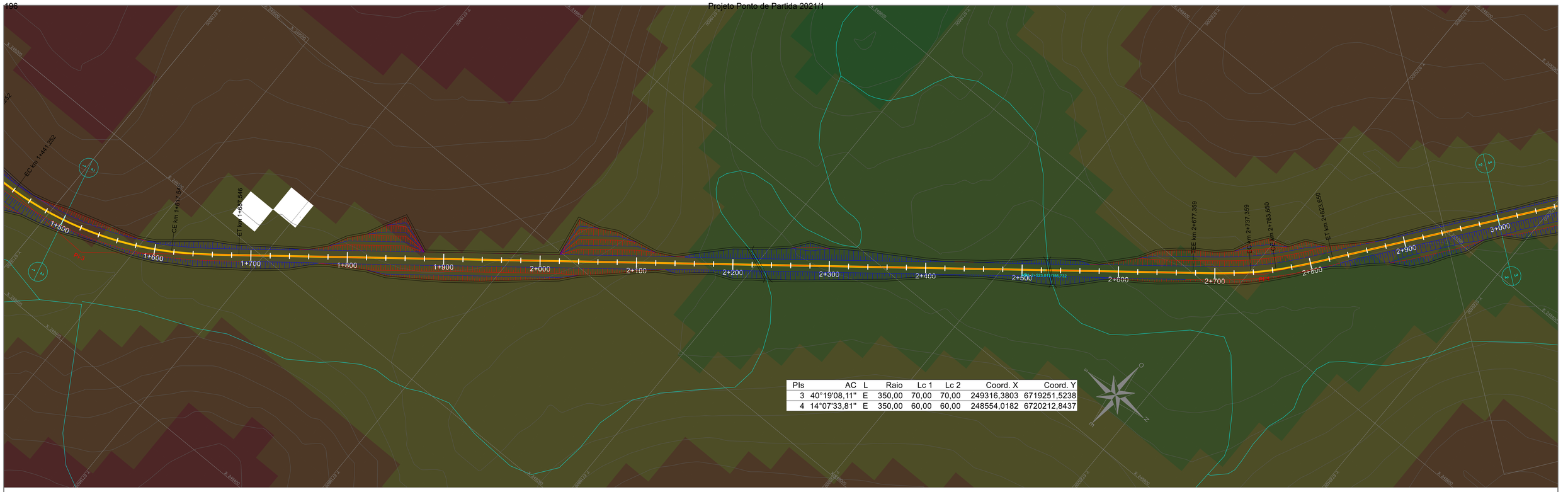
2.2 Linha Geral



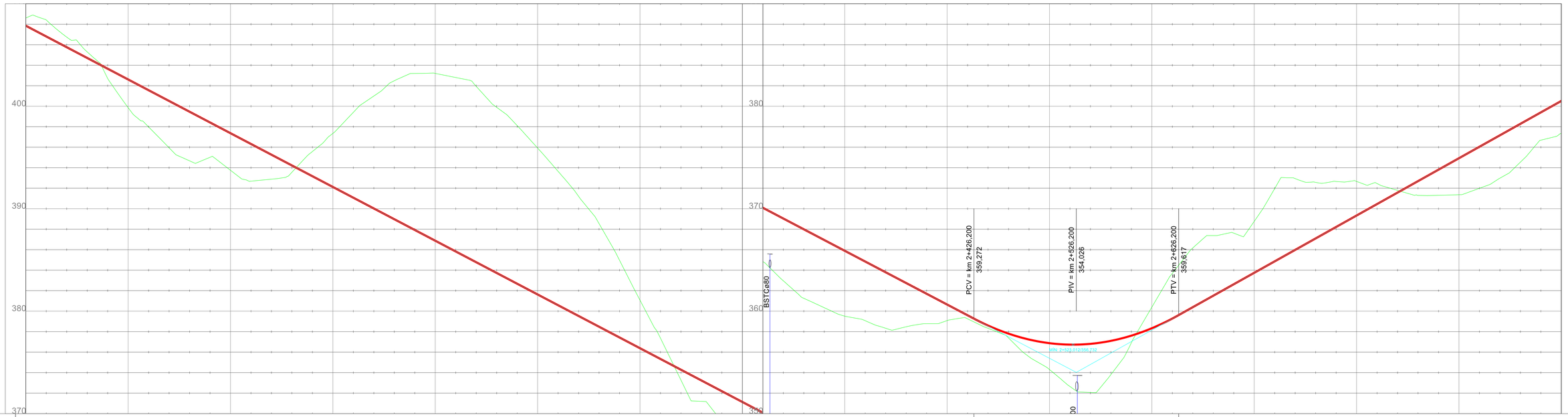
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
PP			0,00	0,00	0,00	249304,2309	6717759,6267
1	46°03'26,80"	D	300,00	70,00	70,00	249153,4622	6718111,4572
2	20°57'28,19"	E	300,00	50,00	50,00	249289,1943	6718433,3905
3	40°19'08,11"	E	350,00	70,00	70,00	249316,3803	6719251,5238



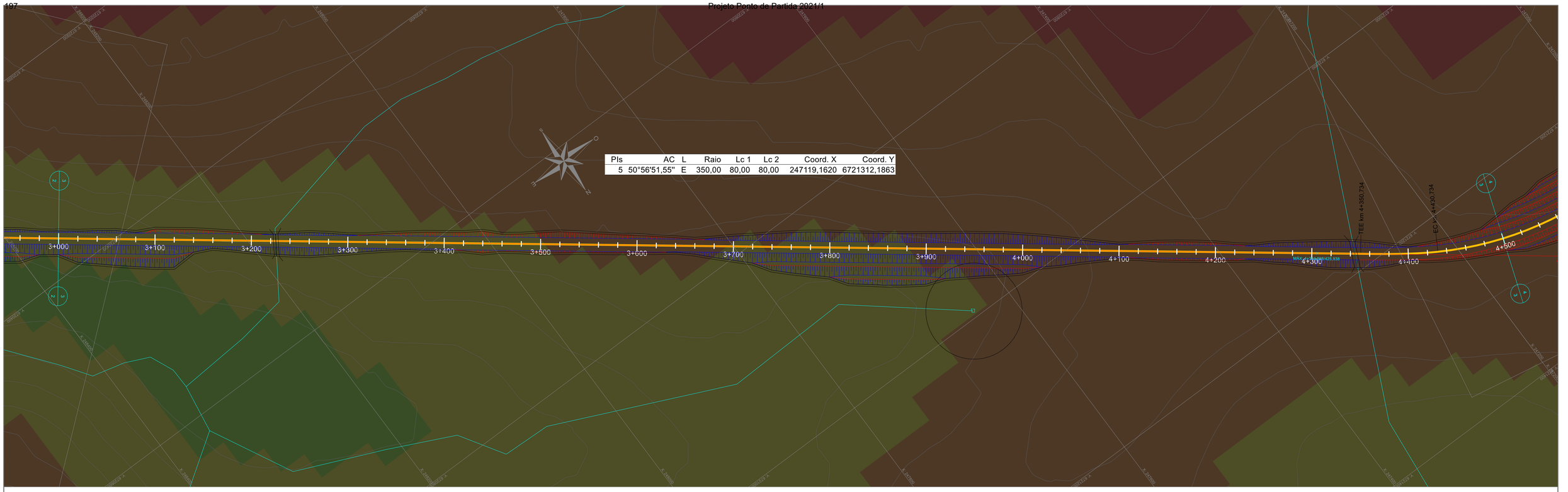
| | | |



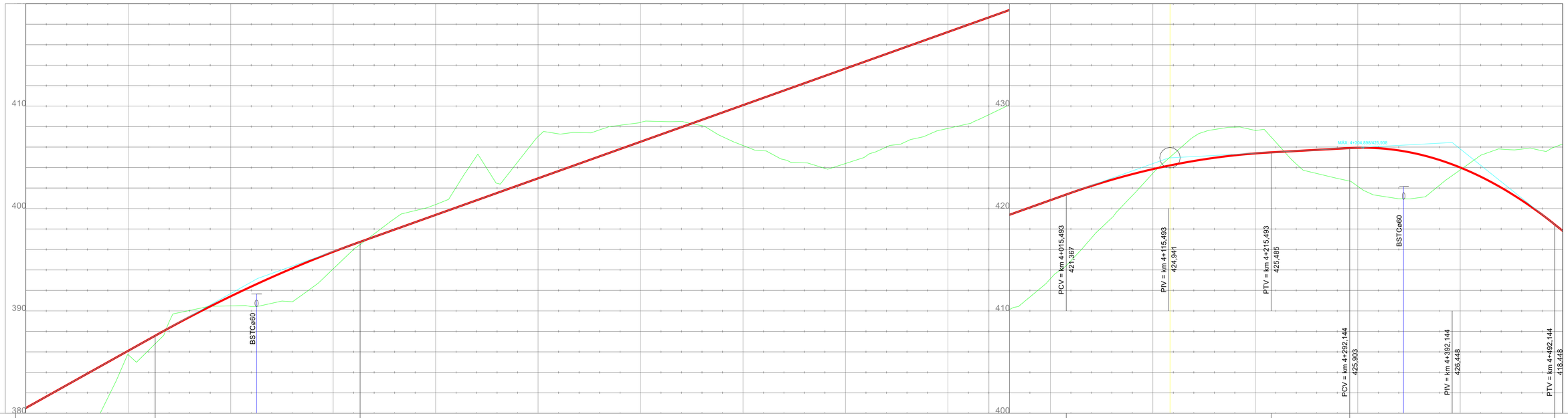
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
3	40°19'08,11"	E	350,00	70,00	70,00	249316,3803	6719251,5238
4	14°07'33,81"	E	350,00	60,00	60,00	248554,0182	6720212,8437



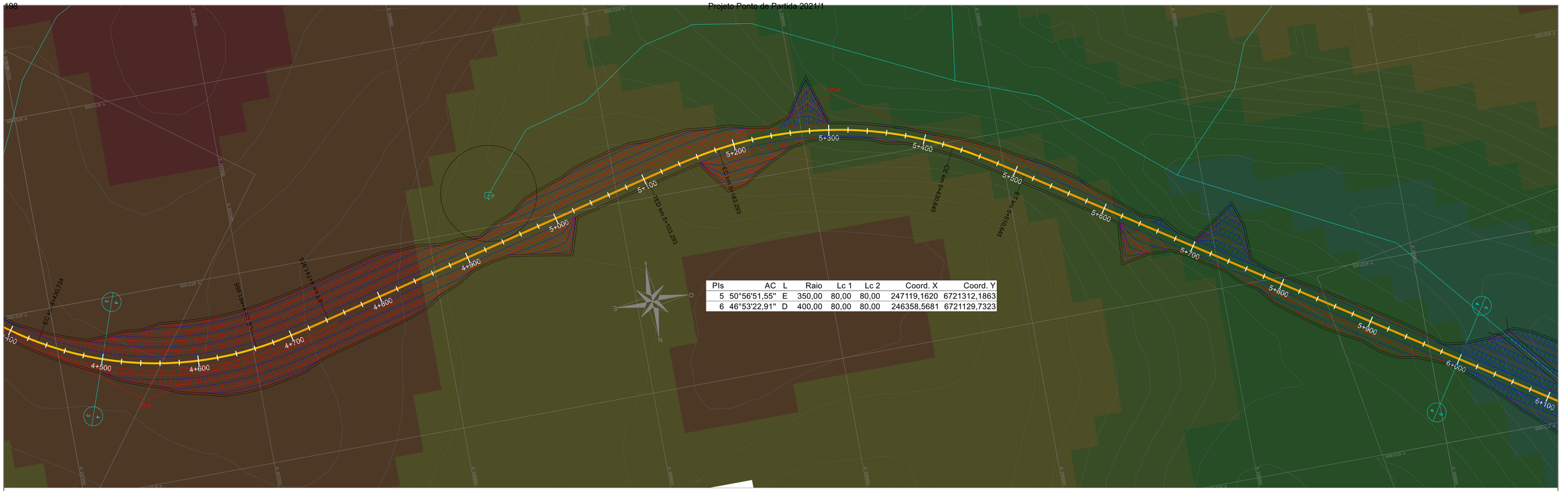
| ALT. | D = 1336,15 i = -5,2456% | | |



PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
5	50°56'51,55"	E	350,00	80,00	80,00	247119,1620	6721312,1863



| | | |

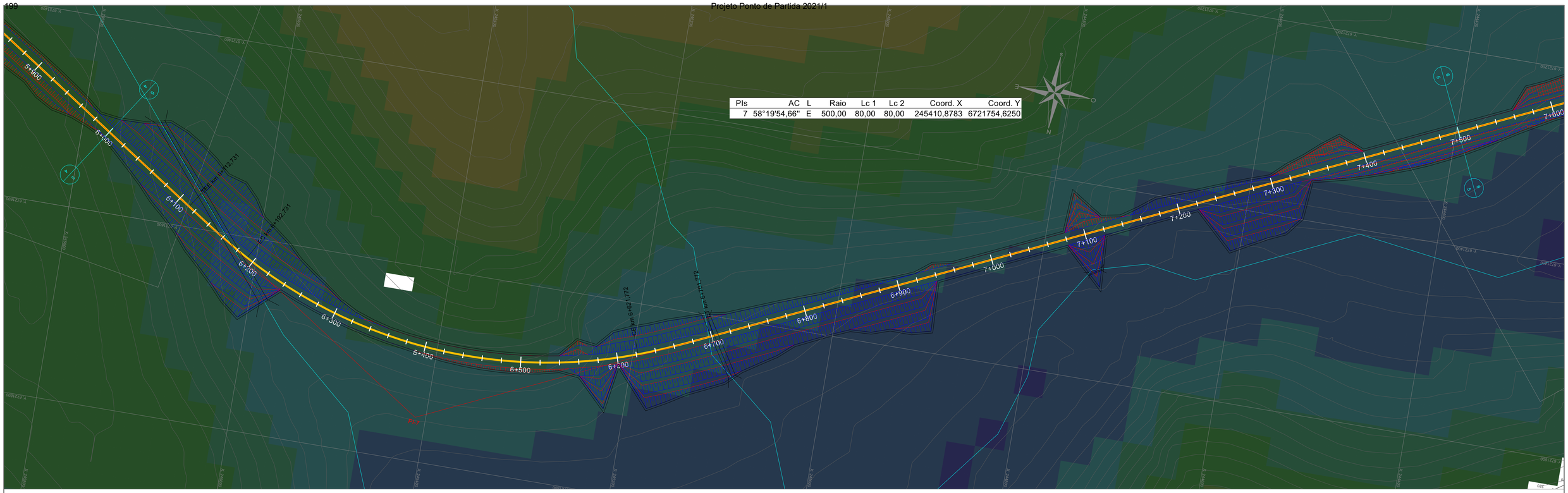


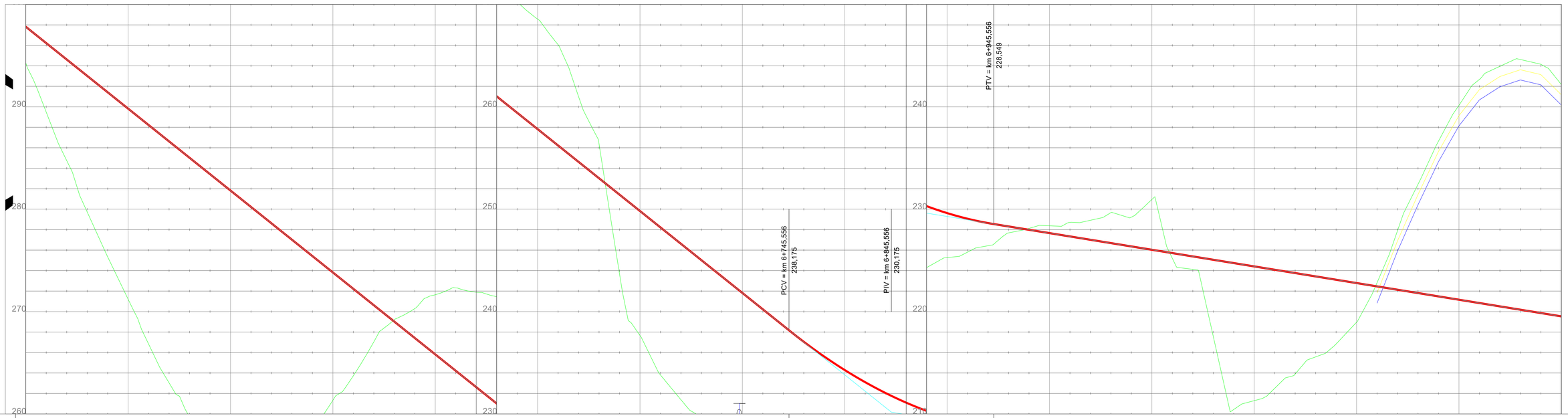
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
5	50°56'51,55"	E	350,00	80,00	80,00	247119,1620	6721312,1863
6	46°53'22,91"	D	400,00	80,00	80,00	246358,5681	6721129,7323



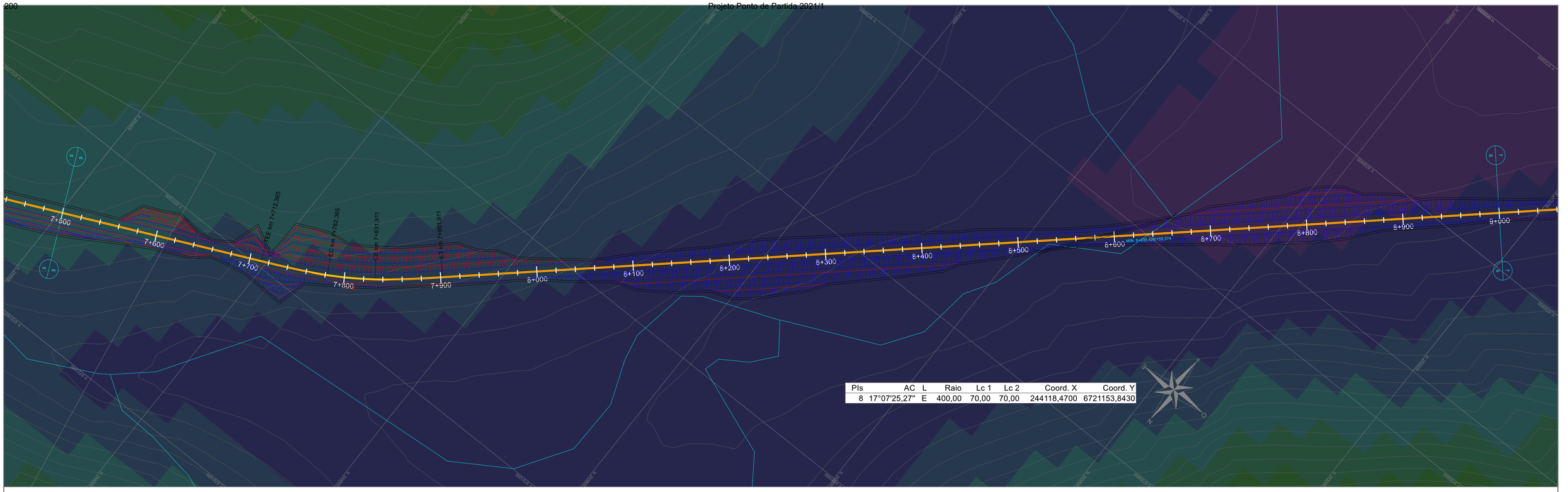
km	TERRENO	PROJETO
4+500	426,297	417,820
	427,175	416,220
	428,273	414,620
	429,159	413,020
	430,378	411,420
4+600	430,306	409,820
	429,165	408,220
	427,653	406,620
	425,900	405,020
	423,889	403,420
4+700	421,820	401,820
	419,711	400,220
	417,684	398,620
	416,159	397,020
	414,575	395,420
4+800	412,812	393,820
	410,325	392,220
	406,836	390,620
	402,437	389,020
	397,594	387,420
4+900	393,574	385,820
	390,630	384,220
	390,916	382,620
	392,542	381,020
	396,057	379,420
5+000	402,601	377,820
	404,060	376,220
	404,065	374,620
	403,509	373,020
	400,612	371,420
5+100	397,468	369,820
	393,948	368,220
	389,521	366,620
	384,596	365,020
	379,094	363,420
5+200	373,930	361,820
	368,149	360,220
	362,670	358,620
	357,611	357,020
	353,103	355,420
5+300	349,392	353,820
	346,063	352,220
	345,135	350,620
	345,191	349,020
	346,638	347,420
5+400	348,924	345,820
	350,824	344,220
	352,813	342,620
	354,817	341,020
	355,912	339,420
5+500	355,782	337,820
	354,705	336,220
	353,468	334,620
	349,925	333,020
	346,056	331,420
5+600	341,686	329,820
	336,124	328,220
	331,217	326,620
	326,948	325,020
	323,195	323,420
5+700	320,278	321,820
	318,500	320,220
	317,110	318,620
	318,582	317,020
	317,640	315,420
5+800	317,171	313,820
	316,524	312,220
	315,764	310,620
	314,721	309,020
	313,935	307,420
5+900	312,986	305,820
	311,407	304,220
	309,576	302,620
	305,963	301,020
	300,736	299,420
6+000	294,311	297,820

EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN
RODOVISIONÁRIOS	Rodovia: PPP-UFGRS-2021/1 Trecho: 4400-6100 Data: 11/2021
Escala: 1:2000	PROJETO GEOMÉTRICO — Código: PG-04

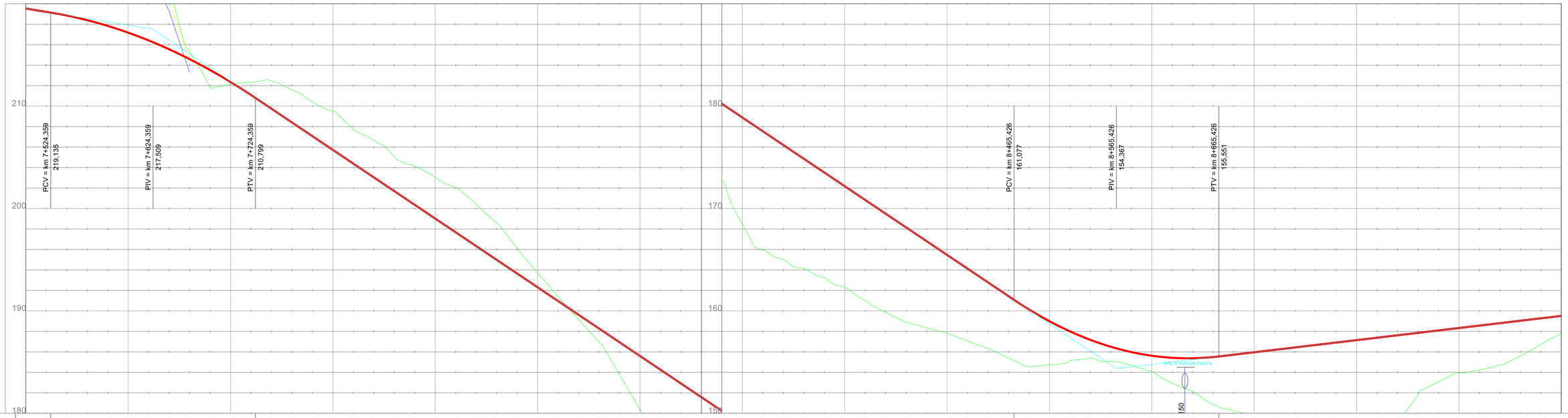

PIs AC L Raio Lc 1 Lc 2 Coord. X Coord. Y
7 58°19'54,66" E 500,00 80,00 80,00 245410,8783 6721754,6250
5+900
6+000
6+100
6+200
6+300
6+400
6+500
6+600
6+700
6+800
6+900
7+000
7+100
7+200
7+300
7+400
7+500
7+600
PI 7


PCV = km 6+745,556
238,175
PIV = km 6+845,556
230,175
PTV = km 6+945,556
228,549

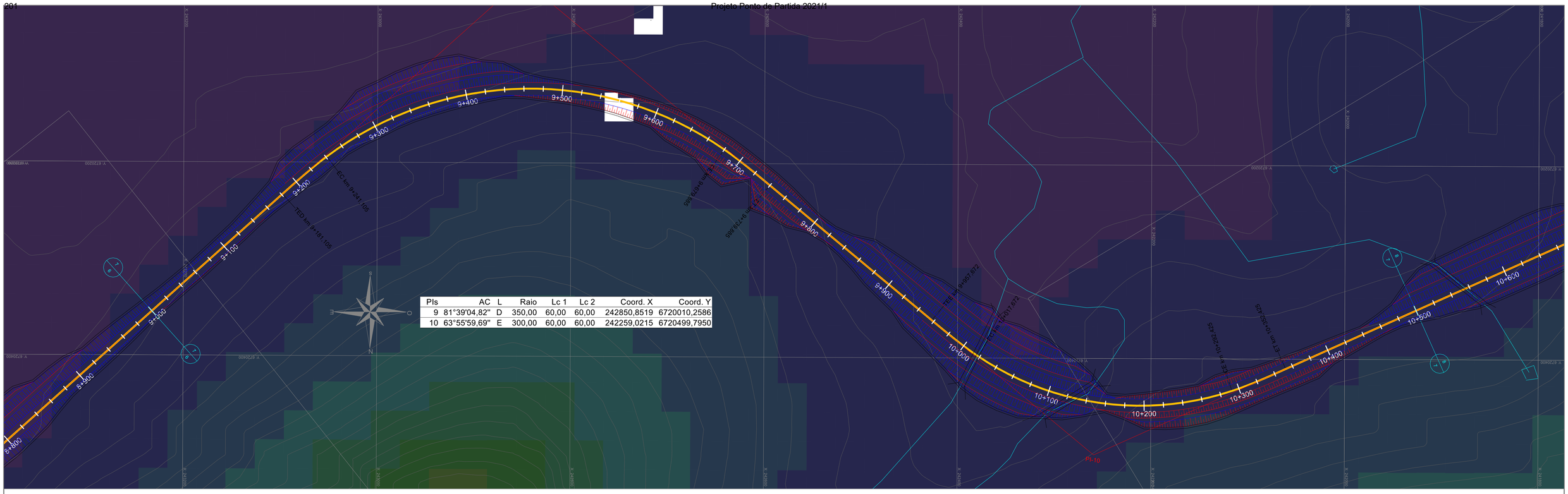
| | | |



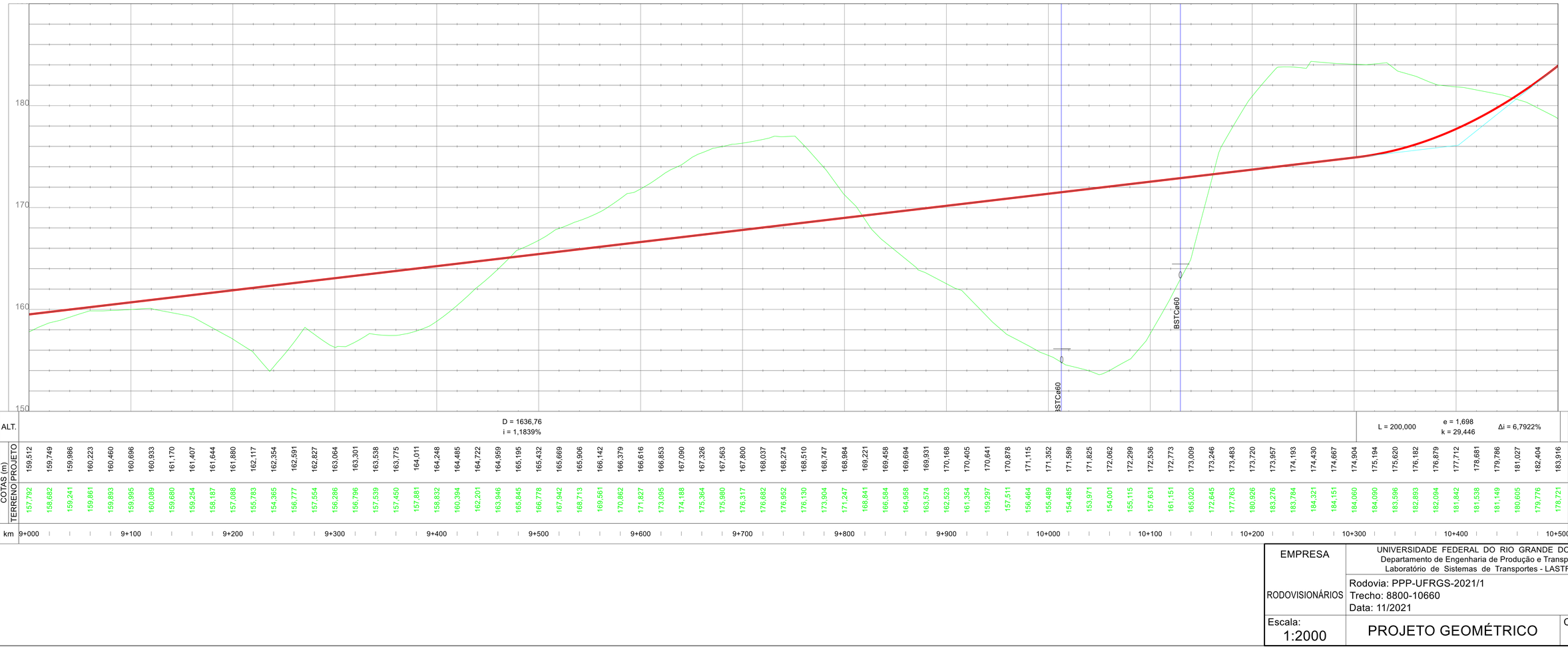
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
8	17°07'25,27"	E	400,00	70,00	70,00	244118,4700	6721153,8430



| | | |



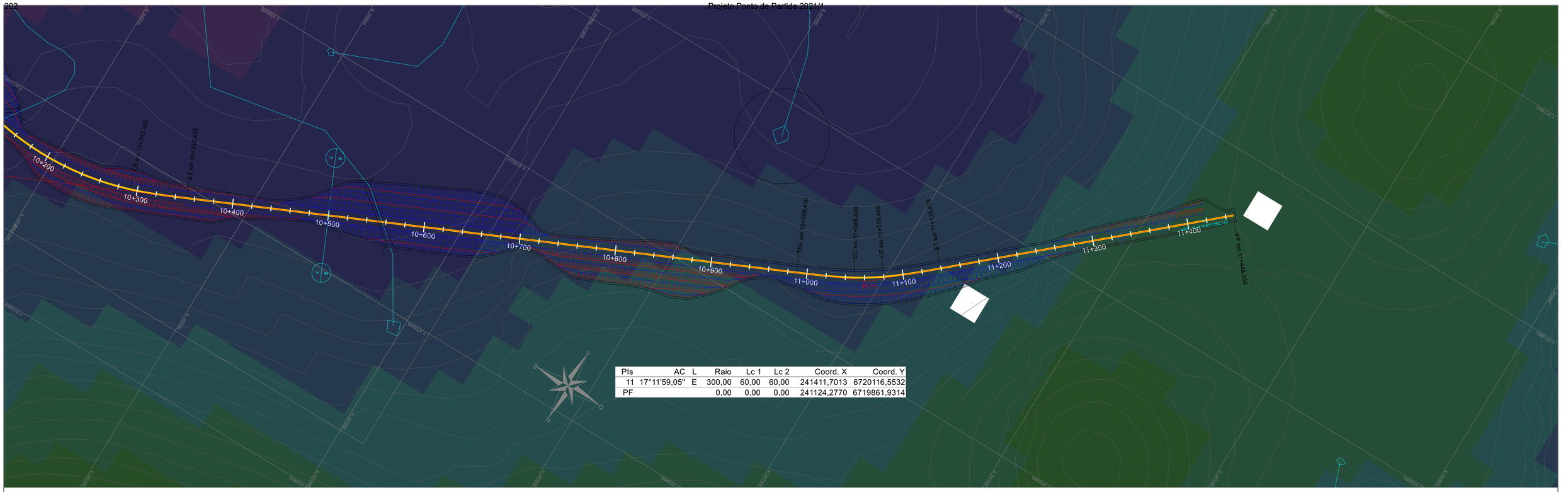
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
9	81°39'04,82"	D	350,00	60,00	60,00	242850,8519	6720010,2586
10	63°55'59,69"	E	300,00	60,00	60,00	242259,0215	6720499,7950



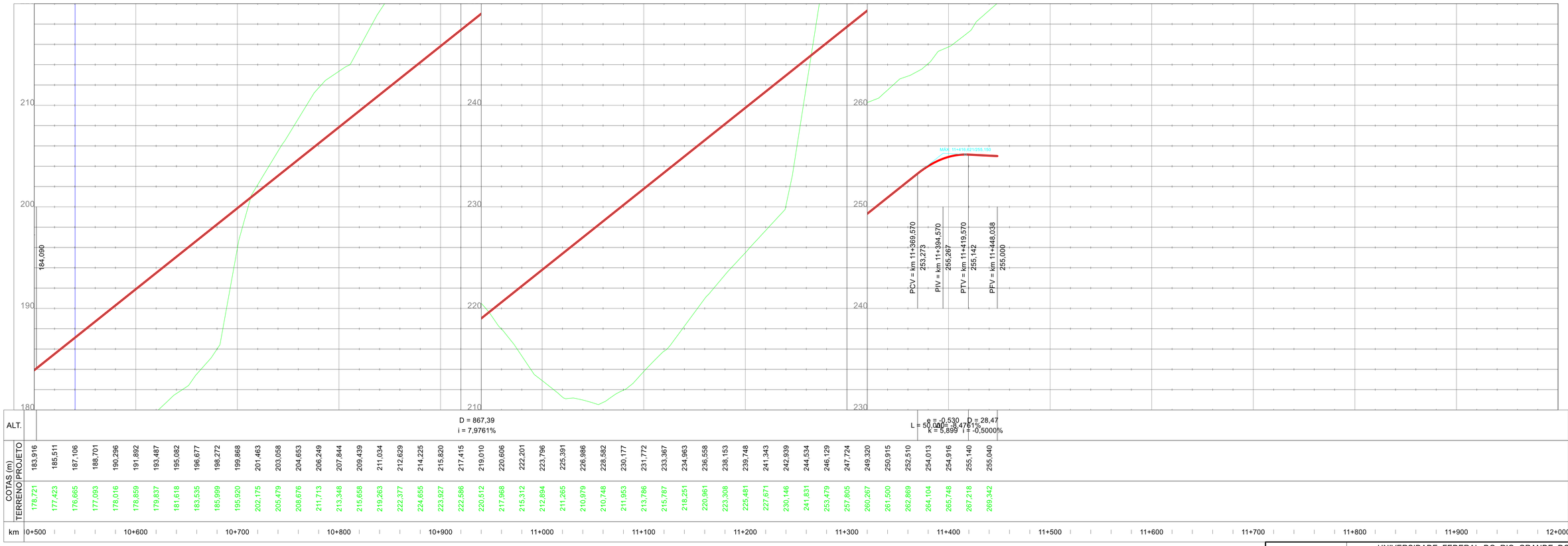
ALT. D = 1636,76 i = 1,1839% L = 200,000 e = 1,698 k = 29,446 Δi = 6,7922%

km	TERRENO	PROJETO
9+000	157,792	159,512
	158,682	159,749
	159,241	159,986
	159,861	160,223
	159,893	160,460
9+100	159,995	160,696
	160,089	160,933
	159,680	161,170
	159,254	161,407
	158,187	161,644
	157,088	161,880
	155,783	162,117
	154,365	162,354
	156,777	162,591
	157,554	162,827
9+200	156,286	163,064
	156,796	163,301
	157,539	163,538
	157,450	163,775
	157,881	164,011
	158,832	164,248
	160,394	164,485
	162,201	164,722
	163,946	164,959
9+300	165,845	165,195
	166,778	165,432
	167,942	165,669
	168,713	165,906
	169,561	166,142
	170,862	166,379
	171,827	166,616
	173,095	166,853
	174,188	167,090
	175,364	167,326
9+400	175,980	167,563
	176,317	167,800
	176,682	168,037
	176,952	168,274
	176,130	168,510
	173,904	168,747
	171,247	168,984
	168,841	169,221
	166,584	169,458
	164,958	169,694
	163,574	169,931
9+500	162,523	170,168
	161,354	170,405
	159,297	170,641
	157,511	170,878
	156,464	171,115
	155,489	171,352
	154,485	171,589
	153,971	171,825
	154,001	172,062
	155,115	172,299
	157,631	172,536
	161,151	172,773
9+600	165,020	173,009
	172,645	173,246
	177,763	173,483
	180,926	173,720
	183,276	173,957
	183,784	174,193
	184,321	174,430
	184,151	174,667
	184,060	174,904
	184,090	175,194
	183,596	175,620
	182,893	176,182
	182,094	176,879
9+700	181,842	177,712
	181,538	178,681
	181,149	179,786
	180,605	181,027
	179,776	182,404
	178,721	183,916

EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN
RODOVISIONÁRIOS	Rodovia: PPP-UFRGS-2021/1 Trecho: 8800-10660 Data: 11/2021
Escala: 1:2000	PROJETO GEOMÉTRICO — Código: PG-07



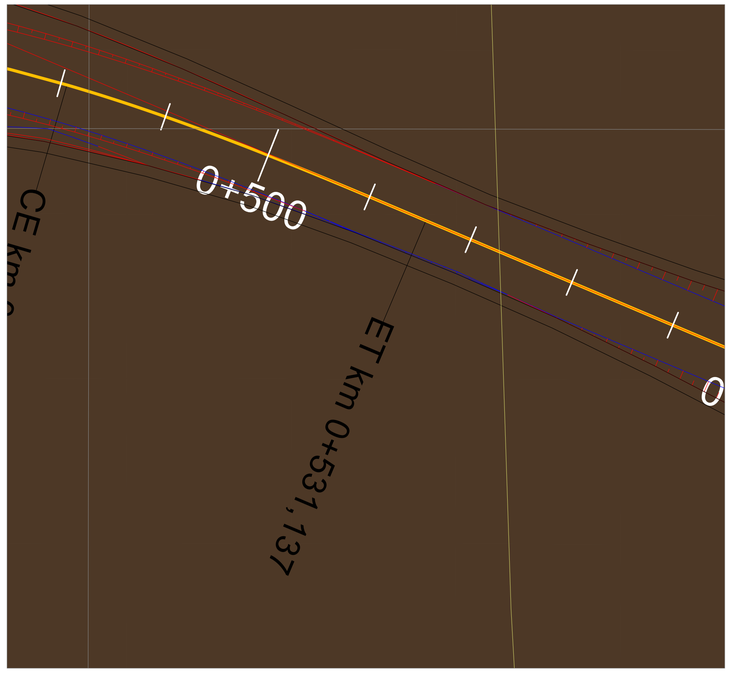
PIs	AC	L	Raio	Lc 1	Lc 2	Coord. X	Coord. Y
11	17°11'59,05"	E	300,00	60,00	60,00	241411,7013	6720116,5532
PF			0,00	0,00	0,00	241124,2770	6719861,9314

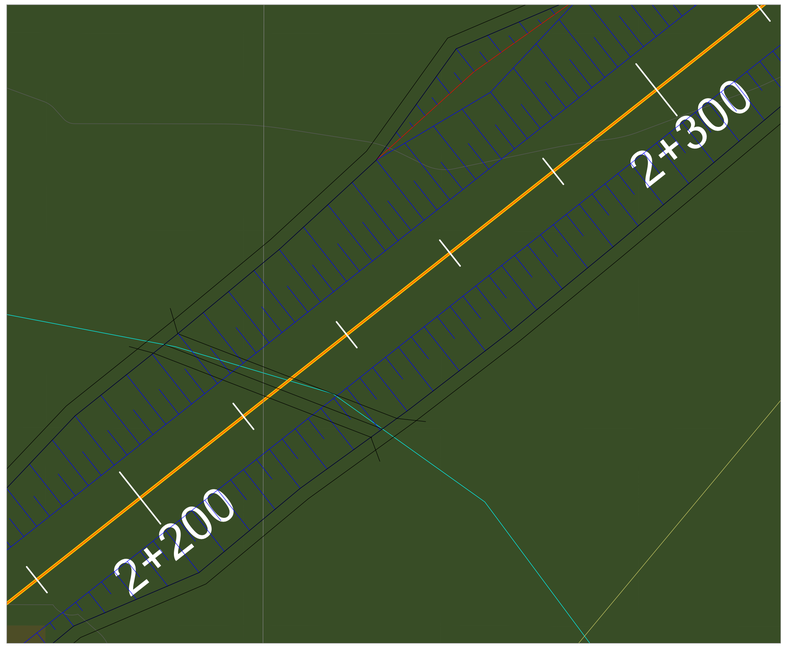


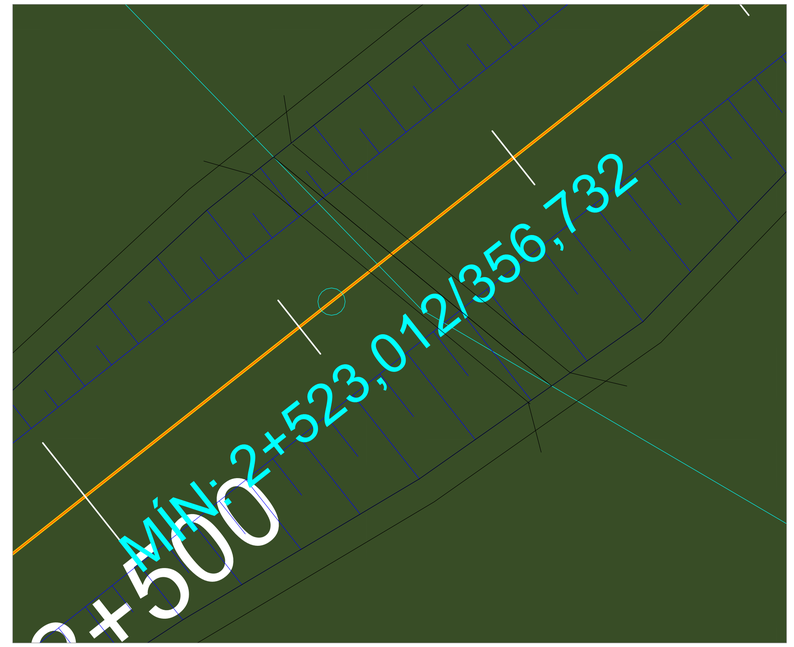
km	0+500			10+600			10+700			10+800			10+900			11+000			11+100			11+200			11+300			11+400			11+500			11+600			11+700			11+800			11+900			12+000
COTAS (m) TERRENO	178,721	177,423	176,665	177,093	178,016	178,859	179,837	181,618	183,535	185,999	195,920	202,175	205,479	209,676	211,713	213,348	215,658	219,263	222,377	224,655	223,927	222,586	220,512	217,968	215,312	212,894	211,265	210,979	210,748	211,953	213,786	215,787	218,251	220,961	223,308	225,481	227,671	230,146	241,831	253,479	257,805	260,267	261,500	262,869	264,104	265,748	267,218	269,342
COTAS (m) PROJETO	183,916	185,511	187,106	188,701	190,296	191,892	193,487	195,082	196,677	198,272	199,868	201,463	203,058	204,653	206,249	207,844	209,439	211,034	212,629	214,225	215,820	217,415	219,010	220,606	222,201	223,796	225,391	226,986	228,582	230,177	231,772	233,367	234,963	236,558	238,153	239,748	241,343	242,939	244,534	246,129	247,724	249,320	250,915	252,510	254,013	254,916	255,140	255,040

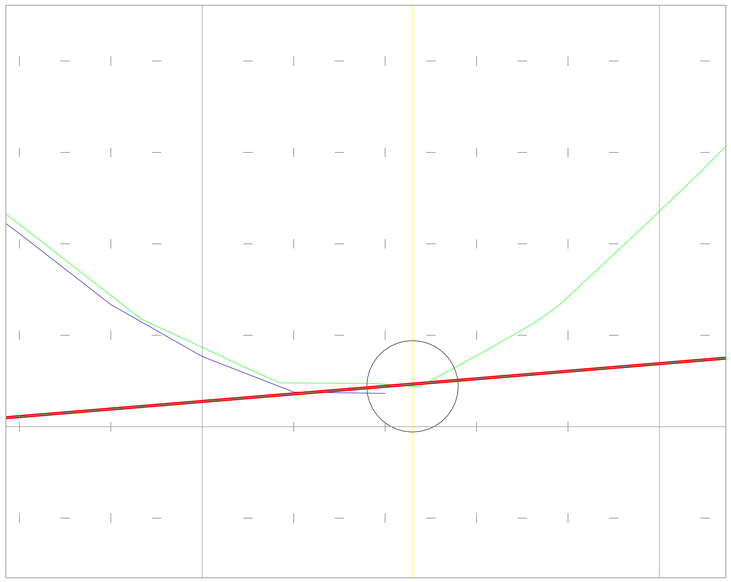
EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
RODOVISIONÁRIOS	Rodovia: PPP-UFRGS-2021/1 Trecho: 10160-11448 Data: 11/2021	
Escala: 1:2000	PROJETO GEOMÉTRICO	Código: PG-08

2.3 Detalhamento do Projeto Planialtimétrico

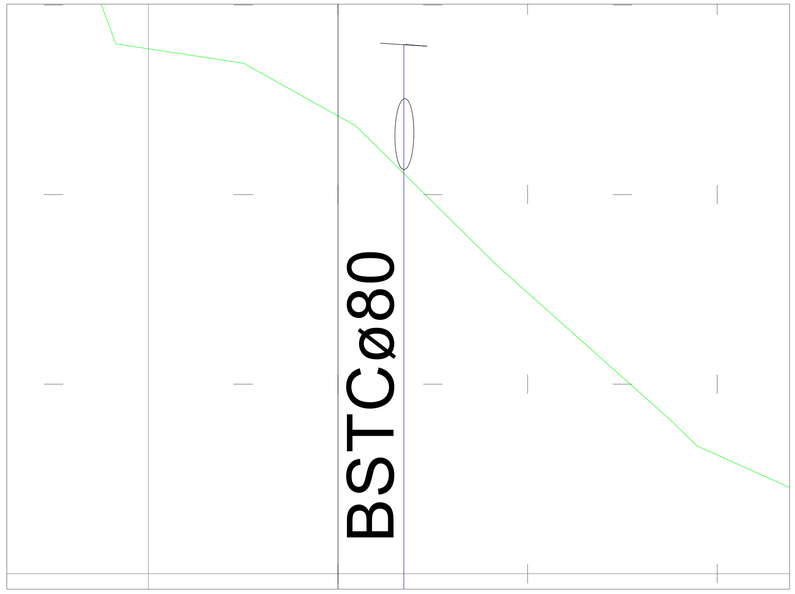




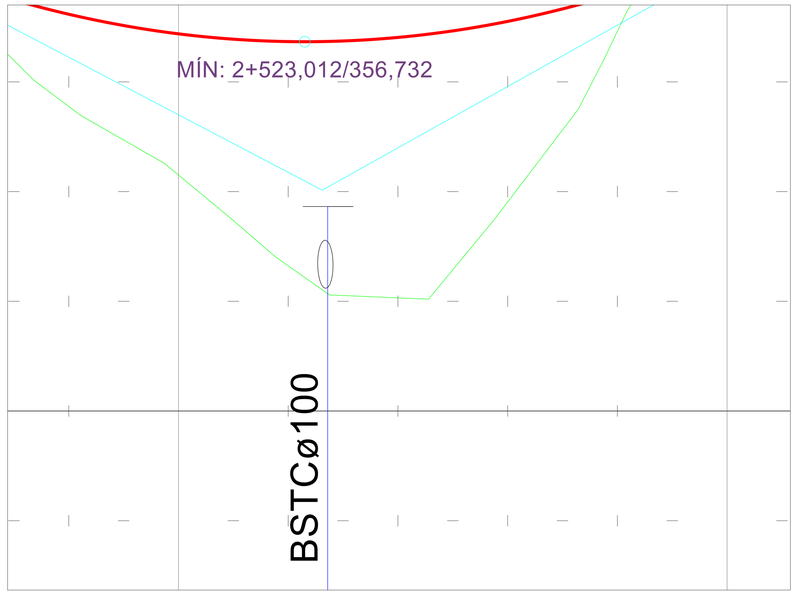




INTERSEÇÃO COM VIA EXISTENTE 1

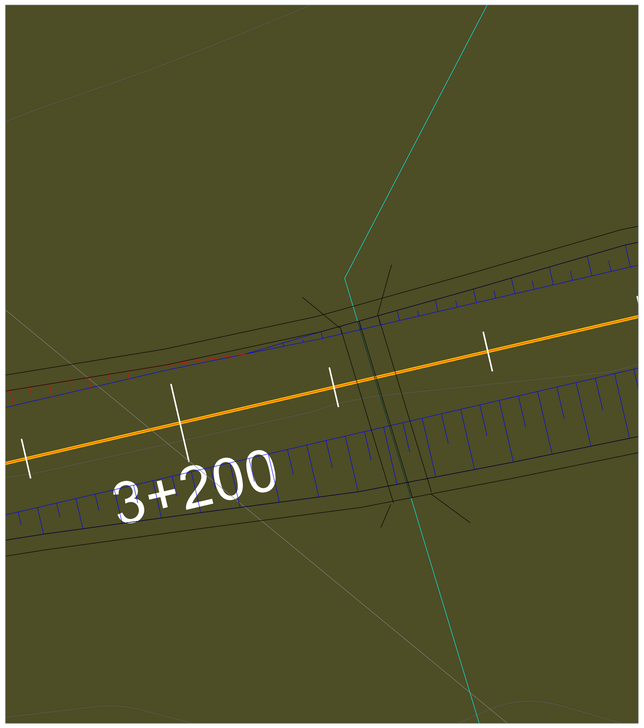


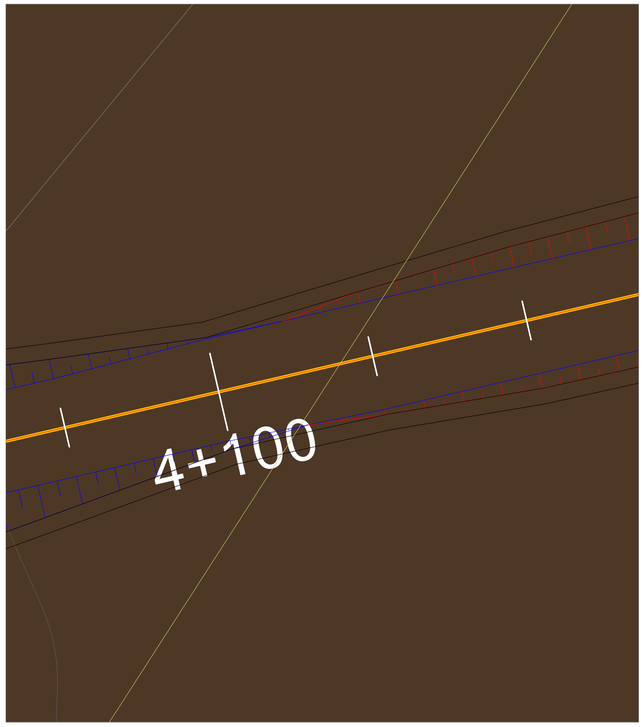
BUEIRO 1

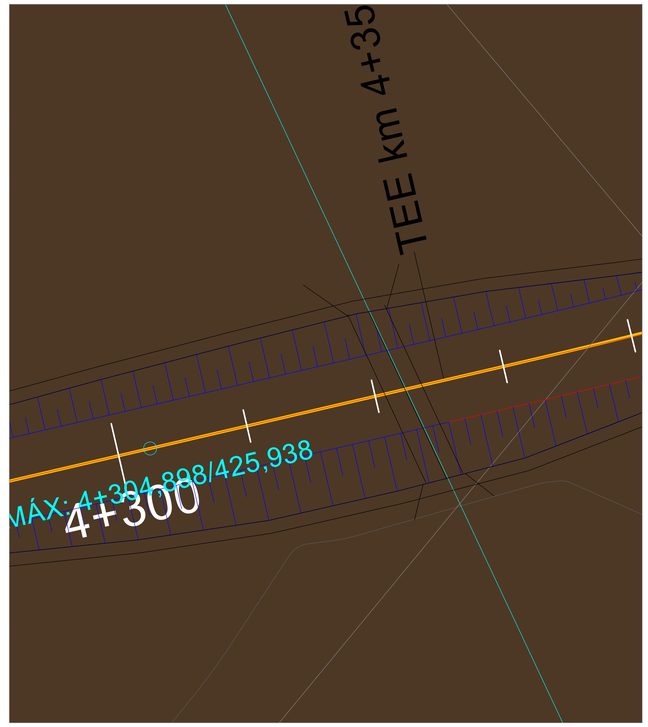


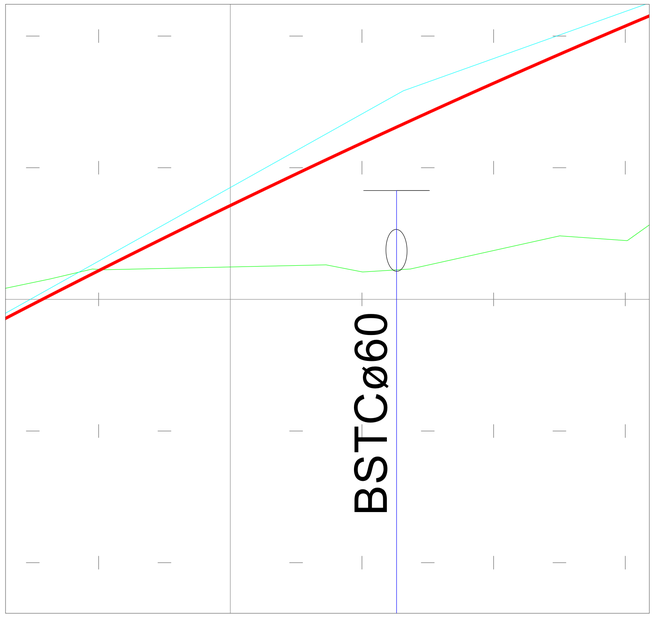
BUEIRO 2

EMPRESA RODOVISIONÁRIOS	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN Rodovia: PPP-UFRGS-2021/1 Data: 11/2021	
Escala: SEM ESCALA	DETALHAMENTO	Código: 1/4

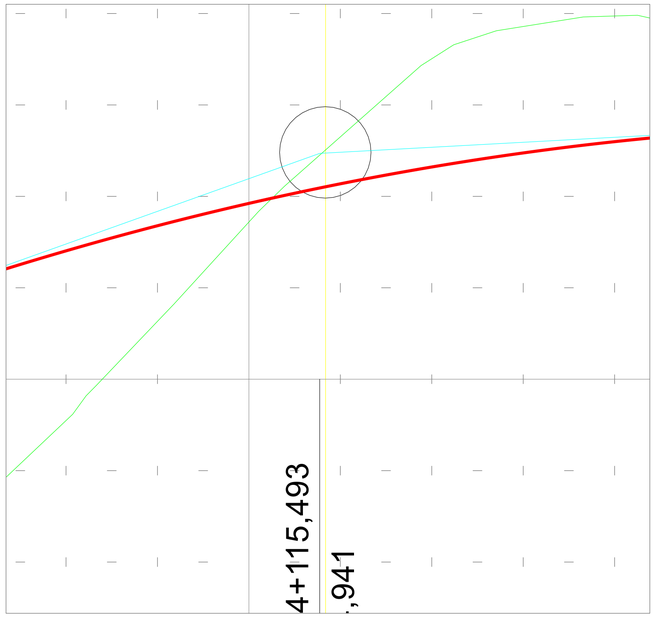




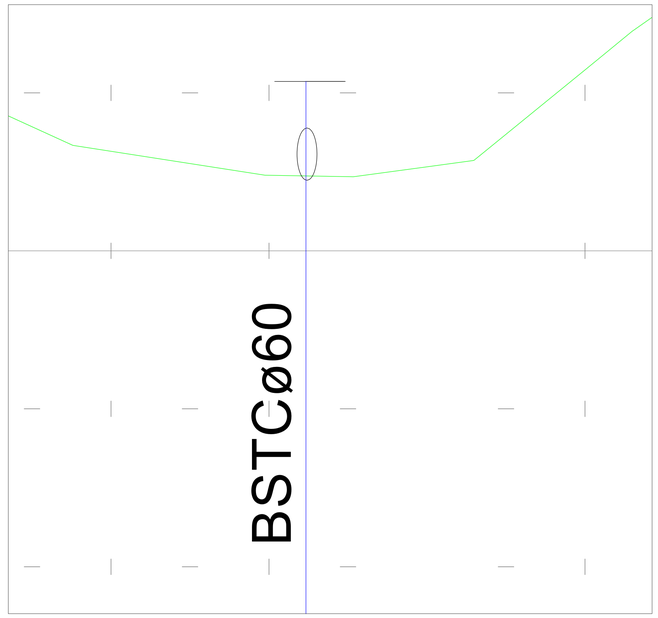




BUEIRO 3

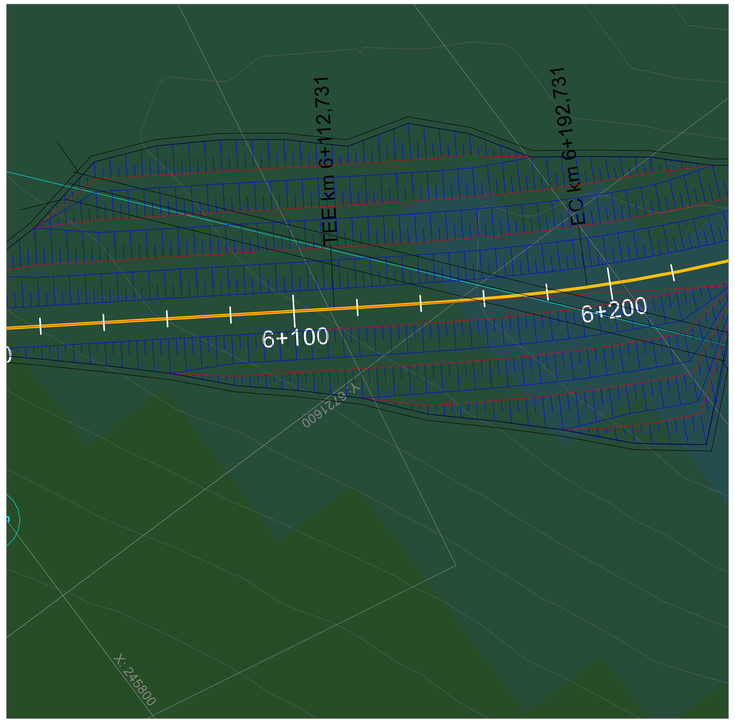


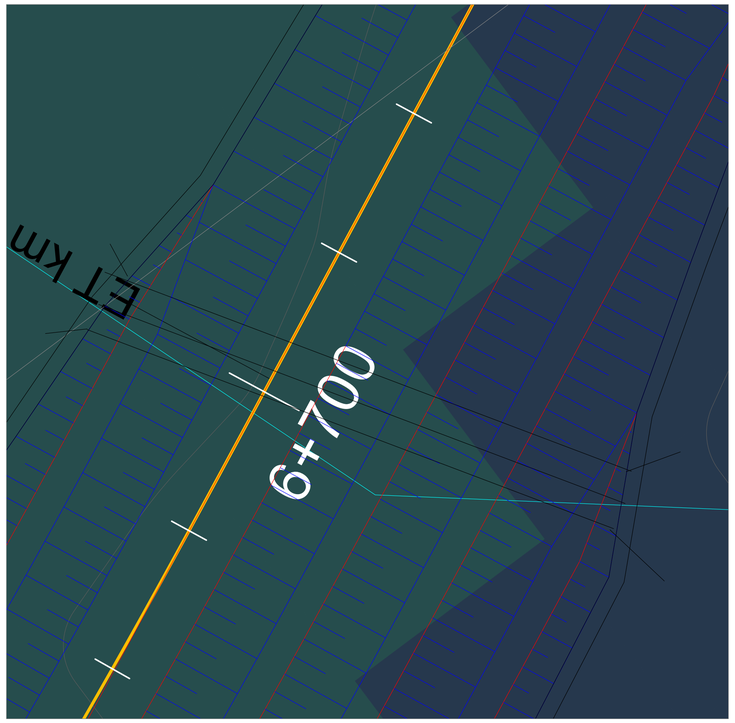
INTERSEÇÃO COM VIA EXISTENTE 2

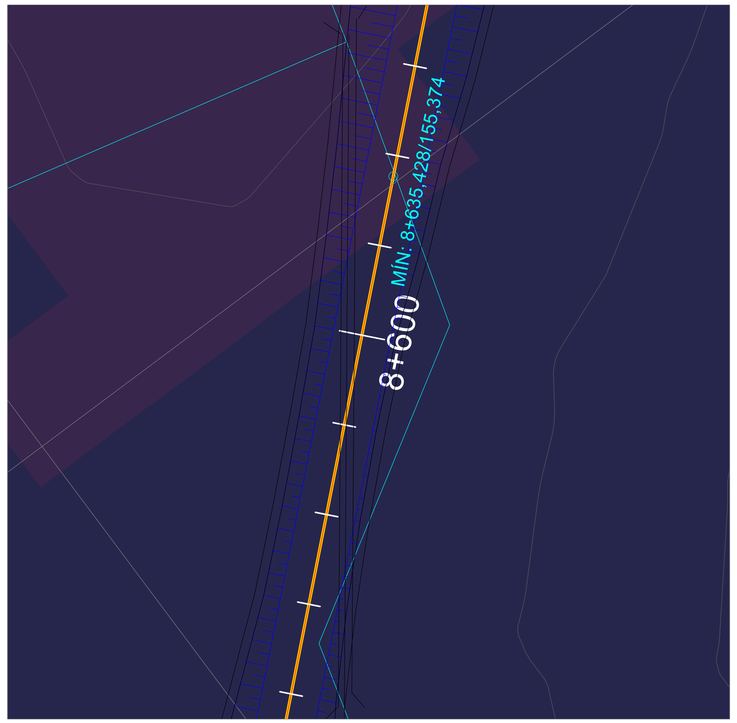


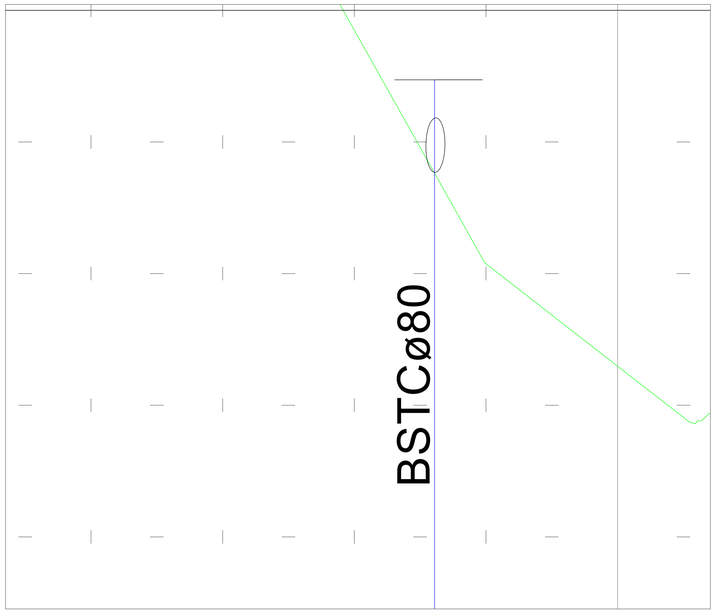
BUEIRO 4

EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
RODOVISIONÁRIOS	Rodovia: PPP-UFRGS-2021/1 Data: 11/2021	
Escala: SEM ESCALA	DETALHAMENTO	Código: 2/4

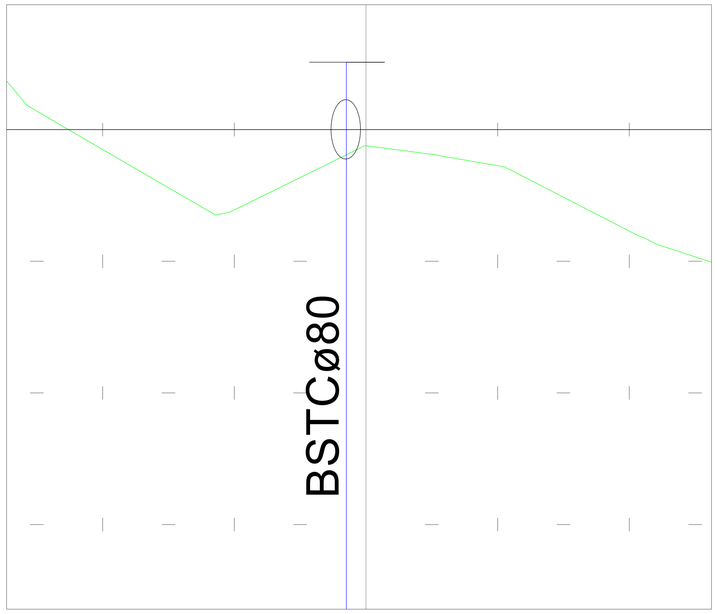




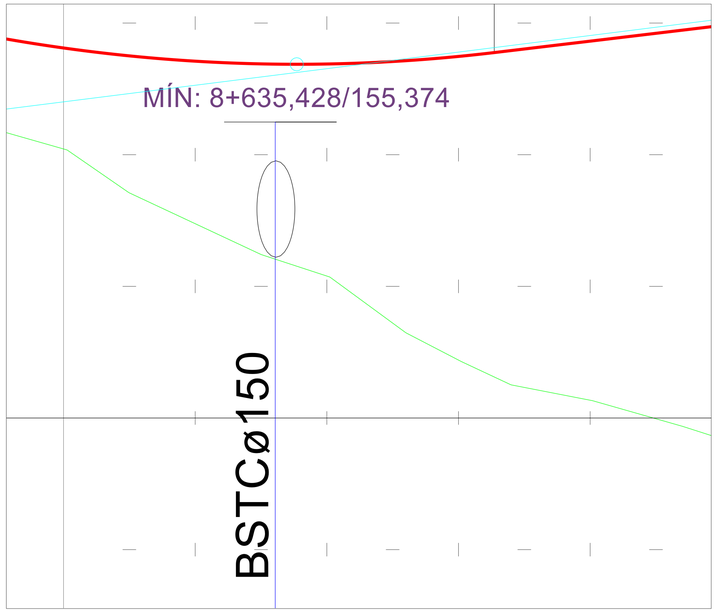




BUEIRO 5

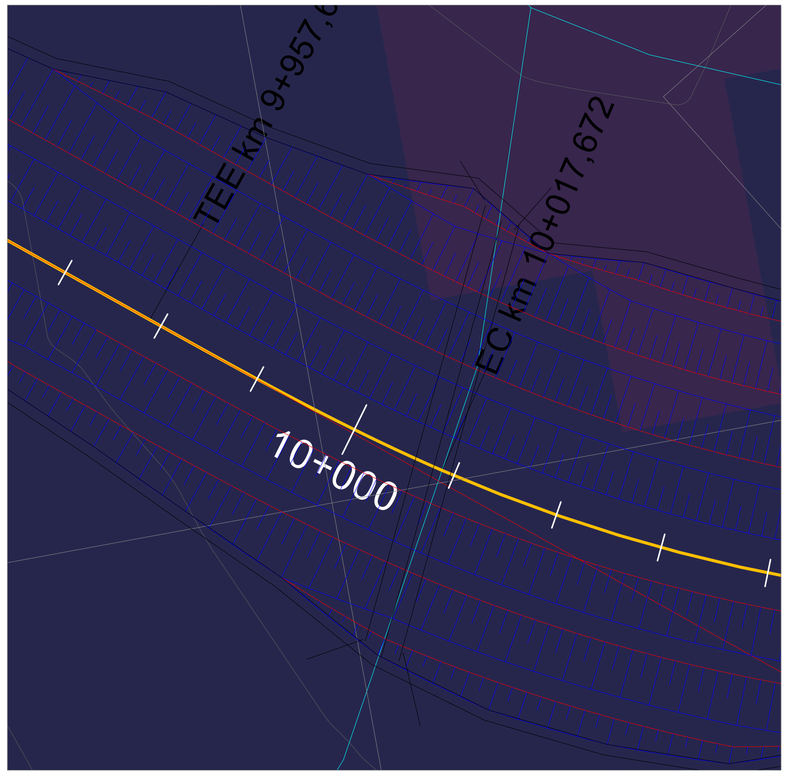


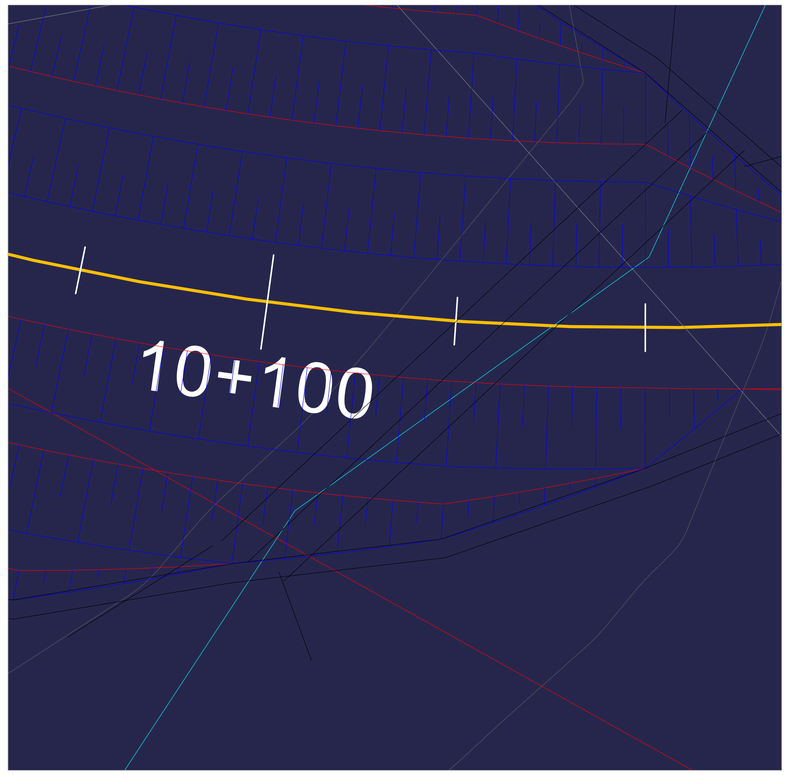
BUEIRO 6

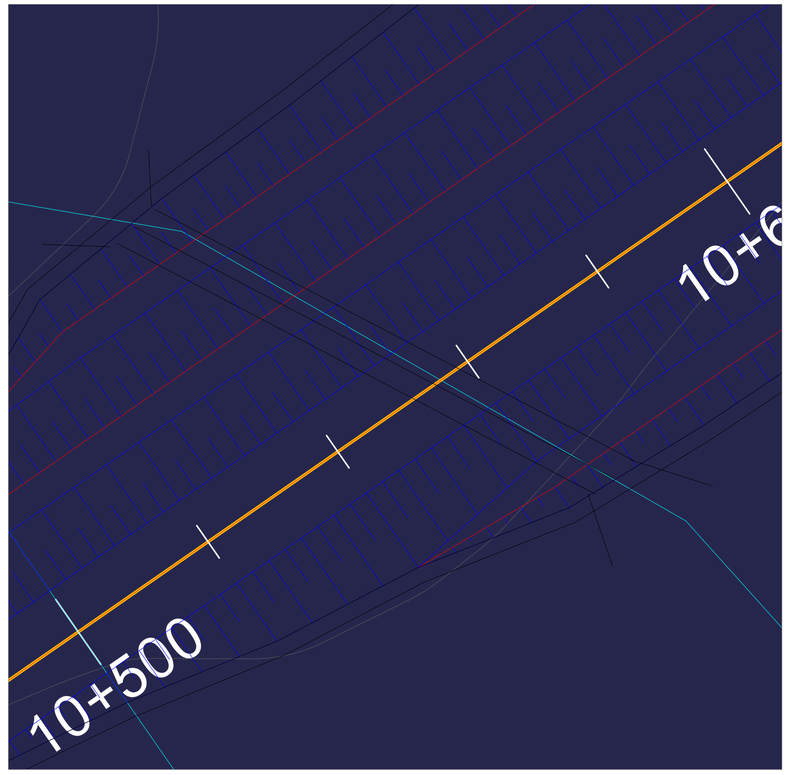


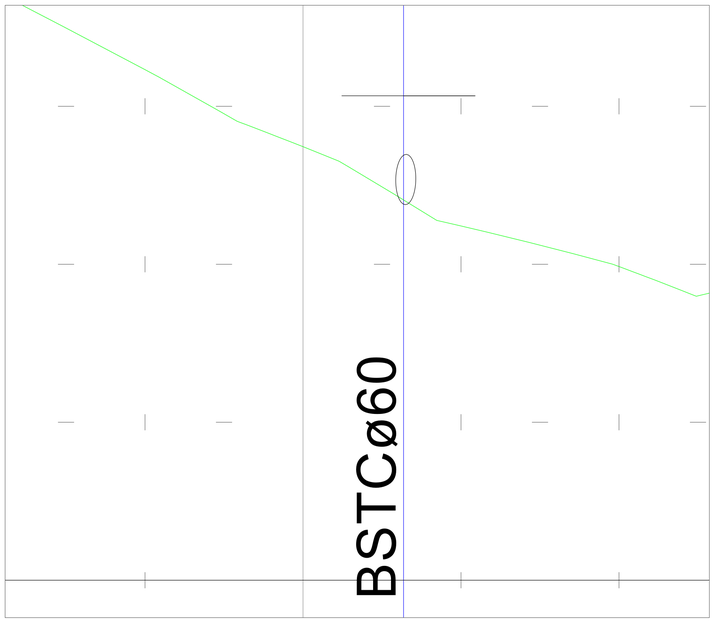
BUEIRO 7 E MÍNIMO

EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
RODOVISIONÁRIOS	Rodovia: PPP-UFRGS-2021/1 Data: 11/2021	
Escala: SEM ESCALA	DETALHAMENTO	Código: 3/4

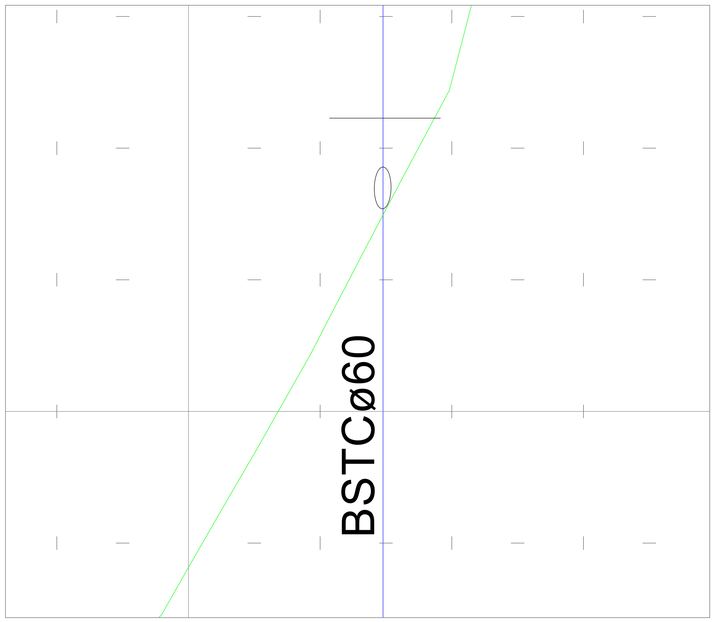




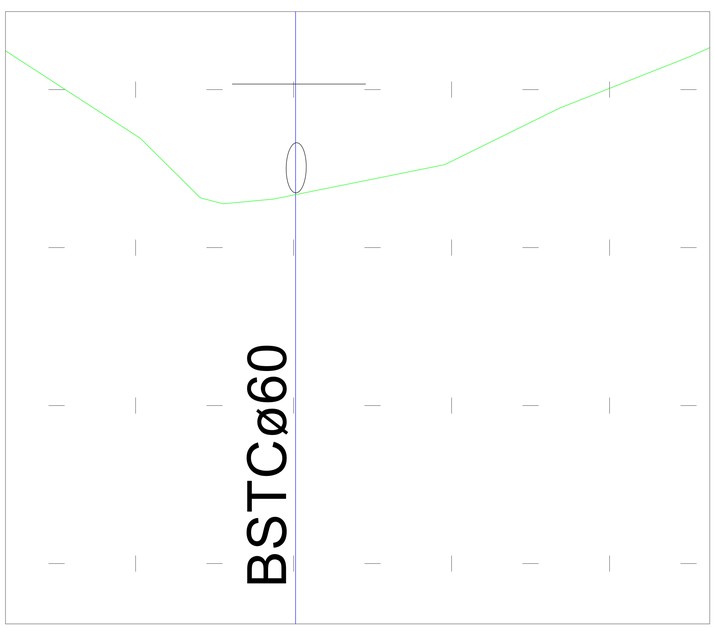




BUEIRO 8



BUEIRO 9

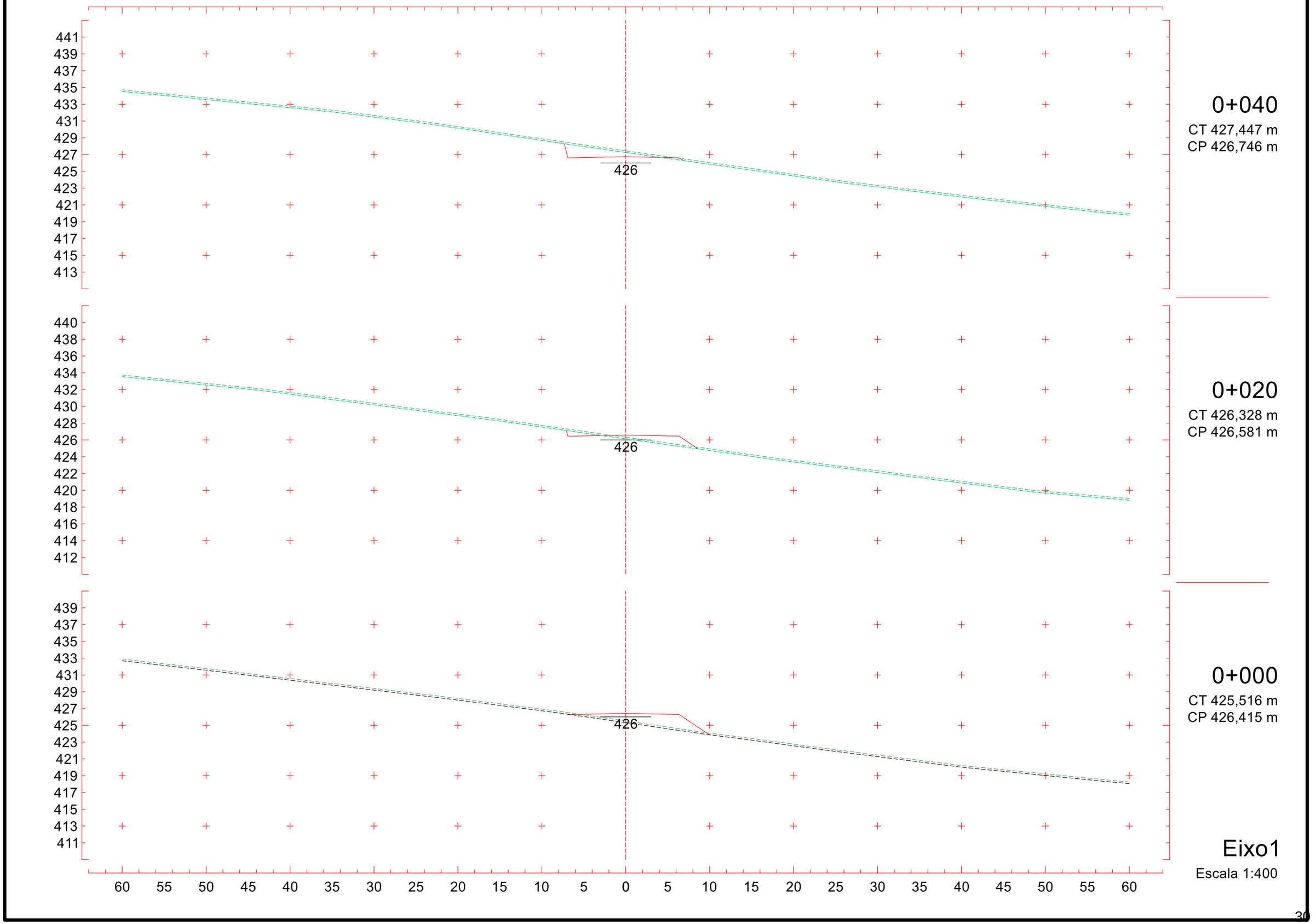


BUEIRO 10

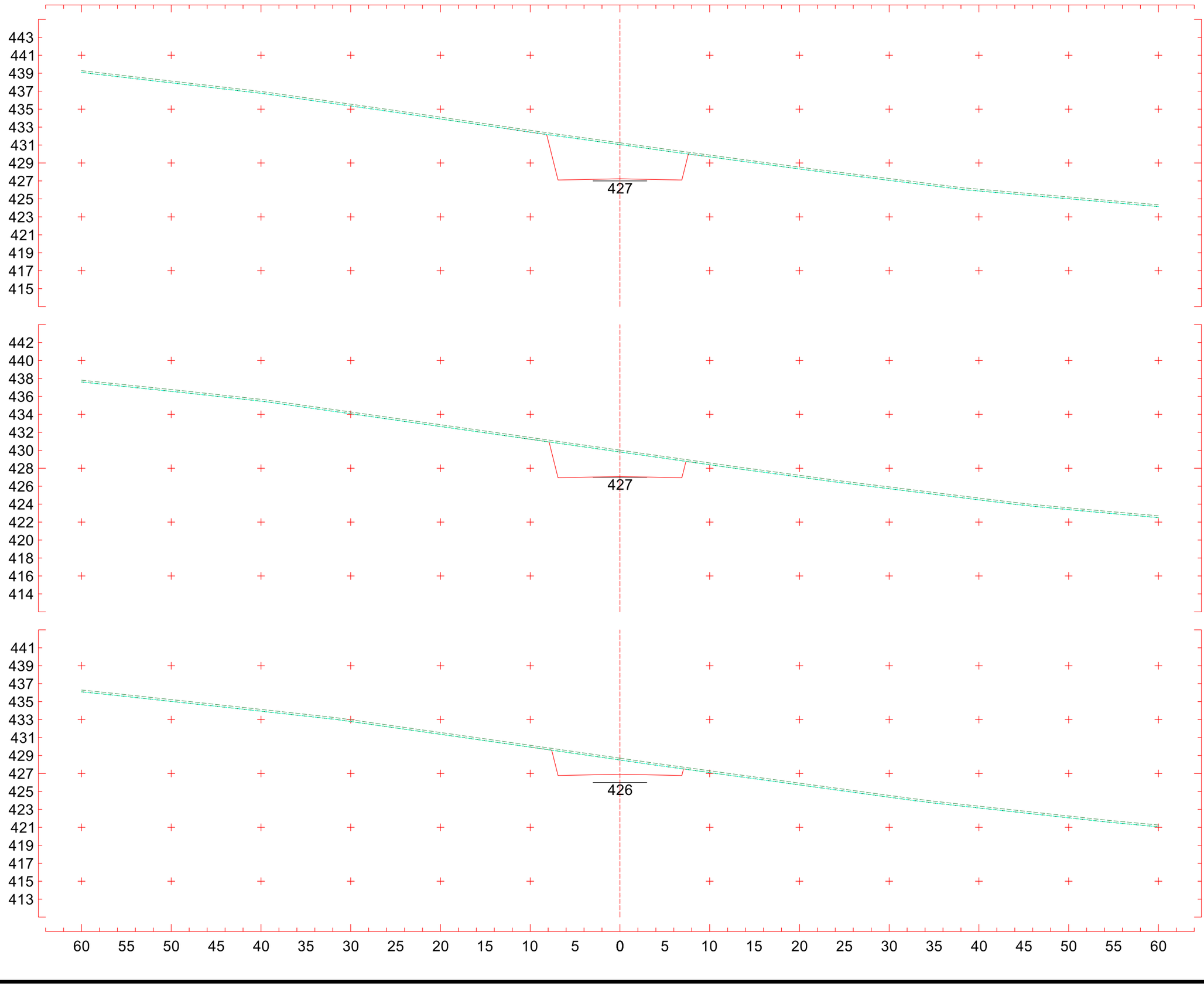
EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
RODOVISIONÁRIOS	Rodovia: PPP-UFGRS-2021/1 Data: 11/2021	
Escala: SEM ESCALA	DETALHAMENTO	Código: 4/4

2.4 Seções Transversais

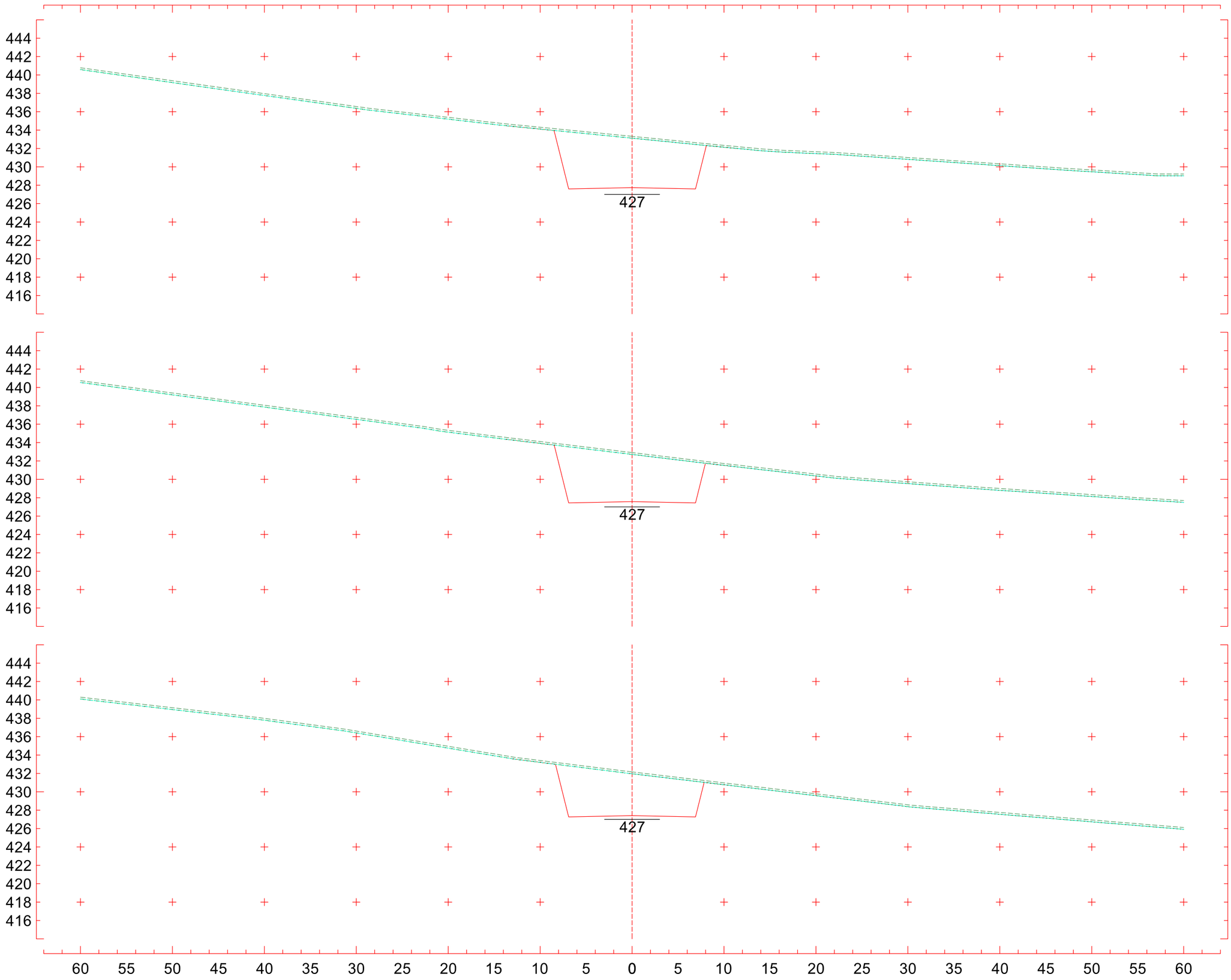
Projeto Ponto de Partida 2021/1



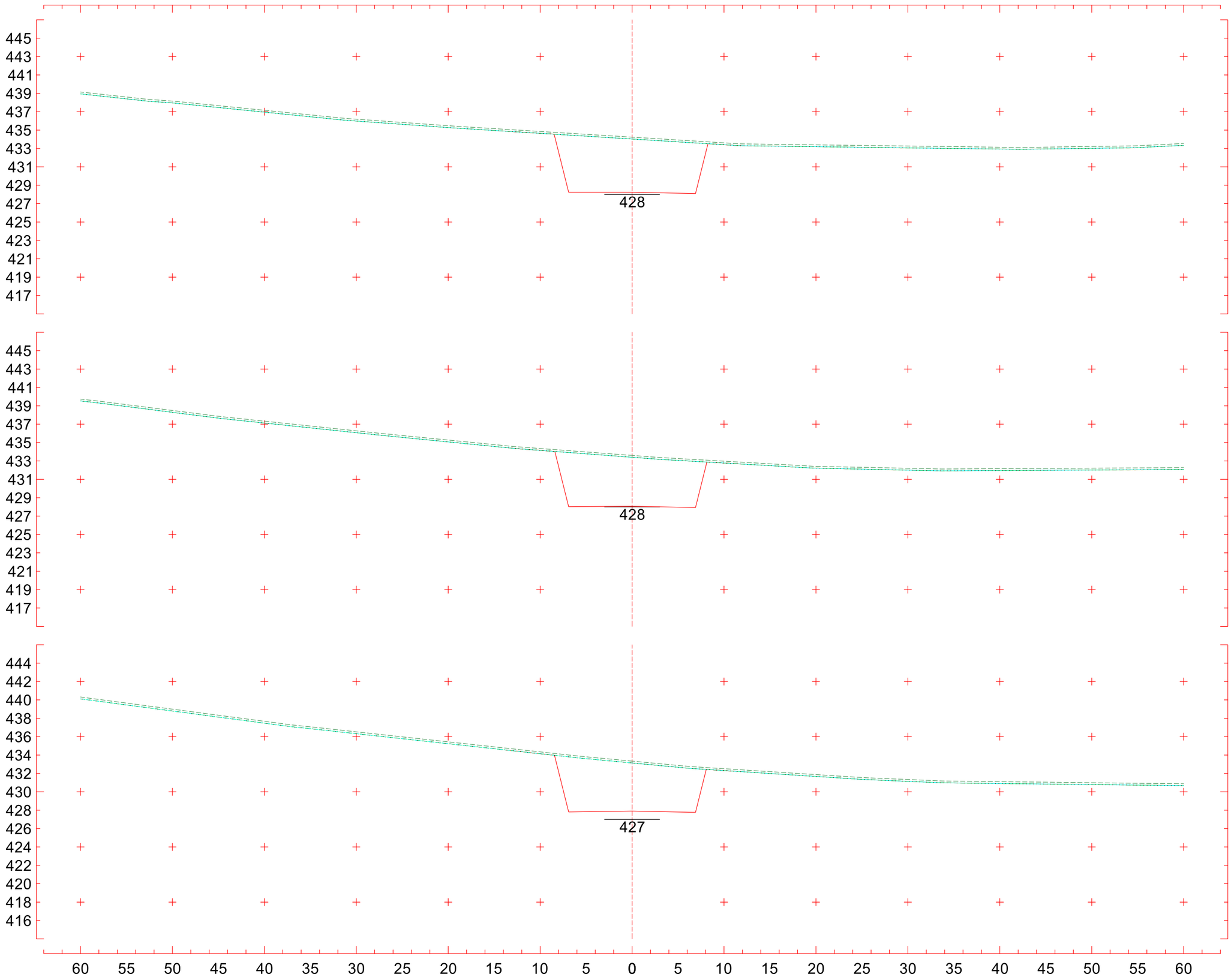
Projeto Ponto de Partida 2021/1



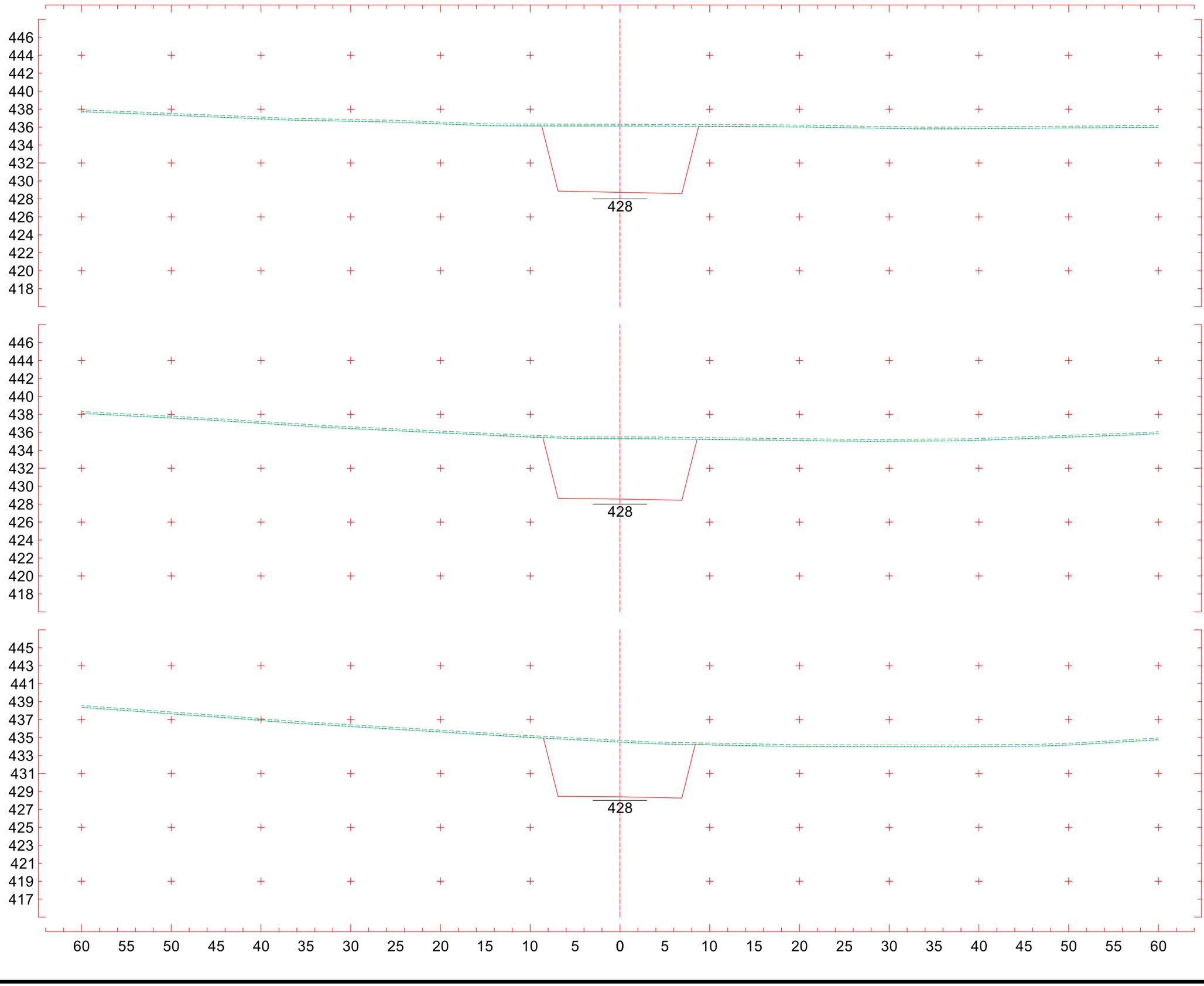
Projeto Ponto de Partida 2021/1



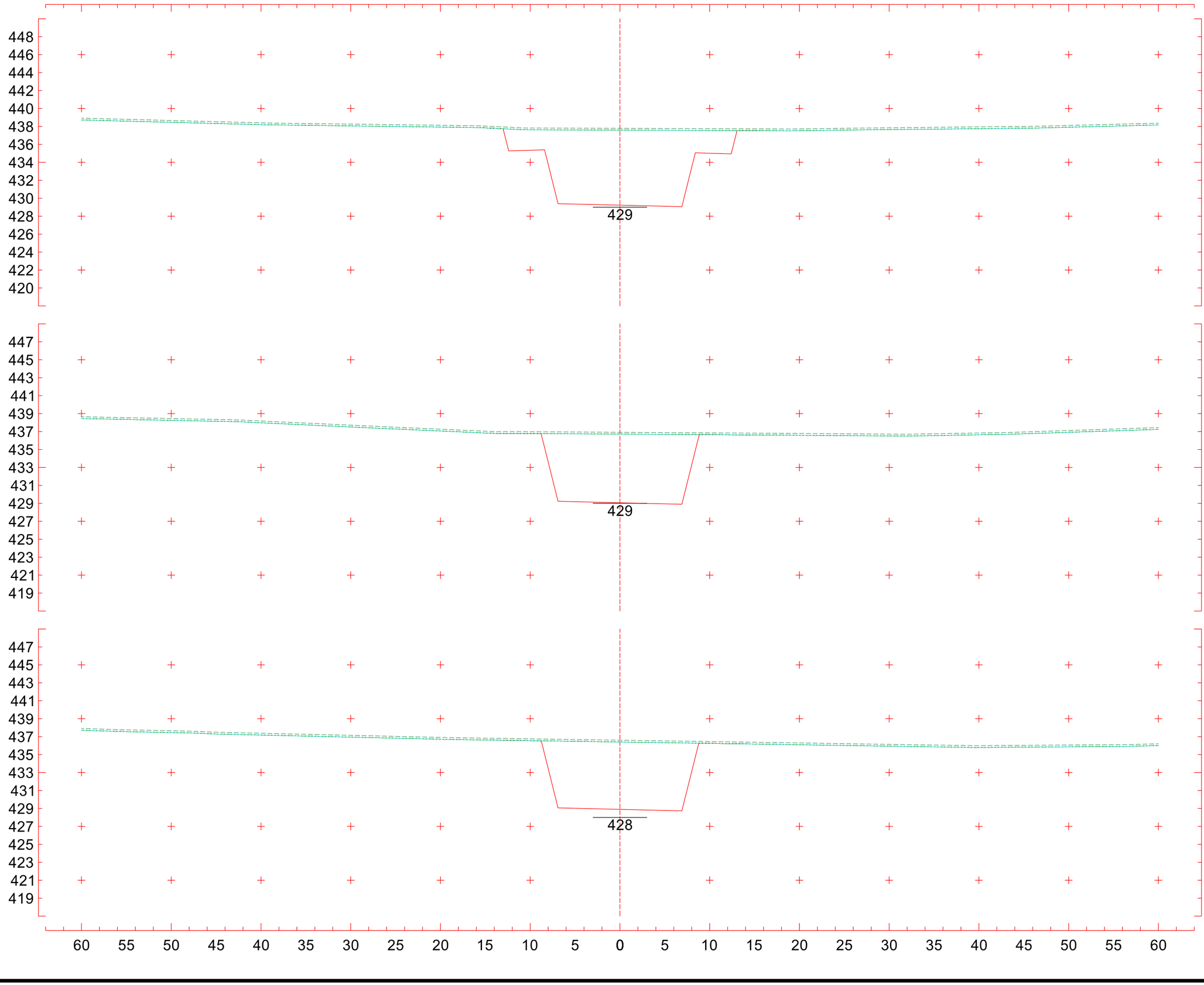
Projeto Ponto de Partida 2021/1



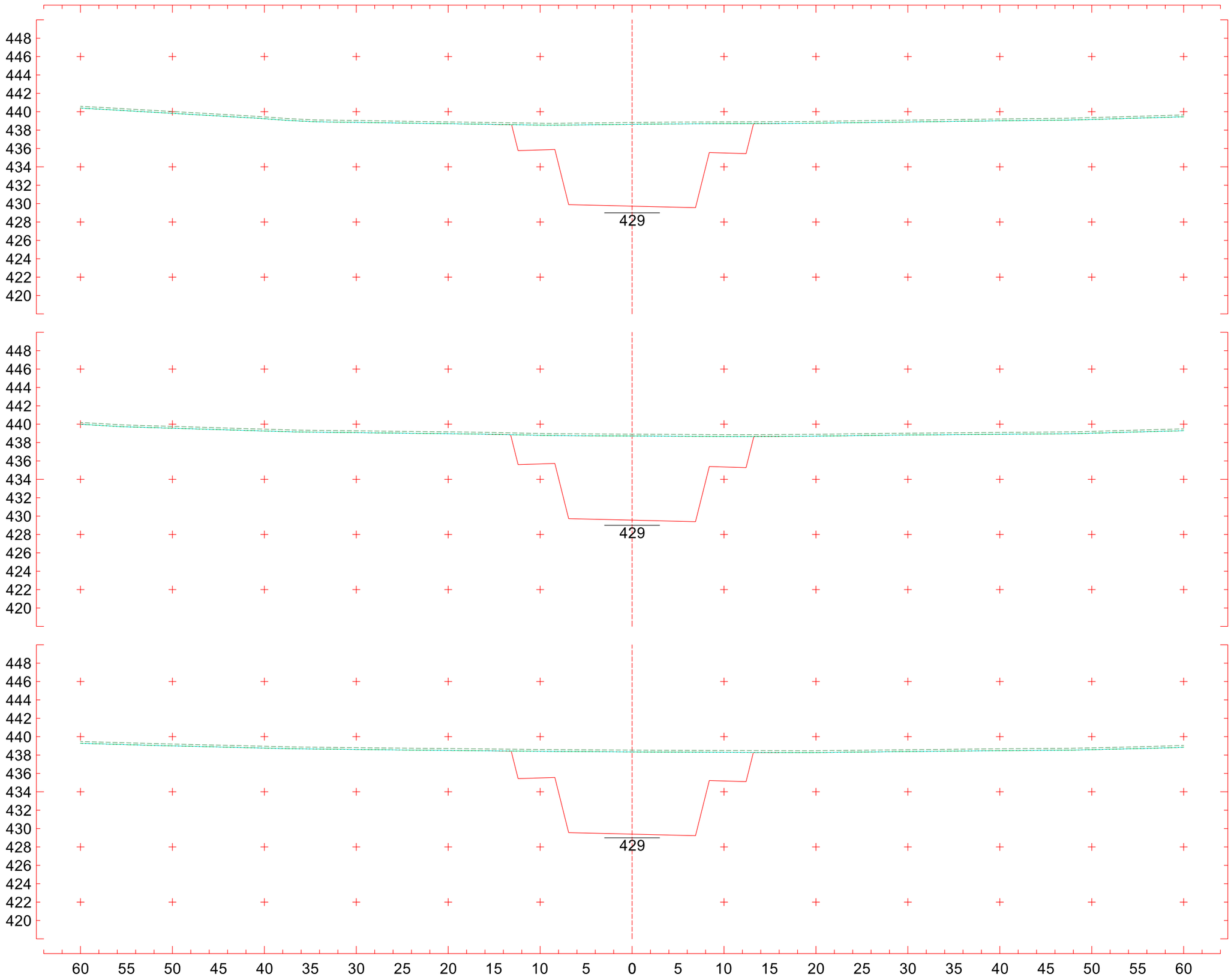
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



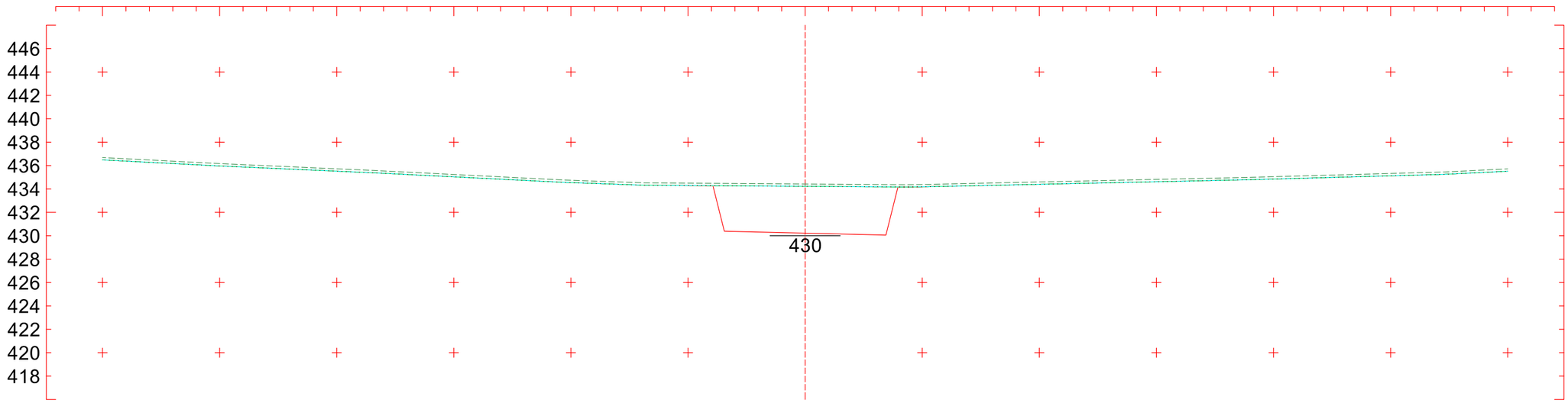
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CT 438,827 m
CP 429,725 m

0+380
CT 438,916 m
CP 429,559 m

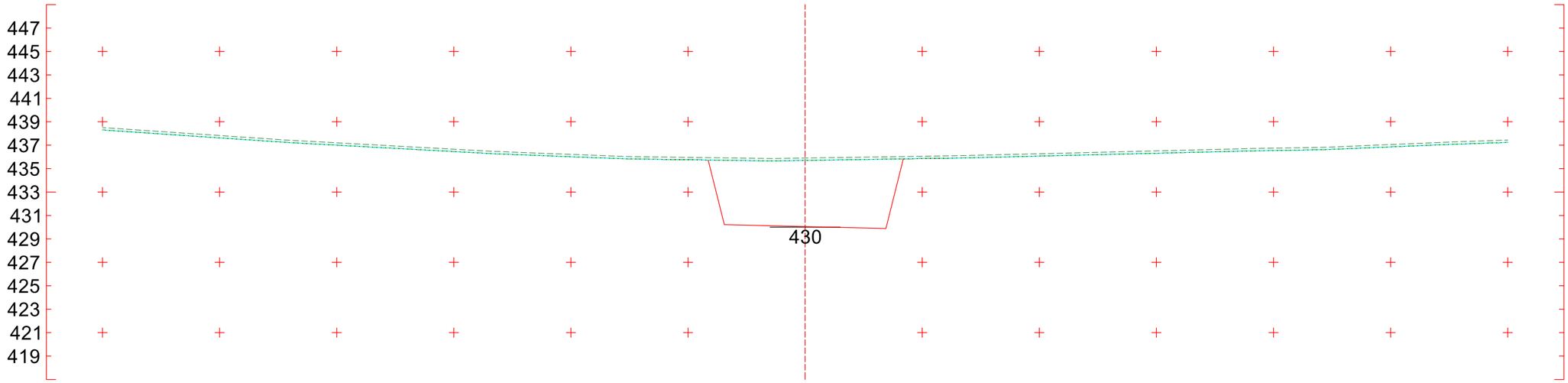
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CT 438,538 m
CP 429,394 m

Eixo1
Escala 1:400

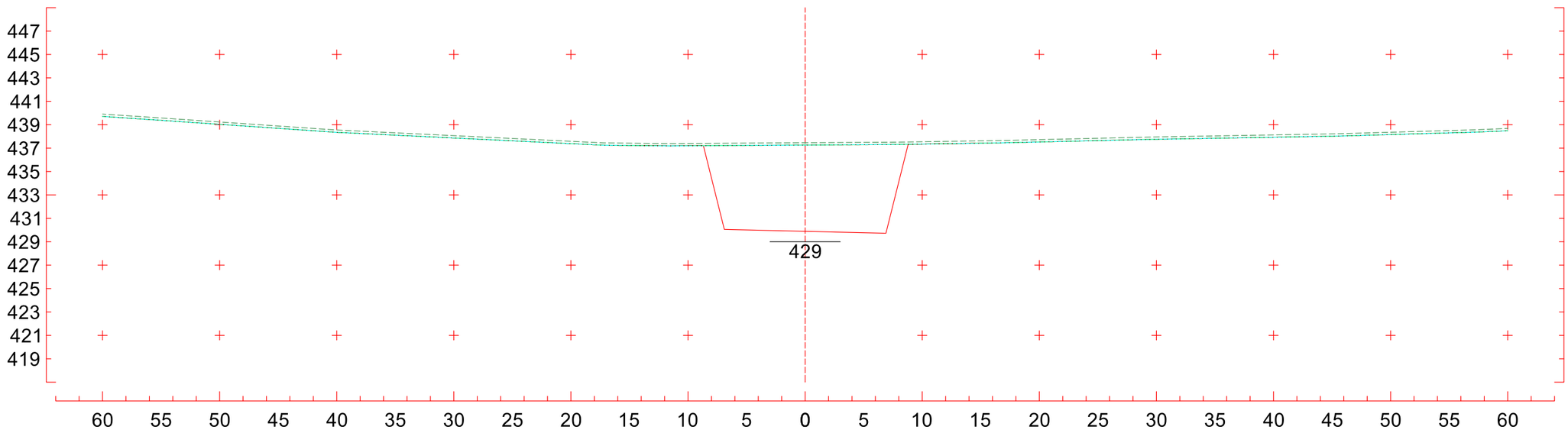
Projeto Ponto de Partida 2021/1



0+460
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CP 430,221 m



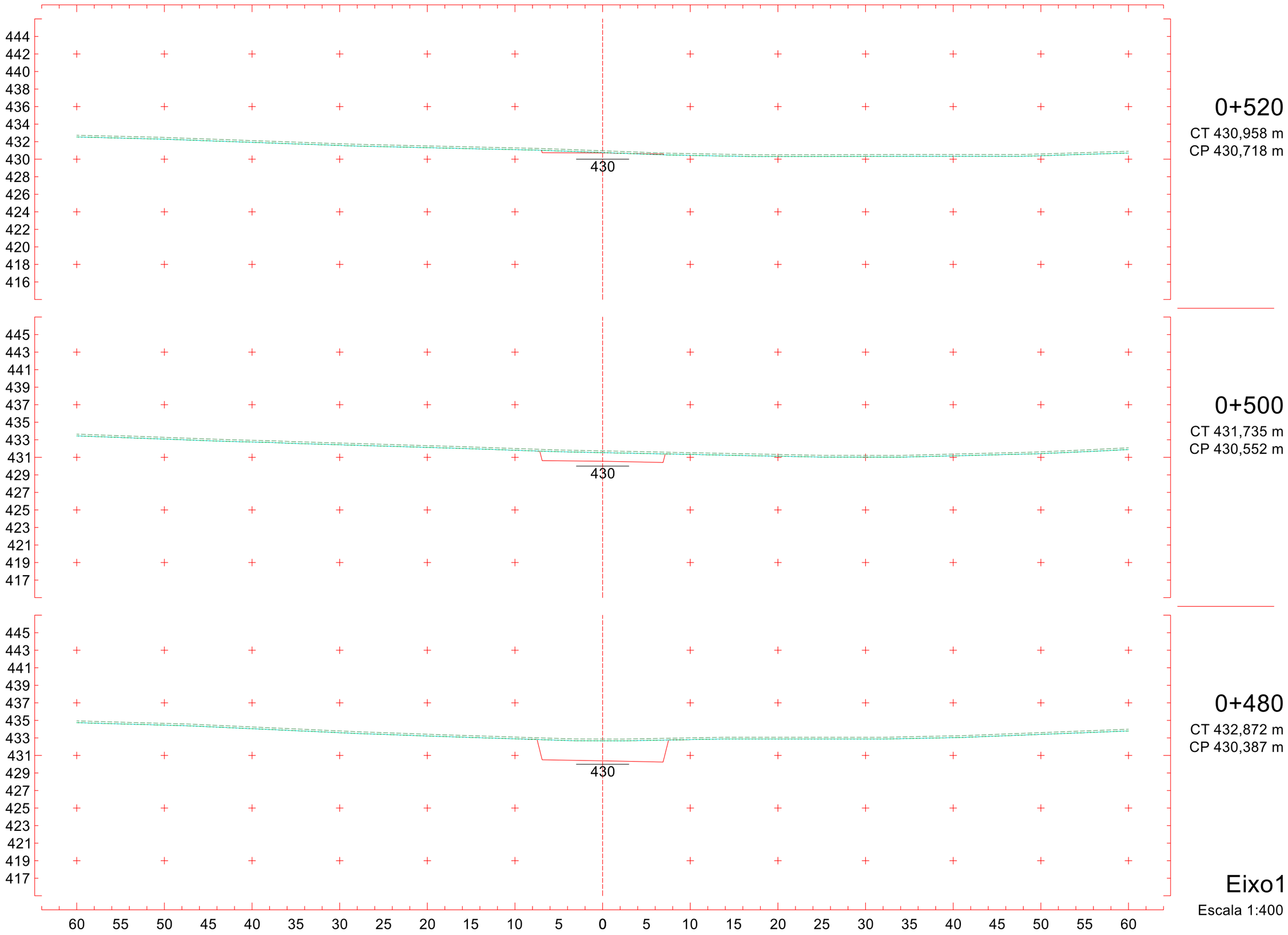
0+440
CT 435,902 m
CP 430,056 m



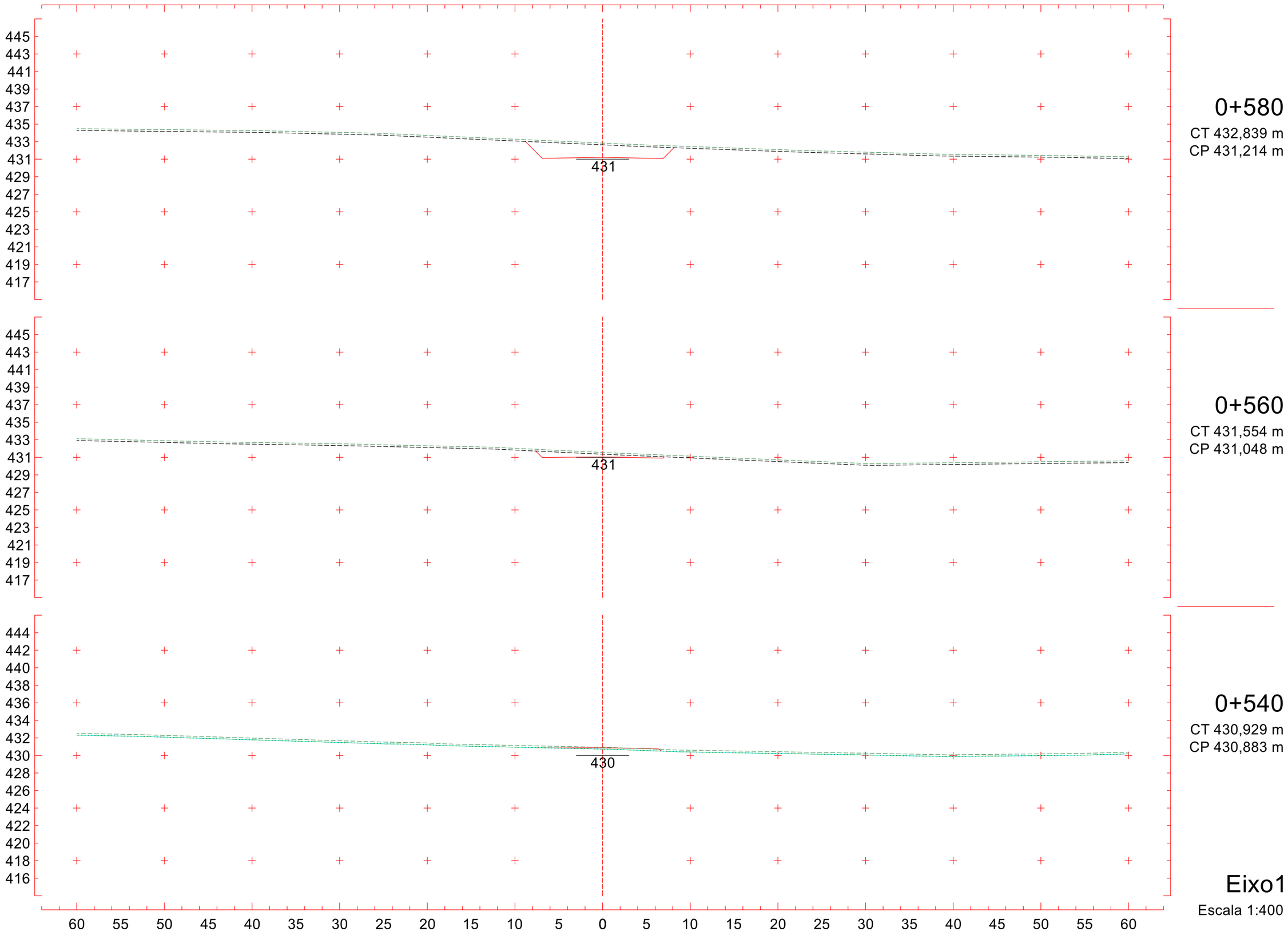
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CT 437,461 m
CP 429,890 m

Eixo1
Escala 1:400

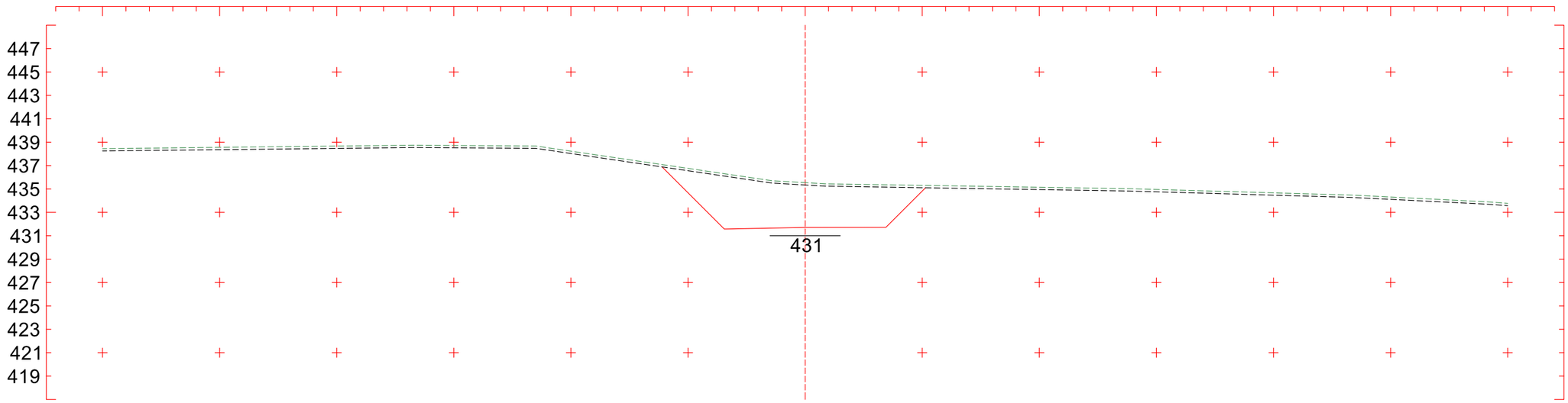
Projeto Ponto de Partida 2021/1



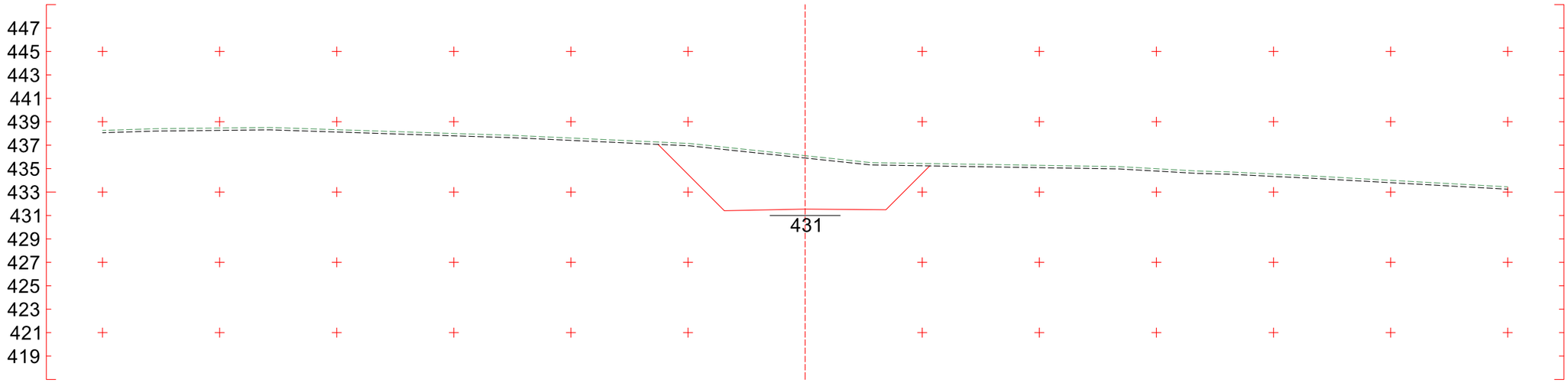
Projeto Ponto de Partida 2021/1



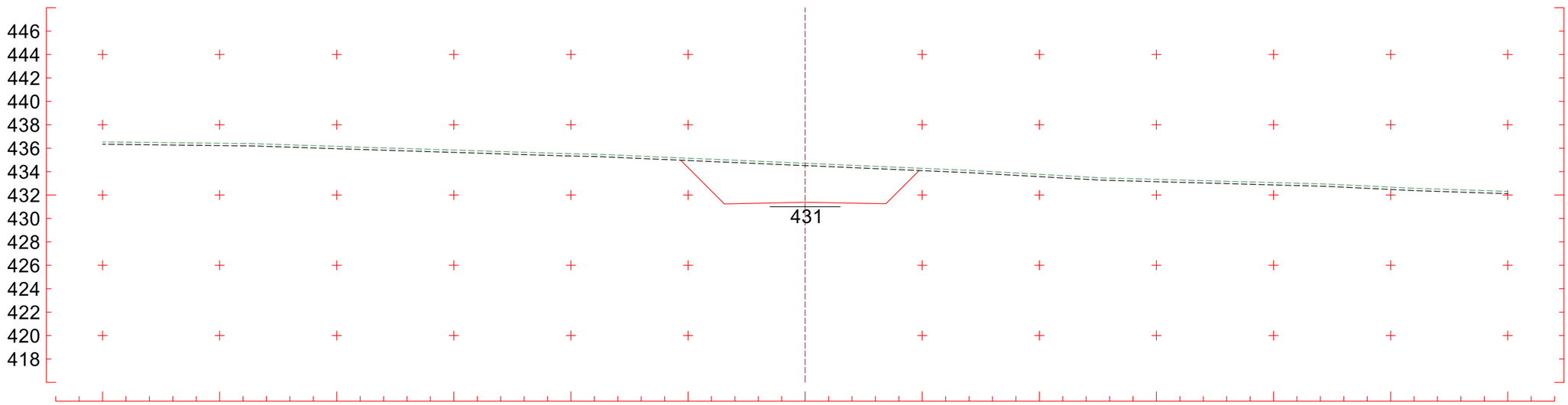
Projeto Ponto de Partida 2021/1



0+640
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CP 431,710 m



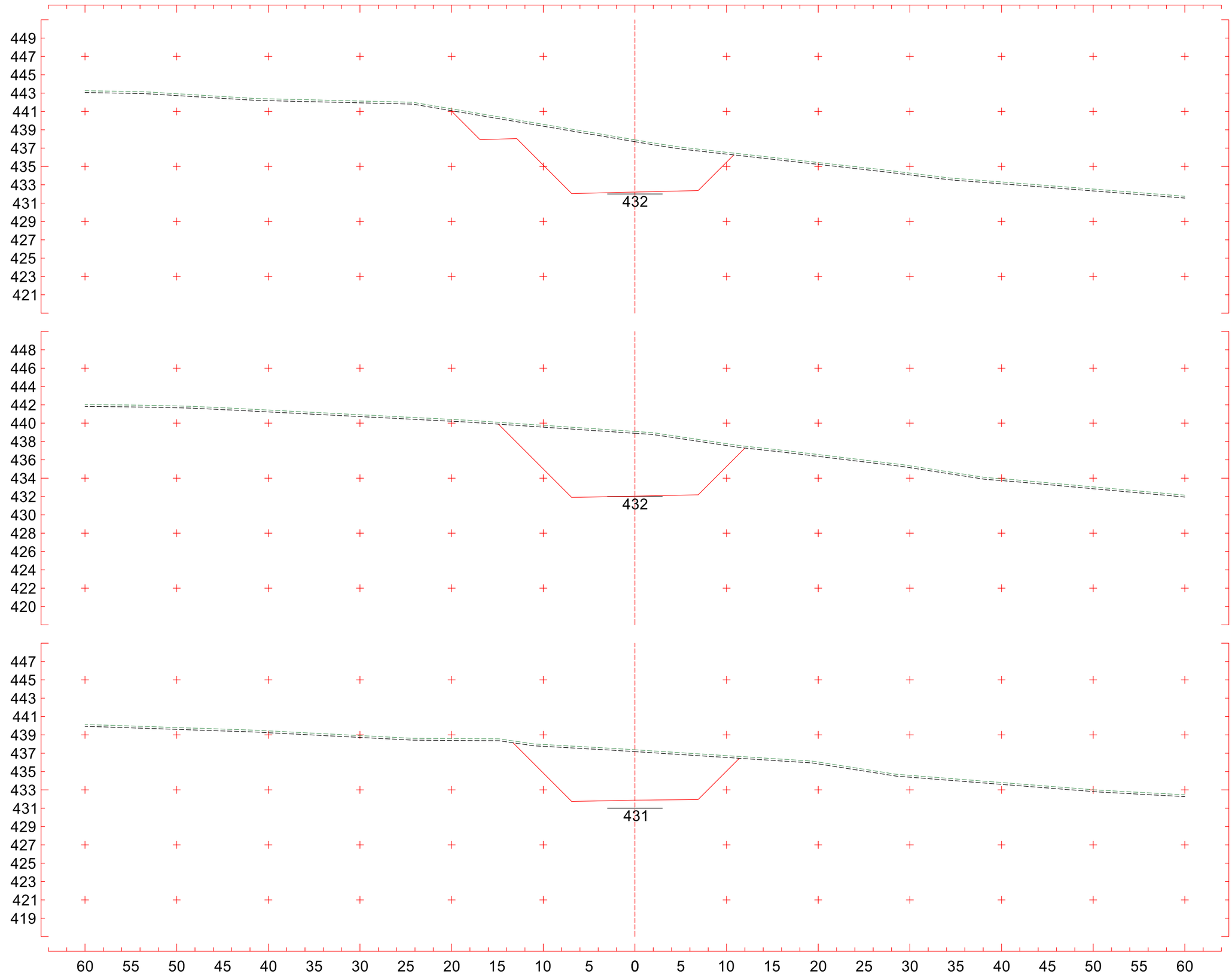
0+620
CT 436,106 m
CP 431,545 m



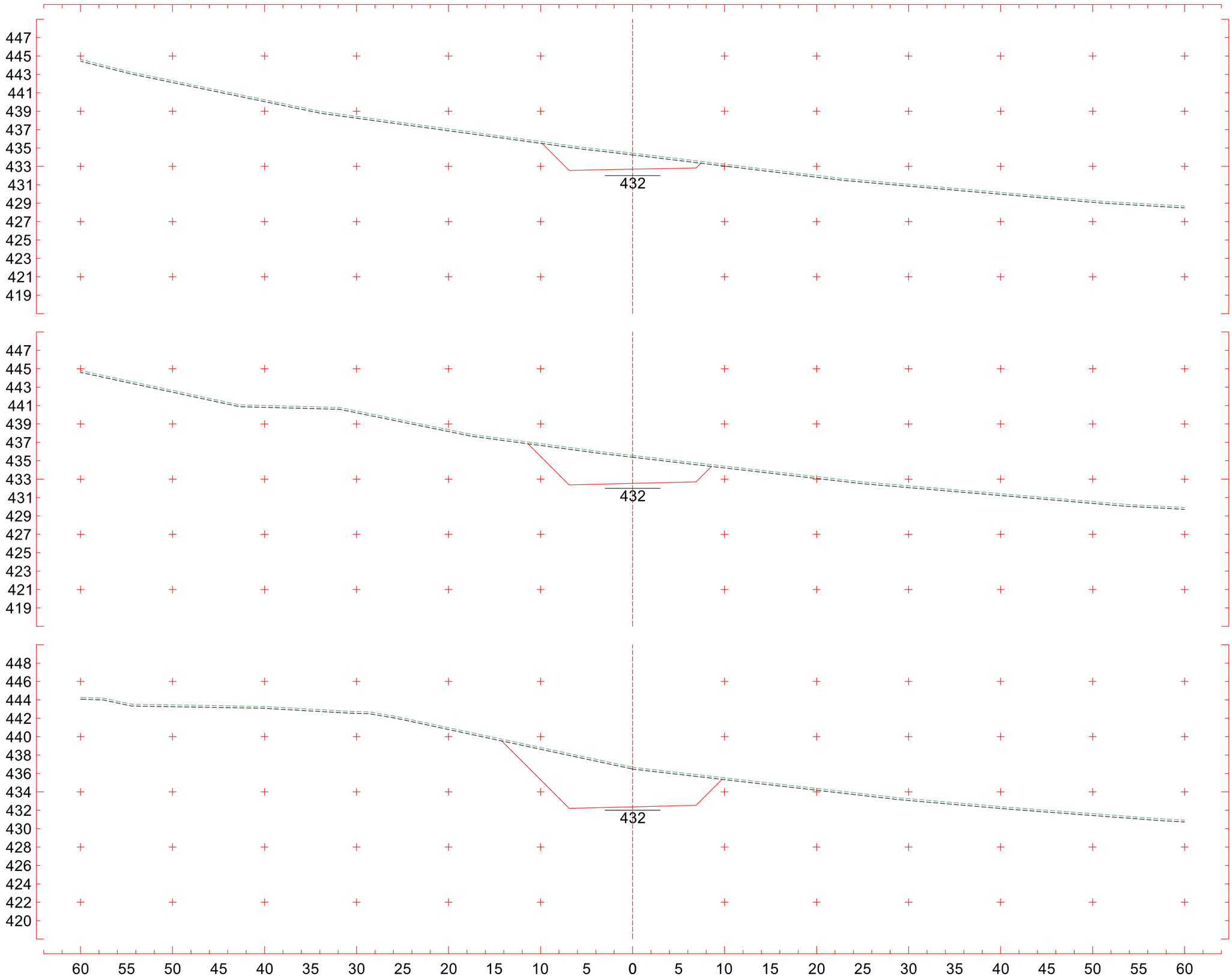
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CT 434,714 m
CP 431,379 m

Eixo1
Escala 1:400

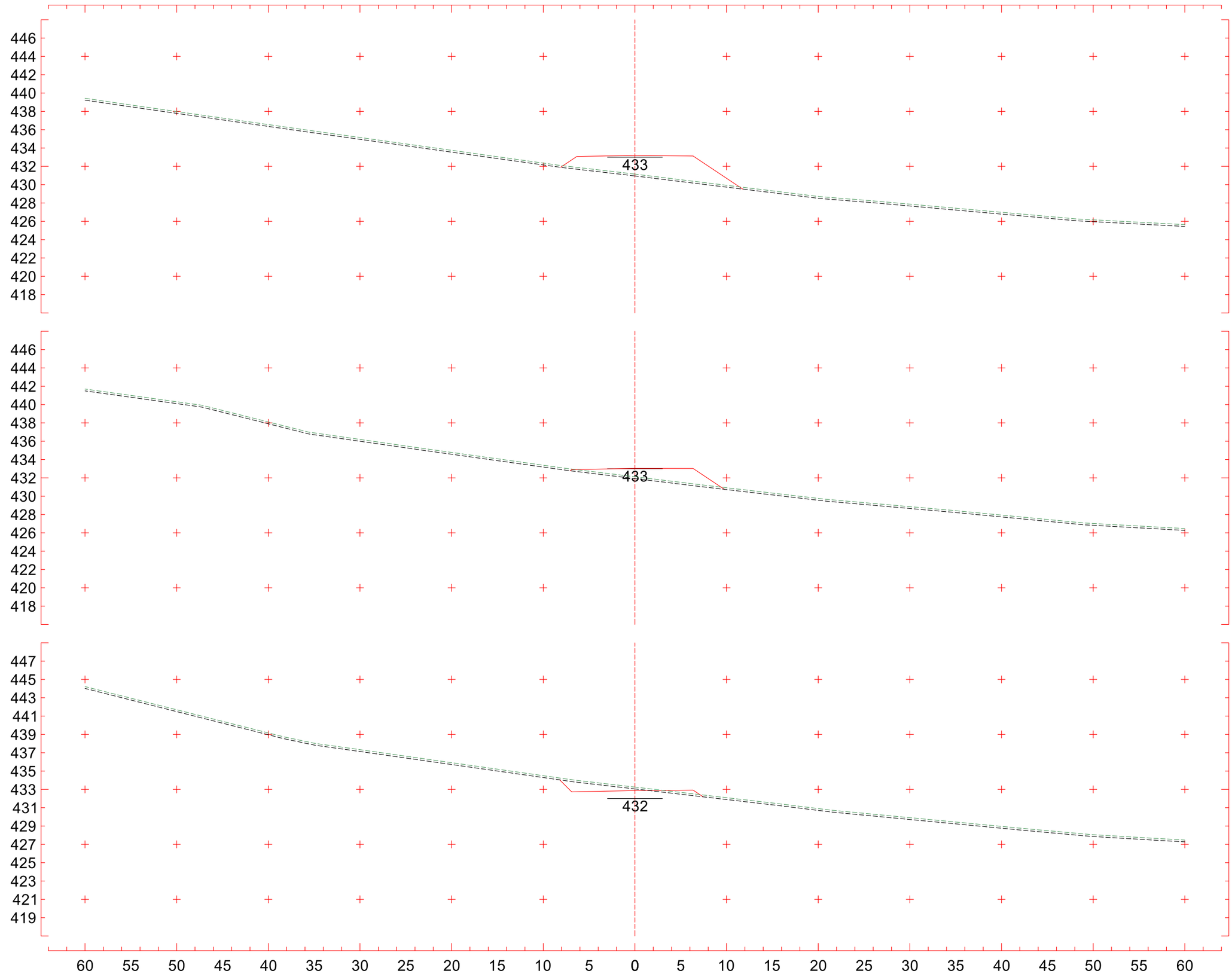
Projeto Ponto de Partida 2021/1



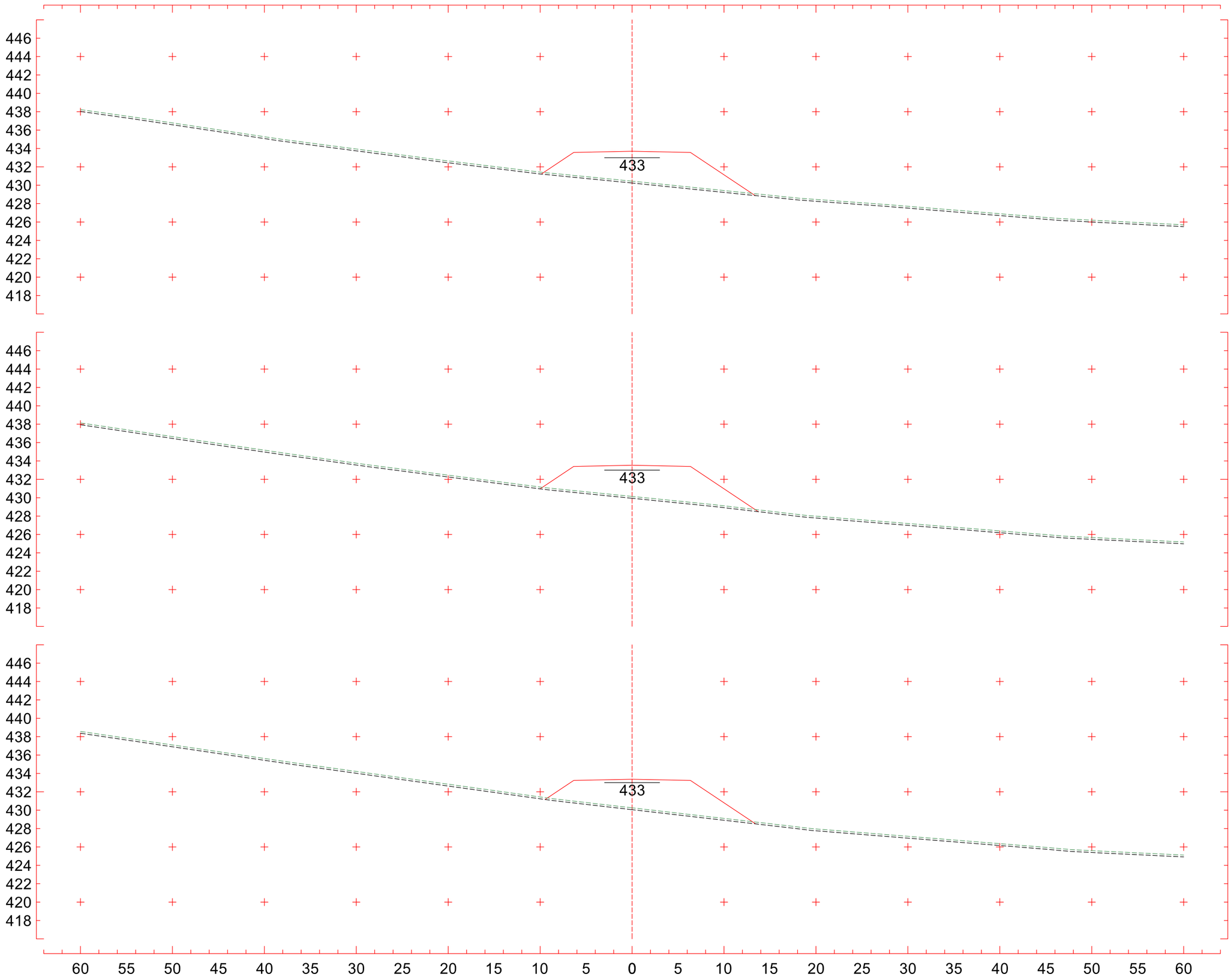
Projeto Ponto de Partida 2021/1



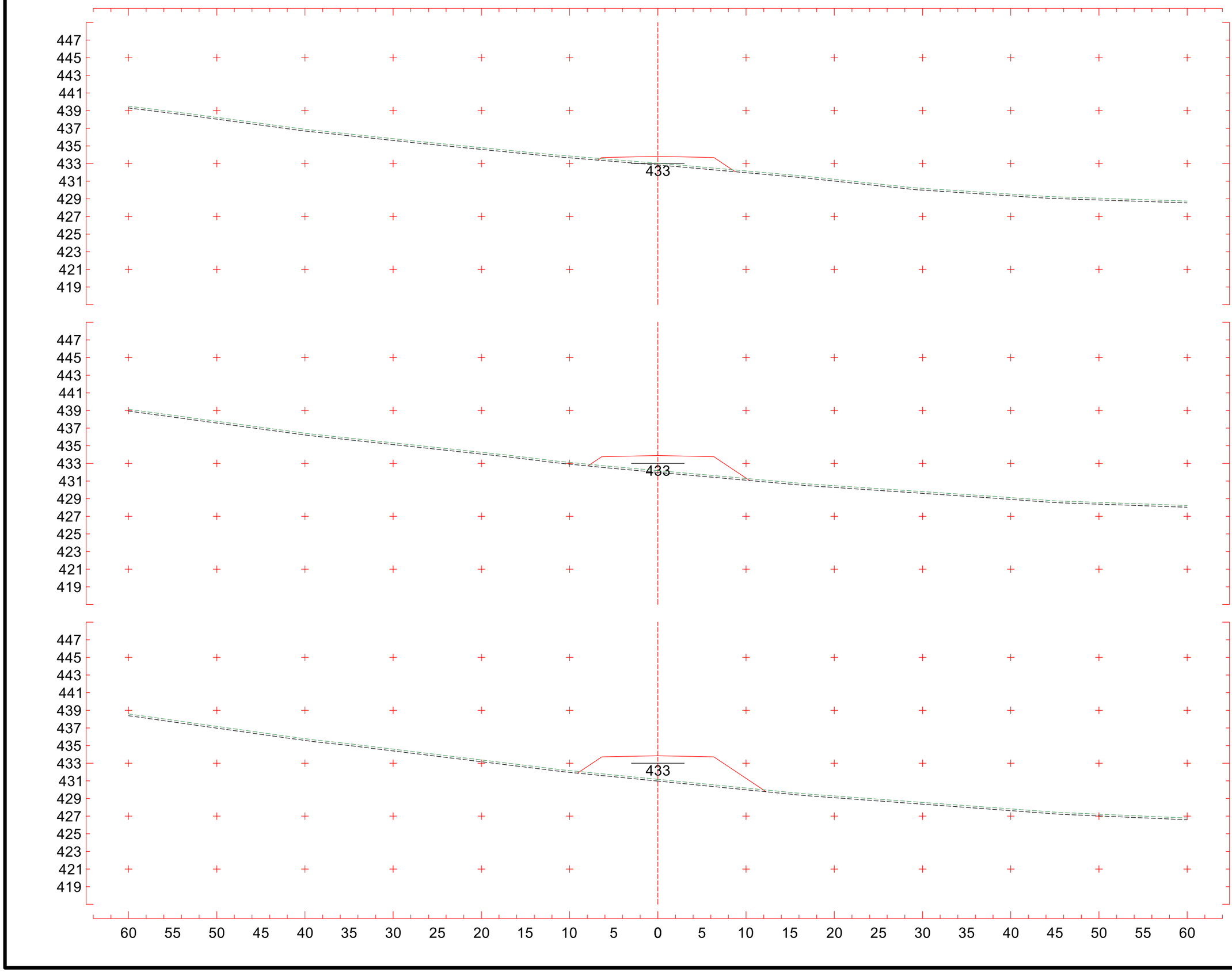
Projeto Ponto de Partida 2021/1



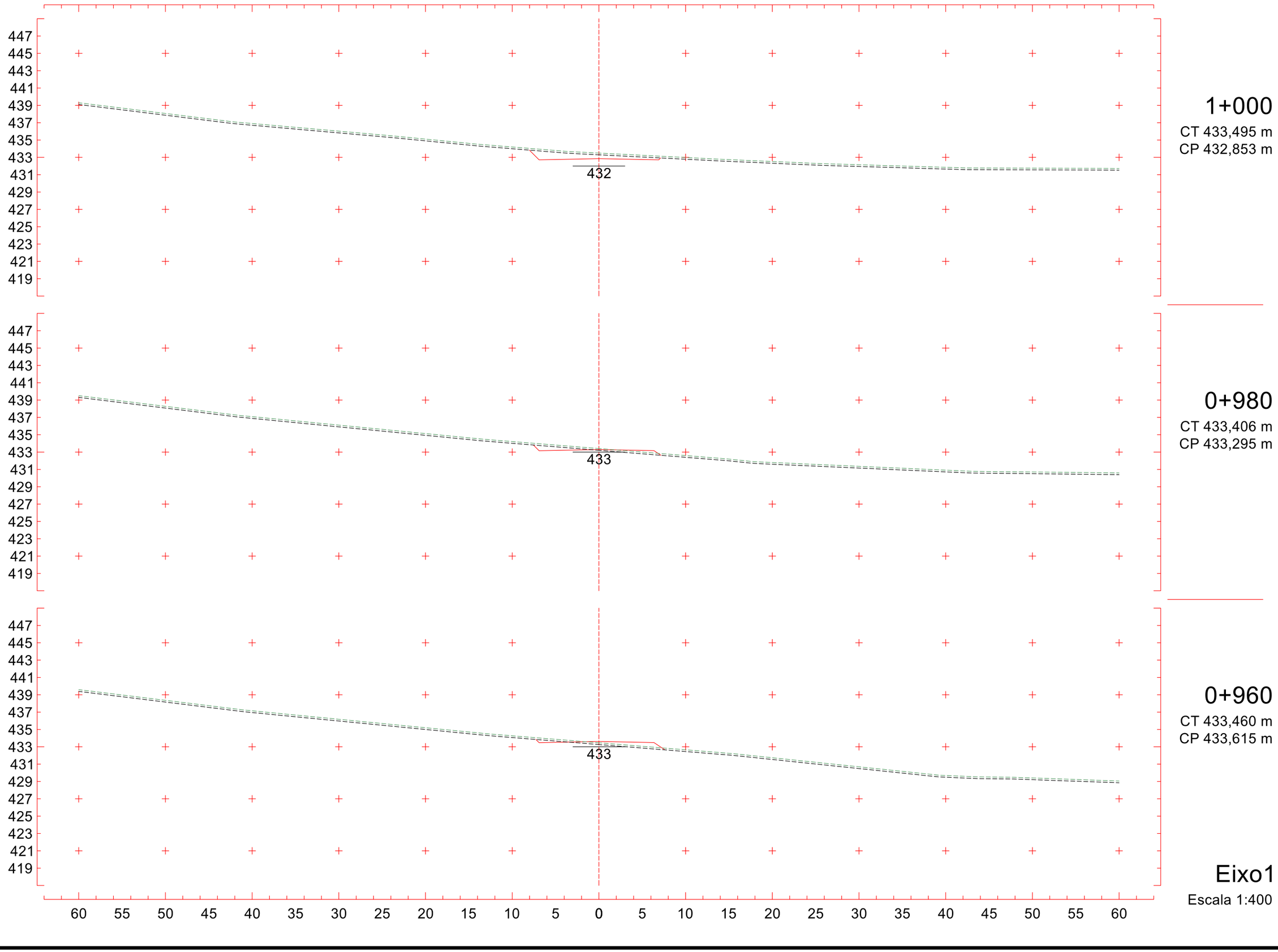
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



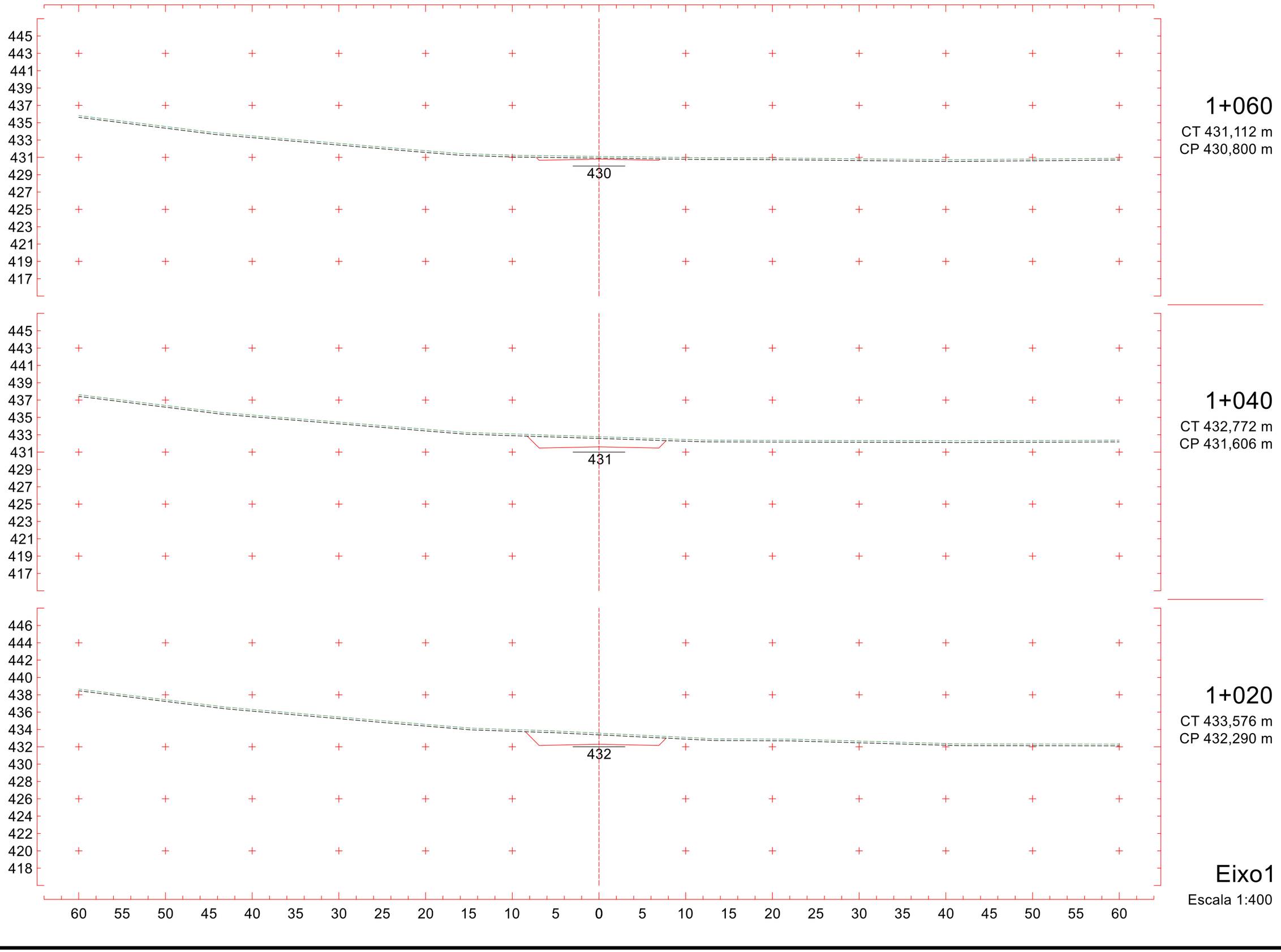
1+000
CT 433,495 m
CP 432,853 m

0+980
CT 433,406 m
CP 433,295 m

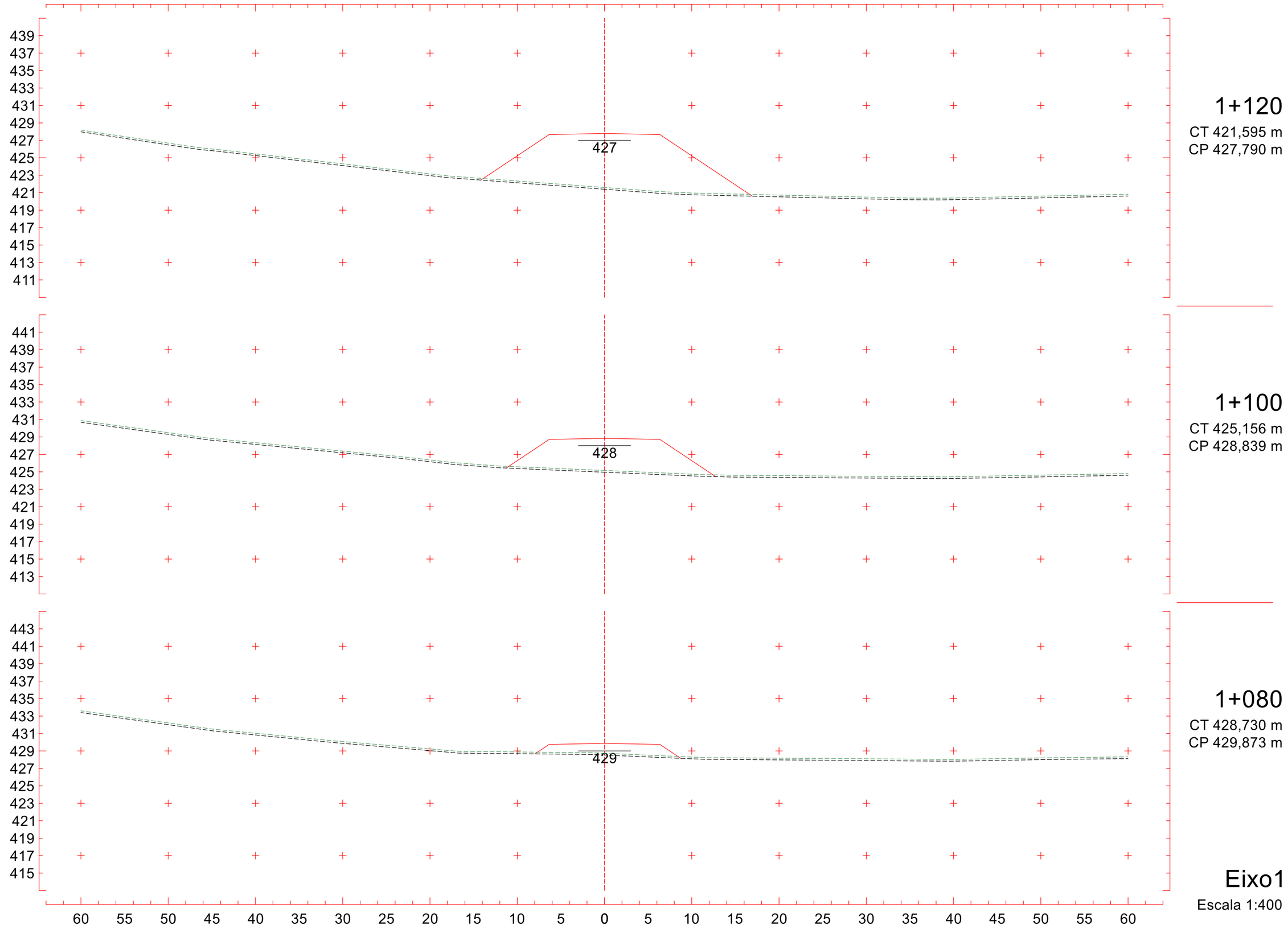
0+960
CT 433,460 m
CP 433,615 m

Eixo1
Escala 1:400

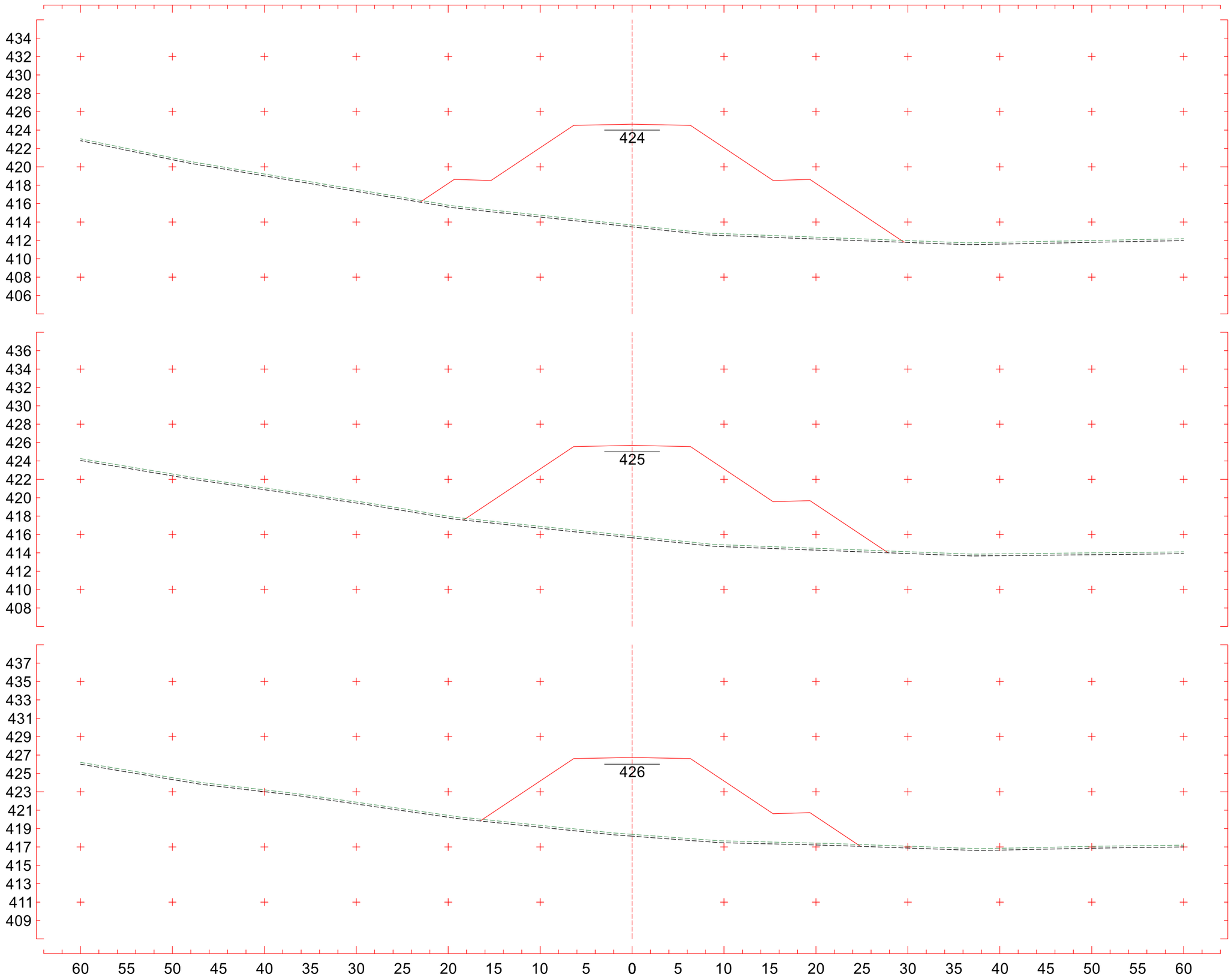
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



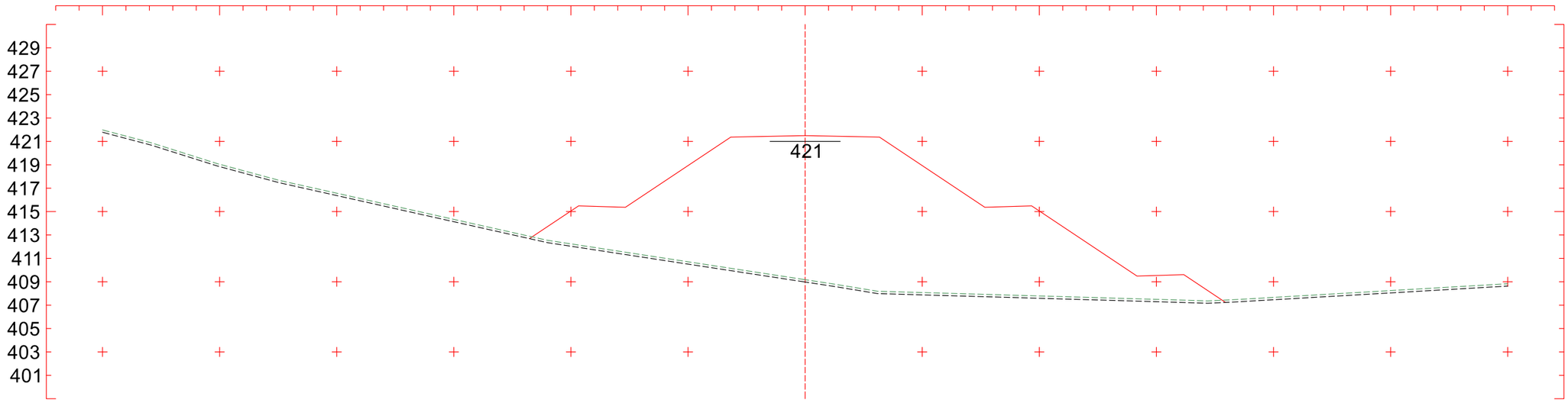
1+180
CT 413,670 m
CP 424,642 m

1+160
CT 415,841 m
CP 425,691 m

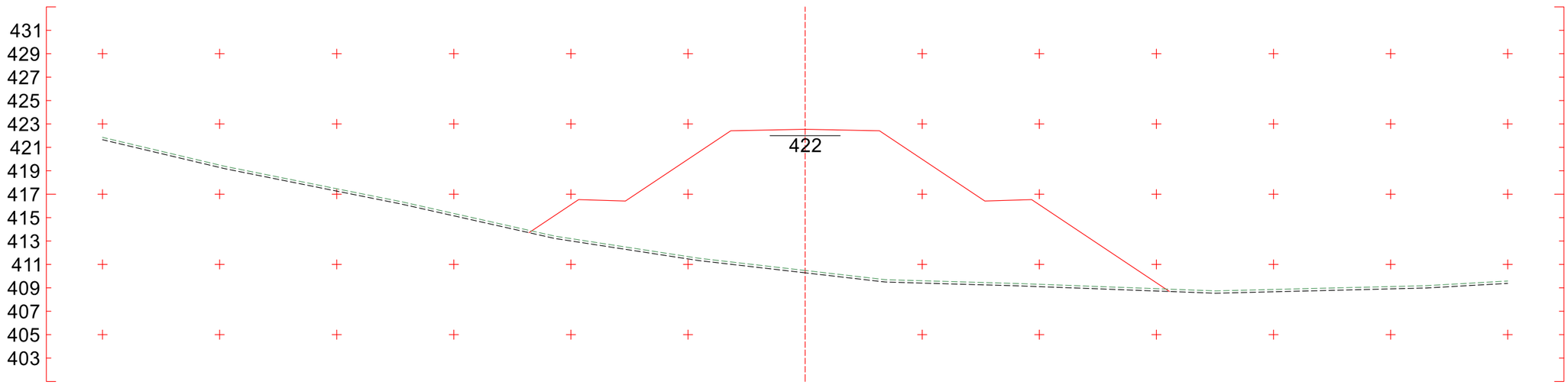
1+140
CT 418,375 m
CP 426,741 m

Eixo1
Escala 1:400

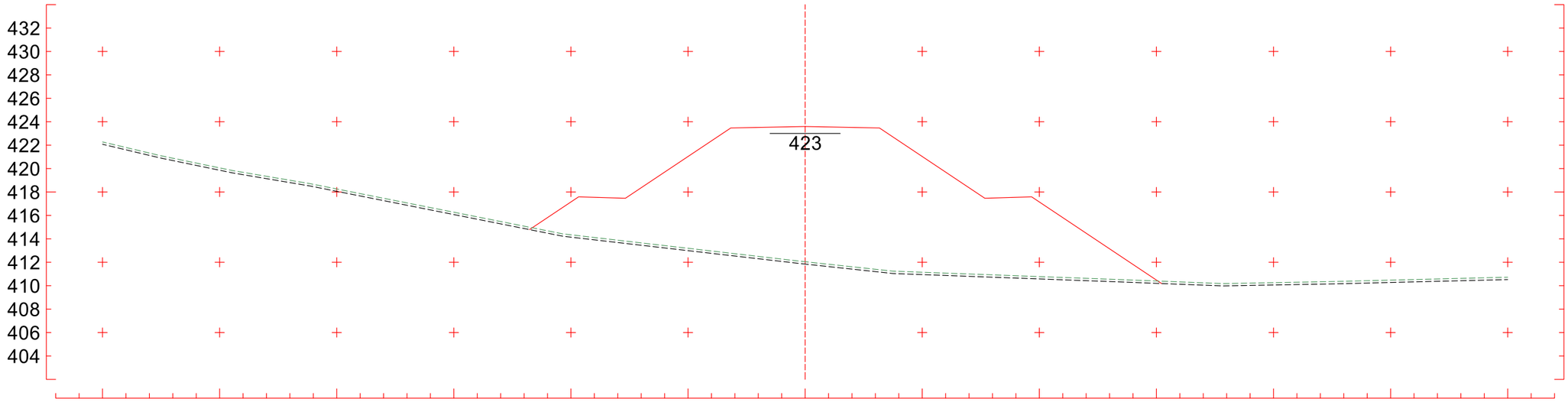
Projeto Ponto de Partida 2021/1



1+240
CT 409,179 m
CP 421,495 m



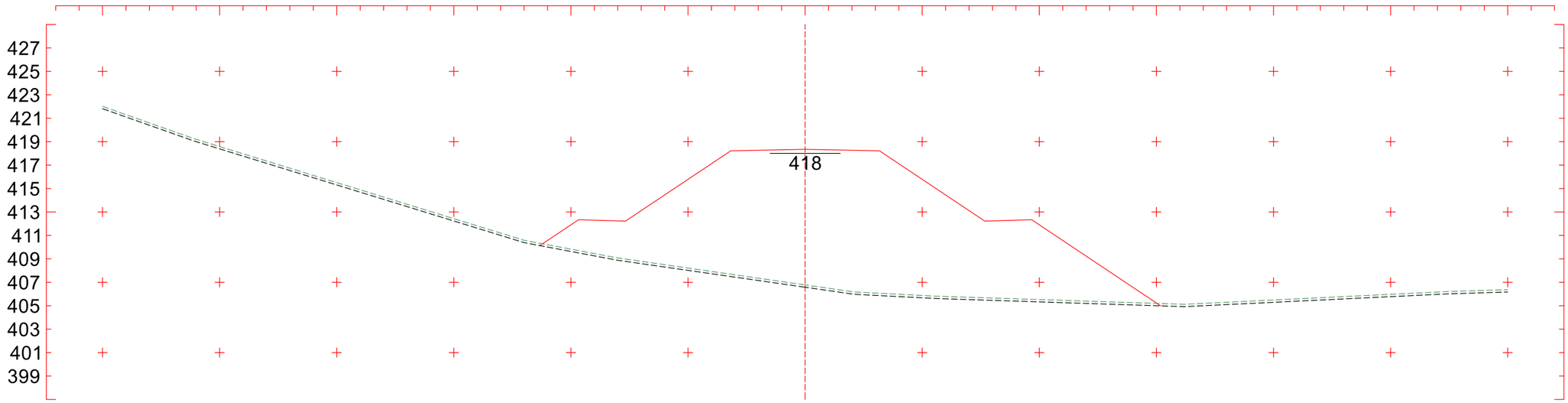
1+220
CT 410,484 m
CP 422,544 m



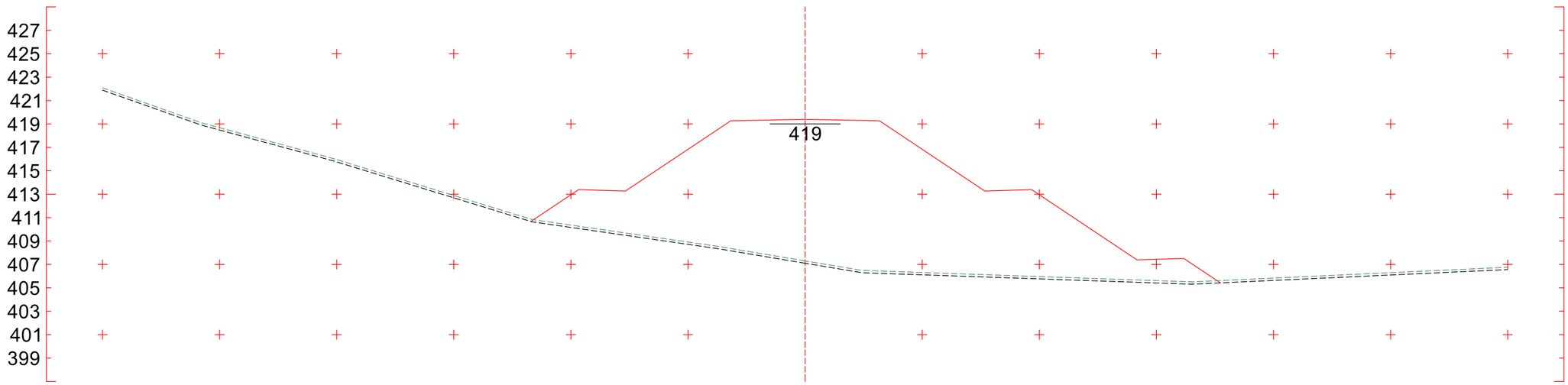
1+200
CT 412,046 m
CP 423,593 m

Eixo1
Escala 1:400

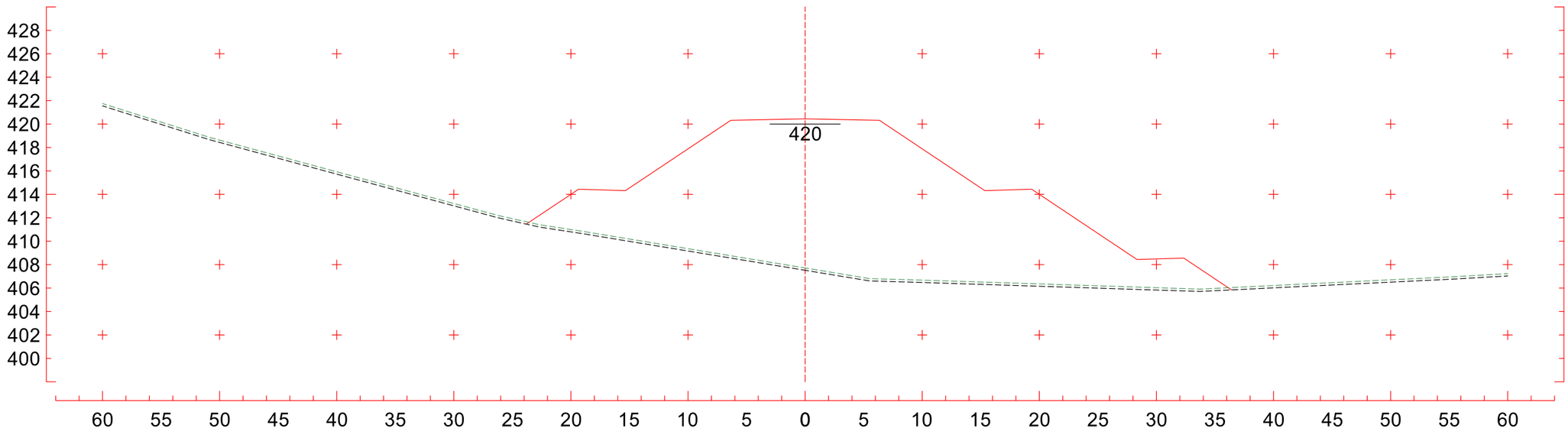
Projeto Ponto de Partida 2021/1



1+300
CT 406,779 m
CP 418,348 m



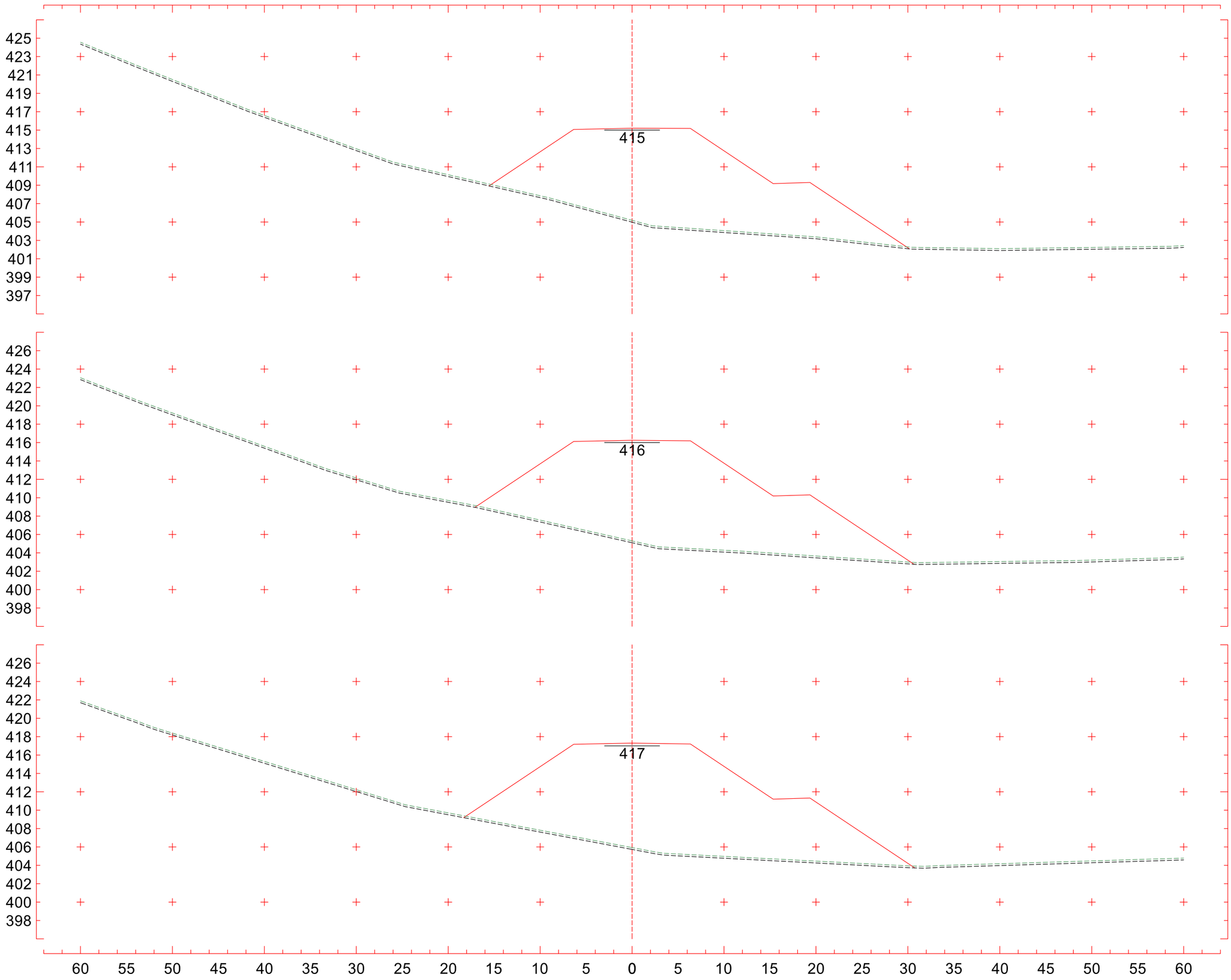
1+280
CT 407,301 m
CP 419,397 m



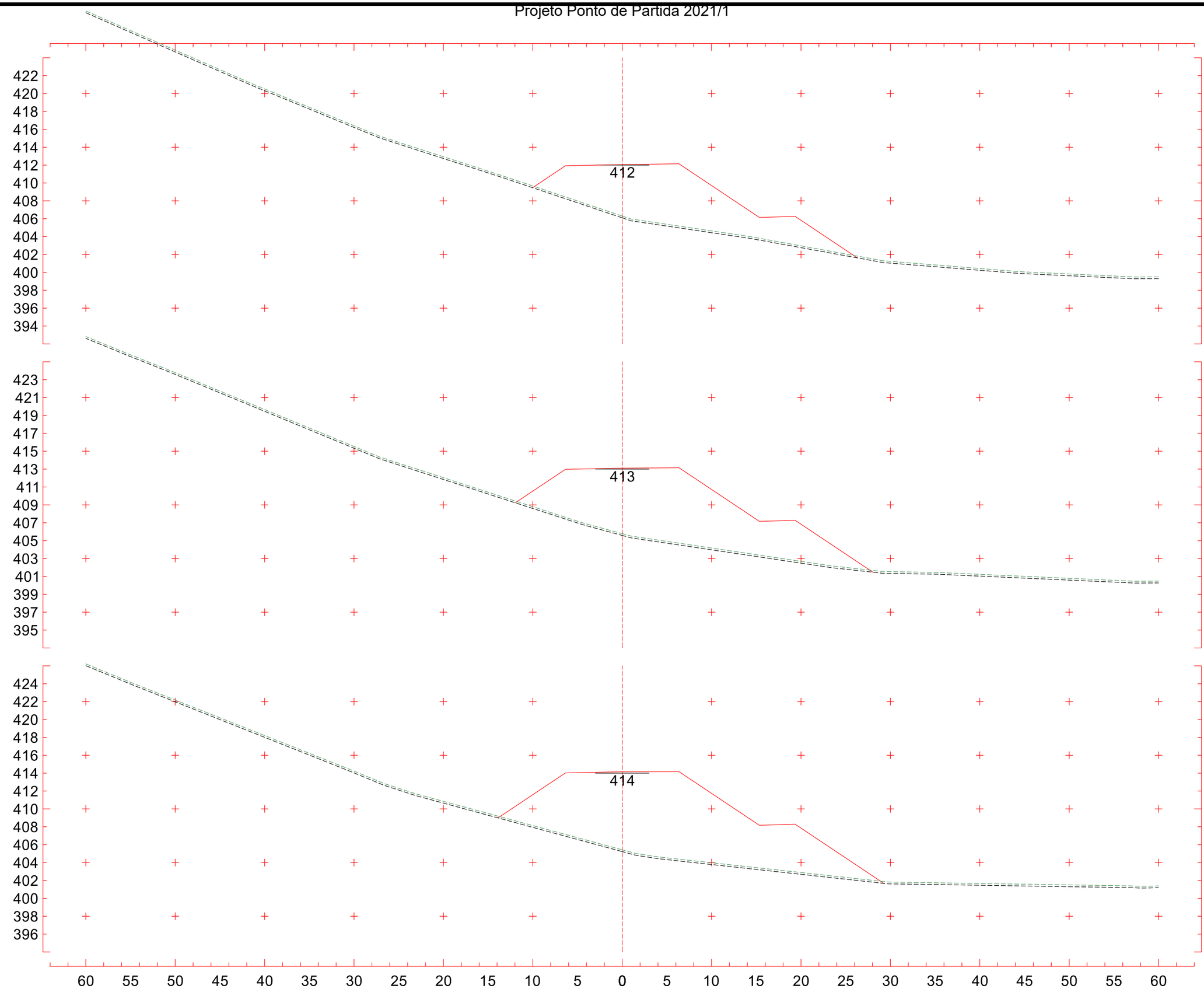
1+260
CT 407,717 m
CP 420,446 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



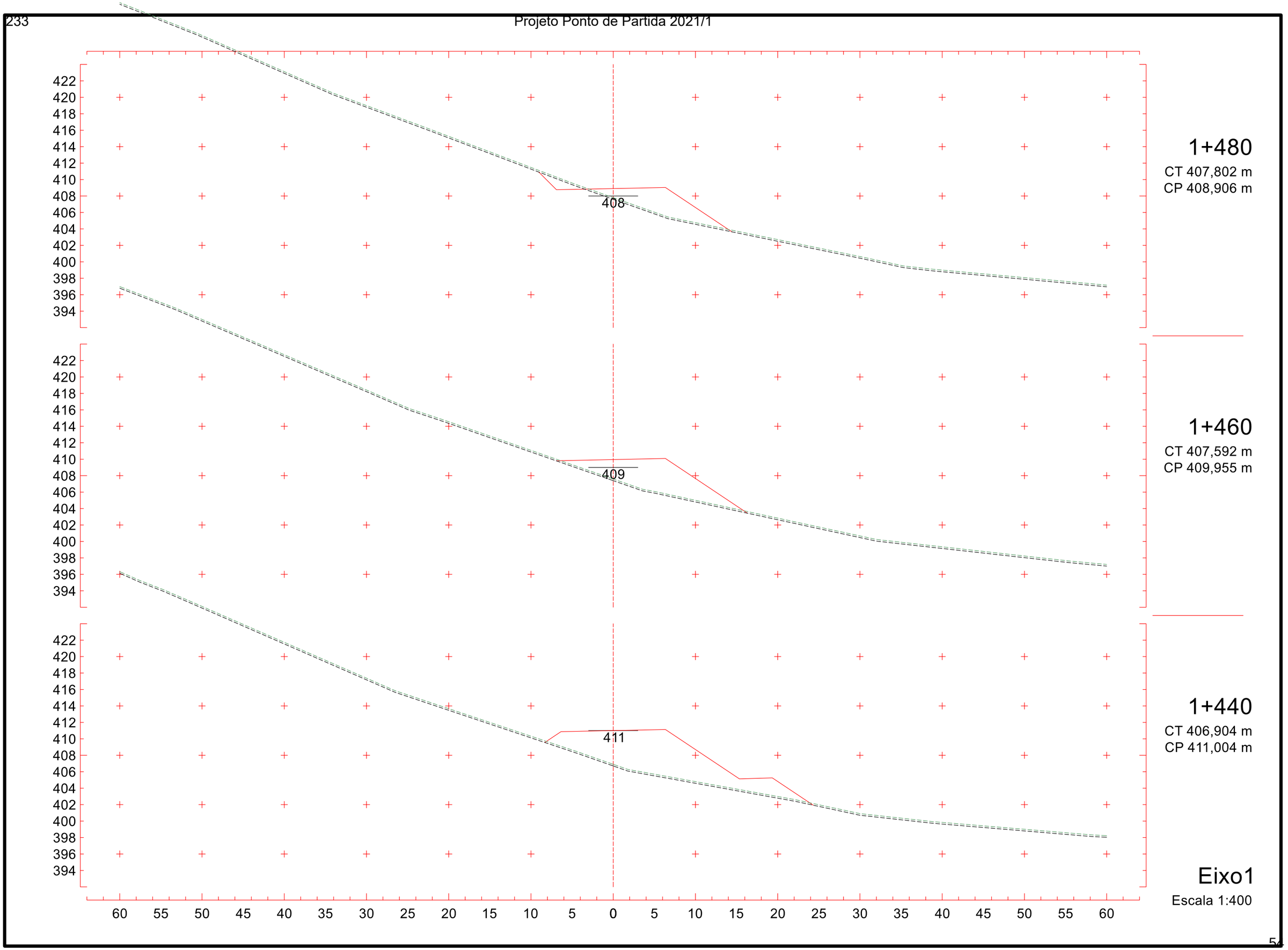
1+420
CT 406,303 m
CP 412,053 m

1+400
CT 405,784 m
CP 413,102 m

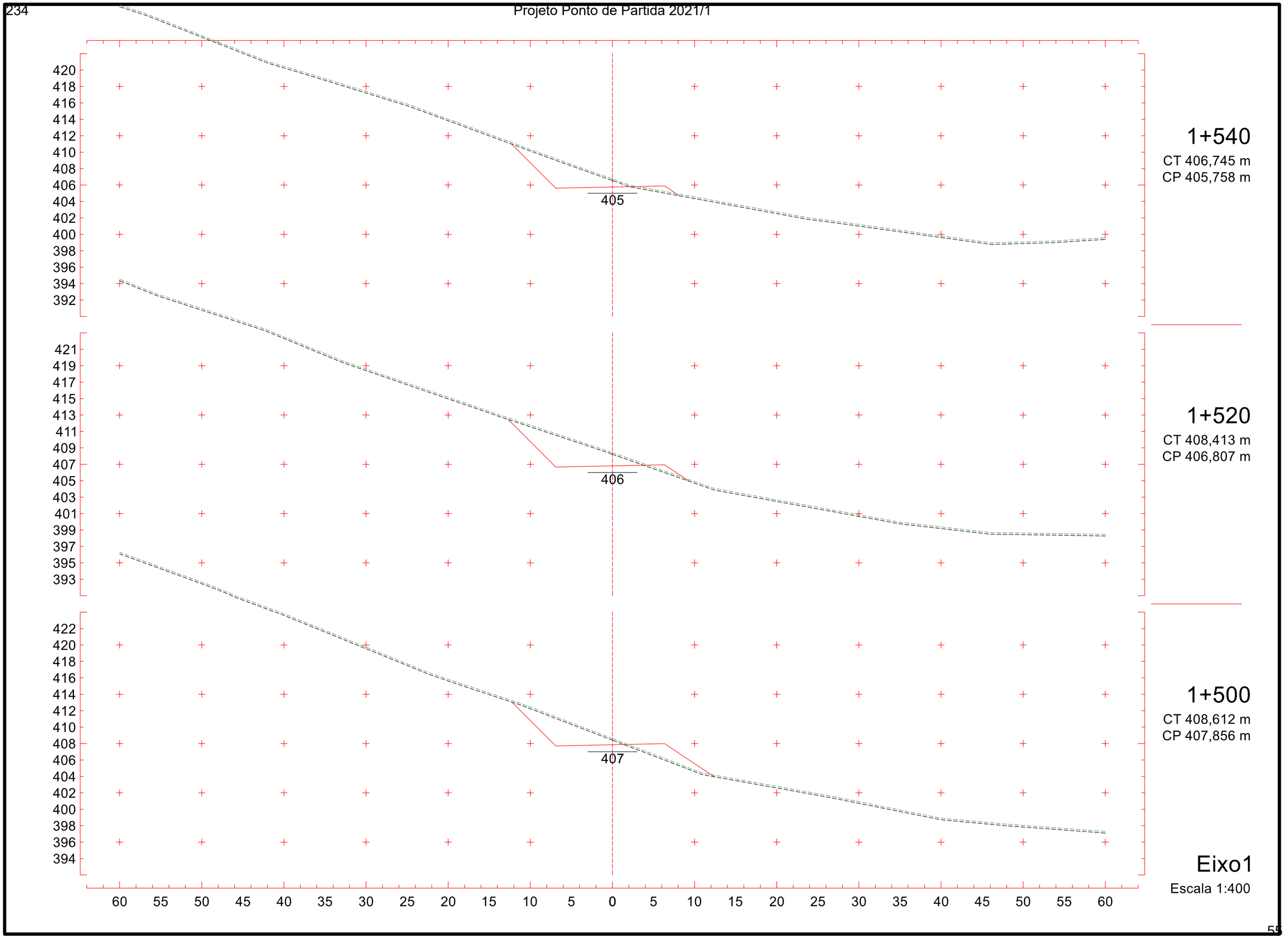
1+380
CT 405,425 m
CP 414,151 m

Eixo1
Escala 1:400

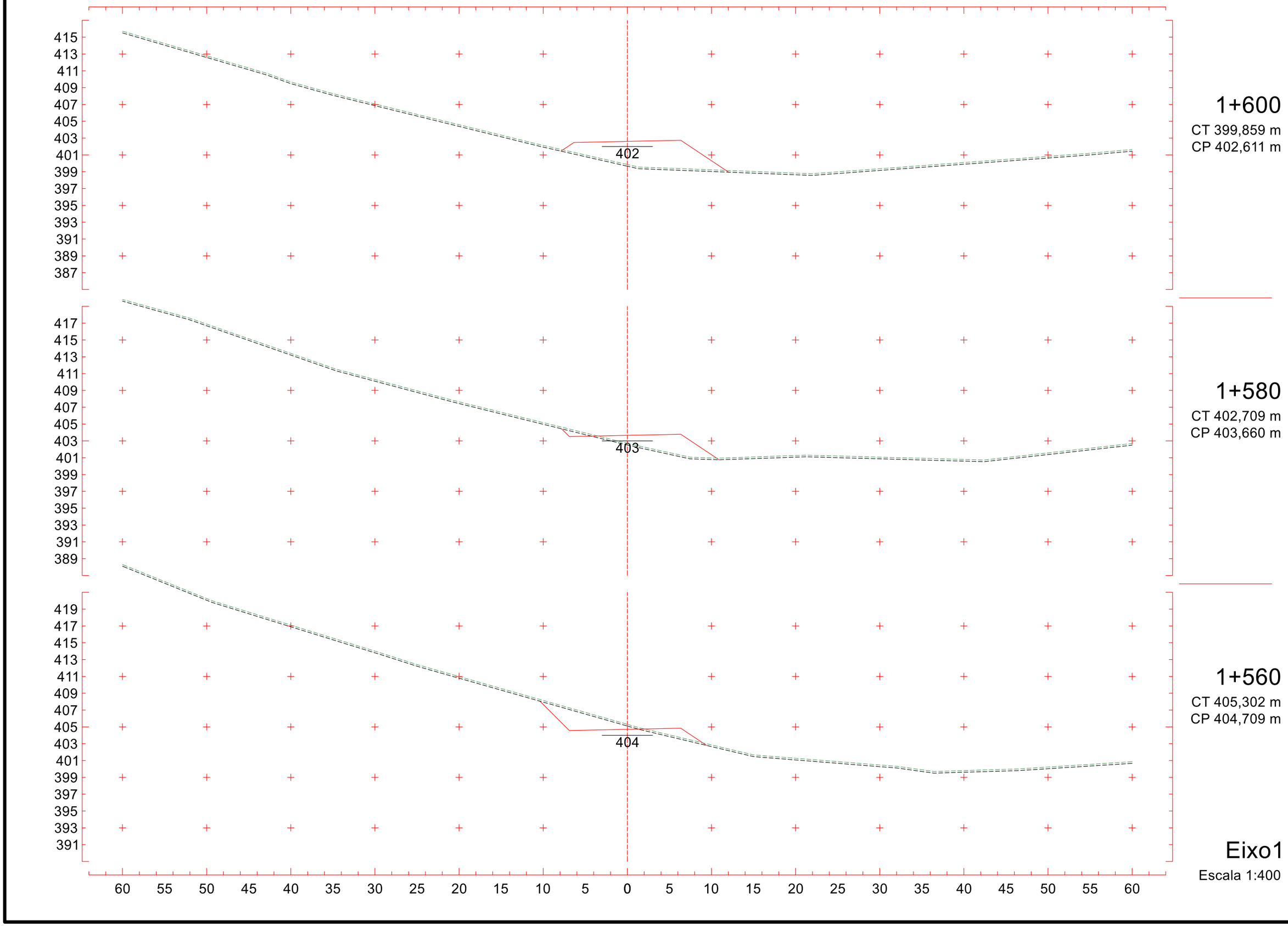
Projeto Ponto de Partida 2021/1



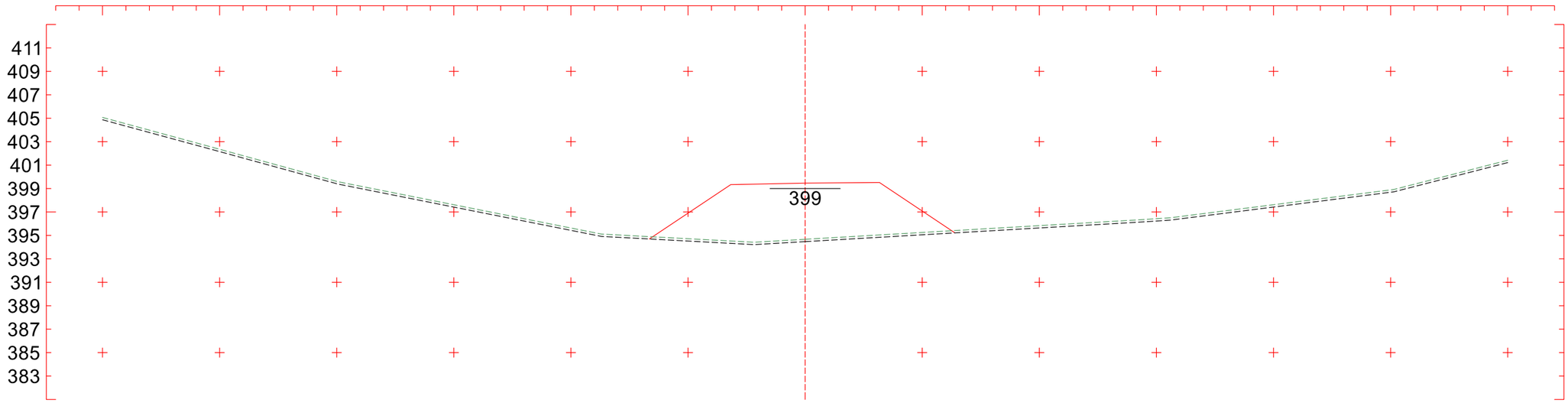
Projeto Ponto de Partida 2021/1



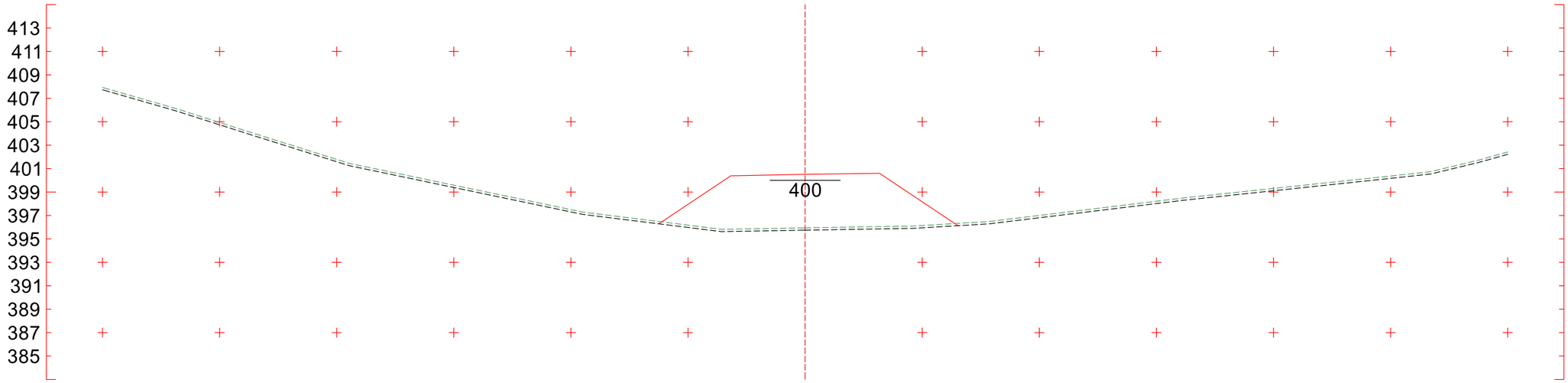
Projeto Ponto de Partida 2021/1



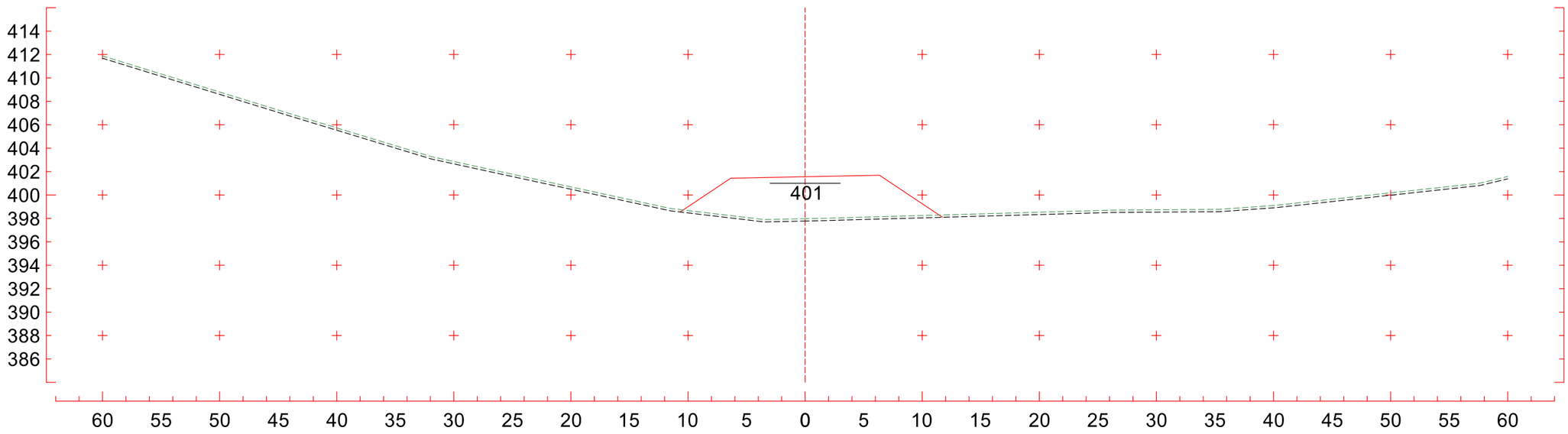
Projeto Ponto de Partida 2021/1



1+660
CT 394,671 m
CP 399,463 m



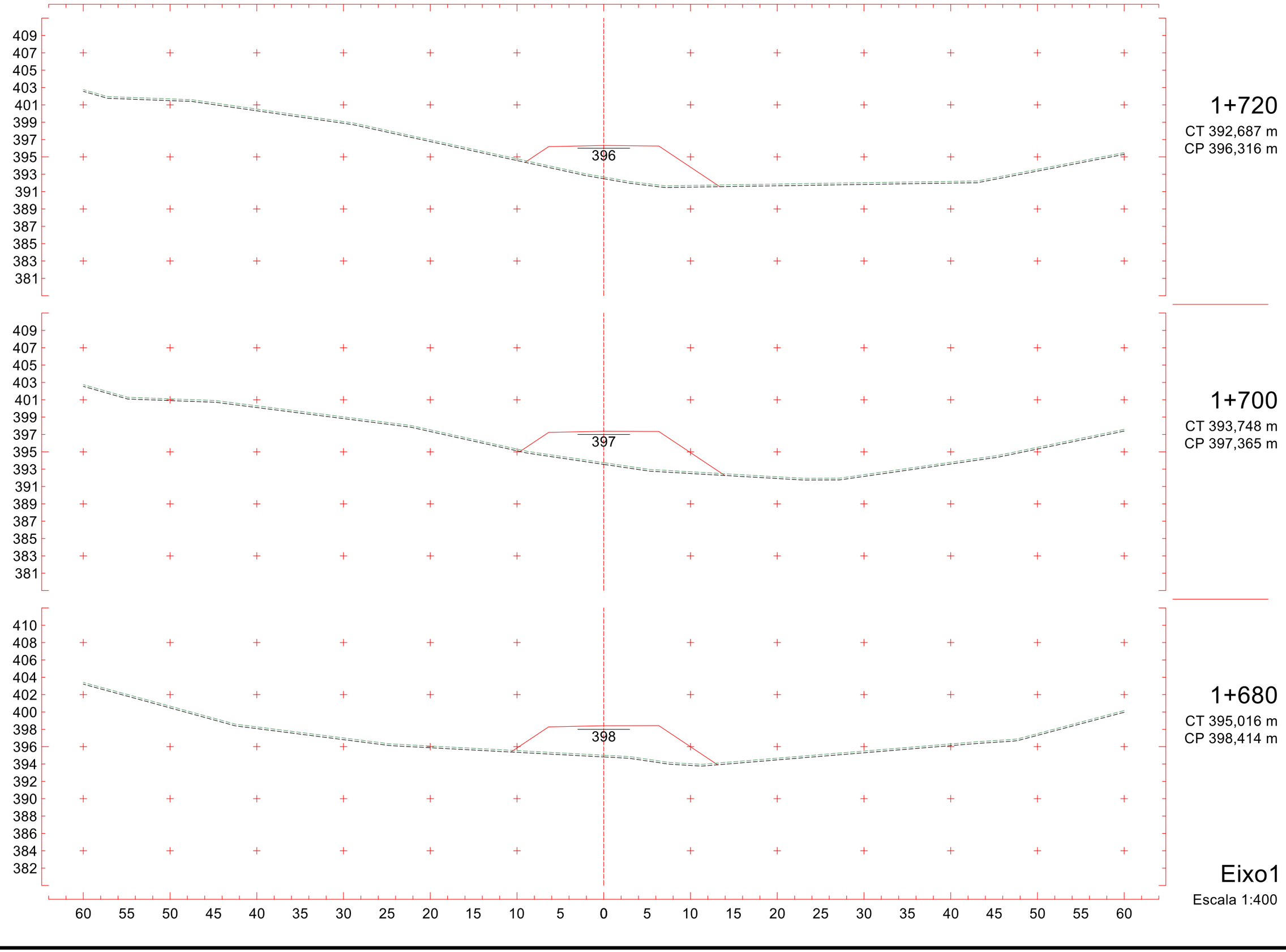
1+640
CT 395,945 m
CP 400,513 m



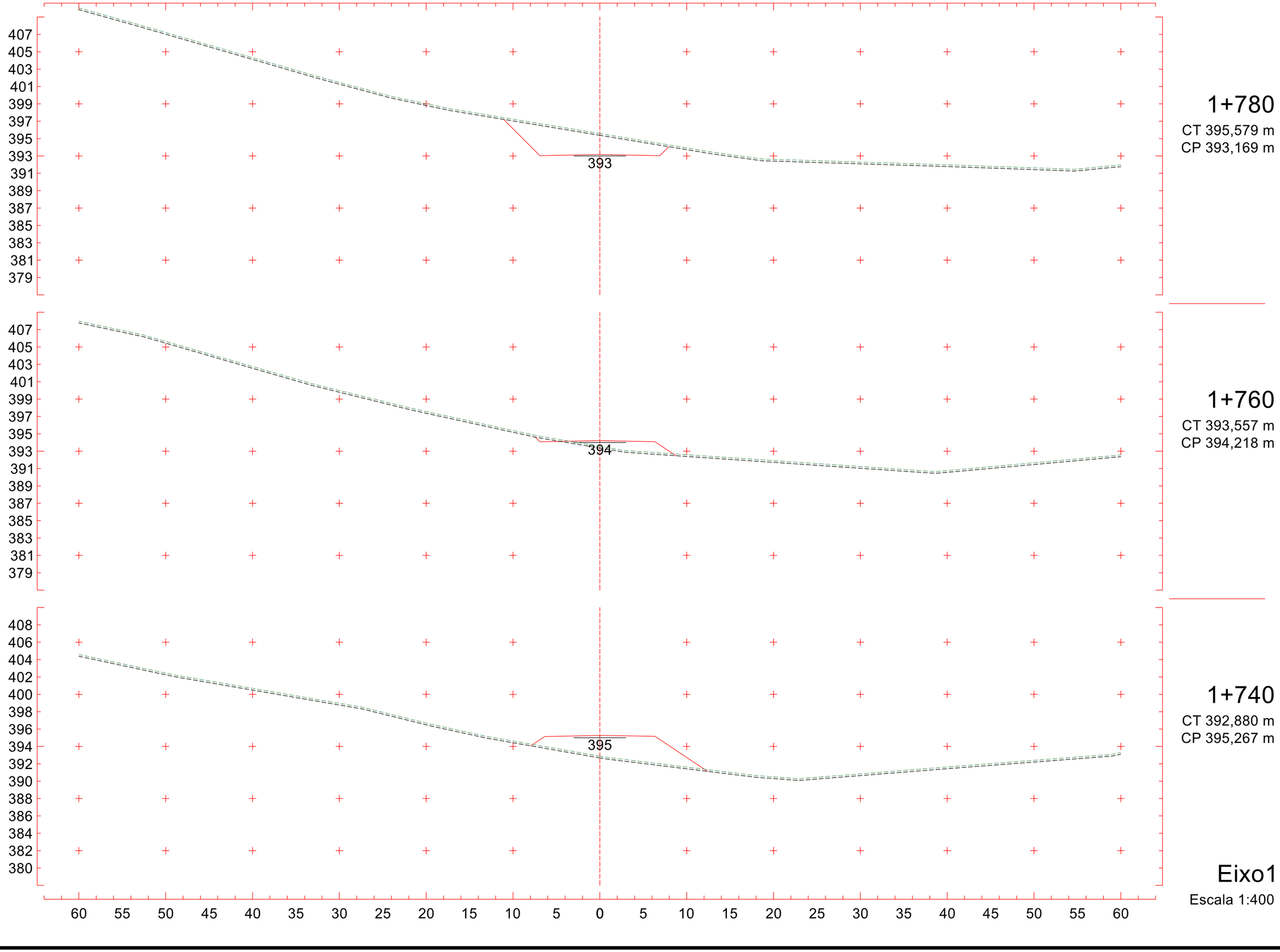
1+620
CT 397,978 m
CP 401,562 m

Eixo1
Escala 1:400

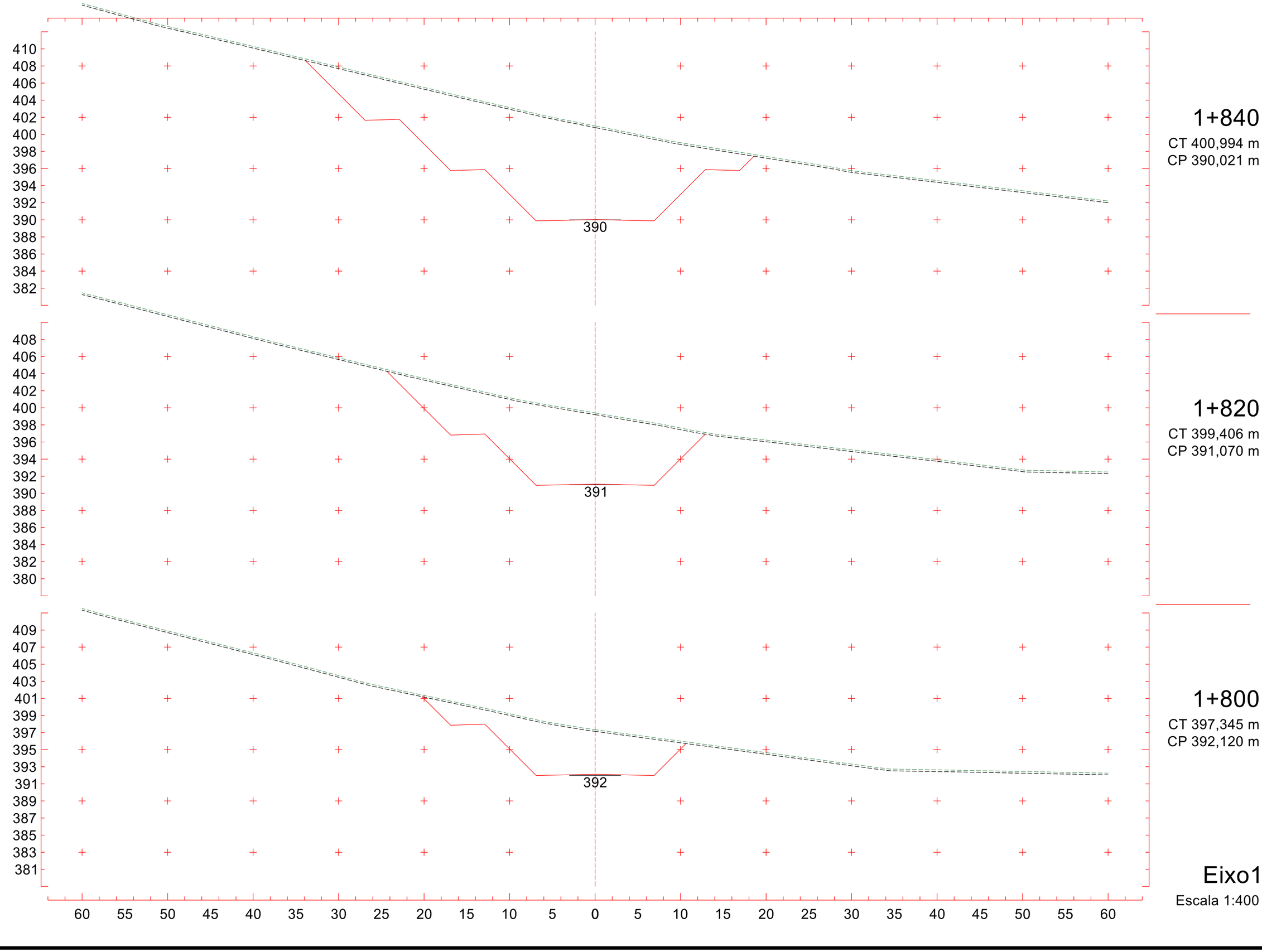
Projeto Ponto de Partida 2021/1



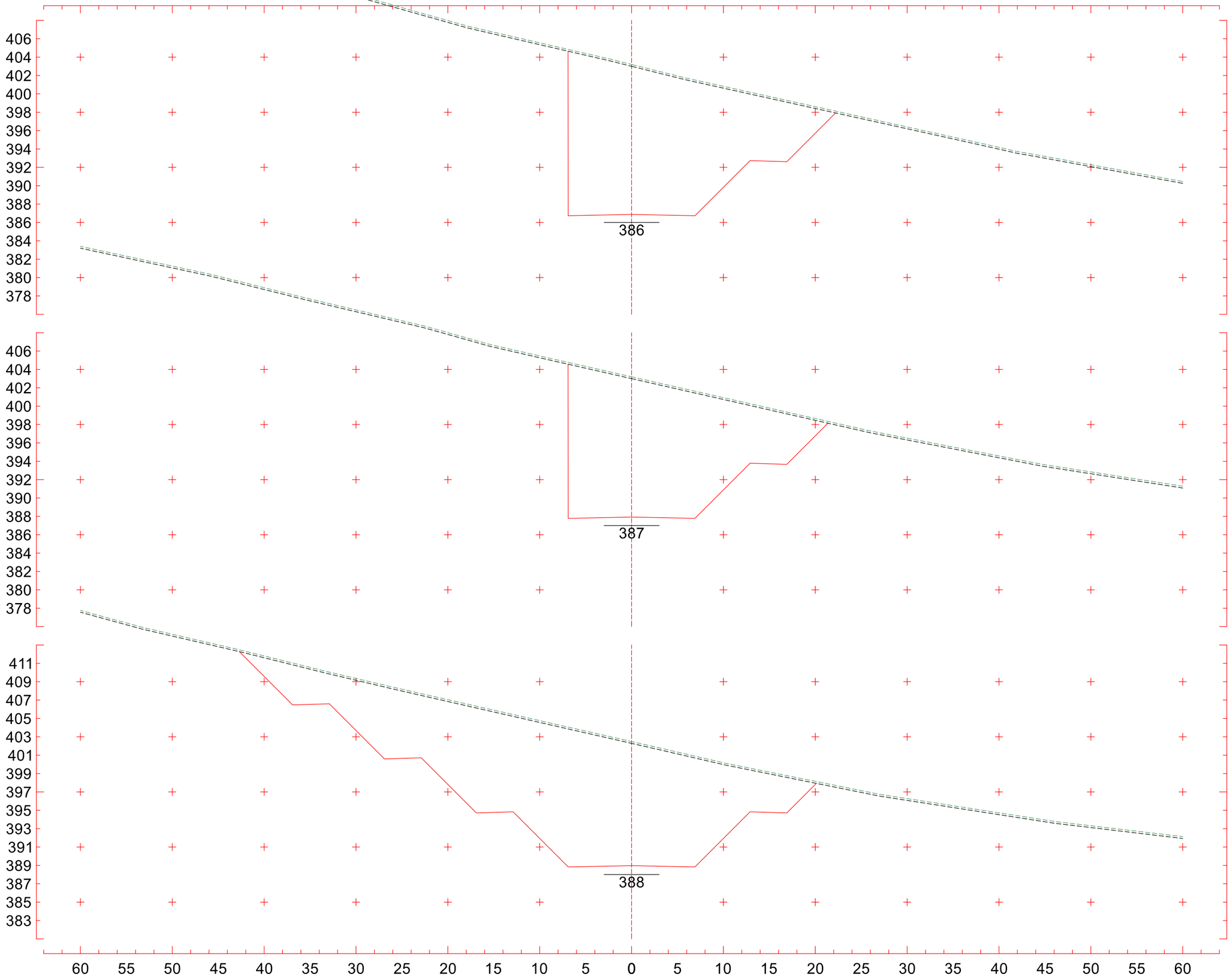
Projeto Ponto de Partida 2021/1



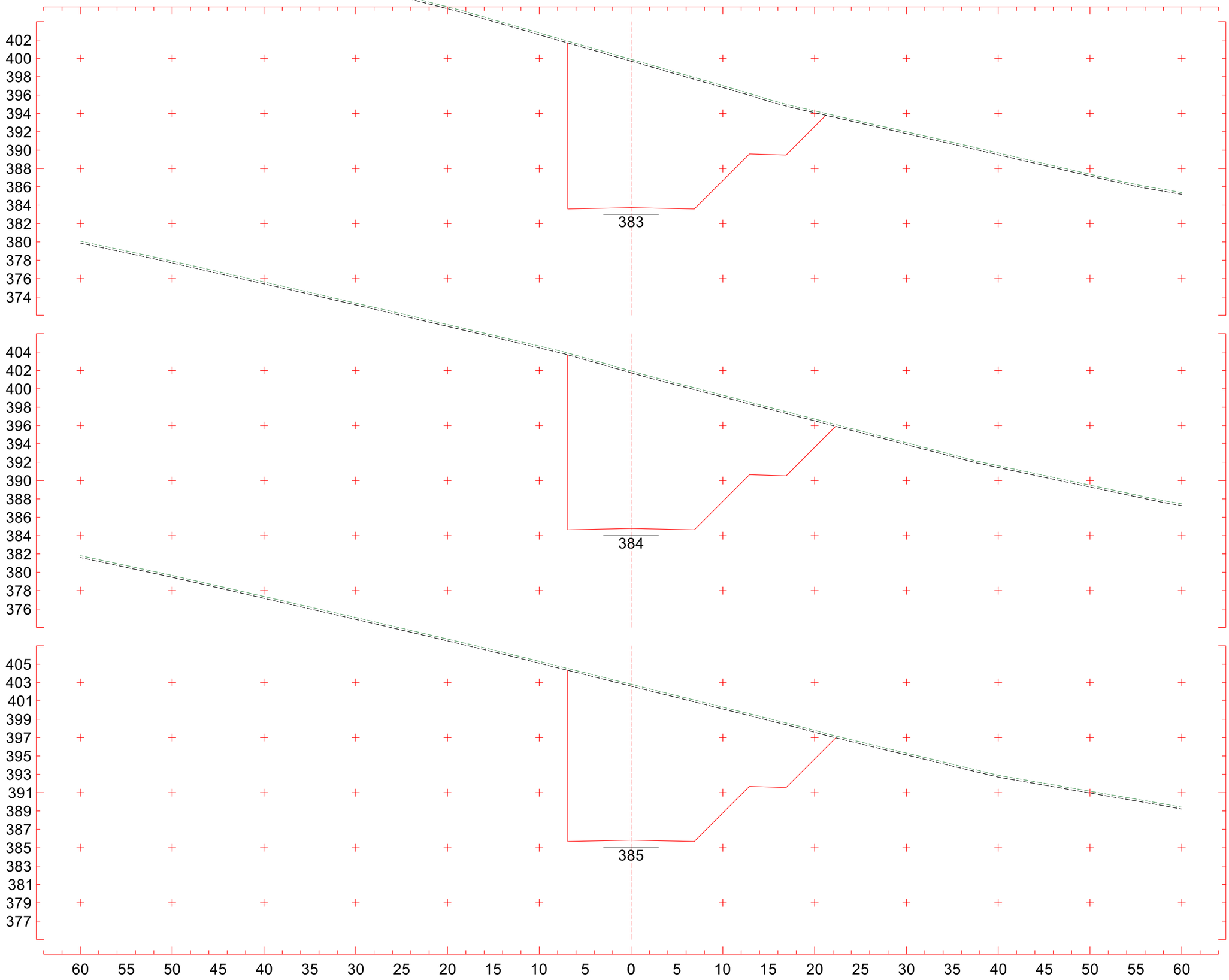
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



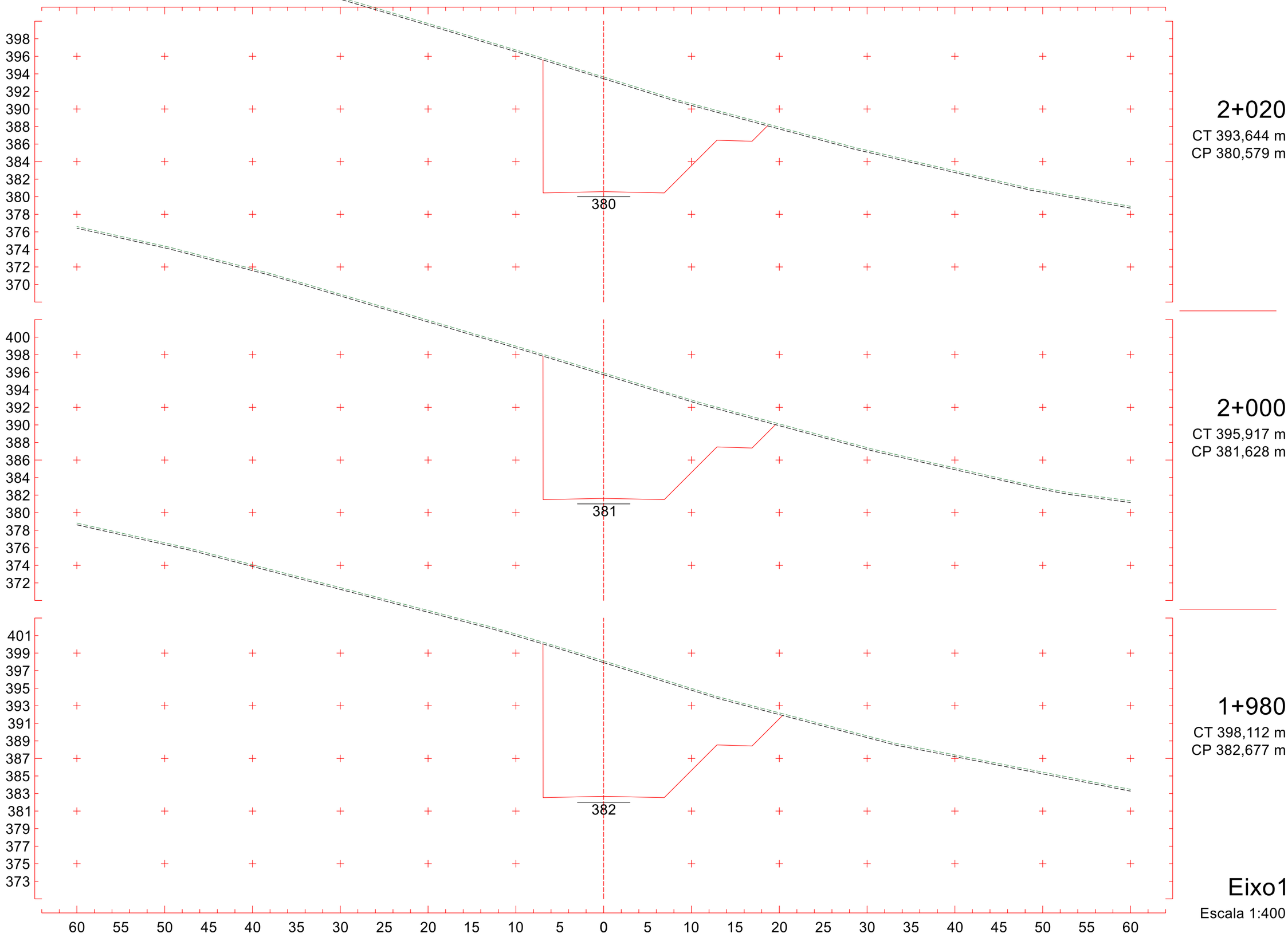
1+960
CT 399,894 m
CP 383,727 m

1+940
CT 401,942 m
CP 384,776 m

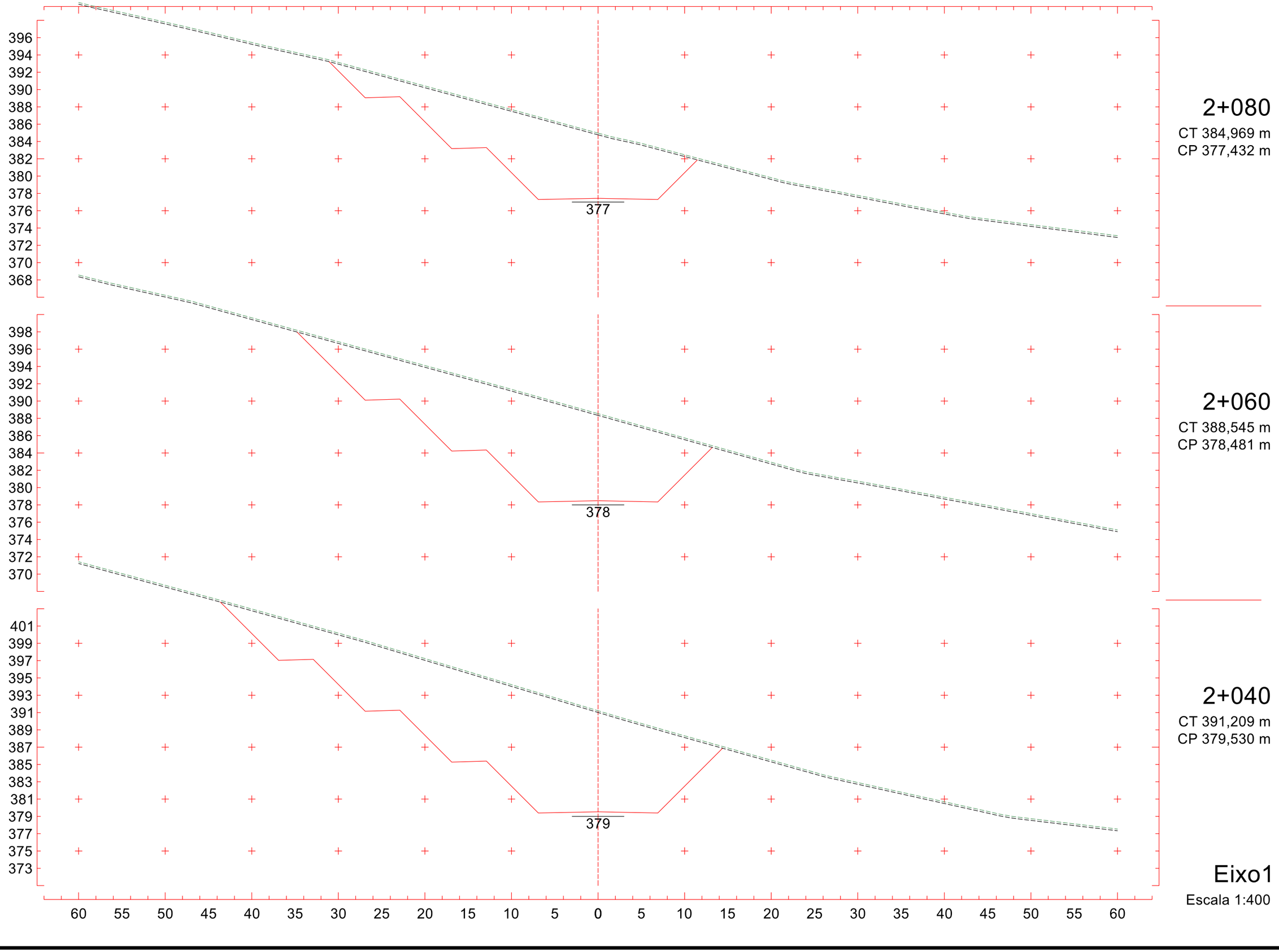
1+920
CT 402,802 m
CP 385,825 m

Eixo1
Escala 1:400

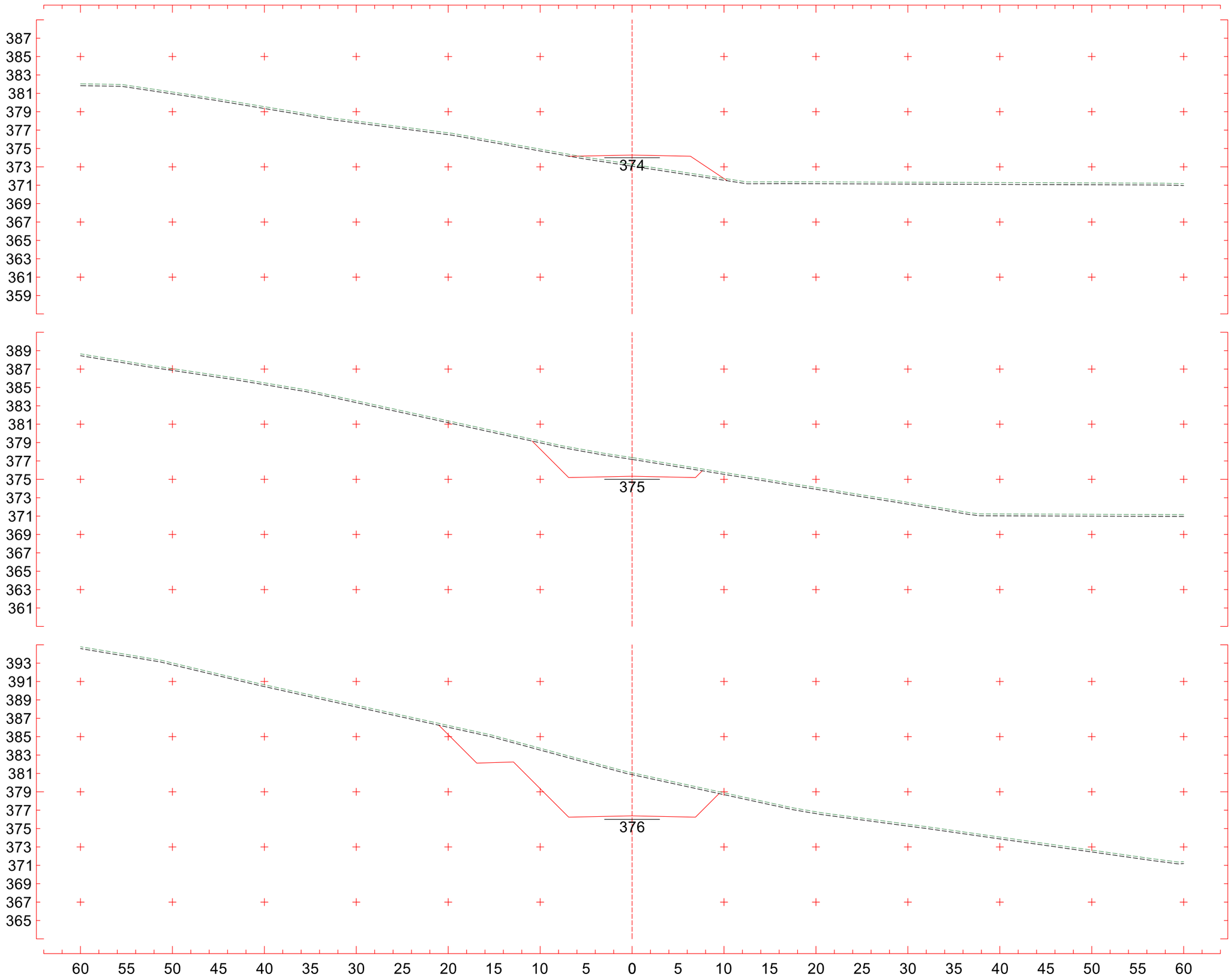
Projeto Ponto de Partida 2021/1



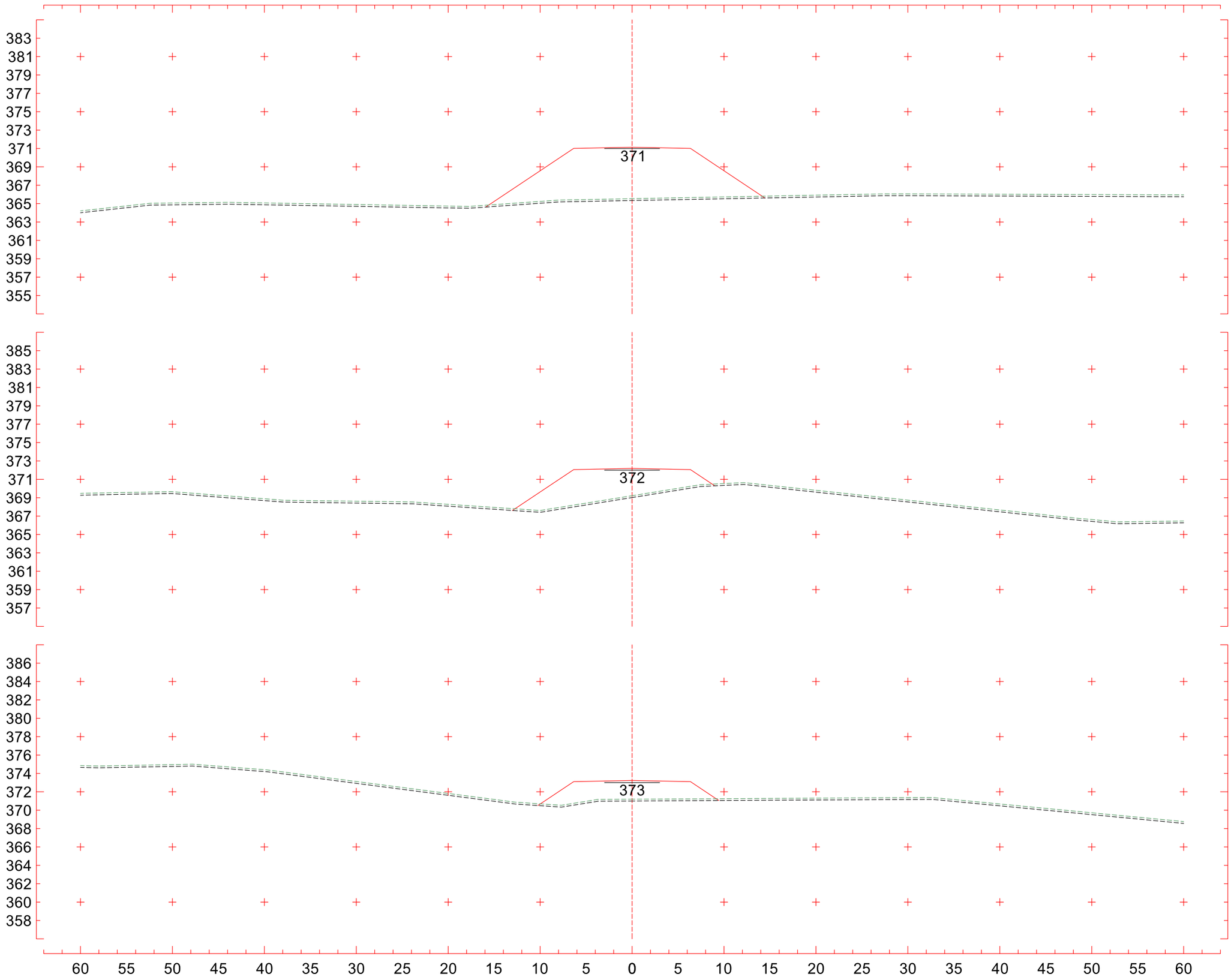
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



