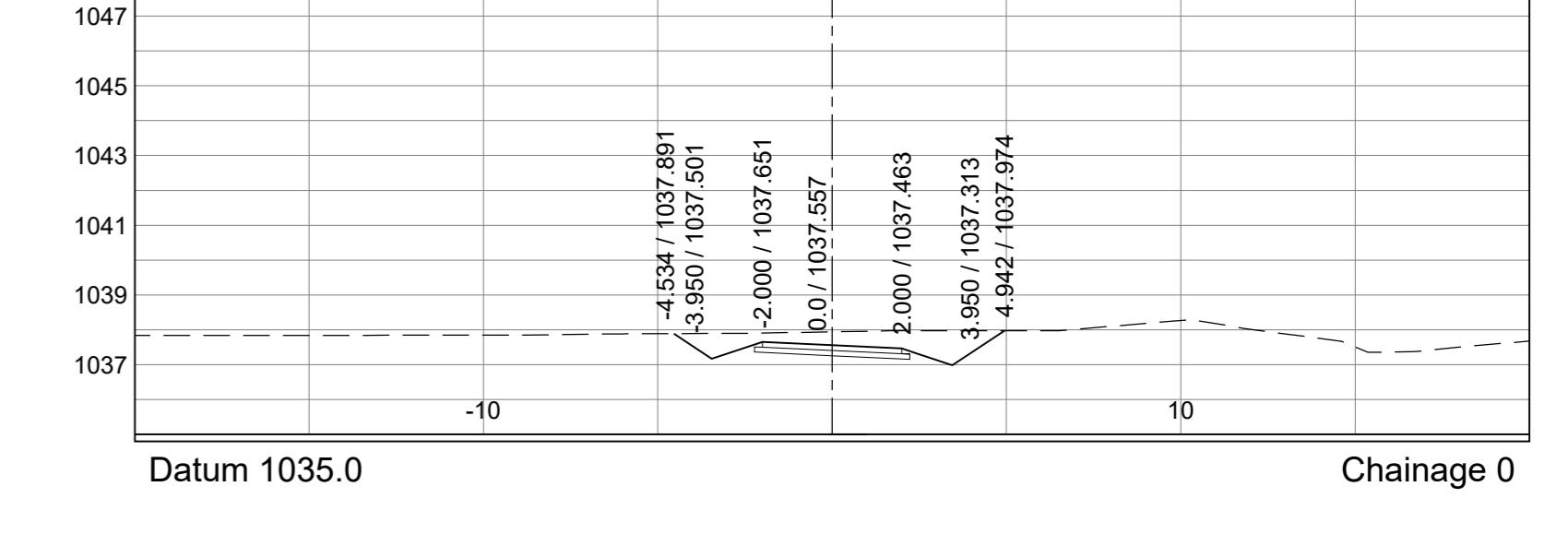
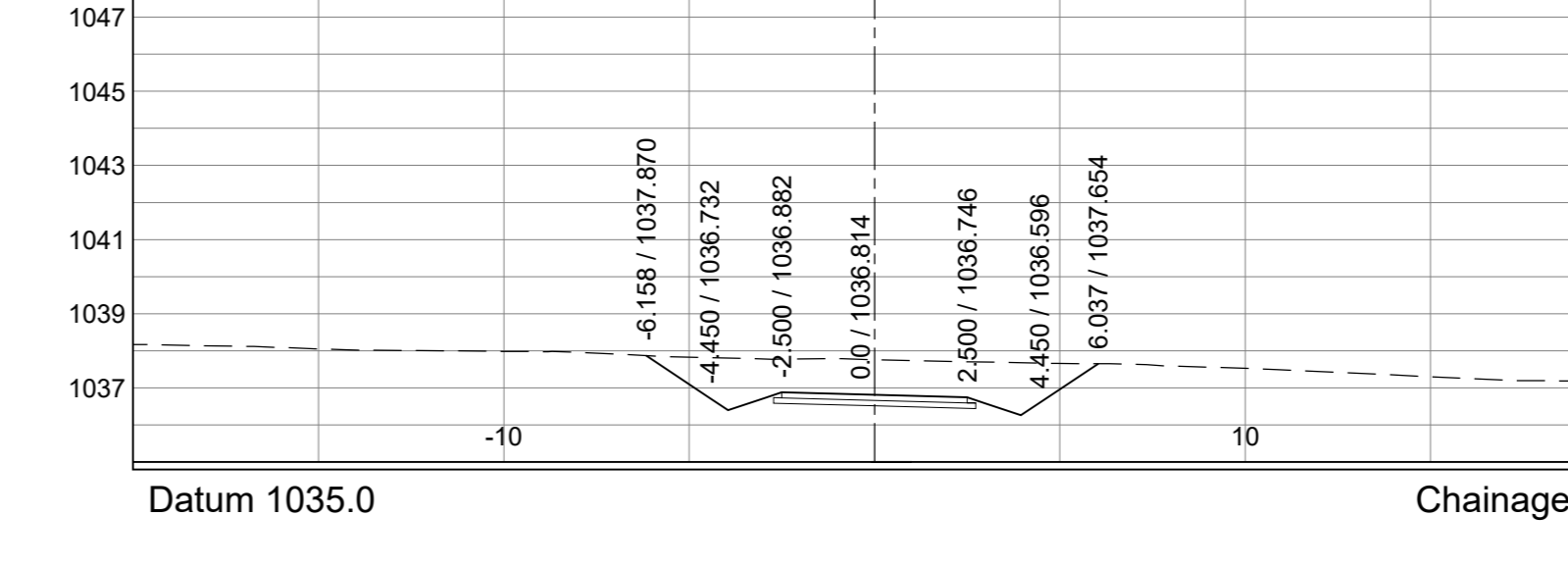
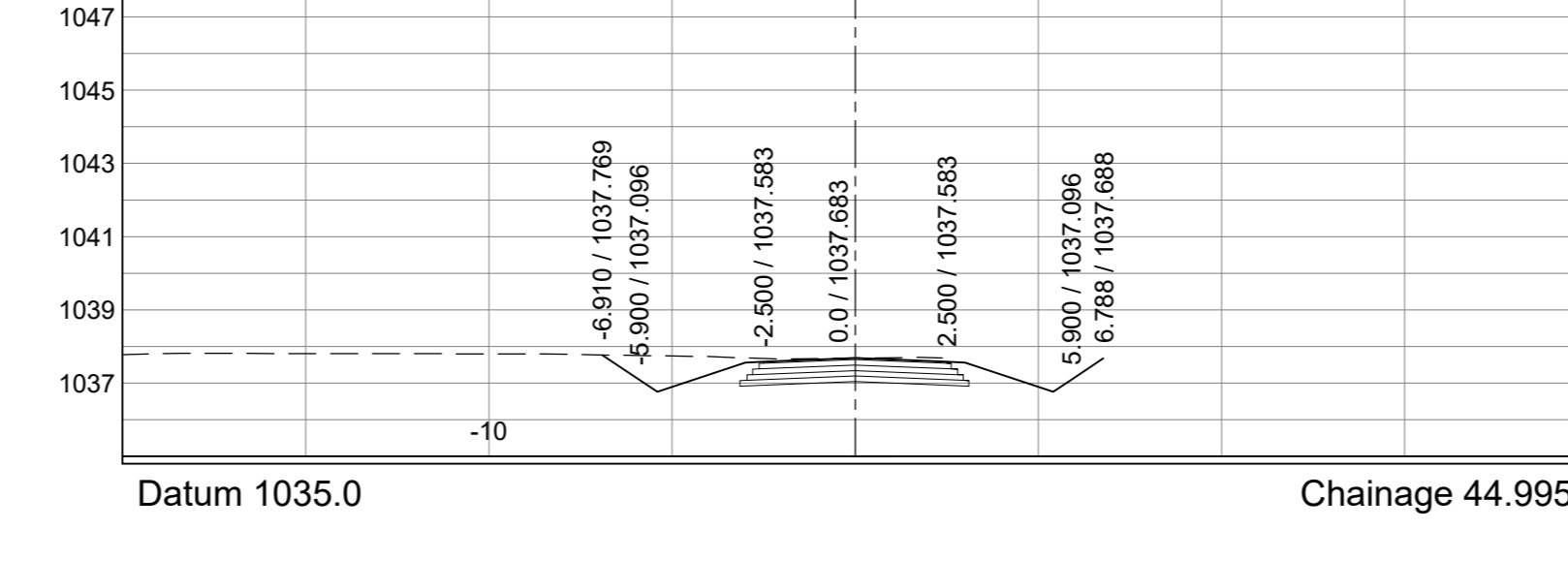
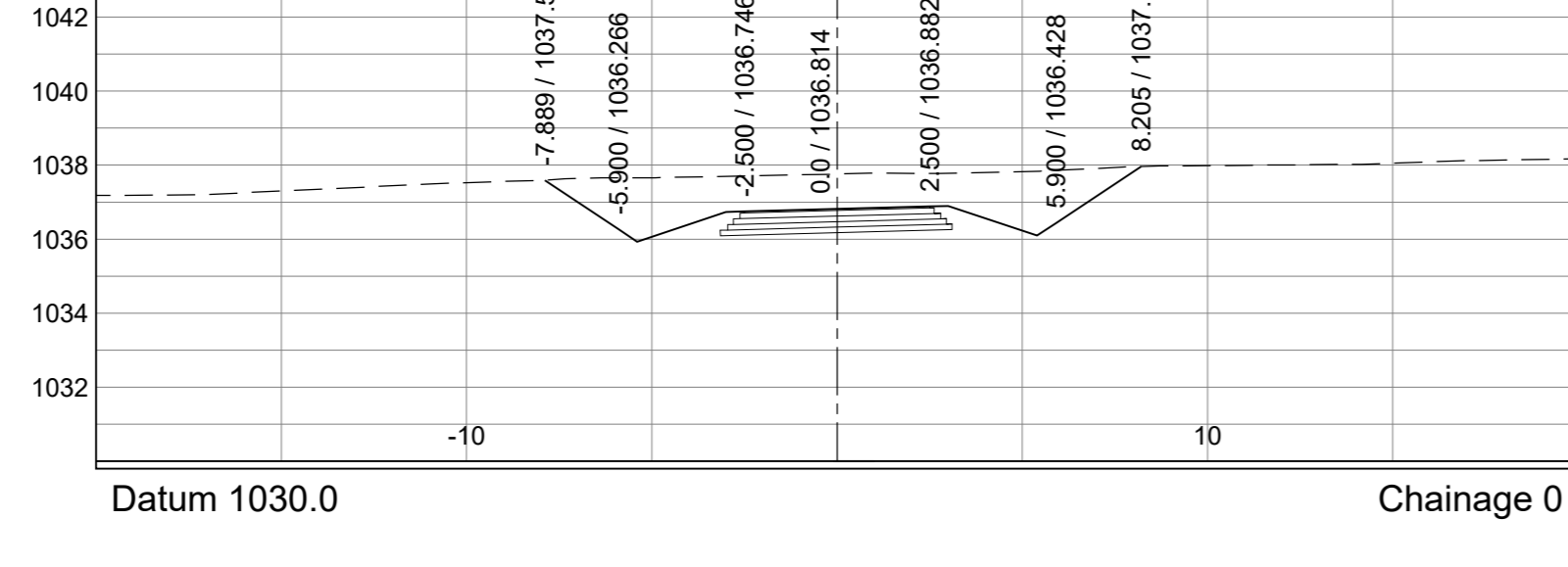
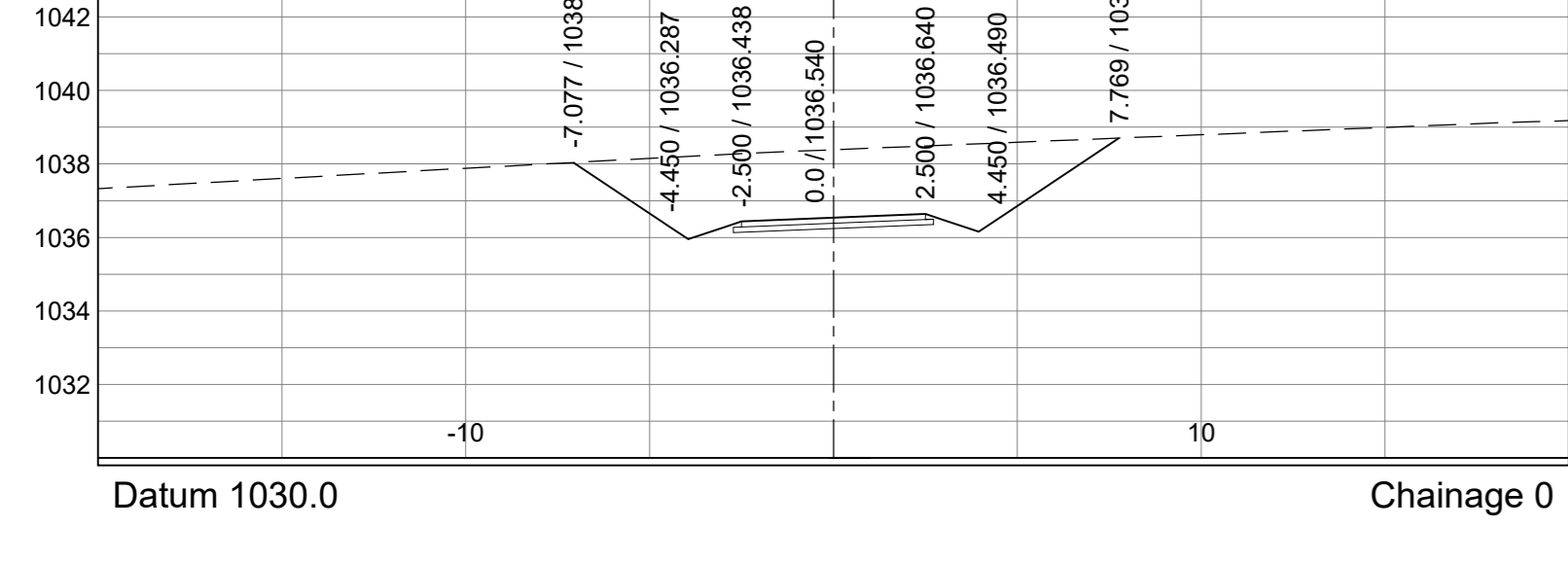
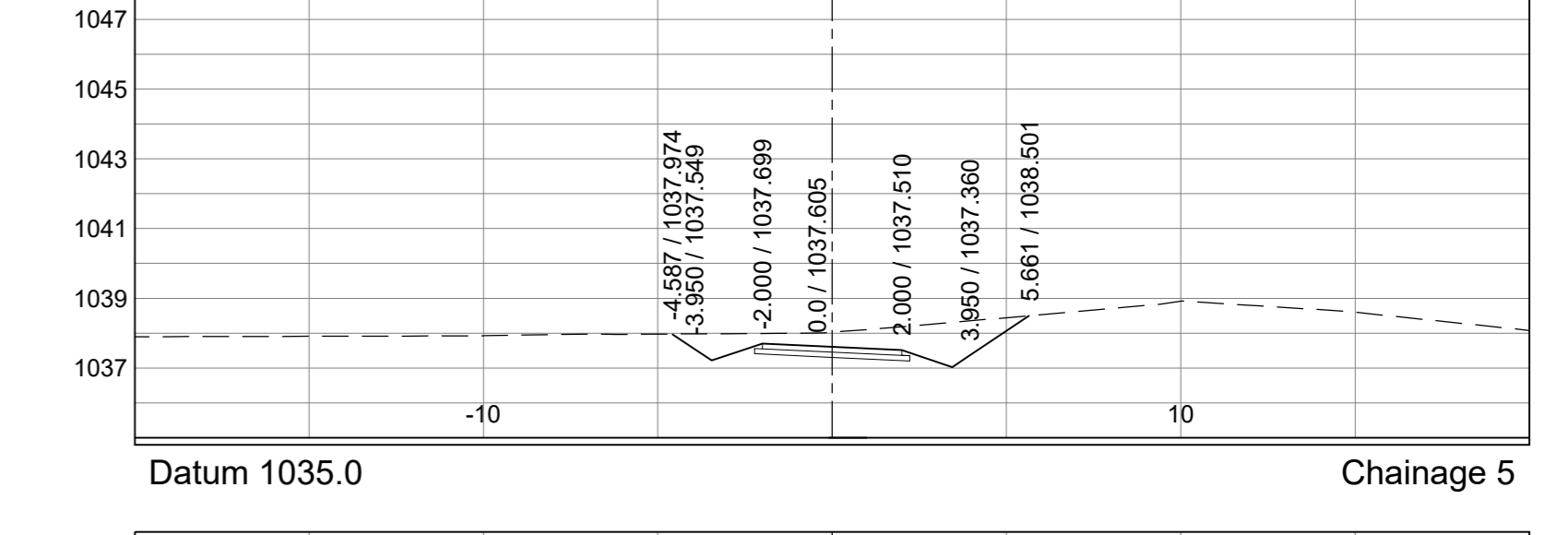
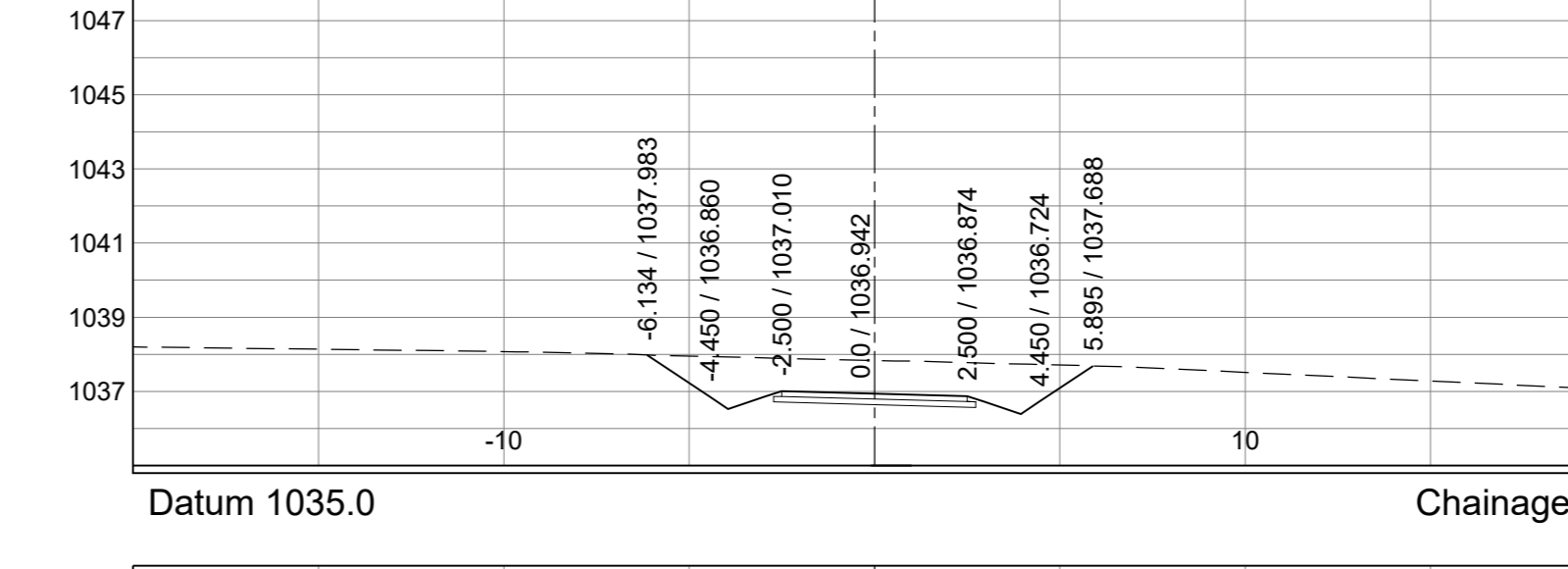
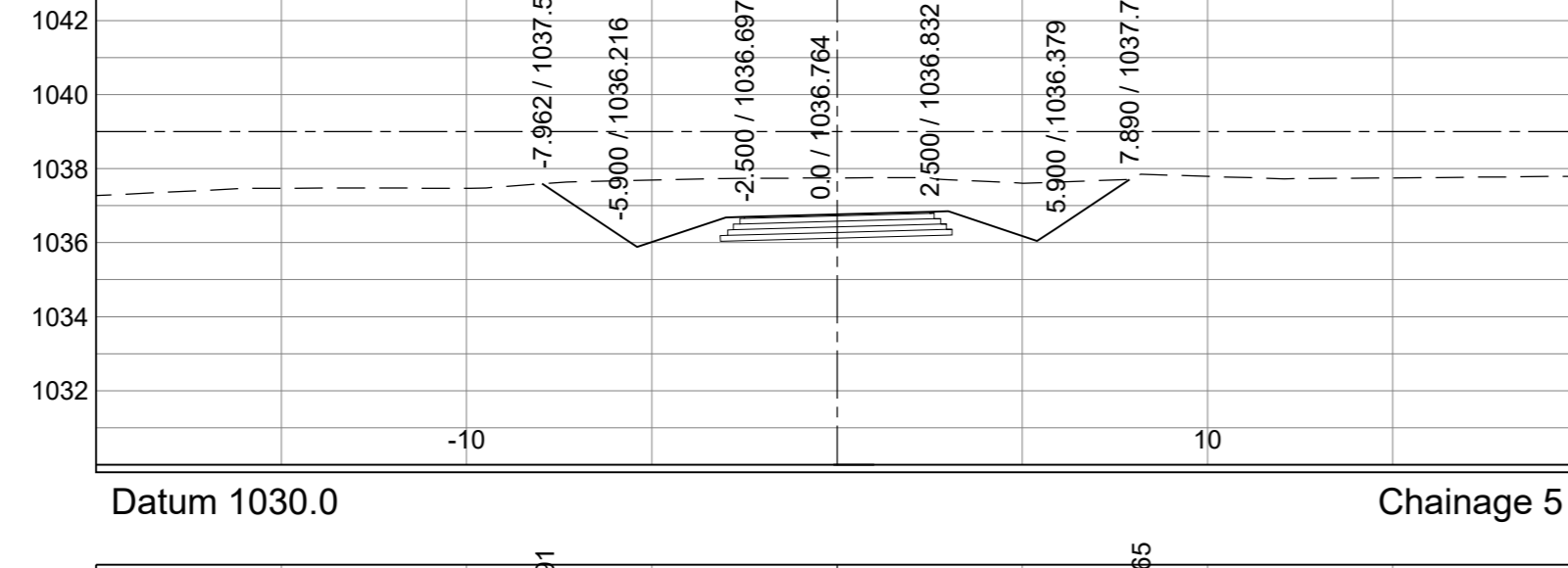
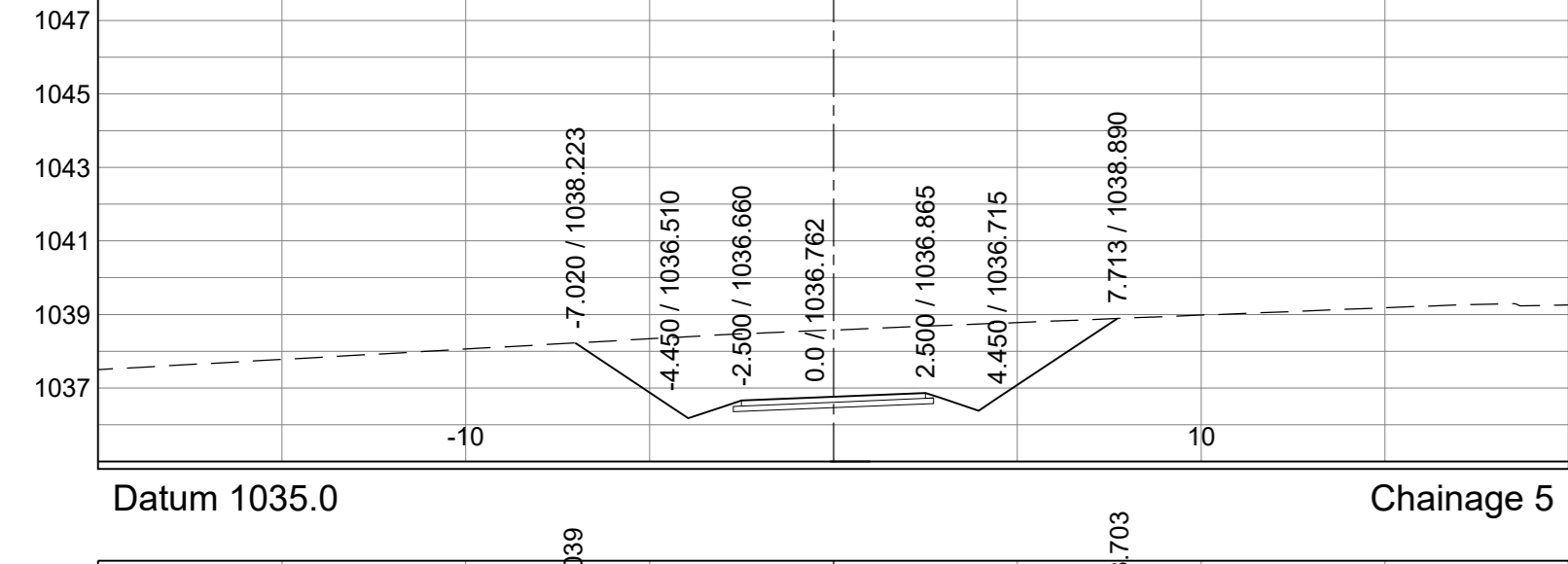
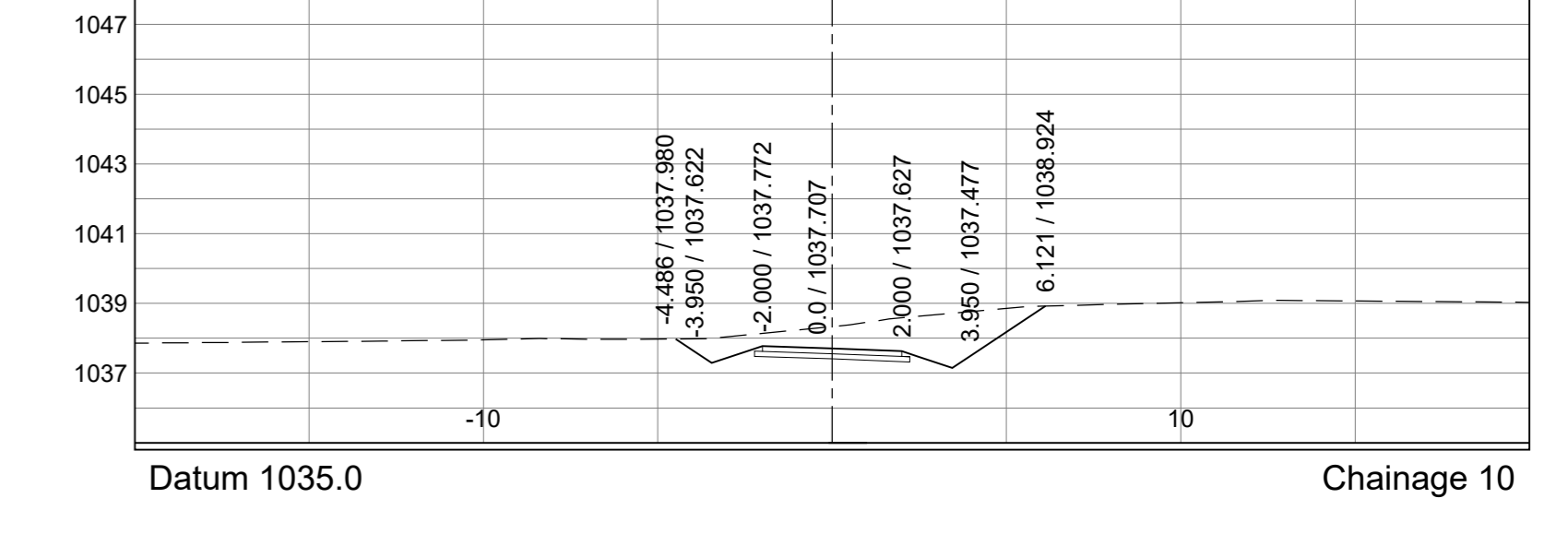
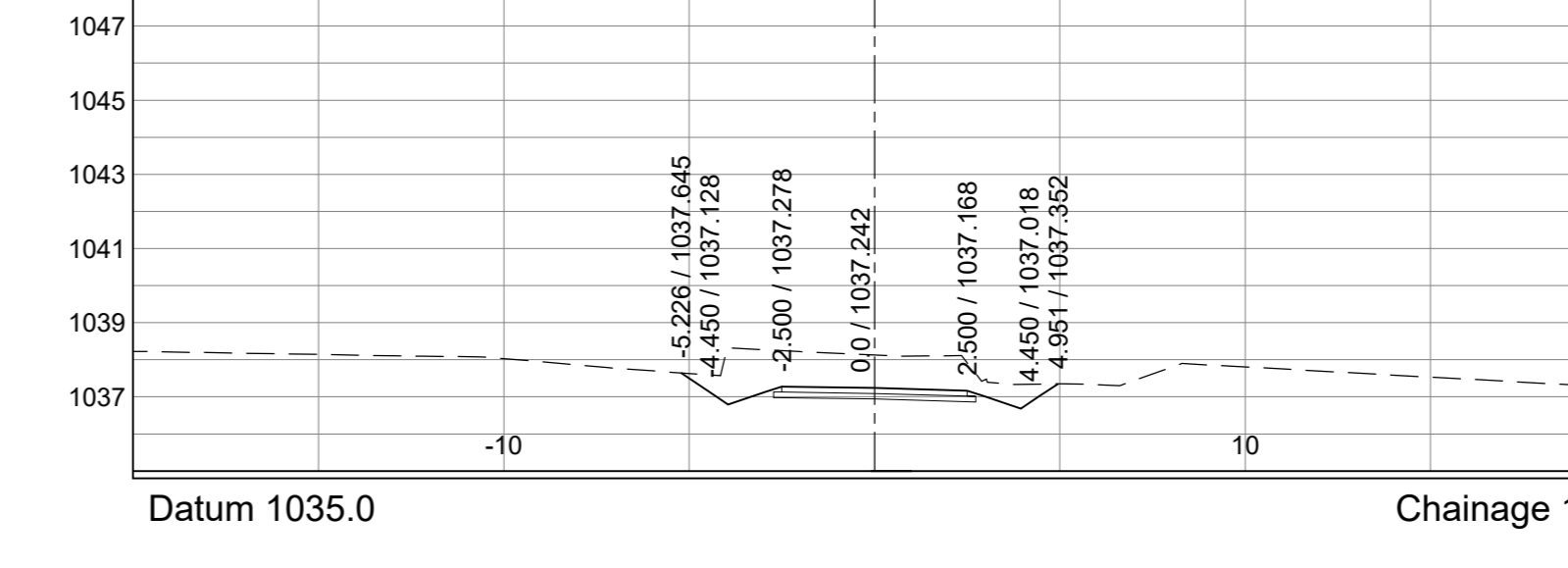
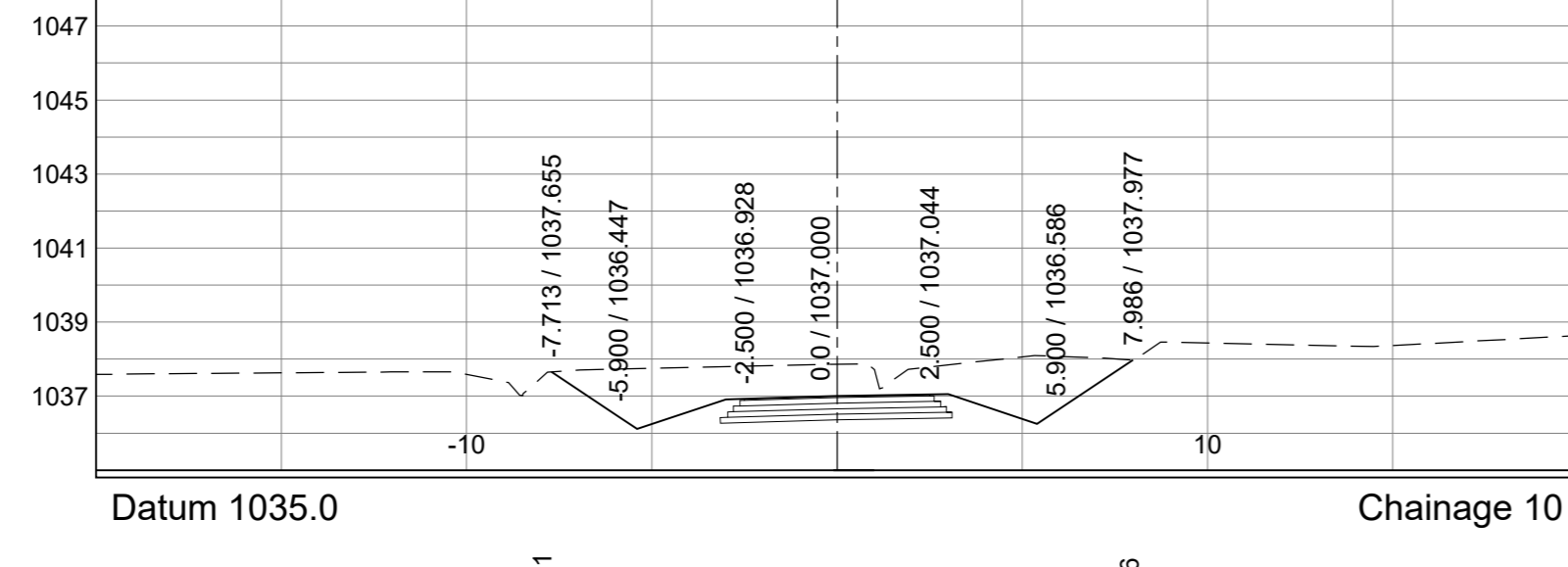
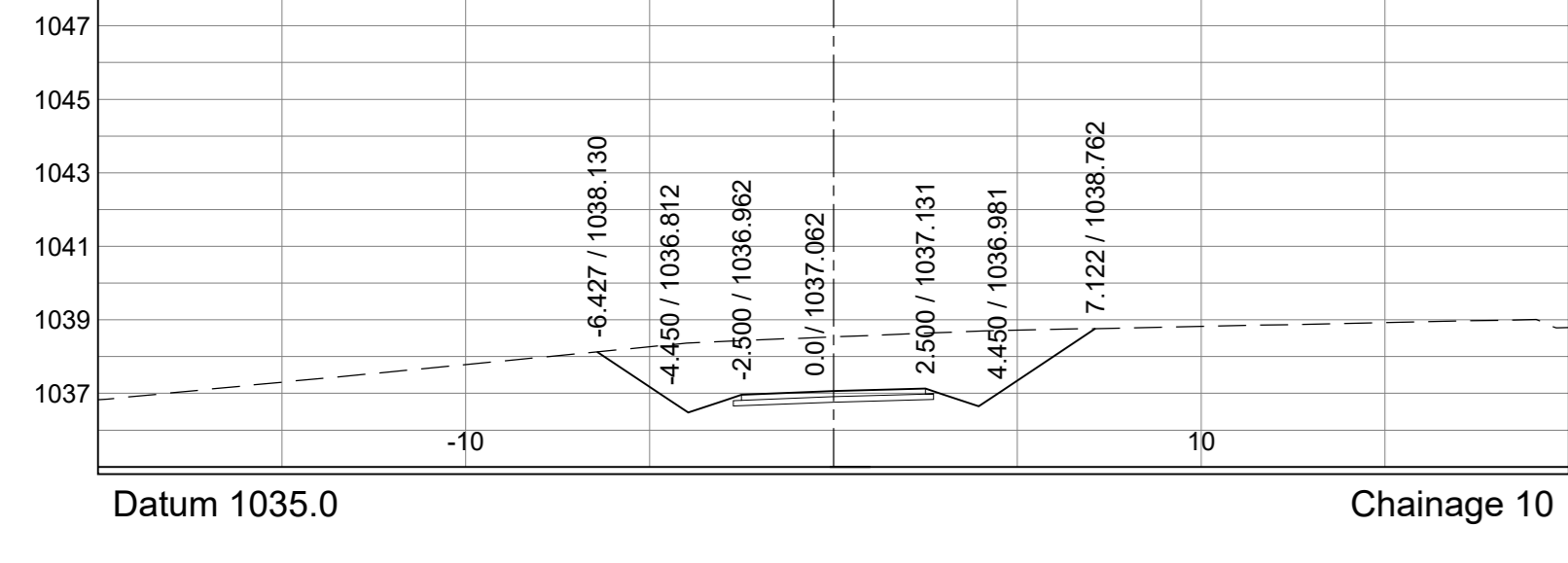
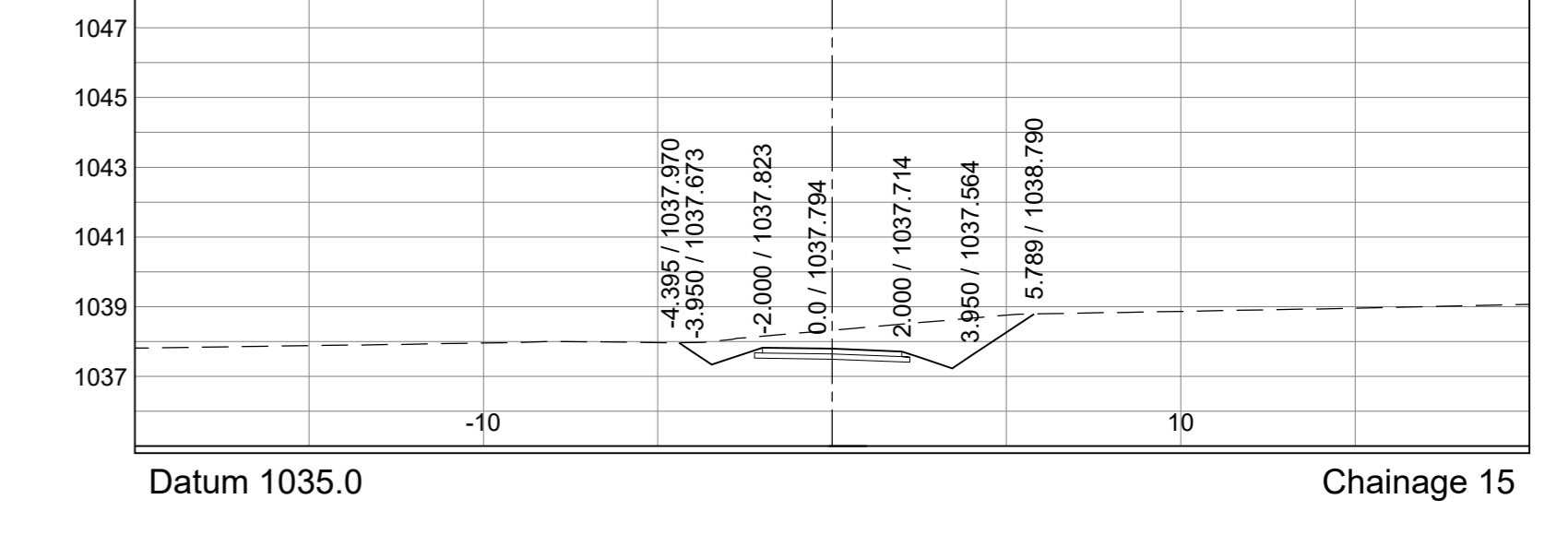
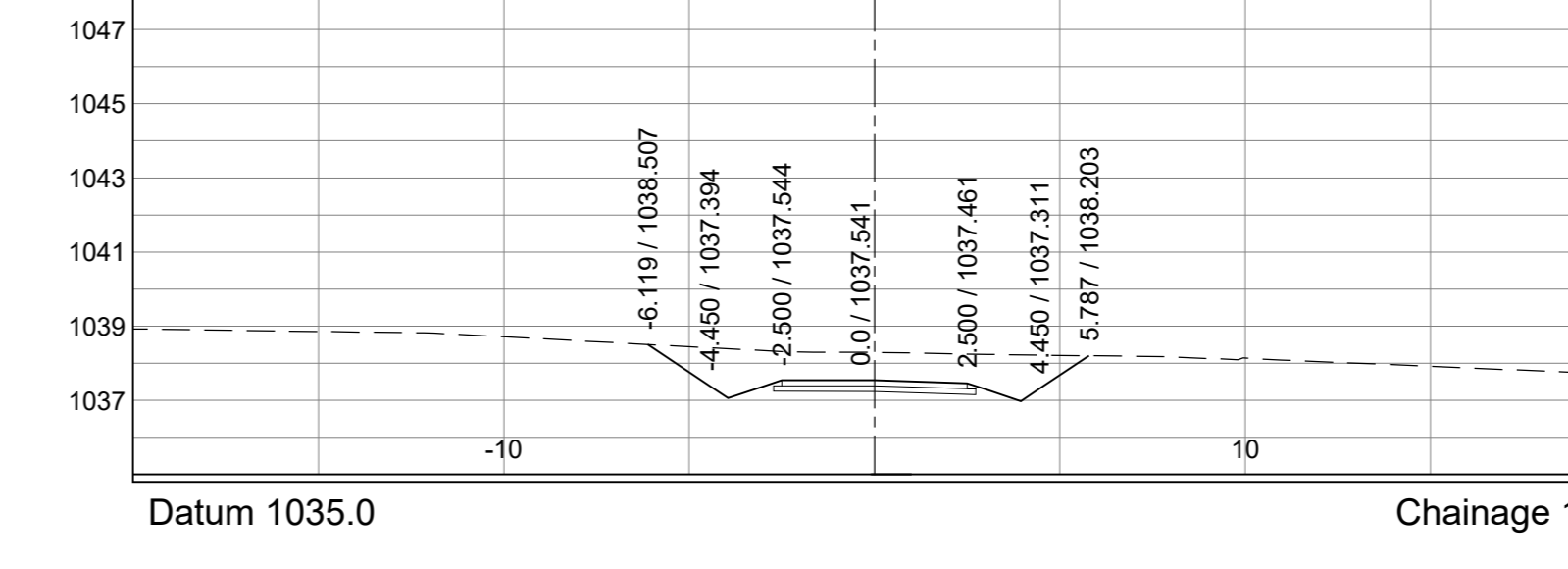
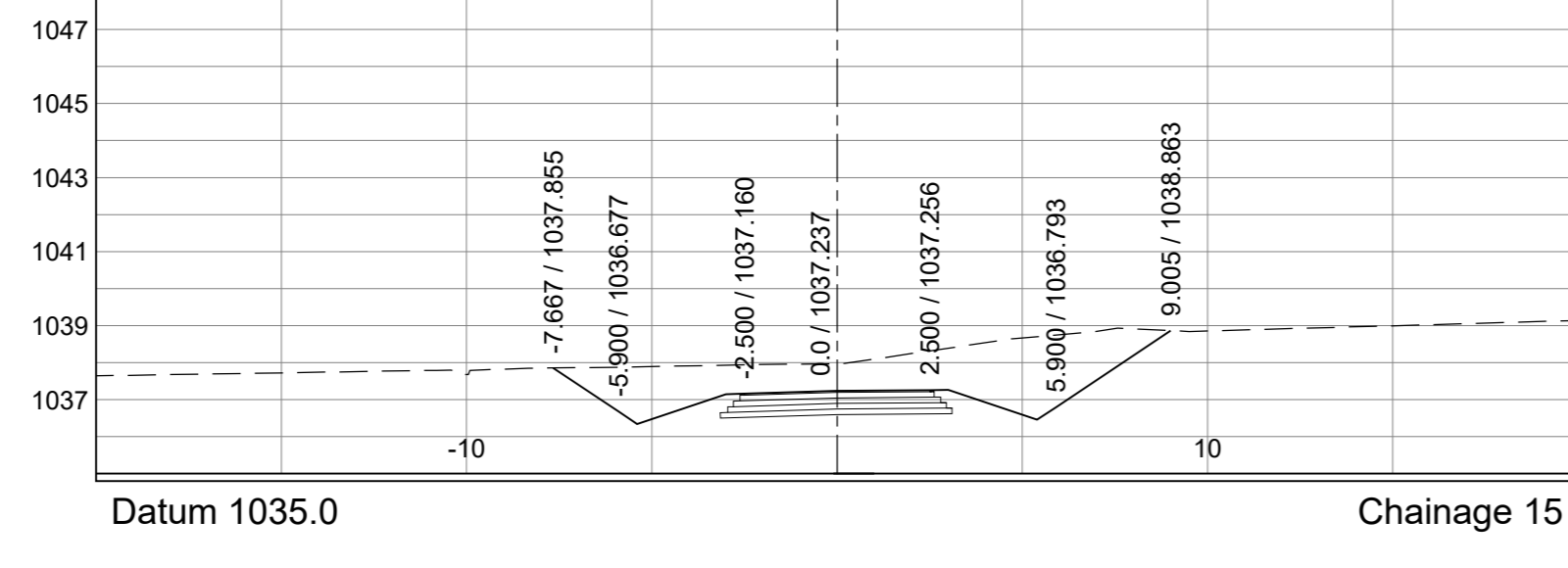
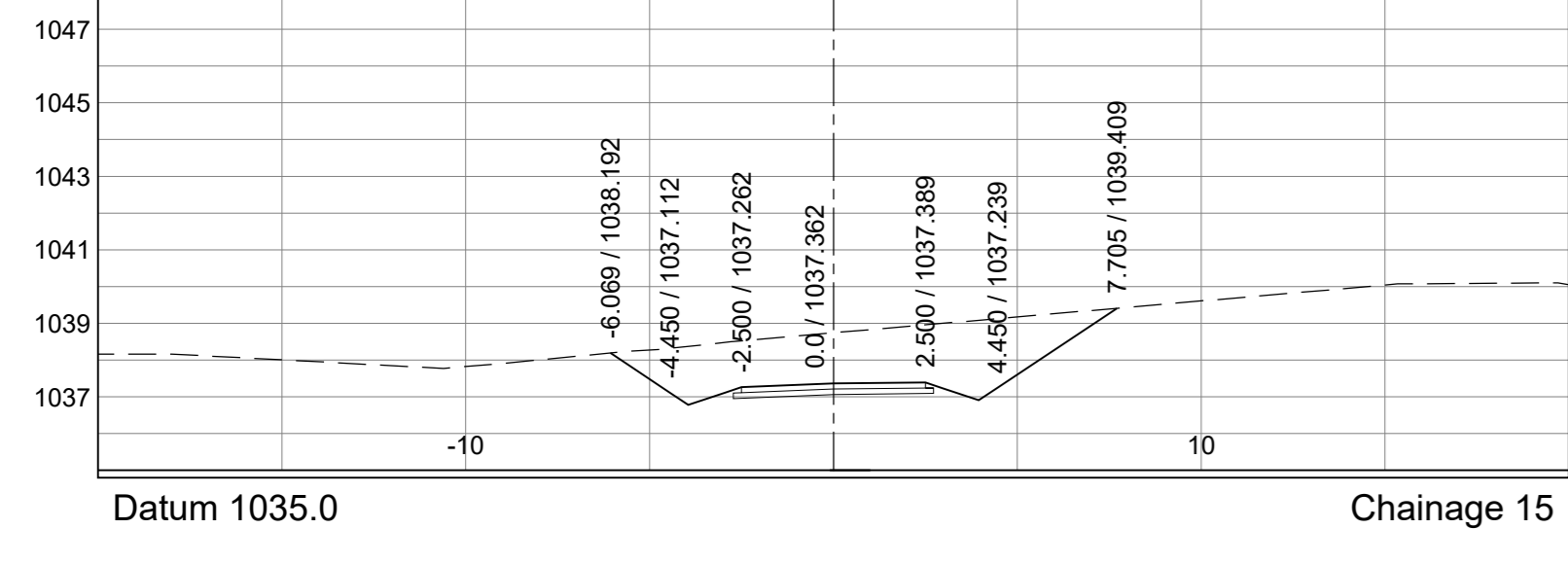
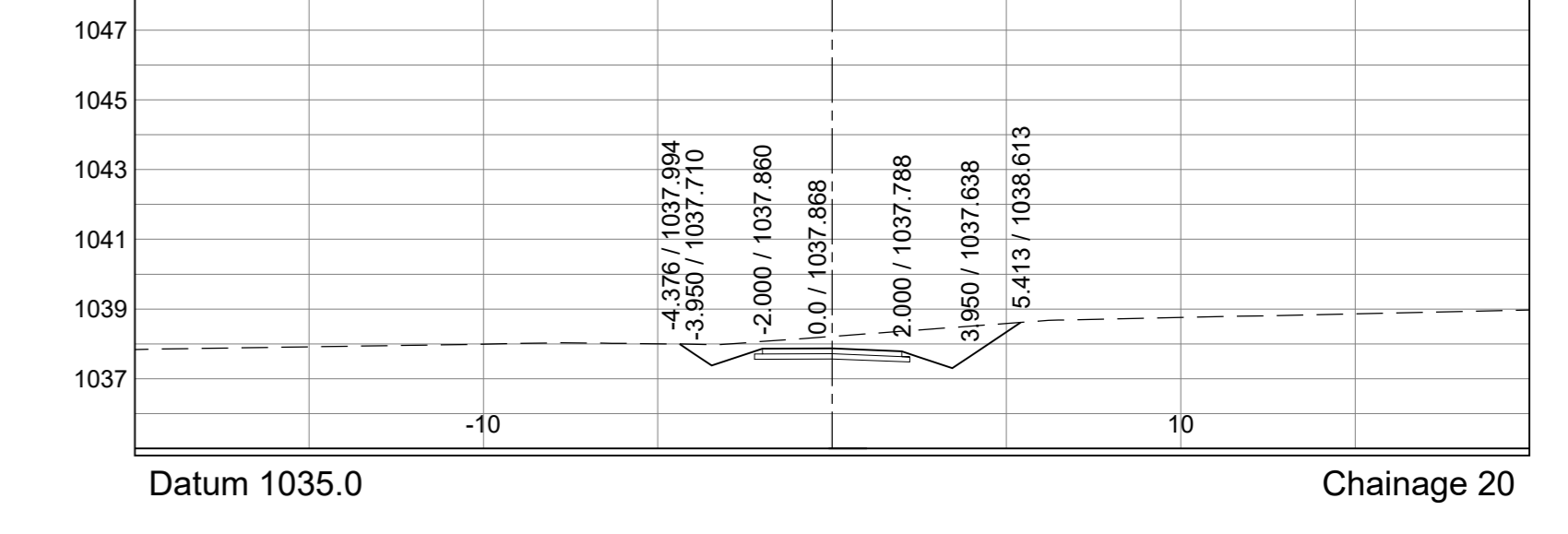
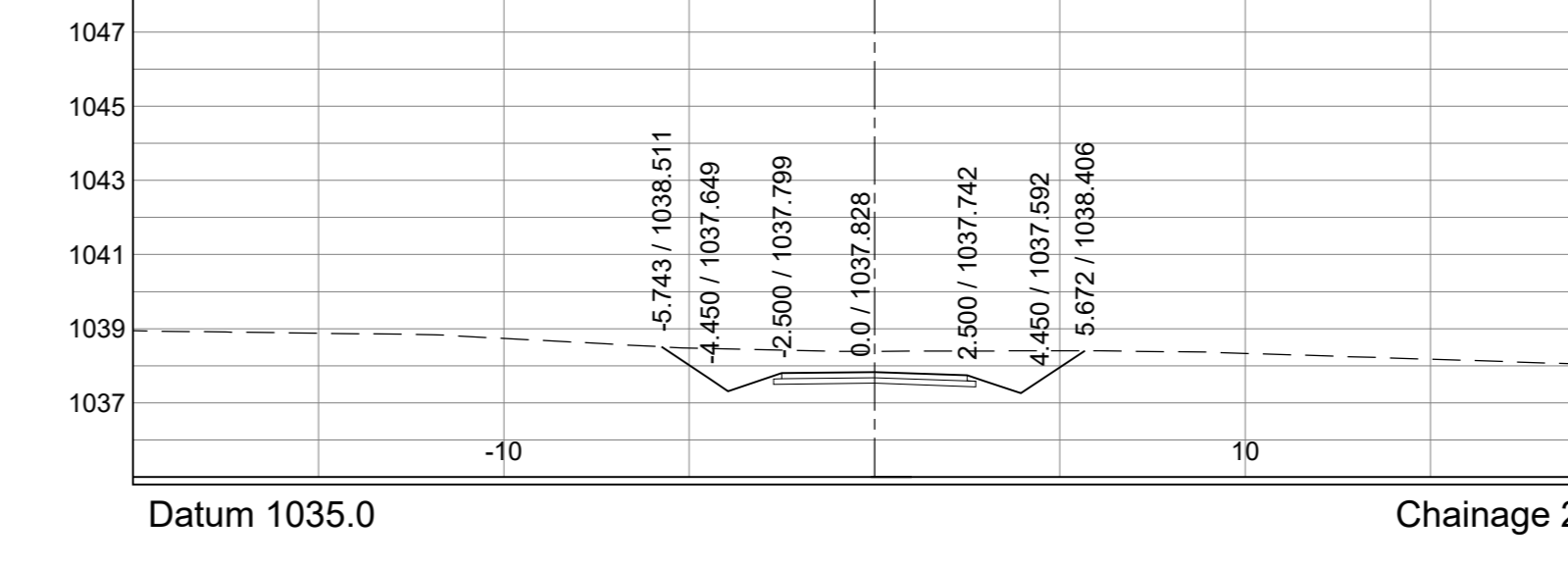
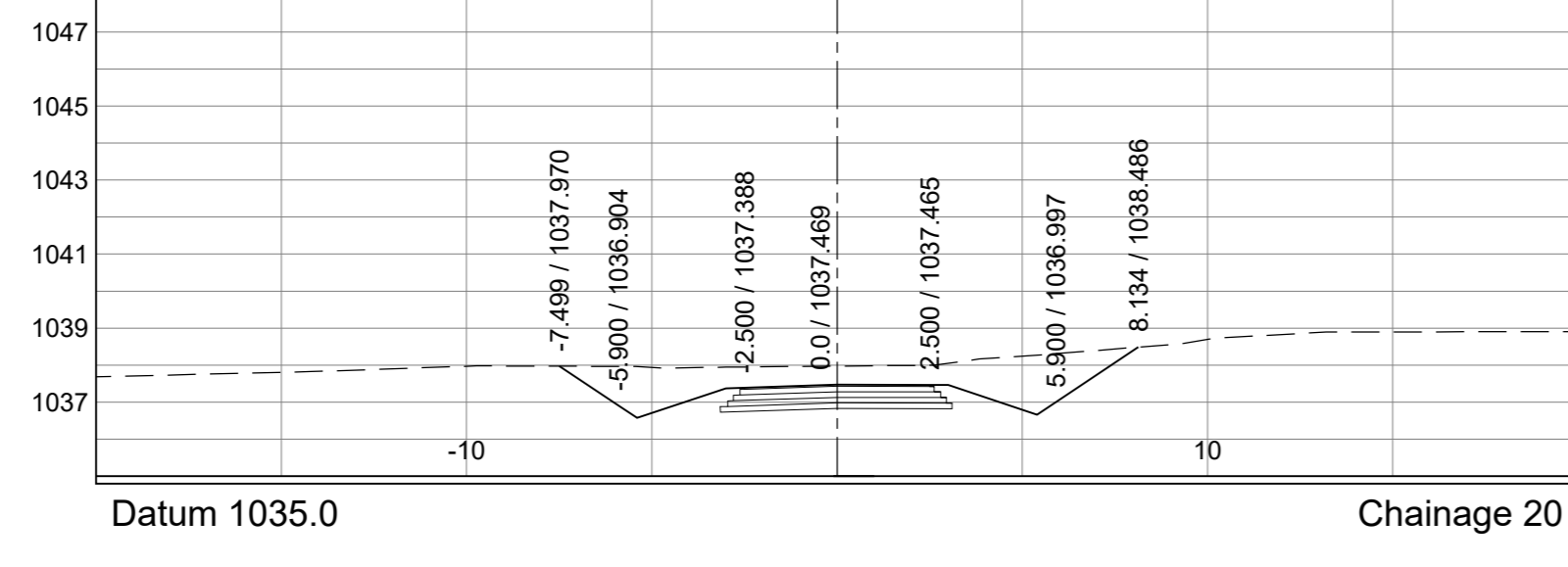
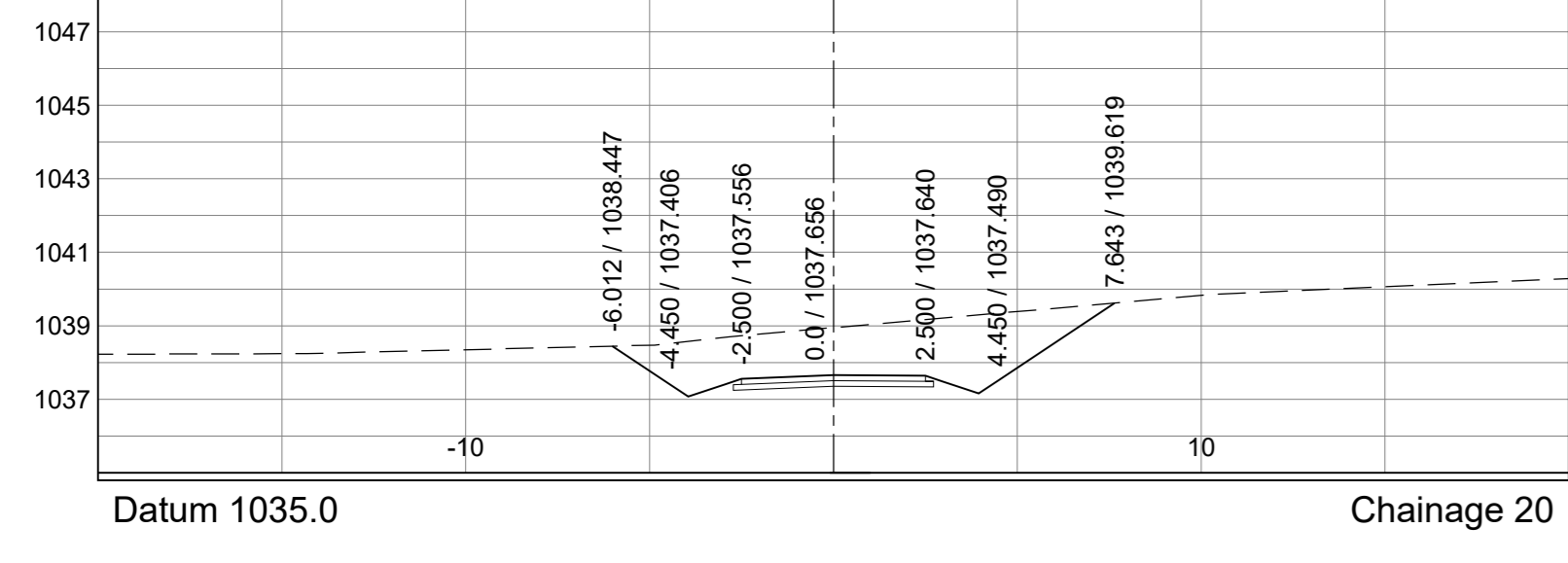
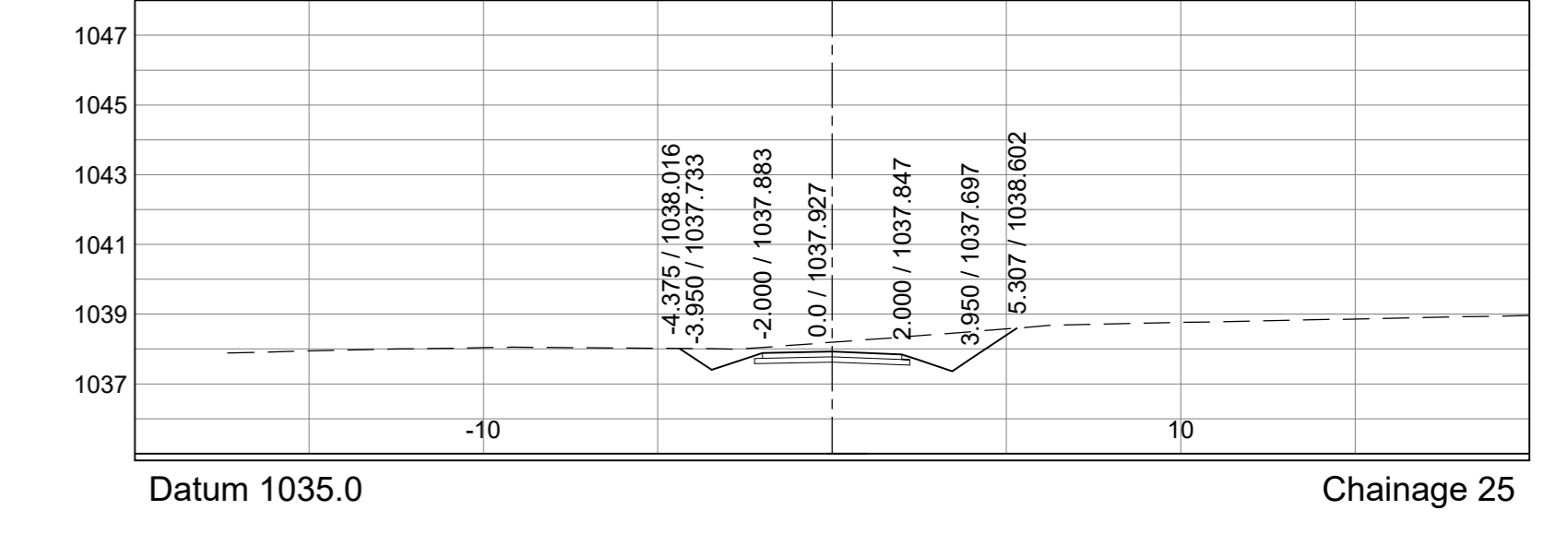
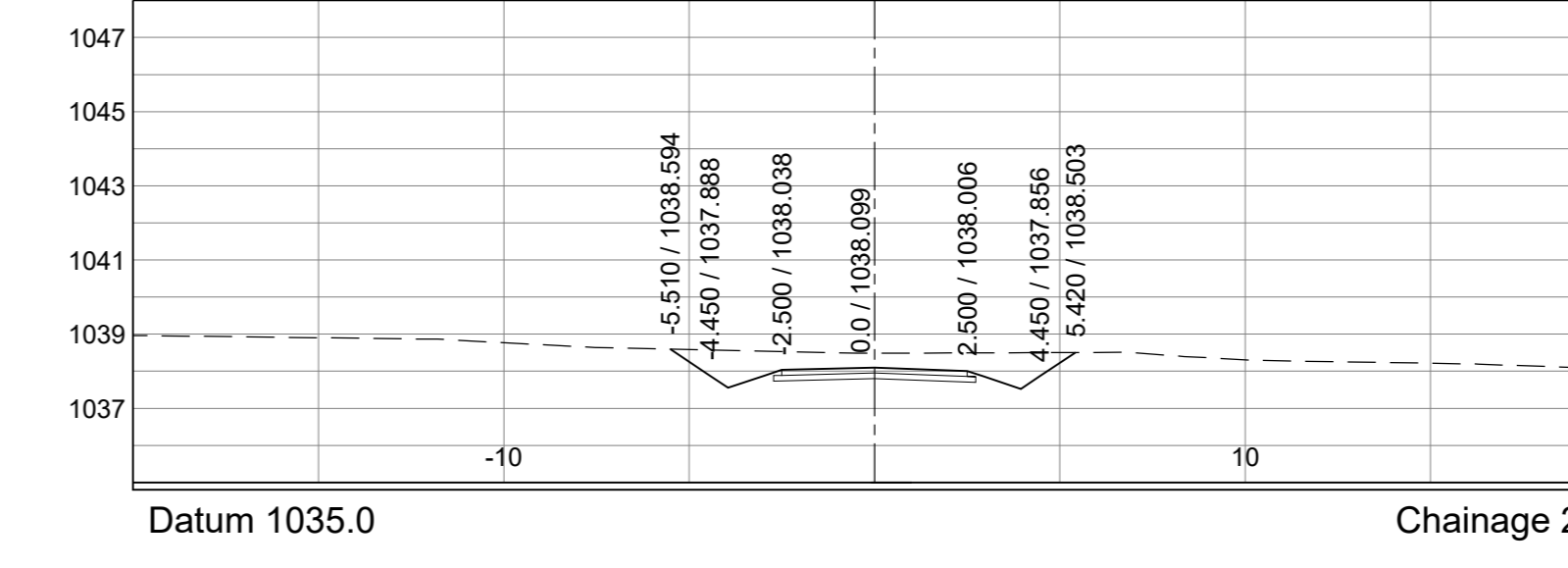
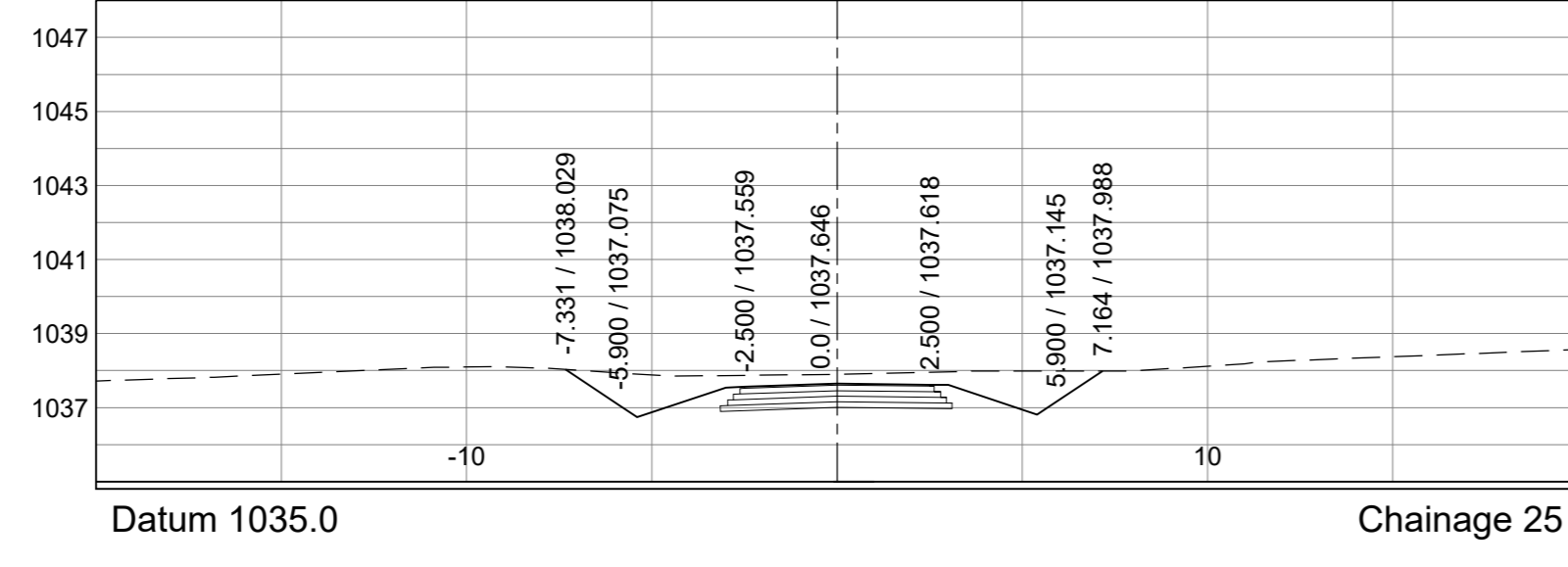
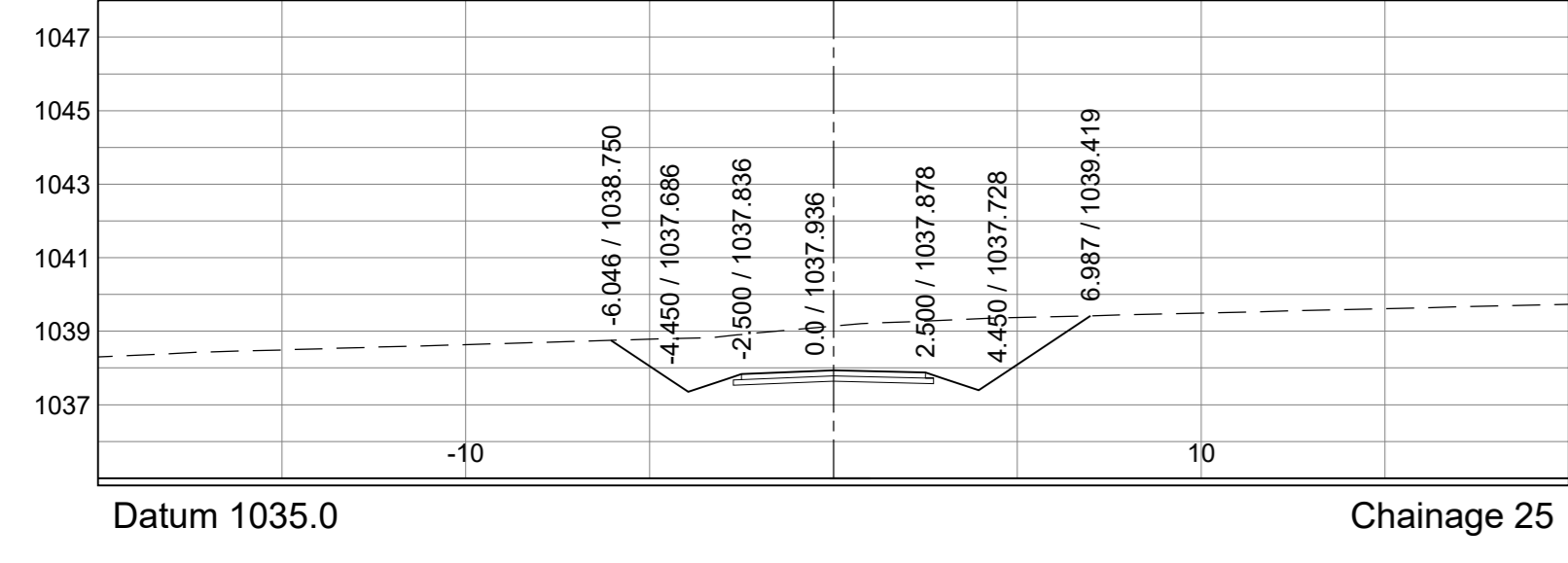
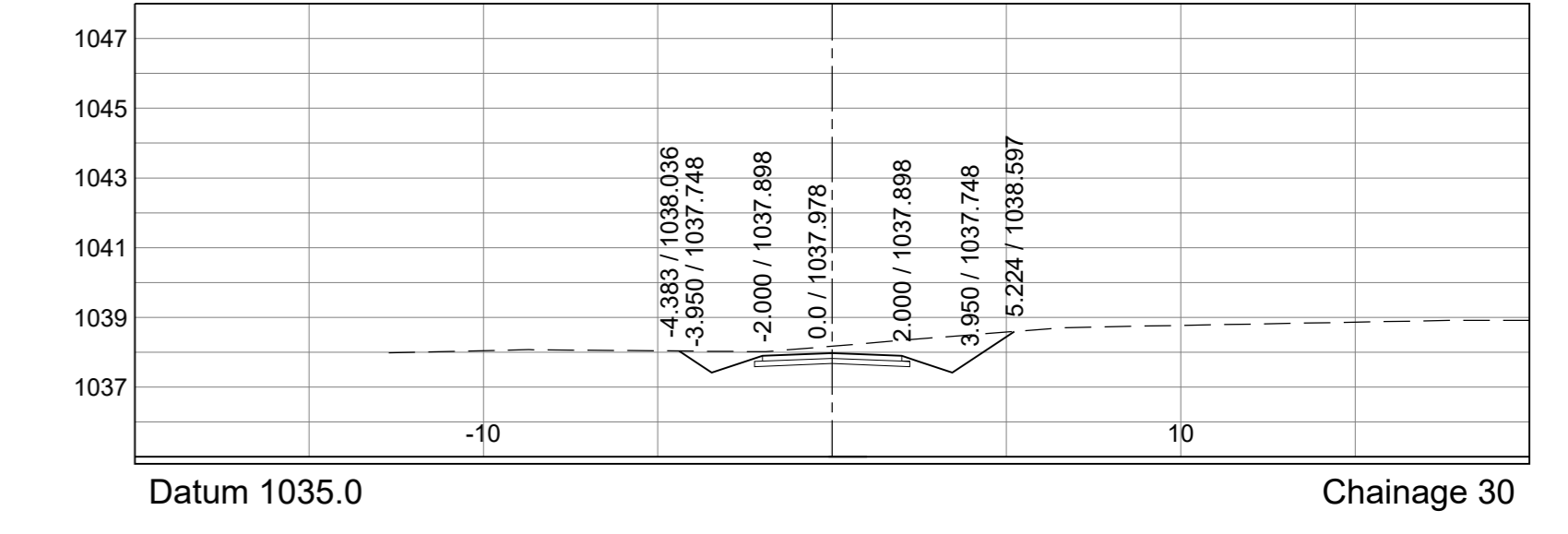
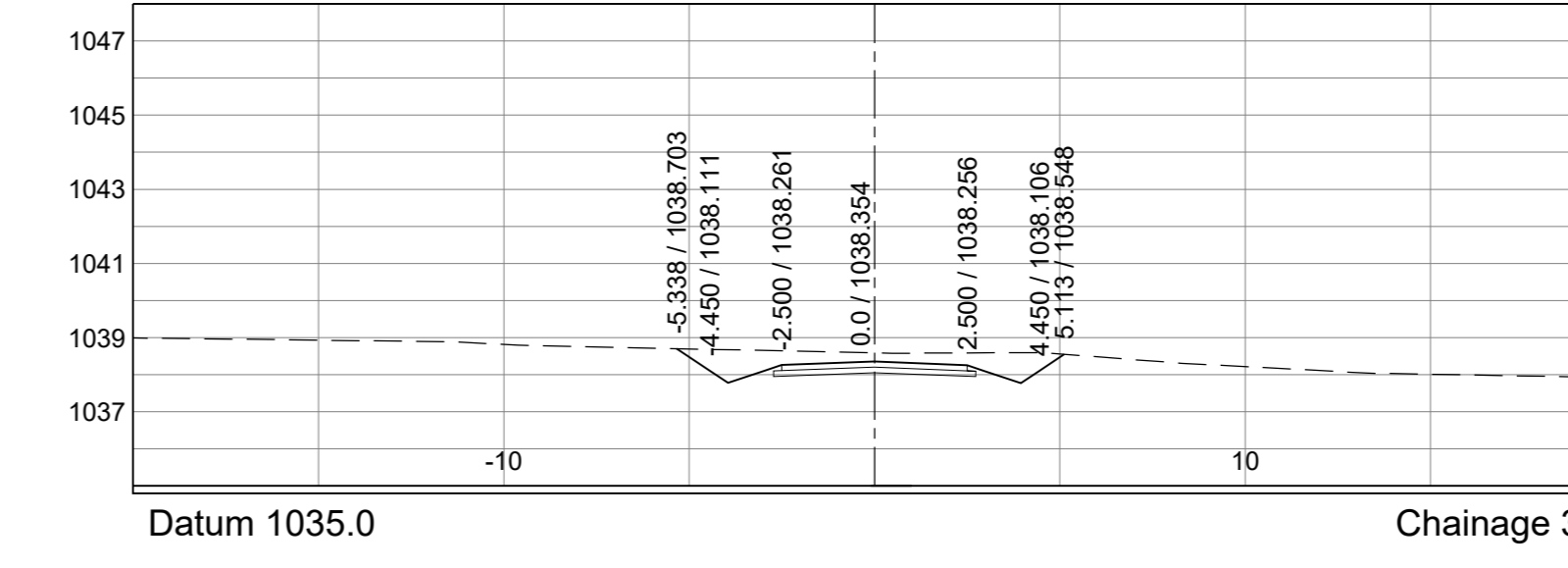
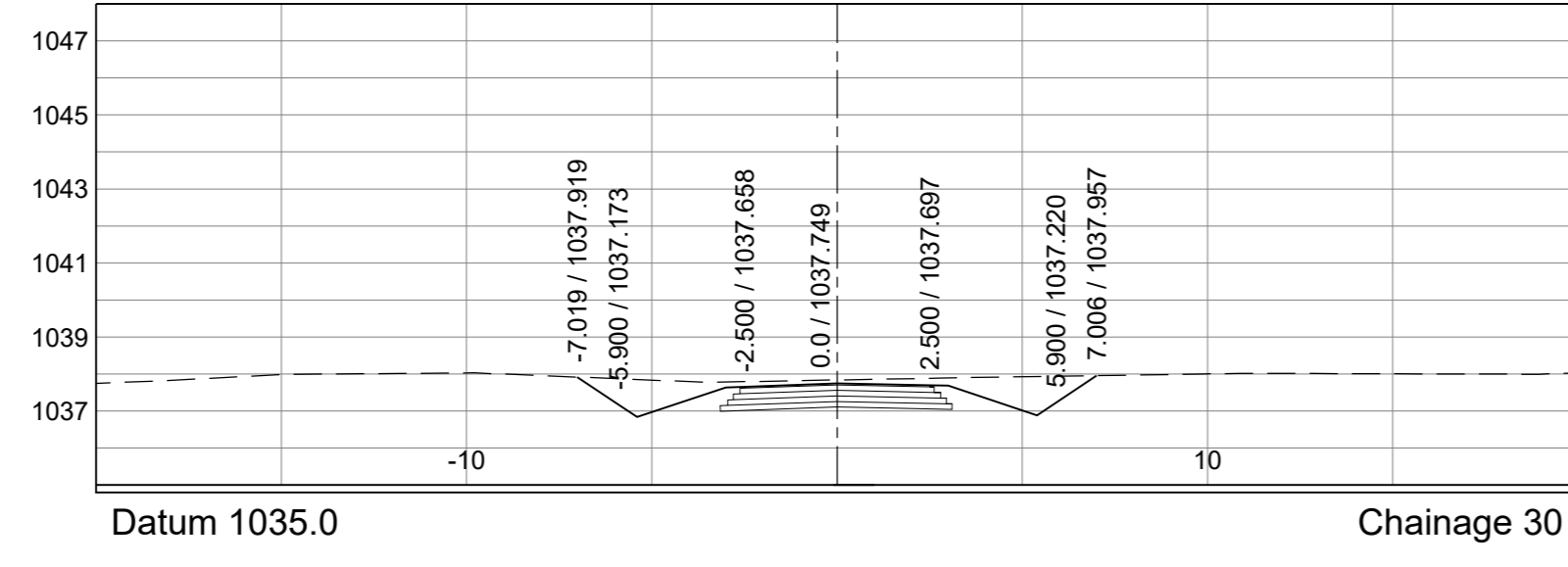
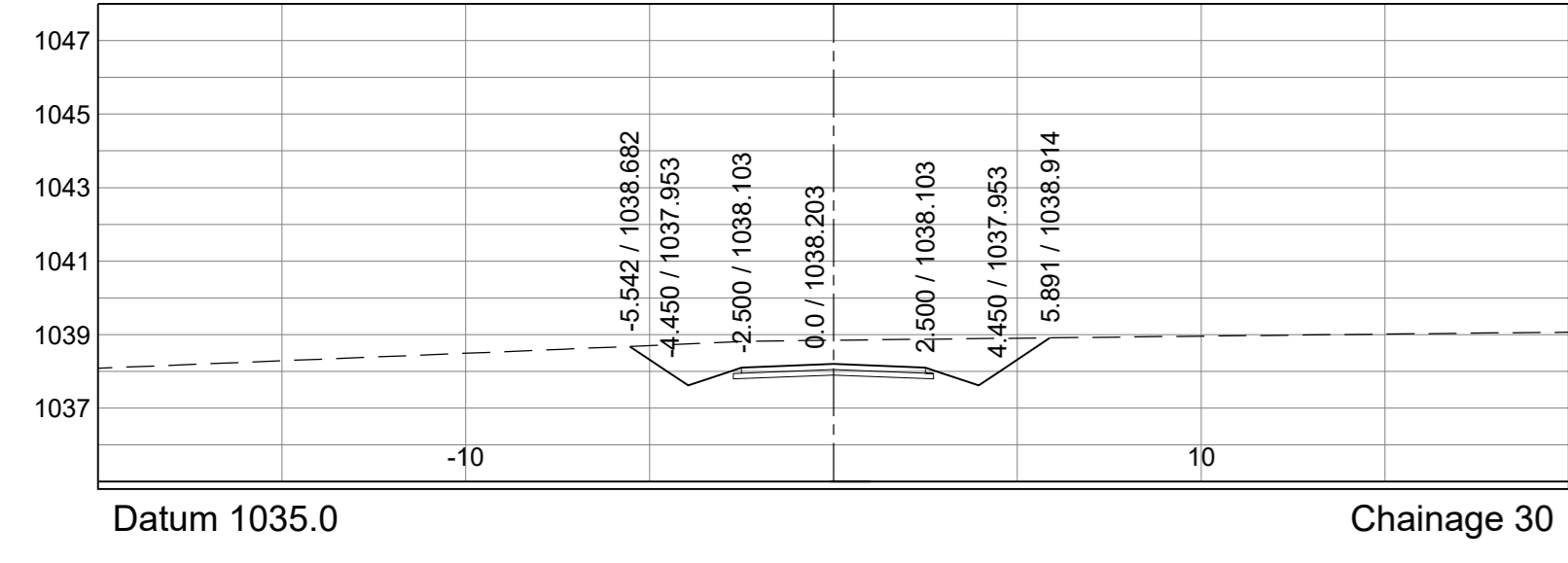
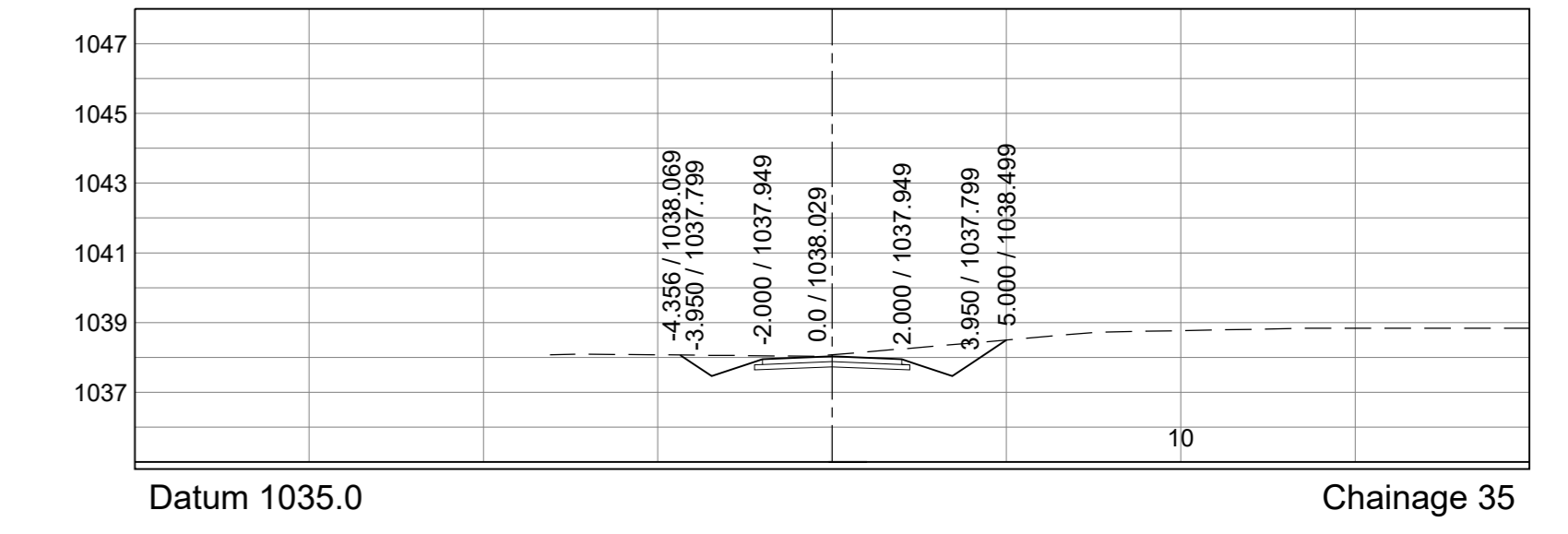
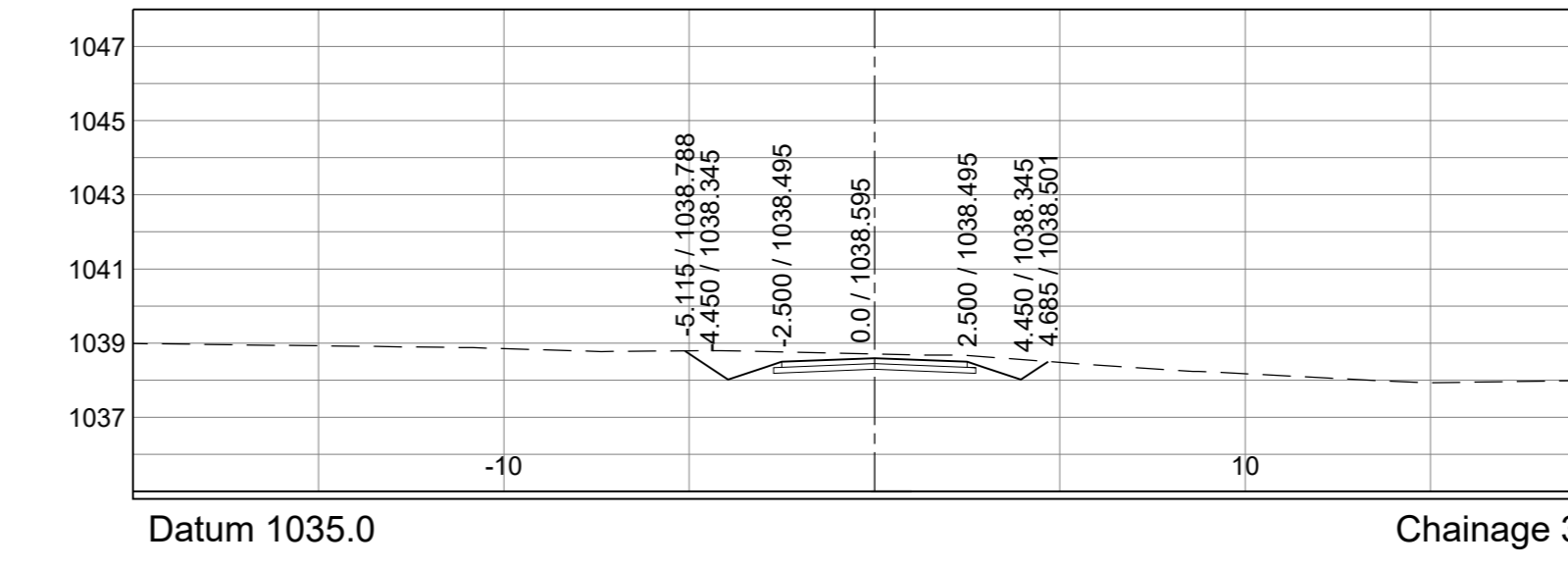
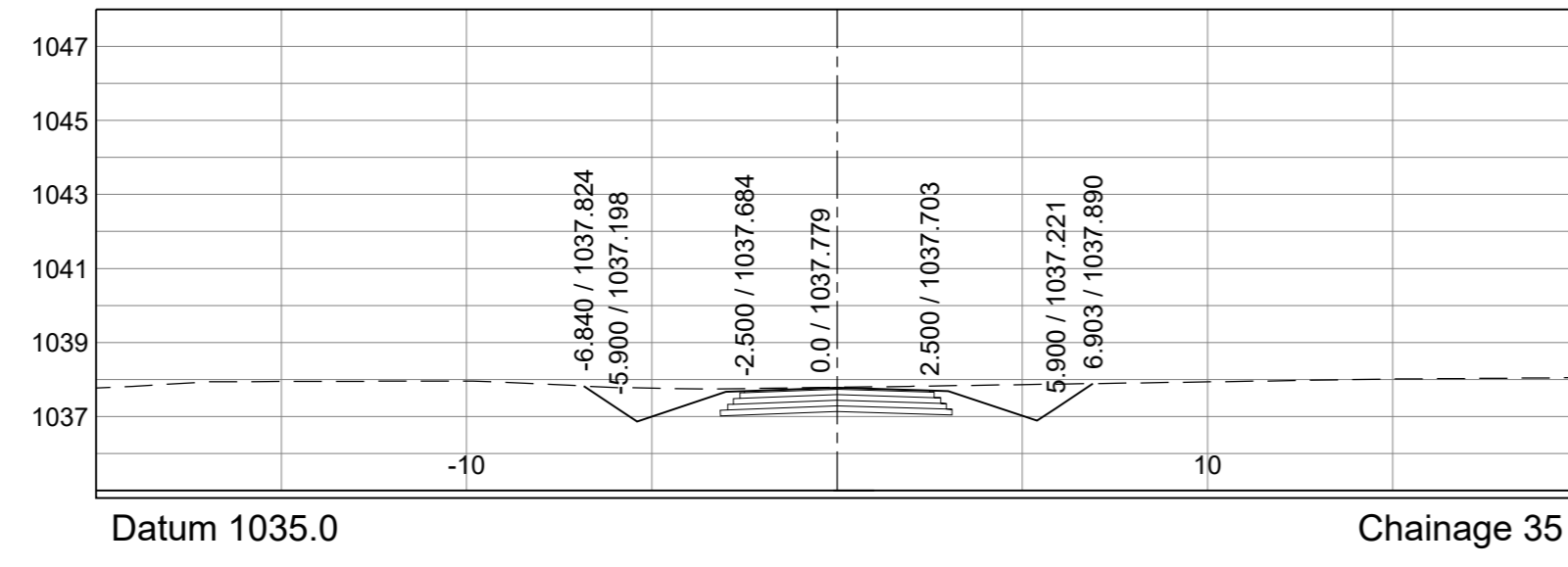
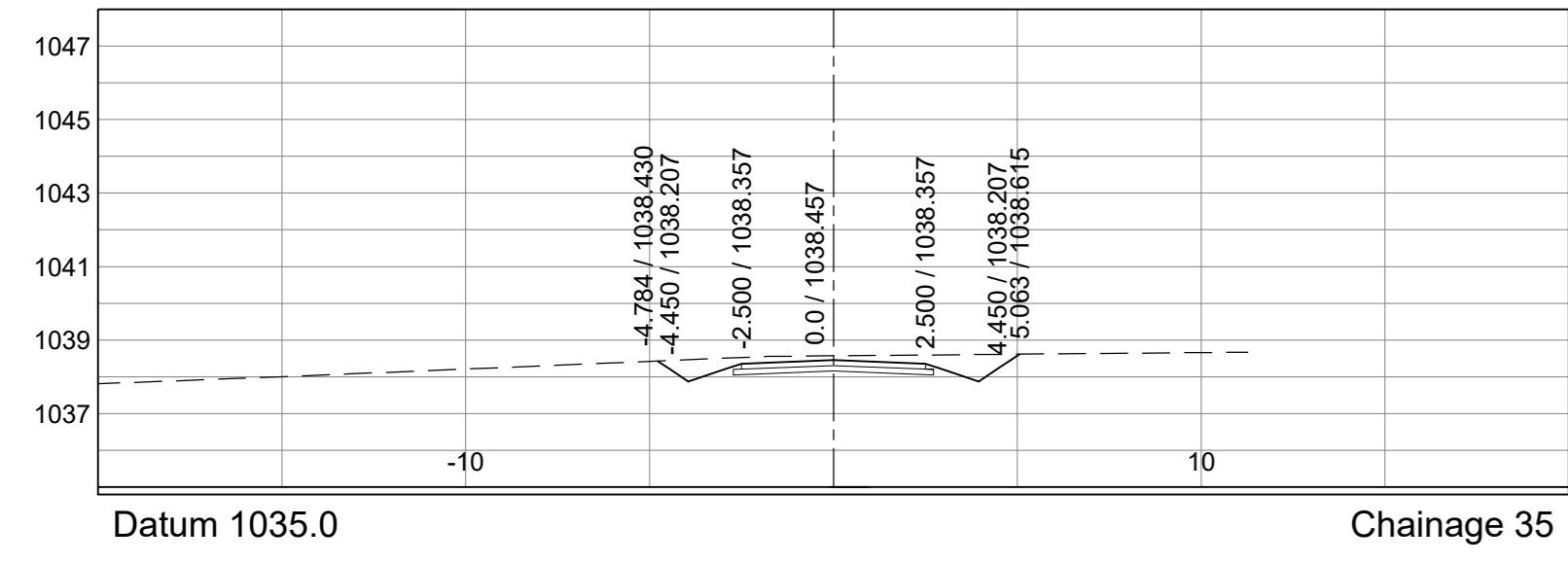
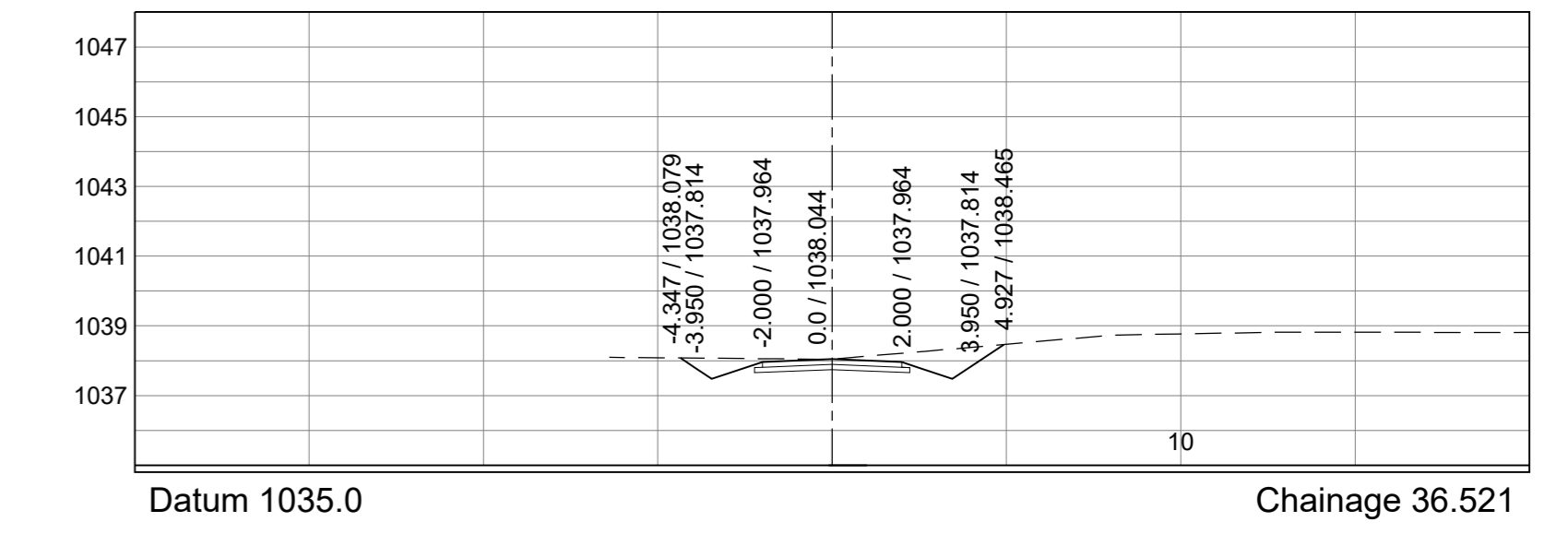
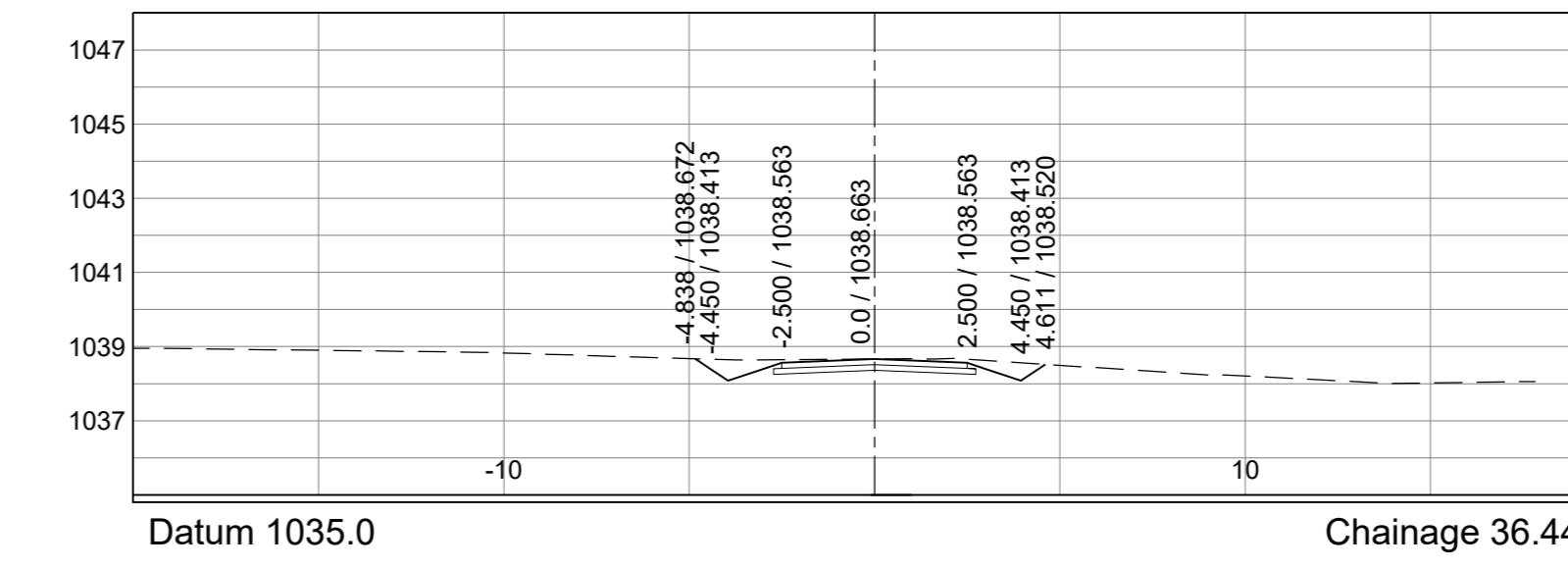
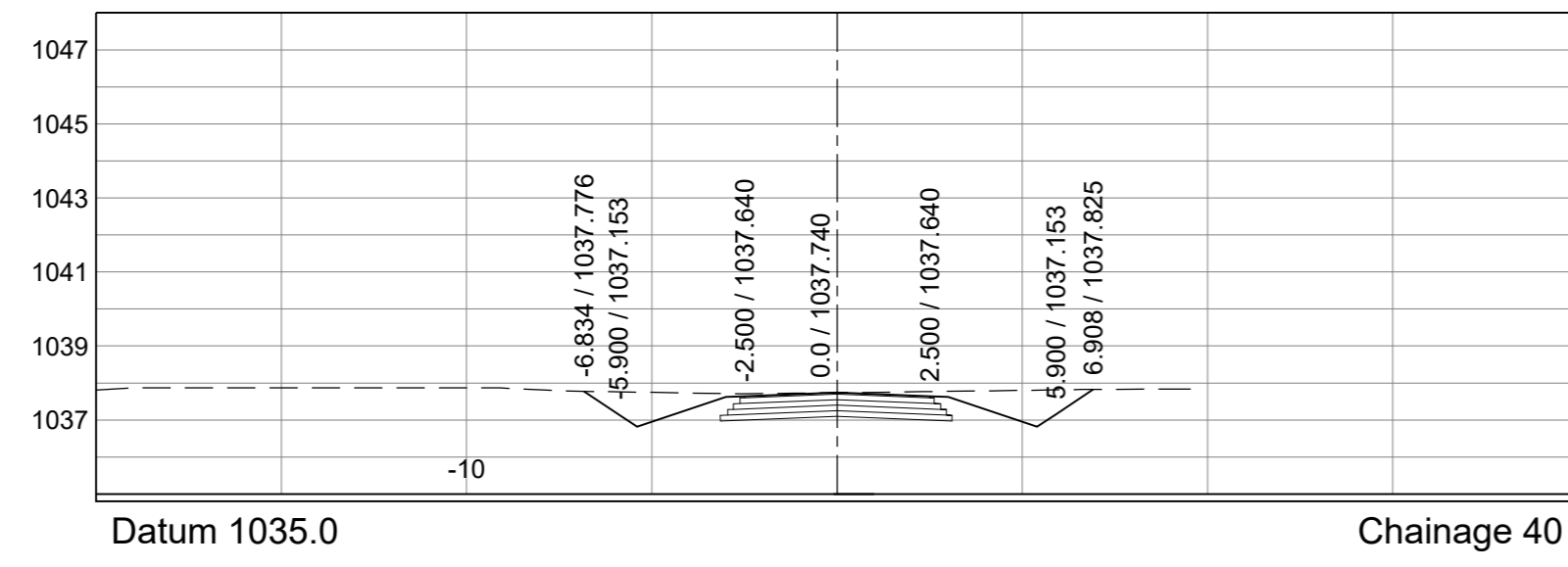
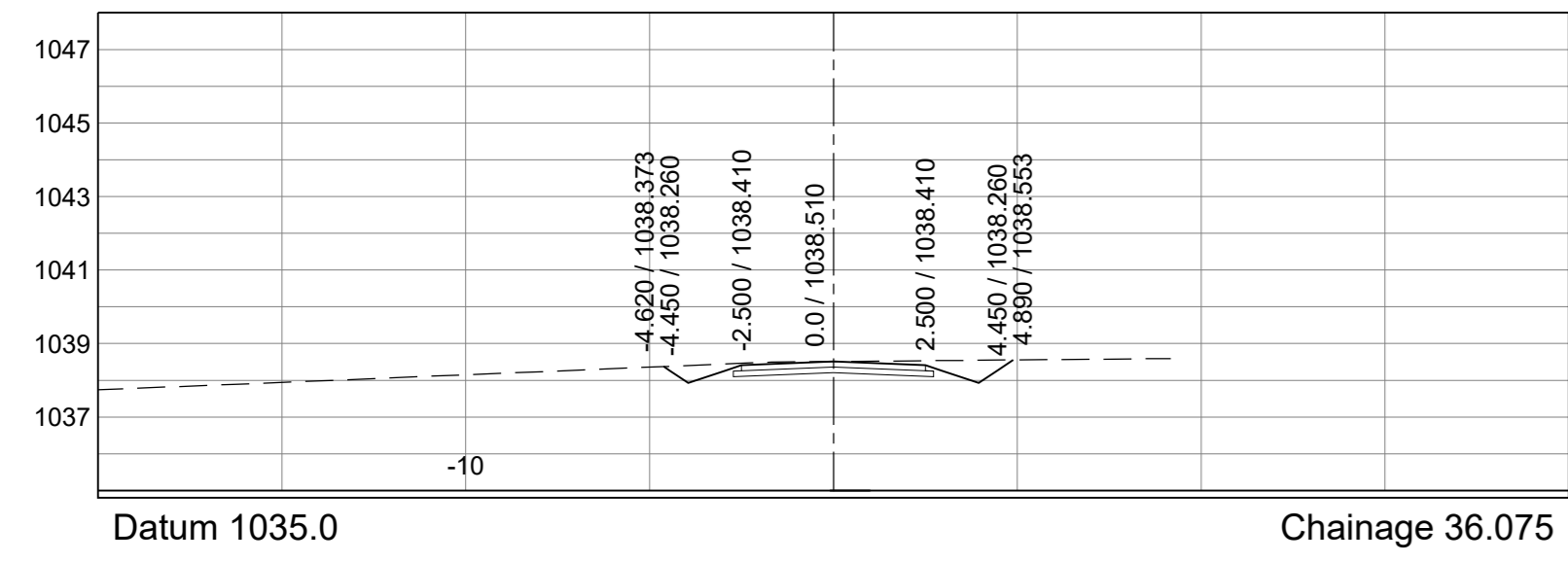


ACCESS @ KM 11+265.967 LHS

ACCESS @ KM 12+215.424 (D348) RHS

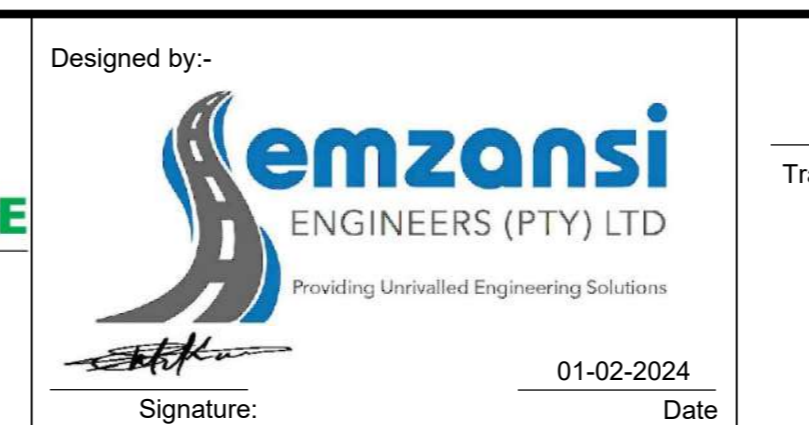
ACCESS @ KM 12+215.424 LHS

RHS ACCESS @ KM 0+022.496 OFF  
ACCESS KM 12+215.424 RHS



AS BUILT			
Symbol	Date	Description	Checked / Signed
A	01-02-2024	ISSUED FOR TENDER	YD
AMENDMENTS			

Continued from:-	-	Designed by:-	Y. DOMA
Continued on:-	C 44331	Checked by:-	N. NGUBANE
Cross Section No:-	C 44330	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44324 - C 44325	Checked by:-	Y. DOMA
Design Plan No:-	C 44312	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
ACCESS ROADS CROSS SECTIONS

Staked km distance km 0+000 - km 0+036 075 km 0+000 - km 0+044 995 km 0+000 - km 0+036 445 km 0+000 - km 0+036 521	Sheet - 1 of - 14	REVISION: A
Scale Vertical Scale 1 : 200 Horizontal Scale 1 : 200	Plan No -	C 46544

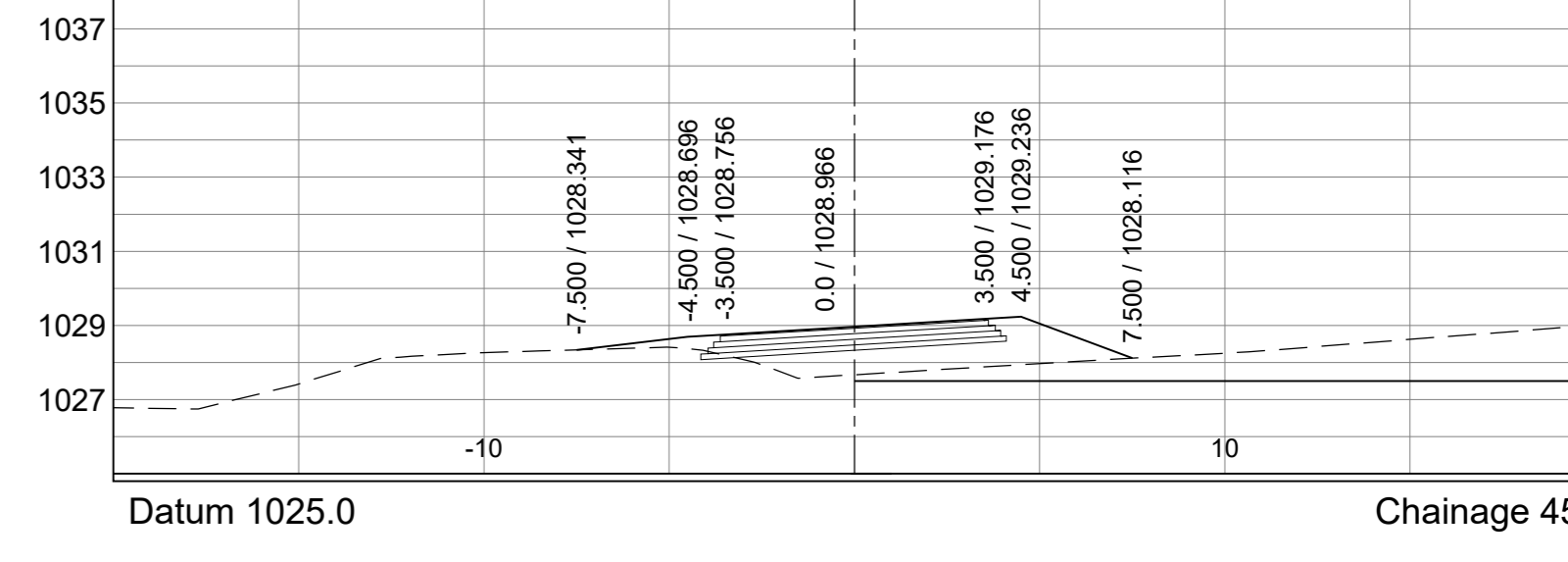
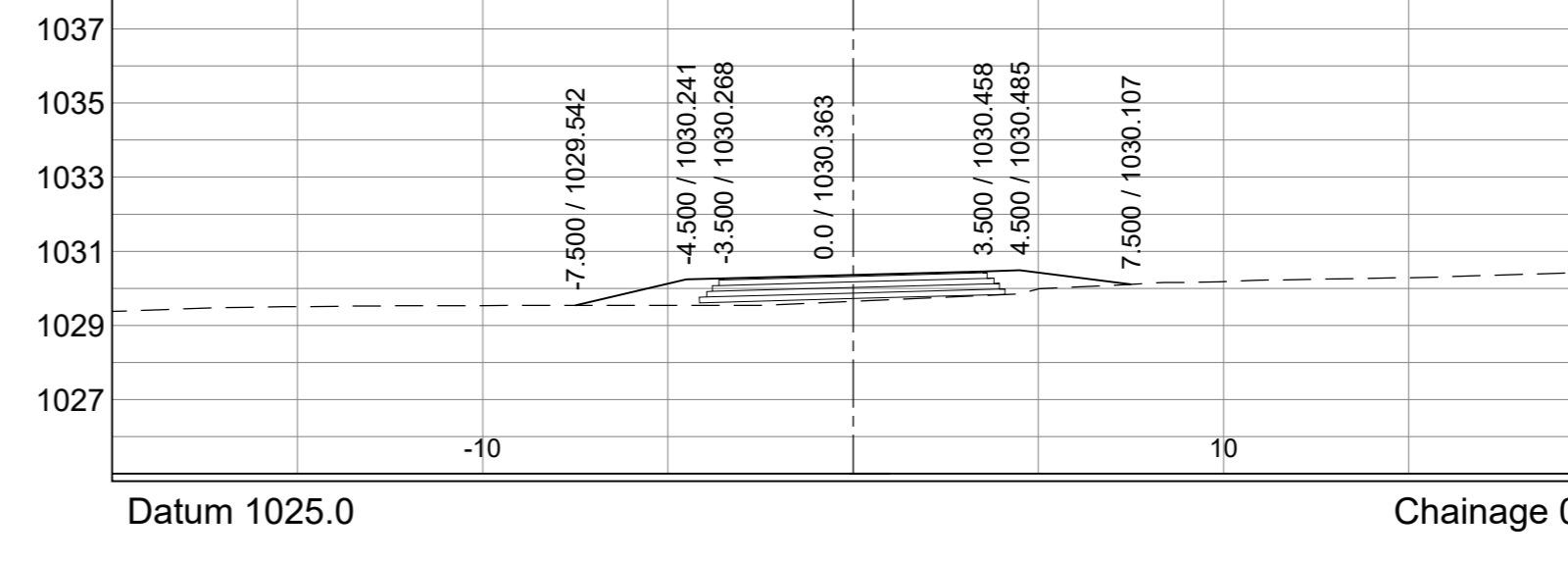
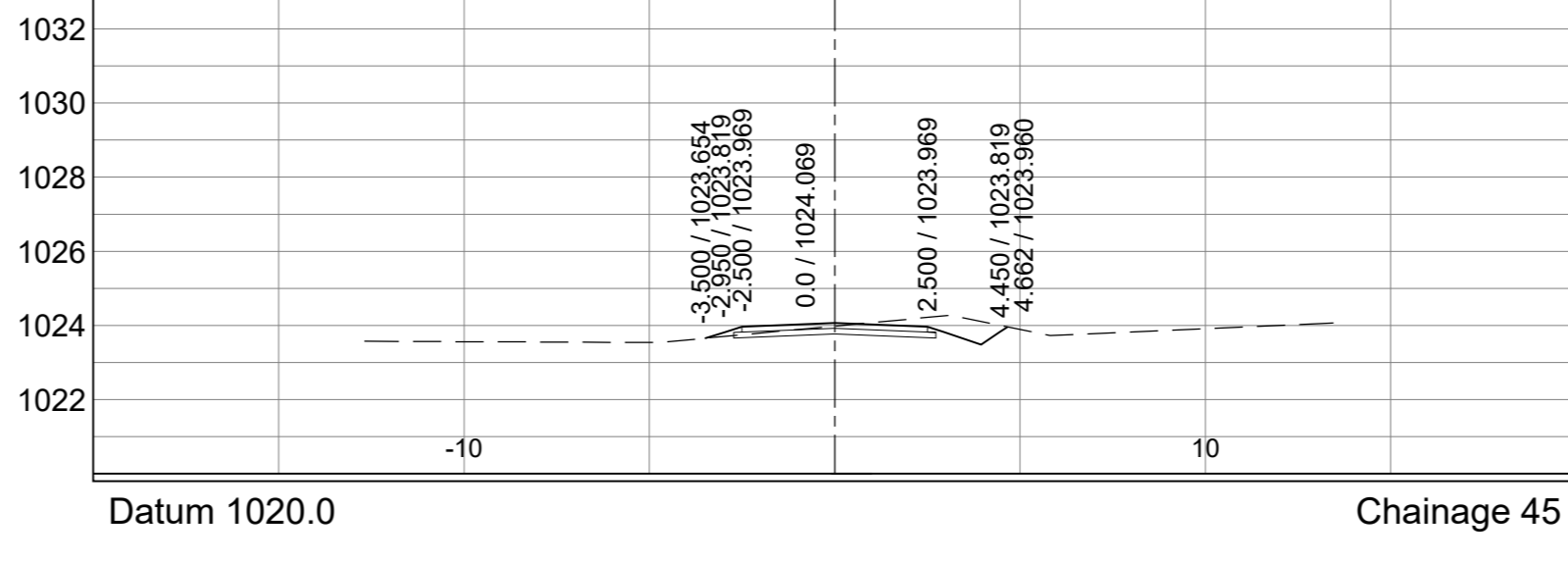
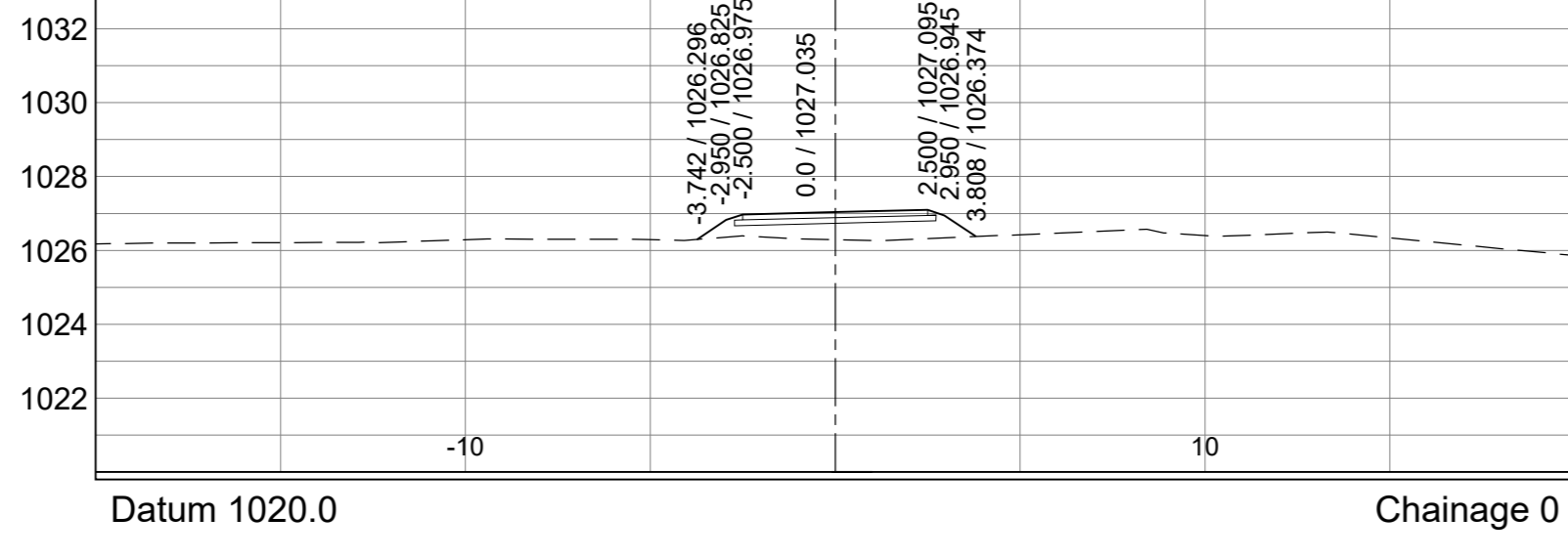
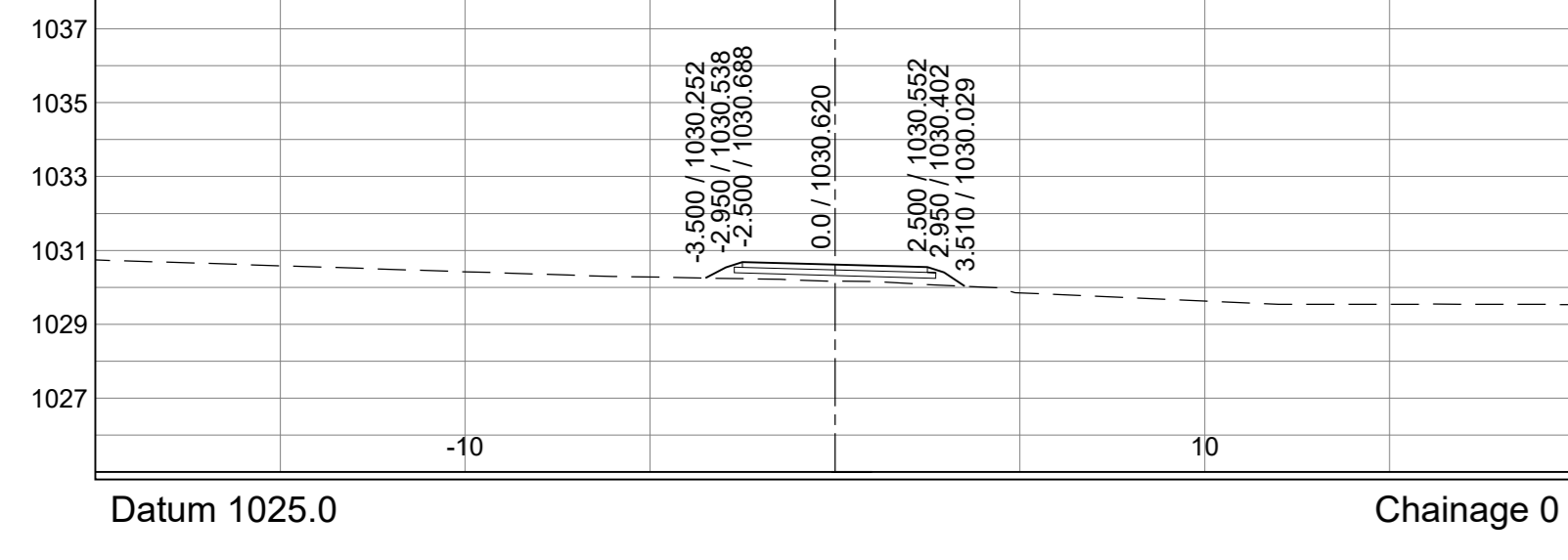
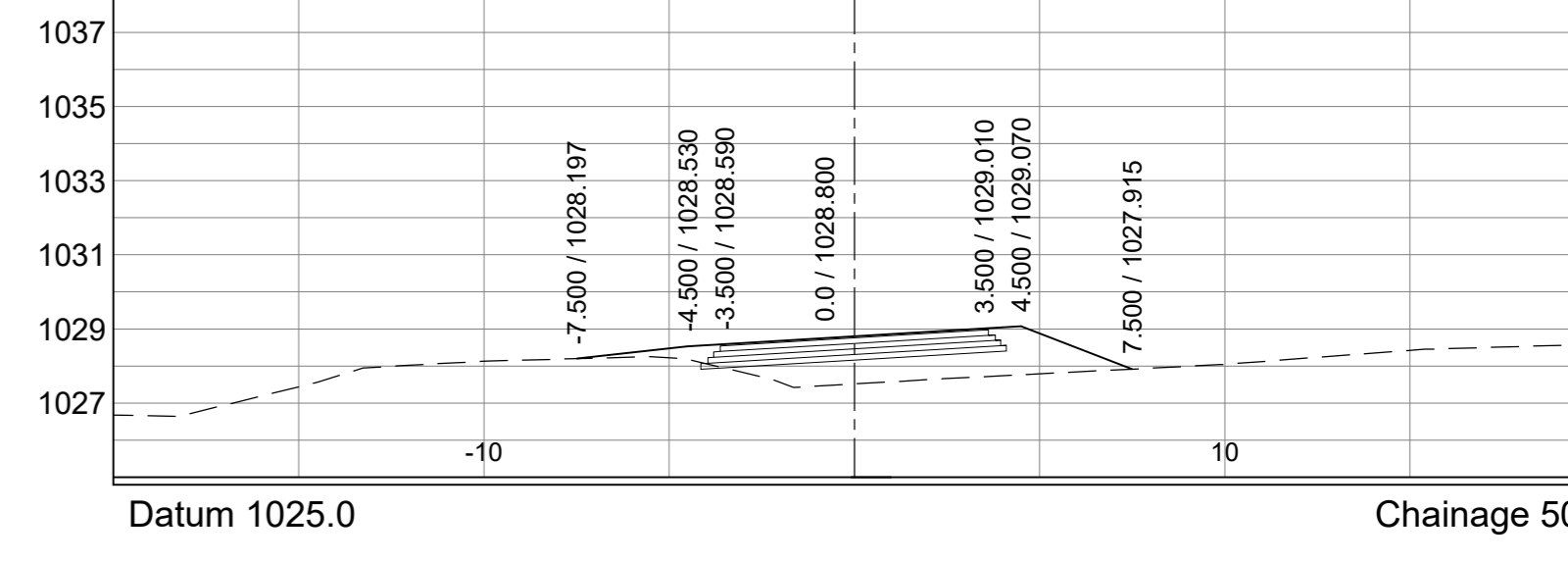
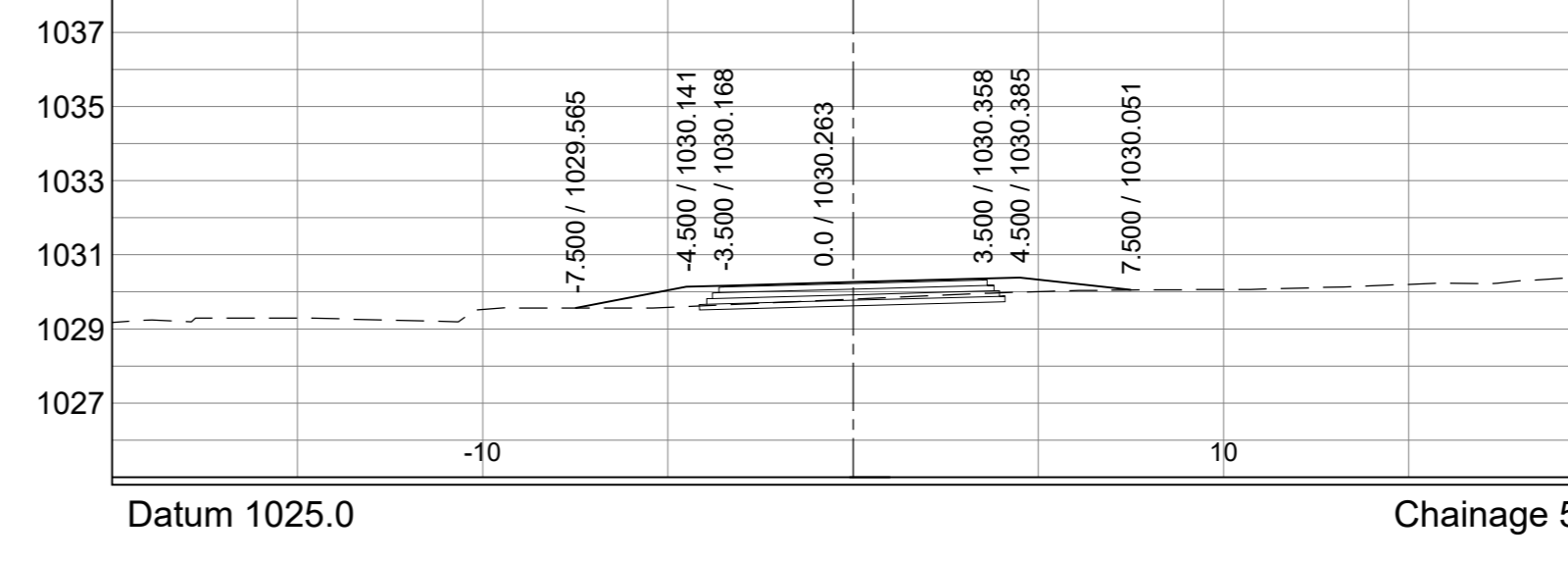
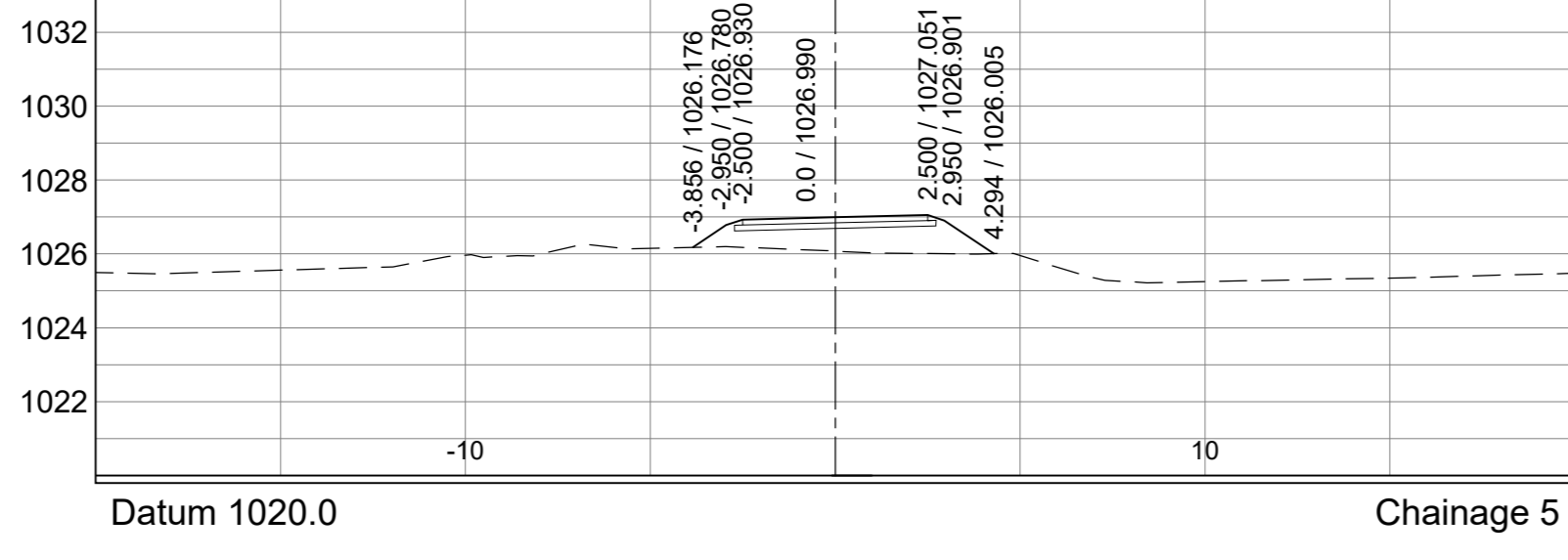
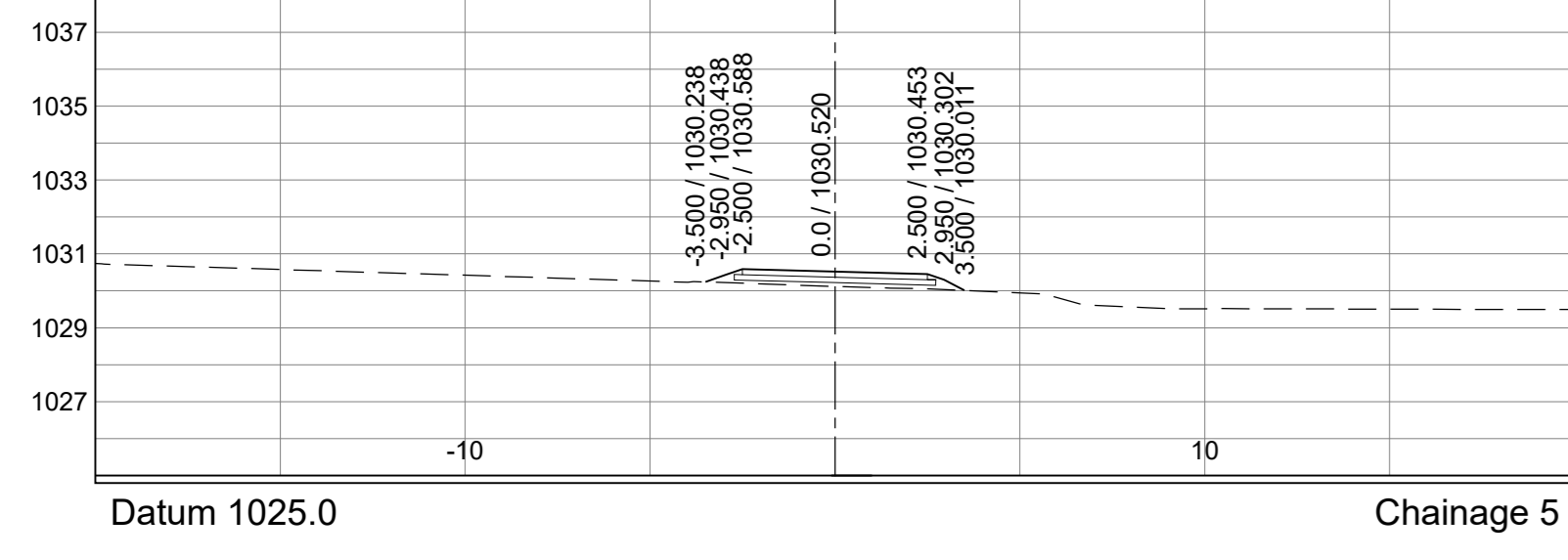
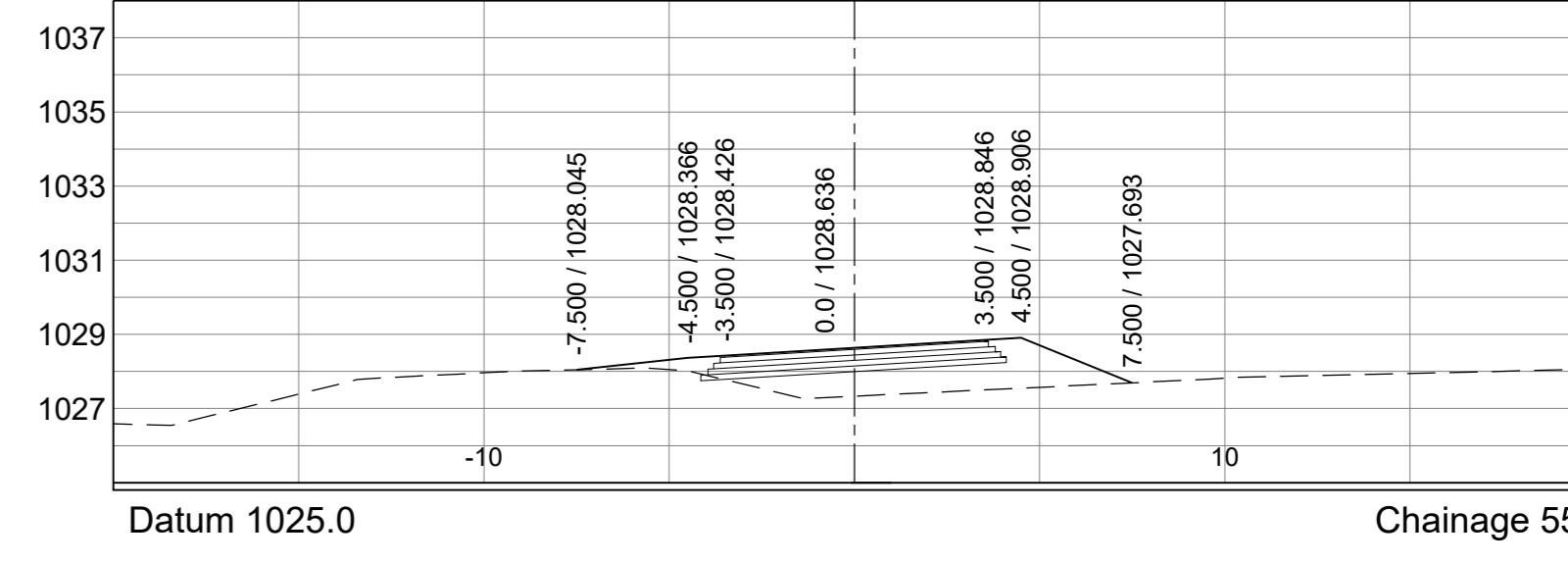
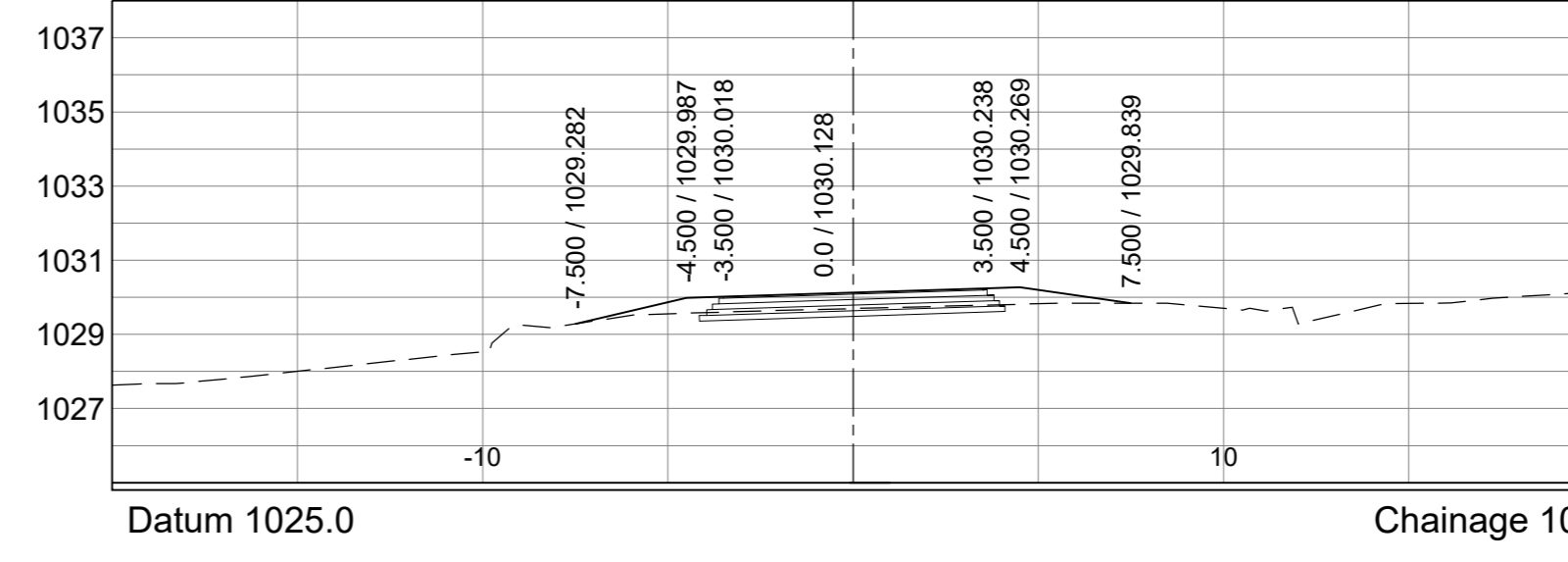
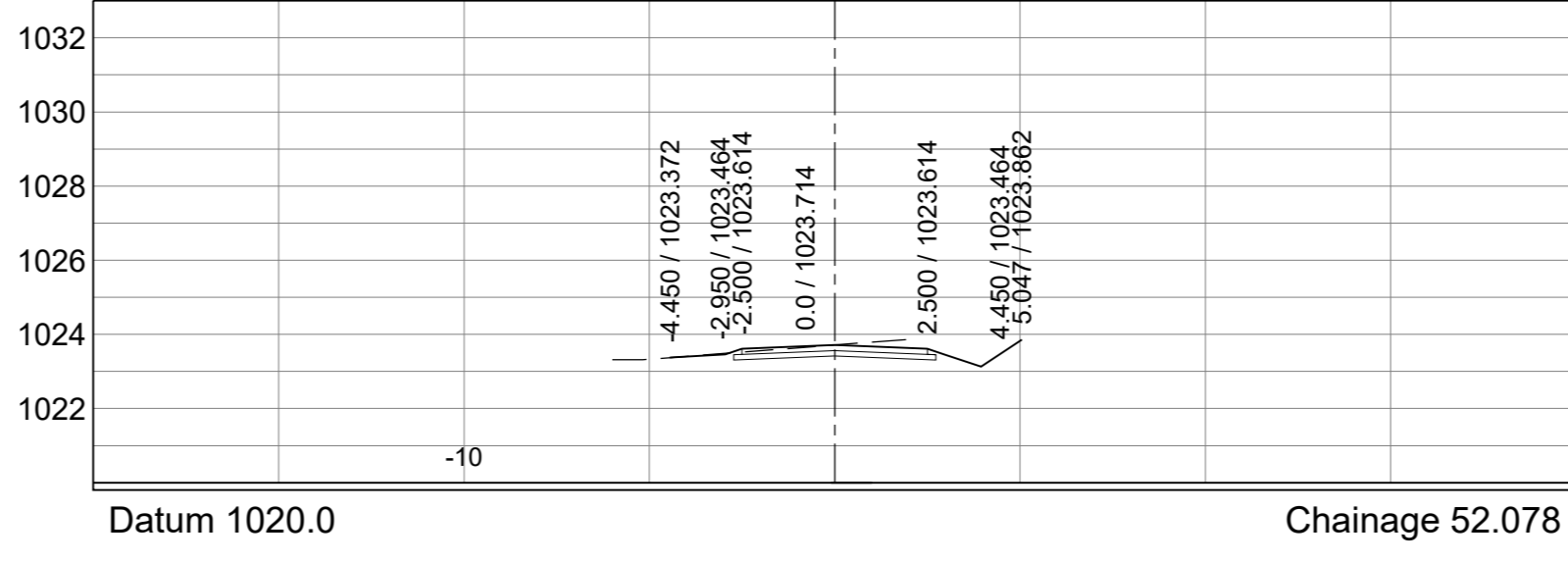
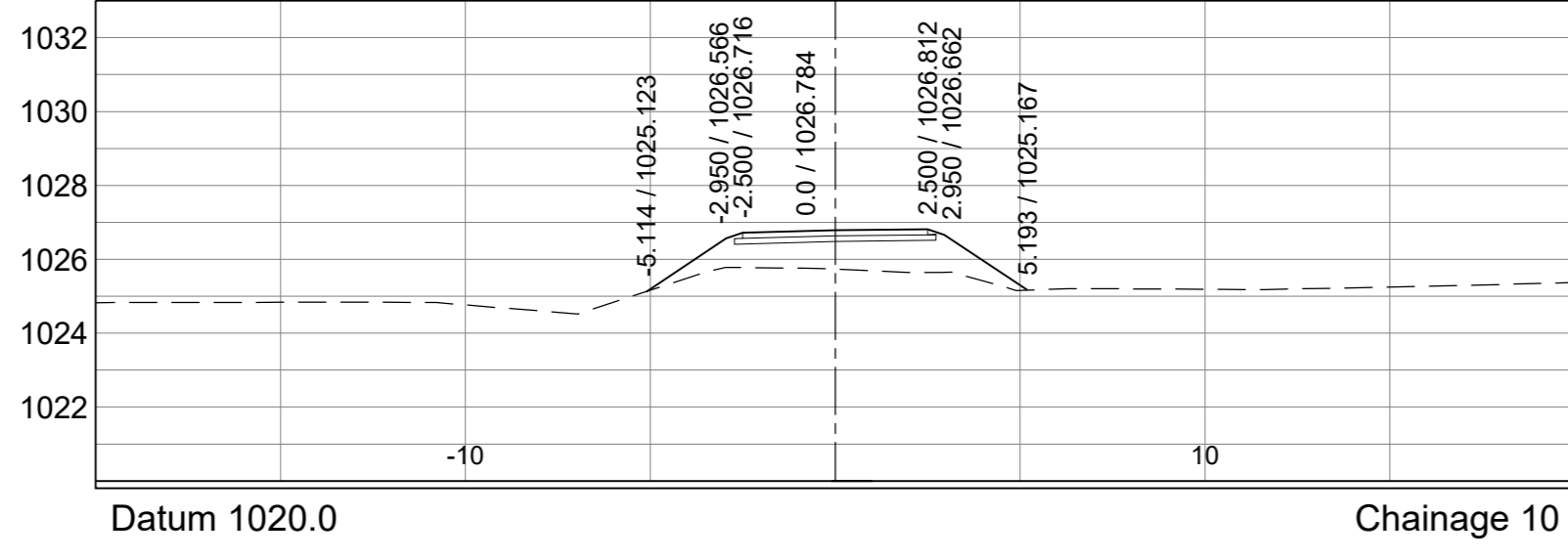
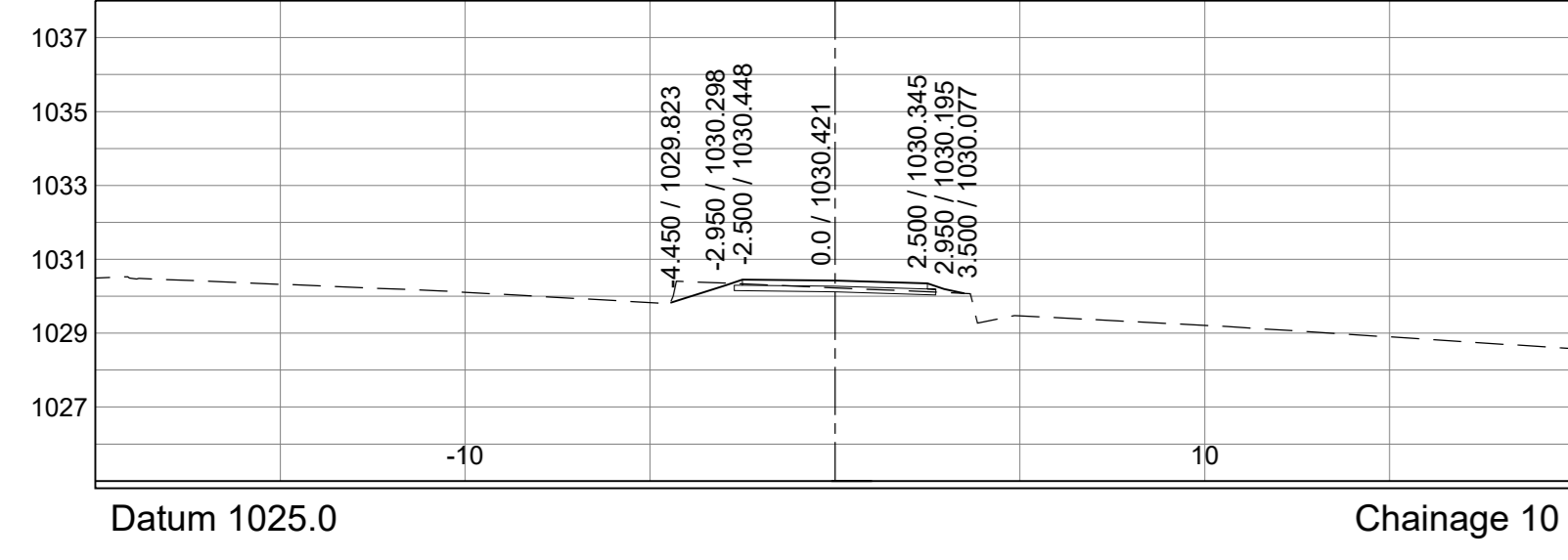
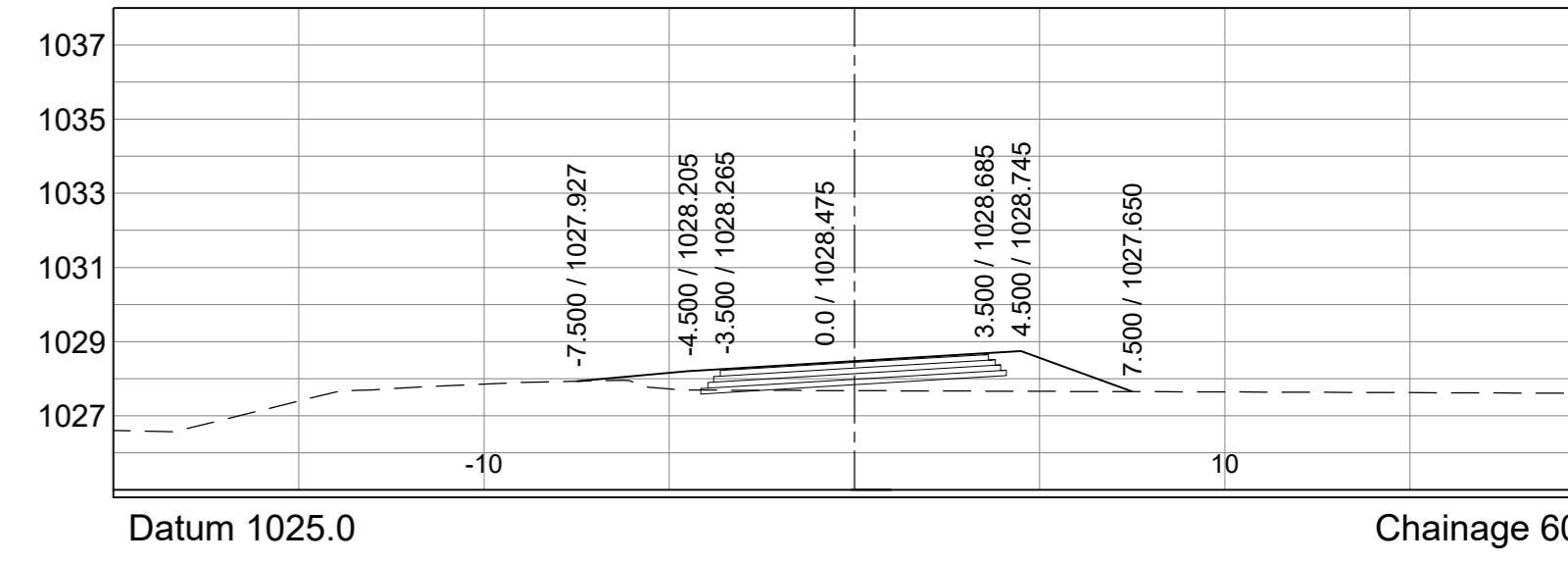
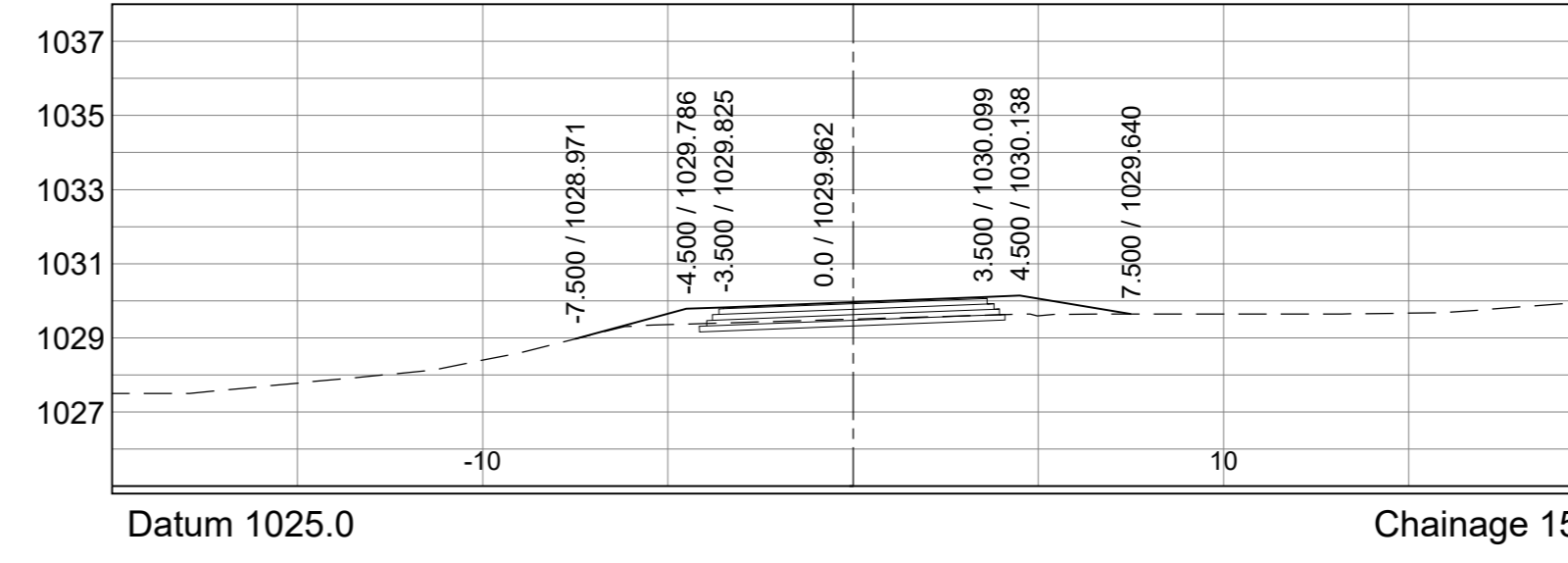
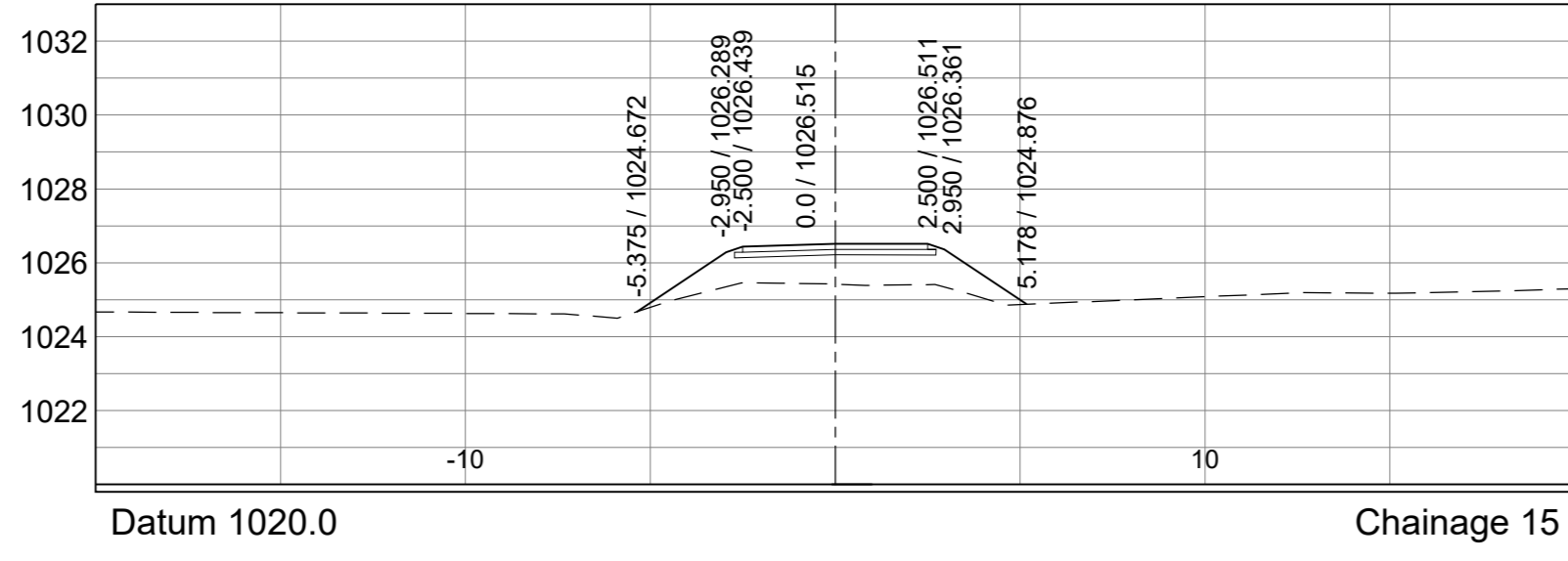
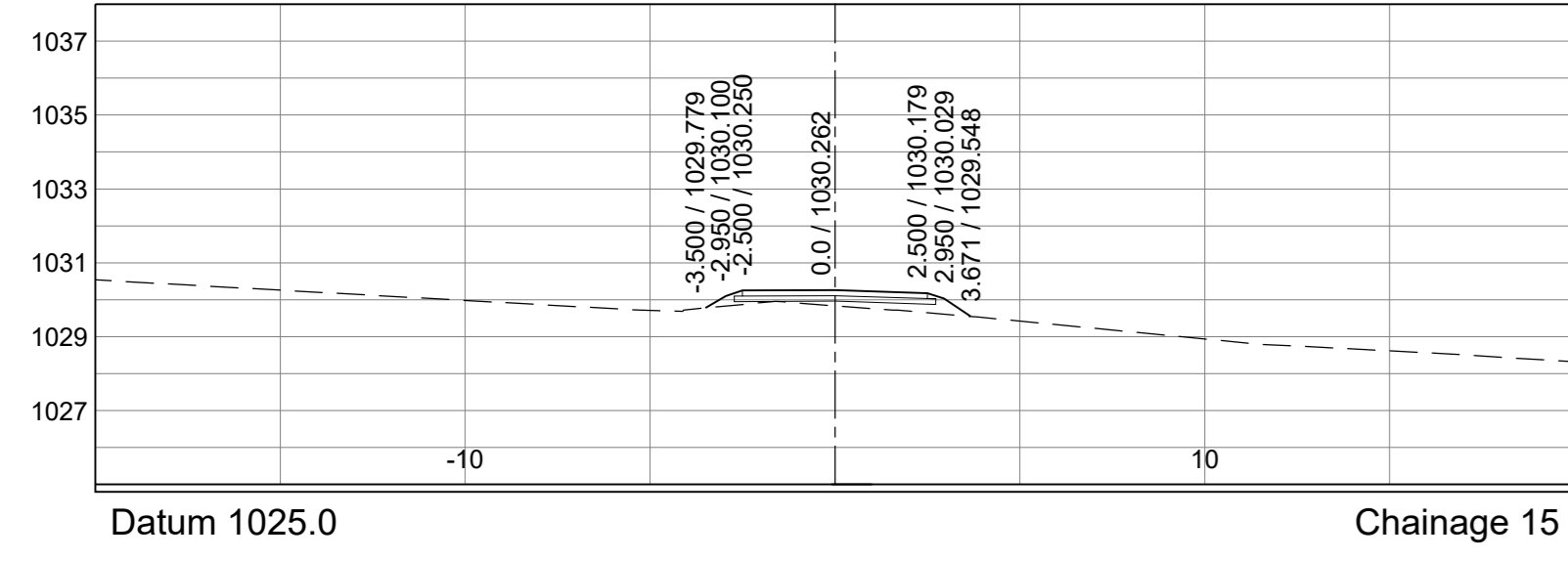
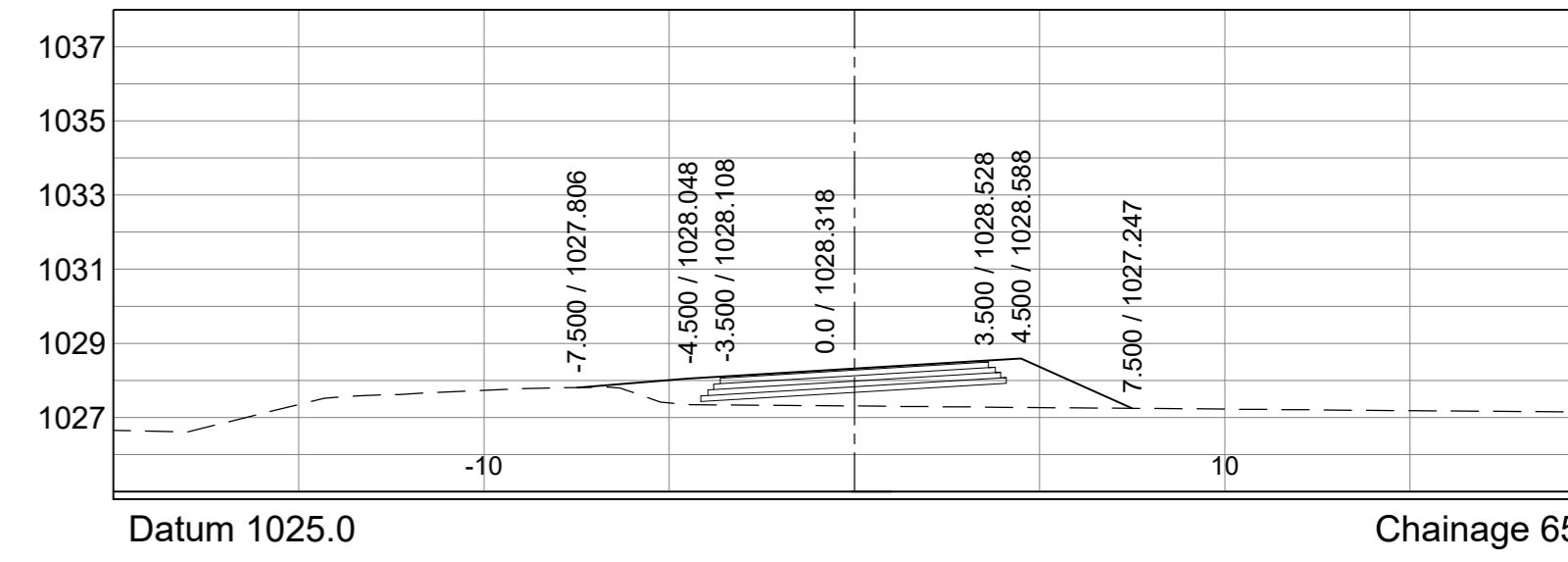
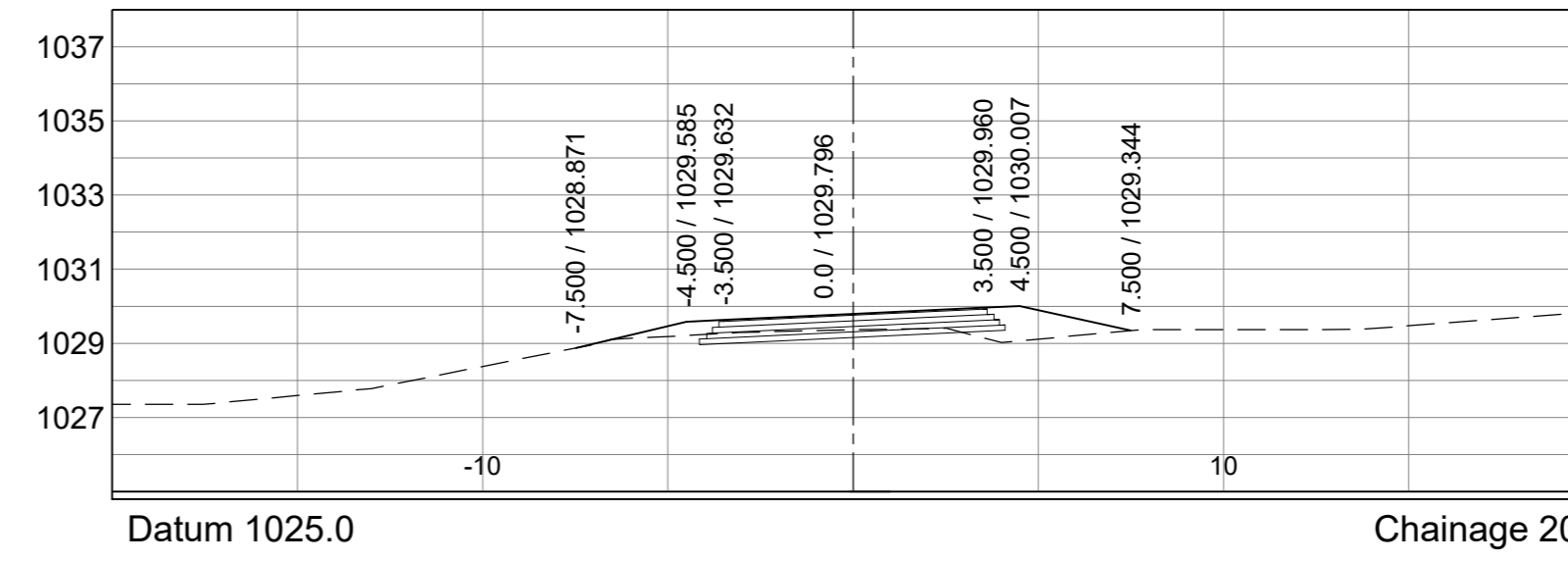
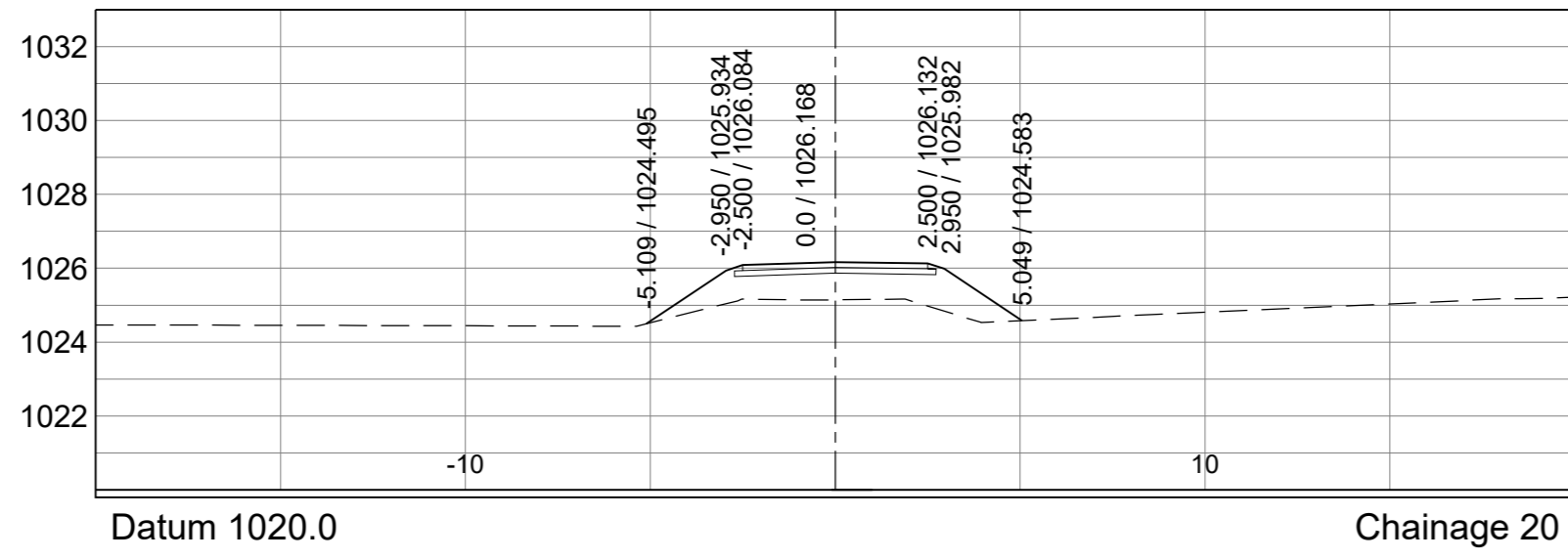
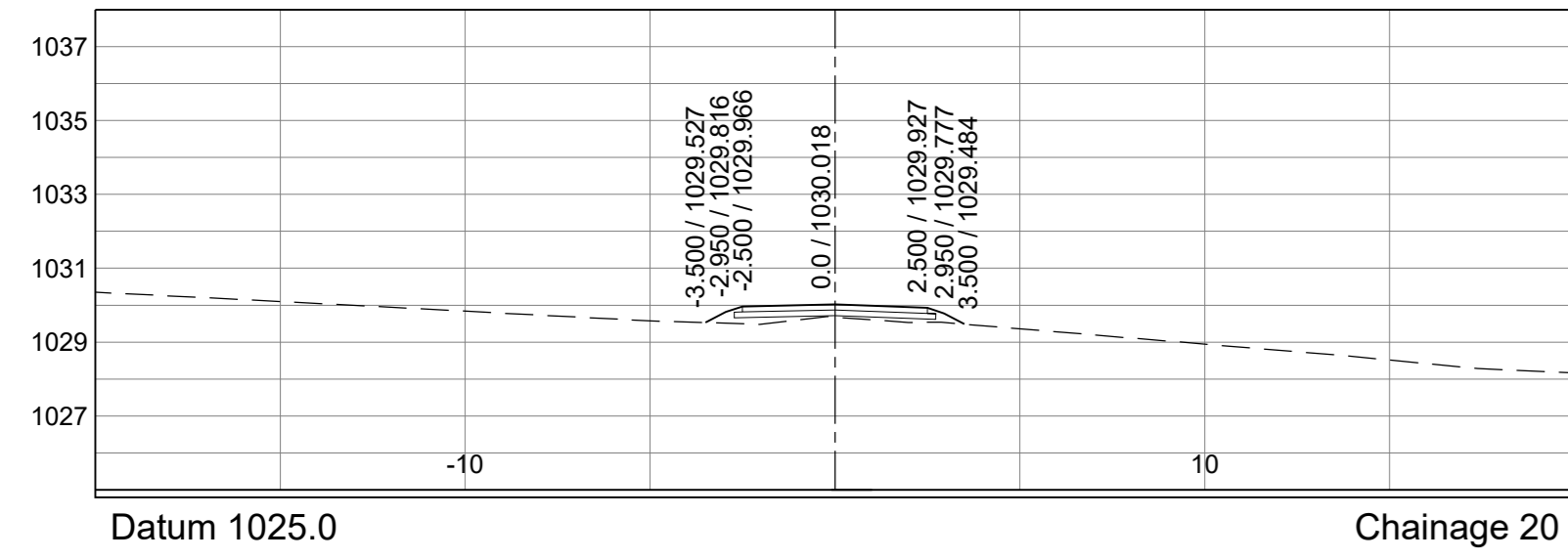
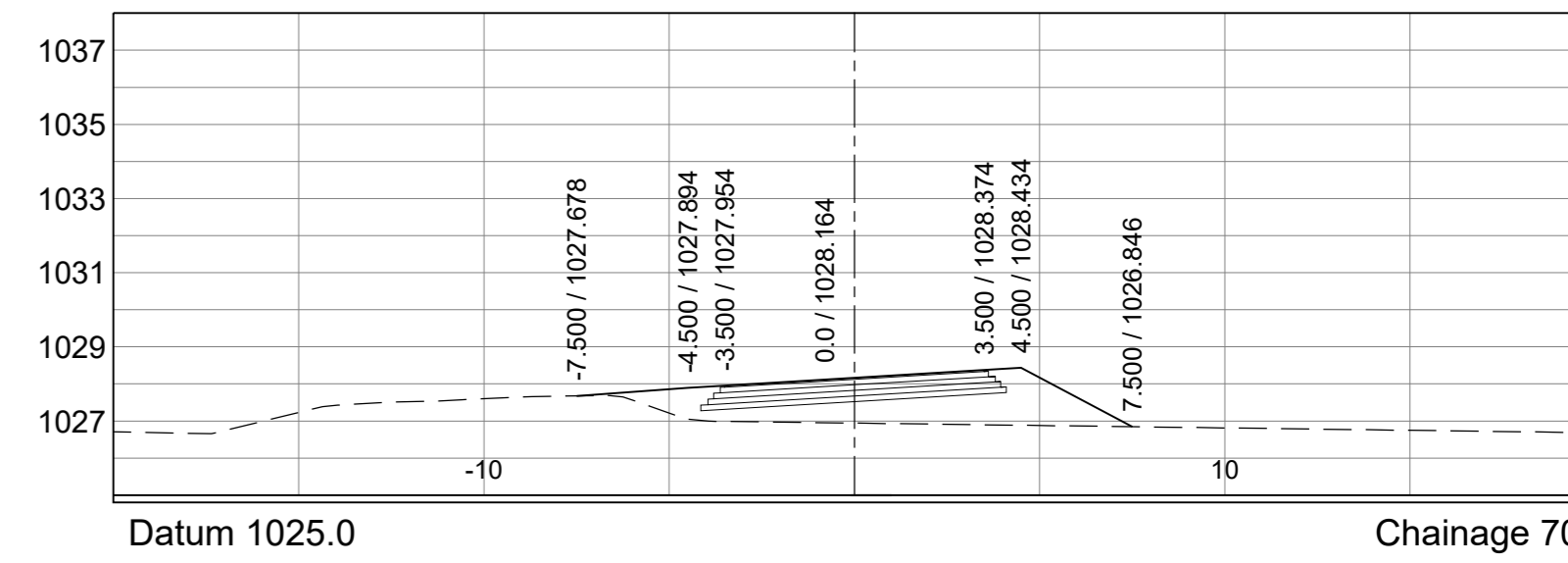
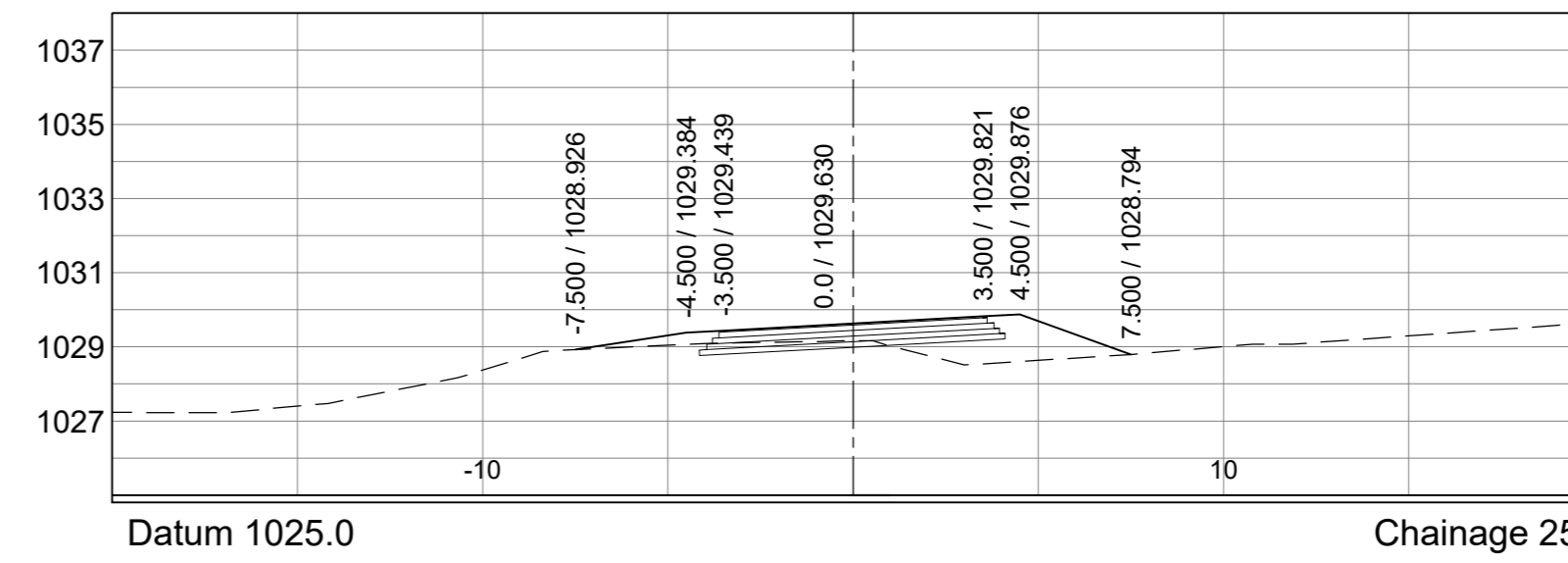
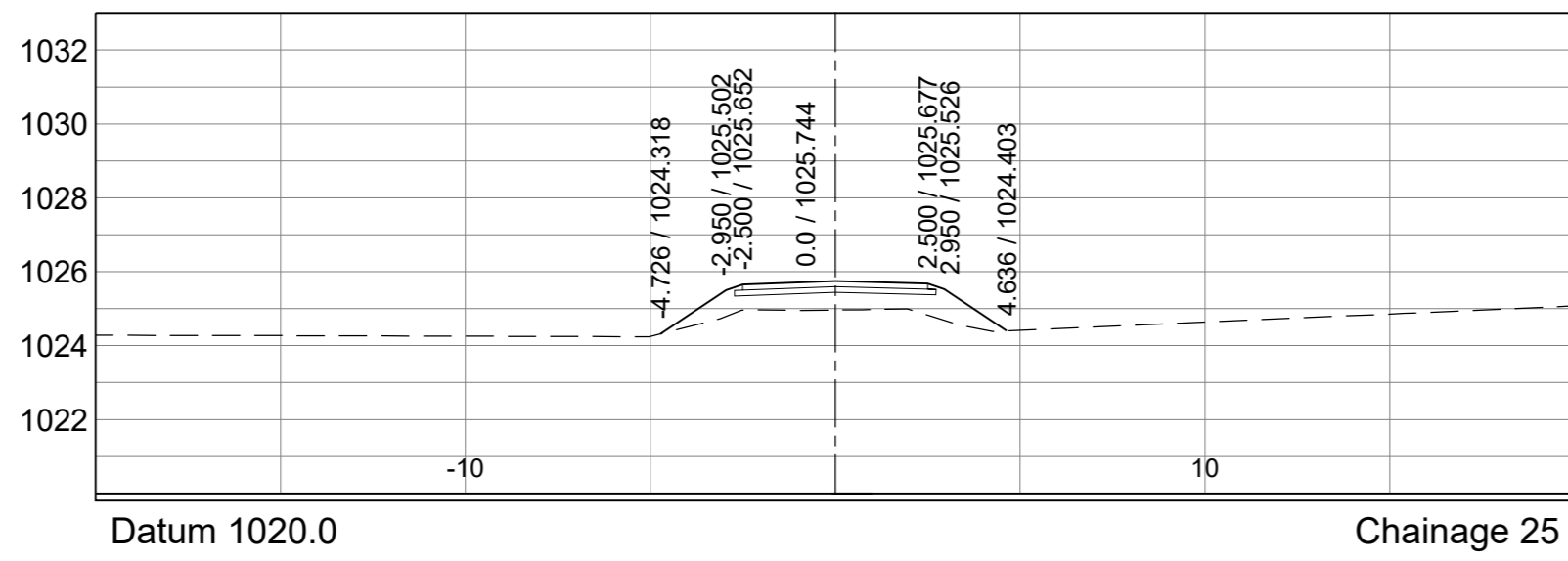
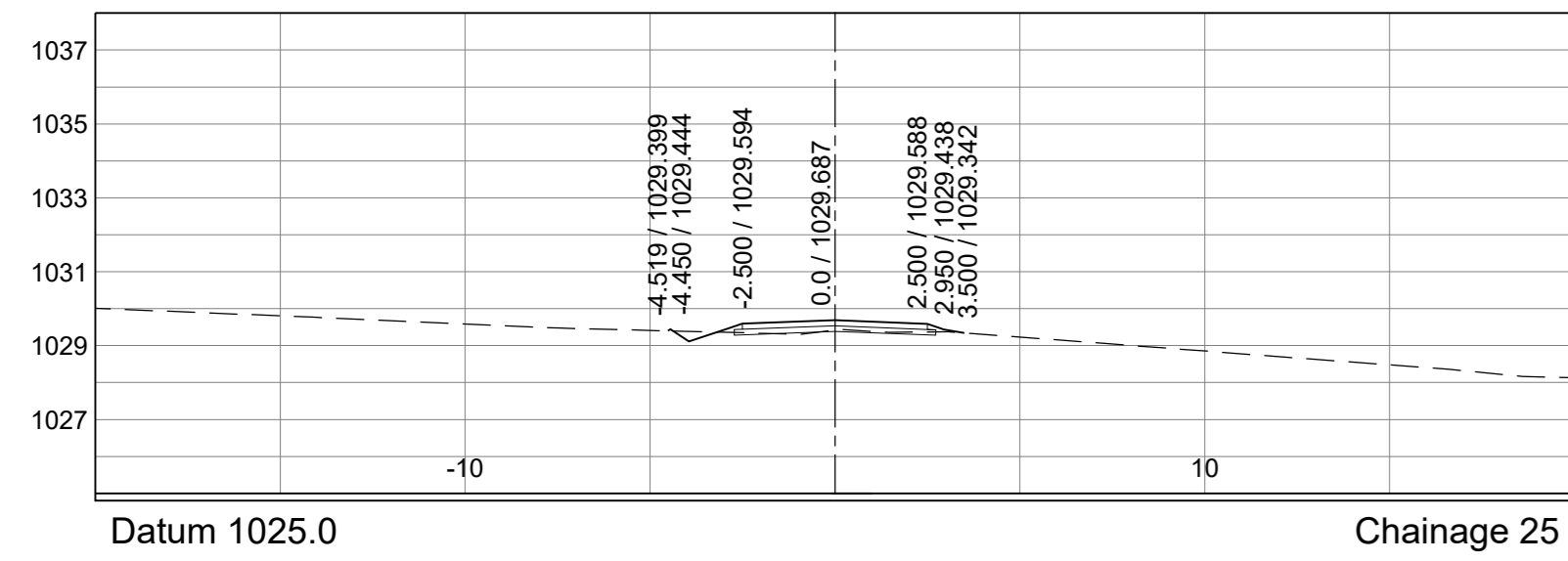
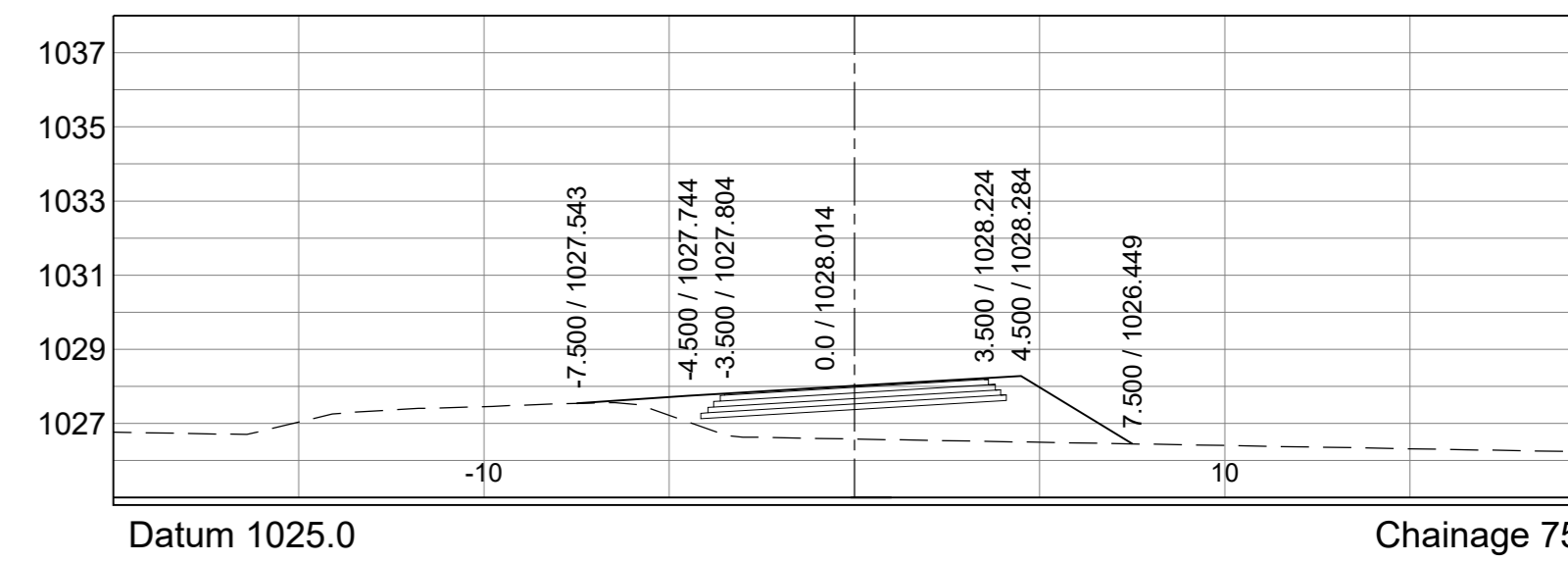
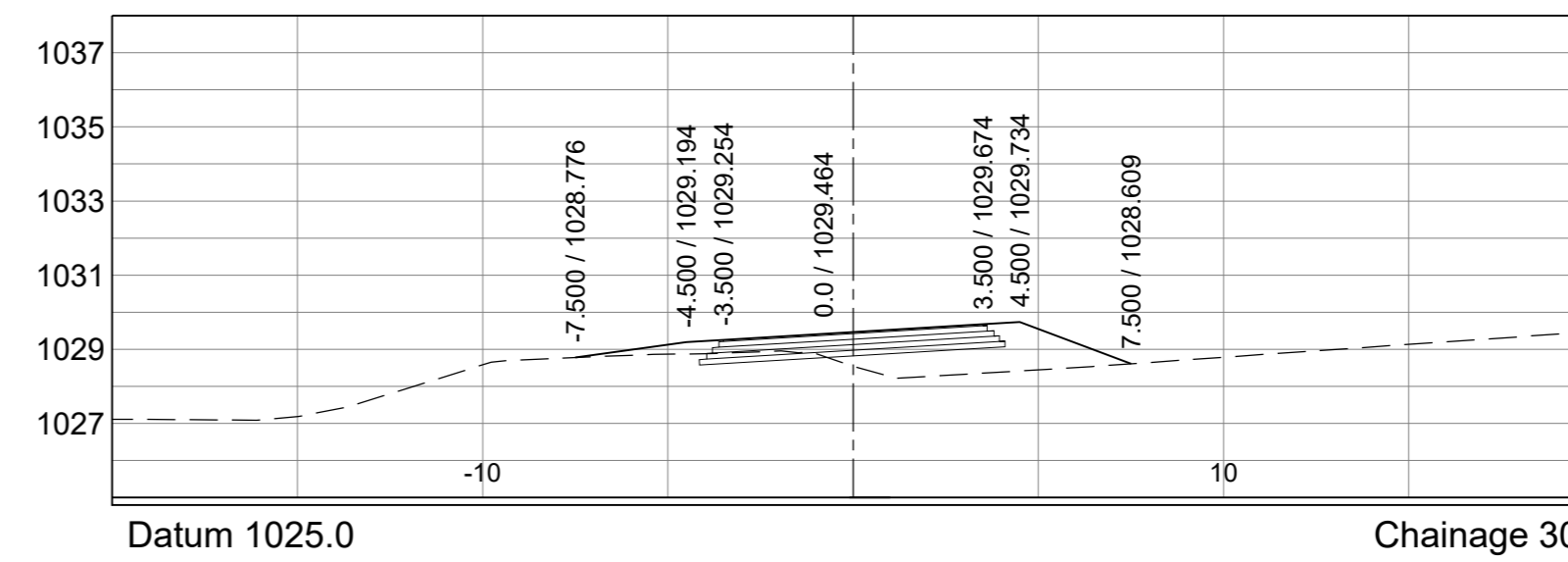
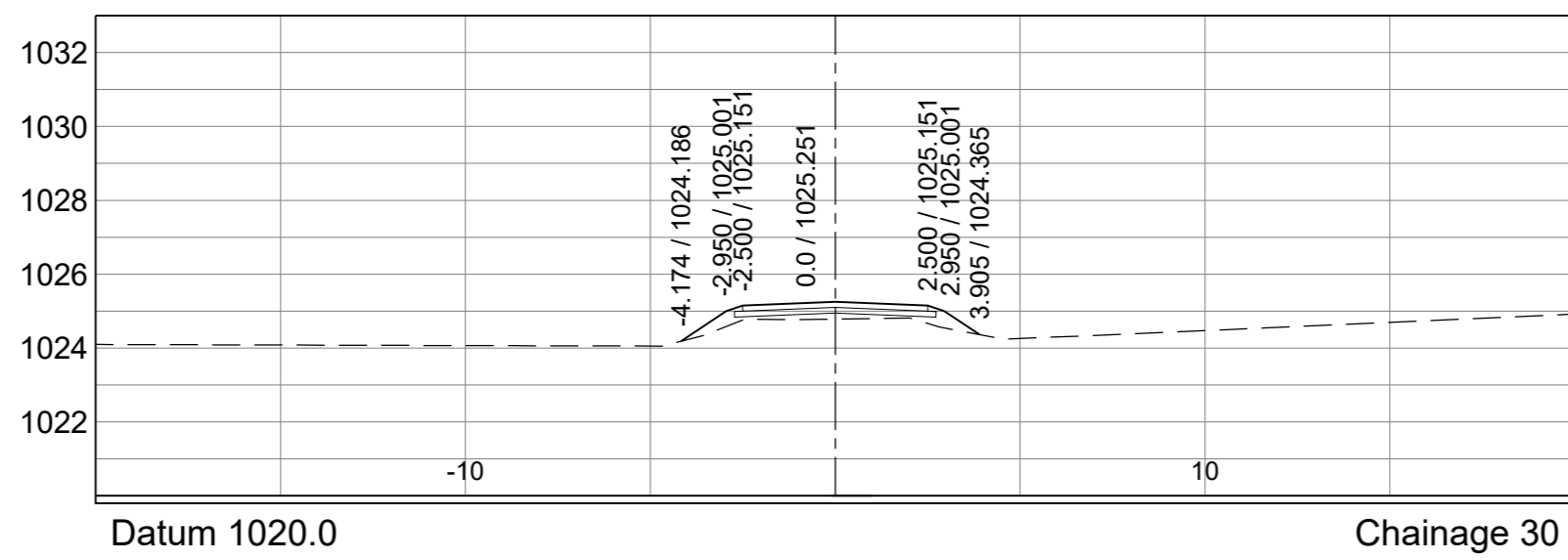
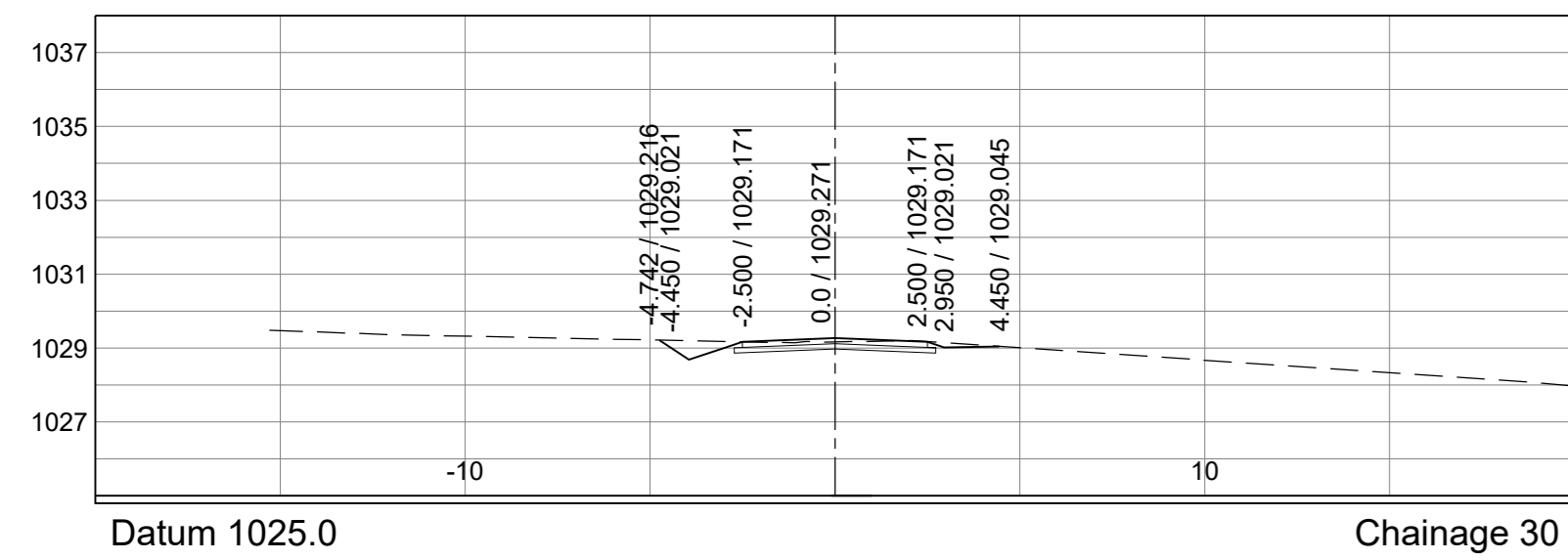
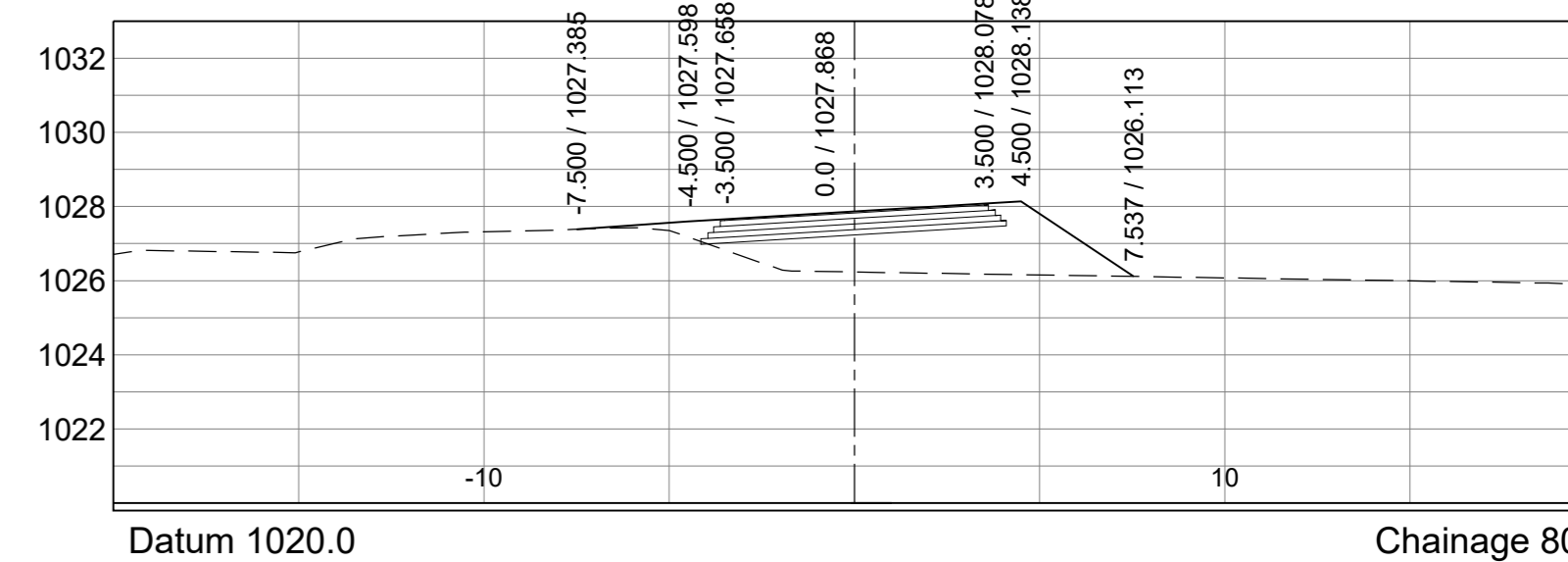
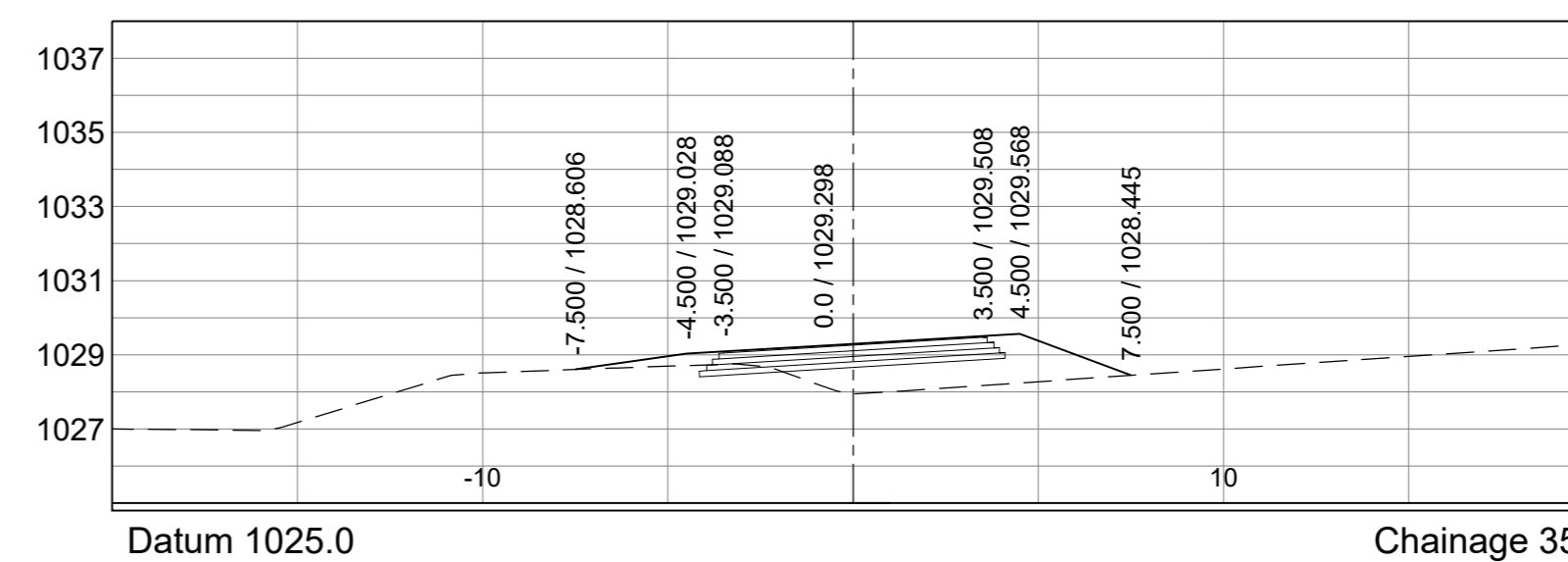
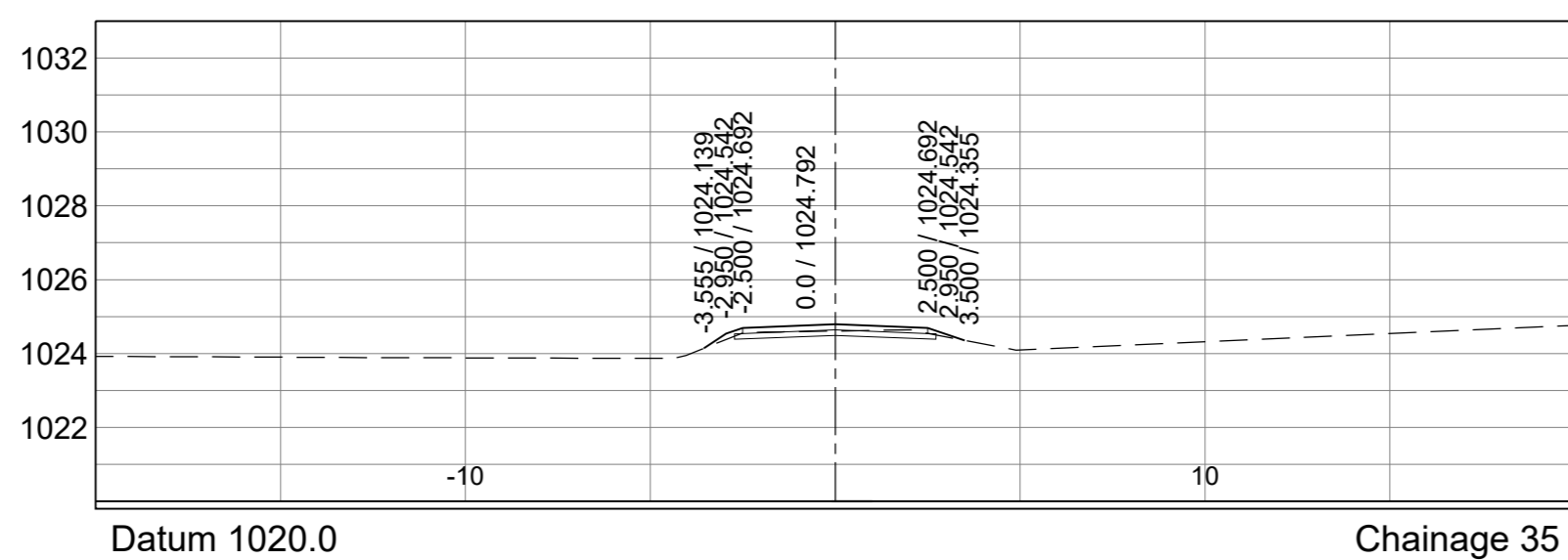
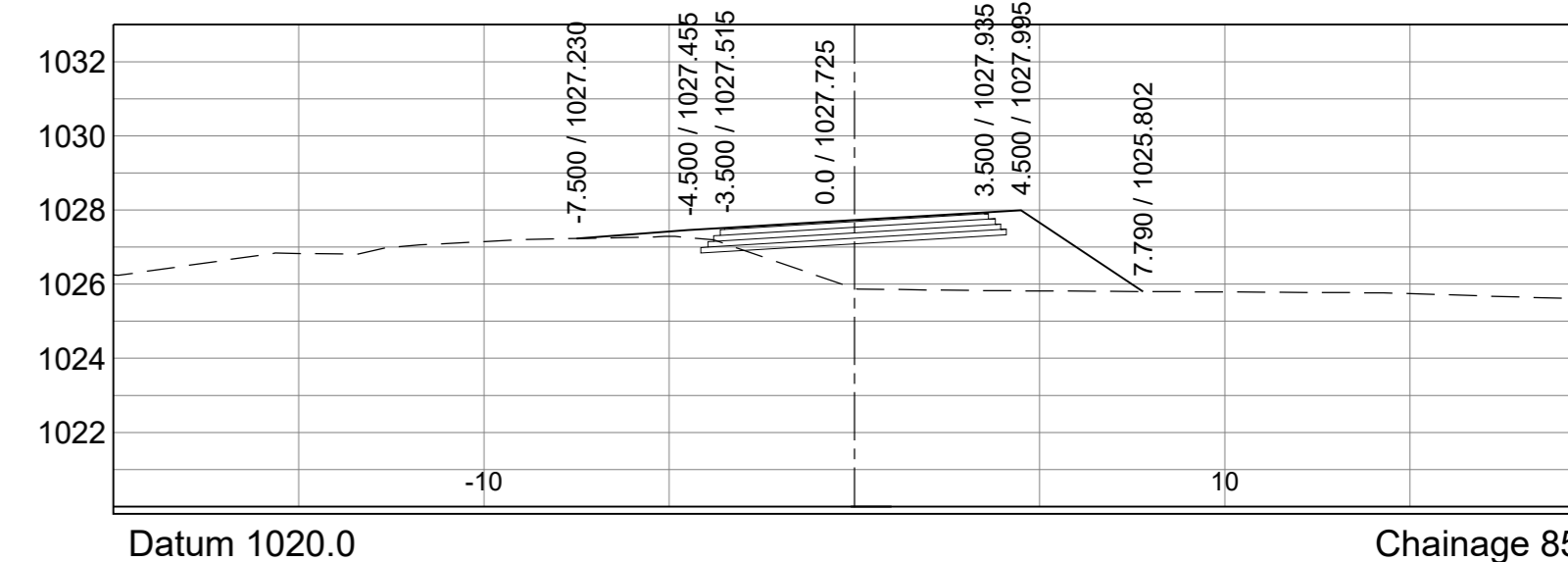
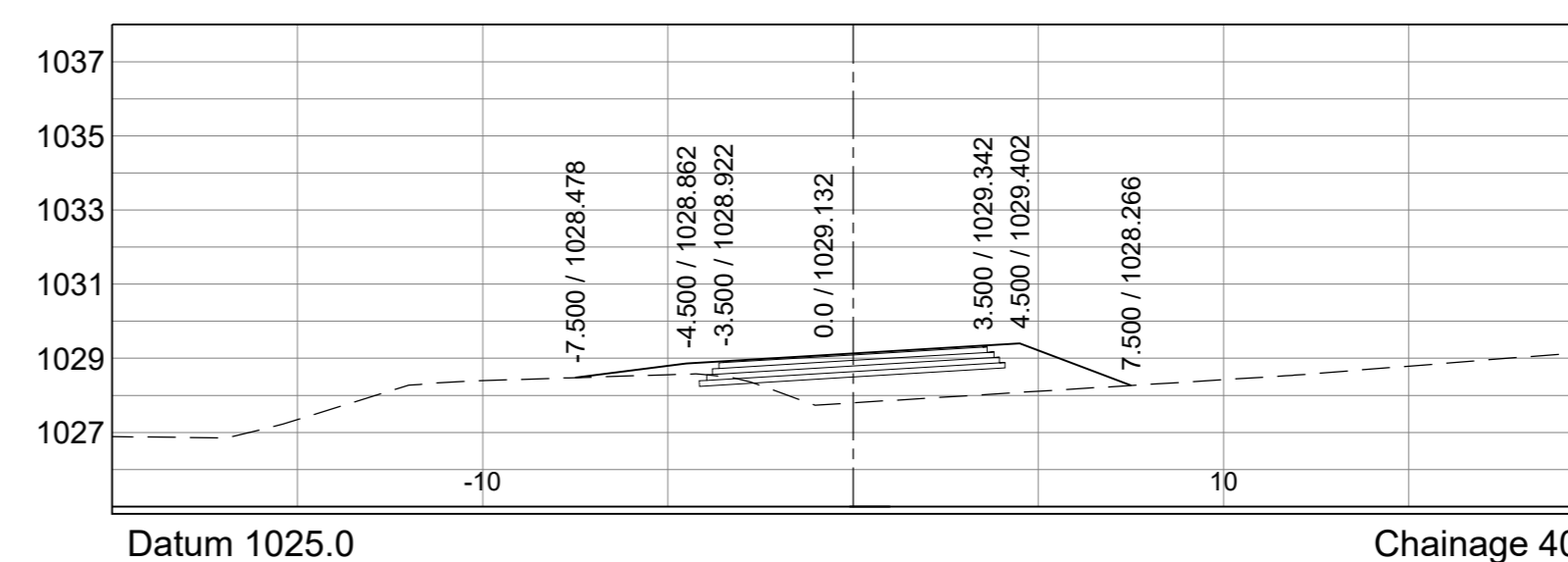
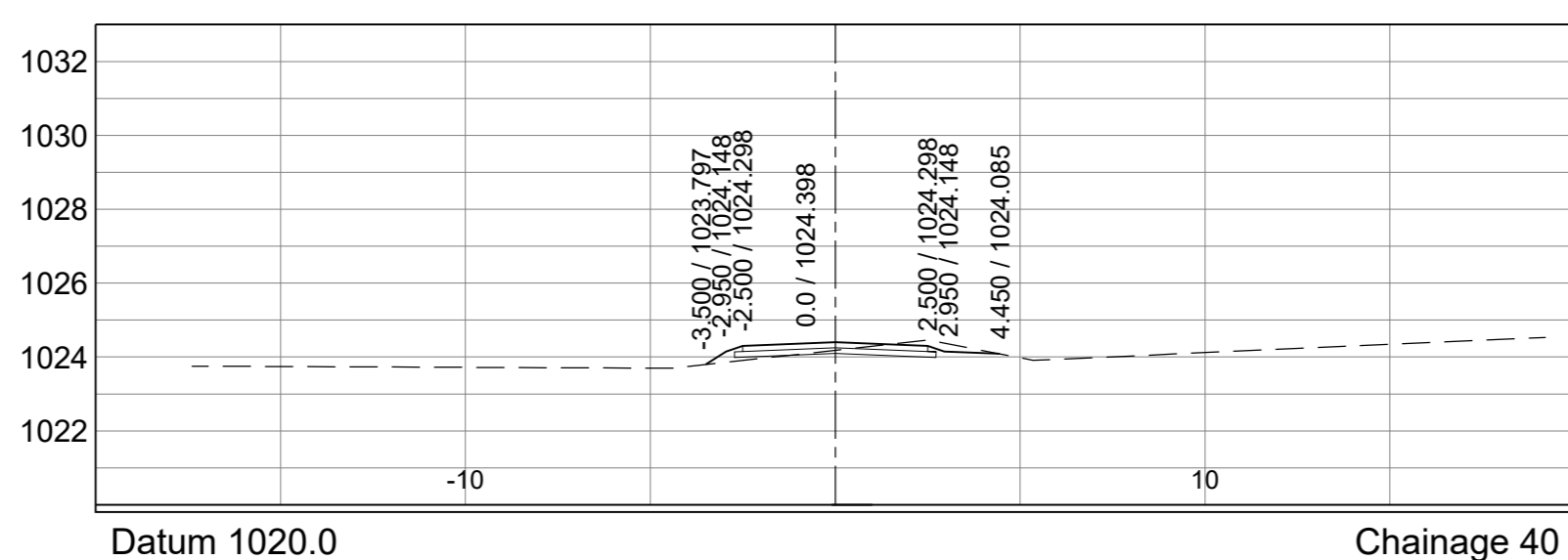
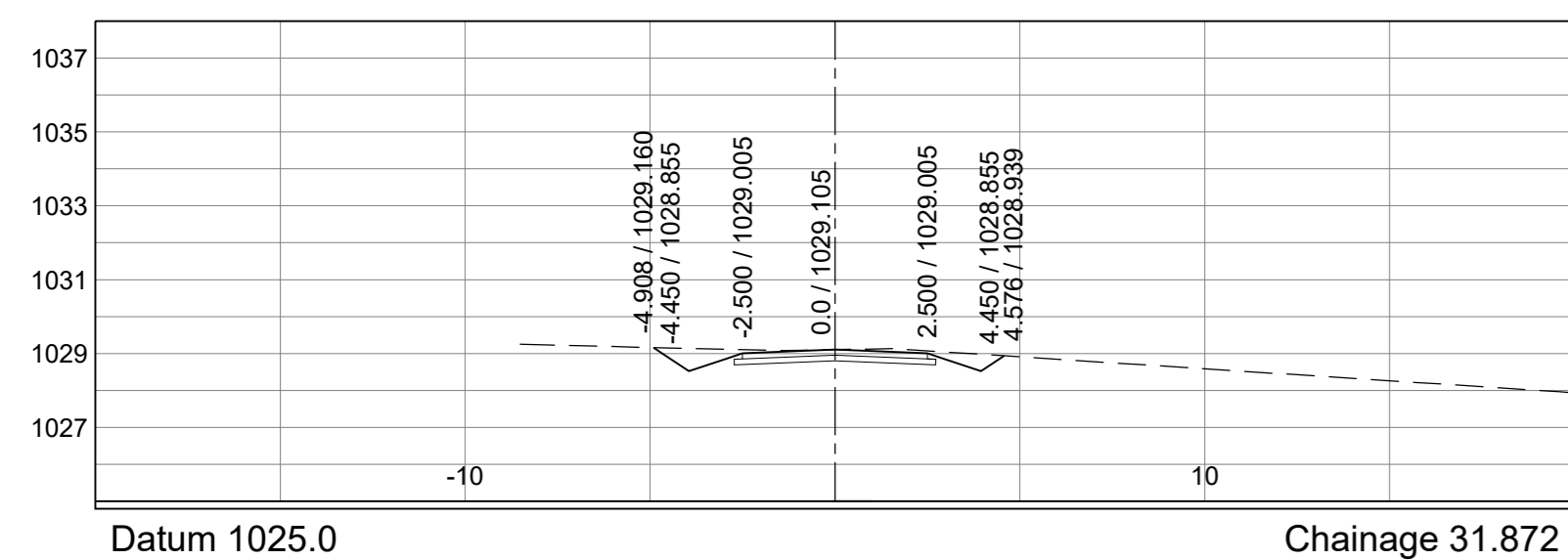
C 46544