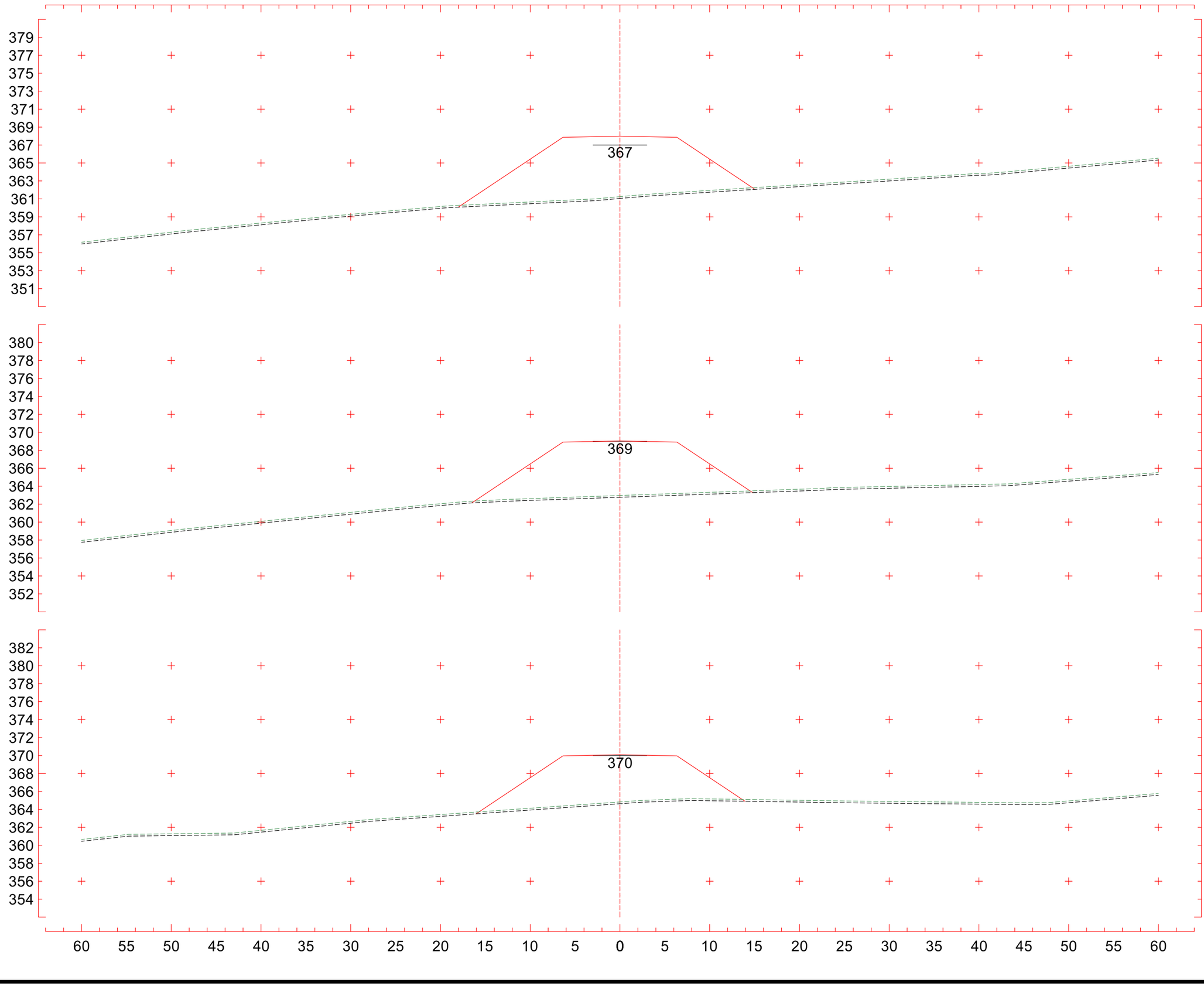
2+200
CT 365,538 m
CP 371,137 m

2+180
CT 369,218 m
CP 372,186 m

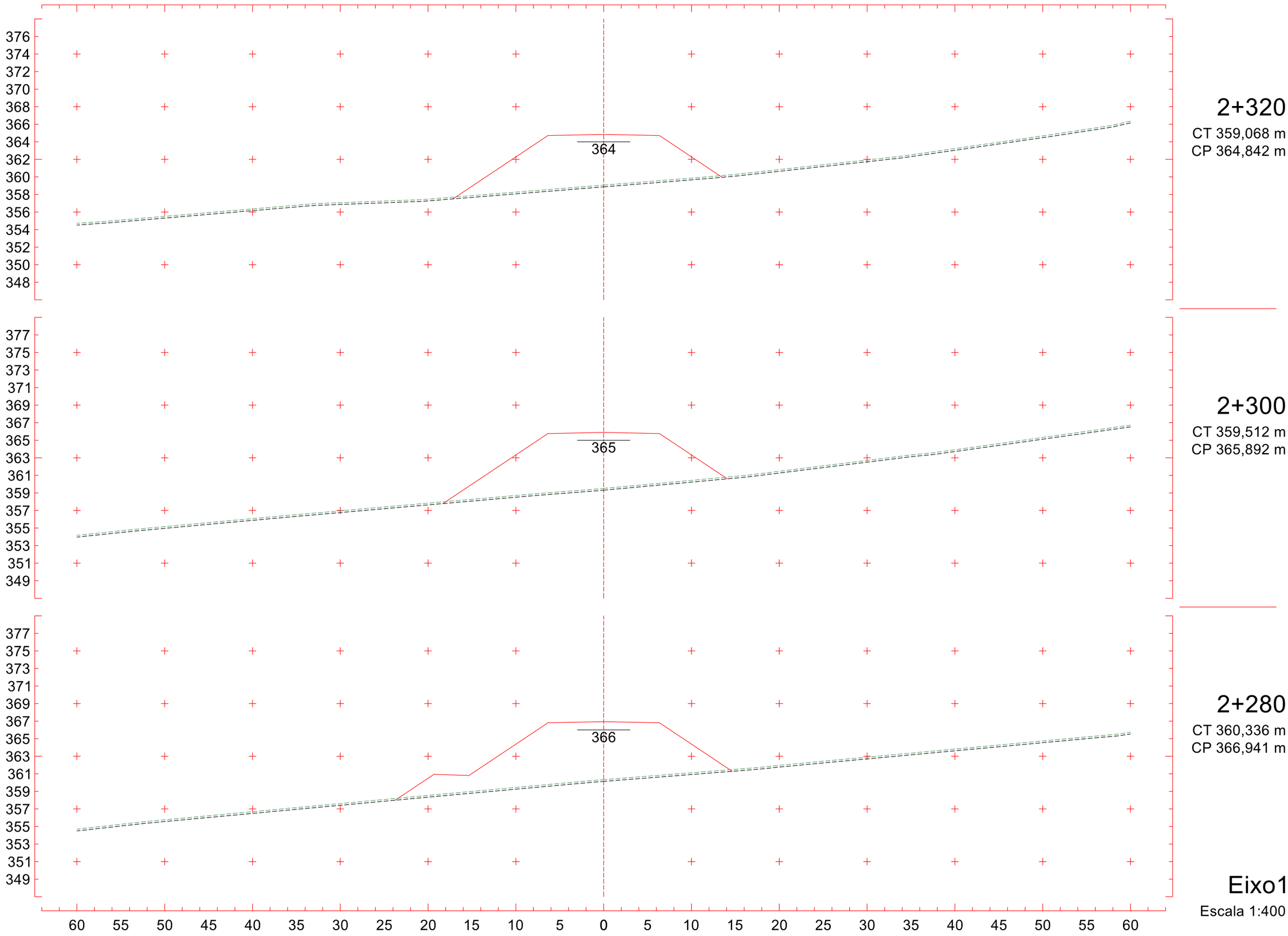
2+160
CT 371,197 m
CP 373,235 m

Eixo1
Escala 1:400

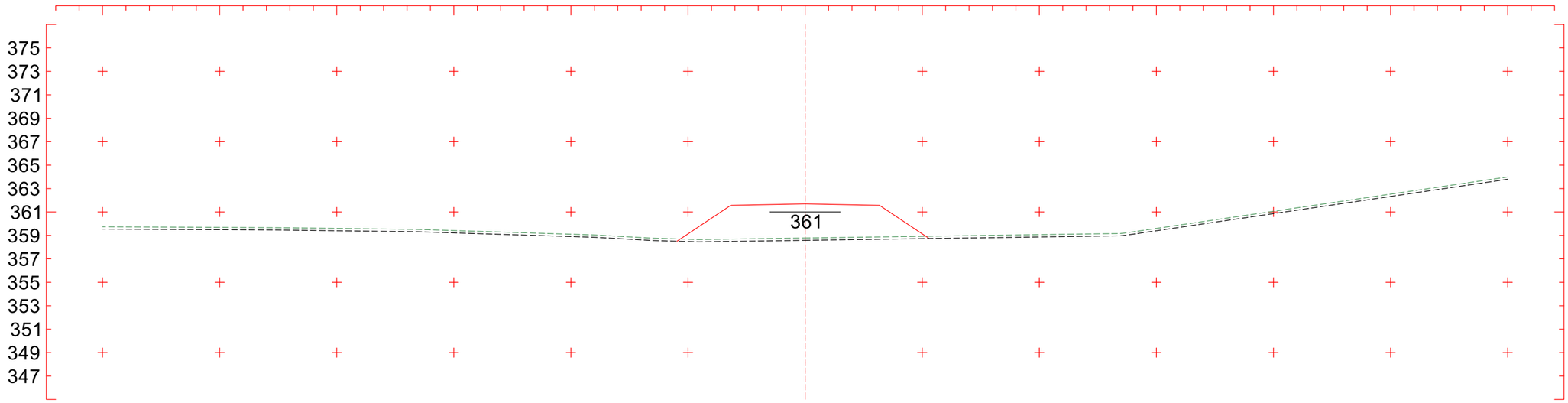
Projeto Ponto de Partida 2021/1



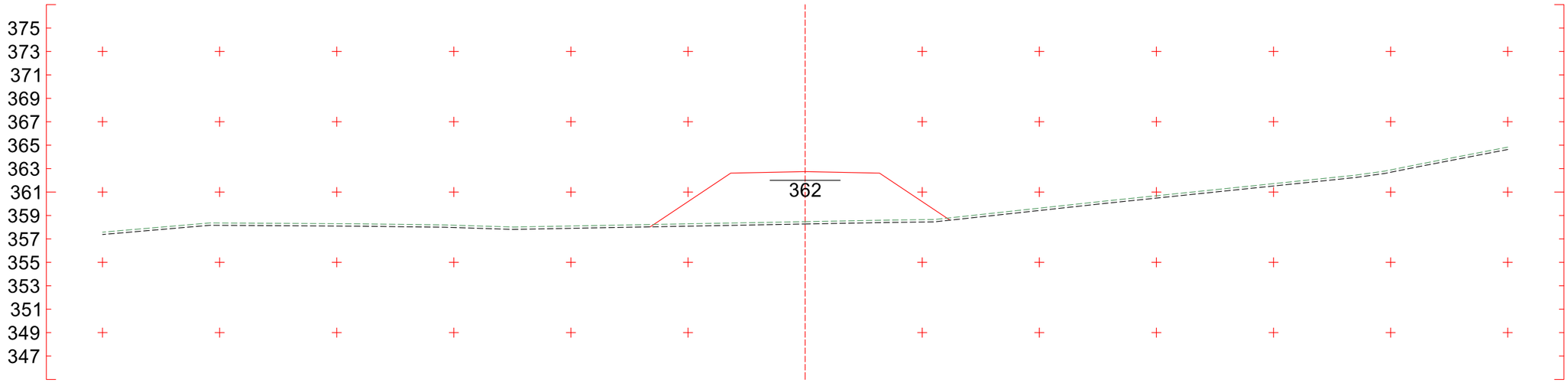
Projeto Ponto de Partida 2021/1



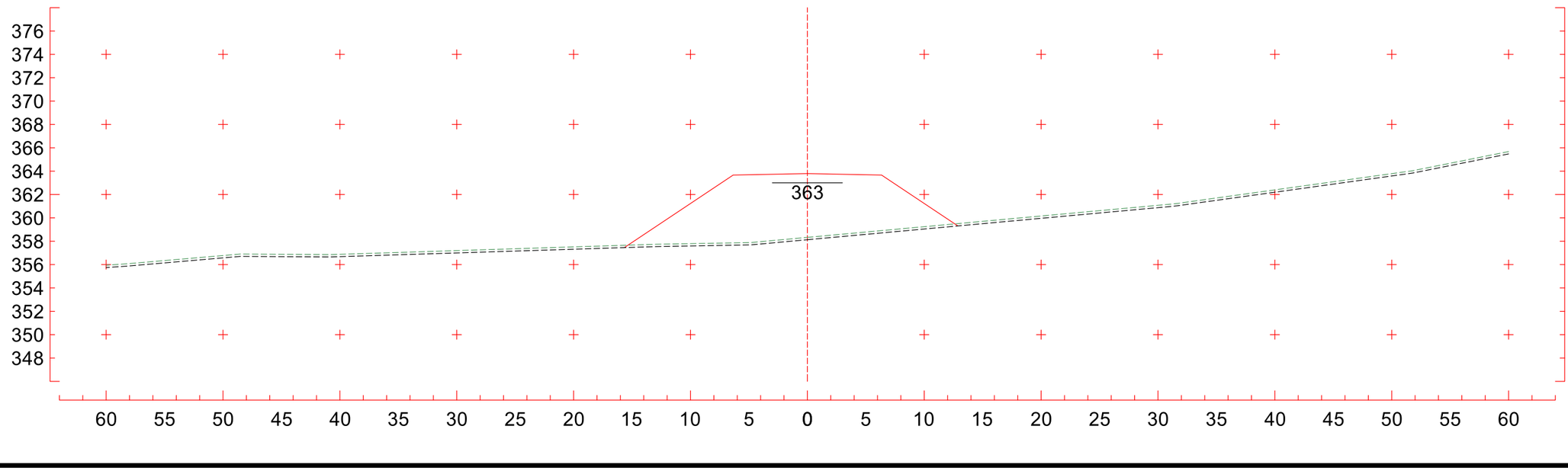
Projeto Ponto de Partida 2021/1



2+380
CT 358,780 m
CP 361,695 m



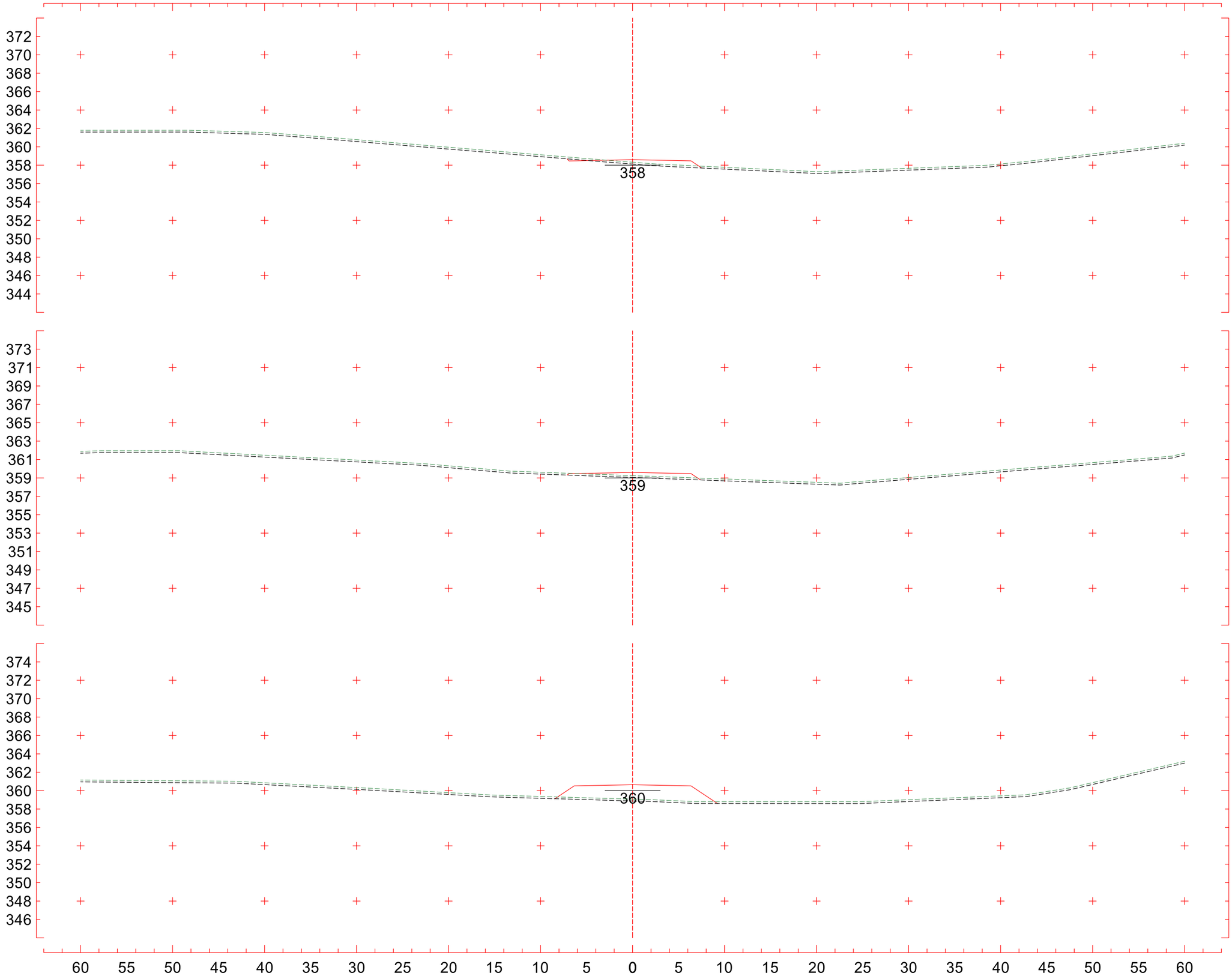
2+360
CT 358,473 m
CP 362,744 m



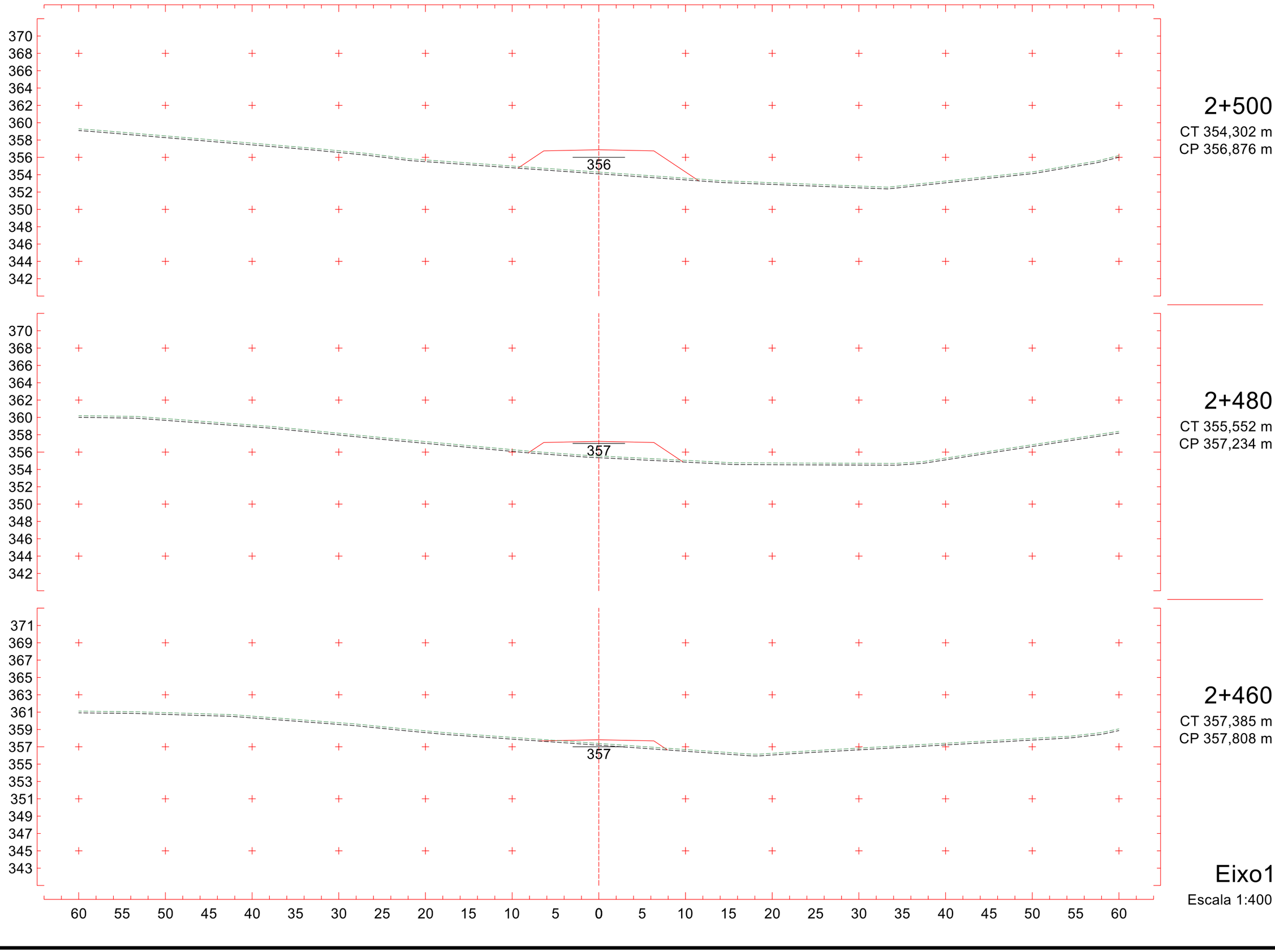
2+340
CT 358,331 m
CP 363,793 m

Eixo1
Escala 1:400

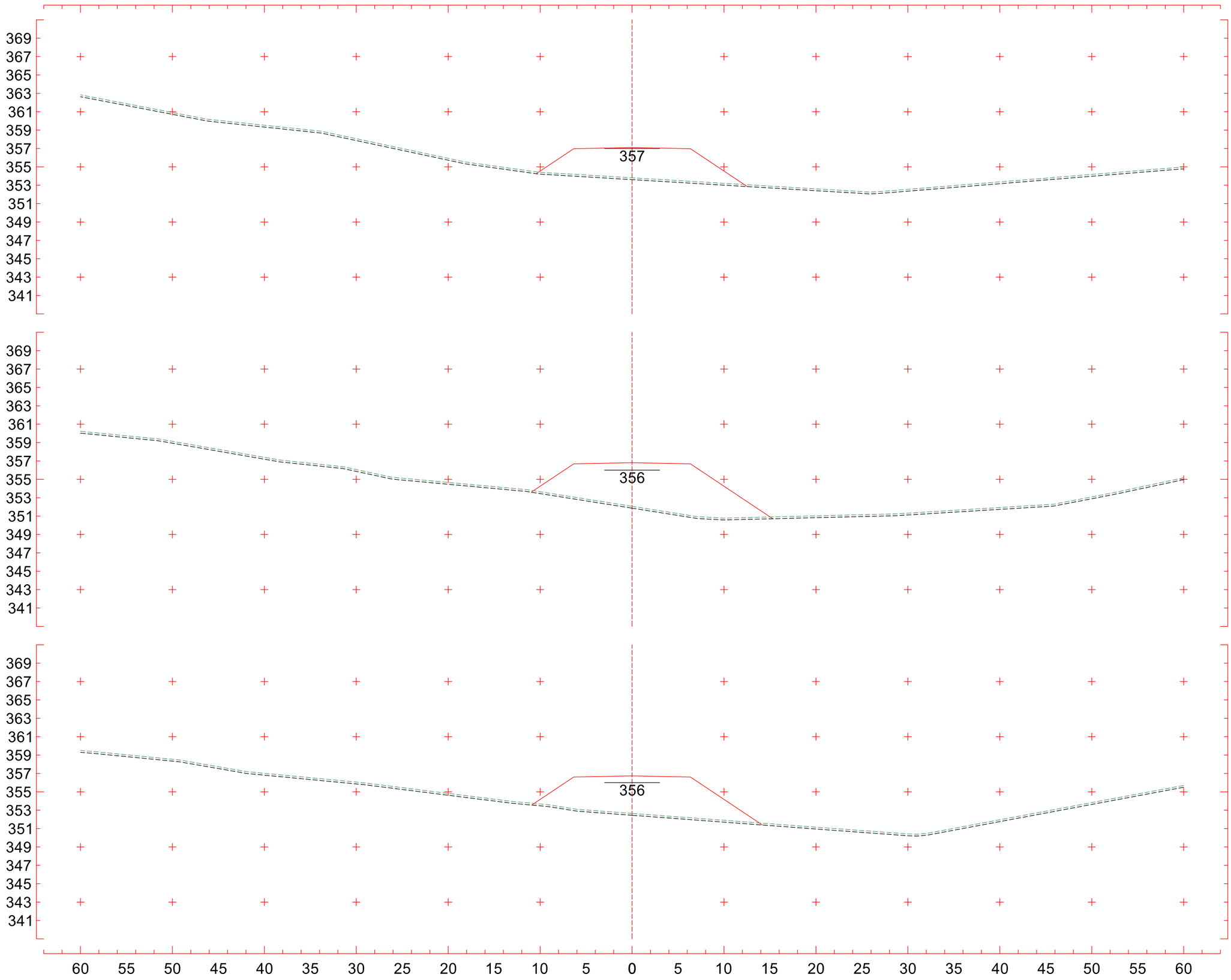
Projeto Ponto de Partida 2021/1



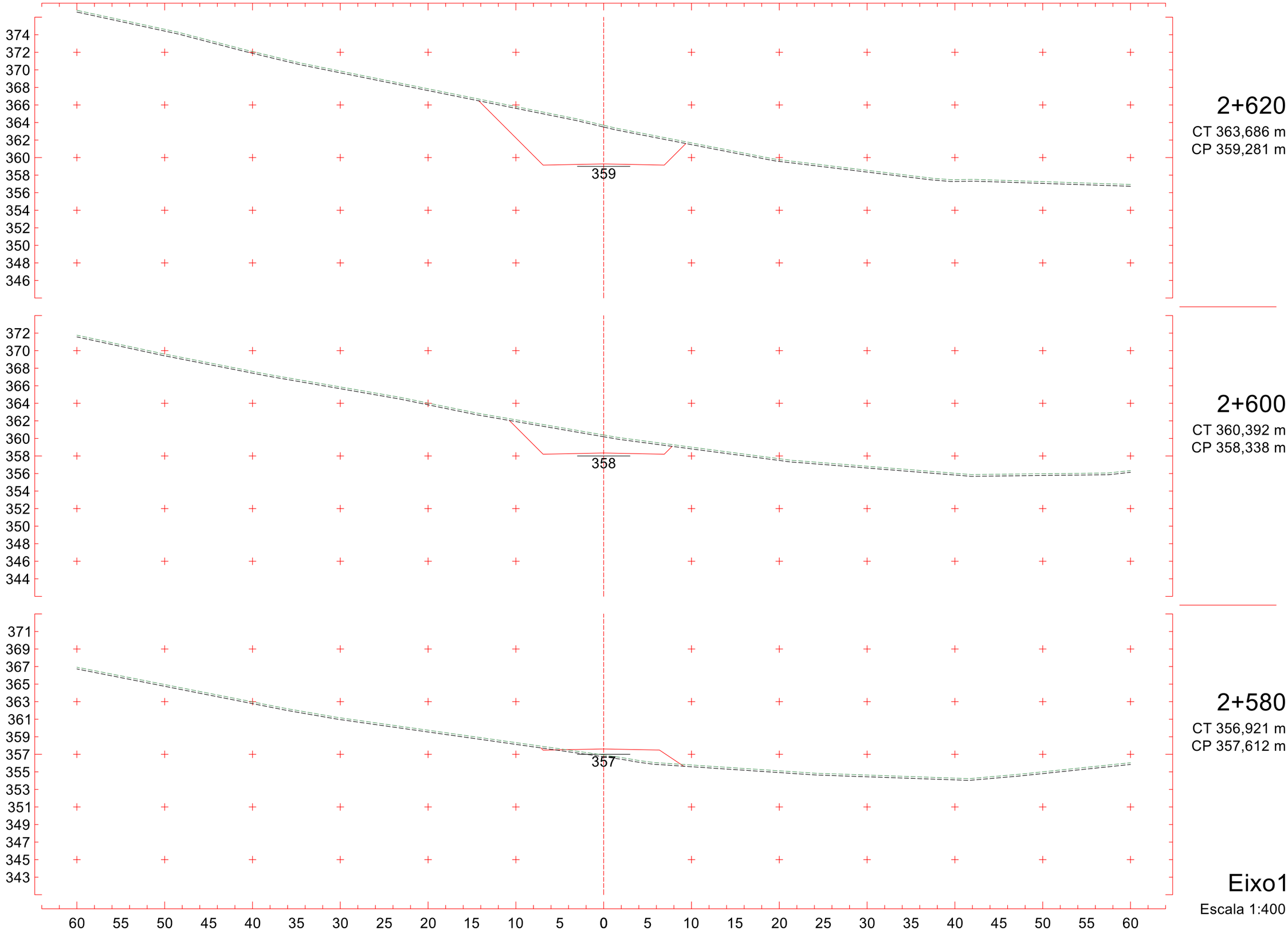
Projeto Ponto de Partida 2021/1



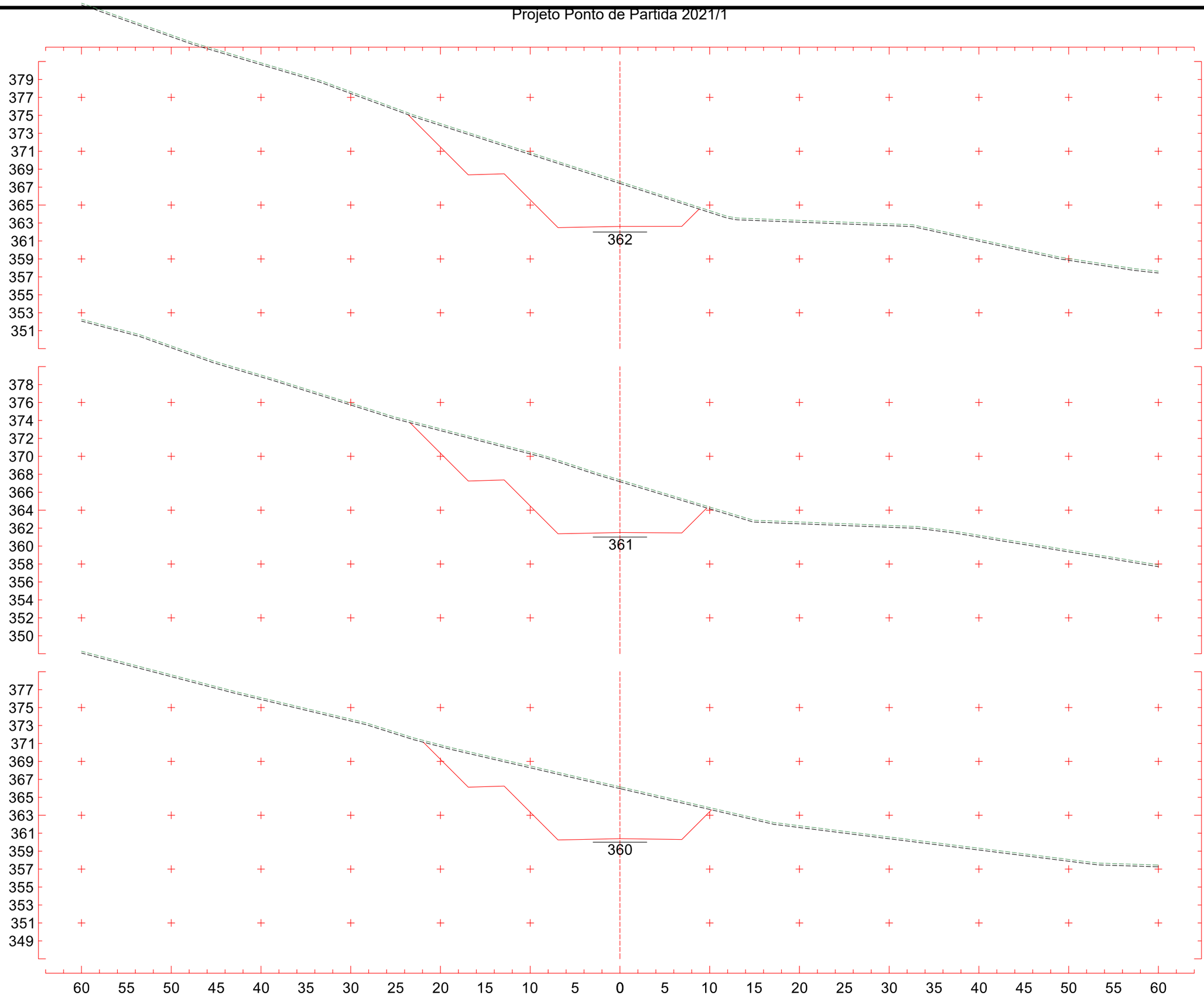
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1

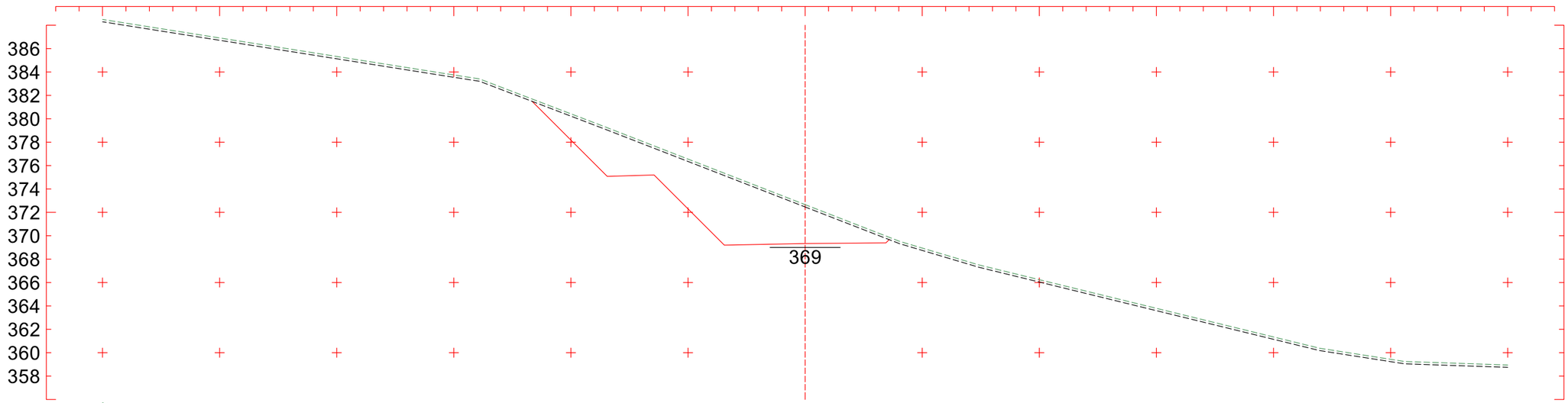


Projeto Ponto de Partida 2021/1



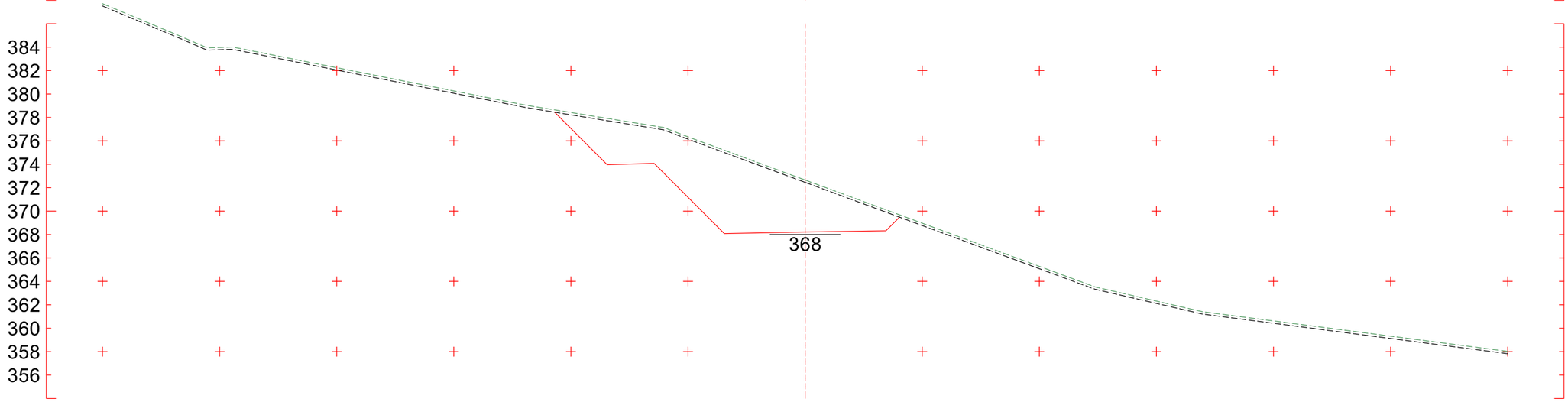
Projeto Ponto de Partida 2021/1

Projeto Ponto de Partida 2021/1



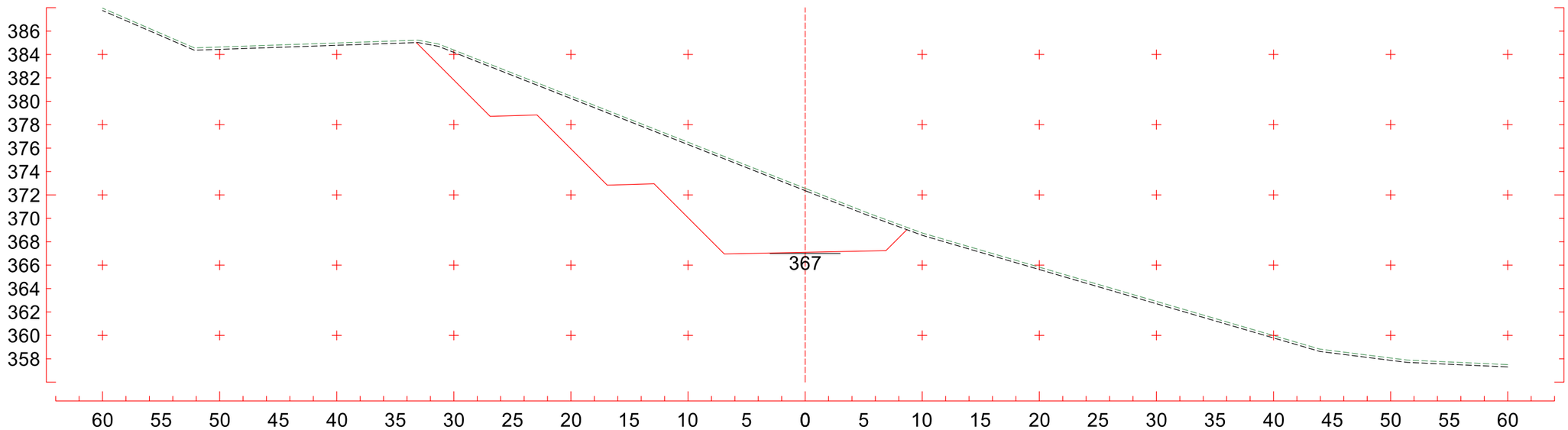
2+800

CT 372,661 m
CP 369,334 m



2+780

CT 372,656 m
CP 368,216 m



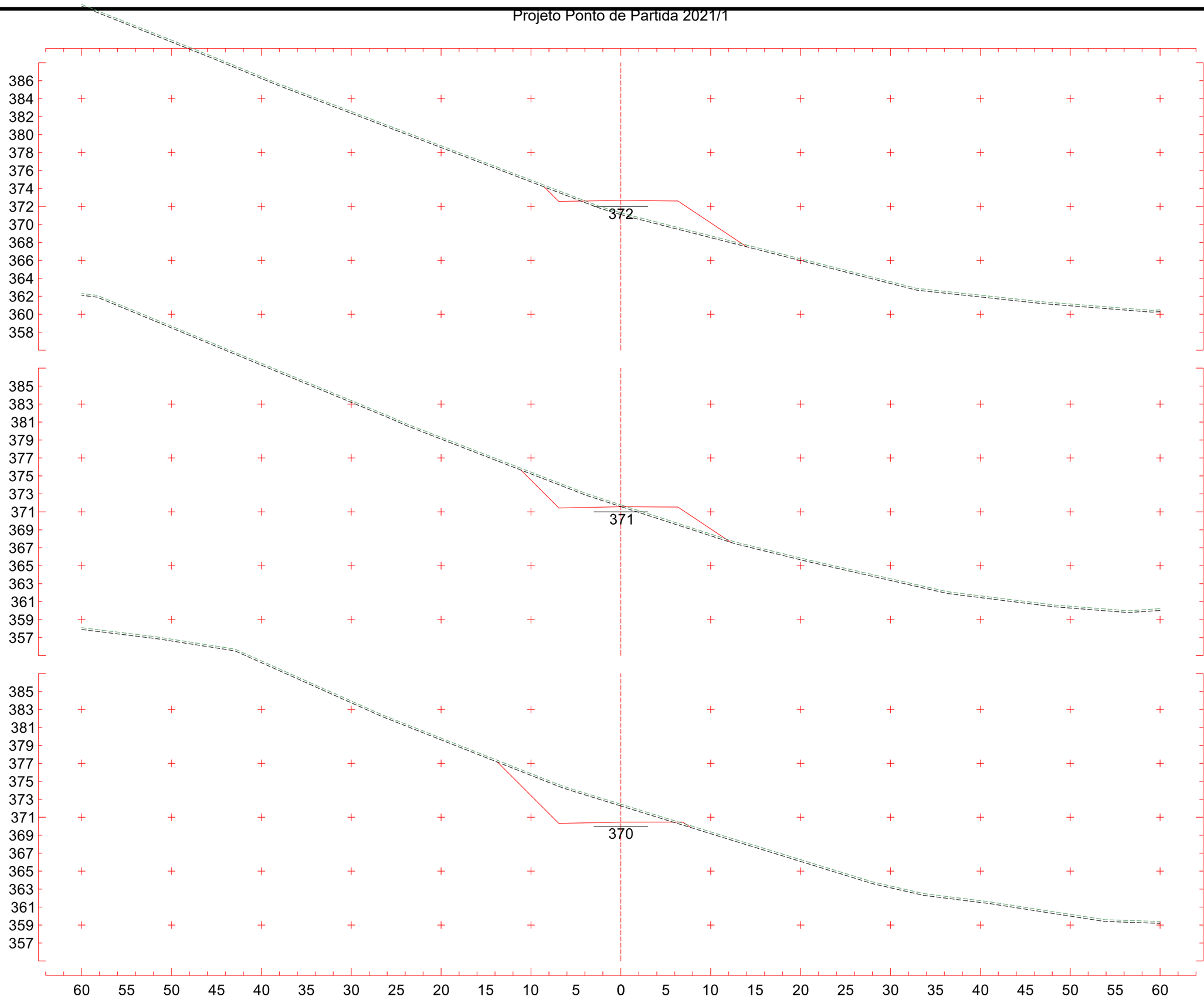
2+760

CT 372,567 m
CP 367,098 m

Eixo1

Escala 1:400

Projeto Ponto de Partida 2021/1



2+860

CT 371,300 m
CP 372,689 m

2+840

CT 371,786 m
CP 371,571 m

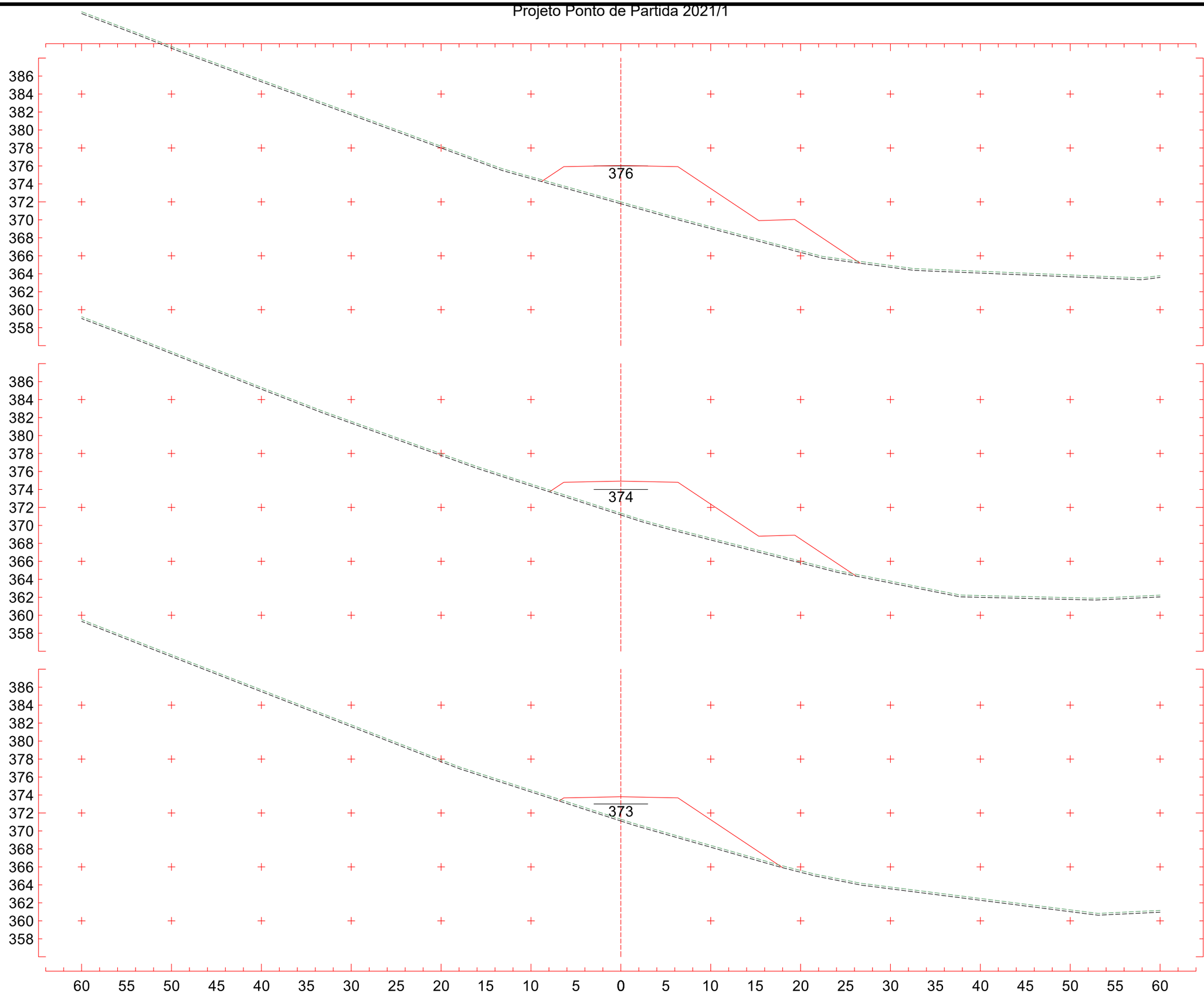
2+820

CT 372,455 m
CP 370,453 m

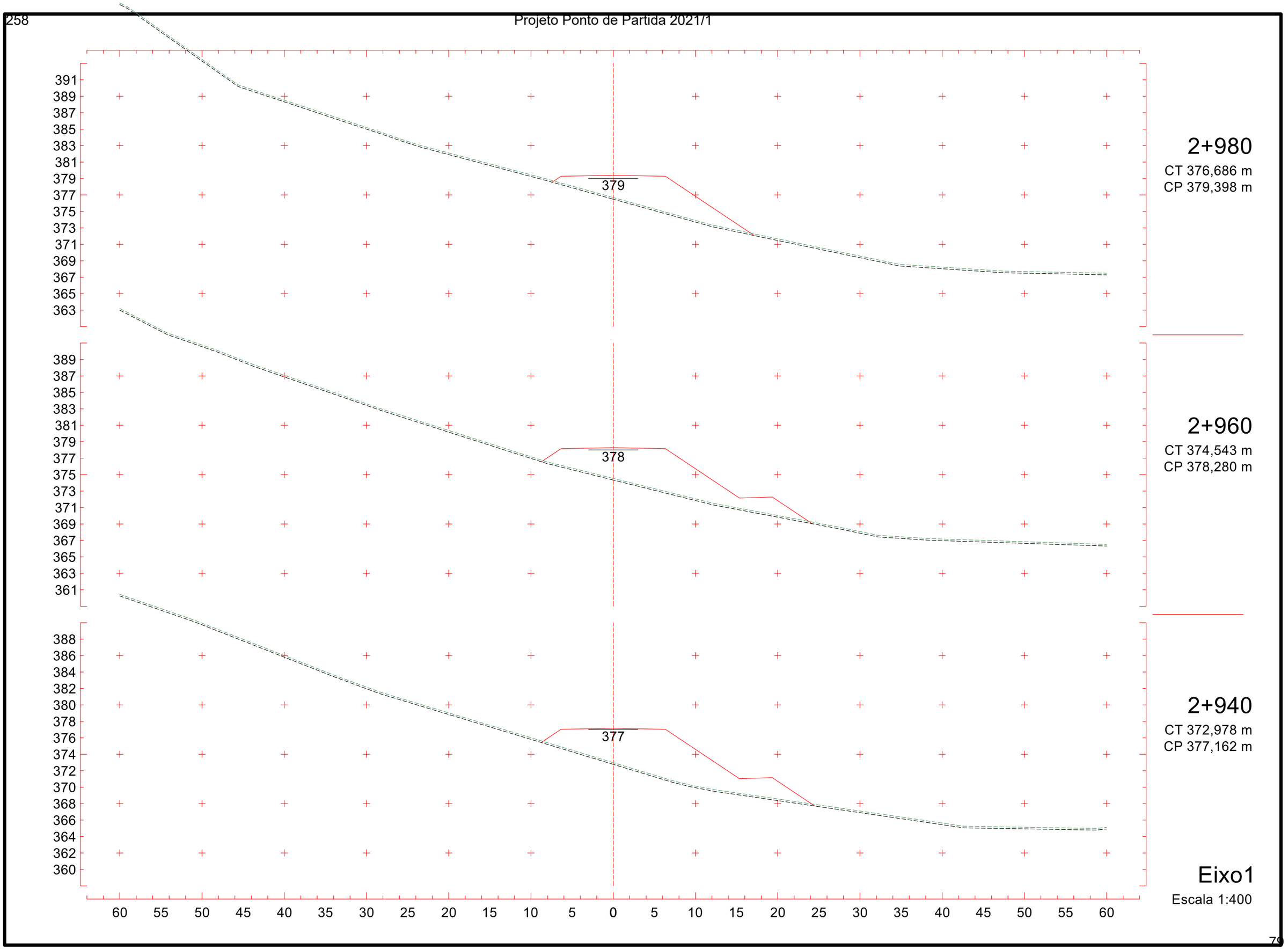
Eixo1

Escala 1:400

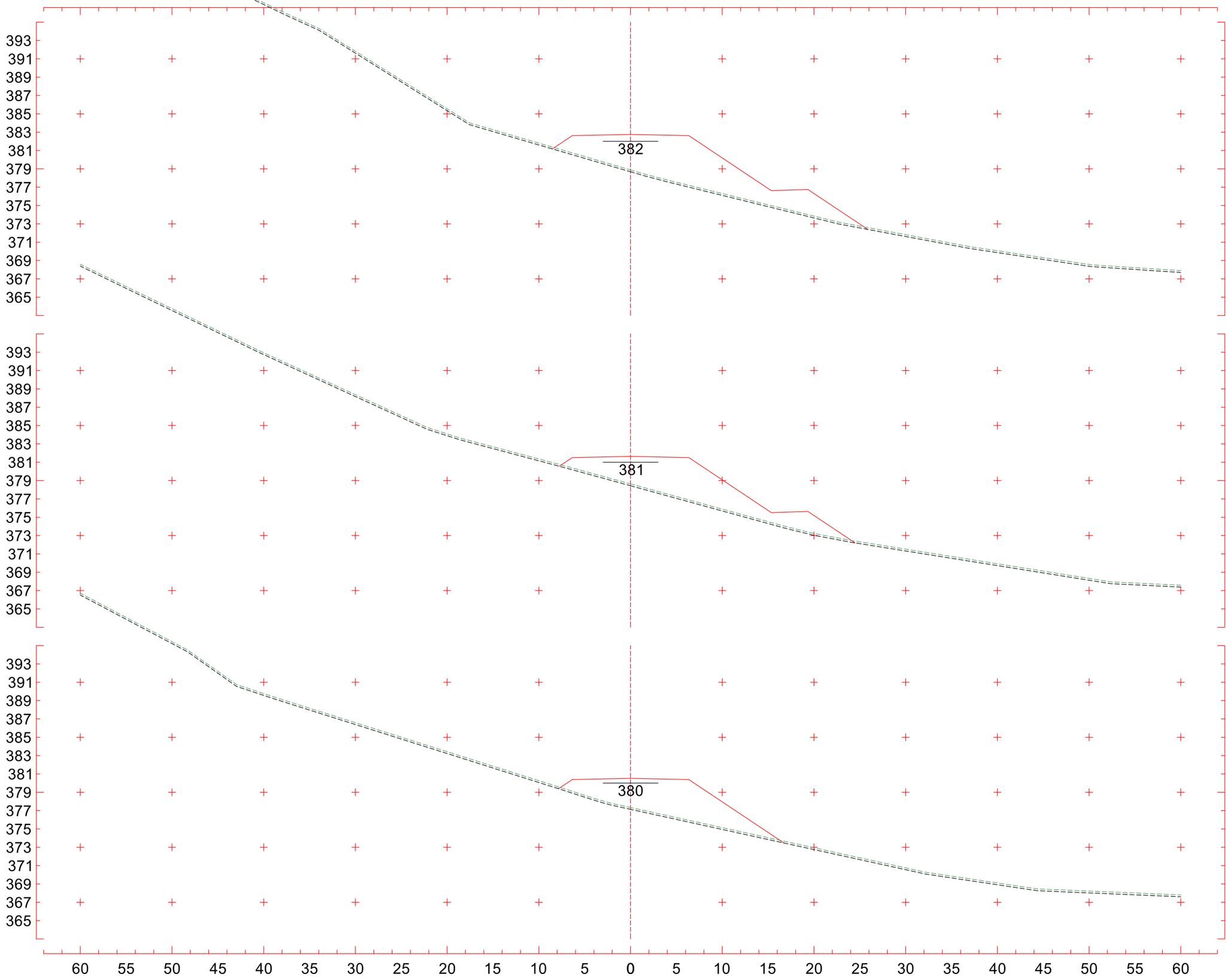
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1

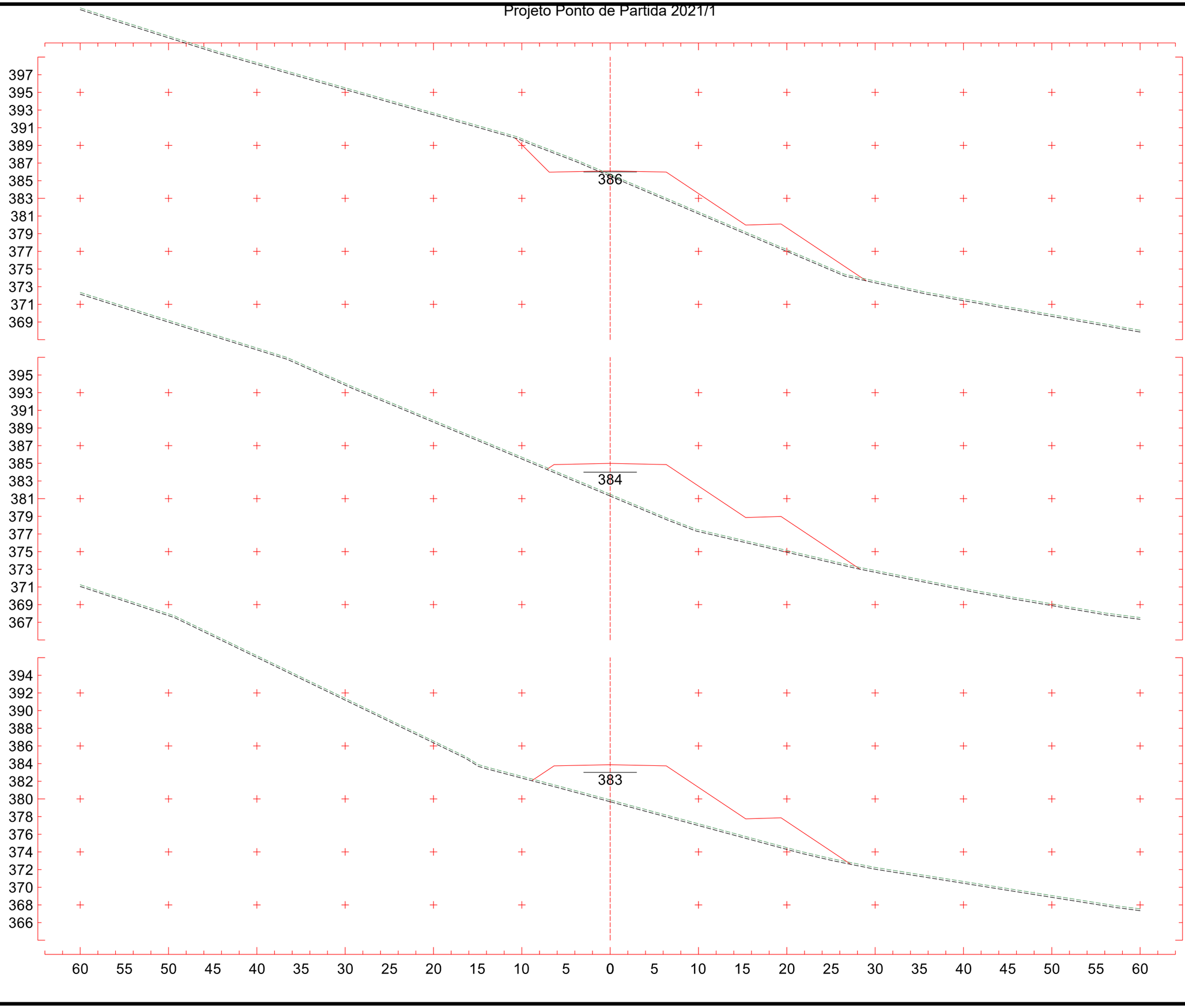


Projeto Ponto de Partida 2021/1

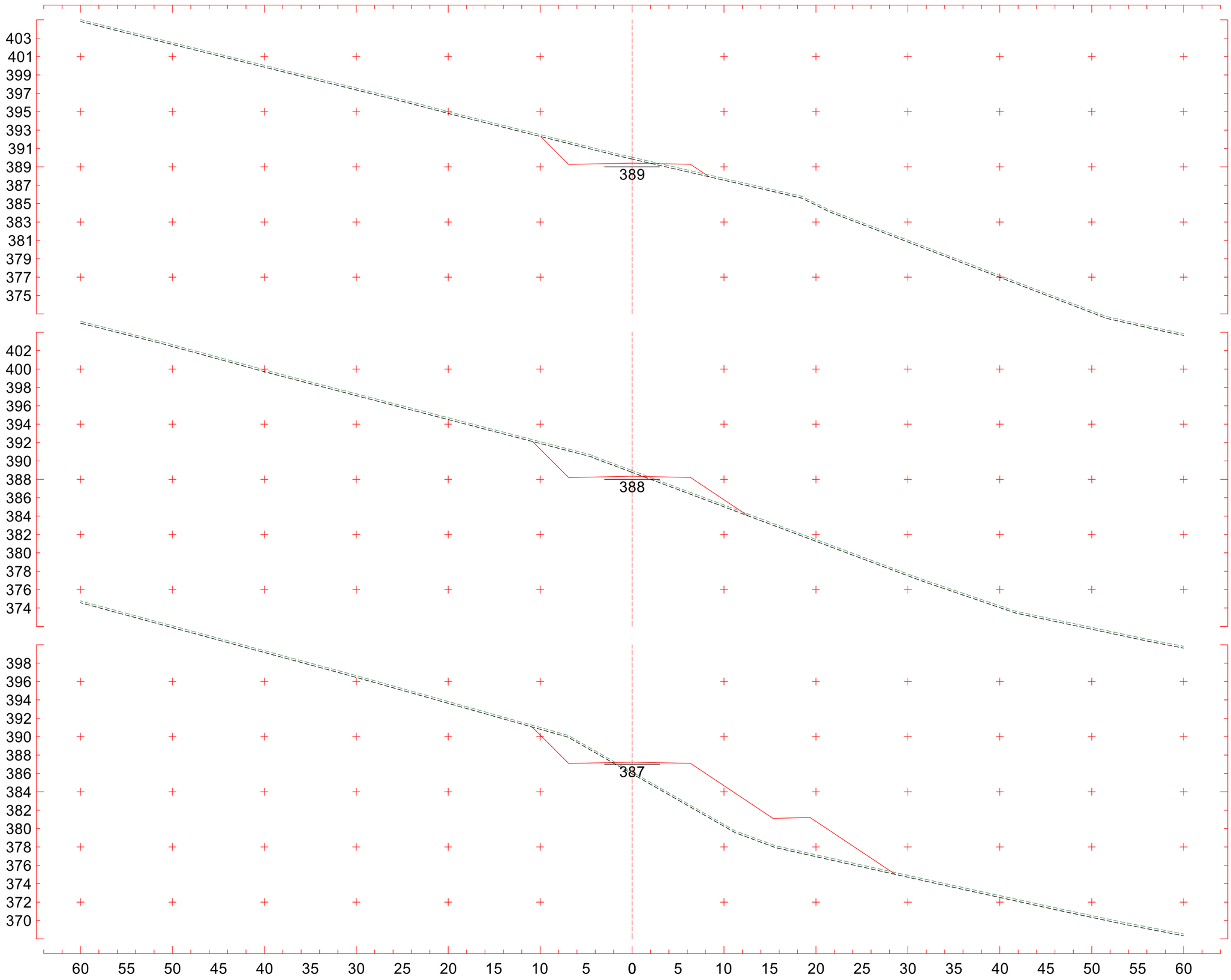


260

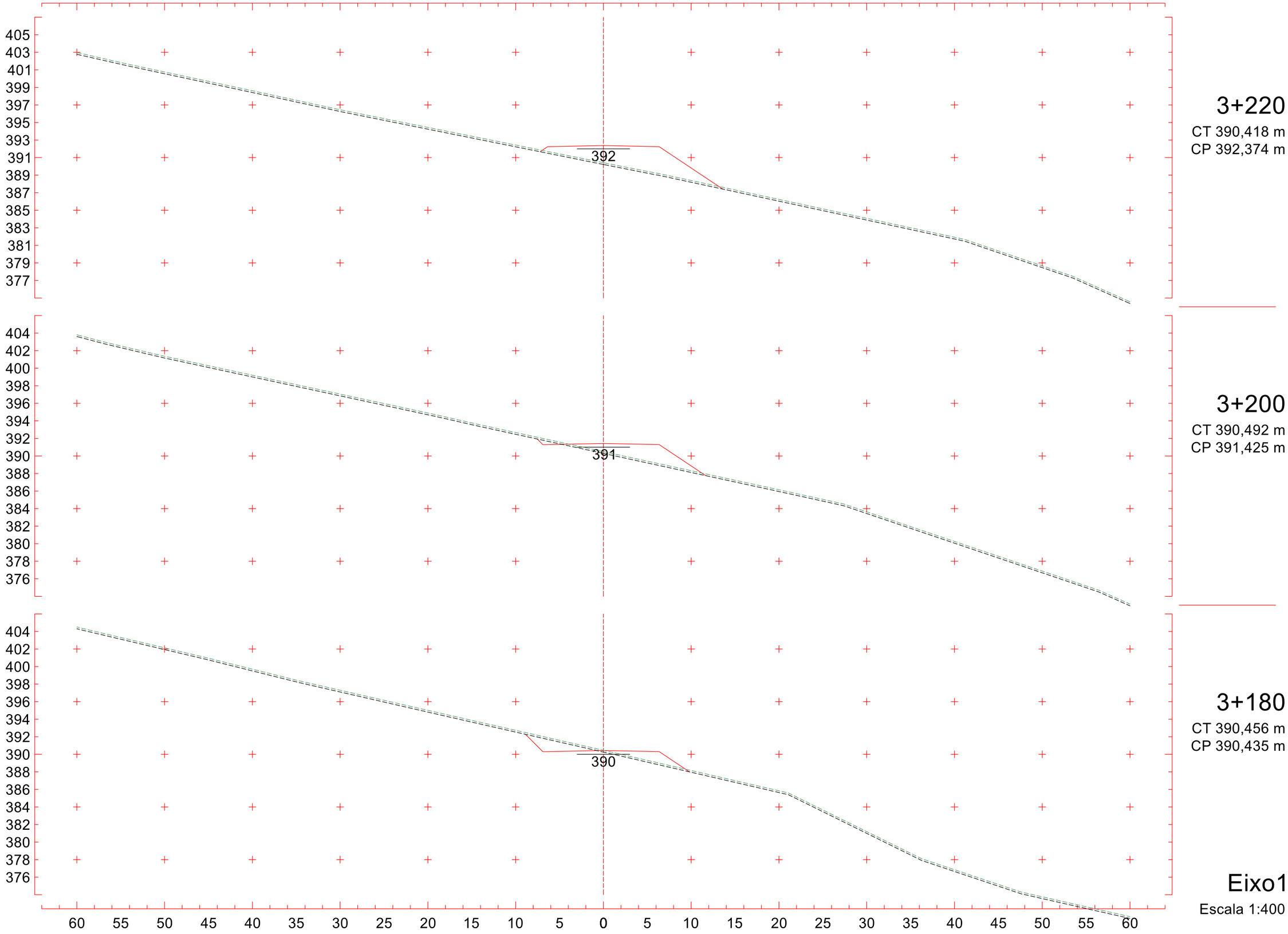
Projeto Ponto de Partida 2021/1



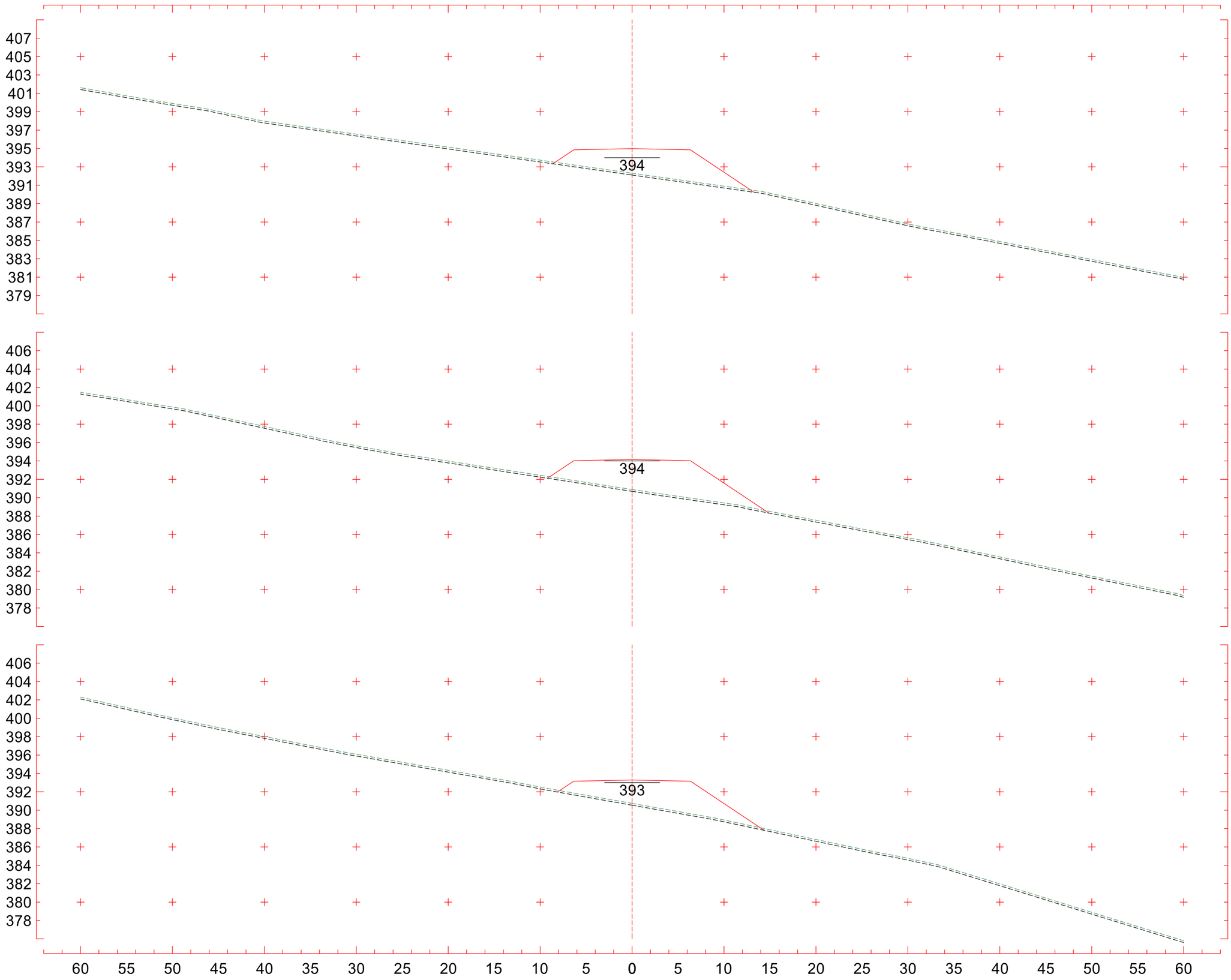
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



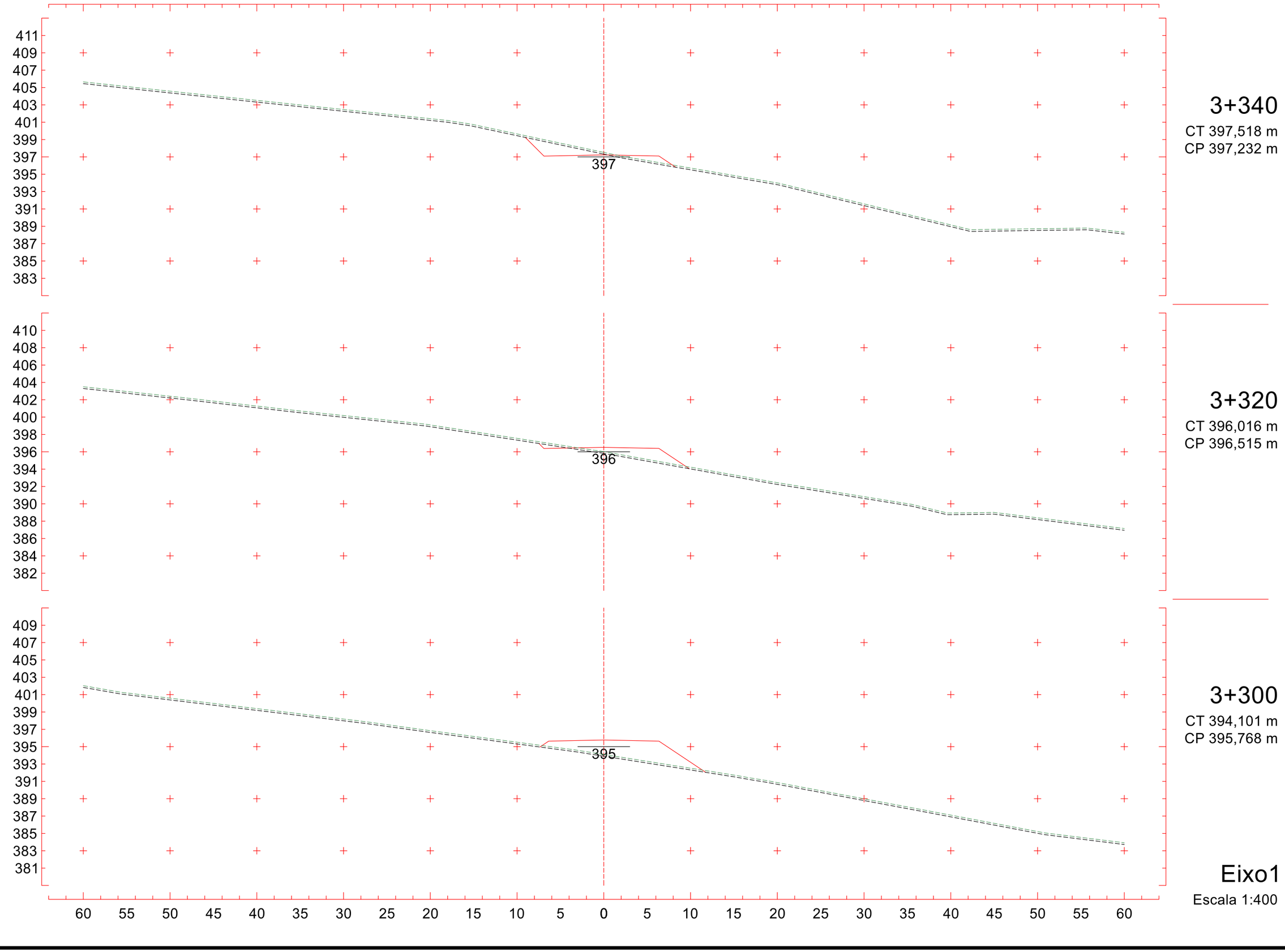
3+280
CT 392,310 m
CP 394,980 m

3+260
CT 390,894 m
CP 394,151 m

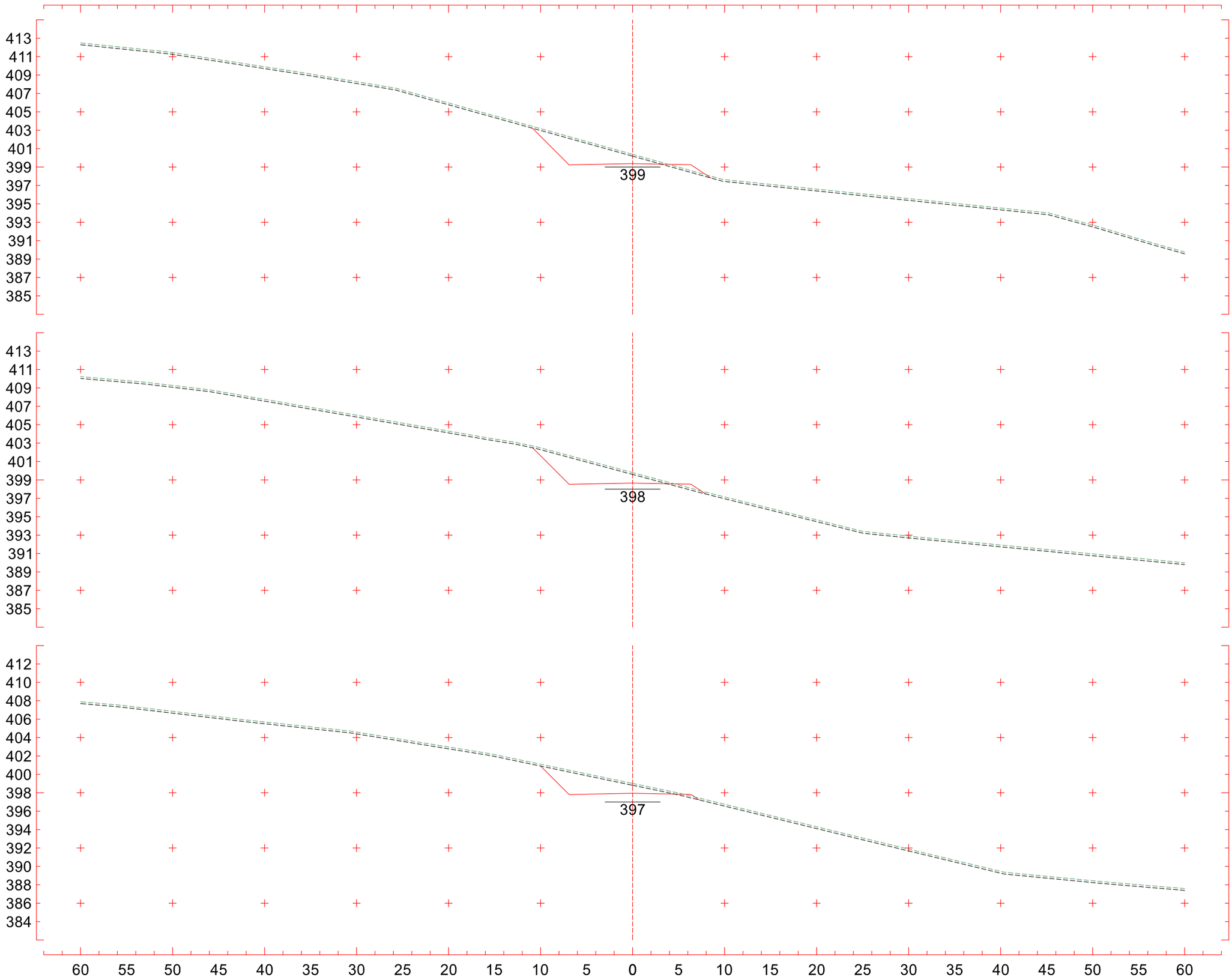
3+240
CT 390,742 m
CP 393,283 m

Eixo1
Escala 1:400

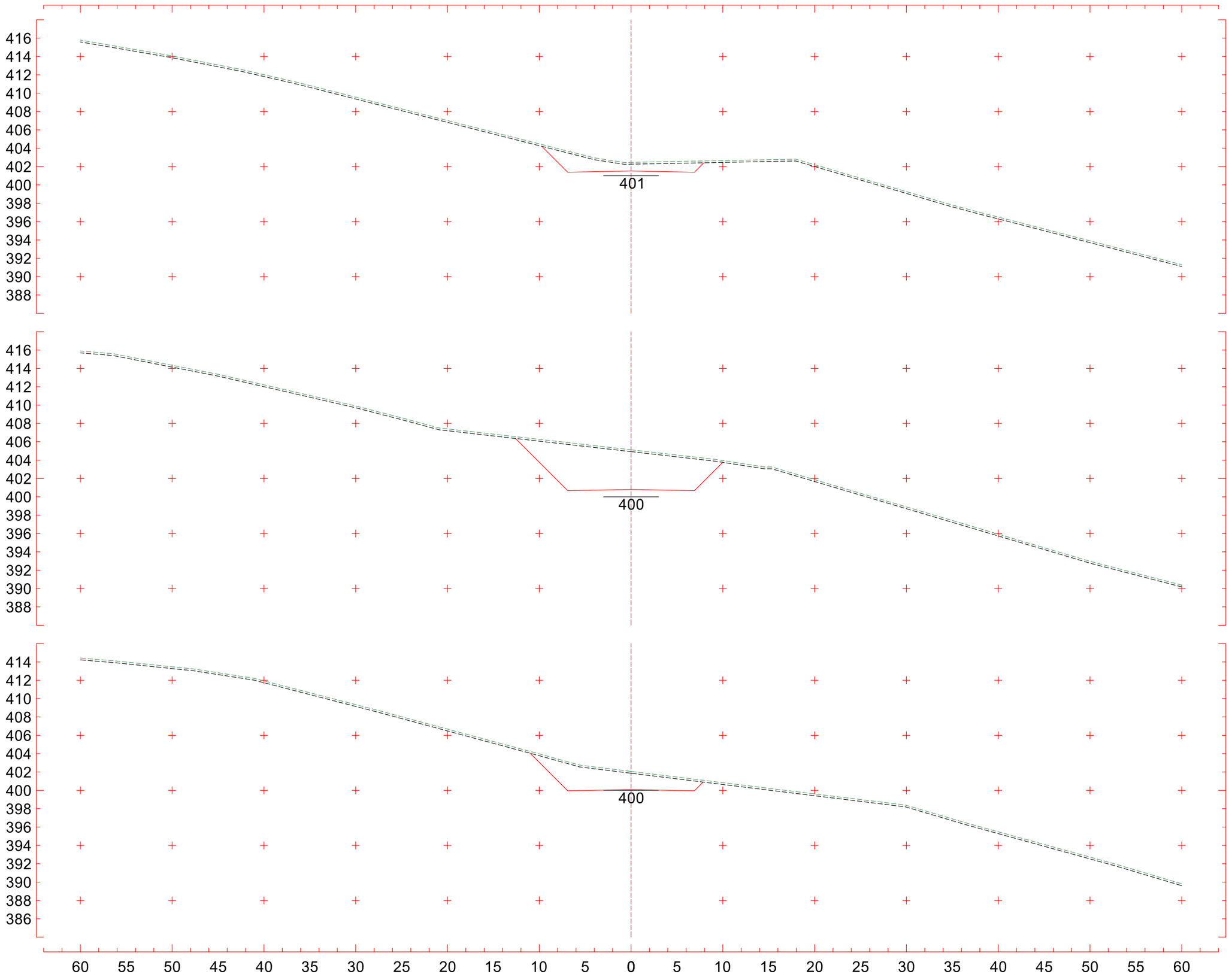
Projeto Ponto de Partida 2021/1



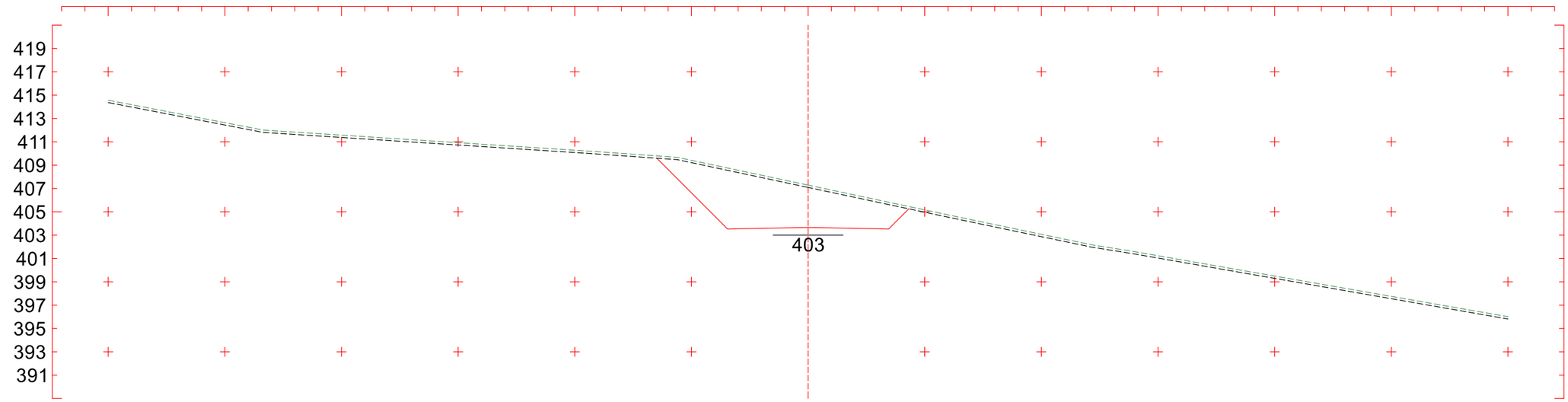
Projeto Ponto de Partida 2021/1



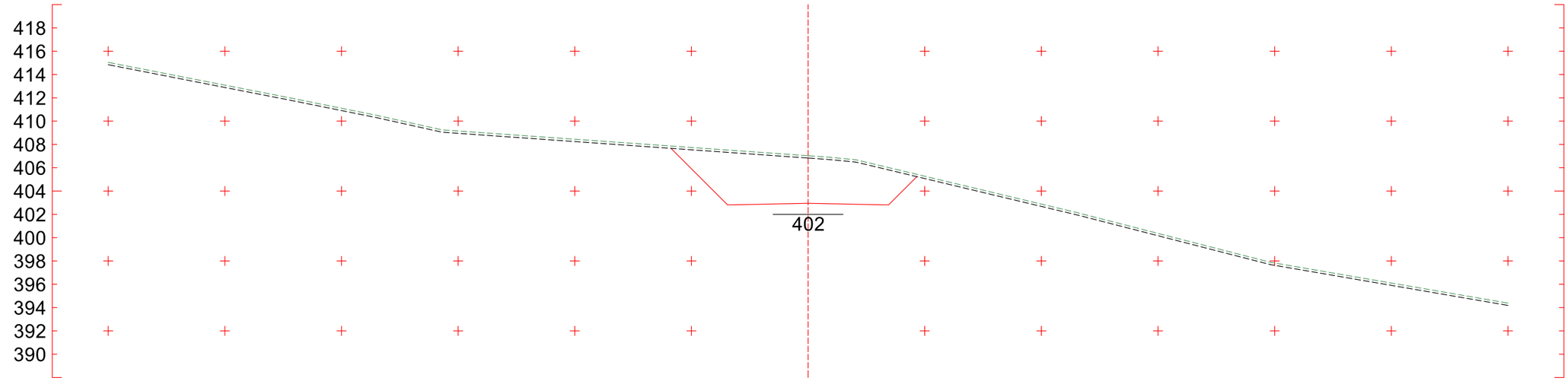
Projeto Ponto de Partida 2021/1



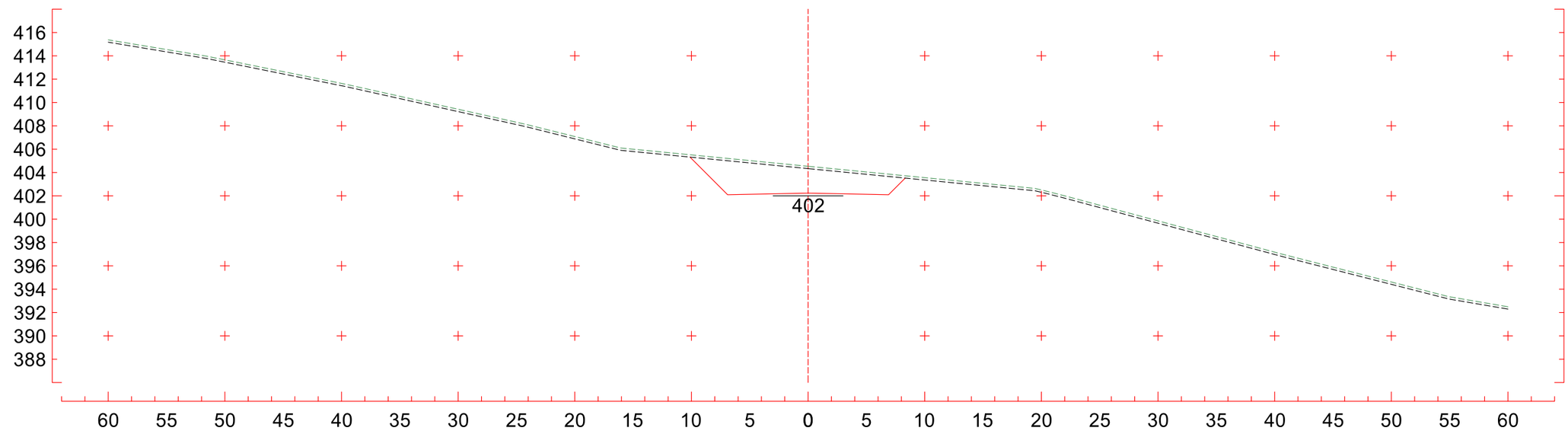
Projeto Ponto de Partida 2021/1



3+520
CT 407,291 m
CP 403,663 m



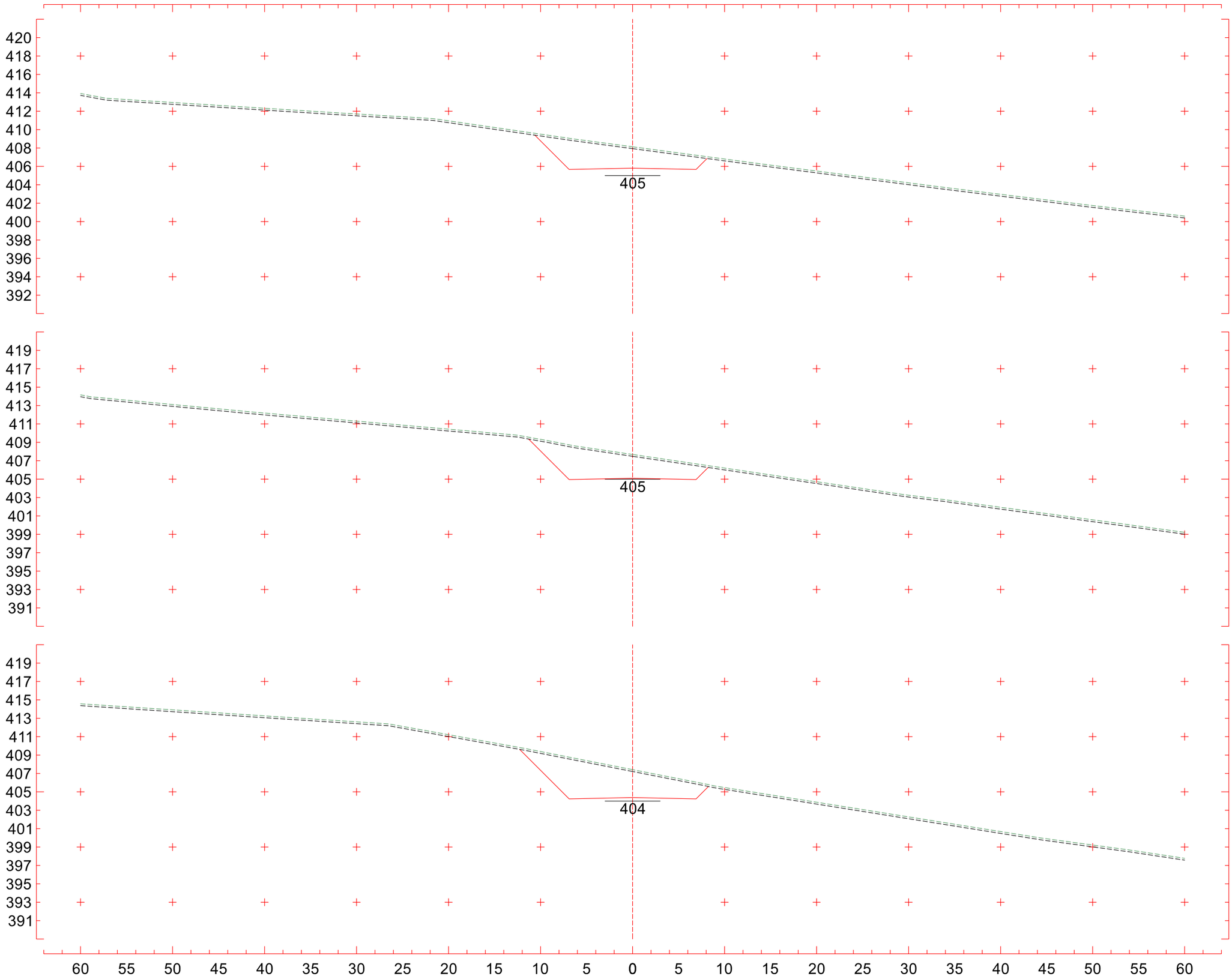
3+500
CT 407,032 m
CP 402,949 m



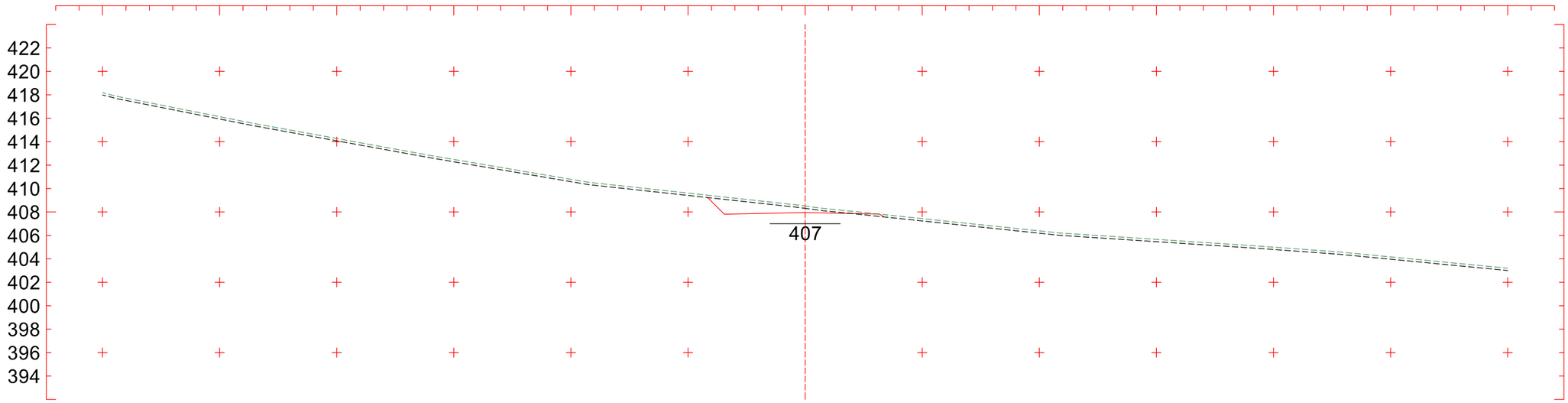
3+480
CT 404,535 m
CP 402,234 m

Eixo1
Escala 1:400

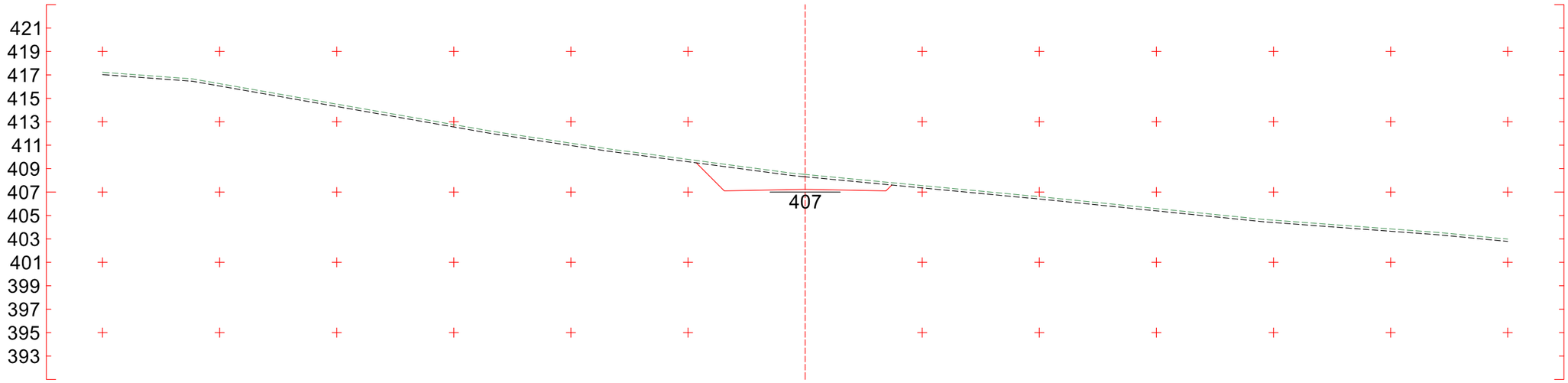
Projeto Ponto de Partida 2021/1



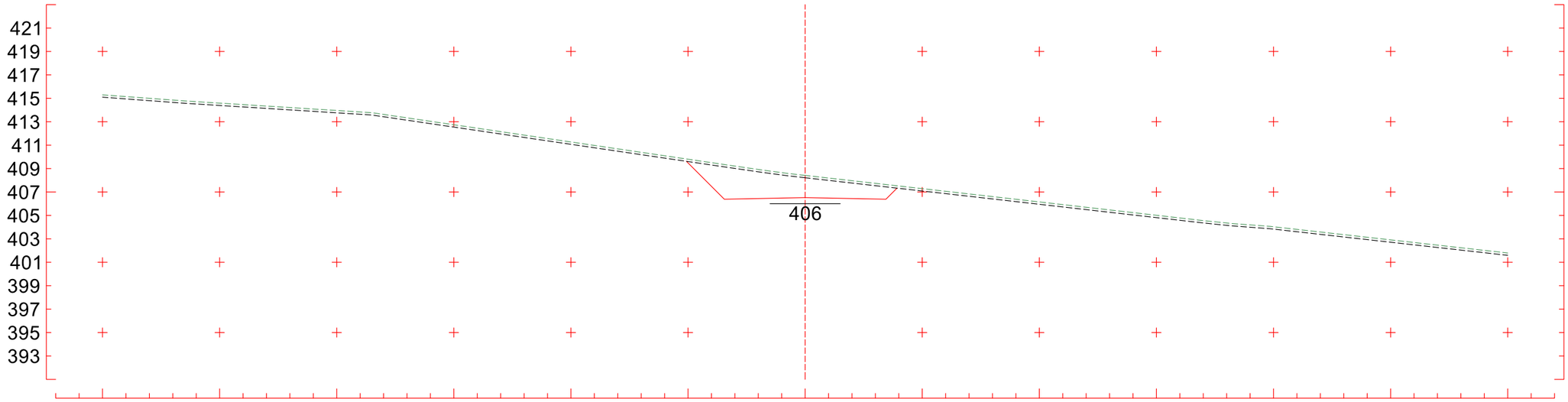
Projeto Ponto de Partida 2021/1



3+640
CT 408,509 m
CP 407,951 m



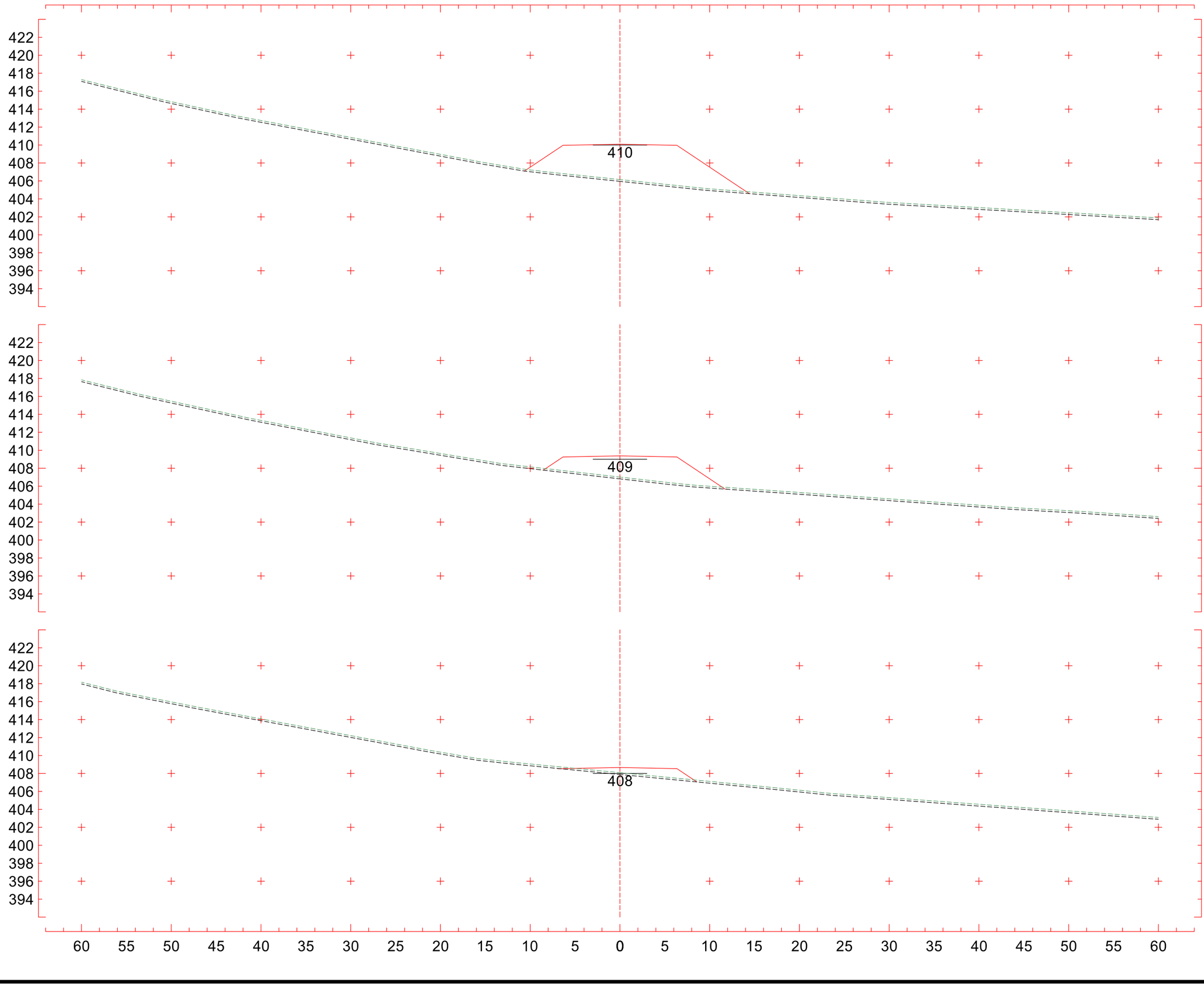
3+620
CT 408,503 m
CP 407,236 m



3+600
CT 408,418 m
CP 406,522 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



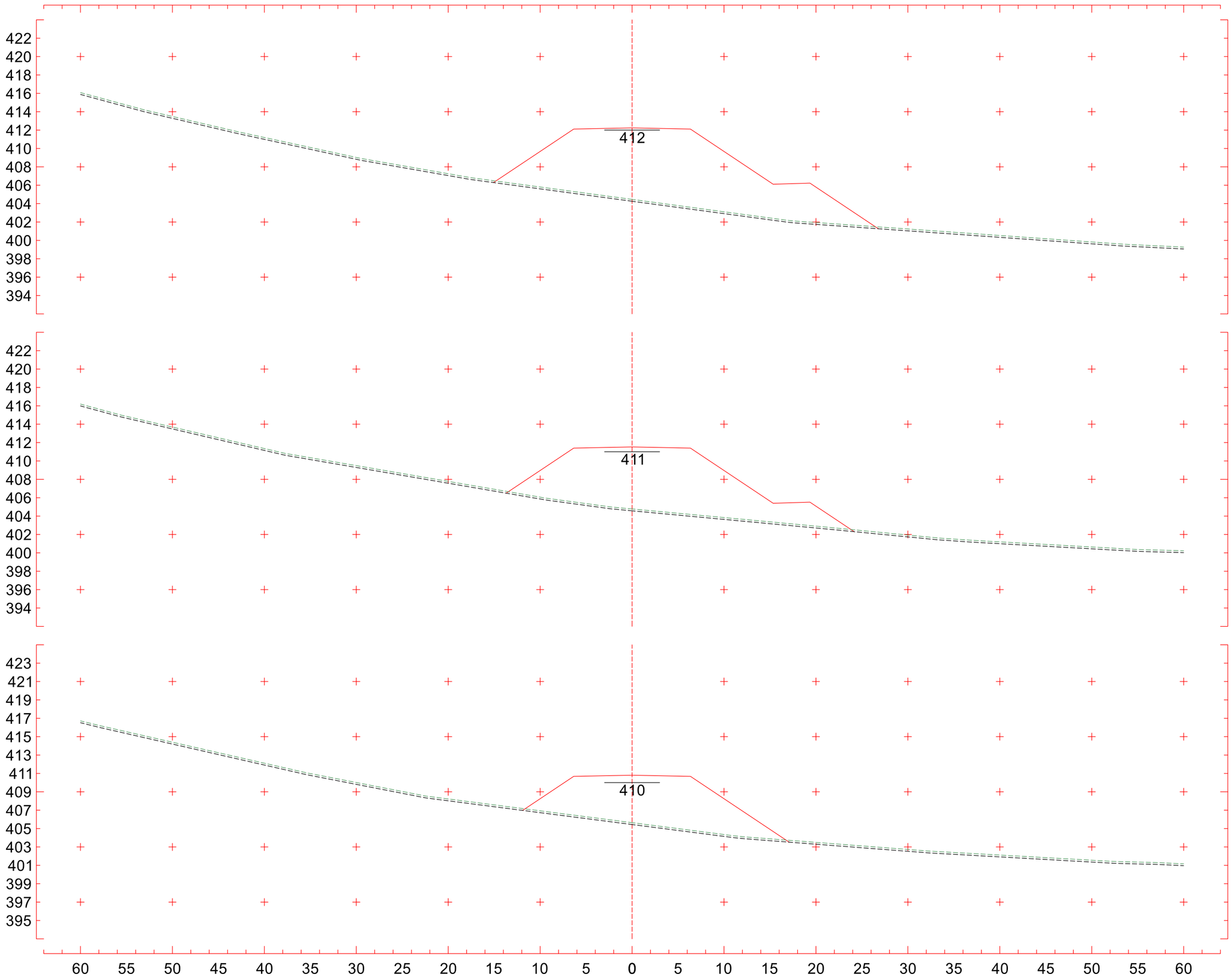
3+700
CT 406,154 m
CP 410,095 m

3+680
CT 407,015 m
CP 409,380 m

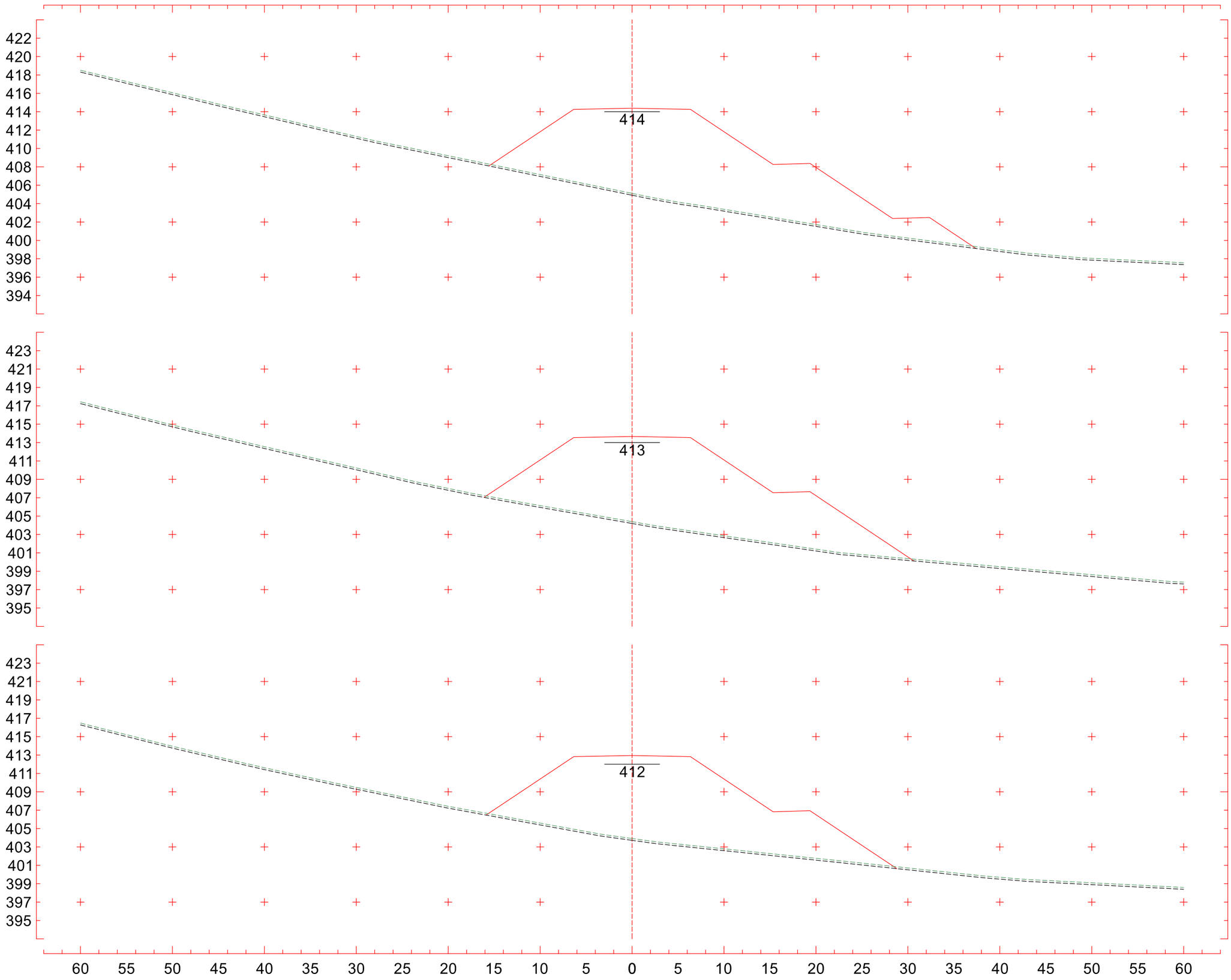
3+660
CT 408,086 m
CP 408,665 m

Eixo1
Escala 1:400

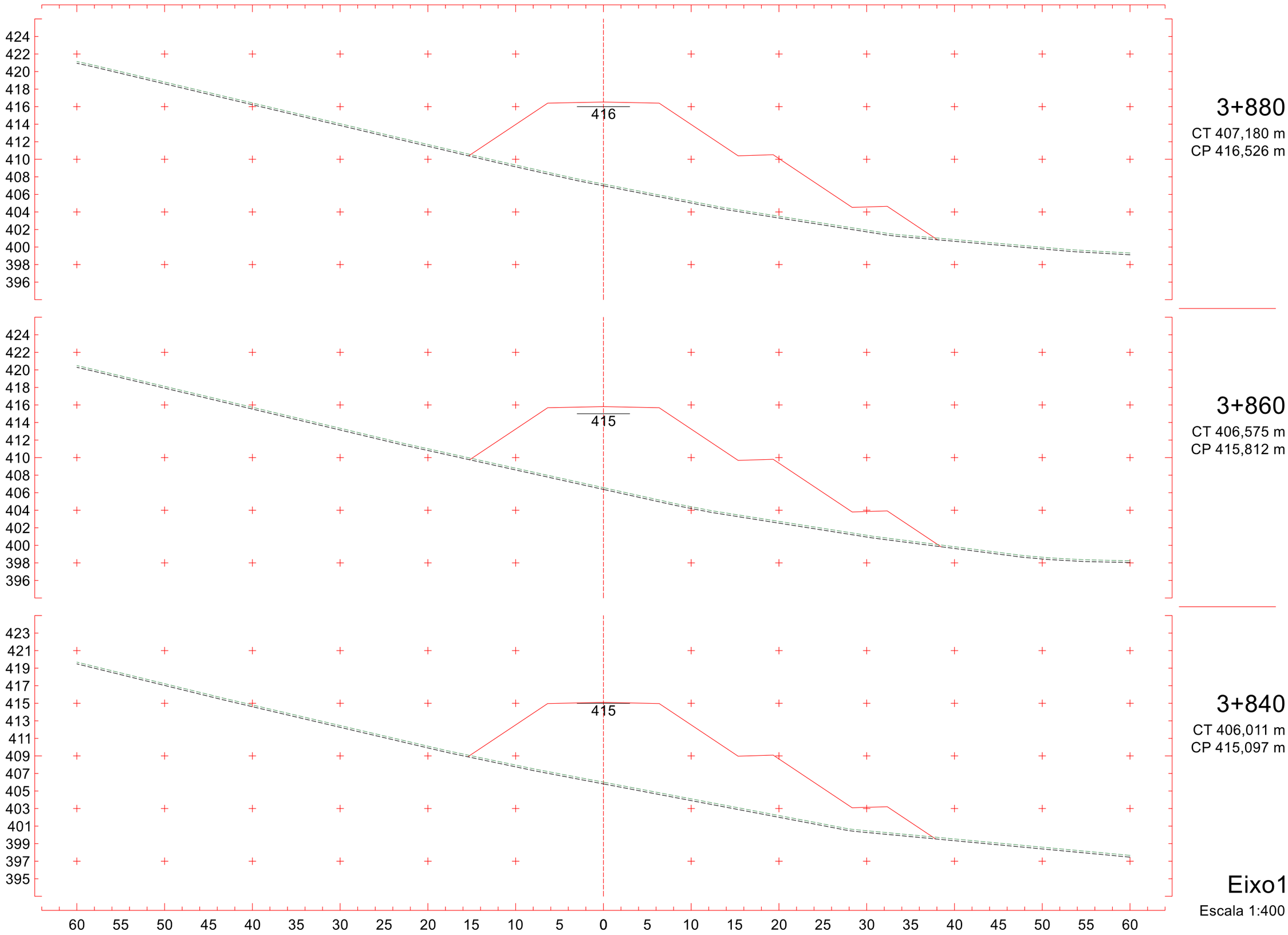
Projeto Ponto de Partida 2021/1



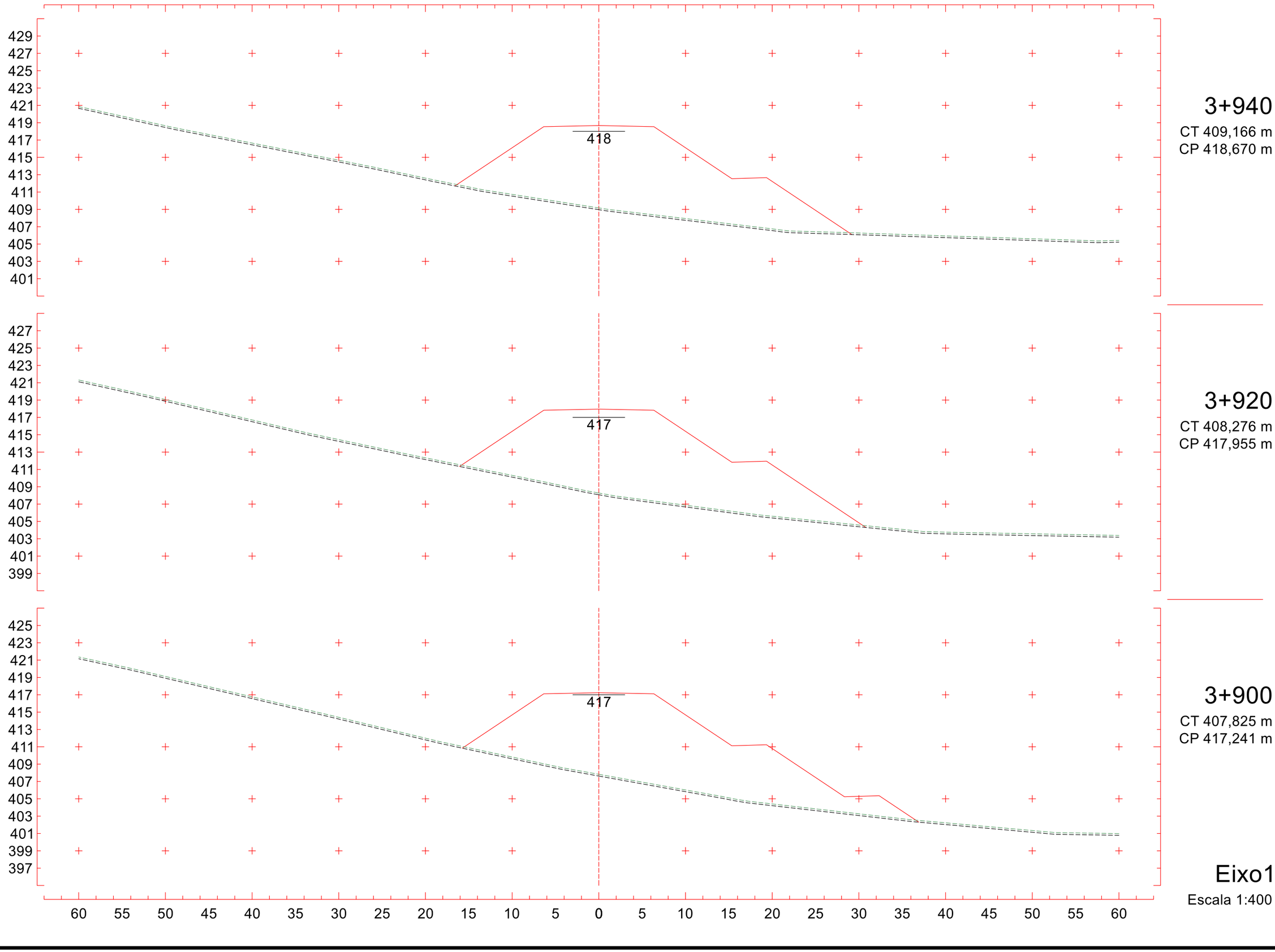
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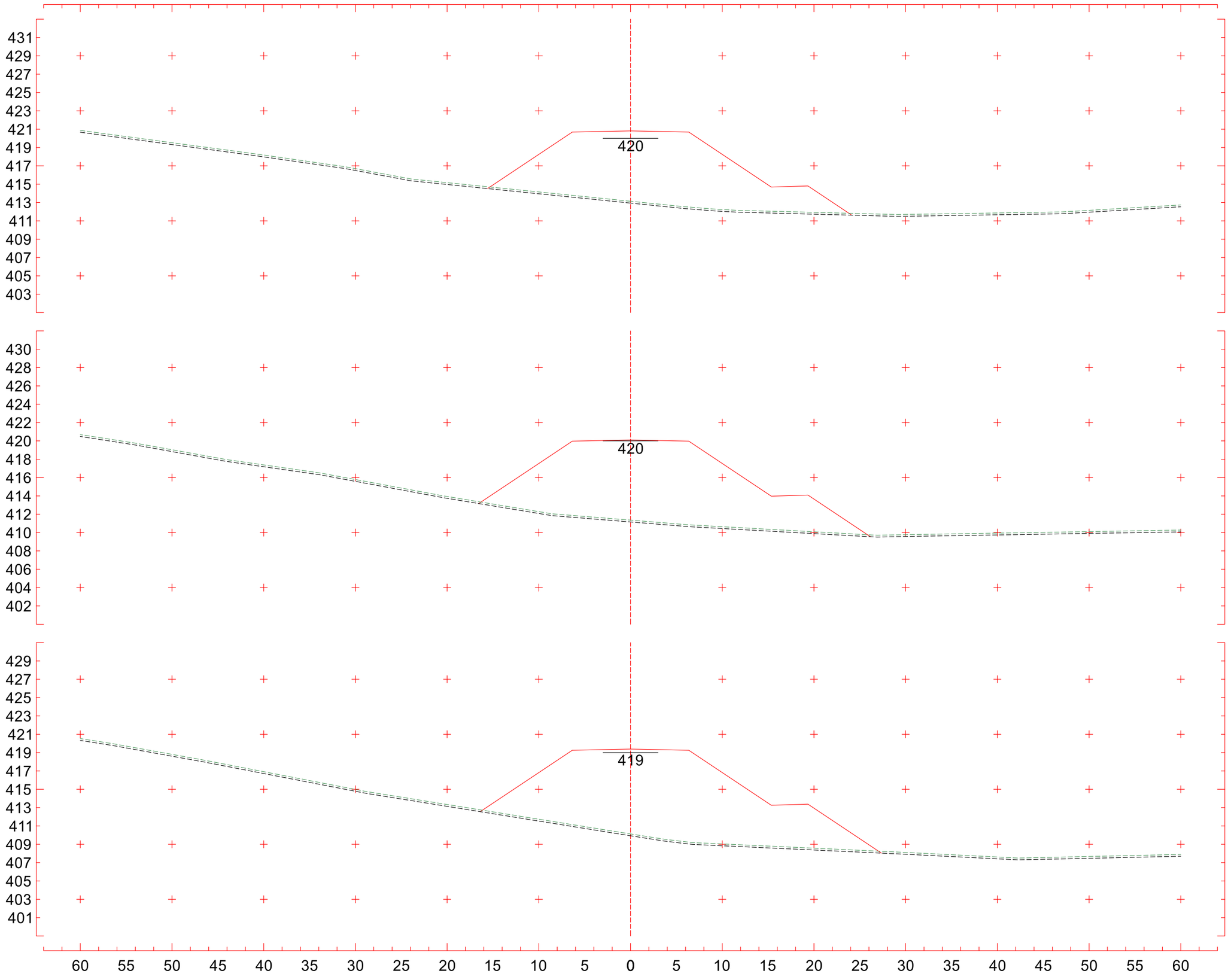
Projeto Ponto de Partida 2021/1



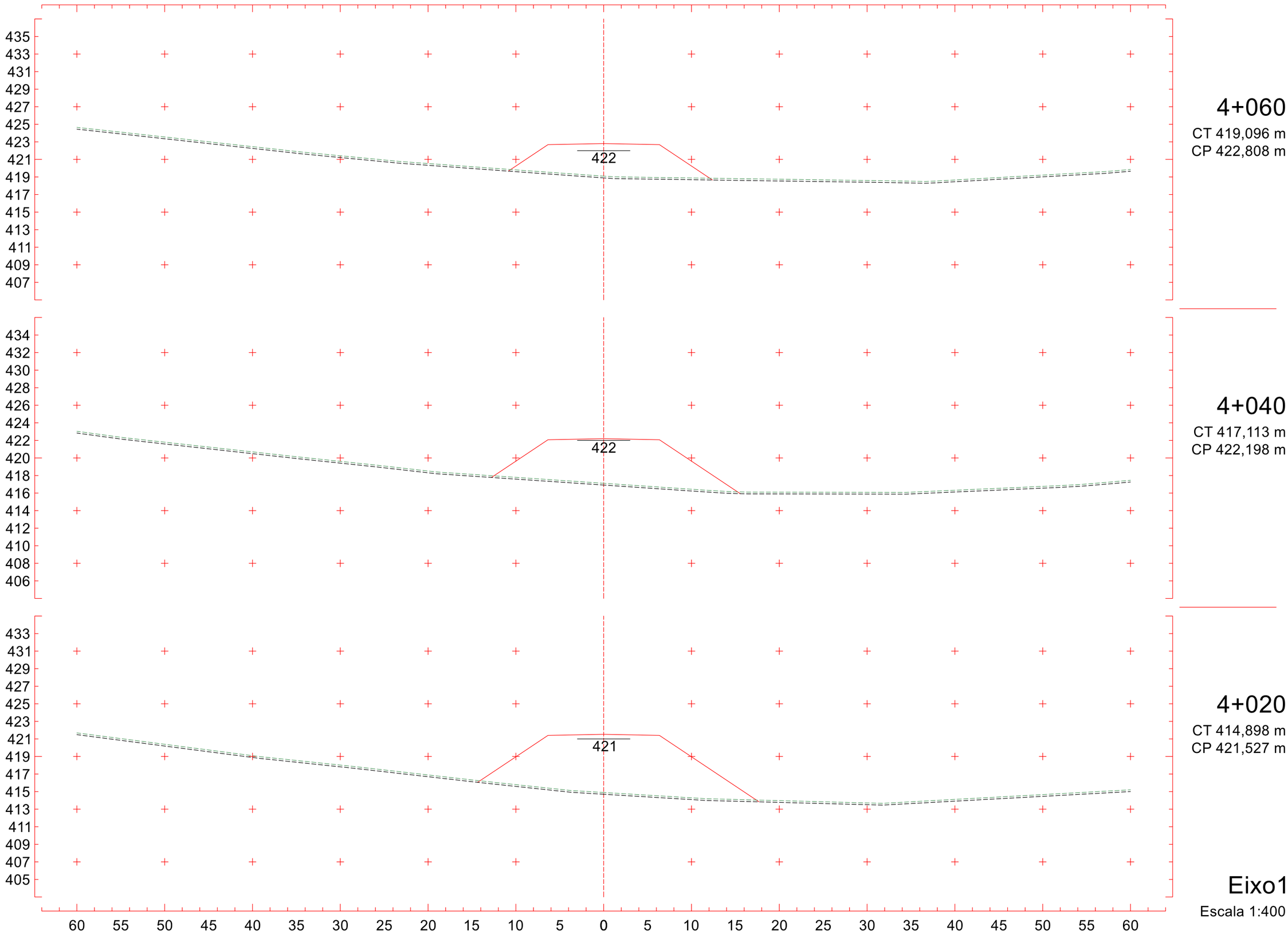
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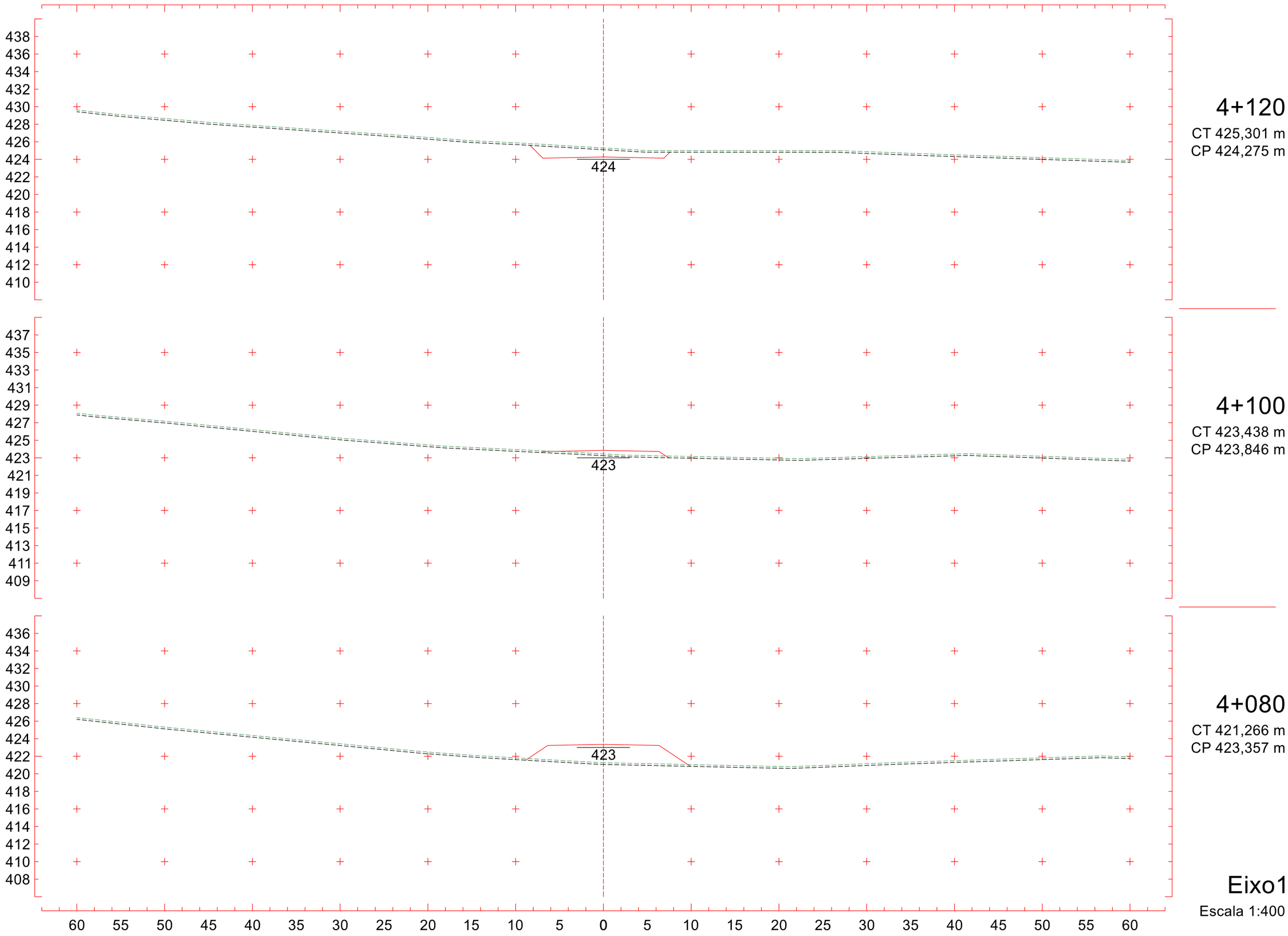
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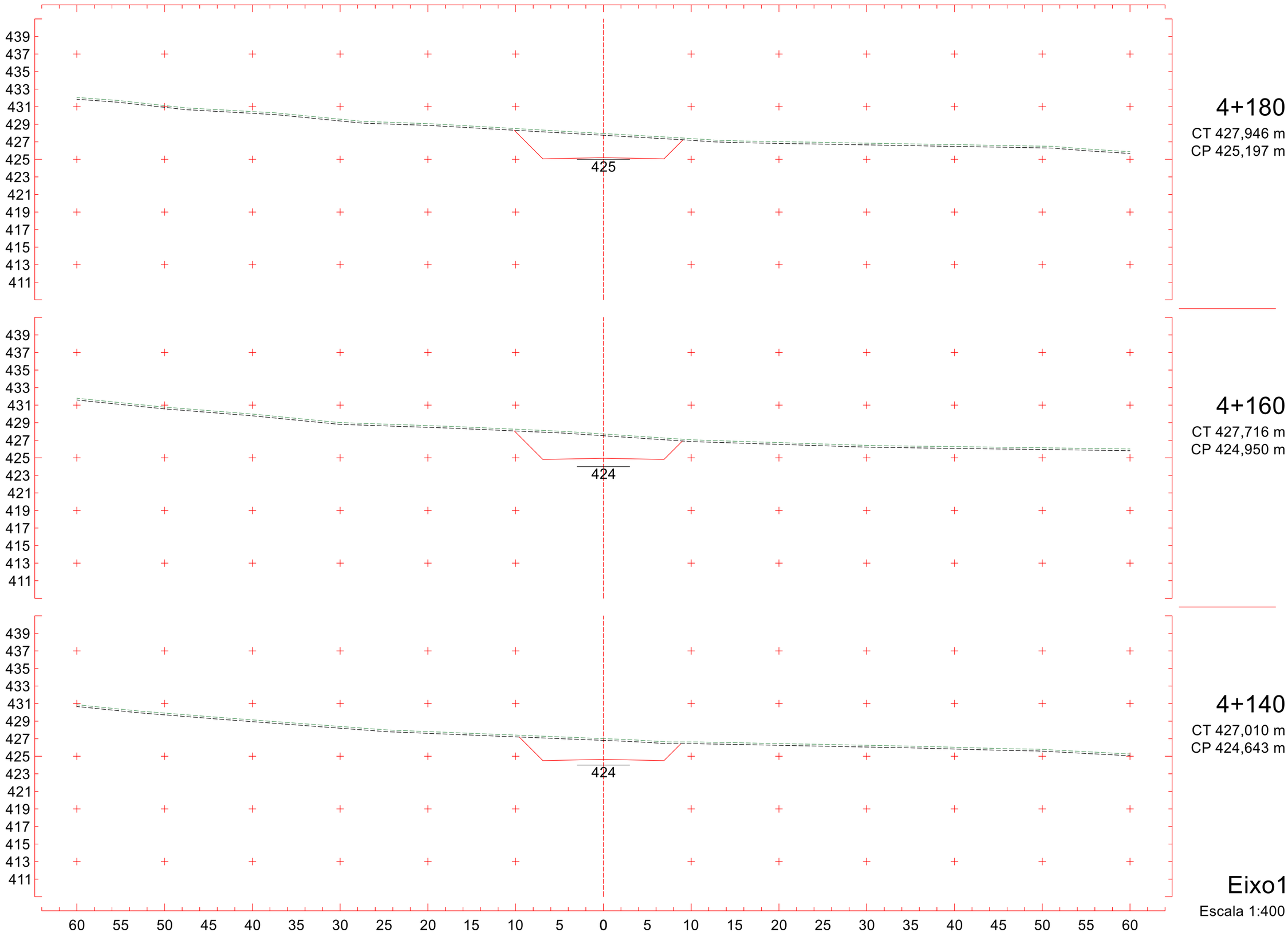
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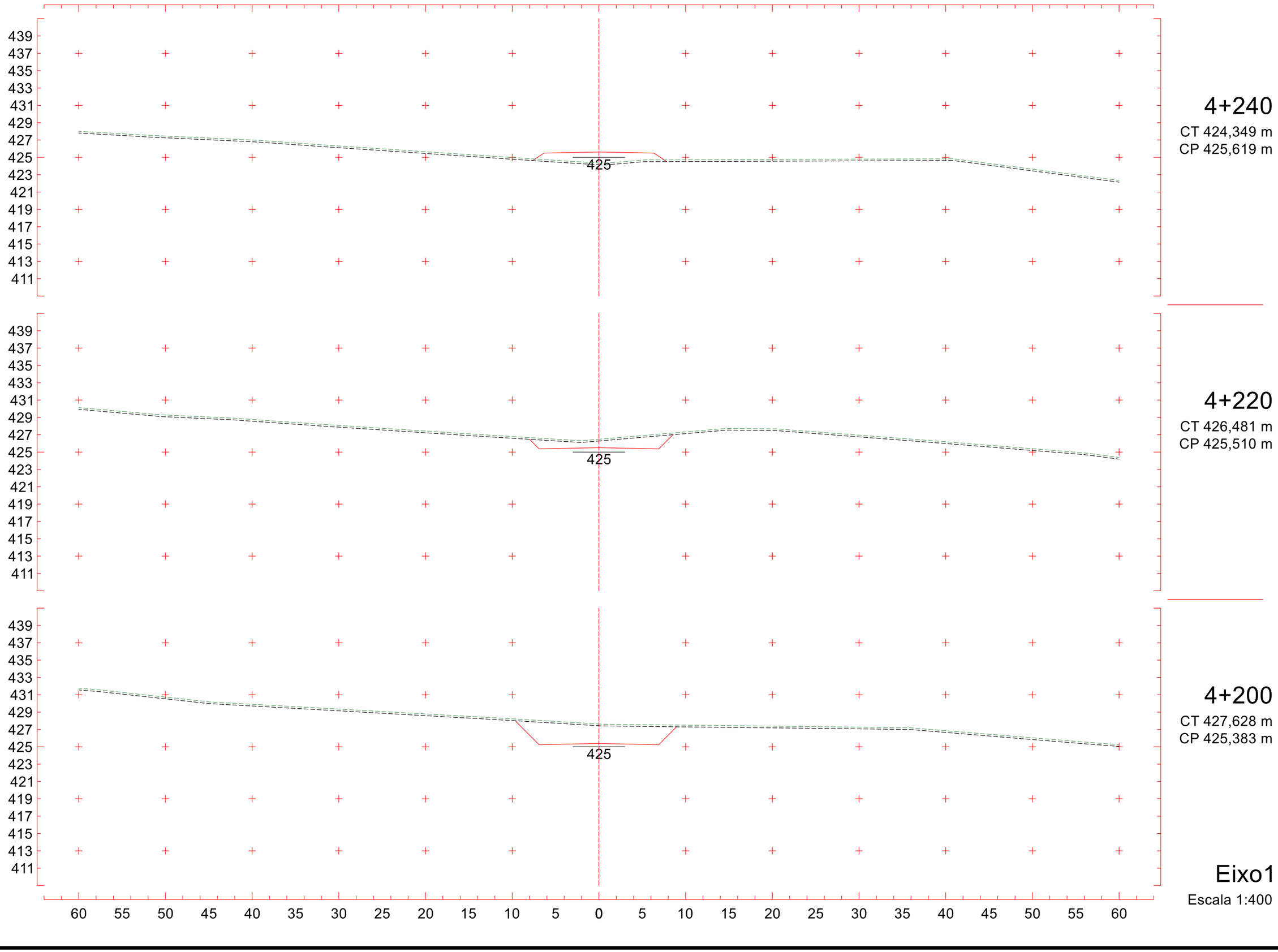
Projeto Ponto de Partida 2021/1



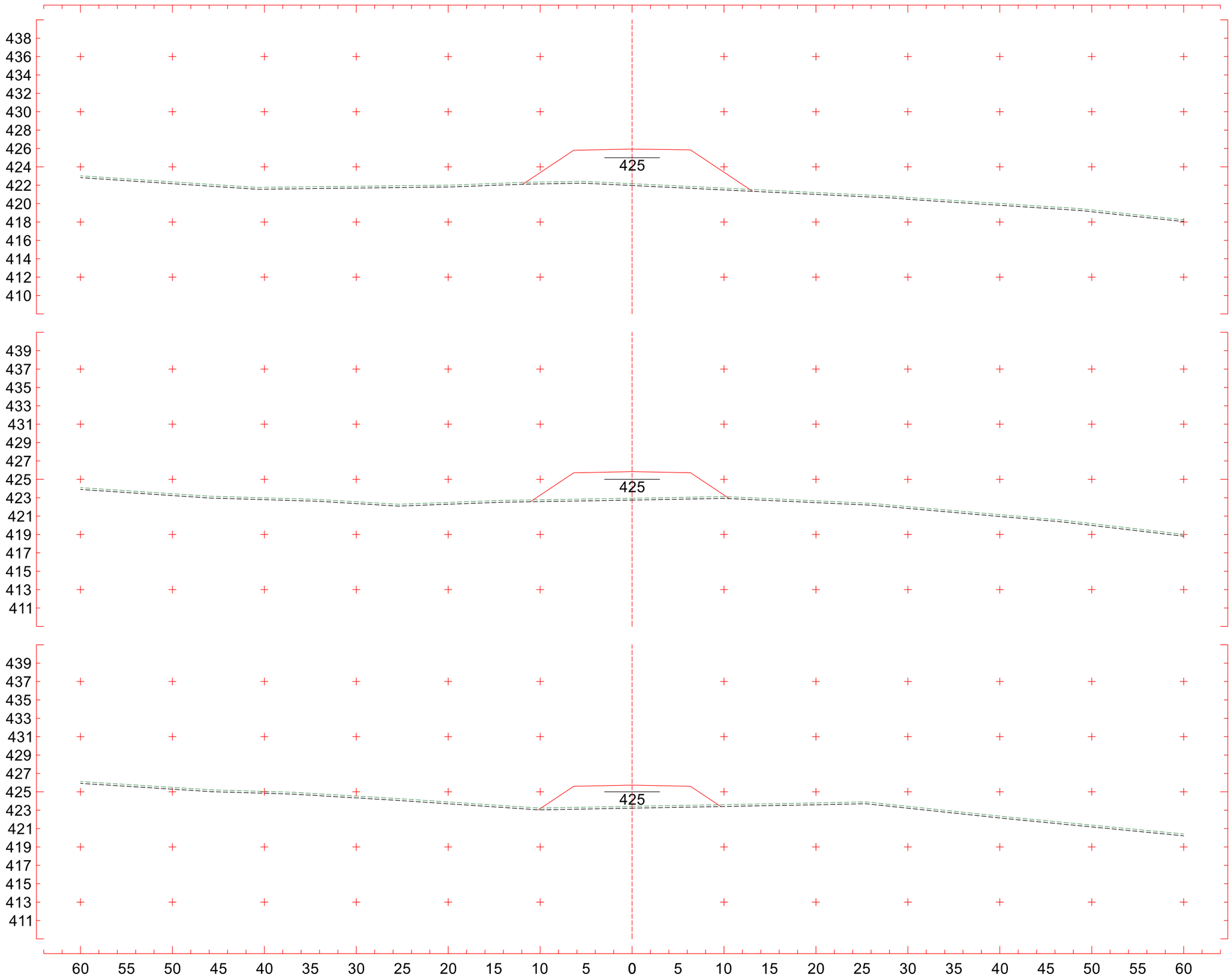
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



4+300

CT 422,171 m
CP 425,933 m

4+280

CT 422,941 m
CP 425,837 m

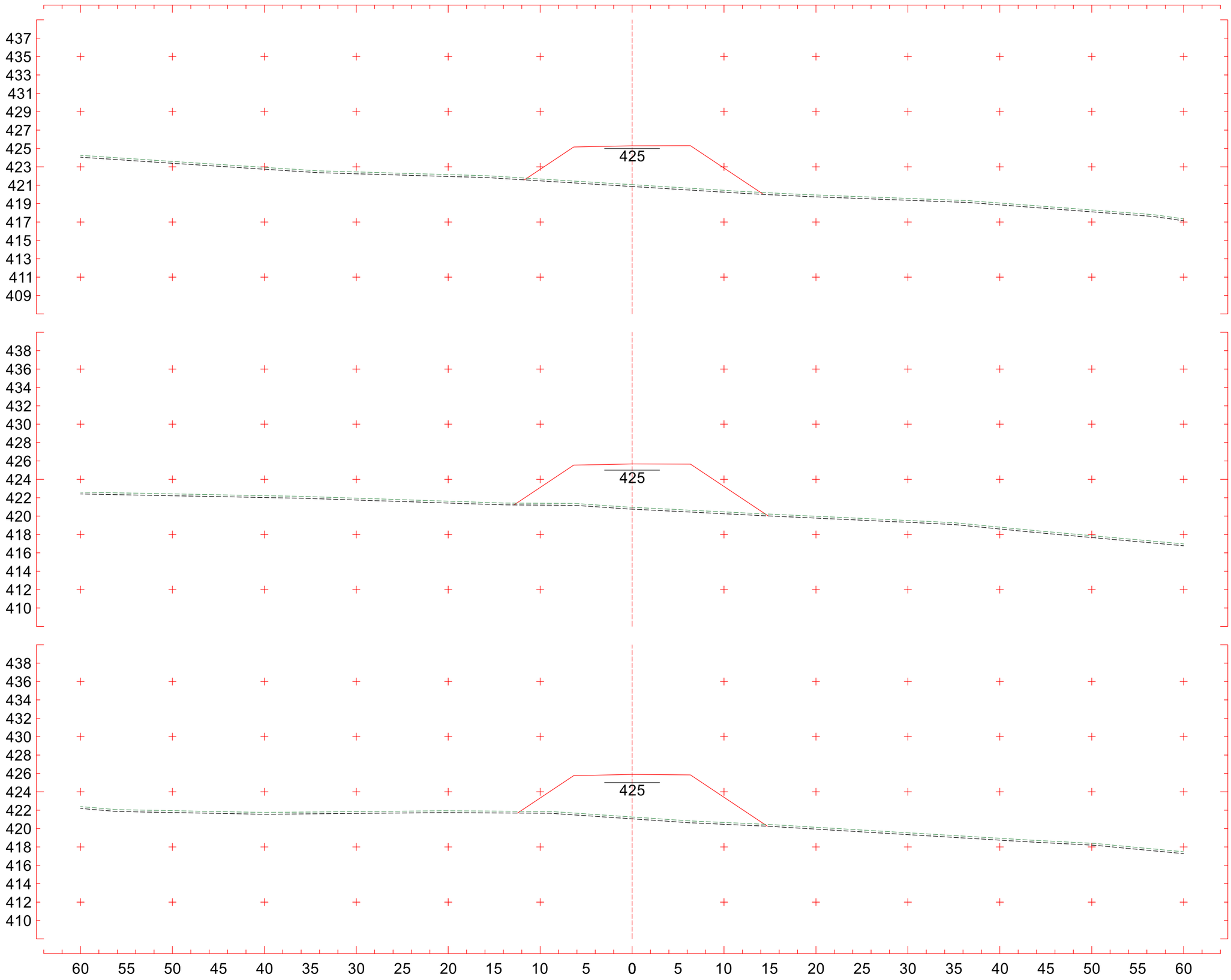
4+260

CT 423,420 m
CP 425,728 m

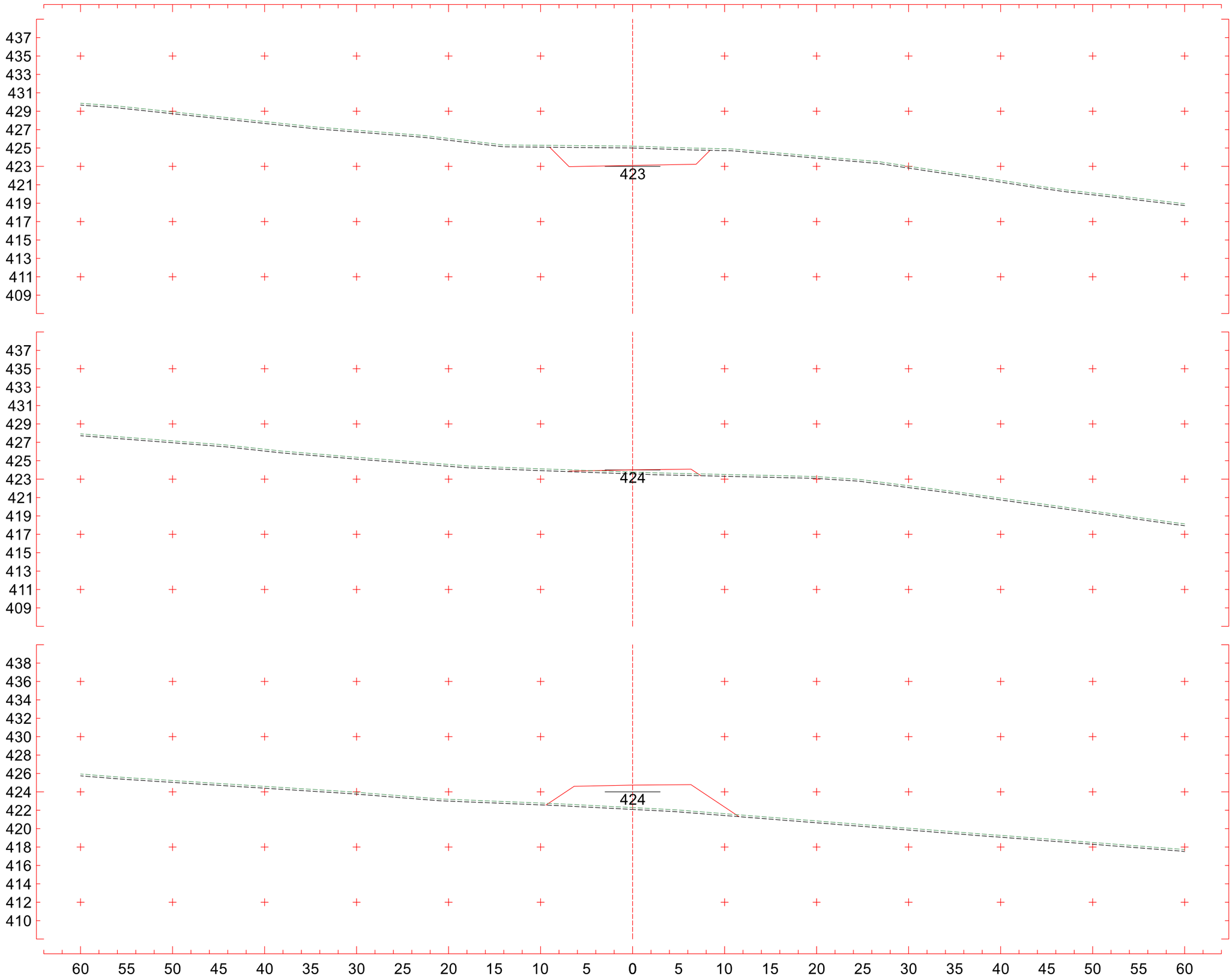
Eixo1

Escala 1:400

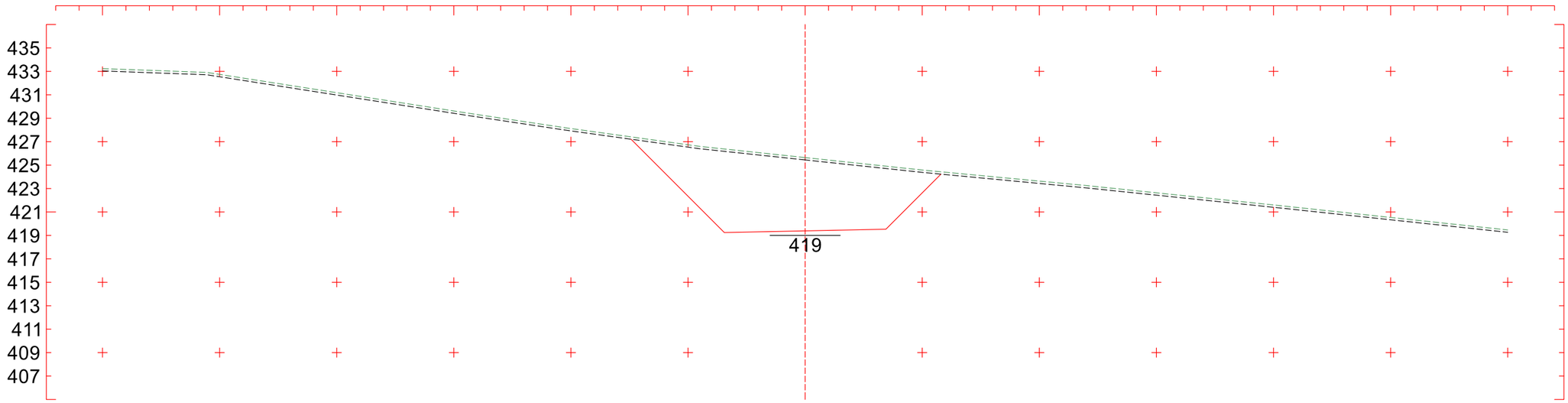
Projeto Ponto de Partida 2021/1



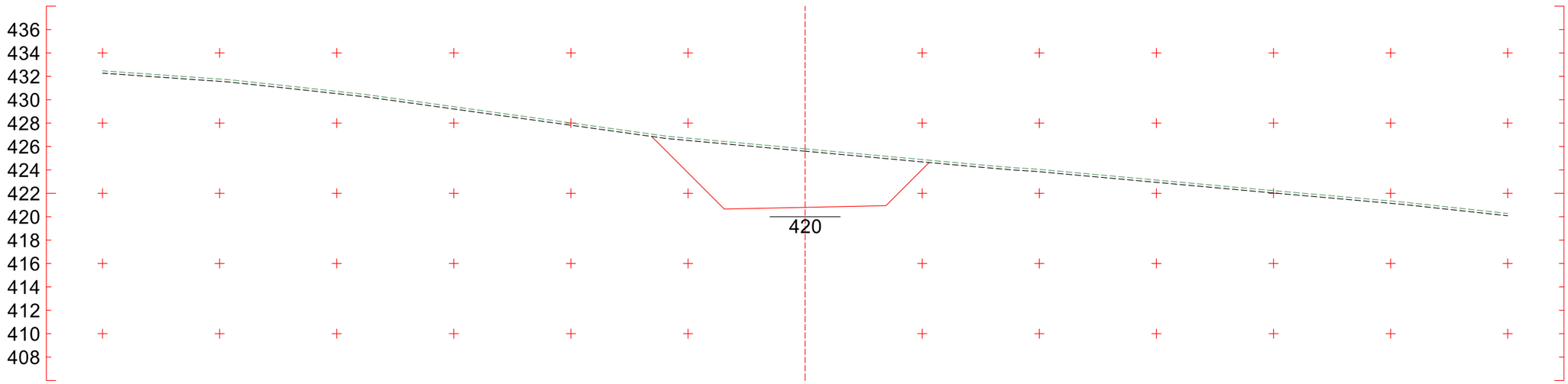
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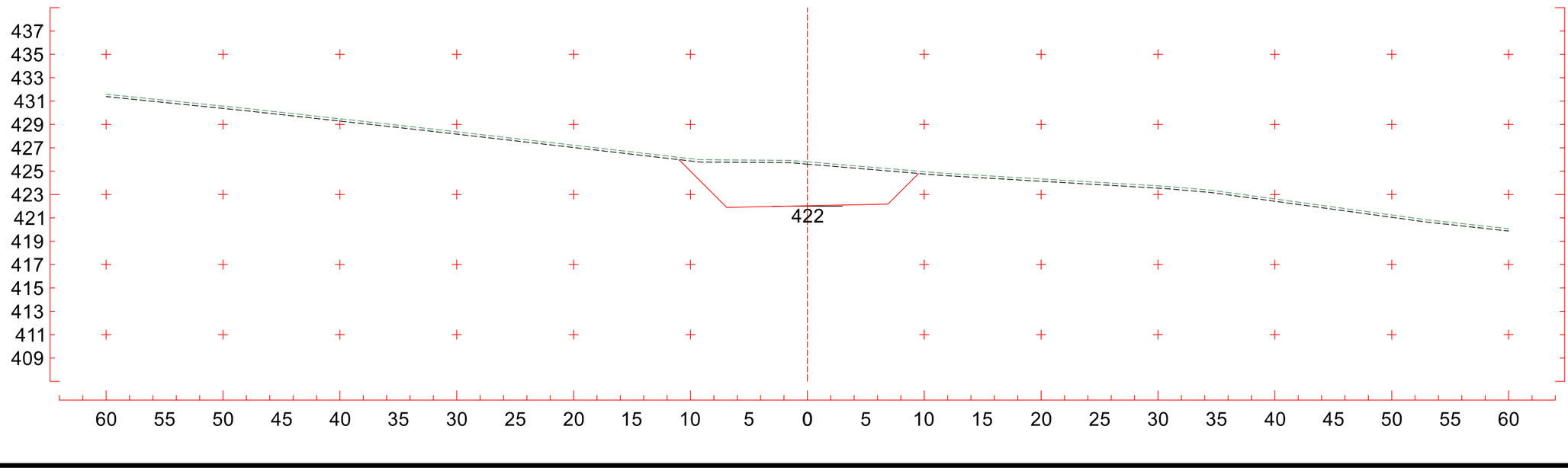
Projeto Ponto de Partida 2021/1



4+480
CT 425,643 m
CP 419,388 m



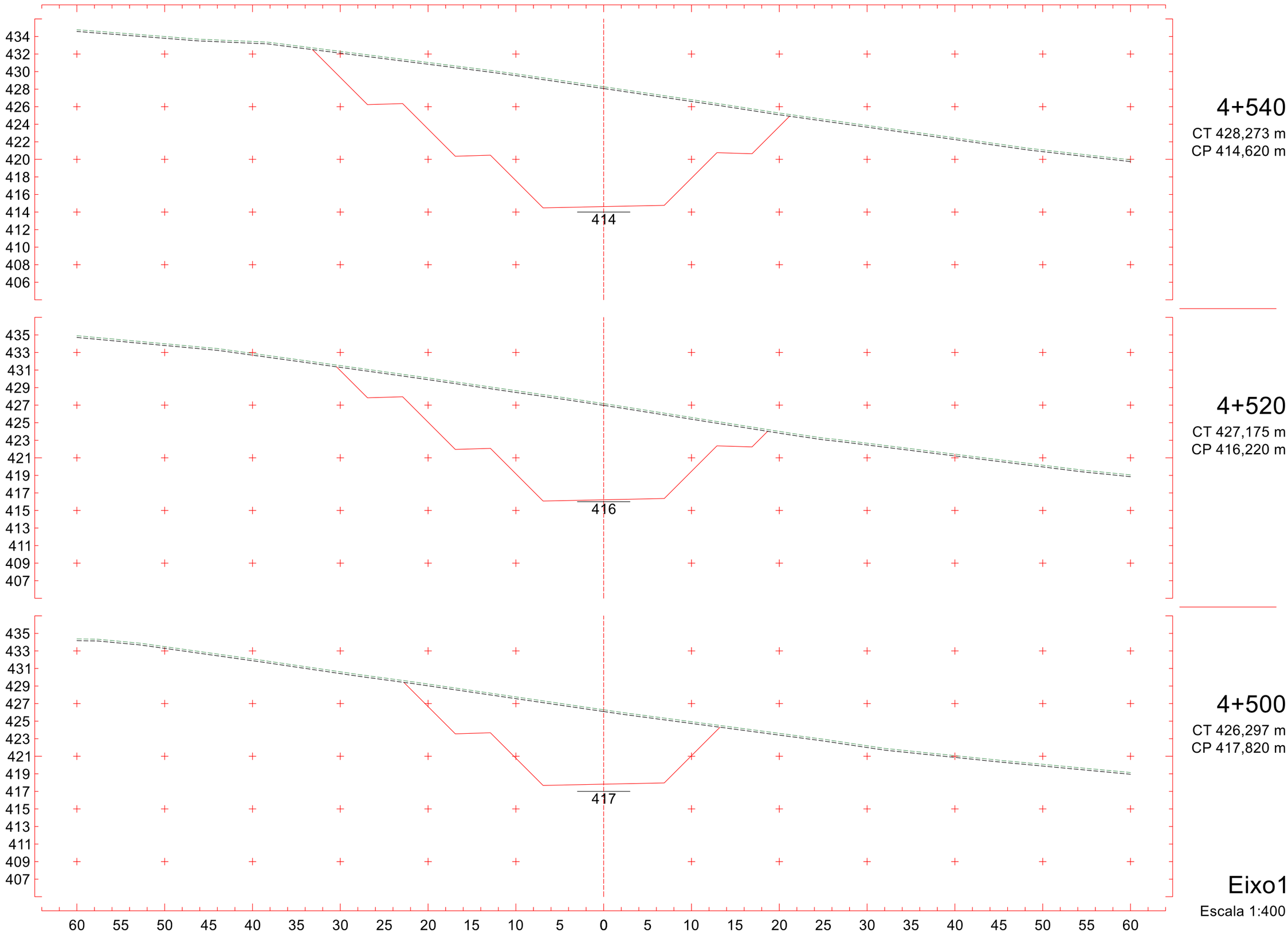
4+460
CT 425,801 m
CP 420,799 m



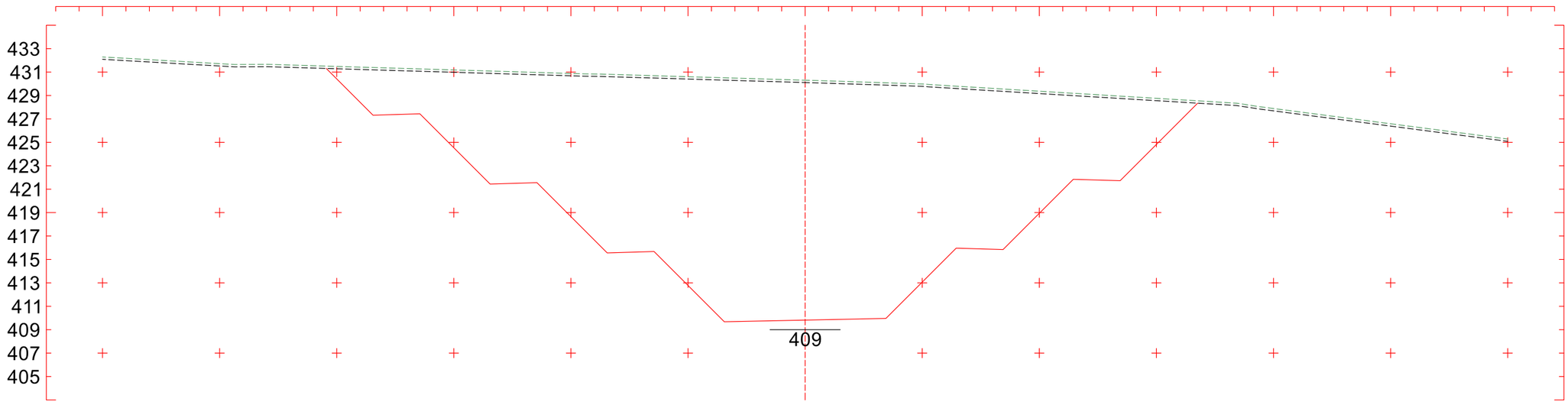
4+440
CT 425,801 m
CP 422,039 m

Eixo1
Escala 1:400

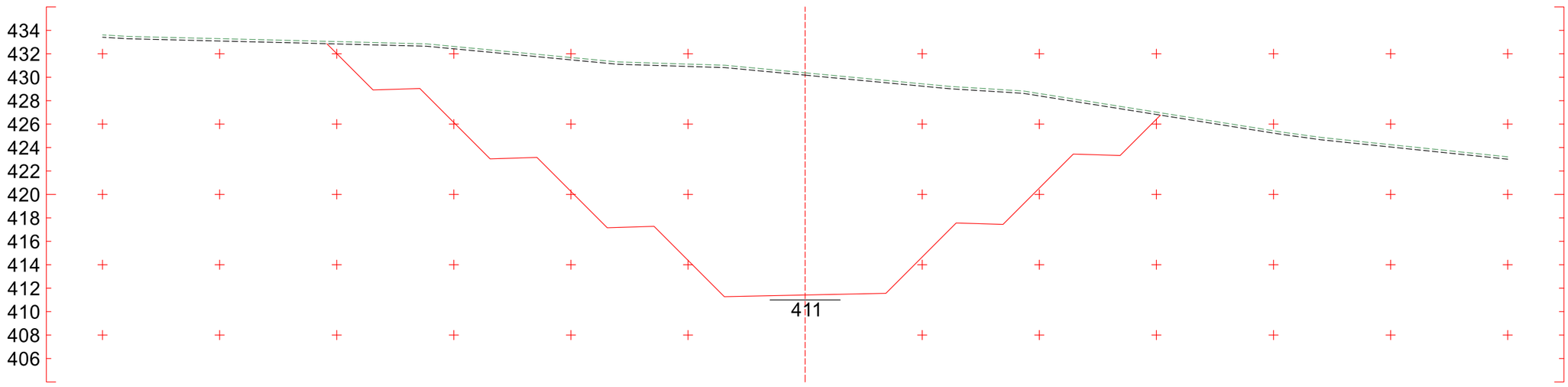
Projeto Ponto de Partida 2021/1



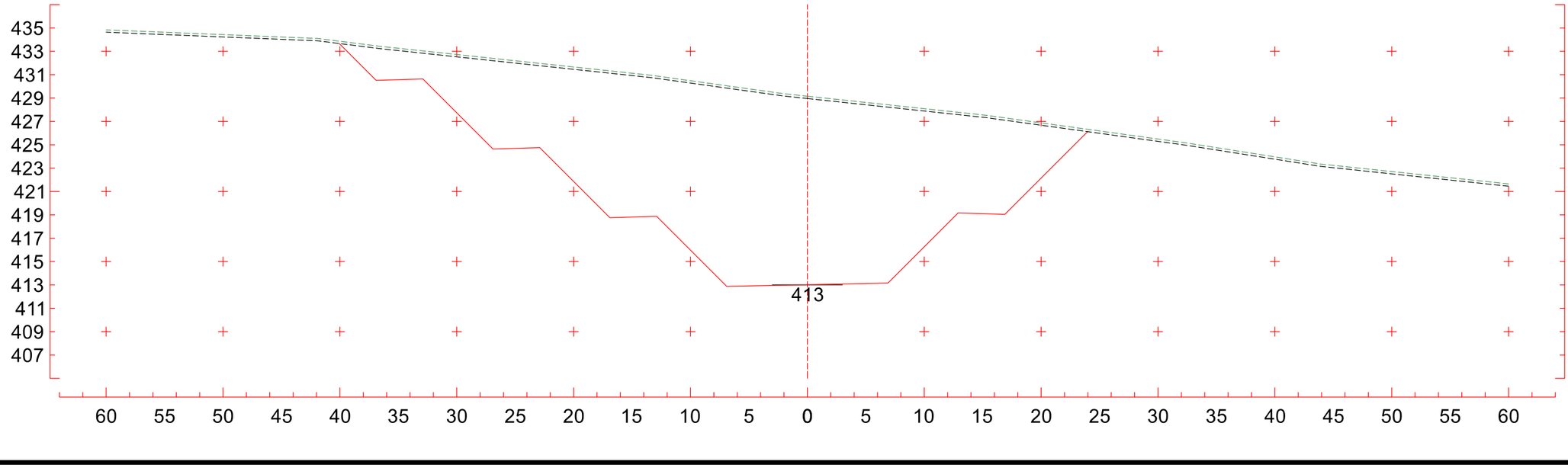
Projeto Ponto de Partida 2021/1



4+600
CT 430,306 m
CP 409,820 m



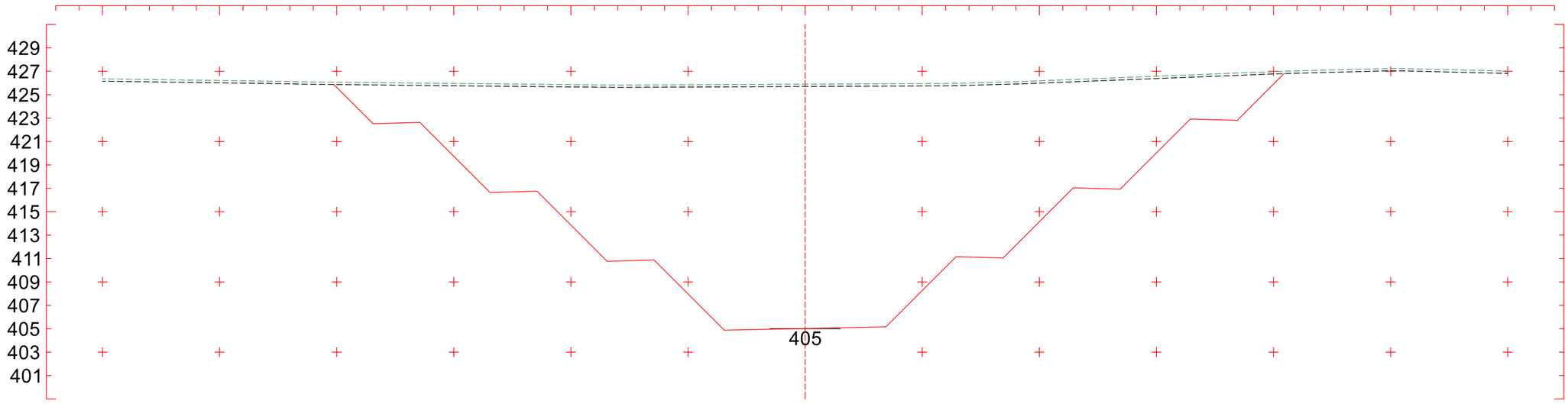
4+580
CT 430,378 m
CP 411,420 m



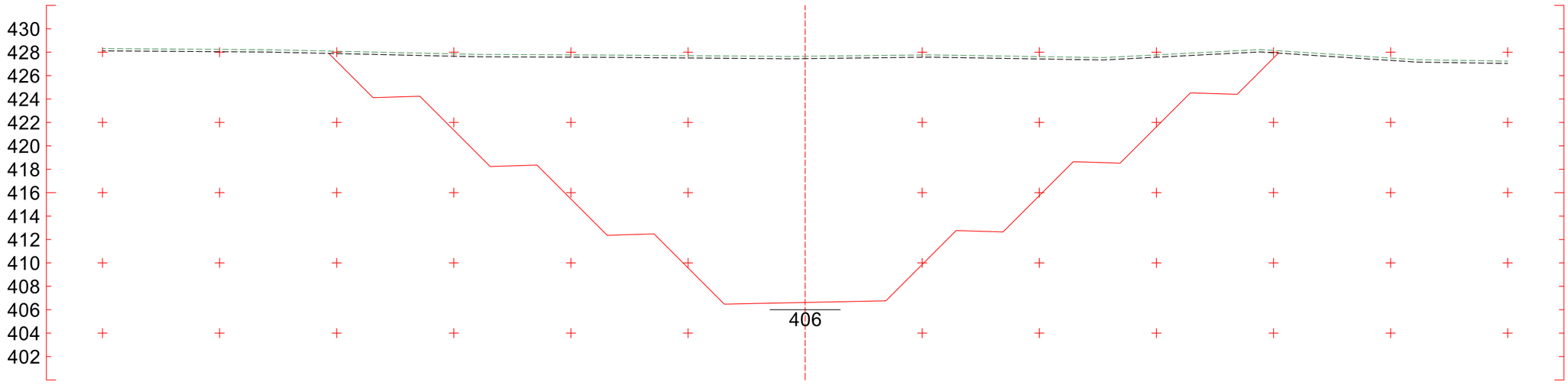
4+560
CT 429,159 m
CP 413,020 m

Eixo1
Escala 1:400

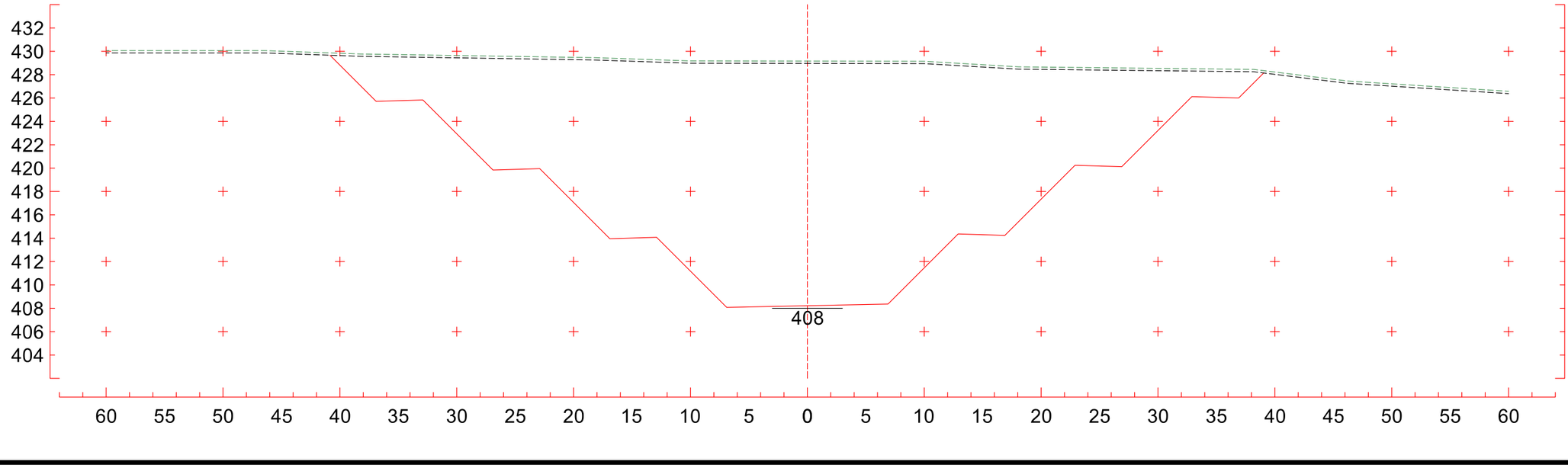
Projeto Ponto de Partida 2021/1



4+660
CT 425,900 m
CP 405,020 m



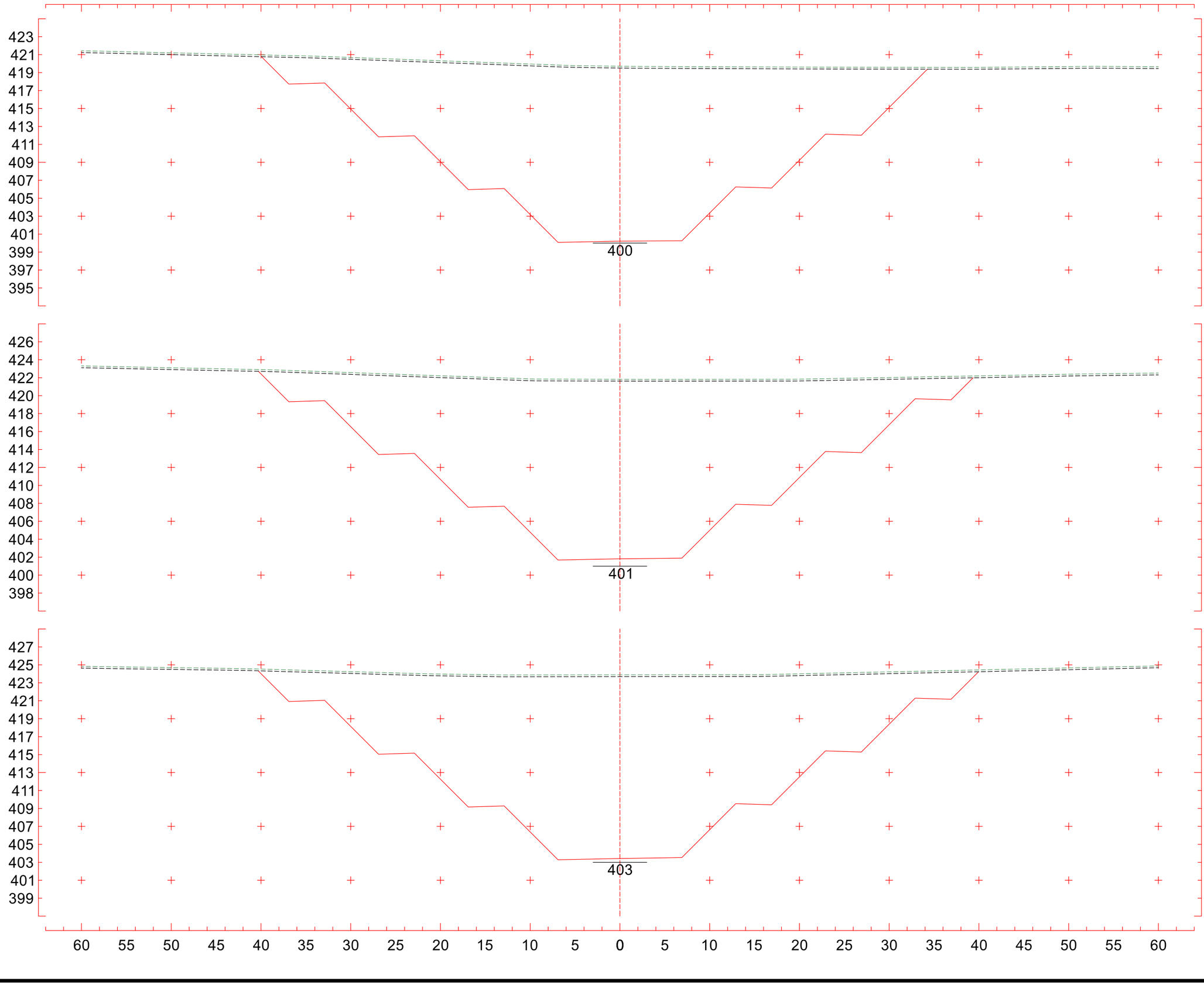
4+640
CT 427,653 m
CP 406,620 m



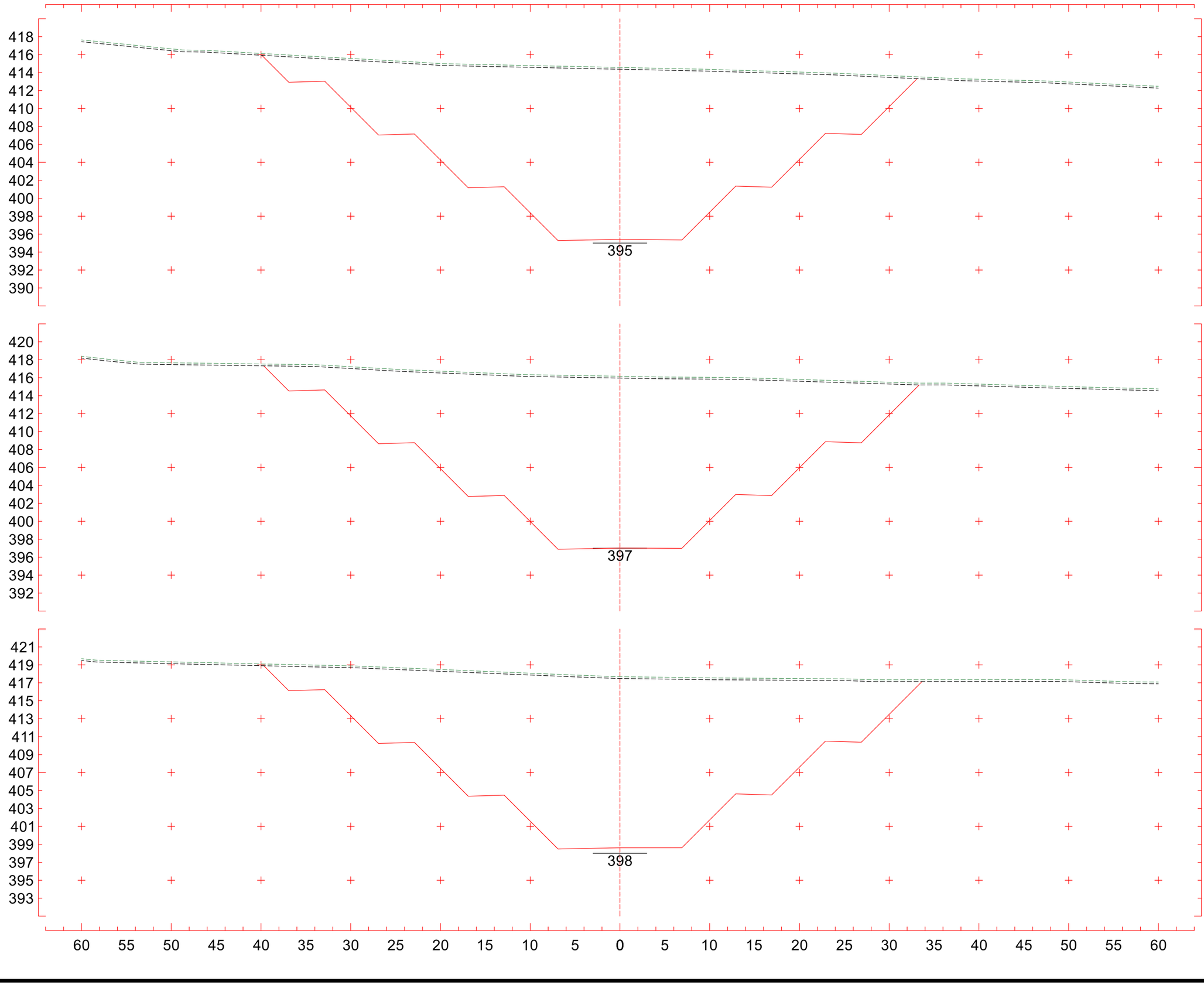
4+620
CT 429,165 m
CP 408,220 m

Eixo1
Escala 1:400

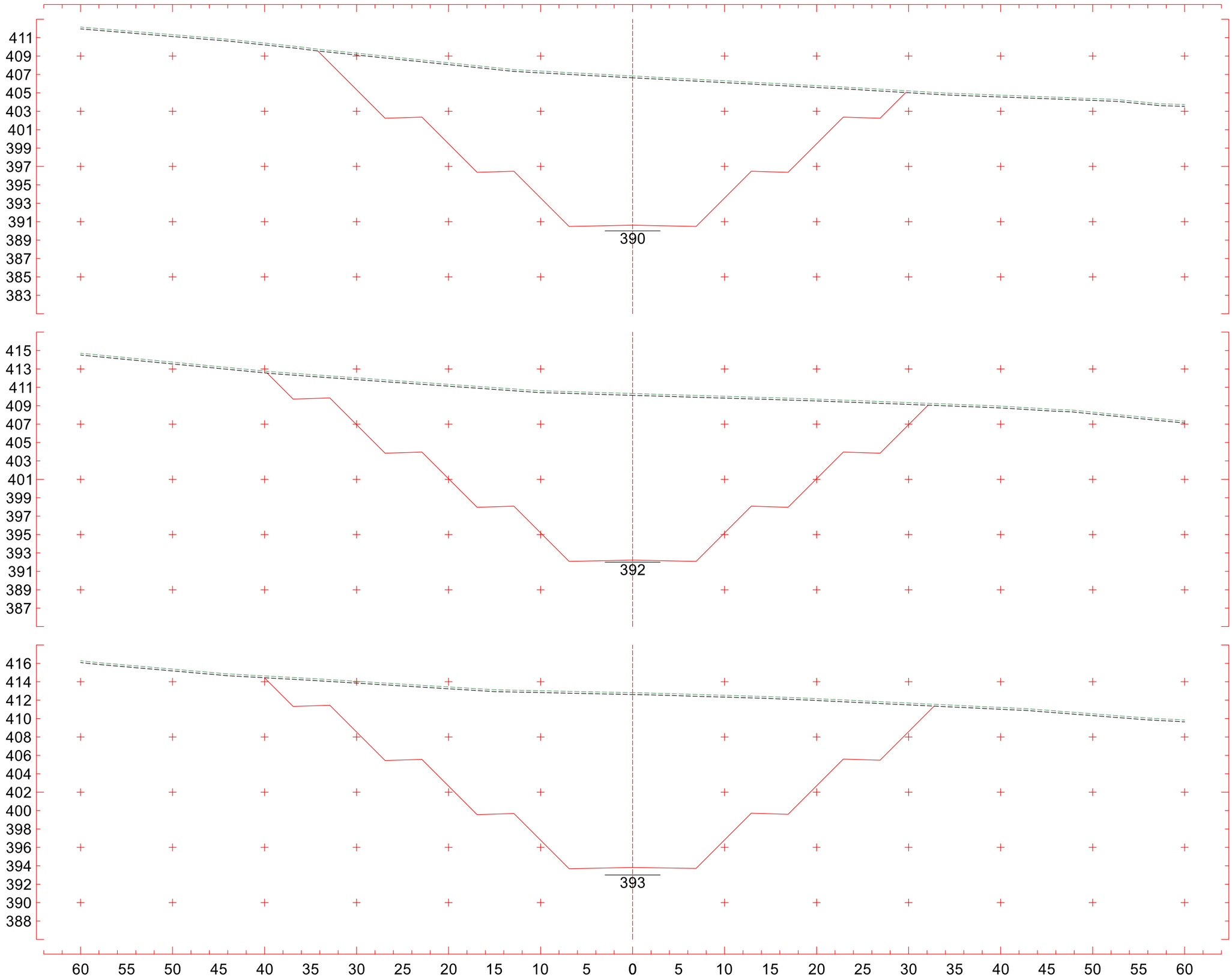
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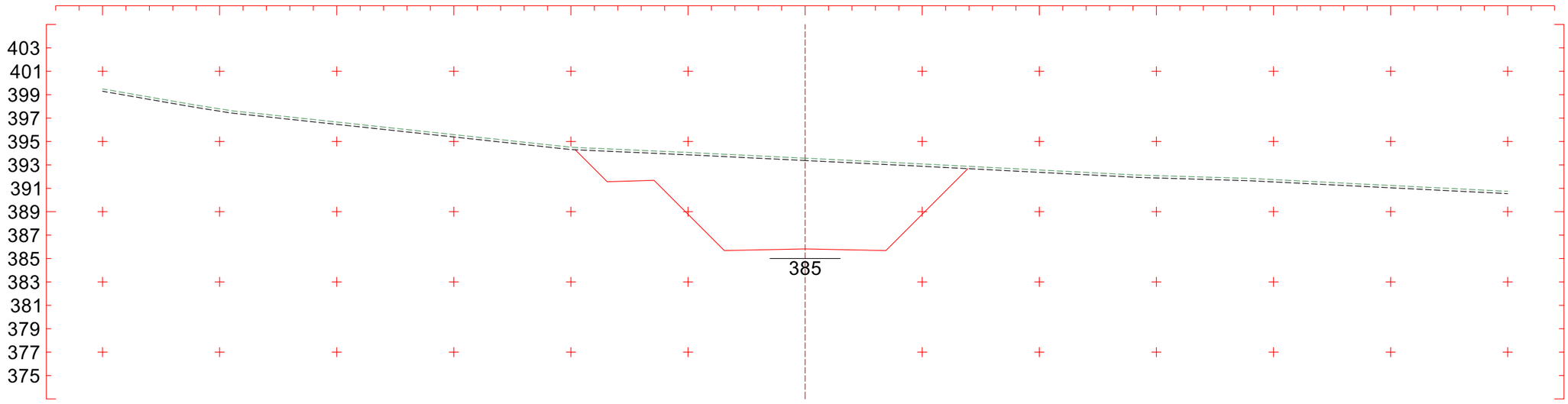
Projeto Ponto de Partida 2021/1



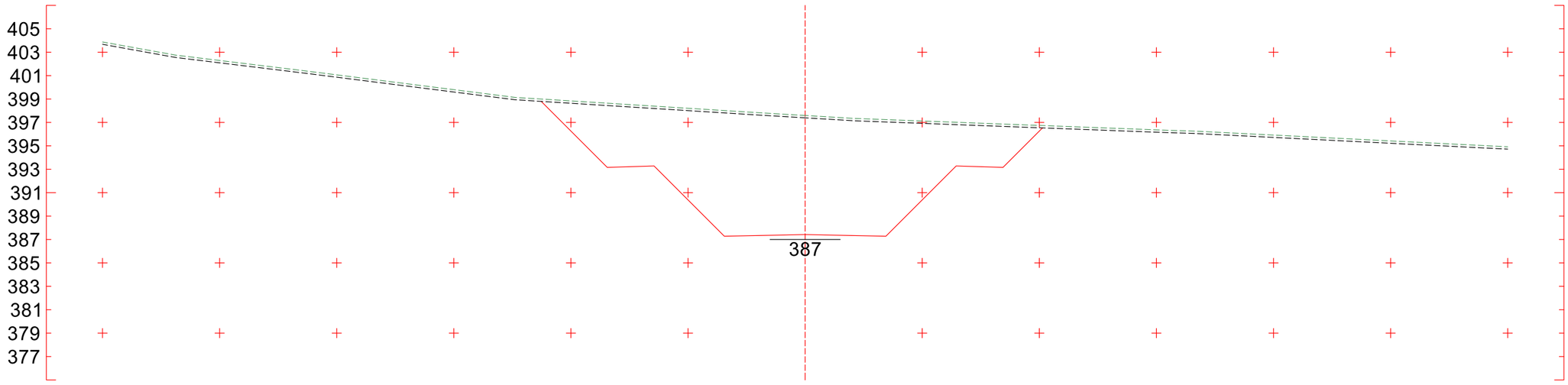
Projeto Ponto de Partida 2021/1



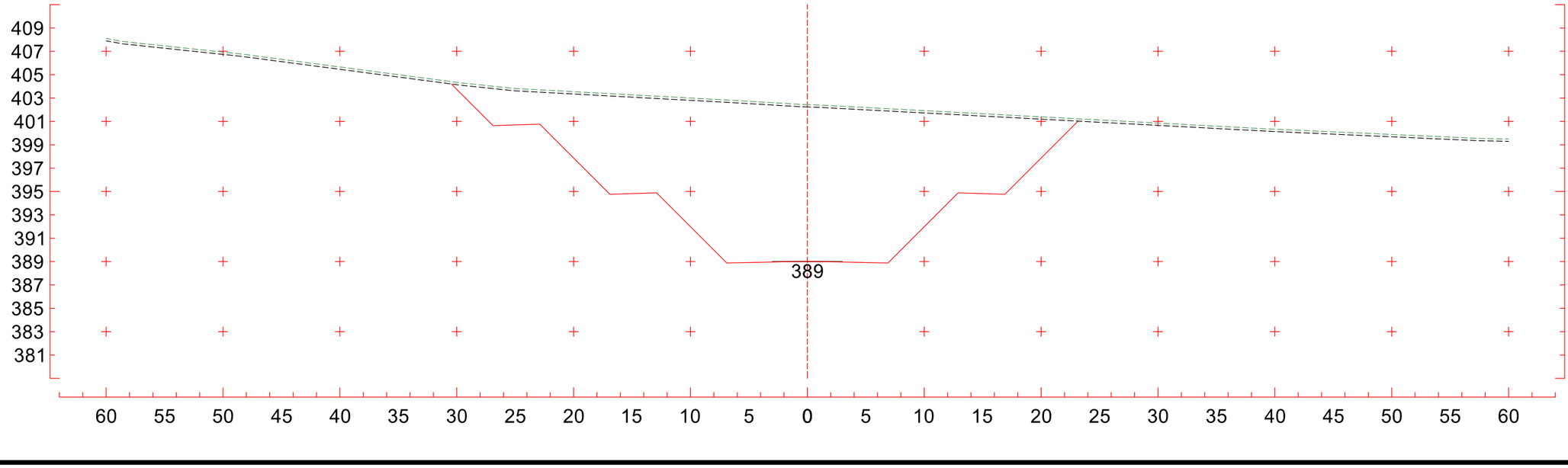
Projeto Ponto de Partida 2021/1



4+900
CT 393,574 m
CP 385,820 m



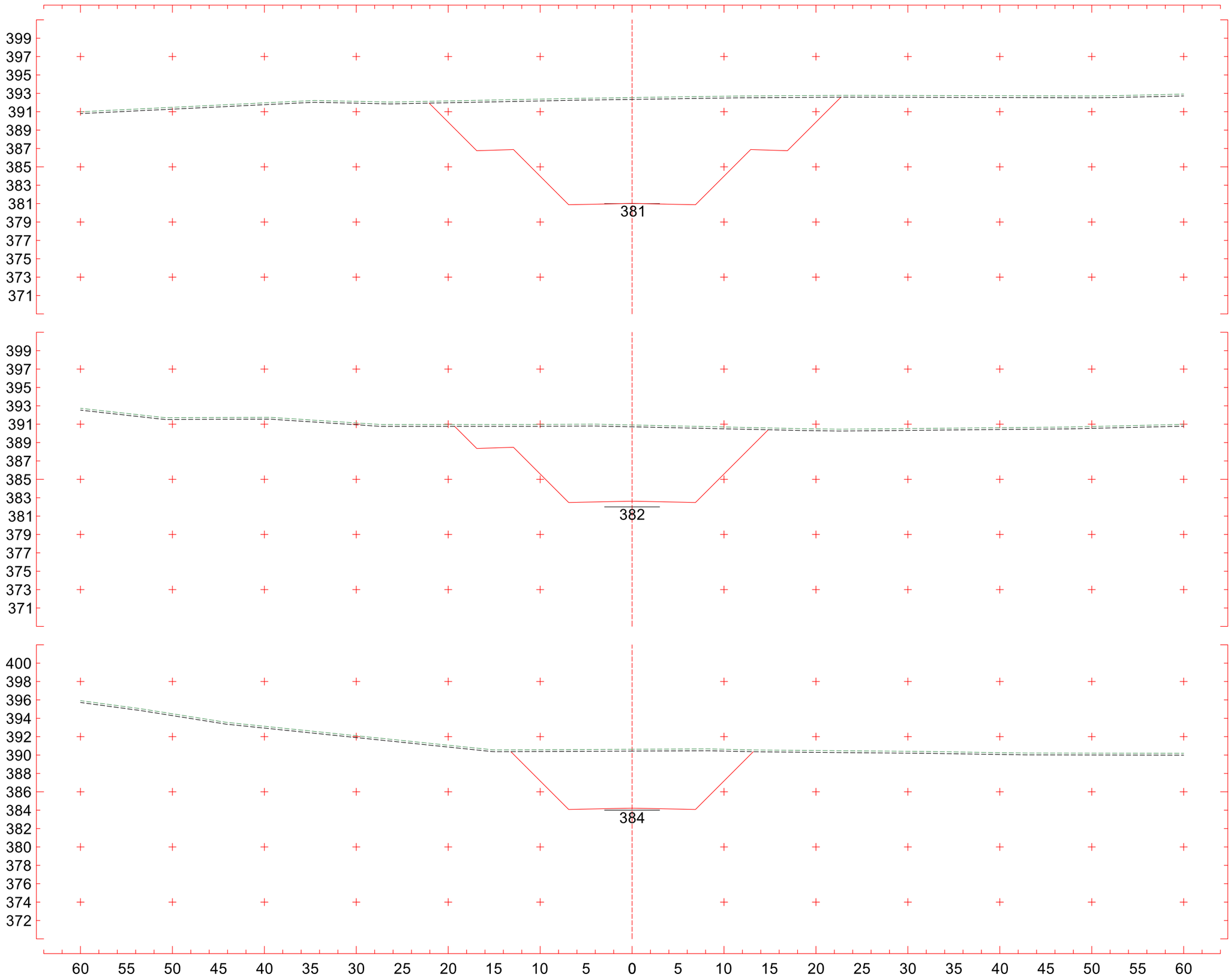
4+880
CT 397,594 m
CP 387,420 m



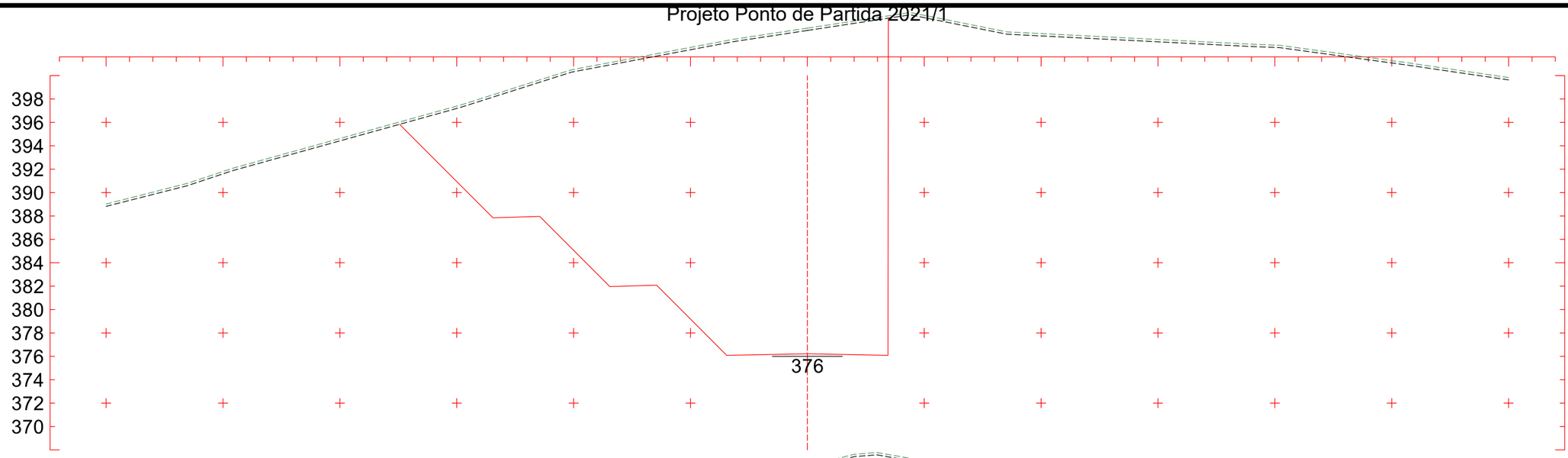
4+860
CT 402,437 m
CP 389,020 m

Eixo1
Escala 1:400

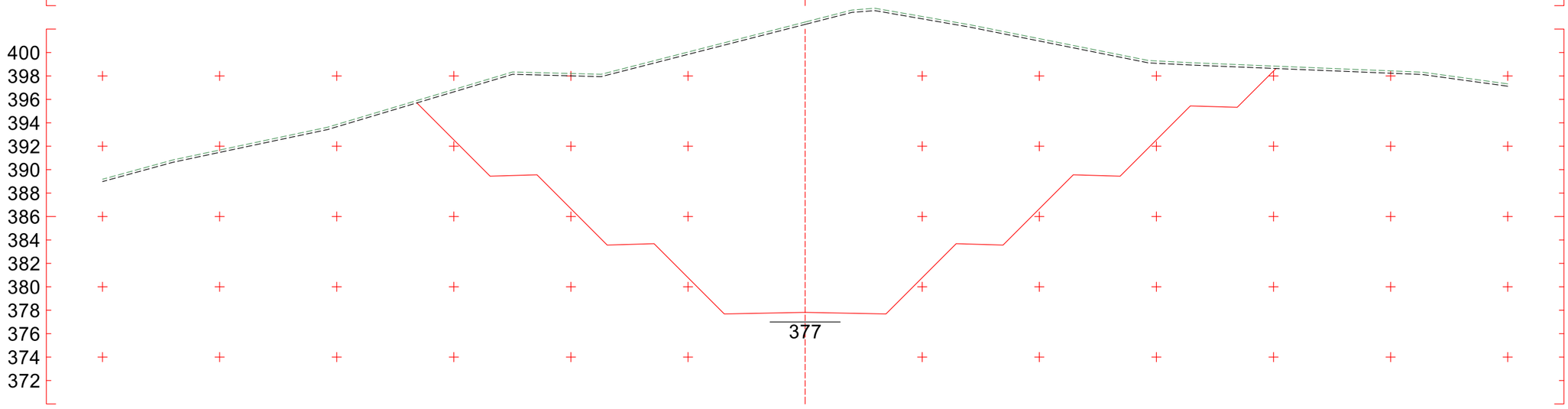
Projeto Ponto de Partida 2021/1



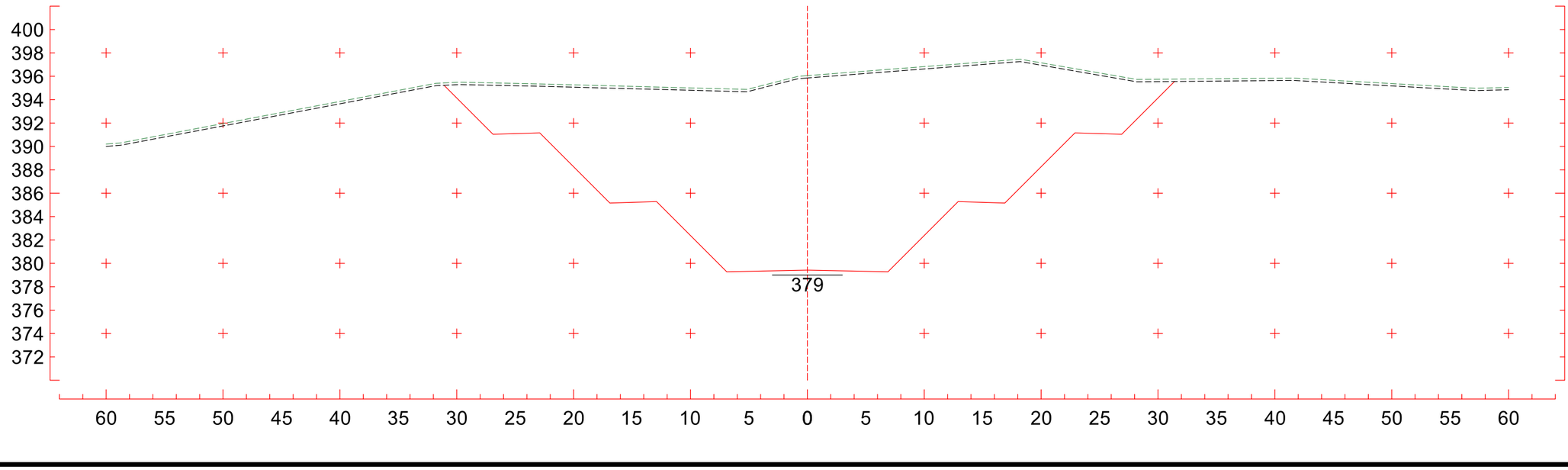
Projeto Ponto de Partida 2021/1



5+020
CT 404,060 m
CP 376,220 m



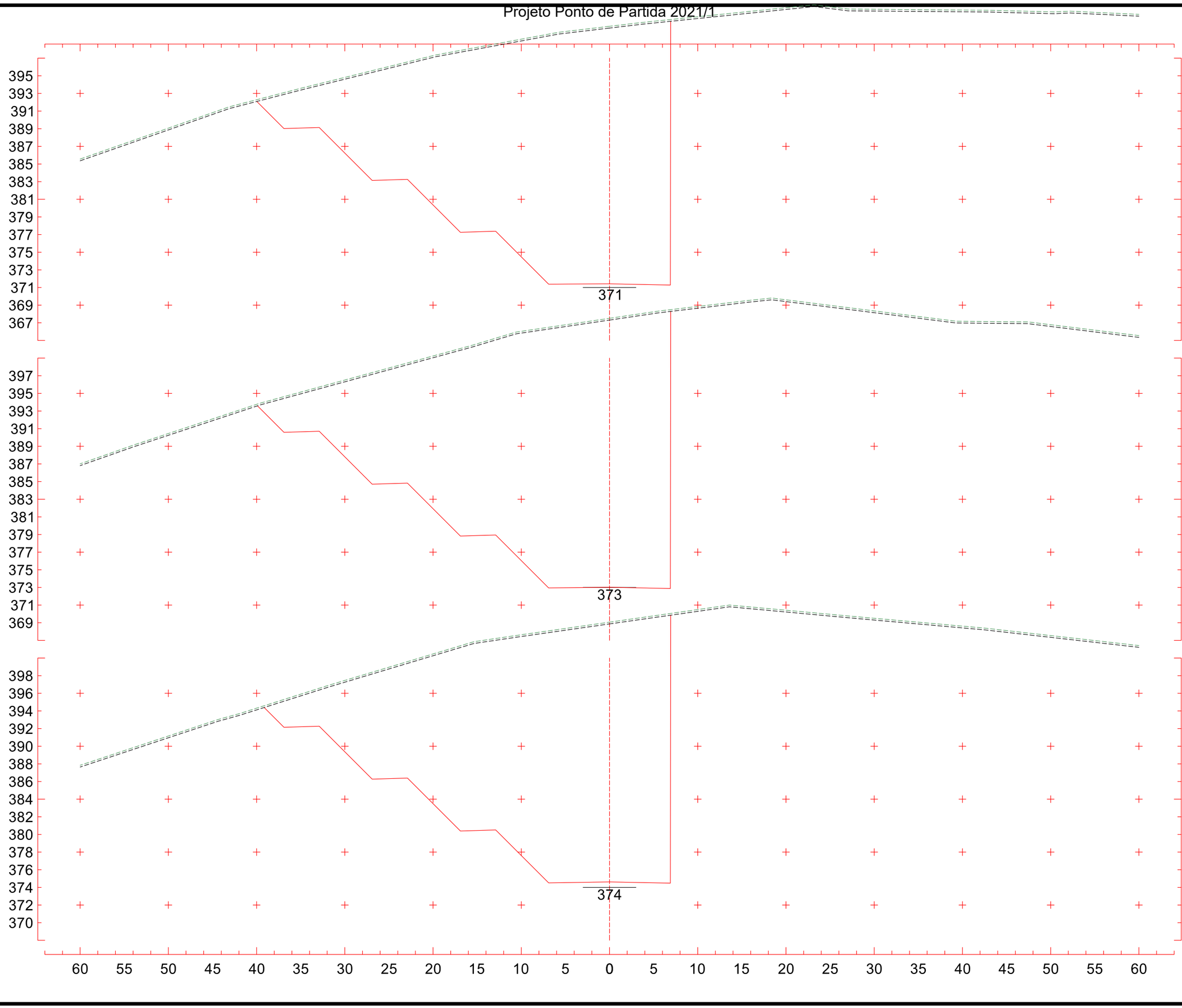
5+000
CT 402,601 m
CP 377,820 m



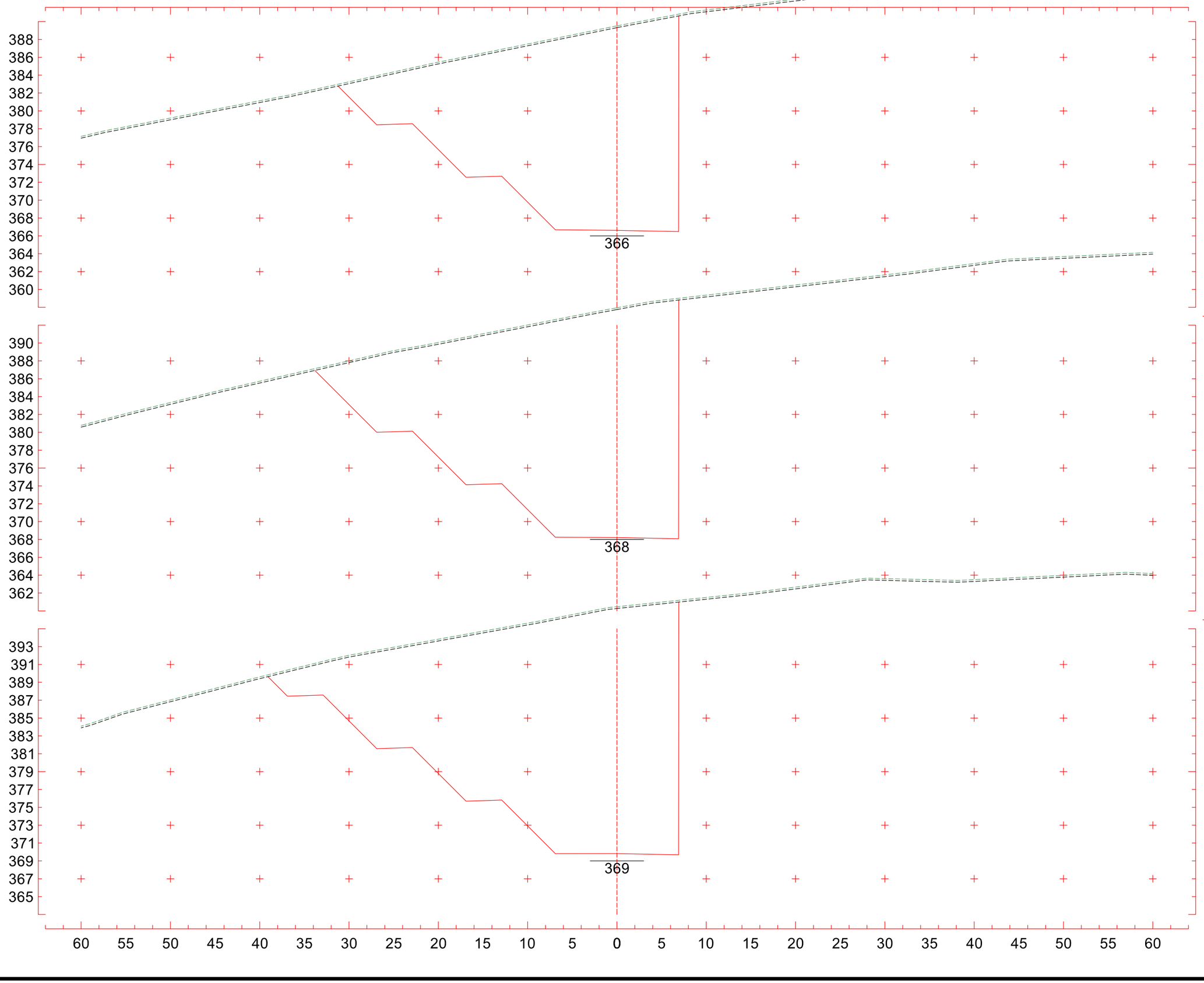
4+980
CT 396,057 m
CP 379,420 m

Eixo1
Escala 1:400

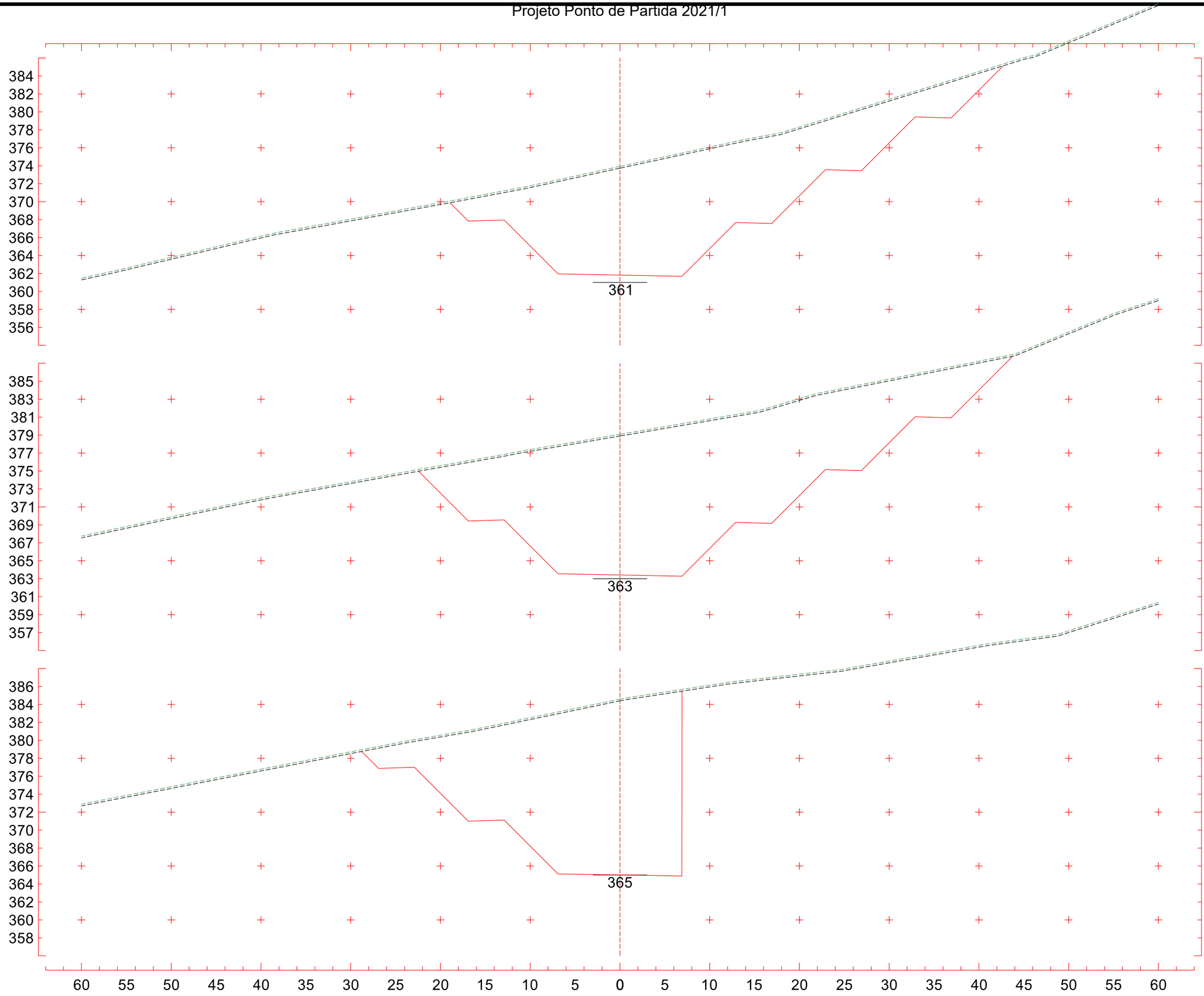
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



5+200

CT 373,930 m
CP 361,820 m

5+180

CT 379,094 m
CP 363,420 m

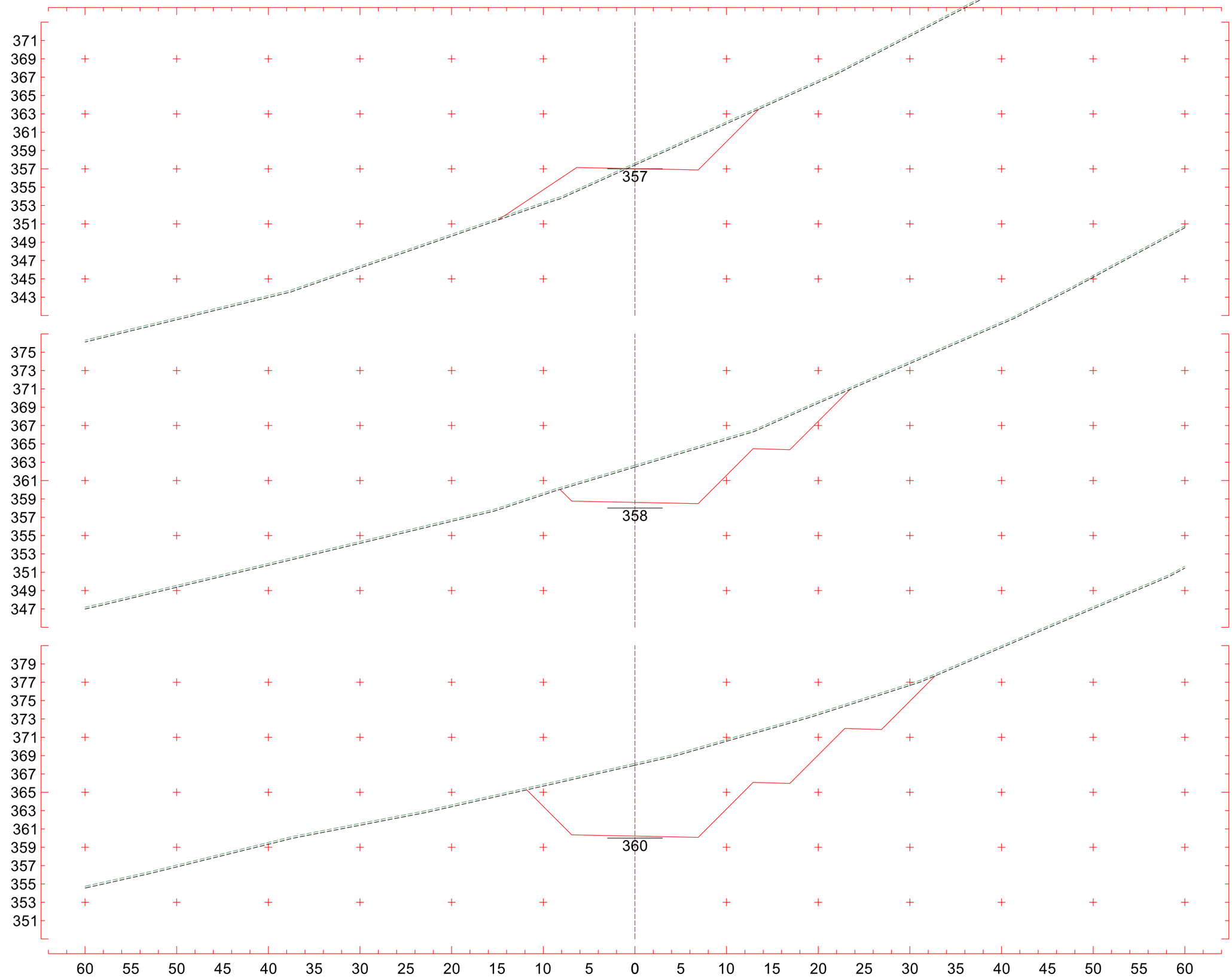
5+160

CT 384,596 m
CP 365,020 m

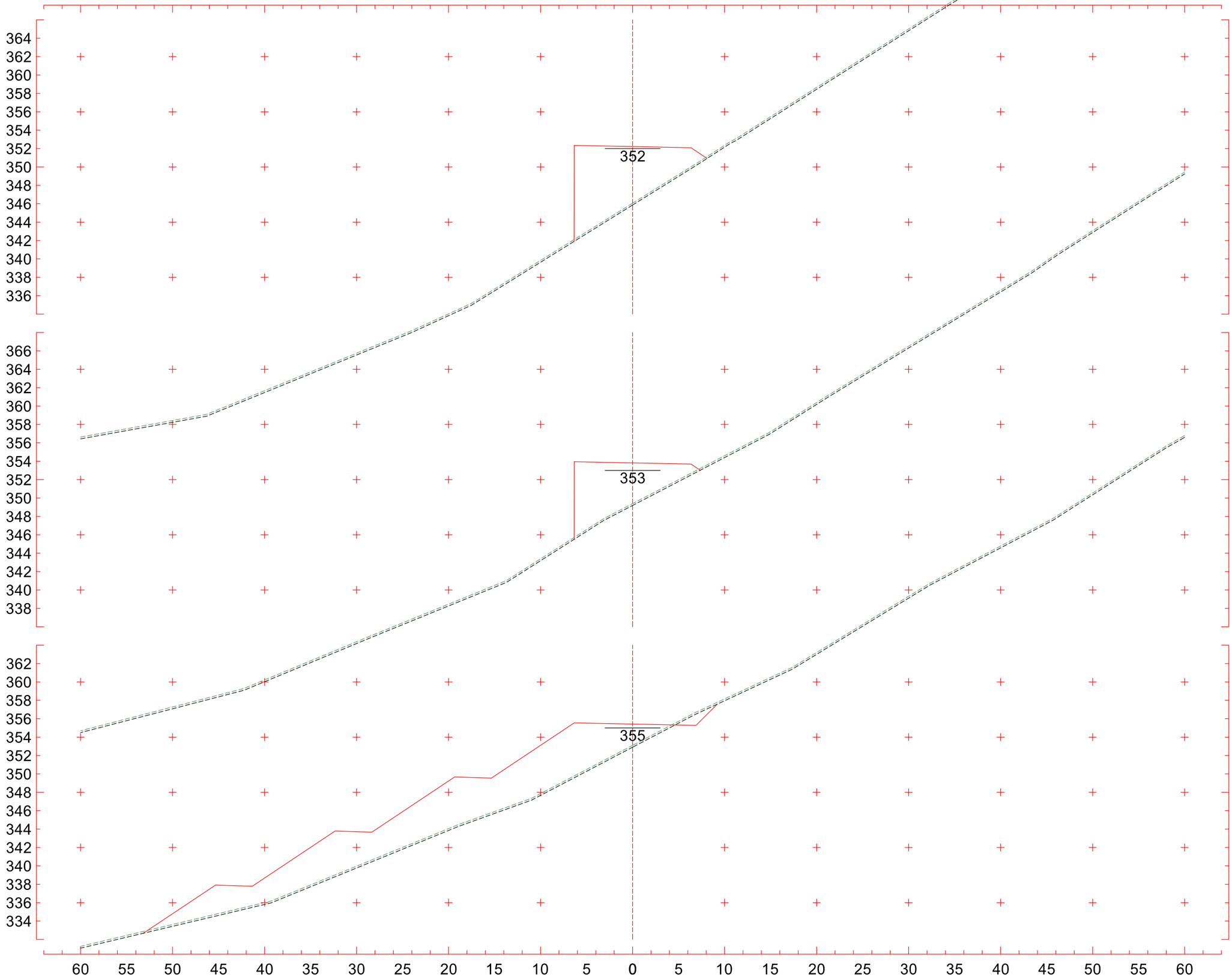
Eixo1

Escala 1:400

Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



5+320

CT 346,063 m
CP 352,220 m

5+300

CT 349,392 m
CP 353,820 m

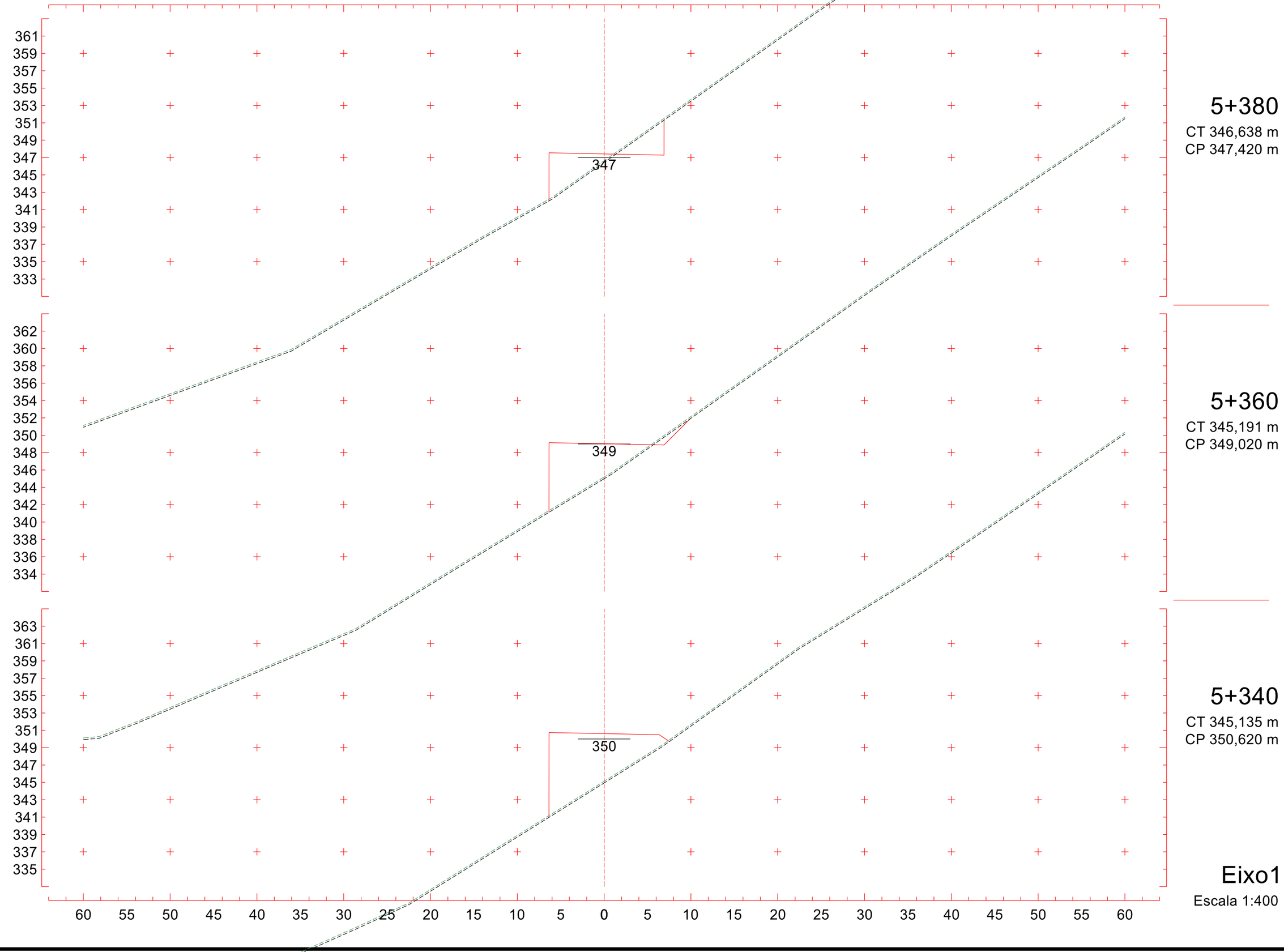
5+280

CT 353,103 m
CP 355,420 m

Eixo1

Escala 1:400

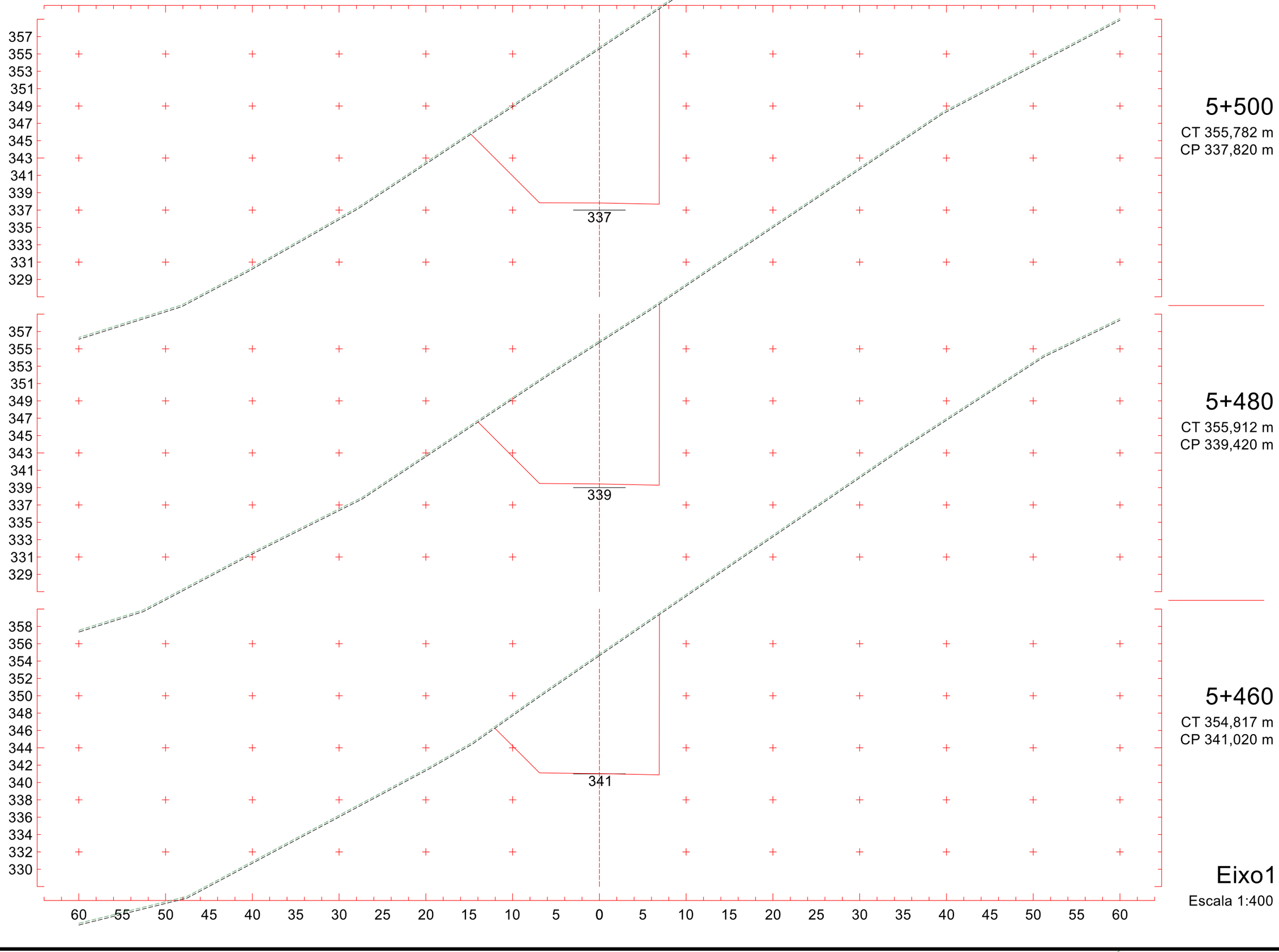
Projeto Ponto de Partida 2021/1



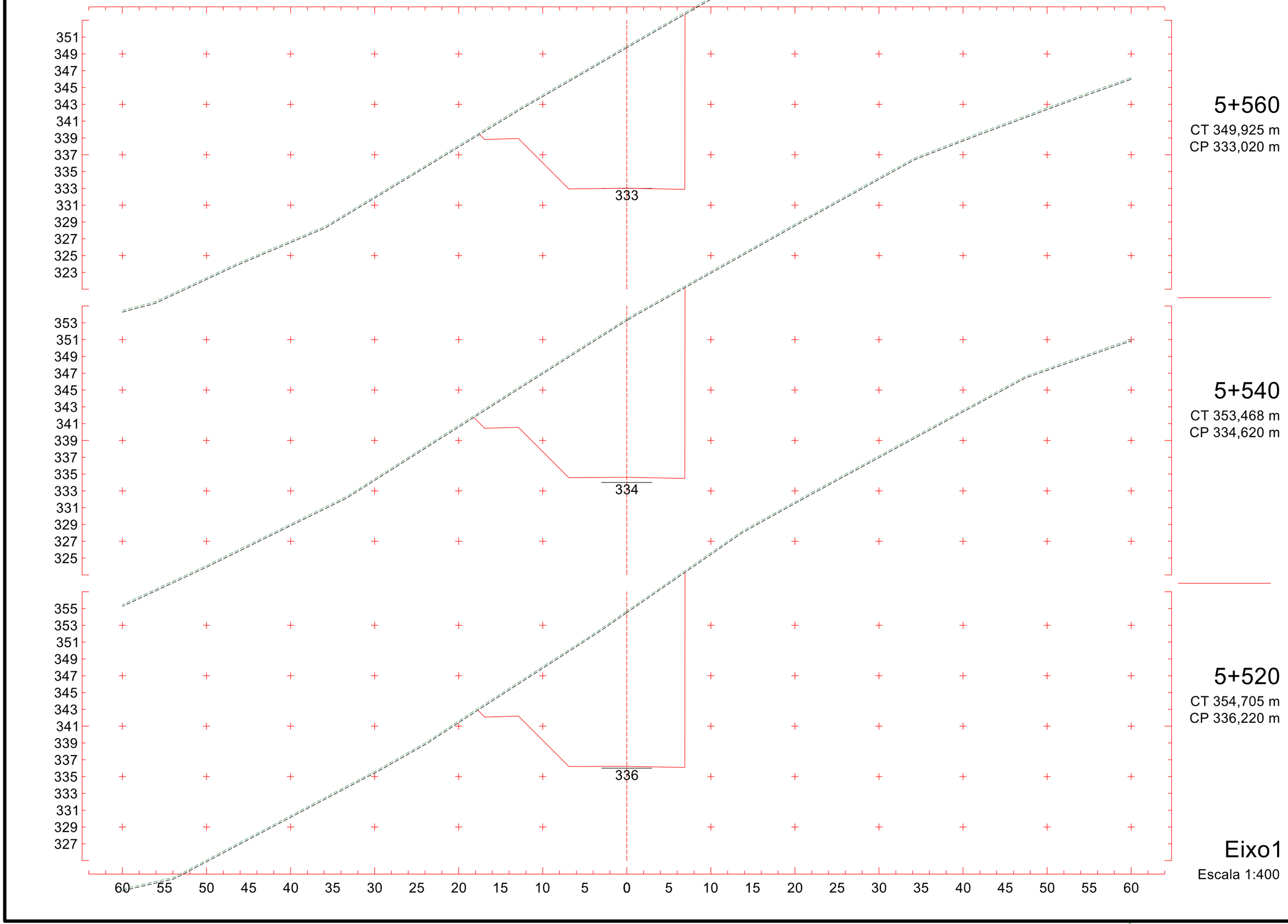
Projeto Ponto de Partida 2021/1

300

Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



5+560
CT 349,925 m
CP 333,020 m

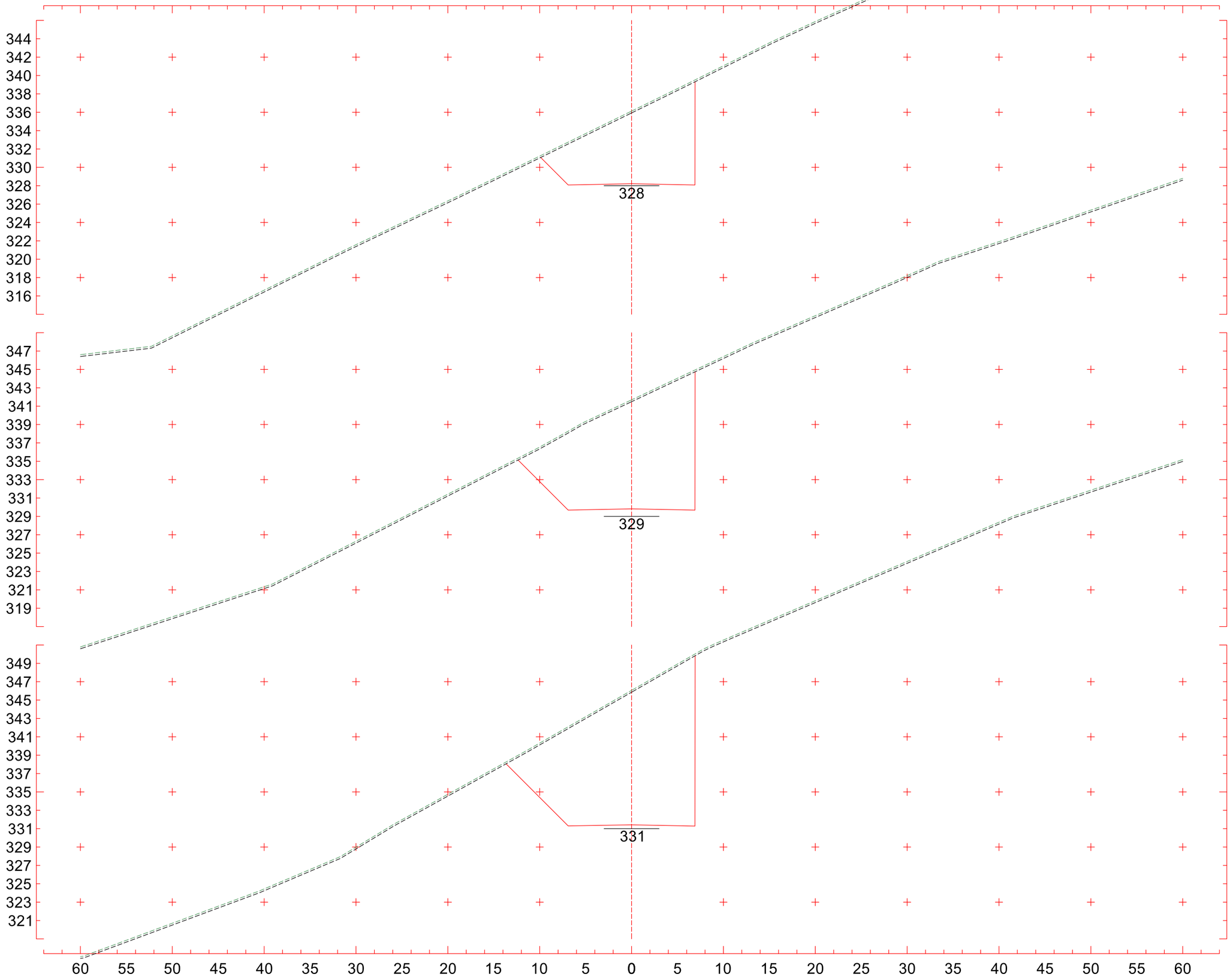
5+540
CT 353,468 m
CP 334,620 m

5+520
CT 354,705 m
CP 336,220 m

Eixo1
Escala 1:400

302

Projeto Ponto de Partida 2021/1



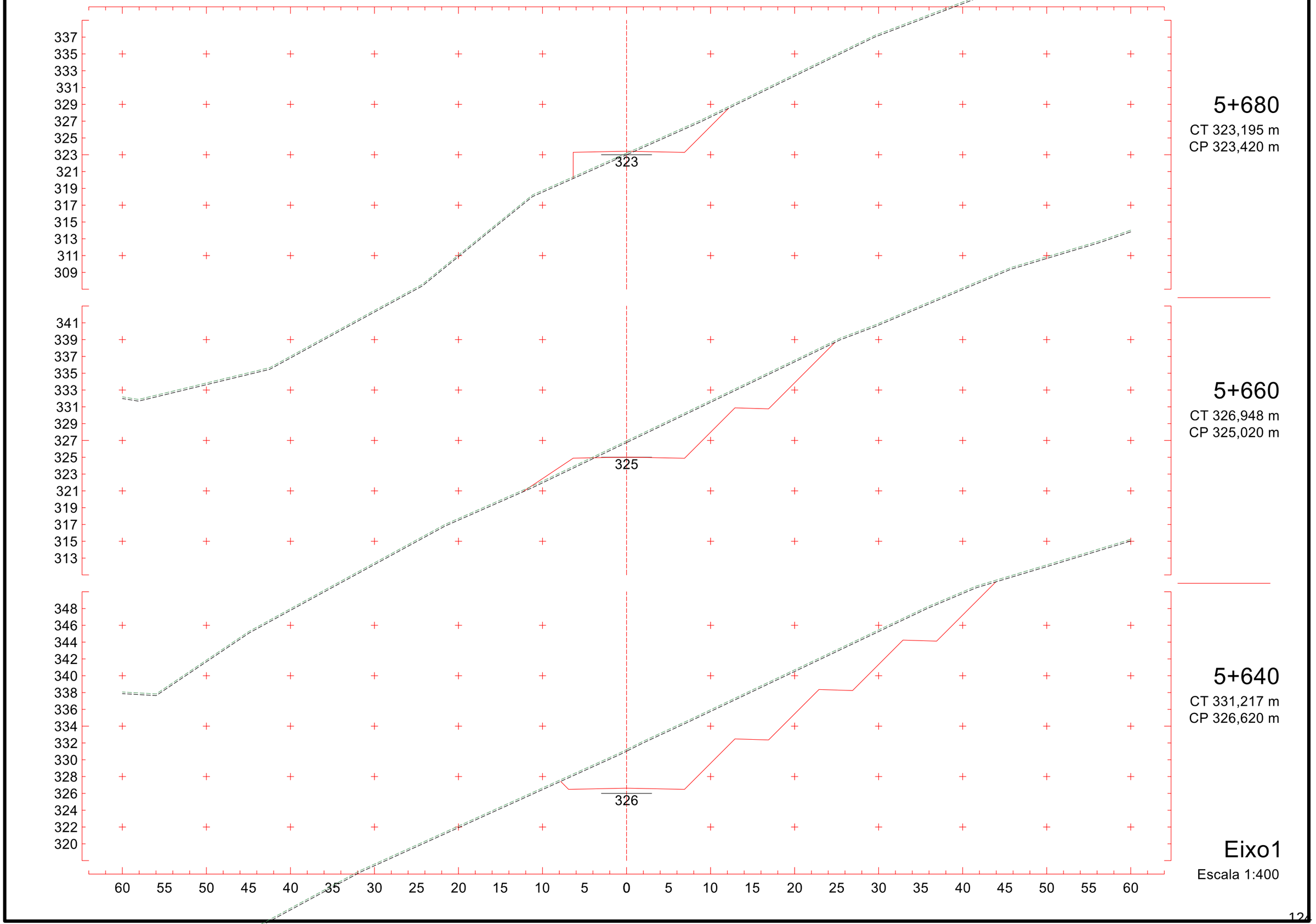
5+620
CT 336,124 m
CP 328,220 m

5+600
CT 341,686 m
CP 329,820 m

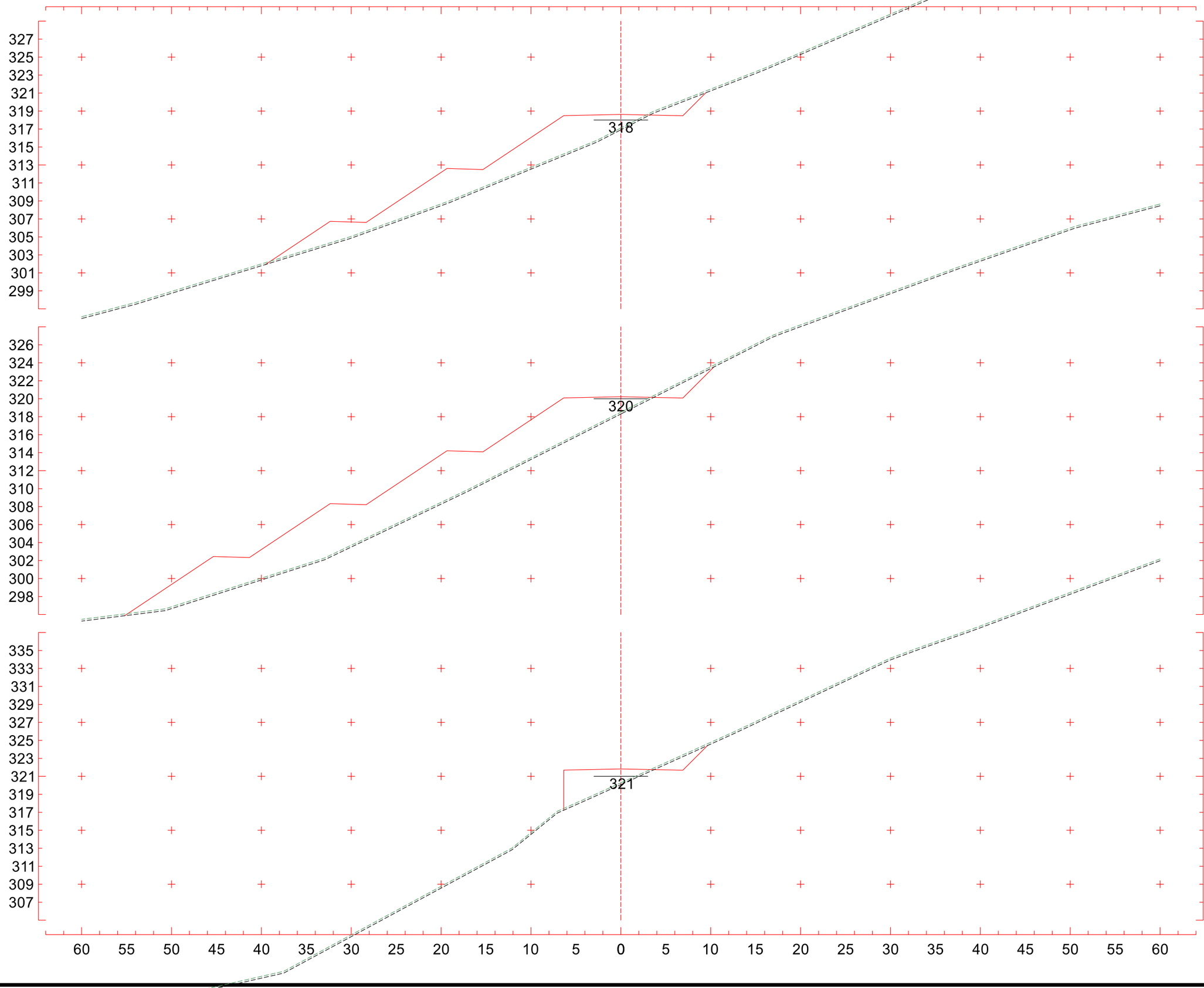
5+580
CT 346,056 m
CP 331,420 m

Eixo1
Escala 1:400

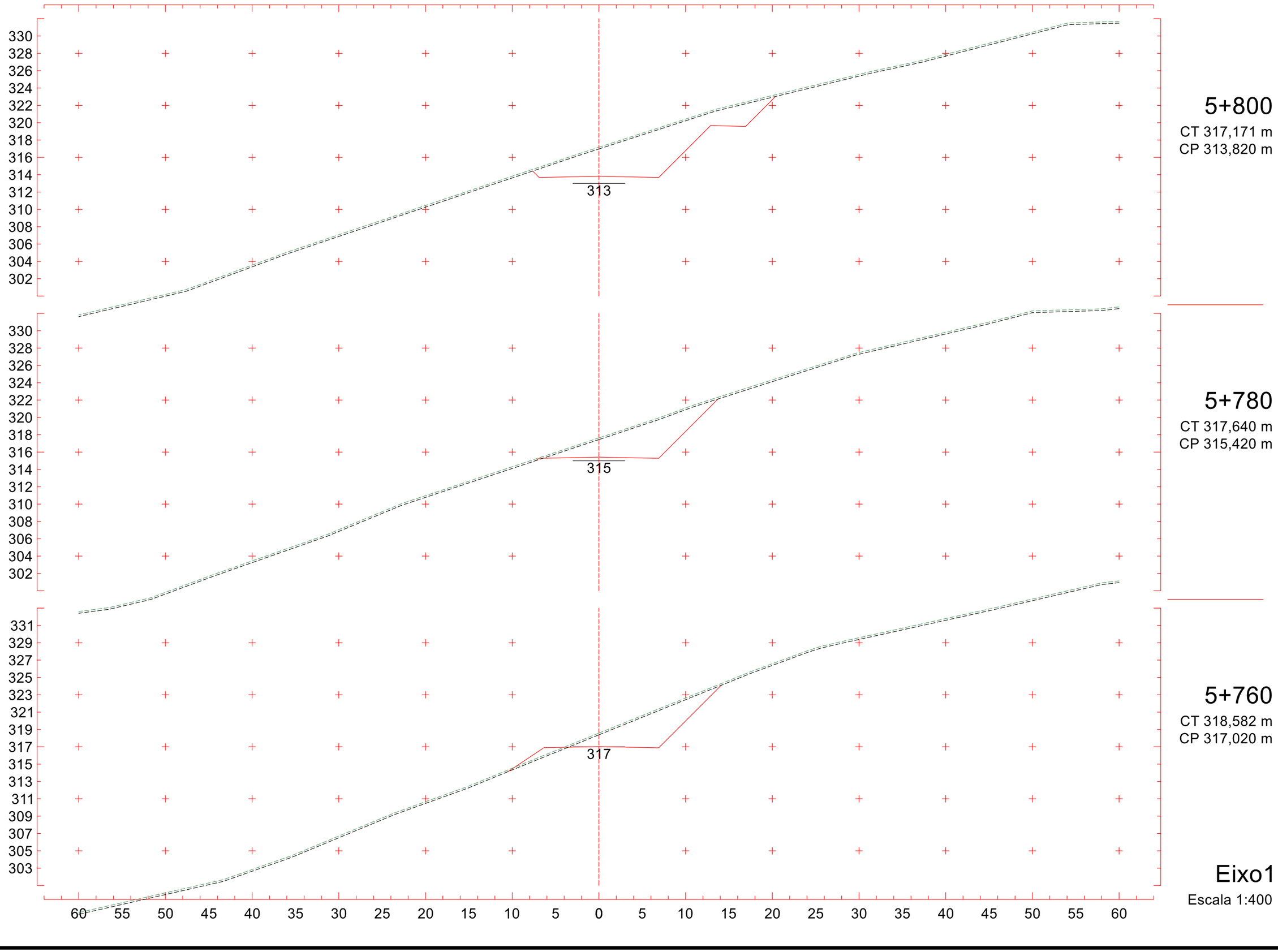
Projeto Ponto de Partida 2021/1



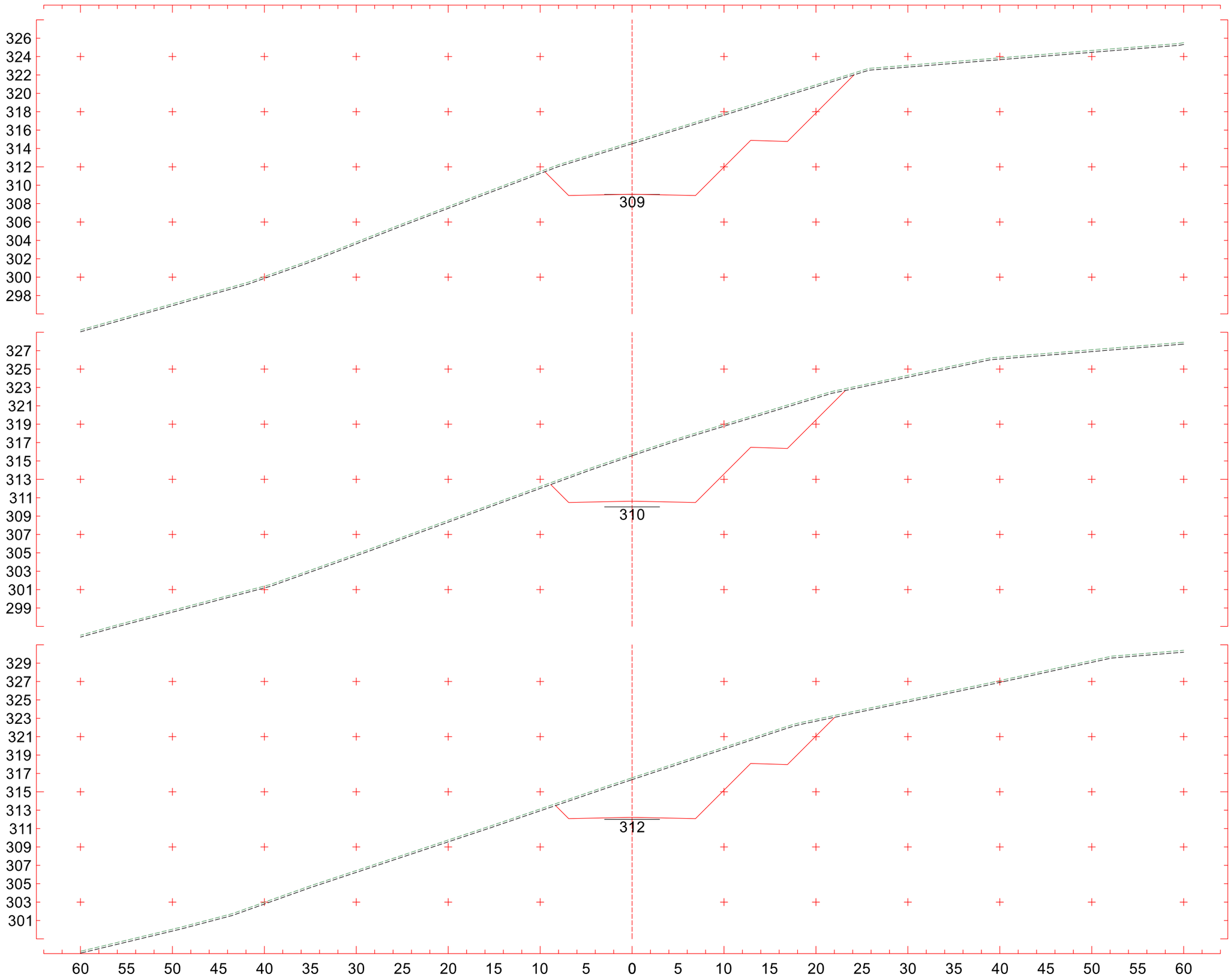
Projeto Ponto de Partida 2021/1



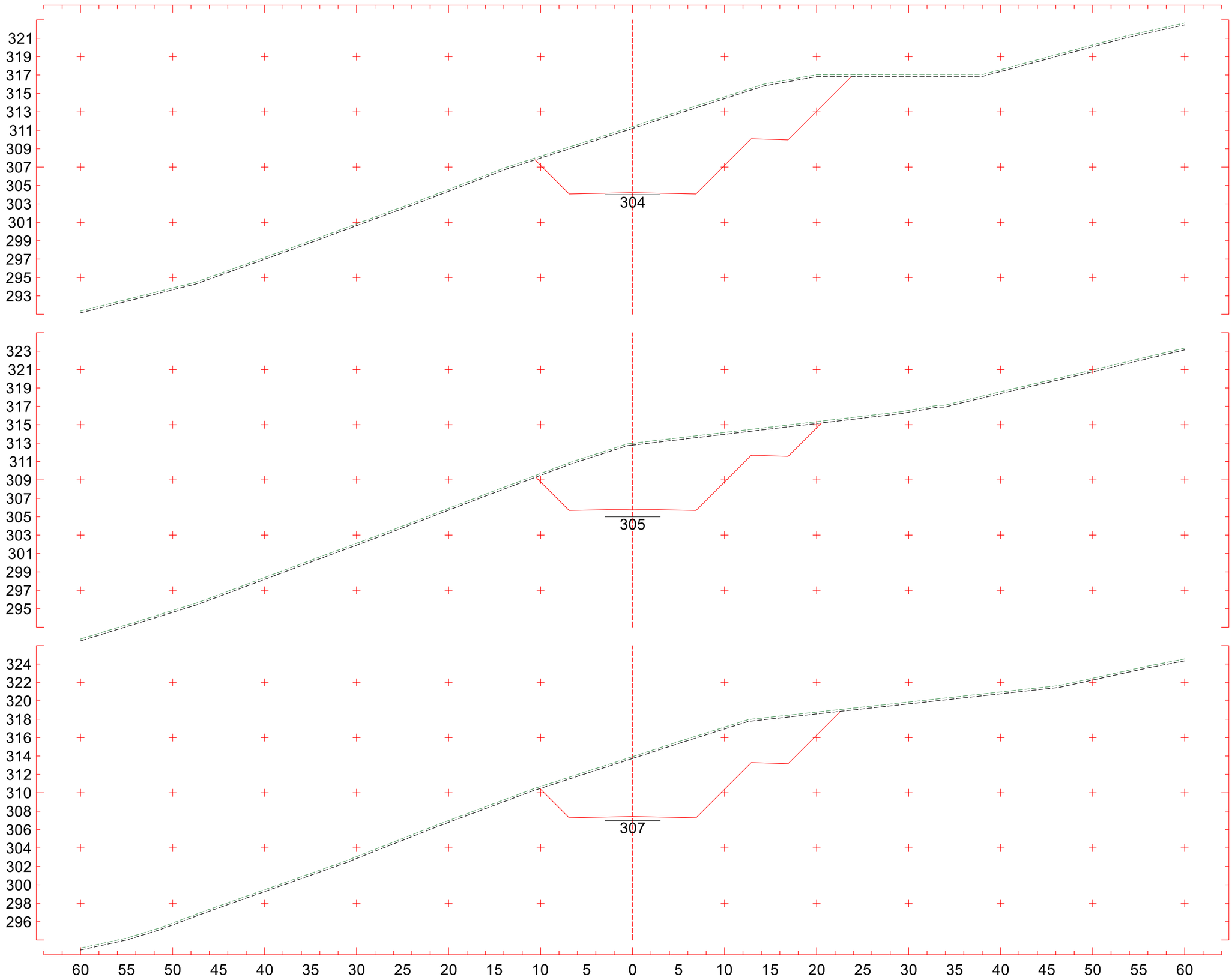
Projeto Ponto de Partida 2021/1



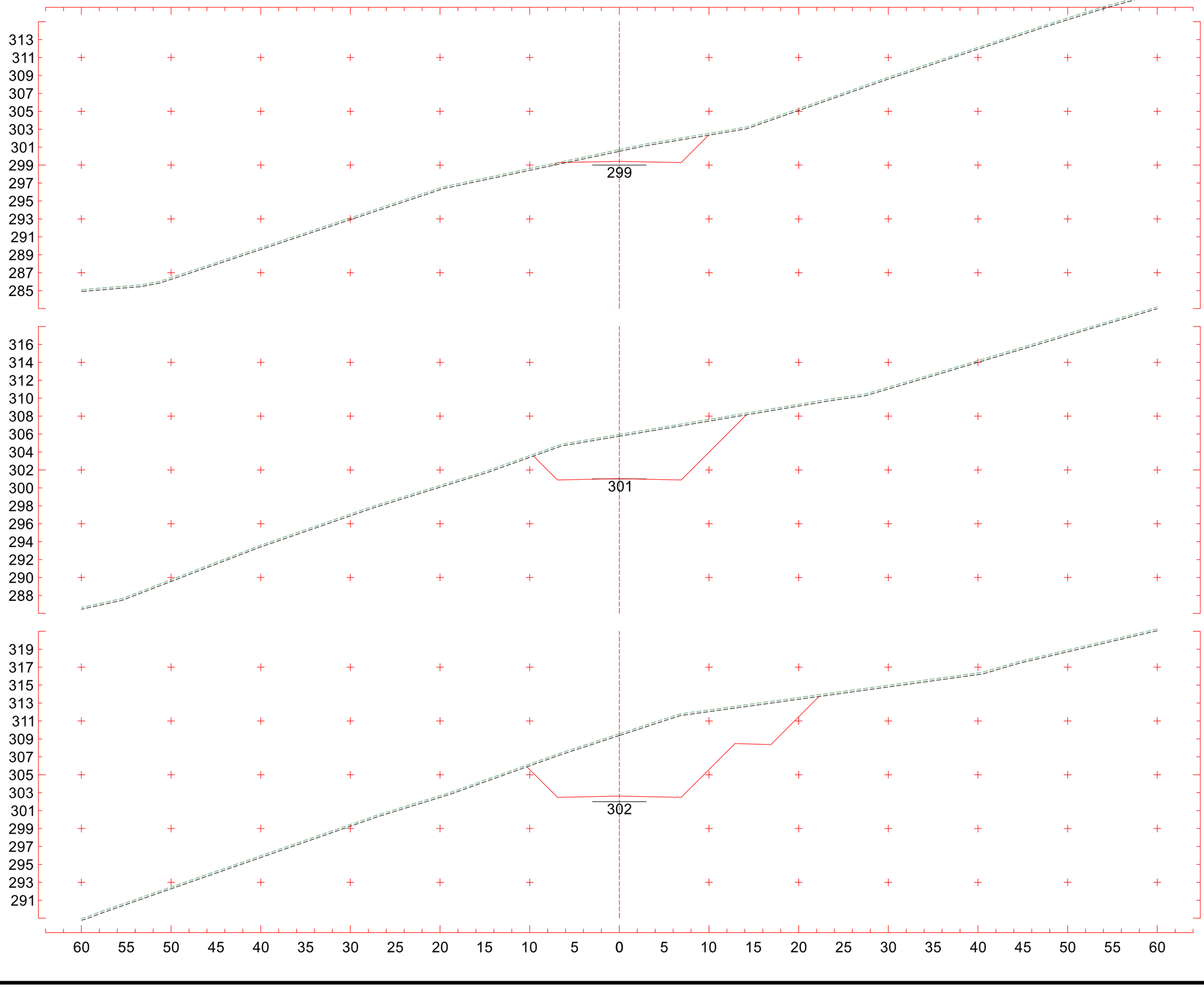
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



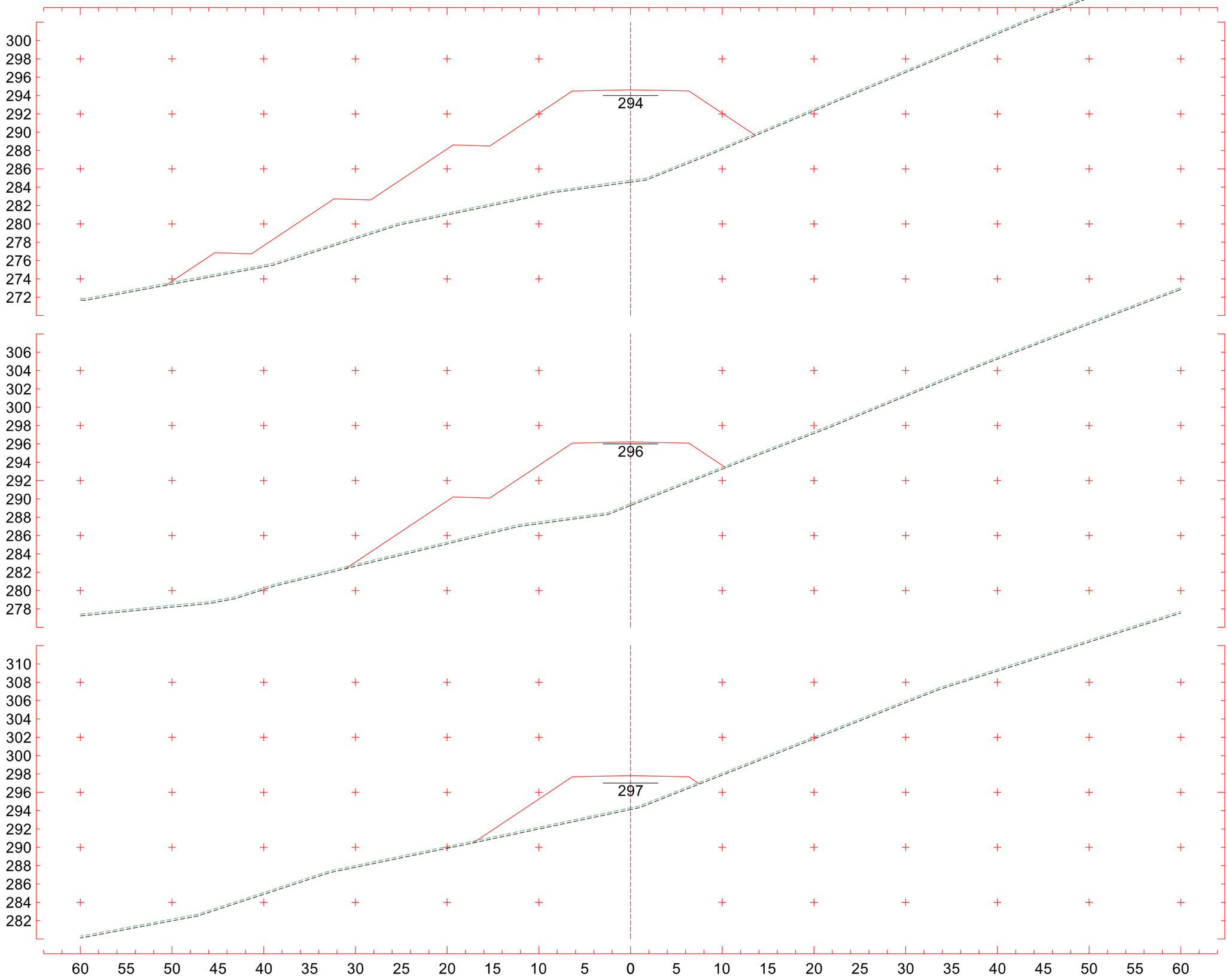
5+980
CT 300,736 m
CP 299,420 m

5+960
CT 305,963 m
CP 301,020 m

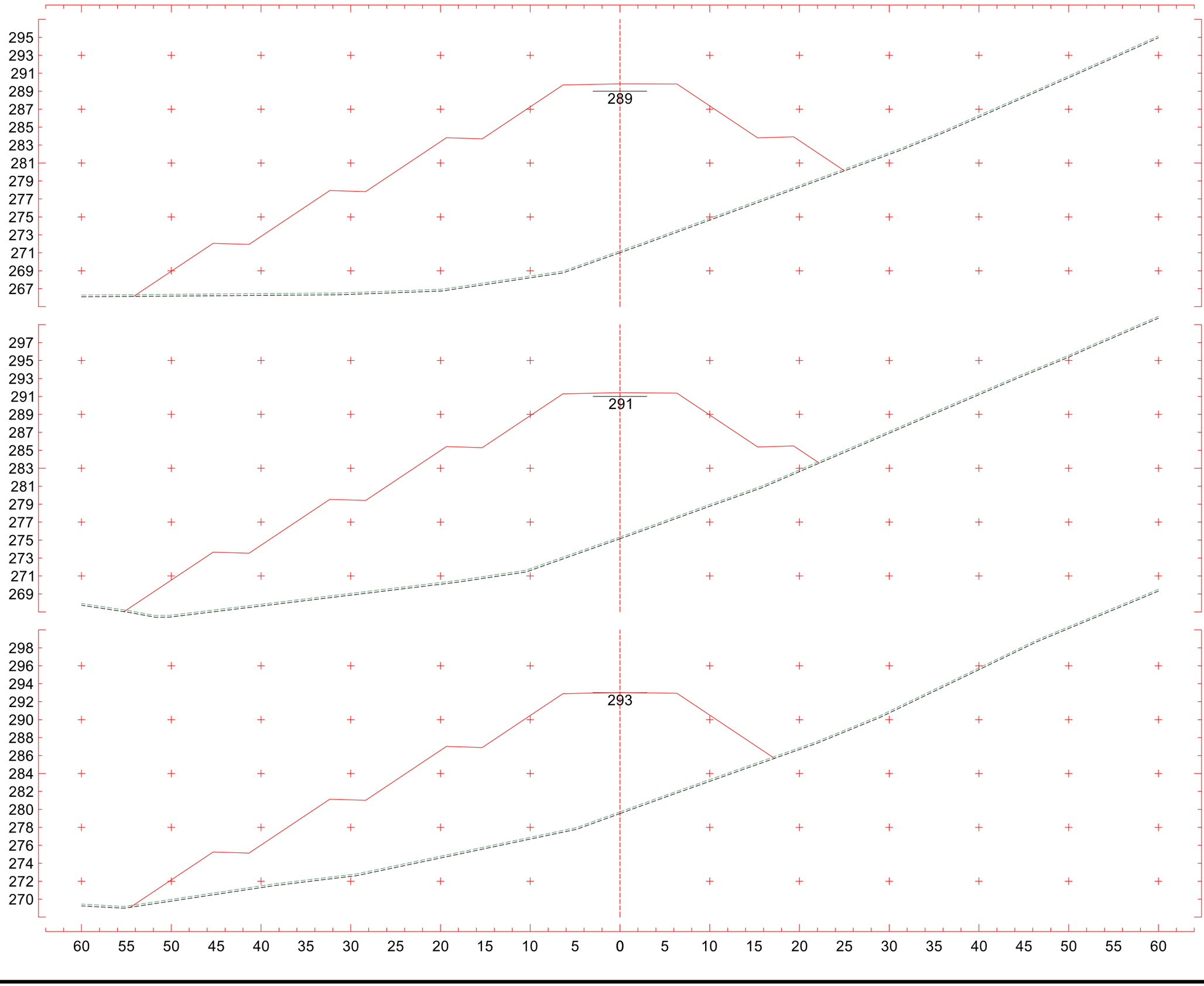
5+940
CT 309,576 m
CP 302,620 m

Eixo1
Escala 1:400

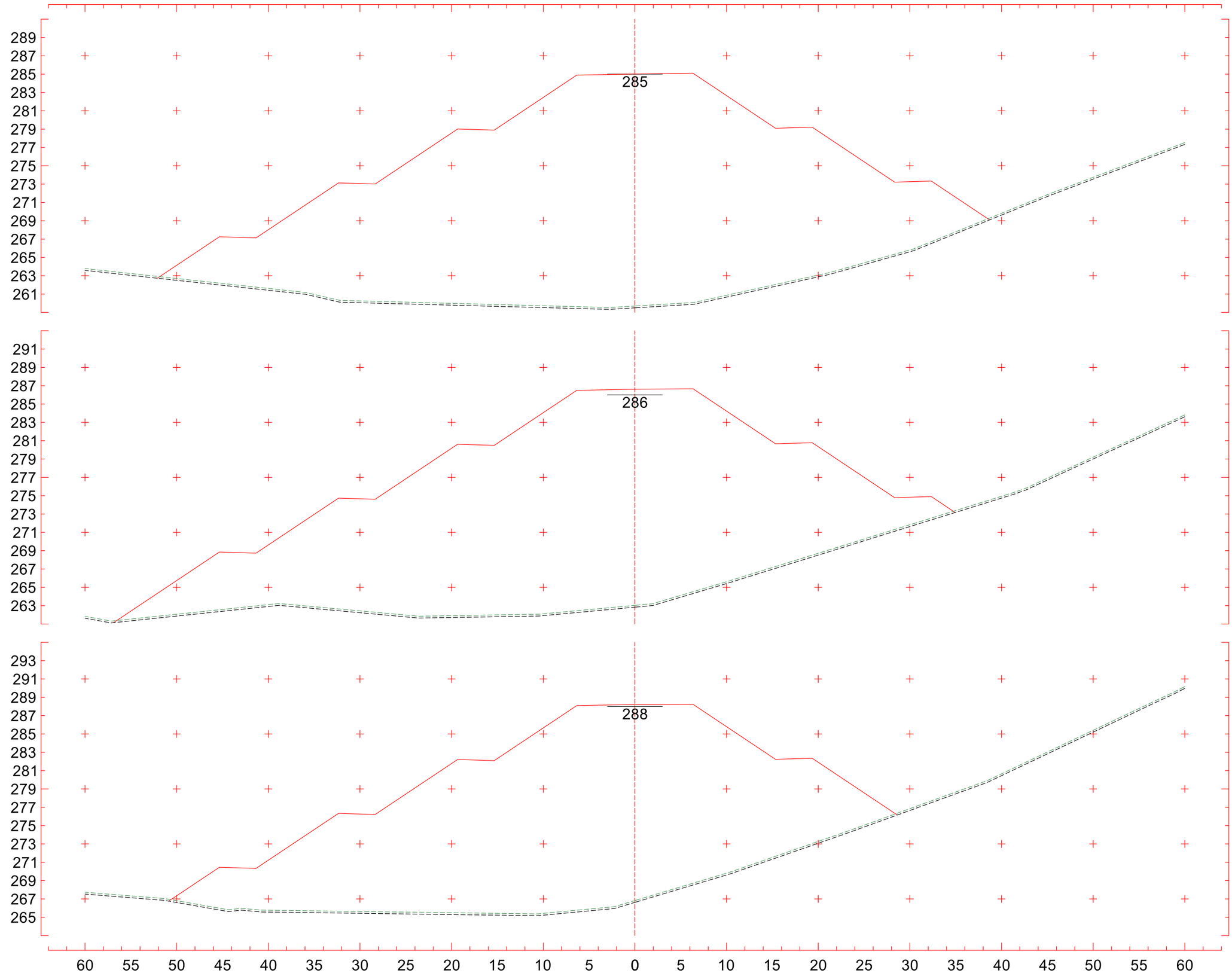
Projeto Ponto de Partida 2021/1



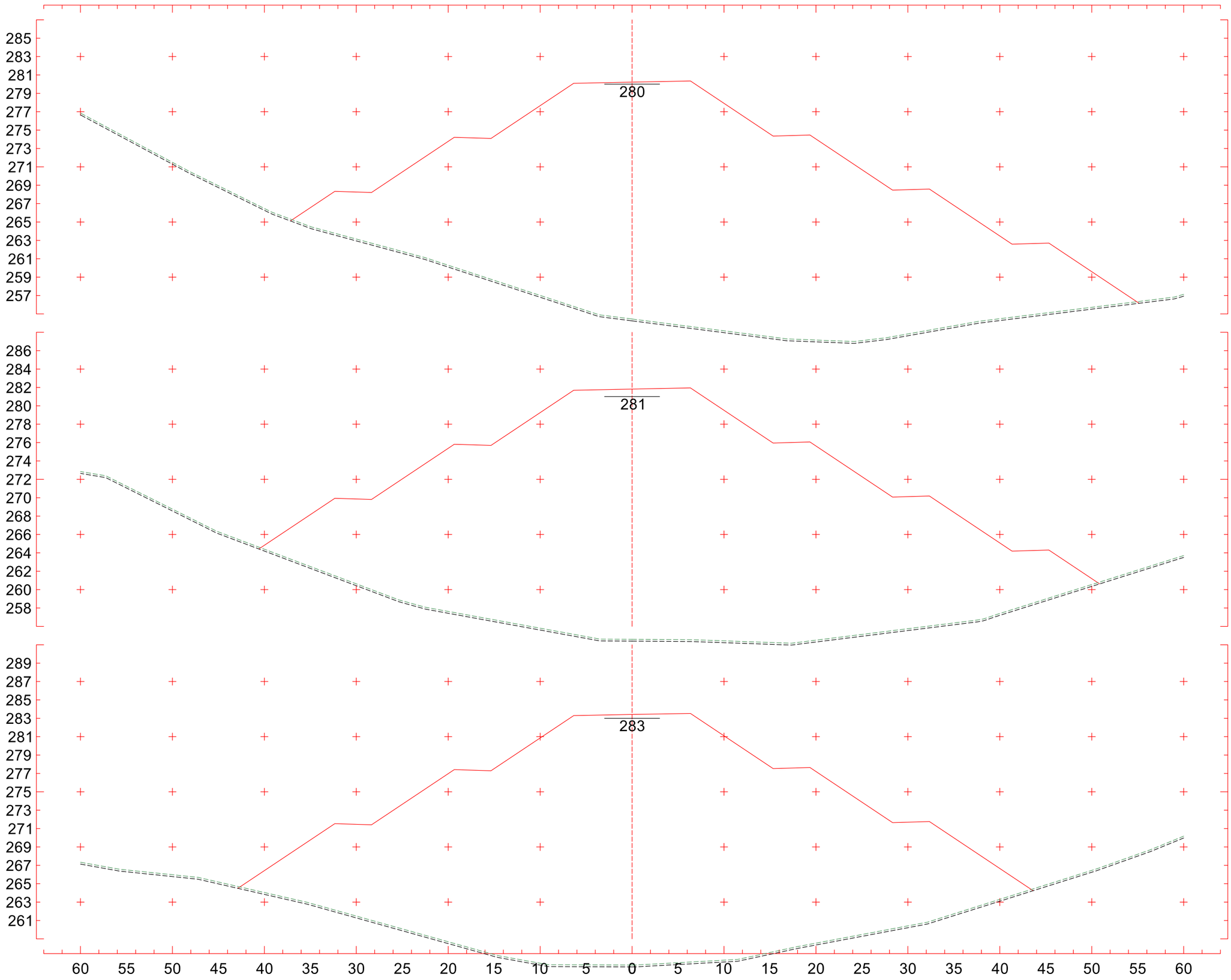
Projeto Ponto de Partida 2021/1



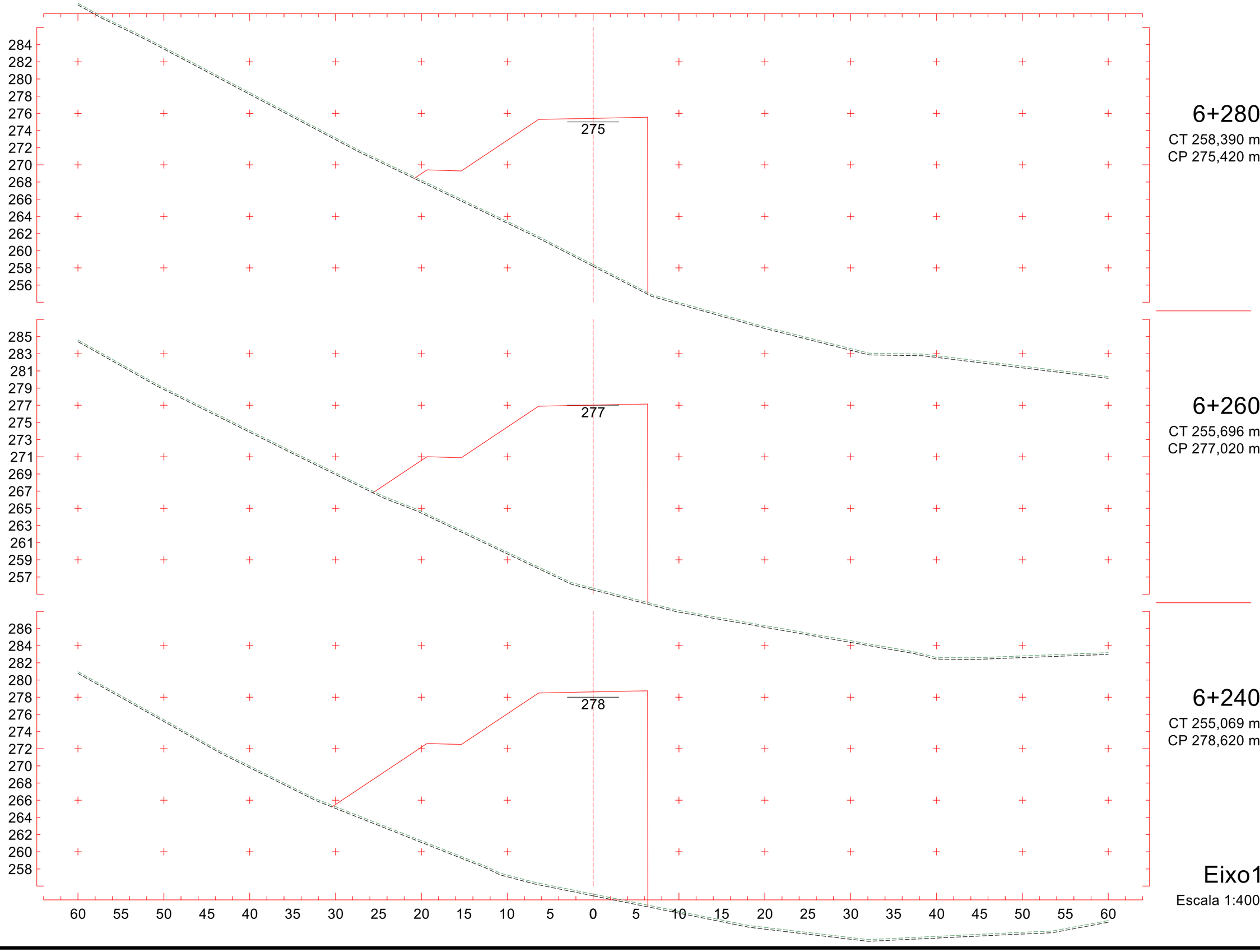
Projeto Ponto de Partida 2021/1



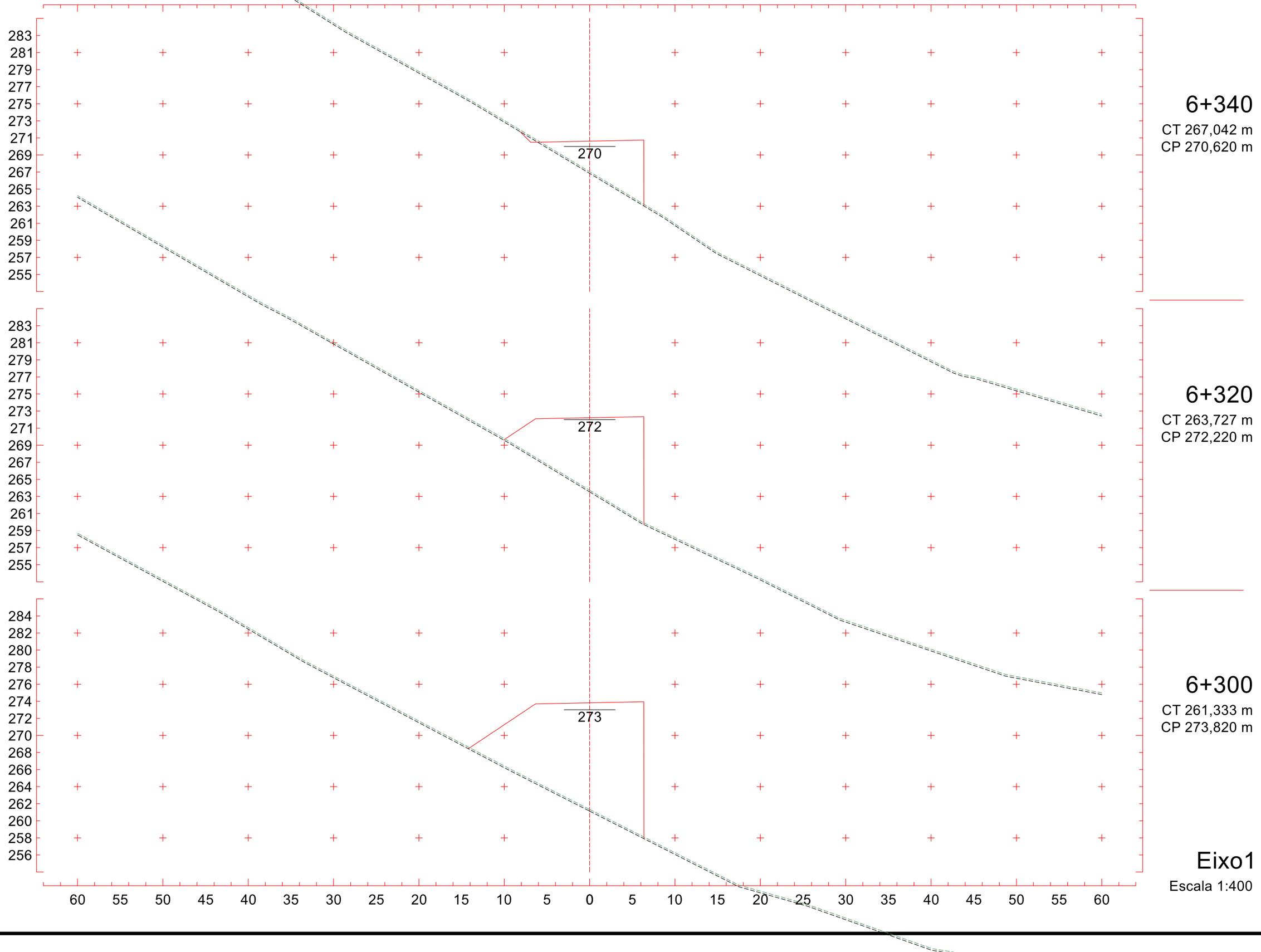
Projeto Ponto de Partida 2021/1



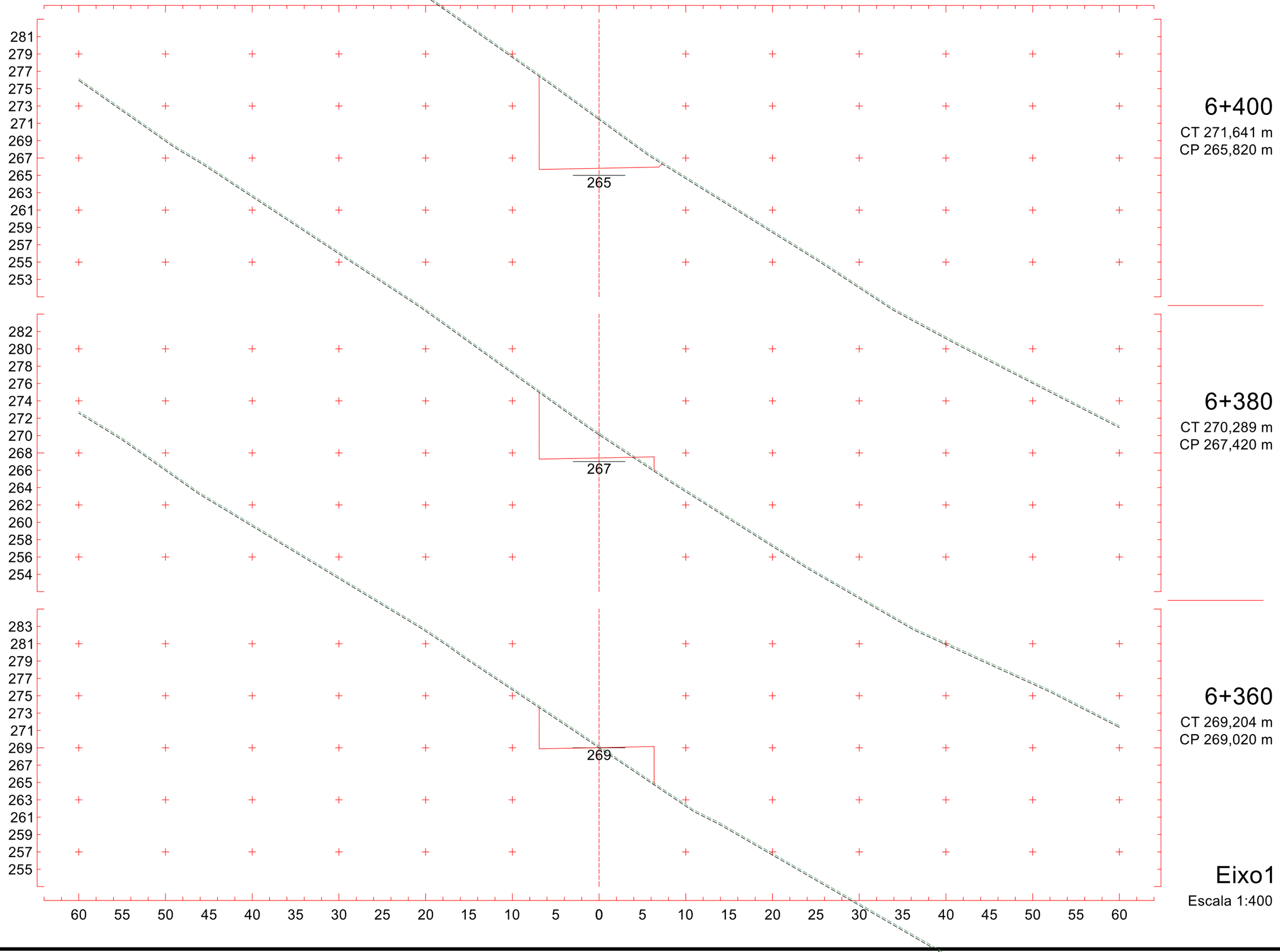
Projeto Ponto de Partida 2021/1



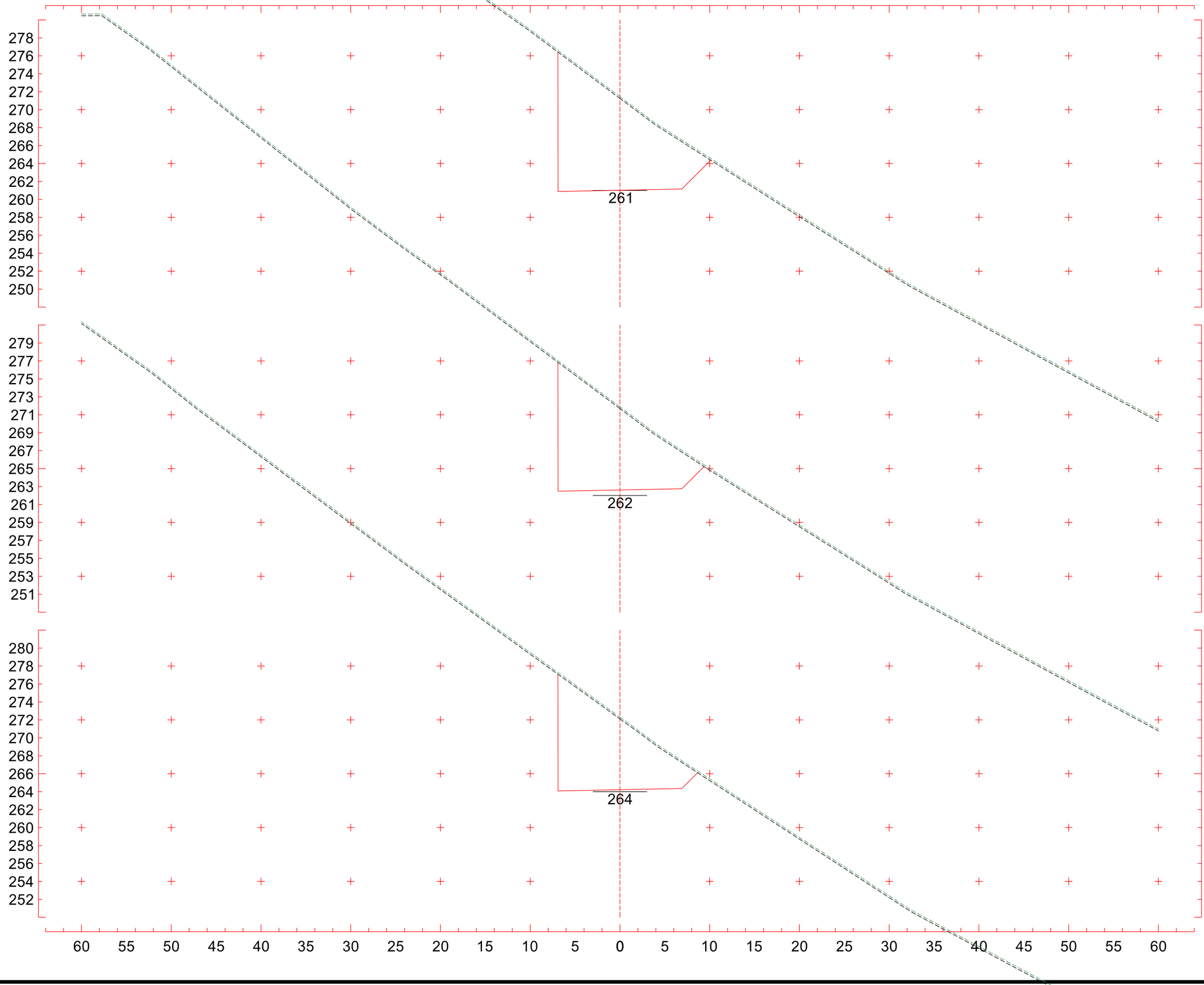
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



6+460

CT 271,454 m
CP 261,020 m

6+440

CT 271,889 m
CP 262,620 m

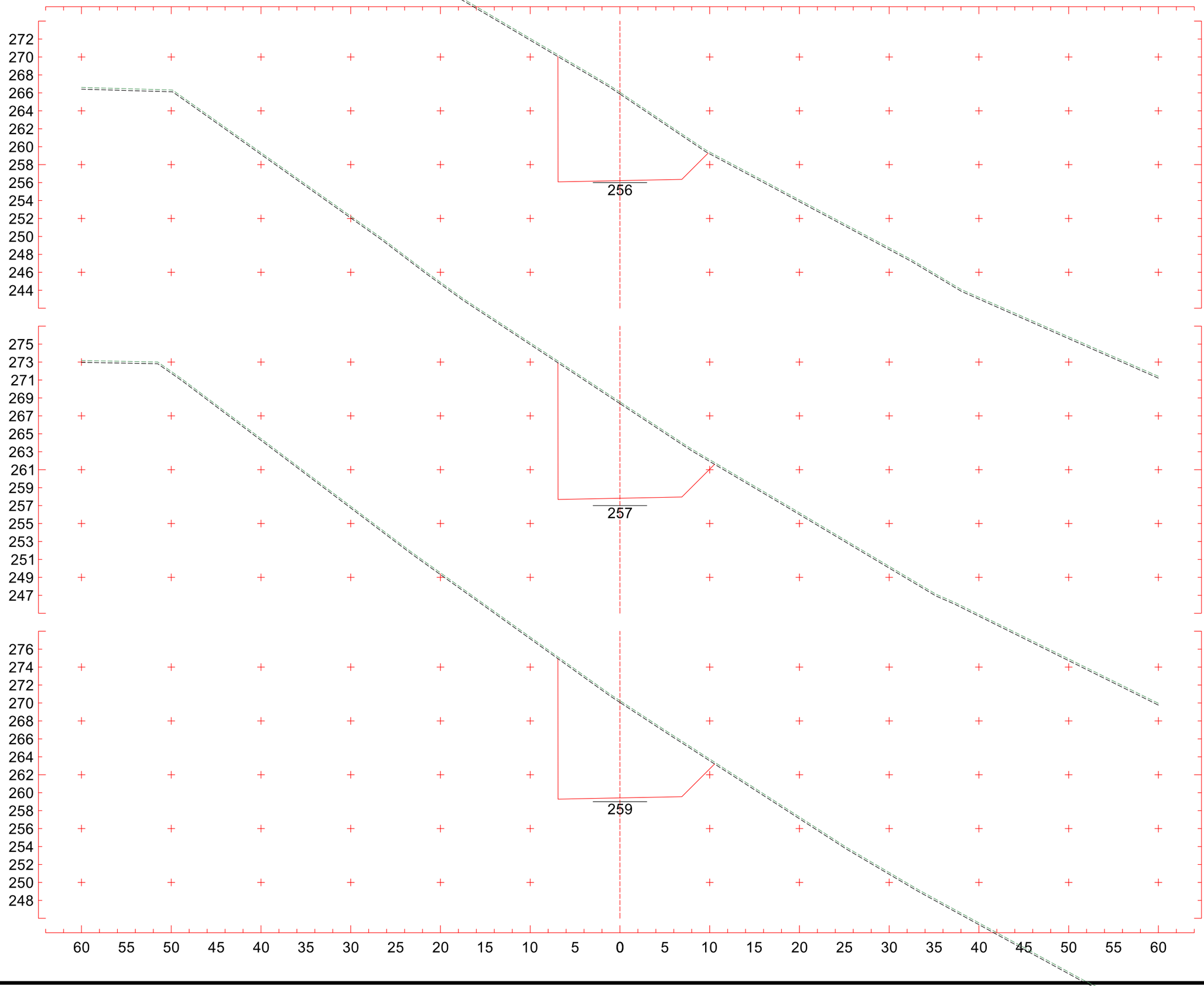
6+420

CT 272,309 m
CP 264,220 m

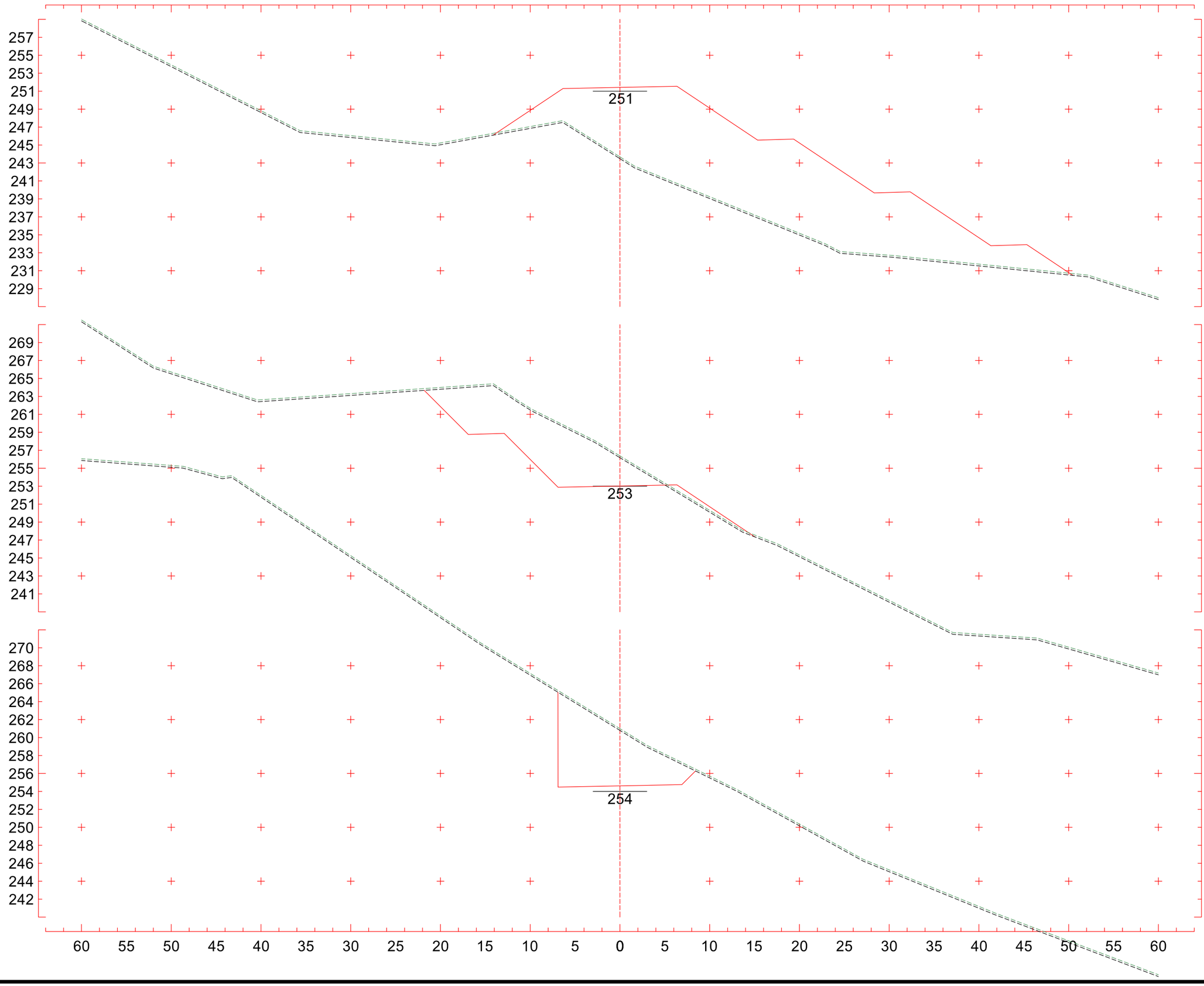
Eixo1

Escala 1:400

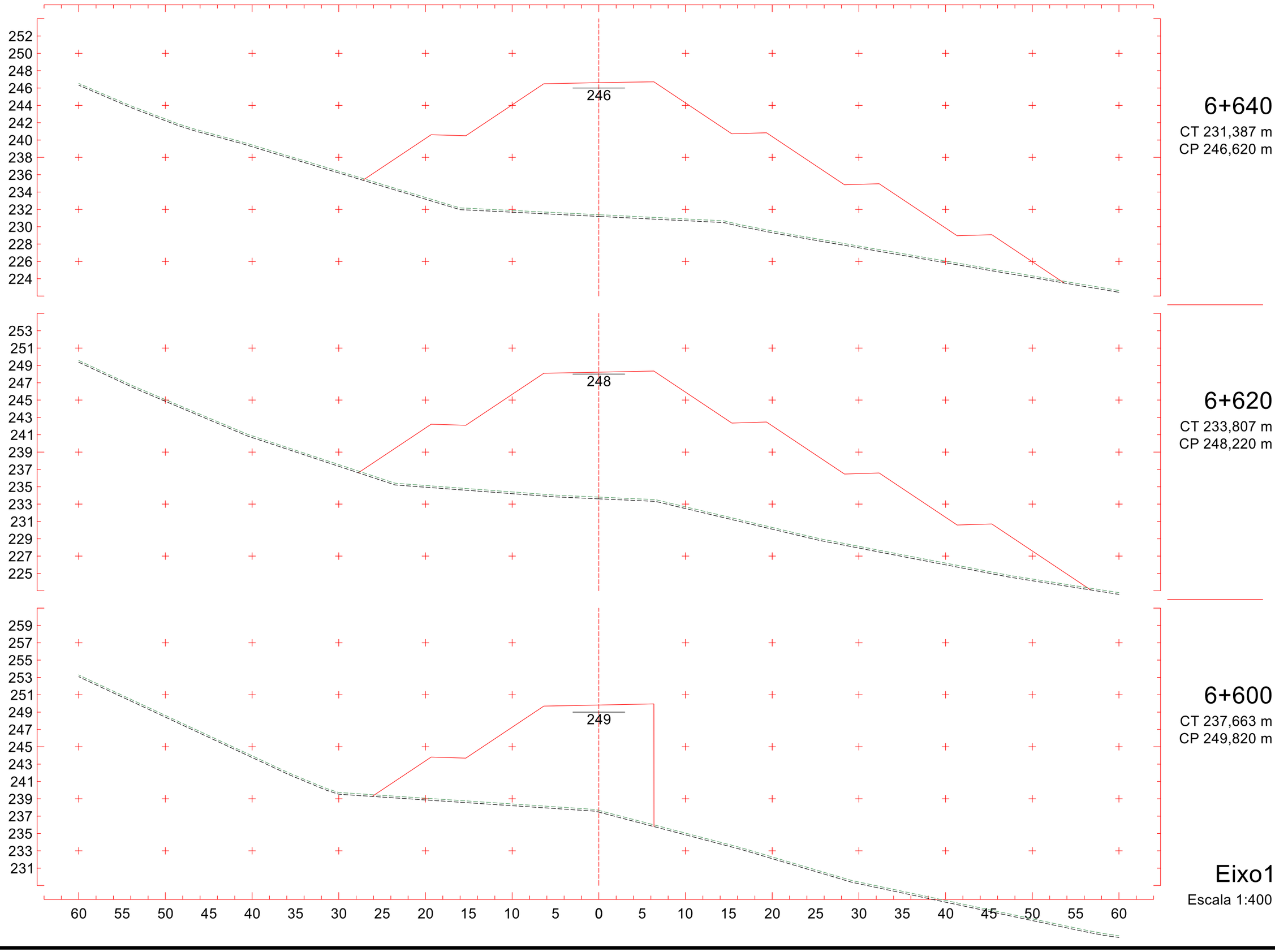
Projeto Ponto de Partida 2021/1



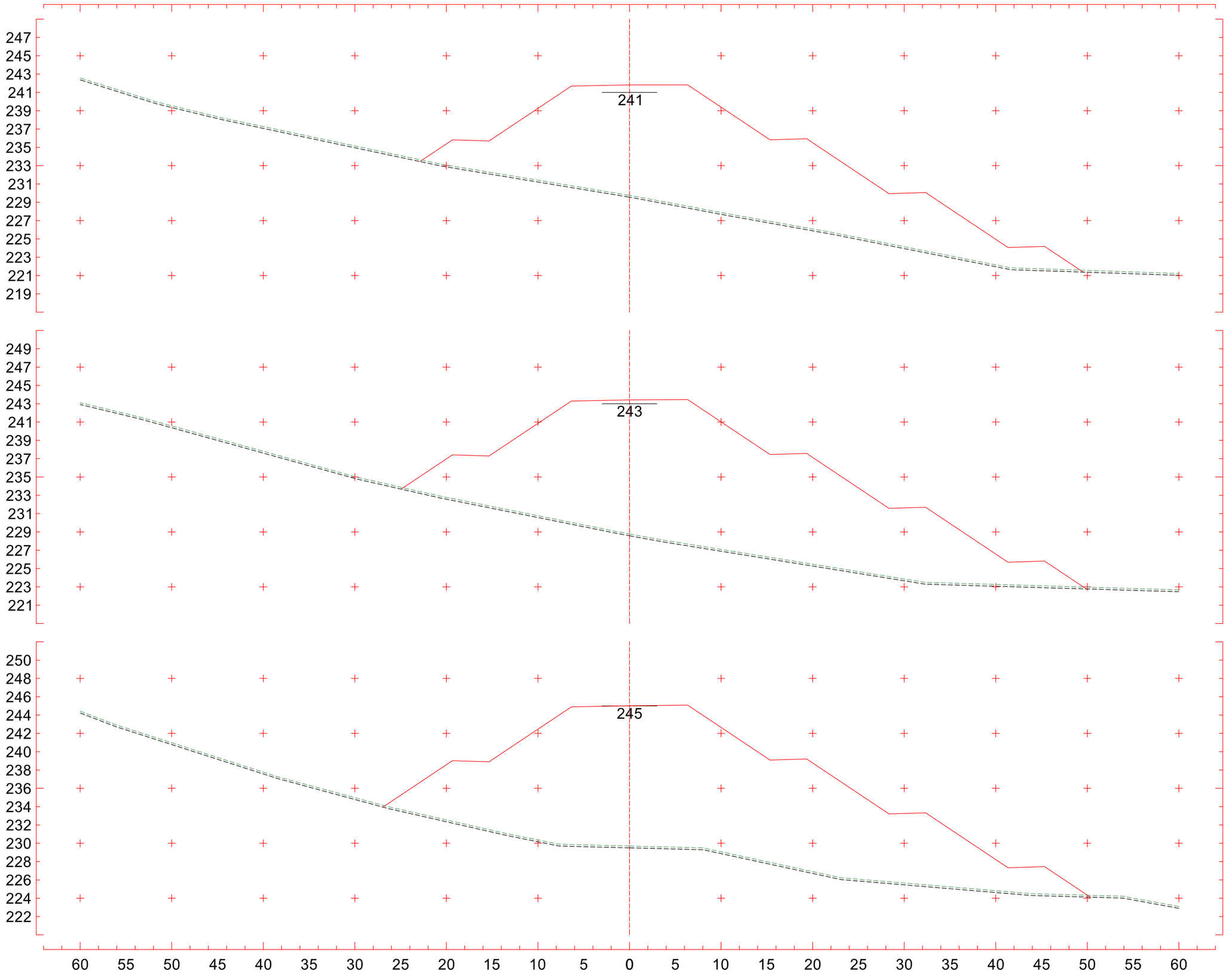
Projeto Ponto de Partida 2021/1



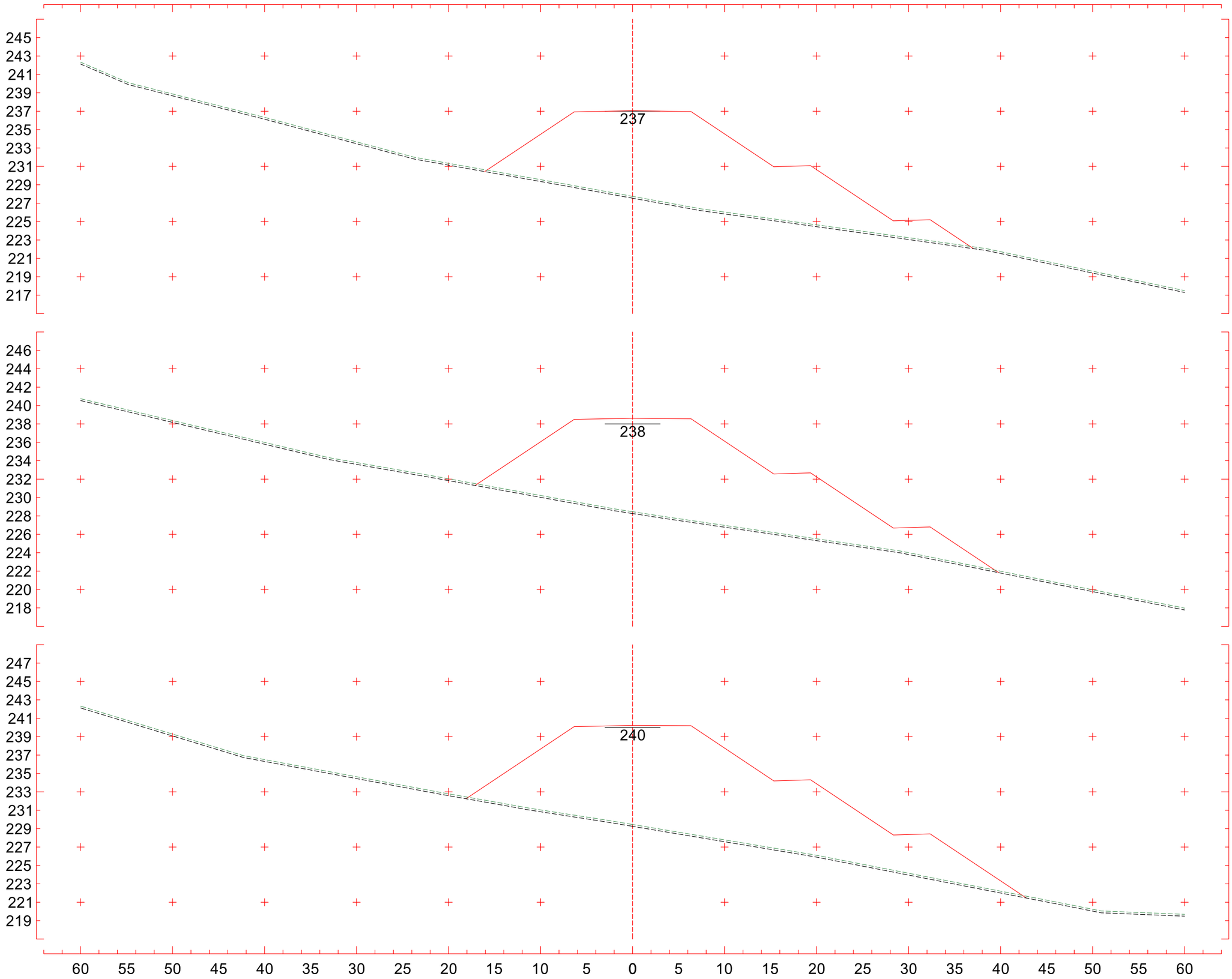
Projeto Ponto de Partida 2021/1



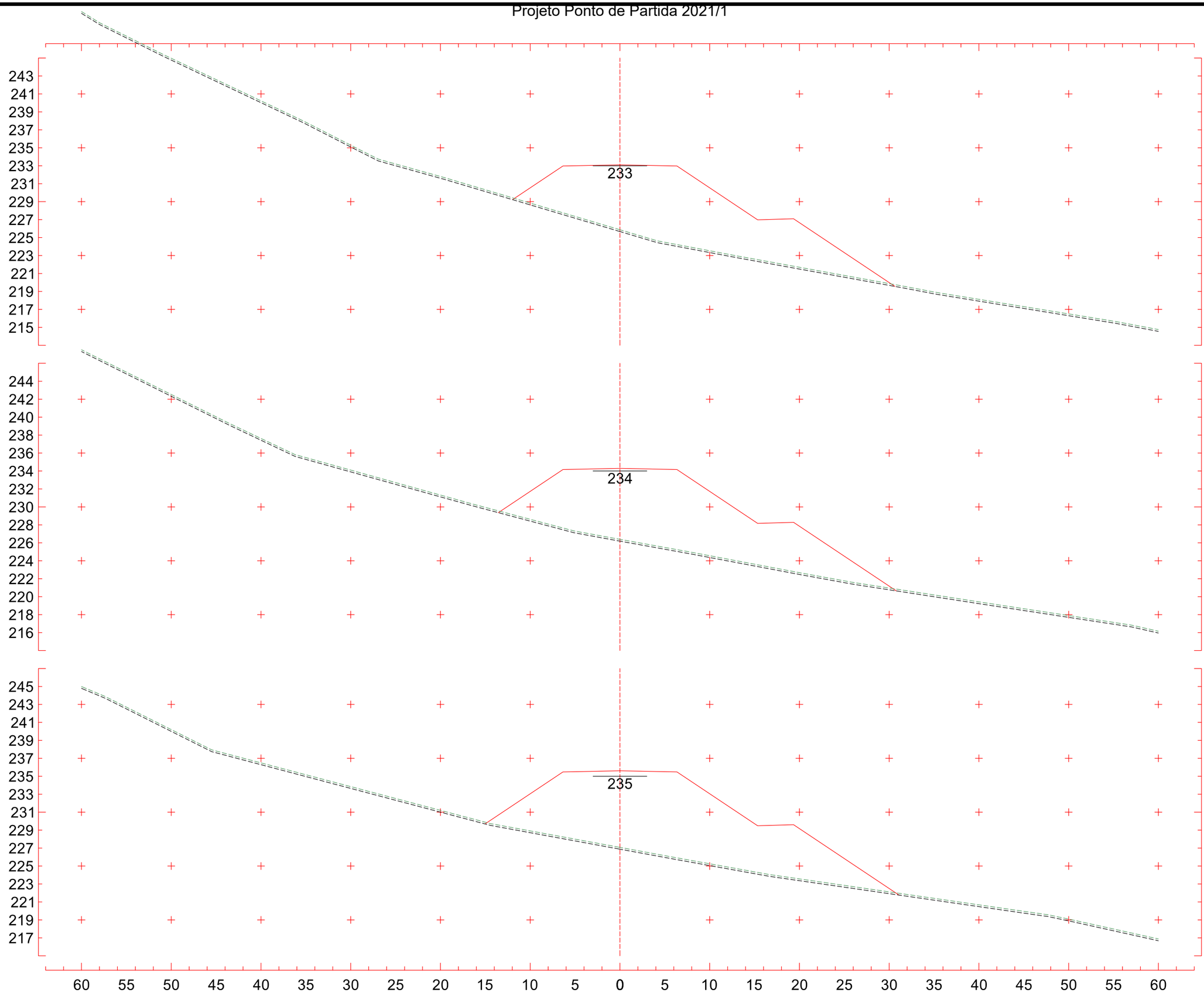
Projeto Ponto de Partida 2021/1



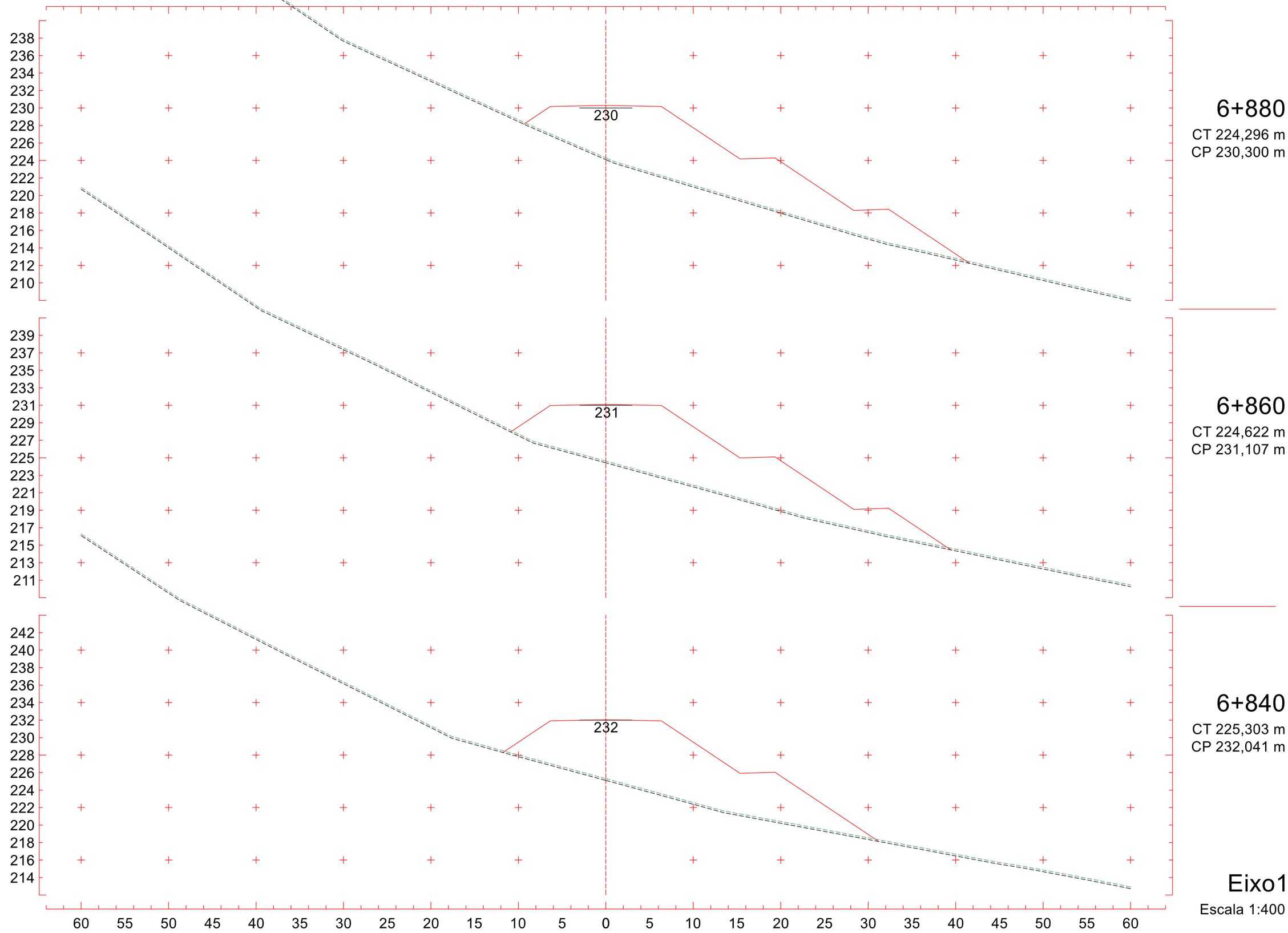
Projeto Ponto de Partida 2021/1



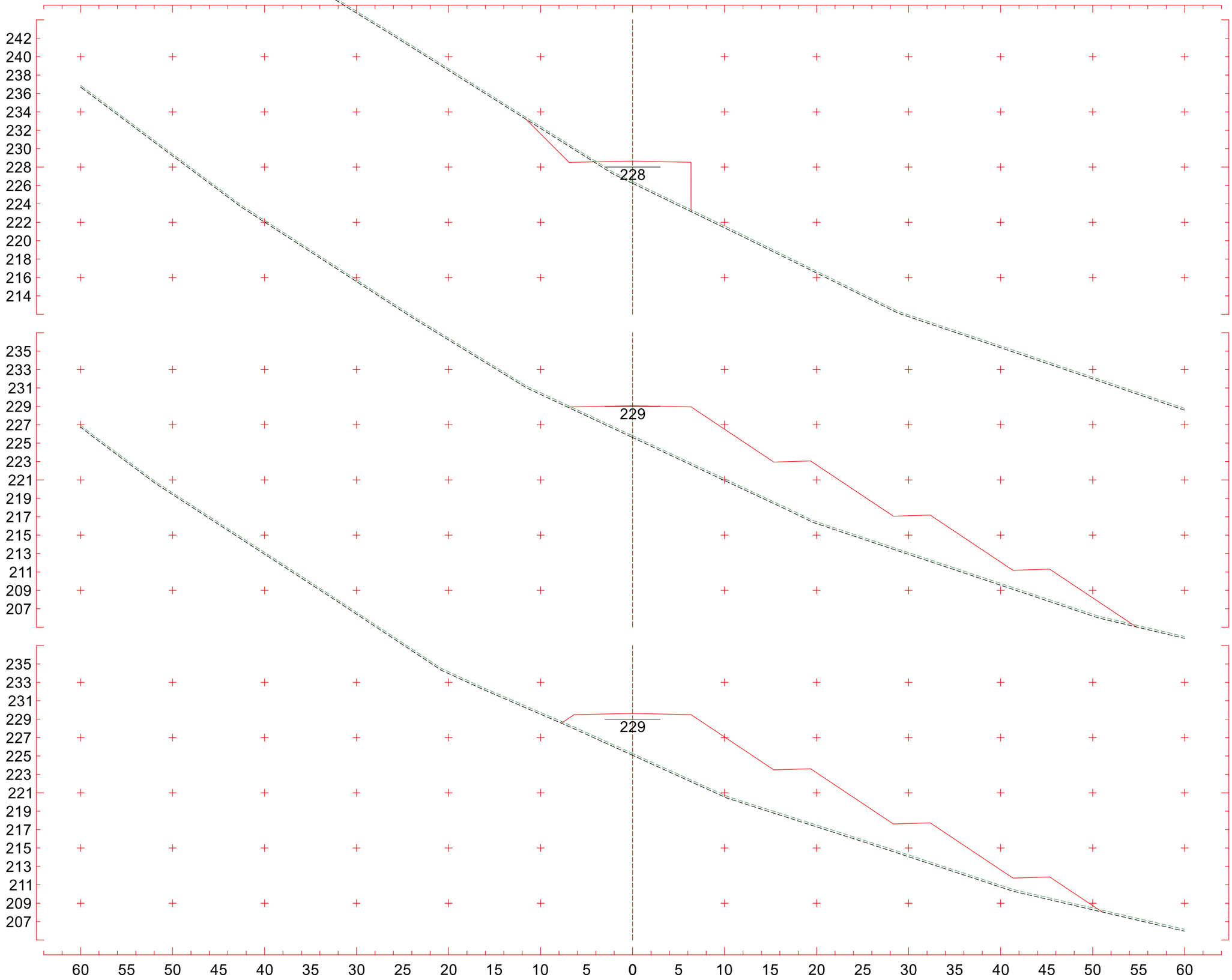
Projeto Ponto de Partida 2021/1



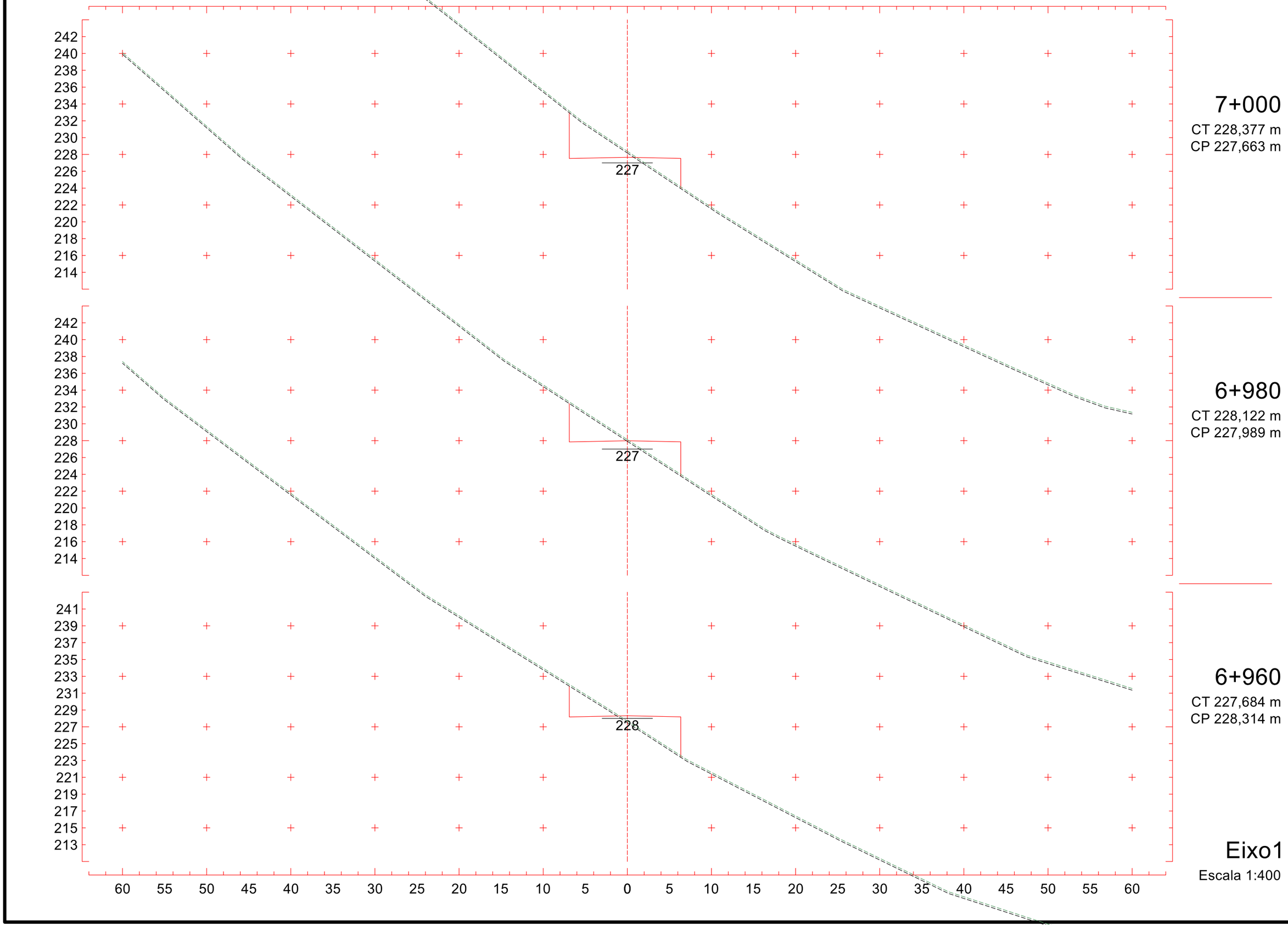
Projeto Ponto de Partida 2021/1



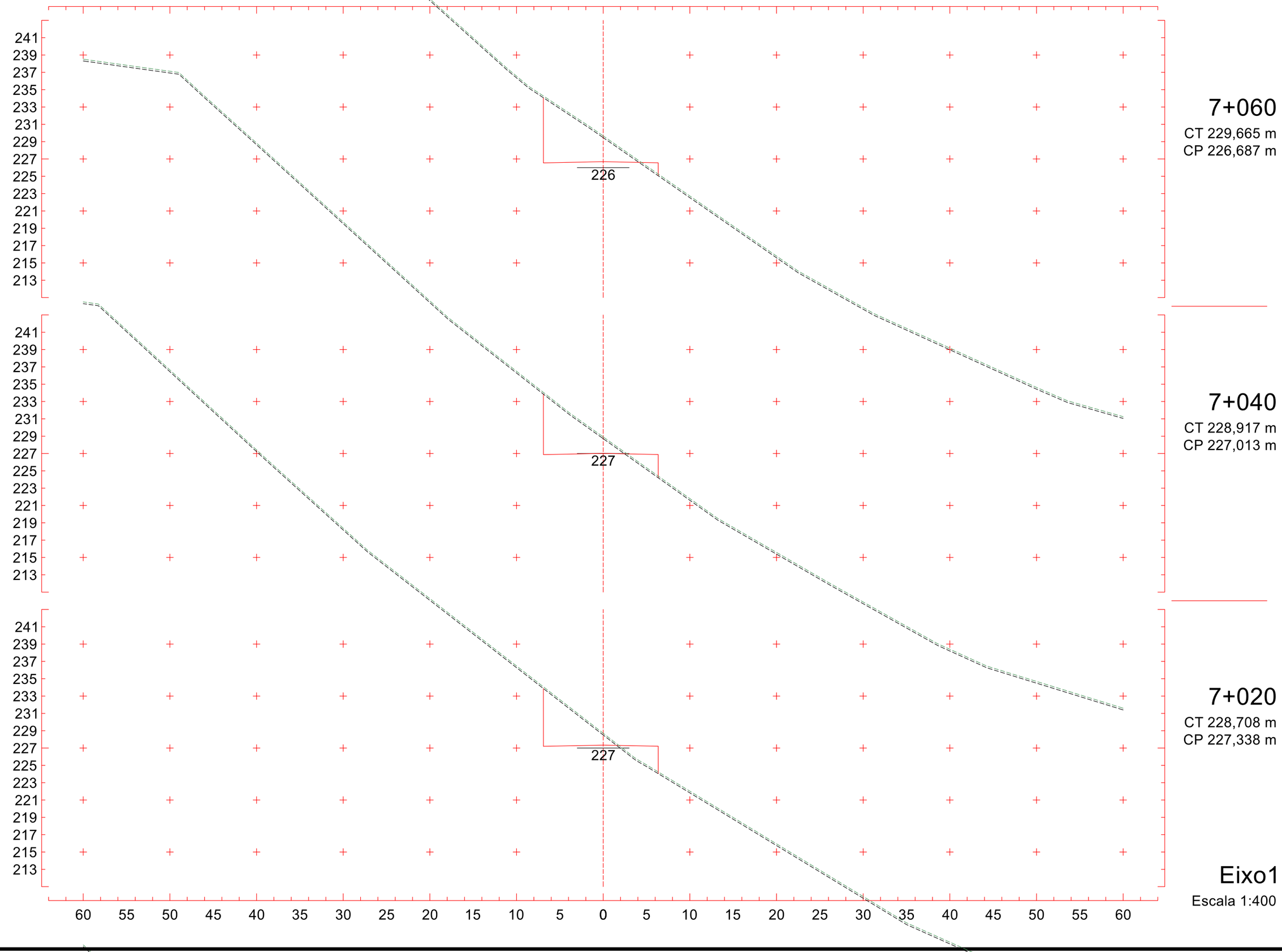
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



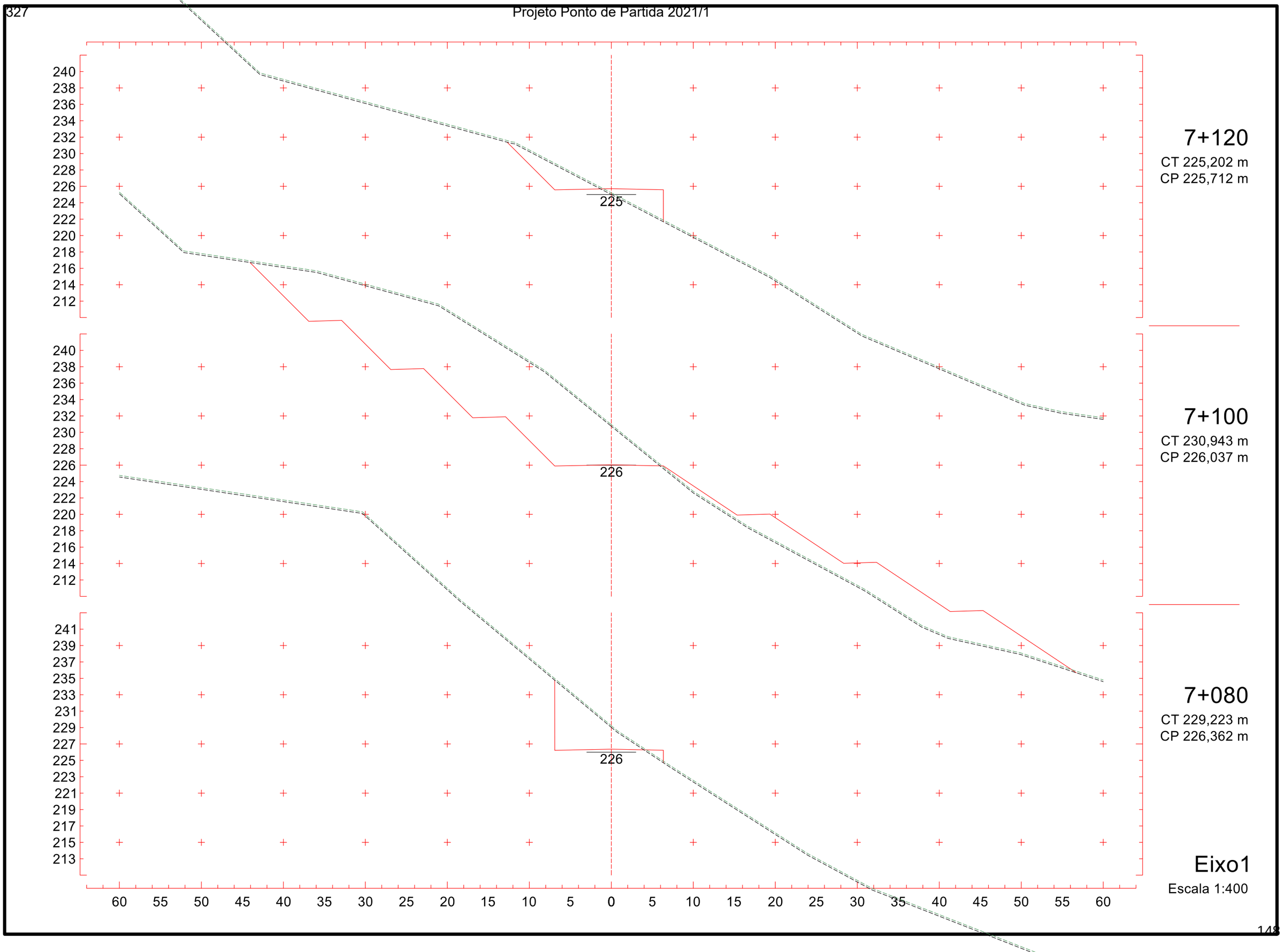
7+060
CT 229,665 m
CP 226,687 m

7+040
CT 228,917 m
CP 227,013 m

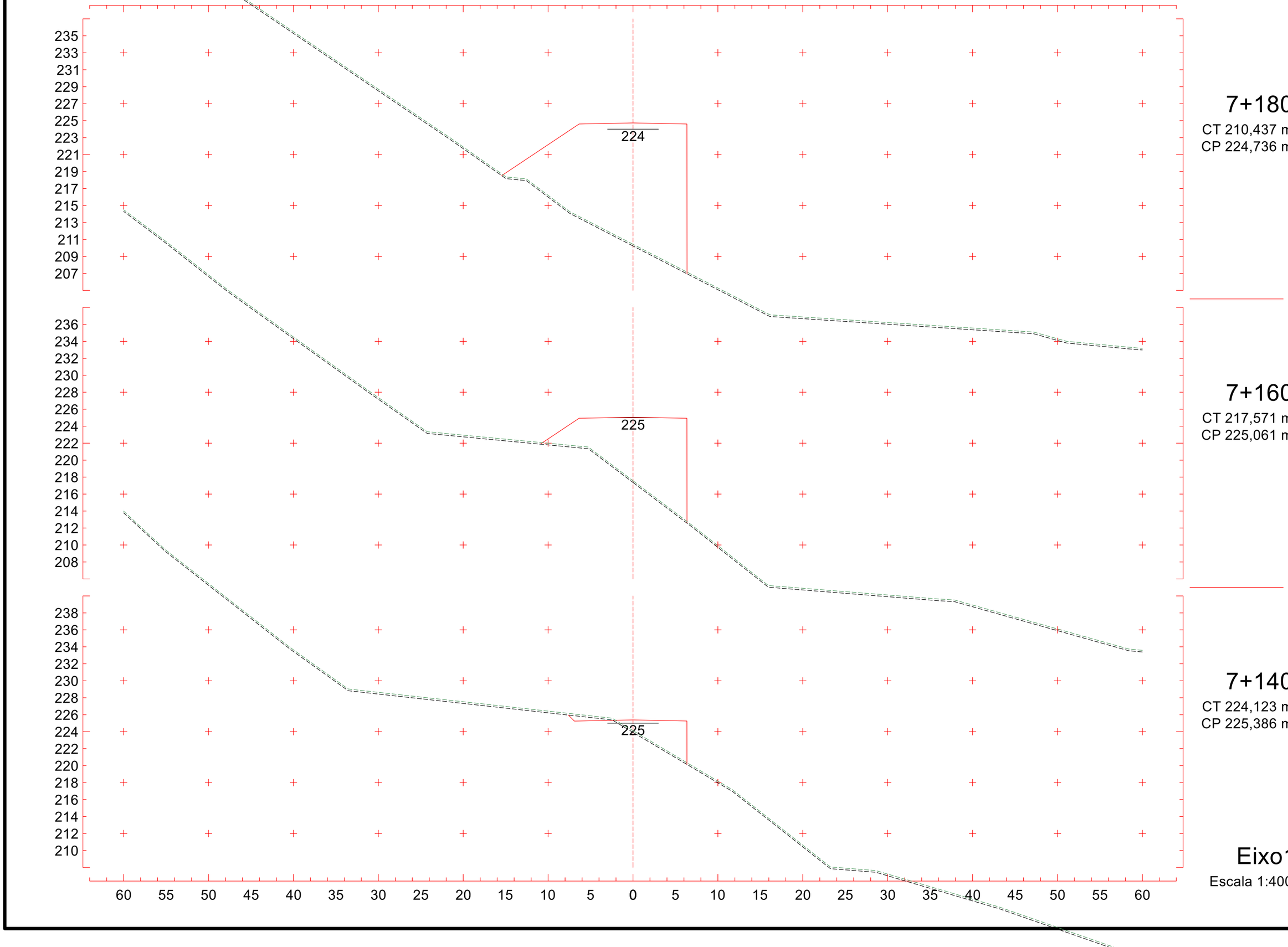
7+020
CT 228,708 m
CP 227,338 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1

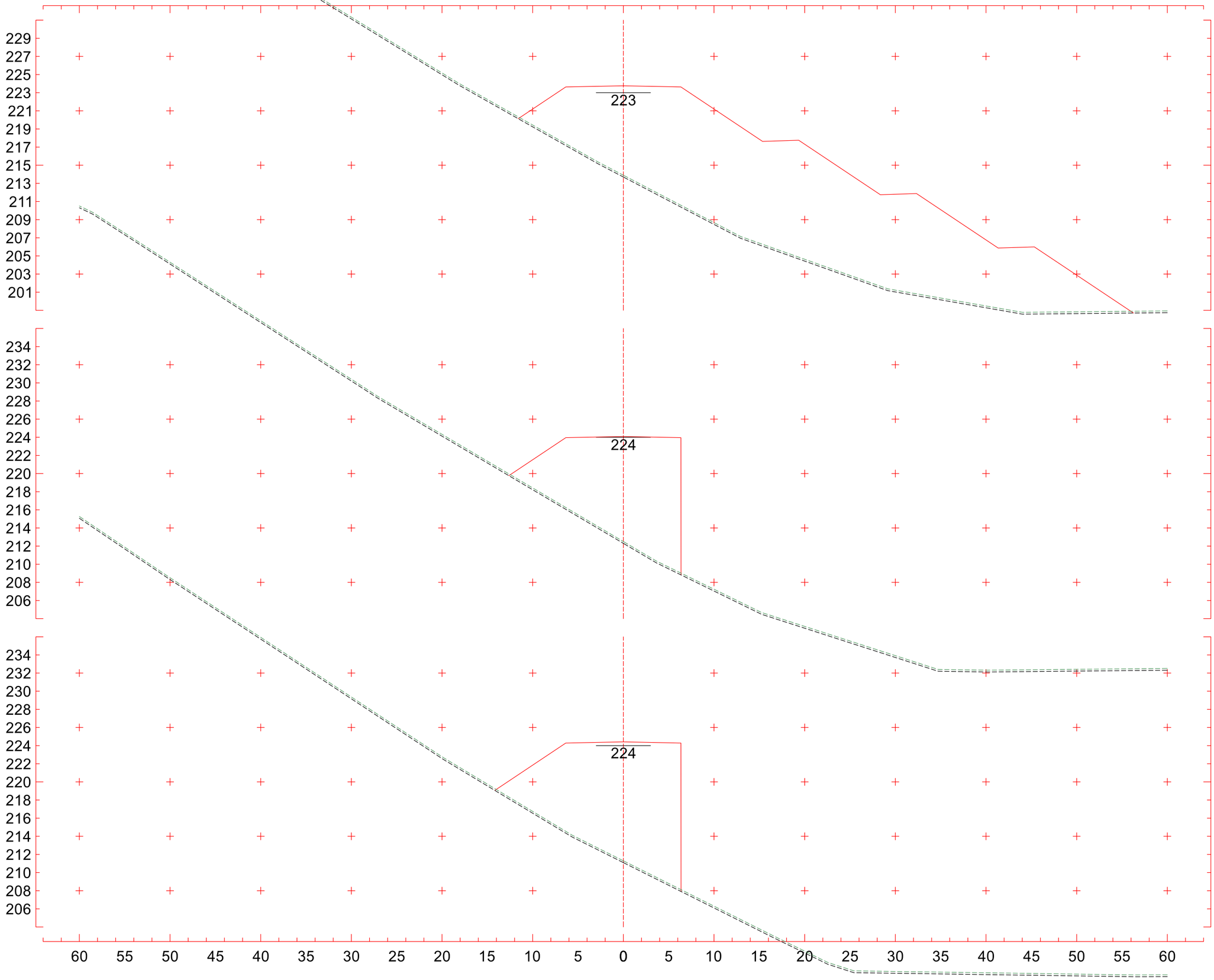


Projeto Ponto de Partida 2021/1



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Projeto Ponto de Partida 2021/1



7+240

CT 213,901 m
CP 223,760 m

7+220

CT 212,504 m
CP 224,085 m

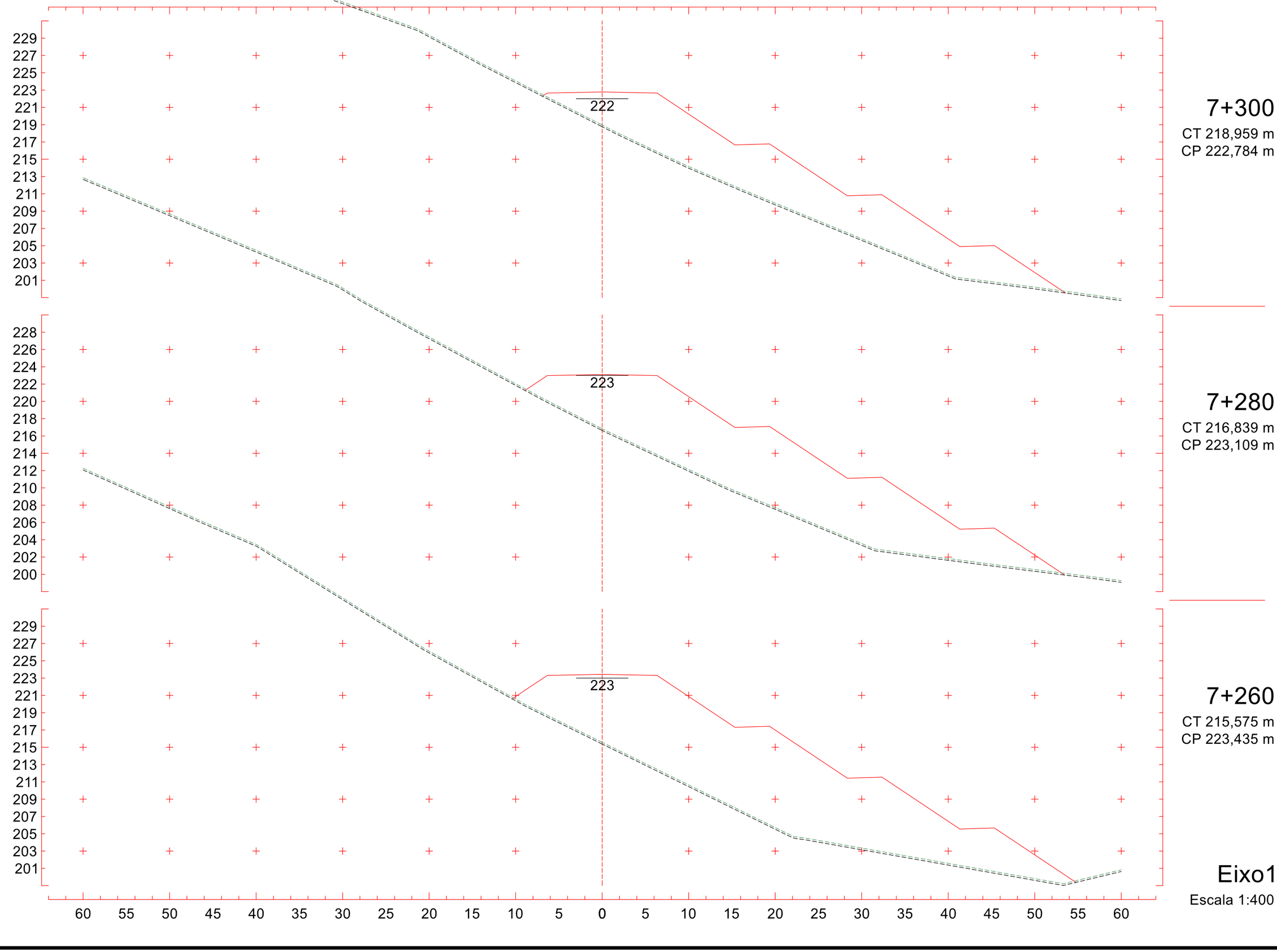
7+200

CT 211,298 m
CP 224,410 m

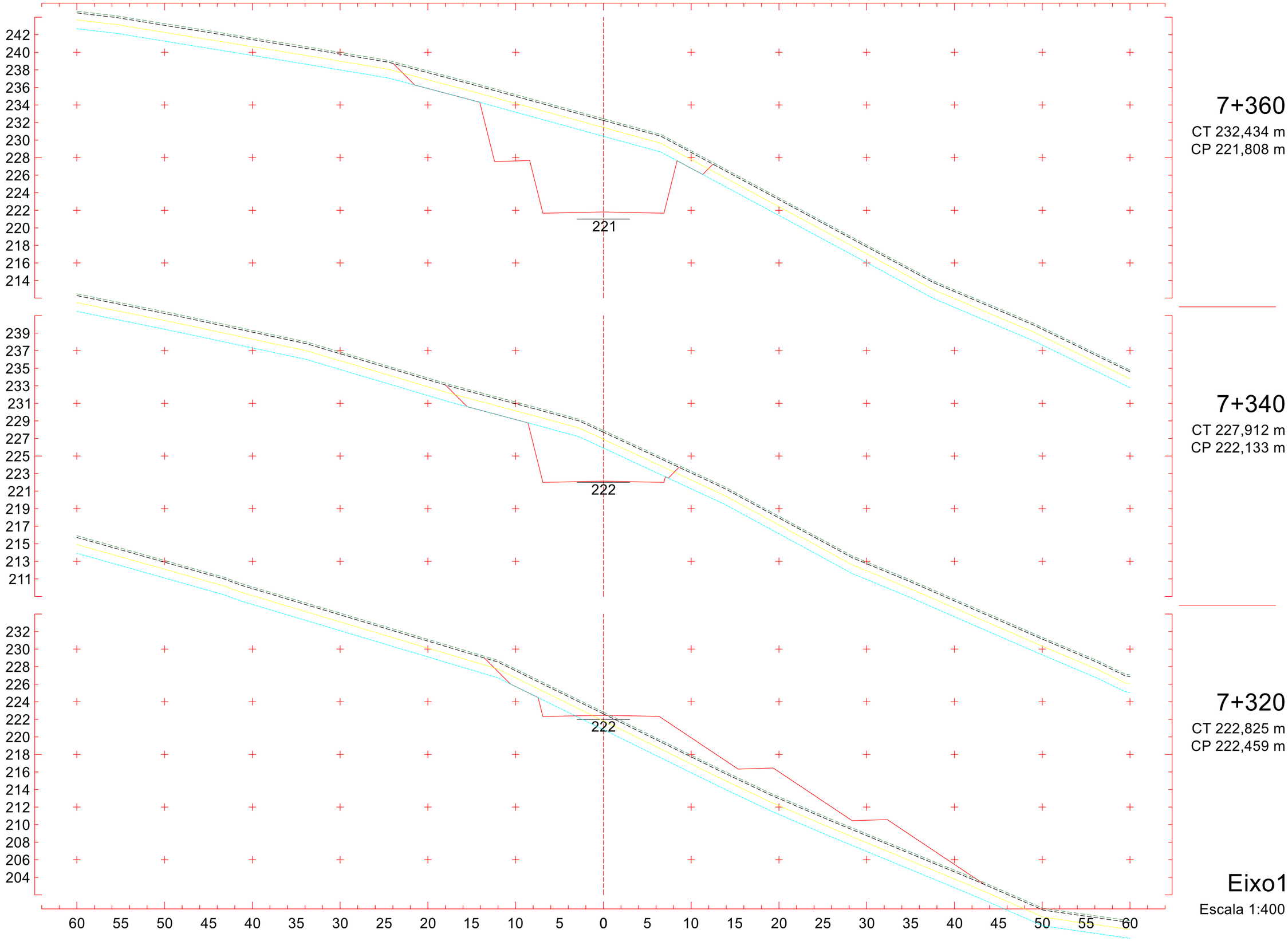
Eixo1

Escala 1:400

Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



7+360

CT 232,434 m
CP 221,808 m

7+340

CT 227,912 m
CP 222,133 m

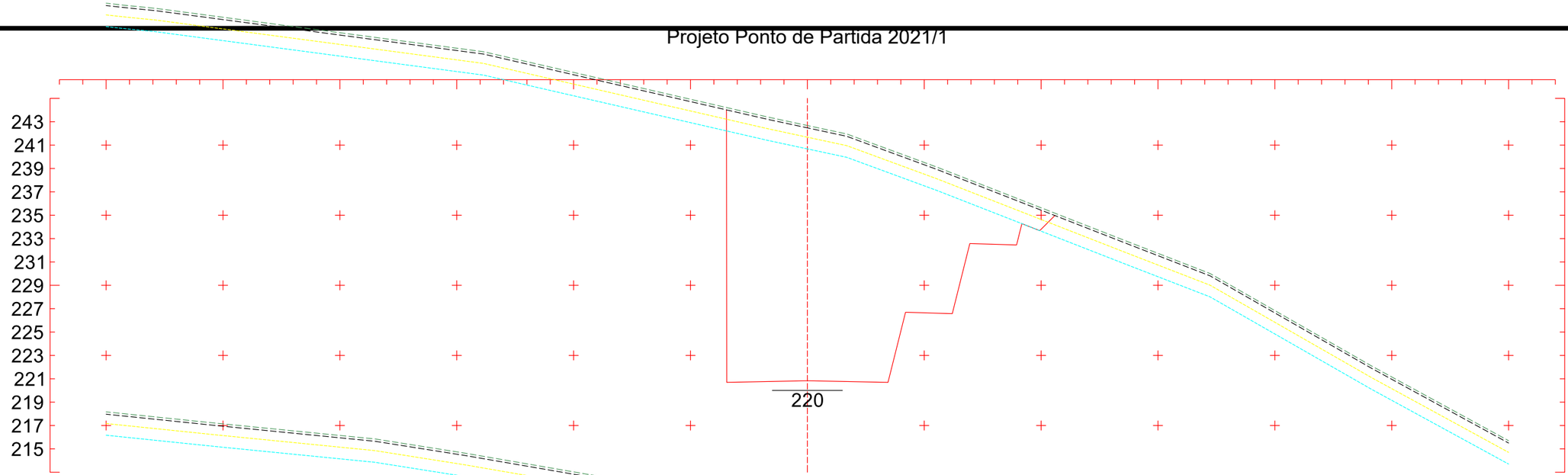
7+320

CT 222,825 m
CP 222,459 m

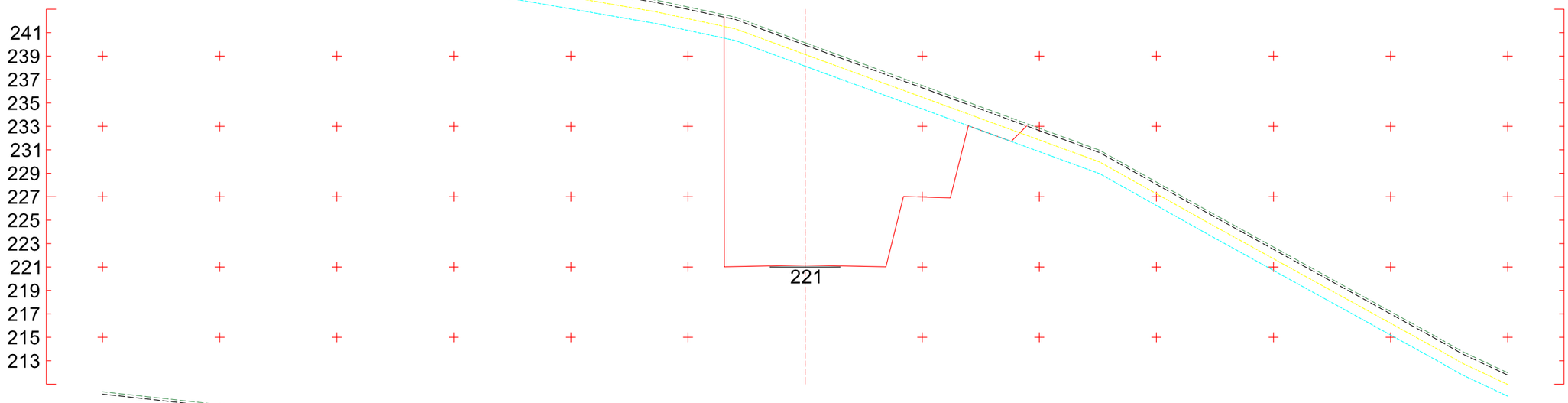
Eixo1

Escala 1:400

Projeto Ponto de Partida 2021/1



7+420
CT 242,678 m
CP 220,832 m

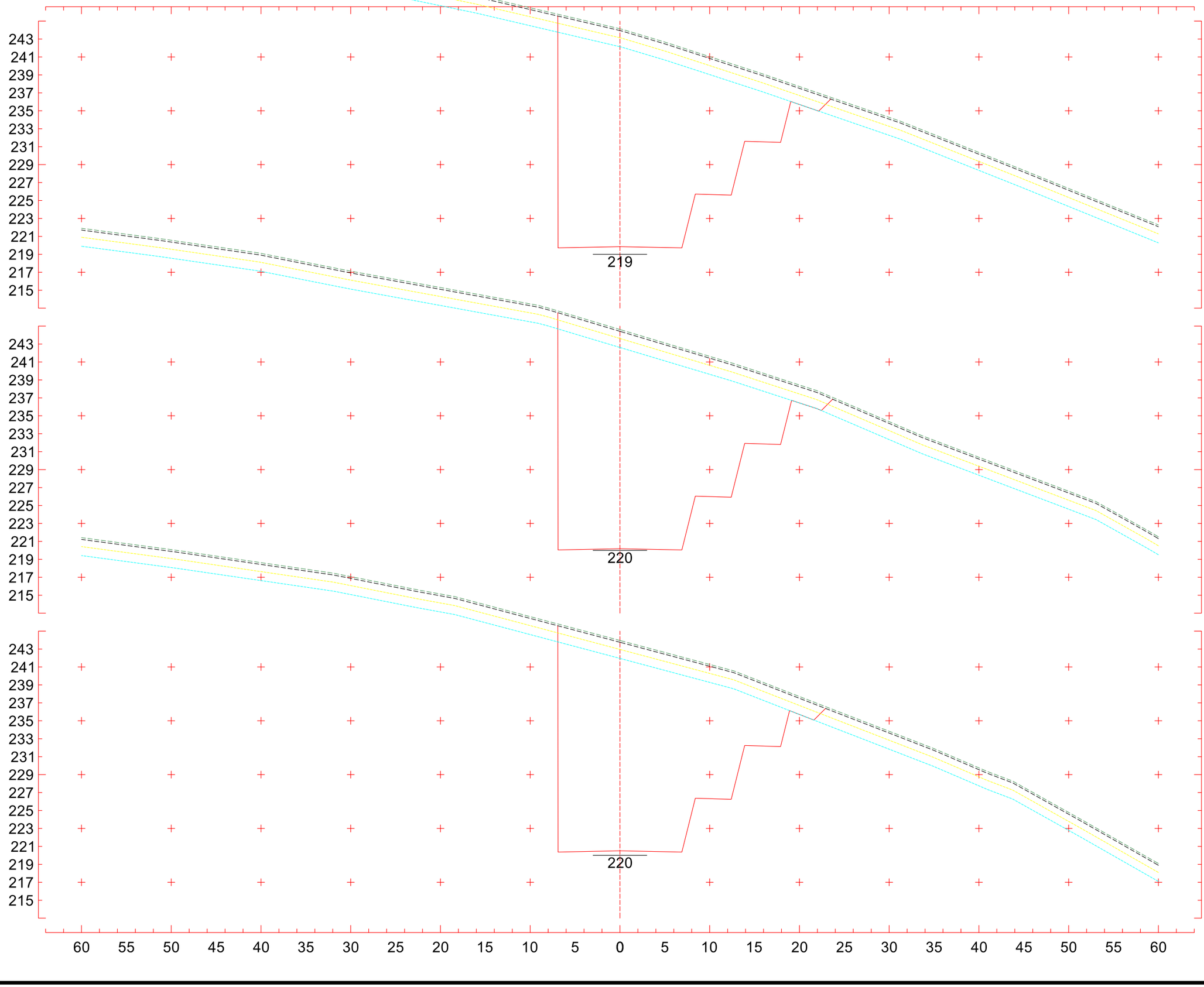


7+400
CT 240,139 m
CP 221,158 m

7+380
CT 236,644 m
CP 221,483 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



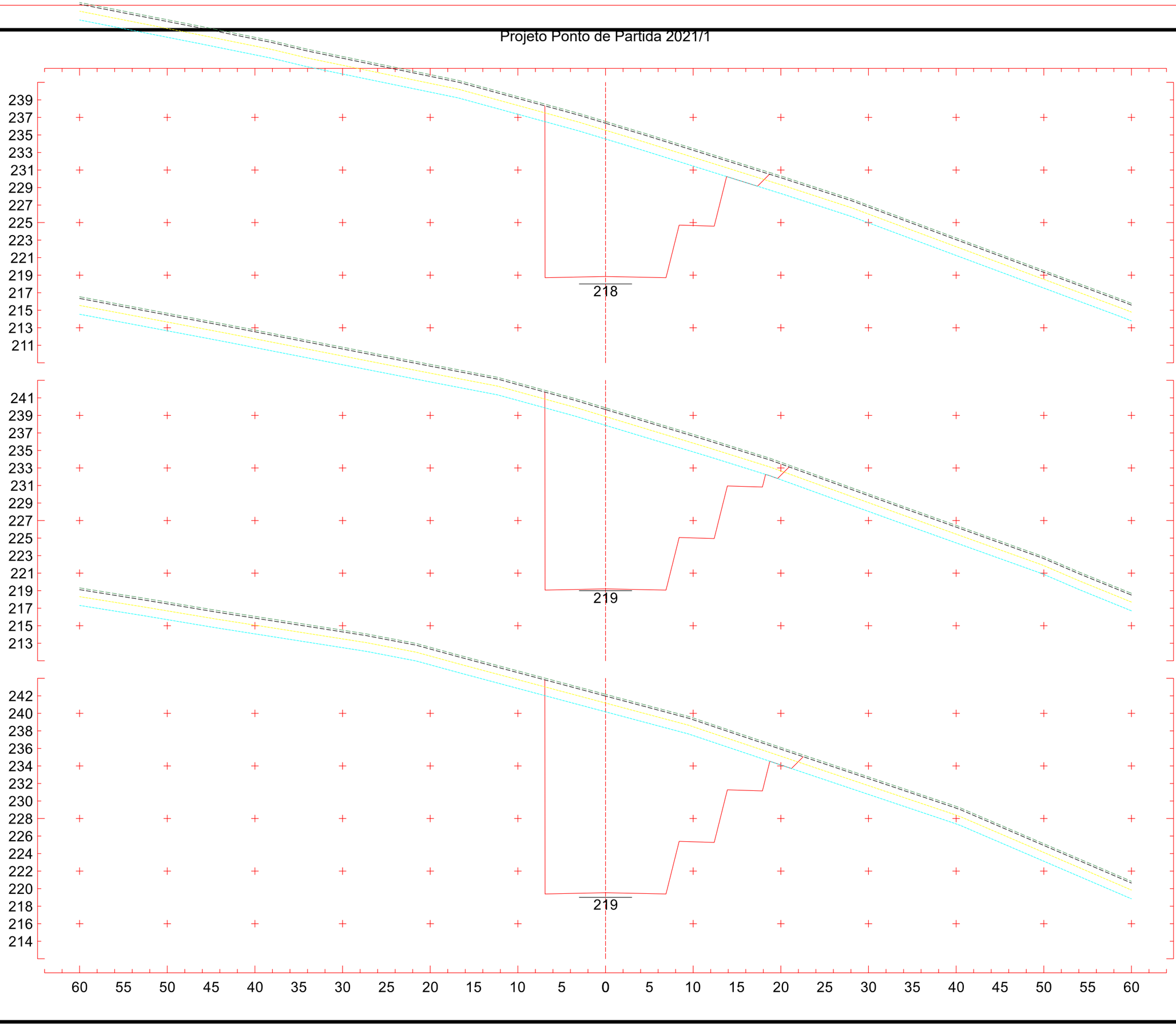
7+480
CT 244,145 m
CP 219,856 m

7+460
CT 244,619 m
CP 220,182 m

7+440
CT 243,956 m
CP 220,507 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



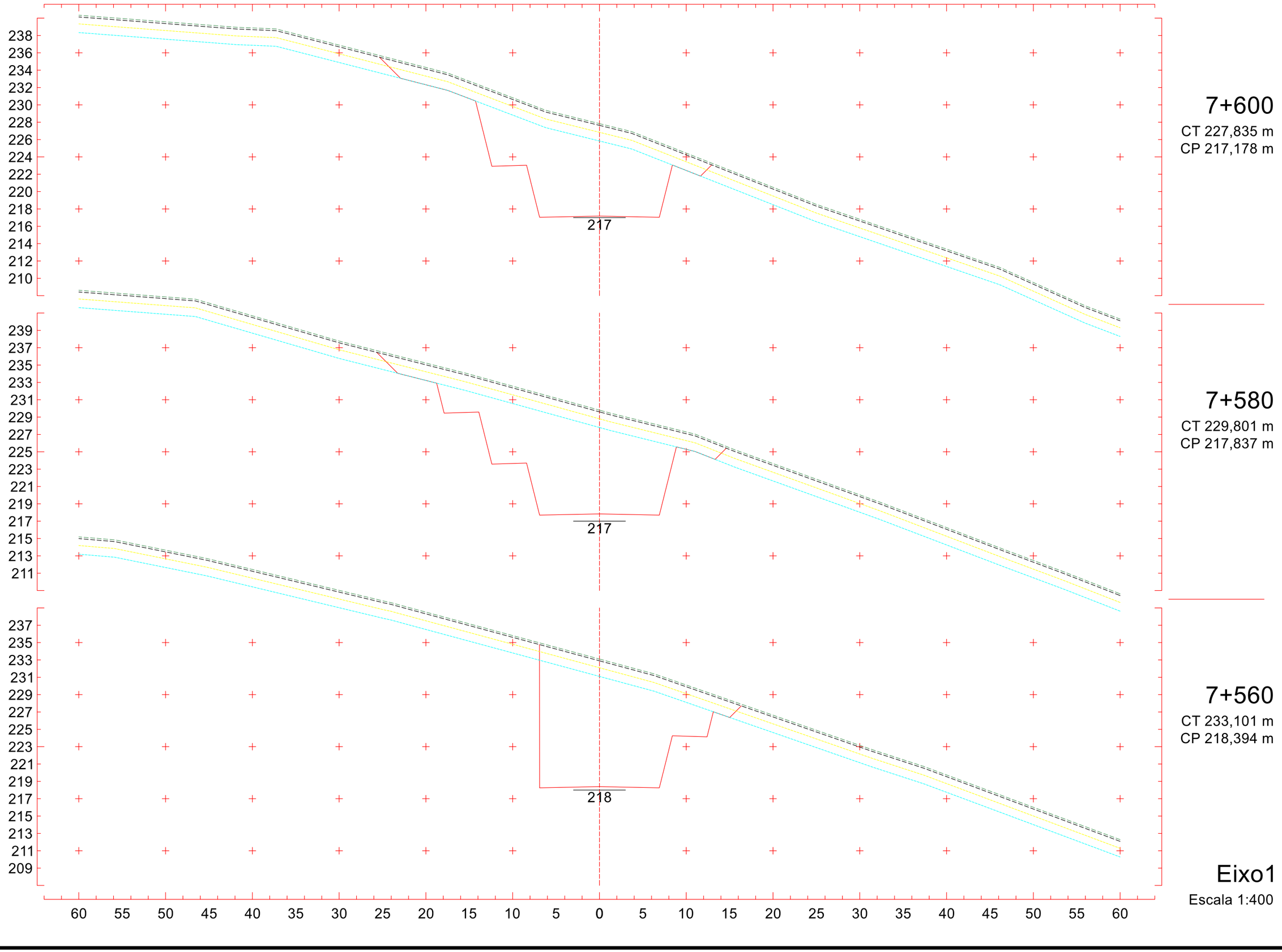
7+540
CT 236,539 m
CP 218,850 m

7+520
CT 239,867 m
CP 219,206 m

7+500
CT 242,176 m
CP 219,531 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



7+600

CT 227,835 m
CP 217,178 m

7+580

CT 229,801 m
CP 217,837 m

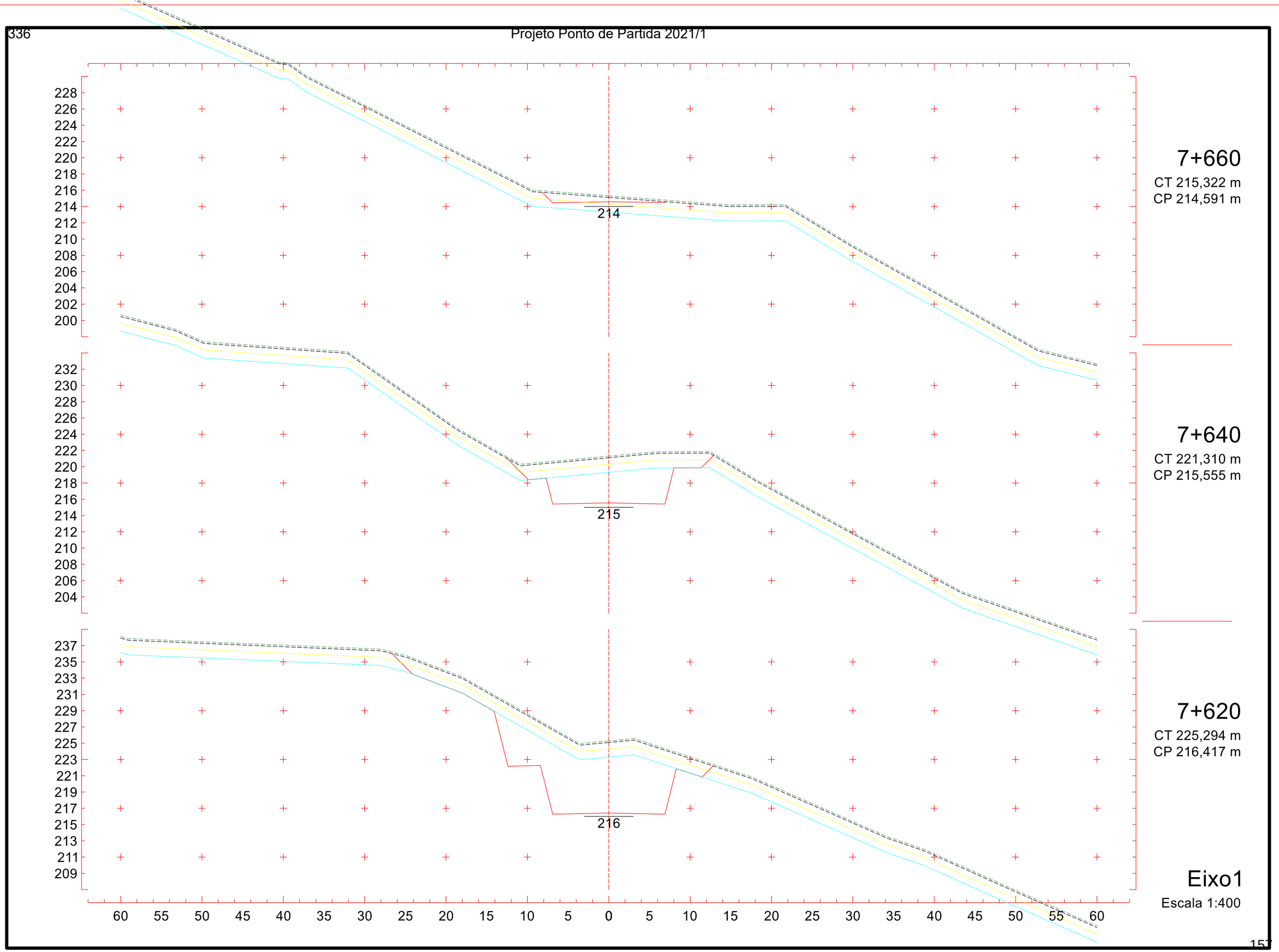
7+560

CT 233,101 m
CP 218,394 m

Eixo1

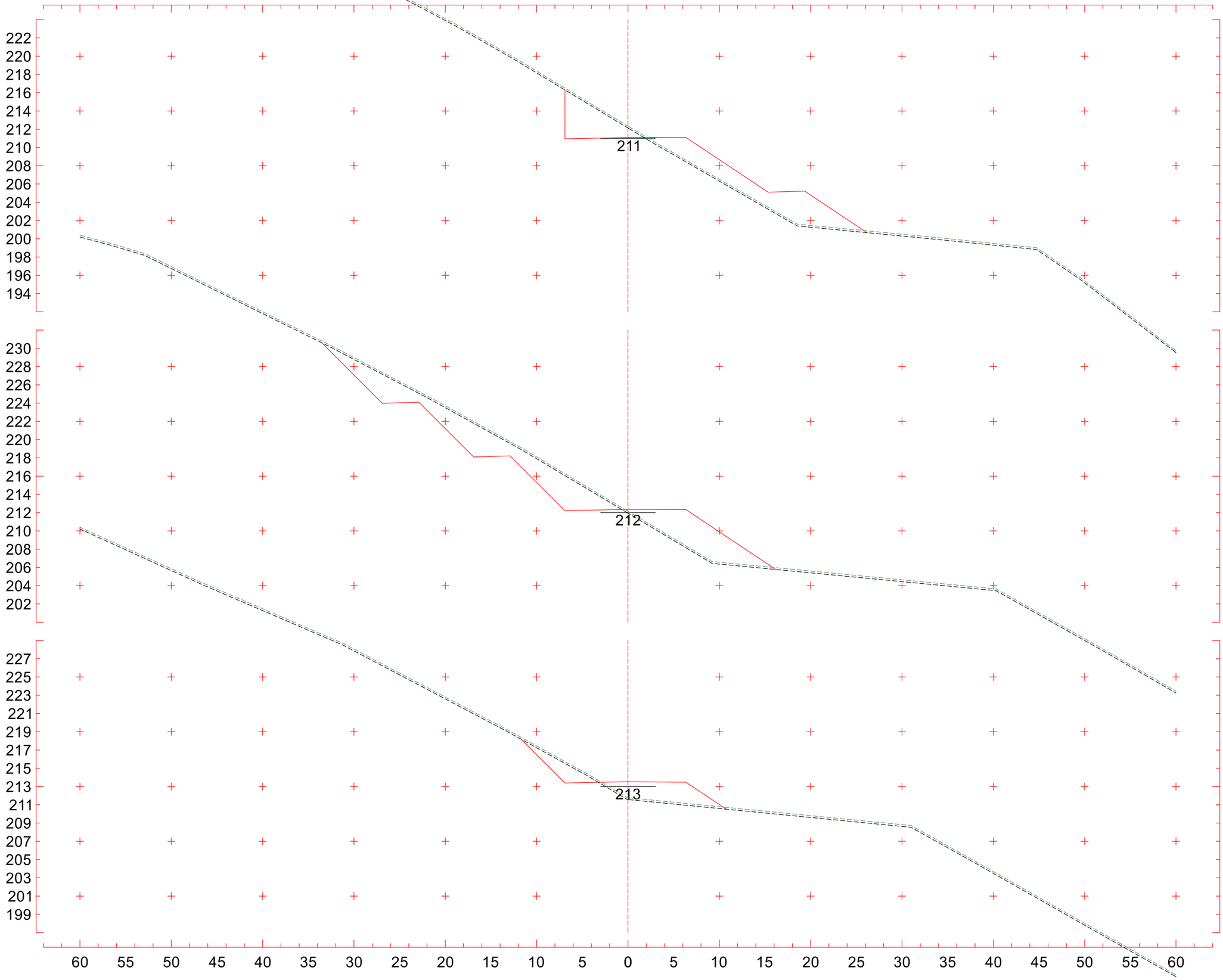
Escala 1:400

Projeto Ponto de Partida 2021/1



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Projeto Ponto de Partida 2021/1



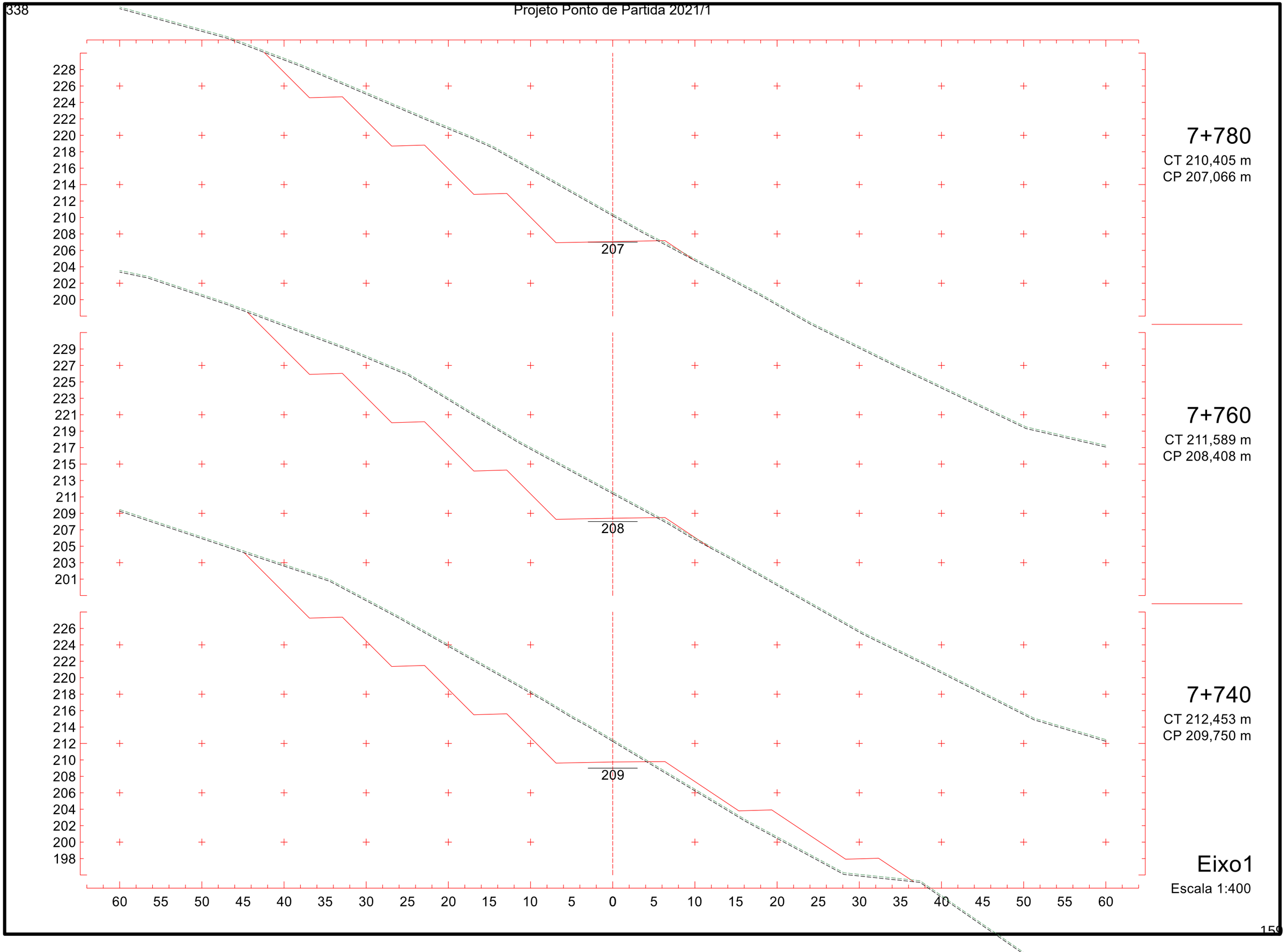
7+720
CT 212,339 m
CP 211,089 m

7+700
CT 212,142 m
CP 212,358 m

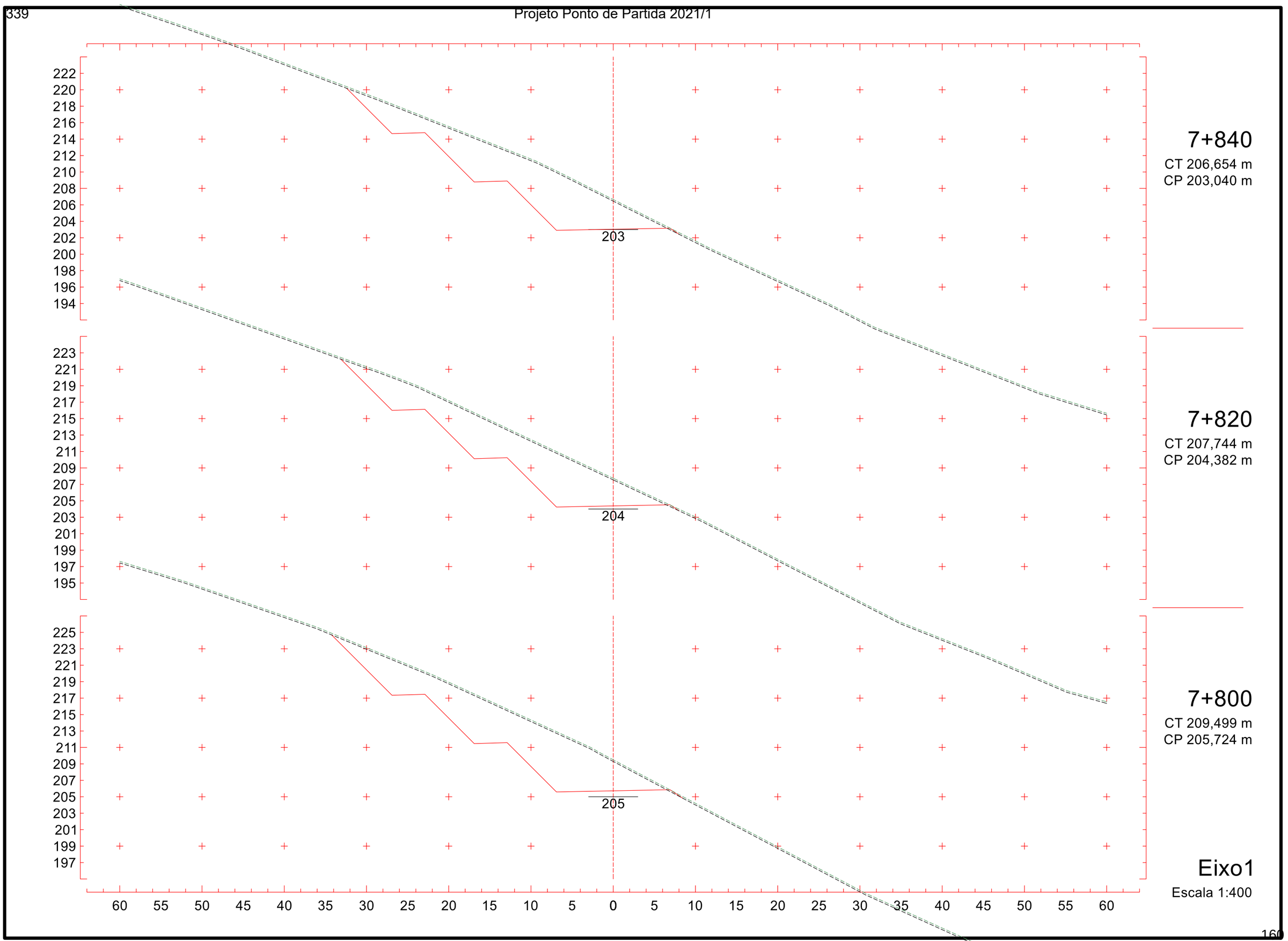
7+680
CT 211,771 m
CP 213,525 m

Eixo1
Escala 1:400

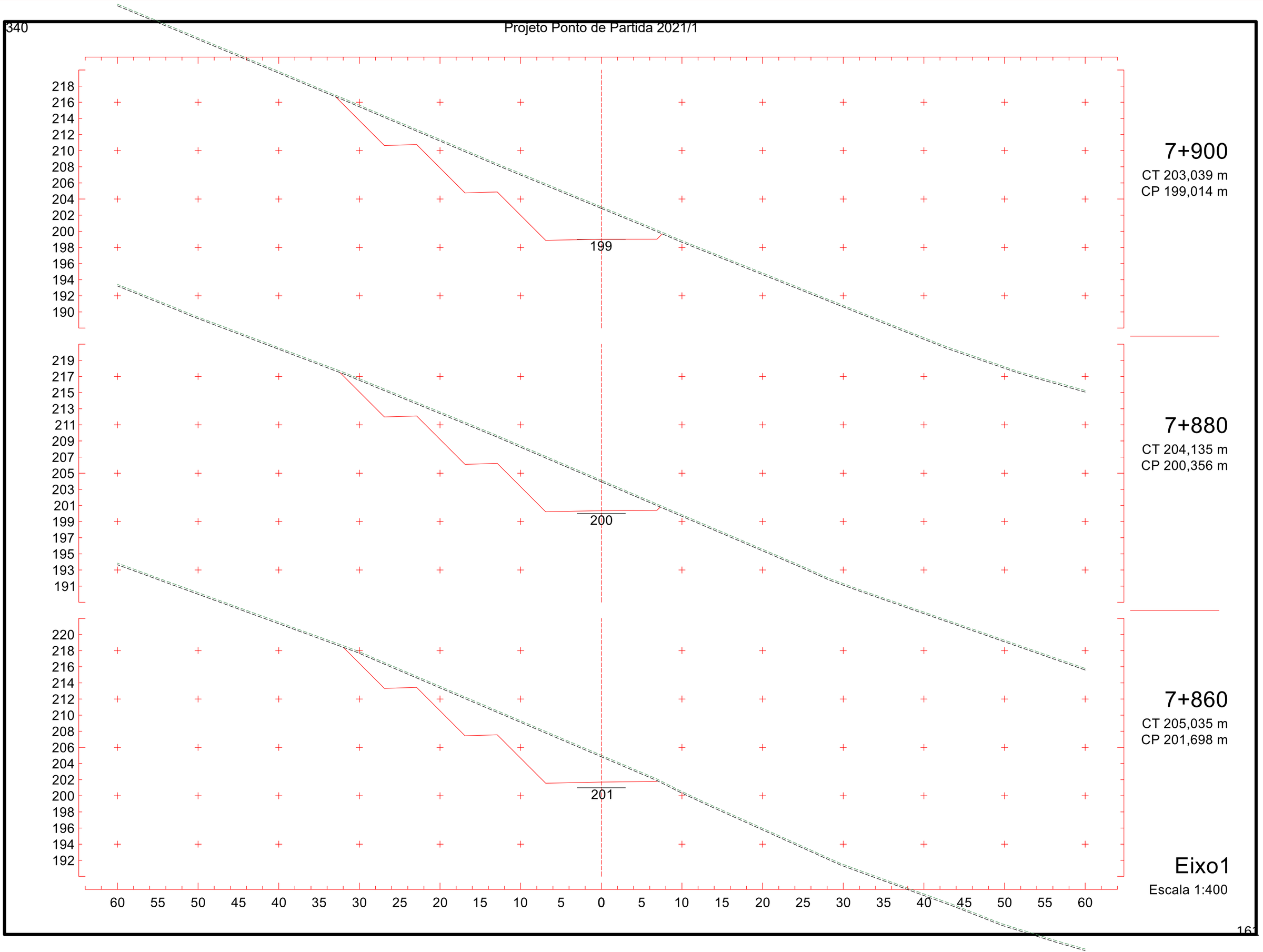
Projeto Ponto de Partida 2021/1



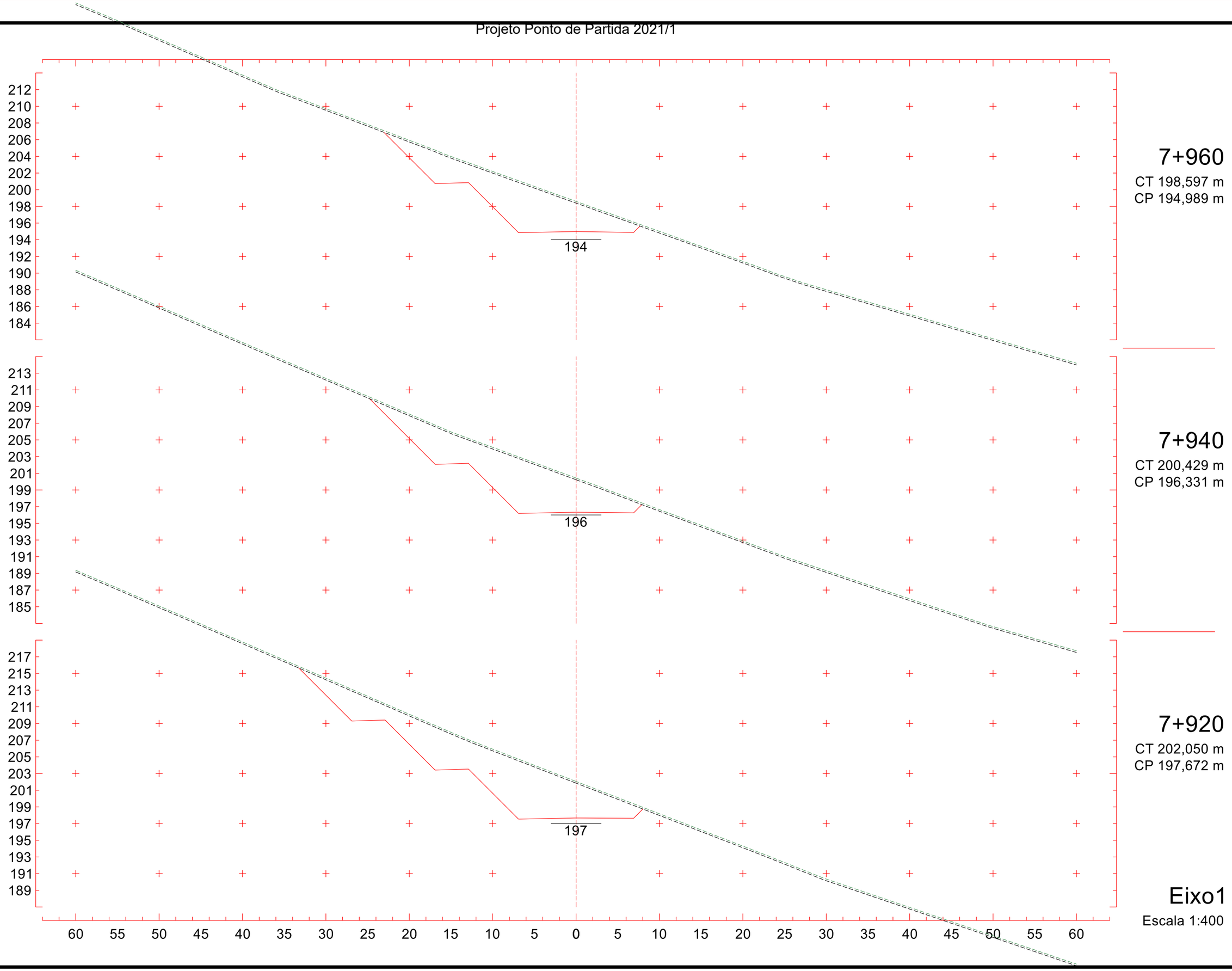
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



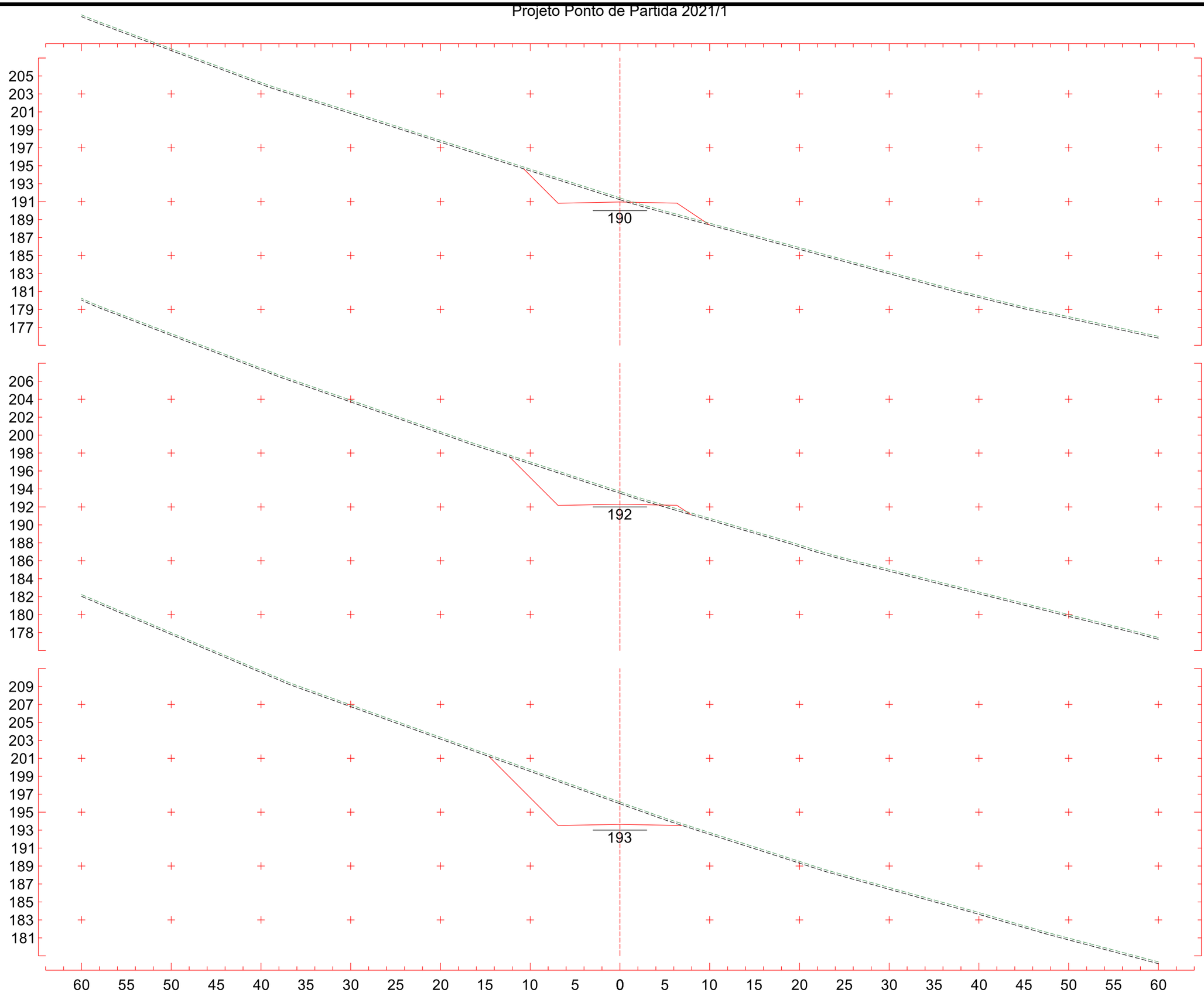
7+960
CT 198,597 m
CP 194,989 m

7+940
CT 200,429 m
CP 196,331 m

7+920
CT 202,050 m
CP 197,672 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



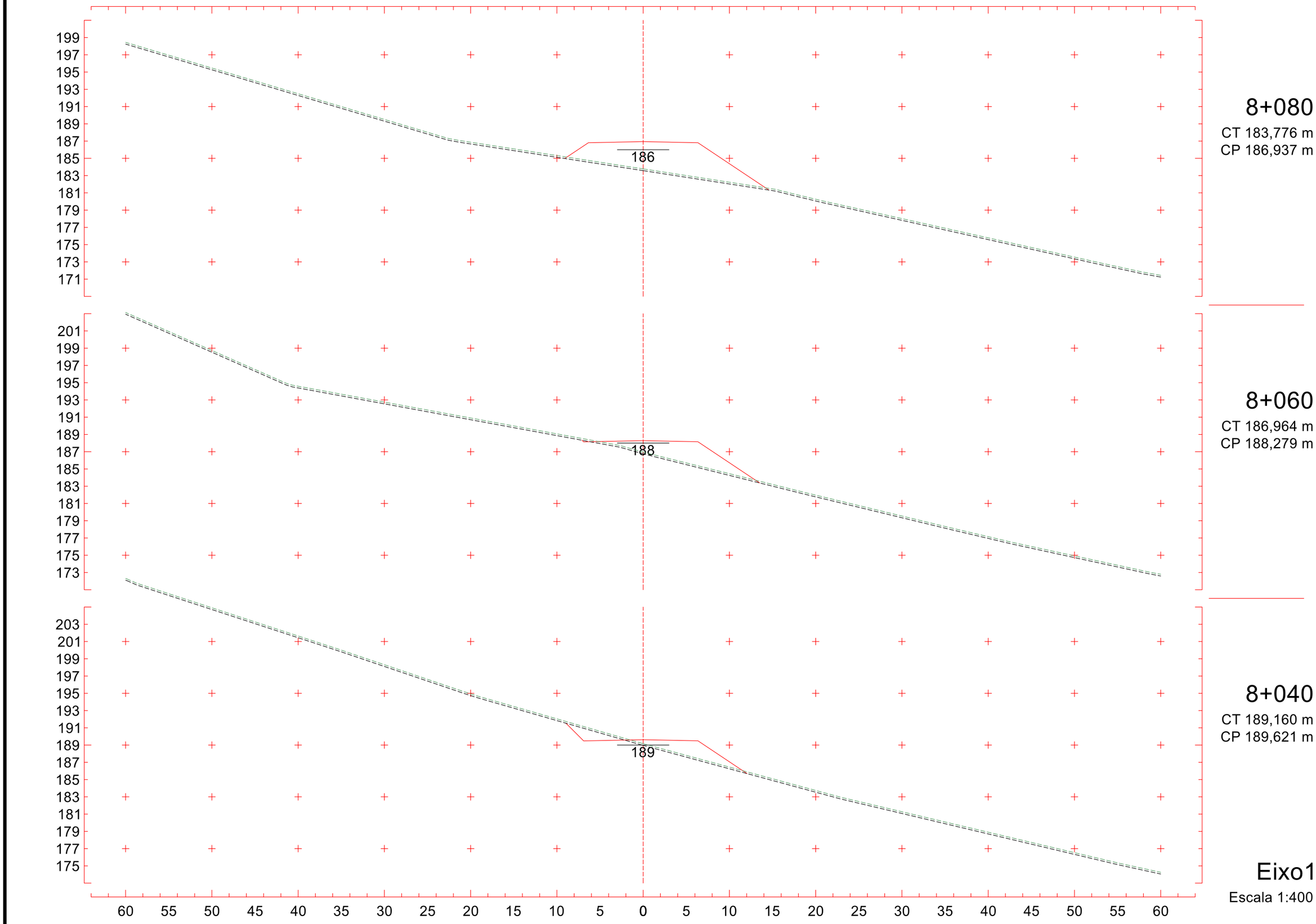
8+020
CT 191,418 m
CP 190,963 m

8+000
CT 193,722 m
CP 192,305 m

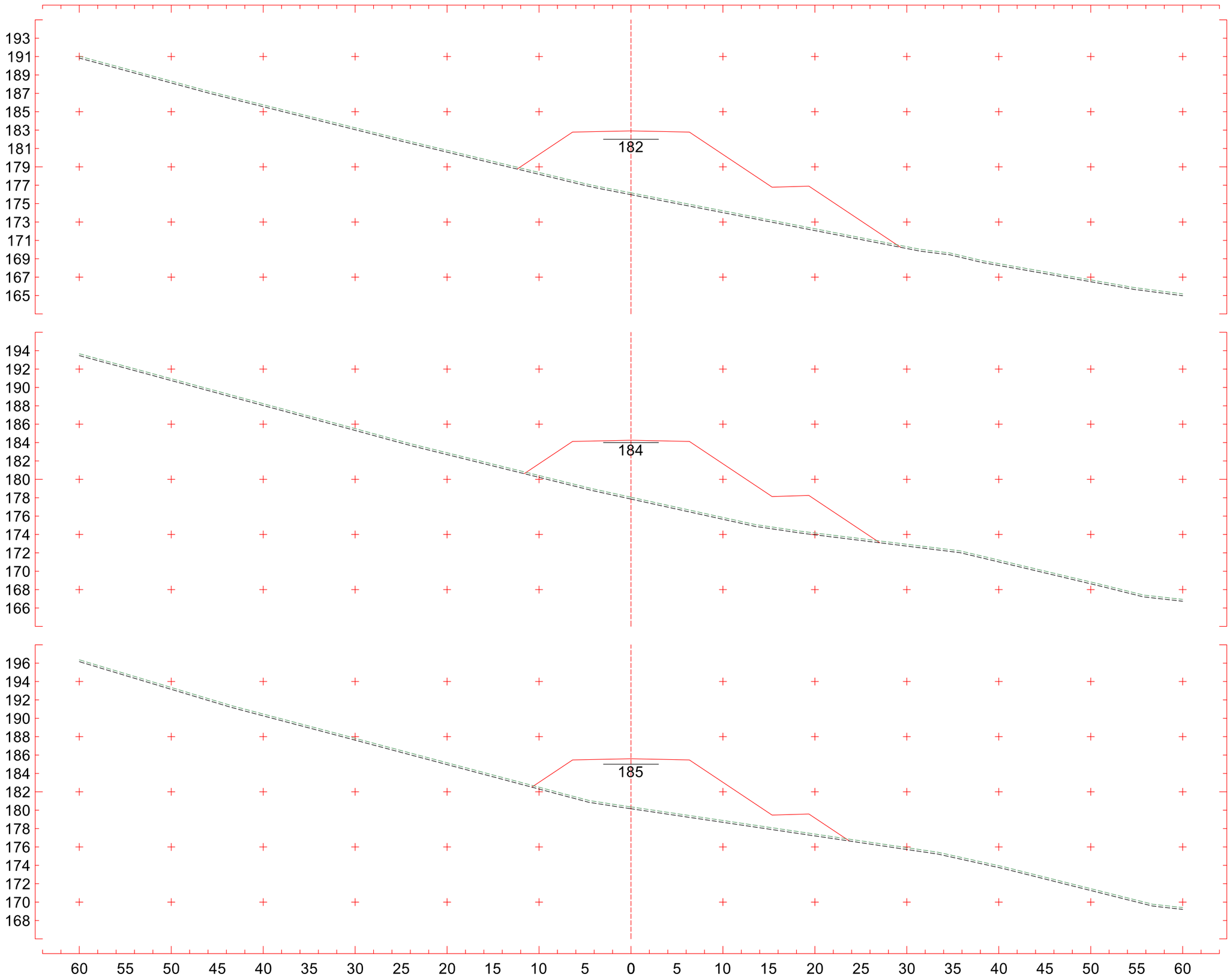
7+980
CT 196,136 m
CP 193,647 m

Eixo1
Escala 1:400

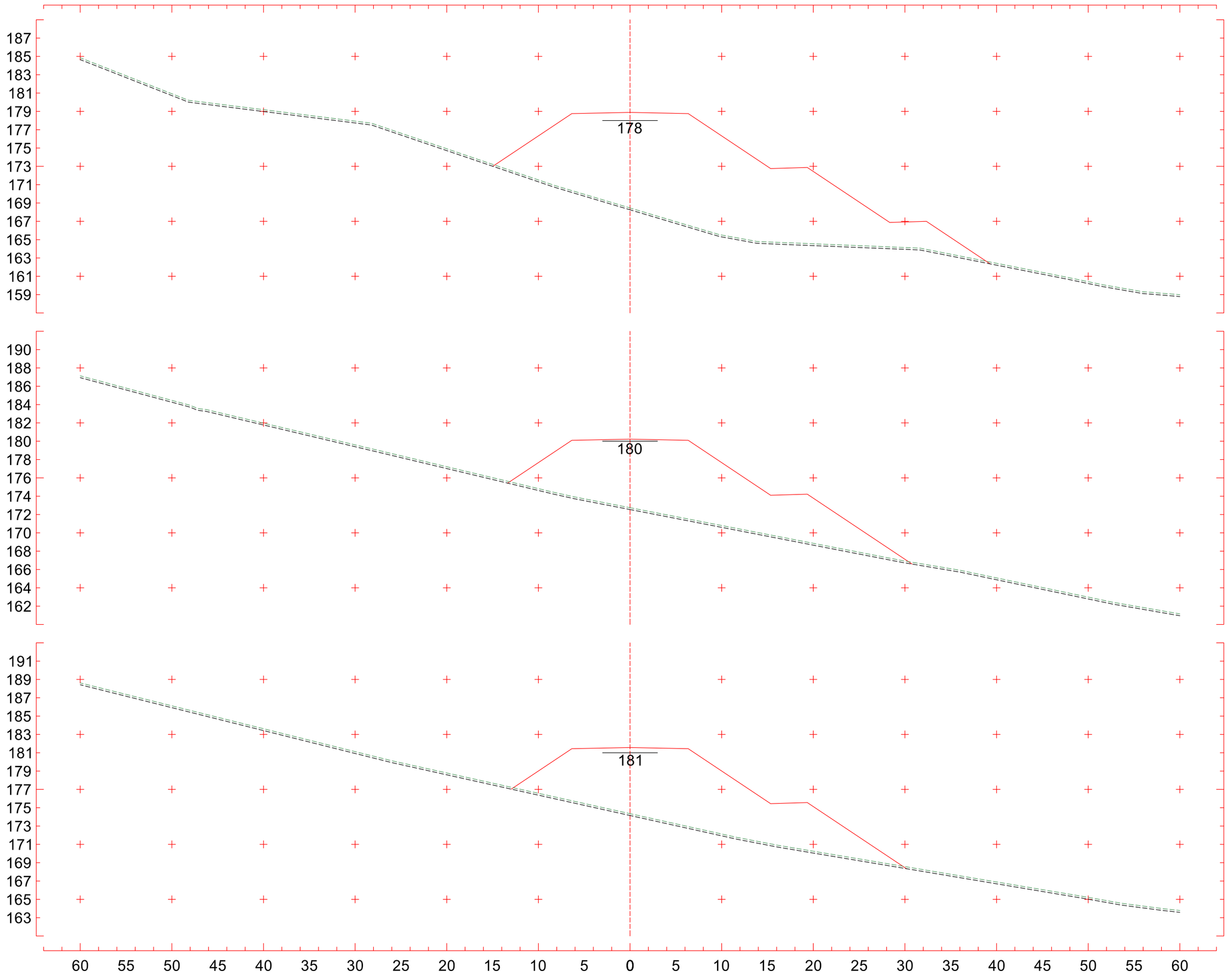
Projeto Ponto de Partida 2021/1



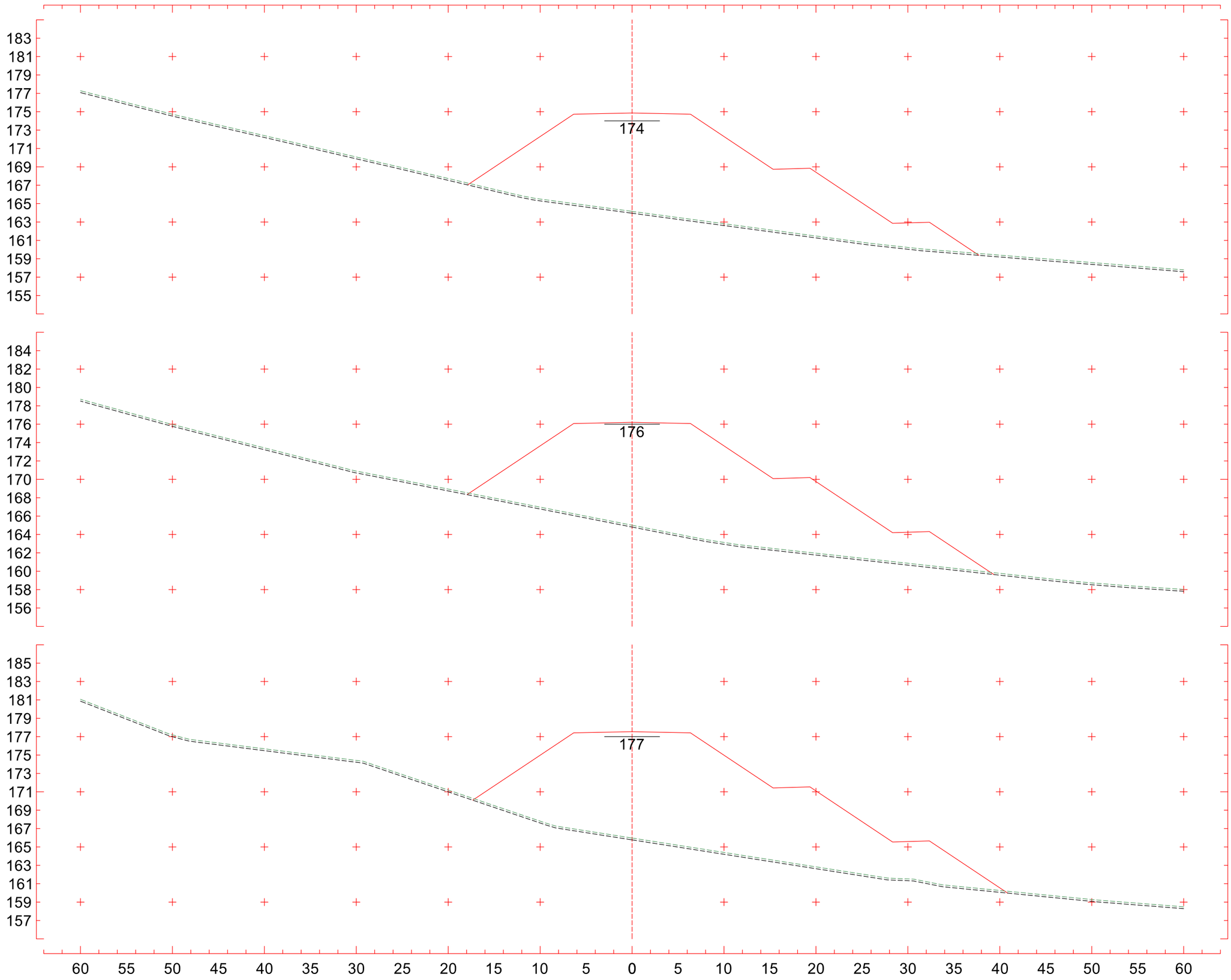
Projeto Ponto de Partida 2021/1



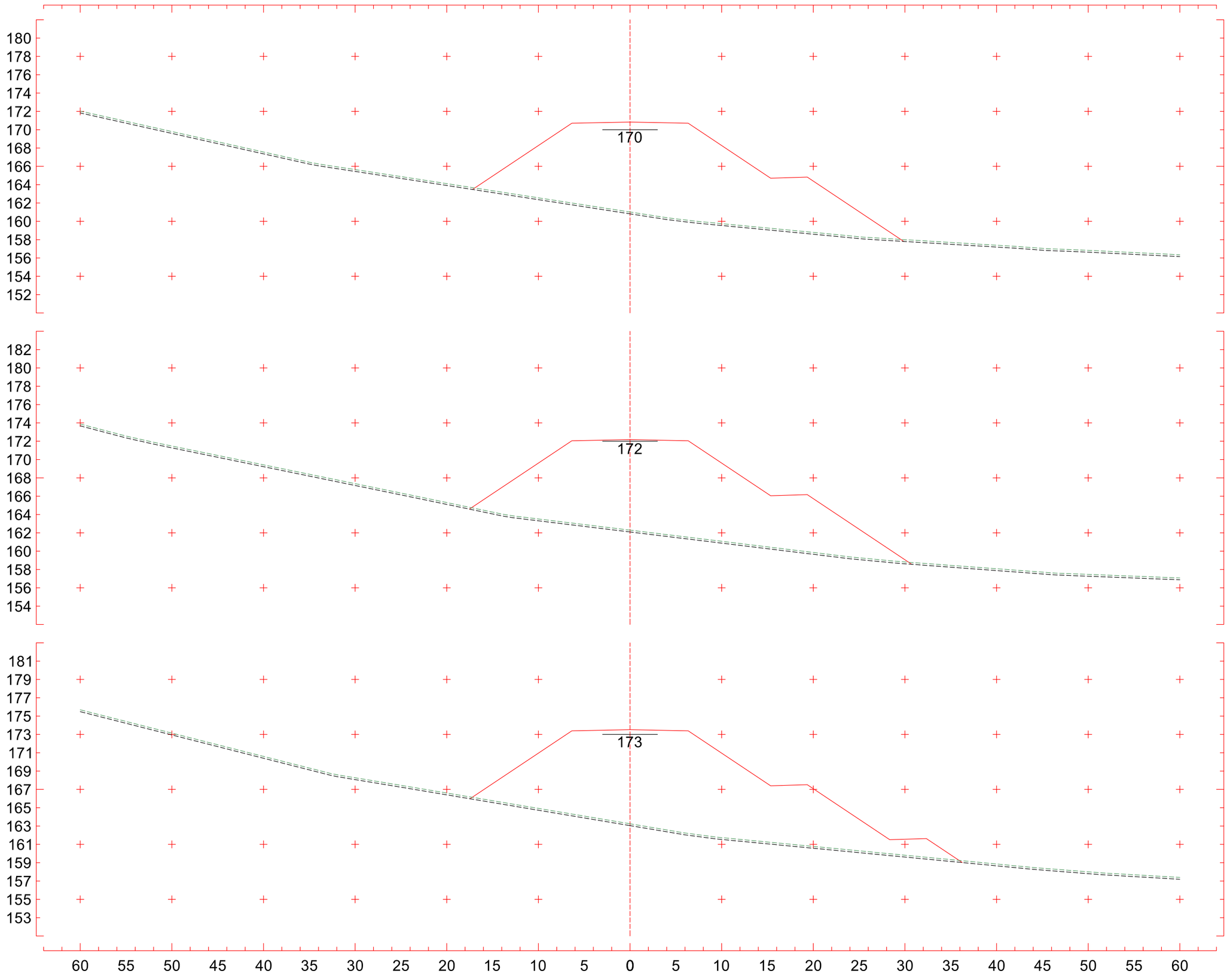
Projeto Ponto de Partida 2021/1



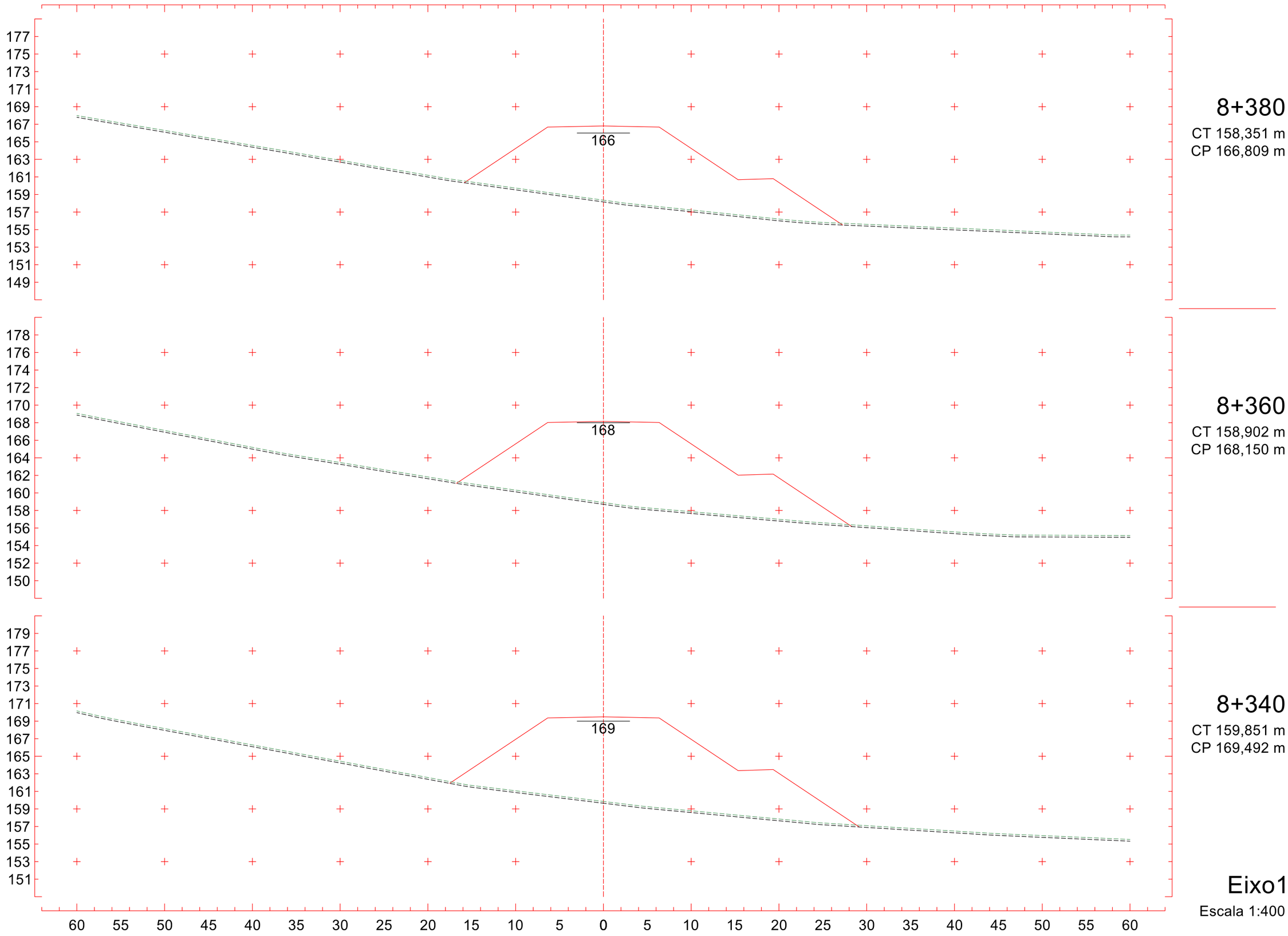
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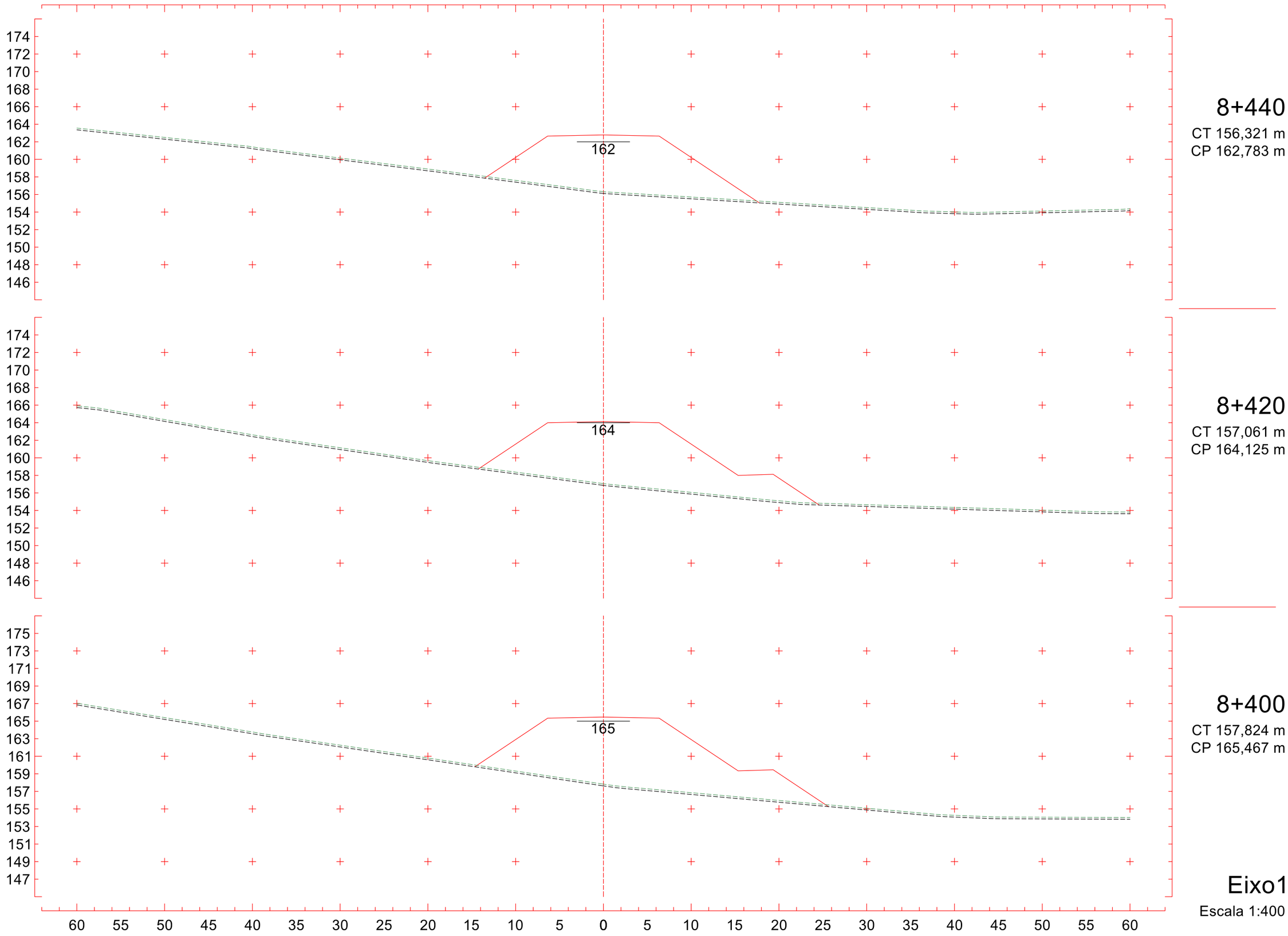
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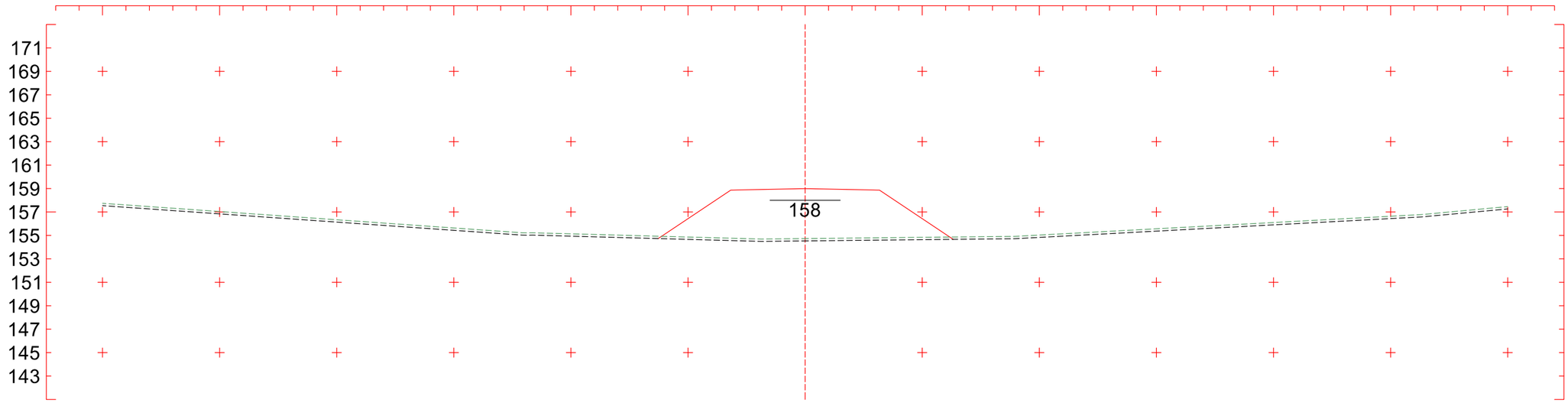
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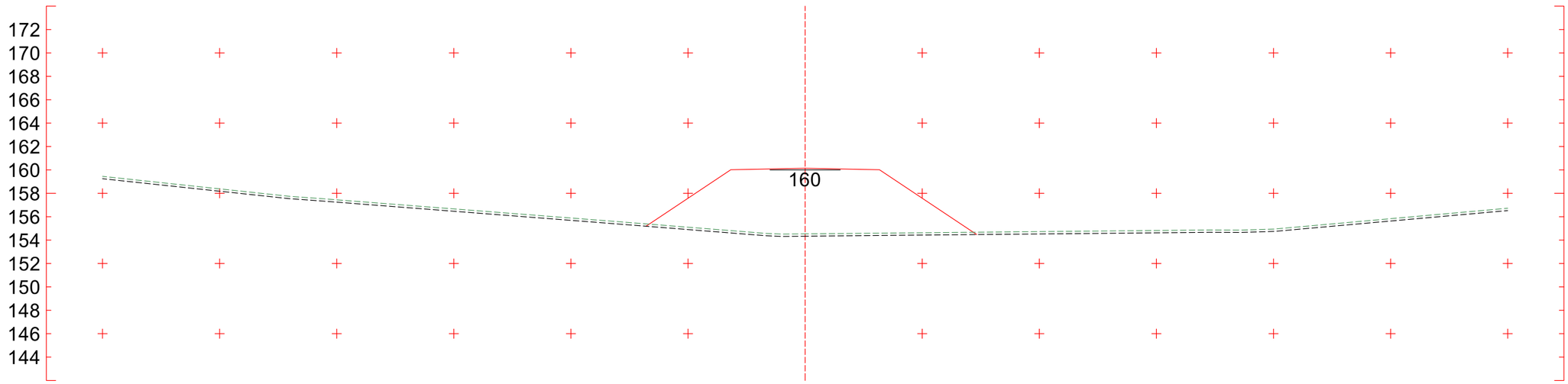
Projeto Ponto de Partida 2021/1



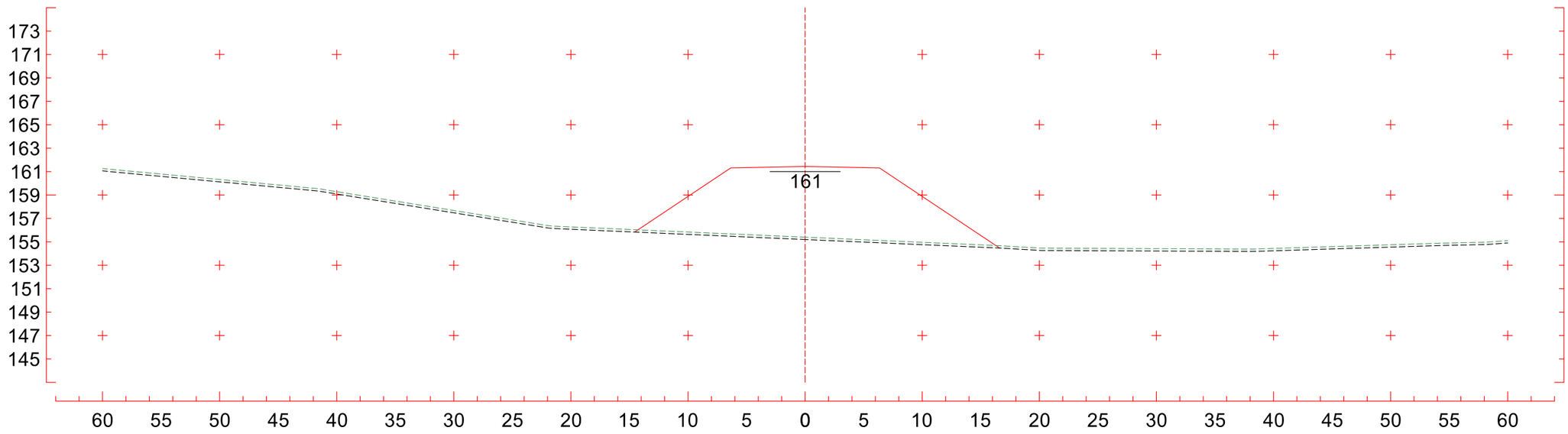
Projeto Ponto de Partida 2021/1



8+500
CT 154,731 m
CP 158,993 m



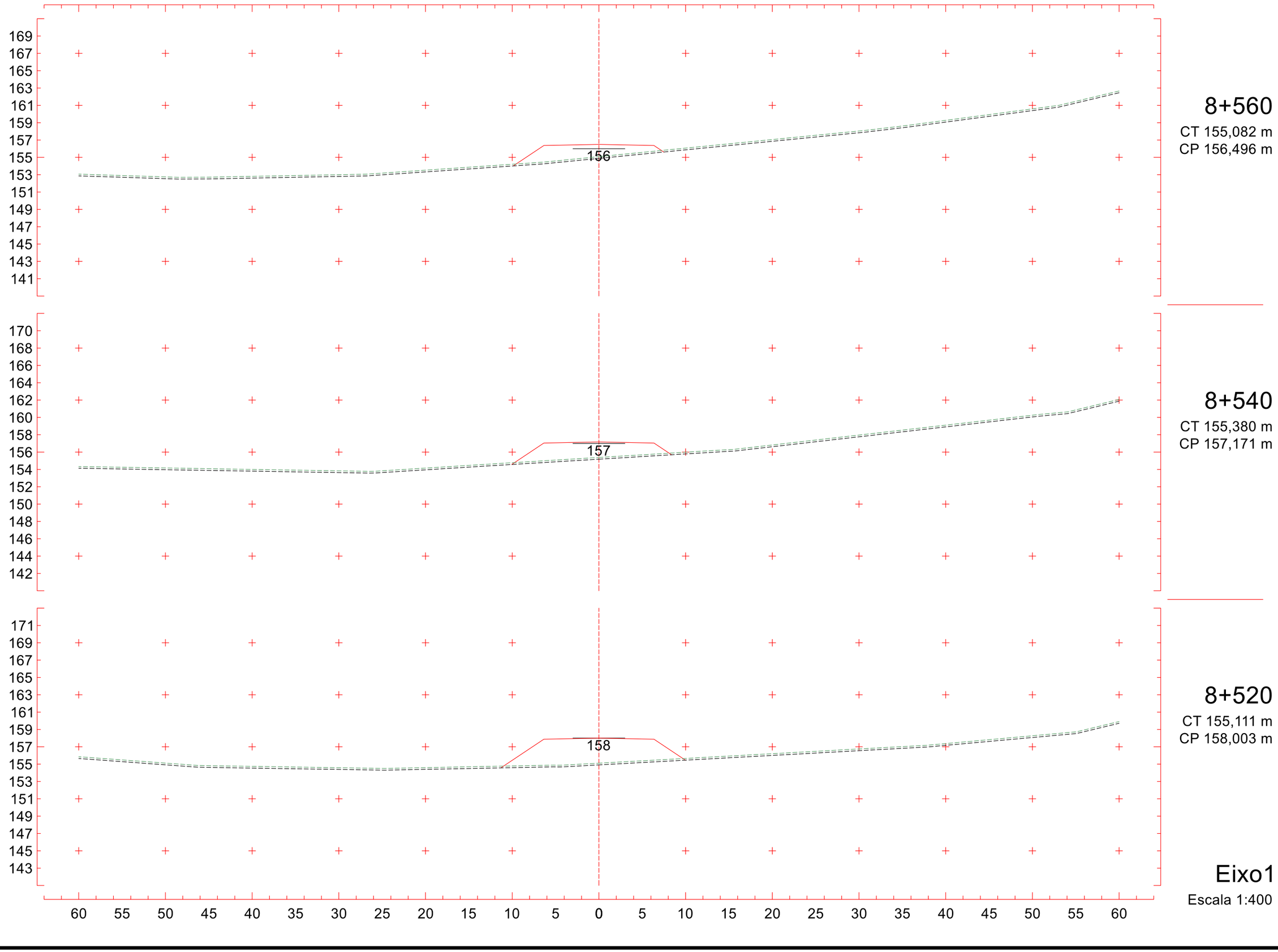
8+480
CT 154,534 m
CP 160,141 m



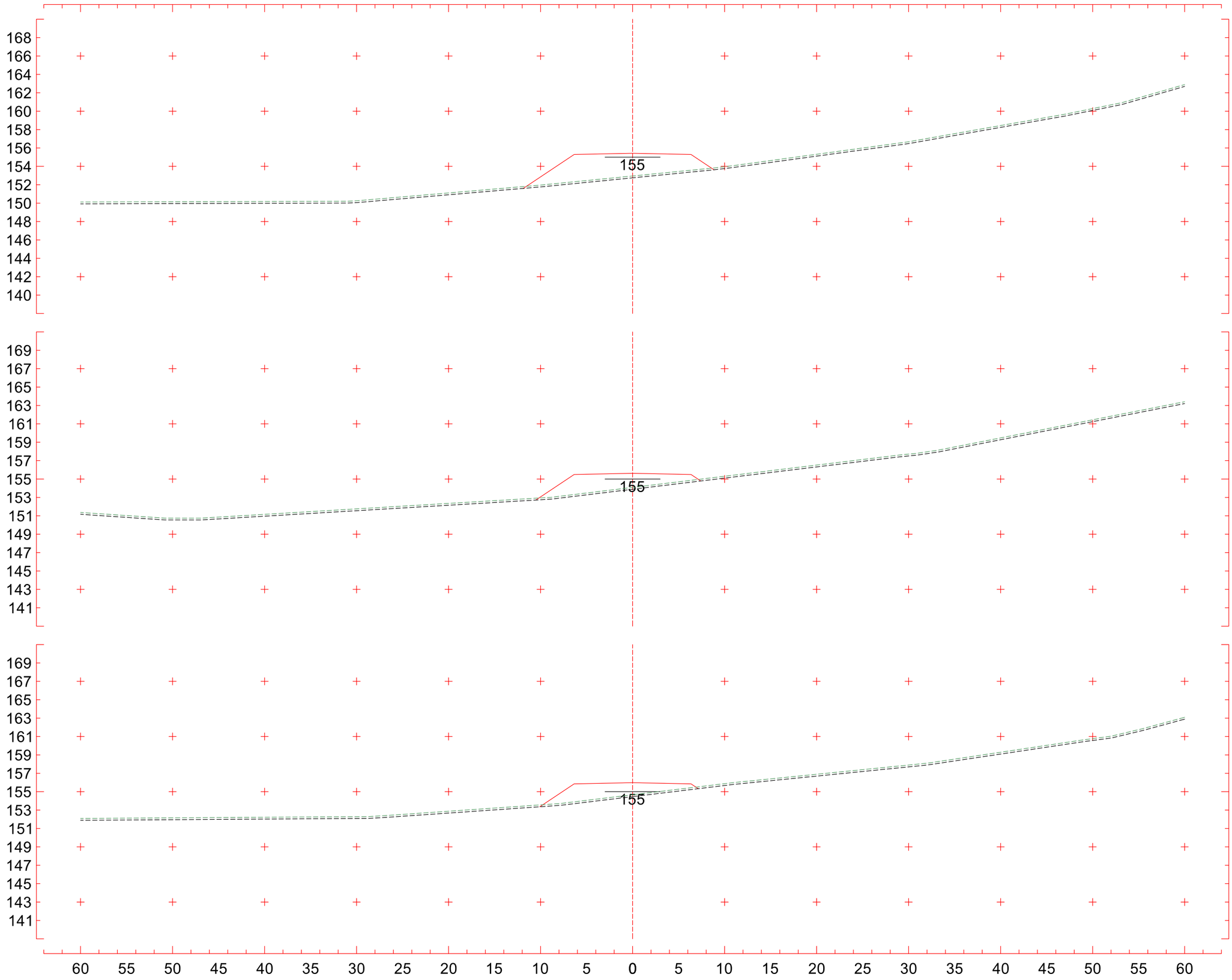
8+460
CT 155,399 m
CP 161,441 m

Eixo1
Escala 1:400

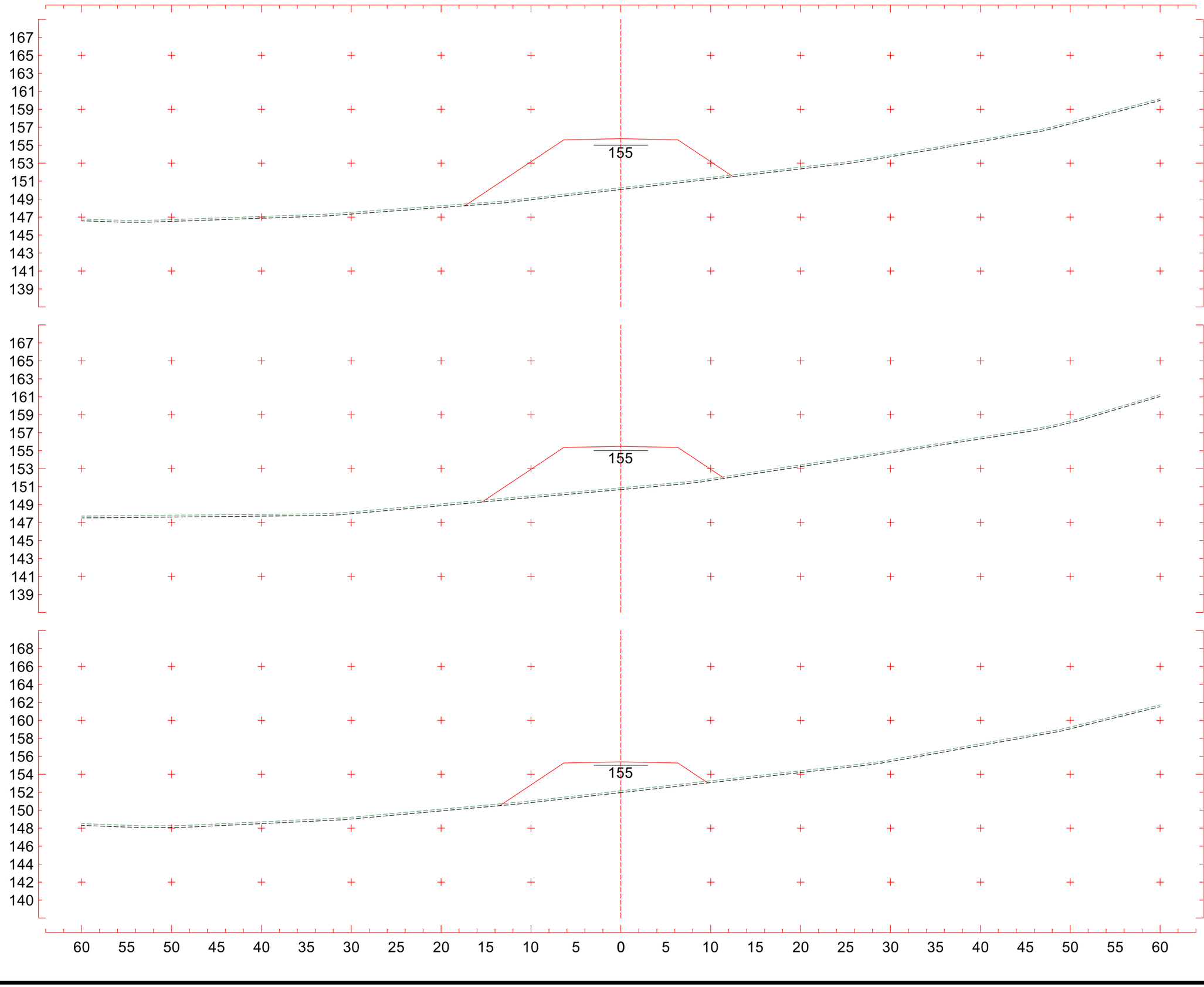
Projeto Ponto de Partida 2021/1



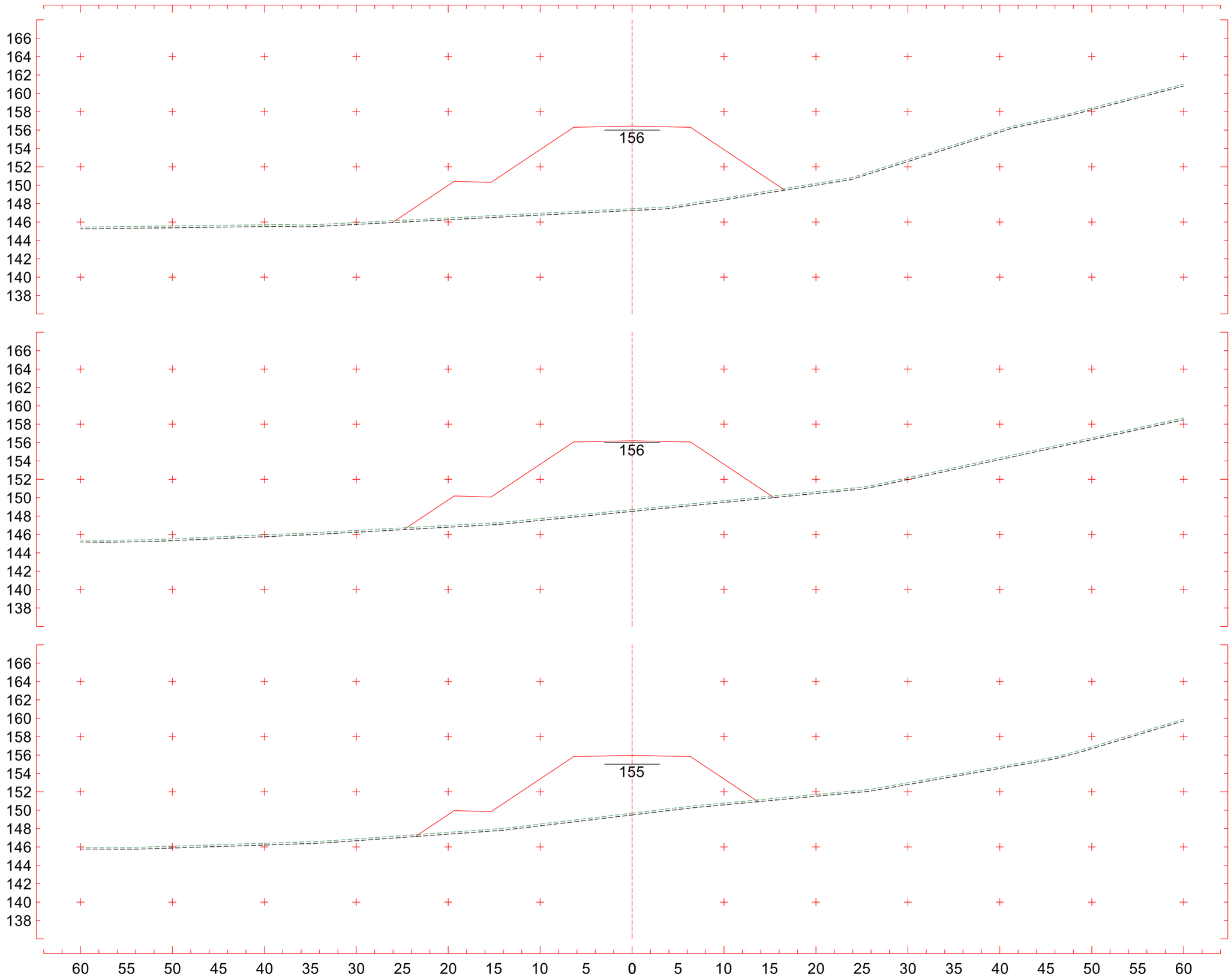
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



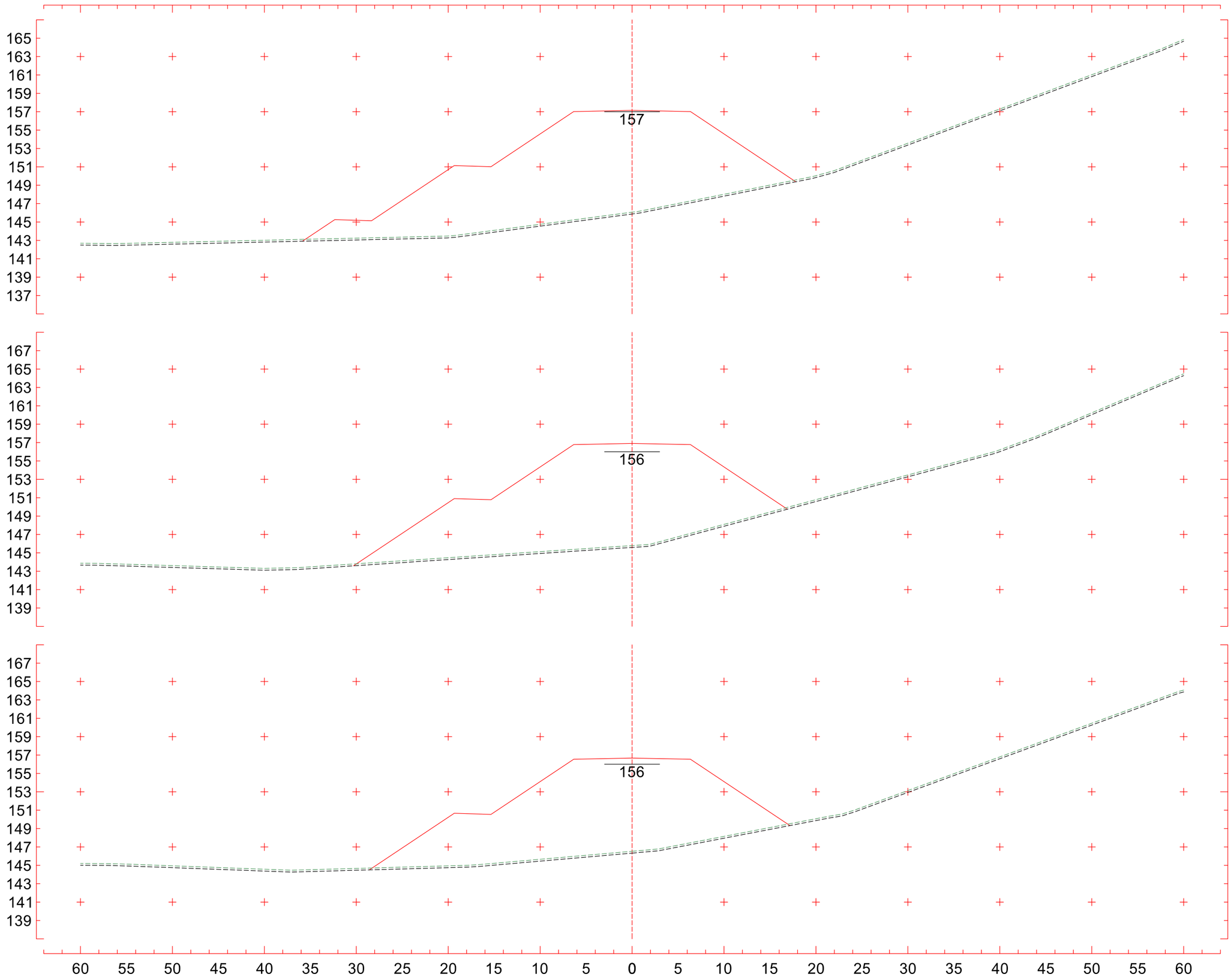
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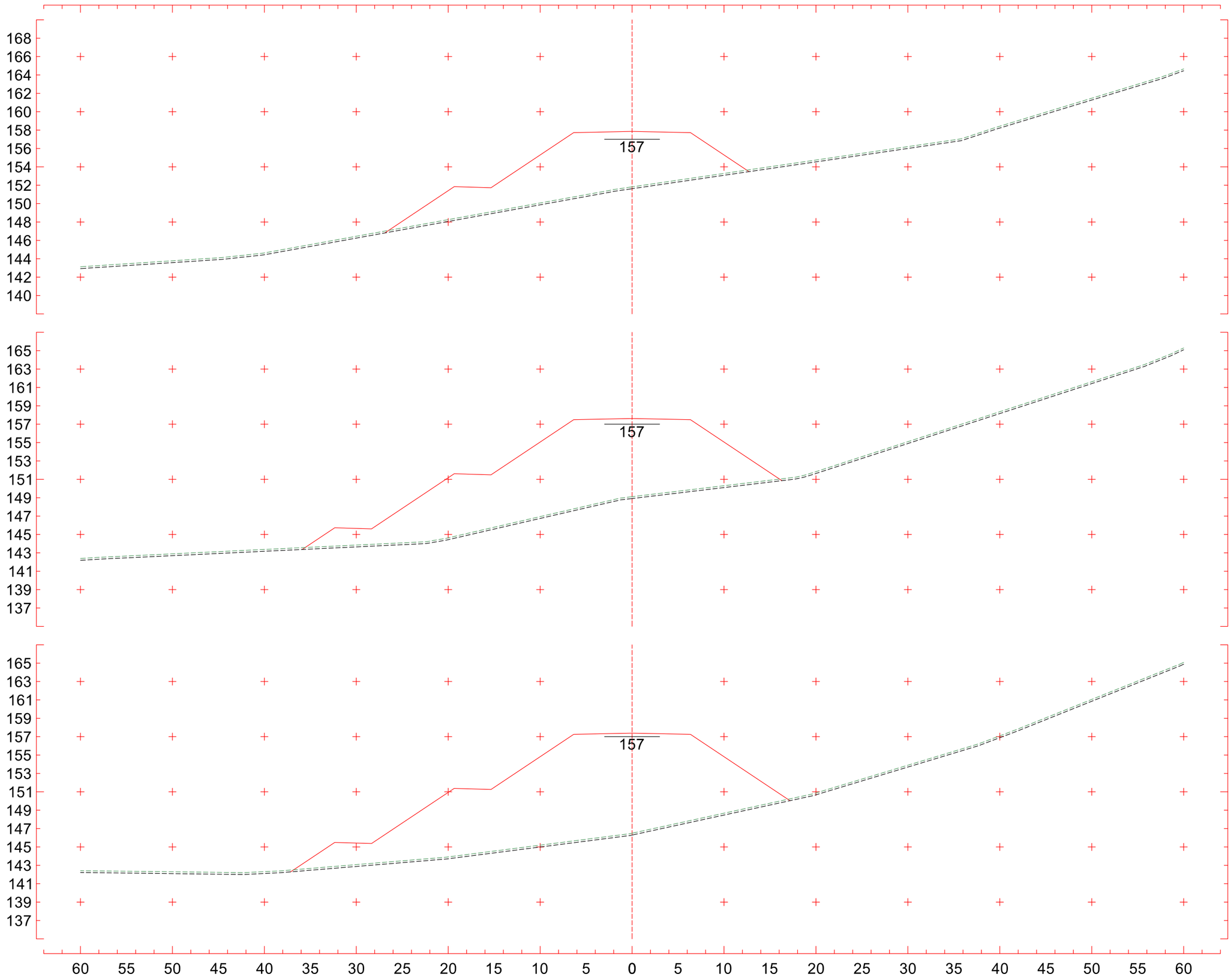
Eixo1

Escala 1:400

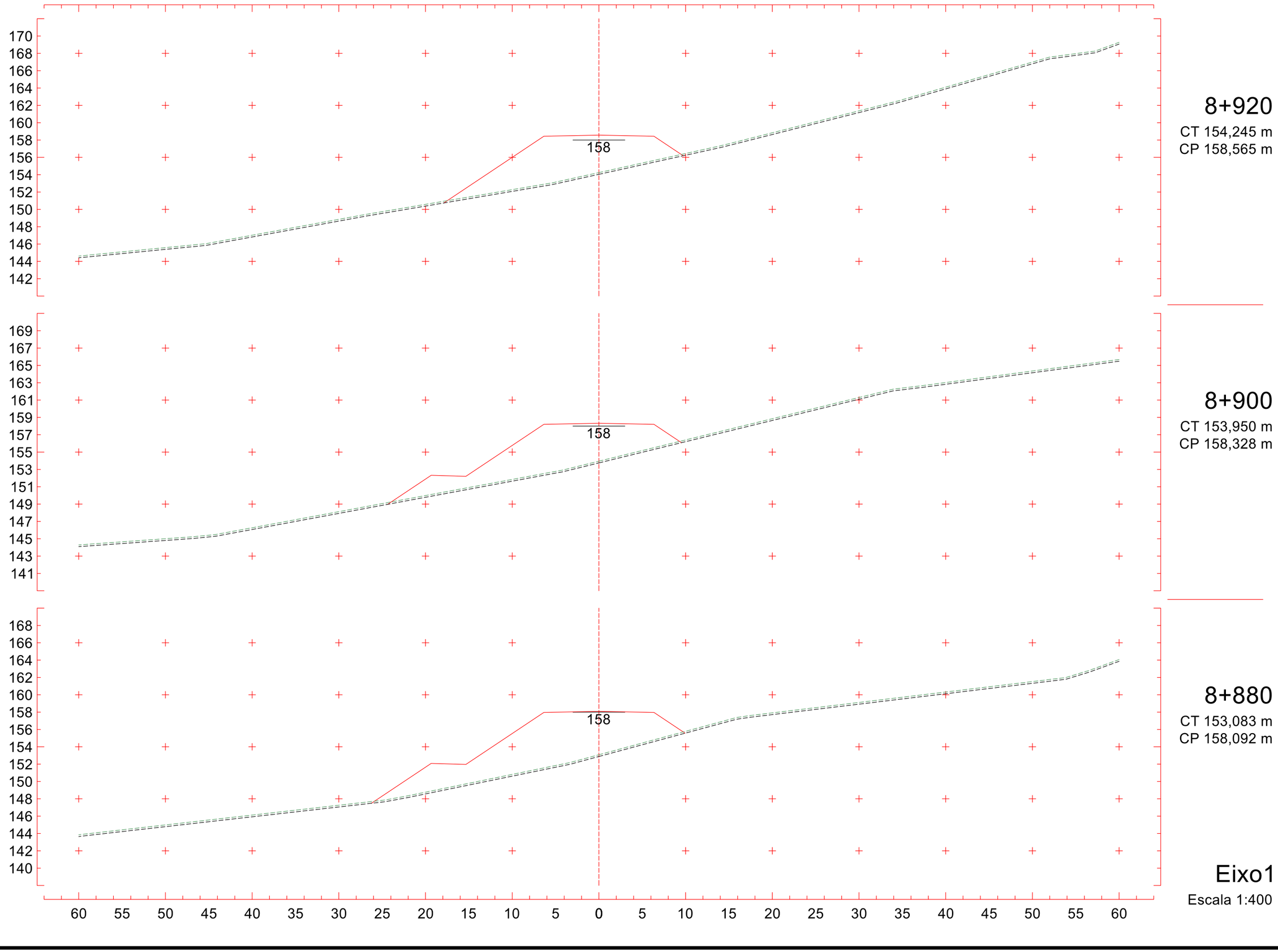
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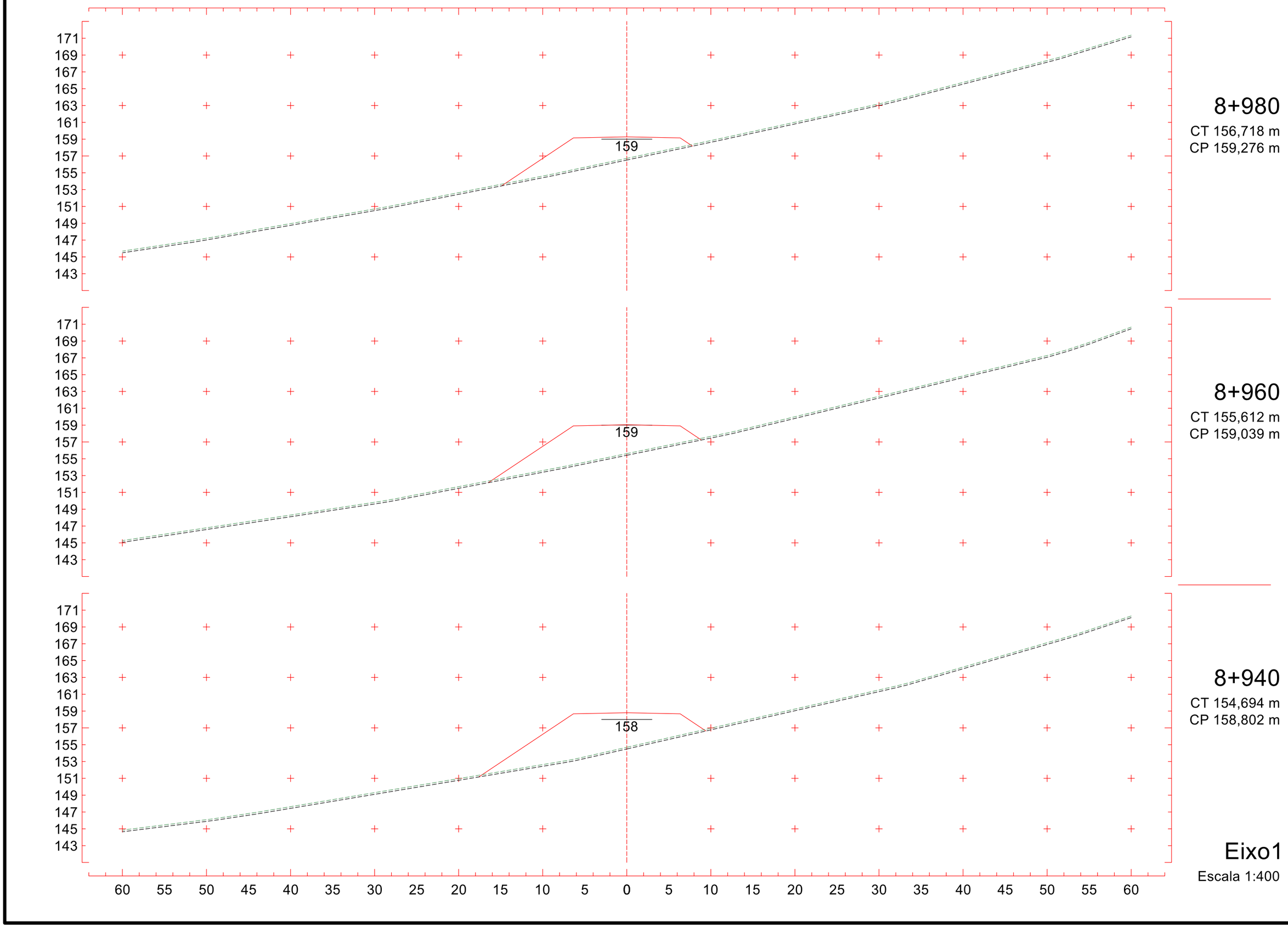
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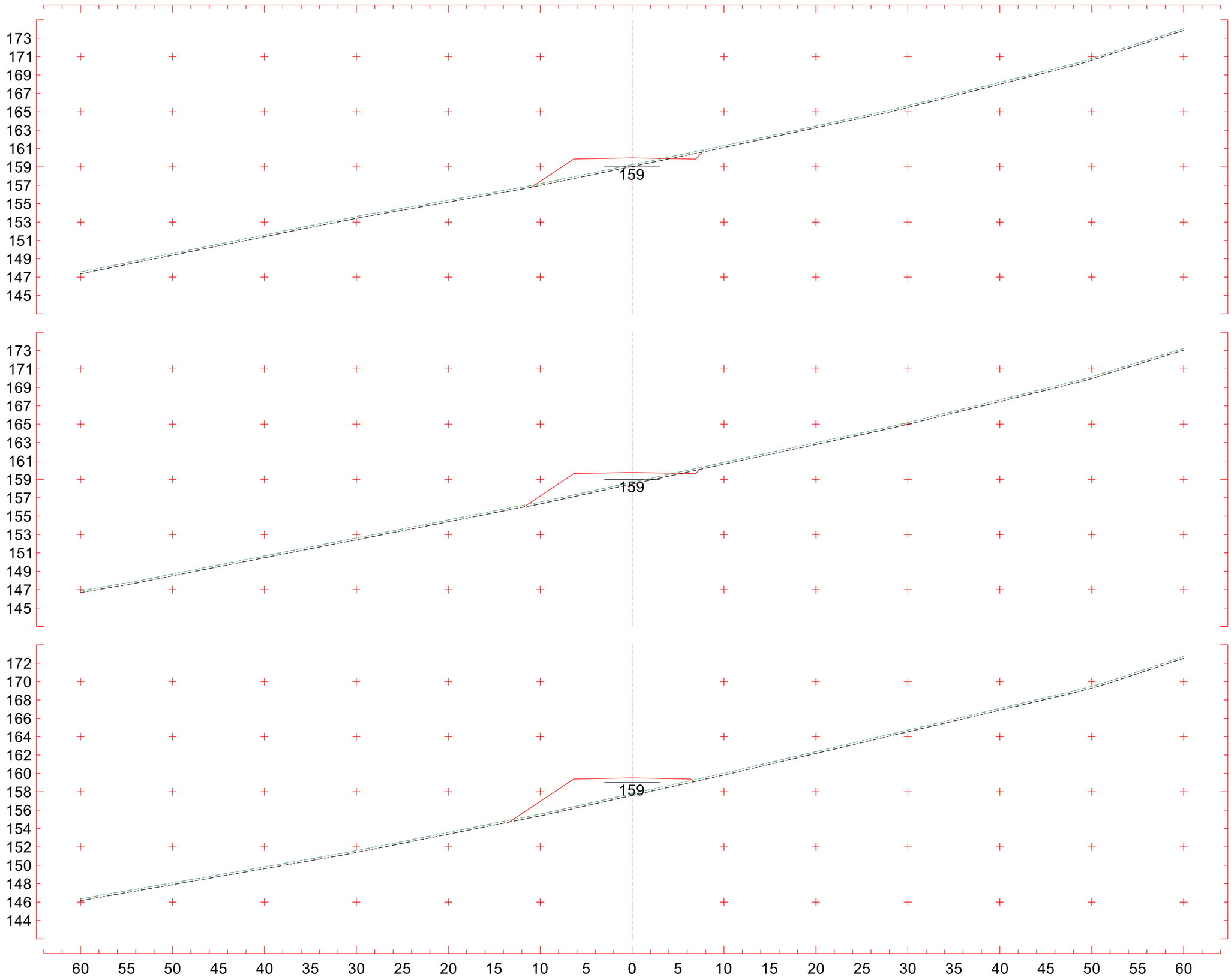
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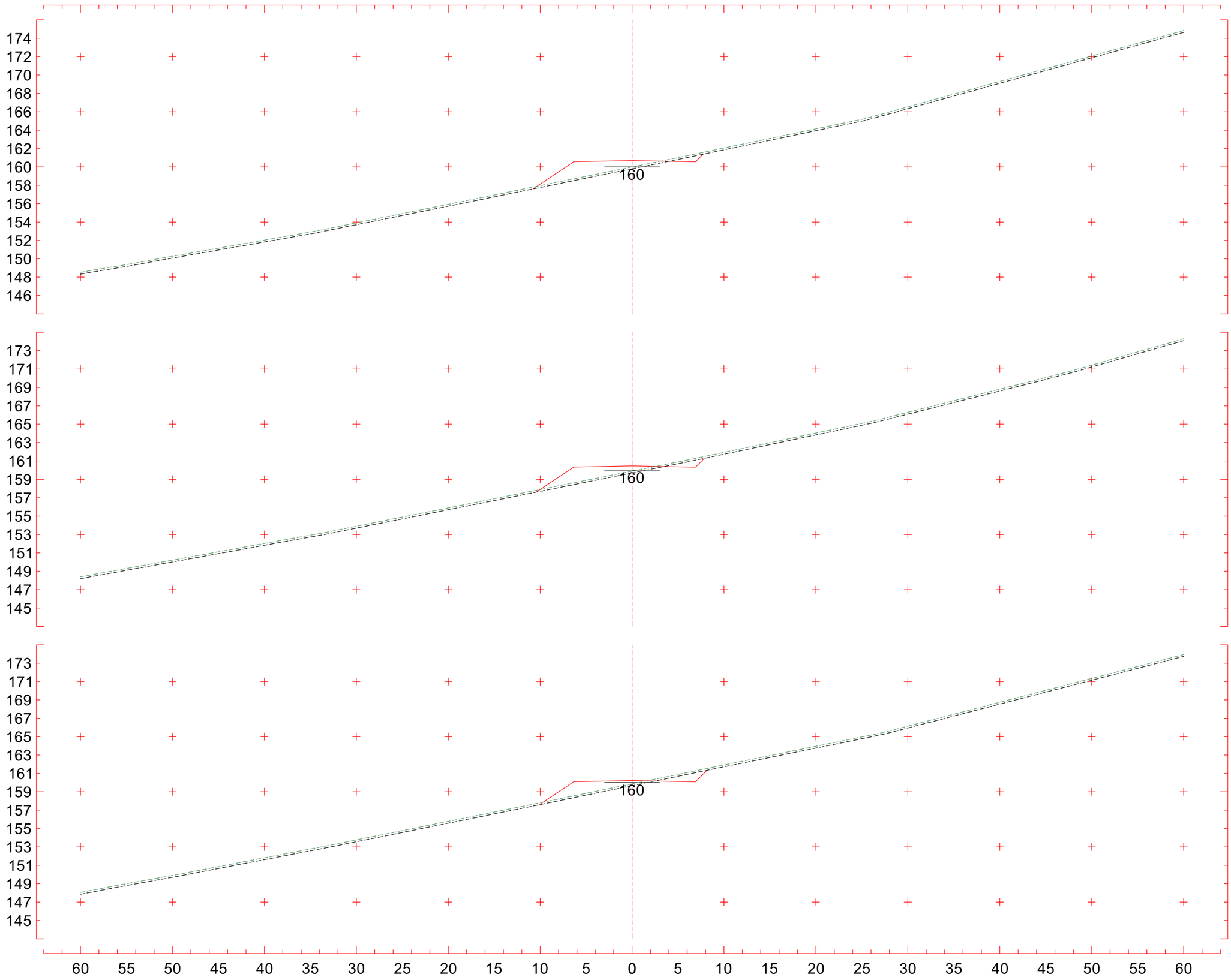
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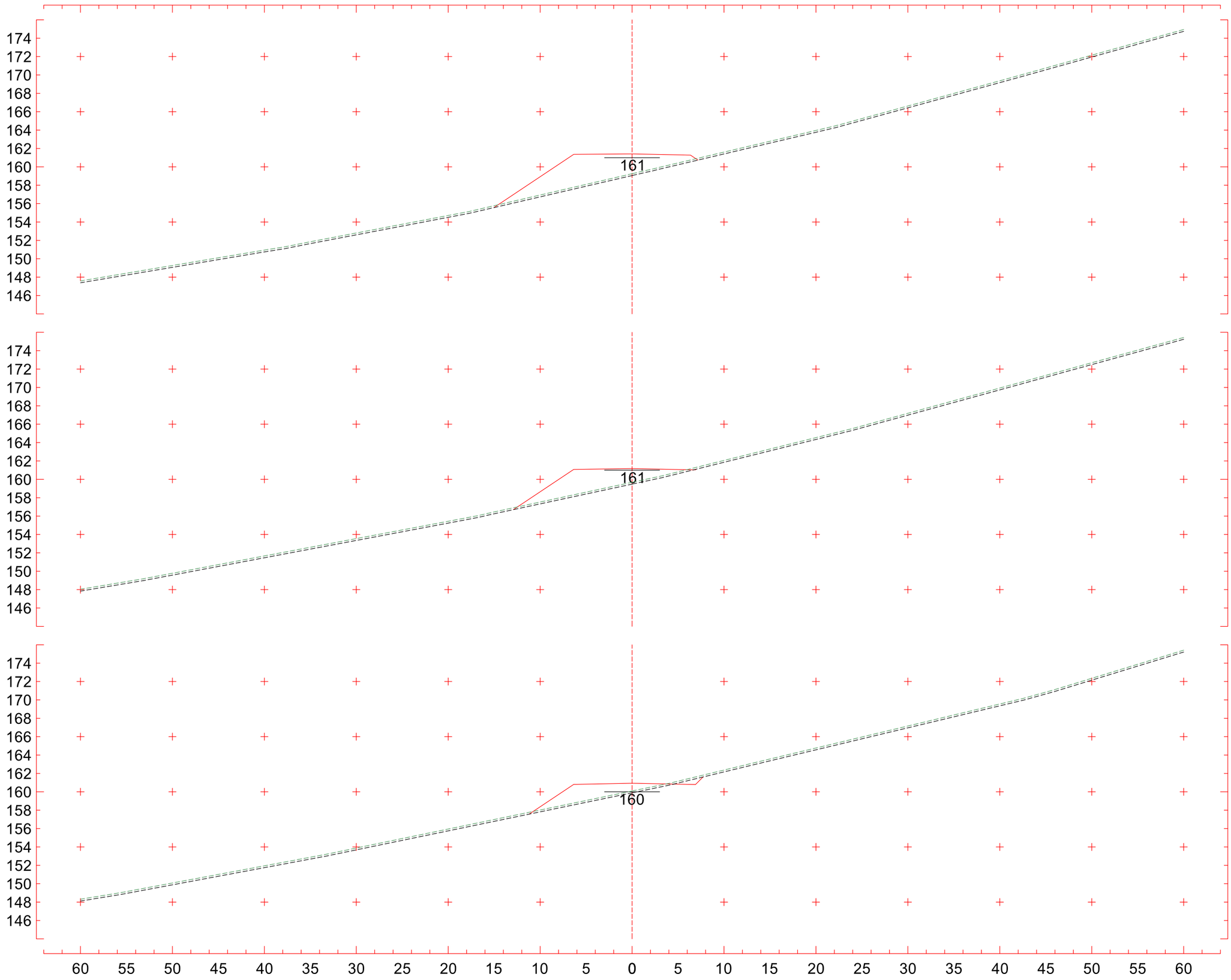
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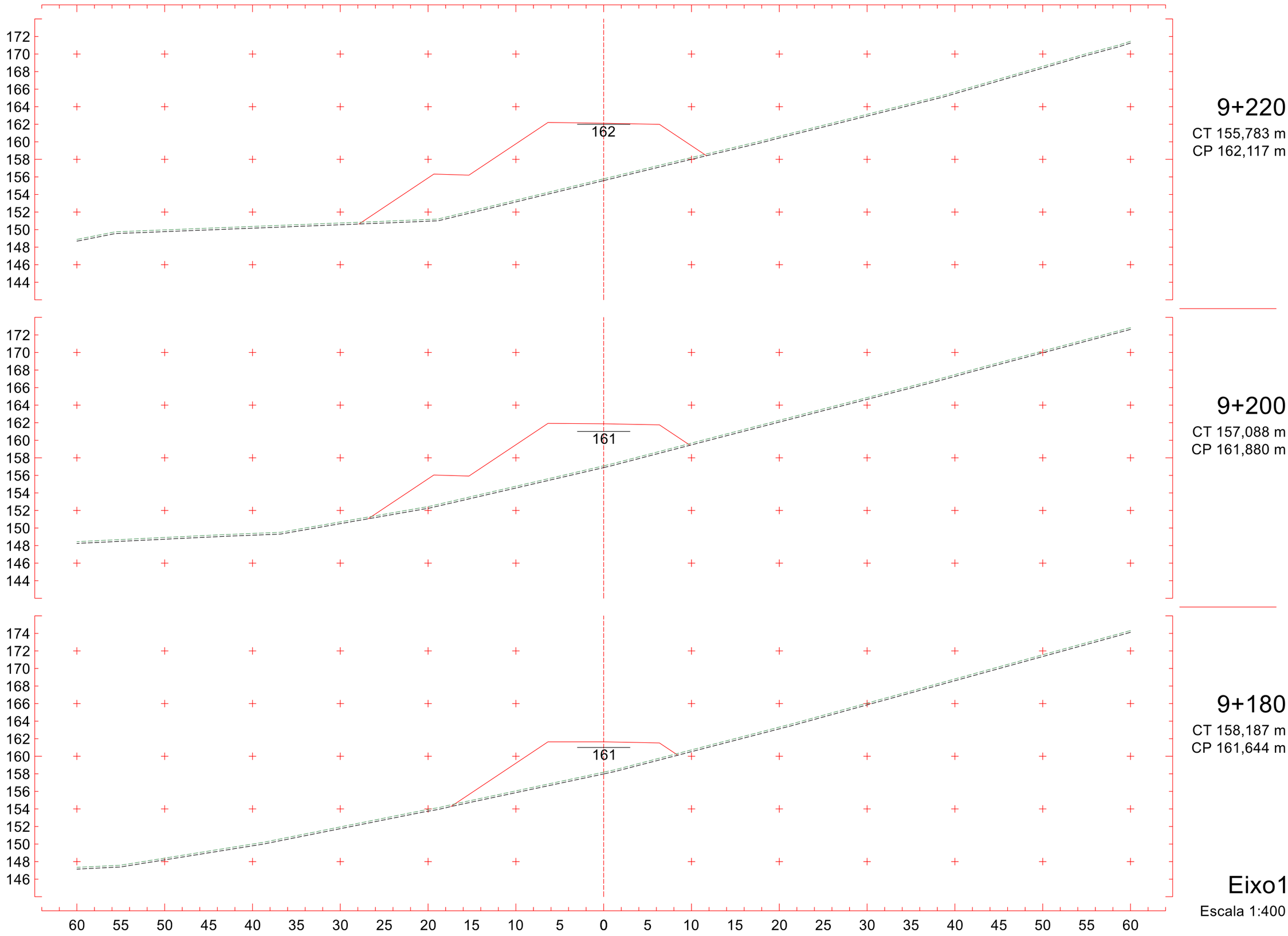
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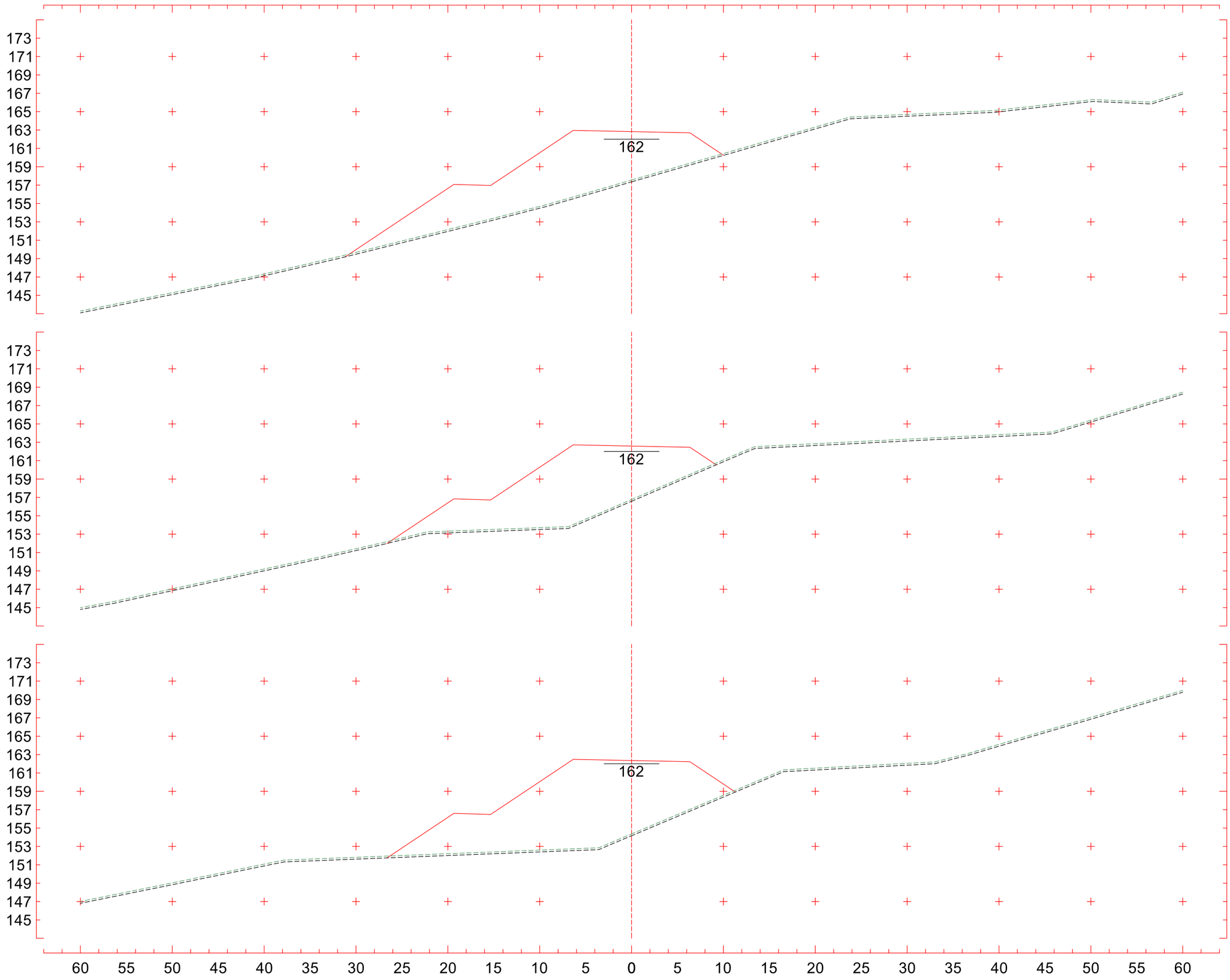
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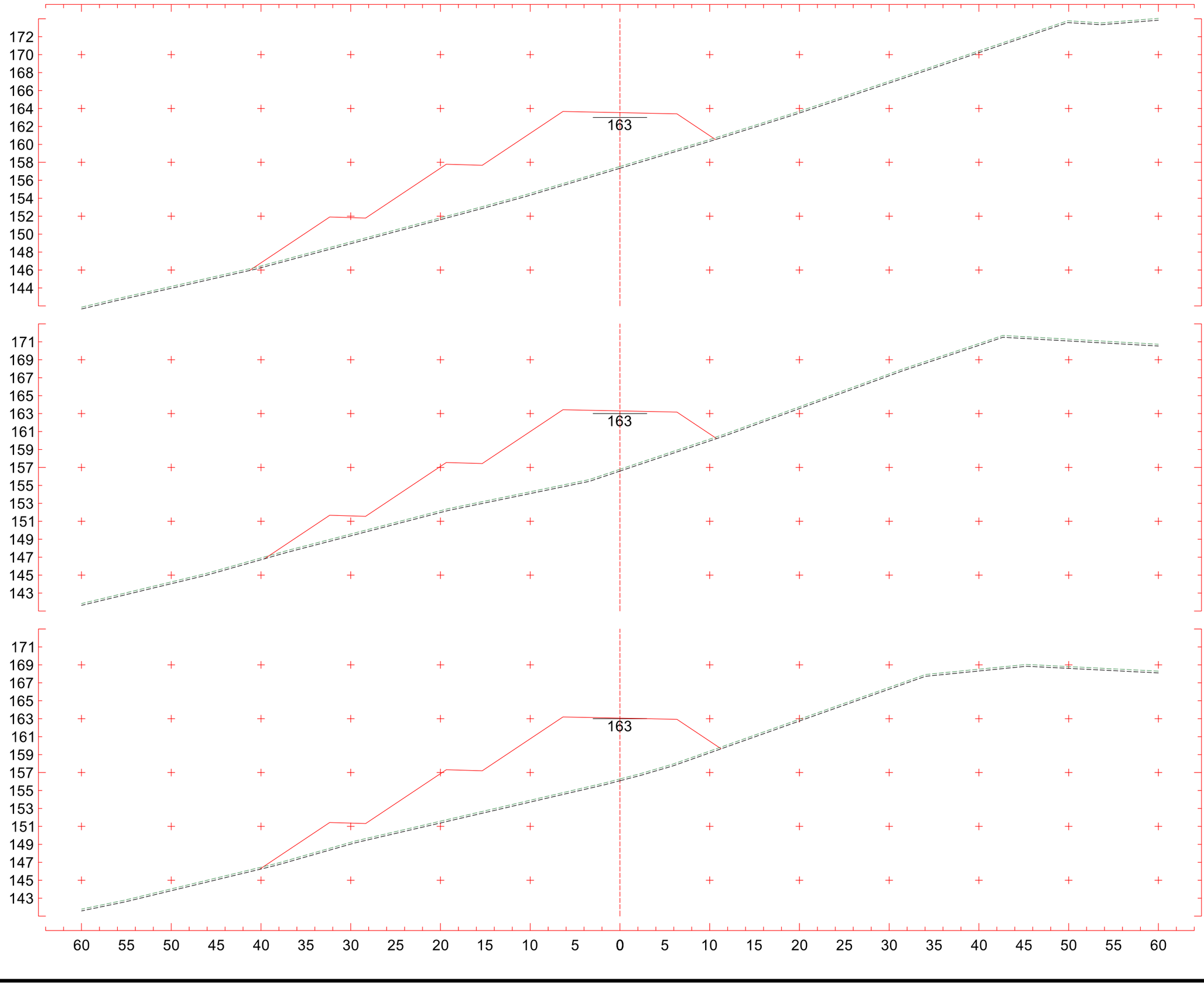
Projeto Ponto de Partida 2021/1



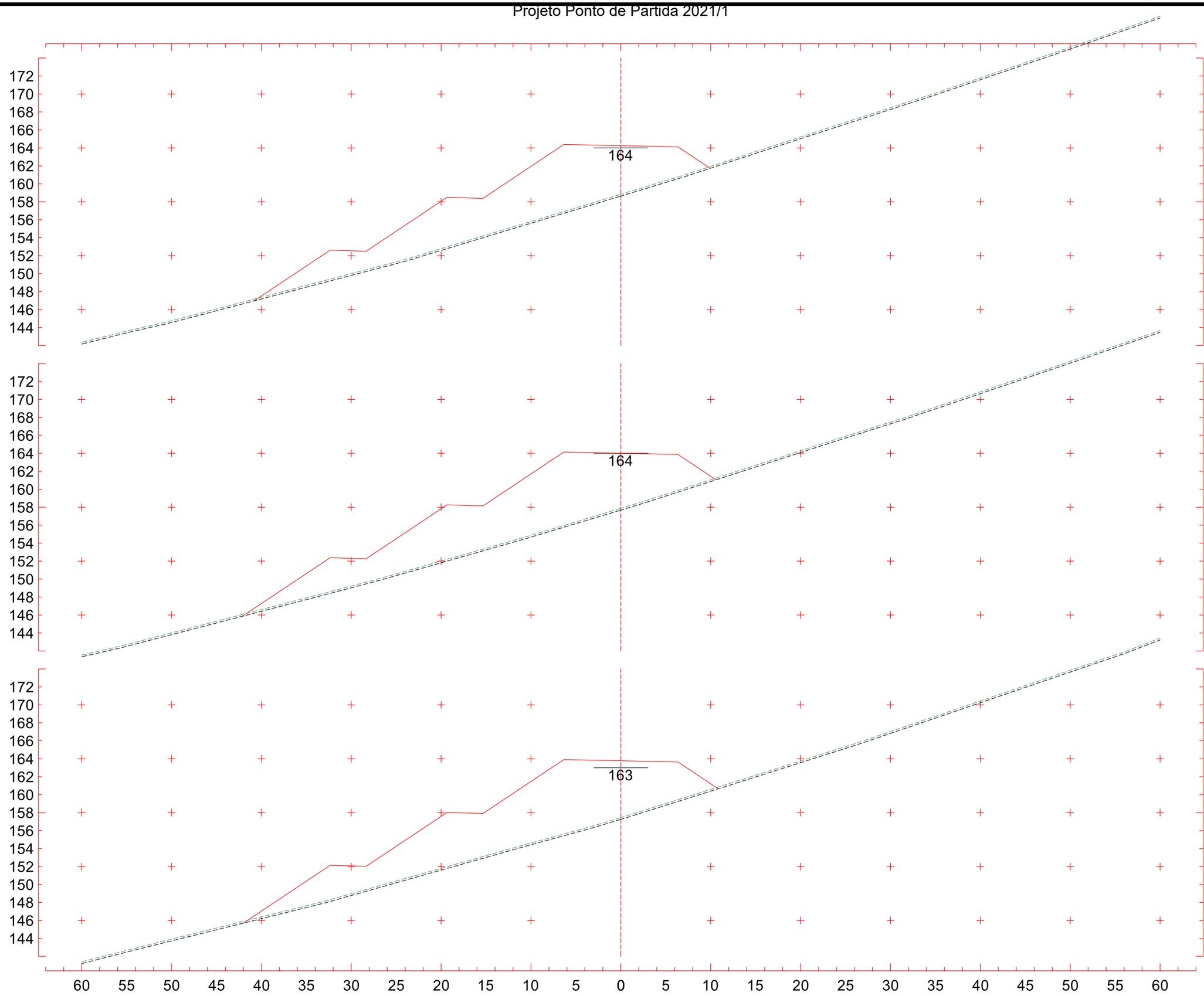
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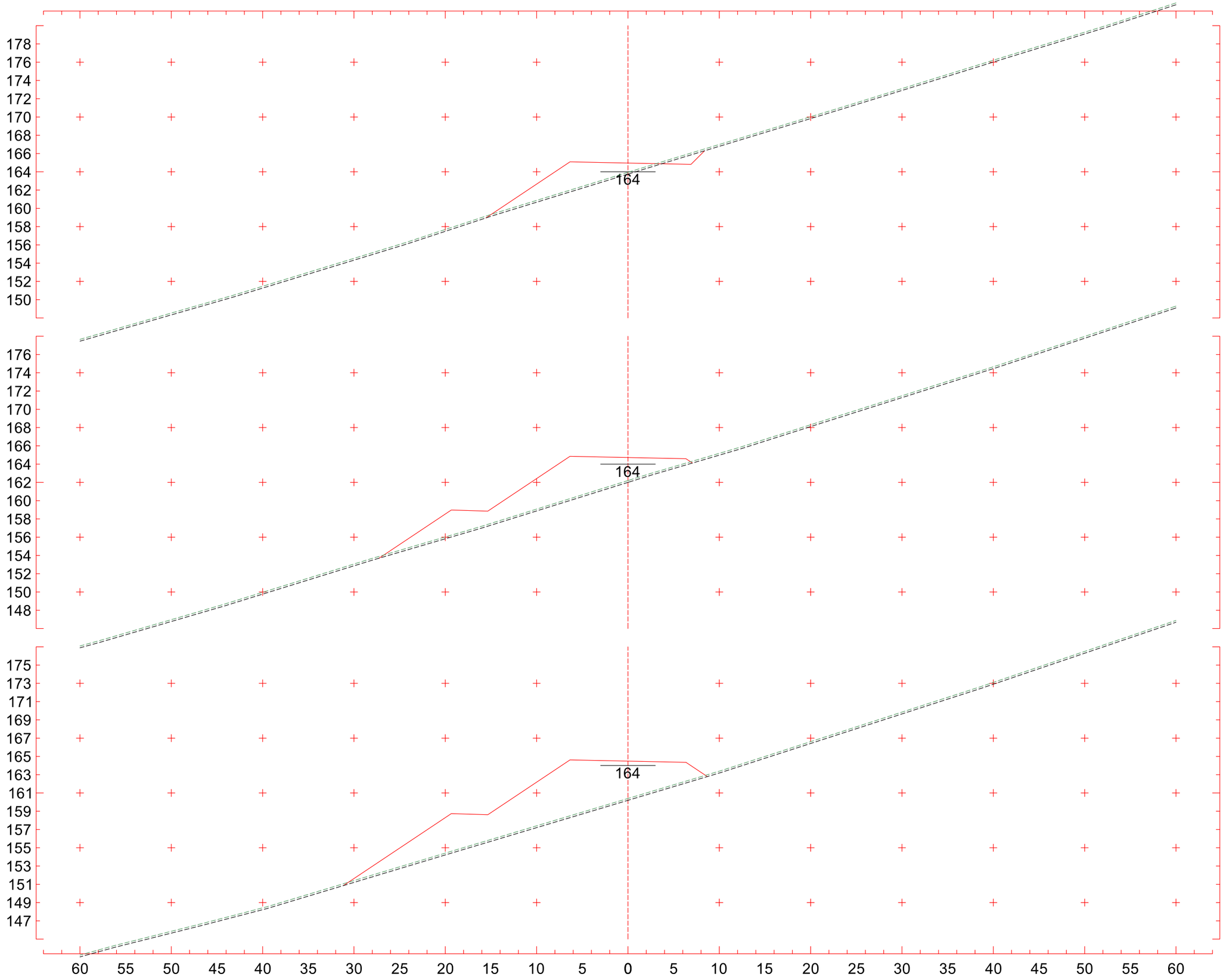
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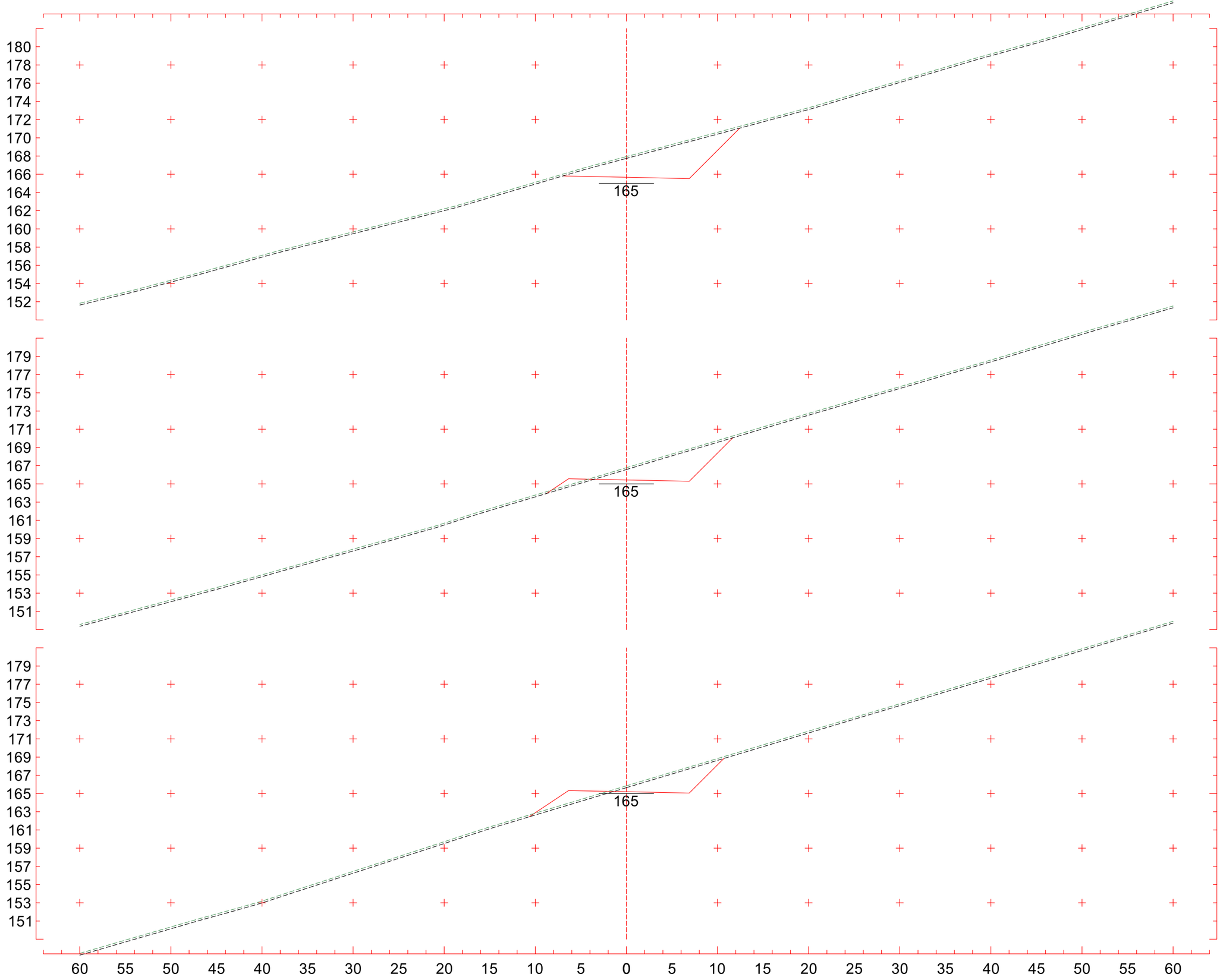
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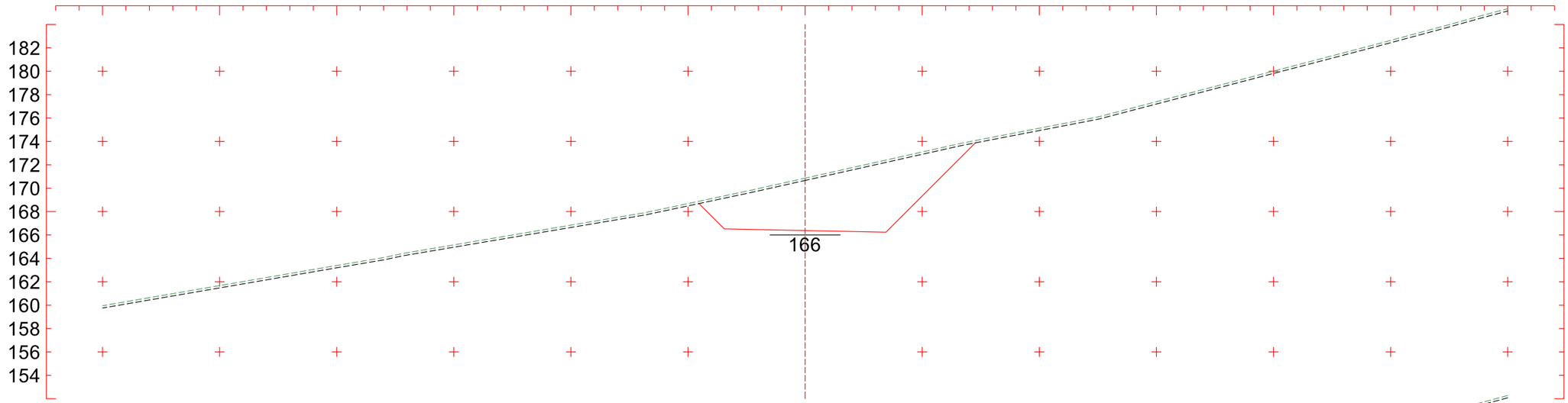
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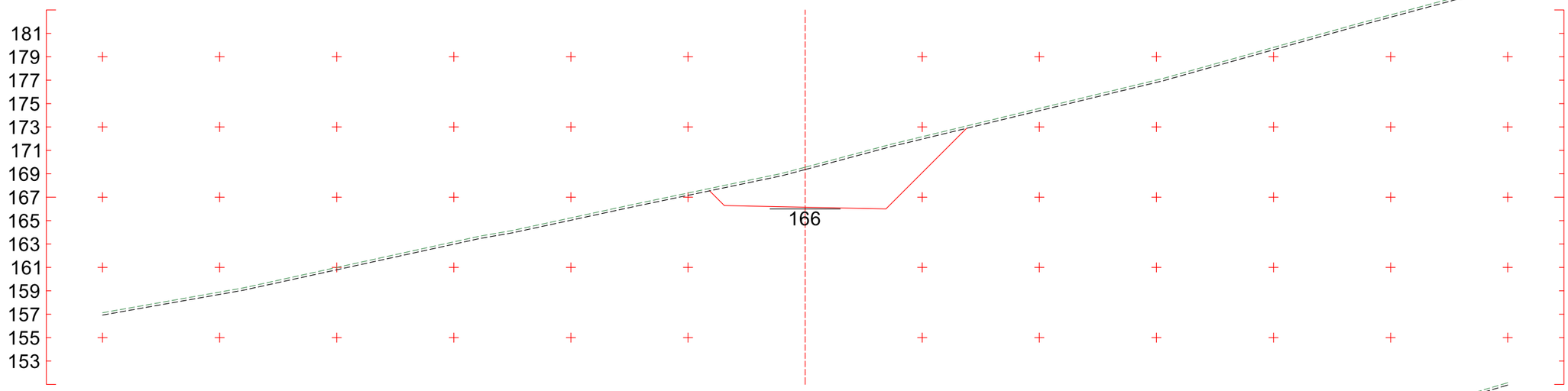
Projeto Ponto de Partida 2021/1