ACCESS @ KM 0+110.216 OF  
ACCESS KM 12+458.295 RHS

ACCESS @ KM 12+458.295 RHS (D348)

ACCESS @ KM 12+448.887 LHS



AS BUILT			
Supervising Engineer	Date	Checked	Signed
AMENDMENTS			
Symbol	Date	Description	Checked
A	01-02-2024	ISSUED FOR TENDER	YD

Continued from:-	C 44330	Designed by:-	Y. DOMA
Continued on:-	C 44332	Checked by:-	N. NGUBANE
Cross Section No:-	C 44331	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44324 - C 44325	Checked by:-	Y. DOMA
Design Plan No:-	C 44313	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport

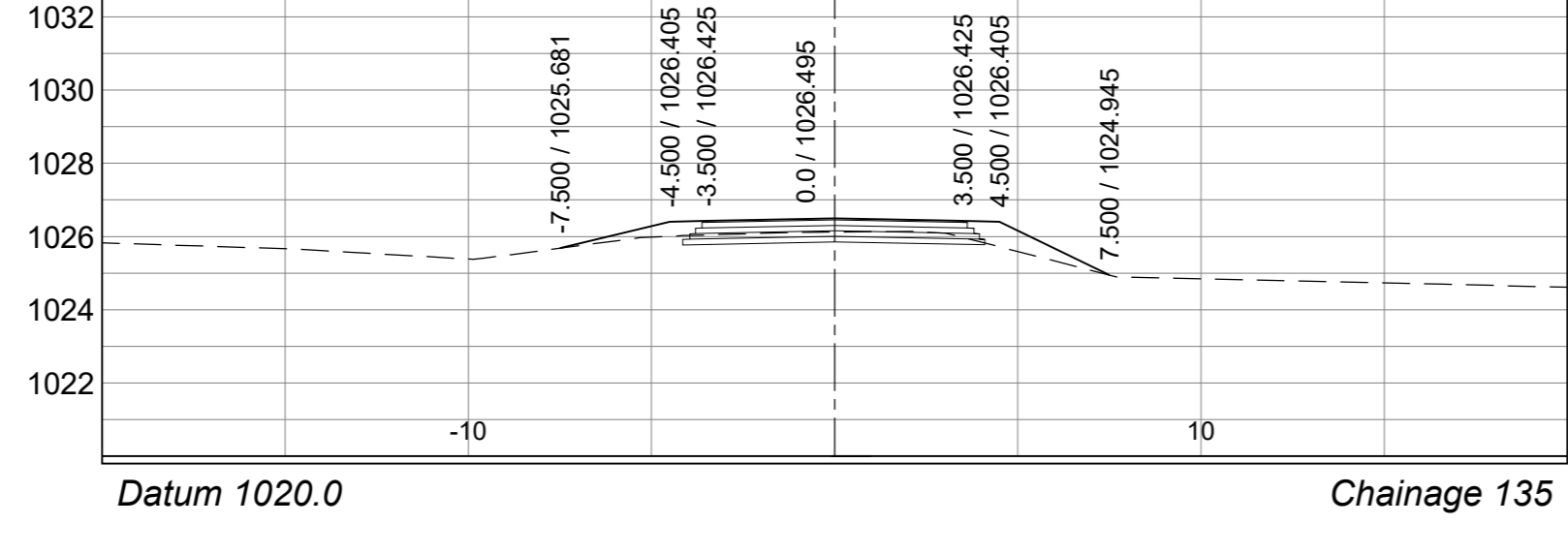
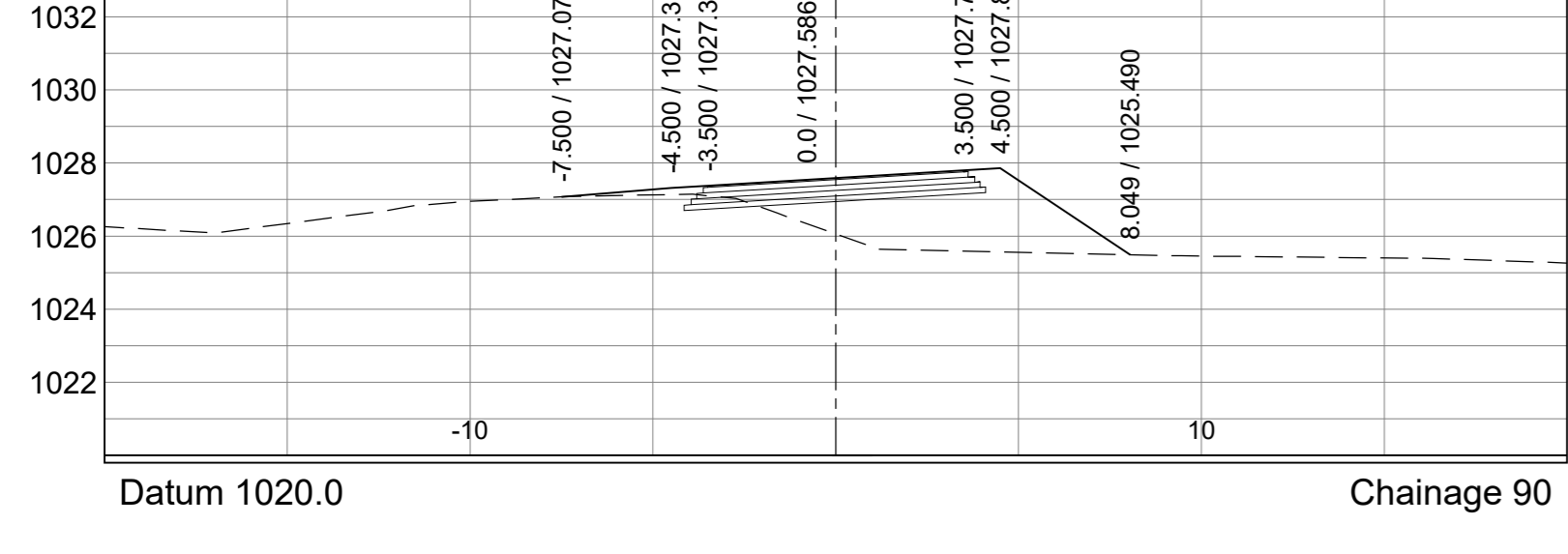
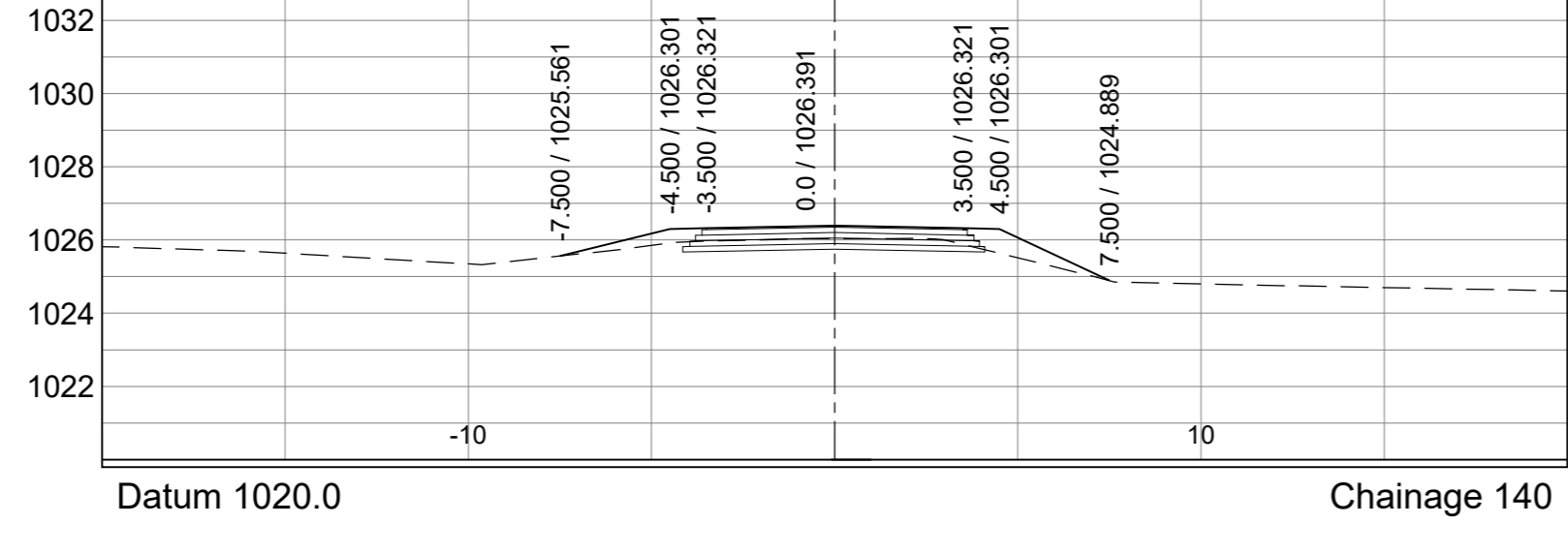
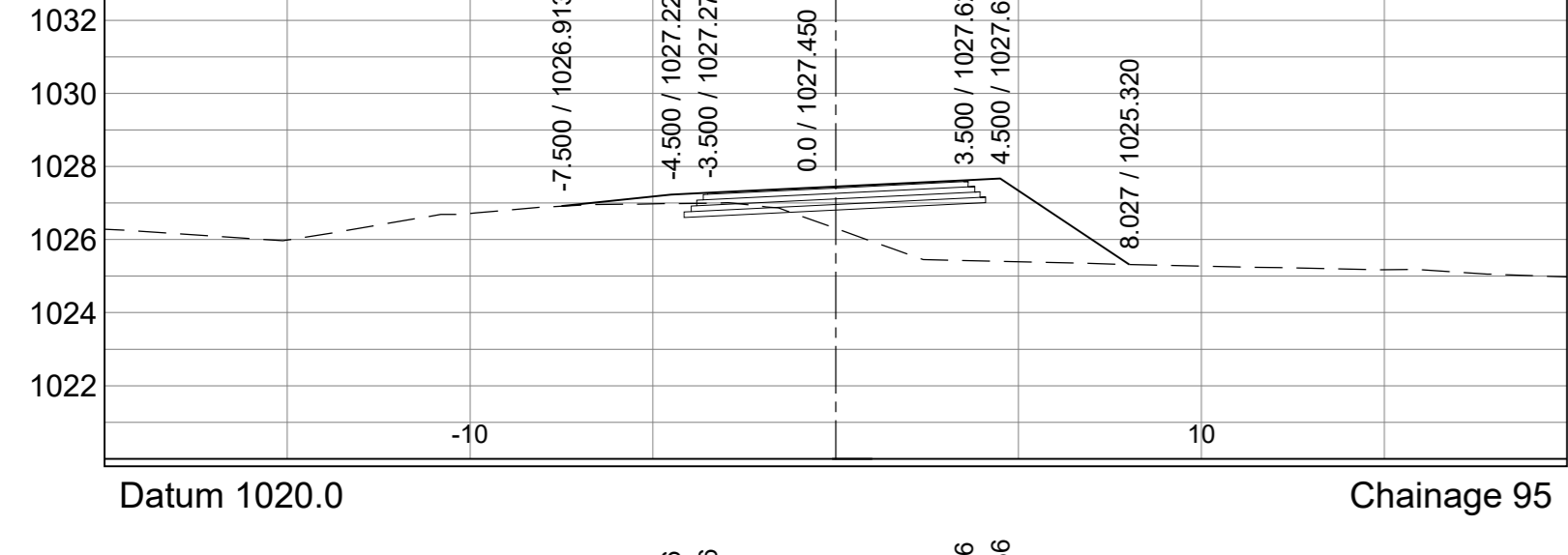
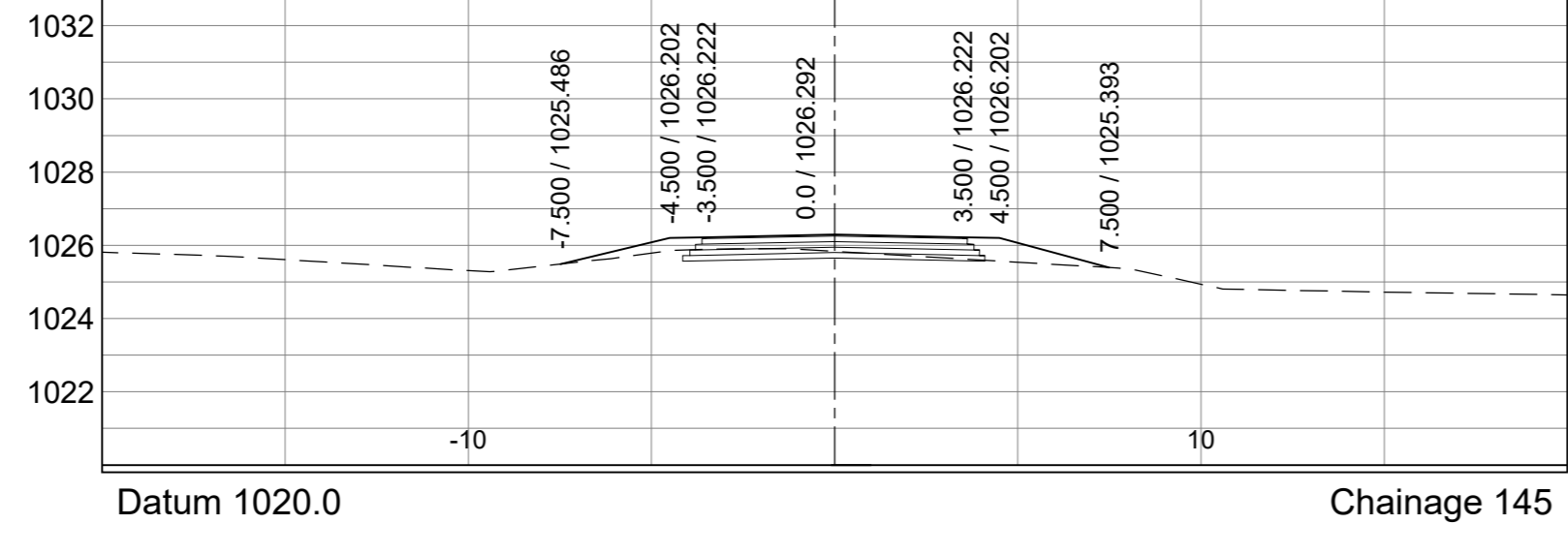
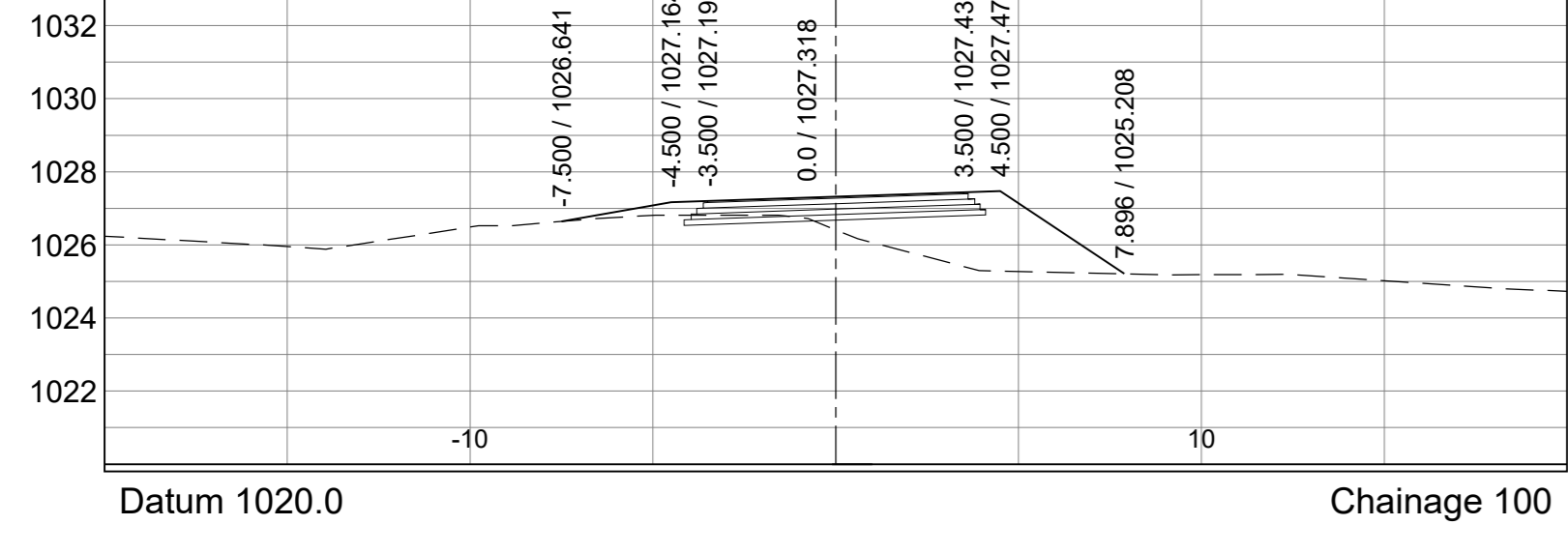
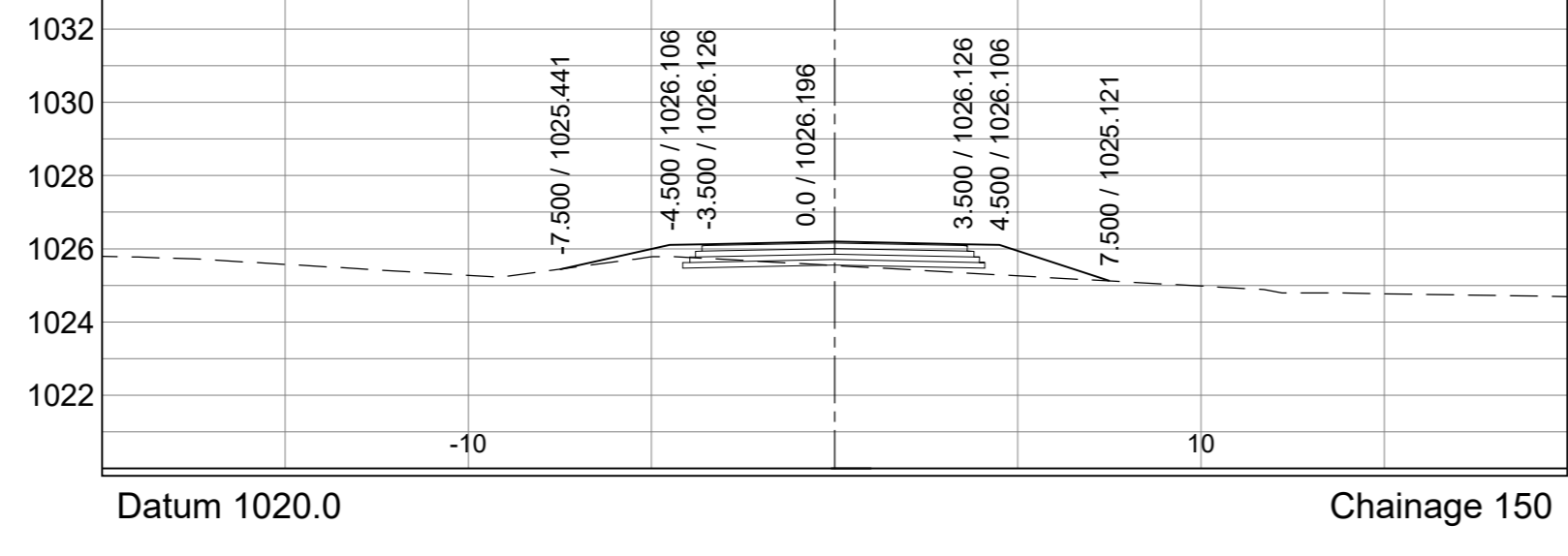
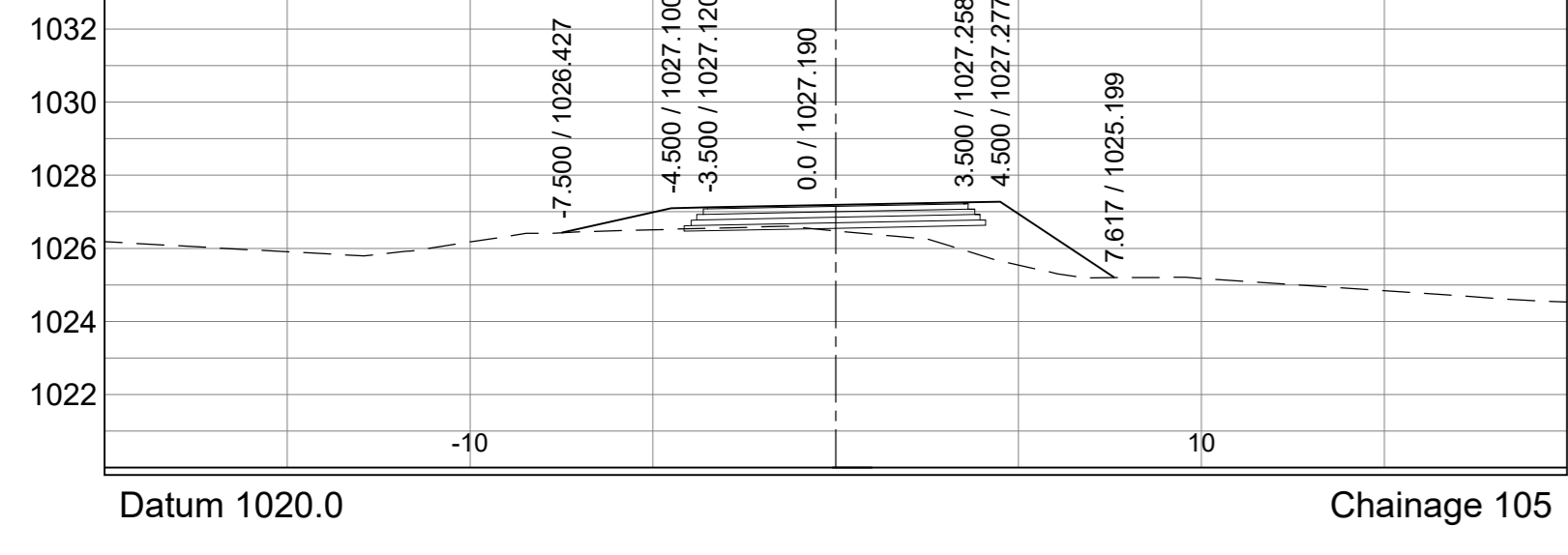
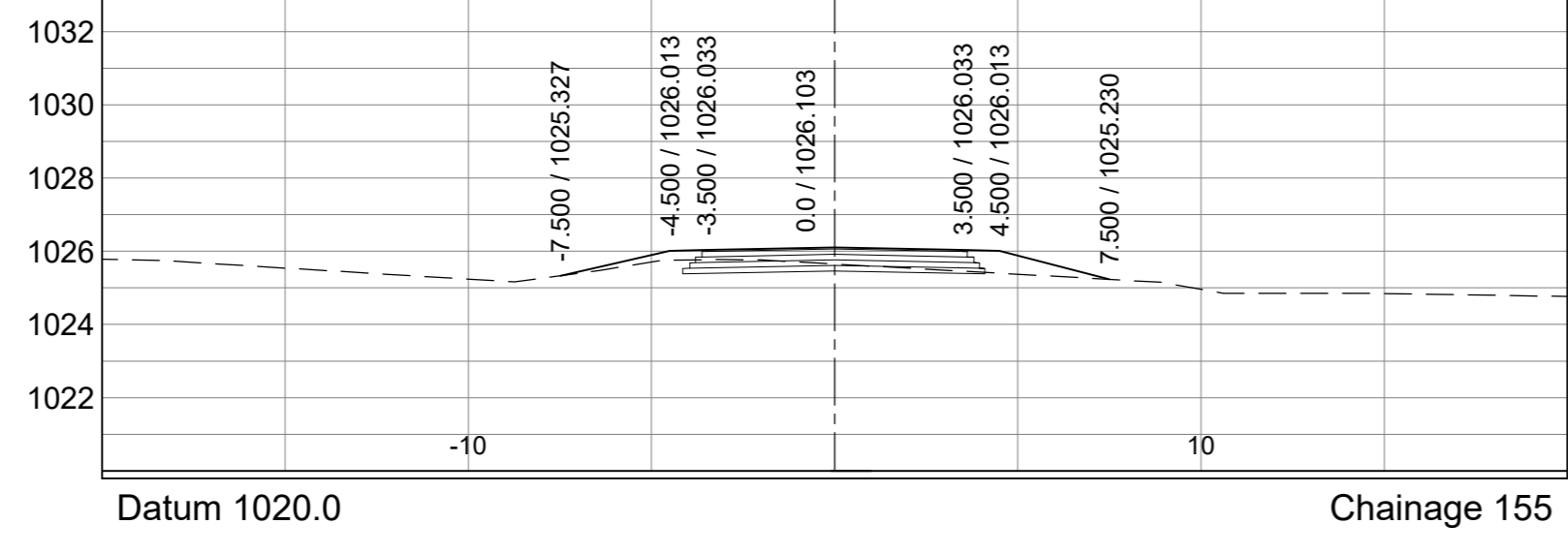
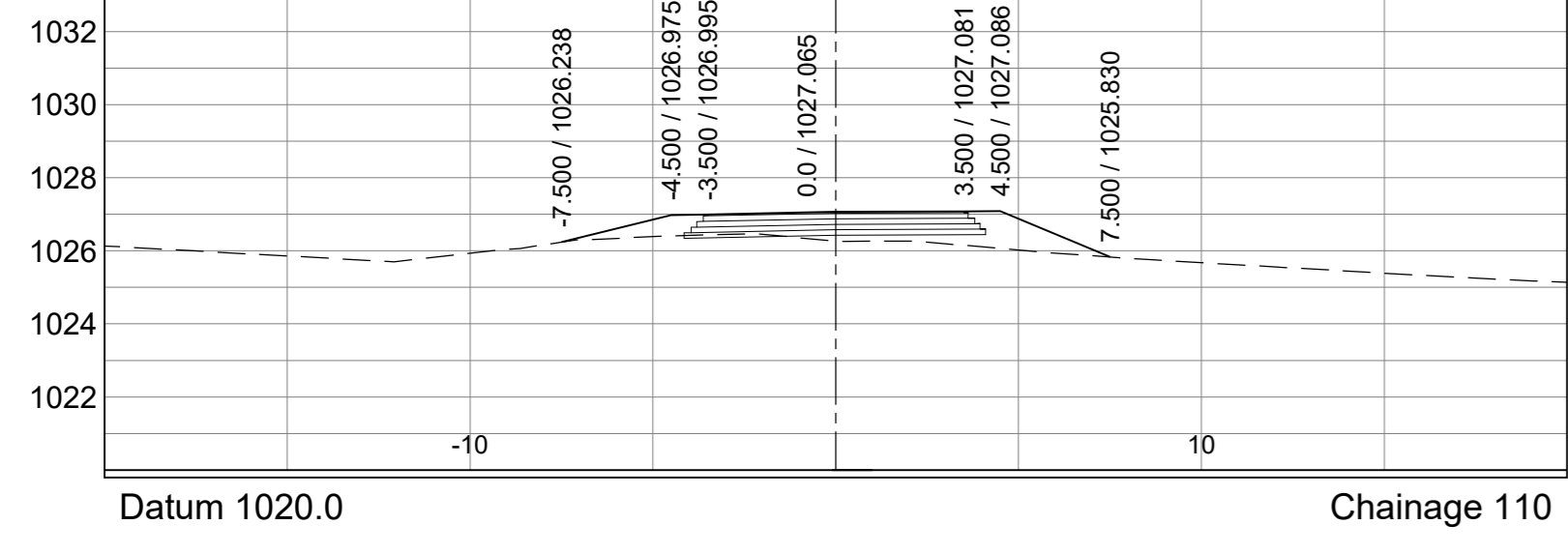
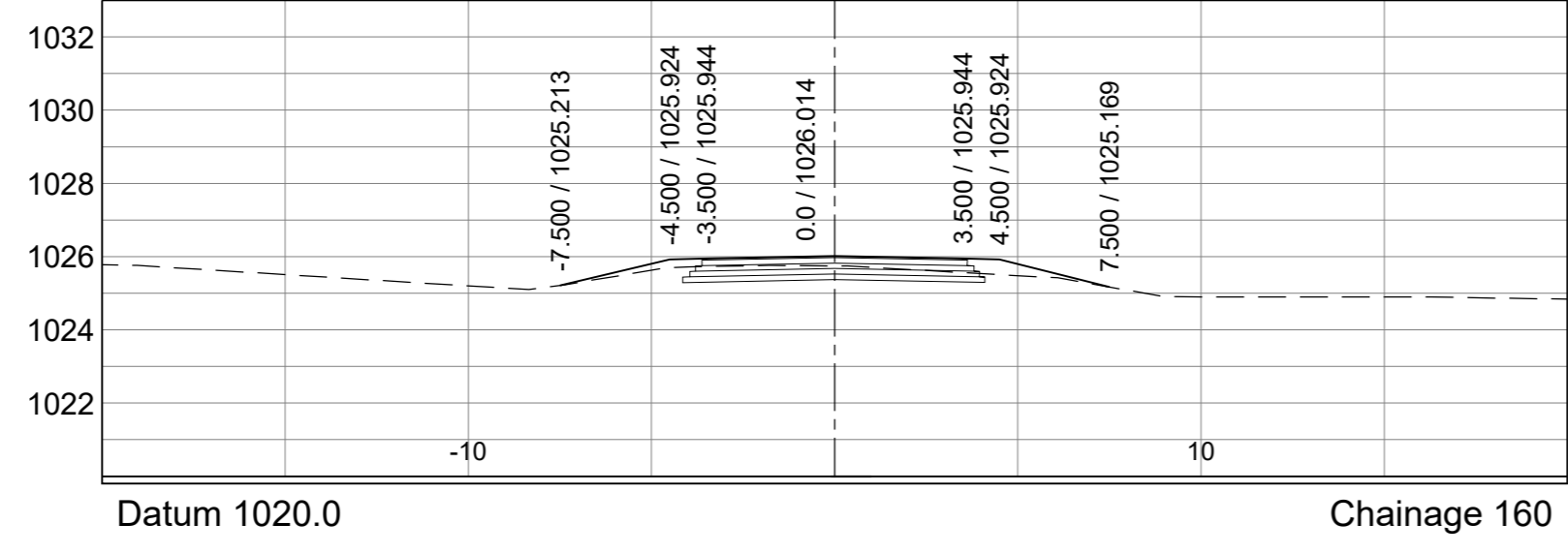
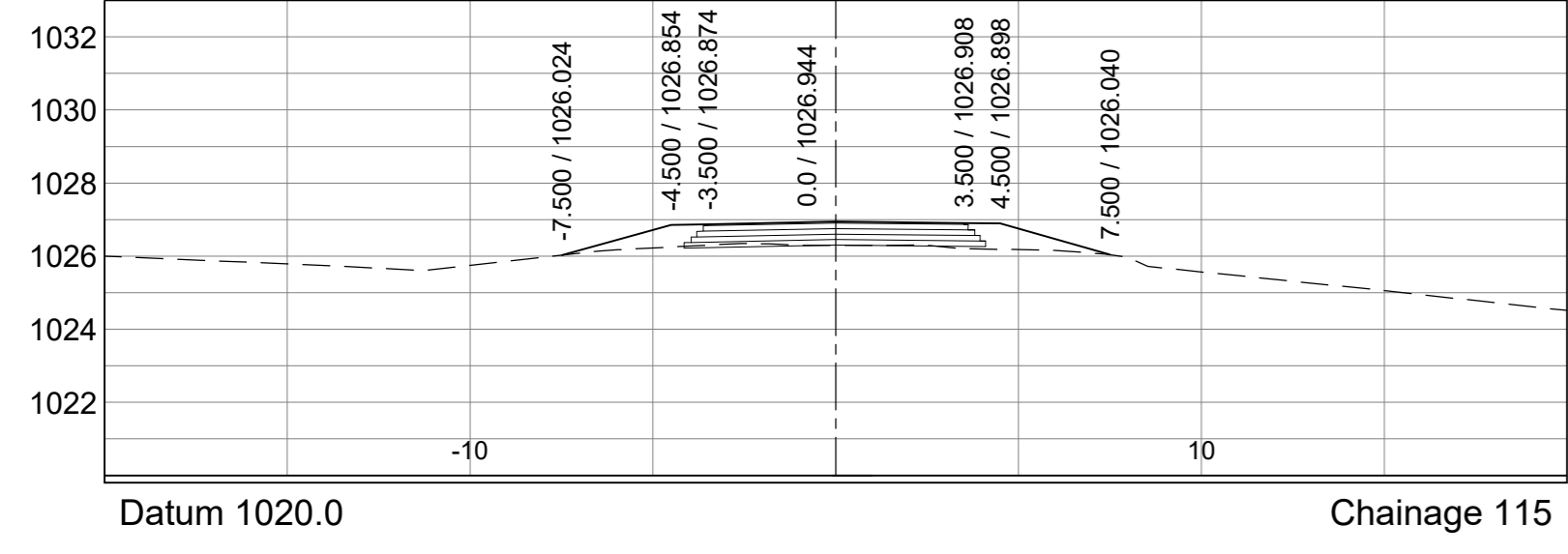
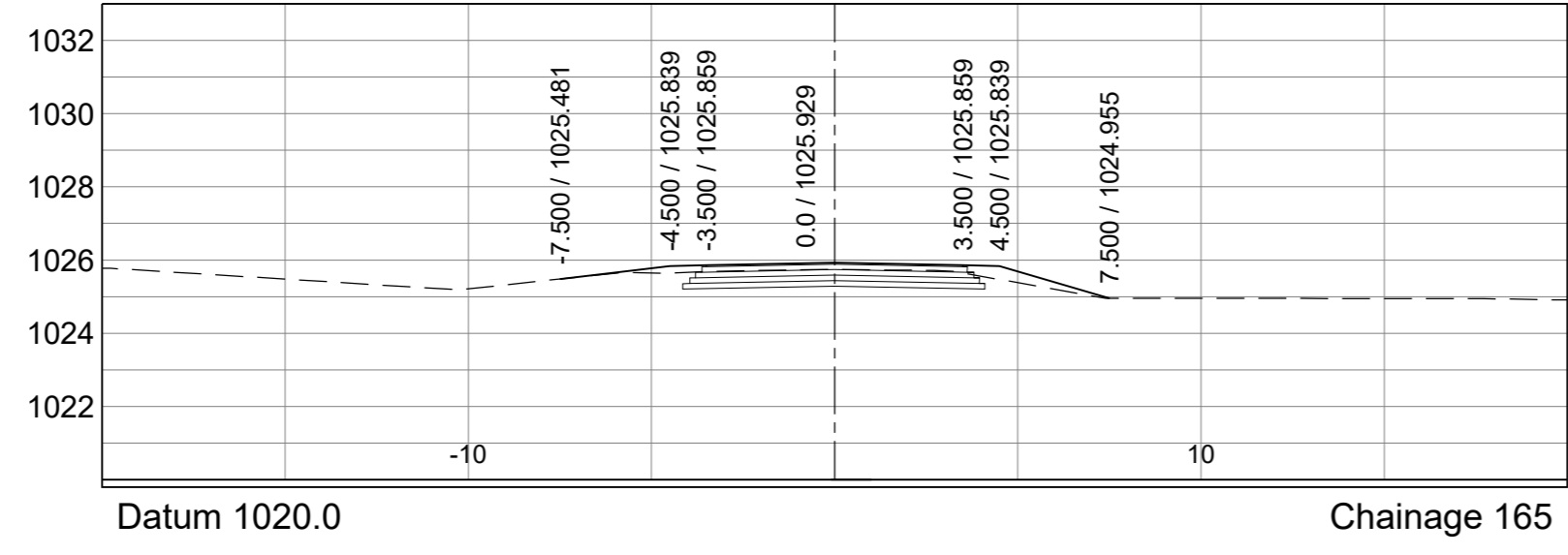
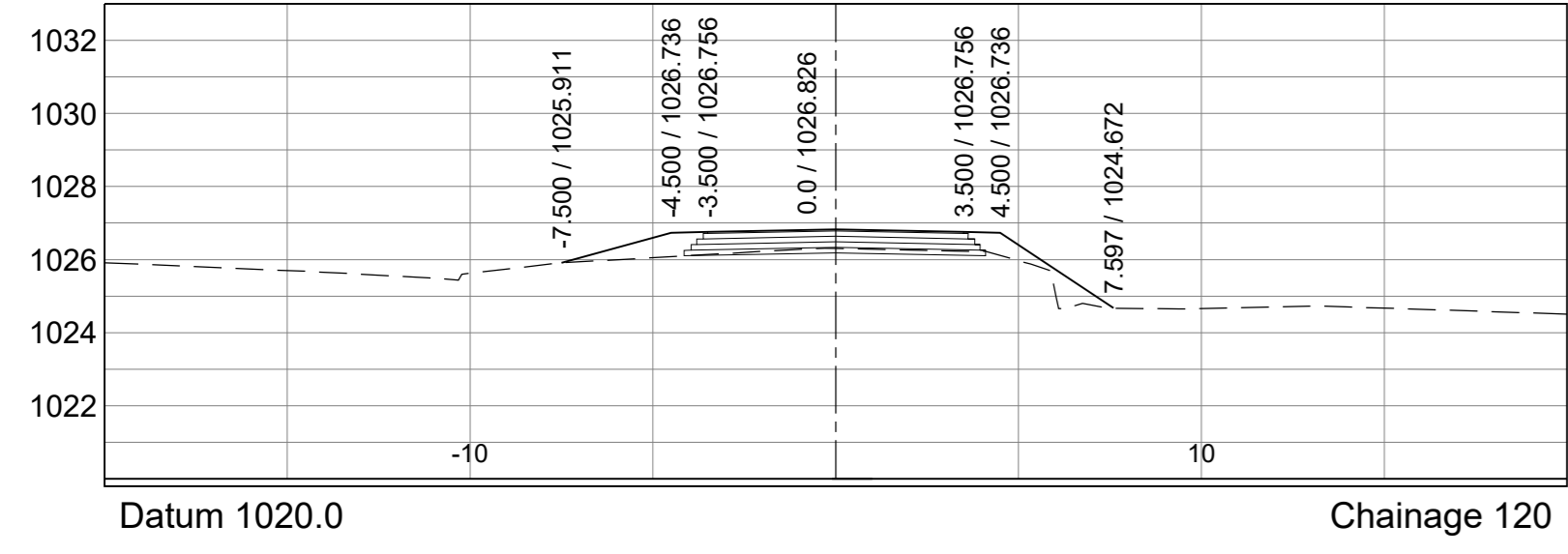
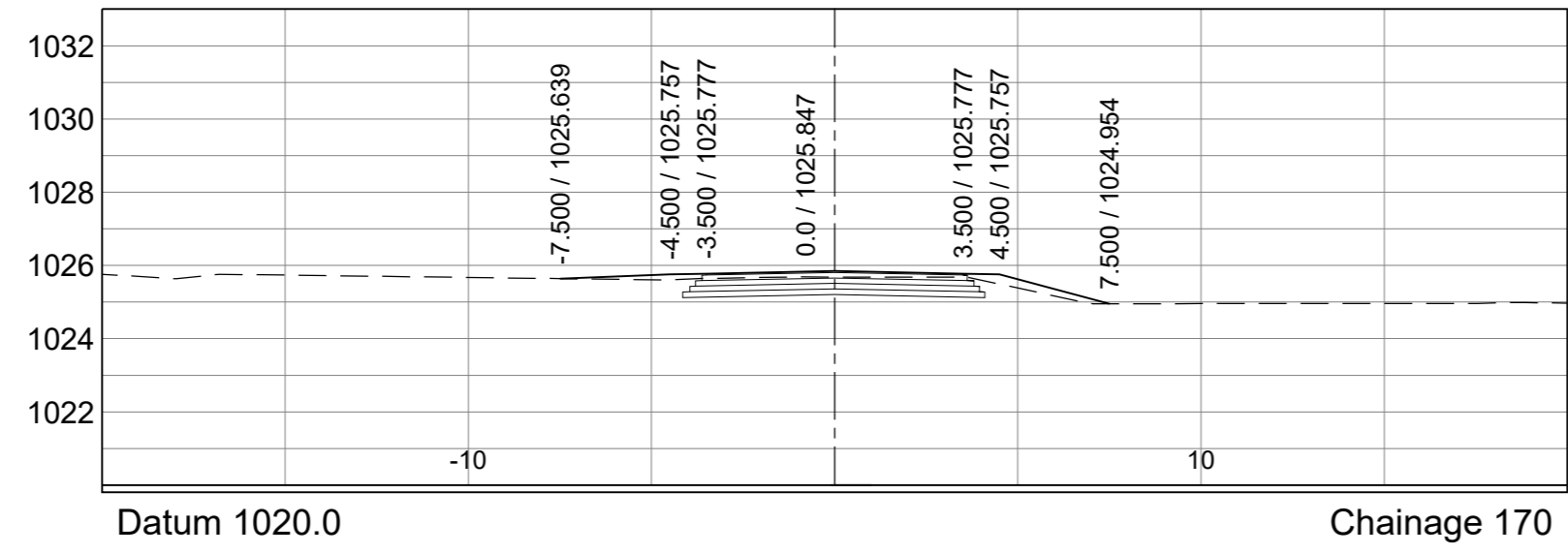
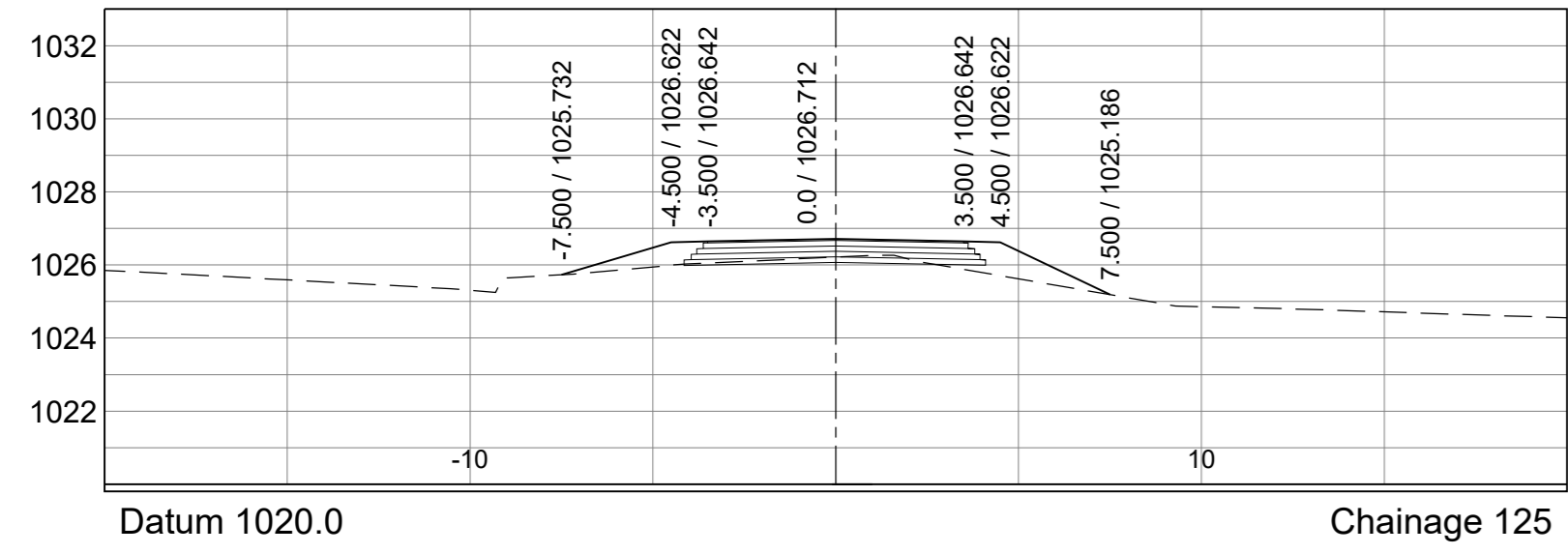
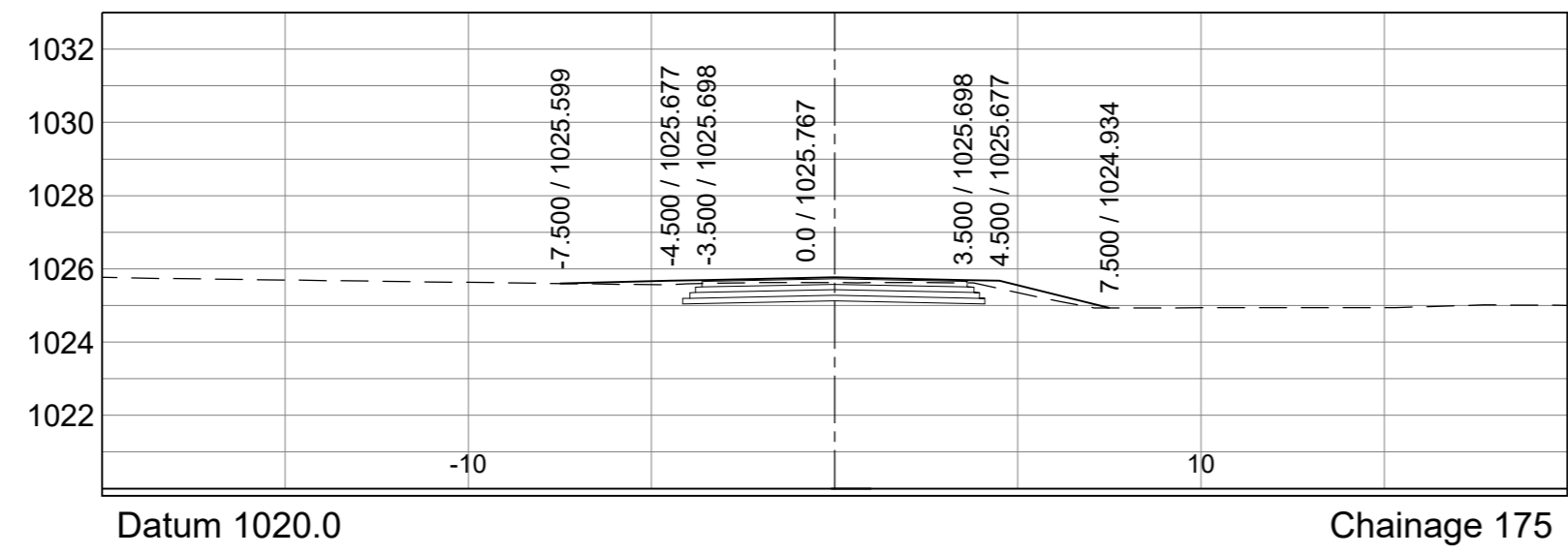
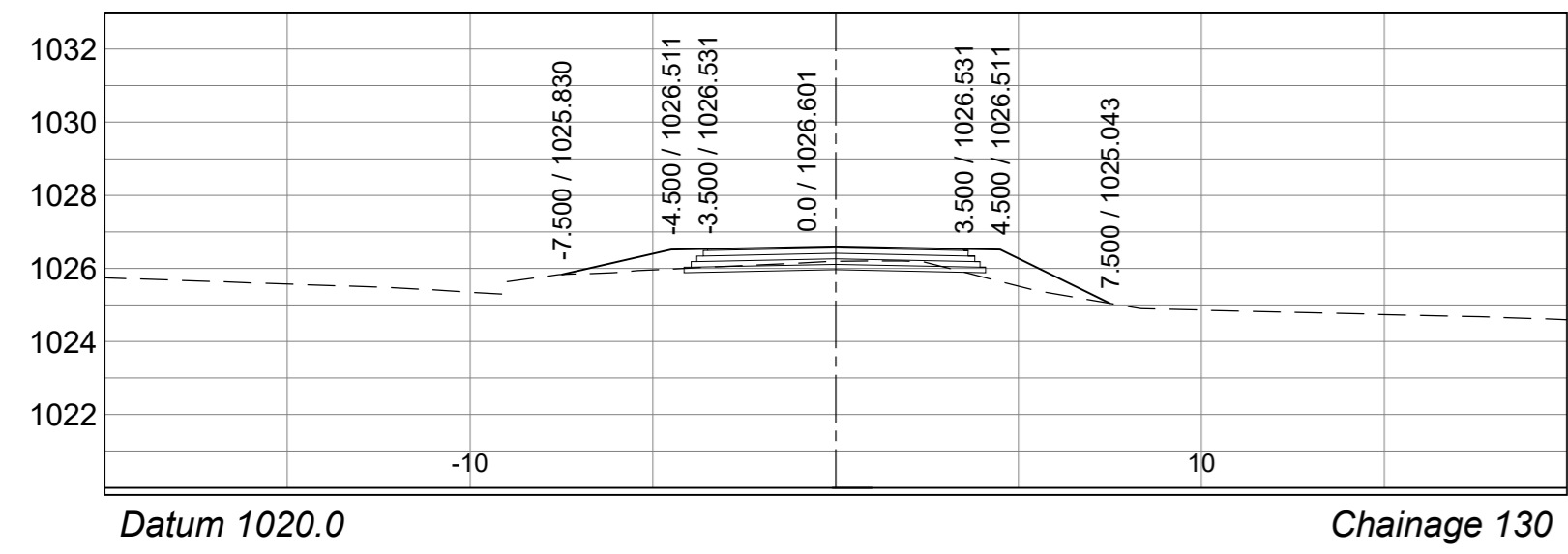
MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
ACCESS ROADS CROSS SECTIONS

Staked km distance km 0+000 - km 0+301 572 km 0+000 - km 0+352 076 km 0+000 - km 0+385 000	Sheet - 2 of - 14	REVISION: A
Scale Vertical Scale 1 : 200 Horizontal Scale 1 : 200	Plan No -	C 46545

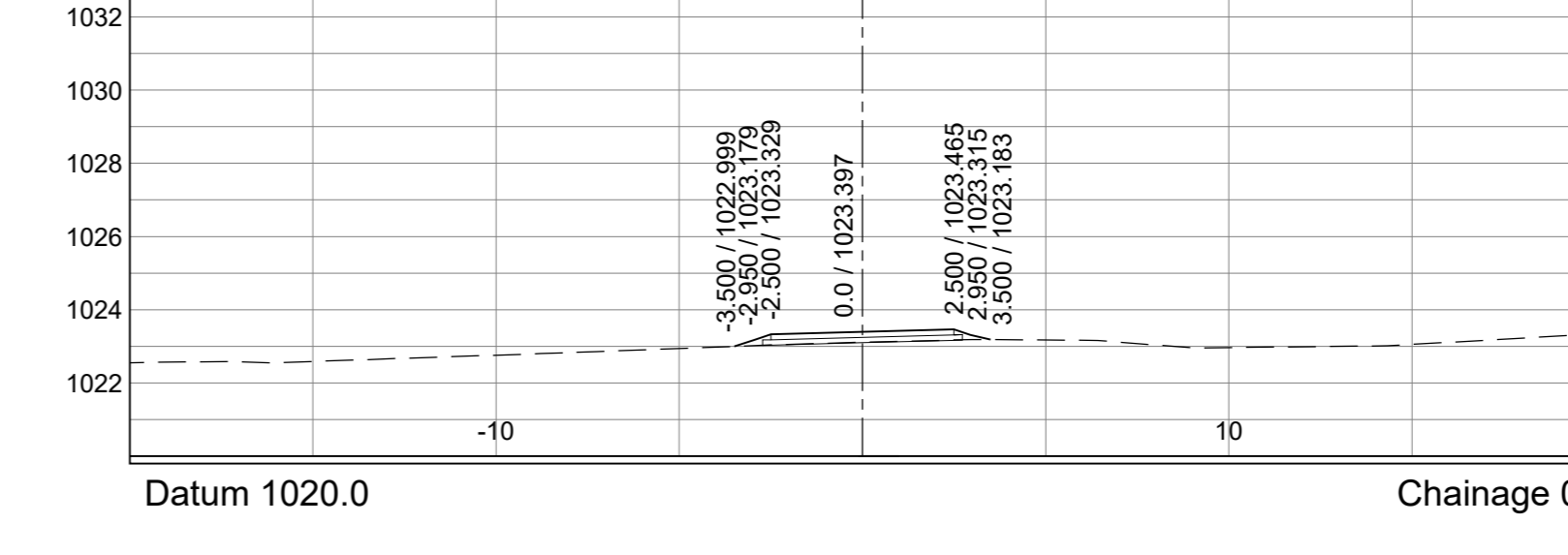
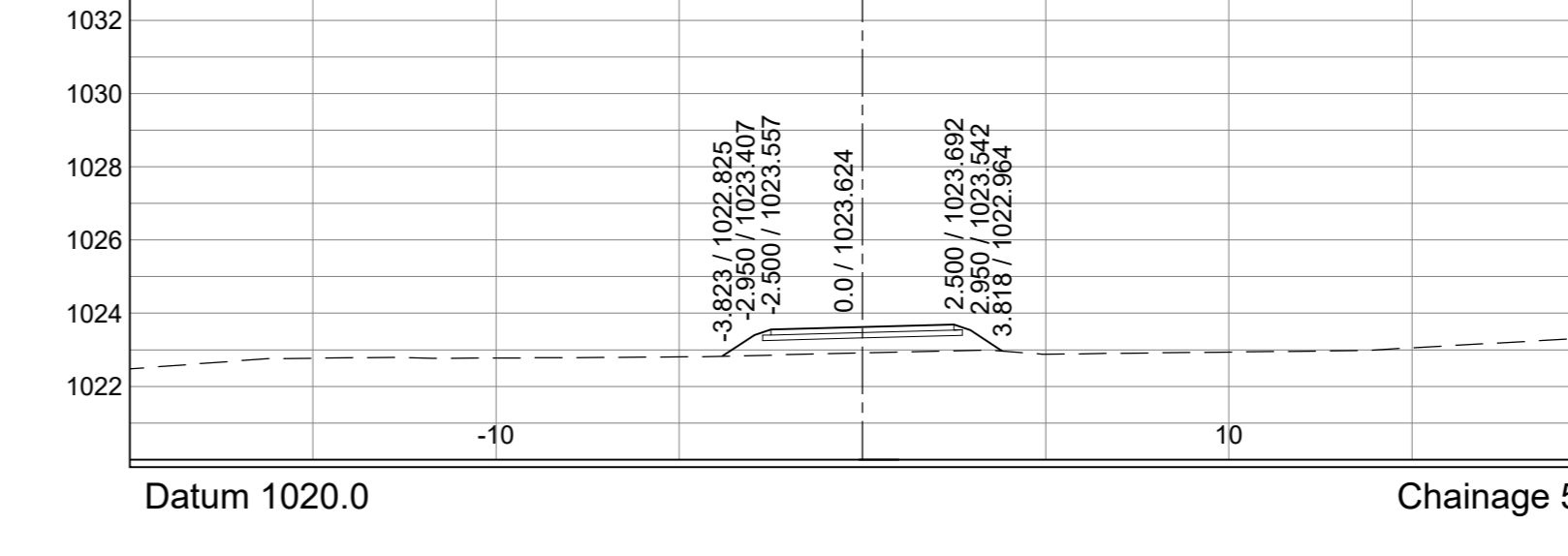
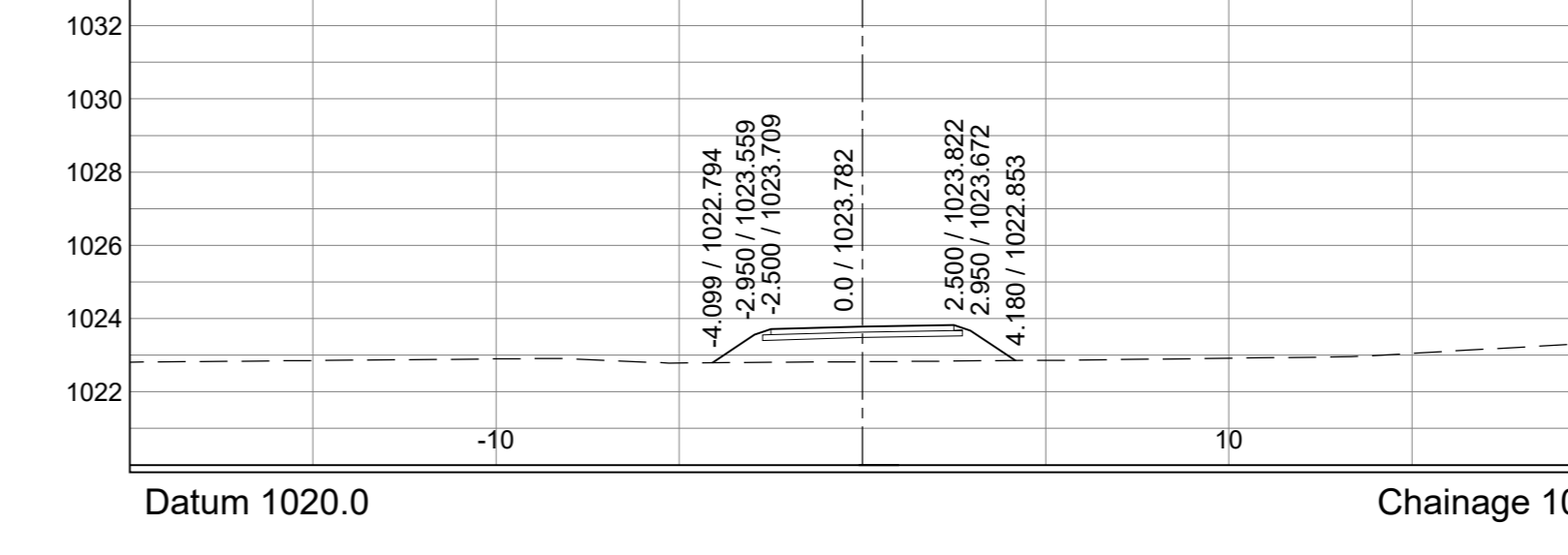
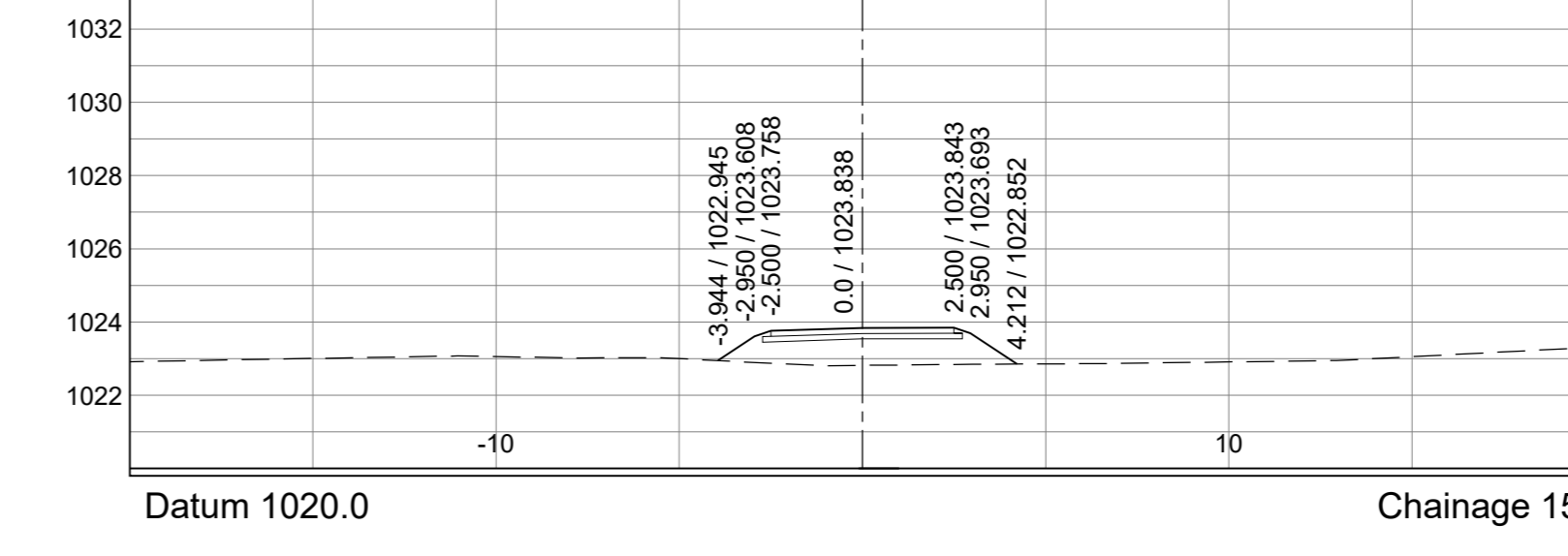
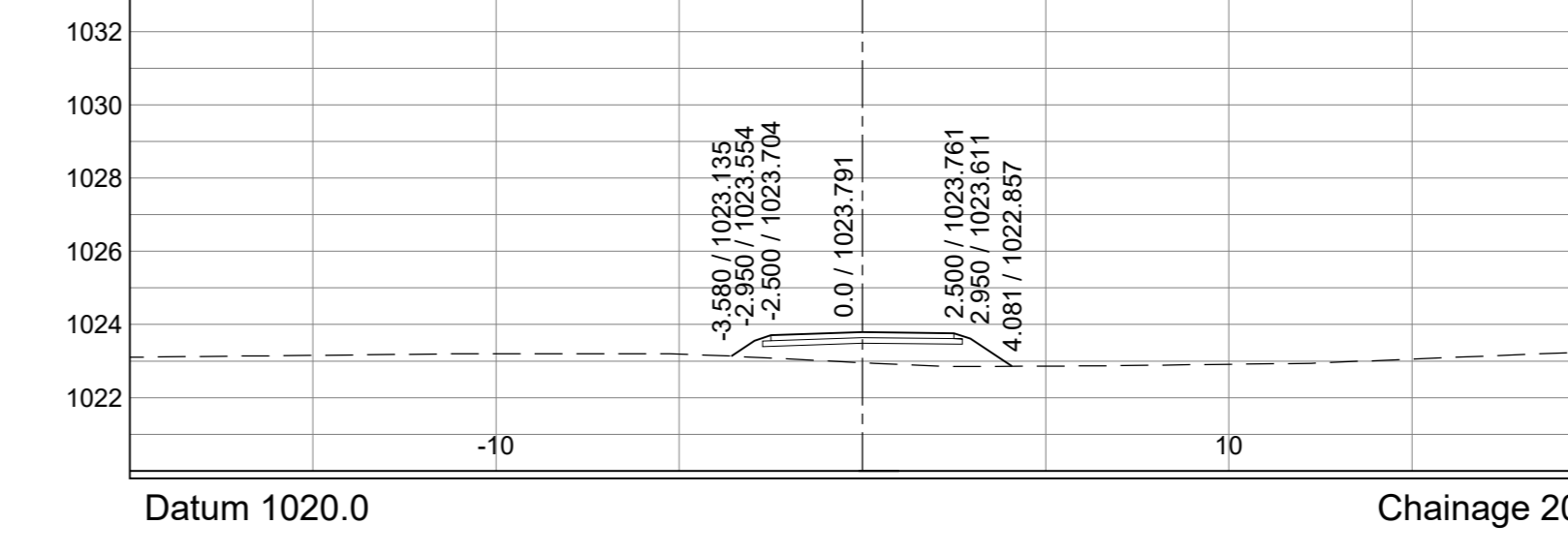
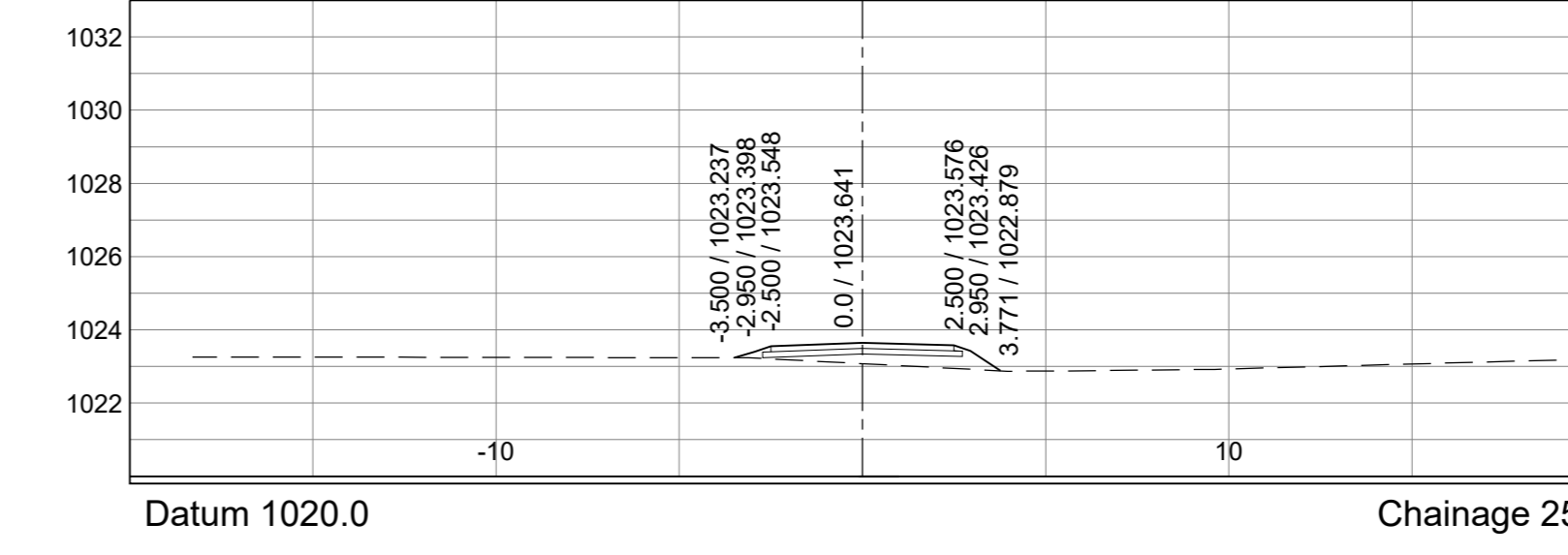
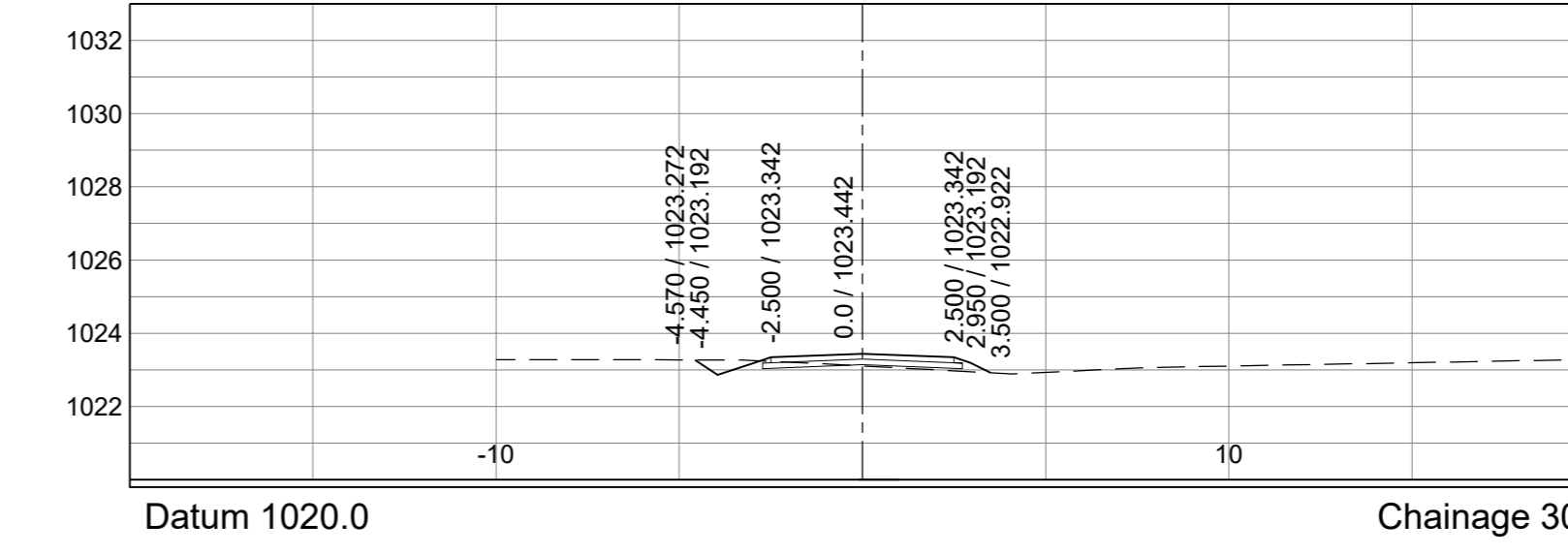
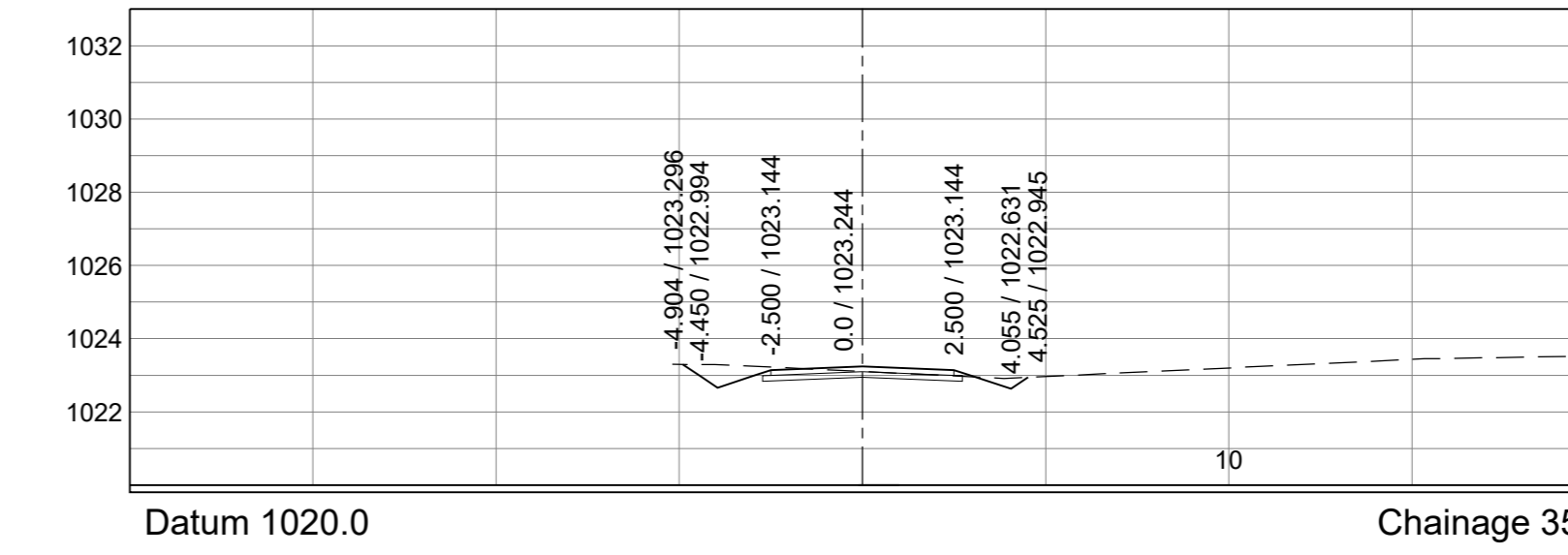
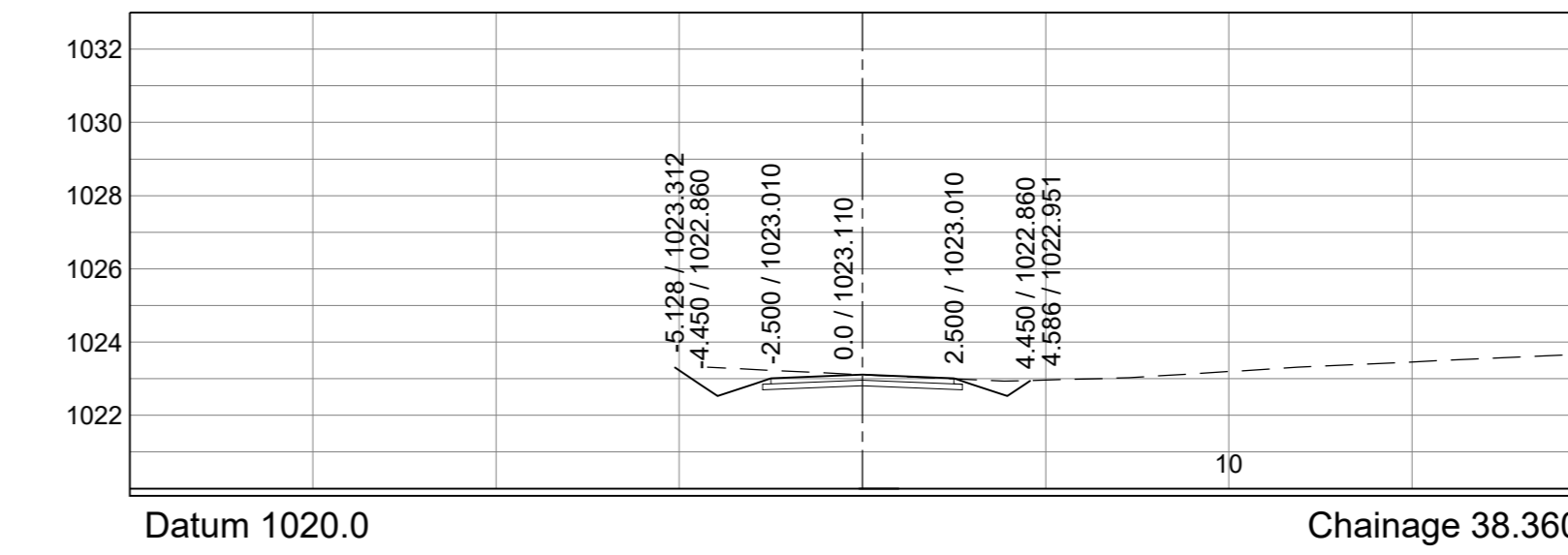
C 46545



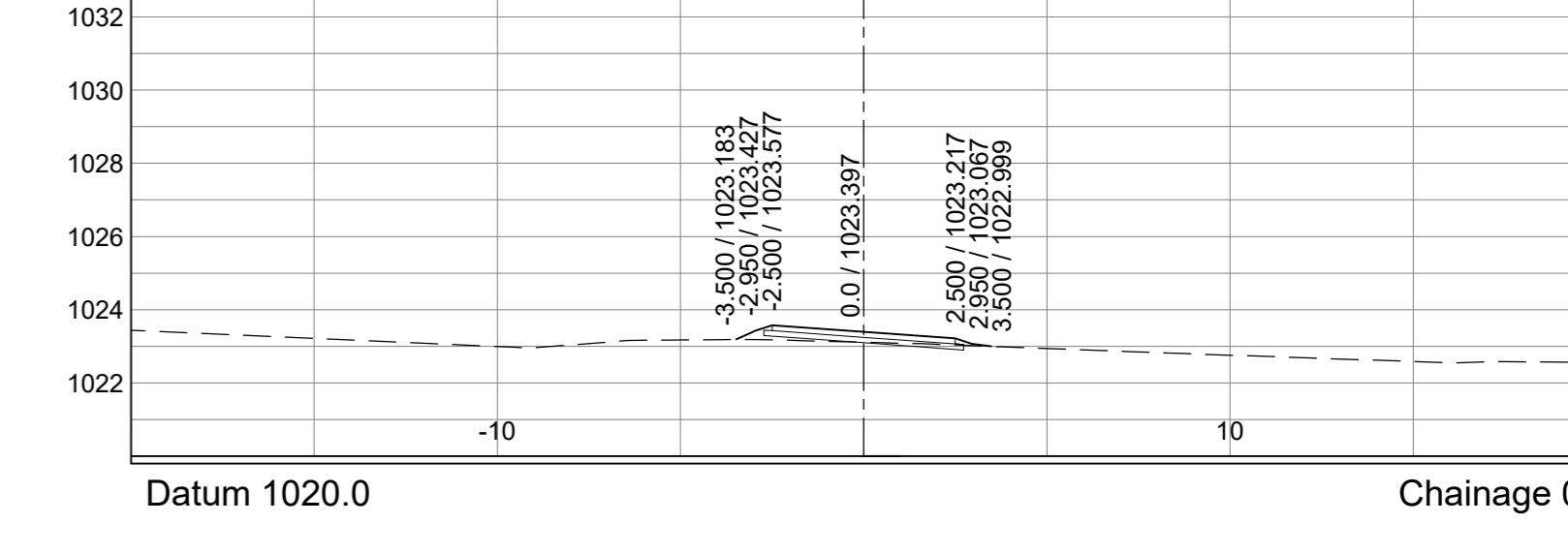
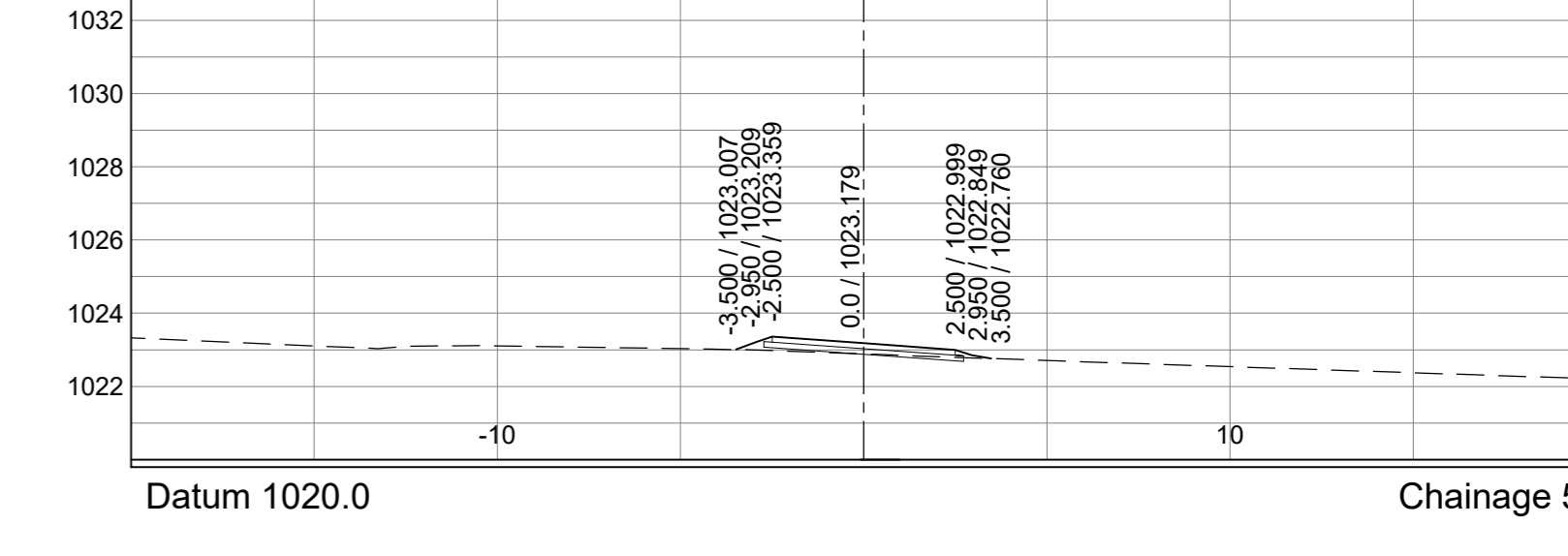
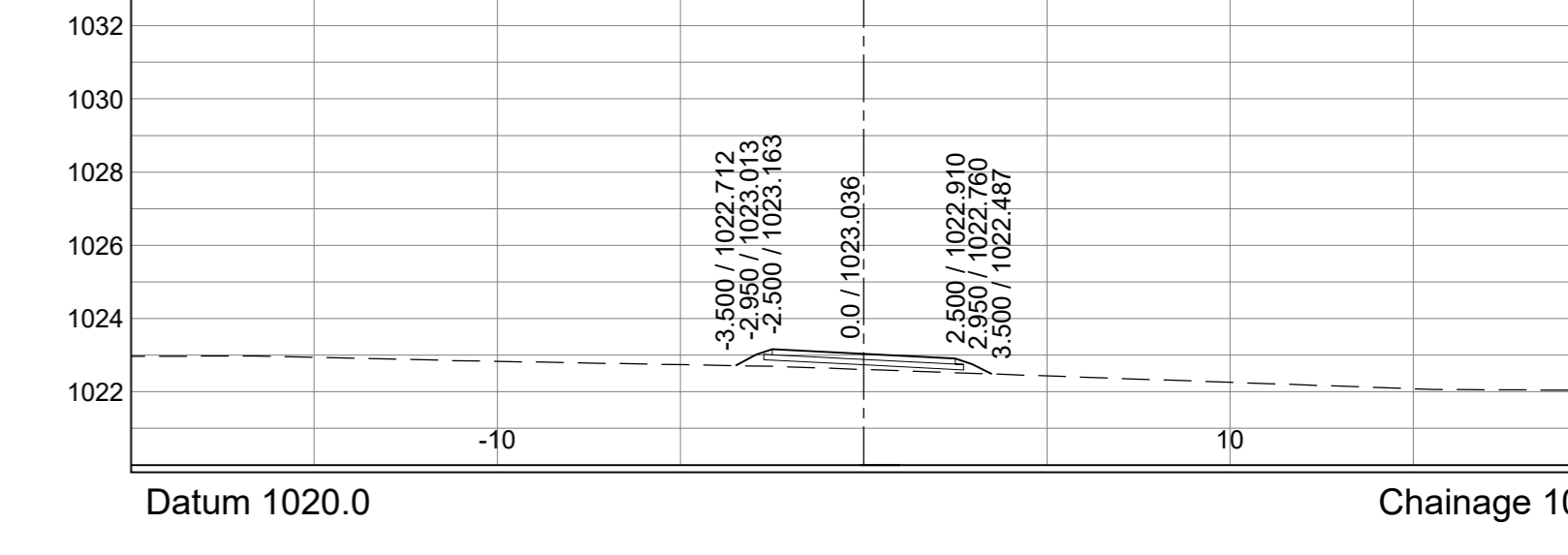
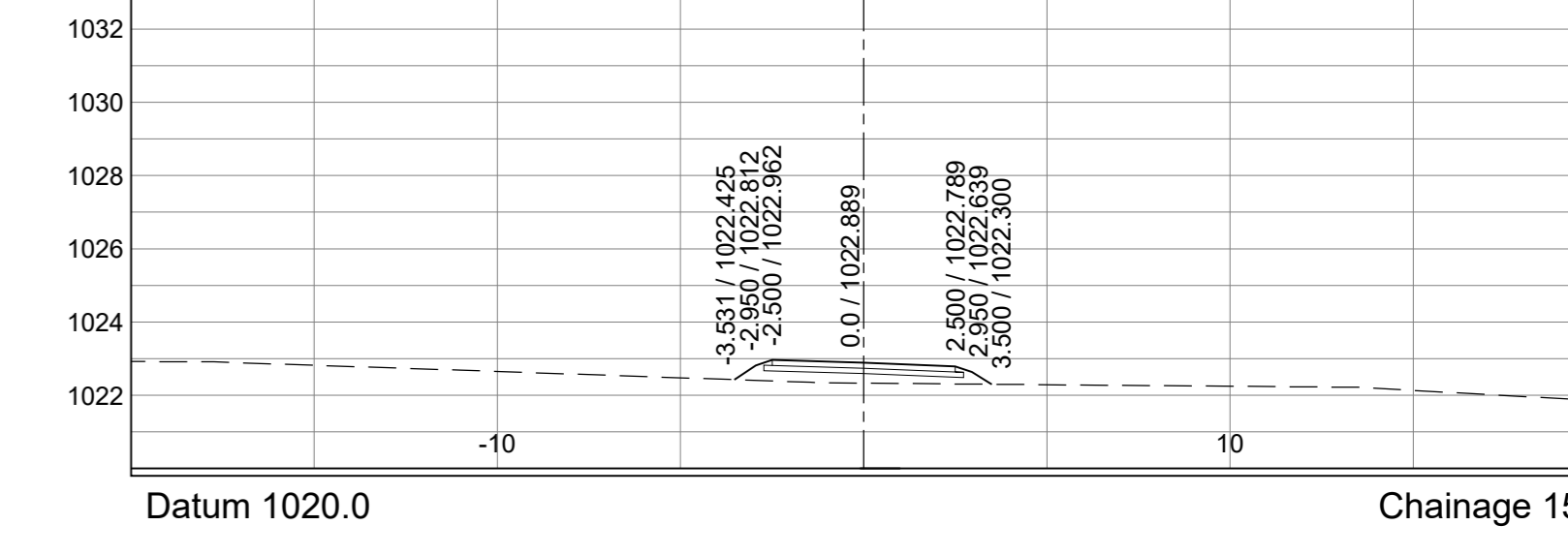
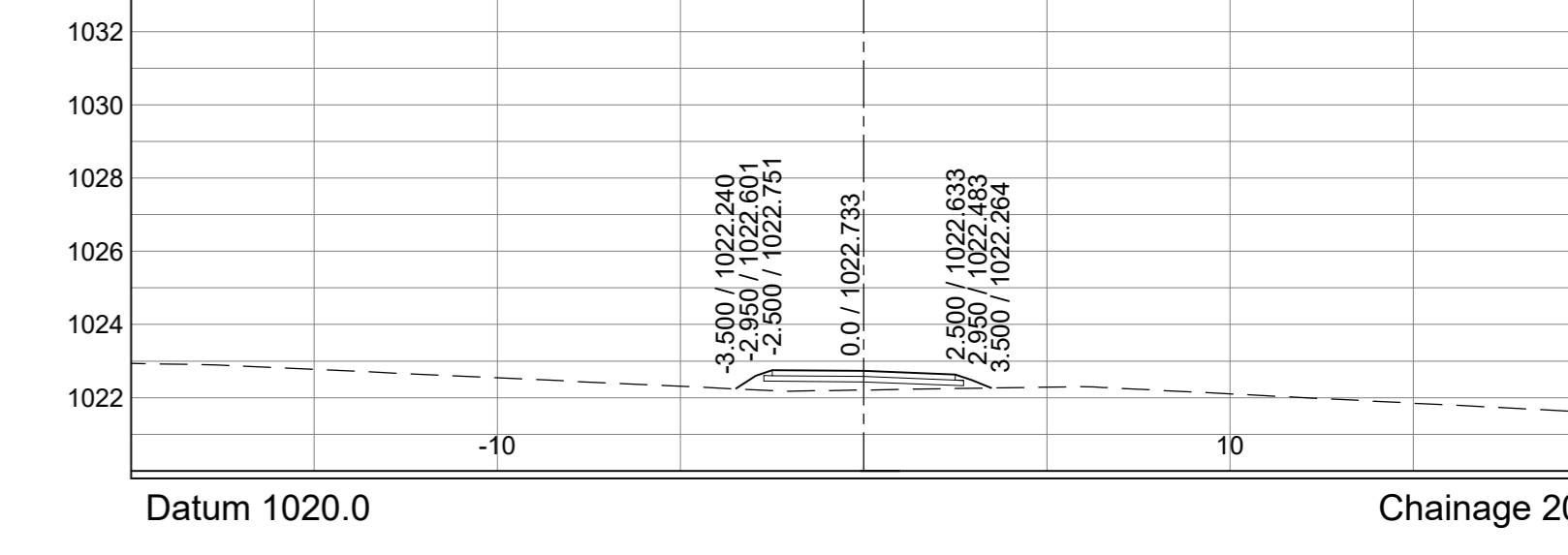
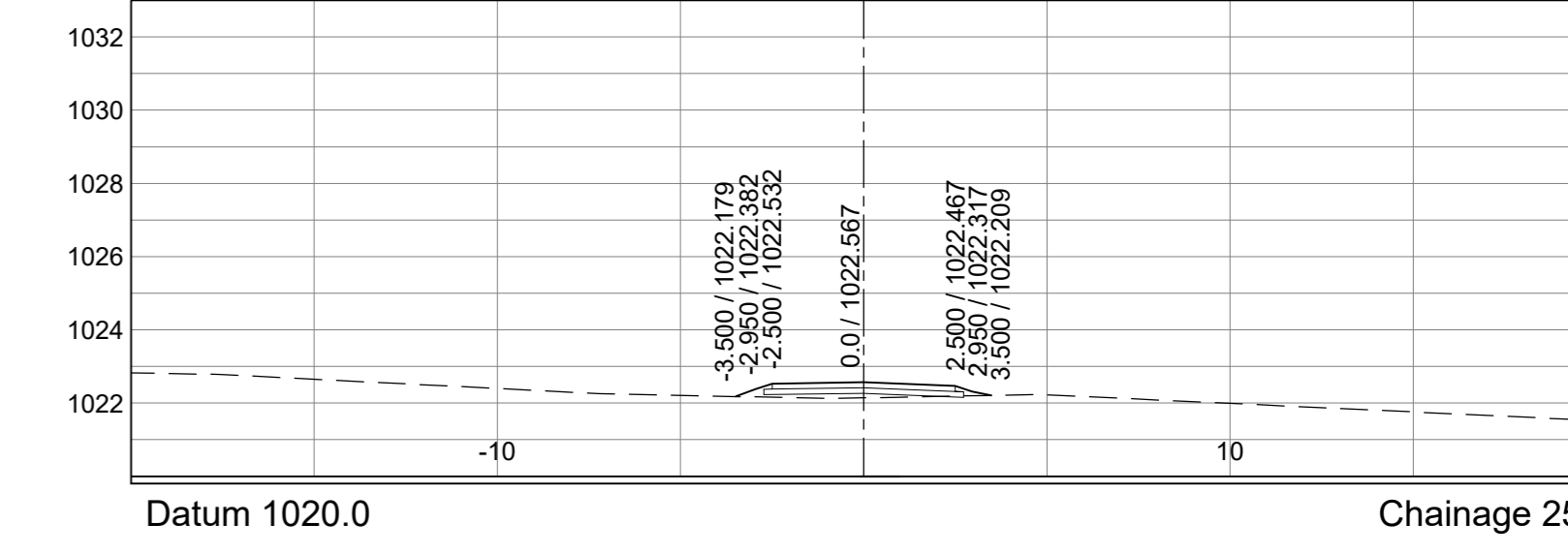
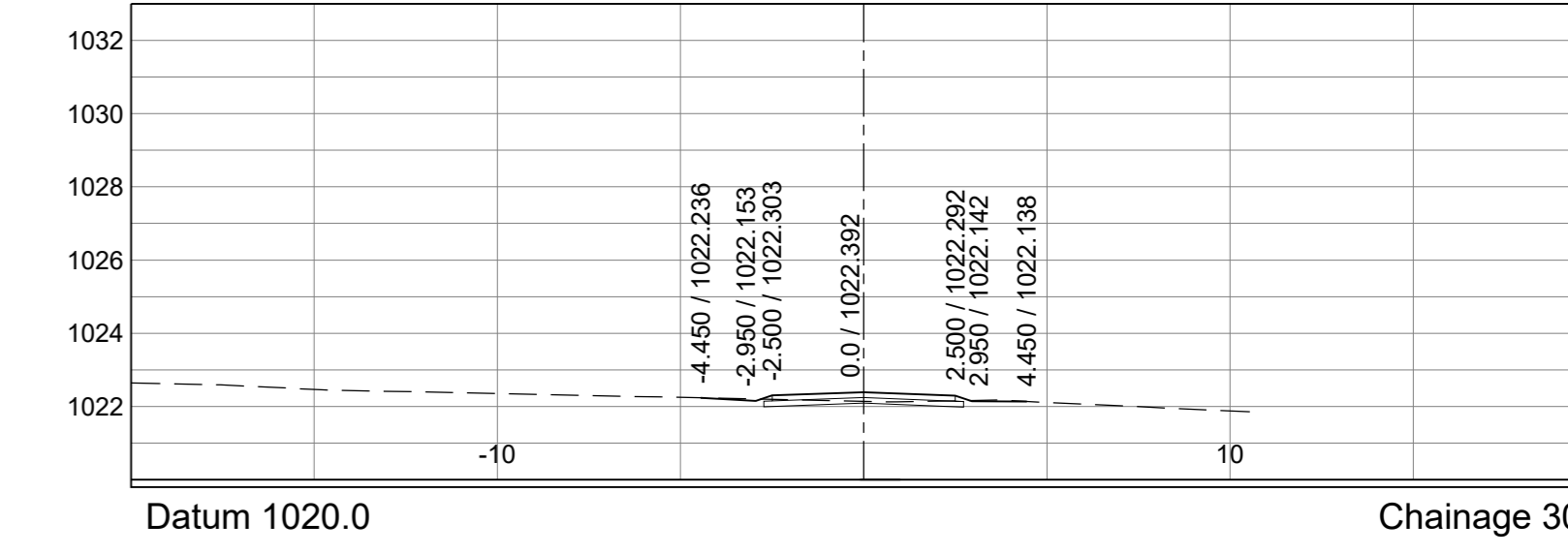
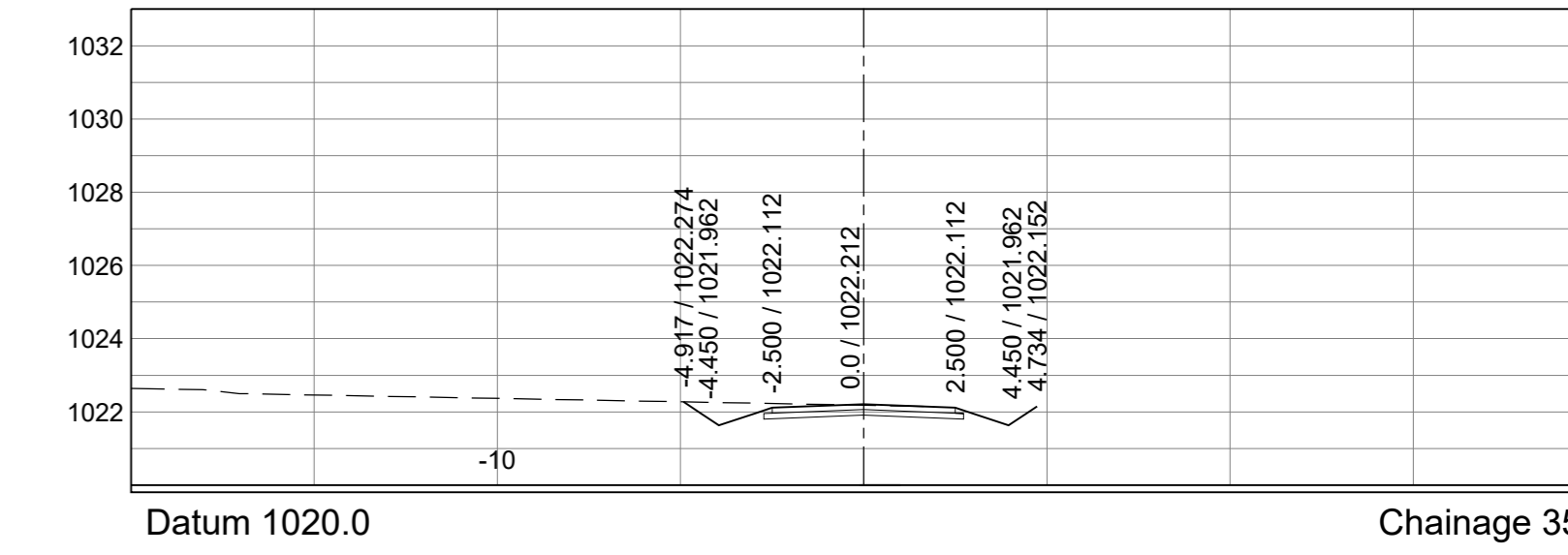
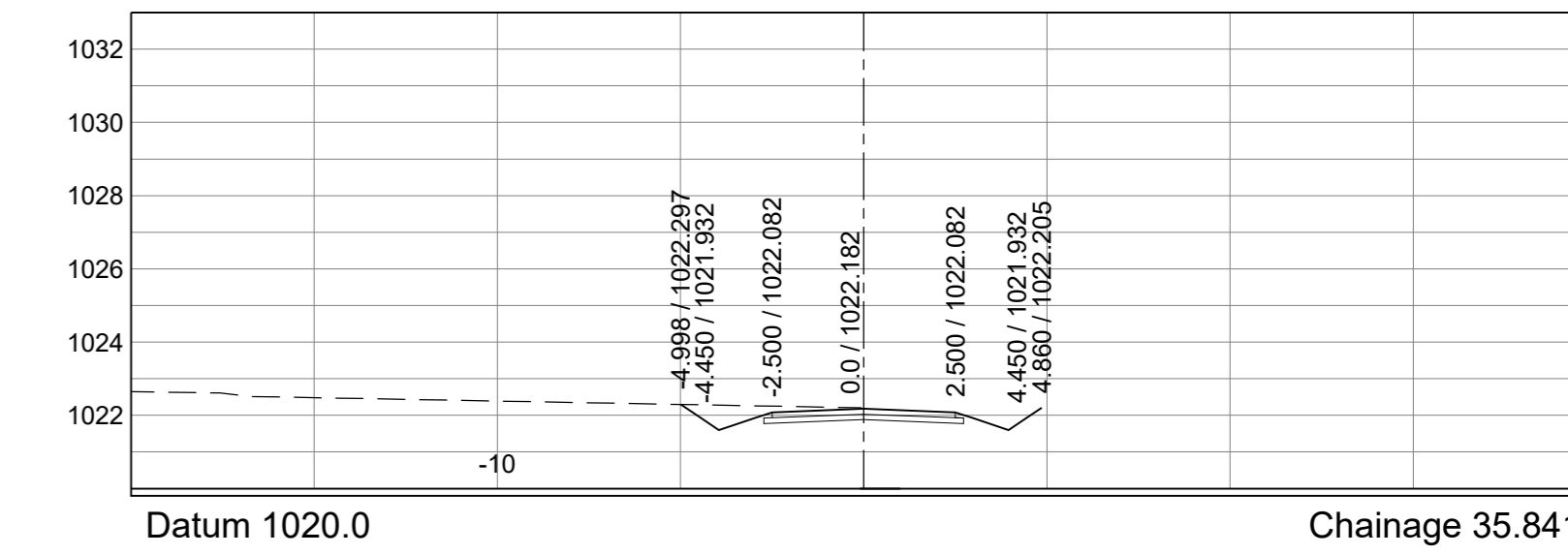
ACCESS @ KM 12+458.295 RHS (D348)



ACCESS @ KM 12+715.000 RHS



ACCESS @ KM 12+715.000 LHS



AS BUILT			
Symbol	Date	Description	Checked
A	01-02-2024	ISSUED FOR TENDER	YD
AMENDMENTS			

Continued from:-	C 44331	Designed by:-	Y. DOMA
Continued on:-	C 44333	Checked by:-	N. NGUBANE
Cross Section No:-	C 44332	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44324 - C 44325	Checked by:-	Y. DOMA
Design Plan No:-	C 44314	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport  
Date: 01-02-2024

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
ACCESS ROADS CROSS SECTIONS

Staked km distance  
km 0+000 - km 0+181.599  
km 0+000 - km 0+338.360  
km 0+000 - km 0+335.841

Scale  
Vertical Scale 1 : 200  
Horizontal Scale 1 : 200

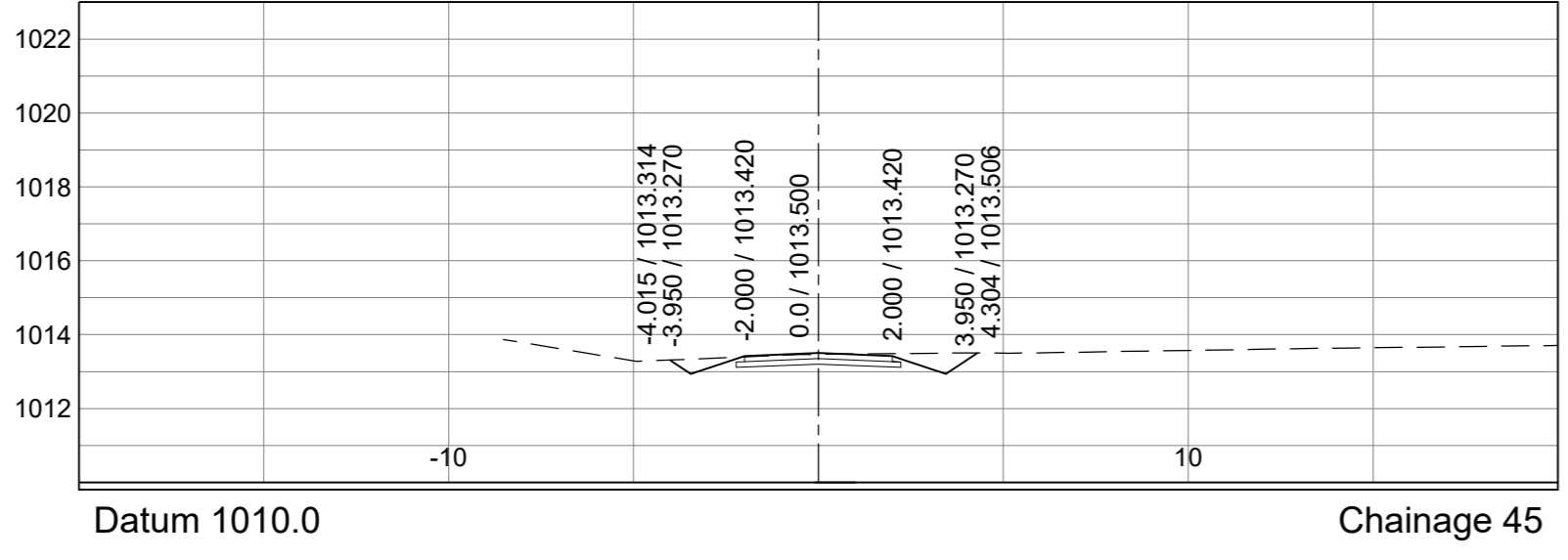
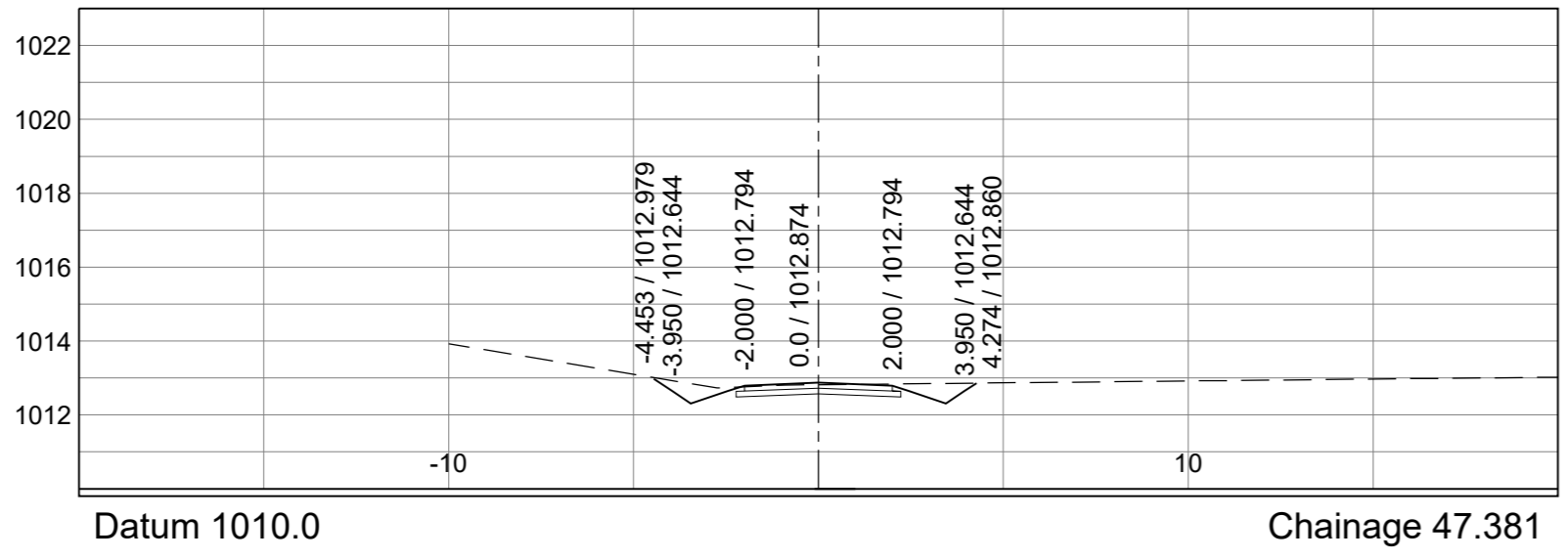
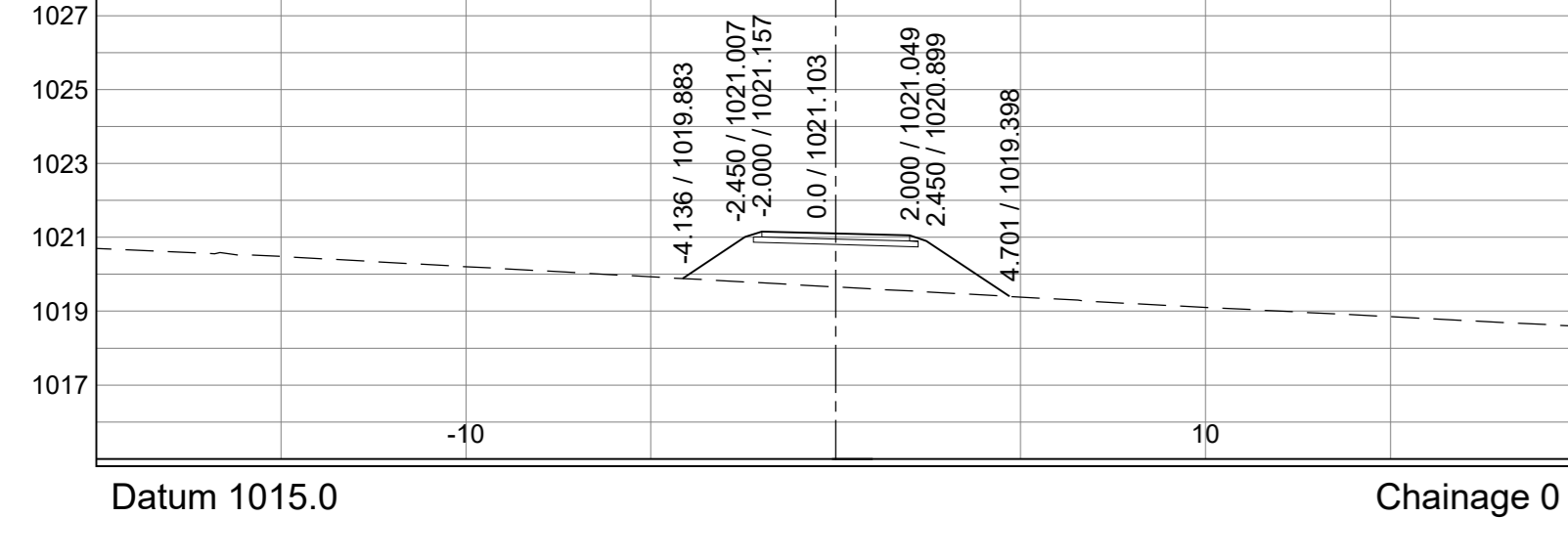
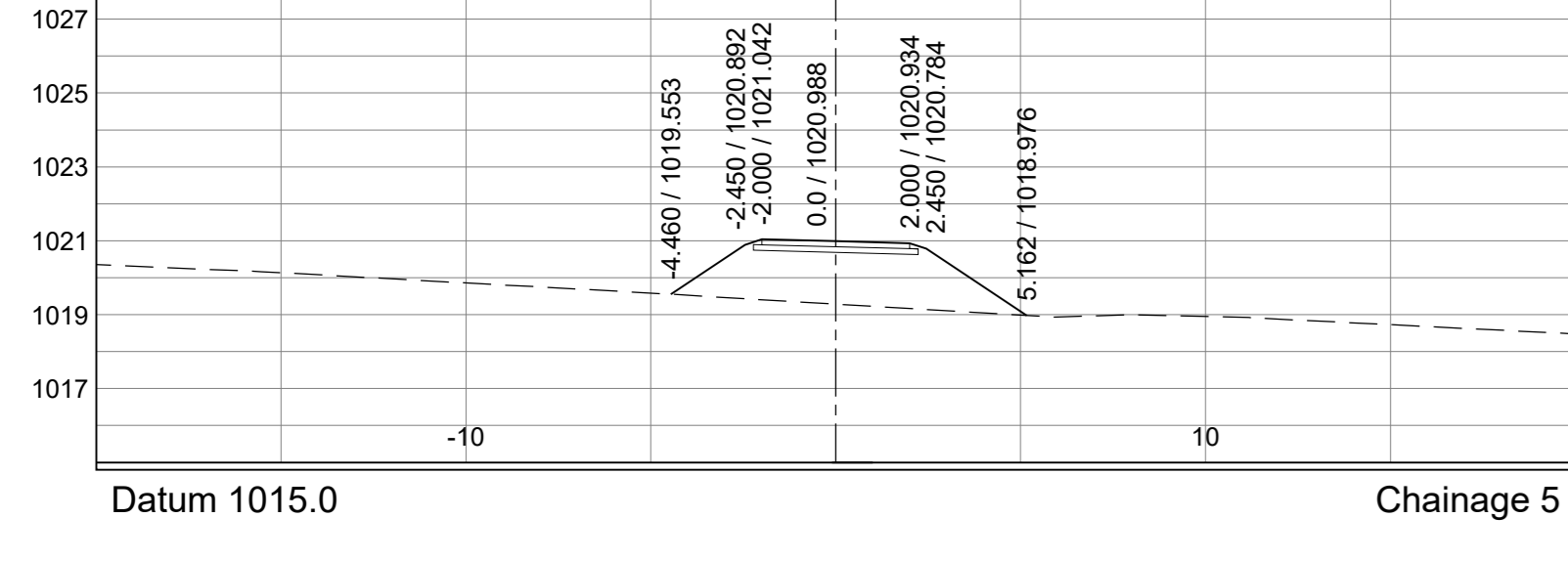
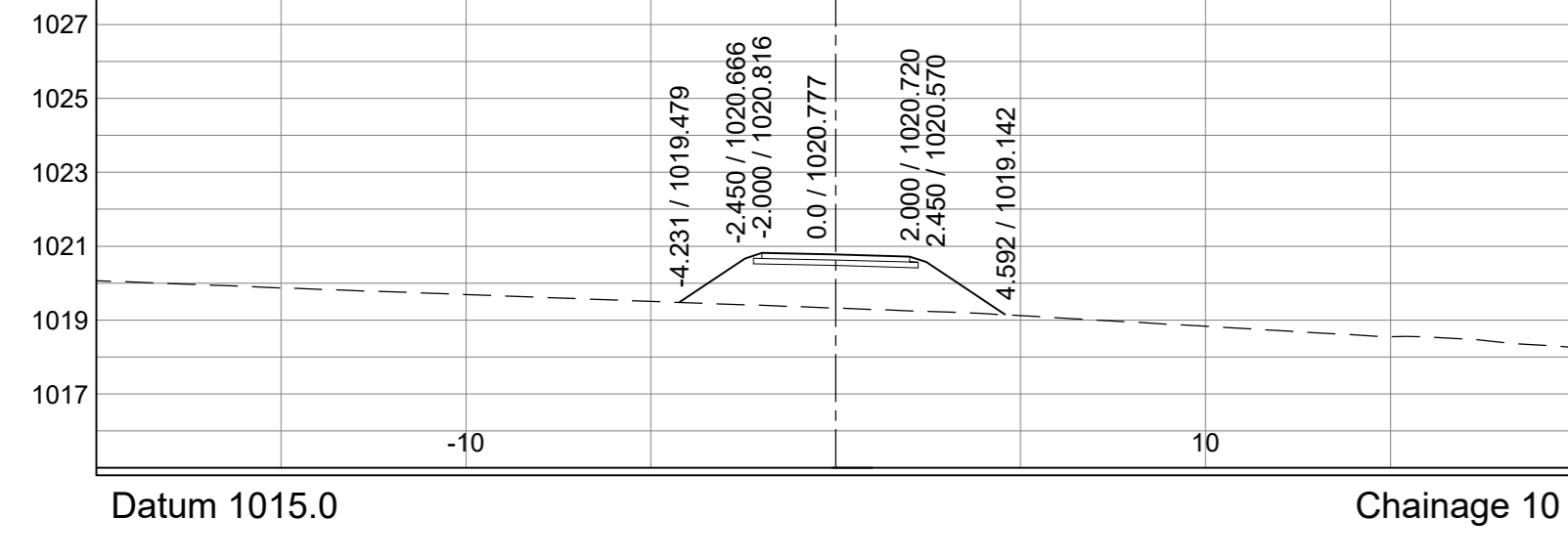
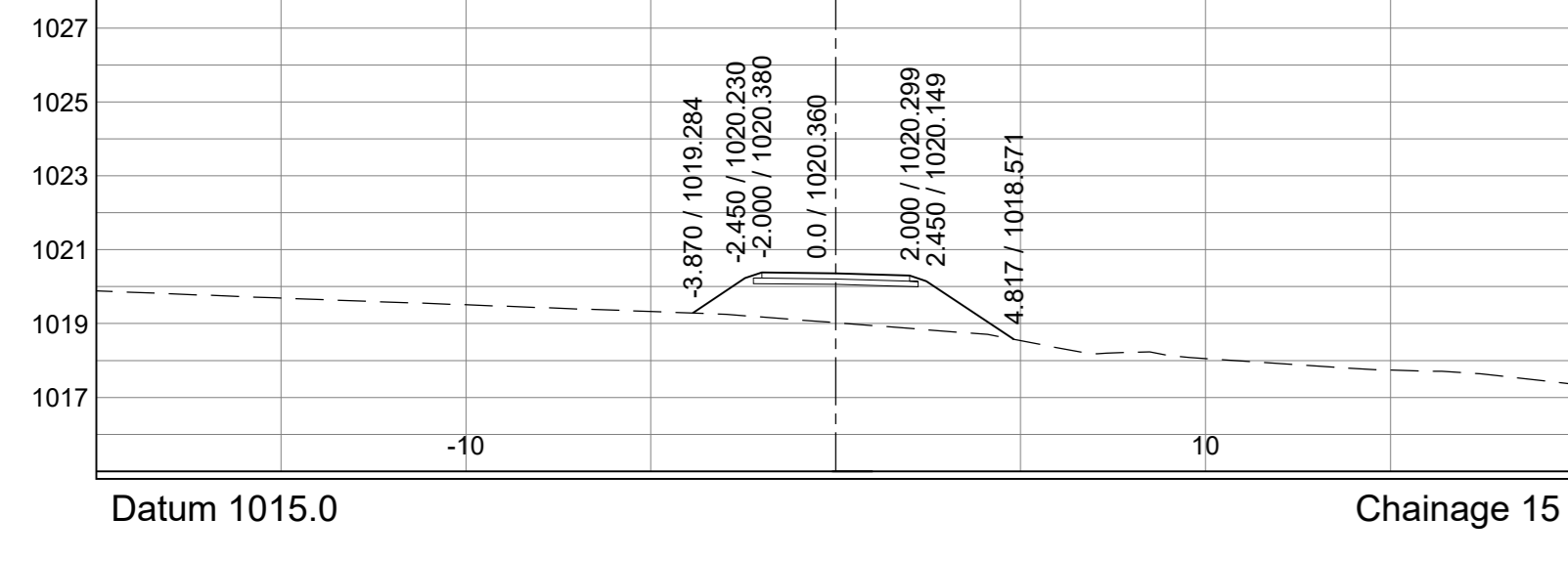
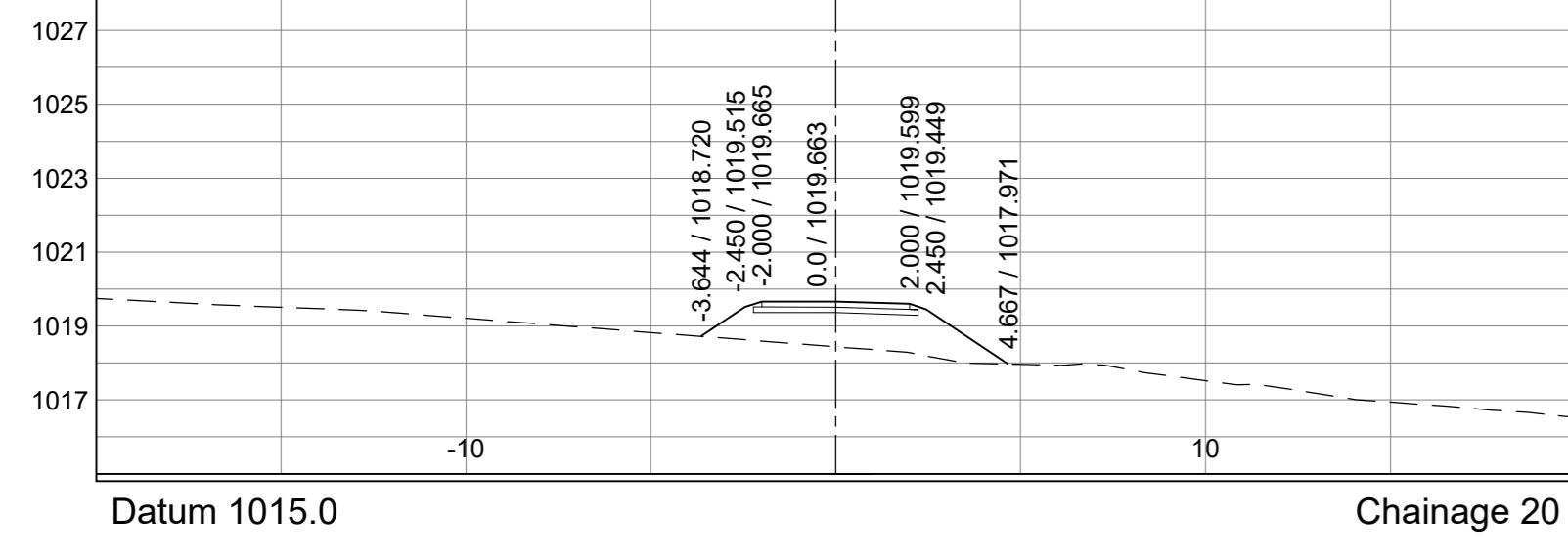
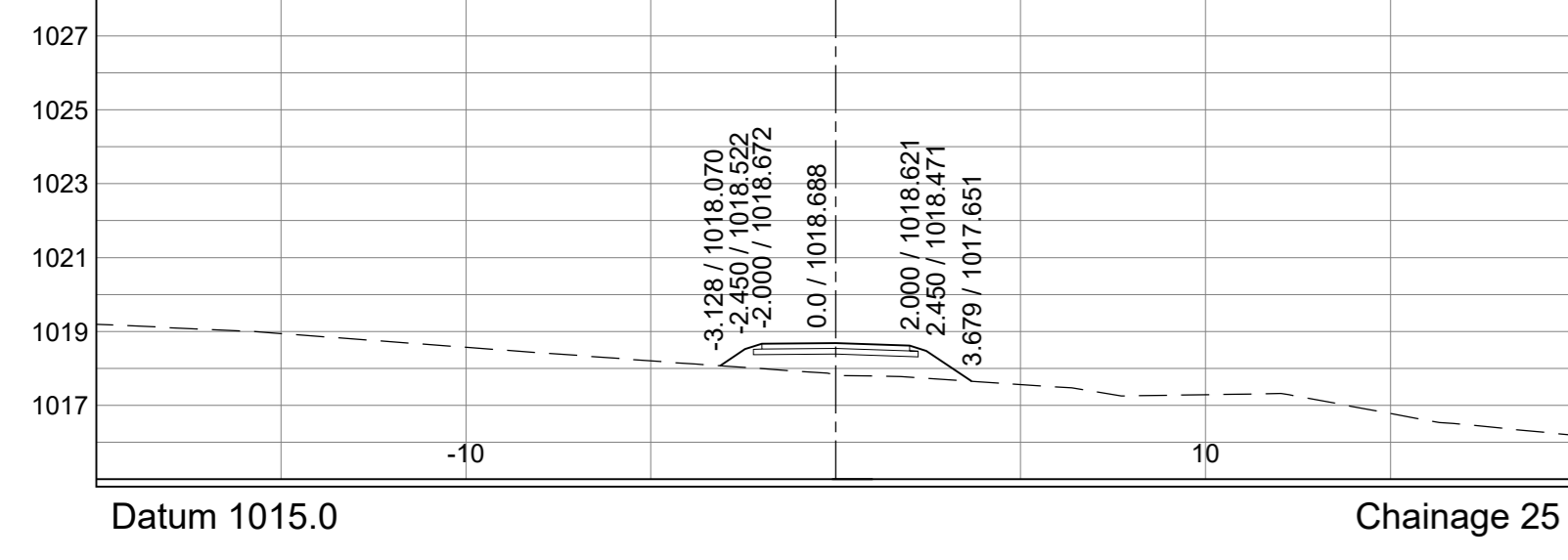
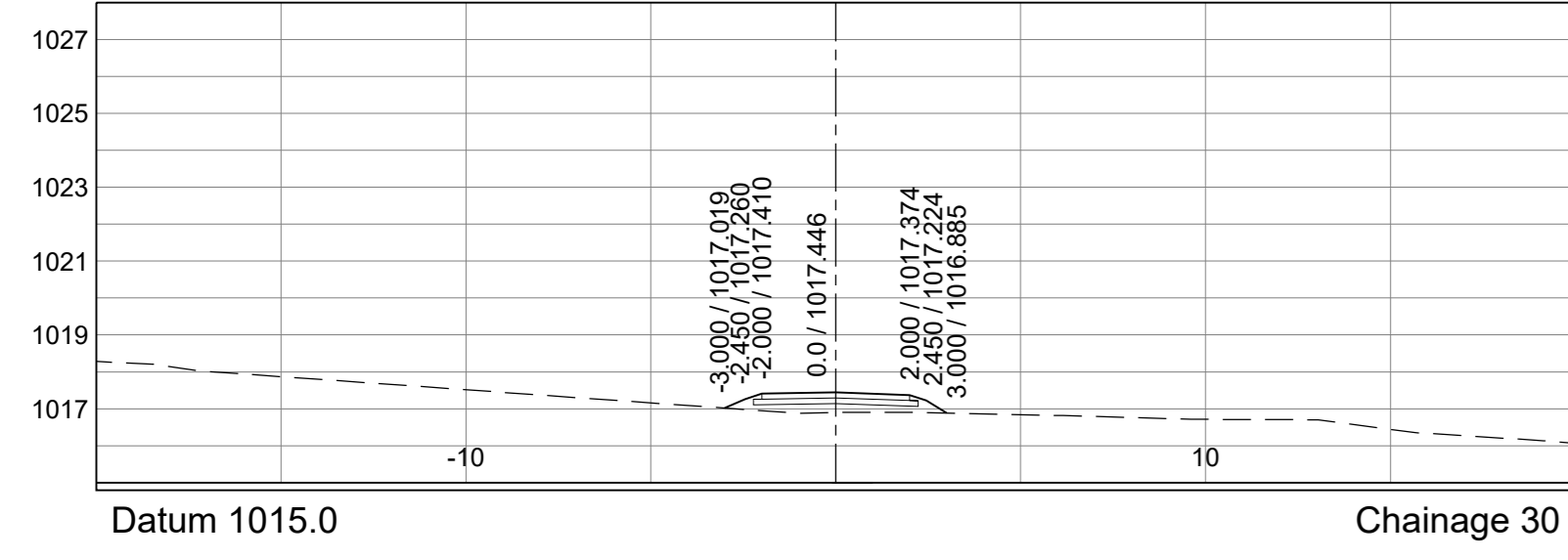
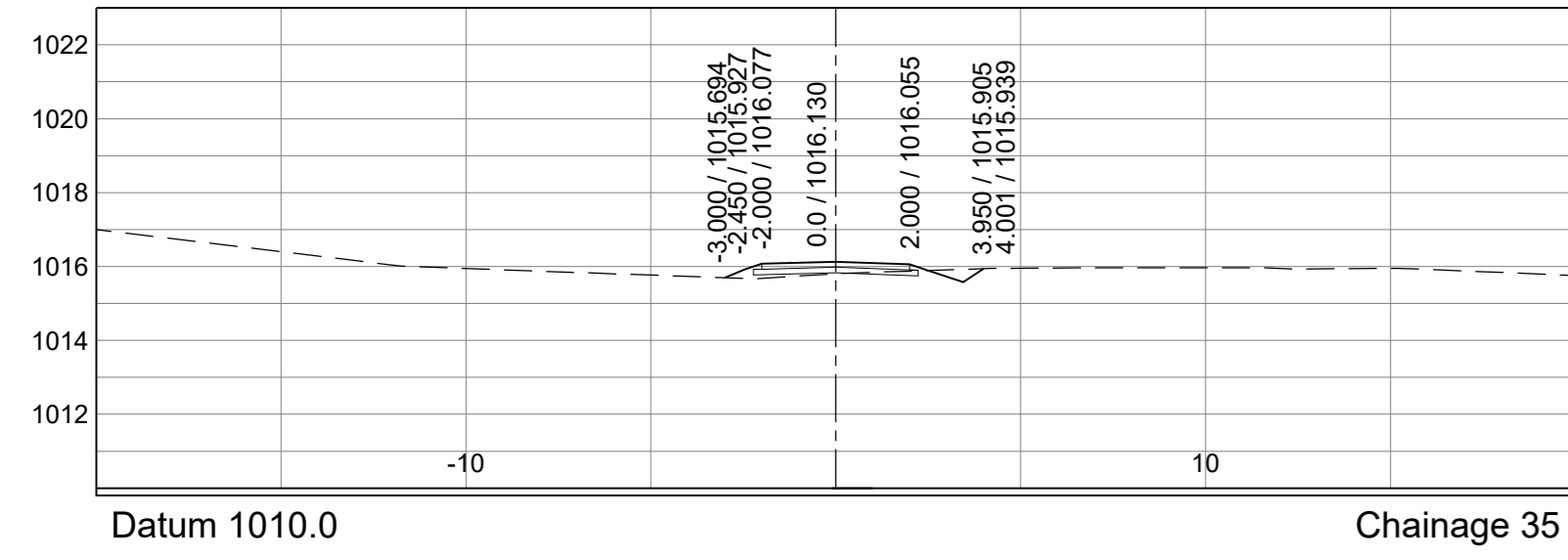
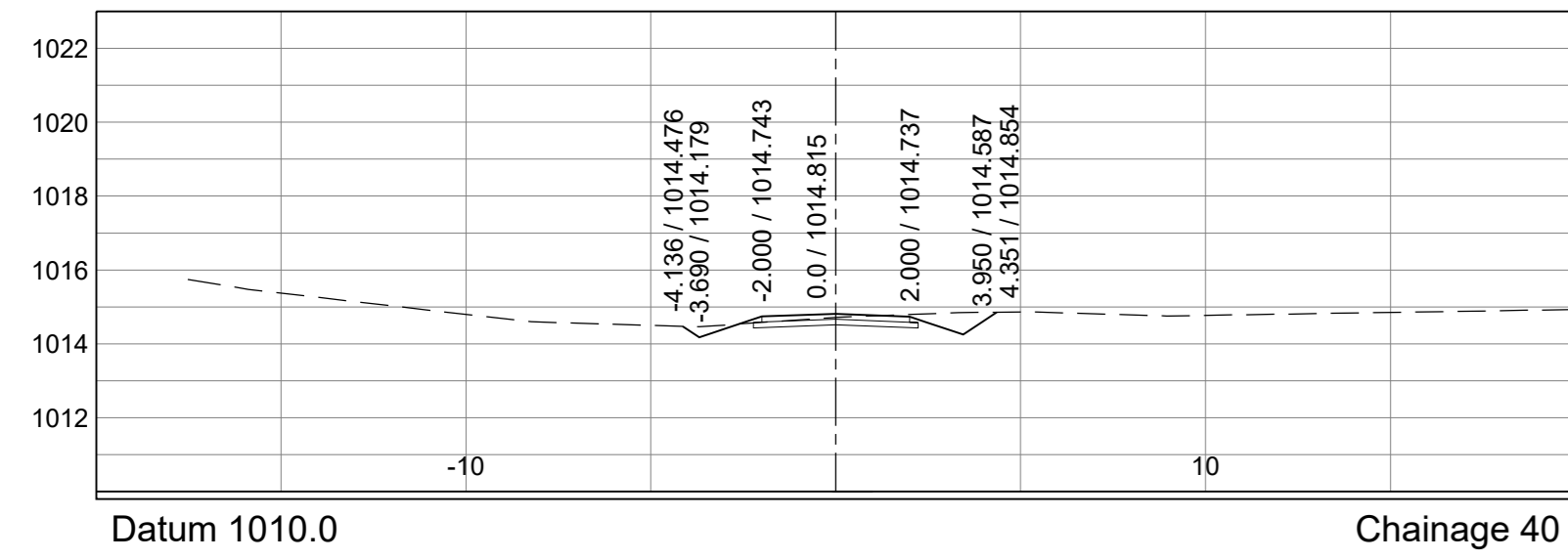
Sheet - 3  
of - 14  
REVISION:  
A

Plan No -  
**C 46546**

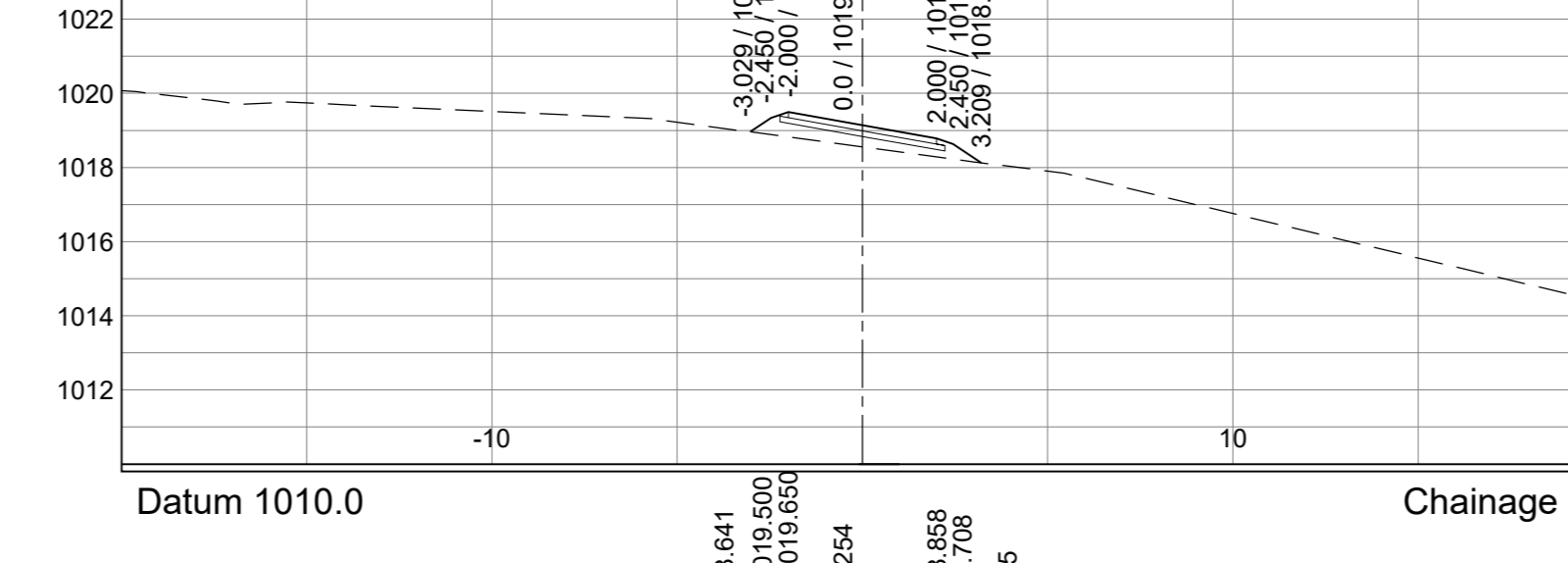
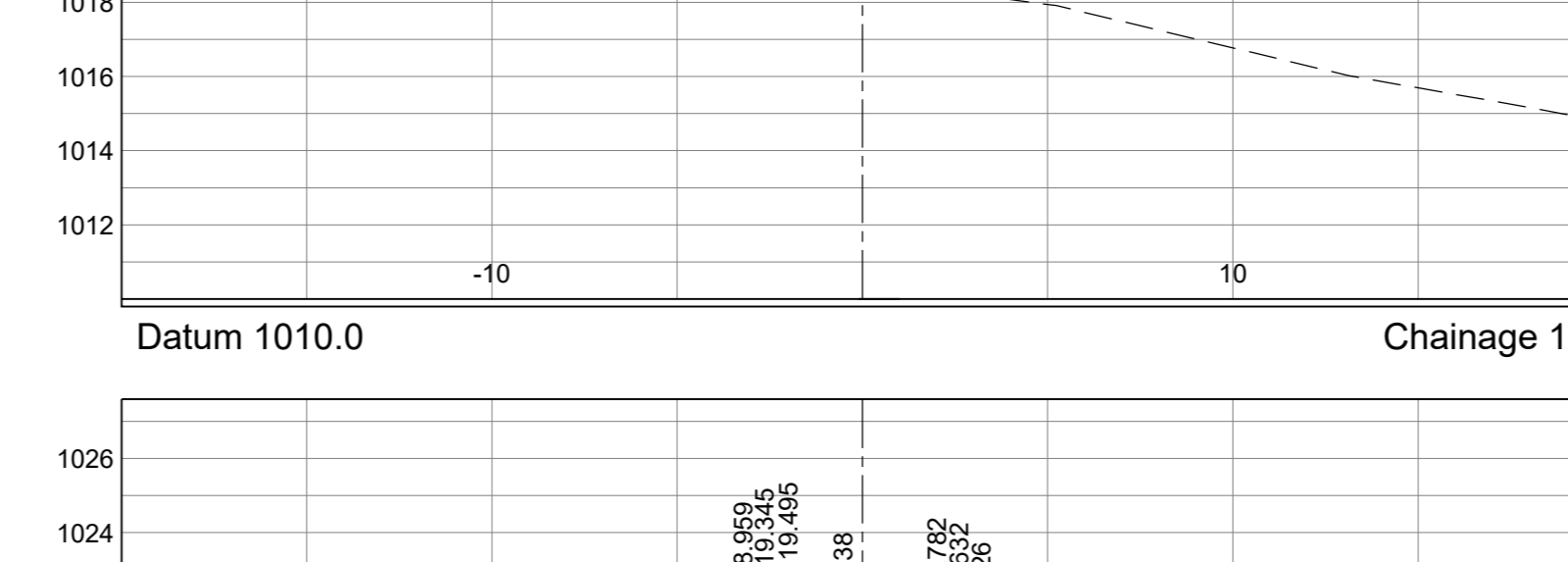
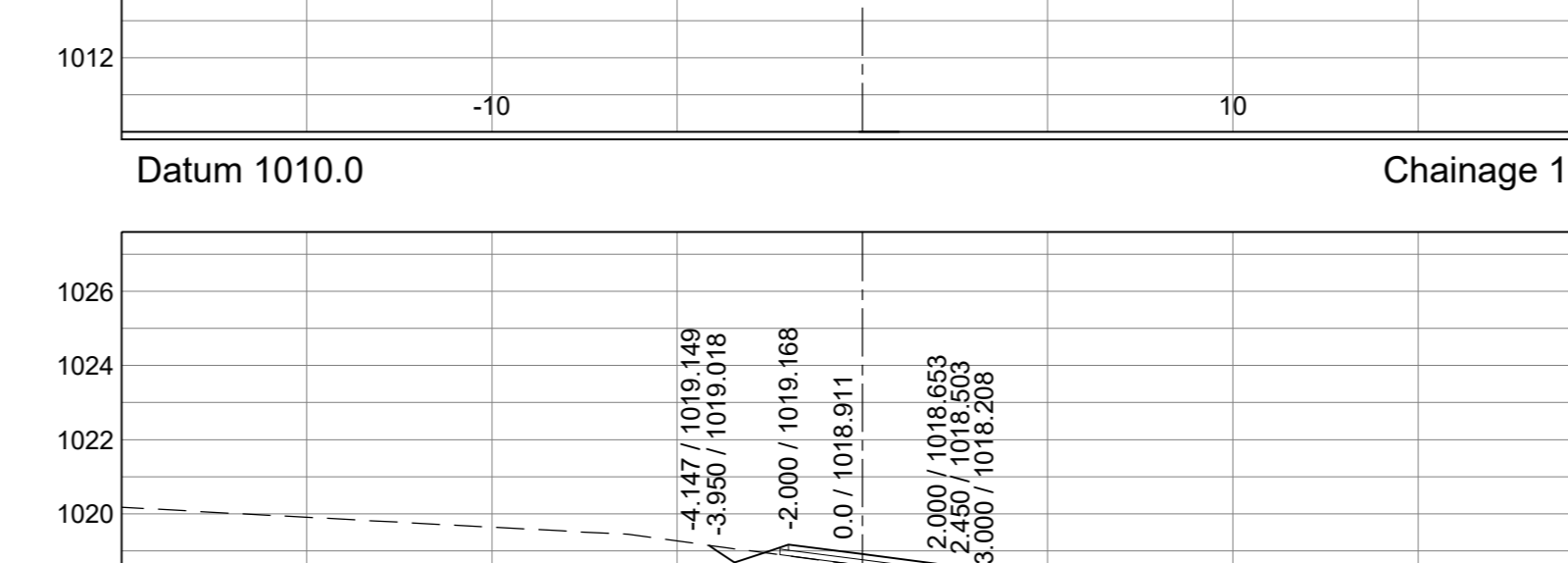
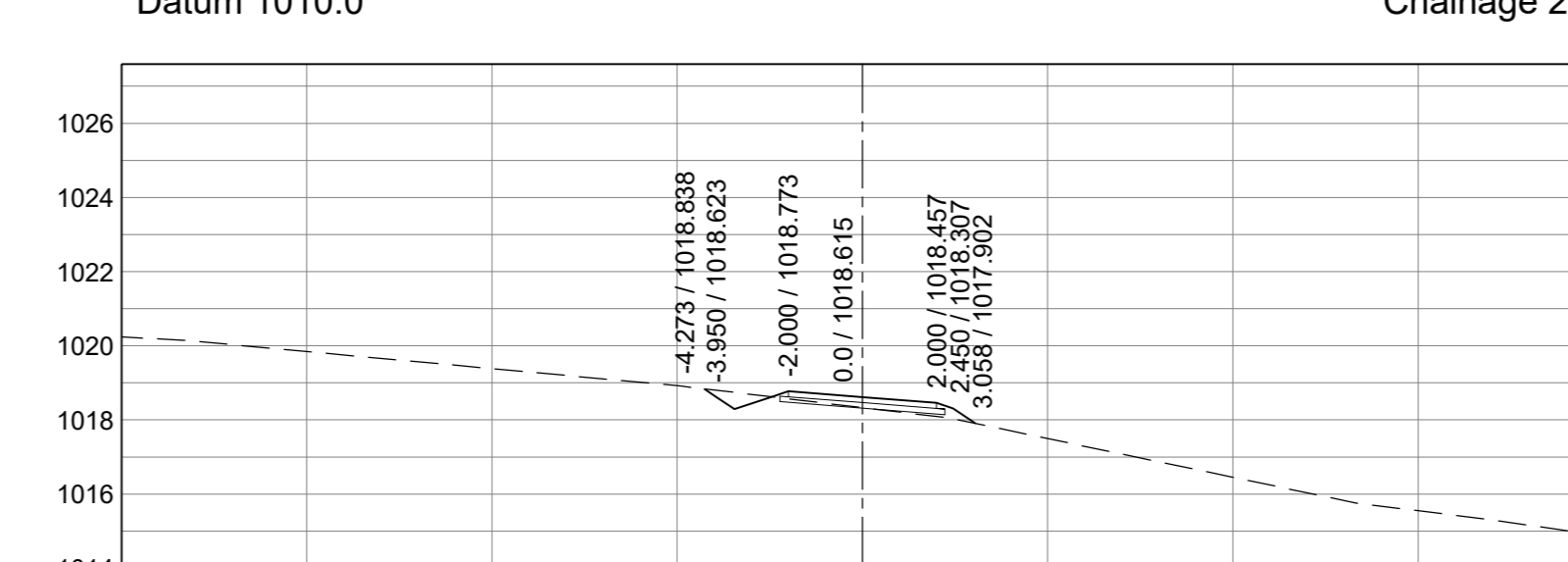
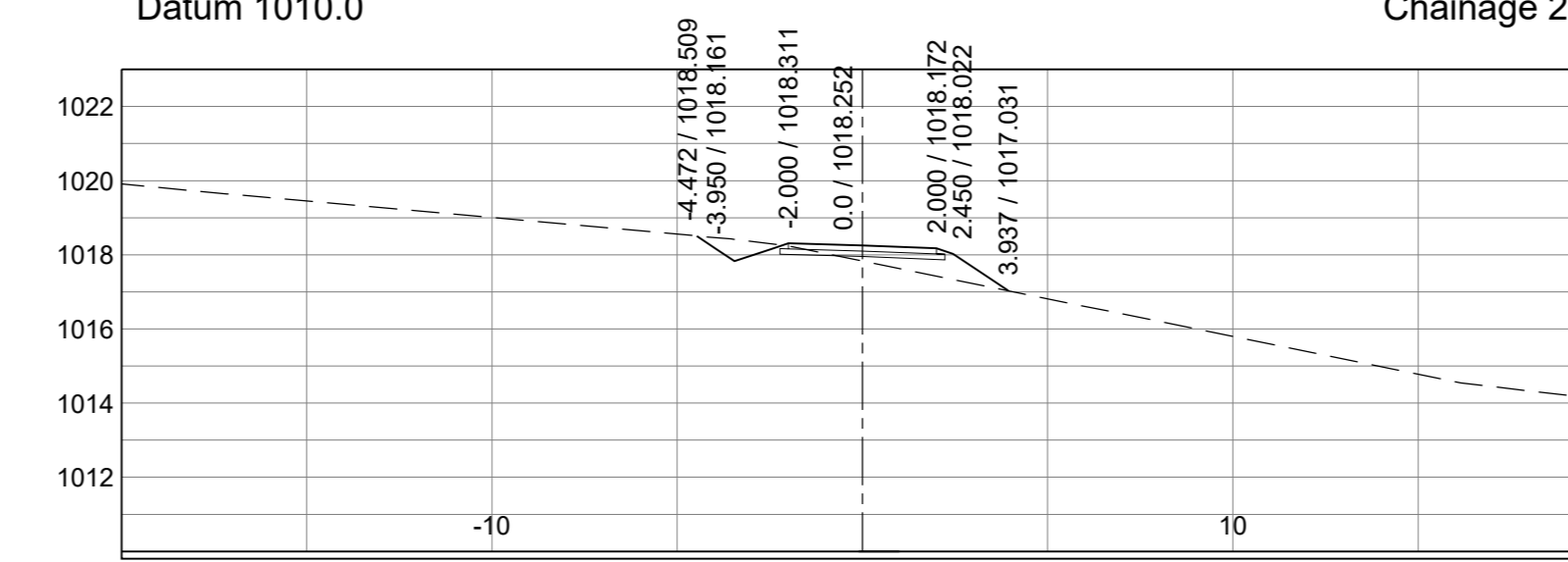
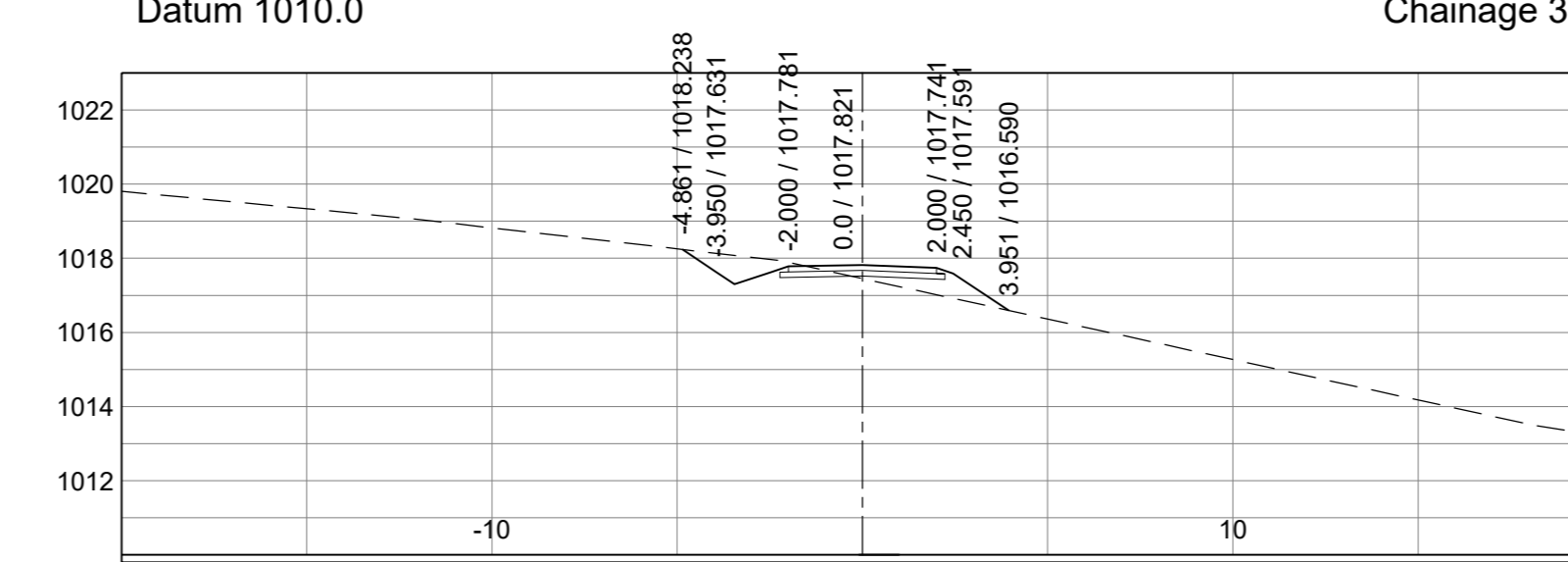
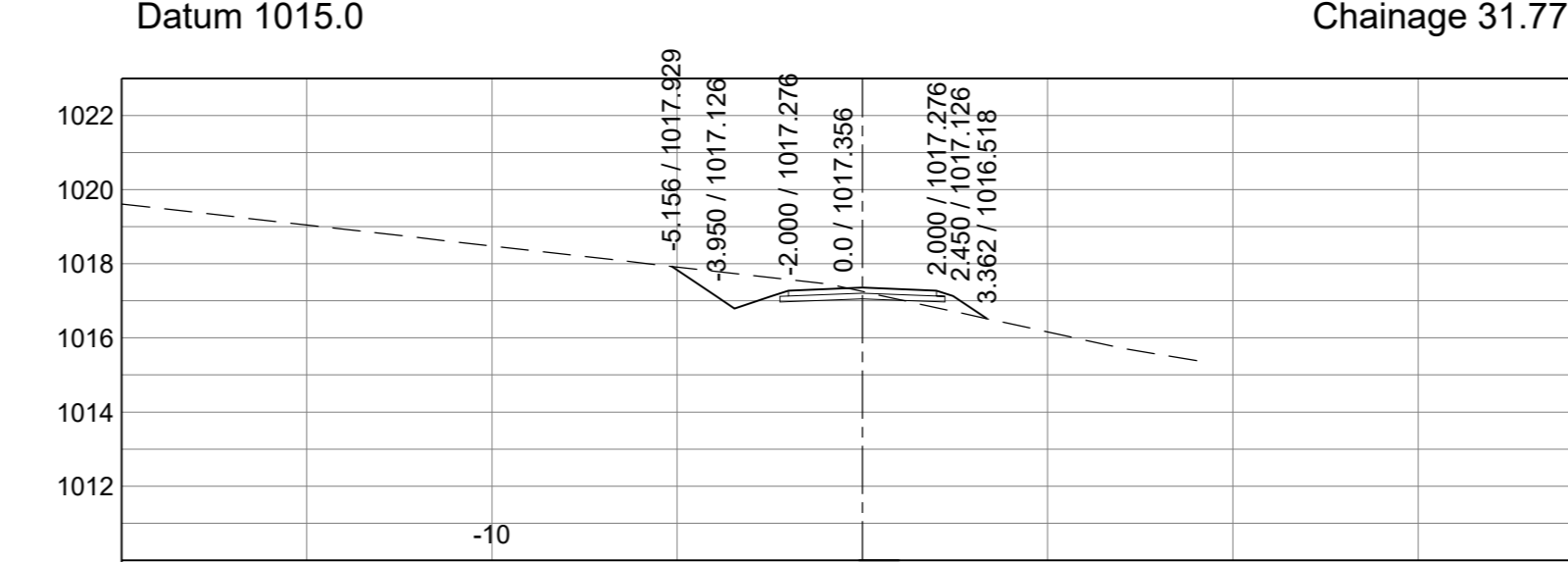
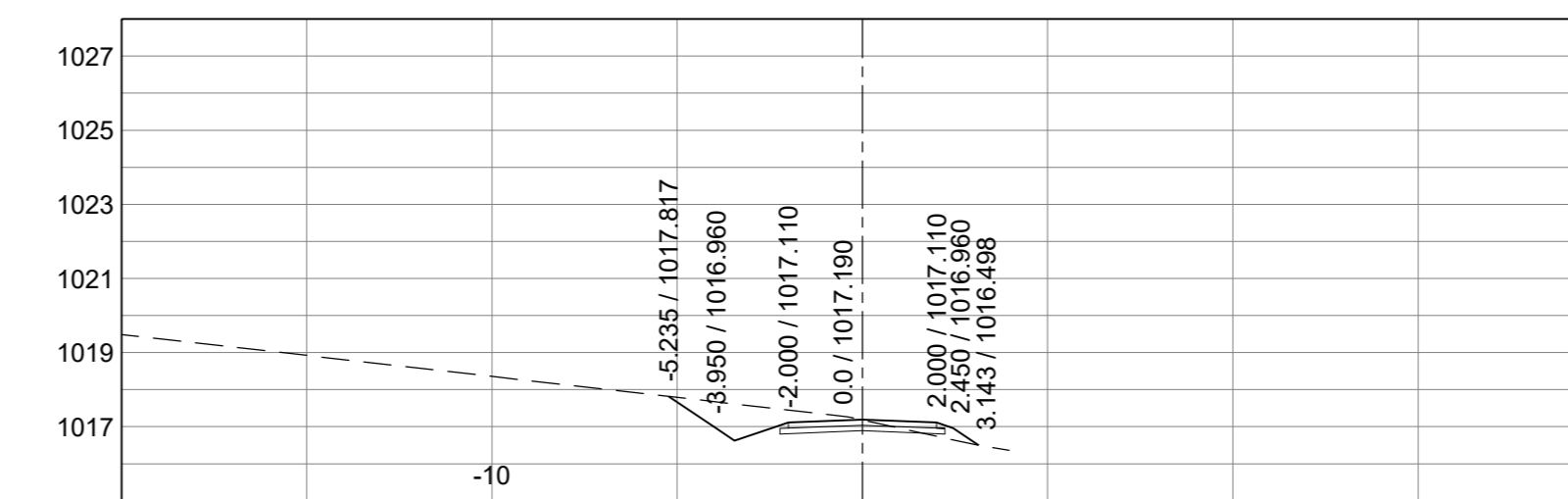
C 46546



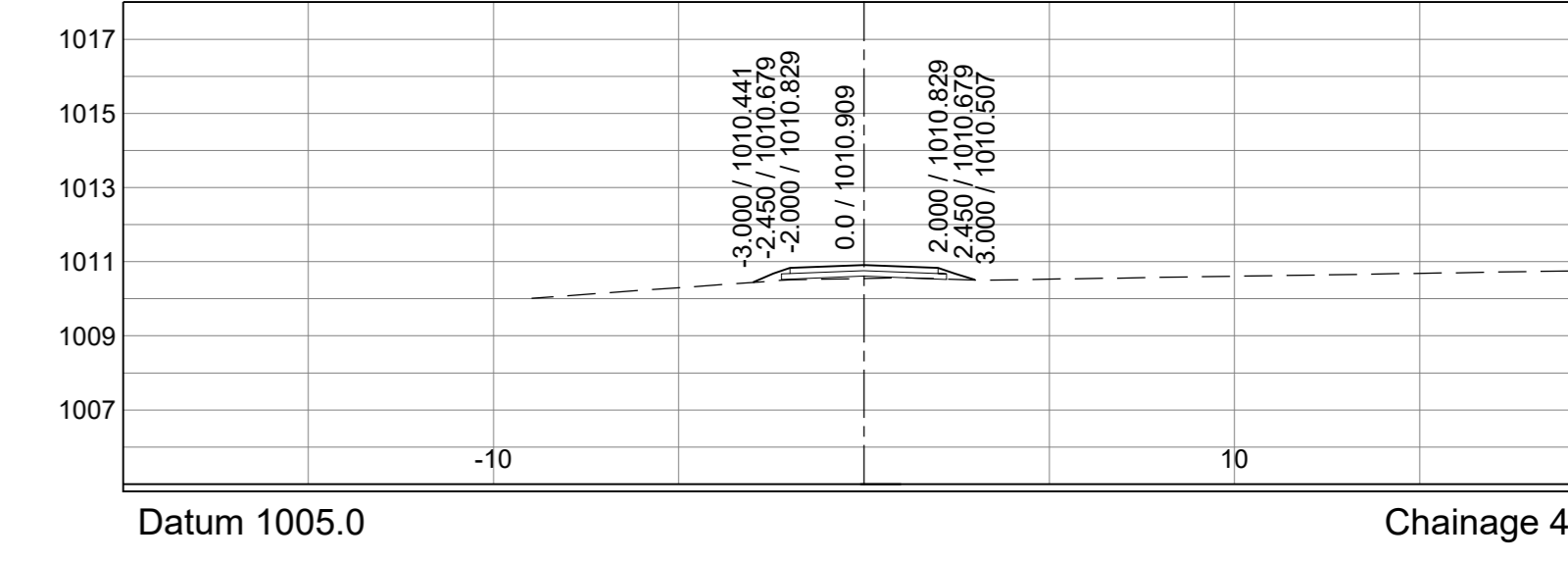
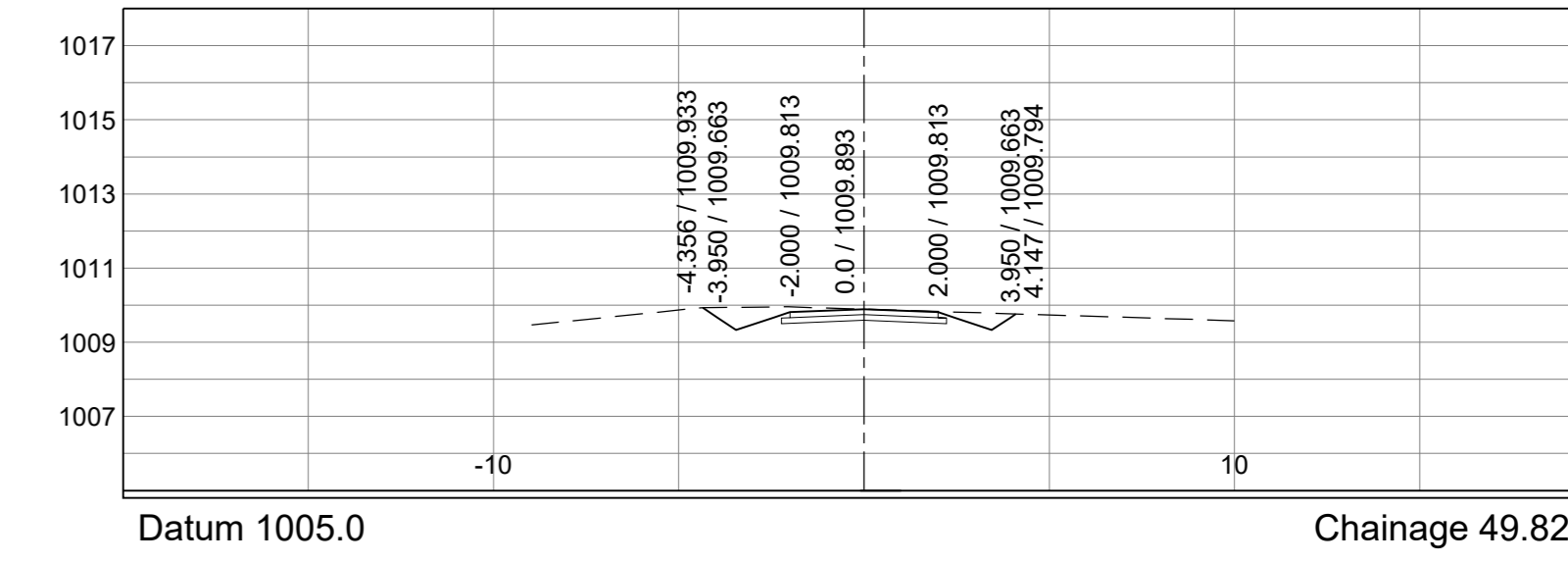
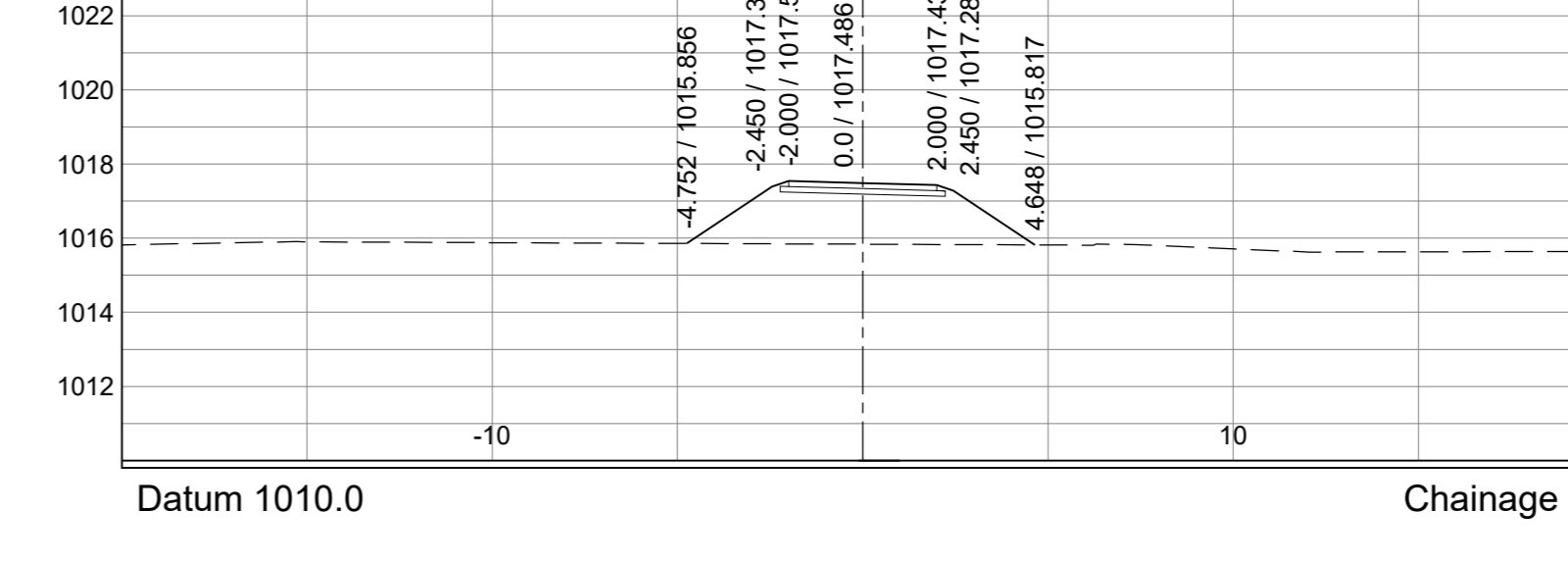
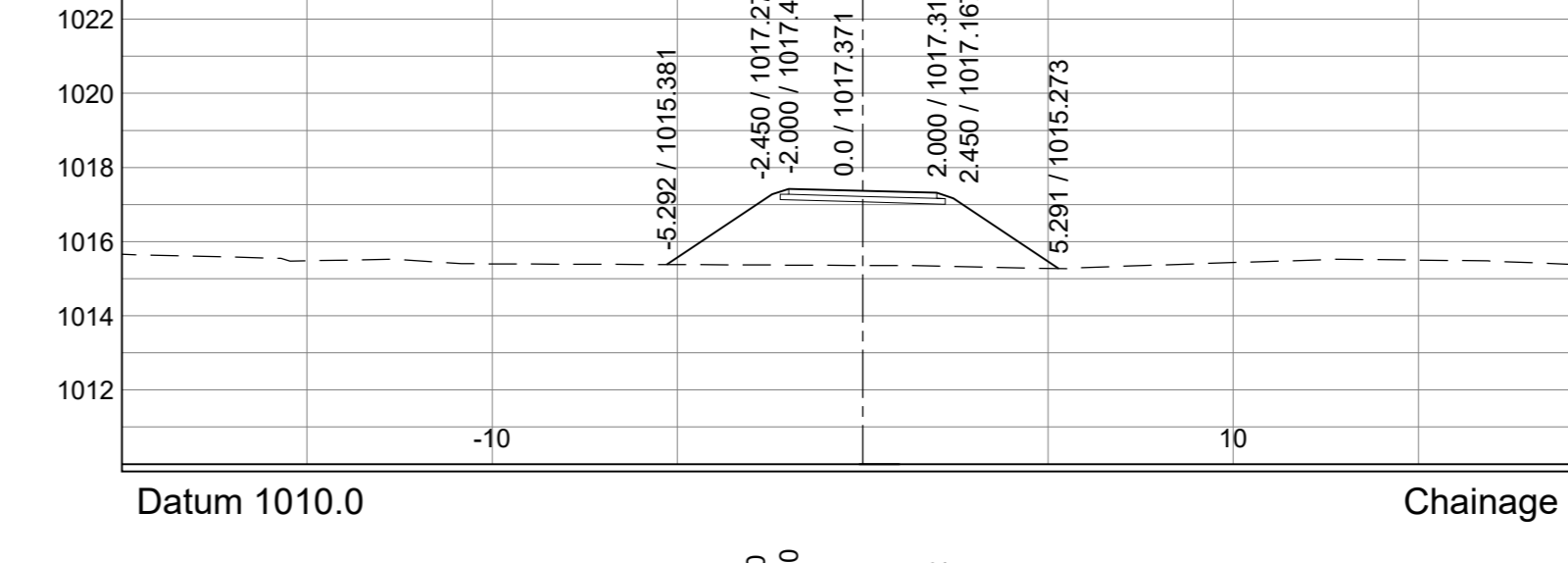
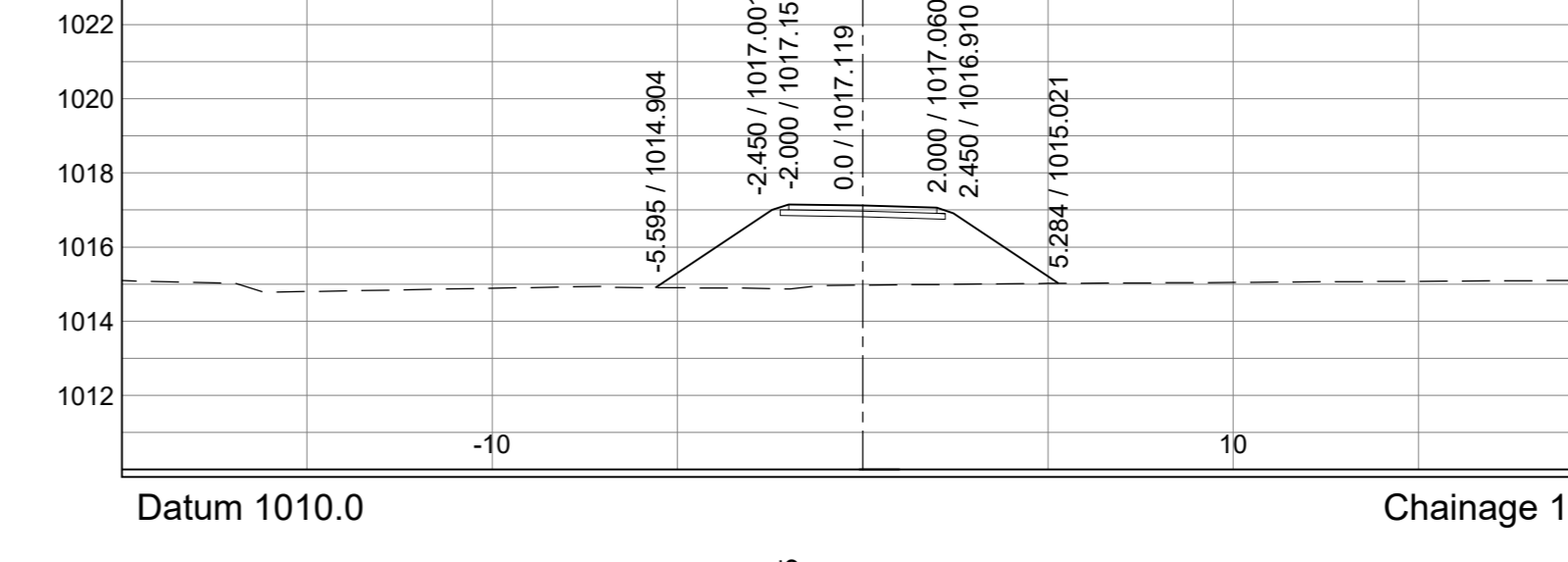
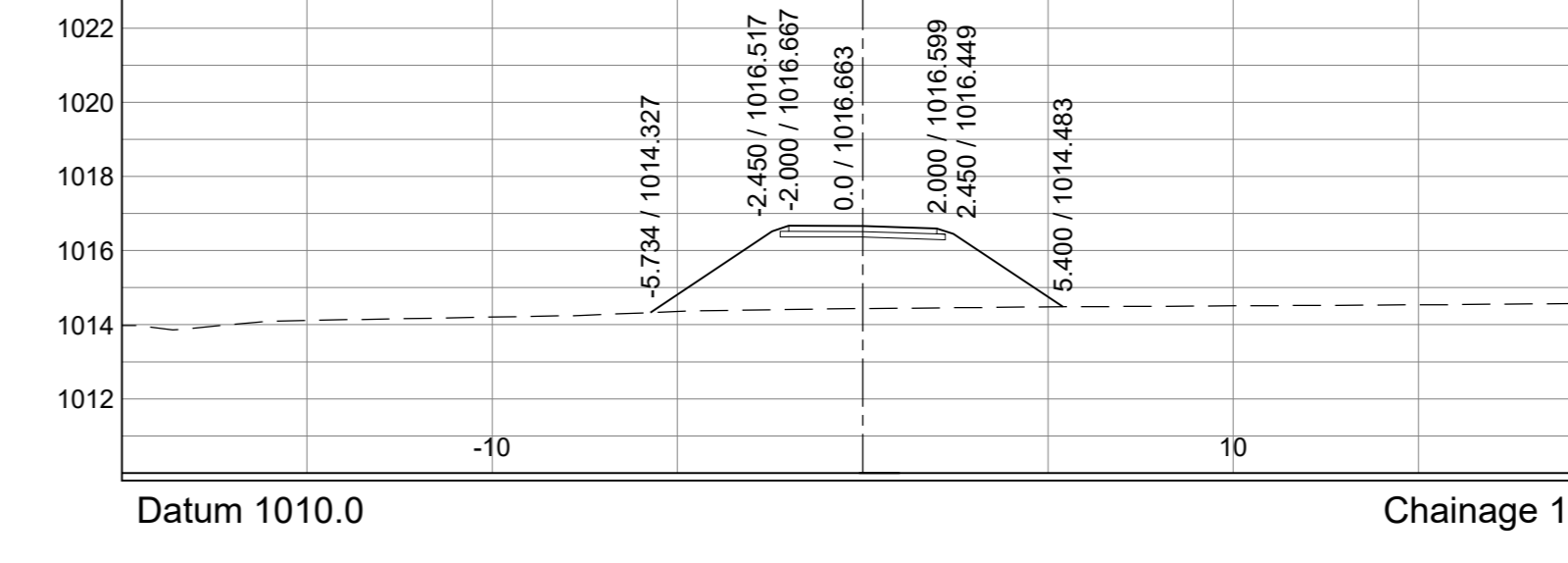
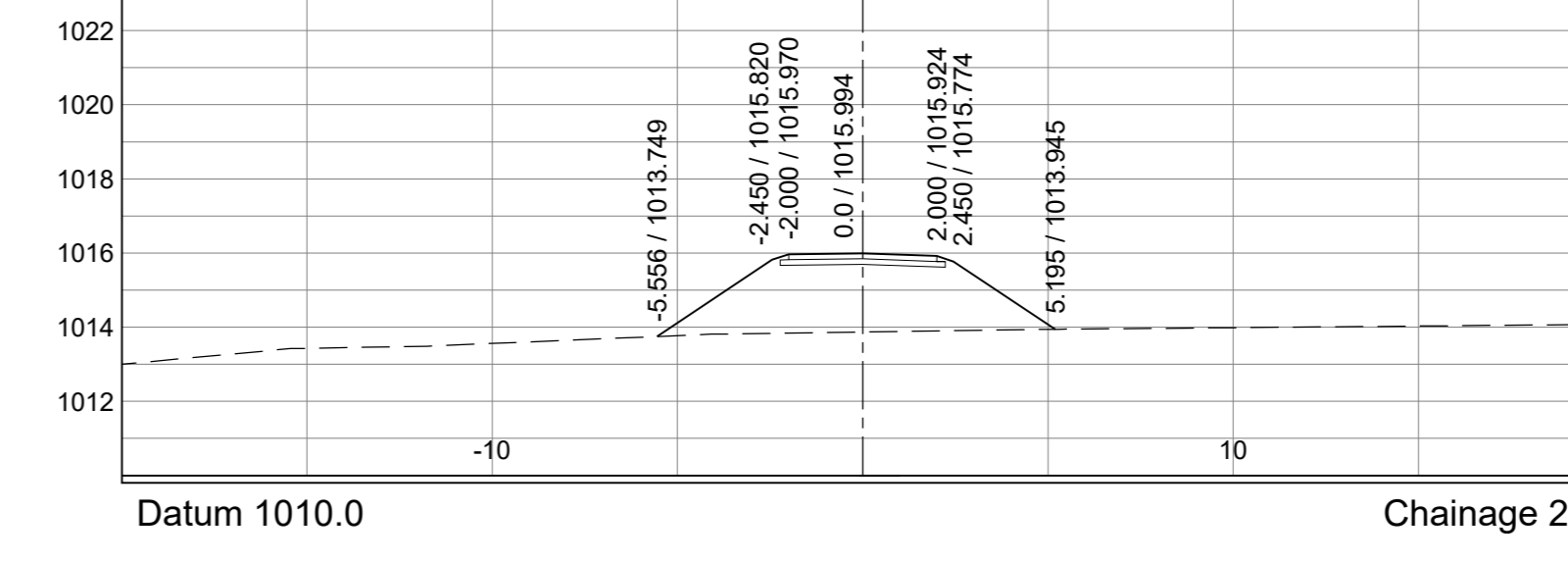
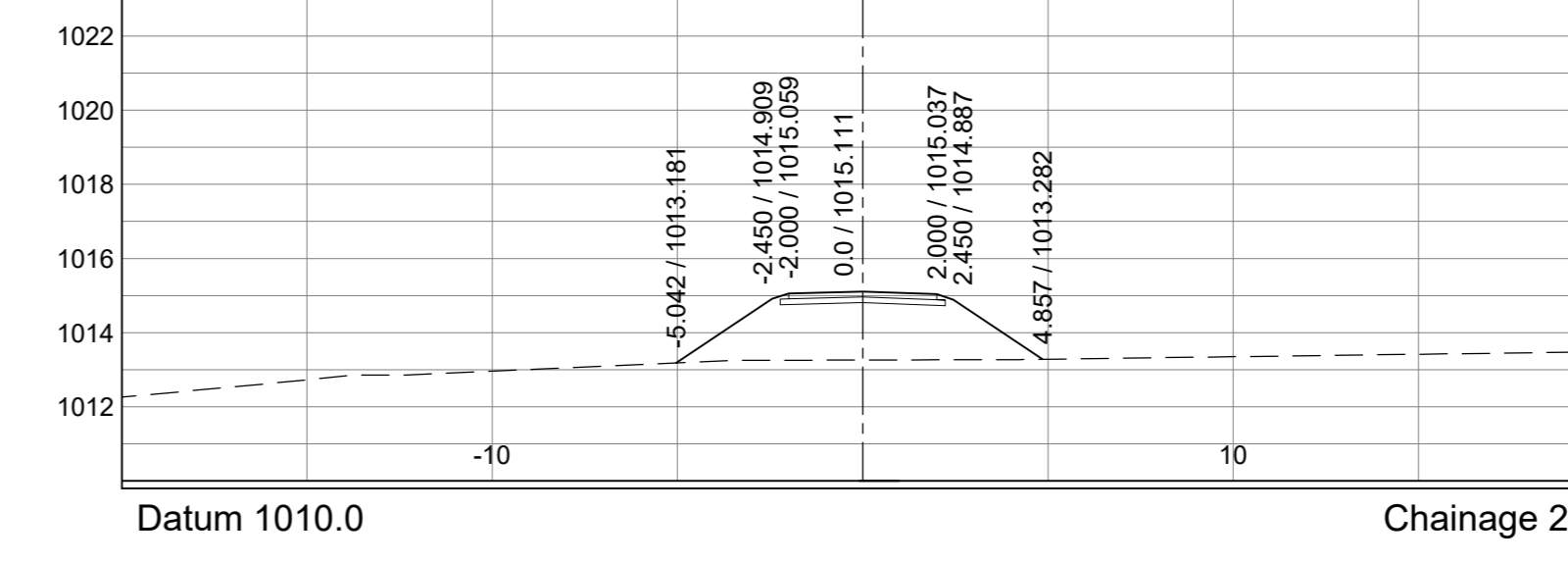
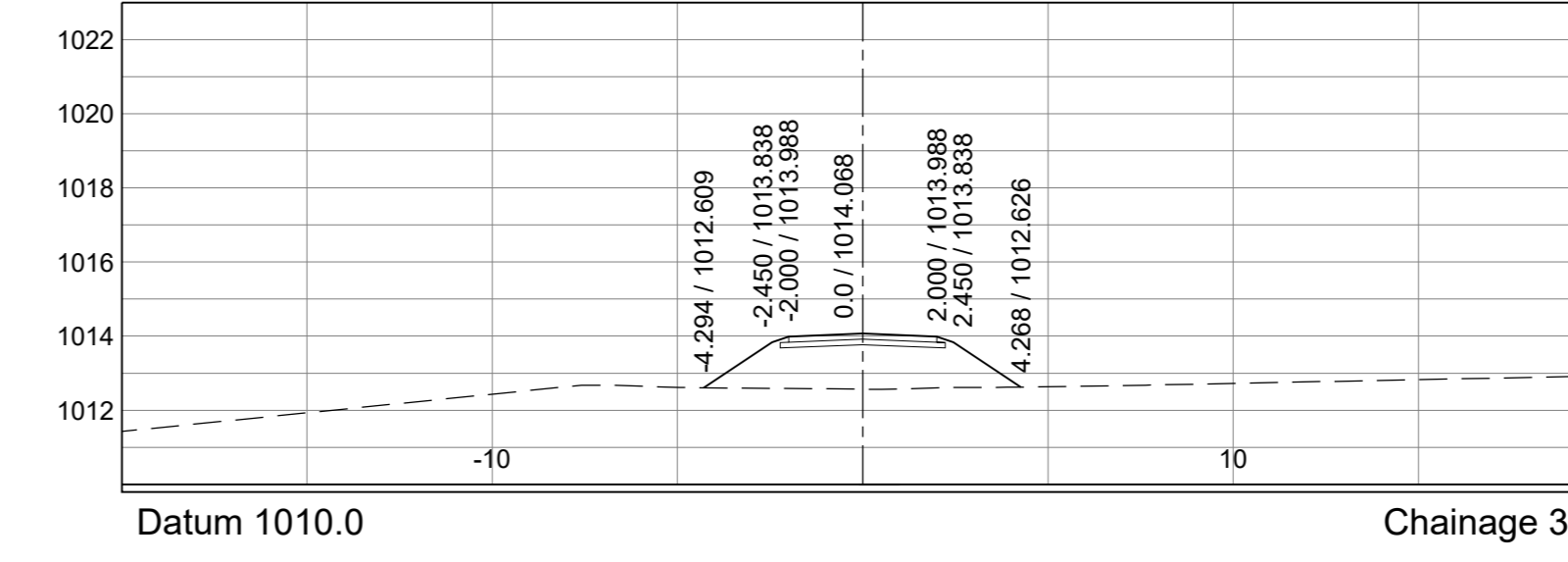
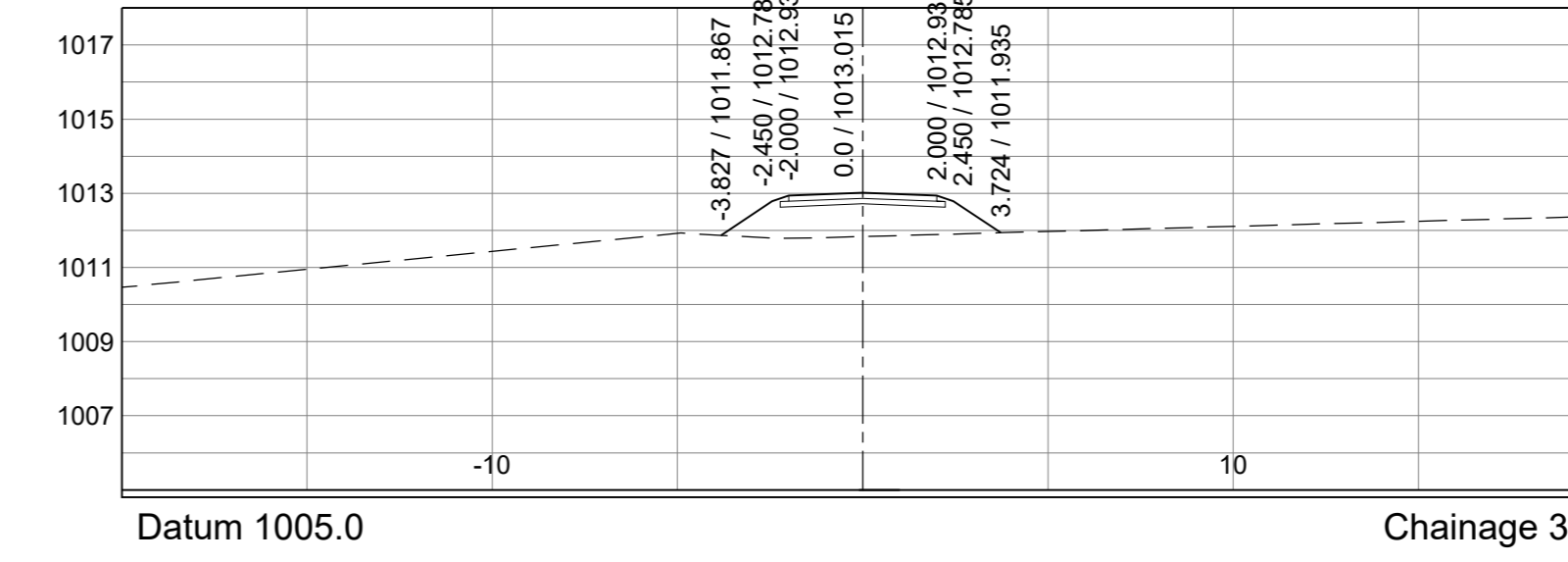
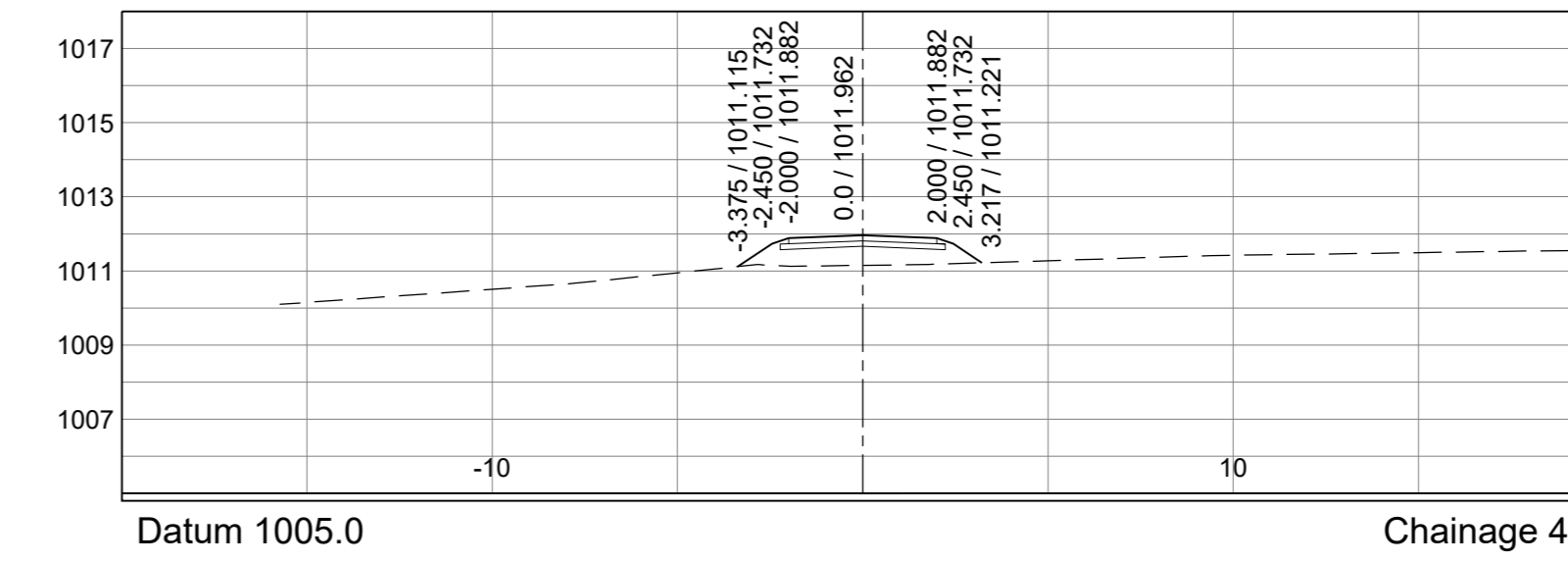
ACCESS @ KM 12+799.811 LHS



LHS ACCESS @ KM 0+022.104 OFF ACCESS KM 12+799.811 LHS



ACCESS @ KM 12+933.165 LHS



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44332	Designed by:-	Y. DOMA
Continued on:-	C 44334	Checked by:-	N. NGUBANE
Cross Section No:-	C 44333	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44325 - C 44326	Checked by:-	Y. DOMA
Design Plan No:-	C 44315	Date of approval:-	



Designed by: **emzansi** ENGINEERS (PTY) LTD

Providing Unrivaled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

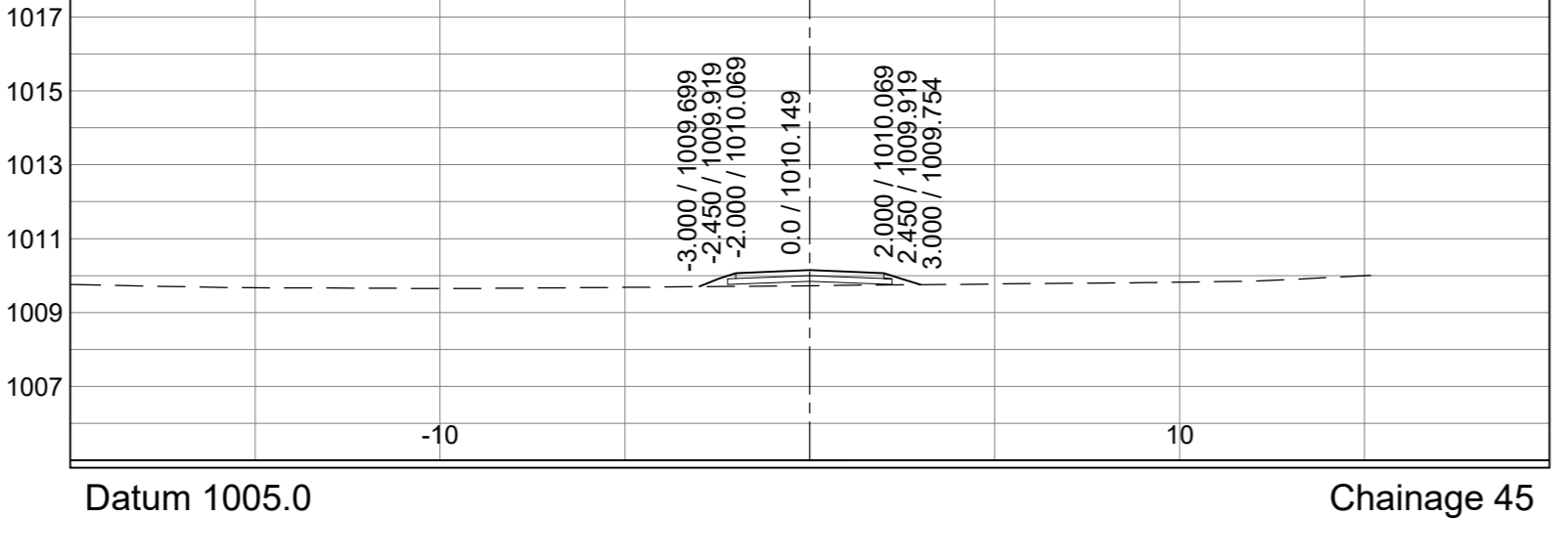
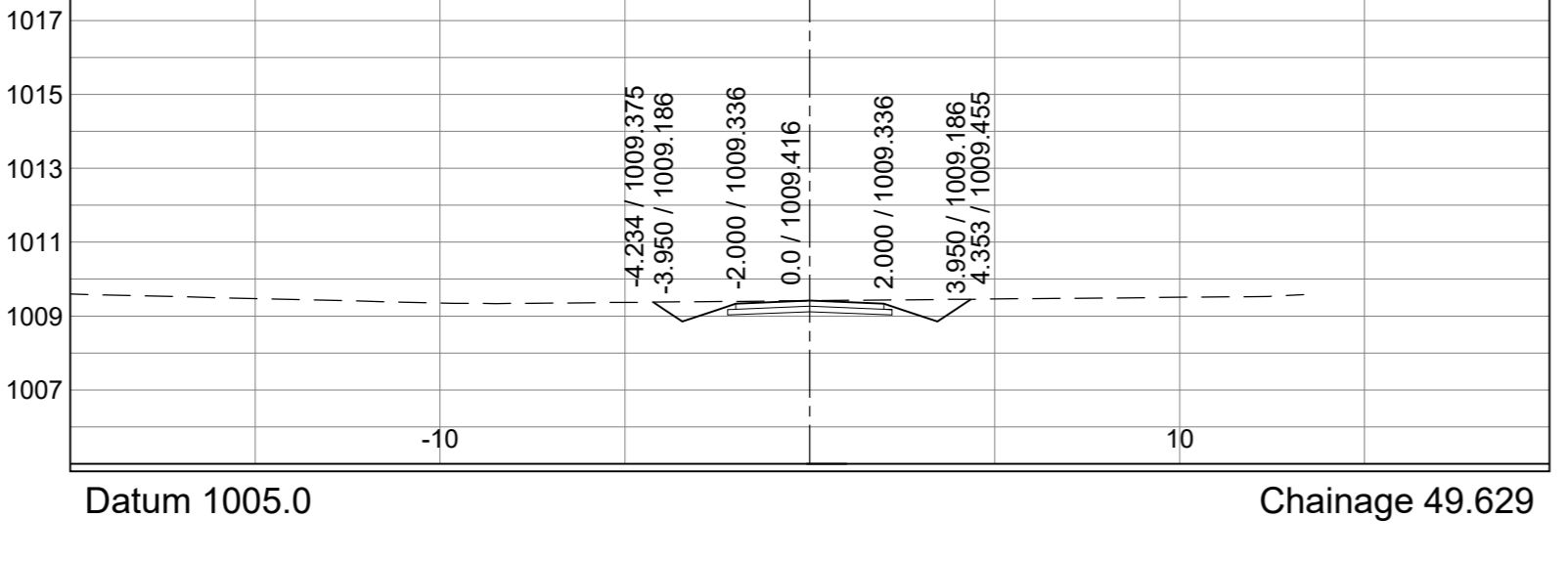
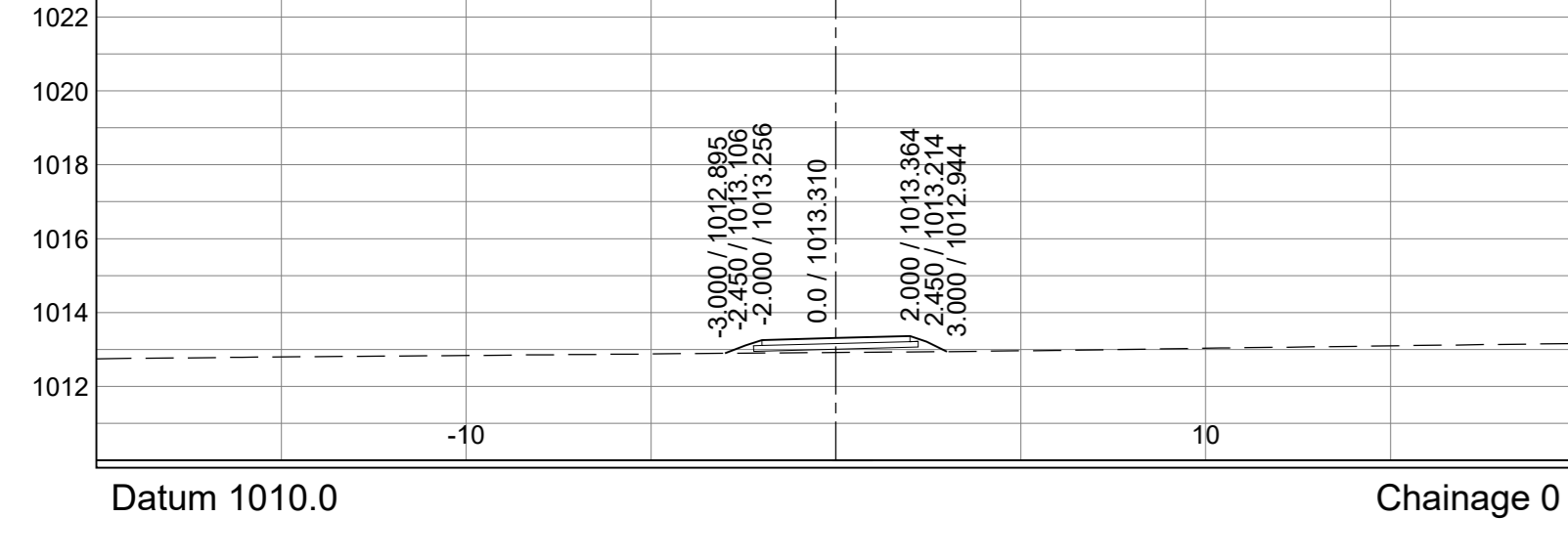
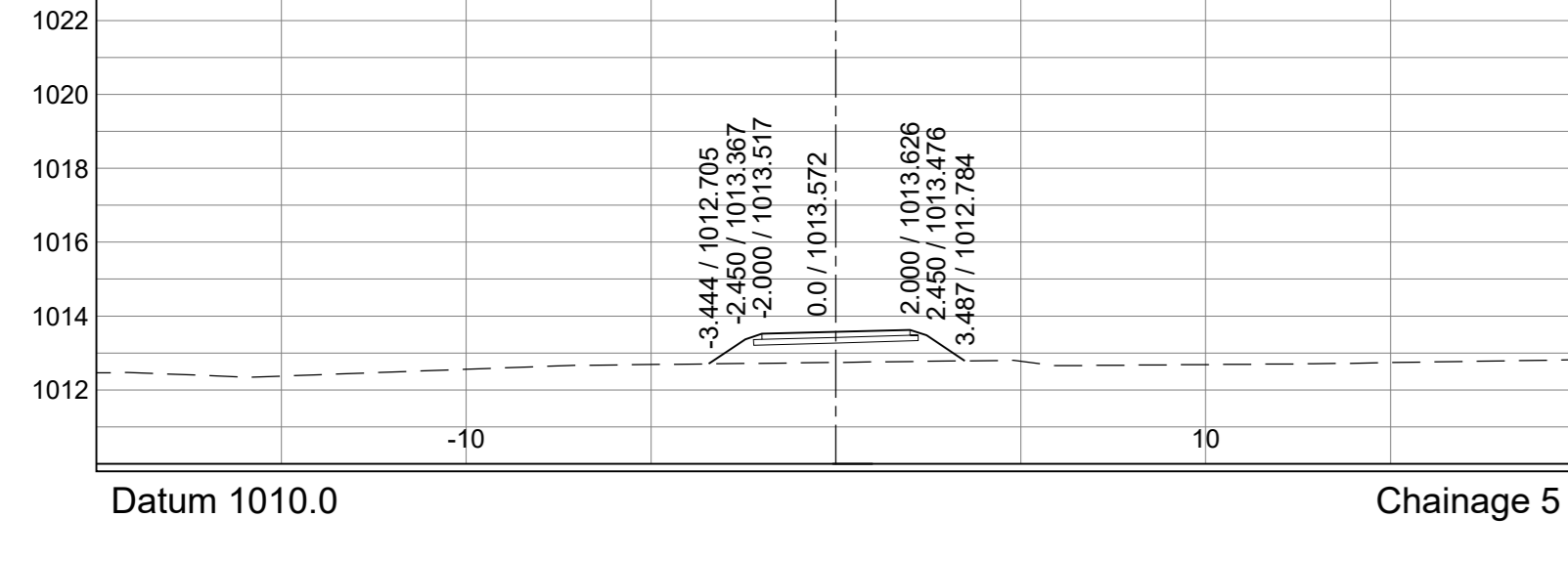
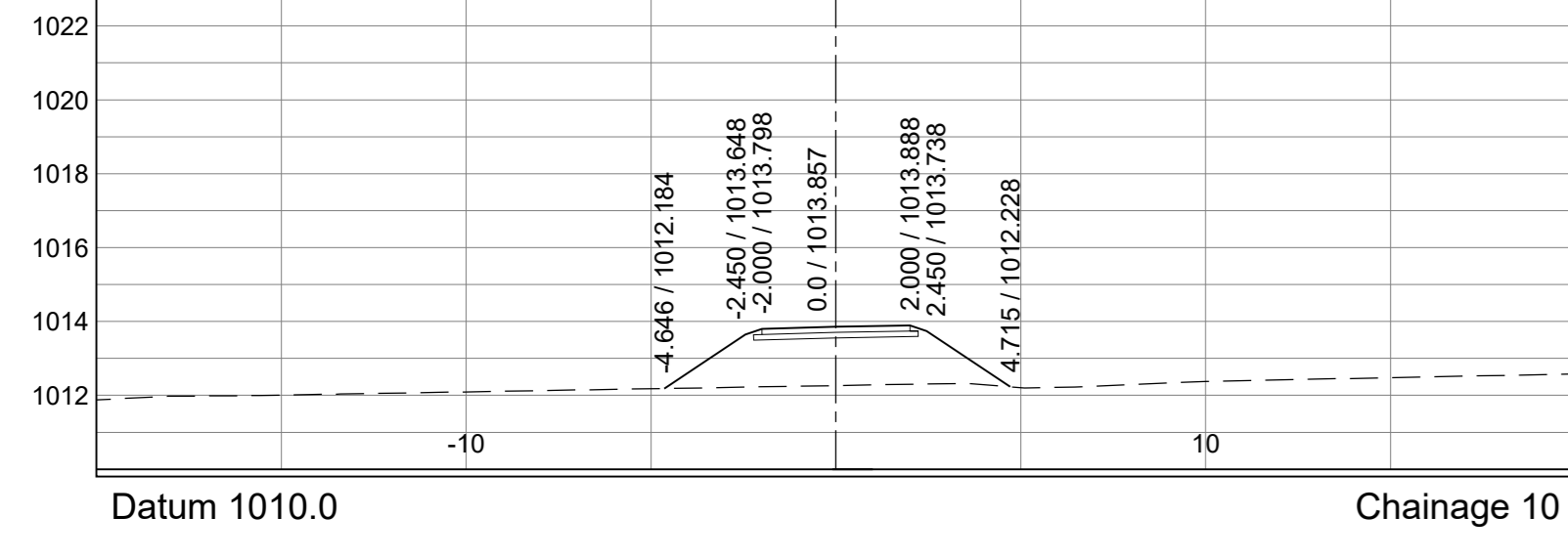
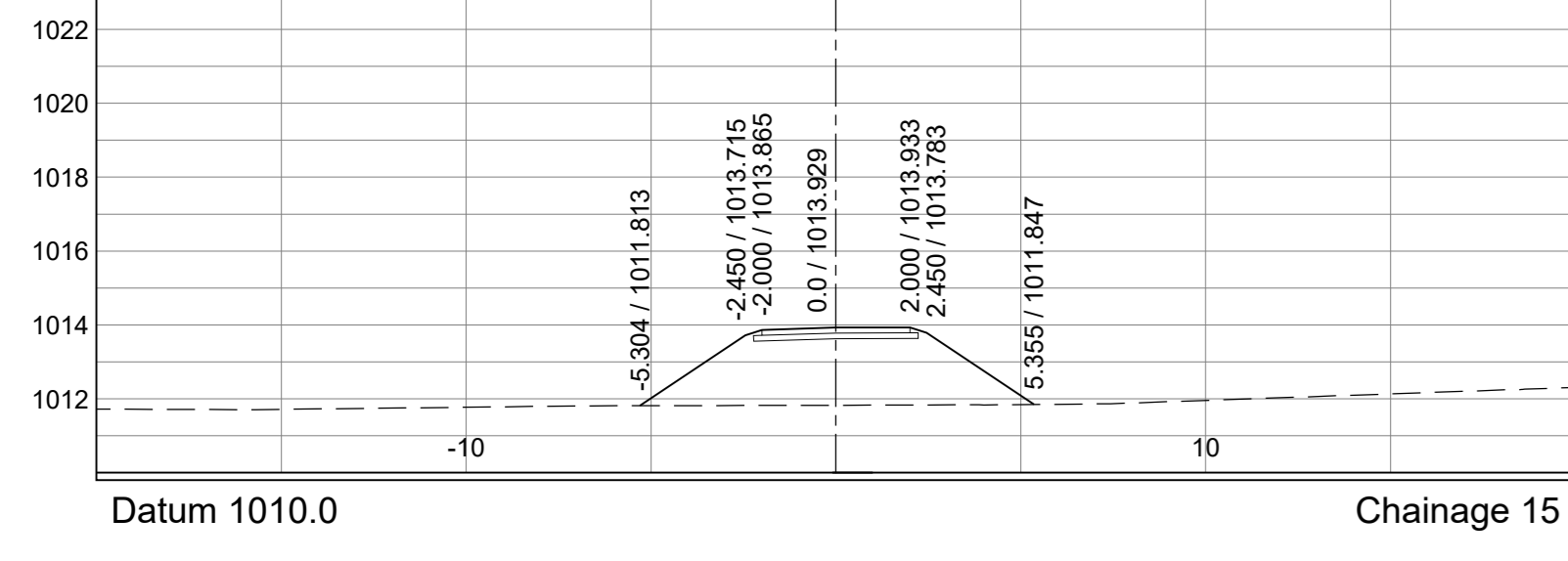
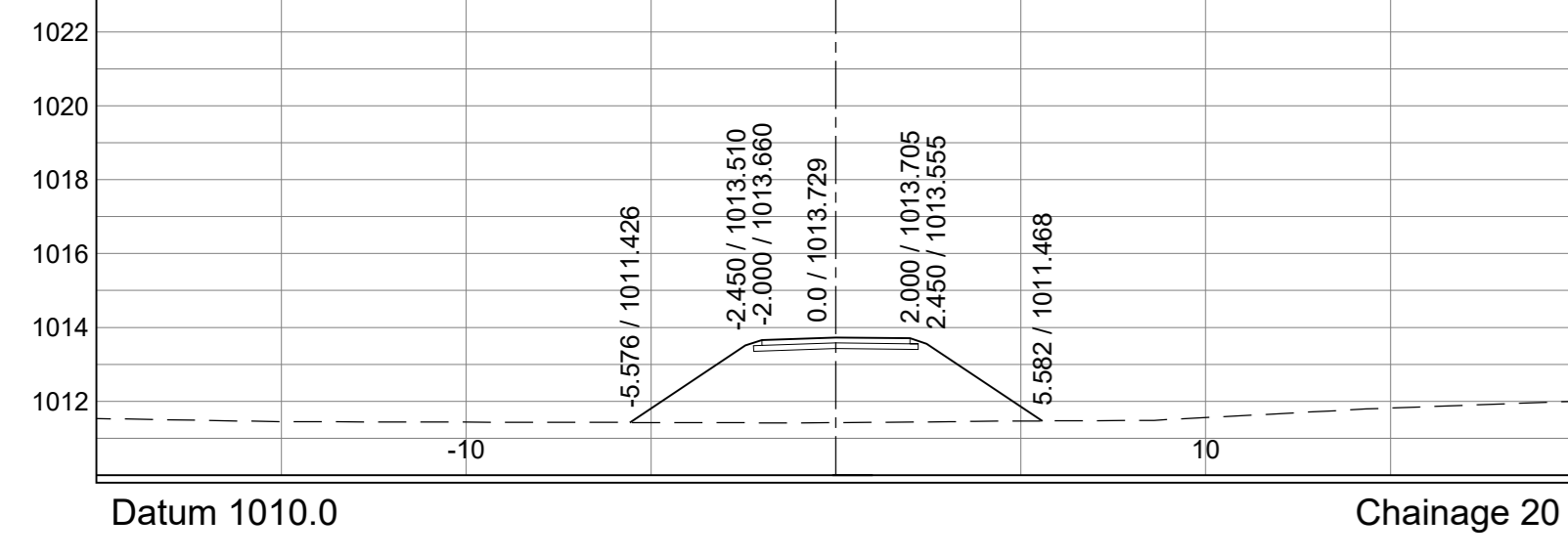
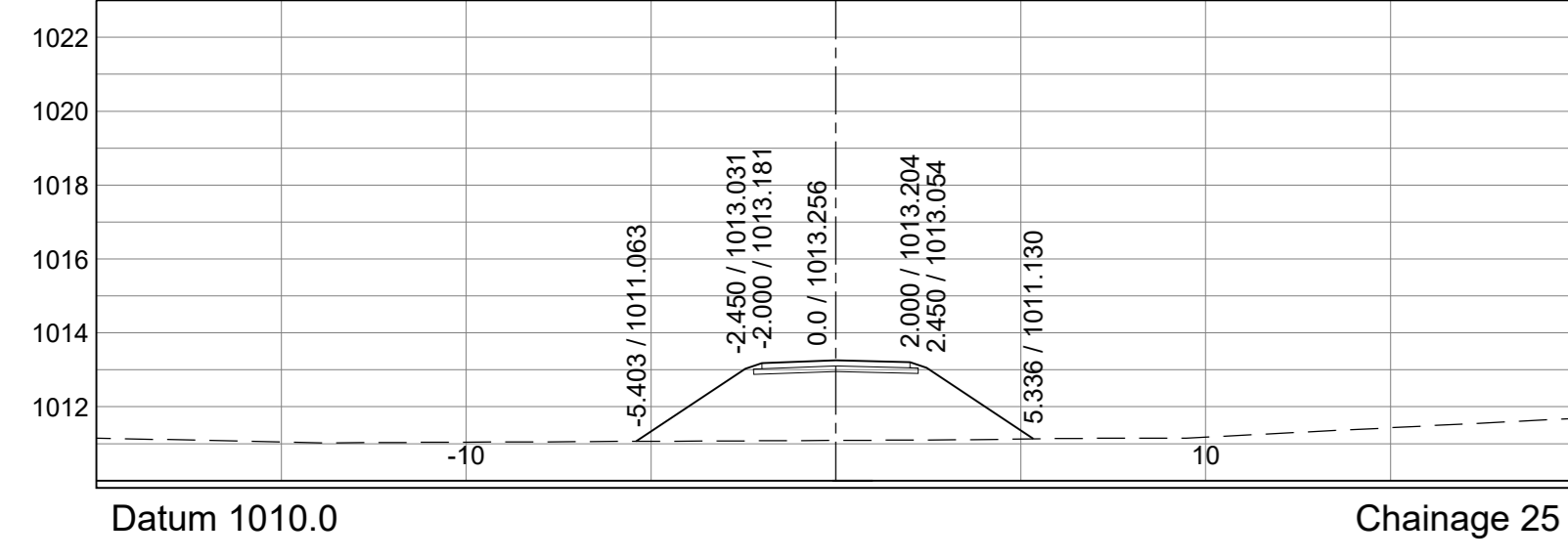
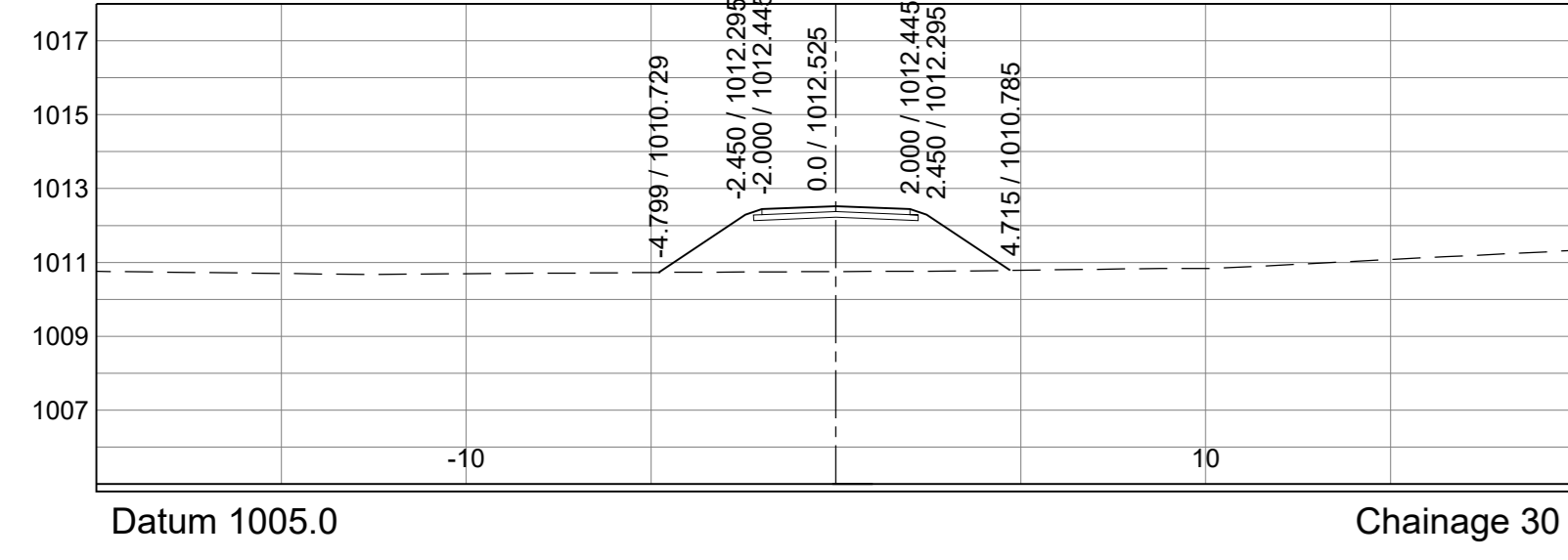
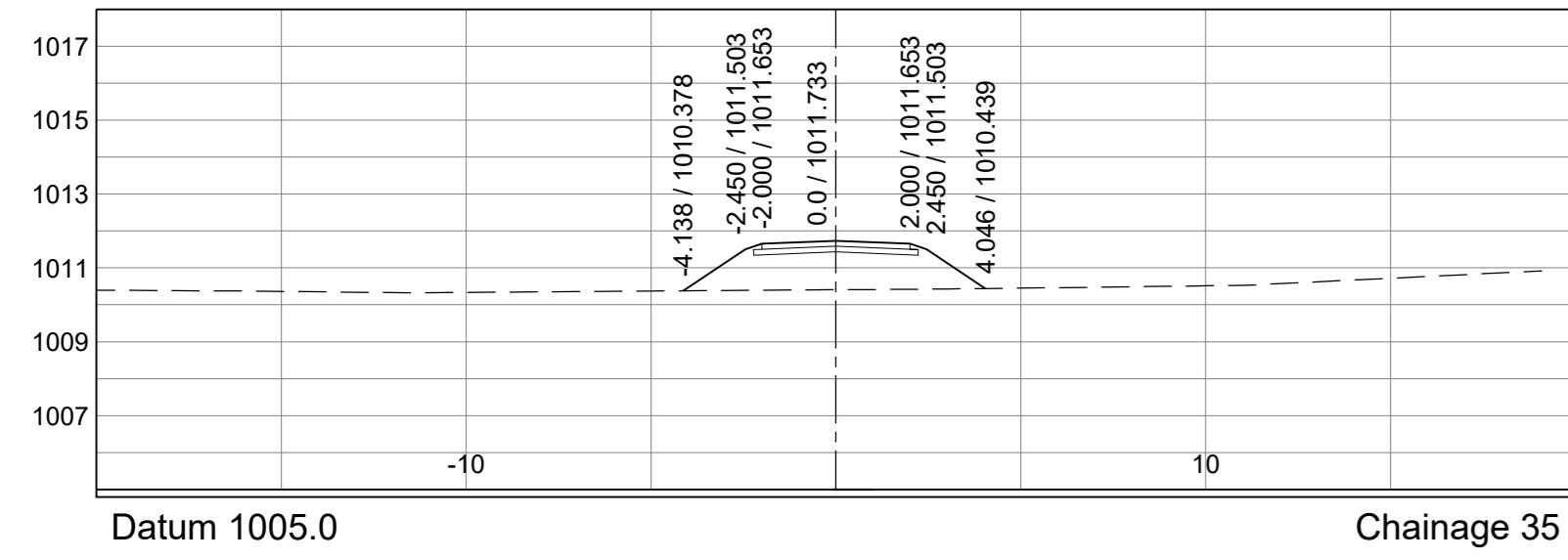
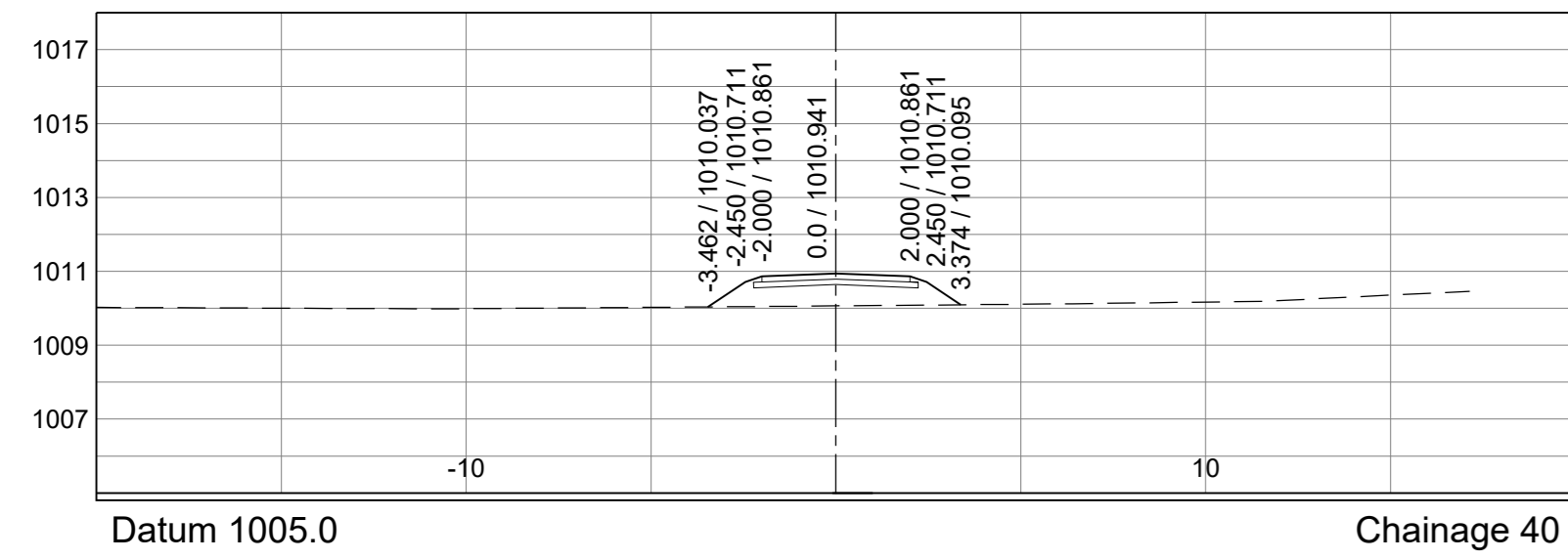
ACCESS ROADS CROSS SECTIONS