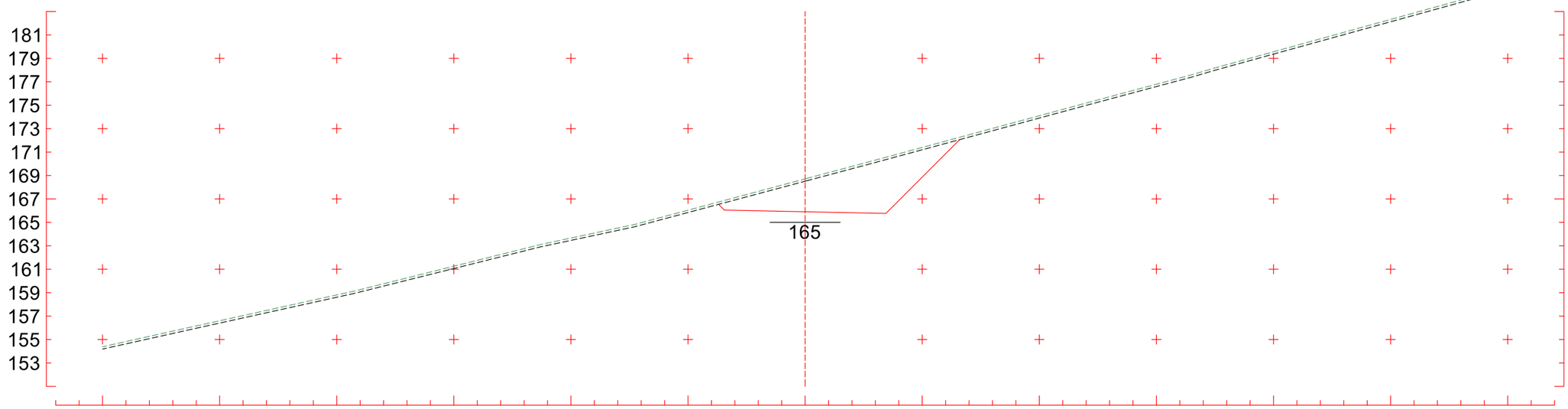
Projeto Ponto de Partida 2021/1



9+580
CT 170,862 m
CP 166,379 m



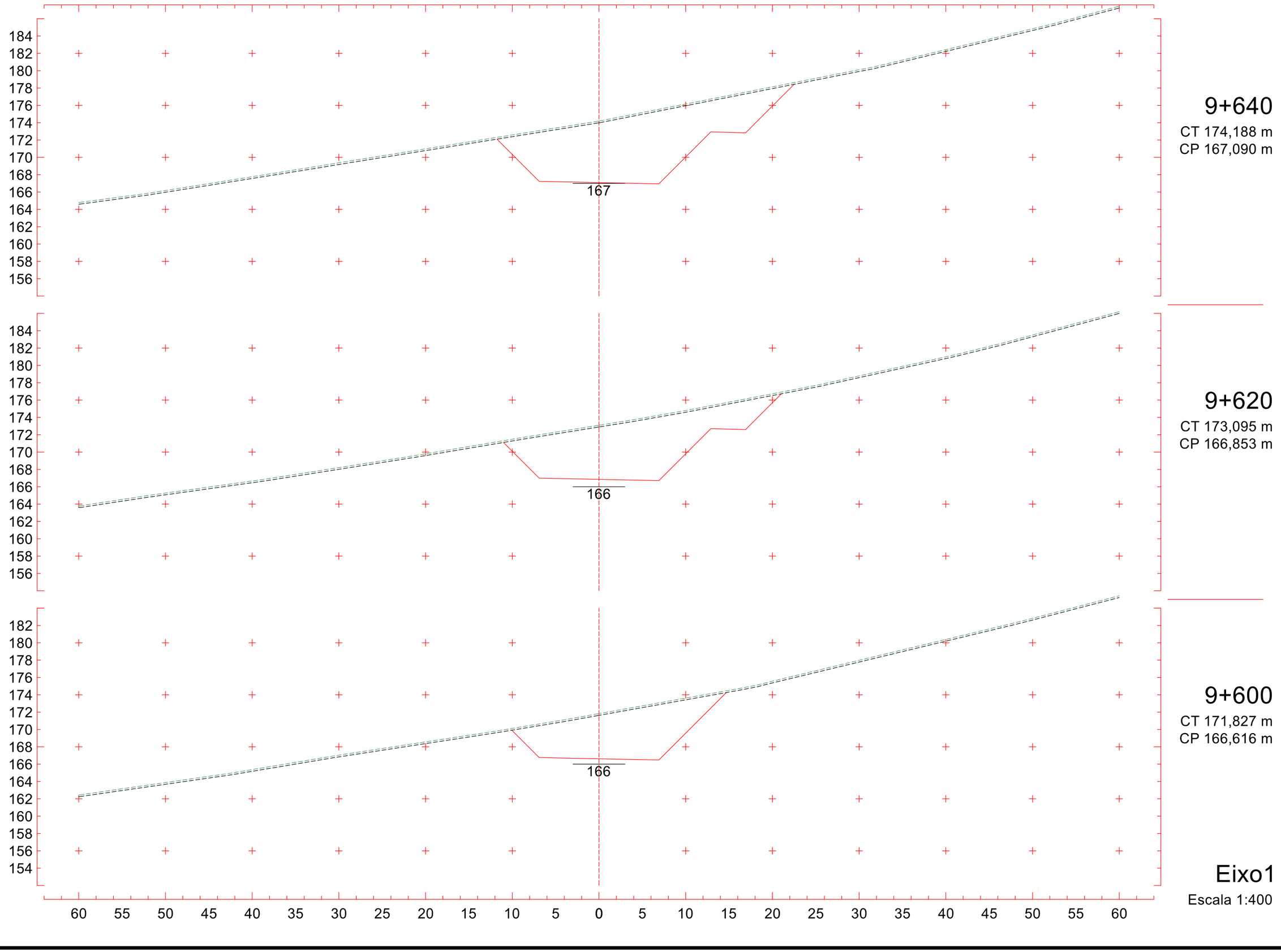
9+560
CT 169,561 m
CP 166,142 m



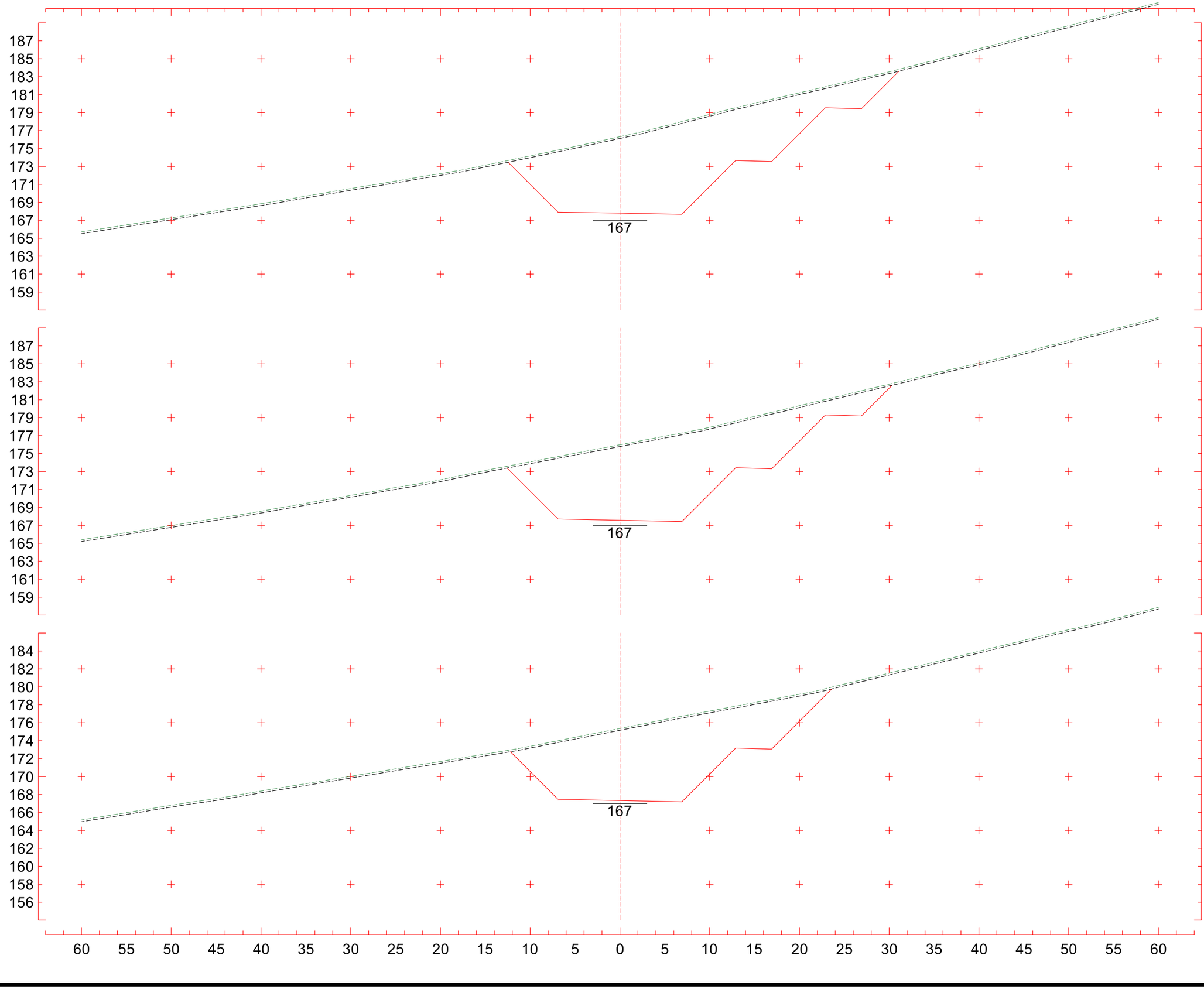
9+540
CT 168,713 m
CP 165,906 m

Eixo1
Escala 1:400

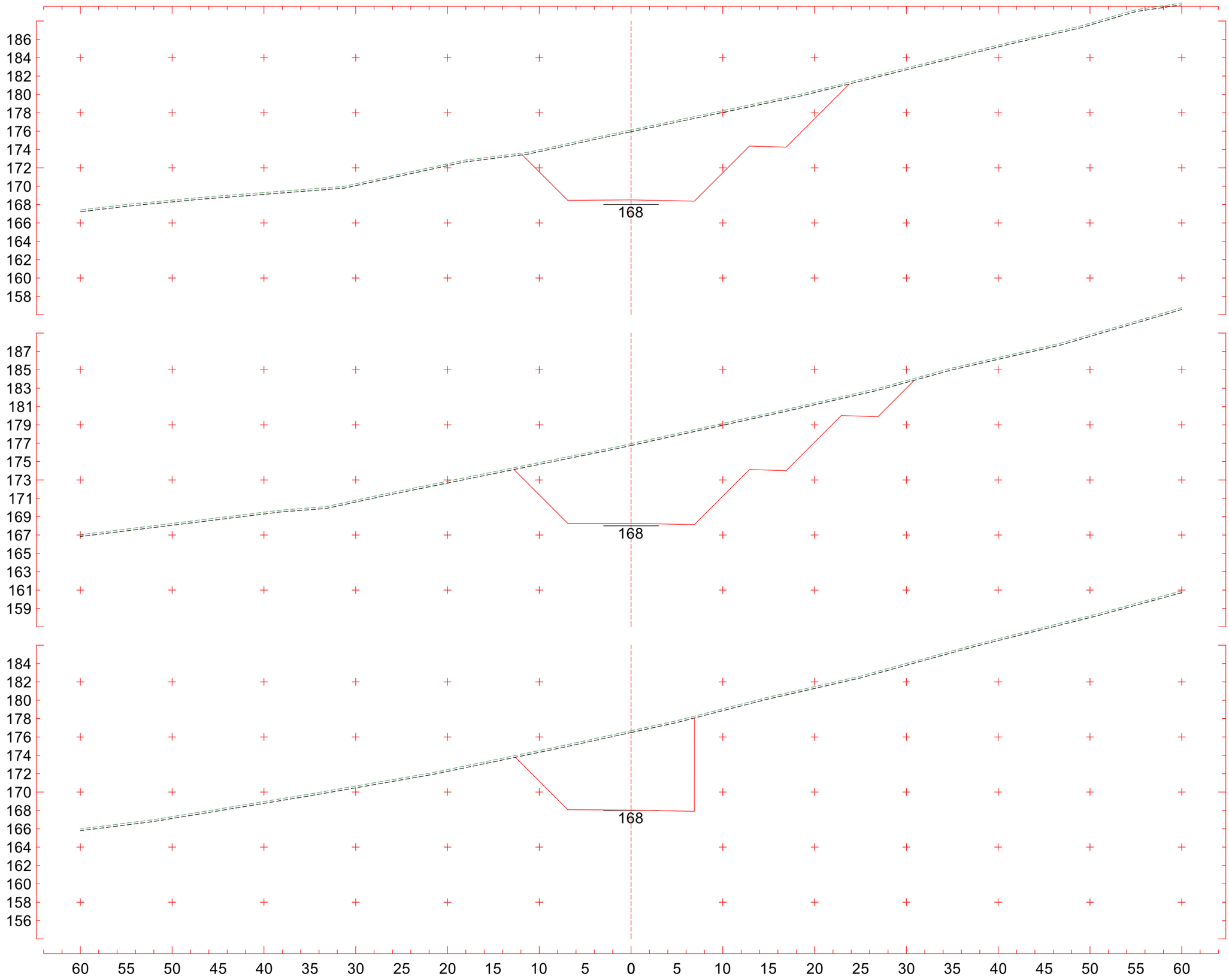
Projeto Ponto de Partida 2021/1



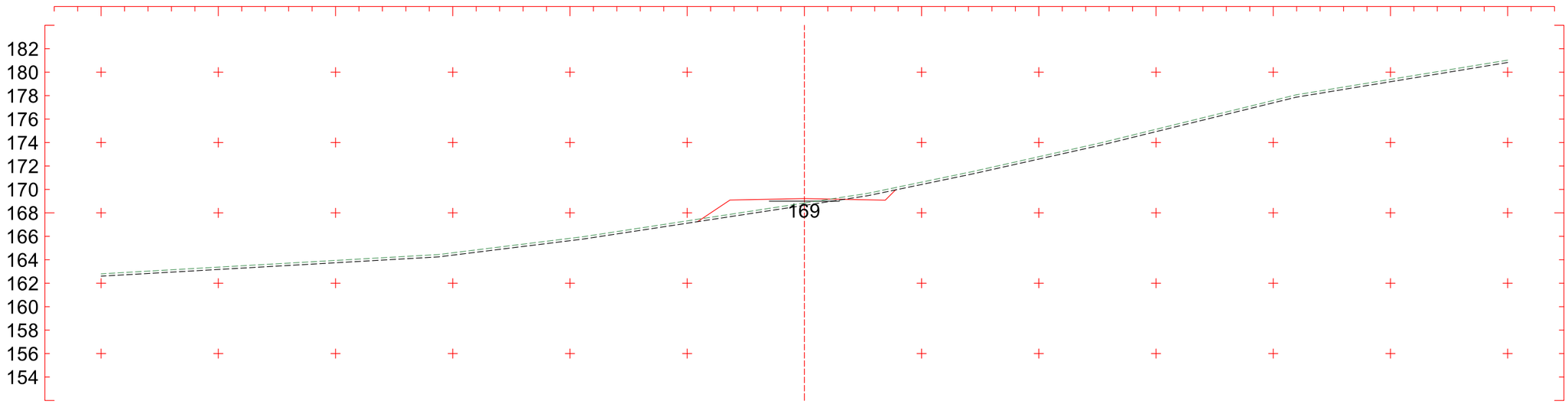
Projeto Ponto de Partida 2021/1



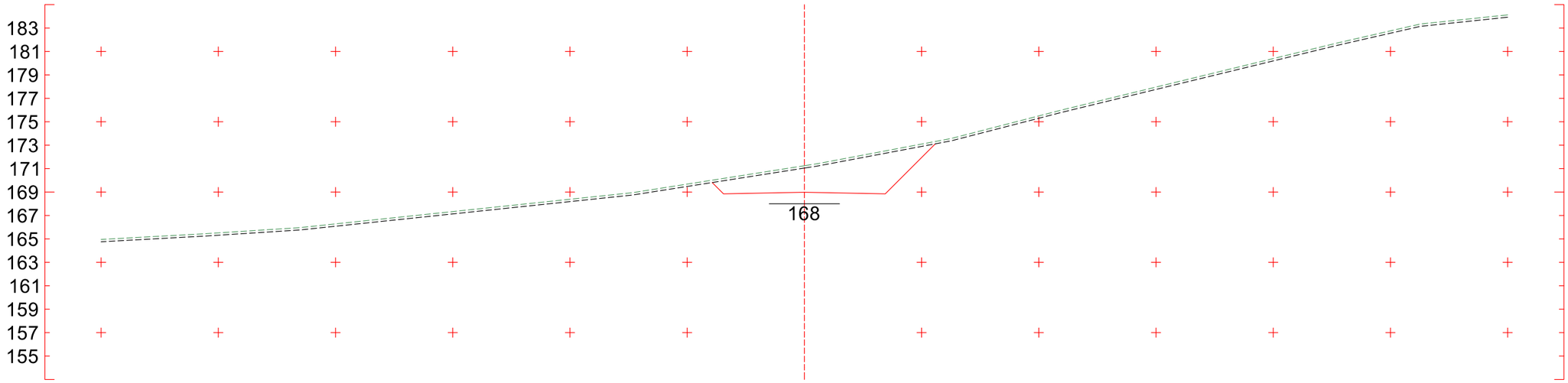
Projeto Ponto de Partida 2021/1



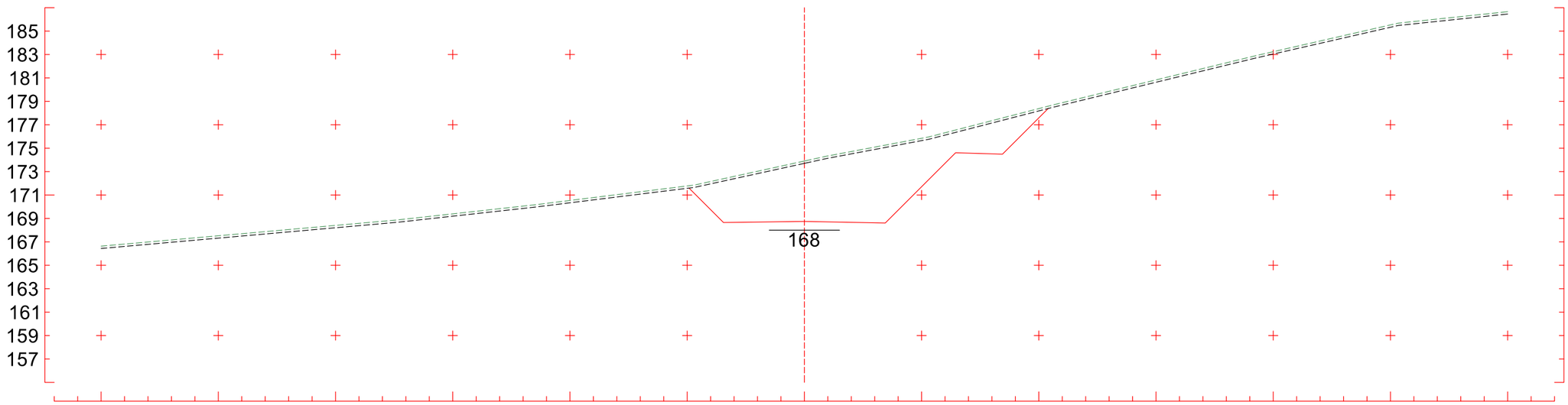
Projeto Ponto de Partida 2021/1



9+820
CT 168,841 m
CP 169,221 m



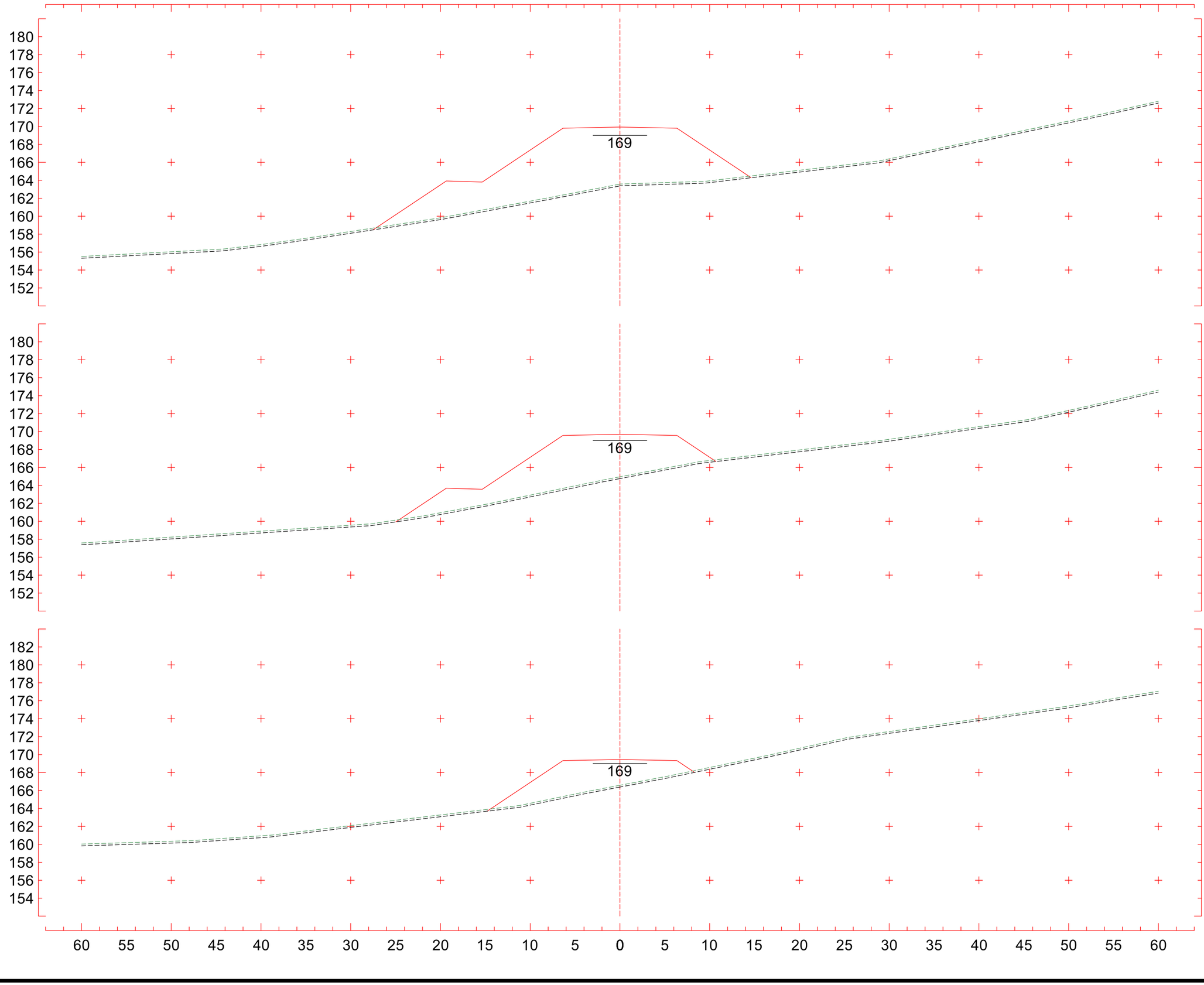
9+800
CT 171,247 m
CP 168,984 m



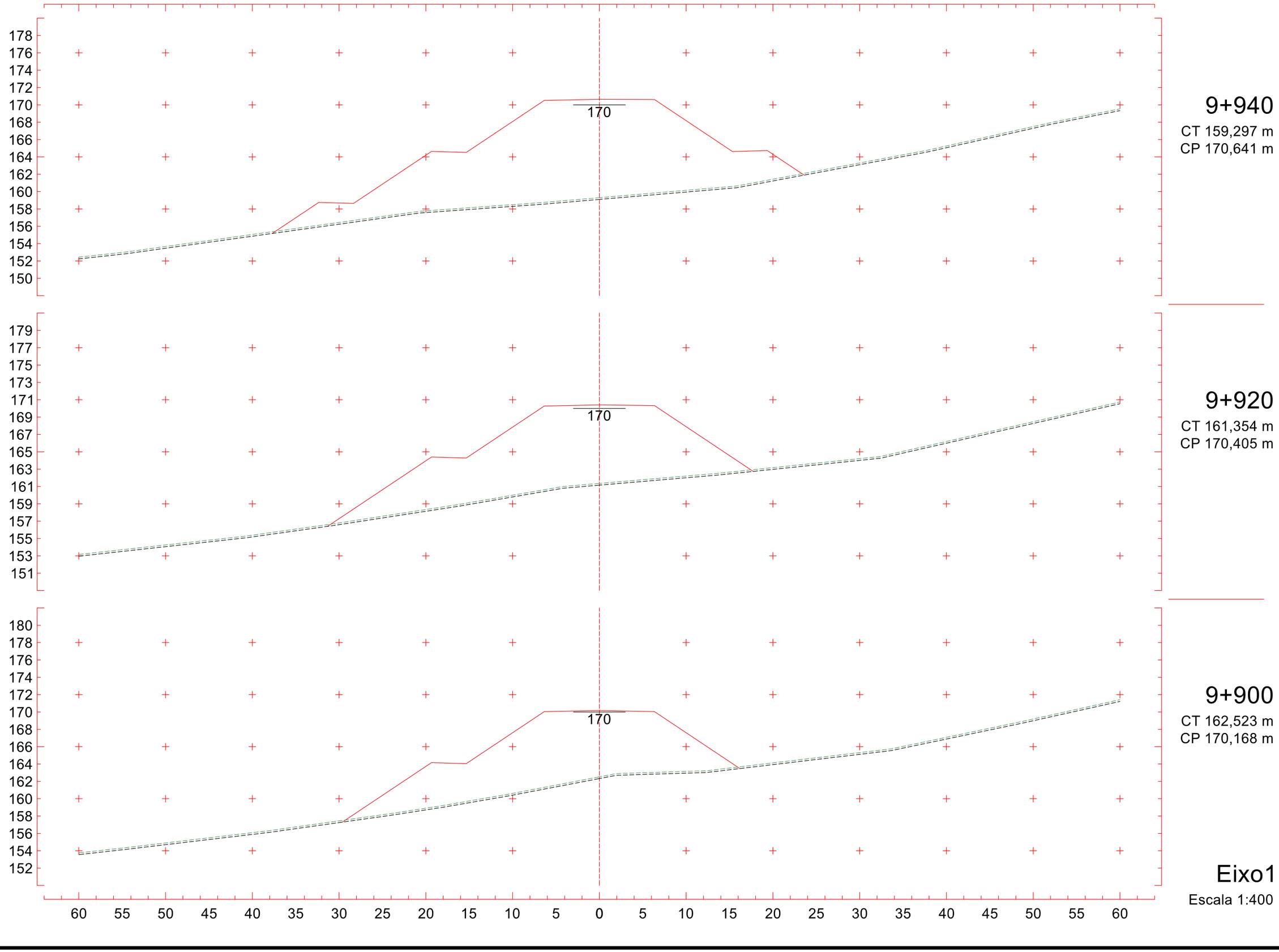
9+780
CT 173,904 m
CP 168,747 m

Eixo1
Escala 1:400

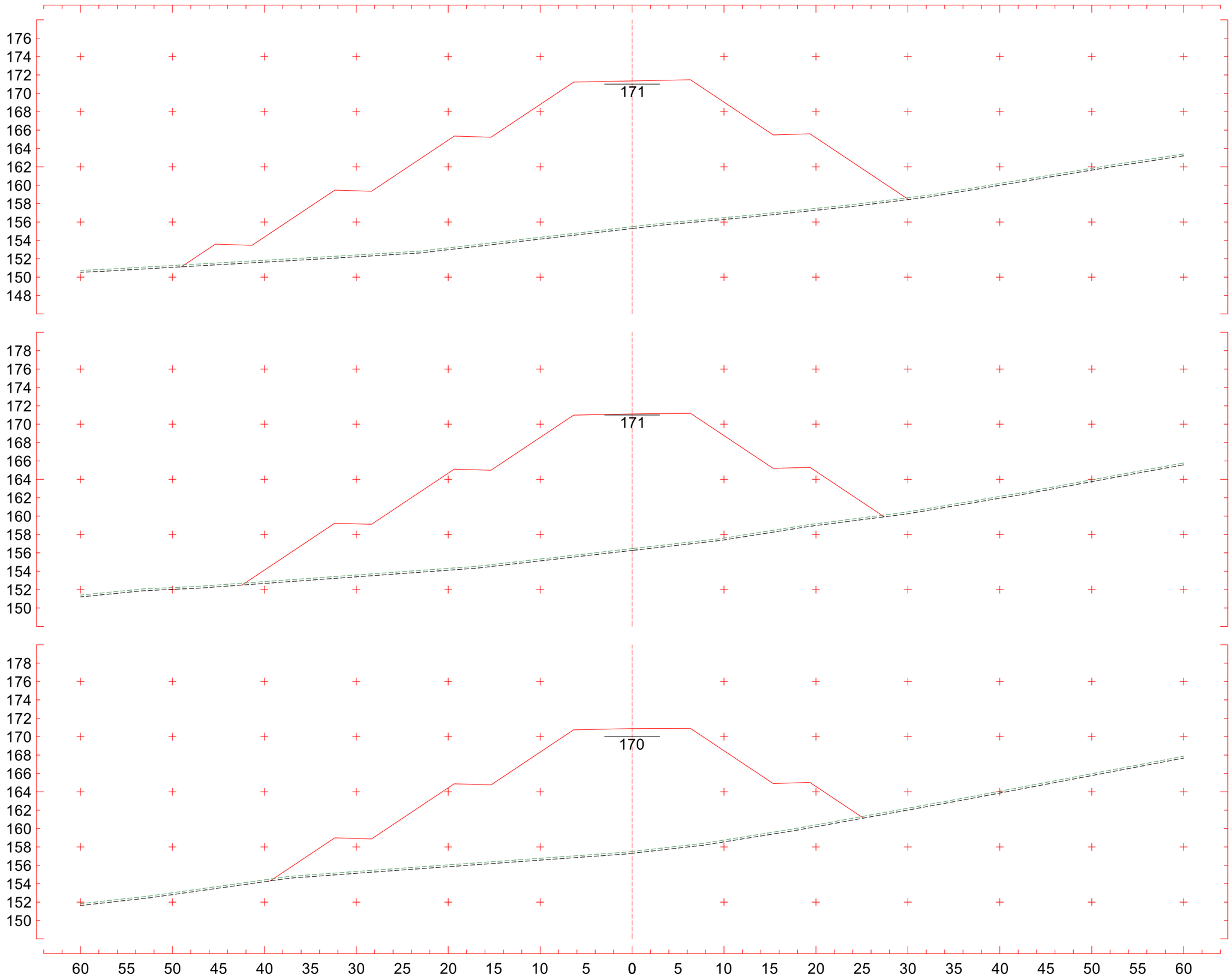
Projeto Ponto de Partida 2021/1



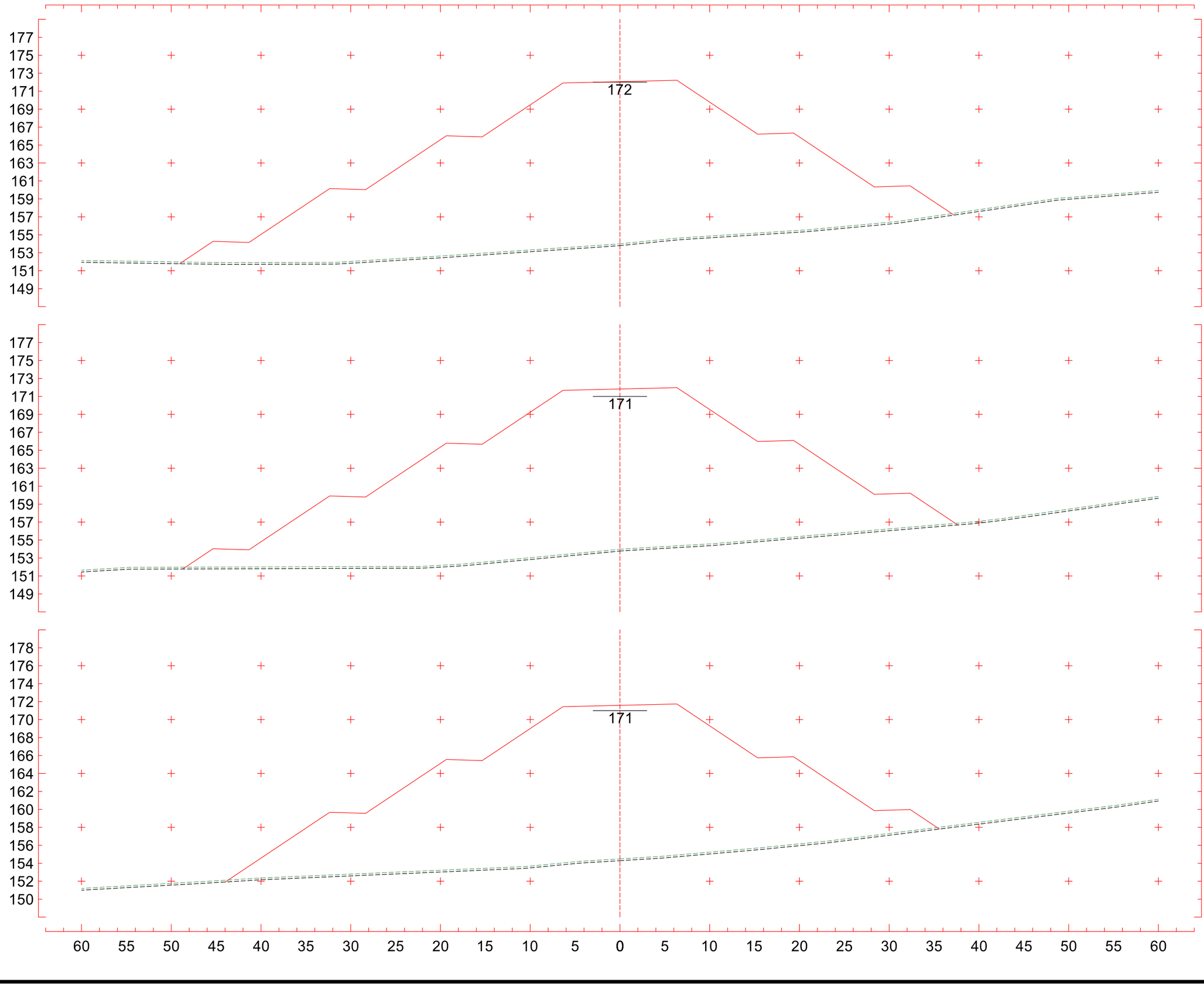
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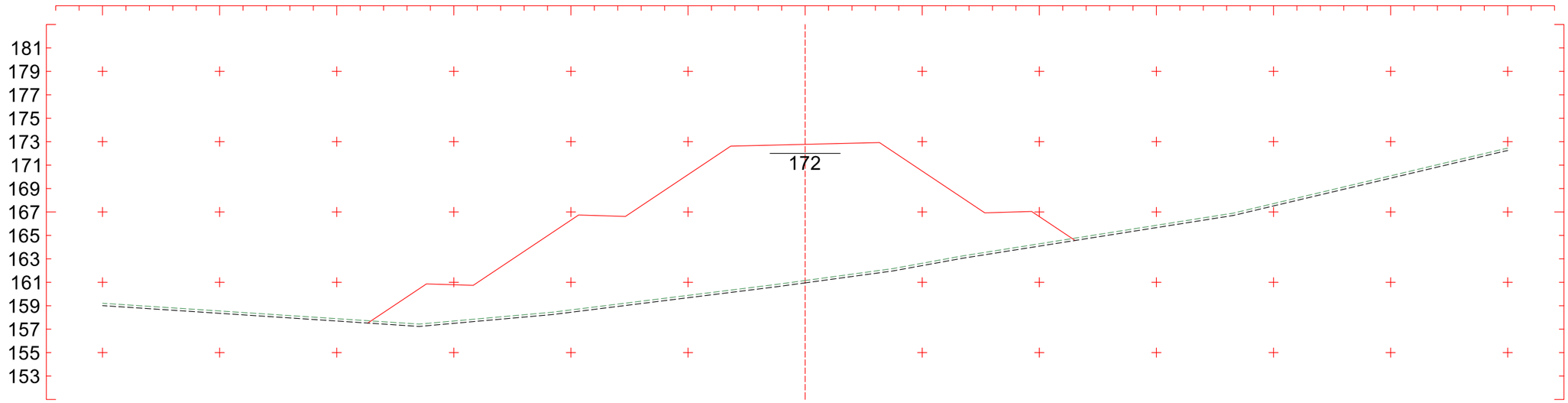
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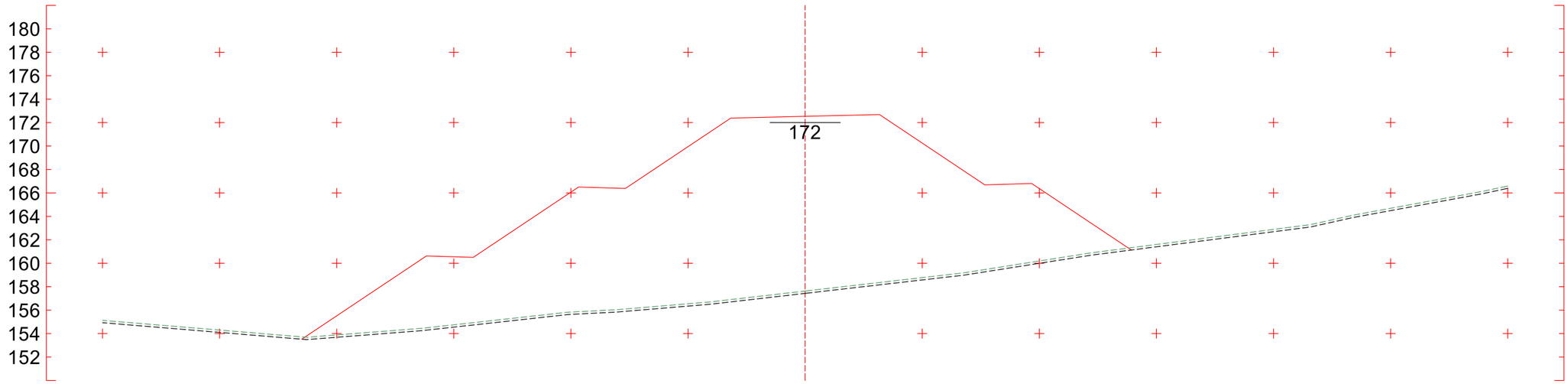
Projeto Ponto de Partida 2021/1



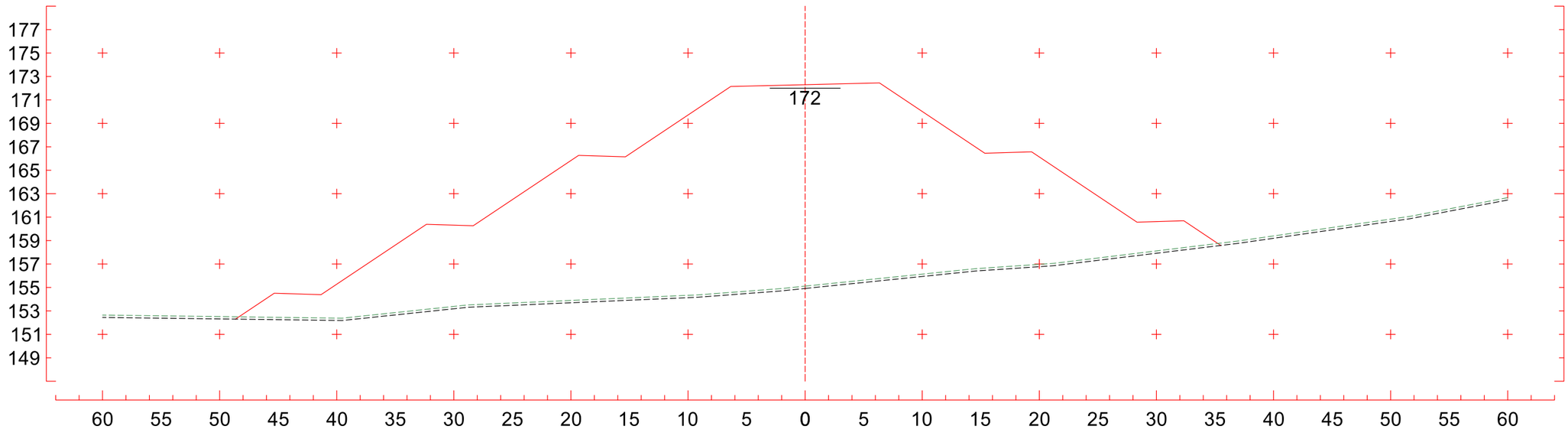
Projeto Ponto de Partida 2021/1



10+120
CT 161,151 m
CP 172,773 m



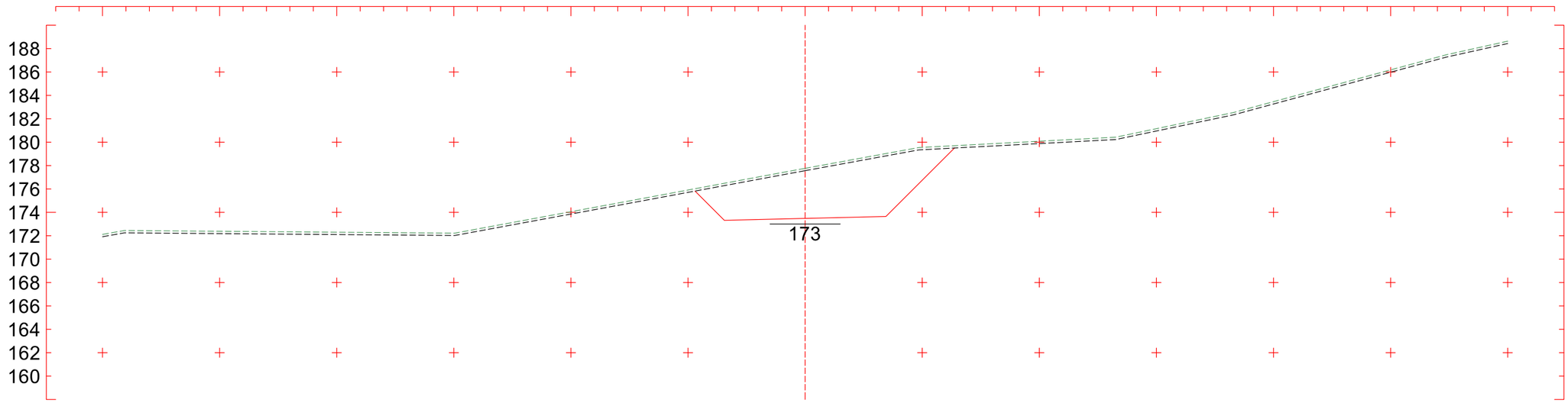
10+100
CT 157,631 m
CP 172,536 m



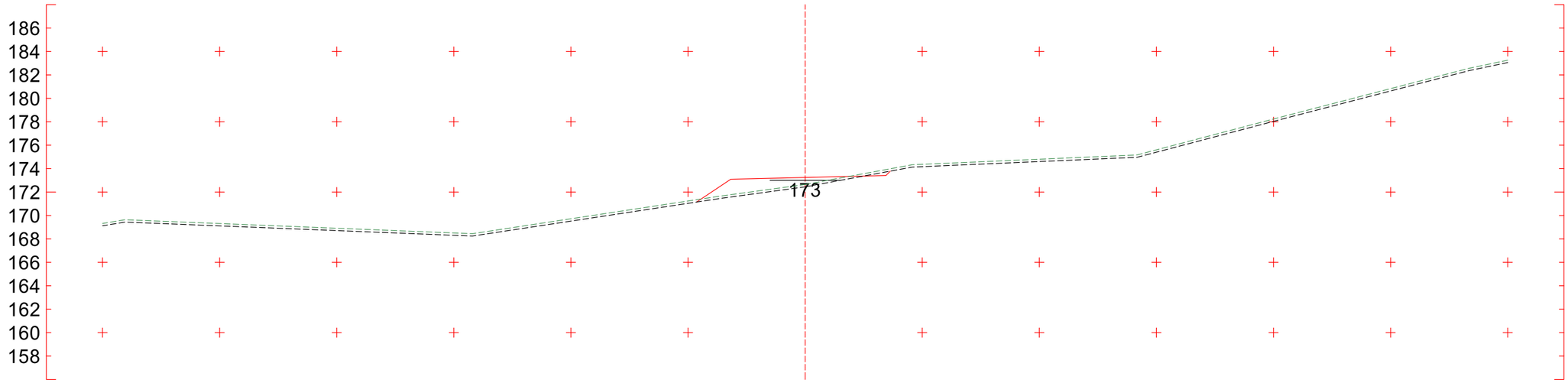
10+080
CT 155,115 m
CP 172,299 m

Eixo1
Escala 1:400

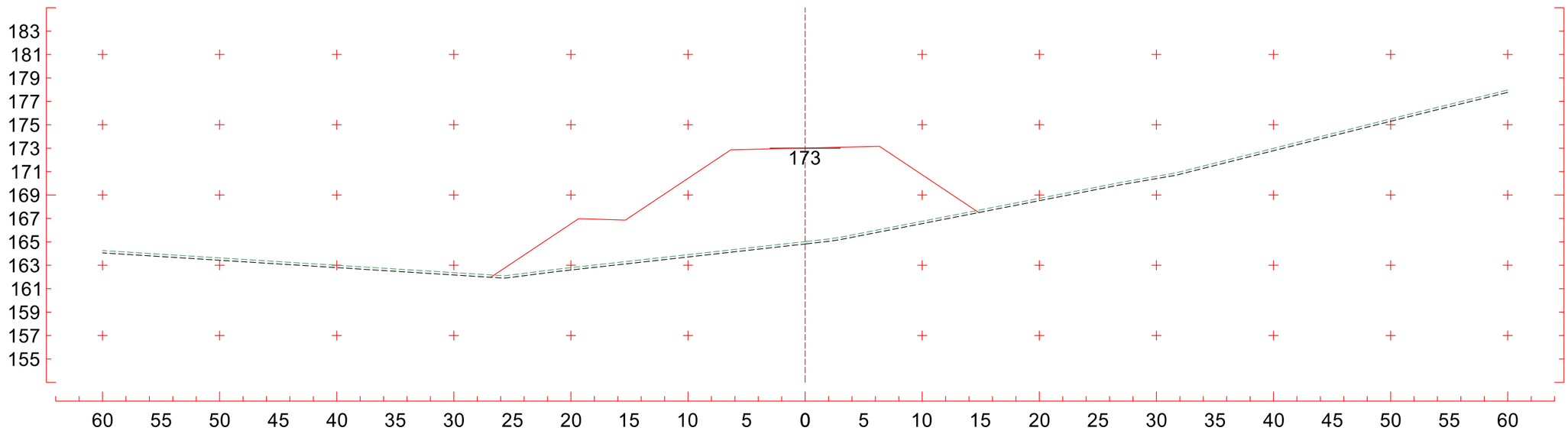
Projeto Ponto de Partida 2021/1



10+180
CT 177,763 m
CP 173,483 m



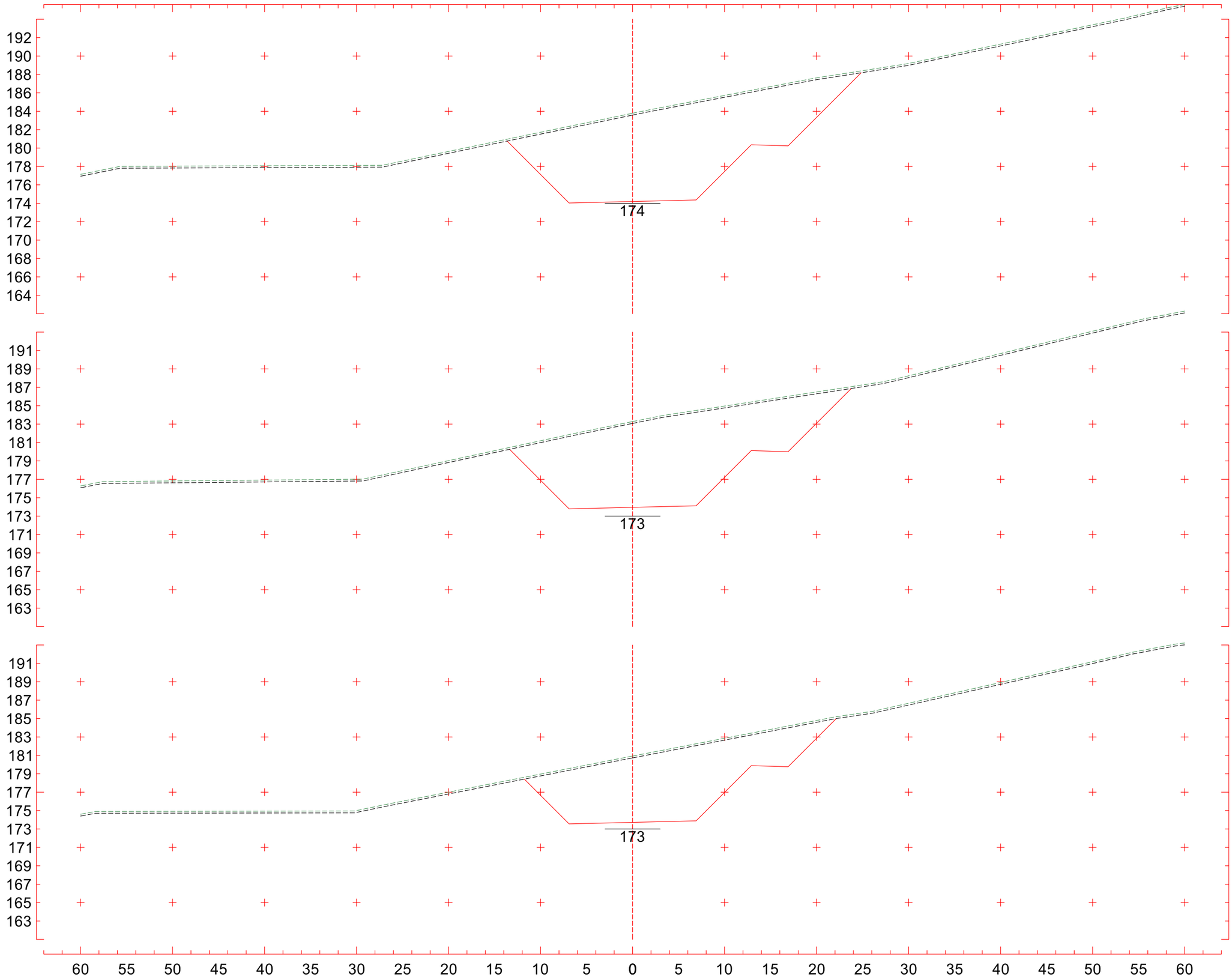
10+160
CT 172,645 m
CP 173,246 m



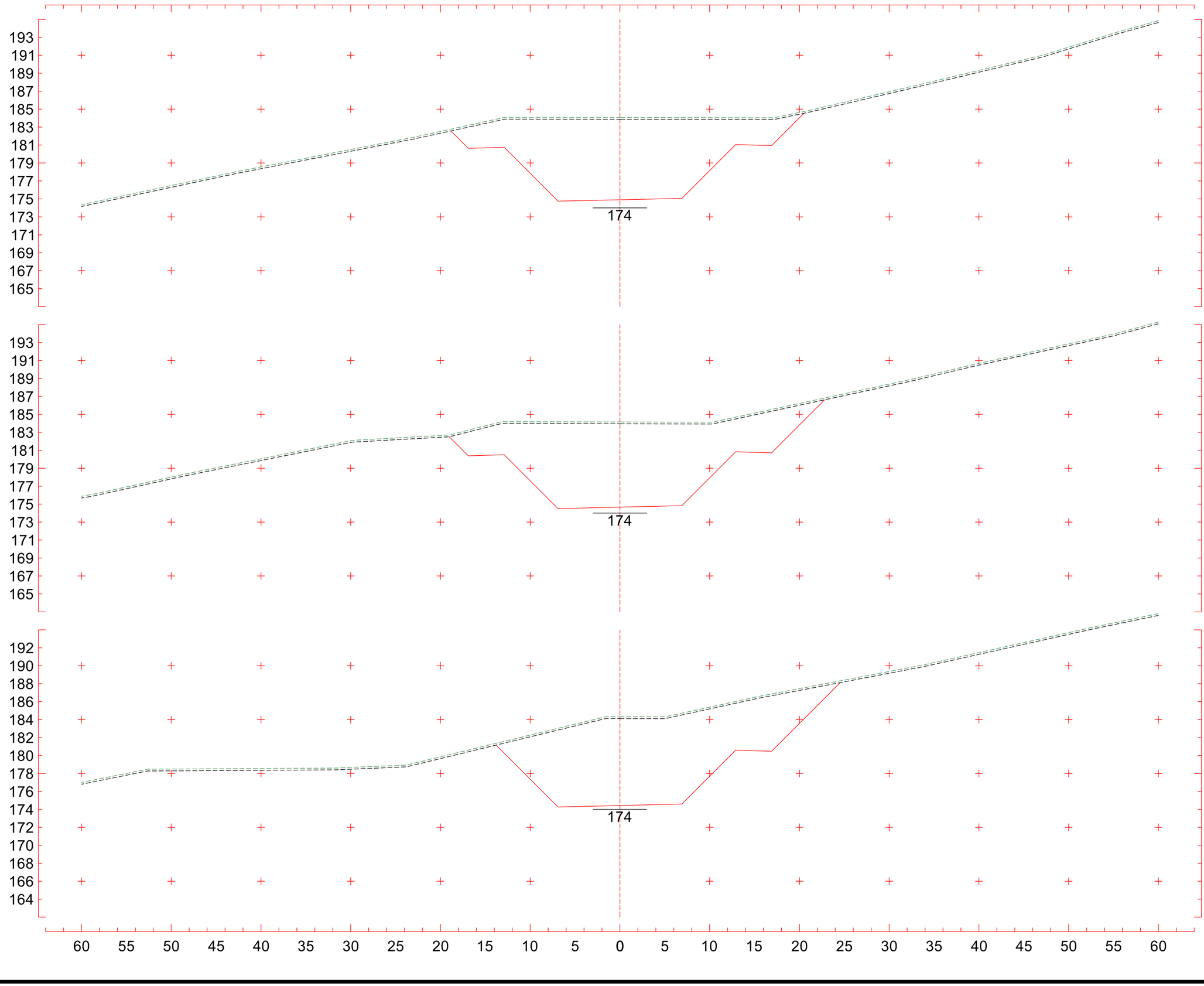
10+140
CT 165,020 m
CP 173,009 m

Eixo1
Escala 1:400

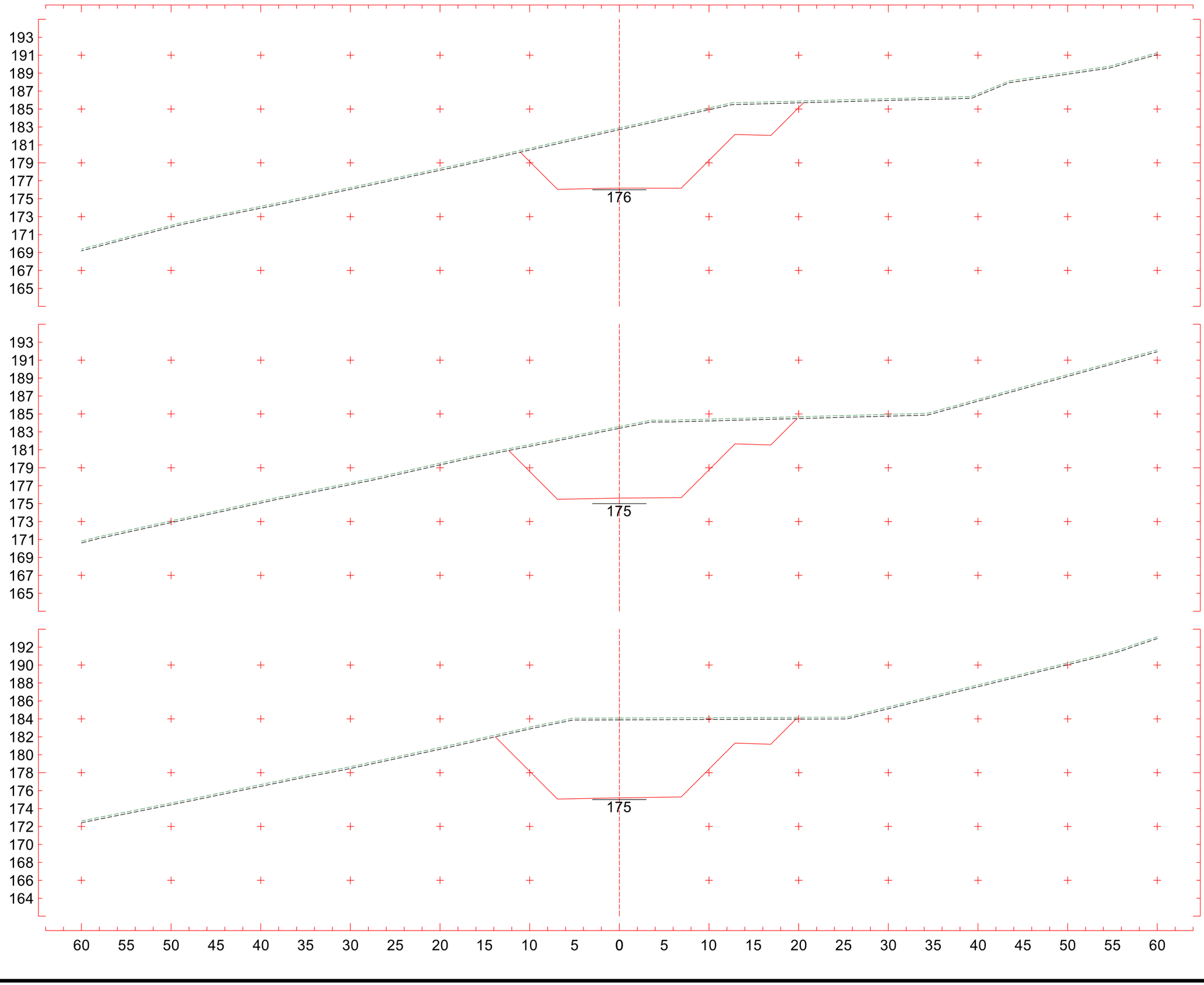
Projeto Ponto de Partida 2021/1



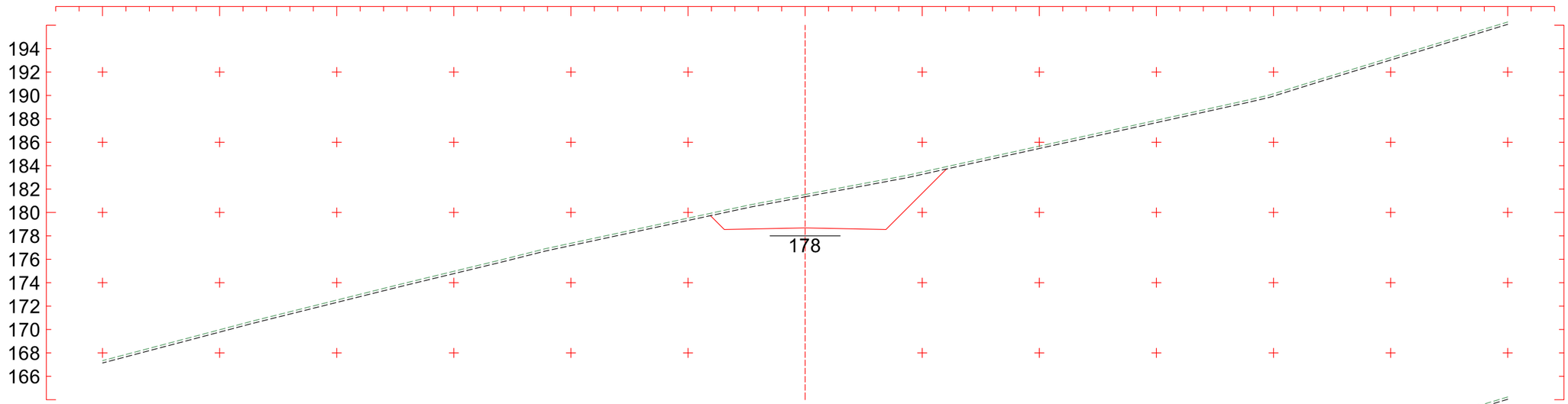
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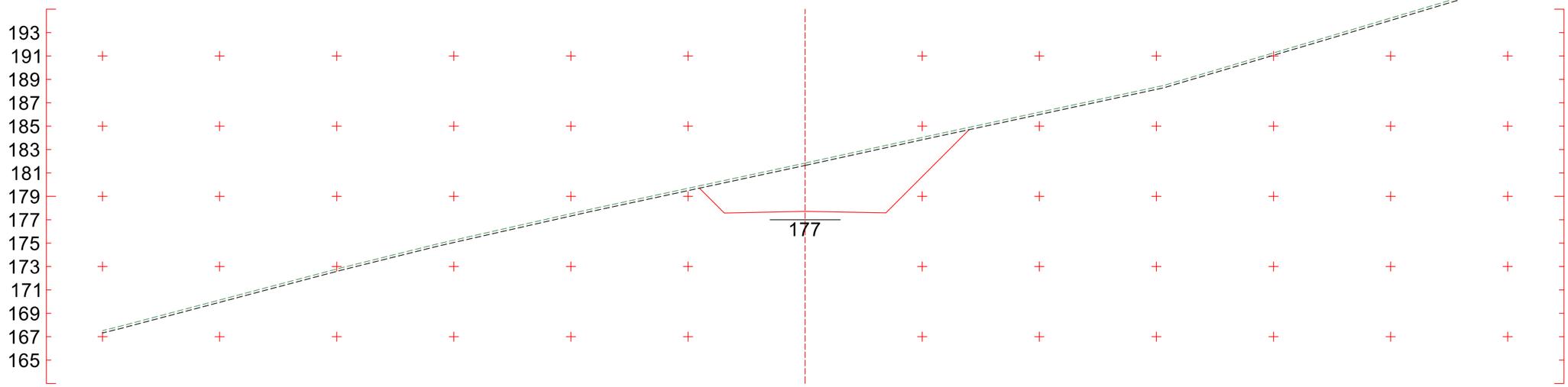
Projeto Ponto de Partida 2021/1



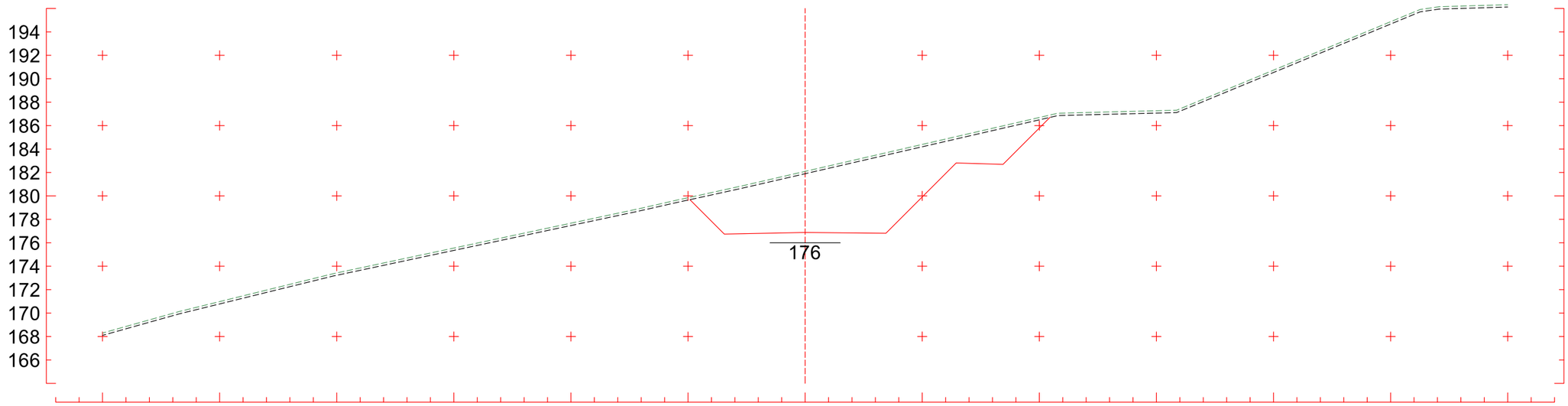
Projeto Ponto de Partida 2021/1



10+420
CT 181,538 m
CP 178,681 m



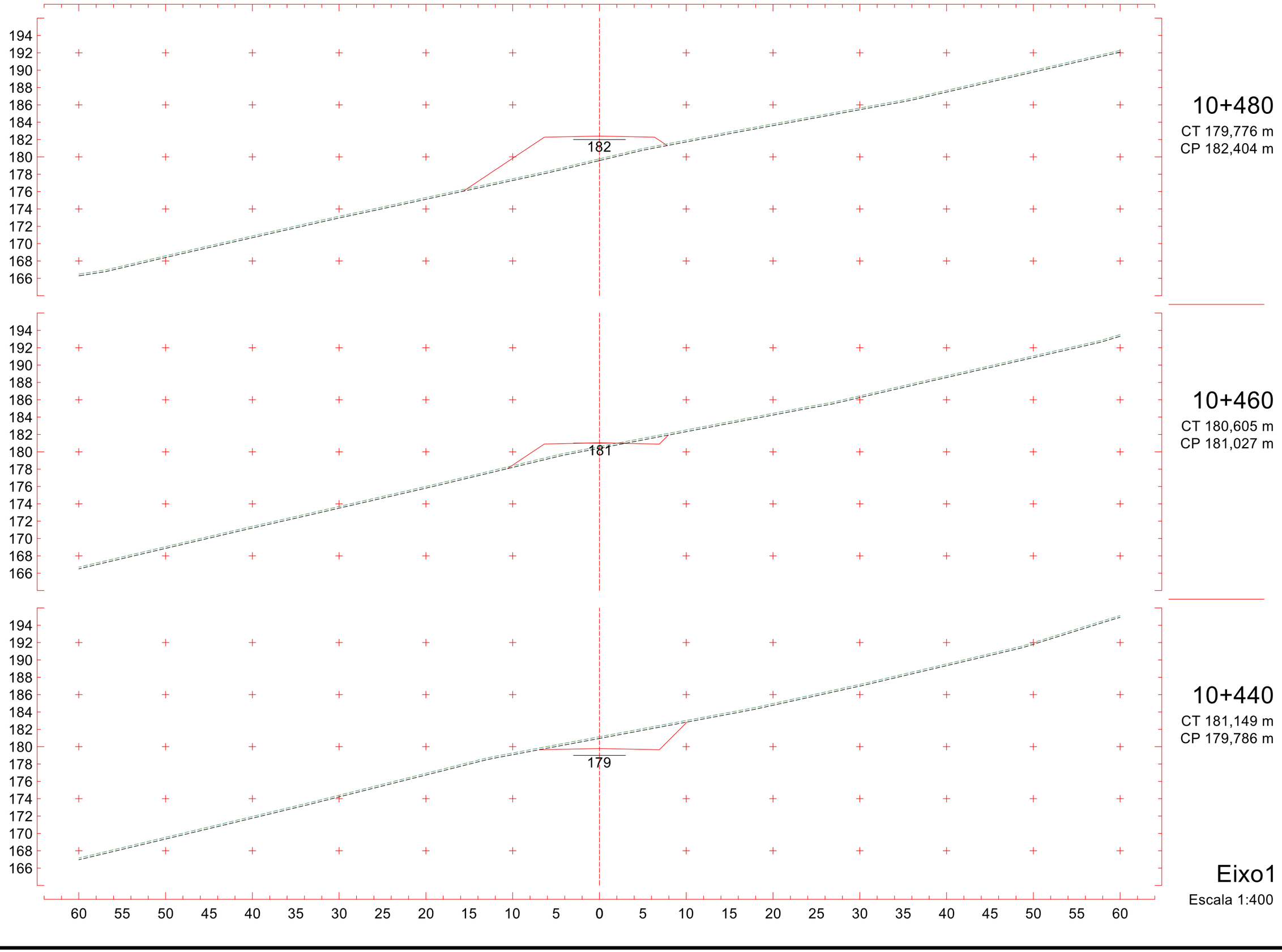
10+400
CT 181,842 m
CP 177,712 m



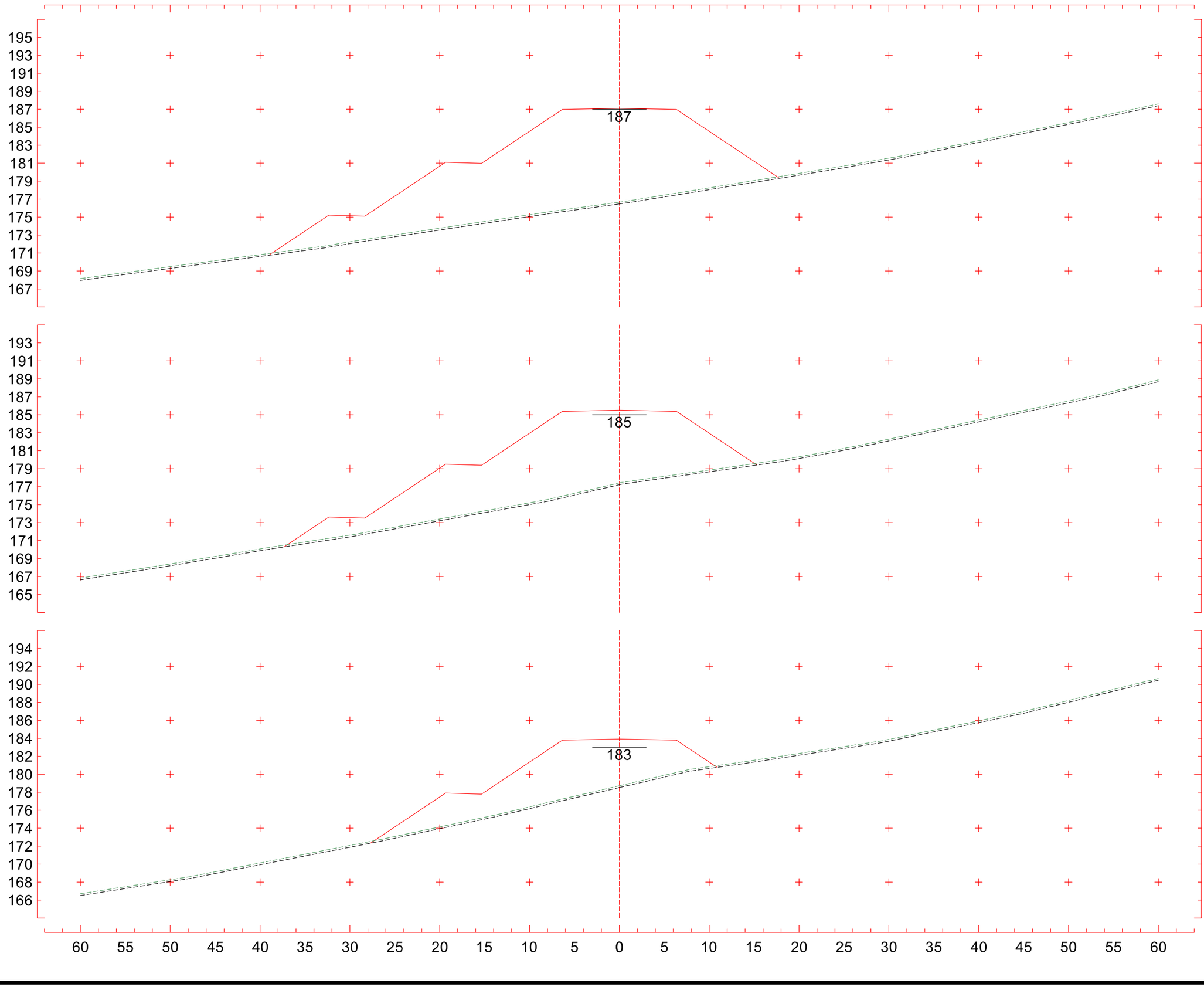
10+380
CT 182,094 m
CP 176,879 m

Eixo1
Escala 1:400

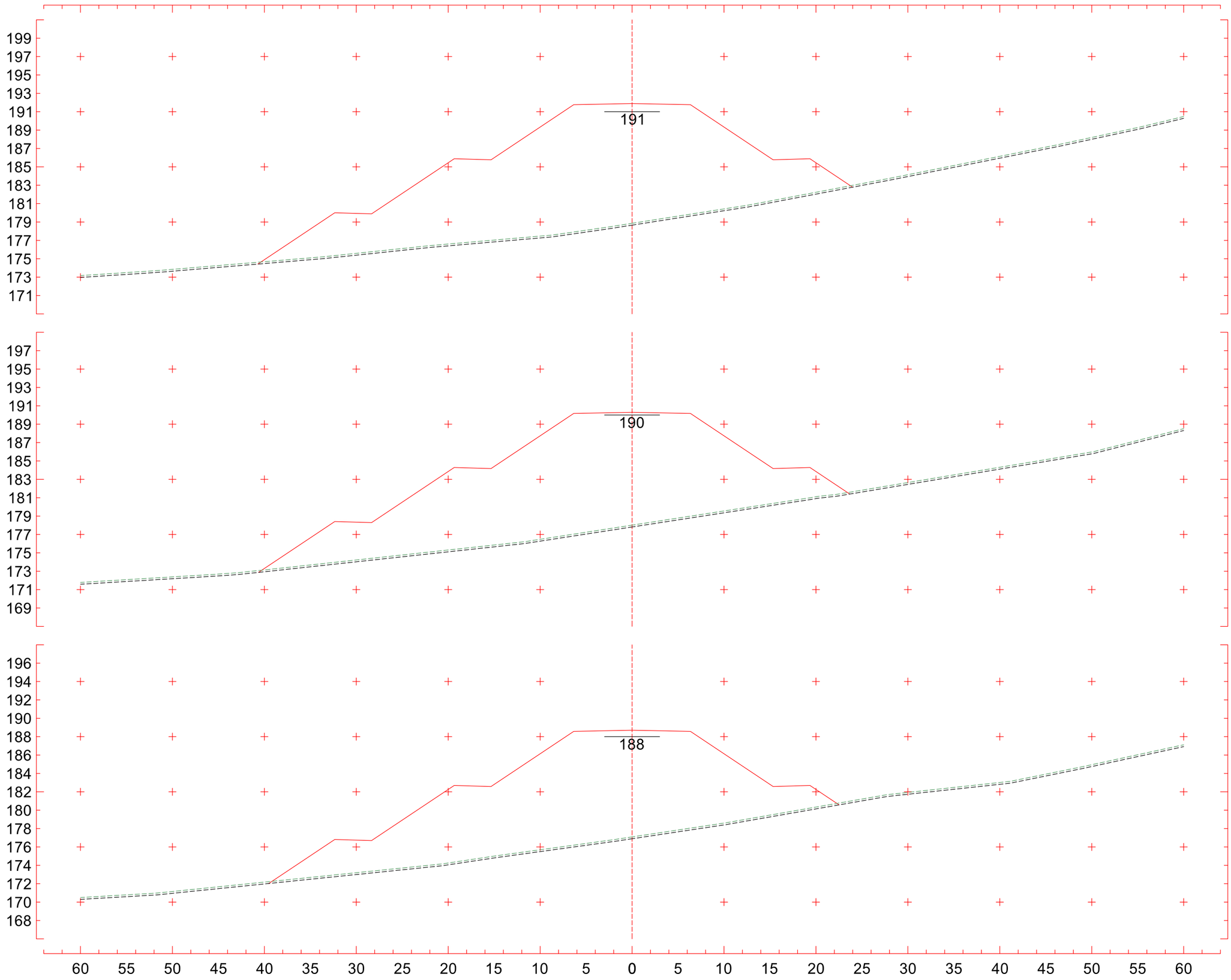
Projeto Ponto de Partida 2021/1



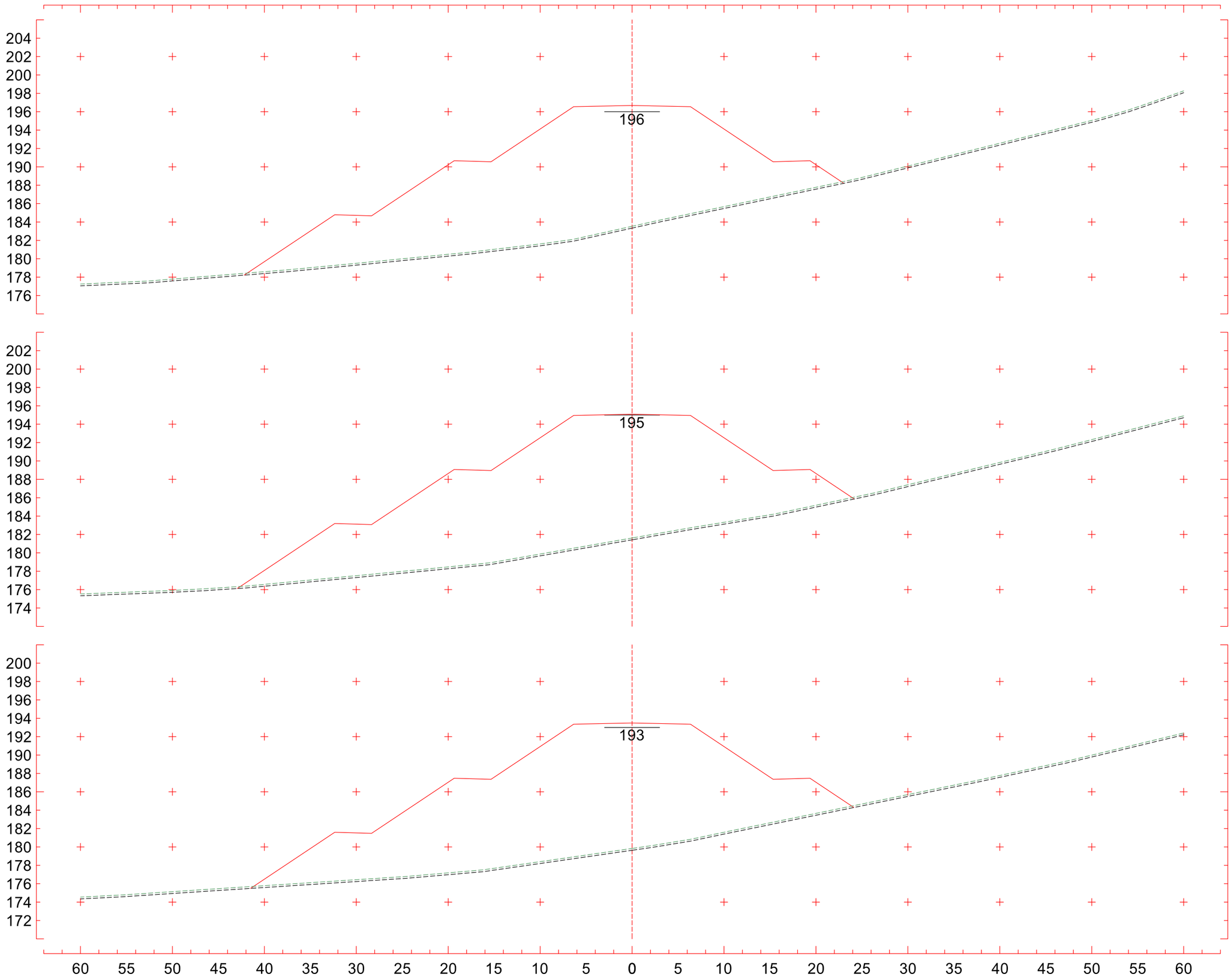
Projeto Ponto de Partida 2021/1



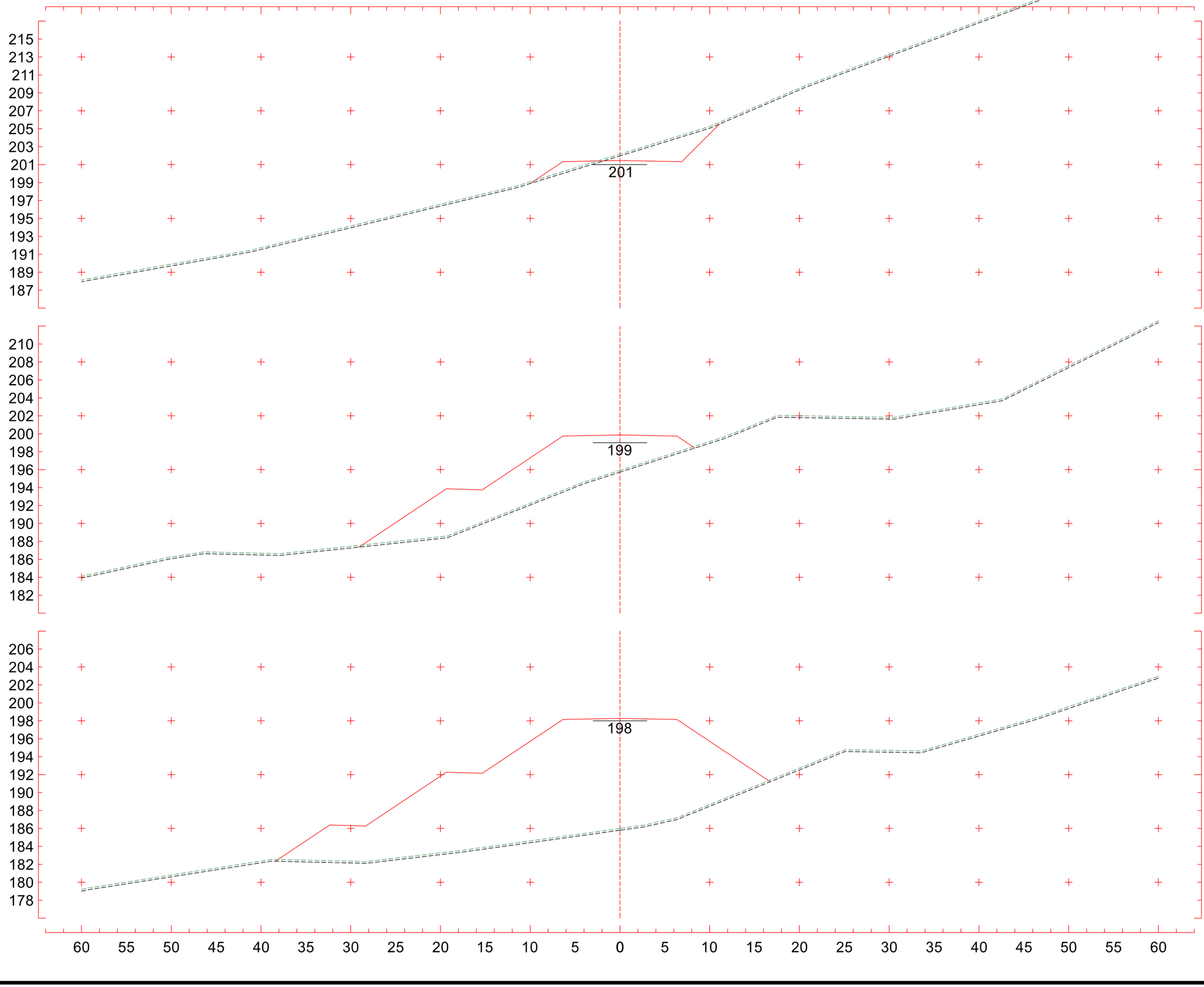
Projeto Ponto de Partida 2021/1



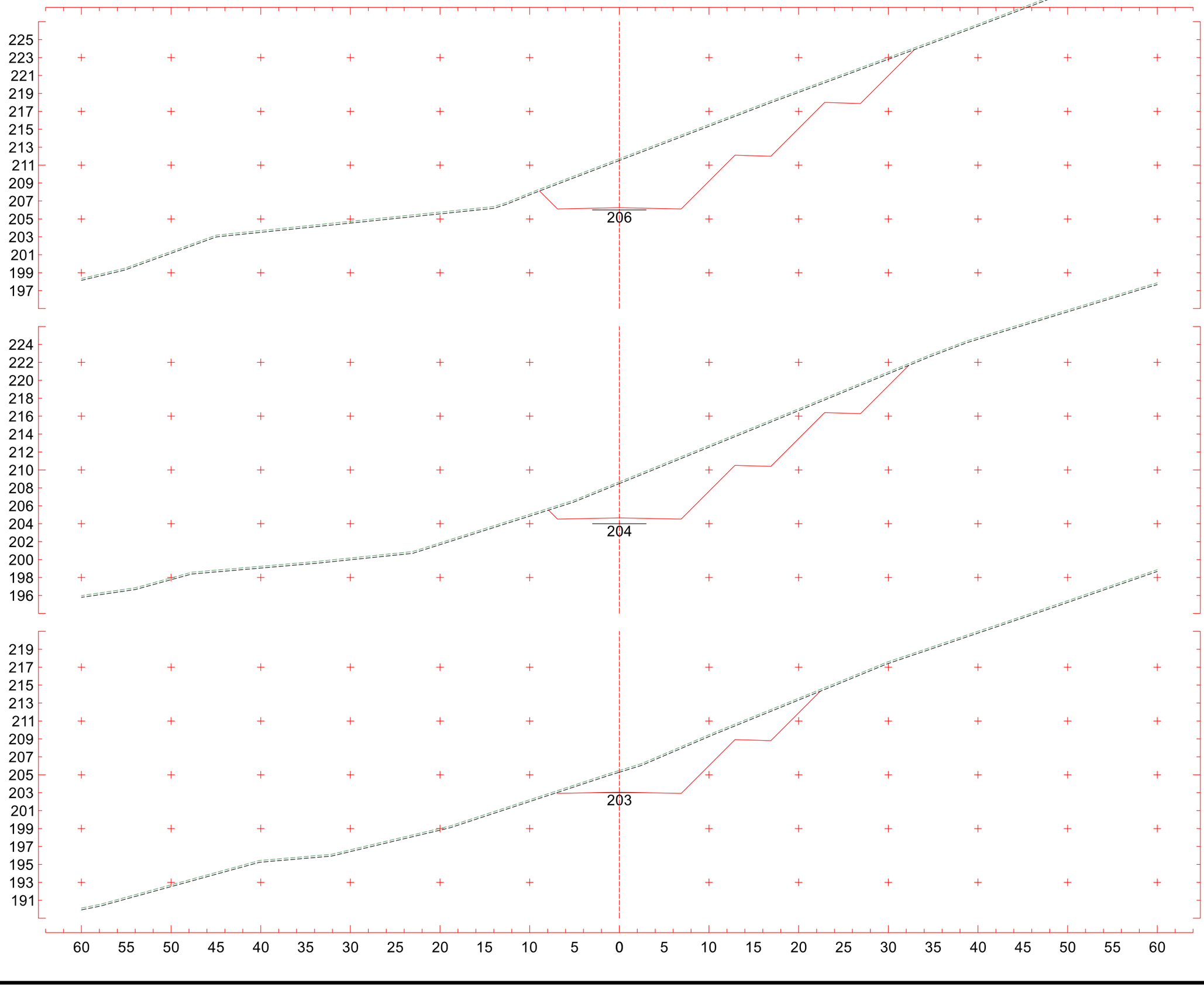
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



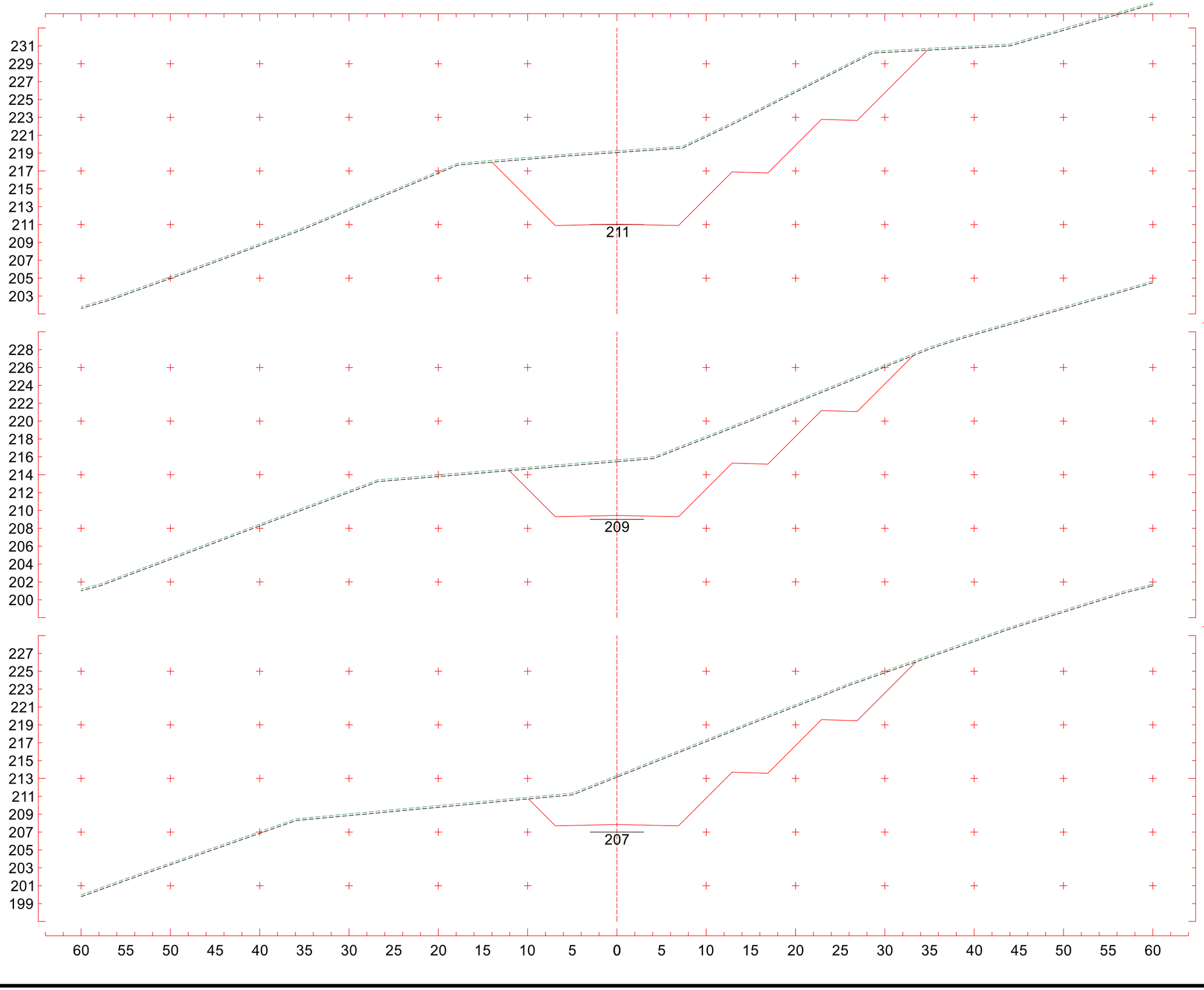
10+780
CT 211,713 m
CP 206,249 m

10+760
CT 208,676 m
CP 204,653 m

10+740
CT 205,479 m
CP 203,058 m

Eixo1
Escala 1:400

Projeto Ponto de Partida 2021/1



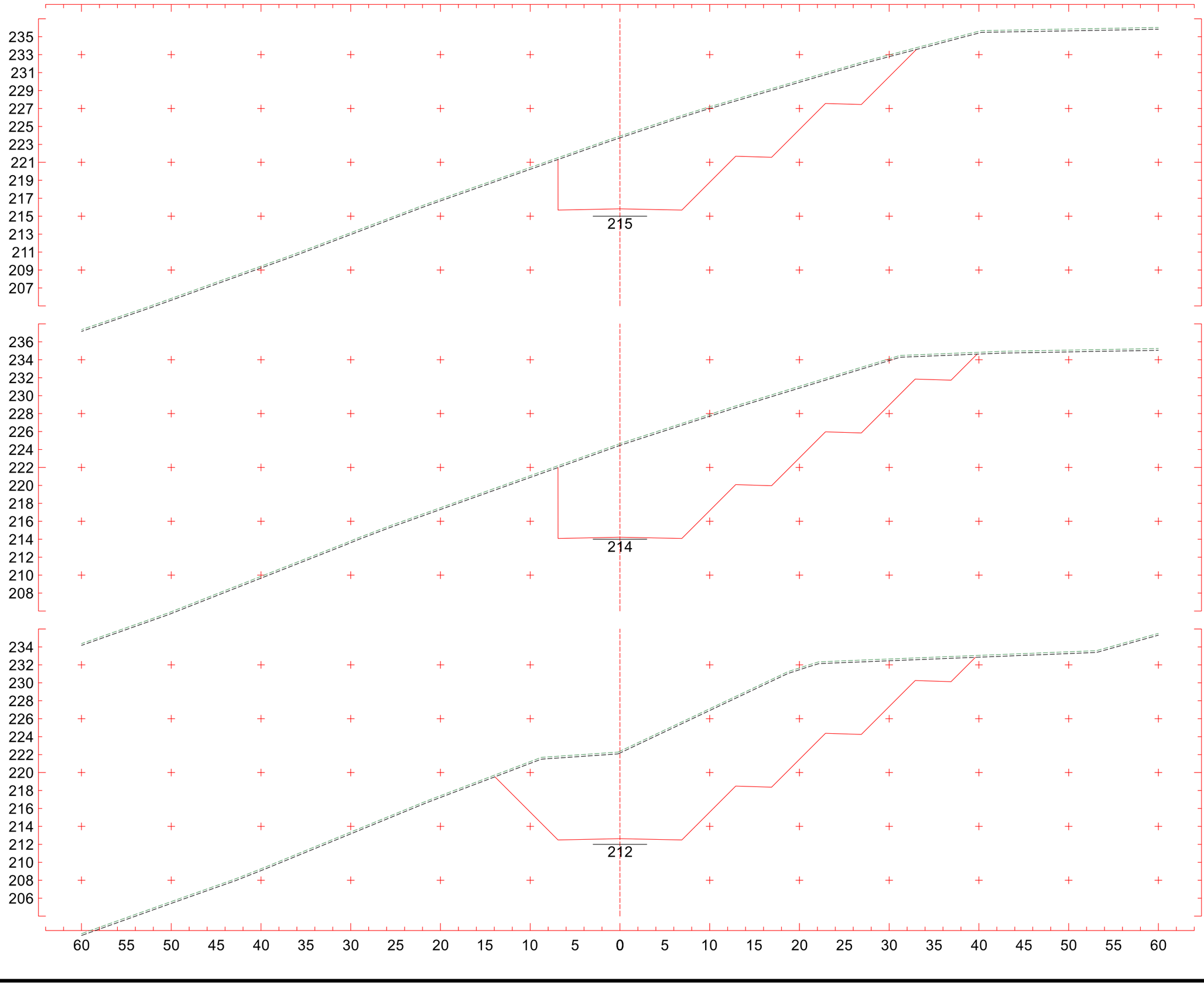
10+840
CT 219,263 m
CP 211,034 m

10+820
CT 215,658 m
CP 209,439 m

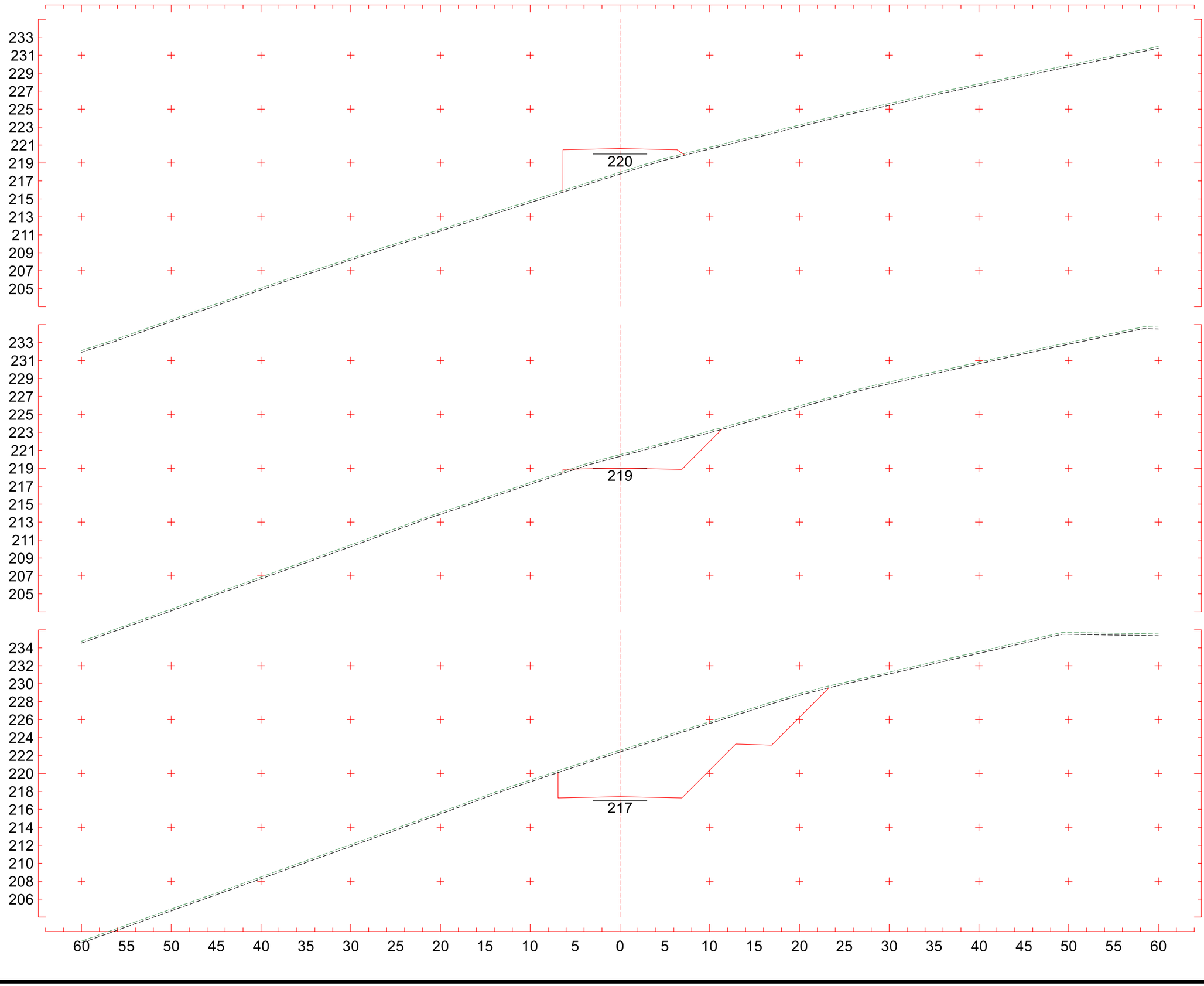
10+800
CT 213,348 m
CP 207,844 m

Eixo1
Escala 1:400

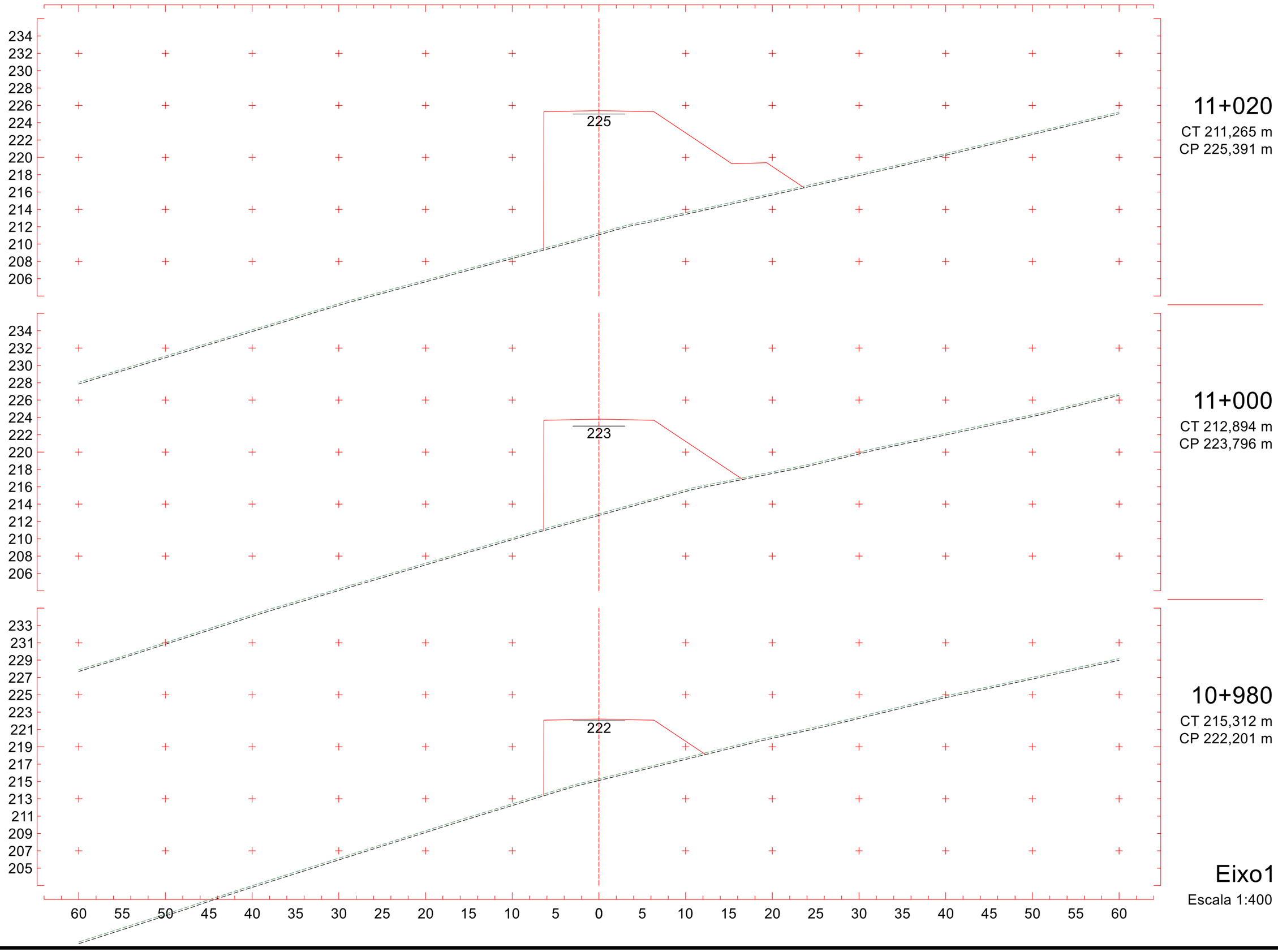
Projeto Ponto de Partida 2021/1



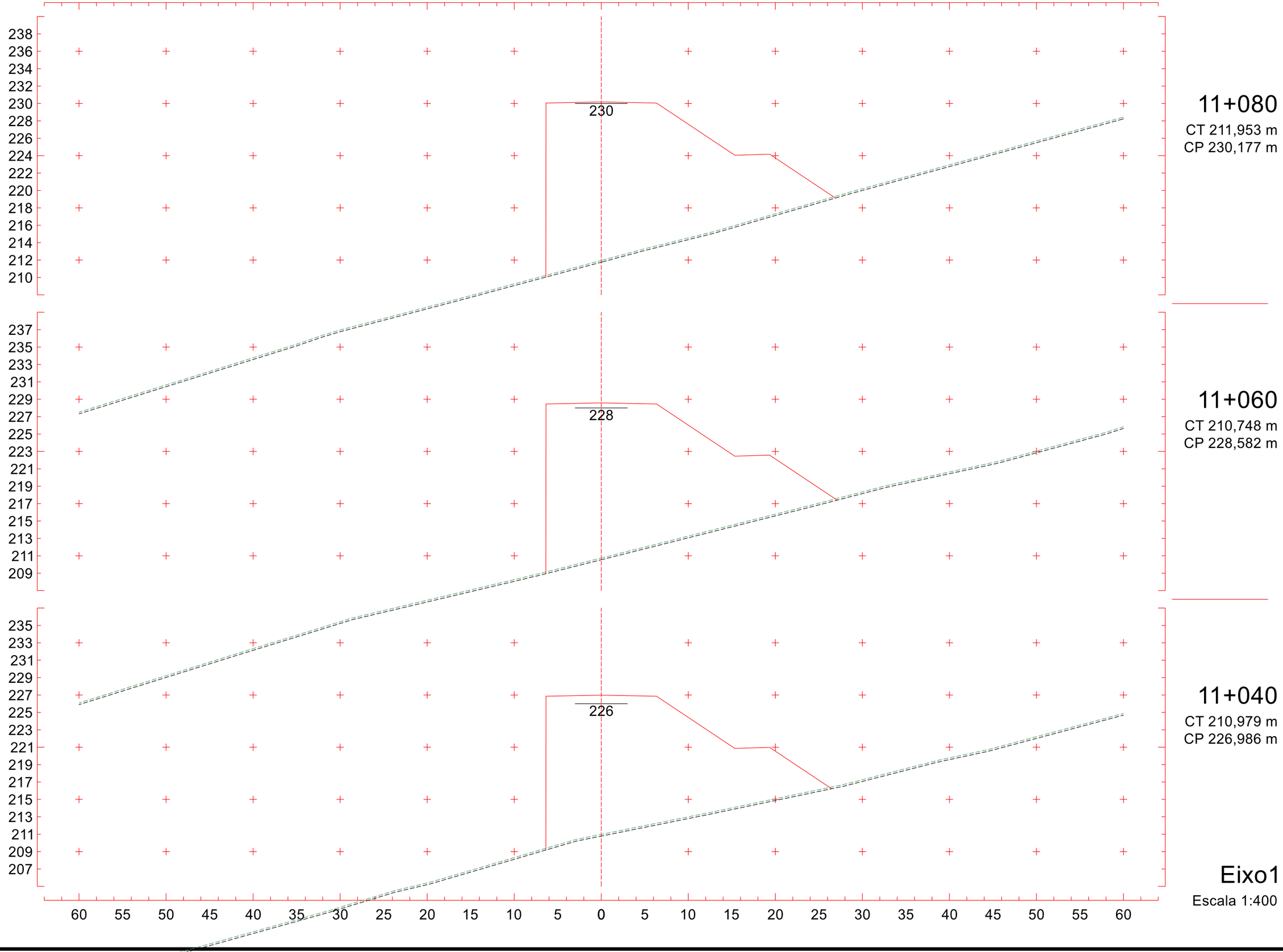
Projeto Ponto de Partida 2021/1



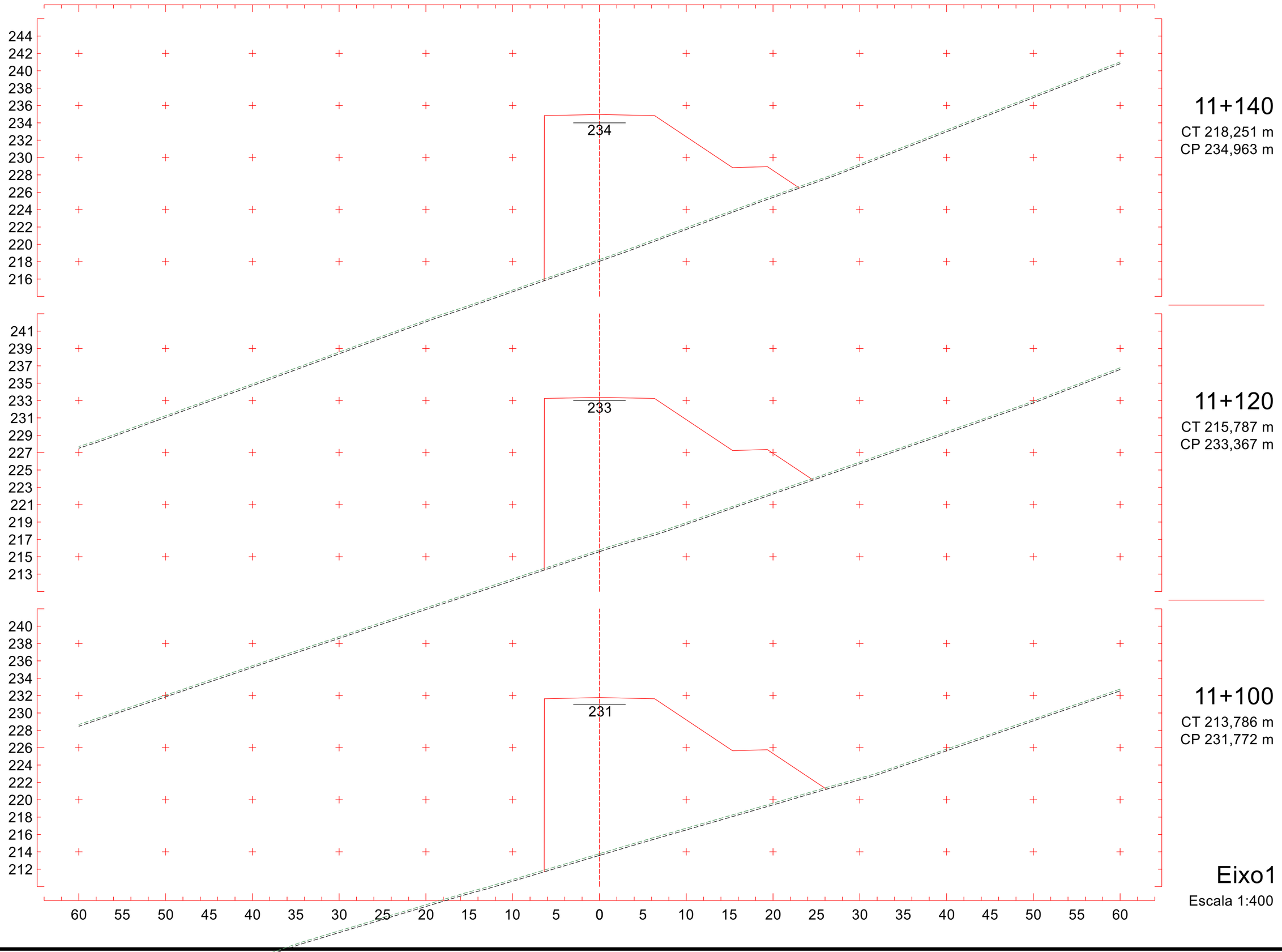
Projeto Ponto de Partida 2021/1



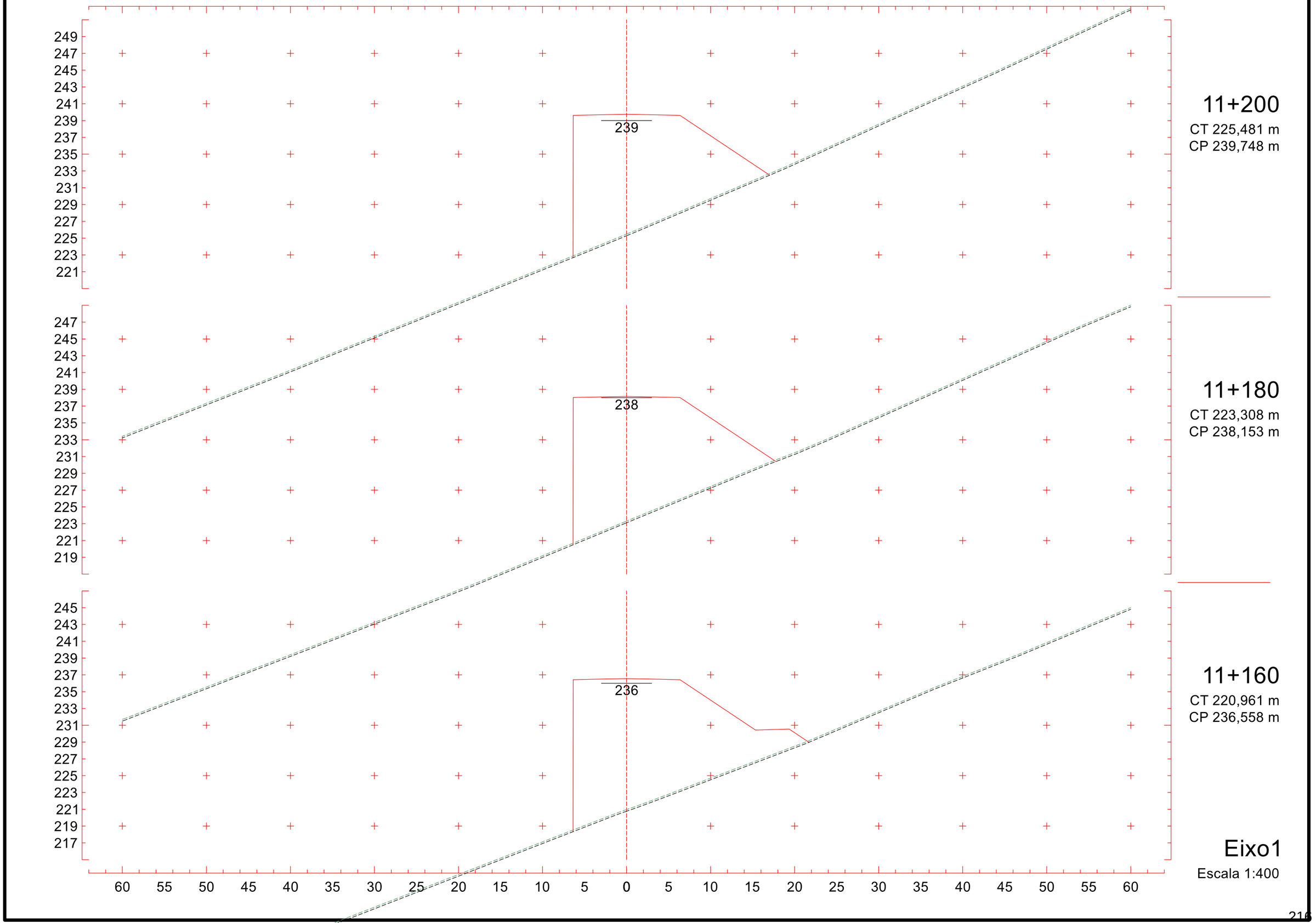
Projeto Ponto de Partida 2021/1



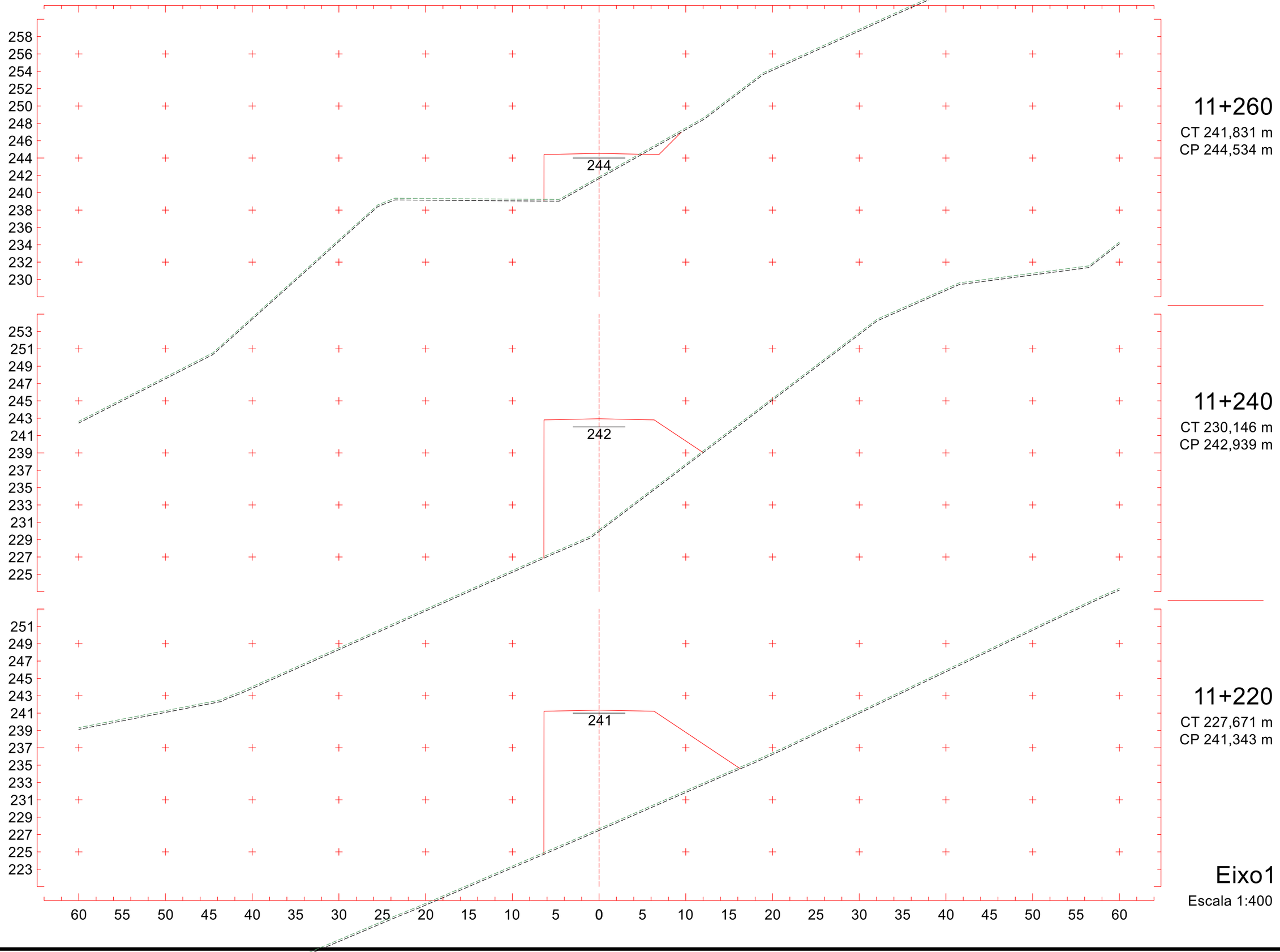
Projeto Ponto de Partida 2021/1



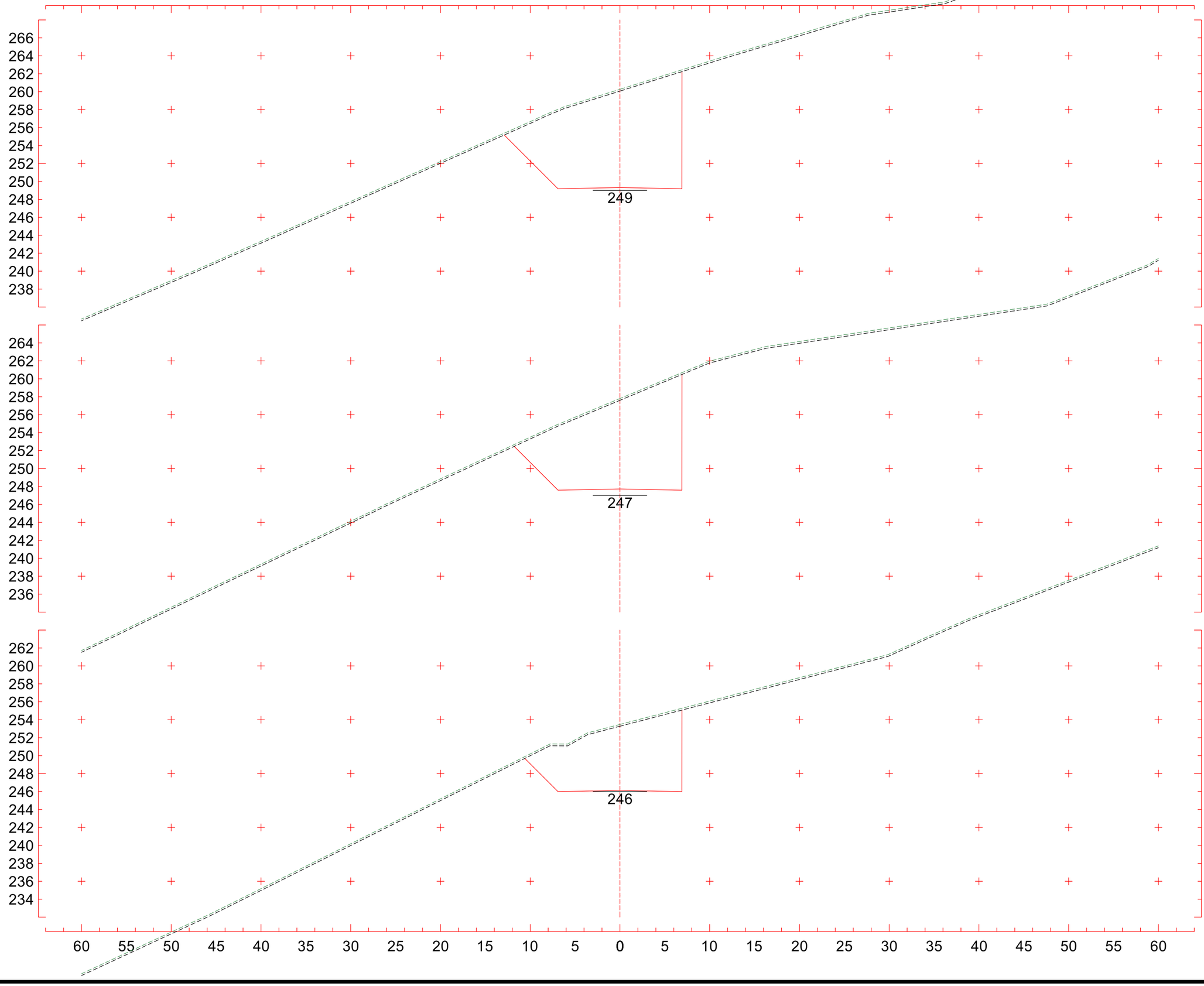
Projeto Ponto de Partida 2021/1



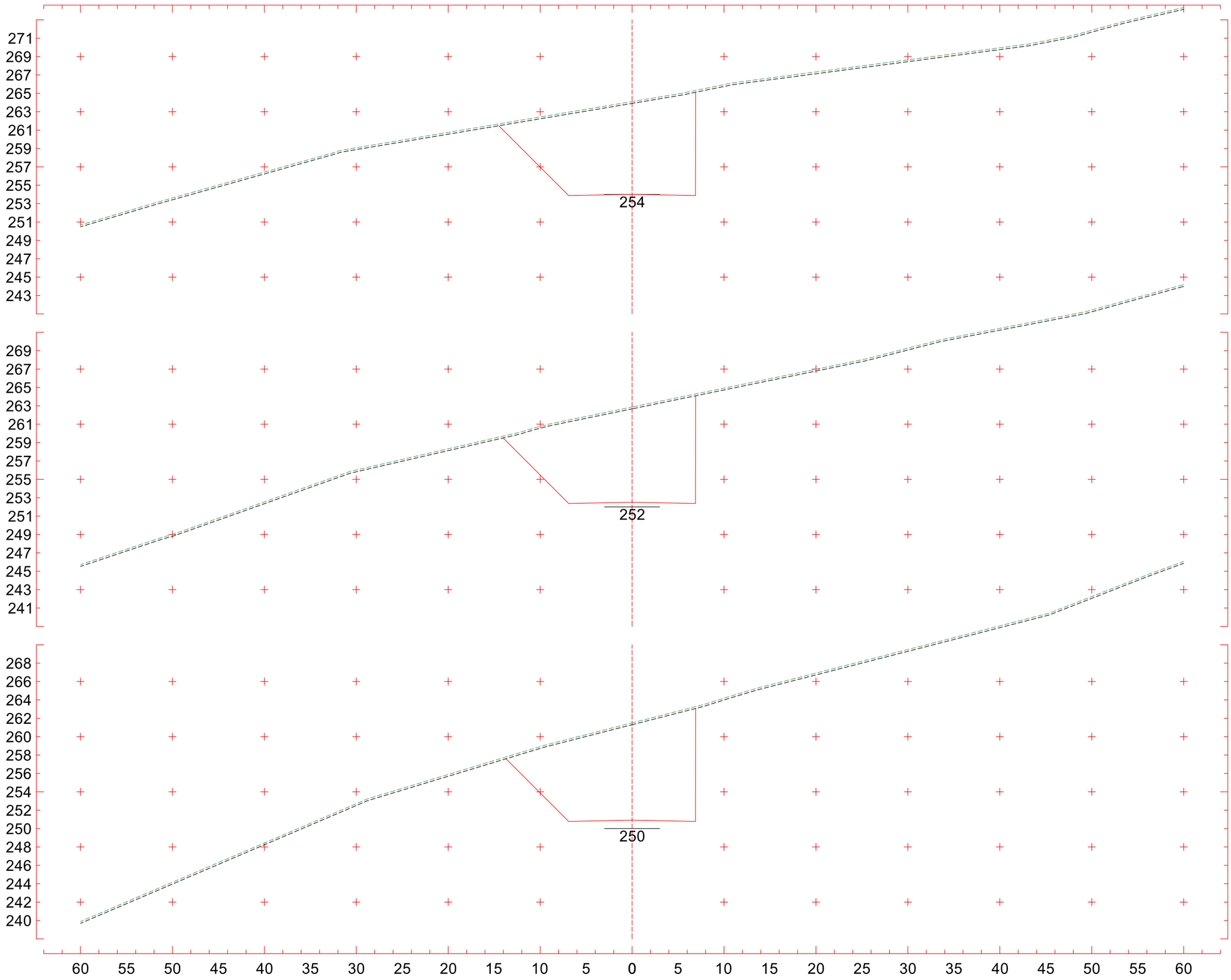
Projeto Ponto de Partida 2021/1



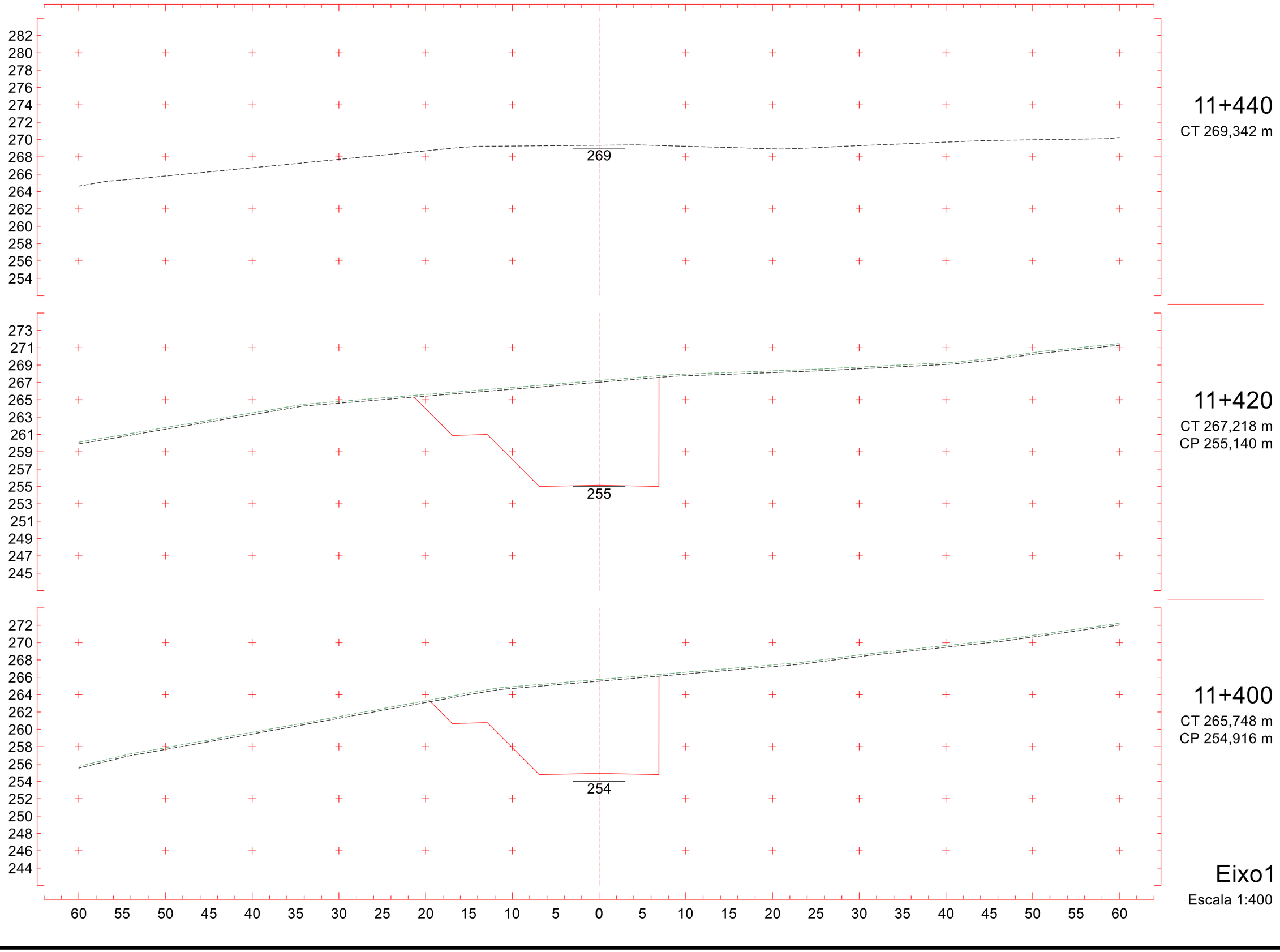
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



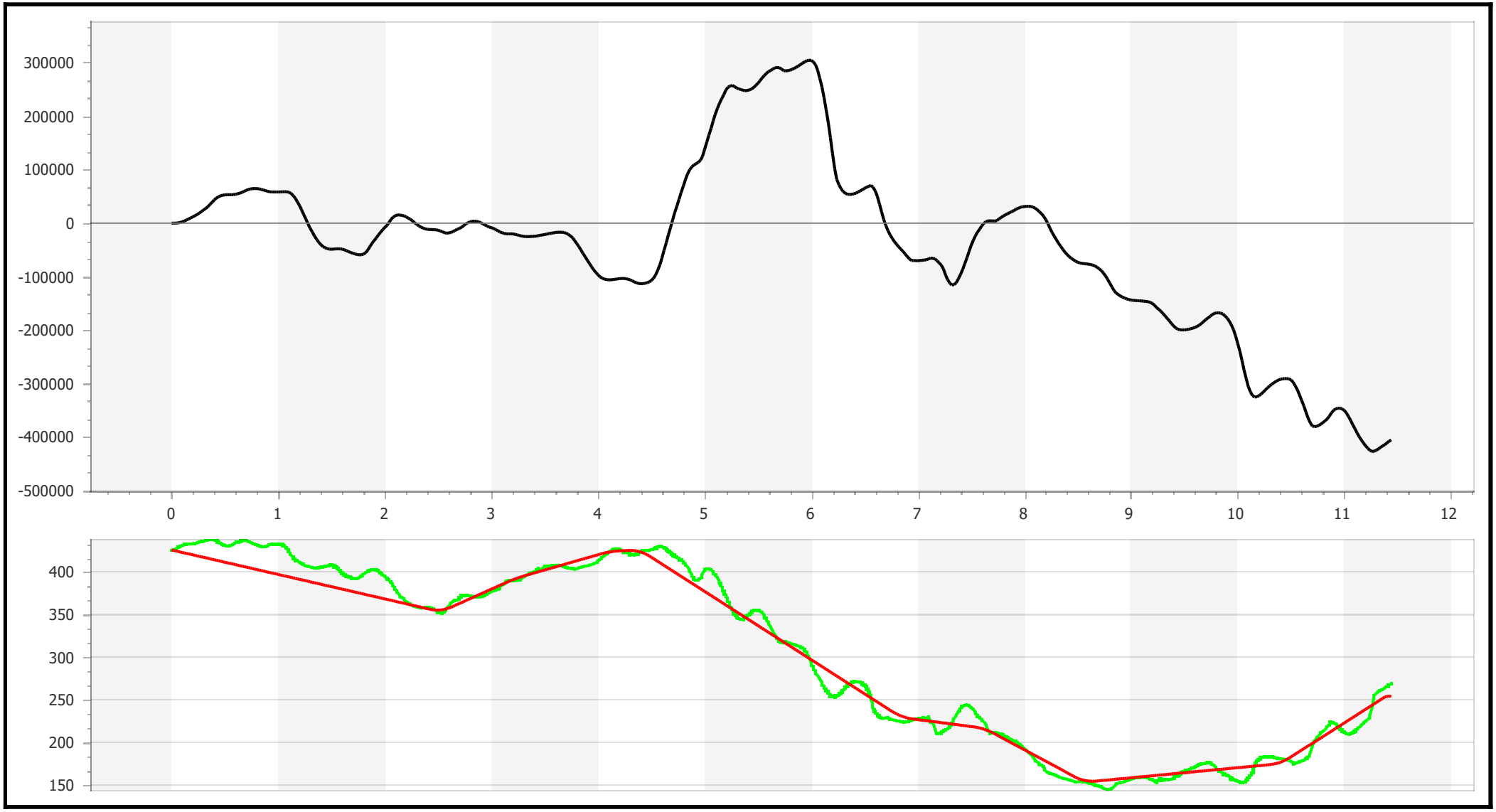
PROJETO DE TERRAPLENAGEM

3 PROJETO DE TERRAPLENAGEM

3.1 Diagrama de Massa

DIAGRAMA DE MASSAS (BR CKNER)

Rodovia:	Grupo de Eixos 1	Homogenei a o:	Corte 1ª Categoria: 1,300
Trecho:	Eixo1	Aterro Camada Superior: 1,000	Corte 2ª Categoria: 1,000
Segmento:	km: 0+000,00 ao km: 11+448,04	Aterro Camada In erior : 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: 11+448,04

Homogenei a o:
Aterro Camada Superior: 1,000
Aterro Camada In erior : 1,000

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

Vo . transp. : 1639162,40m³
Momento tot.: 1675058,86m³.m
DMT : 1,022km

ORIGEM										DESTINO							TRANSPORTE			OBSERVAÇÕES
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	OMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
ID	TIPO	OMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL	(km)	(m)	(m km)	
Empr sti mo	C1ª	1,30	10+400	10+500	10+800	0,320	530000,00	407692,31												
									103441,54	A 014	AI	8+010	8+670	9+510		202706,00	2,150	134474,00	289119,100	
									29506,00	A 014	AS	7+990	8+730	9+510		29506,00	2,090	38357,80	80167,802	
									146167,00	A 015	AI	9+810	10+020	10+170		146167,00	0,800	190017,10	152013,680	
									11854,00	A 015	AS	9+810	10+000	10+170		11854,00	0,820	15410,20	12636,364	
									82536,00	A 016	AI	10+450	10+600	10+730		82536,00	0,420	107296,80	45064,656	
									7926,00	A 016	AS	10+450	10+590	10+730		7926,00	0,410	10303,80	4224,558	
									26261,77	A 017	AI	10+950	11+100	11+270		77033,00	0,920	34140,30	31409,076	
C 001	C3ª	0,80	0+010	0+290	0+530		42758,00	53447,50												
									119,00	A 001	AI	0+000	0+010	0+030		119,00	0,280	95,20	26,656	
									201,00	A 001	AS	0+000	0+010	0+050		201,00	0,280	160,80	45,024	
									40,00	A 002	AS	0+510	0+530	0+550		40,00	0,240	32,00	7,680	
									4794,00	A 003	AI	0+790	0+860	0+970		4794,00	0,570	3835,20	2186,064	
									2000,00	A 003	AS	0+770	0+870	0+990		2000,00	0,580	1600,00	928,000	
									46293,50	A 004	AI	1+070	1+300	1+770		106747,00	1,010	37034,80	37405,148	
C 002	C1ª	1,30	0+550	0+670	0+790		15298,00	11767,69												
									11767,69	A 004	AI	1+070	1+300	1+770			0,630	15298,00	9637,740	
C 003	C1ª	1,30	0+950	1+020	1+070		922,00	709,23												
									709,23	A 004	AI	1+070	1+300	1+770			0,280	922,00	258,160	
C 004	C1ª	1,30	1+470	1+520	1+590		1975,00	1519,23												
									1519,23	A 004	AI	1+070	1+300	1+770			0,220	1975,00	434,500	
C 005	C1ª	1,30	1+750	1+940	2+130		97370,00	74900,00												
									46457,35	A 004	AI	1+070	1+300	1+770			0,640	60394,55	38652,512	
									13148,00	A 004	AS	1+070	1+350	1+770		13148,00	0,590	17092,40	10084,516	
									15294,65	A 005	AI	2+130	2+320	2+590		28004,00	0,380	19883,05	7555,559	
C 006	C1ª	1,30	2+430	2+440	2+450		6,00	4,62												
									4,62	A 005	AI	2+130	2+320	2+590			0,120	6,00	0,720	
C 007	C1ª	1,30	2+570	2+710	2+870		29629,00	22791,54												
									12704,73	A 005	AI	2+130	2+320	2+590			0,390	16516,15	6441,299	
									6195,00	A 005	AS	2+130	2+340	2+590		6195,00	0,370	8053,50	2979,795	
									3891,81	A 006	AI	2+830	3+030	3+350		23407,00	0,320	5059,35	1618,992	
C 008	C1ª	1,30	3+090	3+130	3+210		1234,00	949,23												
									949,23	A 006	AI	2+830	3+030	3+350			0,100	1234,00	123,400	
C 009	C1ª	1,30	3+310	3+490	3+650		11063,00	8510,00												
									8510,00	A 006	AI	2+830	3+030	3+350			0,460	11063,00	5088,980	
C 010	C1ª	1,30	4+110	4+170	4+230		3764,00	2895,38												
									2895,38	A 006	AI	2+830	3+030	3+350			1,140	3764,00	4290,960	
C 011	C1ª	1,30	4+410	4+840	5+290		483474,00	371903,08												
									7160,58	A 006	AI	2+830	3+030	3+350			1,810	9308,75	16848,838	
									4,00	A 006	AI	3+390	3+400	3+410			1,440	5,20	7,488	
									7057,00	A 006	AS	2+810	3+060	3+410		7057,00	1,780	9174,10	16329,898	
									79220,00	A 007	AI	3+650	3+870	4+110		79220,00	0,970	102986,00	99896,420	

1/

QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 11+448,04

Homogenei a o:
Aterro Camada Superior: 1,000
Aterro Camada In erior : 1,000

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

Vo . transp. : 1639162,40m³
Momento tot.: 1675058,86m³.m
DMT : 1,022km

ORIGEM										DESTINO							TRANSPORTE			
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	OBSERVAÇÕES
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	OMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
ID	TIPO	OMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL	(km)	(m)	(m km)	
									10058,00	A 007	AS	3+630	3+870	4+110		10058,00	0,970	13075,40	12683,138	
									7996,00	A 008	AI	4+230	4+320	4+410		7996,00	0,520	10394,80	5405,296	
									2230,00	A 008	AS	4+230	4+310	4+410		2230,00	0,530	2899,00	1536,470	
									8840,00	A 009	AI	5+250	5+300	5+410		8840,00	0,460	11492,00	5286,320	
									1574,00	A 009	AS	5+250	5+300	5+410		1574,00	0,460	2046,20	941,252	
									5902,00	A 010	AI	5+650	5+720	5+770		5902,00	0,880	7672,60	6751,888	
									1523,00	A 010	AS	5+650	5+720	5+790		1523,00	0,880	1979,90	1742,312	
									239574,00	A 011	AI	5+990	6+160	6+390		239574,00	1,320	311446,20	411108,984	
									764,50	A 011	AS	5+970	6+140	6+390		12410,00	1,300	993,85	1292,005	
C 012	C1ª	1,30	5+350	5+640	5+990		84478,00	64983,08												
									11645,50	A 011	AS	5+970	6+140	6+390			0,500	15139,15	7569,575	
									53337,58	A 012	AI	6+550	6+850	7+330		178763,00	1,210	69338,85	83900,009	
C 013	C1ª	1,30	6+330	6+470	6+570		23626,00	18173,85												
									18173,85	A 012	AI	6+550	6+850	7+330			0,380	23626,00	8977,880	
C 014	C1ª	1,30	6+930	7+070	7+150		11223,00	8633,08												
									8633,08	A 012	AI	6+550	6+850	7+330			0,220	11223,00	2469,060	
C 015	C1ª	1,30	7+310	7+770	8+070		48438,00	37260,00												
									37260,00	A 012	AI	6+550	6+850	7+330			0,920	48438,00	44562,960	
C 015	C2ª	1,00	7+310	7+480	7+670		9697,00	9697,00												
									9697,00	A 012	AI	6+550	6+850	7+330			0,630	9697,00	6109,110	
C 015	C3ª	0,80	7+310	7+470	7+650		84118,00	105147,50												
									51661,50	A 012	AI	6+550	6+850	7+330			0,620	41329,20	25624,104	
									18285,00	A 012	AS	6+550	6+880	7+330		18285,00	0,590	14628,00	8630,520	
									2418,00	A 013	AI	7+670	7+710	7+750		2418,00	0,240	1934,40	464,256	
									1077,00	A 013	AS	7+670	7+720	7+850		1077,00	0,250	861,60	215,400	
									31706,00	A 014	AI	8+010	8+670	9+510			1,200	25364,80	30437,760	
C 016	C1ª	1,30	9+010	9+070	9+130		162,00	124,62												
									124,62	A 014	AI	8+010	8+670	9+510			0,400	162,00	64,800	
C 017	C1ª	1,30	9+450	9+670	9+830		42392,00	32609,23												
									32609,23	A 014	AI	8+010	8+670	9+510			1,000	42392,00	42392,000	
C 018	C1ª	1,30	10+150	10+280	10+470		45272,00	34824,62												
									34824,62	A 014	AI	8+010	8+670	9+510			1,610	45272,00	72887,920	
C 019	C1ª	1,30	10+710	10+840	10+950		45641,00	35108,46												
									35108,46	A 017	AI	10+950	11+100	11+270			0,260	45641,00	11866,660	
C 020	C1ª	1,30	11+250	11+350	11+430		28214,00	21703,08												
									15662,77	A 017	AI	10+950	11+100	11+270			0,250	20361,60	5090,400	
									4816,00	A 017	AS	10+930	11+100	11+270		4816,00	0,250	6260,80	1565,200	

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QUADRO DE ORIENTAÇÃO DA TERRAPLENAGEM

Projeto Rodoviário 2024.1

Rodovia: Grupo de Eixos 1
Trecho: Eixo1
Segmento: km: 0+000,00 ao km: 11+448,04

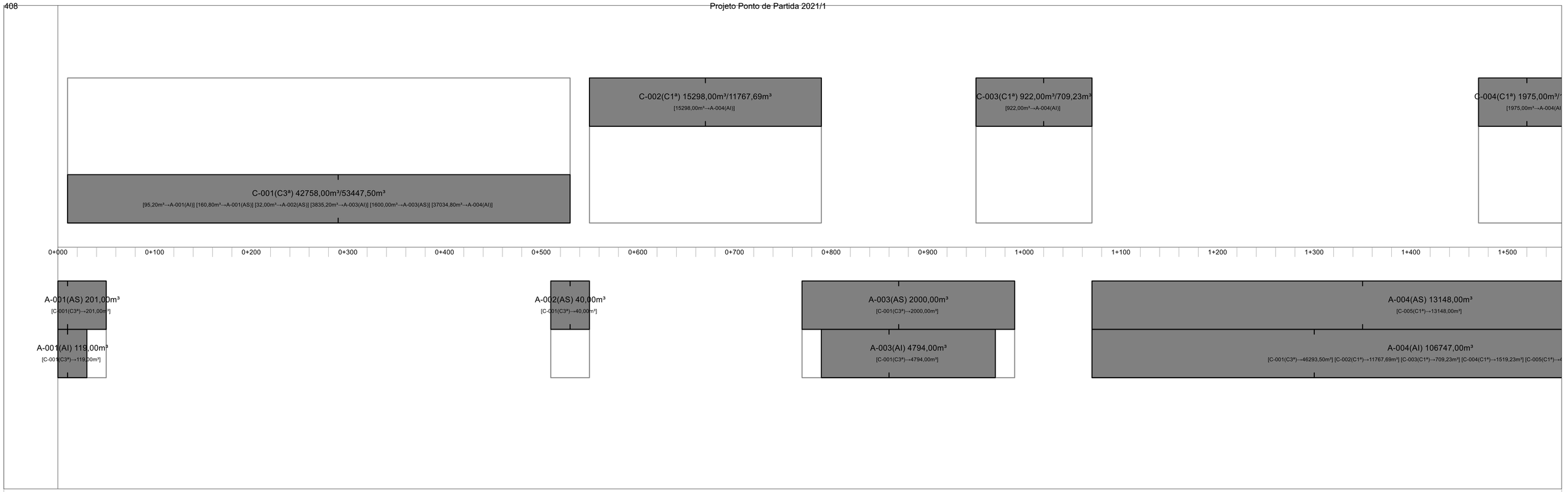
Homogenei a o:
Aterro Camada Superior: 1,000
Aterro Camada In erior : 1,000

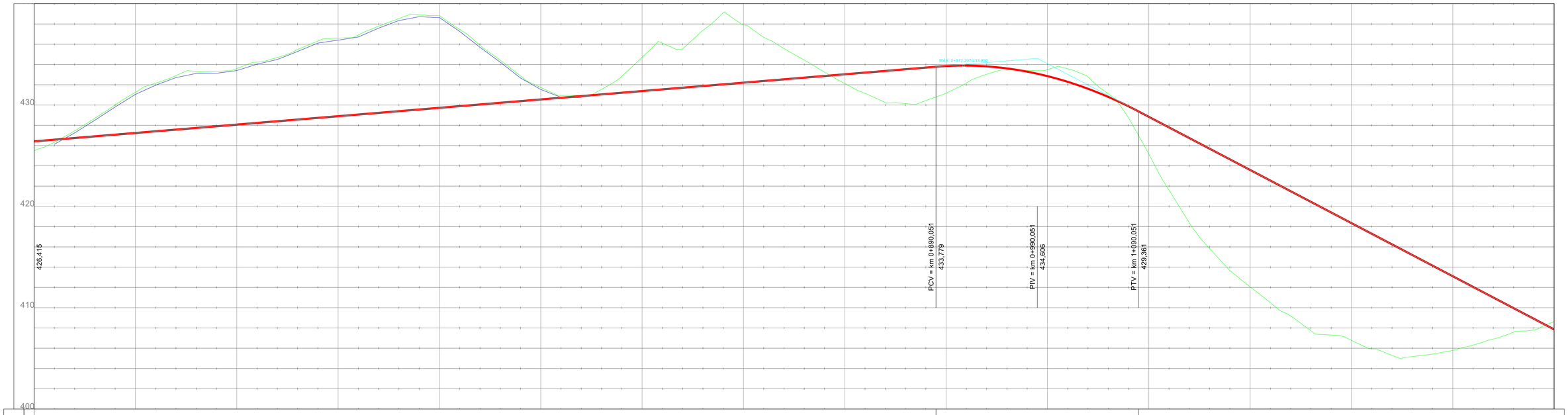
Corte 1ª Categoria: 1,300
Corte 2ª Categoria: 1,000
Corte 3ª Categoria: 0,800

Vo . transp. : 1639162,40m³
Momento tot.: 1675058,86m³.m
DMT : 1,022km

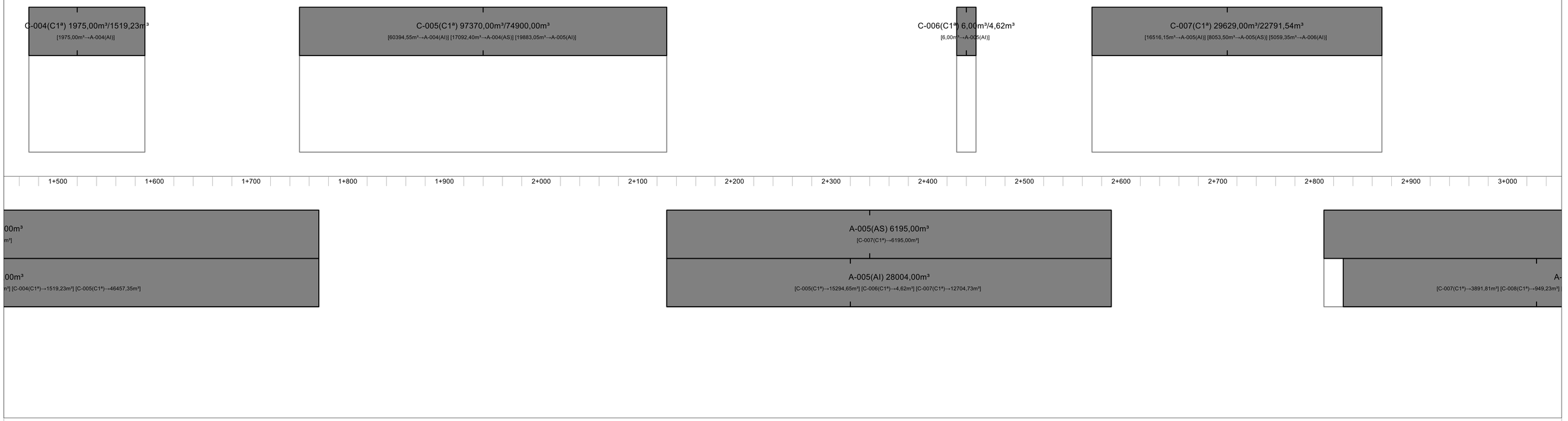
ORIGEM										DESTINO							TRANSPORTE			OBSERVAÇÕES
IDENTIFICAÇÃO			LOCALIZAÇÃO				VOLUMES (m)			IDENTIFICAÇÃO		LOCALIZAÇÃO				VOLUME	DIST.	VOL.	MOM. DE	
ESPECIFICAÇÃO		FATOR	POSICIONAMENTO			DM	GEO.	OMOGENEIZADO		ESPECIFICAÇÃO		POSICIONAMENTO			DM	GEO.	TRANSP.	COMP.	TRANSP.	
ID	TIPO	OMO.	INÍCIO	CM	FIM	(km)	TOTAL	TOTAL	PARC.	ID	TIPO	INÍCIO	CM	FIM	(km)	TOTAL	(km)	(m)	(m km)	

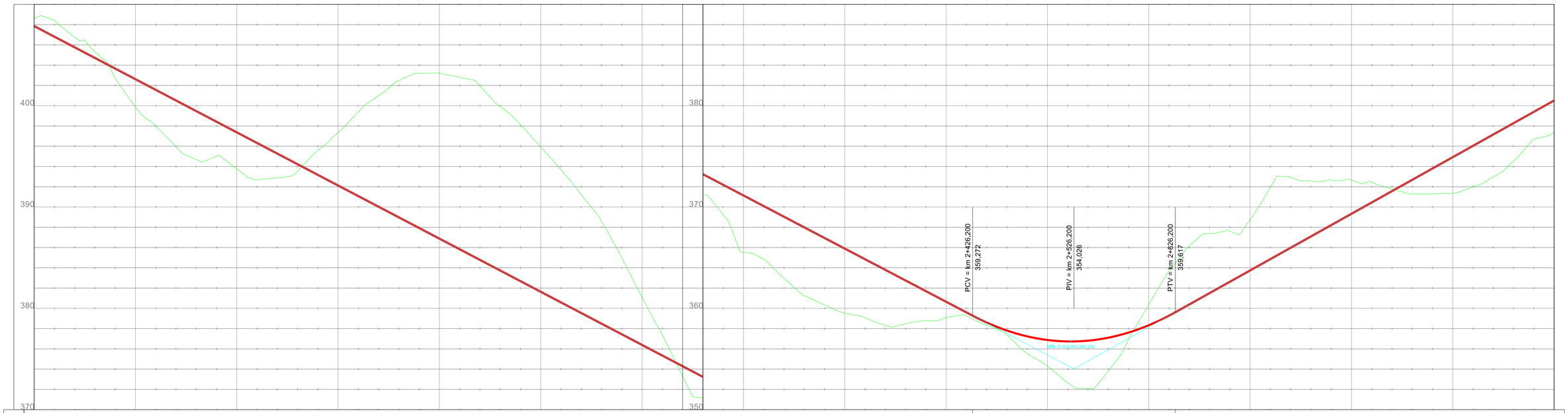
3.3 Esquema Linear de Distribuição dos Materiais


C-001(C3ª) 42758,00m³/53447,50m³
[95,20m³→A-001(AI)] [160,80m³→A-001(AS)] [32,00m³→A-002(AS)] [3835,20m³→A-003(AI)] [1600,00m³→A-003(AS)] [37034,80m³→A-004(AI)]
C-002(C1ª) 15298,00m³/11767,69m³
[15298,00m³→A-004(AI)]
C-003(C1ª) 922,00m³/709,23m³
[922,00m³→A-004(AI)]
C-004(C1ª) 1975,00m³/
[1975,00m³→A-004(AI
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) 201,00m³
[C-001(C3ª)→201,00m³]
A-001(AI) 119,00m³
[C-001(C3ª)→119,00m³]
A-002(AS) 40,00m³
[C-001(C3ª)→40,00m³]
A-003(AS) 2000,00m³
[C-001(C3ª)→2000,00m³]
A-003(AI) 4794,00m³
[C-001(C3ª)→4794,00m³]
A-004(AS) 13148,00m³
[C-005(C1ª)→13148,00m³]
A-004(AI) 106747,00m³
[C-001(C3ª)→46293,50m³] [C-002(C1ª)→11767,69m³] [C-003(C1ª)→709,23m³] [C-004(C1ª)→1519,23m³] [C-005(C1ª)→4

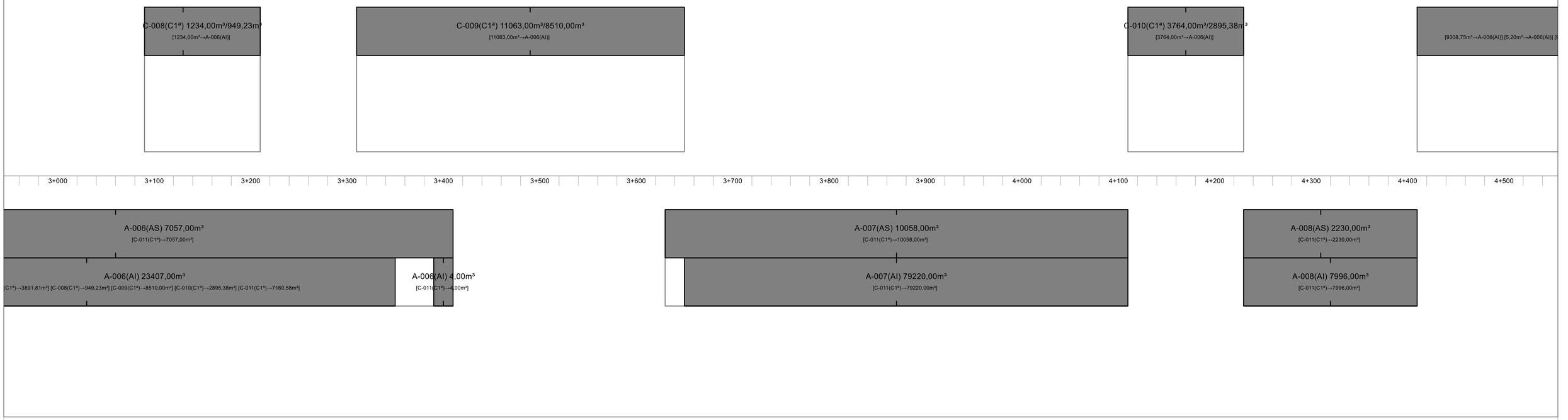

MÁX 0+917,297453,892
PCV = km 0+890,051
433,779
PIV = km 0+990,051
434,606
PTV = km 1+090,051
429,361
426,415
430
420
410
400

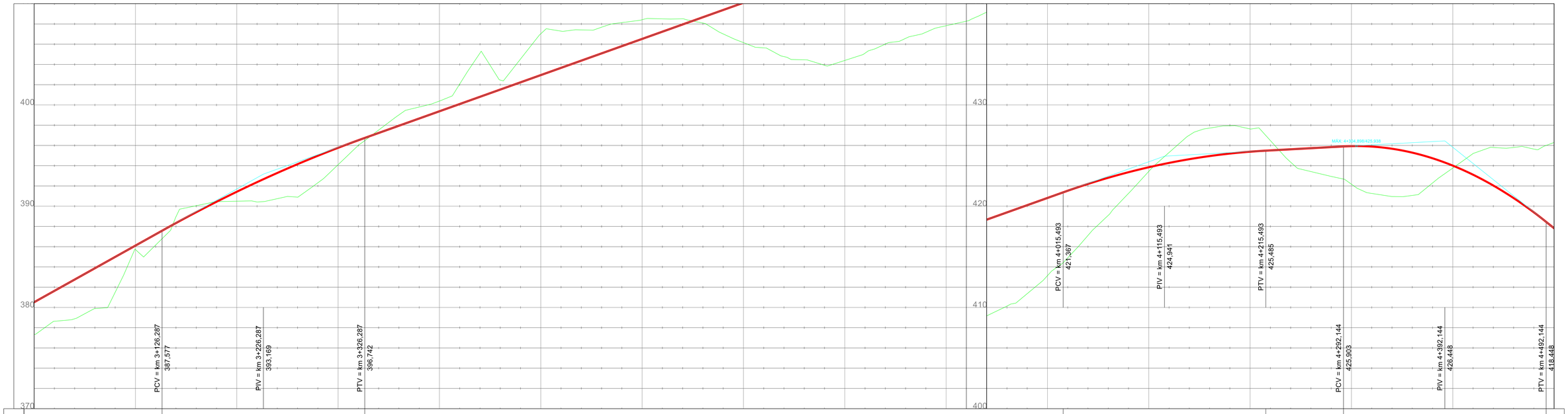
| | | |


C-004(C1ª) 1975,00m³/1519,23m³
[1975,00m³→A-004(AI)]
C-005(C1ª) 97370,00m³/74900,00m³
[60394,55m³→A-004(AI)] [17092,40m³→A-004(AS)] [19883,05m³→A-005(AI)]
C-006(C1ª) 6,00m³/4,62m³
[6,00m³→A-005(AI)]
C-007(C1ª) 29629,00m³/22791,54m³
[16516,15m³→A-005(AI)] [8053,50m³→A-005(AS)] [5059,35m³→A-006(AI)]
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
00m³
m³]
00m³
m³] [C-004(C1ª)→1519,23m³] [C-005(C1ª)→46457,35m³]
A-005(AS) 6195,00m³
[C-007(C1ª)→6195,00m³]
A-005(AI) 28004,00m³
[C-005(C1ª)→15294,65m³] [C-006(C1ª)→4,62m³] [C-007(C1ª)→12704,73m³]
A-
[C-007(C1ª)→3891,81m³] [C-008(C1ª)→949,23m³]


400
390
380
370
380
370
360
350
PCV = km 2+426,200
359,272
PIV = km 2+526,200
354,026
PTV = km 2+626,200
359,617
MIN: 2+523,012/356,732

| | | |


C-008(C1ª) 1234,00m³/949,23m³
[1234,00m³→A-006(AI)]
C-009(C1ª) 11063,00m³/8510,00m³
[11063,00m³→A-006(AI)]
C-010(C1ª) 3764,00m³/2895,38m³
[3764,00m³→A-006(AI)]
[9308,75m³→A-006(AI)] [5,20m³→A-006(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) 7057,00m³
[C-011(C1ª)→7057,00m³]
A-006(AI) 23407,00m³
(C1ª)→3891,81m³] [C-008(C1ª)→949,23m³] [C-009(C1ª)→8510,00m³] [C-010(C1ª)→2895,38m³] [C-011(C1ª)→7160,58m³]
A-006(AI) 4,00m³
[C-011(C1ª)→4,00m³]
A-007(AS) 10058,00m³
[C-011(C1ª)→10058,00m³]
A-007(AI) 79220,00m³
[C-011(C1ª)→79220,00m³]
A-008(AS) 2230,00m³
[C-011(C1ª)→2230,00m³]
A-008(AI) 7996,00m³
[C-011(C1ª)→7996,00m³]


400
390
380
370
430
420
410
400
PCV = km 3+126,287
387,577
PIV = km 3+226,287
393,169
PTV = km 3+326,287
396,742
PCV = km 4+015,493
421,367
PIV = km 4+115,493
424,941
PTV = km 4+215,493
425,485
PCV = km 4+292,144
425,903
PIV = km 4+392,144
426,448
PTV = km 4+492,144
418,448
MÁX. 4+304,895/425,938

| ALT. | | |

C-011(C1ª) 483474,00m³/371903,08m³

308,75m³→A-006(AI)] [5,20m³→A-006(AI)] [9174,10m³→A-006(AS)] [102986,00m³→A-007(AI)] [13075,40m³→A-007(AS)] [10394,80m³→A-008(AI)] [2899,00m³→A-008(AS)] [11492,00m³→A-009(AI)] [2046,20m³→A-009(AS)] [7672,60m³→A-010(AI)] [1979,90m³→A-010(AS)] [311446,20m³→A-011(AI)] [993,85m³→A-011(AS)]

C-012(C1ª) 84478,00m³/64983,08m³

[15139,15m³→A-011(AS)] [69338,85m³→A-012(AI)]

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-009(AS) 1574,00m³

[C-011(C1ª)→1574,00m³]

A-009(AI) 8840,00m³

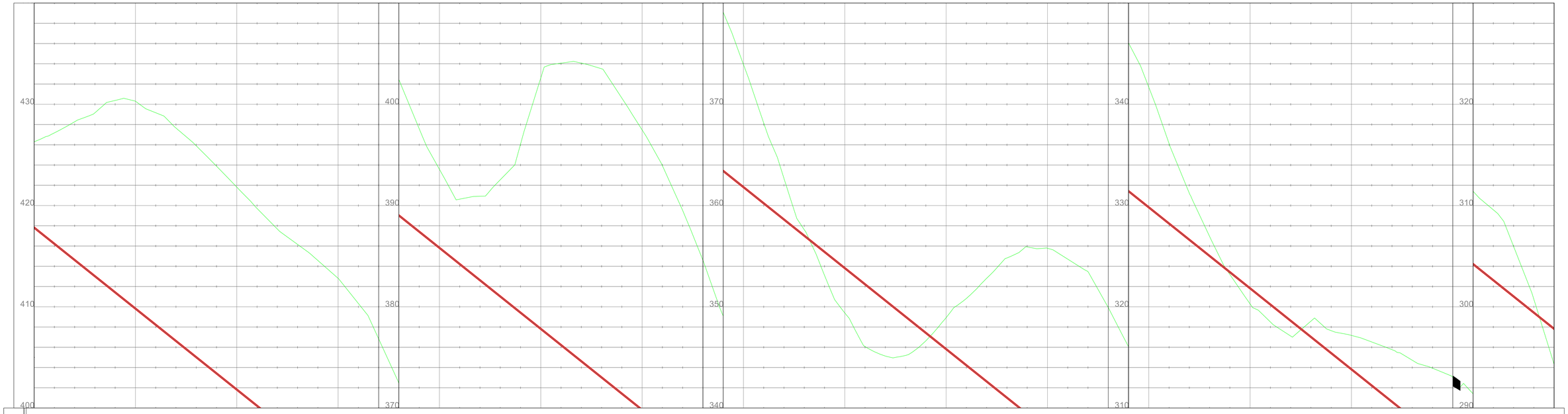
[C-011(C1ª)→8840,00m³]

A-010(AS) 1523,00m³

[C-011(C1ª)→1523,00m³]

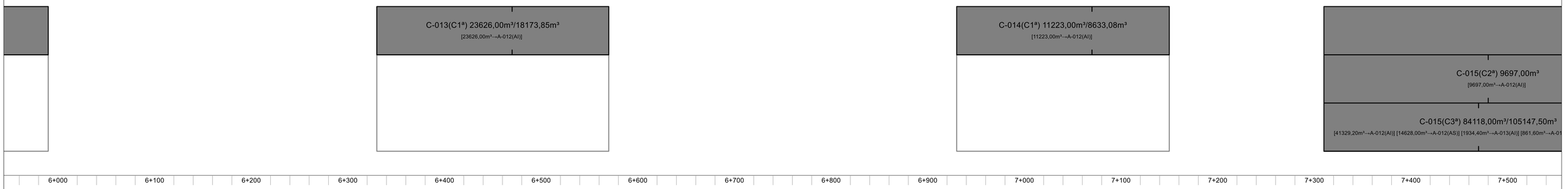
A-010(AI) 5902,00m³

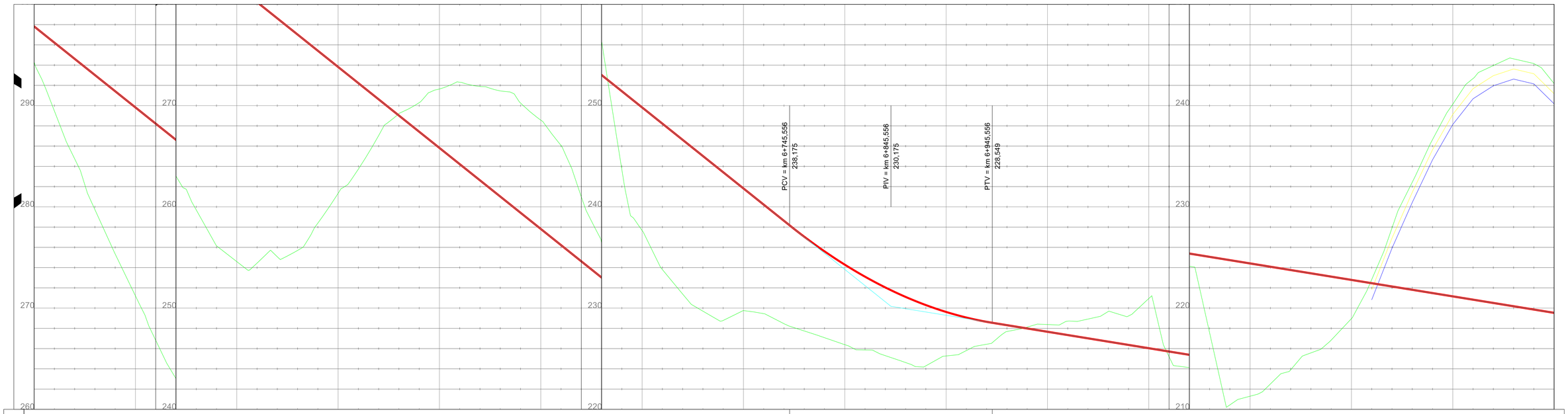
[C-011(C1ª)→5902,00m³]



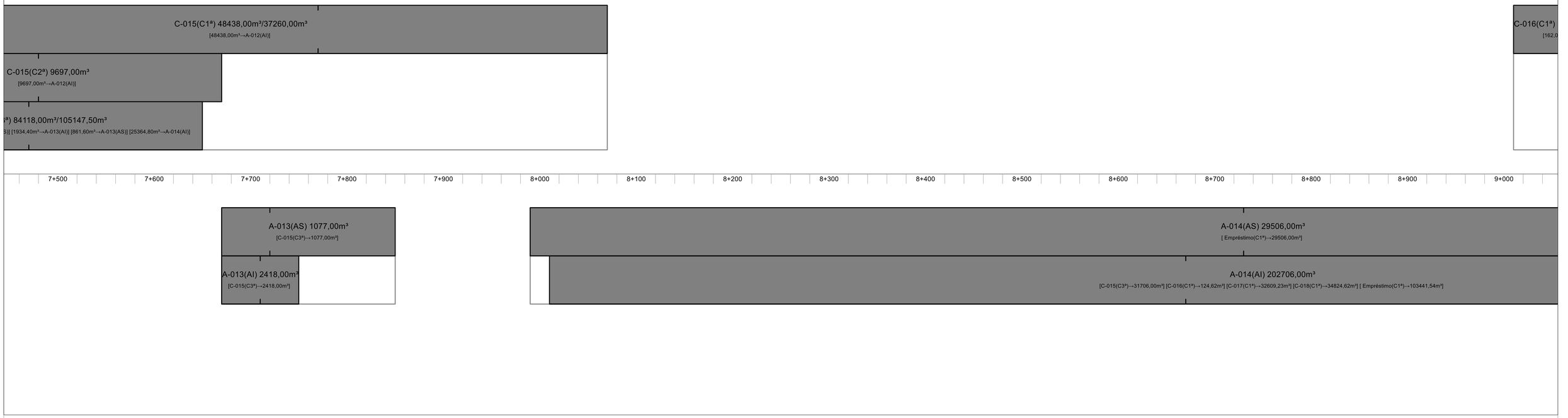
D = 2253,41
i = -8,0000%

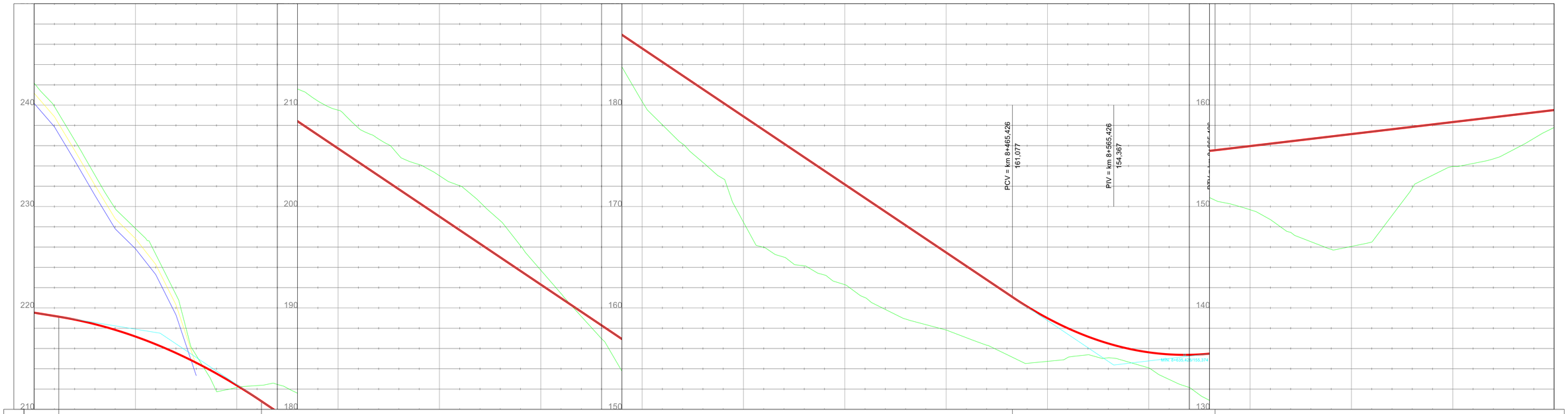
| | | |


C-013(C1ª) 23626,00m³/18173,85m³
[23626,00m³→A-012(AI)]
C-014(C1ª) 11223,00m³/8633,08m³
[11223,00m³→A-012(AI)]
C-015(C2ª) 9697,00m³
[9697,00m³→A-012(AI)]
C-015(C3ª) 84118,00m³/105147,50m³
[41329,20m³→A-012(AI)] [14628,00m³→A-012(AS)] [1934,40m³→A-013(AI)] [861,60m³→A-01
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-011(AS) 12410,00m³
[C-011(C1ª)→764,50m³] [C-012(C1ª)→11645,50m³]
A-011(AI) 239574,00m³
[C-011(C1ª)→239574,00m³]
A-012(AS) 18285,00m³
[C-015(C3ª)→18285,00m³]
A-012(AI) 178763,00m³
[C-012(C1ª)→53337,58m³] [C-013(C1ª)→18173,85m³] [C-014(C1ª)→8633,08m³] [C-015(C1ª)→37260,00m³] [C-015(C2ª)→9697,00m³] [C-015(C3ª)→51661,50m³]

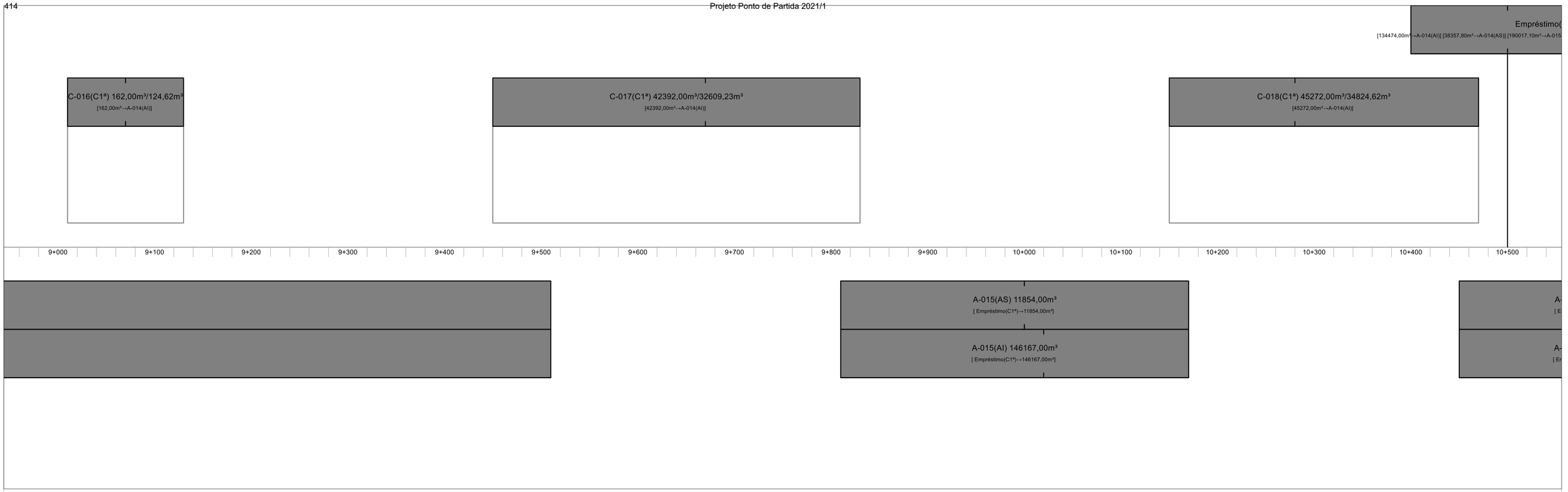

290
280
270
260
270
260
250
240
250
240
230
220
240
230
220
210
PCV = km 6+745,556
238,175
PIV = km 6+845,556
230,175
PTV = km 6+945,556
228,549

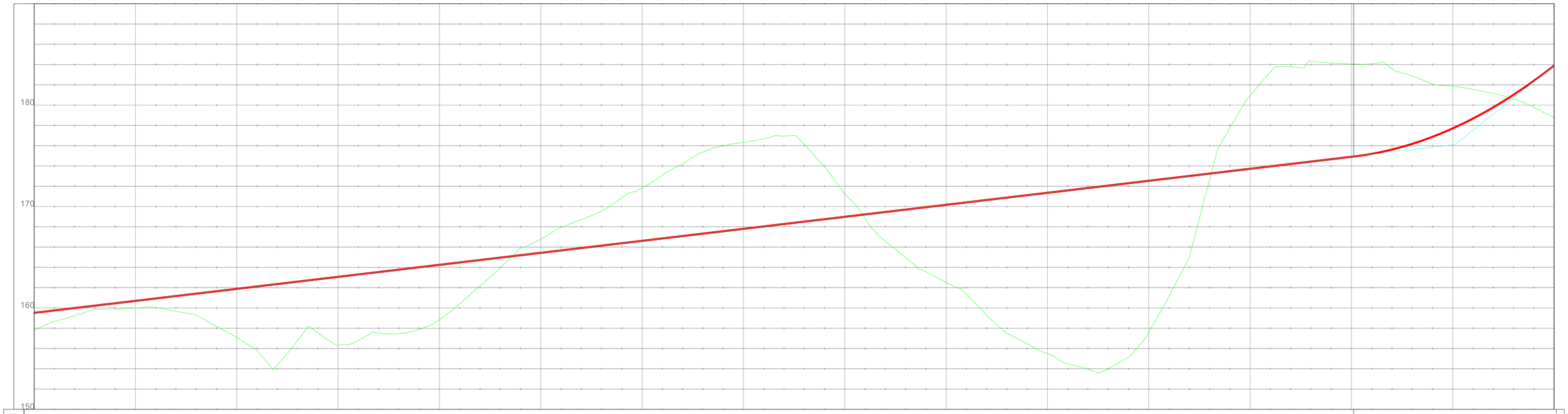
| | | |


C-015(C1ª) 48438,00m³/37260,00m³
[48438,00m³→A-012(AI)]
C-015(C2ª) 9697,00m³
[9697,00m³→A-012(AI)]
ª) 84118,00m³/105147,50m³
S)] [1934,40m³→A-013(AI)] [861,60m³→A-013(AS)] [25364,80m³→A-014(AI)]
C-016(C1ª)
[162,0
7+500
7+600
7+700
7+800
7+900
8+000
8+100
8+200
8+300
8+400
8+500
8+600
8+700
8+800
8+900
9+000
A-013(AS) 1077,00m³
[C-015(C3ª)→1077,00m³]
A-013(AI) 2418,00m³
[C-015(C3ª)→2418,00m³]
A-014(AS) 29506,00m³
[Empréstimo(C1ª)→29506,00m³]
A-014(AI) 202706,00m³
[C-015(C3ª)→31706,00m³] [C-016(C1ª)→124,62m³] [C-017(C1ª)→32609,23m³] [C-018(C1ª)→34824,62m³] [Empréstimo(C1ª)→103441,54m³]

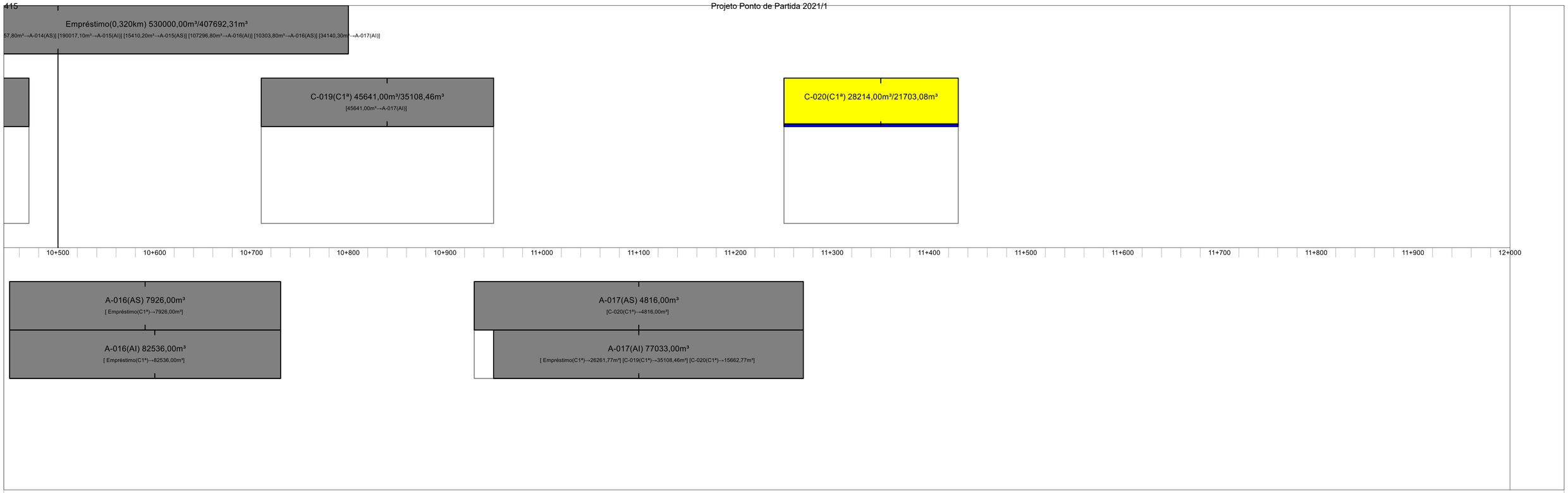

240
230
220
210
210
200
190
180
180
170
160
150
160
150
140
130
PCV = km 8+465,426
161,077
PTV = km 8+565,426
154,367
MIN: 8+655,426/155,374

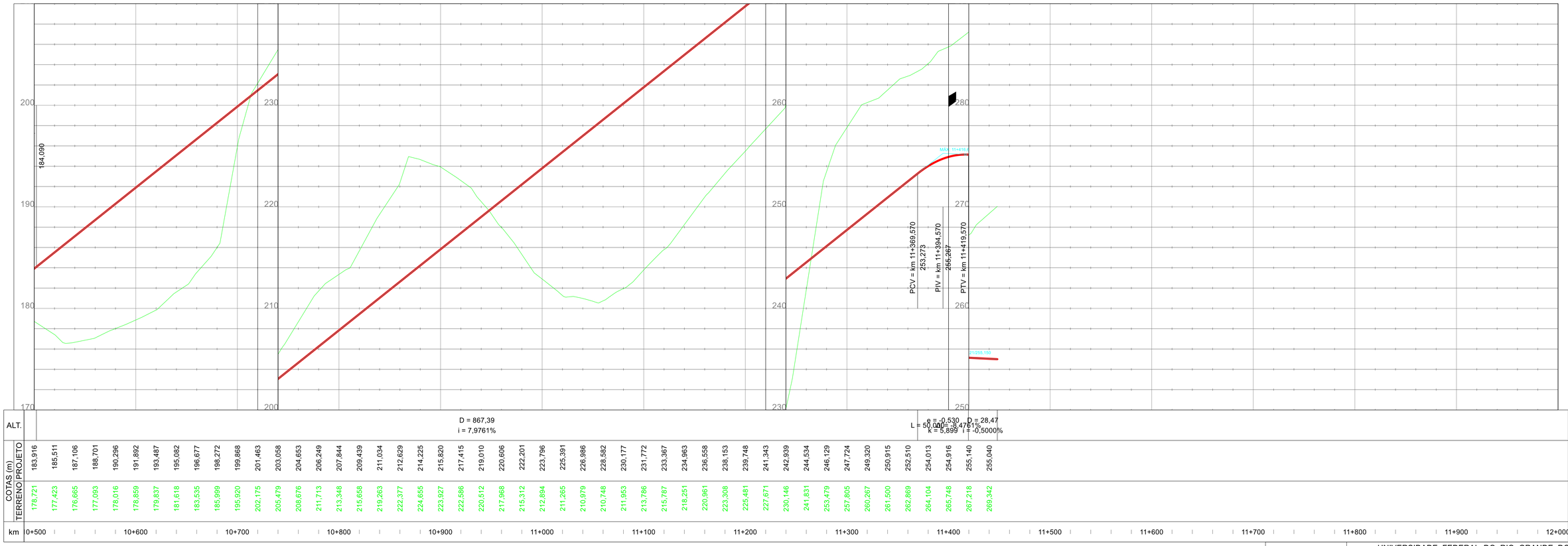
| | | |


Empréstimo(
[134474,00m³→A-014(AI)] [38357,80m³→A-014(AS)] [190017,10m³→A-015
C-016(C1ª) 162,00m³/124,62m³
[162,00m³→A-014(AI)]
C-017(C1ª) 42392,00m³/32609,23m³
[42392,00m³→A-014(AI)]
C-018(C1ª) 45272,00m³/34824,62m³
[45272,00m³→A-014(AI)]
9+000
9+100
9+200
9+300
9+400
9+500
9+600
9+700
9+800
9+900
10+000
10+100
10+200
10+300
10+400
10+500
A-015(AS) 11854,00m³
[Empréstimo(C1ª)→11854,00m³]
A-015(AI) 146167,00m³
[Empréstimo(C1ª)→146167,00m³]

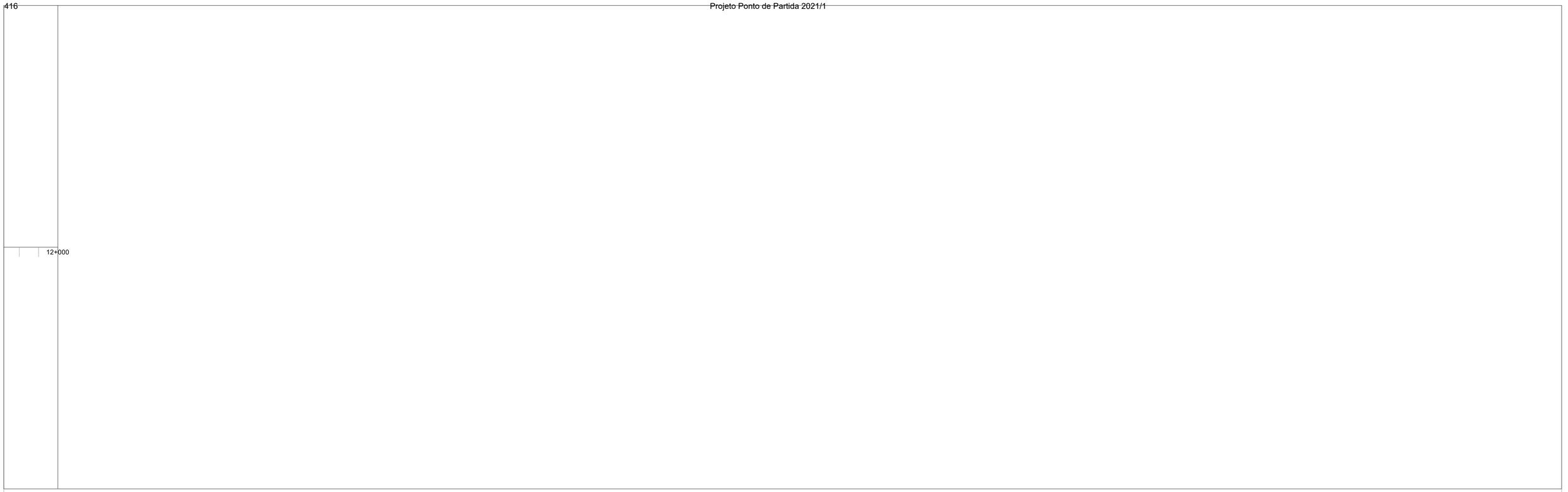

180
170
160
150

| | | |





EMPRESA	UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL Departamento de Engenharia de Produção e Transportes Laboratório de Sistemas de Transportes - LASTRAN	
RODOVISIONÁRIOS	Rodovia: PPP-UFRGS-2021/1 Trecho: 10500-12000 Data: 11/2021	
Escala: 1:2000	PROJ. TERRAPLENAGEM	Código: PT-08



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

ODL ENGENHARIA

Dêreck Hummel Becher
Leonardo de Almeida Pavinato
Oldair José Pozzobom

Alejandro Ruiz Padillo
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 ESTRADA ZIMMERMANN / ITAARA – RS E A RUA ANTÔNIO VEDOIM – ESTRADA DOS BIANCHI / SILVEIRA MARTINS - RS

Rodovia:	PPP 2021/1 – LOTE 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:	14,7 km

VOLUME 2 – PROJETO EXECUTIVO

GRUPO 2111201 – ODL ENGENHARIA

AGOSTO / 2021

Ponto de Partida
Lúdico-Real-Didático

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: ***Project-based learning* – Desenvolvimento de atividades práticas em ambiente lúdico/real/didático (Projeto Ponto de Partida)**
Disciplina: **Projeto Geométrico de Rodovias**

Edição: **2021/2**

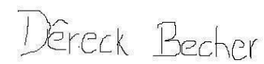
Ano: **2021**
Semestre: **1**

Disciplina: **Rodovias I**

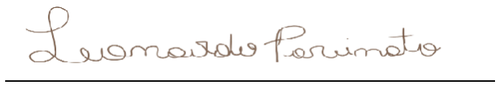
Turma: **12**

Número da Equipe:**2111201**
Nome: **ODL Engenharia**
Integrantes do grupo:

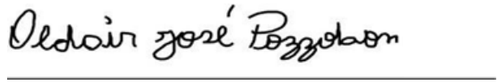
Angelo Carlos Pinheiro Gomes Junior



Dêreck Hummel Becher



Leonardo de Almeida Pavinato



Oldair Jose Pozzobom

SUMÁRIO

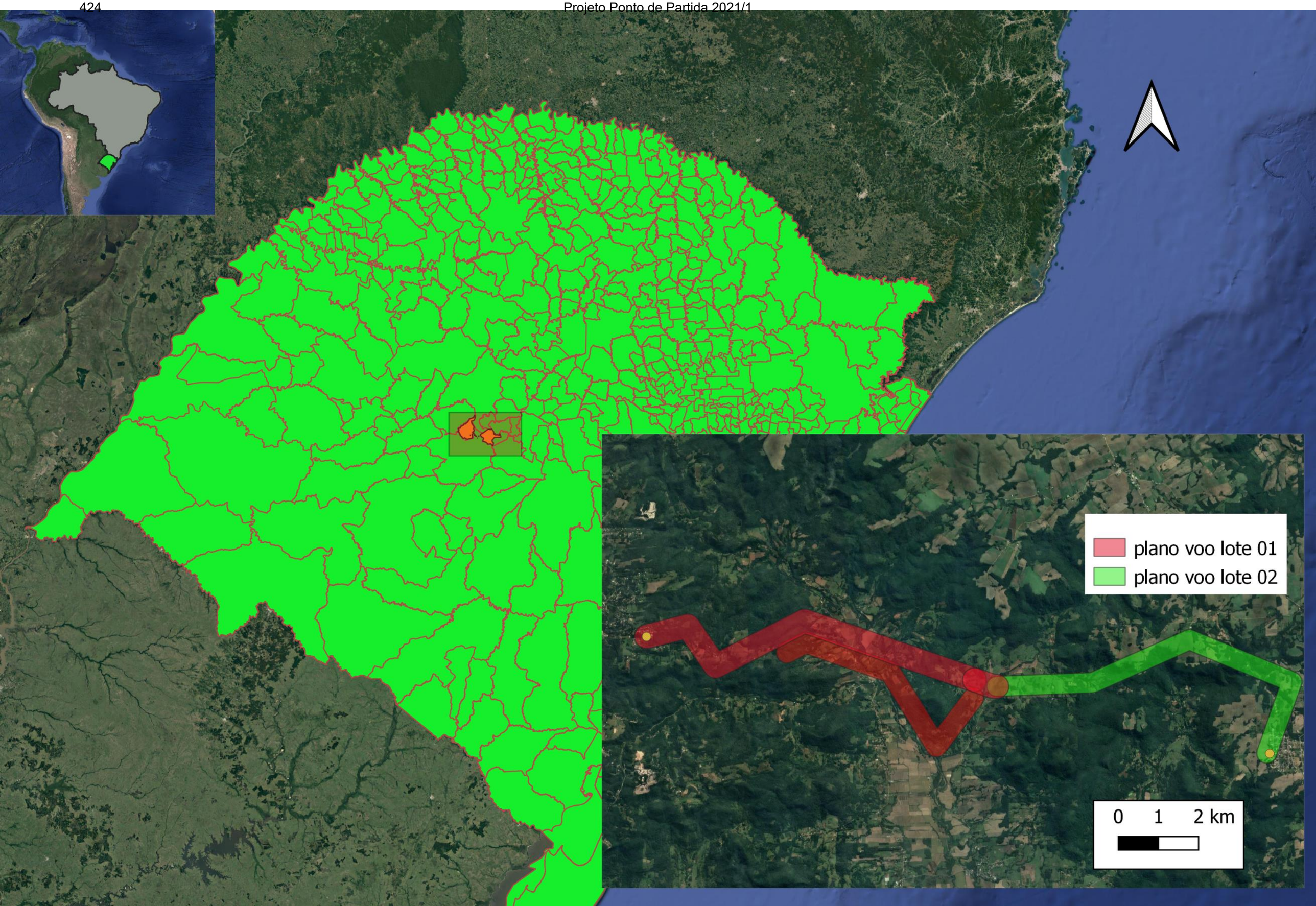
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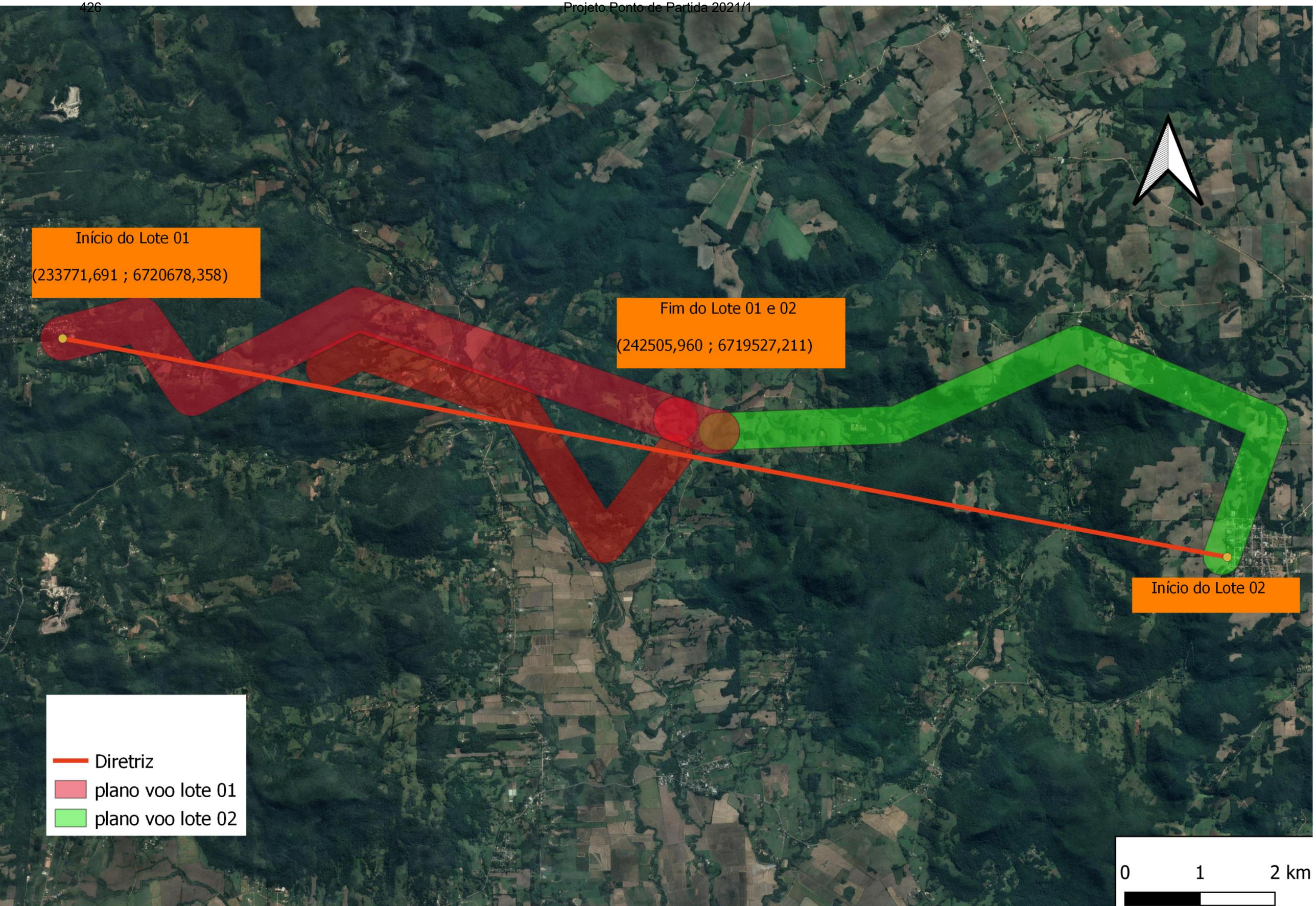
APRESENTAÇÃO

1 APRESENTAÇÃO

Mapa de situação


plano voo lote 01
plano voo lote 02
0 1 2 km

Mapa de Localização


Início do Lote 01
(233771,691 ; 6720678,358)
Fim do Lote 01 e 02
(242505,960 ; 6719527,211)
Início do Lote 02
Diretriz
plano voo lote 01
plano voo lote 02
0
1
2 km

Quadro de características técnicas

CARACTERÍSTICAS TÉCNICAS

Rodovia: PPP 2021/1
Trecho: ODL Engenharia
Segmento: km: 0+000,00 ao km: 14+765,21

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	14765,214	FAIXA DOM. (LE/LD+OFF)	25 / 25 + 10	SUPERELEVAÇÃO MÁX.		TALUDE CORTE 3ª CAT.	

PLANIMETRIA

DISTRIBUIÇÃO DE CURVAS

T	RAIOS (m)	FREQ.	Dc (m)	%	Lc1+Lc2 (m)	%
R	R mínimo = 50,000	1	99,543	0,67	100,000	0,68
A	50,000 < R ≤ 100,000	9	653,478	4,43	1000,000	6,77
N	100,000 < R ≤ 200,000	8	720,090	4,88	1240,000	8,40
S	200,000 < R ≤ 300,000	3	400,117	2,71	580,000	3,93
I	300,000 < R ≤ 500,000					
Ç	R > 500,000					
.	TOTAL EM TRANSIÇÃO	21	1873,227	12,69	2920,000	19,78
S	RAIOS (m)	FREQ.	Dc (m)	%		
I	R mínimo = 300,000	1	63,847	0,43		
M	300,000 < R ≤ 500,000	2	260,251	1,76		
P	500,000 < R ≤ 700,000					
L	700,000 < R ≤ 1000,000					
E	1000,000 < R ≤ 1500,000					
S	R > 1500,000					
	TOTAL SIMPLES	3	324,098	2,20		
TOTAL EM CURVA		24	2197,326	14,88	6990,553	47,34

ALTIMETRIA

VARIAÇÃO ALTIMÉTRICA

ACLIVES			NÍVEL		DECLIVES		
INTERVALO	EXTENSÃO (m)	%	EXTENSÃO	%	INTERVALO	EXTENSÃO (m)	%
0 < i ≤ 1					0 < i ≤ 1	502,435	3,40
1 < i ≤ 2	2073,344	14,04			1 < i ≤ 2		
2 < i ≤ 3	580,978	3,93			2 < i ≤ 3	3074,861	20,83
3 < i ≤ 4	159,663	1,08			3 < i ≤ 4	1200,094	8,13
4 < i ≤ 5	387,849	2,63			4 < i ≤ 5	1257,281	8,52
5 < i ≤ 6					5 < i ≤ 6	768,754	5,21
6 < i ≤ 7	134,495	0,91			6 < i ≤ 7		
7 < i ≤ 8	444,874	3,01			7 < i ≤ 8	1726,265	11,69
8 < i ≤ 9					8 < i ≤ 9	1074,321	7,28
9 < i ≤ 10					9 < i ≤ 10		
i > 10					i > 10		
TOTAL	3781,203	25,61			TOTAL	9604,011	65,04

EXTENSÃO DOS ELEMENTOS VERTICAIS

RAMPA		CURVA CÔNCAVA		CURVA CONVEXA		CURVA TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
13385,214	90,65	820,000	5,55	560,000	3,79	1380,000	9,35

EXTENSÃO DAS INTERTANGENTES

MÍNIMA		MÁXIMA		TOTAL	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
151,371	1,03	852,371	5,77	9647,889	65,34

PARÂMETROS K MÍNIMOS ADOTADOS

EM CURVA CÔNCAVA	7,162	EM CURVA CONVEXA	

PARÂMETROS PLANIMÉTRICOS

TORTUOSIDADE		DISTÂNCIA EM DIRETRIZ	
TOTAL (°/m)	MÉDIA (°/m.km)	EXTENSÃO (m)	ACRÉSCIMO (%)
16,264	1,101	8806,827	67,656

PARÂMETROS ALTIMÉTRICOS

COMPRIMENTO VIRTUAL IDA		COMPRIMENTO VIRTUAL VOLTA		COMPRIMENTO VIRTUAL MÉDIO	
EXTENSÃO (m)	%	EXTENSÃO (m)	%	EXTENSÃO (m)	%
20907,419	141,60	35965,096	243,58	28436,257	192,59

CARACTERÍSTICAS OPERACIONAIS

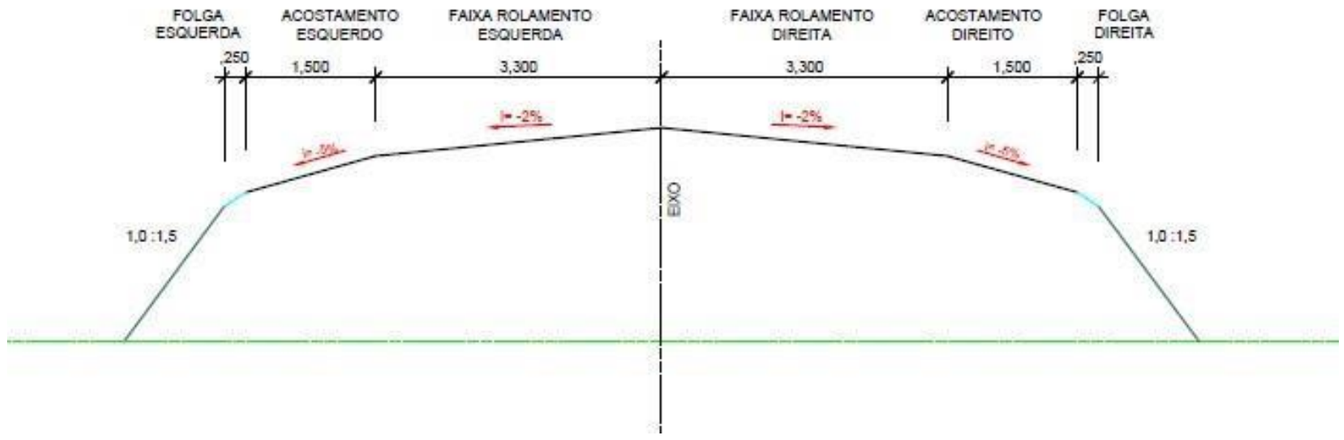
ANO DE ABERTURA		VDM ABERTURA		PARÂMETRO					
ANO FINAL DA VIDA ÚTIL		VDM FINAL							

PROJETO GEOMÉTRICO

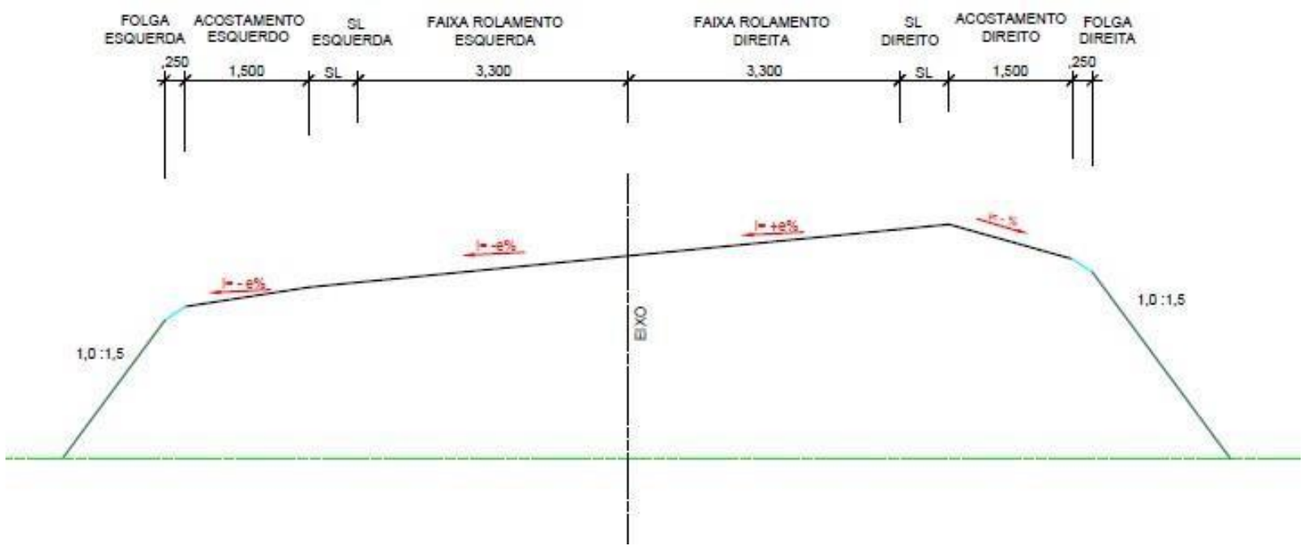
2PROJETO GEOMÉTRICO

Seções transversais tipo

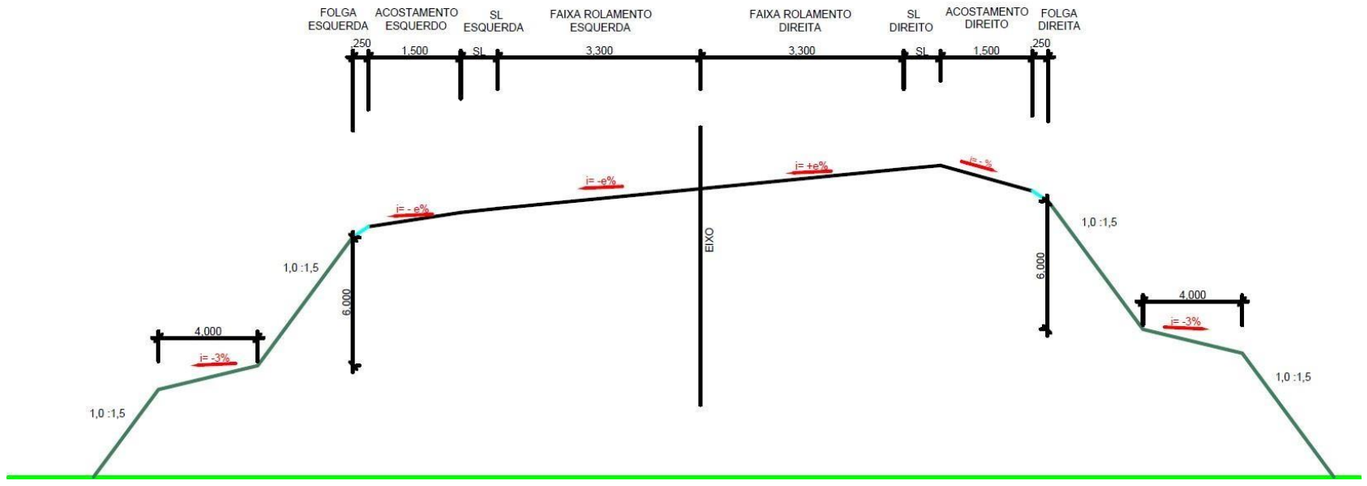
ATERRO EM TANGENTE



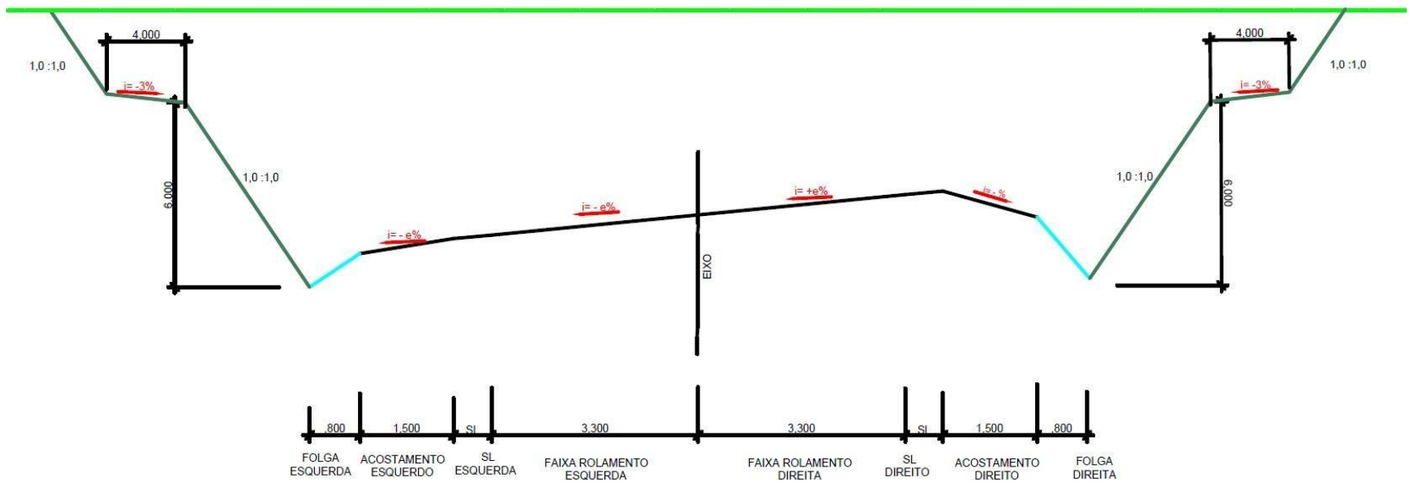
ATERRO EM CURVA (ESQUERDA)



ATERRO EM CURVA (ESQUERDA) COM BANQUETAS



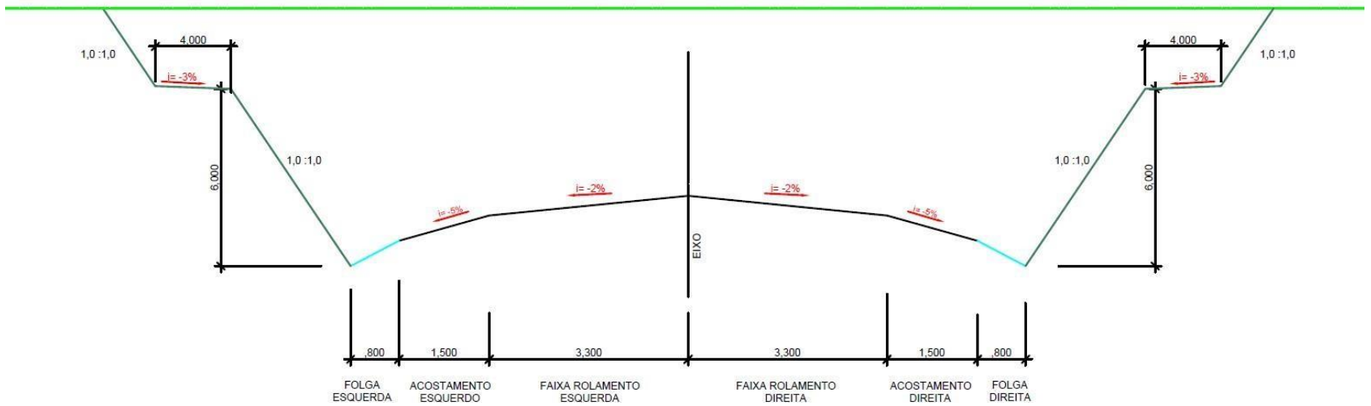
CORTE EM CURVA (ESQUERDA) COM BANQUETAS



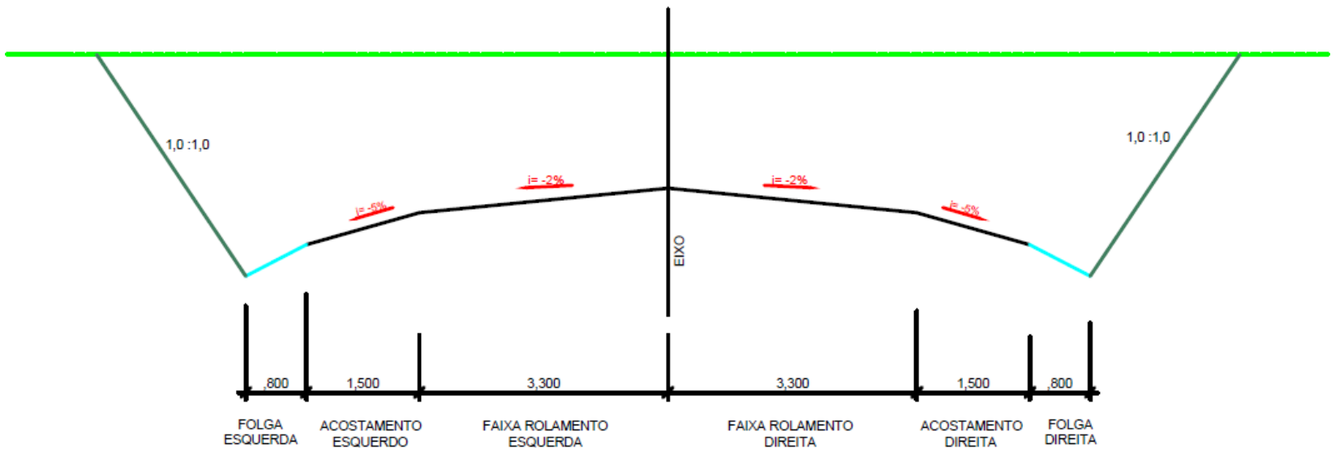
CORTE EM CURVA (ESQUERDA)



CORTE EM TANGENTE COM BANQUETAS



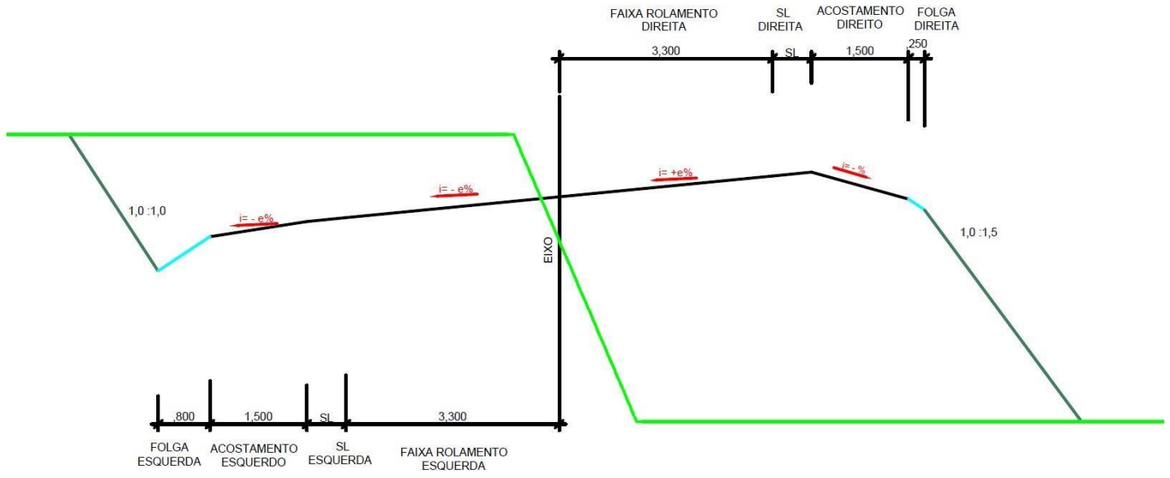
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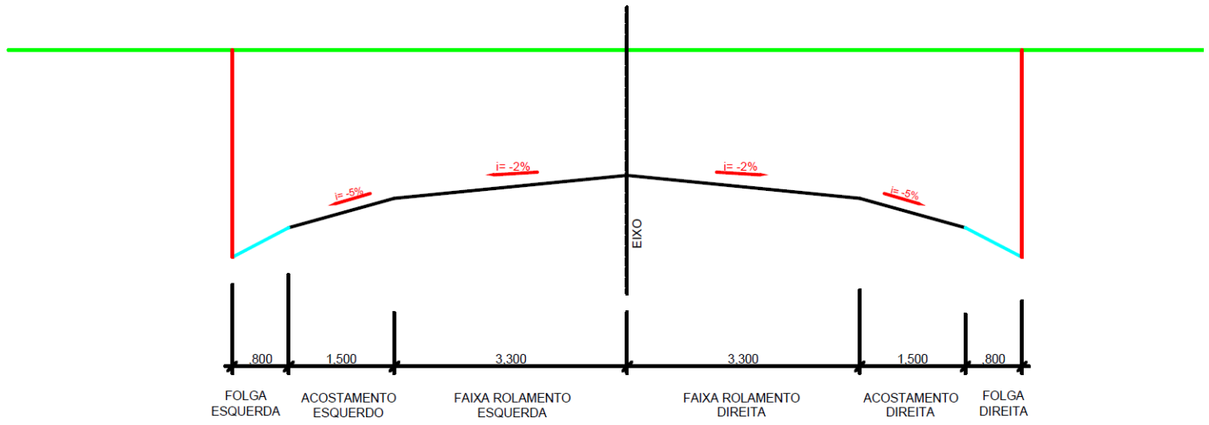
SEÇÃO MISTA EM TANGENTE



SEÇÃO MISTA EM CURVA (ESQUERDA)



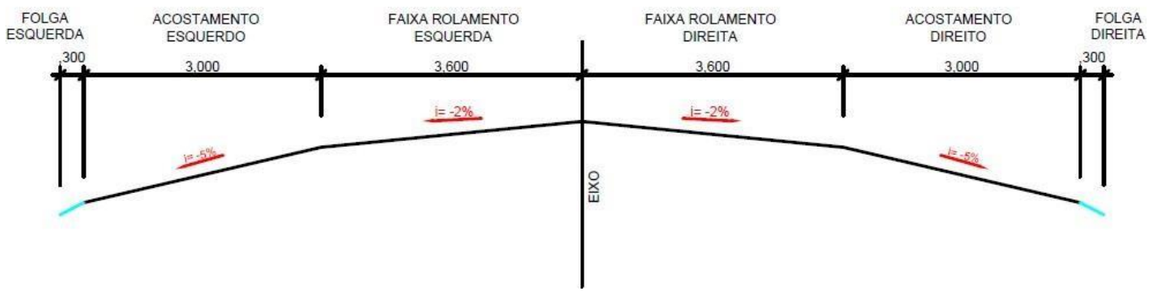
CORTE EM TANGENTE COM MUROS DE ARRIMO



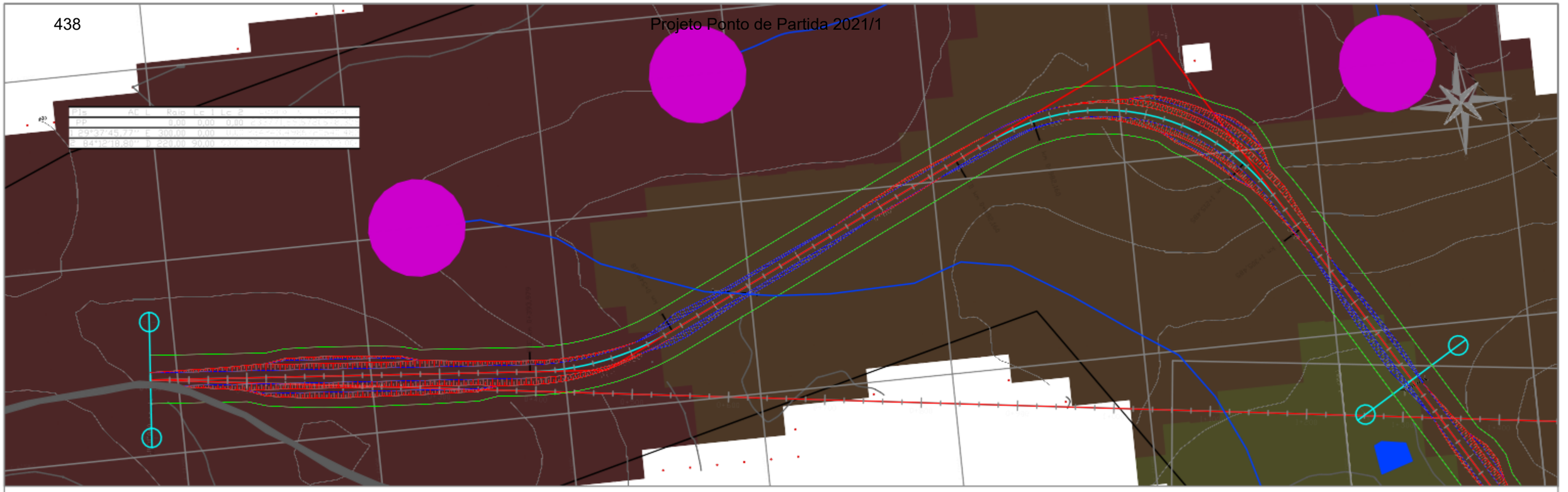
ATERRO EM TANGENTE COM MUROS DE ARRIMO

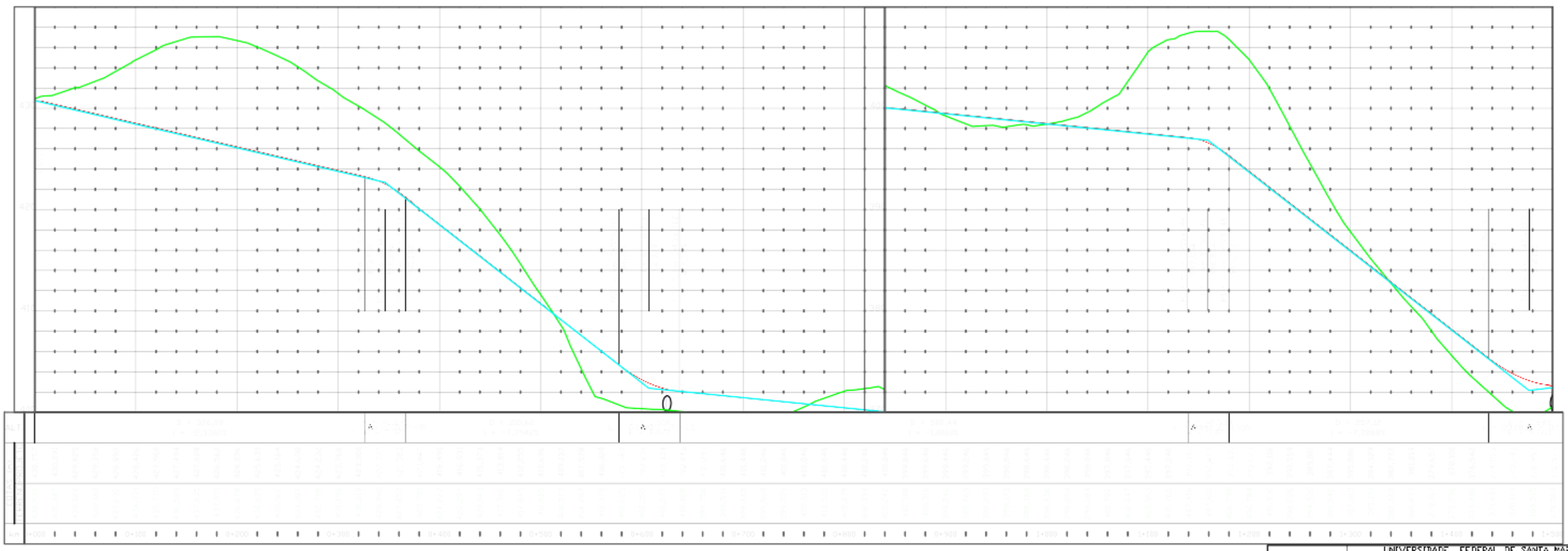


PONTE

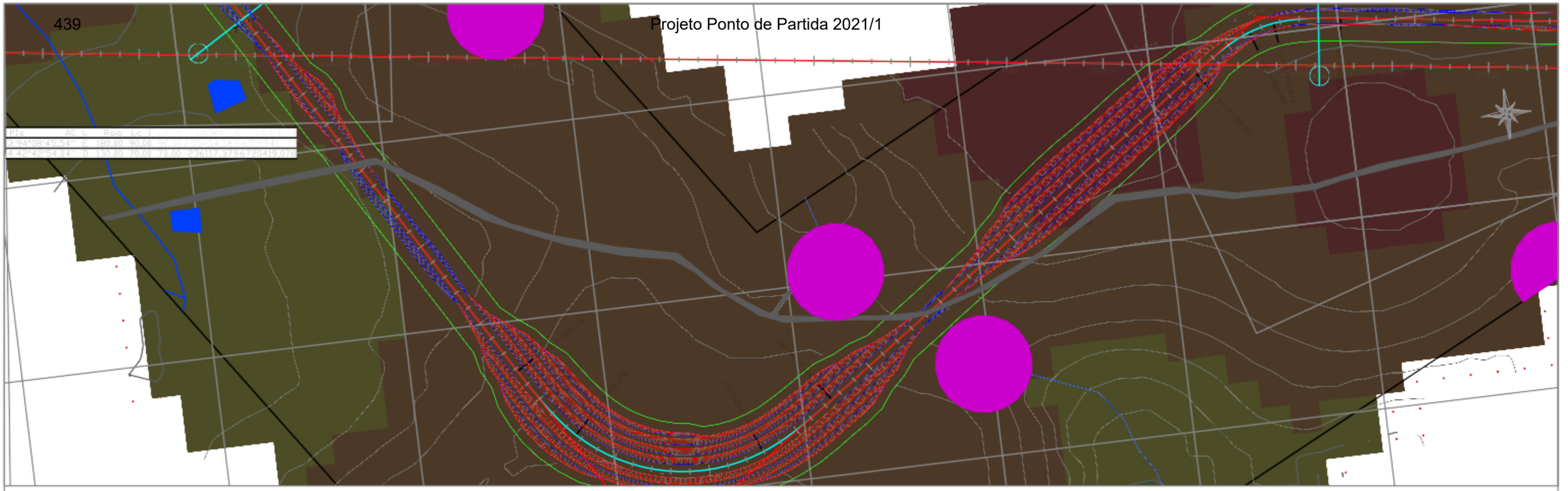


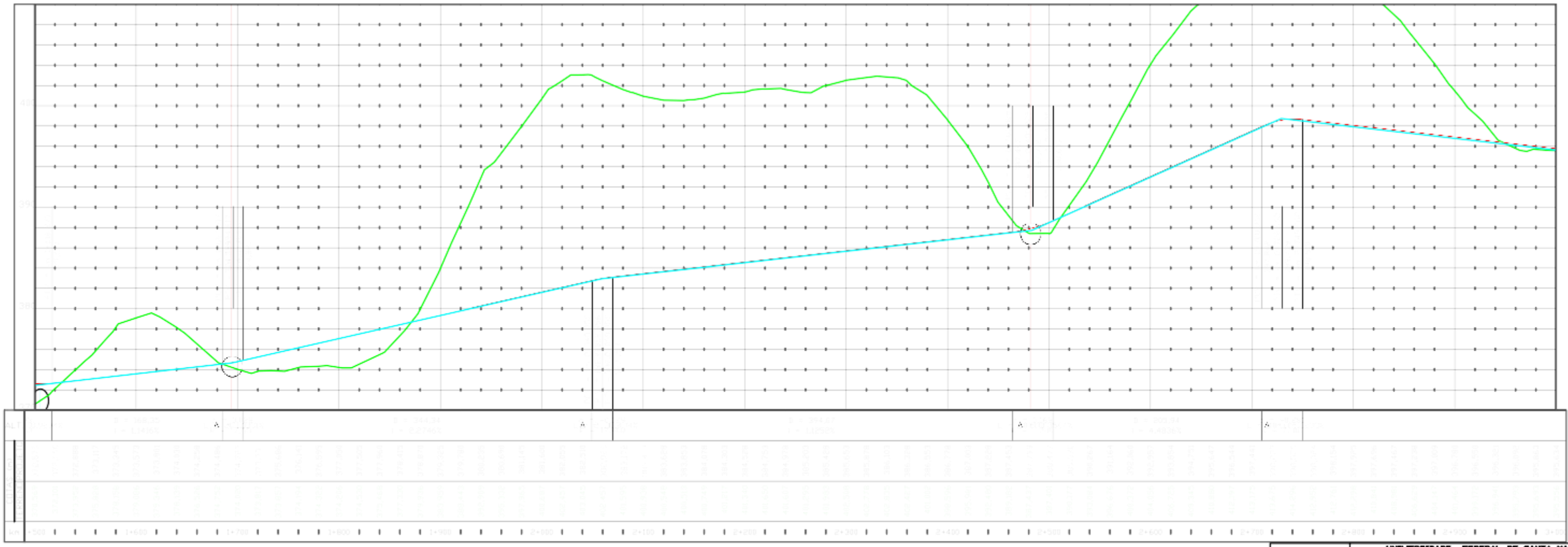
Linha geral



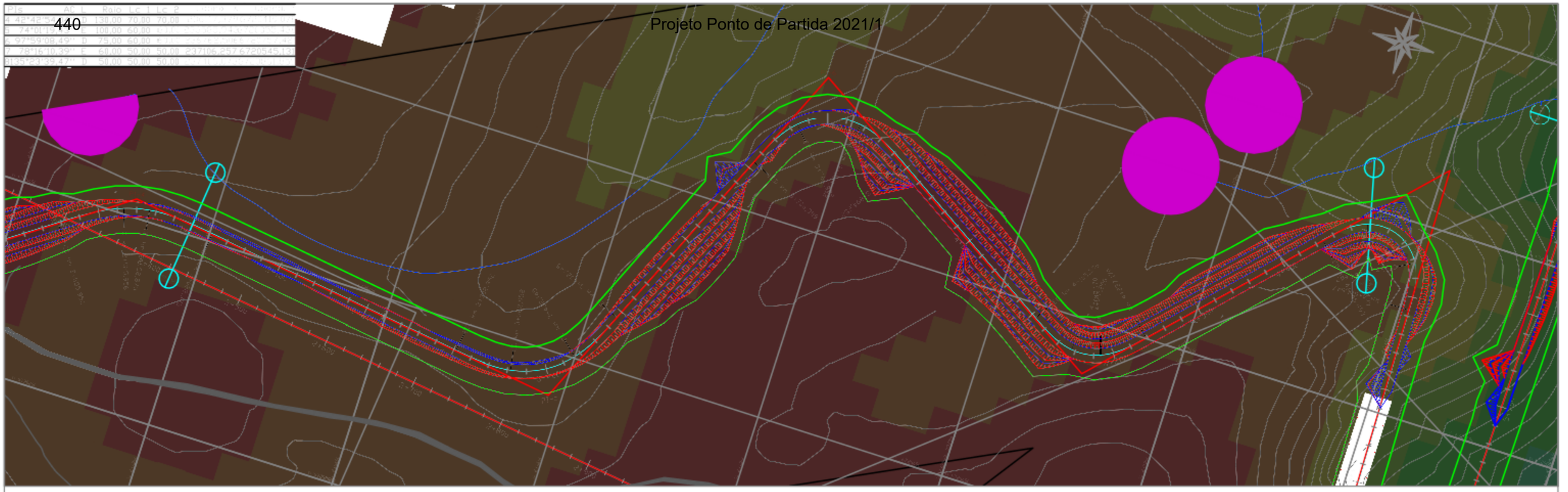


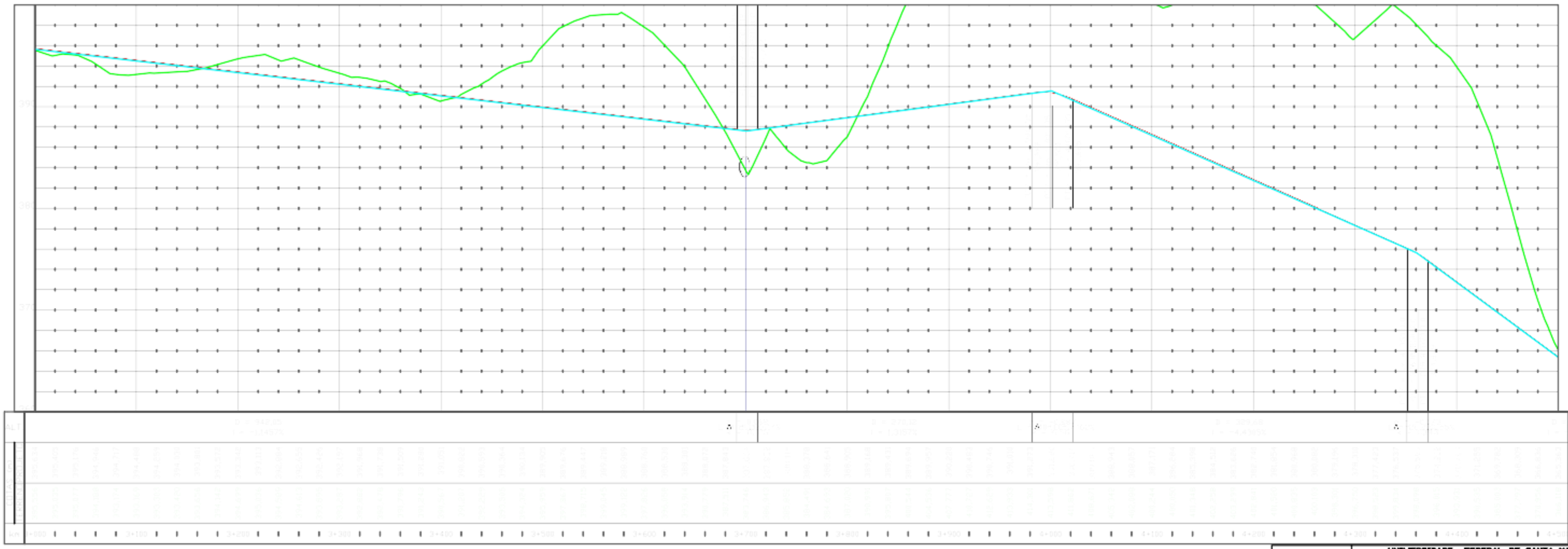
UDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logística - LAMOT	
	Rodovia: PPP - 2021/1 Trecho: Lote 01 Data: 31/06/2021	
Escala 1:2000	PROJETO GEOMETRICO	Folha 01/01



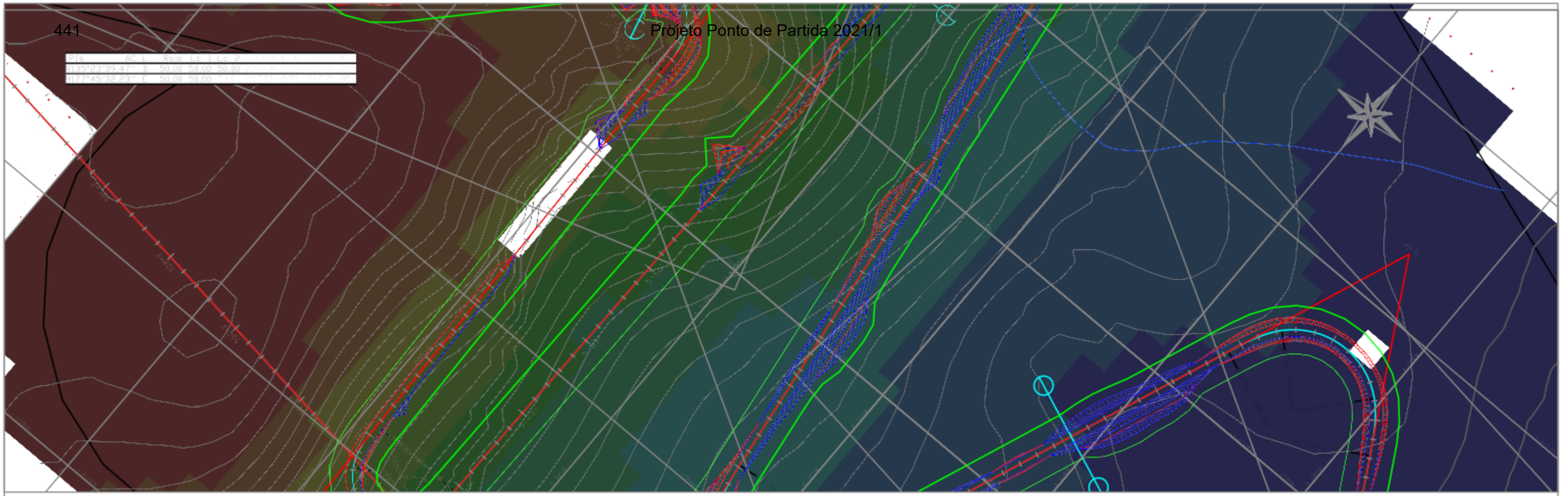


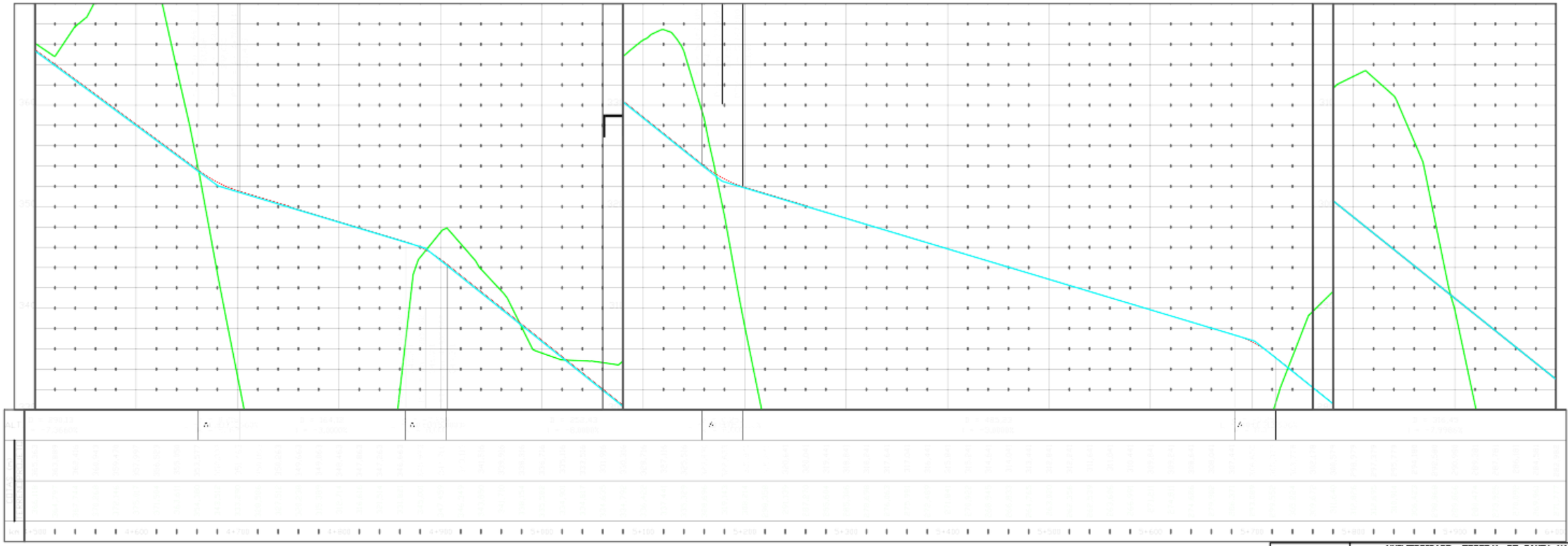
TDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logistica - LAMOT	
	Rodovia: PPP 2021/1 Trecho: Lote 01 Data: 31/08/2021	
Escala 1:2000	PROJETO GEOMETRICO	Folha 02/10



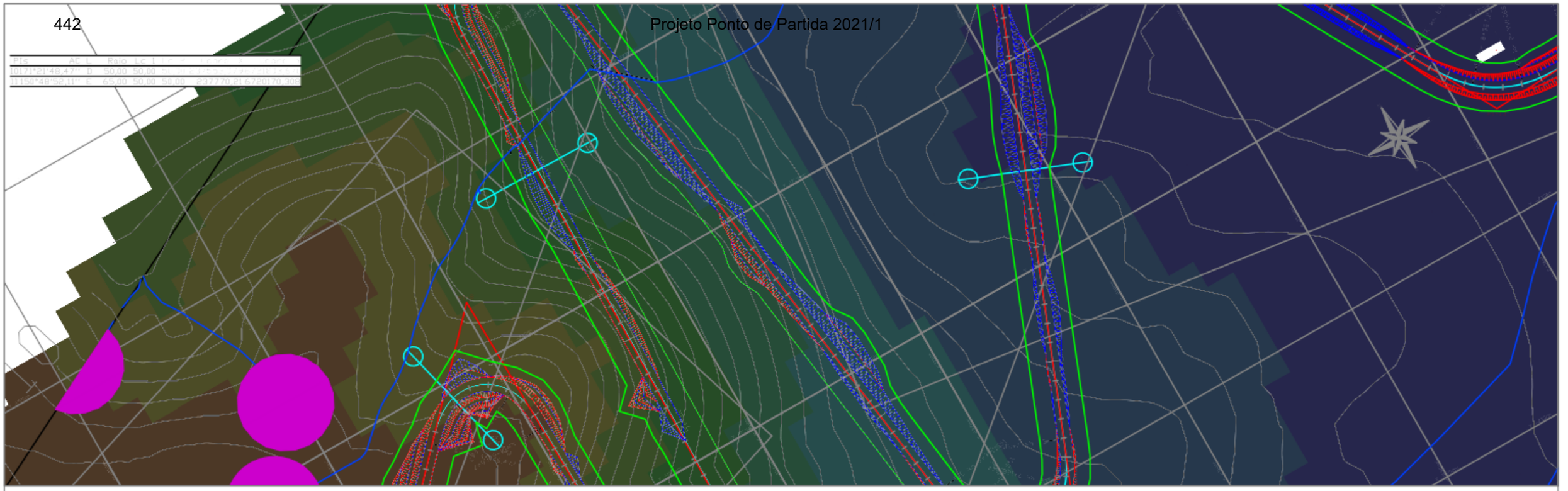


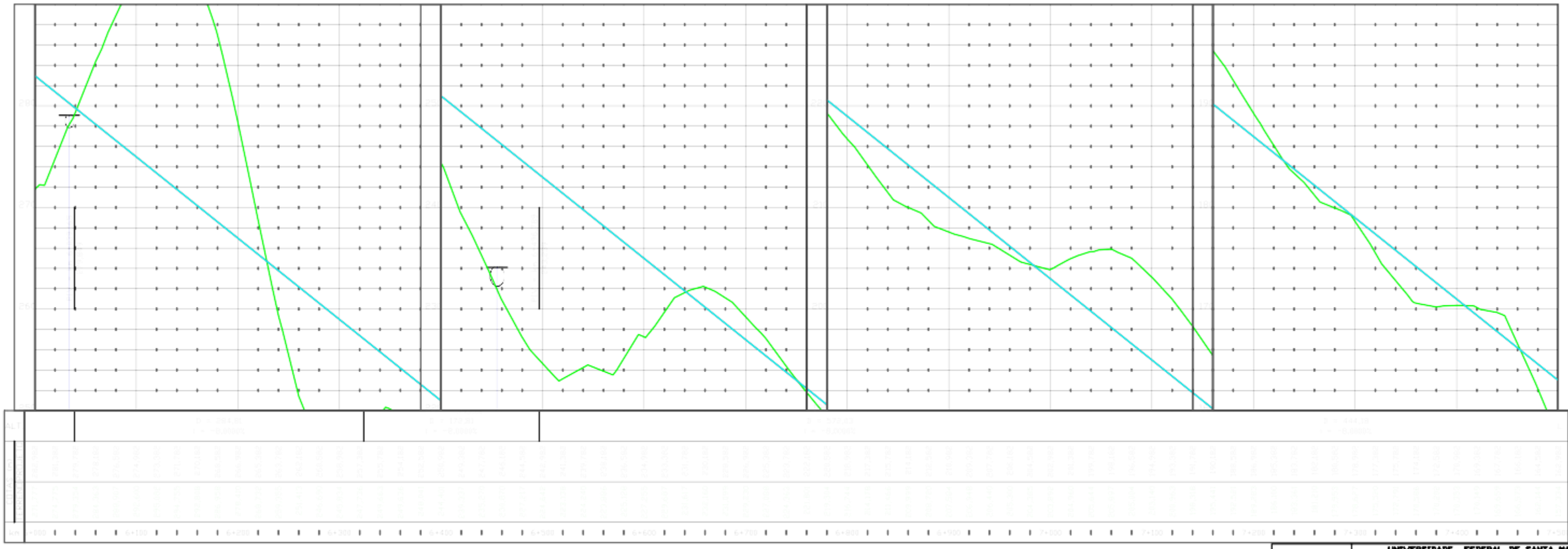
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	Rodovia PPP - 2021/1 Trecho: Lote 01 Data: 31/08/2021	
Escala 1:2000	PROJETO GEOMETRICO	Folha 02/10





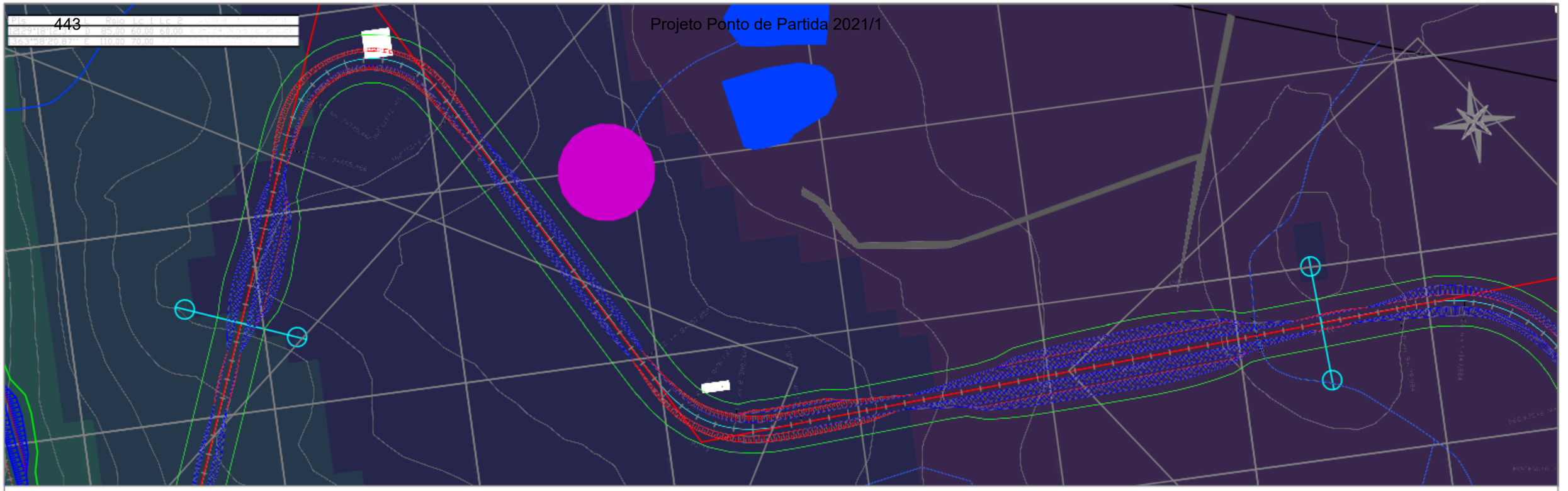
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	Rodovia: PPP - 2021/1 Trecho: Lote 01 Data: 31/08/2021
Escala: 1:2000	PROJETO GEOMETRICO

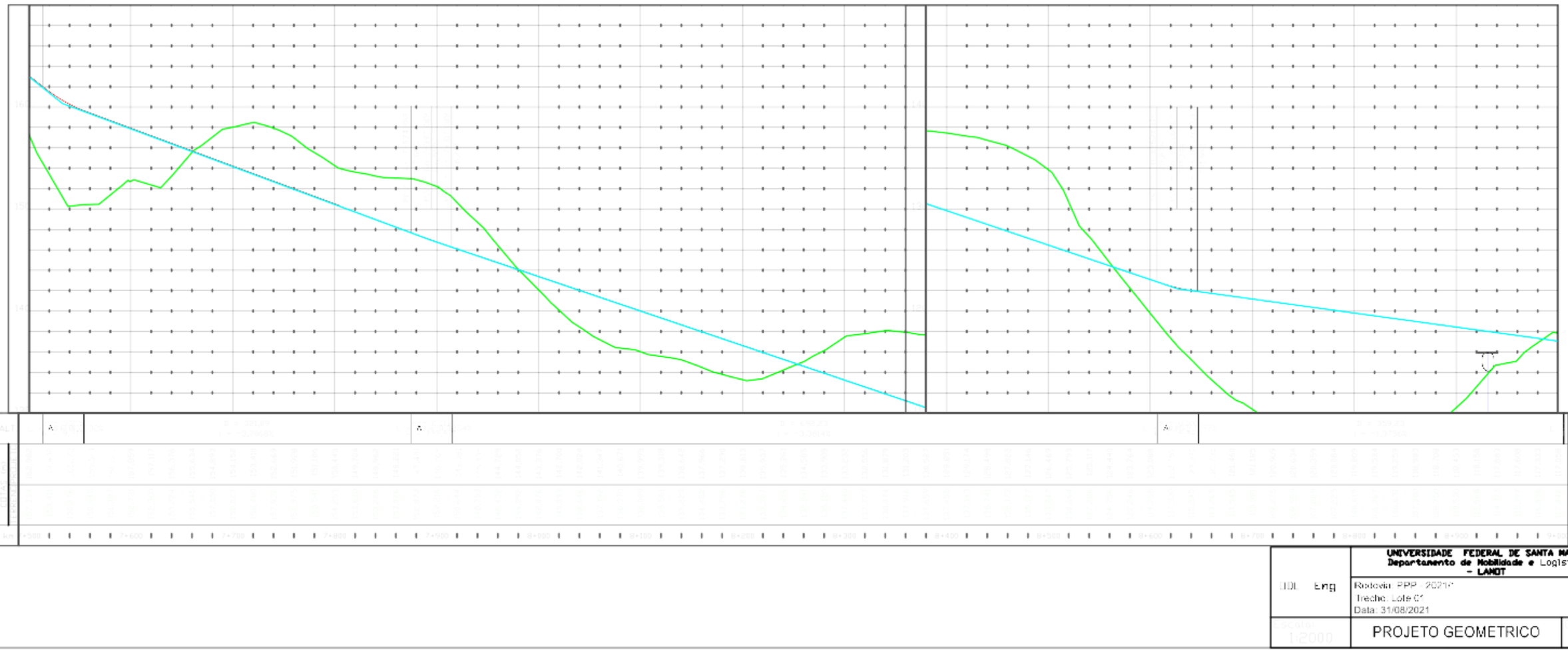




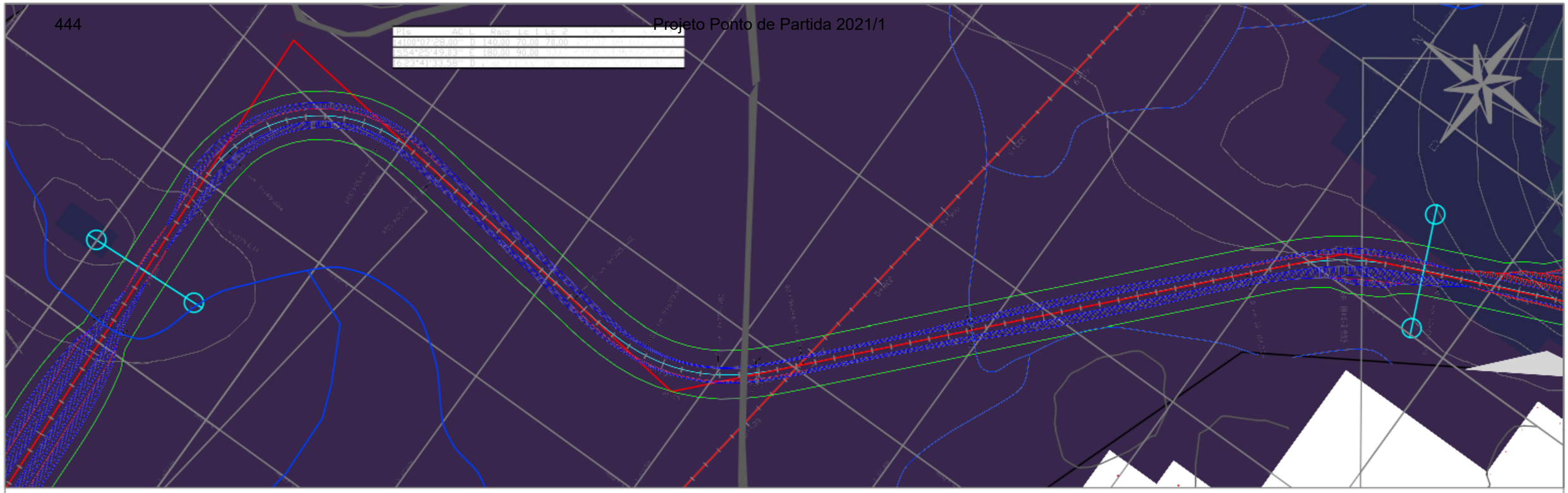
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Escala: 1:2000	PROJETO GEOMETRICO	Folha: 05/16

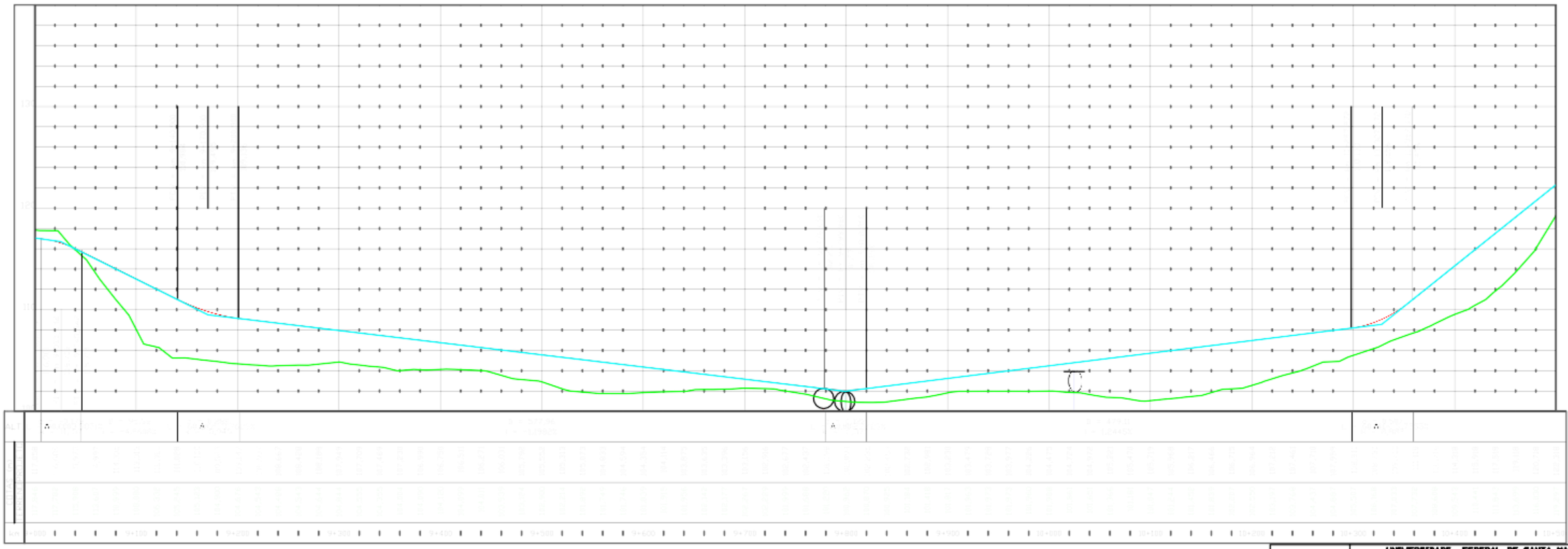
Projeto Ponto de Partida 2021/1





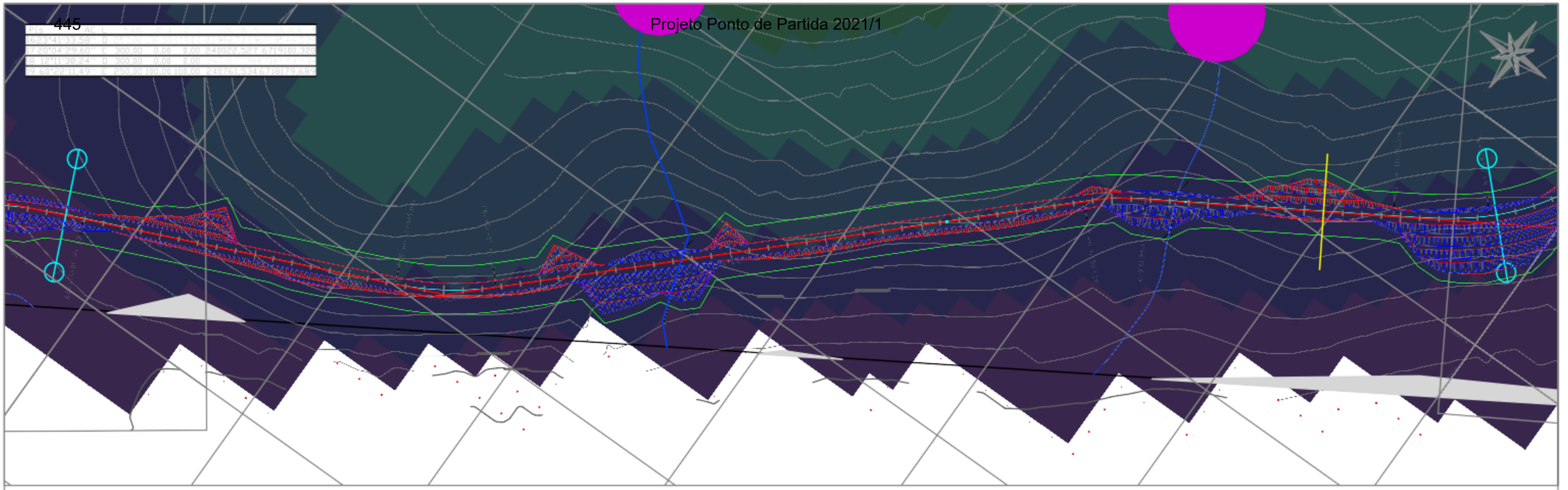
UDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logistico - LAMOT	
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Escala: 1:2000	PROJETO GEOMETRICO	Prancha: 04/04

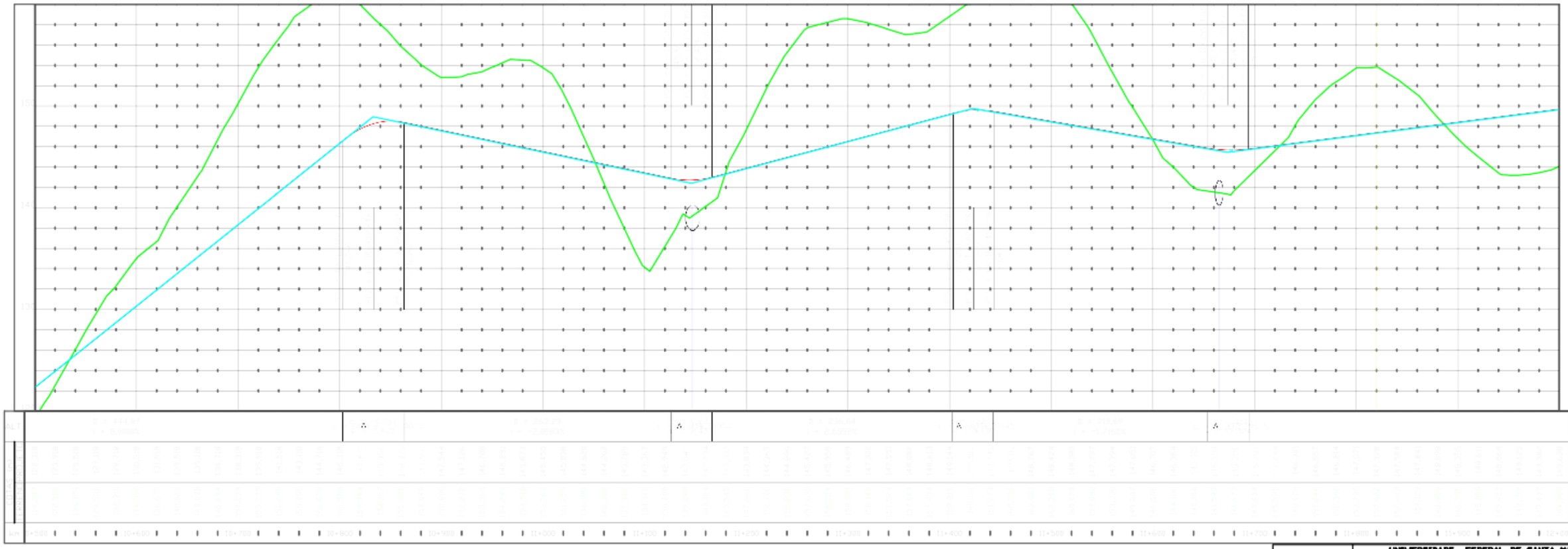




UDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logistica - LAMOT	
	Rodovia PPP 2021/1 Trecho: Lote 01 Data: 31/08/2021	
Escala: 1:2000	PROJETO GEOMETRICO	Prancha: 07/08

Projeto Ponto de Partida 2021/1





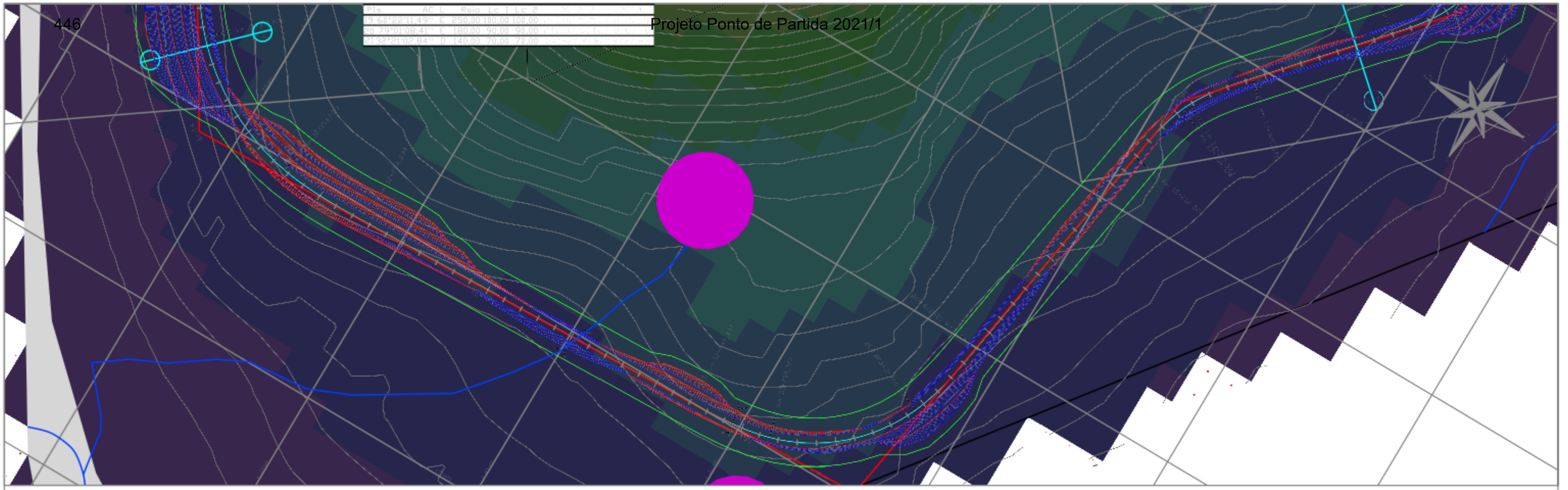


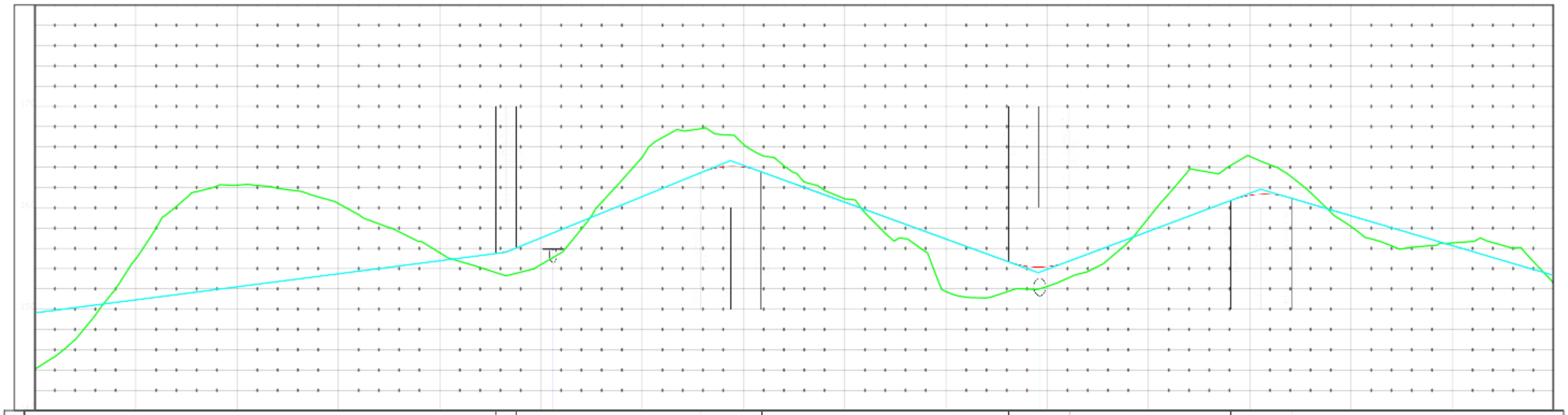
UDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logistica - LAMOT	
	Rodovia PPP 2021/1 Trecho: Lote 01 Data: 31/08/2021	
Escala: 1:2000	PROJETO GEOMETRICO	Folha: 06/09

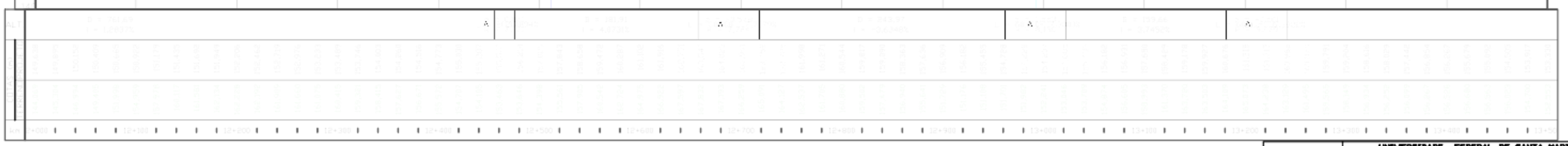
Prancha-PPP_06

Projeto Ponto de Partida 2021/1

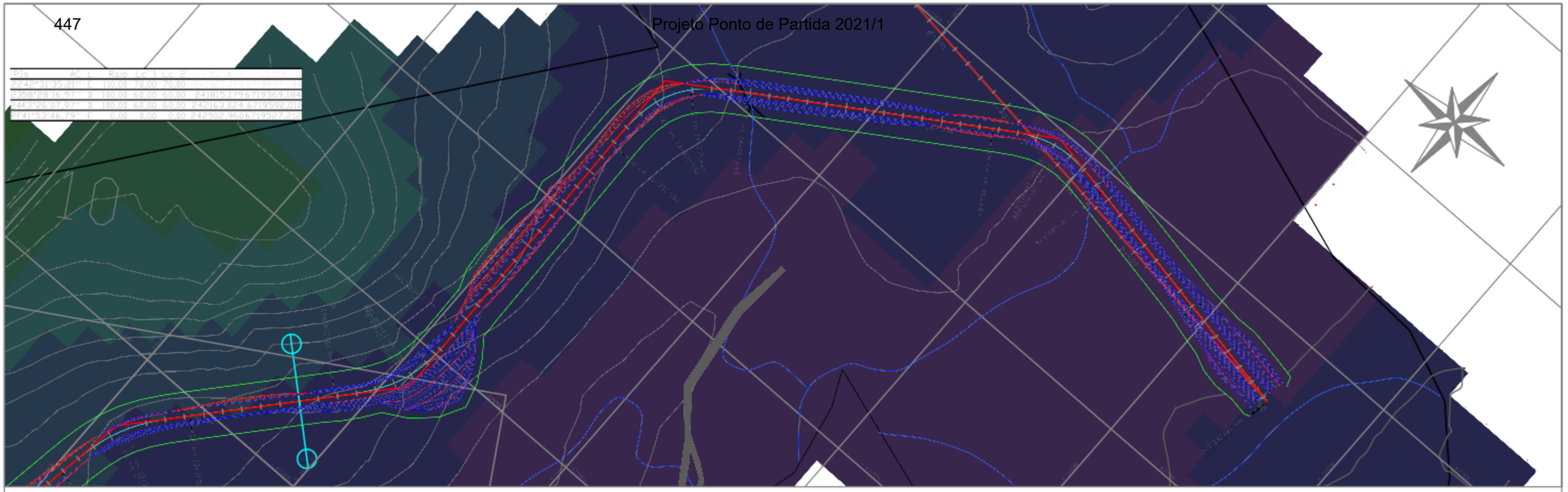
PIs	AC	L	Raio	Le 1	Le 2
PI 60°22'11.49"	E	250,00	180,00	100,00	
PI 79°01'08.41"	E	180,00	90,00	90,00	
PI 32°21'02.84"	D	140,00	70,00	70,00	

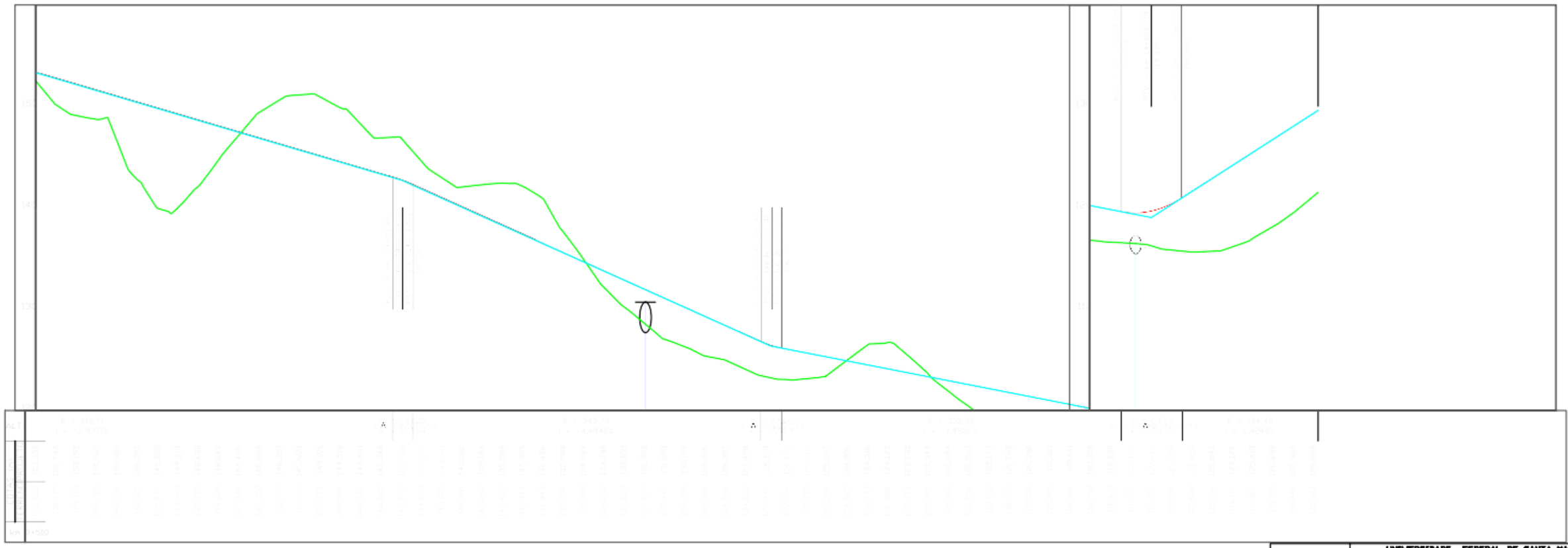






UDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logistica - LAMOT	
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Escala: 1:2000	PROJETO GEOMETRICO	Prancha: 05/08

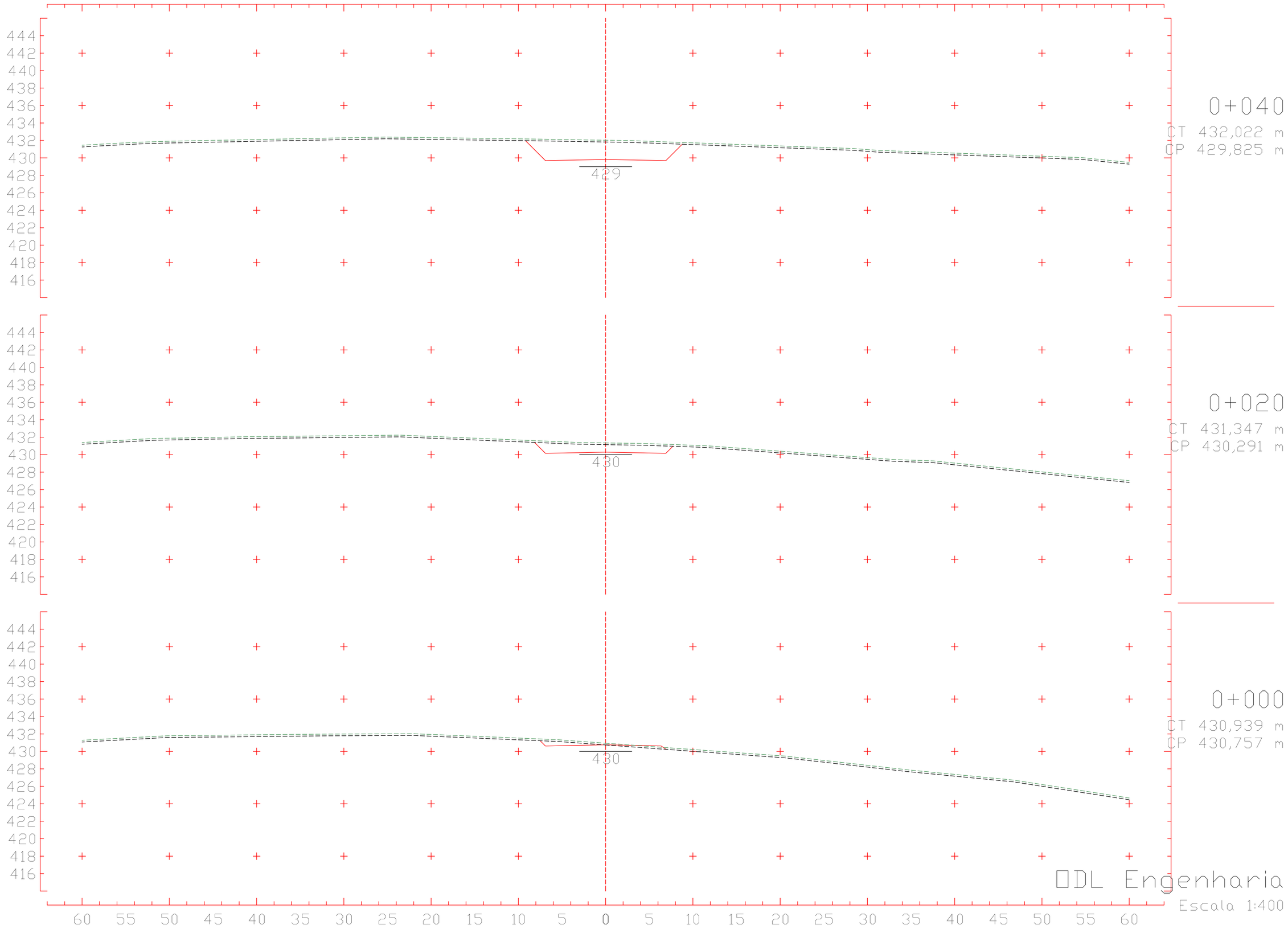




TDL Eng	UNIVERSIDADE FEDERAL DE SANTA MARIA Departamento de Mobilidade e Logistico - LAMOT	
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Escala: 1:2000	PROJETO GEOMETRICO	Folha: 10/10

Seções transversais

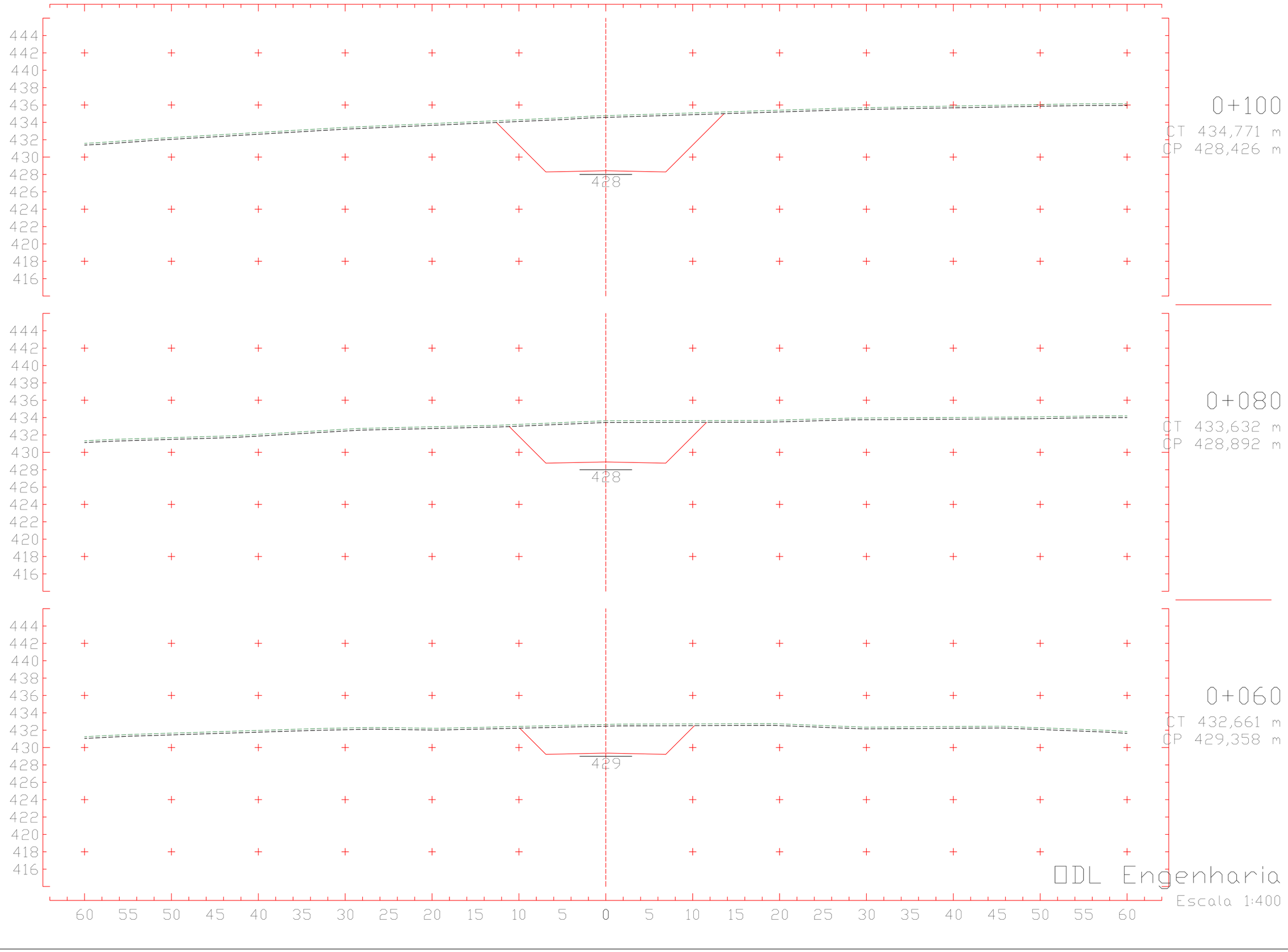
Projeto Ponto de Partida 2021/1



DL Engenharia

Escala 1:400

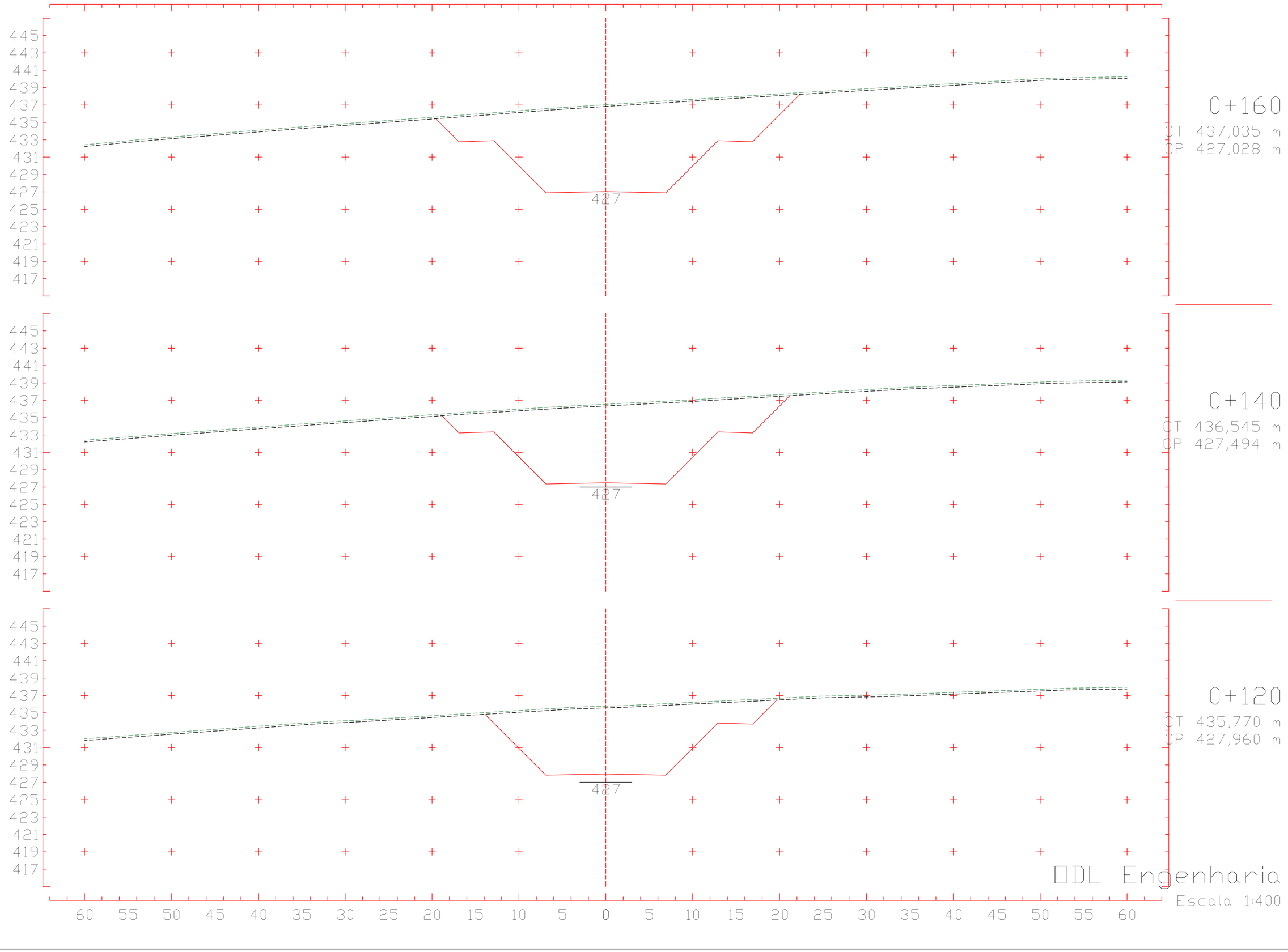
Projeto Ponto de Partida 2021/1



ODL Engenharia

Escala 1:400

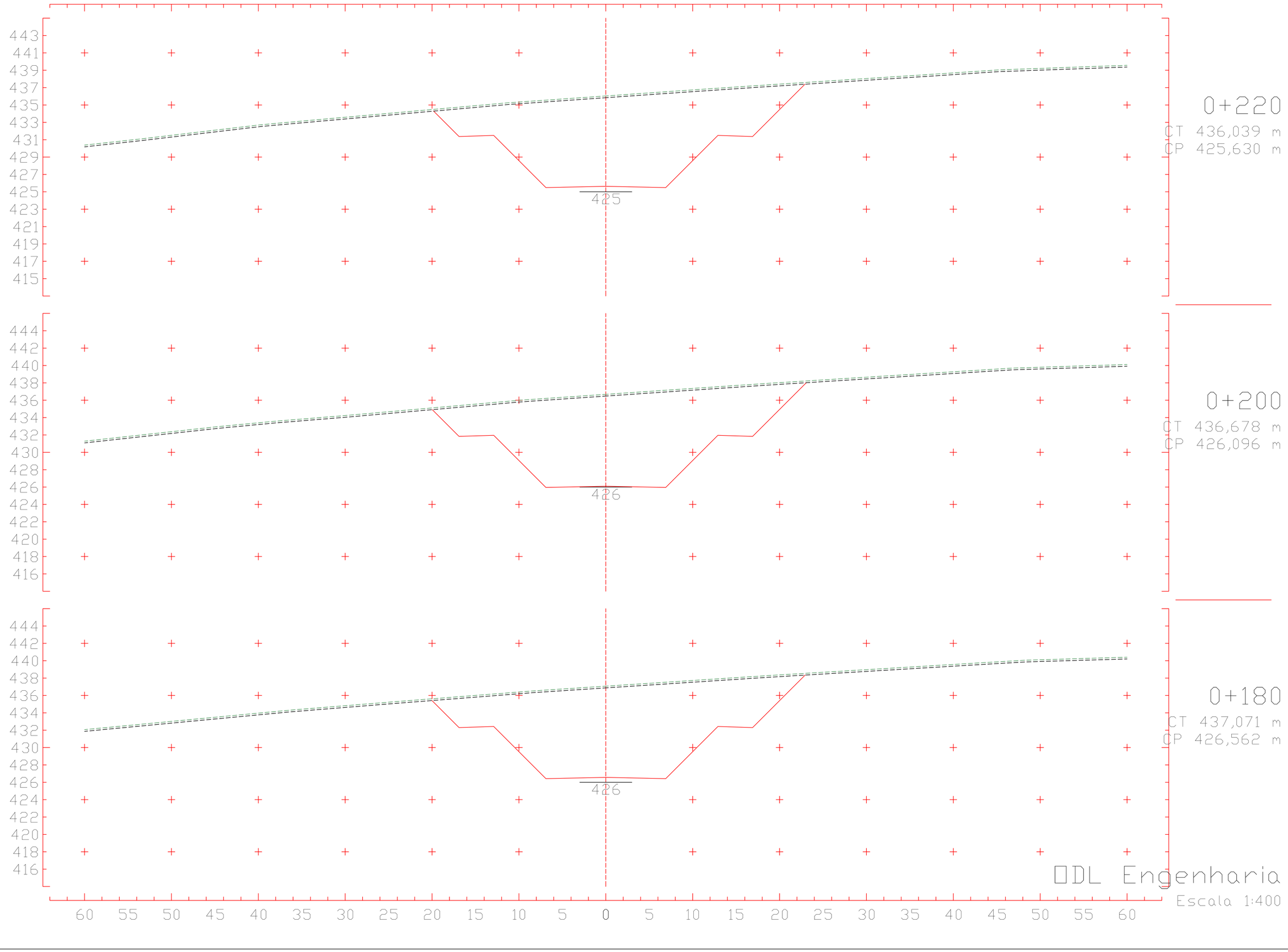
Projeto Ponto de Partida 2021/1



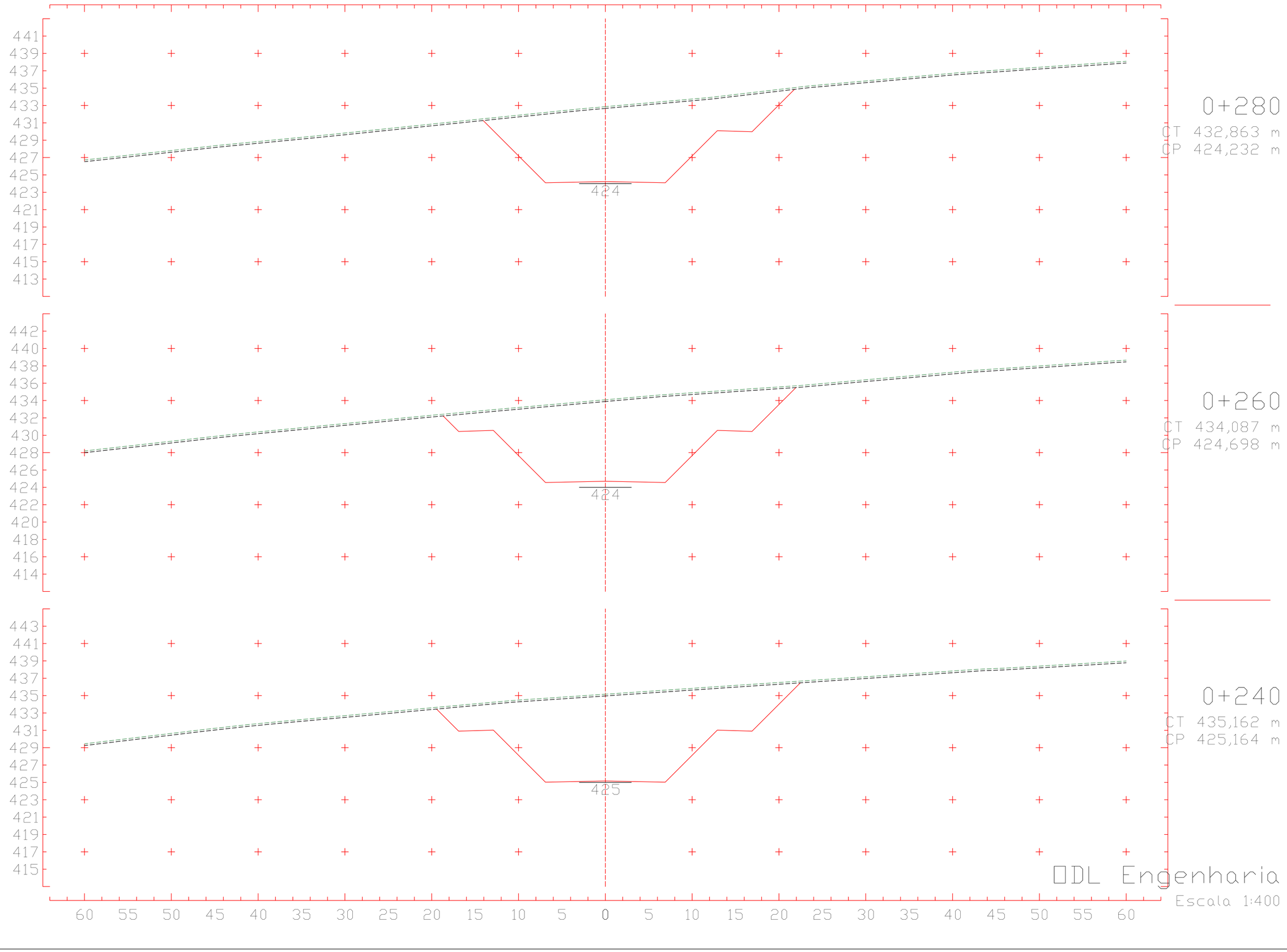
DL Engenharia

Escala 1:400

Projeto Ponto de Partida 2021/1



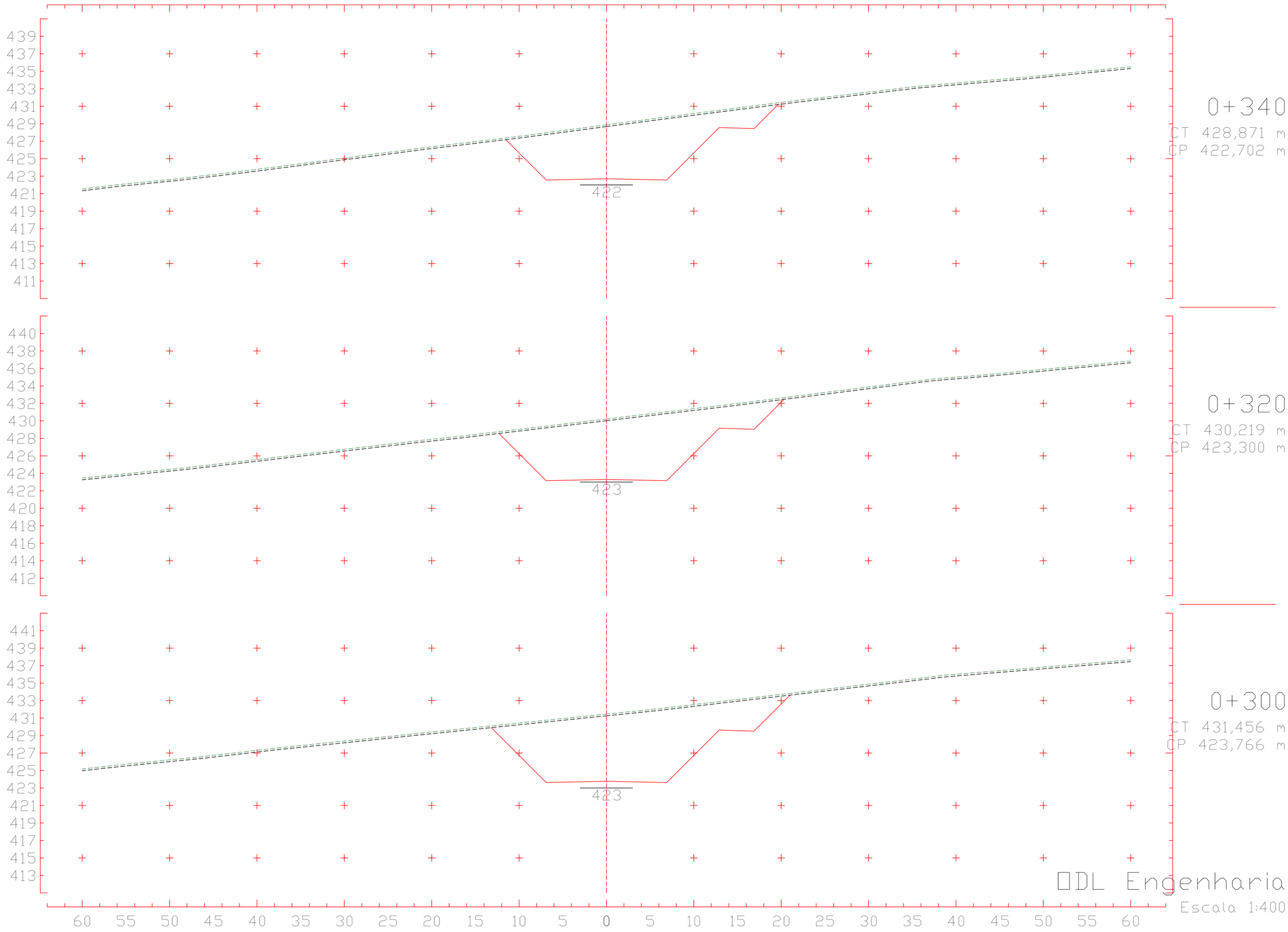
Projeto Ponto de Partida 2021/1



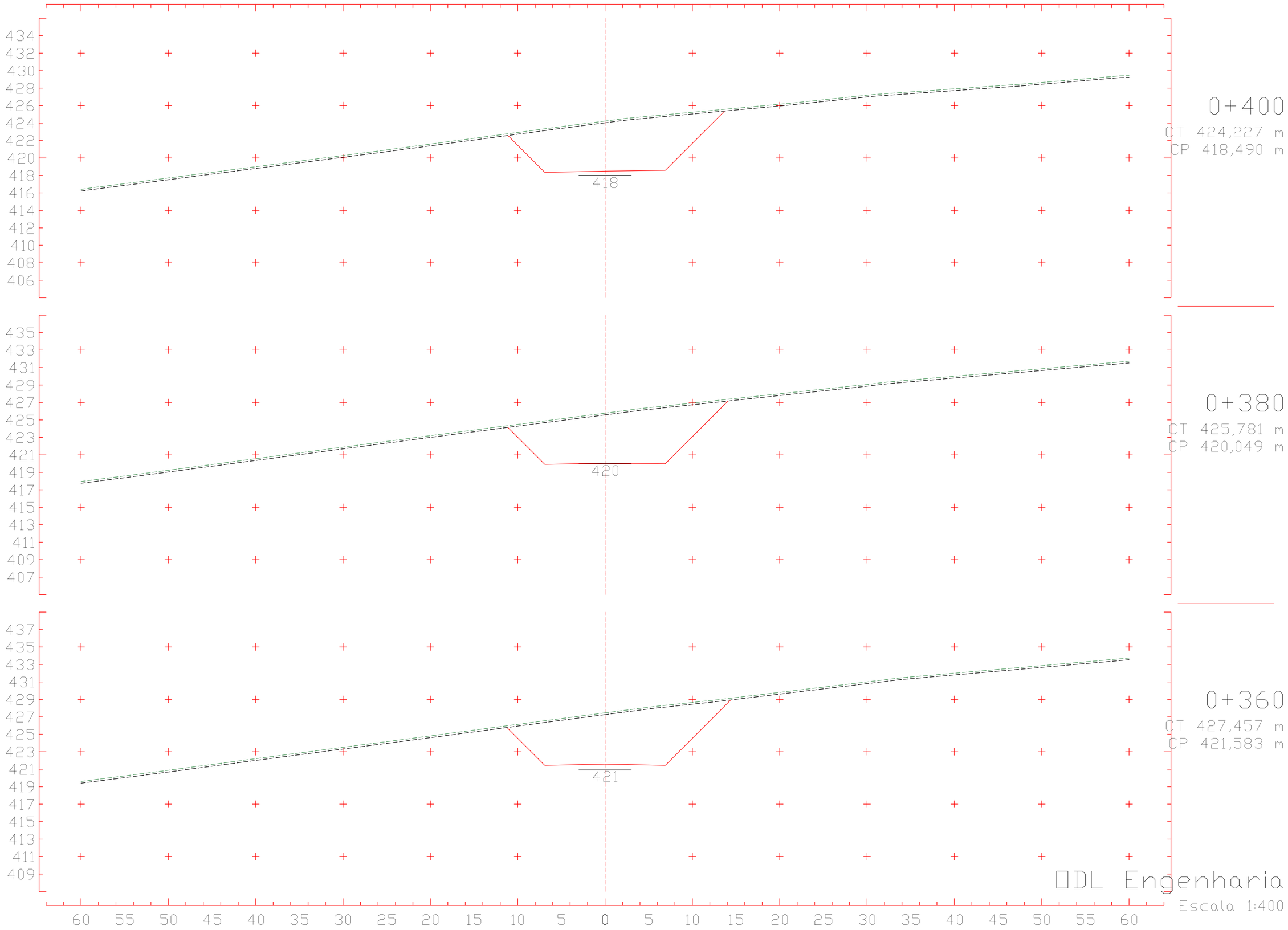
ODL Engenharia

Escala 1:400

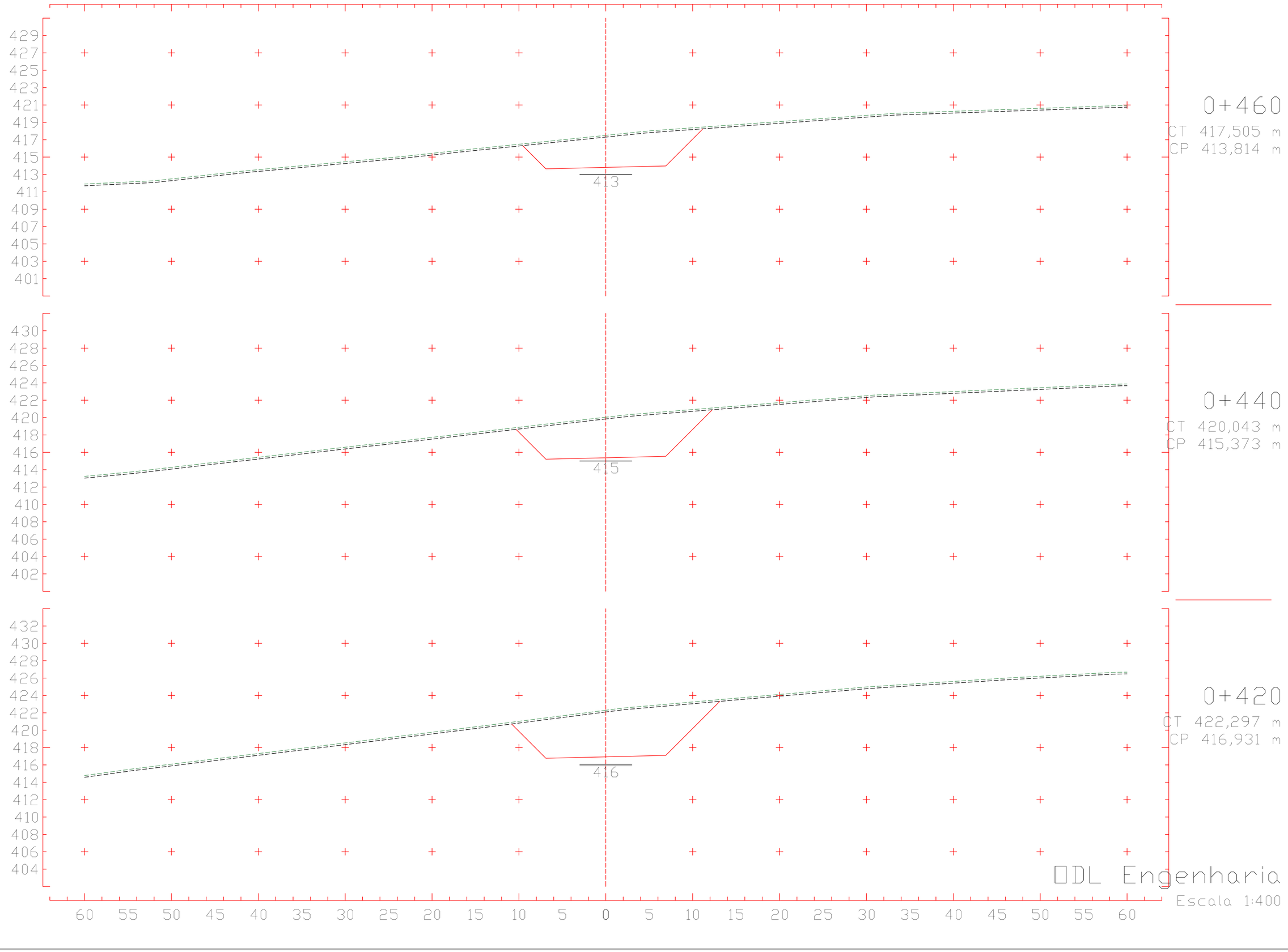
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



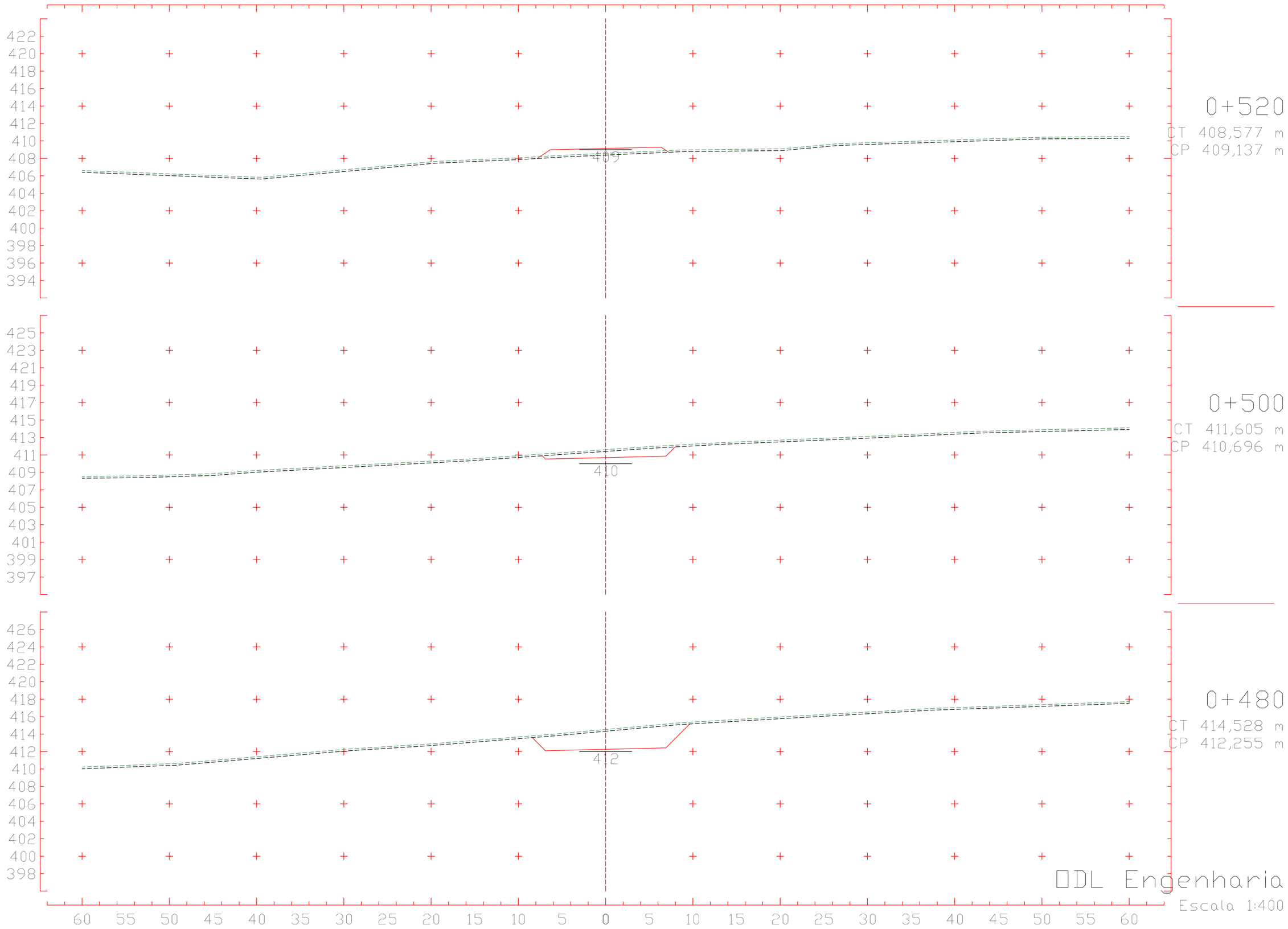
Projeto Ponto de Partida 2021/1



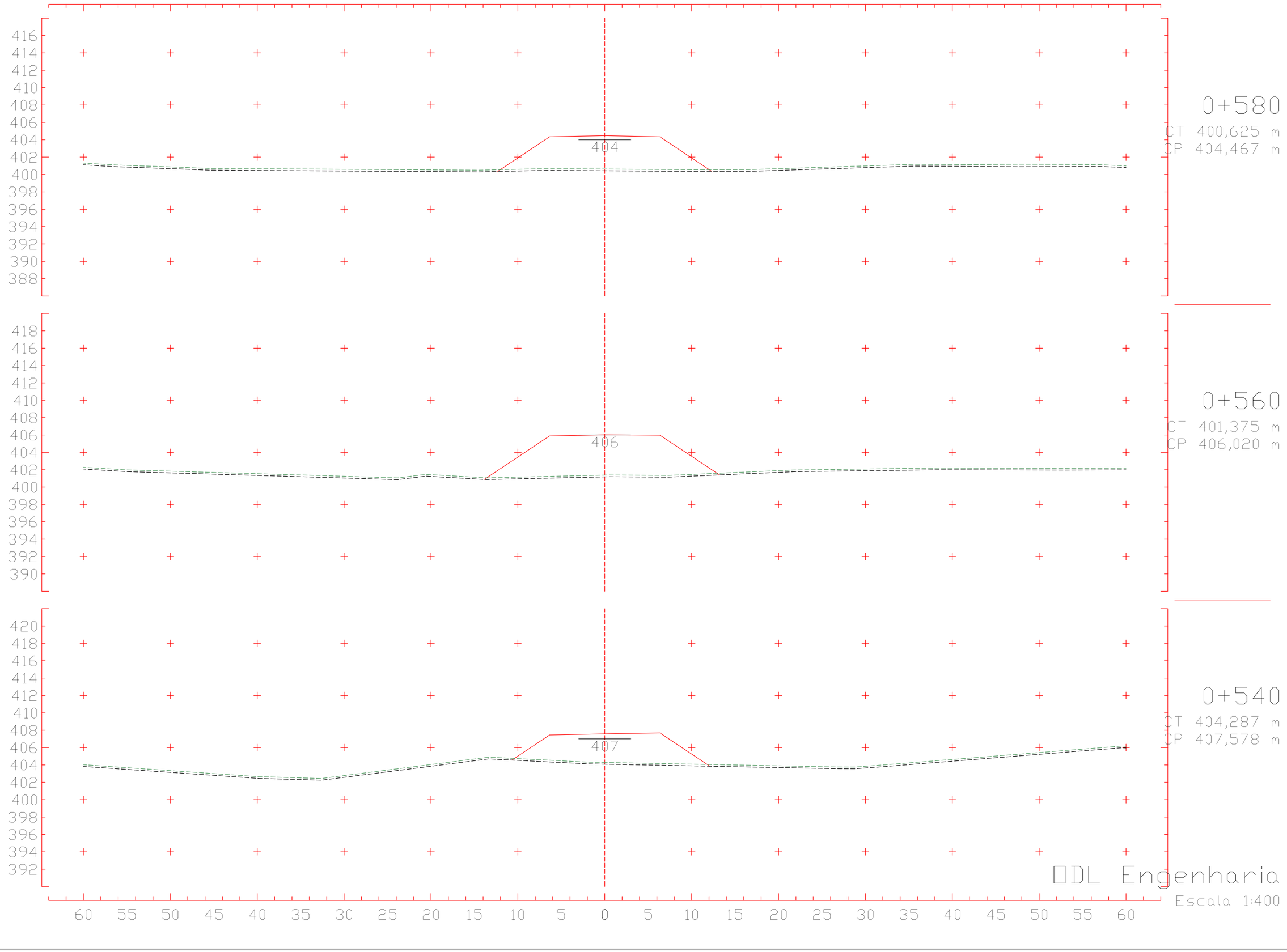
ODL Engenharia

Escala 1:400

Projeto Ponto de Partida 2021/1



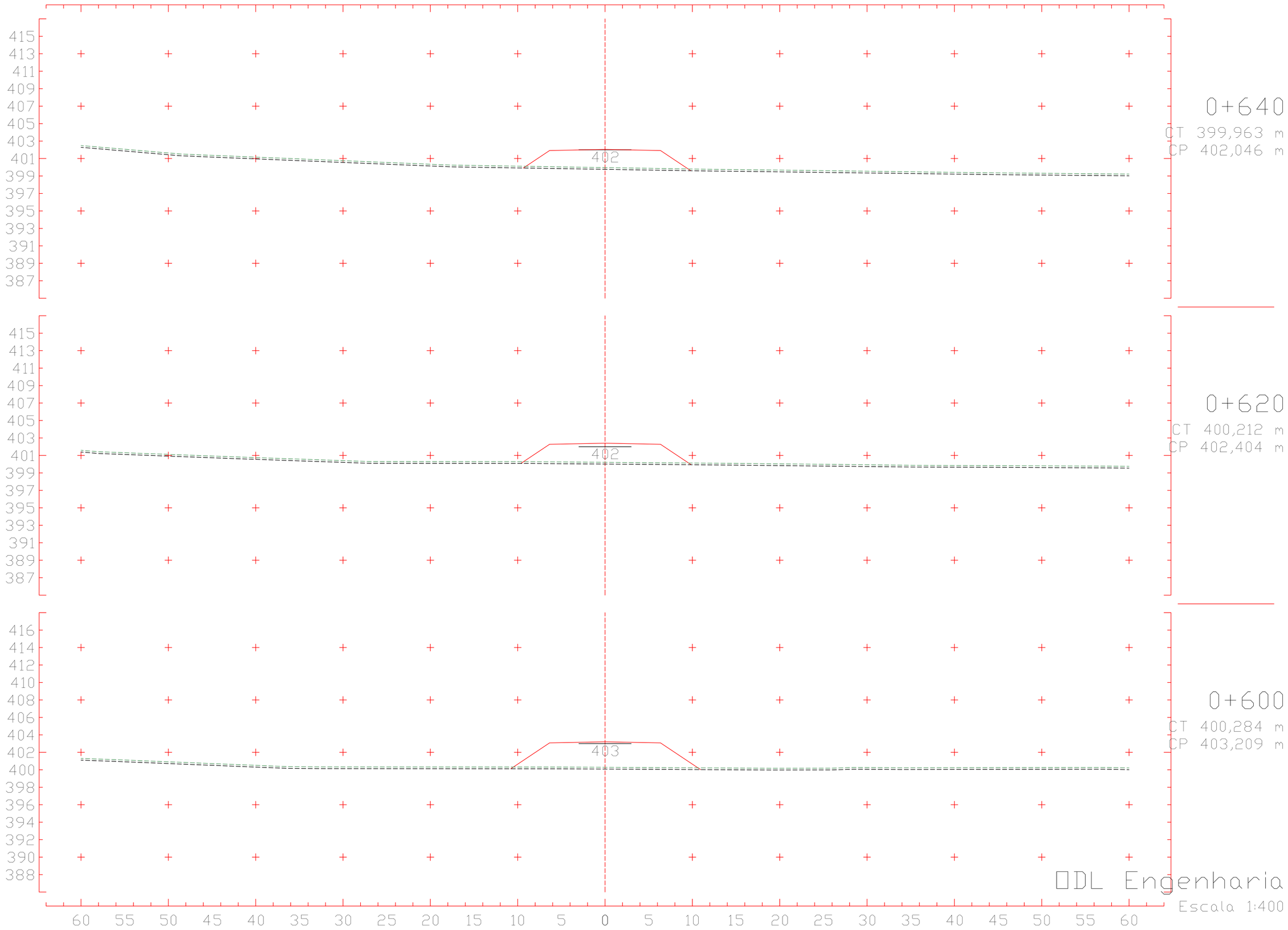
Projeto Ponto de Partida 2021/1



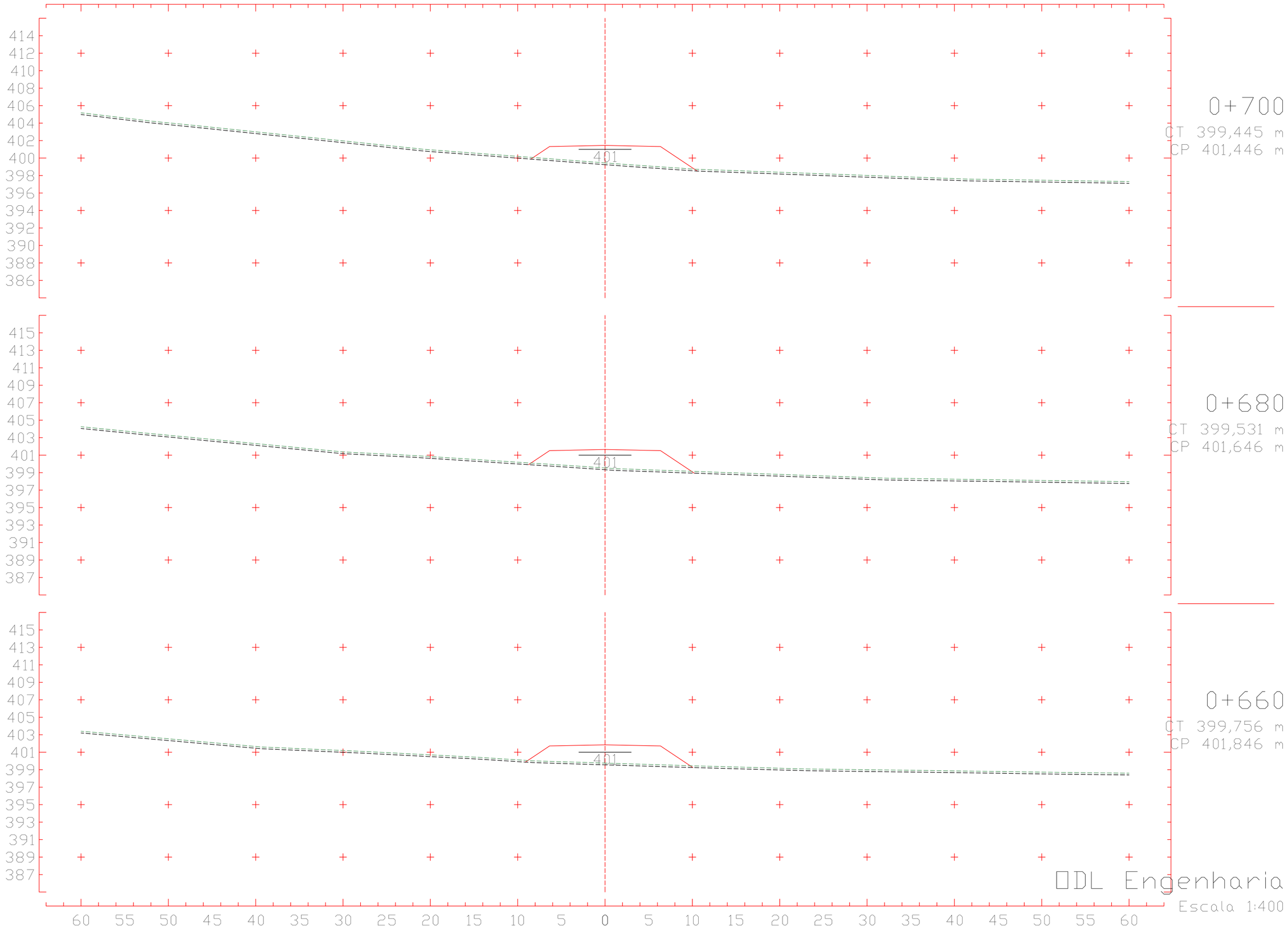
DL Engenharia

Escala 1:400

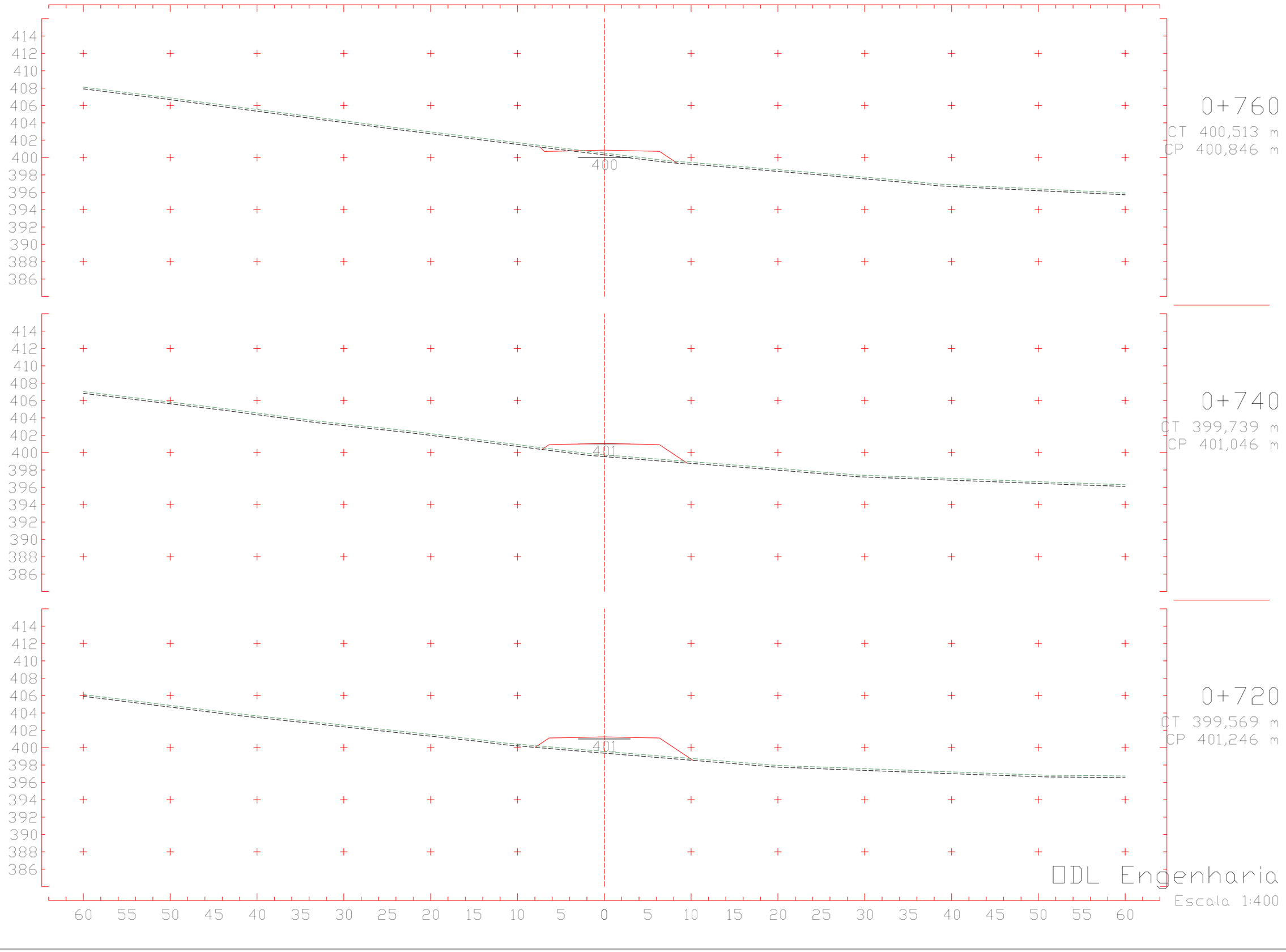
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



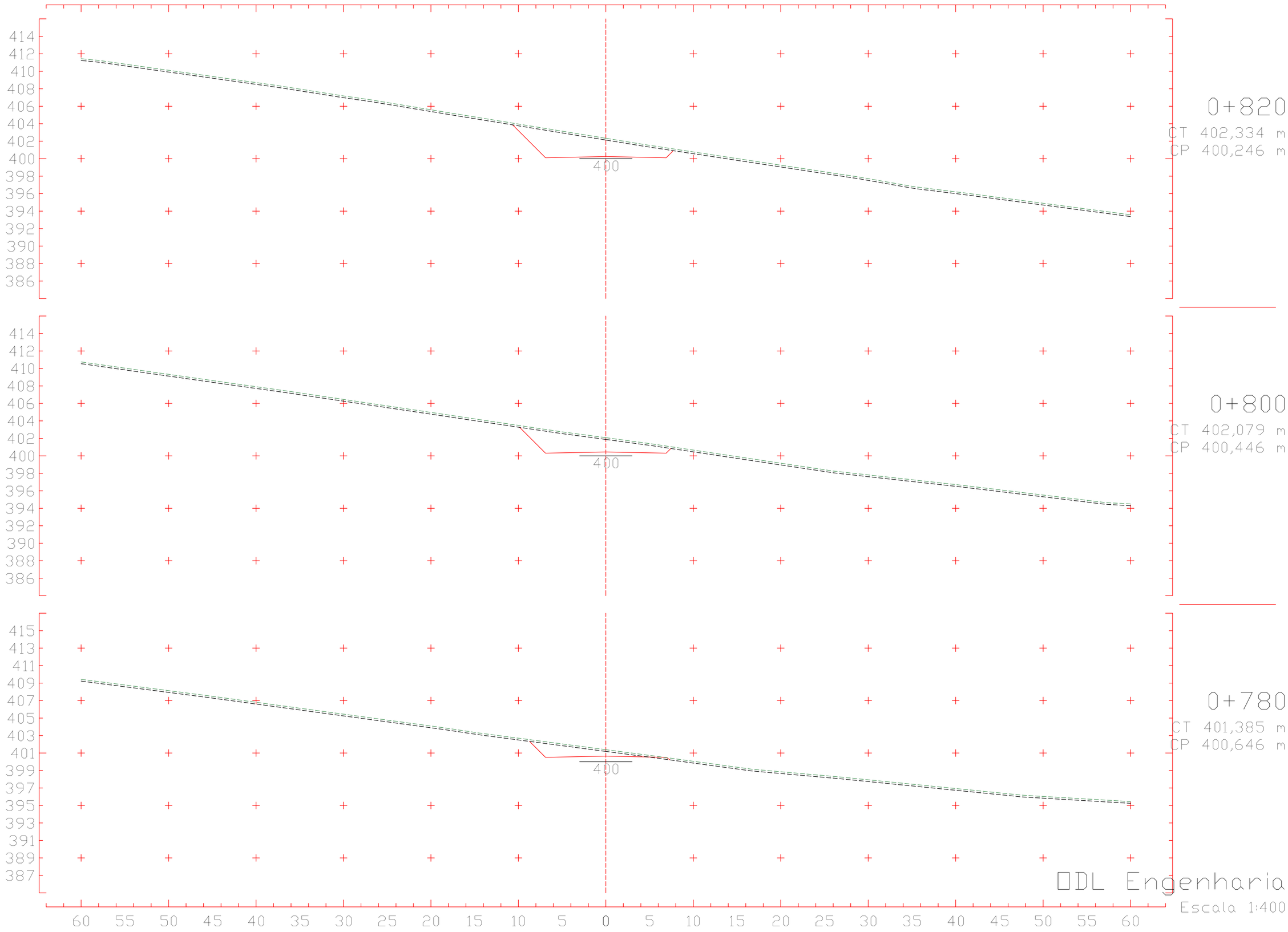
Projeto Ponto de Partida 2021/1



ODL Engenharia

Escala 1:400

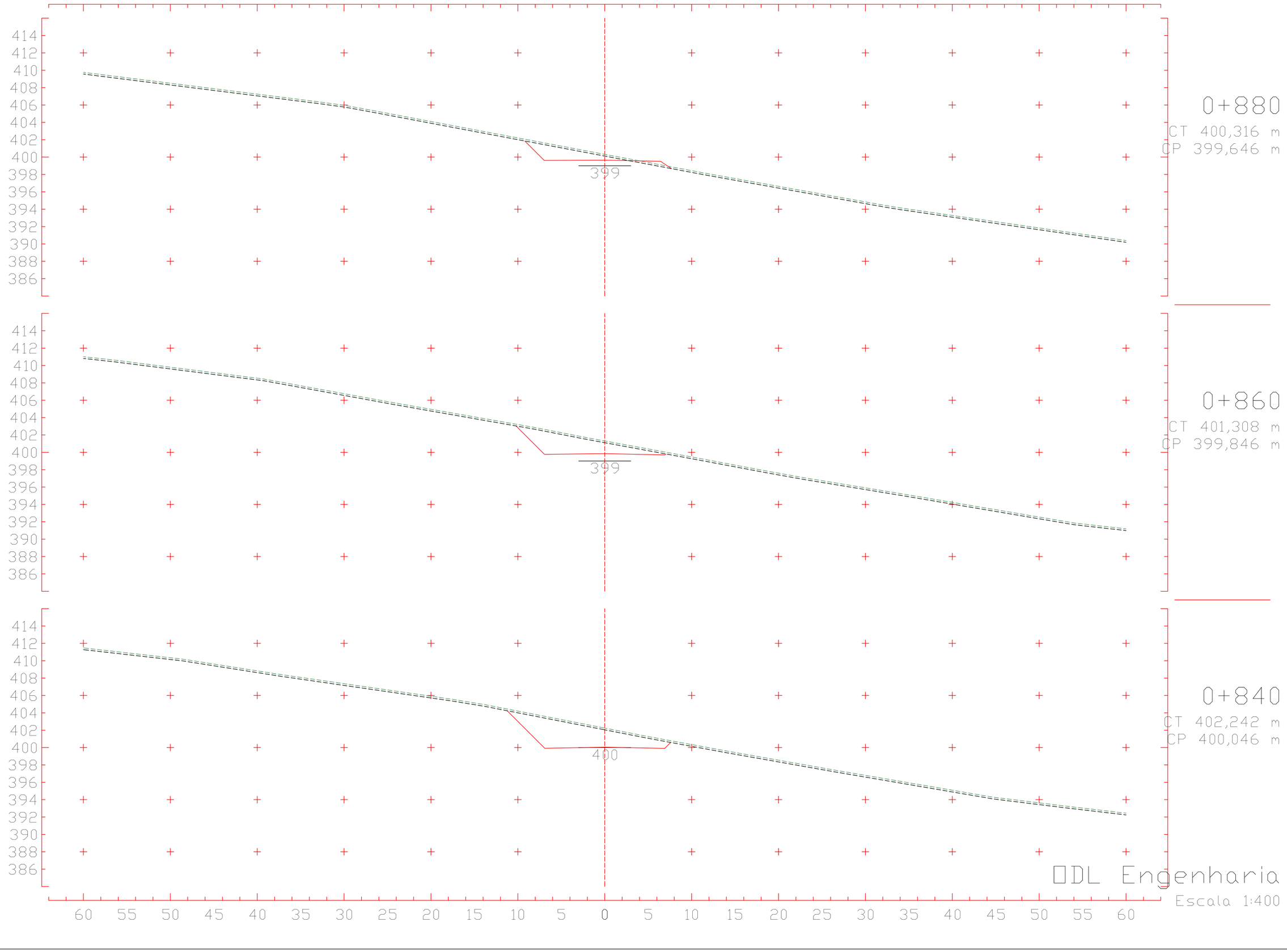
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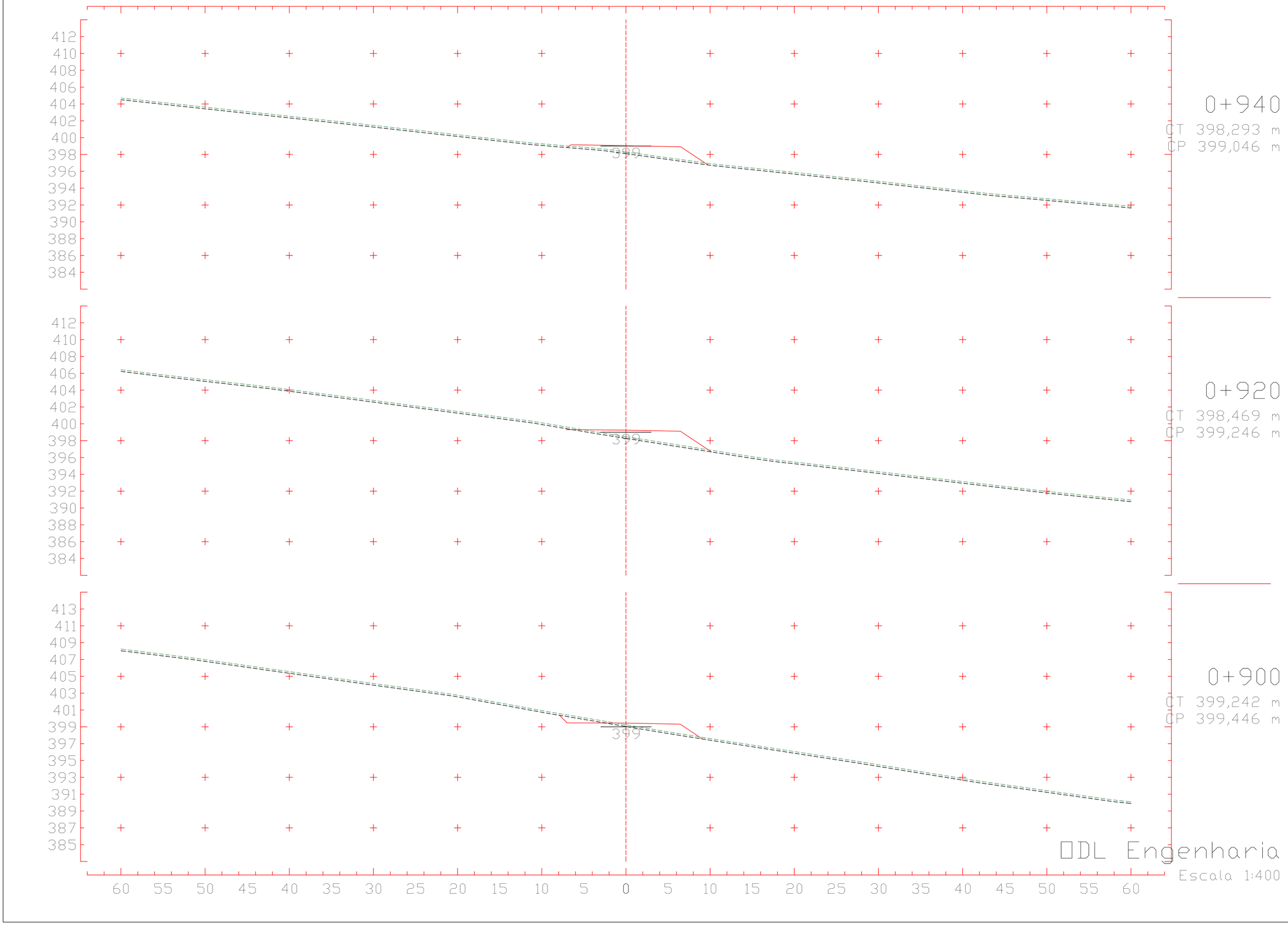
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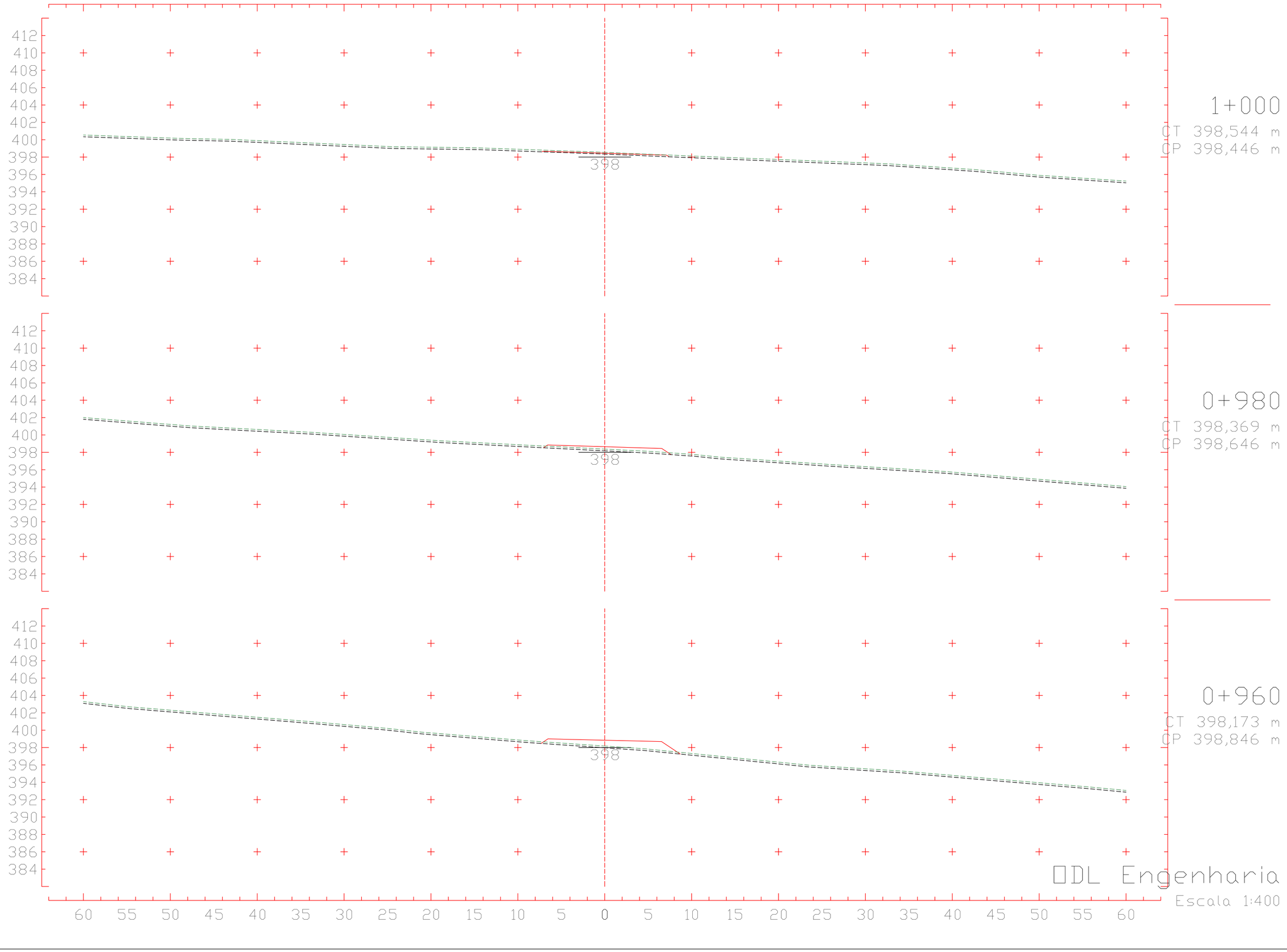
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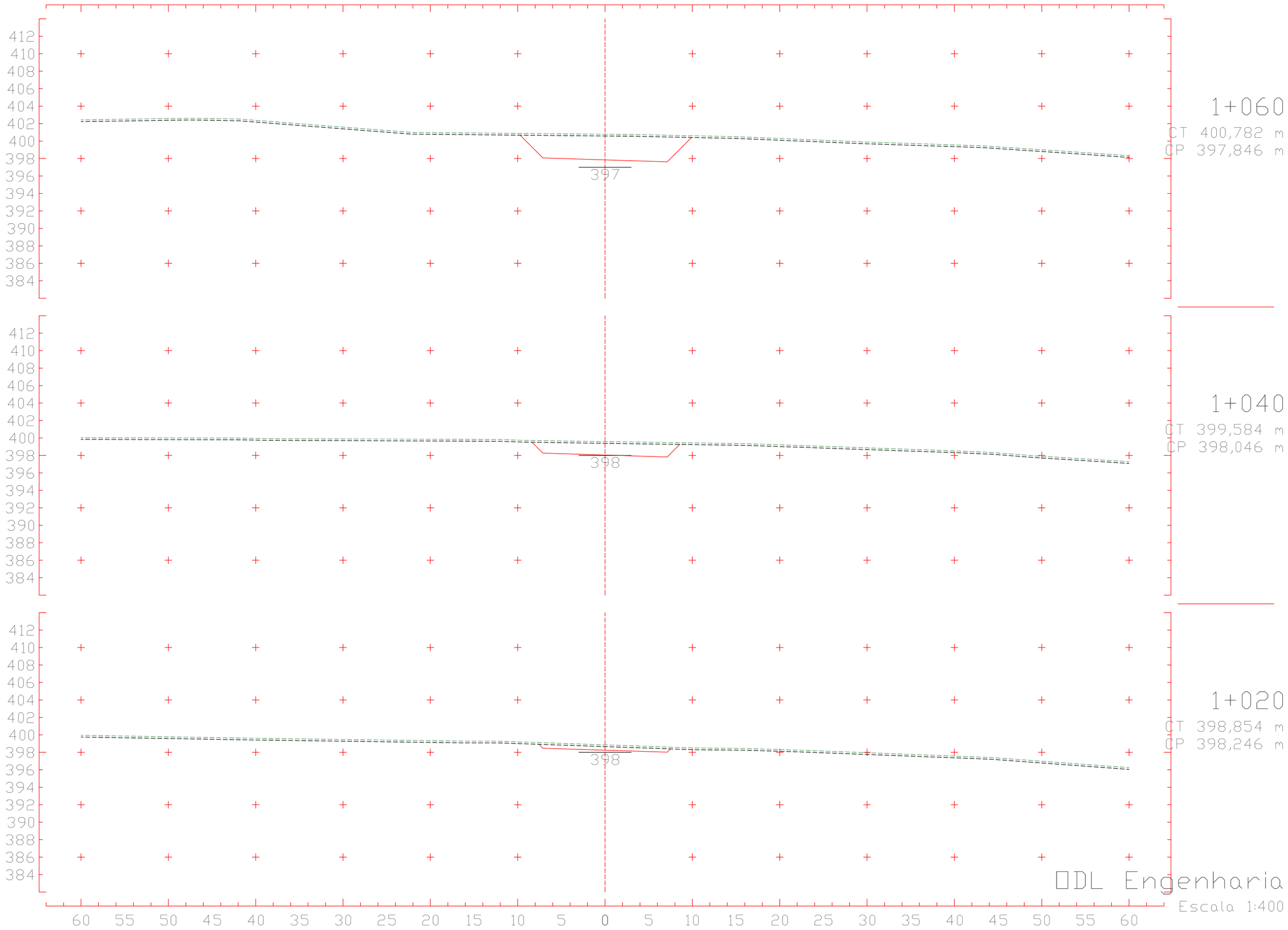
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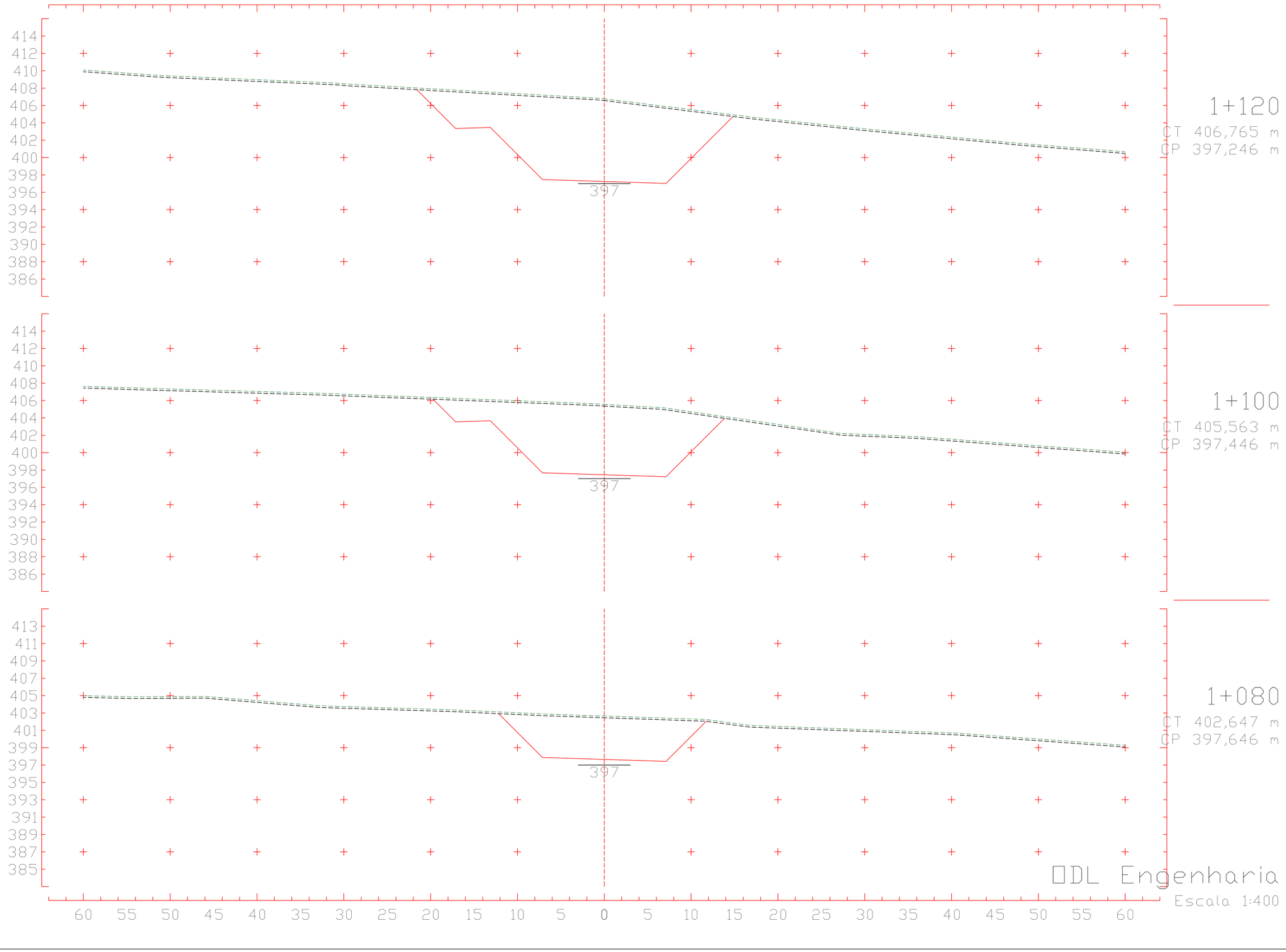
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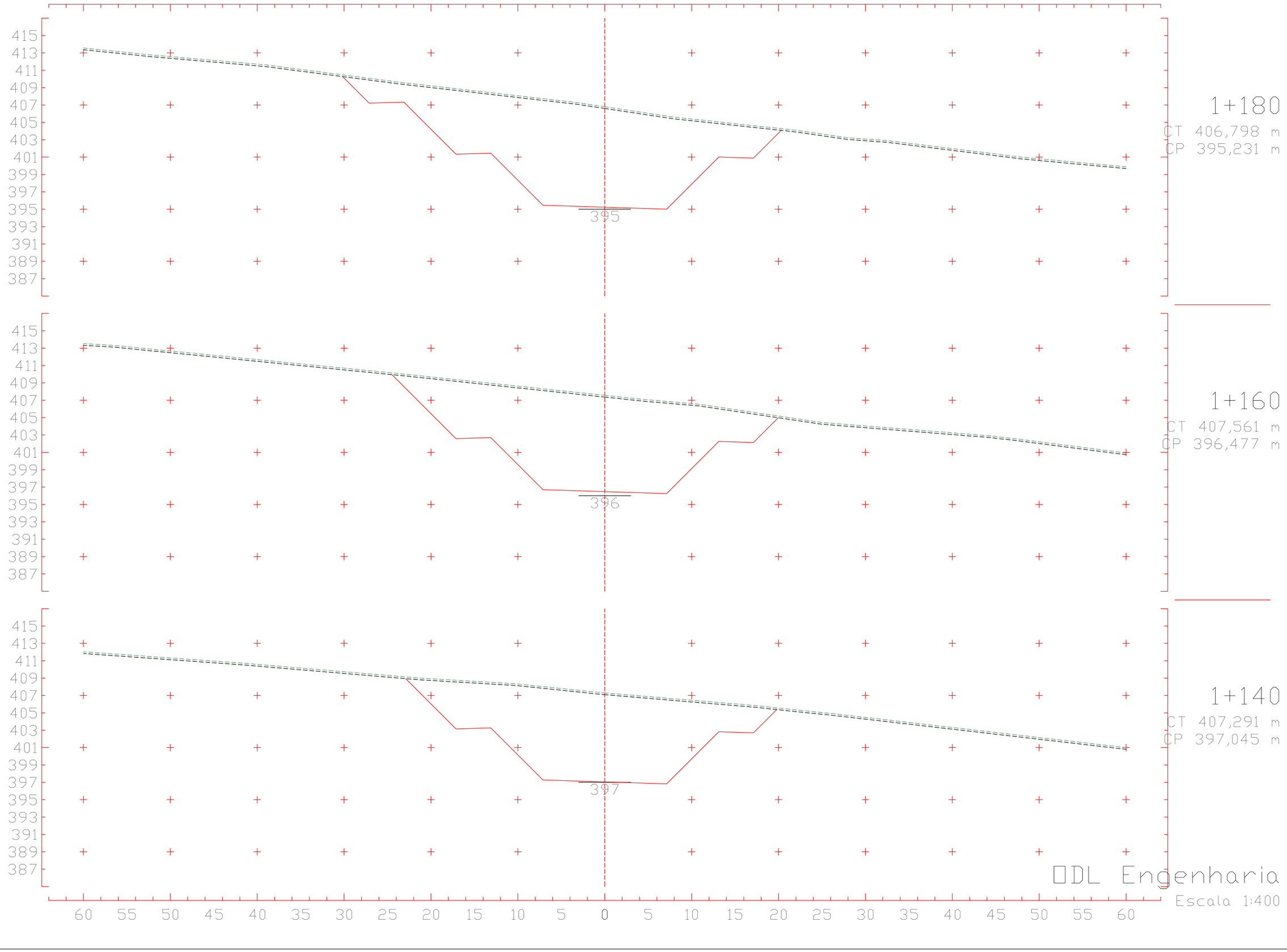


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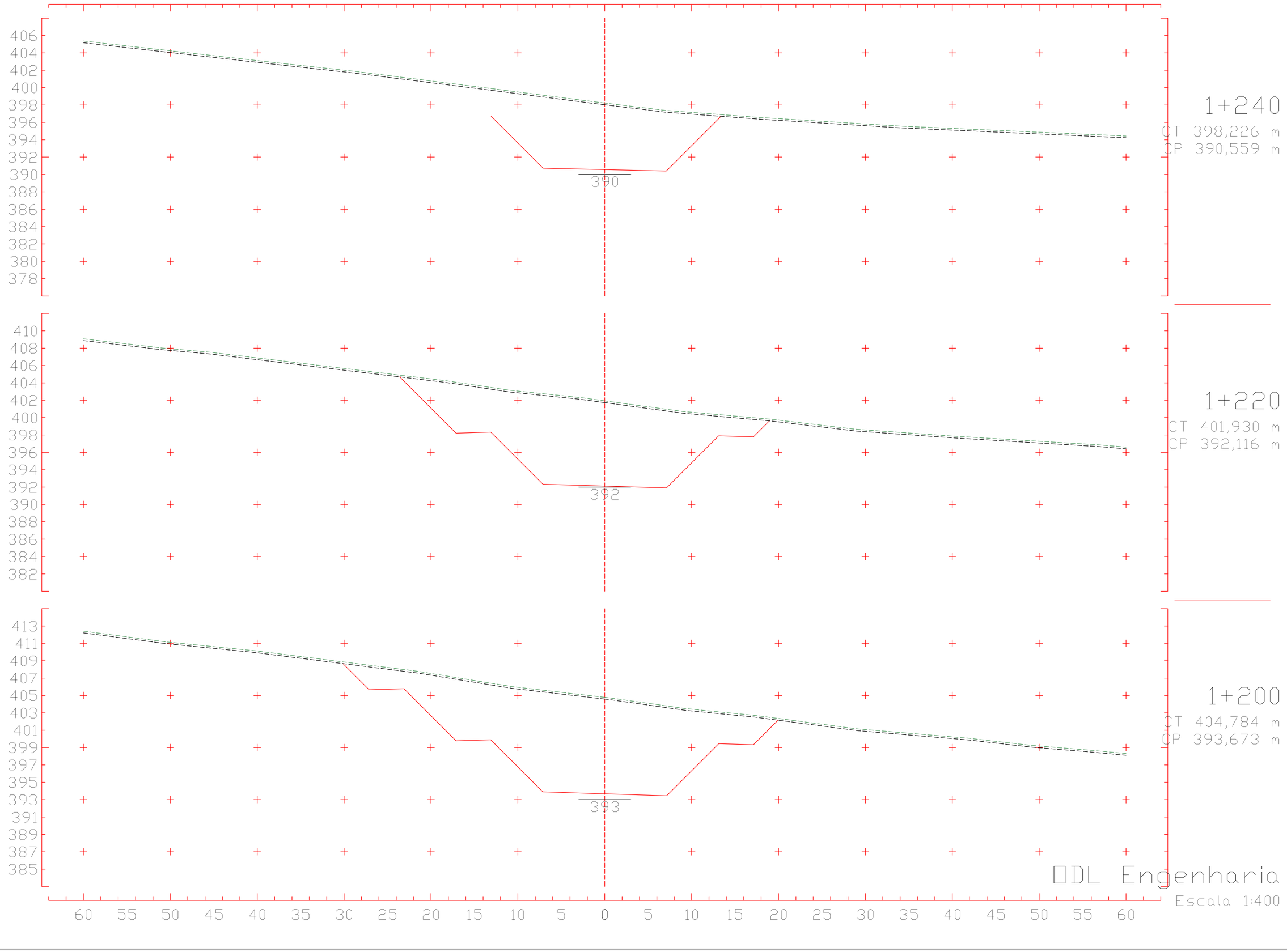


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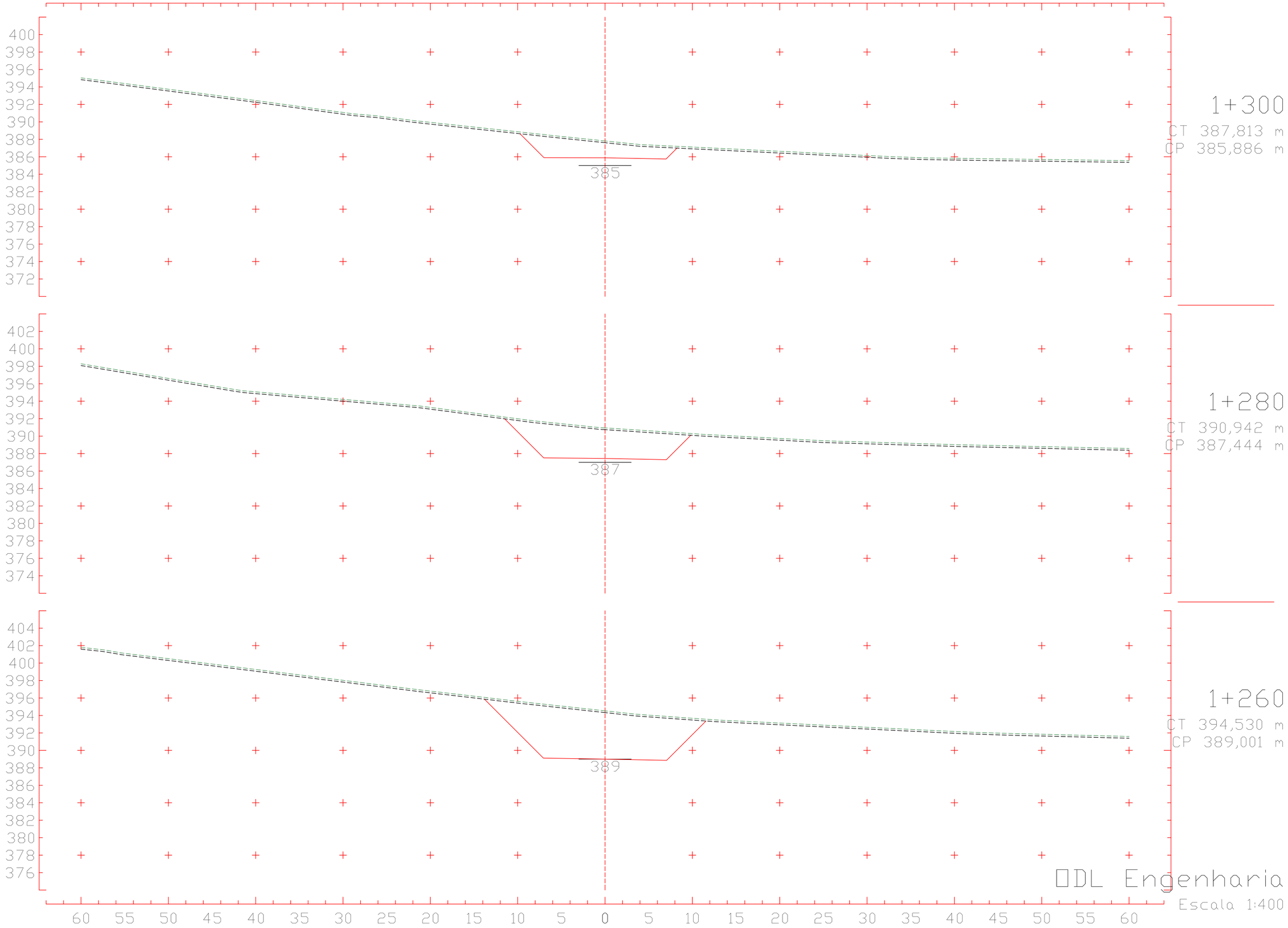



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DL Engenharia
Escala 1:400

Projeto Ponto de Partida 2021/1



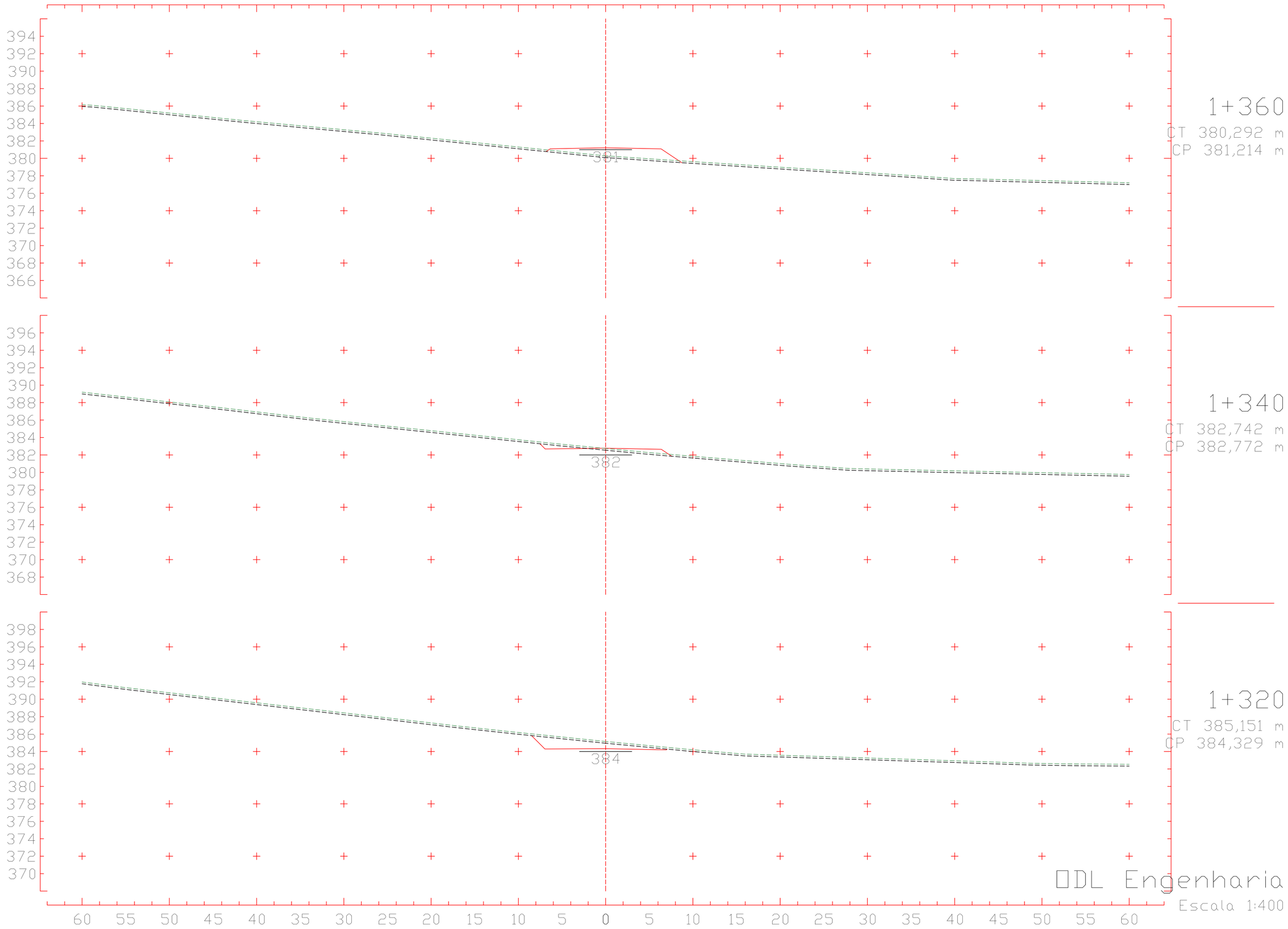
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ODL Engenharia

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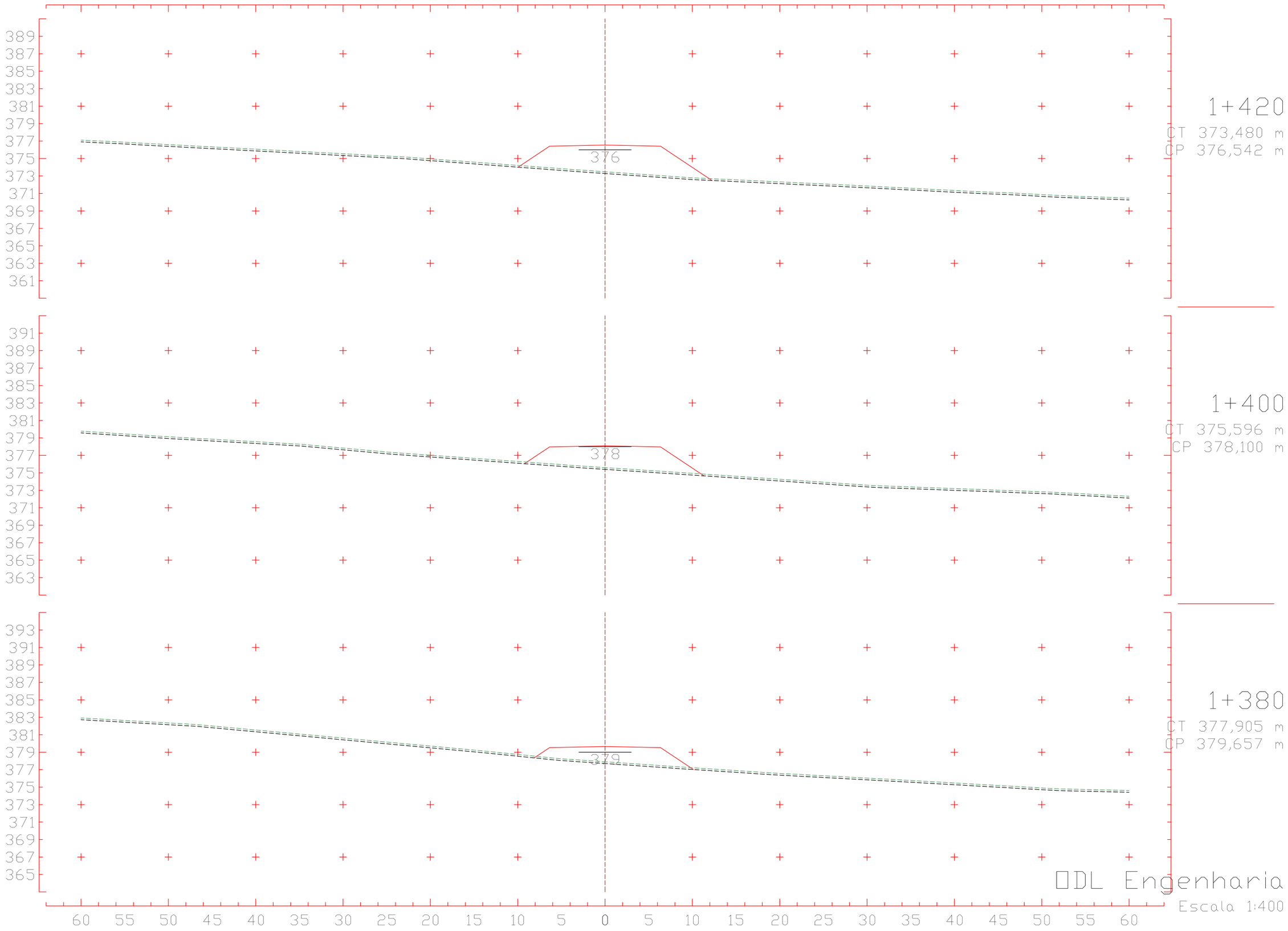
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DL Engenharia

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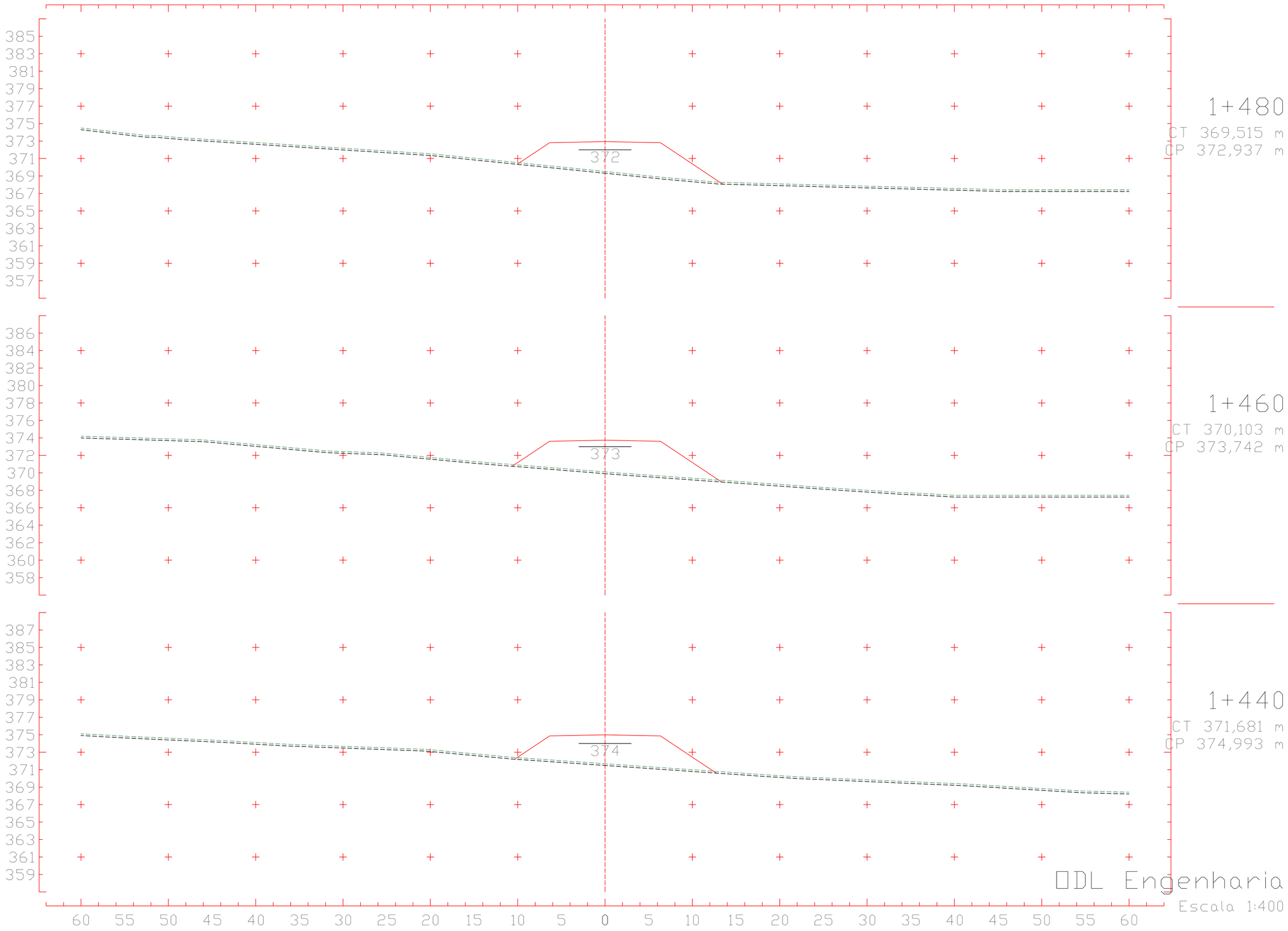
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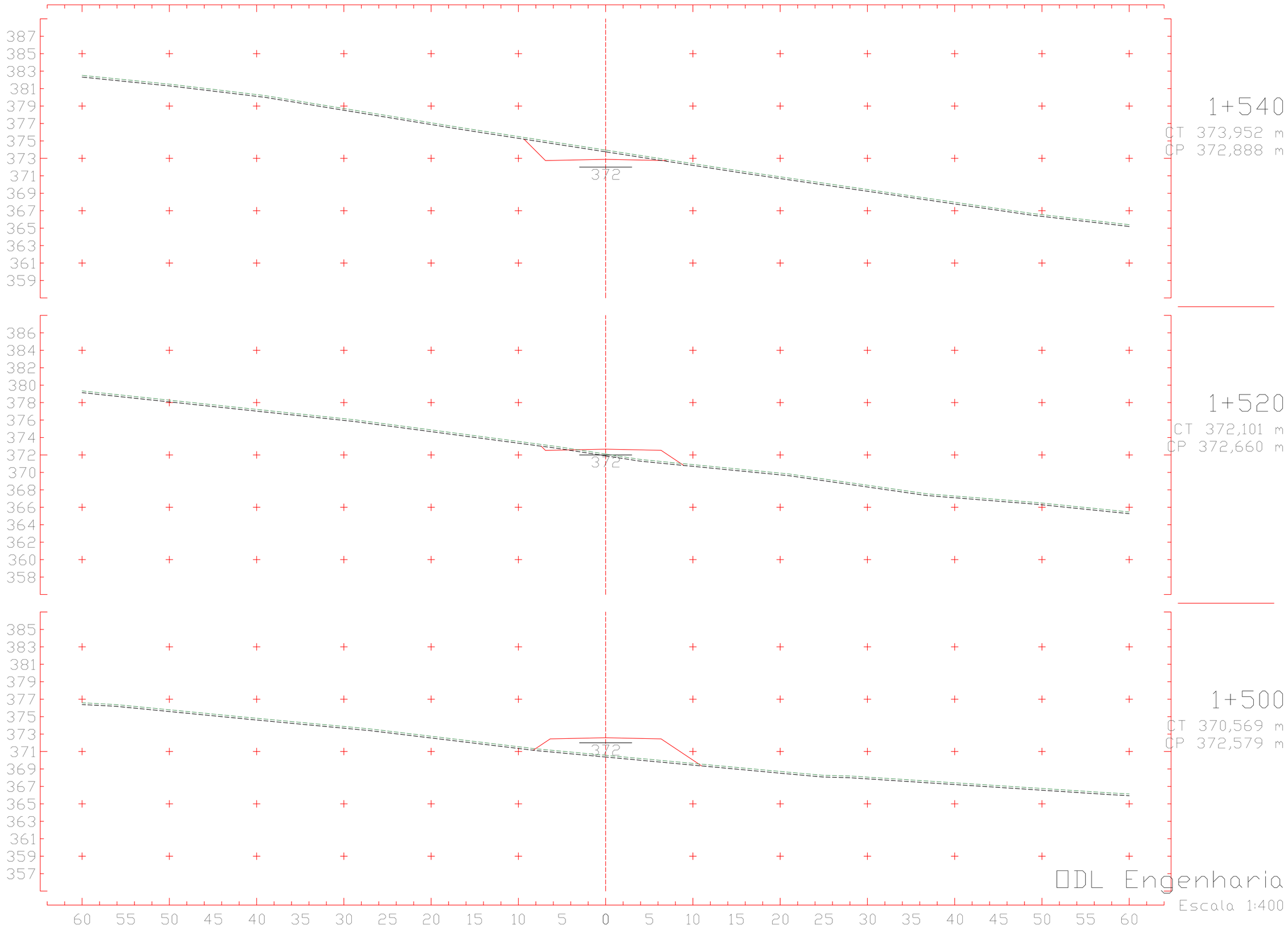
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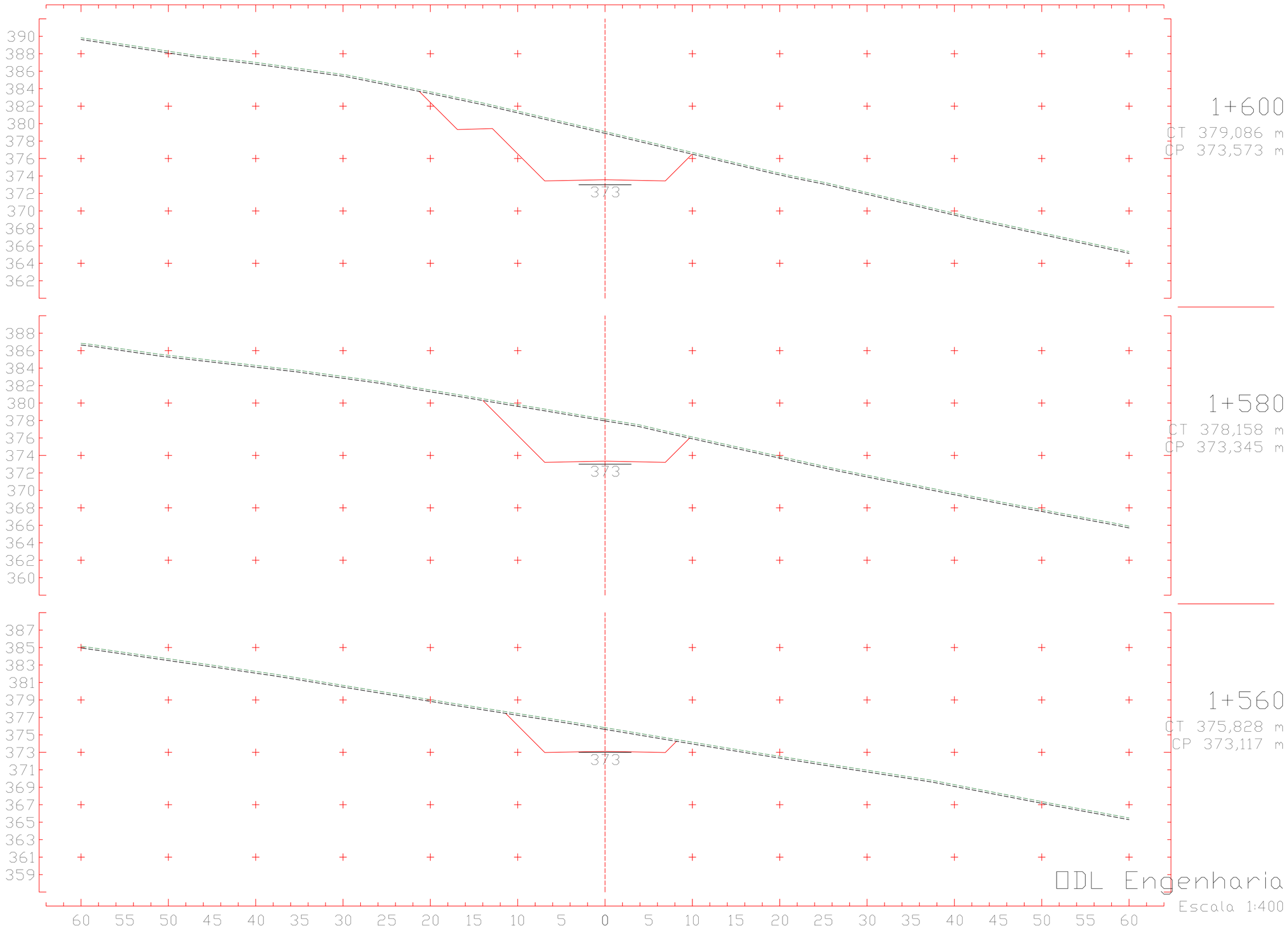
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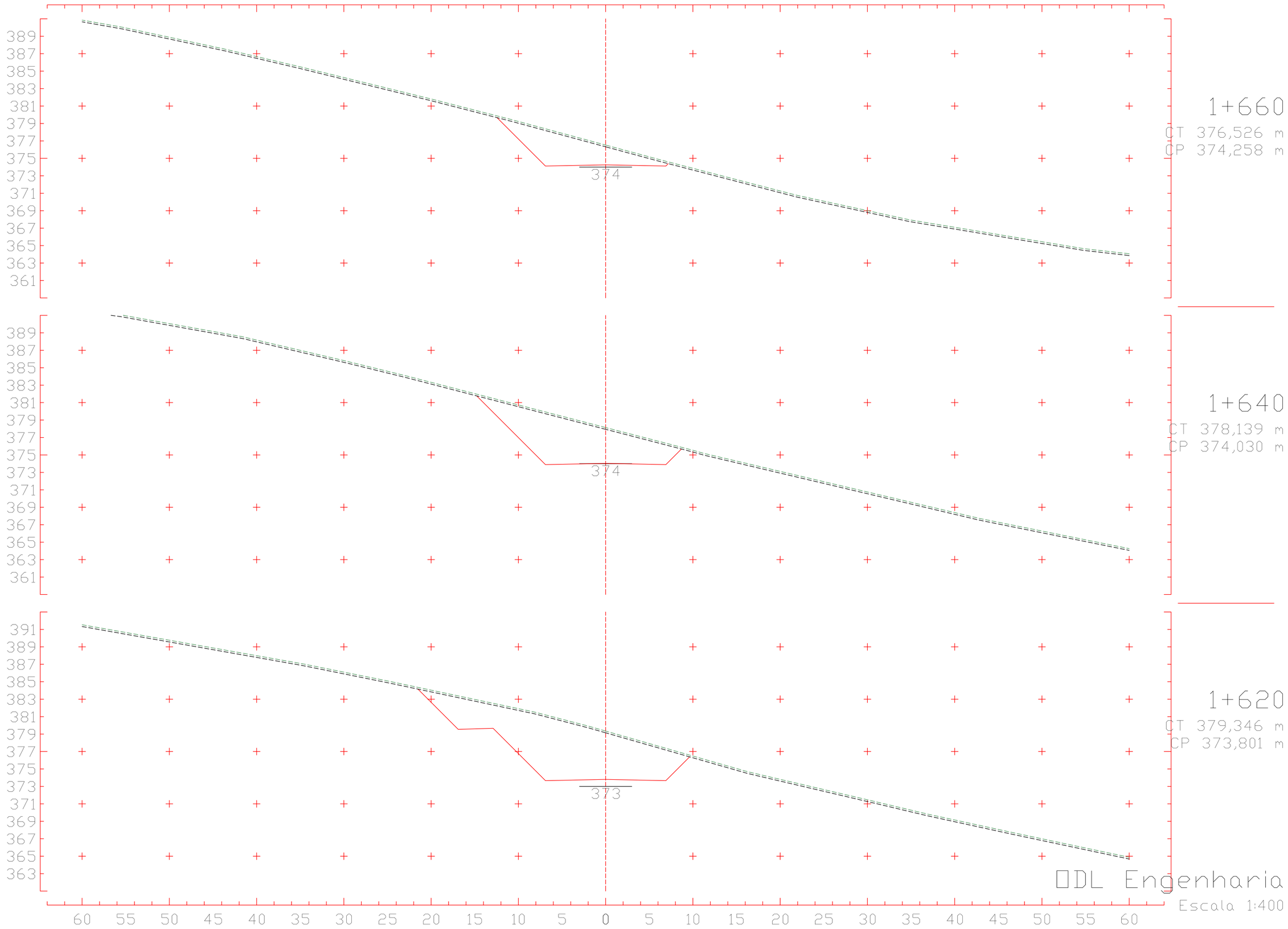
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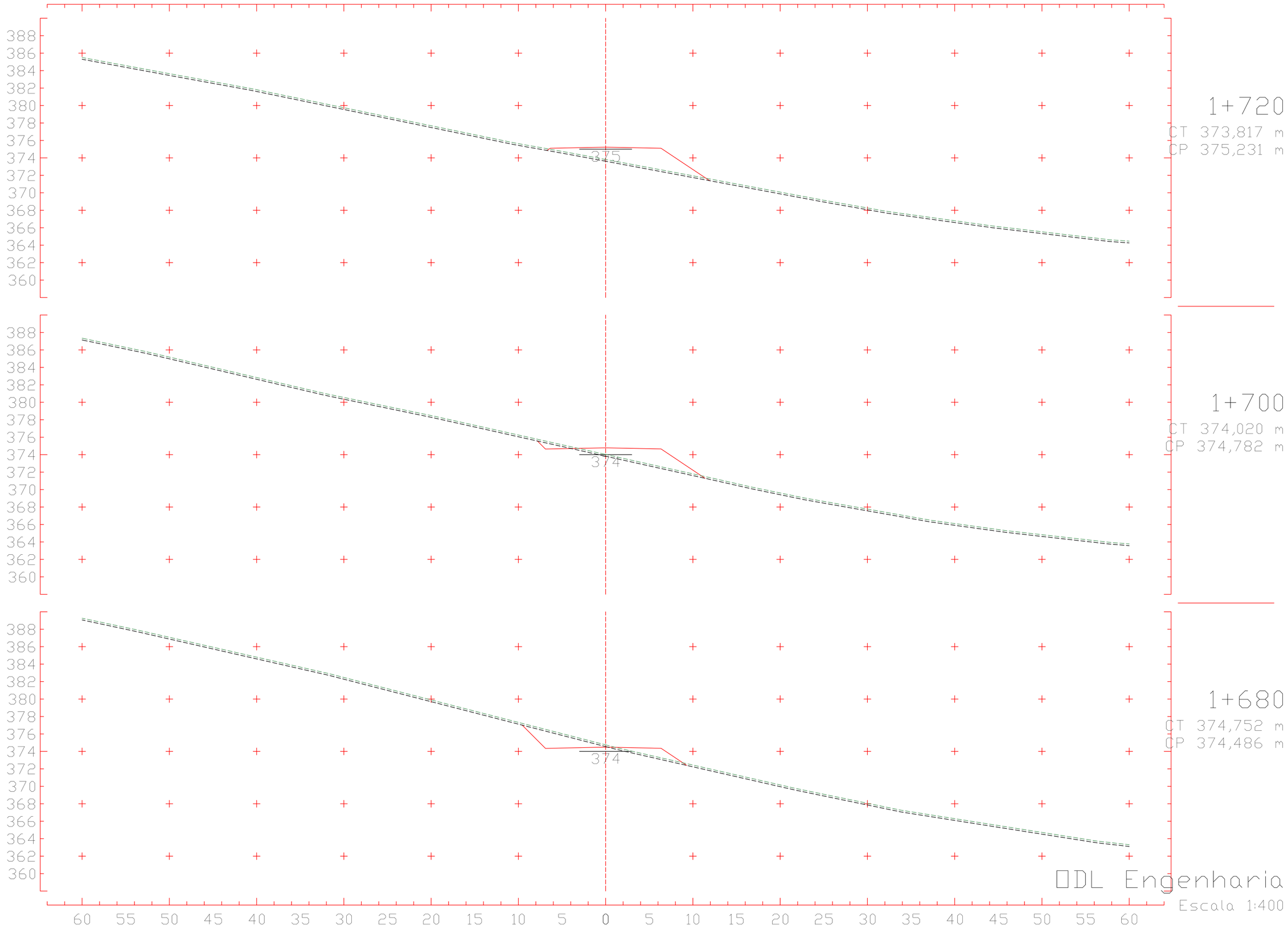
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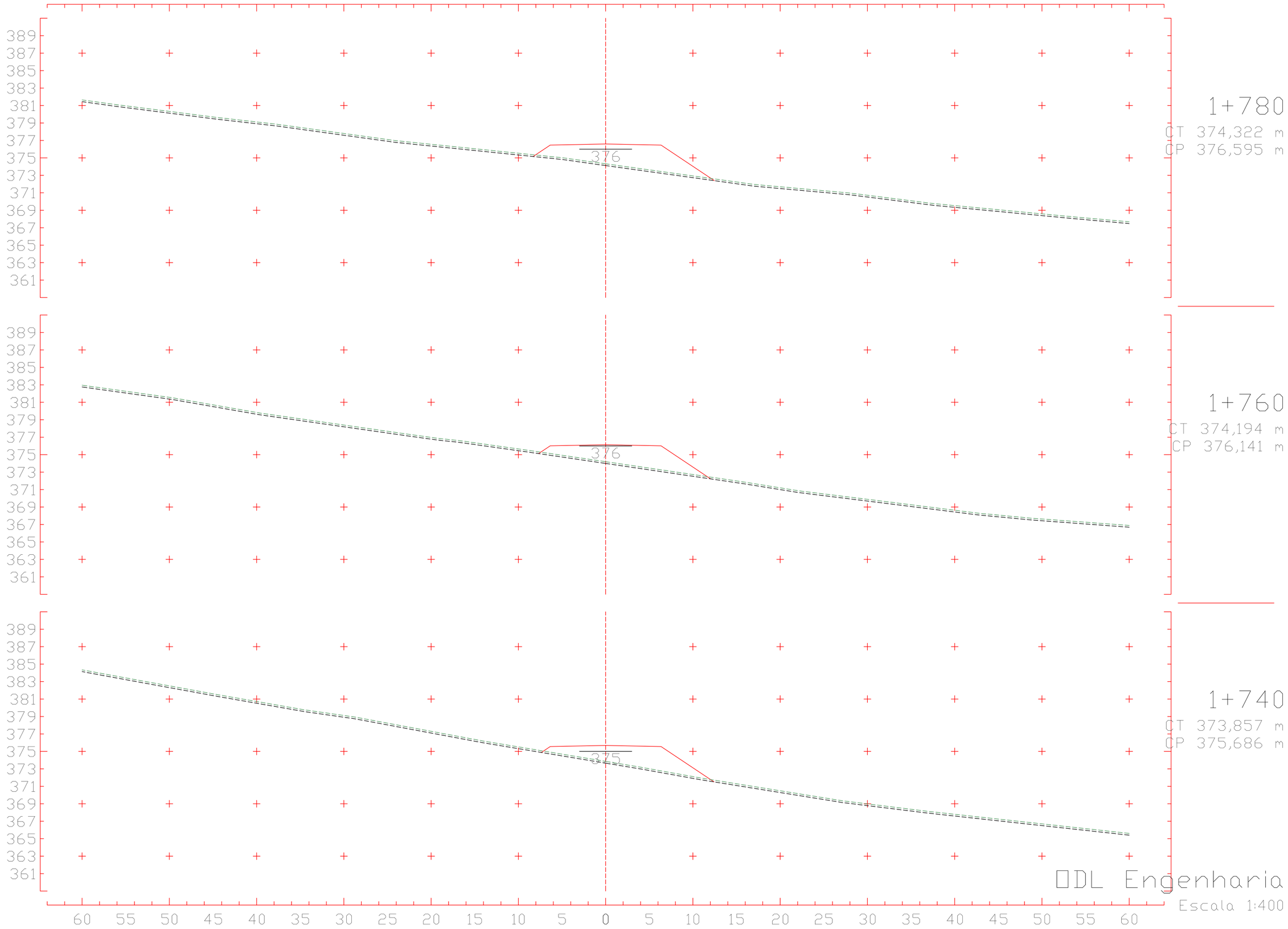
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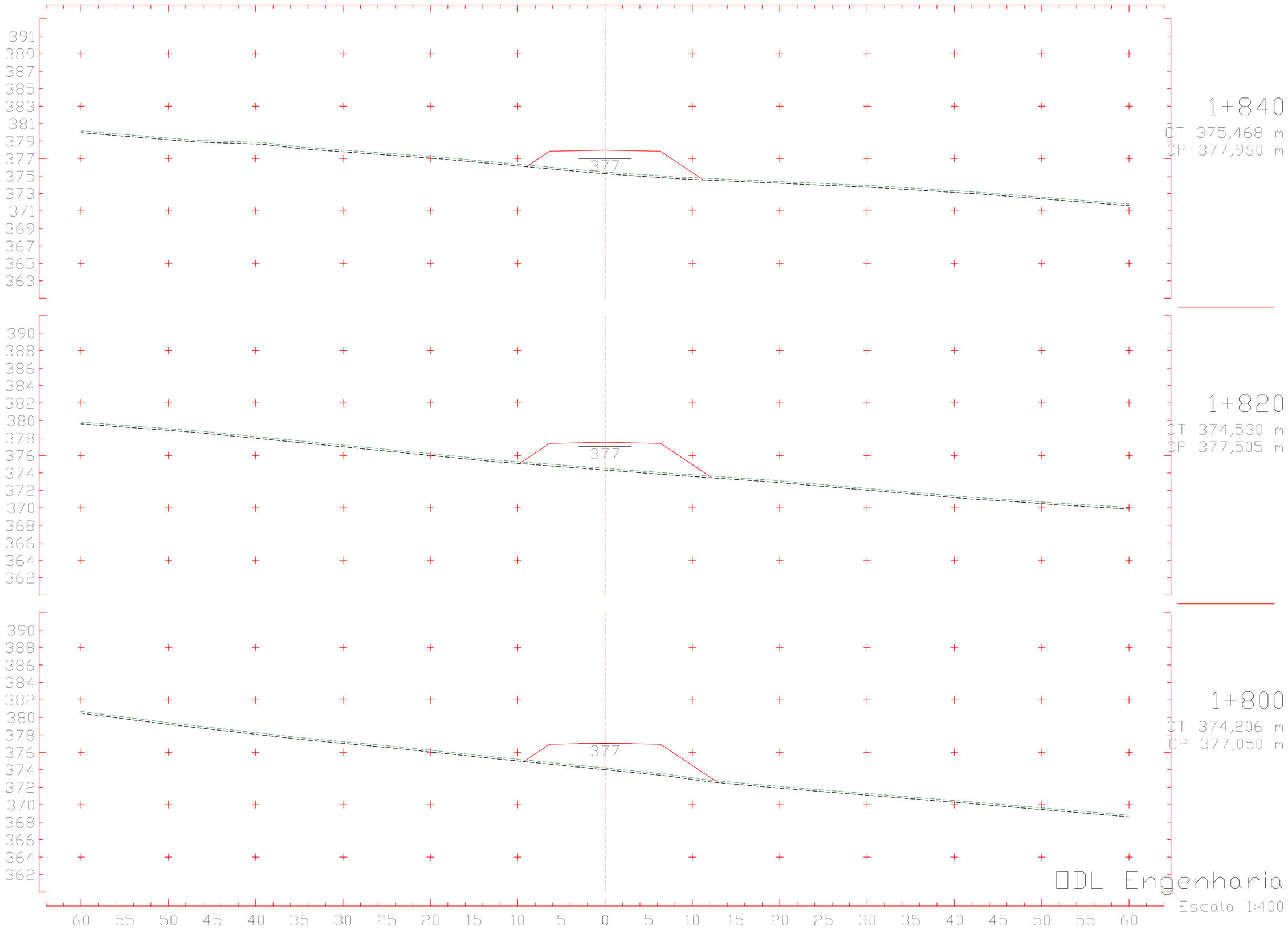
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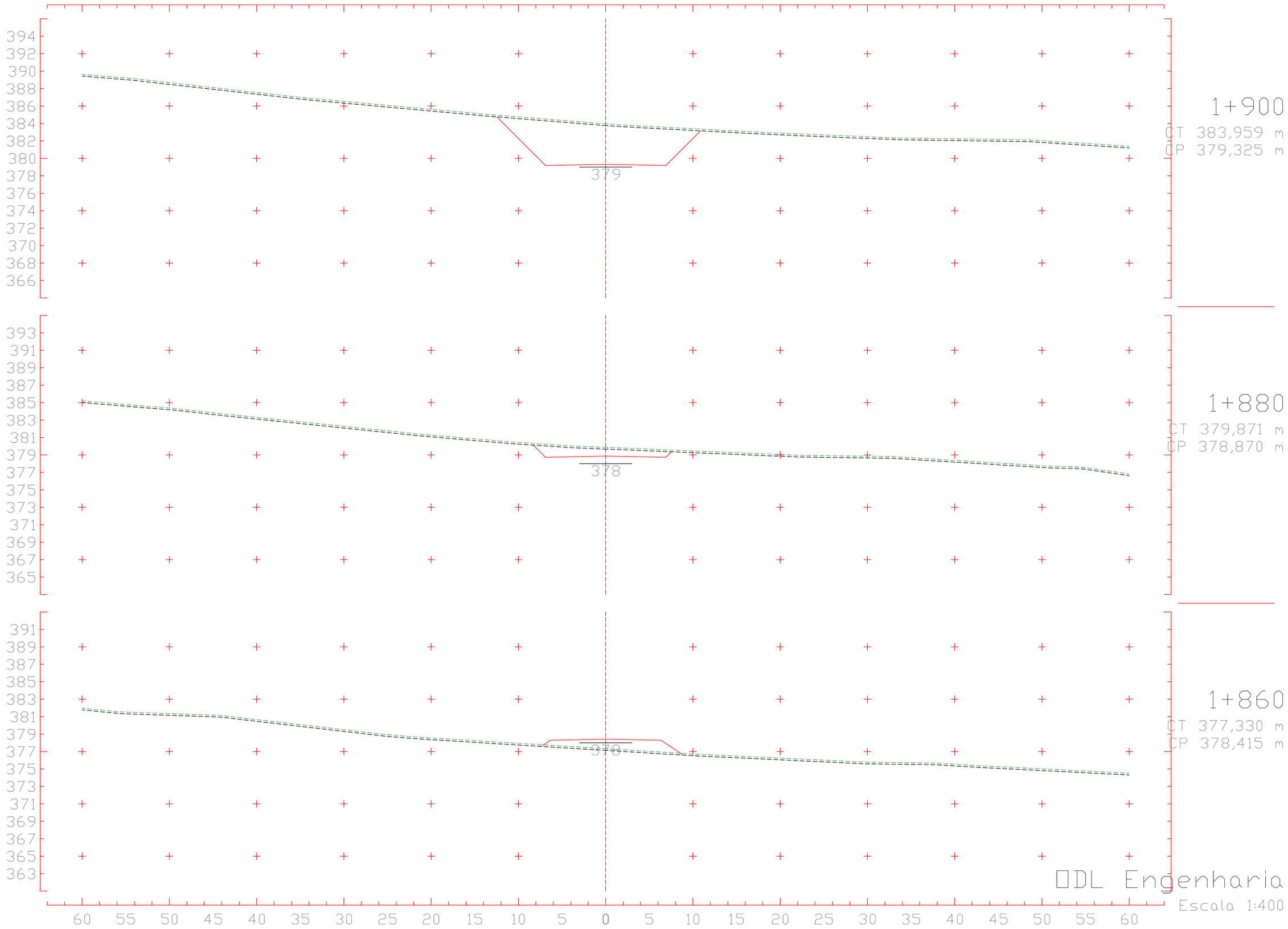
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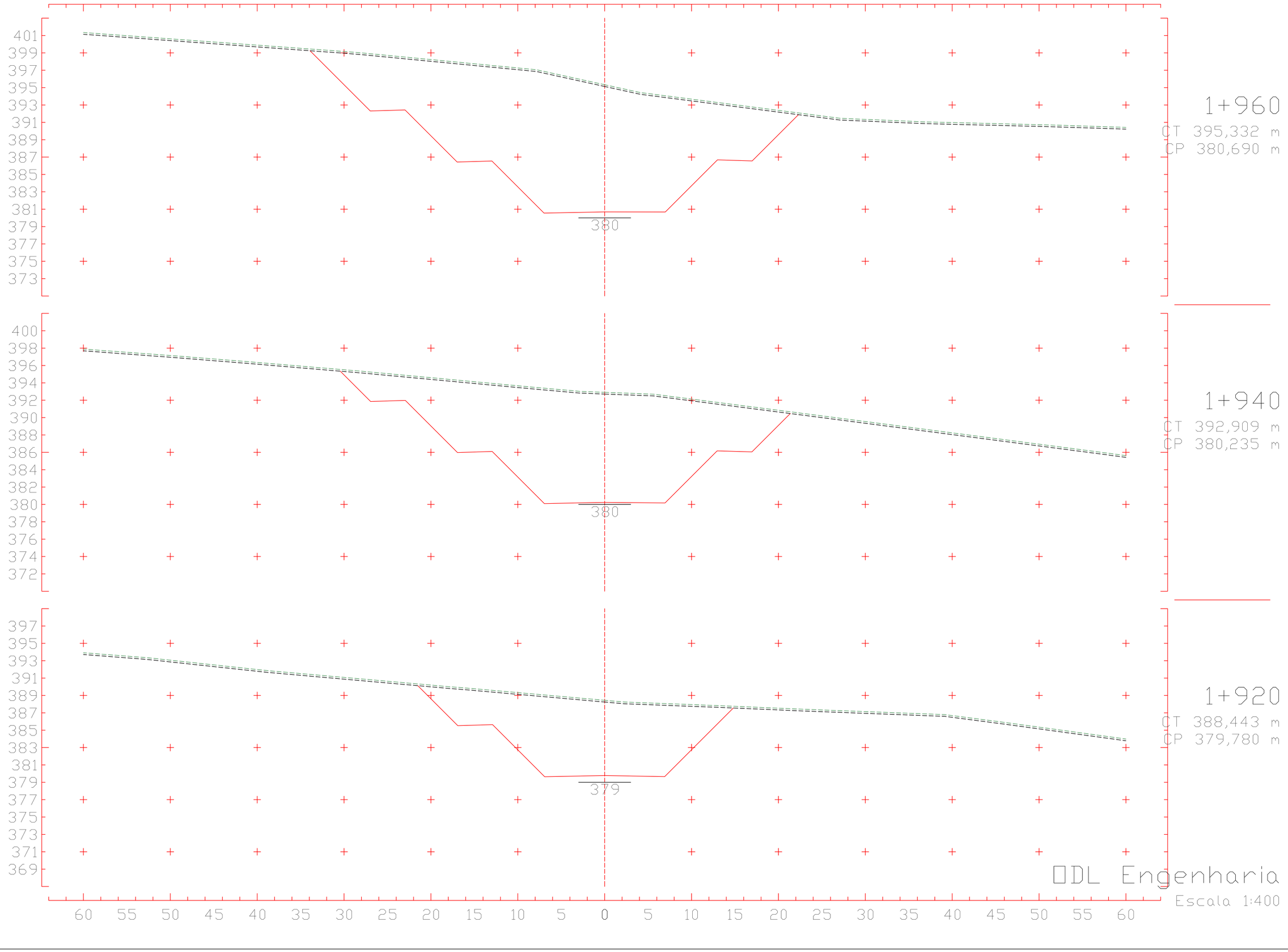
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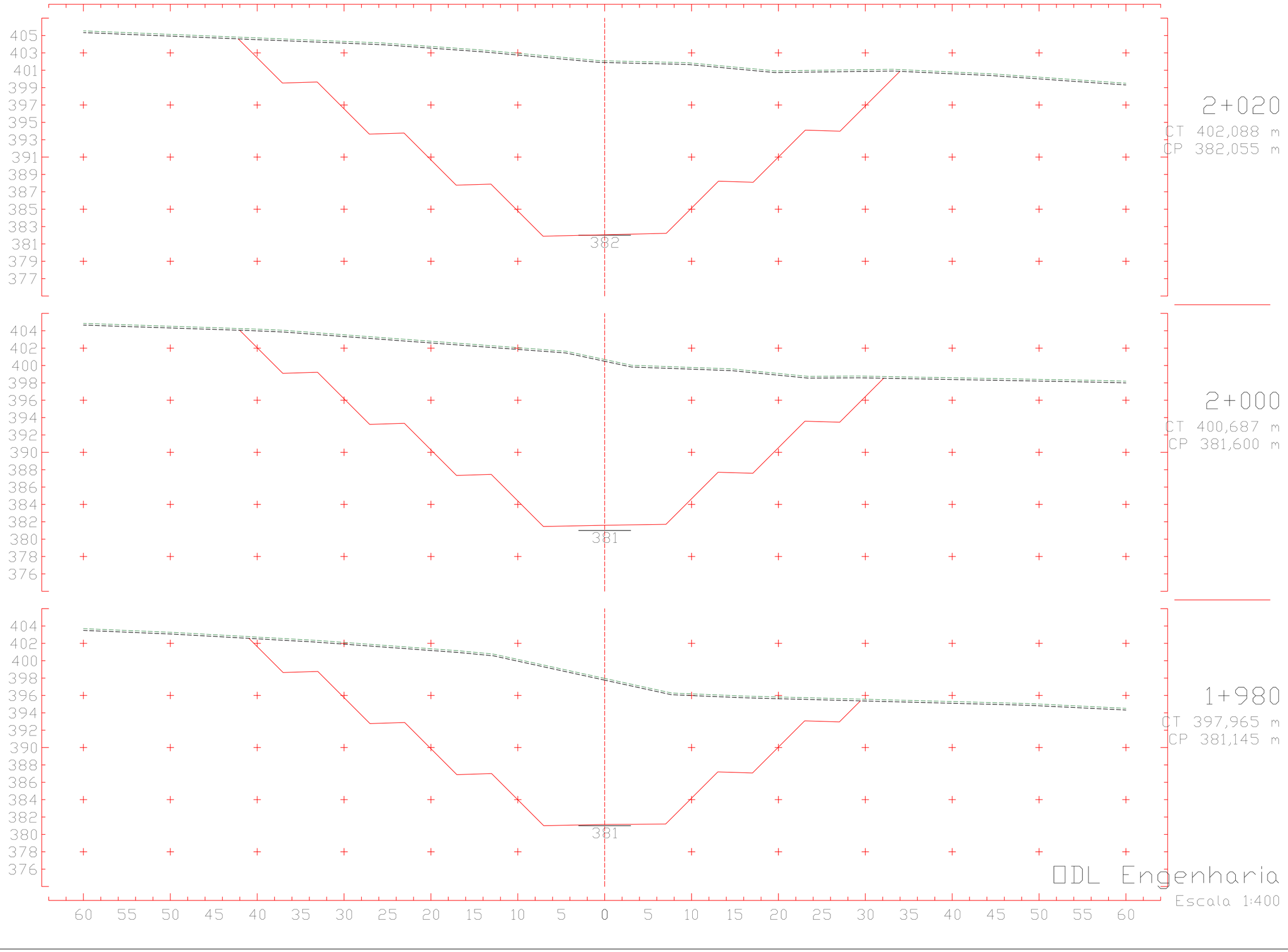
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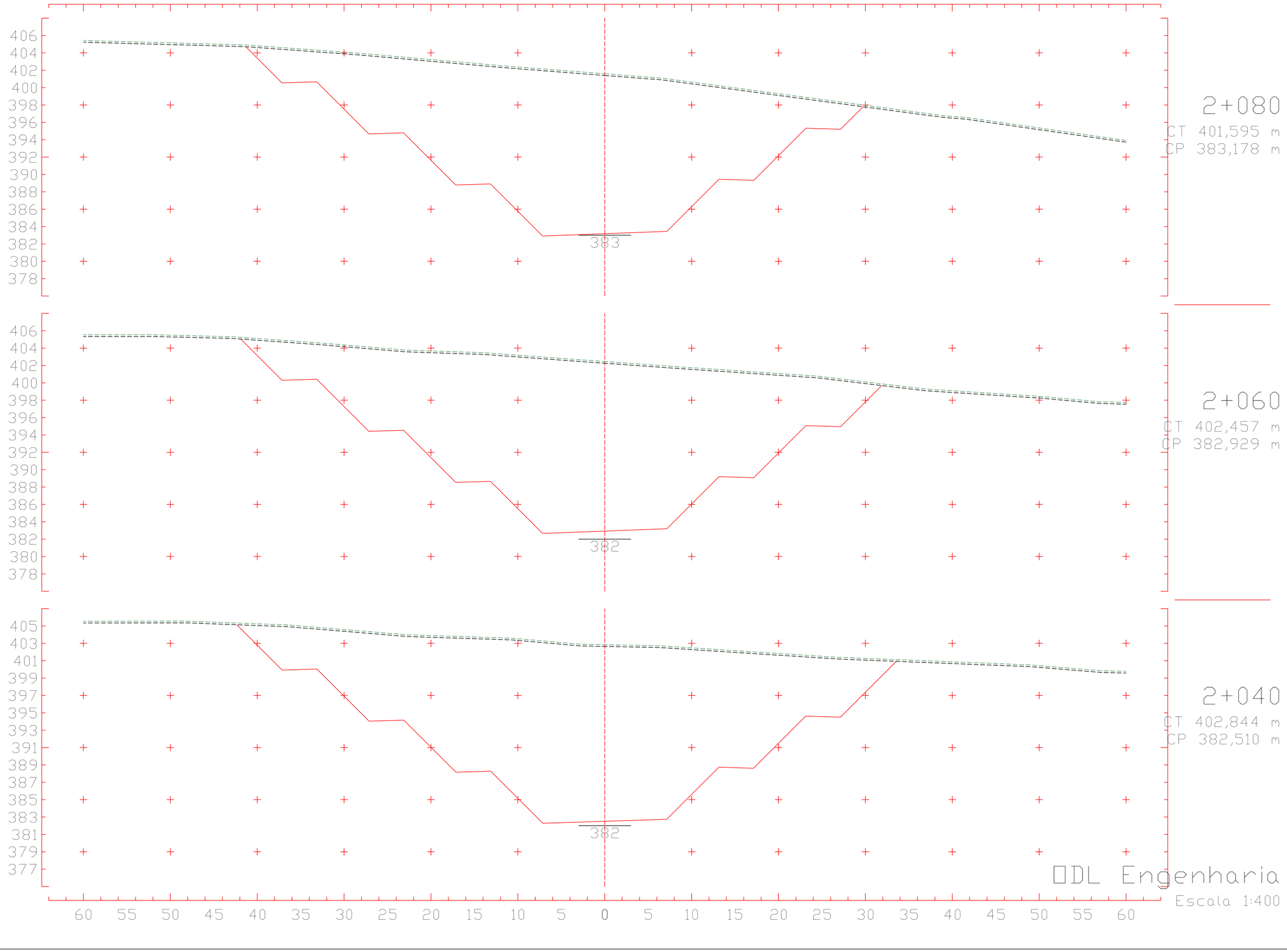
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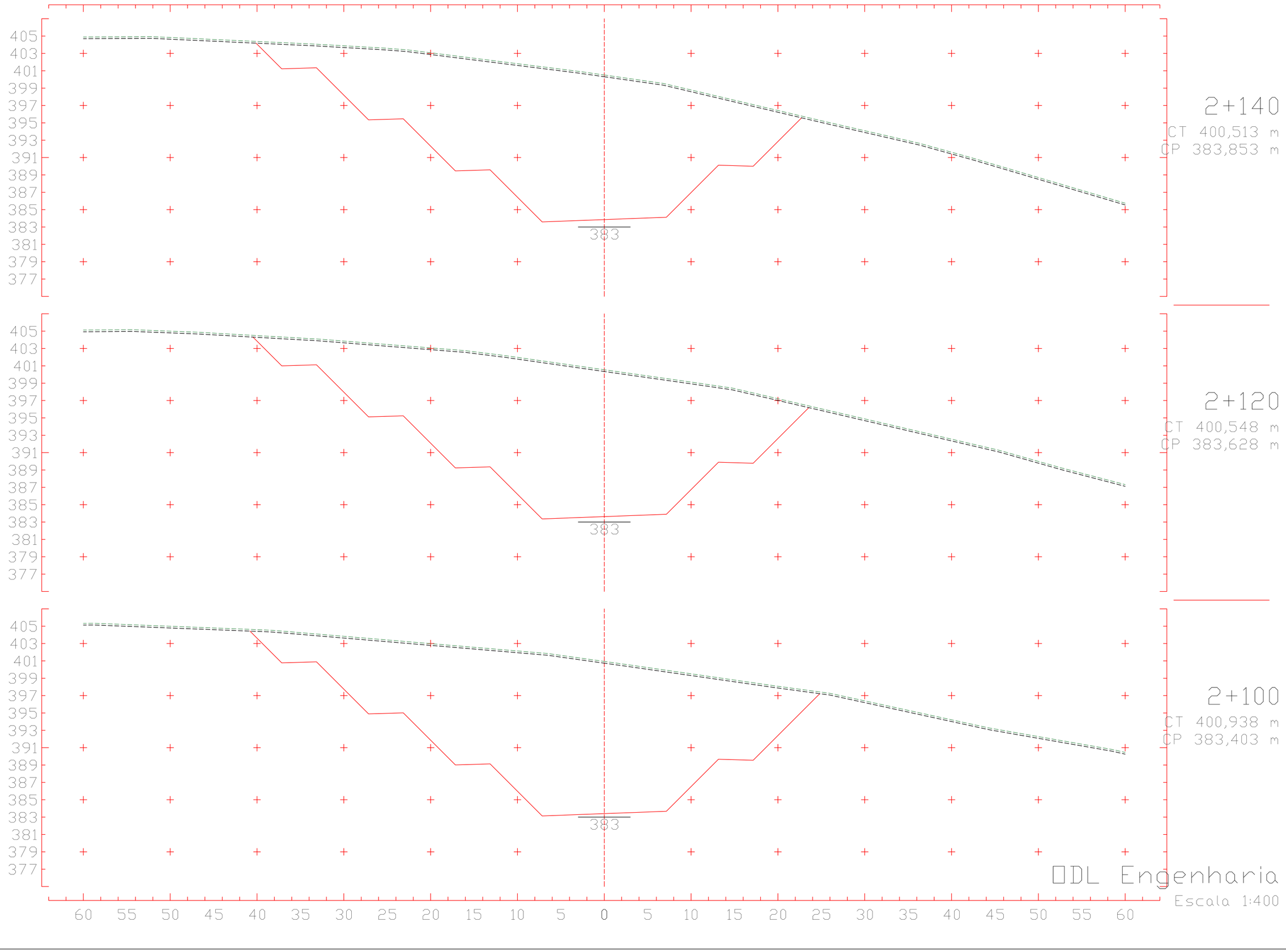
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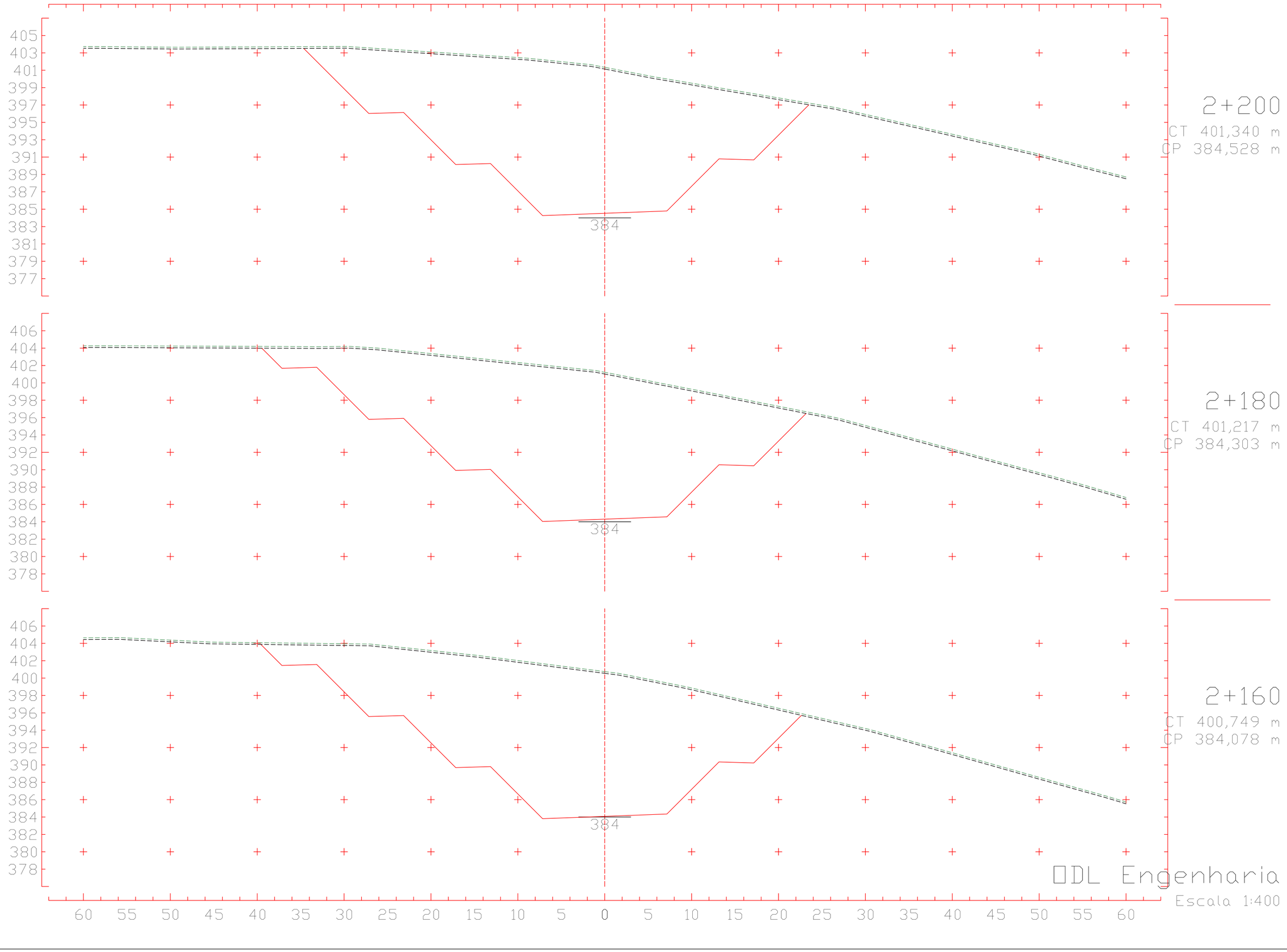
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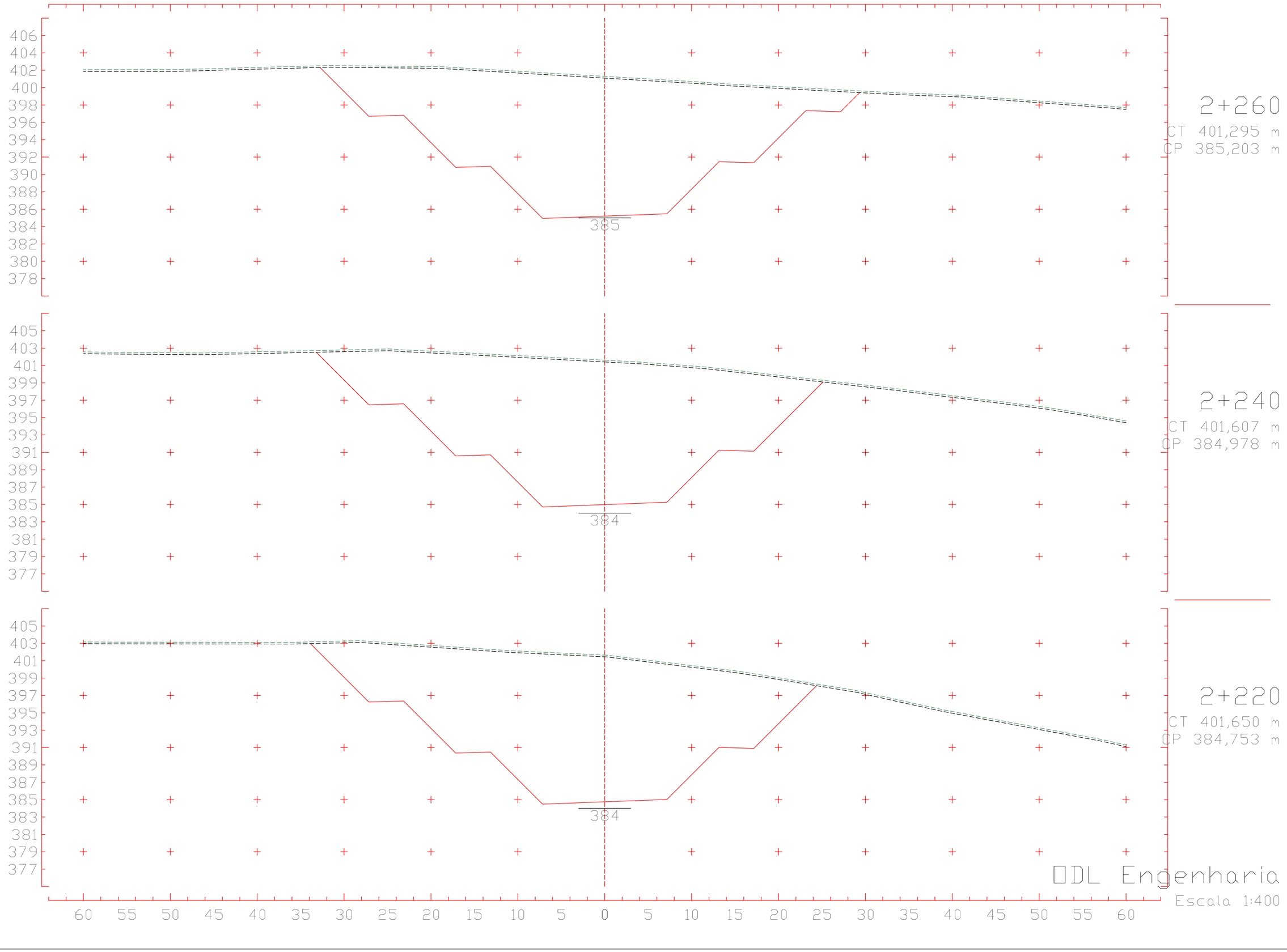


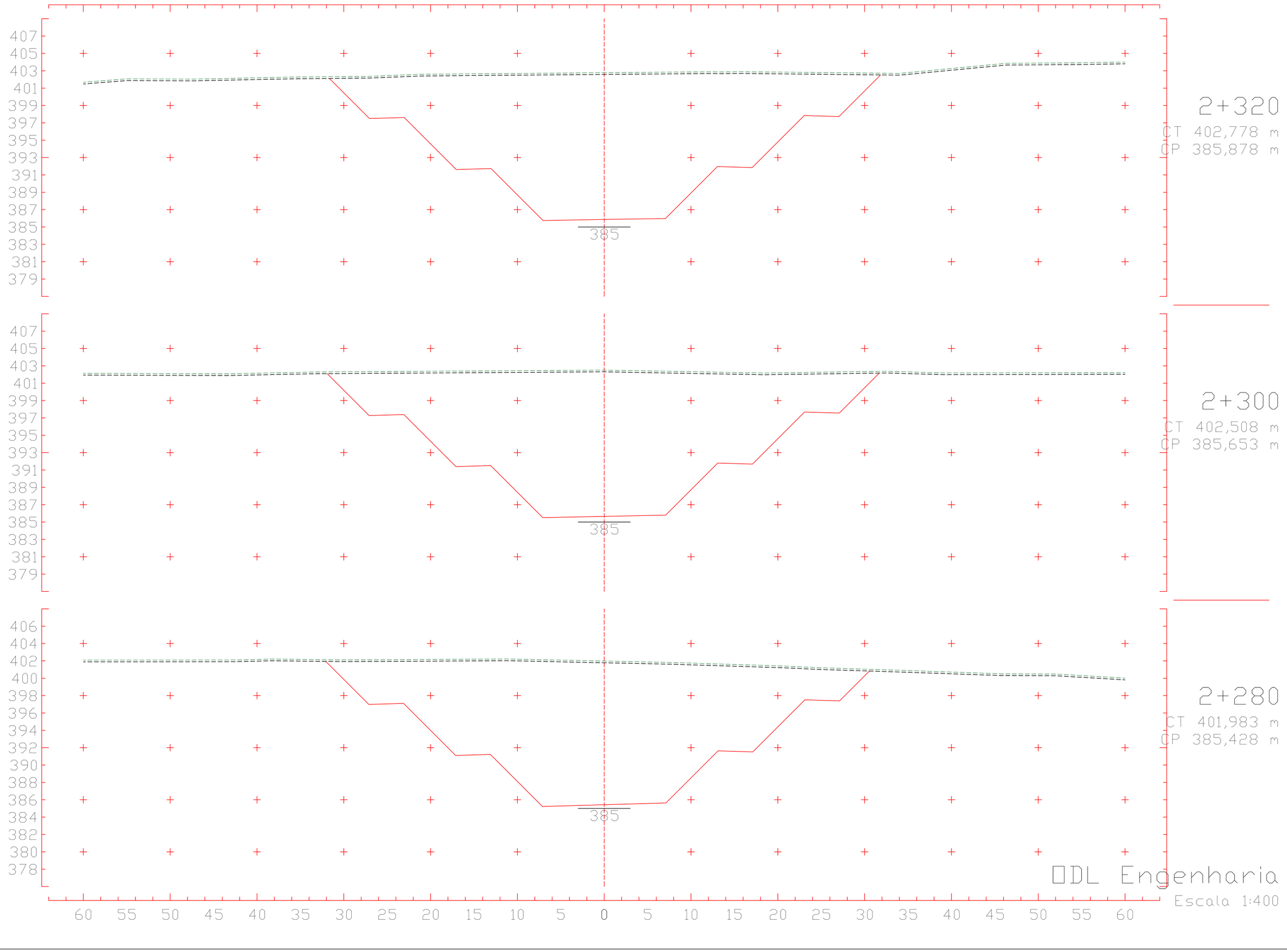
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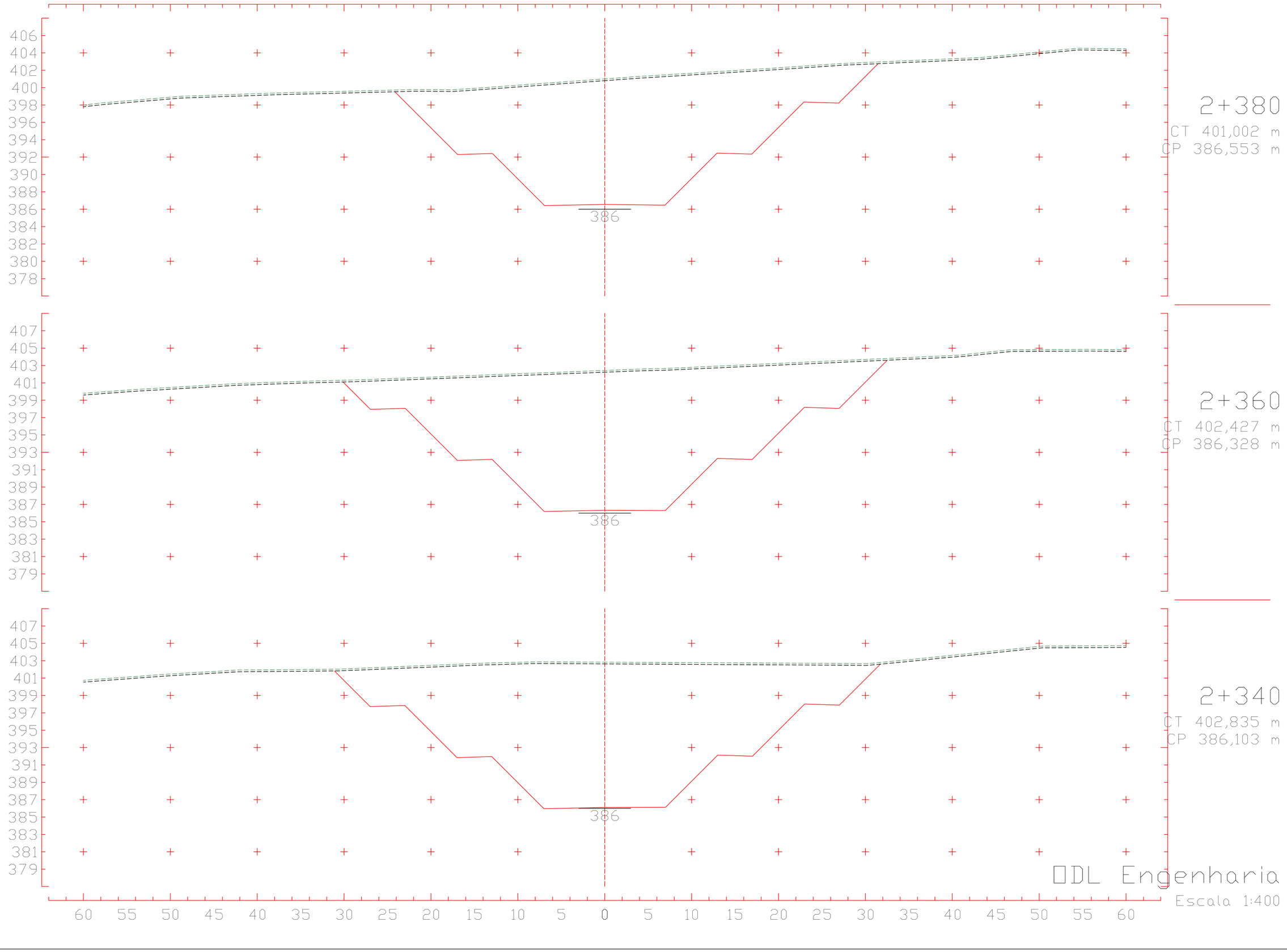
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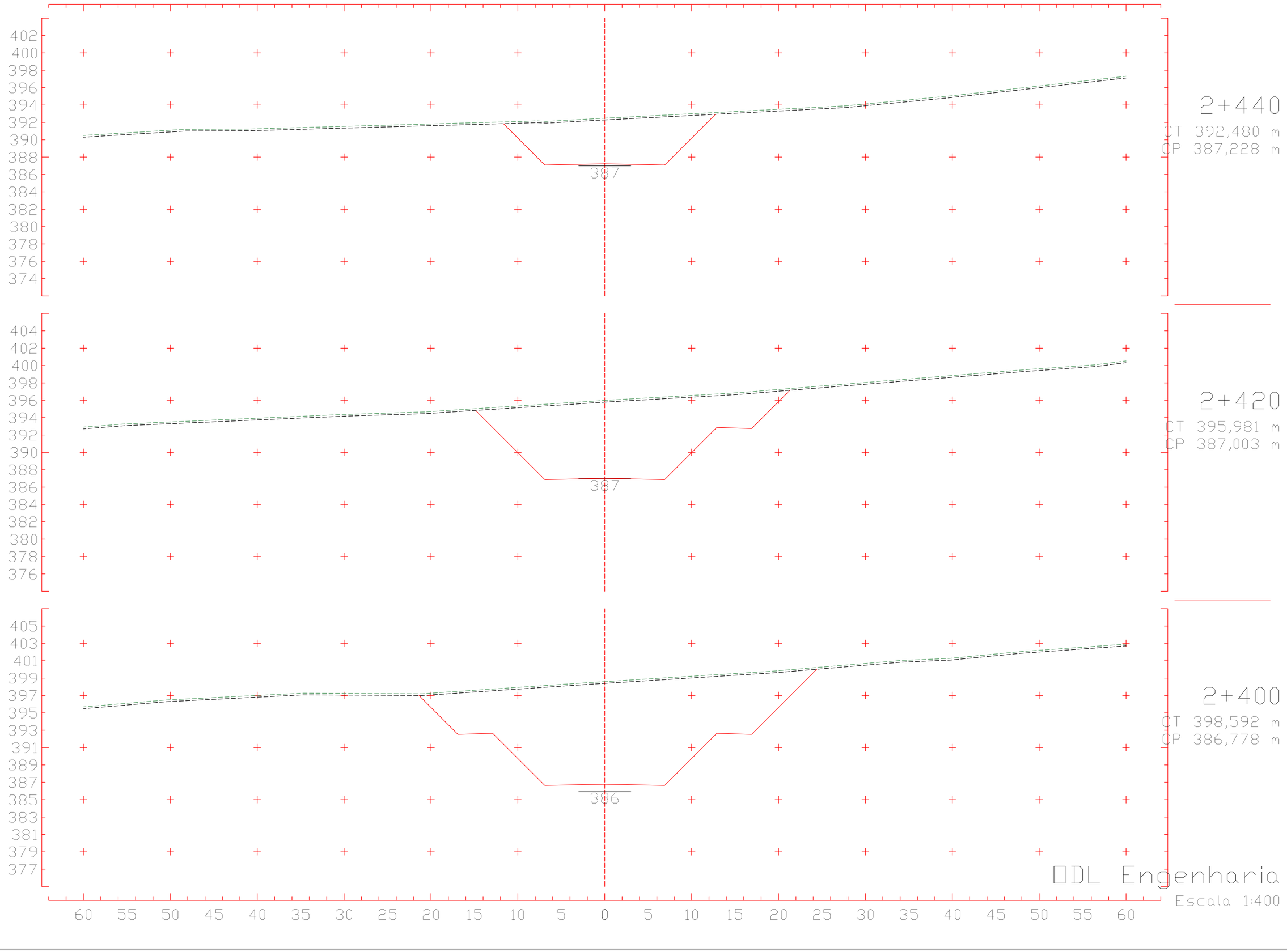

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CP 384,753 m
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DL Engenharia
Escala 1:400


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CT 402,508 m
CP 385,653 m
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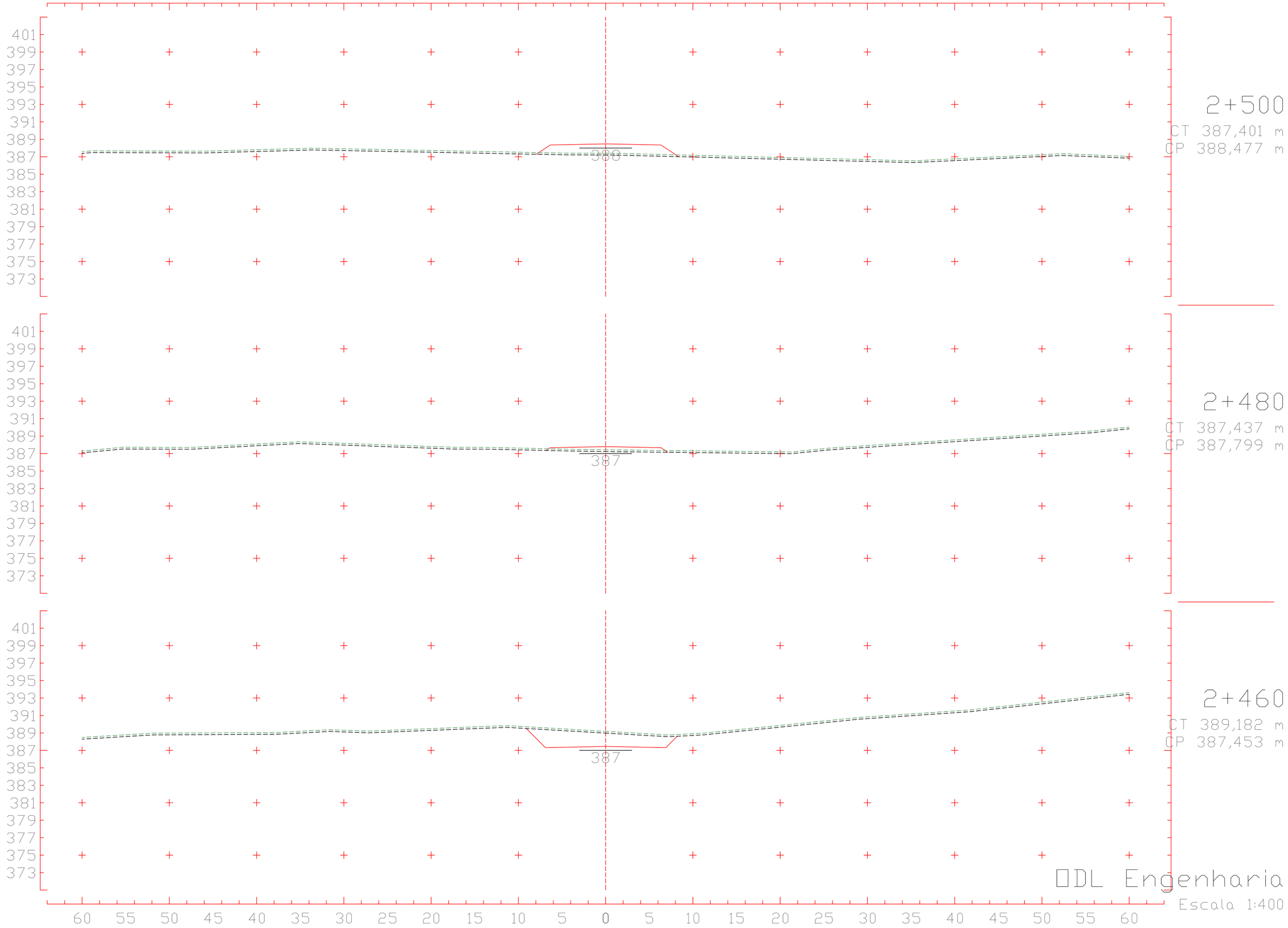
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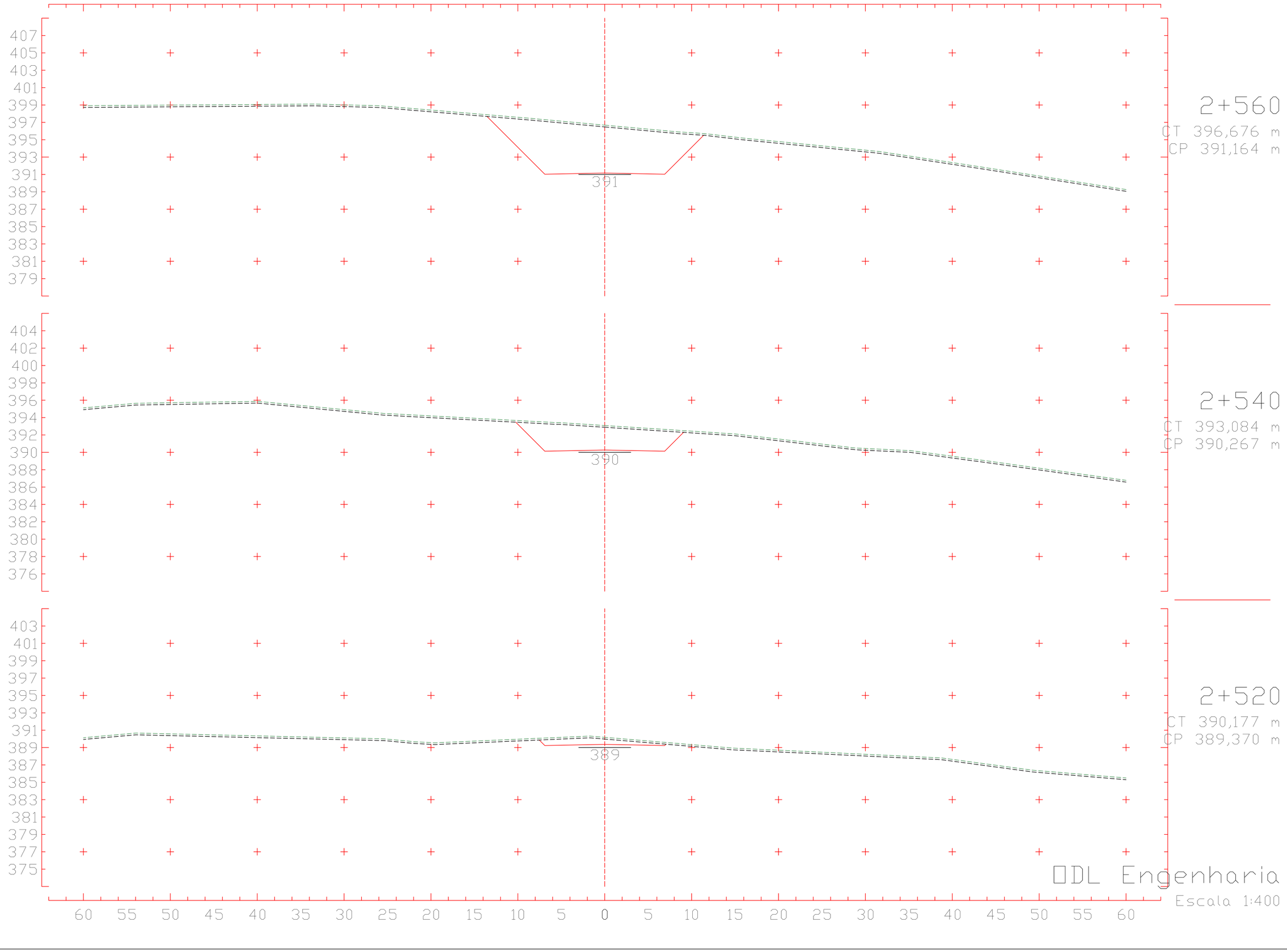
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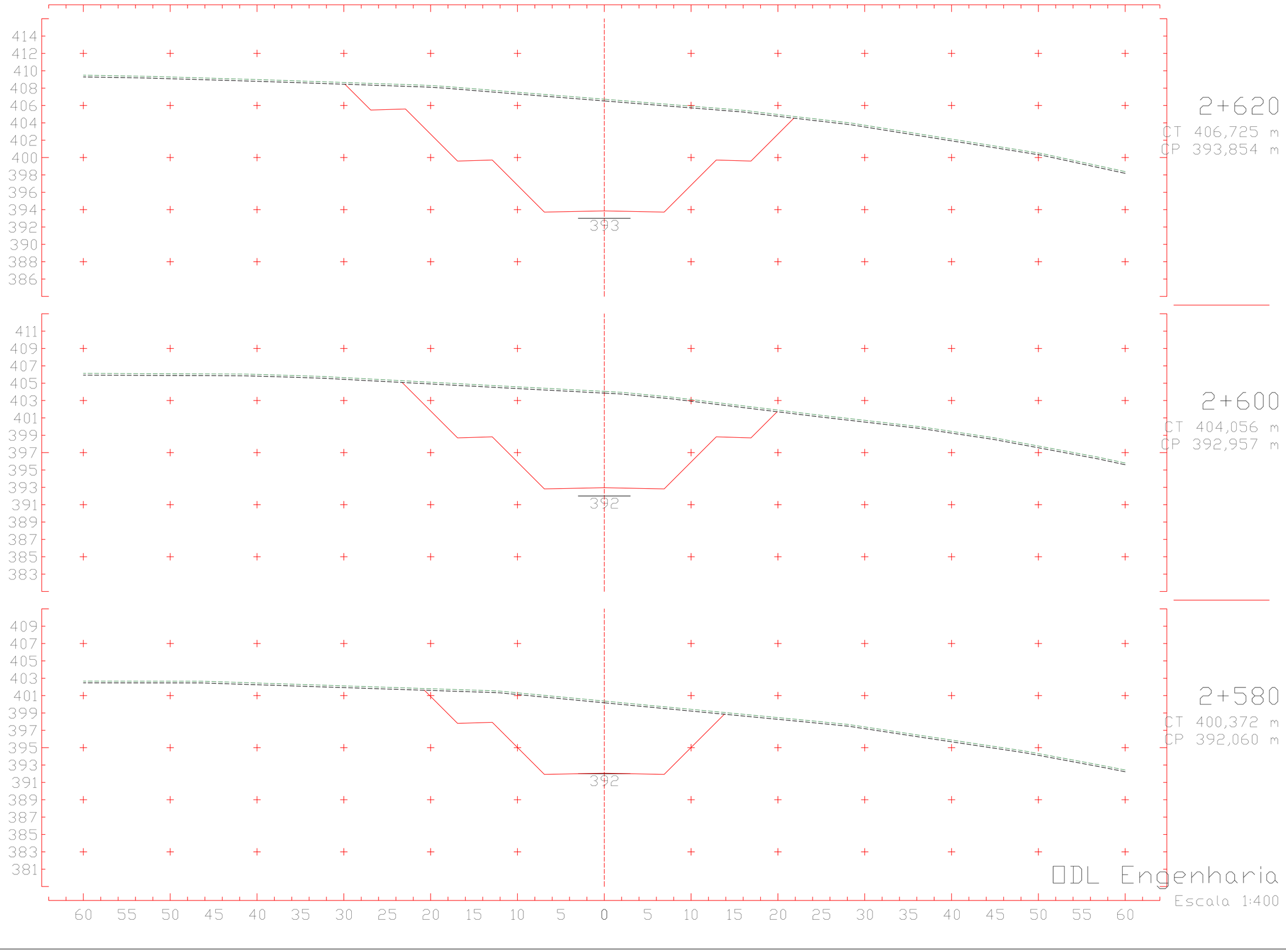
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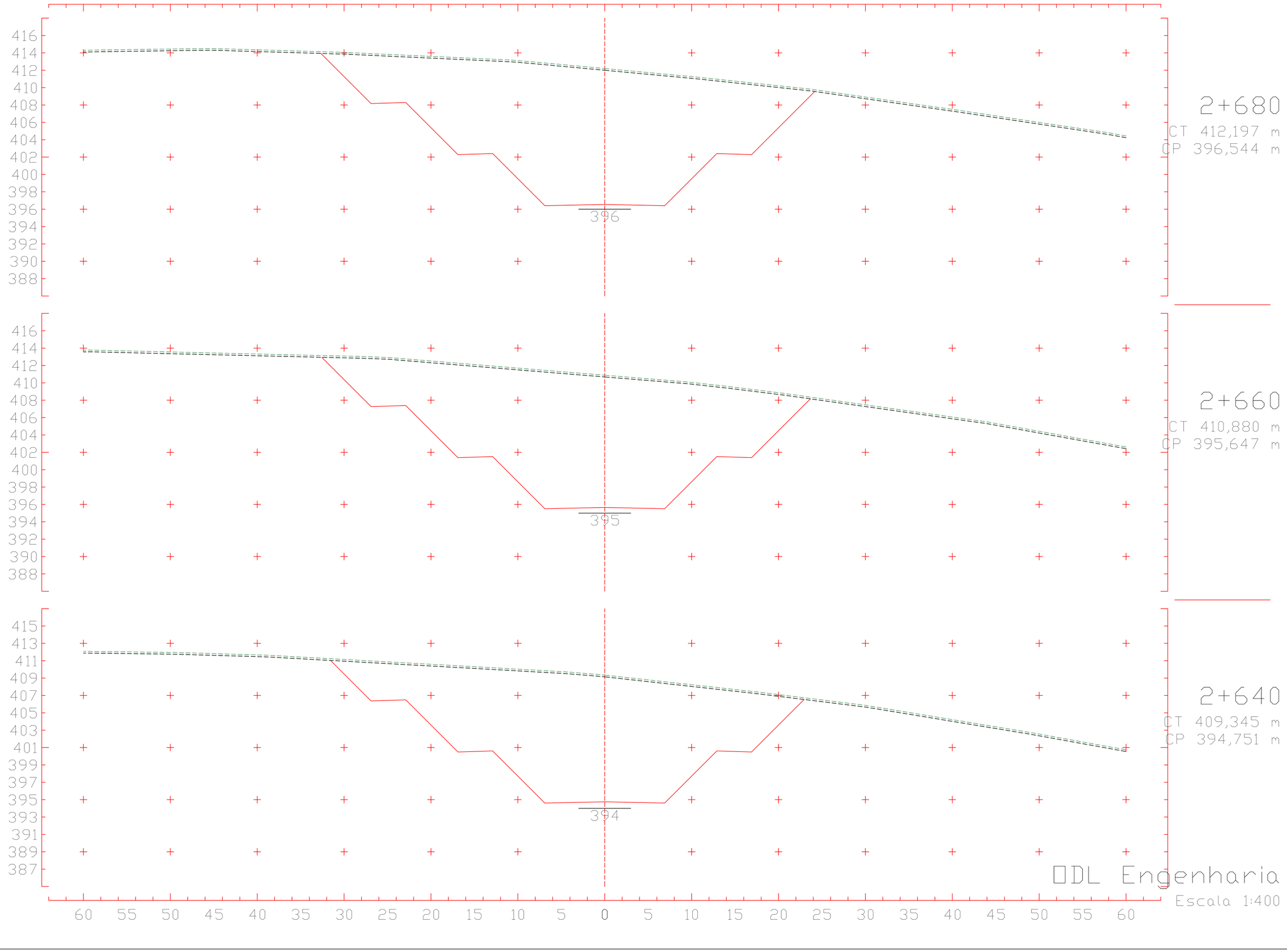
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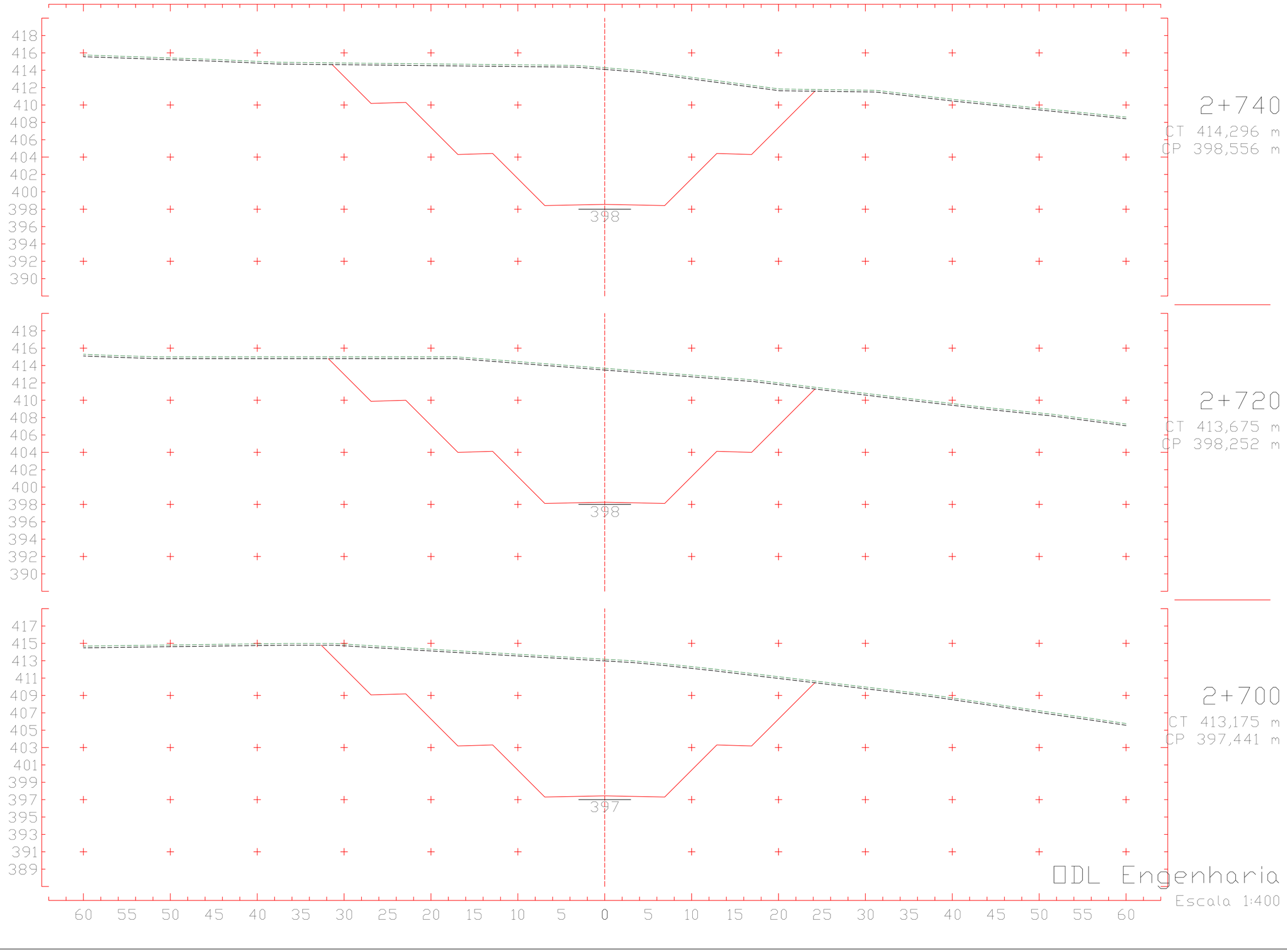
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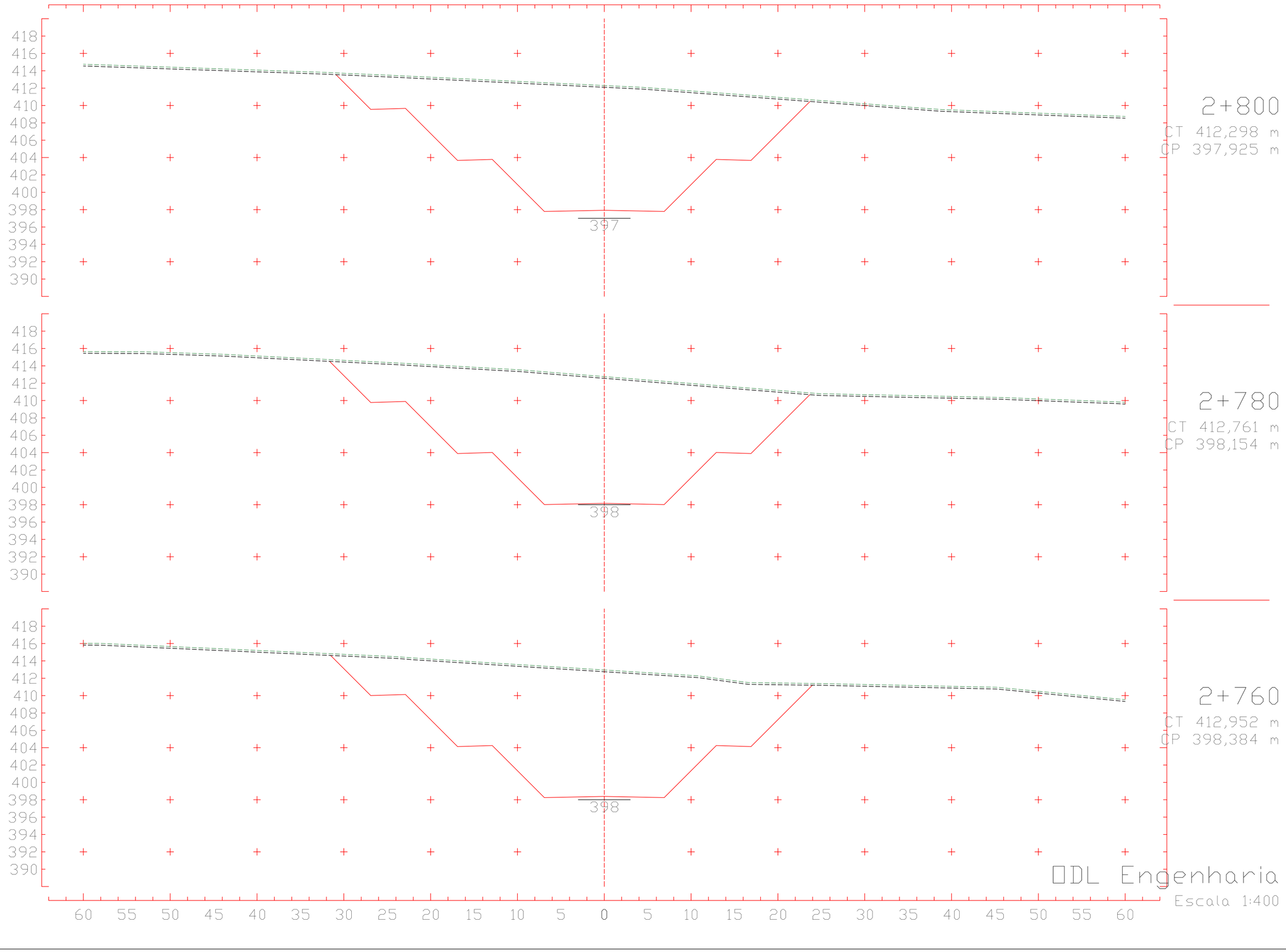
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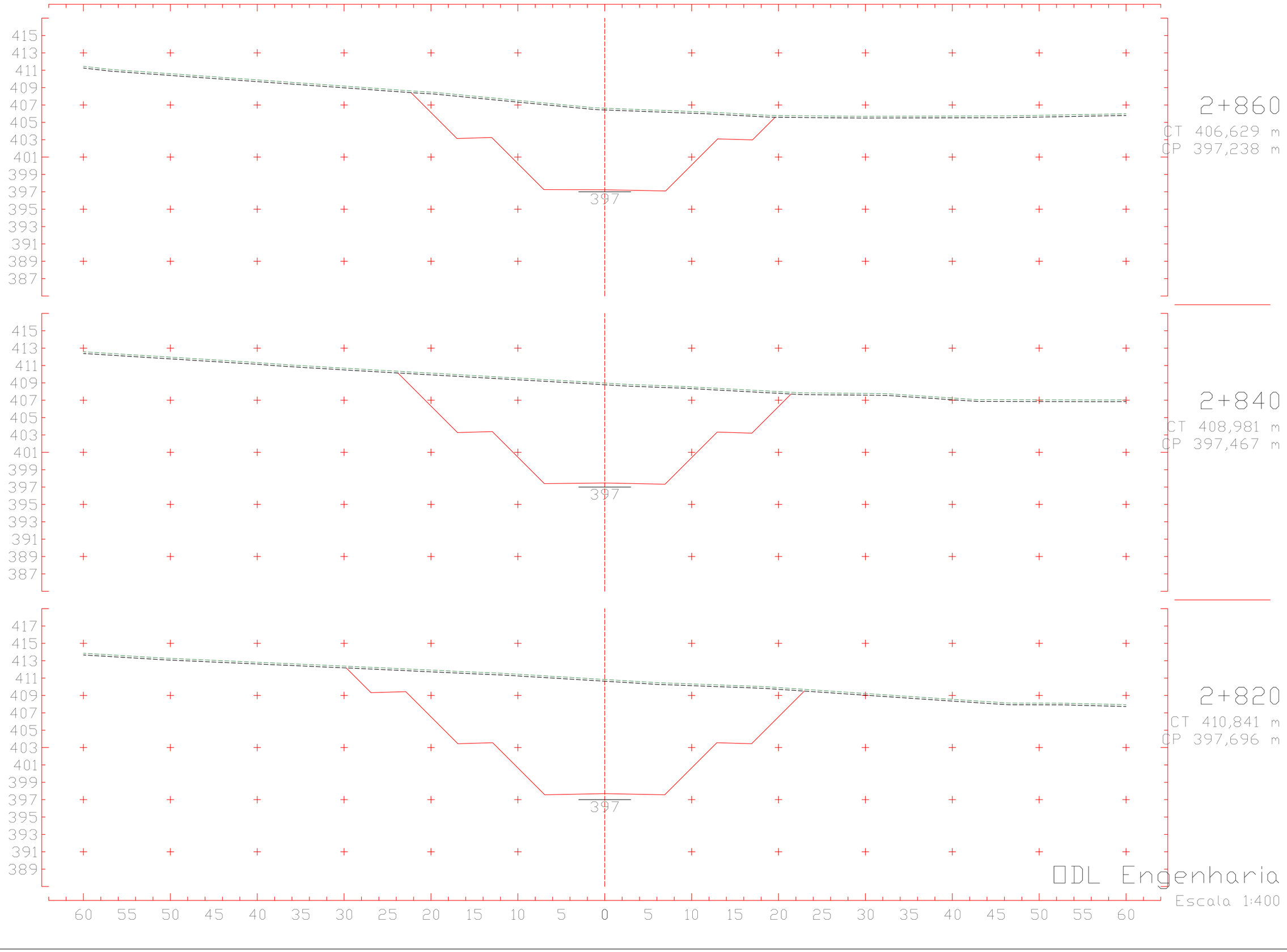
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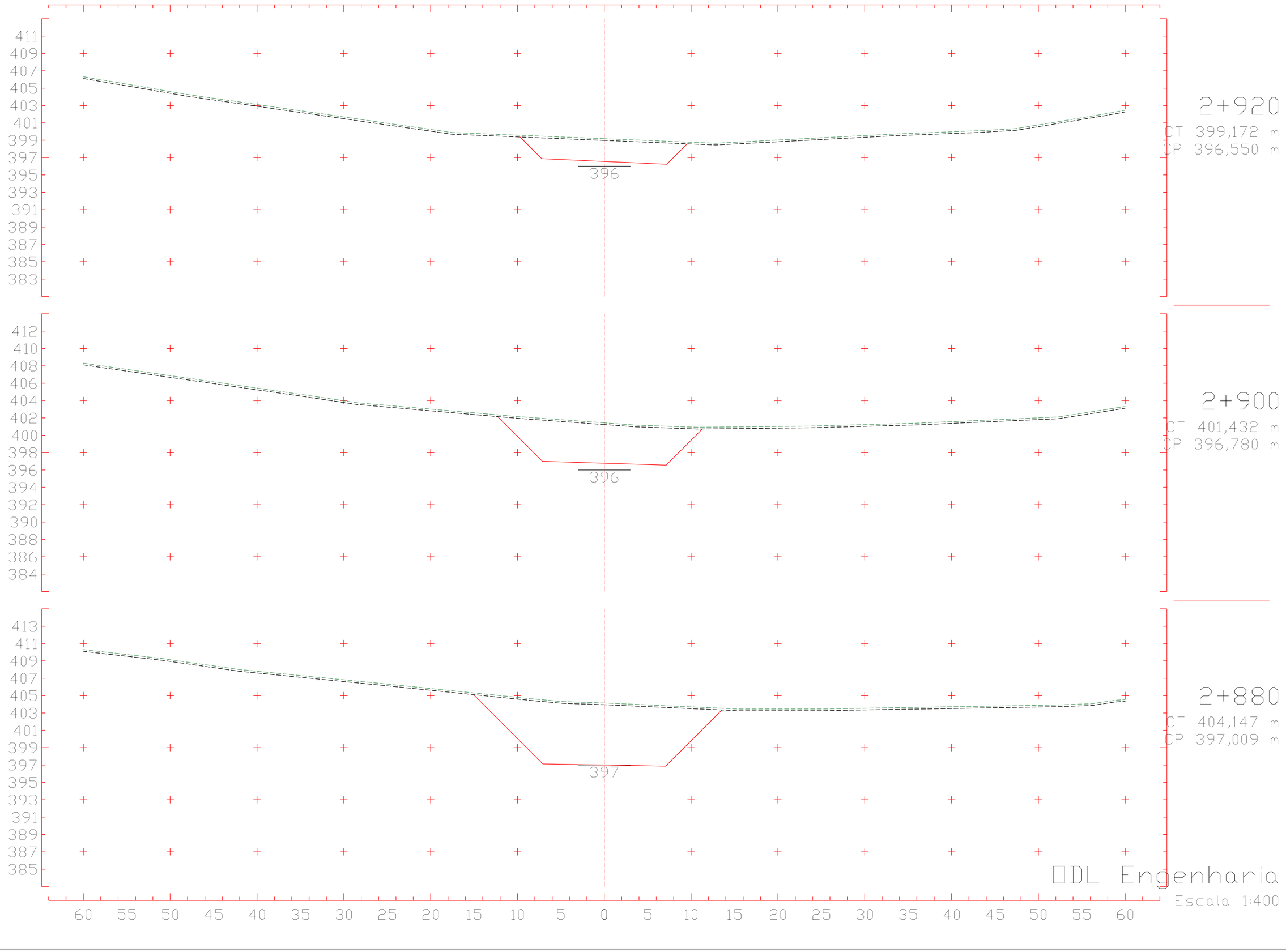
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ODL Engenharia

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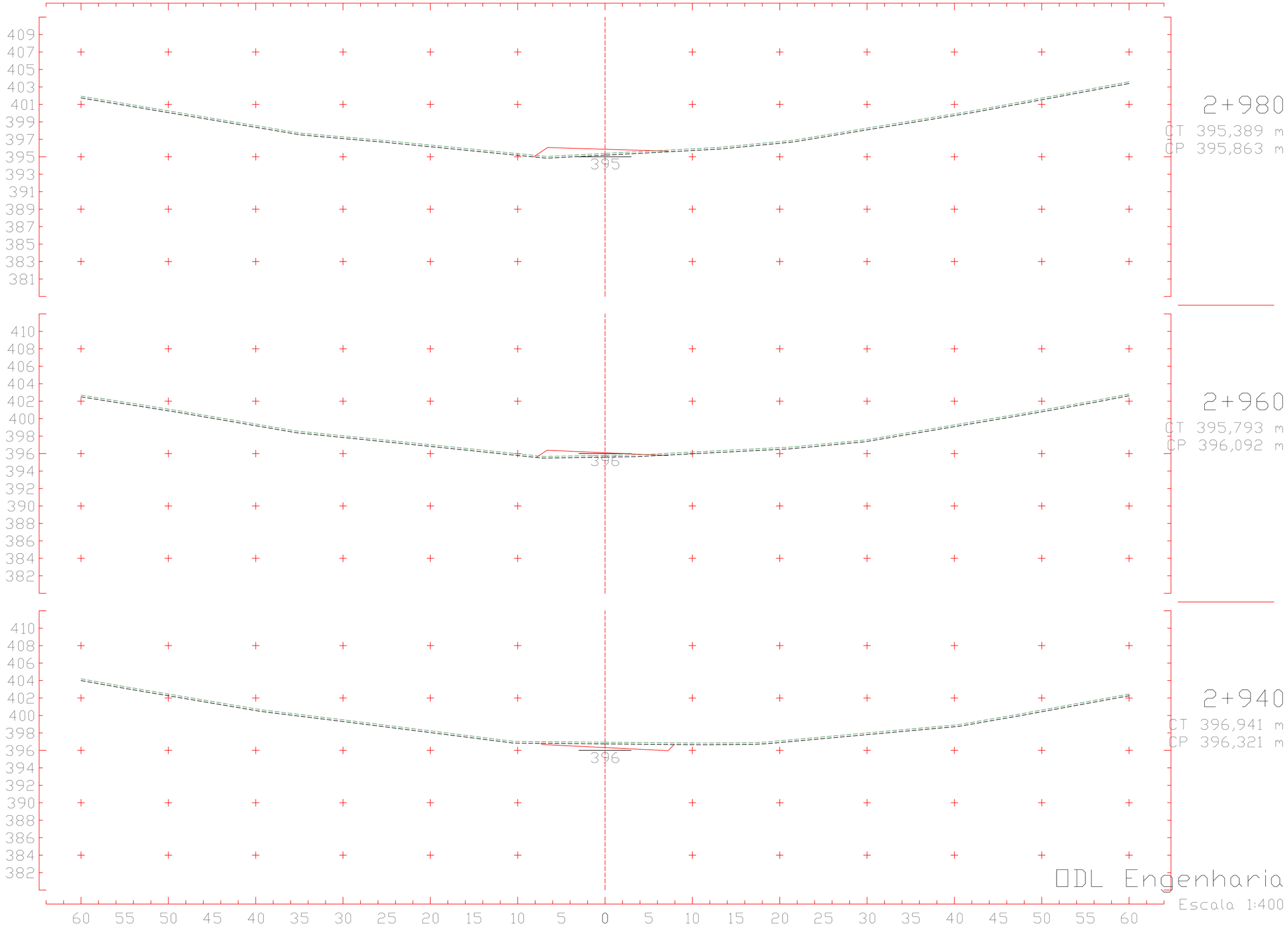
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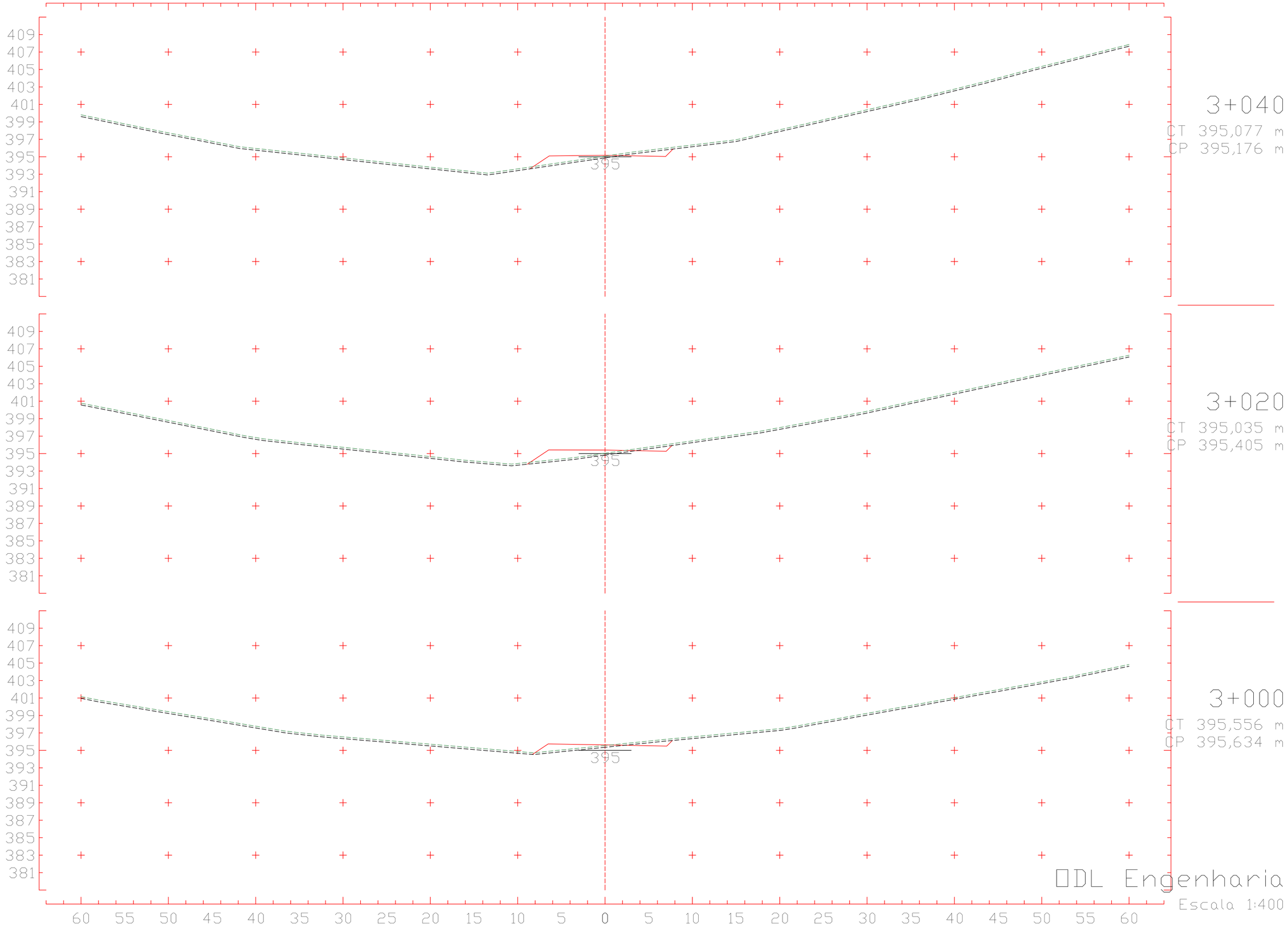
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Escala 1:400

Projeto Ponto de Partida 2021/1



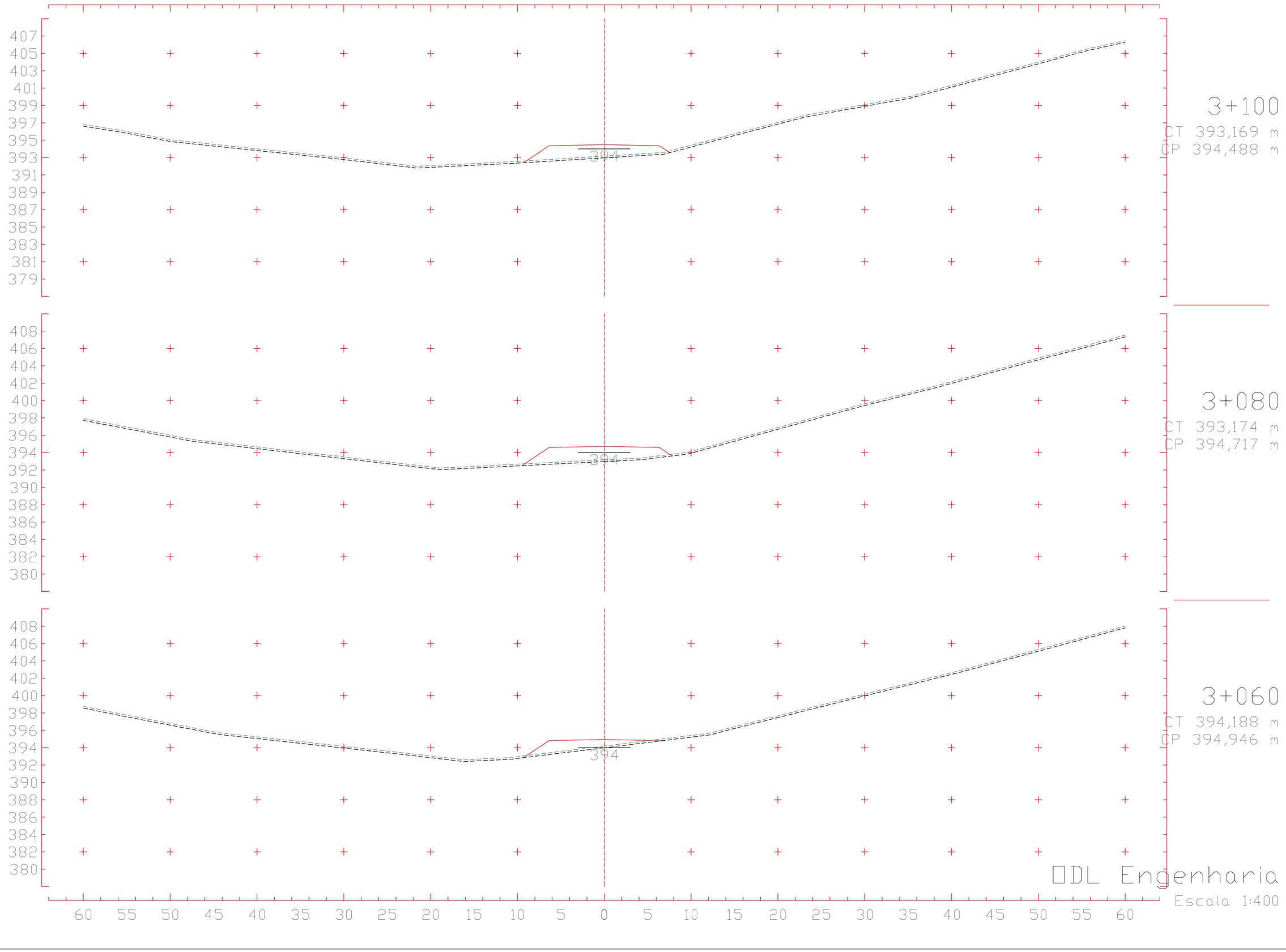
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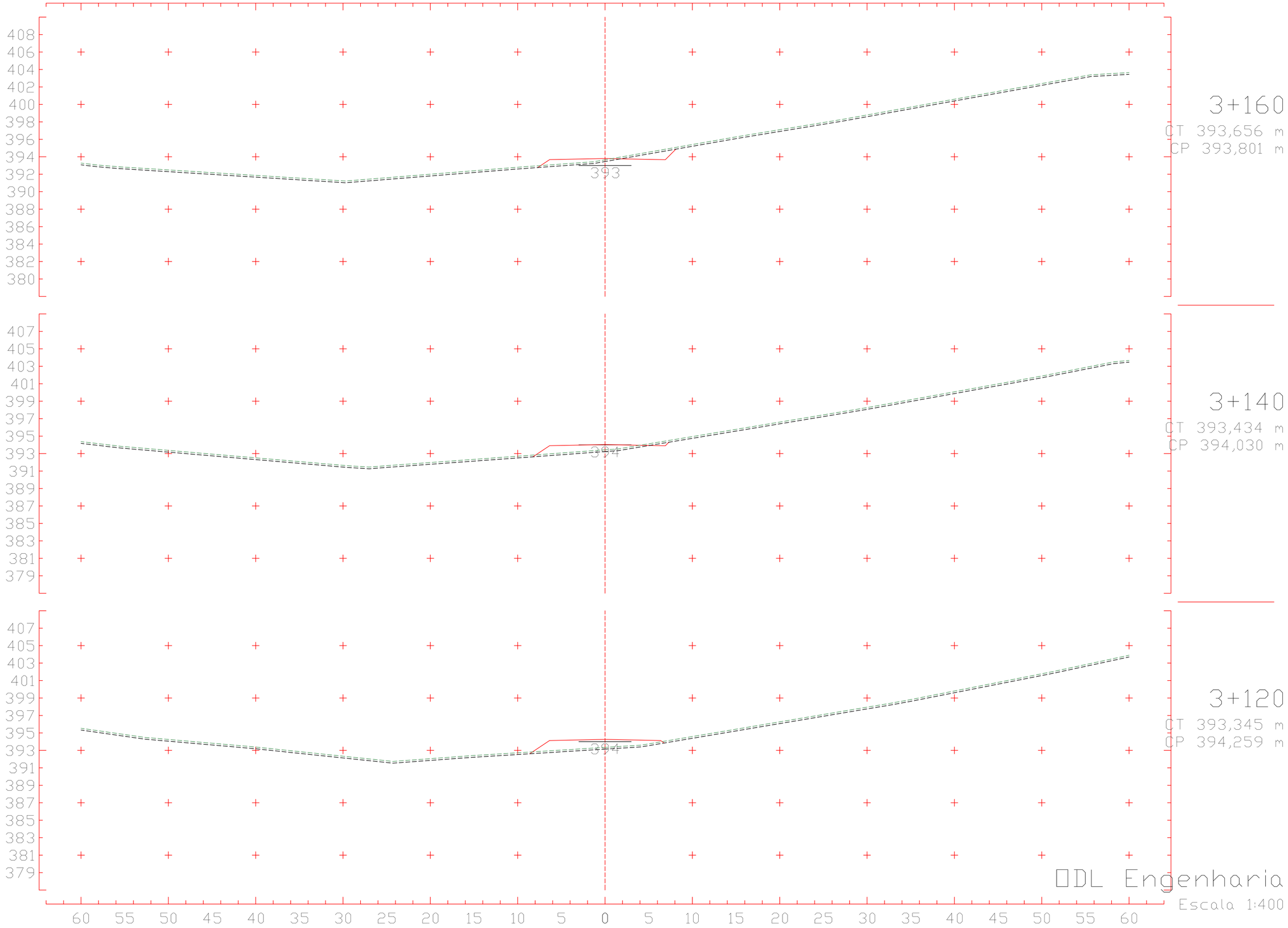
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Projeto Ponto de Partida 2021/1