Staked km distance km 0+000 - km 0+347.779 km 0+300 - km 0+349.823	Sheet - 4 of - 14	REVISION: A
Scale Vertical Scale 1 : 200 Horizontal Scale 1 : 200	Plan No -	<b>C 46547</b>

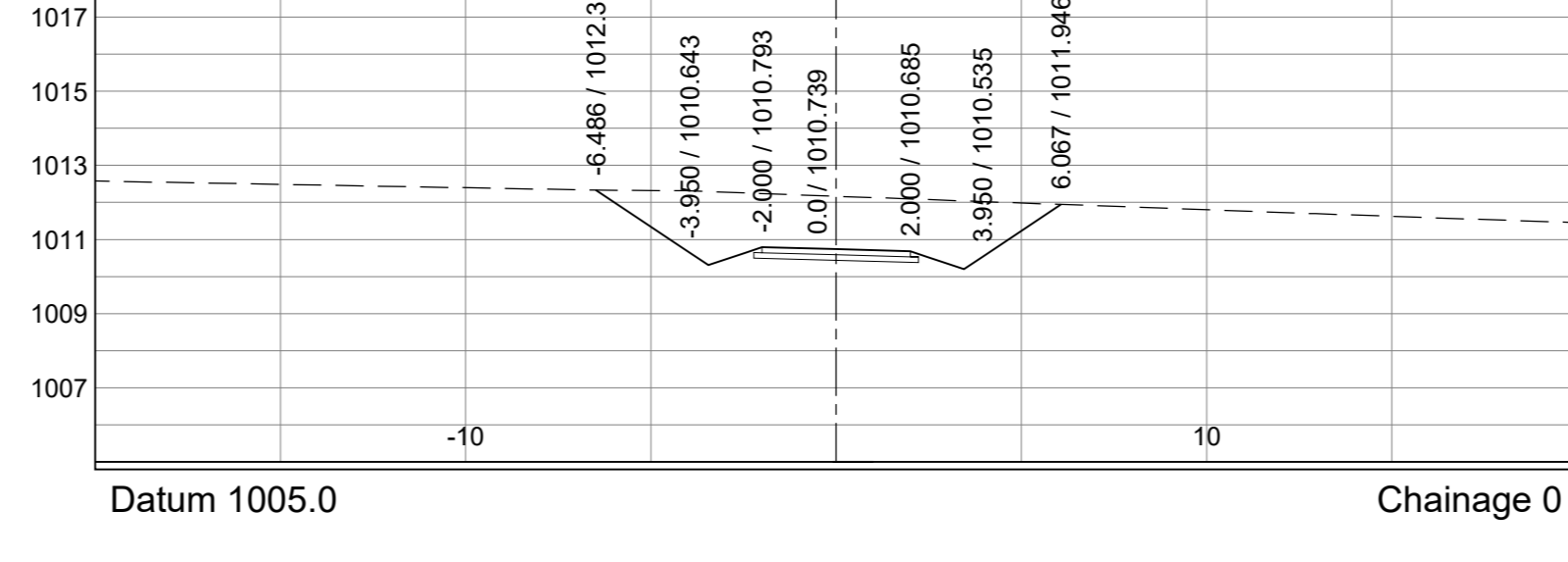
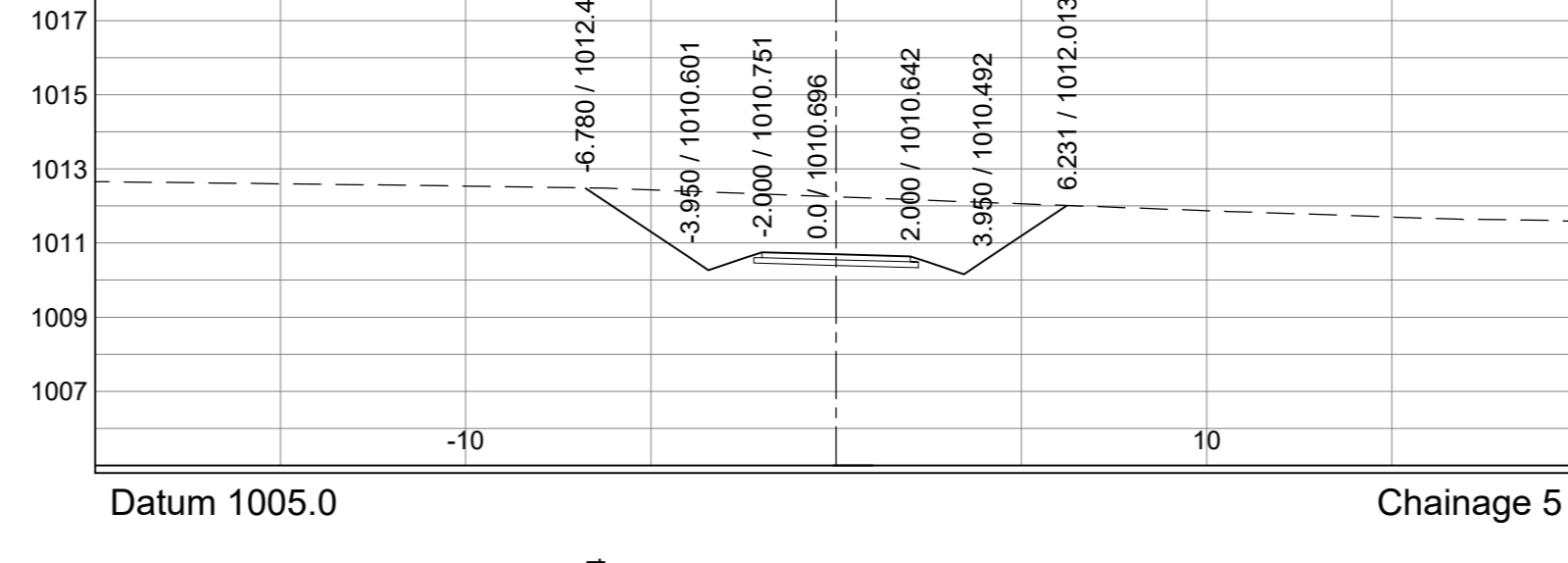
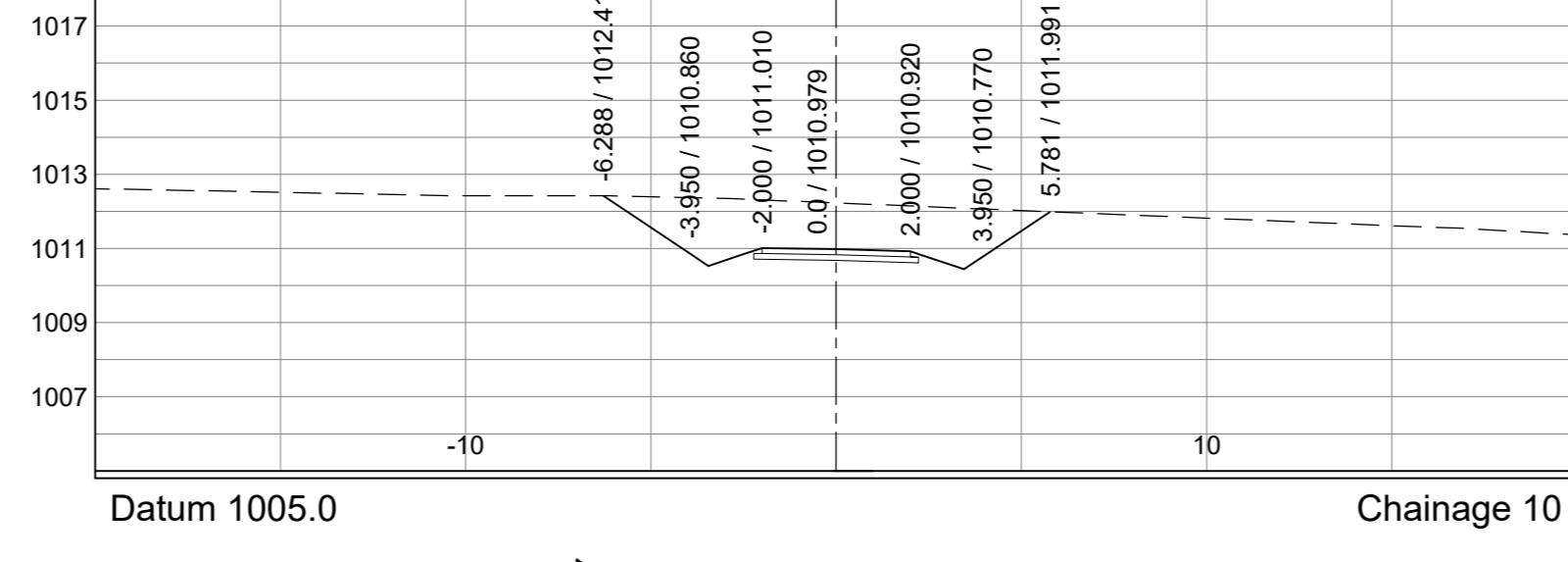
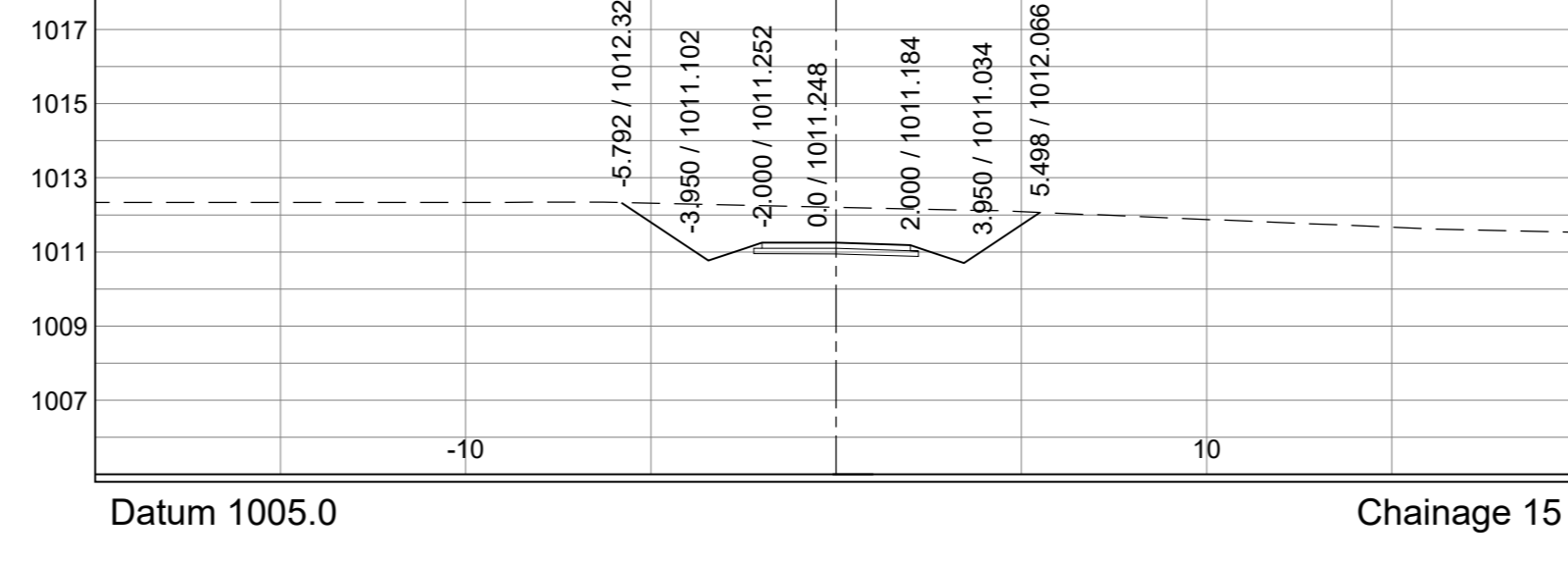
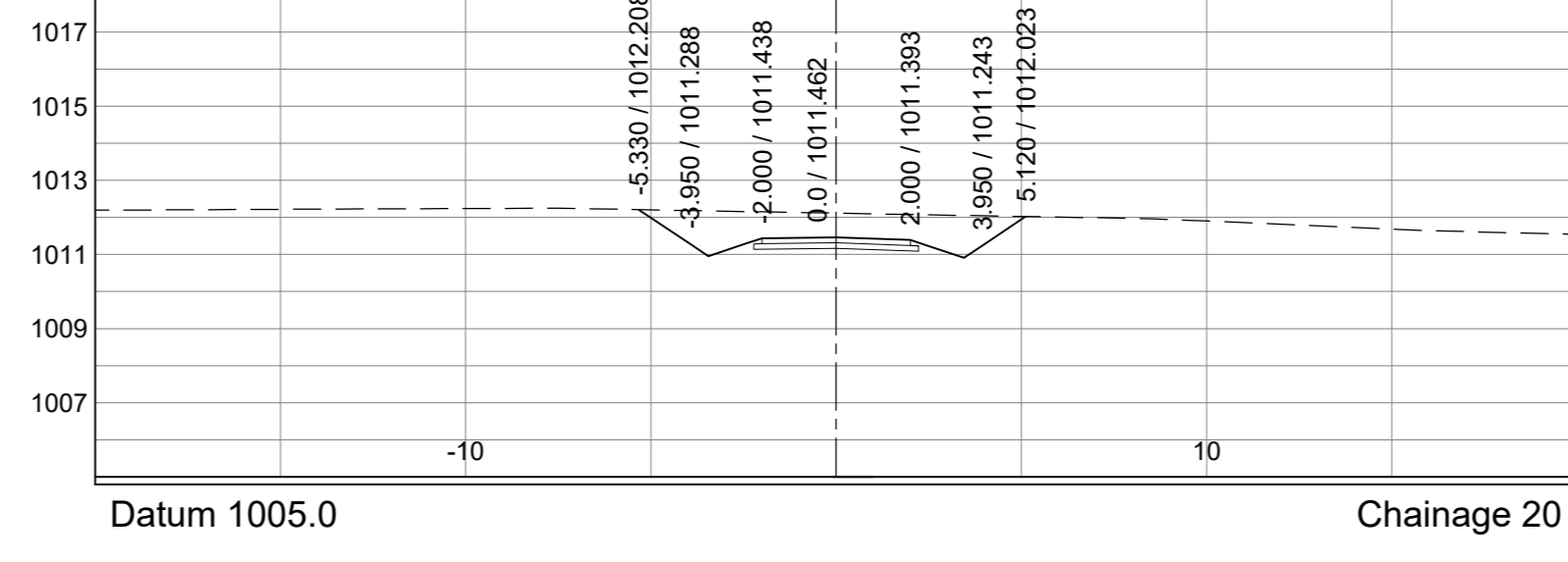
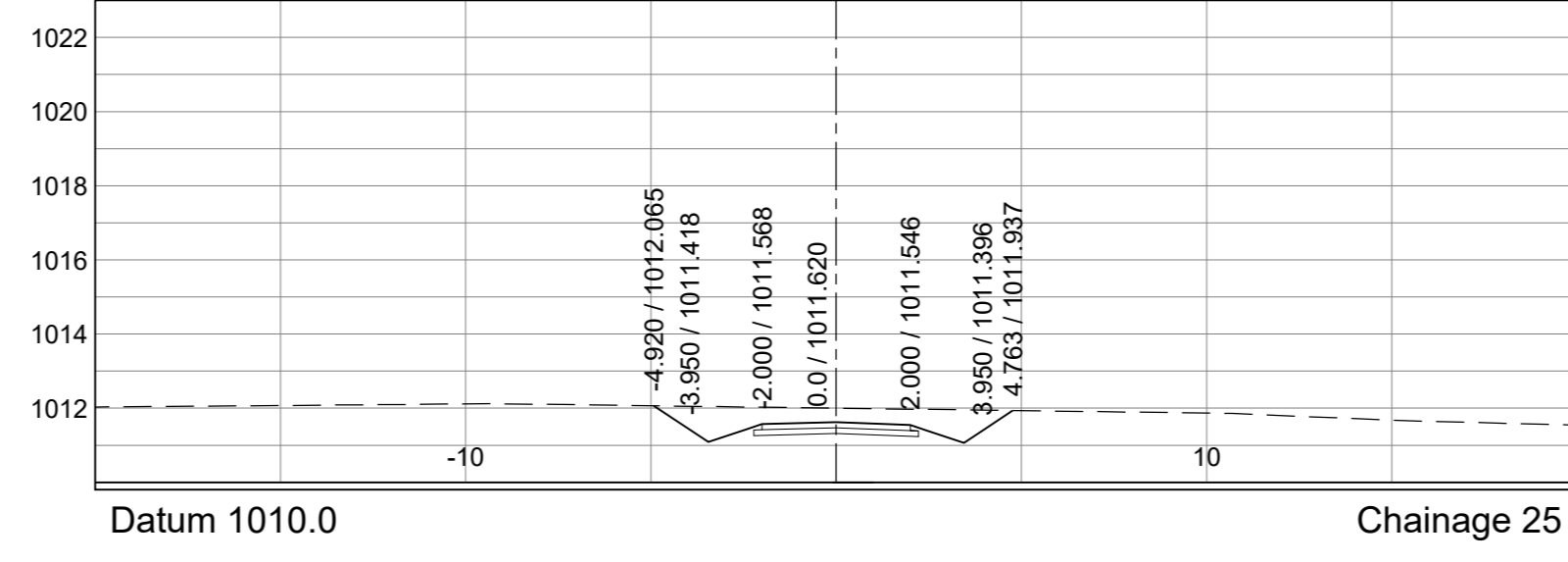
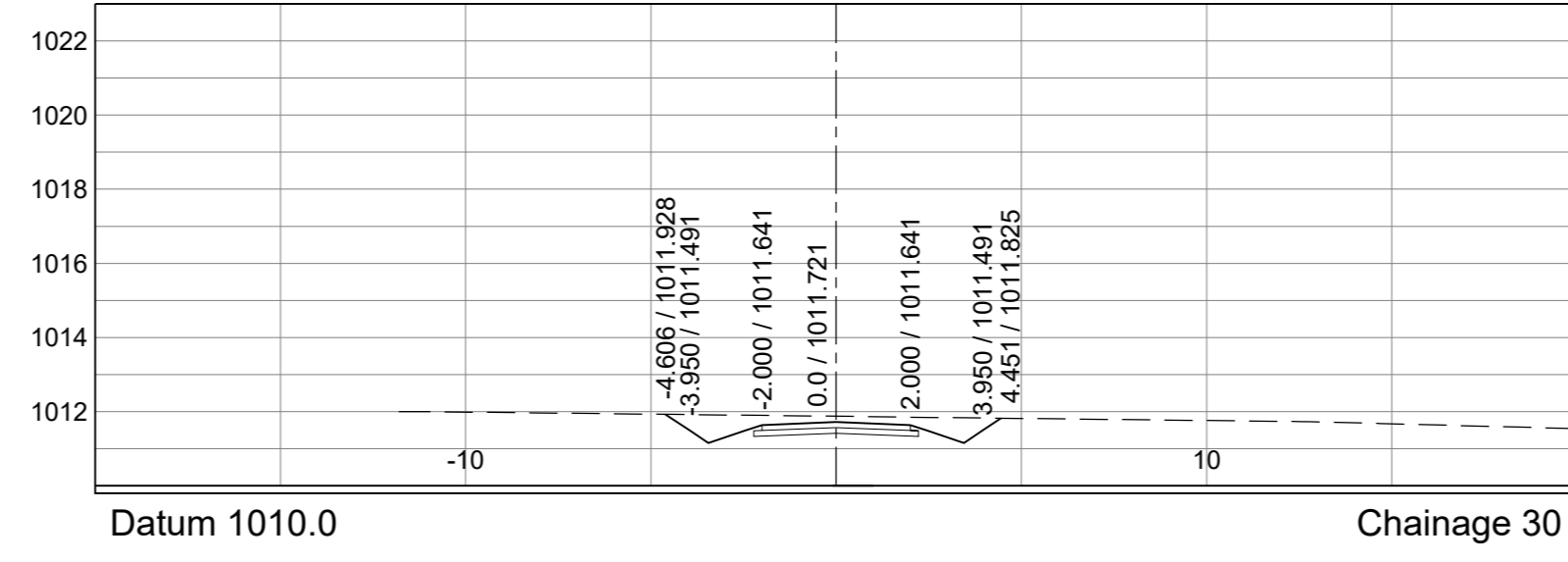
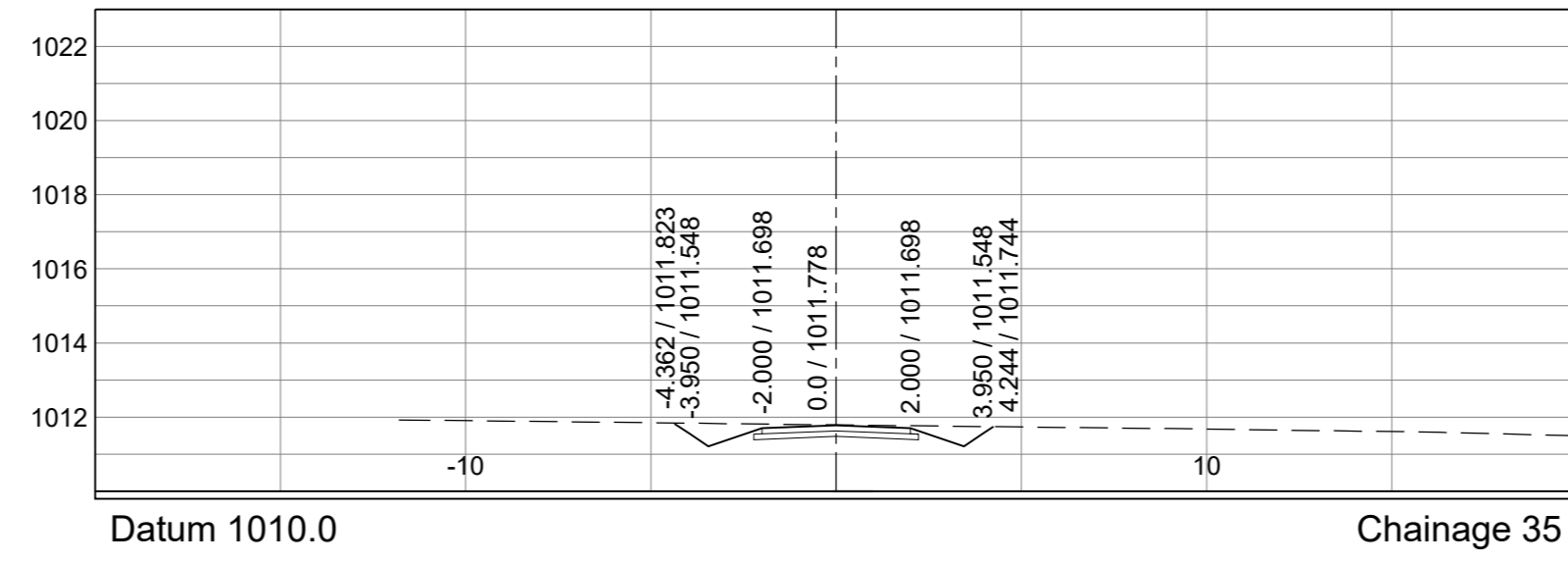
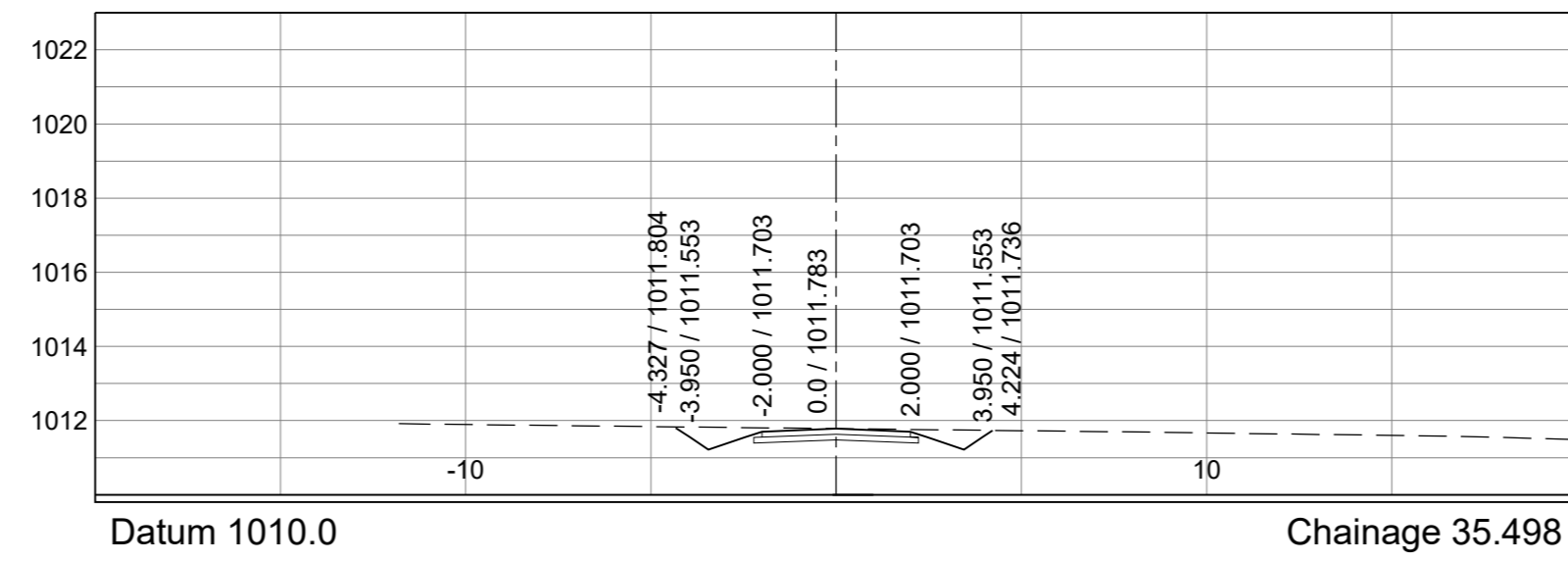
C 46547



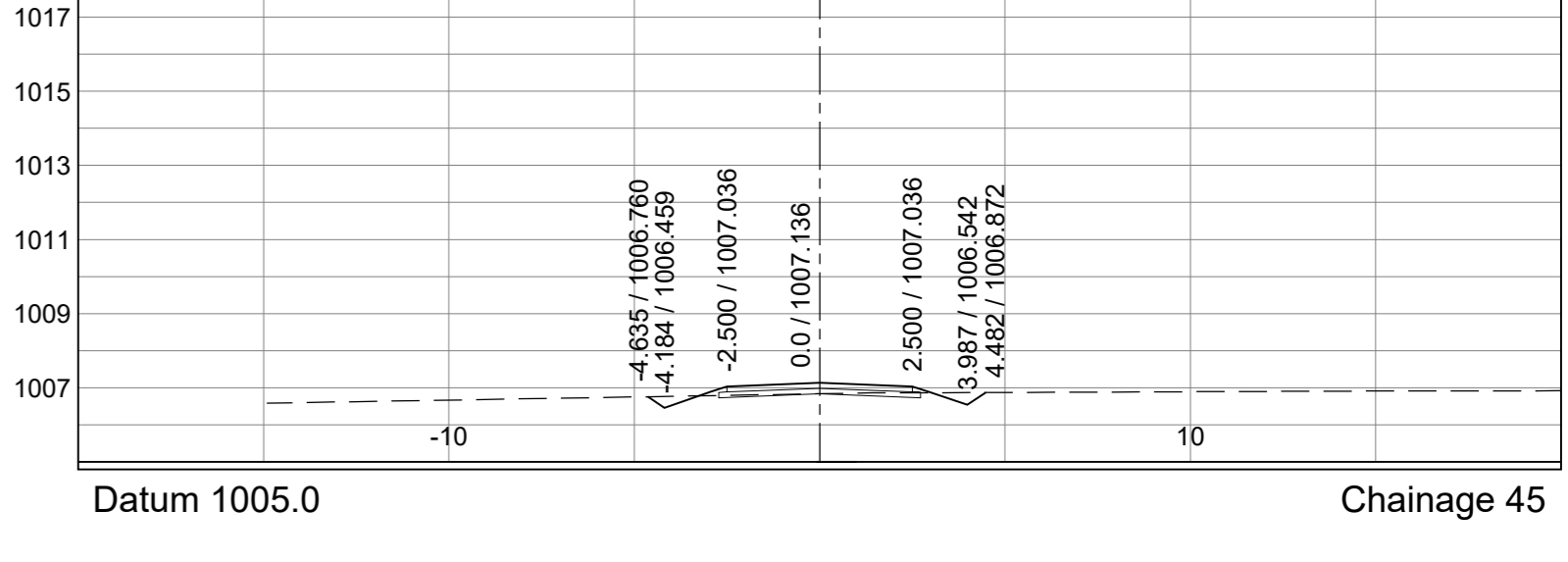
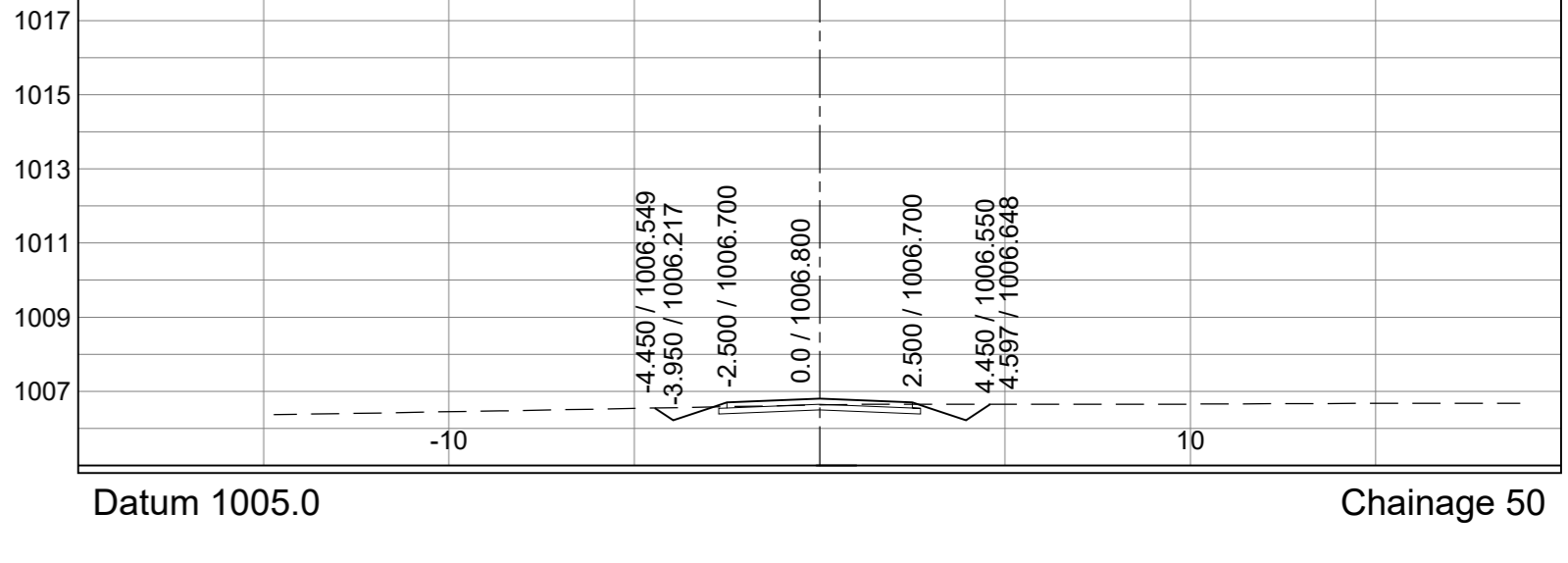
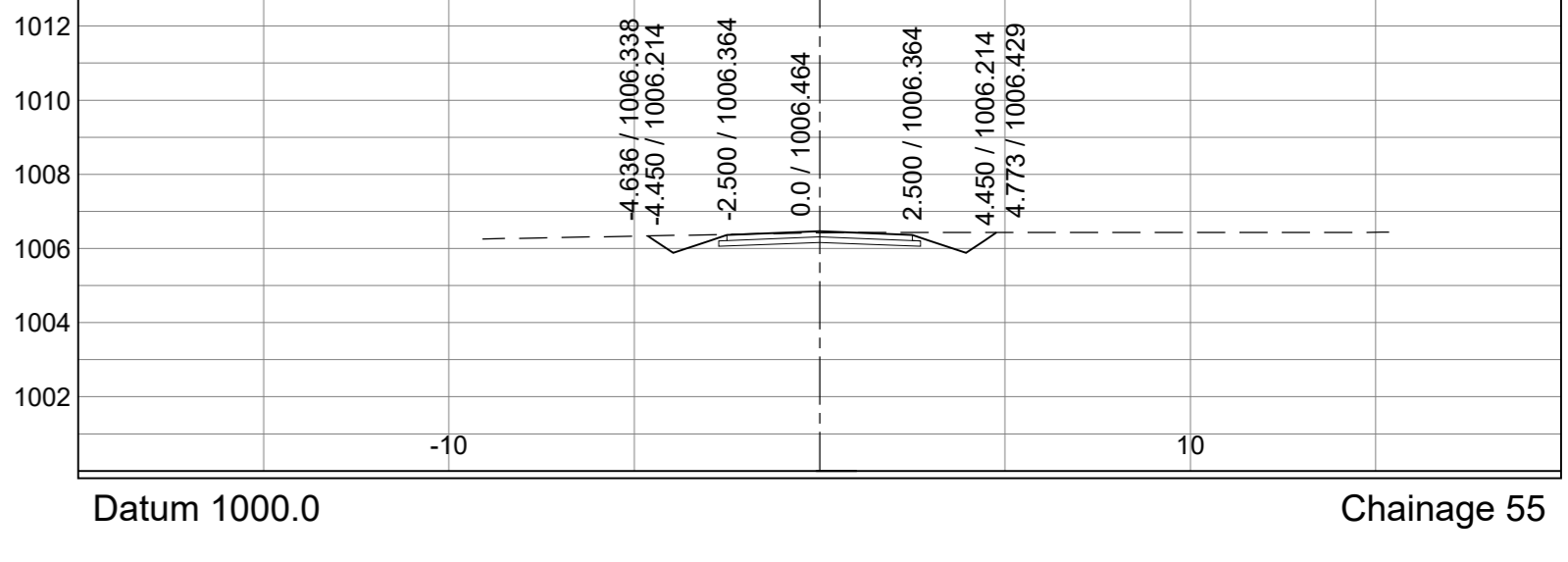
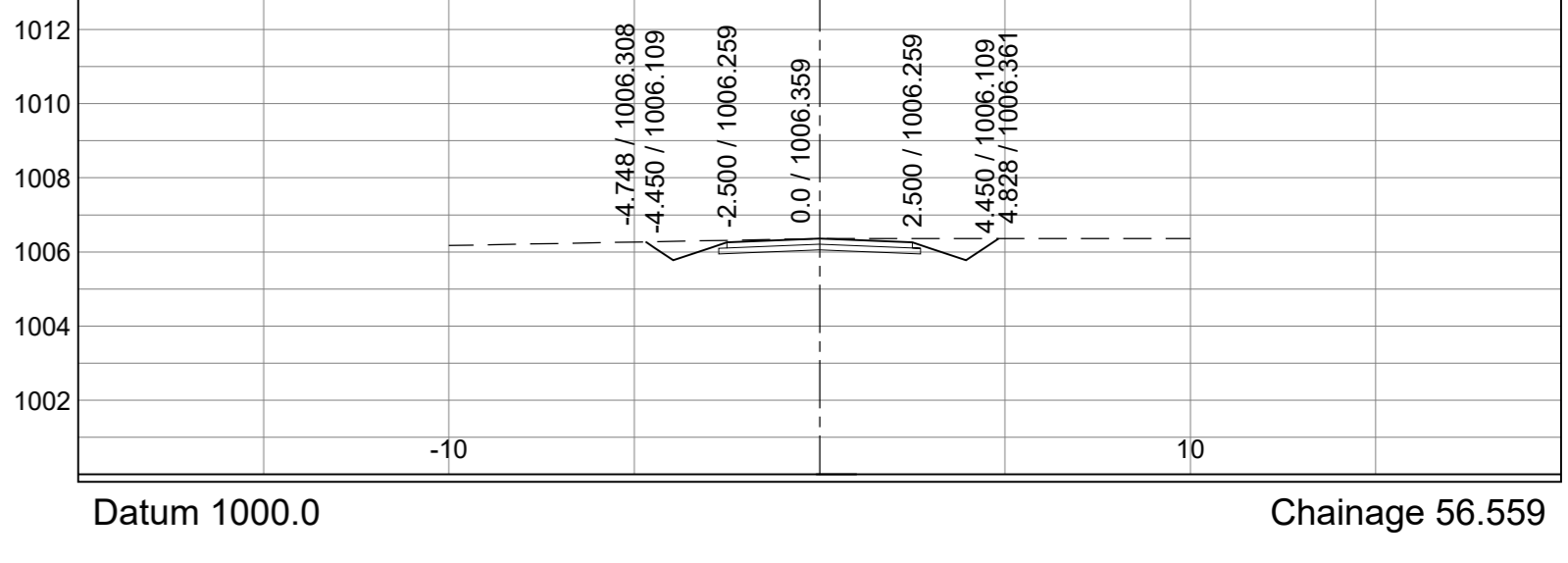
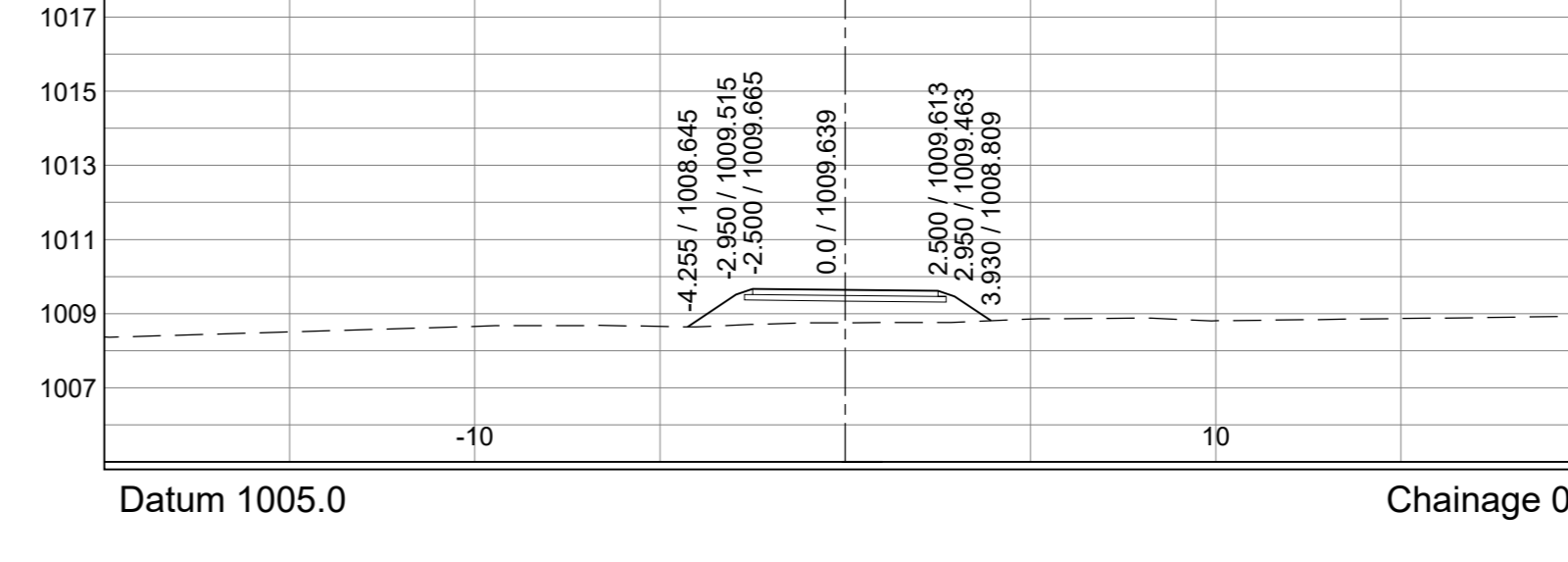
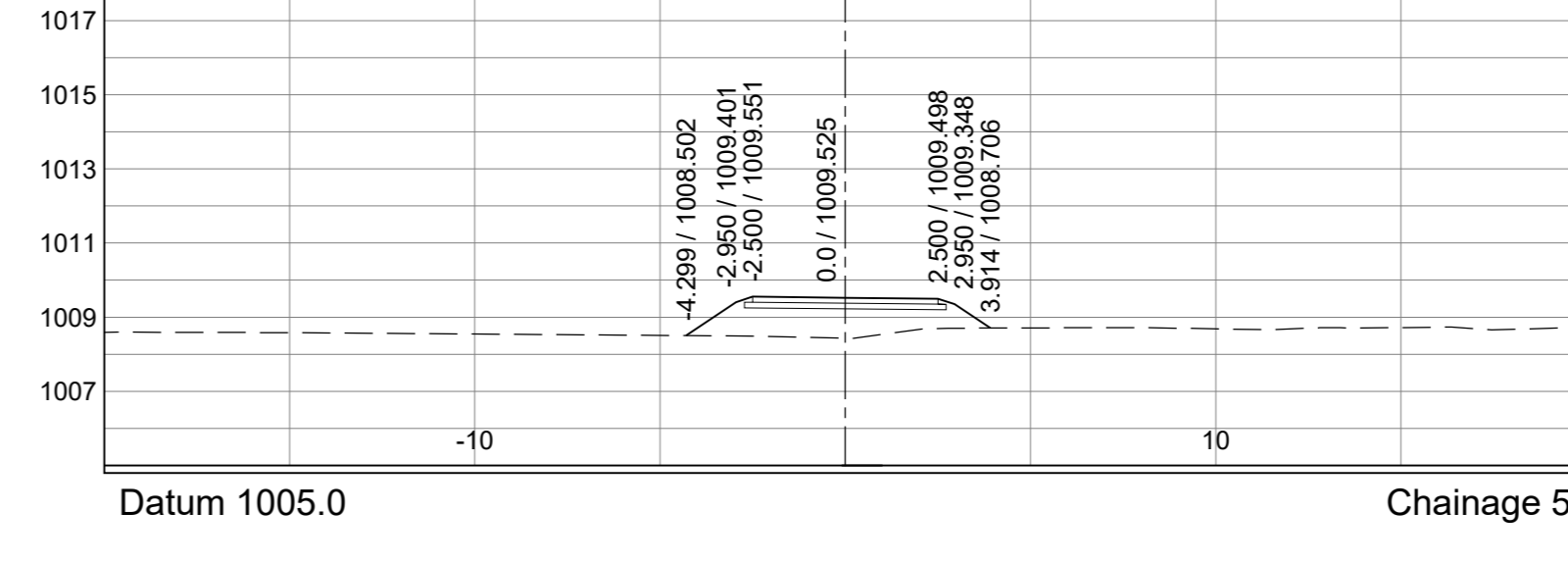
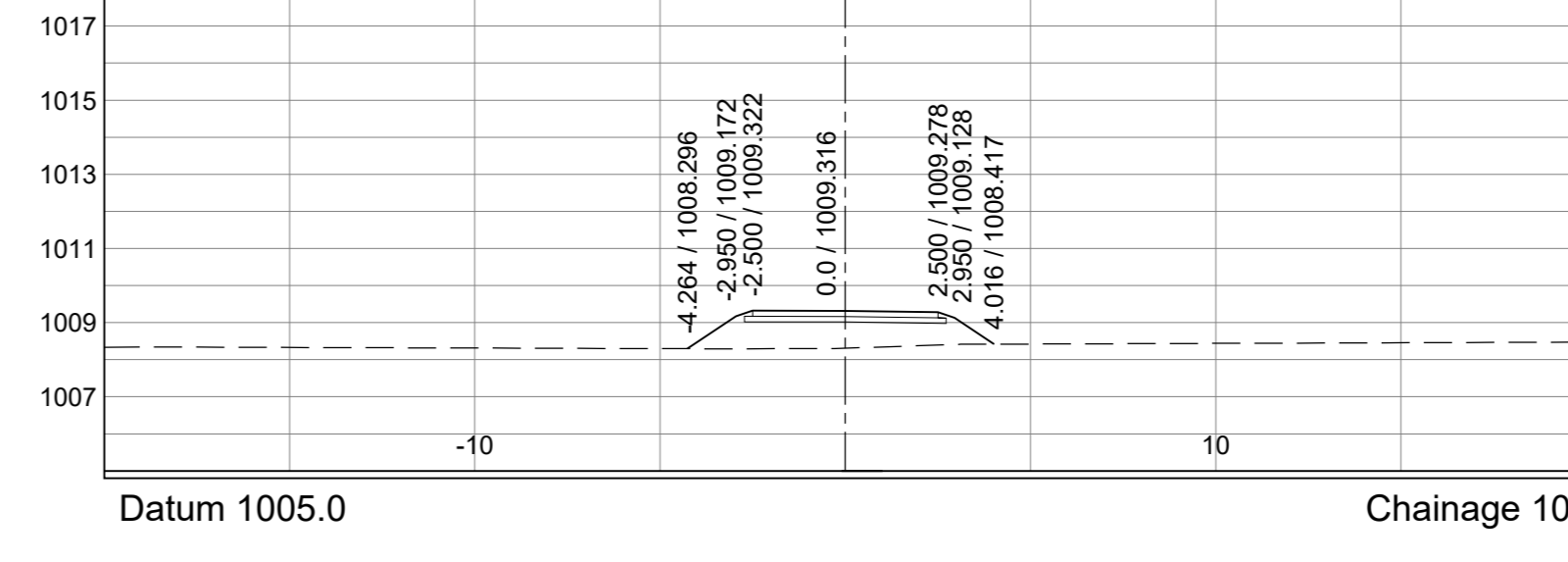
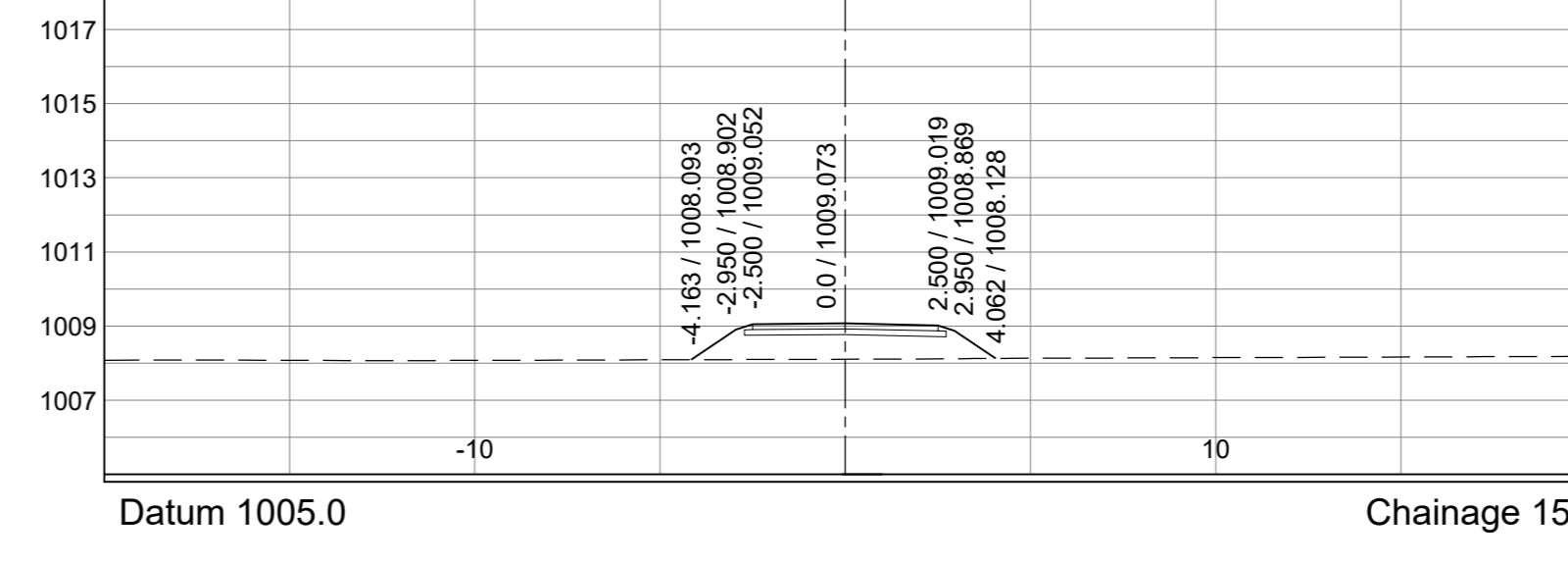
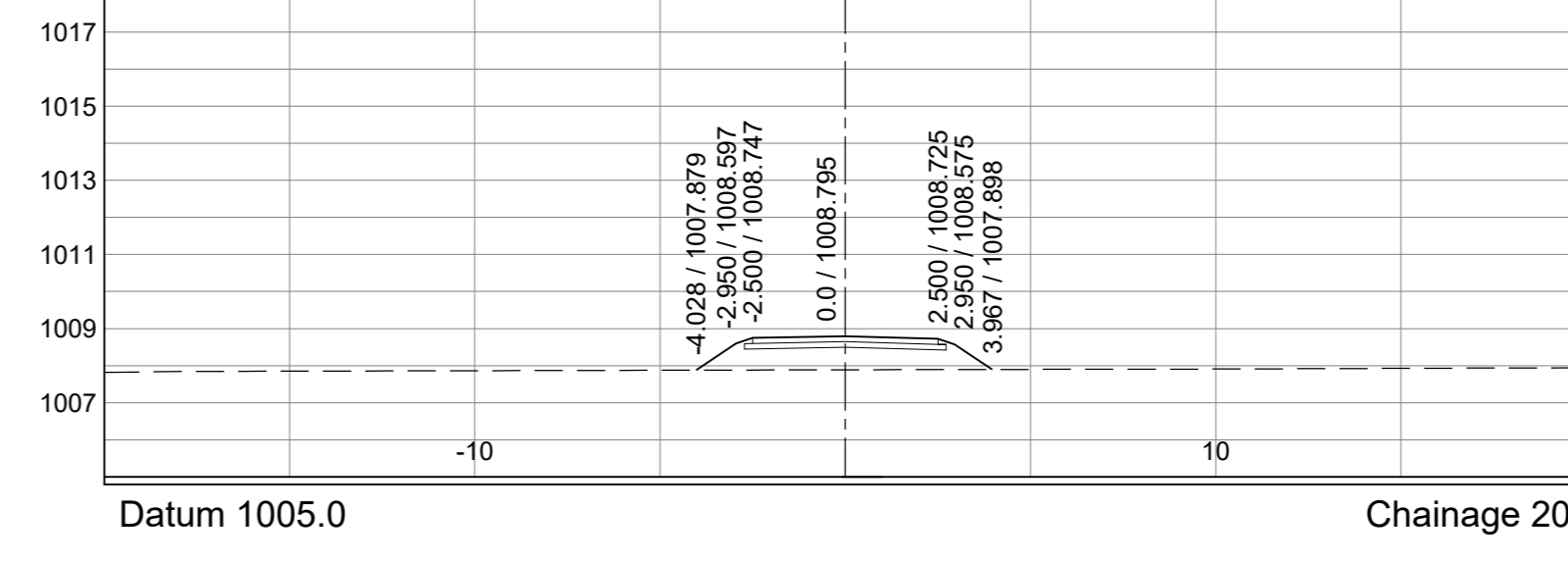
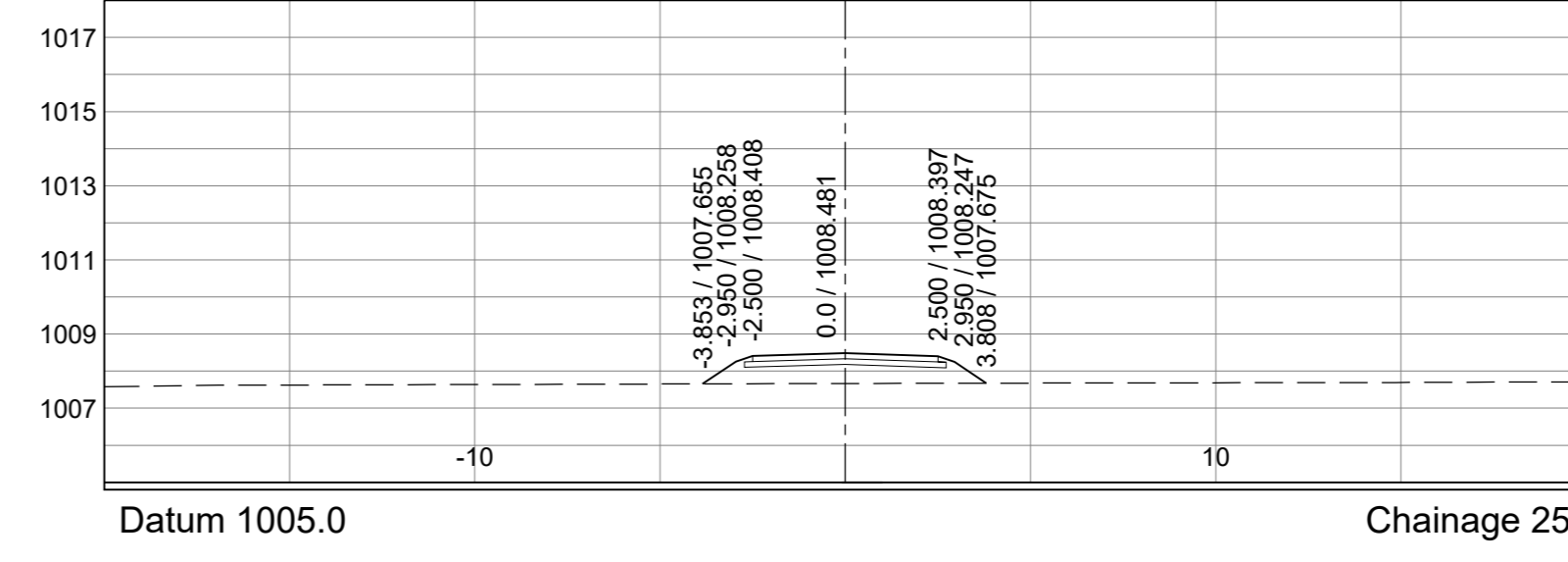
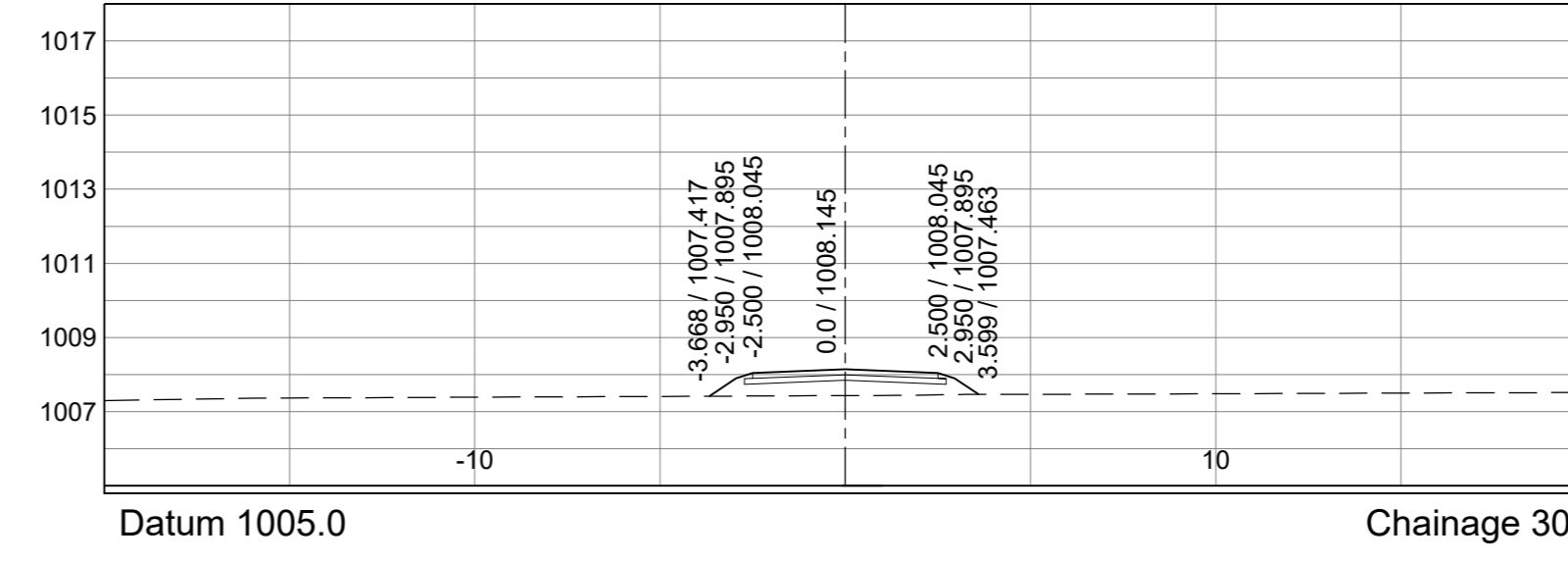
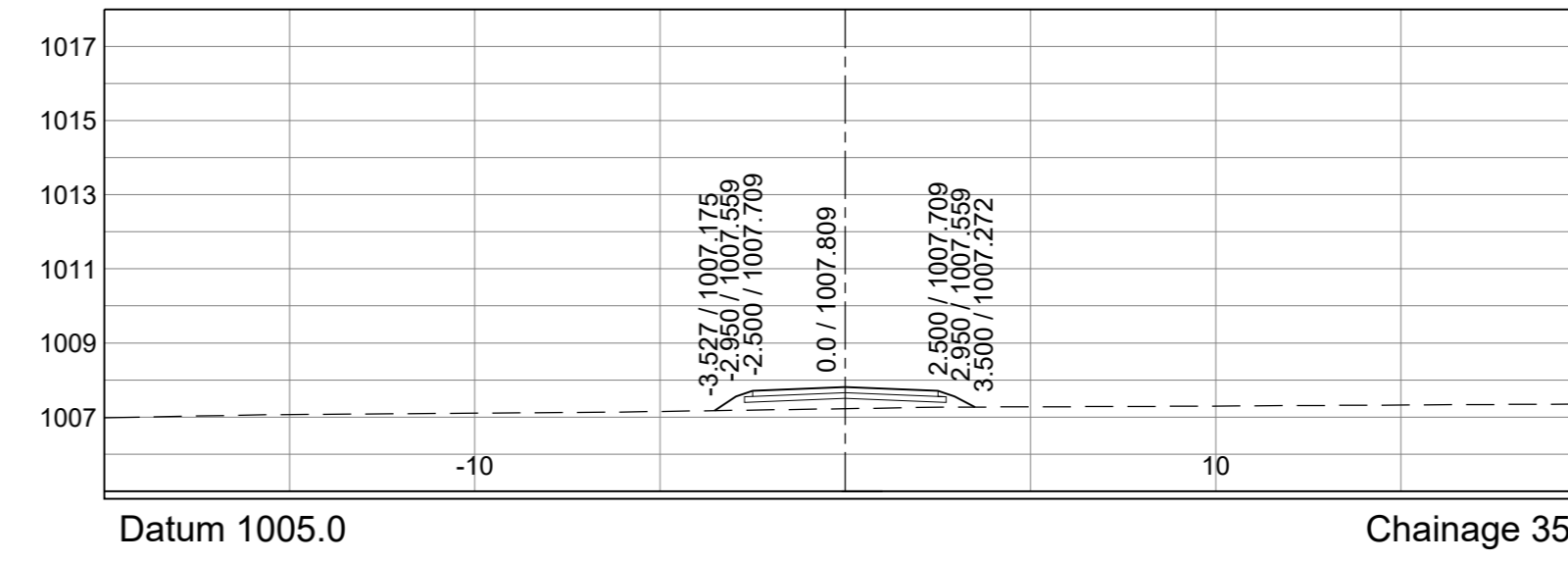
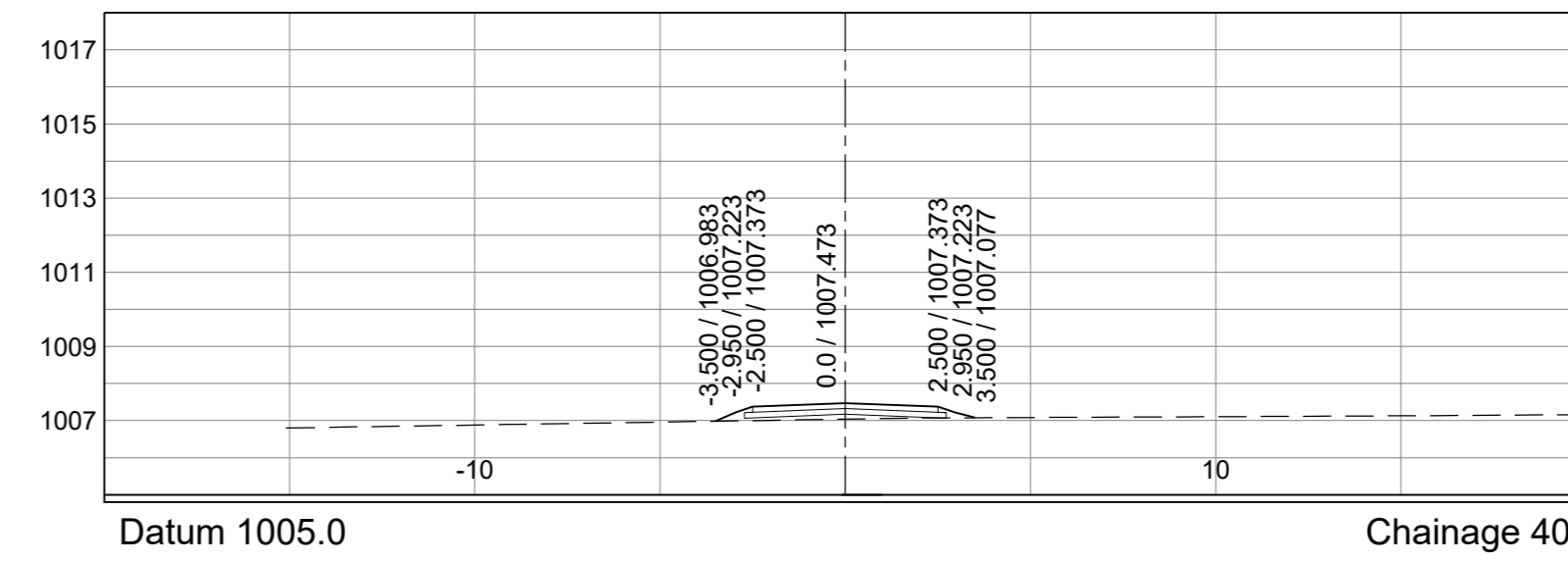
ACCESS @ KM 13+096.258 RHS



ACCESS @ KM 13+249.812 LHS



ACCESS @ KM 13+407.722 RHS



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44333	Designed by:-	Y. DOMA
Continued on:-	C 44335	Checked by:-	N. NGUBANE
Cross Section No:-	C 44334	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44326	Checked by:-	Y. DOMA
Design Plan No:-	C 44316	Date of approval:-	



Designed by: **emzansi** ENGINEERS (PTY) LTD

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS CROSS SECTIONS

Staked km distance	km 0+000 - km 0+348.529	Sheet No -	5	REVISION:
	km 0+000 - km 0+032.498	of -	14	A
	km 0+000 - km 0+056.559	Plan No -		
Vertical Scale	1 : 200			
Horizontal Scale	1 : 200			

**C 46548**

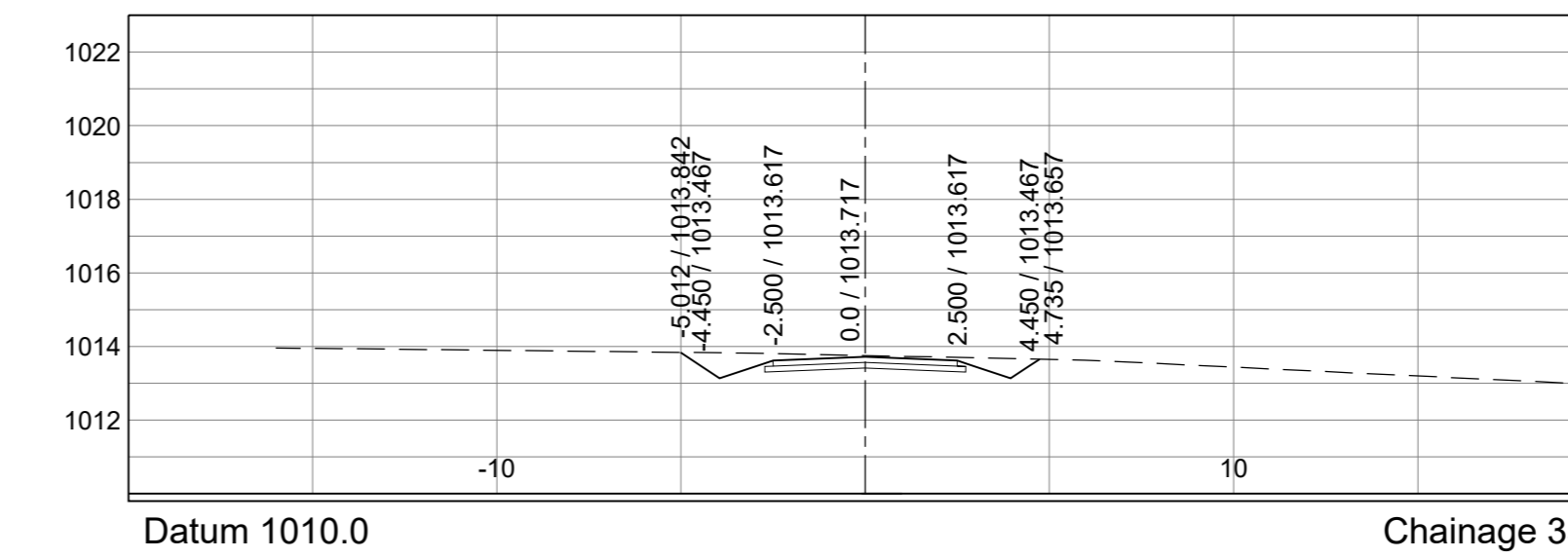
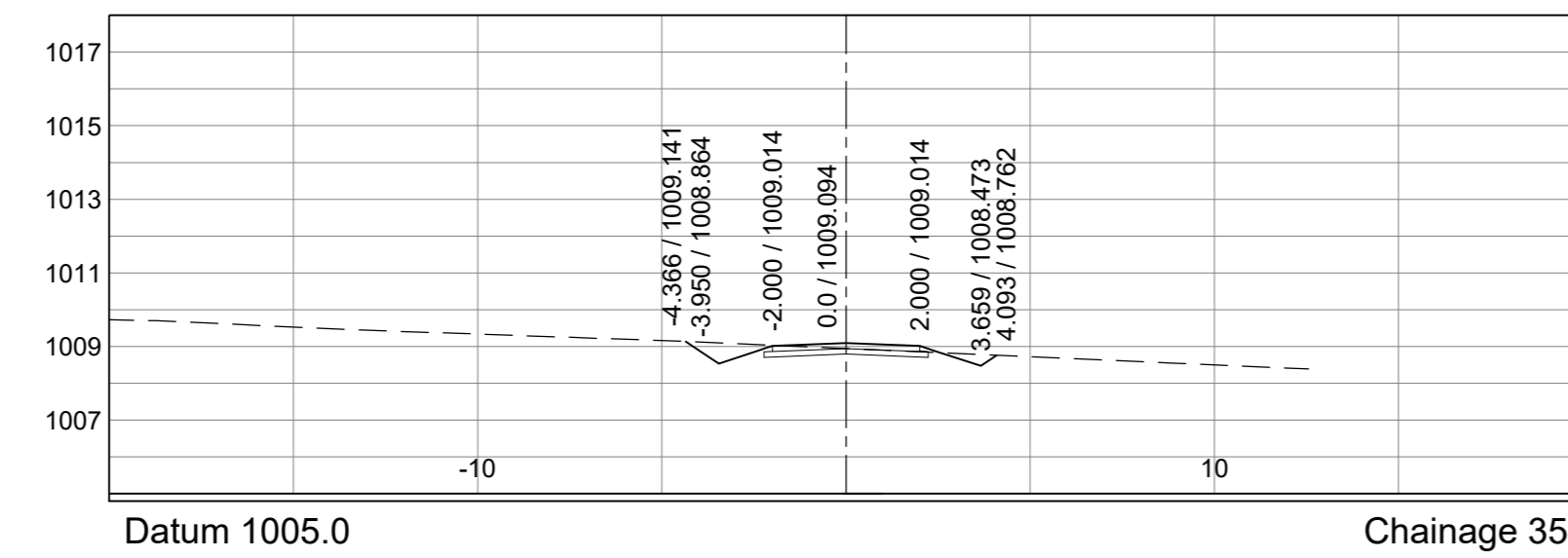
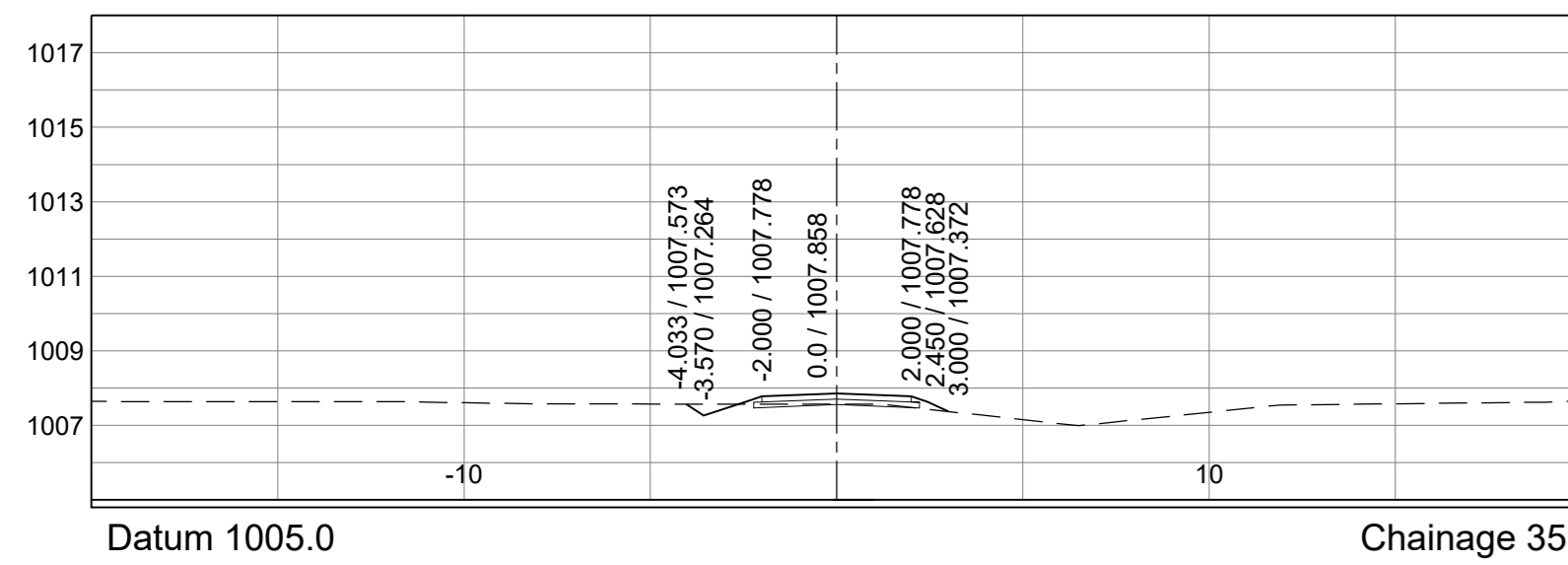
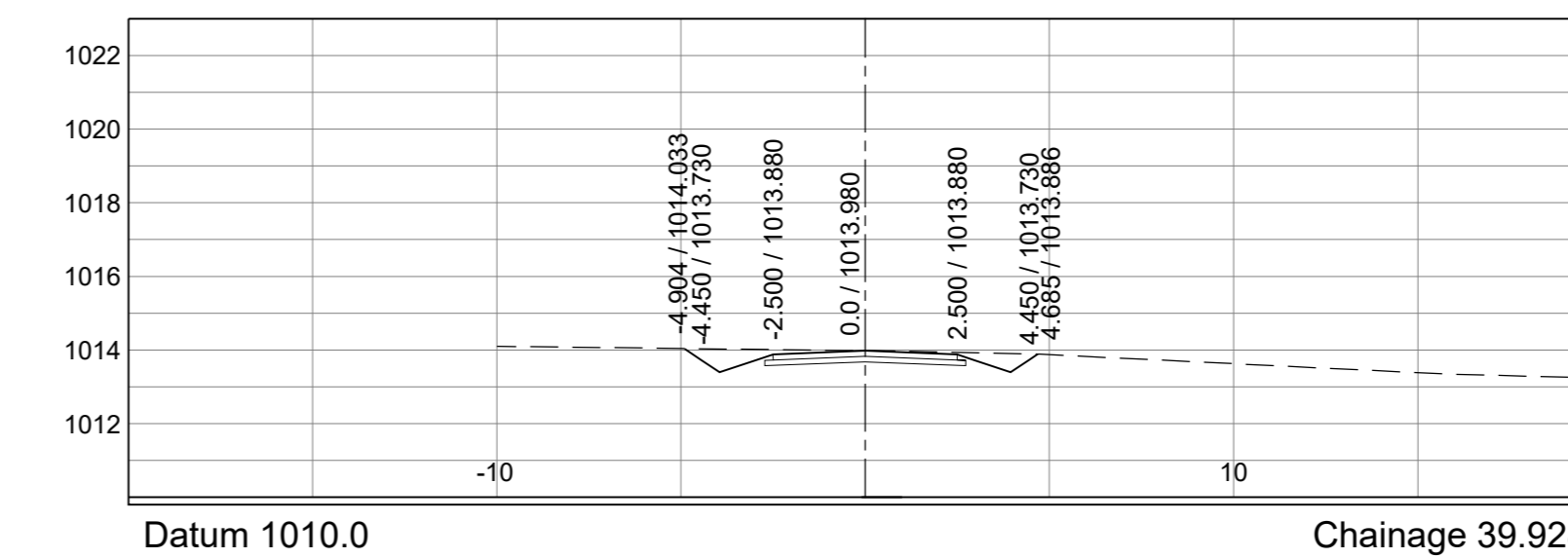
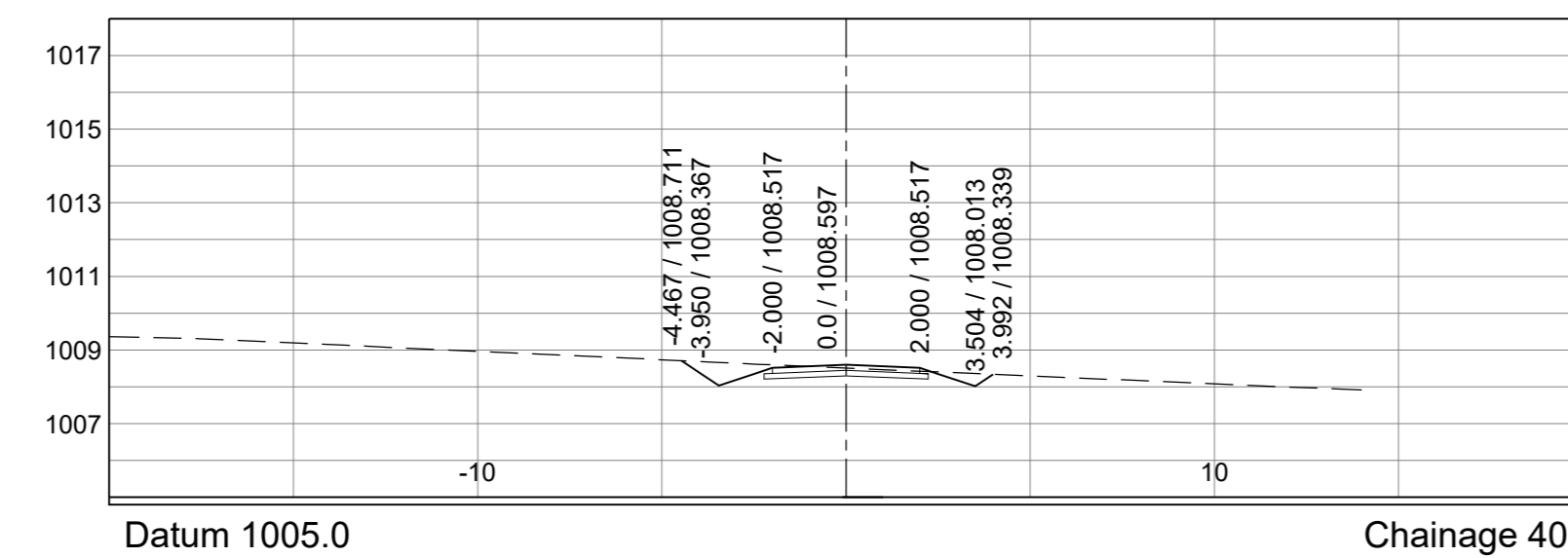
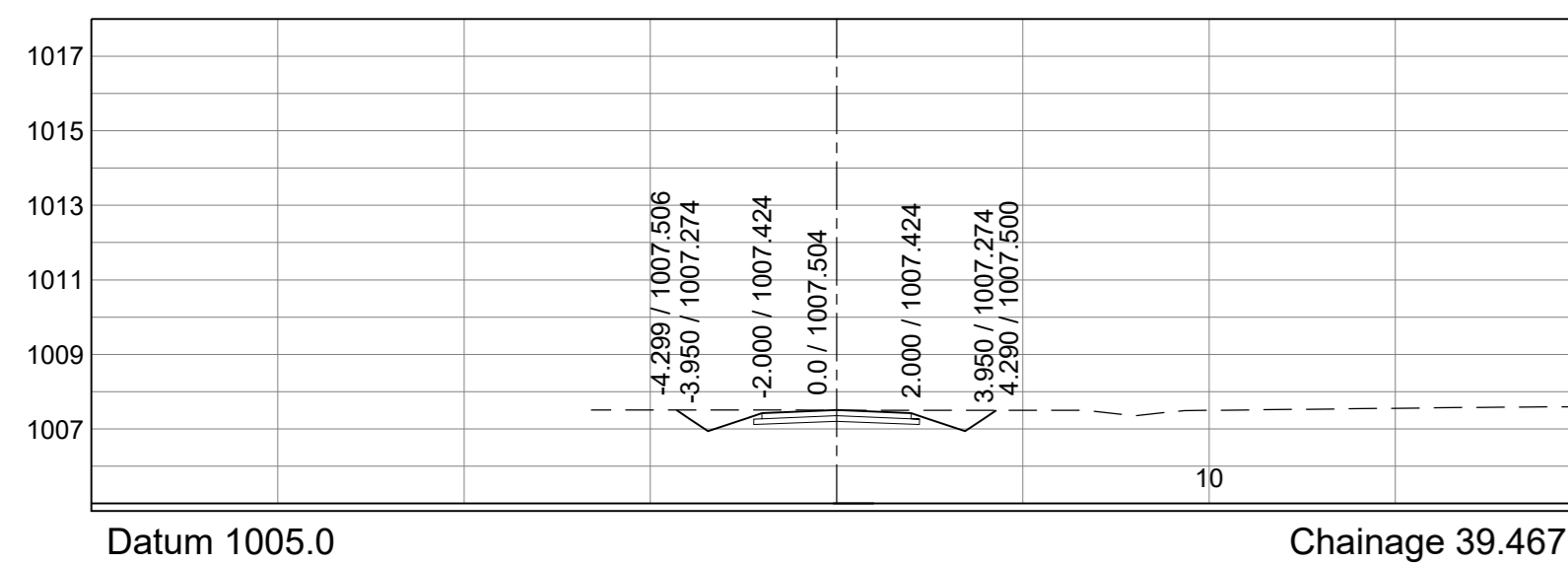
C 46548



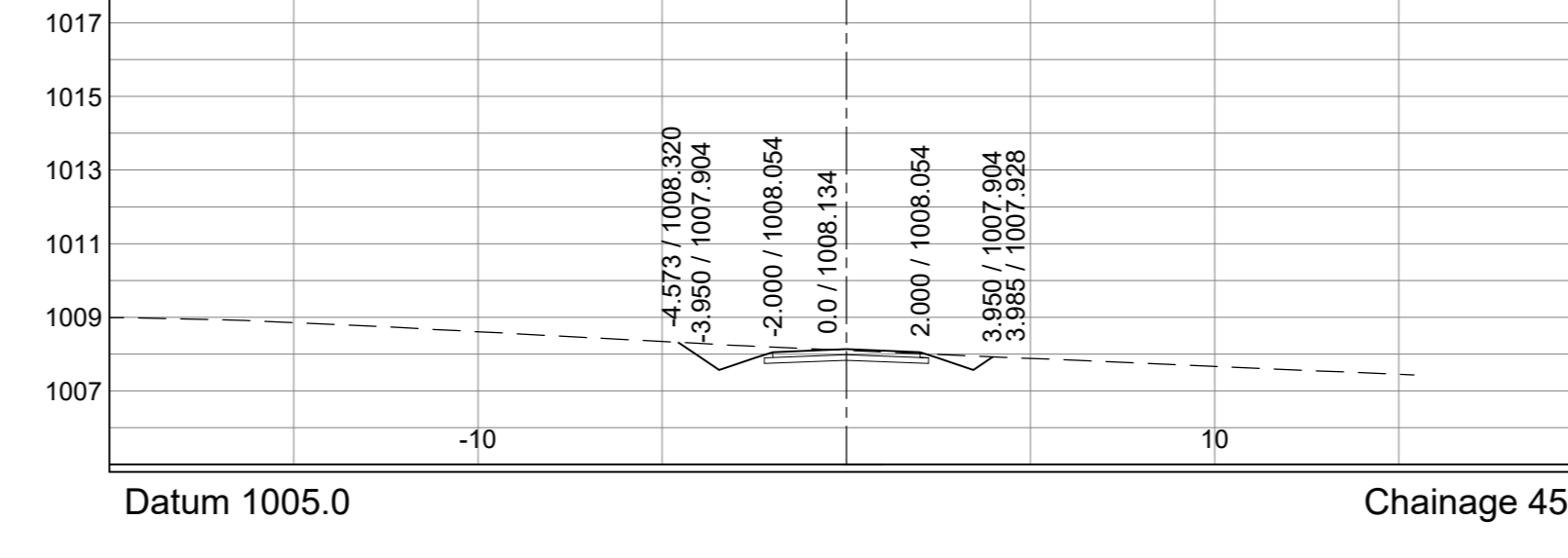
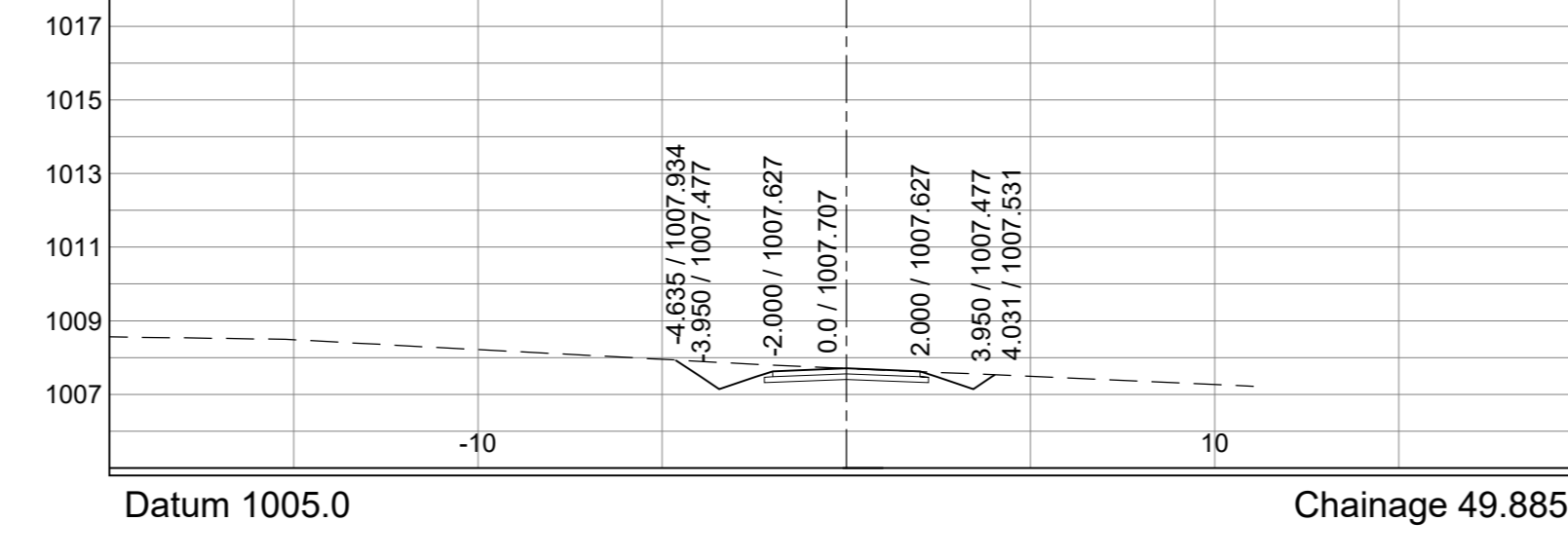
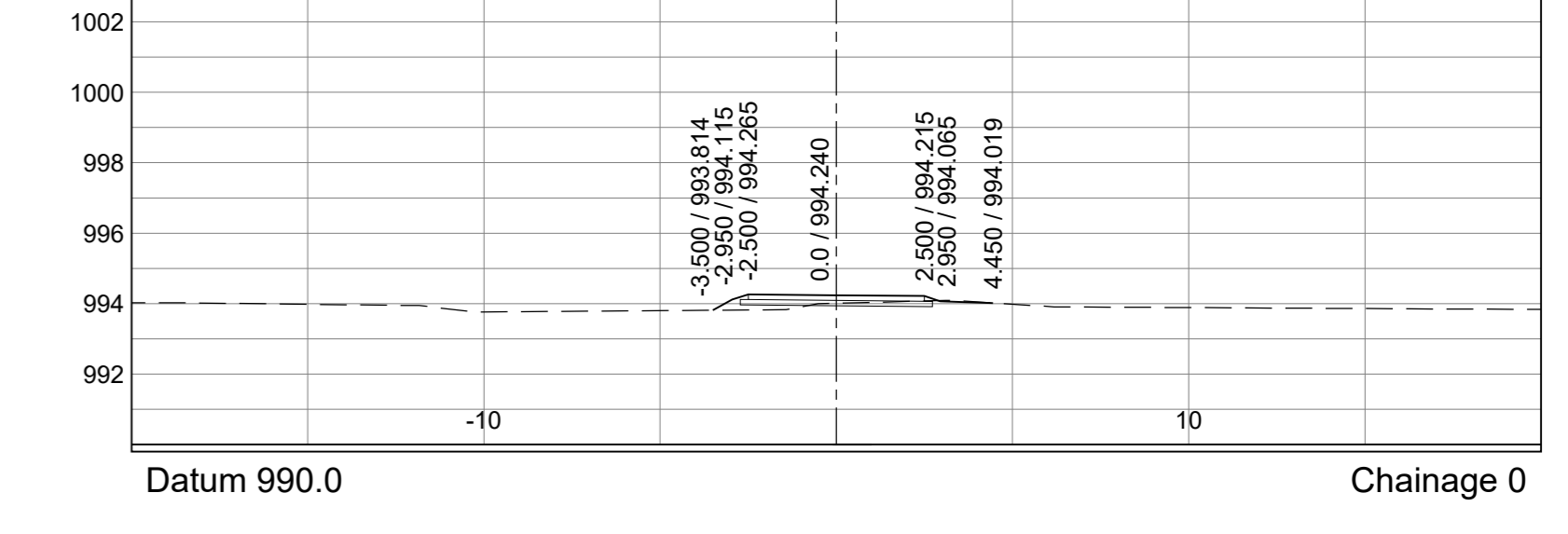
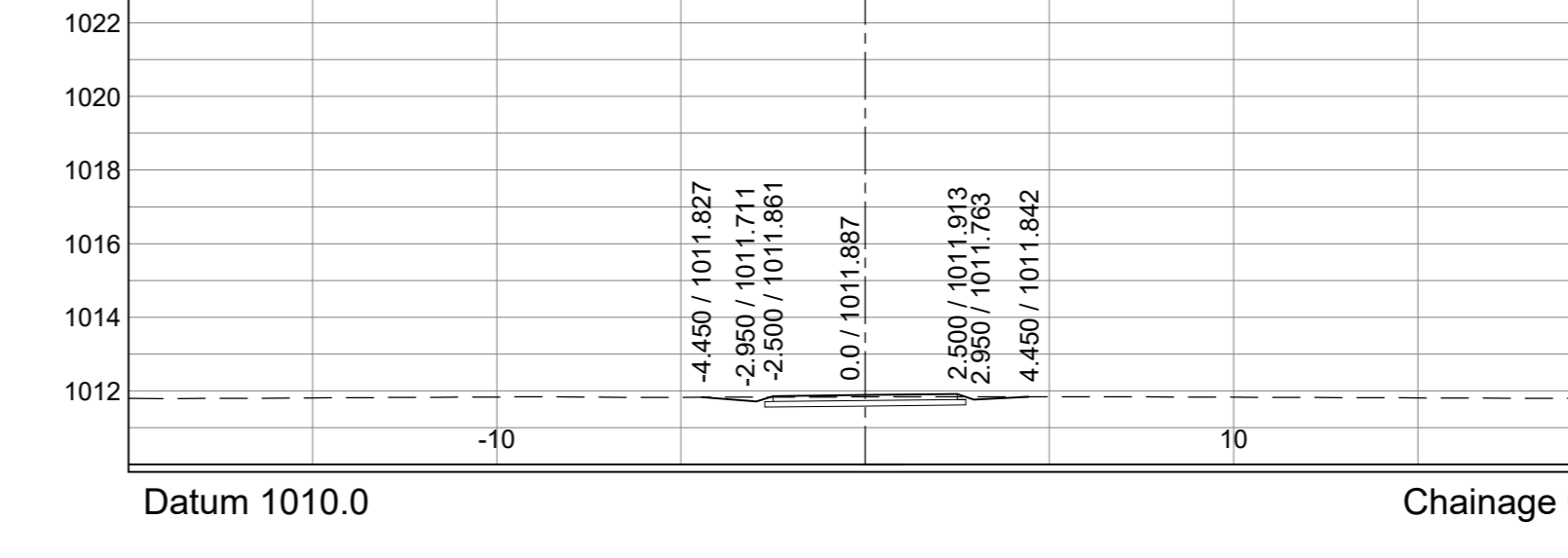
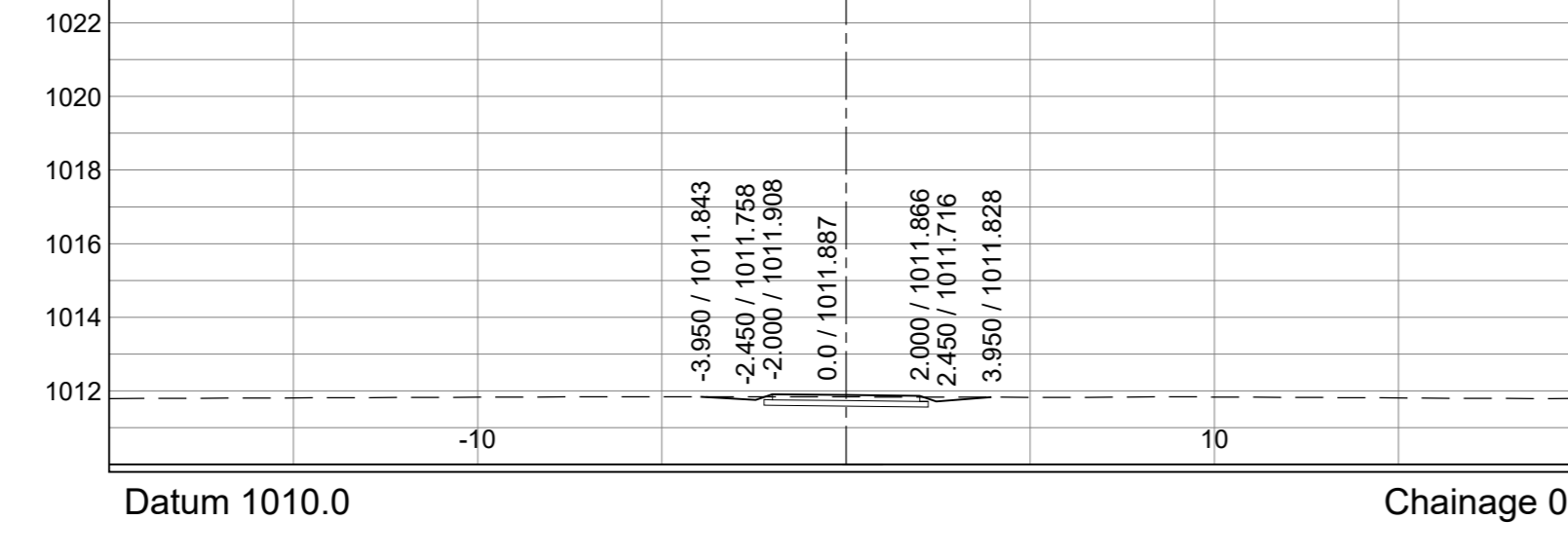
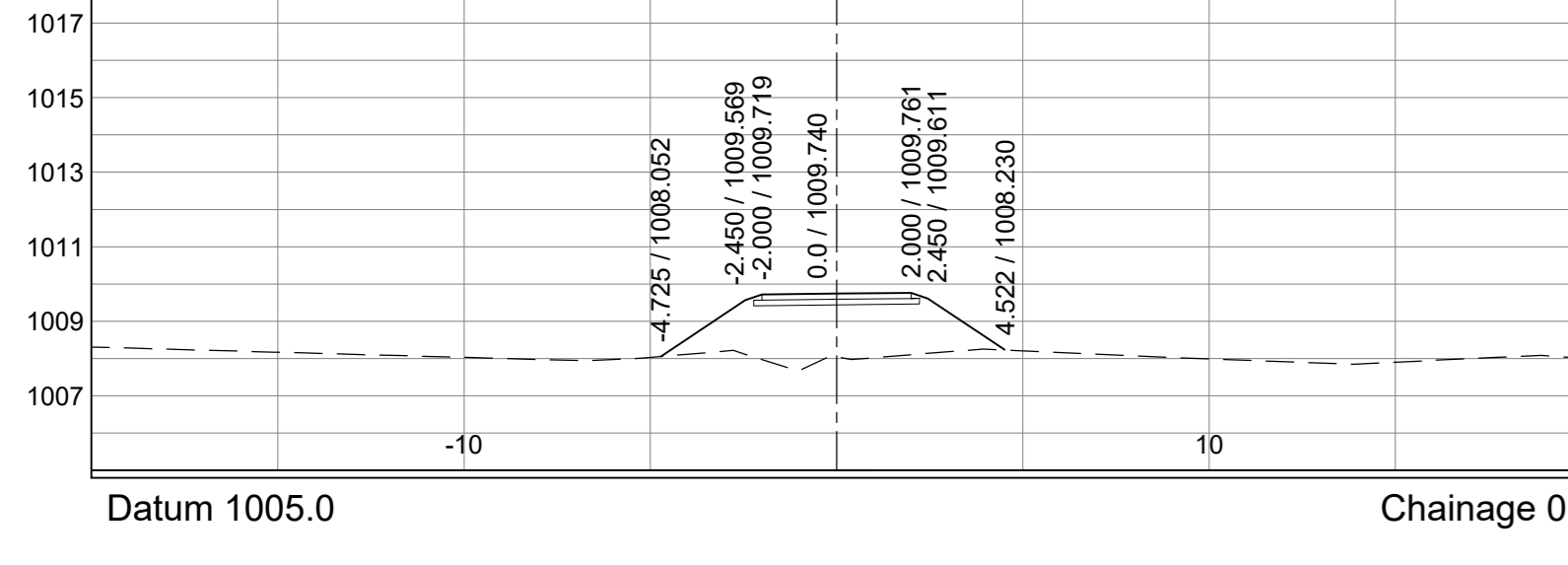
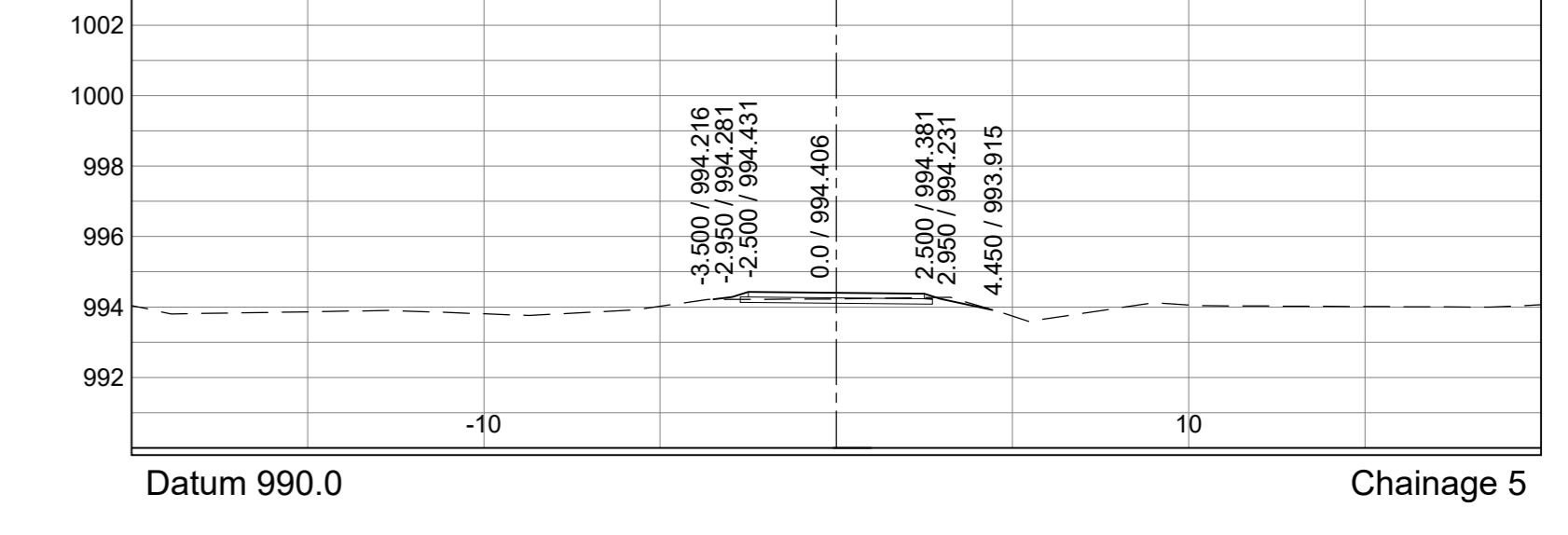
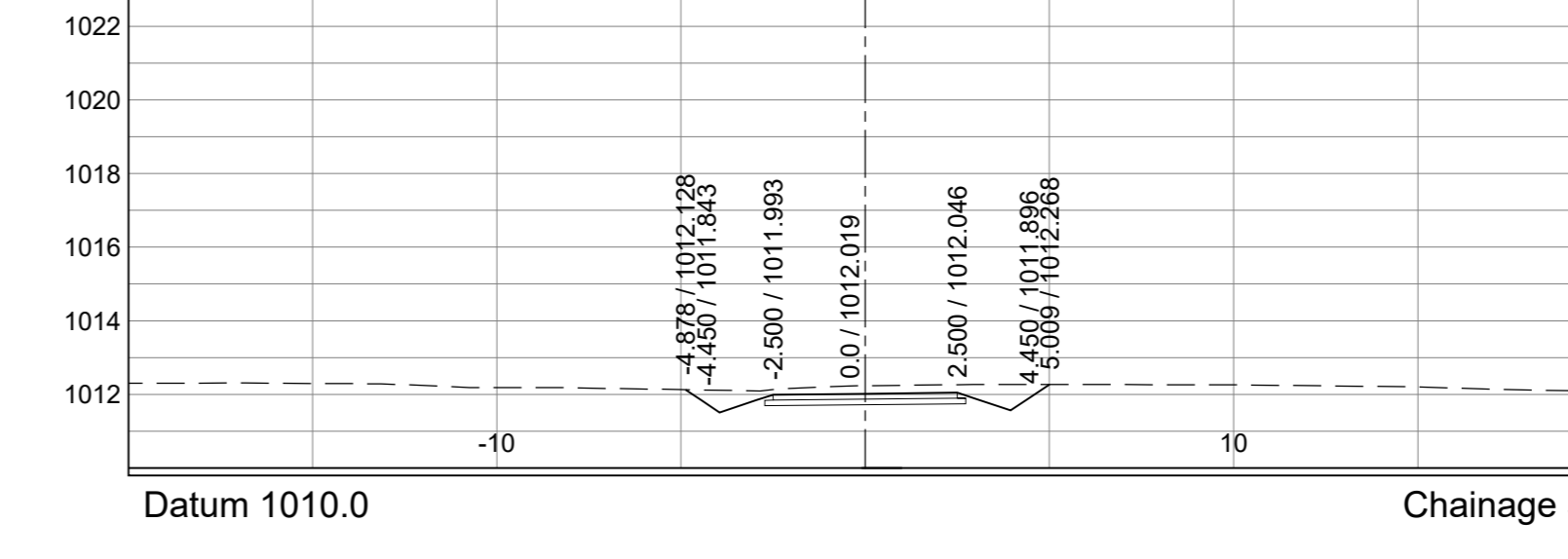
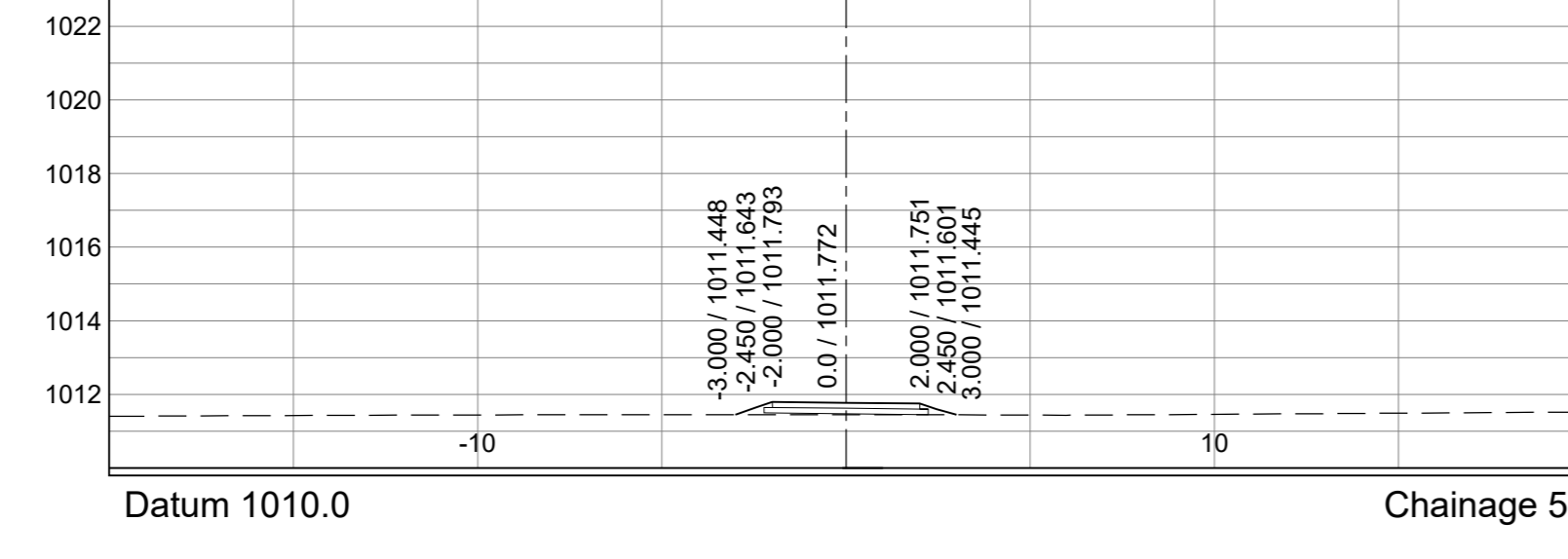
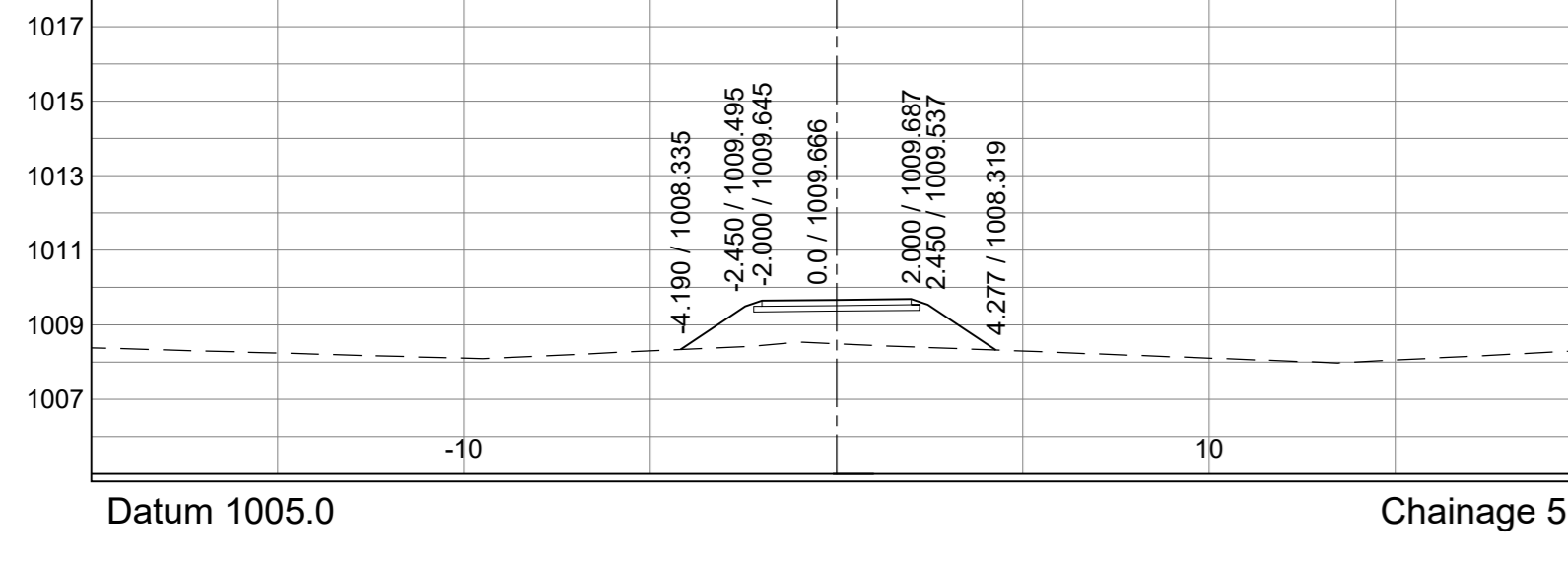
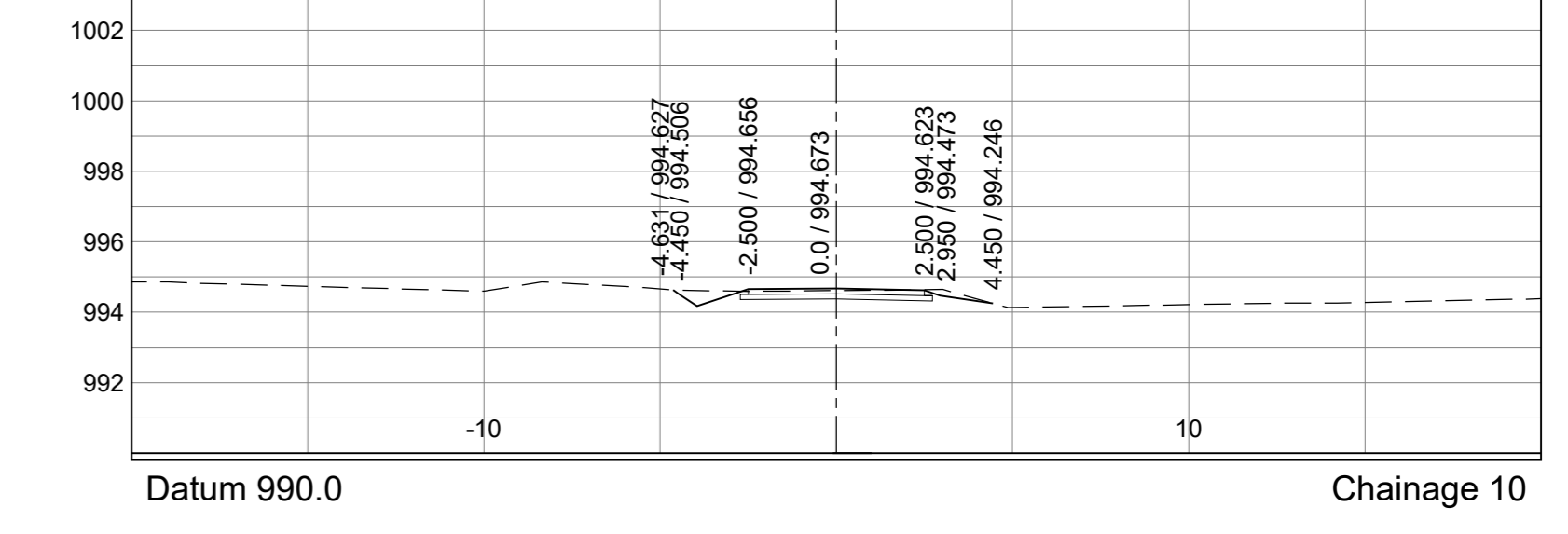
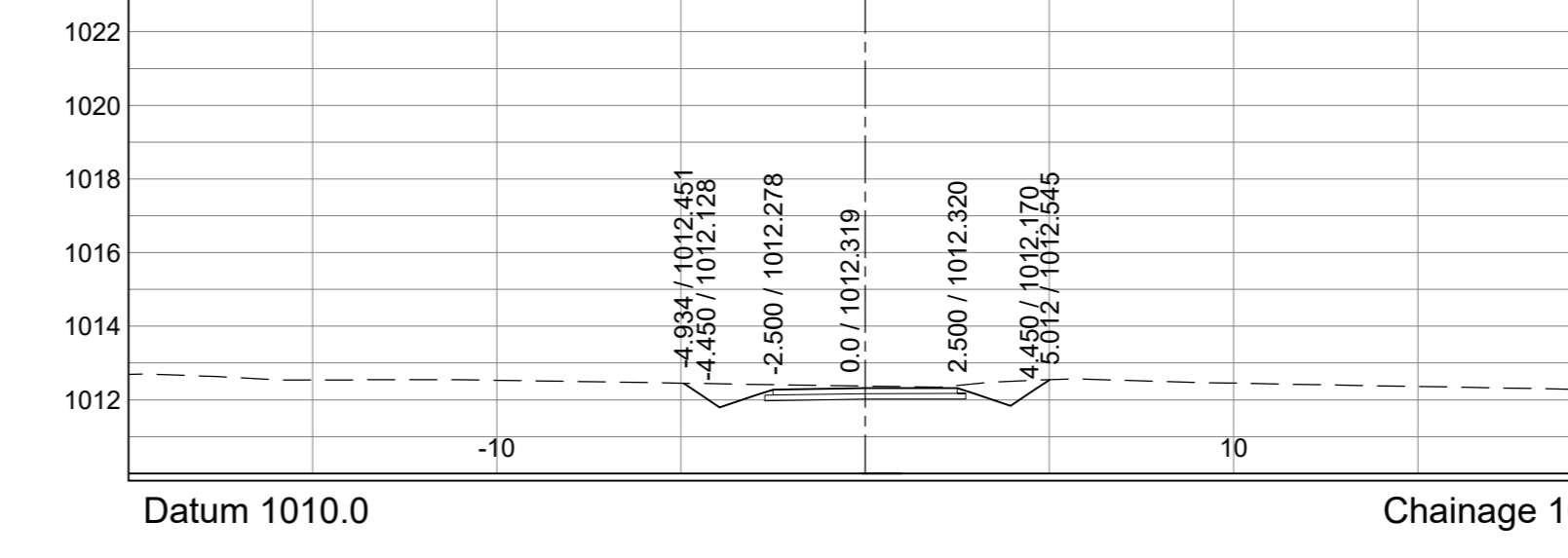
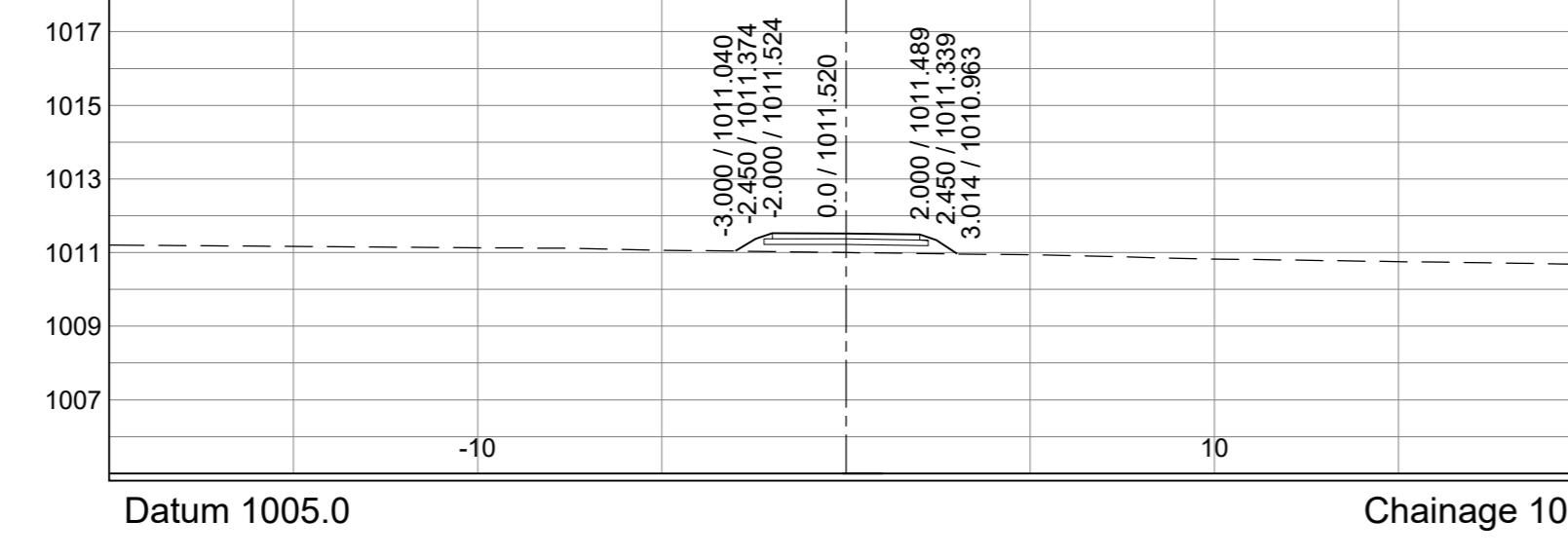
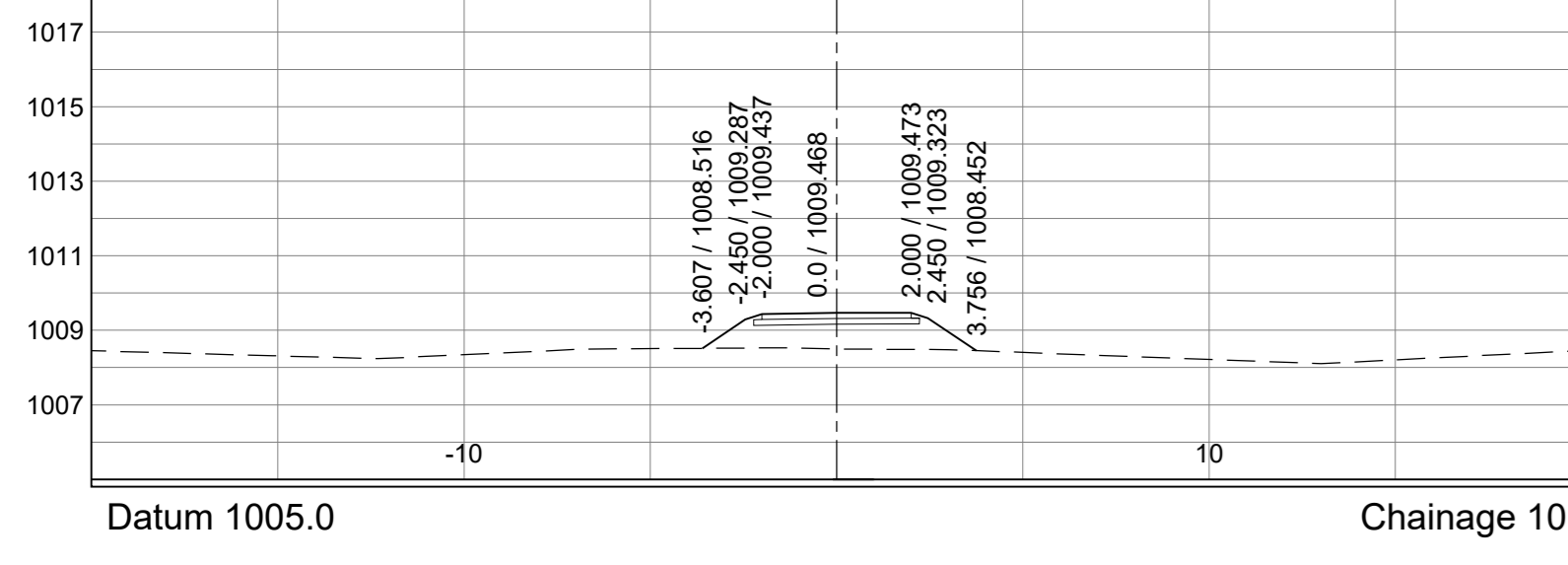
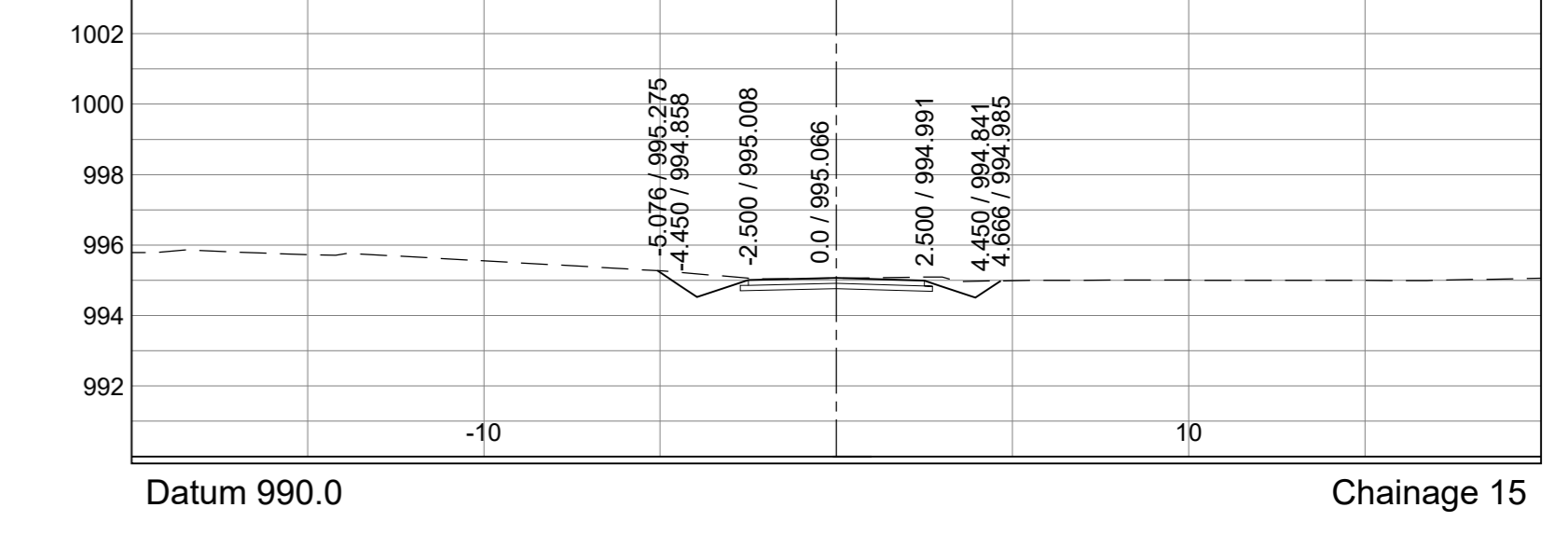
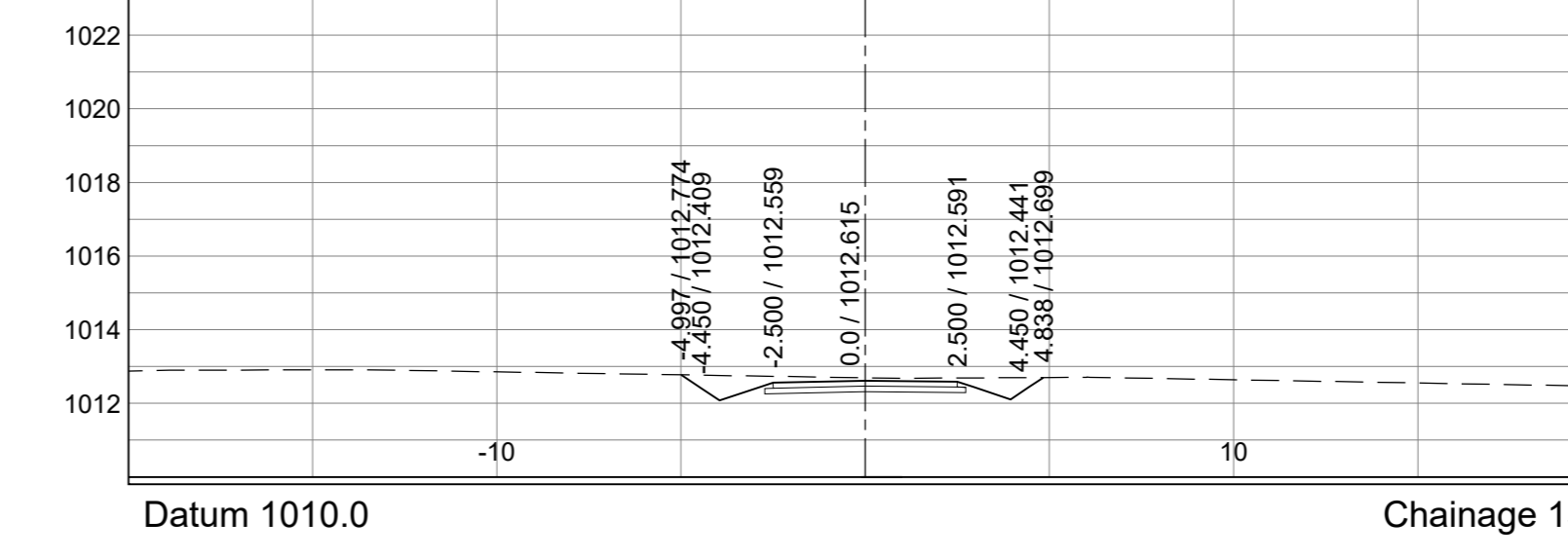
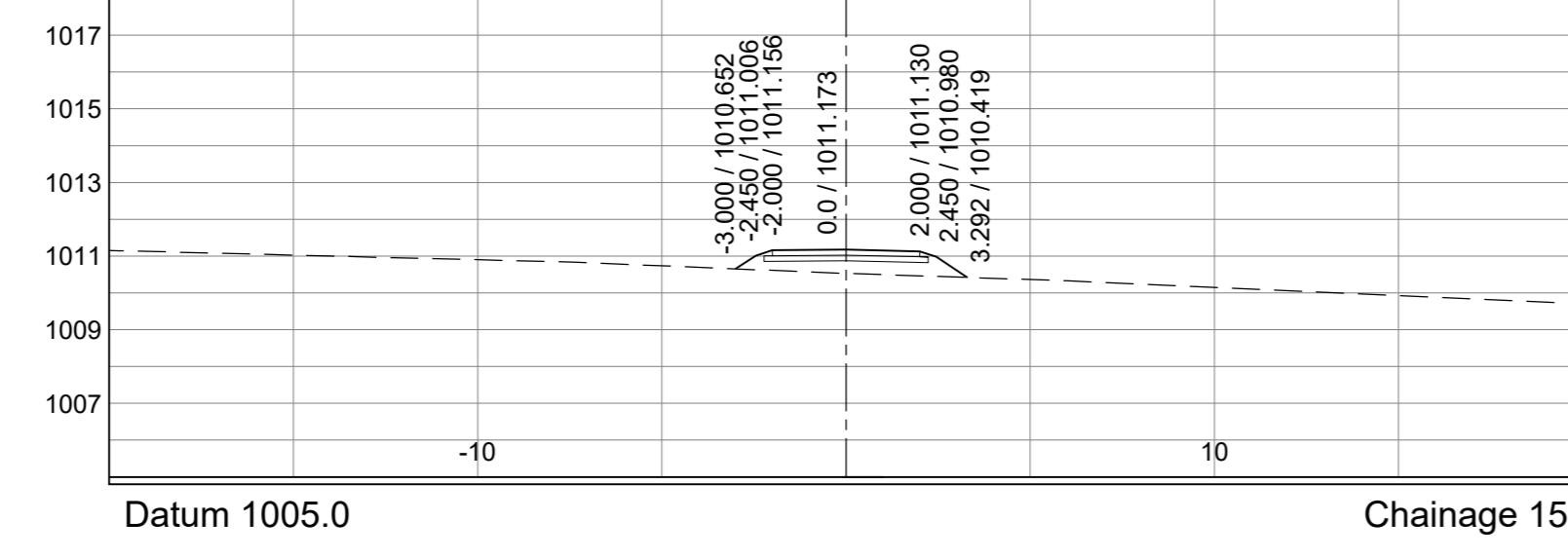
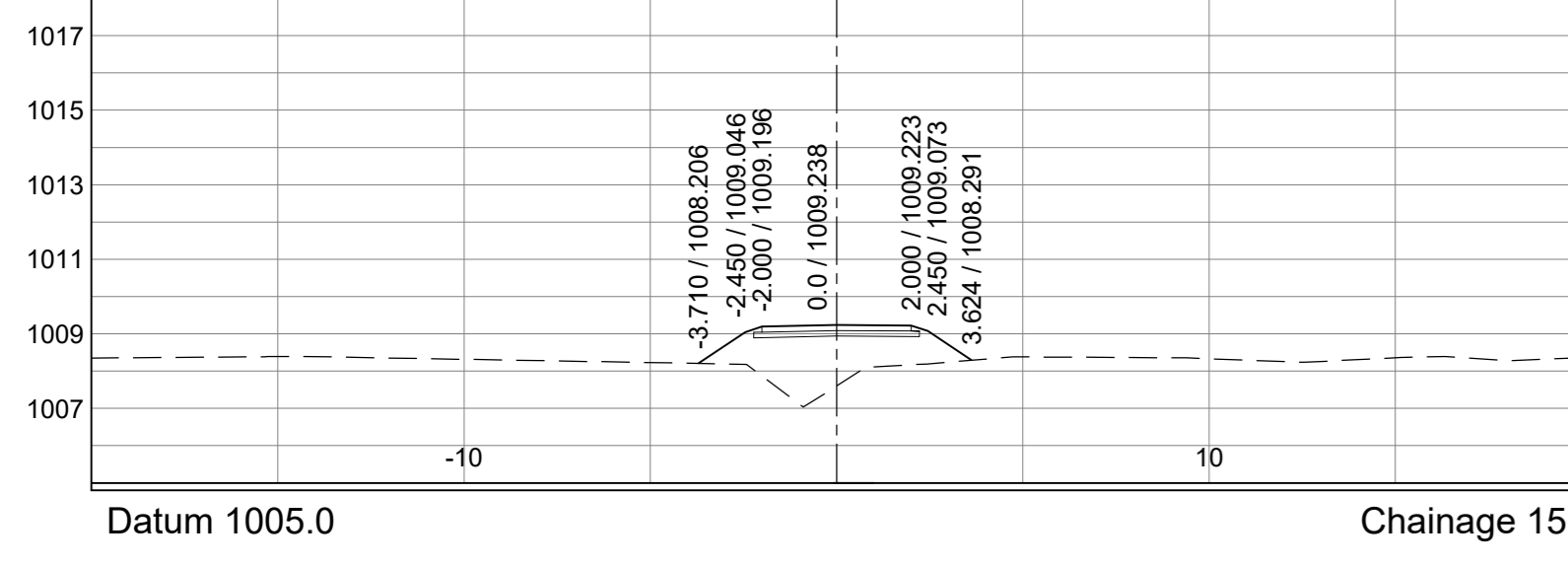
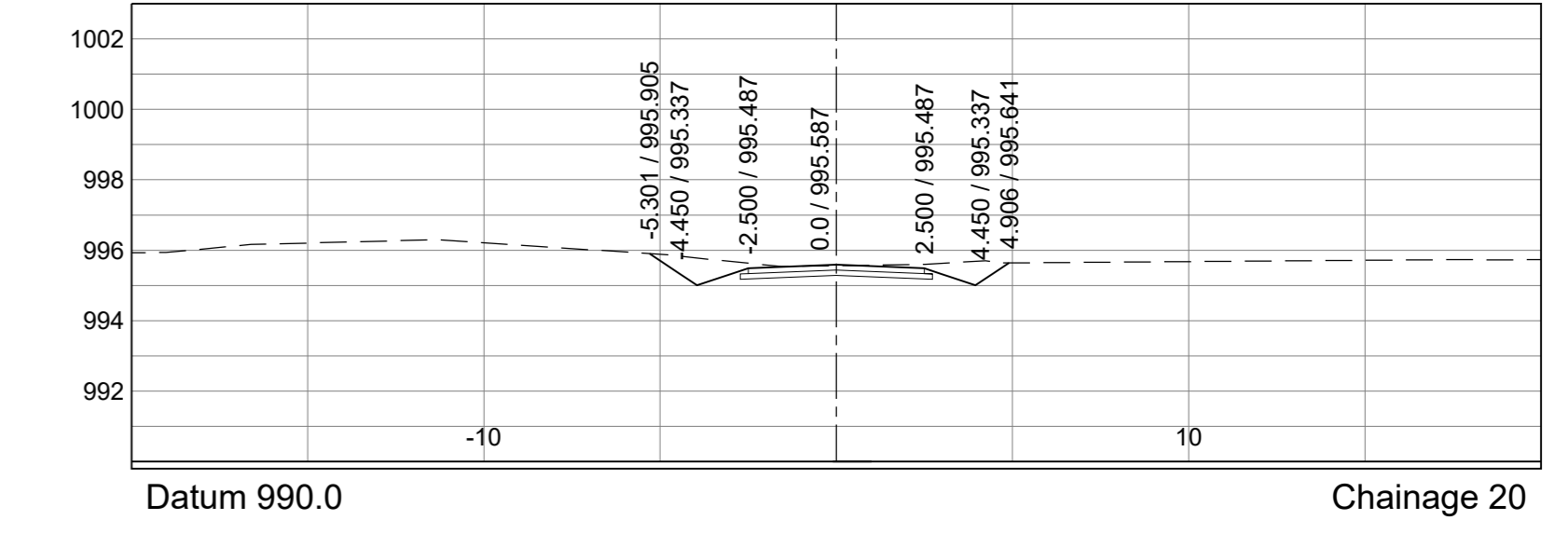
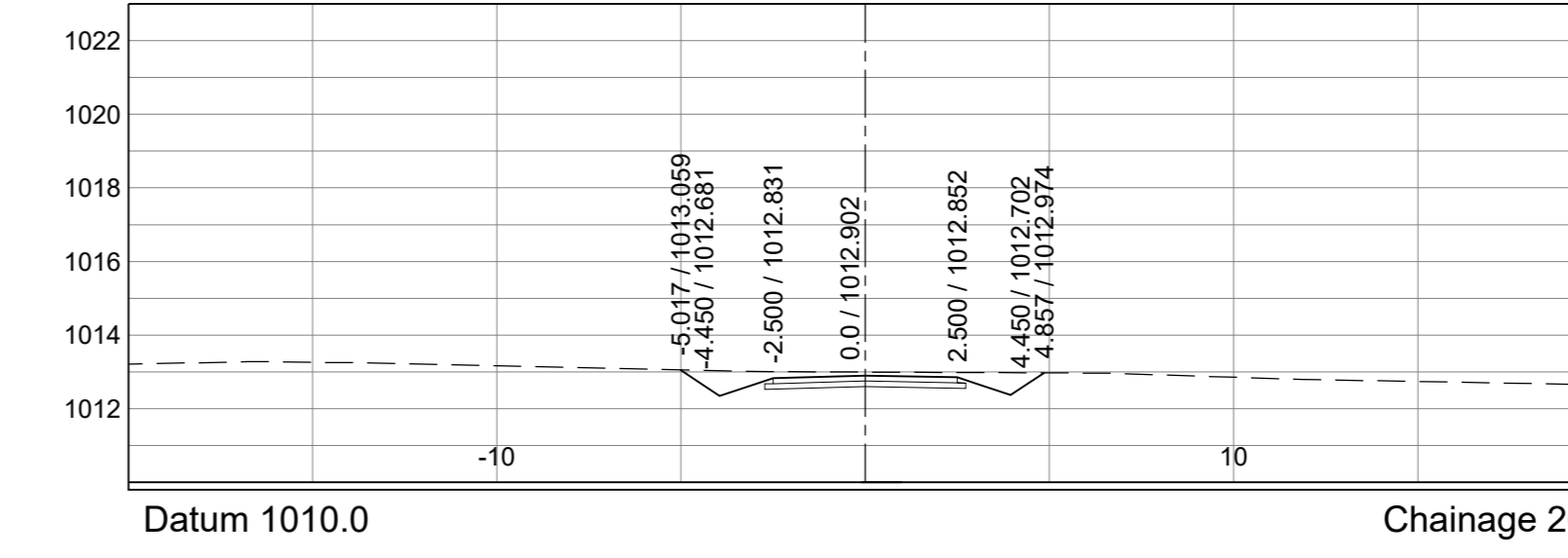
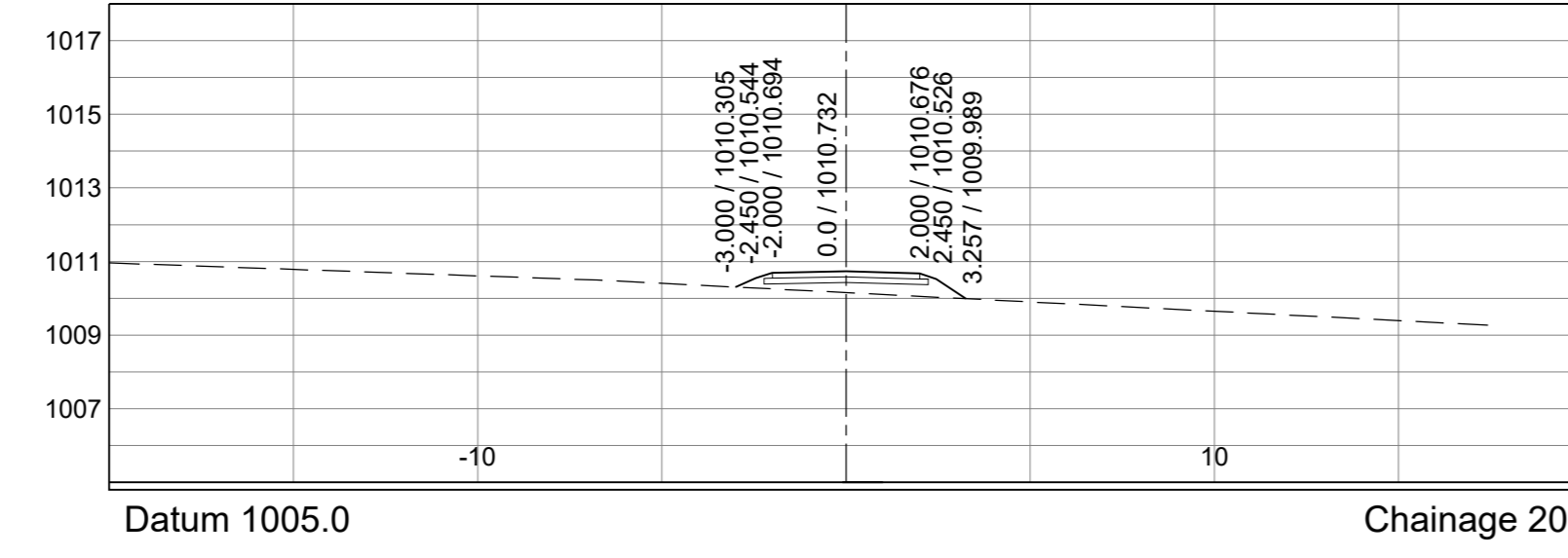
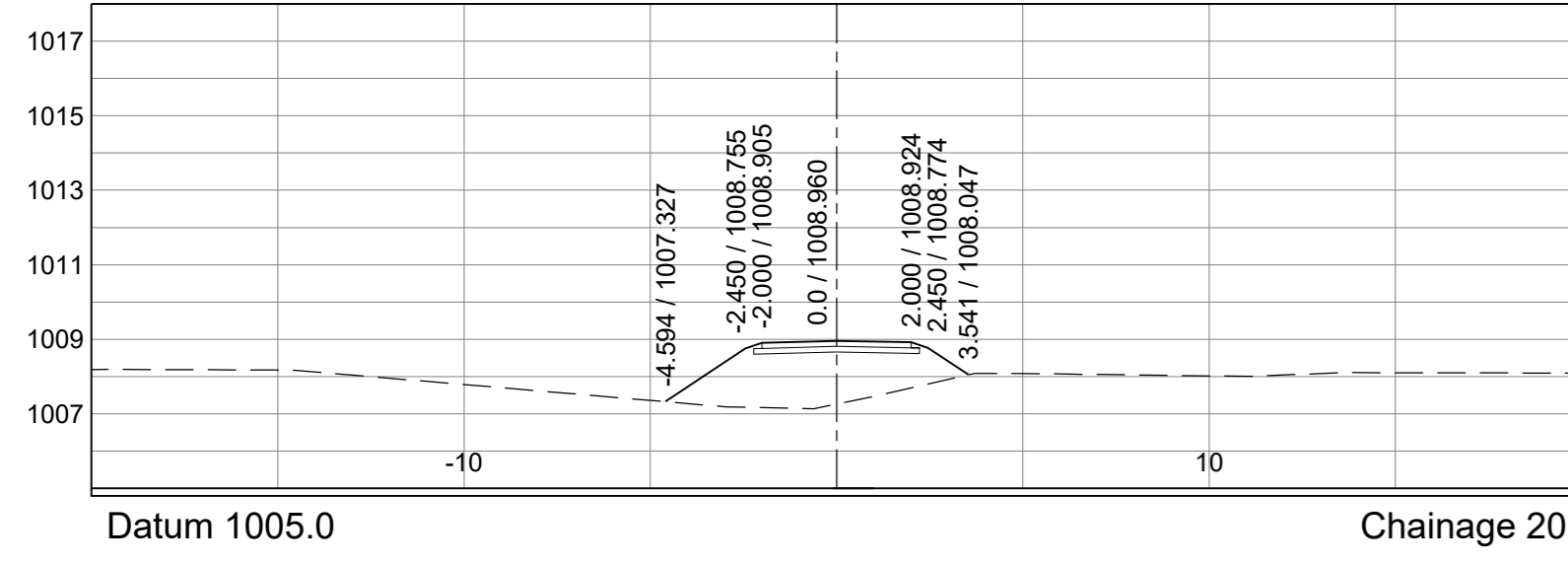
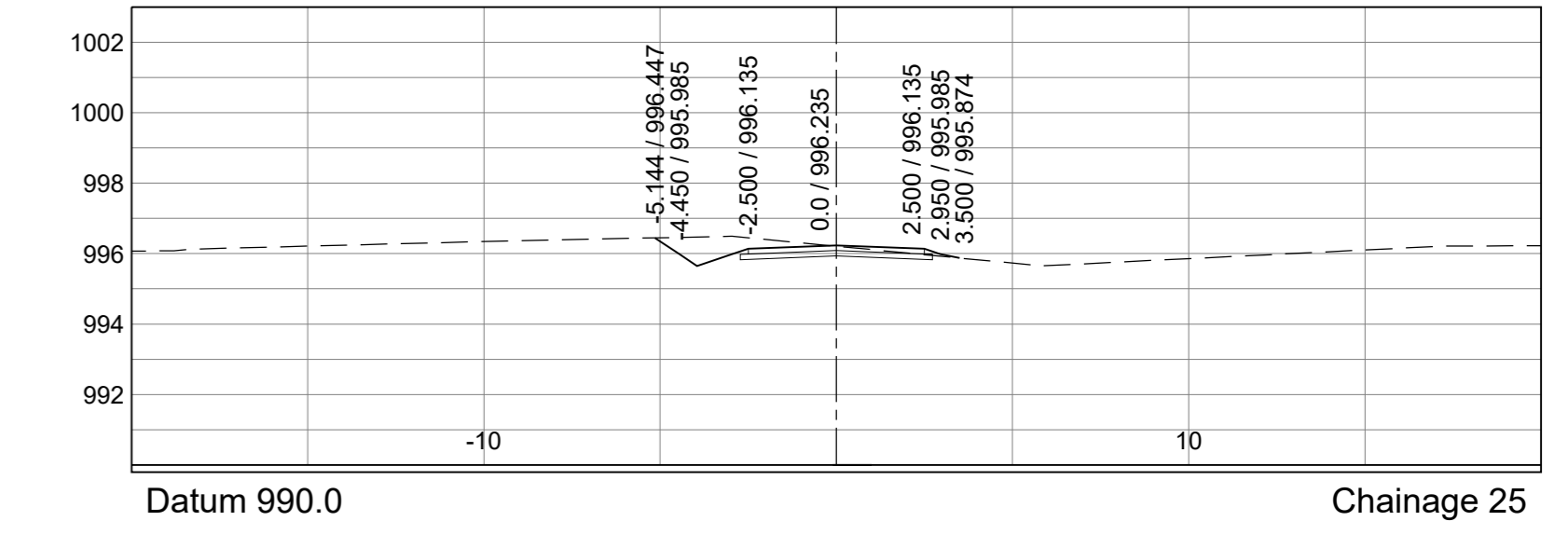
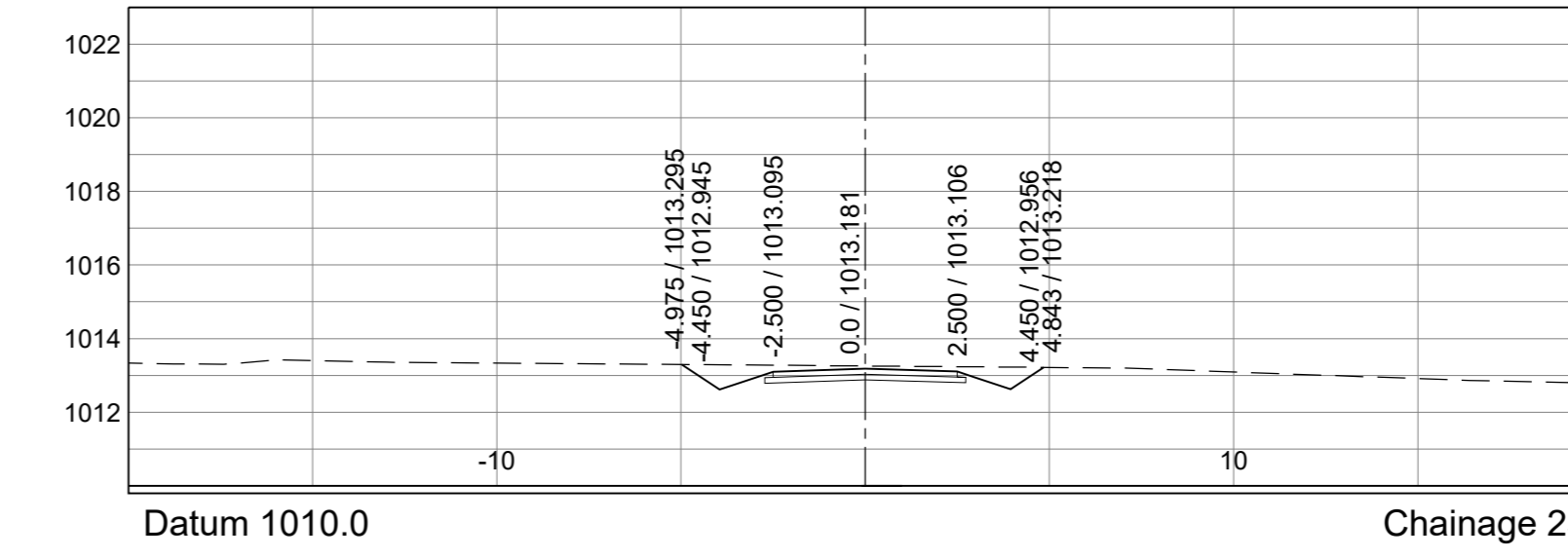
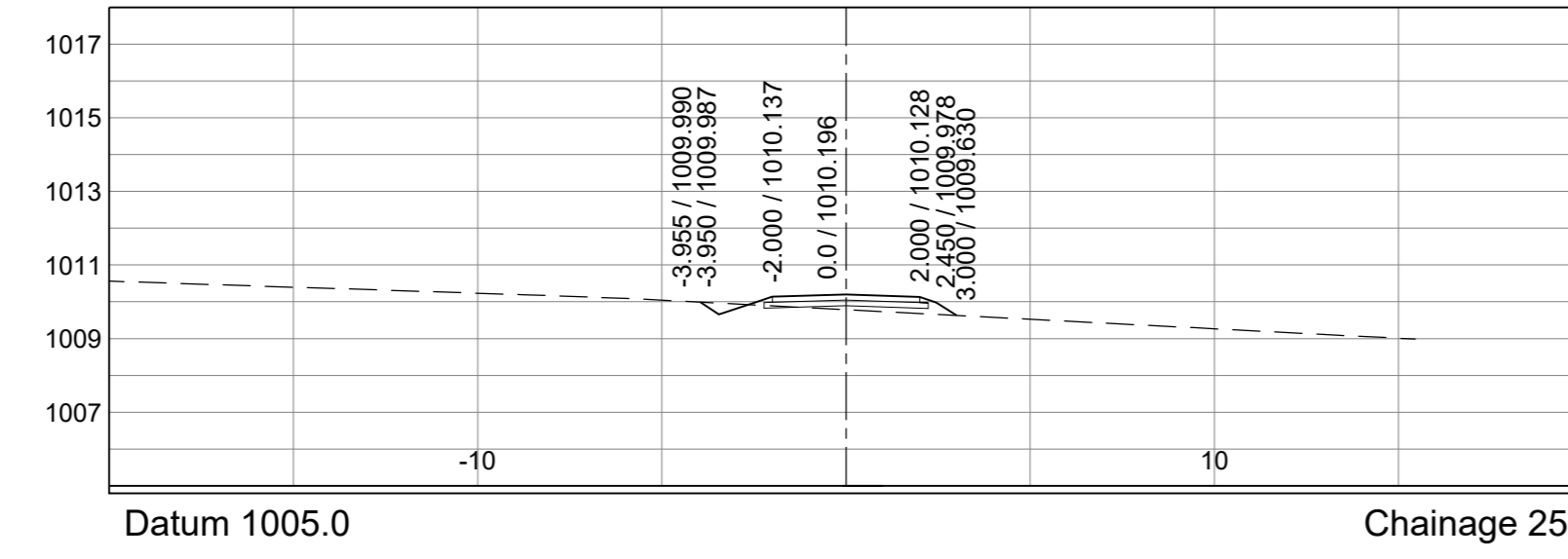
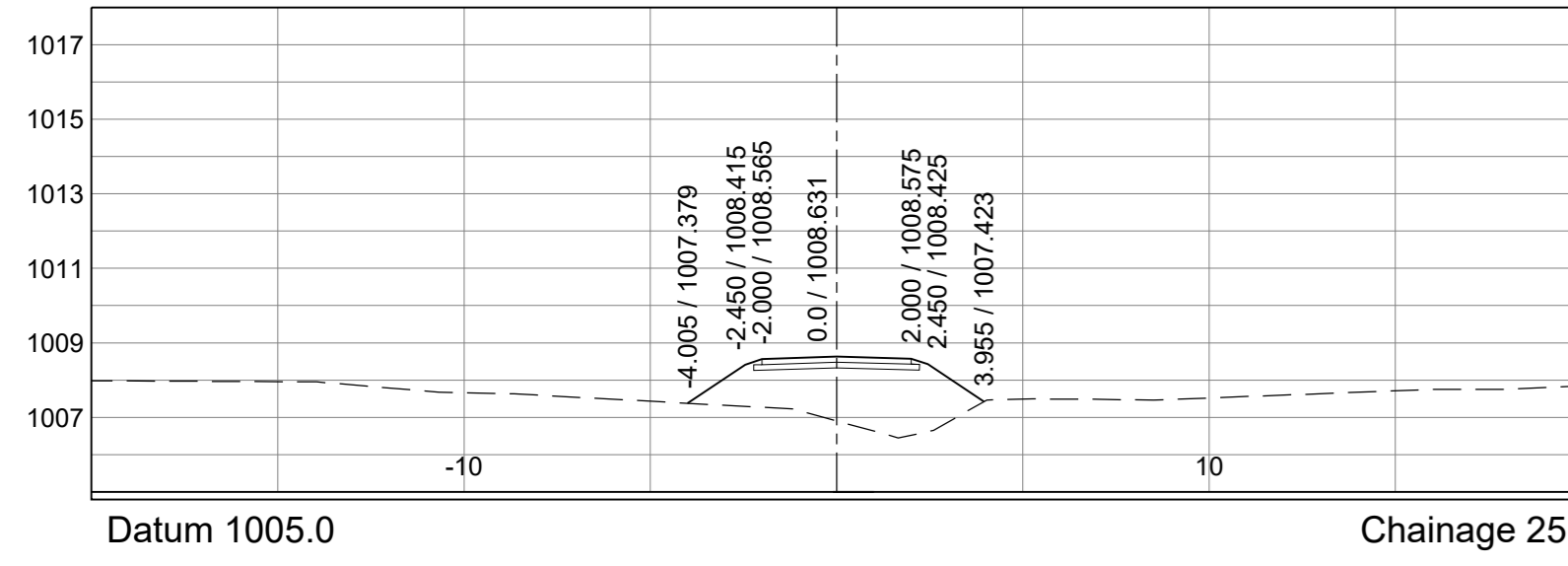
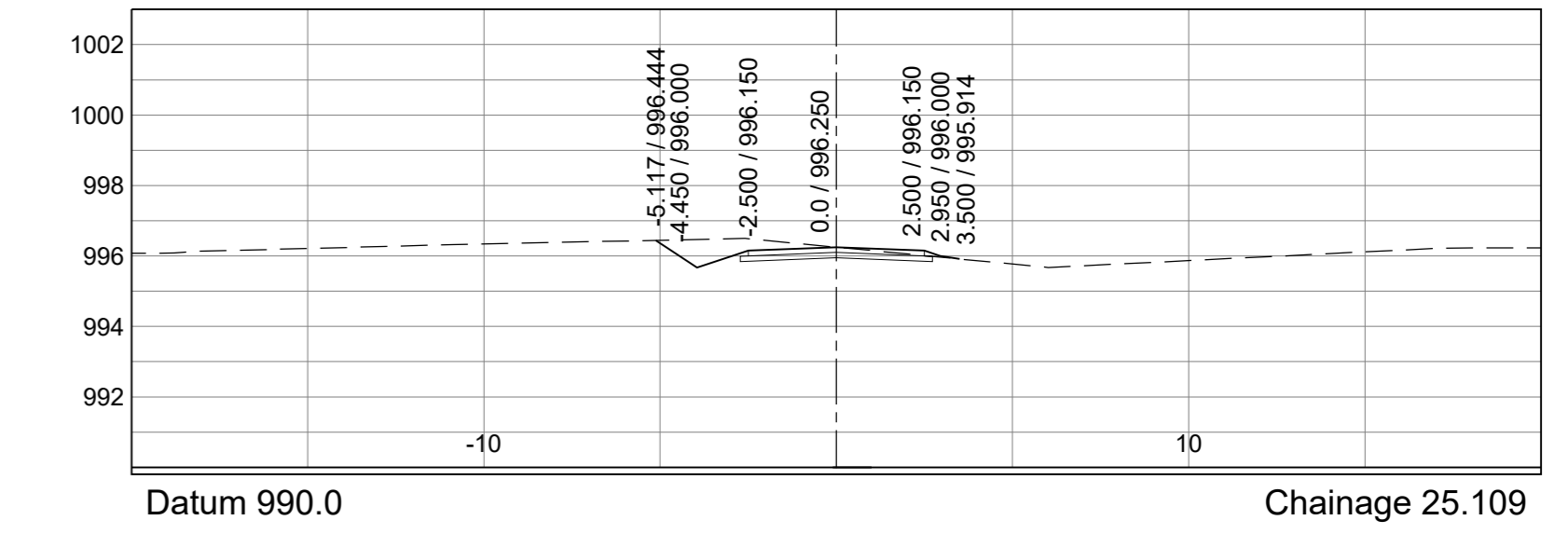
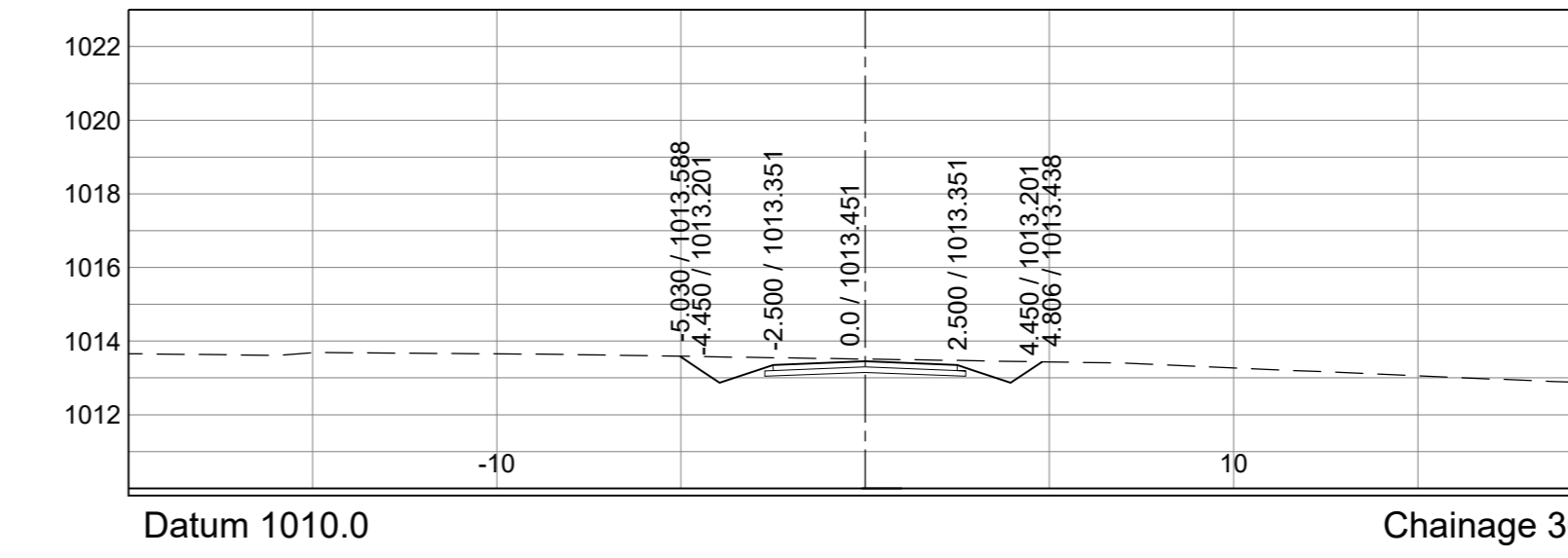
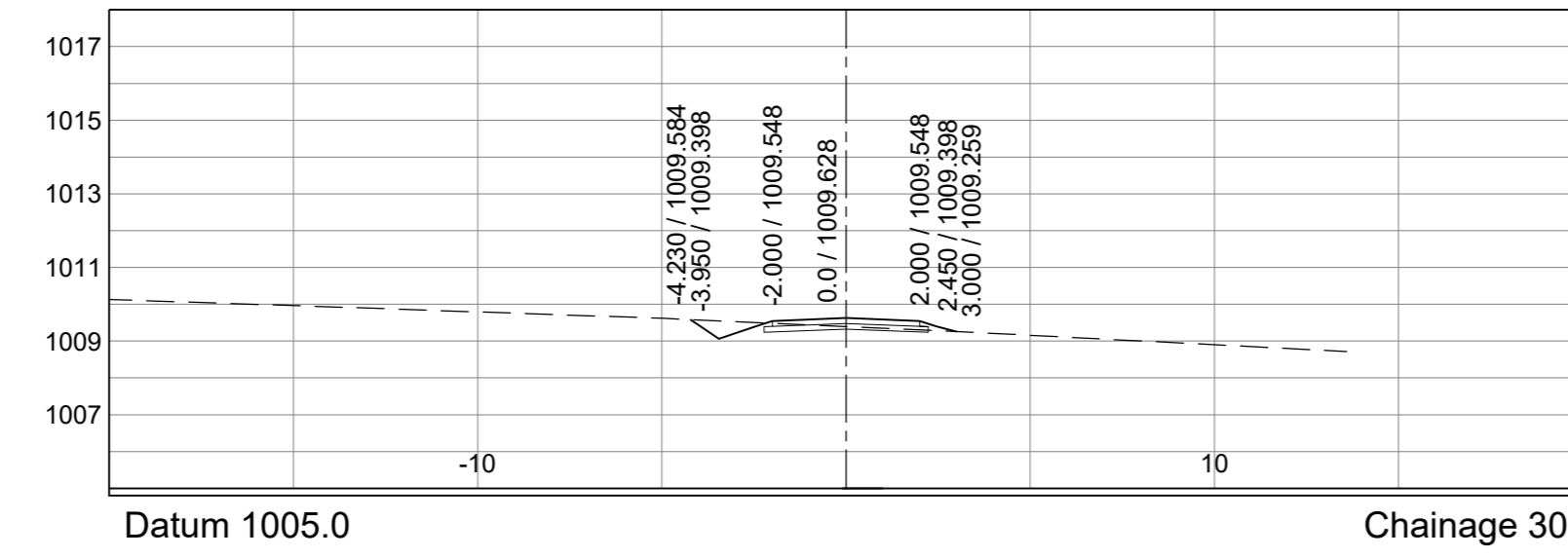
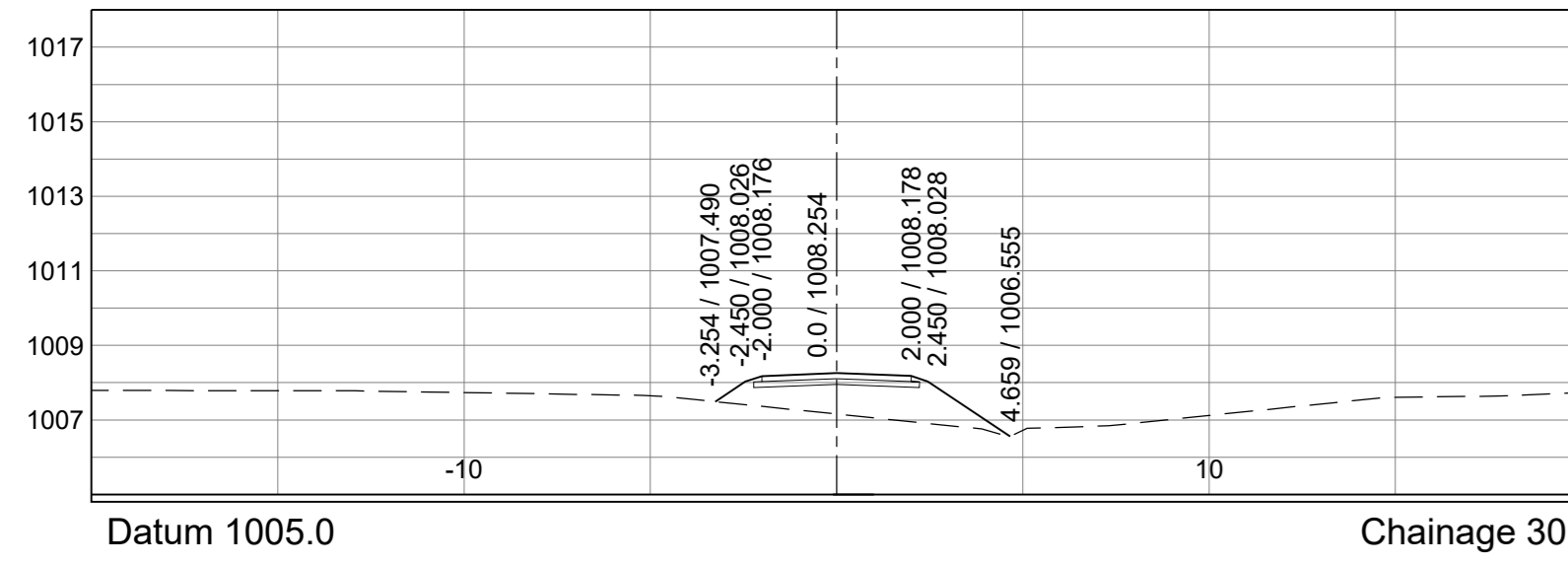
ACCESS @ KM 13+504.810 LHS

ACCESS @ KM 13+752.566 RHS

ACCESS @ KM 13+752.566 LHS



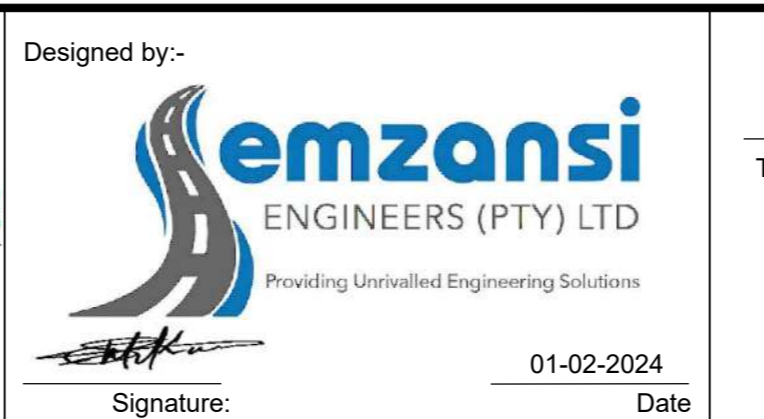
ACCESS @ KM 14+443.657 LHS



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44334	Designed by:-	Y. DOMA
Continued on:-	C 44336	Checked by:-	N. NGUBANE
Cross Section No:-	C 44335	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44326 - C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44317	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport

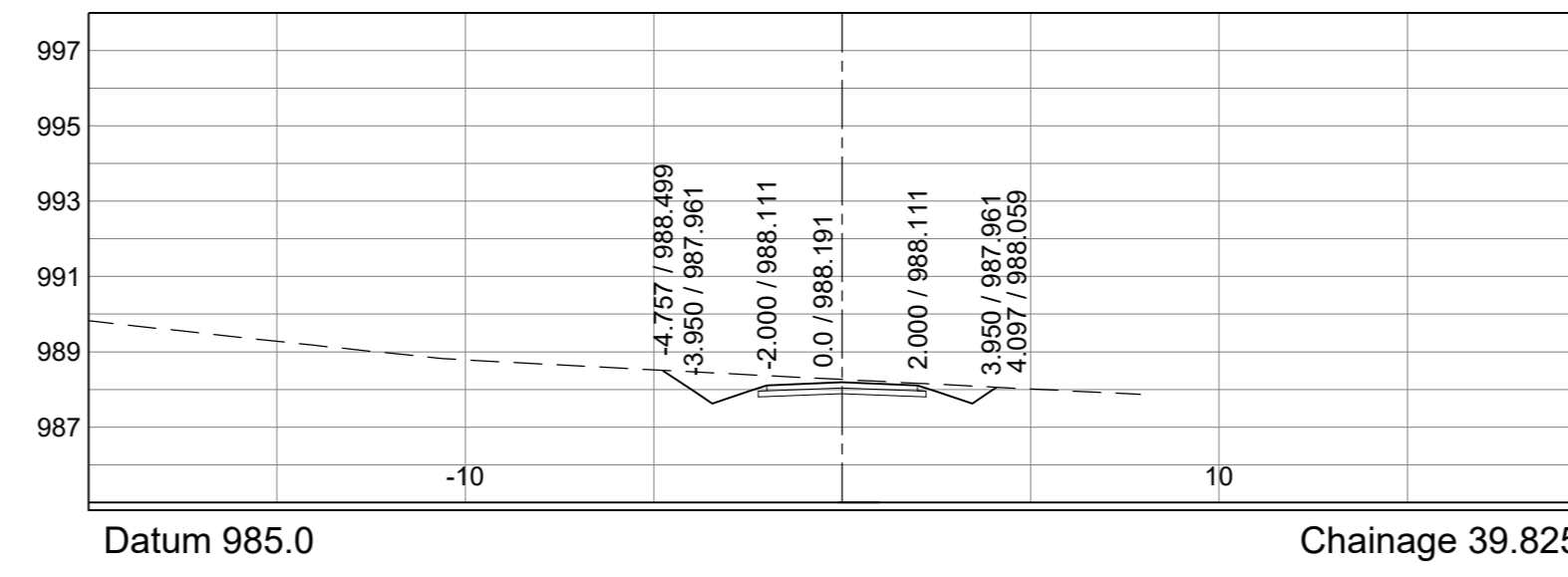
MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
ACCESS ROADS CROSS SECTIONS

Staked km distance	Sheet - 6	REVISION:
km 0+000 - km 0+399.467	of - 14	A
km 0+399.467 - km 0+443.657		
km 0+443.657 - km 0+541.411		
km 0+541.411 - km 0+625.109		
Scale	Plan No -	
Vertical Scale 1 : 200		
Horizontal Scale 1 : 200		