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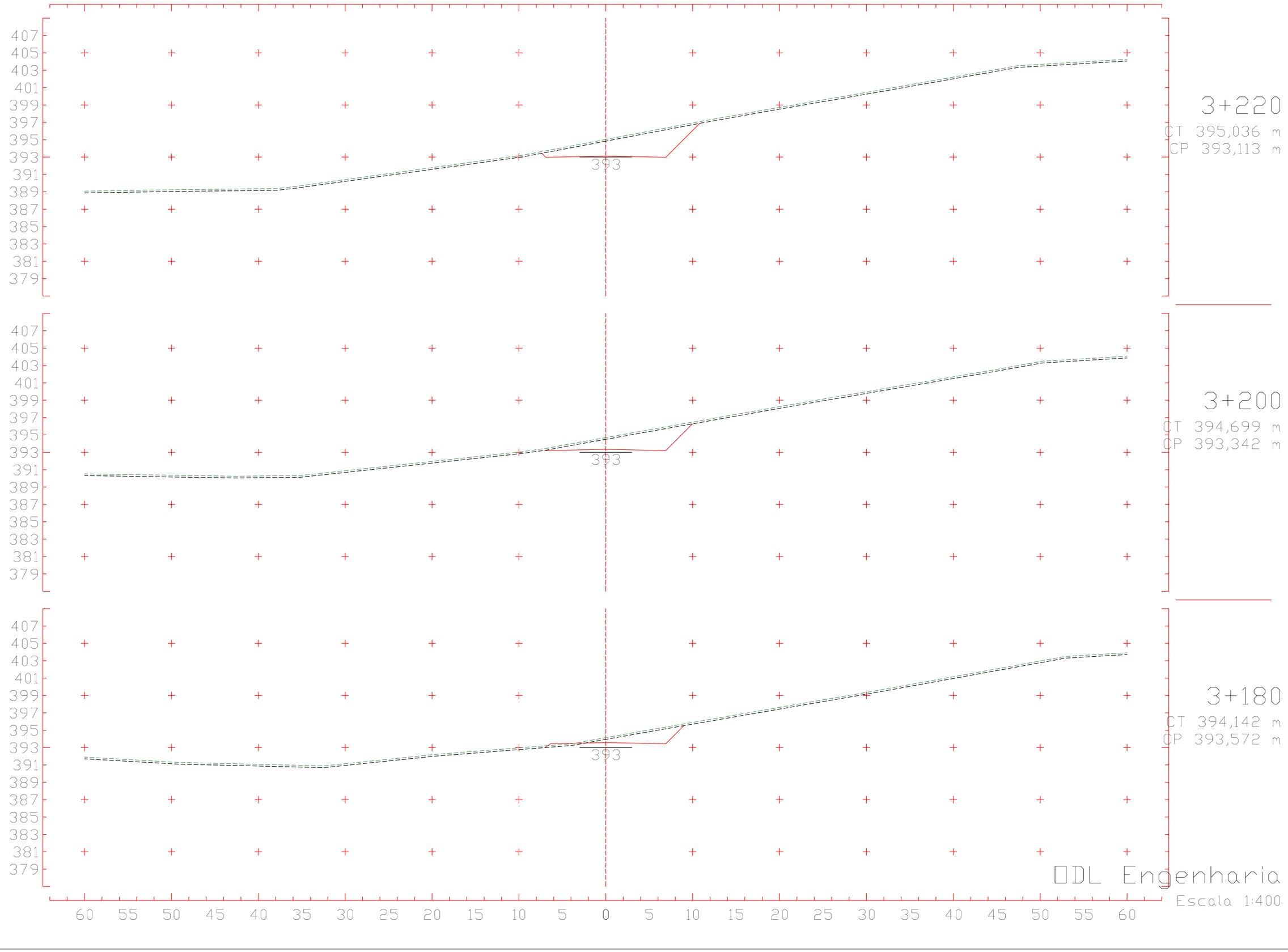
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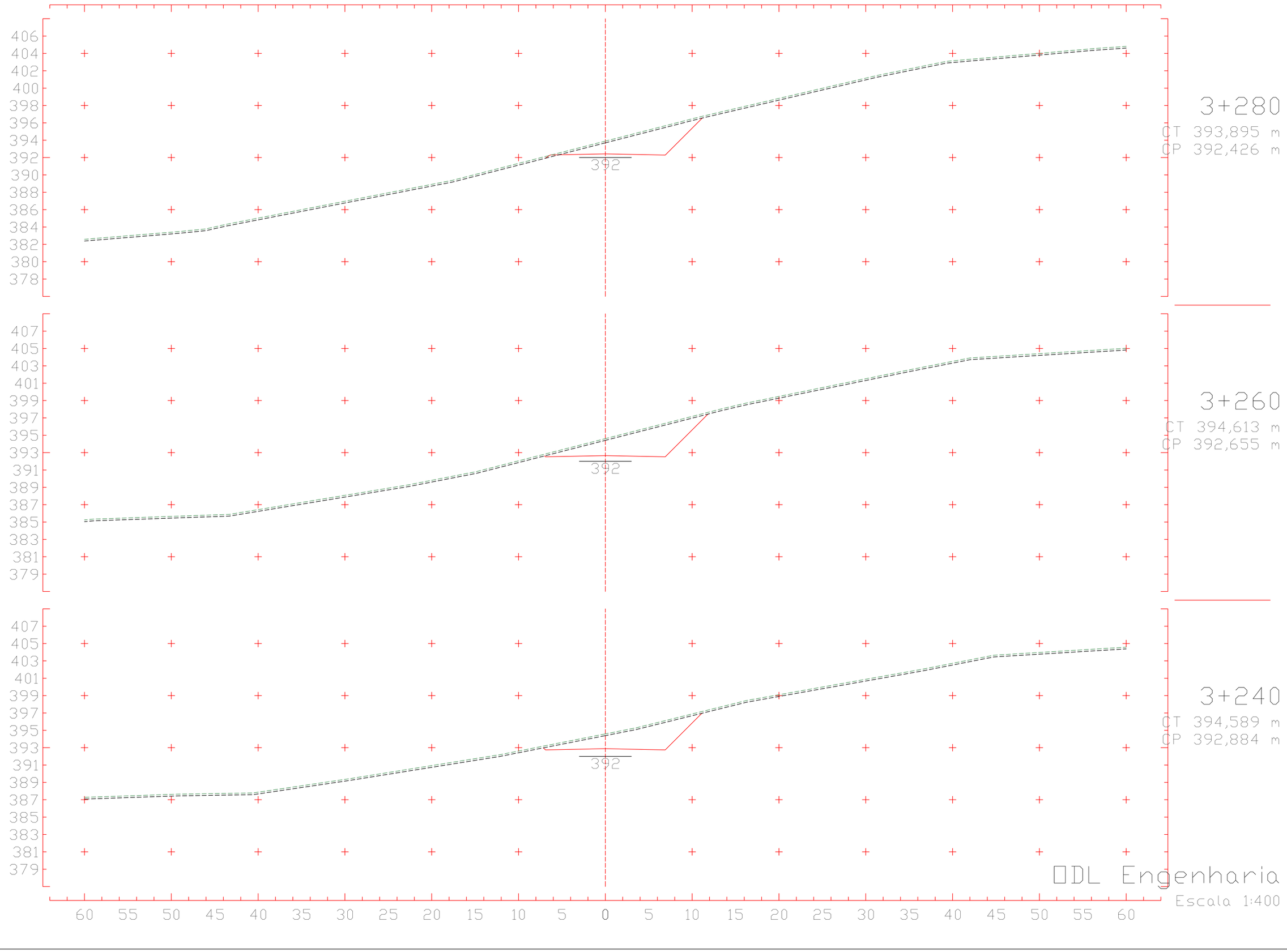
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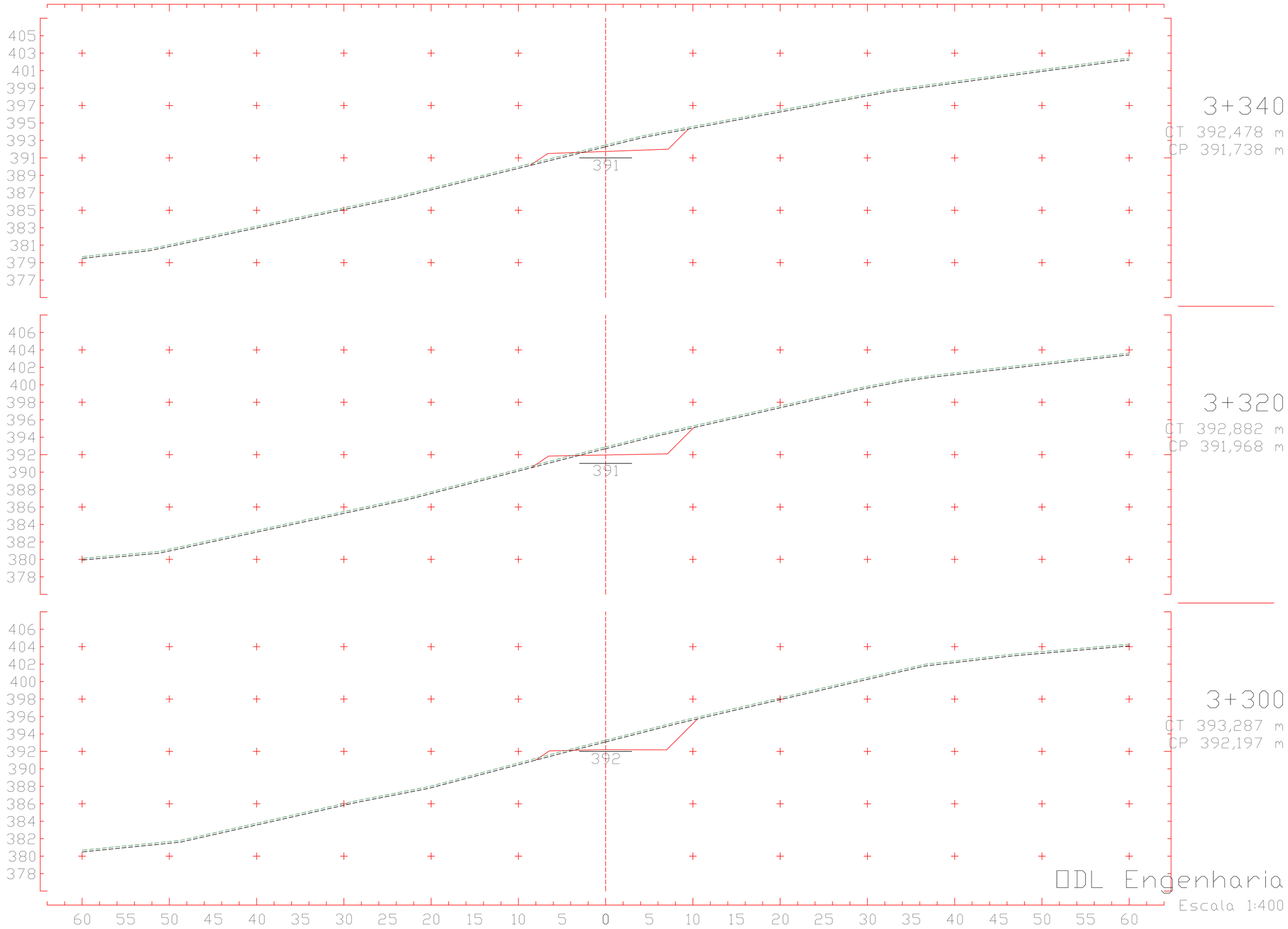
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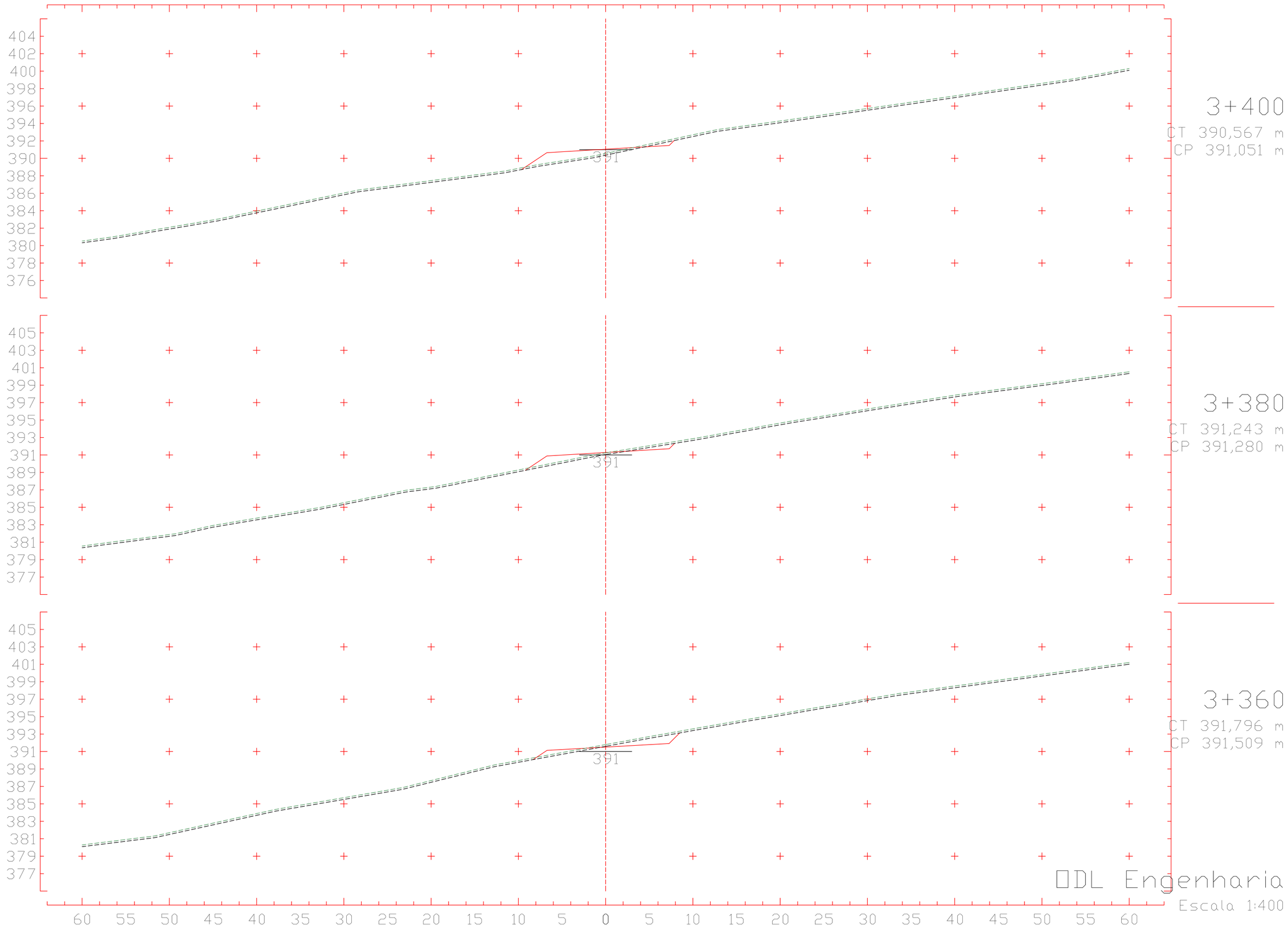
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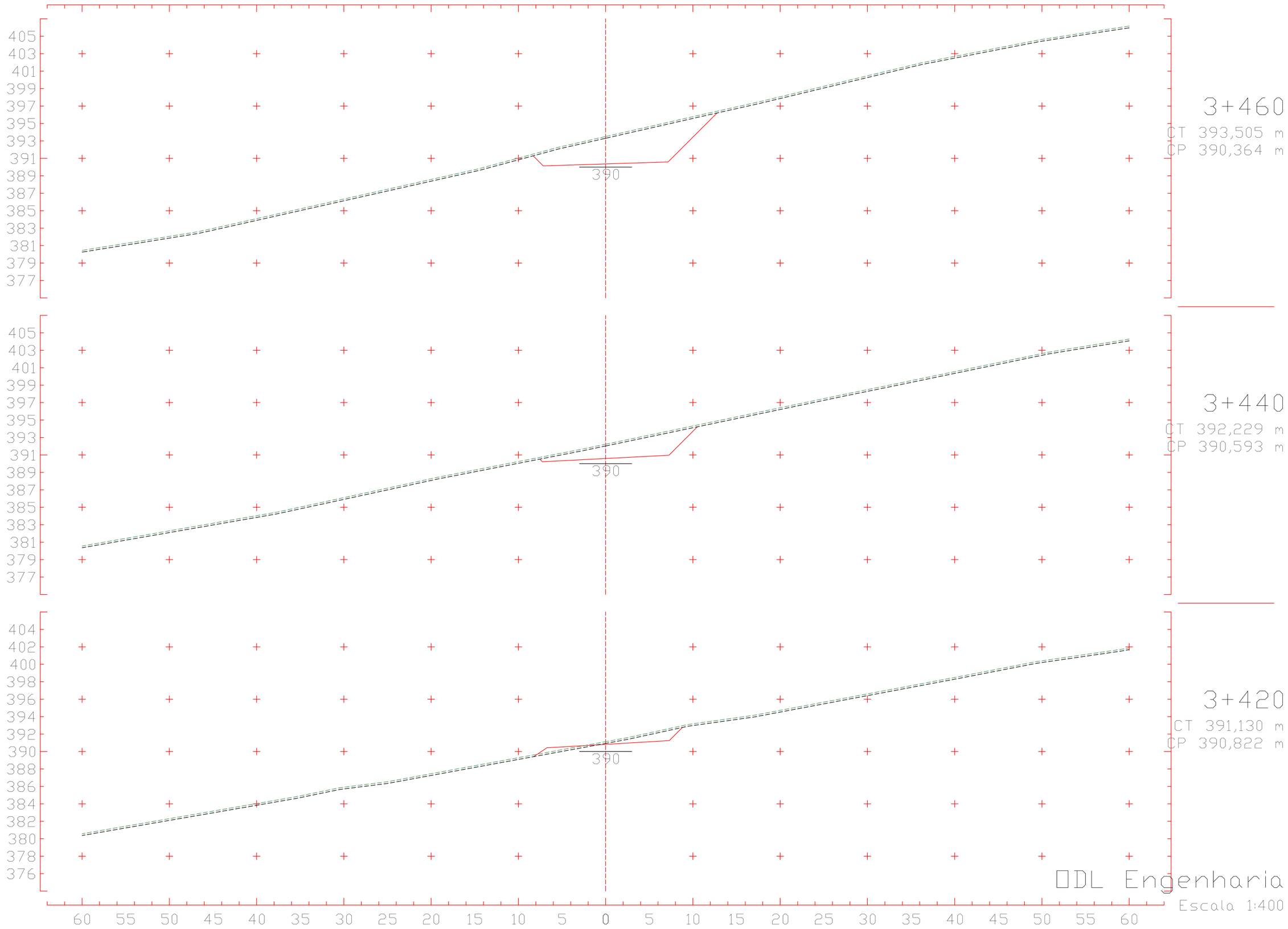
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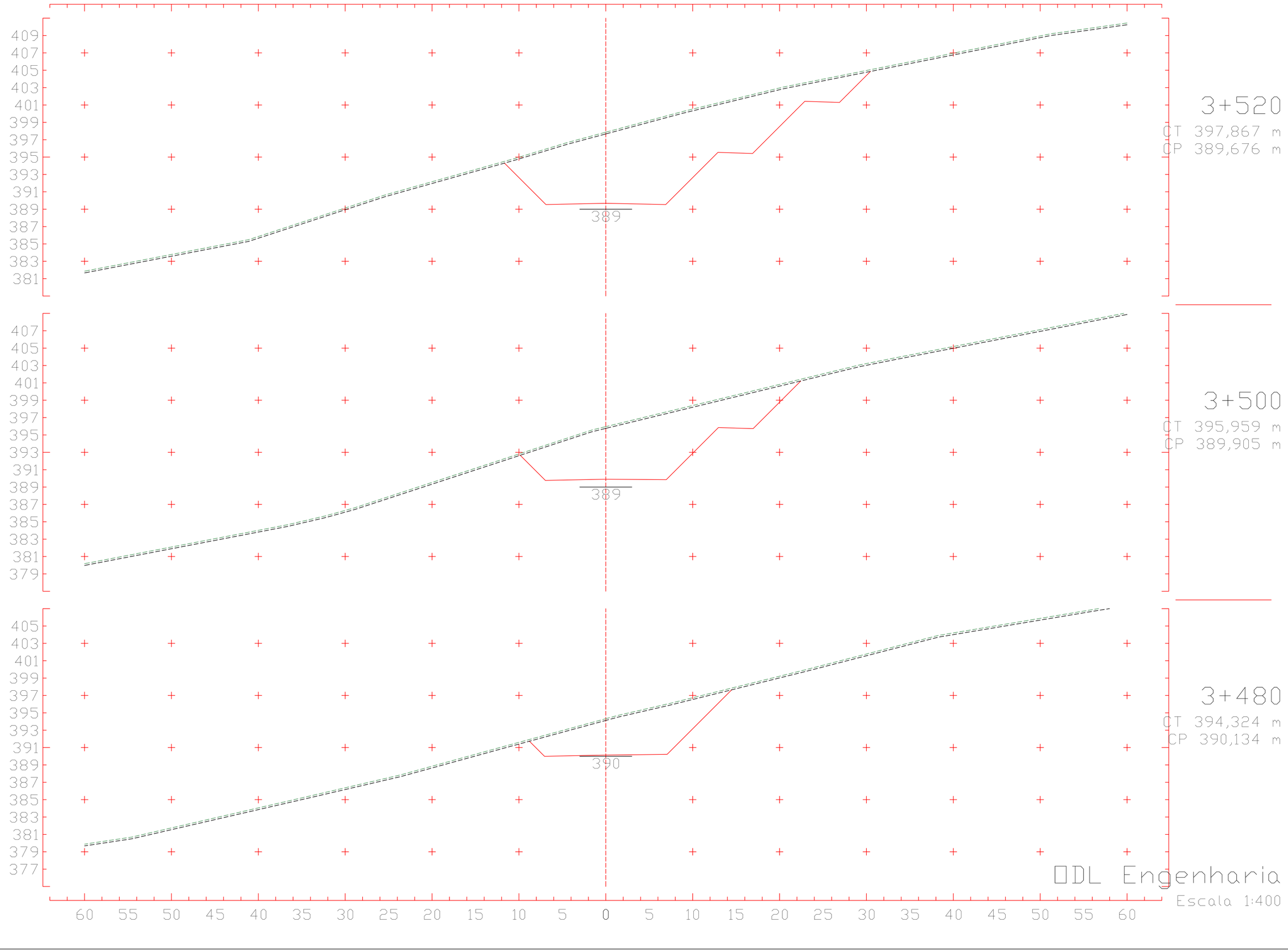
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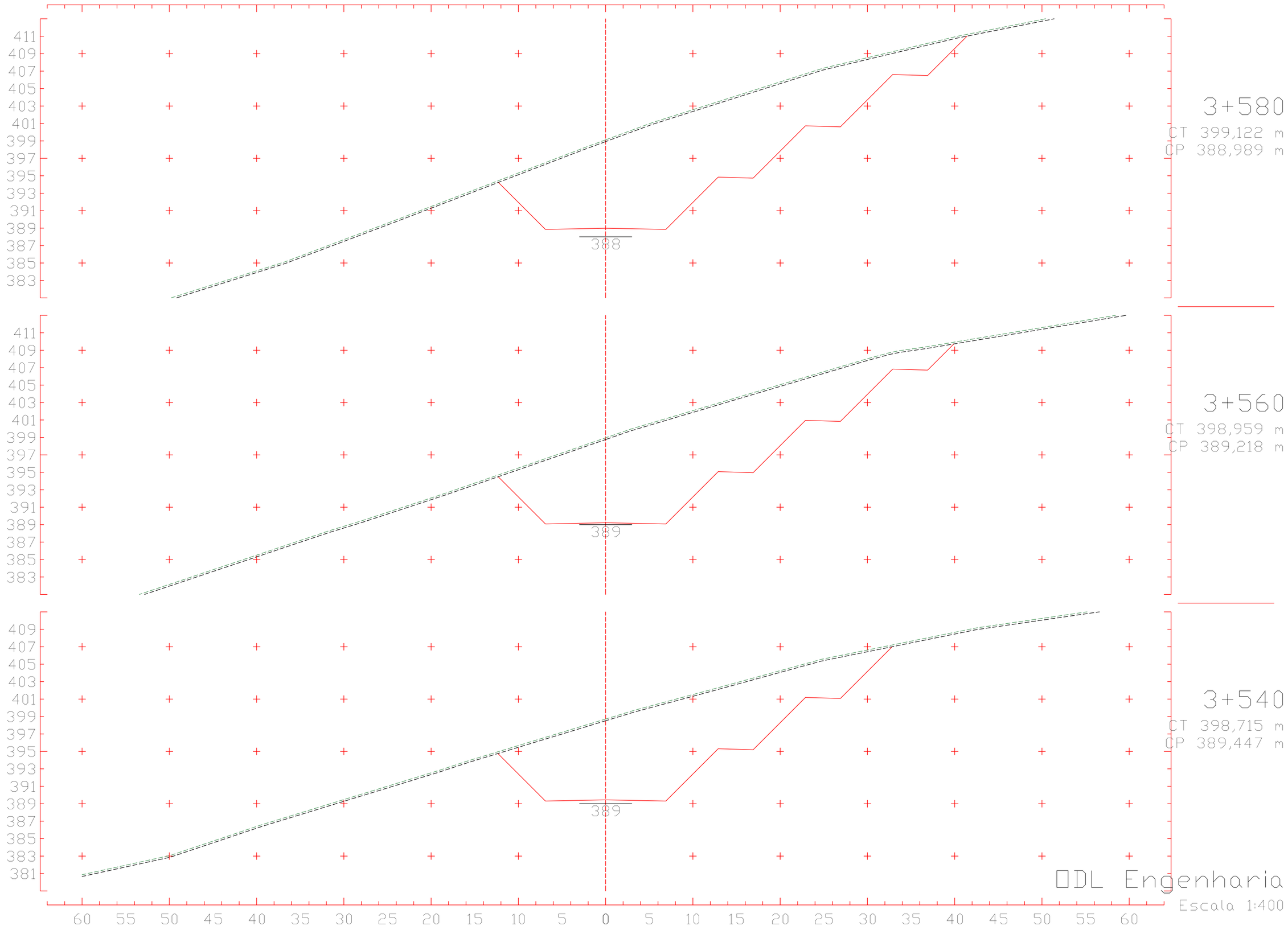
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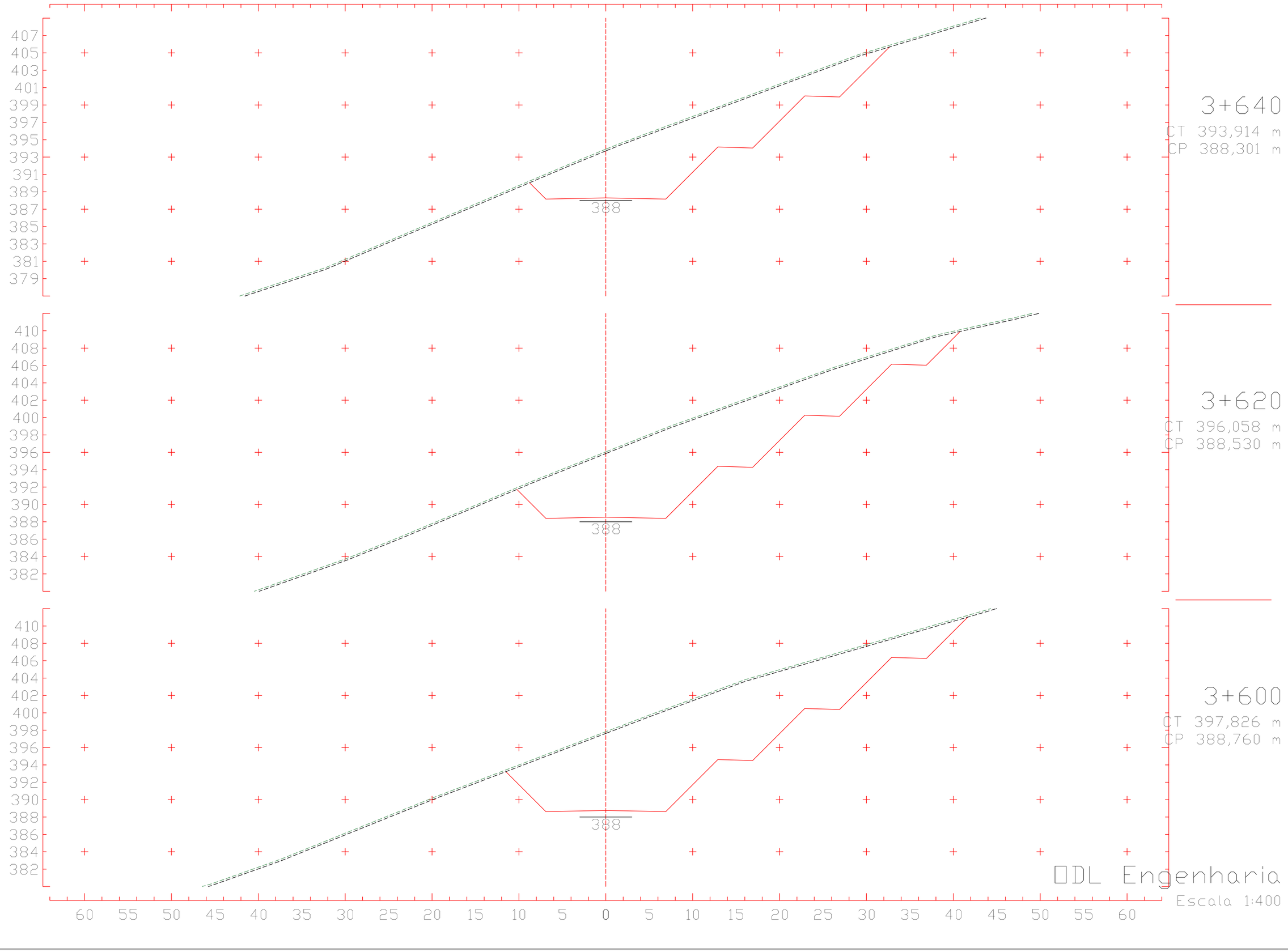
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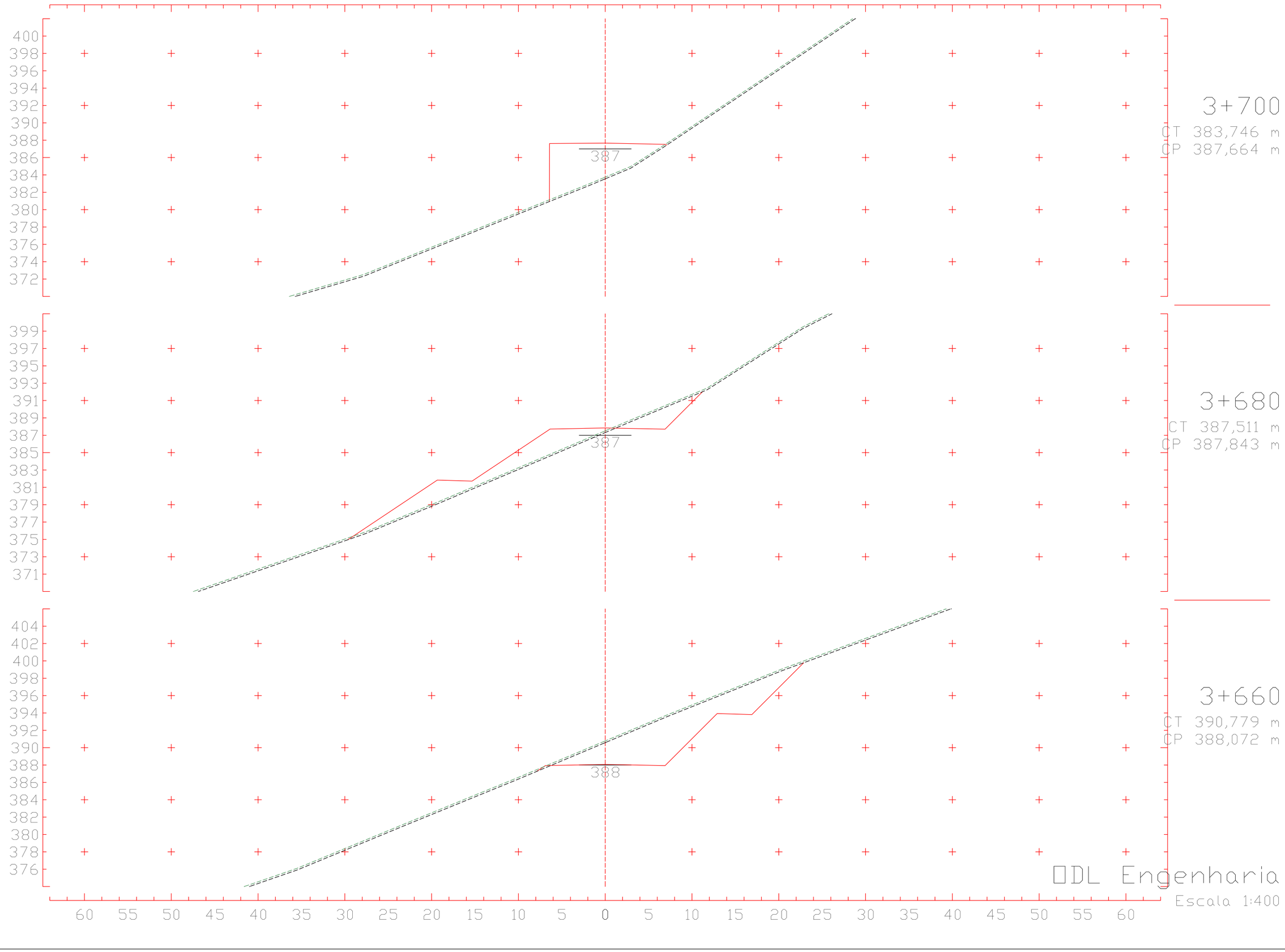
DL Engenharia

Escala 1:400

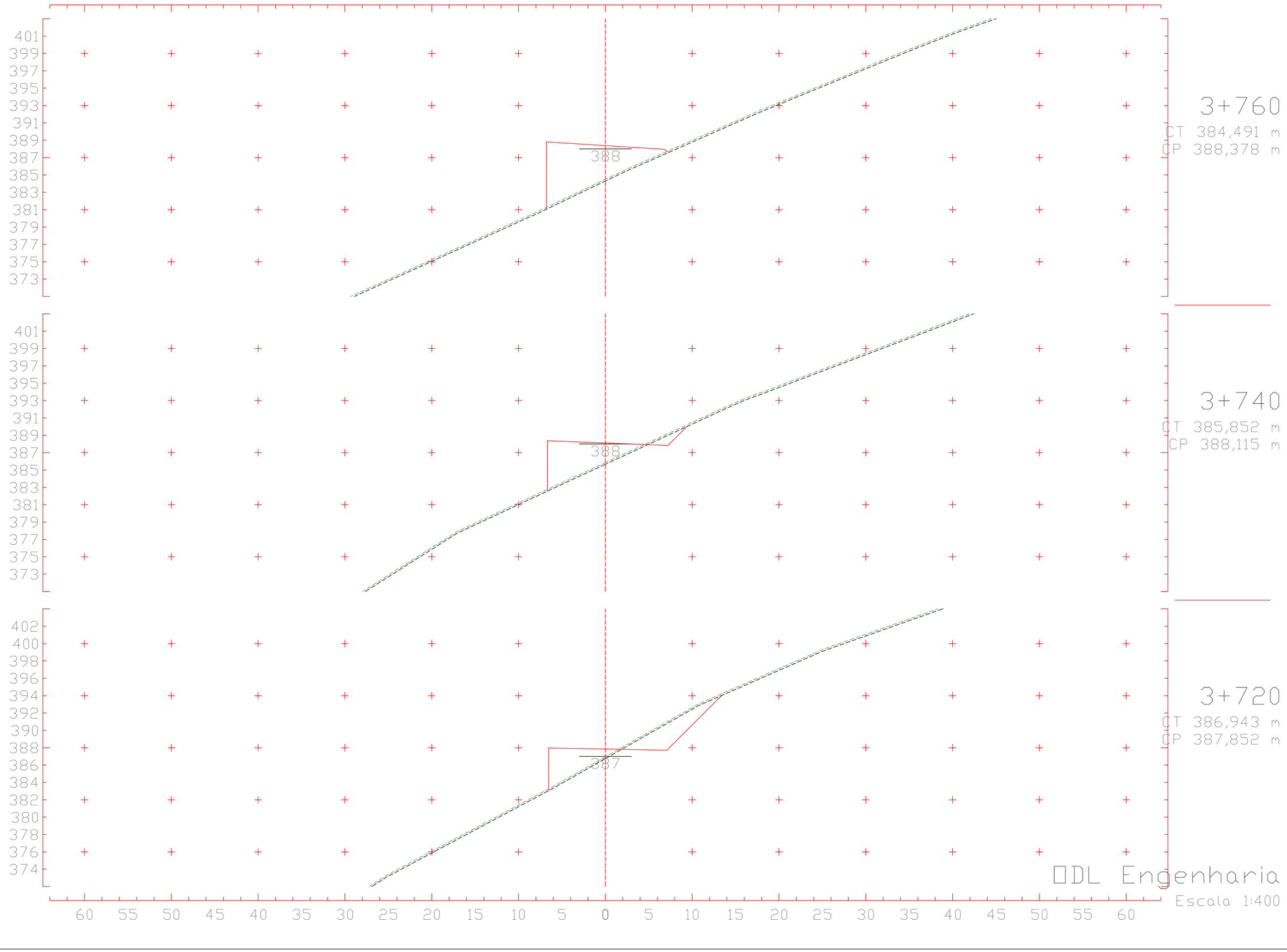
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Projeto Ponto de Partida 2021/1



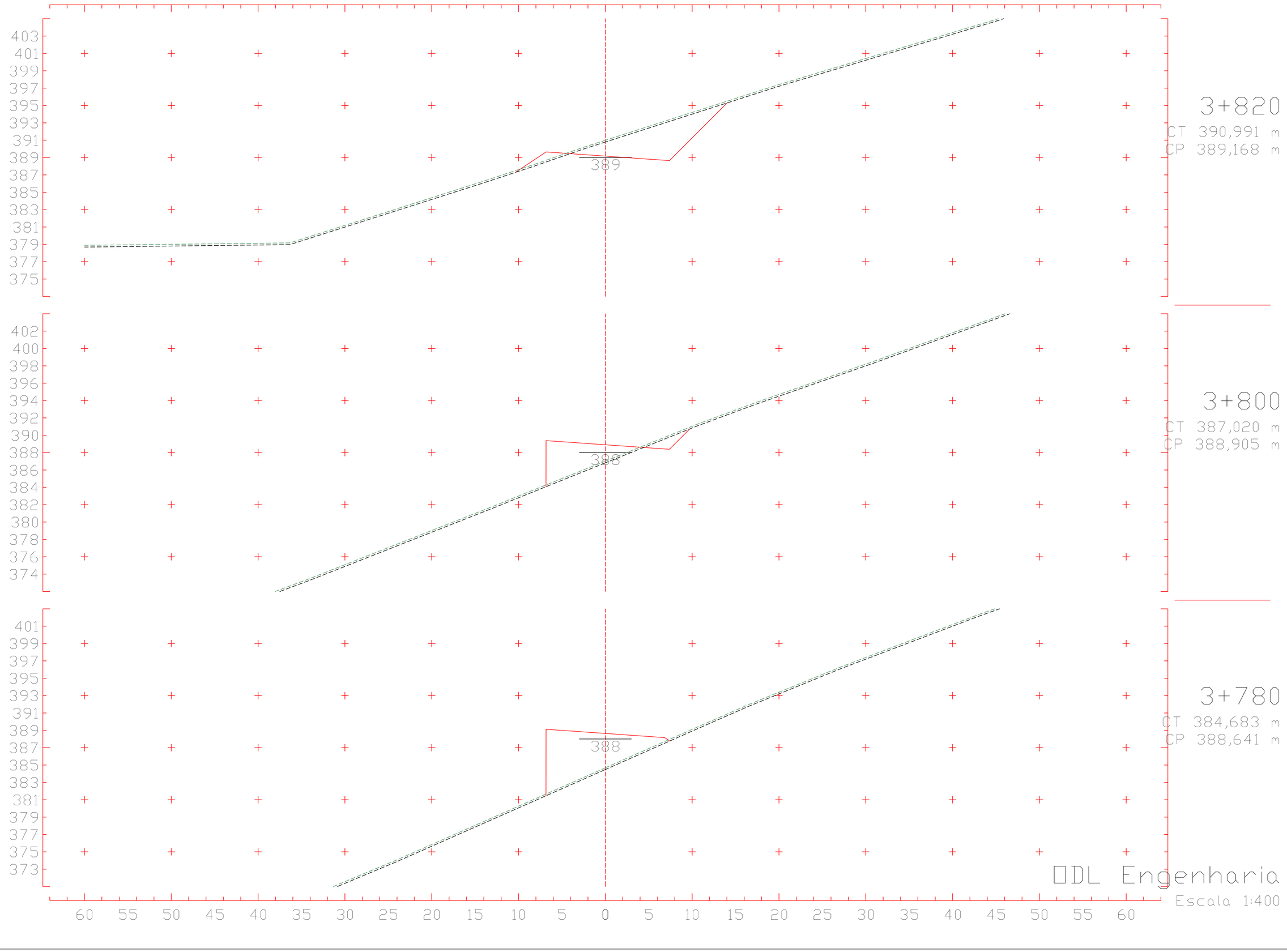
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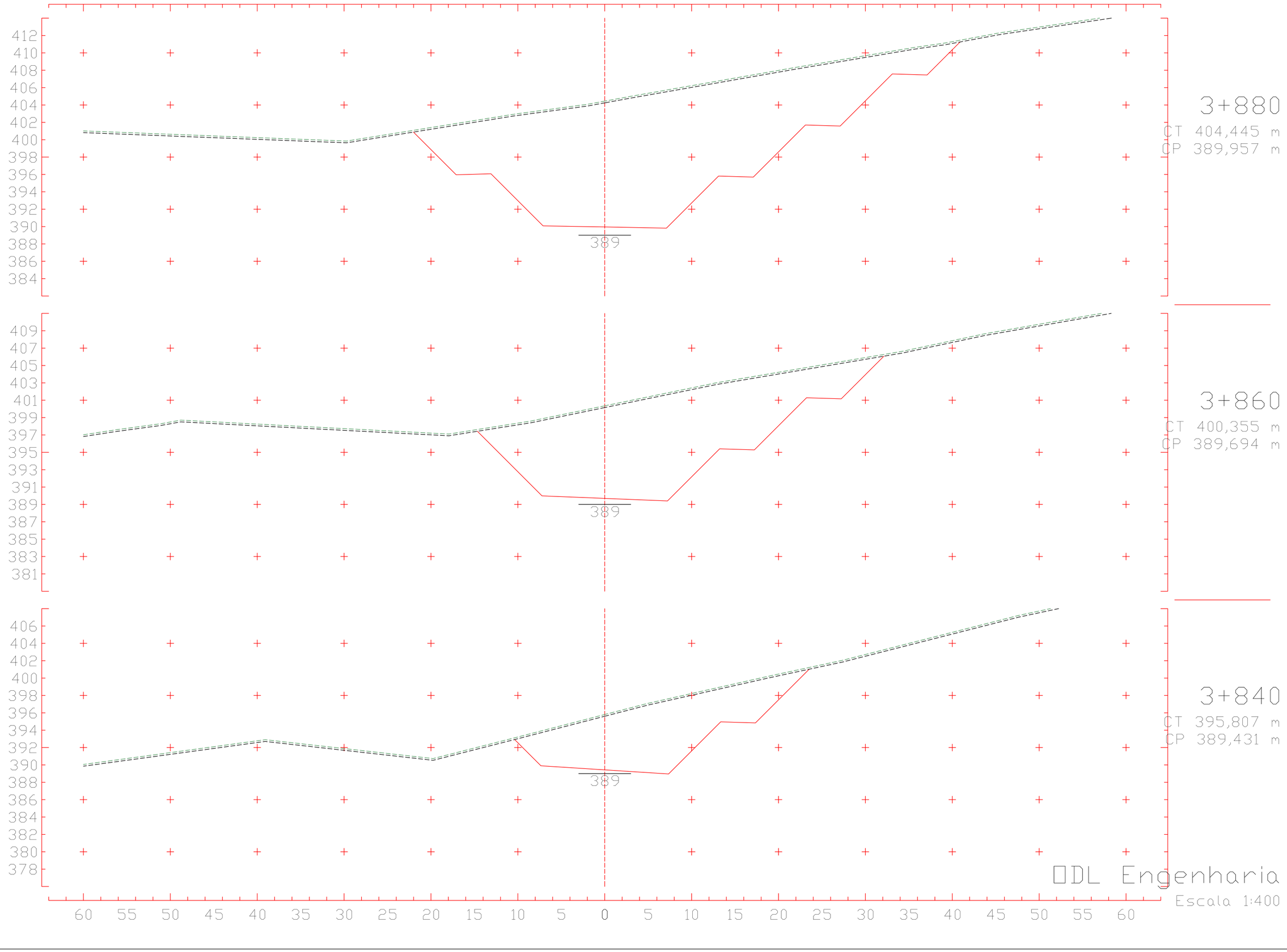
DL Engenharia

Escala 1:400

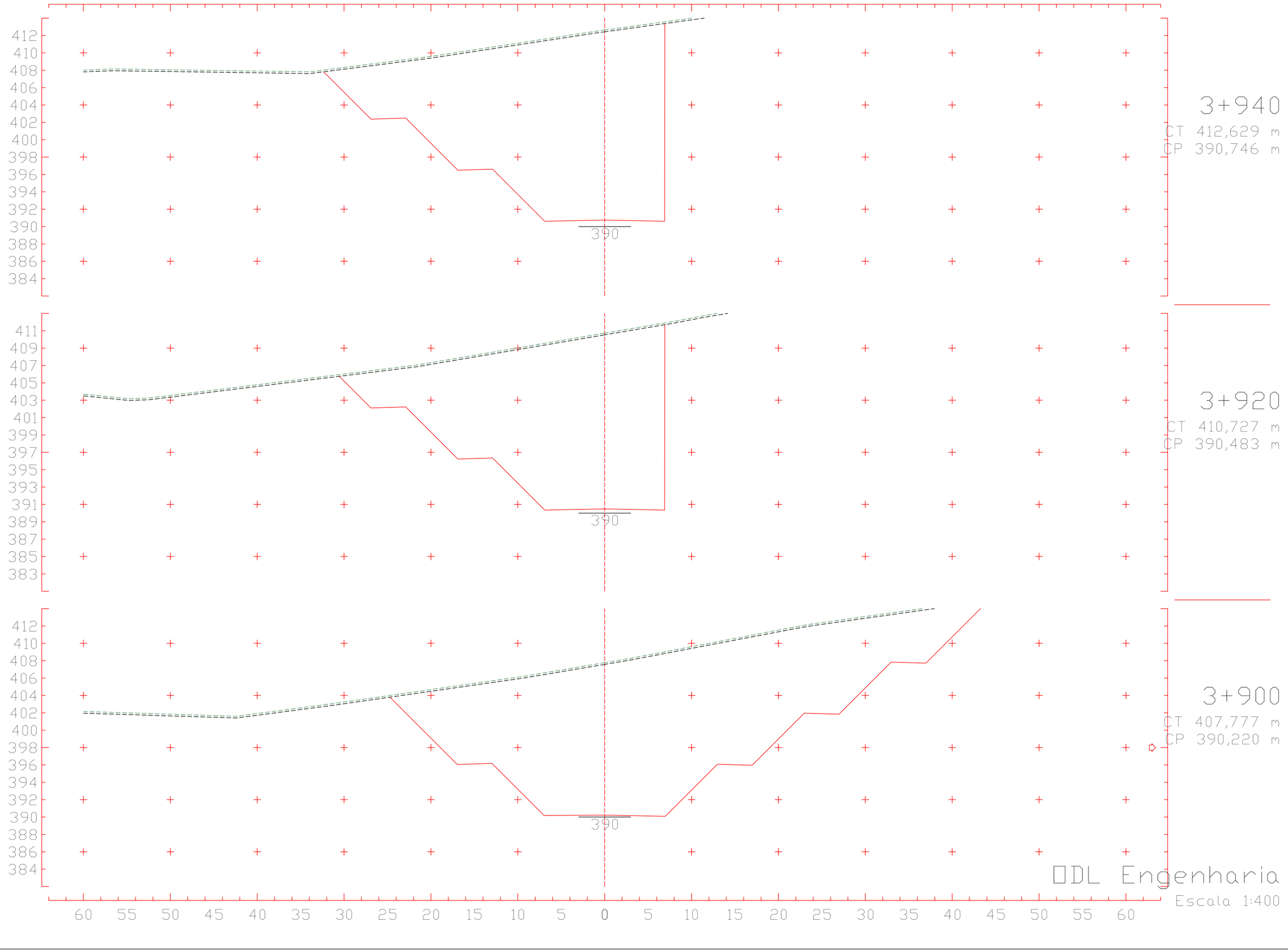
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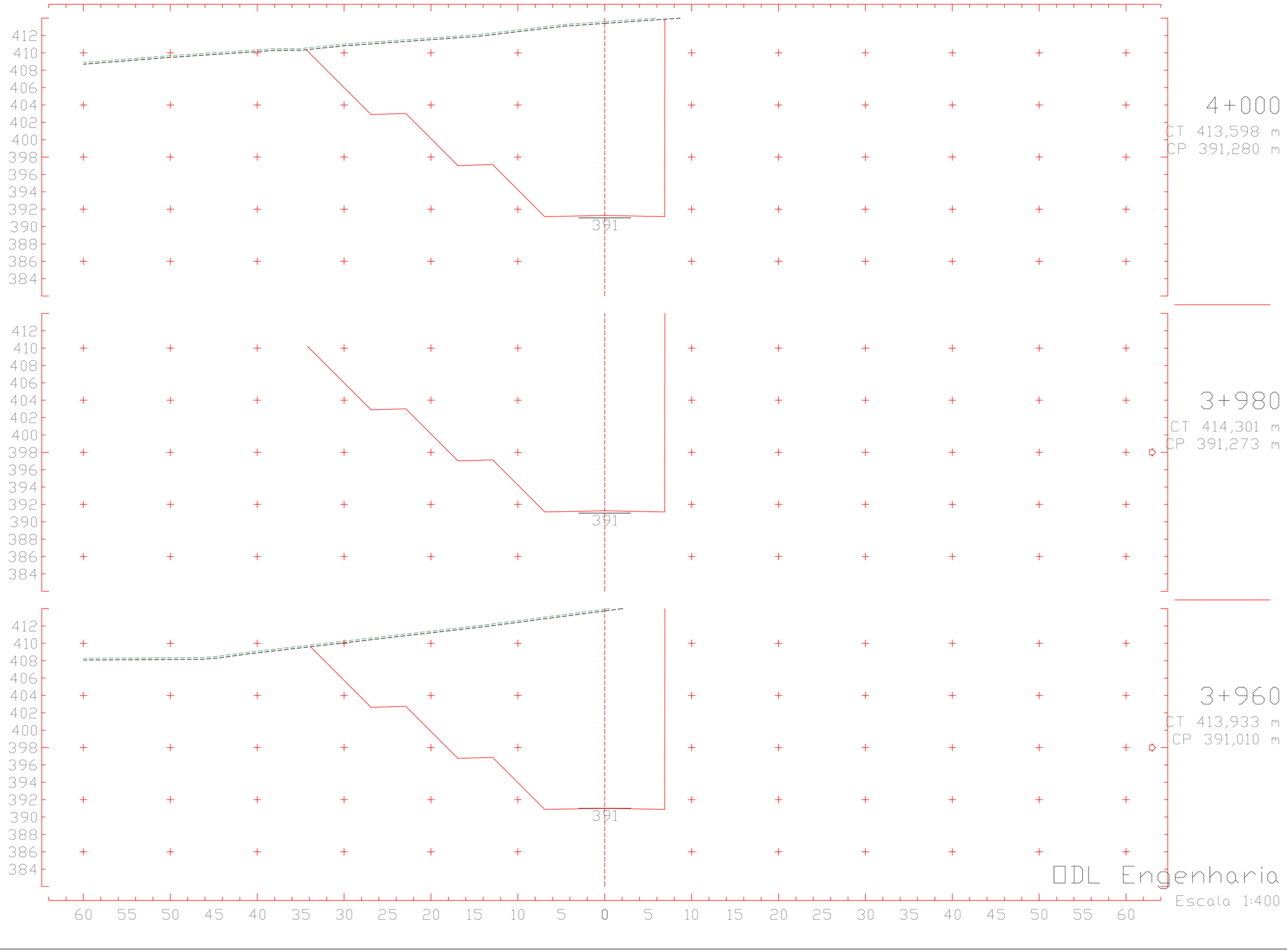
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Projeto Ponto de Partida 2021/1



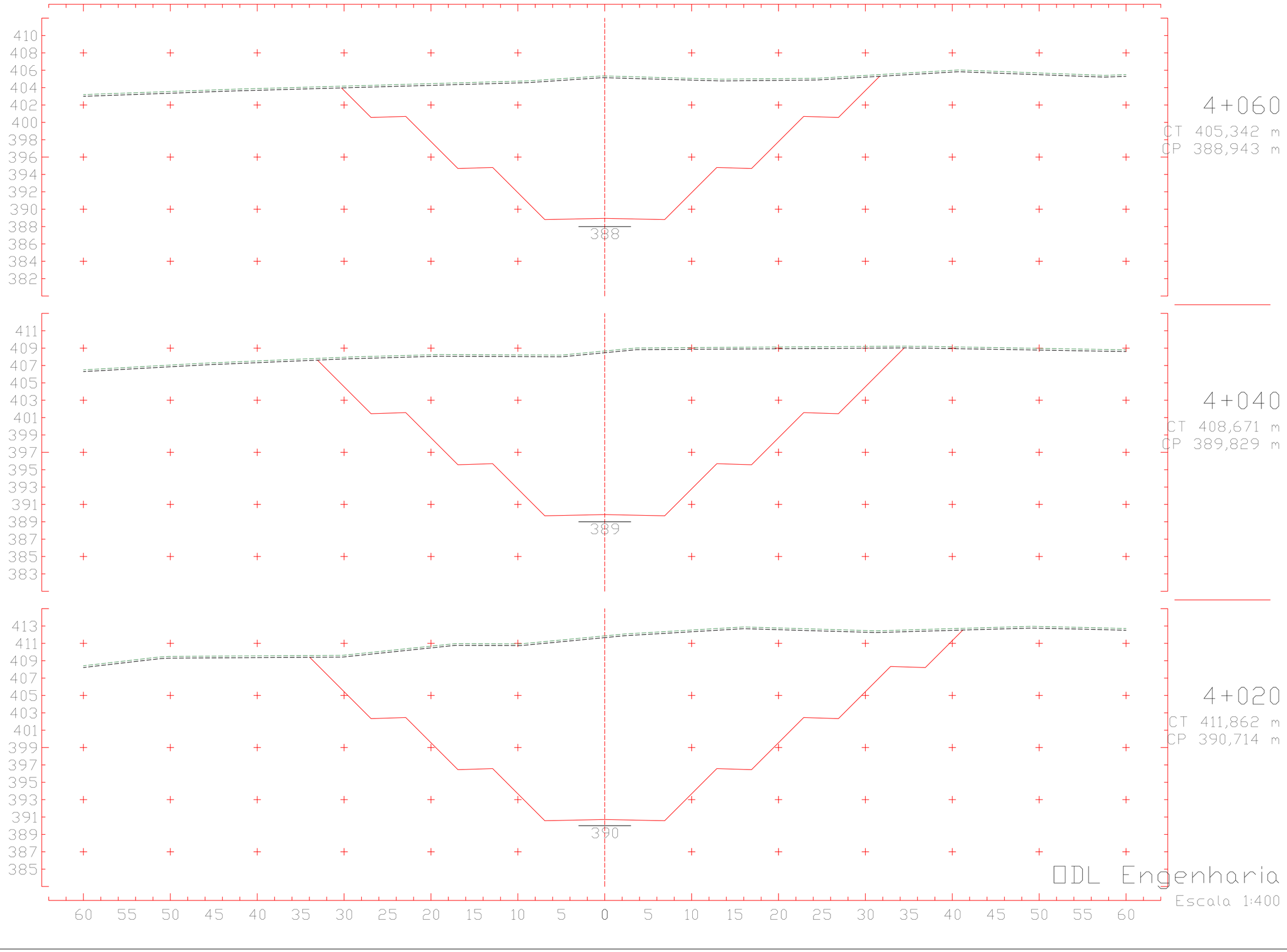
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DL Engenharia

Escala 1:400

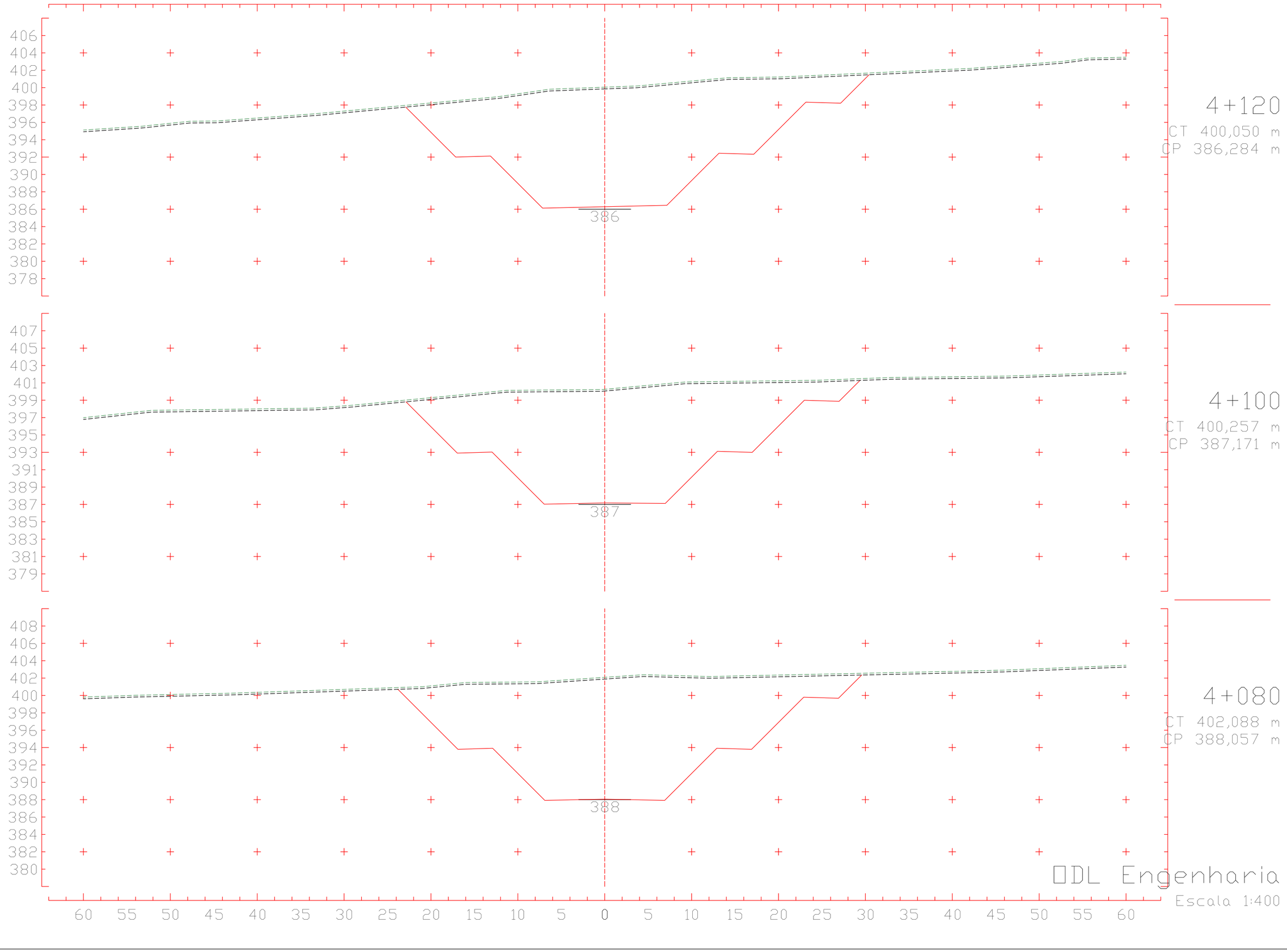
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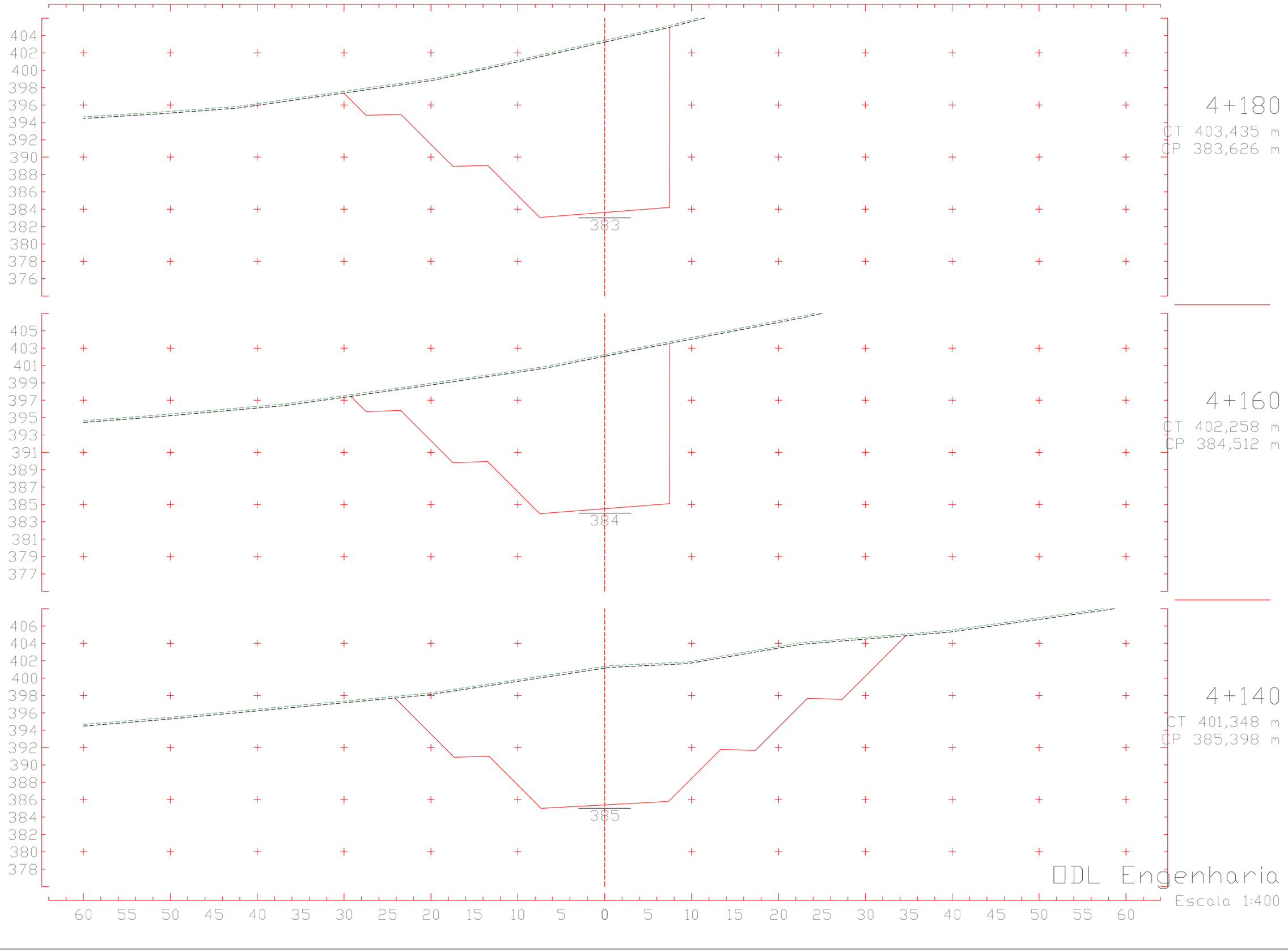
DL Engenharia

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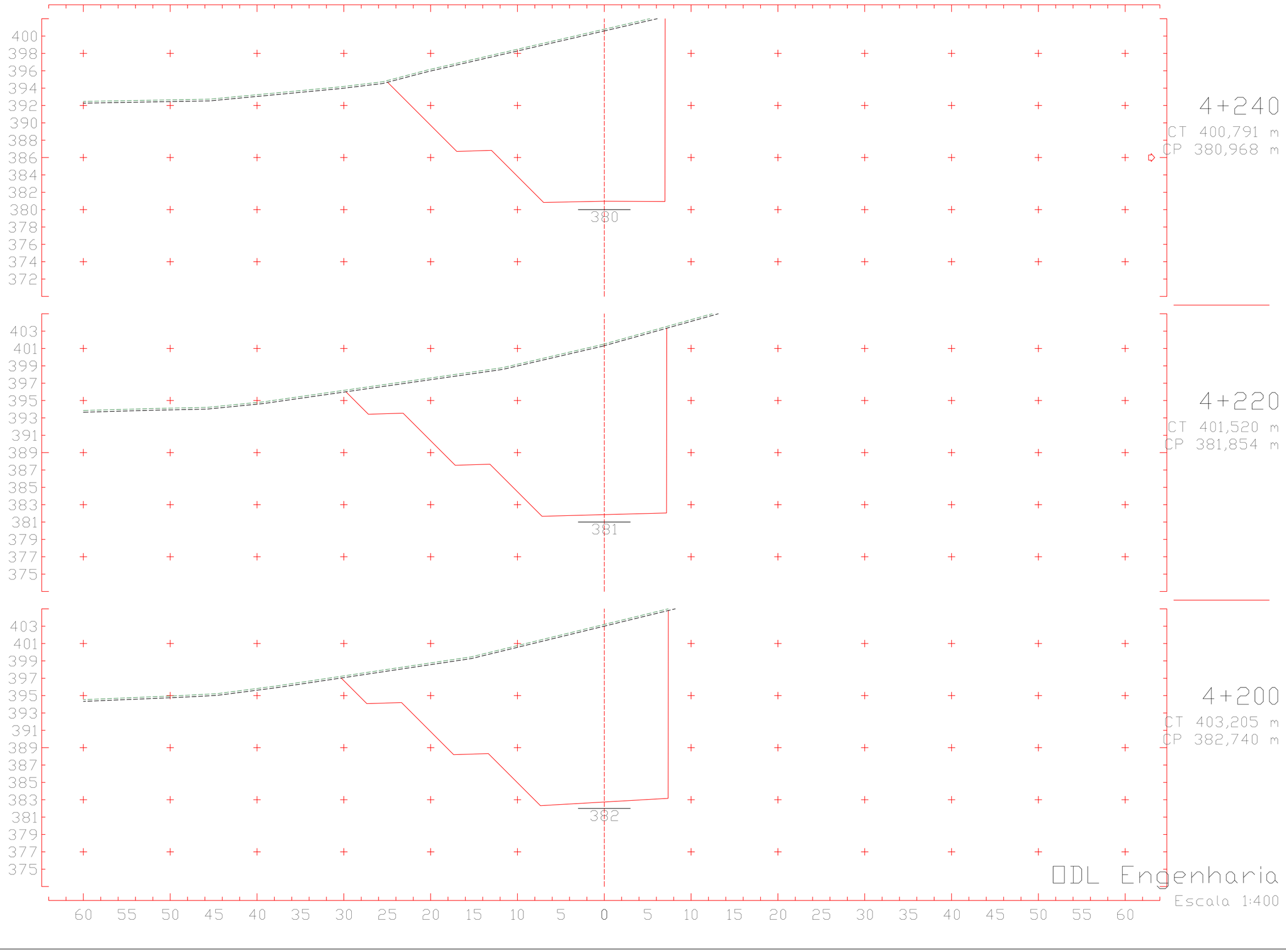
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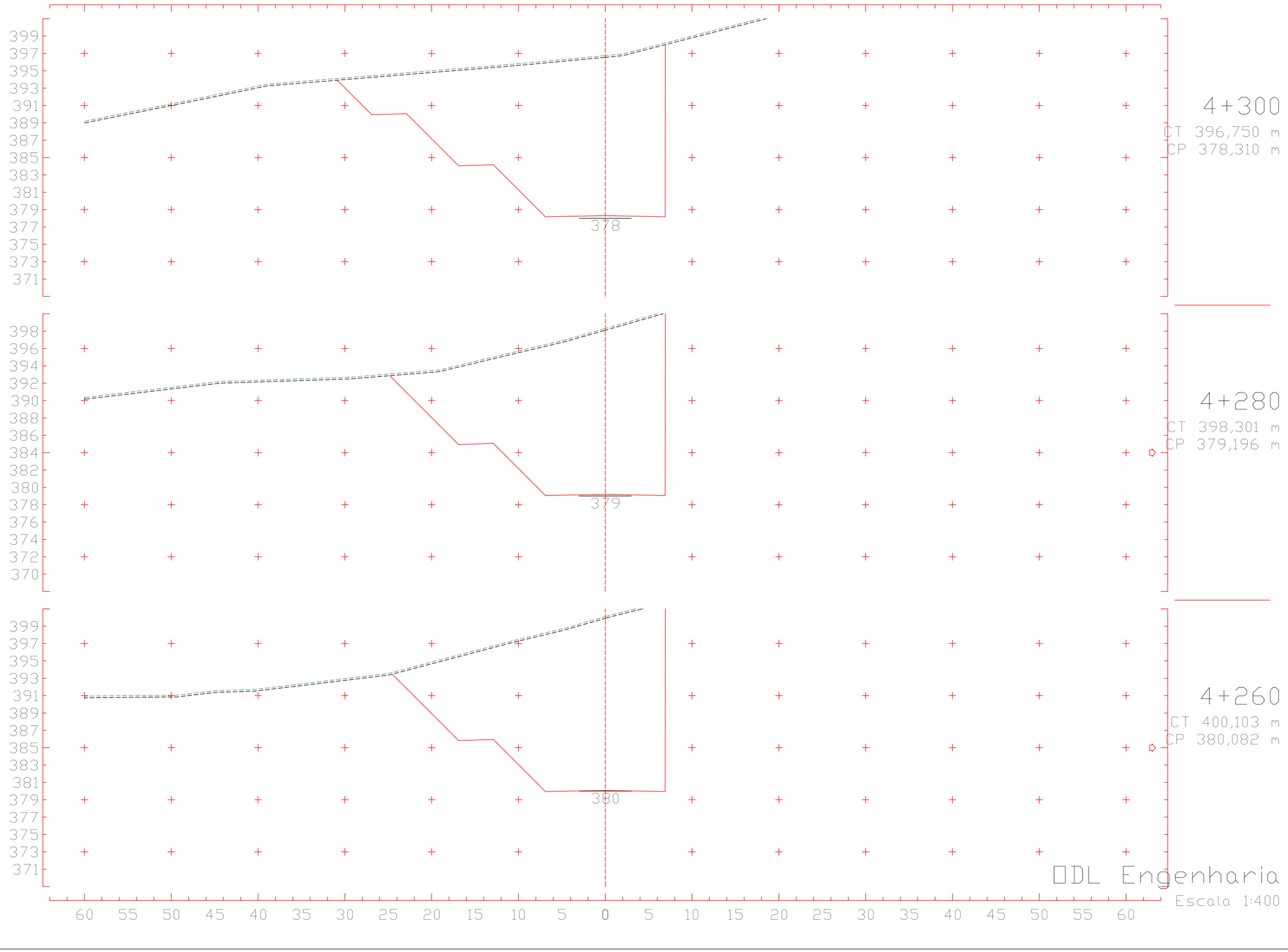
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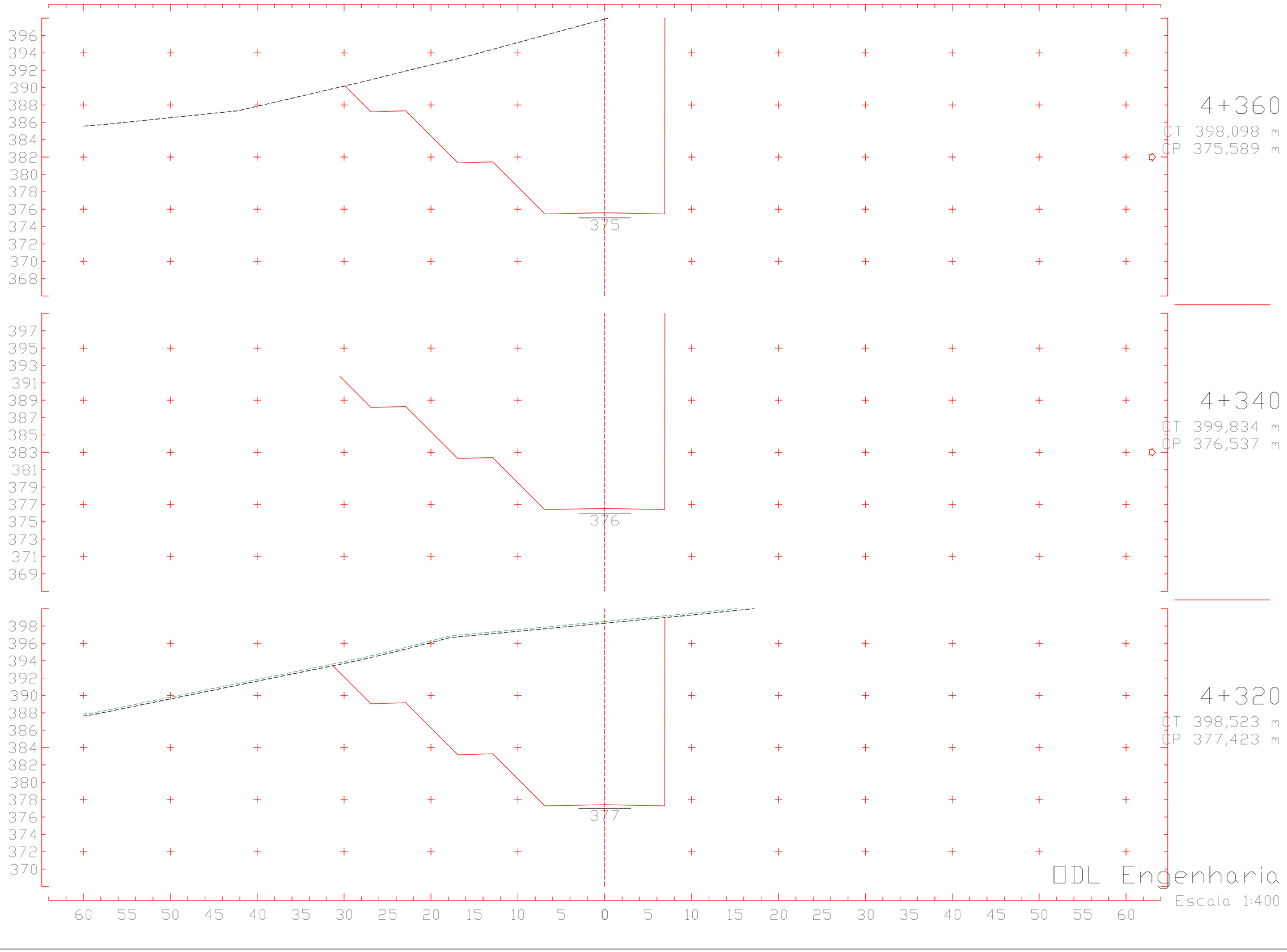
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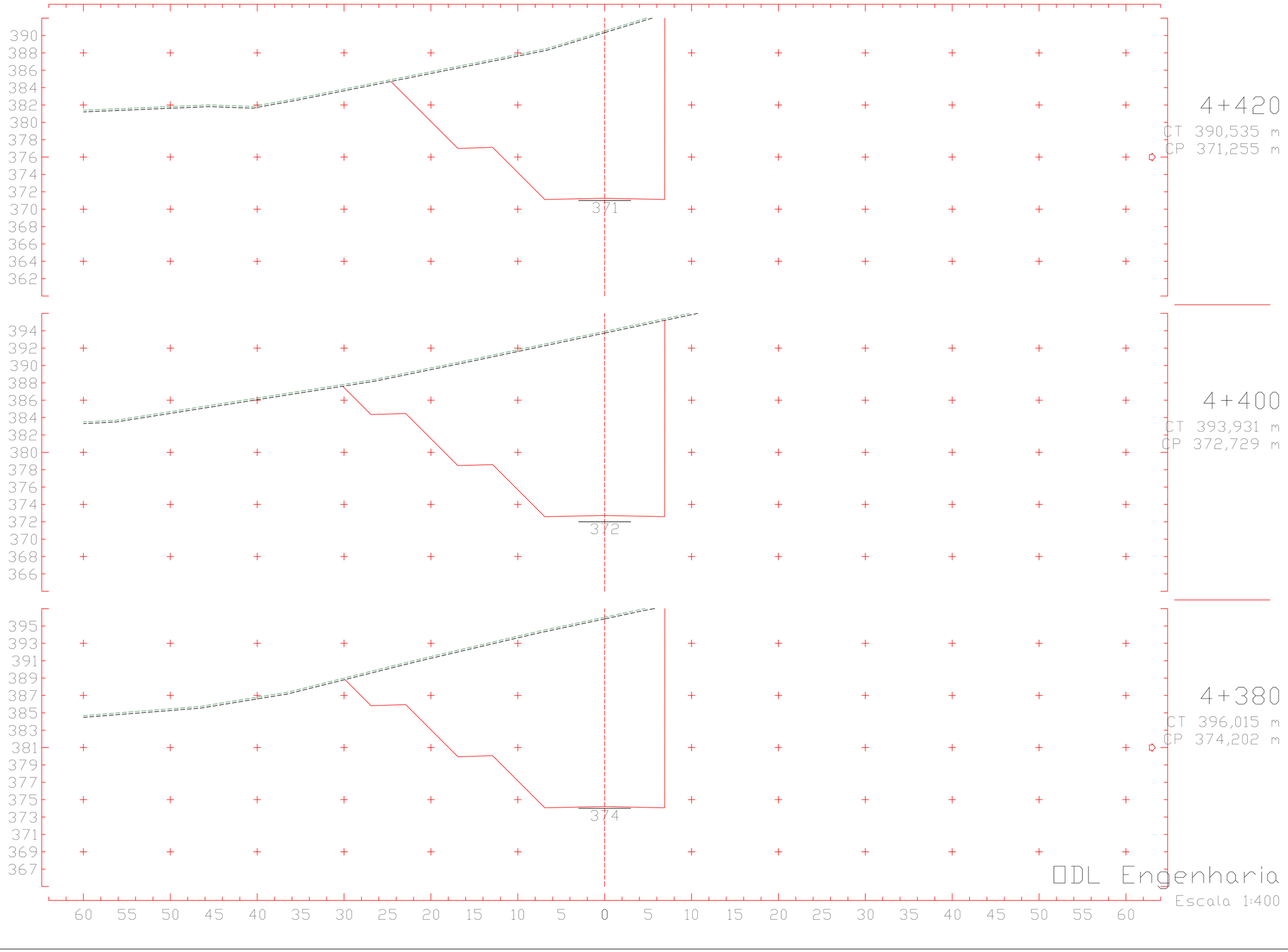
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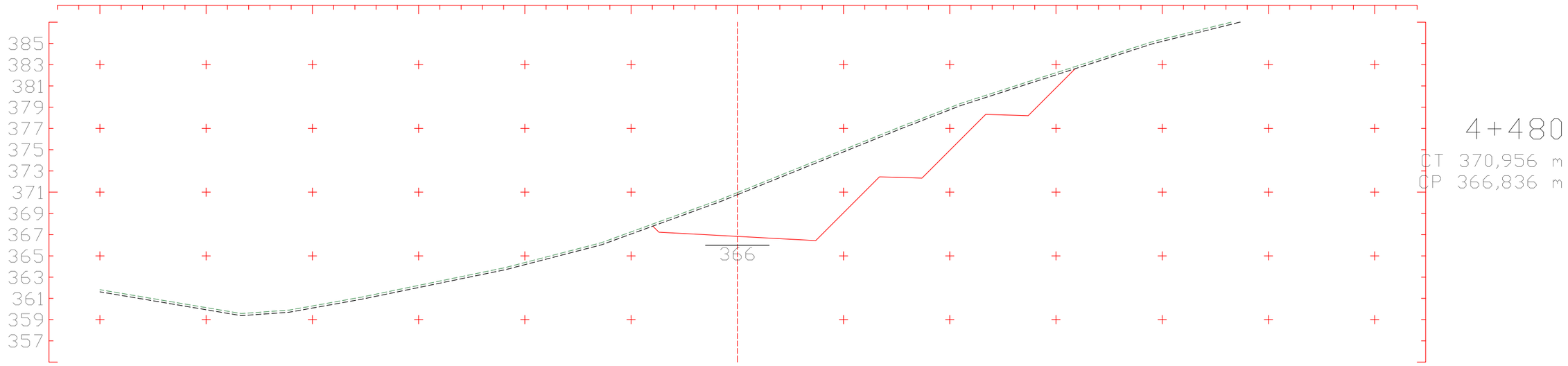
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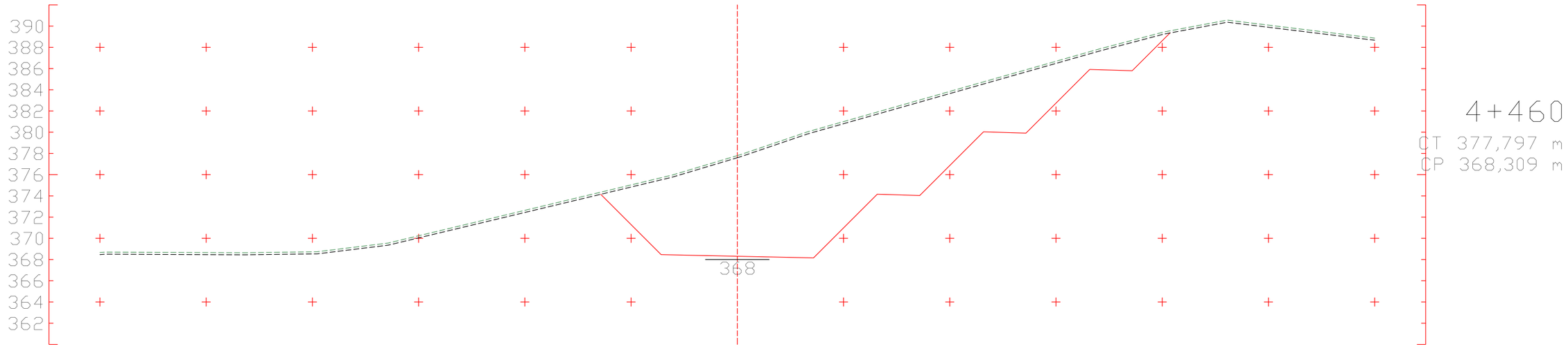


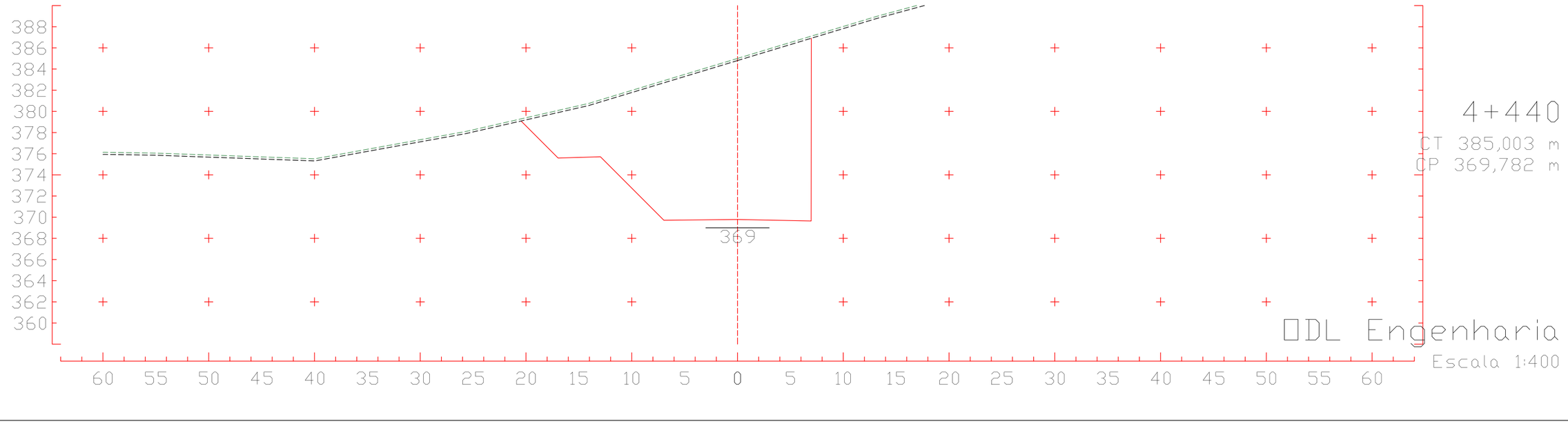
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Projeto Ponto de Partida 2021/1



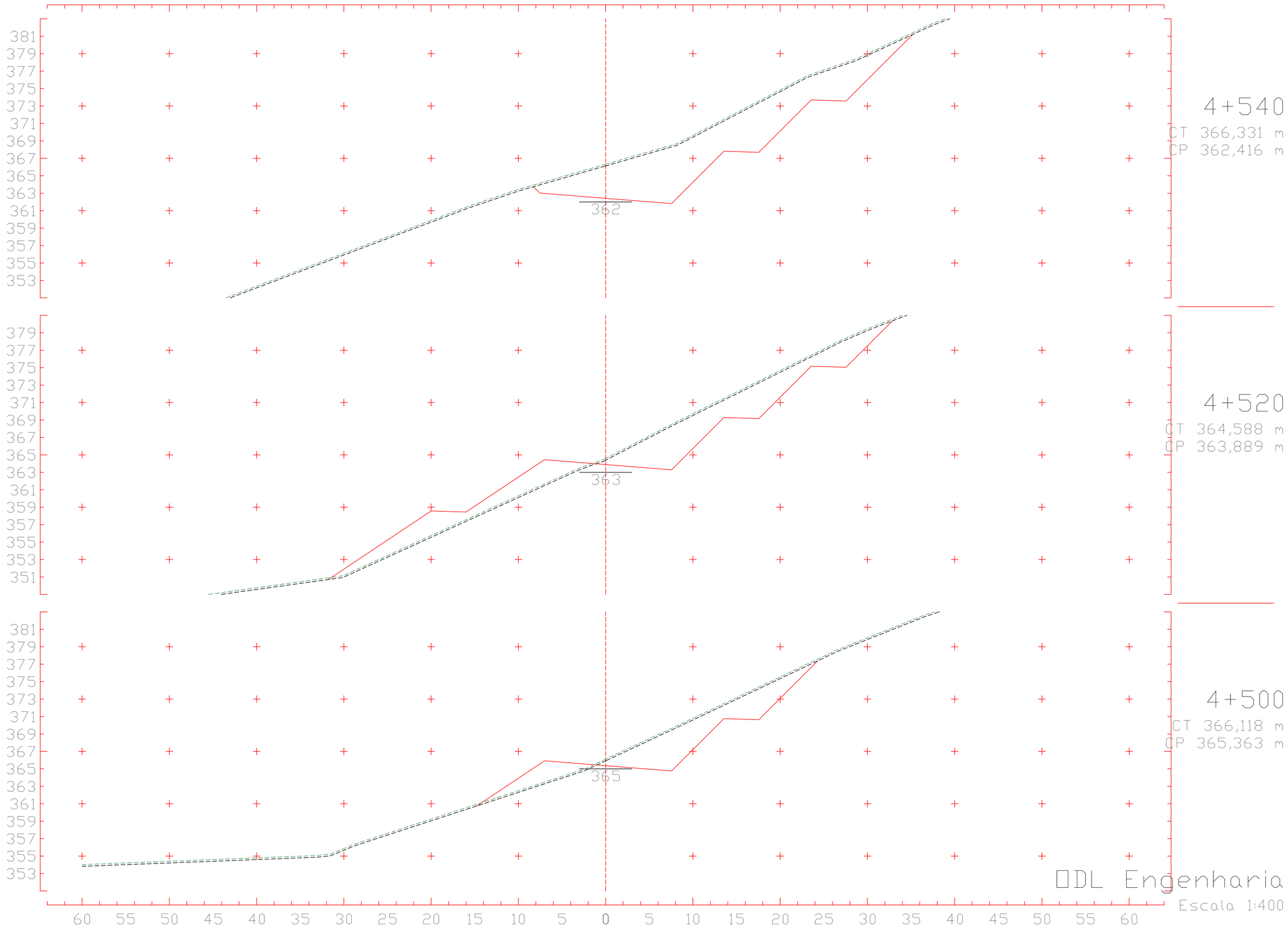




DL Engenharia

Escala 1:400

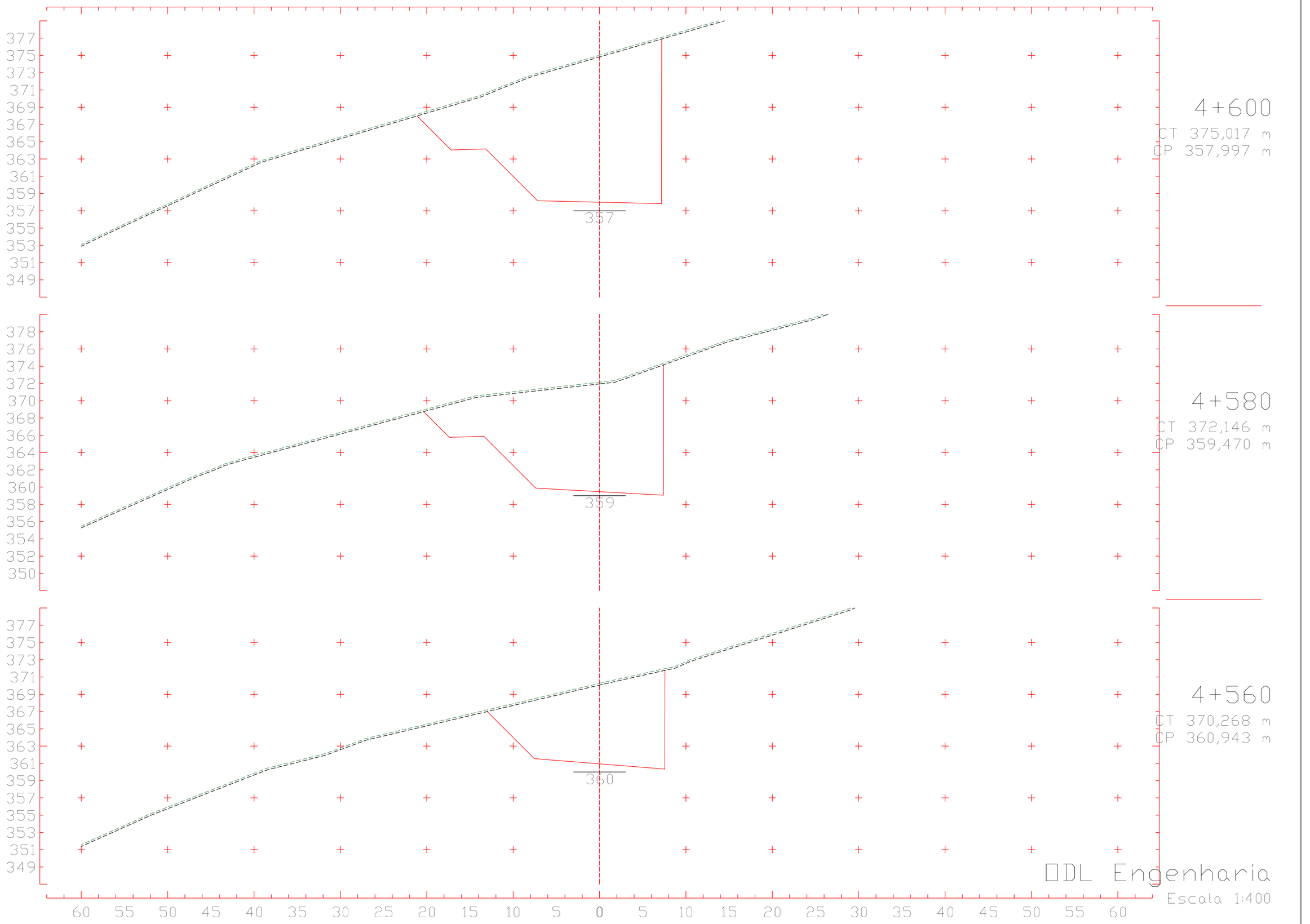
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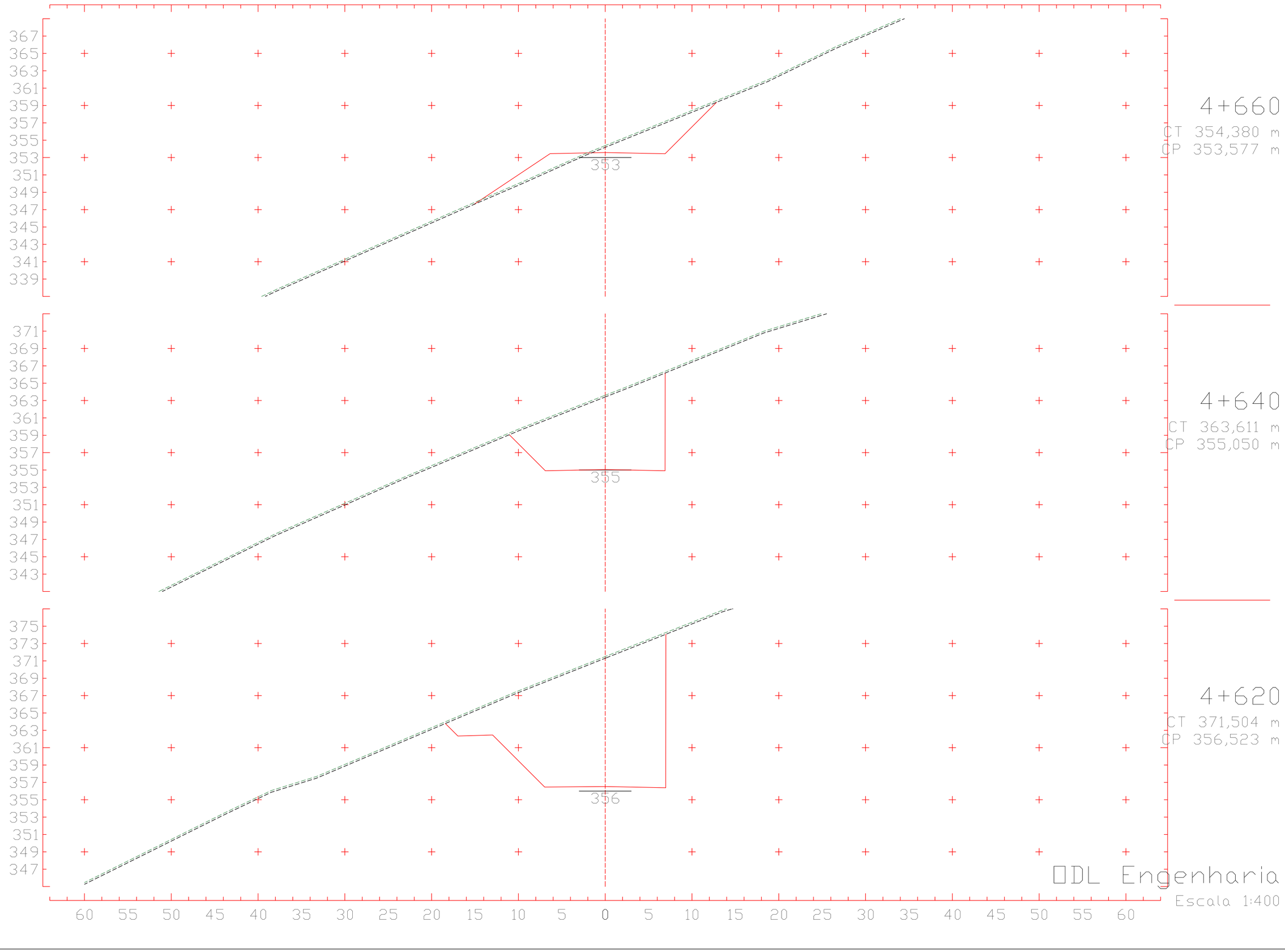


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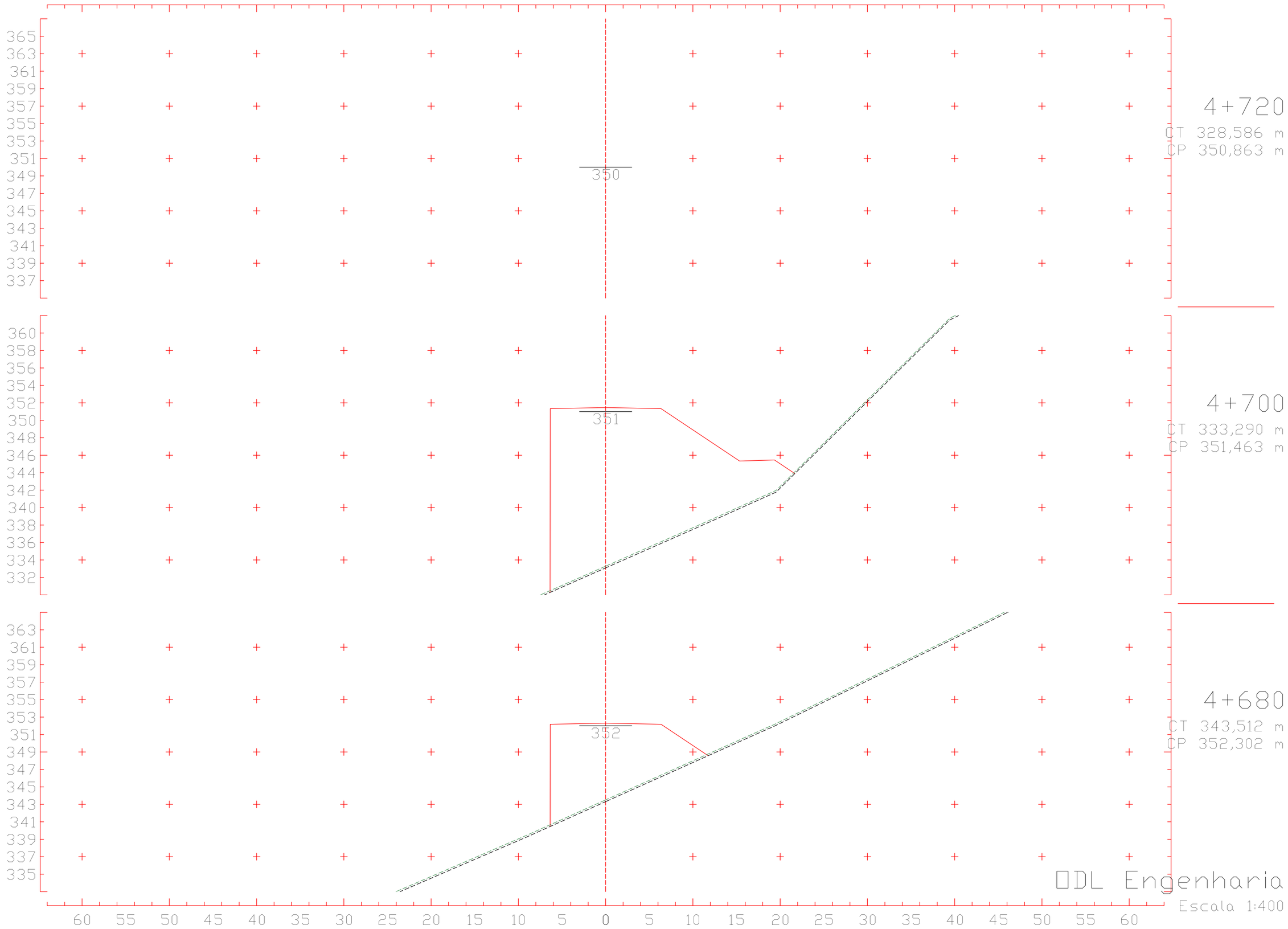
Escala 1:400

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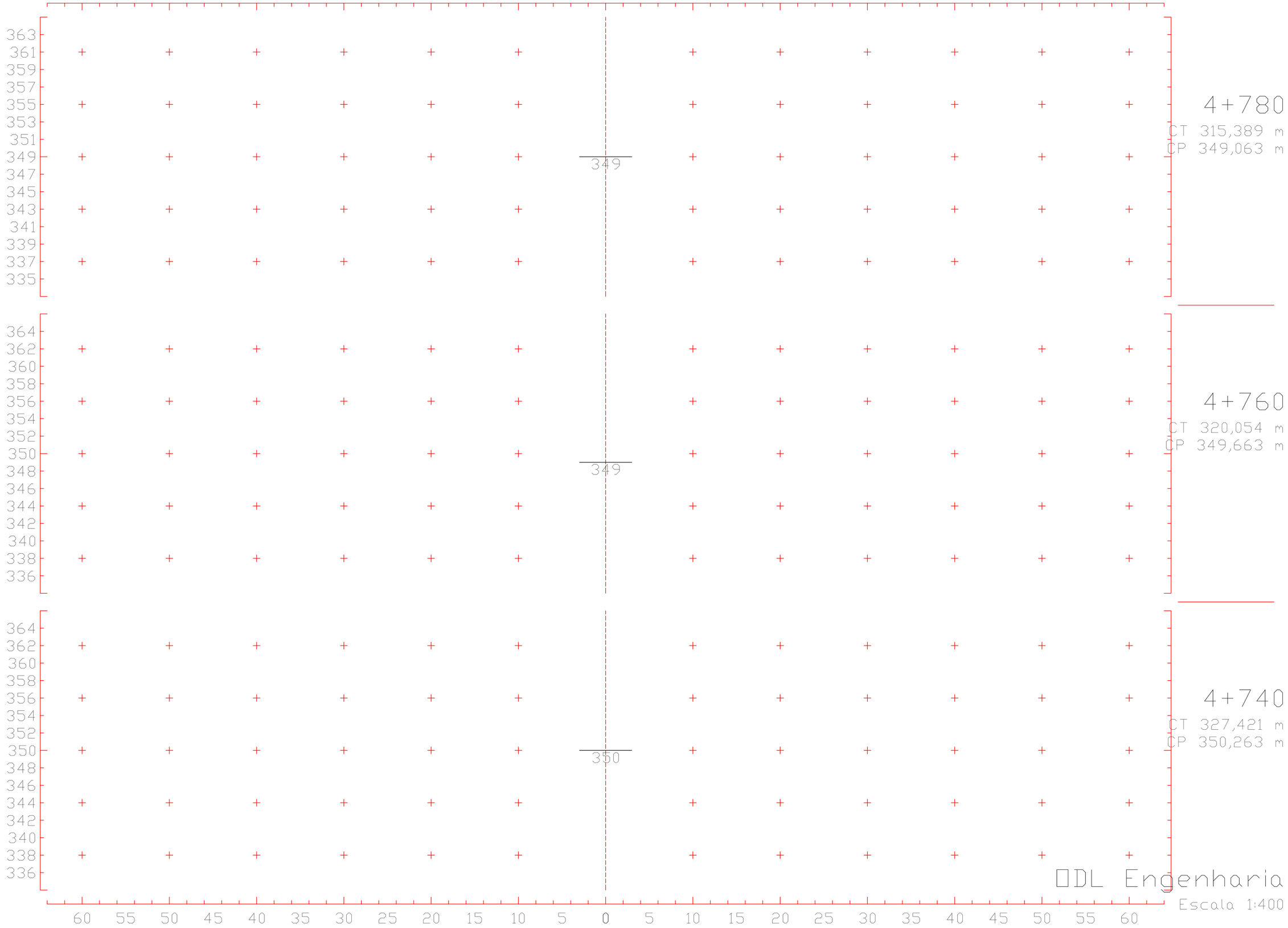



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4+660
CT 354,380 m
CP 353,577 m
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4+640
CT 363,611 m
CP 355,050 m
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CP 356,523 m
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DL Engenharia
Escala 1:400

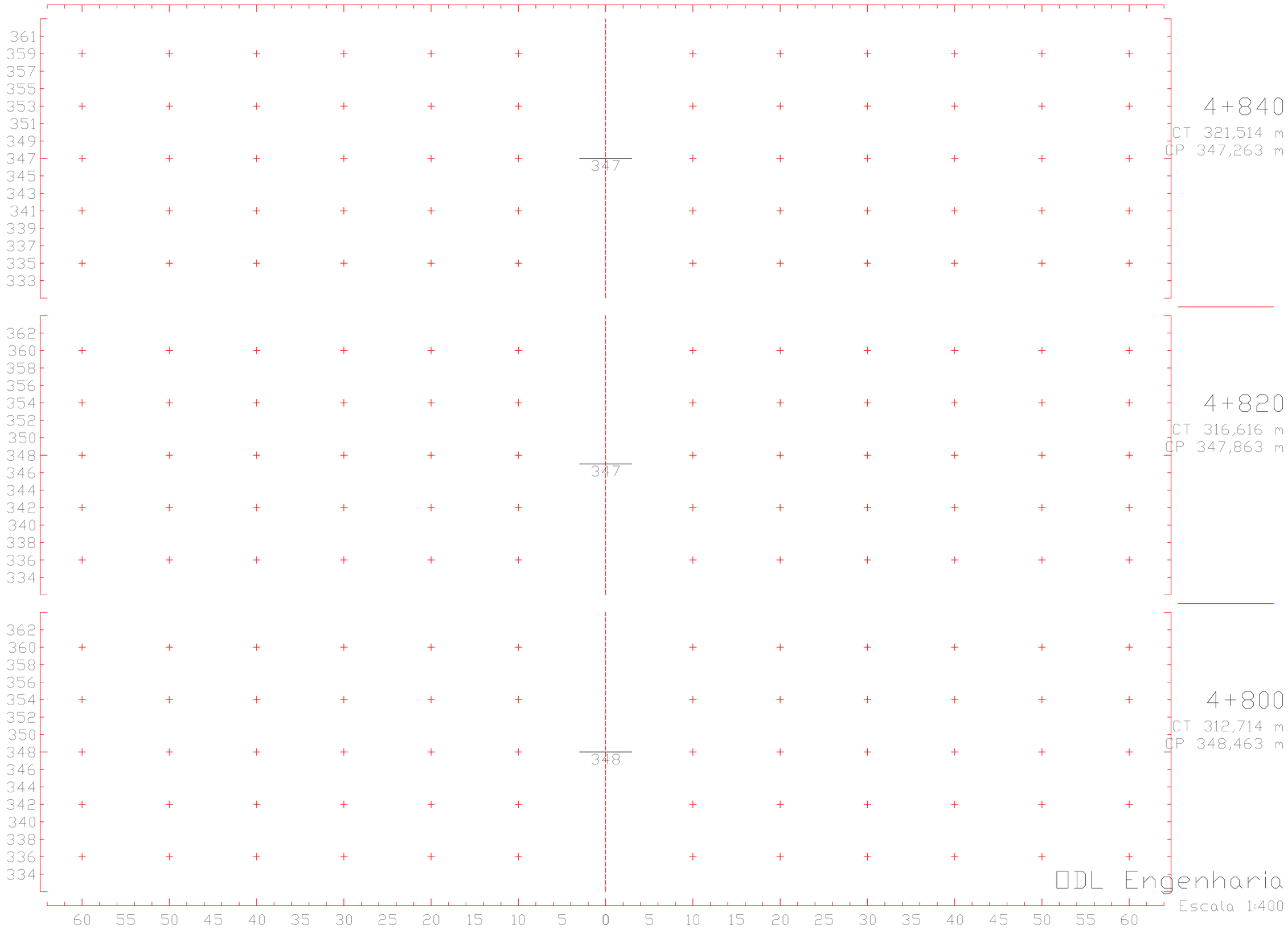
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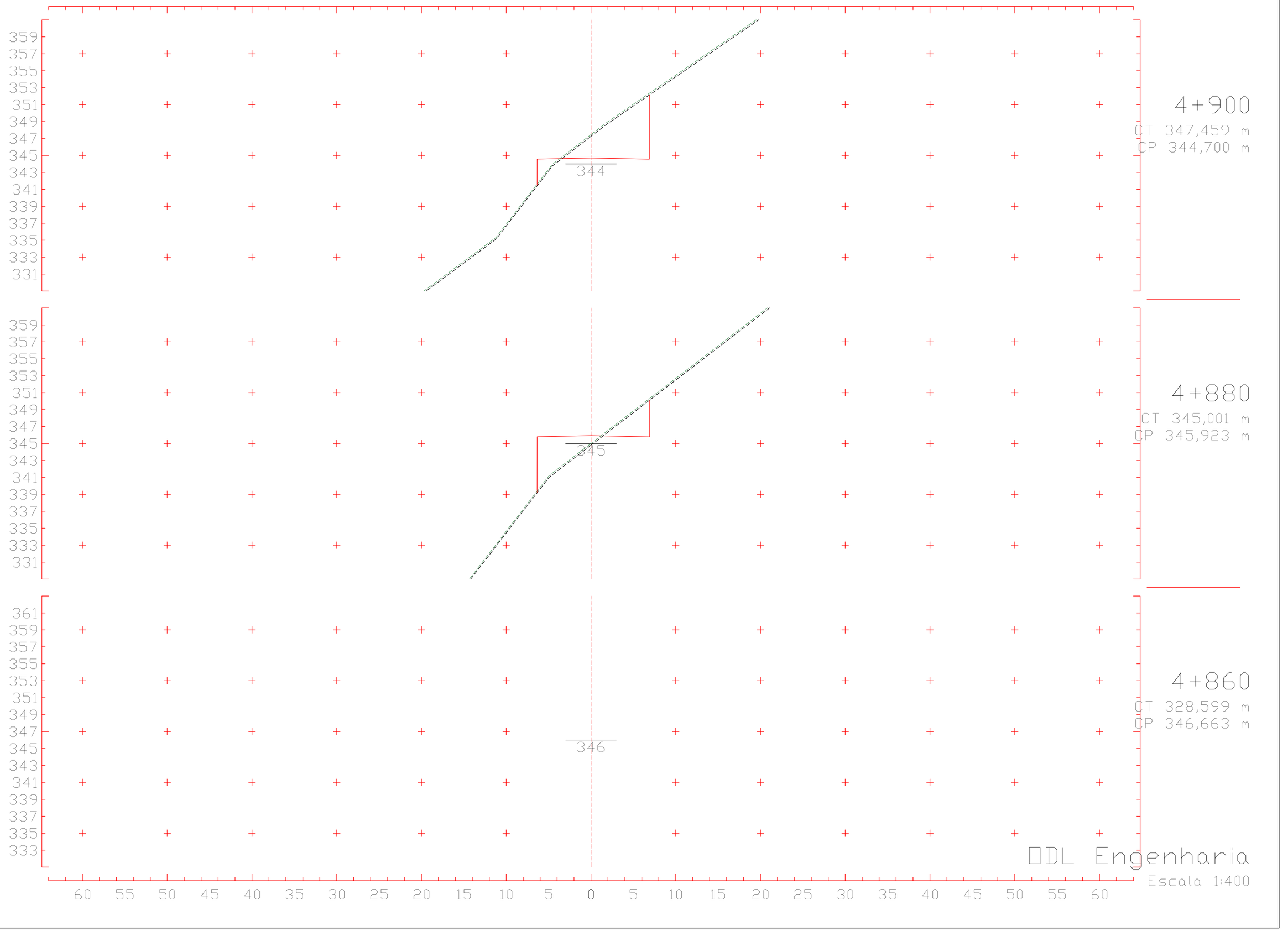
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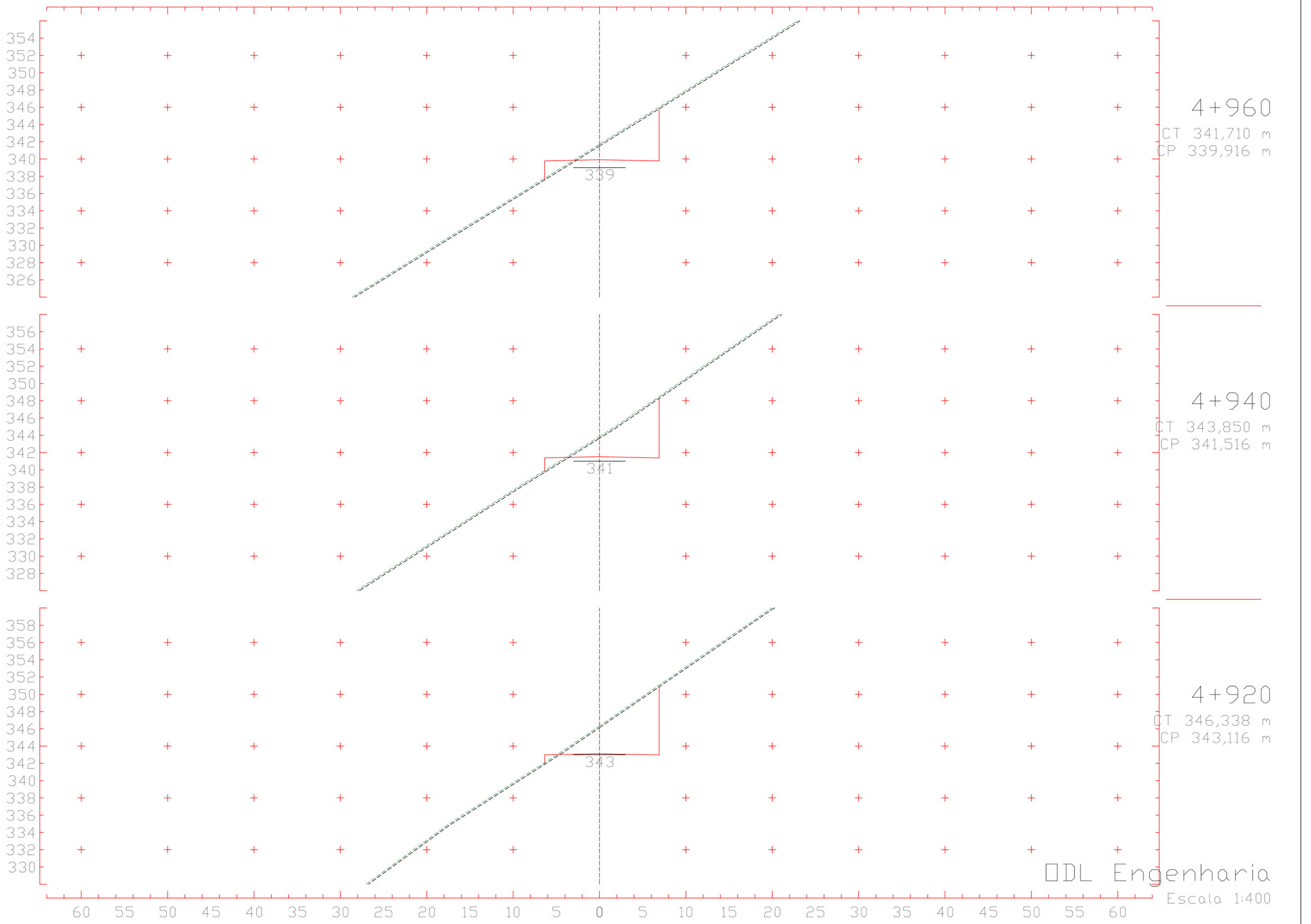
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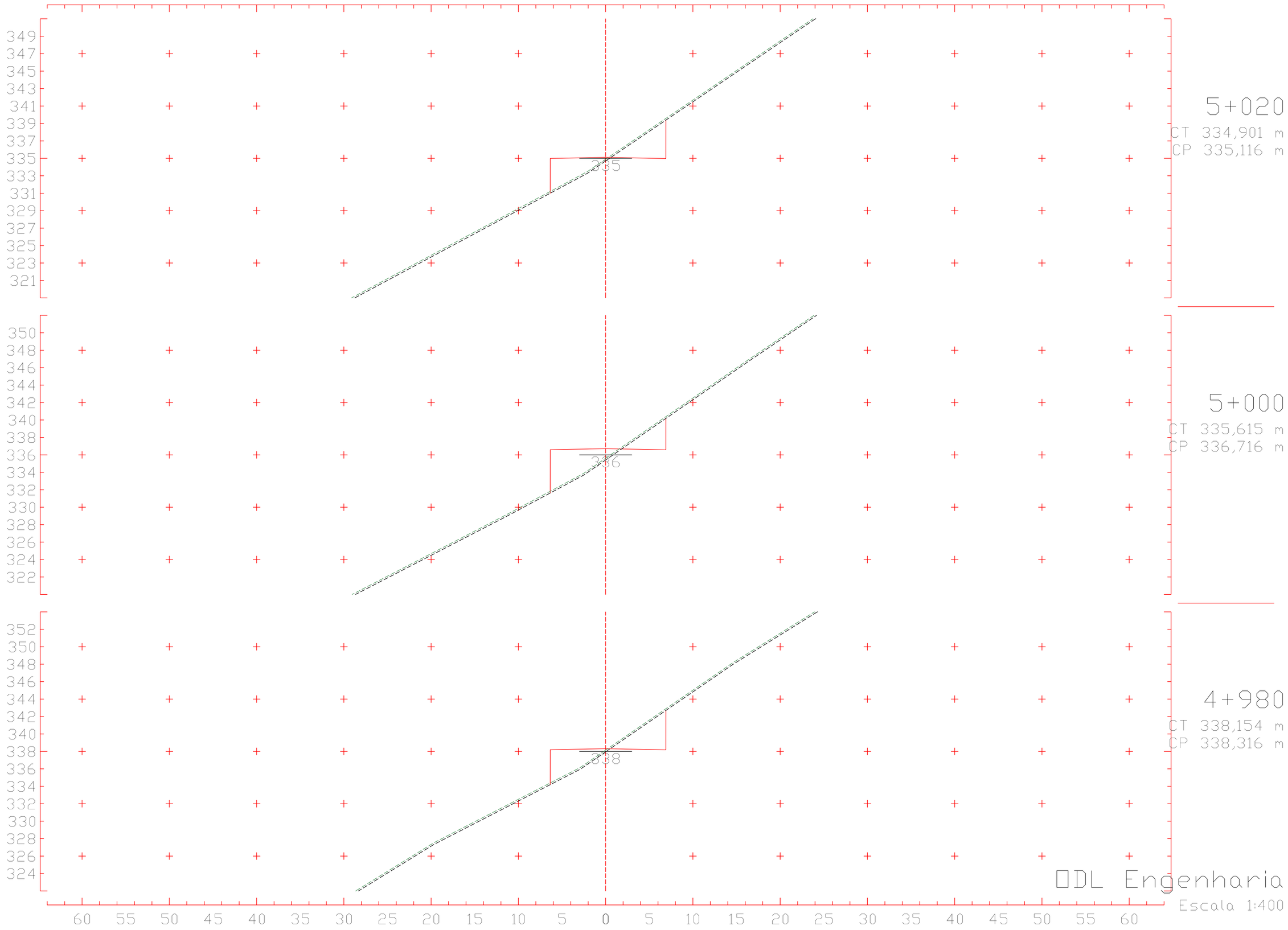
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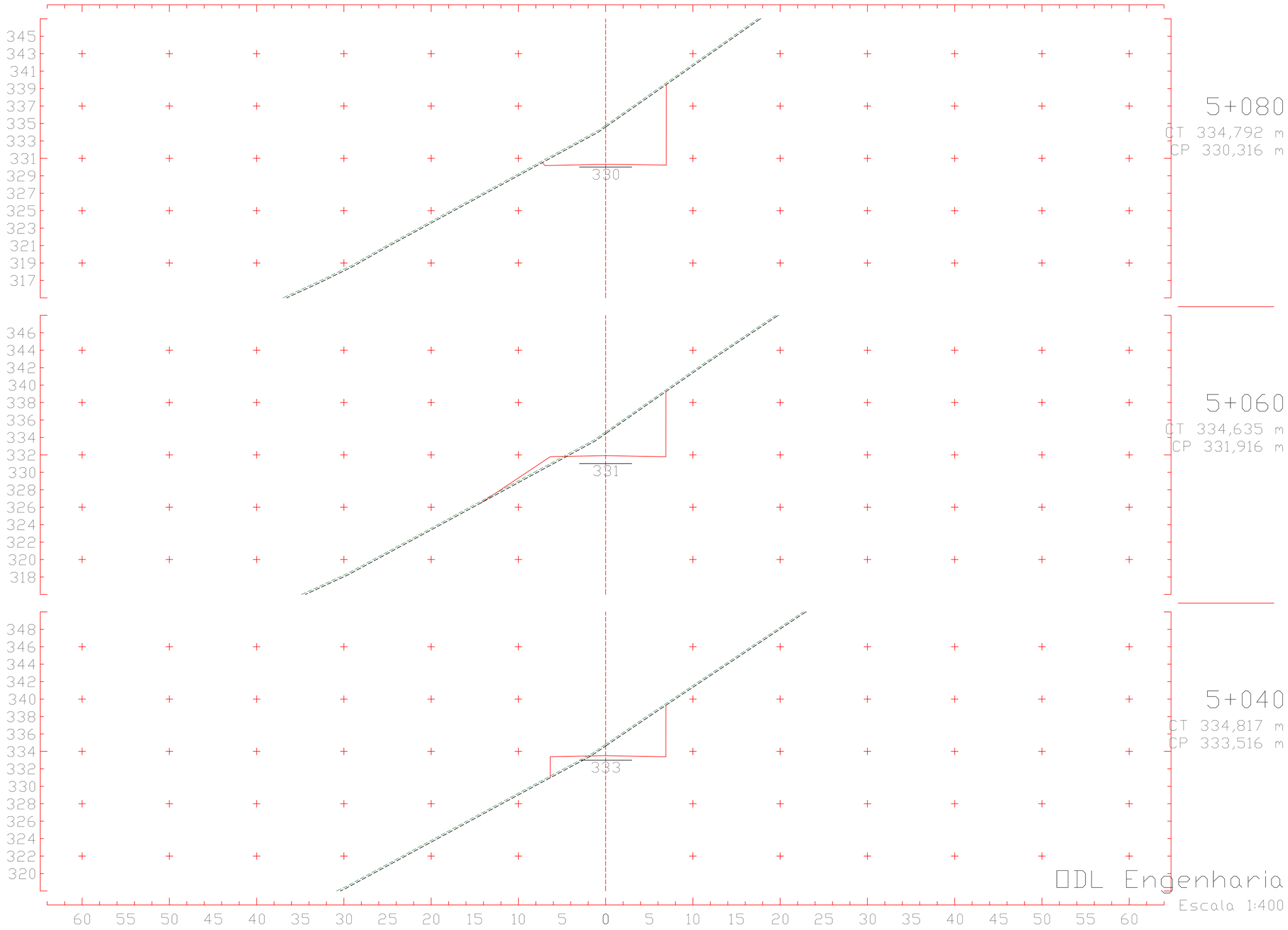
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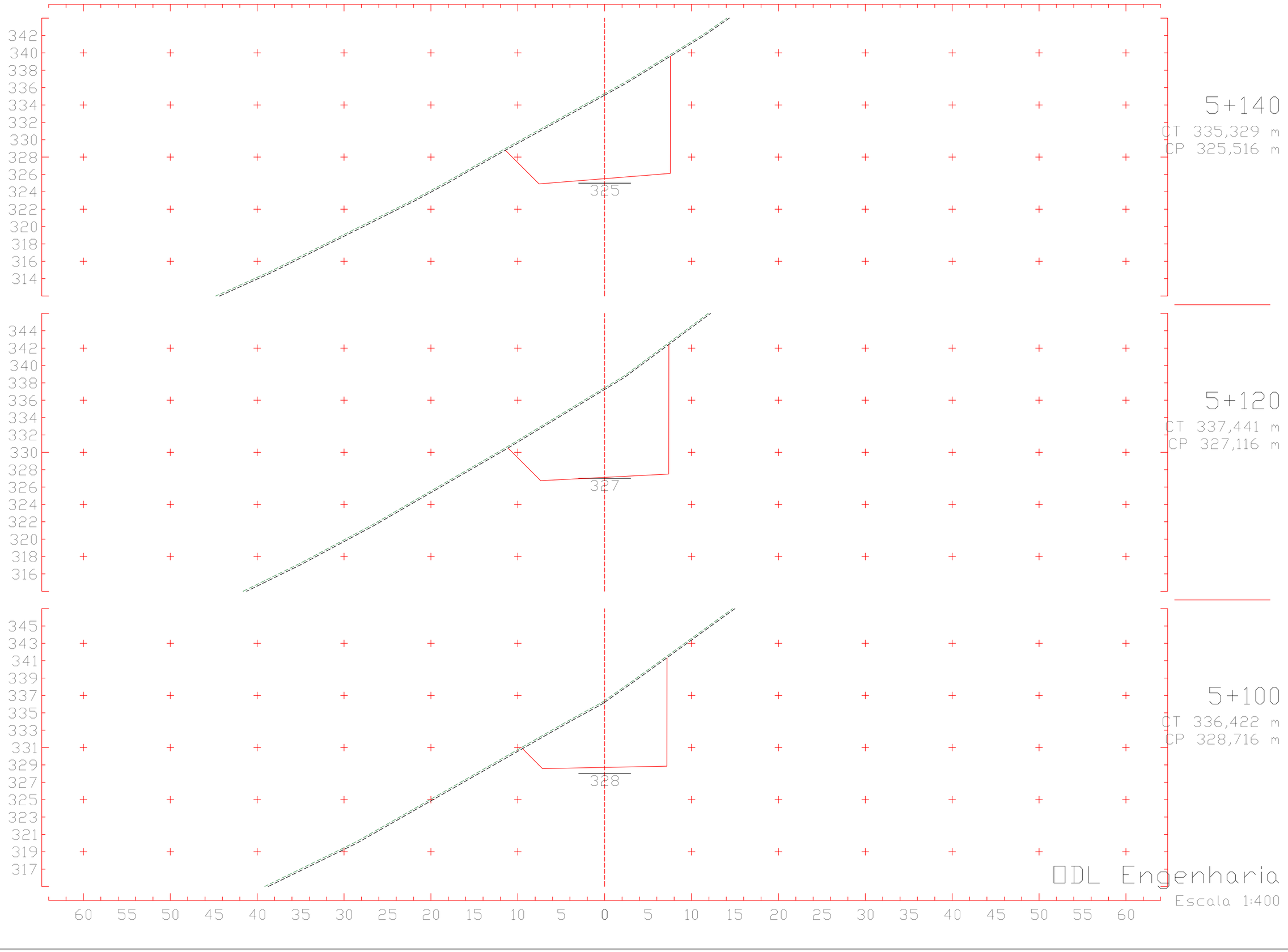
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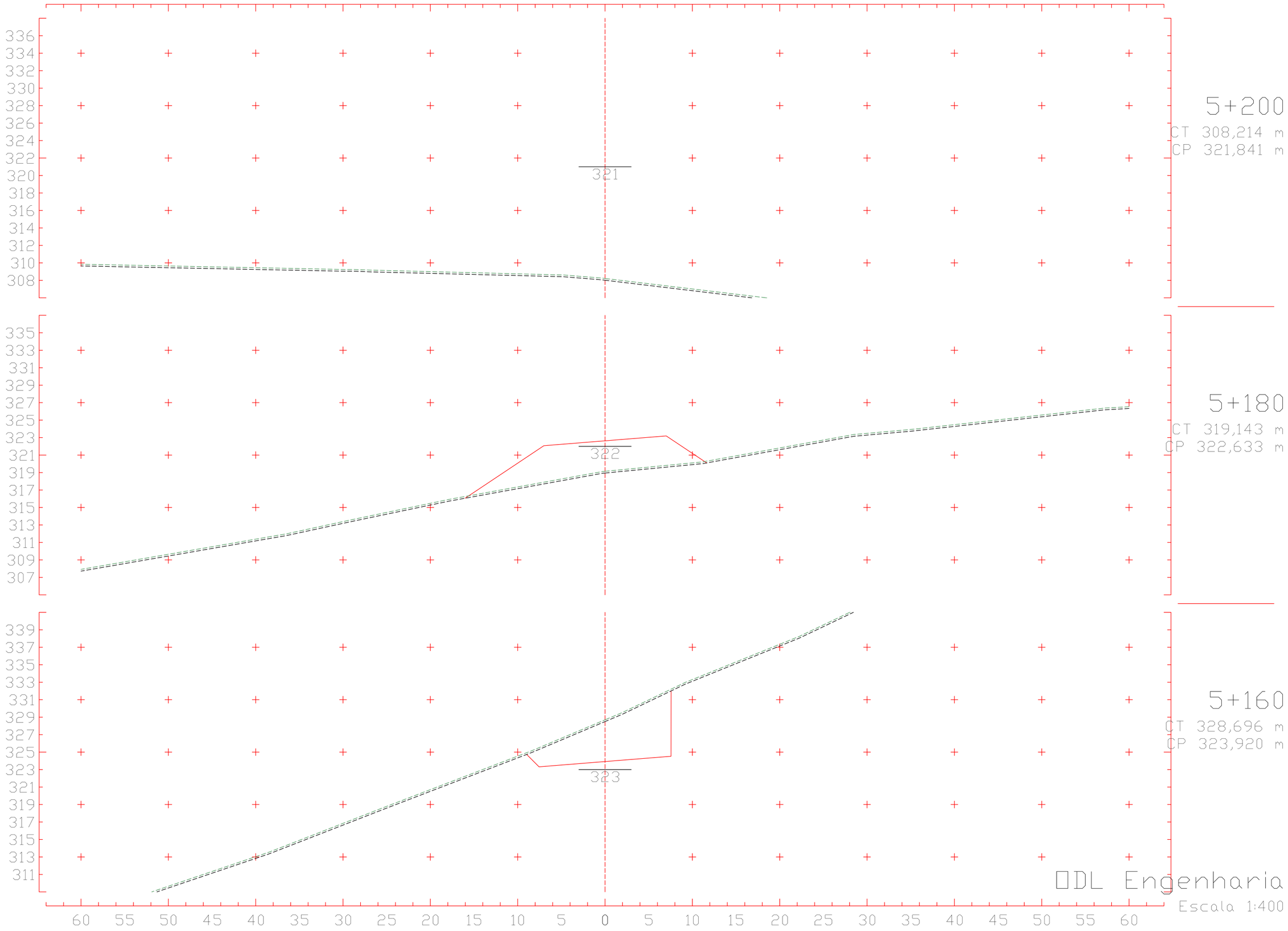
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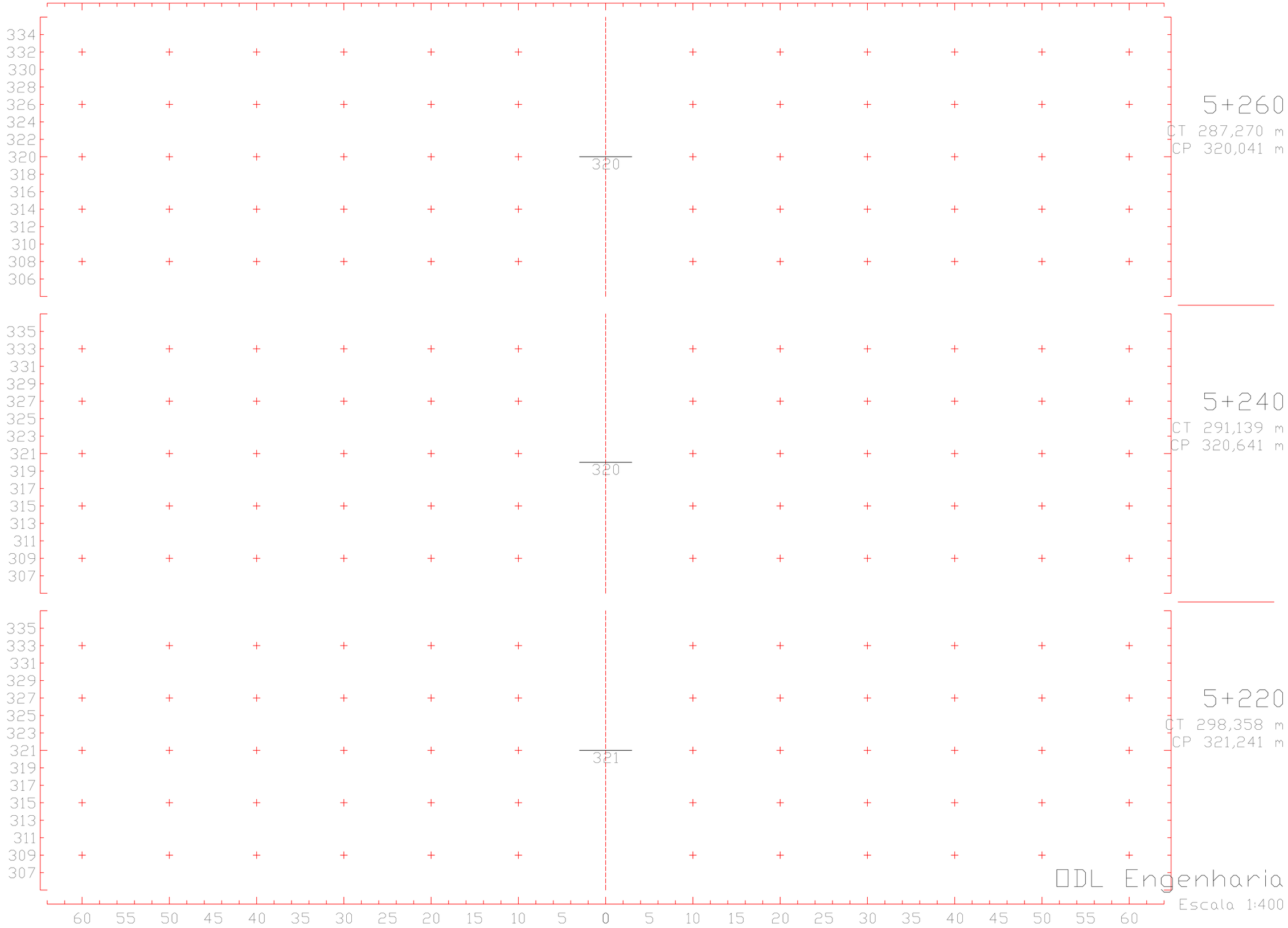
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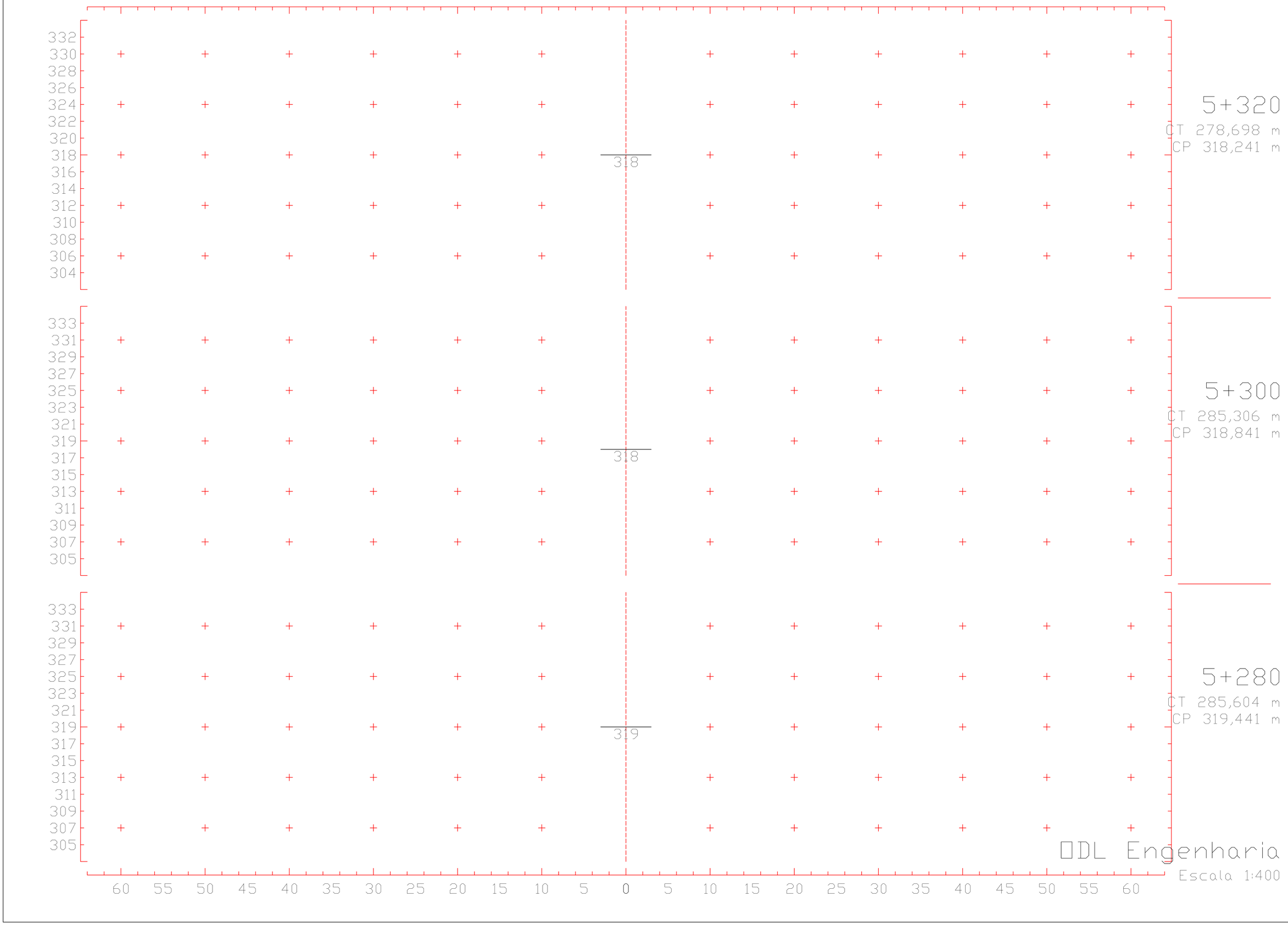


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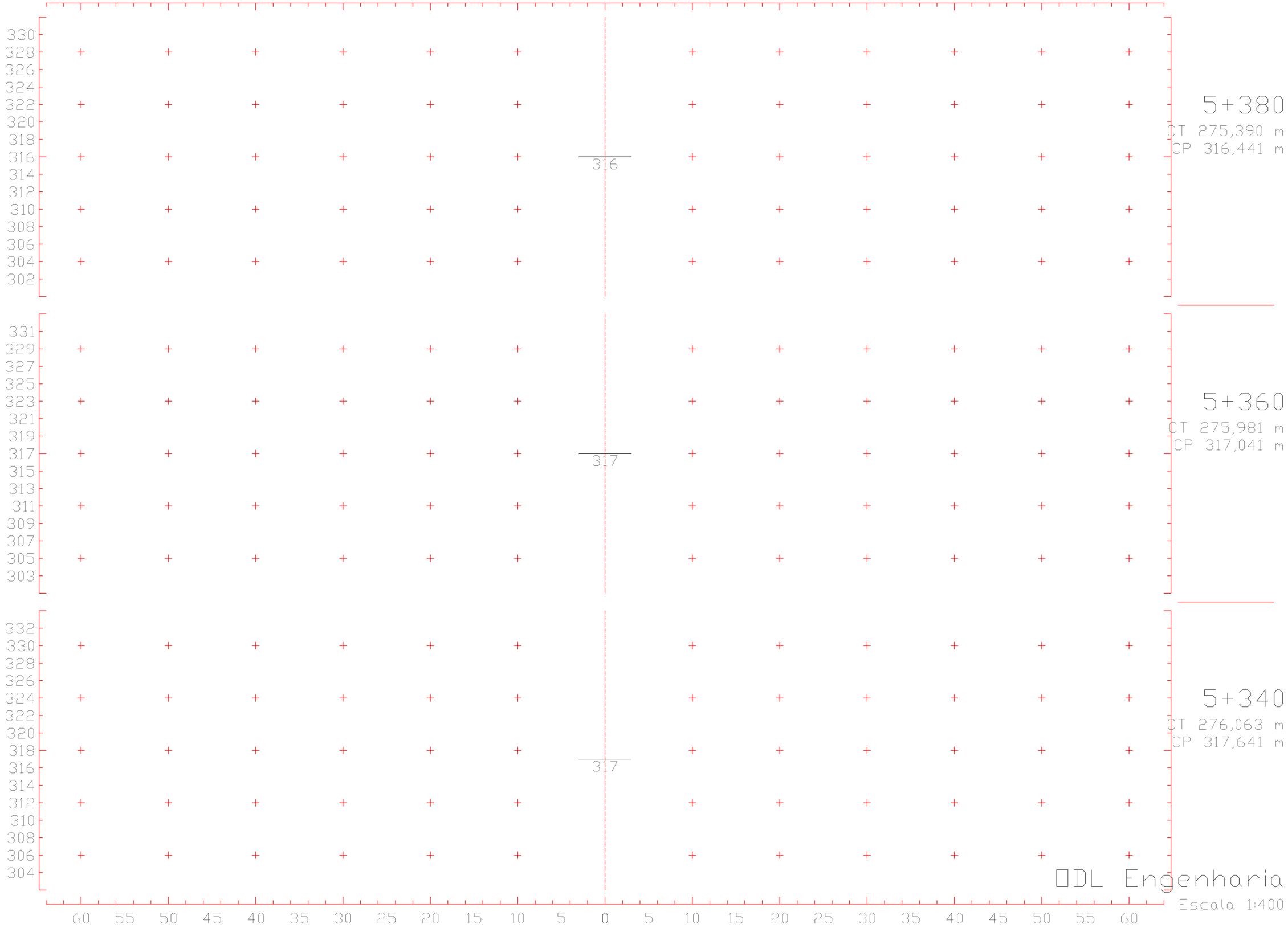


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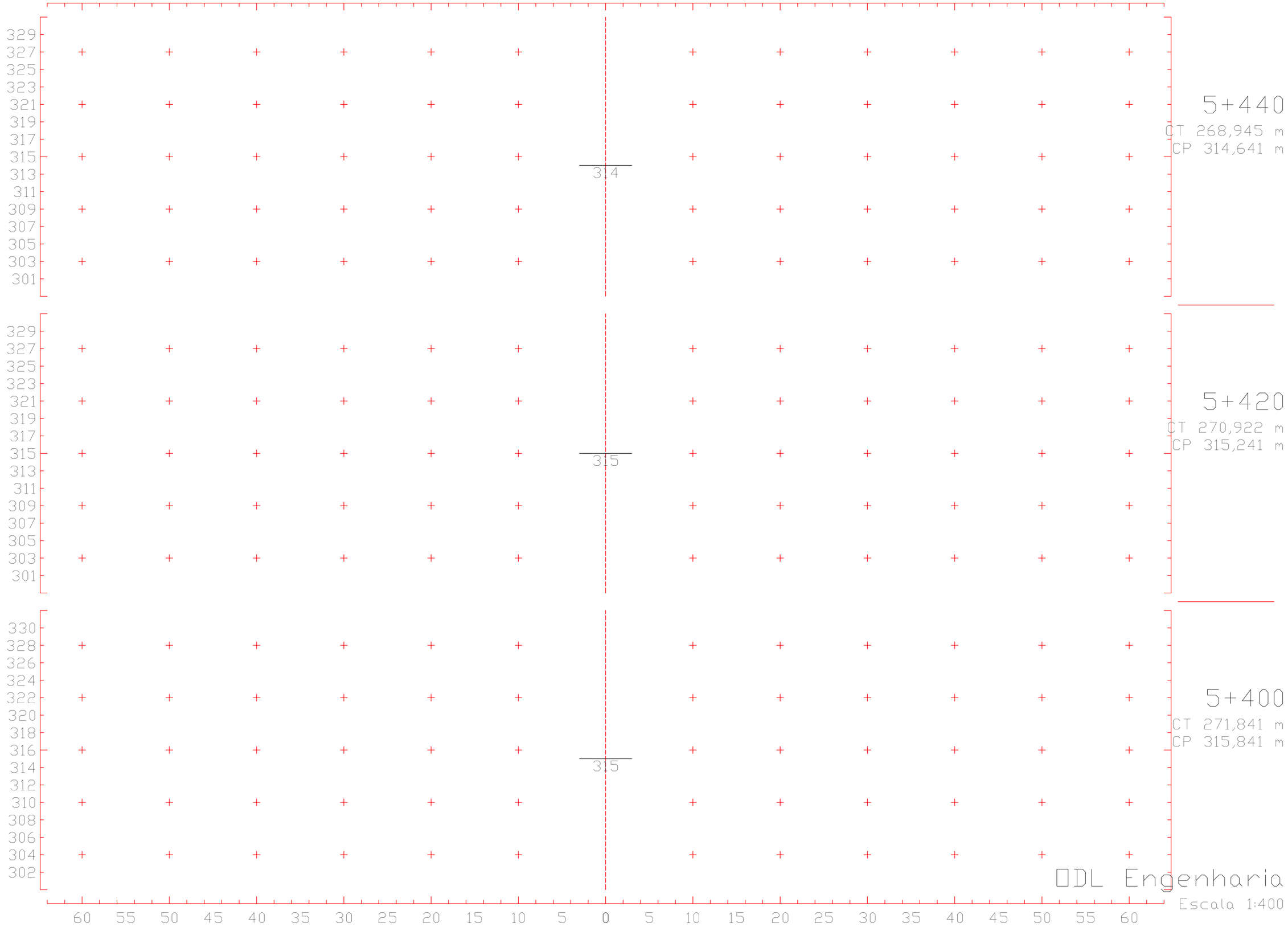



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5+320
CT 278,698 m
CP 318,241 m
333
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327
325
323
321
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307
305
318
5+300
CT 285,306 m
CP 318,841 m
333
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311
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305
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CP 319,441 m
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DL Engenharia
Escala 1:400

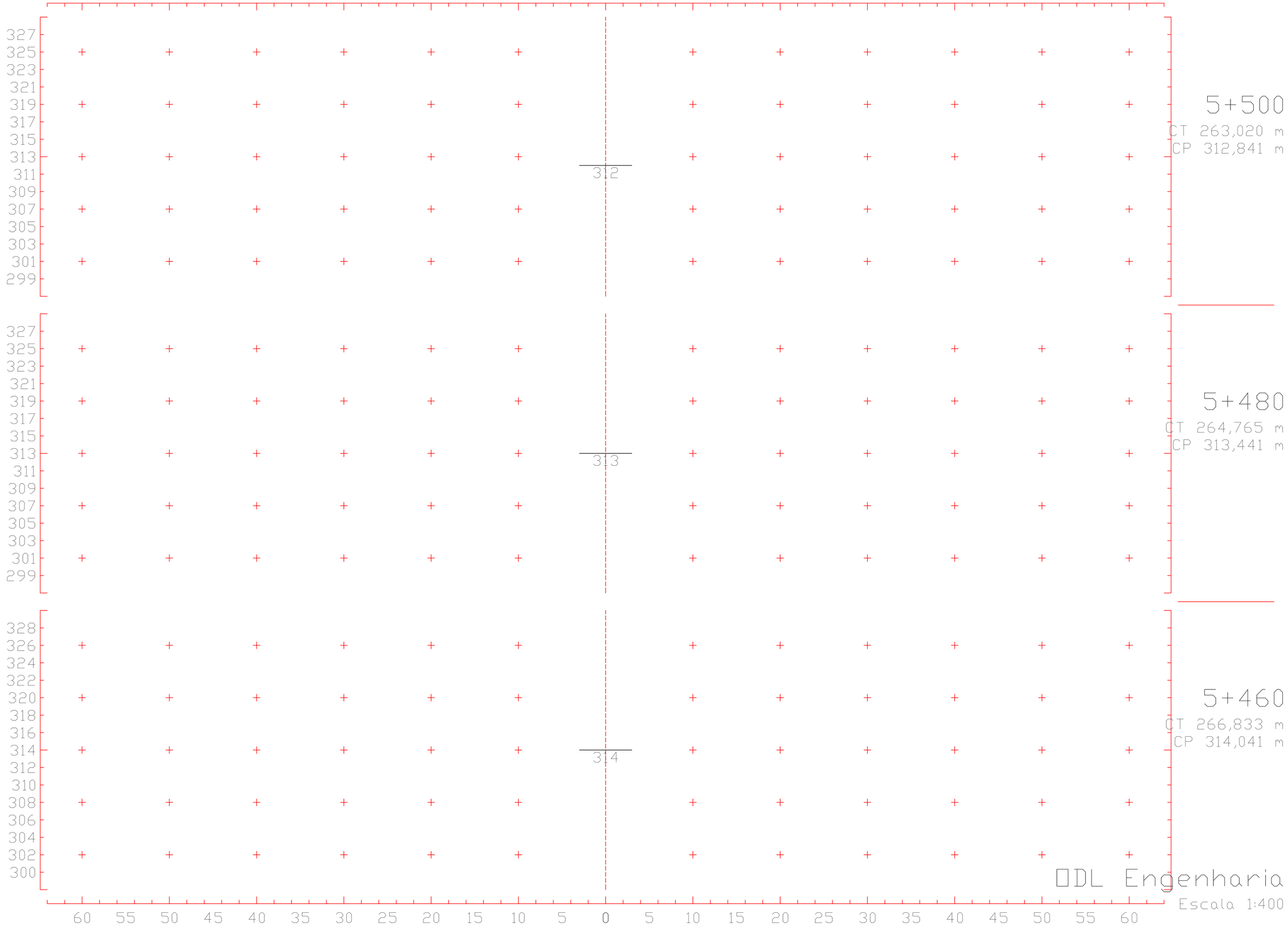
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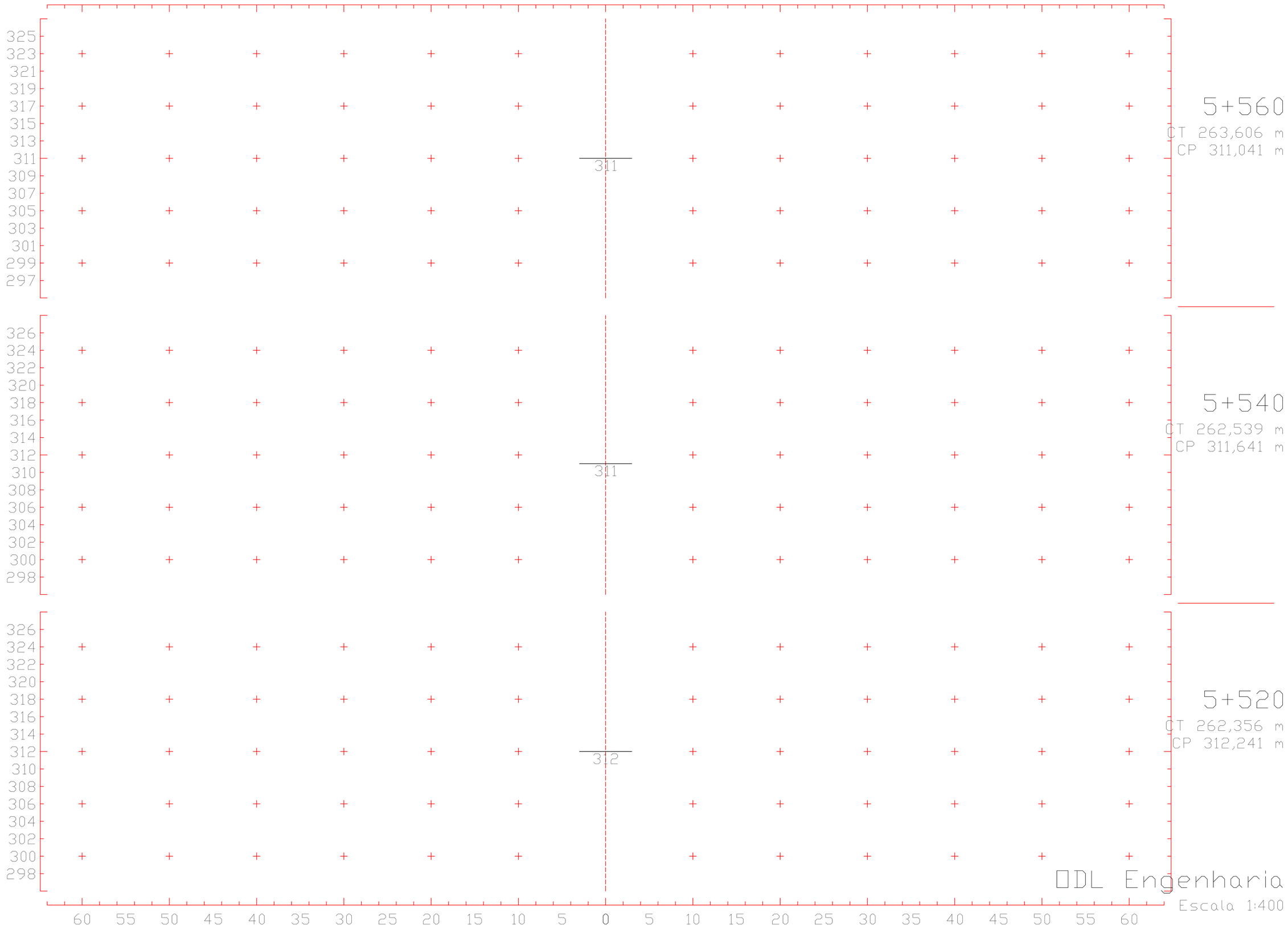
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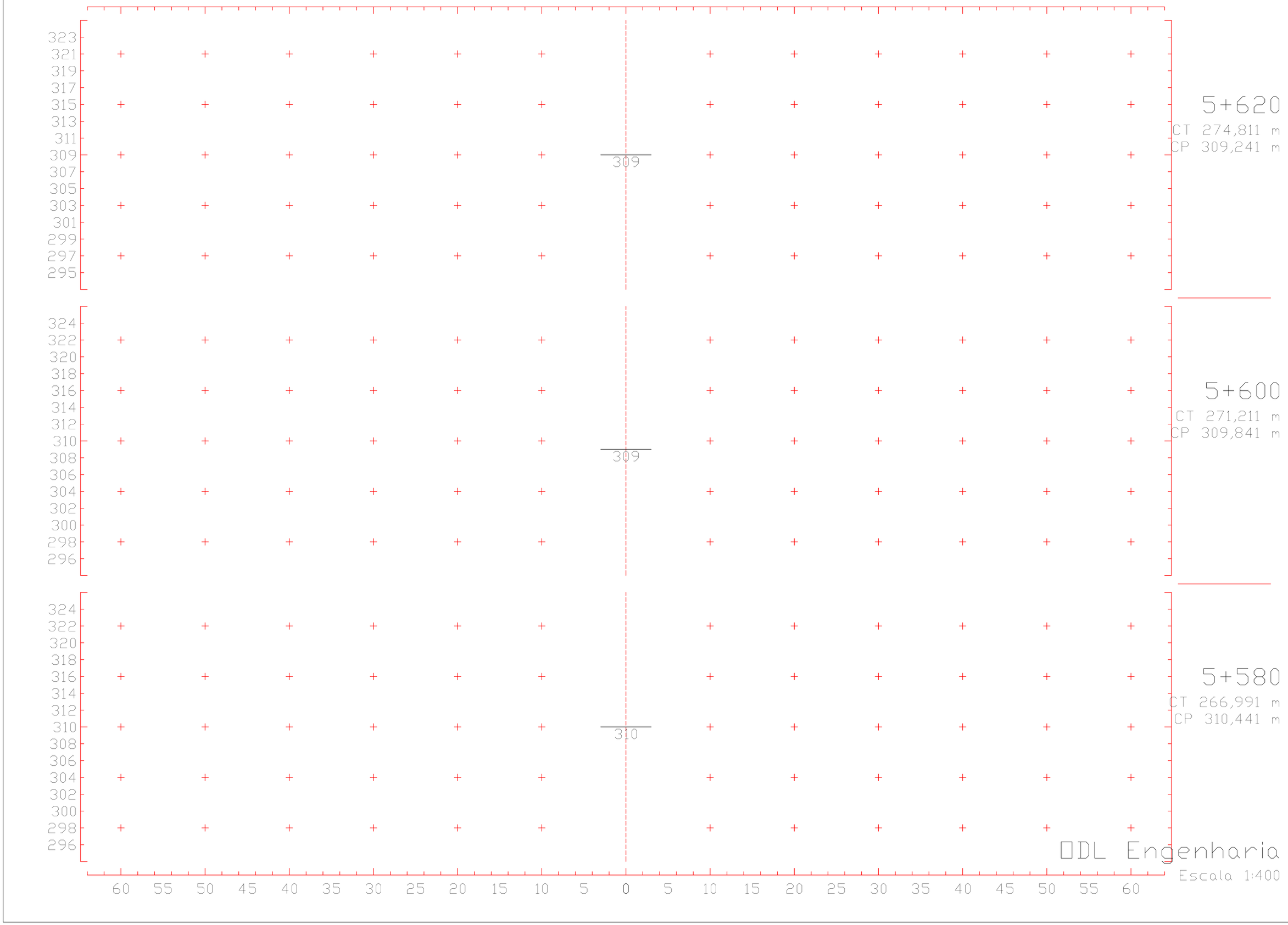


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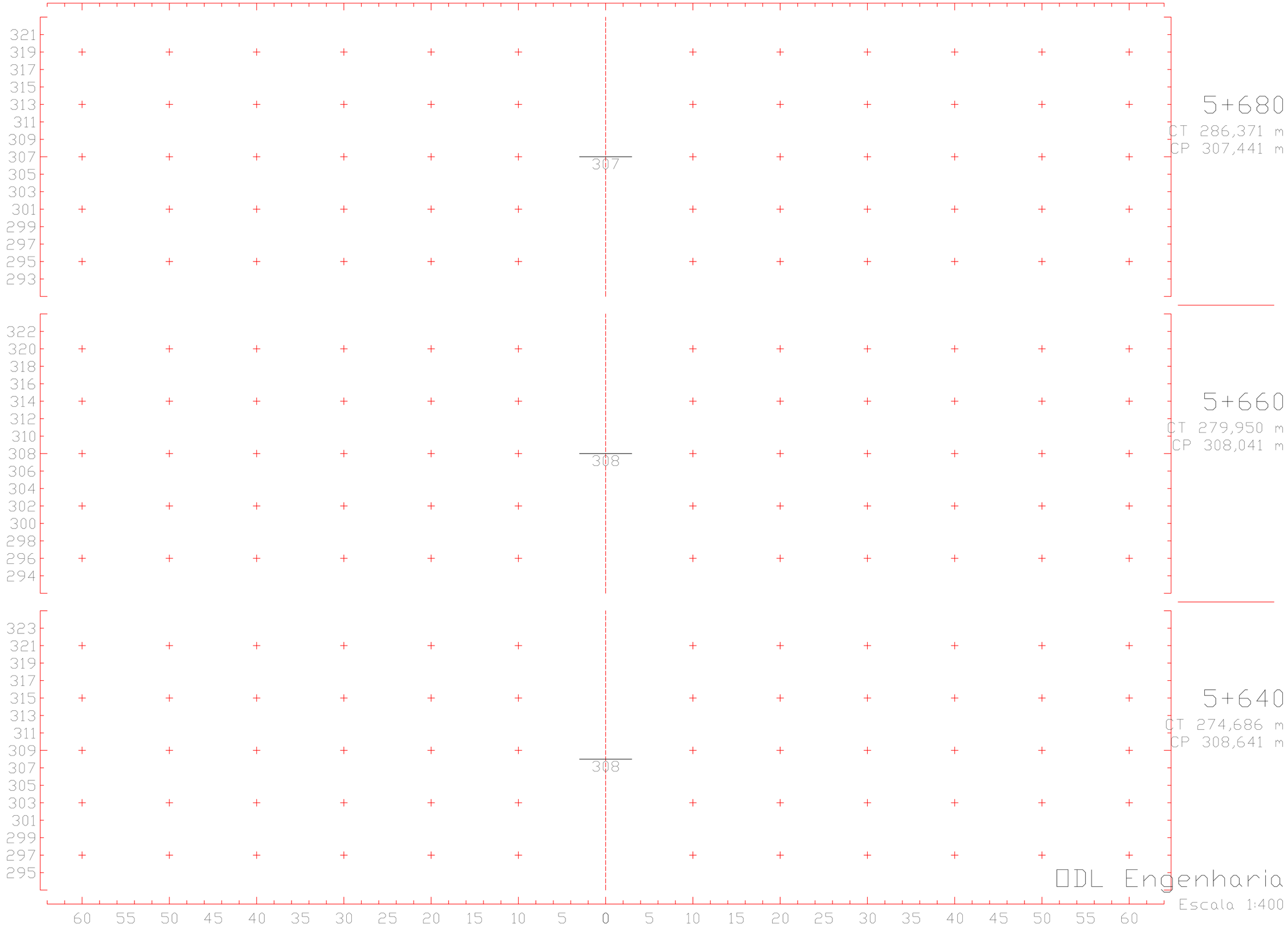


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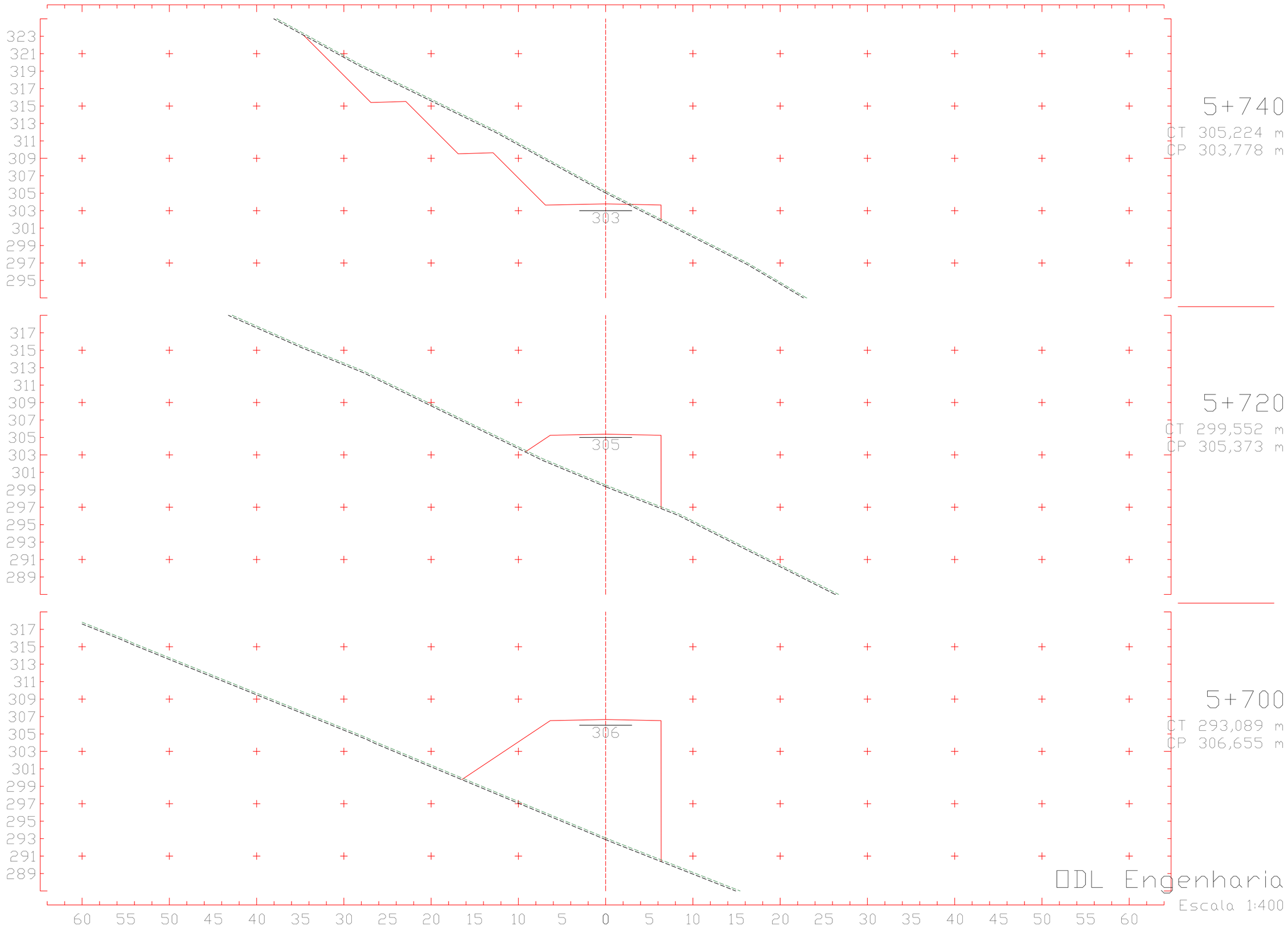



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5+620
CT 274,811 m
CP 309,241 m
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5+600
CT 271,211 m
CP 309,841 m
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5+580
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CP 310,441 m
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DL Engenharia
Escala 1:400

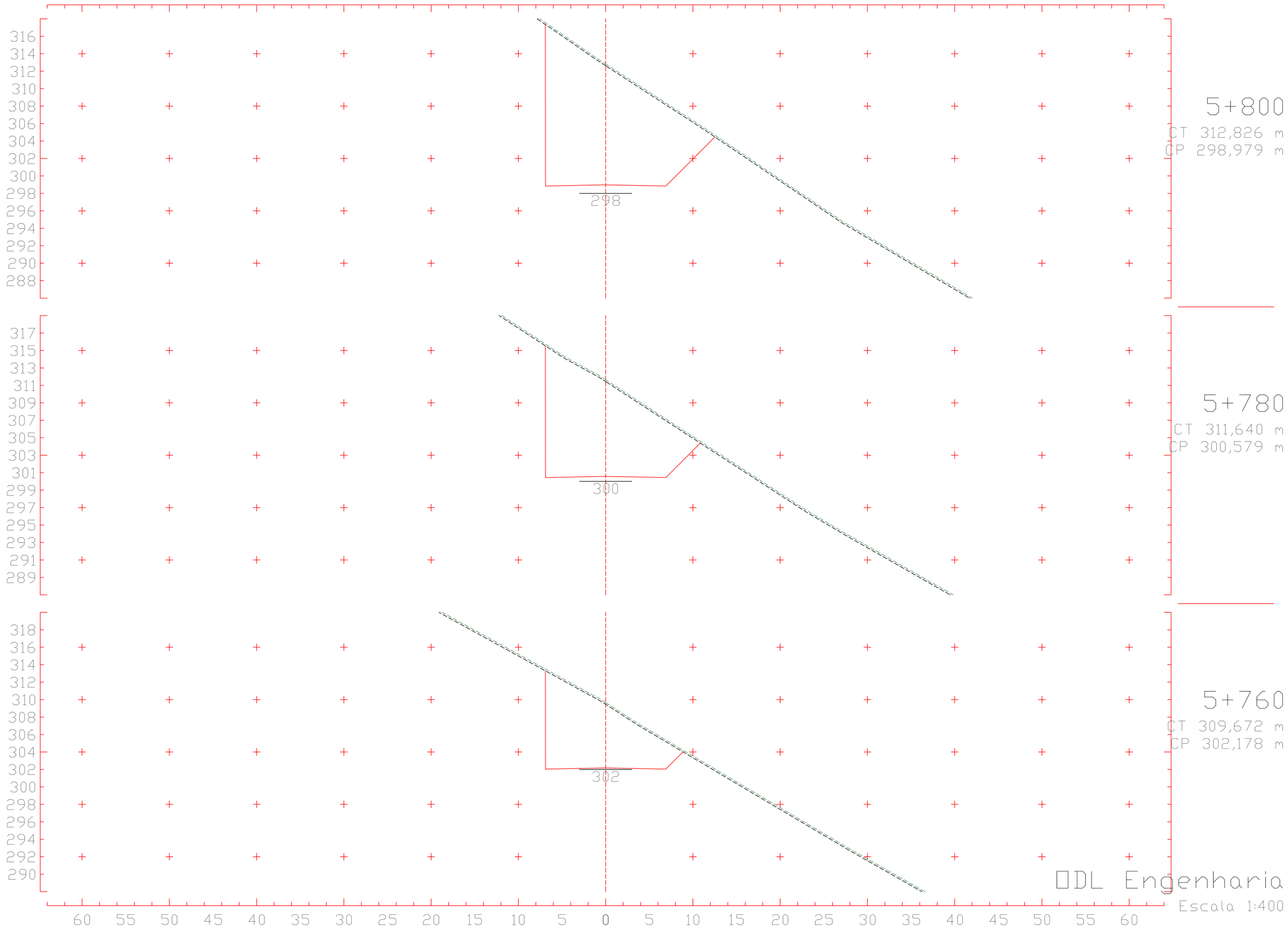
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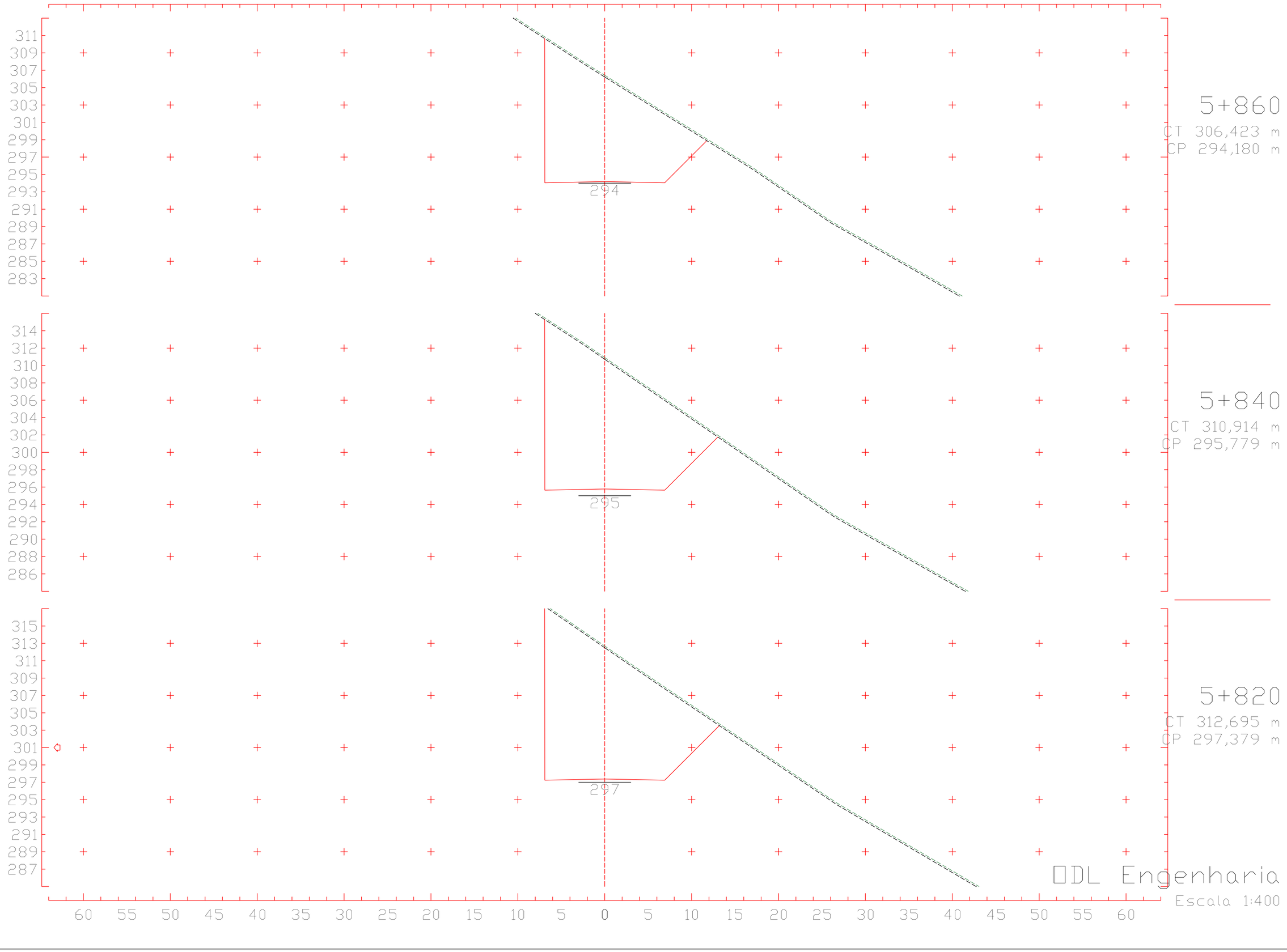


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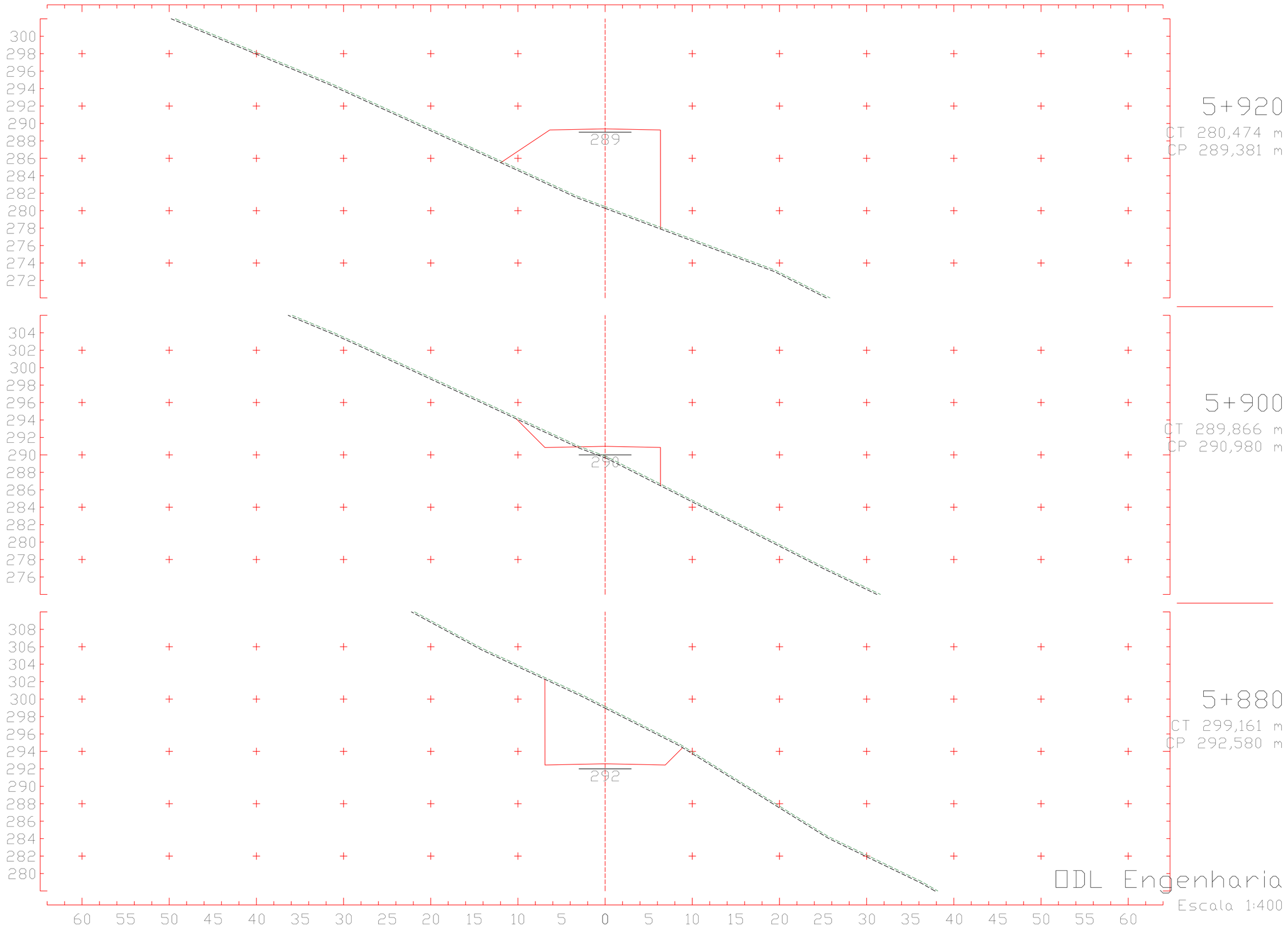


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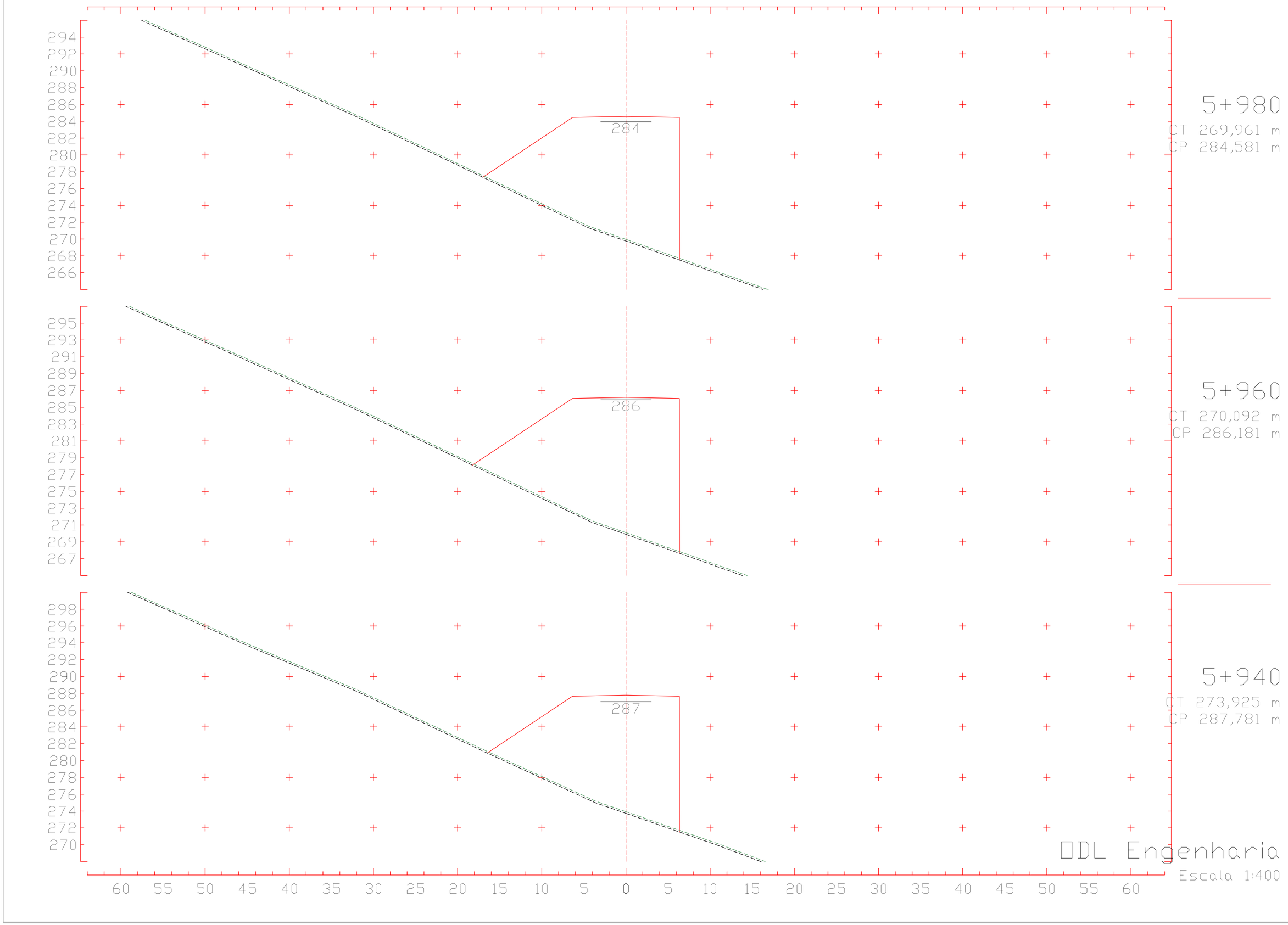

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5+860
CT 306,423 m
CP 294,180 m
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5+840
CT 310,914 m
CP 295,779 m
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5+820
CT 312,695 m
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DL Engenharia
Escala 1:400

Projeto Ponto de Partida 2021/1

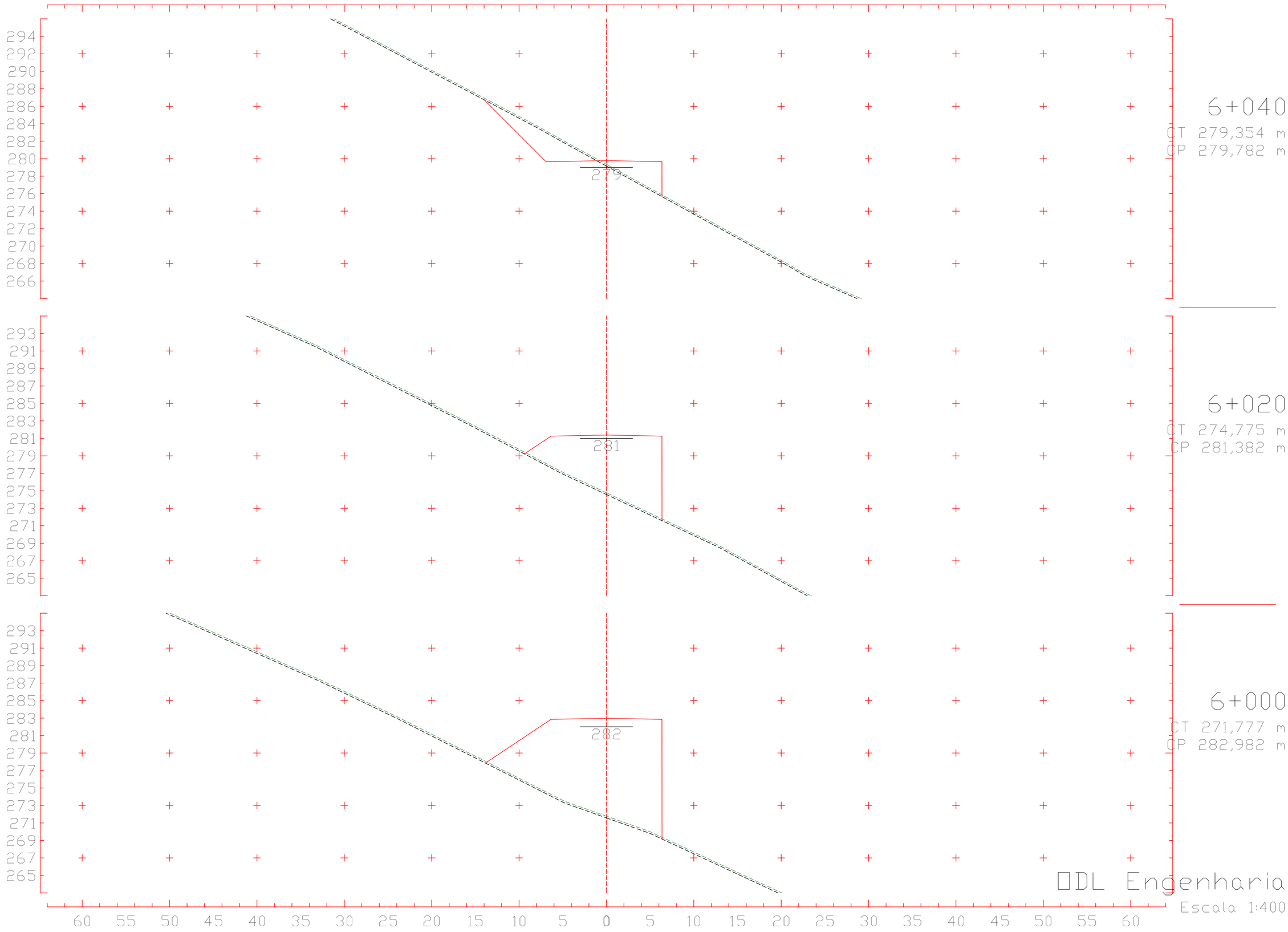


ODL Engenharia

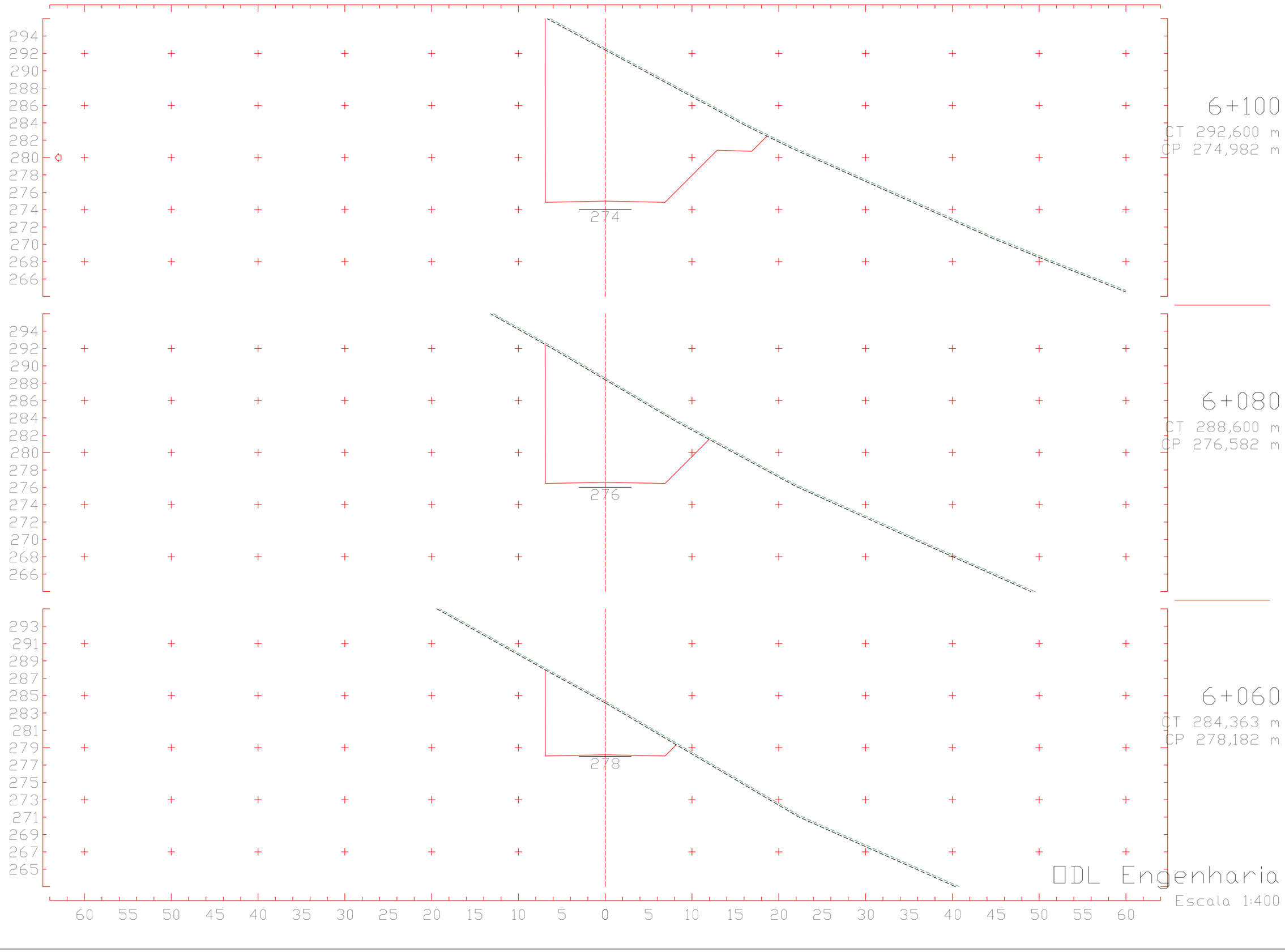
Escala 1:400


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5+980
CT 269,961 m
CP 284,581 m
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CT 270,092 m
CP 286,181 m
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ODL Engenharia
Escala 1:400

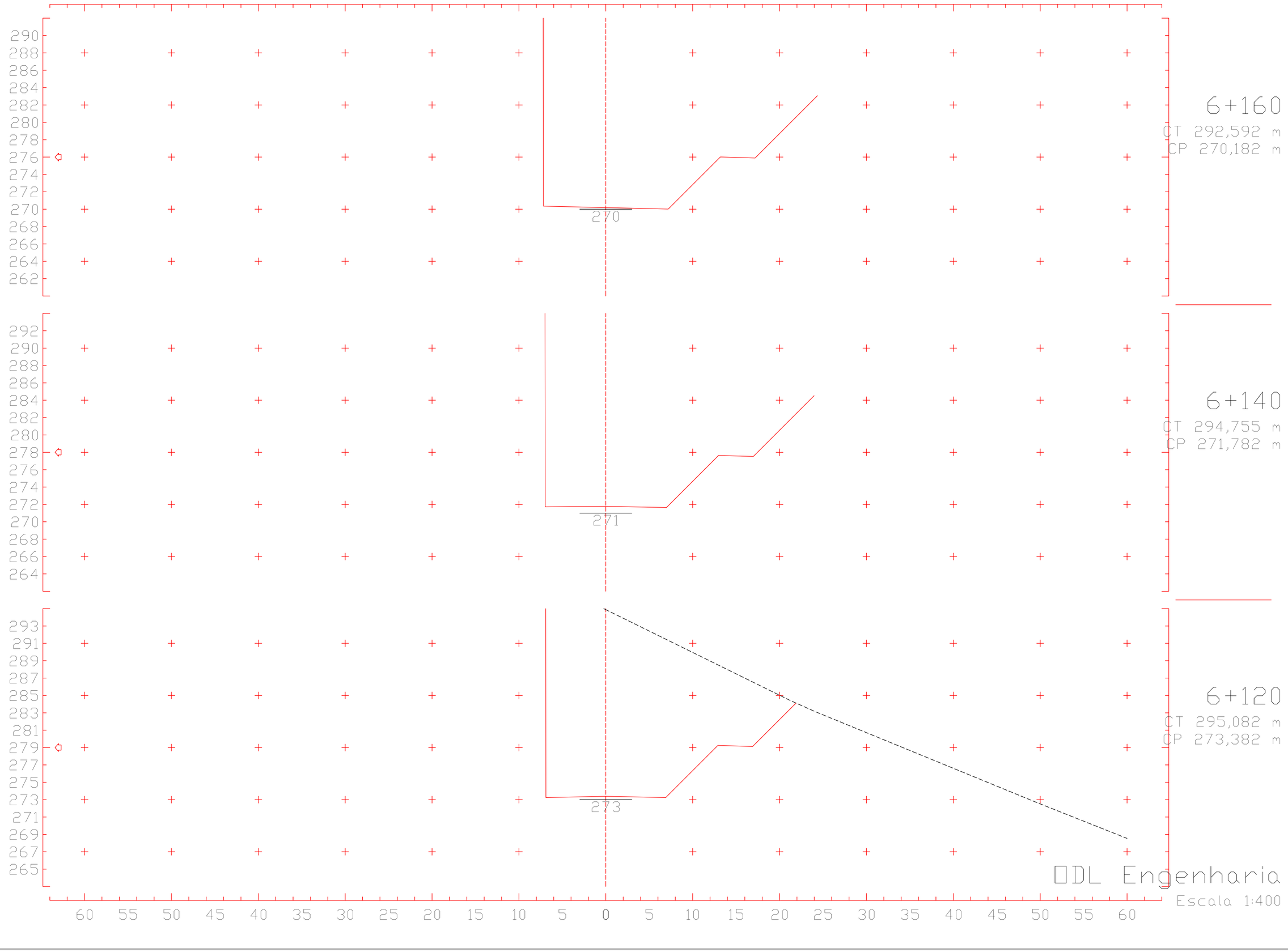
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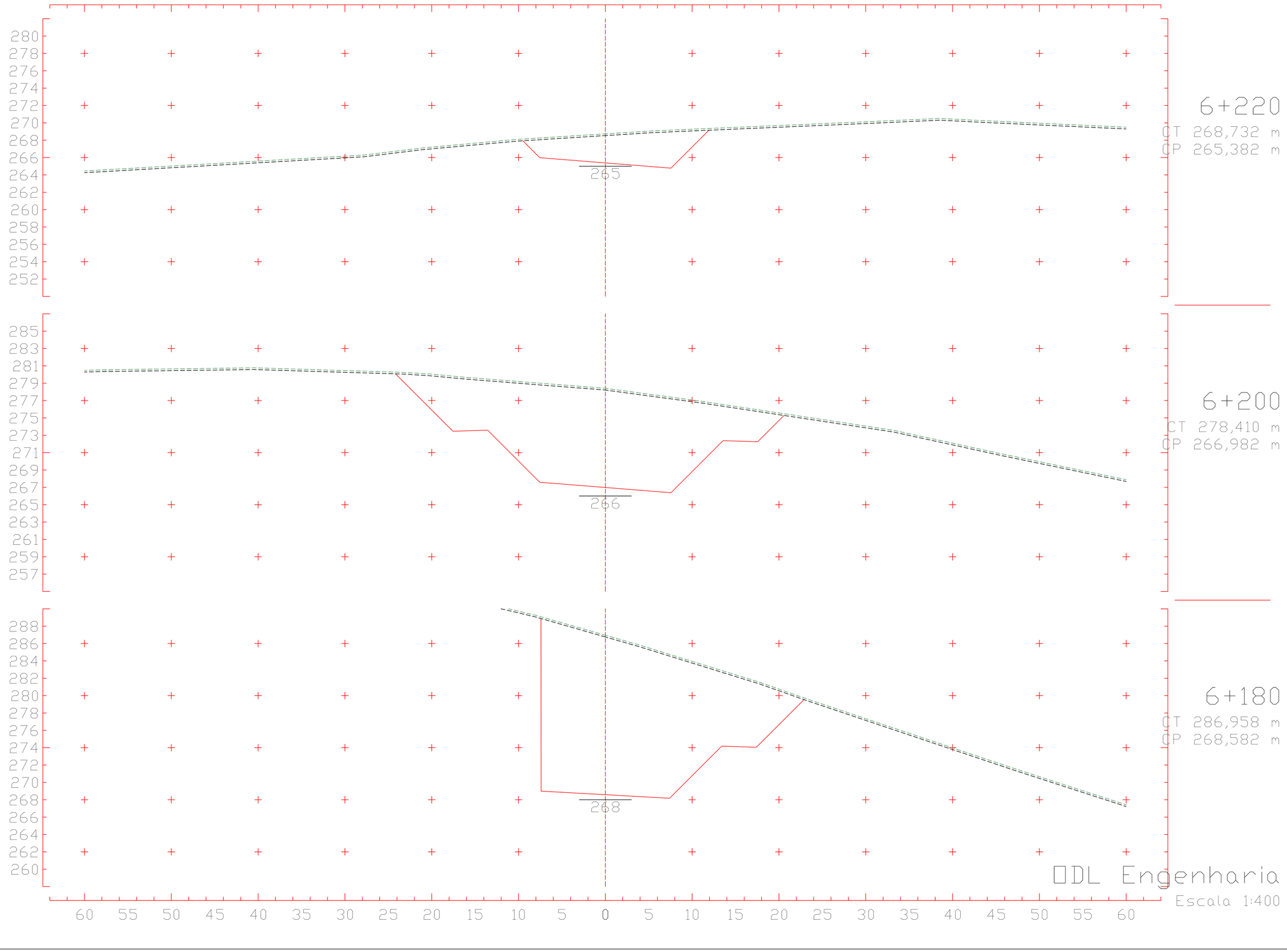
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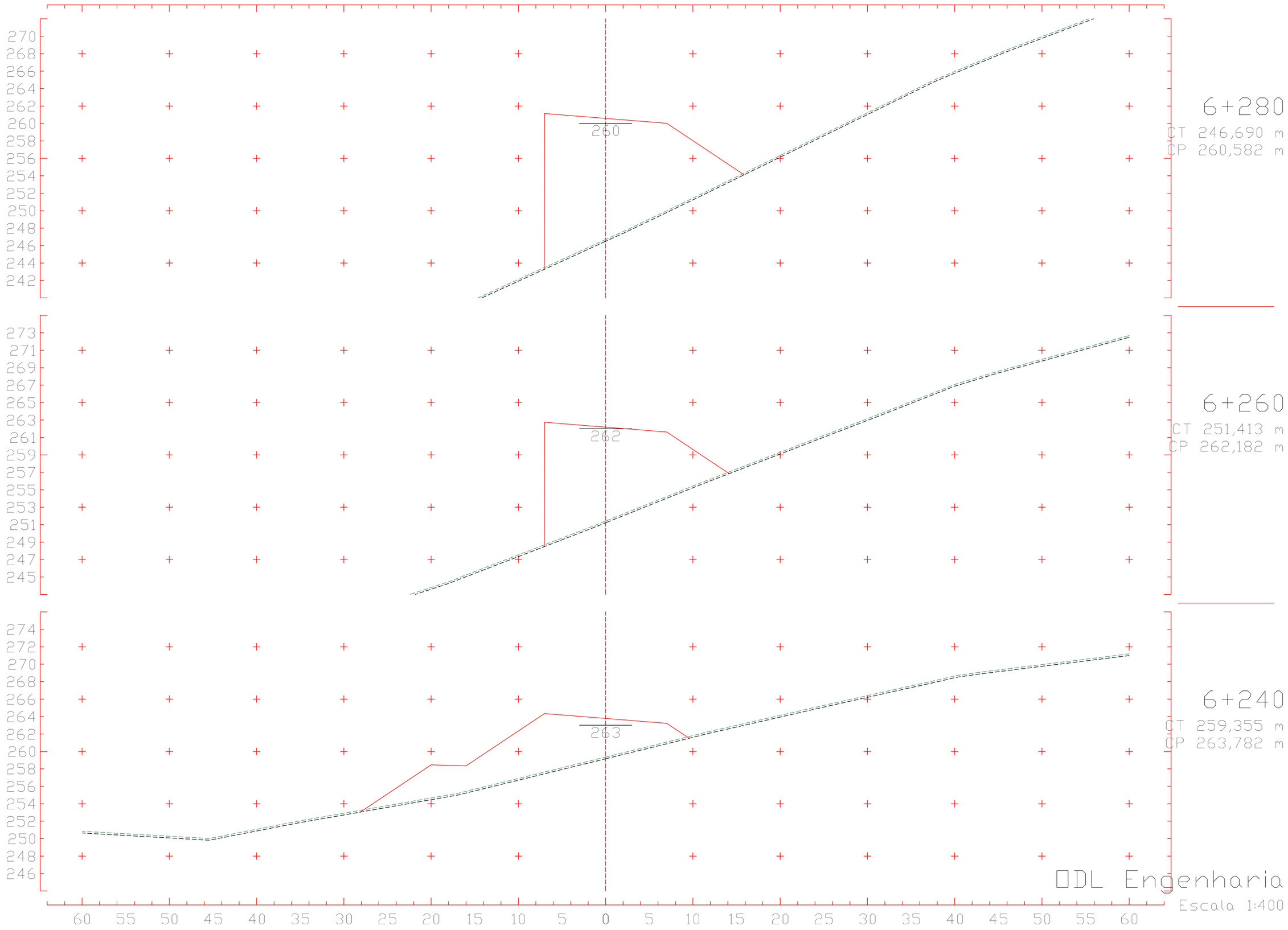
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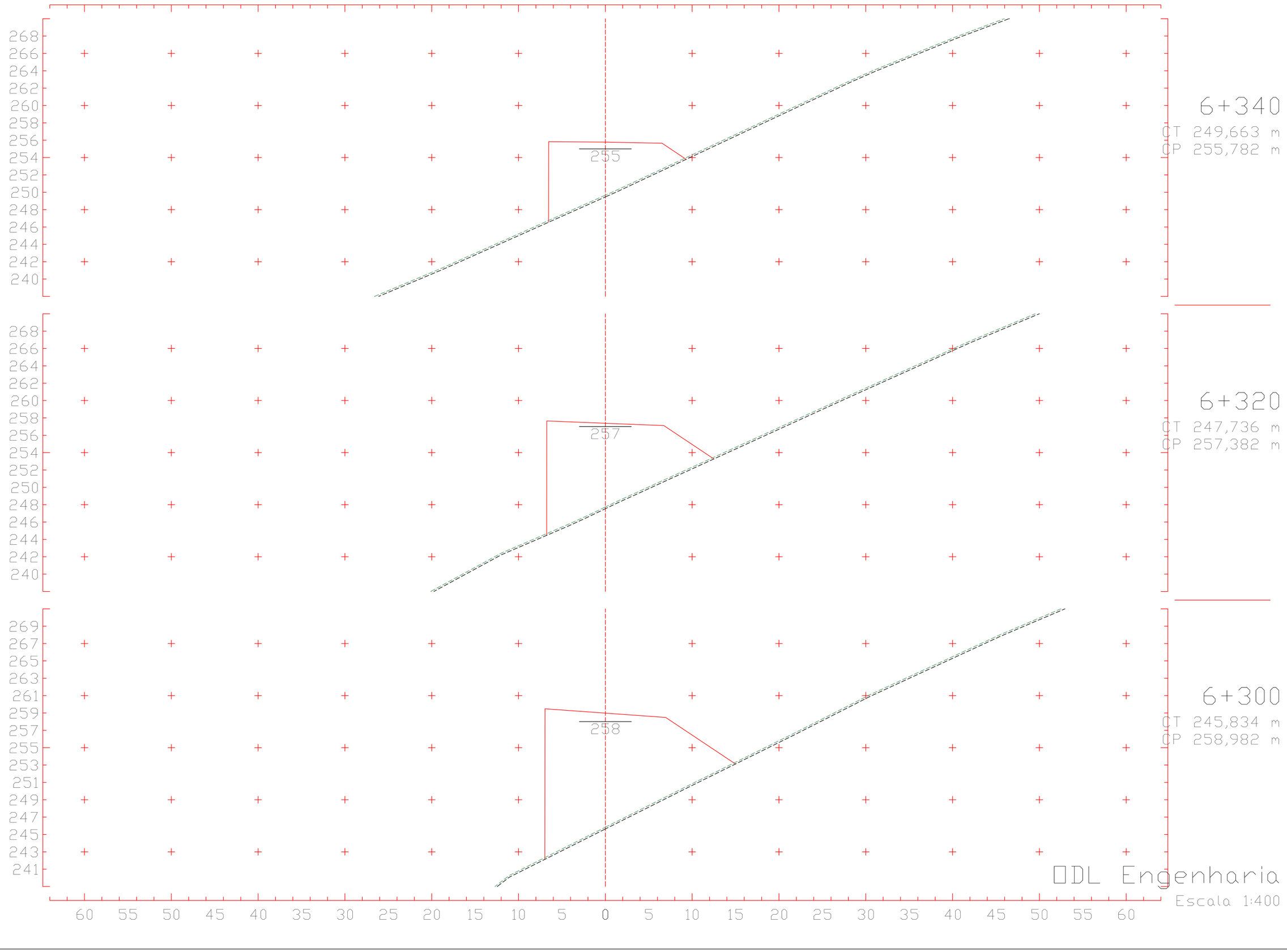
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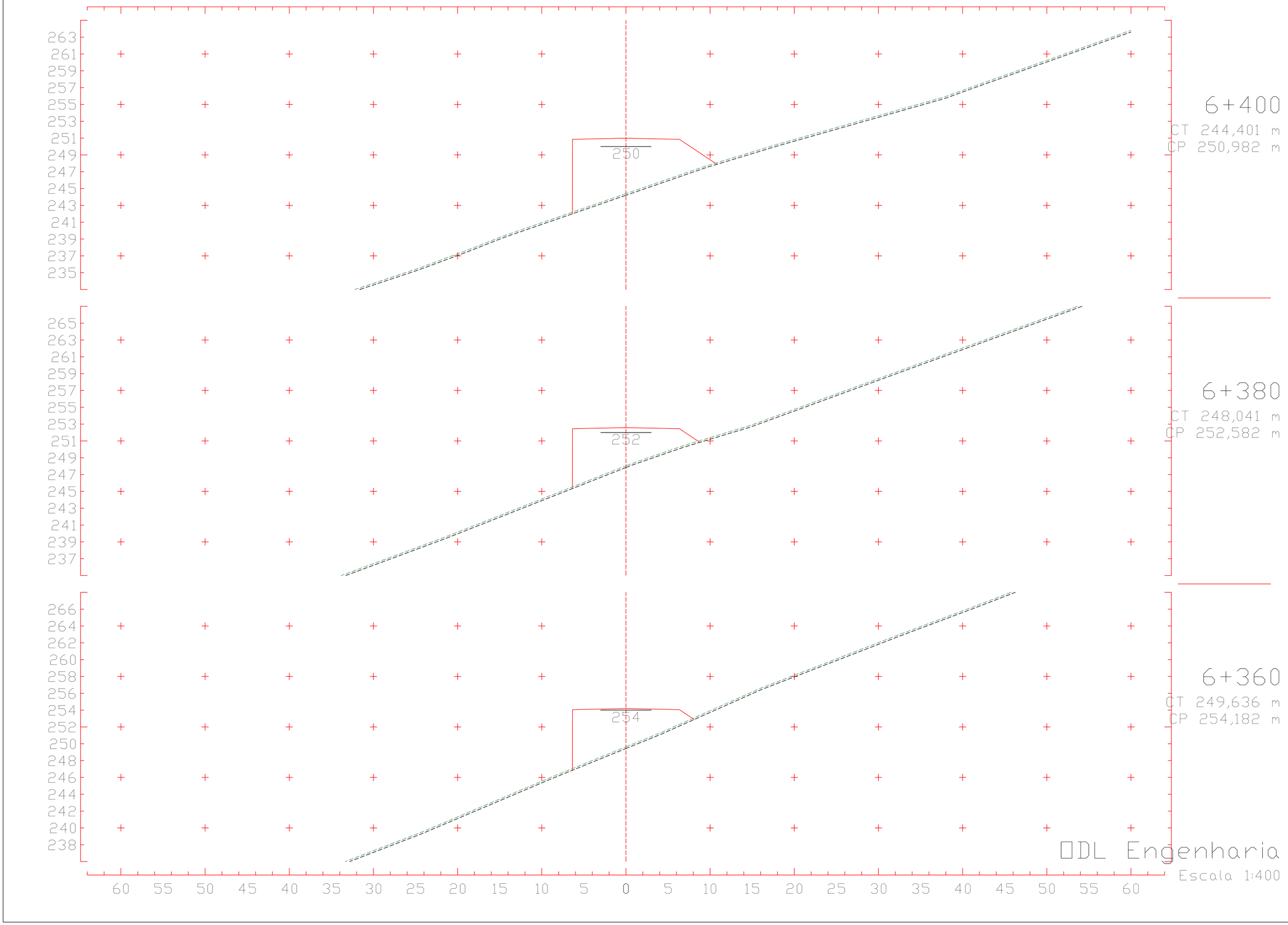
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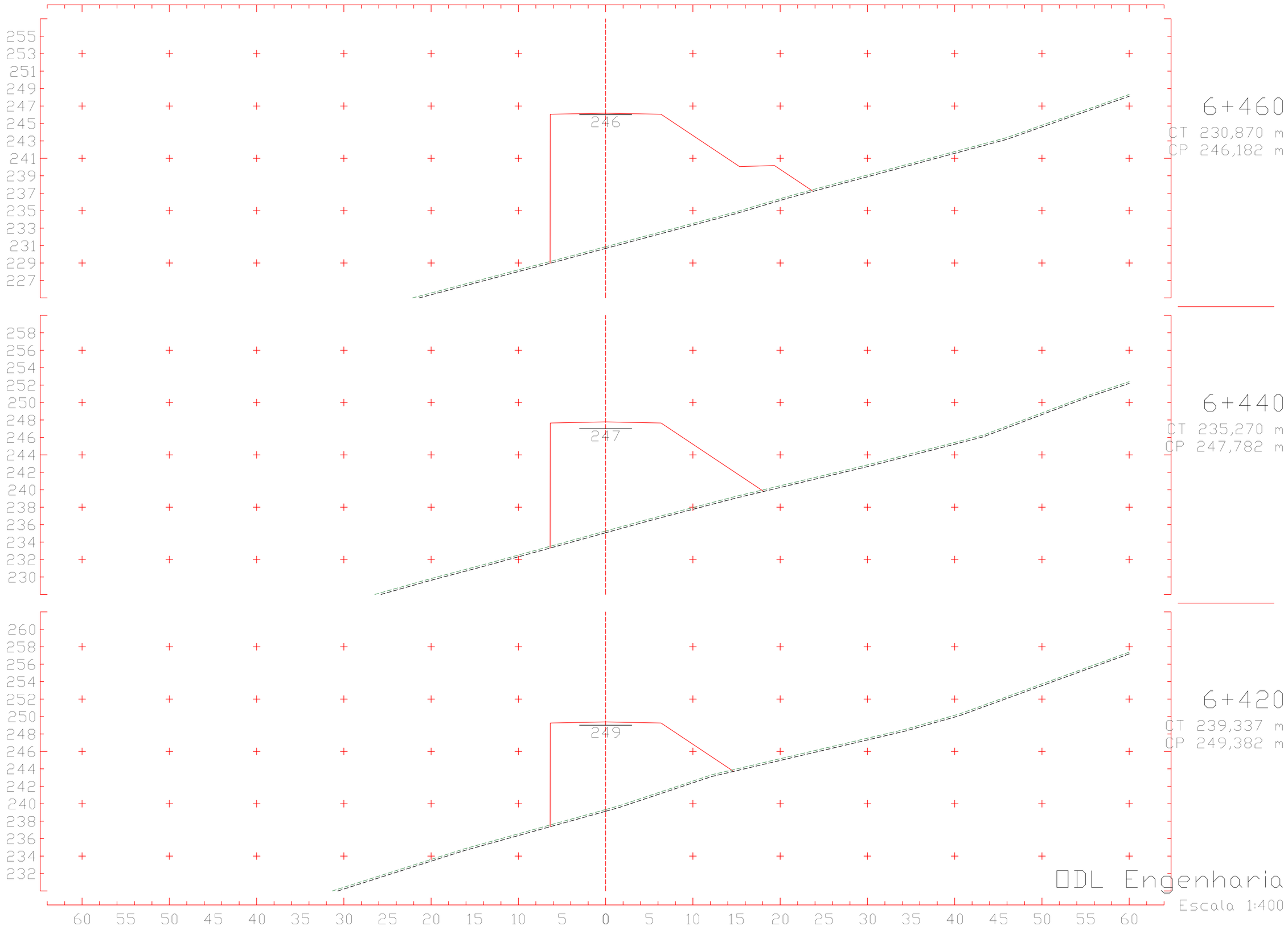
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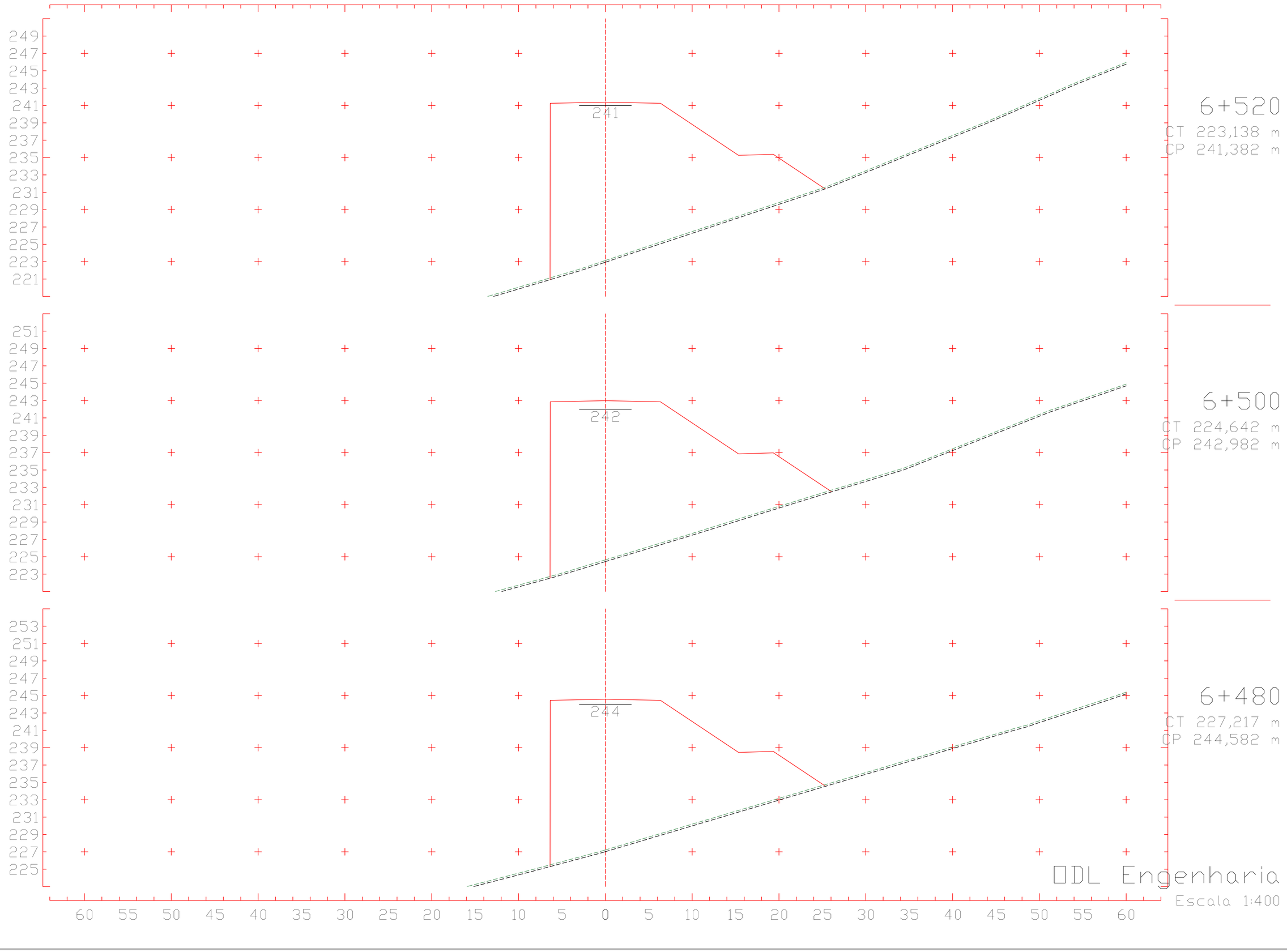
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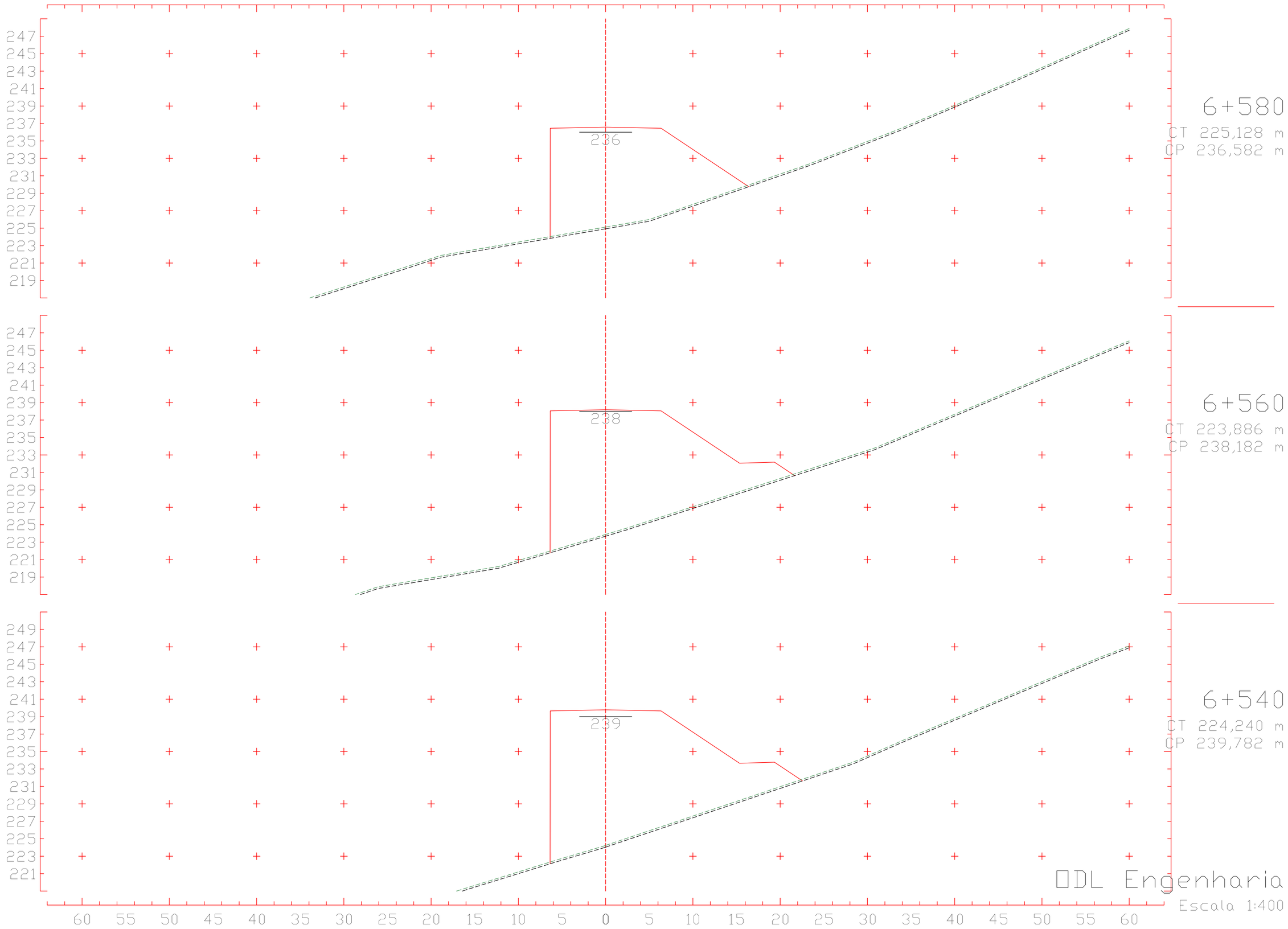
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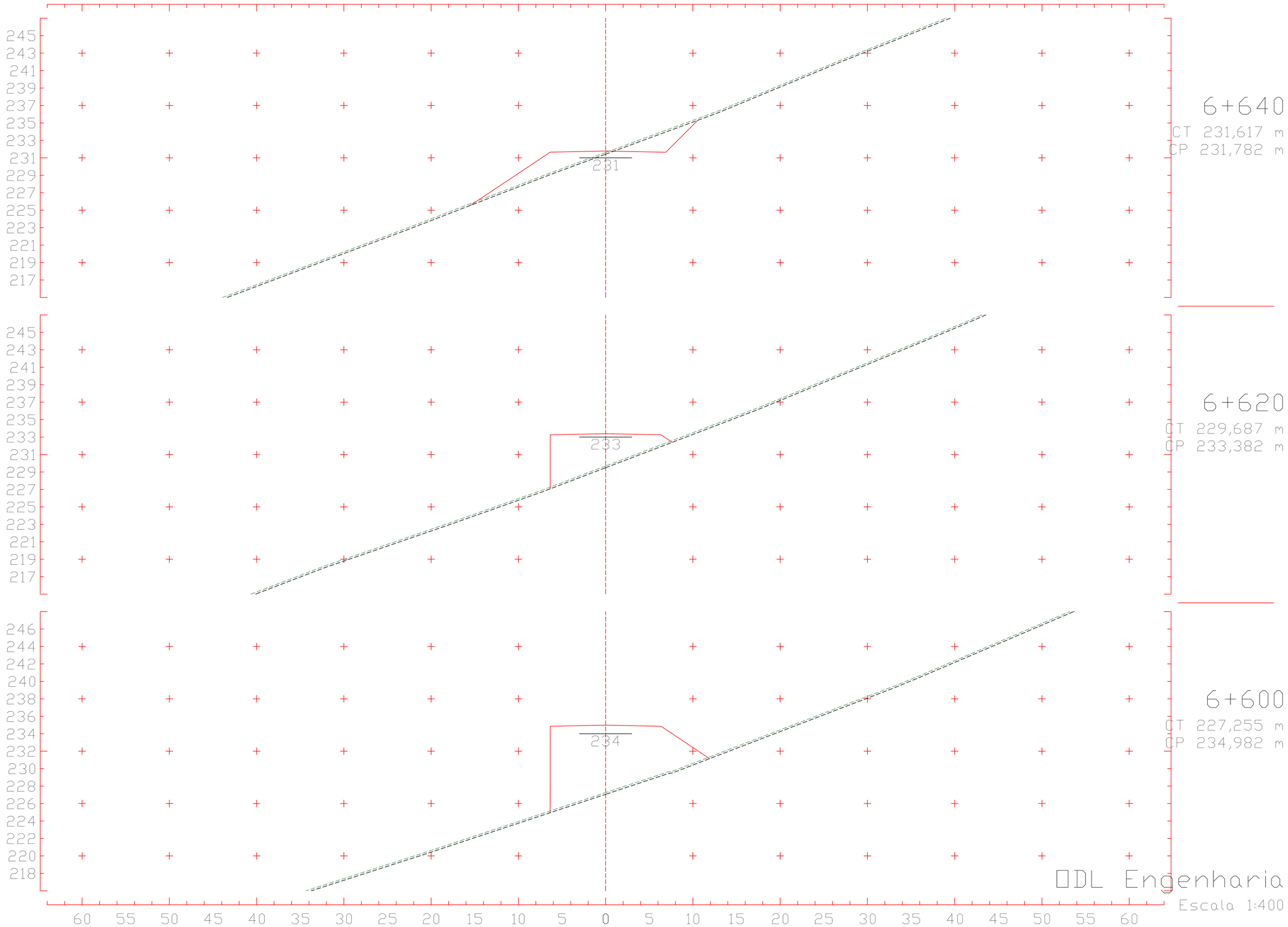
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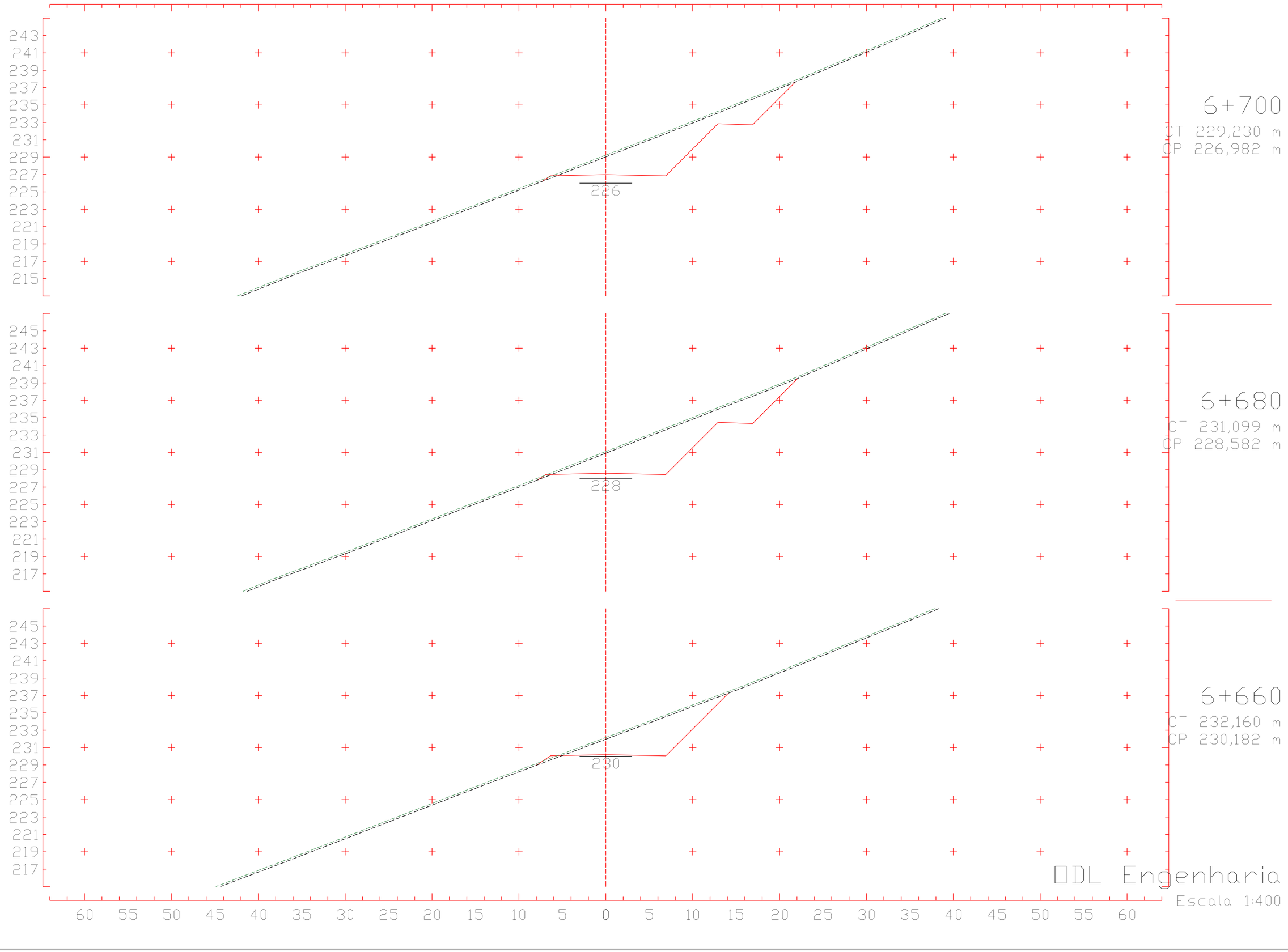
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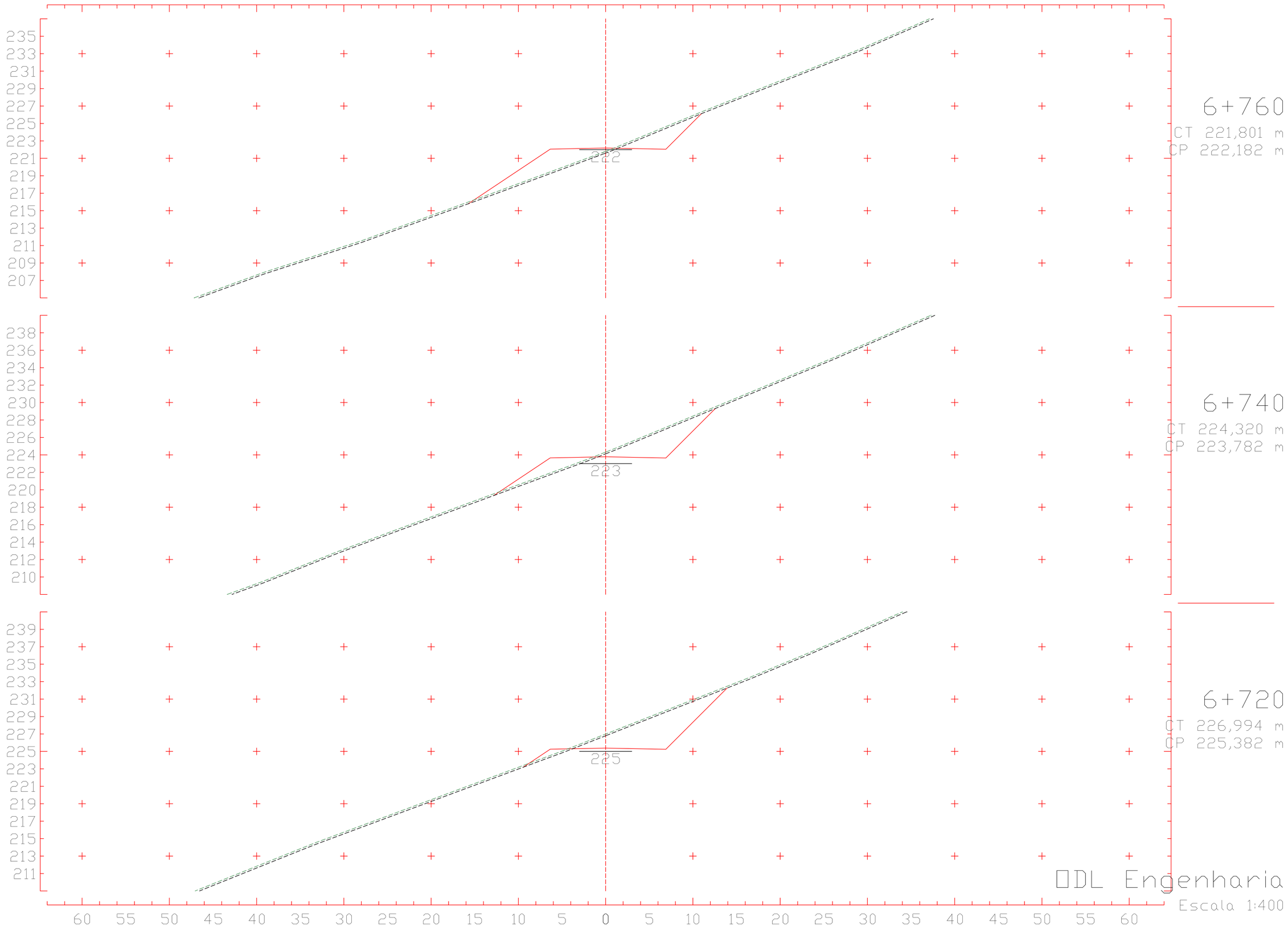
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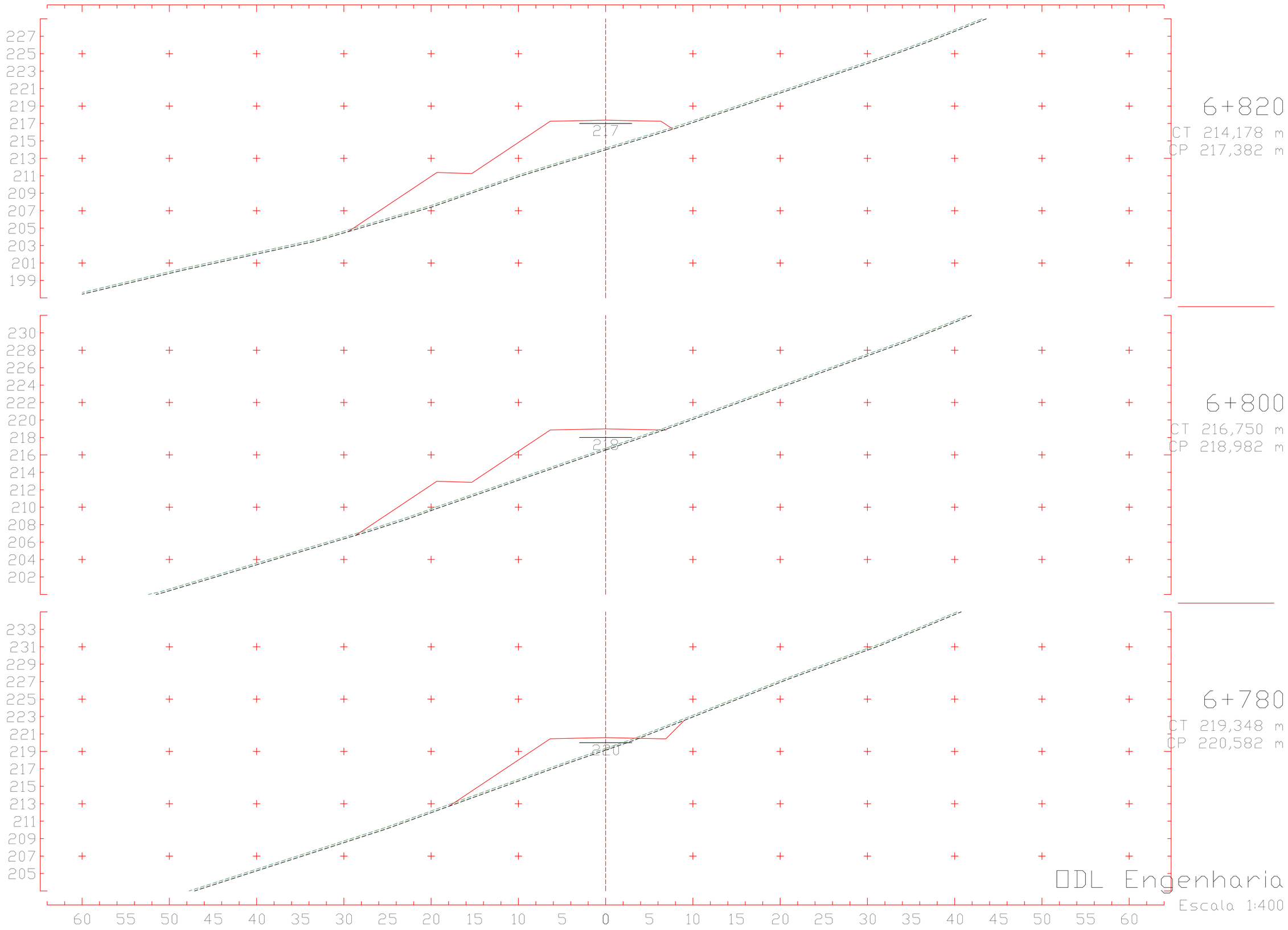
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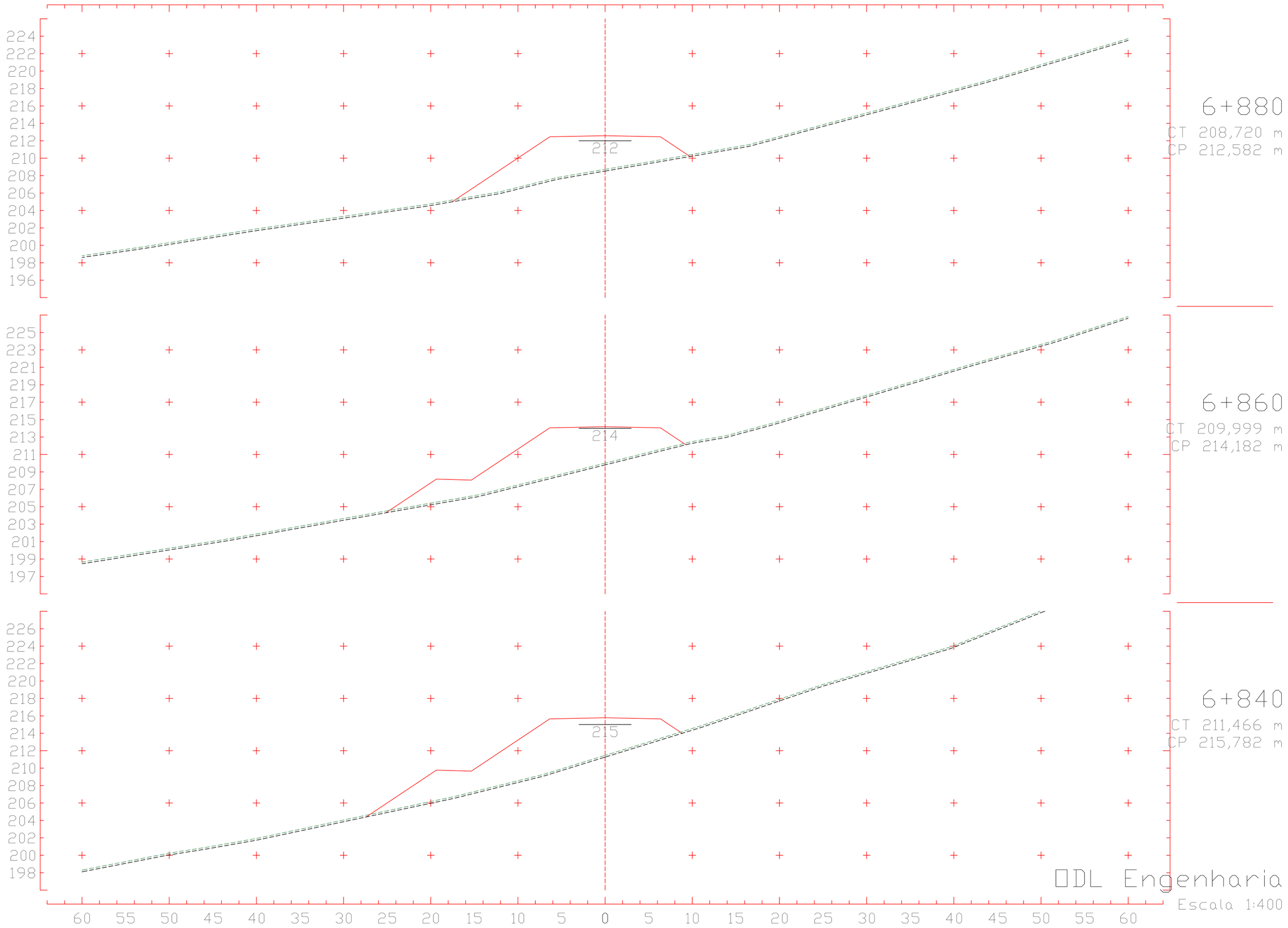
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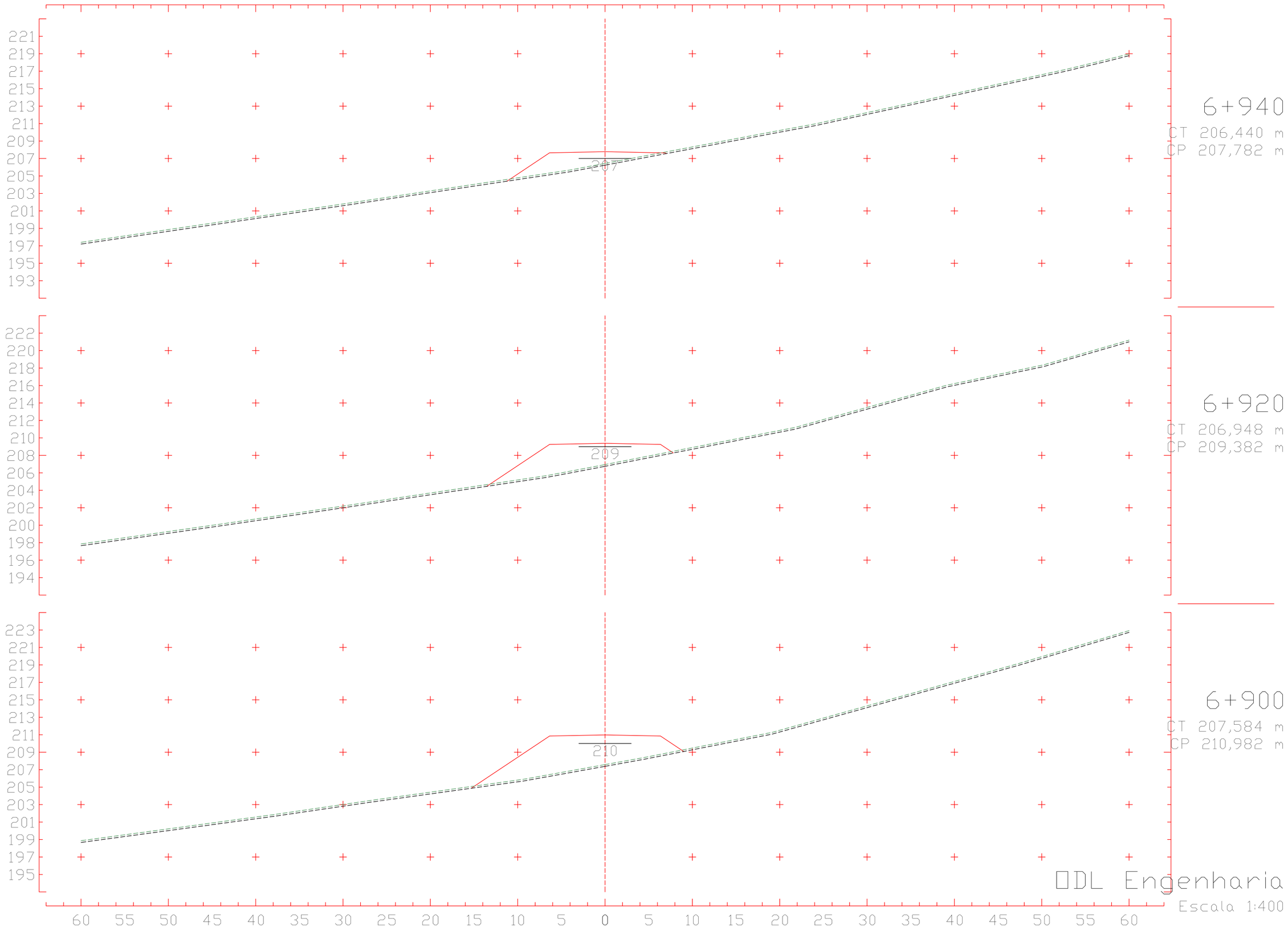
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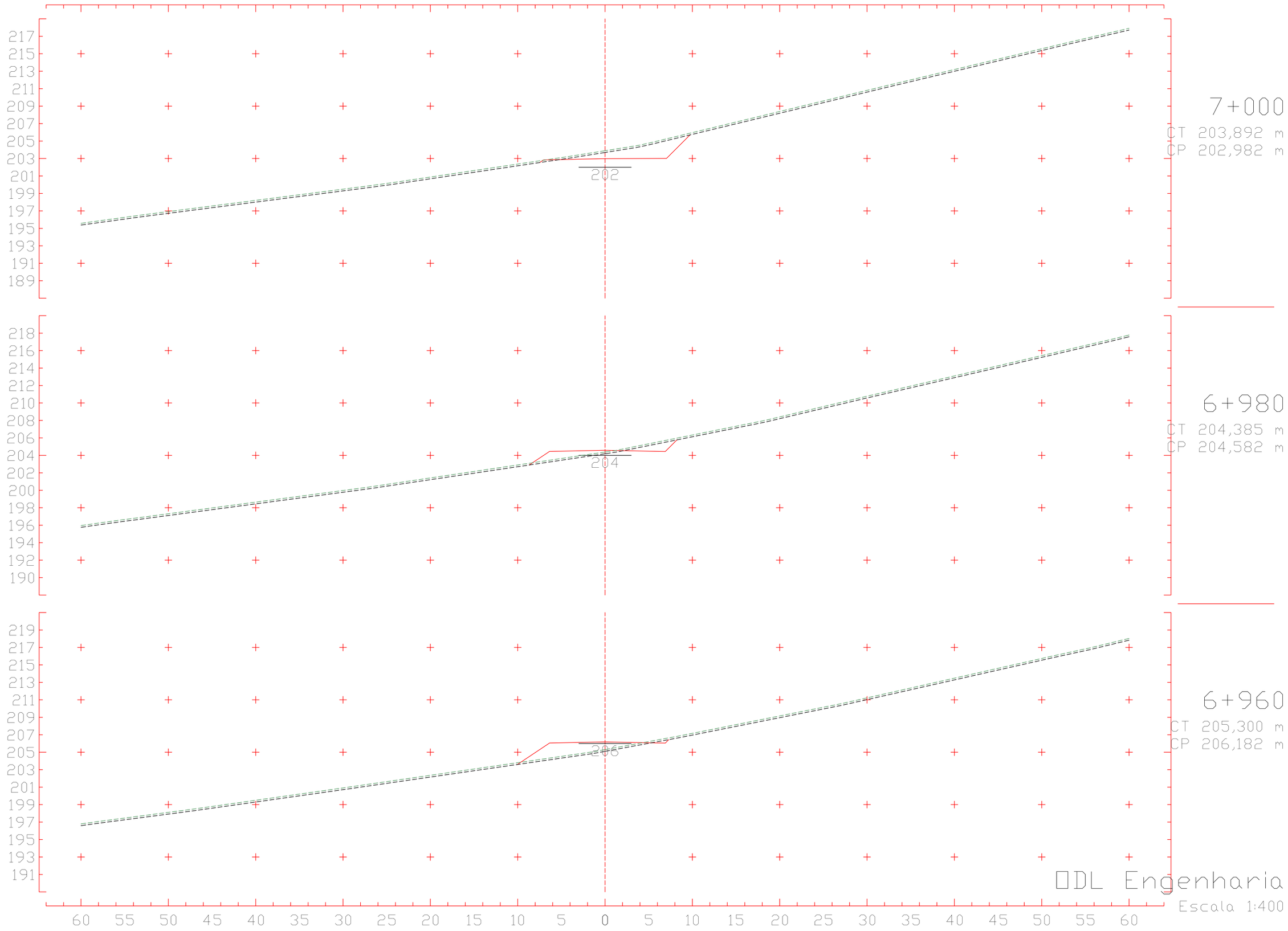
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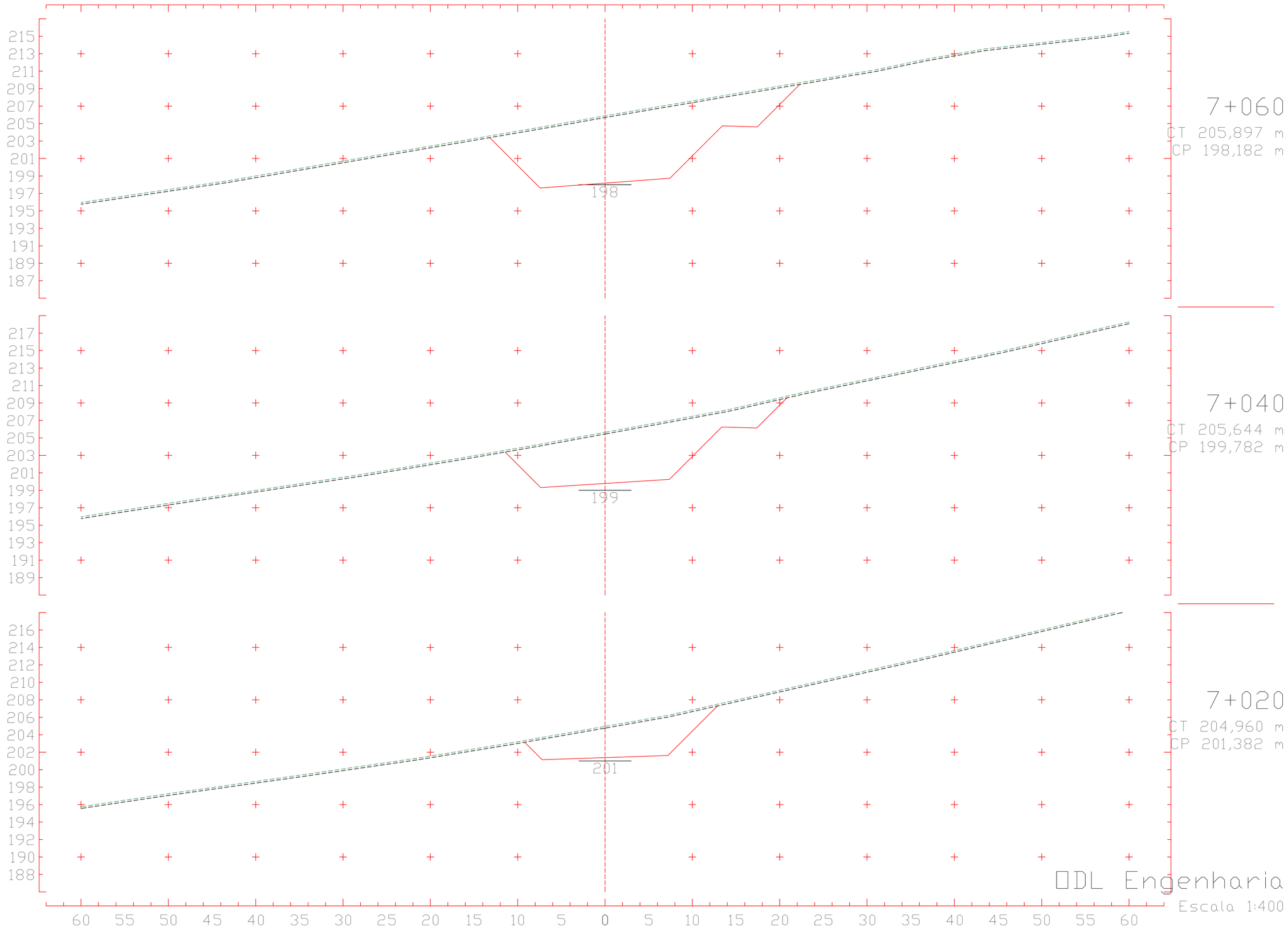
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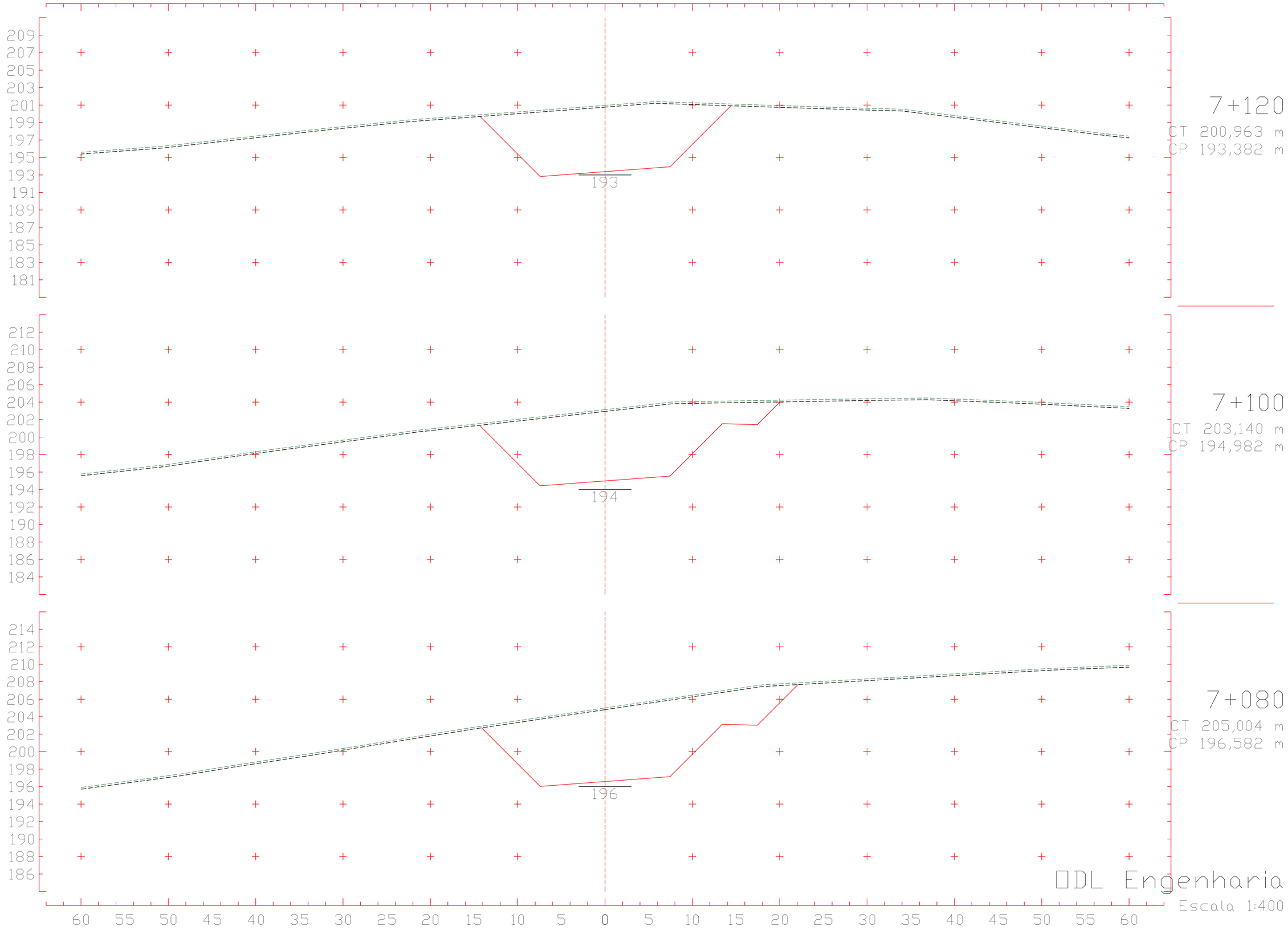
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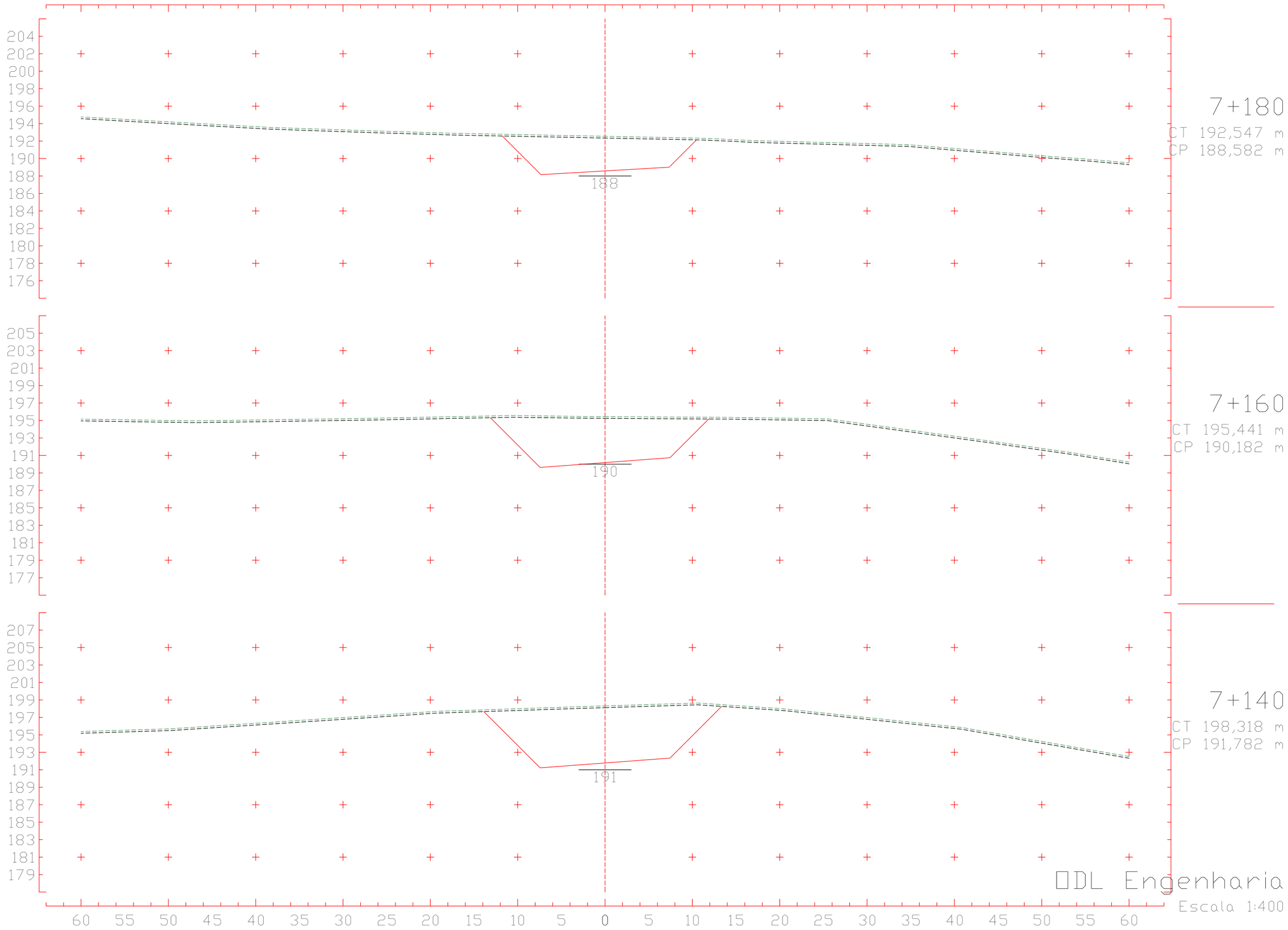
DL Engenharia