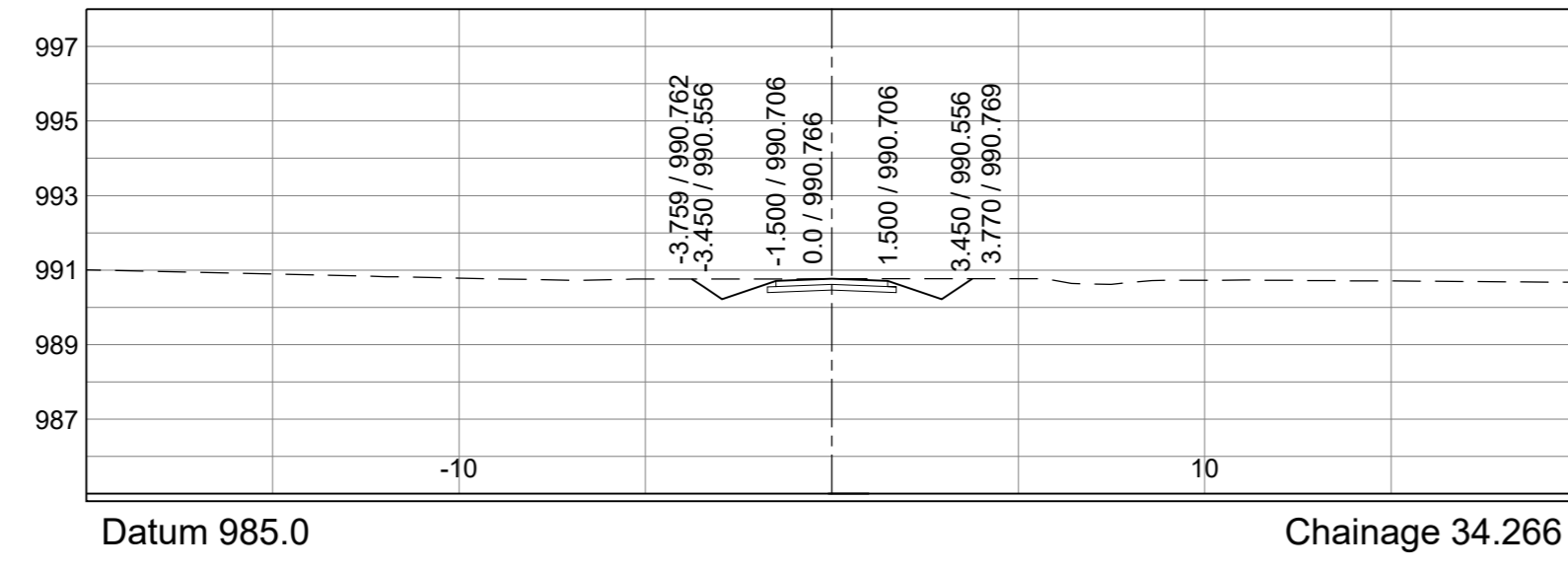
C 46549



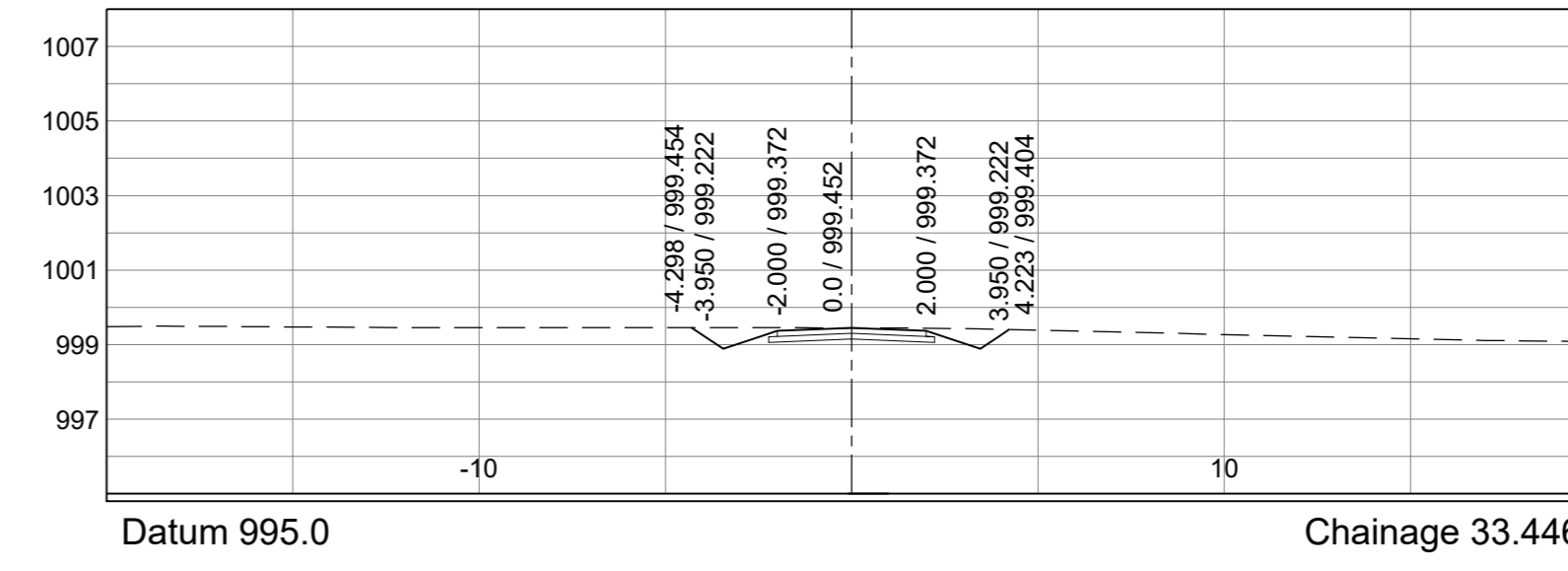
ACCESS @ KM 14+868.166 RHS



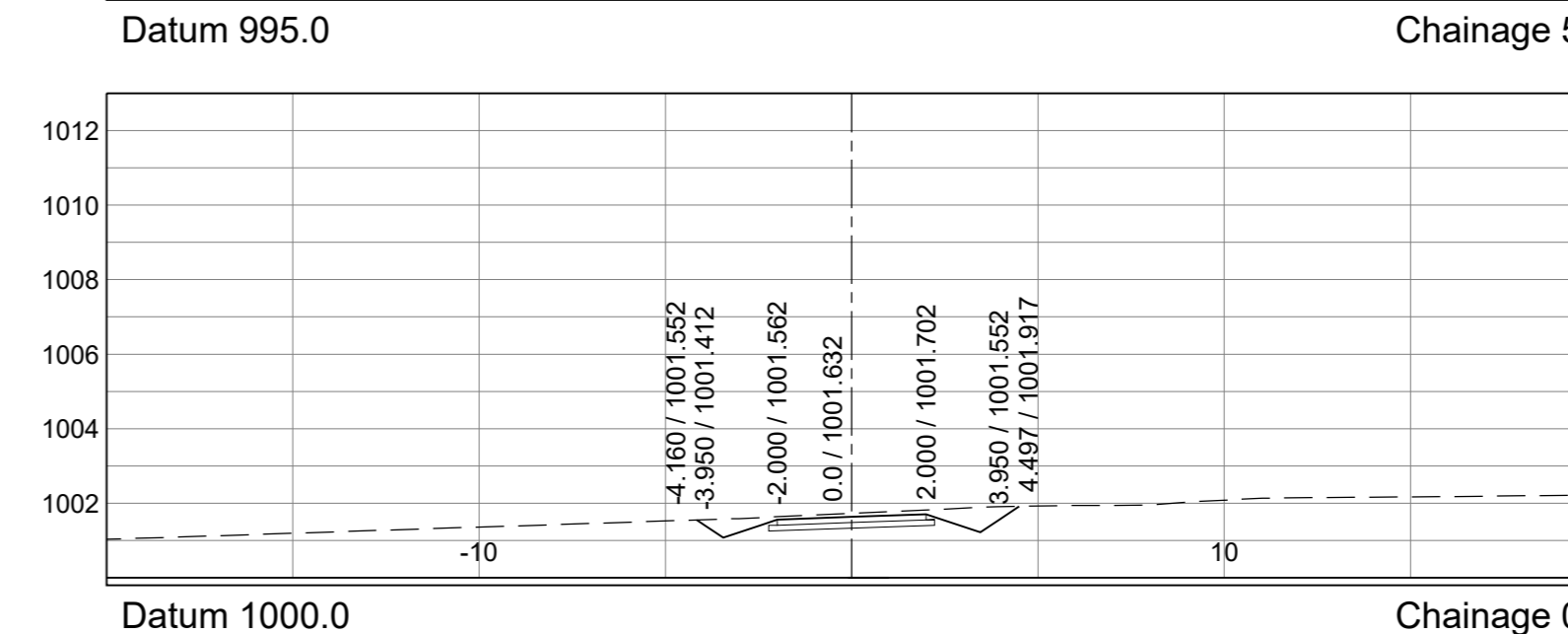
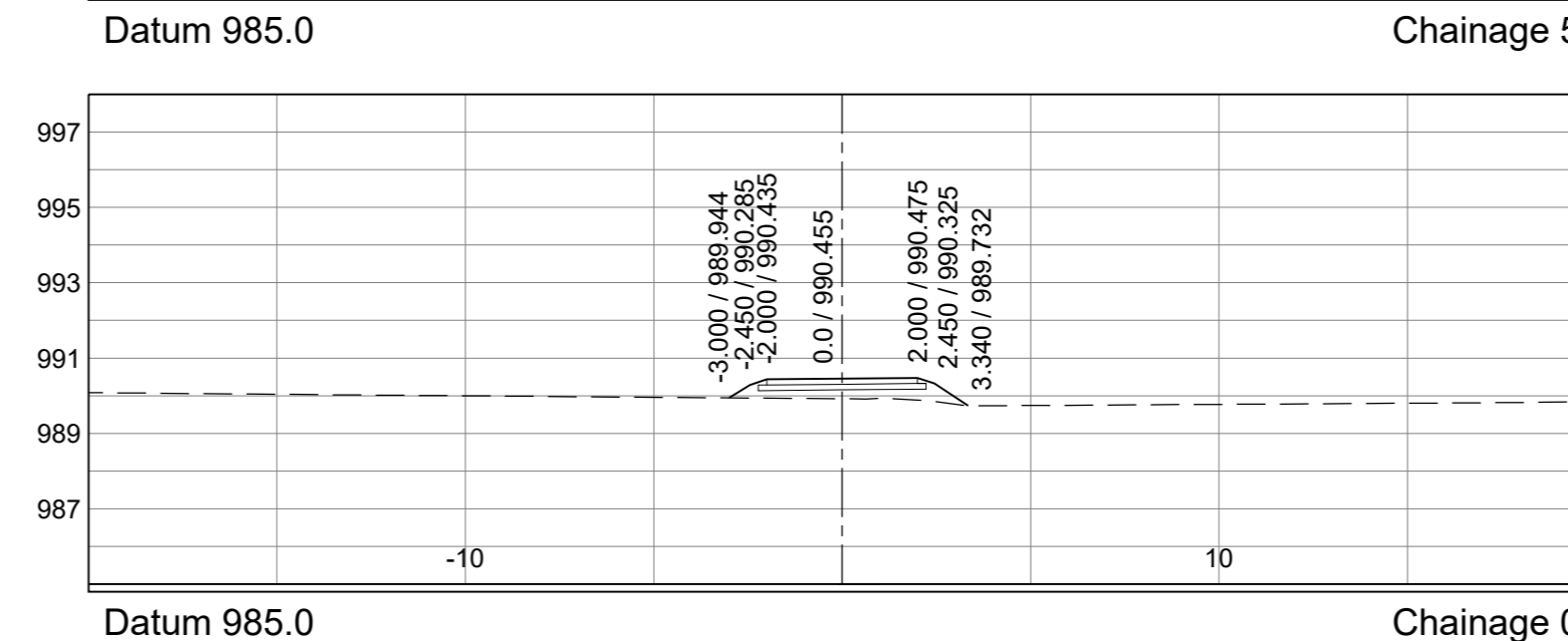
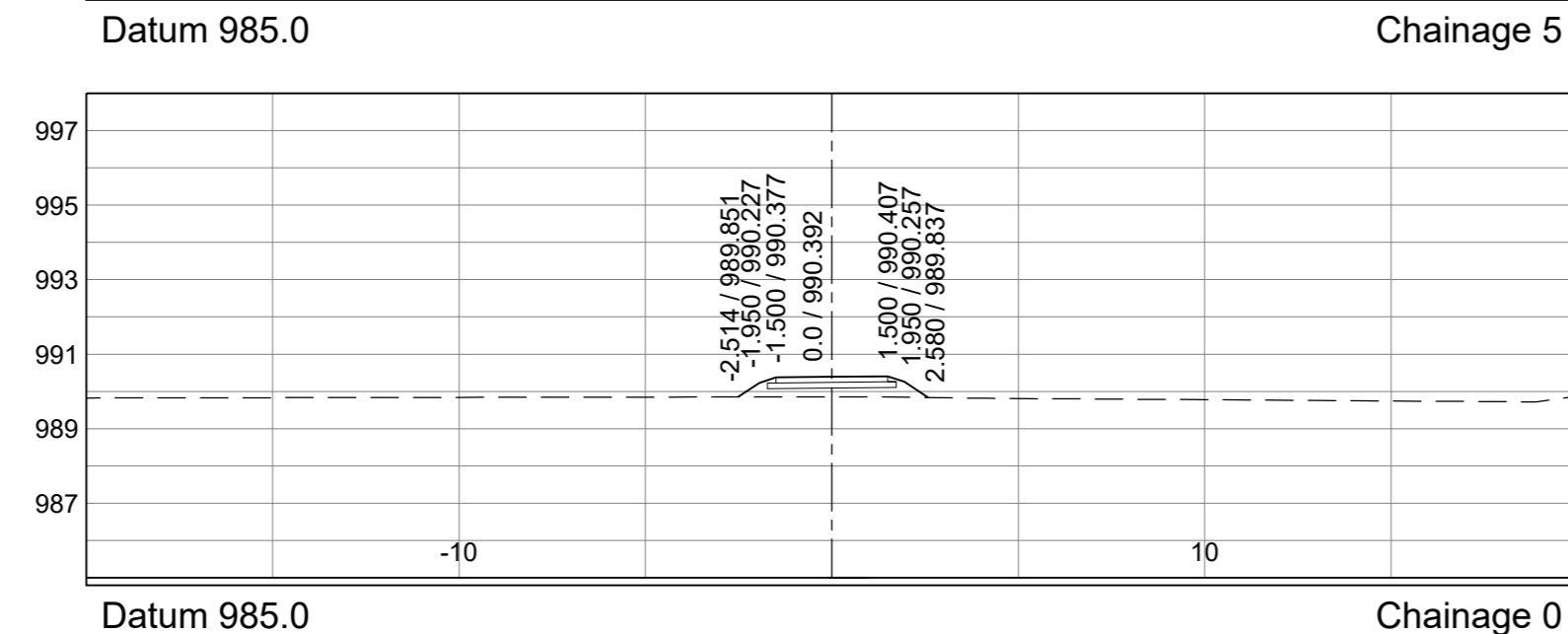
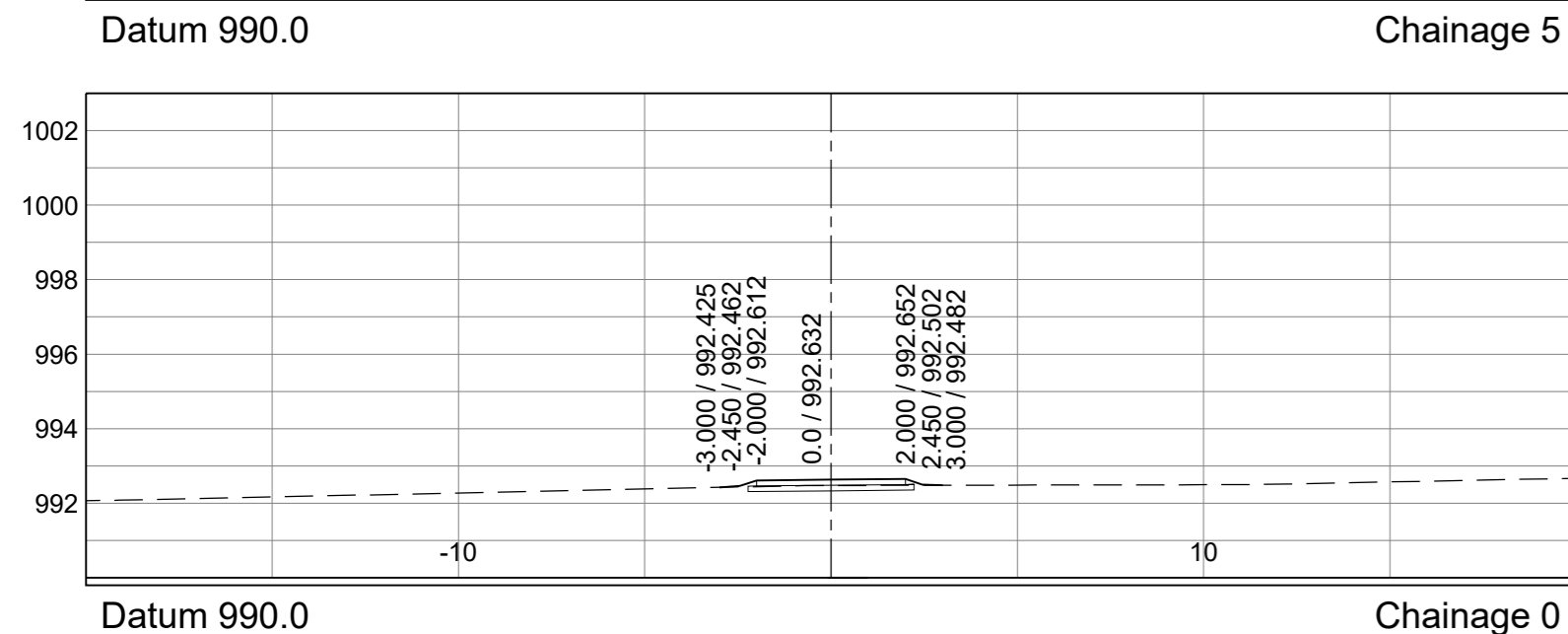
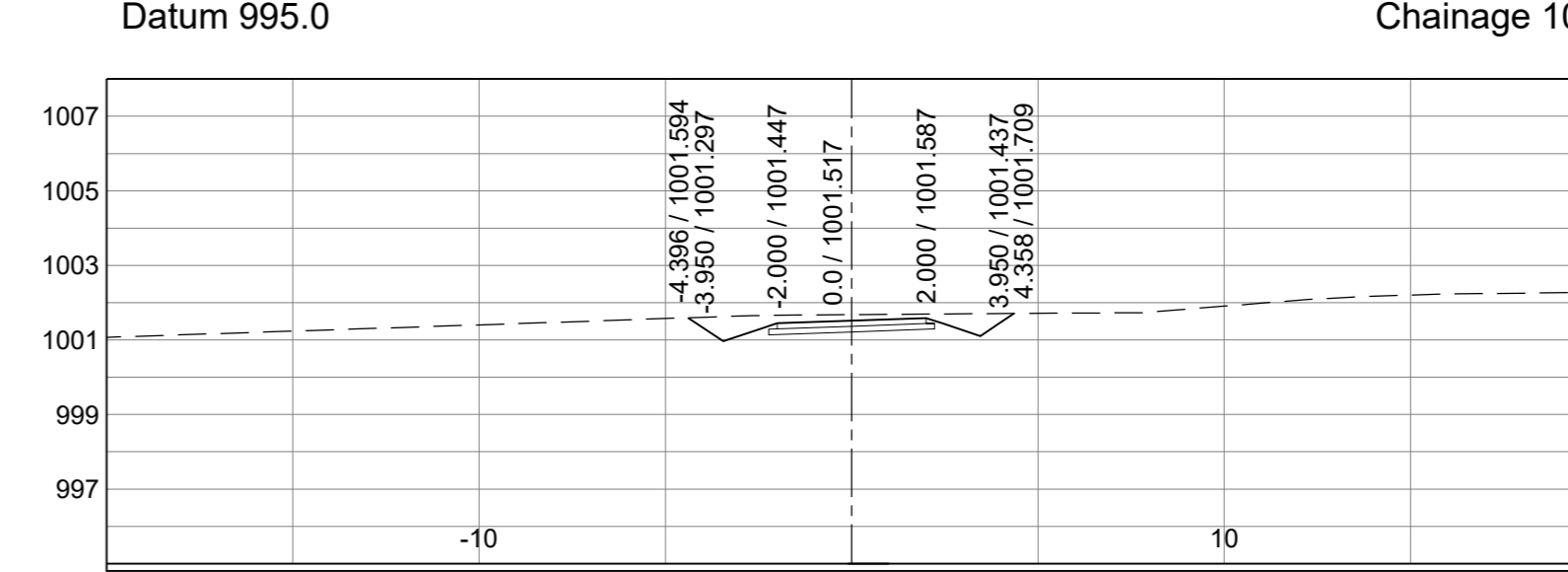
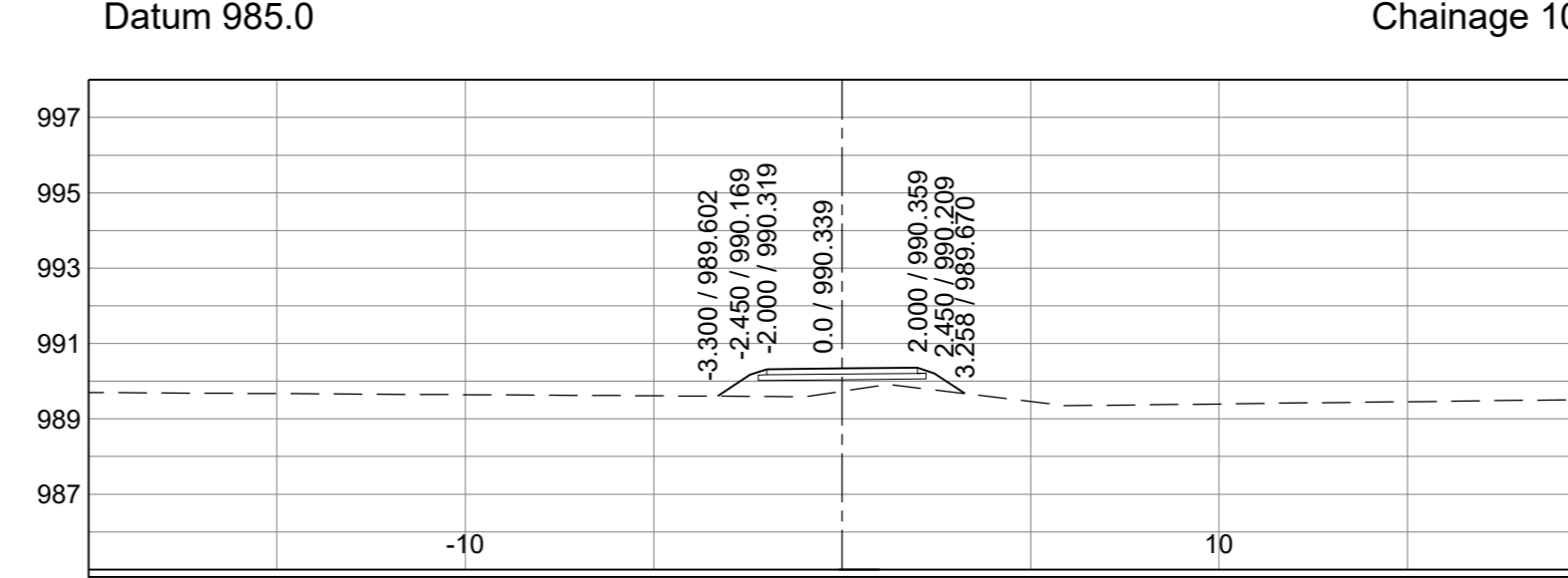
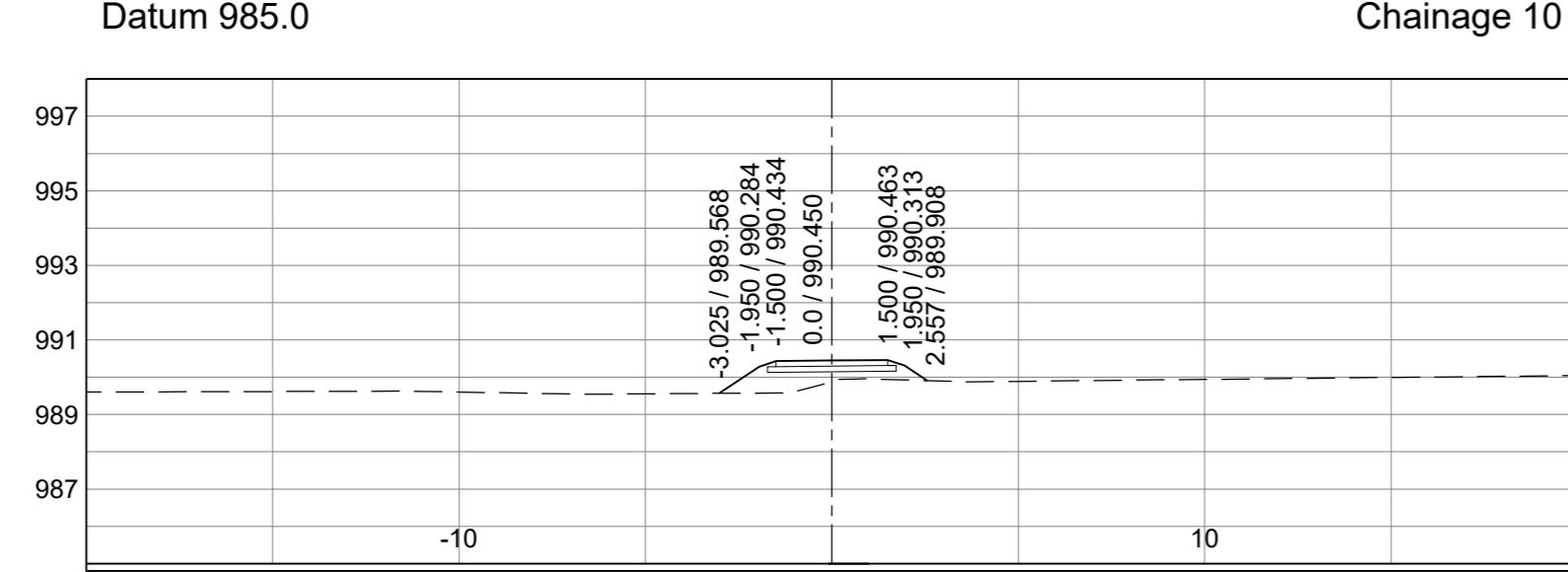
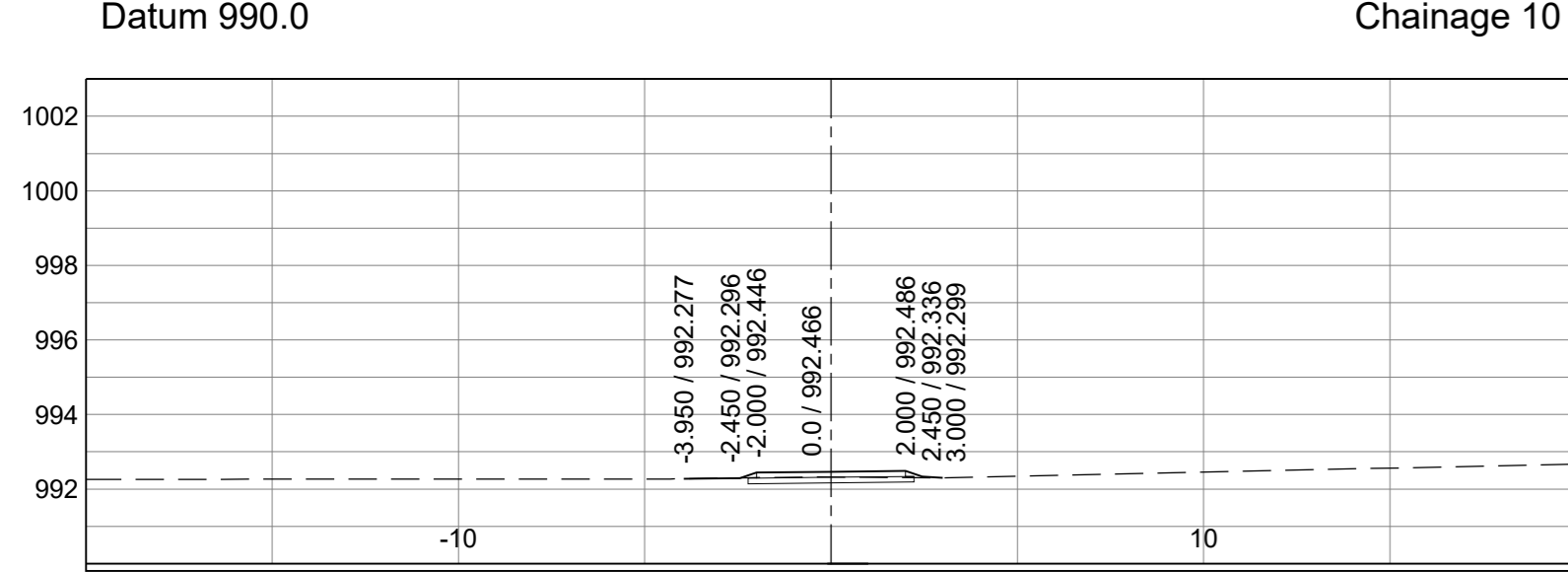
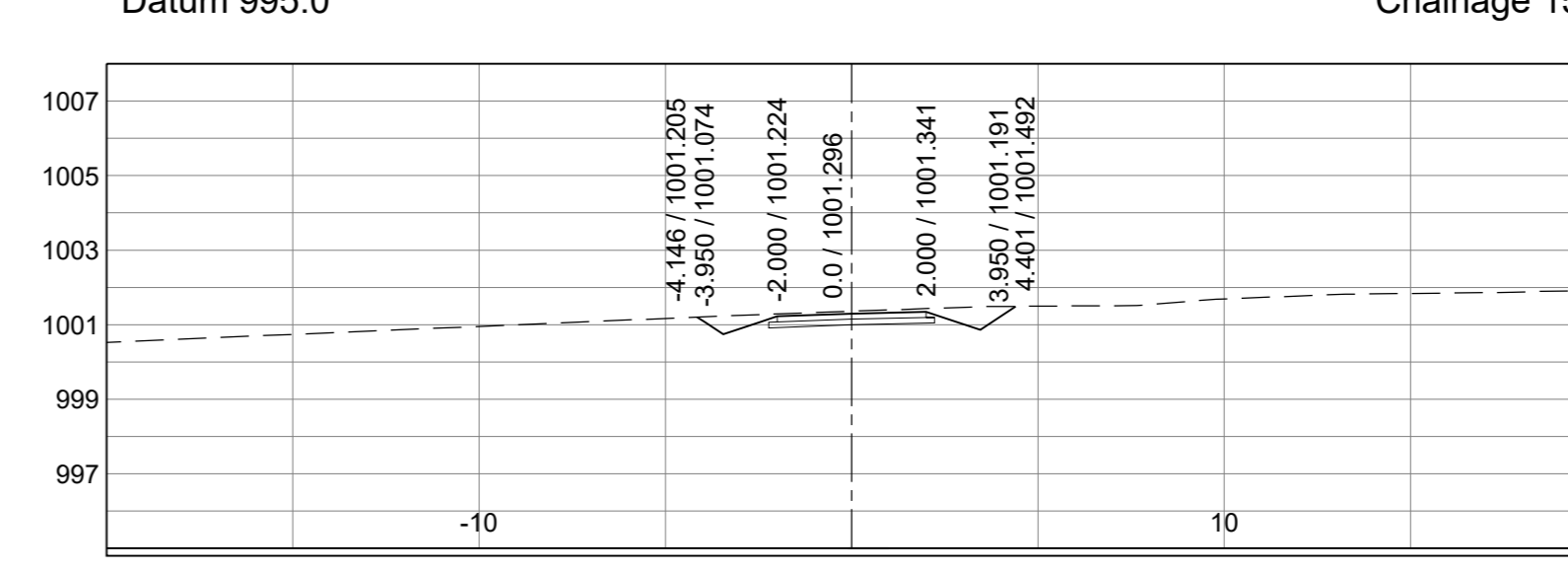
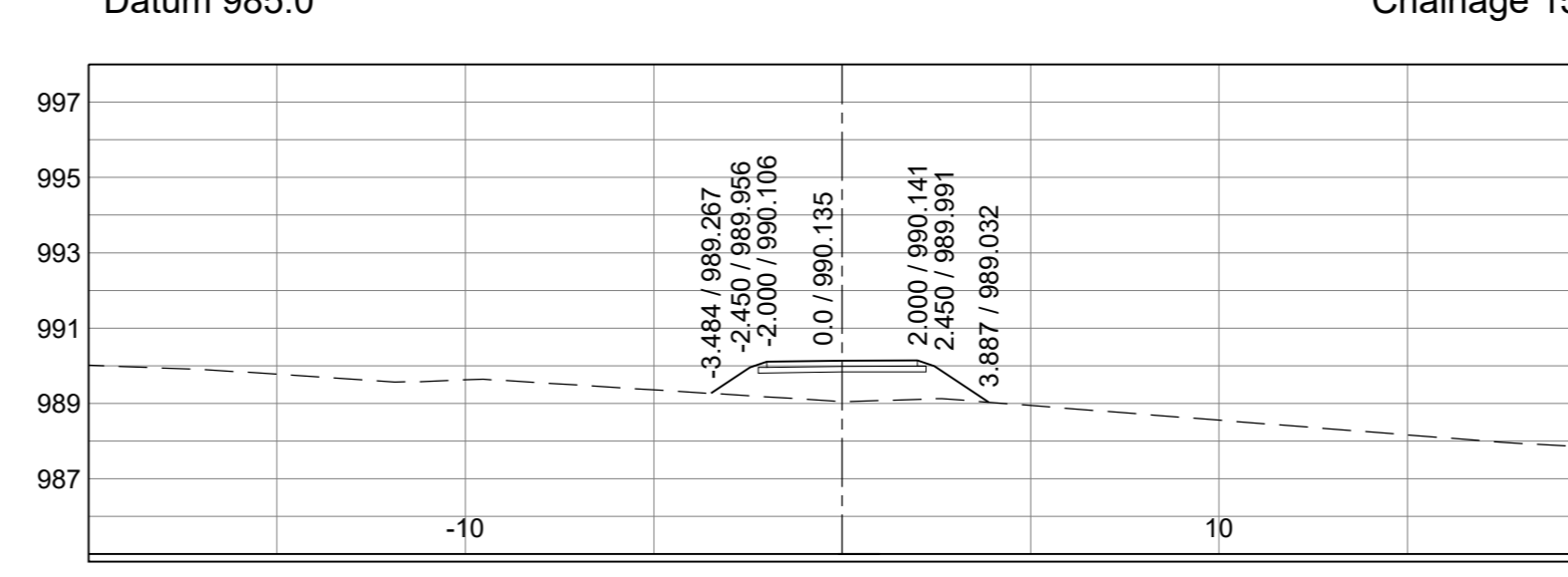
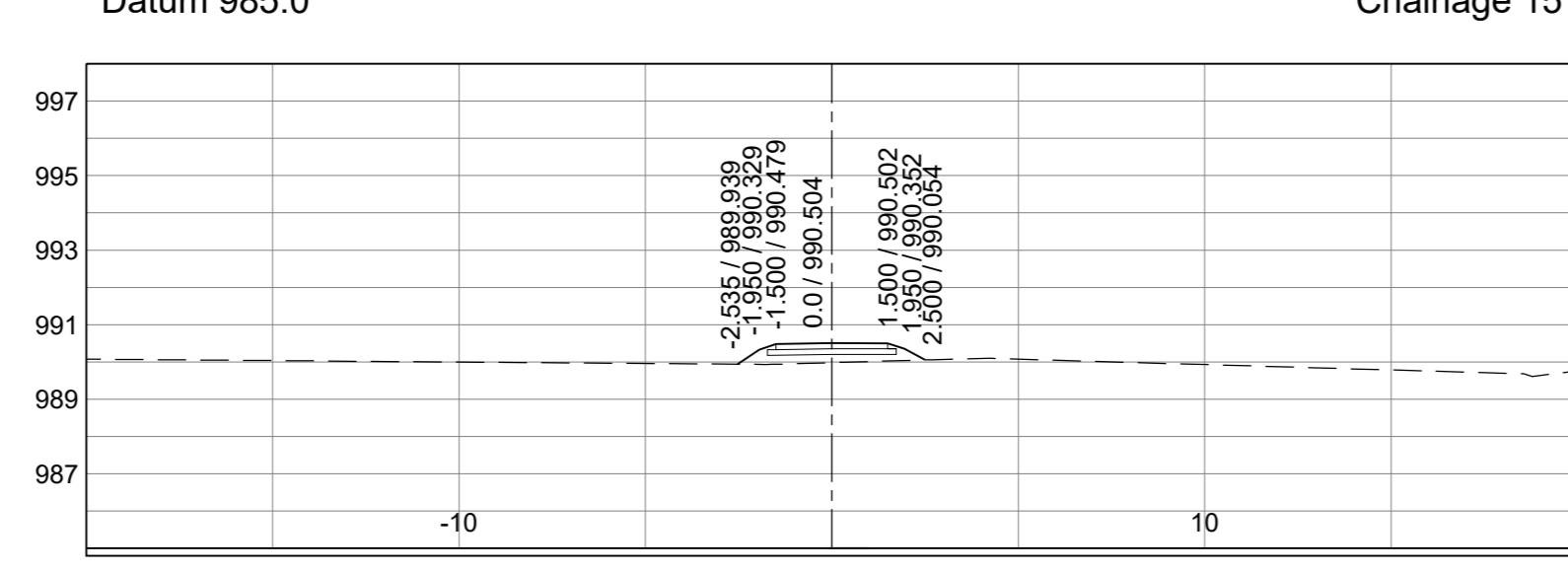
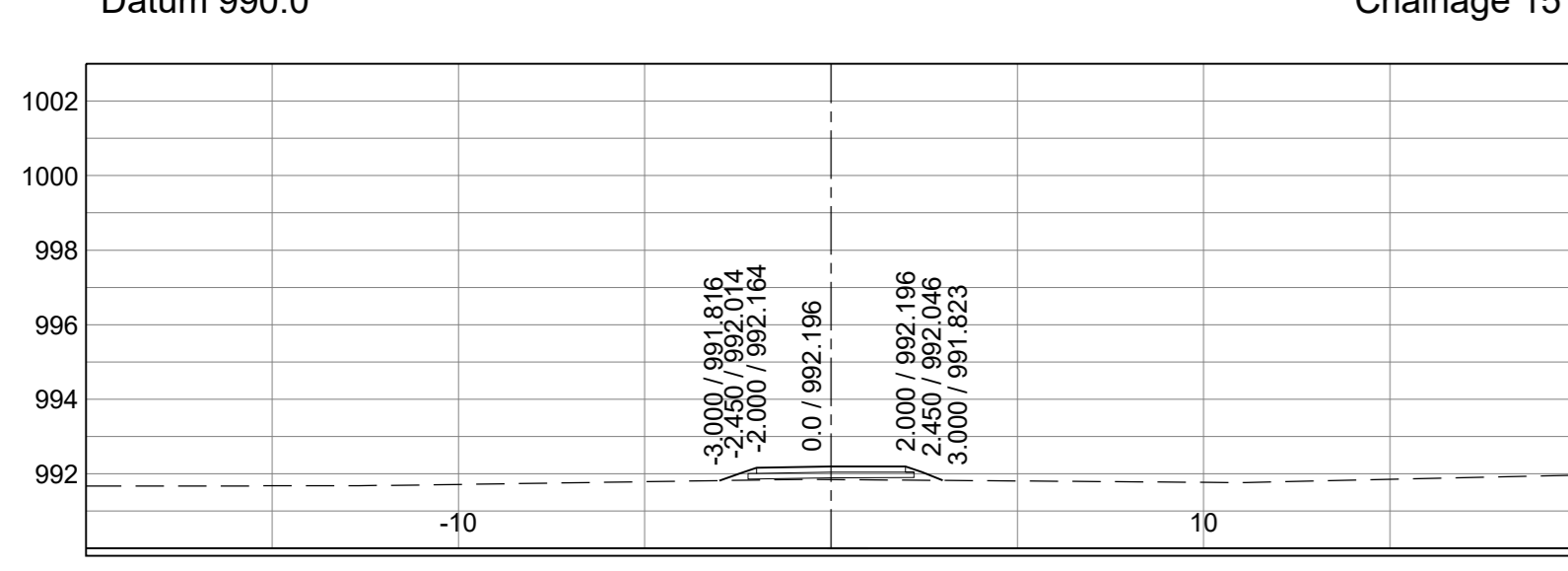
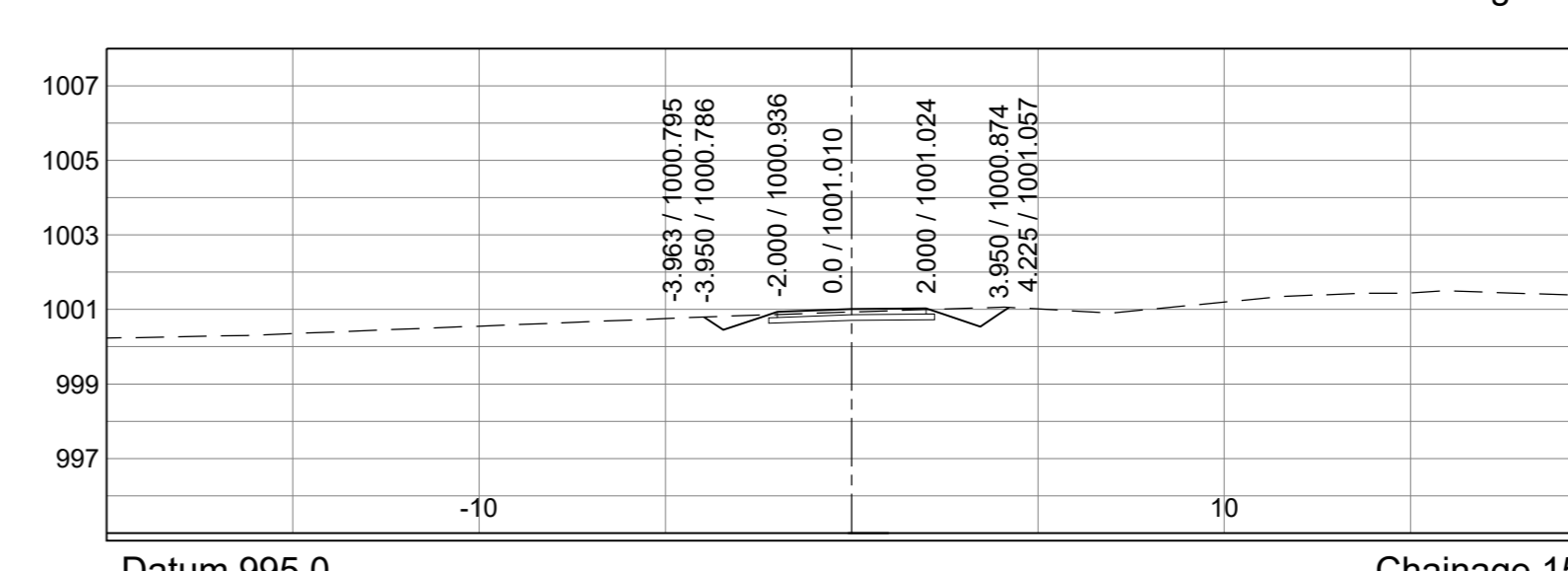
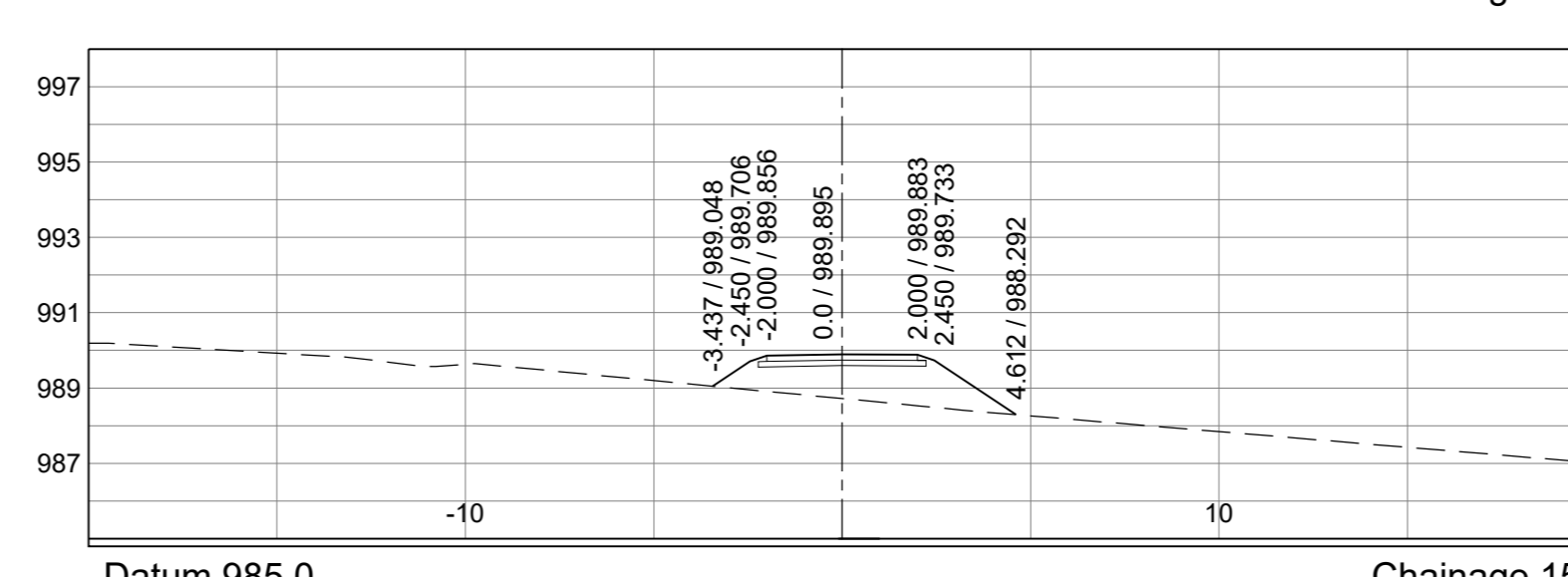
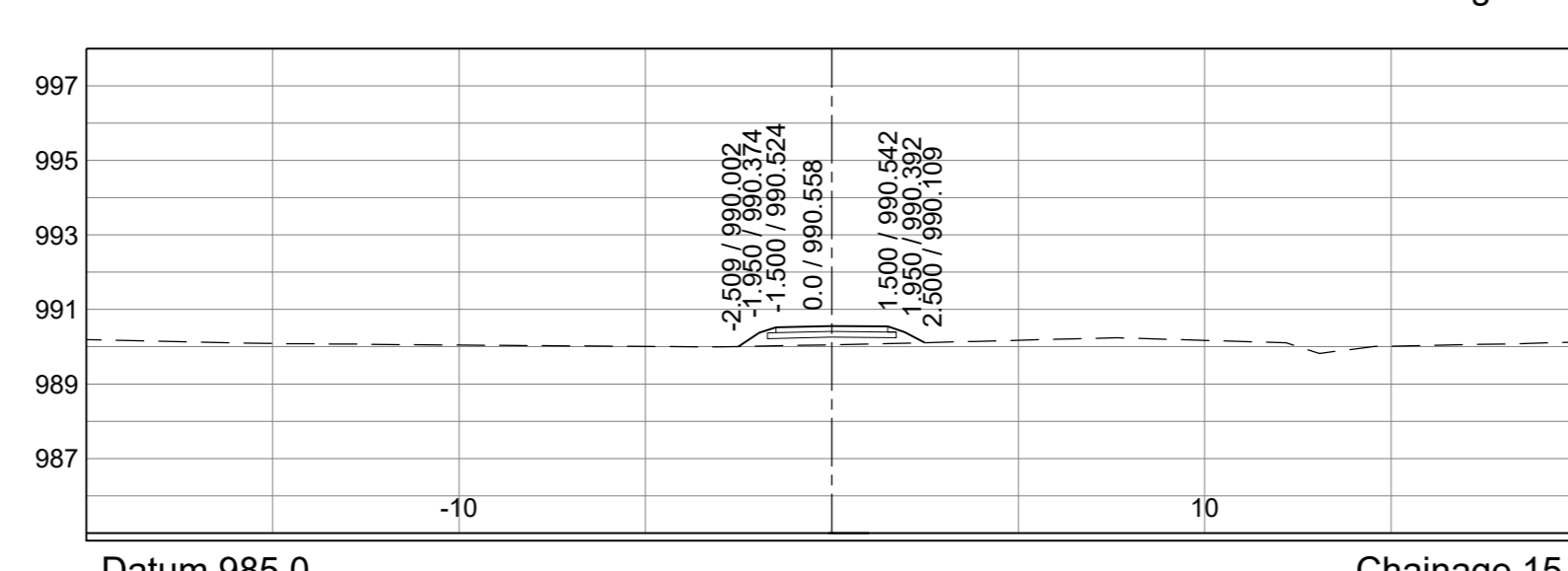
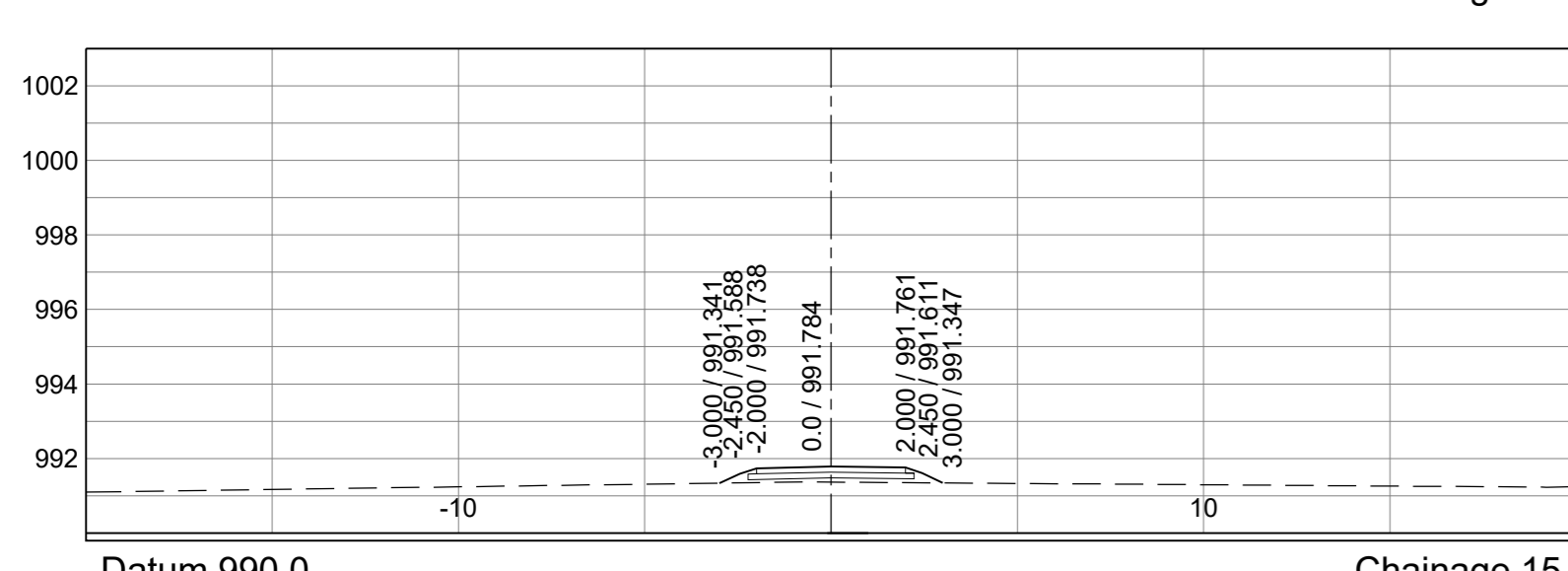
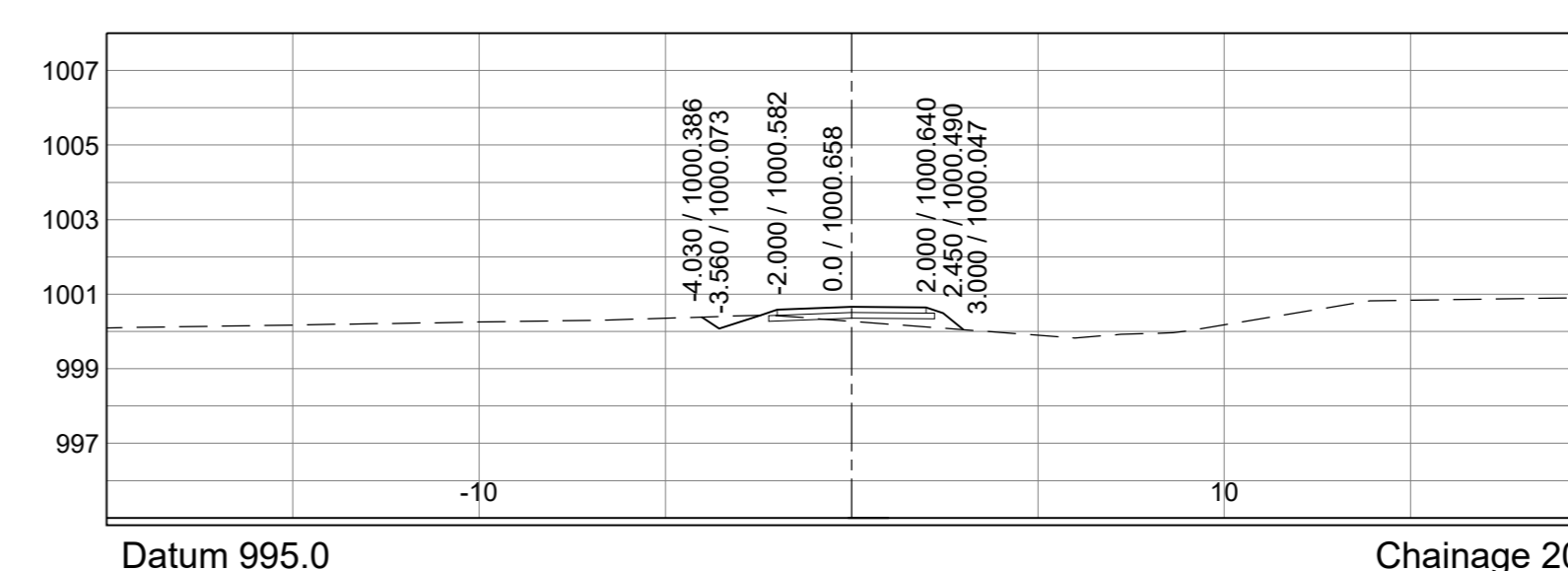
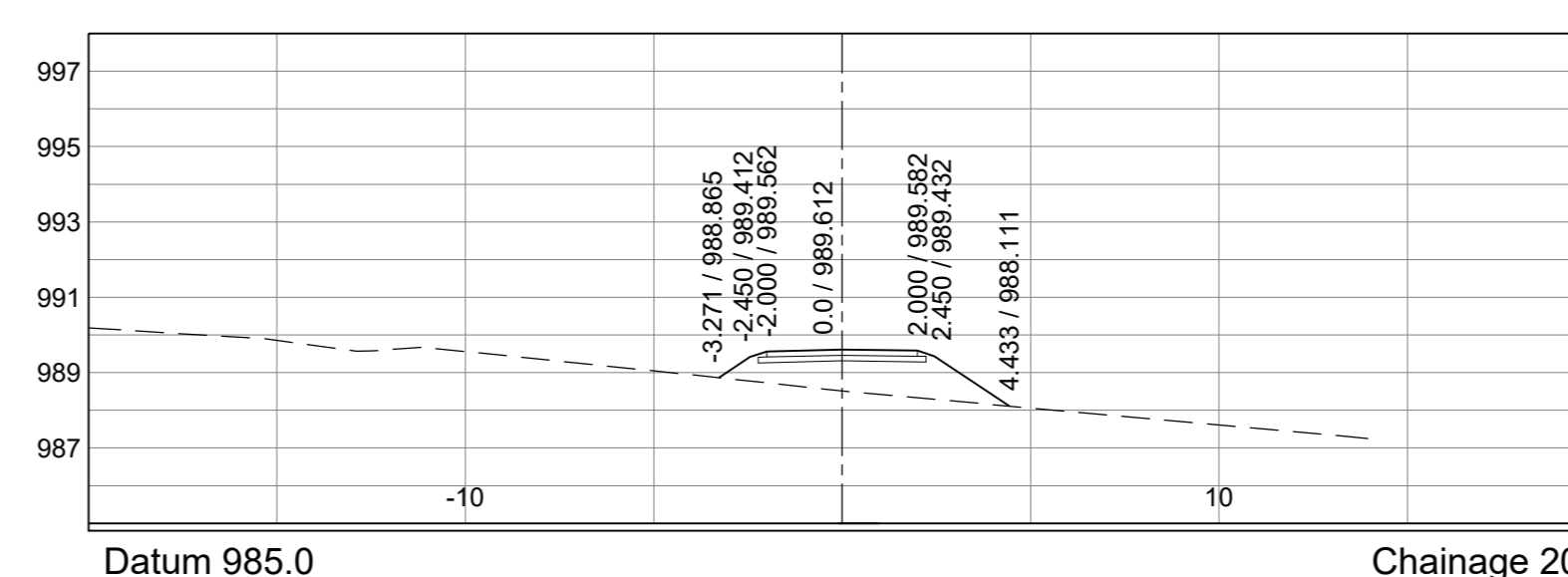
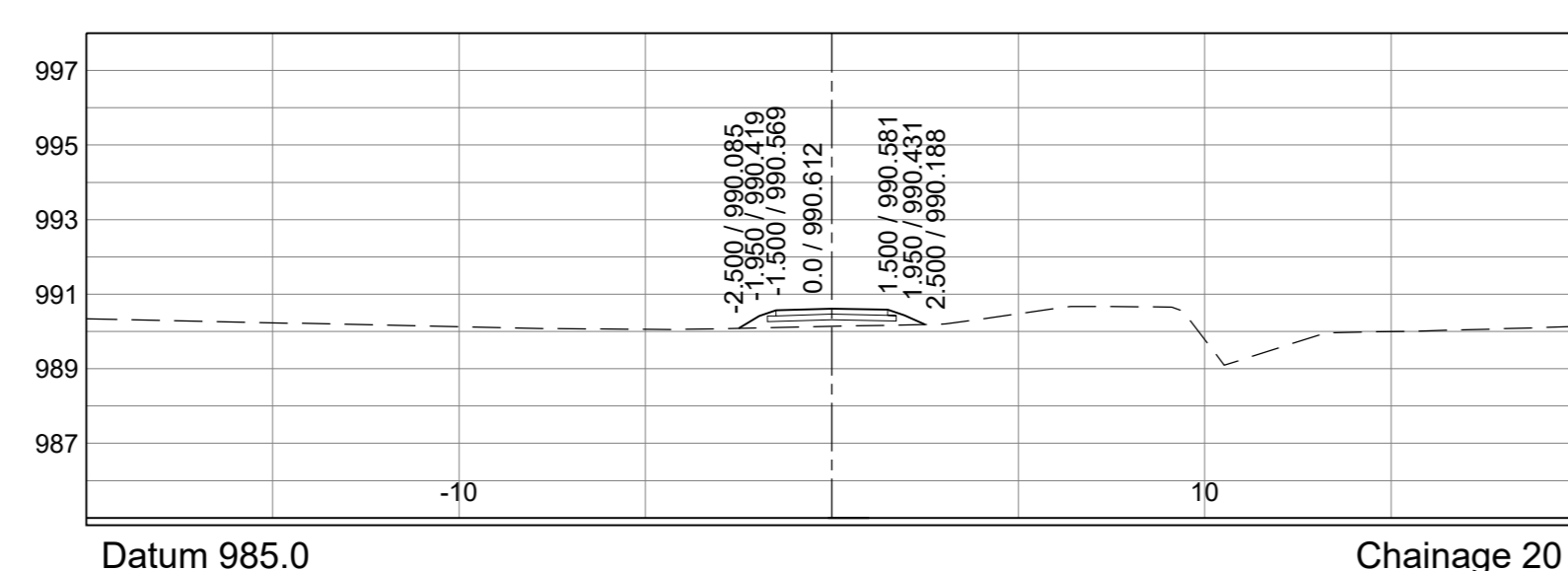
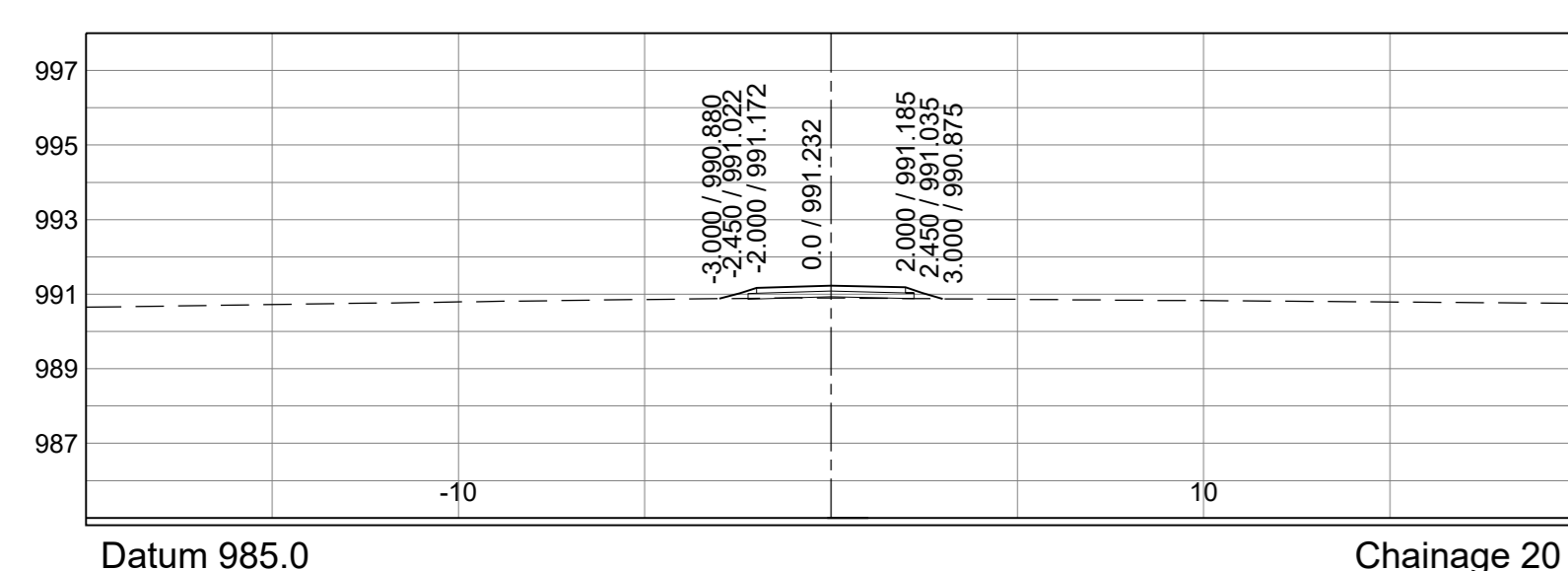
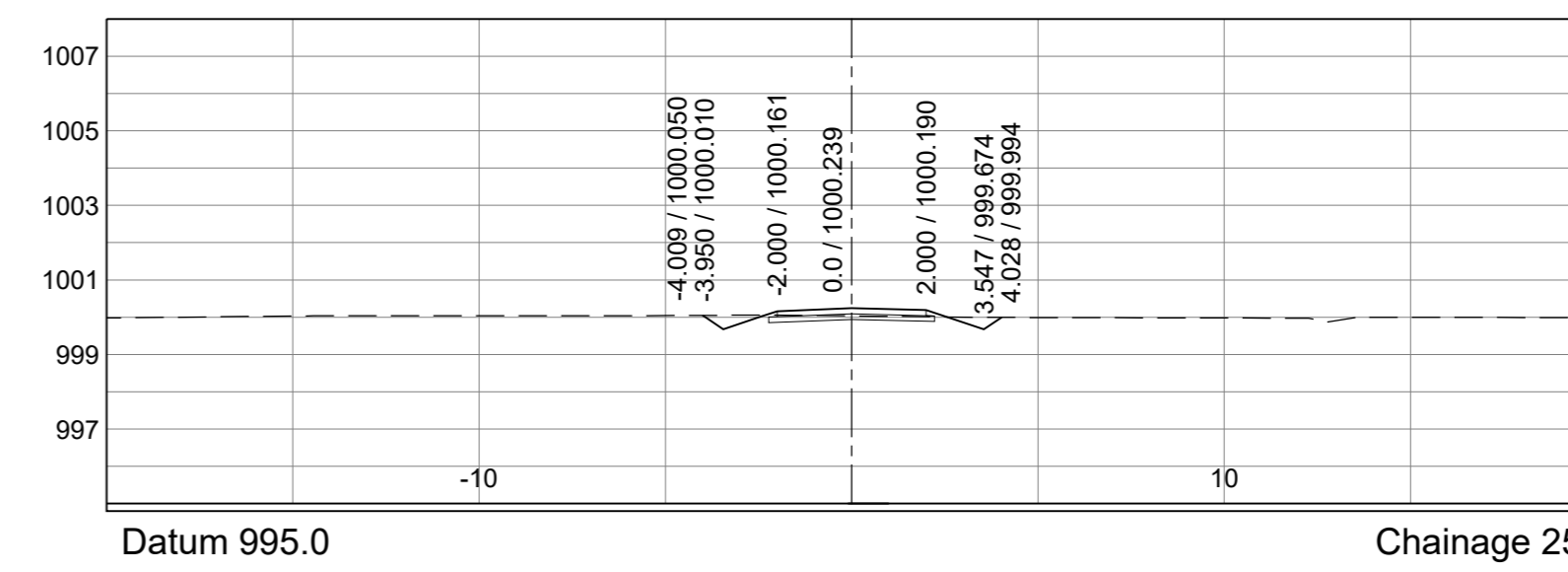
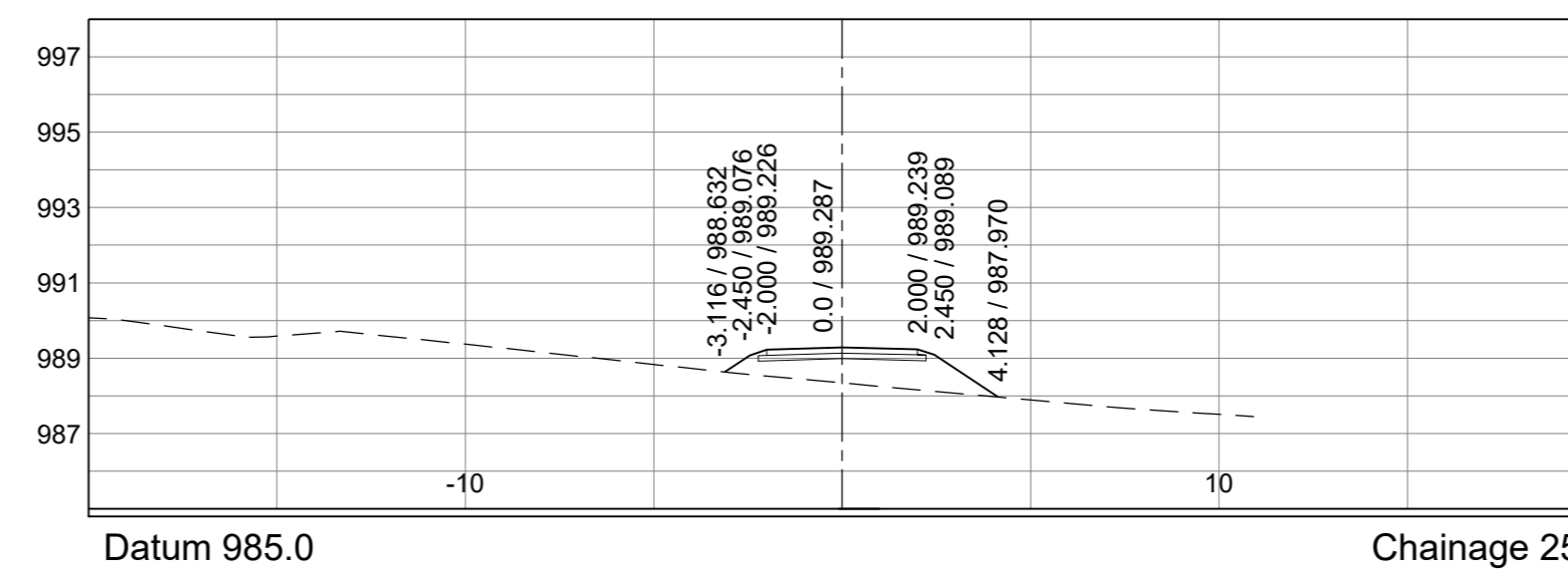
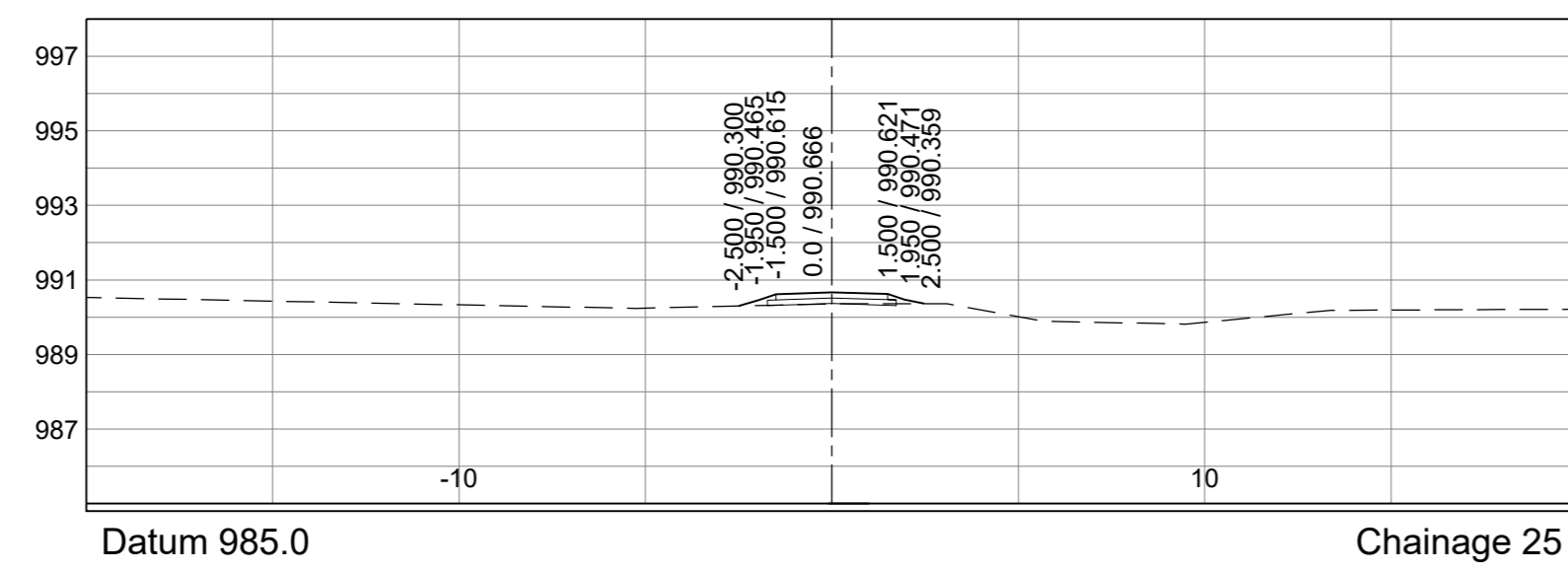
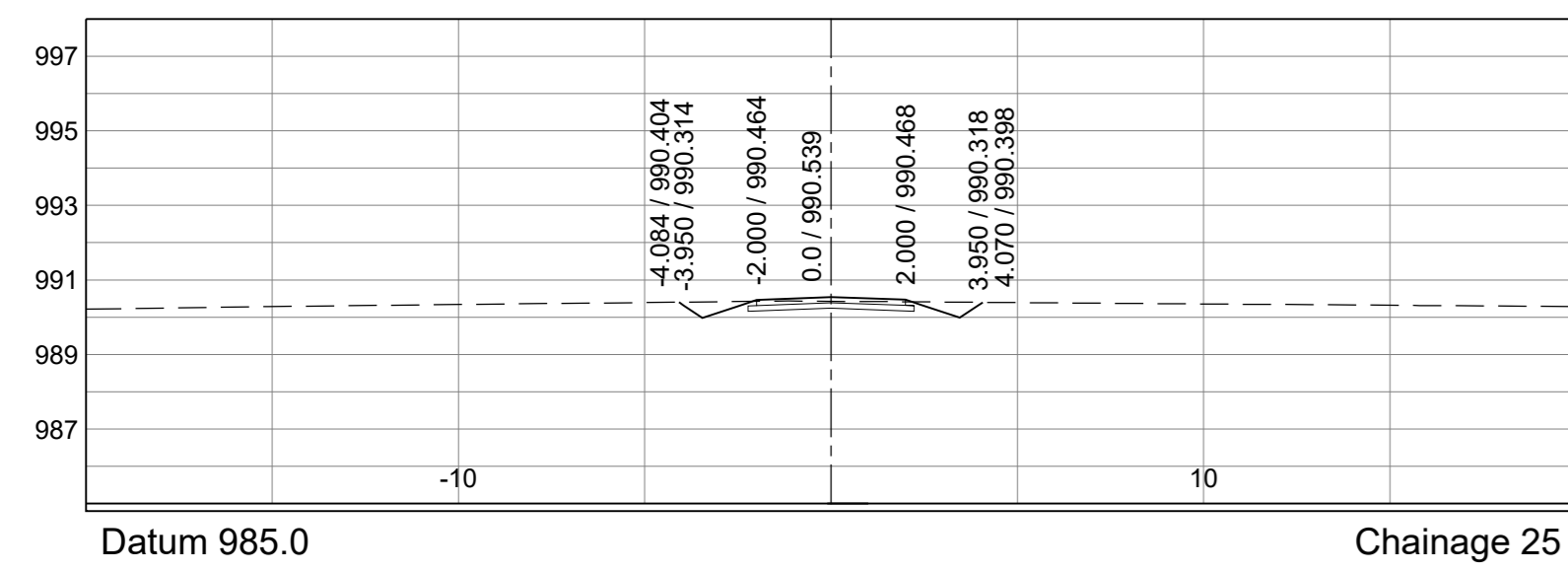
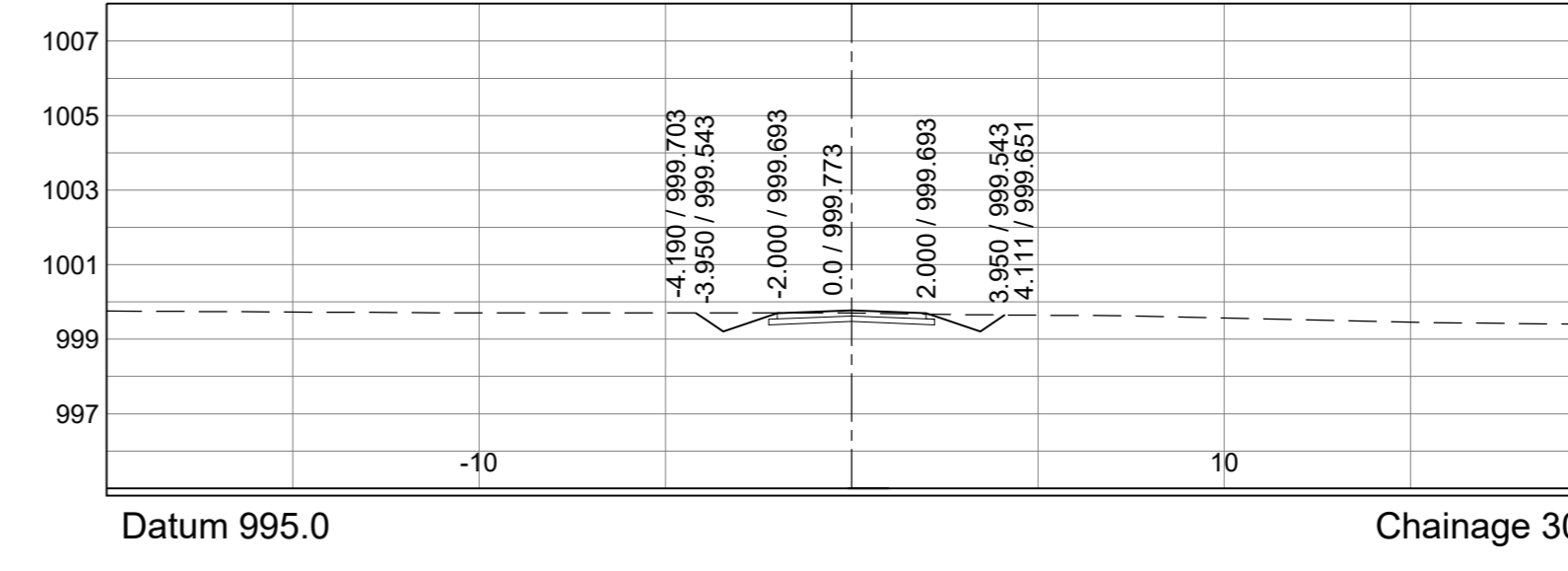
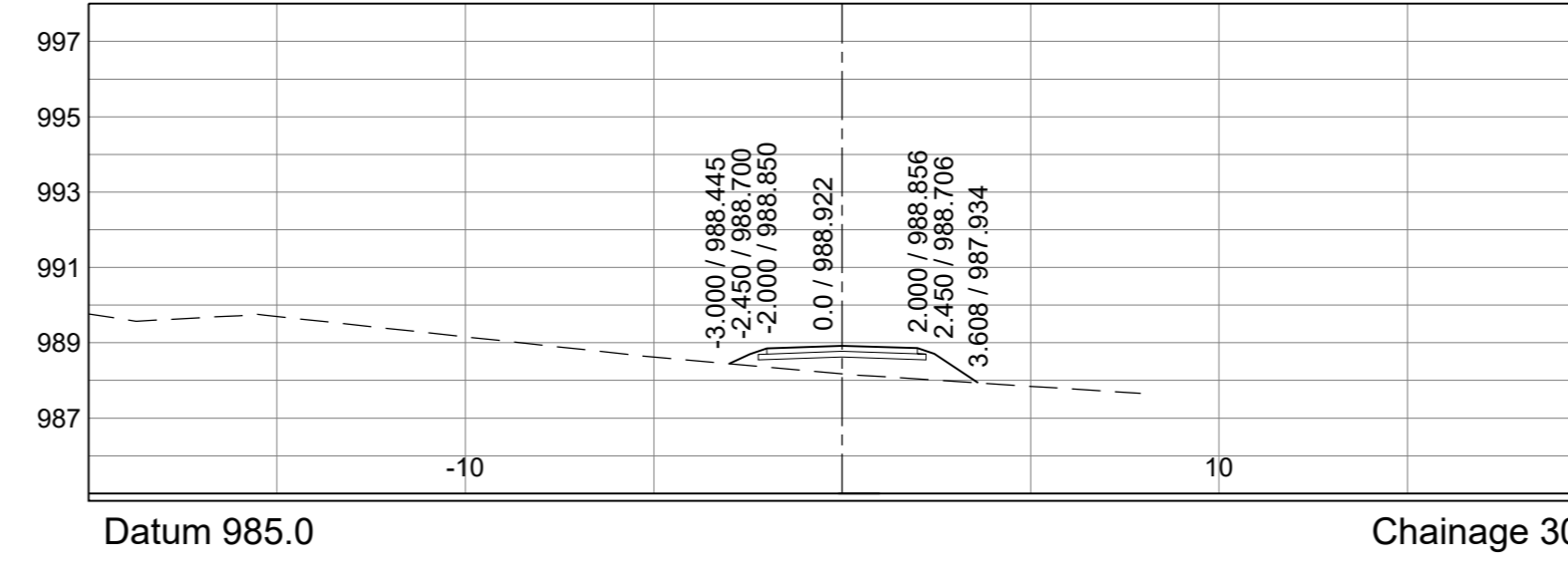
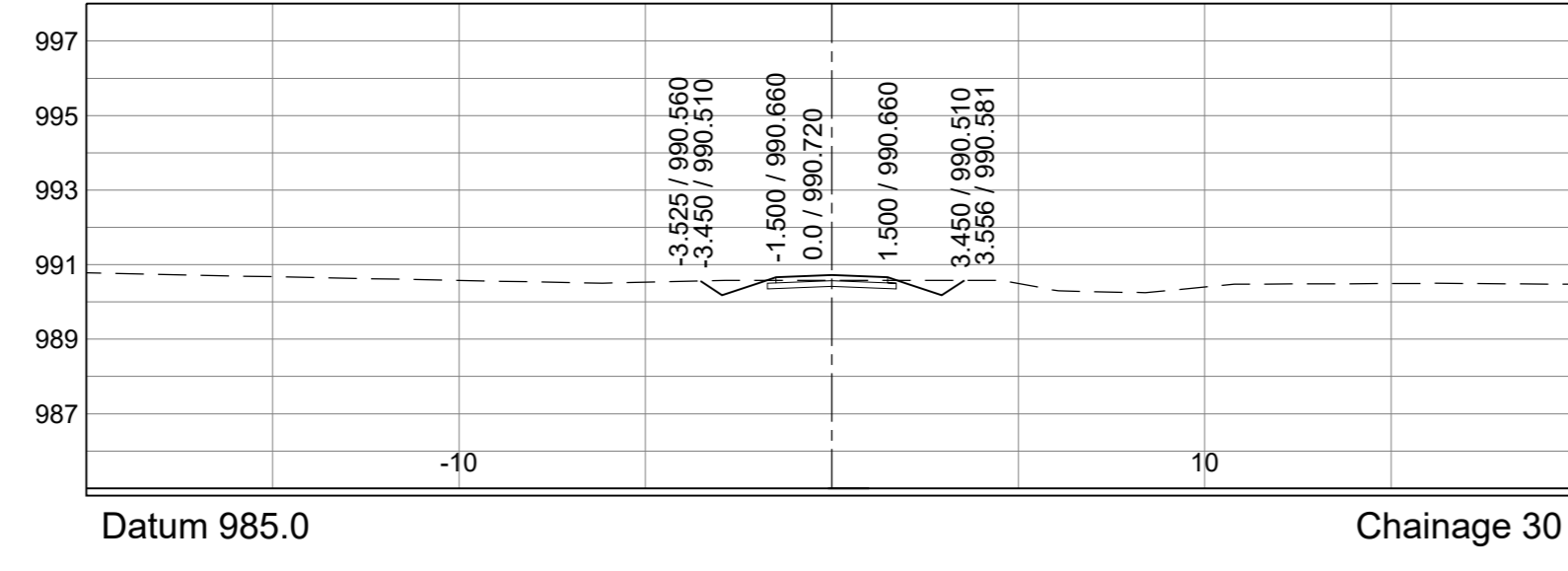
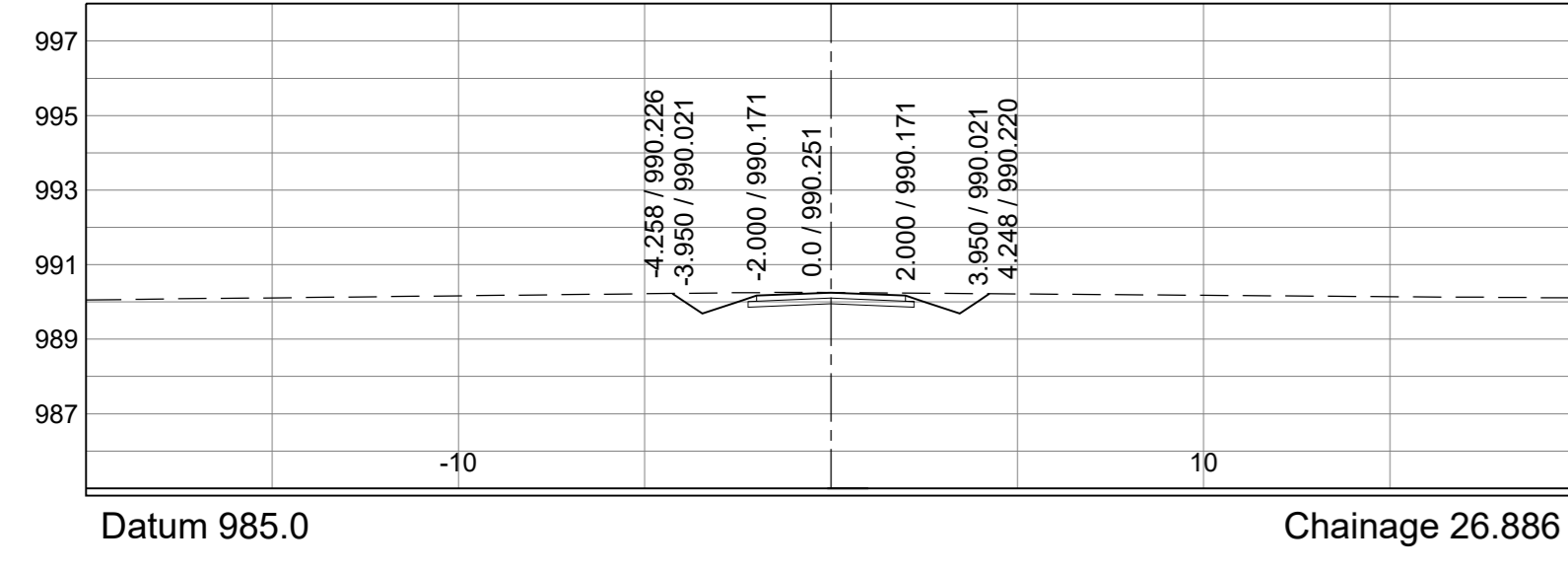
ACCESS @ KM 14+846.437 LHS



ACCESS @ KM 15+229.186 LHS



ACCESS @ KM 14+605.325 RHS



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Date: 01-02-2024

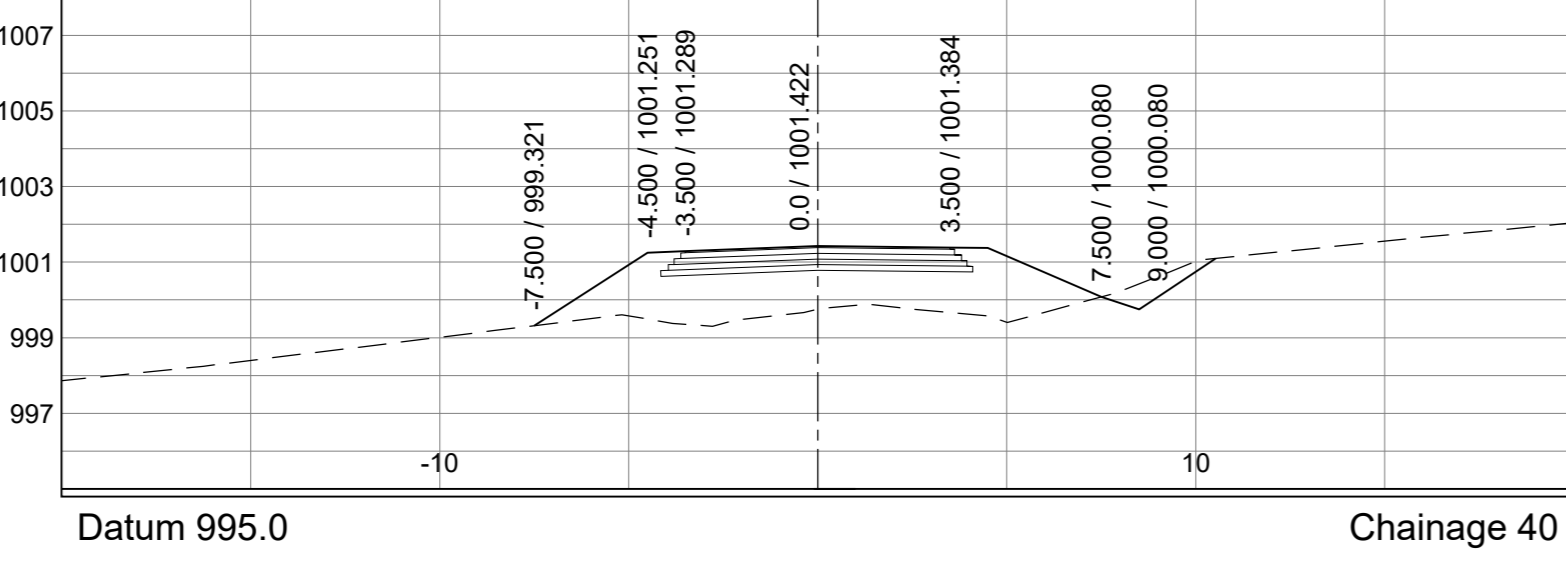
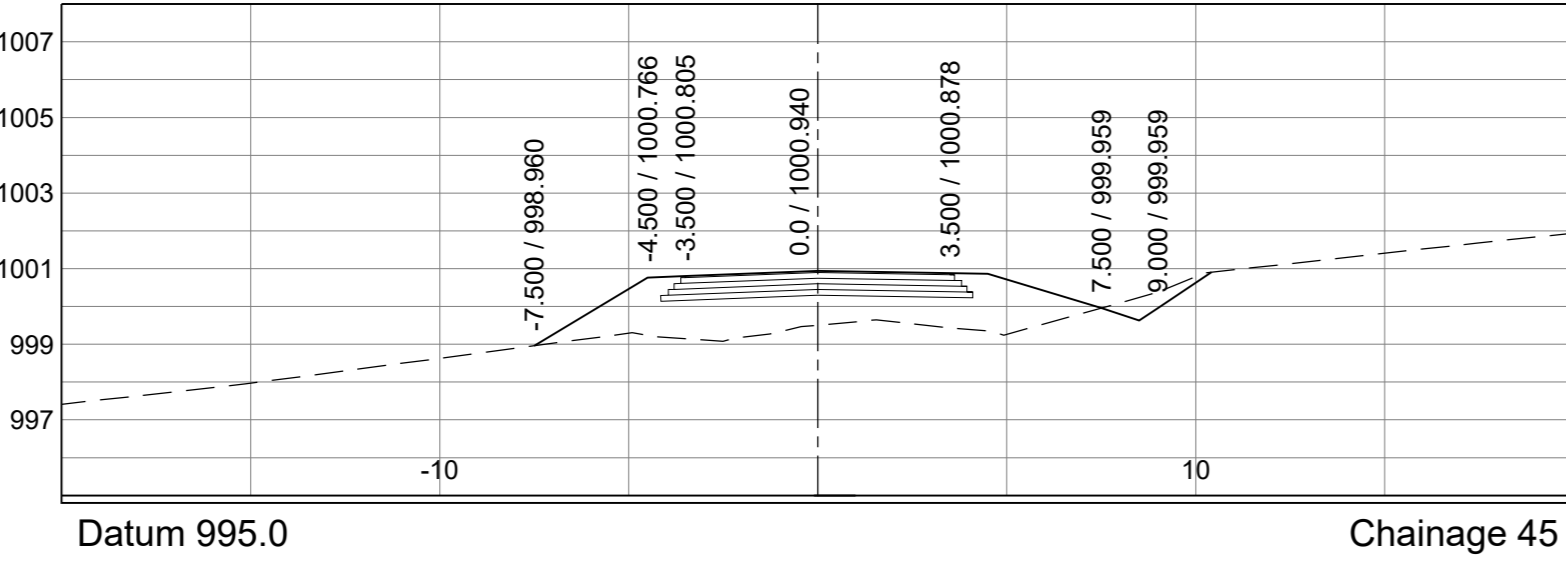
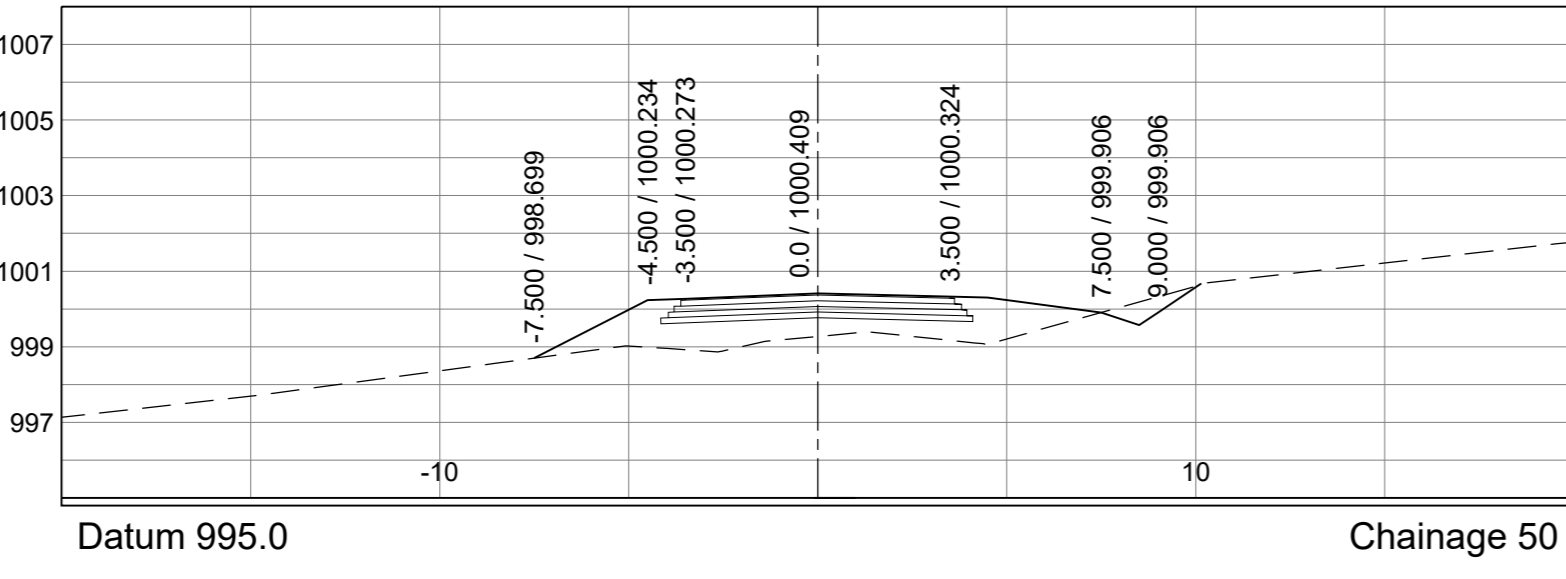
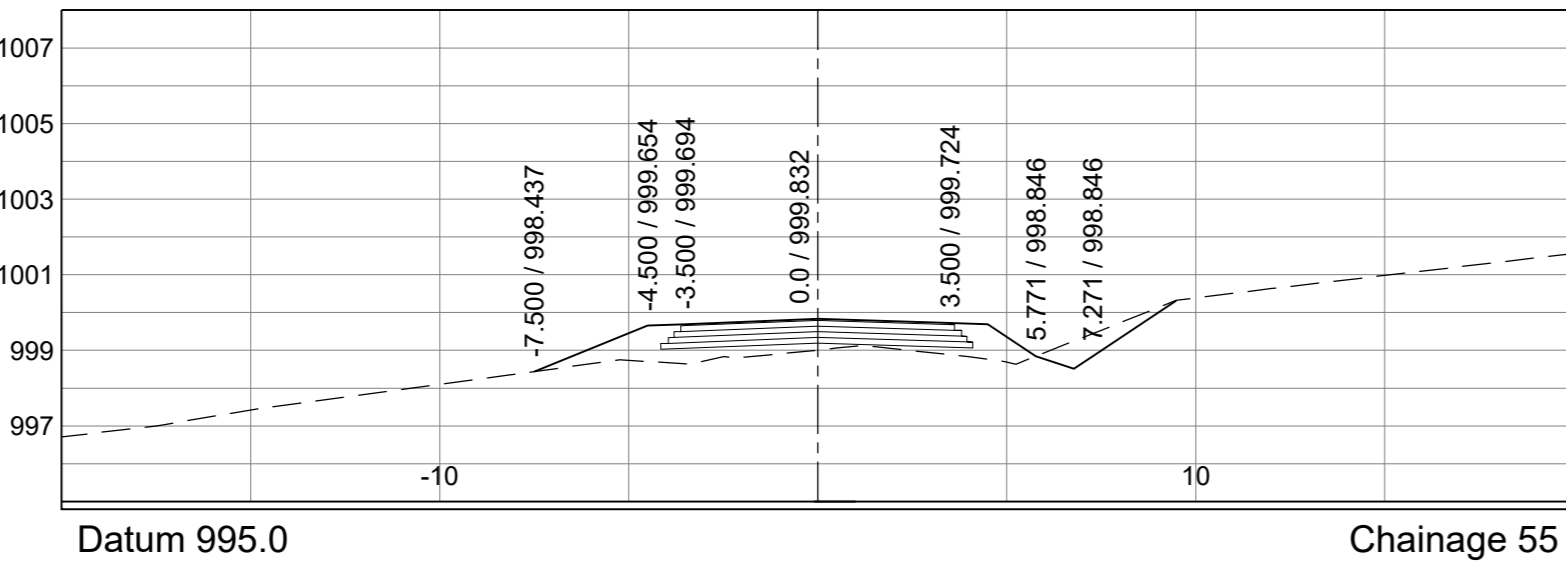
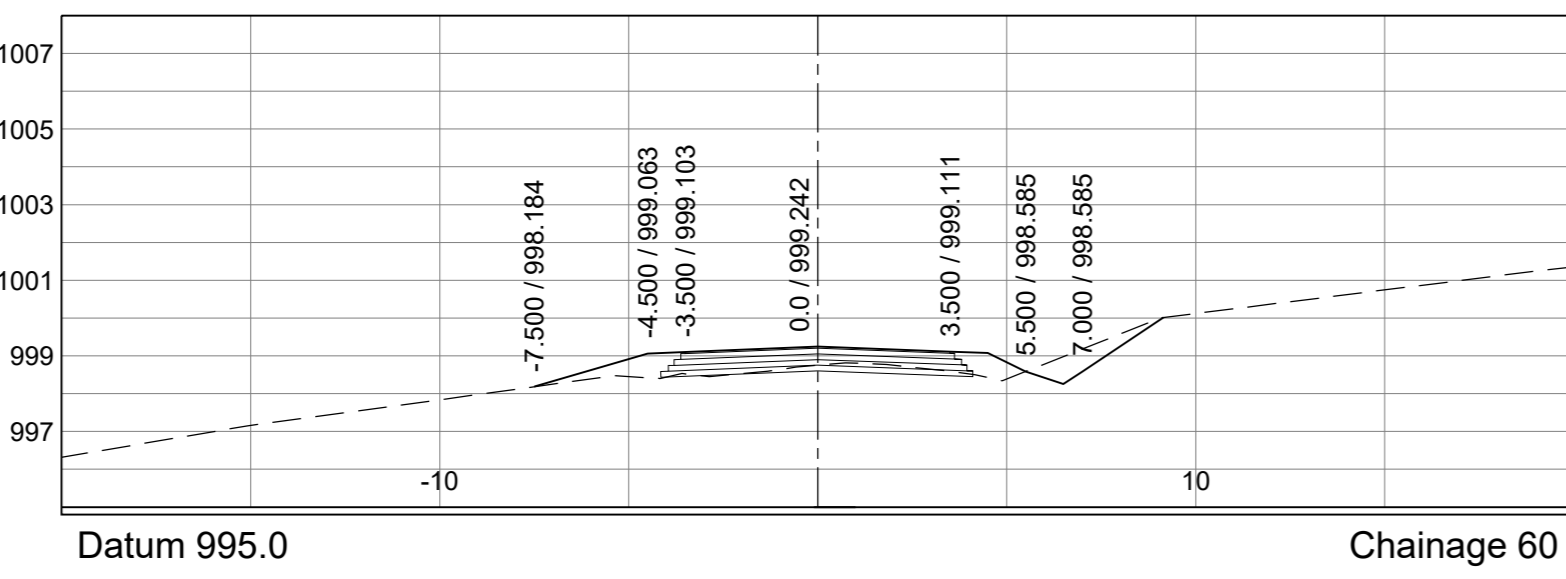
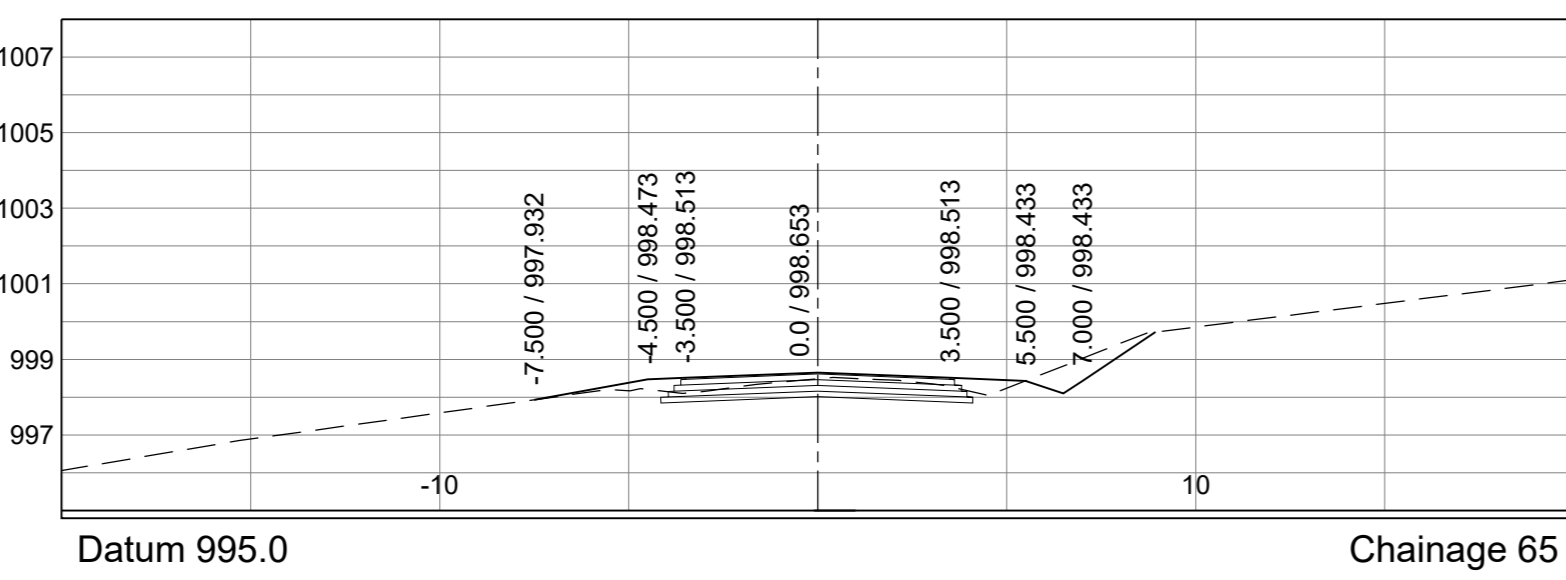
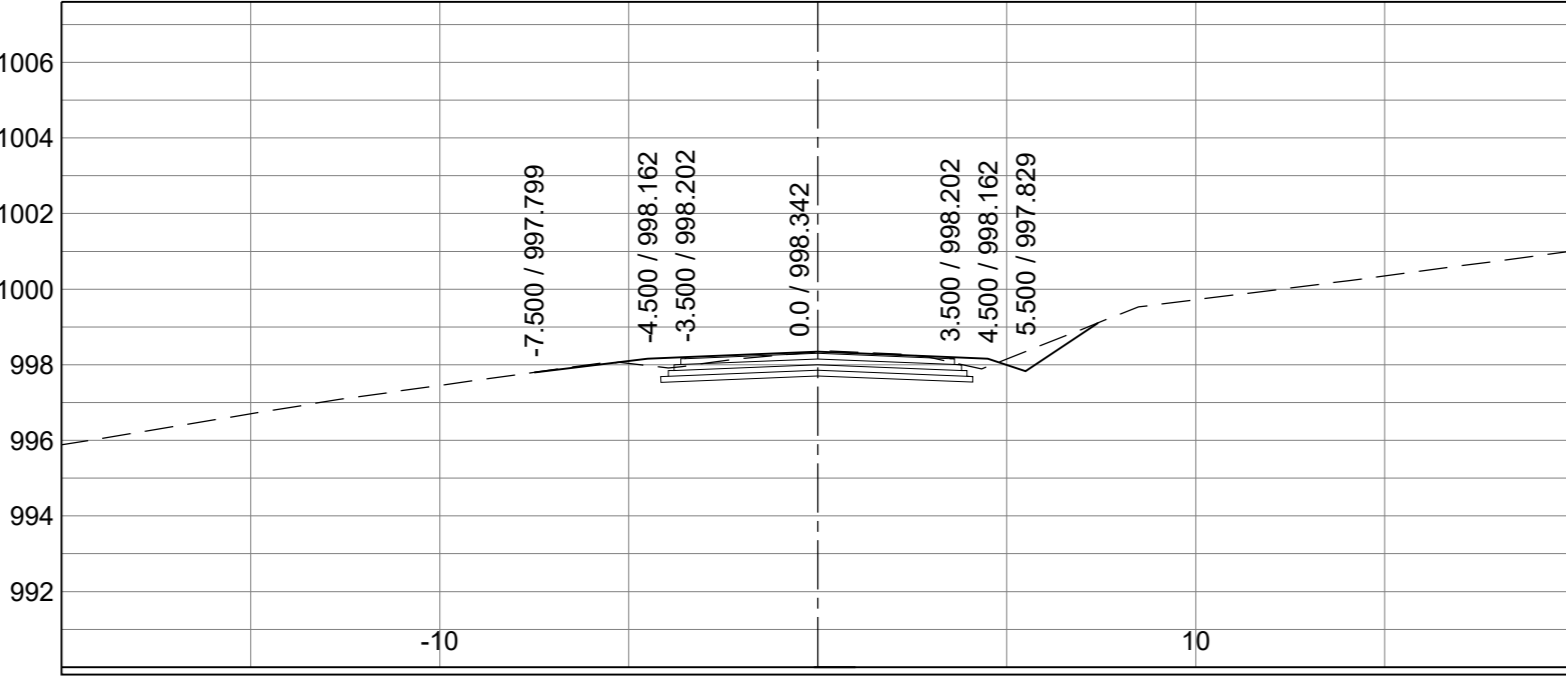
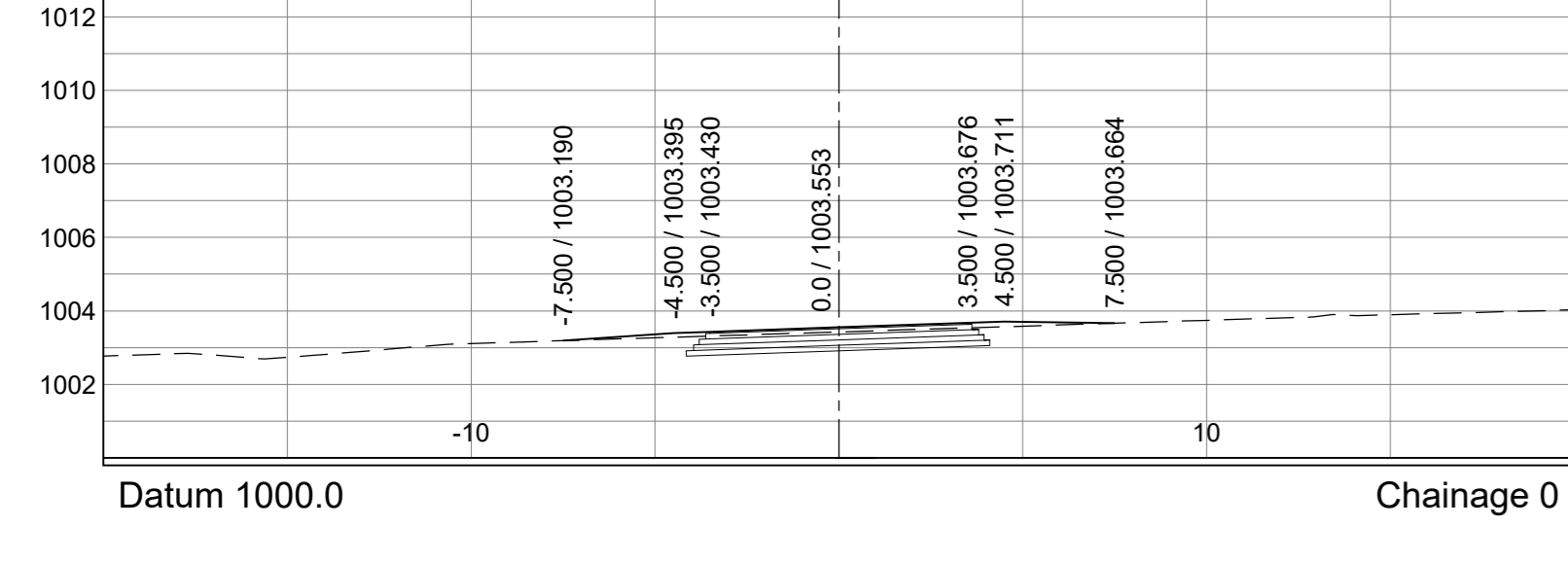
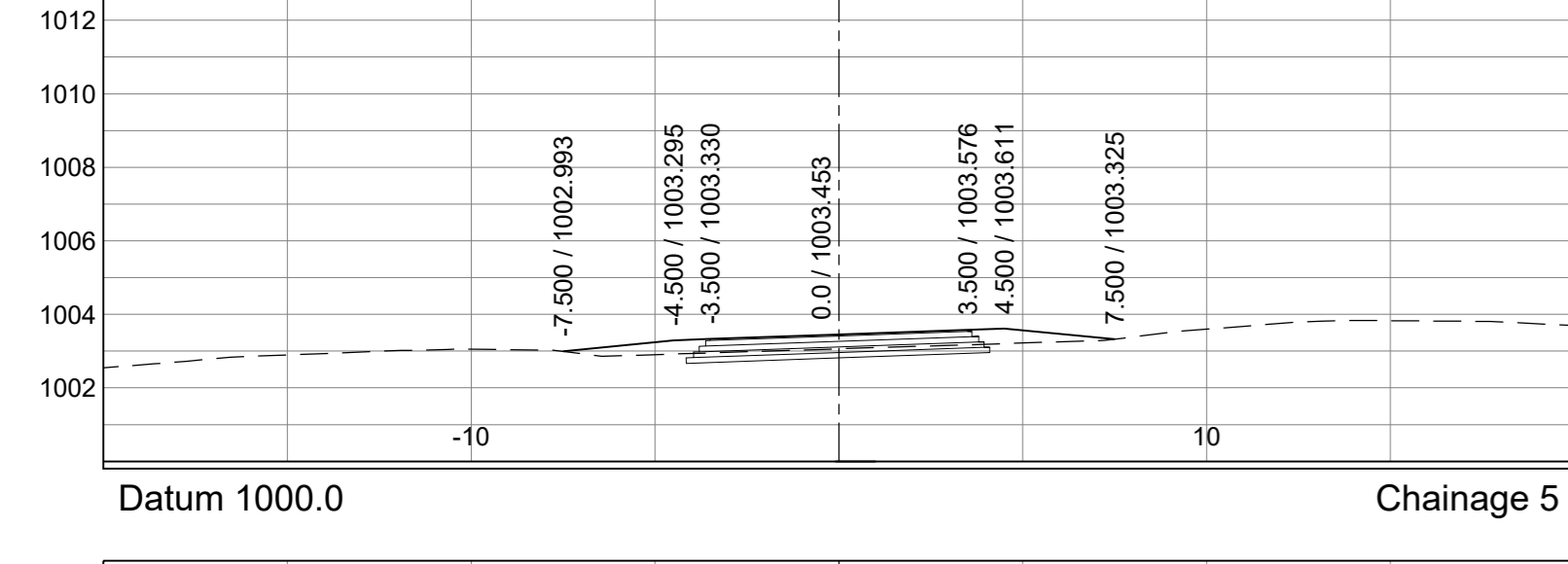
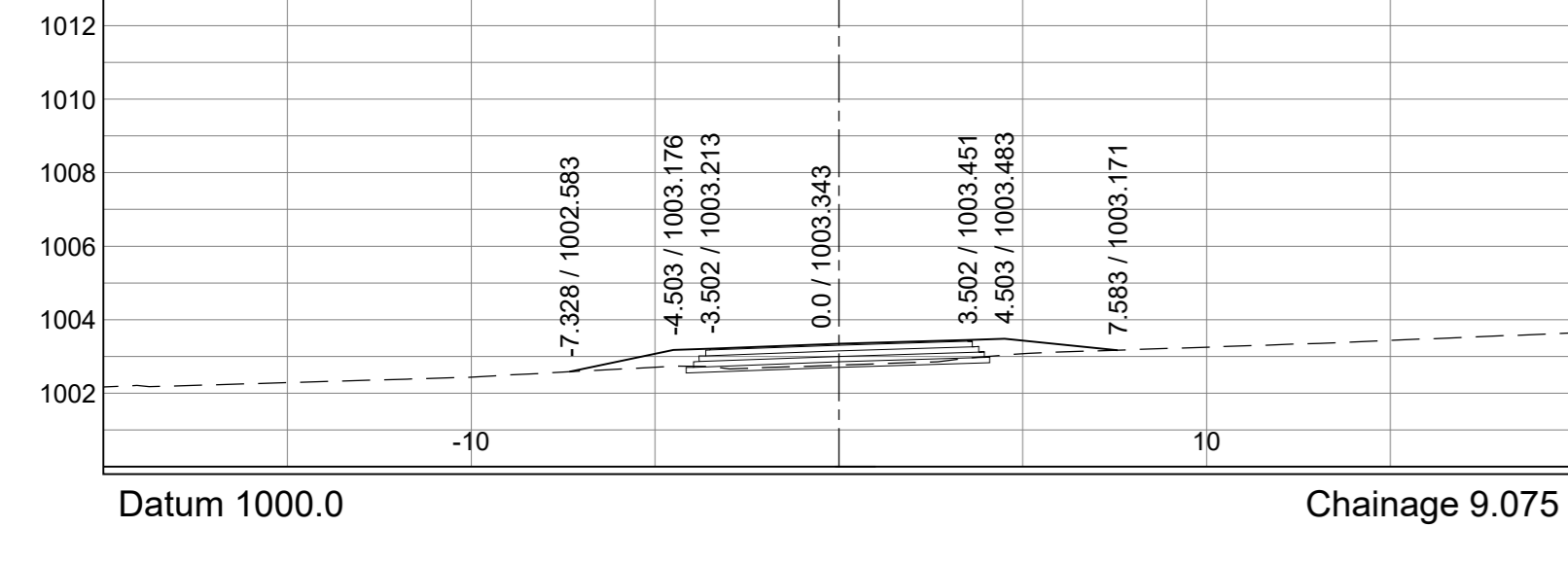
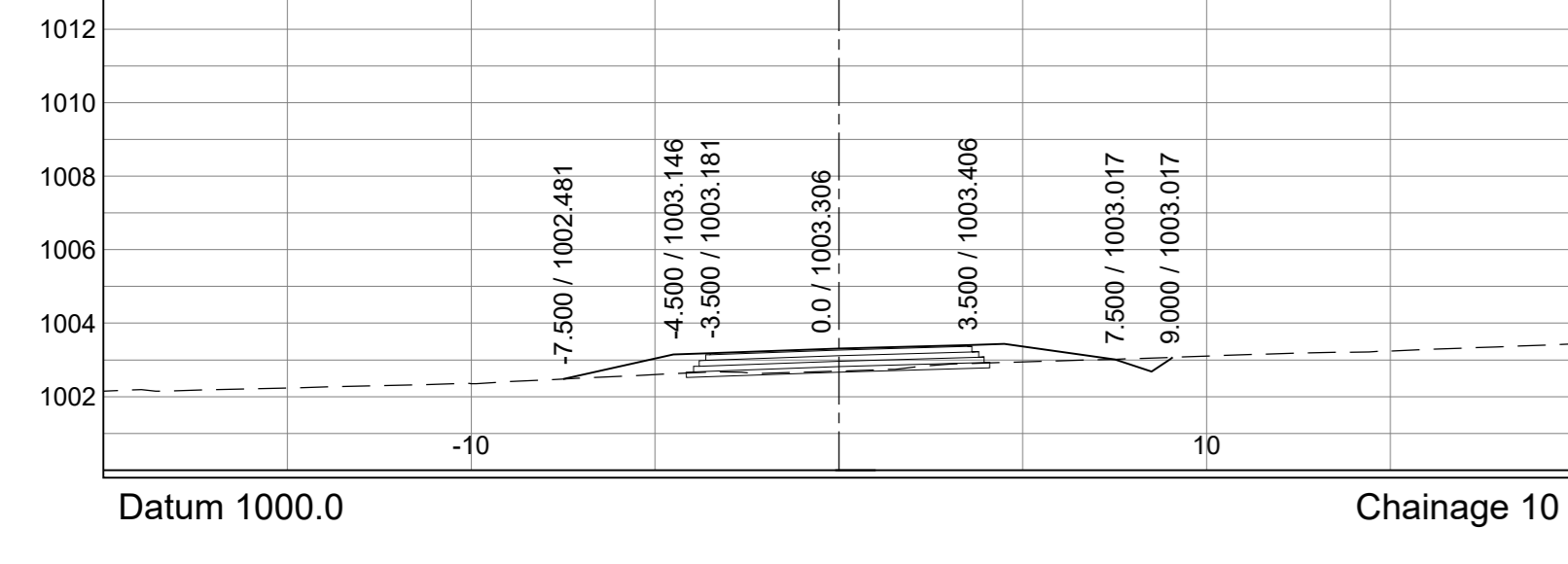
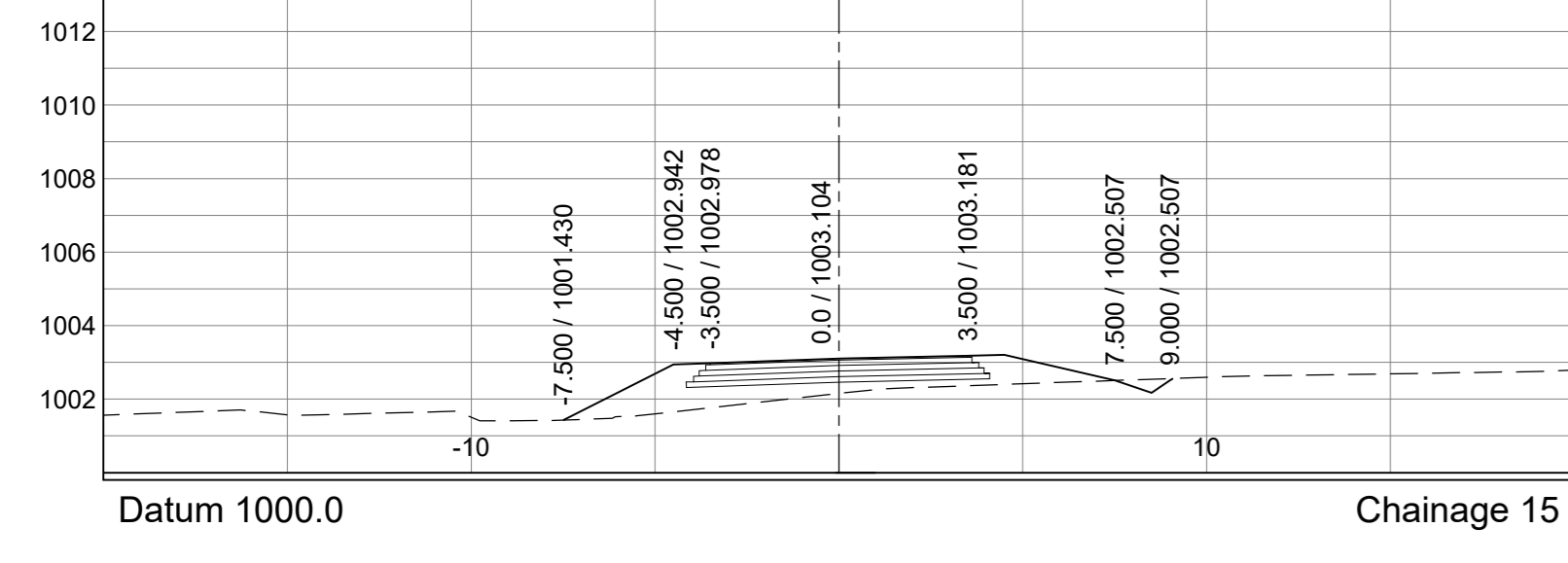
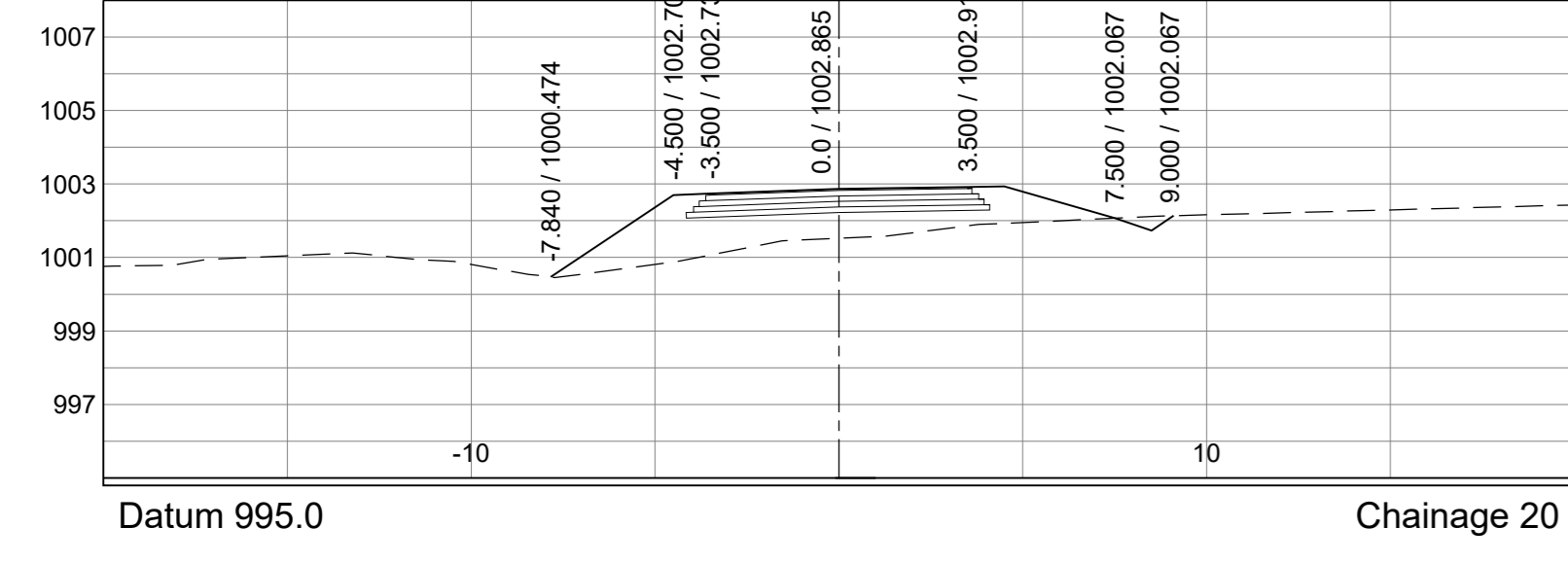
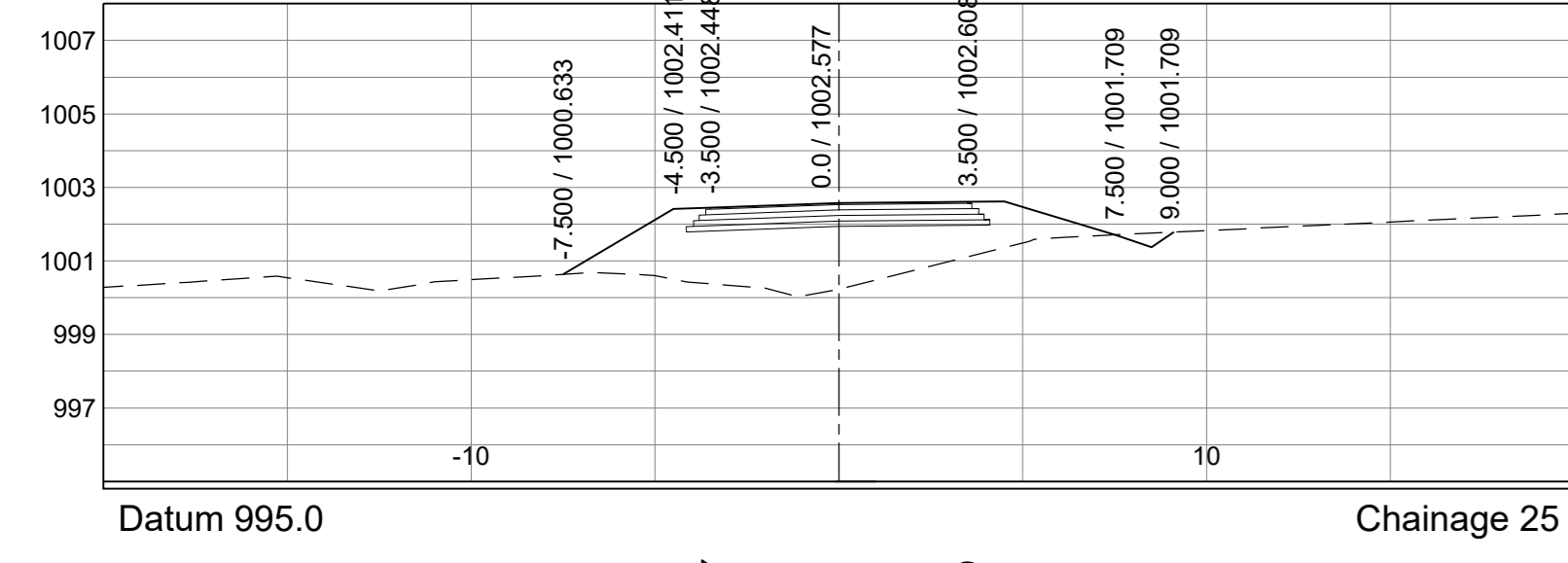
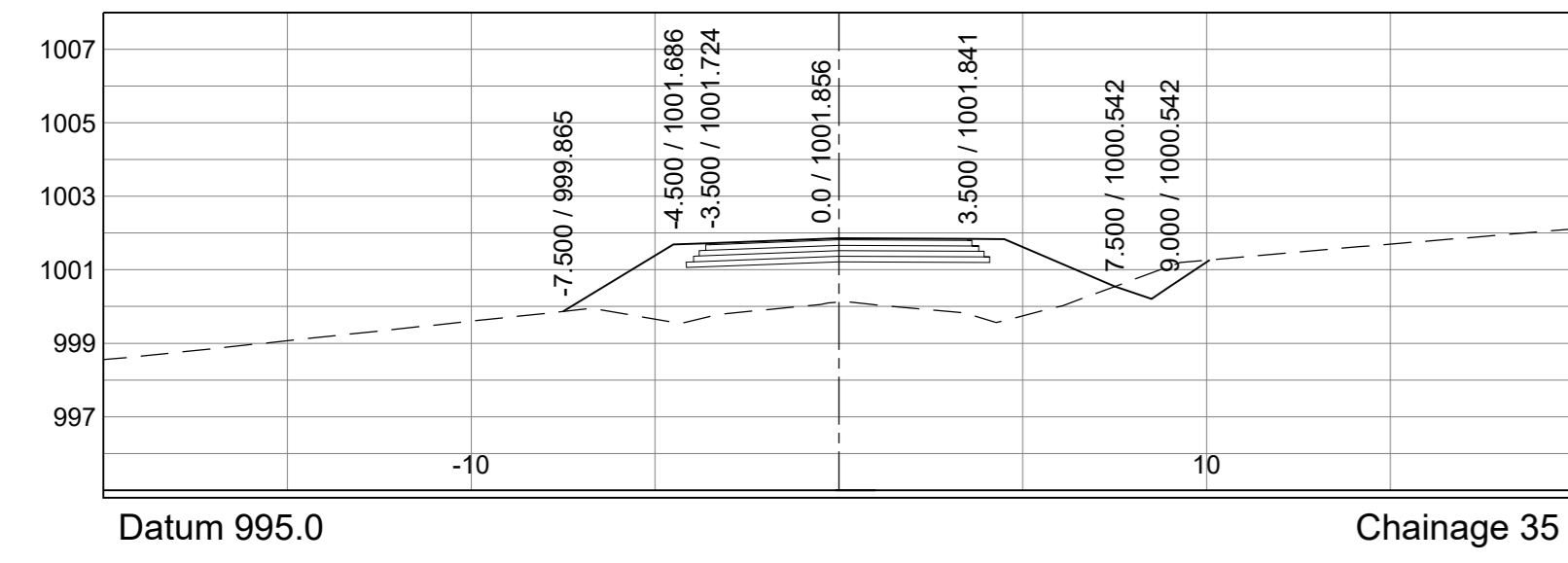
MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 ACCESS ROADS CROSS SECTIONS

Staked km distance	Sheet - 7	REVISION:
km 0+000 - km 0+208.588	of - 14	A
km 0+000 - km 0+334.256	Plan No -	
km 0+000 - km 0+334.635	Scale	
km 0+000 - km 0+334.446	Vertical Scale 1 : 200	
	Horizontal Scale 1 : 200	

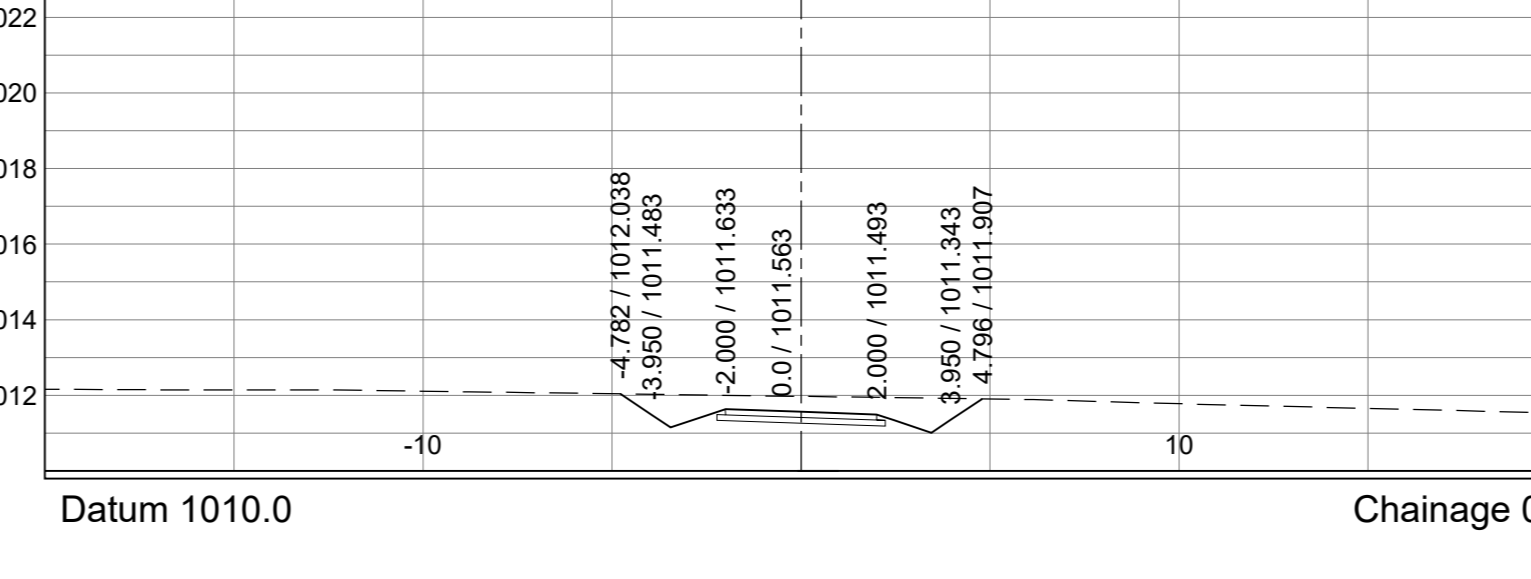
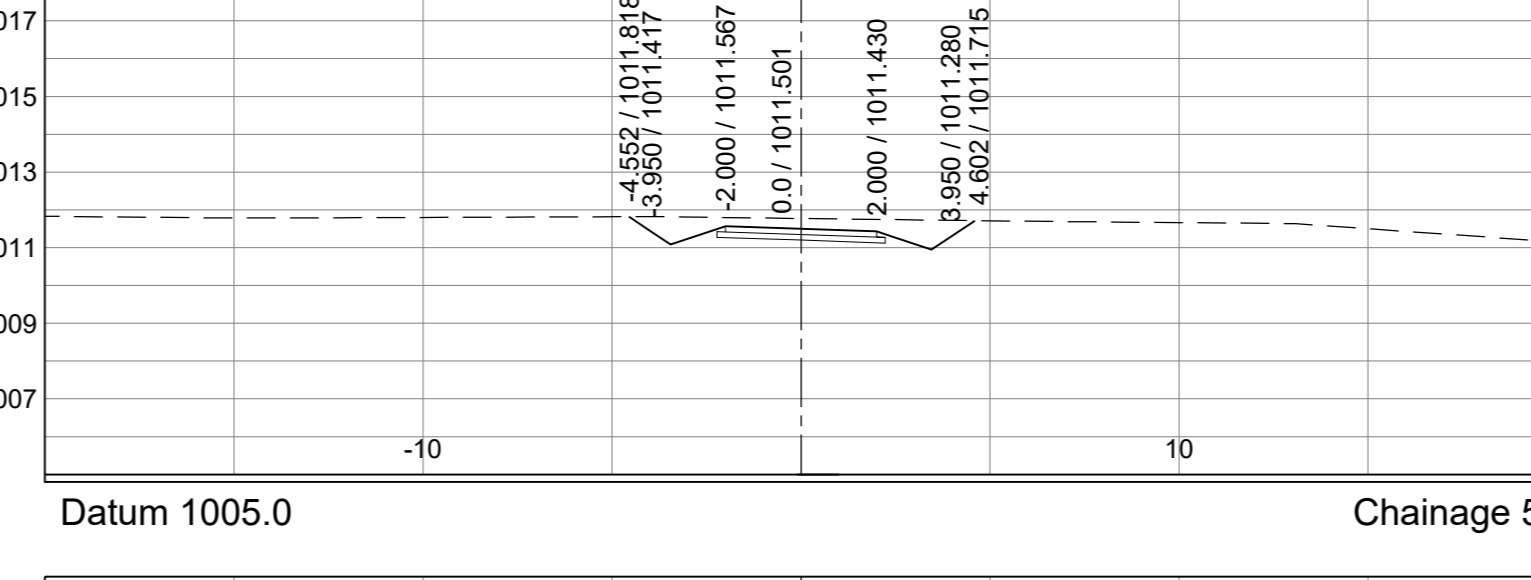
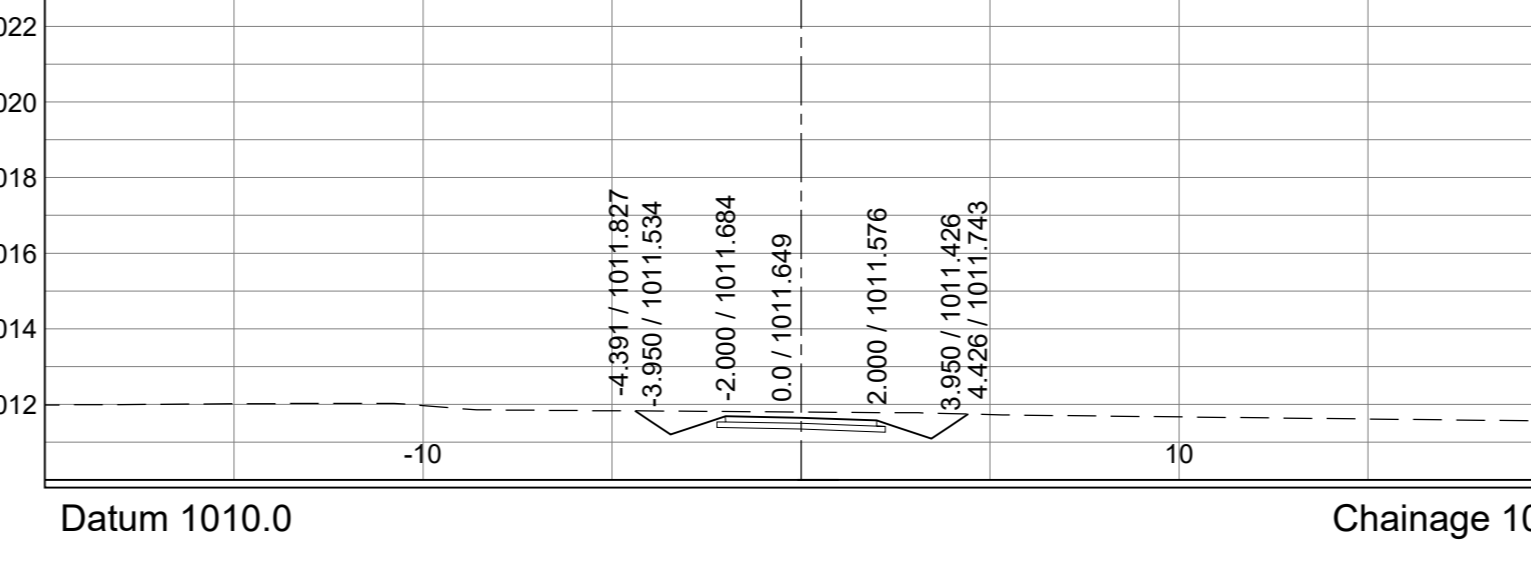
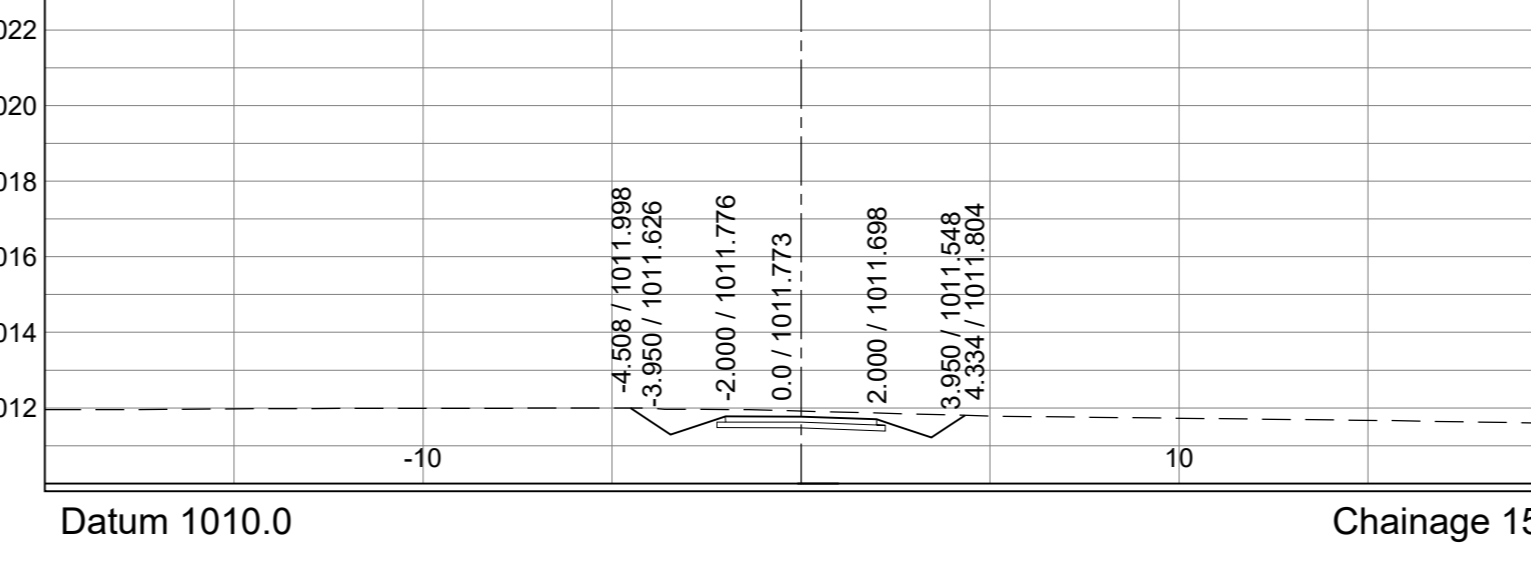
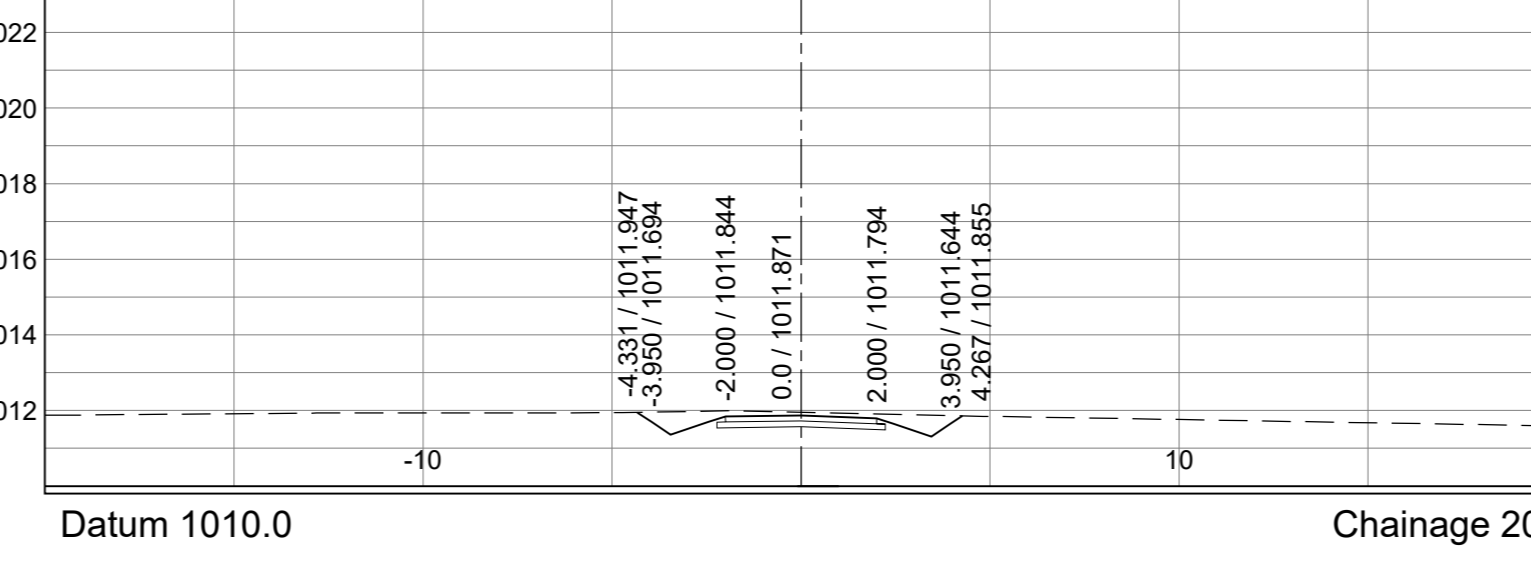
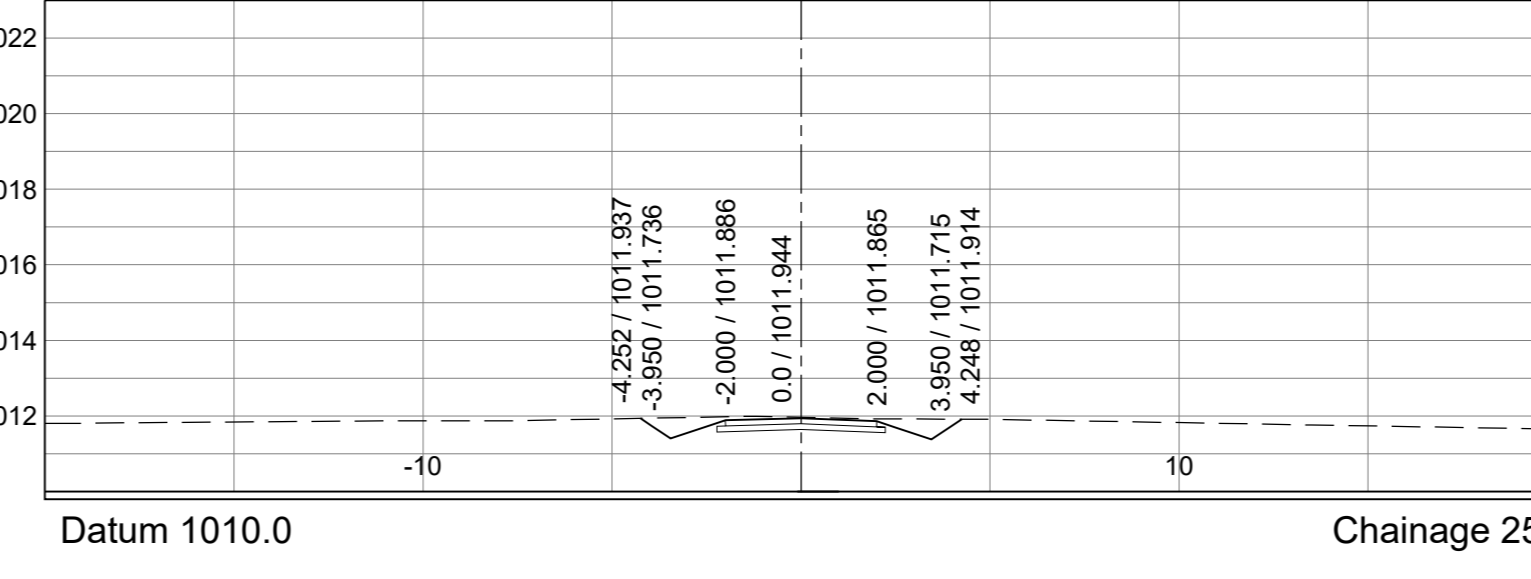
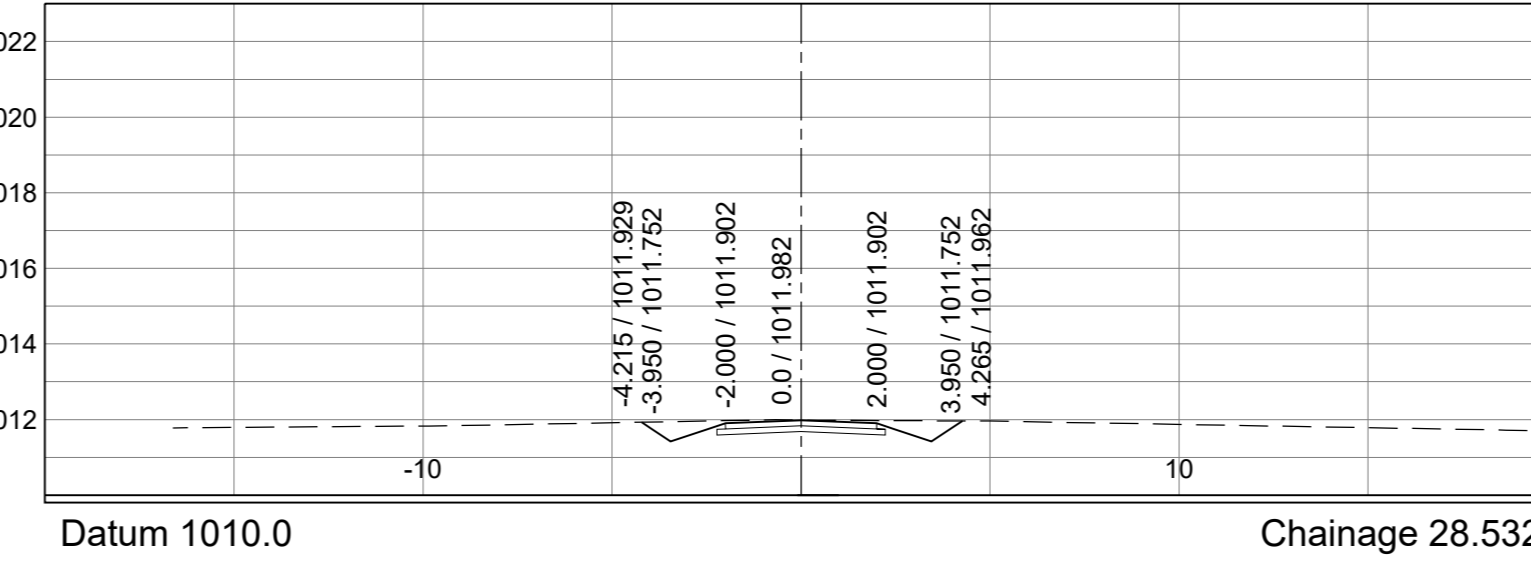
C 46550



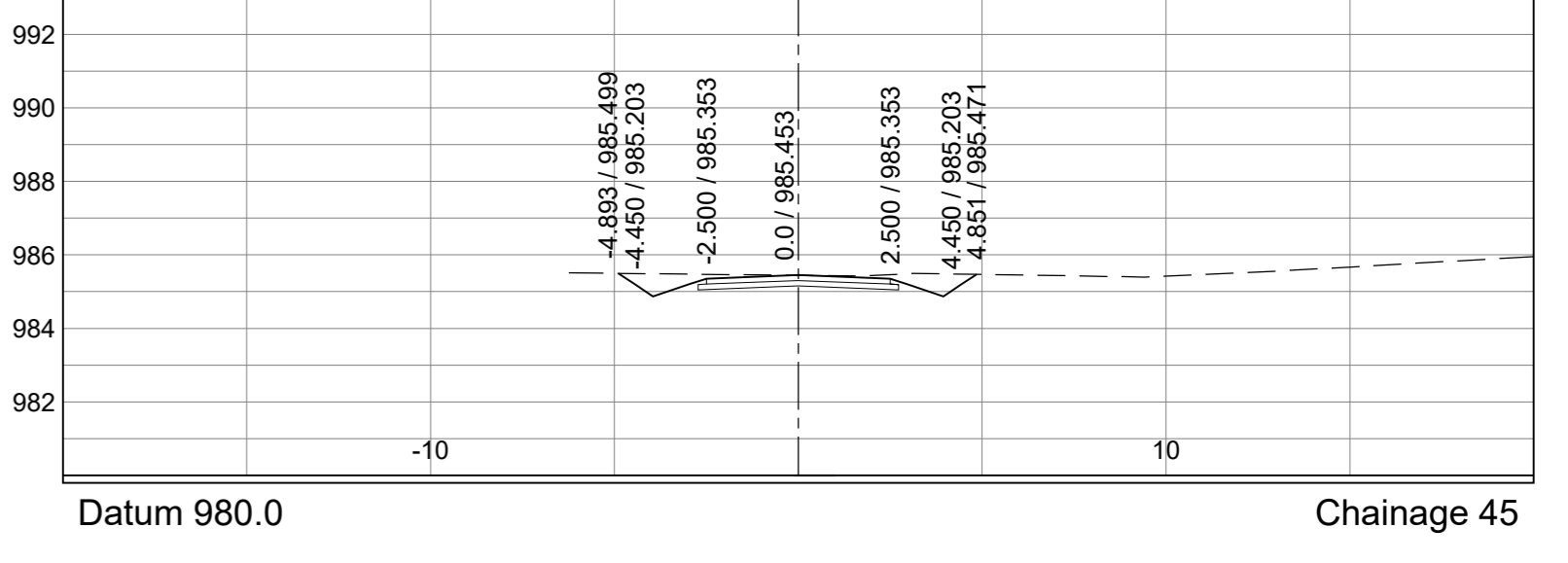
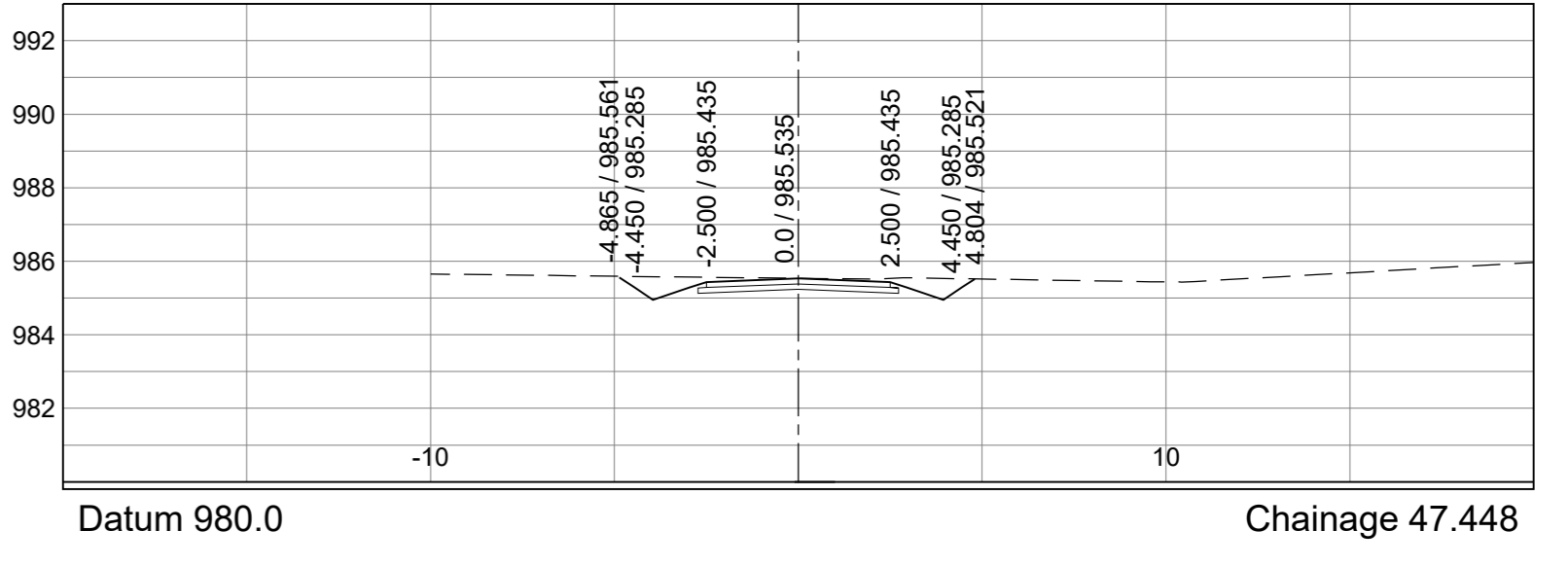
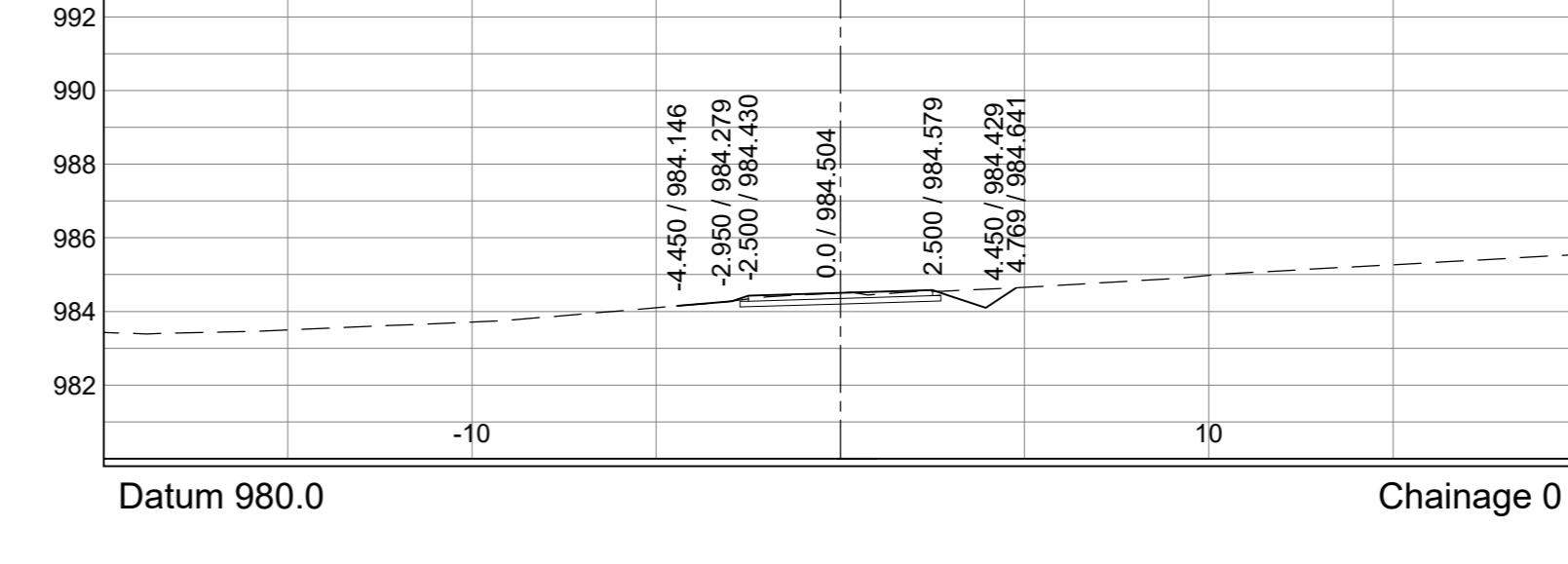
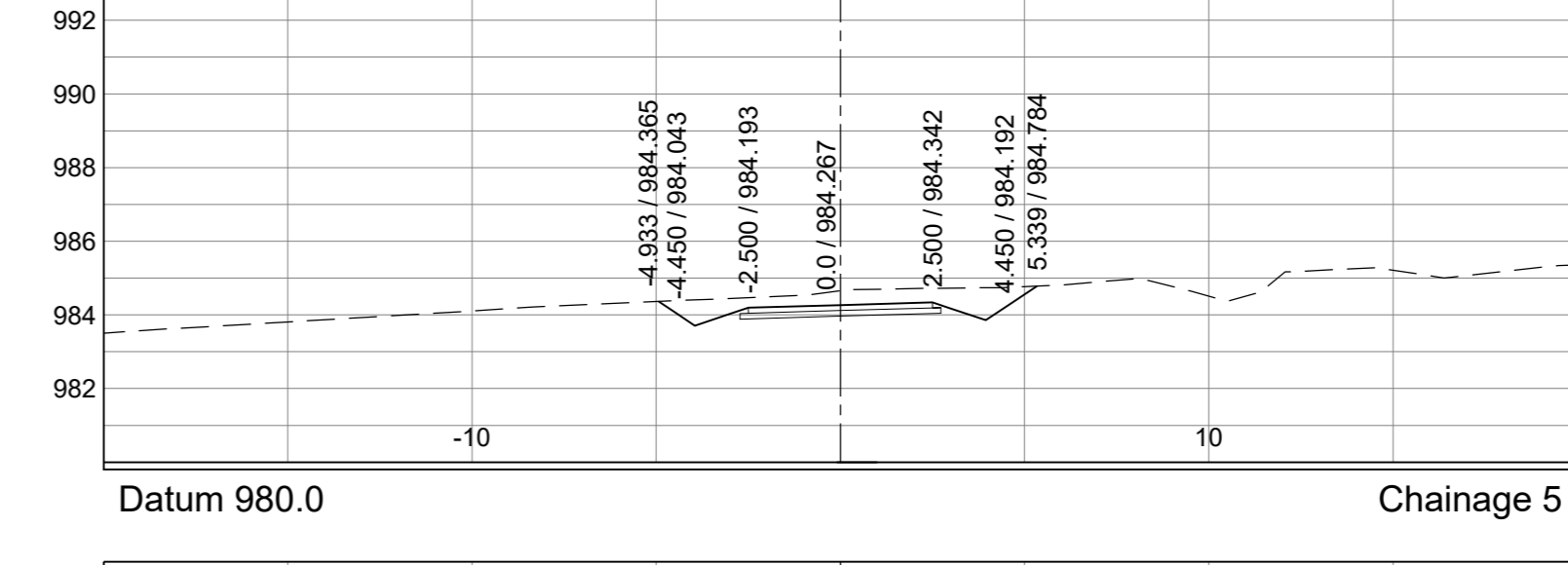
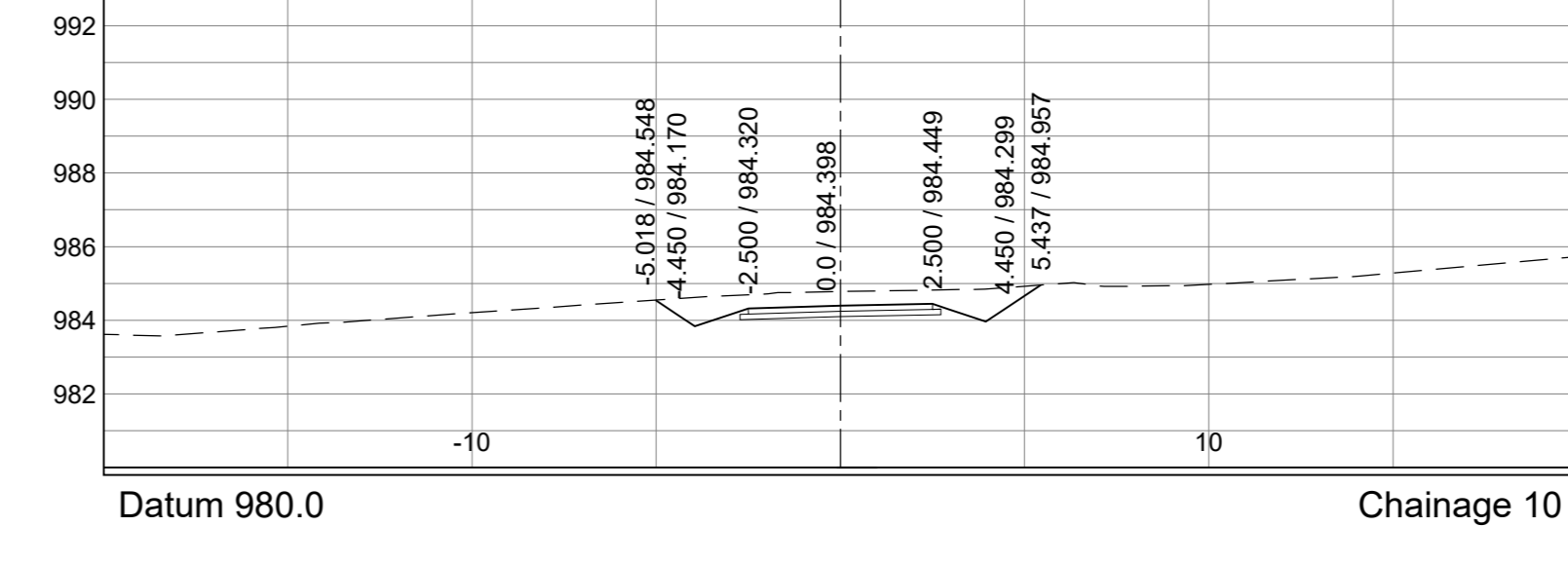
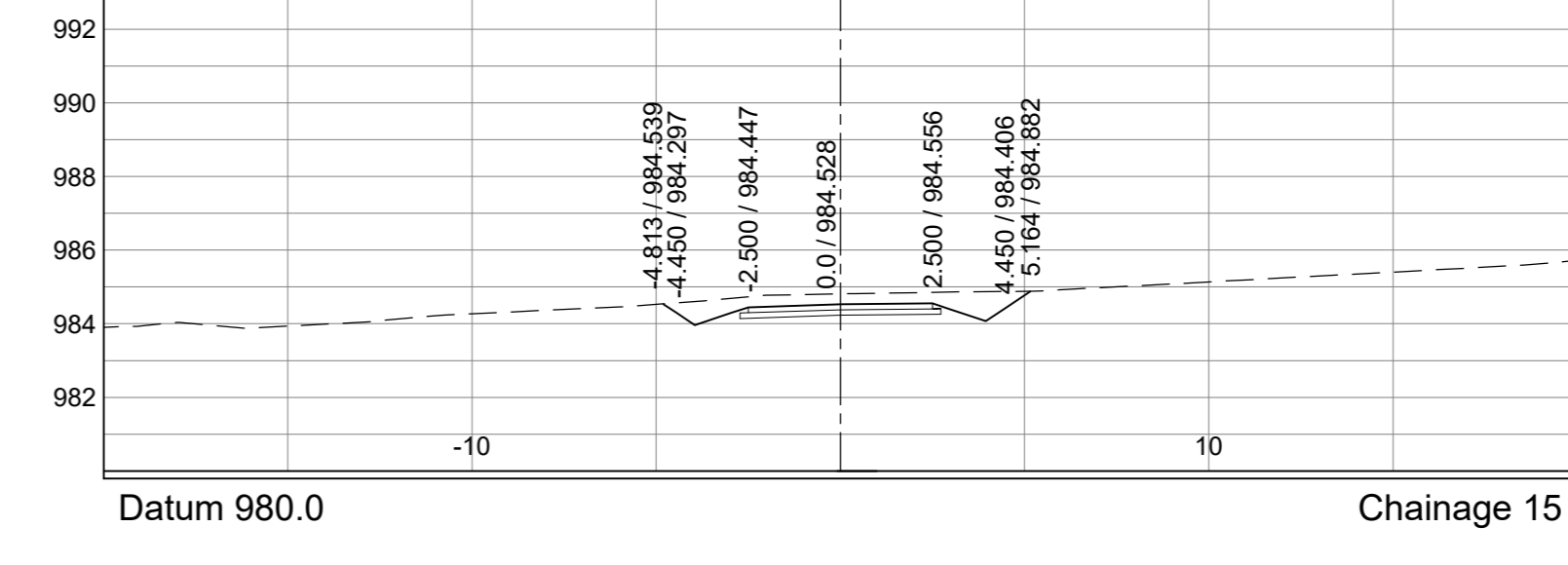
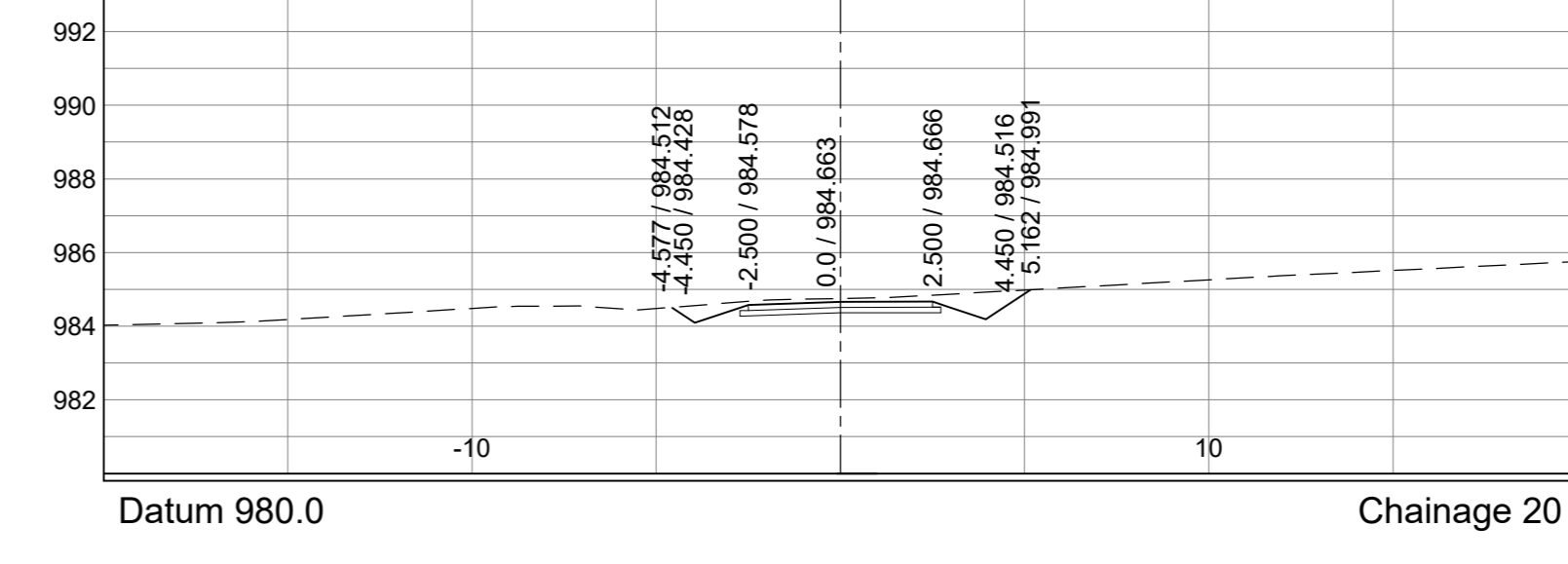
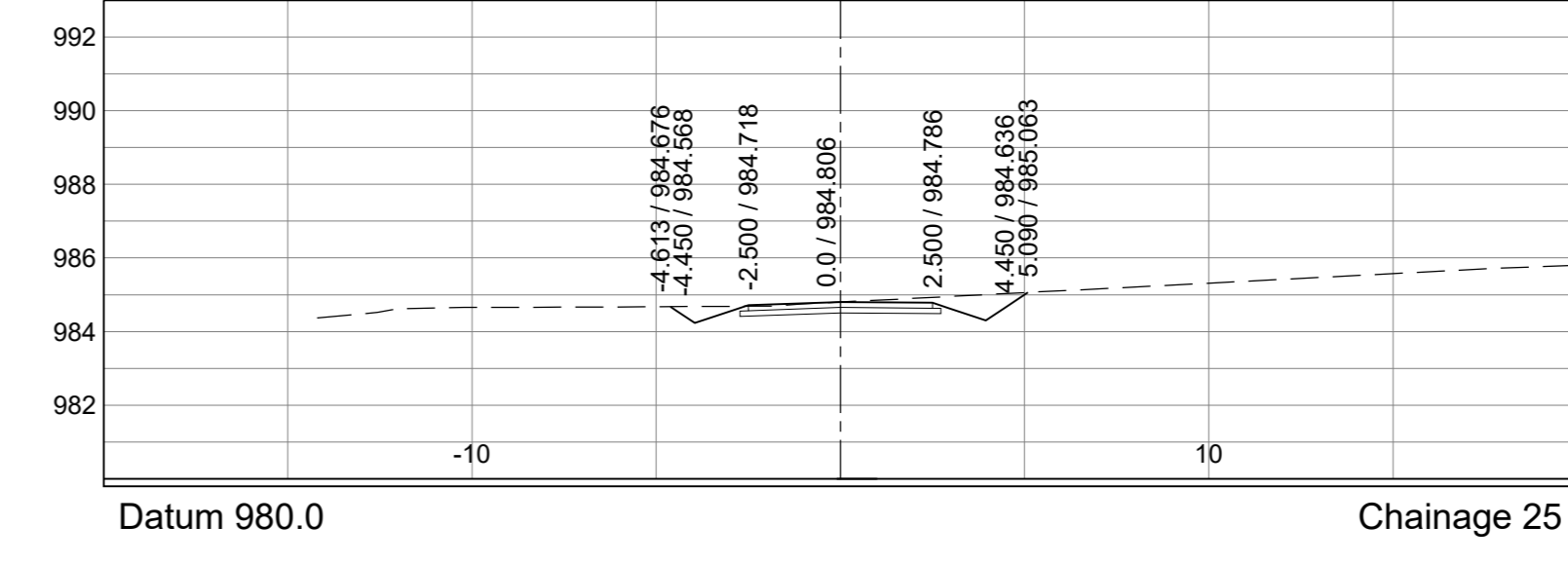
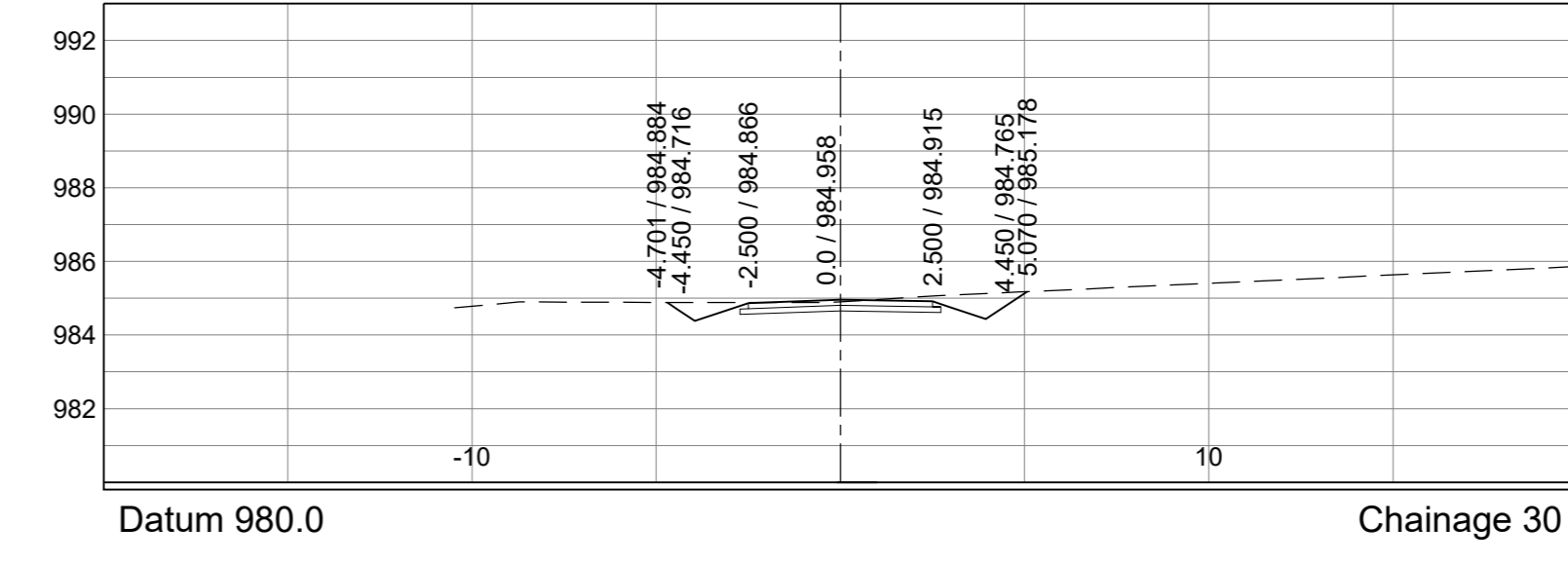
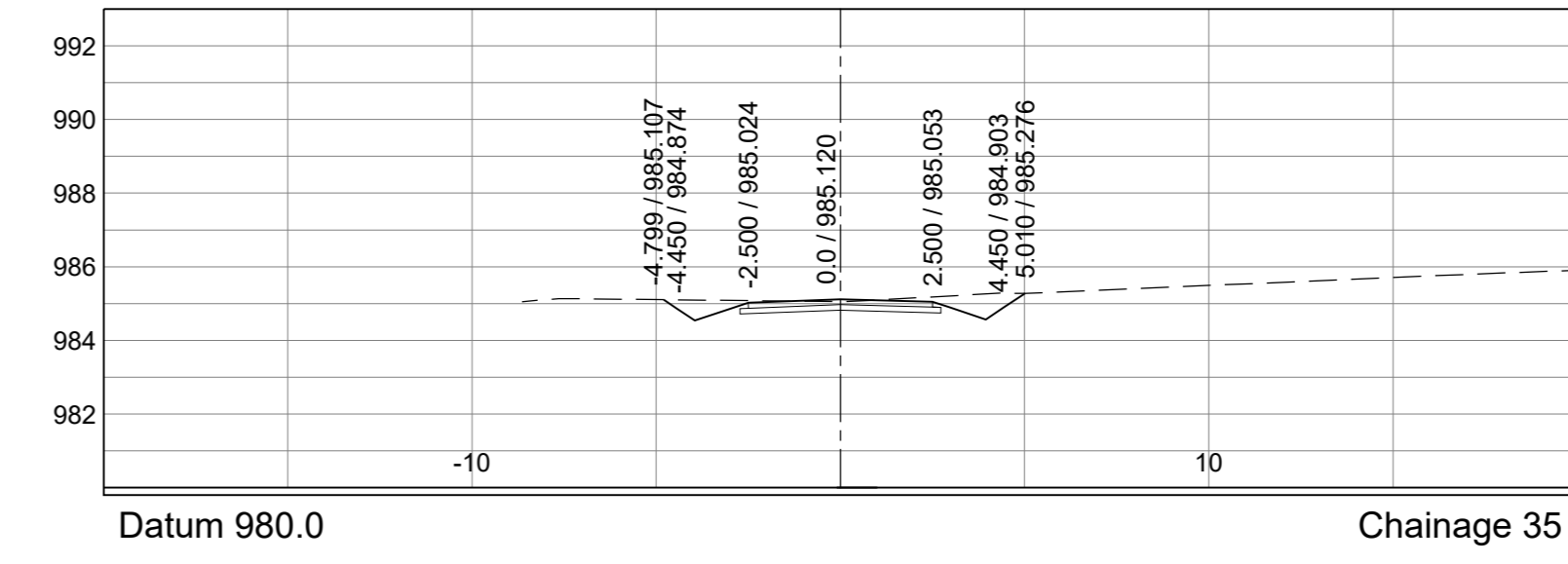
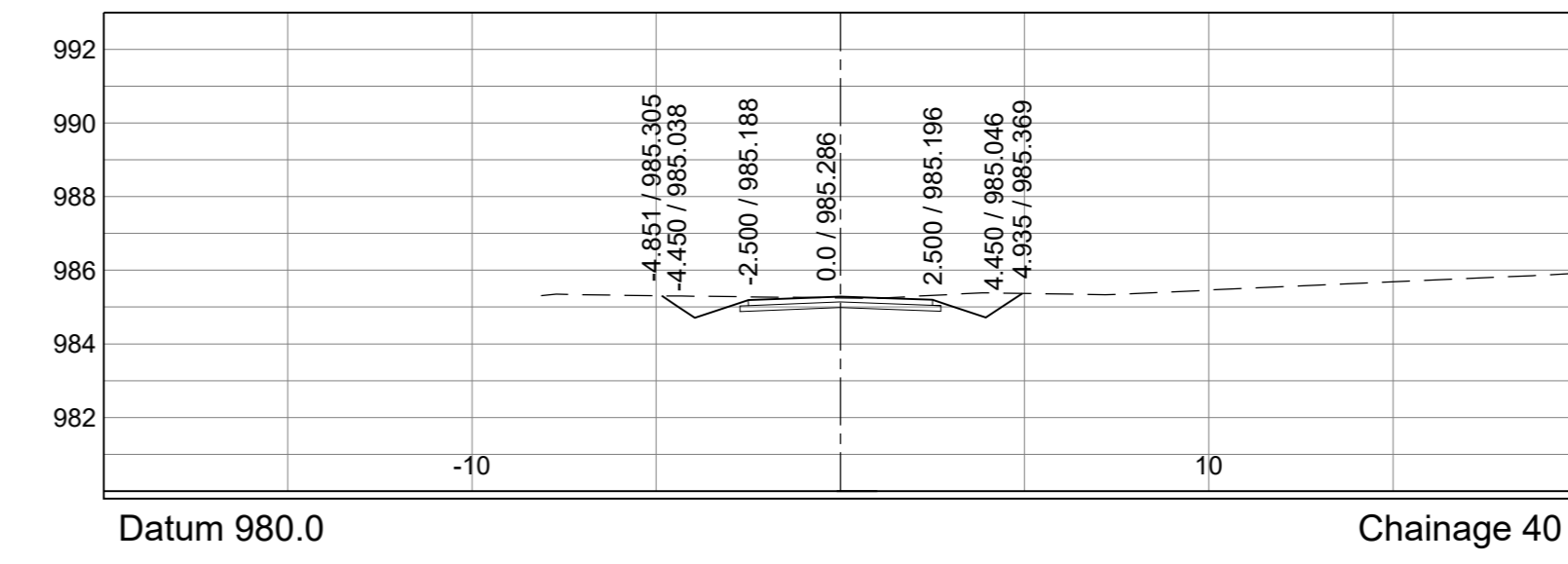
ACCESS @ KM 15+282.378 LHS (D704)



ACCESS @ KM 15+534.811 RHS



ACCESS @ KM 16+311.337 RHS



AS BUILT			
Symbol	Date	Description	Checked / Signed
A	01-02-2024	ISSUED FOR TENDER	YD
AMENDMENTS			

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



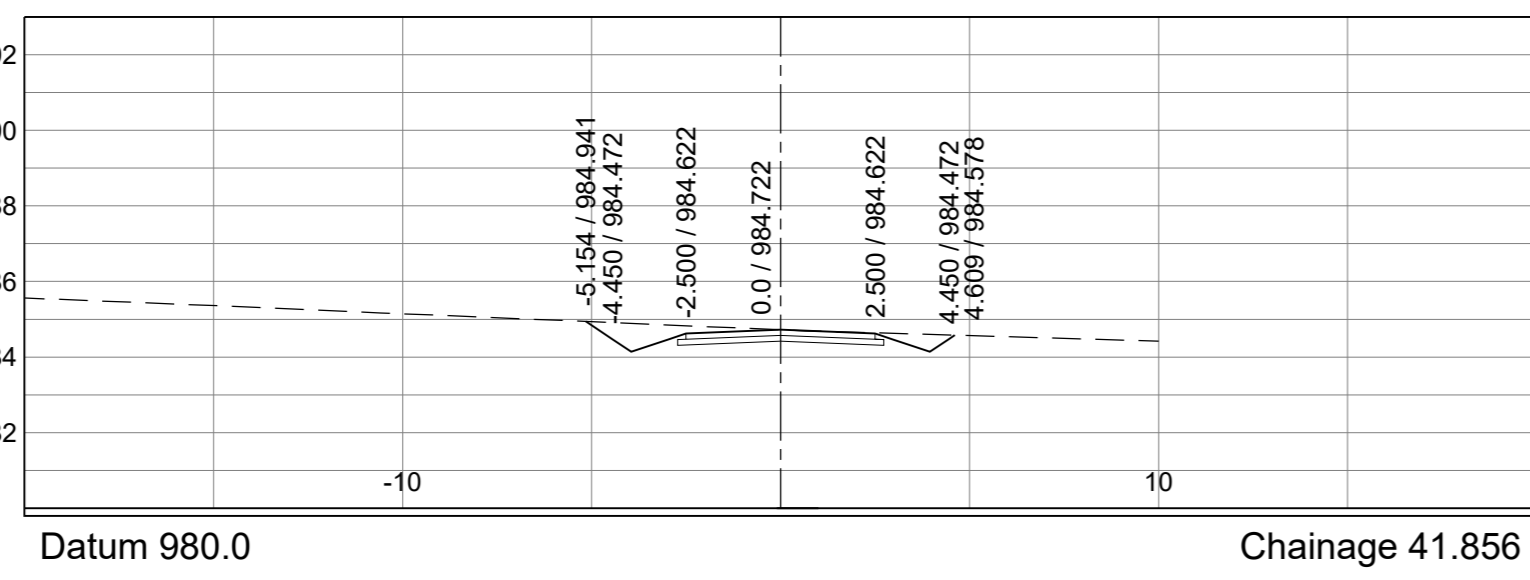
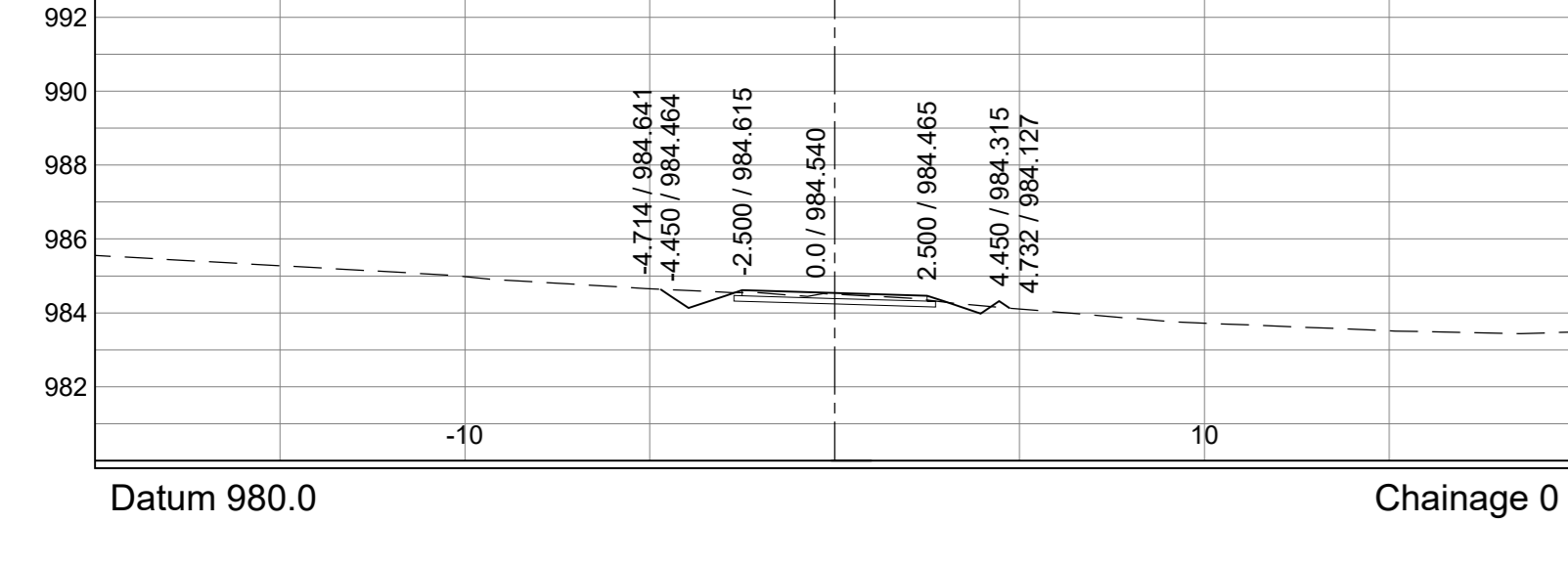
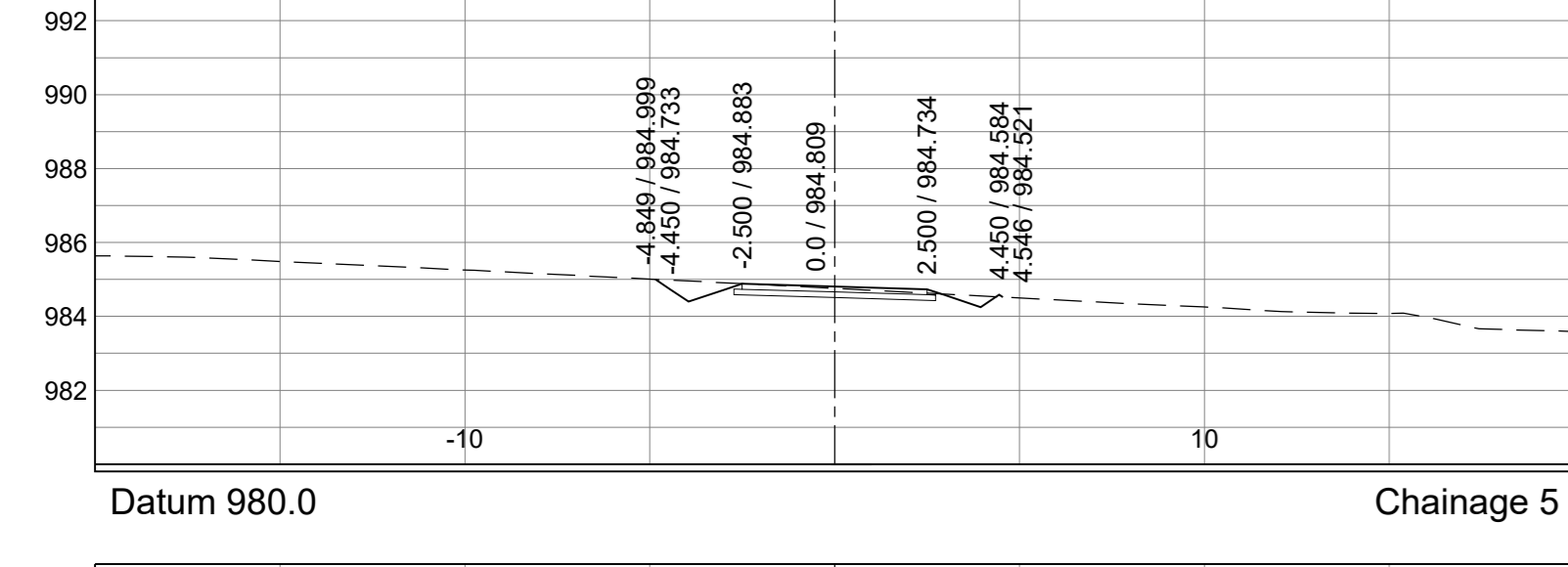
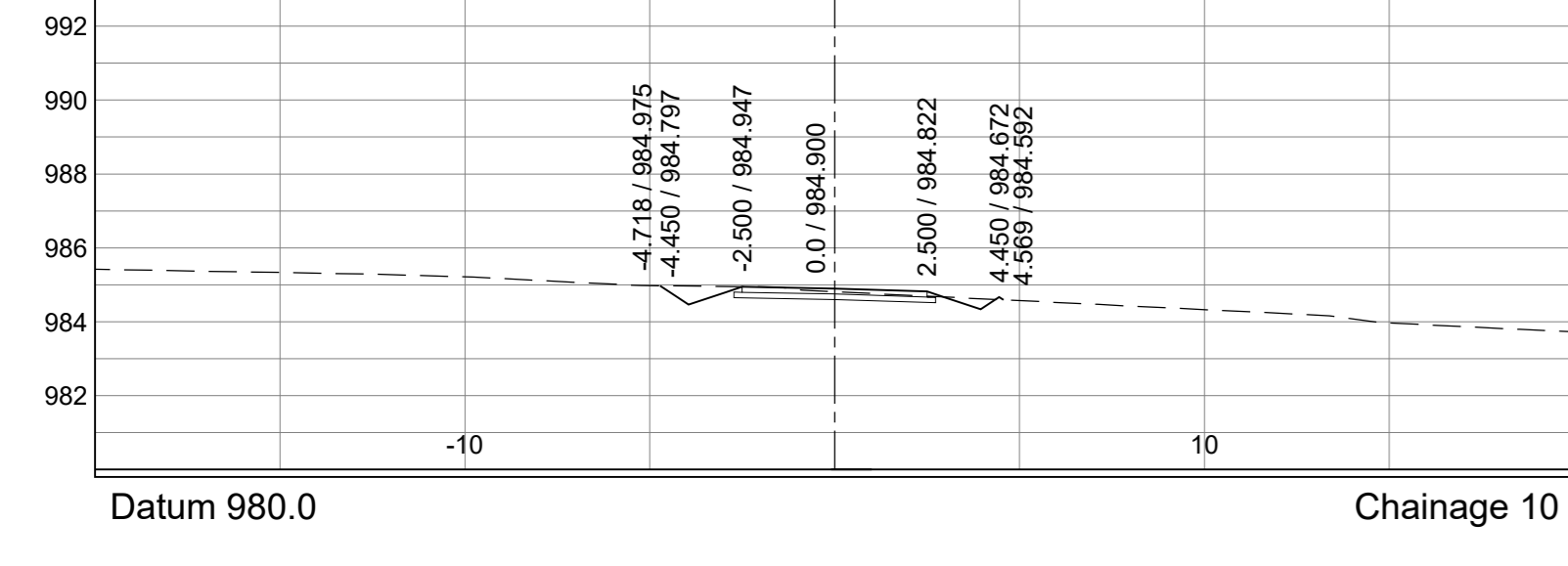
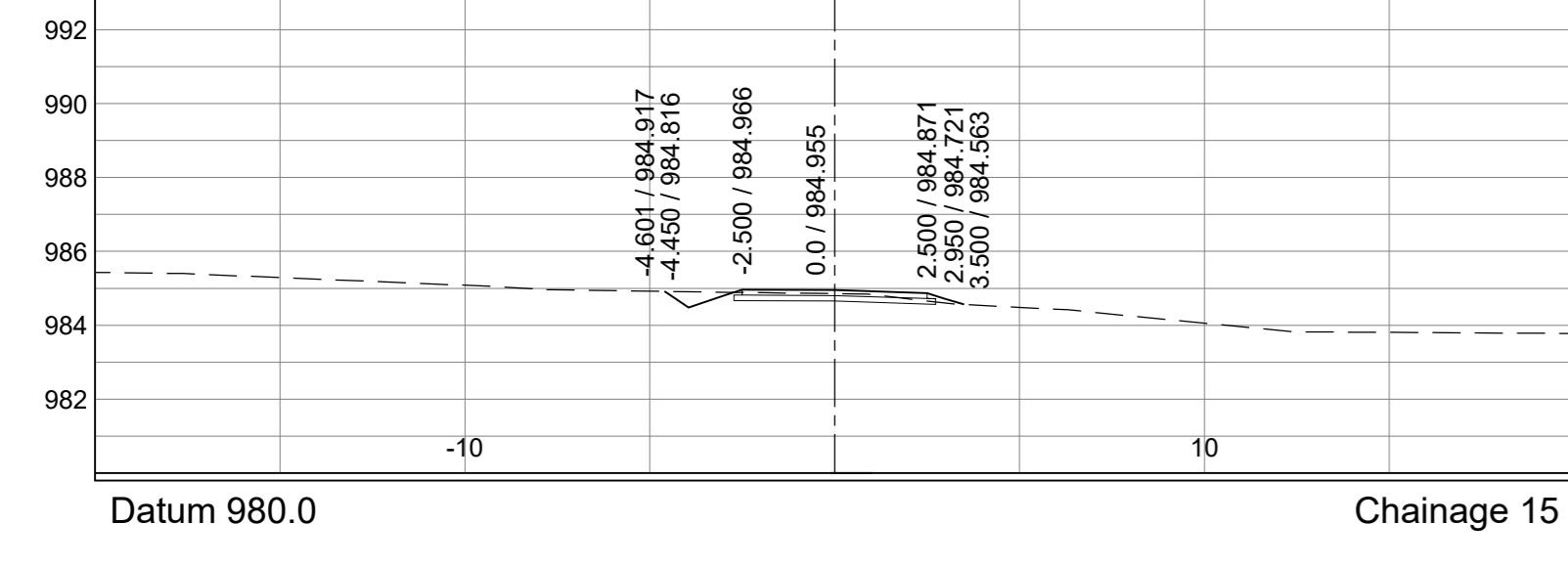
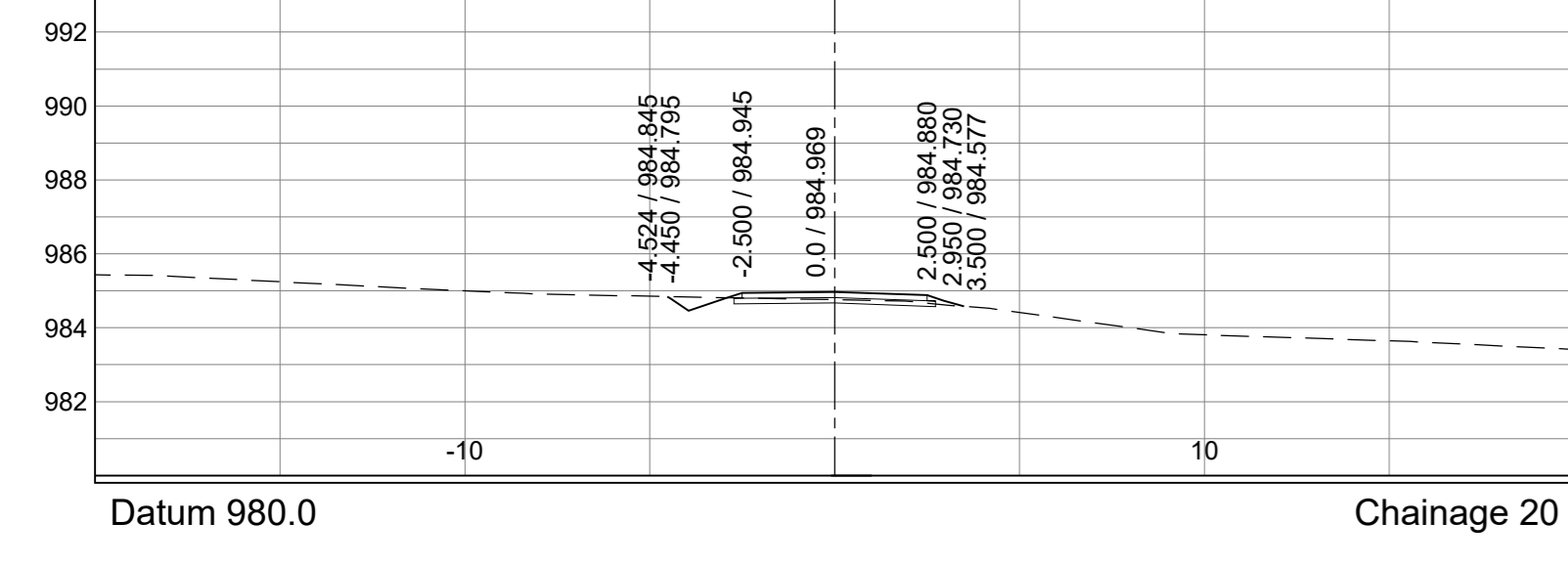
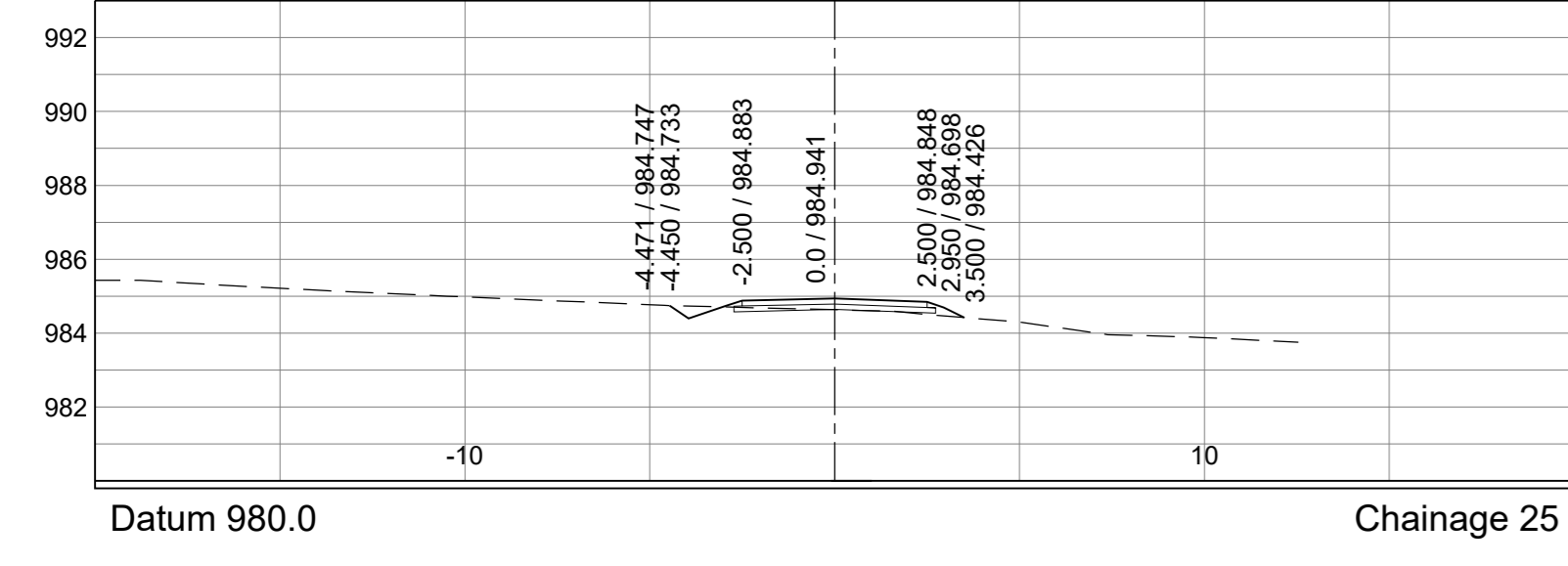
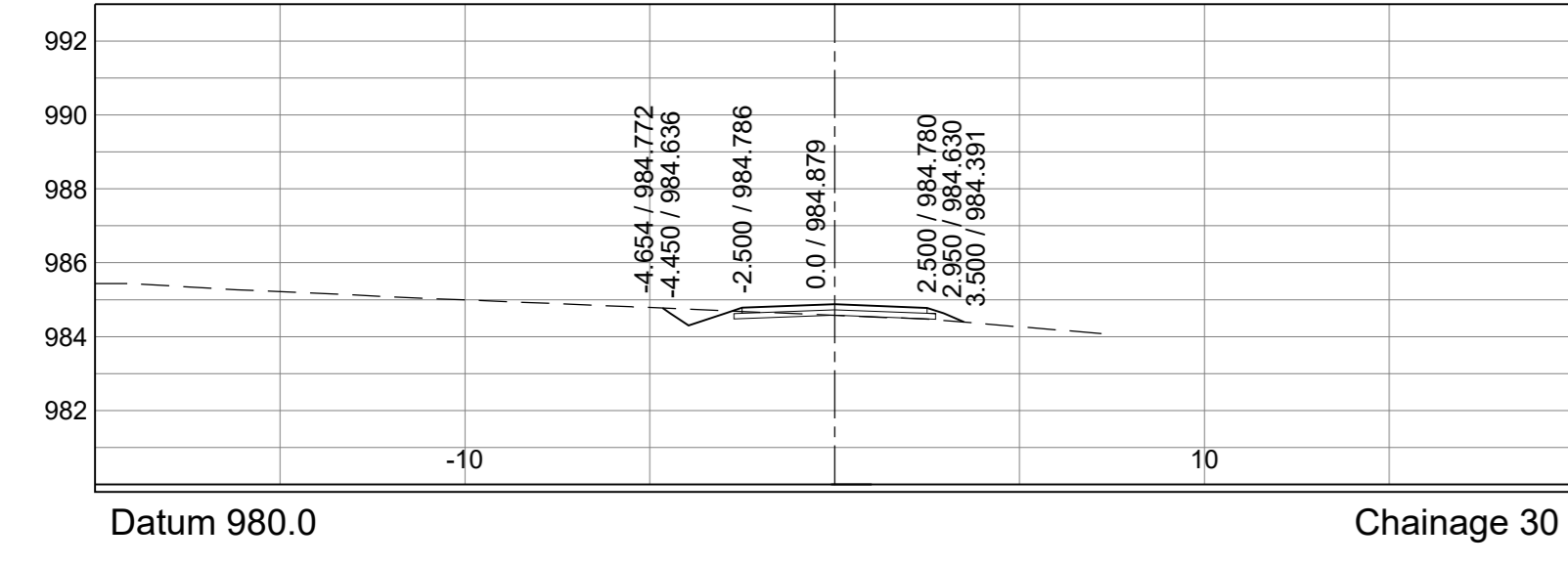
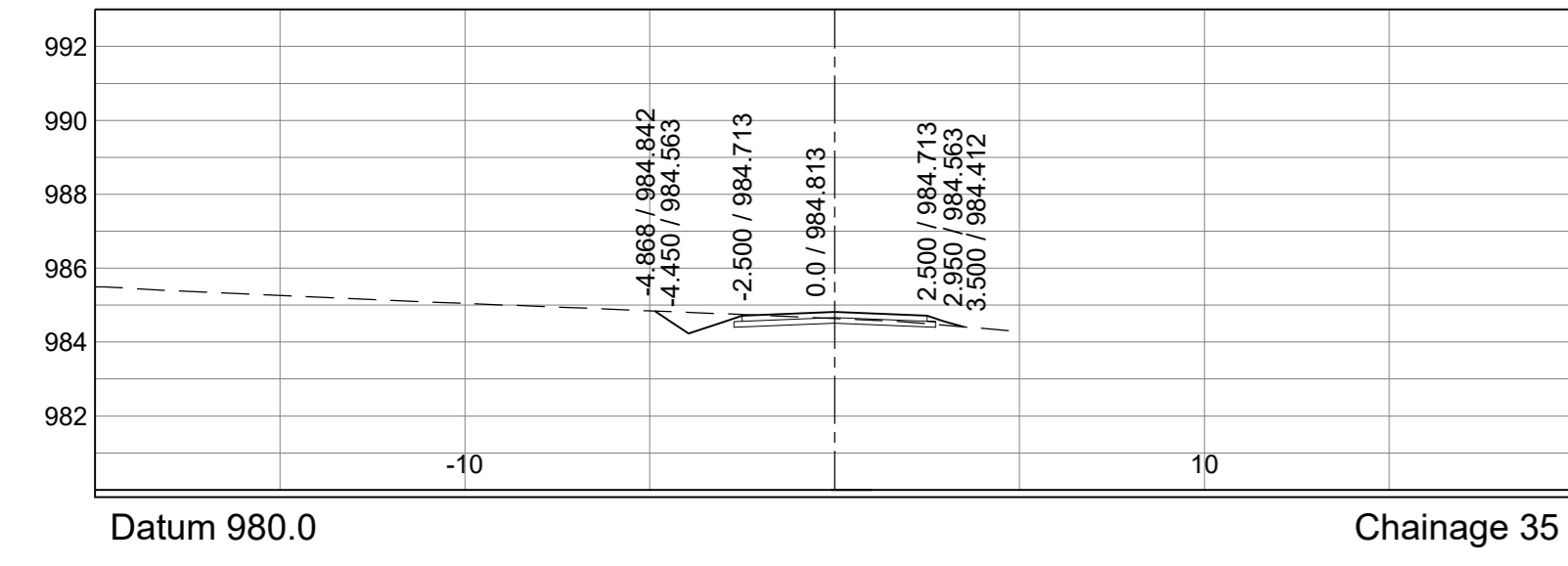
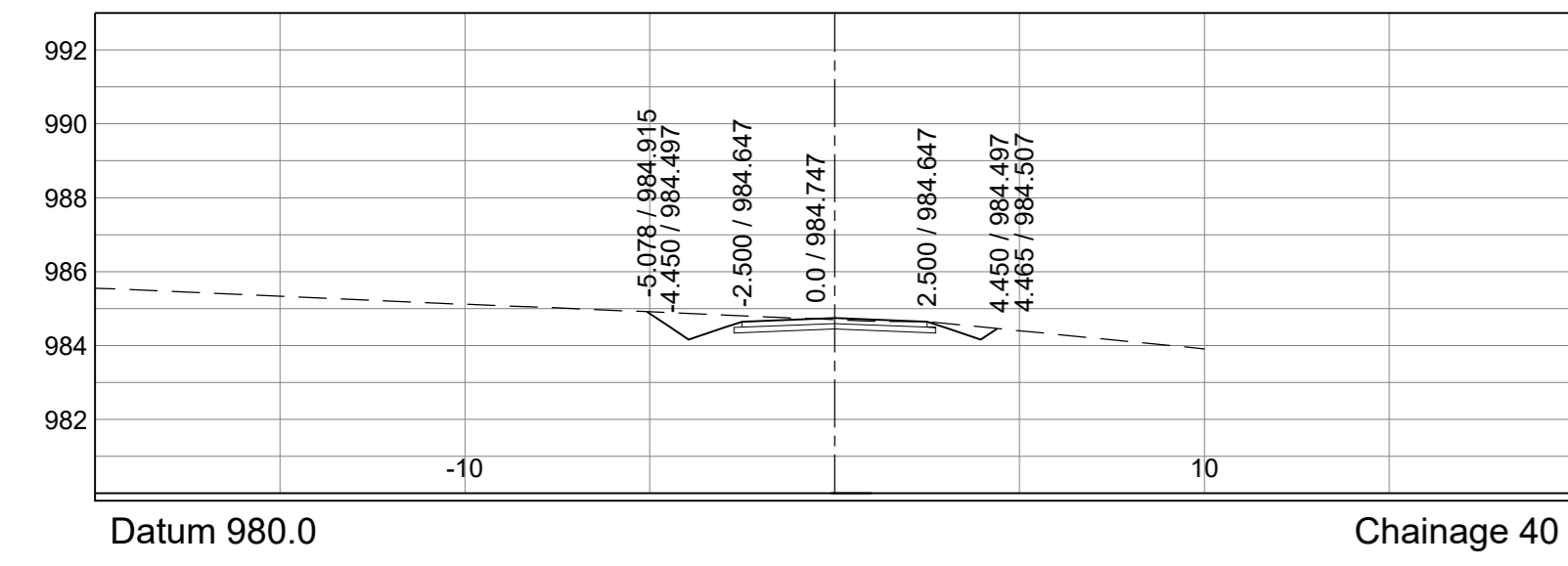
Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: 01-02-2024 Date

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 ACCESS ROADS CROSS SECTIONS  
 Staked km distance  
 km 0+000 - km 0+267 536  
 km 0+000 - km 0+028 532  
 km 0+000 - km 0+047 448  
 Scale  
 Vertical Scale 1 : 200  
 Horizontal Scale 1 : 200  
 Sheet - 8  
 of - 14  
 REVISION:  
 Plan No -  
**C 46551**

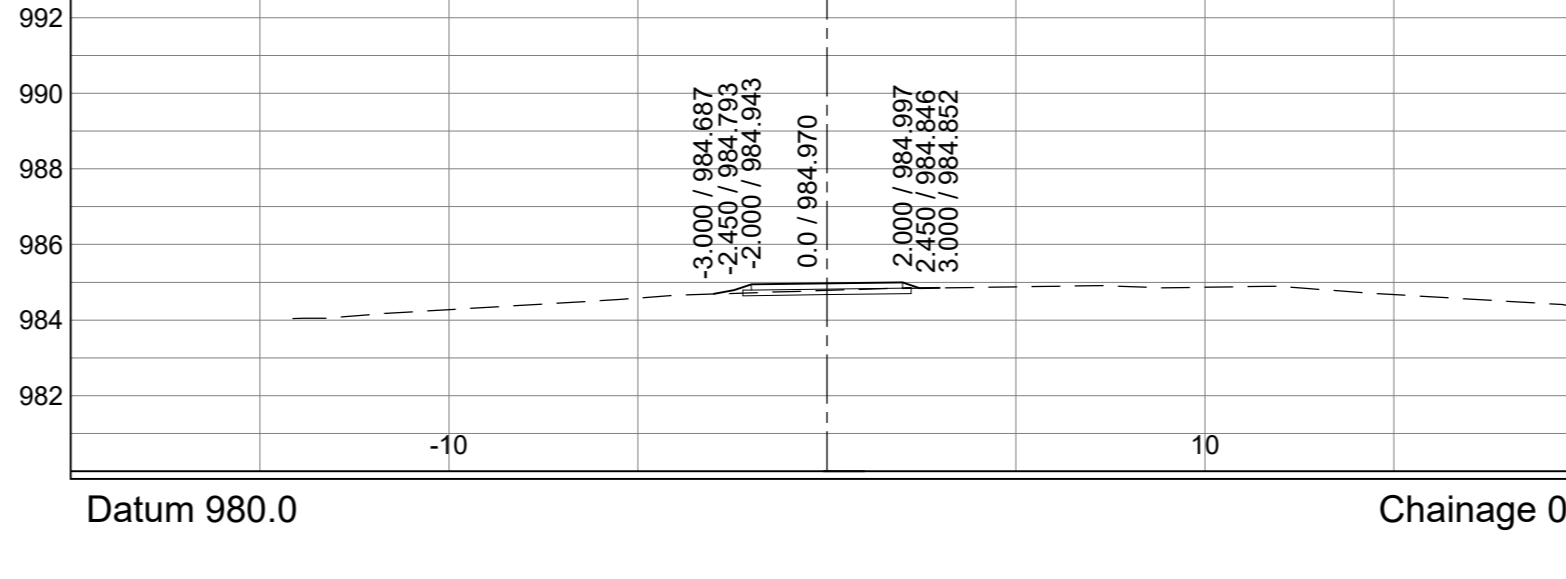
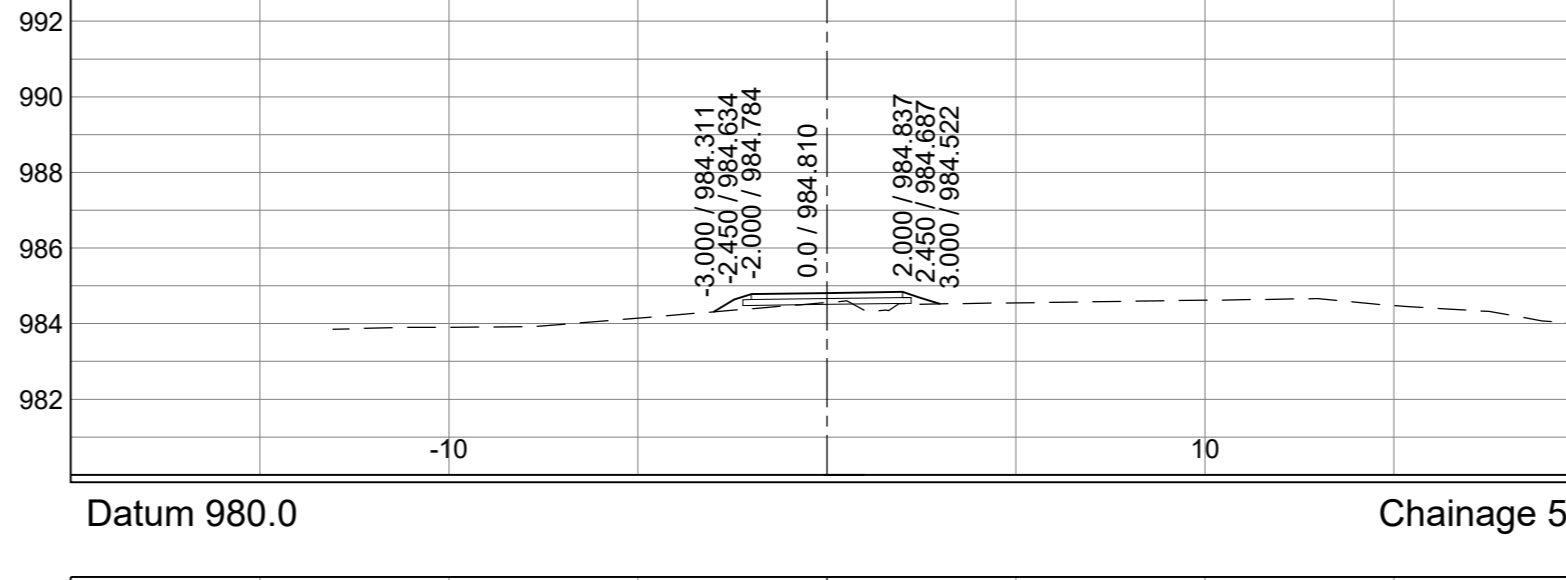
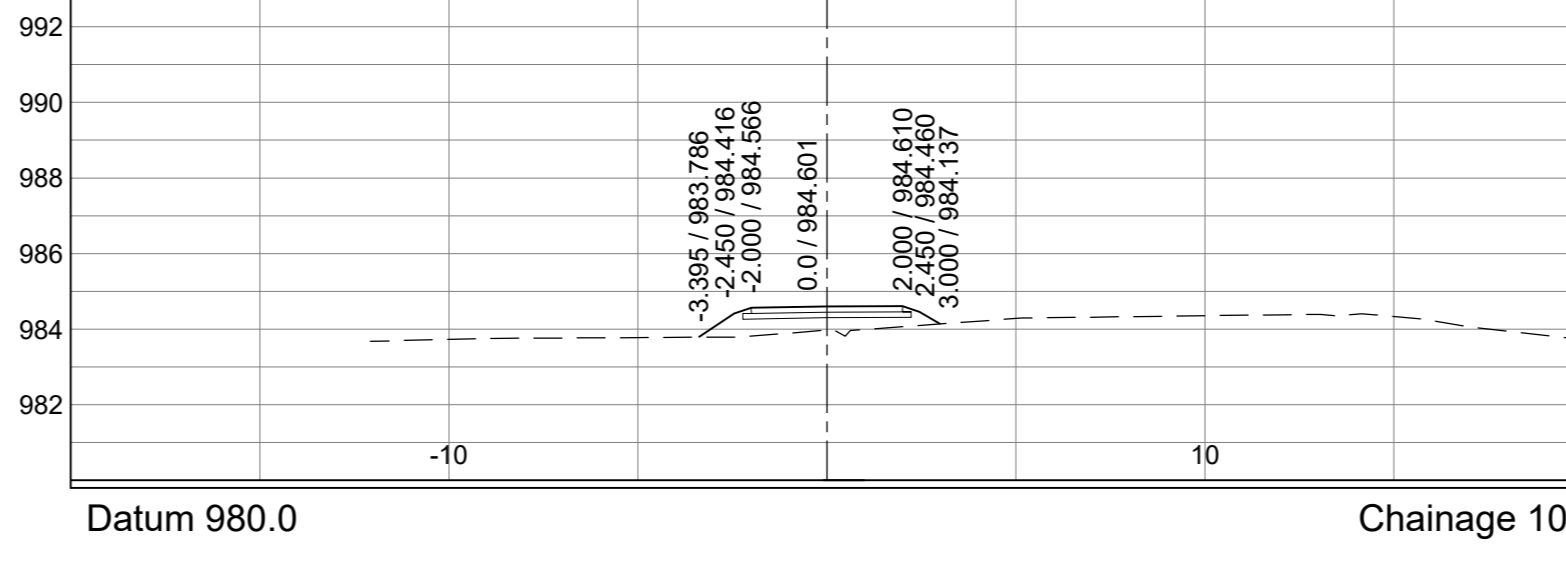
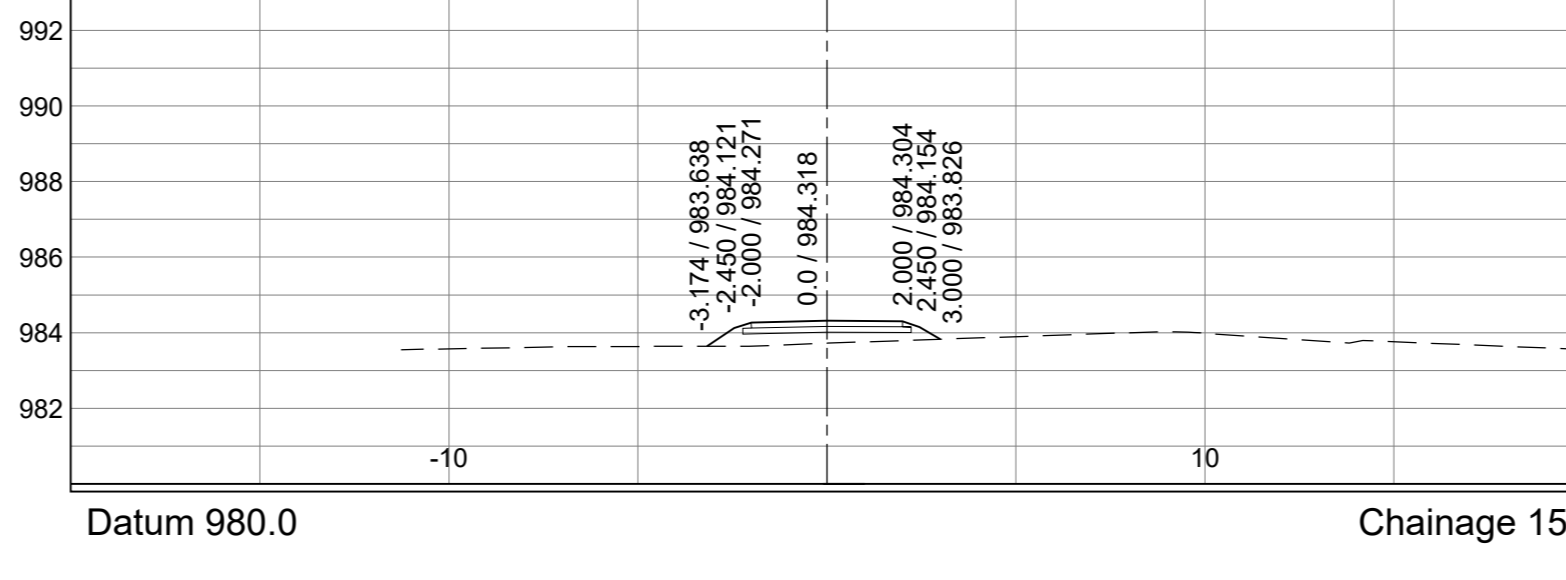
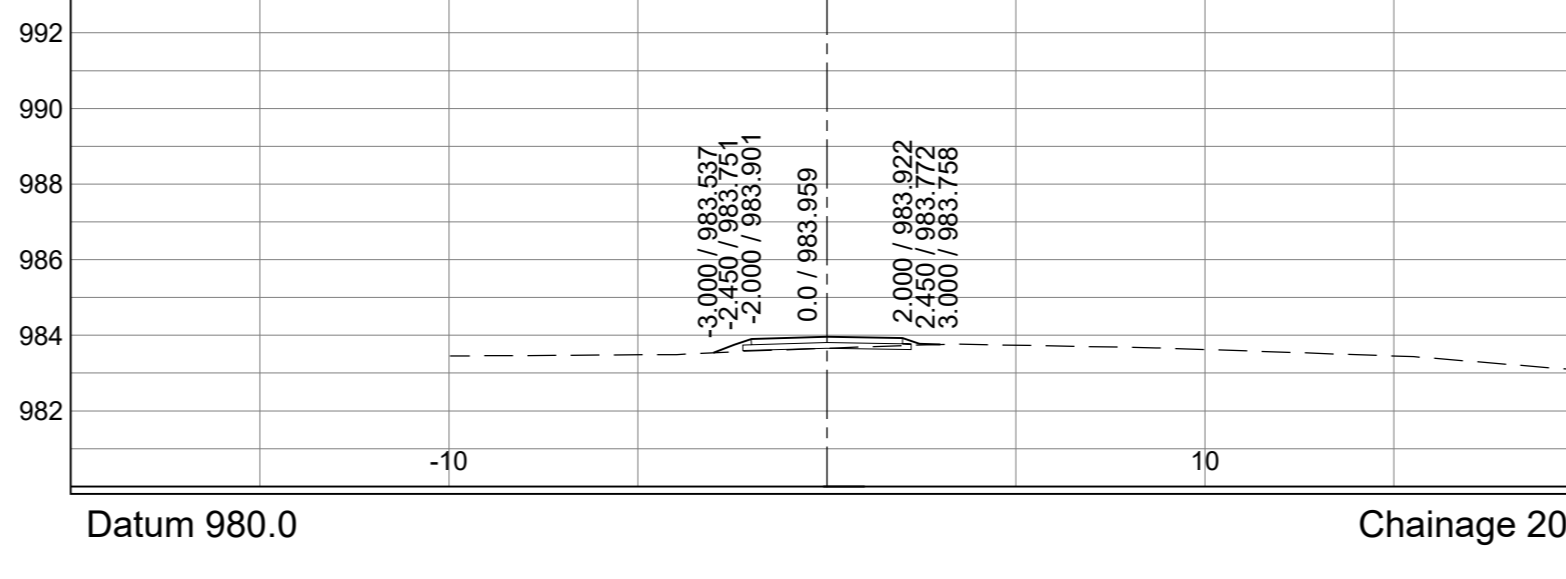
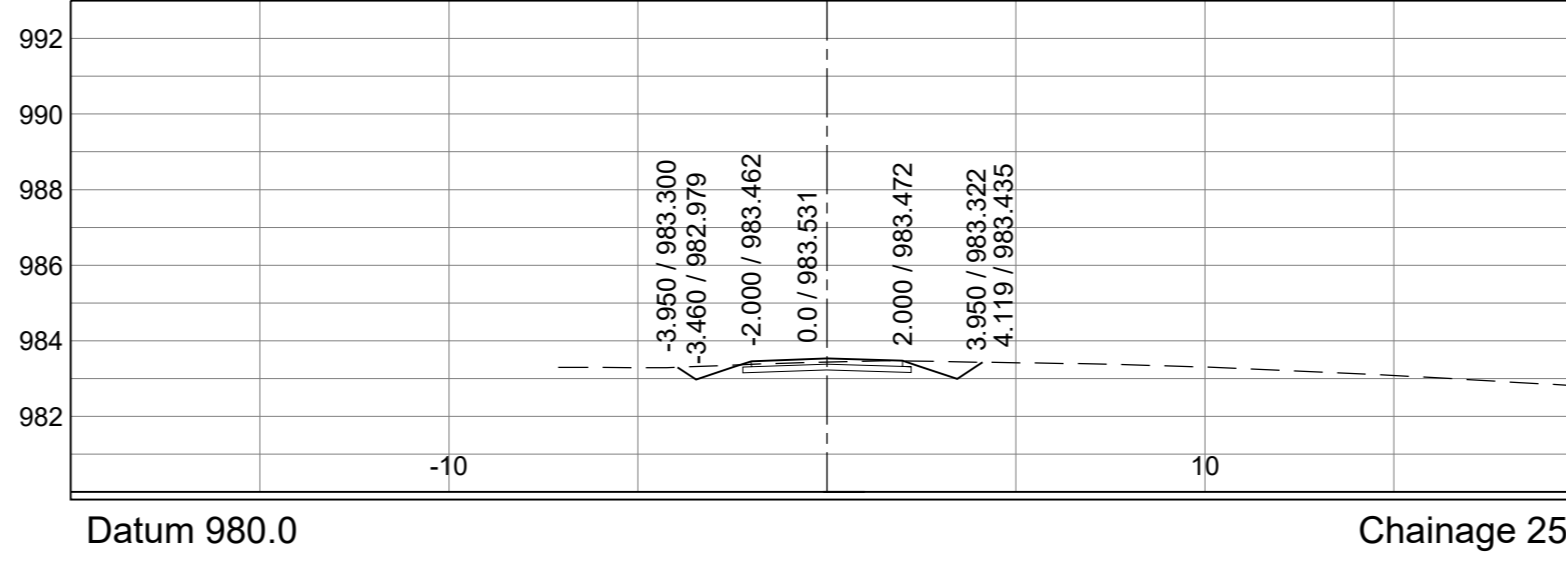
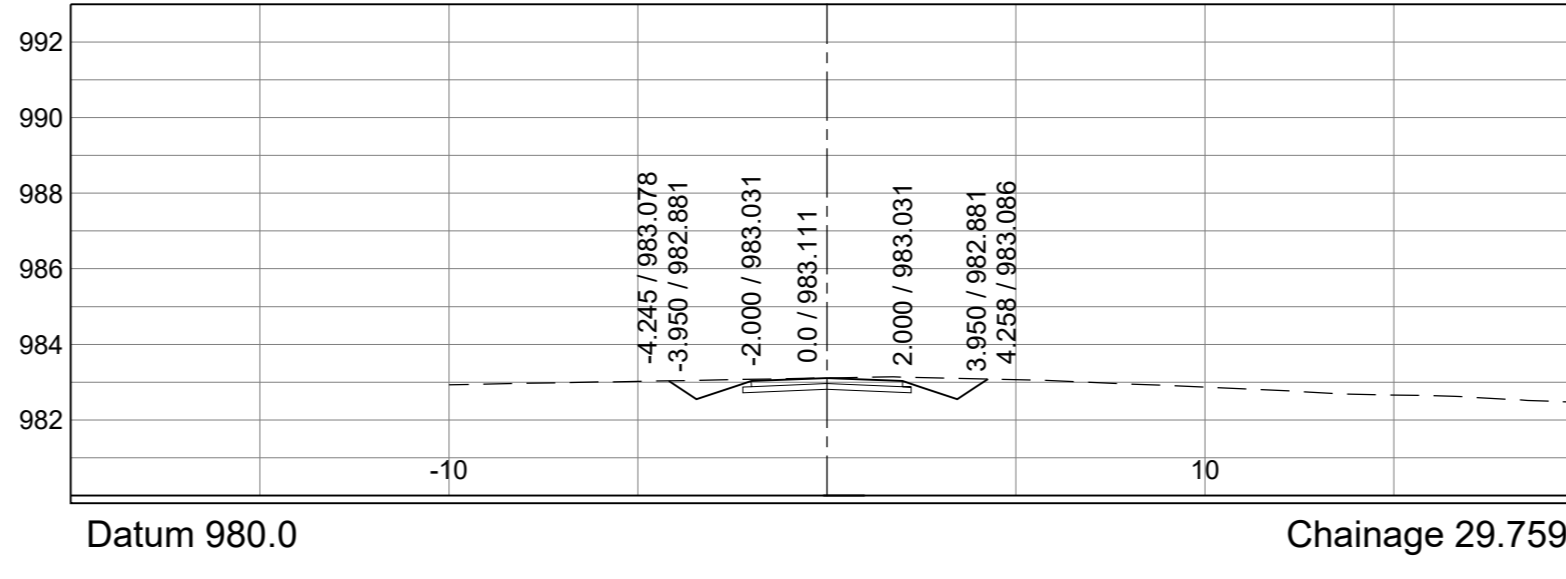
C 46551



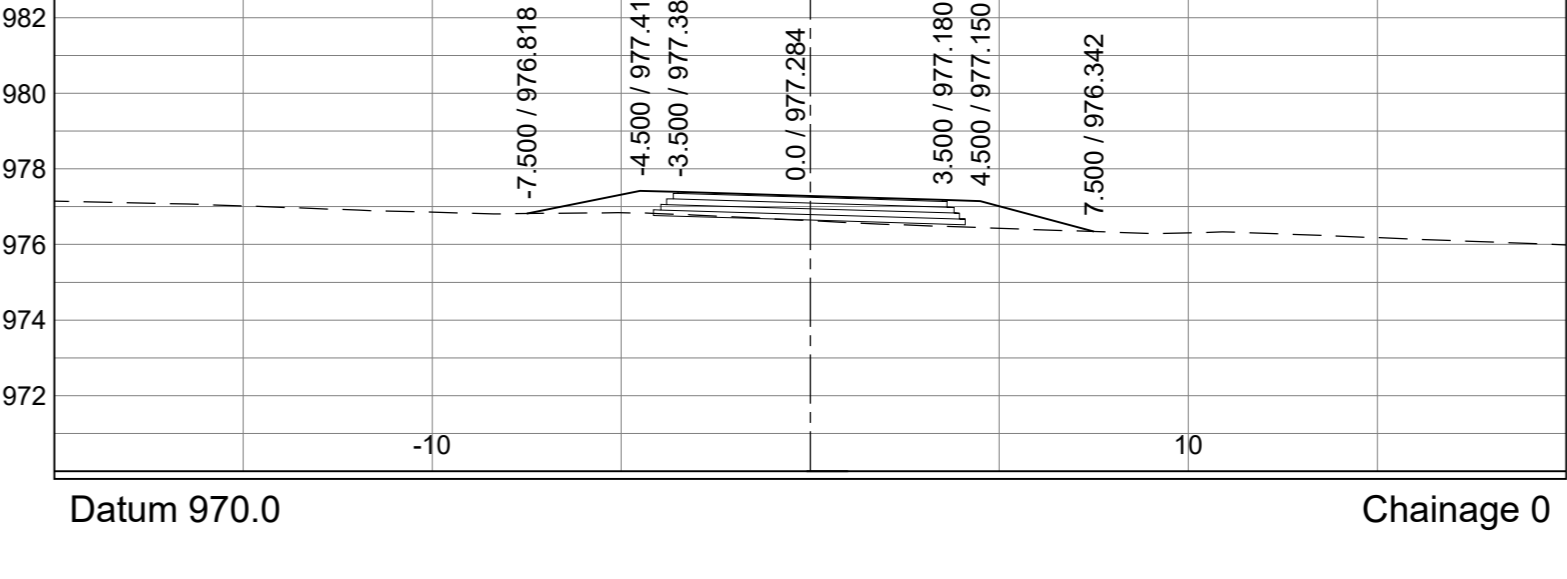
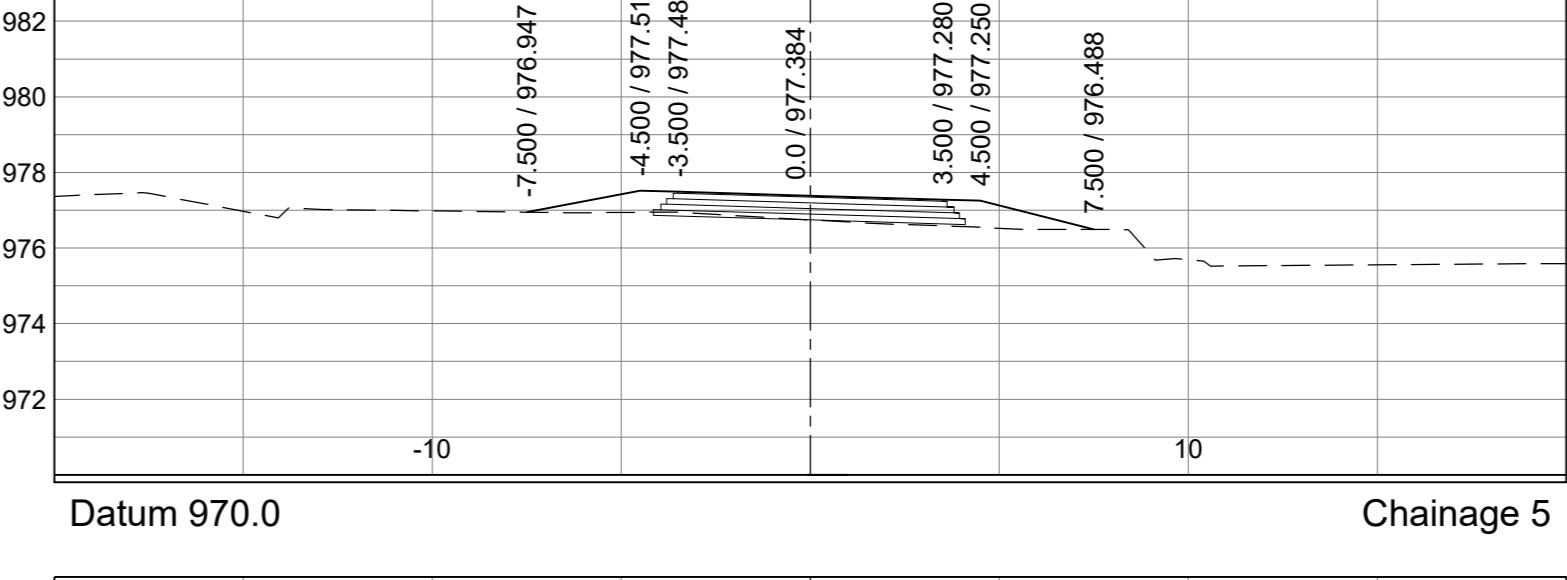
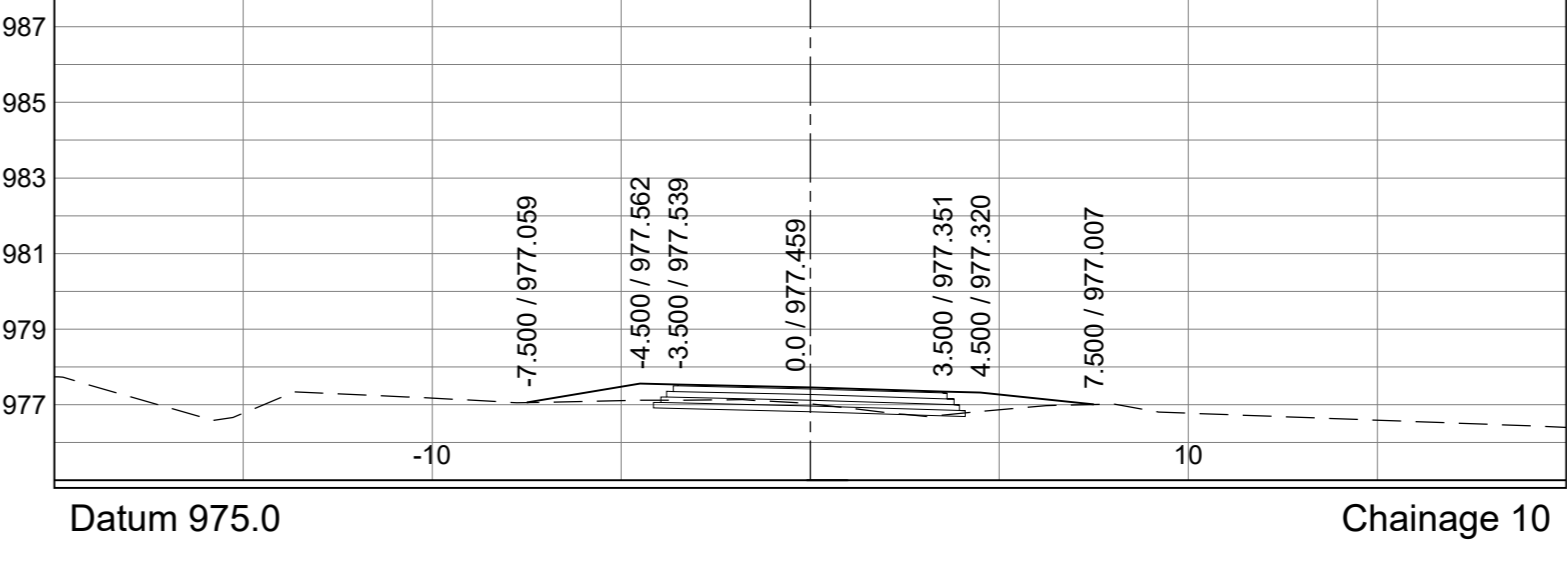
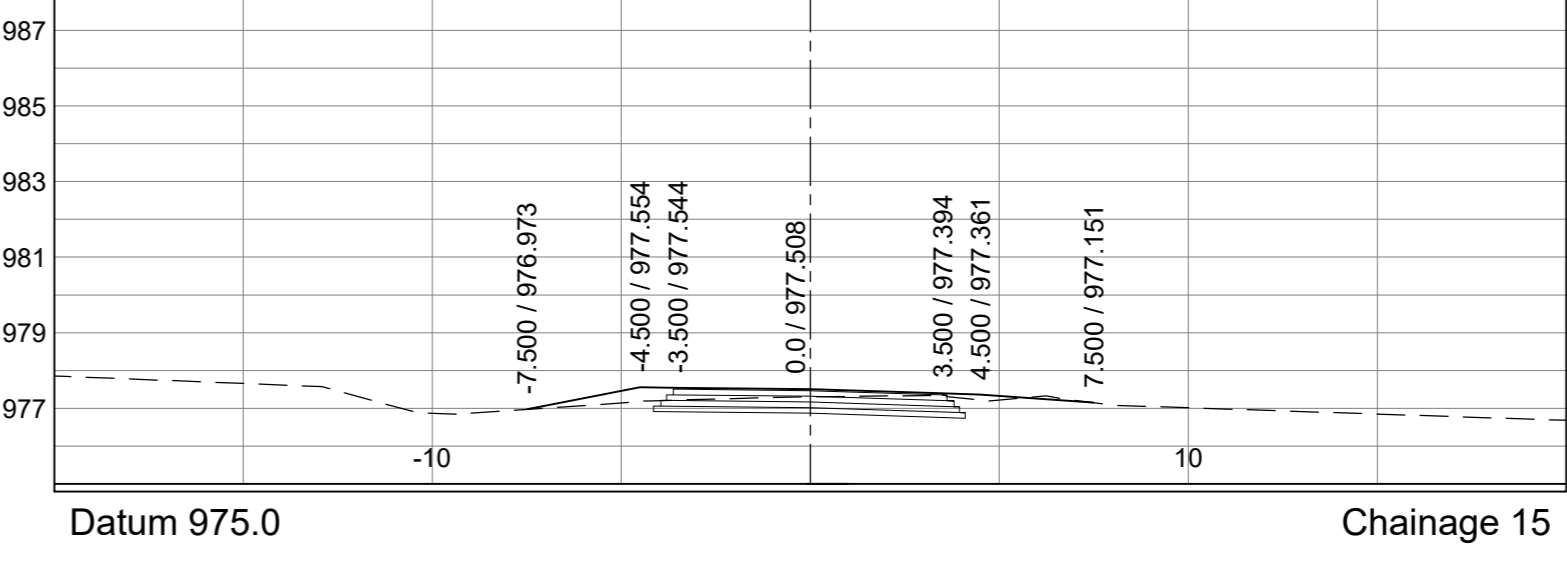
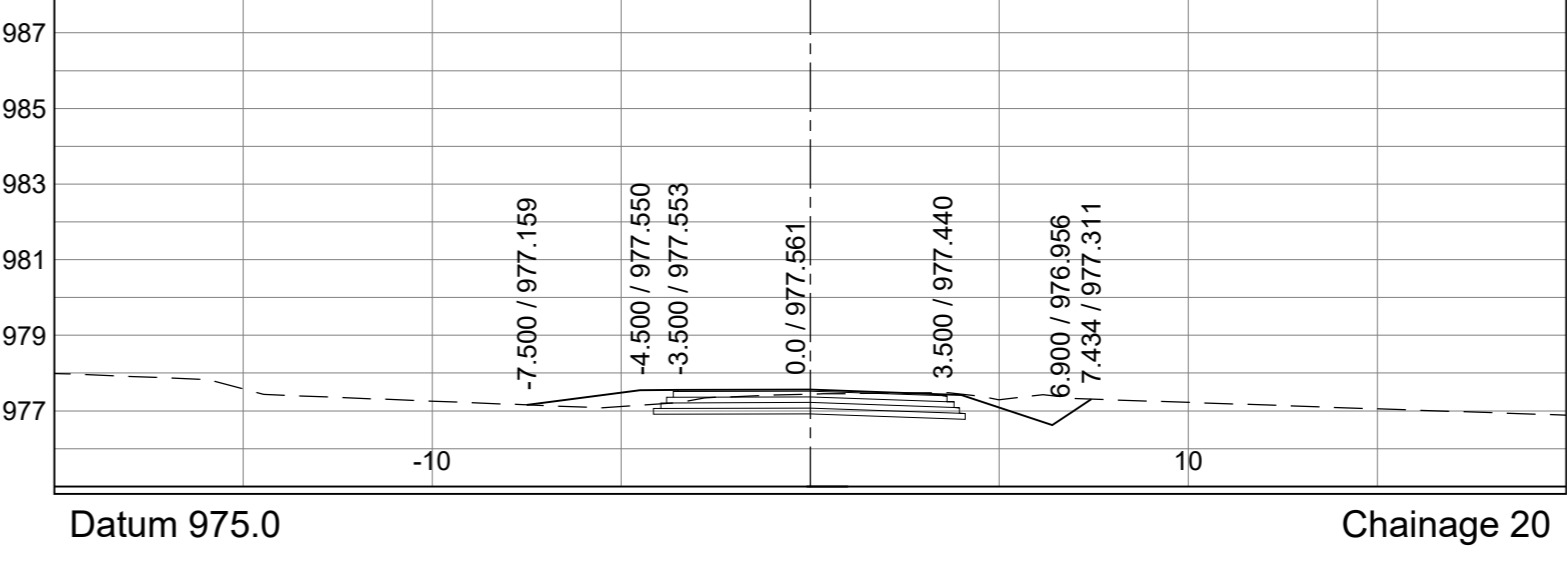
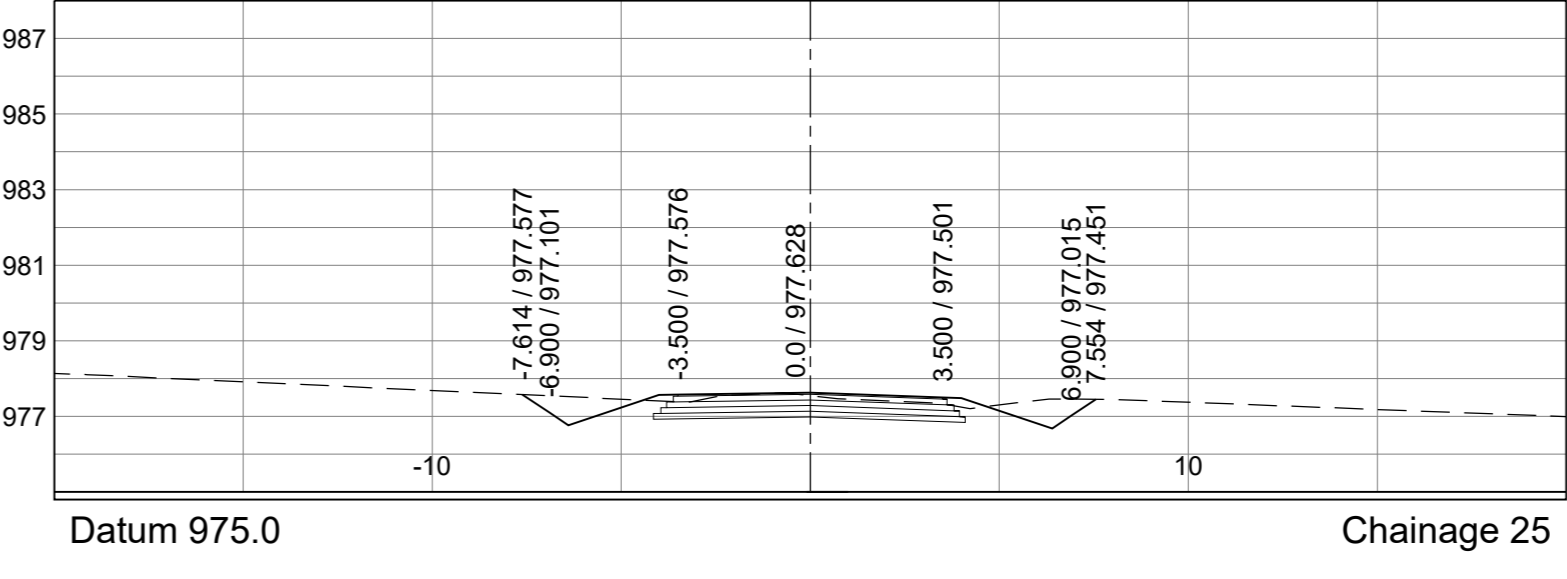
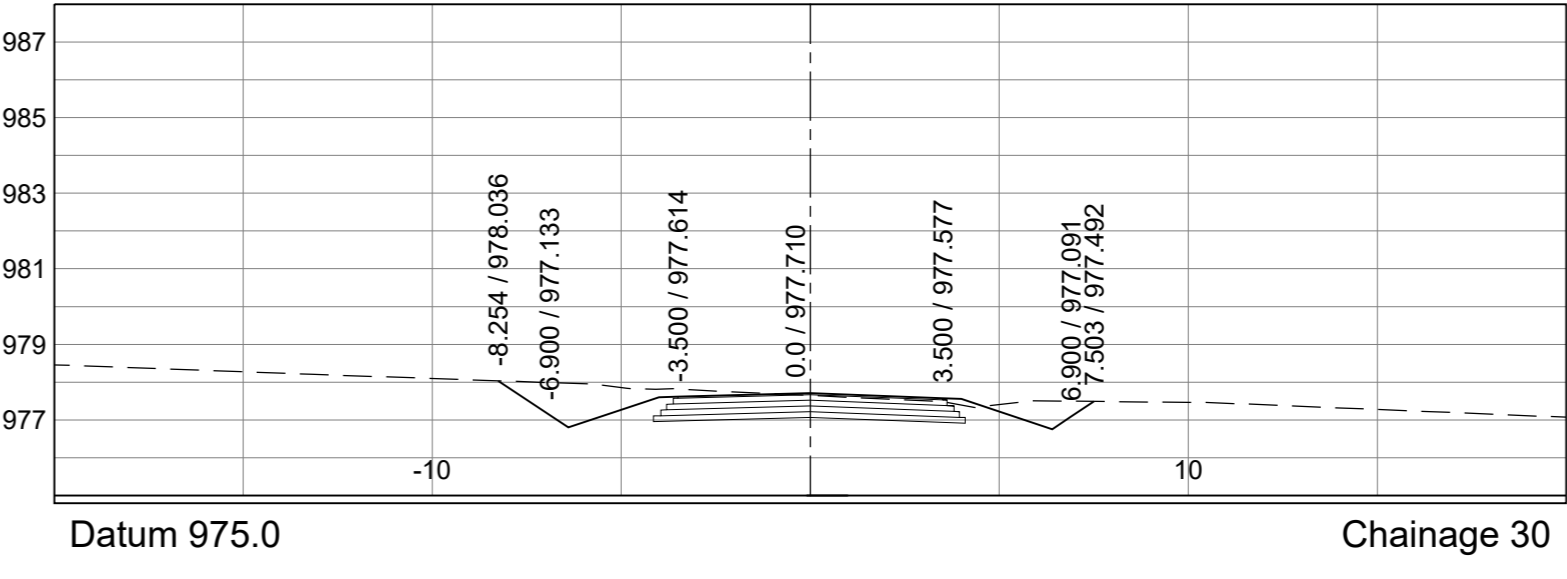
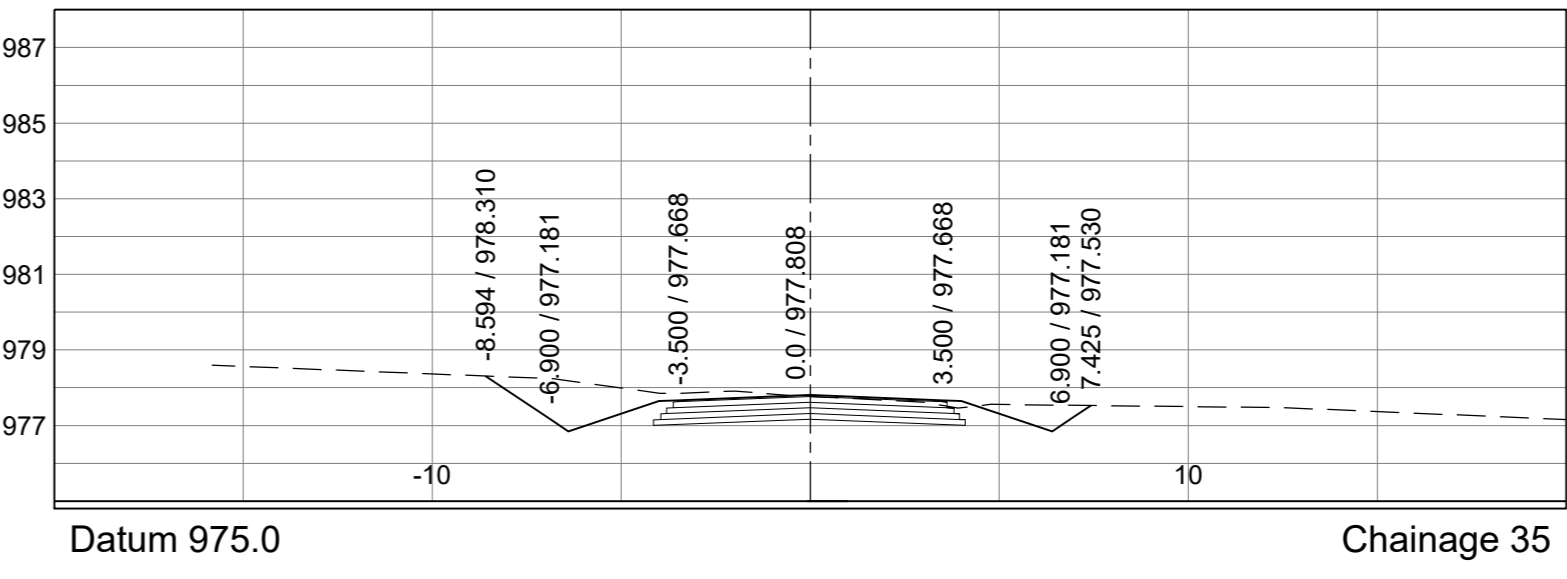
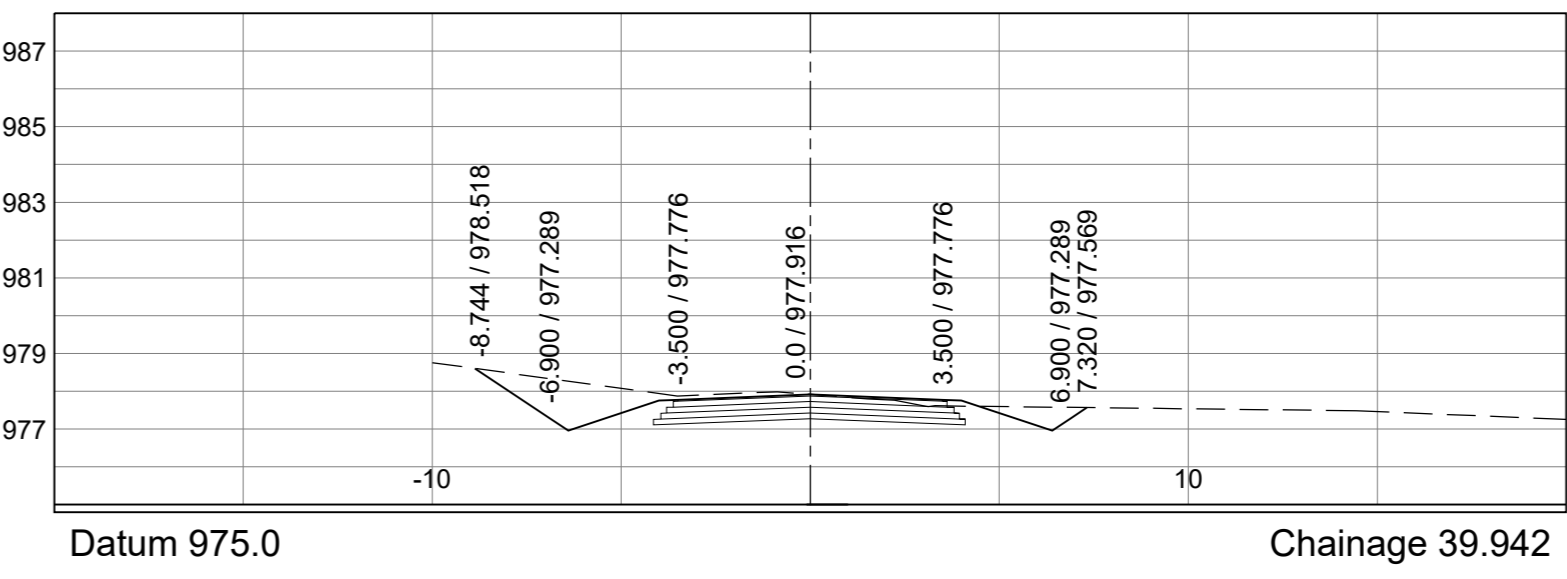
ACCESS @ KM 16+311.337 LHS



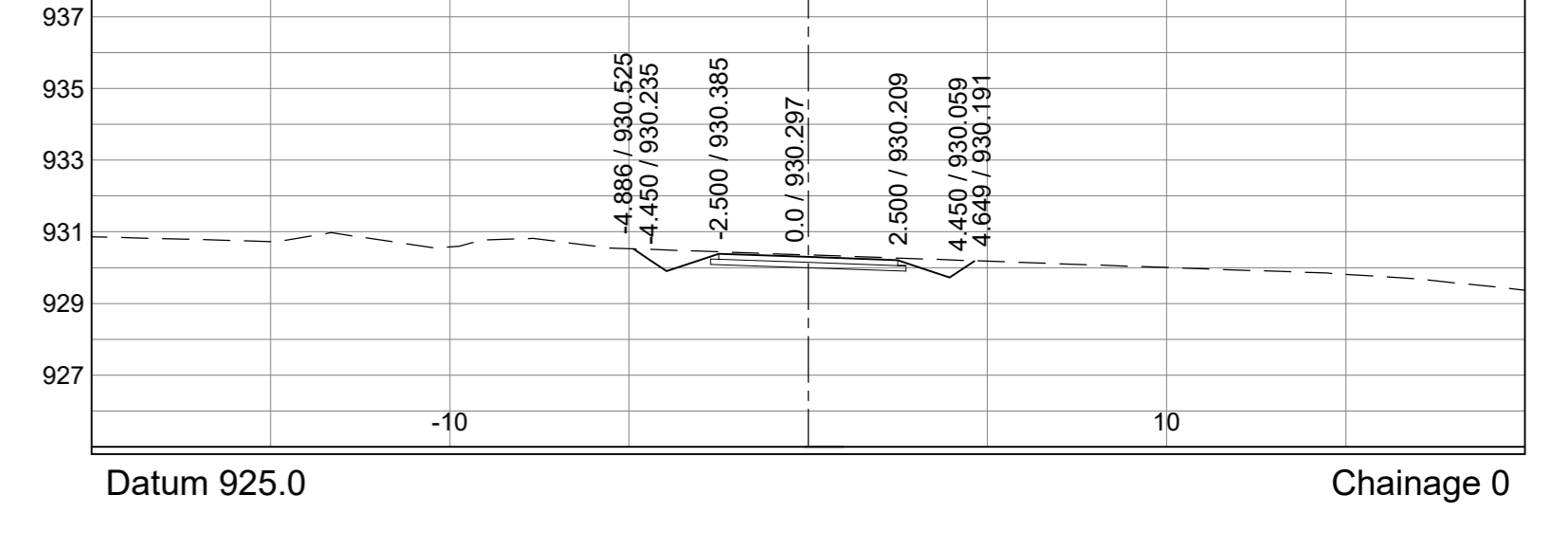
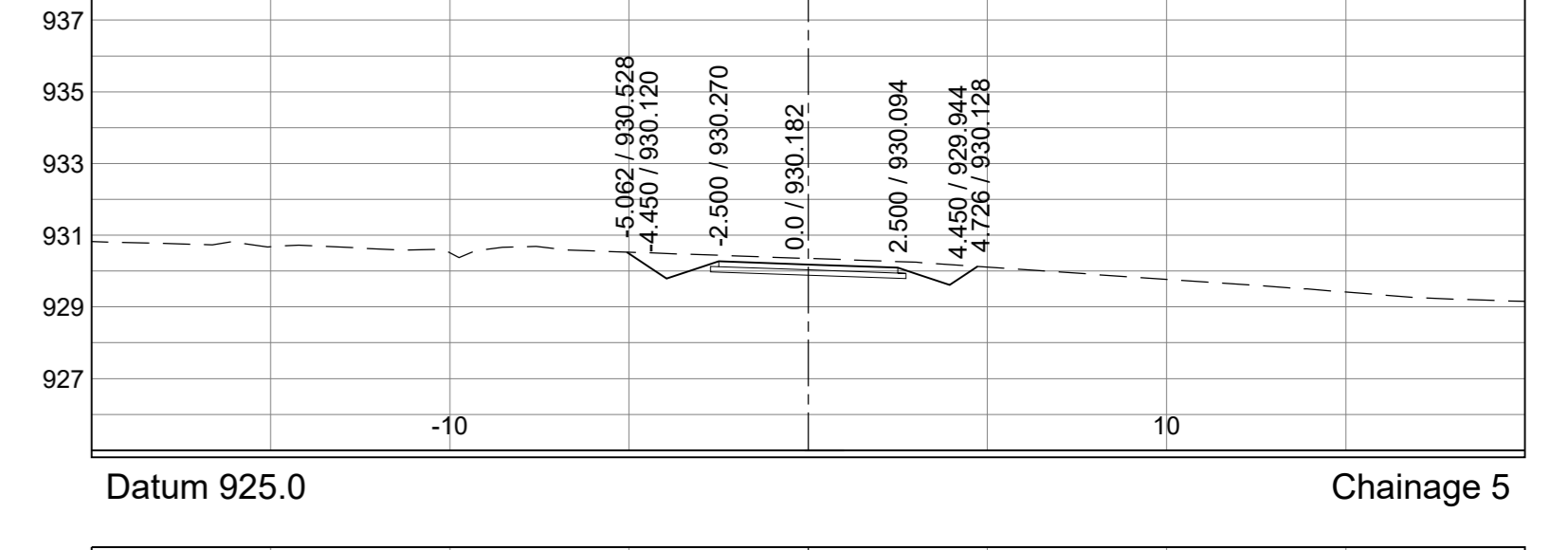
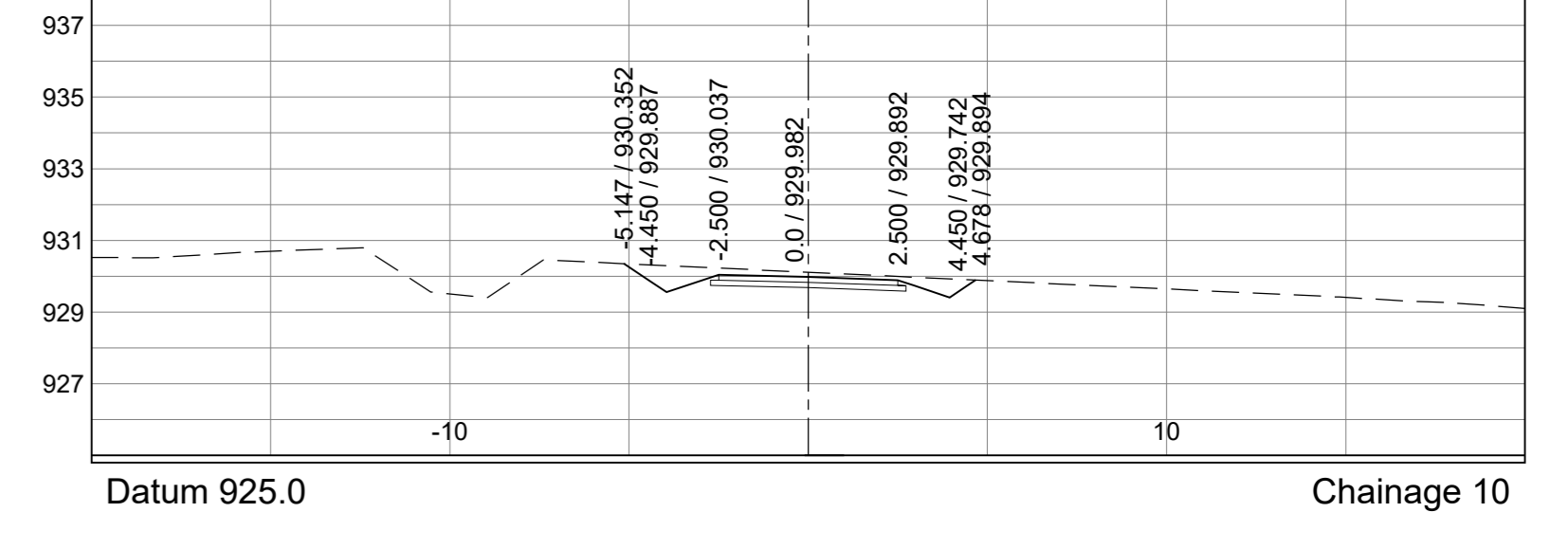
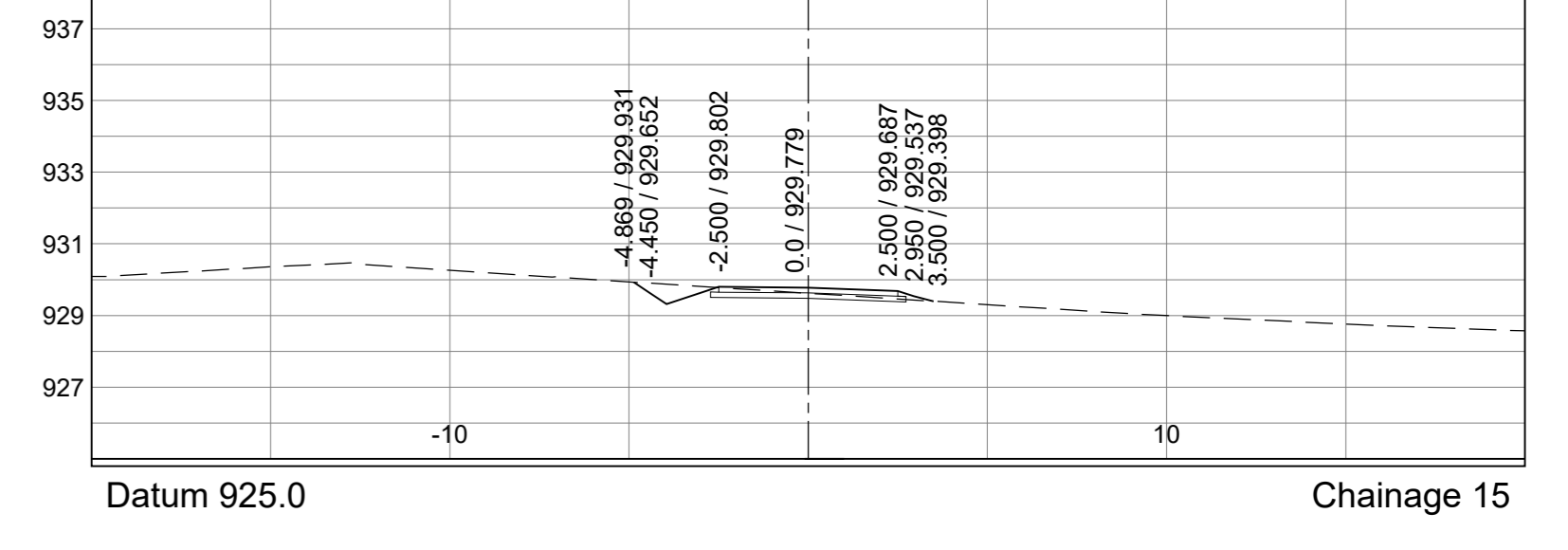
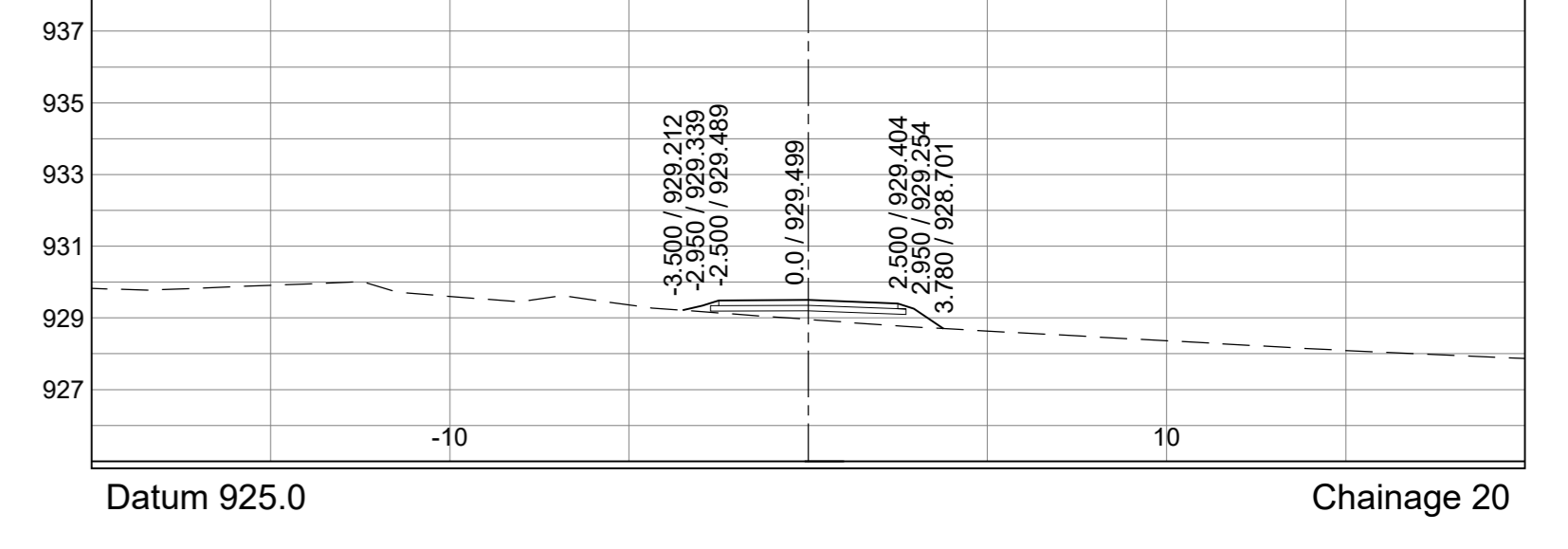
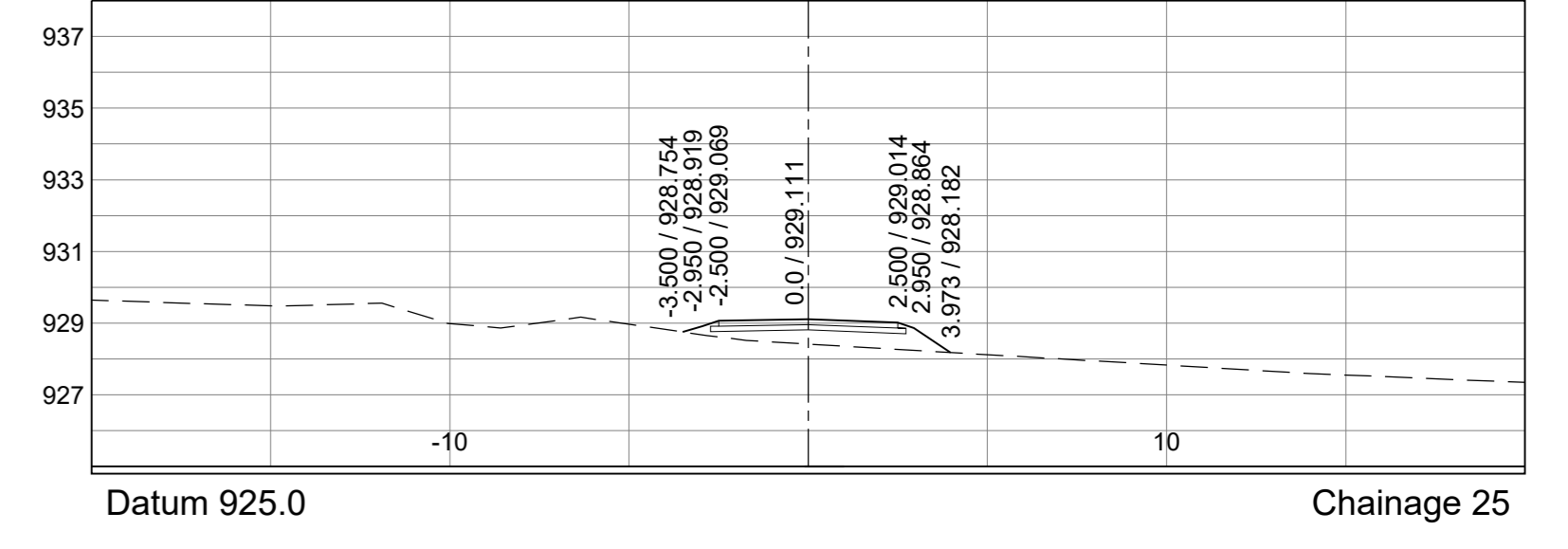
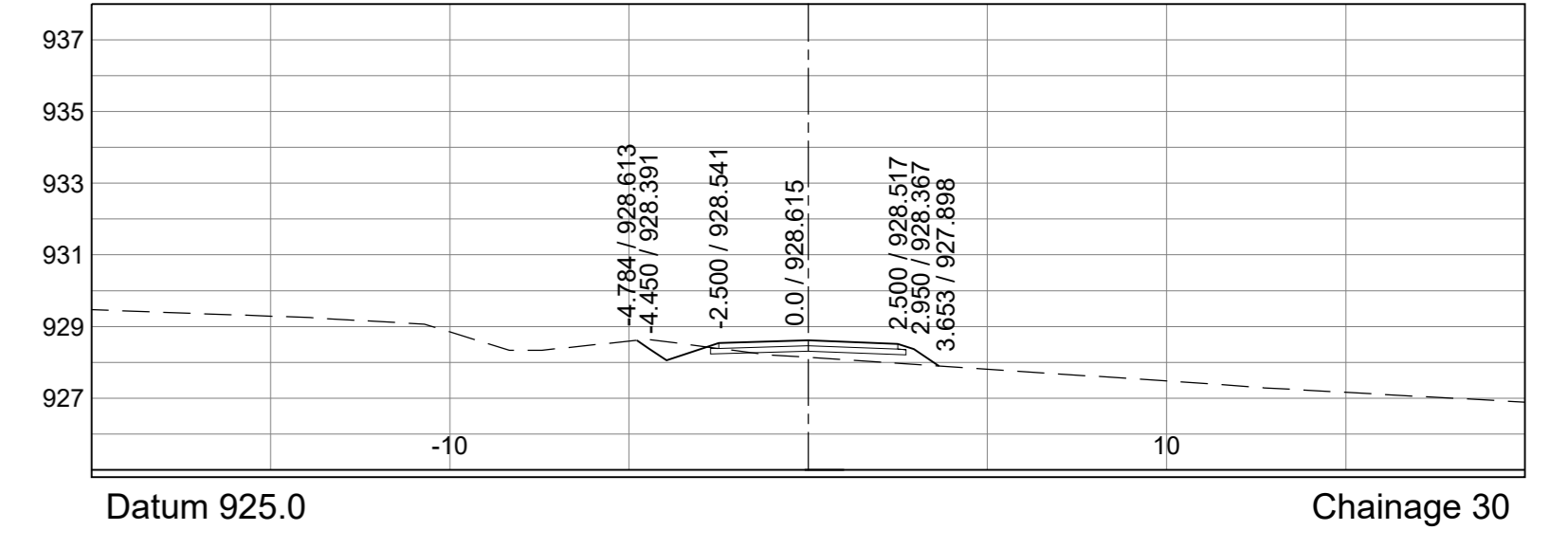
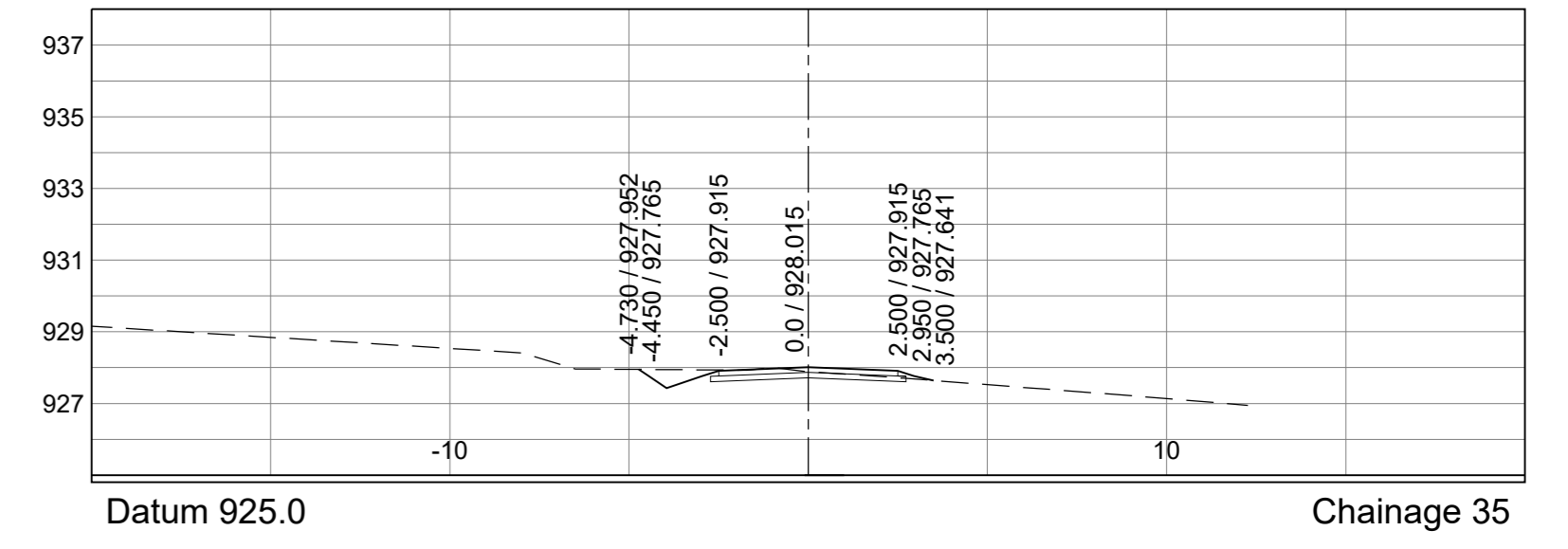
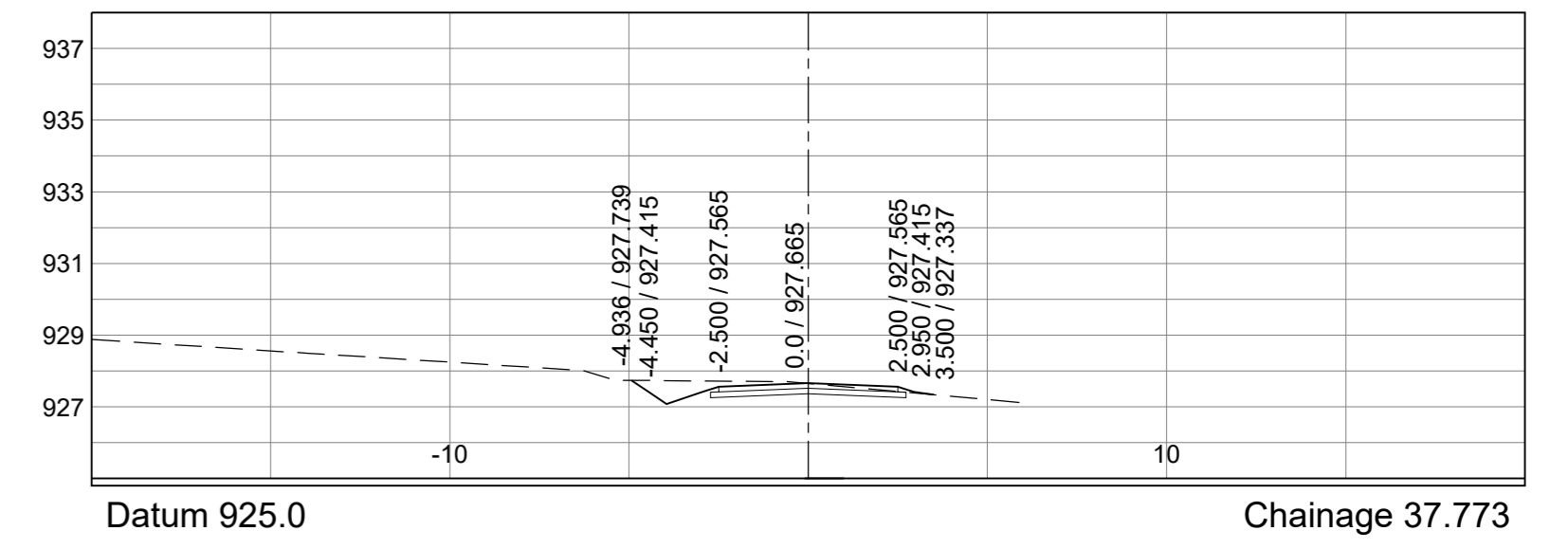
RHS ACCESS @ KM 0+019.165 OFF ACCESS KM 16+311.337 LHS



ACCESS @ KM 16+549.091 LHS (D40)



ACCESS @ KM 17+285.308 LHS



AS BUILT			
Symbol	Date	Description	Checked
A	01-02-2024	ISSUED FOR TENDER	YD
AMENDMENTS			

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivaled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 ACCESS ROADS CROSS SECTIONS

Staked km distance  
 km 0+000 - km 0+041 856  
 km 0+000 - km 0+059 759  
 km 0+000 - km 0+058 842  
 km 0+000 - km 0+037 773

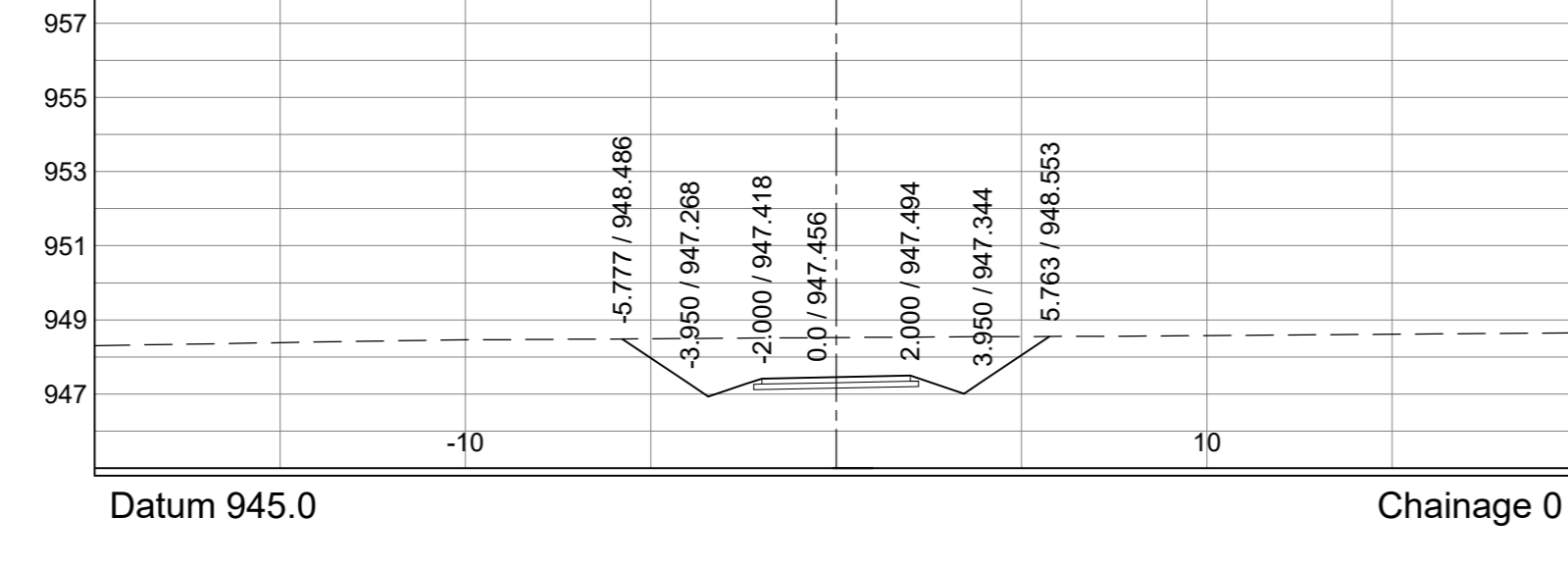
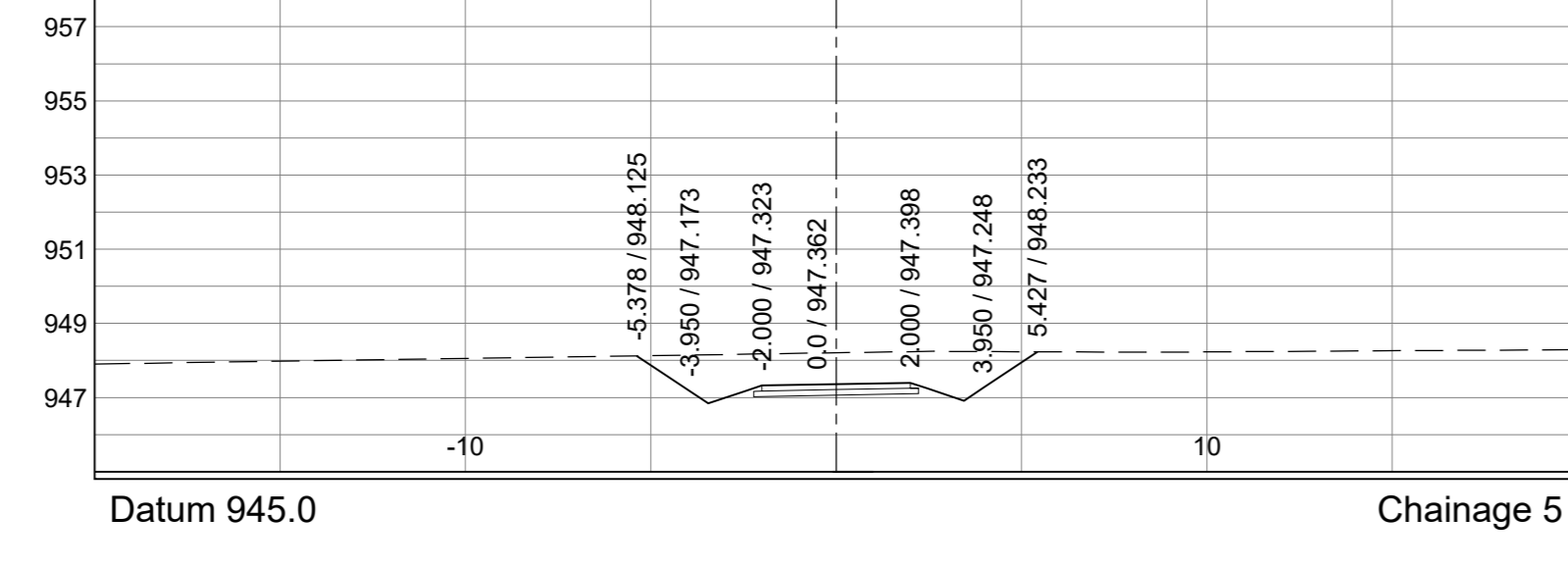
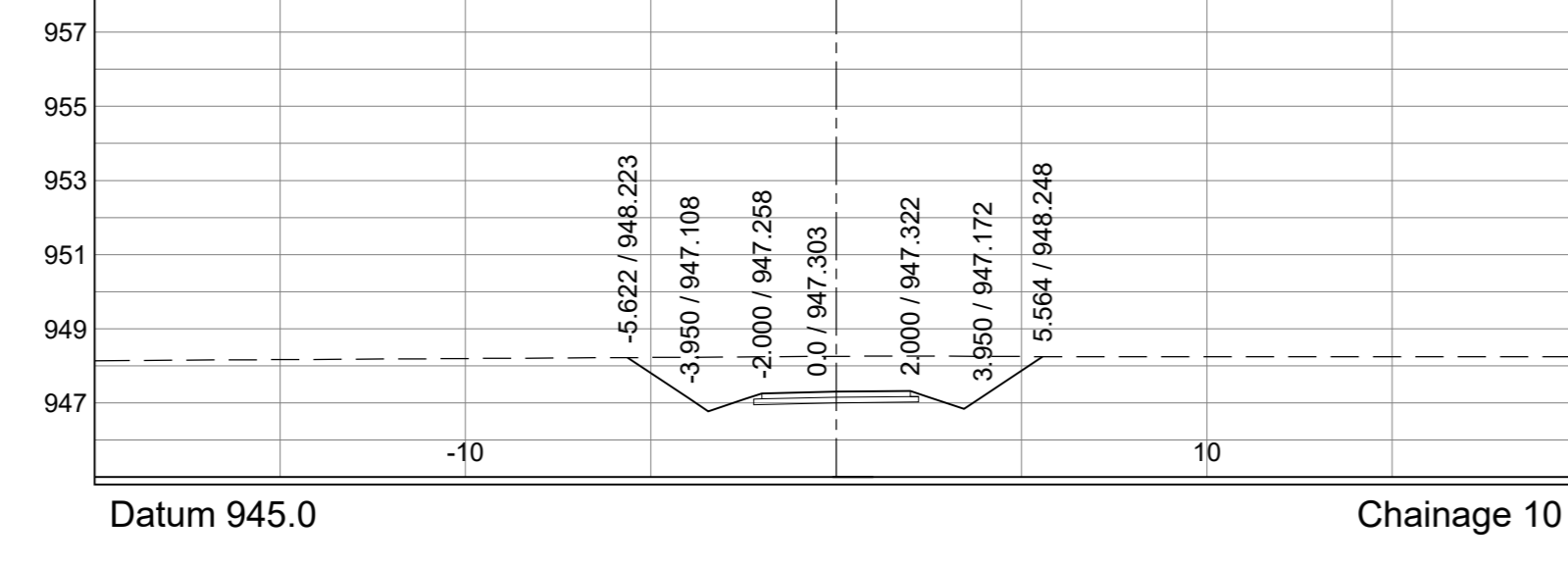
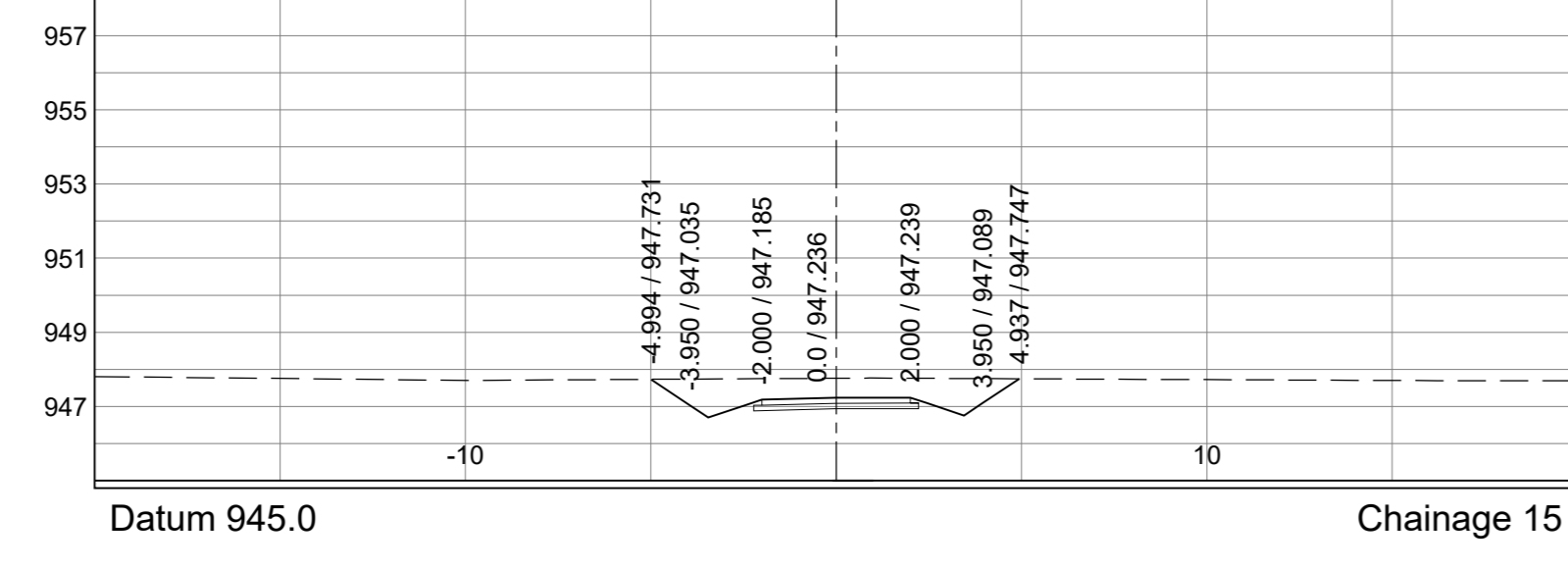
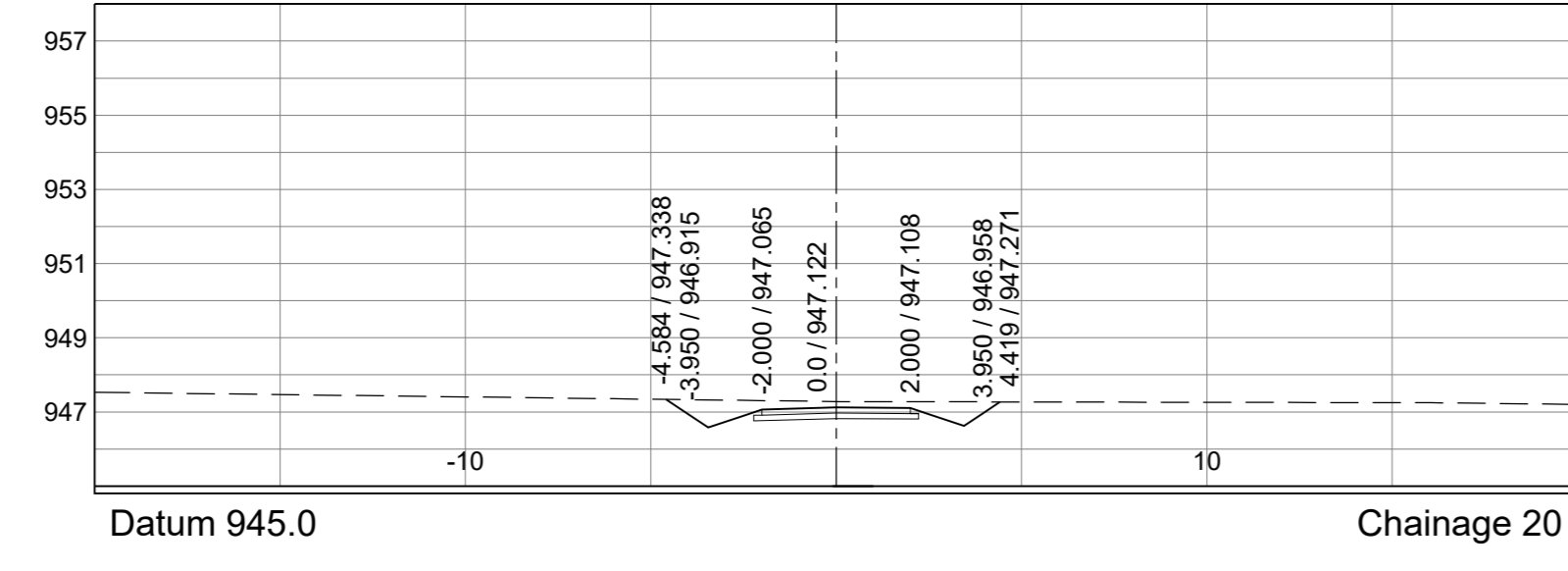
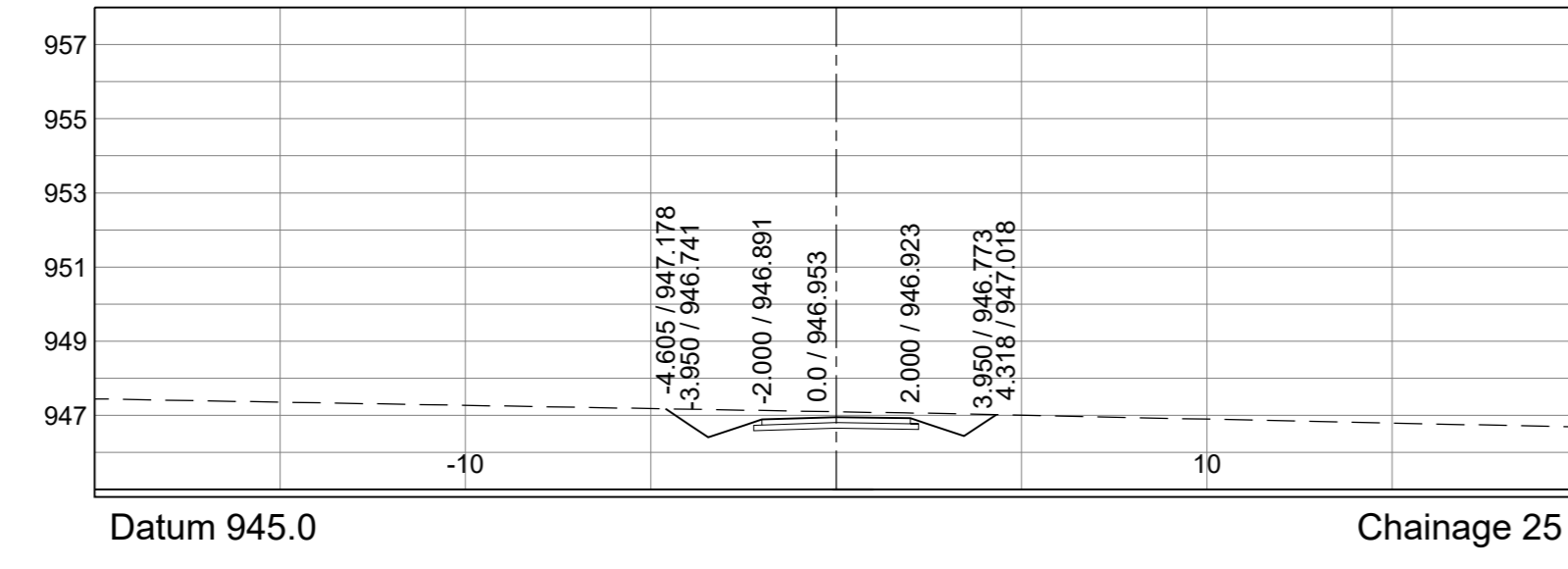
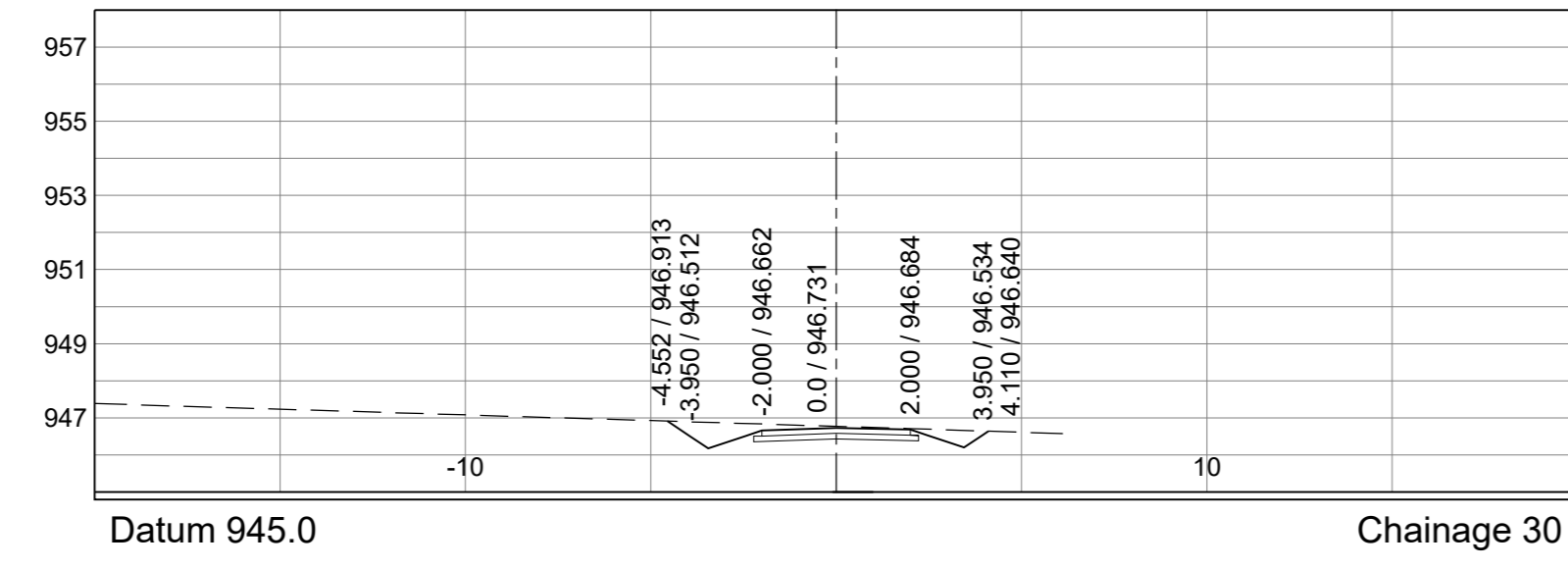
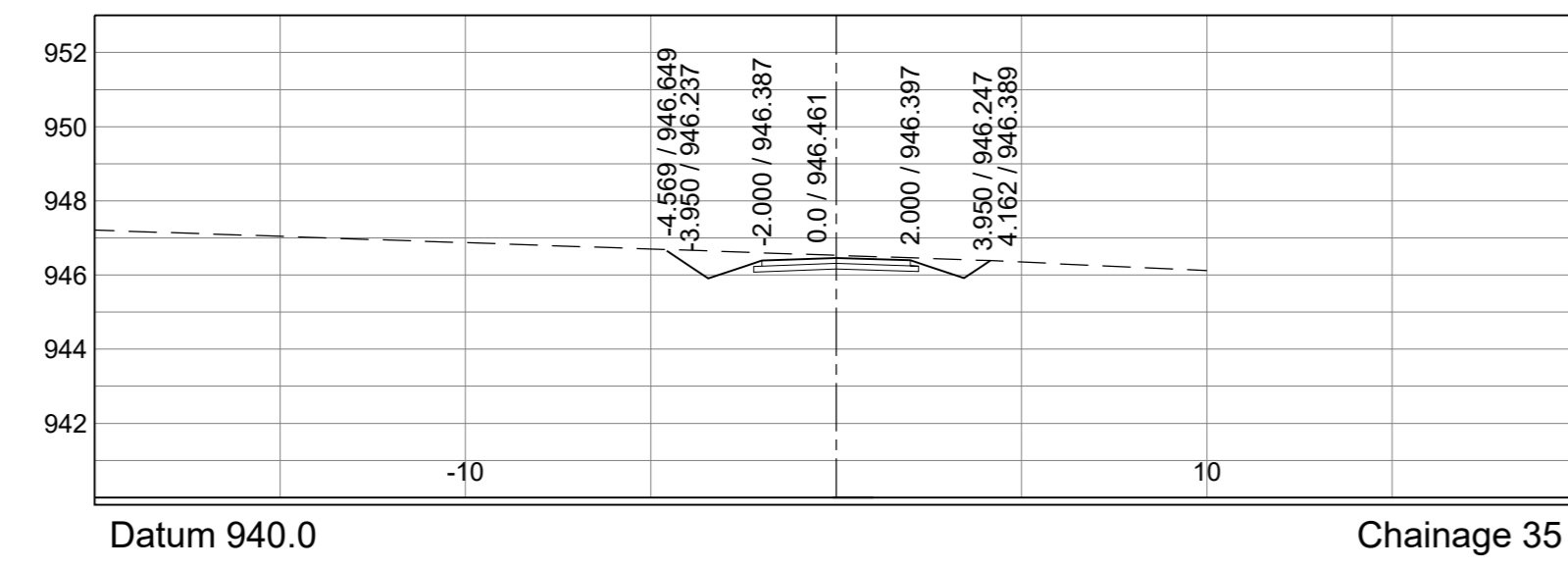
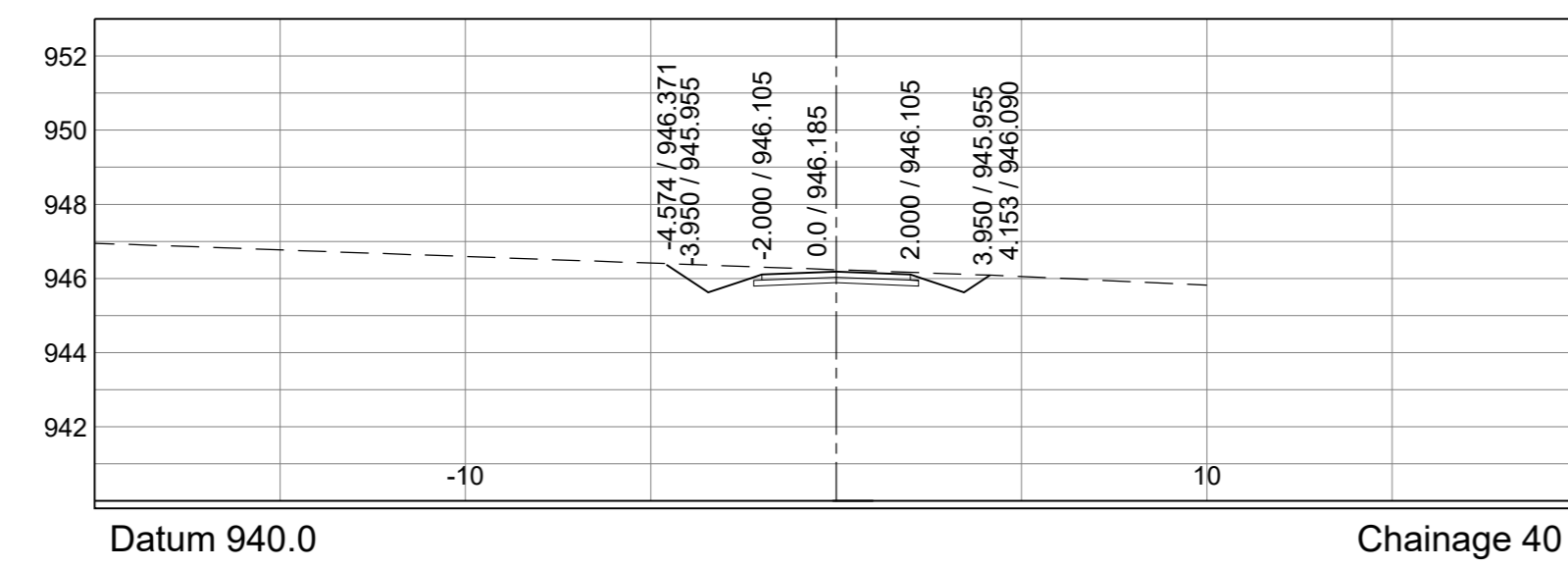
Scale  
 Vertical Scale 1 : 200  
 Horizontal Scale 1 : 200

Sheet - 9 of 14  
 REVISION: A  
**C 47648**

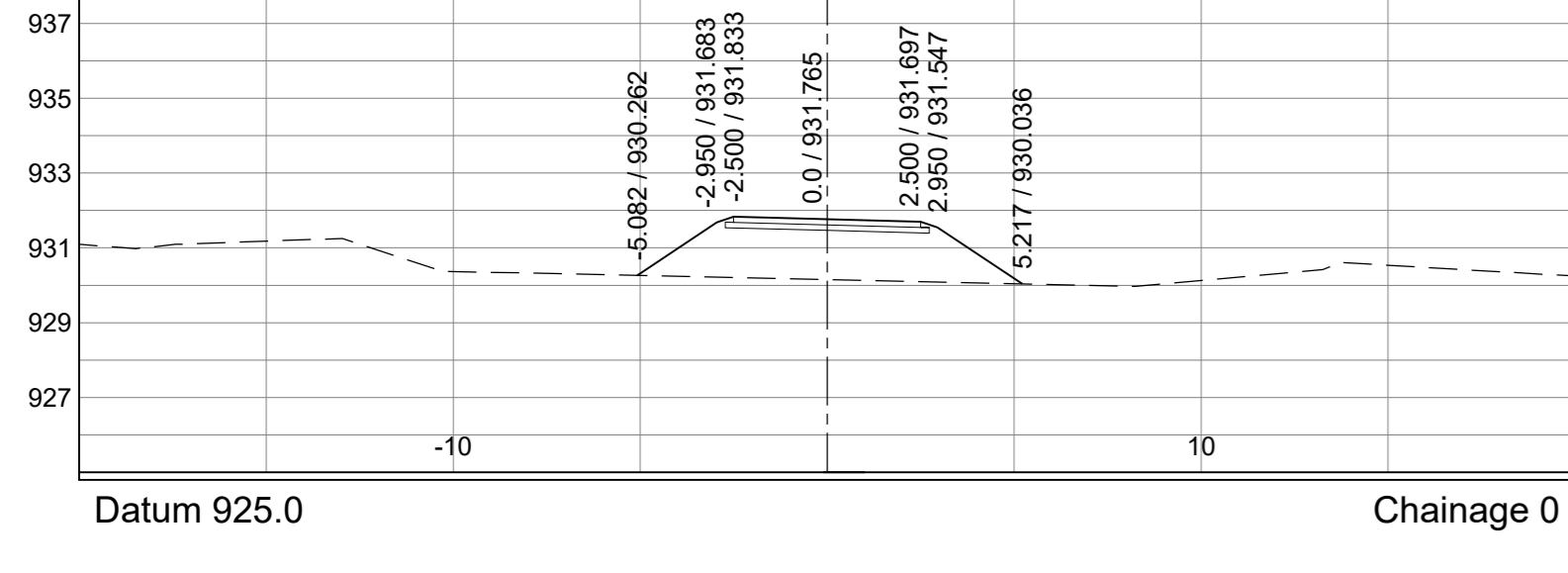
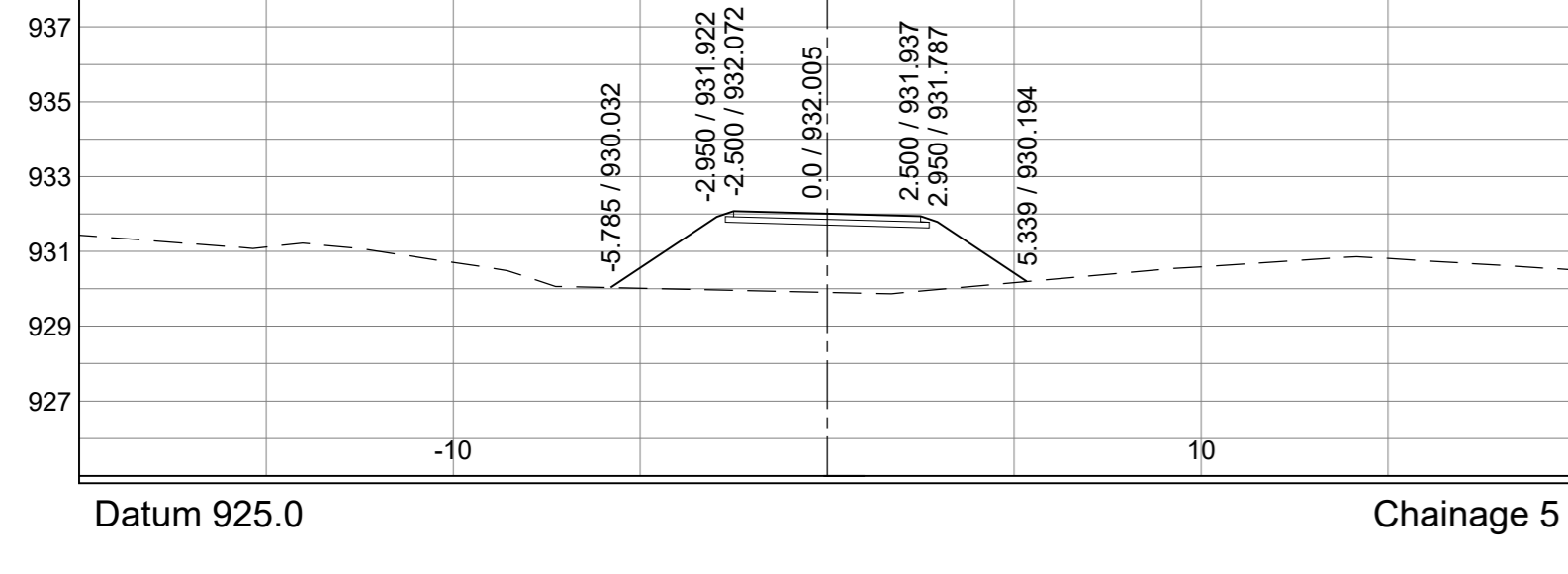
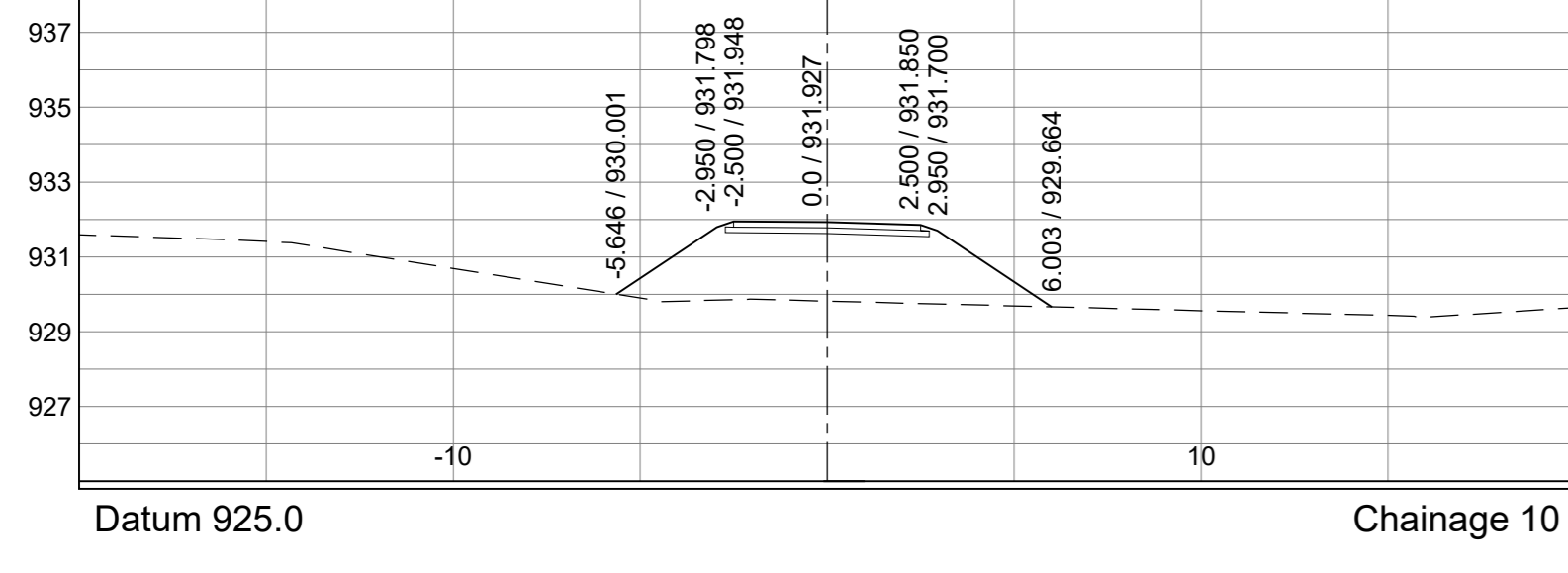
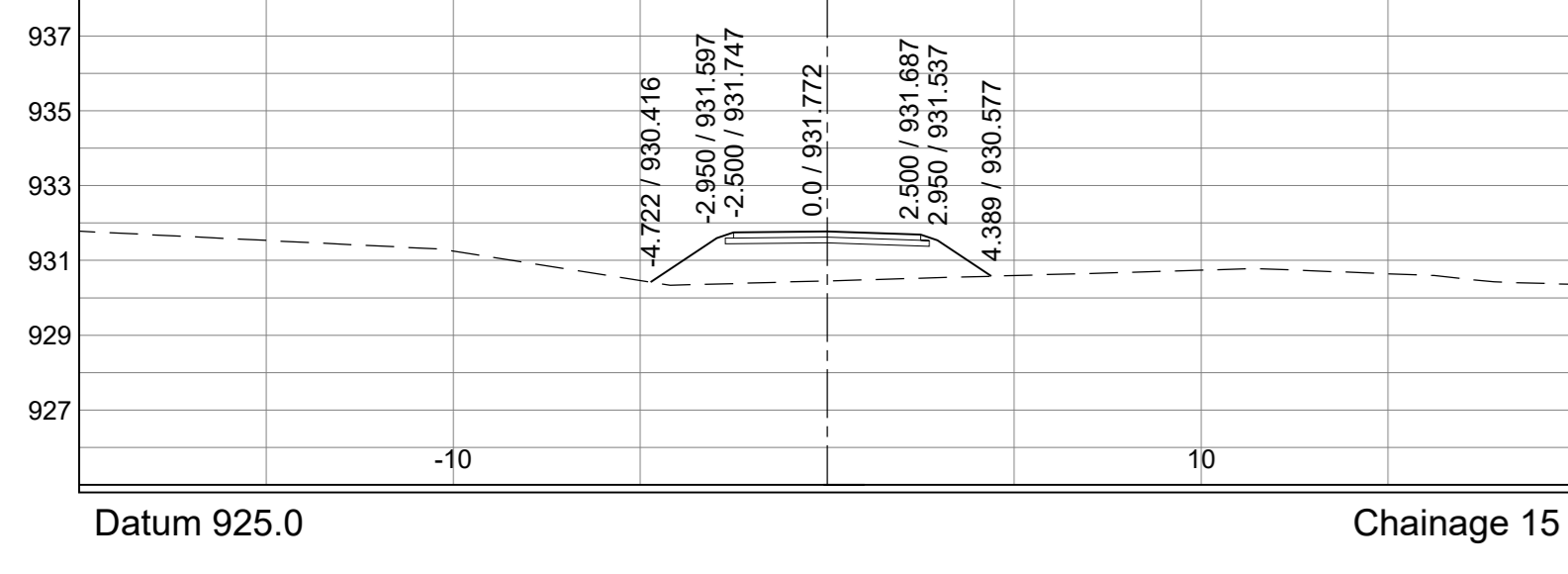
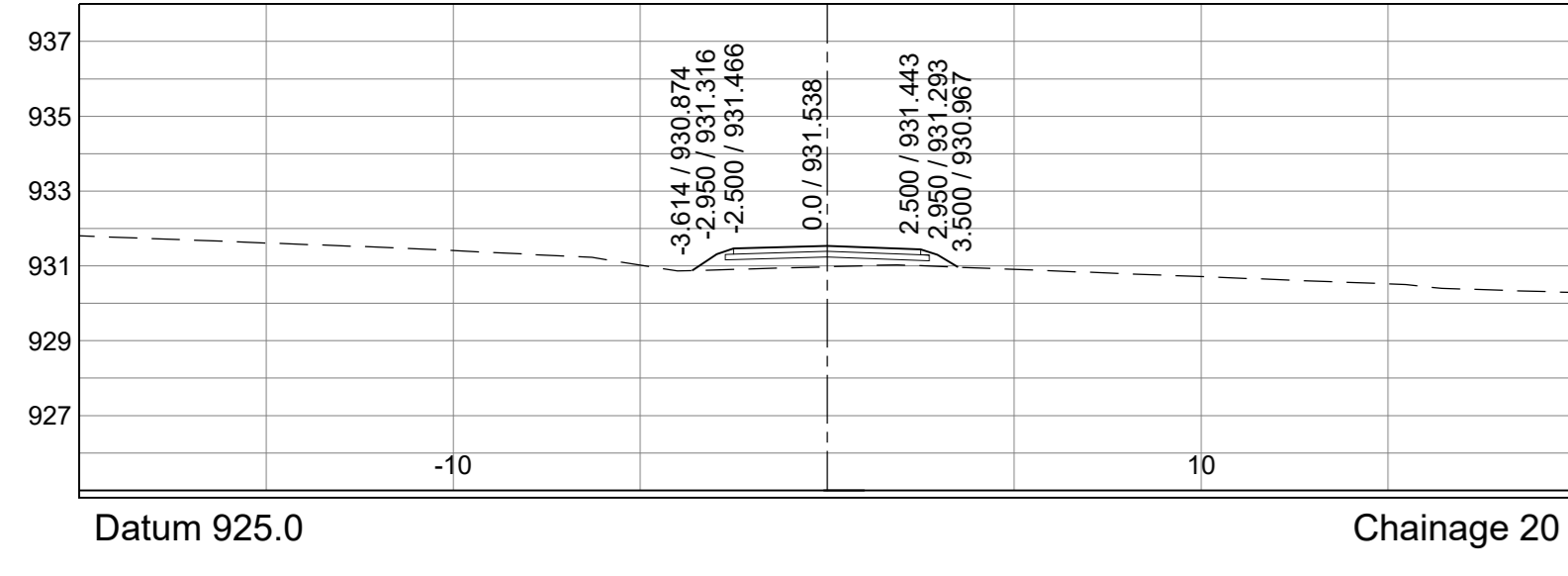
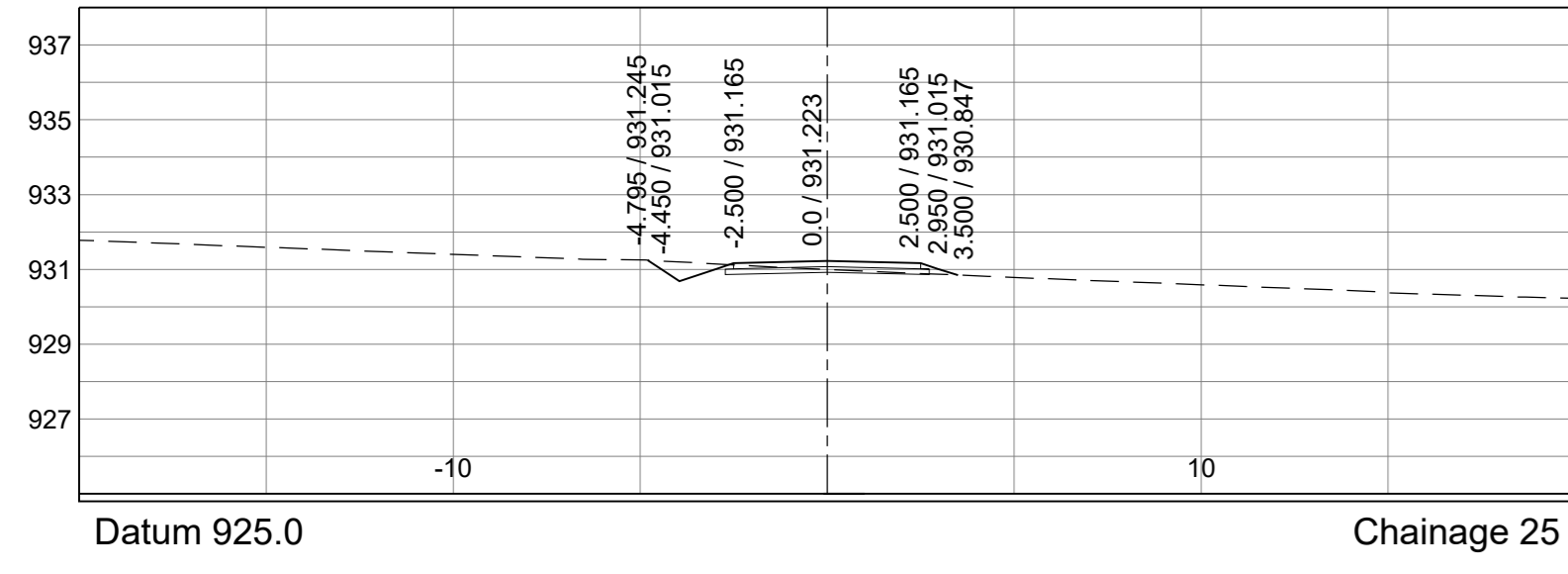
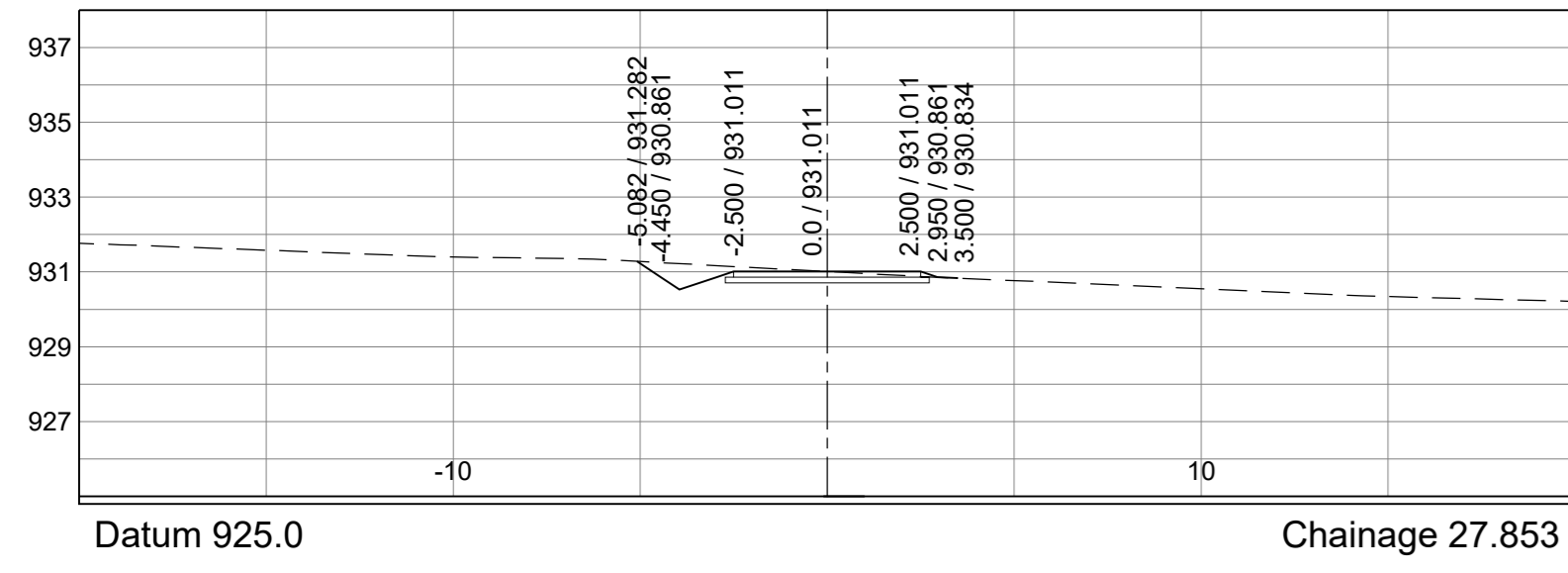
C 47648



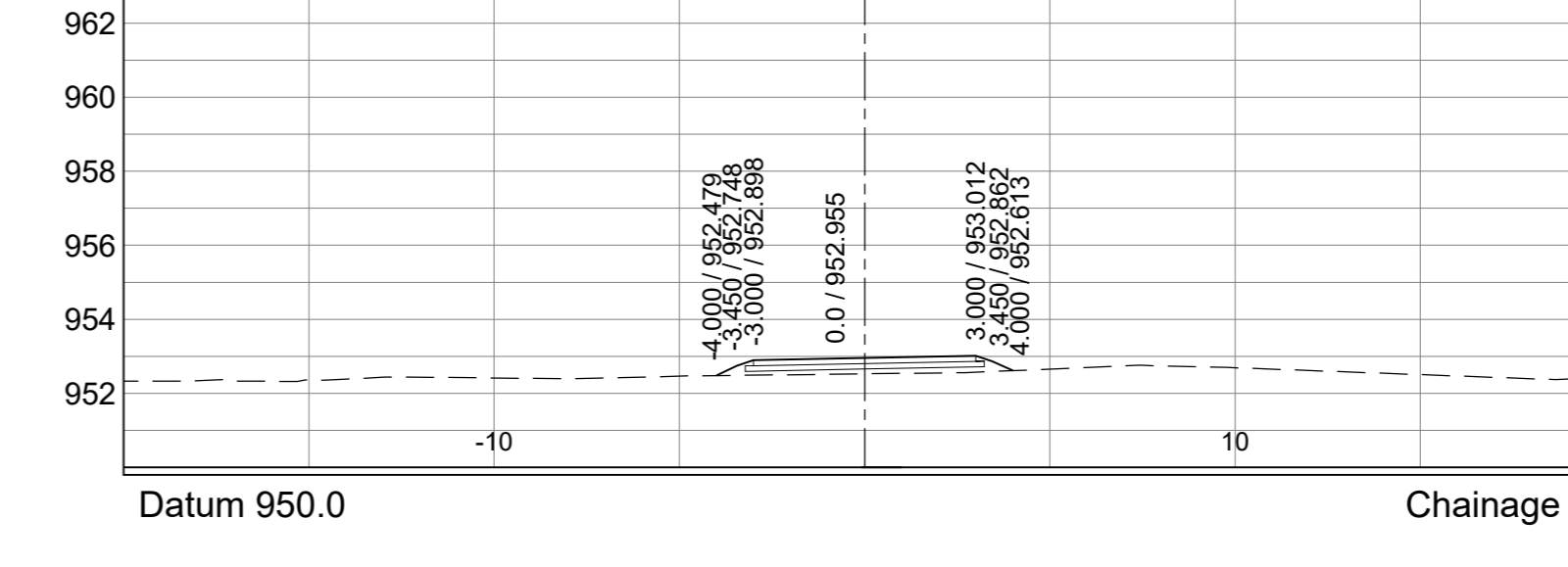
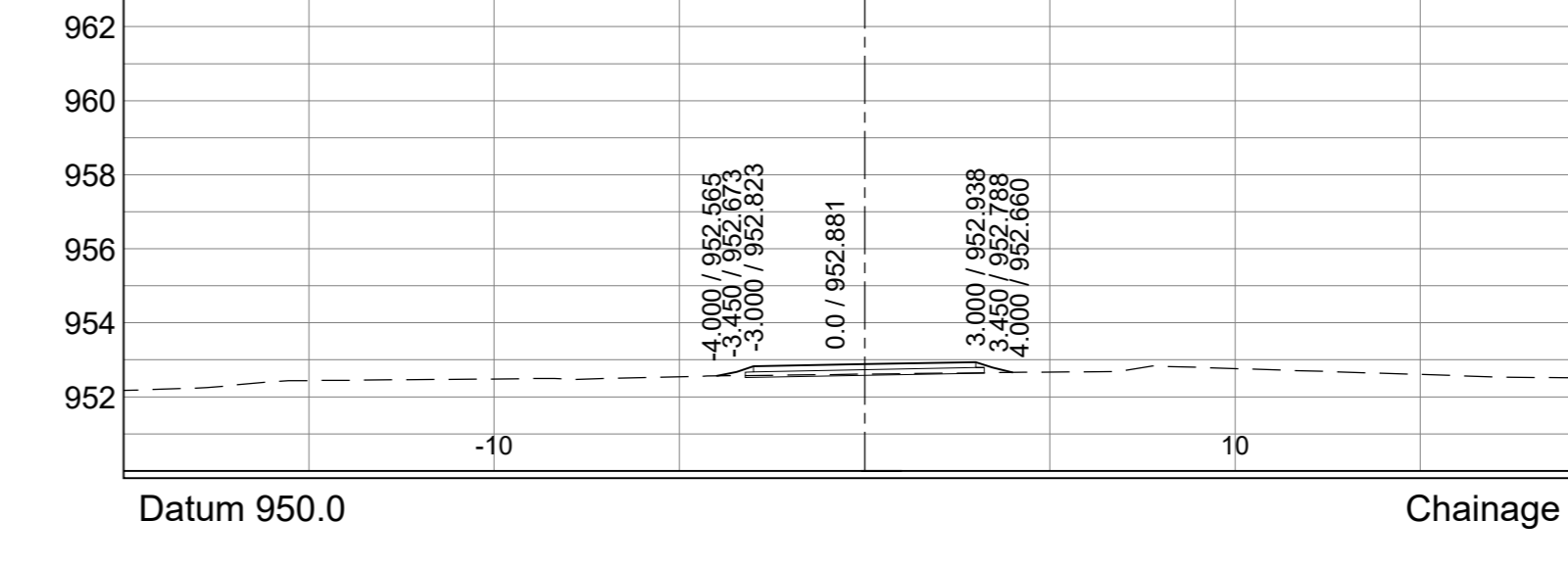
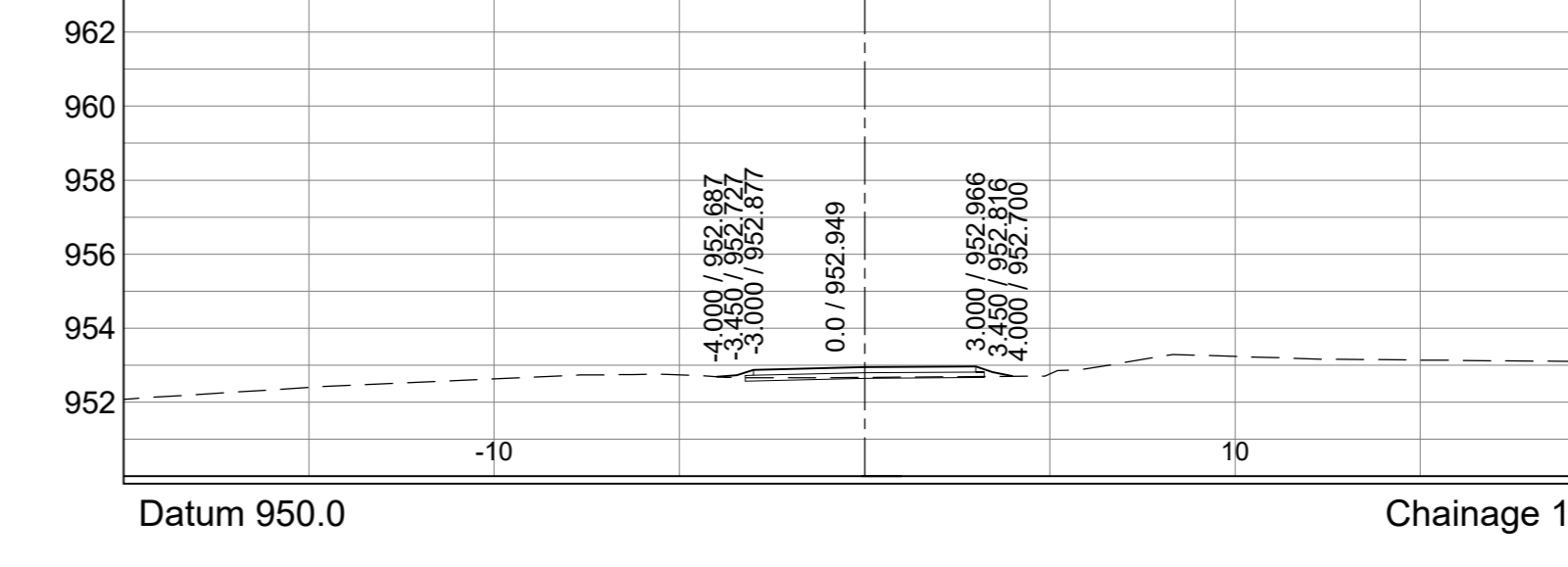
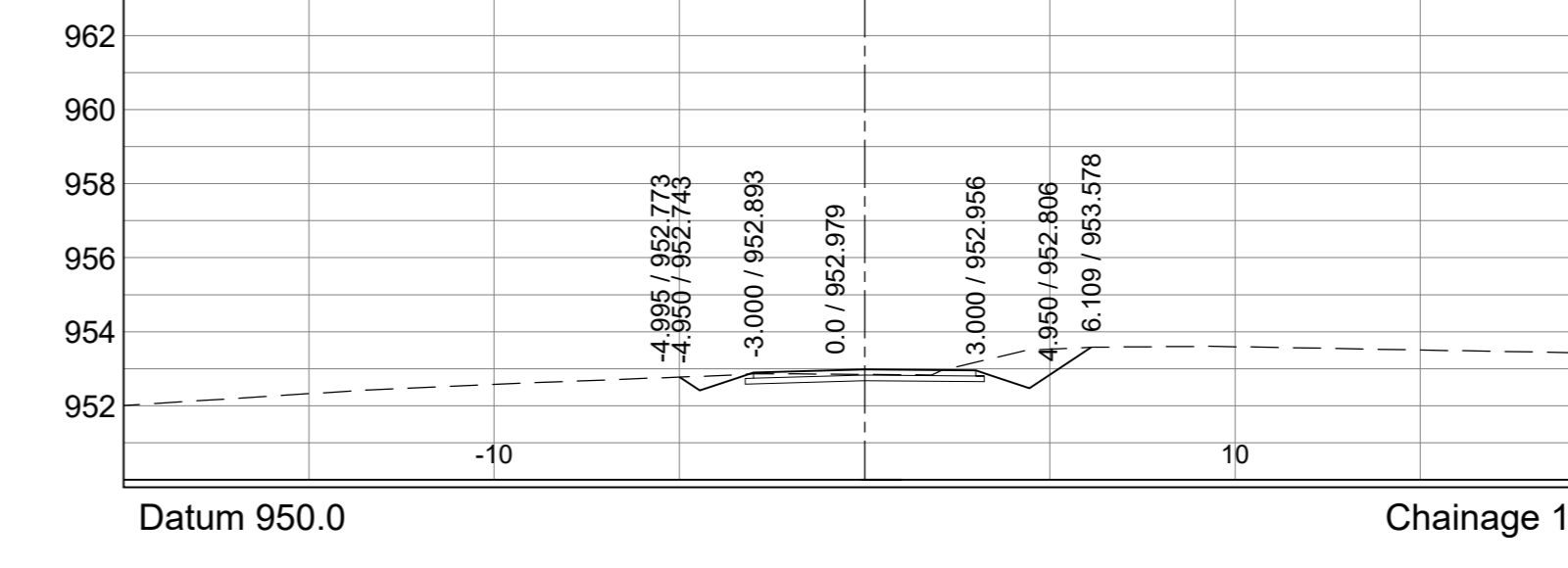
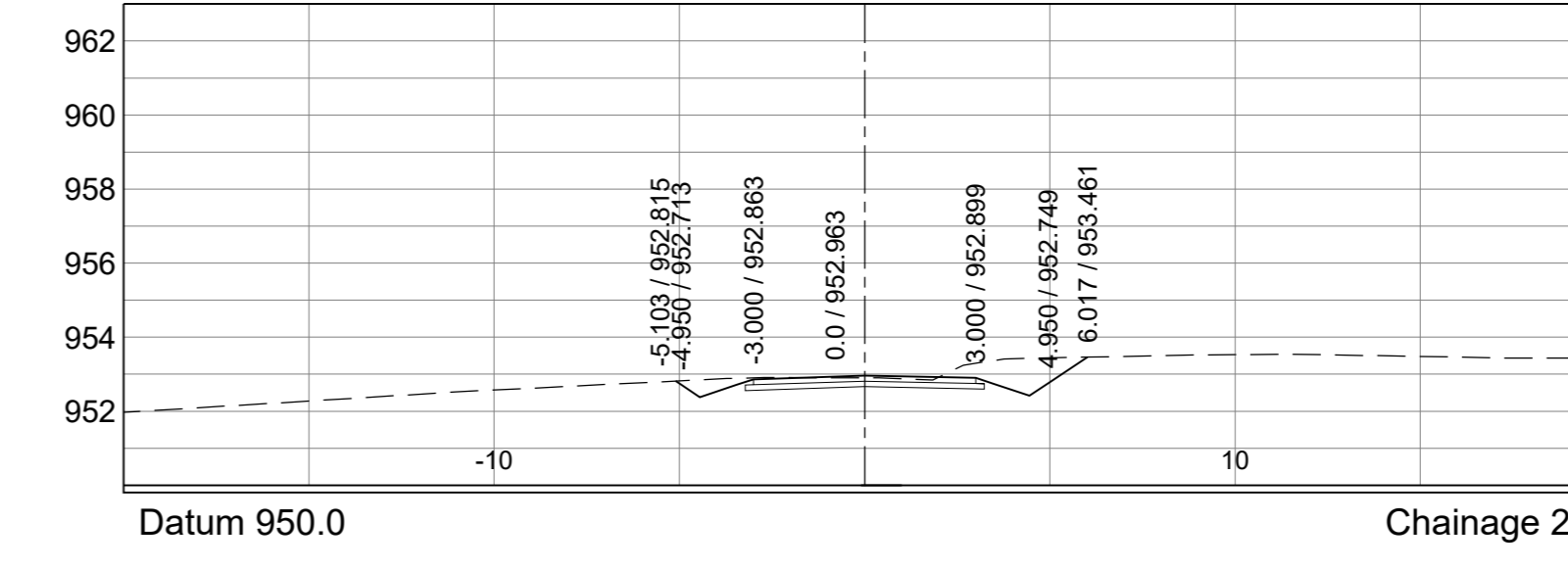
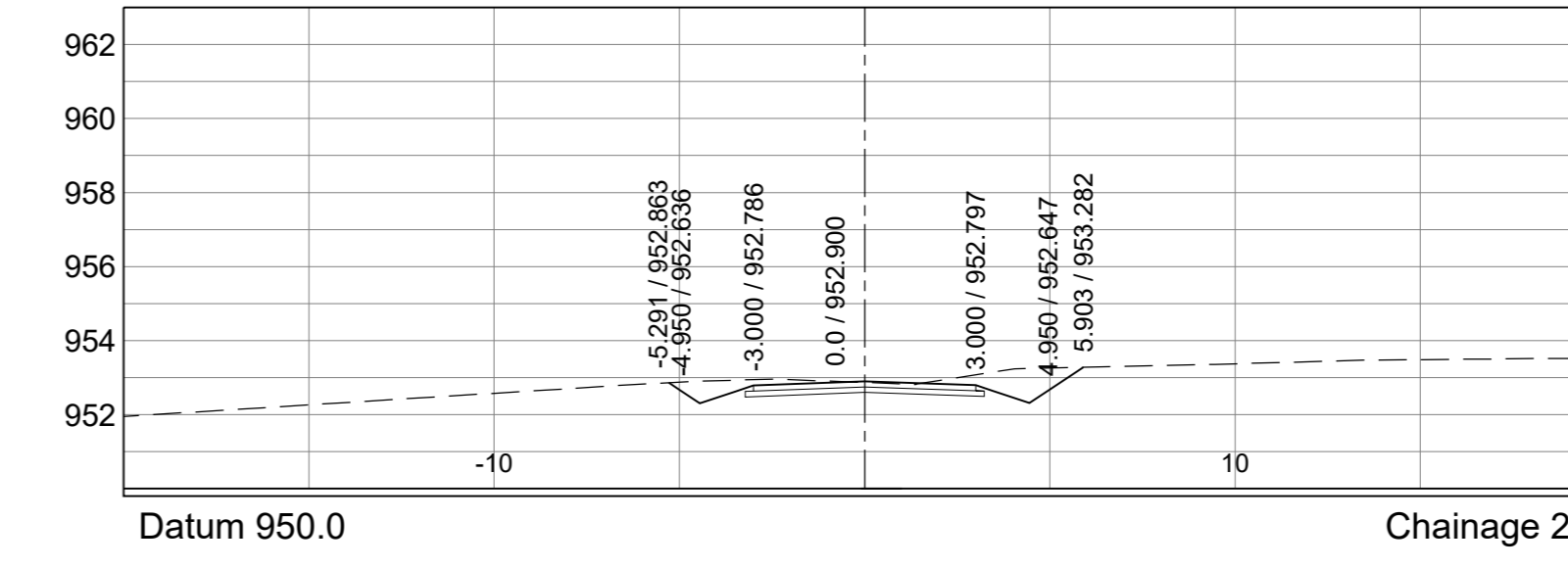
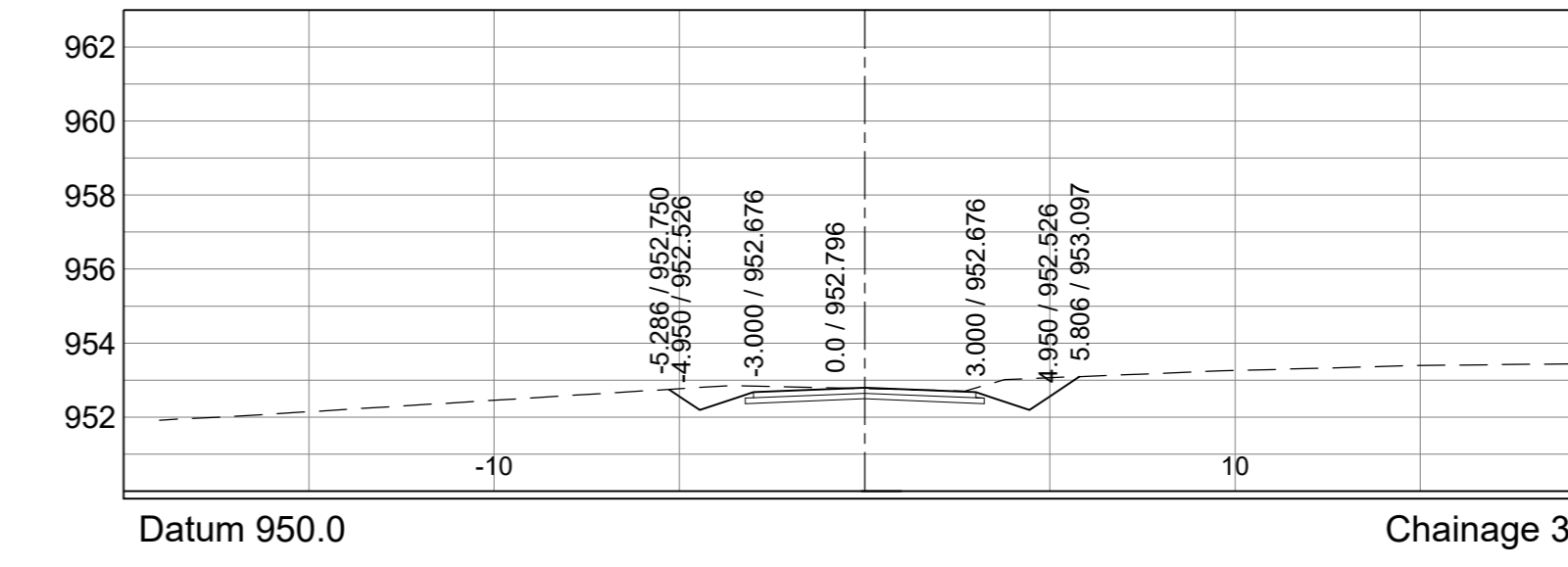
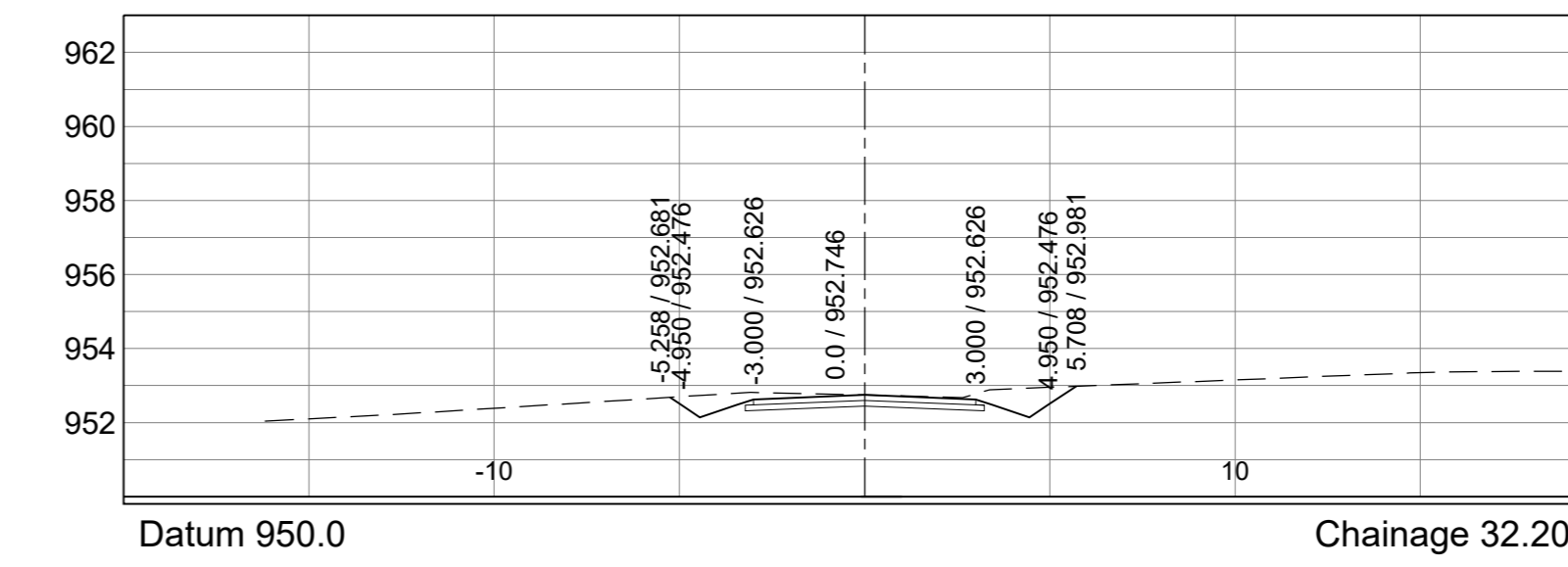
ACCESS @ KM 18+251.985 LHS



ACCESS @ KM 17+587.567 RHS



ACCESS @ KM 18+542.754 LHS (L1925)



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

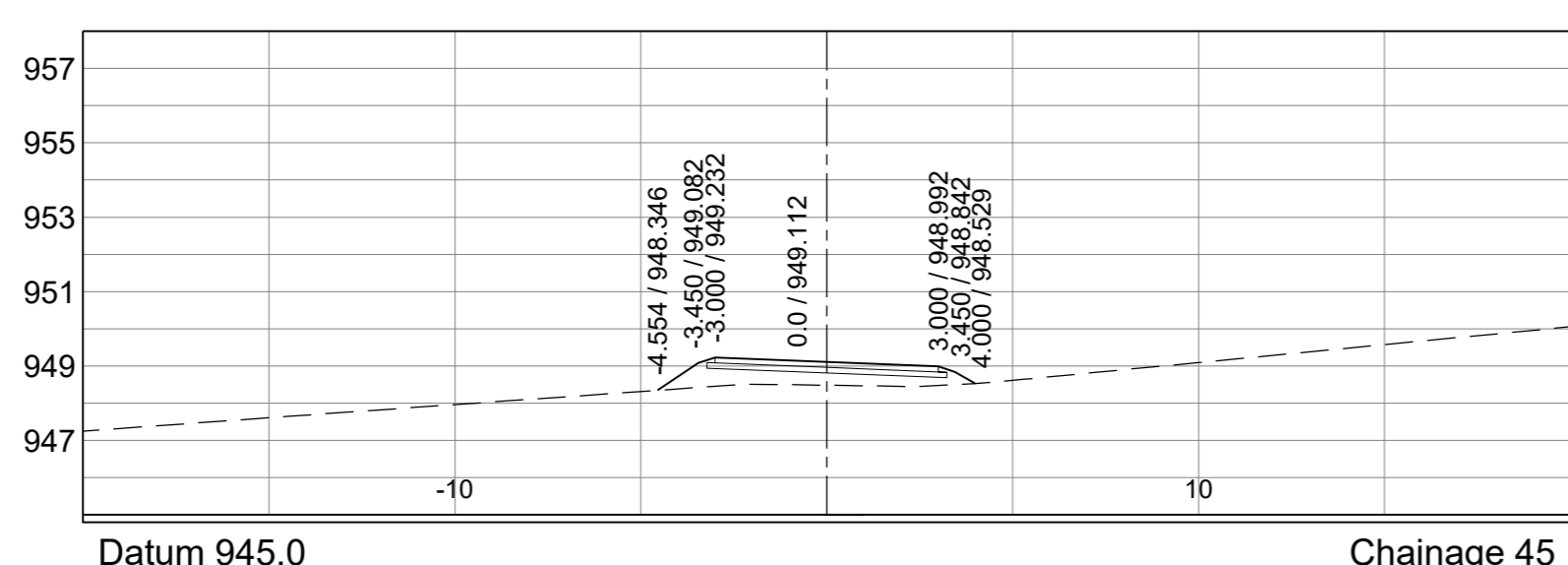
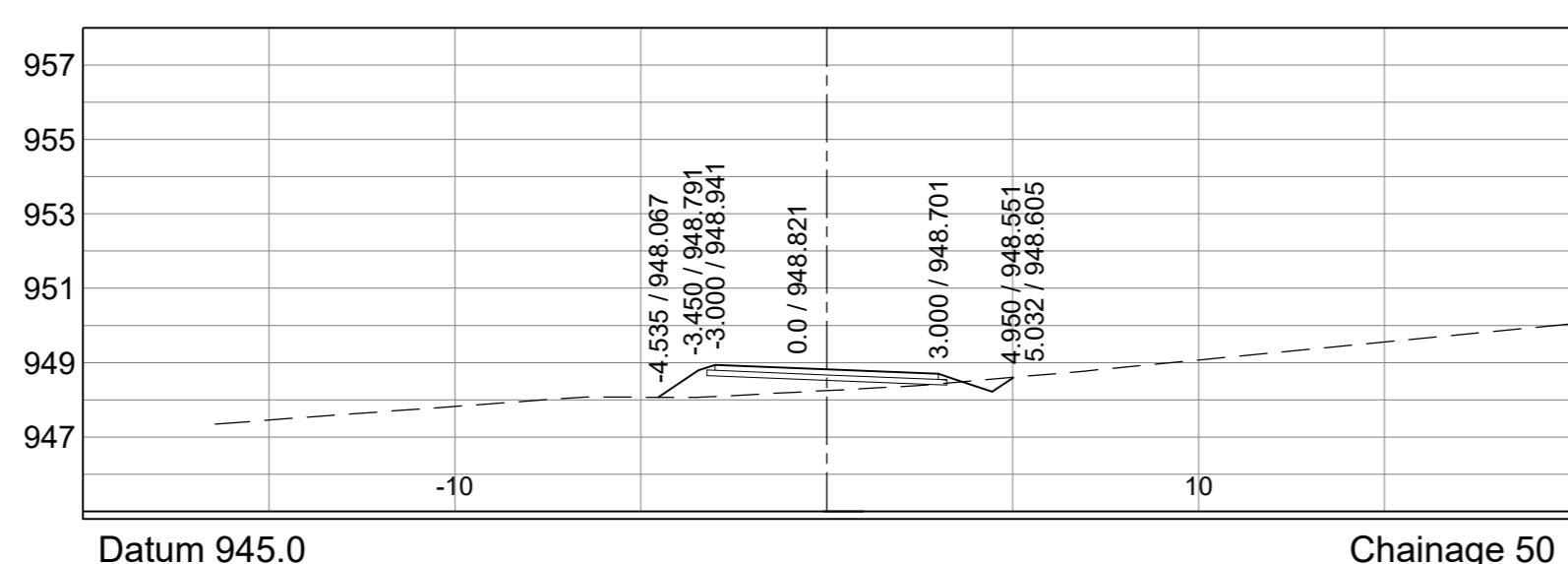
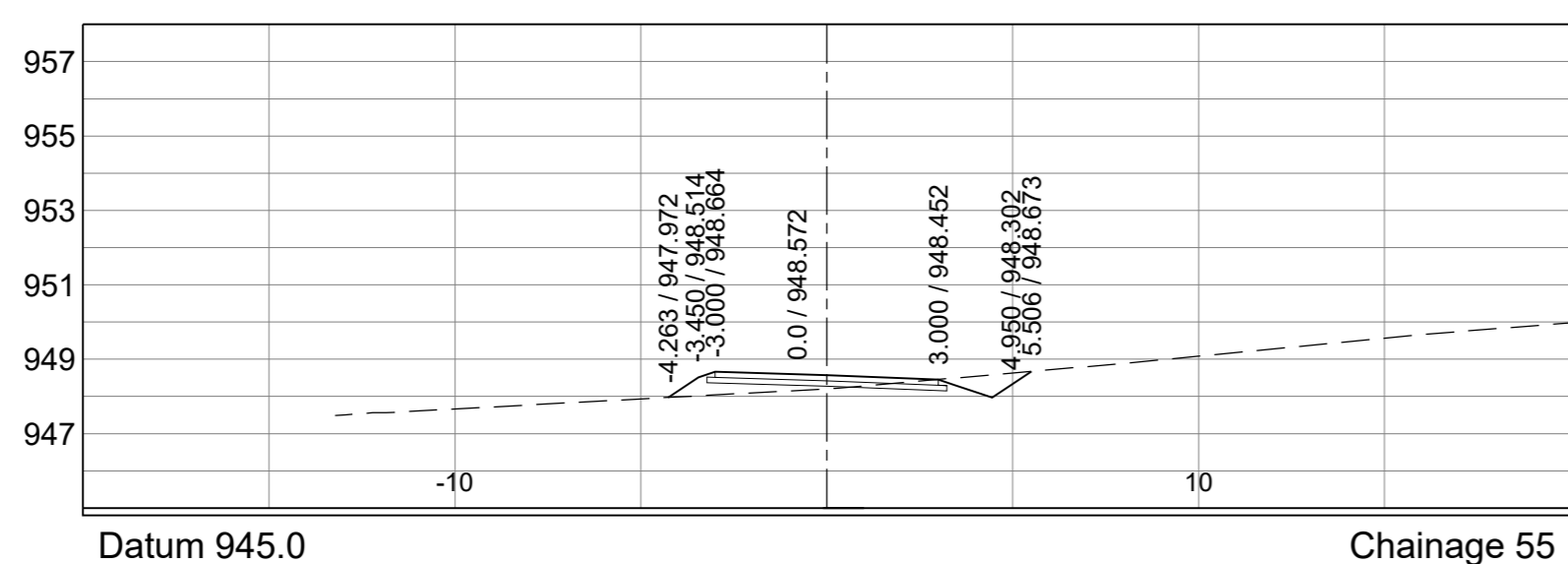
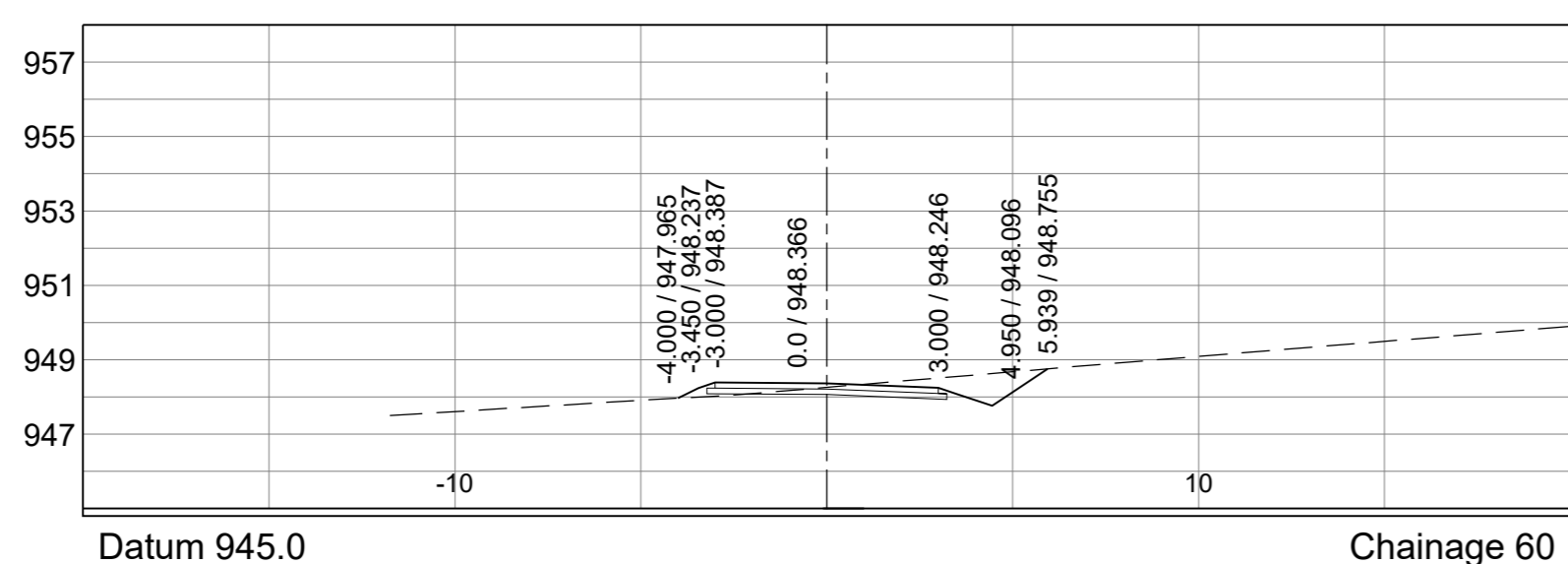
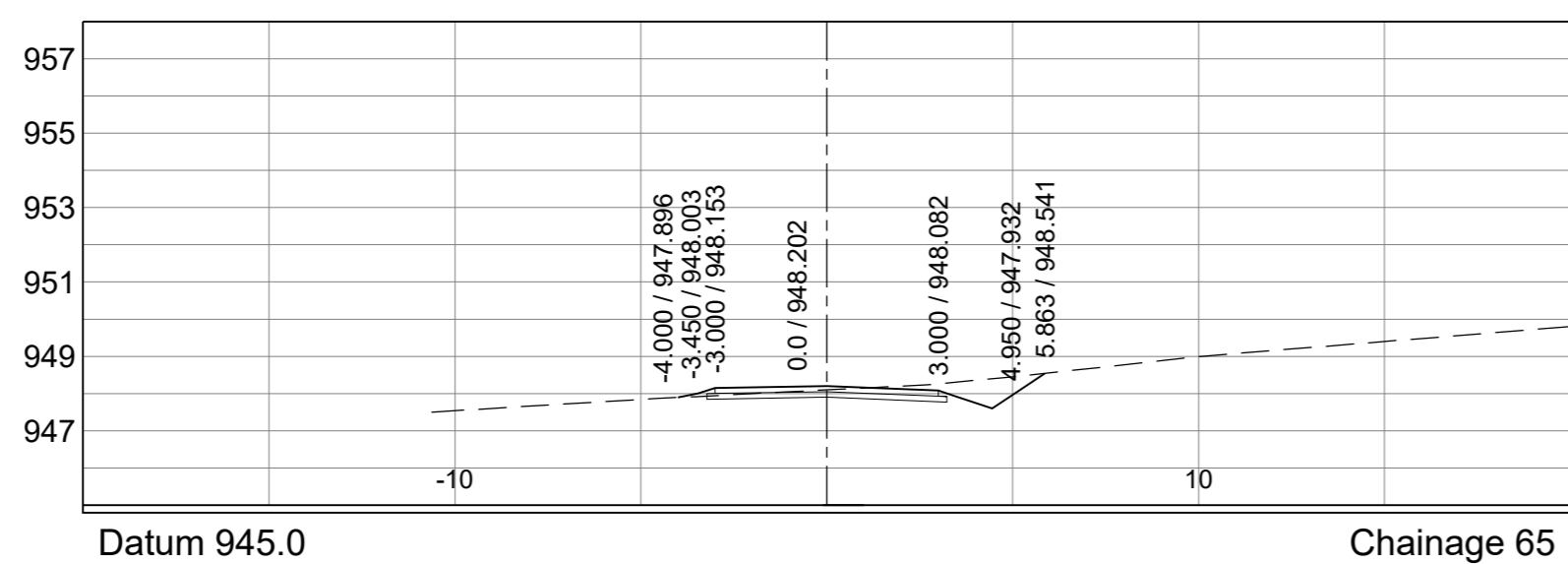
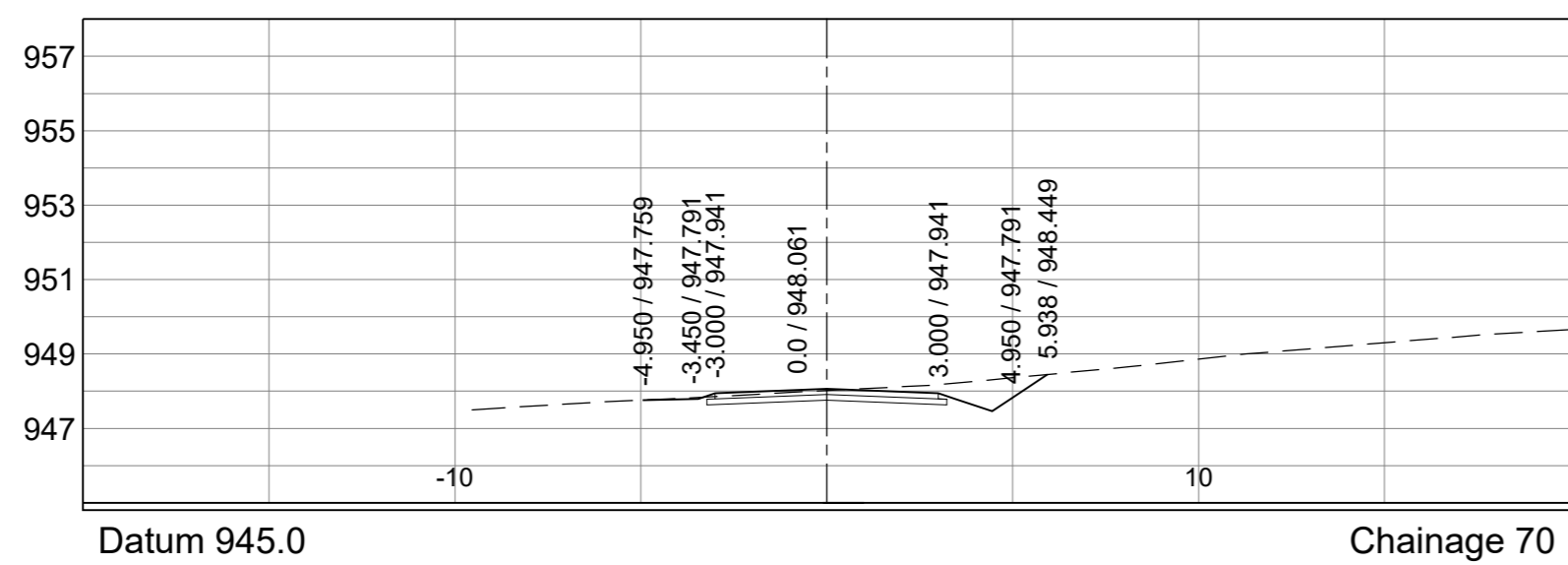
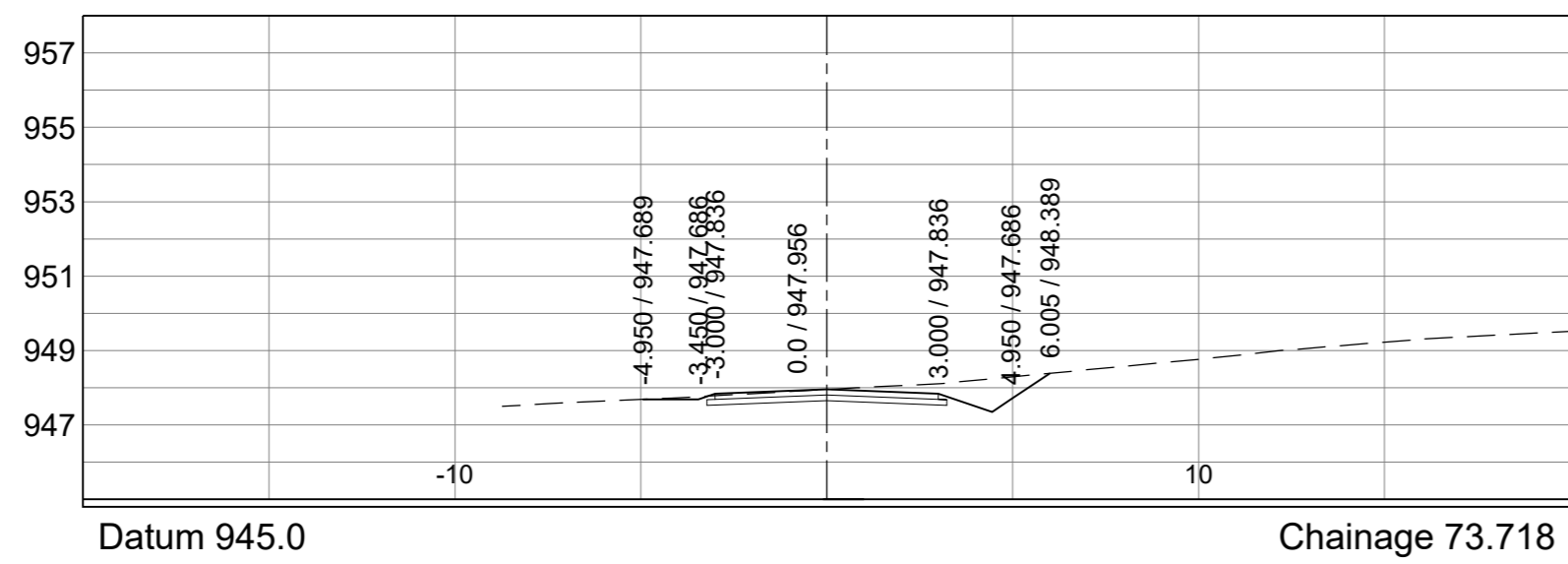
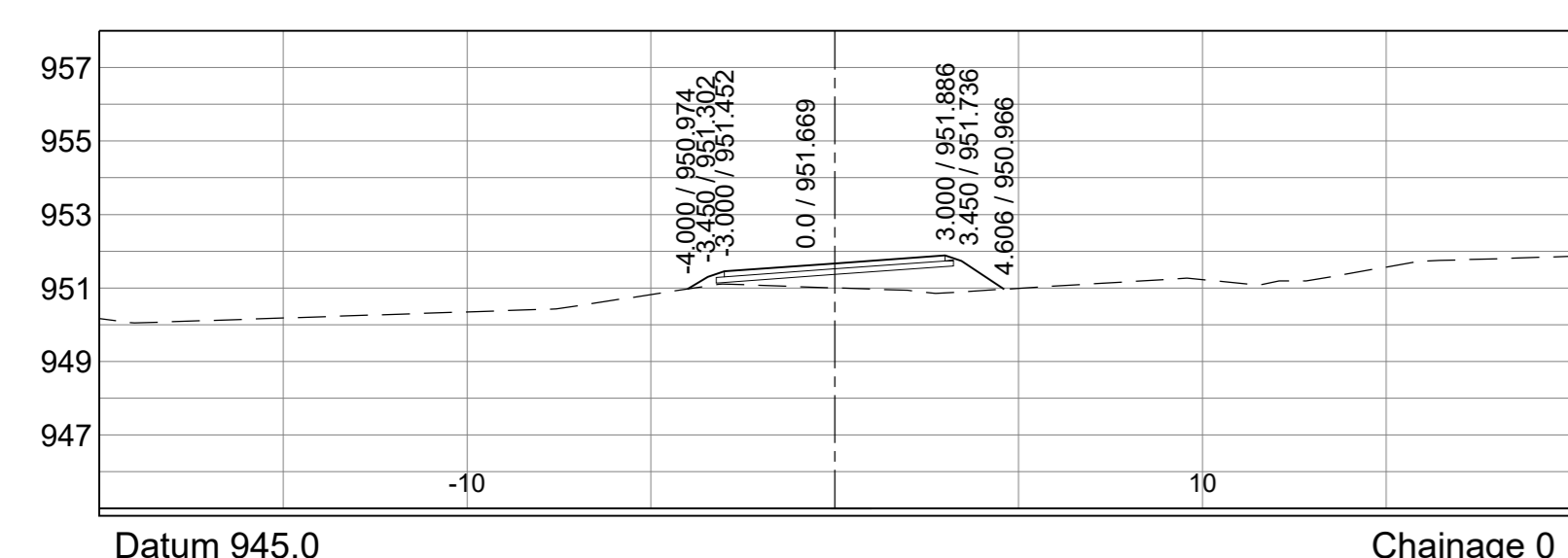
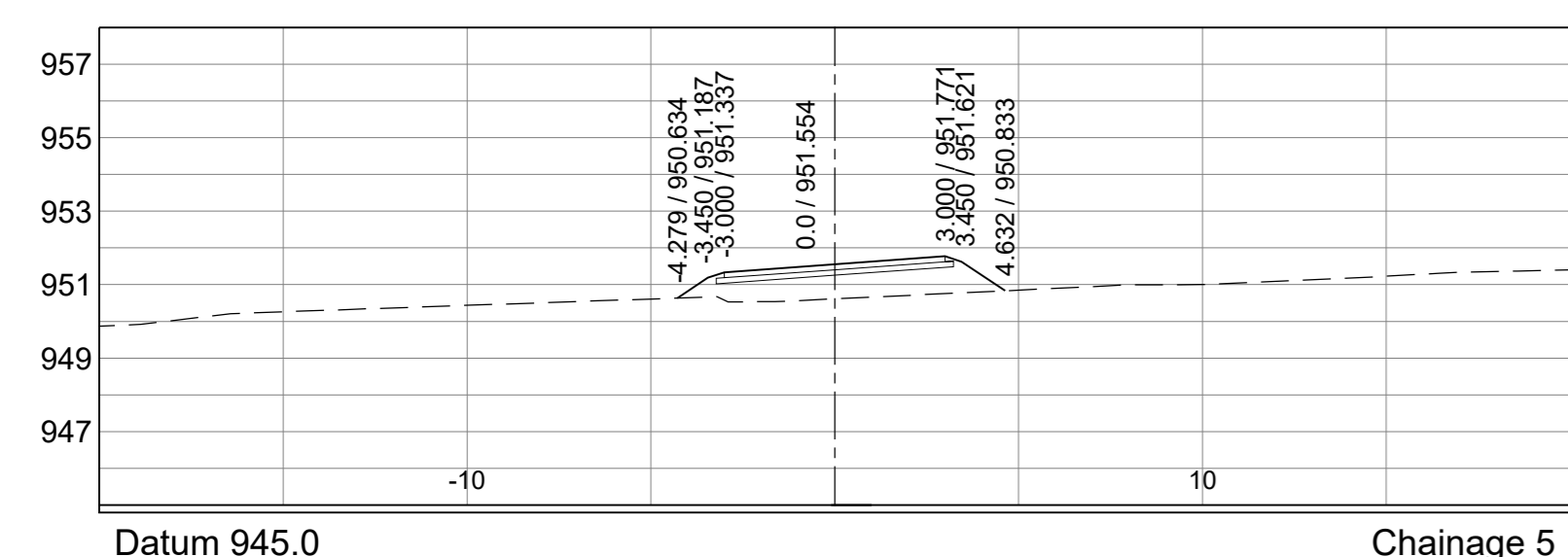
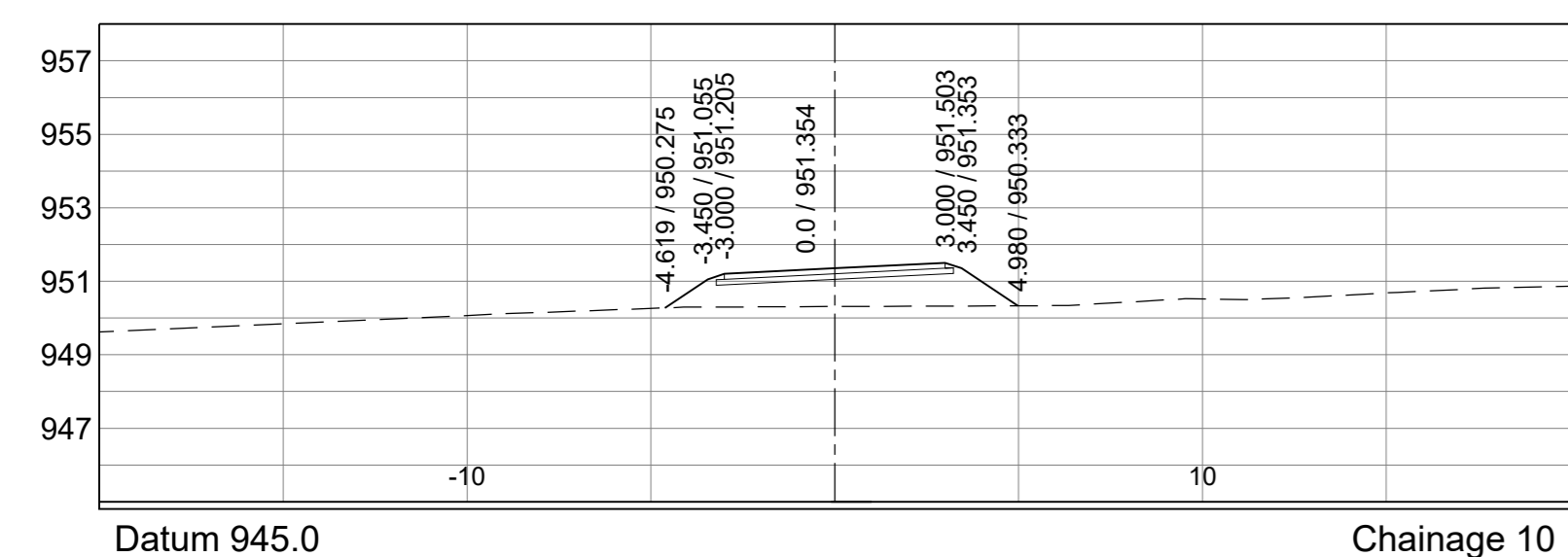
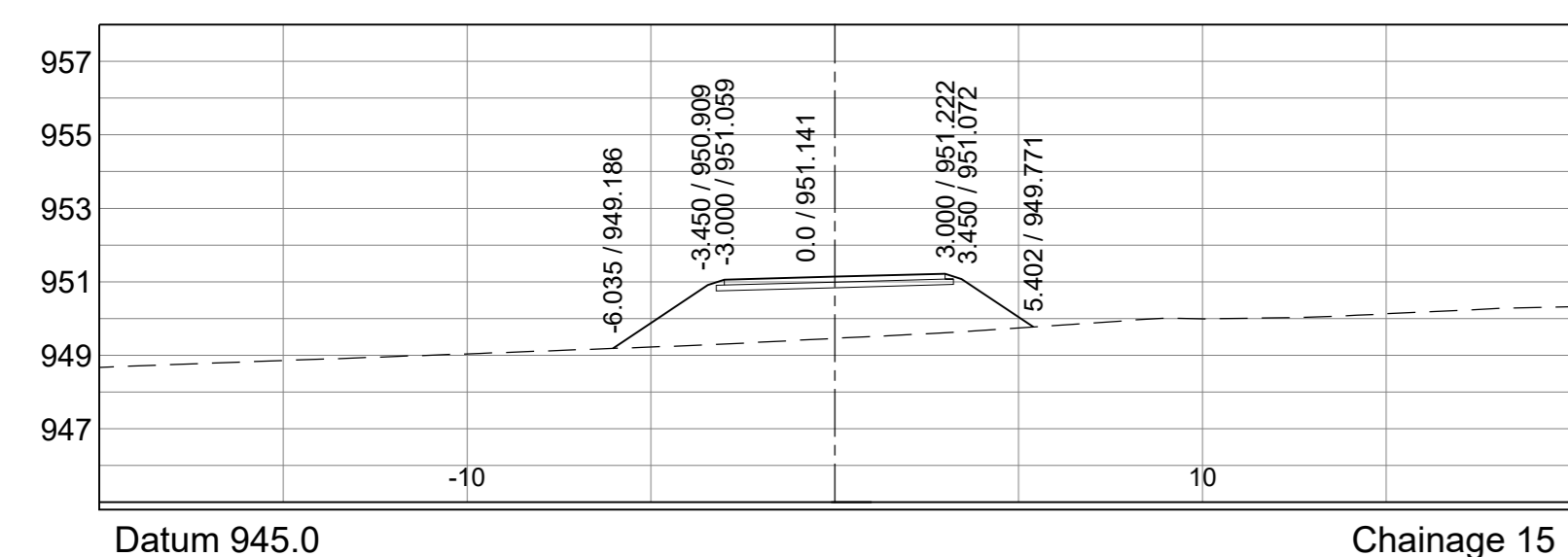
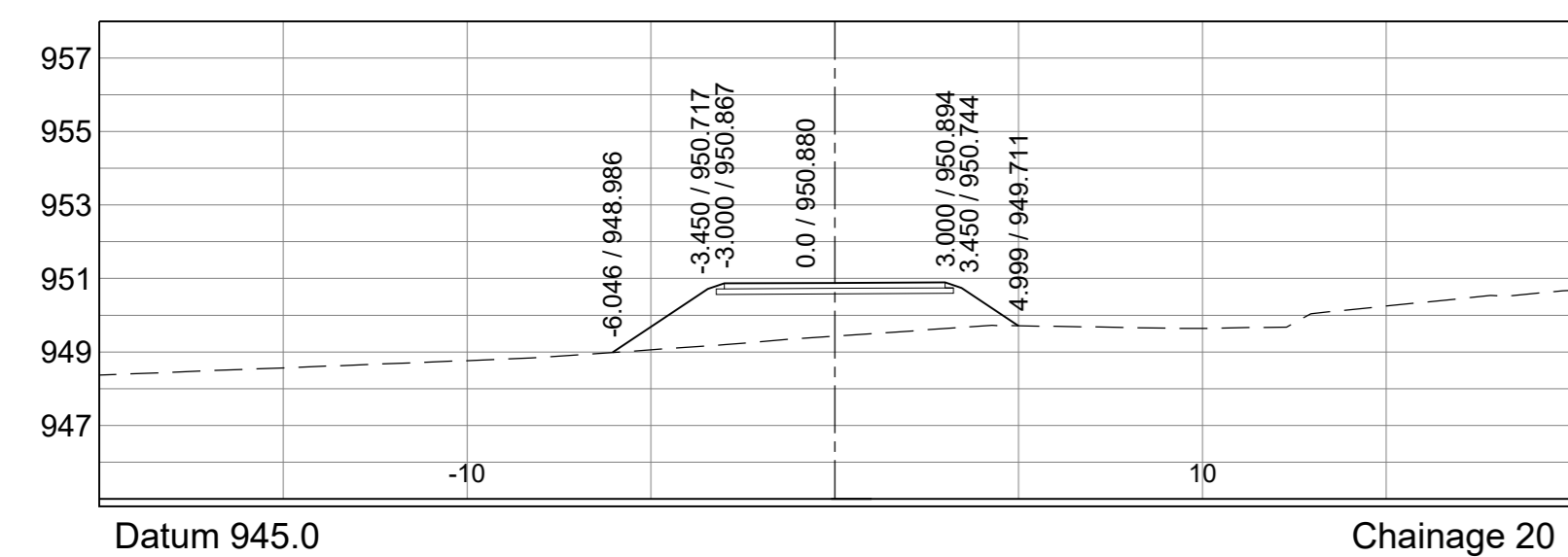
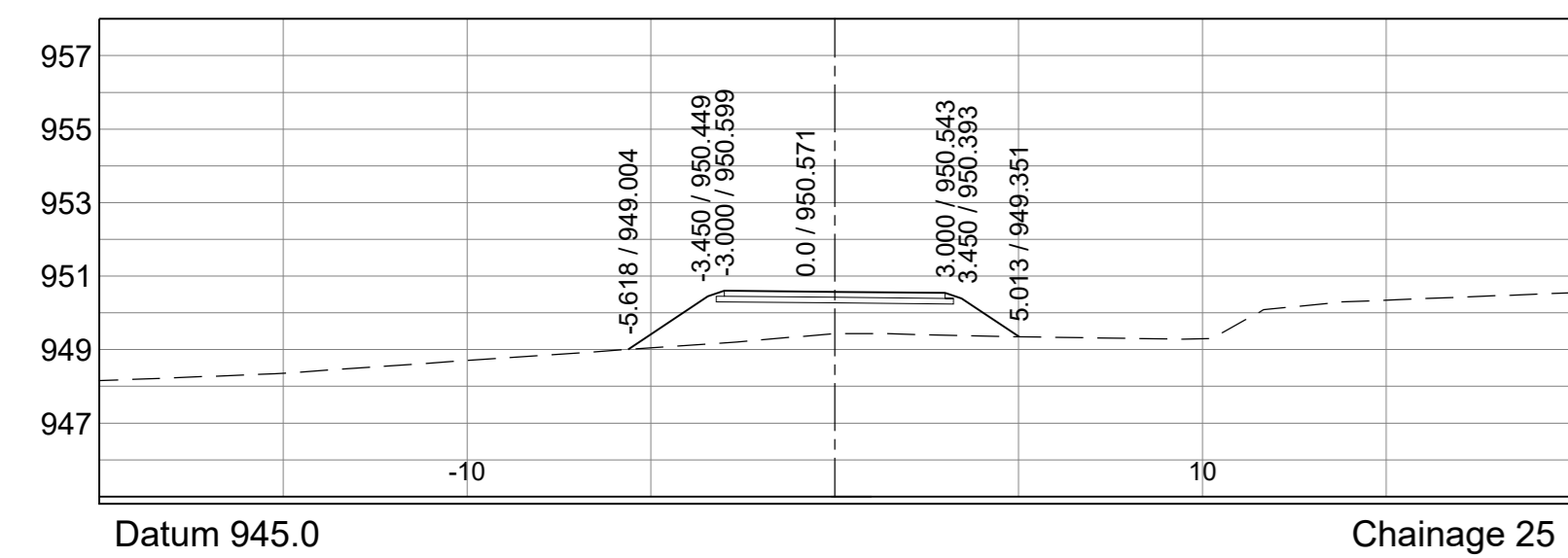
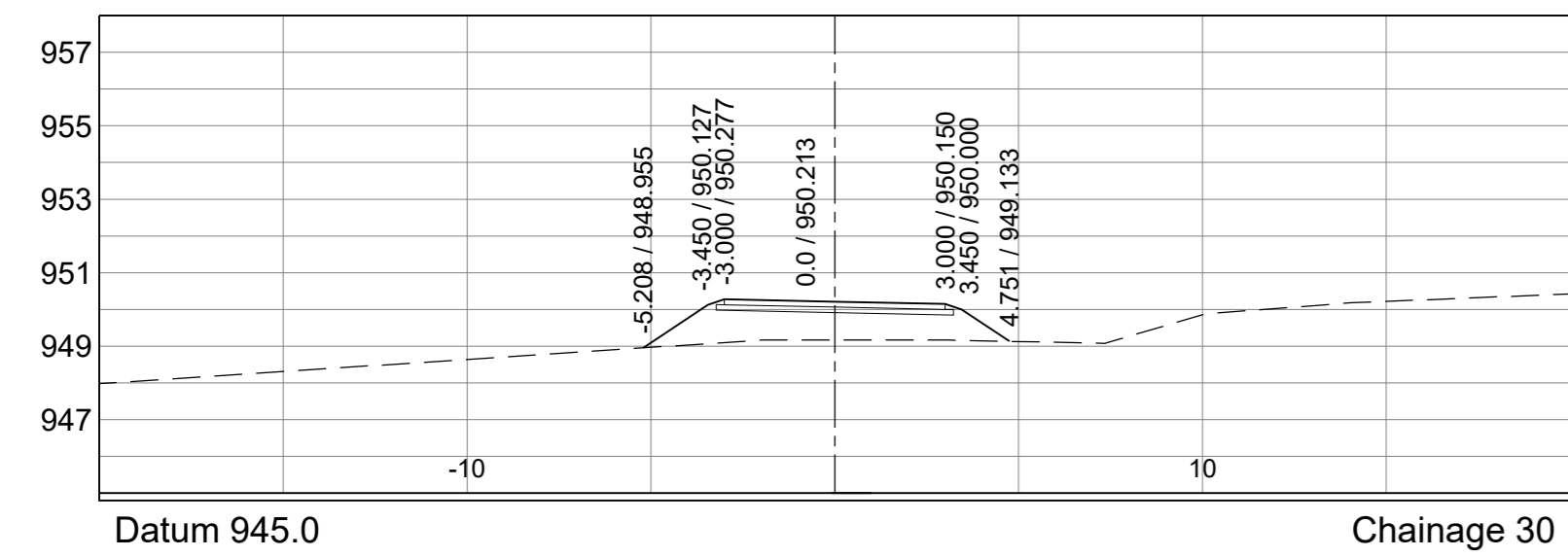
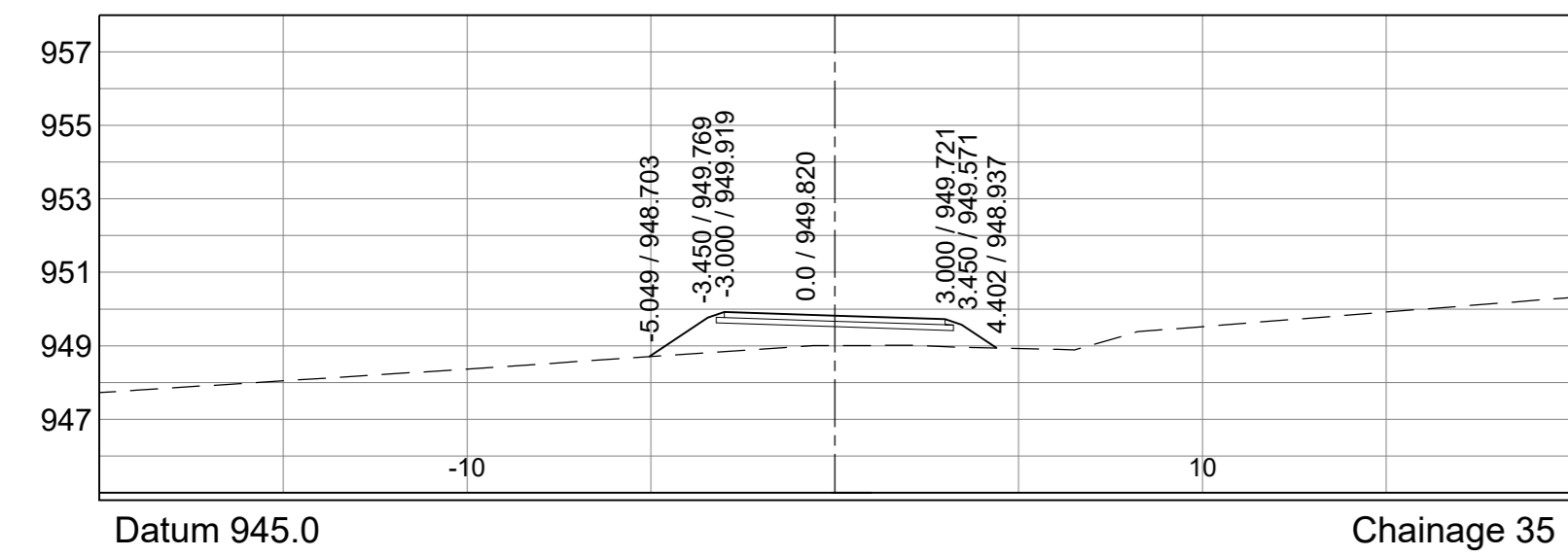
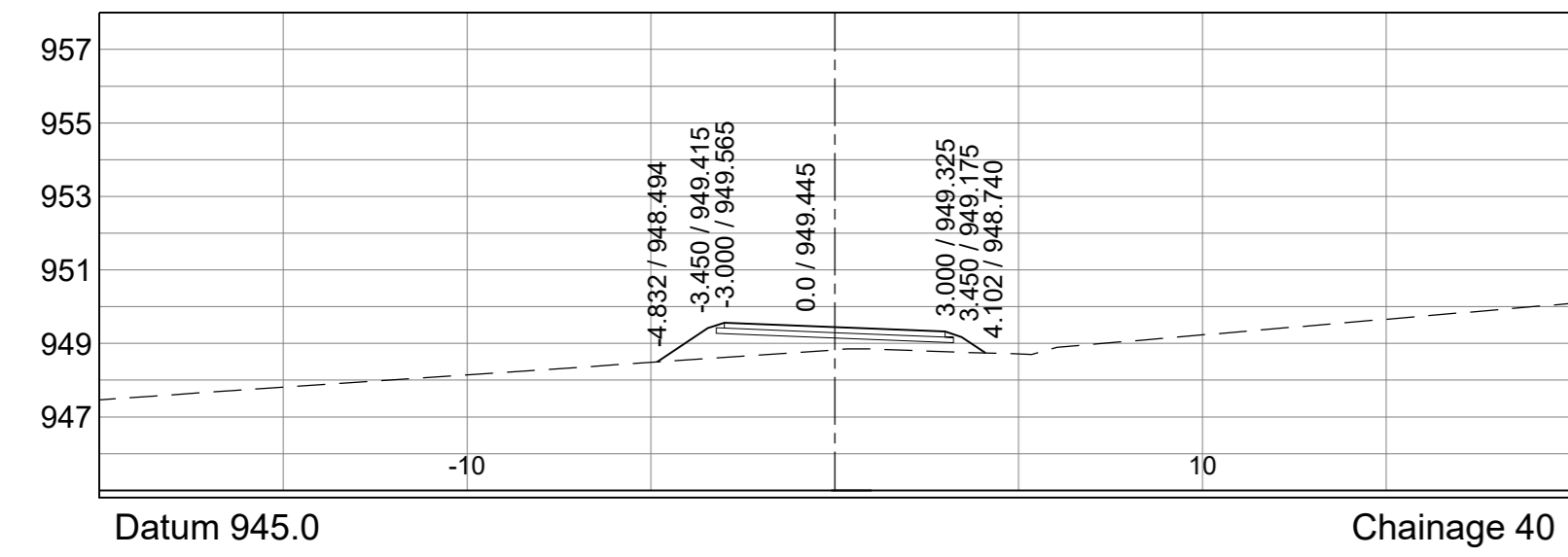
ACCESS ROADS CROSS SECTIONS

Staked km distance km 0+000 - km 0+207.853 km 0+000 - km 0+045.283 km 0+000 - km 0+032.201	Sheet - 10 of - 14	REVISION: A
Scale Vertical Scale 1 : 200 Horizontal Scale 1 : 200	Plan No -	<b>C 47649</b>

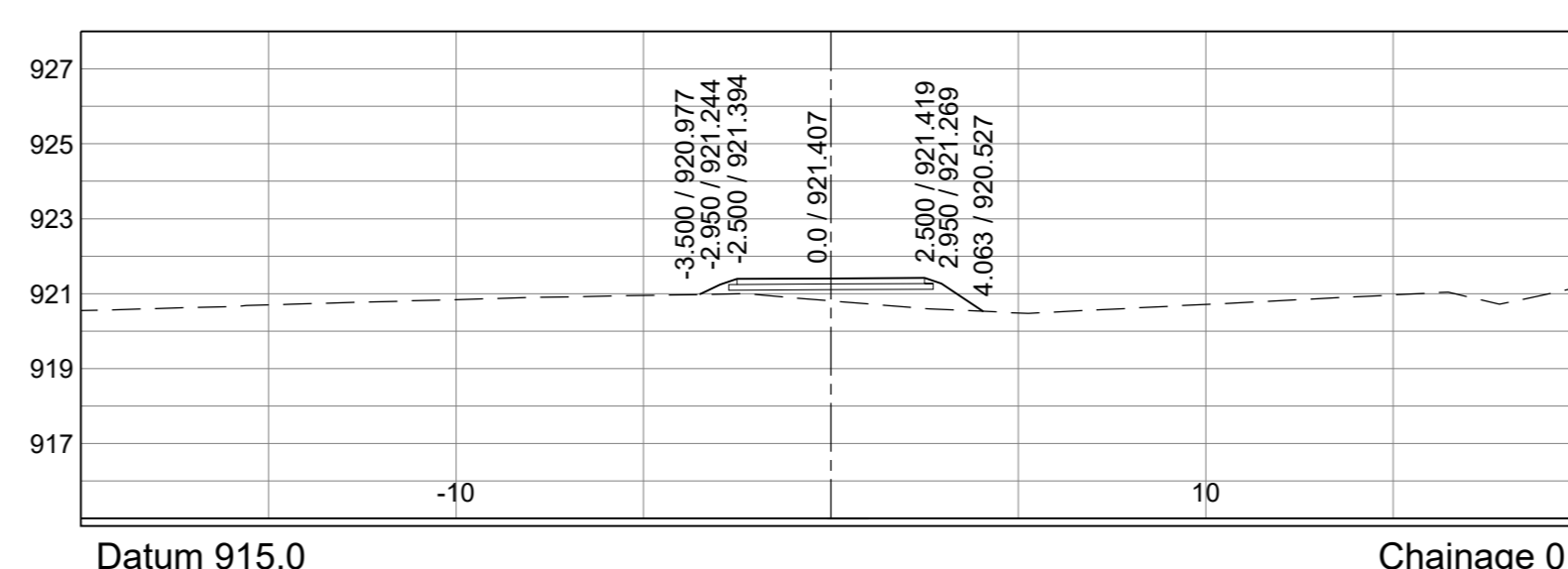
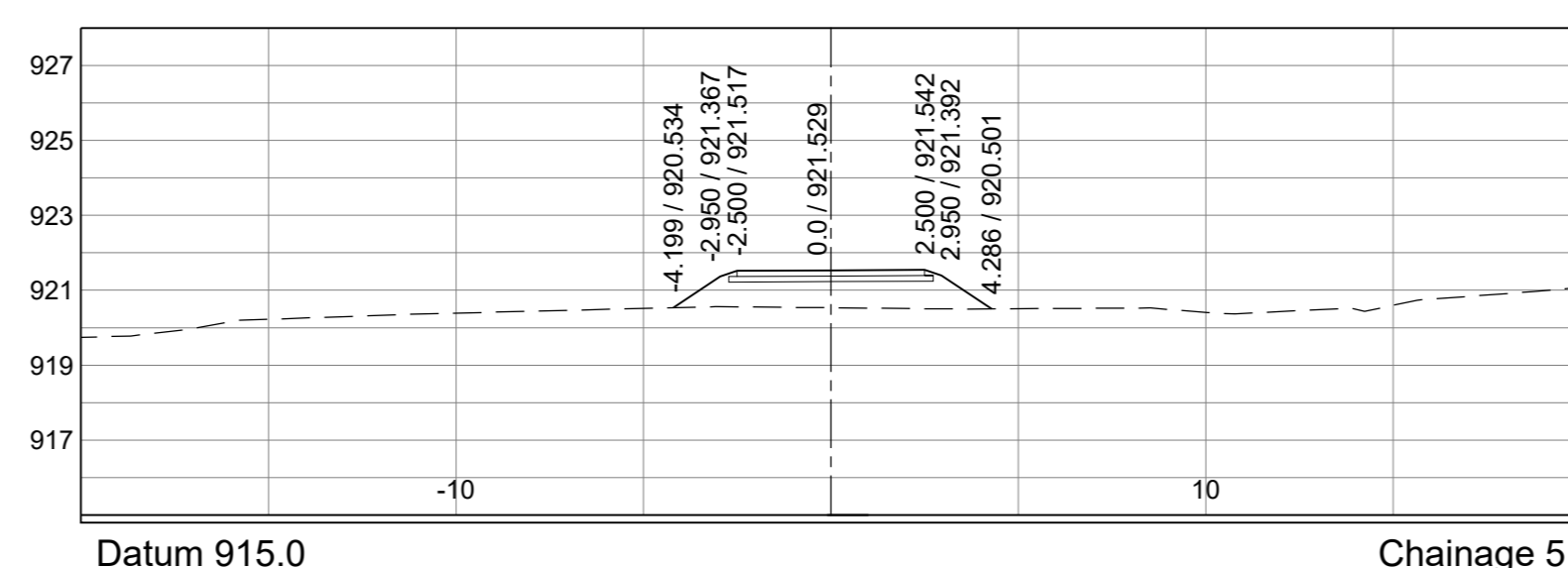
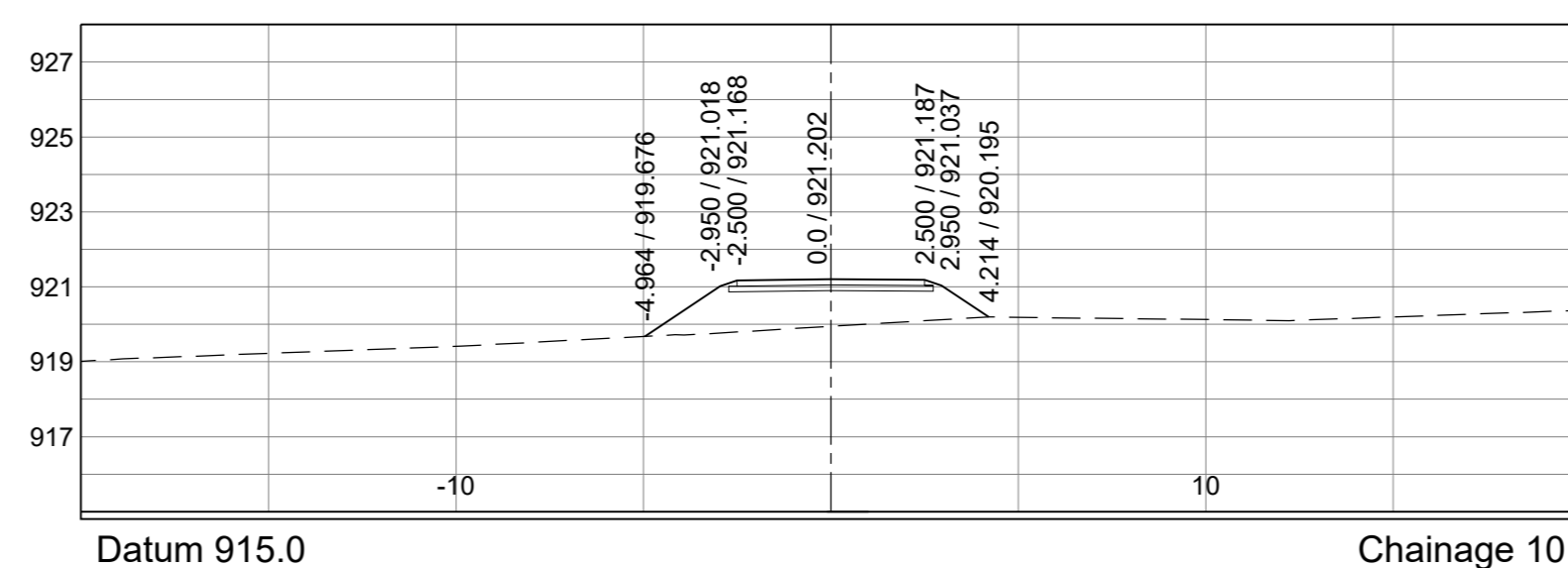
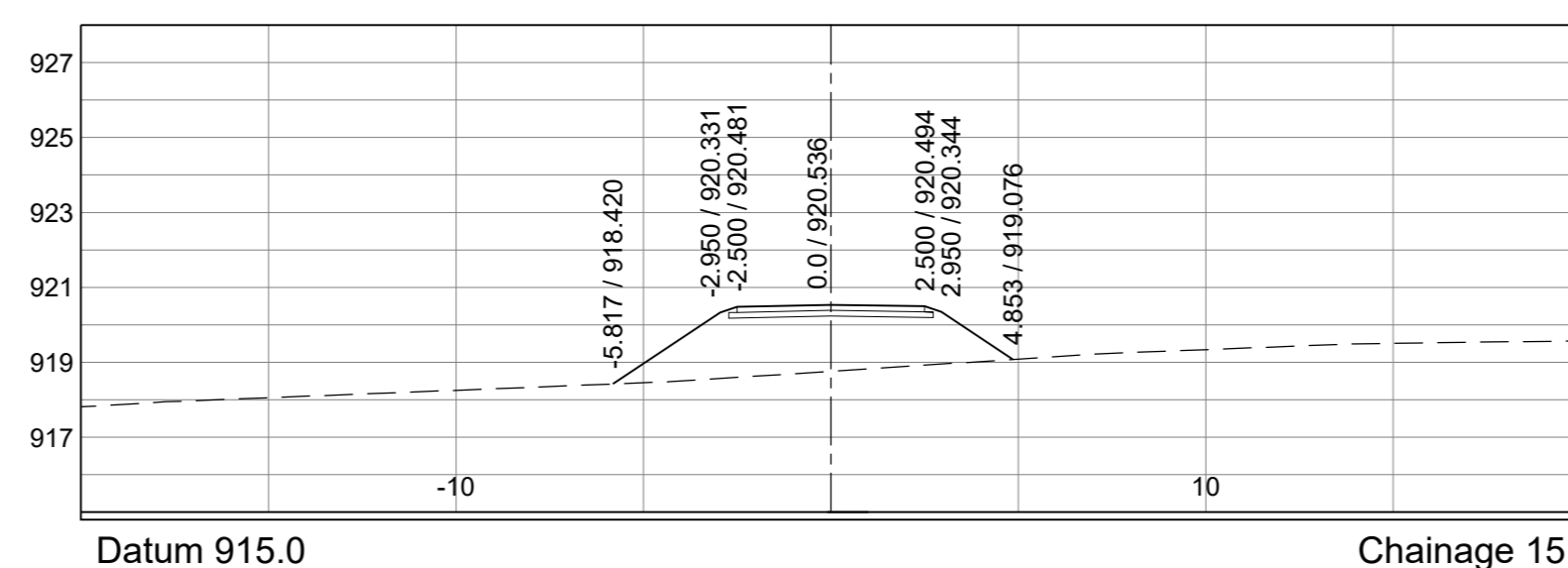
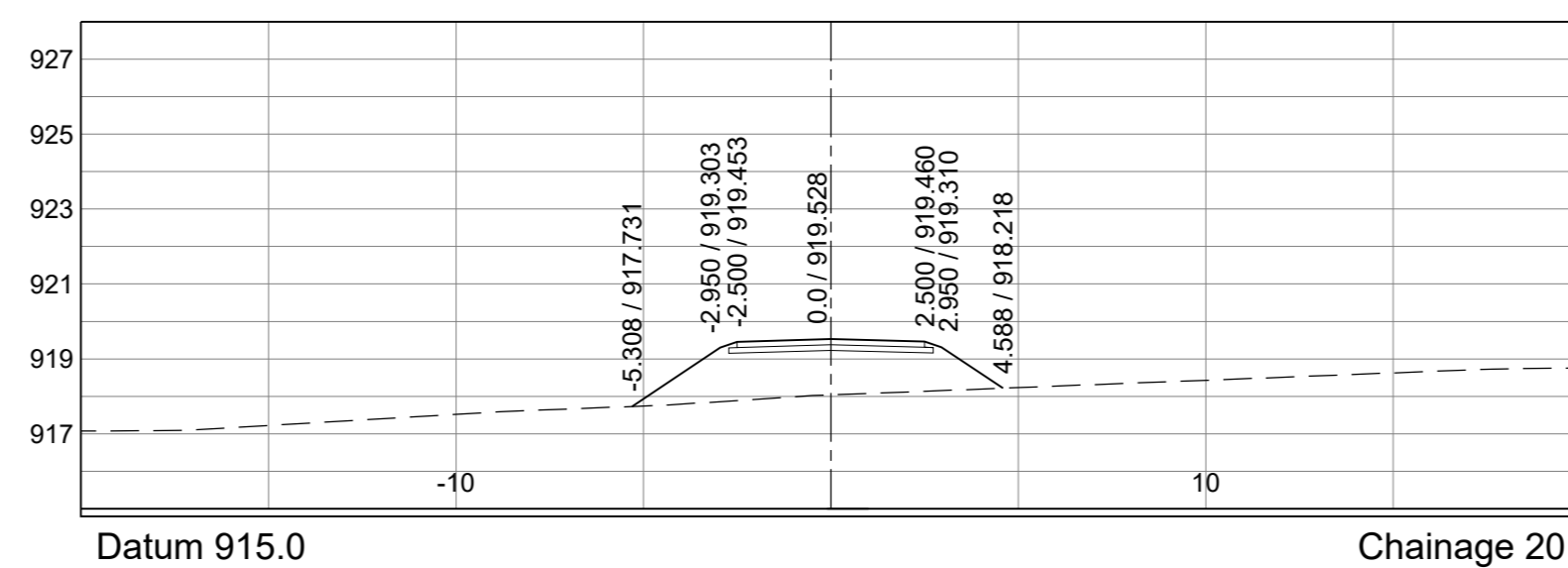
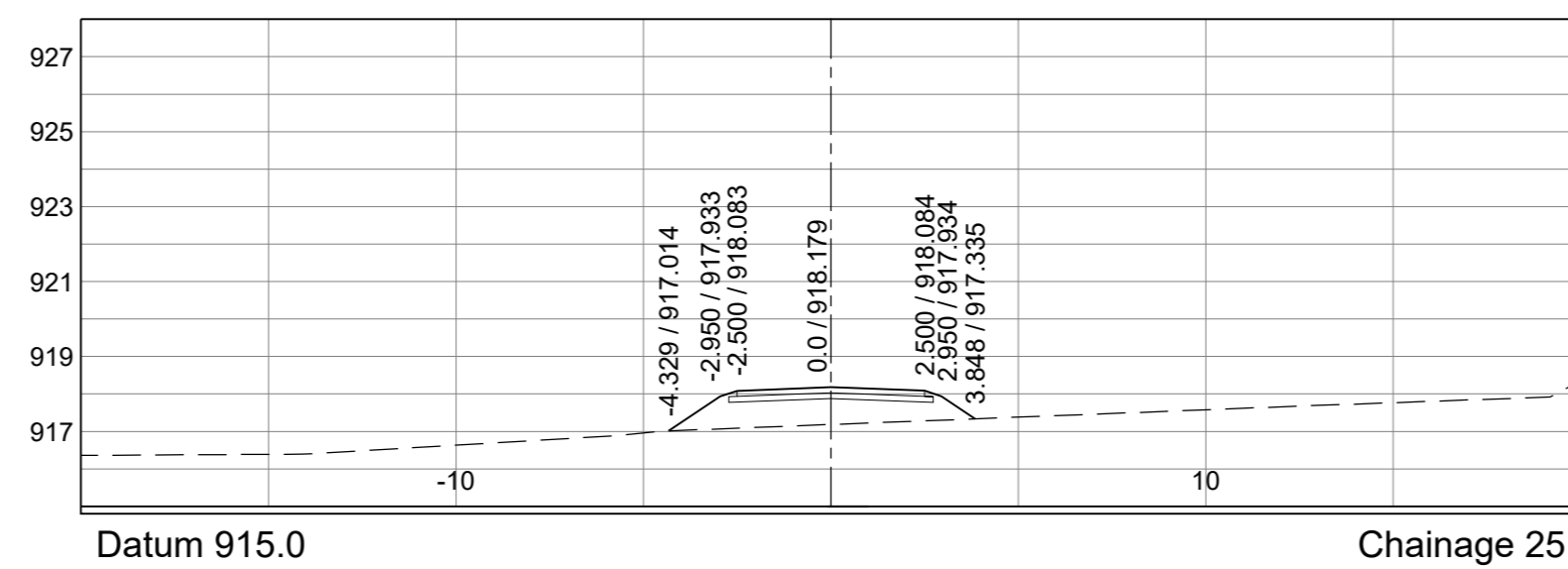
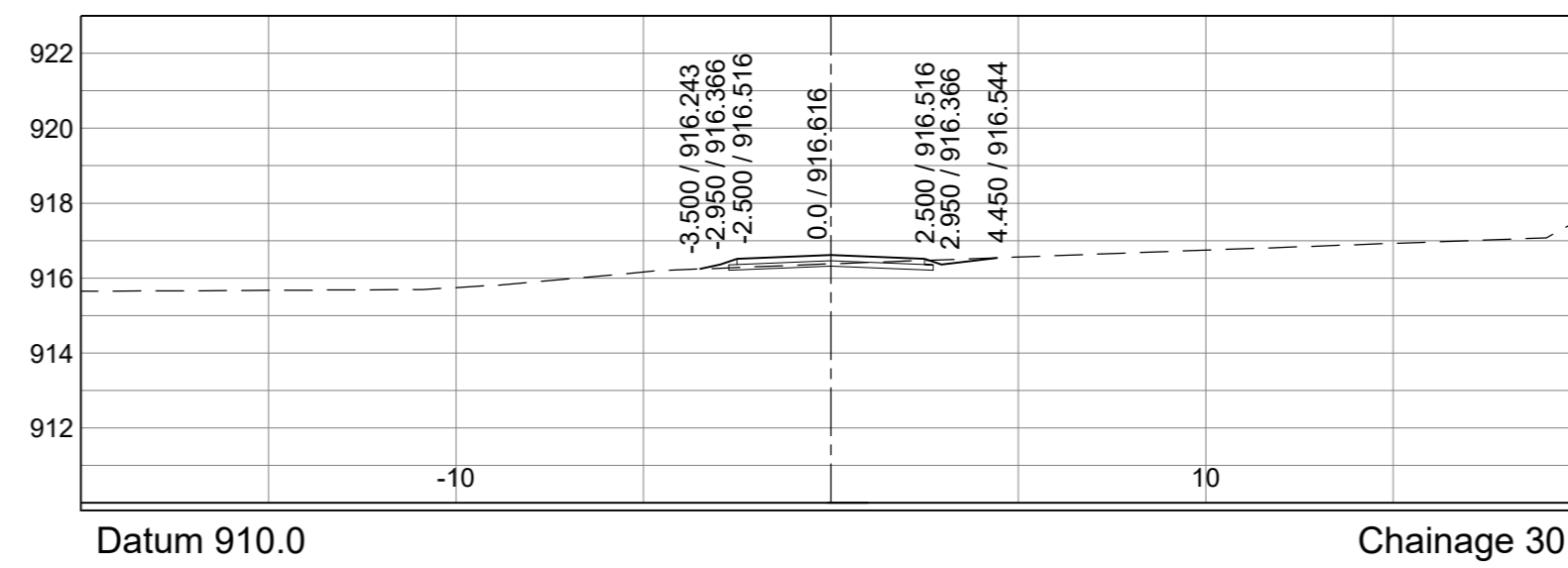
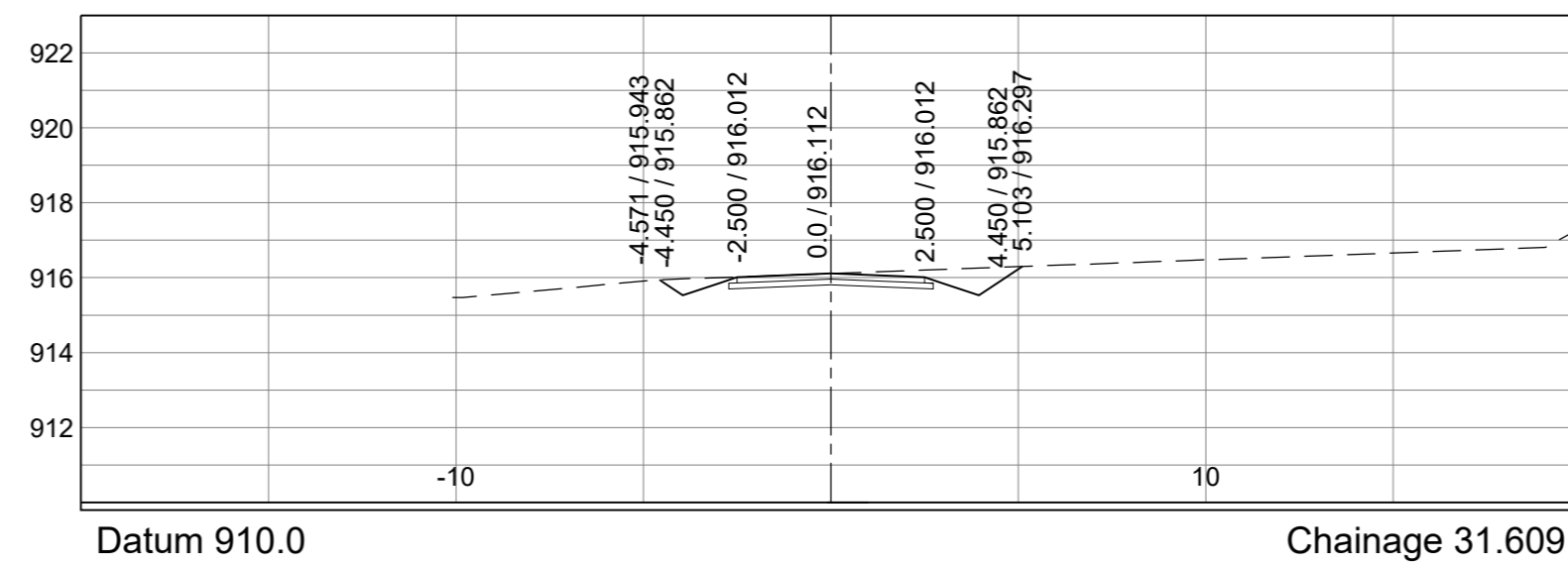
C 47649



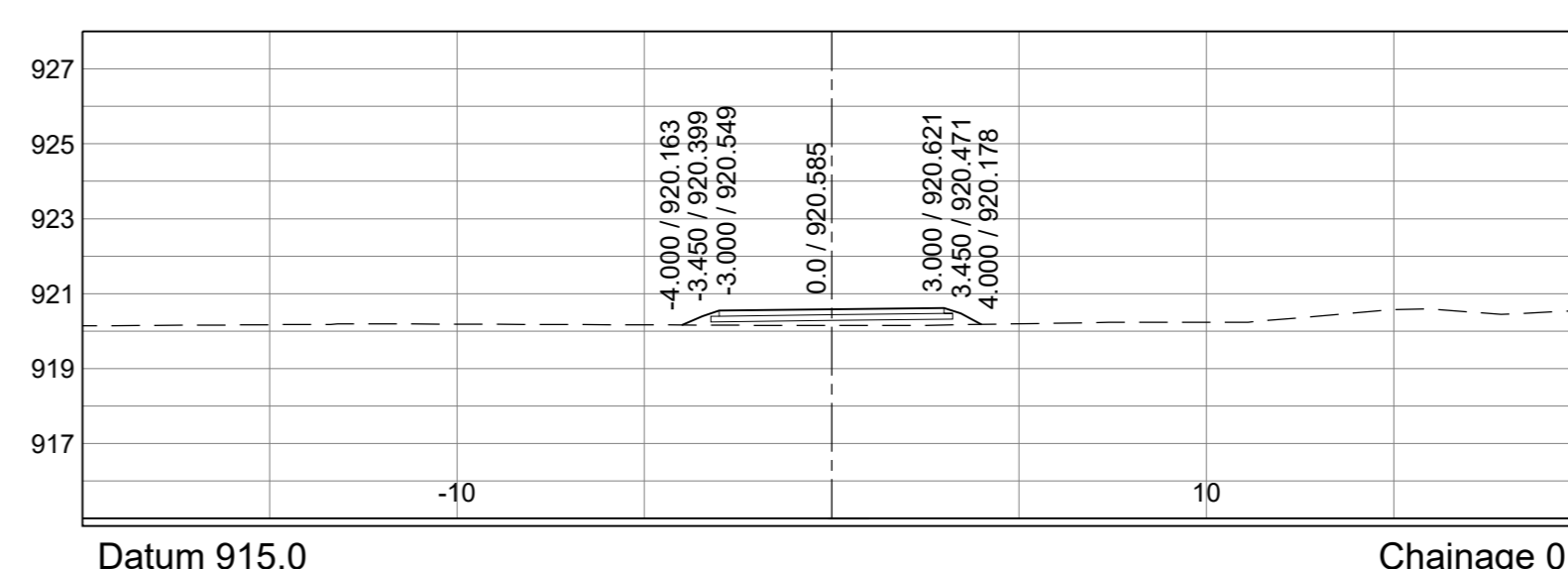
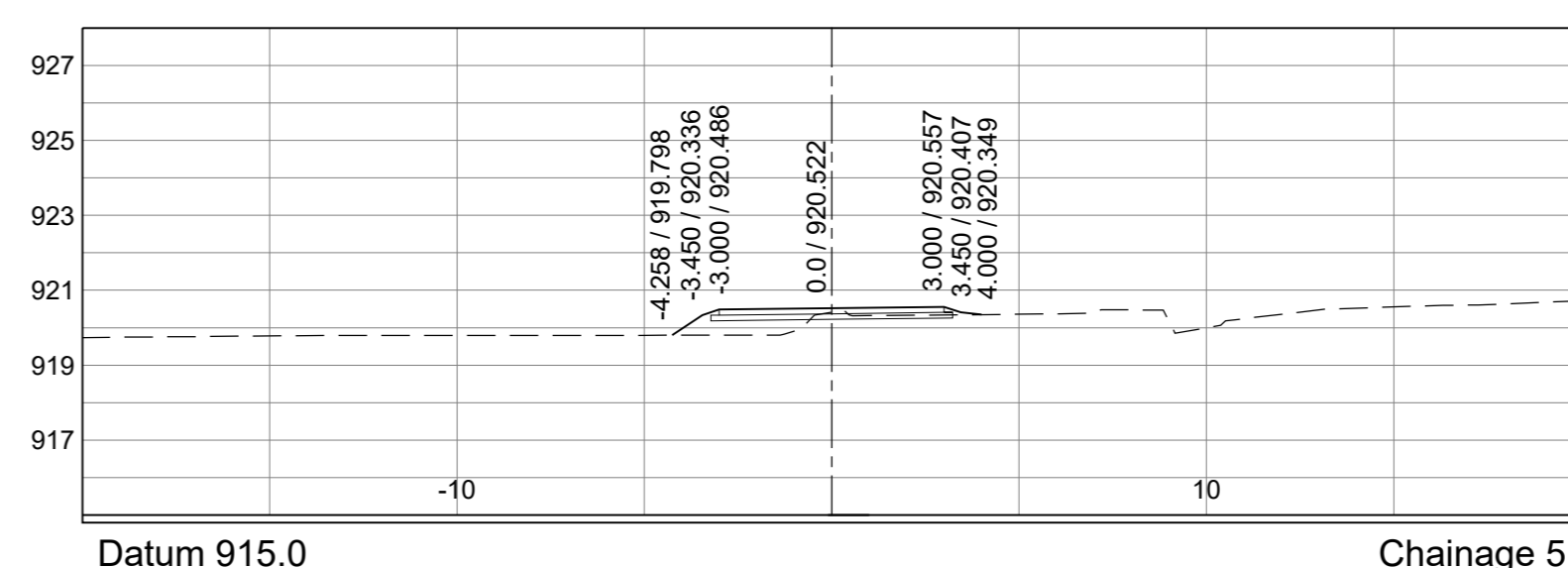
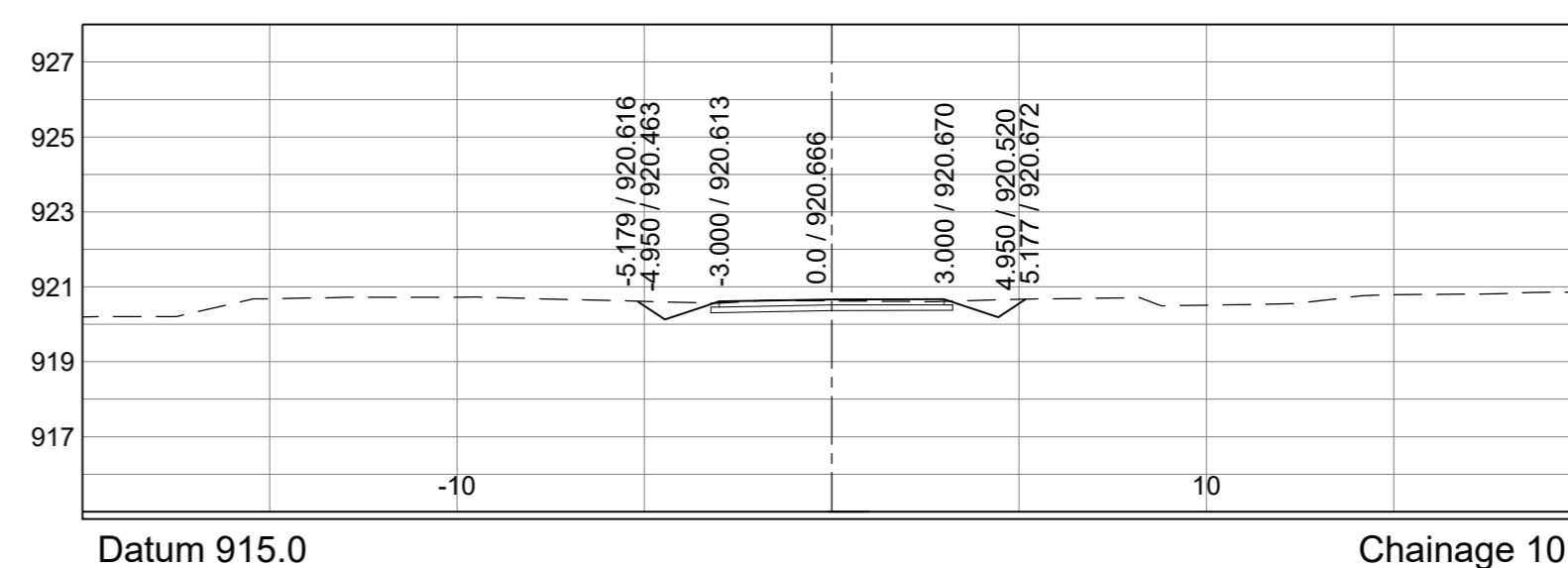
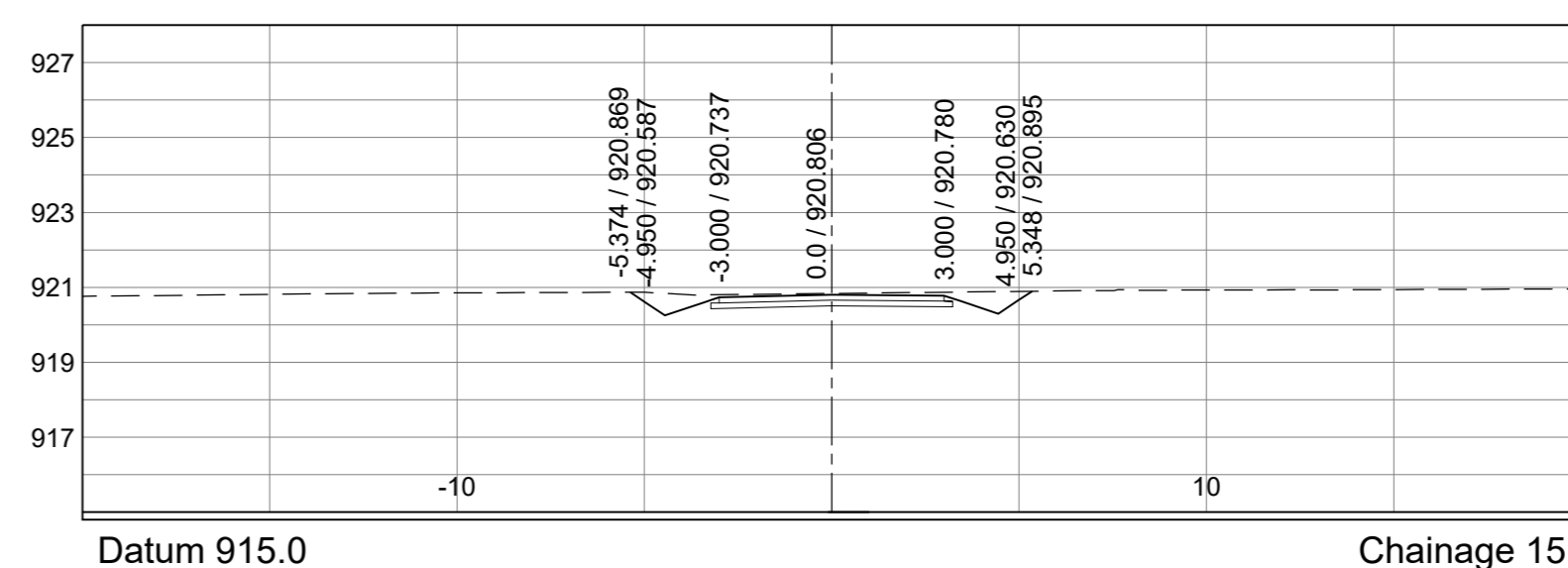
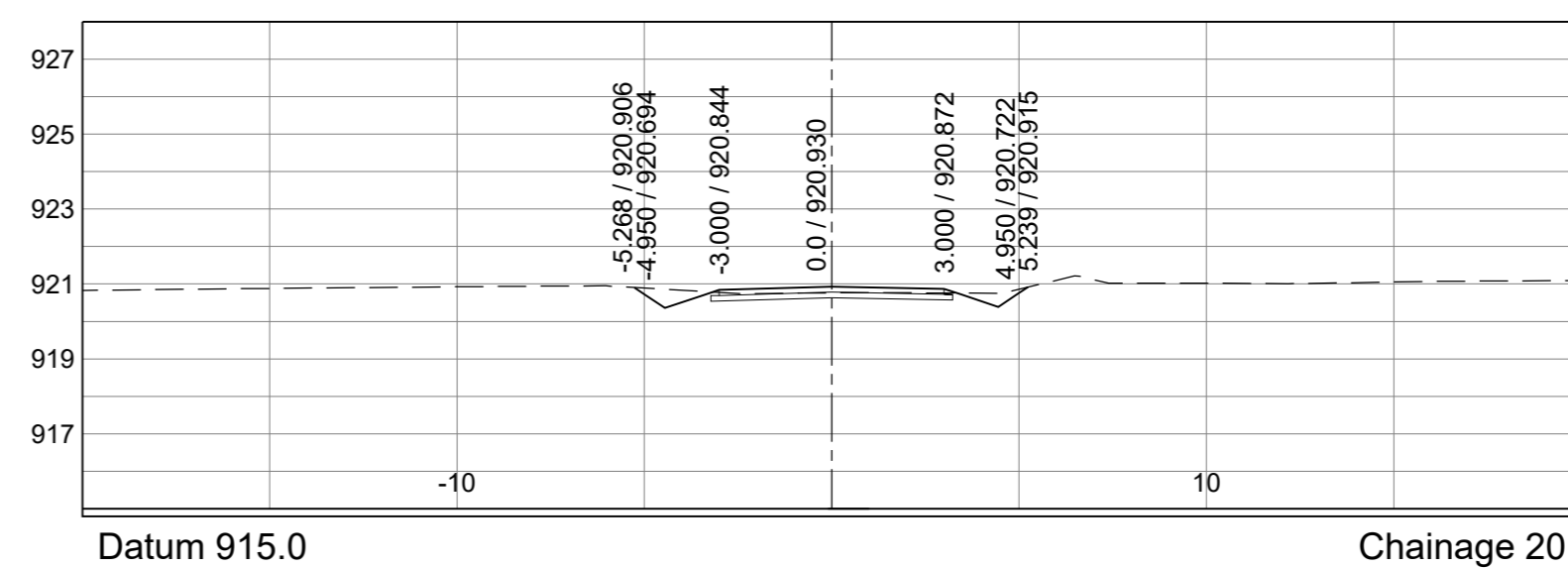
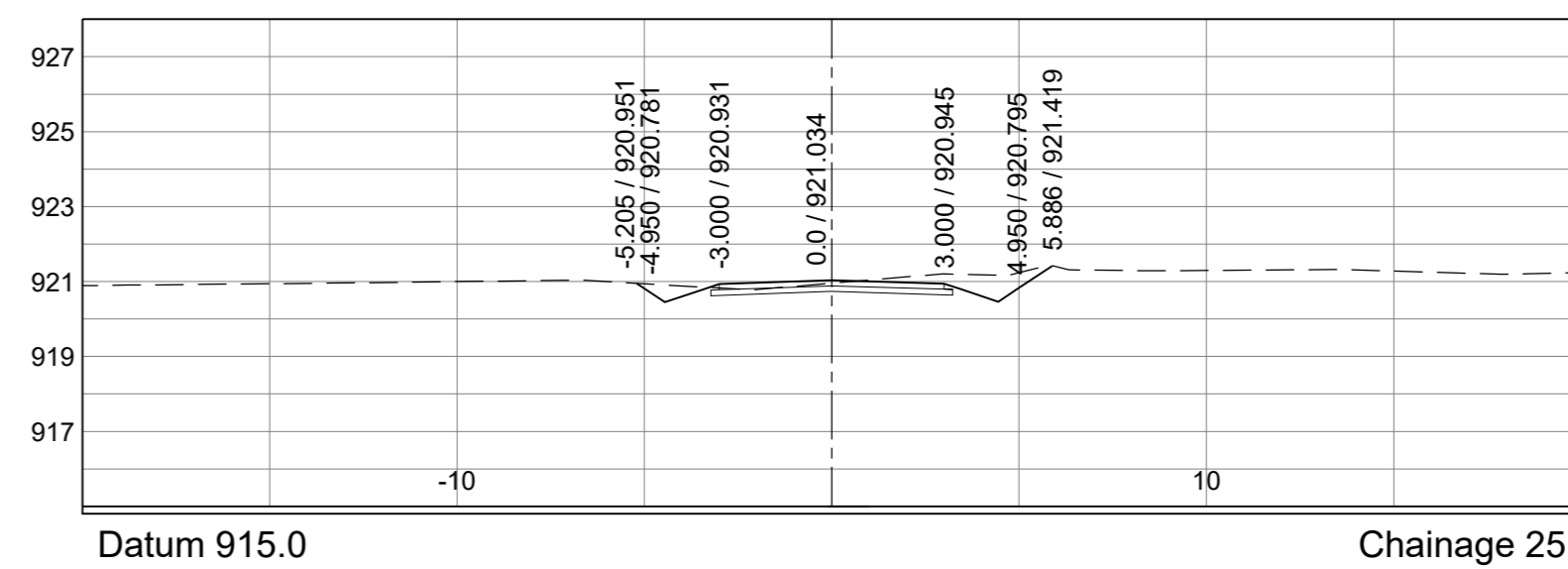
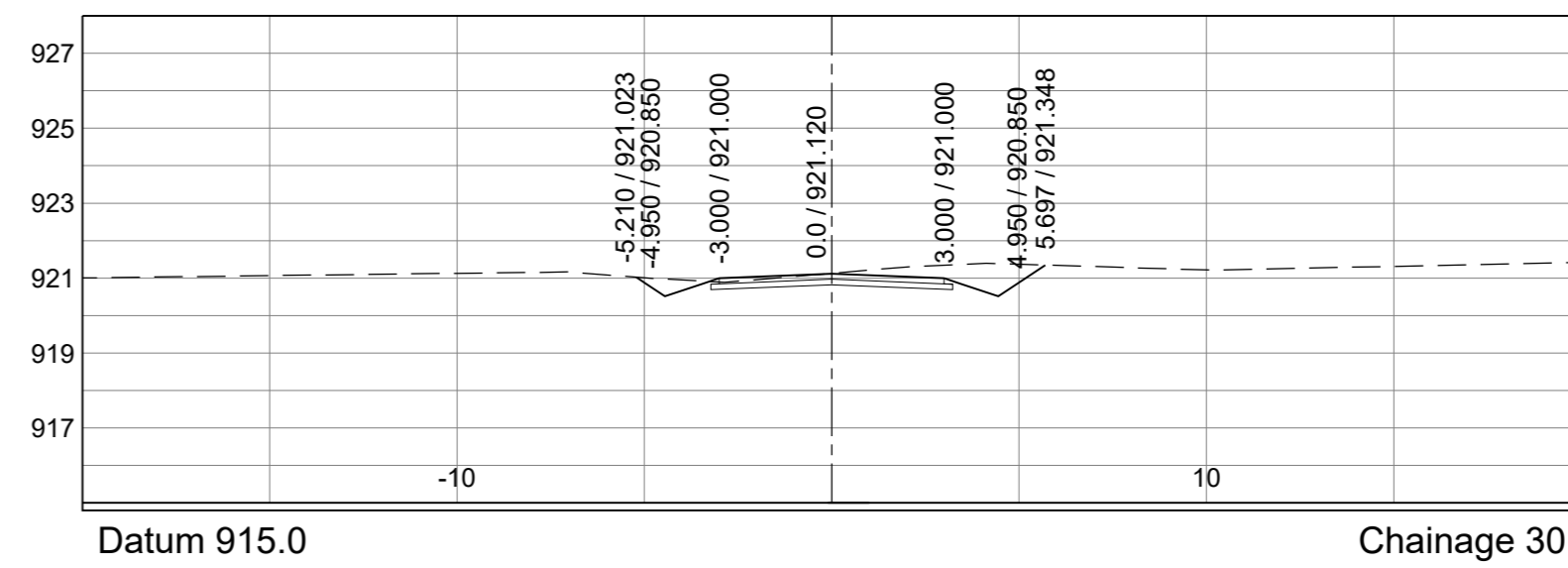
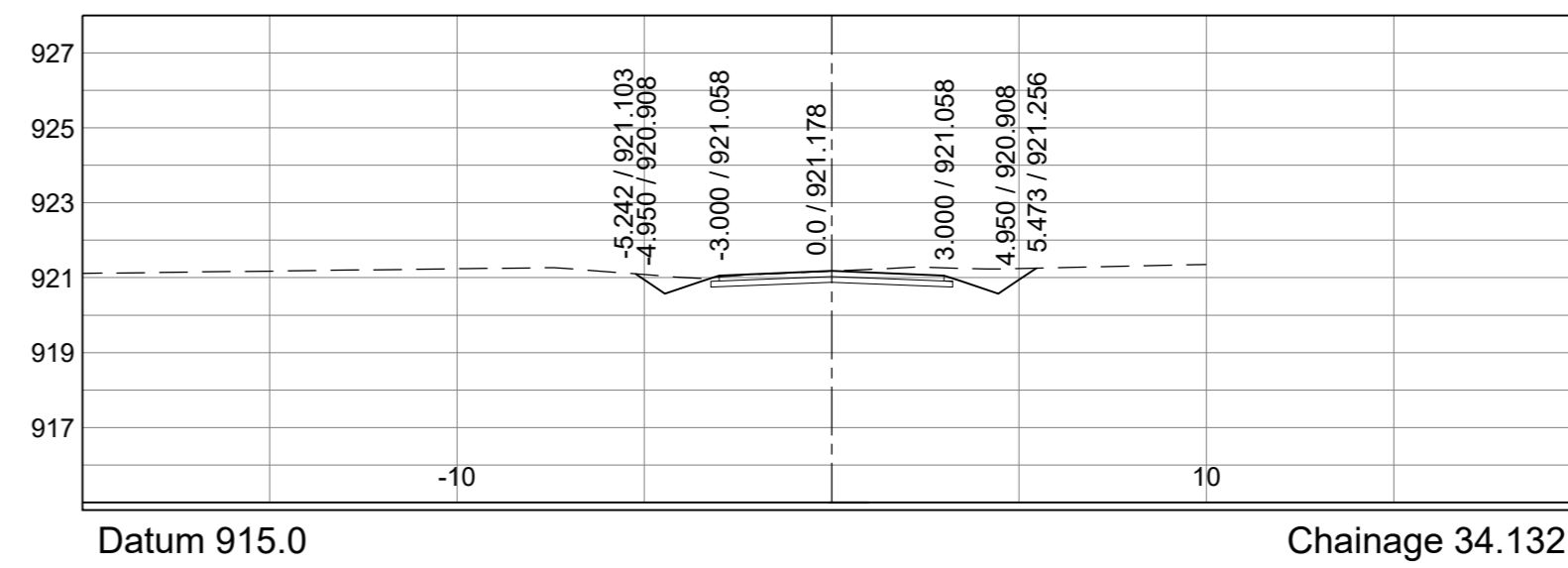
ACCESS @ KM 18+635.347 RHS (L676)



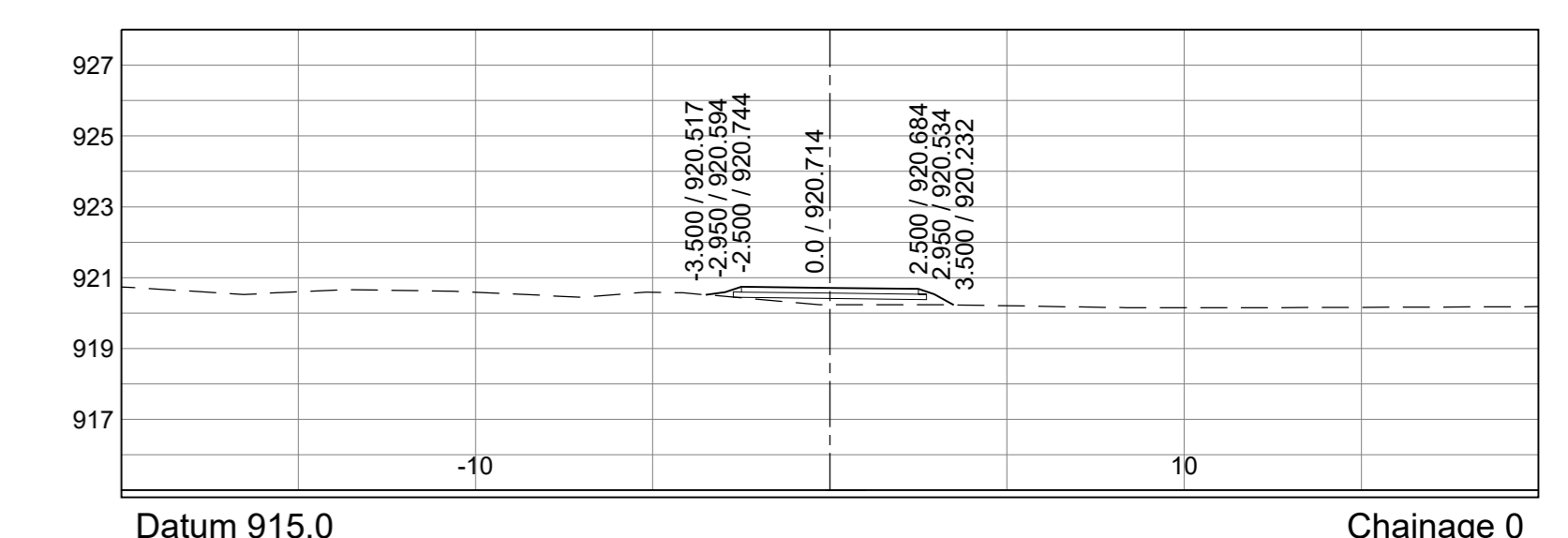
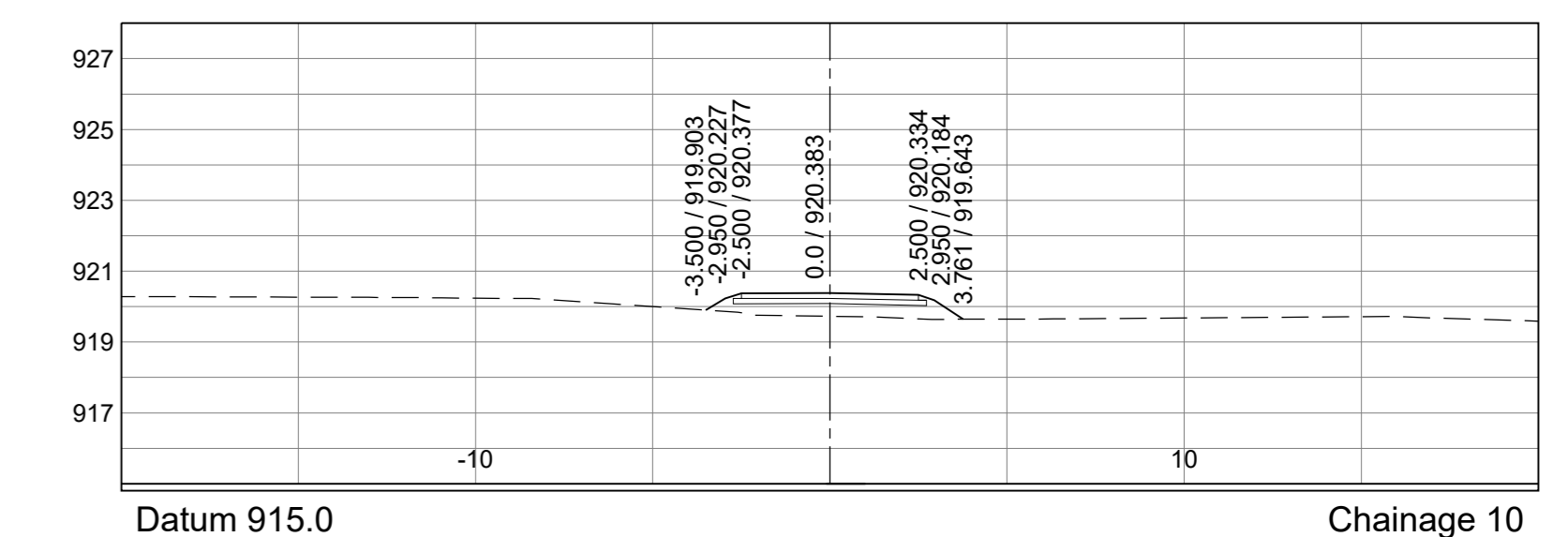
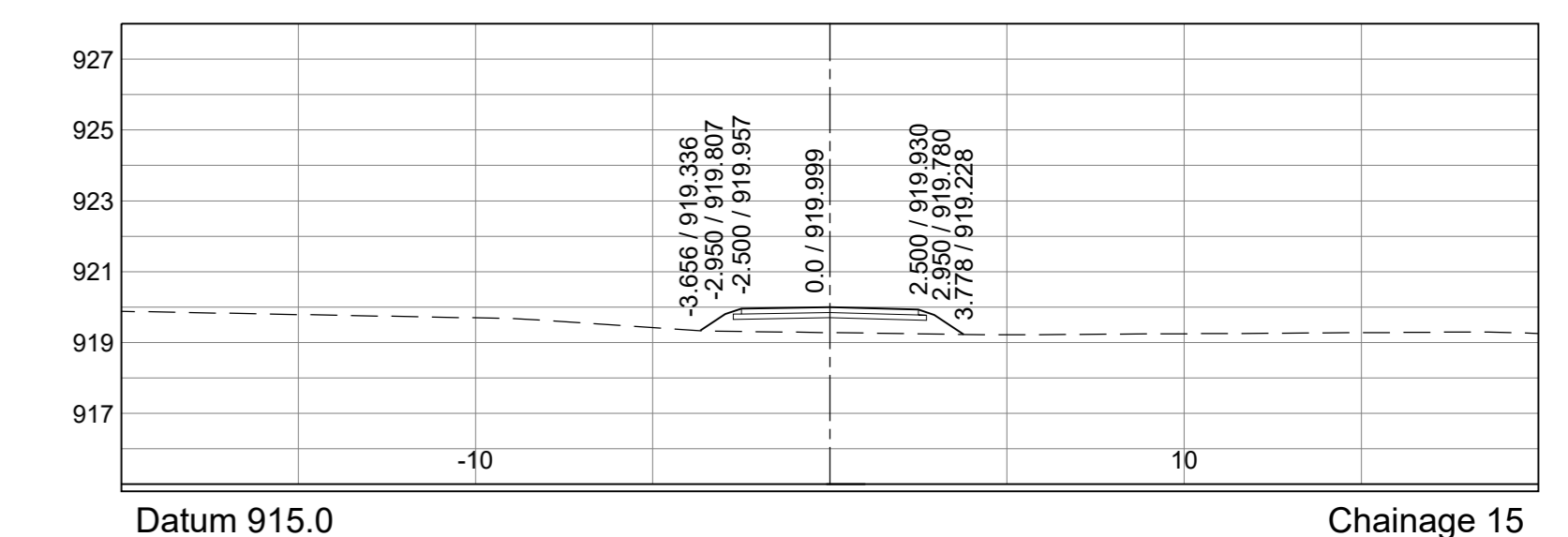
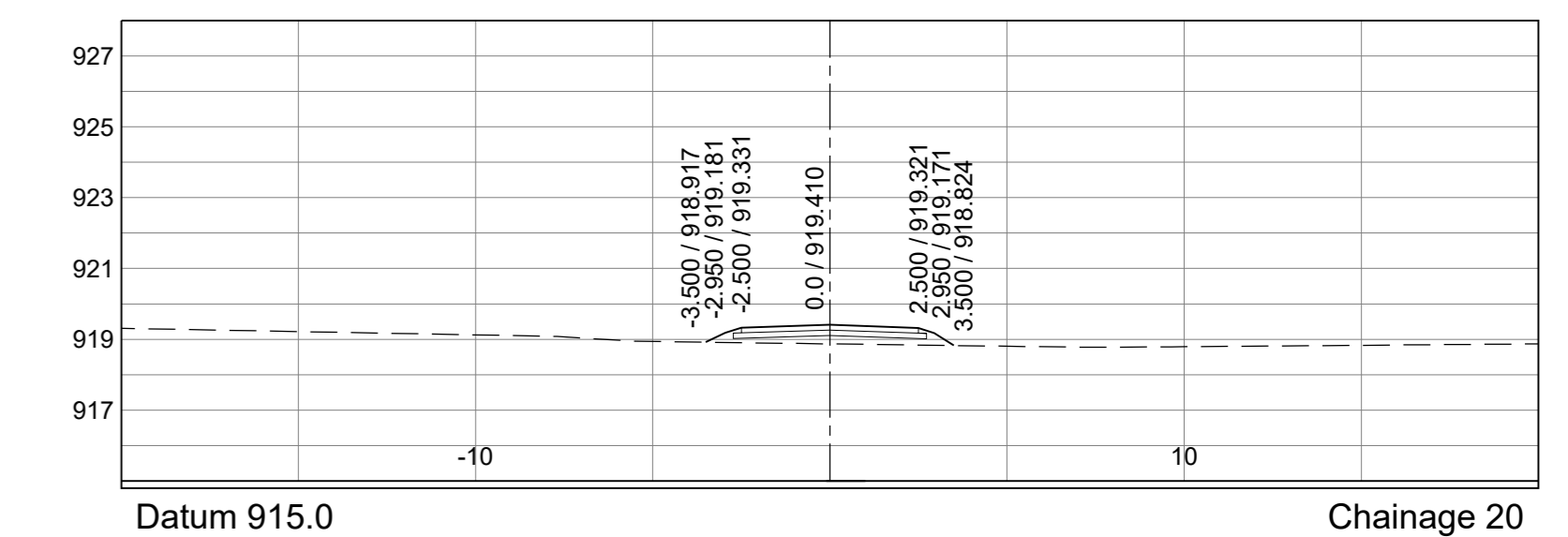
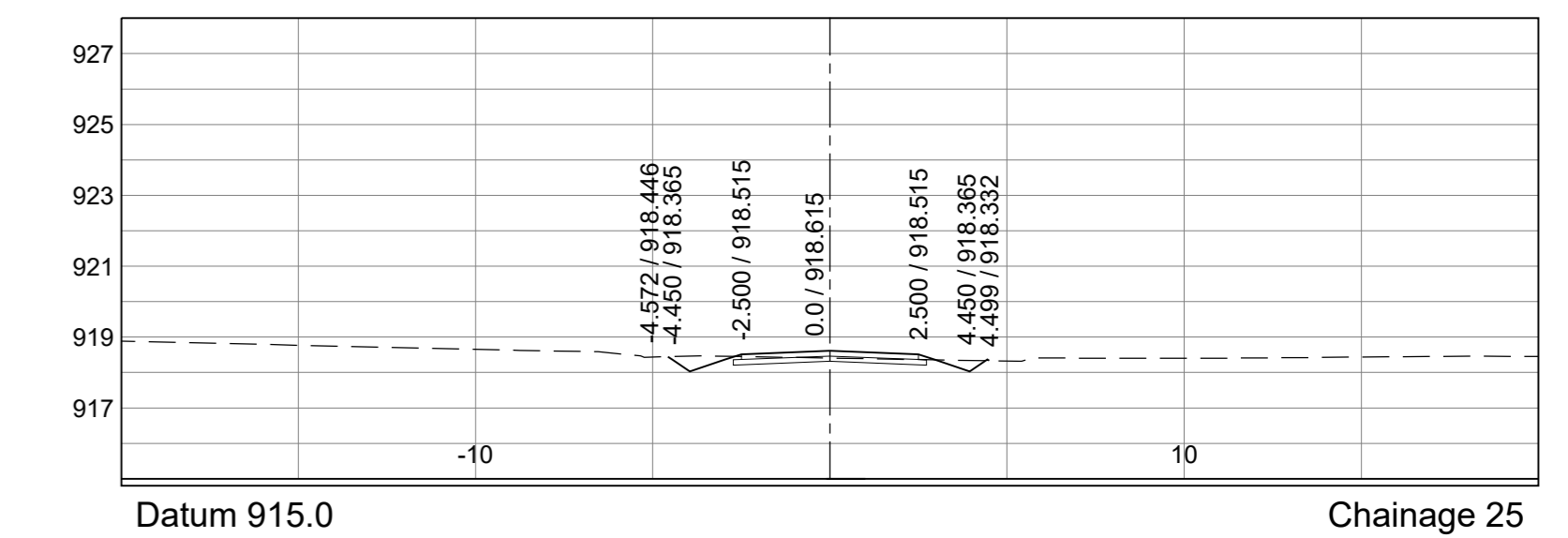
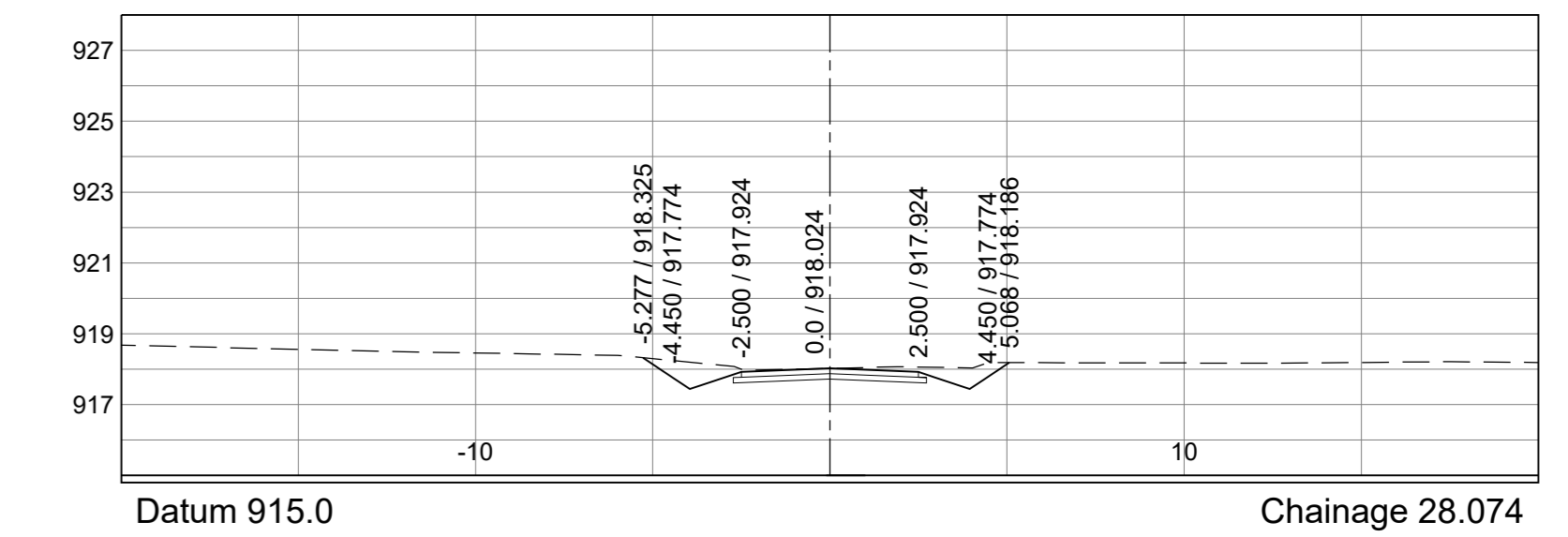
ACCESS @ KM 19+100.162 RHS