Escala 1:400

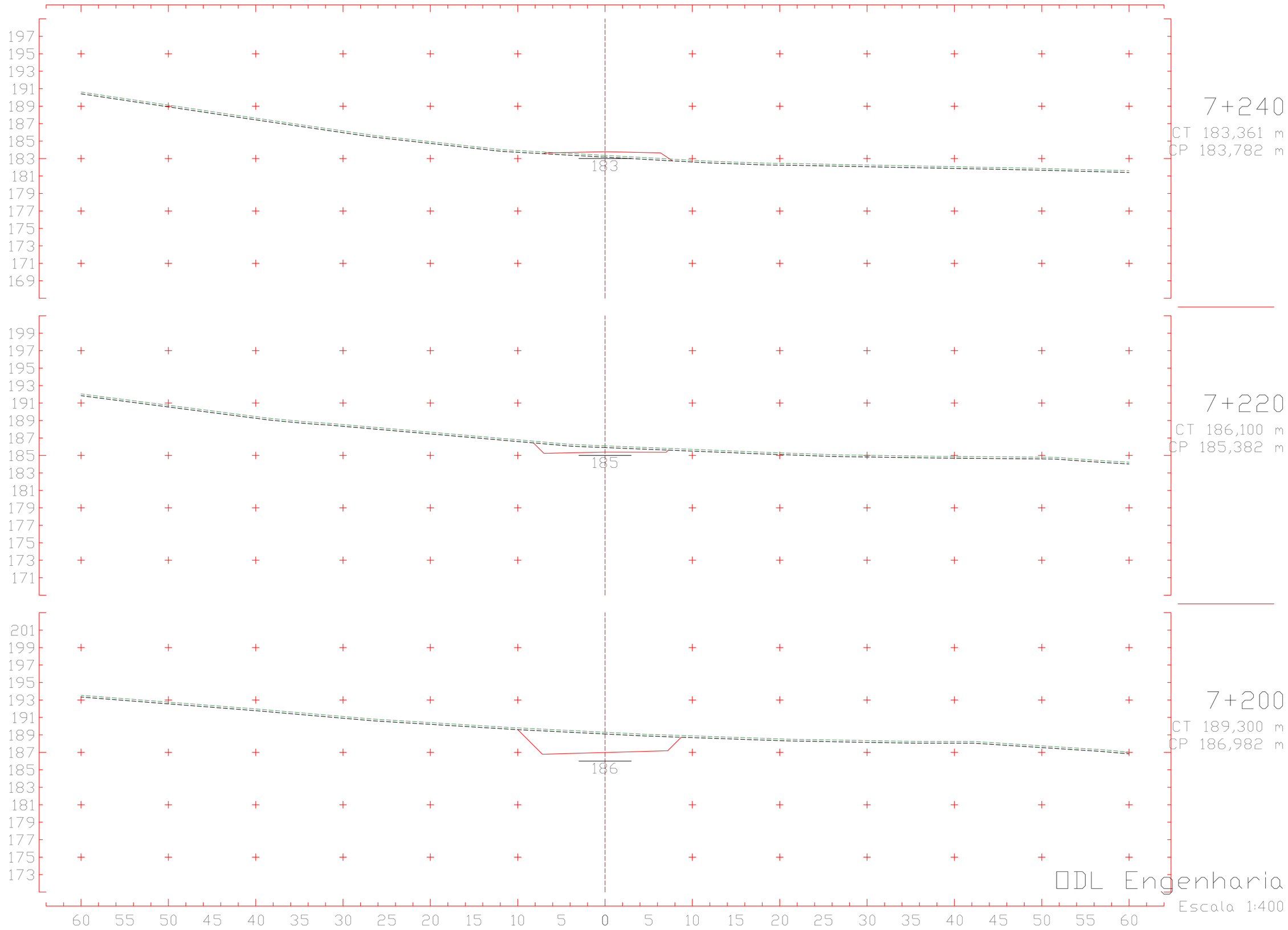
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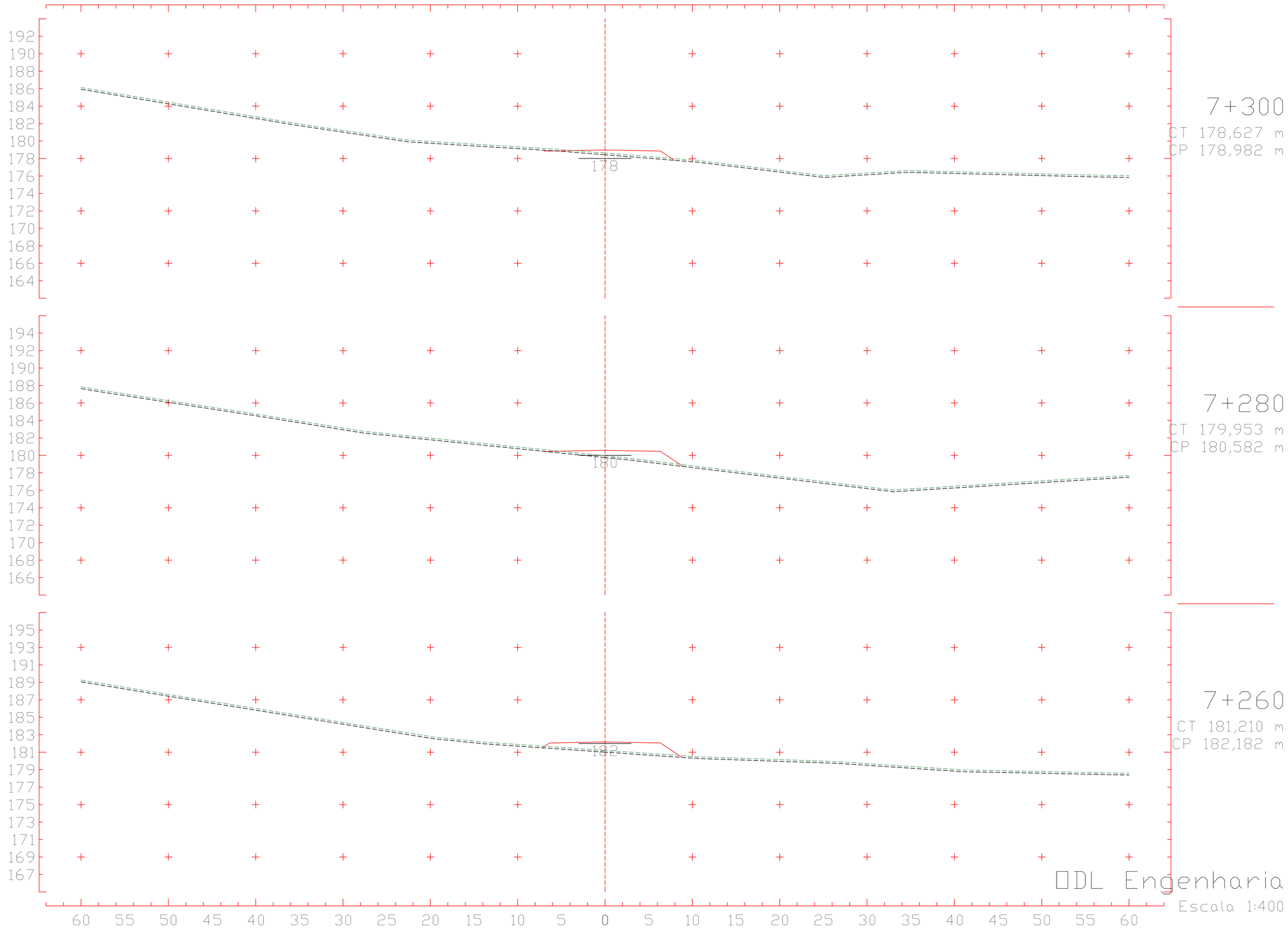
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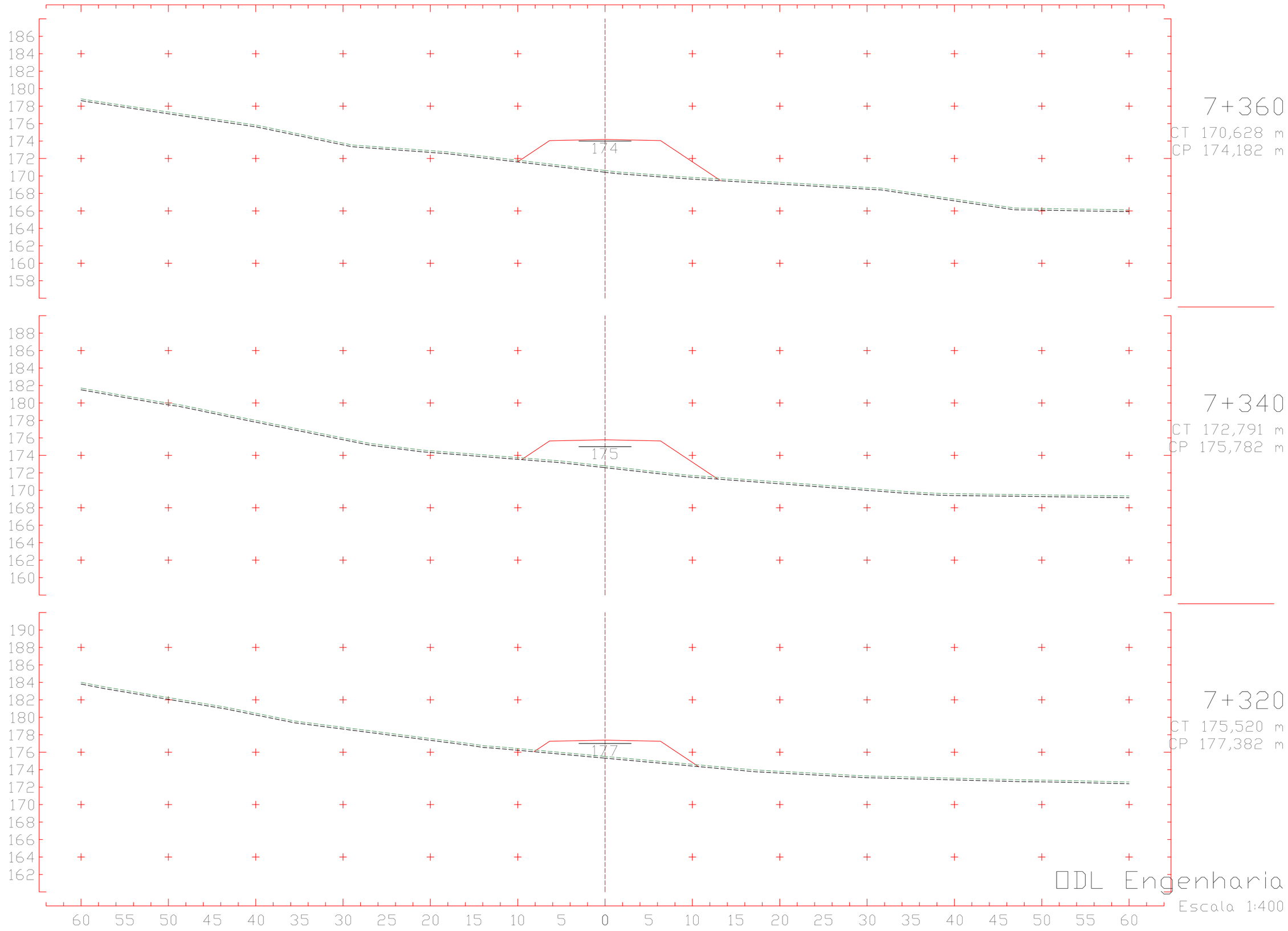
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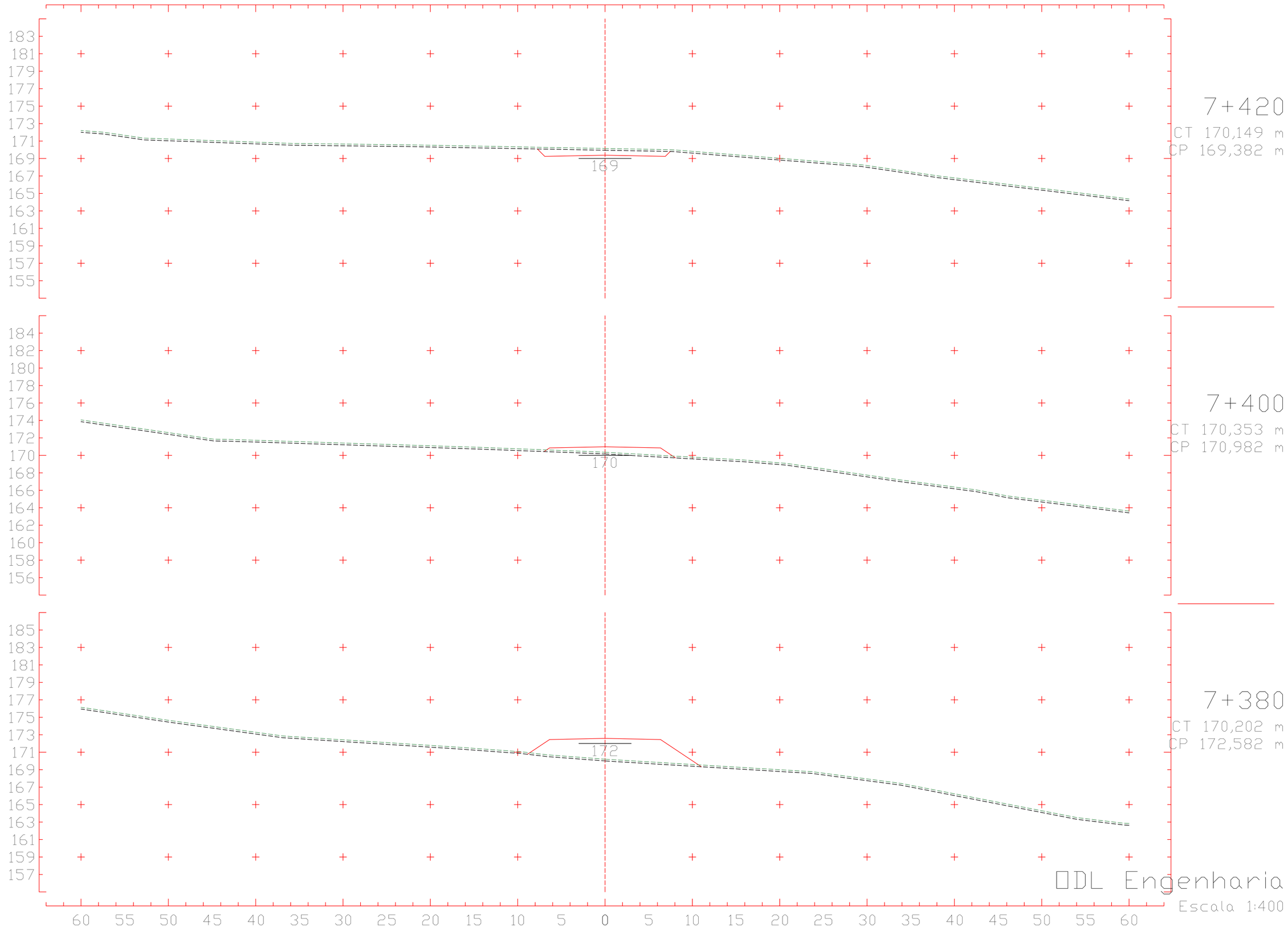
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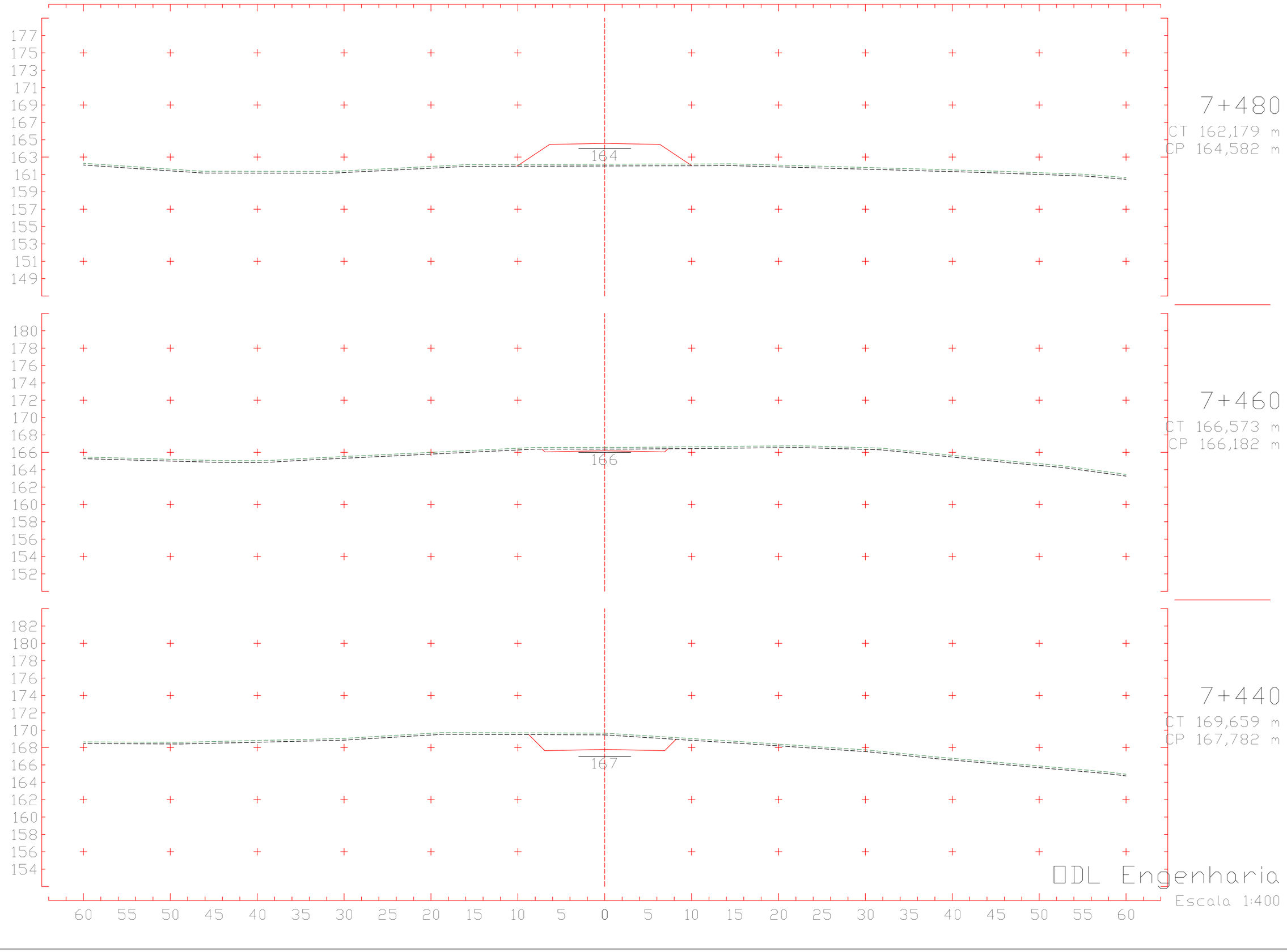
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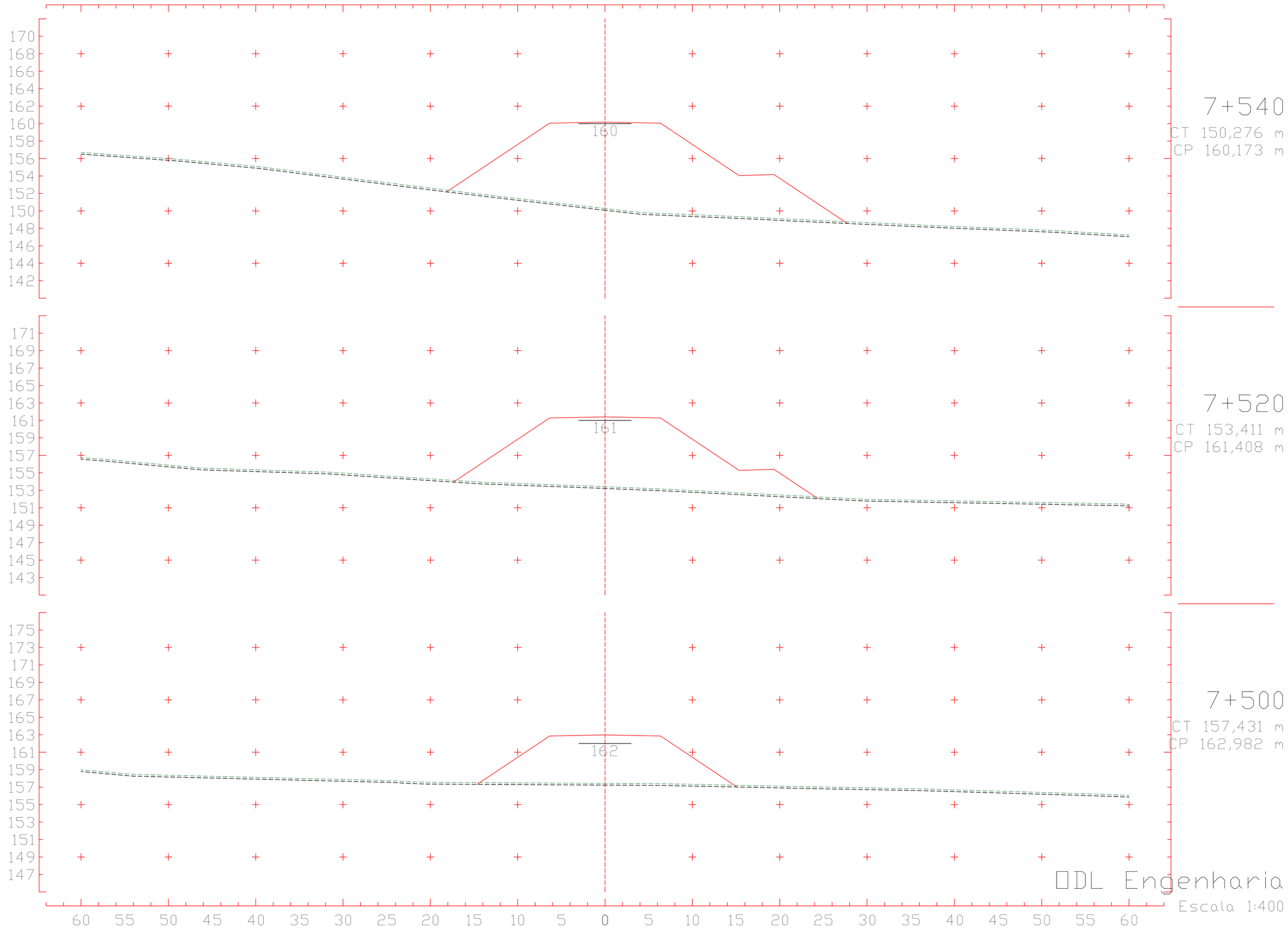
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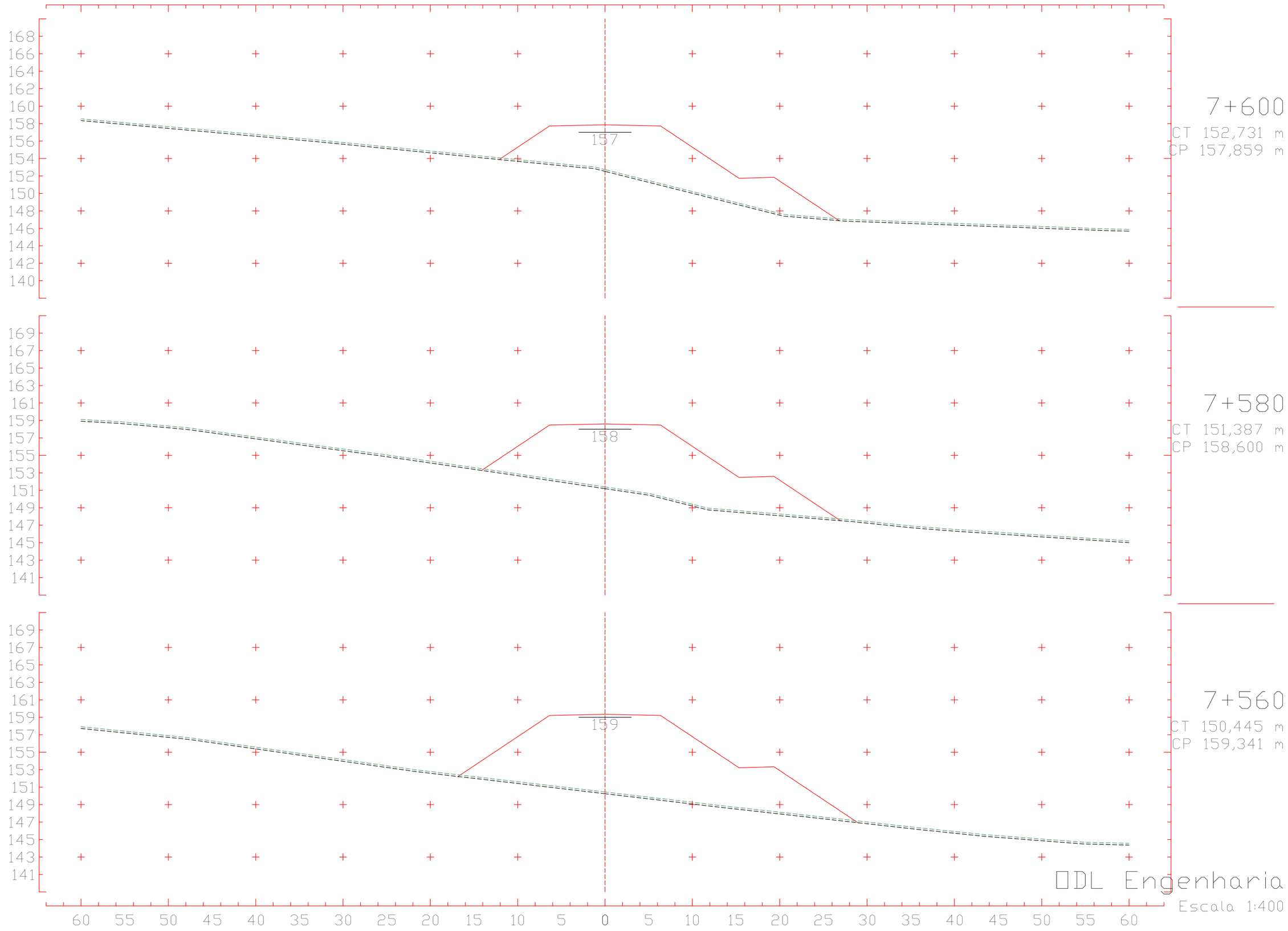
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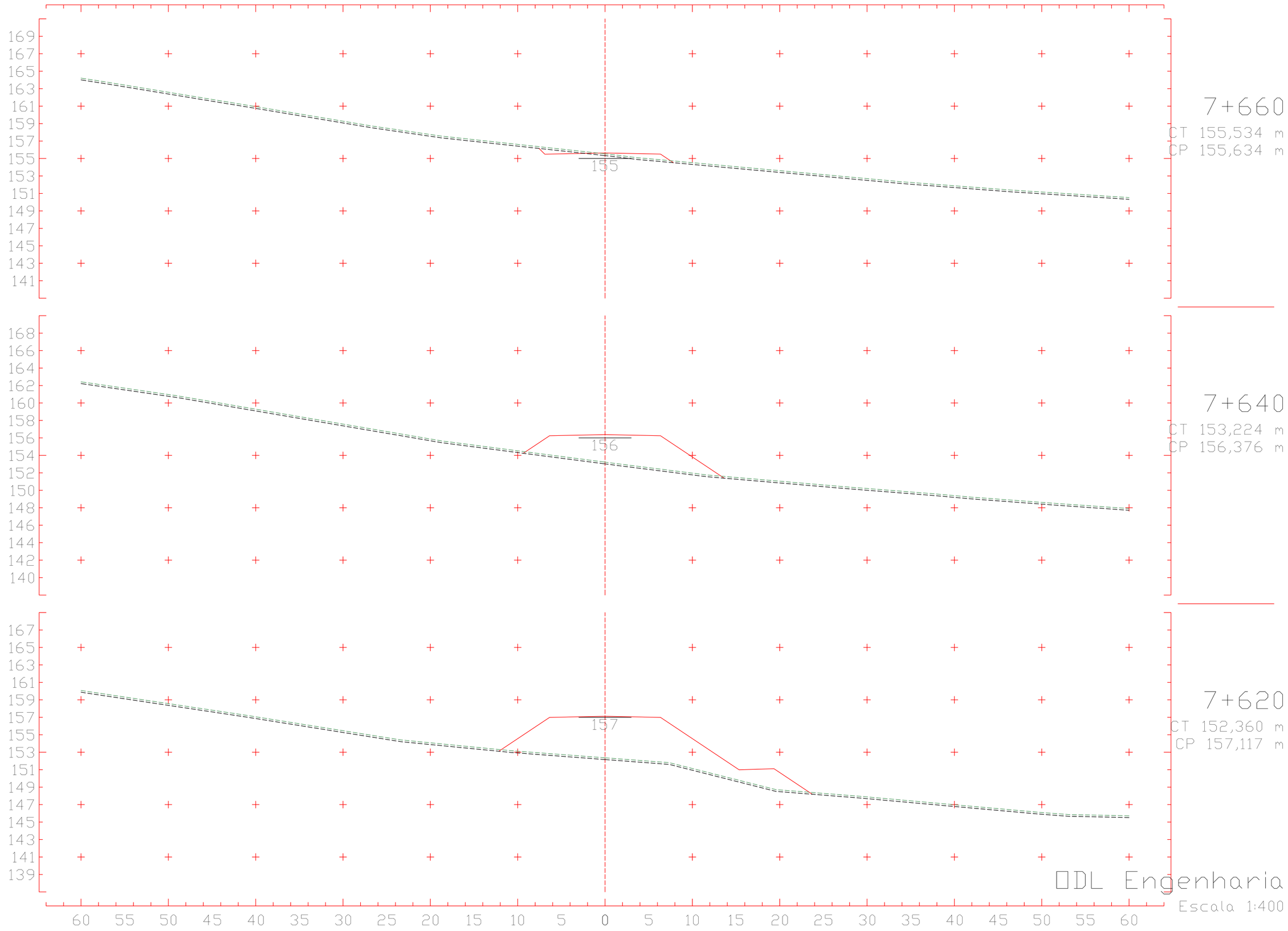
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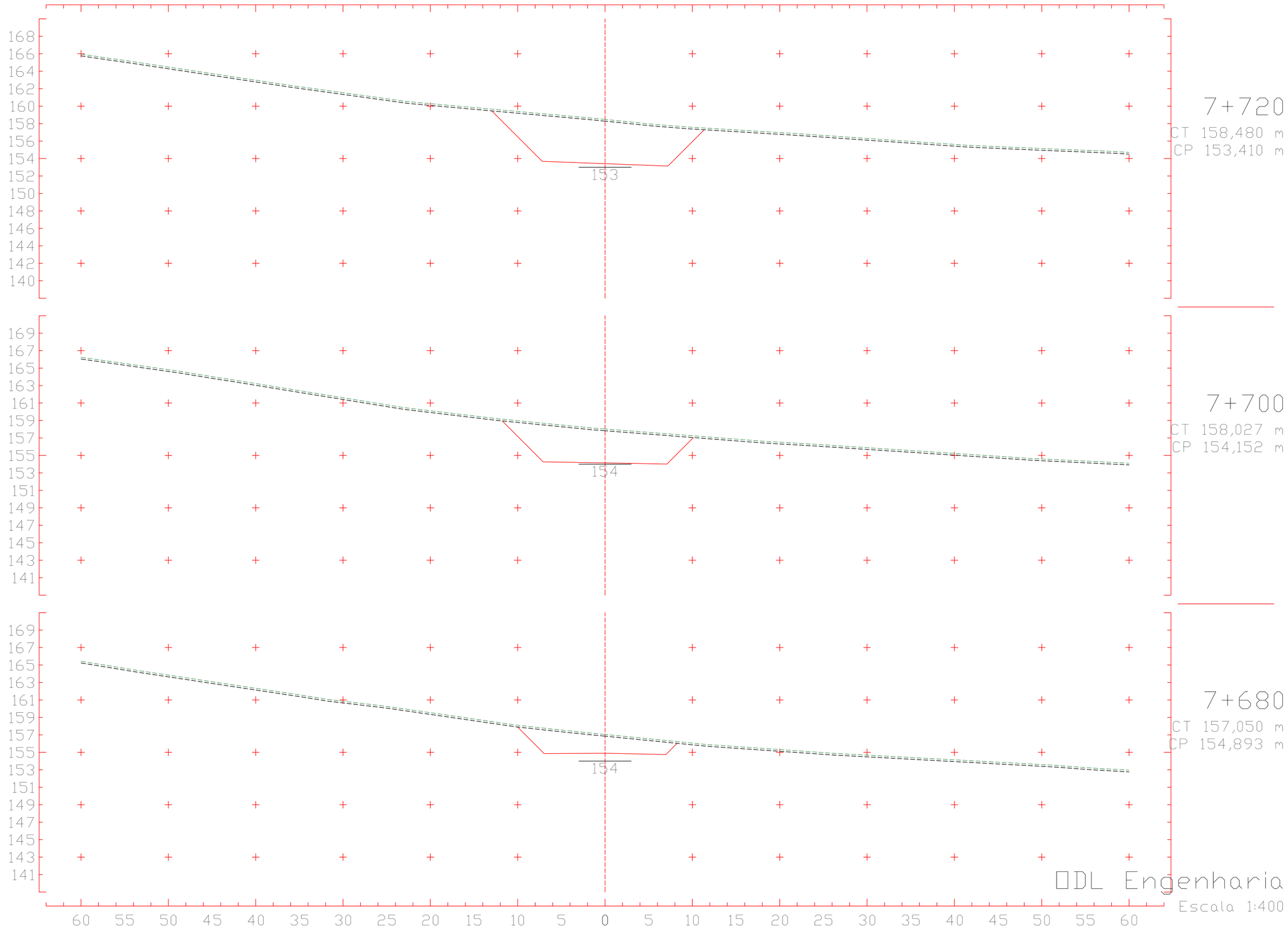
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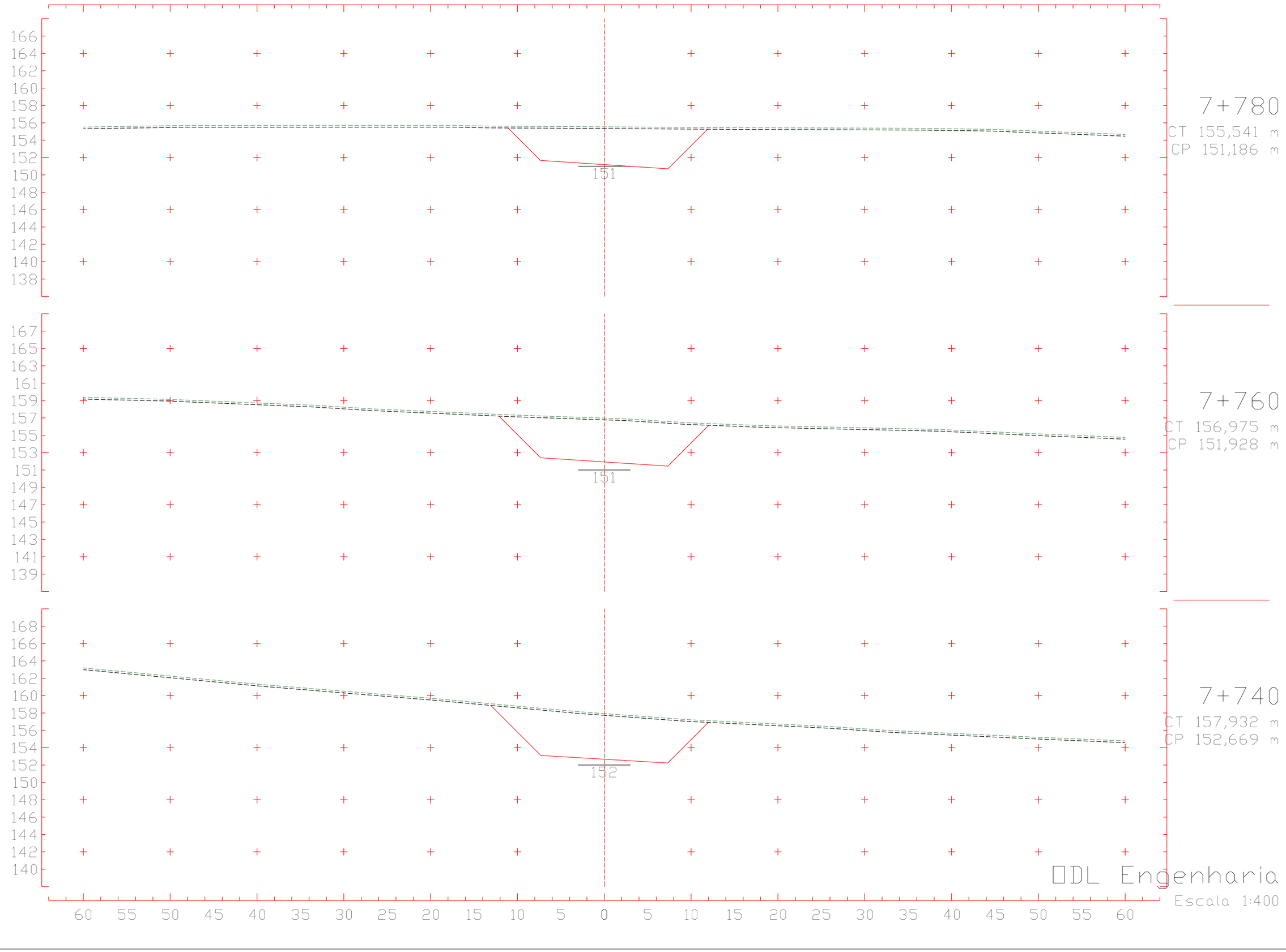
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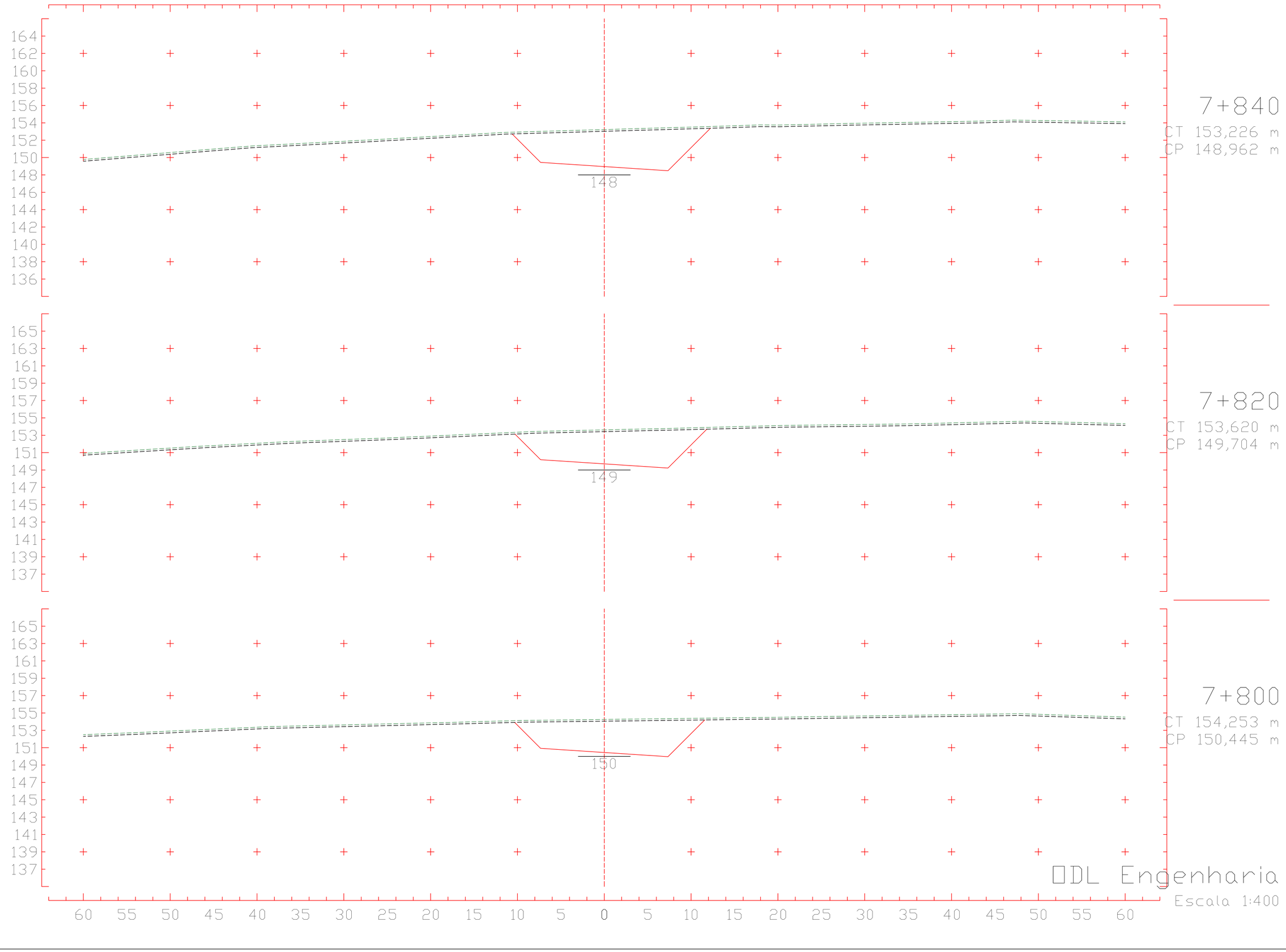
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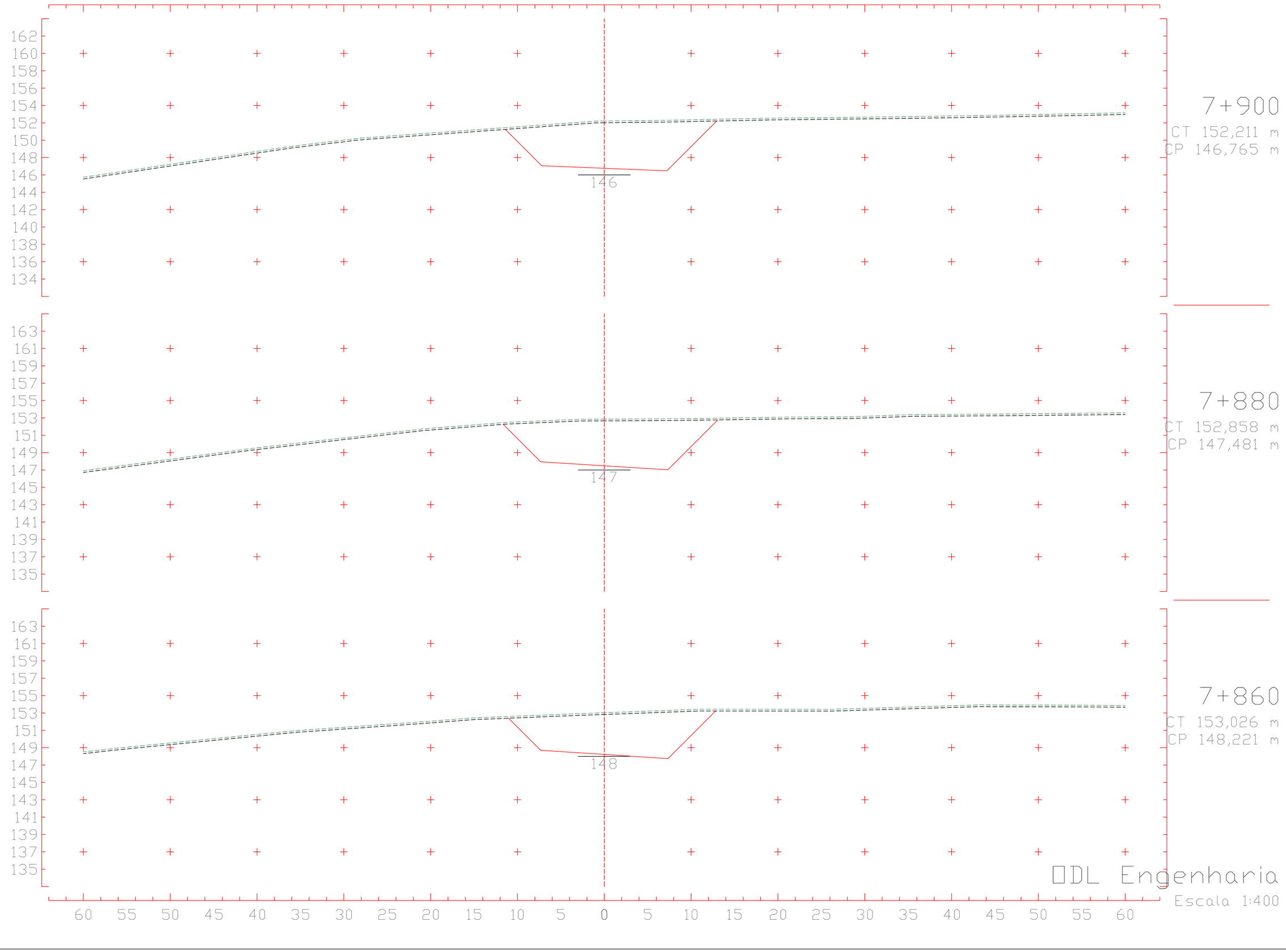
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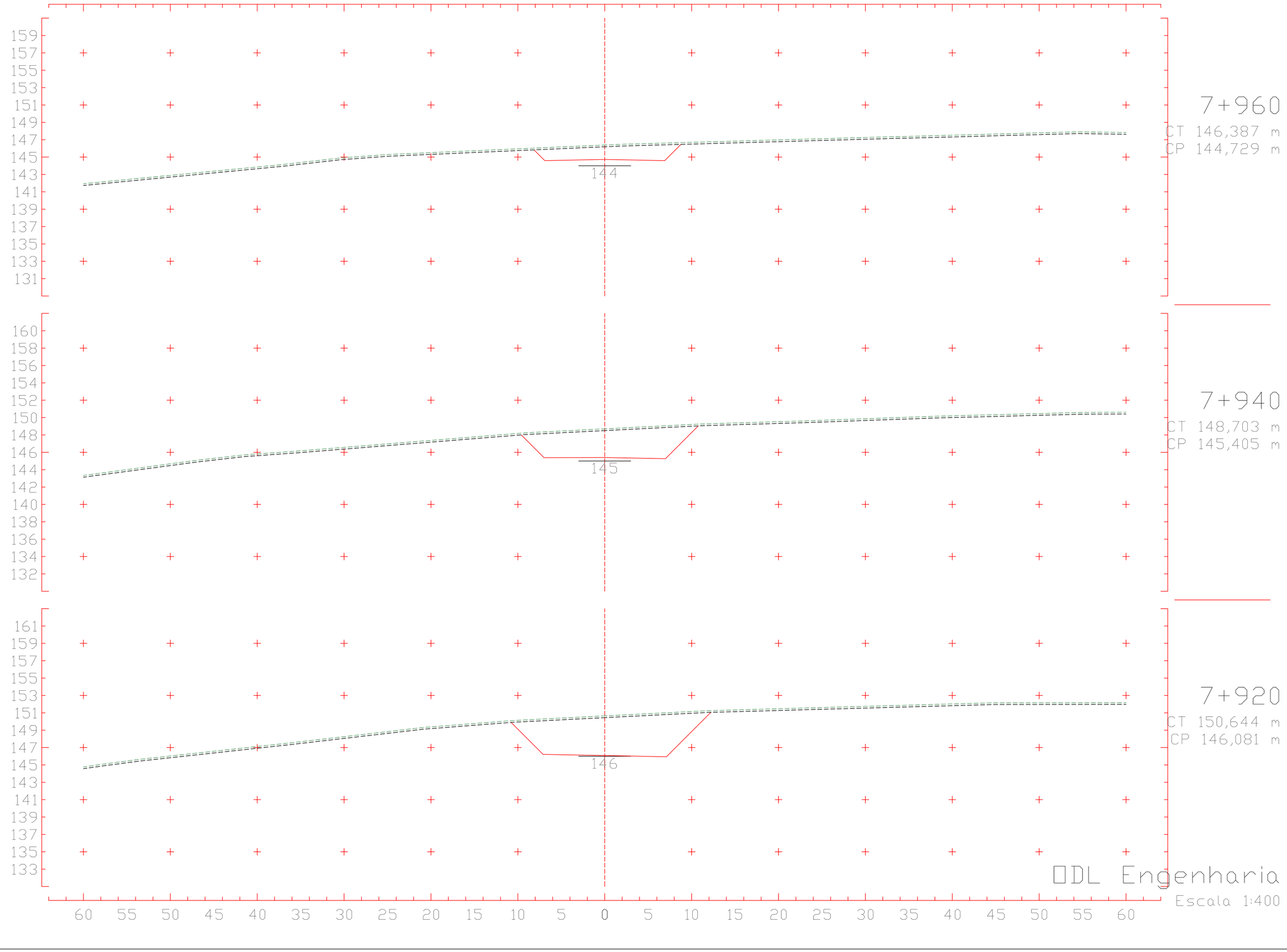
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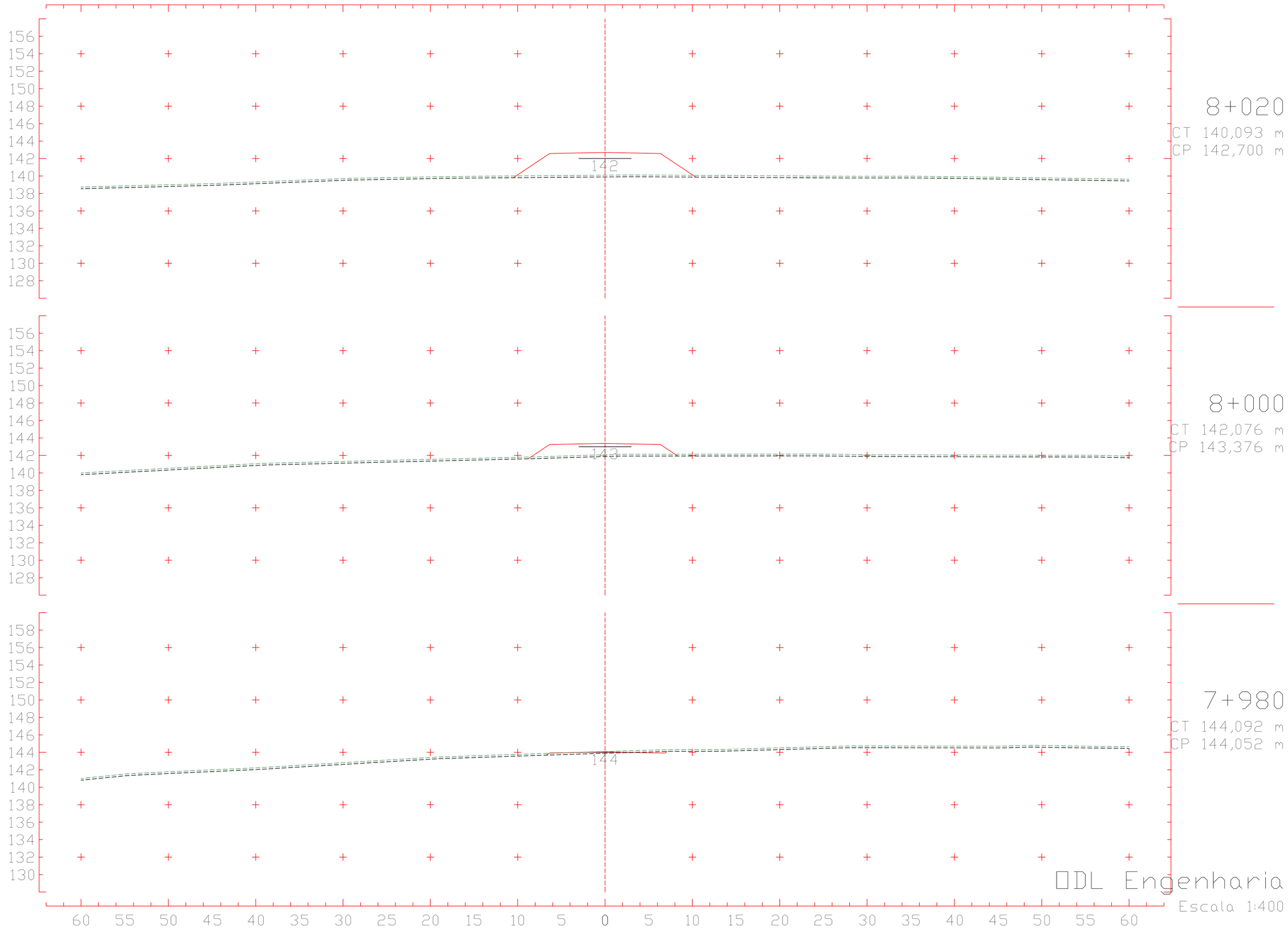
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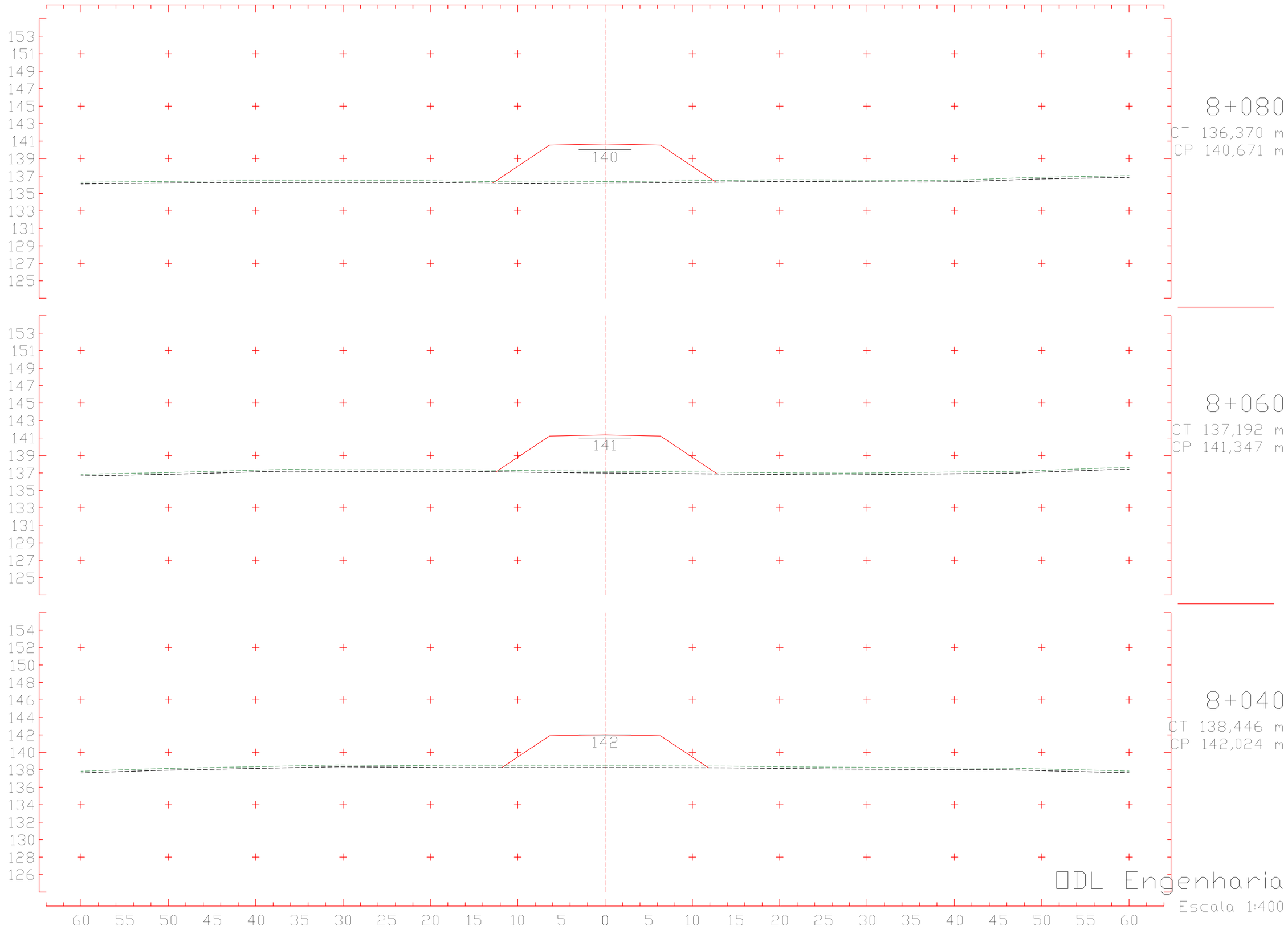
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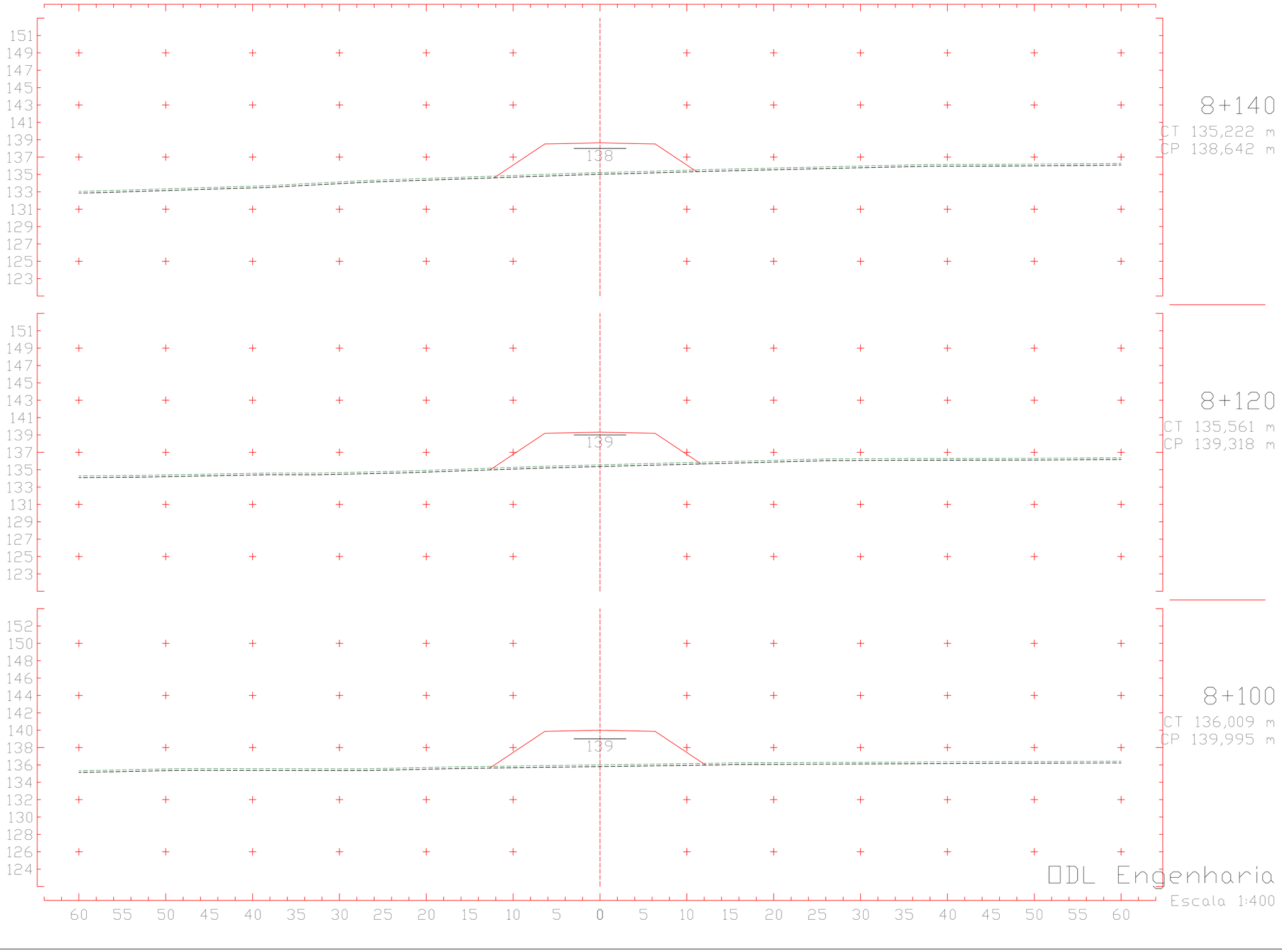
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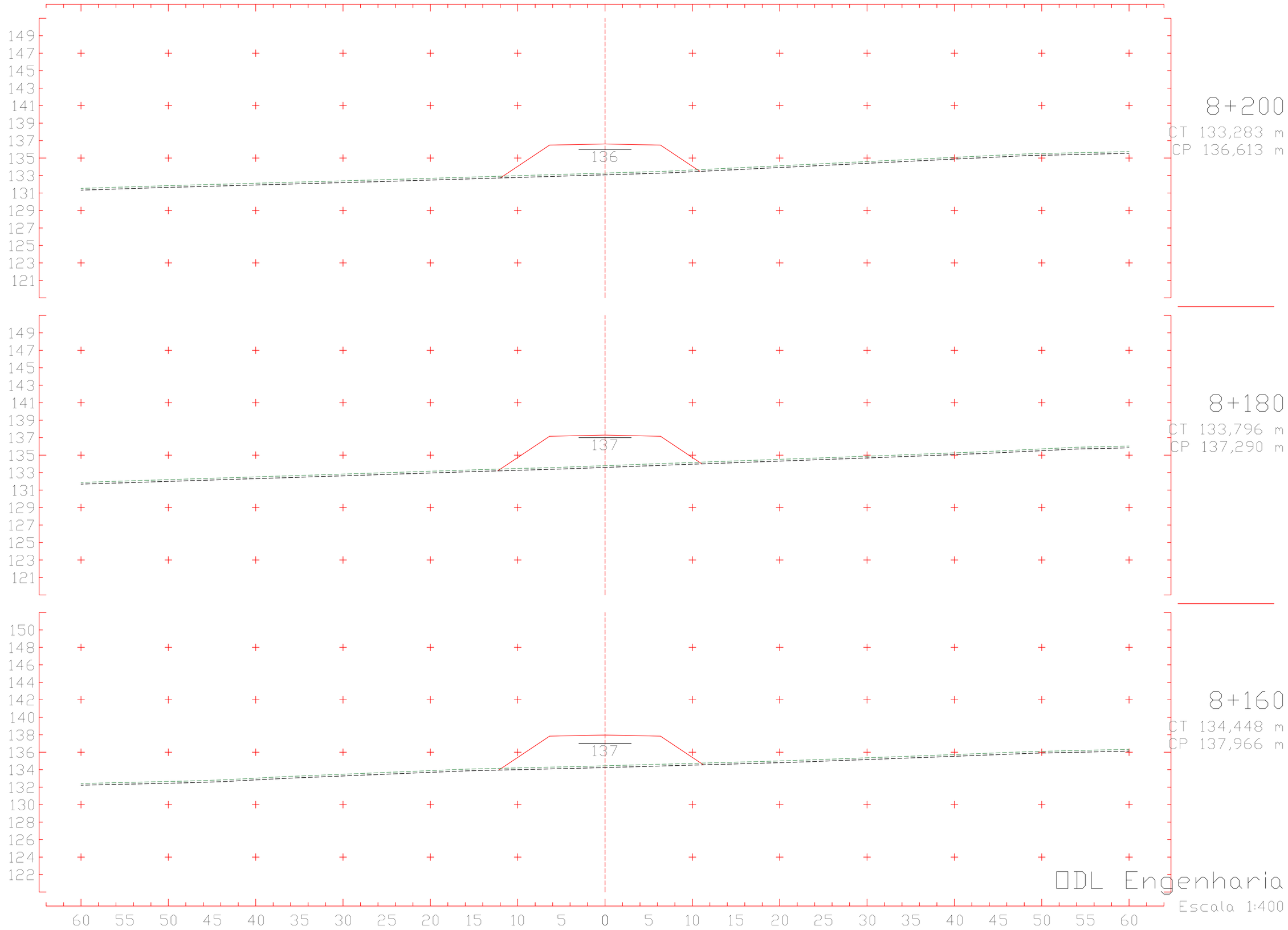
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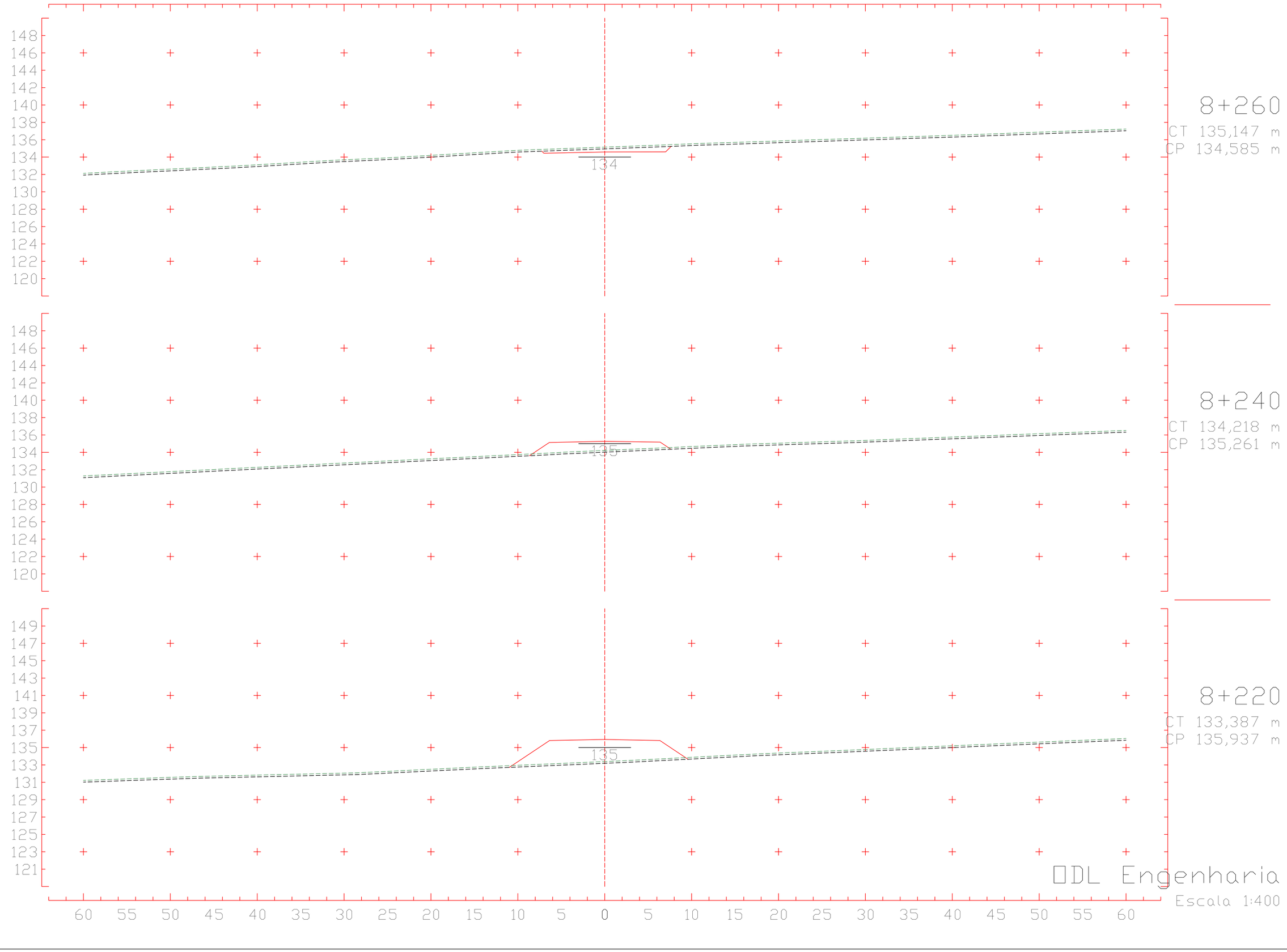
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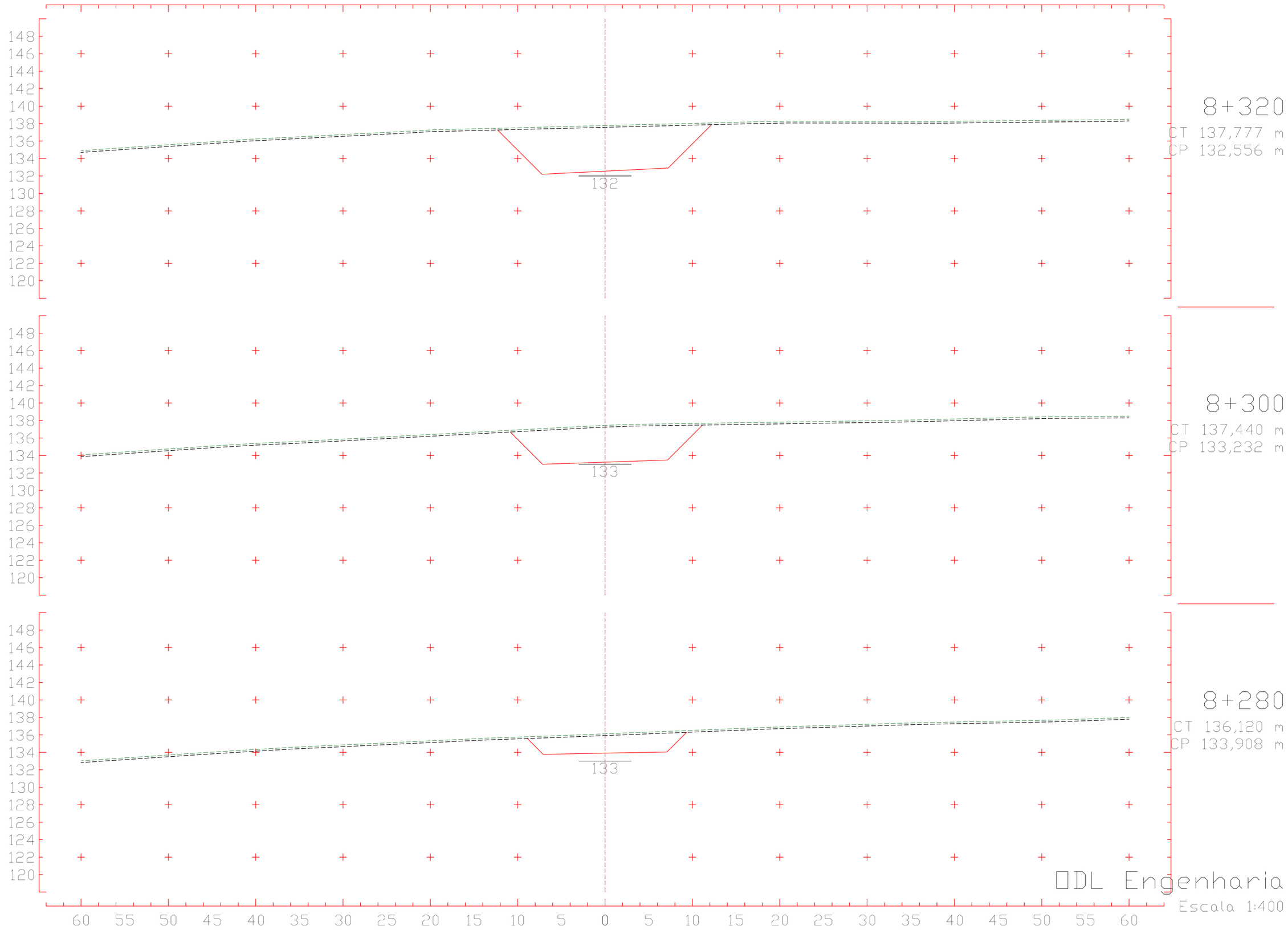
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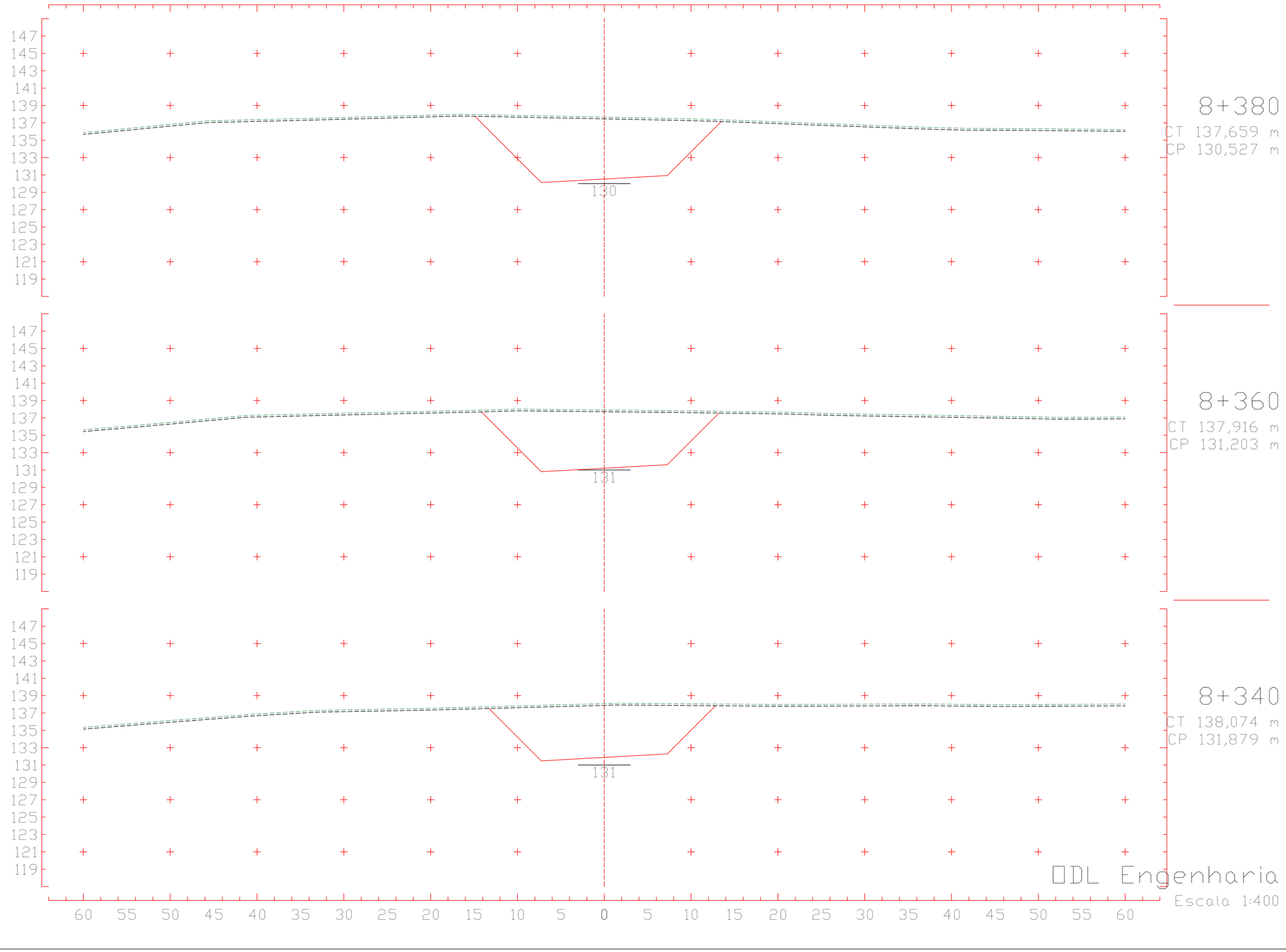
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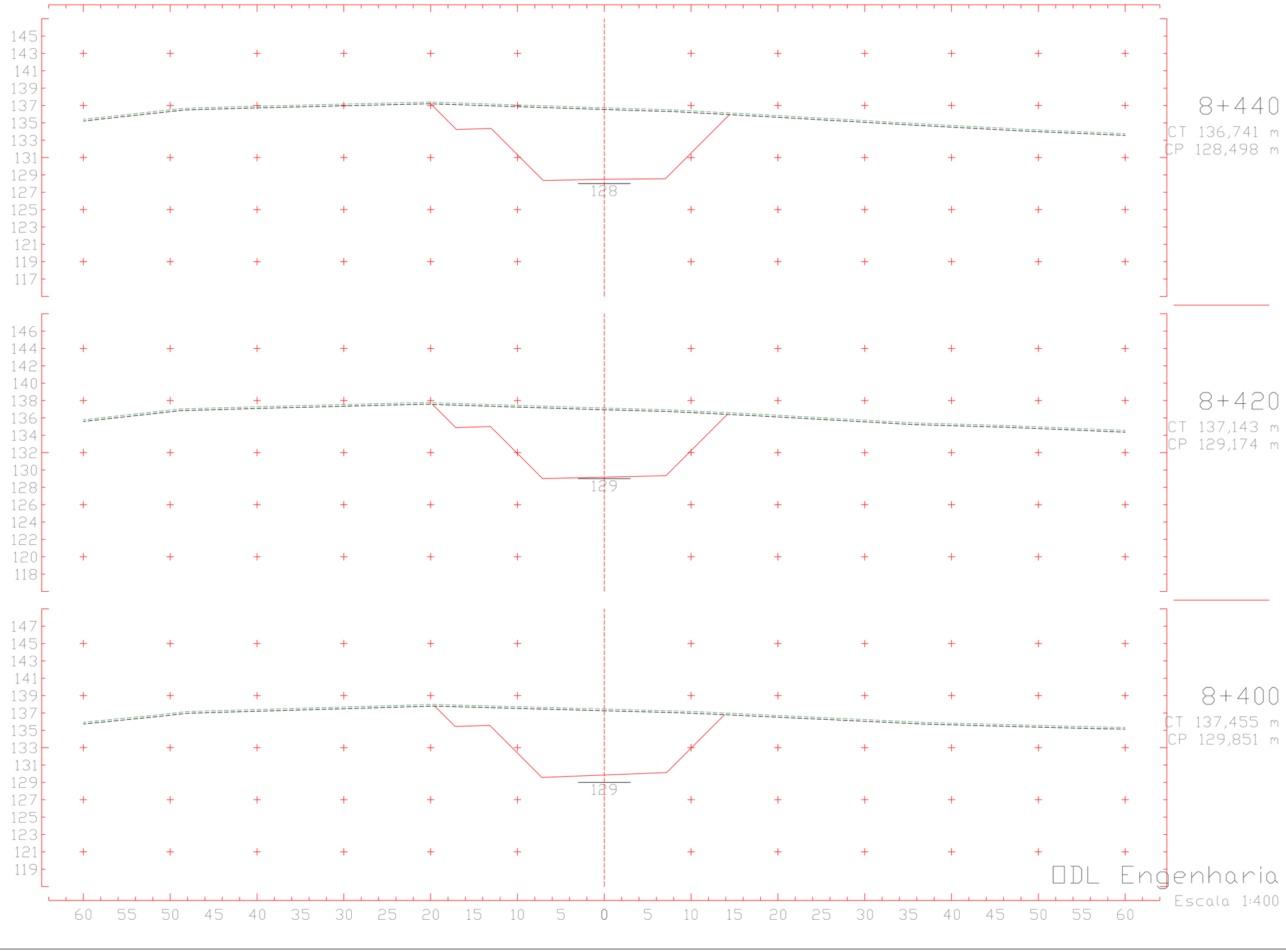
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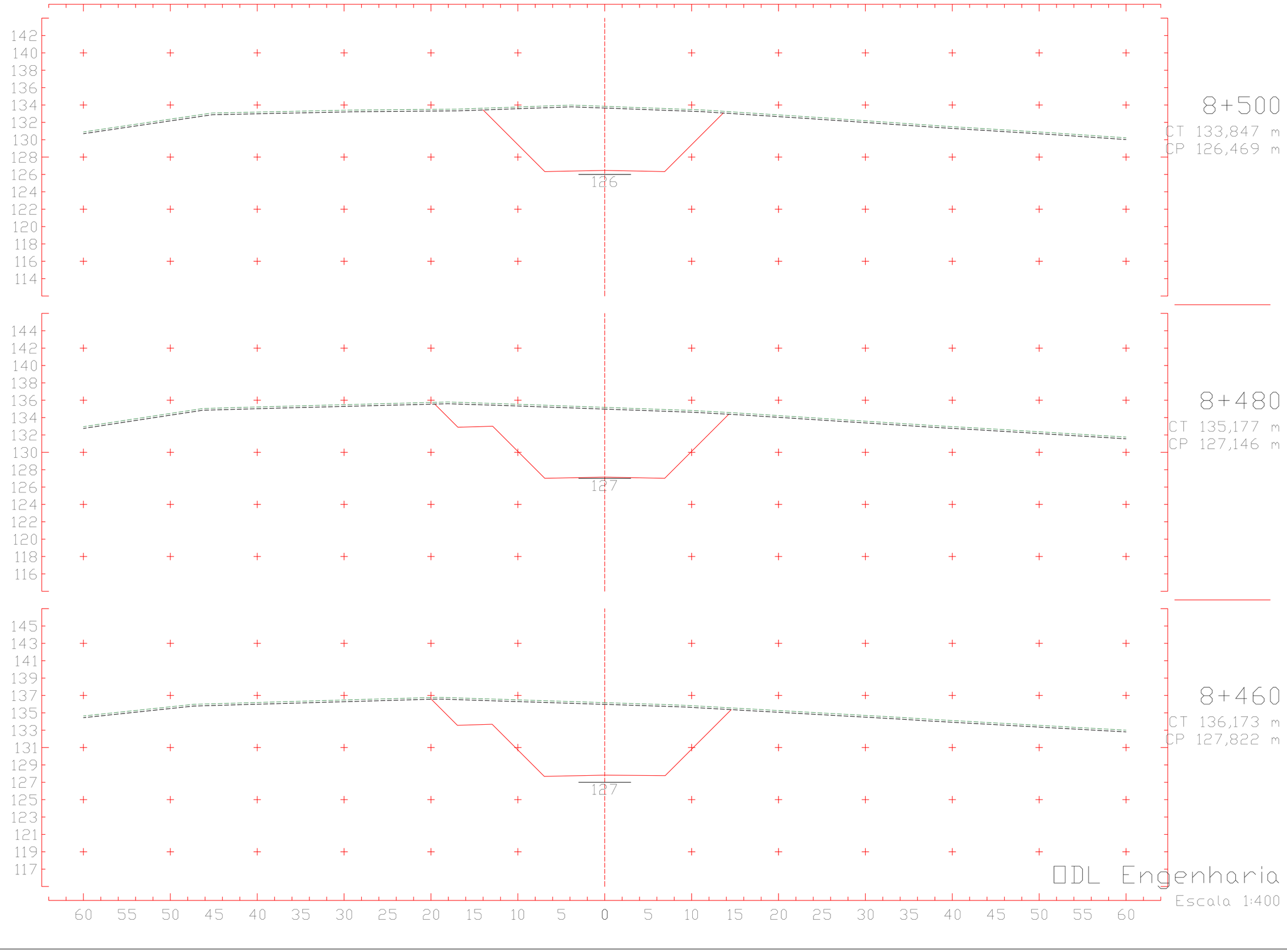
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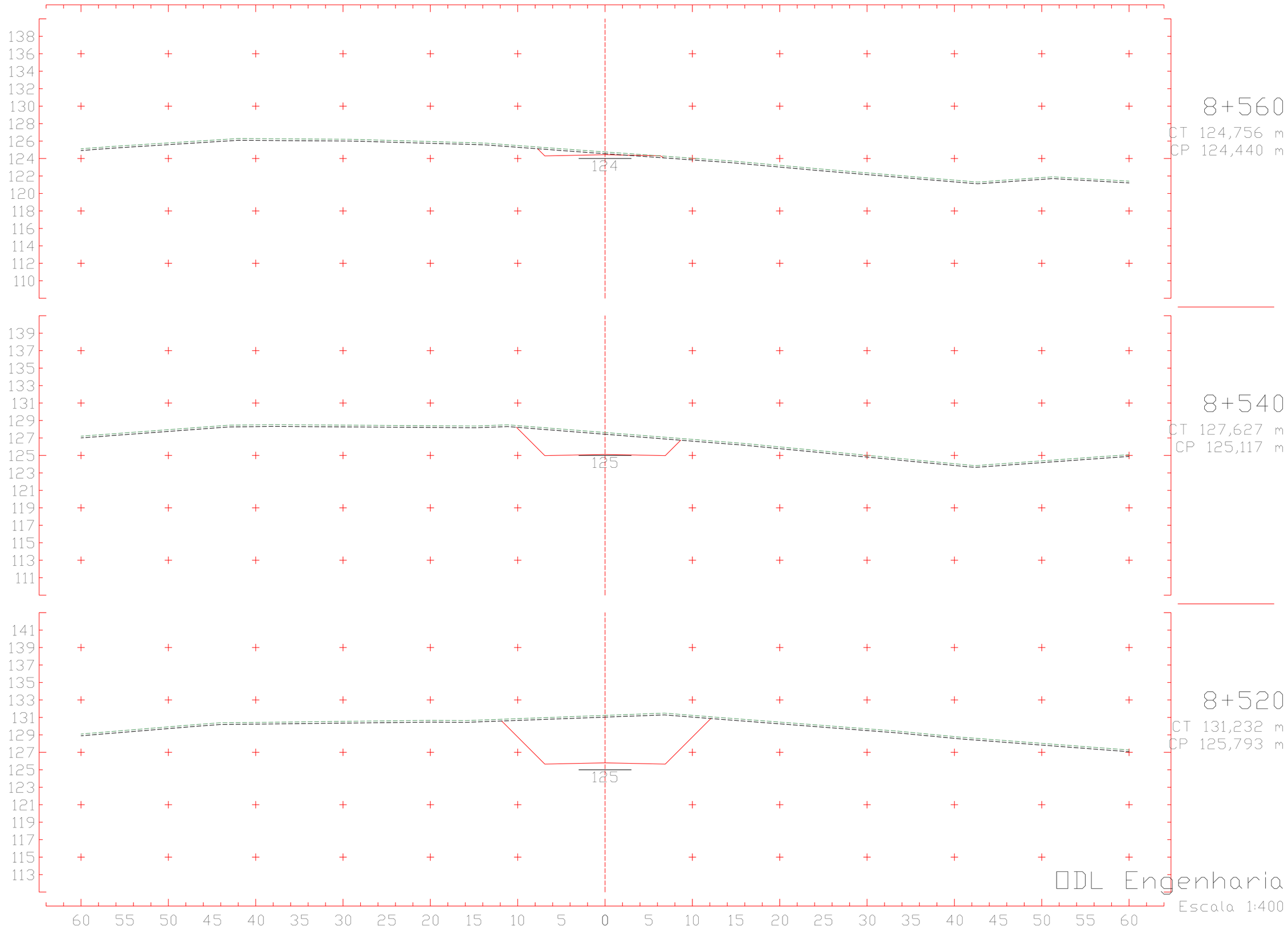
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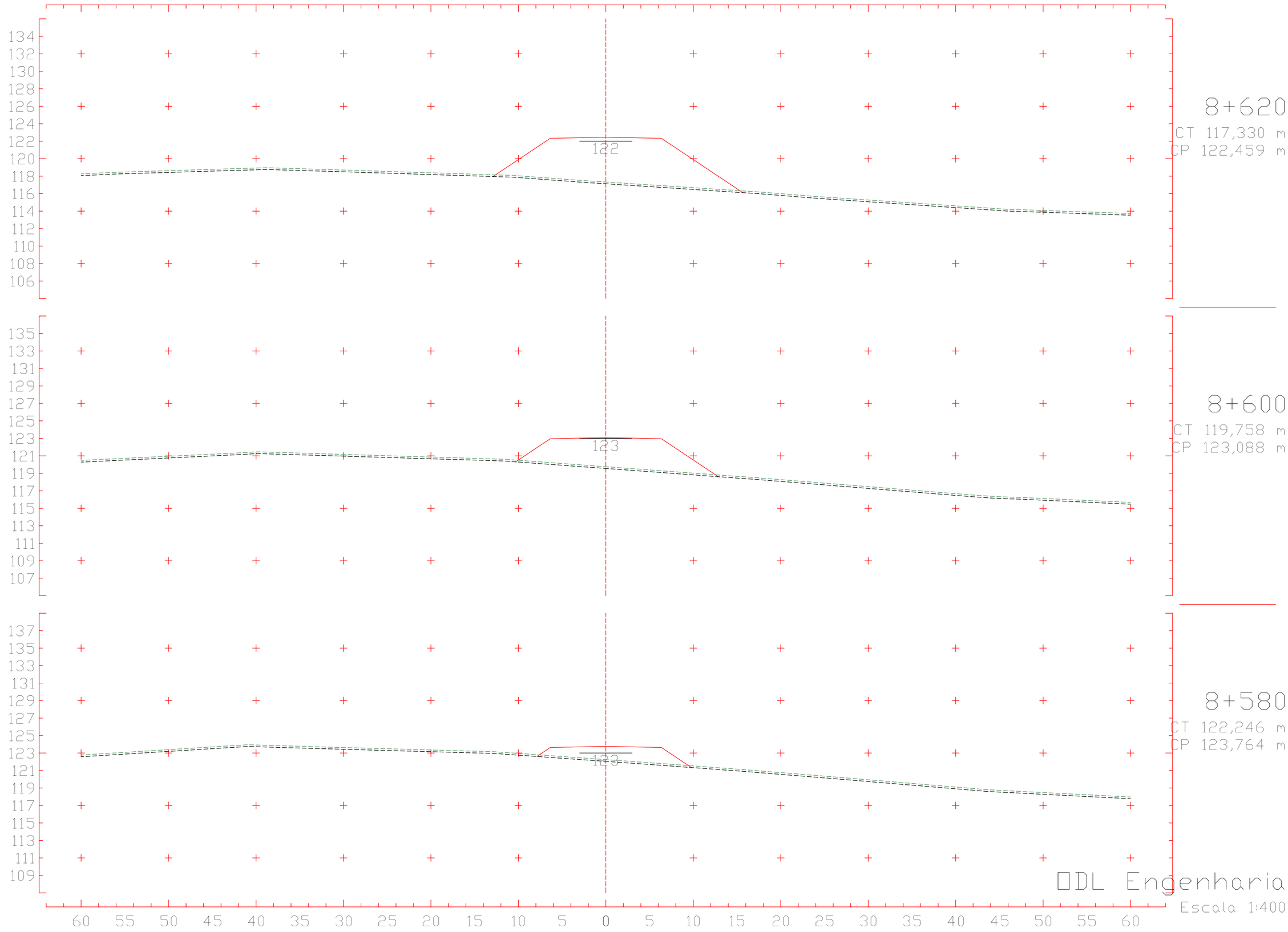
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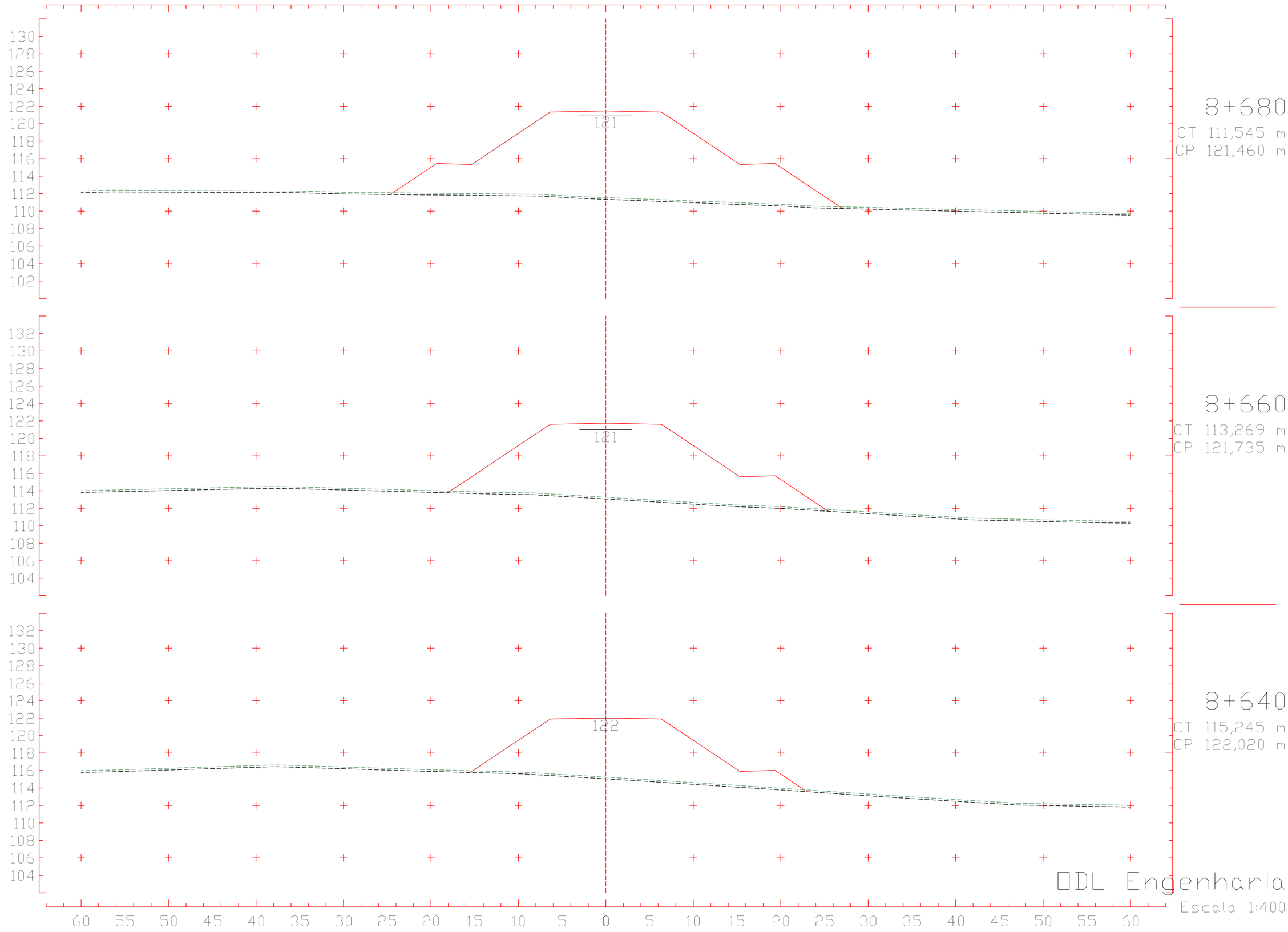
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ODL Engenharia

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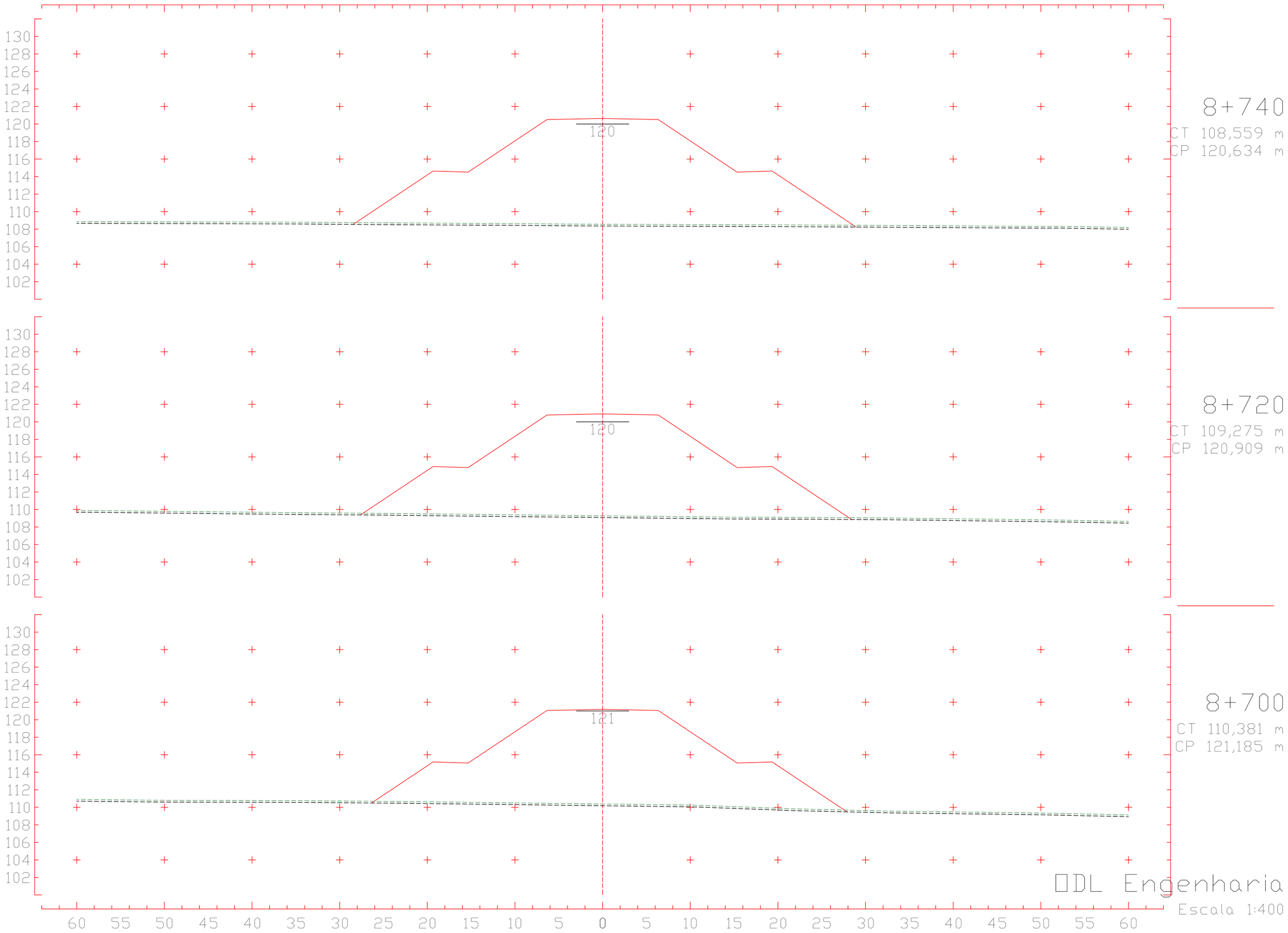
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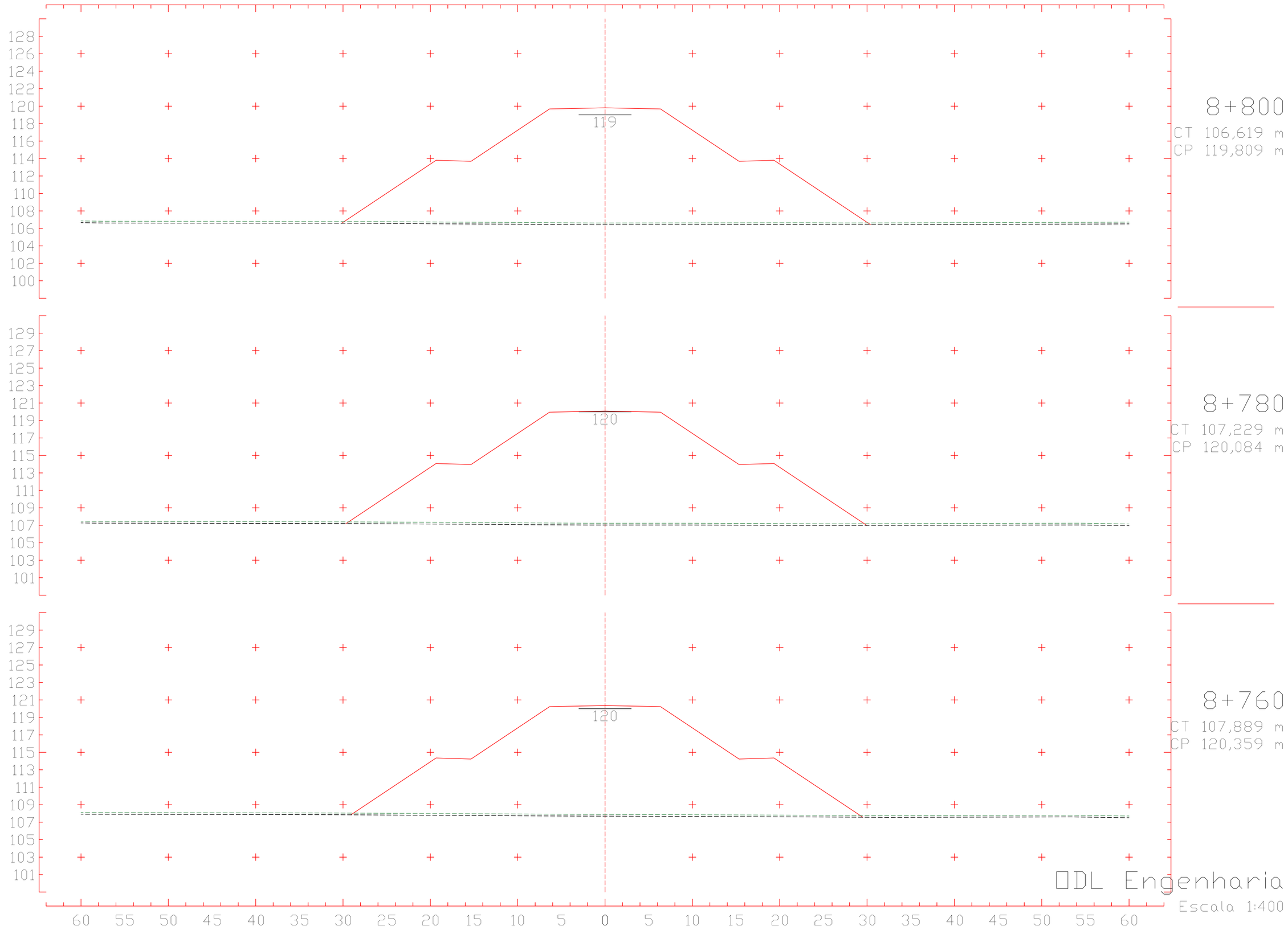
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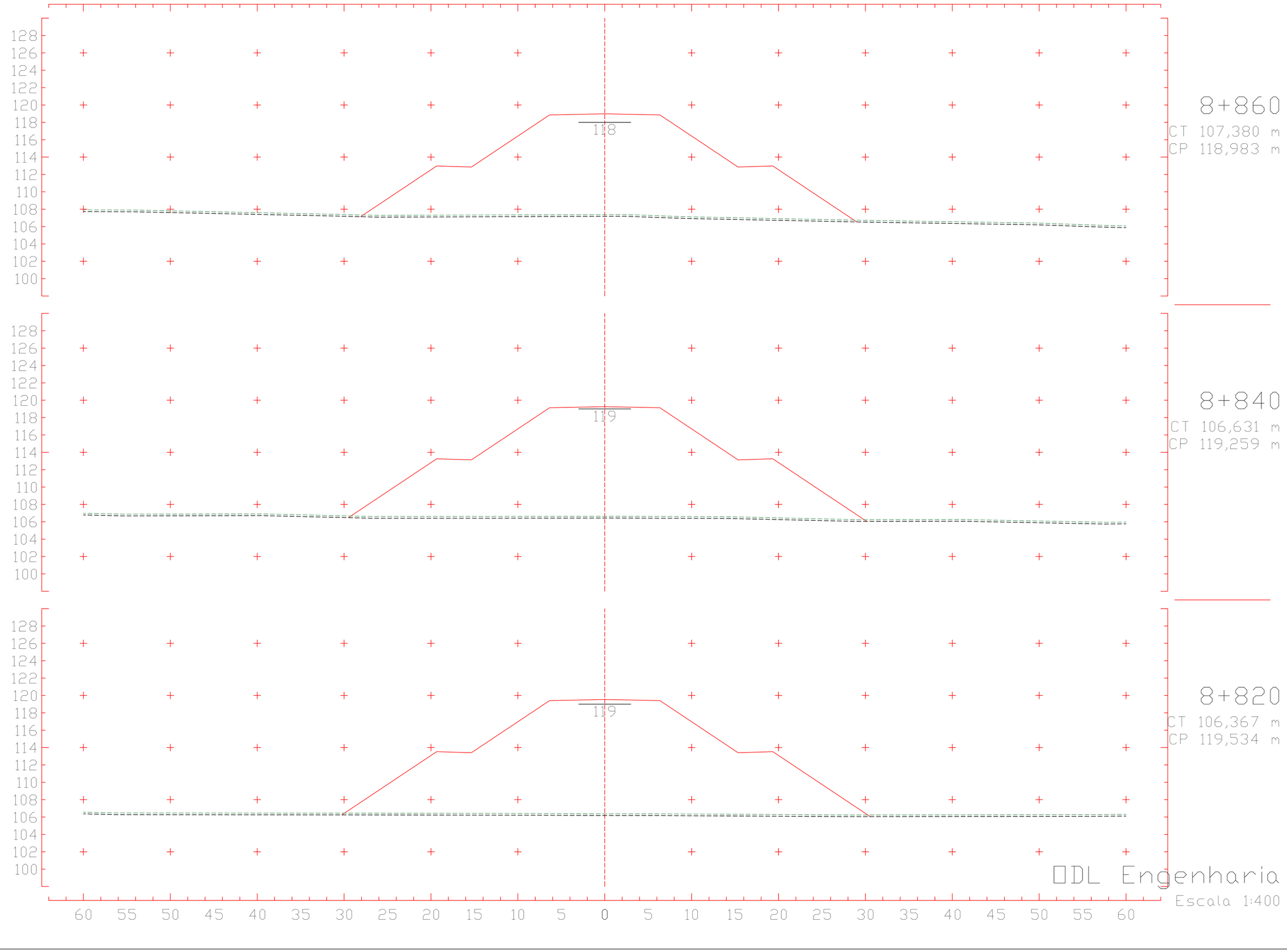
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Escala 1:400

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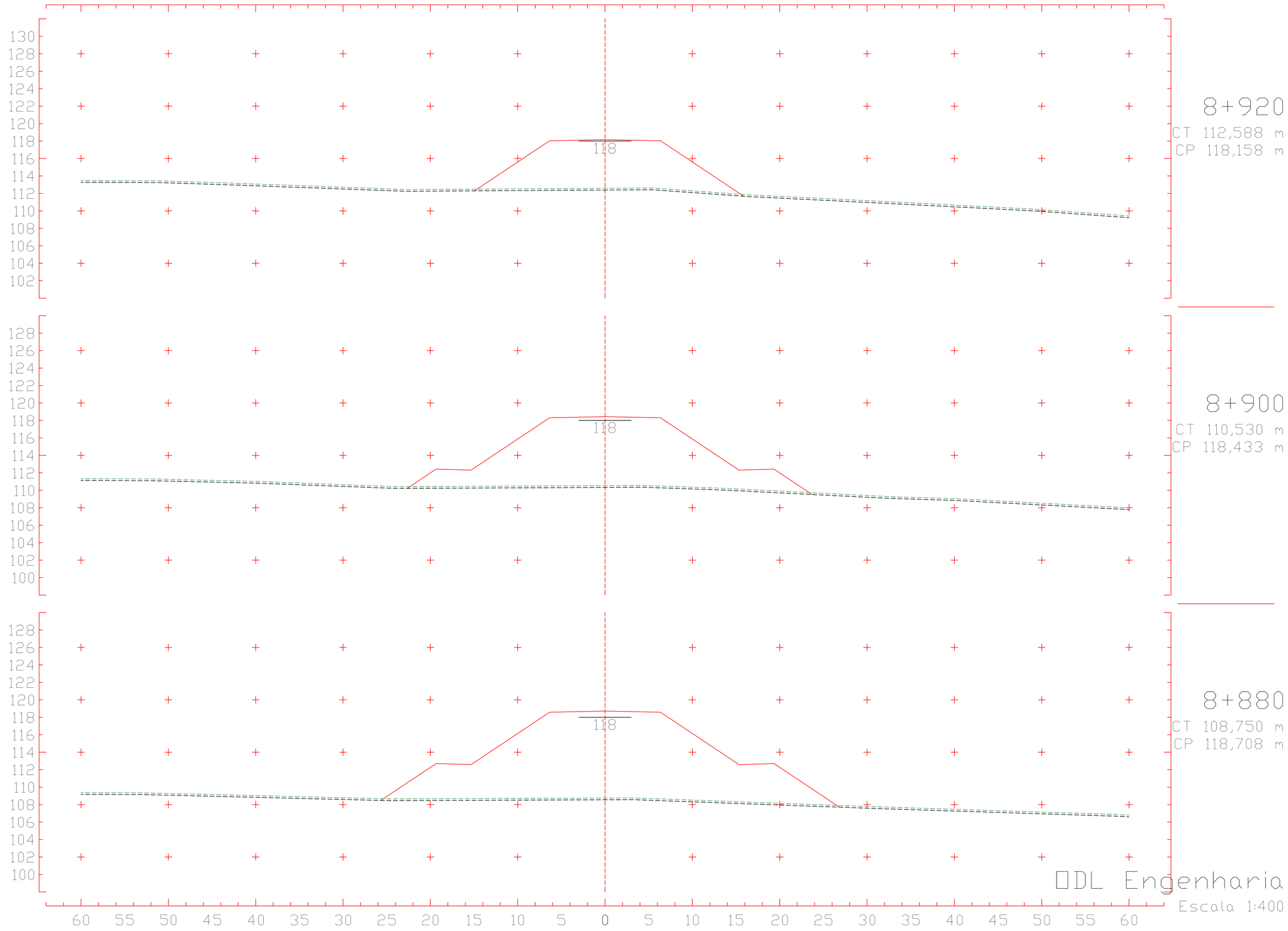
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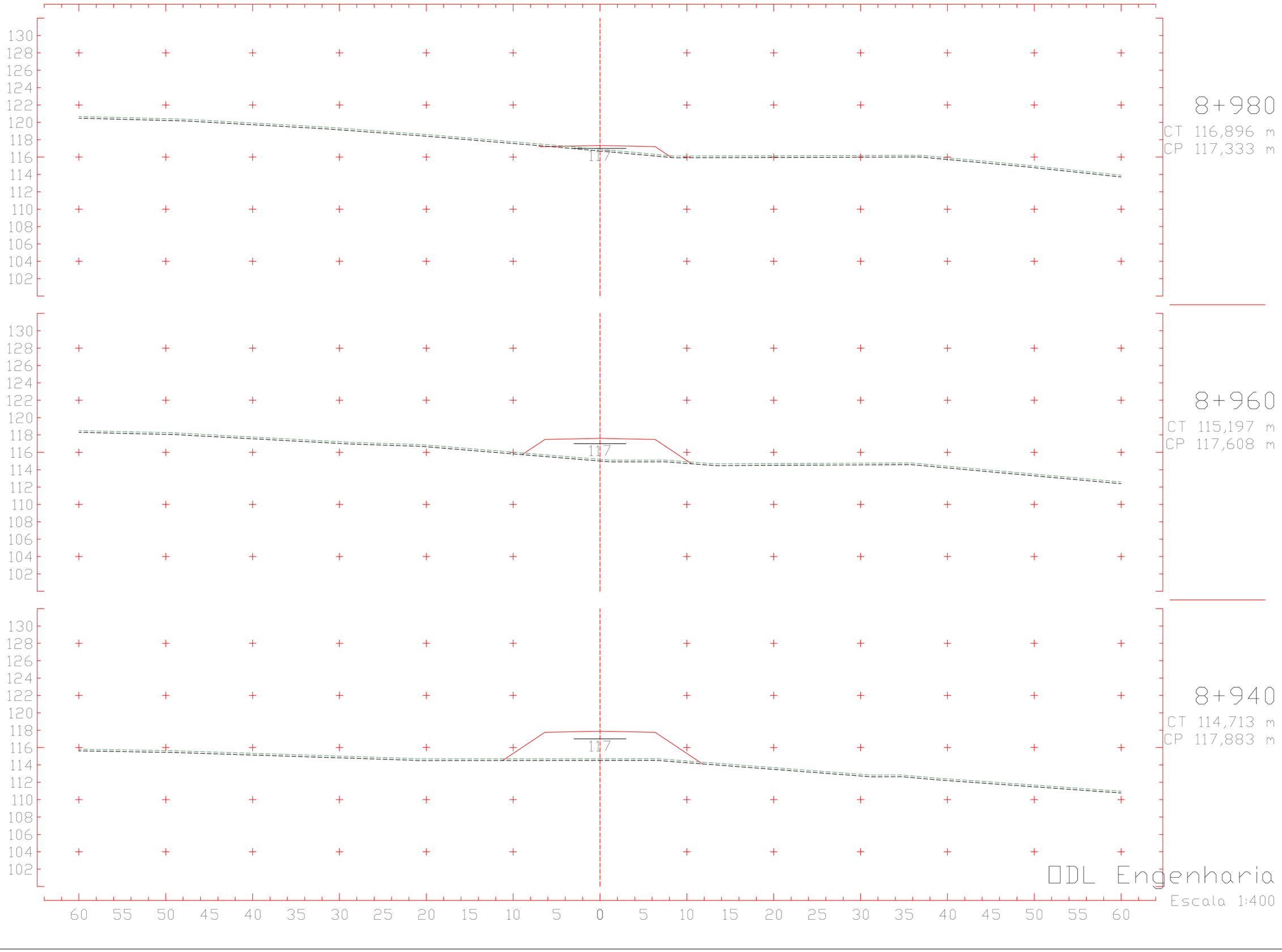
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ODL Engenharia

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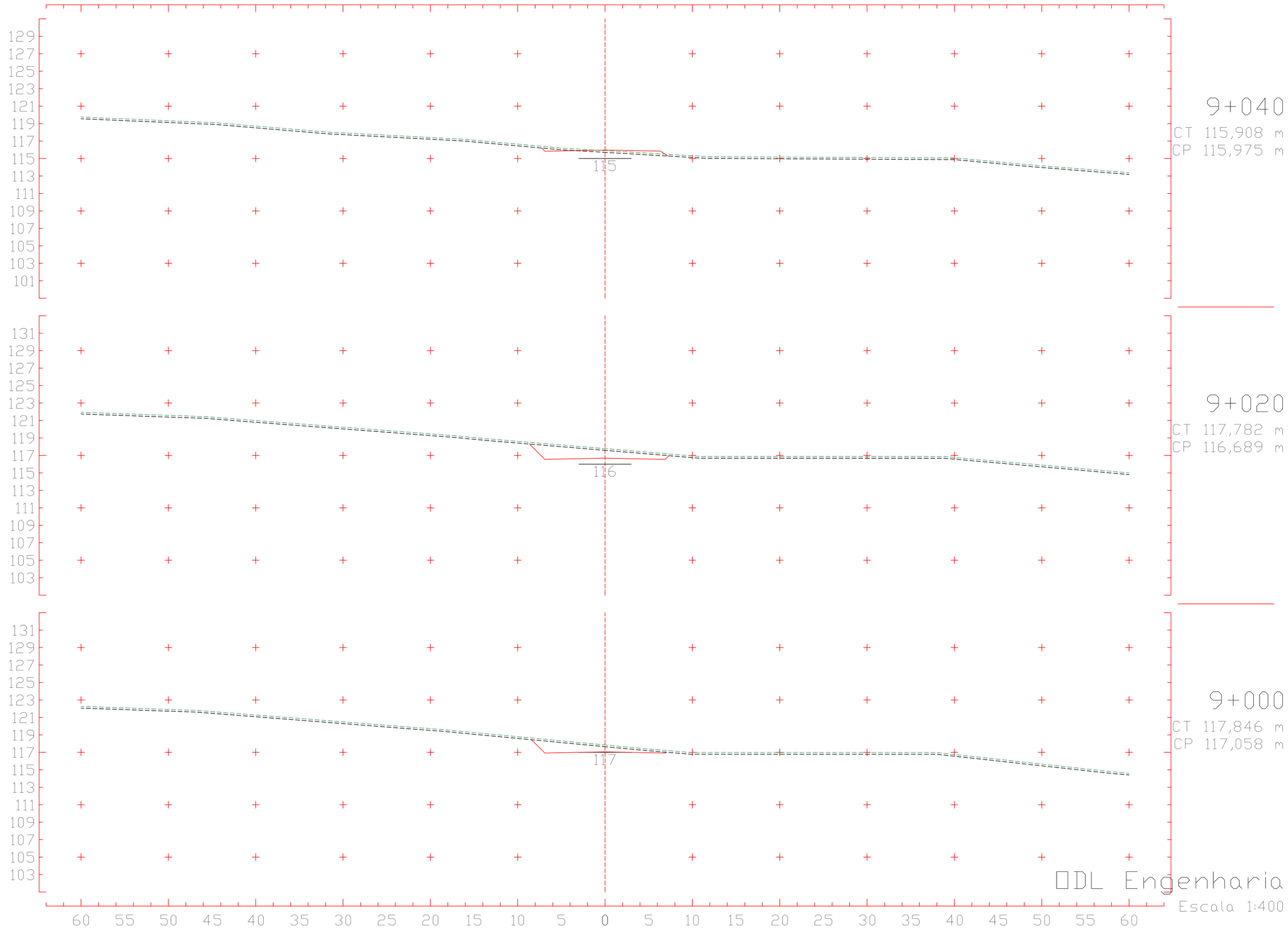
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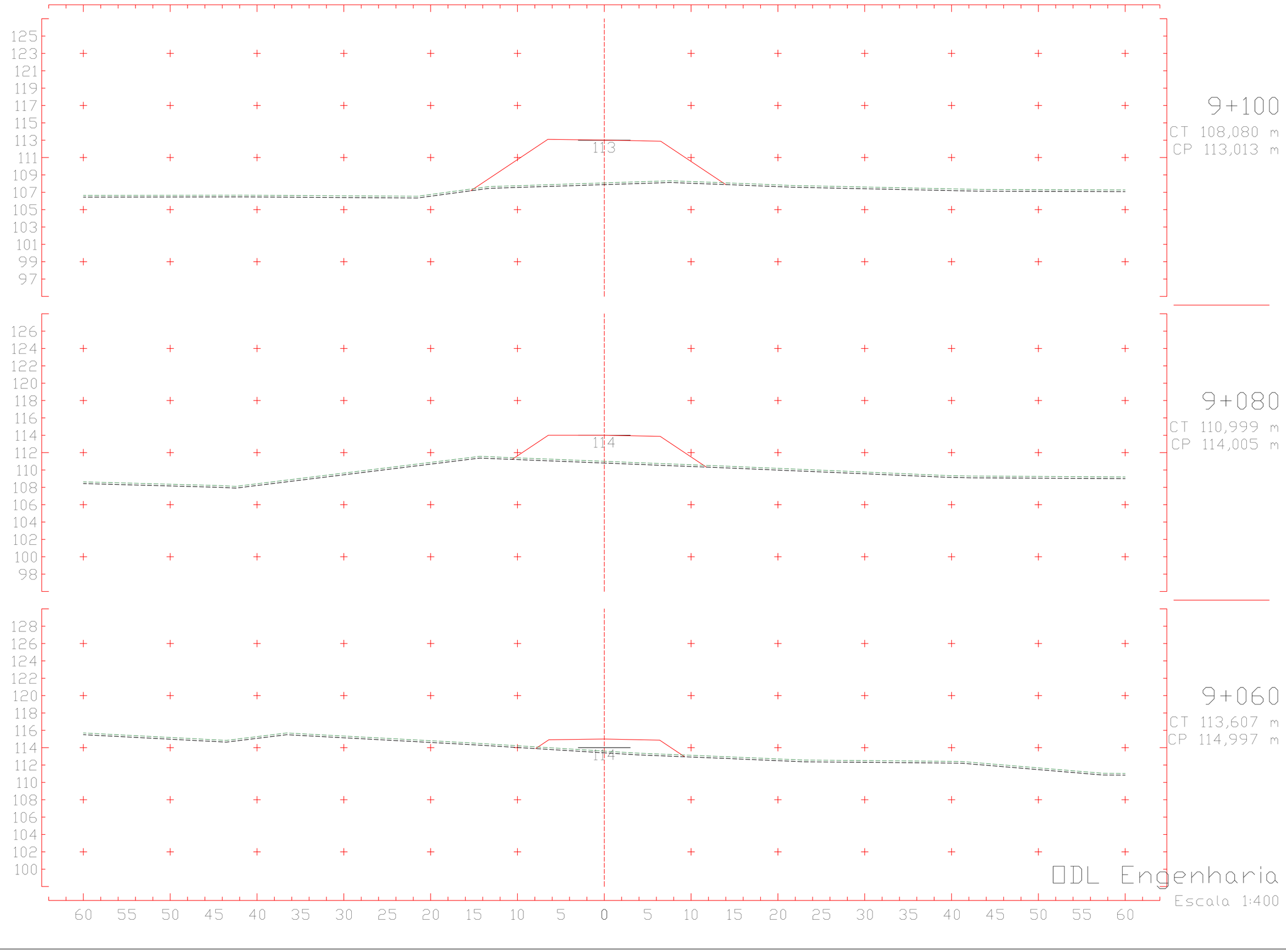
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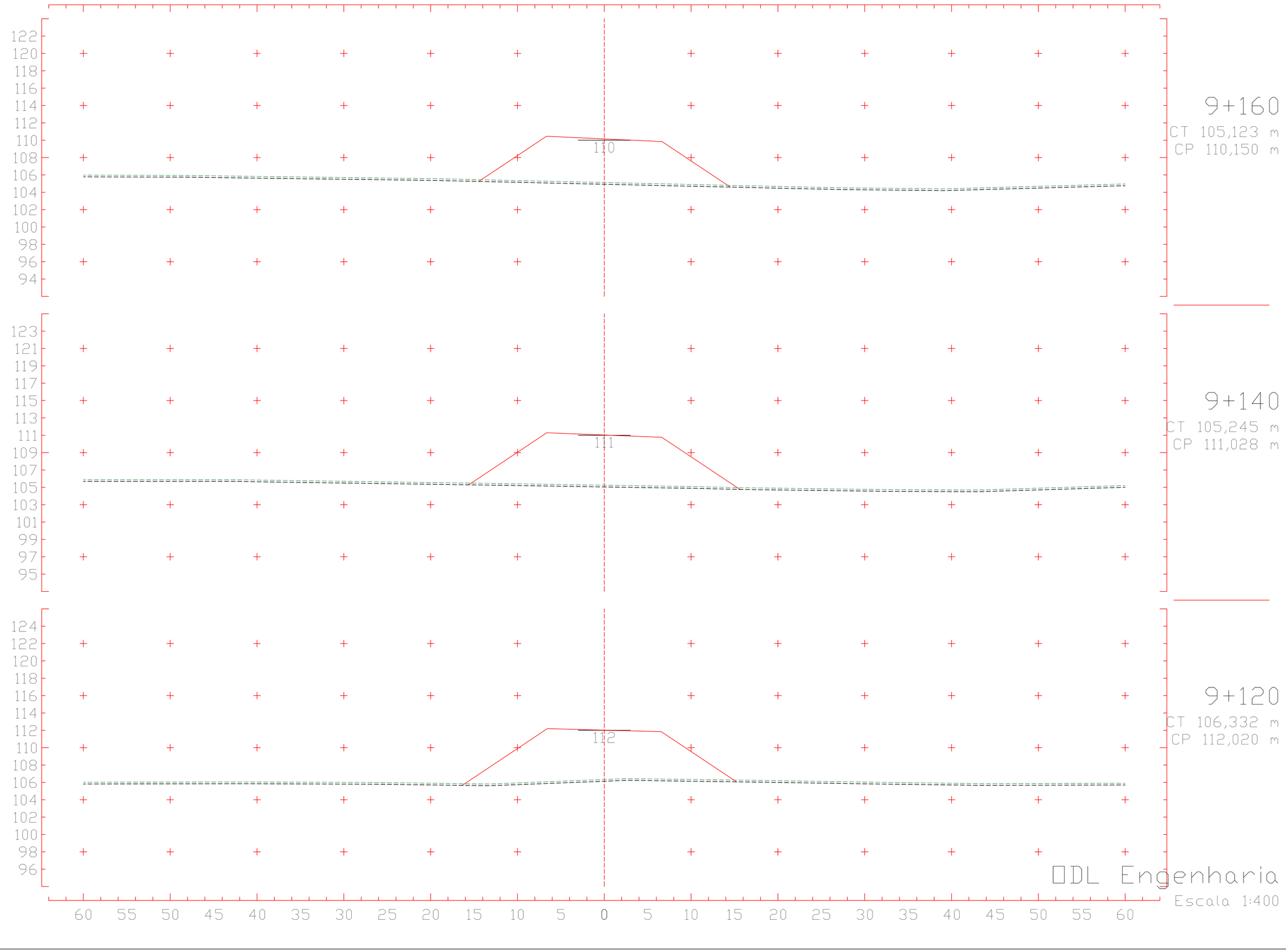
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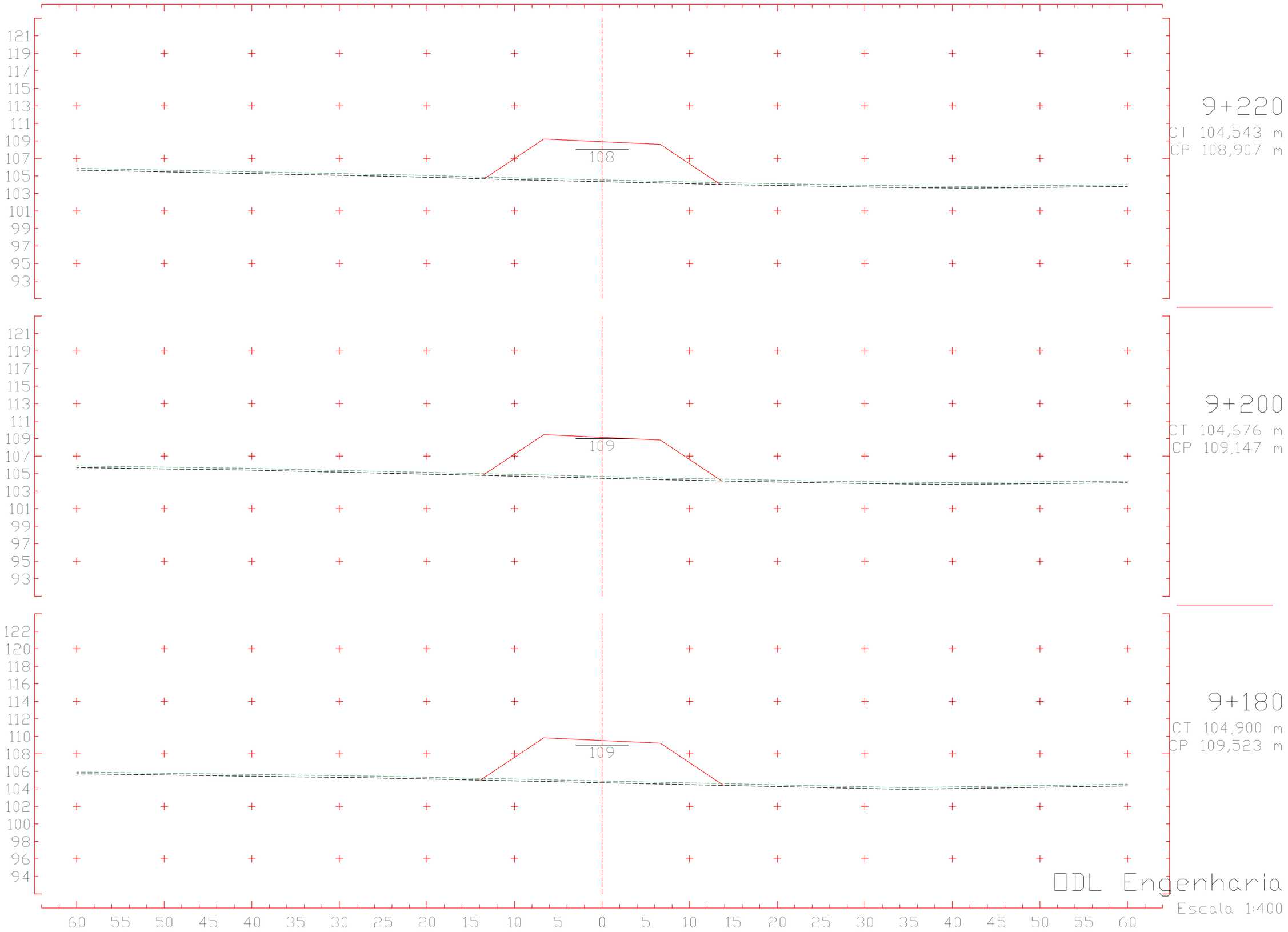
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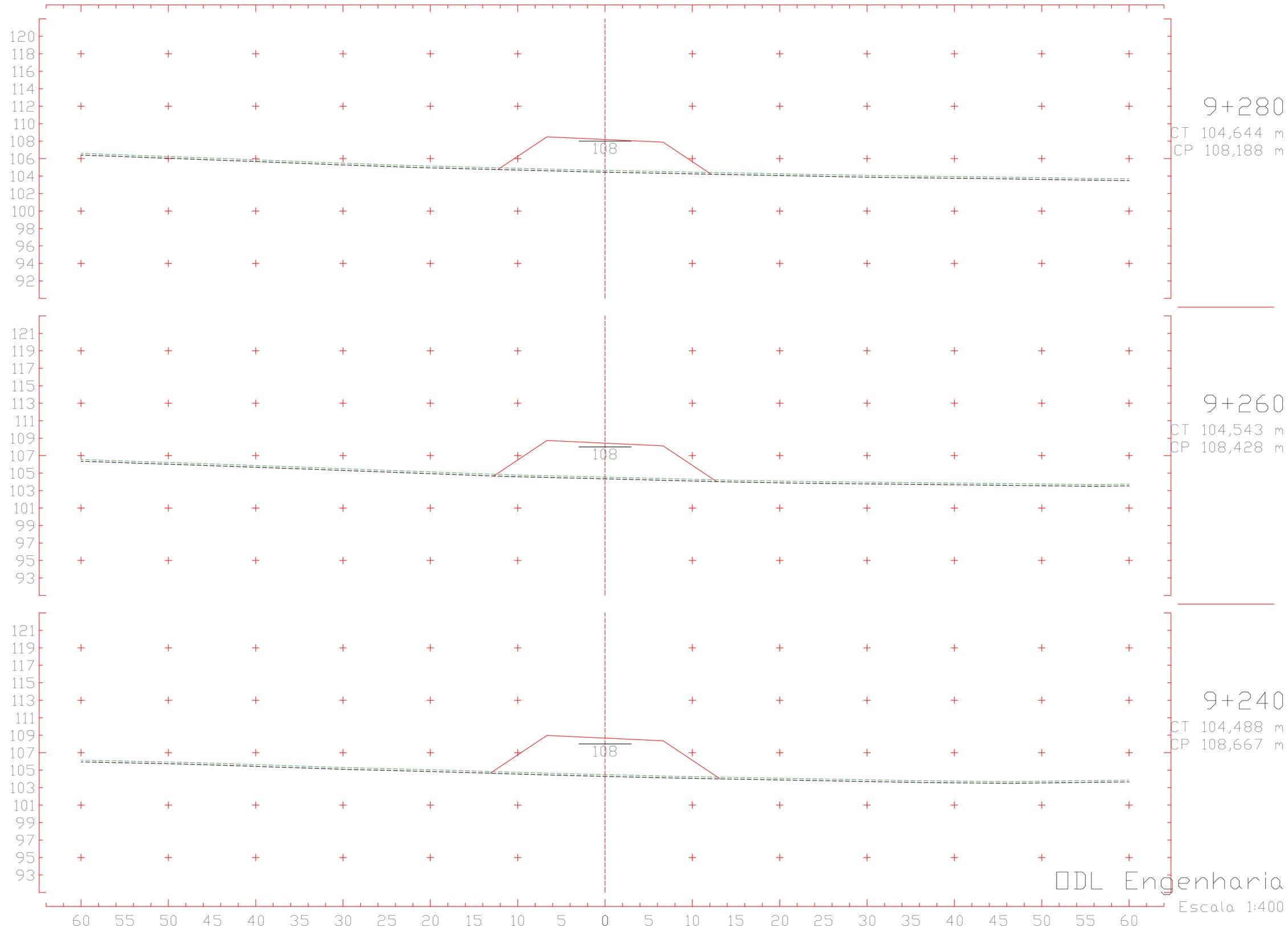
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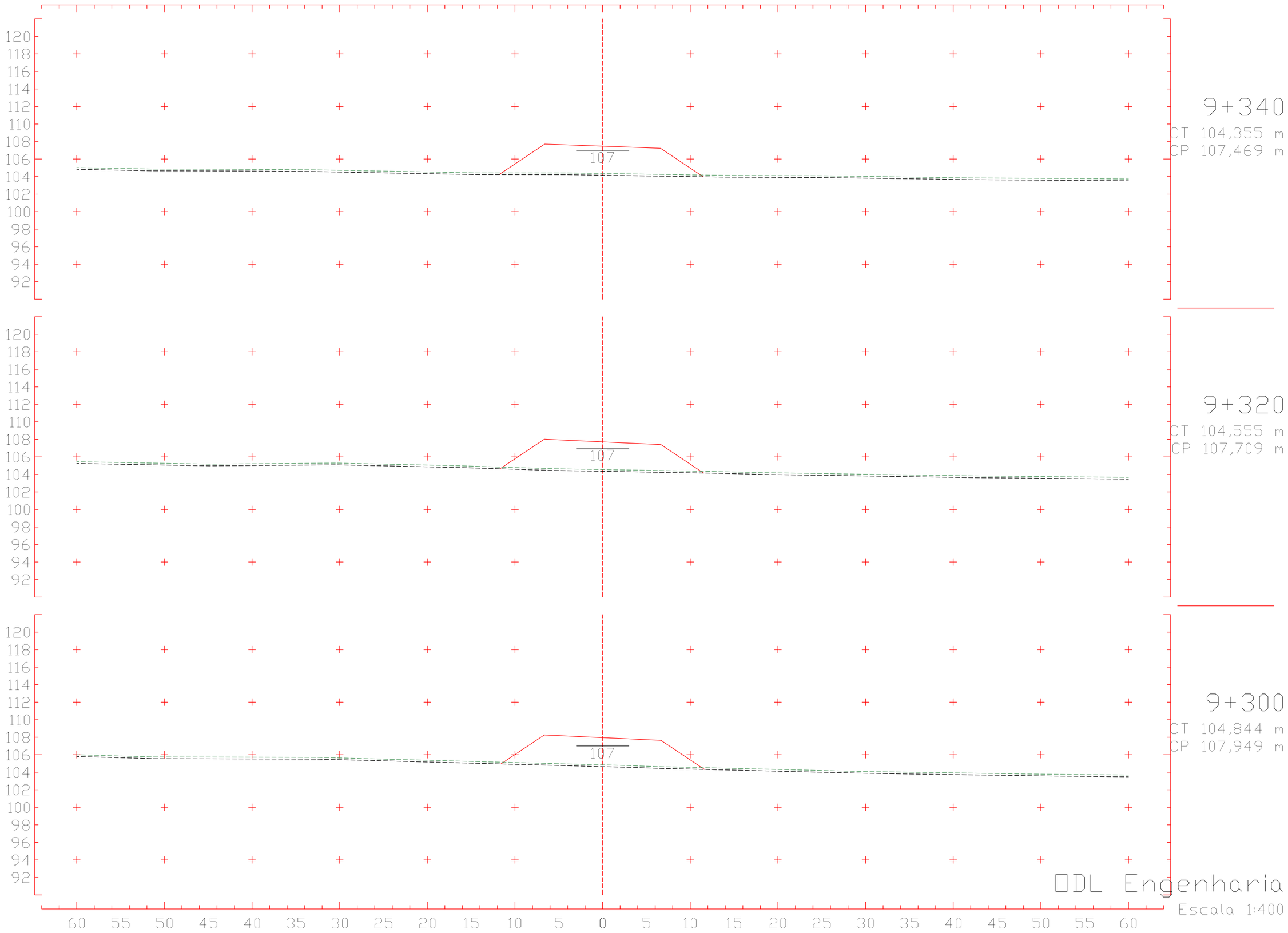
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Projeto Ponto de Partida 2021/1



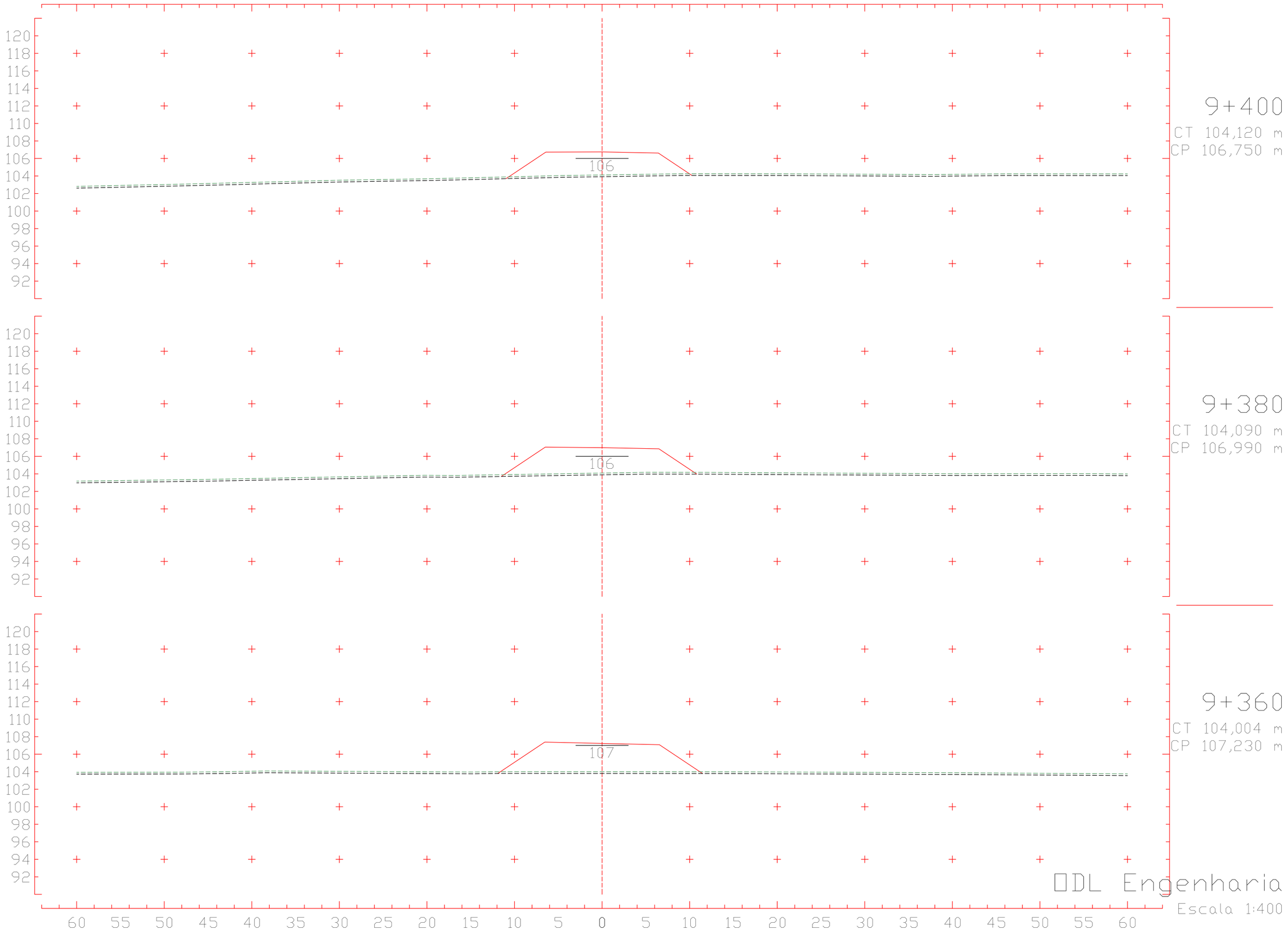
Projeto Ponto de Partida 2021/1



DL Engenharia

Escala 1:400

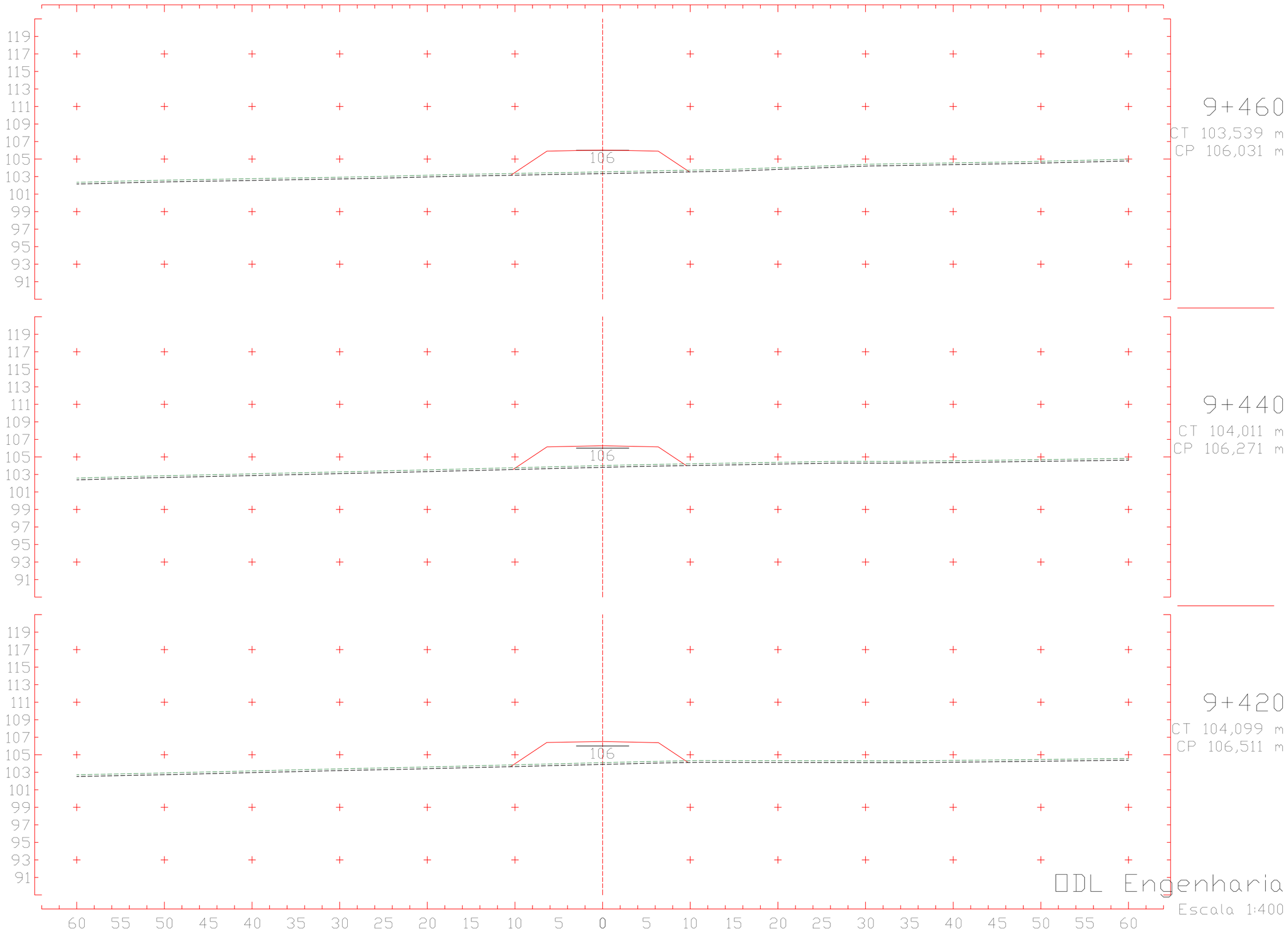
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DL Engenharia

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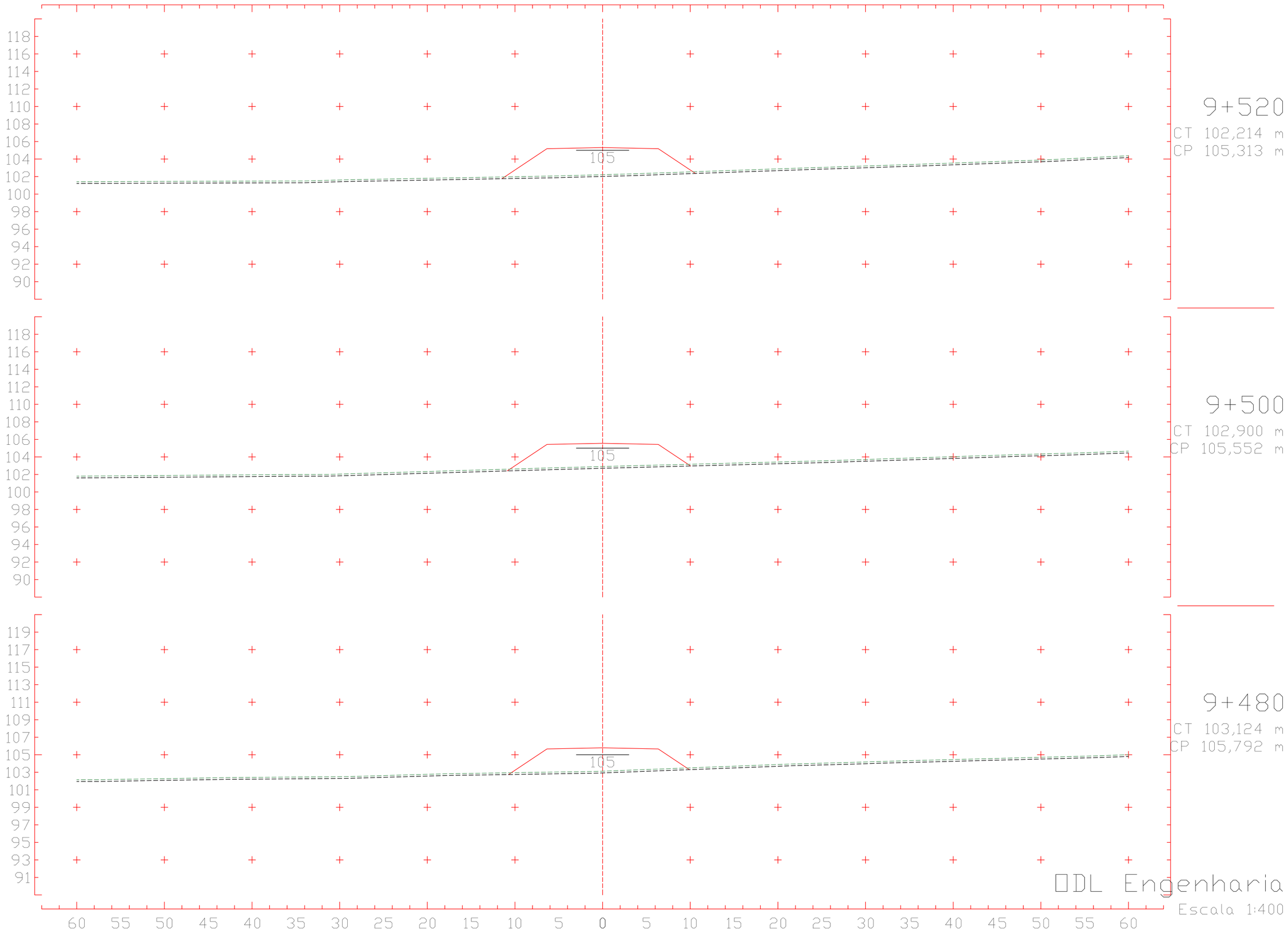
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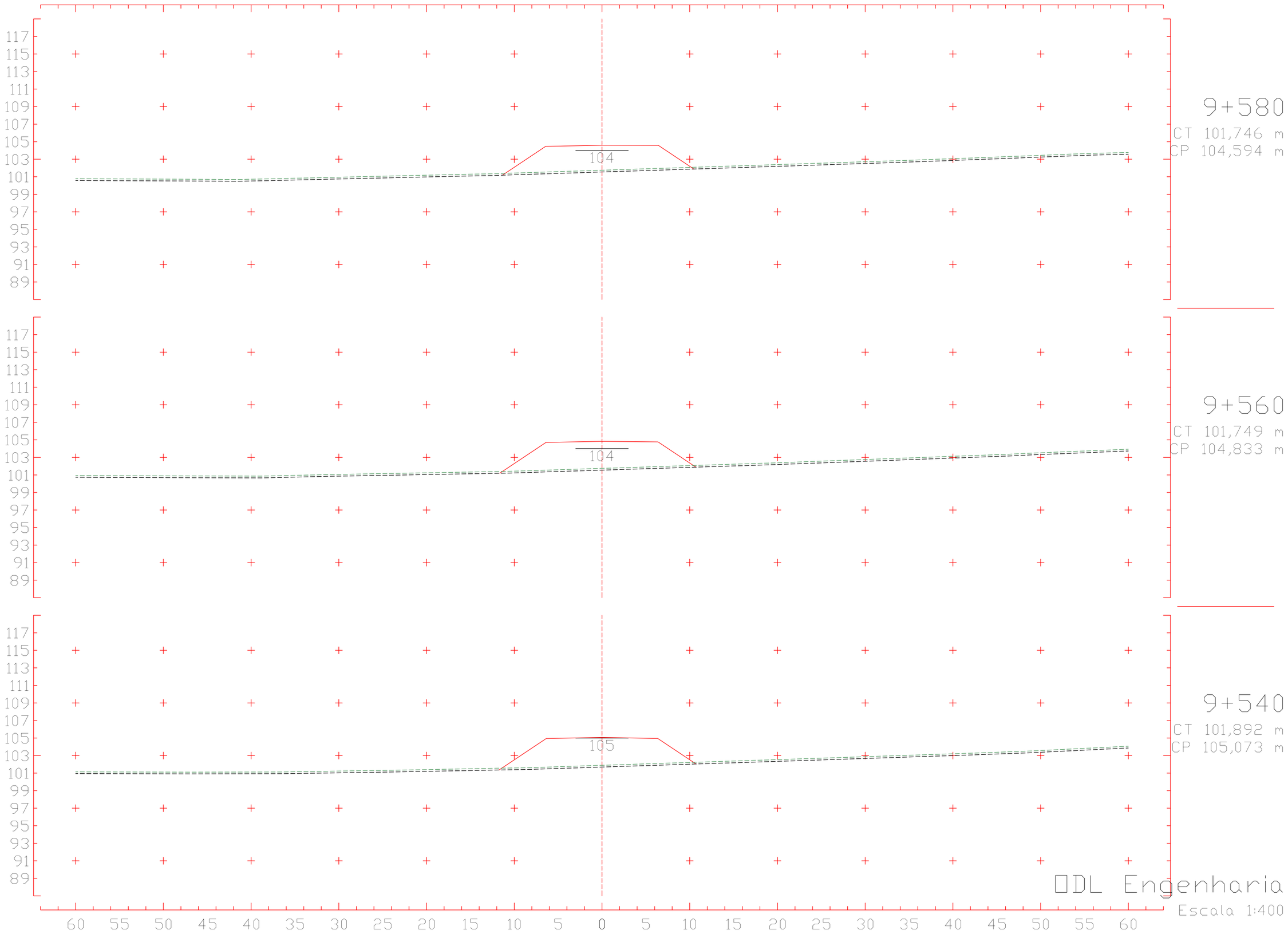
DL Engenharia

Escala 1:400

Projeto Ponto de Partida 2021/1



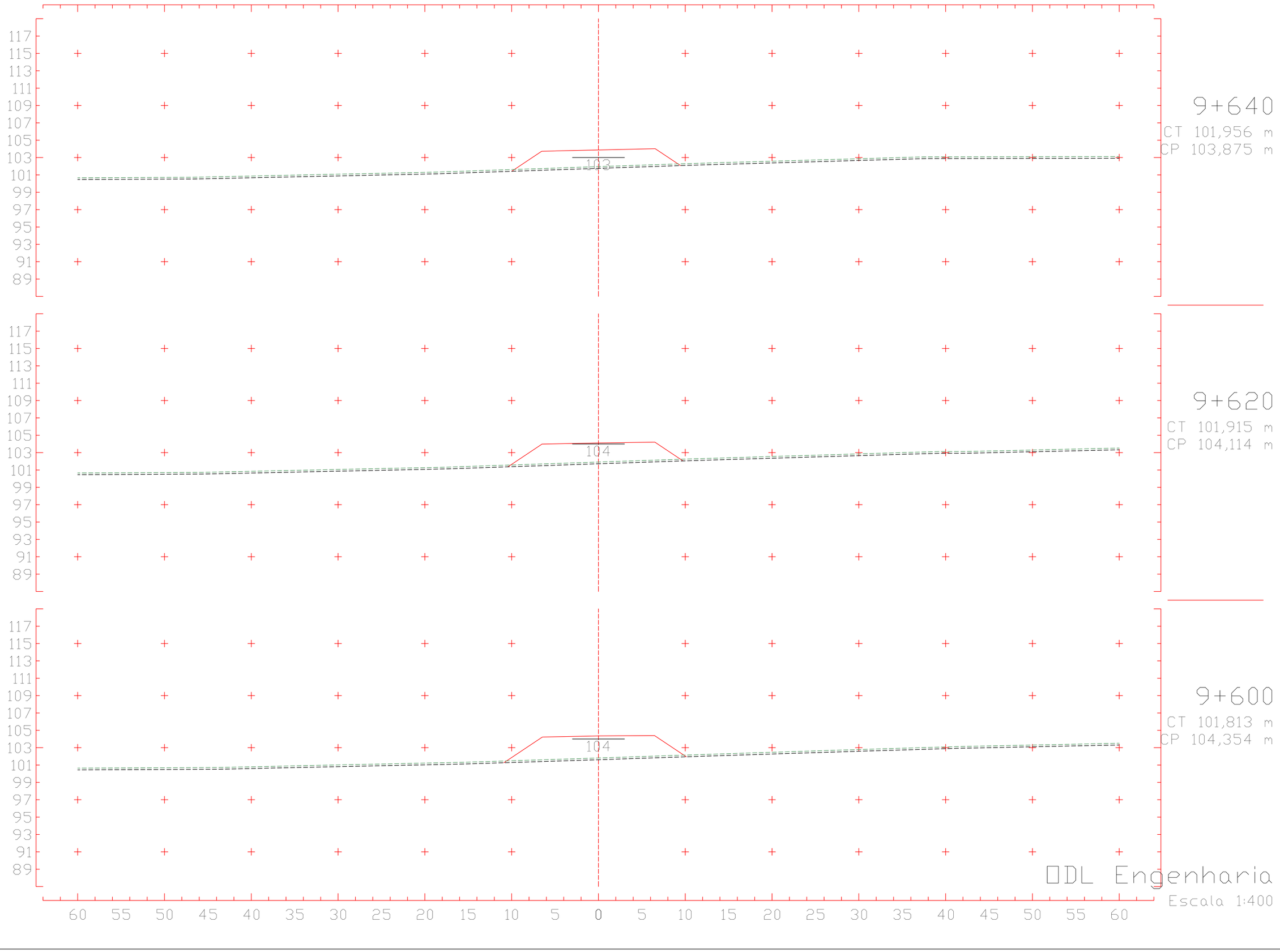
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DL Engenharia

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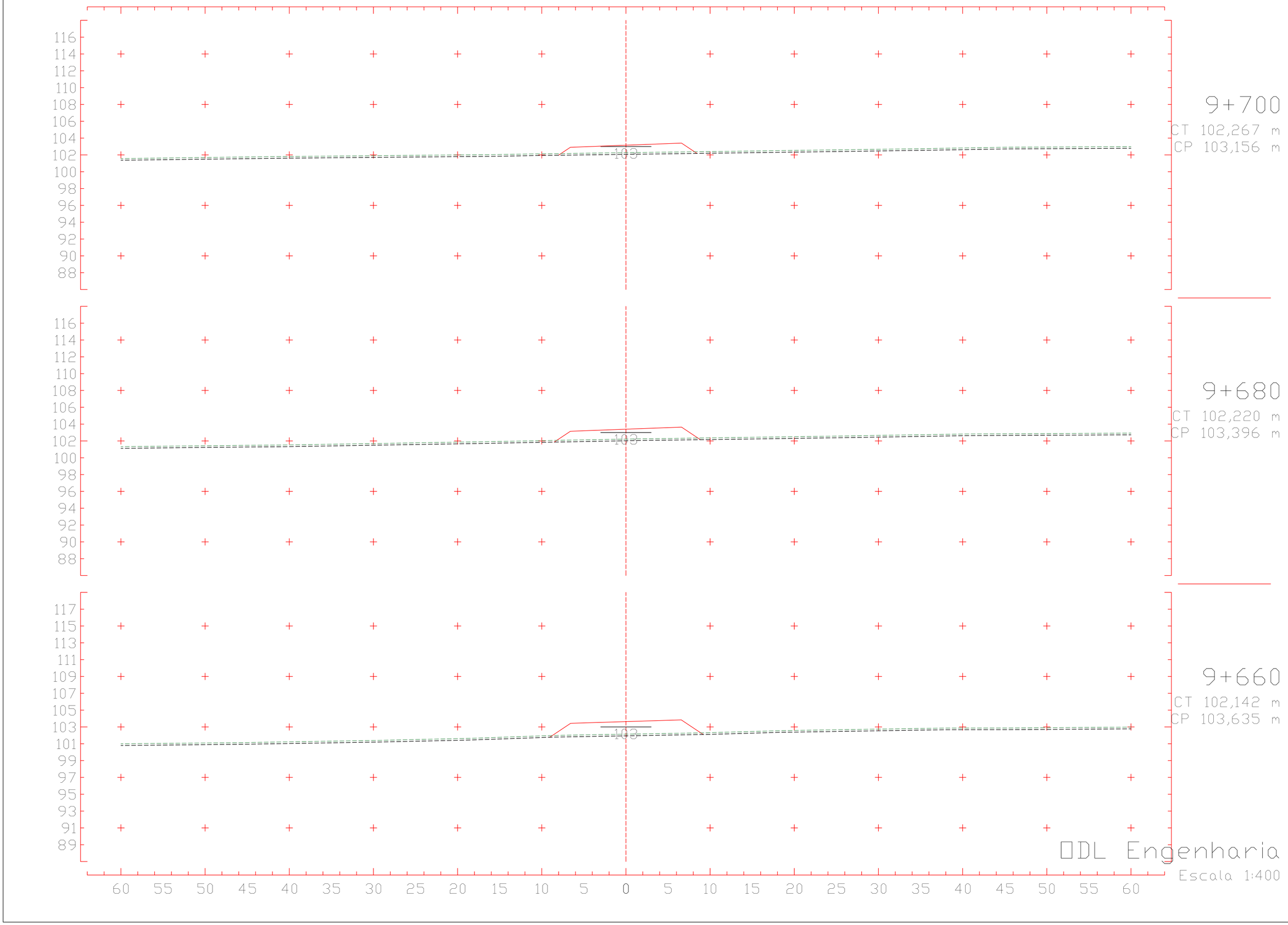
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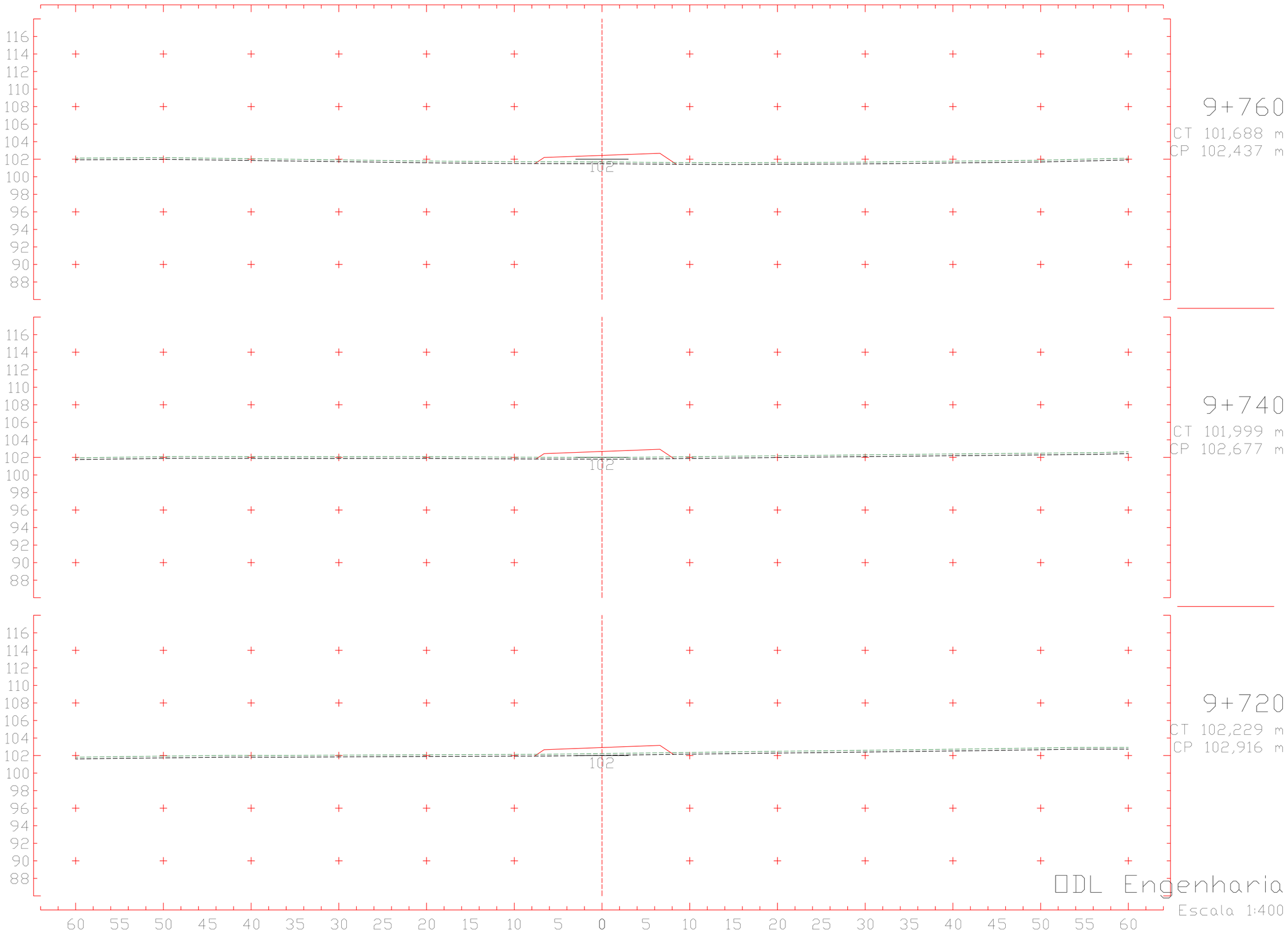
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Escala 1:400

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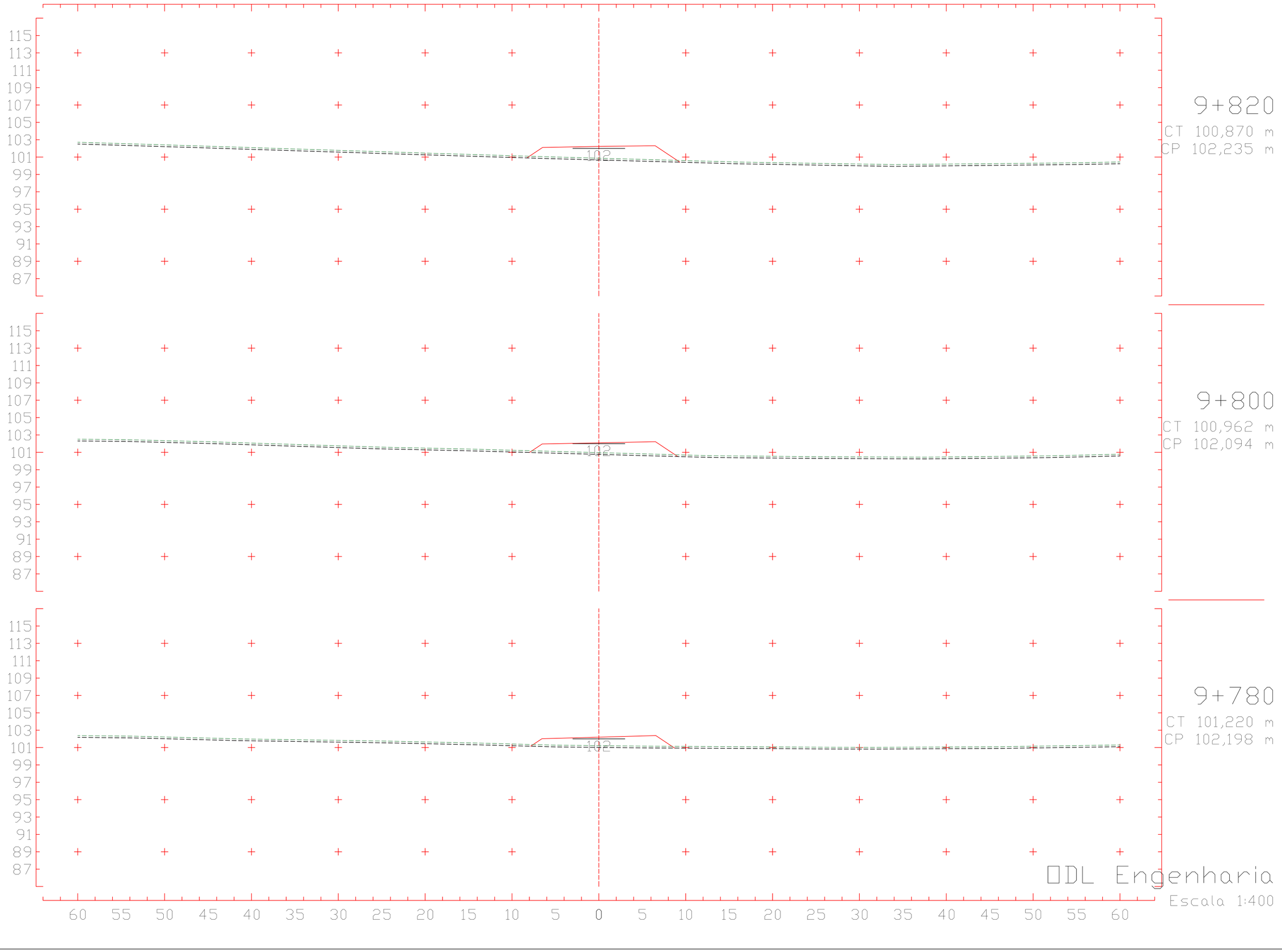
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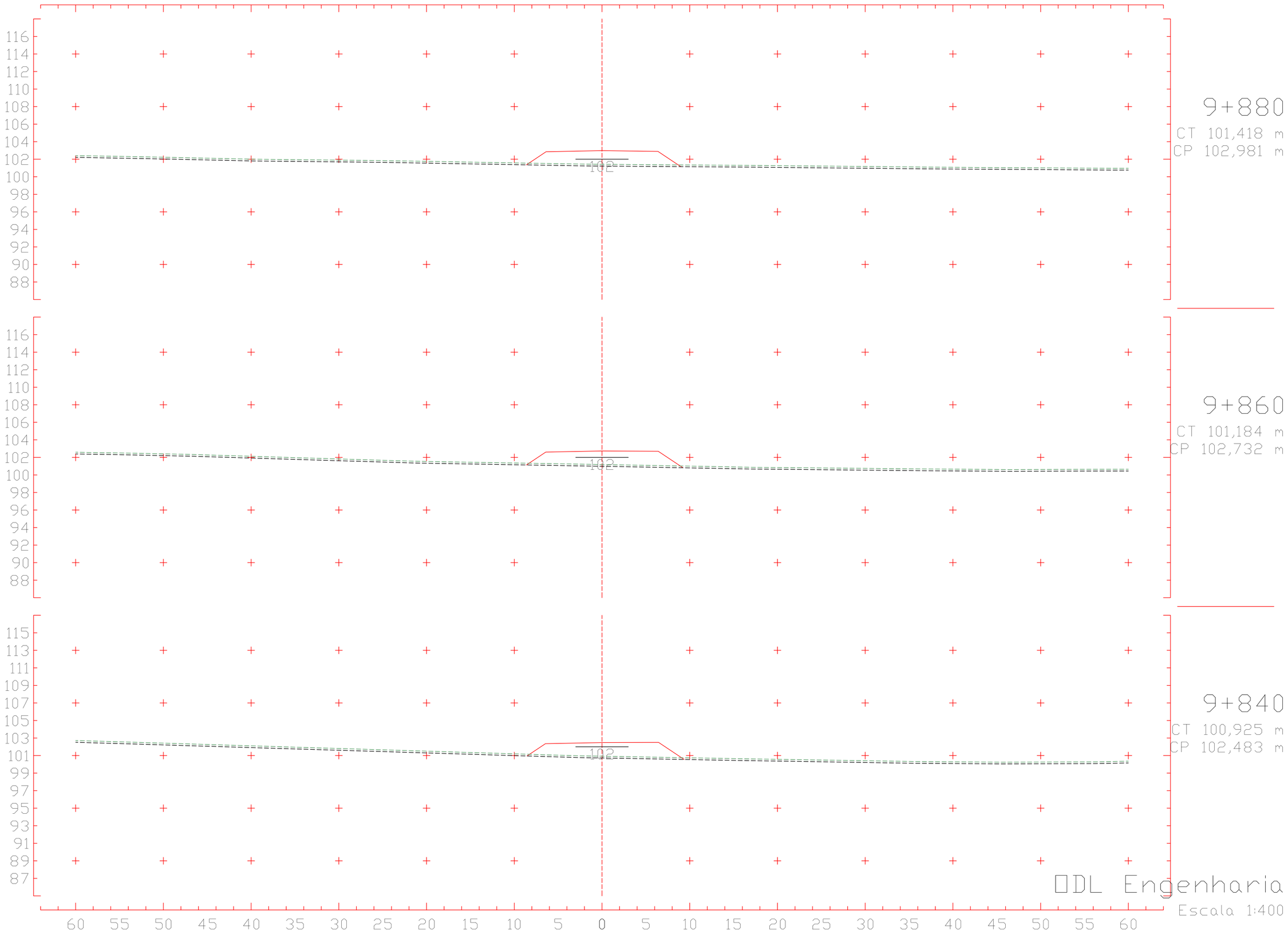
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Escala 1:400

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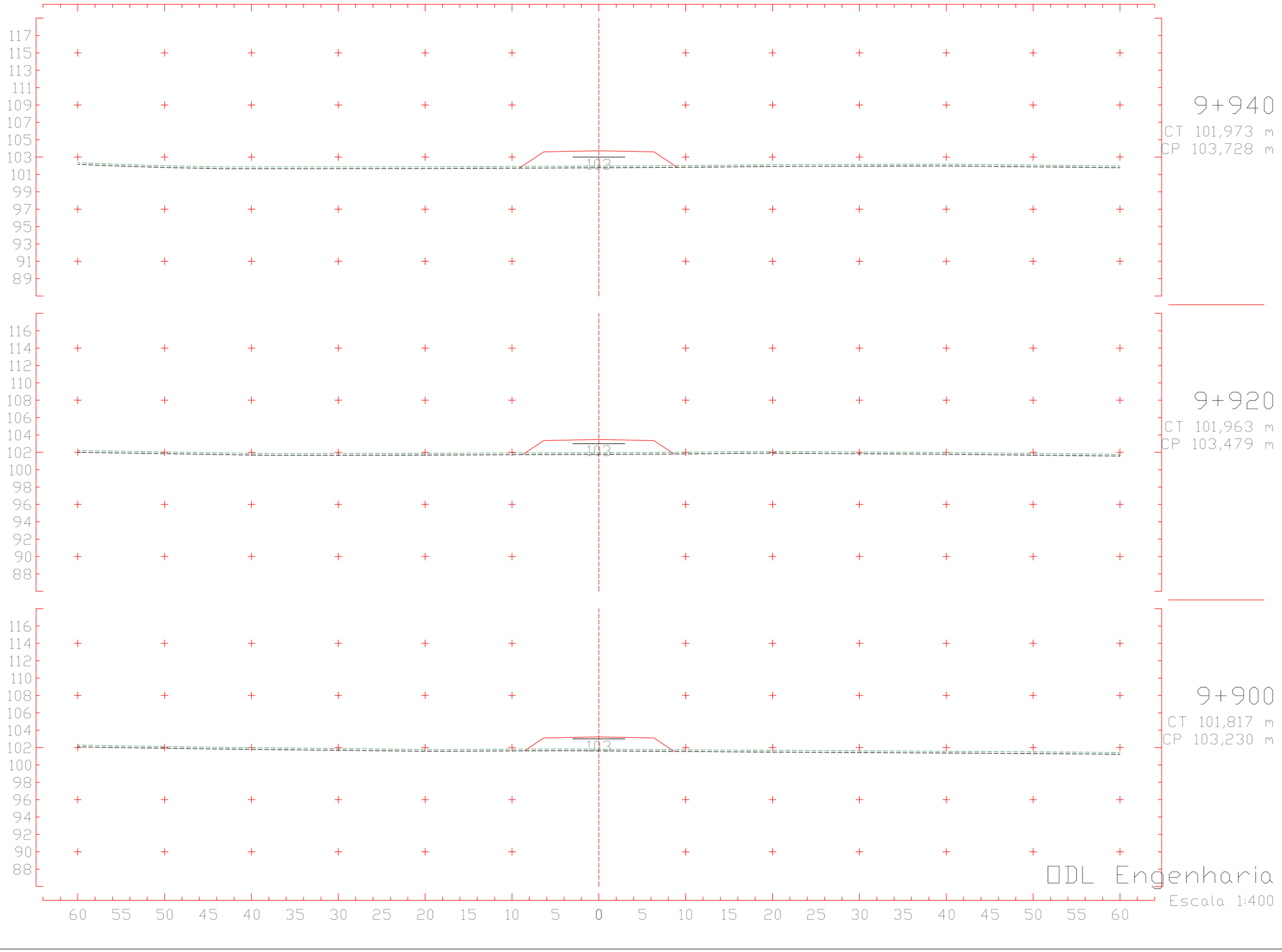
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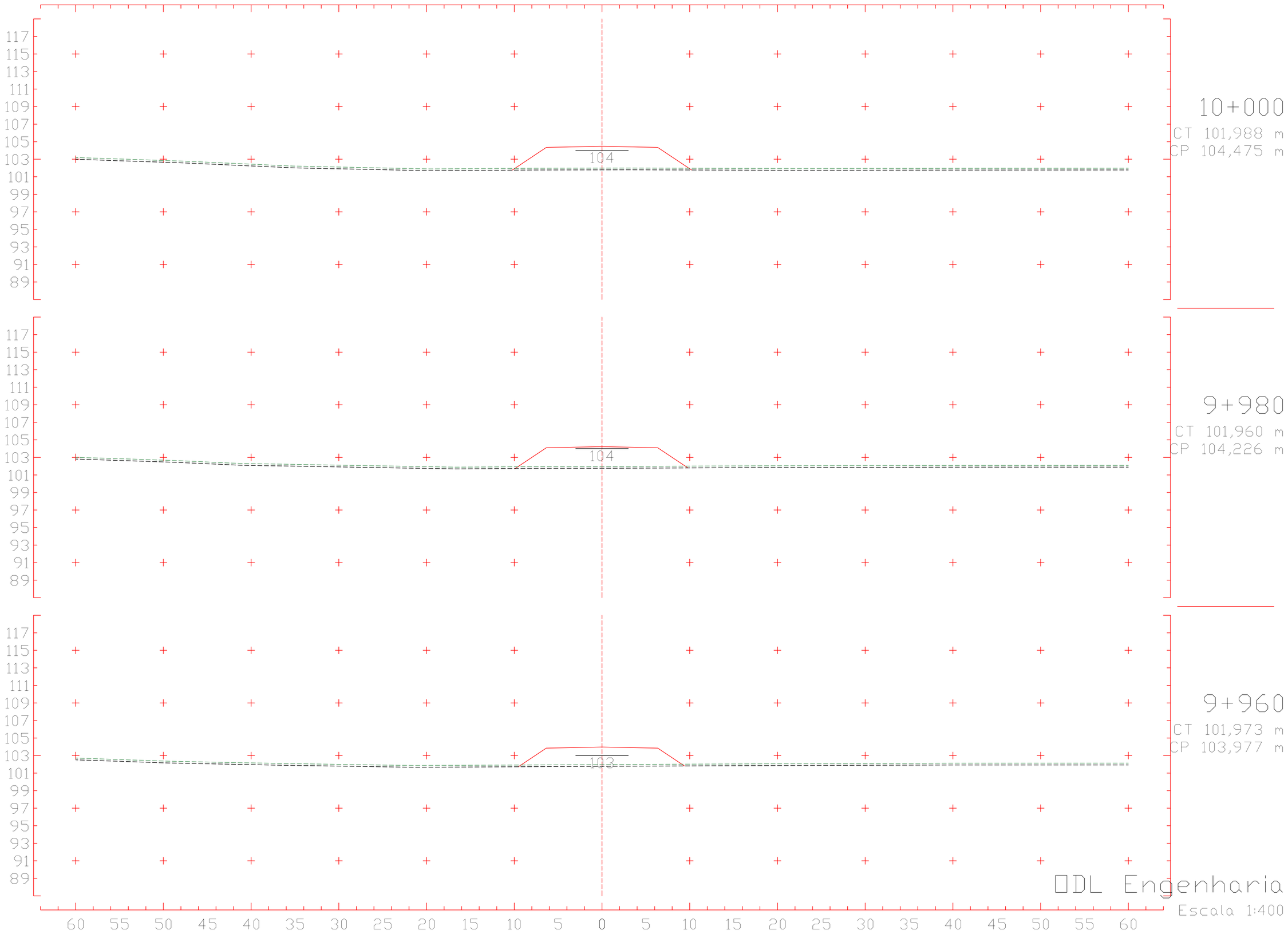
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Escala 1:400

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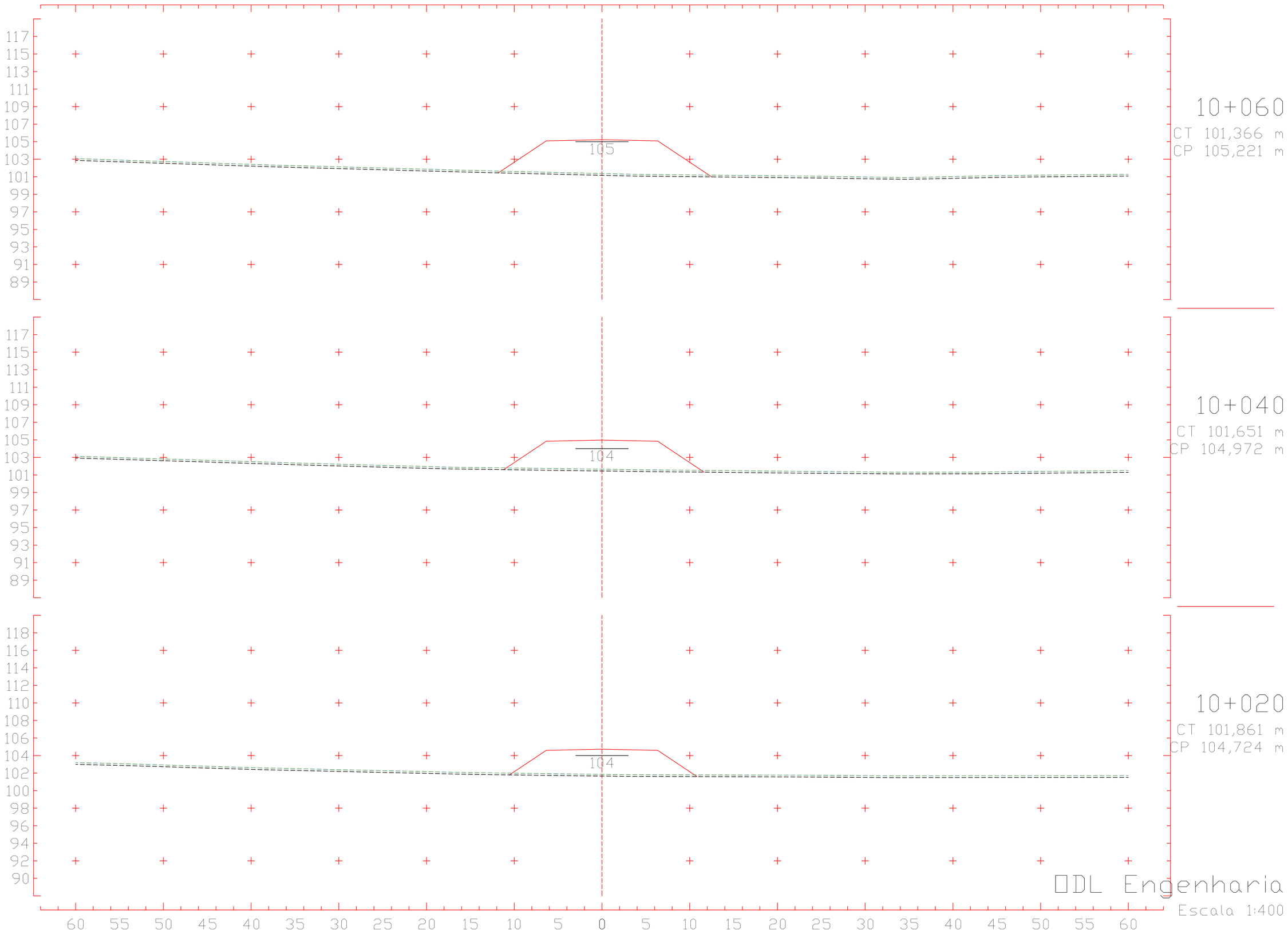
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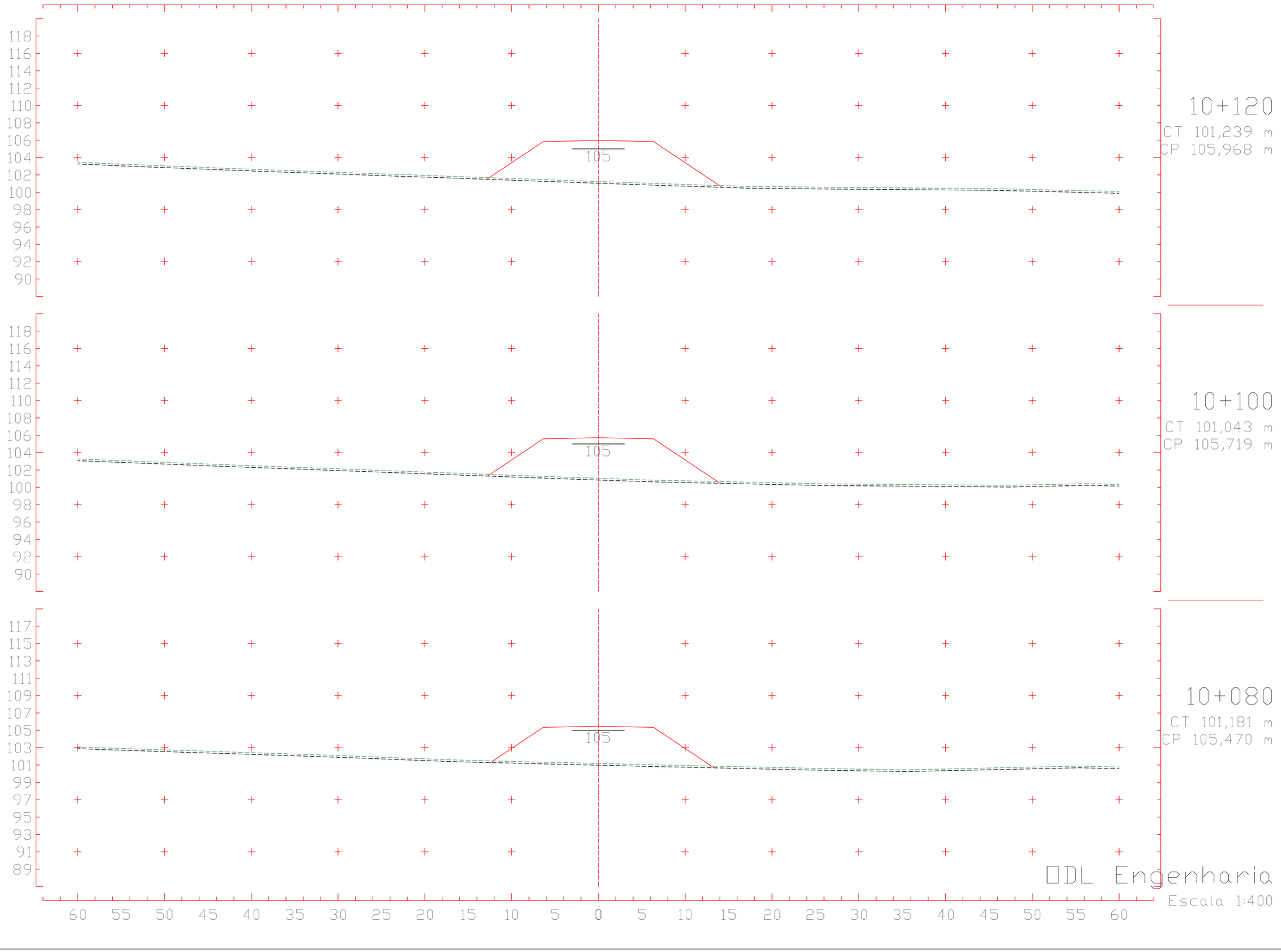
DL Engenharia

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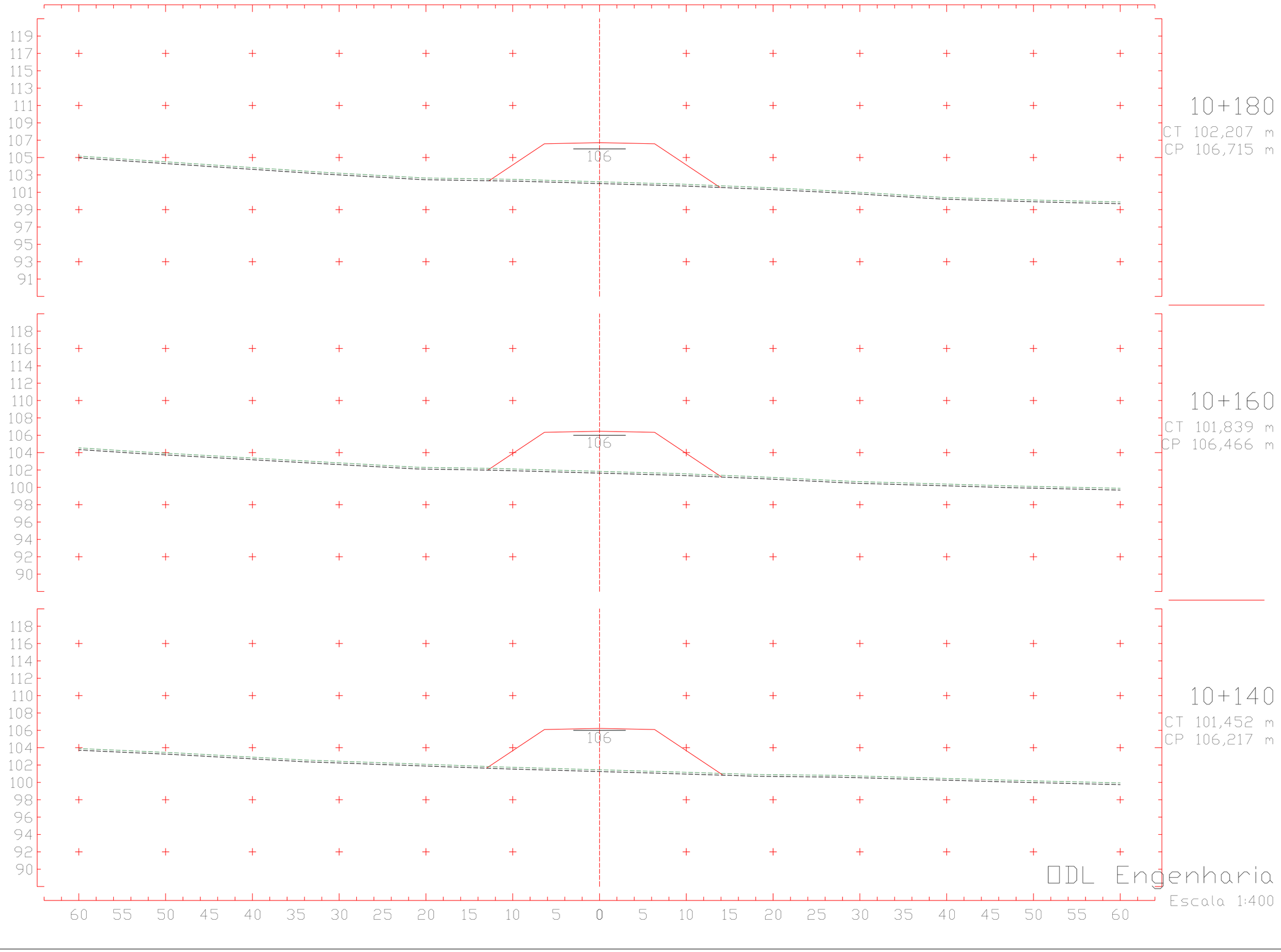
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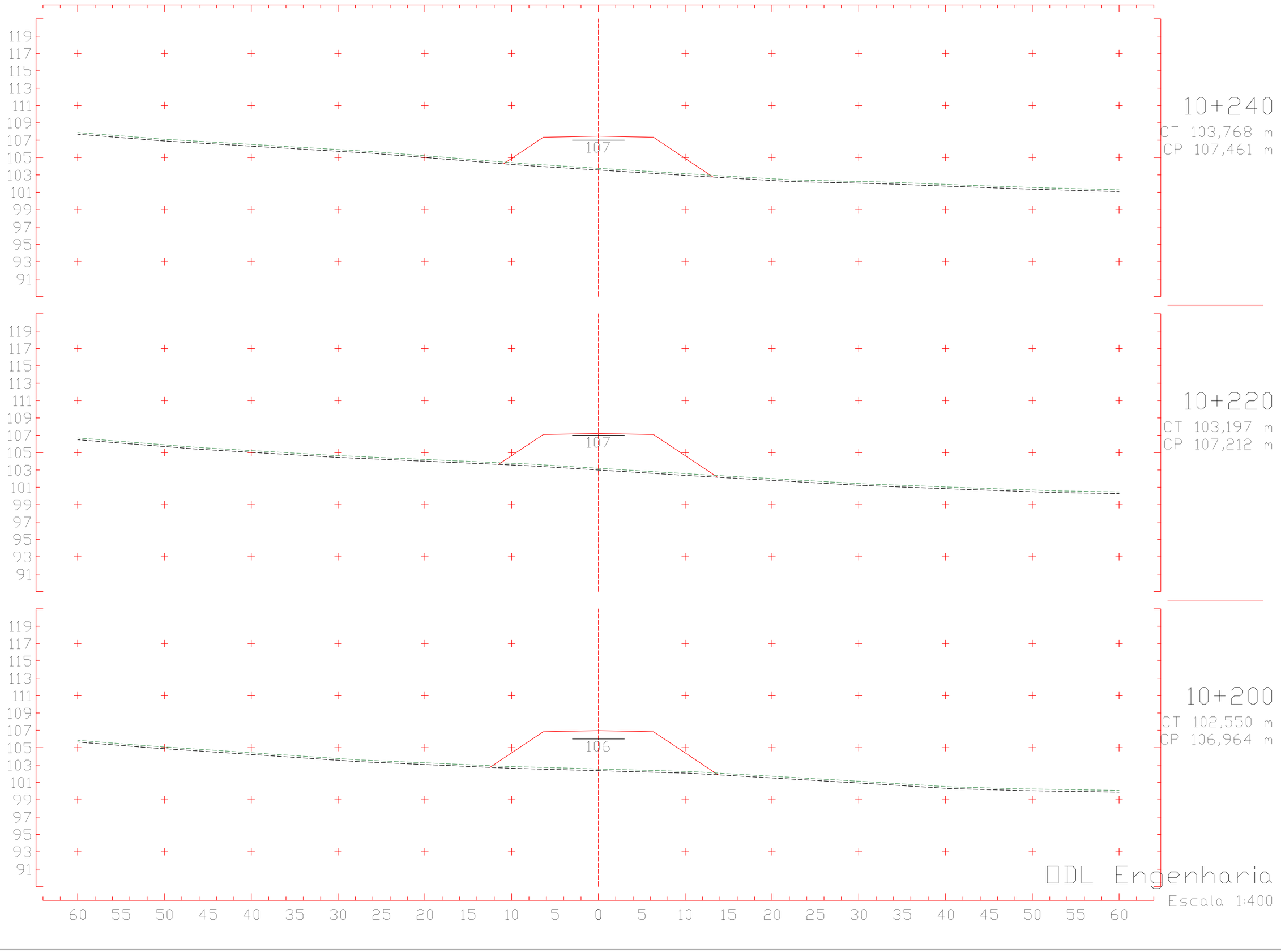
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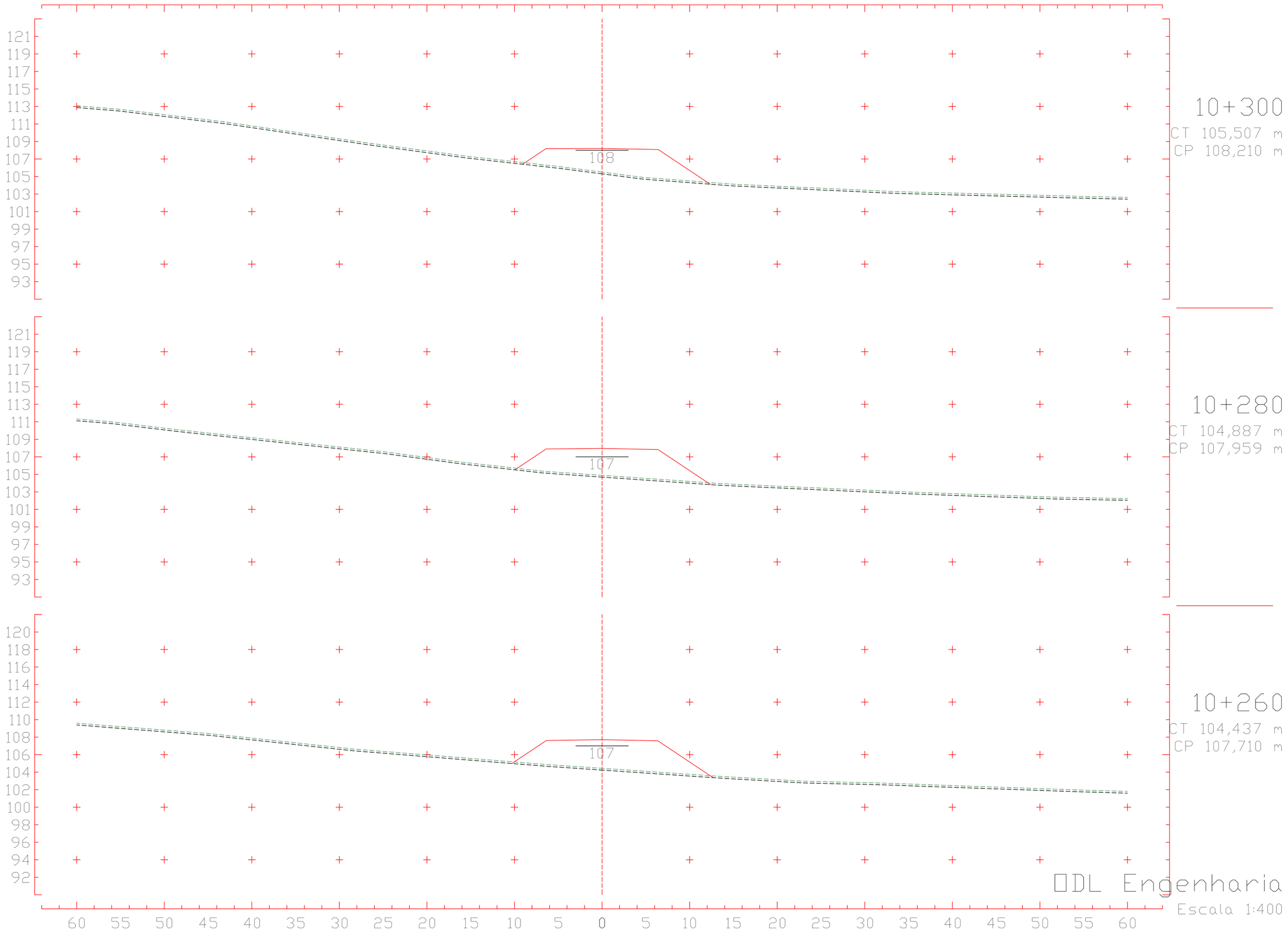
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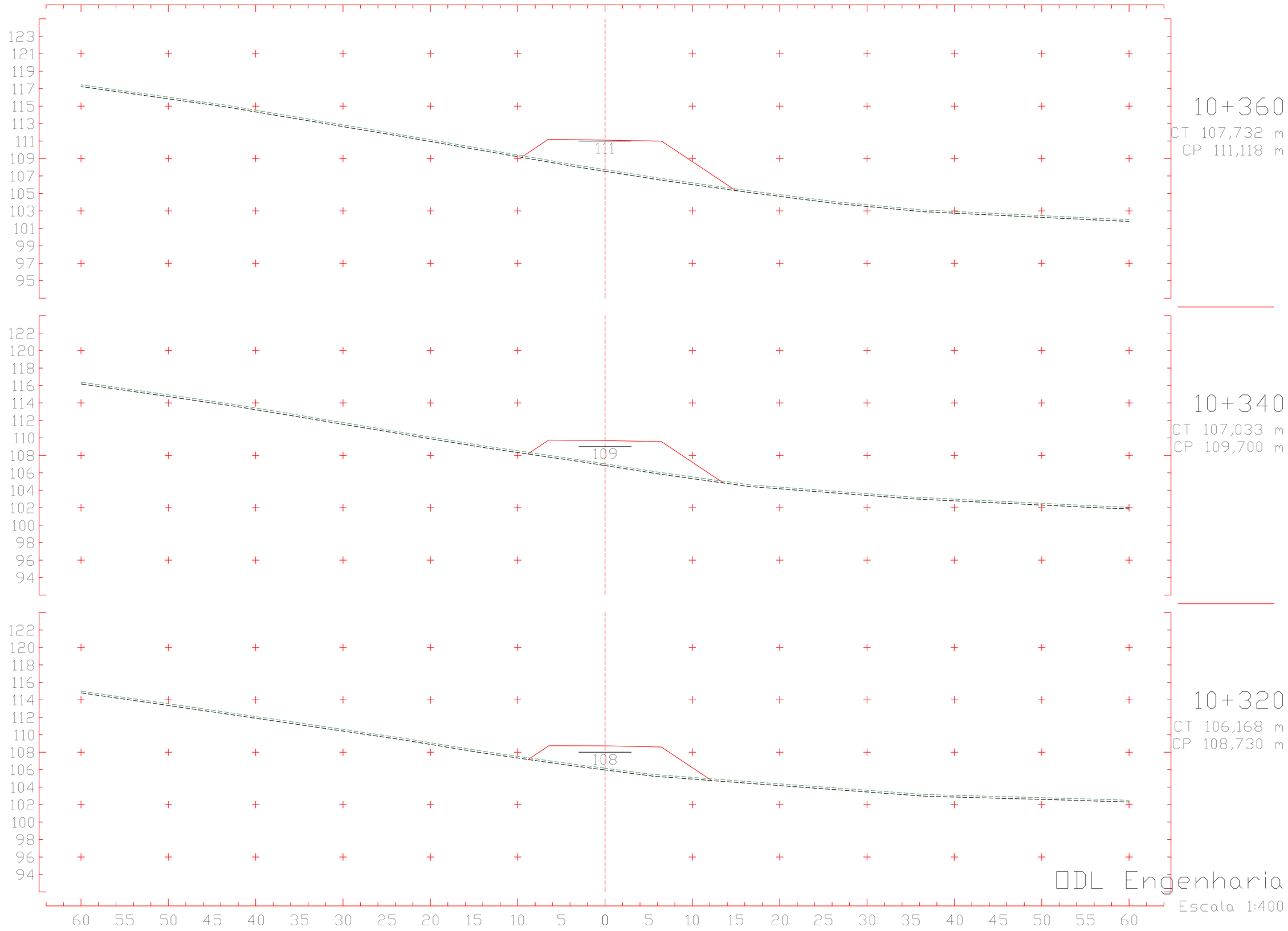


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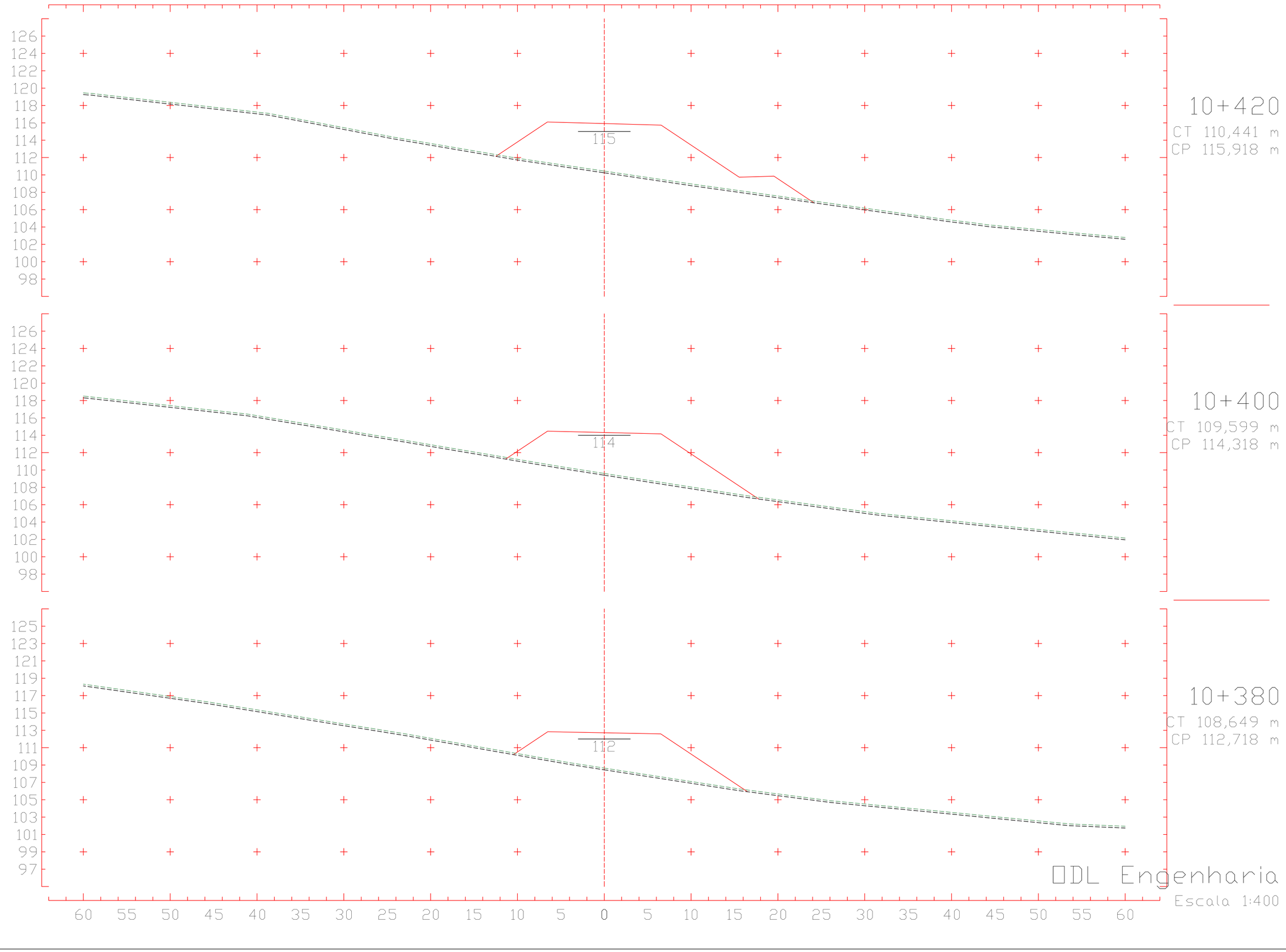
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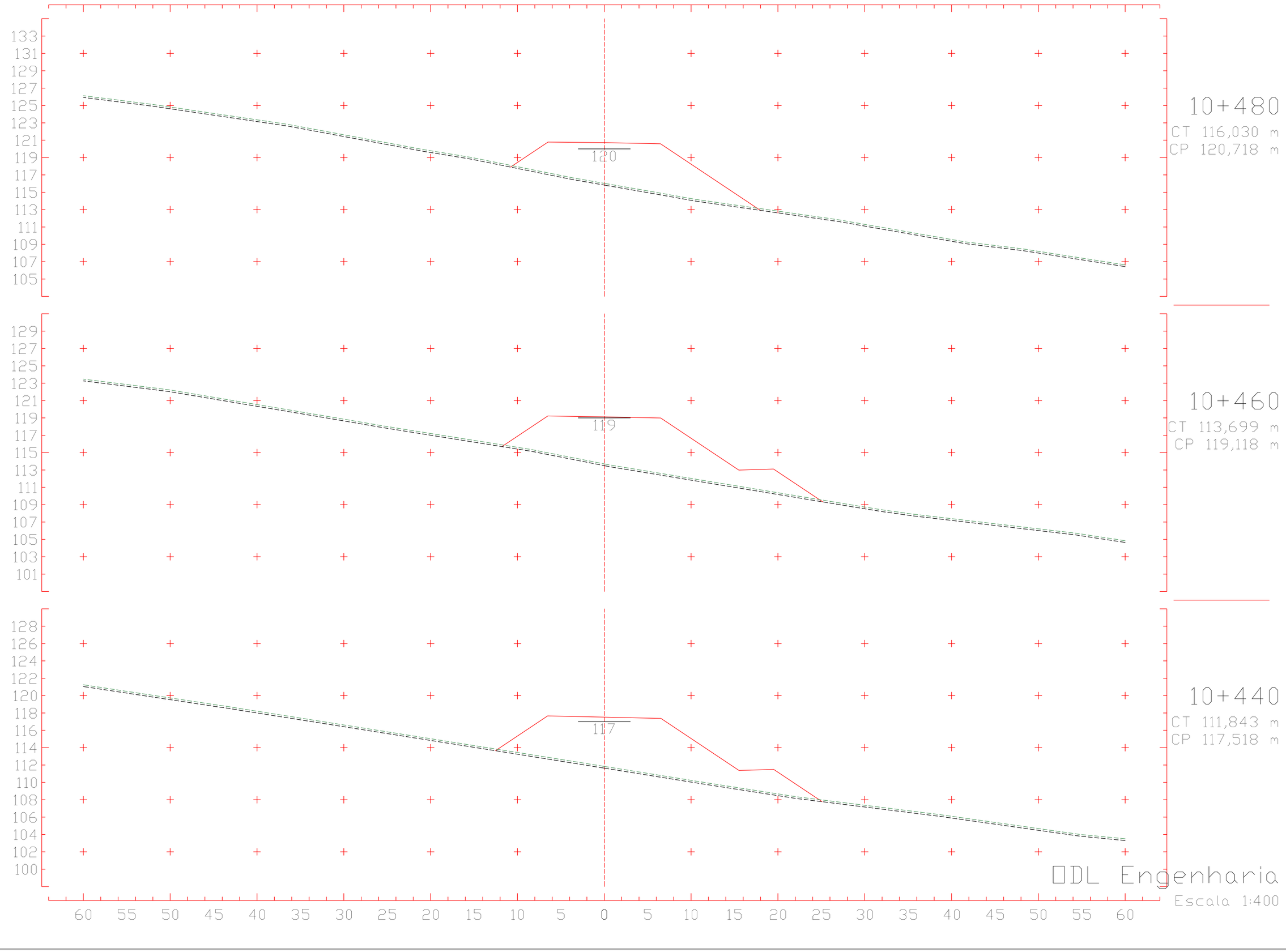
ODL Engenharia

Escala 1:400

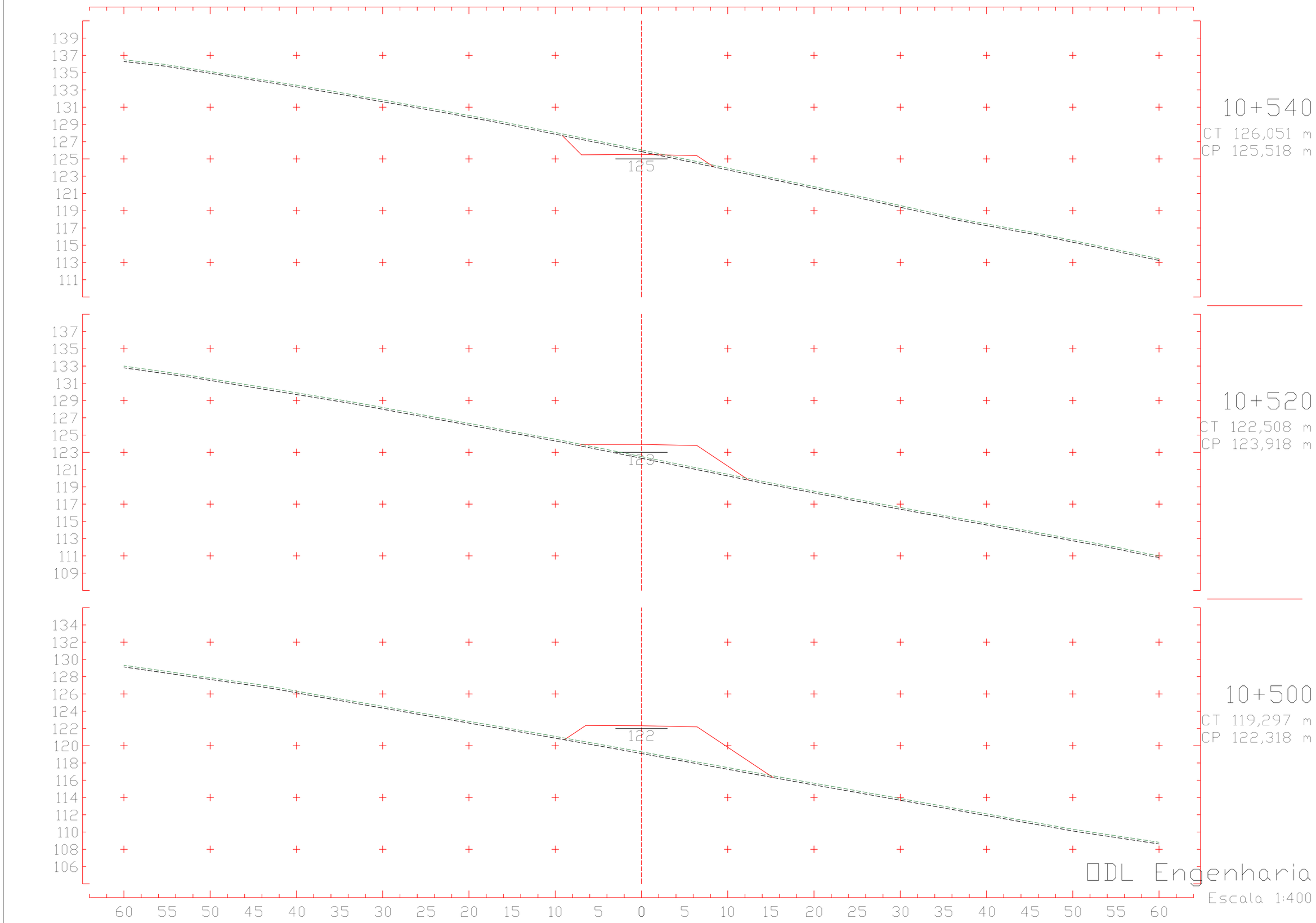
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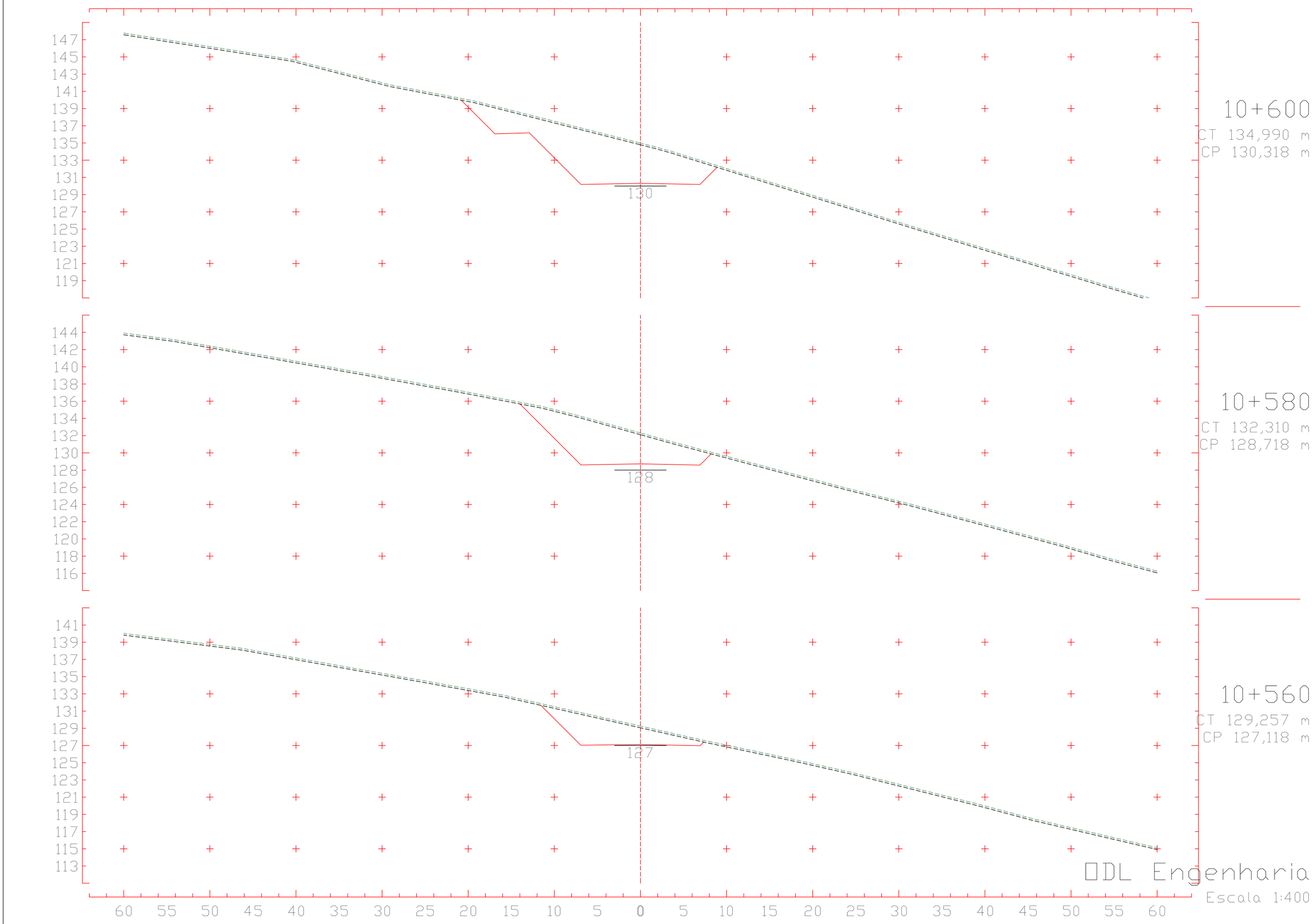
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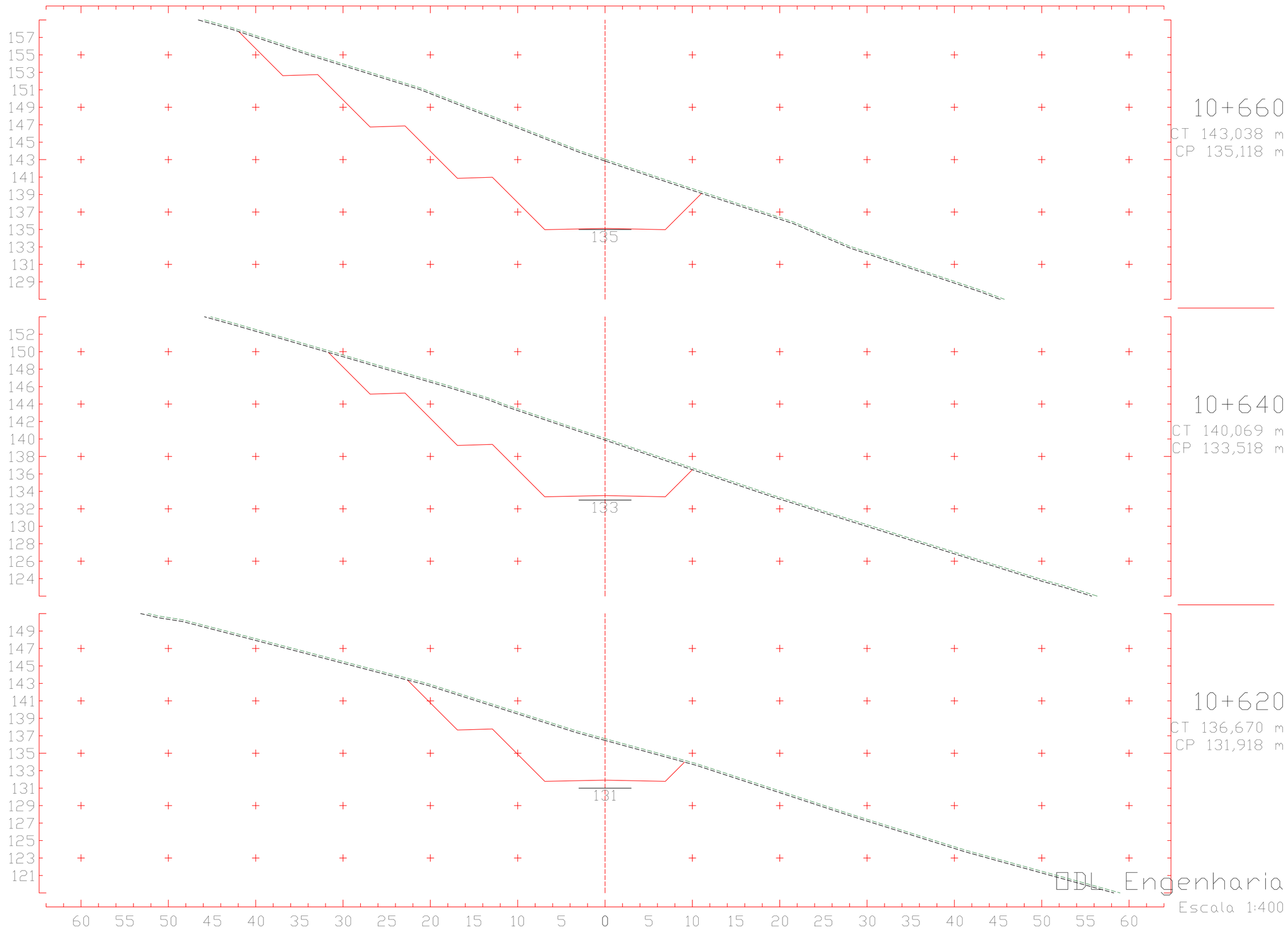
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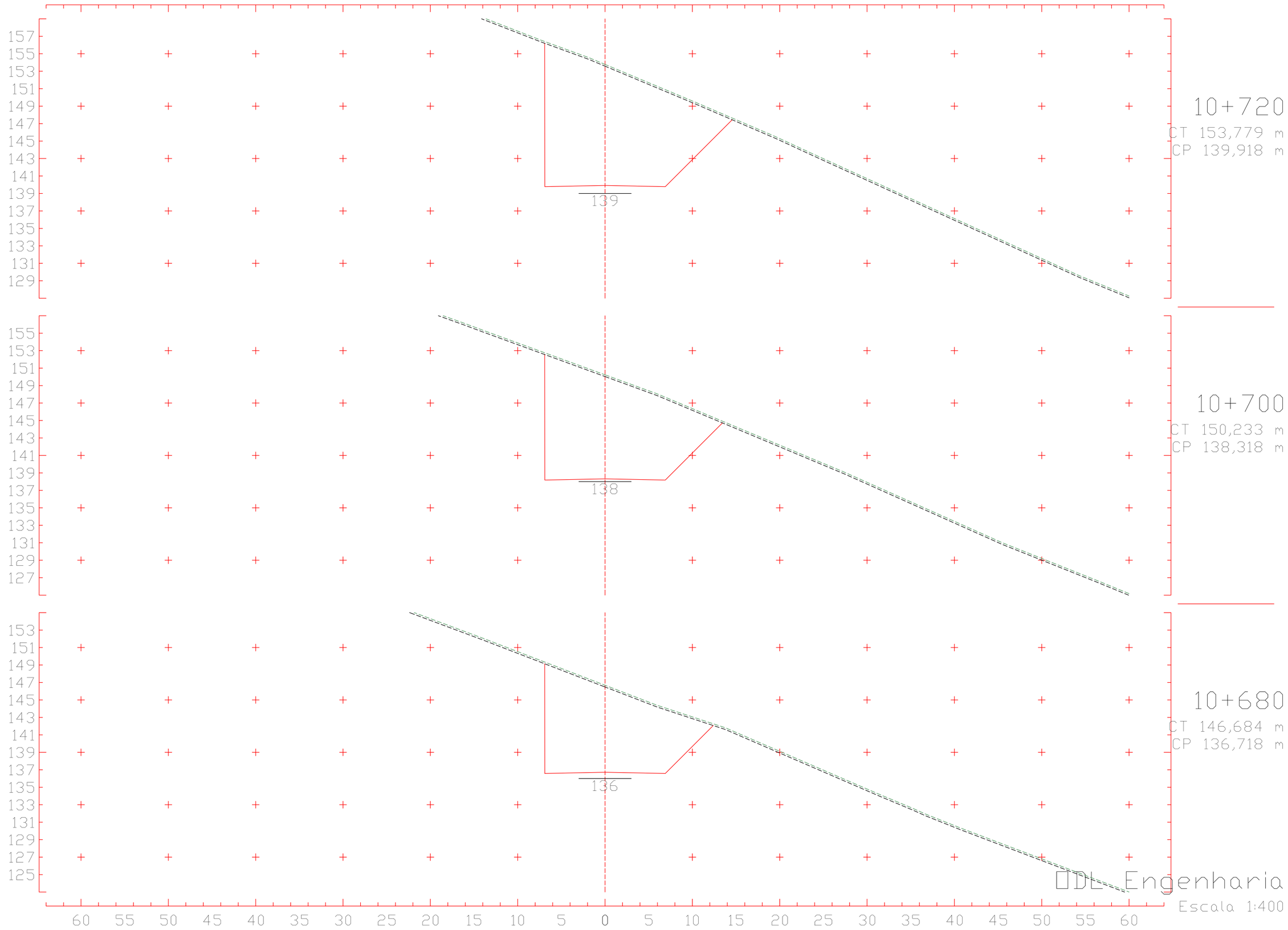
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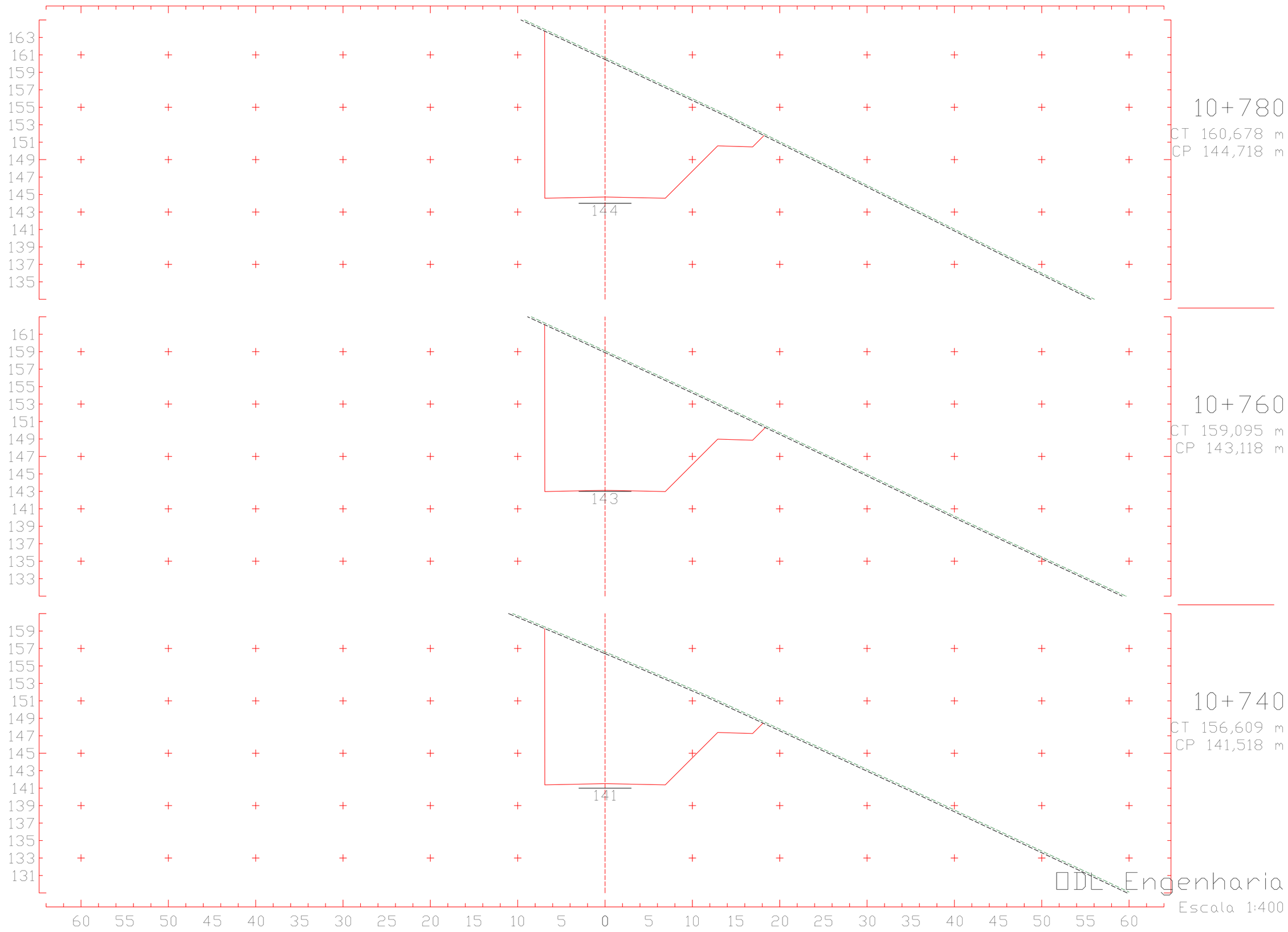
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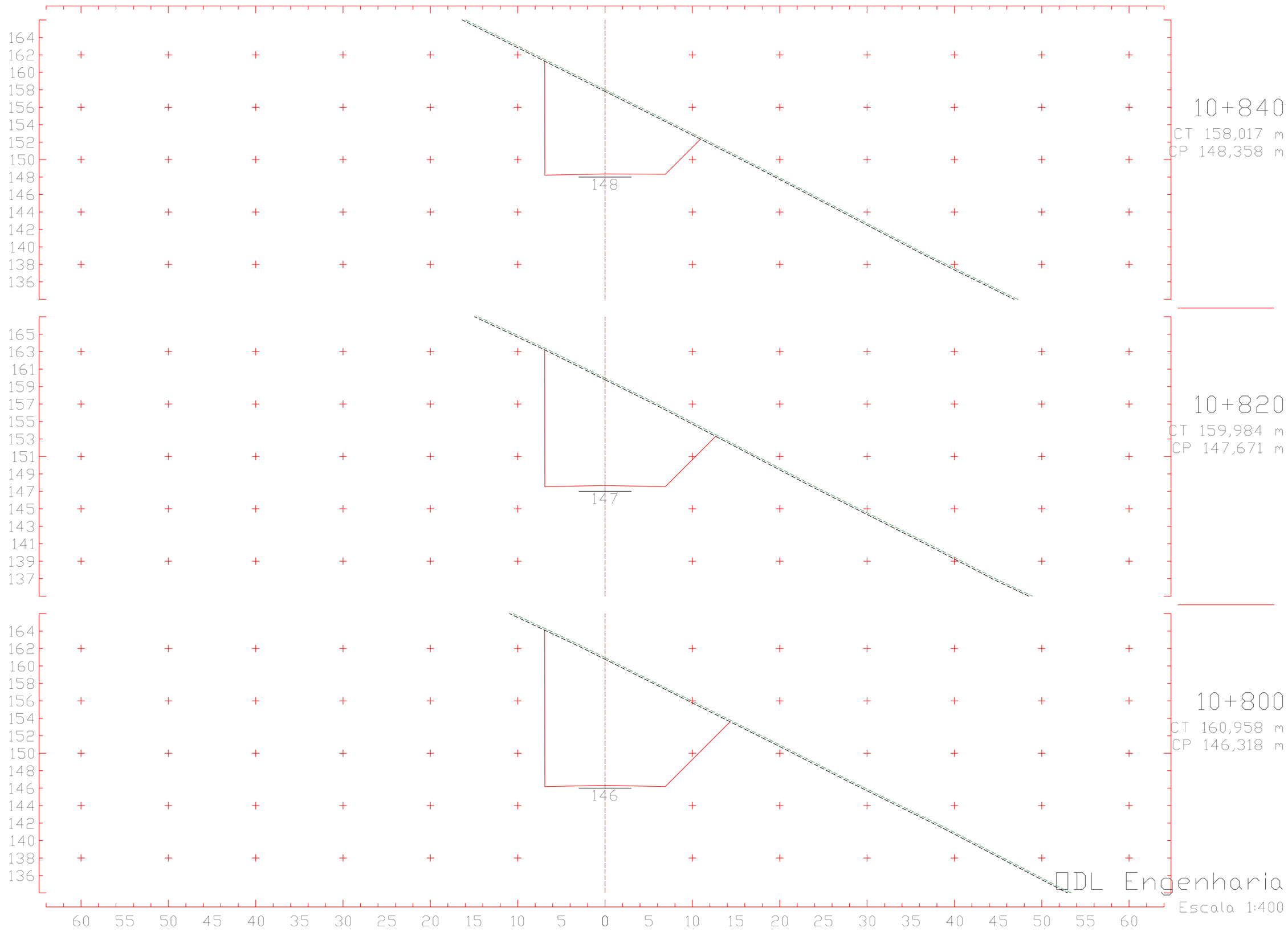
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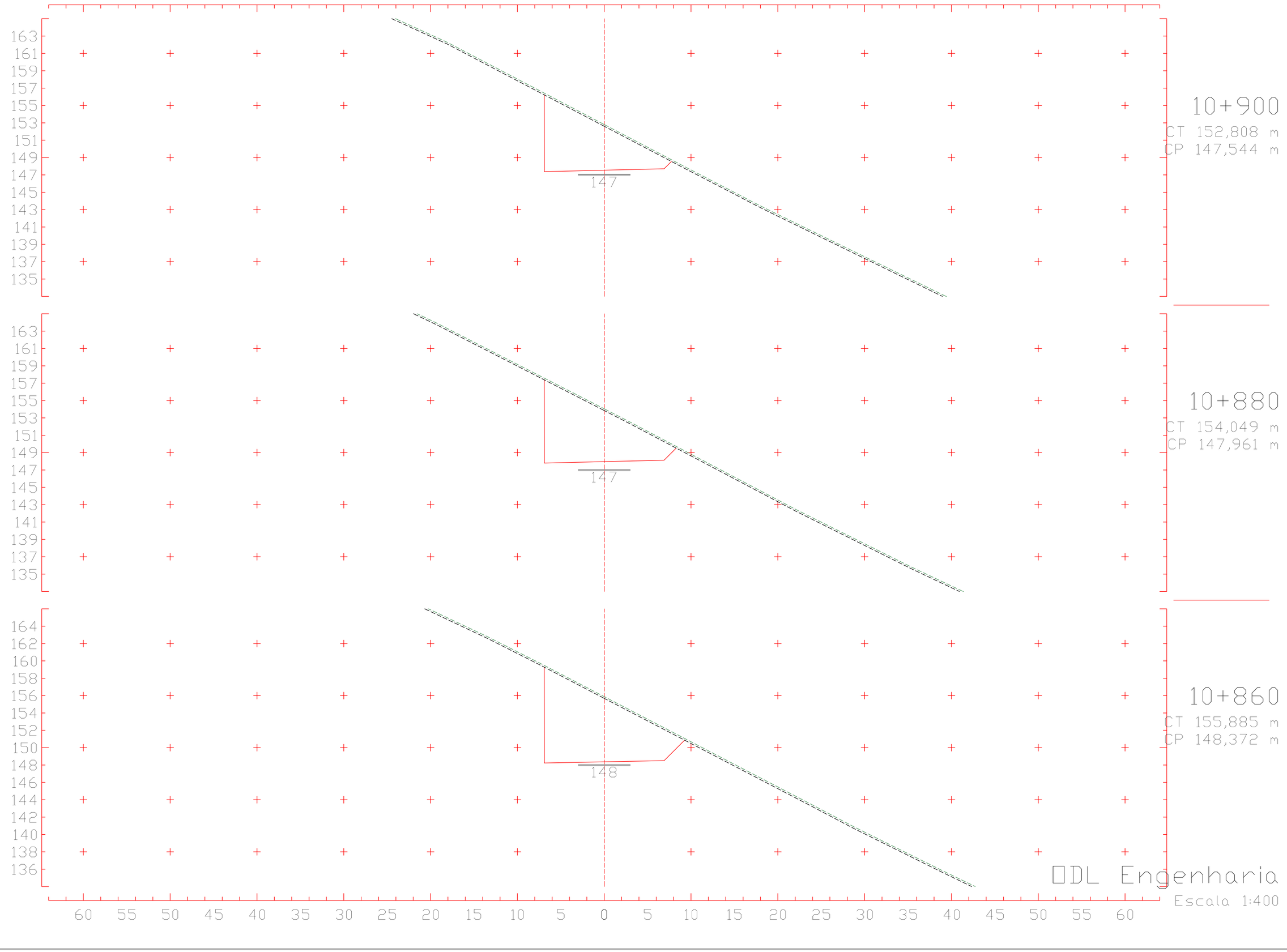
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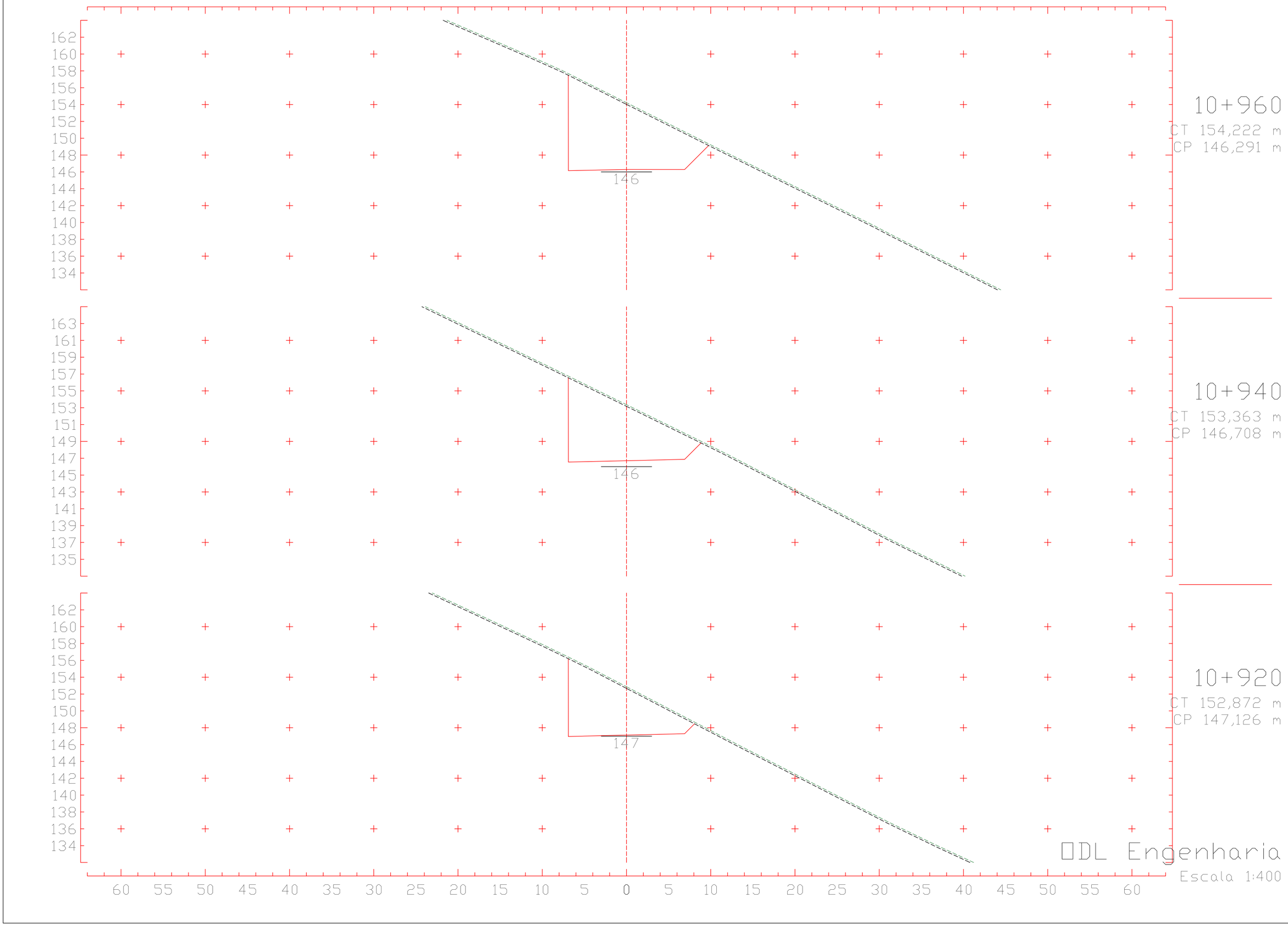
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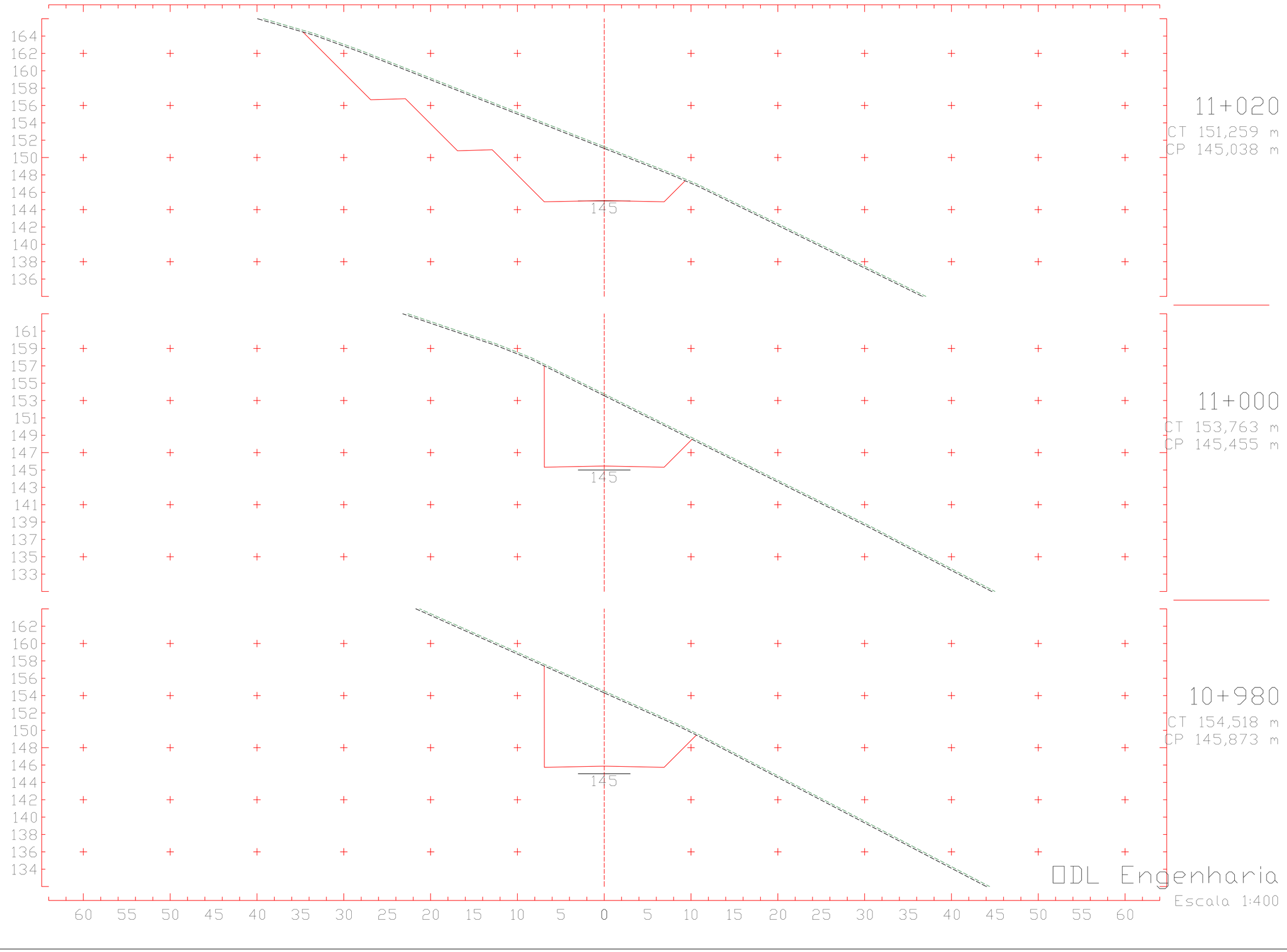
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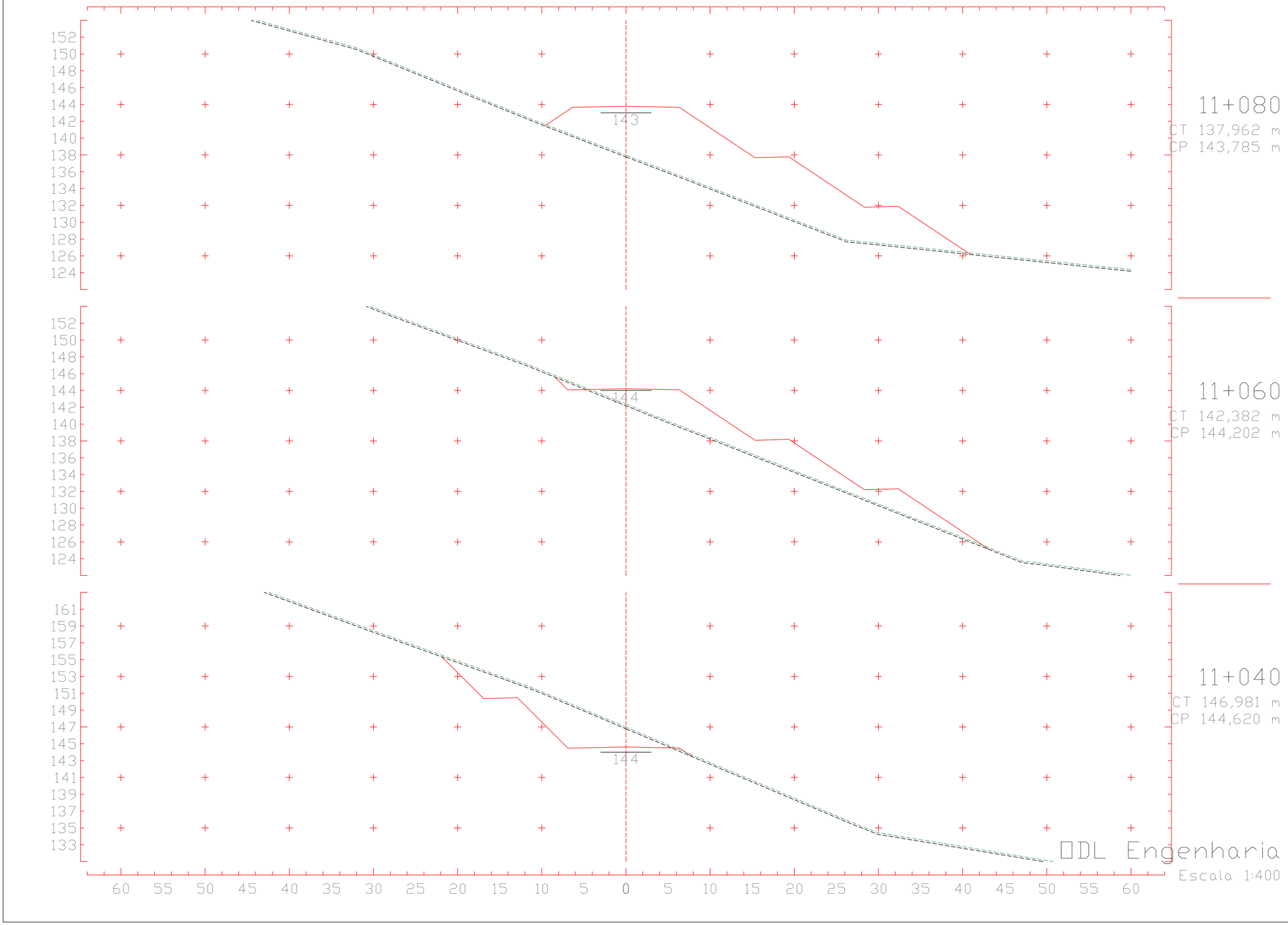
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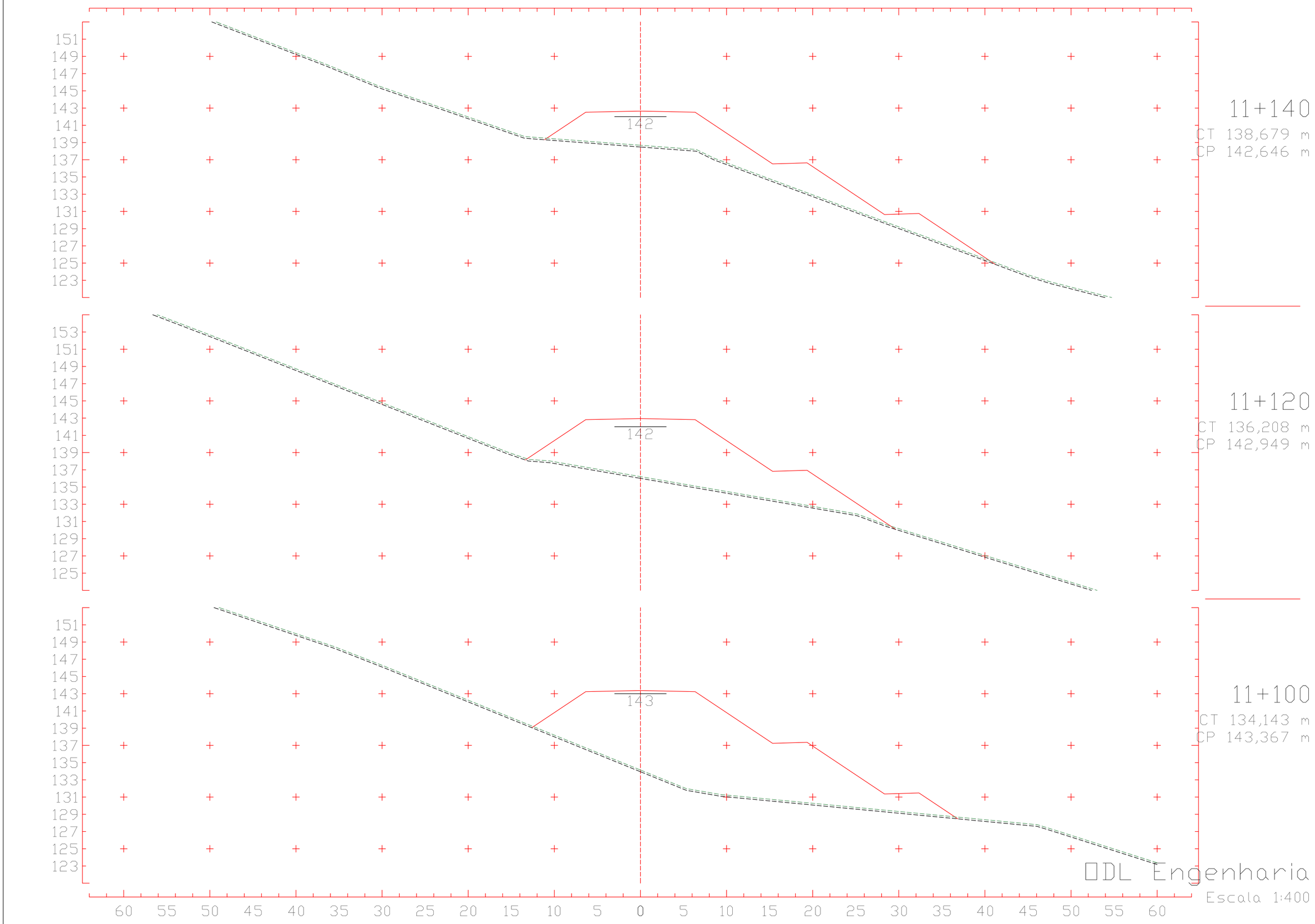
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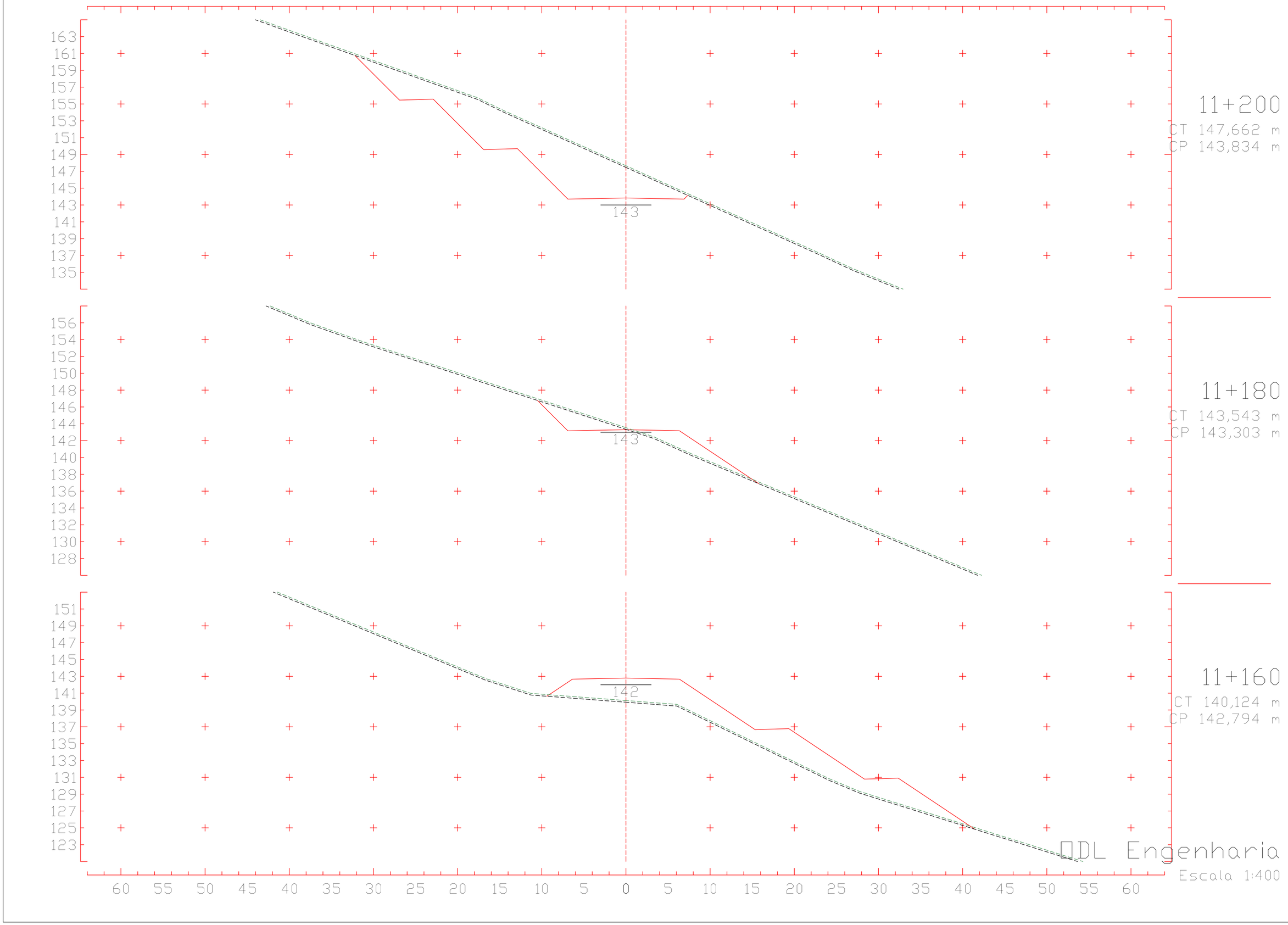
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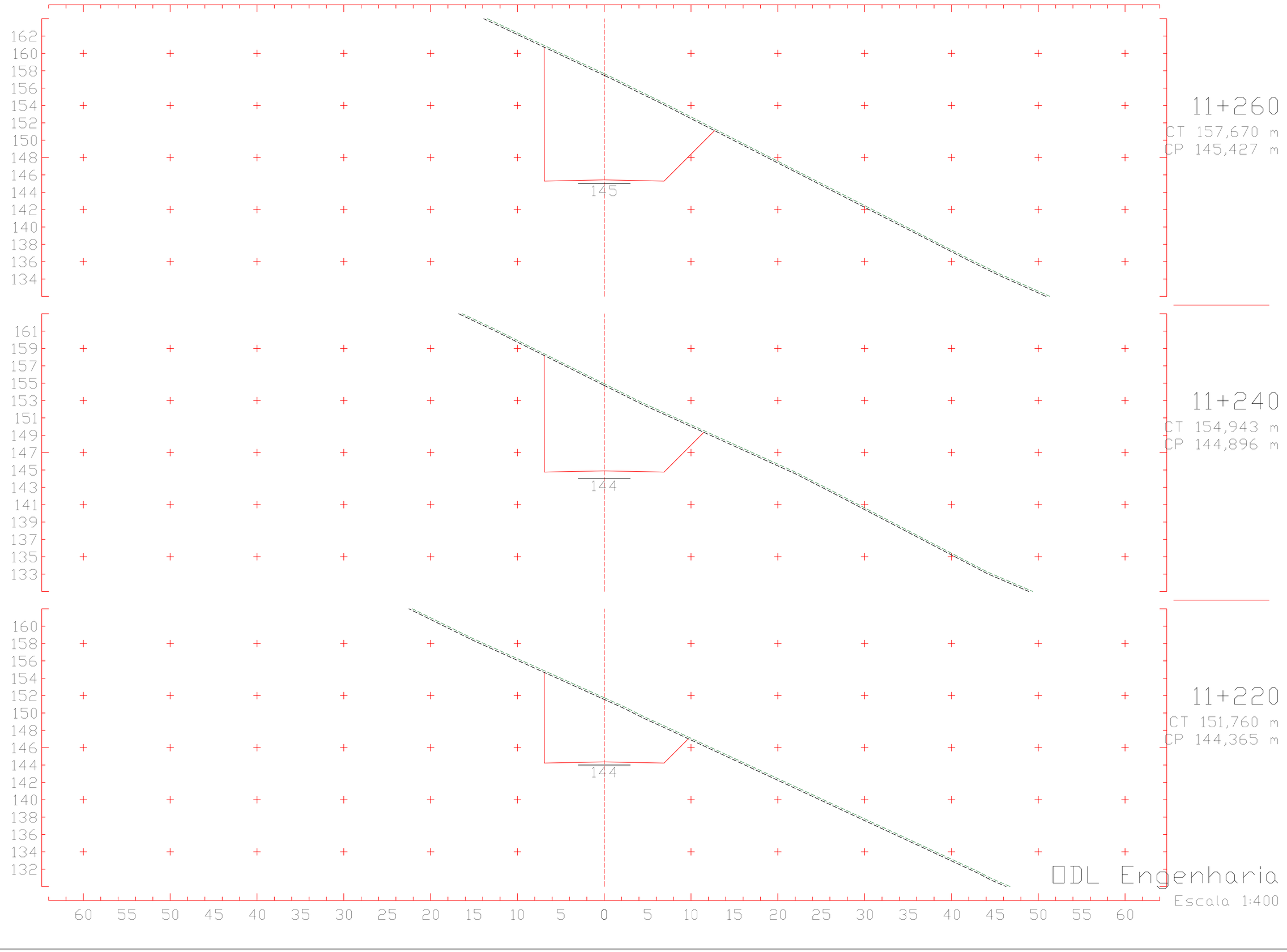
ODL Engenharia