ACCESS @ KM 19+331.756 LHS (L2056)



ACCESS @ KM 19+342.594 RHS



AS BUILT			
Symbol	Date	Description	Checked
A	01-02-2024	ISSUED FOR TENDER	YD
AMENDMENTS			

Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: \_\_\_\_\_ Date: 01-02-2024

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 ACCESS ROADS CROSS SECTIONS

Staked km distance	Sheet - 11	REVISION:
km 0+000 - km 0+078.718	of - 14	A
km 0+000 - km 0+331.609	Plan No -	
km 0+000 - km 0+344.52	Scale	
km 0+000 - km 0+028.074	Vertical Scale 1 : 200	
	Horizontal Scale 1 : 200	

C 47650

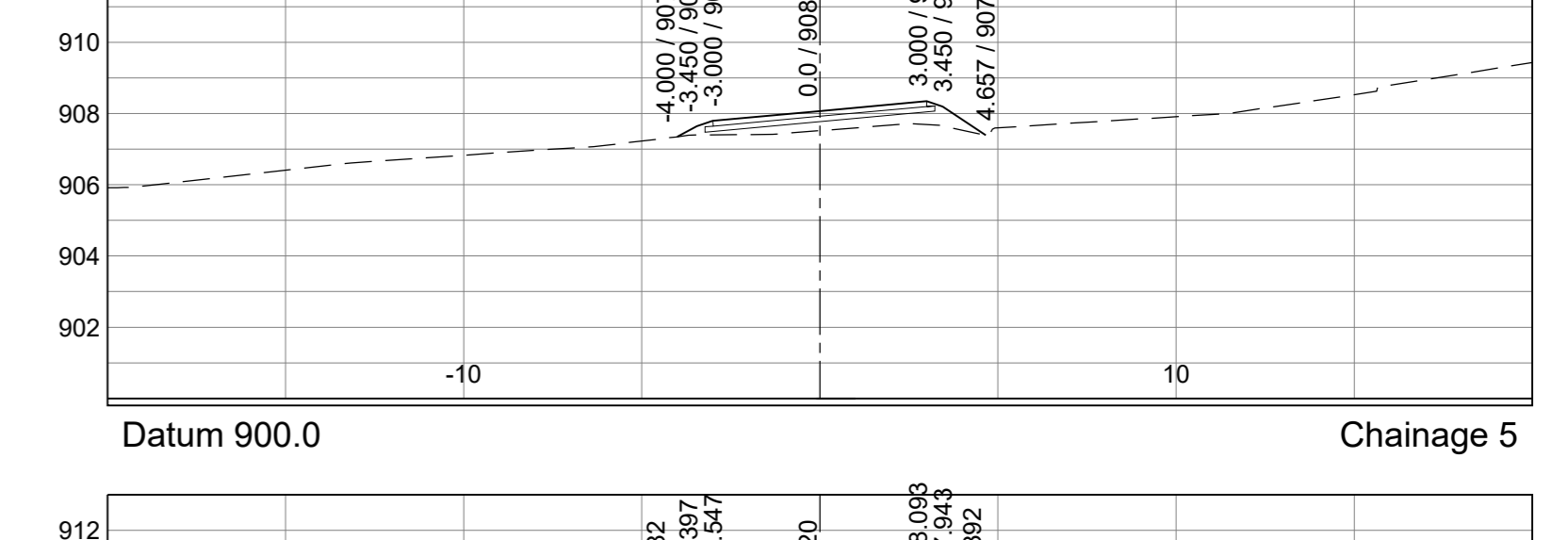
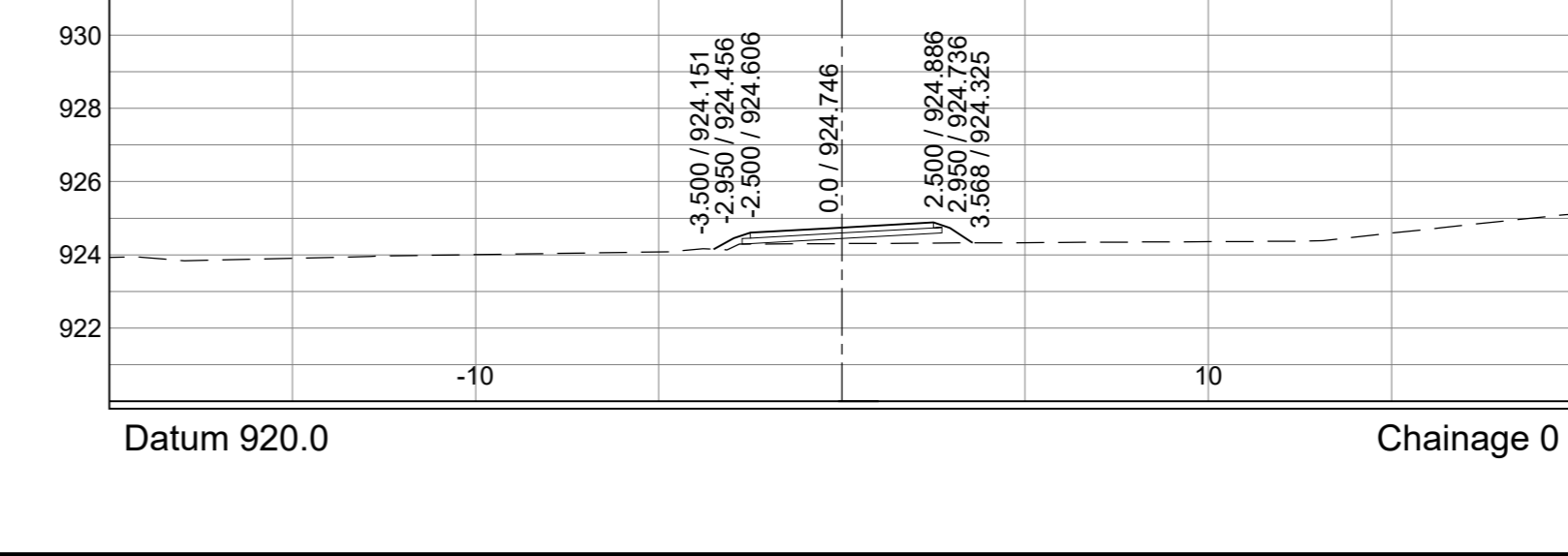
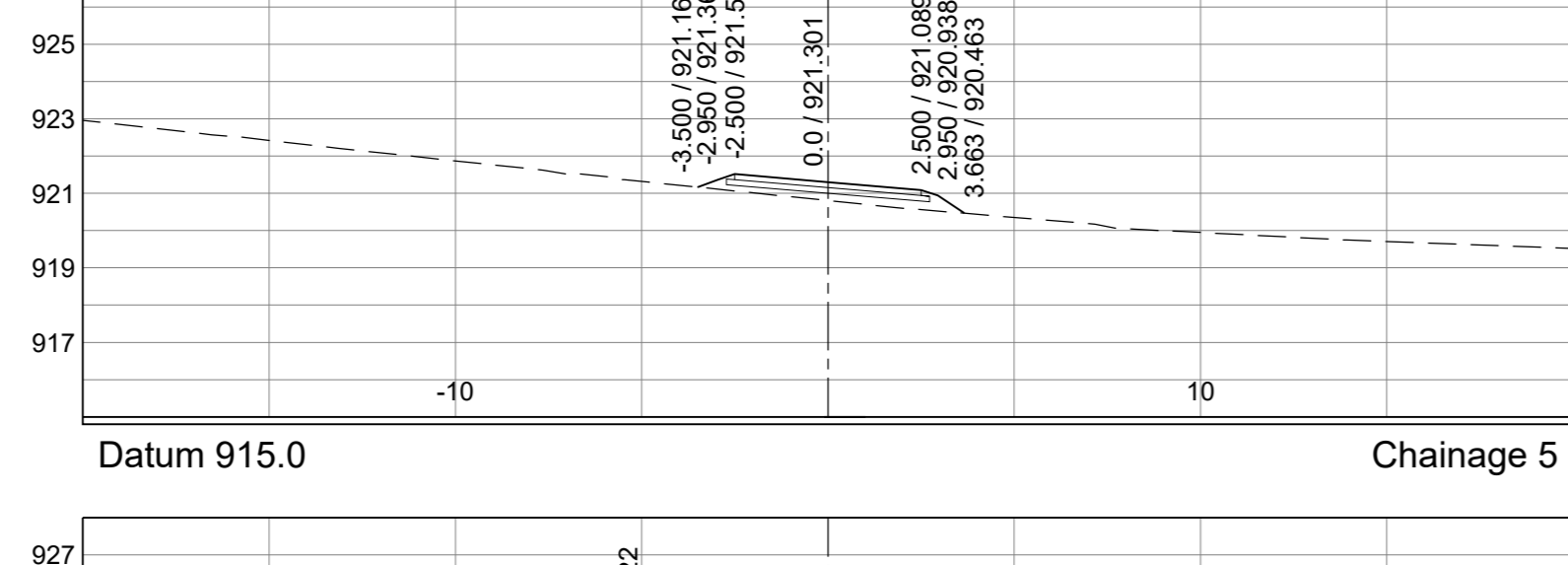
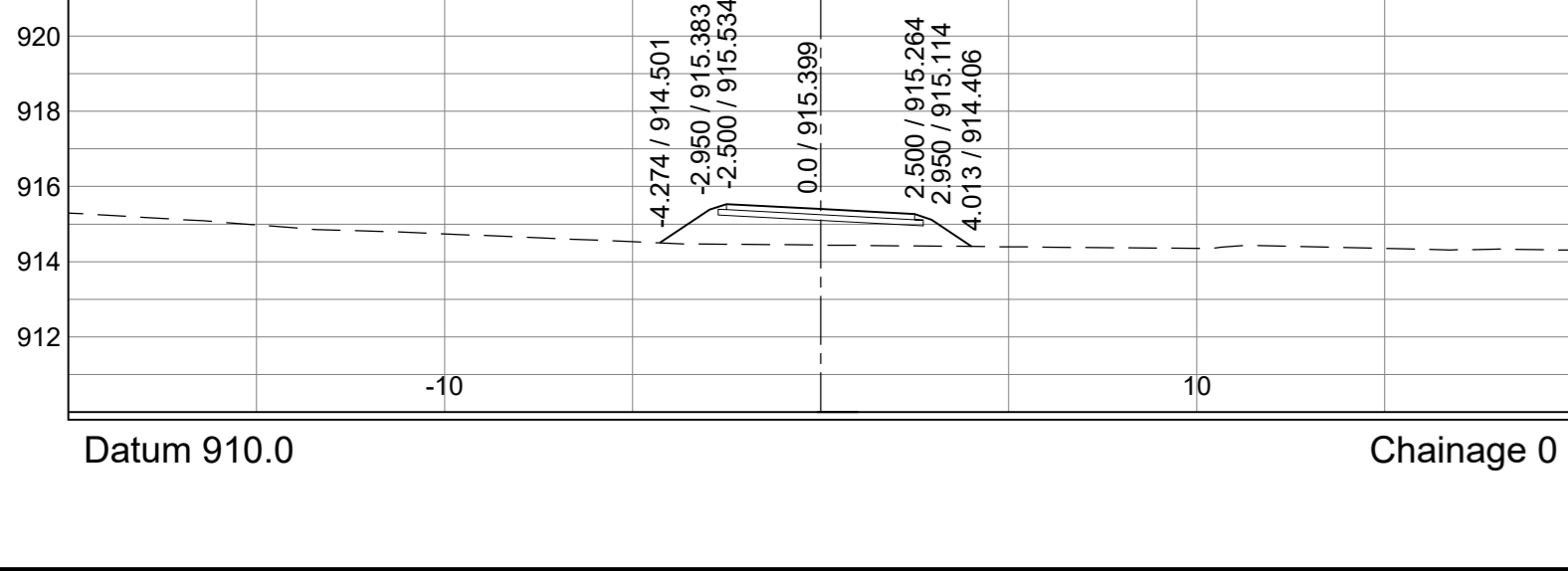
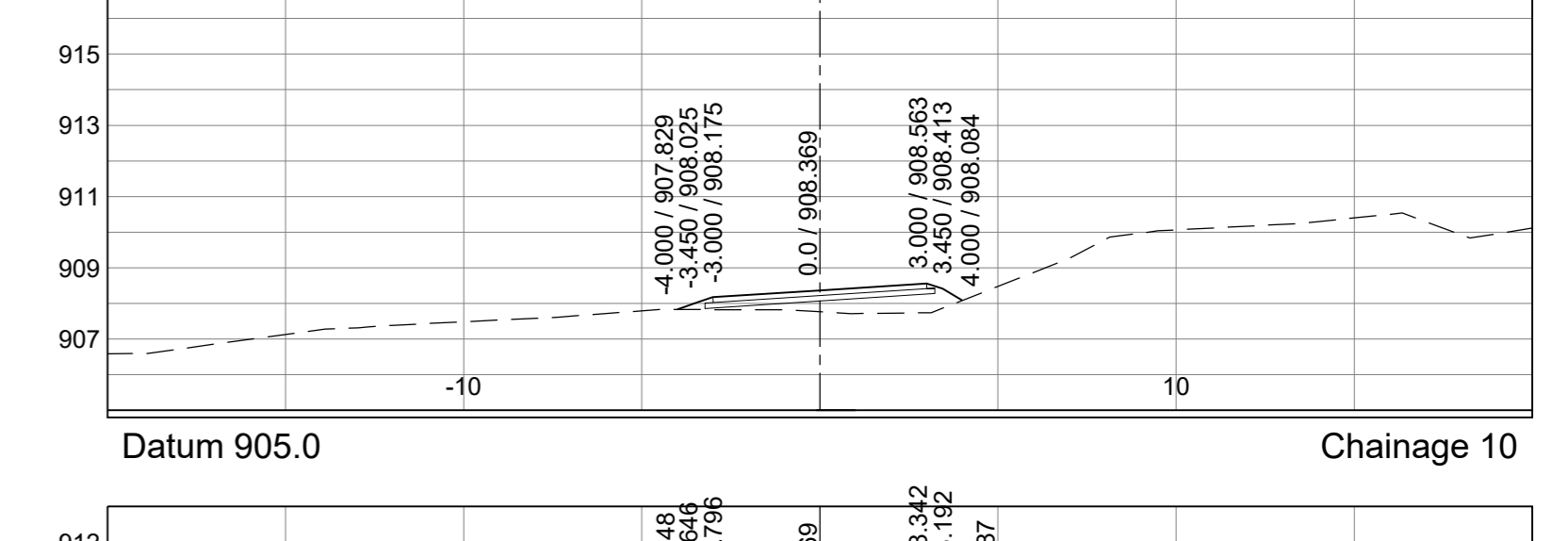
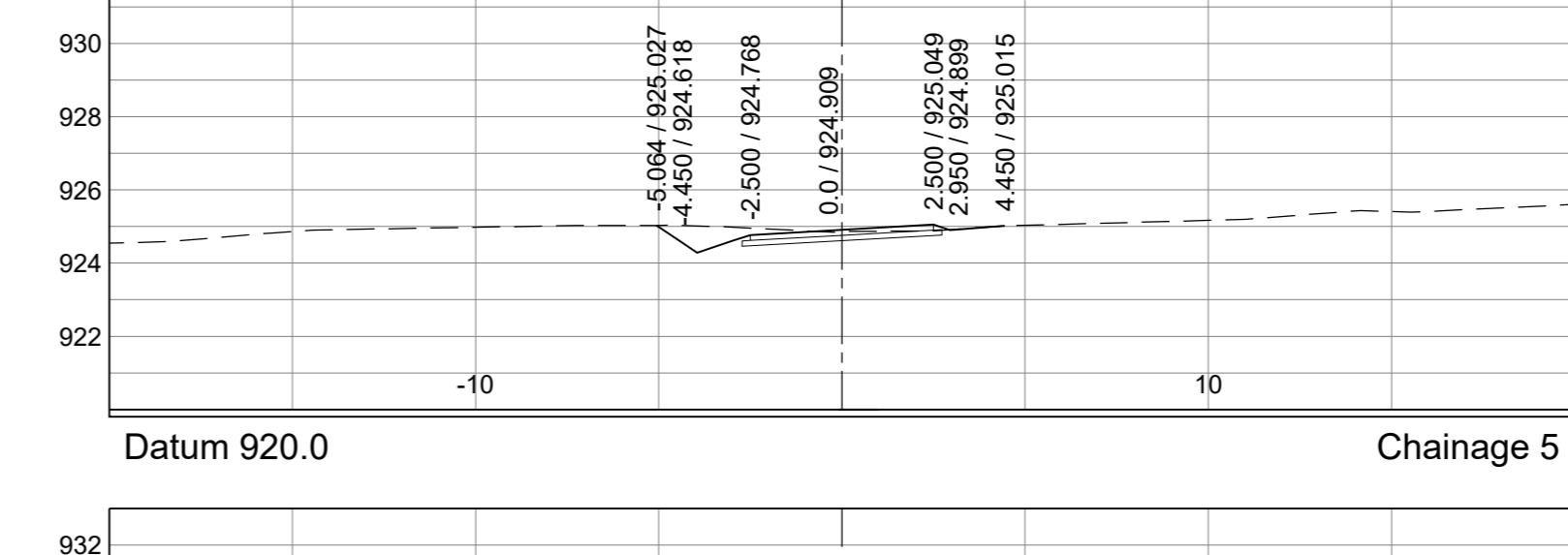
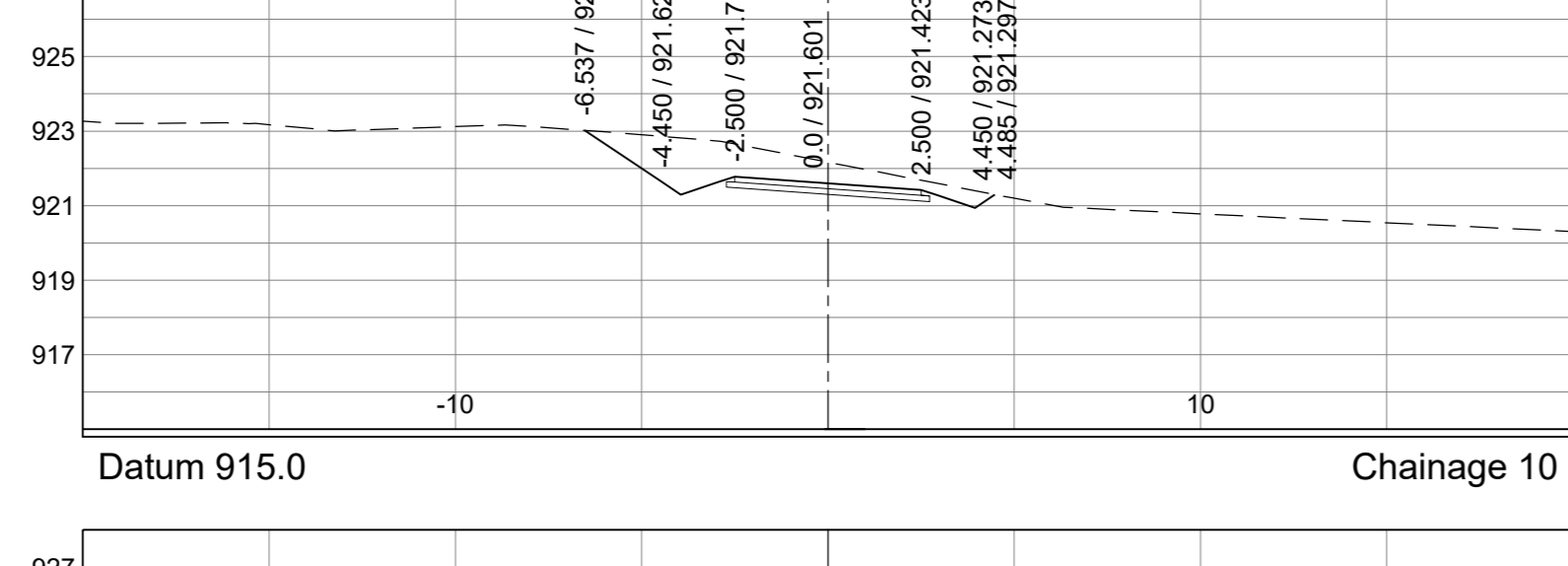
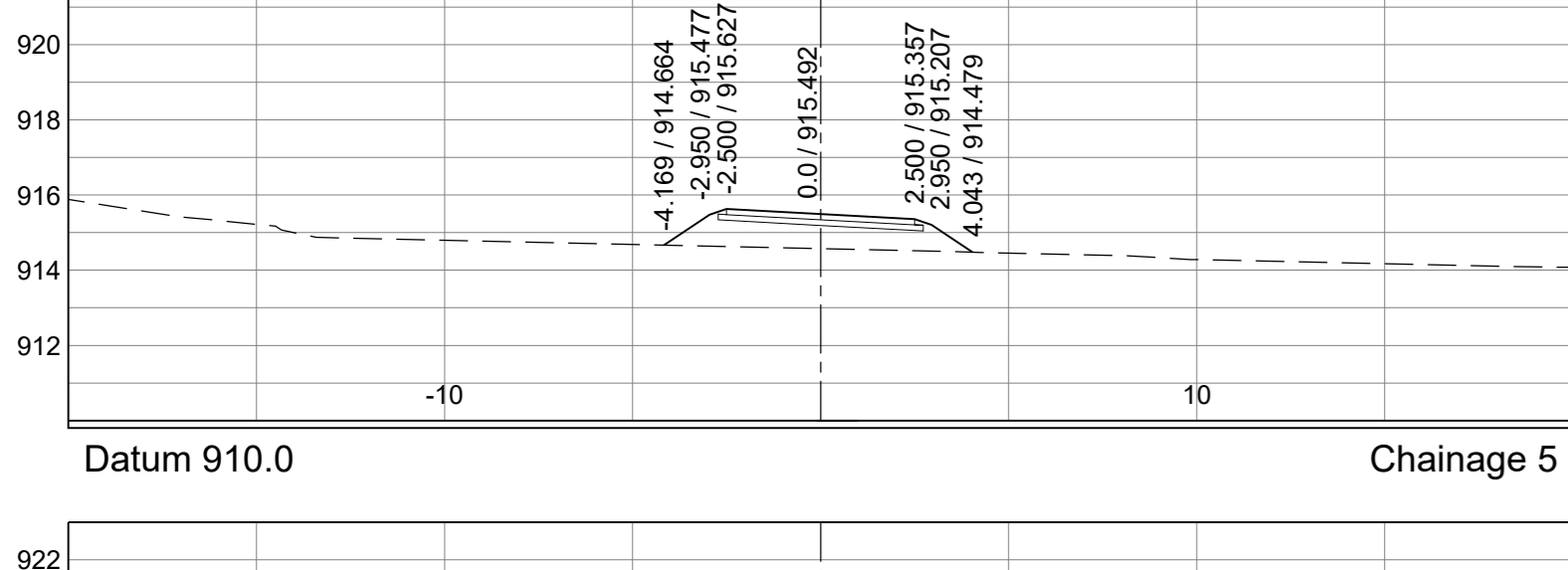
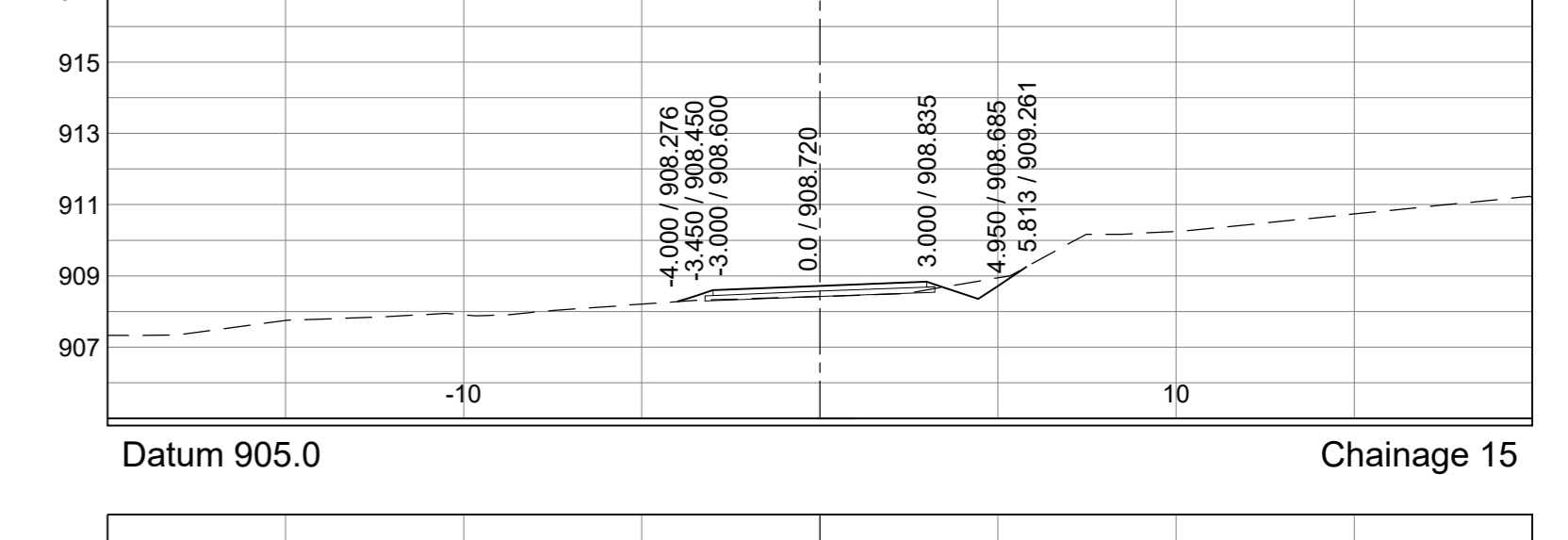
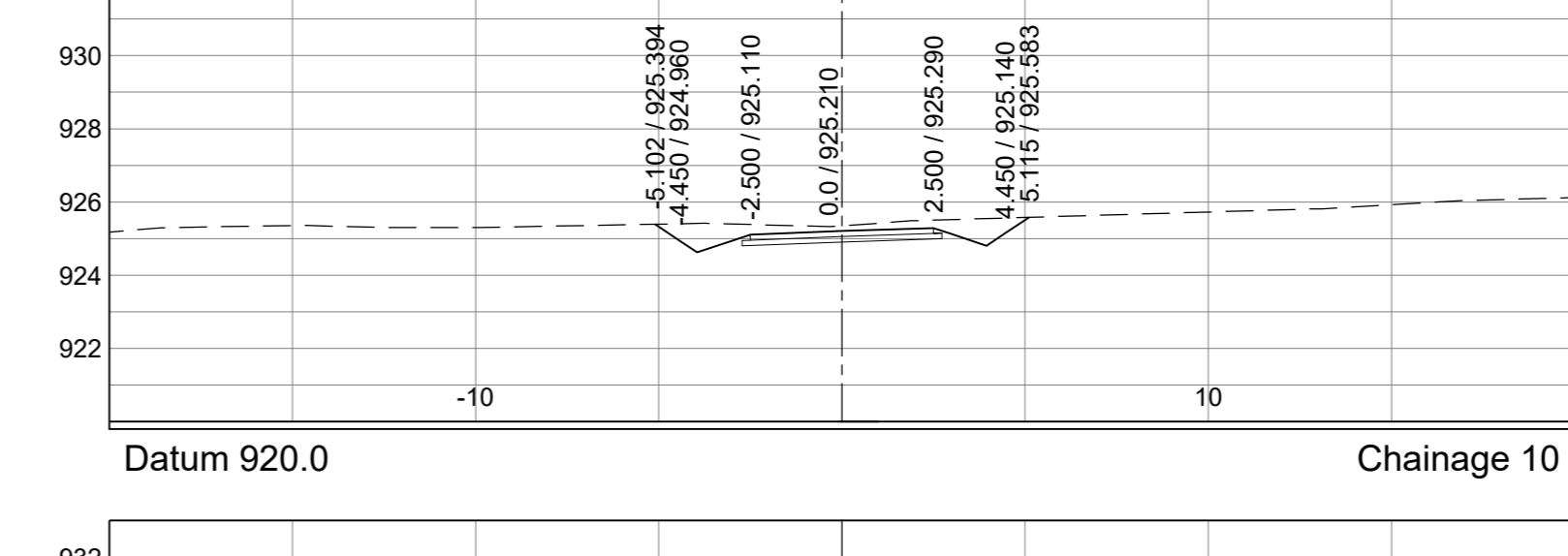
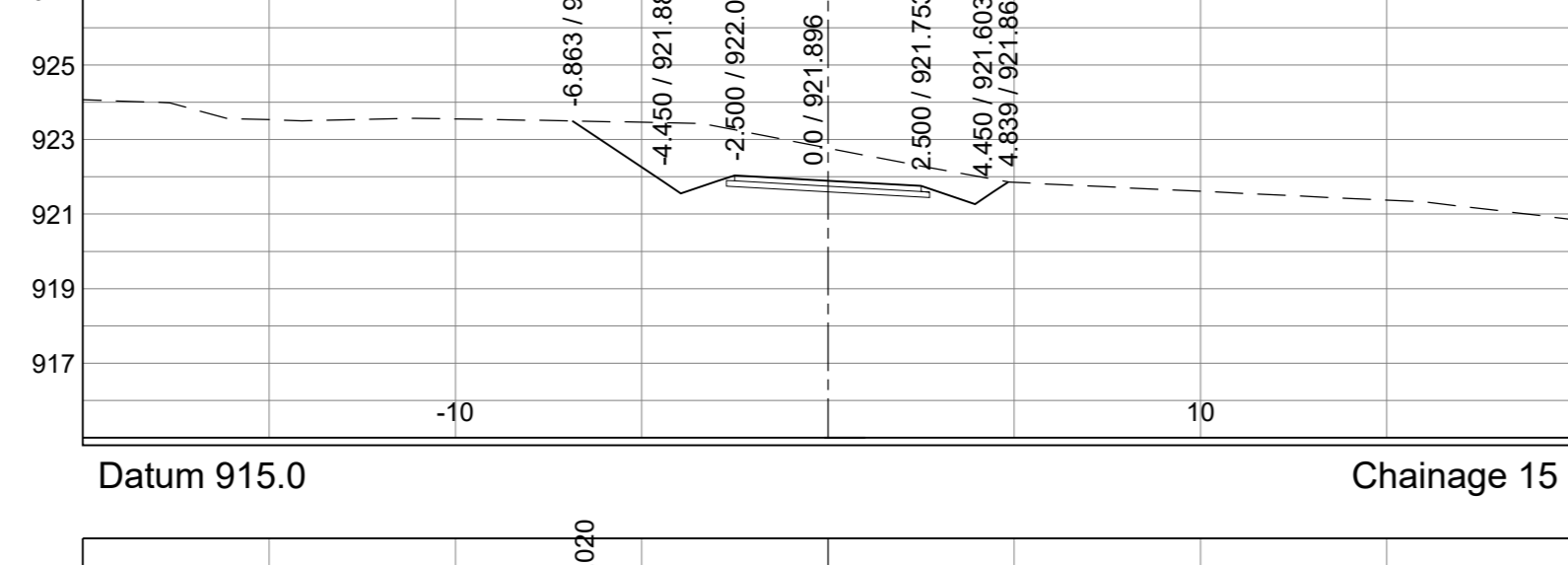
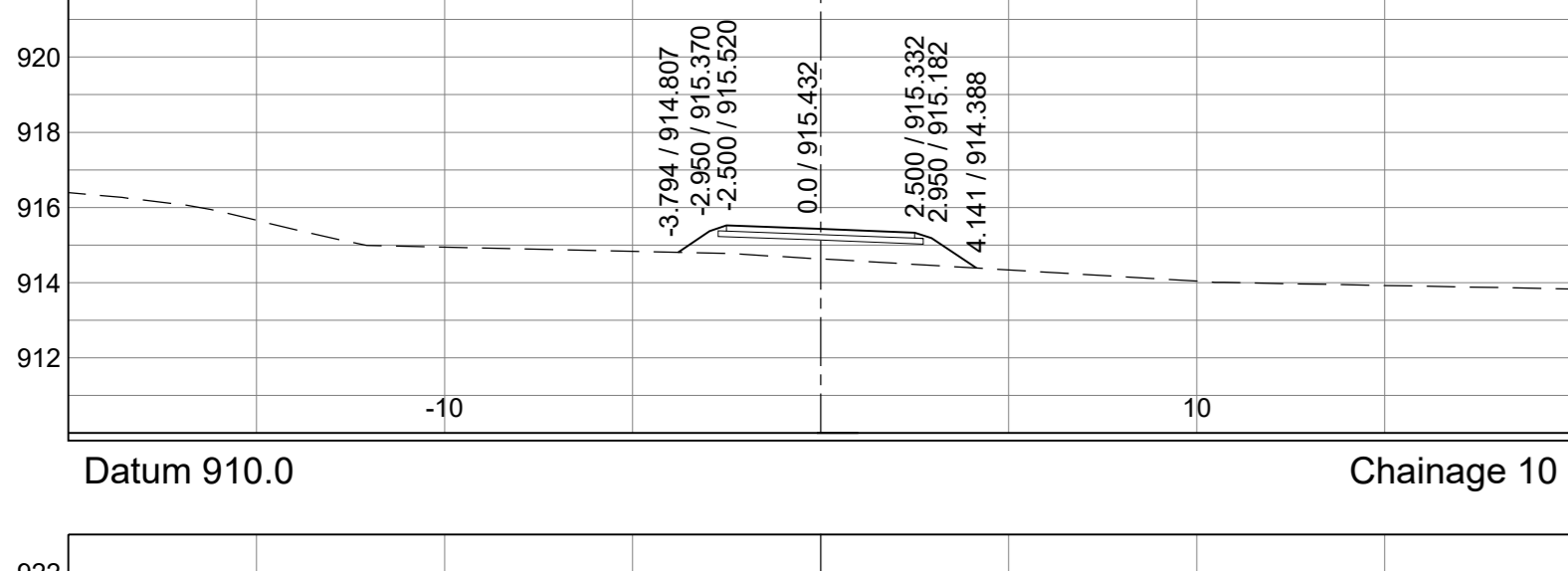
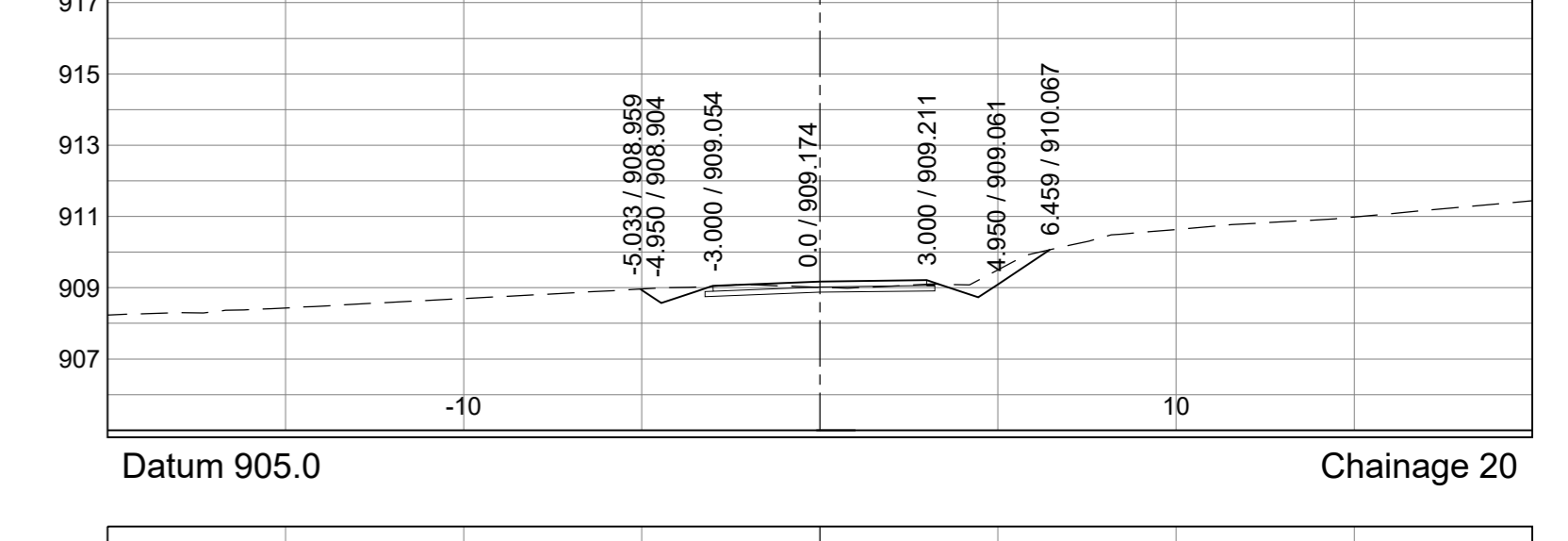
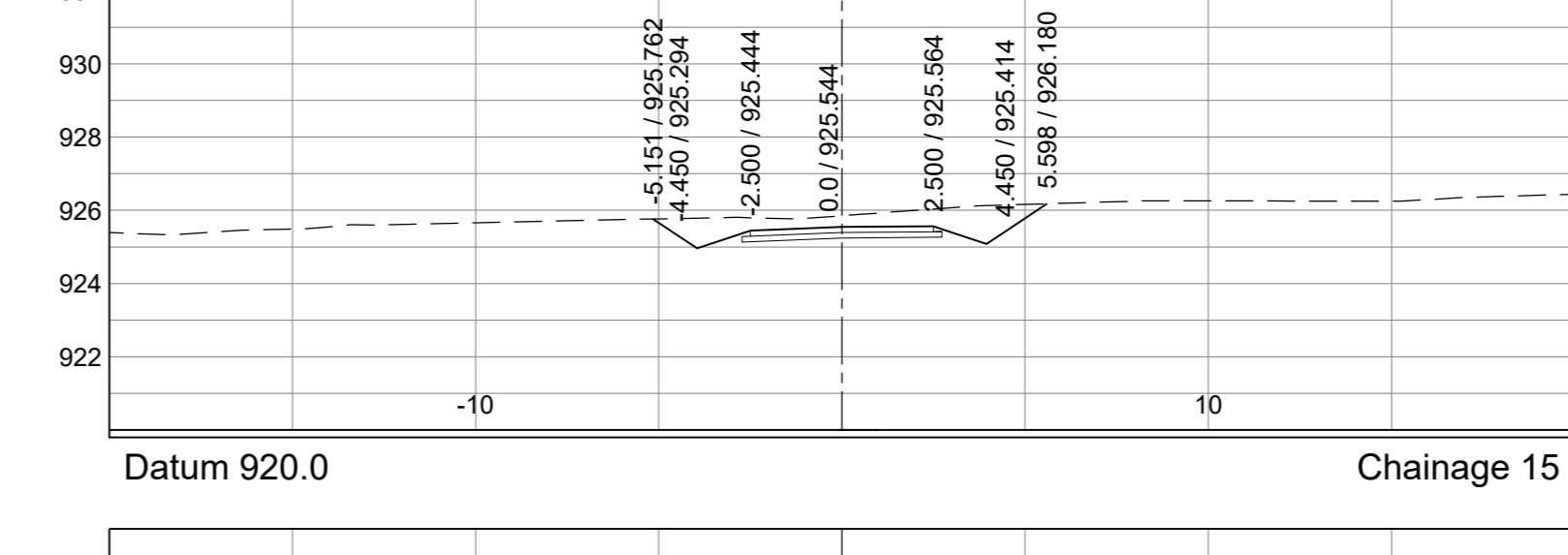
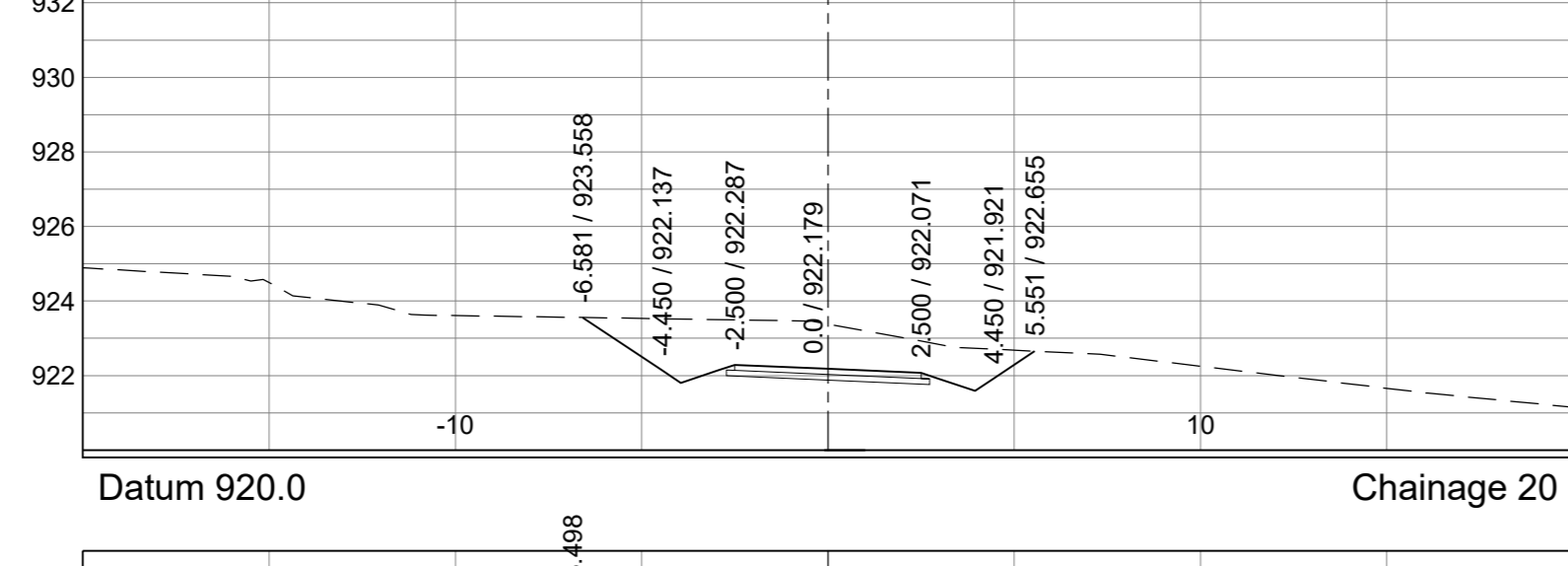
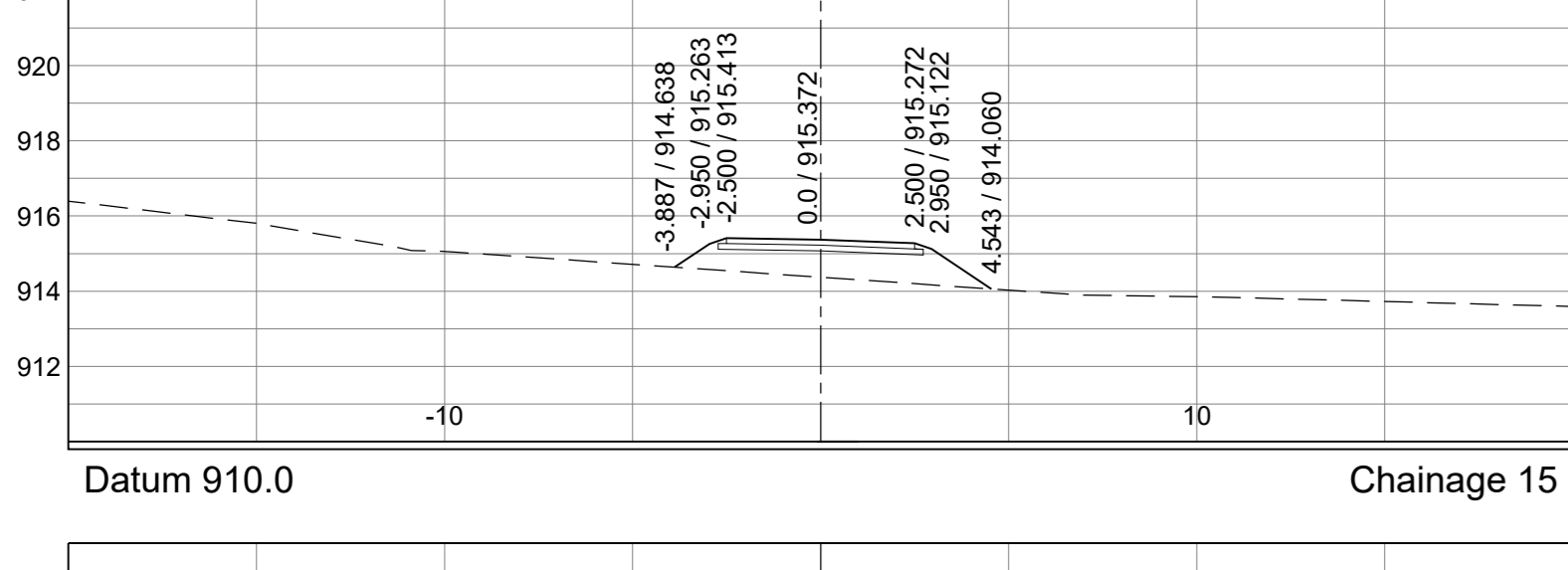
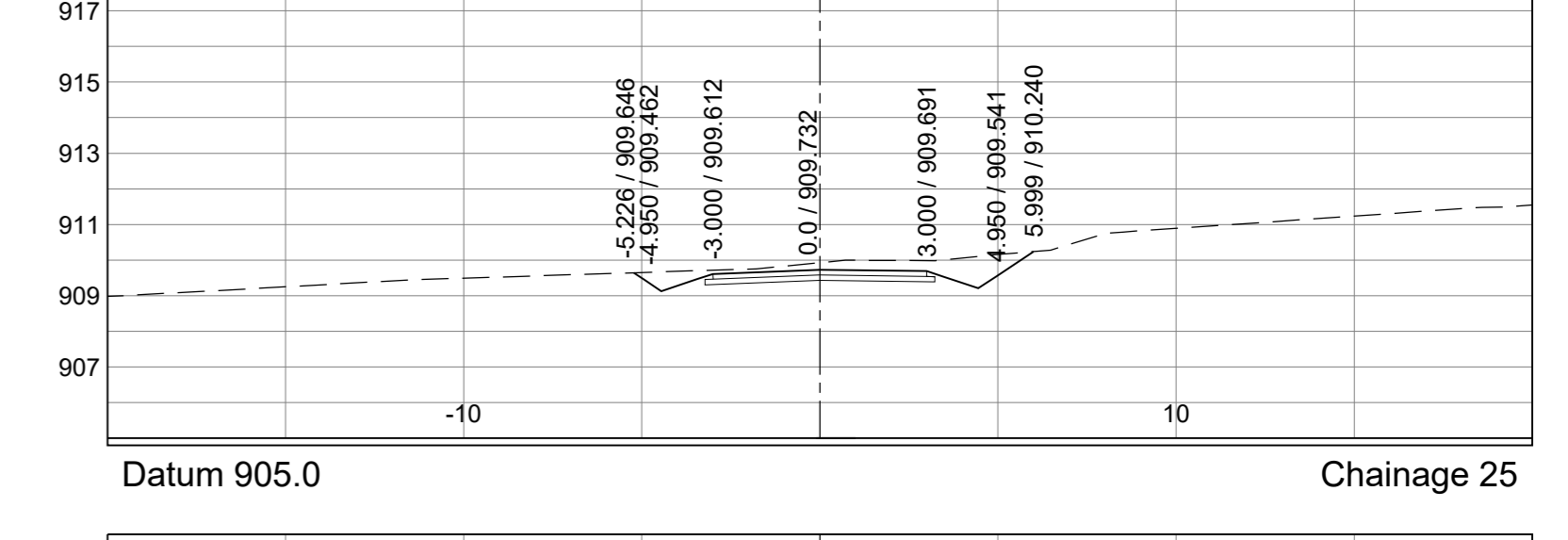
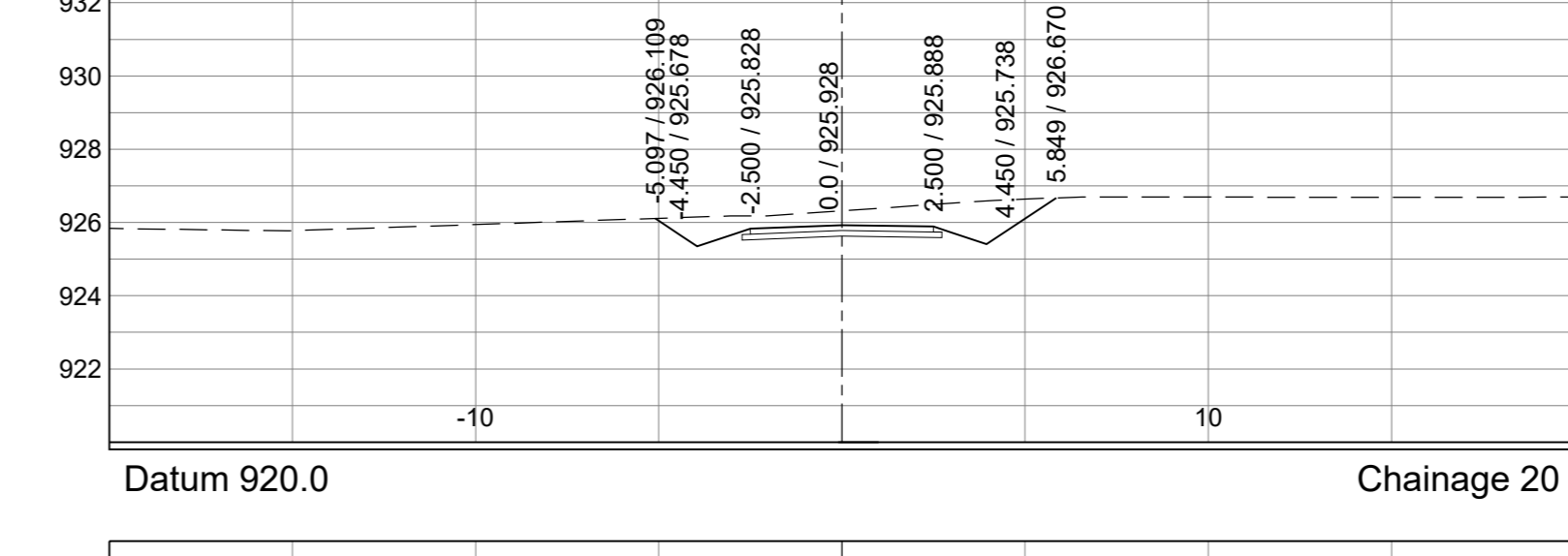
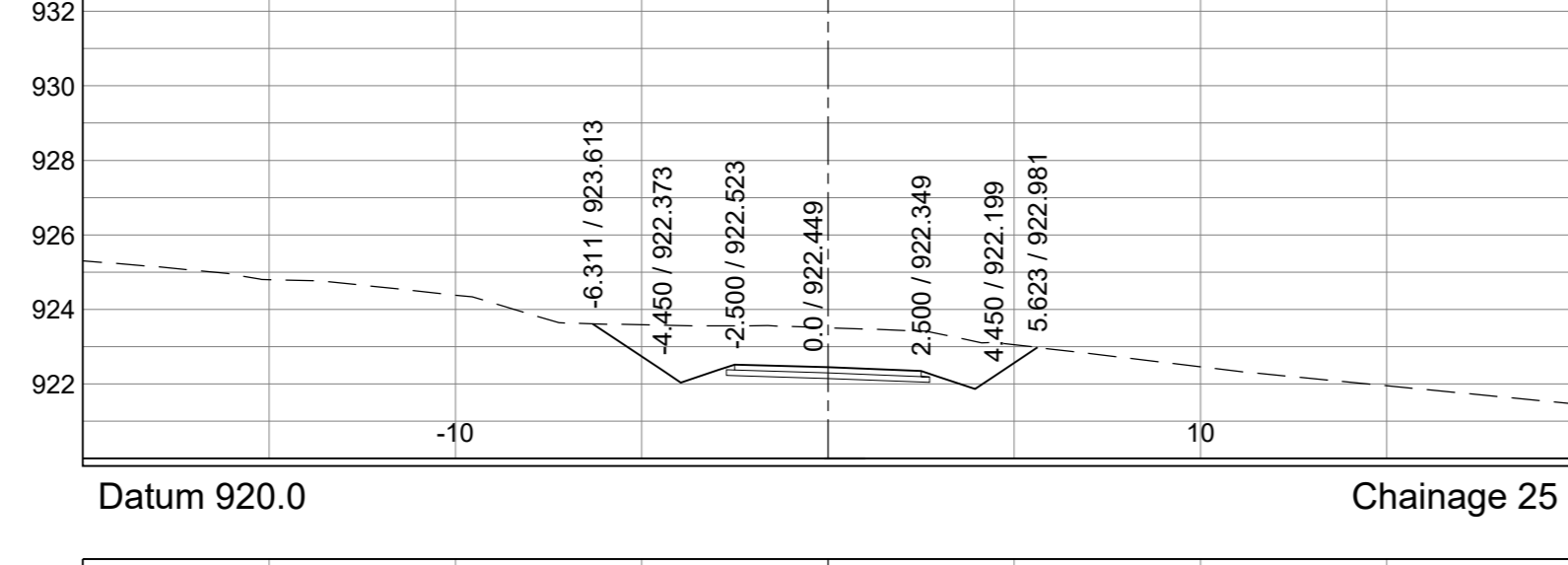
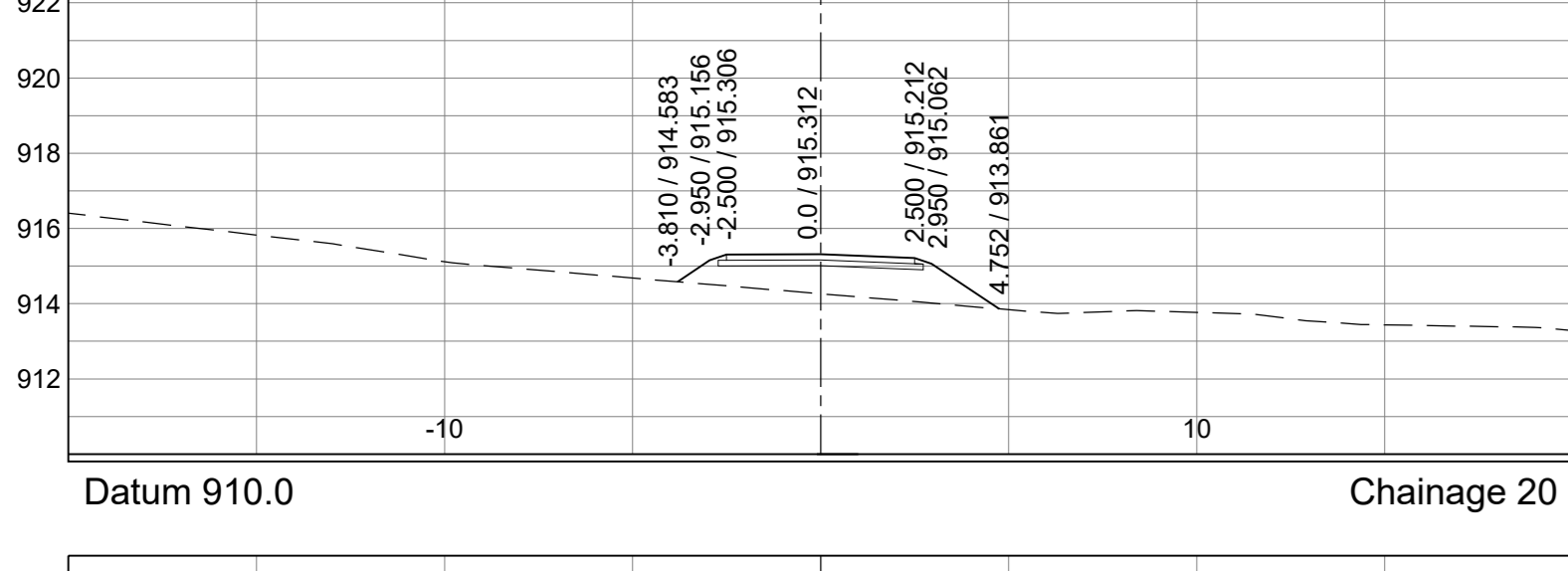
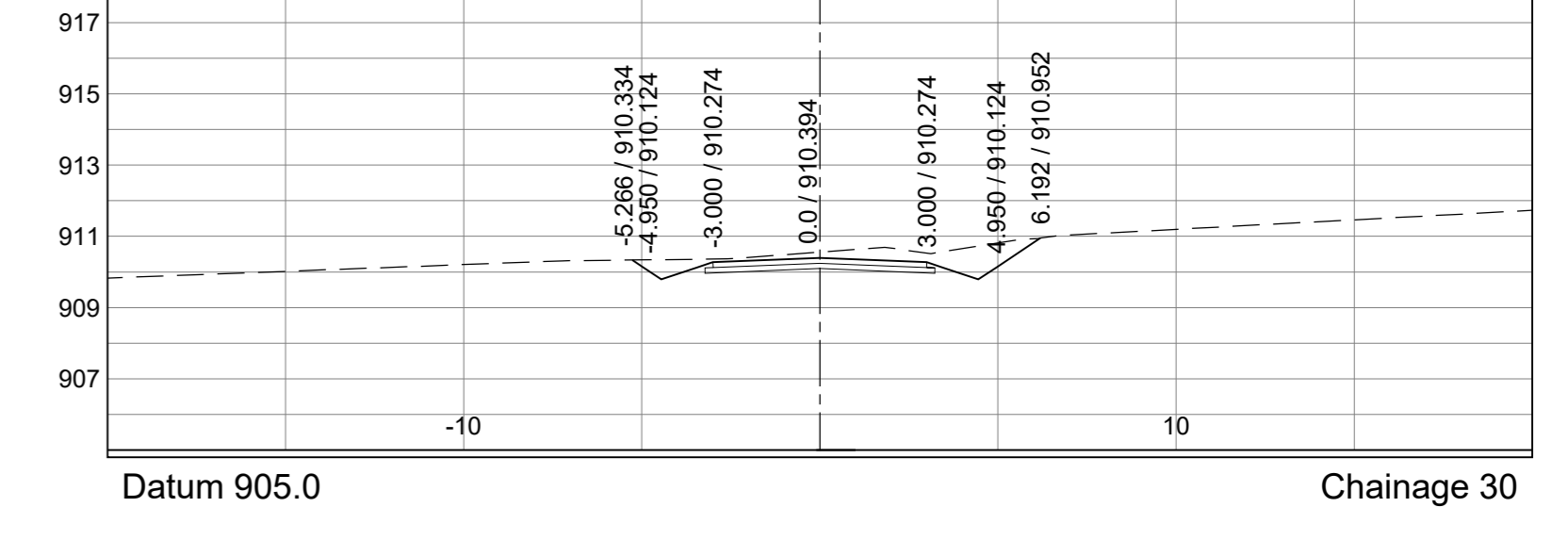
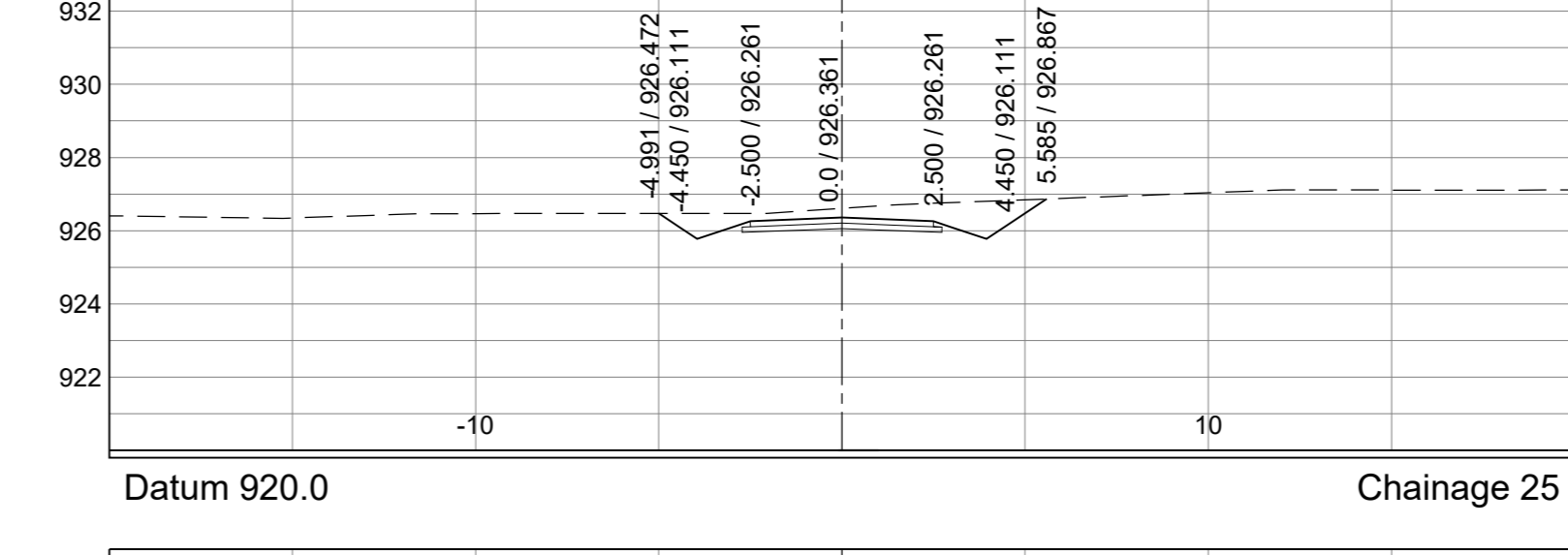
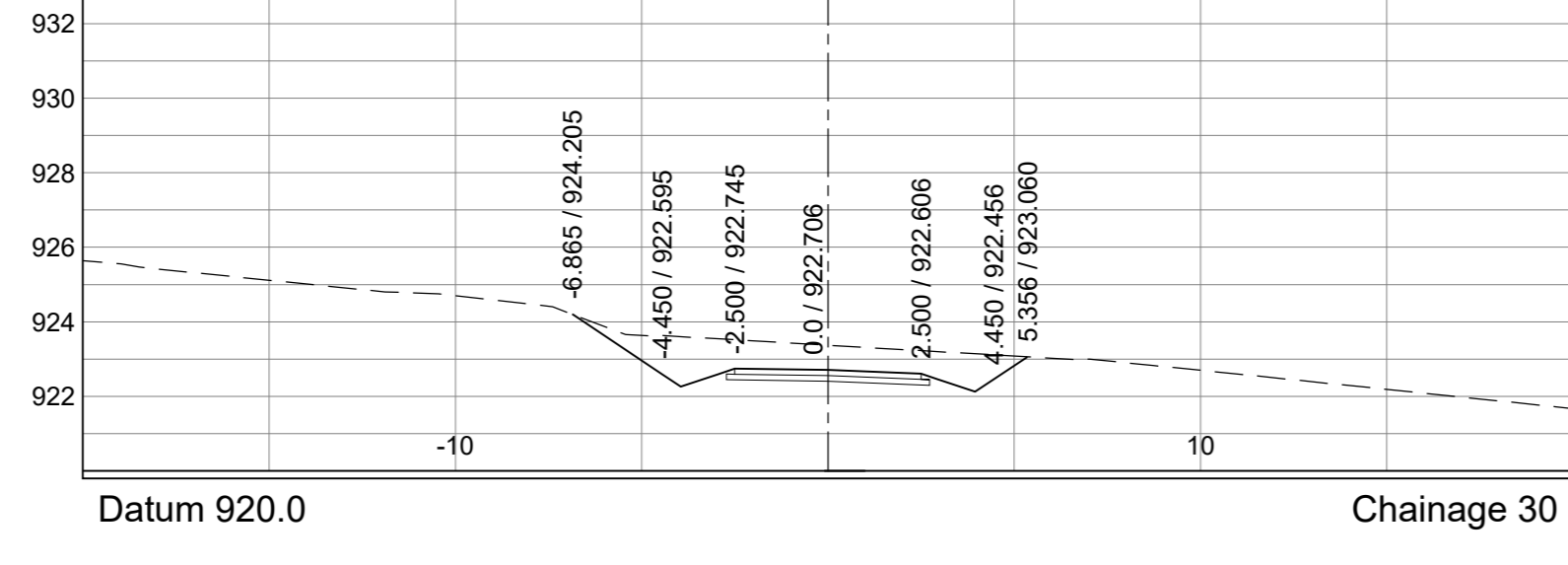
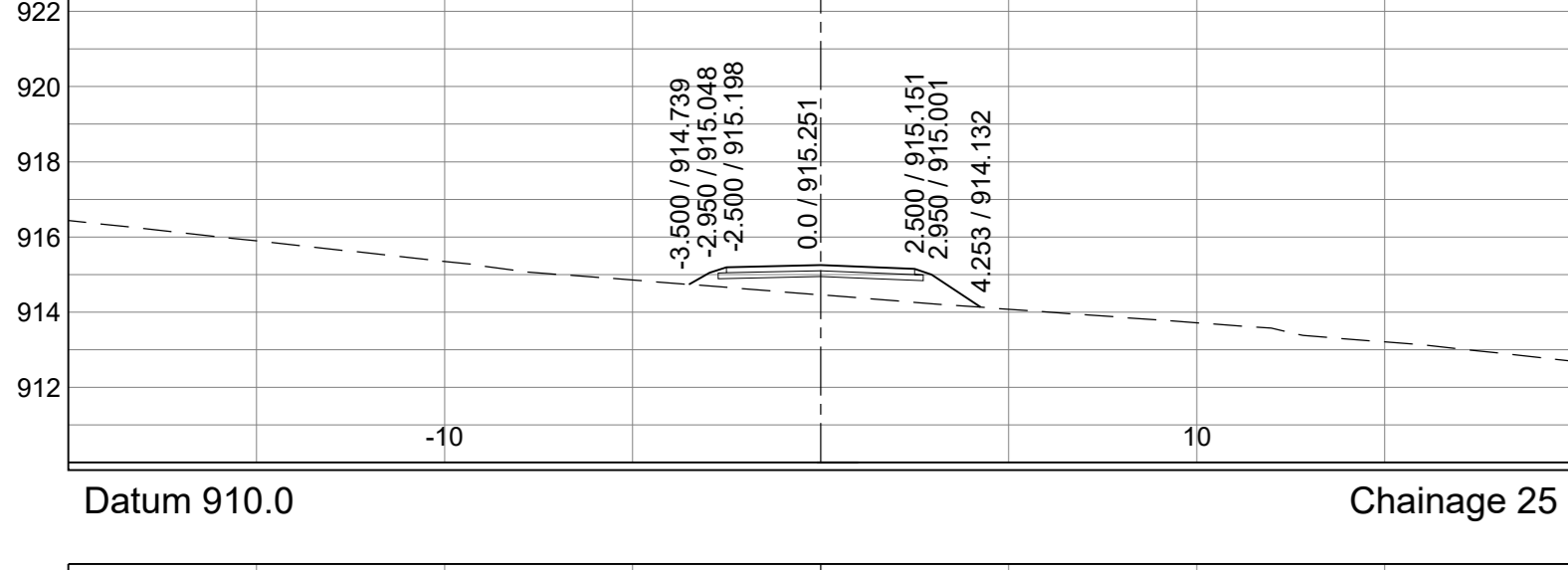
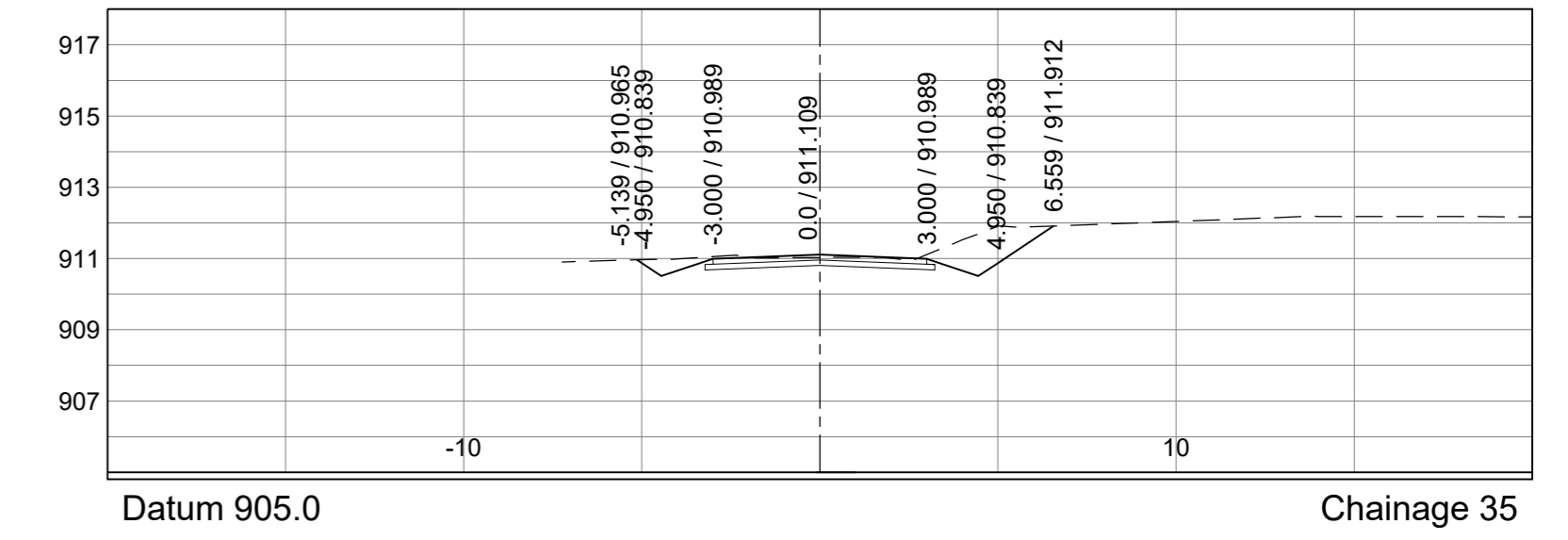
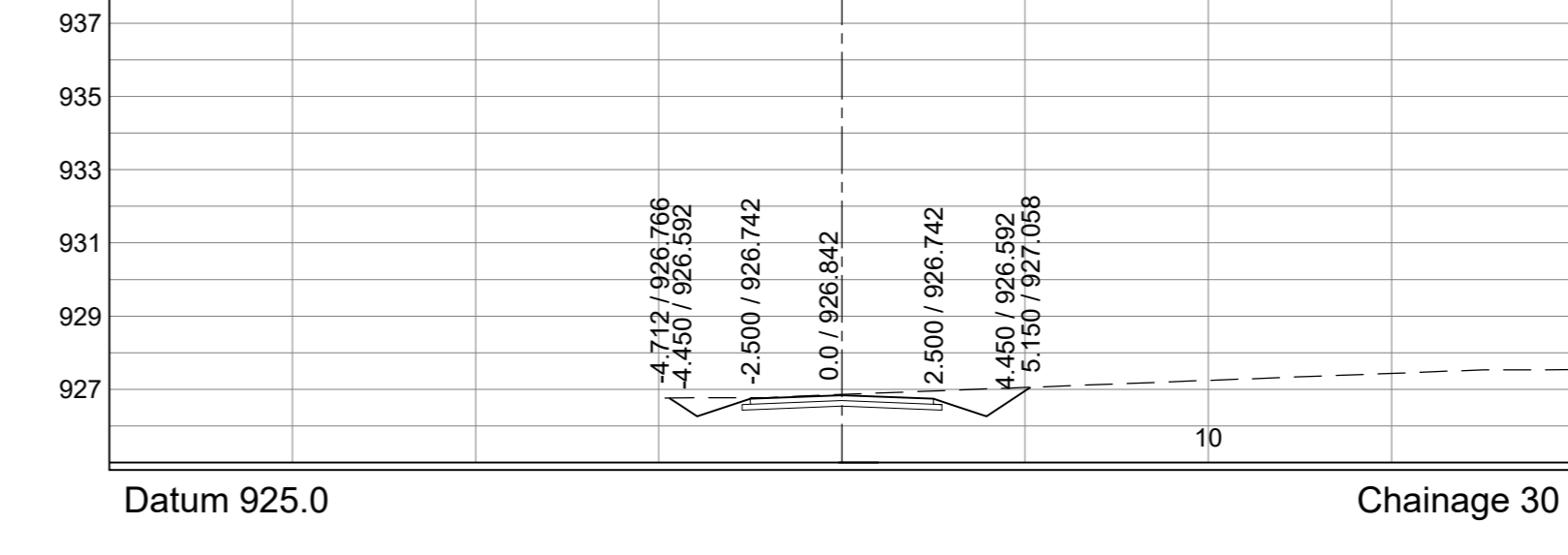
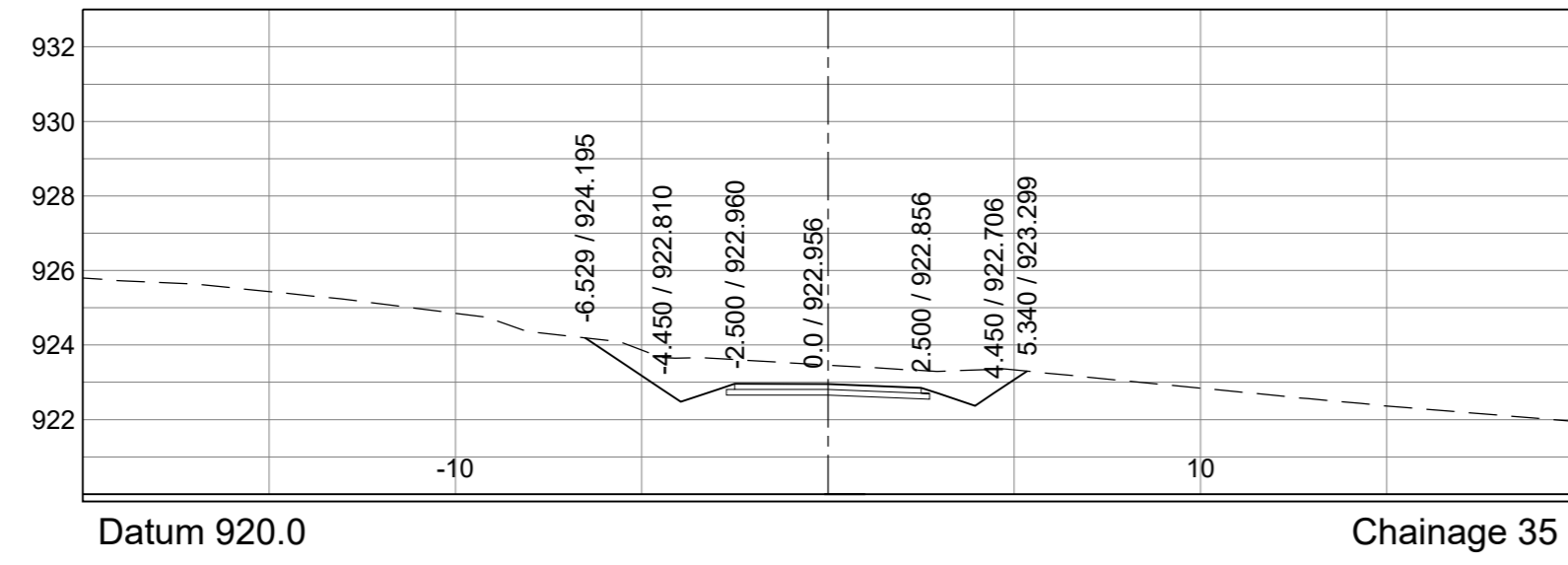
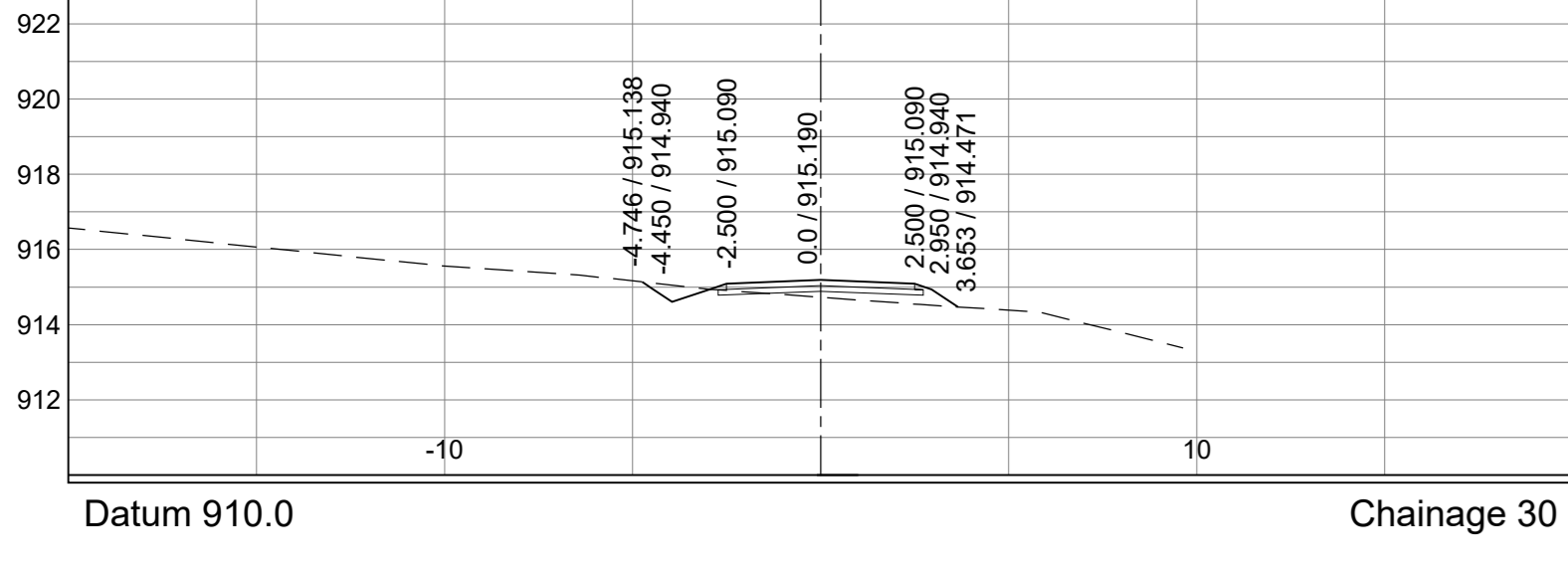
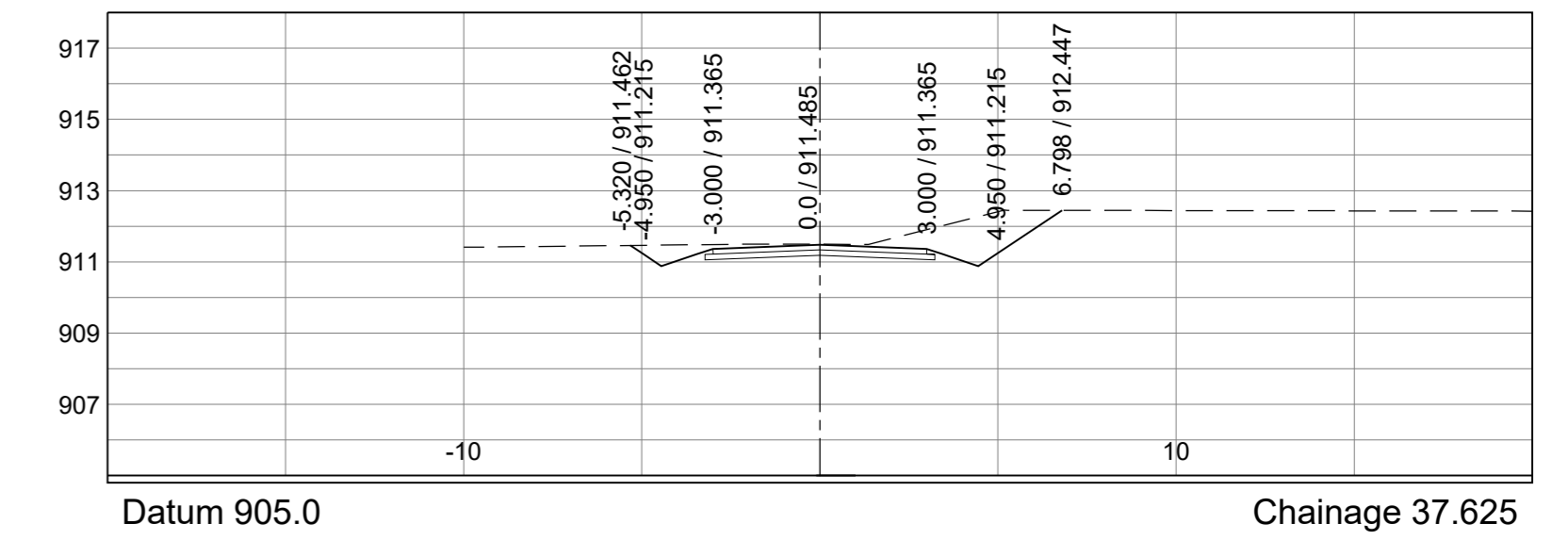
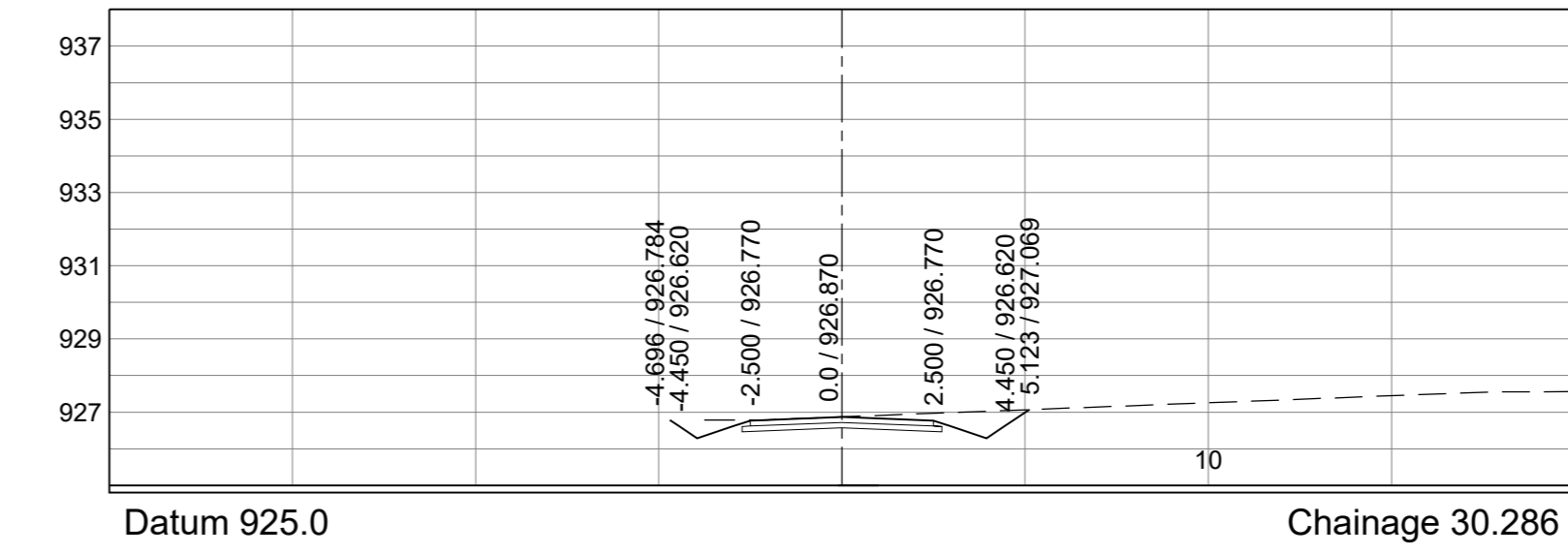
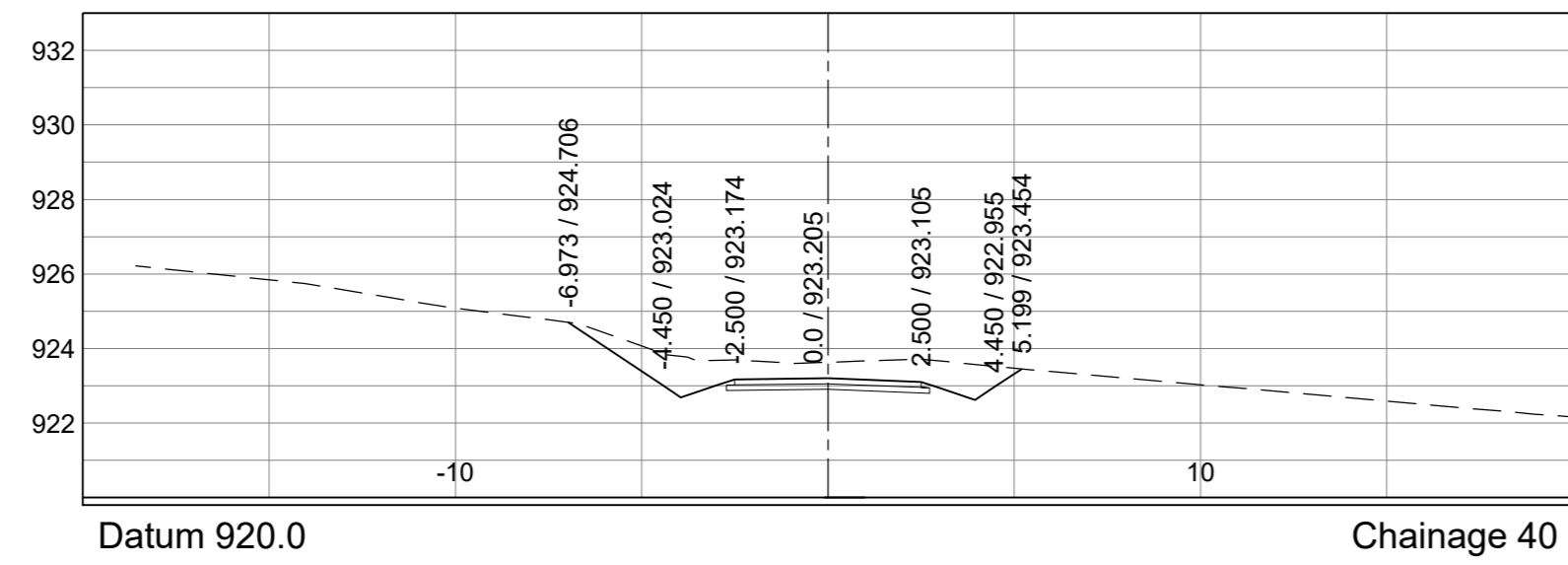
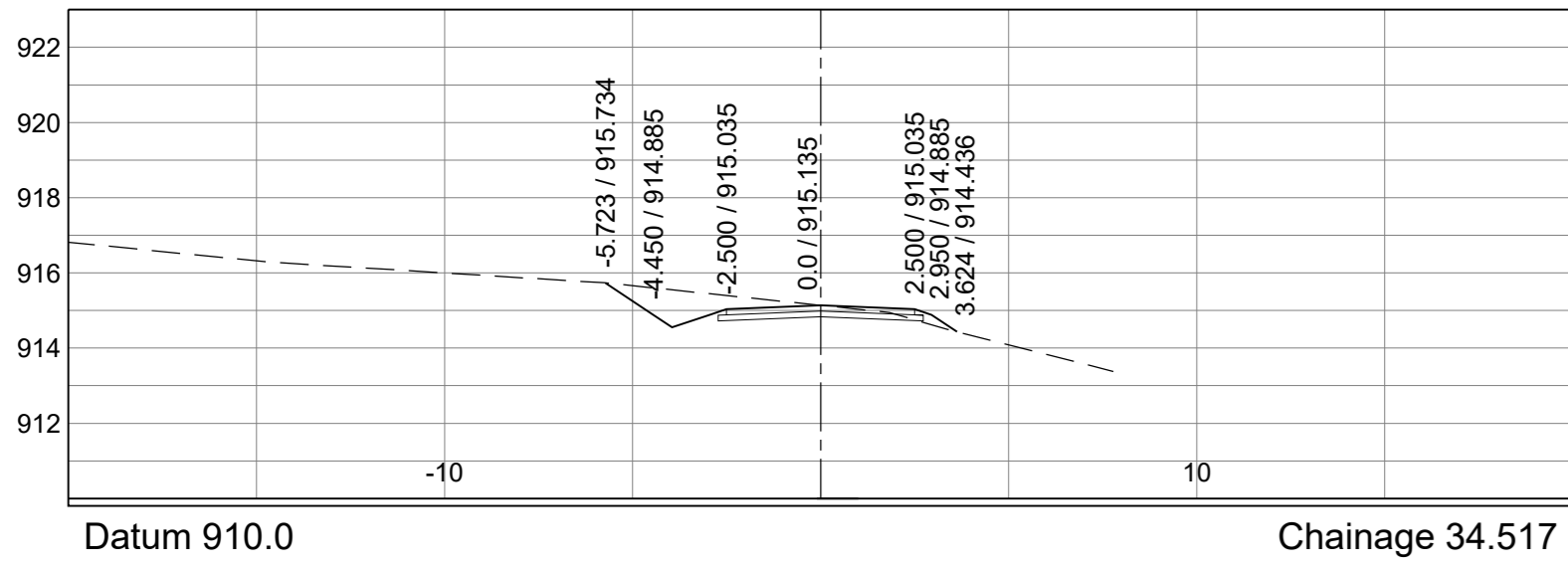


ACCESS @ KM 20+055.654 RHS

ACCESS @ KM 20+524.694 RHS (L2506)

ACCESS @ KM 19+653.258 LHS

ACCESS @ KM 20+264.769 RHS



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
ACCESS ROADS CROSS SECTIONS

Staked km distance	km 0+000 - km 0+034 517	Sheet -	12	REVISION:
	km 0+000 - km 0+055 280	of -	14	A
	km 0+000 - km 0+032 286	Plan No -		
	km 0+000 - km 0+037 625	Scale		
Vertical Scale	1 : 200	Horizontal Scale	1 : 200	C 47651

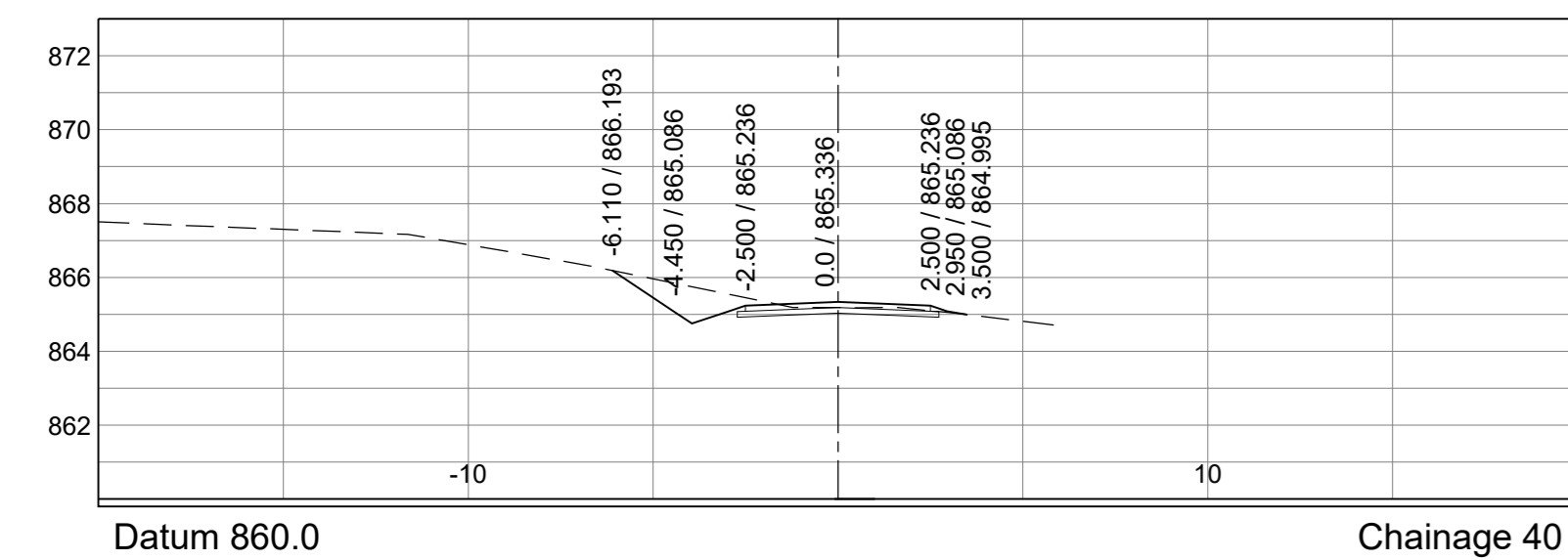
C 47651



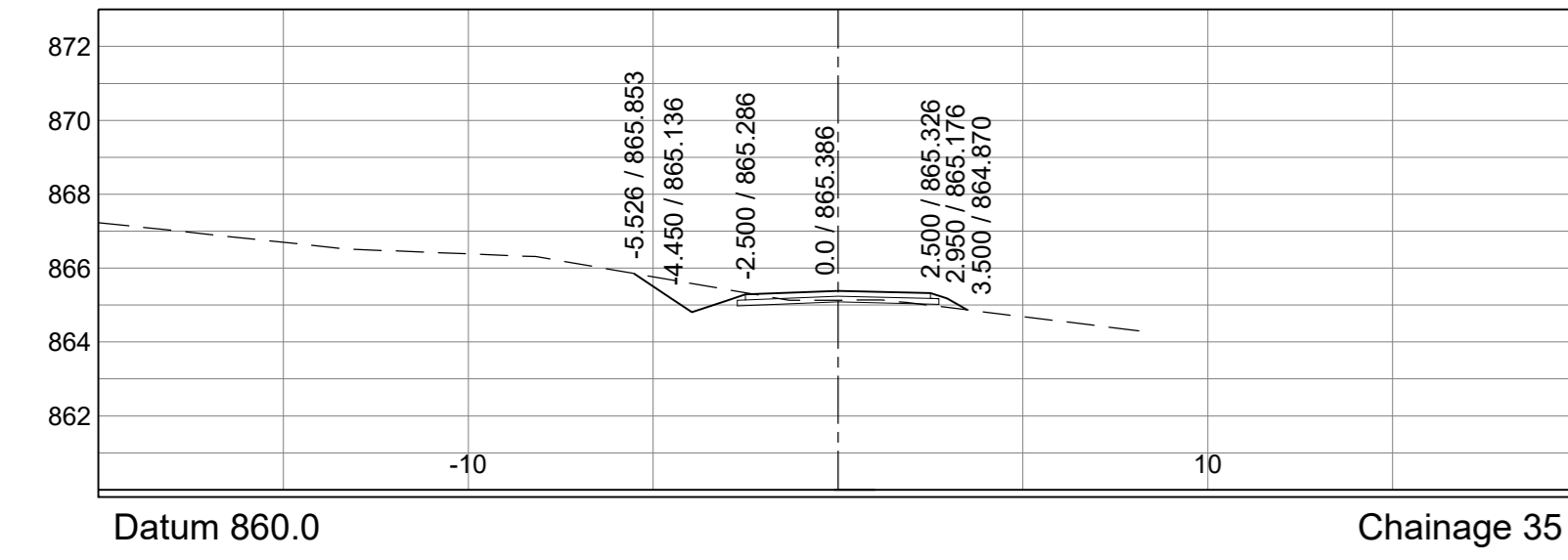




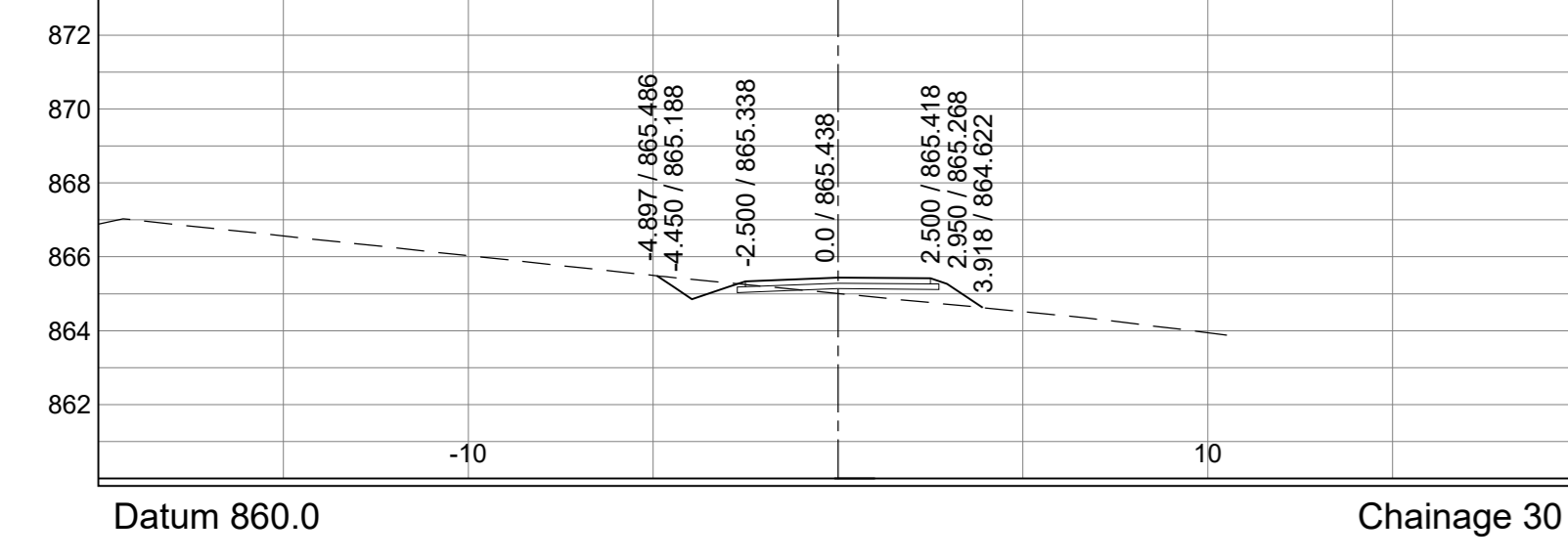
ACCESS @ KM 21+521.808 RHS



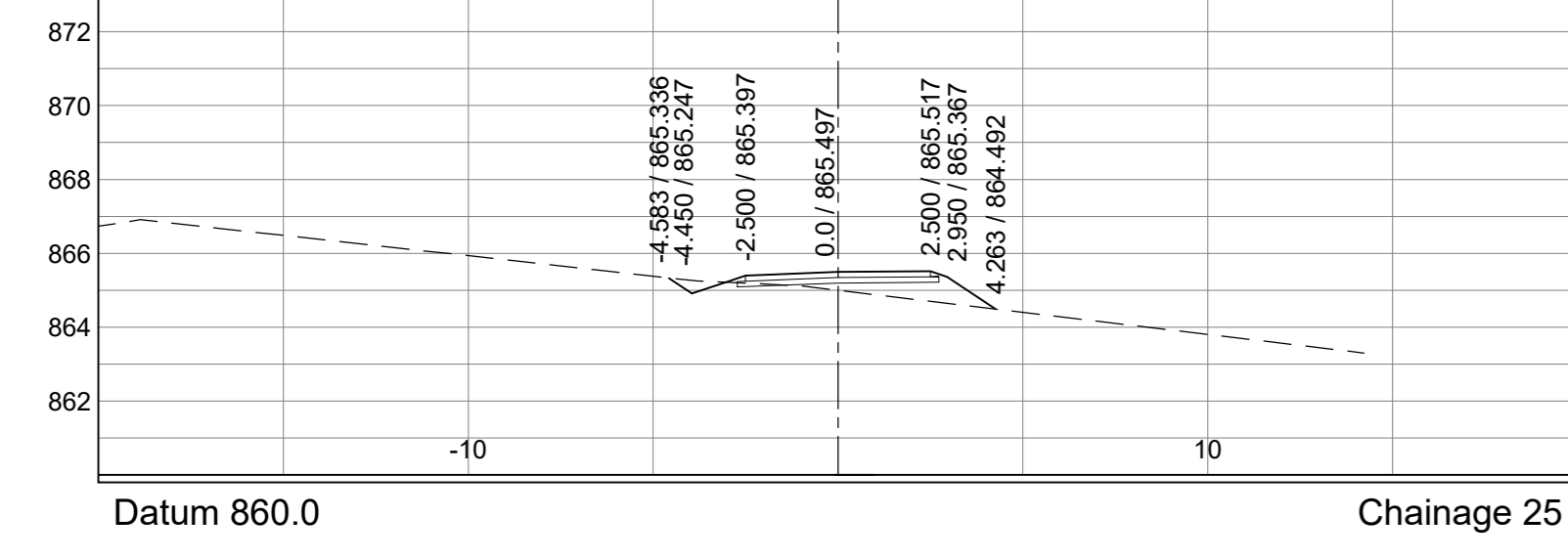
Datum 860.0 Chainage 40



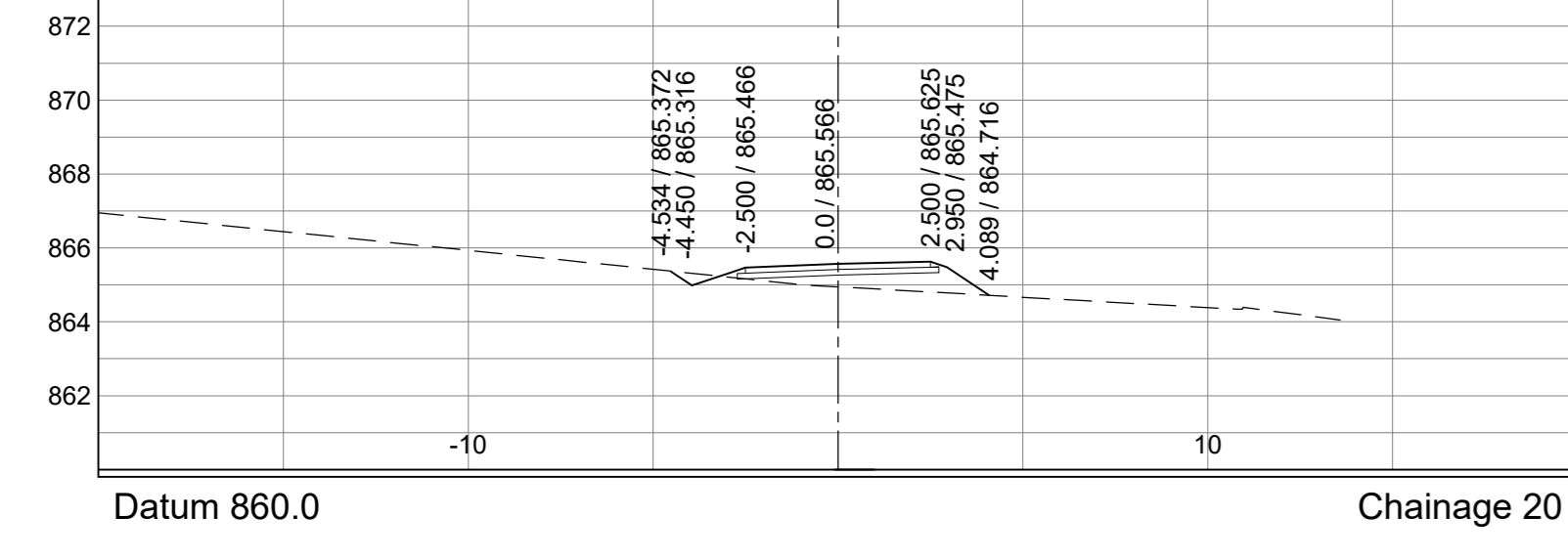
Datum 860.0 Chainage 35



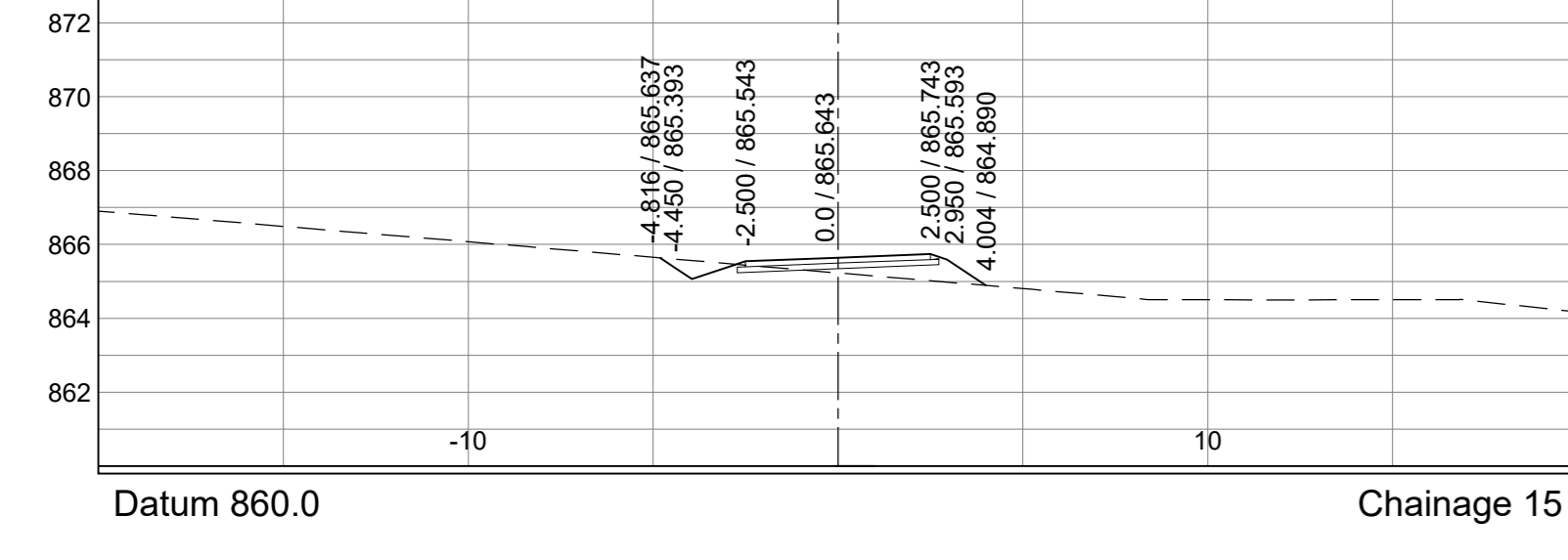
Datum 860.0 Chainage 30



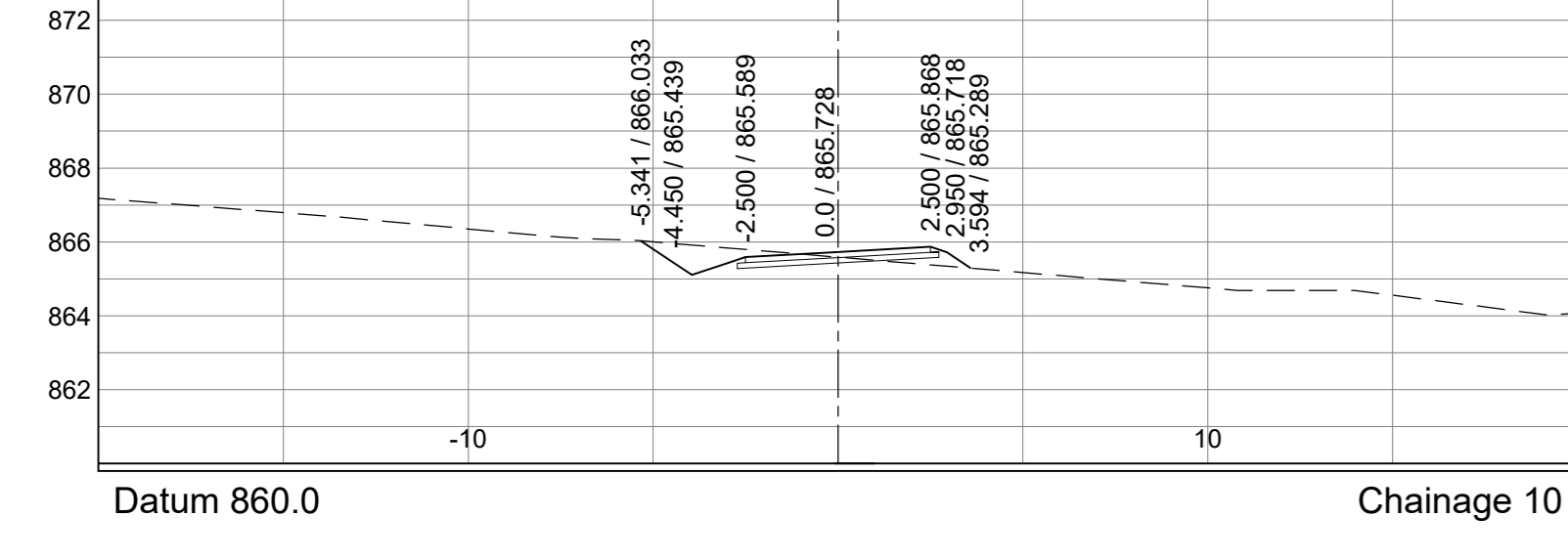
Datum 860.0 Chainage 25



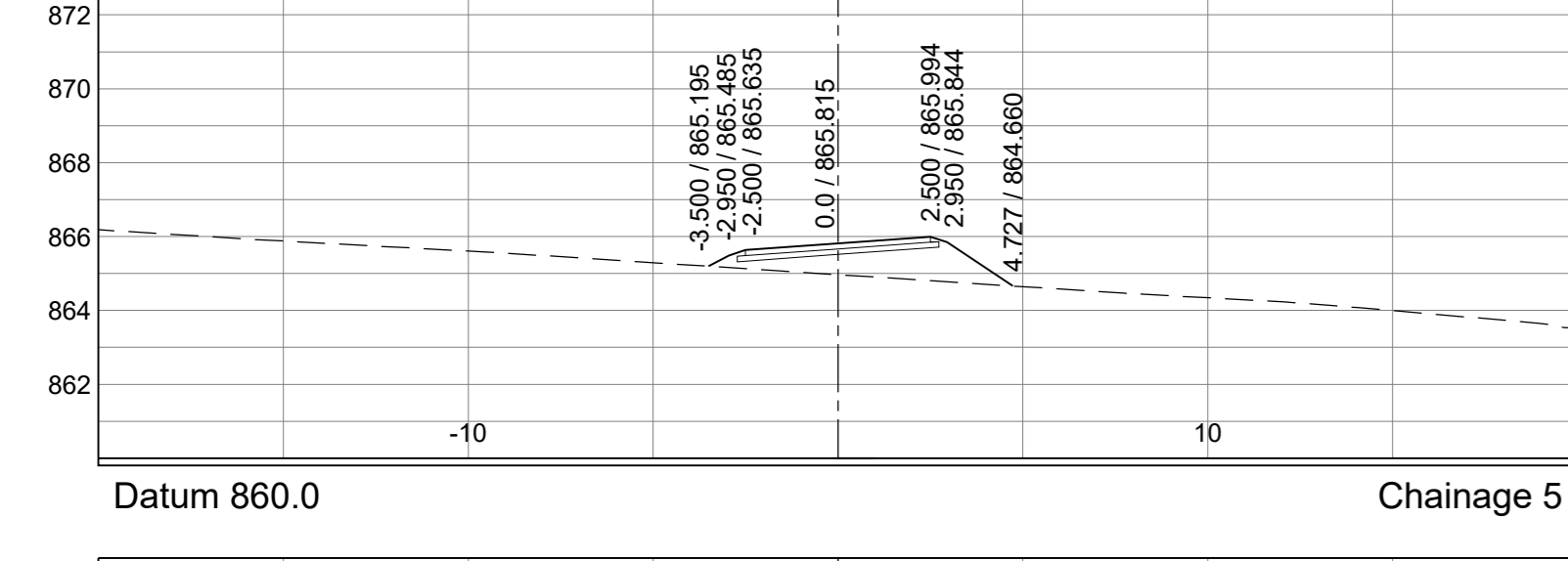
Datum 860.0 Chainage 20



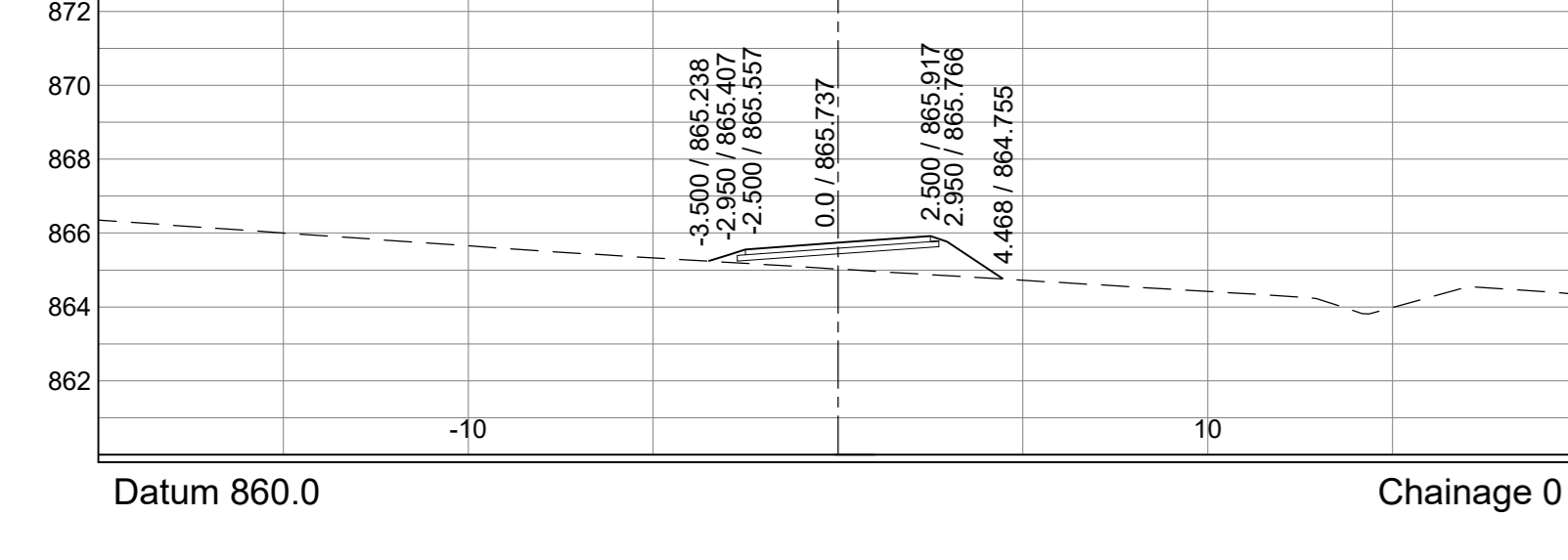
Datum 860.0 Chainage 15



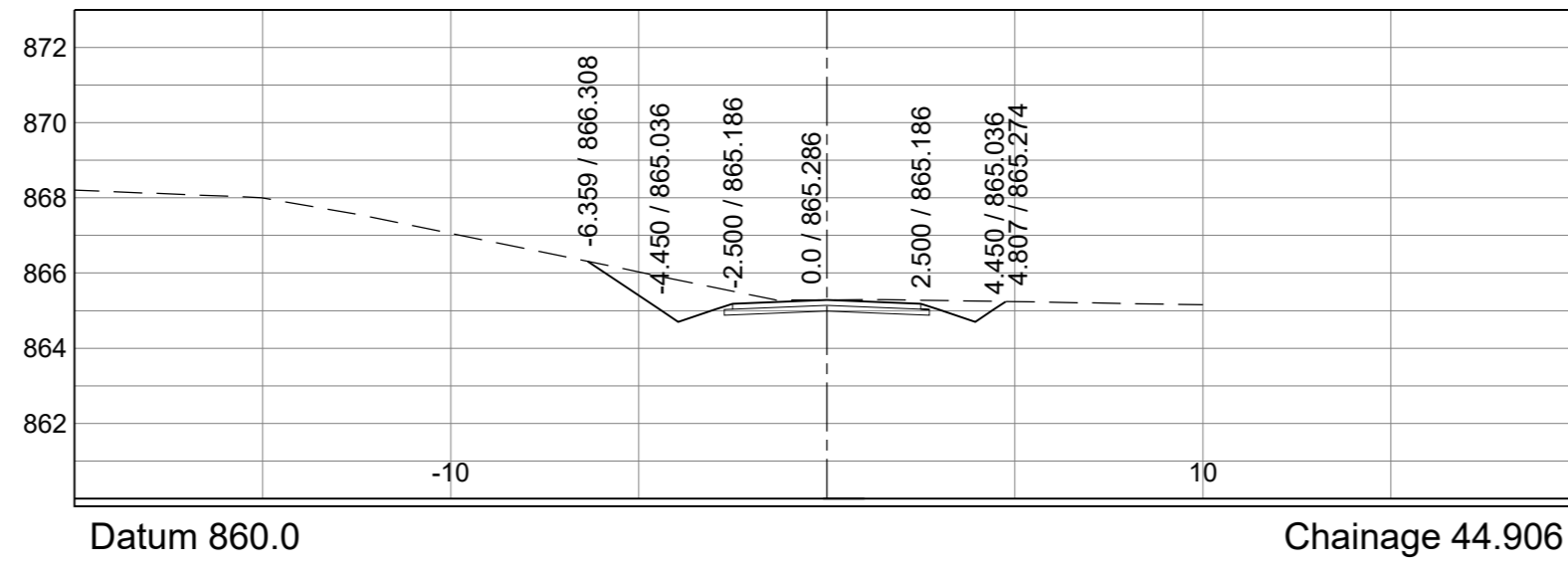
Datum 860.0 Chainage 10



Datum 860.0 Chainage 5

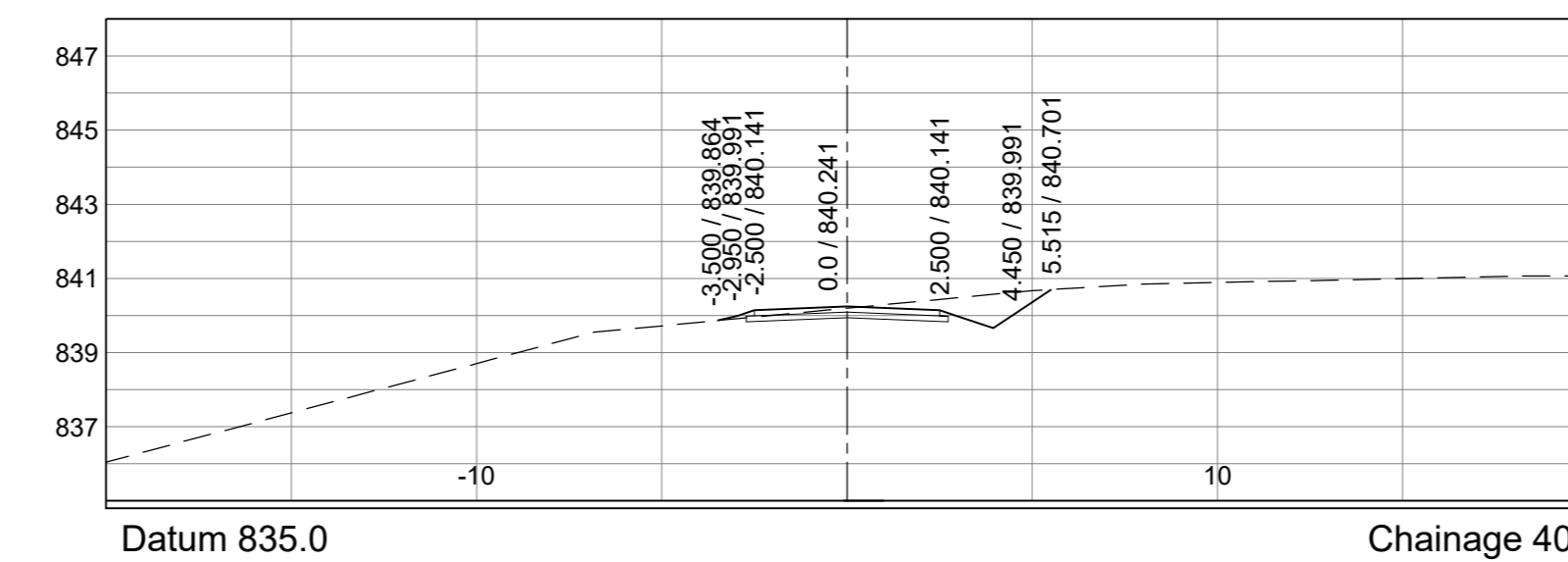


Datum 860.0 Chainage 0

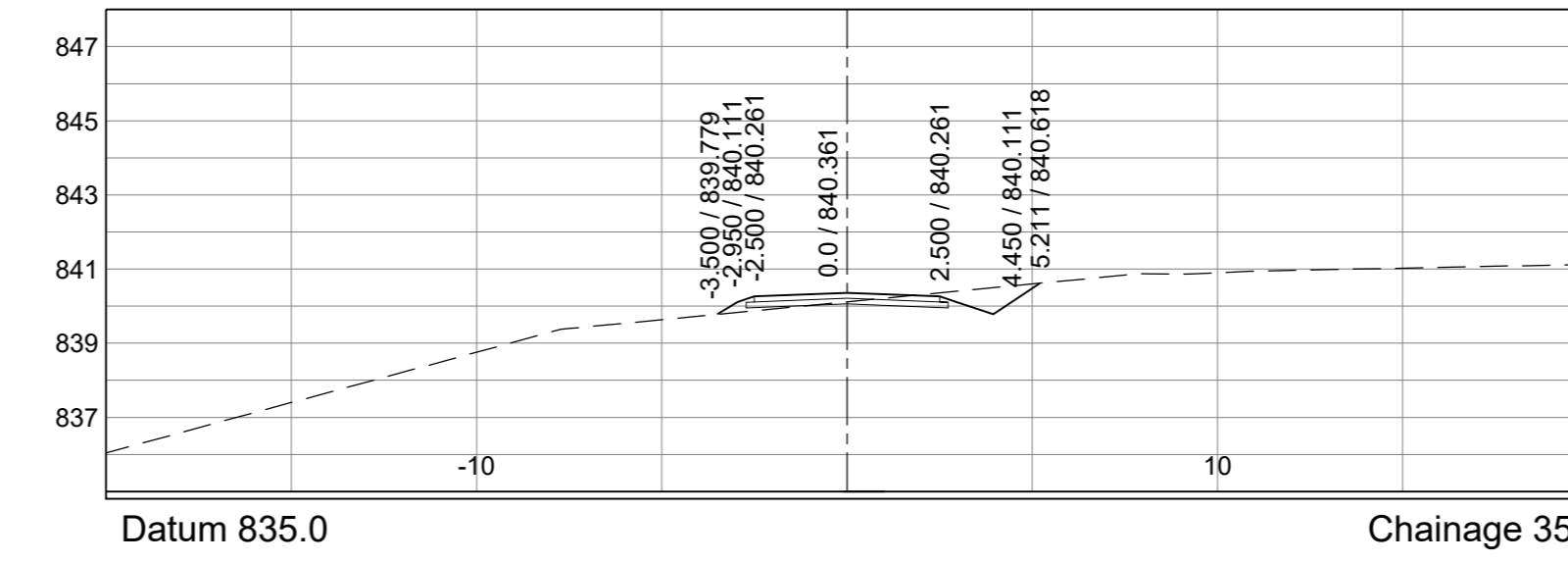


Datum 860.0 Chainage 44.906

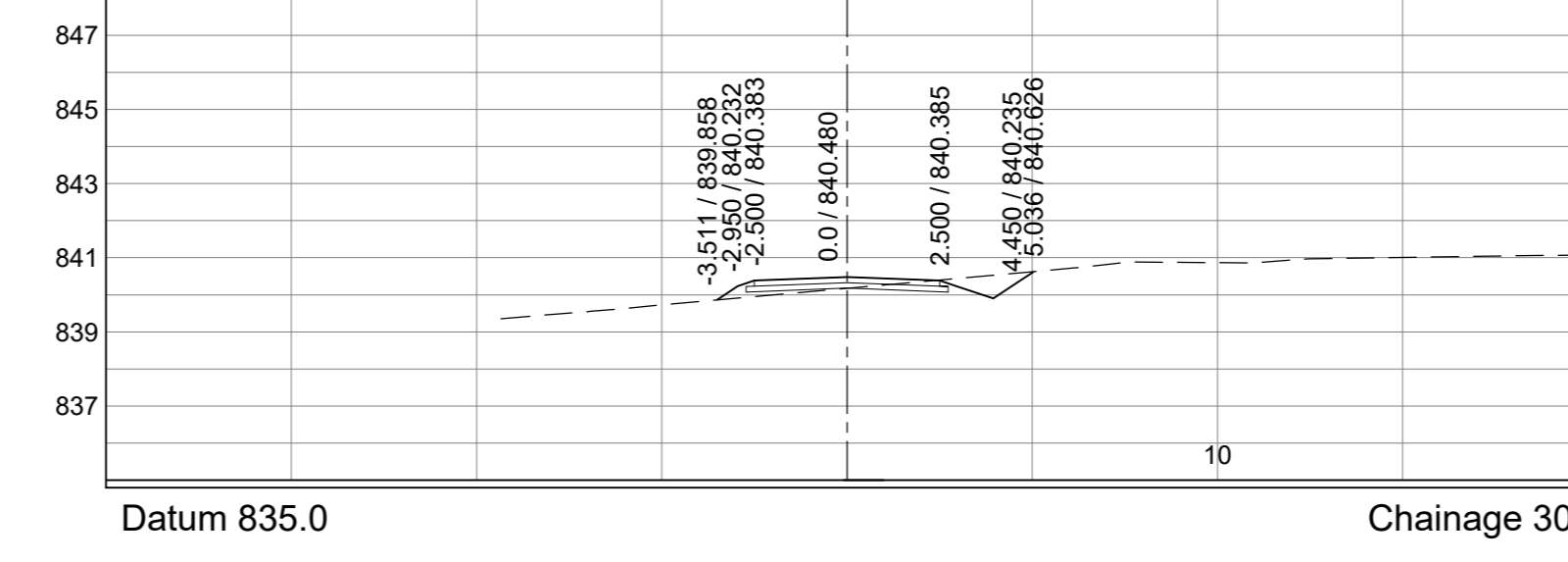
ACCESS @ KM 22+243.724 LHS



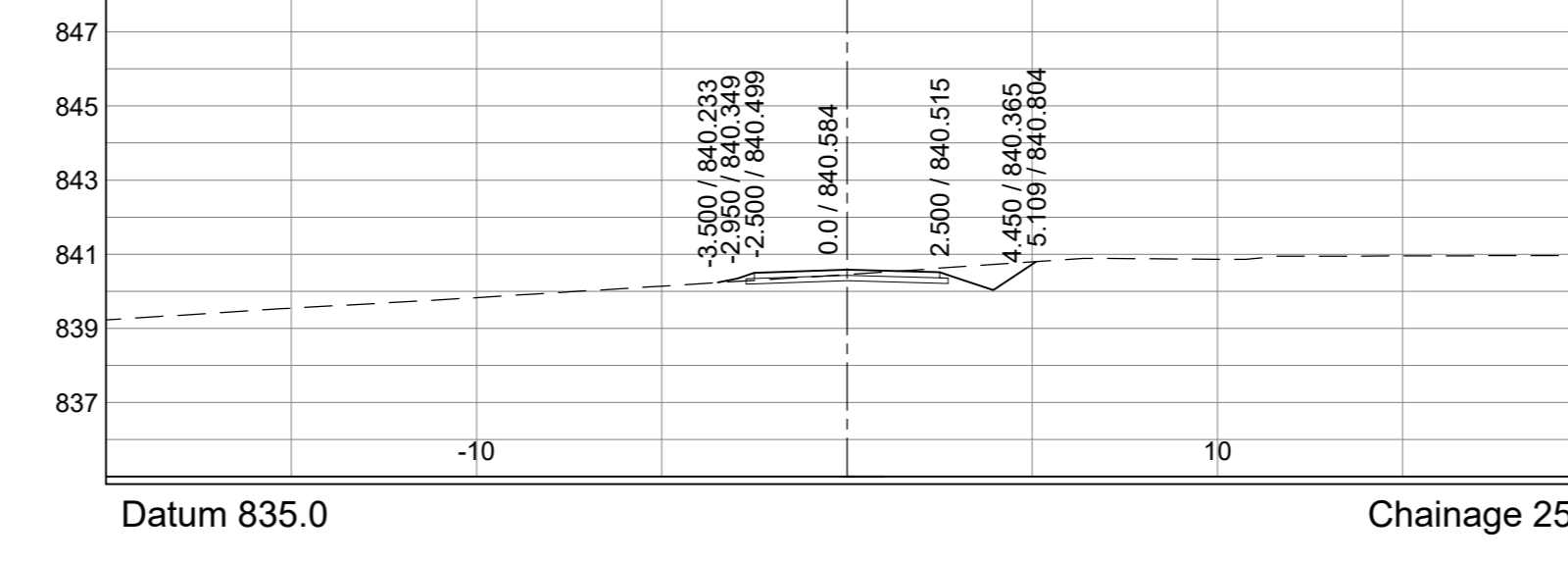
Datum 835.0 Chainage 40



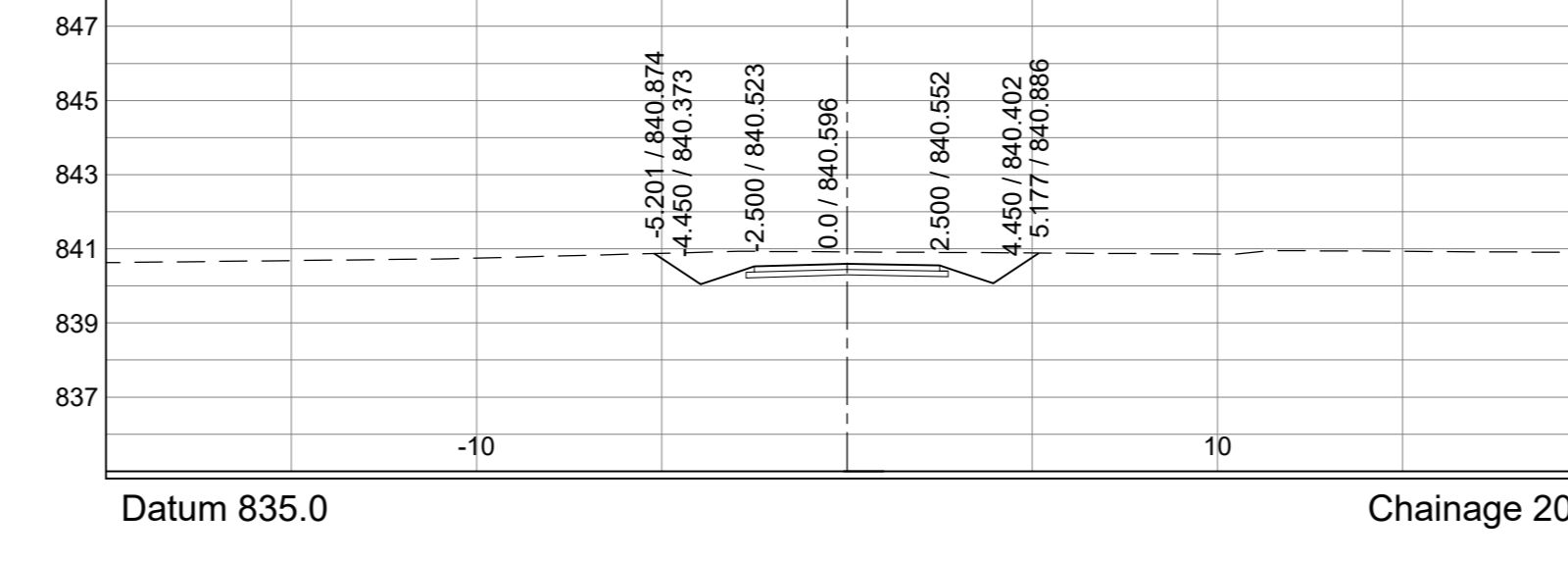
Datum 835.0 Chainage 35



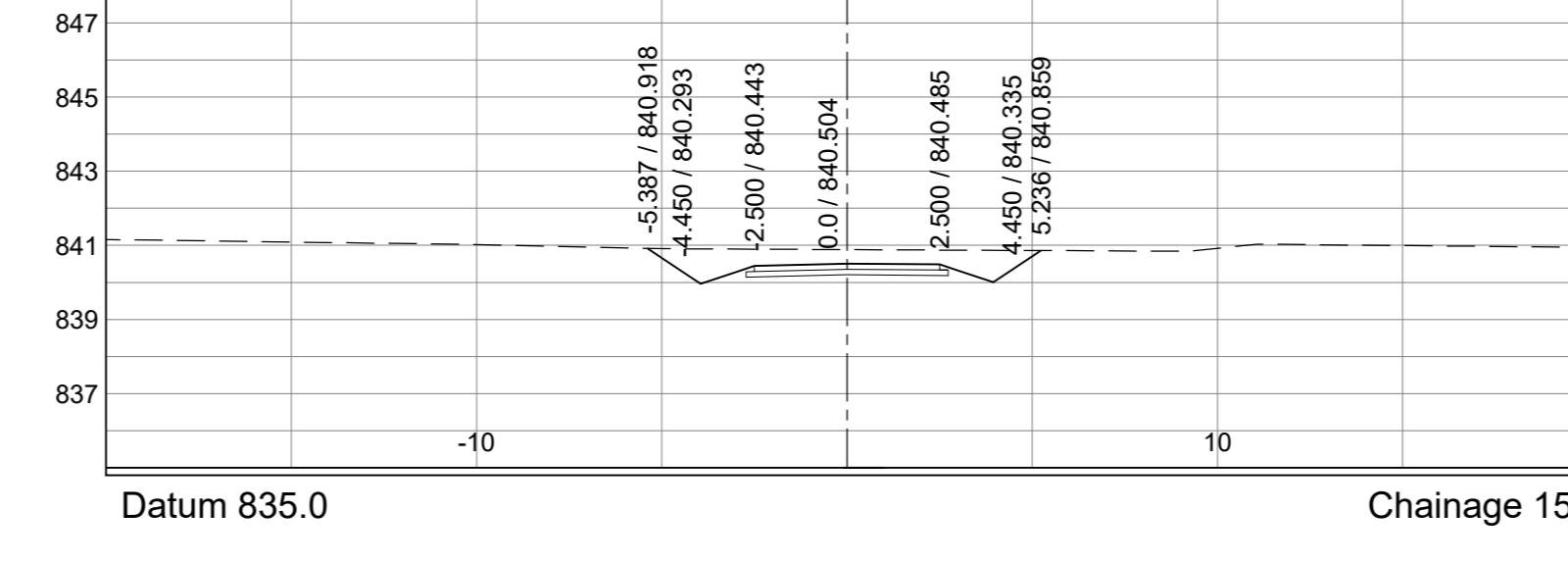
Datum 835.0 Chainage 30



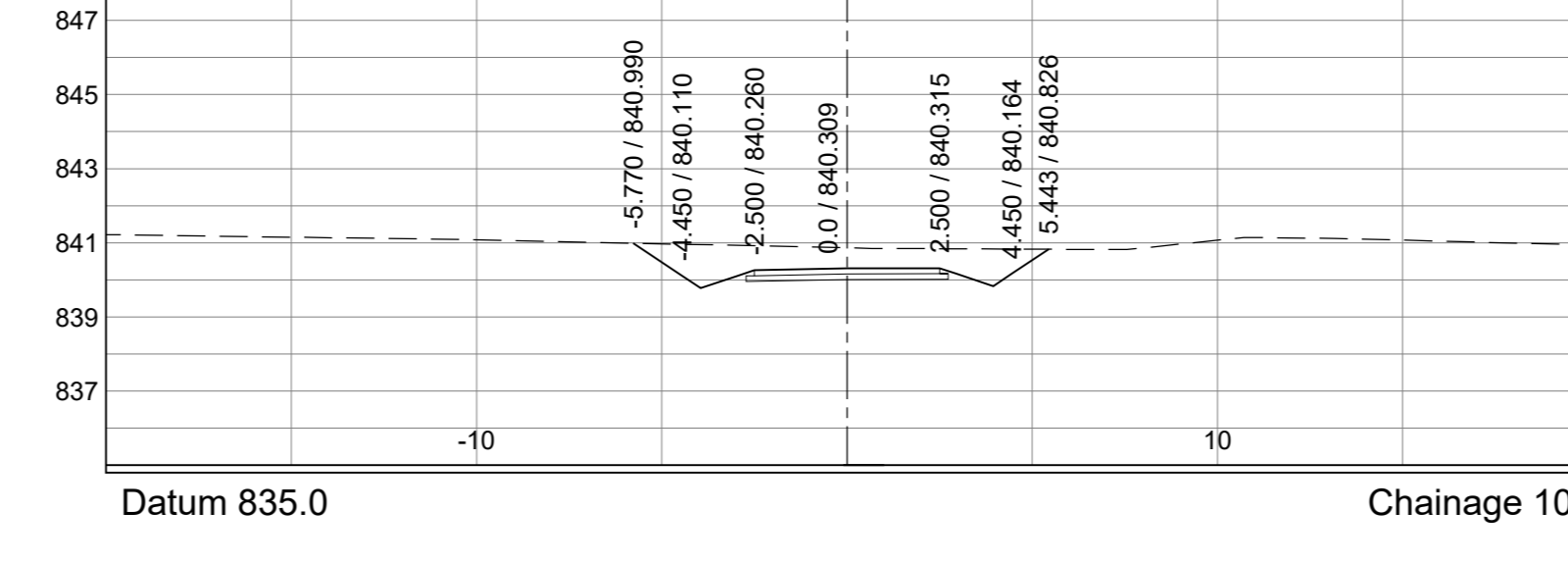
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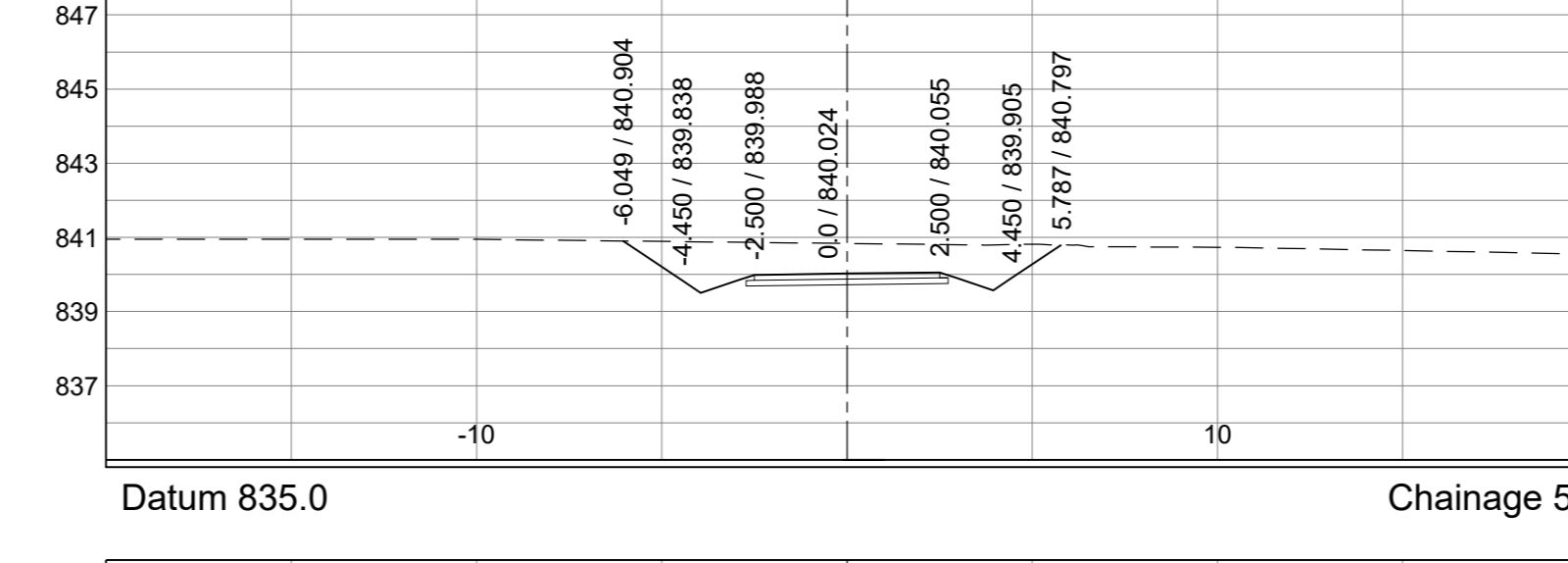
Datum 835.0 Chainage 20



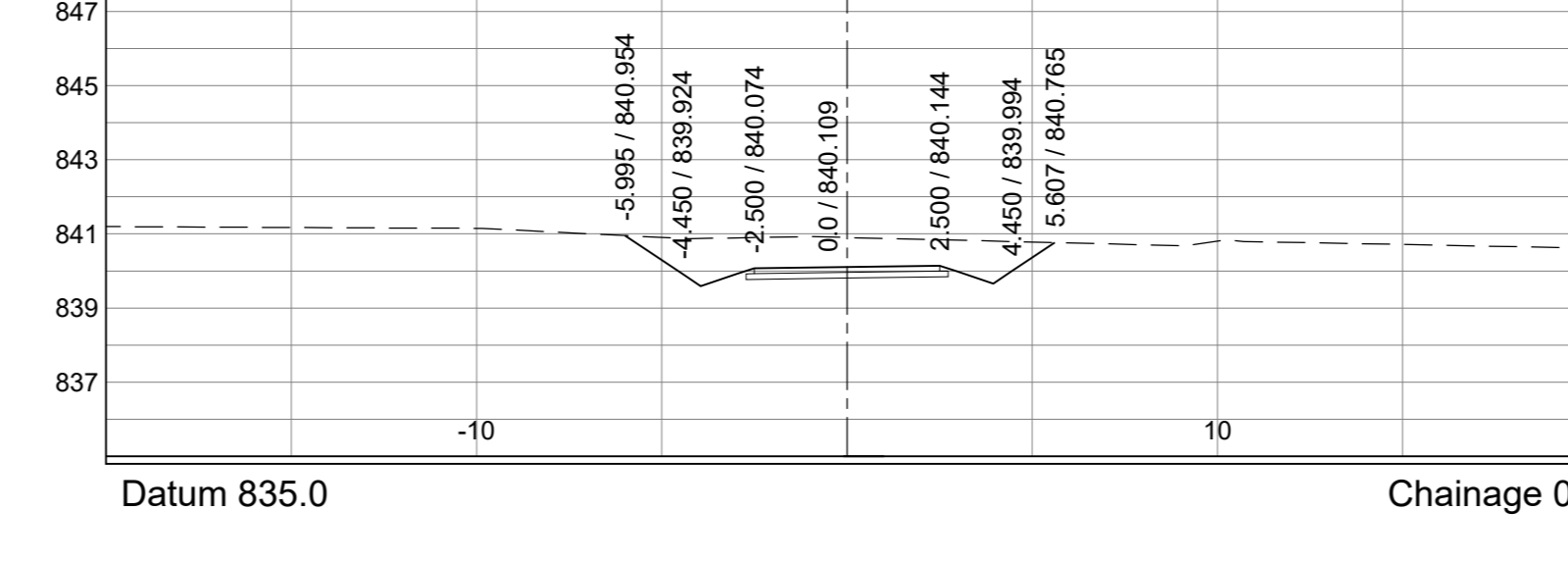
Datum 835.0 Chainage 15



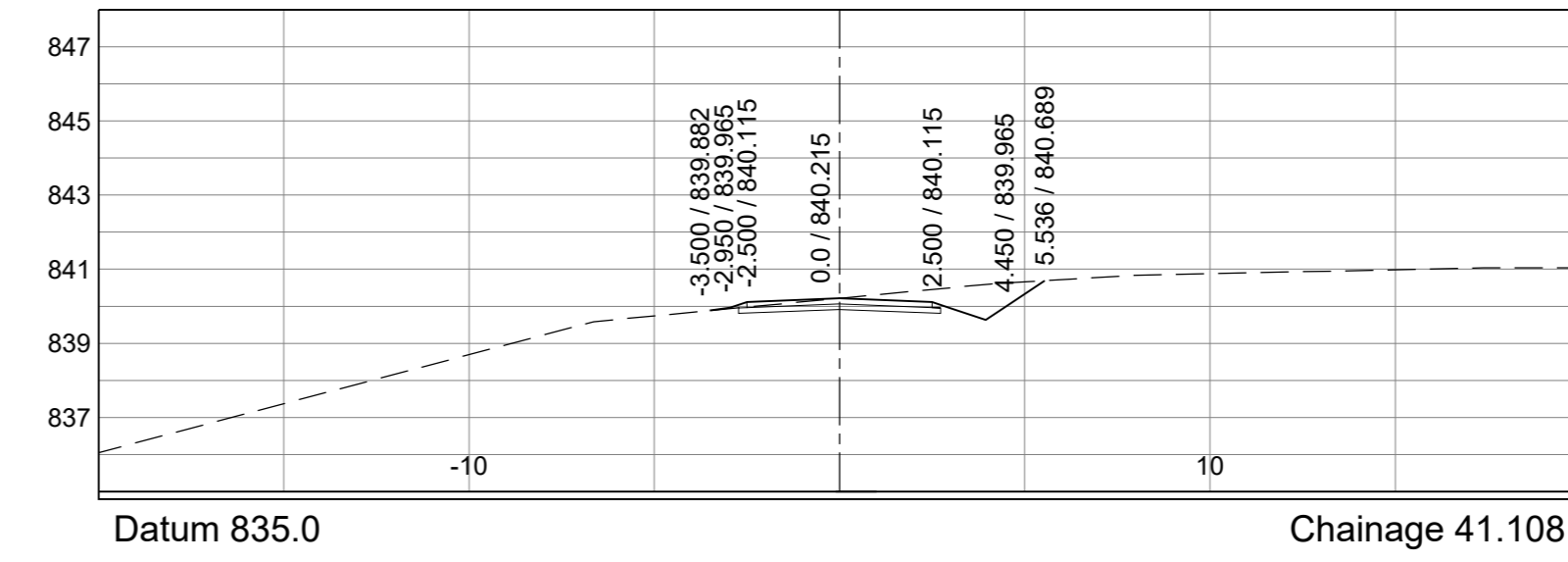
Datum 835.0 Chainage 10



Datum 835.0 Chainage 5



Datum 835.0 Chainage 0



Datum 835.0 Chainage 41.108

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44335	Designed by:-	Y. DOMA
Continued on:-	C 44337	Checked by:-	N. NGUBANE
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



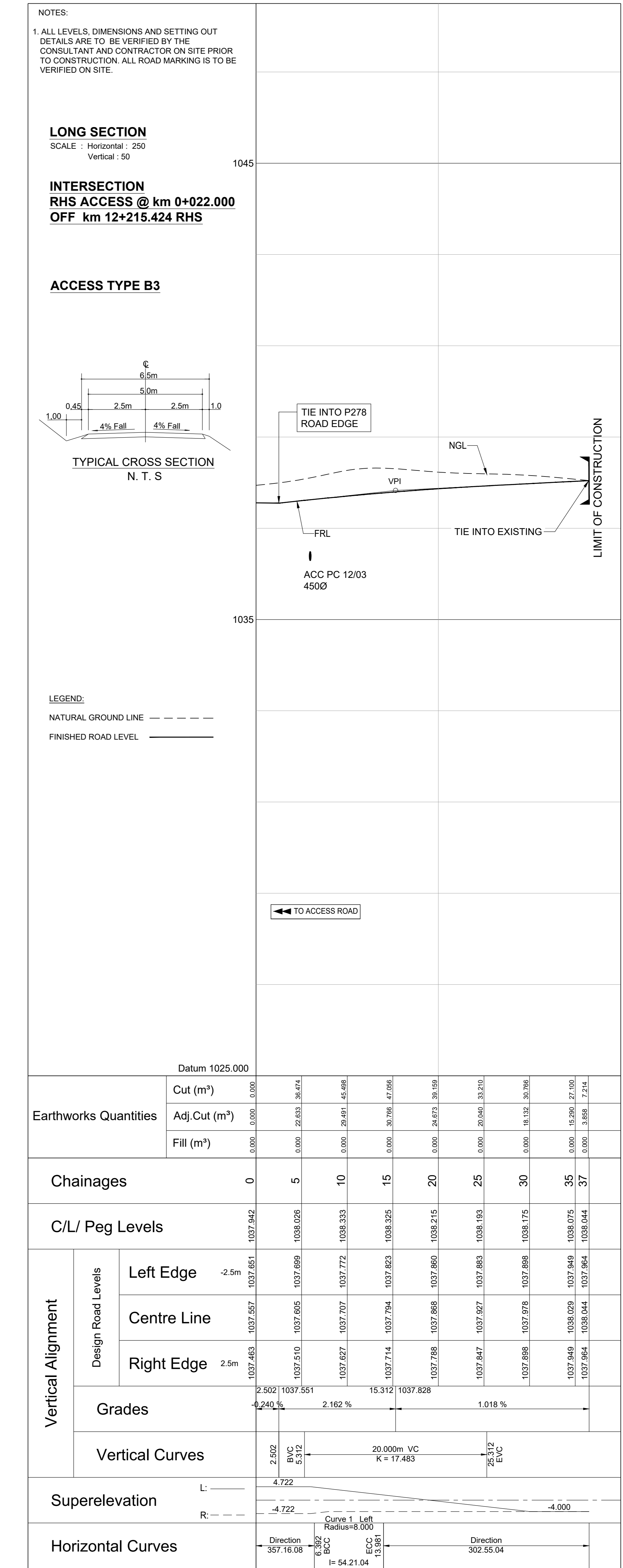
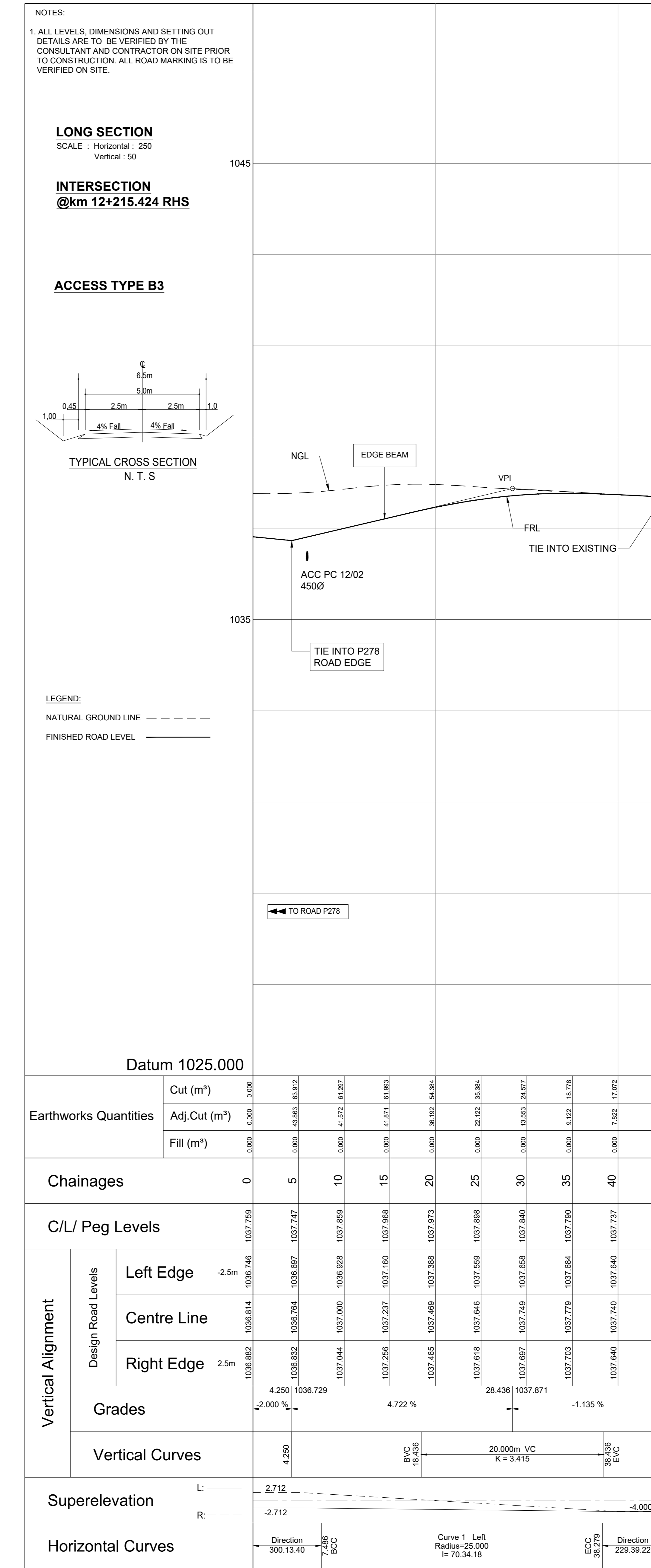
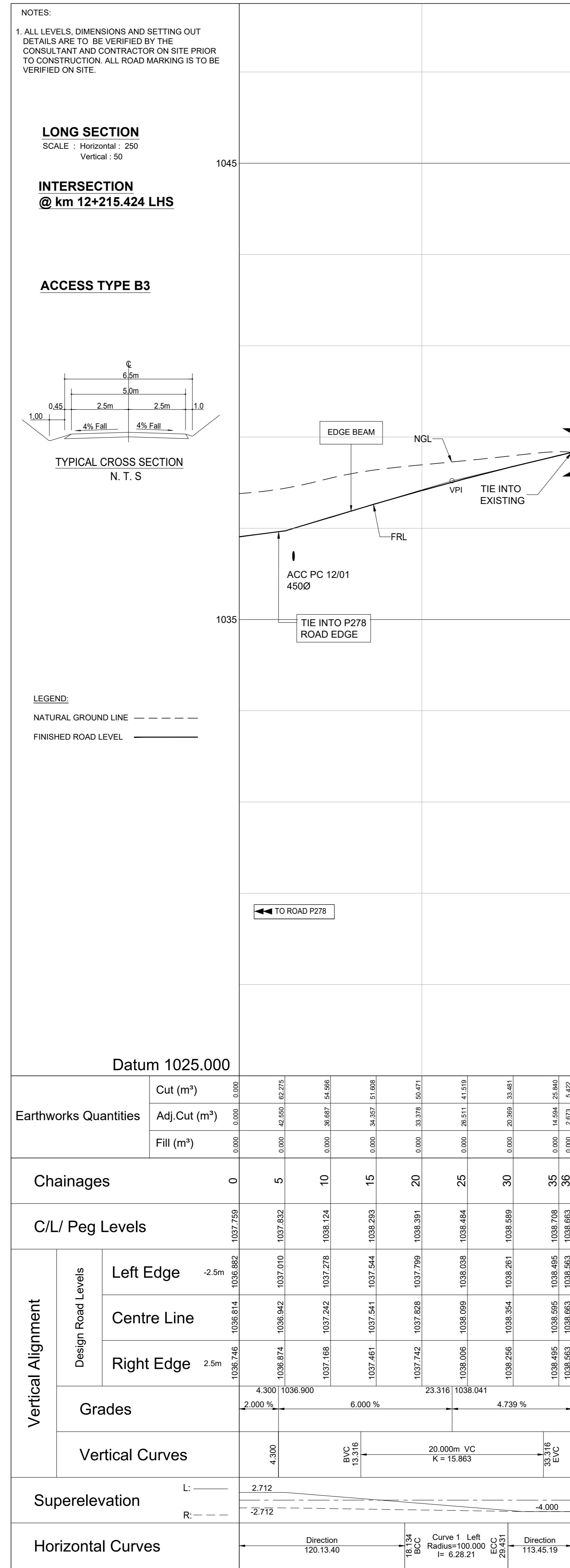
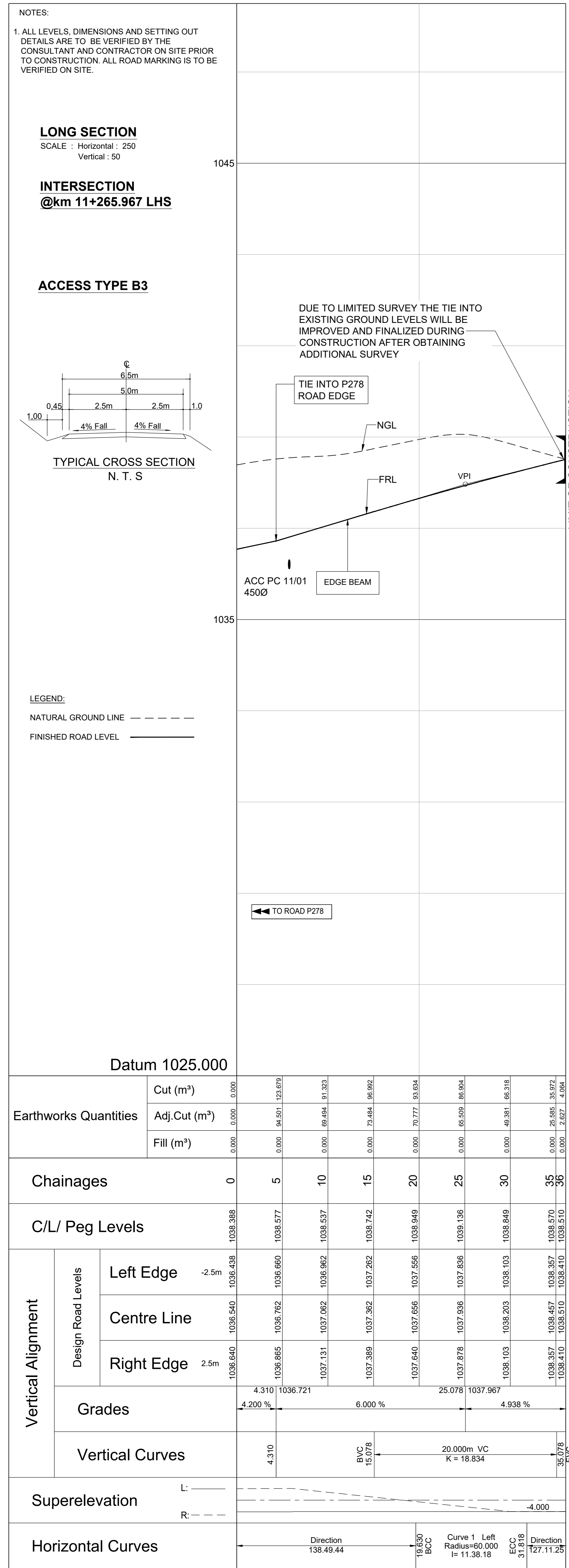
Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 ACCESS ROADS CROSS SECTIONS

Staked km distance km 0+000 - km 0+044.508 km 0+000 - km 0+041.108	Sheet - 14 of - 14	REVISION: A
Scale Vertical Scale 1 : 200 Horizontal Scale 1 : 200	Plan No -	<b>C 47653</b>

C 47653





AS BUILT			
Supervising Engineer	Date	Checked	Signed
Supervising Authority			

Continued from:-	Designed by:- Y. DOMA
Continued on:-	Checked by:- N. NGUBANE
Cross Section No:-	Drawn by:- S. ZITHA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Designed by:-  
**emzansi**  
ENGINEERS (PTY) LTD  
Providing Unbiased Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance km 0+000 - km 0+035 km 0+000 - km 0+045 km 0+000 - km 0+055 km 0+000 - km 0+037	Sheet - 1 of - 15 A	REVISION: A
Scale Plan No :-	HORIZONTAL 1:250 VERTICAL 1:50	C 46538

C 46538





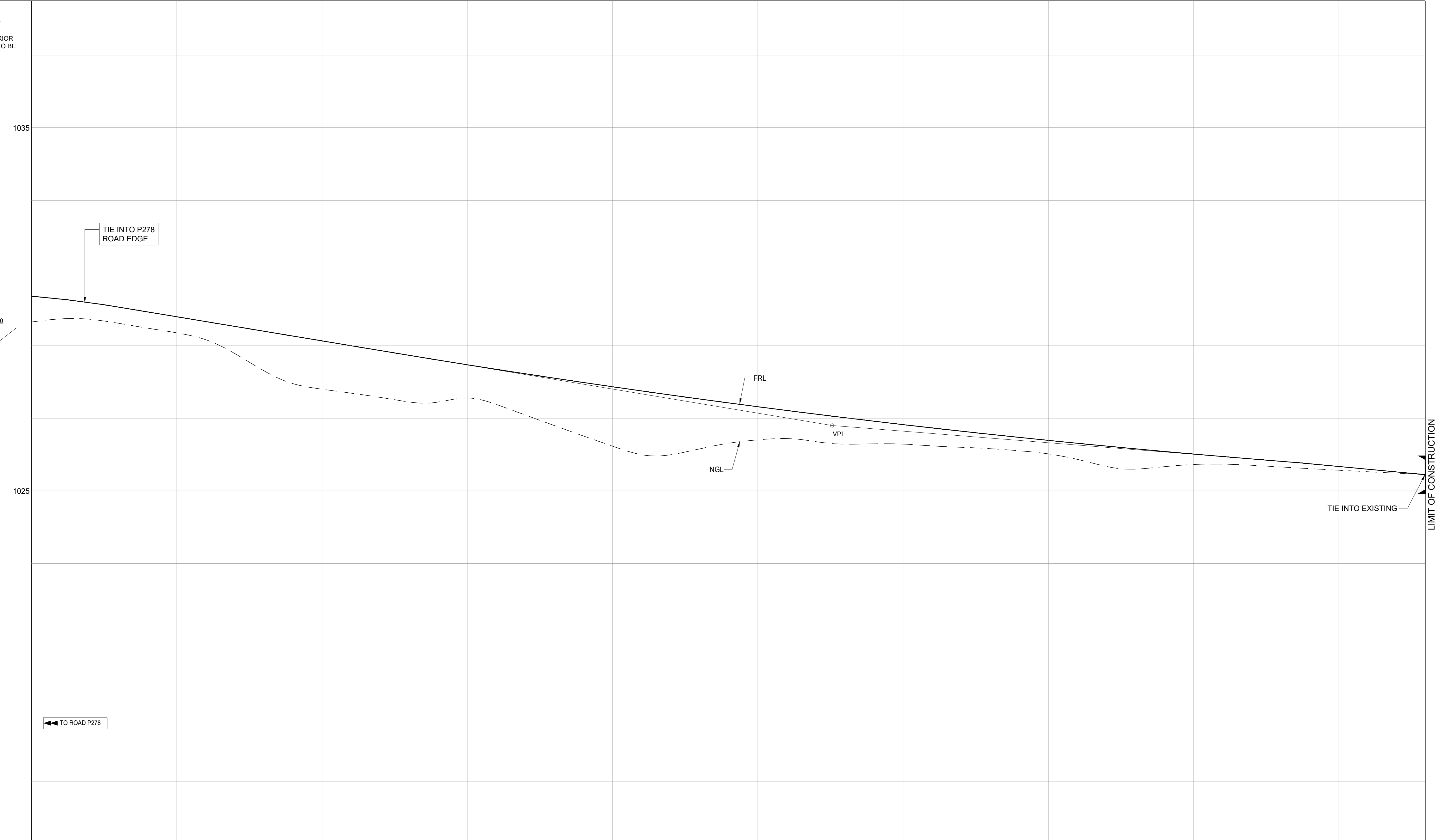
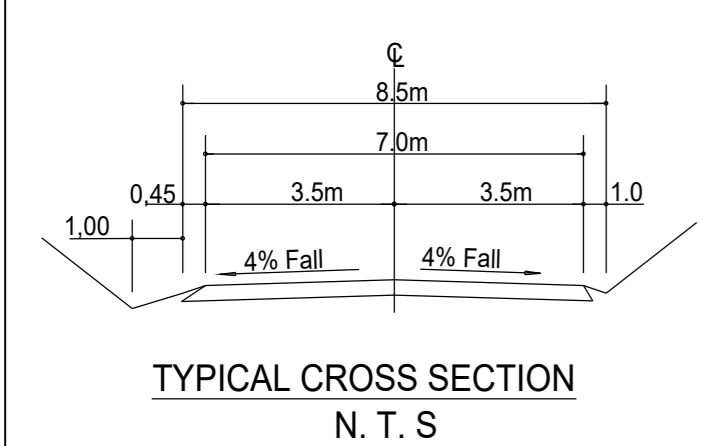


NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION**  
**@ km 12+458.295 RHS**  
**D348**

**ACCESS TYPE B1**



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 1015.000

Earthworks Quantities	Cut (m³)		Adj. Cut (m³)		Fill (m³)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	0	5	10	15	20	25																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
	0.00	11.693	31.111	7.697	8.998	17.294																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Chainages	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	192																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
C/L Peg Levels	1029.651	1029.811	1029.696	1029.505	1029.364	1029.157	1028.539	1027.946	1027.798	1027.669	1027.516	1027.353	1027.077	1026.809	1026.543	1026.281	1026.023	1025.769	1025.519	1025.273	1025.031	1024.793	1024.559	1024.329	1024.103	1023.881	1023.663	1023.449	1023.239	1023.033	1022.831	1022.633	1022.439	1022.249	1022.063	1021.881	1021.703	1021.529	1021.359	1021.193	1021.031	1020.873	1020.719	1020.569	1020.423	1020.281	1020.143	1020.009	1019.879	1019.753	1019.631	1019.513	1019.401	1019.293	1019.189	1019.089	1018.993	1018.901	1018.813	1018.729	1018.649	1018.573	1018.501	1018.433	1018.369	1018.309	1018.253	1018.201	1018.153	1018.109	1018.069	1018.033	1018.001	1017.973	1017.949	1017.929	1017.913	1017.901	1017.893	1017.889	1017.889	1017.893	1017.901	1017.913	1017.929	1017.949	1017.973	1017.999	1018.029	1018.063	1018.101	1018.143	1018.189	1018.239	1018.293	1018.351	1018.413	1018.479	1018.549	1018.623	1018.701	1018.783	1018.869	1018.959	1019.053	1019.151	1019.253	1019.359	1019.469	1019.583	1019.701	1019.823	1019.949	1020.079	1020.213	1020.351	1020.493	1020.639	1020.789	1020.943	1021.099	1021.257	1021.419	1021.583	1021.751	1021.923	1022.099	1022.279	1022.463	1022.651	1022.843	1023.039	1023.239	1023.443	1023.651	1023.863	1024.079	1024.299	1024.523	1024.751	1024.983	1025.219	1025.459	1025.703	1025.951	1026.203	1026.459	1026.719	1026.983	1027.251	1027.523	1027.799	1028.079	1028.363	1028.651	1028.943	1029.239	1029.539	1029.843	1030.151	1030.463	1030.779	1031.099	1031.423	1031.751	1032.083	1032.419	1032.759	1033.099	1033.443	1033.791	1034.139	1034.491	1034.847	1035.207	1035.571	1035.939	1036.311	1036.687	1037.067	1037.451	1037.839	1038.231	1038.627	1039.027	1039.431	1039.839	1040.251	1040.667	1041.087	1041.511	1041.939	1042.371	1042.807	1043.247	1043.691	1044.139	1044.591	1045.047	1045.507	1045.971	1046.439	1046.907	1047.379	1047.853	1048.331	1048.813	1049.299	1049.789	1050.283	1050.781	1051.283	1051.789	1052.299	1052.813	1053.331	1053.853	1054.379	1054.907	1055.439	1055.973	1056.511	1057.053	1057.599	1058.149	1058.703	1059.261	1059.823	1060.389	1060.959	1061.533	1062.111	1062.693	1063.279	1063.867	1064.459	1065.053	1065.651	1066.253	1066.859	1067.467	1068.077	1068.689	1069.303	1069.919	1070.537	1071.157	1071.779	1072.403	1073.029	1073.657	1074.287	1074.919	1075.553	1076.189	1076.827	1077.467	1078.109	1078.753	1079.399	1080.047	1080.697	1081.349	1081.999	1082.651	1083.303	1083.957	1084.613	1085.271	1085.931	1086.593	1087.257	1087.923	1088.591	1089.261	1089.933	1090.607	1091.283	1091.961	1092.641	1093.323	1094.007	1094.693	1095.381	1096.071	1096.763	1097.457	1098.153	1098.851	1099.551	1100.253	1100.957	1101.663	1102.371	1103.081	1103.793	1104.507	1105.223	1105.941	1106.661	1107.383	1108.107	1108.833	1109.561	1110.291	1111.023	1111.757	1112.493	1113.231	1113.971	1114.713	1115.457	1116.203	1116.951	1117.701	1118.453	1119.207	1119.963	1120.721	1121.481	1122.243	1123.007	1123.773	1124.541	1125.311	1126.083	1126.857	1127.633	1128.411	1129.191	1129.973	1130.757	1131.543	1132.331	1133.121	1133.913	1134.707	1135.503	1136.301	1137.101	1137.903	1138.707	1139.513	1140.321	1141.131	1141.943	1142.757	1143.573	1144.391	1145.211	1146.033	1146.857	1147.683	1148.511	1149.341	1150.173	1151.007	1151.843	1152.681	1153.521	1154.363	1155.207	1156.053	1156.901	1157.751	1158.603	1159.457	1160.313	1161.171	1162.031	1162.891	1163.753	1164.617	1165.483	1166.351	1167.221	1168.093	1168.967	1169.843	1170.721	1171.601	1172.483	1173.367	1174.253	1175.141	1176.031	1176.923	1177.817	1178.713	1179.611	1180.511	1181.413	1182.317	1183.223	1184.131	1185.041	1185.953	1186.867	1187.783	1188.701	1189.621	1190.543	1191.467	1192.393	1193.321	1194.251	1195.183	1196.117	1197.053	1197.991	1198.931	1199.873	1200.817	1201.763	1202.711	1203.661	1204.613	1205.567	1206.523	1207.481	1208.441	1209.403	1210.367	1211.333	1212.301	1213.271	1214.243	1215.217	1216.193	1217.171	1218.151	1219.133	1220.117	1221.103	1222.091	1223.081	1224.073	1225.067	1226.063	1227.061	1228.061	1229.063	1230.067	1231.073	1232.081	1233.091	1234.103	1235.117	1236.133	1237.151	1238.171	1239.193	1240.217	1241.243	1242.271	1243.301	1244.333	1245.367	1246.403	1247.441	1248.481	1249.523	1250.567	1251.613	1252.661	1253.711	1254.763	1255.817	1256.873	1257.931	1258.991	1260.053	1261.117	1262.183	1263.251	1264.321	1265.393	1266.467	1267.543	1268.621	1269.701	1270.783	1271.867	1272.953	1274.041	1275.131	1276.223	1277.317	1278.413	1279.511	1280.611	1281.713	1282.817	1283.923	1285.031	1286.141	1287.253	1288.367	1289.483	1290.601	1291.721	1292.843	1293.967	1295.093	1296.221	1297.351	1298.483	1299.617	1300.753	1301.891	1303.031	1304.173	1305.317	1306.463	1307.611	1308.761	1309.913	1311.067	1312.223	1313.381	1314.541	1315.703	1316.867	1318.033	1319.201	1320.371	1321.543	1322.717	1323.893	1325.071	1326.251	1327.433	1328.617	1329.803	1330.991	1332.181	1333.373	1334.567	1335.763	1336.961	1338.161	1339.363	1340.567	1341.773	1342.981	1344.191	1345.403	1346.617	1347.833	1349.051	1350.271	1351.493	1352.717	1353.943	1355.171	1356.401	1357.631	1358.863	1360.097	1361.333	1362.571	1363.811	1365.053	1366.297	1367.543	1368.791	1370.041	1371.293	1372.547	1373.803	1375.061	1376.321	1377.583	1378.847	1380.113	1381.381	1382.651	1383.923	1385.197	1386.473	1387.751	1389.031	1390.313	1391.597	1392.883	1394.171	1395.461	1396.753	1398.047	1399.343	1400.641	1401.941	1403.243	1404.547	1405.853	1407.161	1408.471	1409.783	1411.097	1412.413	1413.731	1415.051	1416.371	1417.693	1419.017	1420.343	1421.671	1422.999	1424.329	1425.661	1426.993	1428.327	1429.663	1430.999	1432.337	1433.677	1435.019	1436.363	1437.709	1439.057	1440.407	1441.759	1443.113	1444.469	1445.827	1447.187	1448.547	1449.909	1451.273	1452.639	1454.007	1455.377	1456.747	1458.119	1459.493	1460.869	1462.247	1463.627	1465.009	1466.393	1467.779	1469.167	1470.557	1471.949	1473.343	1474.739	1476.137	1477.537	1478.939	1480.343	1481.749	1483.157	1484.567	1485.977	1487.389	1488.803	1490.217	1491.633	1493.049	1494.467	1495.887	1497.307	1498.729	1500.153	1501.579	1503.007	1504.437	1505.867	1507.299	1508.733	1510.167	1511.603	1513.039	1514.477	1515.917	1517.359	1518.803	1520.247	1521.693	1523.139	1524.587	1526.037	1527.489	1528.943	1530.397	1531.853	1533.309	1534.767	1536.227	1537.687	1539.149	1540.613	1542.079	1543.547	1545.017	1546.489	1547.963	1549.439	1550.917	1552.397	1553.877	1555.359	1556.843	1558.329	1559.817	1561.307	1562.797	1564.289	1565.783	1567.279	1568.777	1570.277	1571.779	1573.283	1574.789	1576.297	1577.807	1579.317	1580.829	1582.343	1583.857	1585.373	1586.891	1588.411	1589.933	1591.457	1592.983	1594.511	1596.041	1597.573	1599.107	1600.643	1602.181	1603.721	1605.263	1606.807	1608.353	1609.901	1611.451	1612.999	1614.549	1616.101	1617.657	1619.217	1620.779	1622.343	1623.909	1625.477	1627.047	1628.619	1630.193	1631.769	1633.347	1634.927	1636.509	1638.093	1639.679	1641.267	1642.857	1644.449	1646.043	1647.639	1649.237	1650.837	1652.439	1654.043	1655.649	1657.257	1658.867	1660.479	1662.093	1663.709	1665.327	1666.947	1668.567	1670.189	1671.813	1673.439	1675.067	1676.697	1678.329	1679.963	1681.597	1683.233	1684.871	1686.511	1688.153	1689.797	1691.443	1693.091	1694.741	1696.393	1698.047	1699.703	1701.359	1703.017	1704.677	1706.339	1708.003

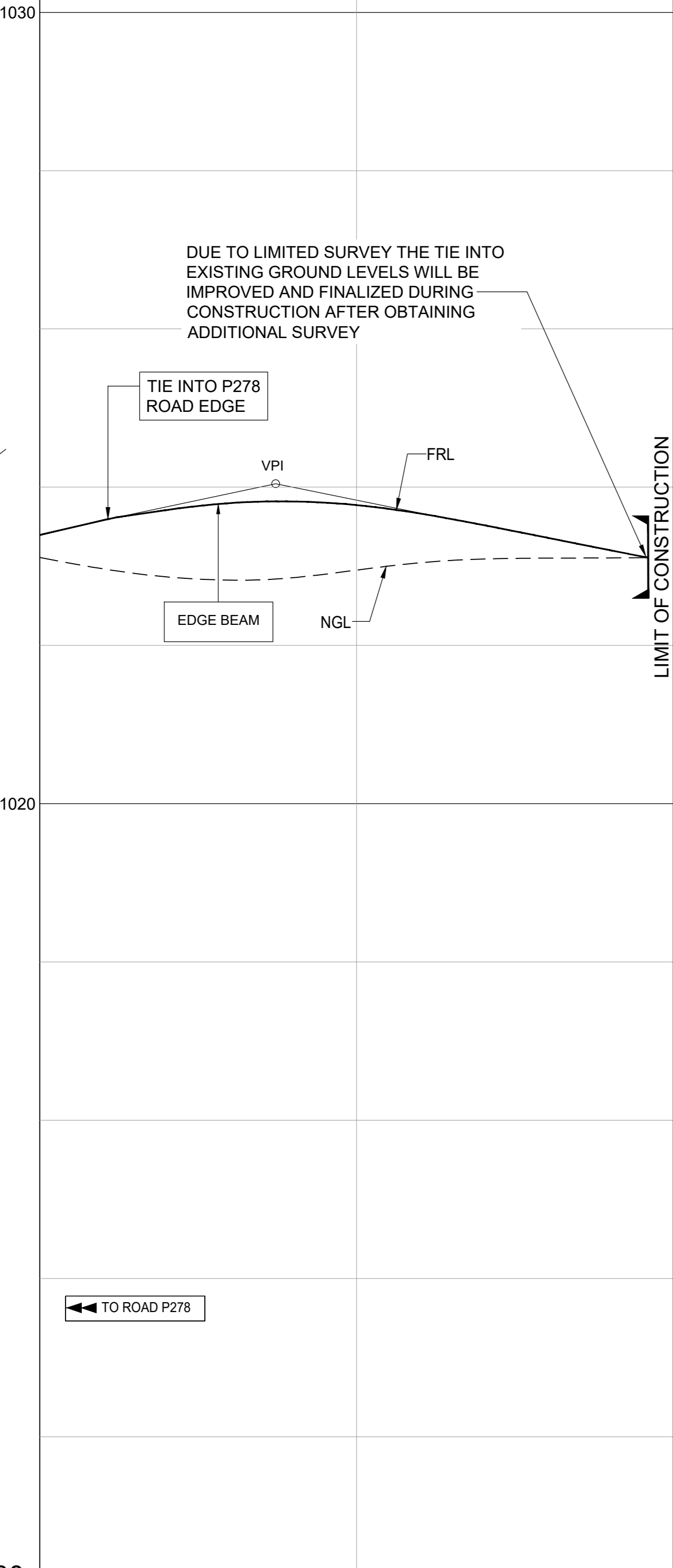
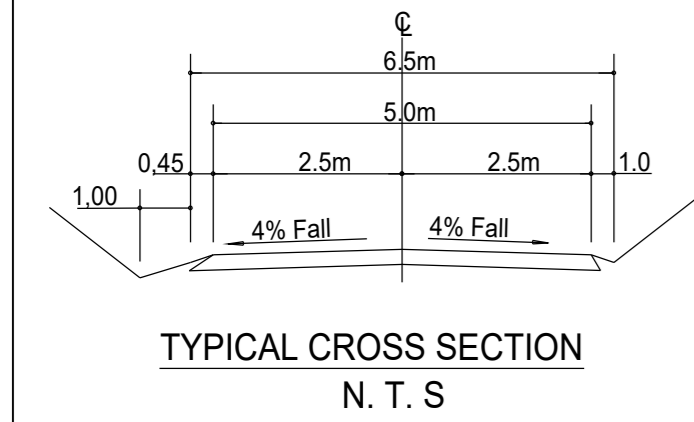


NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 12+715.000 RHS**

**ACCESS TYPE B3**



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 1010.000

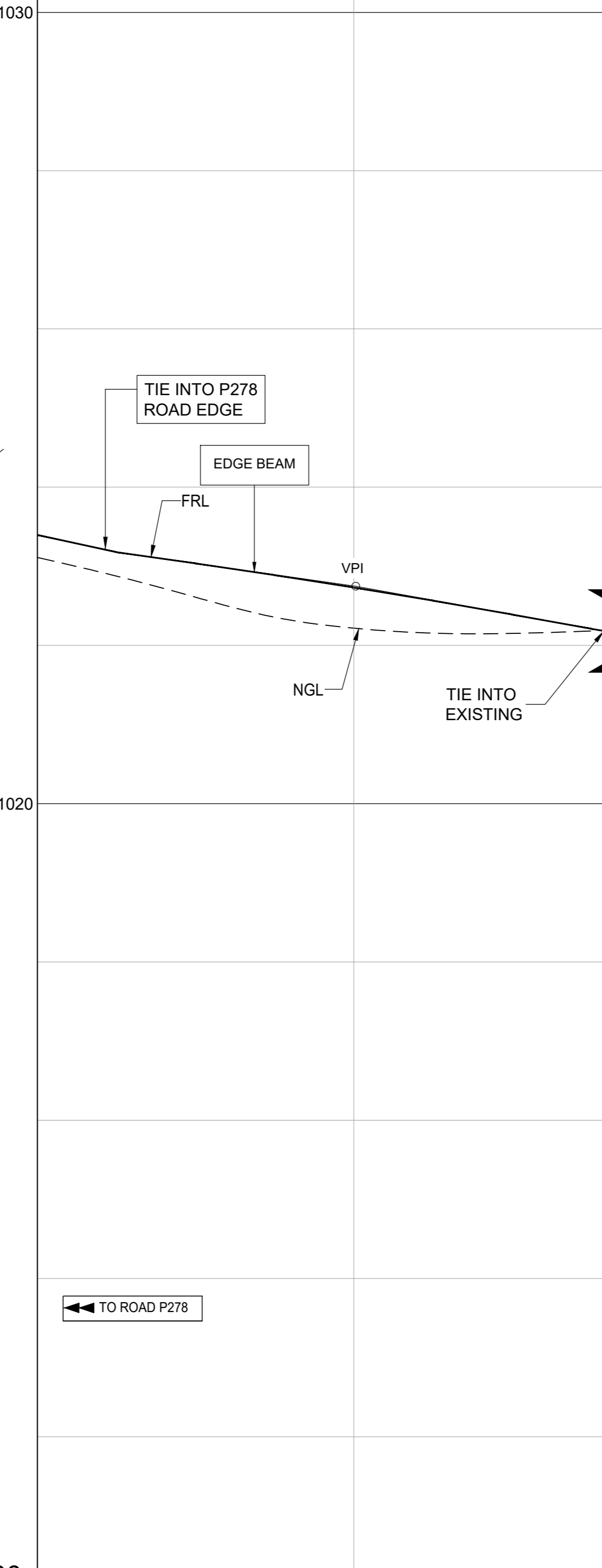
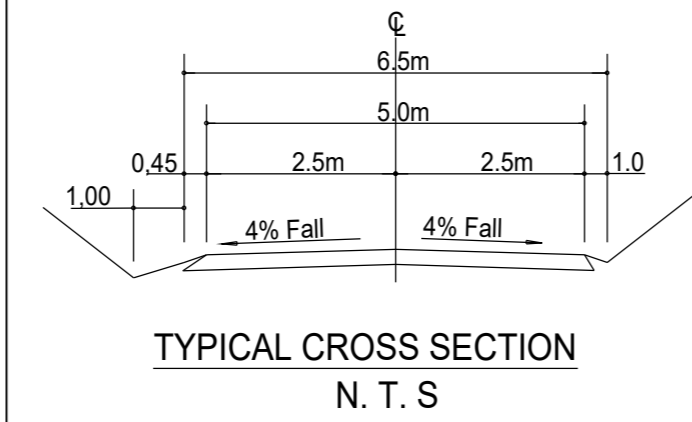
Earthworks Quantities	Cut (m³)	Adj.Cut (m³)	Fill (m³)	Chainages								
				0	5	10	15					
				20	25	30	35					
	0.00	0.00	0.00	0	5	10	15	20	25	30	35	38
C/L/ Peg Levels				Vertical Alignment								
	1023.111	1023.529	1023.111	Left Edge	-2.5m	Centre Line	Right Edge	2.5m	Grades	Vertical Curves	Superelevation	Horizontal Curves
	1023.597	1023.597	1023.111						4.600%	4.304 BVC 20.000m VC K=2.437 26.000 EVC	L: 2.712 R: -2.712	Direction 288.20.45 Curve 1 Right Radius=15.000 K=72.25.30 Direction 0.46.15

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 12+715.000 LHS**

**ACCESS TYPE B3**



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 1010.000

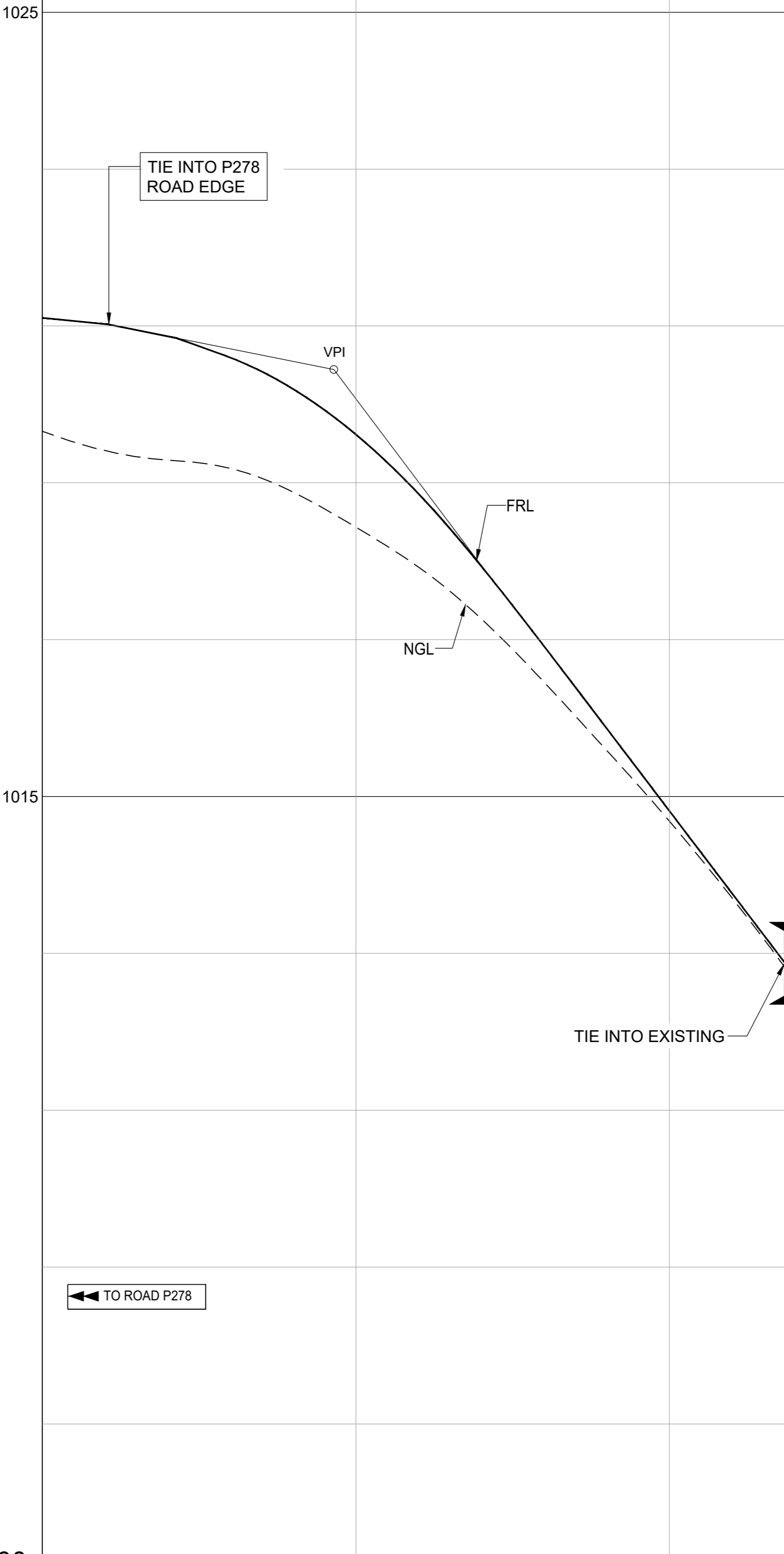
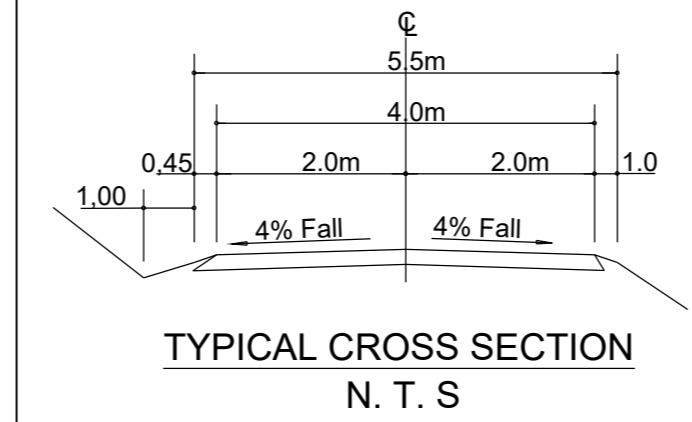
Earthworks Quantities	Cut (m³)	Adj.Cut (m³)	Fill (m³)	Chainages								
				0	5	10	15					
				20	25	30	35					
	0.00	0.00	0.00	0	5	10	15	20	25	30	35	38
C/L/ Peg Levels				Vertical Alignment								
	1023.111	1023.577	1023.111	Left Edge	-2.5m	Centre Line	Right Edge	2.5m	Grades	Vertical Curves	Superelevation	Horizontal Curves
	1023.217	1023.397	1023.111						4.600%	4.304 BVC 20.000m VC K=27.007 26.000 EVC	L: 7.212 R: -7.212	Direction 108.20.47 Curve 1 Left Radius=15.000 K=34.40.44 Direction 73.40.03

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 12+799.811 LHS**

**ACCESS TYPE : MINOR**



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 1005.000

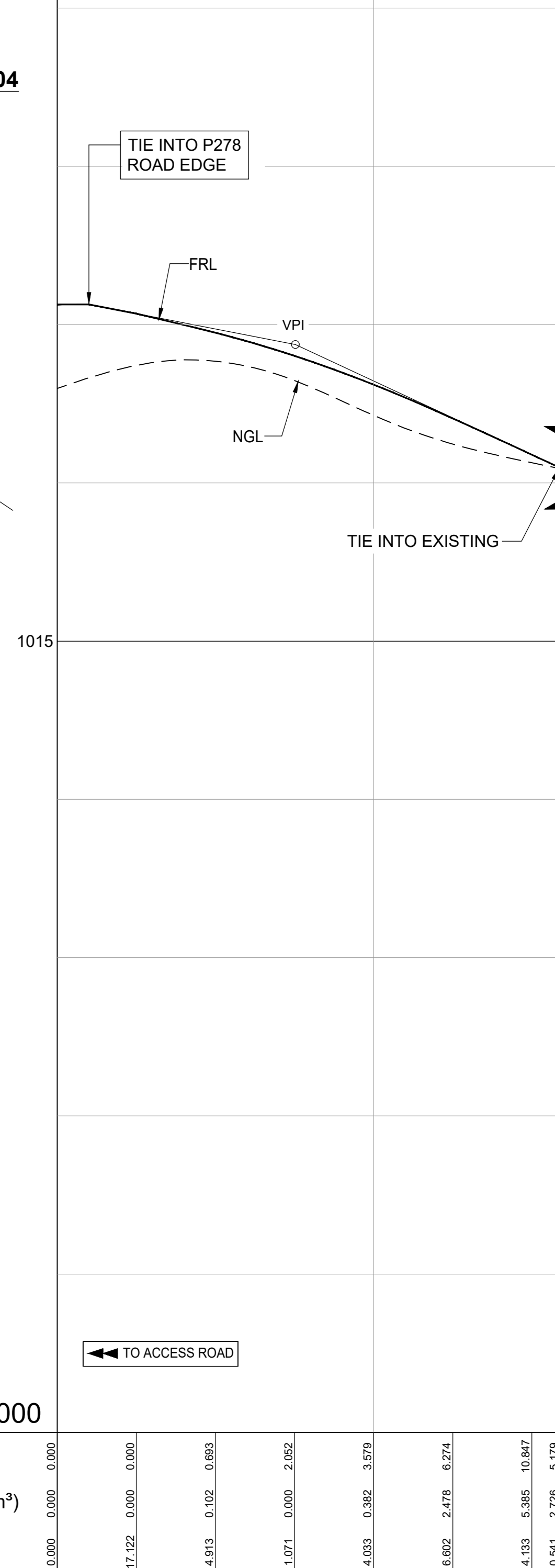
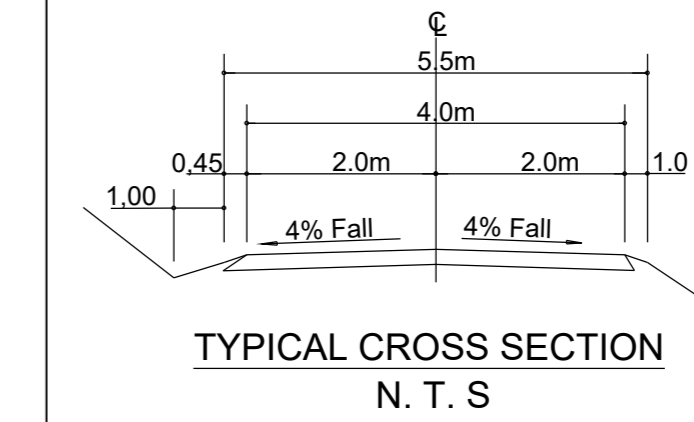
Earthworks Quantities	Cut (m³)	Adj.Cut (m³)	Fill (m³)	Chainages										
				0	5	10	15							
				20	25	30	35							
	0.00	0.00	0.00	0	5	10	15	20	25	30	35	40	45	47
C/L/ Peg Levels				Vertical Alignment										
	1018.656	1021.157	1018.656	Left Edge	-2.0m	Centre Line	Right Edge	2.0m	Grades	Vertical Curves	Superelevation	Horizontal Curves		
	1021.049	1021.103	1018.656						-2.000%	4.250 BVC 8.000 20.000m VC K=0.937 26.000 EVC	L: 2.712 R: -2.712	Direction 101.29.55 Curve 1 Right Radius=20.000 K=24.41.35 Direction 126.11.30		

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**LHS ACCESS @ km 0+022.104**  
**OFF km 12+799.811 LHS**

**ACCESS TYPE : MINOR**



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 1005.000

Earthworks Quantities	Cut (m³)	Adj.Cut (m³)	Fill (m³)	Chainages								
				0	5	10	15					
				20	25	30	32					
	0.00	0.00	0.00	0	5	10	15	20	25	30	32	
C/L/ Peg Levels				Vertical Alignment								
	1018.103	1018.650	1018.103	Left Edge	-2.0m	Centre Line	Right Edge	2.0m	Grades	Vertical Curves	Superelevation	Horizontal Curves
	1018.658	1019.254	1018.658						0.050%	2.000 BVC 2.000 20.000m VC K=3.691 26.000 EVC	L: - R: -	Direction 11.35.12.38 Curve 1 Right Radius=15.000 K=66.09.35 Direction 77.44.47

AS BUILT			
Supervising Engineer	Date	Supervising Authority	
A	01-02-2024	ISSUED FOR TENDER	YD
Symbol	Date	Description	Checked Signed
AMENDMENTS			

Continued from:-	Designed by:- Y. DOMA
Continued on:-	Checked by:- N. NGUBANE
Cross Section No:-	Drawn by:- S. ZITHA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Designed by:- **emzansi** ENGINEERS (PTY) LTD  
Providing Unbiased Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

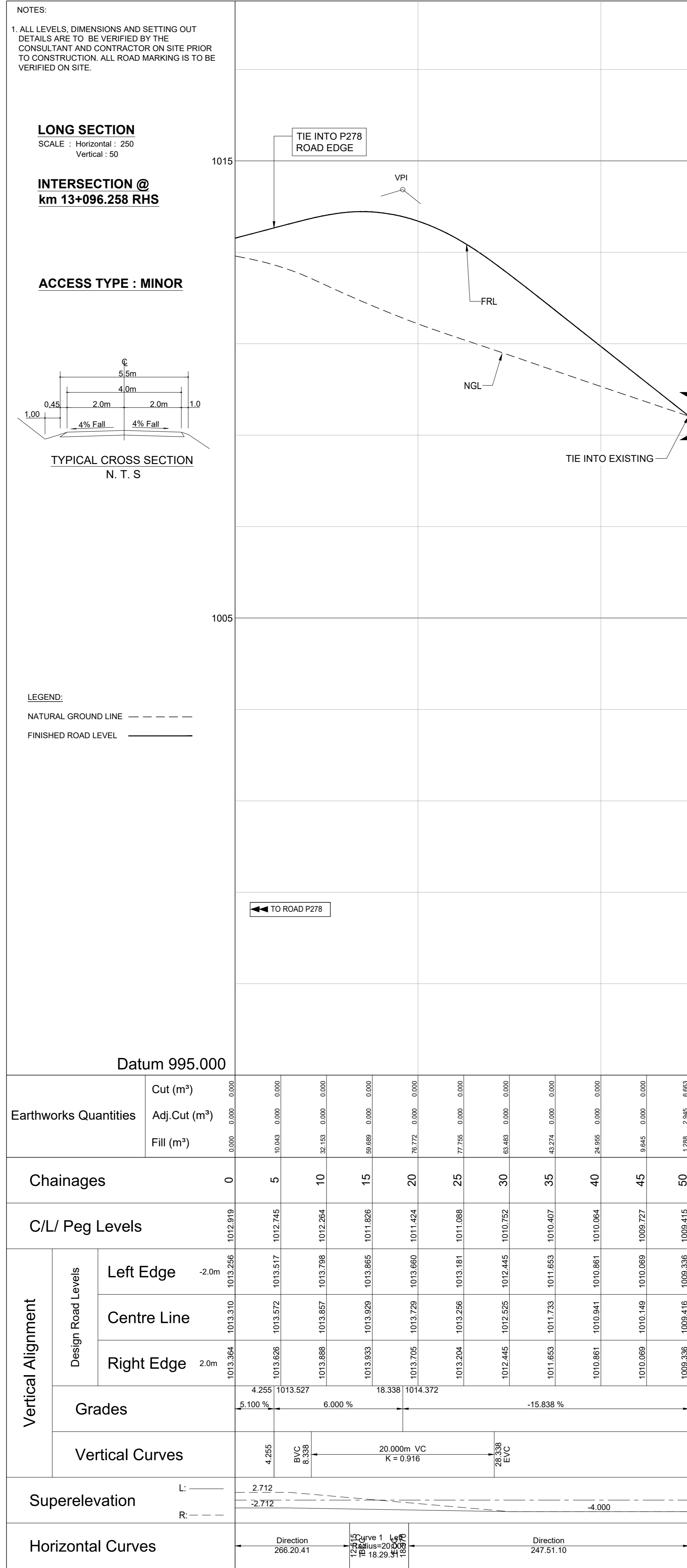
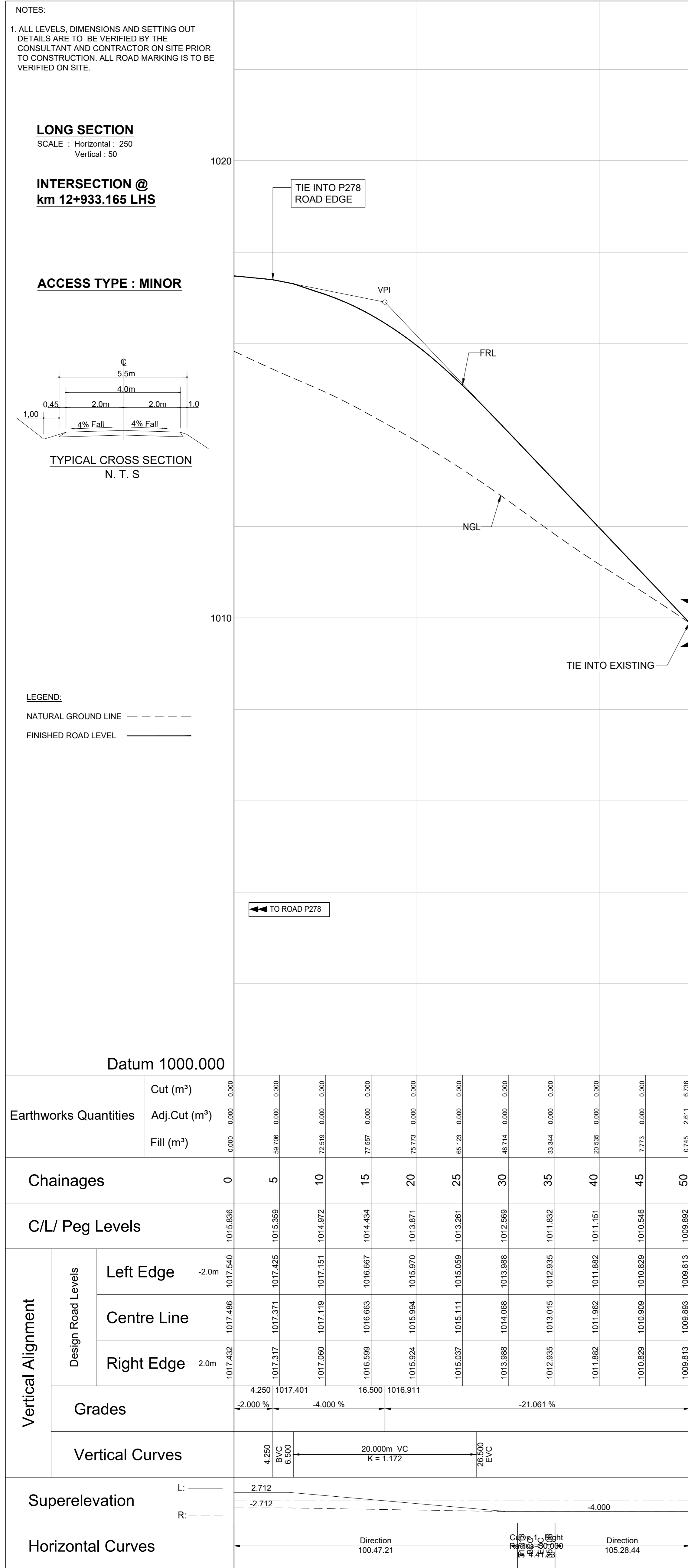
Staked km distance	Sheet No	REVISION:
km 0+000 - km 0+038	4	A
km 0+038 - km 0+087	15	
km 0+087 - km 0+147		
km 0+147 - km 0+302		

Scale: HORIZONTAL 1:250  
VERTICAL 1:50

Plan No: **C 46541**

C 46541





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	Designed by:- Y. DOMA
Continued on:-	Checked by:- N. NGUBANE
Cross Section No:-	Drawn by:- S. ZITHA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance km 0+000 - km 0+050 km 0+000 - km 0+050 km 0+000 - km 0+050	Sheet - 5 of - 15	REVISION: A
Scale HORIZONTAL 1:250 VERTICAL 1:50	Plan No -	<b>C 46542</b>

C 46542





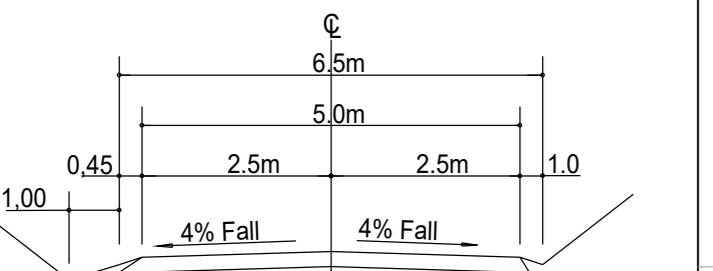


NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

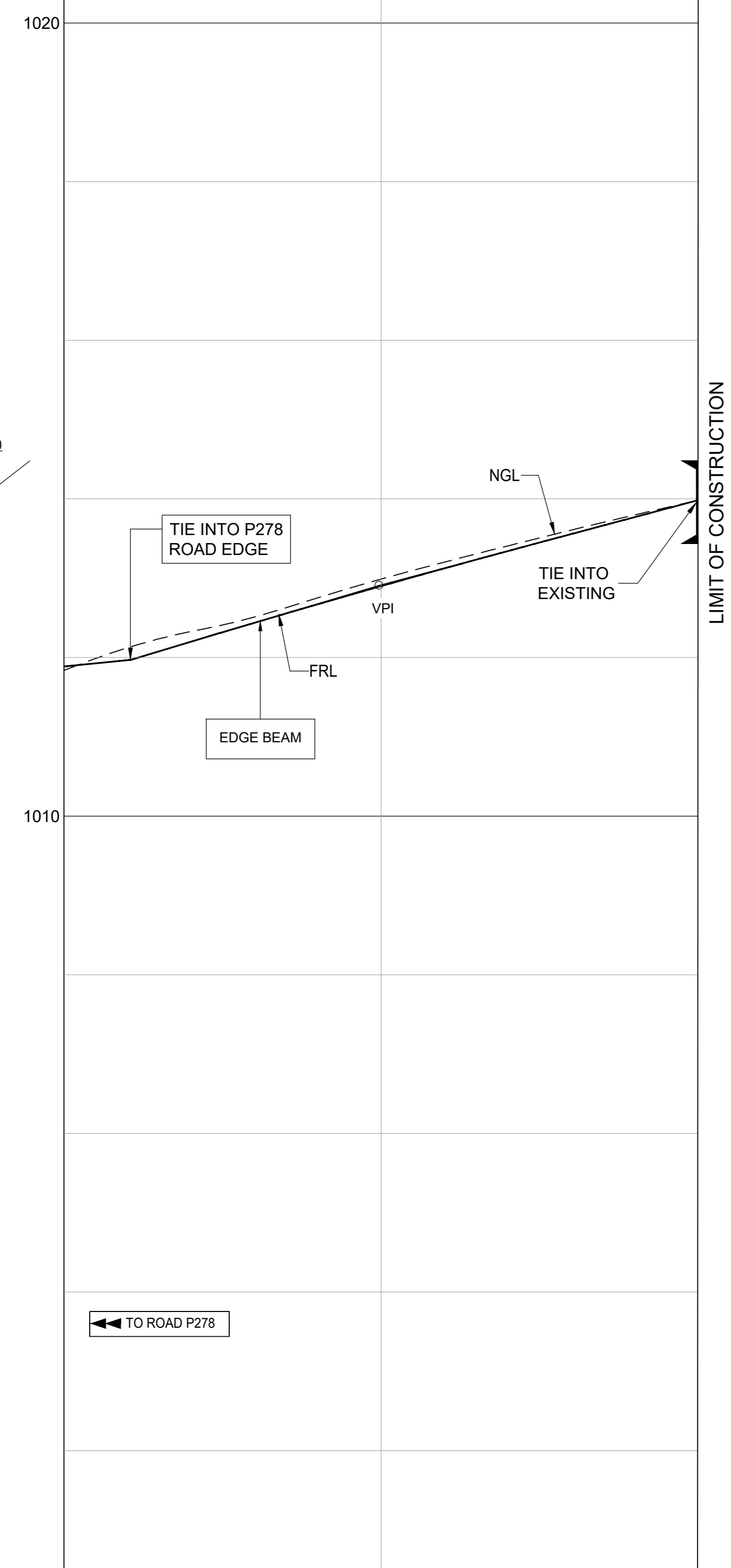
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 13+752.566 LHS**

**ACCESS TYPE B3**



TYPICAL CROSS SECTION  
N. T. S



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

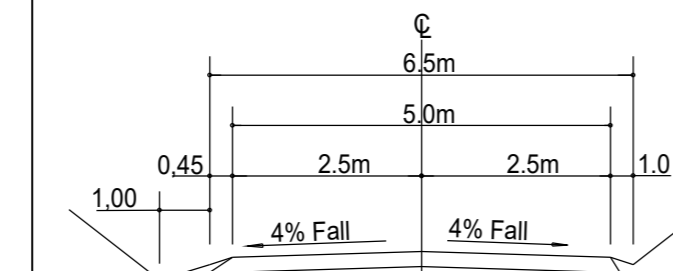
Earthworks Quantities		Cut (m³)	Adj. Cut (m³)	Fill (m³)
		0.000	-0.000	-0.000
Chainages		0	5	10
C/L/ Peg Levels		1011.837	1011.893	1012.235
Vertical Alignment	Design Road Levels	Left Edge 2.5m	Centre Line	Right Edge 2.5m
	Grades	2.001%   6.000%   5.328%		
	Vertical Curves	4.197   20.000m VC   20.000m VC		
Superelevation	L: 1.054   R: -1.054   -4.000			
Horizontal Curves	Direction 83.51.21   Curve 1 Right   Direction 103.51.09			

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

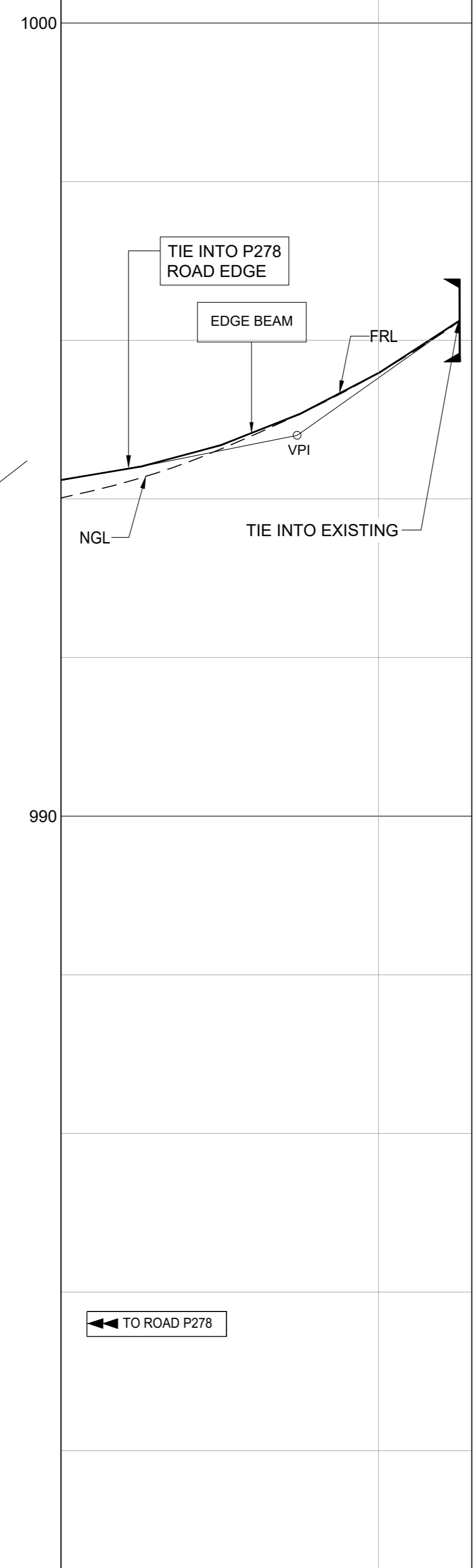
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 14+443.657 LHS**

**ACCESS TYPE B3**



TYPICAL CROSS SECTION  
N. T. S



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

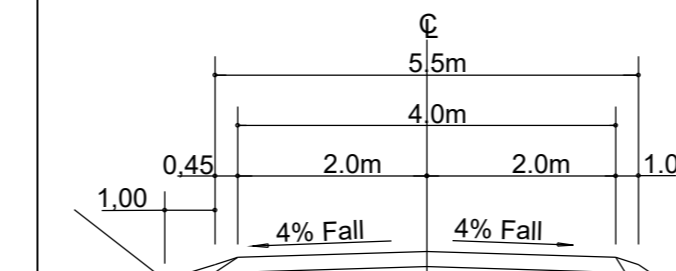
Earthworks Quantities		Cut (m³)	Adj. Cut (m³)	Fill (m³)
		0.000	-0.000	-0.000
Chainages		0	5	10
C/L/ Peg Levels		994.012	994.228	994.611
Vertical Alignment	Design Road Levels	Left Edge -2.5m	Centre Line	Right Edge 2.5m
	Grades	3.200%   4.000%   14.159%		
	Vertical Curves	4.250   20.000m VC   20.000m VC		
Superelevation	L: 1.000   R: -1.000   -4.000			
Horizontal Curves	Direction 95.28.26			

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

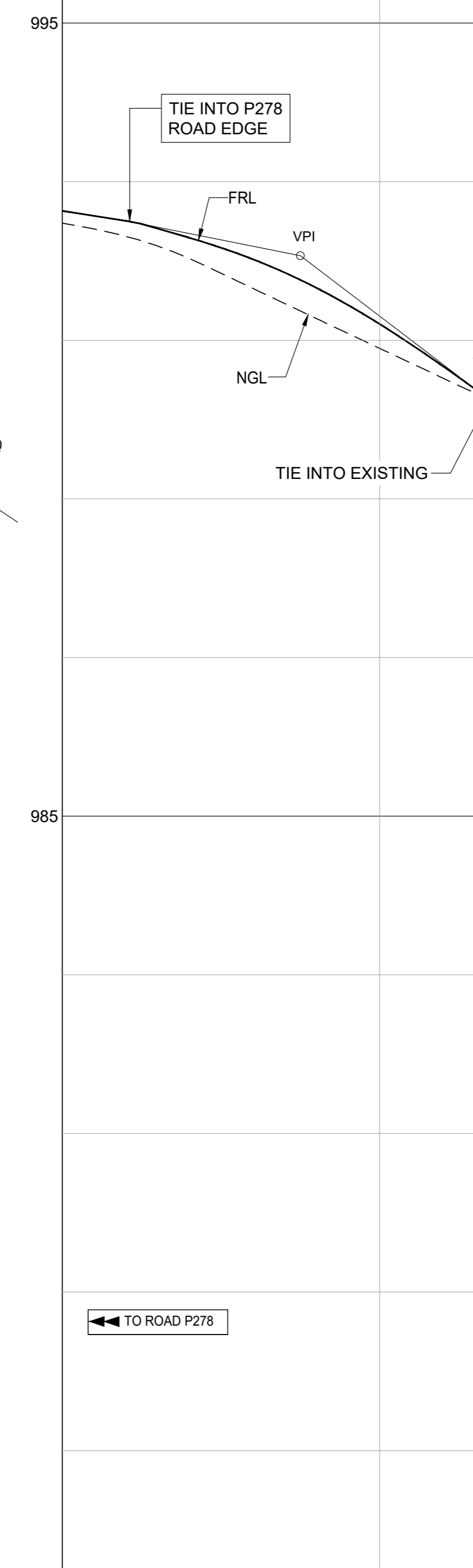
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 14+605.325 RHS**

**ACCESS TYPE : MINOR**



TYPICAL CROSS SECTION  
N. T. S



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

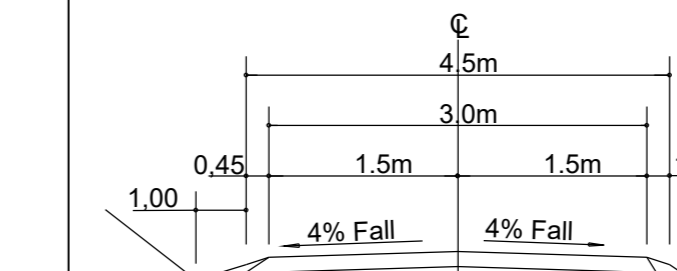
Earthworks Quantities		Cut (m³)	Adj. Cut (m³)	Fill (m³)
		0.000	-0.000	-0.000
Chainages		0	5	10
C/L/ Peg Levels		992.476	992.321	991.369
Vertical Alignment	Design Road Levels	Left Edge -2.0m	Centre Line	Right Edge 2.0m
	Grades	-3.200%   -4.000%   -15.270%		
	Vertical Curves	4.250   20.000m VC   20.000m VC		
Superelevation	L: -1.000   R: -1.000   -4.000			
Horizontal Curves	Direction 284.25.51			

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

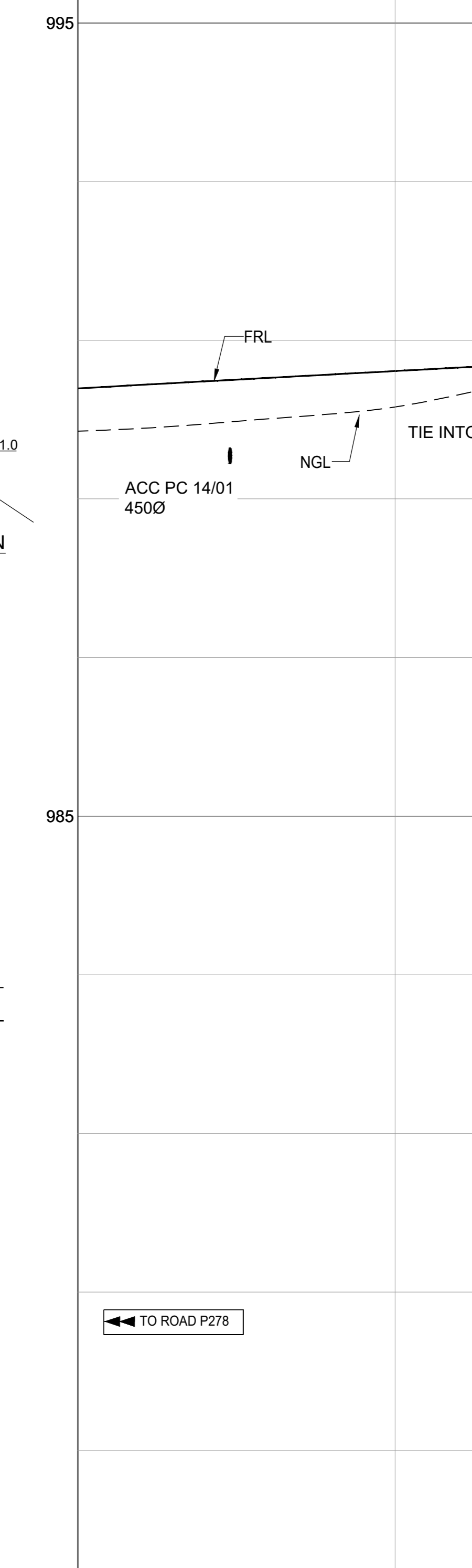
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @**  
**km 14+846.437 LHS**

**ACCESS TYPE : MINOR**



TYPICAL CROSS SECTION  
N. T. S



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Earthworks Quantities		Cut (m³)	Adj. Cut (m³)	Fill (m³)
		0.000	-0.000	-0.000
Chainages		0	5	10
C/L/ Peg Levels		989.854	989.889	989.952
Vertical Alignment	Design Road Levels	Left Edge -1.5m	Centre Line	Right Edge 1.5m
	Grades	1.178%   1.079%		
	Vertical Curves	4.250   20.000m VC   20.000m VC		
Superelevation	L: -1.000   R: -1.000   -4.000			
Horizontal Curves	Direction 118.33.15			

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

**AS BUILT**  
Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
Supervising Authority: \_\_\_\_\_

Continued from:-  
Continued on:-  
Cross Section No:-  
Longitudinal Section No:-  
Design Plan No:-

Designed by:- Y. DOMA  
Checked by:- N. NGUBANE  
Drawn by:- S. ZITHA  
Checked by:- Y. DOMA  
Date of approval:-



Designed by:- emzansi ENGINEERS (PTY) LTD  
Transportation Engineer: Chief Engineer  
Head: Transport



**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
PORTION  
Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance  
km 0+000 - km 0+034  
km 0+000 - km 0+025  
km 0+000 - km 0+027  
km 0+000 - km 0+034

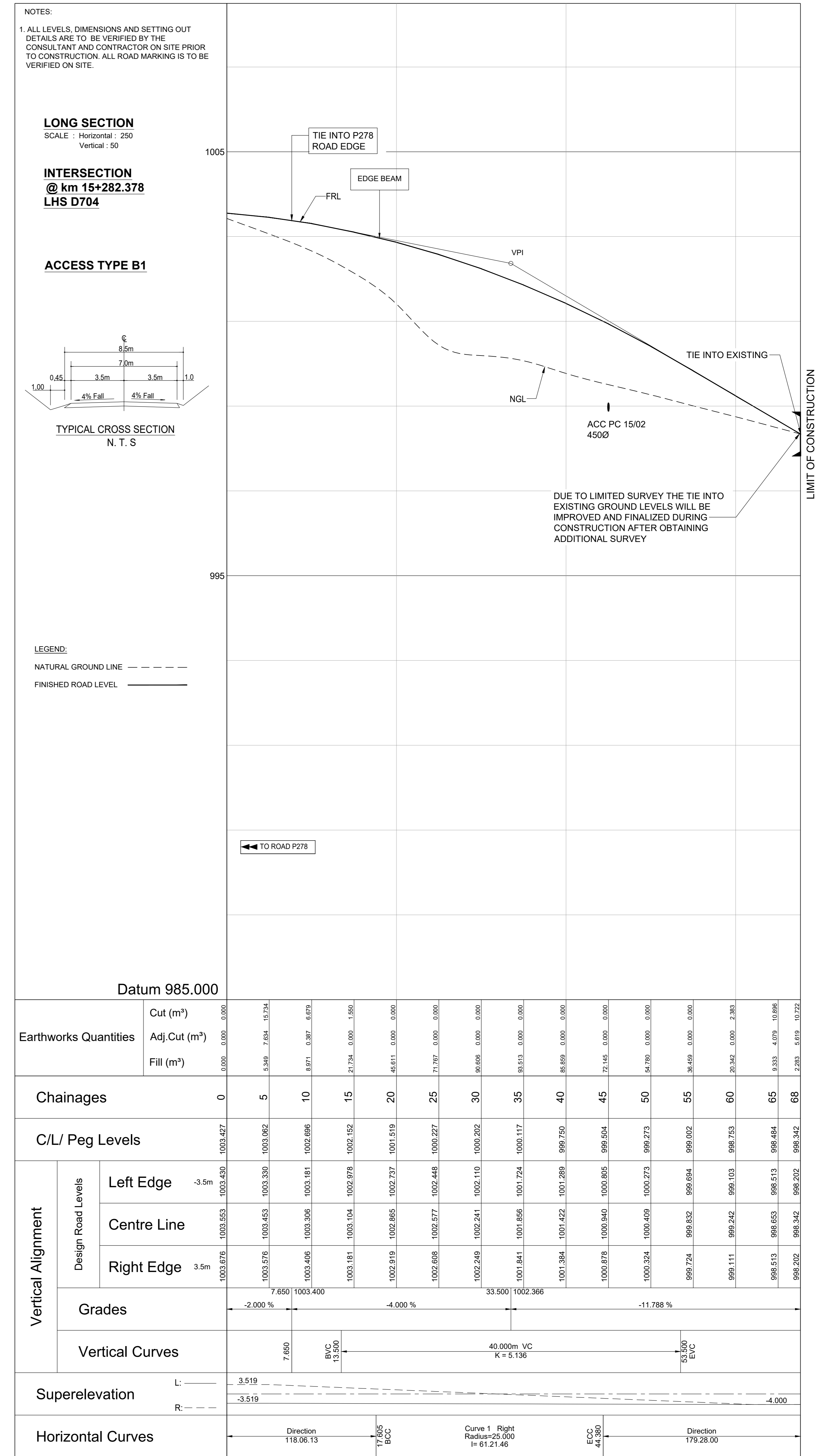
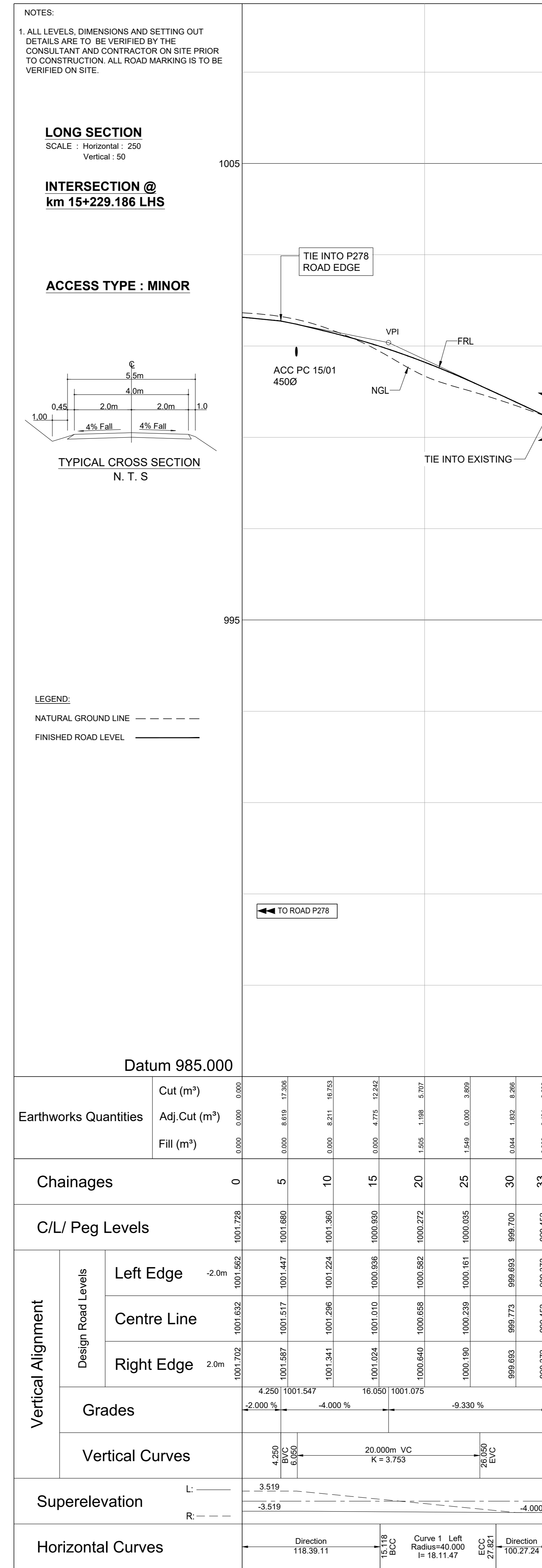
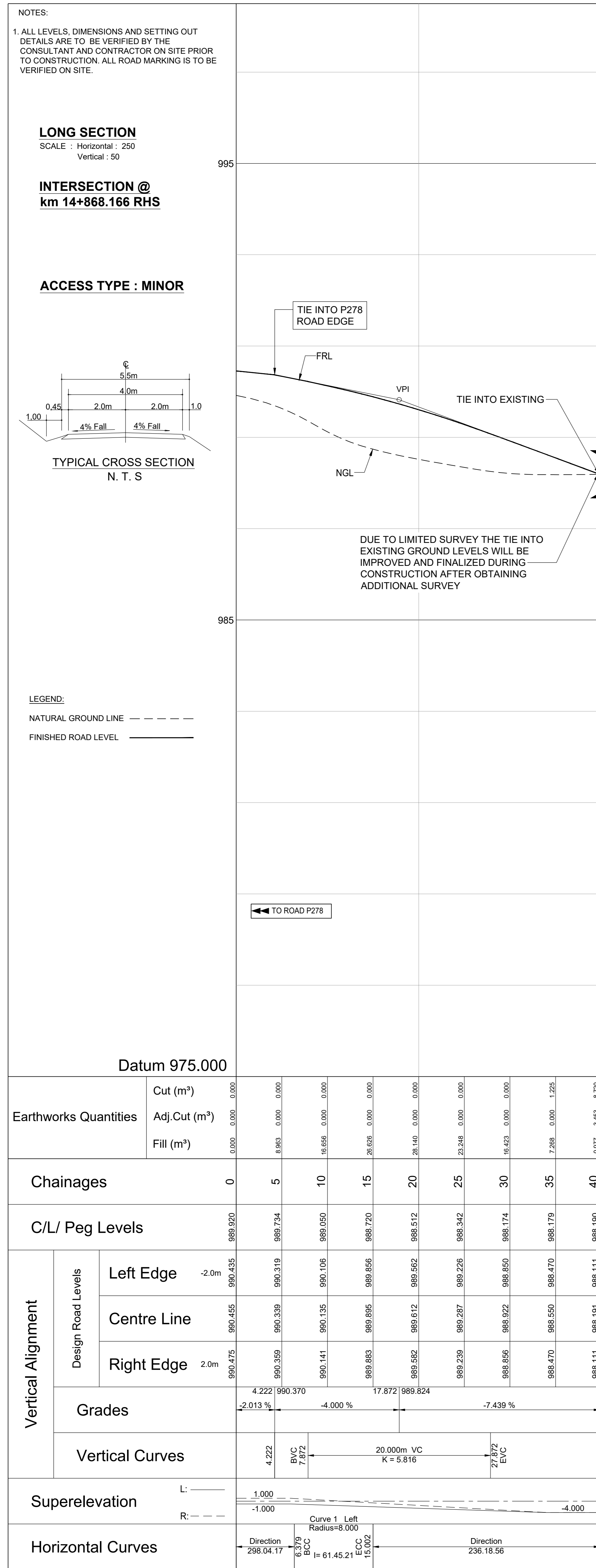
Scale  
HORIZONTAL 1:250  
VERTICAL 1:50

Sheet - 7  
of - 15  
REVISION:  
A

Plan No -  
**C 47635**

C 47635





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	Designed by:- Y. DOMA
Continued on:-	Checked by:- N. NGUBANE
Cross Section No:-	Drawn by:- S. ZITHA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
Providing Unrivaled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

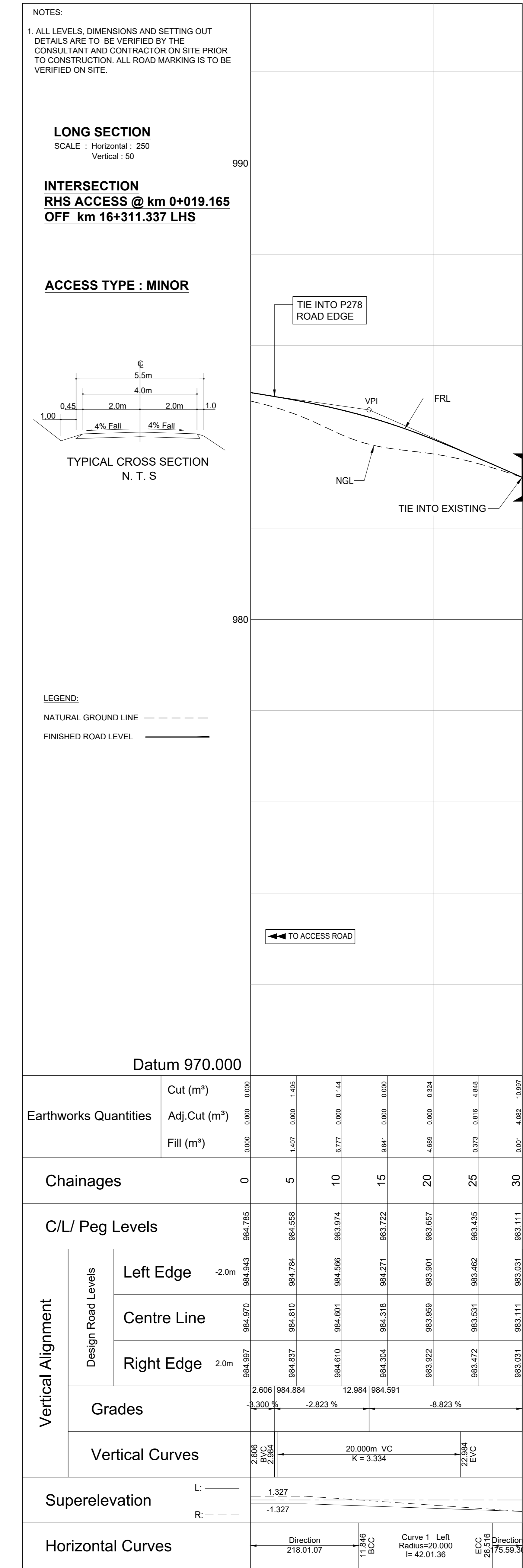
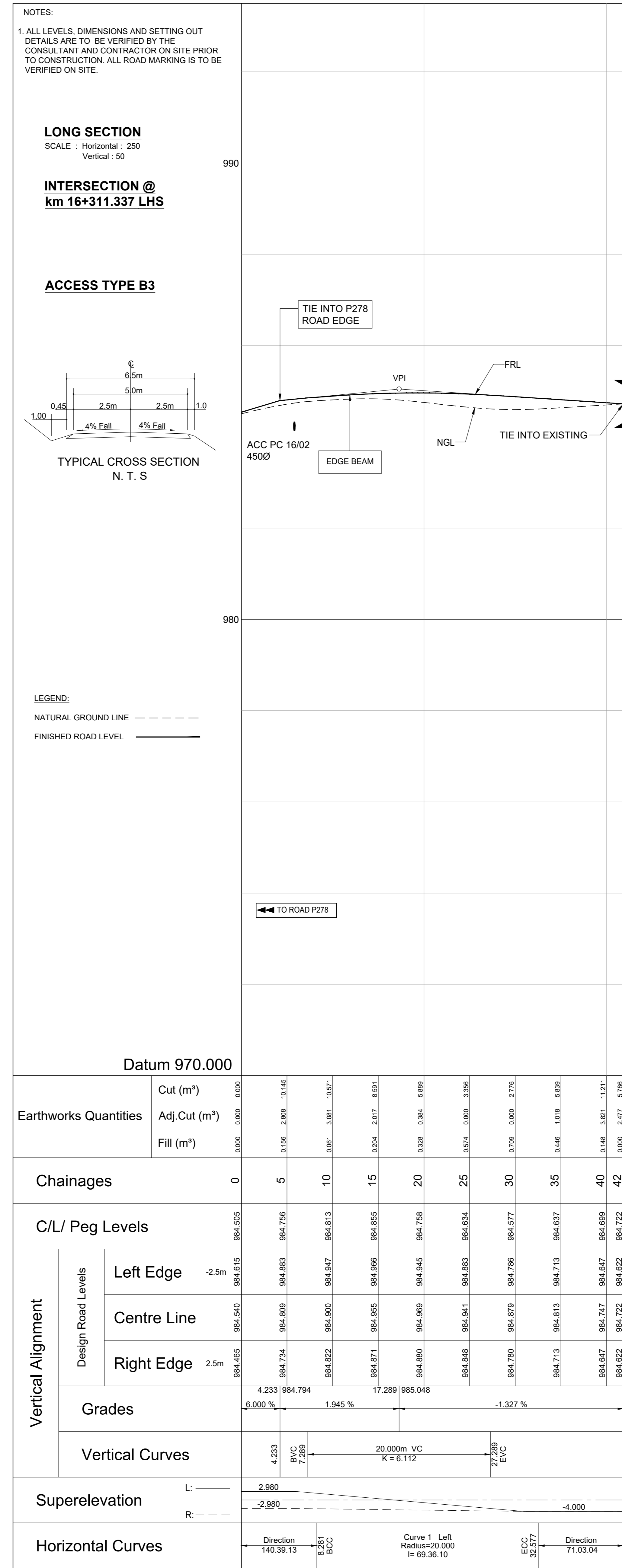
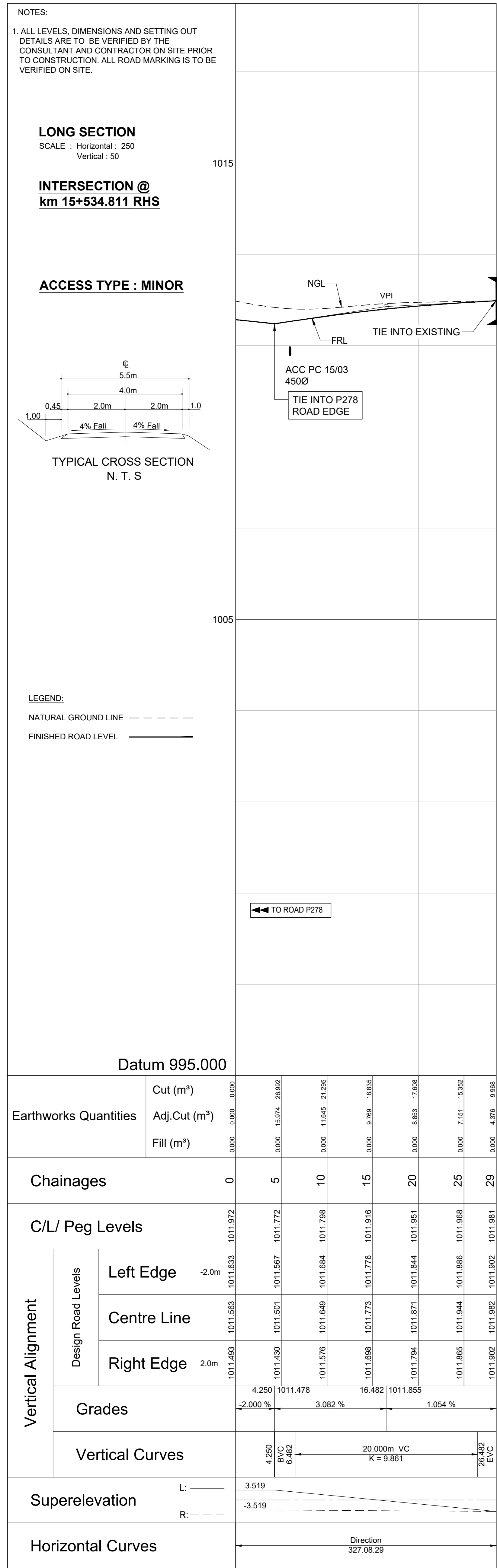
**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance km 0+000 - km 0+040 km 0+000 - km 0+033 km 0+000 - km 0+068	Sheet - 8 of - 15	REVISION: A
Scale HORIZONTAL 1:250 VERTICAL 1:50	Plan No -	<b>C 47636</b>

C 47636





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer \_\_\_\_\_ Date \_\_\_\_\_

Supervising Authority \_\_\_\_\_

Continued from:-	Designed by:- Y. DOMA
Continued on:-	Checked by:- N. NGUBANE
Cross Section No:-	Drawn by:- S. ZITHA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Designed by:-  
**emzansi**  
ENGINEERS (PTY) LTD  
Providing Unbiased Engineering Solutions

Signature: \_\_\_\_\_ Date: 01-02-2024

Transportation Engineer: Chief Engineer  
Head: Transport

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

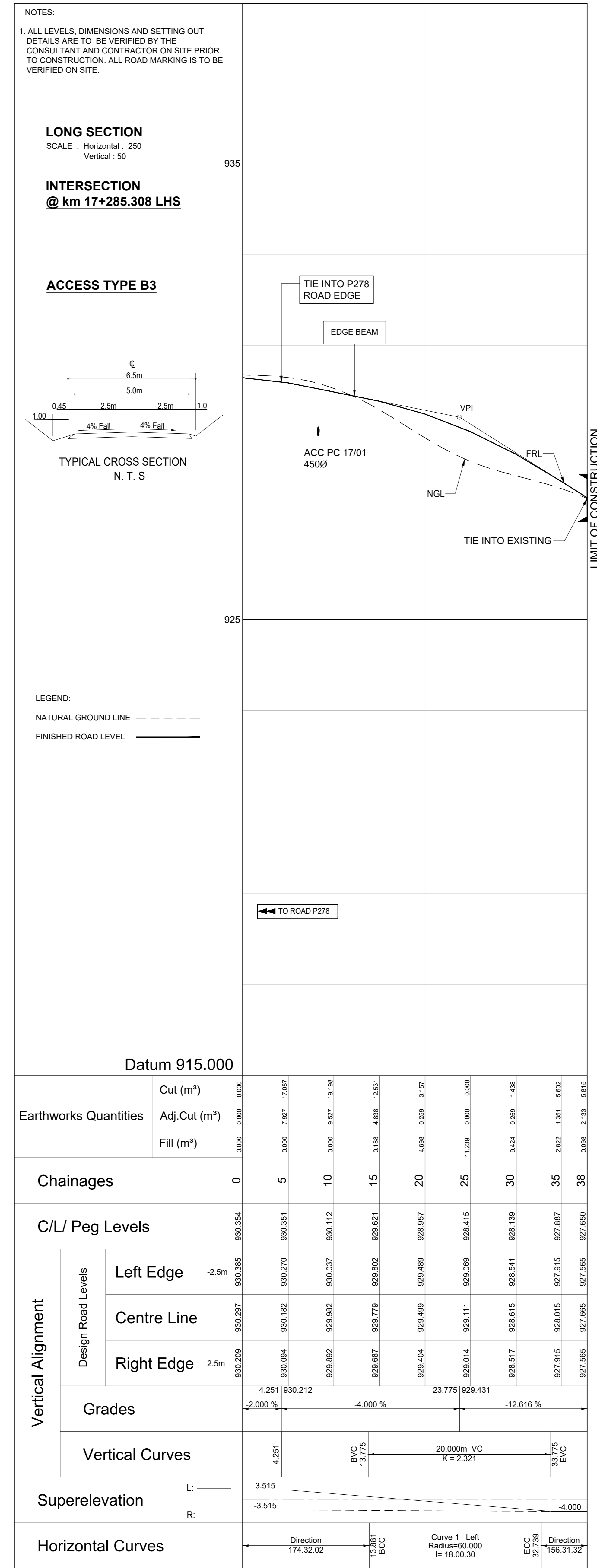
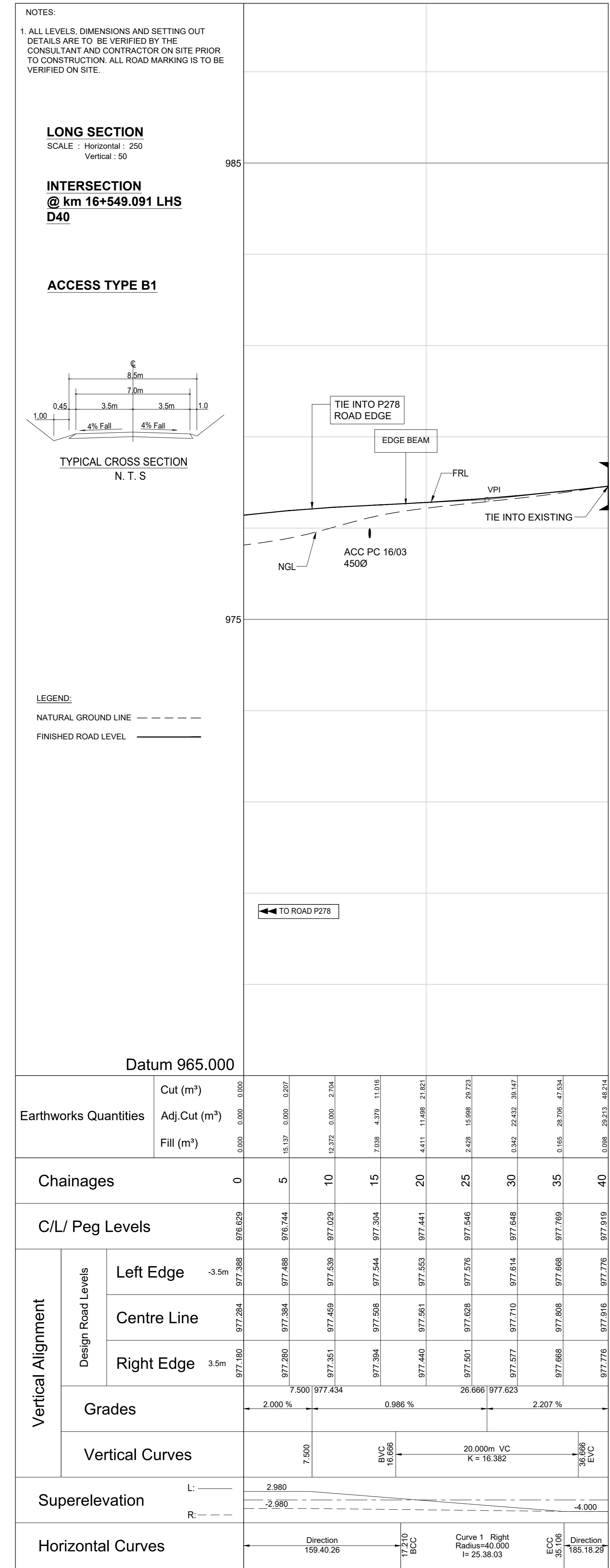
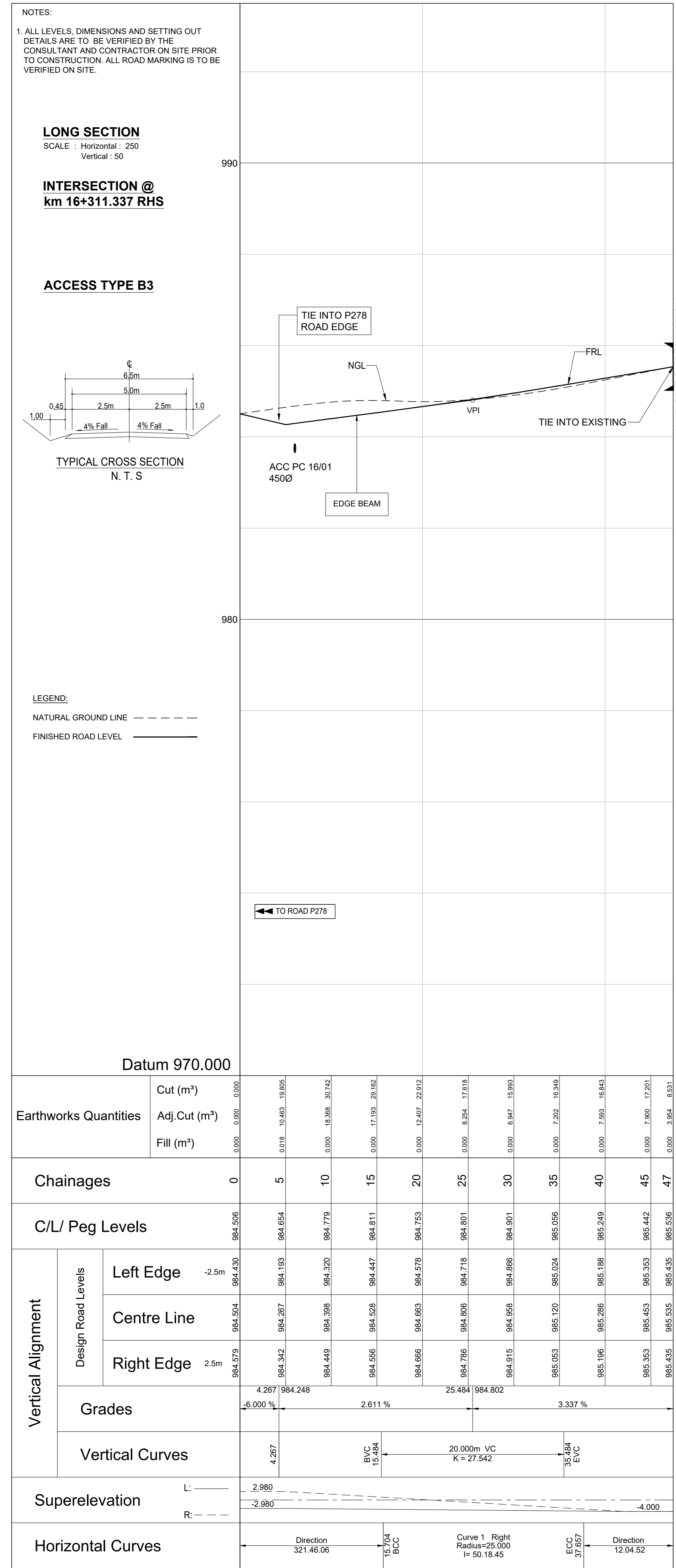
**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance km 0+000 - km 0+029 km 0+000 - km 0+042 km 0+000 - km 0+030	Sheet :- 9 of :- 15	REVISION: A
Scale HORIZONTAL 1:250 VERTICAL 1:50	Plan No :- <b>C 47637</b>	

C 47637



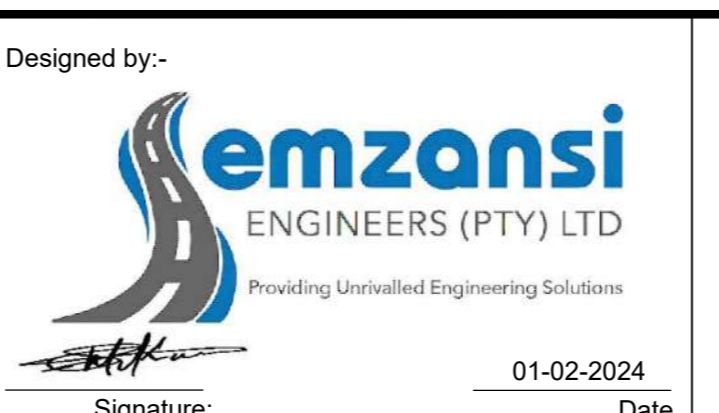


Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

AMENDMENTS

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	Designed by:- Y. DOMA
Continued on:-	Checked by:- N. NGUBANE
Cross Section No:-	Drawn by:- S. ZITHA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Transportation Engineer: Chief Engineer

Head: Transport

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance	Sheet	REVISION:
km 0+000 - km 0+047	10	A
km 0+047 - km 0+048	15	
km 0+048 - km 0+058		

Scale: HORIZONTAL 1:250, VERTICAL 1:50

Plan No: **C 47638**

C 47638

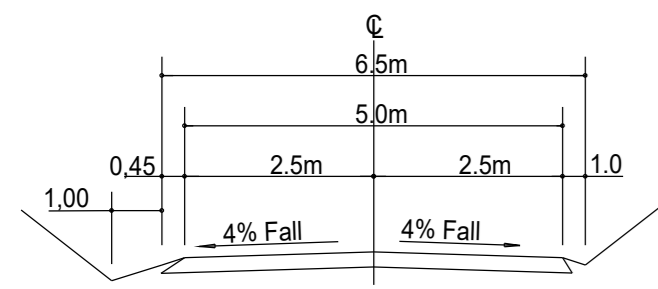


NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

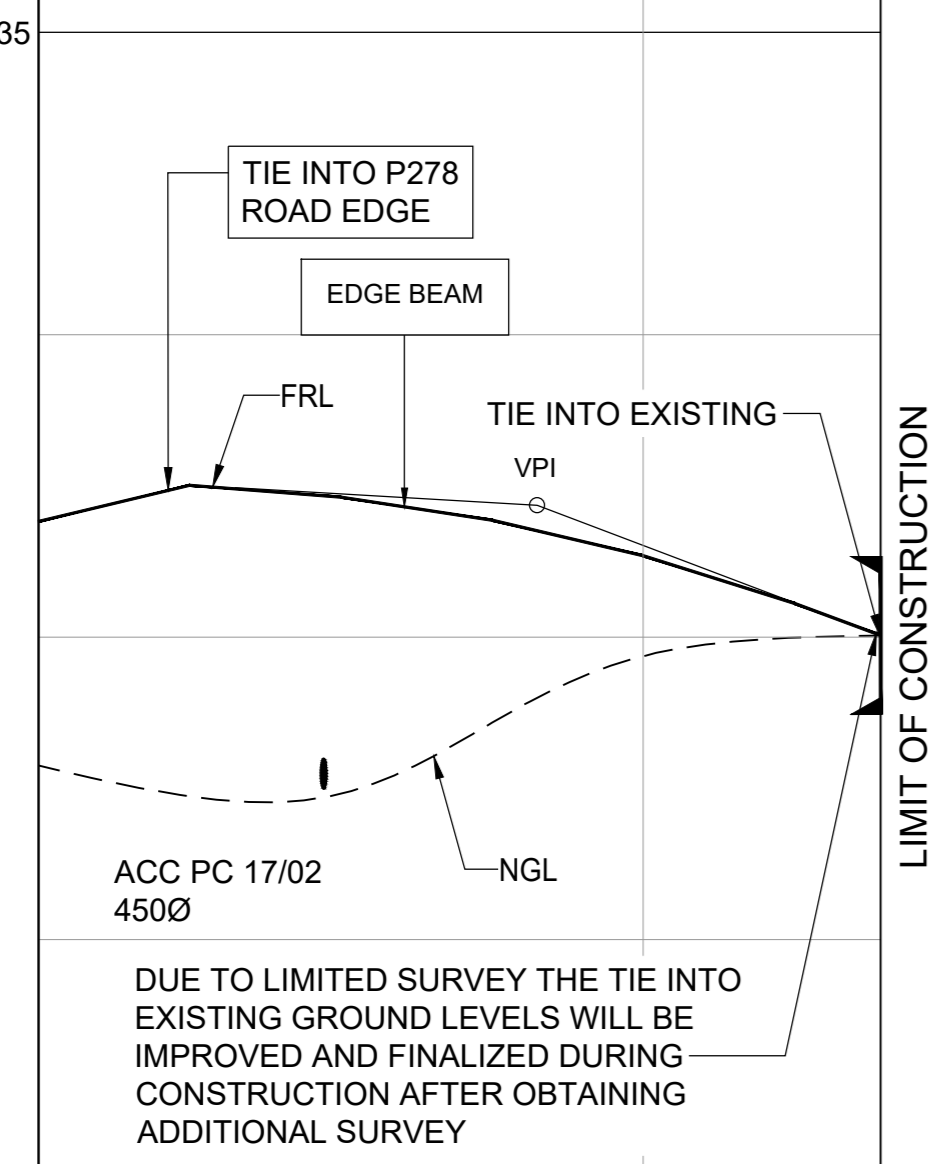
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @  
km 17+587.567 RHS**

**ACCESS TYPE B3**



TYPICAL CROSS SECTION  
N. T. S



DUE TO LIMITED SURVEY THE TIE INTO EXISTING GROUND LEVELS WILL BE IMPROVED AND FINALIZED DURING CONSTRUCTION AFTER OBTAINING ADDITIONAL SURVEY

LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 915.000

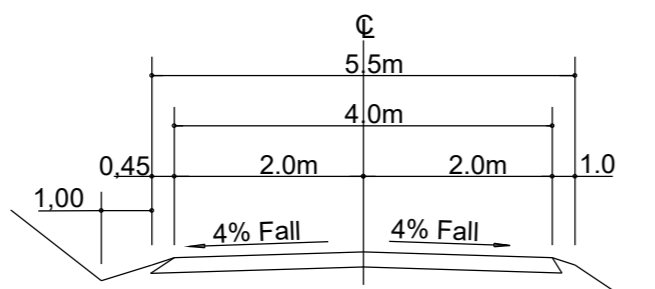
Earthworks Quantities	Cut (m³)		Adj. Cut (m³)		Fill (m³)		
	0	5	10	15	20	25	
Chainages	0	5	10	15	20	25	
C/L/ Peg Levels	920.150	920.906	920.817	920.452	920.977	921.001	
Vertical Alignment	Design Road Levels	Left Edge	-2.5m	931.833	932.072	931.948	931.747
		Centre Line		931.705	932.005	931.927	931.772
		Right Edge	2.5m	931.697	932.005	931.927	931.687
Grades		4.276	932.013	16.490	931.871		
Vertical Curves		4.276	6.450	20.000m VC	K=3.122	26.490	
Superelevation	L: -2.713	R: -2.713					
Horizontal Curves					Direction 337.14.18		

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

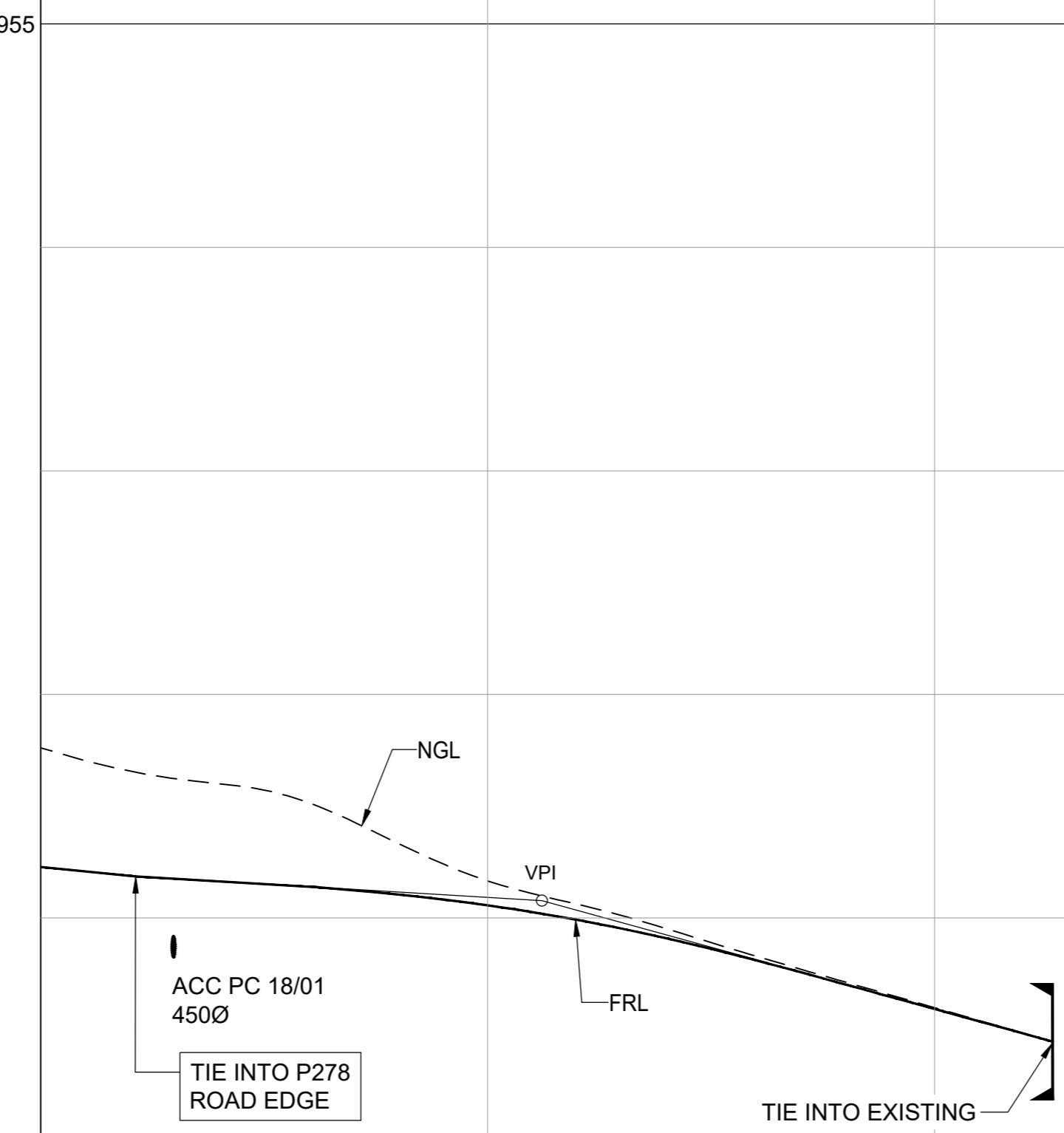
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @  
km 18+251.985 LHS**

**ACCESS TYPE : MINOR**



TYPICAL CROSS SECTION  
N. T. S



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 935.000

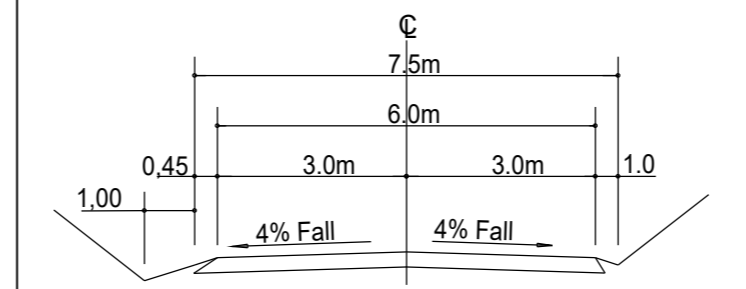
Earthworks Quantities	Cut (m³)		Adj. Cut (m³)		Fill (m³)		
	0	5	10	15	20	25	
Chainages	0	5	10	15	20	25	
C/L/ Peg Levels	948.522	948.205	948.255	947.750	947.281	947.086	
Vertical Alignment	Design Road Levels	Left Edge	-2.0m	947.418	947.323	947.259	946.891
		Centre Line		947.282	947.303	946.892	946.774
		Right Edge	2.0m	947.494	947.282	947.185	946.897
Grades		4.250	947.371	22.432	947.155		
Vertical Curves		4.250	12.432	20.000m VC	K=4.614	32.202	
Superelevation	L: 1.915	R: -1.915					
Horizontal Curves					Direction 140.12.09		

NOTES:  
1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.

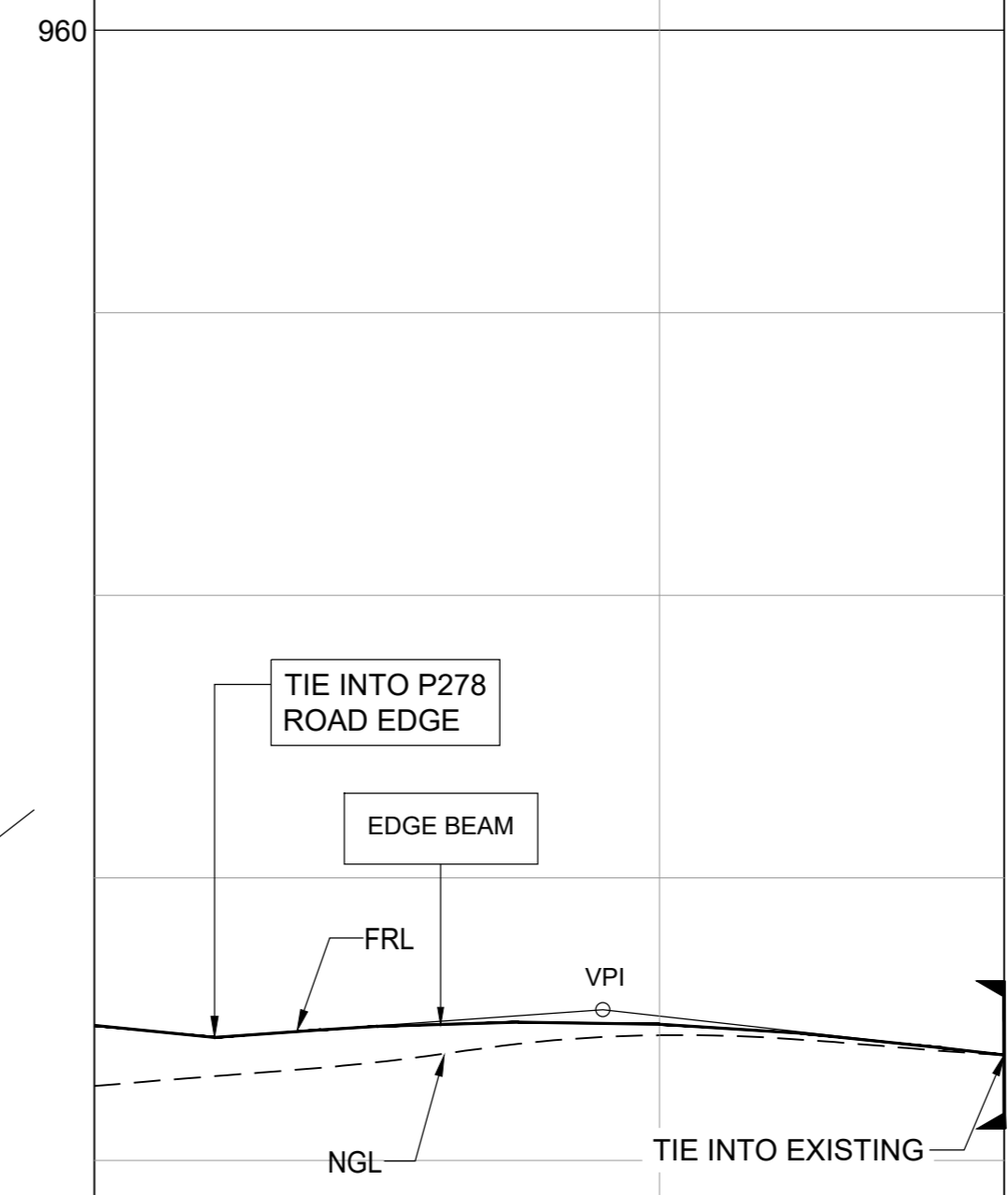
**LONG SECTION**  
SCALE : Horizontal : 250  
Vertical : 50

**INTERSECTION @  
km 18+542.754 LHS  
L1925**

**ACCESS TYPE B3**



TYPICAL CROSS SECTION  
N. T. S



LEGEND:  
NATURAL GROUND LINE - - - - -  
FINISHED ROAD LEVEL - - - - -

Datum 940.000

Earthworks Quantities	Cut (m³)		Adj. Cut (m³)		Fill (m³)		
	0	5	10	15	20	25	
Chainages	0	5	10	15	20	25	
C/L/ Peg Levels	952.527	952.612	952.872	952.844	952.900	952.869	
Vertical Alignment	Design Road Levels	Left Edge	-3.0m	953.012	952.833	952.811	952.883
		Centre Line		952.838	952.881	952.849	952.863
		Right Edge	3.0m	952.866	952.849	952.879	952.899
Grades		4.250	952.870	17.994	953.067		
Vertical Curves		4.250	7.064	20.000m VC	K=5.416	27.064	
Superelevation	L: 1.915	R: -1.915					
Horizontal Curves					Direction 141.07.50		

AS BUILT			
Supervising Engineer	Date	Checked	Signed
Supervising Authority			

Continued from:-	Designed by:-	Y. DOMA
Continued on:-	Checked by:-	N. NGUBANE
Cross Section No:-	Drawn by:-	S. ZITHA
Longitudinal Section No:-	Checked by:-	Y. DOMA
Design Plan No:-	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
Providing Unrivalled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

01-02-2024 Date

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance	Sheet :- 11	REVISION:
km 0+000 - km 0+025	of :- 15	A
km 0+000 - km 0+045		
km 0+000 - km 0+032		
Scale	Plan No :-	
HORIZONTAL 1:250		
VERTICAL 1:50		

**C 47639**

**C 47639**

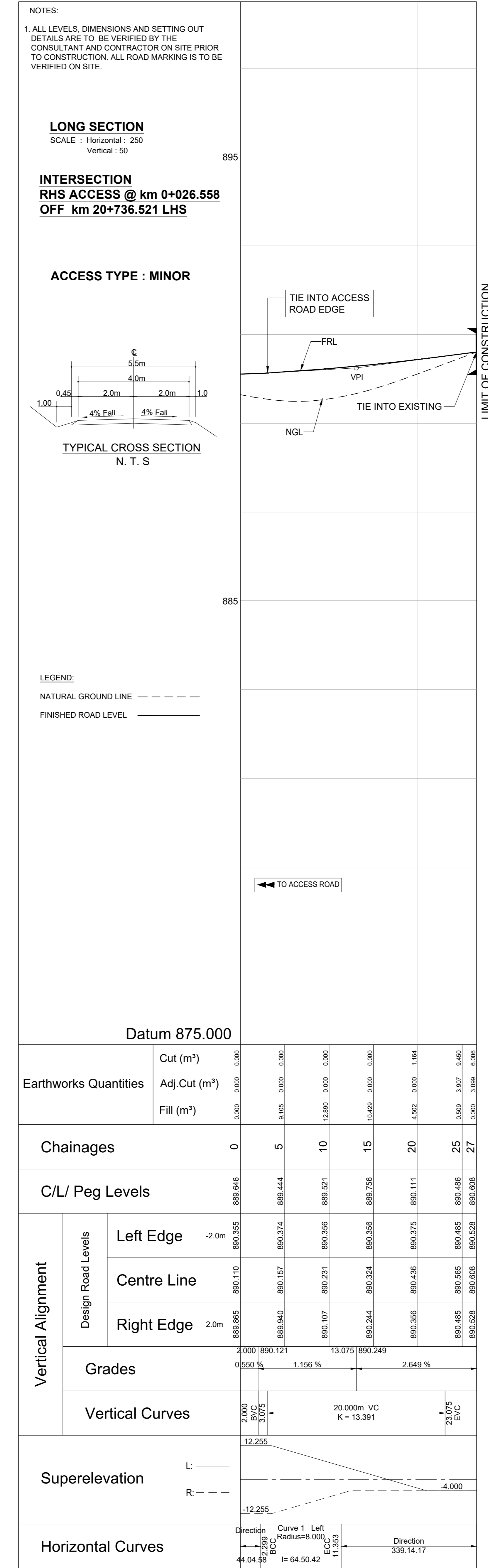
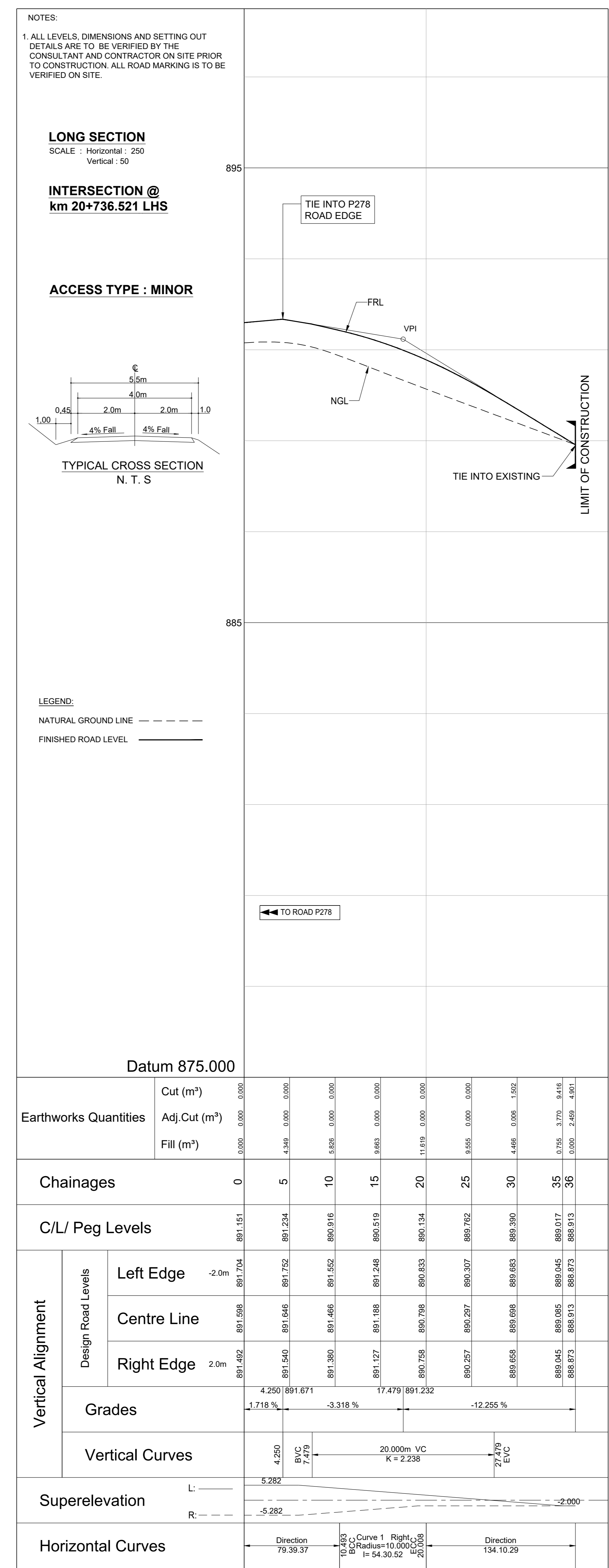
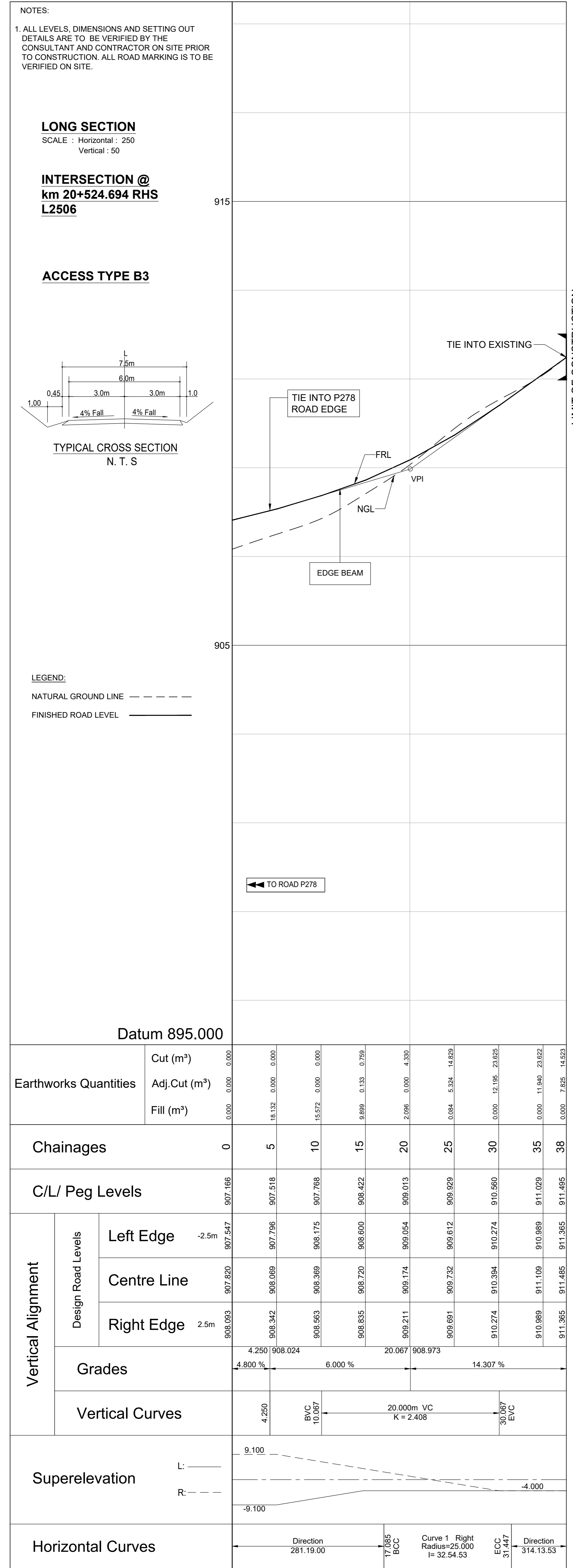




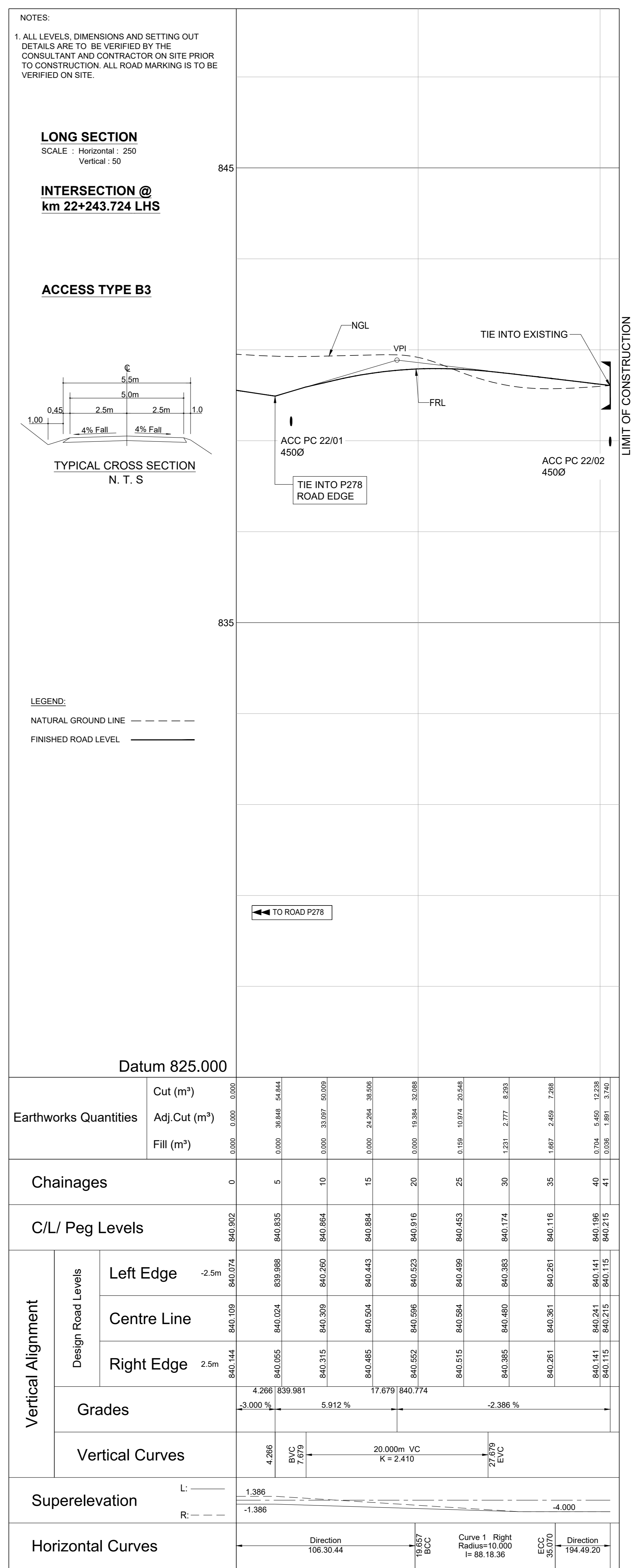
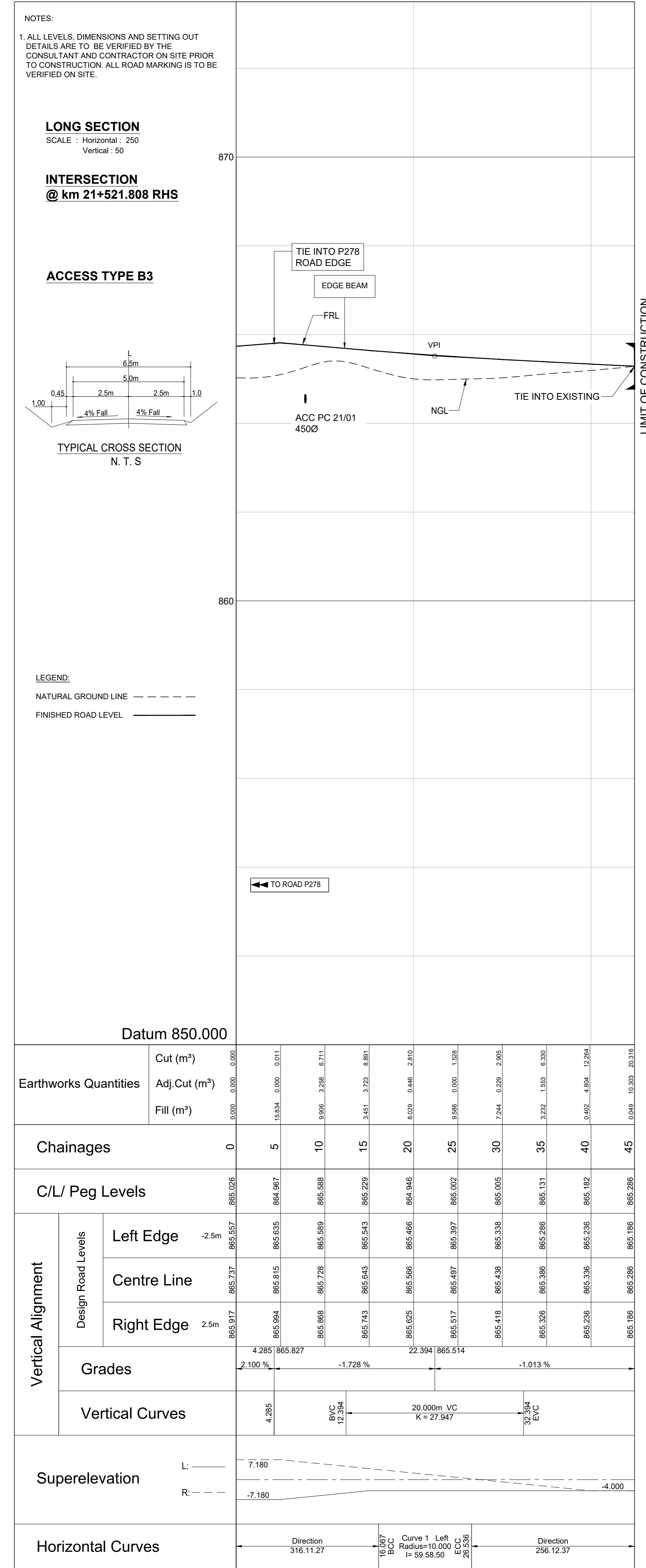
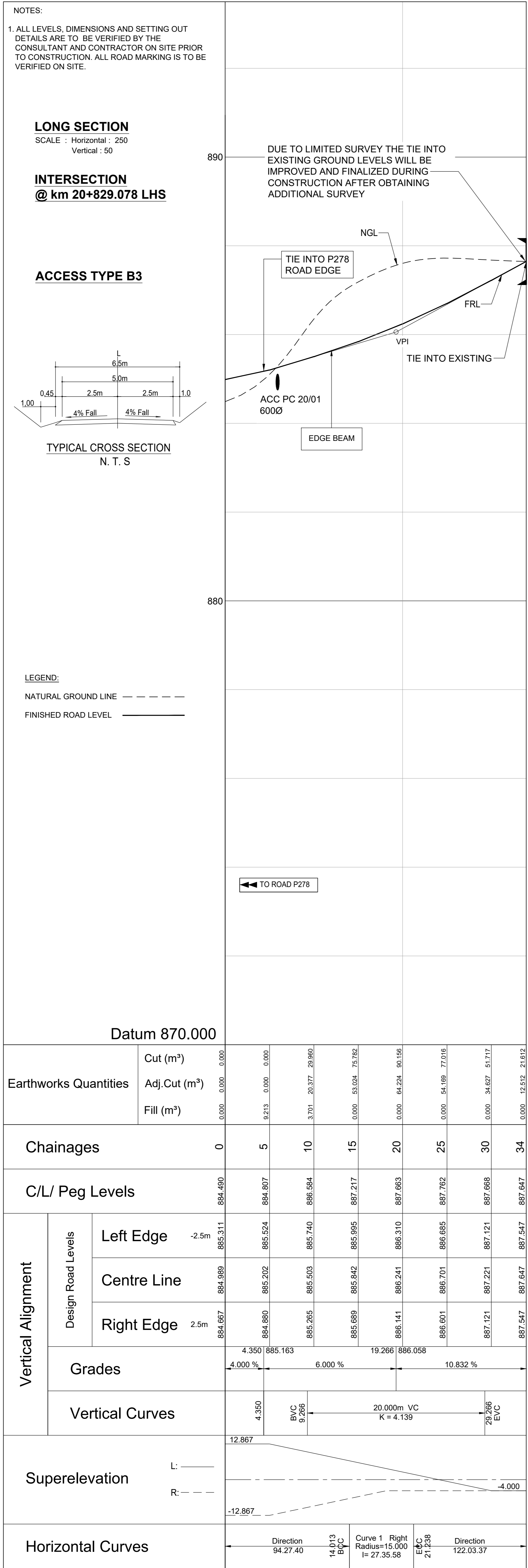












Symbol	Date	Description	Checked	Signed
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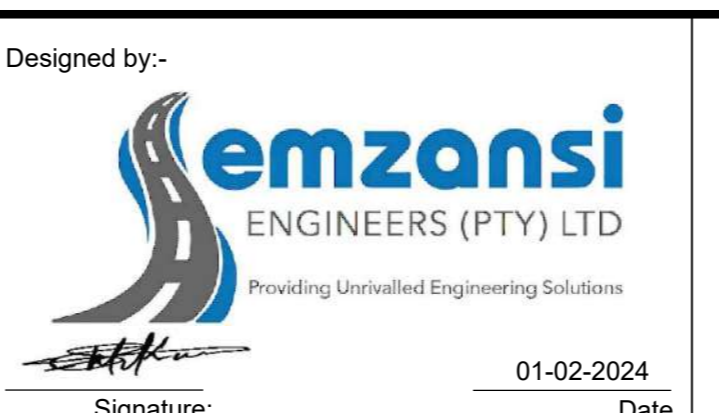
**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-  
Continued on:-  
Cross Section No:-  
Longitudinal Section No:-  
Design Plan No:-

Designed by:- Y. DOMA  
Checked by:- N. NGUBANE  
Drawn by:- S. ZITHA  
Checked by:- Y. DOMA  
Date of approval:-



Transportation Engineer: Chief Engineer  
Head: Transport

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS LONGITUDINAL SECTIONS

Staked km distance  
km 0+000 - km 0+034  
km 0+000 - km 0+045  
km 0+000 - km 0+041

Scale  
HORIZONTAL 1:250  
VERTICAL 1:50

Sheet - 15  
of - 15  
REVISION:  
A

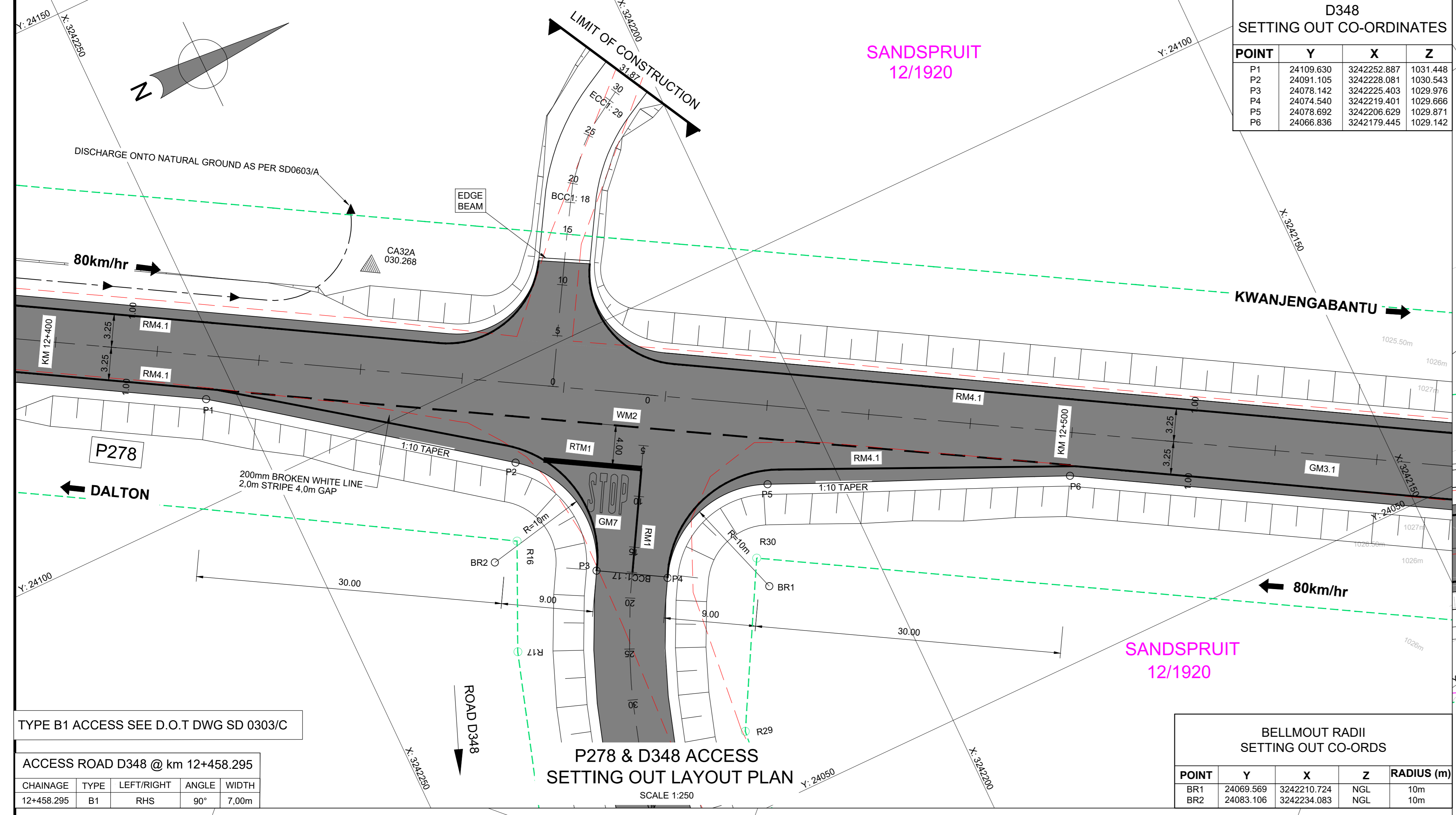
Plan No -  
**C 47643**

C 47643









**D348 SETTING OUT CO-ORDINATES**

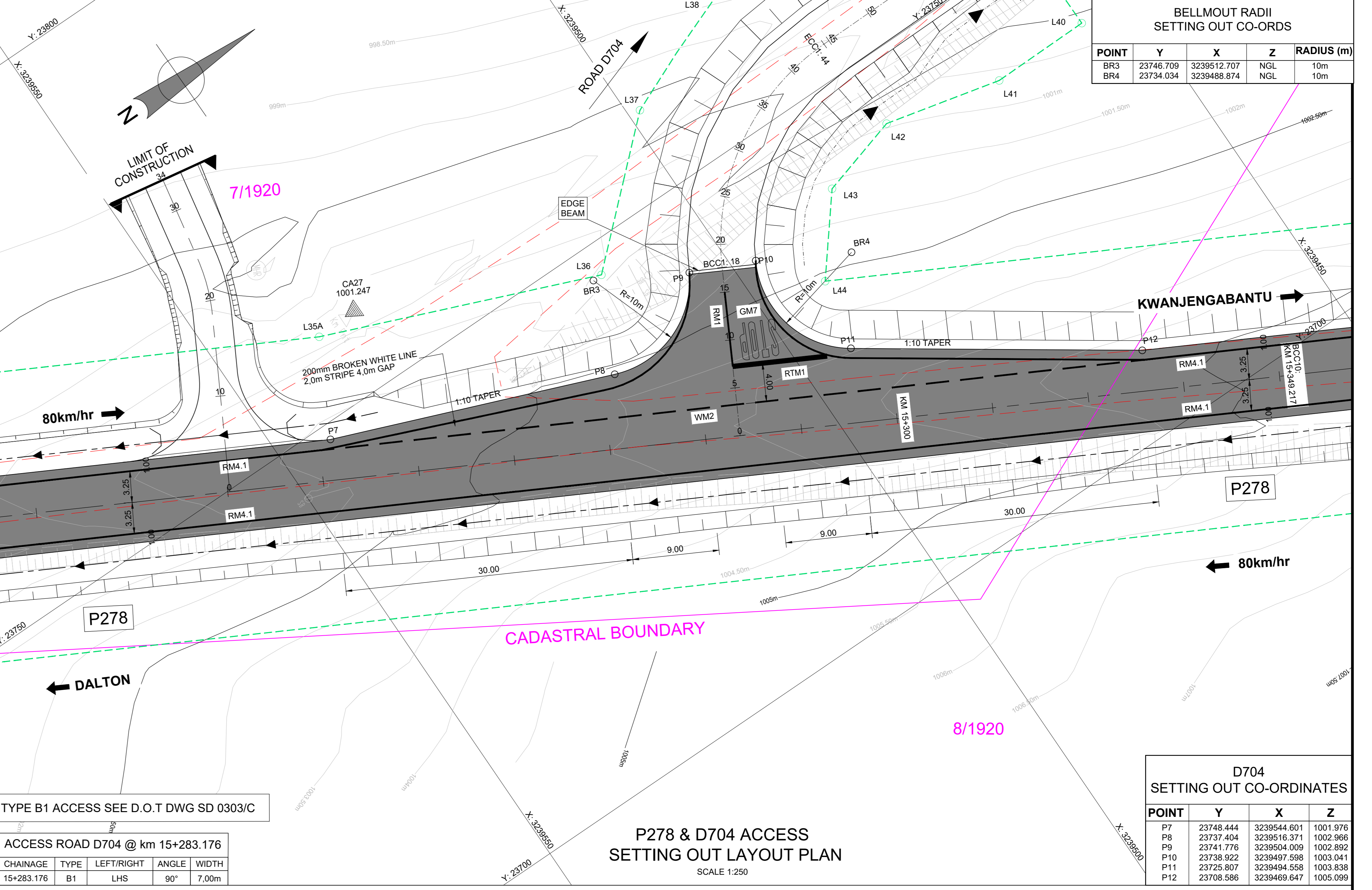
POINT	Y	X	Z
P1	24109.630	3242252.887	1031.448
P2	24091.105	3242228.981	1030.543
P3	24078.142	3242225.403	1029.976
P4	24074.540	3242219.401	1029.606
P5	24078.692	3242236.629	1029.811
P6	24066.836	3242179.445	1029.142

**BELLMOUT RADII SETTING OUT CO-ORDS**

POINT	Y	X	Z	RADIUS (m)
BR1	24069.569	3242210.724	NGL	10m
BR2	24083.106	3242234.083	NGL	10m

**ACCESS ROAD D348 @ km 12+458.295**

CHAINAGE	TYPE	LEFT/RIGHT	ANGLE	WIDTH
12+458.295	B1	RHS	90°	7.00m



**BELLMOUT RADII SETTING OUT CO-ORDS**

POINT	Y	X	Z	RADIUS (m)
BR3	23746.709	3239512.707	NGL	10m
BR4	23734.034	3239468.874	NGL	10m

**BELLMOUT RADII SETTING OUT CO-ORDS**

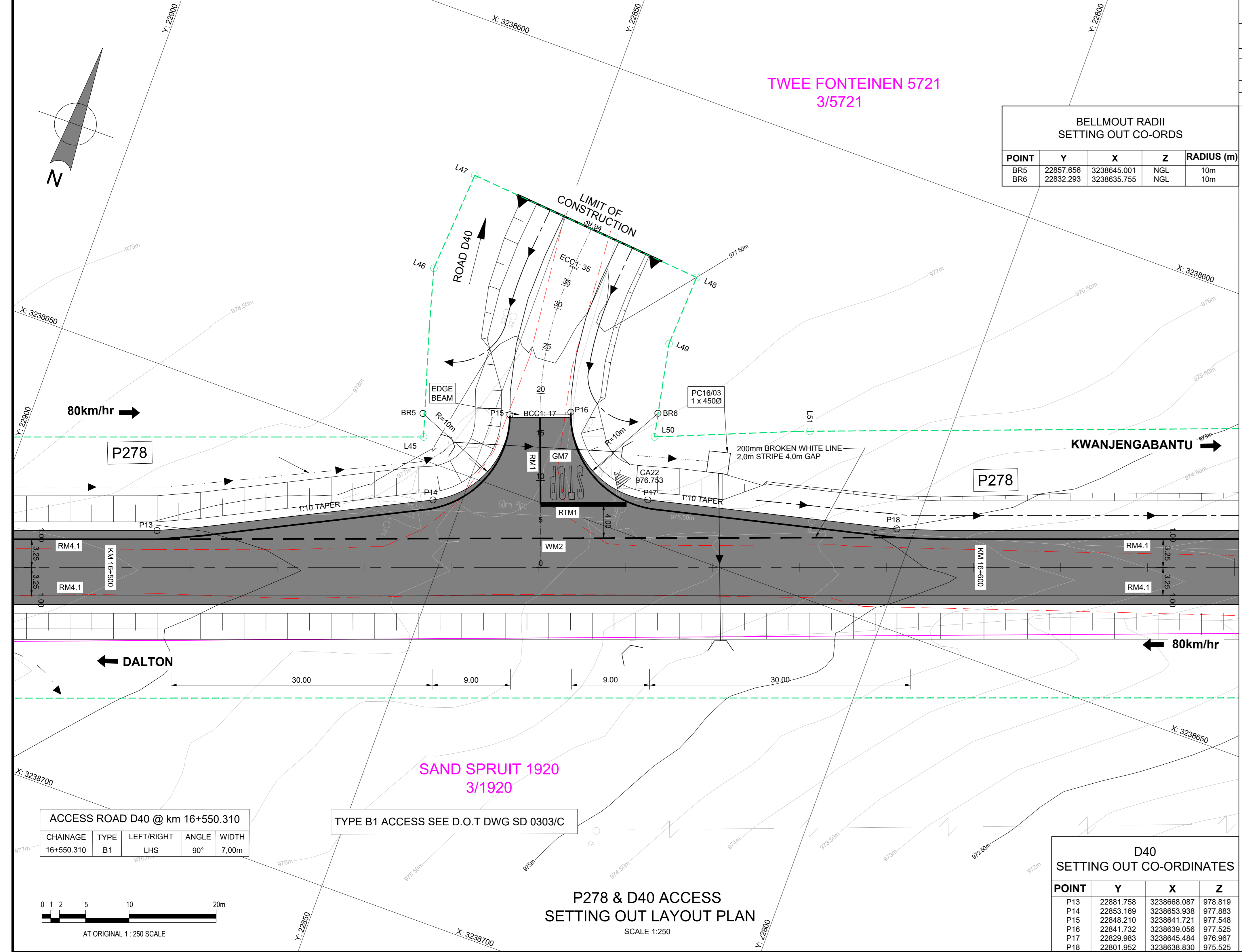
POINT	Y	X	Z	RADIUS (m)
BR1	24069.569	3242210.724	NGL	10m
BR2	24083.106	3242234.083	NGL	10m

**ACCESS ROAD D704 @ km 15+283.176**

CHAINAGE	TYPE	LEFT/RIGHT	ANGLE	WIDTH
15+283.176	B1	LHS	90°	7.00m

**D704 SETTING OUT CO-ORDINATES**

POINT	Y	X	Z
P7	23748.444	3239544.601	1001.976
P8	23737.404	3239516.371	1002.966
P9	23741.776	3239504.009	1002.892
P10	23738.822	3239497.598	1003.941
P11	23725.807	3239494.558	1003.838
P12	23708.586	3239469.647	1005.099



**BELLMOUT RADII SETTING OUT CO-ORDS**

POINT	Y	X	Z	RADIUS (m)
BR5	22857.656	3238645.001	NGL	10m
BR6	22832.293	3238635.755	NGL	10m

**ACCESS ROAD D40 @ km 16+550.310**

CHAINAGE	TYPE	LEFT/RIGHT	ANGLE	WIDTH
16+550.310	B1	LHS	90°	7.00m

**D40 SETTING OUT CO-ORDINATES**

POINT	Y	X	Z
P13	22881.758	3238668.087	975.819
P14	22853.169	3238653.898	977.883
P15	22848.210	3238641.721	977.548
P16	22841.732	3238639.056	977.525
P17	22829.983	3238645.484	978.987
P18	22801.952	3238638.830	975.525

**ROAD MARKING LEGEND**

REGULATORY	Ref.No.	Description
	RTM1	300mm White 'Stop Line'
	RM1	100mm White solid continuous 'No Overtaking Line'
	RM4.1	100mm Yellow solid continuous 'Left Edge Line'

WARNING	Ref.No.	Description
	WM2	200mm White broken 'Continuity Line' (2m line / 4m gap)

WORD MARKING	Ref.No.	Description
	GM7	5500mm White 'STOP'

**SURVEY CONTROL POINTS CO-ORDINATE LIST - MAIN ROAD P278**

STATION	Y	X	Z	DESCRIPTION
CA22	22833.69	3238644.37	978.753	12mm PEG IN CONCRETE
CA27	23756.13	3239535.03	1001.247	12mm PEG IN CONCRETE
CA32A	24114.57	3242232.74	1030.288	12mm PEG IN CONCRETE

**P278 ROAD RESERVE BOUNDARY CO-ORDINATES WGS 84 Lo. 31°**

CODE	LHS		RHS		
	Y	X	Y	X	
L35A	23757.924	3238639.563	R16	24084.082	3242231.224
L36	23746.735	3238511.889	R17	24074.224	3242235.775
L37	23756.632	3238498.740	R29	24057.890	3242218.903
L38	23764.006	3238485.452	R30	24072.589	3242210.669
L39	23764.259	3238455.909			
L40	23740.260	3238455.686			
L41	23740.163	3238486.132			
L42	23743.049	3238478.336			
L43	23740.637	3238486.834			
L44	23733.986	3238492.841			
L45	22856.669	3238647.511			
L46	22862.183	3238628.883			
L47	22861.418	3238617.244			
L48	22833.452	3238619.553			
L49	22833.828	3238627.793			
L50	22831.736	3238636.433			
L51	22815.185	3238631.716			

**LEGEND DESCRIPTION**

[Symbol]	NEW ROAD SURFACE
[Symbol]	1.50m SIDEWALK - SD0203/A
[Symbol]	EXISTING ROAD
[Symbol]	1.0 V-DRAIN - SD0601/2
[Symbol]	2.4 V-DRAIN - SD0601/4
[Symbol]	TOE DRAIN - SD0601/2
[Symbol]	KERB & CHANNEL - SD0701/A
[Symbol]	CATCHWATER BANK - SD0605/A
[Symbol]	GUARDRAILS - SD1101/A & SD1102/A
[Symbol]	NEW ROAD RESERVE
[Symbol]	GRID INLET - SD0405/A
[Symbol]	DEPRESSED INLET - SD0405/A
[Symbol]	SIDE INLET (S1) - SD0703/A
[Symbol]	SIDE INLET (D1) - SD0703/A
[Symbol]	SIDE DRAIN & GRID INLET - SD0602/B
[Symbol]	PIPE CHUTE - SD0605/1
[Symbol]	OPEN CHUTE - SD0605/2
[Symbol]	DIRECTION ARROW
[Symbol]	HEADWALL - SD0406
[Symbol]	STONE PITCH
[Symbol]	RENO MATTRESS
[Symbol]	CHUTE - SD0603/A

- GENERAL NOTES:**
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
  - ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN MIN. COVER = 600mm, MIN SLOPE = 2%.
  - PIPE CULVERTS ARE TO BE LAD IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406.
  - MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KNOX07 STANDARDS.
  - FOR EROSION CONTROL, COBON MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERRIES ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASS/CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 13.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH 'COL' SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON WGS 84.
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSES WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR  $s = (V_0/694) \cdot 0.004v$  FROM THE GEOMETRIC DESIGN GUIDELINE (G2 MANUAL) PAGE 3-16.  $0.3 \pm g$

**AS BUILT**

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

**Continued from:-**

Continued on:-	Designed by:- Y. DOMA
Cross Section No:-	Checked by:- T. PIKA
Longitudinal Section No:-	Drawn by:- S. ZITHA
Design Plan No:-	Checked by:- Y. DOMA
	Date of approval:-

**Transportation Engineer: Chief Engineer**

Head: Transport

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

D348, D708 & D40 TYPE B1 ACCESS SETTING OUT LAYOUT PLAN

Staked km distance: -

Scale: 1:250

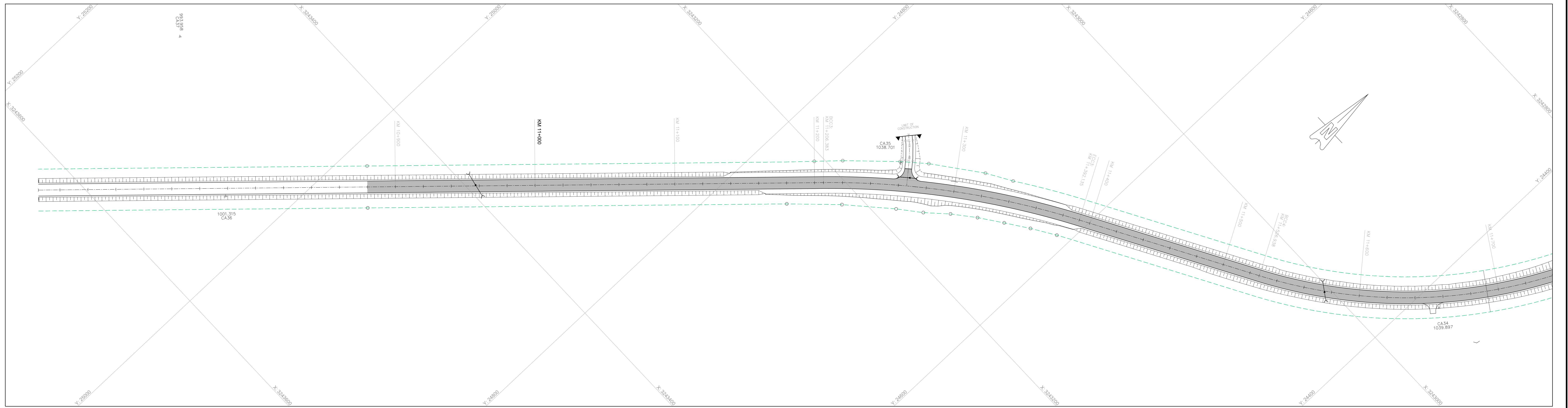
Sheet: 1 of 1

REVISION: A

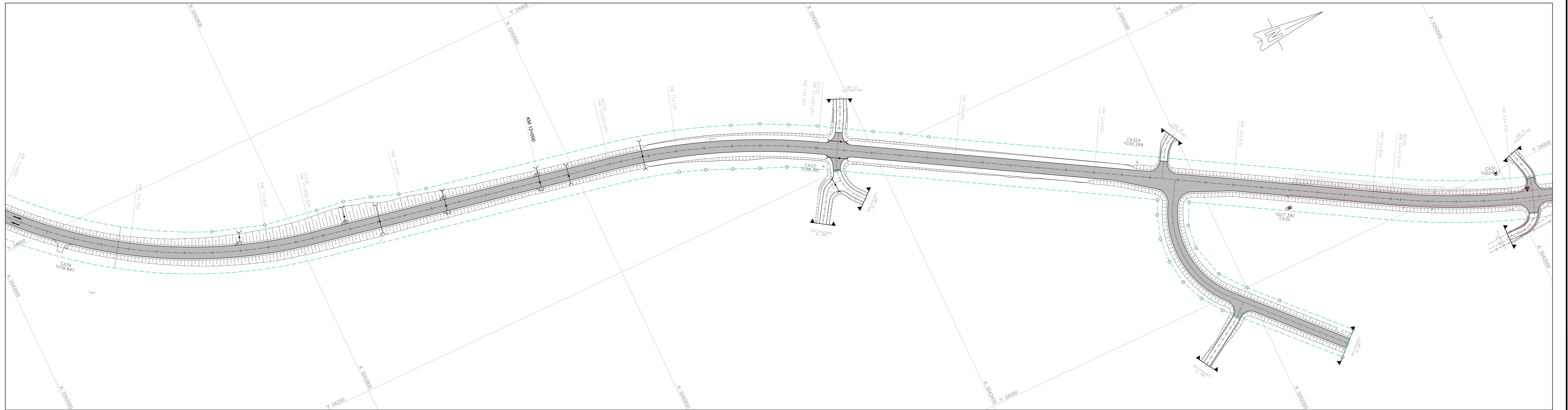
Plan No.: C 47660

C 47660





LEGEND	DESCRIPTION	LEGEND	DESCRIPTION
	NEW ROAD - ASPHALT SURFACE		ELECTRICAL POLE
	AFFECTED		STAY WIRE
	EXISTING ROAD		WIRE FENCE
	AFFECTED WATER RETIC		WALL FENCE
	PROPOSED SLEEVES		PIPE MARKER
	NEW ROAD RESERVE		VALVE
	GRID INLET - SO 0405A		WATER METER
	DEPRESSED INLET - SO 0405A		BENCHMARK
	HEADWALL		ELECTRIC OVERHEAD LINE
	EXISTING WATER PIPELINES		GRAVES
	EMBANKMENT		TAP
	TREE		SURVEYED BUILDINGS (ALSO STRUCTURES, SHACKS)



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	-	Designed by:-	T. PIKA
Continued on:-	C.47662	Checked by:-	Y. DOMA
Cross Section No:-		Drawn by:-	K. NAIDOO
Longitudinal Section No:-		Checked by:-	Y. DOMA
Design Plan No:-		Date of approval:-	



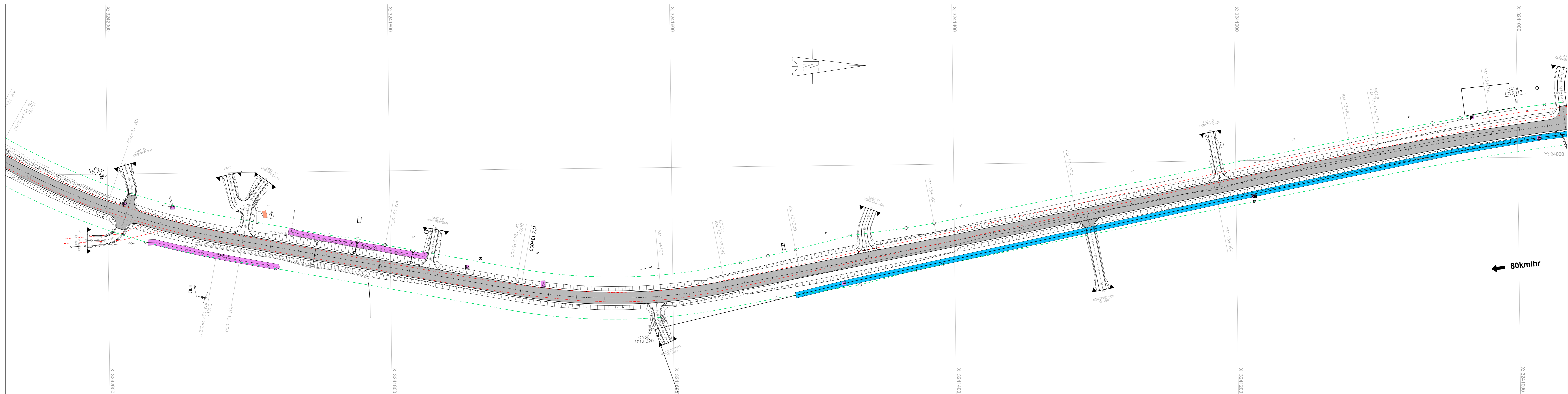
Transportation Engineer: Chief Engineer  
Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
EXISTING SERVICES

Staked km distance km 10+880 - km 11+700 km 11+700 - km 12+700	Sheet :- 1 of :- 6	REVISION: A
Scale 1 : 1000	Plan No :- C 47661	

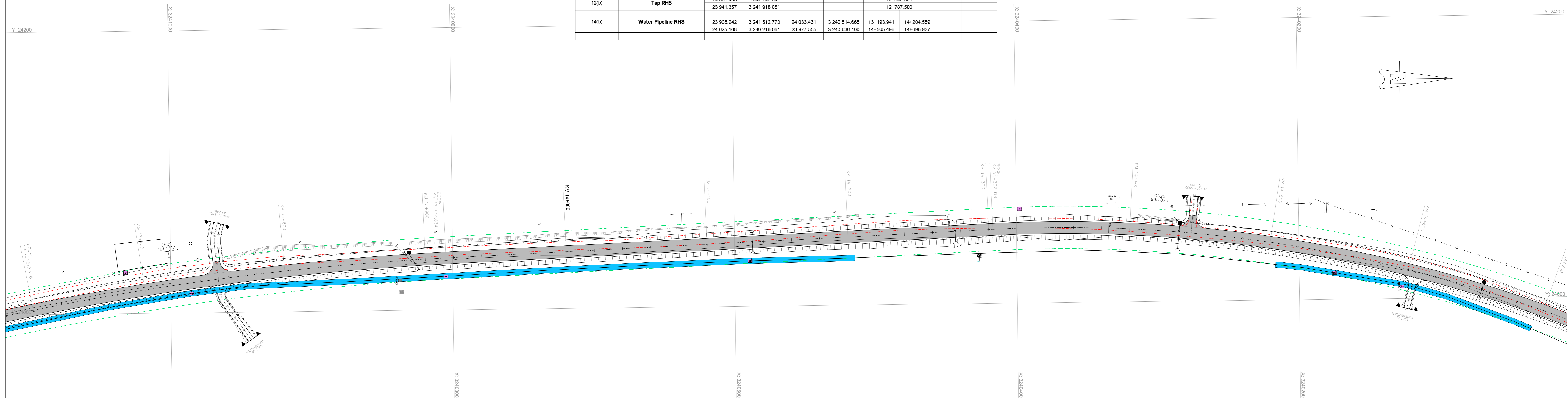
C 47661





LEGEND	DESCRIPTION	LEGEND	DESCRIPTION
	NEW ROAD - ASPHALT SURFACE		ELECTRICAL POLE
	AFFECTED		STAY WIRE
	EXISTING ROAD		WIRE FENCE
	AFFECTED WATER RETIC		WALL FENCE
	PROPOSED SLEEVES		PIPE MARKER
	NEW ROAD RESERVE		VALVE
	GRID INLET - SD 0405A		WATER METER
	DEPRESSED INLET - SD 0405A		BENCHMARK
	HEADWALL		ELECTRIC OVERHEAD LINE
	EXISTING WATER PIPELINES		GRAVES
	EMBANKMENT		TAP
	TREE		SURVEYED BUILDINGS (ALSO STRUCTURES, BHACKS)

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED								
		START CO-ORDINATES	END CO-ORDINATES	START	END			
2	Electric Power Poles LHS	CHAINAGE						
		23 976 074	3 241 954 615			12+744 944		
		23 976 153	3 241 953 596			12+746 958		
		23 919 196	3 241 691 855			13+015 047		
		23 917 451	3 241 691 865			13+015 047		
24 066 737	3 240 397 745			14+321 962				
3	Scour	23 974 559	3 241 187 373			13+526 339		
		24 023 794	3 240 804 808			13+914 634		
4(a)	Fence Line LHS	23 959 831	3 241 869 604	23 957 155	3 241 870 052	12+832 500		
		23 957 155	3 241 870 052	23 938 988	3 241 776 379	12+832 500	12+928 299	
		23 938 988	3 241 776 379	23 941 976	3 241 775 443		12+928 299	
		21 085 342	3 238 013 516	21 097 196	3 237 996 233	0+010 000	0+032 200	Access
		21 085 342	3 238 013 516	21 089 240	3 238 025 056	0+010 000	18+526 750	
4(b)	Fence Line RHS	23 951 056	3 241 971 639	23 951 255	3 241 967 180	12+735 518	12+740 000	
		23 951 255	3 241 967 180	23 931 202	3 241 880 198	12+740 000	12+827 206	
6	Road Marker RHS	24 008 438	3 240 127 283			14+600 000		
		24 021 207	3 240 837 779			13+890 000		
7	KM PNT LHS	23 978 871	3 241 986 577			12+713 085		
		23 931 237	3 241 745 692			12+960 000		
		24 028 841	3 241 031 998			13+688 260		
8	Chamber RHS	23 971 063	3 241 187 028			13+525 796		
		23 916 288	3 241 478 592			13+229 427		
9	Manhole RHS	24 013 676	3 240 985 019			13+732 832		
		24 032 131	3 240 599 071			14+130 422		
		24 018 720	3 240 175 318			14+548 363		
		24 038 493	3 242 147 941			12+540 000		
12(b)	Tap RHS	23 941 357	3 241 918 951			12+787 500		
		23 908 242	3 241 512 773	24 033 431	3 240 514 665	13+193 941	14+204 559	
14(b)	Water Pipeline RHS	24 025 188	3 240 216 961	23 977 555	3 240 036 100	14+505 496	14+696 937	



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 47661	Designed by:-	T. PIKA
Continued on:-	C 47663	Checked by:-	Y. DOMA
Cross Section No:-		Drawn by:-	K. NAIDOO
Longitudinal Section No:-		Checked by:-	Y. DOMA
Design Plan No:-		Date of approval:-	



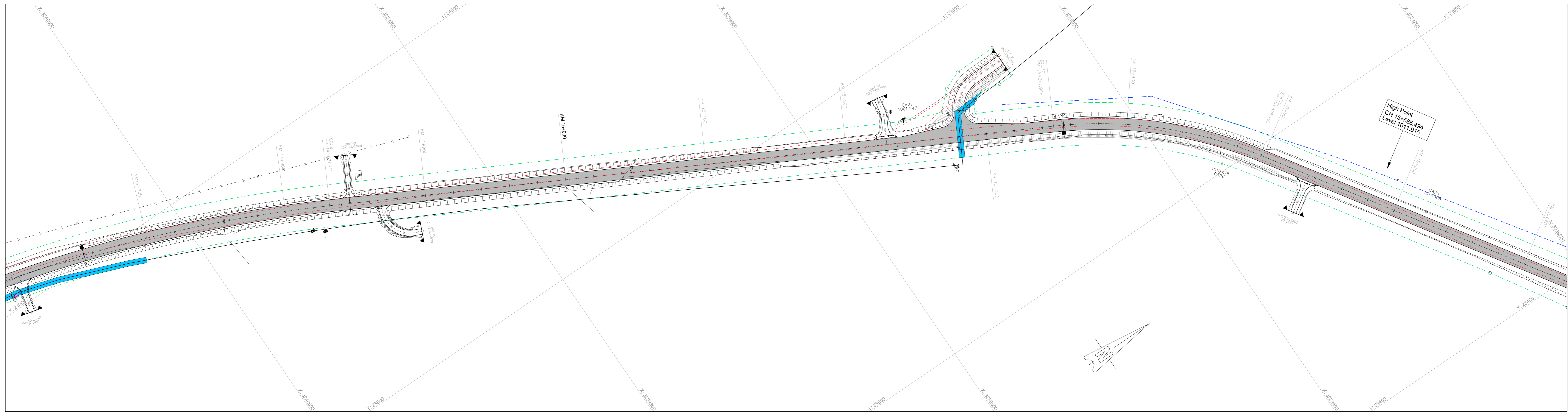
Designed by:-  
**emzansi**  
 ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions  
 Signature: \_\_\_\_\_ Date: 01-02-2024  
 Transportation Engineer: Chief Engineer  
 Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 EXISTING SERVICES

Staked km distance km 12+700 - km 13+700 km 13+700 - km 14+700	Sheet :- 2 of :- 6	REVISION: A
Scale 1 : 1000	Plan No :- C 47662	

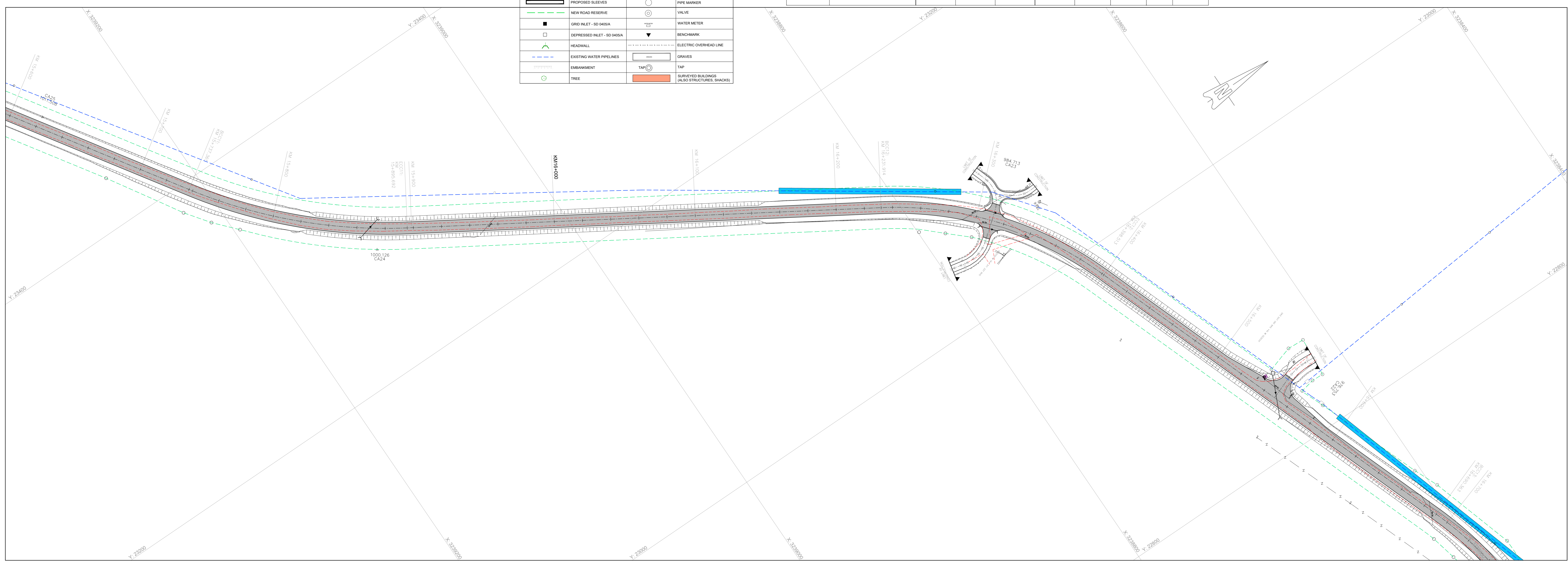
C 47662





LEGEND	DESCRIPTION	LEGEND	DESCRIPTION
	NEW ROAD - ASPHALT SURFACE		ELECTRICAL POLE
	AFFECTED		STAY WIRE
	EXISTING ROAD		WIRE FENCE
	AFFECTED WATER RETIC		WALL FENCE
	PROPOSED SLEEVES		PIPE MARKER
	NEW ROAD RESERVE		VALVE
	GRID INLET - SD 0450A		WATER METER
	DEPRESSED INLET - SD 0450A		BENCHMARK
	HEADWALL		ELECTRIC OVERHEAD LINE
	EXISTING WATER PIPELINES		GRAVES
	EMBANKMENT		TAP
	TREE		SURVEYED BUILDINGS (ALSO STRUCTURES, SHACKS)

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED								
		START CO-ORDINATES	END CO-ORDINATES	START	END			
7	KM PNT LHS	22 854 965	3 238 654 134			CHANNAGE		
						16+534 809		
14(a)	Water Pipeline LHS	23 740 043	3 238 502 044	23 742 924	3 239 478 779	0+015+000	0+045 000	Access
		23 740 043	3 238 502 044	23 712 130	3 239 517 317		15+290 000	Across
		23 157 933	3 238 864 857	23 084 652	3 238 758 528	16+160 000	16+288 762	
		22 802 647	3 238 627 081	22 643 912	3 238 578 005	16+594 335	16+756 841	



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer \_\_\_\_\_ Date \_\_\_\_\_

Supervising Authority \_\_\_\_\_

Continued from:- C 47662  
 Continued on:- C 47664

Cross Section No:-  
 Longitudinal Section No:-  
 Design Plan No:-

Designed by:- T. PIKA  
 Checked by:- Y. DOMA  
 Drawn by:- K. NAIDOO  
 Checked by:- Y. DOMA  
 Date of approval:-



Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions

Signature: \_\_\_\_\_ Date: 01-02-2024

Transportation Engineer: Chief Engineer  
 Head: Transport

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 EXISTING SERVICES

Staked km distance  
 km 14+700 - km 15+700  
 km 15+700 - km 16+700

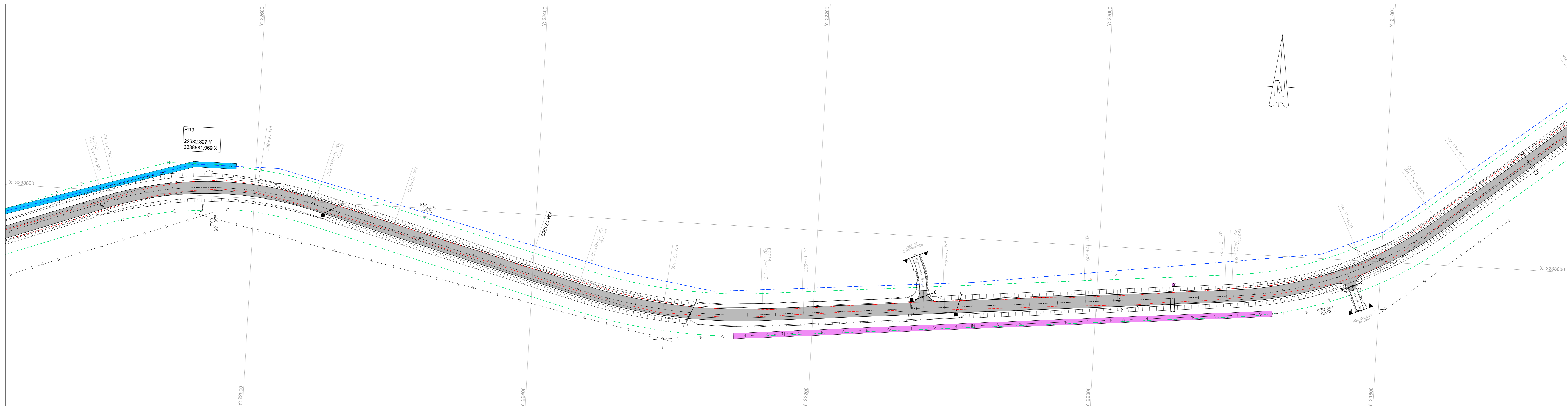
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**1 : 1000**

Sheet :- 3  
 of :- 6  
 REVISION:  
 A

Plan No :-  
**C 47663**

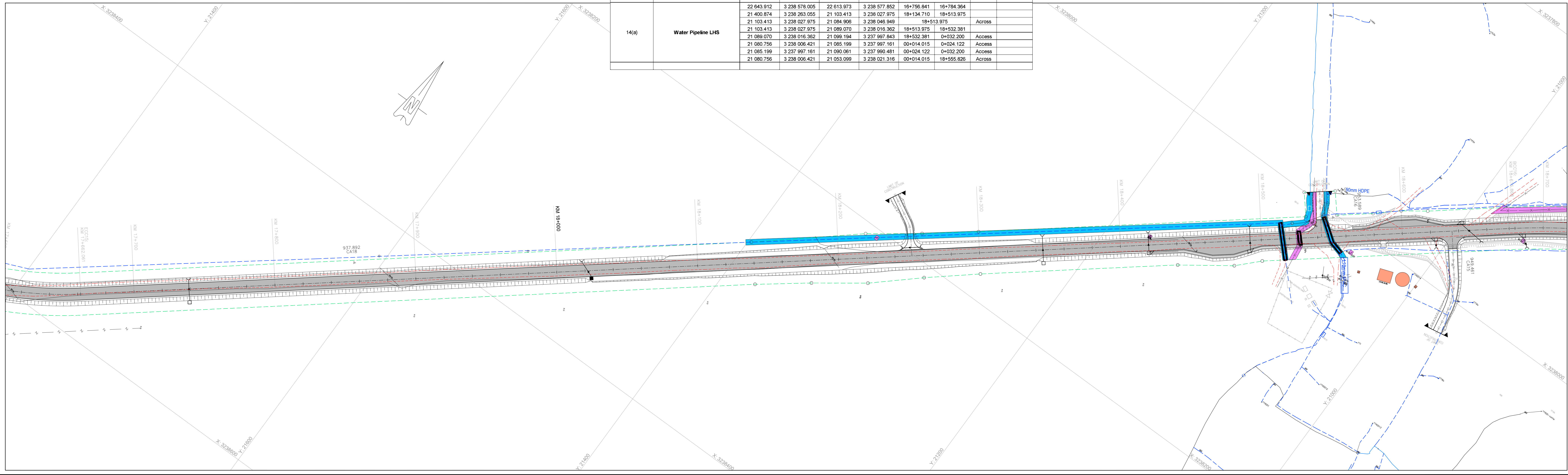
C 47663





LEGEND	DESCRIPTION	LEGEND	DESCRIPTION
	NEW ROAD - ASPHALT SURFACE		ELECTRICAL POLE
	AFFECTED		STAY WIRE
	EXISTING ROAD		WIRE FENCE
	AFFECTED WATER RETIC		WALL FENCE
	PROPOSED SLEEVES		PIPE MARKER
	NEW ROAD RESERVE		VALVE
	GRID INLET - SD 0405A		WATER METER
	DEPRESSED INLET - SD 0405A		BENCHMARK
	HEADWALL		ELECTRIC OVERHEAD LINE
	EXISTING WATER PIPELINES		GRAVES
	EMBANKMENT		TAP
	TREE		SURVEYED BUILDINGS (ALSO STRUCTURES, SHACKS)

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED						
		START CO-ORDINATES		END CO-ORDINATES		CHAINAGE
1	Electric Power Line RHS	22 255 332	3 238 678 283	21 874 951	3 238 641 038	17+150 490 - 17+531 807
2	Electric Power Poles RHS	22 220 528	3 238 674 925			17+184 650
		22 086 359	3 238 661 512			17+320 000
		21 979 425	3 238 651 165			17+427 267
4(a)	Fence Line LHS	21 089 240	3 238 025 056	21 083 021	3 238 032 539	18+526 780 - Across
		20 982 653	3 237 928 699	20 961 369	3 237 924 996	18+669 761 - 18+673 636
		20 982 653	3 237 928 699	20 931 894	3 237 889 437	18+669 761 - 18+733 474
4(b)	Fence Line RHS	21 081 189	3 238 043 959	21 083 021	3 238 032 539	18+520 000 - 18+526 780
5(b)	Water Pole RHS	22 220 555	3 238 674 924			17+184 650
		22 086 314	3 238 661 320			17+320 000
		21 979 422	3 238 651 190			17+426 877
		21 050 296	3 238 015 028			18+563 102
		20 956 864	3 237 936 051			18+695 674
7	KM PNT LHS	21 945 912	3 238 624 520			17+462 825
		21 172 214	3 238 090 583			18+421 011
14(a)	Water Pipeline LHS	22 643 912	3 238 578 005	22 613 973	3 238 577 852	16+756 841 - 16+784 364
		21 400 874	3 238 263 055	21 103 413	3 238 027 975	18+134 710 - 18+513 875
		21 103 413	3 238 027 975	21 084 906	3 238 046 849	18+513 875 - Across
		21 103 413	3 238 027 975	21 089 070	3 238 016 362	18+513 875 - 18+532 381
		21 089 070	3 238 016 362	21 069 194	3 237 997 843	18+532 381 - 0+032 200 Access
		21 080 756	3 238 006 421	21 085 199	3 237 997 181	00+014 015 - 0+034 122 Access
		21 085 199	3 237 997 181	21 090 061	3 237 990 481	00+024 122 - 0+032 200 Access
		21 080 756	3 238 006 421	21 053 099	3 238 021 316	00+014 015 - 18+555 826 - Across



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	
Continued from:-	C 47663
Continued on:-	C 47665
Cross Section No:-	
Longitudinal Section No:-	
Design Plan No:-	
Designed by:-	T. PIKA
Checked by:-	Y. DOMA
Drawn by:-	K. NAIDOO
Checked by:-	Y. DOMA
Date of approval:-	



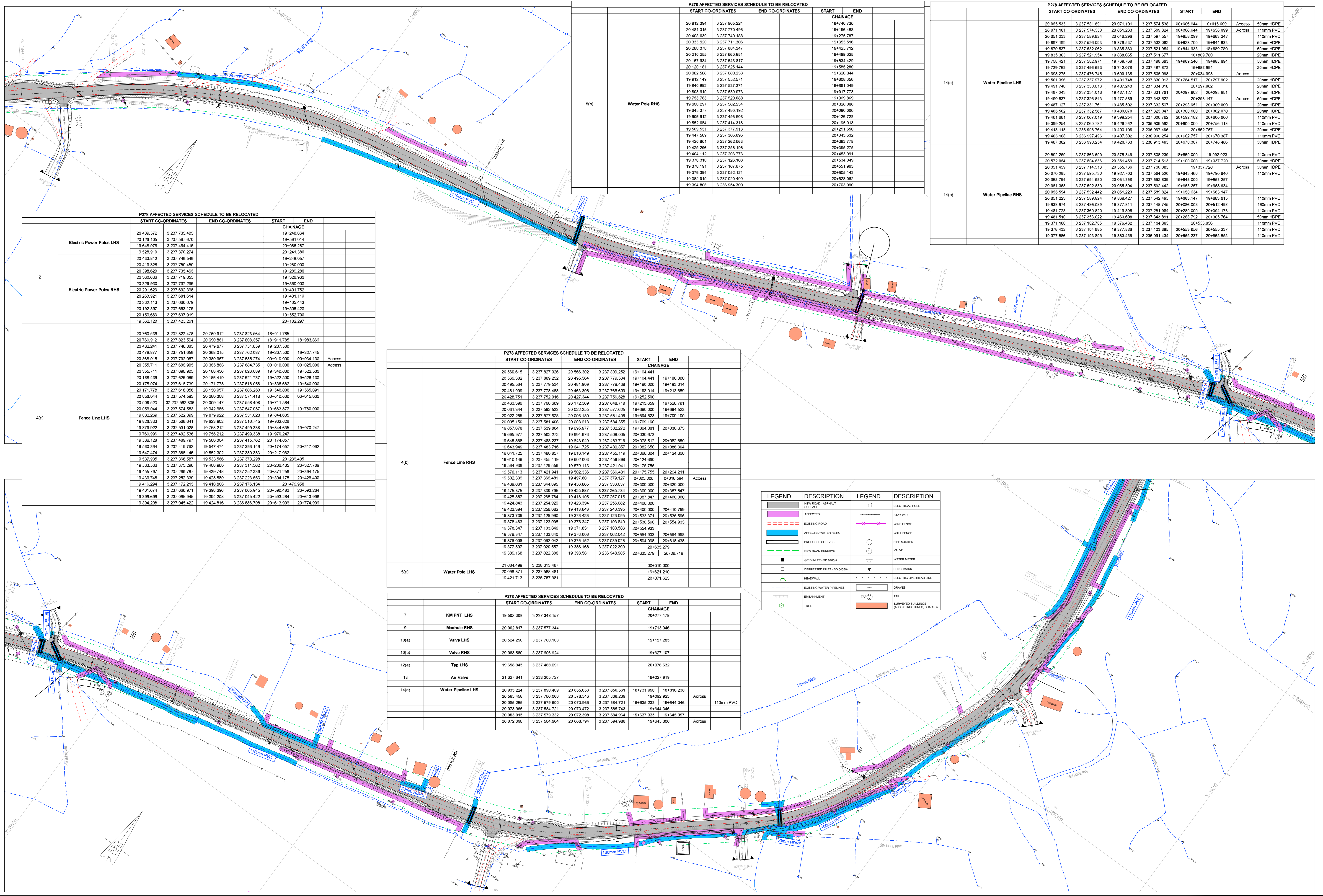
Transportation Engineer: Chief Engineer  
Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
EXISTING SERVICES

Staked km distance km 16+700 - km 17+700 km 17+700 - km 18+700	Sheet - 4 of - 6	REVISION: A
Scale 1 : 1000	Plan No - C 47664	

C 47664





P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED					
START CO-ORDINATES	END CO-ORDINATES	CHAINAGE	START	END	
20 912 304	3 237 905 224	19+740.700			
20 481 315	3 237 770 496	19+196.468			
20 408 039	3 237 740 188	19+275.787			
20 335 920	3 237 711 306	19+353.516			
20 268 378	3 237 684 347	19+425.712			
20 210 255	3 237 660 851	19+489.025			
20 167 634	3 237 643 817	19+534.429			
20 120 181	3 237 625 144	19+585.280			
20 082 586	3 237 608 258	19+626.844			
19 912 149	3 237 552 571	19+808.356			
19 840 892	3 237 537 371	19+851.049			
19 803 910	3 237 530 073	19+917.778			
19 753 783	3 237 520 088	19+968.869			
19 666 297	3 237 502 554	20+020.000			
19 645 377	3 237 486 192	20+080.000			
19 606 512	3 237 456 508	20+126.728			
19 552 054	3 237 414 318	20+195.018			
19 509 551	3 237 377 513	20+251.650			
19 447 586	3 237 306 096	20+343.632			
19 420 901	3 237 262 063	20+393.778			
19 425 296	3 237 258 196	20+395.275			
19 404 112	3 237 203 773	20+453.991			
19 376 310	3 237 126 106	20+534.049			
19 378 191	3 237 107 076	20+551.903			
19 376 394	3 237 052 121	20+605.143			
19 382 910	3 237 029 499	20+628.062			
19 394 808	3 236 954 309	20+703.990			

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED					
START CO-ORDINATES	END CO-ORDINATES	START	END		
20 065 533	3 237 581 891	20 071 101	3 237 574 538	20+006.844	20+015.000
20 071 101	3 237 574 538	20 051 233	3 237 589 824	20+006.844	19+558.099
20 051 233	3 237 589 824	20 046 296	3 237 597 557	19+658.099	19+643.348
19 897 199	3 237 526 093	19 879 537	3 237 532 062	19+826.700	19+844.633
19 879 537	3 237 532 062	19 835.363	3 237 511 954	19+844.633	18+889.780
19 835.363	3 237 521 954	19 838.665	3 237 511 677	18+889.780	20mm HDPE
19 758.621	3 237 502 971	19 739.758	3 237 496 683	19+968.546	19+888.894
19 739.758	3 237 496 683	19 742.078	3 237 487 873	19+988.894	20mm HDPE
19 698.275	3 237 476 745	19 690.135	3 237 506 098	20+034.998	Across
19 501.396	3 237 337 972	19 491.748	3 237 330 013	20+284.517	20+297.902
19 491.748	3 237 330 013	19 487.243	3 237 334 018	20+297.902	20mm HDPE
19 487.243	3 237 334 018	19 487.127	3 237 331 761	20+297.902	20+298.951
19 480.637	3 237 336 843	19 477.589	3 237 343 922	20+298.147	Across
19 487.127	3 237 331 761	19 465.502	3 237 332 567	20+298.951	20mm HDPE
19 485.502	3 237 332 567	19 489.078	3 237 325 047	20+300.000	20+302.070
19 401.881	3 237 067 019	19 399.254	3 237 060 762	20+592.182	20+600.000
19 399.254	3 237 060 762	19 429.262	3 236 906 562	20+600.000	20+756.118
19 413.115	3 236 996.764	19 403.108	3 236 997.496	20+662.757	20mm HDPE
19 403.108	3 236 997.496	19 407.202	3 236 992.254	20+662.757	110mm PVC
19 407.202	3 236 992.254	19 420.733	3 236 913.483	20+670.387	20+748.486

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED					
START CO-ORDINATES	END CO-ORDINATES	CHAINAGE	START	END	
20 439 572	3 237 735 405	19+248.884			
20 126 105	3 237 597 670	19+591.014			
19 648 076	3 237 464 415	20+088.287			
19 528 910	3 237 370 274	20+241.380			
20 433.812	3 237 749 549	19+248.057			
20 410 328	3 237 750 450	19+260.000			
20 368.620	3 237 735 493	19+296.280			
20 360.636	3 237 719 855	19+326.930			
20 329 630	3 237 707 296	19+360.000			
20 291 629	3 237 692 368	19+401.752			
20 263 921	3 237 681 614	19+431.119			
20 232 113	3 237 668 979	19+465.443			
20 192 367	3 237 653 175	19+508.420			
20 150 669	3 237 637 919	19+552.700			
19 562 120	3 237 423 261	20+182.207			

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED					
START CO-ORDINATES	END CO-ORDINATES	CHAINAGE	START	END	
20 560 615	3 237 627 928	20 566 302	3 237 809 252	19+104.441	
20 560 302	3 237 609 252	20 496 564	3 237 776 534	19+104.441	19+180.000
20 496 564	3 237 776 534	20 481 909	3 237 776 468	19+180.000	19+193.014
20 481 909	3 237 776 468	20 463 396	3 237 766 609	19+193.014	19+213.050
20 428 751	3 237 752 016	20 427 344	3 237 756 828	19+252.500	
20 463 396	3 237 766 609	20 172 369	3 237 648 718	19+213.050	19+528.781
20 031 344	3 237 592 533	20 022 255	3 237 577 625	19+680.000	19+684.523
20 022 255	3 237 577 625	20 005 150	3 237 581 496	19+684.523	19+709.100
20 005 150	3 237 581 496	20 003 613	3 237 584 355	19+709.100	
19 857 678	3 237 539 804	19 695 977	3 237 502 272	19+864.081	20+030.673
19 695 977	3 237 502 272	19 694 676	3 237 508 005	20+030.673	
19 645 568	3 237 488 237	19 643 949	3 237 483 716	20+078.512	20+082.650
19 643 949	3 237 483 716	19 641 725	3 237 480 857	20+082.650	20+086.304
19 641 725	3 237 480 857	19 610 149	3 237 455 119	20+086.304	20+124.860
19 610 149	3 237 455 119	19 602 003	3 237 459 899	20+124.860	
19 584 936	3 237 429 556	19 570 113	3 237 421 941	20+175.755	
19 570 113	3 237 421 941	19 502 336	3 237 366 481	20+175.755	20+264.211
19 502 336	3 237 366 481	19 497 801	3 237 379 127	0+005.000	0+018.584
19 499 691	3 237 344 895	19 456 865	3 237 336 037	20+300.000	20+320.000
19 475 375	3 237 339 795	19 425 867	3 237 265 784	20+300.000	20+367.847
19 425 867	3 237 265 784	19 418 105	3 237 257 015	20+367.847	20+400.000
19 424 843	3 237 254 929	19 423 394	3 237 256 082	20+400.000	
19 423 394	3 237 256 082	19 413 843	3 237 246 395	20+400.000	20+410.799
19 373 739	3 237 126 900	19 378 483	3 237 123 095	20+533.371	20+536.596
19 378 483	3 237 123 095	19 378 347	3 237 103 840	20+536.596	20+554.933
19 378 347	3 237 103 840	19 371 831	3 237 103 536	20+554.933	
19 378 347	3 237 103 840	19 378 008	3 237 062 042	20+554.933	20+594.998
19 378 008	3 237 062 042	19 375 152	3 237 039 028	20+594.998	20+618.438
19 377 597	3 237 020 557	19 386 168	3 237 022 300	20+635.279	
19 386 168	3 237 022 300	19 398 581	3 236 948 905	20+635.279	20709.719

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED					
START CO-ORDINATES	END CO-ORDINATES	CHAINAGE	START	END	
21 084 499	3 238 013 487	0+010.000			
20 096 871	3 237 588 481	19+621.210			
19 421 713	3 236 787 981	20+871.625			

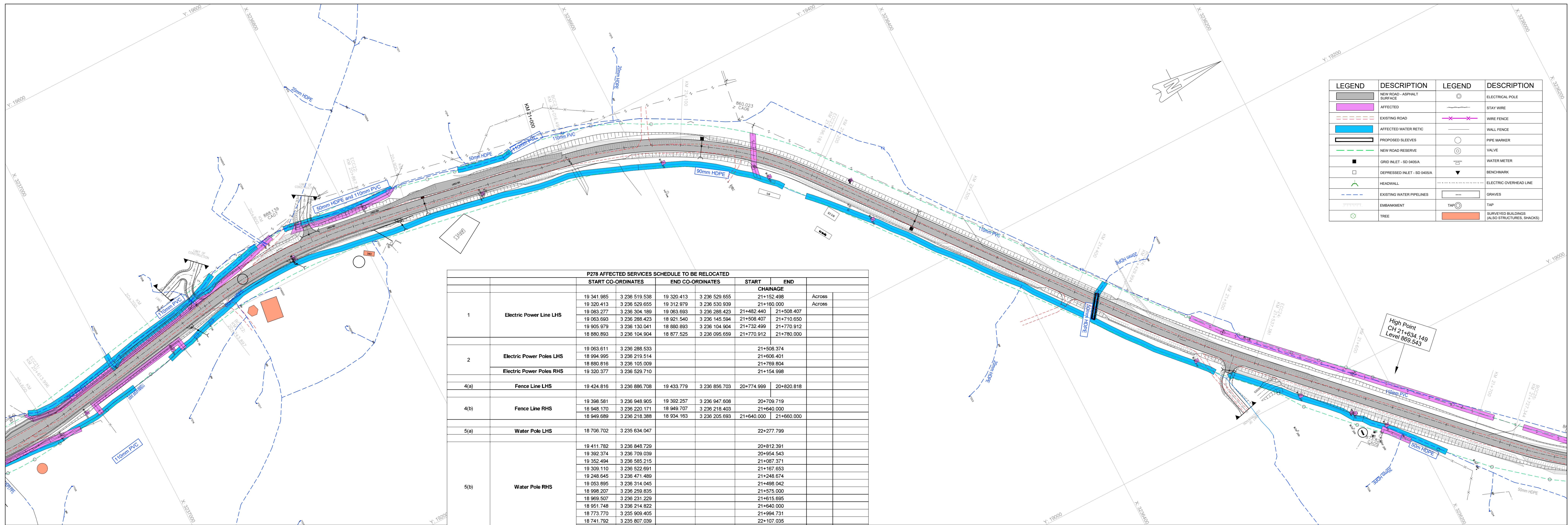
  

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED					
START CO-ORDINATES	END CO-ORDINATES	CHAINAGE	START	END	
7	KIM PNT LHS	19 502 308	3 237 348 157	20+277.178	
9	Manhole RHS	20 002 817	3 237 577 344	19+713.946	
10(a)	Valve LHS	20 524 258	3 237 768 103	19+157.285	
10(b)	Valve RHS	20 083 580	3 237 606 924	19+627.107	
12(a)	Tap LHS	19 658 945	3 237 468 091	20+076.632	
13	Air Valve	21 327 841	3 238 205 727	18+227.919	
14(a)	Water Pipeline LHS	20 933 224	3 237 880 409	20 855 653	3 237 850 551
		20 885 456	3 237 786 066	20 578 346	3 237 808 239
		20 085 285	3 237 579 900	20 073 969	3 237 586 721
		20 073 969	3 237 584 721	20 073 472	3 237 585 743
		20 083 915	3 237 579 332	20 072 398	3 237 584 964
		20 072 398	3 237 584 964	20 068 794	3 237 594 980

LEGEND	DESCRIPTION	LEGEND	DESCRIPTION
	NEW ROAD - ASPHALT SURFACE		ELECTRICAL POLE
	AFFECTED ROAD		STAY WIRE
	EXISTING ROAD		WIRE FENCE
	AFFECTED WATER RETC		WALL FENCE
	PROPOSED SLEEVES		PIPE MANNER
	NEW ROAD RESERVE		VALVE
	GRID INLET - SD DASSA		WATER METER
	DEPRESSED INLET - SD DASSA		BENCHMARK
	HEADWALL		ELECTRIC OVERHEAD LINE
	EXISTING WATER PIPELINES		GRAVES
	EMBANKMENT		TAP
	TREE		SURVIVED BUILDINGS (ALSO STRUCTURES, SHACKS)

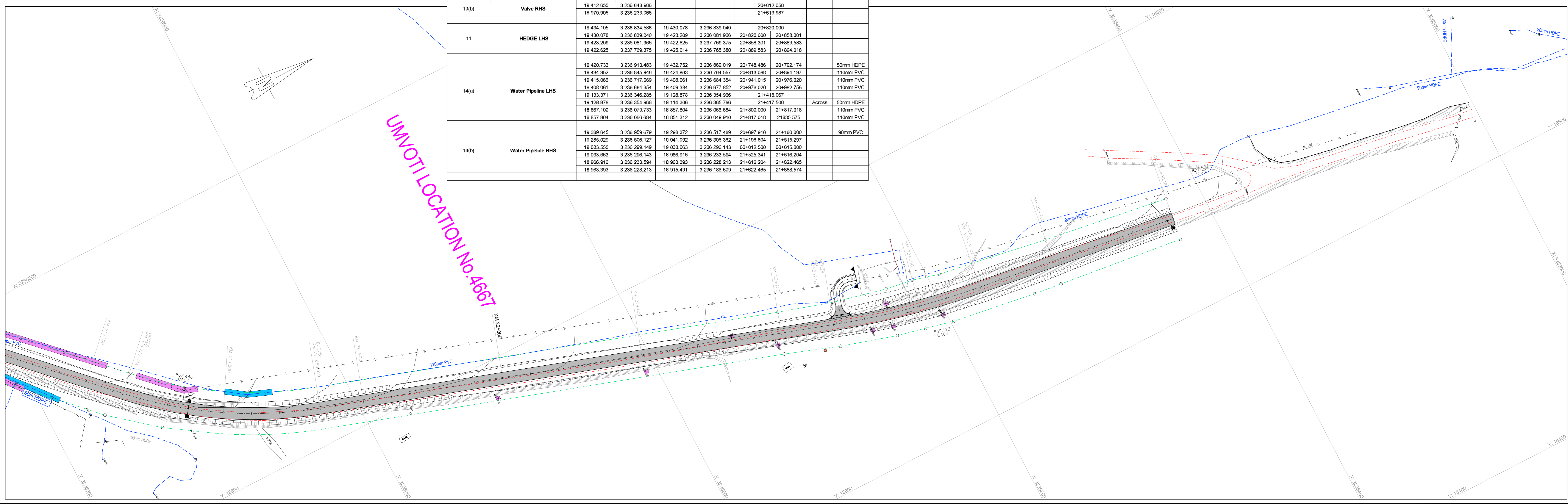
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LEGEND	DESCRIPTION	LEGEND	DESCRIPTION
	NEW ROAD - ASPHALT SURFACE		ELECTRICAL POLE
	AFFECTED		STAY WIRE
	EXISTING ROAD		WIRE FENCE
	AFFECTED WATER RETIC		WALL FENCE
	PROPOSED SLEEVES		PIPE MARKER
	NEW ROAD RESERVE		VALVE
	GRID INLET - 50 040/A		WATER METER
	DEPRESSED INLET - 50 040/A		BENCHMARK
	HEADWALL		ELECTRIC OVERHEAD LINE
	EXISTING WATER PIPELINES		GRAVES
	EMBANKMENT		TAP
	TREE		EXISTING BUILDINGS (ALSO STRUCTURES, SHACKS)

P278 AFFECTED SERVICES SCHEDULE TO BE RELOCATED						
		START CO-ORDINATES	END CO-ORDINATES	START	END	
1	Electric Power Line LHS	19 341 985	3 236 519 538	19 320 413	3 236 529 855	21+152.498
		19 320 413	3 236 529 855	19 312 979	3 236 530 939	21+190.000
		19 063 277	3 236 304 189	19 063 693	3 236 288 423	21+482.440
		19 063 693	3 236 288 423	18 921 540	3 236 145 594	21+508.407
		19 005 979	3 236 130 041	18 880 893	3 236 104 904	21+732.499
18 880 893	3 236 104 904	18 877 525	3 236 095 659	21+770.912	21+780.000	
2	Electric Power Poles LHS	19 063 611	3 236 288 533			21+508.374
		18 994 995	3 236 219 514			21+608.401
		18 880 816	3 236 105 009			21+789.804
		19 320 377	3 236 529 710			21+154.998
4(a)	Fence Line LHS	19 424 816	3 236 886 708	19 433 779	3 236 856 703	20+774.999
4(b)	Fence Line RHS	19 398 581	3 236 948 905	19 392 257	3 236 947 608	20+709.719
18 948 170	3 236 220 171	18 949 707	3 236 218 403			21+640.000
18 948 689	3 236 218 388	18 934 163	3 236 205 693	21+640.000	21+660.000	
5(a)	Water Pole LHS	18 706 702	3 235 634 047			22+277.799
5(b)	Water Pole RHS	19 411 782	3 236 848 729			20+812.391
		19 392 374	3 236 709 039			20+954.543
		19 352 494	3 236 585 215			21+087.371
		19 309 110	3 236 522 691			21+187.653
		19 248 645	3 236 471 489			21+248.674
		19 053 895	3 236 314 045			21+498.042
		18 998 207	3 236 259 835			21+575.000
		18 969 507	3 236 231 229			21+615.695
		18 951 748	3 236 214 822			21+640.000
		18 773 770	3 235 909 405			21+994.731
18 741 792	3 235 807 039			22+107.035		
18 716 008	3 235 715 297			22+197.315		
7	KM PNT LHS	19 280 602	3 236 473 323			21+222.520
18 736 895	3 235 742 347					22+165.000
10(b)	Valve RHS	19 412 650	3 236 848 886			20+812.058
18 970 905	3 236 233 096					21+613.987
11	HEDGE LHS	19 434 105	3 236 834 586	19 430 078	3 236 839 040	20+820.000
		19 430 078	3 236 838 040	19 423 209	3 236 081 966	20+820.000
		19 423 209	3 236 081 966	19 422 625	3 237 769 375	20+858.301
		19 422 625	3 237 769 375	19 425 014	3 236 765 380	20+889.583
14(a)	Water Pipeline LHS	19 420 733	3 236 913 483	19 432 752	3 236 869 019	20+748.486
		19 434 352	3 236 845 946	19 424 863	3 236 764 557	20+813.088
		19 415 066	3 236 717 069	19 408 061	3 236 684 354	20+941.915
		19 408 061	3 236 684 354	19 409 384	3 236 677 852	20+978.020
		19 133 371	3 236 346 285	19 128 878	3 236 354 966	21+415.067
		19 128 878	3 236 354 966	19 114 306	3 236 305 786	21+447.500
		18 887 100	3 236 073 733	18 857 804	3 236 066 684	21+800.000
		18 857 804	3 236 066 684	18 851 312	3 236 049 910	21+817.018
		19 389 645	3 236 959 679	19 298 372	3 236 517 489	20+697.916
		19 285 029	3 236 506 127	19 041 092	3 236 306 362	21+198.604
19 033 550	3 236 299 149	19 033 693	3 236 296 143	00+012.500		
19 033 693	3 236 296 143	18 966 916	3 236 233 584	21+525.341		
18 966 916	3 236 233 584	18 963 393	3 236 228 213	21+616.204		
18 963 393	3 236 228 213	18 915 491	3 236 186 609	21+622.465		
18 915 491	3 236 186 609	21+622.465	21+688.574			



Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 47665	Designed by:-	T. PIKA
Continued on:-		Checked by:-	Y. DOMA
Cross Section No:-		Drawn by:-	K. NAIDOO
Longitudinal Section No:-		Checked by:-	Y. DOMA
Design Plan No:-		Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 EXISTING SERVICES

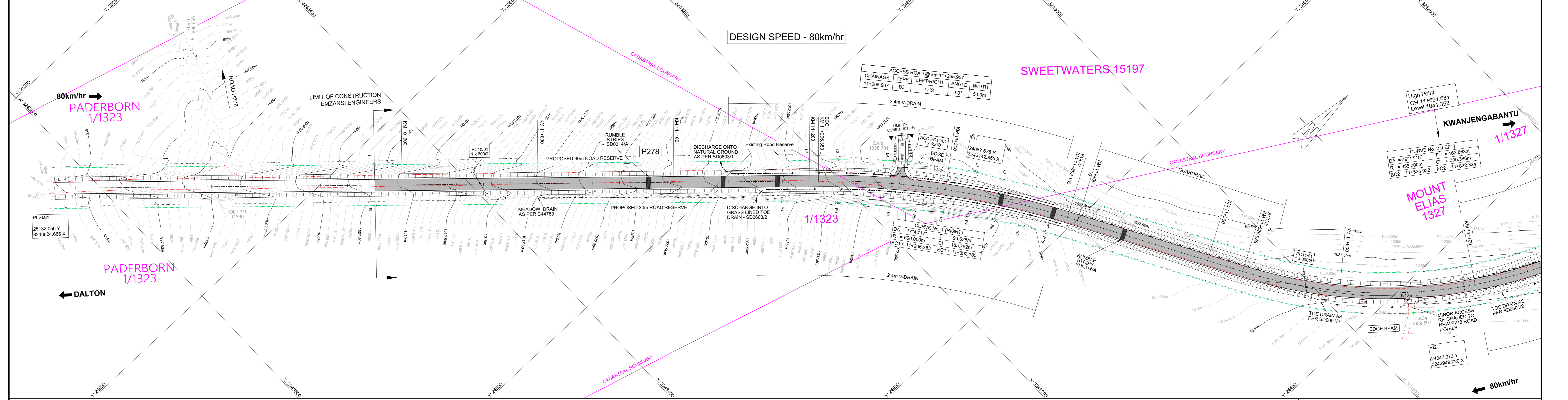
Staked km distance km 20+700 - km 21+700 km 21+700 - km 22+491	Sheet - 6 of - 6	REVISION: A
Scale <b>1: 1000</b>	Plan No - <b>C 47666</b>	

C 47666









**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	10+644.558	25 132.056	3 243 624.666	
<b>CURVE No. 1 (RIGHT)</b>				
BCC 1	11+206.383	24 751.153	3 243 211.677	R= 600.000m
PI 1	24 687.678	3 243 142.855		T= 93.625m
ECC 1	11+392.135	24 606.252	3 243 096.643	Lc= 185.752m
<b>CURVE No. 2 (LEFT)</b>				
BCC 2	11+526.938	24 489.014	3 243 030.106	R= 355.000m
PI 2	24 347.373	3 242 949.720		T= 162.863m
ECC 2	11+832.324	24 315.920	3 242 789.924	Lc= 305.386m

**ACCESS ROAD: @ 11 + 265.967 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	0+000.000	24 706.650	3 243 169.960	
BCC 1	0+019.630	24 721.570	3 243 155.180	R= 60.000m
PI 1	24 725.600	3 243 150.580		T= 11' 38' 18"
ECC 1	0+031.820	24 730.470	3 243 146.880	Lc= 6.11m
END	0+036.080	24 733.860	3 243 144.310	

**P278 ROAD RESERVE BOUNDARY CO-ORDINATES WGS 84 Lo. 31°**

CODE	LHS		RHS		
	Y	X	Y	X	
L01	24 983.506	3 243 441.478	R01	24 981.316	3 243 461.668
L02	24 766.710	3 243 206.007	R02	24 758.014	3 243 241.240
L03	24 753.118	3 243 190.856	R03	24 730.590	3 243 212.836
L04	24 724.493	3 243 161.370	R04	24 701.808	3 243 186.688
L05	24 709.352	3 243 147.482	R05	24 686.548	3 243 174.328
L06	24 676.653	3 243 122.586	R06	24 672.501	3 243 160.812
L07	24 659.004	3 243 112.012	R07	24 657.393	3 243 148.520
			R08	24 641.551	3 243 137.189
			R09	24 625.772	3 243 126.235
			R10	24 609.330	3 243 115.783

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	HWD = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
10957.793	PC1001	1 X 600 PC	750	Class C	17.9	240	1013.352	1012.969	2.2	0.014078	0.22	0.6	1.2	0.6	383	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting required
11574.811	PC1101	1 X 600 PC	750	Class C	16.4	250	1039.727	1038.547	7.2	0.002807	0.01	1.3	2.2	0.5	300	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 11+265.967 LHS	ACC PC 11/01	5.764	1 X 450 PC	NEW	750	Class C	12.718	90	1038.109	1035.719	3.1	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	Remarks	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	Remarks
11140	11254	114	Chute: SD 0603/1	7.941	SD0601/4	1.5m Concrete		←	11165	11254	89	Chute: SD 0603/1	7.941	SD0601/4	1.5m Concrete			→	
11254	11260	6		1.021	SD0601/4	1.5m Concrete		←	11254	11390	136		1.021	SD0601/4	1.5m Concrete			→	
11272	11380	108	Access Pipe Crossing	1.021	SD0601/4	1.5m Concrete		←										→	

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	Remarks					
						←	10.968	11.160	202	9.901	Meadow	Grassed	←						
						←	11.579	11.647	68	0.735	SD0601/2	Grassed	←						
						←	11.660	11.882	222	-0.450	SD0601/2	Grassed	→						

**P278 GUARDRAIL SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
km from	km to	Length (m)	Notes	km from	km to	Length (m)	Notes
11.400	11.545	145	Flared Ends				

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
Chainage	Type	Length (m)	Remarks	Chainage	Type	Length (m)	Remarks
11+265.967	Edge Beam	5.00					

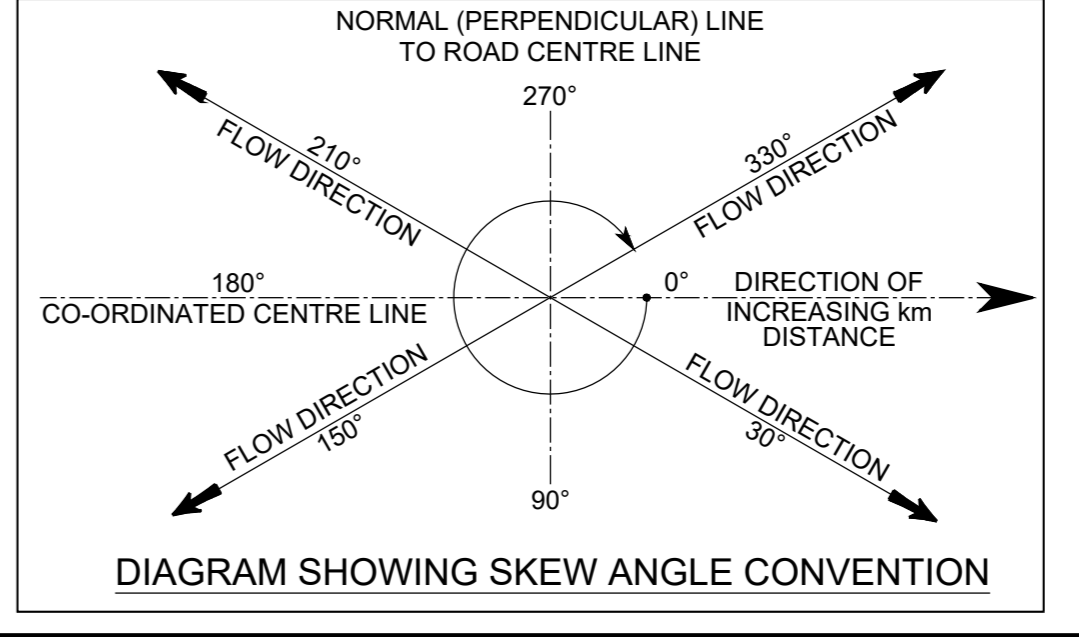
**P278 INTERSECTION SCHEDULE**

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE				REMARKS				
					REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)					
1	Acc RD 11+265.967	11+265.967	B3	80	138	143	144	195	240	198	240	195	insufficient ISDs, consider W216/217/18 signs

- GENERAL NOTES:**
- ALL LEVEL DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
  - ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
  - MIN COVER = 600mm; MIN SLOPE = 2%.
  - PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH NZS 3101 STANDARDS.
  - FOR EROSION CONTROL GABION MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERMS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASSED/CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESS ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001-3.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTM).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "COLTO SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES".
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON (WGS 84).
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR  $s = \sqrt{(0.694 \cdot 0.3 \cdot G)}$  FROM THE GEOMETRIC DESIGN GUIDELINE (G2 MANUAL) PAGE 3-16.

**LEGEND**

LEGEND	DESCRIPTION
[Symbol]	NEW ROAD SURFACE
[Symbol]	1.50m SIDEWALK - SD203/A
[Symbol]	EXISTING ROAD
[Symbol]	1.0 V-DRAIN - SD0601/2
[Symbol]	2.4 V-DRAIN - SD0601/4
[Symbol]	TOE DRAIN - SD0601/2
[Symbol]	KERB & CHANNEL - SD0701/A
[Symbol]	CATCHWATER BANK - SD0605/A
[Symbol]	GUARDRAILS - SD1101/A & SD1102/A
[Symbol]	NEW ROAD RESERVE
[Symbol]	EXISTING ROAD RESERVE
[Symbol]	GRID INLET - SD0405/A
[Symbol]	DEPRESSED INLET - SD0405/A
[Symbol]	SIDE INLET (S1) - SD0703/A
[Symbol]	SIDE INLET (D1) - SD0703/A
[Symbol]	SIDE DRAIN & GRID INLET - SD0602/B
[Symbol]	PIPE CHUTE - SD0605/1
[Symbol]	OPEN CHUTE - SD0605/2
[Symbol]	DIRECTION ARROW
[Symbol]	HEADWALL - SD0406
[Symbol]	STONE PITCH
[Symbol]	RENO MATTRESS
[Symbol]	CHUTE - SD0603/A



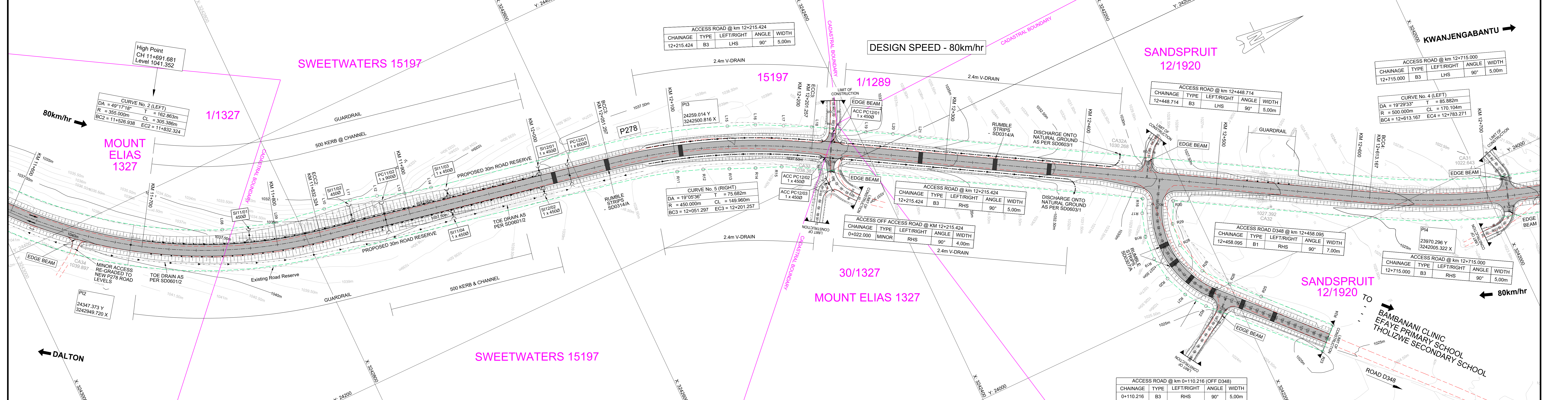
**SURVEY CONTROL POINTS CO-ORDINATE LIST - MAIN ROAD P278**

STATION	Y	X	Z	DESCRIPTION
CA34	24384.17	3242952.08	1039.897	12mm PEG IN CONCRETE
CA35	24723.71	3243161.55	1038.701	12mm PEG IN CONCRETE
CA36	25037.01	3243529.94	1001.315	12mm PEG IN CONCRETE
CA37	25142.71	3243475.48	993.958	12mm PEG IN CONCRETE

<b>AS BUILT</b>		Continued from:-	-	Designed by:-	T. PIKA		Transportation Engineer: Chief Engineer Head: Transport	<b>MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU</b>		Staked km distance	Sheet - 1	REVISION:
Supervising Engineer		Continued on:-	C 44313	Checked by:-	Y. DOMA			km 10+880 - km 11+700	of : 12	A		
Date		Cross Section No:-	C 44330, C 44331	Drawn by:-	K. NAIIDOO			Scale	Plan No.:-			
AMENDMENTS		Longitudinal Section No:-	C 44324	Checked by:-	Y. DOMA			1 : 1000	C 44312			
Supervising Authority		Design Plan No:-	C 44312	Date of approval:-								

C 44312





**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
<b>CURVE No. 2 (LEFT)</b>			
BCC 2	11+526.938	24 489.014	R = 355.000m DA = 49°17'18" T = 162.863m BC2 = 11+526.938 EC2 = 11+832.324
PI 2		24 347.373	49° 17' 18"
ECC 2	11+832.324	24 315.920	Lc = 305.386m
<b>CURVE No. 3 (RIGHT)</b>			
BCC 3	12+051.297	24 273.630	R = 450.000m DA = 19°05'36" T = 75.662m BC3 = 12+051.297 EC3 = 12+201.257
PI 3		24 259.014	19° 05' 36"
ECC 3	12+201.257	24 220.912	Lc = 149.960m
<b>CURVE No. 4 (LEFT)</b>			
BCC 4	12+613.167	24 013.534	R = 500.000m DA = 19°29'33" T = 85.882m BC4 = 12+613.167 EC4 = 12+783.271
PI 4		23 970.296	19° 29' 33"
ECC 4	12+783.271	23 954.297	Lc = 170.104m

**ACCESS ROAD: @ 12 + 215.424 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	24 213.780	3 242 423.190
BCC 1	0+007.490	24 207.310	R = 25.000m 70° 34' 18"
PI 1		24 192.020	T = 17.690m
ECC 1	0+038.280	24 178.540	
END	0+044.990	24 173.420	

**ACCESS ROAD: @ 12 + 215.424 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	24 213.780	3 242 423.190
BCC 1	0+016.130	24 229.440	R = 100.000m 06° 28' 21"
PI 1		24 234.330	T = 5.650m
ECC 1	0+029.430	24 239.510	
END	0+036.440	24 245.920	

**ACCESS ROAD: @ 12 + 448.714 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	24 096.340	3 242 221.630
BCC 1	0+018.130	24 111.950	R = 20.000m 31° 11' 56"
PI 1		24 116.750	T = 5.580m
ECC 1	0+029.020	24 119.390	
END	0+031.870	24 120.740	

**ACCESS ROAD D348 @ 12 + 458.095 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	24 091.600	3 242 213.500
BCC 1	0+017.470	24 076.520	R = 65.000m 73° 36' 57"
PI 1		24 034.550	T = 48.64m
ECC 1	0+100.990	23 999.130	
END	0+191.900	23 932.926	

**ACCESS ROAD: @ 12 + 715.000 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 971.550	3 241 986.960
BCC 1	0+011.620	23 982.580	R = 15.000m 34° 40' 44"
PI 1		23 987.030	T = 4.680m
ECC 1	0+020.700	23 991.520	
END	0+035.650	24 006.060	

**ACCESS ROAD: @ 12 + 715.000 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 971.550	3 241 986.960
BCC 1	0+008.790	23 963.210	R = 15.000m 72° 25' 30"
PI 1		23 952.780	T = 10.980m
ECC 1	0+027.750	23 952.930	
END	0+038.360	23 953.080	

**ACCESS ROAD: @ 00 + 110.216 - RHS (OFF D348)**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 991.640	3 242 206.520
BCC 1	0+007.150	23 986.740	R = 50.000m 11° 19' 18"
PI 1		23 983.350	T = 4.96m
ECC 1	0+017.030	23 980.730	
END	0+052.080	23 962.220	

**P278 ROAD RESERVE BOUNDARY CO-ORDINATES WGS 84 Lo. 31°**

CODE	LHS		RHS		
	Y	X	Y	X	
L08	24 350.892	3 242 853.330	R11	24 247.343	3 242 532.387
L09	24 339.147	3 242 816.937	R12	24 240.714	3 242 514.381
L10	24 332.871	3 242 778.956	R13	24 232.981	3 242 496.691
L11	24 330.488	3 242 759.402	R14	24 225.262	3 242 479.633
L12	24 325.028	3 242 739.733	R15	24 217.954	3 242 461.117
L13	24 318.289	3 242 720.676	R16	24 083.864	3 242 230.862
L14	24 313.741	3 242 701.187	R17	24 074.220	3 242 235.761
L15	24 261.996	3 242 484.728	R18	24 057.524	3 242 241.009
L16	24 254.214	3 242 465.562	R19	24 040.056	3 242 242.081
L17	24 244.762	3 242 447.152	R20	24 022.772	3 242 239.345
L18	24 235.220	3 242 428.829	R21	24 006.649	3 242 232.539
L19	24 214.634	3 242 394.445	R22	23 992.368	3 242 222.366
L20	24 205.039	3 242 376.902	R23	23 925.726	3 242 158.888
L21	24 194.320	3 242 359.987	R24	23 940.141	3 242 143.628
R25	23 981.546	3 242 182.600			
R26	23 999.760	3 242 199.743			
R27	24 017.112	3 242 213.817			
R28	24 041.081	3 242 220.669			
R29	24 057.690	3 242 218.903			
R30	24 072.868	3 242 211.149			

- GENERAL NOTES:**
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
  - ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY UNLESS SHOWN OTHERWISE.
  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN. MIN COVER = 600mm MIN SLOPE = 2%.
  - PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHED, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS < 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0401 OR SD 0407. BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KZN DOT STANDARDS.
  - FOR EROSION CONTROL, GABION MATRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERMERS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASSSED CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINED V-DRAINS AS PER SD 0601/4 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESSSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAILYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0302 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 13.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "COLT" SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON (WGS 84).
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR:  $s = \sqrt{(0.694 \cdot 0.004 \cdot \dots)}$  FROM THE GEOMETRIC DESIGN GUIDELINE (S2 MANUAL) PAGE 3-16.

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR NO	VELOCITY (m/s)	HWD = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
11882	PC11/02	1 X 600 PC	75D	Class_C	21.0	270	1037.142	1034.999	10.2	0.0392	0.45	1.5	3.4	0.6	521	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting and Reno Matress.
12021	PC12/01	1 X 600 PC	75D	Class_C	16.0	270	1037.379	1037.063	2.0	0.0040	0.06	6.5	11.3	0.5	307	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	ACCESS LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 12+215.424 LHS	ACC PC 12/01	5.954	1 X 450 PC	NEW	75D	Class_C	13.615	90	1036.289	1035.932	2.6	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	
ACCESS @ 12+215.424 RHS	ACC PC 12/02	5.950	1 X 450 PC	NEW	75D	Class_C	12.853	90	1036.138	1035.804	2.6	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	
ACCESS OFF 12+215.424 @ 00+022.000 RHS	ACC PC 12/03	5.950	1 X 450 PC	NEW	75D	Class_C	13.118	100	1036.837	1036.511	2.5	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	

**P278 ROAD SIDE DRAINAGE SCHEDULE**

CHAINAGE	ID	PIPE SIZE	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
11780.000	SI11/01	1 X 450	75D	Class_C	6.7	270	1039.632	1038.493	47.1	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno matress
11858.276	SI11/02	1 X 450	75D	Class_C	12.1	270	1039.681	1033.143	53.7	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno matress
11930.558 (LHS)	SI11/03	1 X 450	75D	Class_C	5.4	270	1038.947	1038.438	46.5	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno matress
11930.558 (RHS)	SI11/04	1 X 450	75D	Class_C	3.4	270	1038.947	1037.656	37.6	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno matress
12000.000 (LHS)	SI12/01	1 X 450	75D	Class_C	3.0	270	1038.360	1037.440	31.0	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno matress
12000.000 (RHS)	SI12/02	1 X 450	75D	Class_C	2.4	270	1038.363	1037.440	38.0	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno matress

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	Remarks	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	Remarks
12060	12192	132		-1.000	SD0601/4	1.5m Concrete		→		12060	12192	132		-1.000	SD0601/4	1.5m Concrete		→	
12192	12209	17	Access Pipe Crossing	-2.712	SD0601/4	1.5m Concrete		→		12192	12209	17	Access Pipe Crossing	-2.712	SD0601/4	1.5m Concrete		→	
12222	12424	202	Chute: SD 0603/1	-2.712	SD0601/4	1.5m Concrete		→		12222	12395	17	Chute: SD 0603/1	-2.712	SD0601/4	1.5m Concrete		→	

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE								
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction
						→	11.660	11.882	222	-0.450	SD0601/2	Grassed	←
						→	11.882	11.970	88	0.795	SD0601/2	Grassed	←
						→	11.970	12.021	51	-0.588	SD0601/2	Grassed	←
						→	12.021	12.075	54	0.741	SD0601/2	Grassed	←

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE			RIGHT HAND SIDE		
Chainage	Type	Length (m)	Chainage	Type	Length (m)
12+215.424	Edge Beam	5.00	12+215.424	Edge Beam	5.00
12+448.714	Edge Beam	5.00	0+100.216 (OFF D348)	Edge Beam	5.00

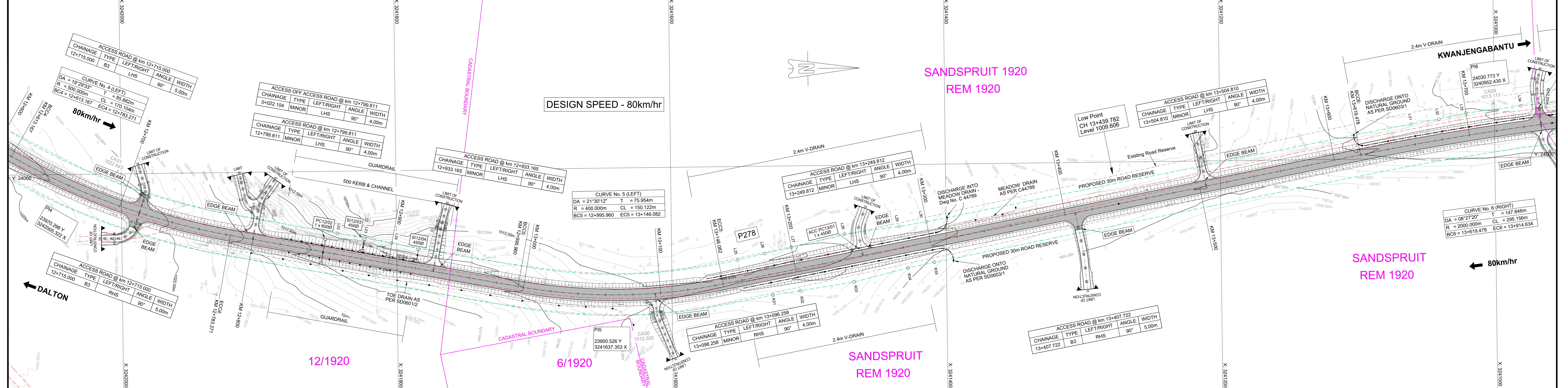
**P278 GUARDRAIL SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE				
km from	km to	Length (m)	Notes	Remarks	km from	km to	Length (m)	Notes	Remarks
11.700	12.000	300	Flared Ends		11.700	11.980	280	Flared Ends	
12.520	12.555	35	Flared Ends						

**P278 INTERSECTION SCHEDULE**

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE				RIGHT HAND SIDE SIGHT DISTANCES BASED ON GRADE				REMARKS
					REQD SSD (m)	AVAIL SSD LHS (m)	REQD SSD (m)	AVAIL SSD RHS (m)	REQD SSD (m)				





Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
<b>CURVE No. 4 (LEFT)</b>			
BCC 4	12+113.167	24 013.534	3 242 079.526 R= 500.000m
PI 4		23 970.296	3 242 005.322 T= 85.882m
ECC 4	12+783.271	23 954.297	3 241 920.943 Lc= 170.104m
<b>CURVE No. 5 (LEFT)</b>			
BCC 5	12+995.960	23 914.675	3 241 711.978 R= 400.000m
PI 5		23 900.526	3 241 637.353 T= 75.954m
ECC 5	13+146.082	23 914.715	3 241 562.736 Lc= 150.122m
<b>CURVE No. 6 (RIGHT)</b>			
BCC 6	13+619.478	24 003.153	3 241 097.674 R= 2000.000m
PI 6		24 030.773	3 240 952.430 T= 147.846m
ECC 6	13+914.634	24 036.736	3 240 804.704 Lc= 295.156m

**ACCESS ROAD: @ 12 + 715.000 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 971.550	3 241 986.960
BCC 1	0+011.620	23 962.580	3 241 983.300 R= 15.000m
PI 1		23 967.030	3 241 981.830 T= 34° 40' 44"
ECC 1	0+020.700	23 991.520	3 241 983.140 T= 4.680m
END	0+035.850	24 006.060	3 241 987.400

**ACCESS ROAD: @ 12 + 715.000 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 971.550	3 241 986.960
BCC 1	0+008.790	23 963.210	3 241 989.720 R= 15.000m
PI 1		23 952.780	3 241 993.180 T= 72° 25' 30"
ECC 1	0+027.750	23 952.052	3 242 004.160 T= 10.960m
END	0+038.360	23 953.080	3 242 014.770

**ACCESS ROAD: @ 12 + 799.811 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 951.220	3 241 904.690
BCC 1	0+024.690	23 975.410	3 241 899.770 R= 20.000m
PI 1		23 979.700	3 241 898.900 T= 24° 41' 35"
ECC 1	0+033.310	23 983.230	3 241 896.310 T= 4.380m
END	0+047.380	23 994.590	3 241 888.000

**ACCESS OF ACCESS ROAD: @ 12 + 799.811 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 972.890	3 241 800.290
BCC 1	0+003.200	23 973.520	3 241 803.420 R= 8.000m
PI 1		23 974.570	3 241 808.530 T= 66° 09' 35"
ECC 1	0+012.440	23 979.660	3 241 809.630 T= 5.21m
END	0+031.780	23 988.560	3 241 813.740

**ACCESS ROAD: @ 12 + 933.165 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 926.370	3 241 773.670
BCC 1	0+031.010	23 956.840	3 241 767.860 R= 50.000m
PI 1		23 958.650	3 241 767.480 T= 4° 41' 23"
ECC 1	0+035.110	23 960.820	3 241 766.930 T= 2.050m
END	0+049.820	23 975.010	3 241 763.010

**ACCESS ROAD: @ 13 + 096.258 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 908.480	3 241 612.130
BCC 1	0+012.520	23 895.990	3 241 611.340 R= 20.000m
PI 1		23 892.740	3 241 611.130 T= 18° 29' 31"
ECC 1	0+018.970	23 889.730	3 241 609.900 T= 3.260m
END	0+049.630	23 861.330	3 241 598.340

**ACCESS ROAD: @ 13 + 249.812 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 934.090	3 241 460.830
BCC 1	0+014.350	23 948.190	3 241 463.520 R= 20.000m
PI 1		23 953.740	3 241 464.570 T= 31° 32' 35"
ECC 1	0+025.360	23 959.020	3 241 462.570 T= 5.650m
END	0+035.500	23 968.500	3 241 458.970

**ACCESS OF ACCESS ROAD: @ 13 + 407.722 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 963.560	3 241 305.890
BCC 1	0+027.950	23 936.140	3 241 300.420 R= 60.000m
PI 1		23 932.850	3 241 299.760 T= 6° 24' 33"
ECC 1	0+034.670	23 929.500	3 241 299.480 T= 3.360m
END	0+056.560	23 907.690	3 241 297.620

**ACCESS OF ACCESS ROAD: @ 13 + 504.810 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	
START	0+000.000	23 981.730	3 241 210.320
END	0+039.470	24 020.520	3 241 217.590

**P278 ROAD RESERVE BOUNDARY CO-ORDINATES WGS 84 Lo. 31°**

CODE	LHS		RHS		
	Y	X	Y	X	
L22	23 954.776	3 241 842.949	R21	23 906.306	3 241 526.611
L23	23 951.916	3 241 823.135	R32	23 909.099	3 241 506.784
L24	23 947.324	3 241 803.649	R33	23 915.126	3 241 467.213
L25	23 932.052	3 241 551.865	R34	23 924.834	3 241 428.072
L26	23 936.401	3 241 532.334	R35	23 928.734	3 241 408.725
L27	23 940.750	3 241 512.802			
L28	23 950.140	3 241 473.971			
L29	23 955.012	3 241 434.081			
L30	23 958.206	3 241 414.330			
L31	24 025.122	3 241 060.223			
L32	24 028.440	3 241 040.421			
L33	24 032.599	3 241 020.668			
L34	24 037.367	3 240 960.628			

**GENERAL NOTES:**

- ALL LEVEL DIMENSIONS AND SETTINGS OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
- ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
- EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
- CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
- MIN COVER = 600mm MIN SLOPE = 2%
- PIPE CULVERTS ARE TO BE LAD IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406, MIN DIA = 450mm FOR MINOR ACCESS ROADS.
- BOX CULVERTS < 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407, BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH K2M D1 STANDARDS.
- FOR EROSION CONTROL, GABION MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
- EARTH BERM ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
- ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
- GRAVEL/CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
- SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
- KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
- WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
- THE POSITIONS OF ACCESSSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
- GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
- EXISTING ROAD SIGNS, SERVICES AND FENCINGS AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
- UNDERGROUND SERVICE CROSSINGS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
- ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTM3).
- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "COLTO SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES".
- ALL SURVEY AND SETTING OUT DATA PROVIDED ON (WGS 84)
- NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
- THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR  $s = \sqrt{0.694 \cdot 0.004 \cdot \dots}$  FROM THE GEOMETRIC DESIGN GUIDELINE (G2 MANUAL) PAGE 9-16.

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	HwD = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
12852	PI12/02	1 X 600 PC	75D	Class_C	16.4	270	1017.424	1016.690	4.5	0.0270	0.31	0.8	1.7	0.8	470	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 13+249.812 LHS	ACC PC 13/01	5.950	1 X 450 PC	NEW	75D	Class_C	11.634	90	1010.021	1009.752	2.3	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406

**P278 SIDE INLET SCHEDULE**

CHAINAGE	ID	PIPE SIZE	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
12880.000	SI12/03	1 X 450	75D	Class_C	7.4	270	1017.463	1014.051	46.3	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno mattress
12820.000	SI12/04	1 X 450	75D	Class_C	3.2	270	1018.462	1015.150	40.7	Side Inlet (S1) (SD 0702/A)	Pipe Culvert Headwall (SD 0406)	Reno mattress

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow direction	Remarks	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow direction	Remarks
13135	13245	110	Access Pipe Crossing	-2.712	SD0601/4	1.5m Concrete		→		13160	13308	148		-2.712	SD0601/4	1.5m Concrete		→	
13255	13308	53	Chute: SD 0603/1	-2.712	SD0601/4	1.5m Concrete		→		13308	13310	2	Chute: SD 0603/1	1.054	SD0601/4	1.5m Concrete		→	
13308	13310	2	Chute: SD 0603/1	1.054	SD0601/4	1.5m Concrete		→											
13620	13746	126	Chute: SD 0603/1	1.054	SD0601/4	1.5m Concrete		→											

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE								
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction
12.780	12.852	72	-11.806	SD0601/2	Grassed	→	12.852	13.060	208	-1.923	SD0601/2	Grassed	→
13.315	13.365	50	-2.000	Meadow	Grassed	→							

**P278 GUARDRAIL SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
km from	km to	Length (m)	Notes	km from	km to	Length (m)	Notes
12.820	12.925	105	Flared Ends	12.820	12.920	100	Flared Ends

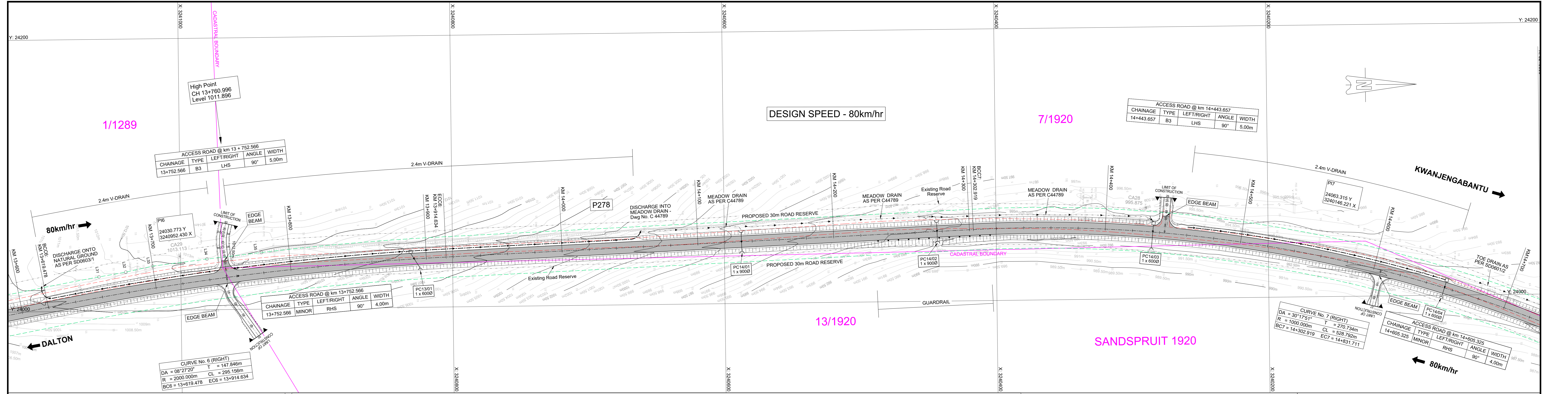
**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE			RIGHT HAND SIDE		
Chainage	Type	Length (m)	Chainage	Type	Length (m)
12+715.000	Edge Beam	5.00	12+715.000	Edge Beam	5.00
12+799.811	Edge Beam	20.00			
12+933.165	Edge Beam	20.00			
13+249.812	Edge Beam	20.00	13+096.258	Edge Beam	20.00
13+504.810	Edge Beam	20.00	13+407.722	Edge Beam	5.00

**P278 KERB CHANNEL DRAINS SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE				
From km	To km	Length (m)	Flow direction	Outlet details	From km	To km	Length (m)	Flow direction	Outlet details
12.820									





**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	R=
CURVE No. 6 (RIGHT)			
BCC 6	13+619.478	24 003.153	3 241 007.674
PI 6		24 030.773	3 240 952.430
ECC 6	13+914.634	24 036.736	3 240 804.704
CURVE No. 7 (RIGHT)			
BCC 7	14+302.919	24 052.396	3 240 416.735
PI 7		24 063.315	3 240 146.221
ECC 7	14+631.711	23 936.271	3 239 907.146

**ACCESS ROAD: @ 13 + 752.566 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	R=
START	0+000.000	24 023.650	3 240 966.200
BCC 1	0+023.550	24 047.060	3 240 968.720
PI 1		24 062.320	3 240 969.280
ECC 1	0+034.020	24 057.450	3 240 968.020
END	0+039.930	24 063.190	3 240 966.600

**ACCESS ROAD: @ 13 + 752.566 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	R=
START	0+000.000	24 023.650	3 240 966.200
BCC 1	0+007.430	24 016.260	3 240 965.400
PI 1		24 011.160	3 240 964.850
ECC 1	0+017.460	24 006.960	3 240 961.920
END	0+049.880	23 980.360	3 240 943.380

**ACCESS ROAD: @ 14 + 443.657 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	R=
START	0+000.000	24 048.170	3 240 276.180
END	0+026.120	24 074.170	3 240 273.680

**ACCESS ROAD: @ 14 + 605.325 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data
		Y X	R=
START	0+000.000	24 019.070	3 240 117.330
END	0+026.890	23 993.030	3 240 124.030

**P278 ROAD RESERVE BOUNDARY**  
CO-ORDINATES WGS 84 Lo. 31°

CODE	LHS	Y	X	CODE	RHS	Y	X
L31		24 025.122	3 241 060.223				
L32		24 028.440	3 241 040.421				
L33		24 032.599	3 241 020.668				
L34		24 037.367	3 240 980.628				
L35		24 041.698	3 240 940.596				

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km <sup>2</sup> )	DESIGN Q (m <sup>3</sup> /s)	FR No	VELOCITY (m/s)	Hw/D = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
13892	PC13/01	1 X 600 PC	75D	Class. C	16.0	60	1008.176	1007.827	2.2	0.0107	0.16	0.6	1.2	0.6	348	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
14132	PC14/01	1 X 900 PC	75D	Class. C	15.5	90	998.770	998.420	2.3	0.0380	0.58	0.7	1.6	0.6	568	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting required
14277	PC14/02	1 X 900 PC	75D	Class. C	17.1	90	994.302	992.094	13.0	0.0660	0.96	1.4	3.8	0.9	773	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting and Reno Mattress
14435	PC14/03	1 X 600 PC	75D	Class. C	14.3	90	992.778	992.467	2.2	0.0207	0.32	0.5	1.2	0.8	477	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
14655	PC14/04	1 X 600 PC	75D	Class. C	14.3	90	990.279	989.970	2.2	0.0068	0.10	0.7	1.5	0.5	454	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE										
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		
13620	13746	126	Chute: SD 0603/1	1.054	SD0601/4	1.5m Concrete		←		13759	13814	56	Grid Inlet: SD 0602/B	-3.828	SD0601/4	1.5m Concrete		→		
13814	13899	76	Grid Inlet: SD 0602/B	-3.828	SD0601/4	1.5m Concrete		→		13899	14055	166	Chute: SD 0603/1	-3.828	SD0601/4	1.5m Concrete		→		
14460	14655	195	Grid Inlet: SD 0602/B	-1.000	SD0601/4	1.5m Concrete		→												

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction		From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction					
14.056	14.132	76	-5.263	Meadow	Grassed	→													
14.132	14.276	144	-3.819	Meadow	Grassed	→													
14.276	14.450	174	-0.287	Meadow	Grassed	→													
14.660	14.847	187	-0.535	SD0601/2		→													

**P278 GUARDRAIL SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE				
km from	km to	Length (m)	Notes		km from	km to	Length (m)	Notes	
					14.230	14.315	85	Flared Ends	

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE			RIGHT HAND SIDE		
Chainage	Type	Length (m)	Chainage	Type	Length (m)
13+752.566	Edge Beam	5.00	13+752.566	Edge Beam	21.00
14+443.657	Edge Beam	5.00	14+605.325	Edge Beam	20.00

**P278 INTERSECTION SCHEDULE**  
LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD LHS (m)	AVAIL ISD LHS (m)	REQD ISD RHS (m)	AVAIL ISD RHS (m)	REMARKS
5	Acc RD 13+752.566	13+752.566	B3	80	138	488	144	153	240	337	240	215	ok
6	Acc RD 14+443.657	14+443.657	B3	80	144	660	138	306	240	384	240	348	ok

**GENERAL NOTES:**

- ALL LEVEL DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
- ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
- EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
- CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
- MIN COVER = 600mm MIN SLOPE = 2%.
- PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
- BOX CULVERTS < 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KZN D&T STANDARDS.
- FOR EROSION CONTROL GABION MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
- EARTH BERMS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
- ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 3m VERTICAL DROP.
- GRASSED/CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/6 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
- SUBSOIL DRAINS AS PER SD 0601 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
- KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
- WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
- THE POSITIONS OF ACCESSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESS SERVING SINGLE RESIDENTIAL PROPERTIES.
- GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
- EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
- UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
- ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "COLTO" SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
- ALL SURVEY AND SETTING OUT DATA PROVIDED ON RWGS 84.
- NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
- THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR:  $s = 0.024 \sqrt{0.024 \cdot G}$  FROM THE GEOMETRIC DESIGN GUIDELINE (G2 MANUAL) PAGE 3-16.  $s = 0.024 \sqrt{0.024 \cdot G}$



**AS BUILT**

Supervising Engineer	Date	Continued from:-	C 44314	Designed by:-	T. PIKA
		Continued on:-	C 44316	Checked by:-	Y. DOMA
		Cross Section No:-	C 44334, C 44335	Drawn by:-	K. NAIIDOO
		Longitudinal Section No:-	C 44325, C 44326	Checked by:-	Y. DOMA
		Design Plan No:-	C 44315	Date of approval:-	

**AMENDMENTS**

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

**KWAZULU-NATAL PROVINCE**  
TRANSPORT  
REPUBLIC OF SOUTH AFRICA

**emzansi**  
ENGINEERS (PTY) LTD  
Providing Unbiased Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

01-02-2024  
Date

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

DESIGN PLAN

Staked km distance: km 13+700 - km 14+700

Sheet: 4 of 12

Scale: 1:1000

Plan No: C 44315

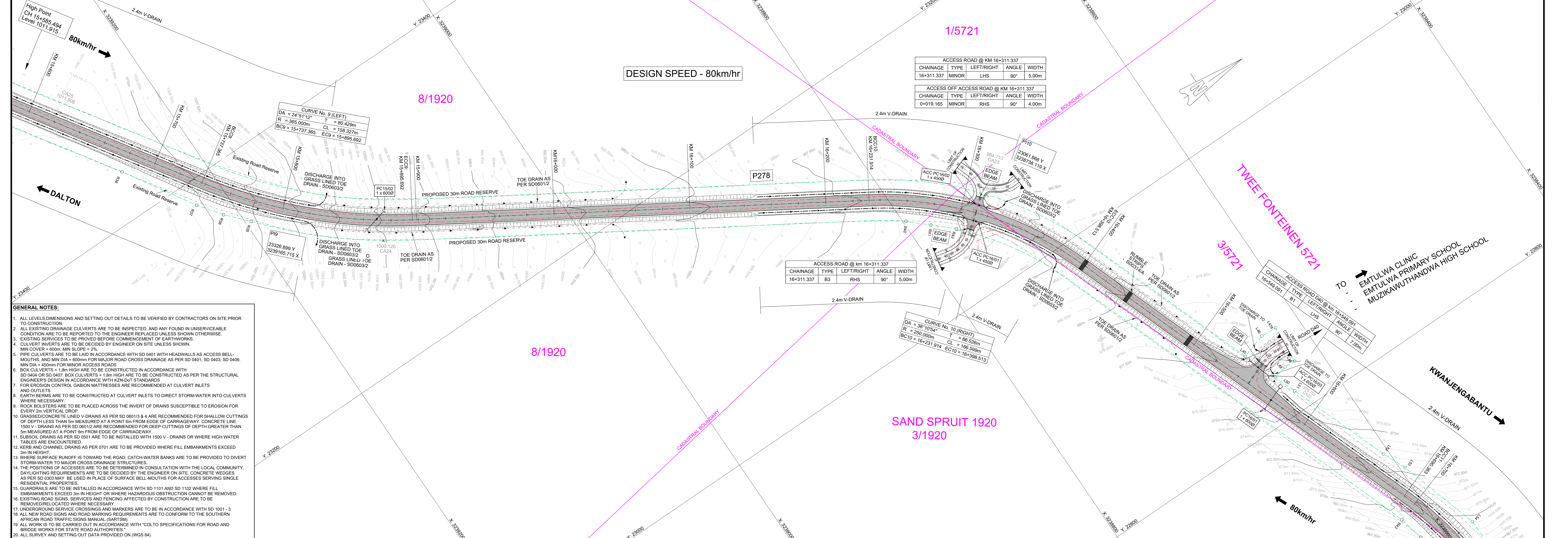
REVISION: A

C 44315









- GENERAL NOTES:**
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
  - ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPAIRED UNLESS SHOWN OTHERWISE.
  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
  - MIN COVER = 600mm, MIN SLOPE = 2%.
  - PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS < 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH IZM-DOT STANDARDS.
  - FOR EROSION CONTROL, GABION MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERMS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASS/CONCRETE LINED V-DRAINS AS PER SD 0601/2 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0601 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (GAT708).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH 'COLTO' SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON DWGS 84).
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSDS WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR  $s = v(0,094 + 0,3 \pm G)$

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	Hw/D = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
15869	PC1502	1 X 600 PC	75D	Class_C	20.3	310	1000.487	996.757	8.3	0.0089	0.14	1.3	2.3	0.6	333	Pipe Culvert Headwall (SD 0406)	Pipe Culvert Headwall (SD 0406)	Daylighting required
16549	PC1601	1 X 600 PC	75D	Class_C	19.8	90	975.177	974.709	2.4	0.0300	0.46	0.7	1.6	0.6	524	1/5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 16+311.337 RHS	ACC PC 16/01	5.816	1 X 450 PC	NEW	75D	Class_C	13.568	90	983.649	983.250	2.9	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	Daylighting required
ACCESS @ 16+311.337 LHS	ACC PC 16/02	5.816	1 X 450 PC	NEW	75D	Class_C	12.884	90	984.128	983.788	2.6	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	Daylighting required
ACCESS @ 16+549.091 (D40) LHS	ACC PC 16/03	13.813	1 X 600 PC	NEW	75D	Class_C	11.580	94	978.784	978.244	4.7	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	Daylighting required

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE						RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Subsoil Drain	Flow Direction
15647	15625	178	Chute: SD 0603/1	-6.678	SD0601/4	1.5m Concrete	→	15647	15620	173	Chute: SD 0603/1	-6.878	SD0601/4	1.5m Concrete	→
16150	16395	155	Access Pipe Crossing	-2.980	SD0601/4	1.5m Concrete	→	16150	16304	154	Access Pipe Crossing	-2.980	SD0601/4	1.5m Concrete	→
16317	16325	8	Chute: SD 0603/1	-2.980	SD0601/4	1.5m Concrete	→	16318	16380	62	Chute: SD 0603/1	-2.980	SD0601/4	1.5m Concrete	→
16575	16638	63	Chute: SD 0603/1	-7.762	SD0601/4	1.5m Concrete	→	16685	16847	162	Grid Inlet: SD 0602/B	-7.762	SD0601/4	1.5m Concrete	→

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE						RIGHT HAND SIDE							
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	
15.830	15.875	45	-5.556	SD0601/2	Grassed	→	15.625	15.863	38	-7.805	SD0601/2	Grassed	→
15.875	15.920	45	-16.867	SD0601/2	Grassed	→	15.863	16.040	177	-4.915	SD0601/2	Grassed	→
16.400	16.537	137	-4.380	SD0601/2	Grassed	→	16.381	16.440	59	-6.356	SD0601/2	Grassed	→
16.560	16.570	10	-5.000	SD0601/2	Grassed	→							

**P278 INTERSECTION SCHEDULE**

LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE											
Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD LHS (m)	AVAIL ISD LHS (m)	REMARKS
8	Acc RD 16+311.337	16+311.337	B3	80	150	444	133	313	240	526	240 330
9	Acc RD 16+549.091 @ D40	16+549.091	B1	80	150	273	133	198	240	261	240 213 ok

**P278 INTERSECTION SCHEDULE**

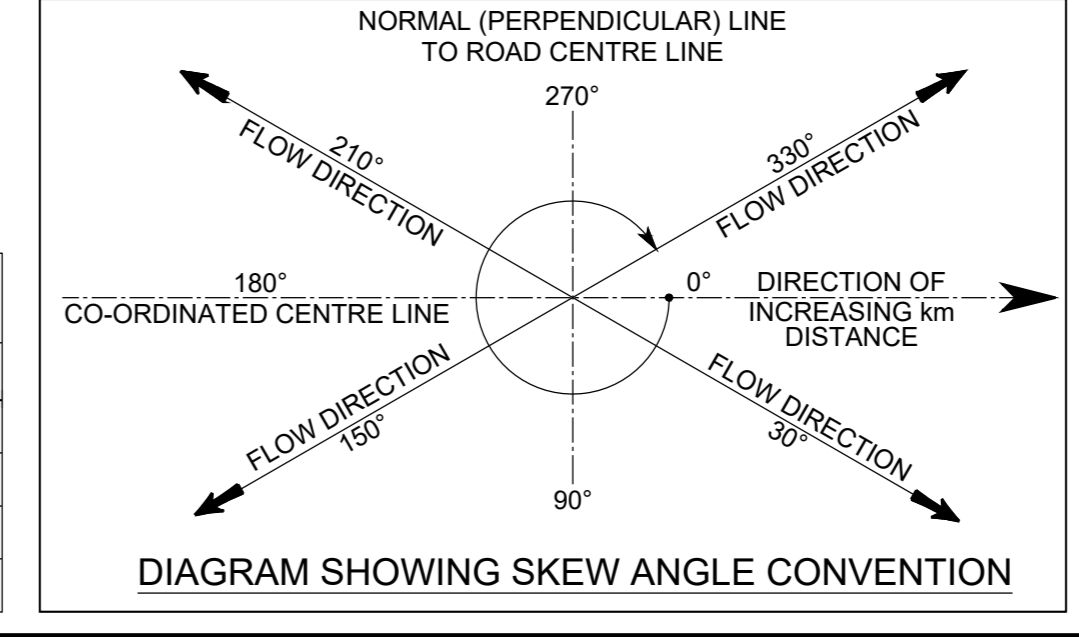
RIGHT HAND SIDE SIGHT DISTANCES BASED ON GRADE											
Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD LHS (m)	AVAIL ISD LHS (m)	REMARKS
5	Acc RD 16+311.337	16+311.337	B3	80	134	400	149	283	240	244	240 213 proposed rumble strips plus concealed signs must be installed

**P278 ROAD RESERVE BOUNDARY**

CO-ORDINATES WGS 84 Lo. 31°					
LHS			RHS		
CODE	Y	X	CODE	Y	X
L45	22 856 669	3 238 647 511	R36	23 433 760	3 239 253 998
L46	22 862 199	3 238 620 120	R37	23 382 576	3 239 222 384
L47	22 861 418	3 238 617 244	R38	23 365 761	3 239 209 982
L48	22 833 452	3 238 619 553	R39	23 350 185	3 239 196 052
L49	22 833 828	3 238 627 793	R40	23 077 791	3 238 799 203
L50	22 831 810	3 238 638 055	R41	23 066 513	3 238 784 271
L51	22 815 185	3 238 631 716	R42	23 053 849	3 238 770 403
L52	22 740 173	3 238 603 904	R43	22 692 533	3 238 619 948
L53	22 722 897	3 238 596 460			
L54	22 662 260	3 238 577 819			

**SURVEY CONTROL POINTS**

STATION	Y	X	Z	DESCRIPTION
CA22	22833.69	3238644.37	976.753	12mm PEG IN CONCRETE
CA23	23066.63	3238737.47	984.713	12mm PEG IN CONCRETE
CA24	23283.76	3239123.64	1000.126	12mm PEG IN CONCRETE
CA25	23495.01	3239266.86	1011.508	12mm PEG IN CONCRETE



**LEGEND**

LEGEND	DESCRIPTION
[Symbol]	NEW ROAD SURFACE
[Symbol]	1.50m SIDEWALK - SD0203/A
[Symbol]	EXISTING ROAD
[Symbol]	1.0 V-DRAIN - SD0601/2
[Symbol]	2.4 V-DRAIN - SD0601/4
[Symbol]	TOE DRAIN - SD0601/2
[Symbol]	KERB & CHANNEL - SD0701/A
[Symbol]	CATCHWATER BANK - SD0605/A
[Symbol]	GUARDRAILS - SD1101/A & SD1102/A
[Symbol]	NEW ROAD RESERVE
[Symbol]	EXISTING ROAD RESERVE
[Symbol]	GRID INLET - SD0405/A
[Symbol]	DEPRESSED INLET - SD0405/A
[Symbol]	SIDE INLET (S1) - SD0703/A
[Symbol]	SIDE INLET (D1) - SD0703/A
[Symbol]	SIDE DRAIN & GRID INLET - SD0602/B
[Symbol]	PIPE CHUTE - SD0605/1
[Symbol]	OPEN CHUTE - SD0605/2
[Symbol]	DIRECTION ARROW
[Symbol]	HEADWALL - SD0406
[Symbol]	STONE PITCH
[Symbol]	RENO MATTRESS
[Symbol]	CHUTE - SD0603/A

**NOTATION**

BCC	BEGINNING OF CIRCULAR CURVE
ECC	END OF CIRCULAR CURVE
PI	POINT OF INTERSECTION
R	RADIUS OF CIRCULAR CURVE
Δ	RADIUS OF CIRCULAR CURVE
Lc	LENGTH OF CIRCULAR CURVE
T	LENGTH OF CURVE TANGENT
BT	BEGINNING OF TAPER

**AS BUILT**

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

Supervising Authority

Continued from:-	C 44316	Designed by:-	T. PIKA
Continued on:-	C 44318	Checked by:-	Y. DOMA
Cross Section No:-	C 44337 - C 44338	Drawn by:-	K. NAIDOO
Longitudinal Section No:-	C 44326, C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44317	Date of approval:-	



Designed by: **emzansi ENGINEERS (PTY) LTD**

Transportation Engineer: Chief Engineer

Head: Transport

01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

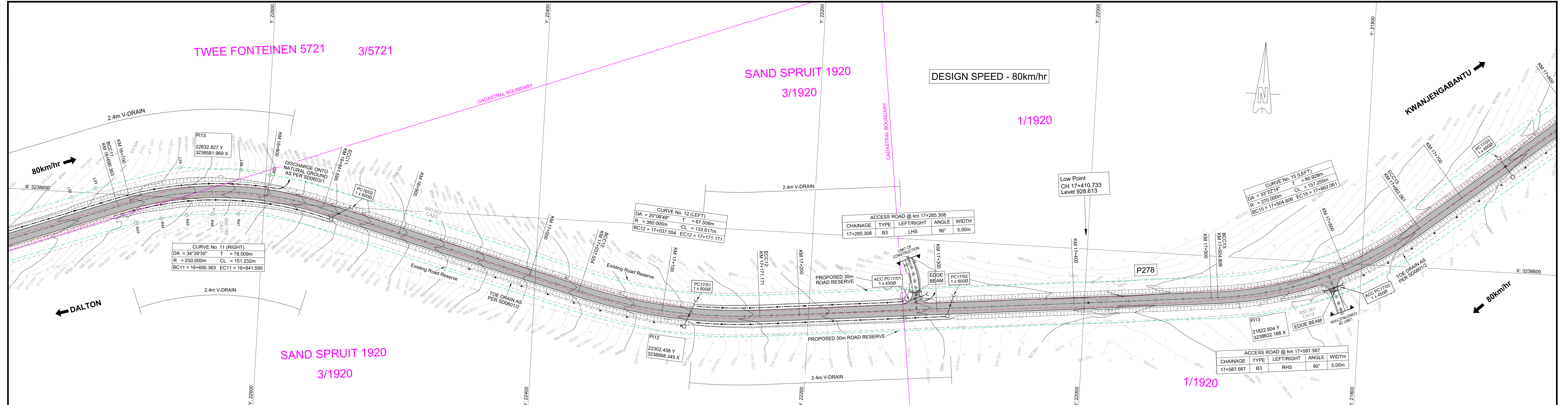
**UPGRADING OF MAIN ROAD 278 (P278)**

DESIGN PLAN

Slaked km distance	Sheet: 6	REVISION:
km 15+700 - km 16+700	of: 12	A
Scale	Plan No: -	
1 : 1000	<b>C 44317</b>	

C 44317





**P278: HORIZONTAL ALIGNMENT DATA**

CO-ORDINATES WGS 84 Lo. 31°

Point	Chainage	Y	X	Curve data
<b>CURVE No. 11 (RIGHT)</b>				
BCC 11	16+690.363	22 706.128	3 238 608.660	R= 250.000m Δ = 34°39'35"
PI 11	22 632.827	3 238 581.969		T= 78.009m
ECC 11	16+841.595	22 557.354	3 238 601.702	Lc= 151.232m
<b>CURVE No. 12 (LEFT)</b>				
BCC 12	17+037.554	22 367.768	3 238 651.269	R= 380.000m Δ = 20°08'48"
PI 12	22 302.458	3 238 669.345		T= 67.500m
ECC 12	17+171.171	22 235.263	3 238 661.881	Lc= 133.617m
<b>CURVE No. 15 (LEFT)</b>				
BCC 13	17+504.806	21 903.160	3 238 629.938	R= 270.000m Δ = 33°22'14"
PI 13	21 822.604	3 238 622.188		T= 80.928m
ECC 13	17+662.061	21 759.591	3 238 571.406	Lc= 157.255m

**ACCESS ROAD: @ 17 + 285.308 - LHS**

Point	Chainage	Y	X	Curve data
START	0+000.000	22 121.650	3 238 650.950	
BCC 1	0+013.880	22 122.970	3 238 637.140	R= 60.000m
PI 1	0+032.740	22 123.880	3 238 627.670	Δ = 18°00'30"
ECC 1	0+032.740	22 127.670	3 238 618.950	T= 9.51m
END	0+037.770	22 129.670	3 238 614.330	

**ACCESS ROAD: @ 17 + 587.567 - RHS**

Point	Chainage	Y	X	Curve data
START	0+000.000	21 823.270	3 238 609.600	
END	0+027.850	21 812.500	3 238 635.280	

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	VELOCITY (m/s)	HWID (m)	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
16854	PC16/02	1 X 600 PC	75D	Class_C	19.1	315	956.636	956.207	2.3	0.0017	0.03	0.7	1.2	301	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
17120	PC17/01	1 X 600 PC	75D	Class_C	19.6	290	936.501	936.056	2.3	0.0057	0.10	0.7	1.2	318	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
17309	PC17/02	1 X 600 PC	75D	Class_C	19.0	290	928.184	927.777	2.1	0.0062	0.14	0.7	1.2	335	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 17+285.308 LHS	ACC PC 17/01	8.295	1 X 450 PC	NEW	75D	Class_C	13.526	72	929.017	928.746	2.0	Depressed Inlet - 0405/A	Pipe Culvert Headwall - SD 0406	
ACCESS @ 17+587.567 RHS	ACC PC 17/02	9.439	1 X 450 PC	NEW	75D	Class_C	10.788	270	929.995	929.742	2.3	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction			
16638	16810	172	Chute: SD 0603/1	-7.762	SD0601/4	1.5m Concrete	→	16685	16847	162	Grid Inlet: SD 0602/B	-7.762	SD0601/4	1.5m Concrete	→				
17125	17275	150	Access Pipe Crossing	-7.762	SD0601/4	1.5m Concrete	→	17125	17295	170	Grid Inlet: SD 0602/B	-7.762	SD0601/4	1.5m Concrete	→				
17290	17295	5	Chute: SD 0603/1	-7.762	SD0601/4	1.5m Concrete	→	17295	17306	11	Grid Inlet: SD 0602/B	2.713	SD0601/4	1.5m Concrete	→				

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Slope (%)	Drain Type	Drain Lining	Flow Direction	From km	To km	Length (m)	Slope (%)	Drain Type	Drain Lining	Flow Direction						
16.940	17.118	178	-6.882	SD0601/2	Grassed	→	17.595	17.746	151	3.311	SD0601/2	Grassed	←						

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE				
Chainage	Type	Length (m)	Chainage	Type	Length (m)				
17+285.308	Edge Beam	5.00	17+587.567	Edge Beam	5.00				

**P278 INTERSECTION SCHEDULE**

LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD LHS (m)	AVAIL ISD LHS (m)	REQD ISD RHS (m)	AVAIL ISD RHS (m)	REMARKS
10	Acc RD 17+285.308	17+285.308	B3	80	171	244	123	326	240	223	240	309	ok

RIGHT HAND SIDE SIGHT DISTANCES BASED ON GRADE

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD LHS (m)	AVAIL ISD LHS (m)	REQD ISD RHS (m)	AVAIL ISD RHS (m)	REMARKS
6	Acc RD 17+587.567	17+587.567	B3	80	168	494	124	550	240	518	240	613	ok

**P278 ROAD RESERVE BOUNDARY**

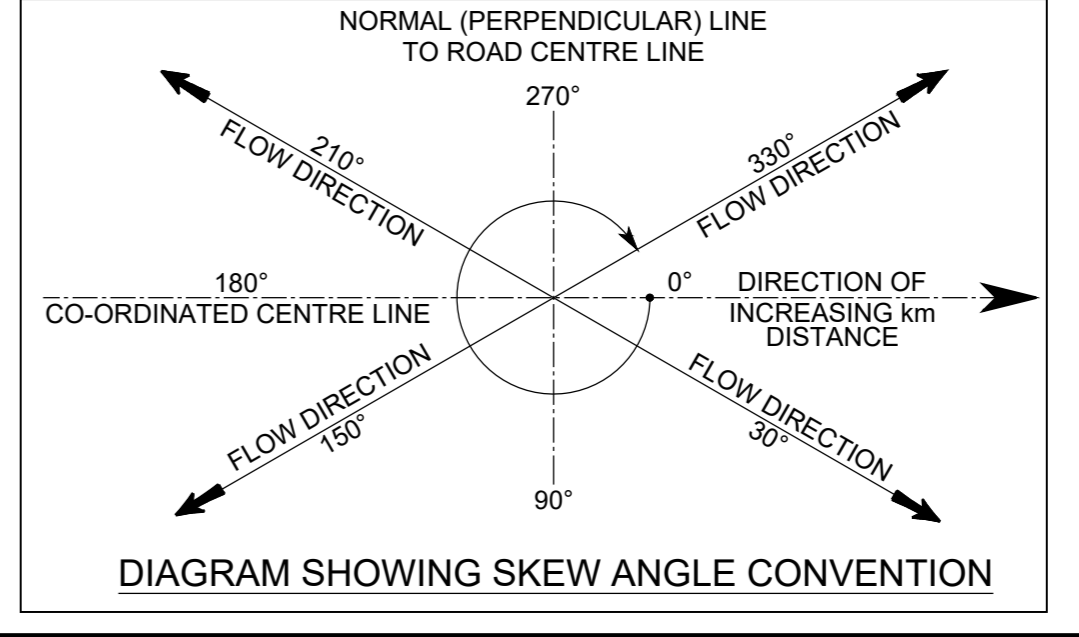
CO-ORDINATES WGS 84 Lo. 31°

LHS						RHS					
CODE	Y	X	CODE	Y	X						
L52	22 740.173	3 238 603.904	R43	22 692.533	3 238 619.948						
L53	22 722.897	3 238 596.480	R44	22 674.096	3 238 615.732						
L54	22 662.200	3 238 577.919	R45	22 655.921	3 238 612.973						
L55	22 618.102	3 238 577.245	R46	22 637.116	3 238 610.353						
L56	22 596.875	3 238 579.644	R47	22 618.399	3 238 609.976						

- GENERAL NOTES:**
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
  - ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
  - MIN COVER = 600mm MIN SLOPE = 2%.
  - PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS < 1.5m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS > 1.5m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KZN-DT STANDARDS.
  - FOR EROSION CONTROL GABION MATRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERMERS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASSED/CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0601 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESS ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESS SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "COLTO SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES".
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON (WGS 84).
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR:  $s = \sqrt{0.694 + 0.3 \pm G}$

**LEGEND**

LEGEND	DESCRIPTION
[Symbol]	NEW ROAD SURFACE
[Symbol]	1.50m SIDEWALK - SD0203/A
[Symbol]	EXISTING ROAD
[Symbol]	1.0 V-DRAIN - SD0601/2
[Symbol]	2.4 V-DRAIN - SD0601/4
[Symbol]	TOE DRAIN - SD0601/2
[Symbol]	KERB & CHANNEL - SD0701/A
[Symbol]	CATCHWATER BANK - SD0605/A
[Symbol]	QUARDRAILS - SD1101/A & SD1102/A
[Symbol]	NEW ROAD RESERVE
[Symbol]	EXISTING ROAD RESERVE
[Symbol]	GRID INLET - SD0405/A
[Symbol]	DEPRESSED INLET - SD0405/A
[Symbol]	SIDE INLET (S1) - SD0703/A
[Symbol]	SIDE INLET (D1) - SD0703/A
[Symbol]	SIDE DRAIN & GRID INLET - SD0602/B
[Symbol]	PIPE CHUTE - SD0605/1
[Symbol]	OPEN CHUTE - SD0605/2
[Symbol]	DIRECTION ARROW
[Symbol]	HEADWALL - SD0406
[Symbol]	STONE PITCH
[Symbol]	RENO MATTRESS
[Symbol]	CHUTE - SD0603/A



**SURVEY CONTROL POINTS**

CO-ORDINATE LIST - MAIN ROAD P278

STATION	Y	X	Z	DESCRIPTION
CA19	21835.15	3238628.58	930.361	12mm PEG IN CONCRETE
CA20	22478.57	3238606.35	950.822	12mm PEG IN CONCRETE
CA21	22836.26	3238606.42	956.188	12mm PEG IN CONCRETE

**AS BUILT**

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

Continued from:-	C 44317	Designed by:-	T. PIKA
Continued on:-	C 44319	Checked by:-	Y. DOMA
Cross Section No:-	C 44338 - C 44340	Drawn by:-	K. NAIDOO
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION Km 10+880 - Km 22+491

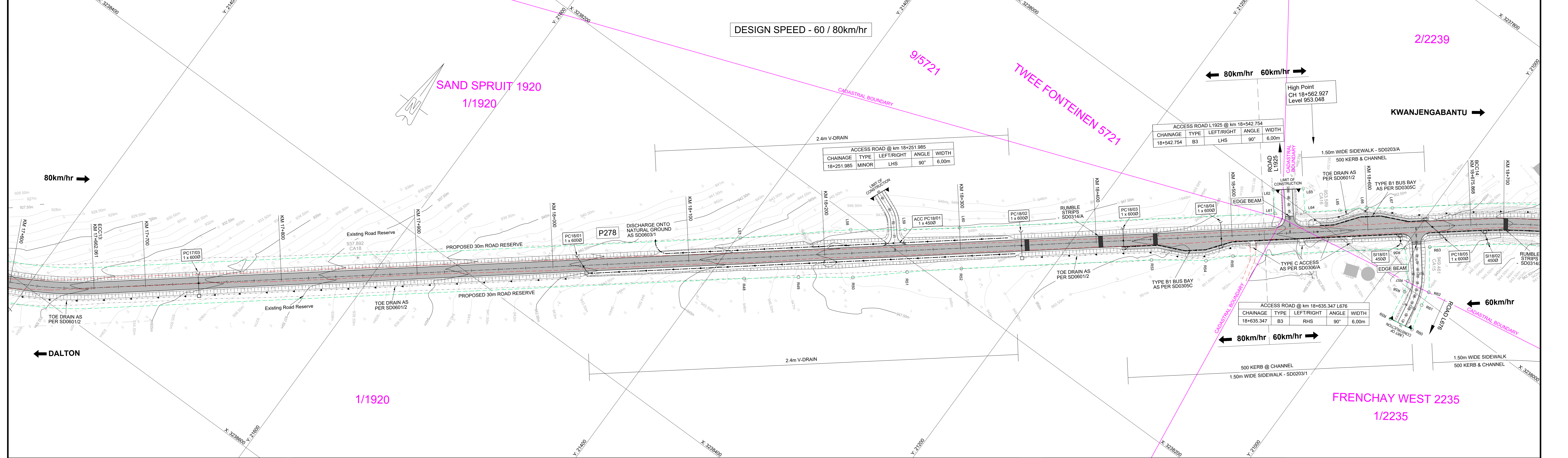
**UPGRADING OF MAIN ROAD 278 (P278)**

DESIGN PLAN

Staked km distance	Sheet - 7	REVISION:
km 16+700 - km 17+700	of - 12	A
Scale	Plan No -	
<b>1 : 1000</b>	<b>C 44318</b>	

C 44318





**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
CURVE No. 13 LEFT			
BCC 13	17+504.806	21 983.160	R= 270.000m
PI 13	17+662.061	21 822.604	33° 22' 14"
ECC 13	17+820.316	21 759.591	80.920m
CURVE No. 14 RIGHT			
BCC 14	18+675.868	20 870.213	R= 480.000m
PI 14	18+834.123	20 719.100	27° 24' 05"
ECC 14	18+992.378	20 764.416	117.018m

**ACCESS ROAD: @ 18 + 251.985 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	21 300.260	
BCC 1	0+021.380	21 313.950	R= 20.000m
PI 1	0+042.760	21 317.120	27° 50' 57"
ECC 1	0+064.140	21 321.700	4.96m
END	0+085.520	21 334.820	

**ACCESS ROAD L1925 @ 18 + 542.754 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	21 073.860	
END	0+032.200	21 094.070	

**ACCESS ROAD: @ 18 + 635.347 - RHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	21 001.760	
BCC 1	0+032.910	20 981.160	R= 50.000m
PI 1	0+064.820	20 973.110	28° 50' 29"
ECC 1	0+096.730	20 970.900	12.86m
END	0+128.640	20 968.210	

**P278 ROAD RESERVE BOUNDARY CO-ORDINATES WGS 84 Lo. 31°**

CODE	Y	X	CODE	Y	X
L57	21 397.816	3 238 260.591	R48	21 378.026	3 238 283.204
L58	21 335.990	3 238 207.873	R49	21 346.317	3 238 258.805
L59	21 303.761	3 238 184.118	R50	21 313.954	3 238 235.217
L60	21 272.287	3 238 159.428	R51	21 284.091	3 238 206.526
L61	21 091.450	3 238 013.694	R52	21 253.462	3 238 182.786
L62	21 102.503	3 238 000.412	R53	21 144.396	3 238 095.010
L63	21 085.396	3 237 996.713	R54	21 111.793	3 238 071.720
L64	21 074.266	3 237 999.845	R55	21 097.737	3 238 057.289
L65	21 054.271	3 237 983.731	R56	20 999.044	3 237 977.769
L66	21 039.354	3 237 970.368	R57	20 983.360	3 237 966.047
L67	21 024.075	3 237 959.397	R58	20 980.485	3 238 003.853
L68	20 977.059	3 238 025.988	R59	20 977.059	3 238 025.988
L69	20 969.606	3 238 022.940	R60	20 969.606	3 238 022.940
L70	20 964.531	3 238 034.378	R61	20 964.531	3 238 034.378
L71	20 958.667	3 237 993.582	R62	20 958.667	3 237 993.582
L72	20 954.932	3 237 966.380	R63	20 954.932	3 237 966.380

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	Hw/D =	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
17739	PC1703	1 X 600 PC	75D	Class. C	23.0	270	934.145	933.641	2.2	0.0016	0.02	0.7	1.2	0.5	301	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
18022	PC1802	1 X 600 PC	75D	Class. C	19.3	240	941.315	940.900	2.1	0.0011	0.02	0.7	1.2	0.5	300	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
18345	PC1802	1 X 600 PC	75D	Class. C	19.0	270	947.703	947.249	2.4	0.0025	0.34	0.6	1.2	0.8	509	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
18420	PC1803	1 X 600 PC	75D	Class. C	12.1	270	949.364	949.000	3.0	0.0009	0.01	0.8	1.4	0.5	300	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
18492	PC1804	1 X 600 PC	75D	Class. C	14.1	270	950.702	950.404	2.1	0.0007	0.01	0.7	1.2	0.5	300	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
18647	PC1805	1 X 600 PC	75D	Class. C	18.2	45	950.172	949.496	3.9	0.0008	0.01	0.9	1.8	0.5	300	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 18+251.985 LHS	ACC PC 18/01	5.951	1 X 450 PC	NEW	75D	Class. C	11.930	90	946.640	946.400	2.0	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	

**P278 ROAD SIDE DRAINAGE SCHEDULE**

CHAINAGE	ID	PIPE SIZE	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
18624.870	SI1801	1 X 450	75D	Class. C	2.7	270	950.740	950.597	5.3	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Reno mattress
18687.692	SI1802	1 X 450	75D	Class. C	3.6	50	947.712	947.551	4.5	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		
18080	18245	165	Chute: SD 0603/1	1.915	SD0601/4	1.5m Concrete		←	18025	18340	315	Grid Inlet: SD 0602/B	1.915	SD0601/4	1.5m Concrete		←		
18257	18335	78	Access Pipe Crossing	1.915	SD0601/4	1.5m Concrete		←											

**P278 KERB CHANNEL DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Flow direction	Outlet details	From km	To km	Length (m)	Flow direction	Outlet details										
18.418	18.492	74	←	Side Inlet: SD 0703/A	18.492	18.554	72	←	Side Inlet: SD 0703/A										
18.565	18.643	78	→	Side Inlet: SD 0703/A	18.564	18.624	60	→	Side Inlet: SD 0703/A										
18.645	18.686	41	→	Side Inlet: SD 0703/A	18.686	18.767	81	→	Side Inlet: SD 0703/A										

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE				
Chainage	Type	Length (m)	Chainage	Type	Length (m)				
18+251.985	Edge Beam	20.00							
18+542.754	Edge Beam	6.00	18+835.347	Edge Beam	6.00				

**P278 SIDEWALK SCHEDULE**

LEFT HAND SIDE					RIGHT HAND SIDE				
km from	km to	Length (m)	Width (m)	Remarks					
18.505	18.645	80	1.50	18.420 18.630 210 1.50					
				18.645 18.095 450 1.50					

**P278 BUS / TAXI PARKING BAY SCHEDULE**

Chainage	From	To	Length (m)	Position
18.445	18.500	55	RHS	
18.575	18.630	55	LHS	

**P278 INTERSECTION SCHEDULE**

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE				RIGHT HAND SIDE SIGHT DISTANCES BASED ON GRADE				REMARKS
					REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	
11	Acc RD 18+542.754 @ L1925	18+542.754	B3	60	87	630	93	105	180	180	130	insufficient RHS sight distance, consider W218/217/18 signs	

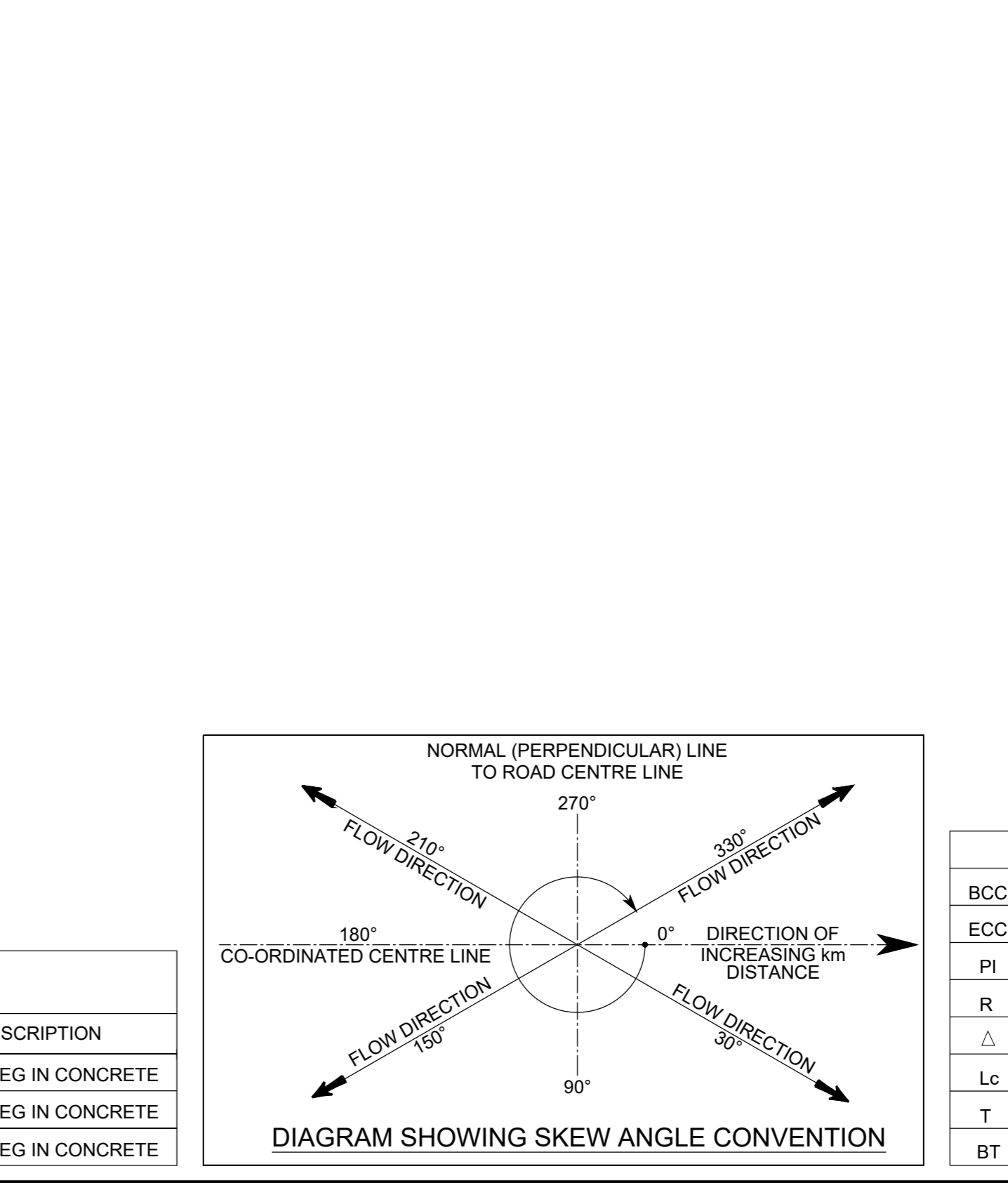
**P278 INTERSECTION SCHEDULE**

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE				RIGHT HAND SIDE SIGHT DISTANCES BASED ON GRADE				REMARKS
					REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	
7	Acc RD 18+635.347 @ L676	18+635.347	B3	60	90	106	89	133	180	131	180	proposed rumble strips plus concealed signs must be installed	

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  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
  - MIN COVER = 600mm MIN SLOPE = 2%.
  - PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS + 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KZN-DOT STANDARDS.
  - FOR EROSION CONTROL GABION MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERM ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASS/CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "DOT" SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON (WGS 84).
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSDS WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULA:  $s = \sqrt{0.694 + 0.3 z^2}$

**LEGEND**

LEGEND	DESCRIPTION
[Symbol]	NEW ROAD SURFACE
[Symbol]	1.50m SIDEWALK - SD0203/A
[Symbol]	EXISTING ROAD
[Symbol]	1.0 V-DRAIN - SD0601/2
[Symbol]	2.4 V-DRAIN - SD0601/4
[Symbol]	TOE DRAIN - SD0601/2
[Symbol]	KERB & CHANNEL - SD0701/A
[Symbol]	CATCHWATER BANK - SD0605/A
[Symbol]	GUARDRAILS - SD1101/A & SD1102/A
[Symbol]	NEW ROAD RESERVE
[Symbol]	EXISTING ROAD RESERVE
[Symbol]	GRID INLET - SD0405/A
[Symbol]	DEPRESSED INLET - SD0405/A
[Symbol]	SIDE INLET (S1) - SD0703/A
[Symbol]	SIDE INLET (D1) - SD0703/A
[Symbol]	SIDE DRAIN & GRID INLET - SD0602/B
[Symbol]	PIPE CHUTE - SD0605/1
[Symbol]	OPEN CHUTE - SD0605/2
[Symbol]	HEADWALL - SD0406
[Symbol]	STONE PITCH
[Symbol]	RENO MATTRESS
[Symbol]	CHUTE - SD0603/A



**SURVEY CONTROL POINTS**

STATION	Y	X	Z	DESCRIPTION
CA15	20987.45	3237979.60	949.461	12mm PEG IN CONCRETE
CA16	21075.65	3238002.67	953.589	12mm PEG IN CONCRETE
CA18	21616.22	3238438.72	937.892	12mm PEG IN CONCRETE

**AS BUILT**

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

Continued from:-	C 44318	Designed by:-	T. PIKA
Continued on:-	C 44320	Checked by:-	Y. DOMA
Cross Section No:-	C 44340 - C 44341	Drawn by:-	K. NAIDOO
Longitudinal Section No:-	C 44327, C 44328	Checked by:-	Y. DOMA
Design Plan No:-	C 44319	Date of approval:-	



**emzansi ENGINEERS (PTY) LTD**  
 Providing Unbiased Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491

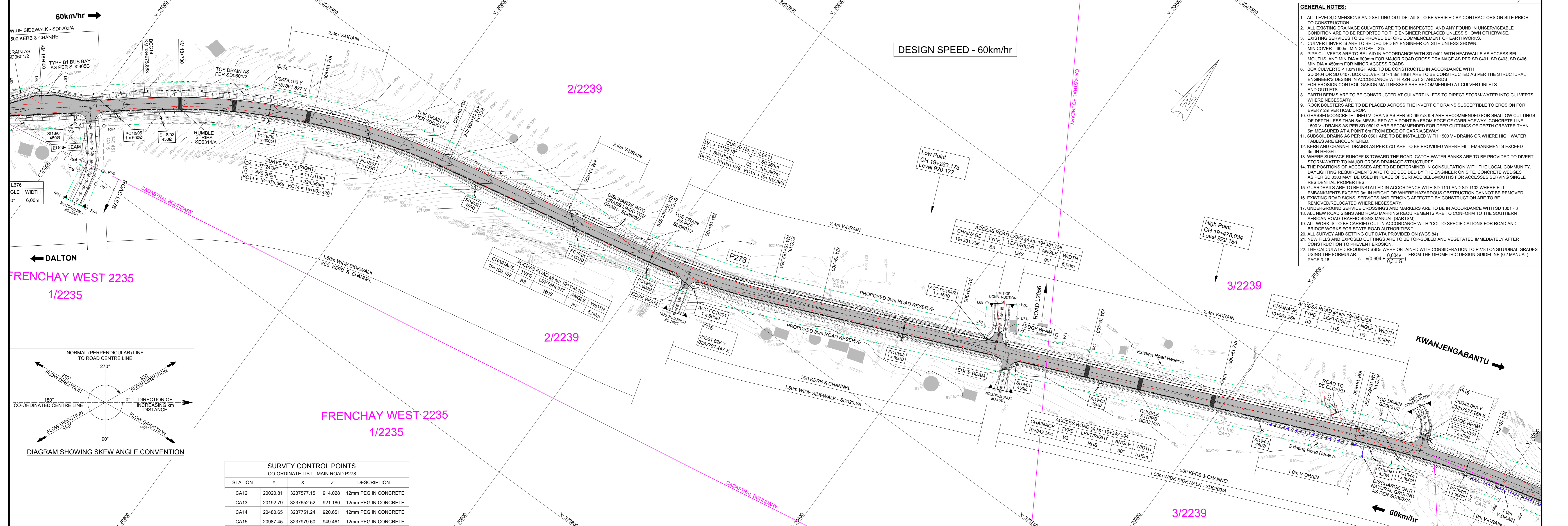
**UPGRADING OF MAIN ROAD 278 (P278)**

DESIGN PLAN

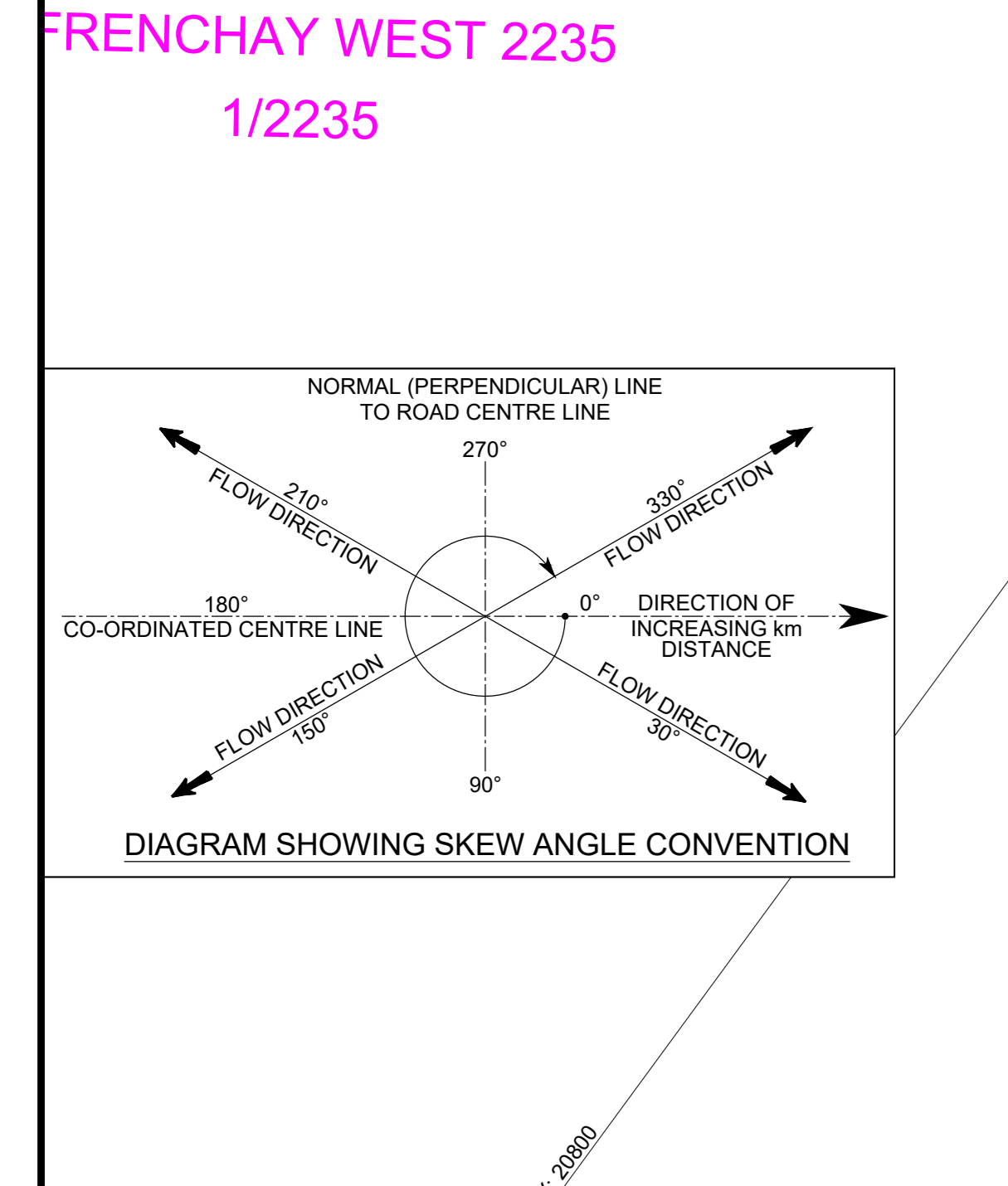
Staked km distance	Sheet - 8	REVISION:
km 17+700 - km 18+700	of - 12	A
Scale	Plan No -	
1: 1000	<b>C 44319</b>	

C 44319





- GENERAL NOTES:**
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
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  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN:
    - MIN COVER = 600mm MIN SLOPE = 2%
  - PIPE CULVERTS ARE TO BE LAD IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
  - BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS > 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KEN-DOT STANDARDS.
  - FOR EROSION CONTROL, GABION MATRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERMS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRASSED CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 1m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINED 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 1m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - EXISTING REQUIREMENTS ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DATALIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE MEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, BARRIERS AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICES AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3. ALL SURVEY AND SETTING OUT DATA PROVIDED ON (WGS 84).
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
  - ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH 'COL' TO SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSCA WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULAR  $s = \sqrt{0.684 + 0.004V}$  FROM THE GEOMETRIC DESIGN GUIDELINE (G2 MANUAL) PAGE 3-16.