Escala 1:400

Projeto Ponto de Partida 2021/1



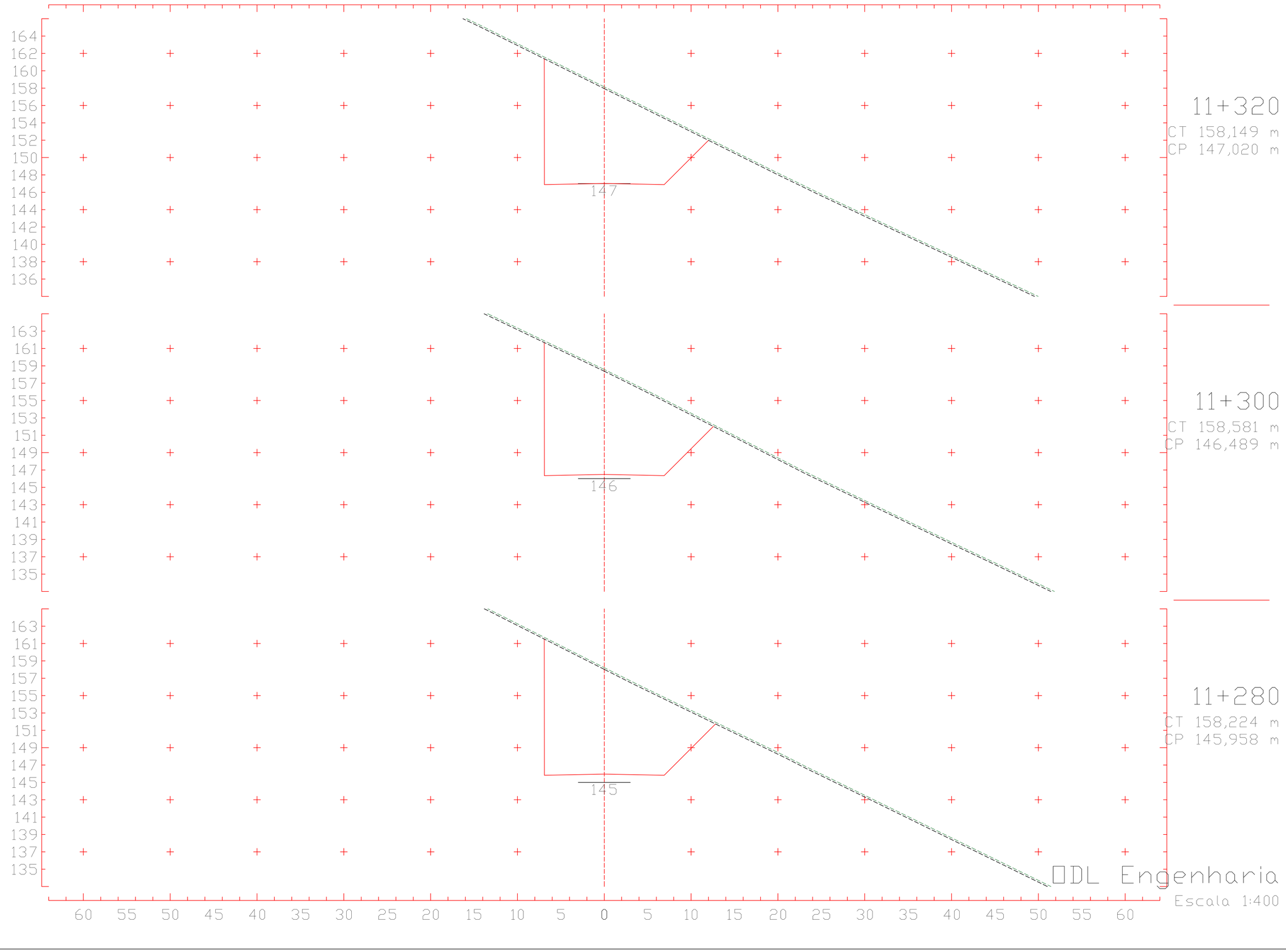
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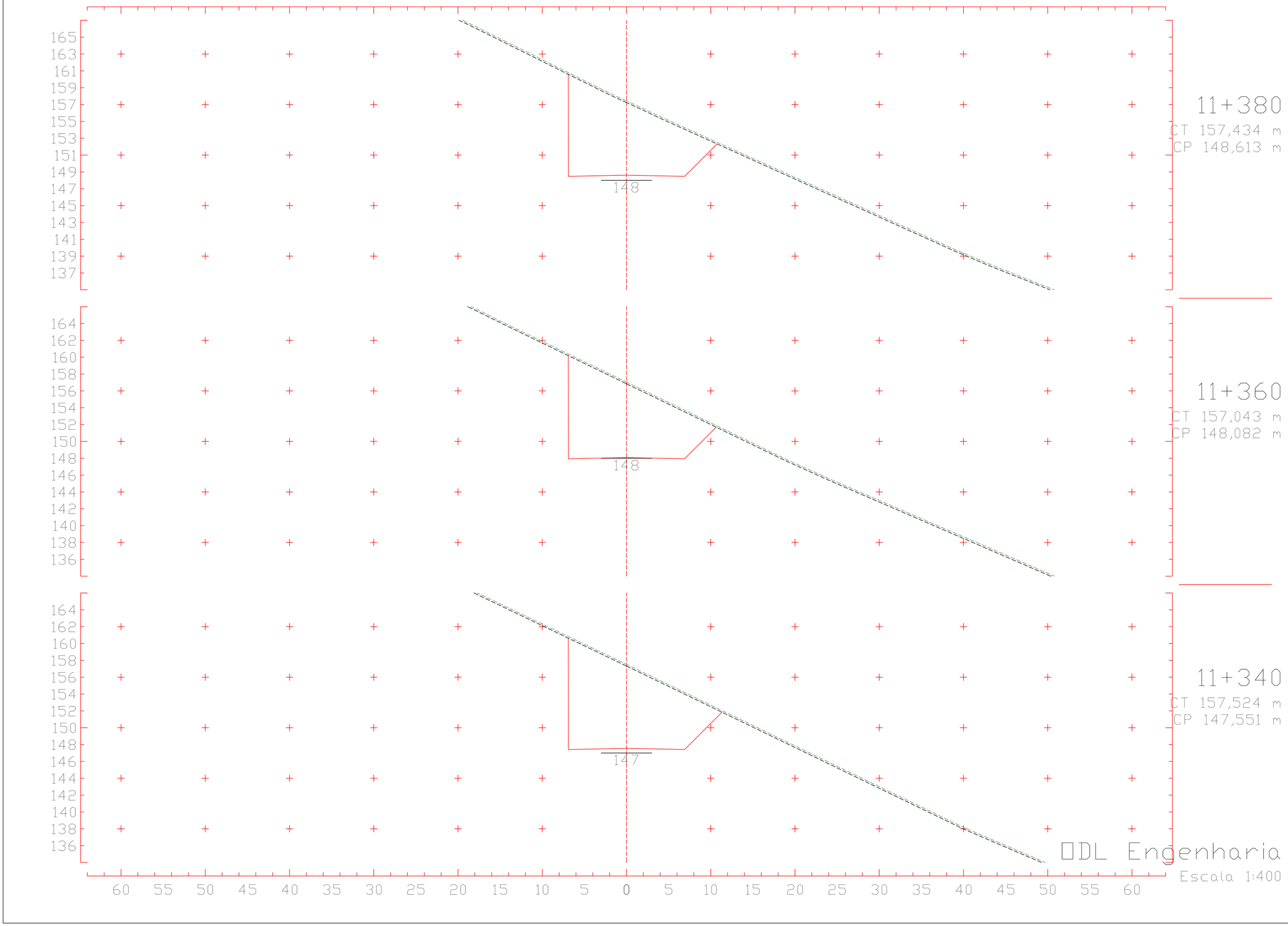
DL Engenharia

Escala 1:400

Projeto Ponto de Partida 2021/1

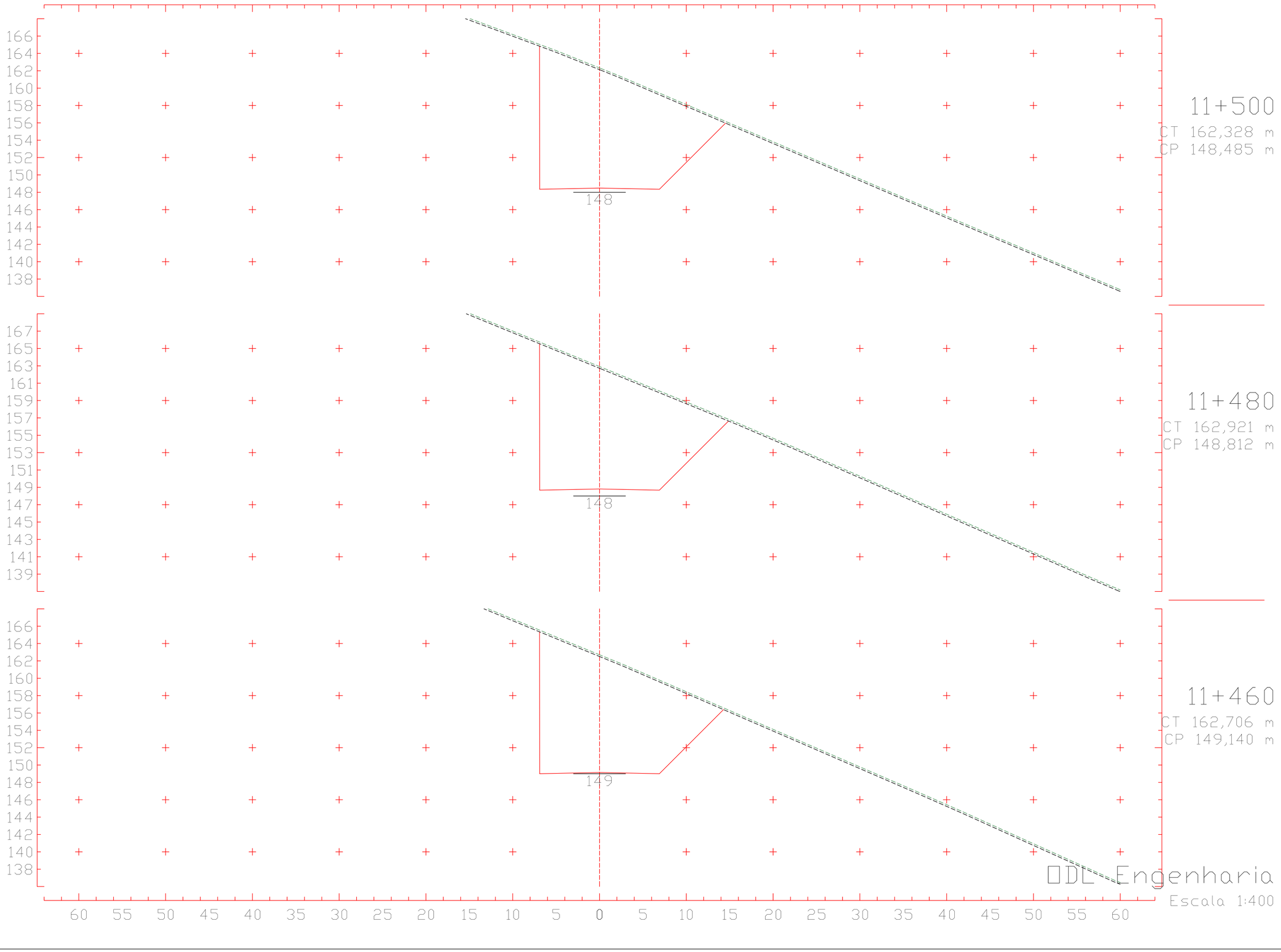


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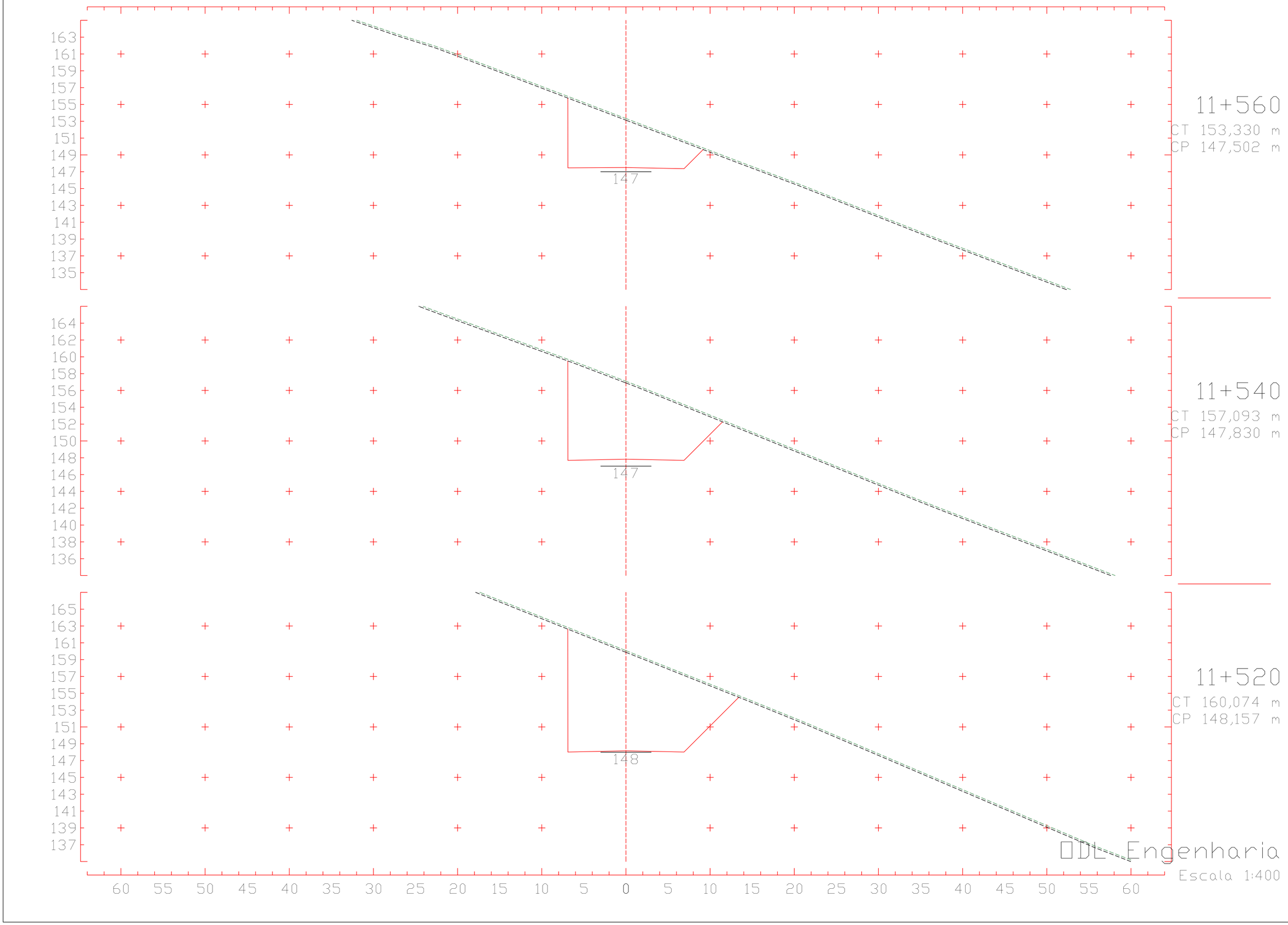


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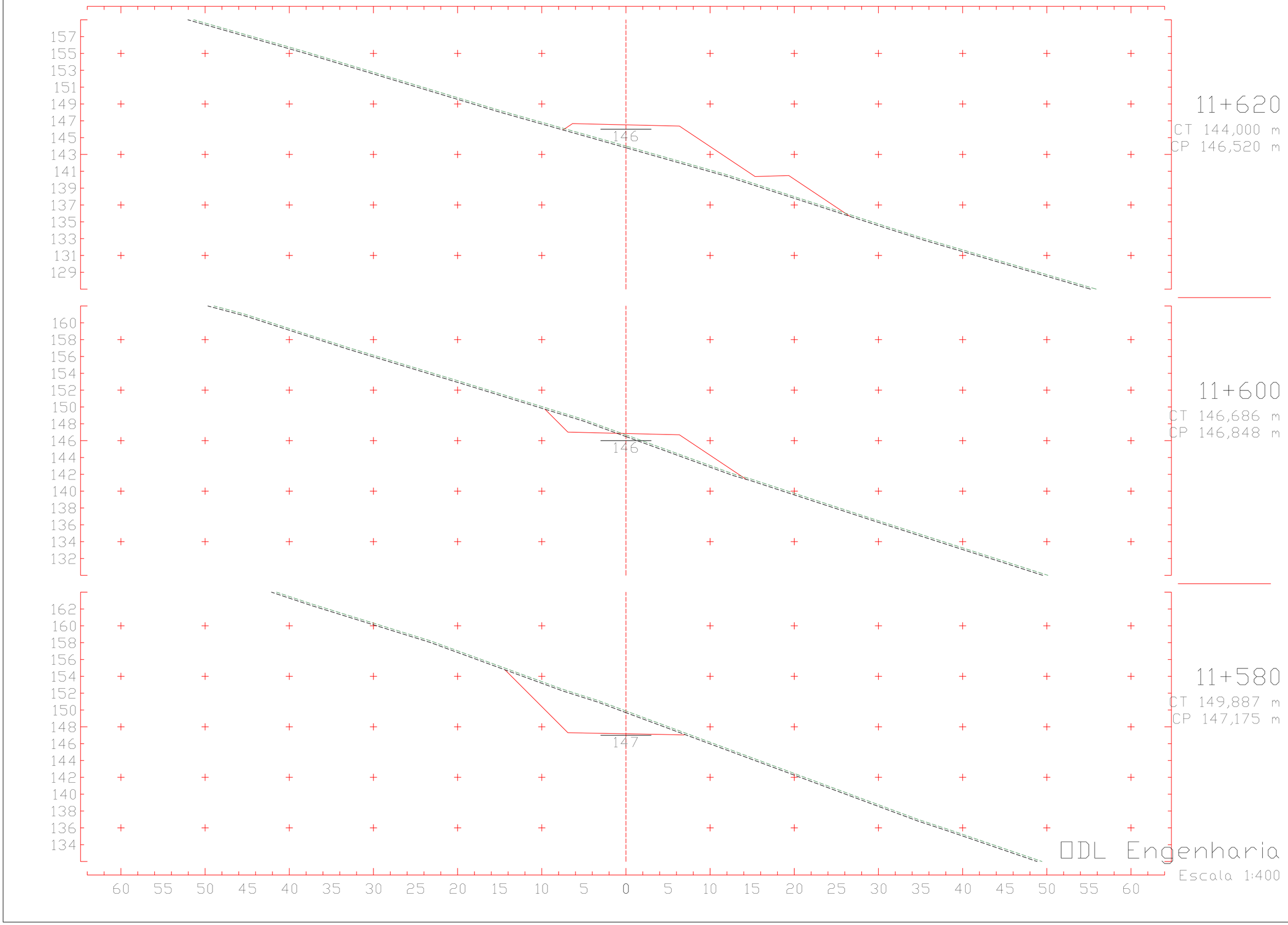
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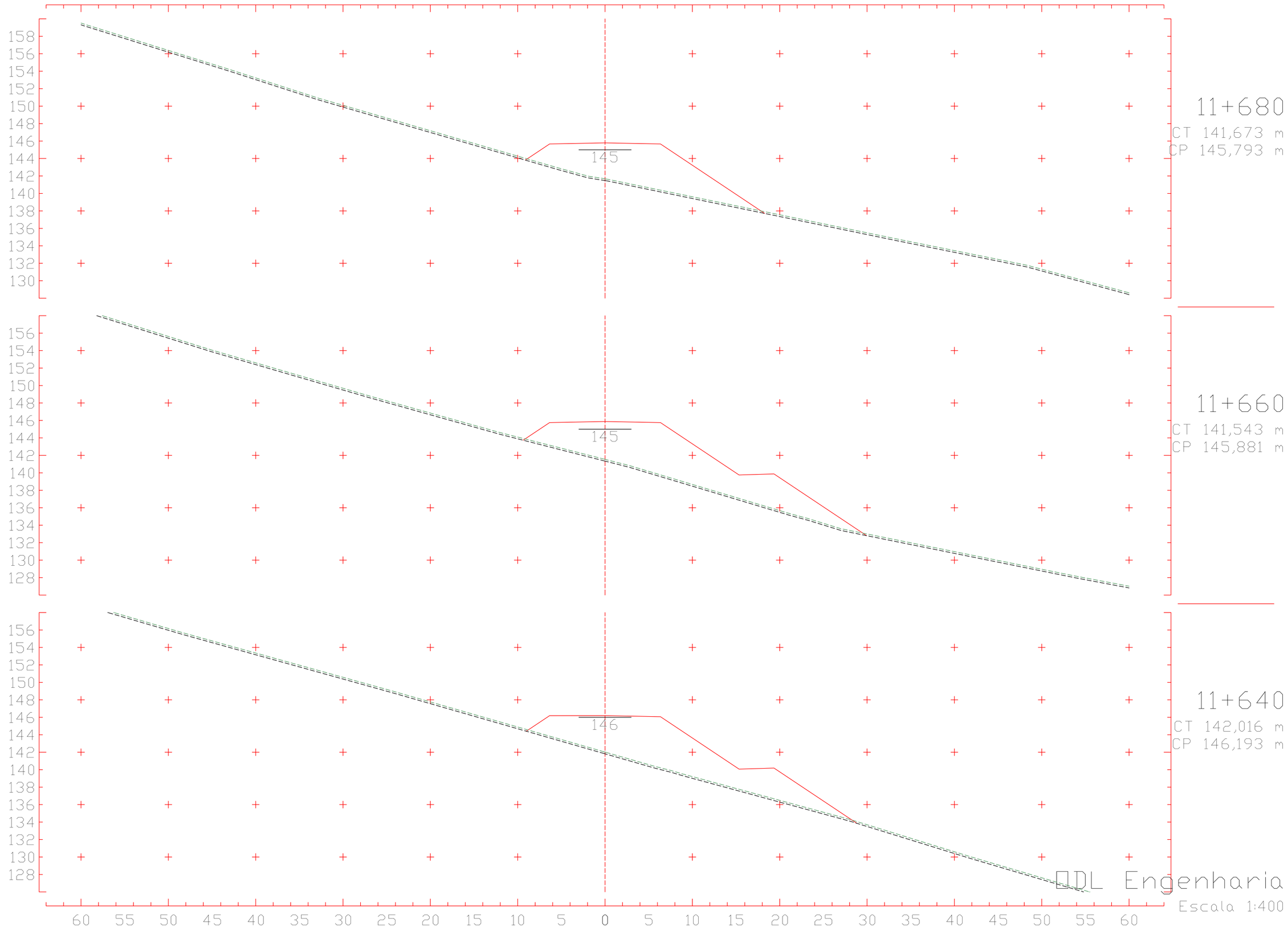
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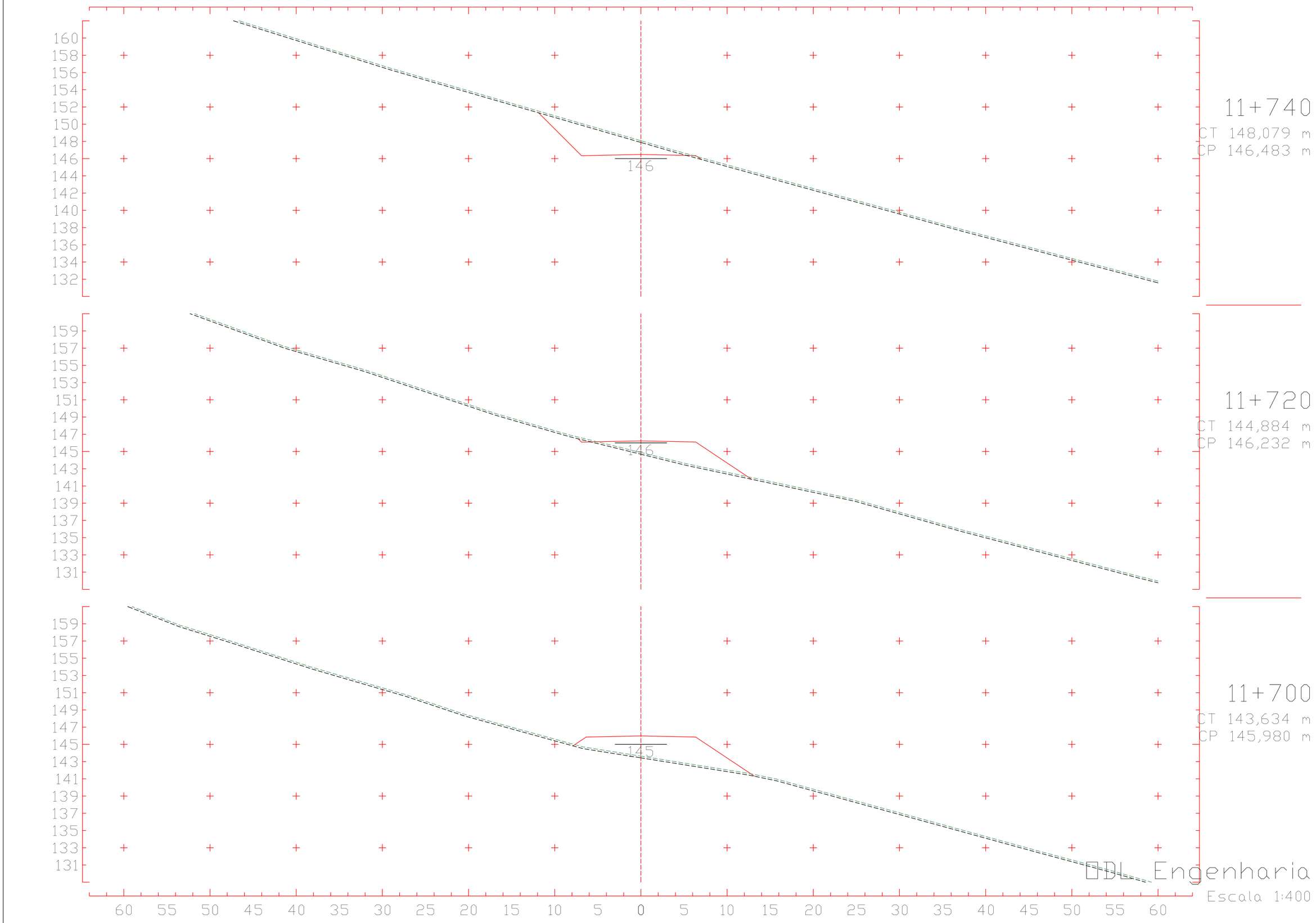
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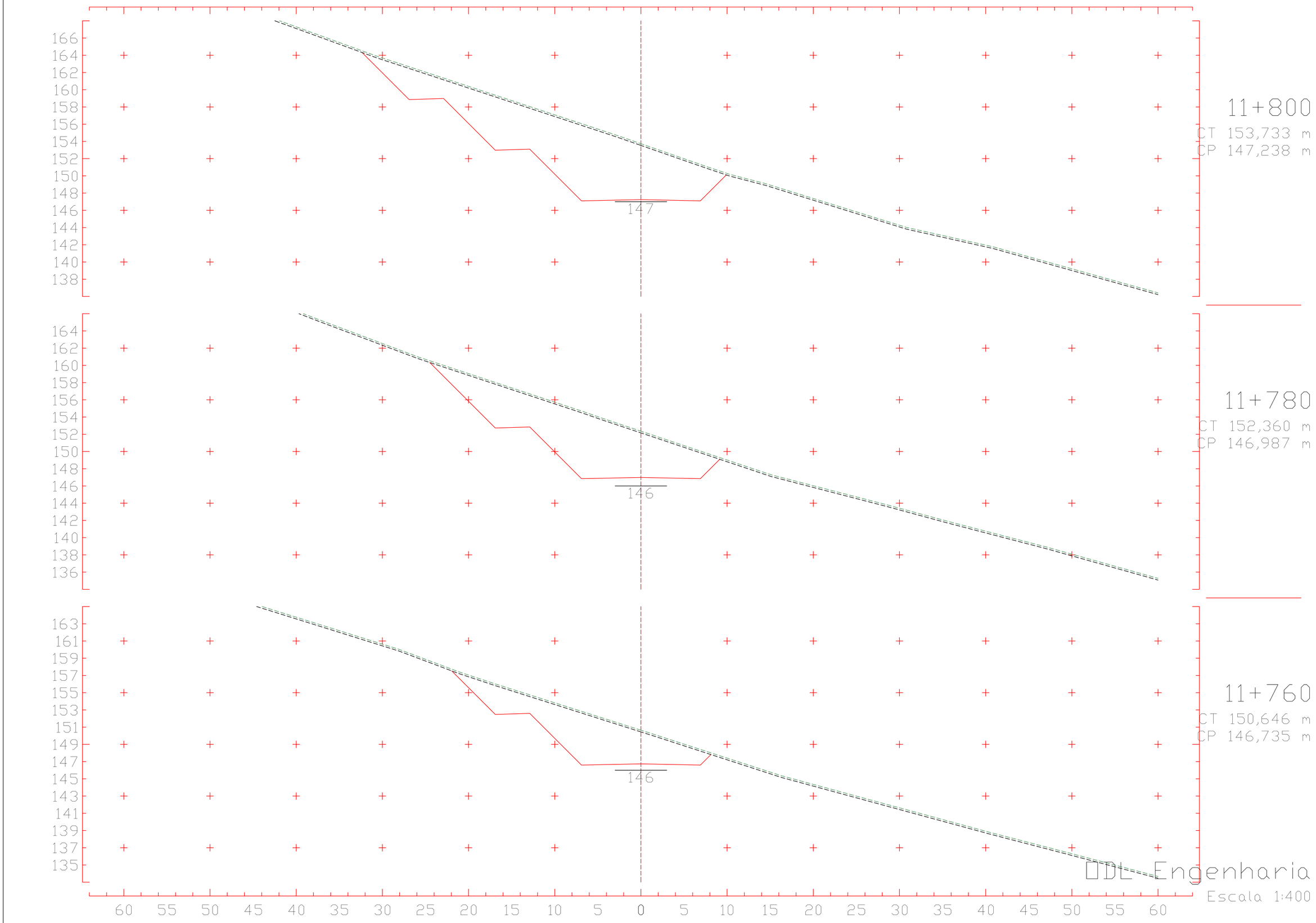
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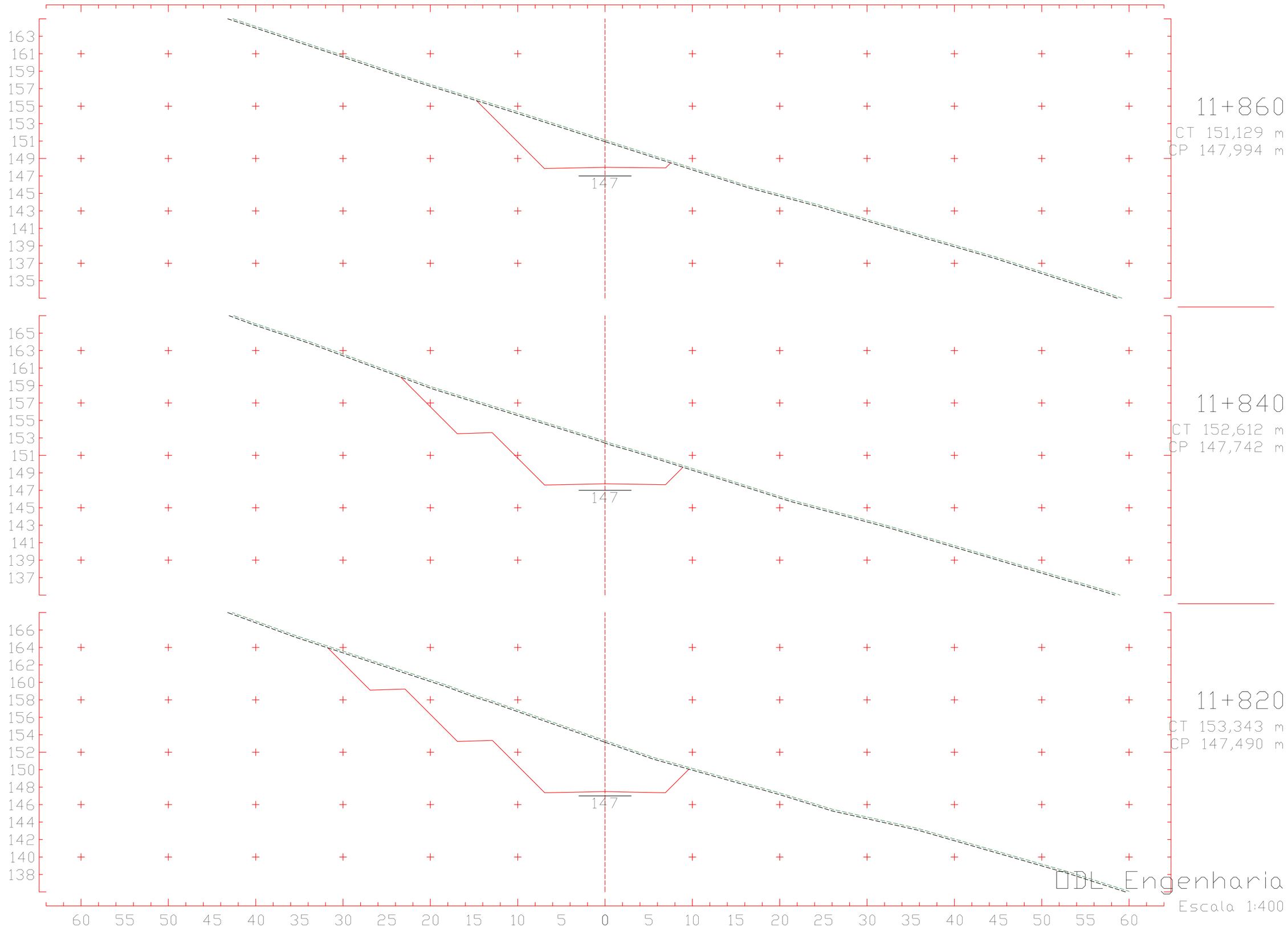
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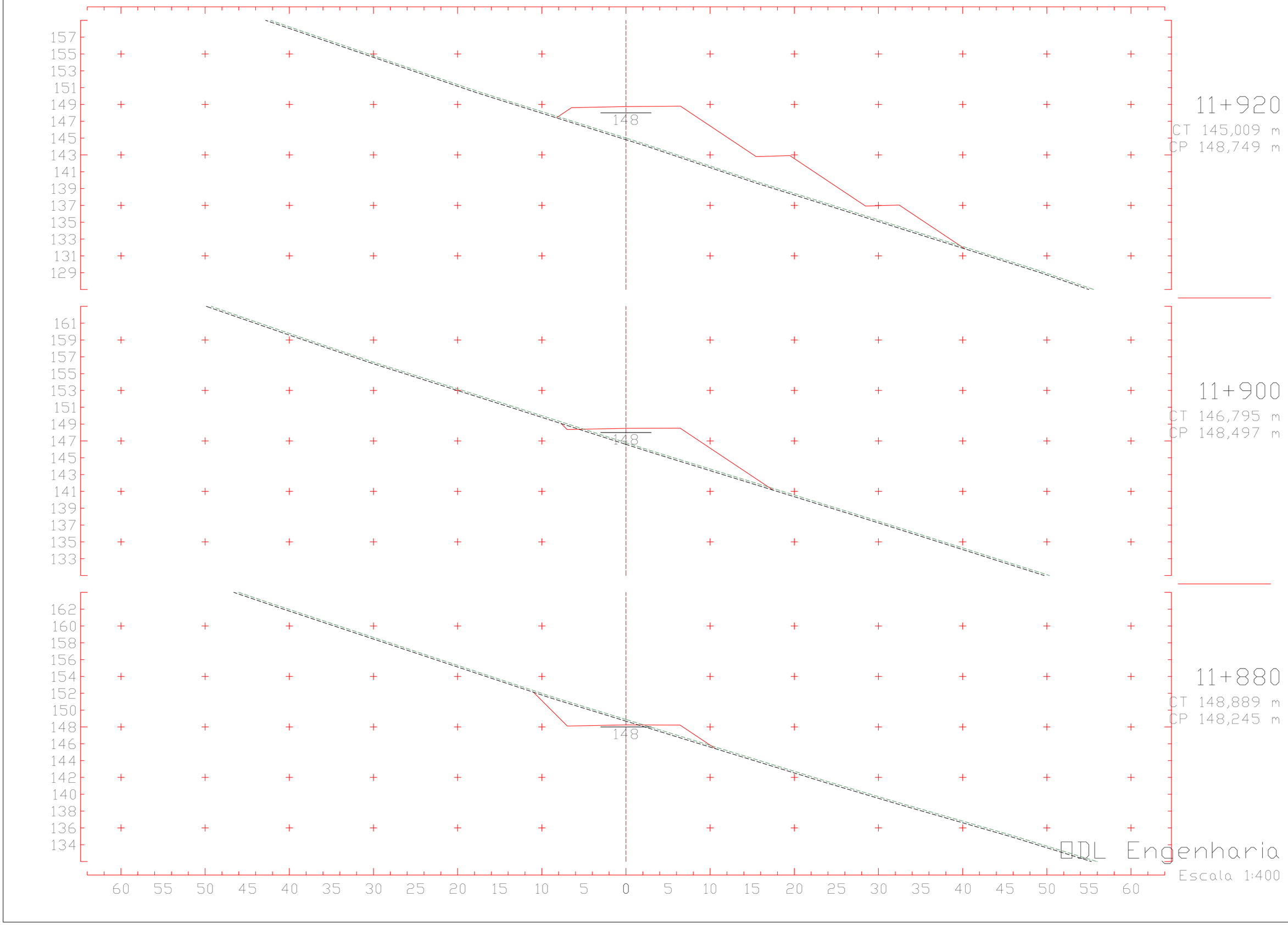
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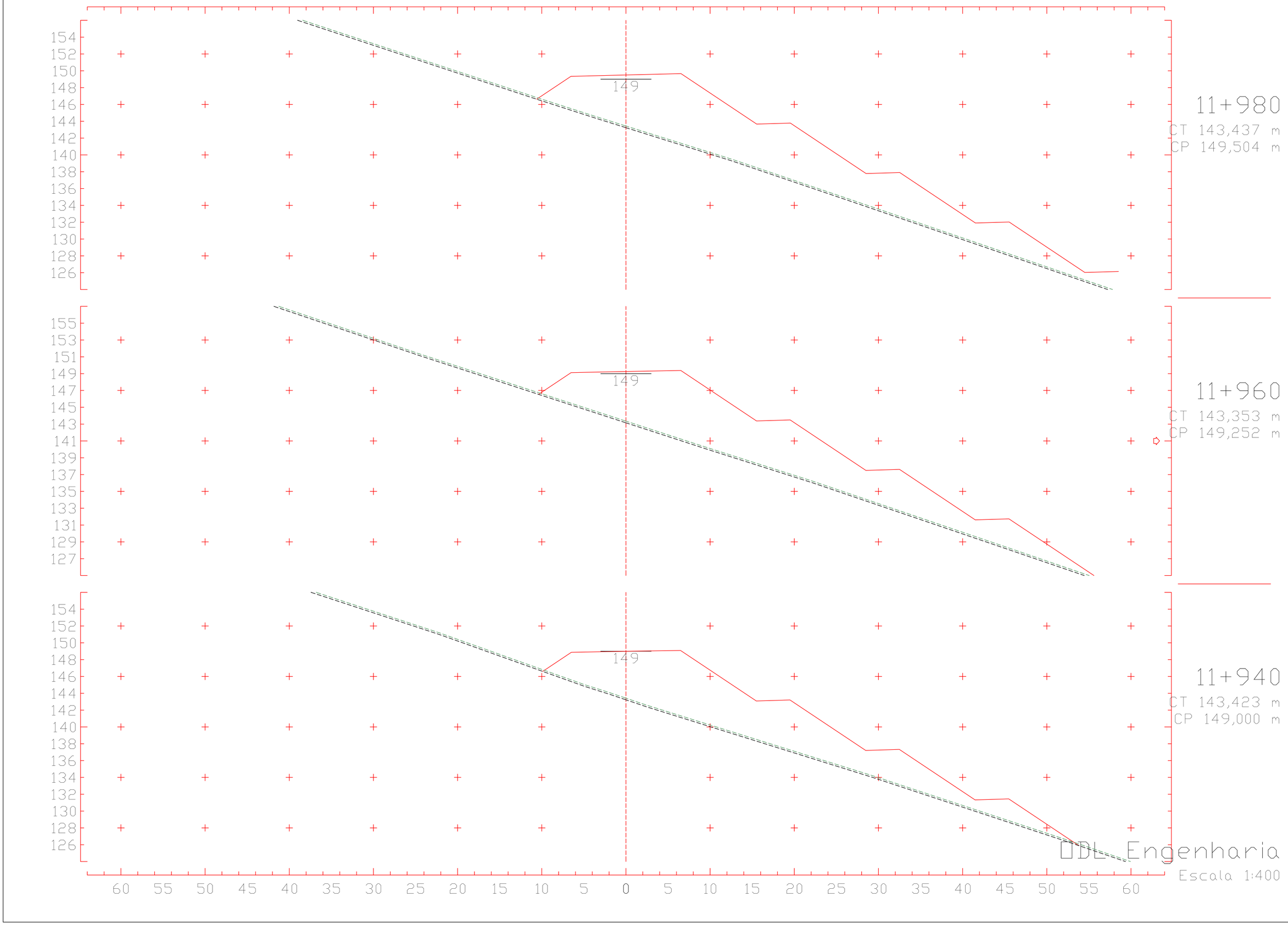
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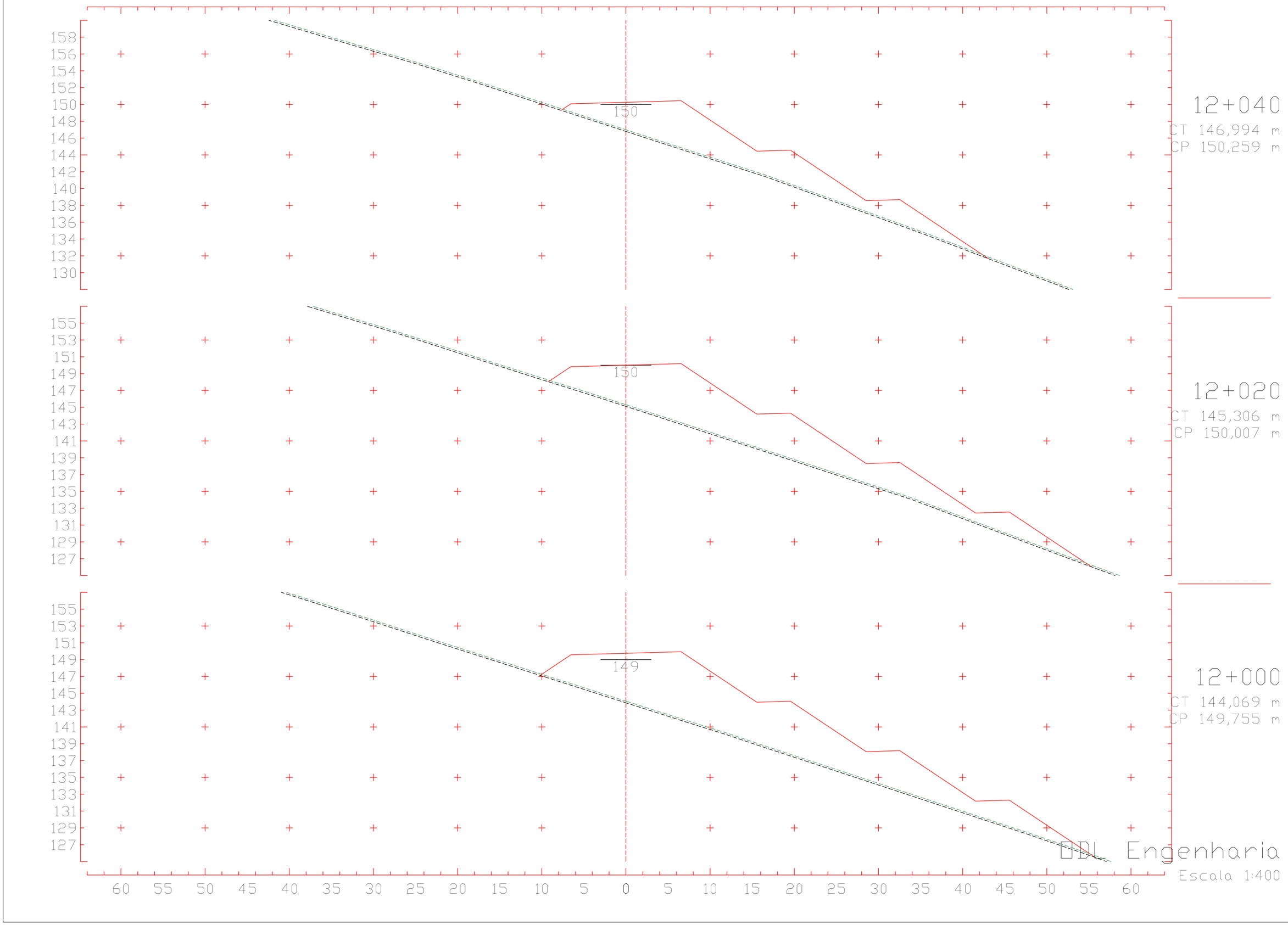
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Projeto Ponto de Partida 2021/1

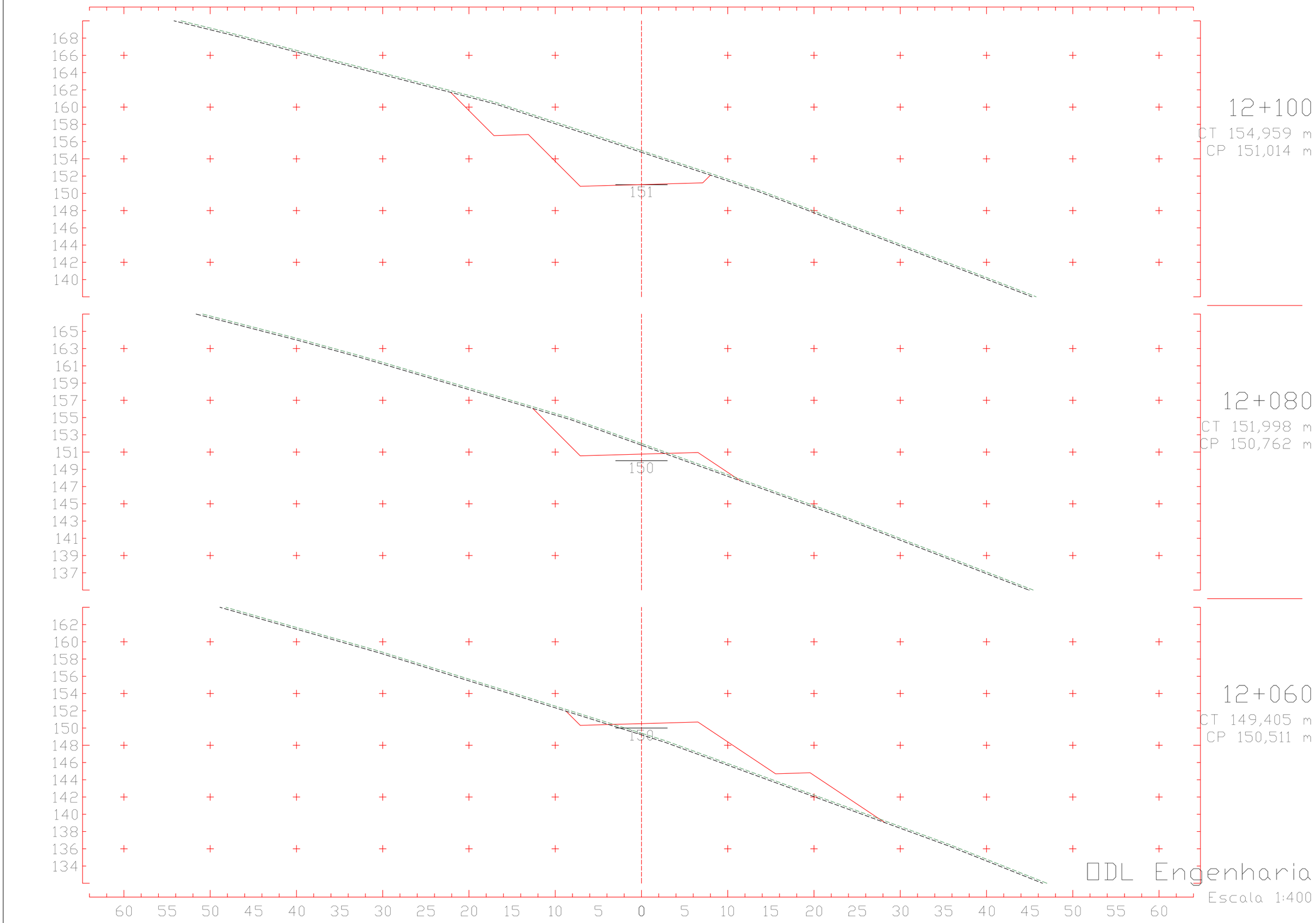


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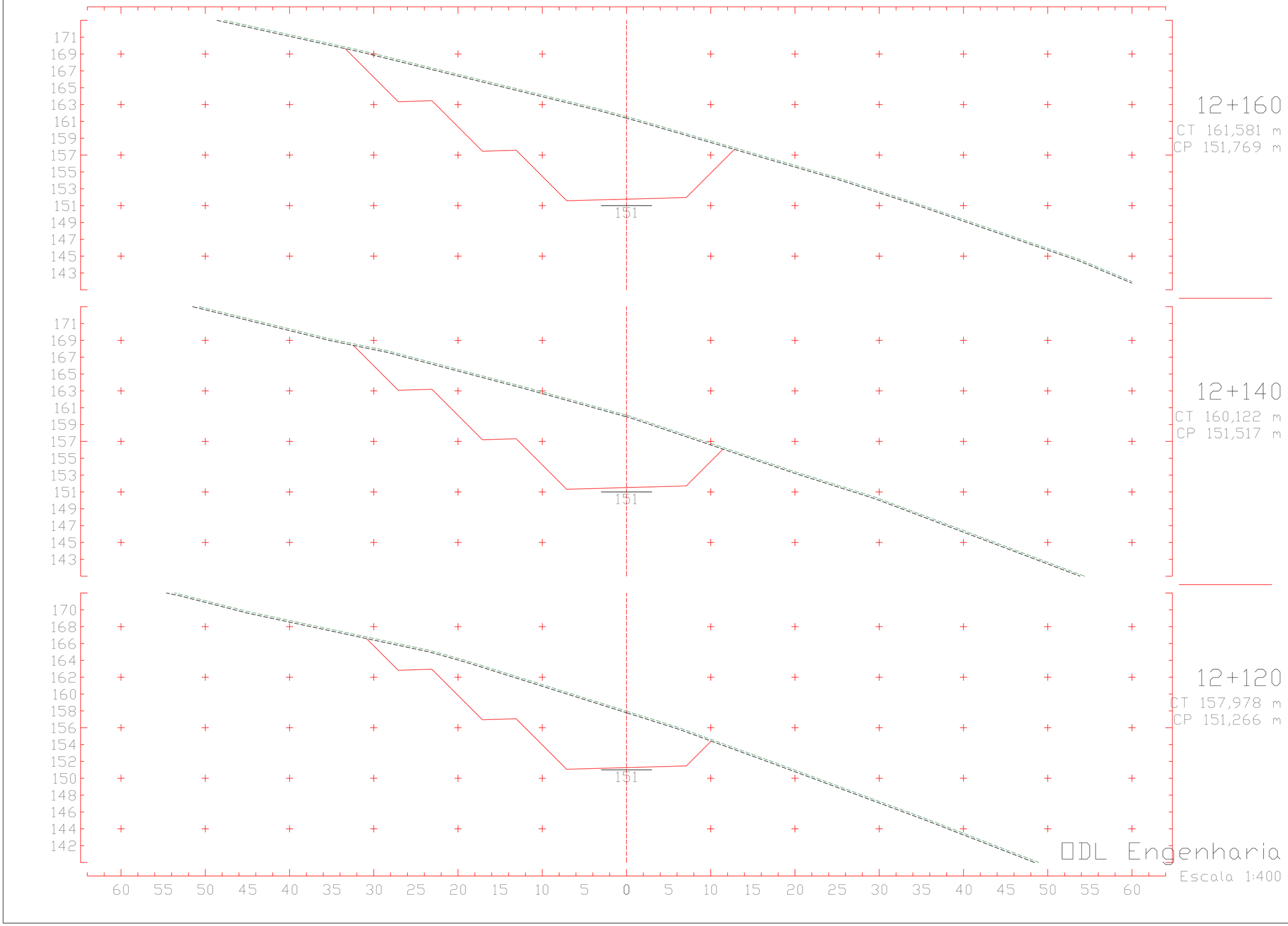


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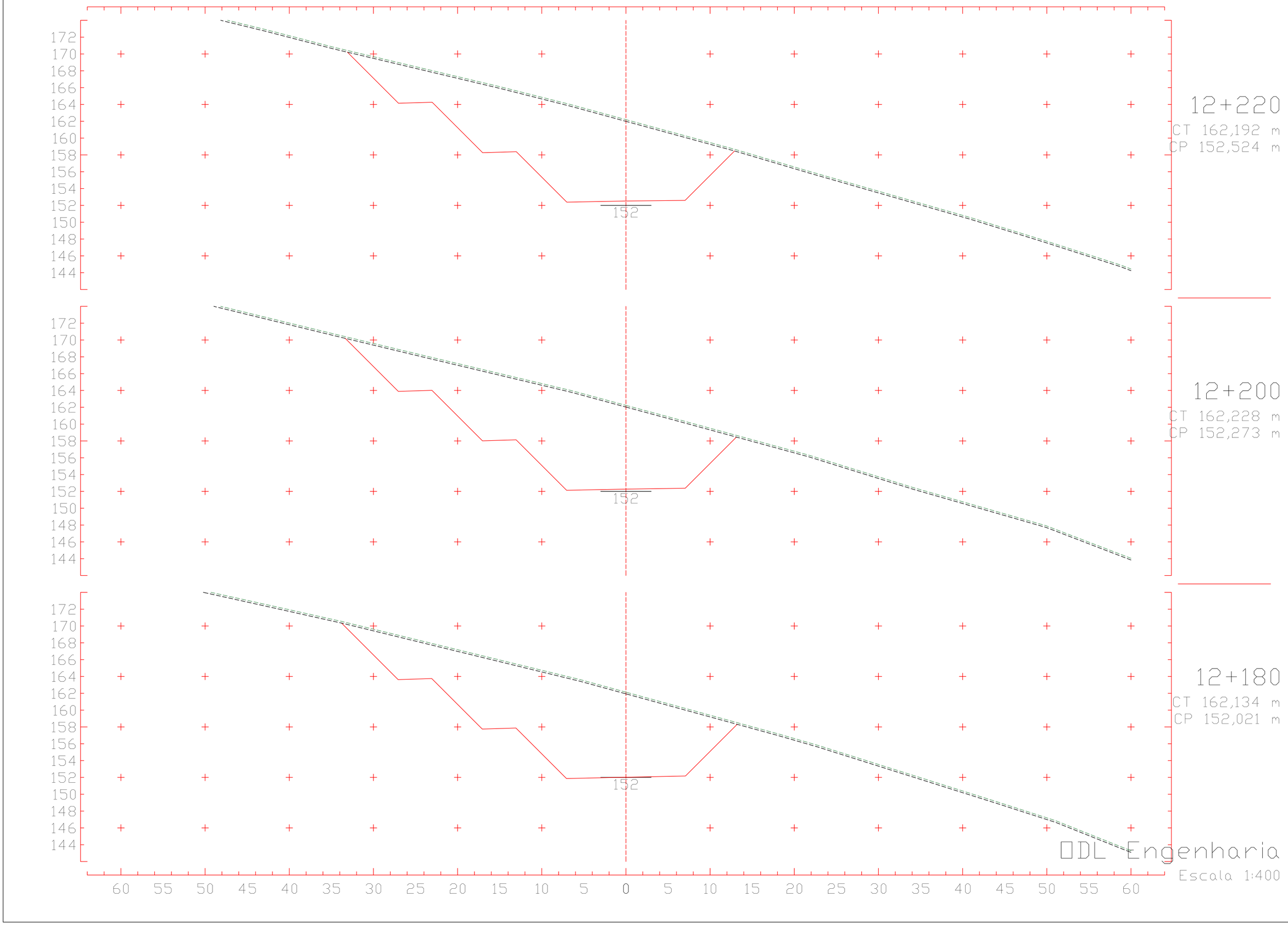
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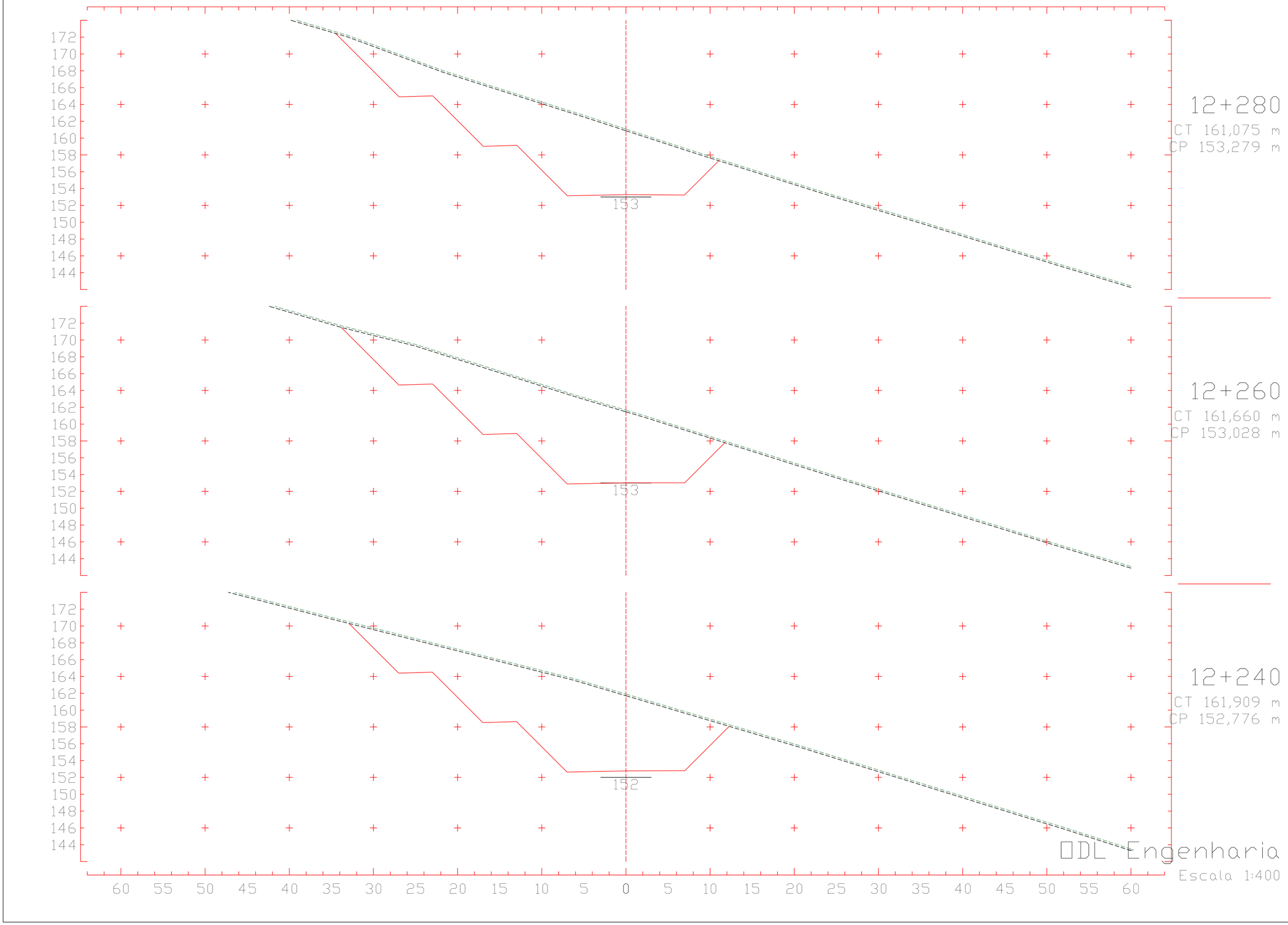
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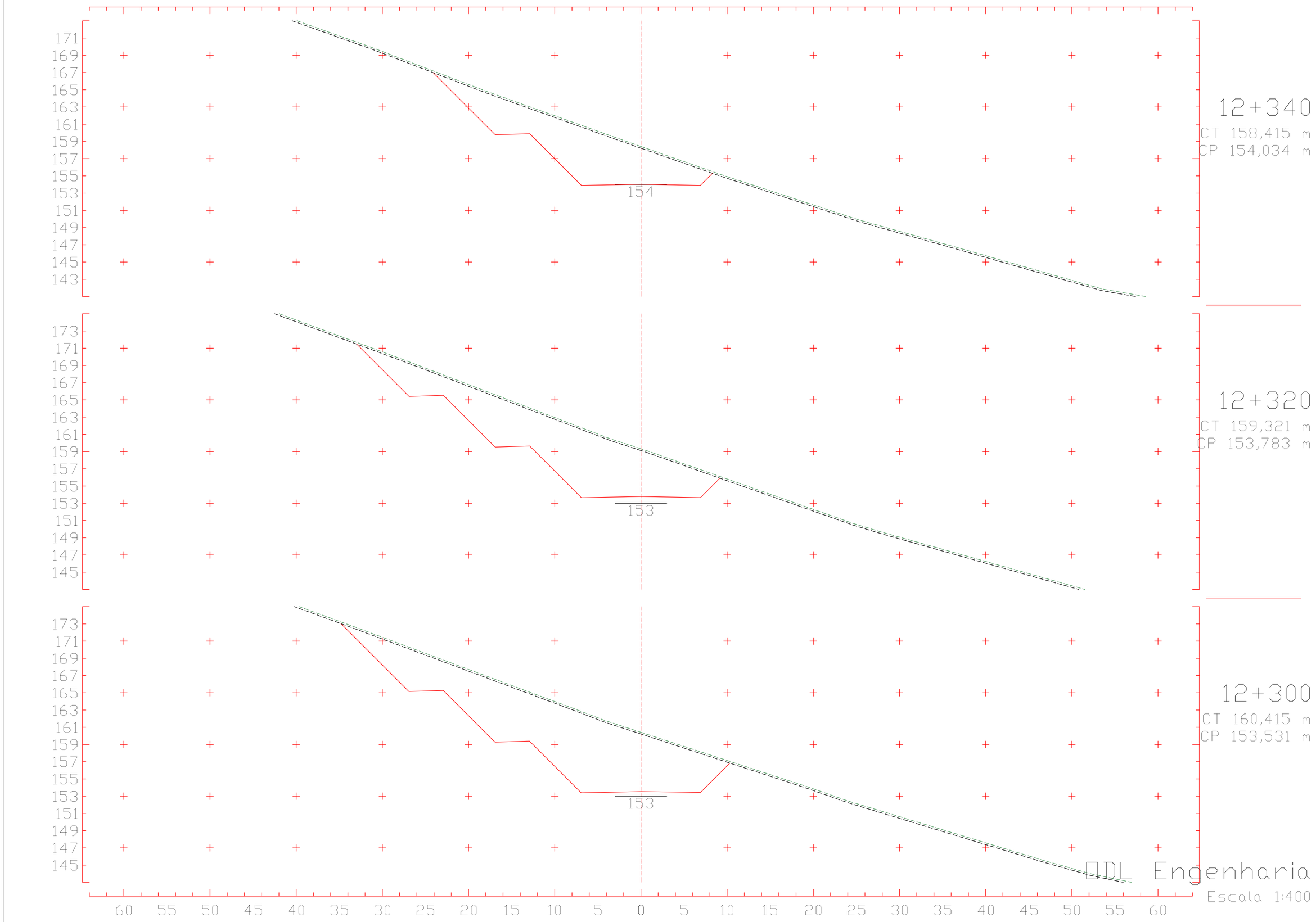
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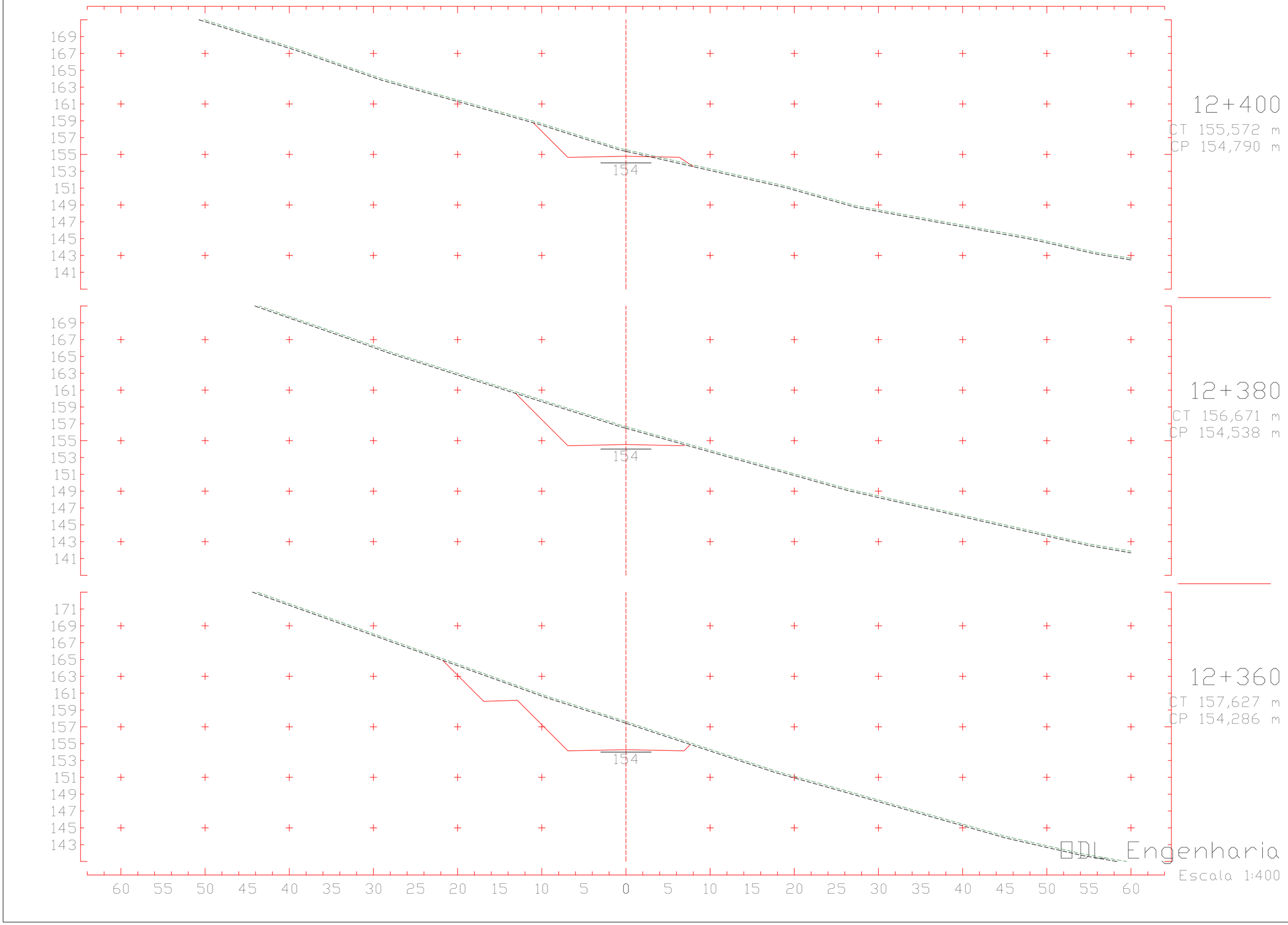
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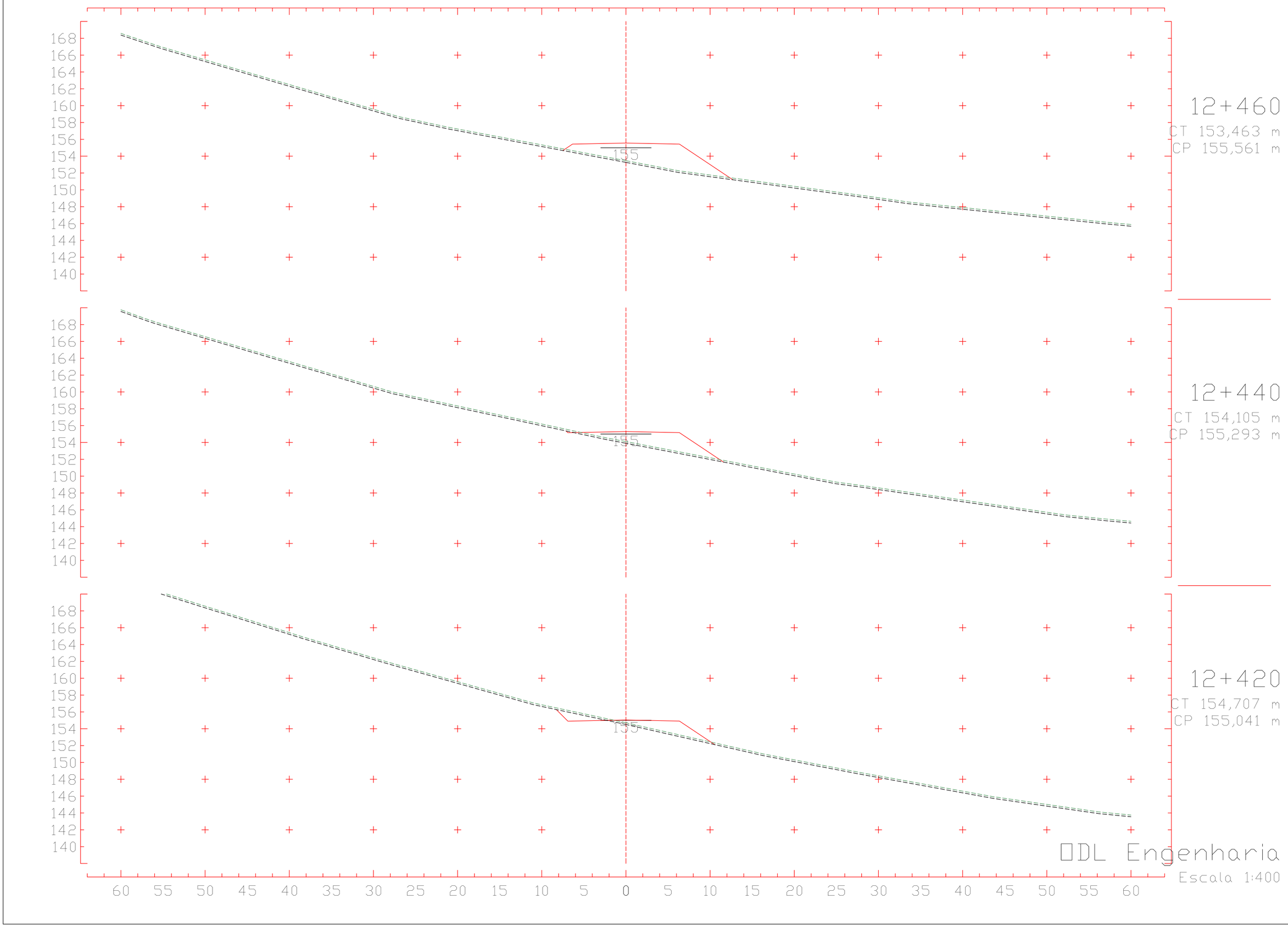
Projeto Ponto de Partida 2021/1



Projeto Ponto de Partida 2021/1



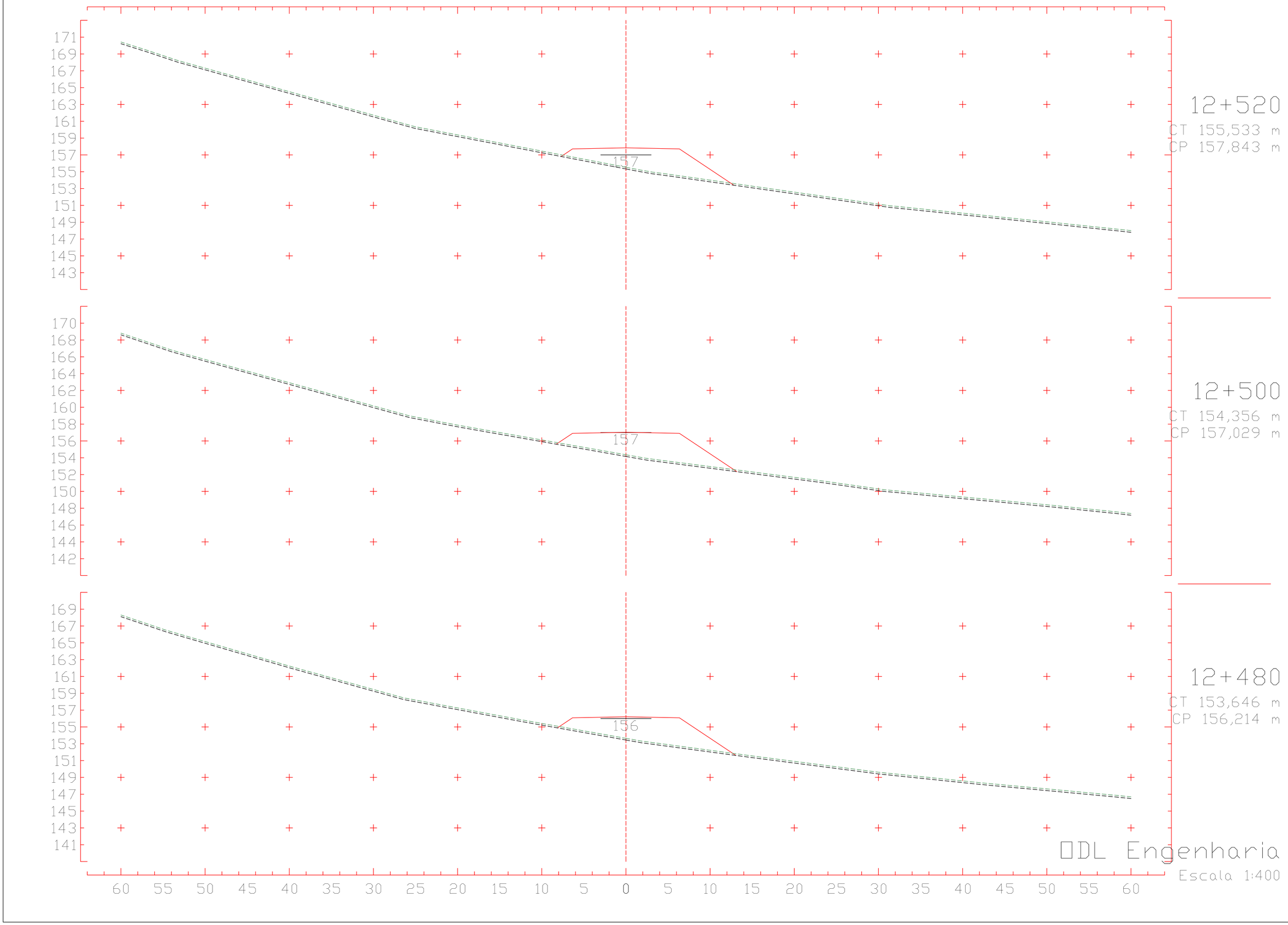
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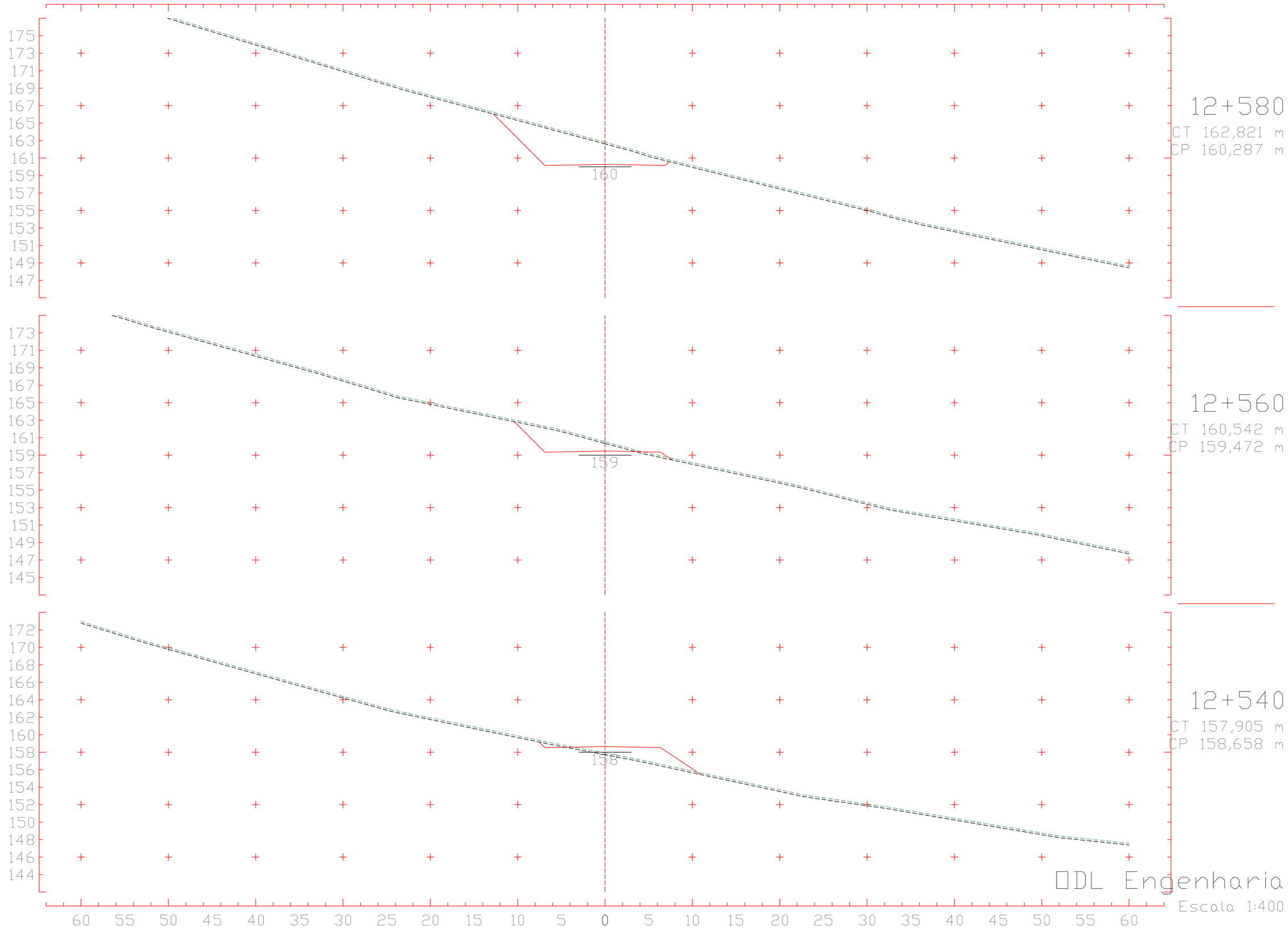
ODL Engenharia

Escala 1:400

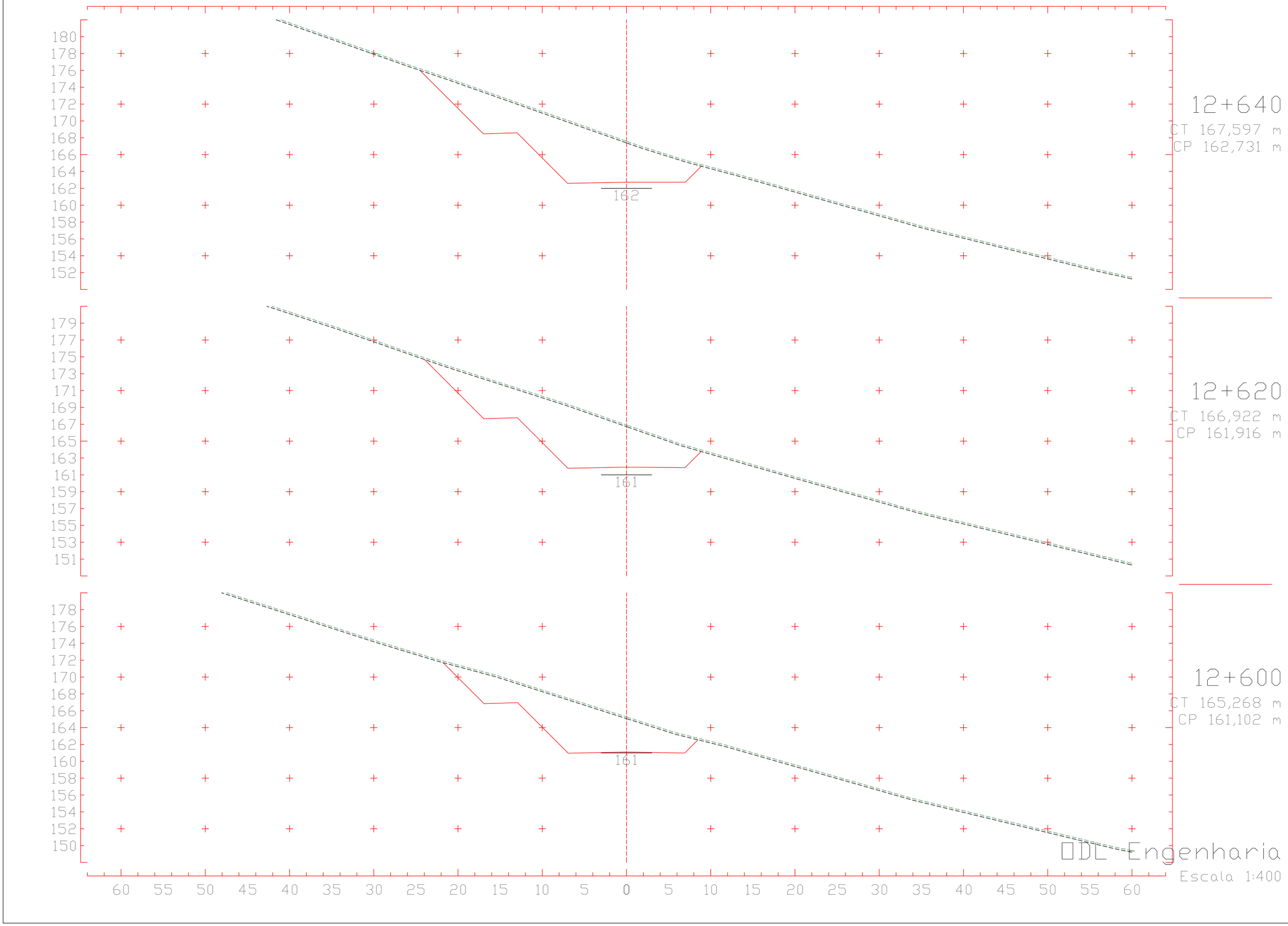
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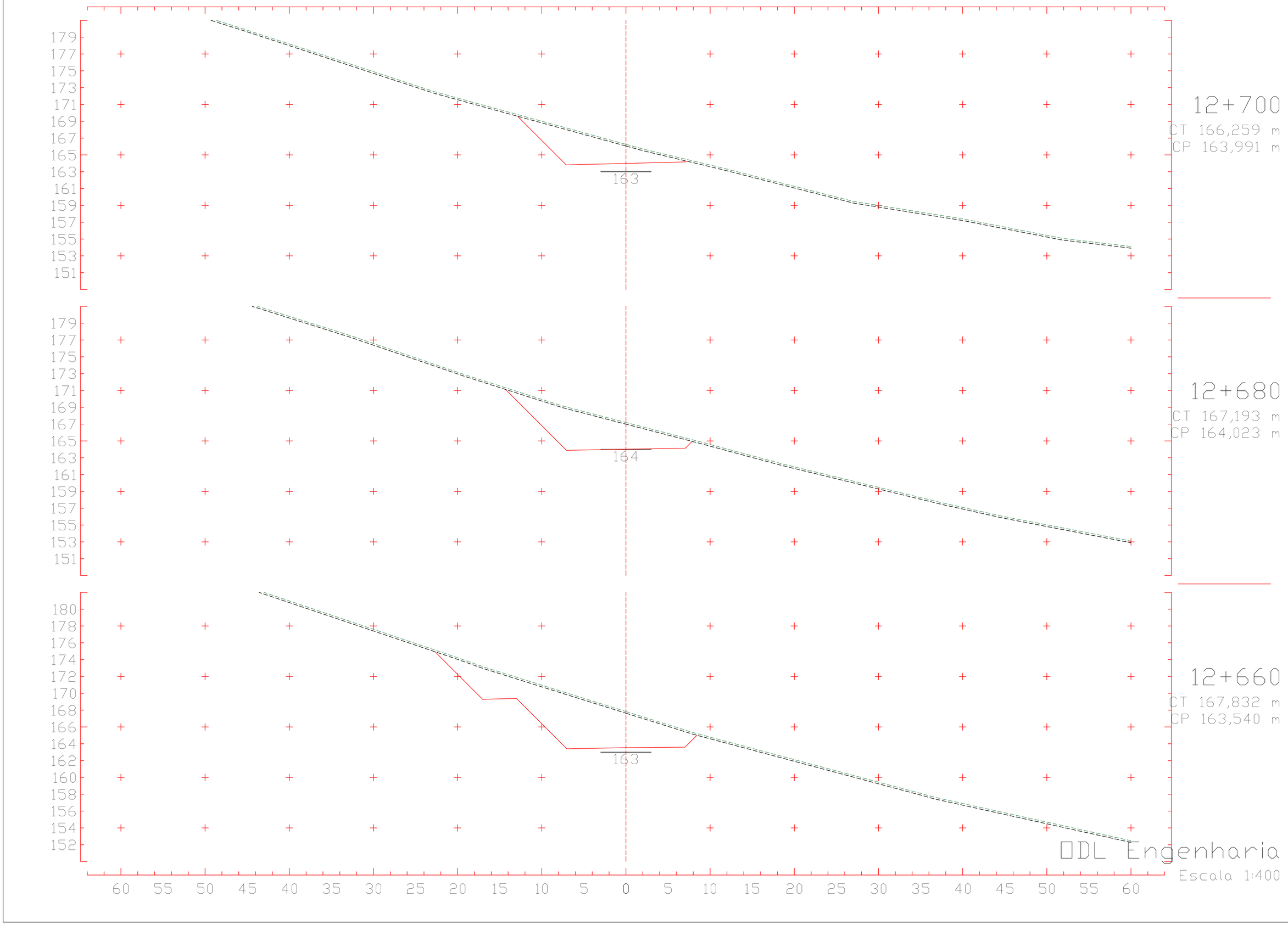
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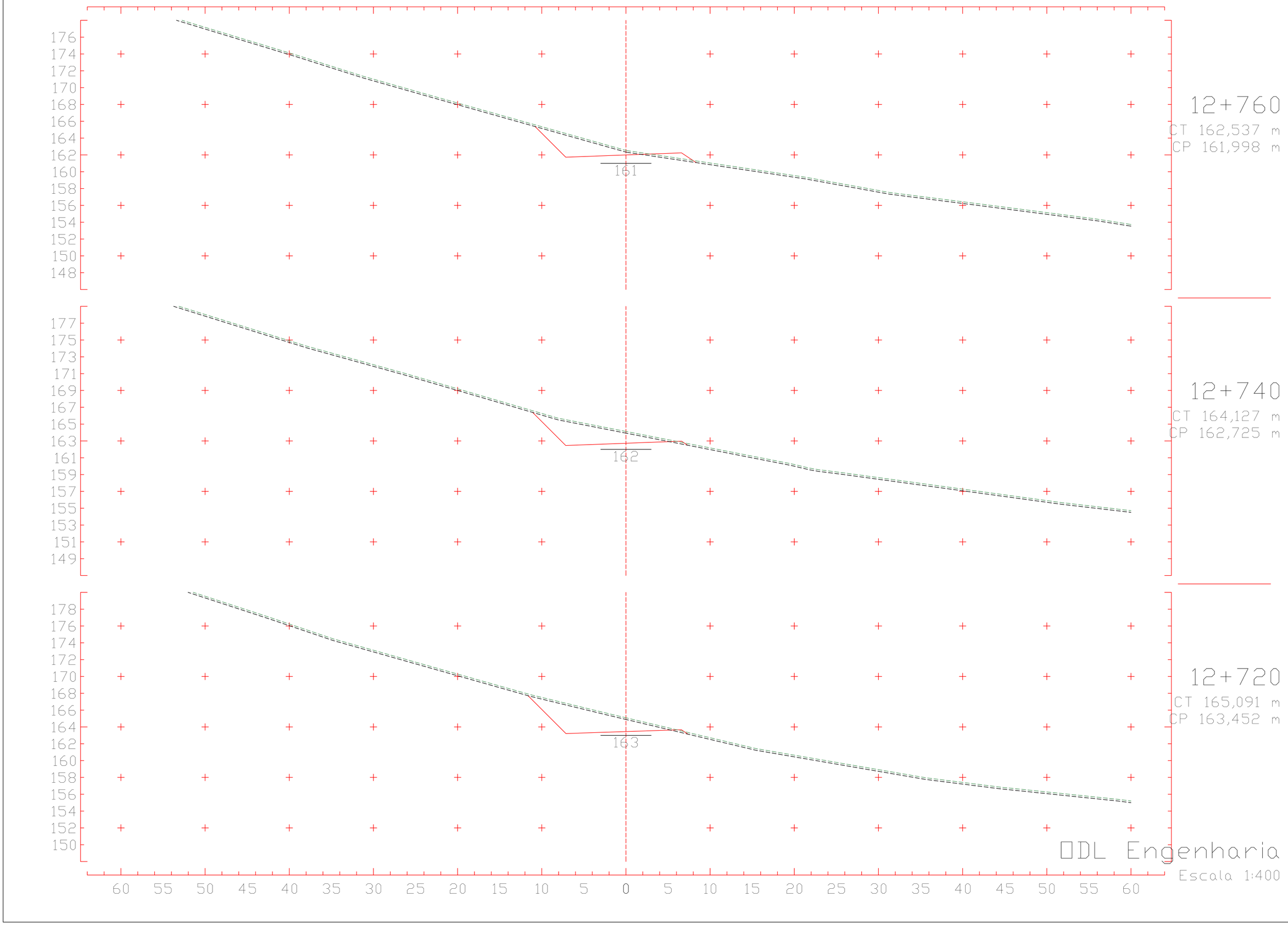
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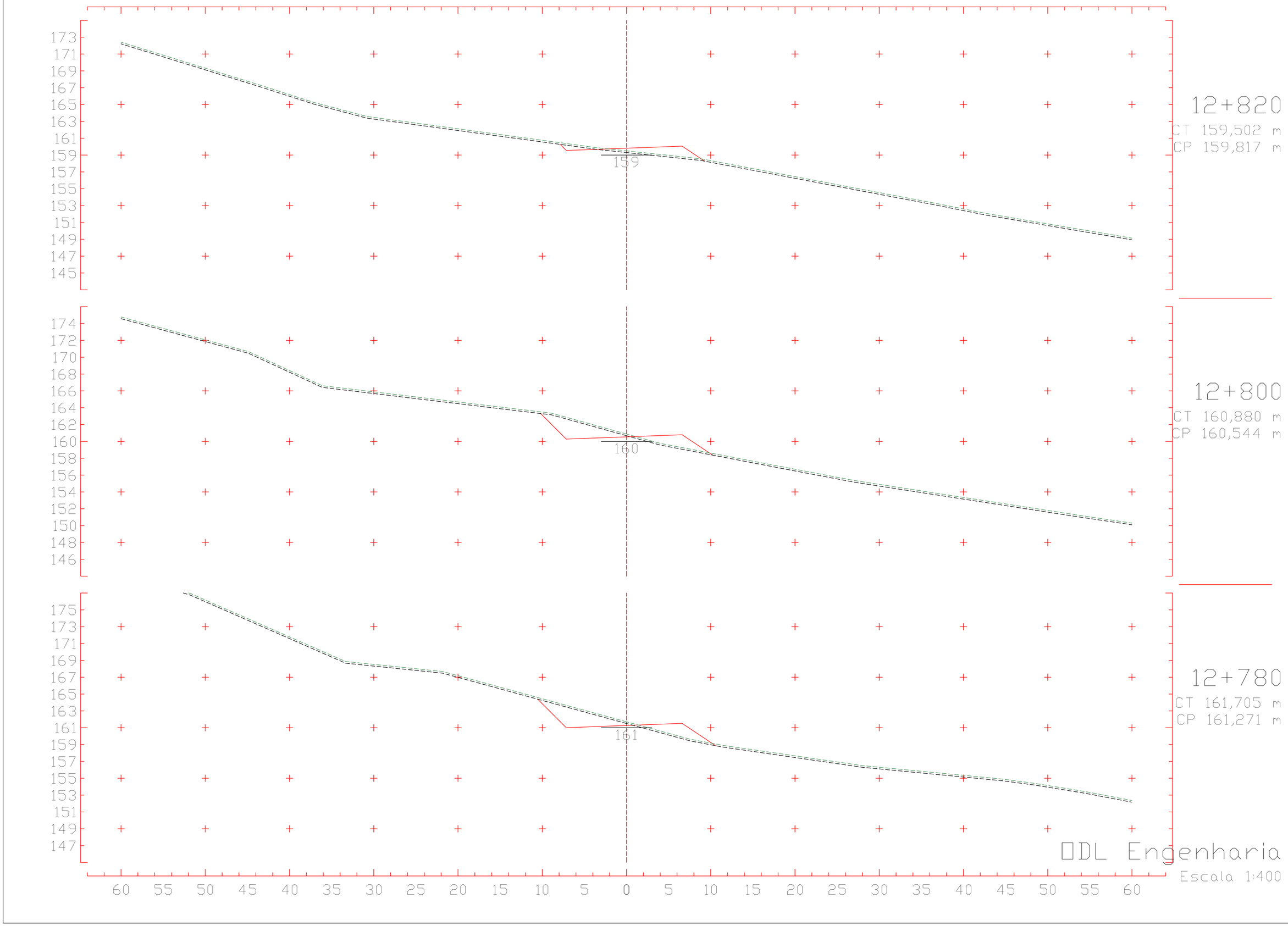
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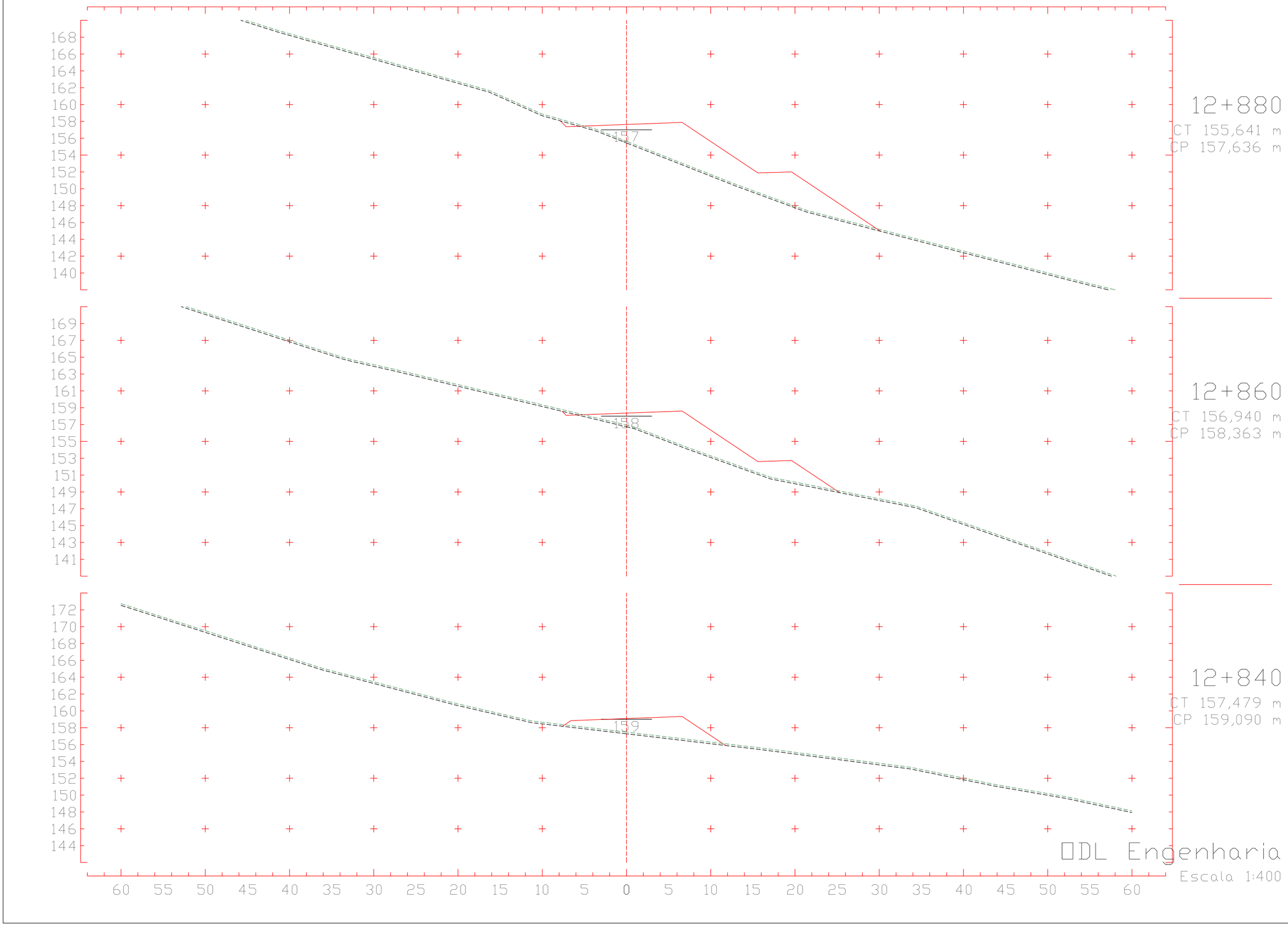
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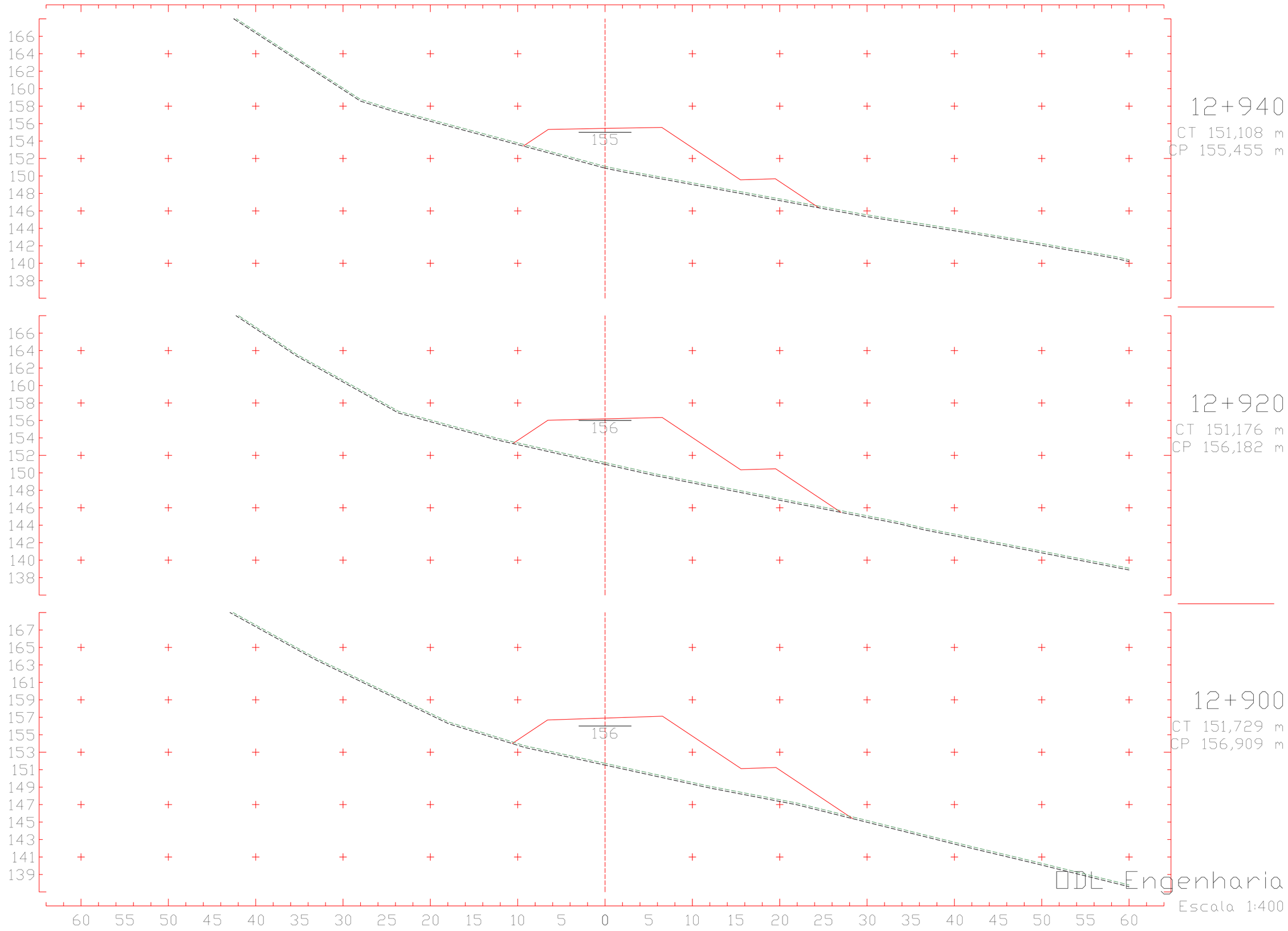
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Projeto Ponto de Partida 2021/1



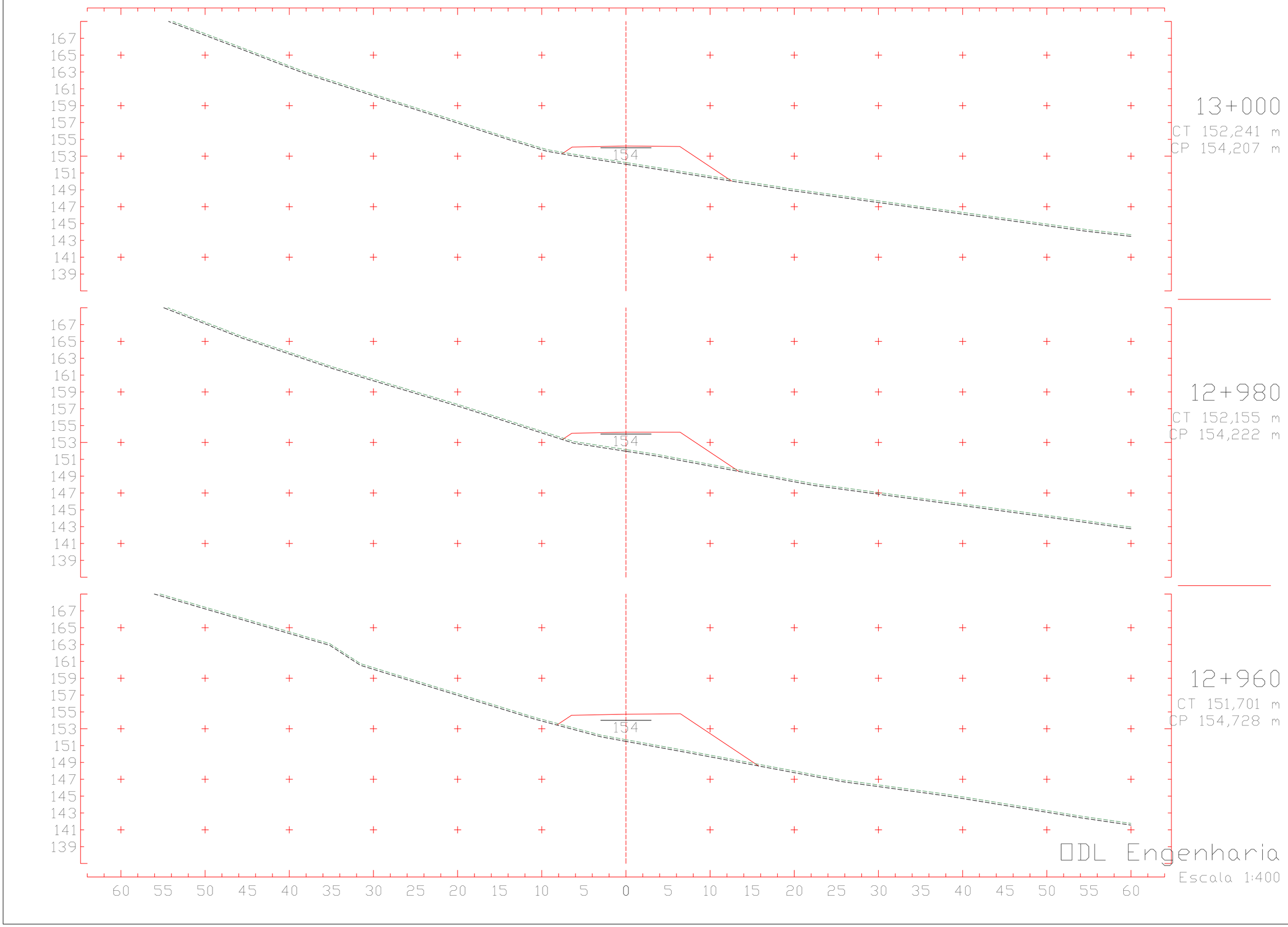
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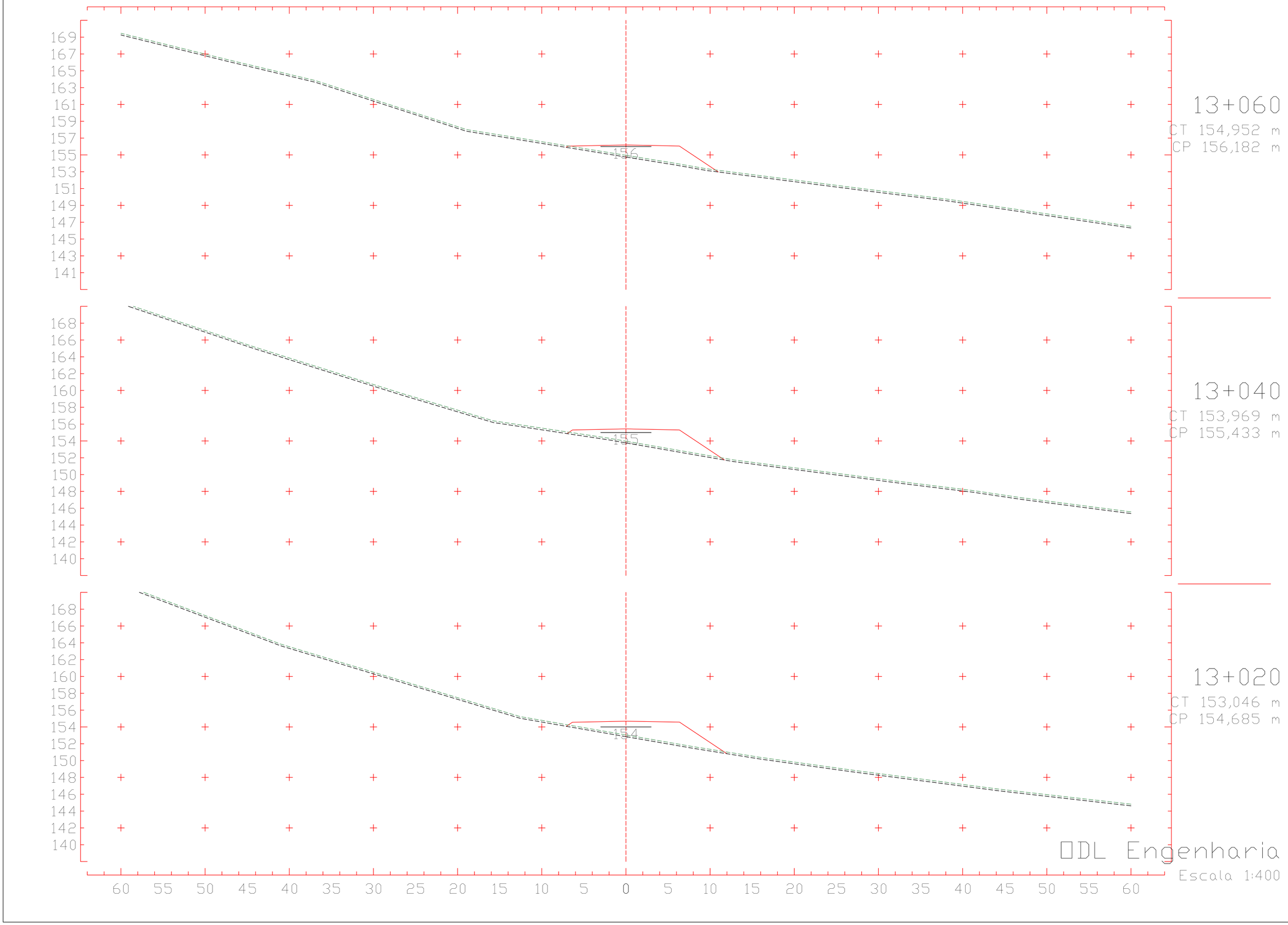
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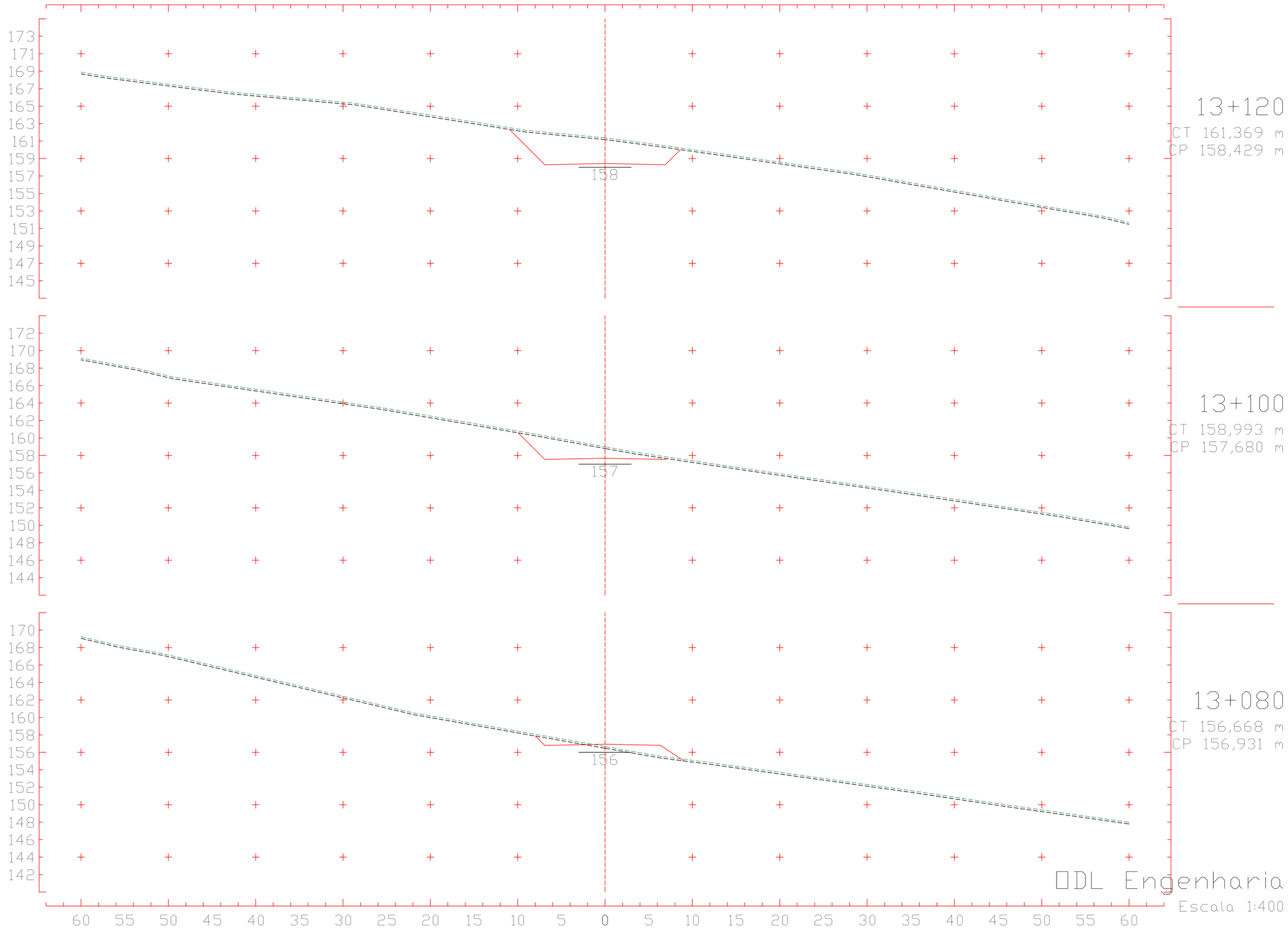
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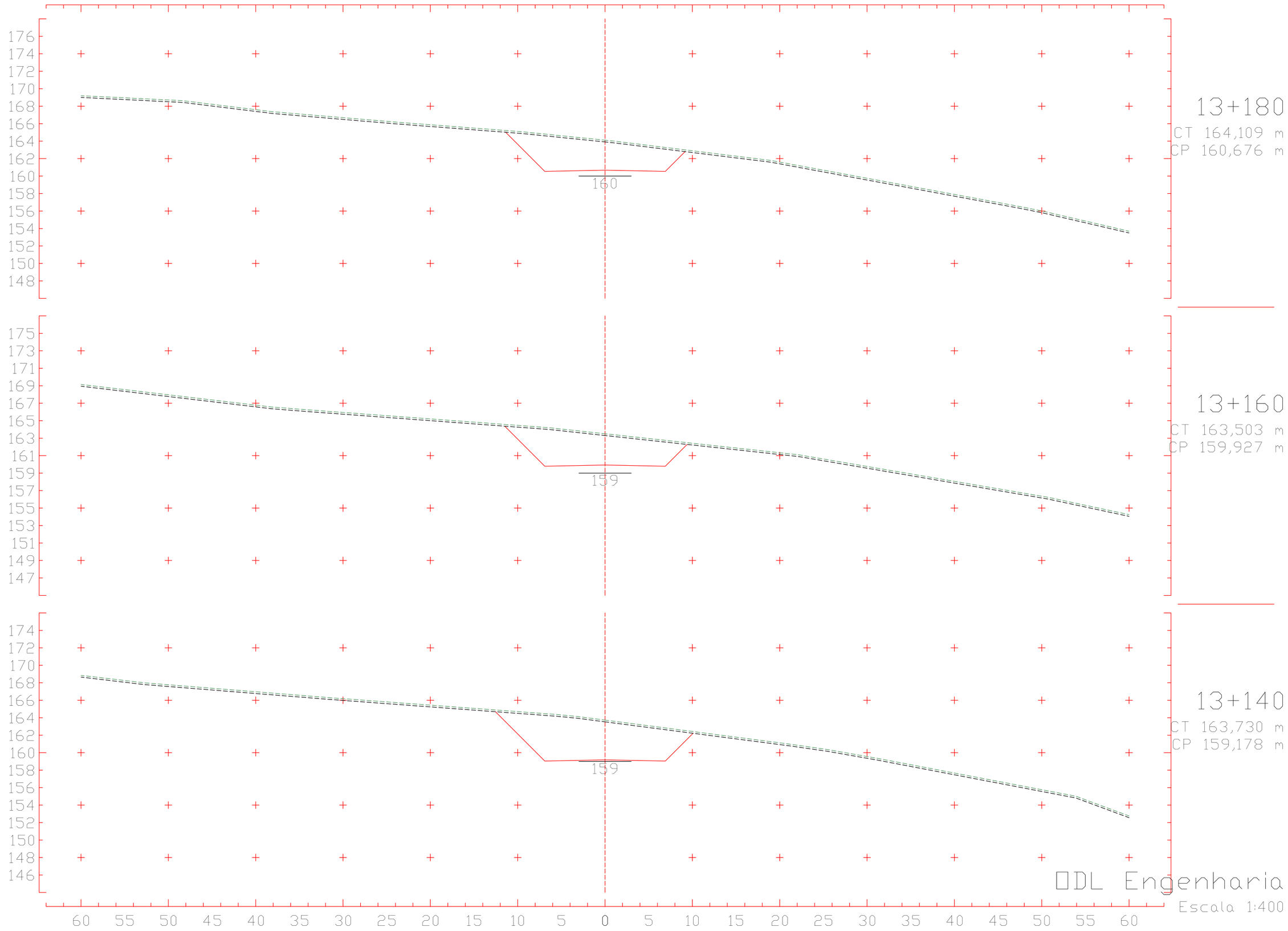
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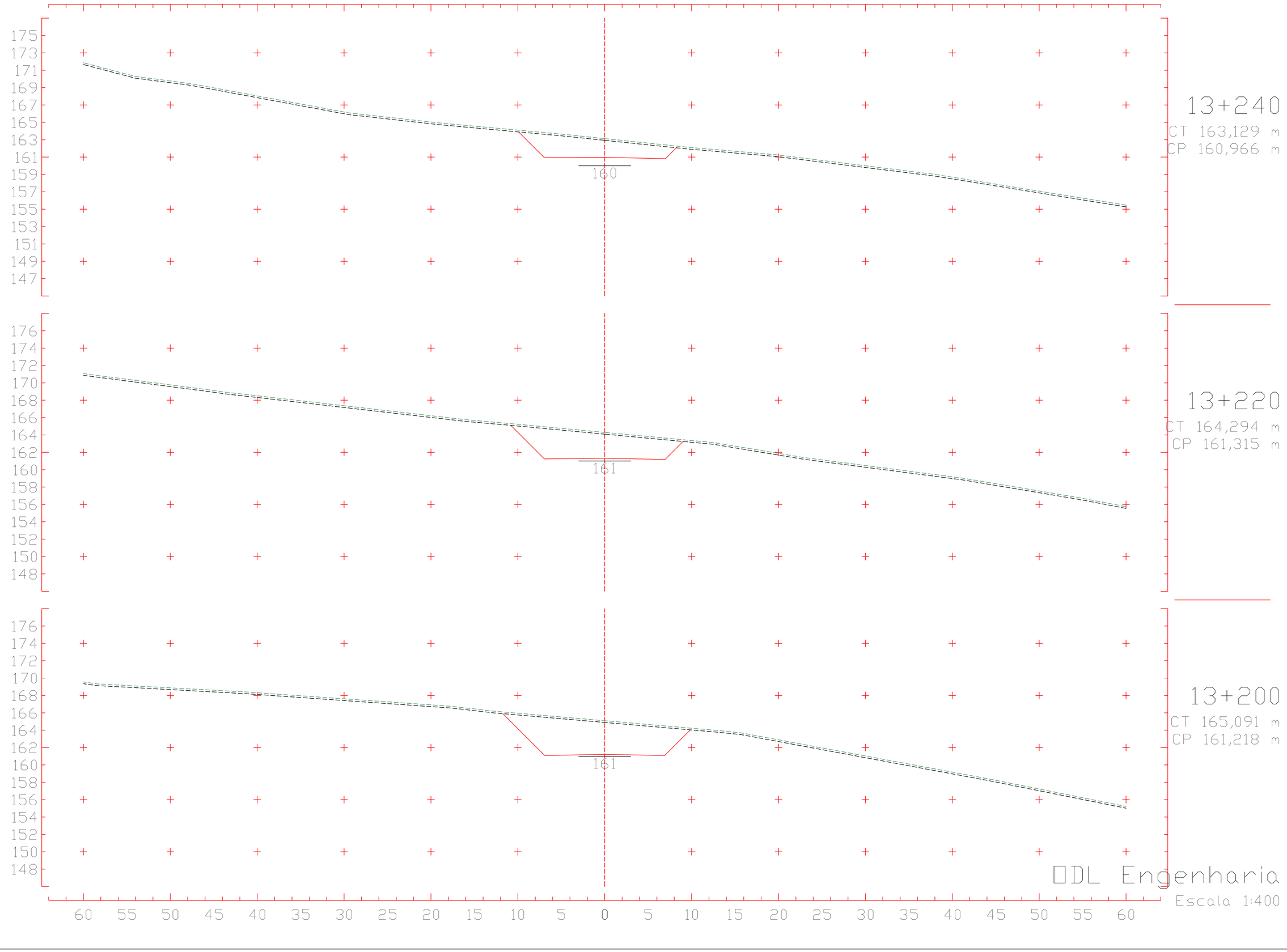
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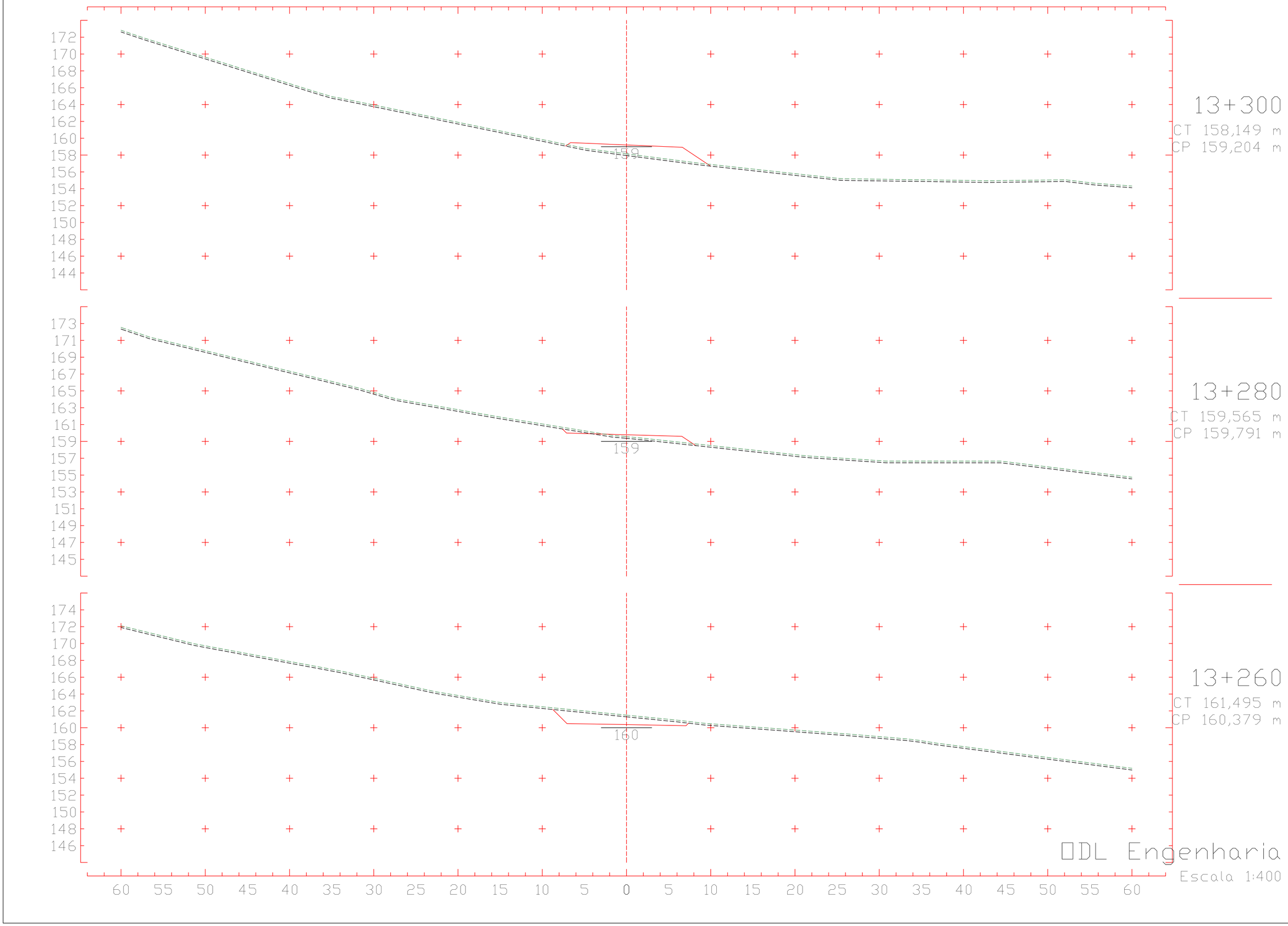
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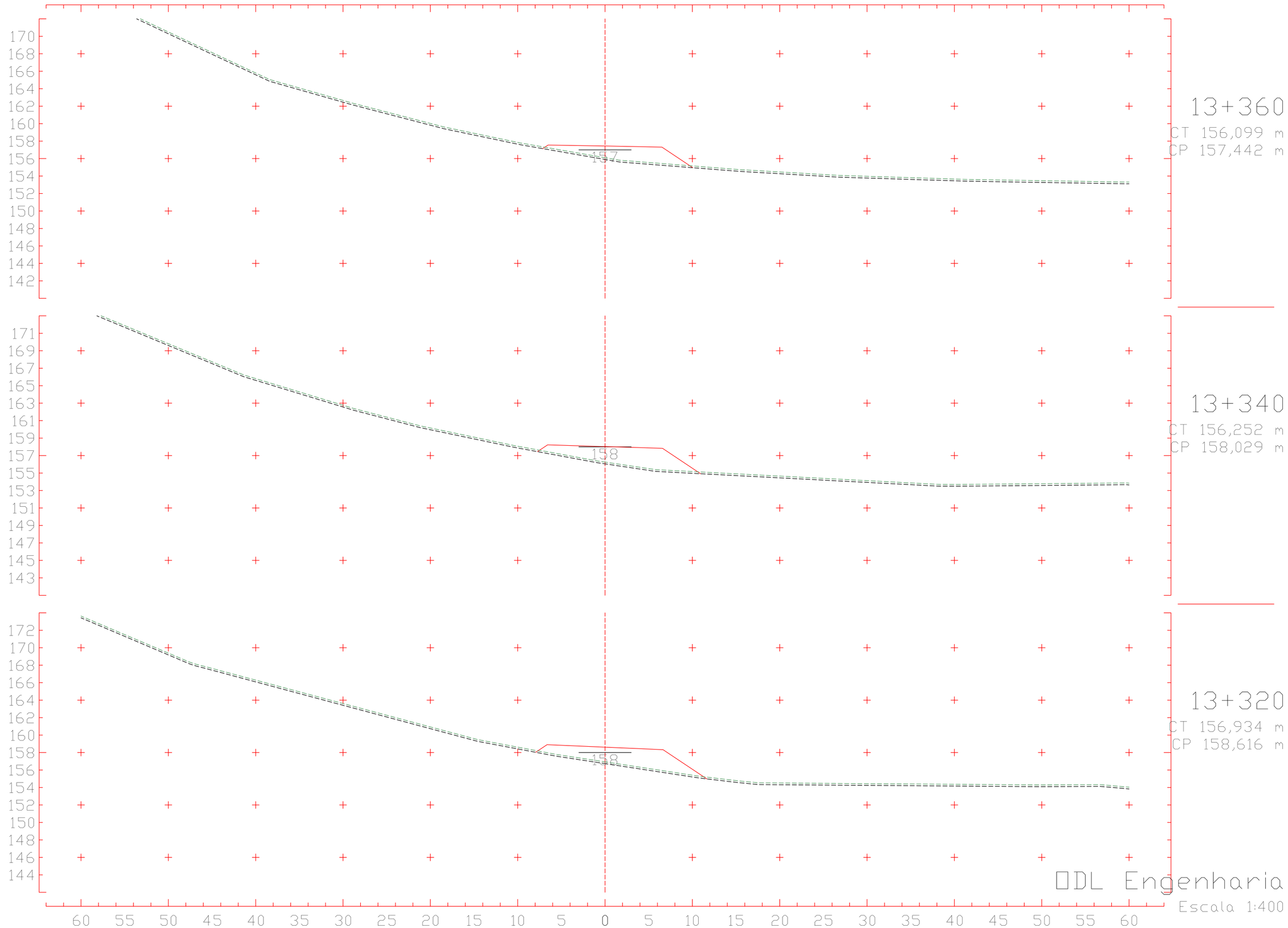
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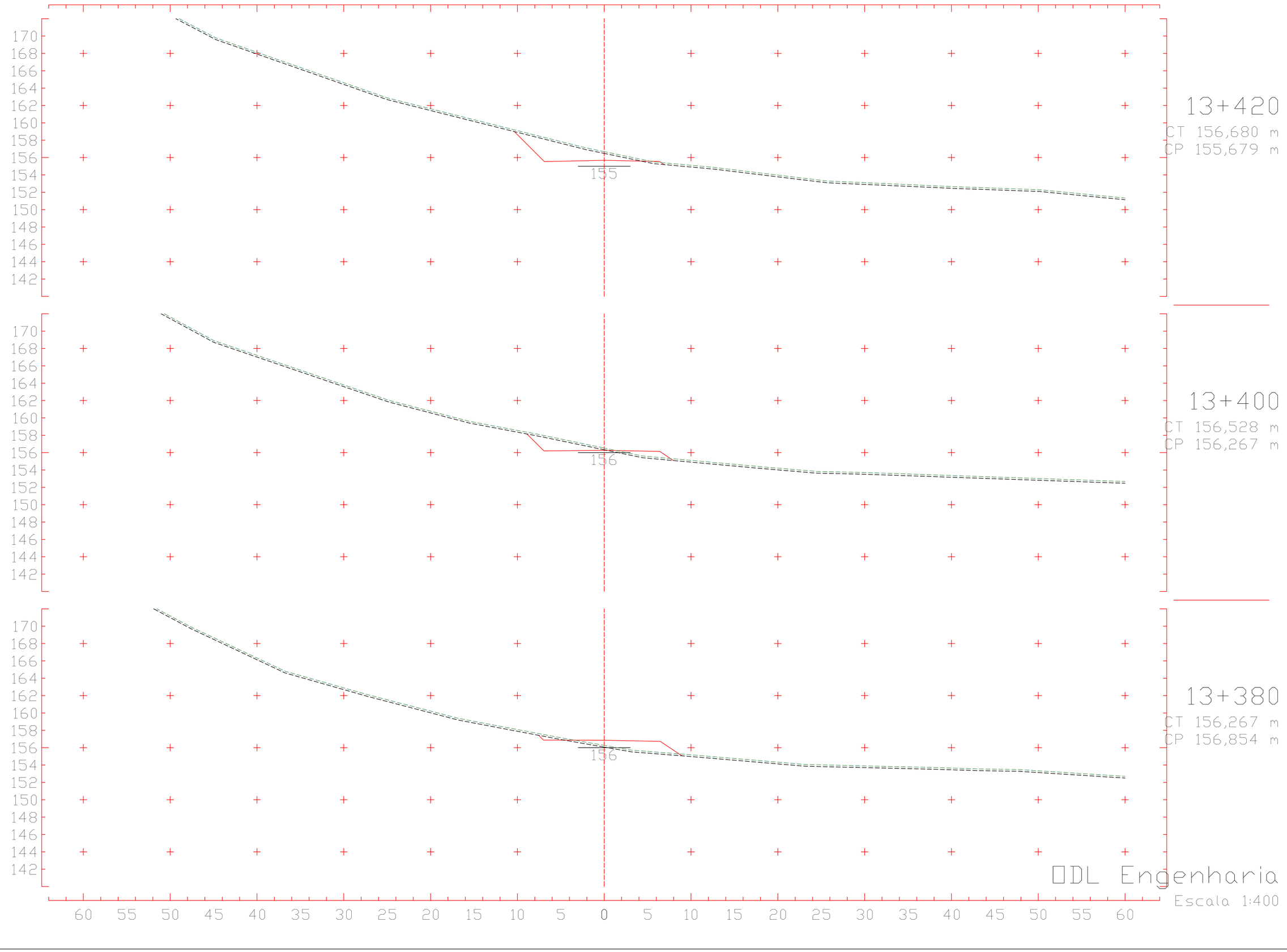
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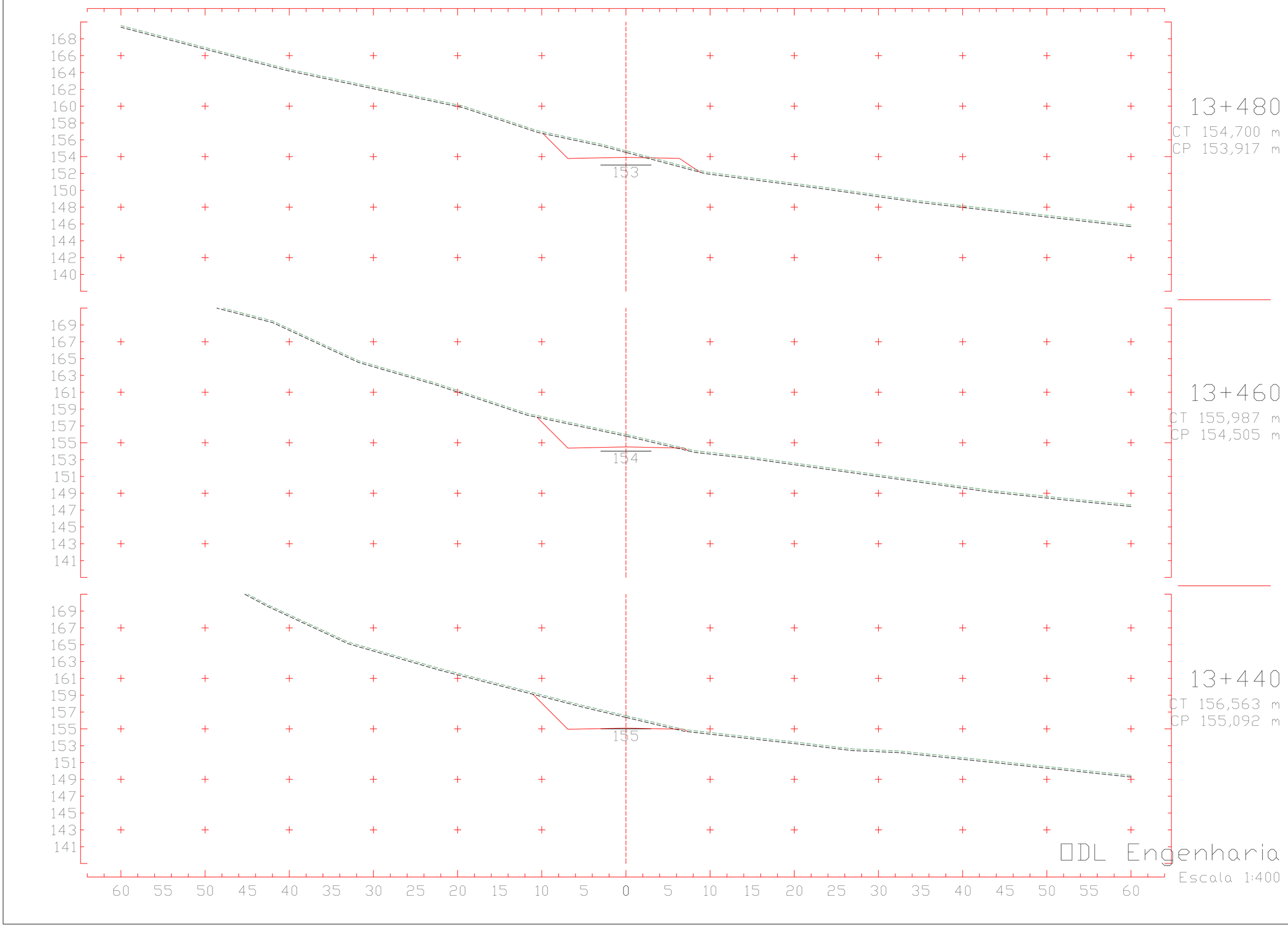
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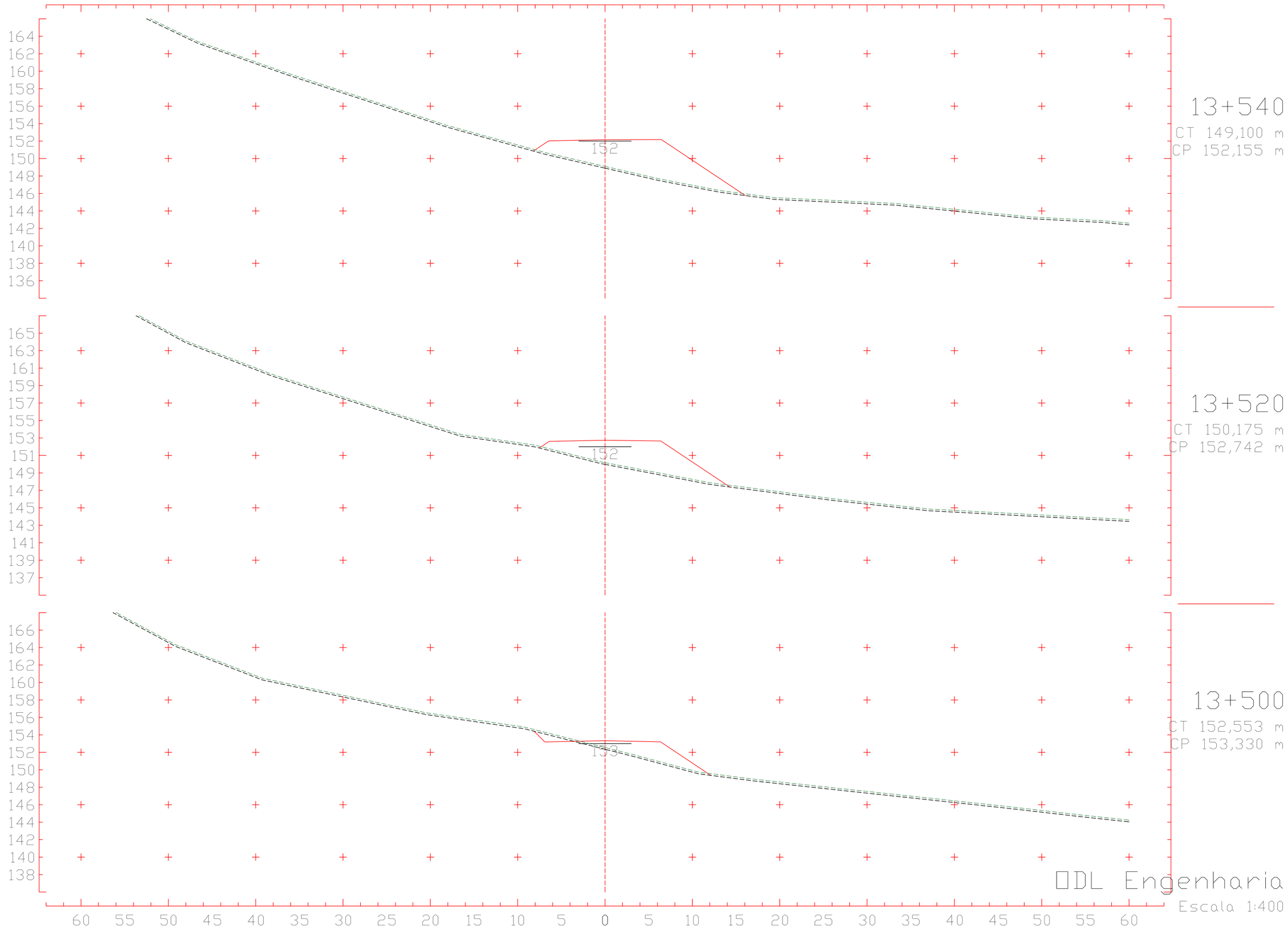
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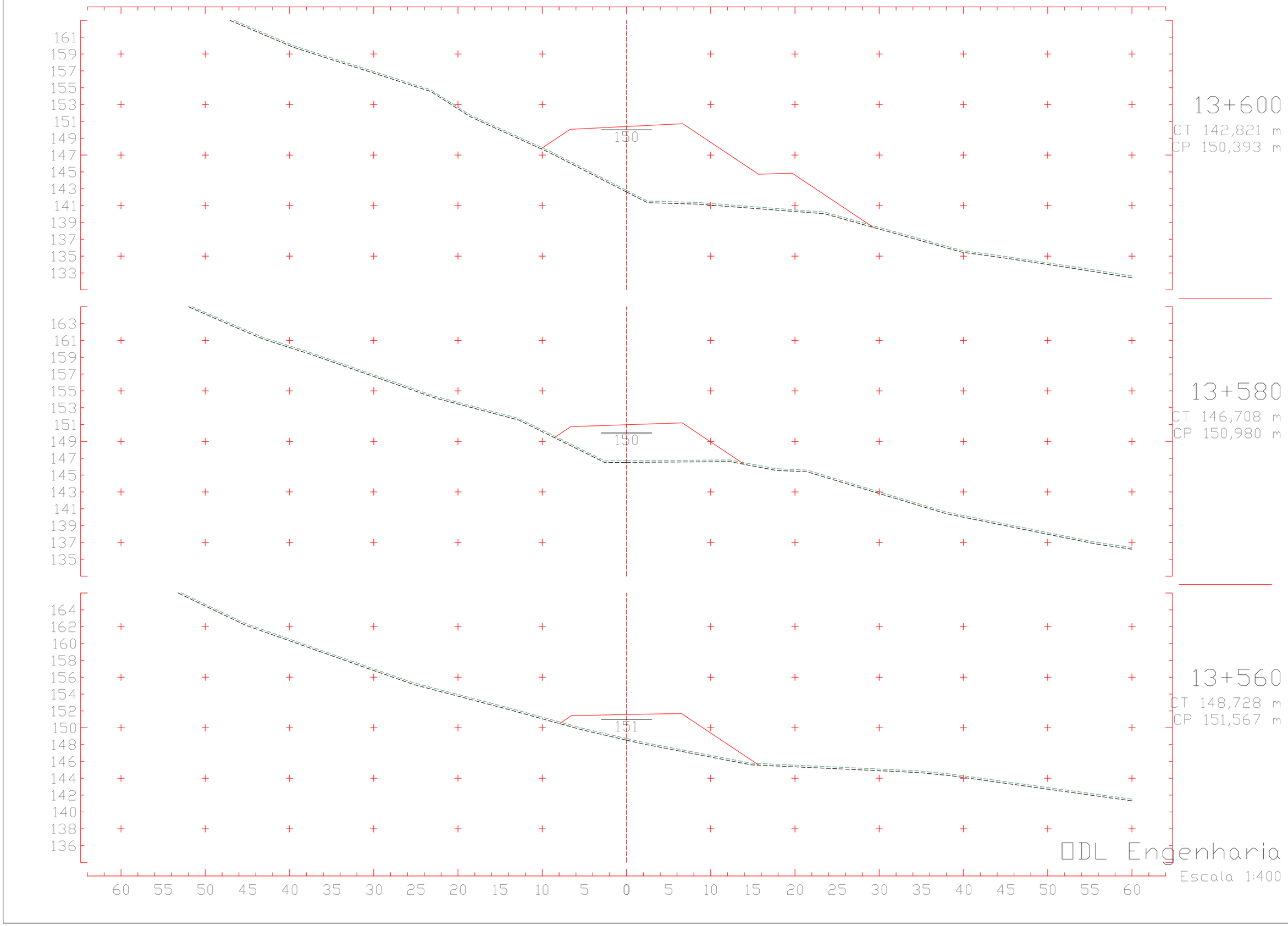
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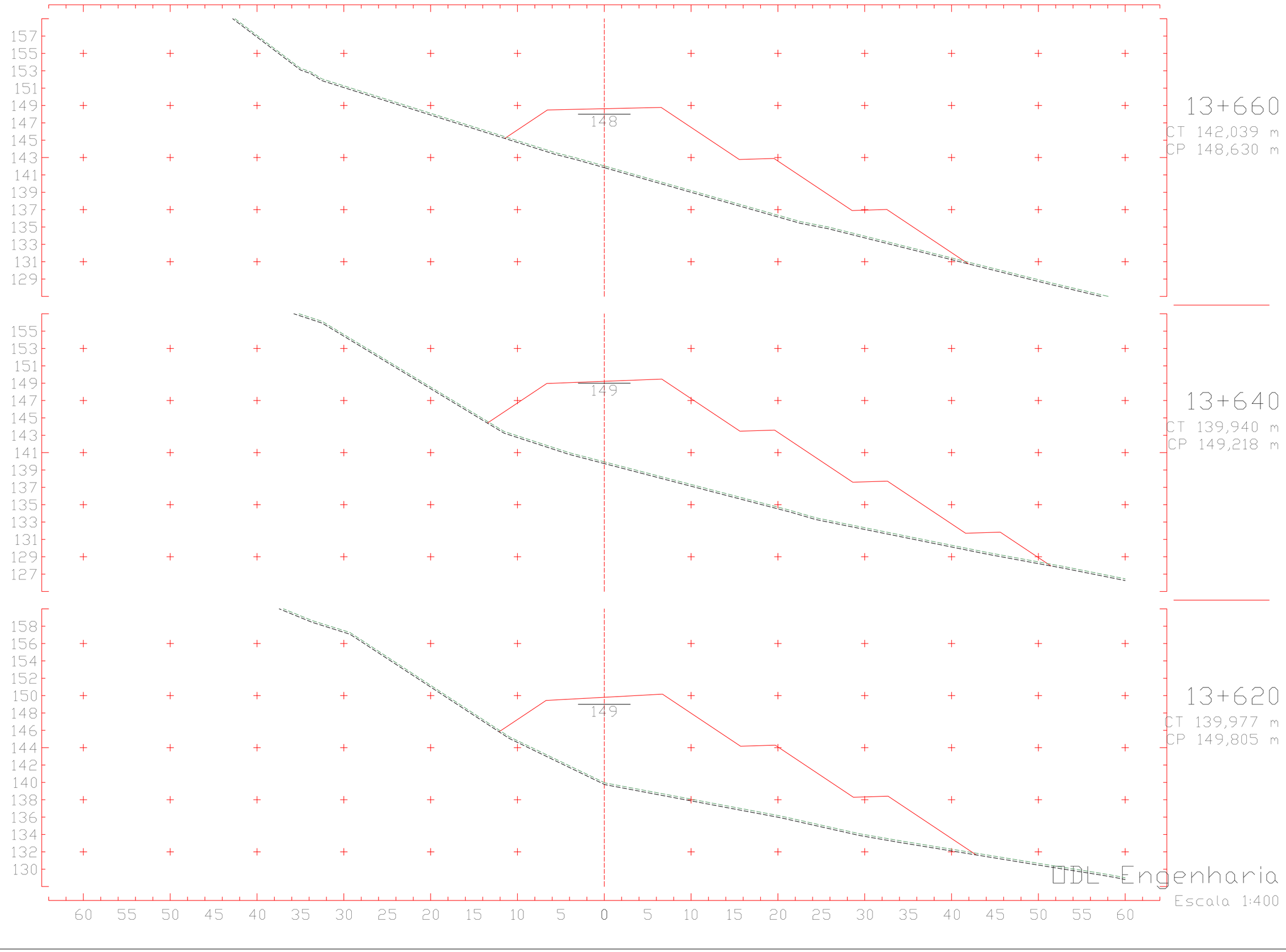
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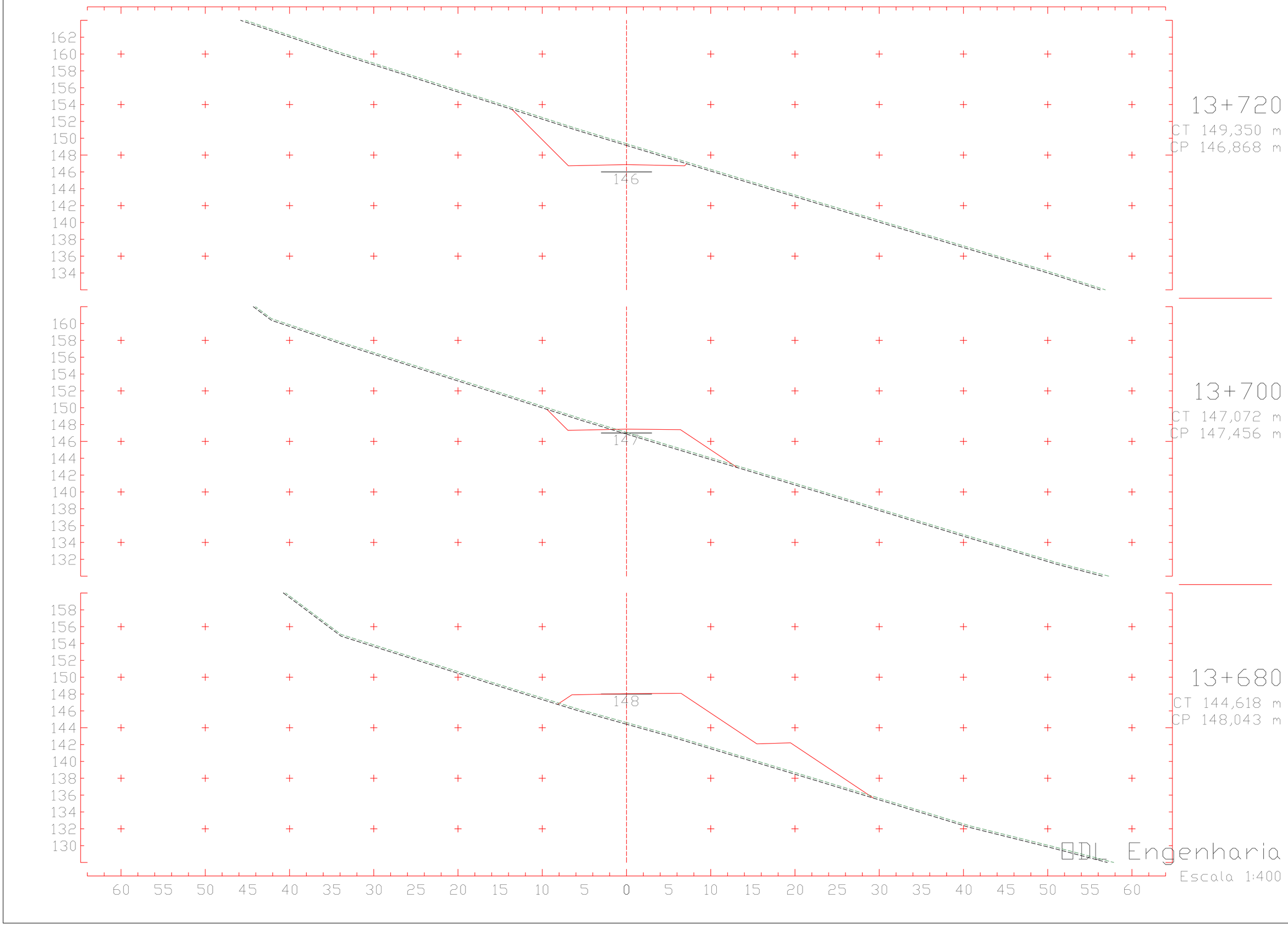
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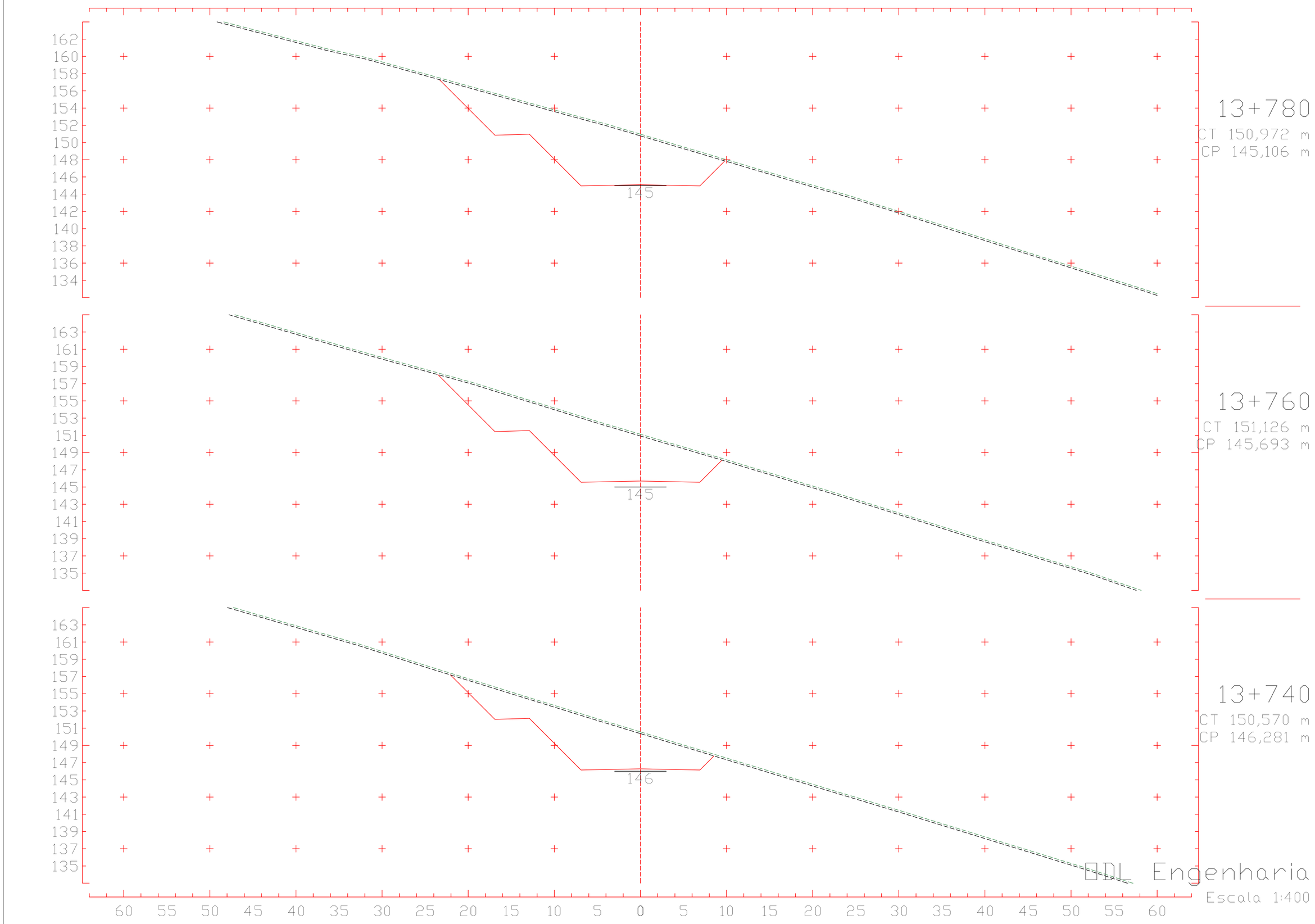
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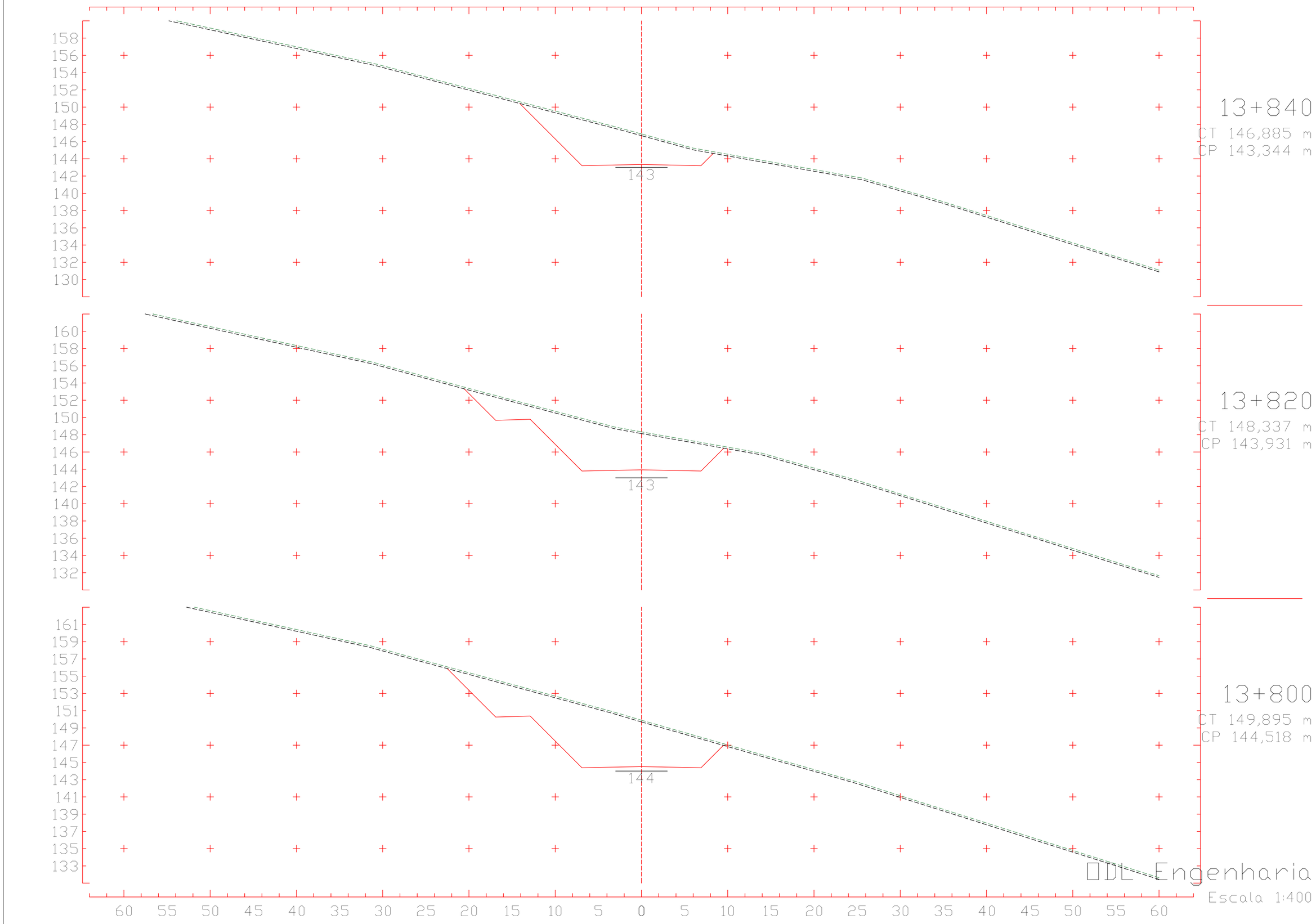
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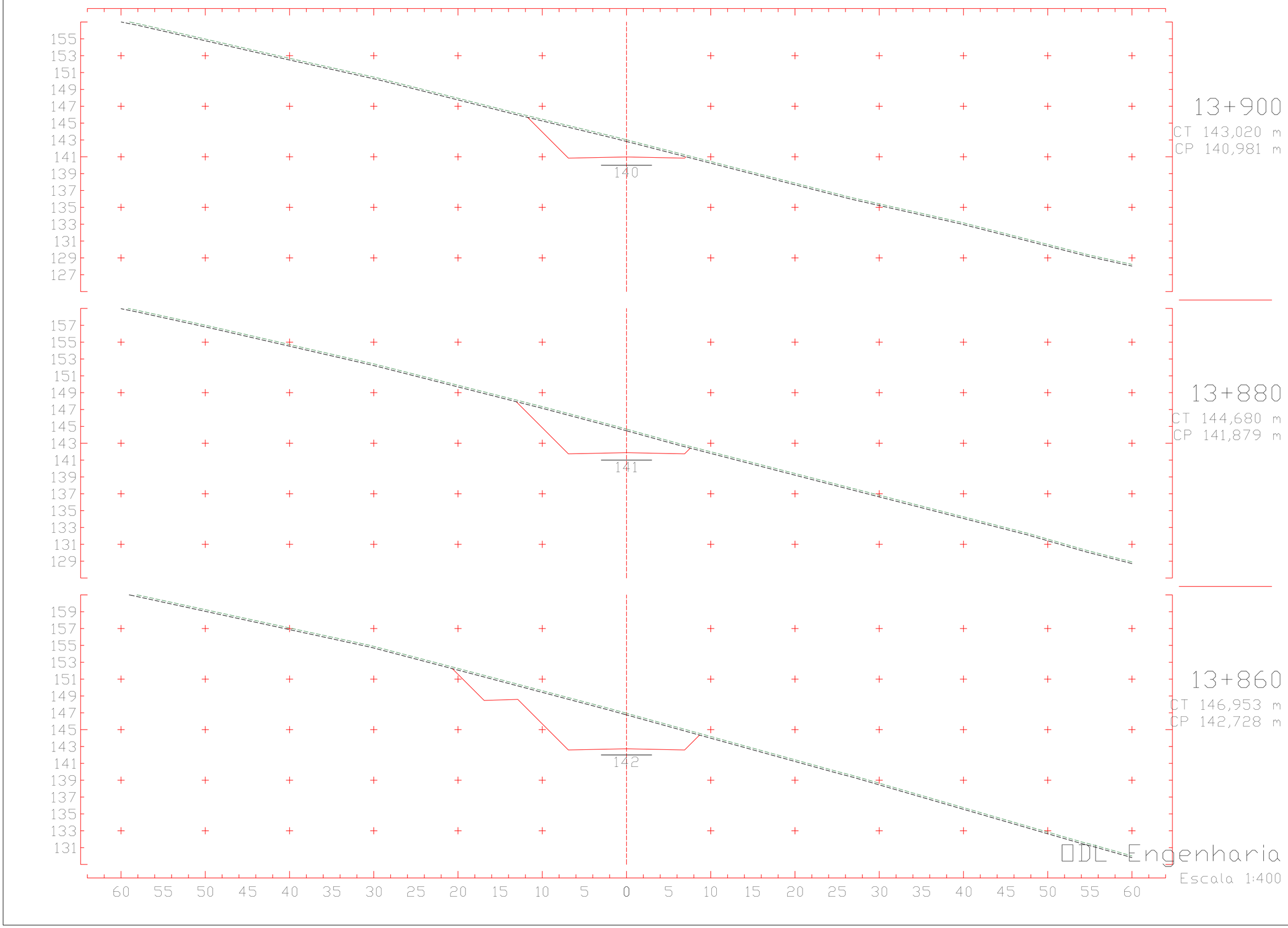
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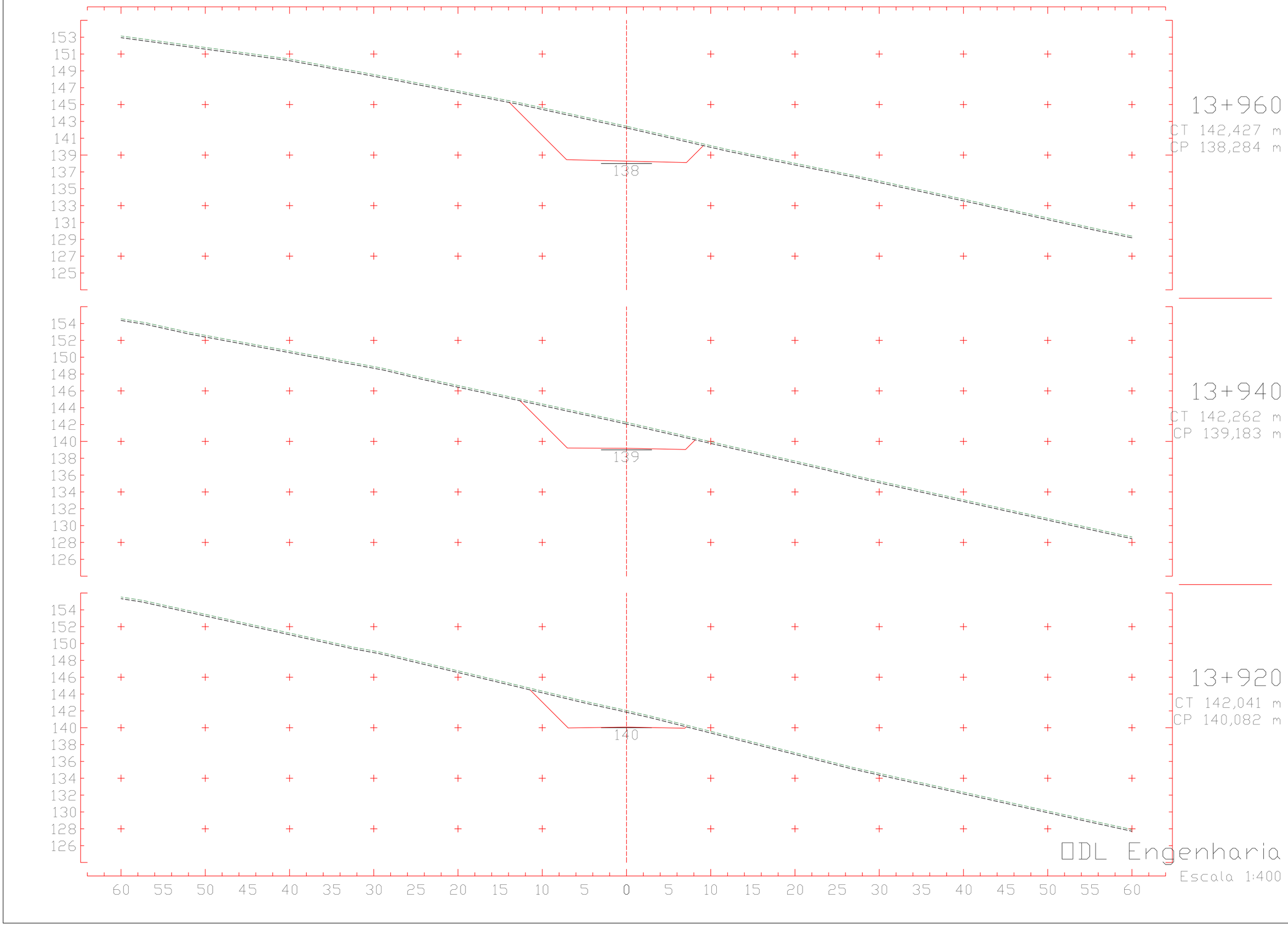
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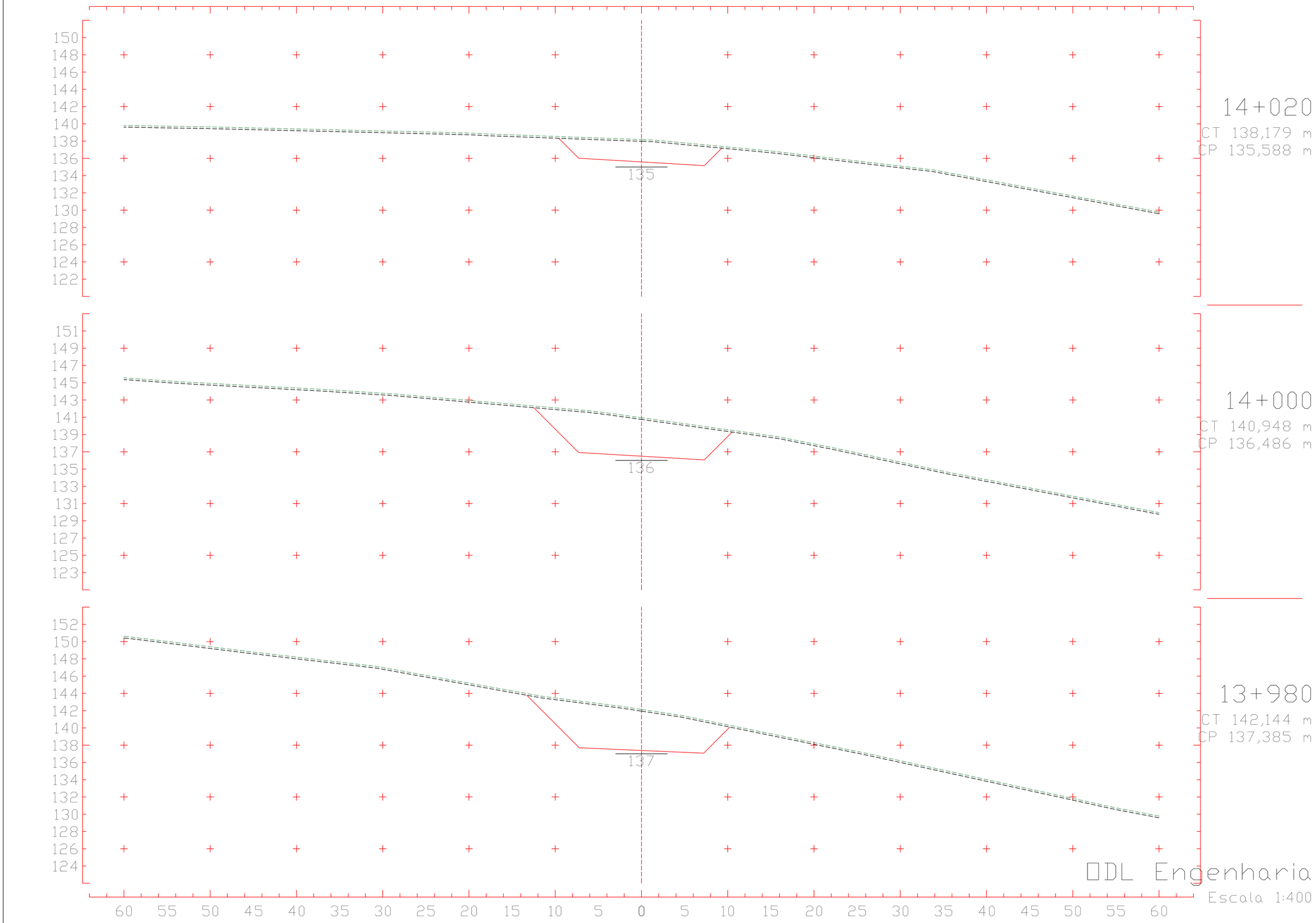
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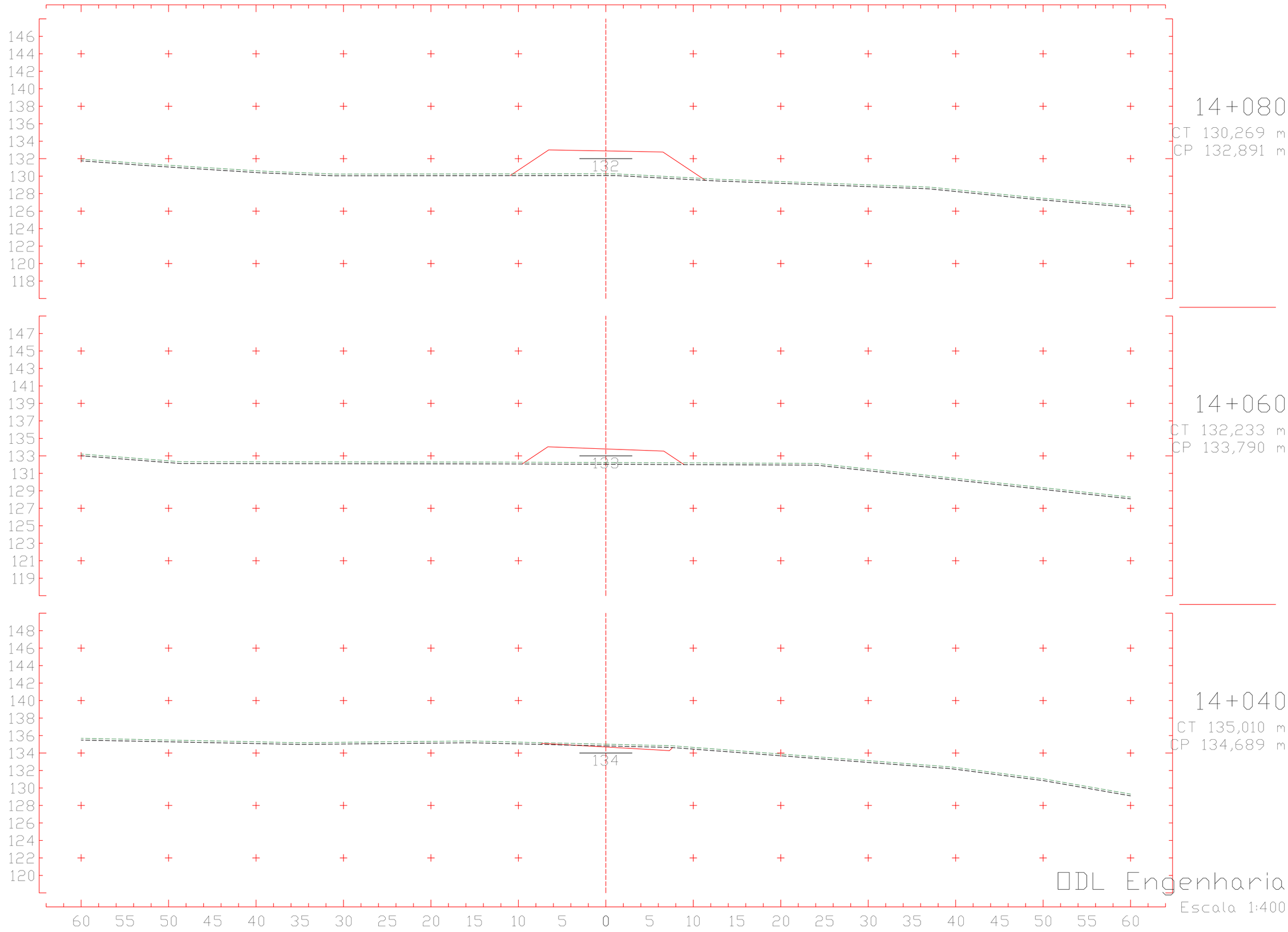
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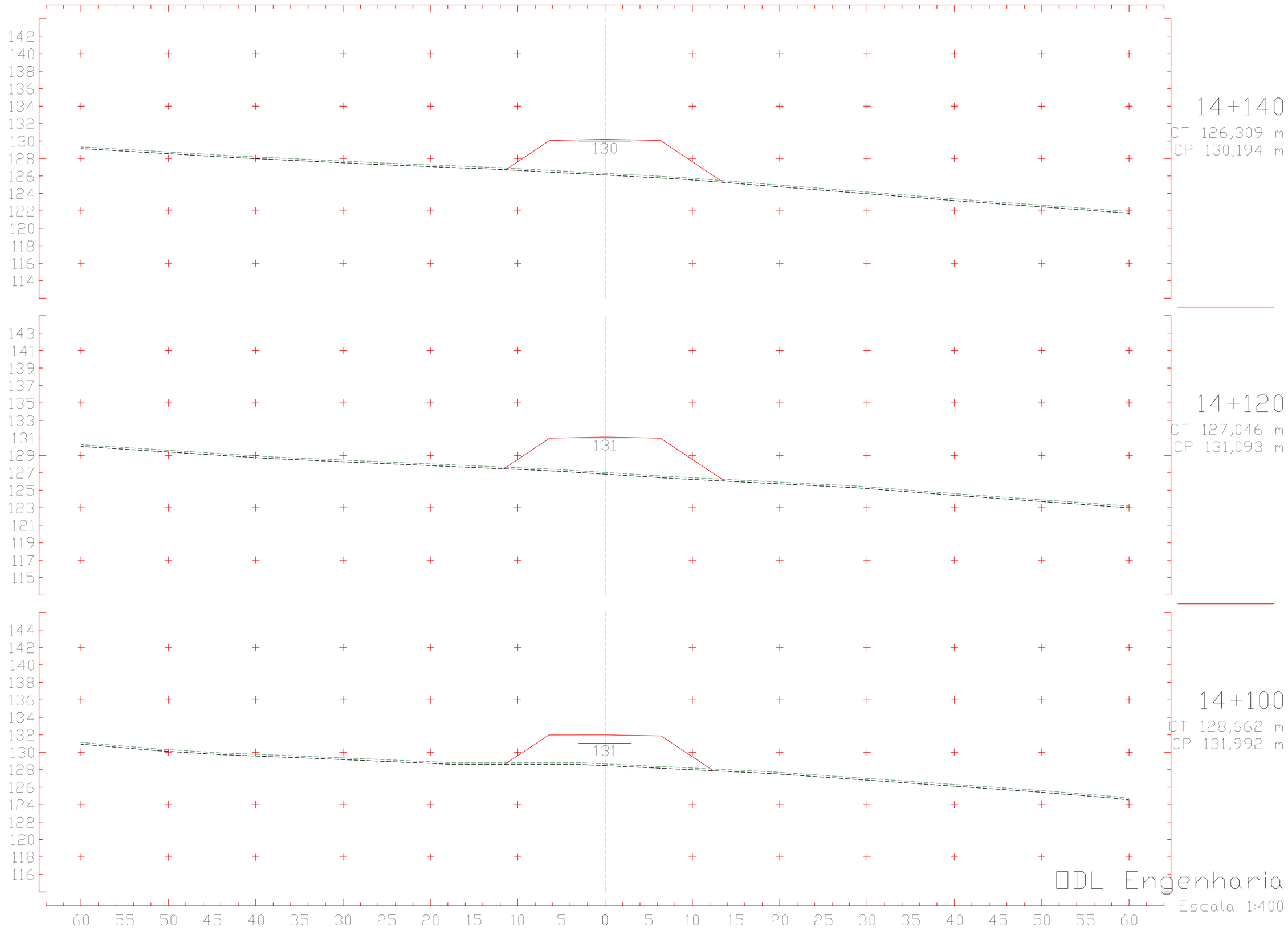
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ODL Engenharia

Escala 1:400

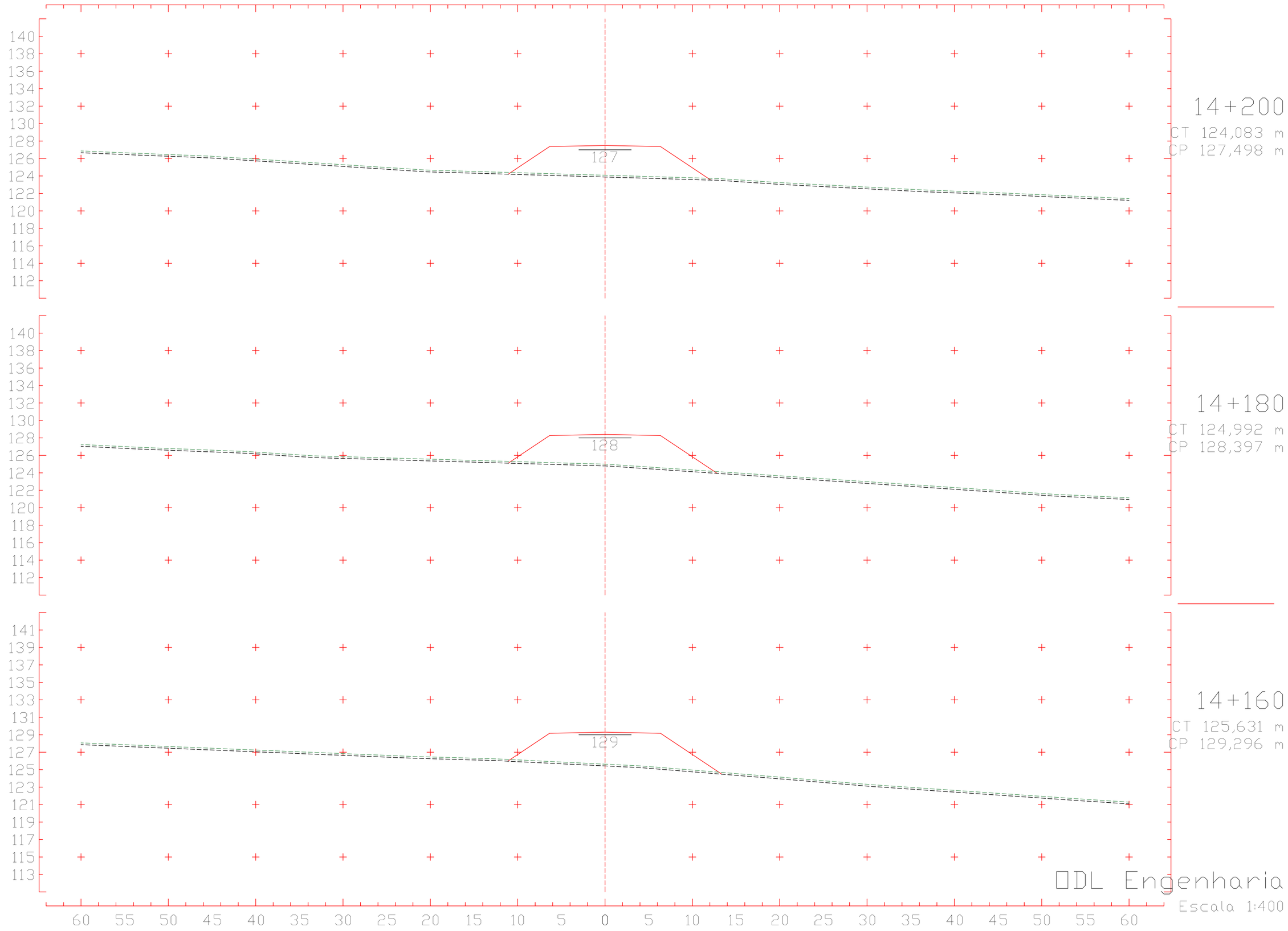
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ODL Engenharia

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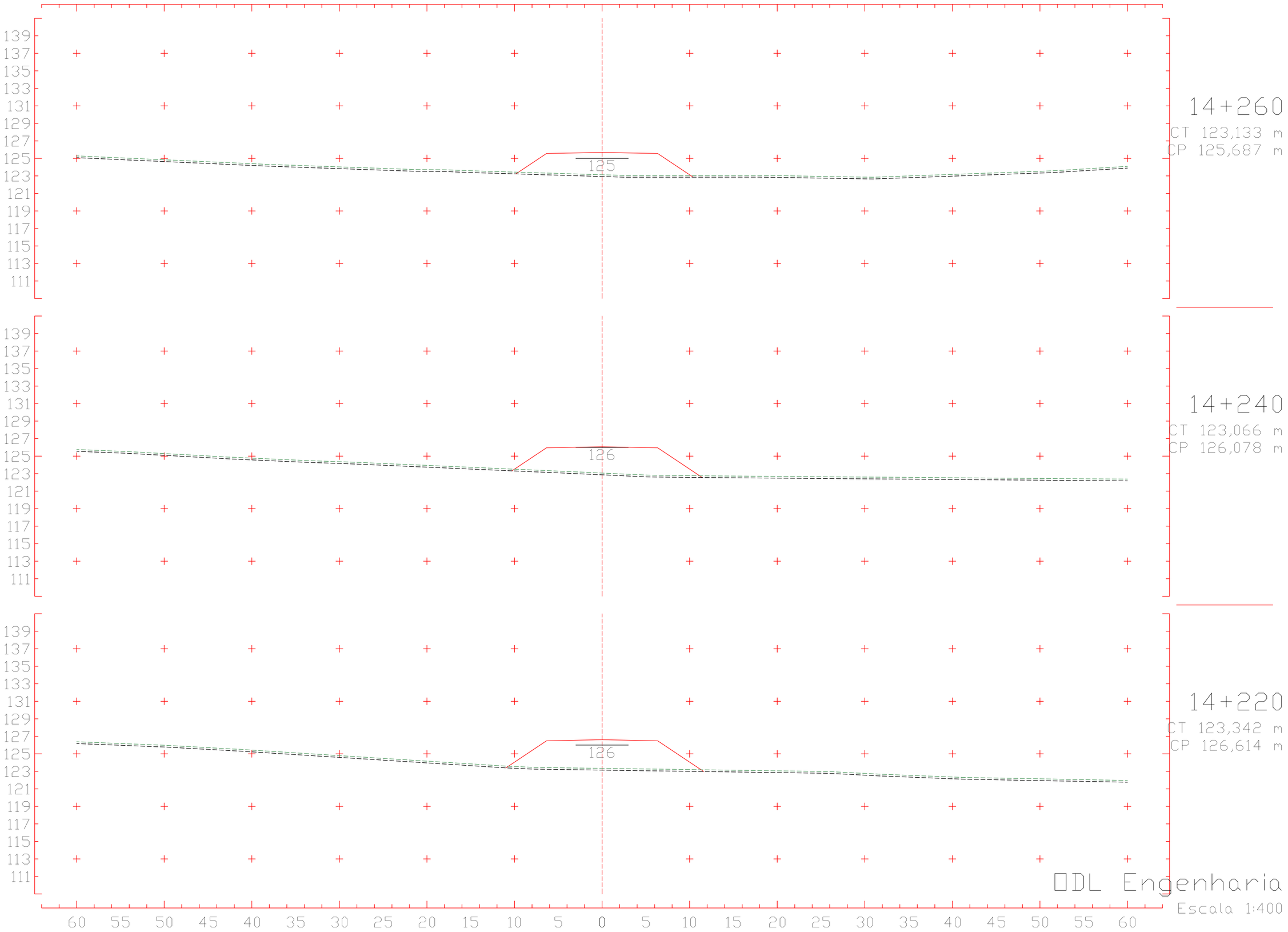
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ODL Engenharia

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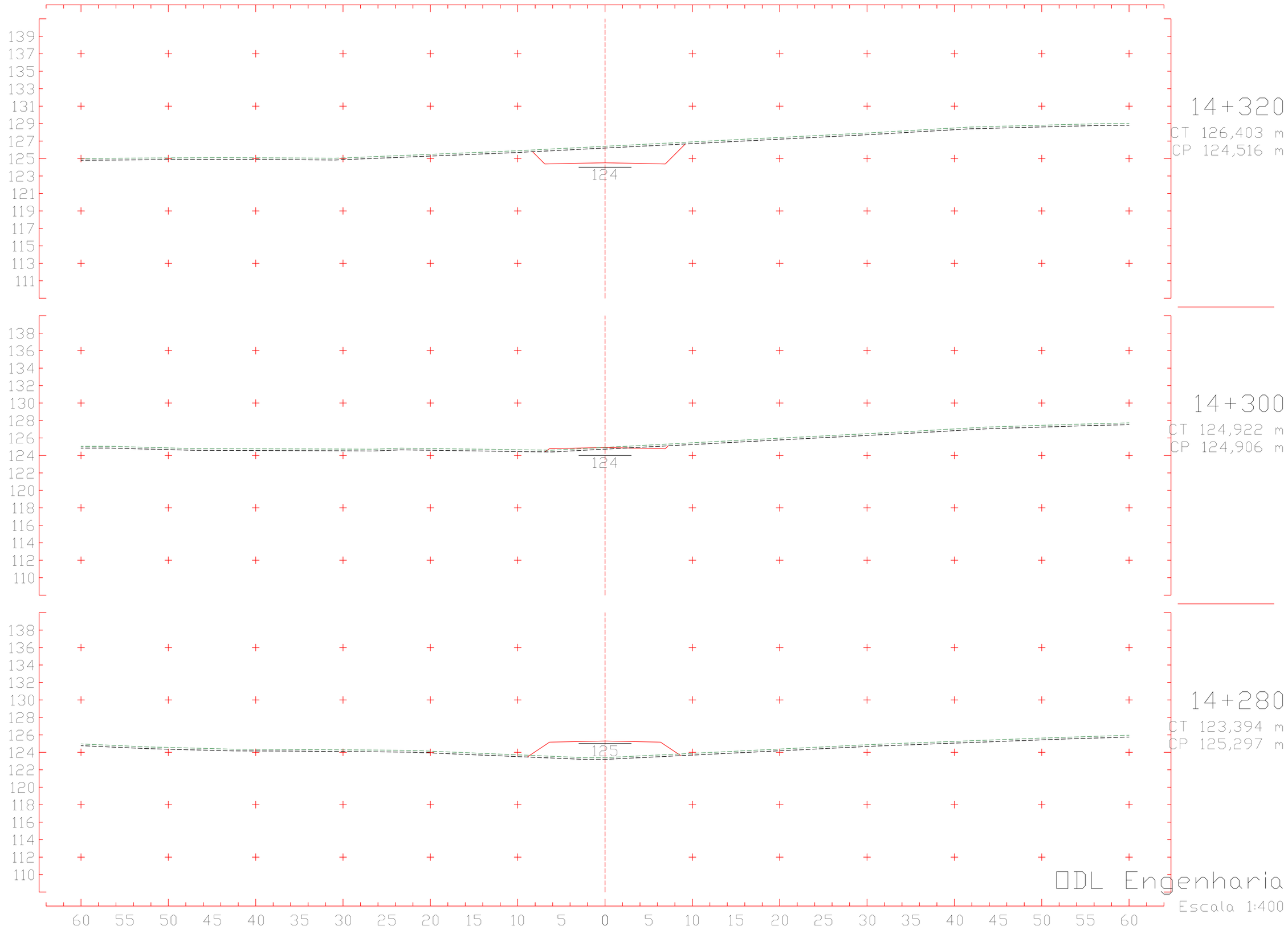
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ODL Engenharia

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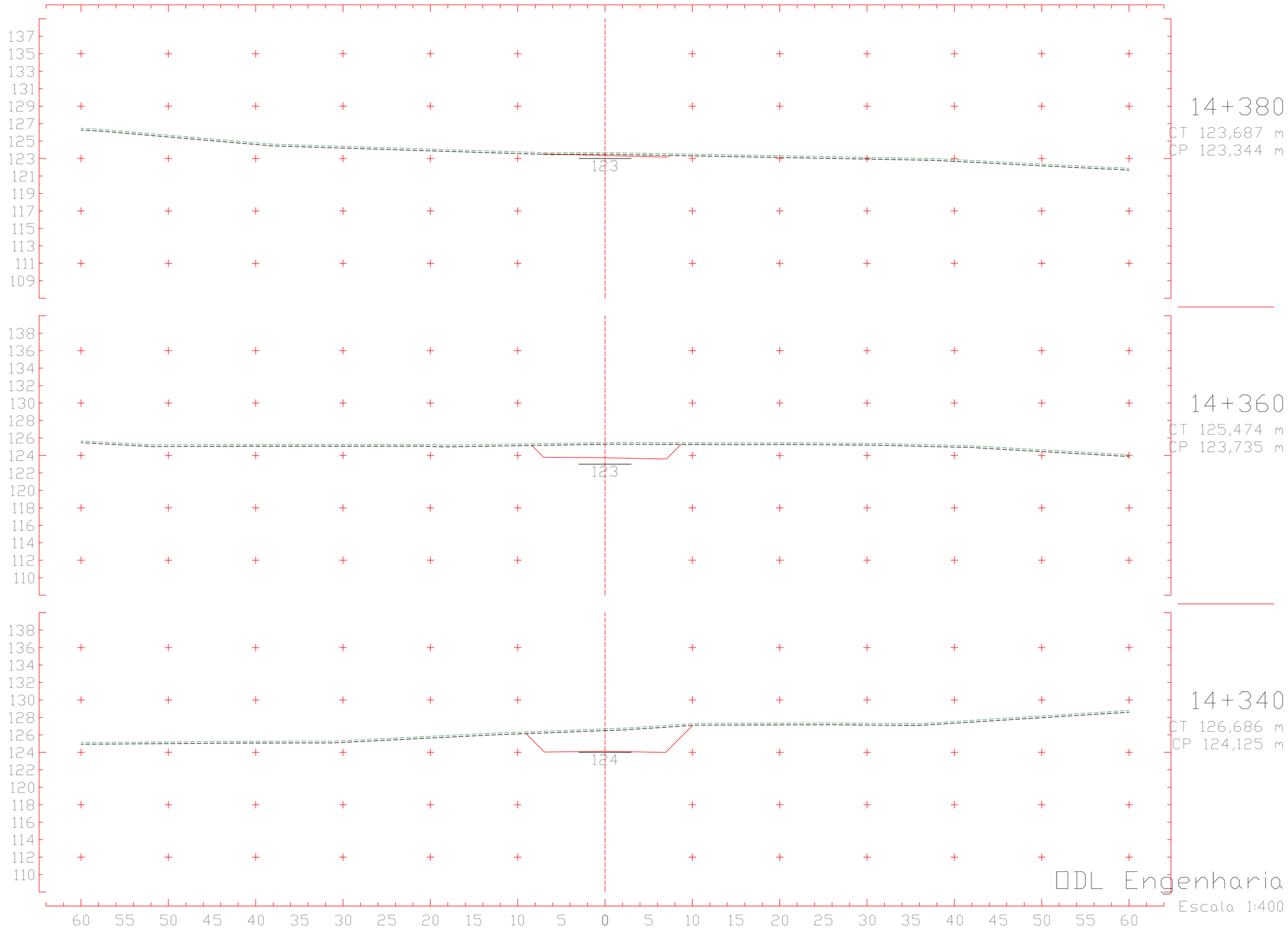
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DL Engenharia

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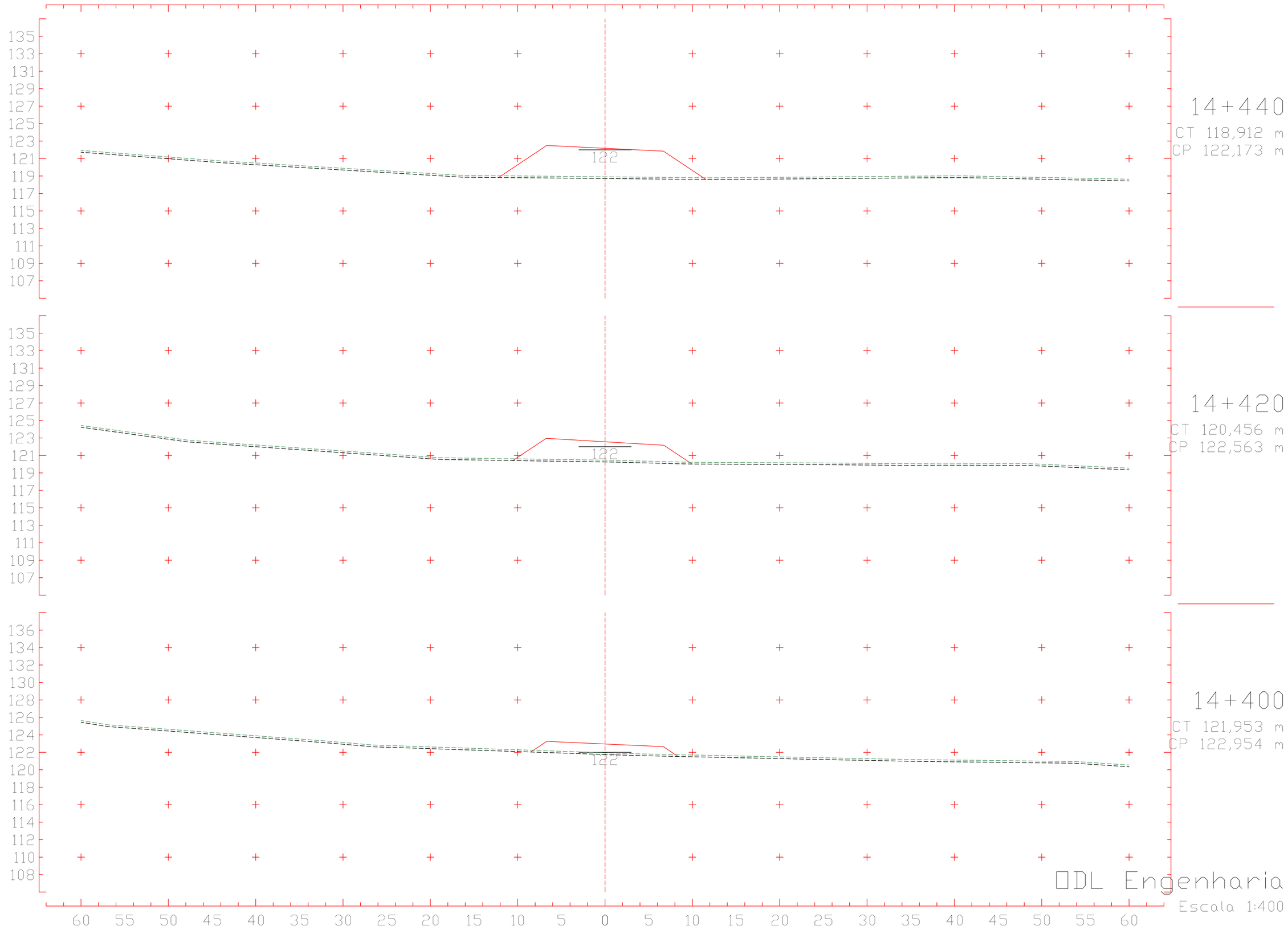
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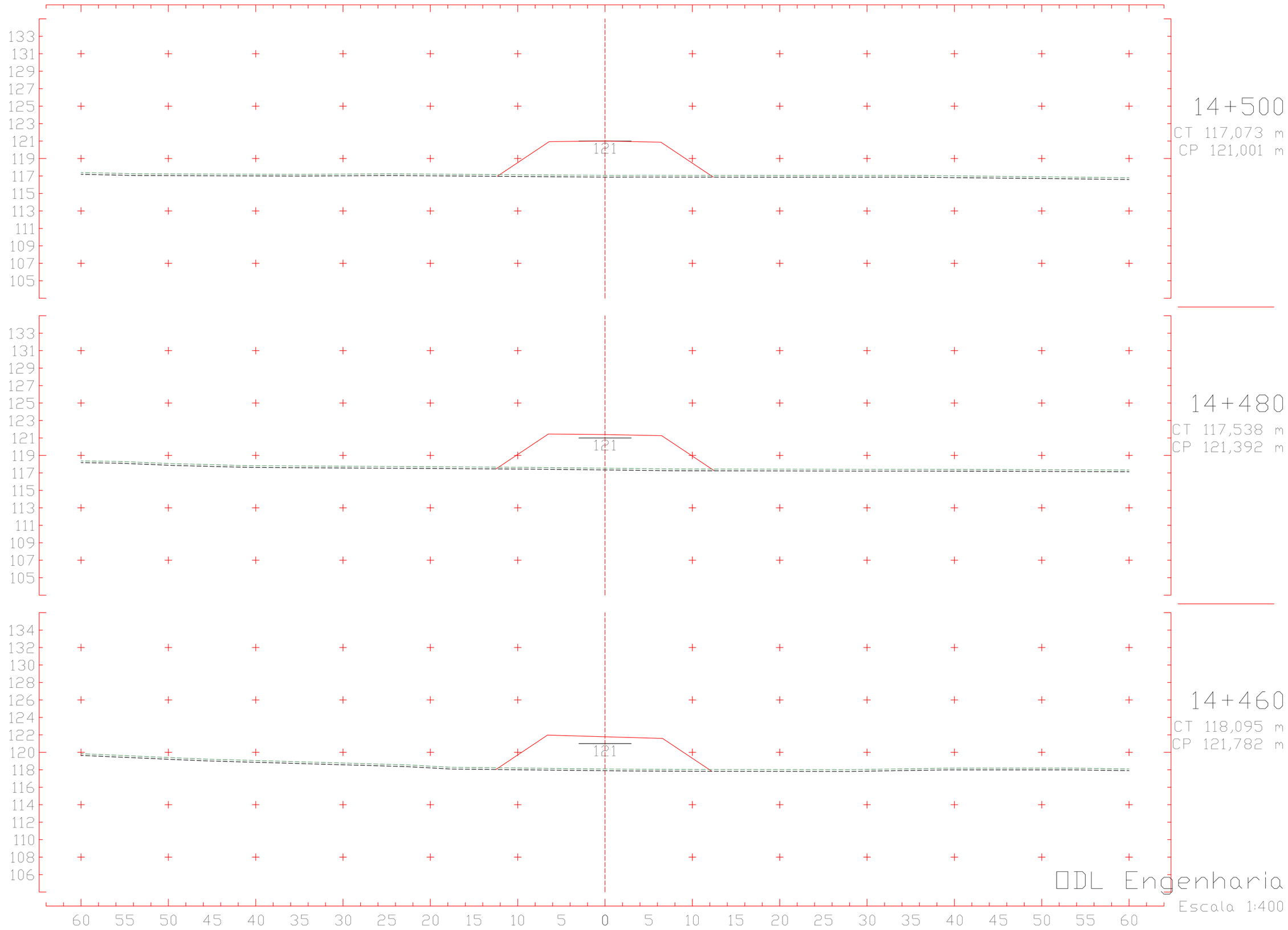
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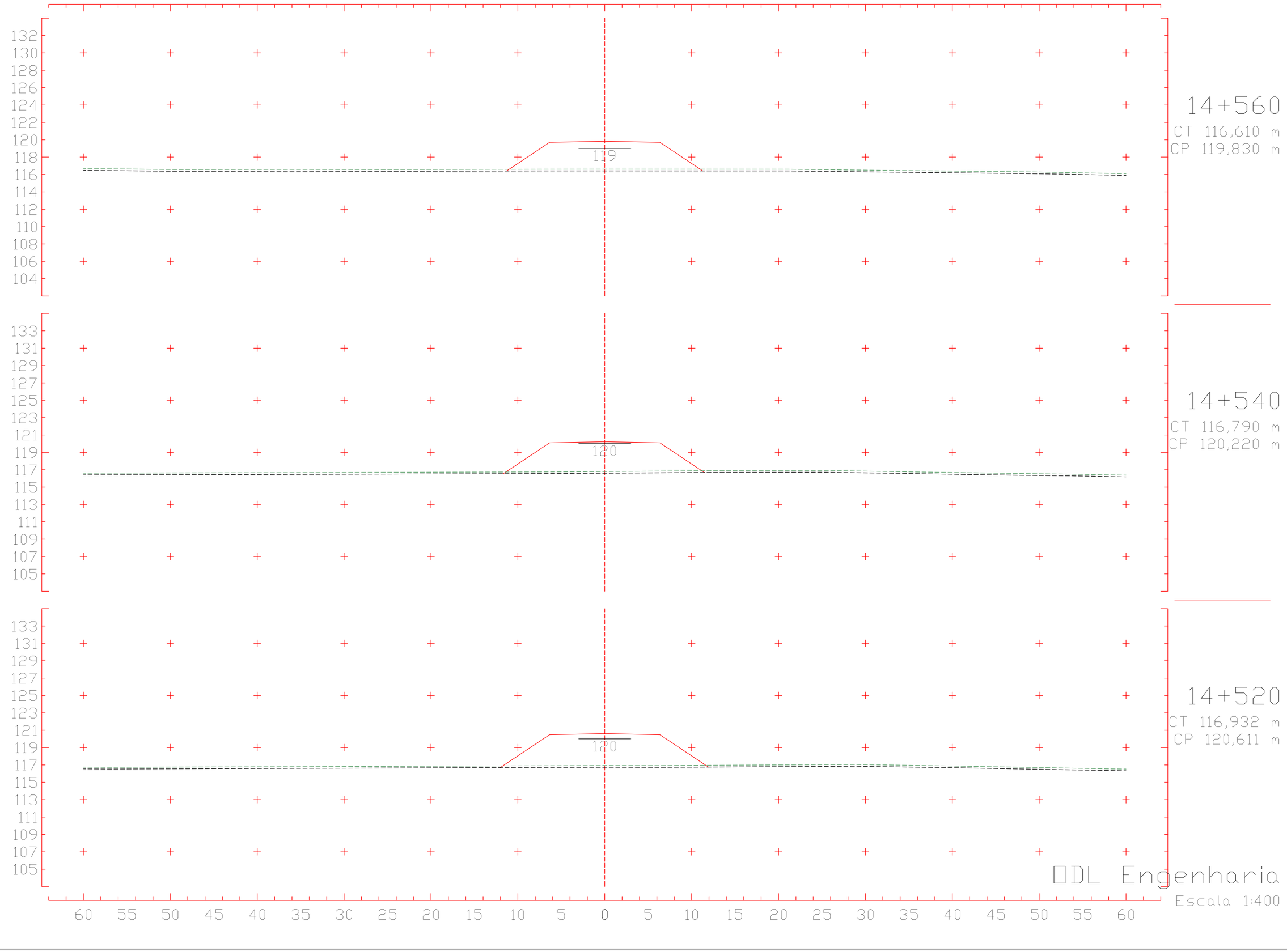
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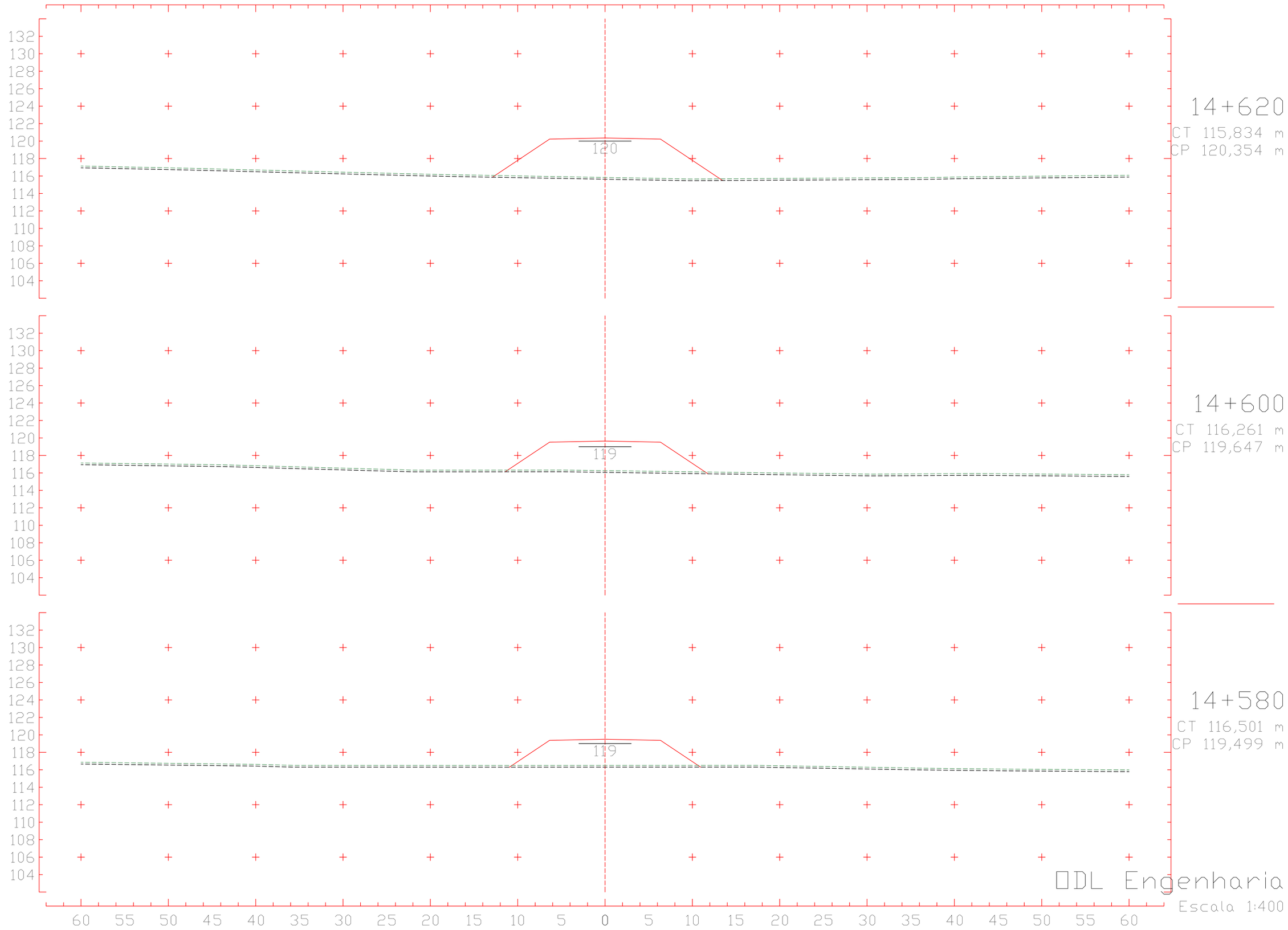
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Escala 1:400

Projeto Ponto de Partida 2021/1



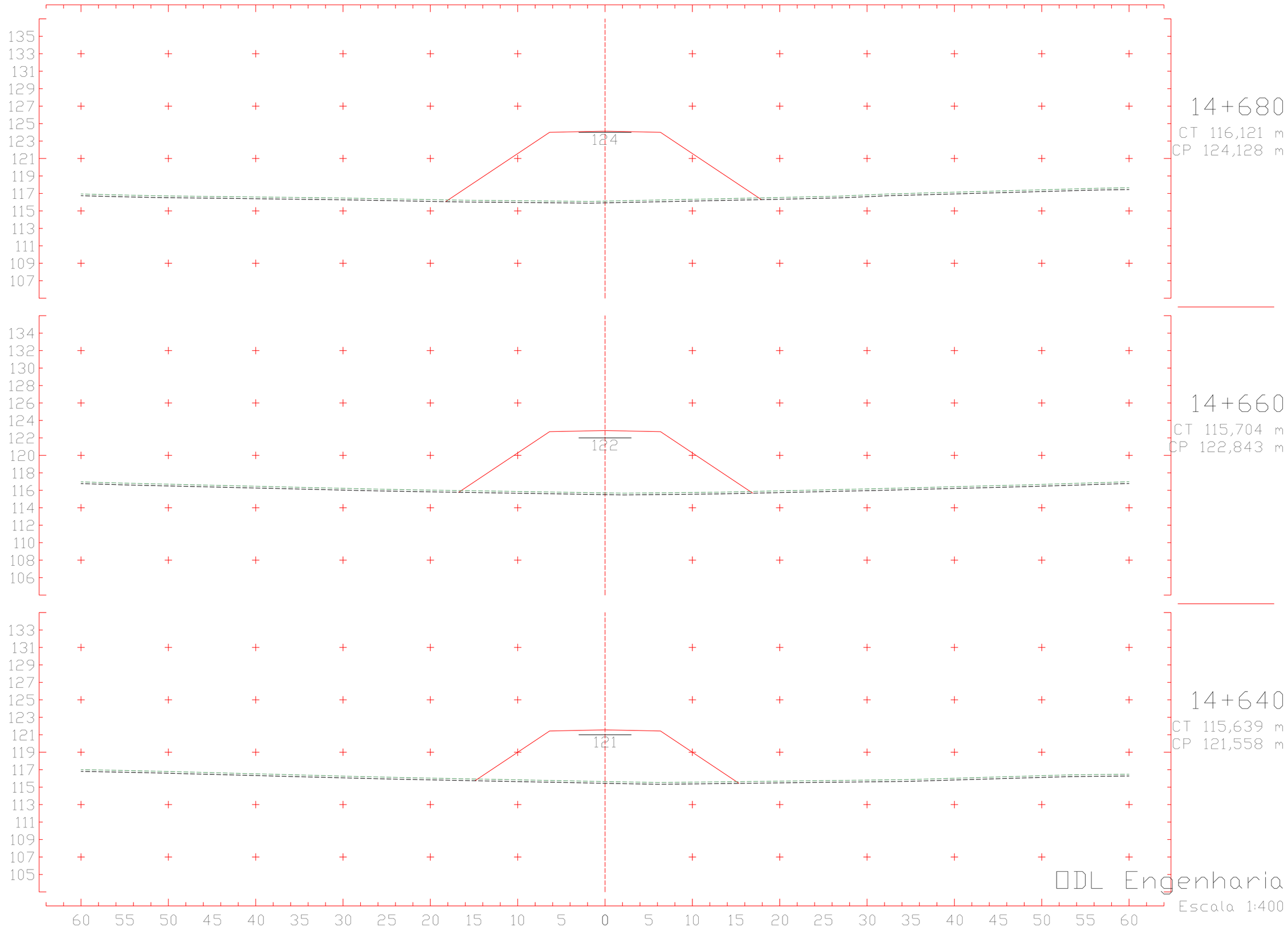
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DL Engenharia

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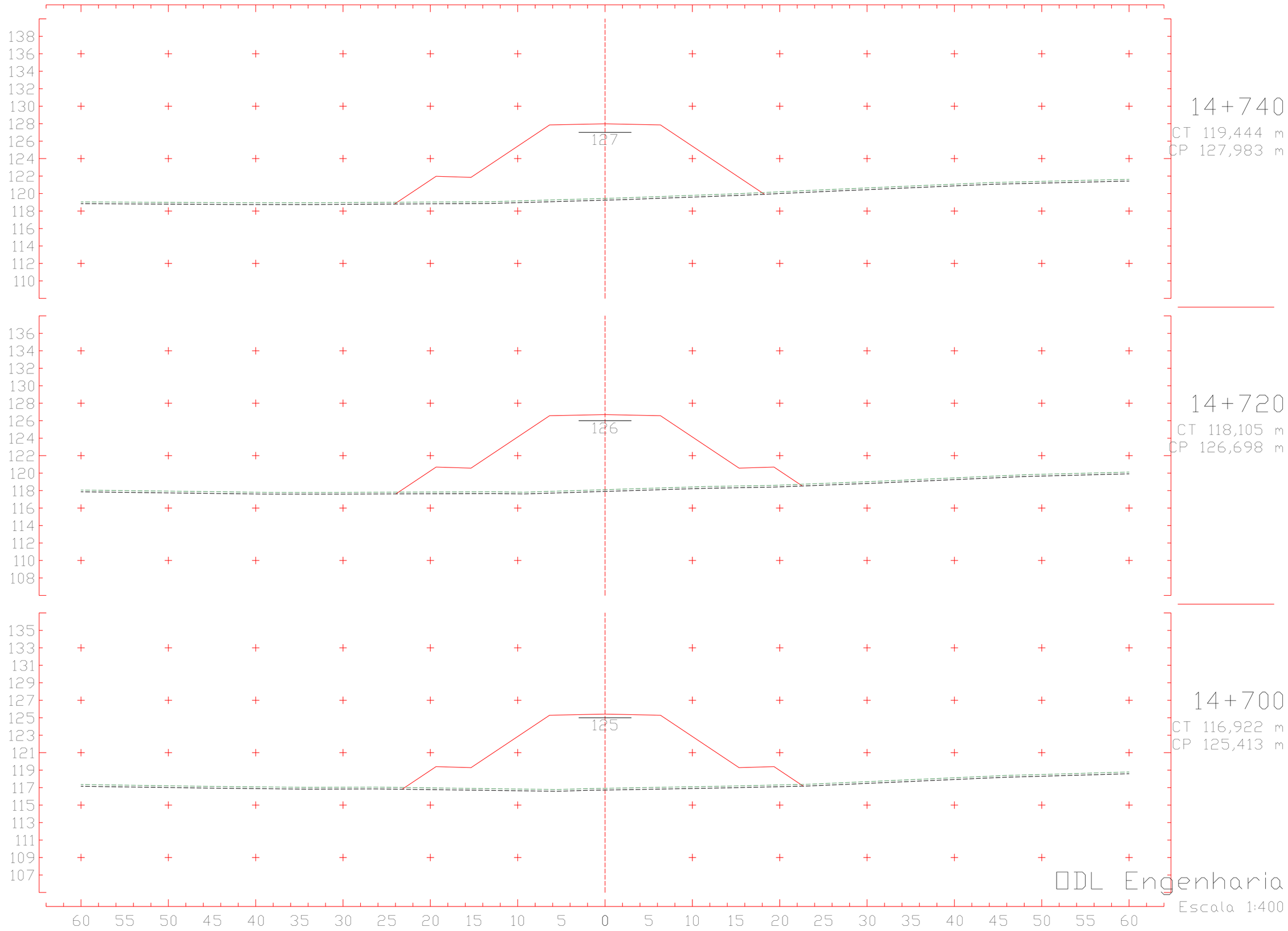
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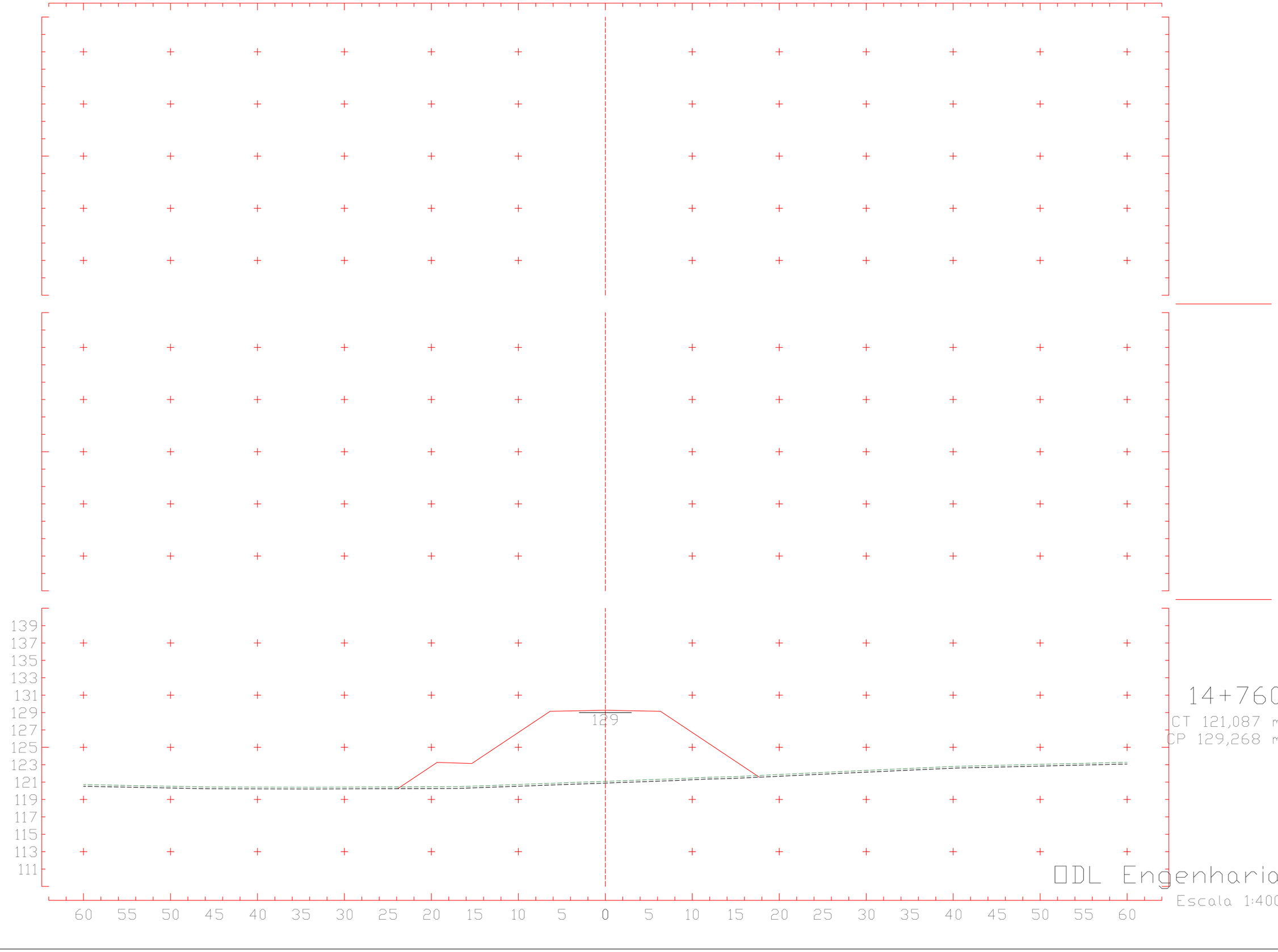
ODL Engenharia

Escala 1:400

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Projeto Ponto de Partida 2021/1



CRONOGRAMA PLANEJADO/REALIZADO

3 CRONOGRAMA PLANEJADO/REALIZADO

ATIVIDADE/PRAZO

| | | | Semanas | | |