**SURVEY CONTROL POINTS**  
CO-ORDINATE LIST - MAIN ROAD P278

STATION	Y	X	Z	DESCRIPTION
CA12	20020.81	3237577.15	914.028	12mm PEG IN CONCRETE
CA13	20192.79	3237652.52	921.180	12mm PEG IN CONCRETE
CA14	20480.65	3237751.24	920.651	12mm PEG IN CONCRETE
CA15	20987.45	3237979.60	948.461	12mm PEG IN CONCRETE

**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data		
		Y X	R=		
BCC 14	18+675.868	20 970 213	3 237 935.254	Δ	480.000m
PI 14	20 879.100	3 237 861.827	117.018m	T=	27° 24' 05"
ECC 14	18+905.426	20 764.416	3 237 838.570	Lc=	229.558m
		Y X	R=		
BCC 15	19+061.979	20 610.986	3 237 807.456	Δ	500.000m
PI 15	20 561.628	3 237 797.447	50.363m	T=	11° 30' 13"
ECC 15	19+162.366	20 515.257	3 237 777.795	Lc=	100.387m
		Y X	R=		
BCC 16	19+044.508	20 108.164	3 237 605.271	Δ	900.000m
PI 16	20 042.065	3 237 577.258	71.790m	T=	9° 07' 17"
ECC 16	19+747.785	19 972.361	3 237 560.078	Lc=	143.277m

**ACCESS ROAD: @ 18 + 635.347 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data		
		Y X	R=		
START	0+000.000	21 001.760	3 237 960.680		
BCC 1	0+032.910	20 981.160	3 237 986.350	Δ	50.000m
PI 1	0+073.720	20 973.110	3 237 996.370	R=	28° 50' 29"
ECC 1	0+058.080	20 970.900	3 238 009.040	T=	12.86m
END	0+073.720	20 968.210	3 238 024.440		

**ACCESS ROAD: @ 19 + 100.162 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data	
		Y X	R=	
START	0+000.000	20 573.890	3 237 798.440	
END	0+031.610	20 565.170	3 237 828.820	

**ACCESS ROAD L2056 @ 19 + 331.756 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data		
		Y X	R=		
START	0+000.000	20 359.300	3 237 711.700		
BCC 1	0+015.630	20 365.400	3 237 697.300	Δ	50.000m
PI 1	0+036.980	20 366.980	3 237 693.570	R=	9° 16' 13"
ECC 1	0+023.720	20 369.140	3 237 690.140	T=	4.05m
END	0+034.130	20 374.690	3 237 681.340		

**ACCESS ROAD L1925 @ 19 + 342.594 - RHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data	
		Y X	R=	
START	0+000.000	20 349.320	3 237 707.470	
END	0+028.070	20 338.330	3 237 733.300	

**ACCESS ROAD: @ 19 + 653.258 - LHS**

Point	Chainage	CO - ORDINATES WGS 84 Lo. 31°	Curve data		
		Y X	R=		
START	0+000.000	20 062.790	3 237 587.470		
BCC 1	0+011.800	20 066.800	3 237 576.380	Δ	25.000m
PI 1	0+029.940	20 069.940	3 237 567.730	R=	40° 24' 44"
ECC 1	0+029.430	20 077.930	3 237 563.170	T=	9.20m
END	0+034.520	20 082.350	3 237 560.660		

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	HwID = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
18768	PC1810/6	1 X 600 PC	750	Class C	14.1	270	941.996	941.580	3.0	0.0169	0.26	0.7	1.4	0.7	419	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Pipe Chute and Daylighting required
18842	PC1810/7	1 X 600 PC	750	Class C	13.7	60	936.948	936.279	4.2	0.0086	0.13	0.9	1.6	0.6	331	1.5/2.4 V-Drain Depressed Inlet (SD 0406)	Pipe Culvert Headwall (SD 0406)	Pipe Chute and Daylighting required
19006	PC19101	1 X 600 PC	750	Class C	22.5	50	924.952	924.247	3.1	0.0096	0.15	0.8	1.4	0.6	338	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Pipe Chute and Daylighting required
19070	PC19102	1 X 600 PC	750	Class C	20.7	90	920.277	919.581	3.4	0.0294	0.45	0.9	1.9	0.6	521	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19263	PC19103	1 X 600 PC	750	Class C	18.9	270	918.077	917.648	2.3	0.0058	0.09	0.8	1.6	0.5	453	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19634	PC19104	1 X 600 PC	750	Class C	21.5	45	915.216	914.695	2.4	0.0007	0.10	0.7	1.3	0.5	318	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19690	PC19105	1 X 600 PC	750	Class C	14.9	270	912.671	912.347	2.2	0.0007	0.01	0.7	1.2	0.5	300	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 19+100.162 RHS	ACC PC 19101	8.549	1 X 600 PC	NEW	750	Class C	17.943	288	920.389	919.393	5.6	Side Inlet S1 - SD 0703/A	Pipe Culvert Headwall - SD 0406	
ACCESS @ 19+331.756 (L2056) LHS	ACC PC 19102	5.948	1 X 450 PC	NEW	750	Class C	14.512	270	919.773	919.604	1.2	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	
ACCESS @ 19+653.258 LHS	ACC PC 19103	10.048	1 X 450 PC	NEW	750	Class C	7.107	90	914.650	914.427	3.1	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	

**P278 SIDE INLET SCHEDULE**

CHAINAGE	ID	PIPE SIZE	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
18930.727	SI18103	1 X 450	750	Class C	4.0	75	930.056	929.334	18.1	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting and Reno mattress
19350.000	SI19101	1 X 450	750	Class C	5.0	90	919.339	919.196	2.9	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19412.609	SI19102	1 X 450	750	Class C	3.3	70	920.114	920.018	2.9	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19522.541	SI18103	1 X 450	750	Class C	8.3	59	920.132	919.921	2.5	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19616.314	SI18104	1 X 450	750	Class C	3.1	59	916.148	916.024	4.1	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		
18796	18837	42	Grid Inlet SD 0602/B	-7.230	SD0601/4	1.5m Concrete		→	19080	19263	183	Grid Inlet SD 0602/B	-0.500	SD0601/4	1.5m Concrete		←		
19080	19263	183	Grid Inlet SD 0602/B	-0.500	SD0601/4	1.5m Concrete		→	19263	19284	20	Grid Inlet SD 0602/B	-0.500	SD0601/4	1.5m Concrete		←		
19263	19284	20	Grid Inlet SD 0602/B	-0.500	SD0601/4	1.5m Concrete		→	19284	19326	63	Grid Inlet SD 0602/B	-0.500	SD0601/4	1.5m Concrete		←		
19326	19340	14	Access Pipe Crossing	1.192	SD0601/4	1.5m Concrete		→	19340	19478	194	Access Pipe Crossing	1.192	SD0601/4	1.5m Concrete		→		
19478	19516	176	Grid Inlet SD 0602/B	-5.381	SD0601/4	1.5m Concrete		→	19516	19625	109	Grid Inlet SD 0602/B	-5.381	SD0601/4	1.5m Concrete		→		

**P278 1.0m V-Drain Behind Sidewalk**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		
19540	19540	70	Open Chute SD 0605/2	-5.381	SD0601/2	1.0m Concrete		→	19695	19698	3	Open Chute SD 0605/2	-5.381	SD0601/2	1.0m Concrete		→		
19698	19765	67	Open Chute SD 0605/2	-0.649	SD0601/2	1.0m Concrete		→											

**P278 INTERSECTION SCHEDULE**

LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE														
Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD (m)	AVAIL ISD (m)	REQD ASD (m)	AVAIL ASD (m)	REMARKS	
12	Acc RD 19+331.756 @ L2056	19+331.756	B3	60	88	282	92	193	180	250	180	201	ok	
13	Acc RD 19+653.258	19+653.258	B3	60	100	153	82	174	180	161	180	441	ok	

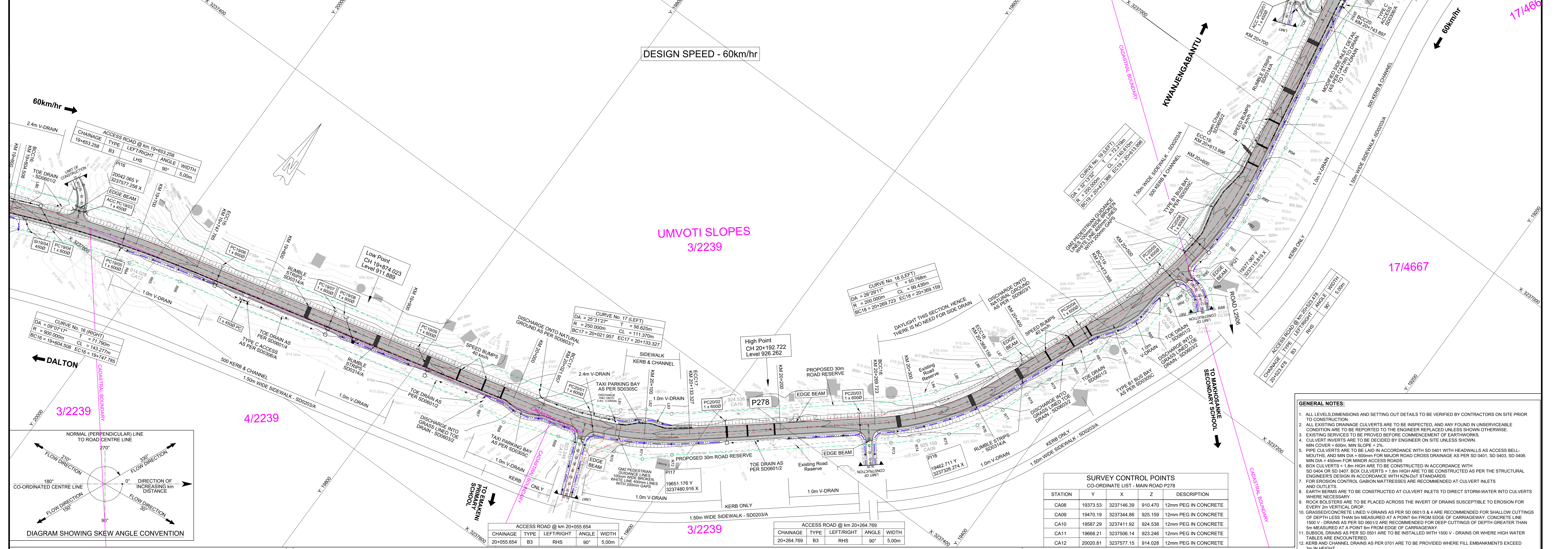
**P278 INTERSECTION SCHEDULE**

RIGHT HAND SIDE SIGHT DISTANCES BASED ON GRADE														
Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD (m)	AVAIL ISD (m)	REQD ASD (m)	AVAIL ASD (m)	REMARKS	
8	Acc RD 19+100.162	19+100.162	B3	60	90	349	89	435	180	329	180	443	ok	
9	Acc RD 19+342.594	19+342.594	B3	60	88	312	92	174	180	331	180	191	proposed rumble strips plus concealed signs must be installed	

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction						
18.555	18.790	235	-3.830	SD0601/2	Grassed	→	18.686	18.767	81	→	Side Inlet SD 0703/A								
18.845	19.000	155	-7.097	SD0601/2	Grassed	→	18.767	18.844	77	→	Side Inlet SD 0703/A								
19.040	19.069	29	-5.172	SD0601/2	Grassed	→	18.844	18.930	86	→	Side Inlet SD 0703/A								
19.630	19.645	15	-14.66																





**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
<b>CURVE No. 16 RIGHT</b>				
BCC 16	19+604.508	20 108.164	3 237 605.271	R= 900.000m
PI 16	19+604.508	20 042.065	3 237 577.258	T= 97' 07" 17"
ECC 16	19+747.785	19 972.361	3 237 560.078	Lc= 143.277m
<b>CURVE No. 17 LEFT</b>				
BCC 17	20+021.957	19 706.156	3 237 494.466	R= 250.000m
PI 17	20+021.957	19 651.176	3 237 480.916	T= 25' 31" 27"
ECC 17	20+133.327	19+607.402	3 237 444.997	Lc= 111.370m
<b>CURVE No. 18 LEFT</b>				
BCC 18	20+269.723	19 501.958	3 237 358.478	R= 200.000m
PI 18	20+269.723	19 462.711	3 237 326.274	T= 50.768m
ECC 18	20+369.159	19 443.575	3 237 279.250	Lc= 99.436m
<b>CURVE No. 19 LEFT</b>				
BCC 19	20+473.386	19 404.289	3 237 182.711	R= 250.000m
PI 19	20+473.386	19 377.067	3 237 115.819	T= 72.219m
ECC 19	20+613.996	19 389.709	3 237 044.715	Lc= 140.610m

**ACCESS ROAD: @ 19 + 653.258 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	0+000.000	20 062.790	3 237 587.470	
BCC 1	0+011.800	20 066.800	3 237 578.380	R= 25.000m
PI 1	0+011.800	20 069.940	3 237 567.730	T= 40' 24" 44"
ECC 1	0+029.430	20 077.930	3 237 563.170	Lc= 9.20m
END	0+034.520	20 082.350	3 237 560.660	

**ACCESS ROAD: @ 20 + 055.654 - RHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	0+000.000	19 674.080	3 237 484.210	
END	0+055.280	19 653.740	3 237 535.610	

**ACCESS ROAD: @ 20 + 264.769 - RHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	0+000.000	19 505.790	3 237 361.620	
END	0+030.290	19 486.490	3 237 384.960	

**ACCESS ROAD: @ 20 + 523.478 - RHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	0+000.000	19 390.180	3 237 134.740	
BCC 1	0+017.090	19 373.430	3 237 138.090	R= 25.000m
PI 1	0+017.090	19 366.180	3 237 139.540	T= 32' 54" 53"
ECC 1	0+031.450	19 360.890	3 237 144.690	Lc= 7.38m
END	0+037.630	19 356.470	3 237 149.000	

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	HwD + 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
19765	PC1906	1 X 800 PC	750	Class. C	14.7	270	911.292	910.510	5.3	0.0015	0.02	1.1	1.9	0.5	301	1.5/2.4 V-Drain Grid Inlet (SD 0602/B)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19854	PC1907	1 X 800 PC	750	Class. C	15.3	270	910.635	910.198	2.9	0.0006	0.01	0.8	1.4	0.5	300	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19869	PC1908	1 X 900 PC	750	Class. C	20.1	230	910.332	909.794	2.7	0.1250	1.50	0.7	2.1	0.7	849	1.5/2.4 V-Drain Grid Inlet (SD 0602/B)	Pipe Culvert Headwall (SD 0406)	Daylighting required
19928	PC1909	1 X 800 PC	750	Class. C	23.5	220	911.583	910.460	4.8	0.0005	0.01	1.0	1.8	0.5	300	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20061	PC2001	1 X 800 PC	750	Class. C	25.3	250	920.633	918.475	8.5	0.0035	0.05	1.4	2.4	0.5	305	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20160	PC2002	1 X 800 PC	750	Class. C	15.7	270	924.915	924.406	3.2	0.0013	0.20	0.8	1.5	0.6	371	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20257	PC2003	1 X 800 PC	750	Class. C	15.0	270	923.837	923.473	2.4	0.0129	0.20	0.7	1.3	0.6	371	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20440	PC2004	1 X 800 PC	750	Class. C	15.4	270	913.551	913.142	2.7	0.0137	0.20	0.7	1.3	0.6	371	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20516	PC2005	1 X 800 PC	750	Class. C	15.3	270	907.203	906.700	3.1	0.0073	0.11	0.8	1.4	0.5	322	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20548	PC2006	1X600 PC	750	Class. C	15.3	270	904.579	904.190	2.5	0.0006	0.01	0.7	1.3	0.5	300	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		
20020	20078	58	Chute: SD 0603/1	8.502	SD0601/4	1.5m Concrete		←	20080	20 135	55	1.5m drain SD 0601/2						→	

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction						
19 775	19 854	79	-0.633	SD0601/4	Grassed	→	19 934	19 980	46	5.435	SD0601/2	Grassed	←						
20 159	20 200	41	1.220	SD0601/2	Grassed	←	20 415	20 439	24	-4.167	SD0601/2	Grassed	→						
20 500	20 516	16	-3.125	SD0601/2	Grassed	→													

**P278 1.0m V-Drain Behind Sidewalk**

LEFT HAND SIDE										RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction		
19988	19795	67	Open Chute: SD 0605/2	-0.649	SD0601/2	1.0m Concrete		←	19985	19874	9	Open Chute: SD 0605/2	-0.649	SD0601/2	1.0m Concrete		←		
19874	19920	46	Depressed Inlet: (SD 0405/A)	-0.649	SD0601/2	1.0m Concrete		←	19874	19920	46	Depressed Inlet: (SD 0405/A)	-0.649	SD0601/2	1.0m Concrete		←		
20080	20120	40	Lined Side Drain: SD0601/4	8.502	SD0601/2	1.0m Concrete		←	19855	20045	60	Lined Toe Drain: SD0601/2	8.502	SD0601/2	1.0m Concrete		←		
20065	20155	90	Depressed Inlet: (SD 0405/A)	8.502	SD0601/2	1.0m Concrete		→	20205	20255	50	Depressed Inlet: (SD 0405/A)	-5.610	SD0601/2	1.0m Concrete		→		
20205	20255	50	Depressed Inlet: (SD 0405/A)	-5.610	SD0601/2	1.0m Concrete		→	20275	20415	140	Lined Toe Drain: SD0601/2	-5.610	SD0601/2	1.0m Concrete		→		
20440	20450	10	Lined Side Drain: SD0601/4	-5.610	SD0601/2	1.0m Concrete		→	20450	20500	50	Lined Toe Drain: SD0601/2	-9.100	SD0601/2	1.0m Concrete		→		
20550	20657	107	Chute: SD 0603/1	-9.100	SD0601/2	1.0m Concrete		→	20657	20750	93	Chute: SD 0603/1	-5.282	SD0601/2	1.0m Concrete		→		

**P278 INTERSECTION SCHEDULE**

Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)	REQD ISD LHS (m)	AVAIL ISD LHS (m)	REQD ISD RHS (m)	AVAIL ISD RHS (m)	REMARKS
10	Acc RD 20+055.654	20+055.654	B3	60	79	444	109	104	180	97	180	115	proposed rumble strips plus concealed signs must be installed
11	Acc RD 20+264.769	20+264.769	B3	60	101	105	82	206	180	124	180	215	proposed rumble strips plus concealed signs must be installed
12	Acc RD 20+523.478 @ L2506	20+523.478	B3	60	111	156	78	330	180	180	180	335	ok

**P278 SIDEWALK SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
km from	km to	Length (m)	Width (m)	km from	km to	Length (m)	Width (m)
20 080	20 135	55	1.50	20 065	20 055	10	1.50
20 535	20 625	90	1.50	20 270	20 520	250	1.50
				20 535	20 625	90	1.50

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
Chainage	Type	Length (m)	Position	Chainage	Type	Length (m)	Position
20+212.000	Edge Beam	15.00	20+264.769	20+055.654	Edge Beam	5.00	RHS
20+393.000	Edge Beam	15.00	20+523.478	20+264.769	Edge Beam	5.00	LHS
				20+445	20+500	55	RHS
				20+555	20+610	55	LHS

**P278 BUS / TAXI PARKING BAY SCHEDULE**

Chainage	Length (m)	Position
19 995	20 025	30
20 055	20 115	30
20 445	20 500	55
20 555	20 610	55

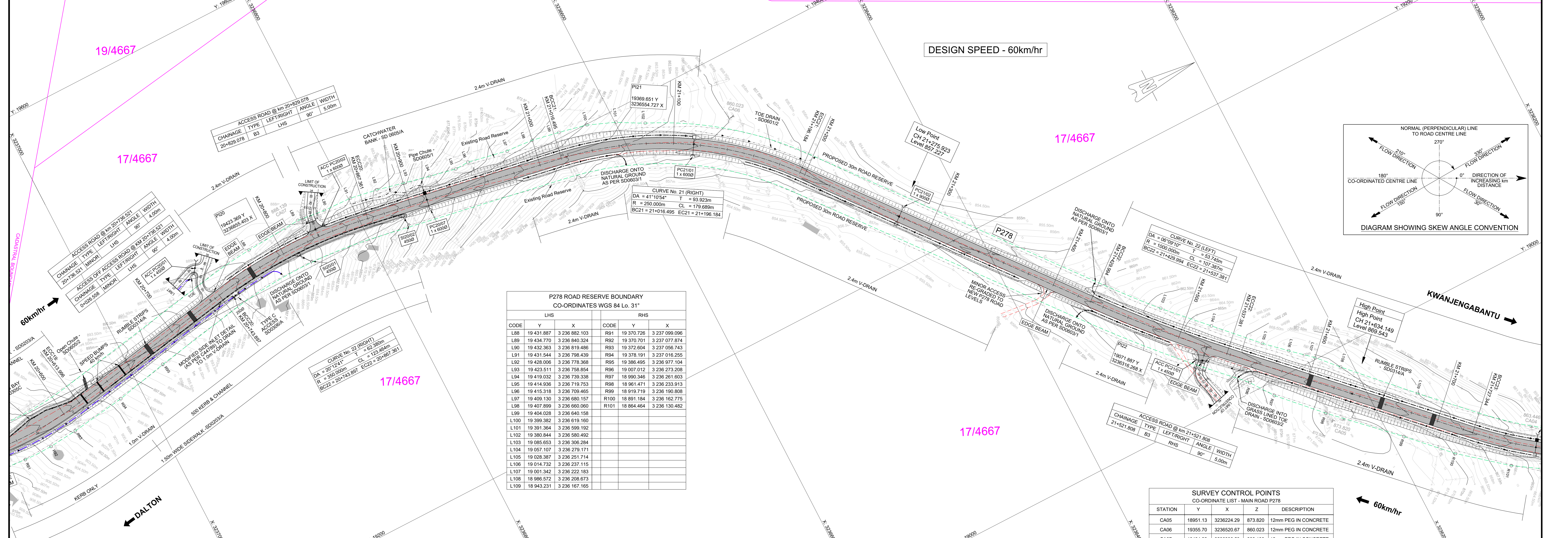
**SURVEY CONTROL POINTS**

STATION	Y	X	Z	DESCRIPTION
CA08	19373.53	3237146.39	910.470	12mm PEG IN CONCRETE
CA09	19470.19	3237344.86	925.150	12mm PEG IN CONCRETE
CA10	19587.29	3237411.92	924.538	12mm PEG IN CONCRETE
CA11	19668.21	3237506.14	923.246	12mm PEG IN CONCRETE
CA12	20020.81	3237577.15	914.028	12mm PEG IN CONCRETE

**P278 ROAD RESERVE BOUNDARY**

CO-ORDINATES WGS 84 Lo. 31°					
LHS			RHS		
CODE	Y	X	CODE	Y	X
L81	19 658.785	3 237 460.855	R84	20 014.064	3 237 587.091
L82	19 643.830	3 237 449.428	R85	19 995.067	3 237 582.117
L83	19 626.840	3 237 441.058	R86	19 976.195	3 237 576.507
L84	19 479.605	3 237 313.220	R87	19 743.303	3 237 519.071
L85	19 469.616	3 237 297.480	R88	19 722.743	3 237 518.915
L86	19 461.373	3 237 281.122	R89	19 684.186	3 237 503.760
L87	19 463.382	3 237 263.955	R90	19 644.610	3 237 488.422
			R91	19 624.436	3 237 480.630
			R92	19 606.797	3 237 465.318
			R93	19 484.140	3 237 362.893
			R94	19 468.672	3 237 349.608
			R95	19 453.573	3 237 332.254
			R96	19 440.495	3 237 314.786
			R97	19 431.890	3 237 294.725
			R98	19 424.685	3 237 275.233
			R99	19 417.742	3 237 256.466
			R80	19 410.518	3 237 237.813
			R81	19 402.684	3 237 219.409
			R82	19 390.302	





**P278 ROAD RESERVE BOUNDARY**  
CO-ORDINATES WGS 84 Lo. 31°

CODE	Y	X	CODE	Y	X
L88	19 431.887	3 236 882.103	R91	19 370.726	3 237 099.096
L89	19 434.770	3 236 840.324	R92	19 370.701	3 237 077.874
L90	19 432.363	3 236 819.486	R93	19 372.604	3 237 056.743
L91	19 431.544	3 236 798.439	R94	19 378.191	3 237 016.255
L92	19 428.006	3 236 778.368	R95	19 386.495	3 236 977.104
L93	19 423.511	3 236 758.854	R96	19 007.012	3 236 273.208
L94	19 419.032	3 236 739.338	R97	19 990.346	3 236 261.603
L95	19 414.938	3 236 719.753	R98	19 961.471	3 236 233.913
L96	19 415.318	3 236 709.465	R99	19 919.719	3 236 190.808
L97	19 409.130	3 236 690.157	R100	19 891.184	3 236 162.775
L98	19 407.899	3 236 660.060	R101	18 864.464	3 236 130.482
L99	19 404.028	3 236 640.158			
L100	19 399.382	3 236 619.160			
L101	19 391.364	3 236 599.192			
L102	19 380.844	3 236 580.492			
L103	19 085.653	3 236 306.284			
L104	19 057.107	3 236 279.171			
L105	19 028.387	3 236 251.714			
L106	19 014.732	3 236 237.115			
L107	19 001.342	3 236 222.183			
L108	18 986.572	3 236 208.673			
L109	18 943.231	3 236 167.165			

**SURVEY CONTROL POINTS**  
CO-ORDINATE LIST - MAIN ROAD P278

STATION	Y	X	Z	DESCRIPTION
CA05	18951.13	3236224.29	873.820	12mm PEG IN CONCRETE
CA06	19355.70	3236520.67	860.023	12mm PEG IN CONCRETE
CA07	19434.22	3236836.59	888.139	12mm PEG IN CONCRETE

**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
<b>CURVE No. 20 RIGHT</b>			
BCC 20	20+743.897	19 412.440	R= 350.000m
PI 20	20+743.897	19 423.369	20° 12' 41"
ECC 20	20+867.361	19 412.398	T= 62.380m
<b>CURVE No. 21 RIGHT</b>			
BCC 21	21+106.495	19 398.169	R= 250.000m
PI 21	21+106.495	19 399.651	41° 10' 54"
ECC 21	21+196.184	19 396.339	T= 93.923m
<b>CURVE No. 22 LEFT</b>			
BCC 22	21+429.994	19 113.838	R= 1000.000m
PI 22	21+429.994	19 071.887	6° 09' 10"
ECC 22	21+537.381	19 033.779	T= 53.745m
<b>CURVE No. 23 LEFT</b>			
BCC 23	21+727.344	18 899.085	R= 300.000m
PI 23	21+727.344	18 847.943	27° 02' 14"
ECC 23	21+868.910	18 825.510	T= 72.126m

**ACCESS ROAD: @ 20 + 736.521 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	19 411.160	
BCC 1	0+010.490	19 421.480	R= 10.000m
PI 1	0+020.300	19 426.550	64° 50' 52"
ECC 1	0+020.001	19 430.240	T= 5.15m
END	0+036.400	19 442.000	

**ACCESS OFF ACCESS ROAD: @ 20 + 736.521 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	19 434.940	
BCC 1	0+002.300	19 436.540	R= 8.000m
PI 1	0+011.350	19 436.280	27° 35' 58"
ECC 1	0+026.630	19 432.860	T= 5.08m
END	0+036.400	19 442.000	

**ACCESS ROAD: @ 21 + 521.808 - RHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	19 044.910	
BCC 1	0+016.070	19 033.790	R= 10.000m
PI 1	0+029.790	19 029.790	59° 58' 50"
ECC 1	0+026.540	19 024.190	T= 5.77m
END	0+044.910	19 006.350	

**P278 1.0m V-Drain Behind Sidewalk**

From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction
20.755	20.875	120	Chute: SD 0603/1	-5.282	SD0601/2	1.0m Concrete		→

**GENERAL NOTES:**

- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
- ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
- EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
- CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
- MIN COVER = 600mm, MIN SLOPE = 2%.
- PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN DIA = 450mm FOR MINOR ACCESS ROADS.
- BOX CULVERTS = 1.8m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS = 1.8m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KZN-DT STANDARDS.
- FOR EROSION CONTROL GABION MATRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
- EARTH BERMS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
- ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
- GRASS/SEDIMENT LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINED V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
- SUBSOIL DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 150V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
- KERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
- WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
- THE POSITIONS OF ACCESSSES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEIGHTS AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESS SERVING SINGLE RESIDENTIAL PROPERTIES.
- GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
- EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
- UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
- ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
- ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH "COLTO" SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR SETTING OUT ROAD AUTHORITIES.
- ALL SURVEY AND SETTING OUT DATA PROVIDED ON WGS 84.
- NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOPSOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
- THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULA:  $s = (v/0.894 + 0.3 \pm G)^2$

**ACCESS ROAD: @ 20 + 829.078 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	19 417.060	
BCC 1	0+014.010	19 431.030	R= 15.000m
PI 1	0+029.790	19 434.700	27° 35' 58"
ECC 1	0+021.240	19 437.820	T= 3.68m
END	0+033.940	19 448.580	

**ACCESS ROAD: @ 21 + 521.808 - RHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°	Curve data
START	0+000.000	19 044.910	
BCC 1	0+016.070	19 033.790	R= 10.000m
PI 1	0+029.790	19 029.790	59° 58' 50"
ECC 1	0+026.540	19 024.190	T= 5.77m
END	0+044.910	19 006.350	

**P278 TOE DRAINS SCHEDULE**

From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction
21.120	21.190	70	-5.000	SD0601/2	Grassed	→	21.525	21.555	30	6.667	SD0601/2	Grassed	←

**P278 EDGE BEAM SCHEDULE**

Chainage	Type	Length (m)	Chainage	Type	Length (m)
20+736.521	Edge Beam	16.00	21+521.808	Edge Beam	5.00

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	HWD = 1.2	HEADWATER DEPTH (m)	INLET	OUTLET	REMARKS
20913	PC20/07	1 X 600 PC	75D	Class_C	20.1	270	873.485	873.375	2.3	0.0100	0.20	0.6	1.2	0.6	371	1.5/2.4 V-Drain Grid Inlet (SD 0602/B)	Pipe Culvert Headwall (SD 0406)	Daylighting required
21115	PC21/01	1 X 600 PC	75D	Class_C	17.4	90	859.330	858.990	2.0	0.0155	0.36	0.5	1.1	0.9	530	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
21276	PC21/02	1 X 900 PC	75D	Class_C	15.4	90	855.132	854.792	2.2	0.0800	0.92	0.6	1.6	0.8	746	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS 20+736.521 @ 00+026.558 RHS	ACC PC 20/1	6.126	1 X 450 PC	NEW	75D	Class_C	6.272	315	889.309	888.938	5.9	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406
ACCESS @ 20+829.078 LHS	ACC PC 20/2	5.903	1 X 600 PC	NEW	75D	Class_C	14.135	90	884.930	883.442	10.5	Depressed Inlet - 0405/A	Pipe Culvert Headwall - SD 0406
ACCESS @ 21+521.808 RHS	ACC PC 21/01	10.599	1 X 450 PC	NEW	75D	Class_C	8.992	90	864.454	864.274	2.0	Depressed Inlet - 0405/A	Pipe Culvert Headwall - SD 0406

**P278 SIDE INLET SCHEDULE**

CHAINAGE	ID	PIPE SIZE	PIPE CLASS	BEDDING TYPE	PIPE LENGTH (m)	SKREW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
20809.800	SI20/01	1 X 450	75D	Class_C	6.7	50	886.537	885.331	3.1	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
20892.534	SI20/02	1 X 450	75D	Class_C	4.0	50	876.742	876.599	3.6	Side Inlet (S1) (SD 0703/A)	Pipe Culvert Headwall (SD 0406)	Daylighting and Reno mattress

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE						RIGHT HAND SIDE											
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Drain Lining	Subsoil Drain	Flow Direction
20.755	20.824	69	Access Pipe Crossing	-5.282	SD0601/4	1.5m Concrete		→	20.985	20.992	7		-12.867	SD0601/4	1.5m Concrete		→
20.835	20.913	78	Grid Inlet SD 0602/B	-12.867	SD0601/4	1.5m Concrete		→	20.992	21.060	68	Chute: SD 0603/1	-3.568	SD0601/4	1.5m Concrete		→
20.913	20.982	80		-12.867	SD0601/4	1.5m Concrete		→	21.055	21.265	110		-3.568	SD0601/4	1.5m Concrete		→
20.992	21.115	123	Grid Inlet SD 0602/B	-3.568	SD0601/4	1.5m Concrete		→	21.265	21.276	11	Grid Inlet SD 0602/B	2.923	SD0601/4	1.5m Concrete		→
									21.276	21.375	99		2.923	SD0601/4	1.5m Concrete		→
21.430	21.459	29	Chute: SD 0603/1	2.923	SD0601/4	2.4m Concrete		←	21.430	21.459	29	Chute: SD 0603/1	2.923	SD0601/4	1.5m Concrete		←
21.459	21.634	176		7.180	SD0601/4	2.4m Concrete		←	21.459	21.495	36		7.180	SD0601/4	1.5m Concrete		←
									21.560	21.634	74		7.180	SD0601/4	1.5m Concrete		←
21.634	21.653	18		7.180	SD0601/4	2.4m Concrete		←	21.634	21.653	18		7.180	SD0601/4	1.5m Concrete		←
21.653	21.775	122	Grid Inlet SD 0602/B	-9.457	SD0601/4	2.4m Concrete		←	21.653	21.775	122	Grid Inlet SD 0602/B	-9.457	SD0601/4	1.5m Concrete		←

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE						RIGHT HAND SIDE							
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction
21.120	21.190	70	-5.000	SD0601/2	Grassed	→	21.525	21.555	30	6.667	SD0601/2	Grassed	←

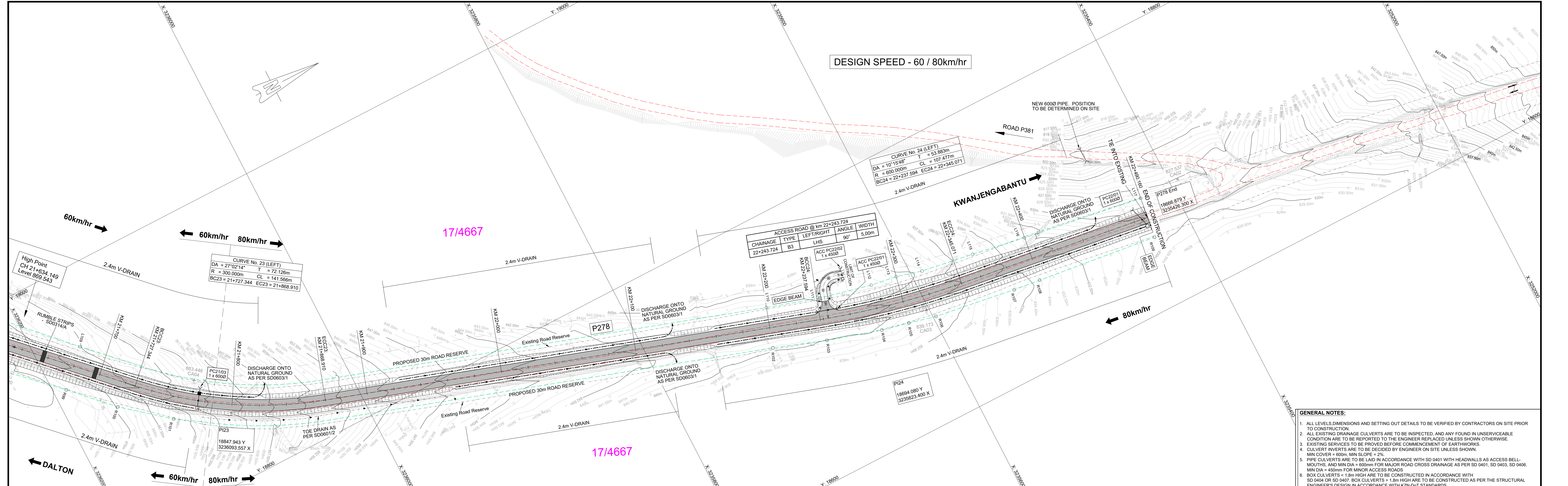
**P278 EDGE BEAM SCHEDULE**

Chainage	Type	Length (m)	Chainage	Type	Length (m)
20+736.521	Edge Beam	16.00	21+521.808	Edge Beam	5.00

**P278 SIDEWALK SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
Chainage	Type	Length (m)	Width (m)	Chainage	Type	Length (m)	Width (m)
20+736.521	Edge Beam	16.00	385	20+530	Edge Beam	385	1.50
20+829.078	Edge Beam	5.00					





DESIGN SPEED - 60 / 80km/hr

- GENERAL NOTES:**
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS TO BE VERIFIED BY CONTRACTORS ON SITE PRIOR TO CONSTRUCTION.
  - ALL EXISTING DRAINAGE CULVERTS ARE TO BE INSPECTED, AND ANY FOUND IN UNSERVICEABLE CONDITION ARE TO BE REPORTED TO THE ENGINEER REPLACED UNLESS SHOWN OTHERWISE.
  - EXISTING SERVICES TO BE PROVIDED BEFORE COMMENCEMENT OF EARTHWORKS.
  - CULVERT INVERTS ARE TO BE DECIDED BY ENGINEER ON SITE UNLESS SHOWN.
  - PIPE CULVERTS ARE TO BE LAID IN ACCORDANCE WITH SD 0401 WITH HEADWALLS AS ACCESS BELL-MOUTHS, AND MIN DIA = 600mm FOR MAJOR ROAD CROSS DRAINAGE AS PER SD 0401, SD 0403, SD 0406. MIN COVER = 600mm. MIN SLOPE = 2%.
  - BOX CULVERTS < 1.2m HIGH ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SD 0404 OR SD 0407. BOX CULVERTS > 1.2m HIGH ARE TO BE CONSTRUCTED AS PER THE STRUCTURAL ENGINEER'S DESIGN IN ACCORDANCE WITH KZN DDT STANDARDS.
  - FOR EROSION CONTROL GABION MATTRESSES ARE RECOMMENDED AT CULVERT INLETS AND OUTLETS.
  - EARTH BERMS ARE TO BE CONSTRUCTED AT CULVERT INLETS TO DIRECT STORM-WATER INTO CULVERTS WHERE NECESSARY.
  - ROCK BOLSTERS ARE TO BE PLACED ACROSS THE INVERT OF DRAINS SUSCEPTIBLE TO EROSION FOR EVERY 2m VERTICAL DROP.
  - GRAVELLED CONCRETE LINED V-DRAINS AS PER SD 0601/3 & 4 ARE RECOMMENDED FOR SHALLOW CUTTINGS OF DEPTH LESS THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY. CONCRETE LINE 1500 V-DRAINS AS PER SD 0601/2 ARE RECOMMENDED FOR DEEP CUTTINGS OF DEPTH GREATER THAN 5m MEASURED AT A POINT 6m FROM EDGE OF CARRIAGEWAY.
  - SURFACE DRAINS AS PER SD 0501 ARE TO BE INSTALLED WITH 1500 V-DRAINS OR WHERE HIGH WATER TABLES ARE ENCOUNTERED.
  - HERB AND CHANNEL DRAINS AS PER 0701 ARE TO BE PROVIDED WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT.
  - WHERE SURFACE RUNOFF IS TOWARD THE ROAD, CATCH-WATER BANKS ARE TO BE PROVIDED TO DIVERT STORM-WATER TO MAJOR CROSS DRAINAGE STRUCTURES.
  - THE POSITIONS OF ACCESSORIES ARE TO BE DETERMINED IN CONSULTATION WITH THE LOCAL COMMUNITY. DAYLIGHTING REQUIREMENTS ARE TO BE DECIDED BY THE ENGINEER ON SITE. CONCRETE WEDGES AS PER SD 0303 MAY BE USED IN PLACE OF SURFACE BELL-MOUTHS FOR ACCESSES SERVING SINGLE RESIDENTIAL PROPERTIES.
  - GUARDRAILS ARE TO BE INSTALLED IN ACCORDANCE WITH SD 1101 AND SD 1102 WHERE FILL EMBANKMENTS EXCEED 3m IN HEIGHT OR WHERE HAZARDOUS OBSTRUCTION CANNOT BE REMOVED.
  - EXISTING ROAD SIGNS, SERVICES AND FENCING AFFECTED BY CONSTRUCTION ARE TO BE REMOVED/RELOCATED WHERE NECESSARY.
  - UNDERGROUND SERVICE CROSSINGS AND MARKERS ARE TO BE IN ACCORDANCE WITH SD 1001 - 3.
  - ALL NEW ROAD SIGNS AND ROAD MARKING REQUIREMENTS ARE TO CONFORM TO THE SOUTHERN AFRICAN ROAD TRAFFIC SIGNS MANUAL (SARTSM).
  - ALL WORK IS TO BE CARRIED OUT IN ACCORDANCE WITH COLTO SPECIFICATIONS FOR ROAD AND BRIDGE WORKS FOR STATE ROAD AUTHORITIES.
  - ALL SURVEY AND SETTING OUT DATA PROVIDED ON WGS 84.
  - NEW FILLS AND EXPOSED CUTTINGS ARE TO BE TOP-SOILED AND VEGETATED IMMEDIATELY AFTER CONSTRUCTION TO PREVENT EROSION.
  - THE CALCULATED REQUIRED SSDs WERE OBTAINED WITH CONSIDERATION TO P278 LONGITUDINAL GRADES USING THE FORMULA  $s = \sqrt{0.094 + 0.3 \pm g}$

**P278: HORIZONTAL ALIGNMENT DATA**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
<b>CURVE No. 23 LEFT</b>				
BCC 23	21+727.344	18 899.085	3 236 144.417	R= 300.000m
PI 23	18 847.943	3 236 093.557		T= 27° 02' 14"
ECC 23	21+868.910	18 825.510	3 236 025.008	Lc= 141.566m
<b>CURVE No. 24 LEFT</b>				
BCC 24	22+237.594	18 710.839	3 235 674.610	R= 600.000m
PI 24	18 694.080	3 235 623.400		T= 10° 15' 48"
ECC 24	22+345.071	18 686.714	3 235 570.023	Lc= 53.883m
END	22+490.156	18 666.879	3 235 426.300	T= 107.477m

**ACCESS ROAD: @ 22+243.724 - LHS**

Point	Chainage	CO-ORDINATES WGS 84 Lo. 31°		Curve data
		Y	X	
START	0+000.000	18 708.970	3 235 668.770	
BCC 1	0+010.640	18 719.170	3 235 665.760	R= 20.000m
PI 1	0+029.640	18 729.040	3 235 662.850	T= 54° 26' 24"
ECC 1	0+029.640	18 732.410	3 235 653.120	Lc= 10.29m
END	0+033.320	18 733.610	3 235 649.650	

**P278 CULVERTS SCHEDULE**

CHAINAGE	CULVERT ID	CULVERT SIZE	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	CATCHMENT AREA (km²)	DESIGN Q (m³/s)	FR No	VELOCITY (m/s)	HWD = 1.2	HEADWATER DEPTH (mm)	INLET	OUTLET	REMARKS
21775	PC21/03	1 X 600 PC	75D	Class_C	14.3	90	861.940	861.509	3.0	0.0038	0.06	0.8	1.4	0.5	306	1.5/2.4 V-Drain Depressed Inlet (SD 0405/A)	Pipe Culvert Headwall (SD 0406)	Daylighting required
22491	PC22/01	1 X 600 PC	75D	Class_C	18.2	245	828.194	827.823	2.0	0.0064	0.10	0.7	1.2	0.5	317	1.5/2.4 V-Drain Grid Inlet (SD 0602/B)	Pipe Culvert Headwall (SD 0406)	Daylighting required

**P278 ACCESS CULVERT SCHEDULE**

ACCESS NAME	CULVERT REF	ACCESS CHAINAGE (m)	CULVERT SIZE	CULVERT STATUS	PIPE CLASS	BEDDING TYPE	CULVERT LENGTH (m)	SKEW	INLET LEVEL	OUTLET LEVEL	GRADE (%)	INLET	OUTLET	REMARKS
ACCESS @ 22+243.724 LHS	ACC PC 22/01	6.035	1 X 450 PC	NEW	75D	Class_C	12.638	90	836.326	836.011	2.5	Pipe Culvert Headwall - SD 0406	Pipe Culvert Headwall - SD 0406	
ACCESS 22+243.724 @ 00+041.108 RHS	ACC PC 22/02	41.108	1 X 450 PC	NEW	75D	Class_C	10.716	90	838.882	838.613	2.5	Depressed Inlet - 0405/A	Pipe Culvert Headwall - SD 0406	Daylight required

**P278 ROAD SIDE DRAINAGE SCHEDULE**

LEFT HAND SIDE						RIGHT HAND SIDE									
From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Subsoil Drain	Flow Direction	From km	To km	Length (m)	Discharge Type	Grade (%)	Drain Type	Subsoil Drain	Flow Direction
21653	21775	122	Grid Inlet SD 0602/B	-9.457	SD0601/4	2.4m Concrete	→	21653	21775	122	Grid Inlet SD 0602/B	-9.457	SD0601/4	1.5m Concrete	→
21775	21820	45	Chute SD 0603/1	-9.457	SD0601/4	2.4m Concrete	→	21965	21978	13	Chute SD 0603/1	-9.457	SD0601/4	1.5m Concrete	→
21925	21978	53	Chute SD 0603/1	-1.386	SD0601/4	2.4m Concrete	→	21978	22125	147	Chute SD 0603/1	-1.386	SD0601/4	1.5m Concrete	→
21978	22125	147	Access Pipe Crossing	-1.386	SD0601/4	2.4m Concrete	→	22160	22263	103	Chute SD 0603/1	-1.386	SD0601/4	1.5m Concrete	→
22248	22263	15		-1.386			→	22263	22418	155	Grid Inlet SD 0602/B	-5.727	SD0601/4	1.5m Concrete	→
22263	22418	155	Chute SD 0603/1	-5.727	SD0601/4	2.4m Concrete	→	22418	22489	71	Grid Inlet SD 0602/B	-2.084	SD0601/4	1.5m Concrete	→
22418	22450	32	Chute SD 0603/1	-2.084	SD0601/4	2.4m Concrete	→								

**P278 TOE DRAINS SCHEDULE**

LEFT HAND SIDE						RIGHT HAND SIDE							
From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction	From km	To km	Length (m)	Slope (%)	Drain type	Drain lining	Flow direction
21.780	21.960	180	-9.444	SD0601/2	Grassed	→							

**P278 EDGE BEAM SCHEDULE**

LEFT HAND SIDE				RIGHT HAND SIDE			
Chainage	Type	Length (m)	Chainage	Type	Length (m)		
22+243.724	Edge Beam	5.00					

**P278 INTERSECTION SCHEDULE**

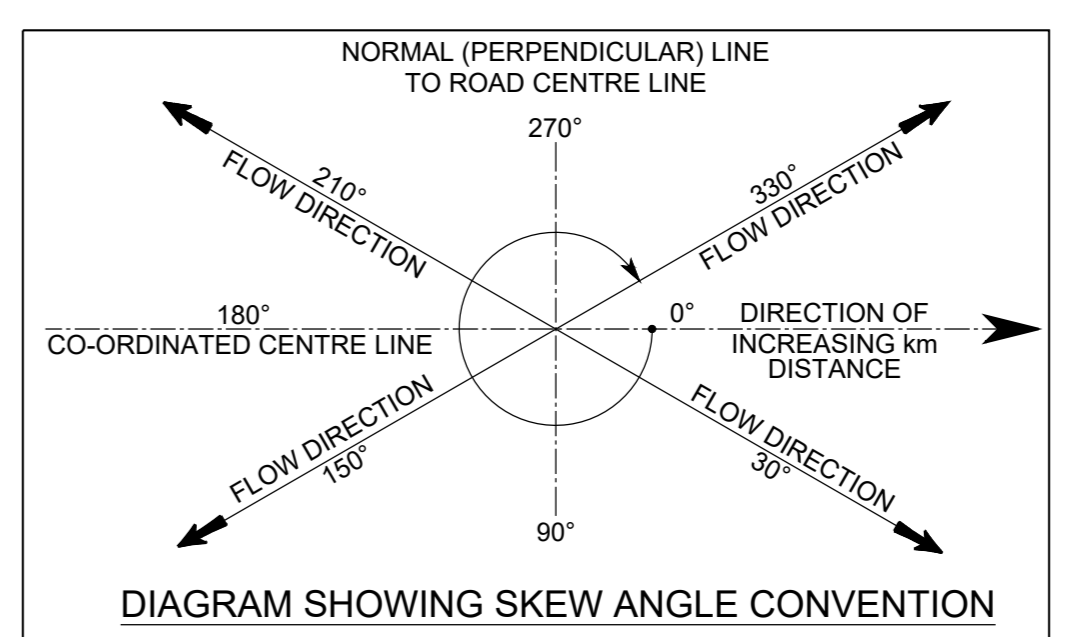
Item No.	ACCESS NAME	CHAINAGE (m)	TYPE OF INTERSECTION	DESIGN SPEED	LEFT HAND SIDE SIGHT DISTANCES BASED ON GRADE				REMARKS		
					REQD SSD LHS (m)	AVAIL SSD LHS (m)	REQD SSD RHS (m)	AVAIL SSD RHS (m)			
15	Acc RD 22+243.724	22+243.724	B3	60	62	450	88	242	180	176	ok

**P278 ROAD RESERVE BOUNDARY**

LHS				RHS			
CODE	Y	X	CODE	Y	X		
L109	18 943.231	3 236 167.165	R99	18 919.719	3 236 190.808		
L110	18 736.808	3 235 705.667	R100	18 891.184	3 236 162.775		
L111	18 724.988	3 235 667.523	R101	18 864.464	3 236 130.482		
L112	18 716.066	3 235 629.618	R102	18 708.244	3 235 715.018		
L113	18 713.129	3 235 610.432	R103	18 694.926	3 235 677.229		
L114	18 708.063	3 235 591.632	R104	18 683.040	3 235 637.897		
L115	18 701.932	3 235 552.965	R105	18 678.550	3 235 617.843		
L116	18 695.126	3 235 513.599	R106	18 673.694	3 235 597.814		
L117	18 681.741	3 235 424.272	R107	18 664.651	3 235 537.808		
			R108	18 662.291	3 235 517.944		
			R109	18 651.552	3 235 428.415		

**SURVEY CONTROL POINTS**

STATION	Y	X	Z	DESCRIPTION
CA02	18681.63	3235393.68	827.537	12mm PEG IN CONCRETE
CA03	18680.99	3235601.98	839.173	12mm PEG IN CONCRETE
CA04	18882.80	3236103.86	863.446	12mm PEG IN CONCRETE



**NOTATION**

BCC	BEGINNING OF CIRCULAR CURVE
ECC	END OF CIRCULAR CURVE
PI	POINT OF INTERSECTION
R	RADIUS OF CIRCULAR CURVE
Lc	LENGTH OF CIRCULAR CURVE
T	LENGTH OF CURVE TANGENT
BT	BEGINNING OF TAPER

**LEGEND**

LEGEND	DESCRIPTION
[Symbol]	NEW ROAD SURFACE
[Symbol]	1.50m SIDEWALK - SD0203/A
[Symbol]	EXISTING ROAD
[Symbol]	1.0 V-DRAIN - SD0601/2
[Symbol]	2.4 V-DRAIN - SD0601/4
[Symbol]	TOE DRAIN - SD0601/2
[Symbol]	KERB & CHANNEL - SD0701/A
[Symbol]	CATCHWATER BANK - SD0605/A
[Symbol]	GUARDRAILS - SD1101/A & SD1102/A
[Symbol]	NEW ROAD RESERVE
[Symbol]	EXISTING ROAD RESERVE
[Symbol]	GRID INLET - SD0405/A
[Symbol]	DEPRESSED INLET - SD0405/A
[Symbol]	INLET INLET (S1) - SD0703/A
[Symbol]	SIDE INLET (D1) - SD0703/A
[Symbol]	SIDE DRAIN & GRID INLET - SD0602/B
[Symbol]	PIPE CHUTE - SD0605/1
[Symbol]	OPEN CHUTE - SD0605/2
[Symbol]	STONE PITCH
[Symbol]	RENO MATTRESS
[Symbol]	CHUTE - SD0603/A

**AS BUILT**

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

Continued from:-	C 44322	Designed by:-	T. PIKA
Continued on:-		Checked by:-	Y. DOMA
Cross Section No:-	C 47645 - C 47647	Drawn by:-	K. NAIDOO
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323	Date of approval:-	



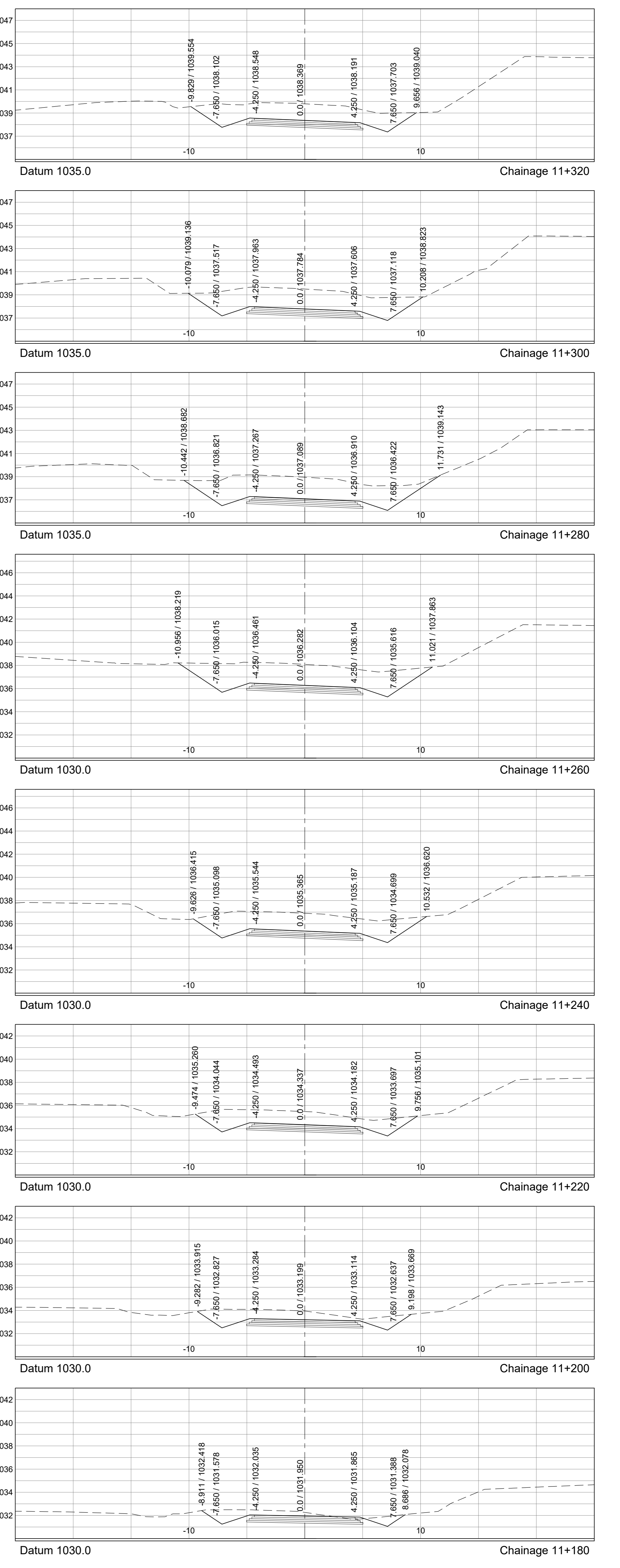
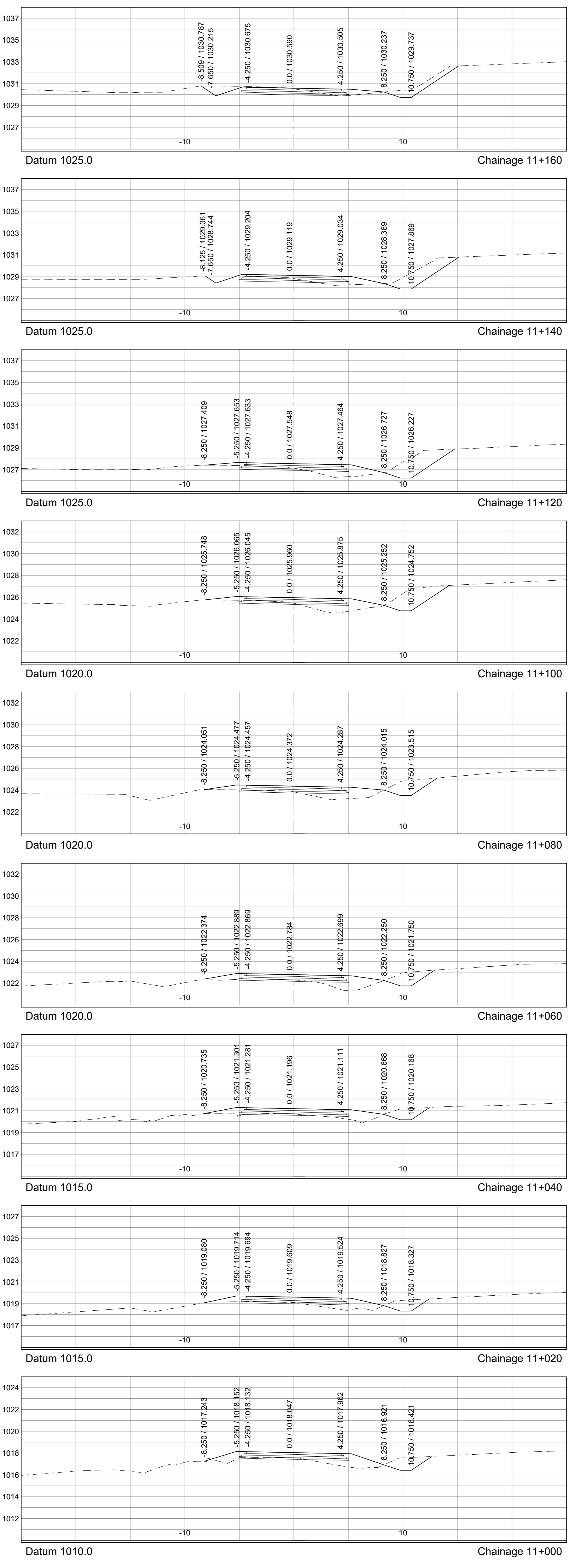
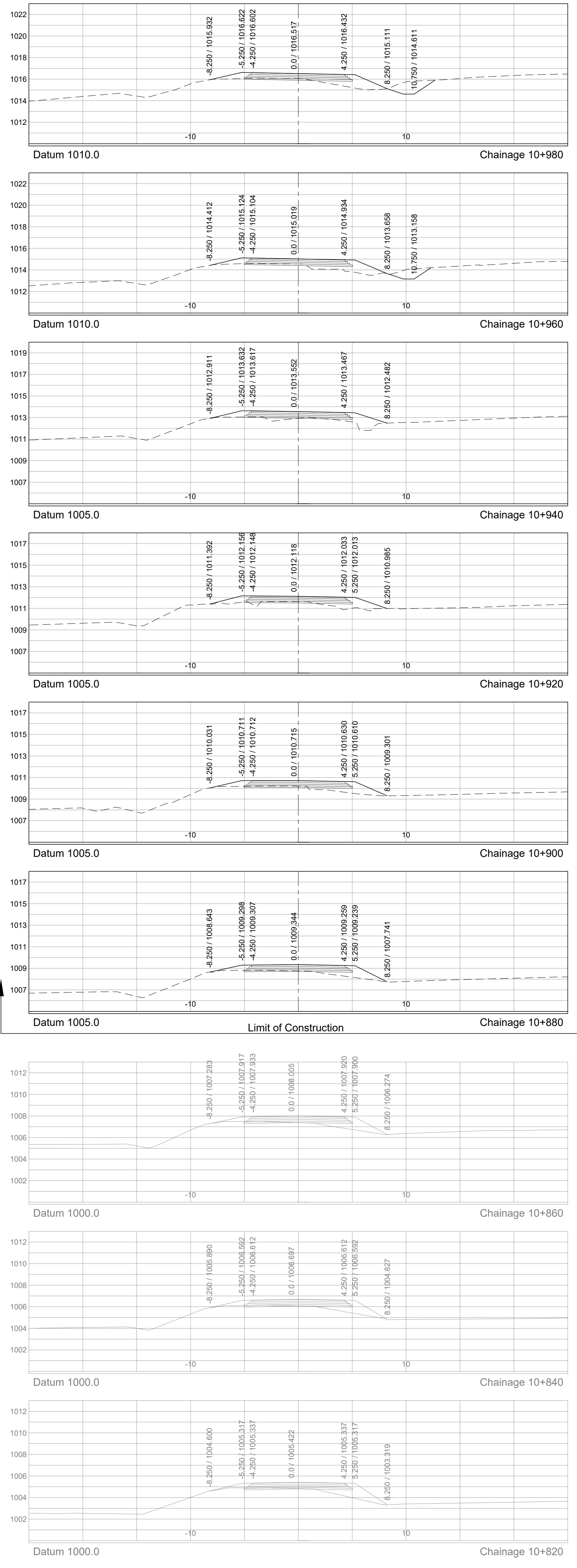
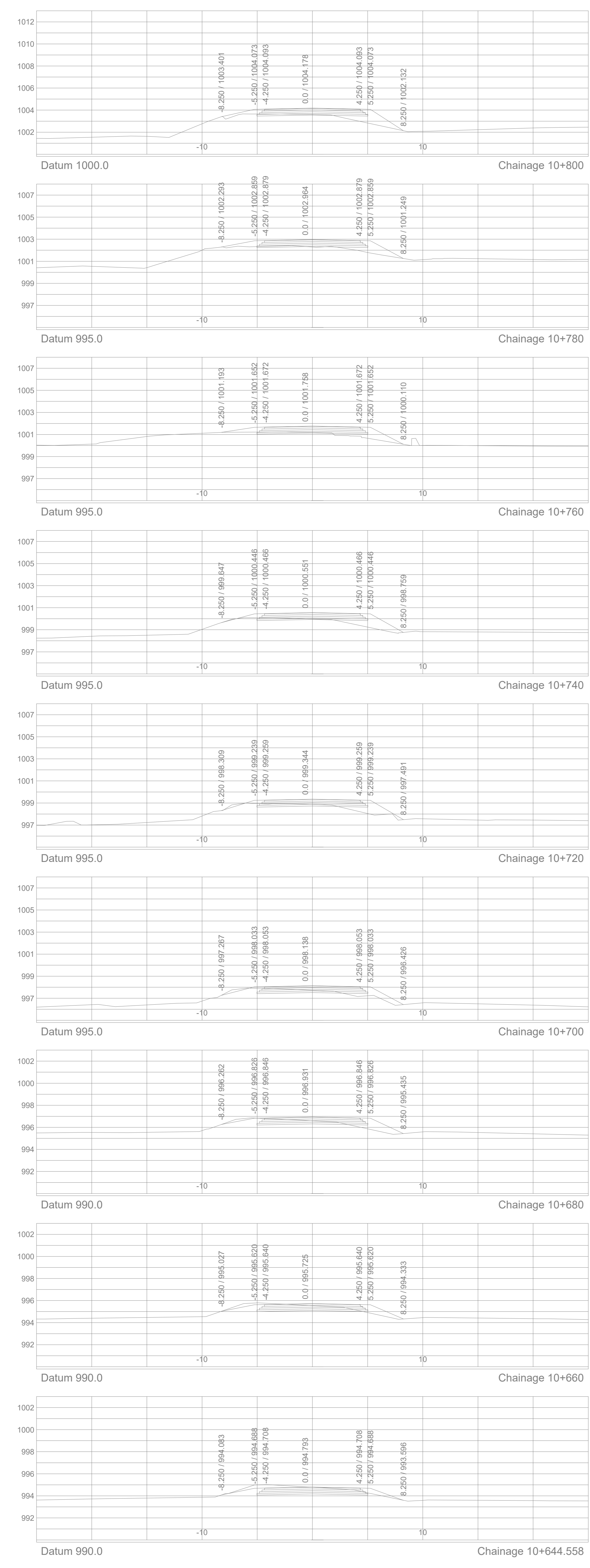
Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unbiased Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 DESIGN PLAN

Staked km distance	Sheet - 12	REVISION:
km 21+700 - km 22+491	of - 12	A
Scale	Plan No. -	
<b>1 : 1000</b>		<b>C 44323</b>

C 44323





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-  
 Continued on:-  
 Cross Section No:-  
 Longitudinal Section No:-  
 Design Plan No:-

Designed by:-  
 Checked by:-  
 Drawn by:-  
 Checked by:-  
 Date of approval:-



Designed by:-  
**emzansi**  
 ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

Scale  
 HORIZONTAL 1:200  
 VERTICAL 1:200

Staked km distance  
 km 10+644 - km 11+320

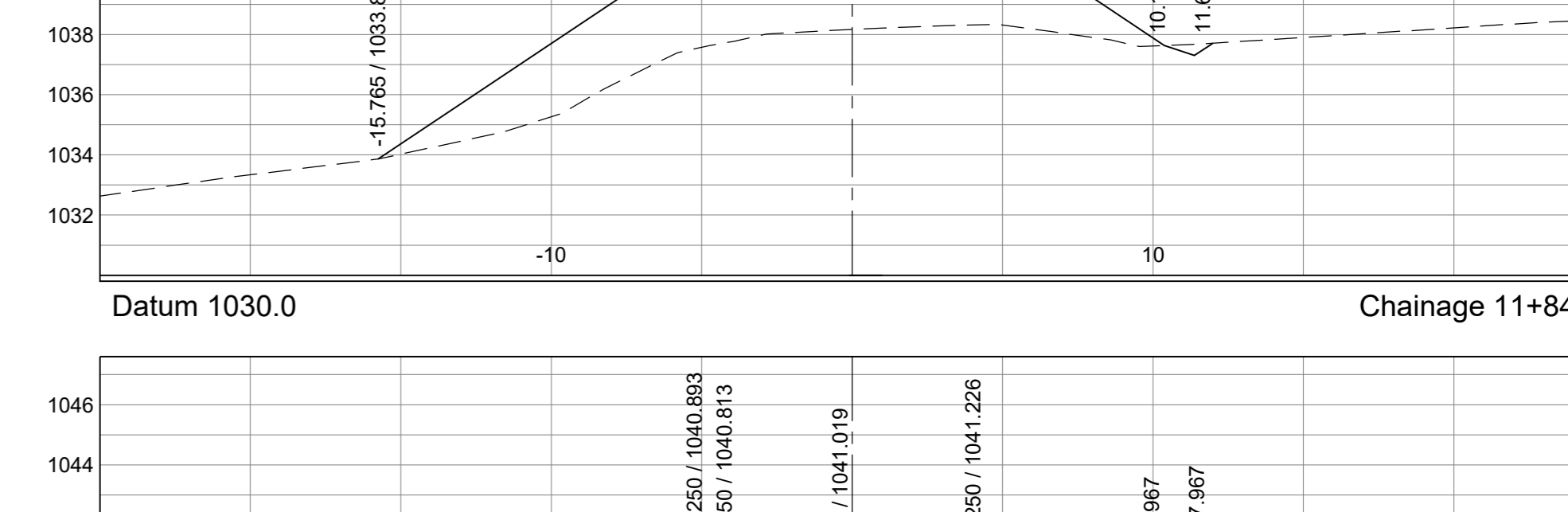
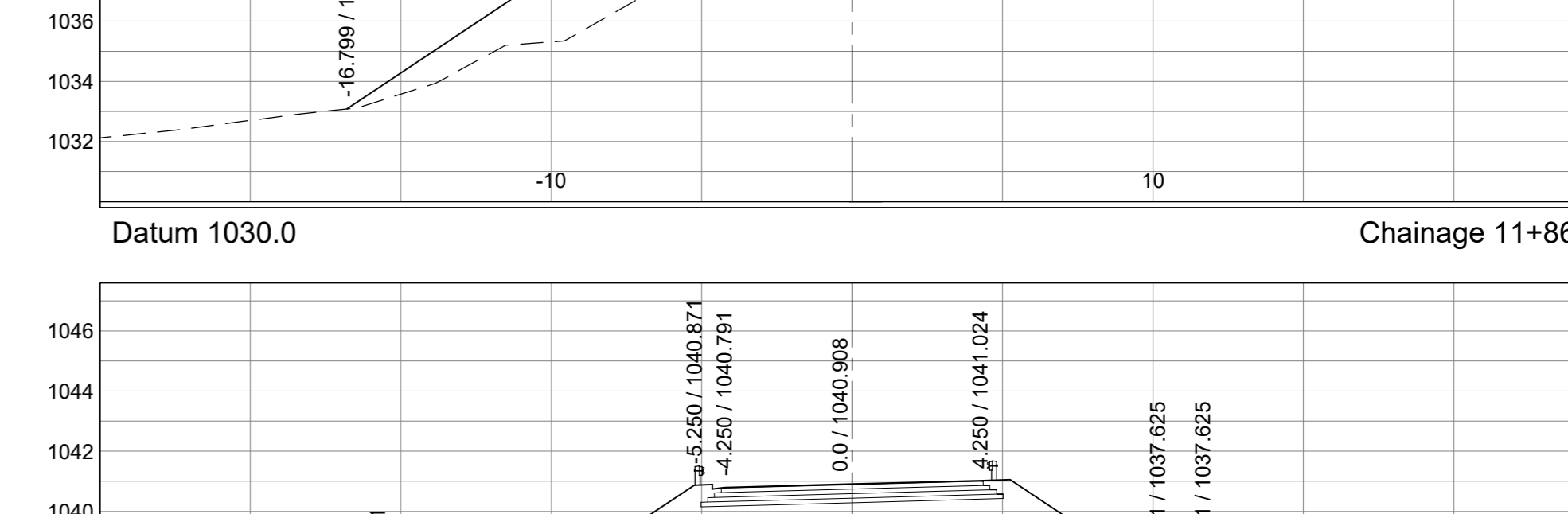
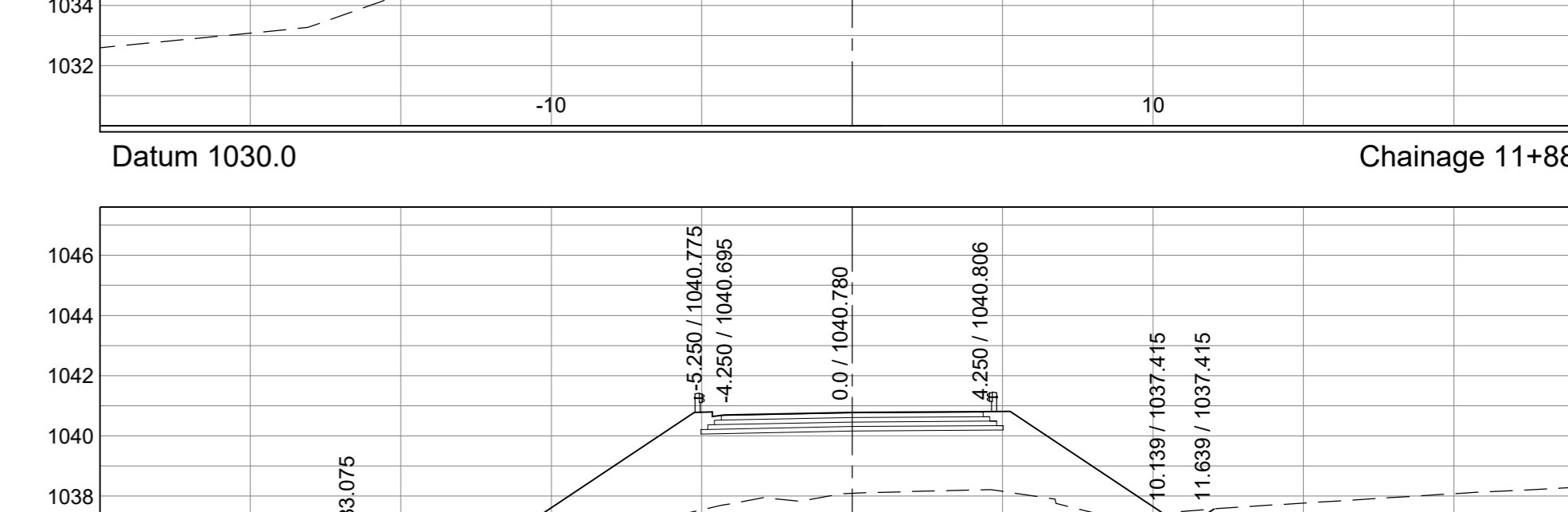
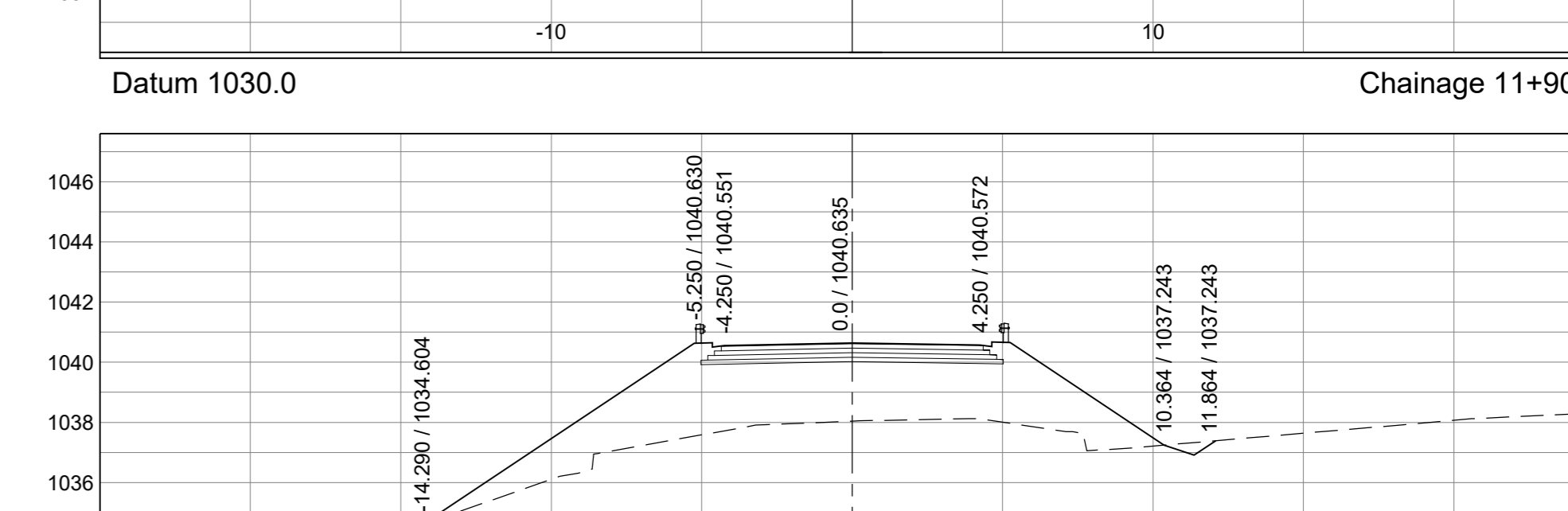
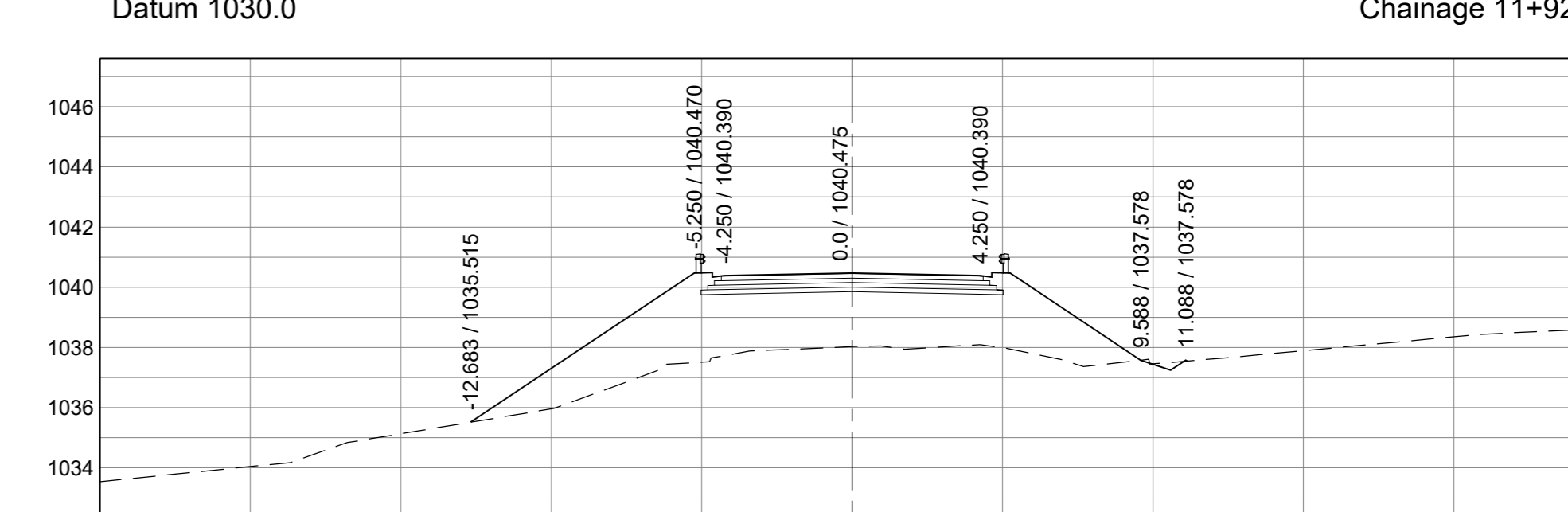
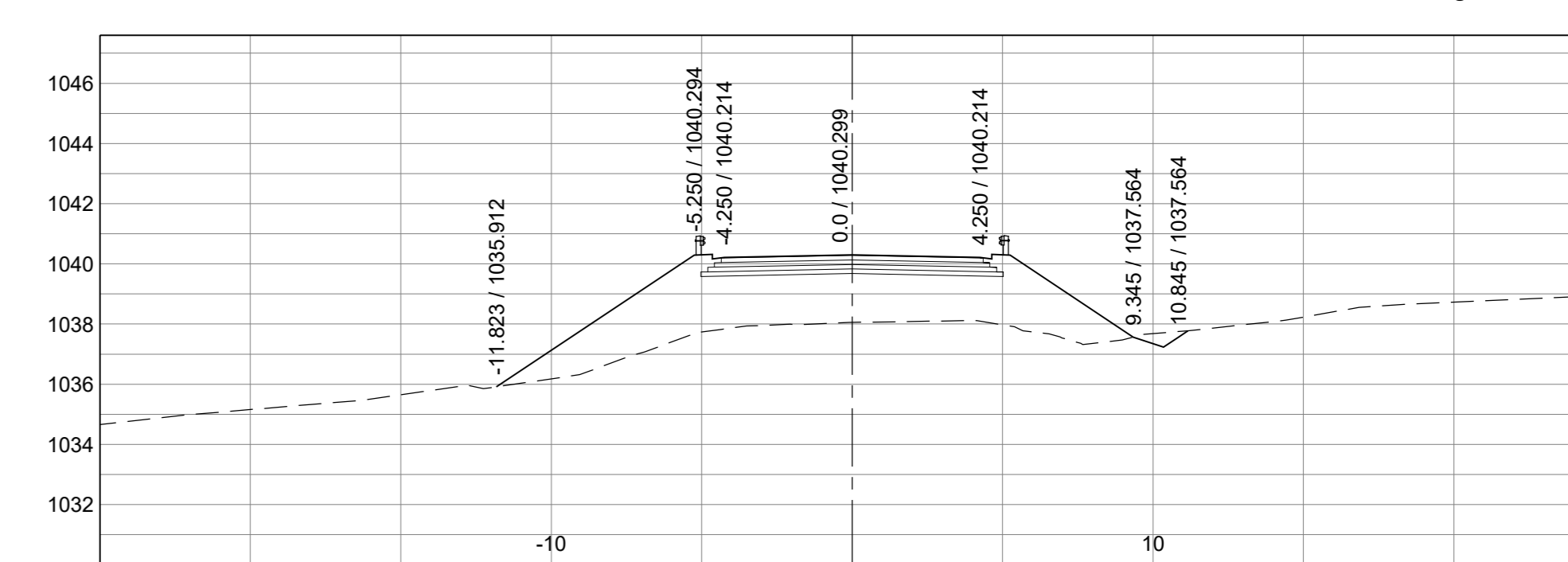
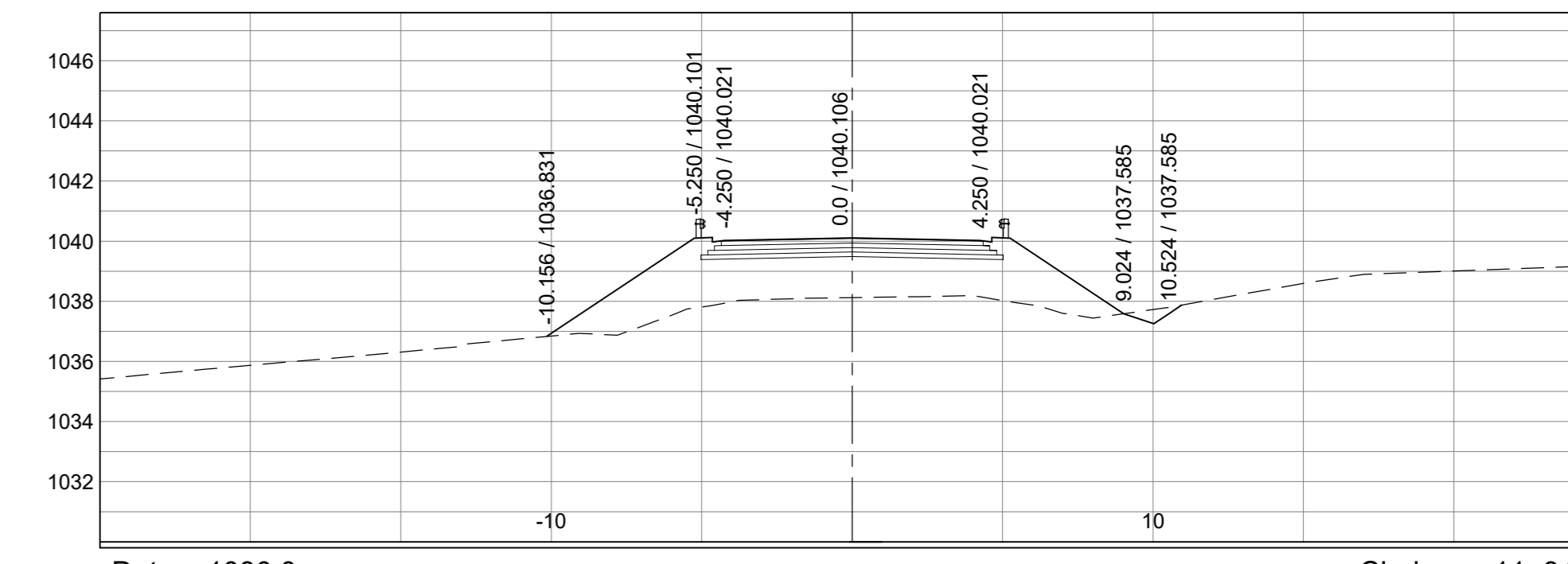
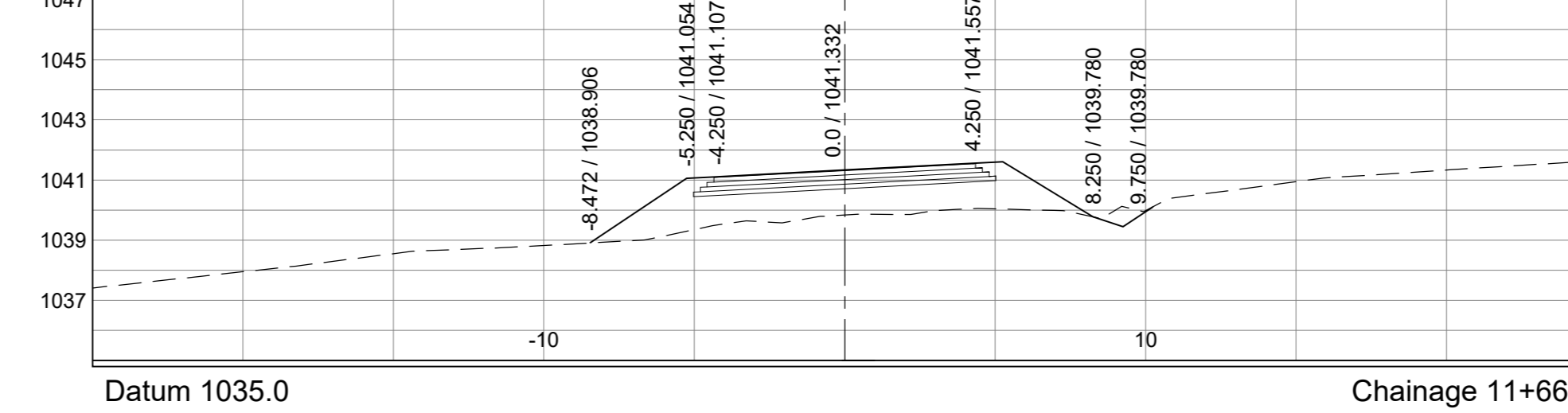
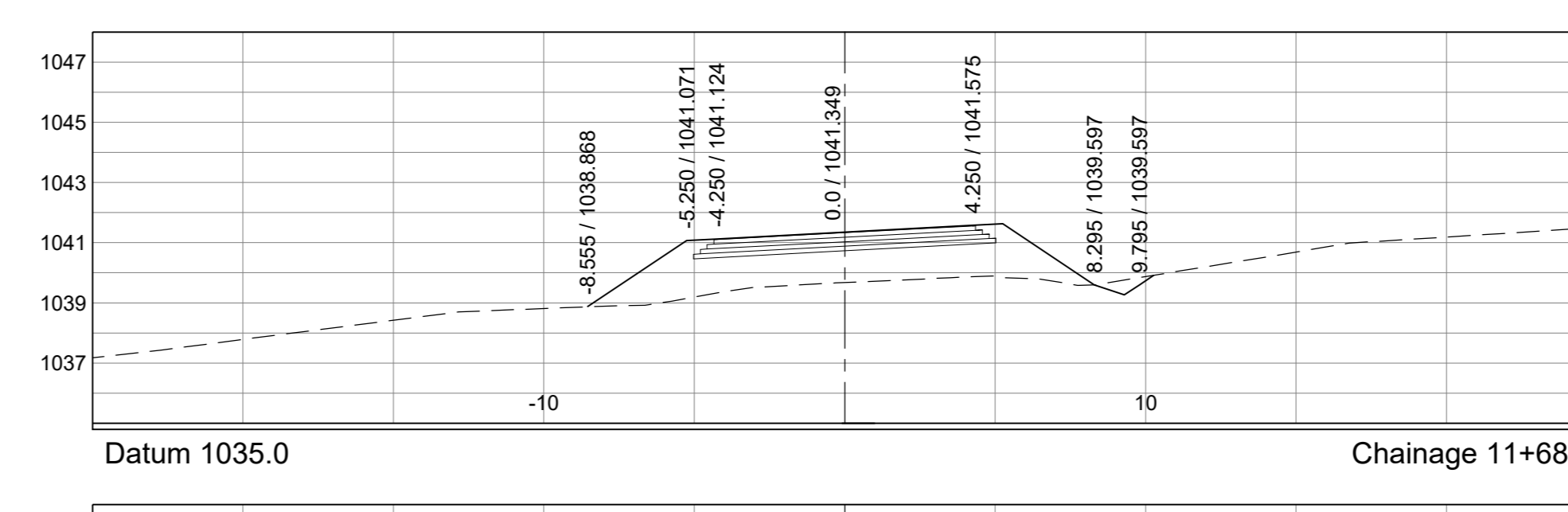
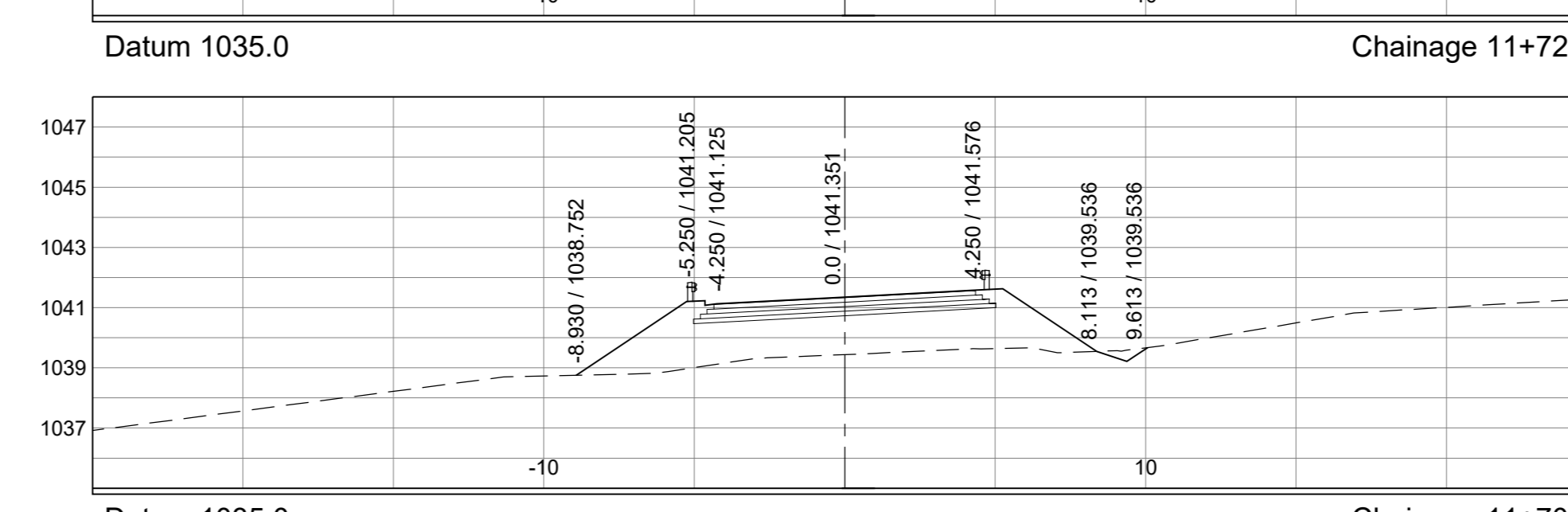
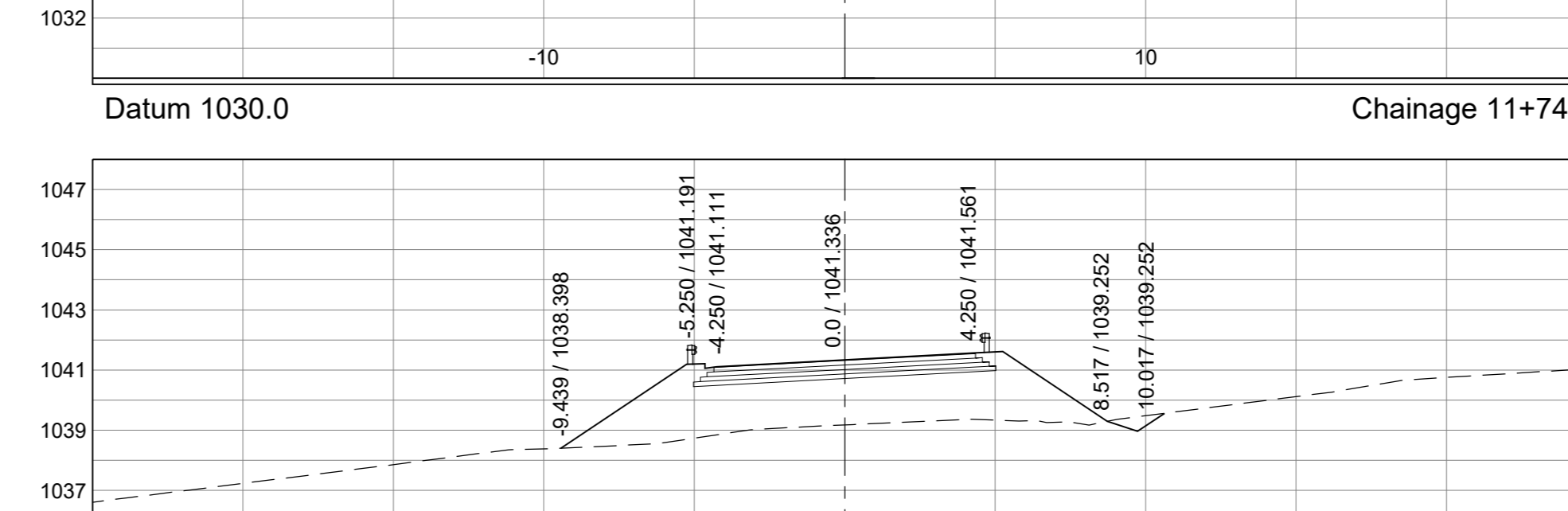
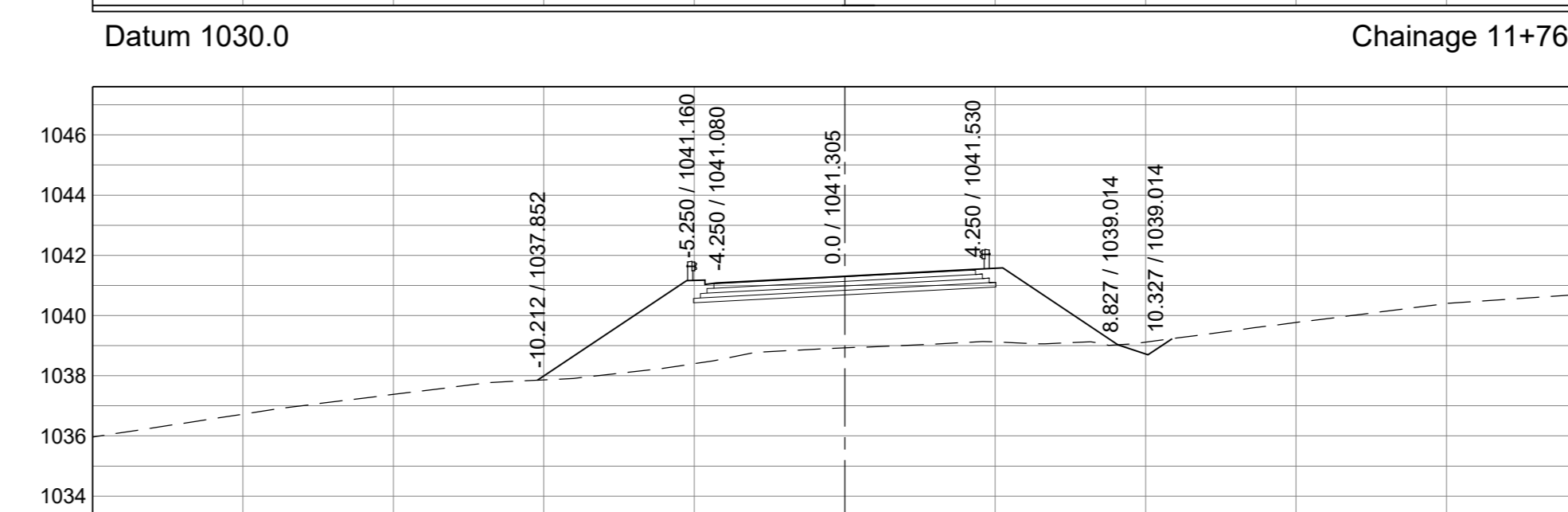
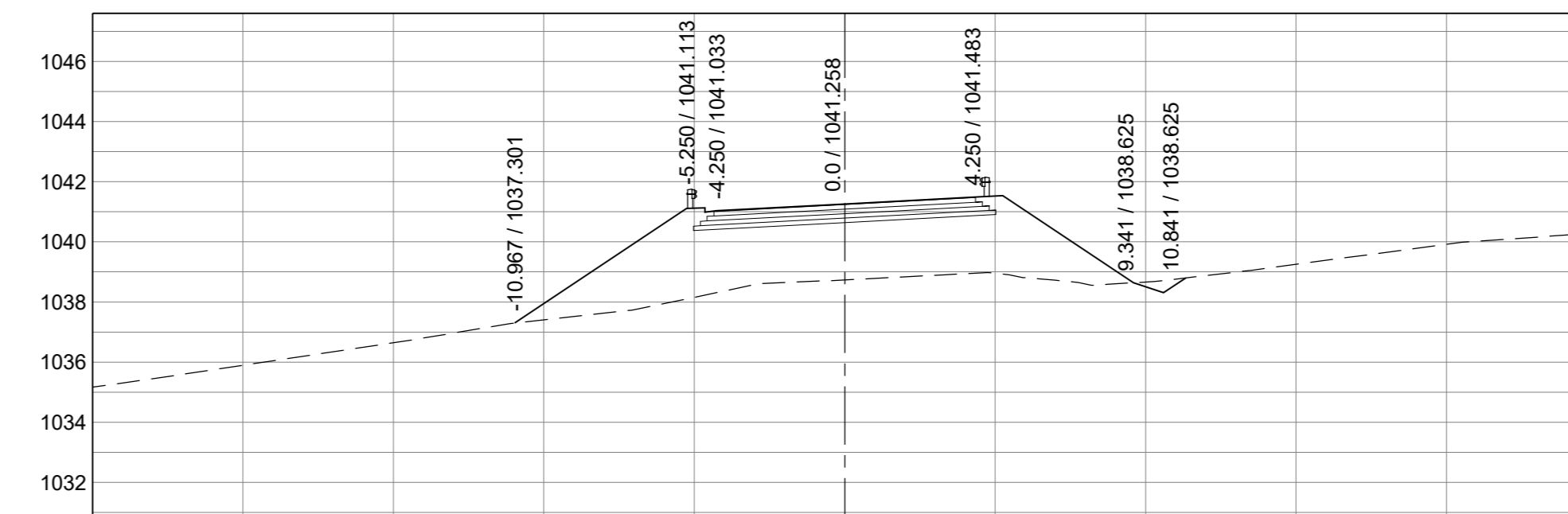
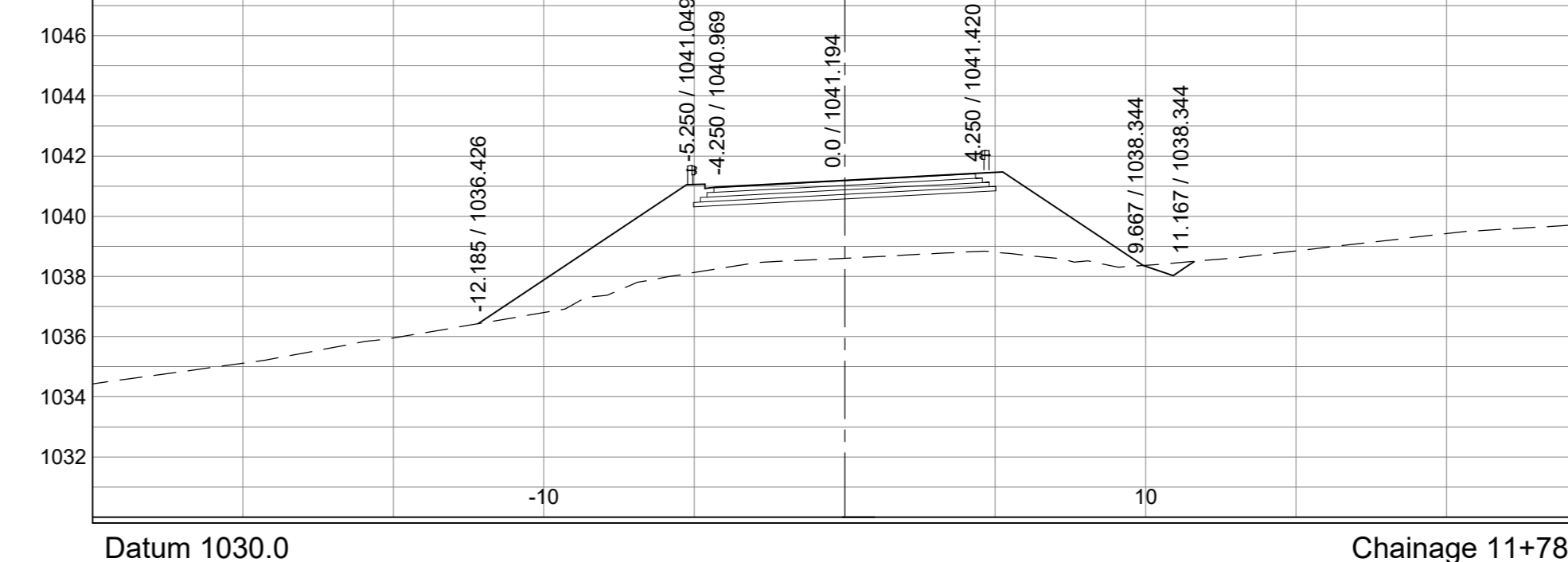
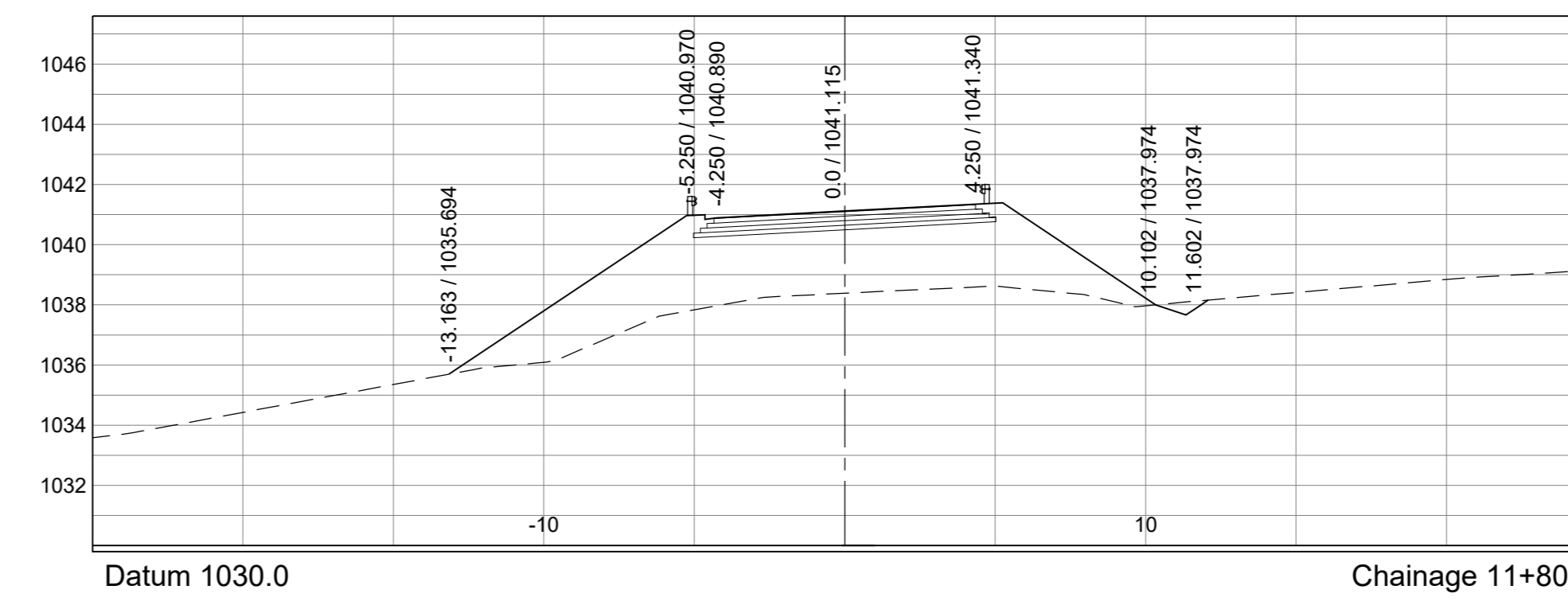
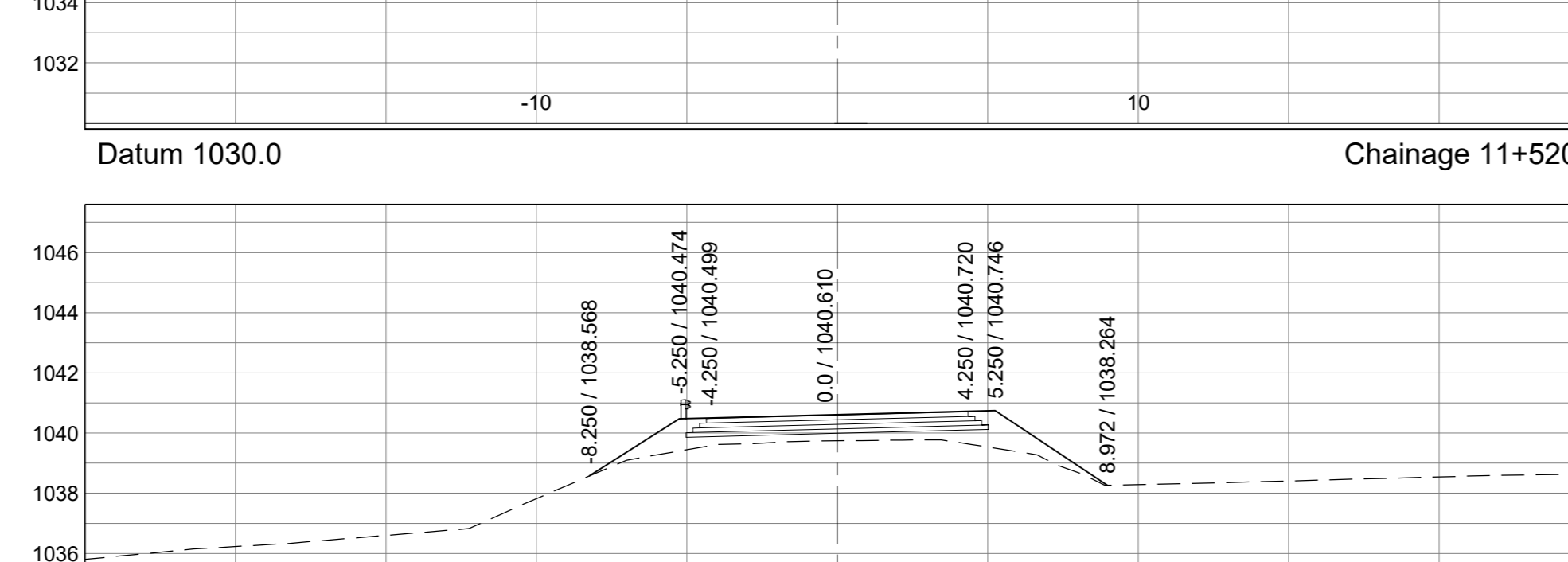
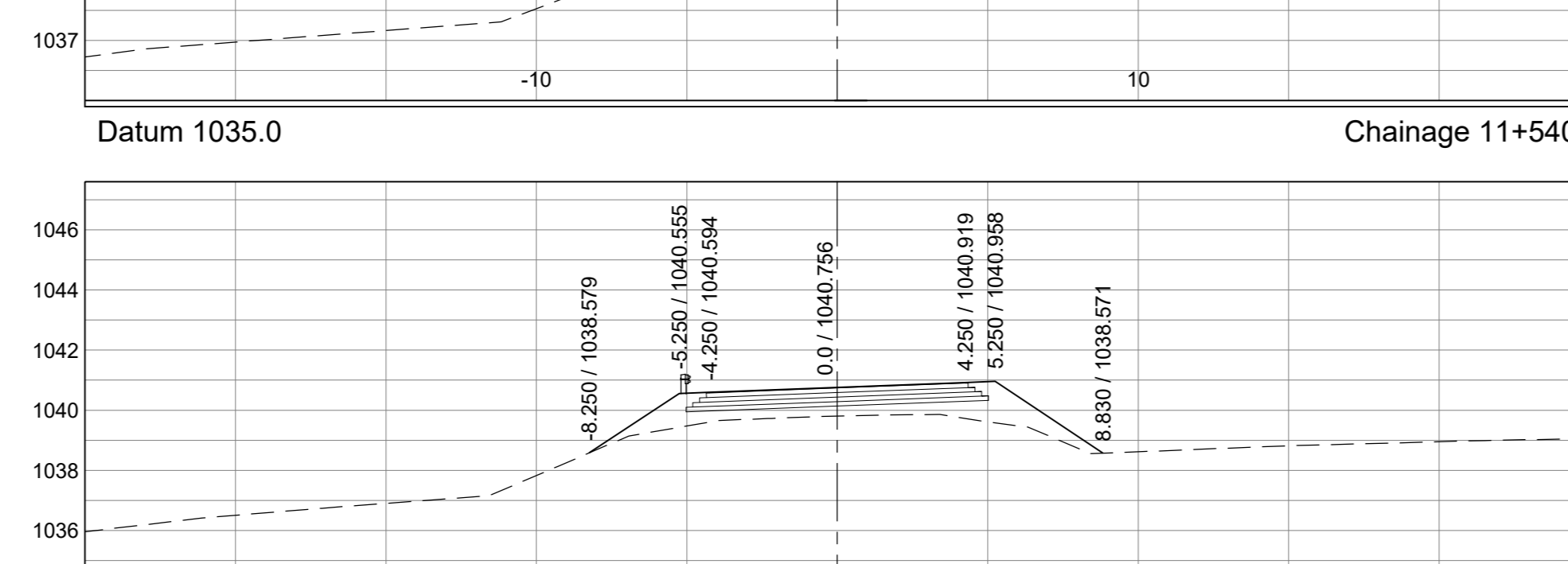
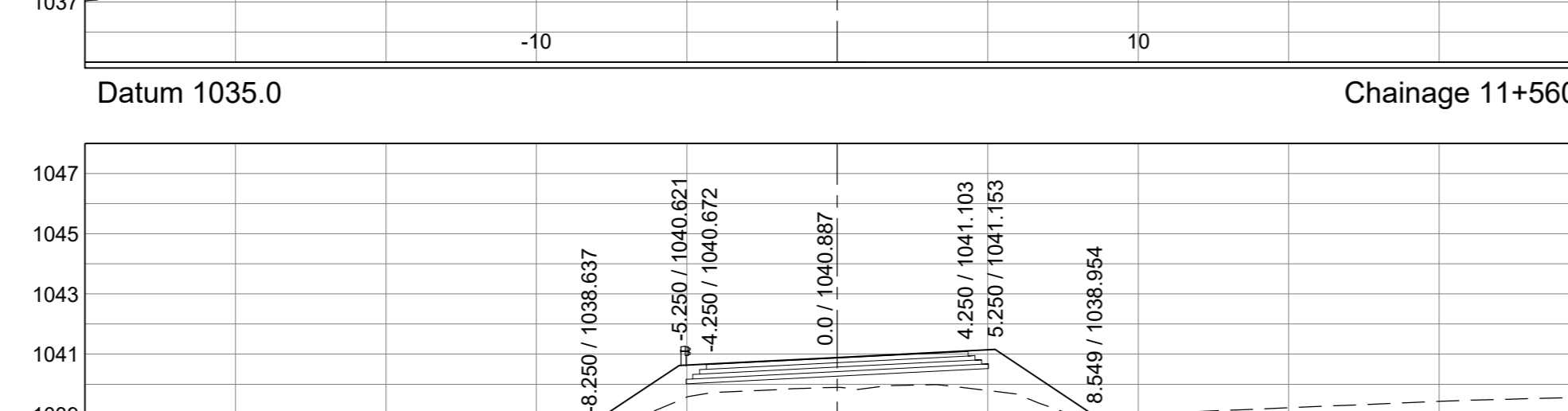
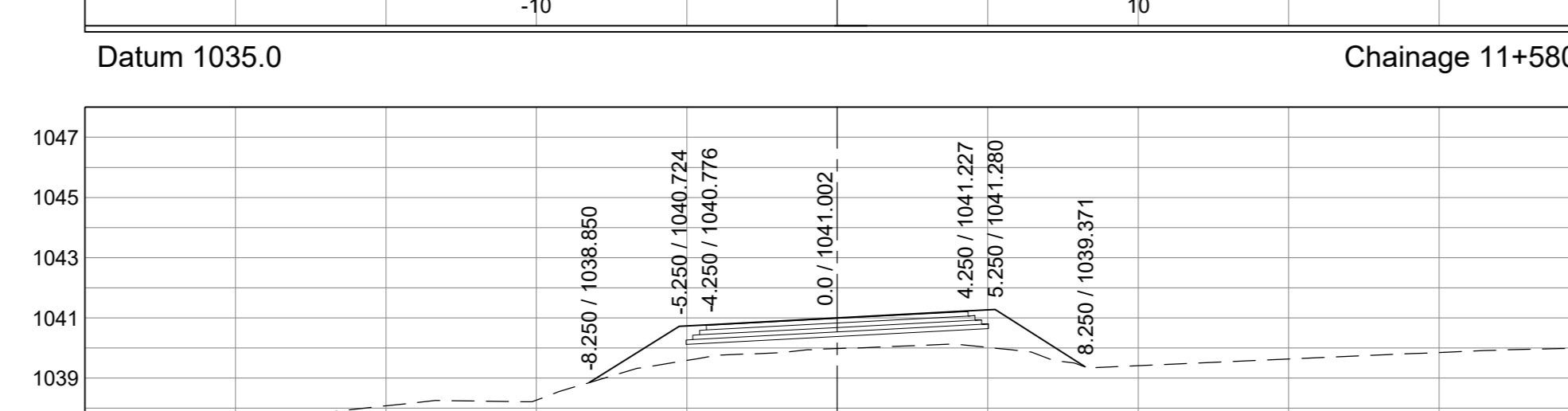
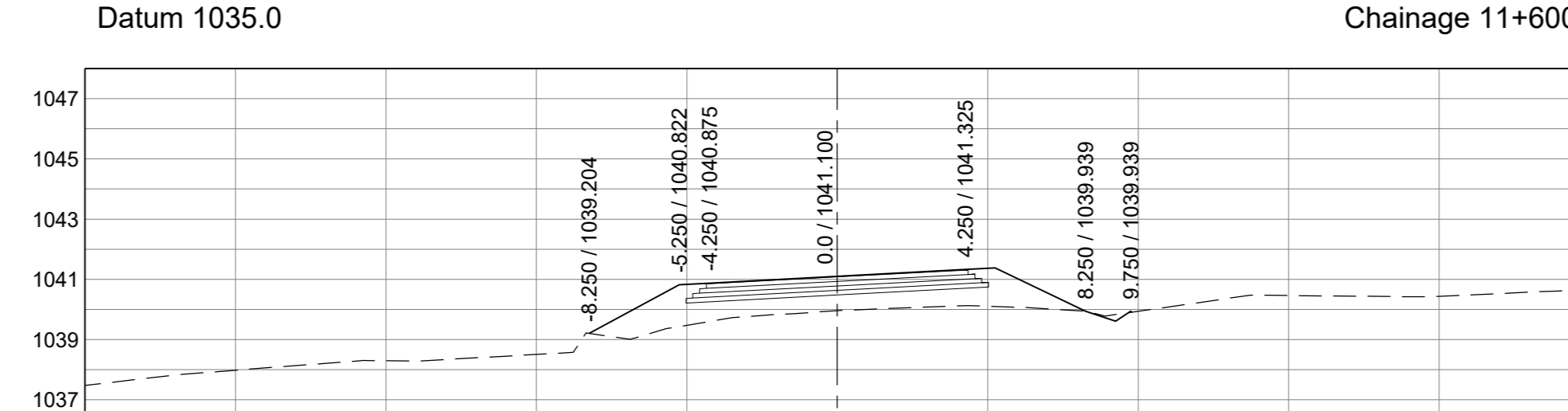
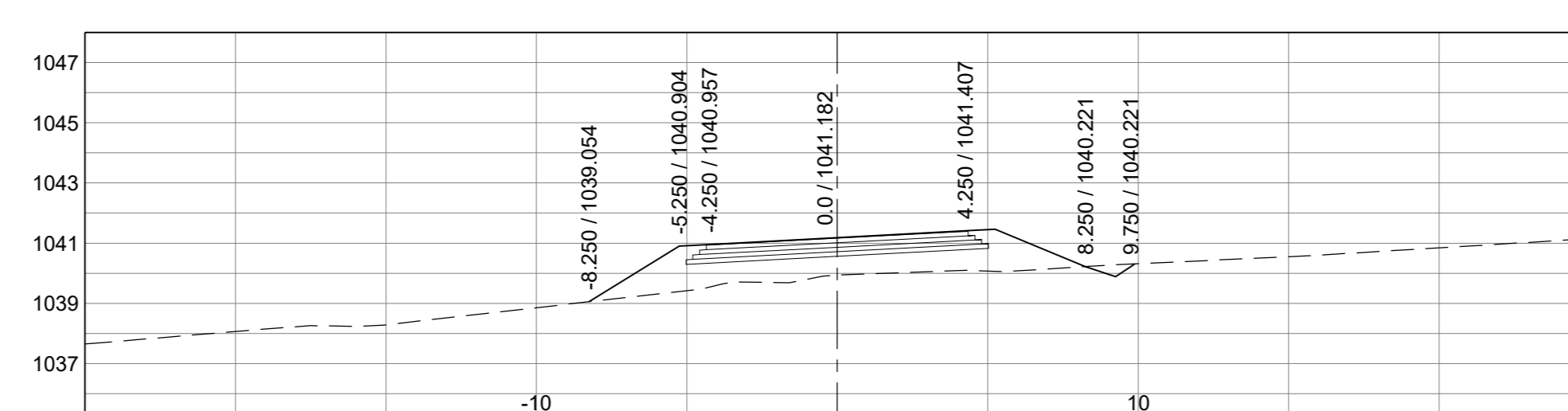
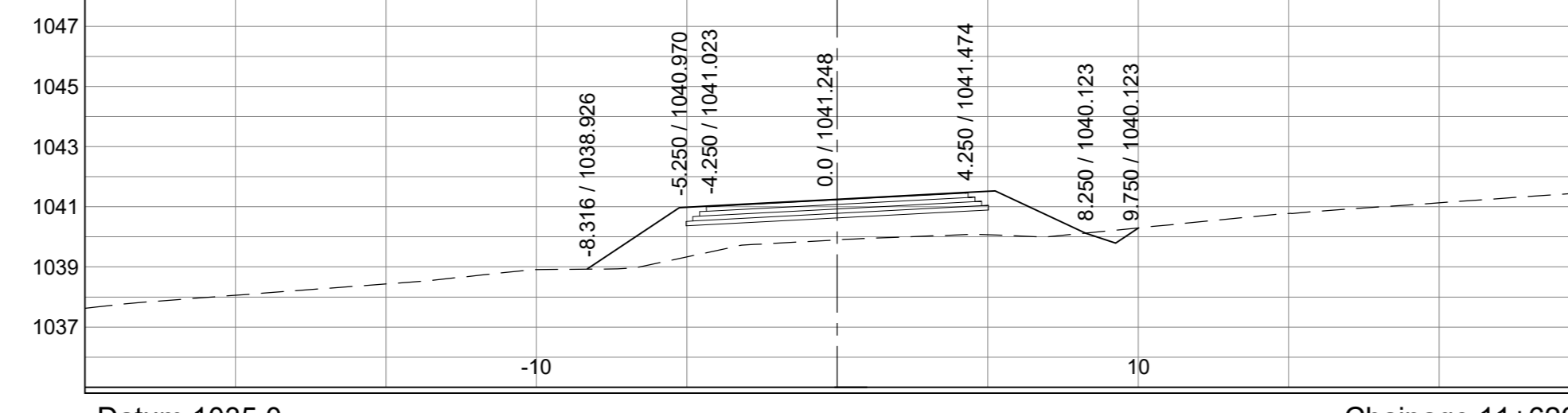
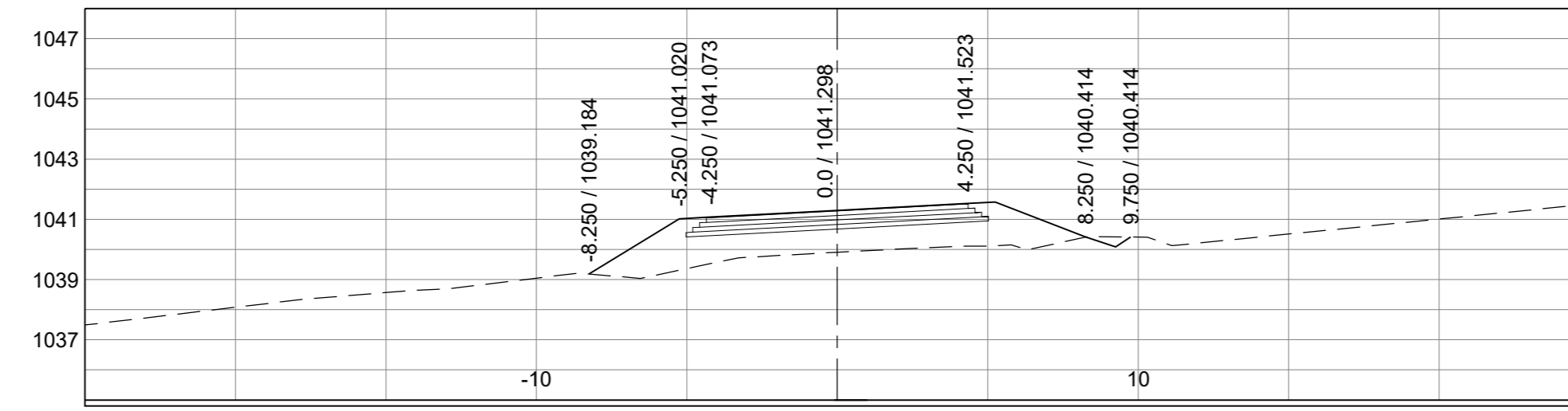
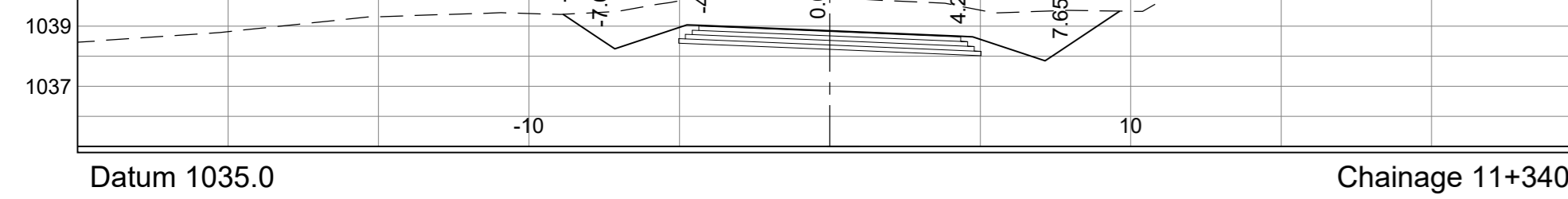
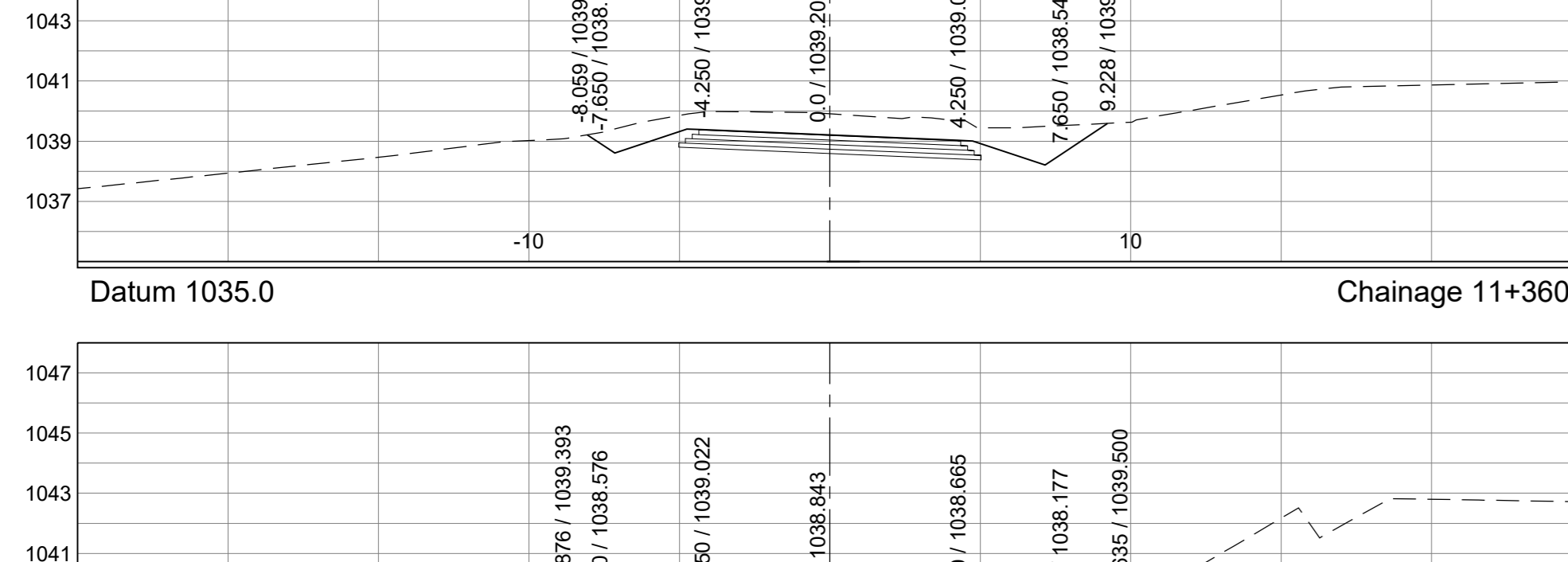
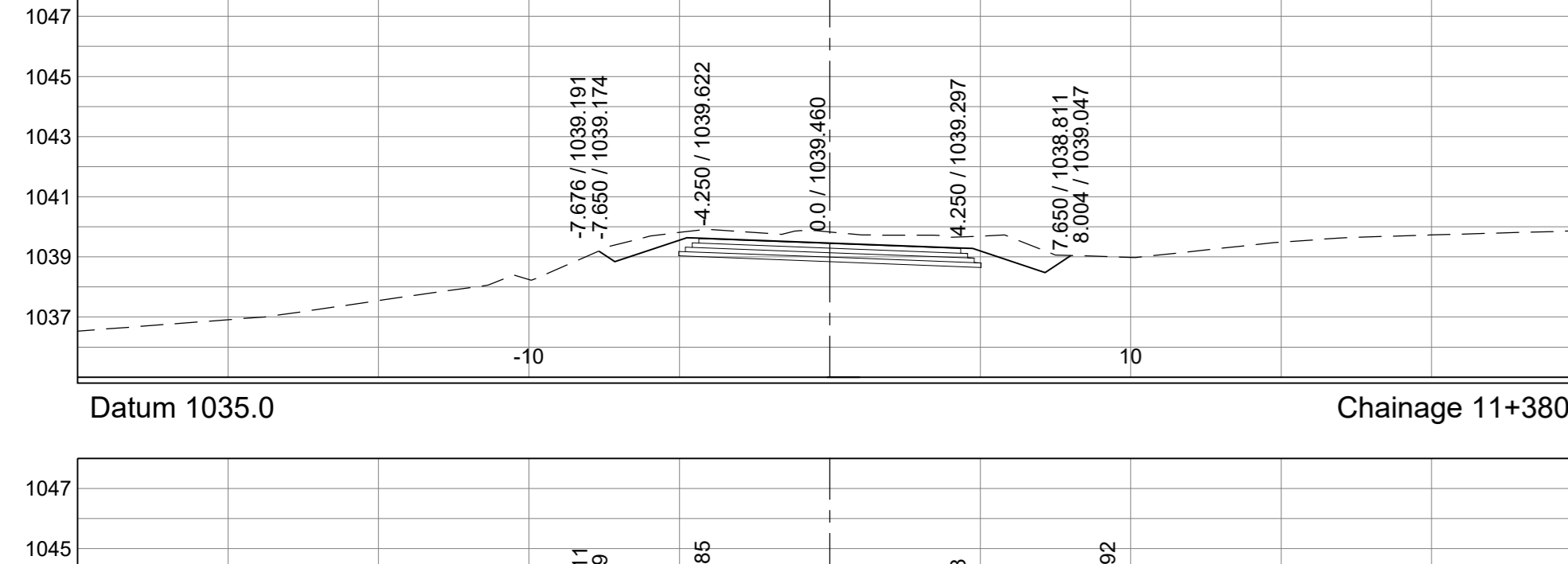
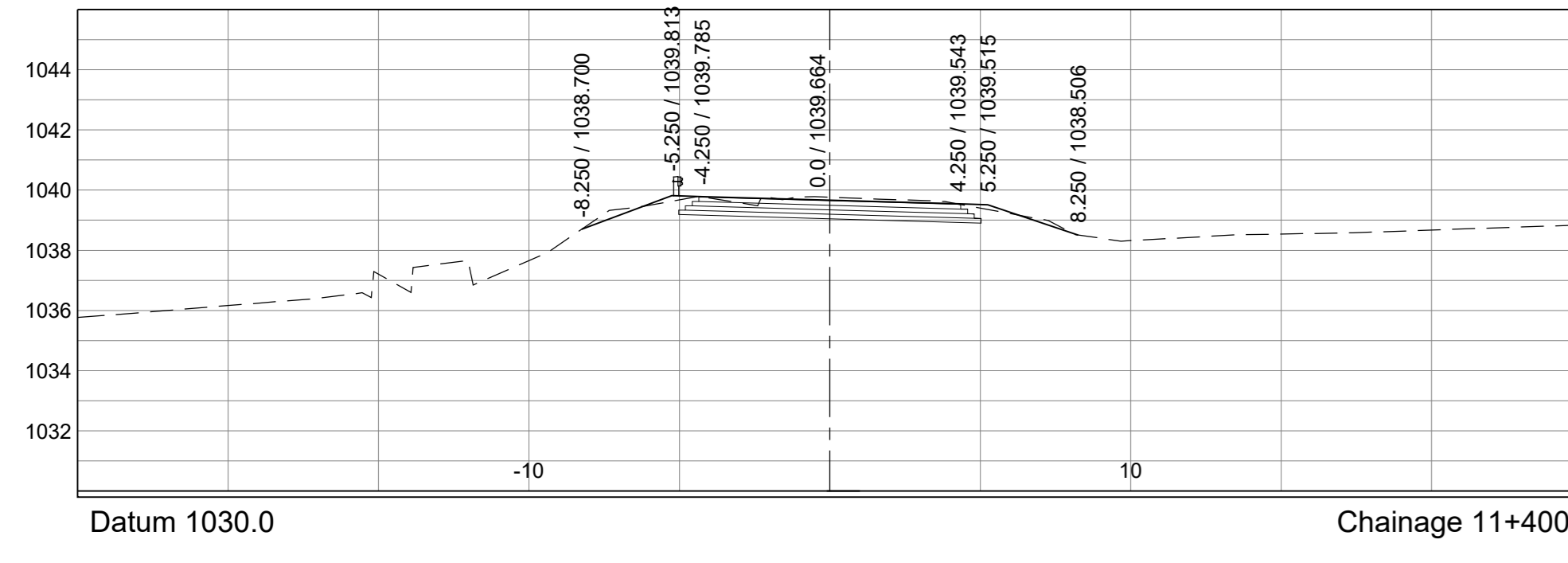
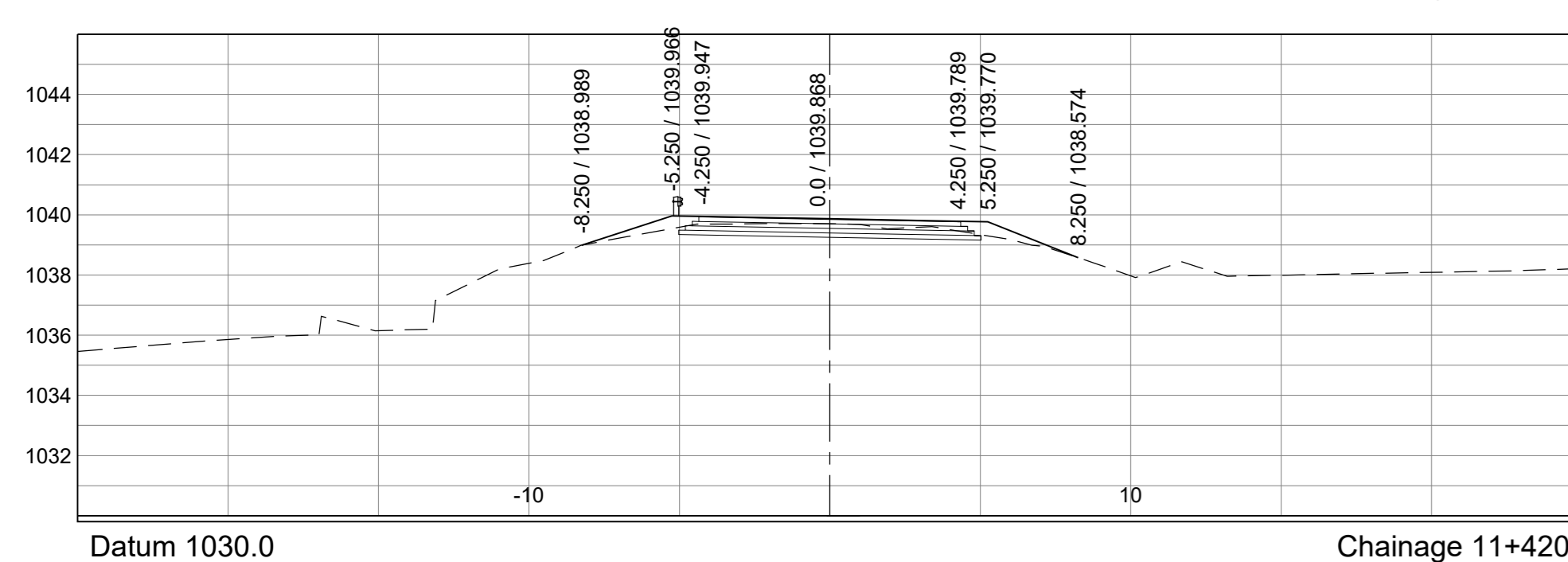
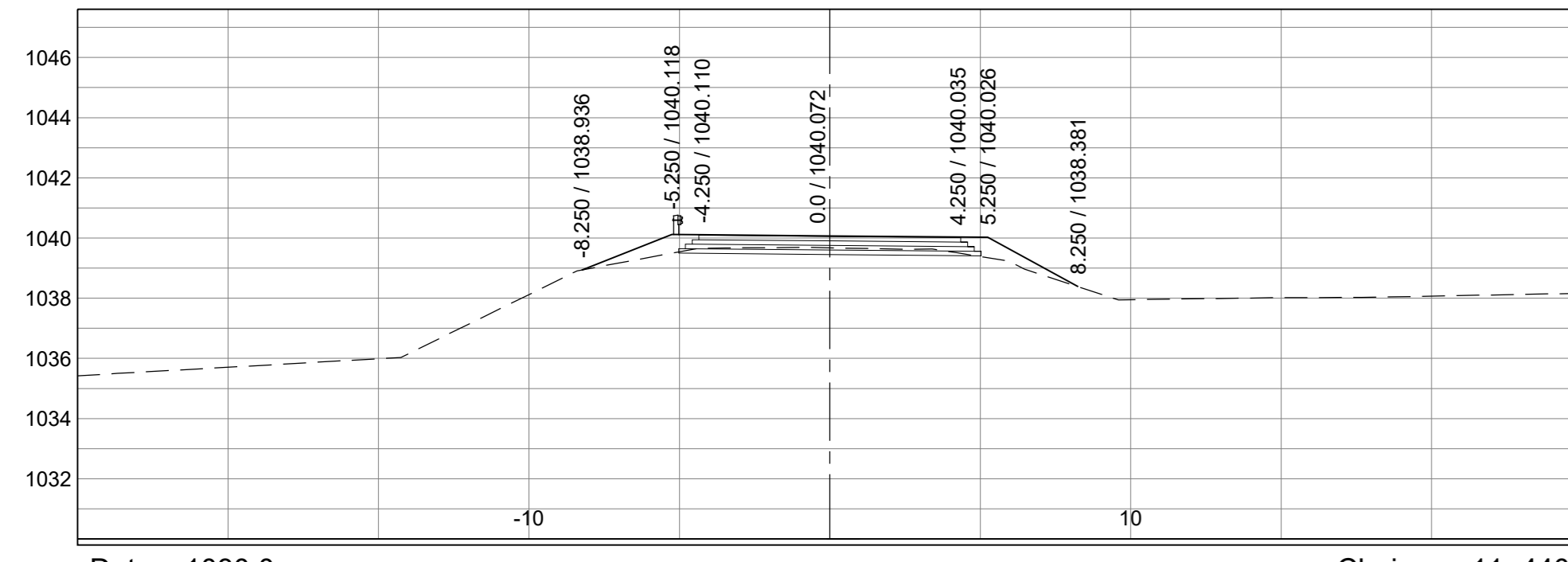
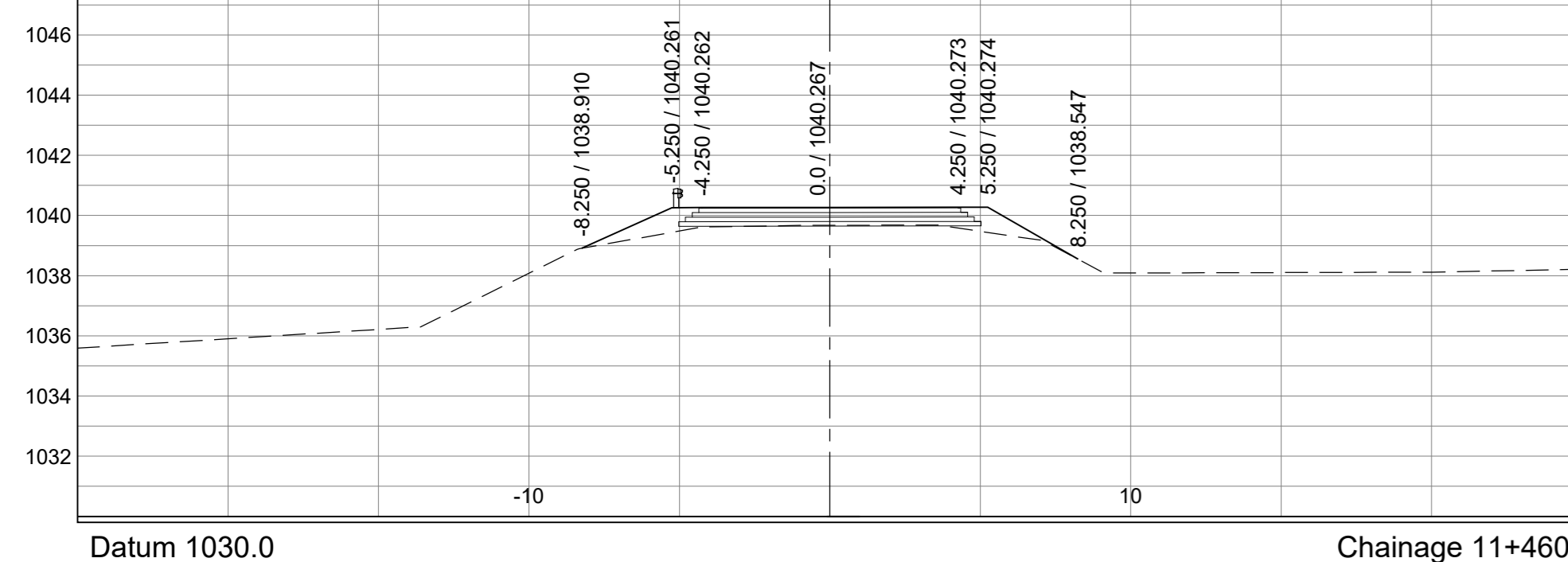
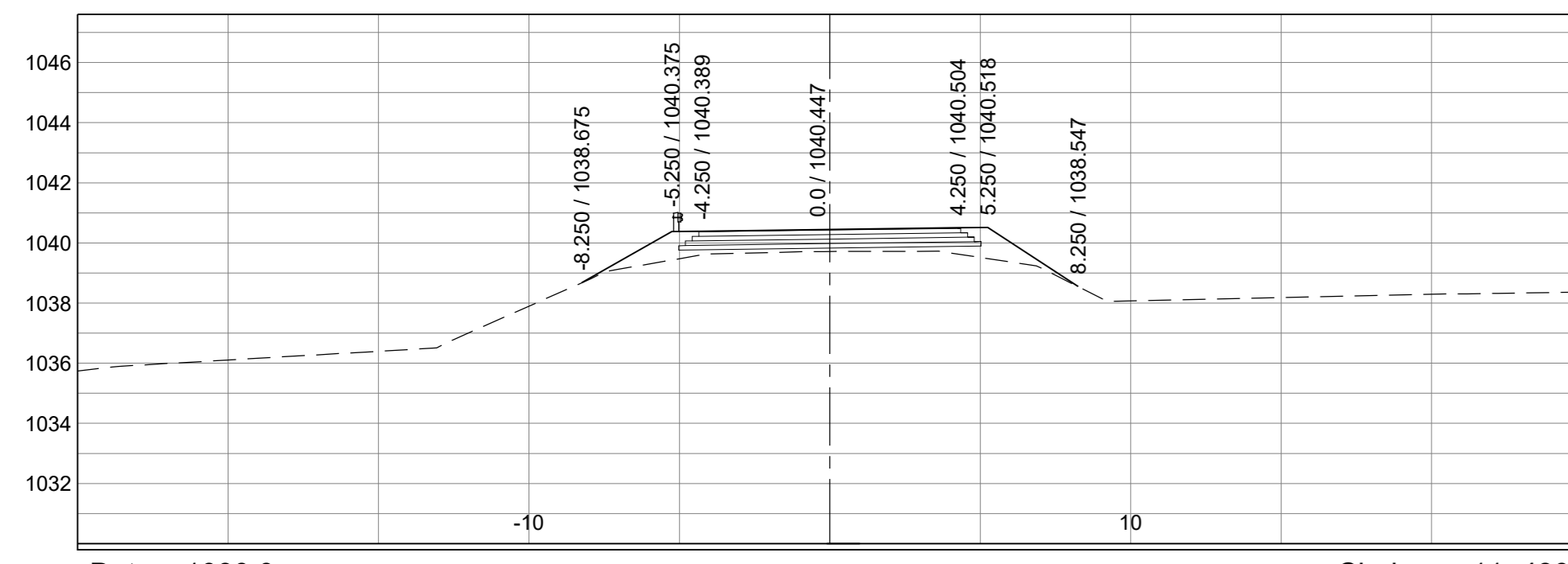
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 of - 18

REVISION:  
 A

Plan No -  
**C 44330**

C 44330





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44330	Designed by:-	T. PIKA
Continued on:-	C 44332	Checked by:-	Y. DOMA
Cross Section No:-	C 44331	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44324 - C 44325	Checked by:-	Y. DOMA
Design Plan No:-	C 44313	Date of approval:-	

Designed by:- T. PIKA  
Checked by:- Y. DOMA  
Drawn by:- S. ZITHA  
Checked by:- Y. DOMA



Designed by:- **emzansi** ENGINEERS (PTY) LTD  
Providing Unrivaled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

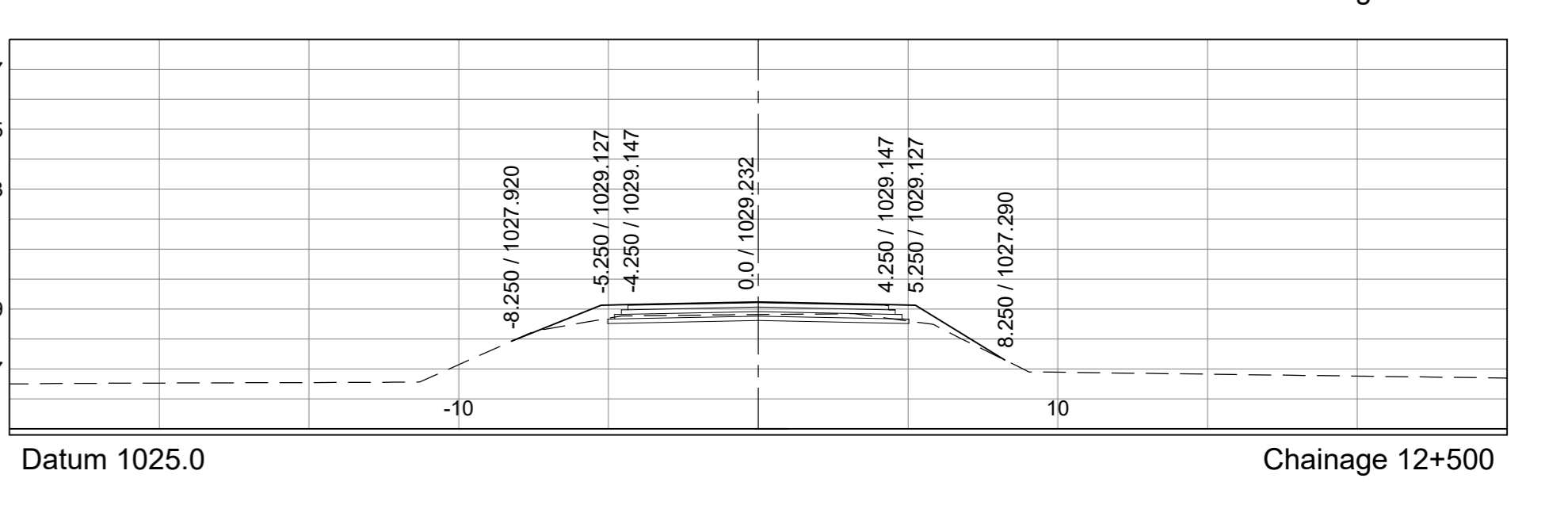
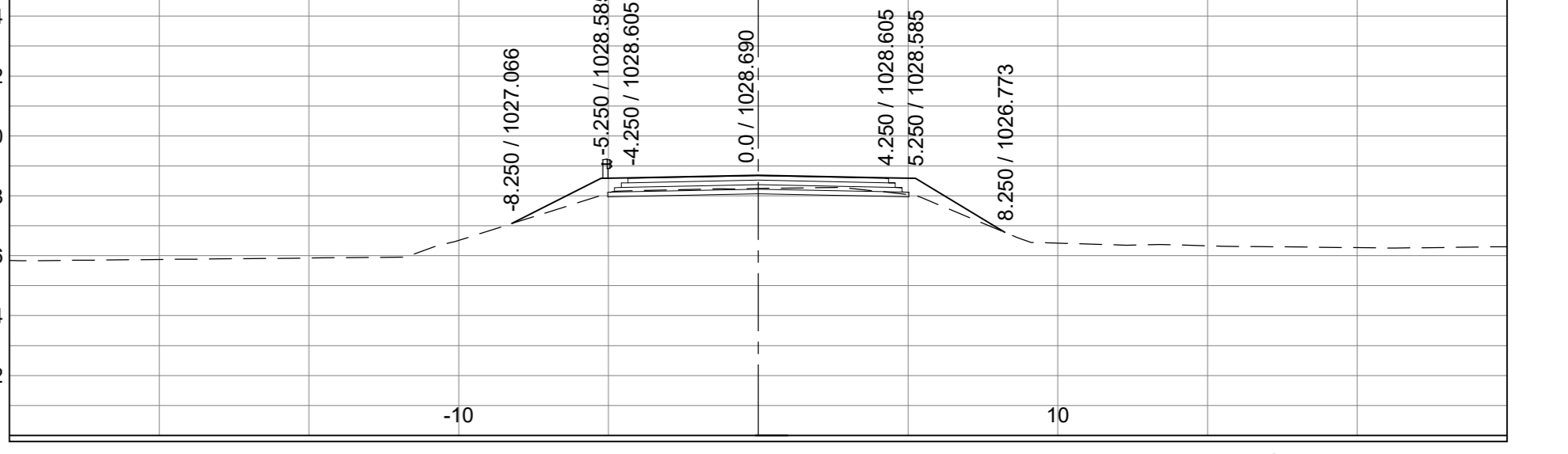
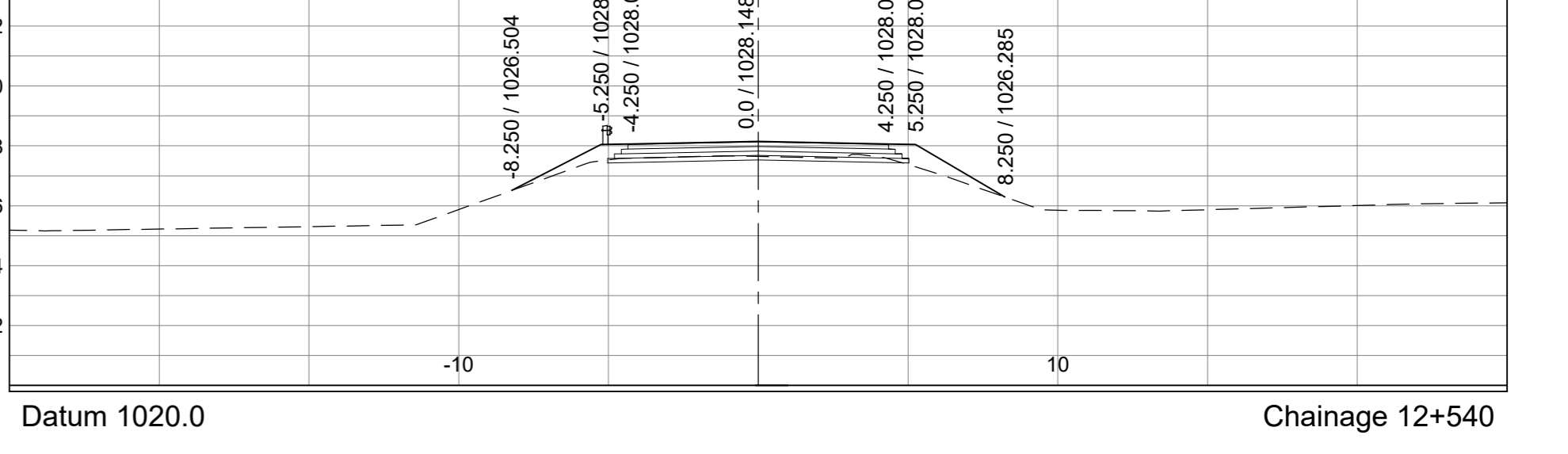
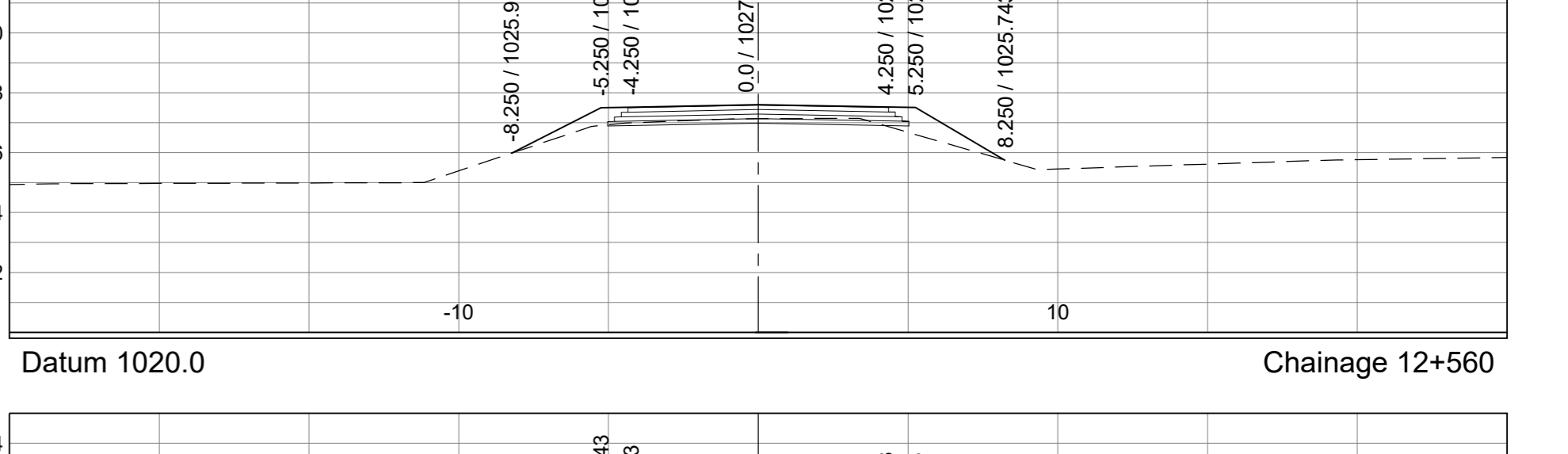
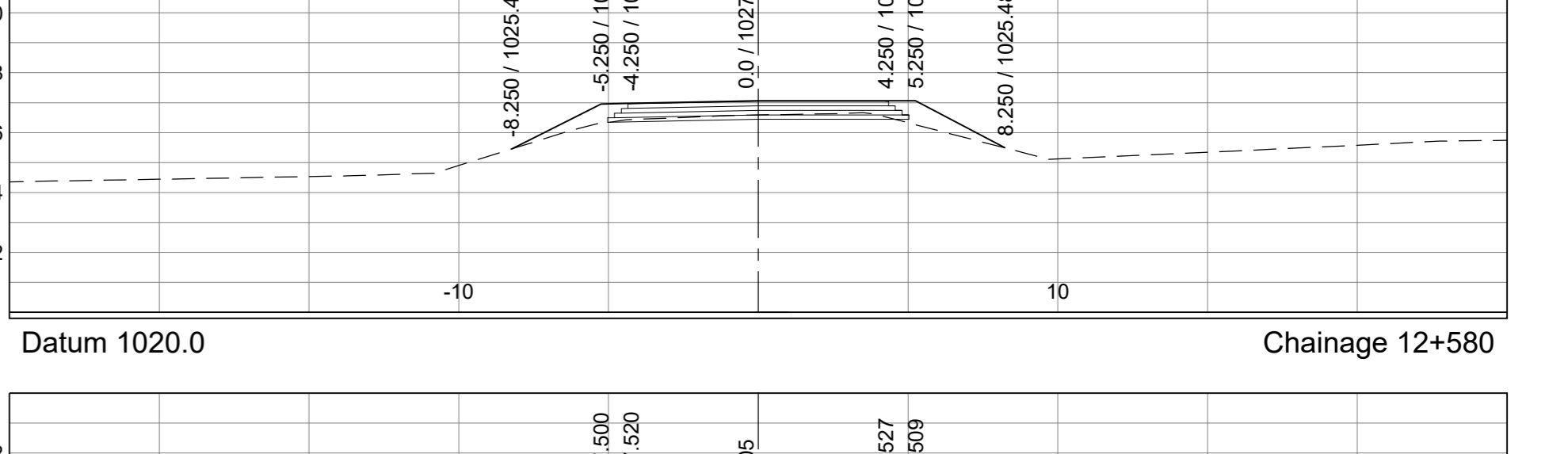
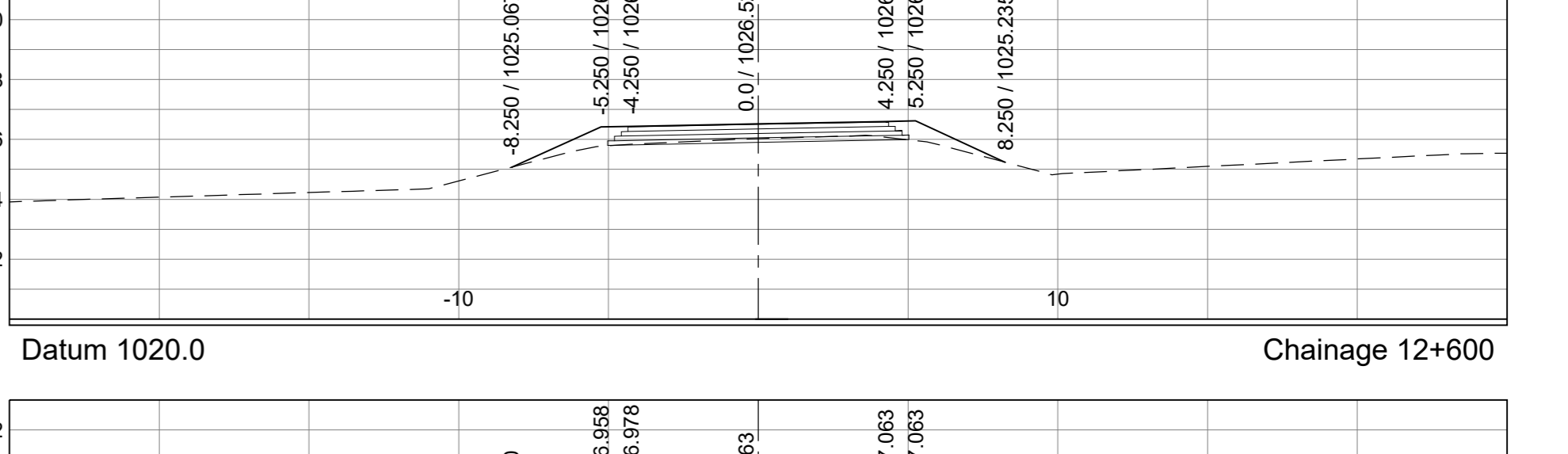
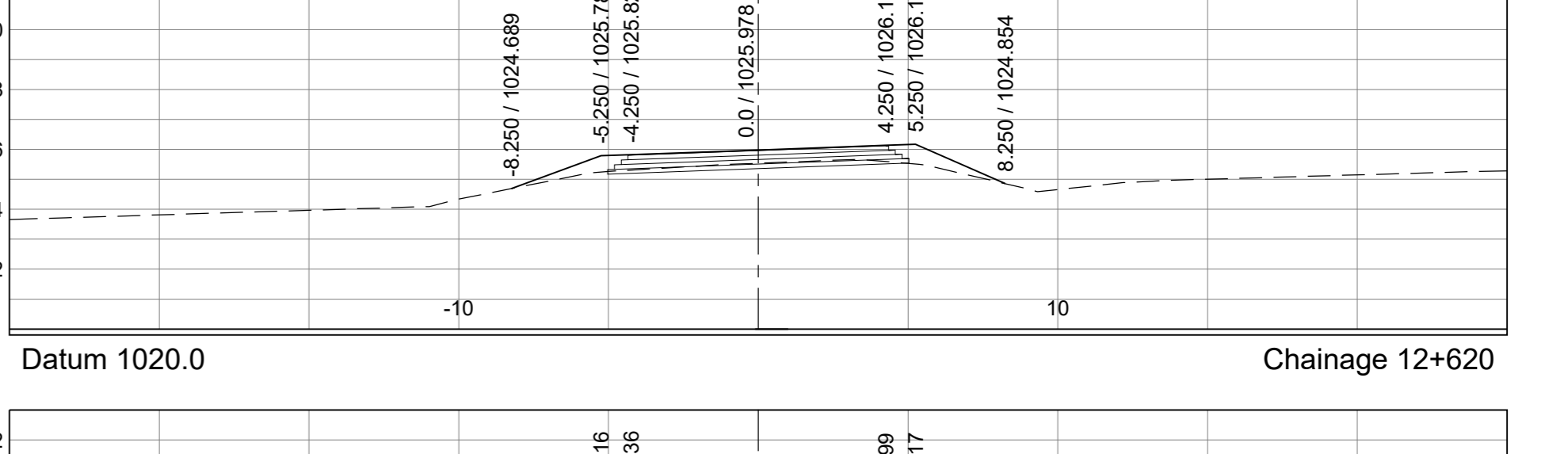
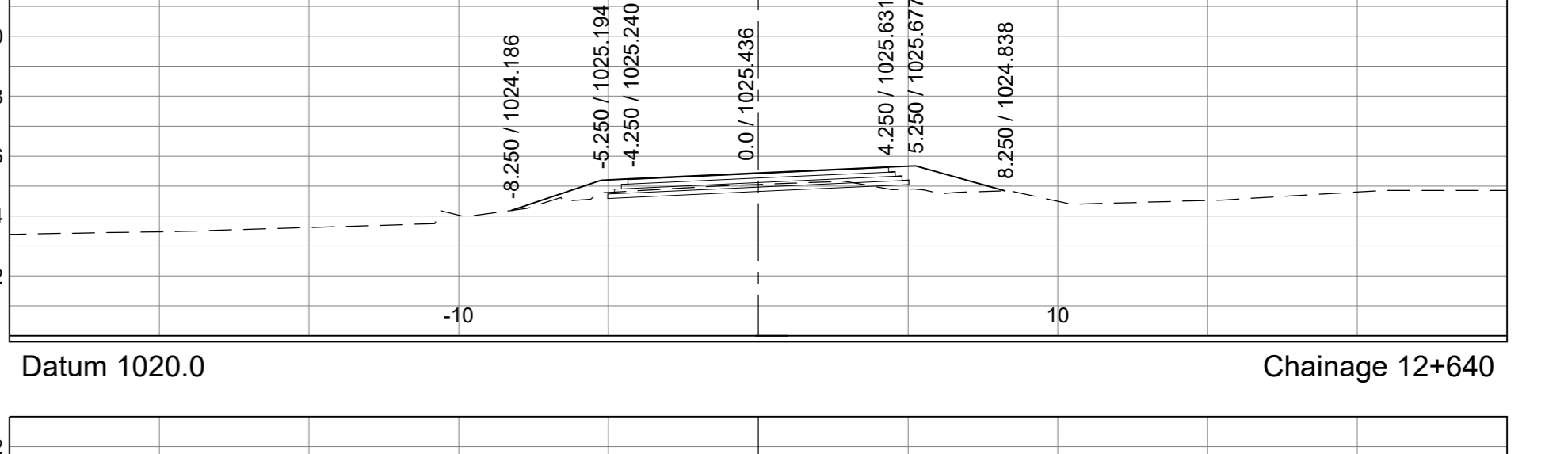
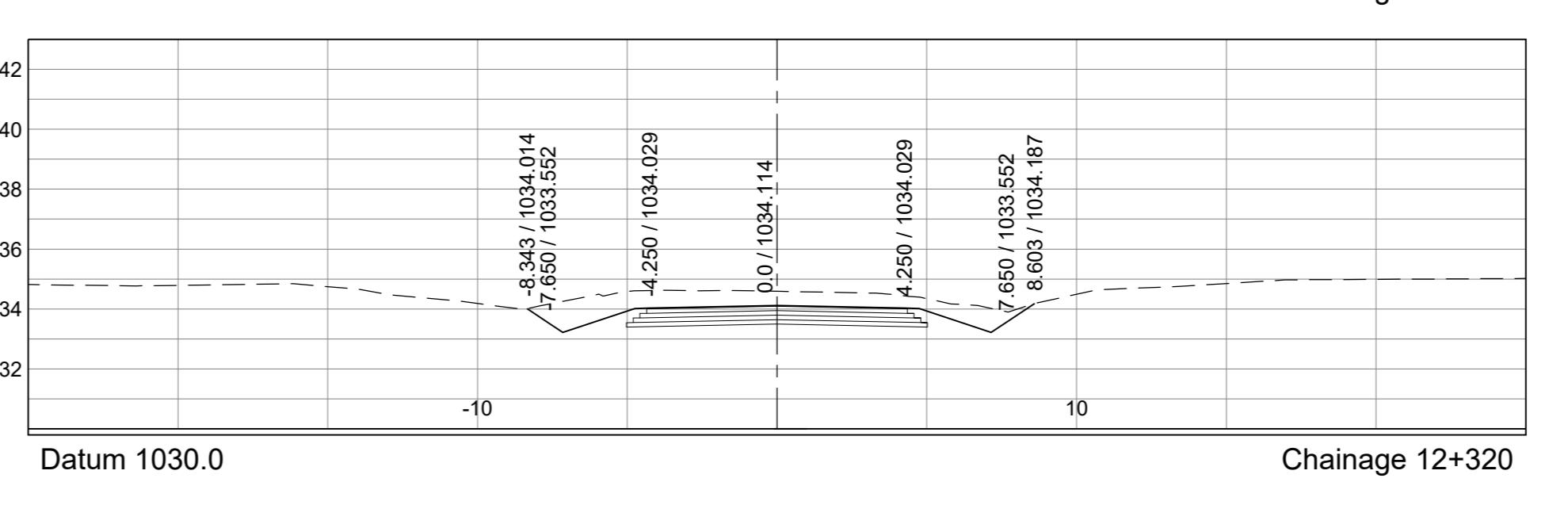
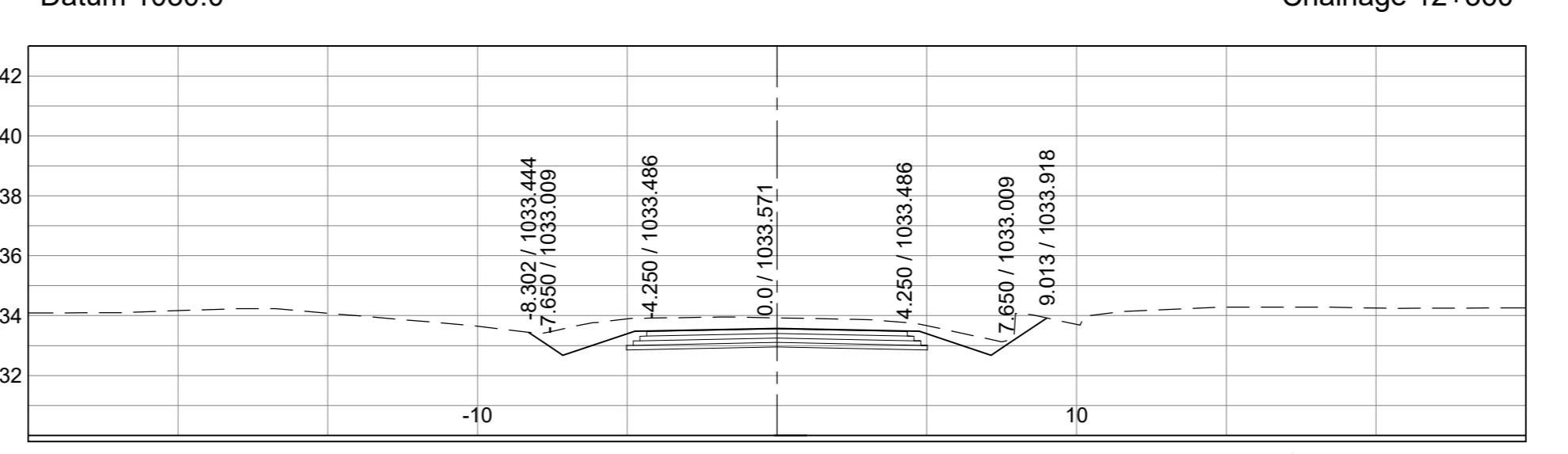
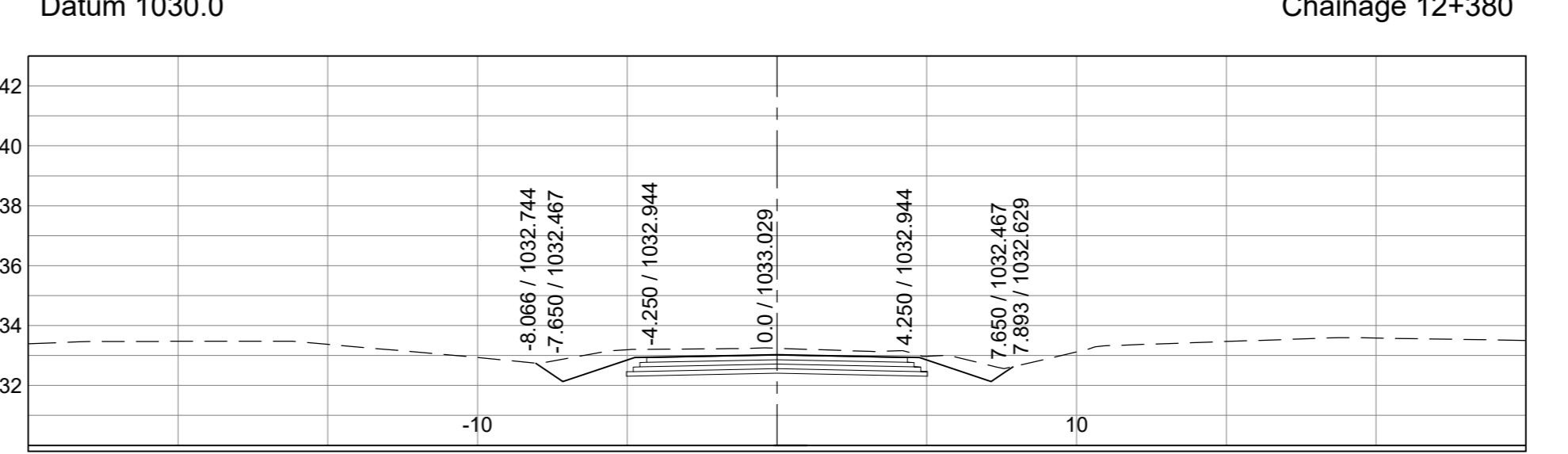
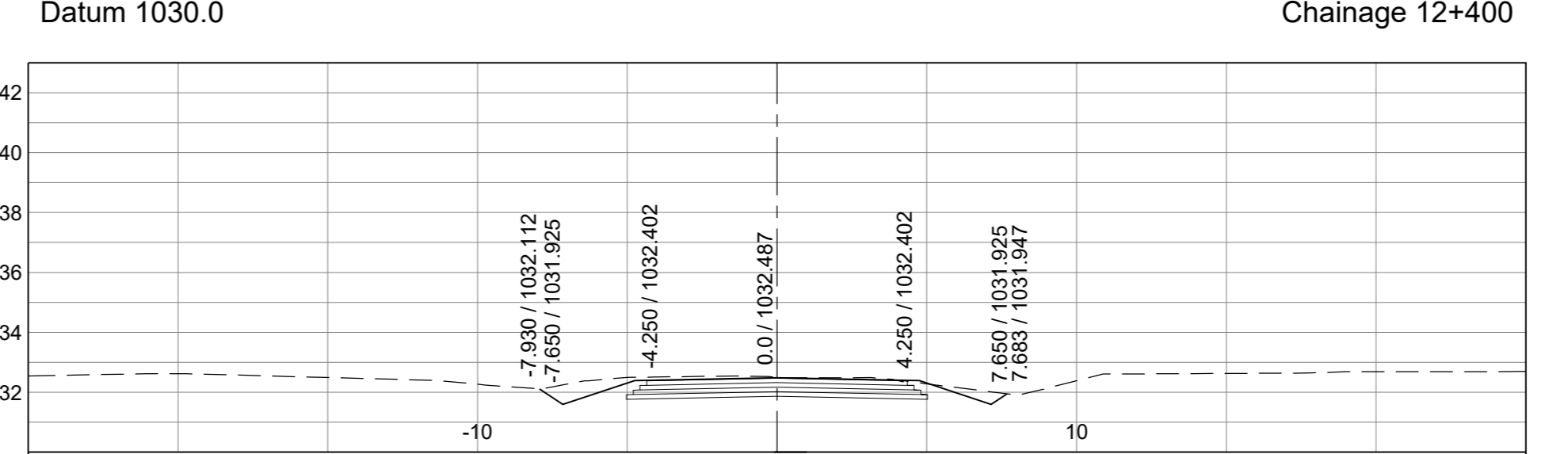
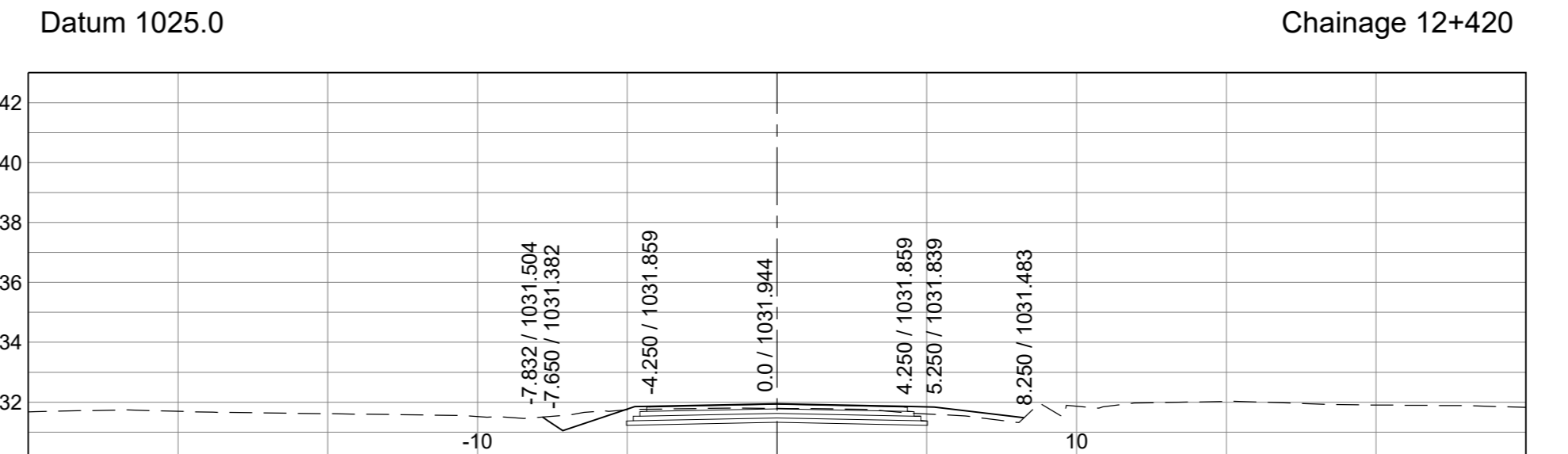
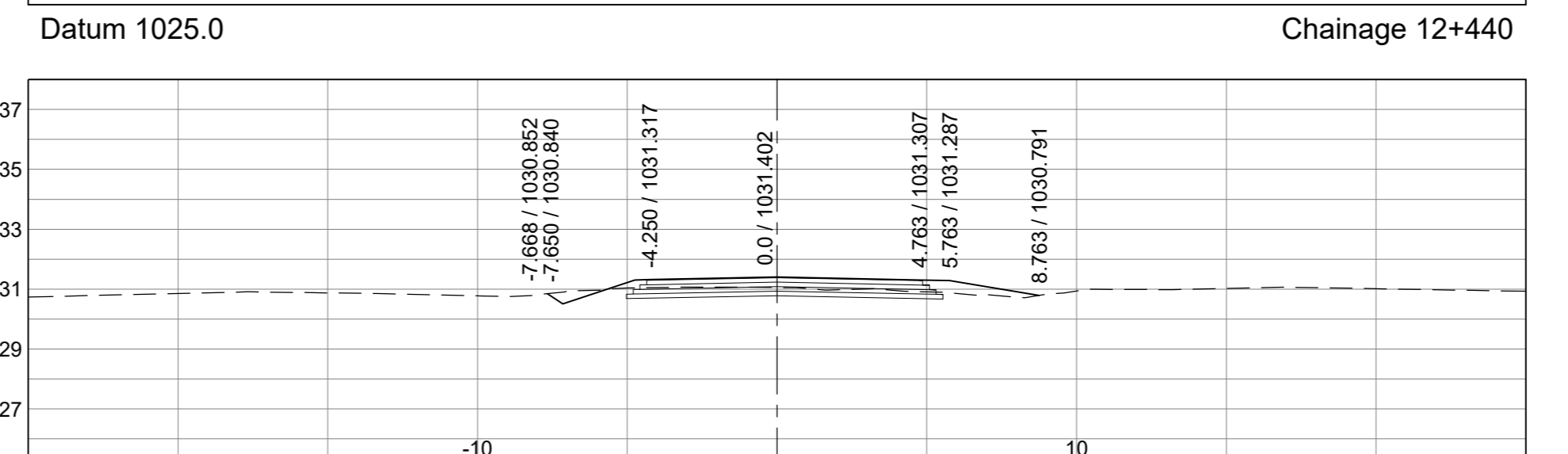
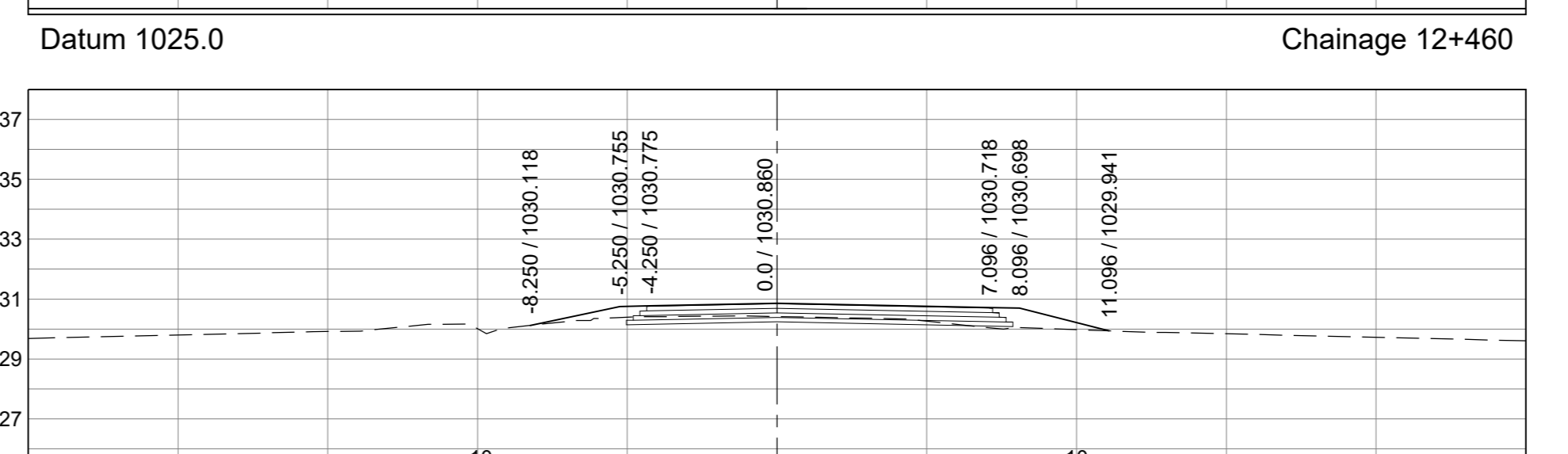
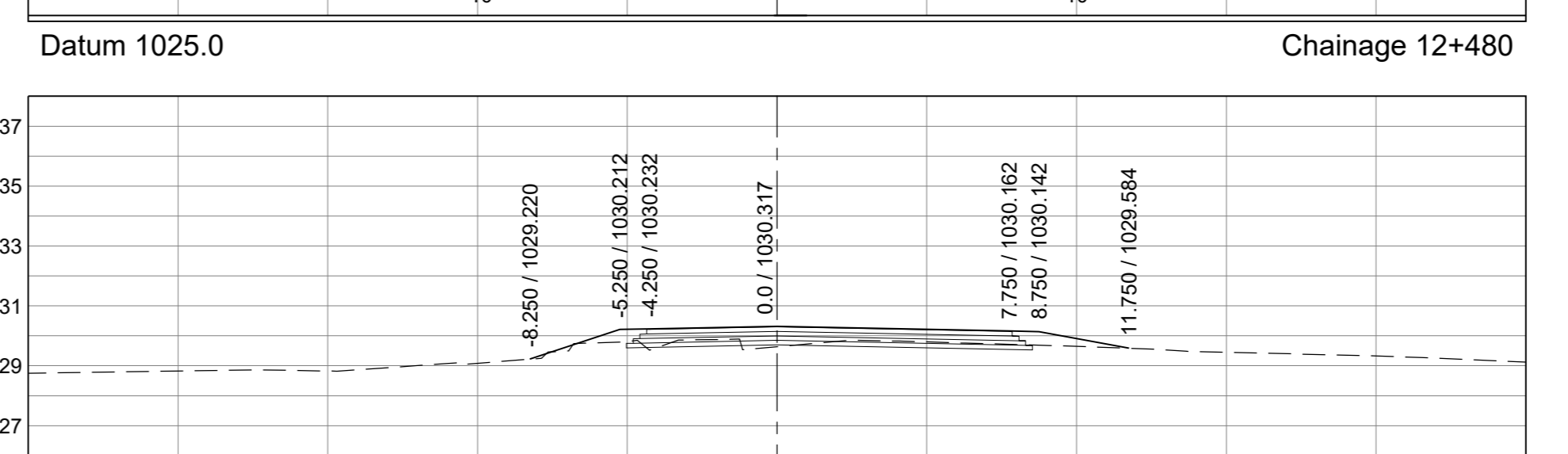
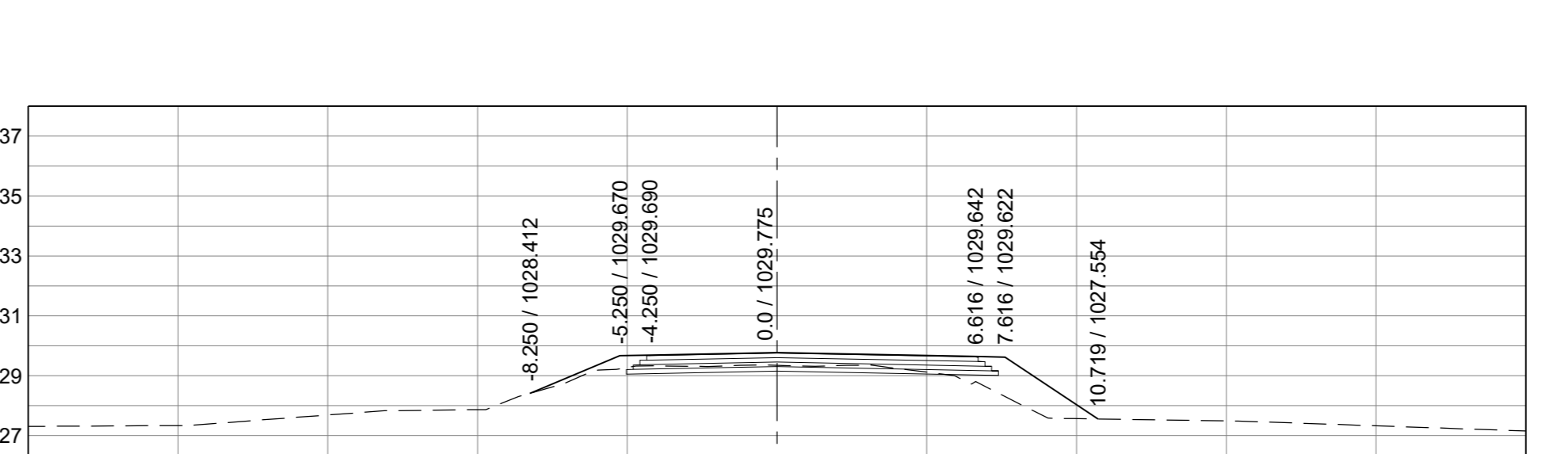
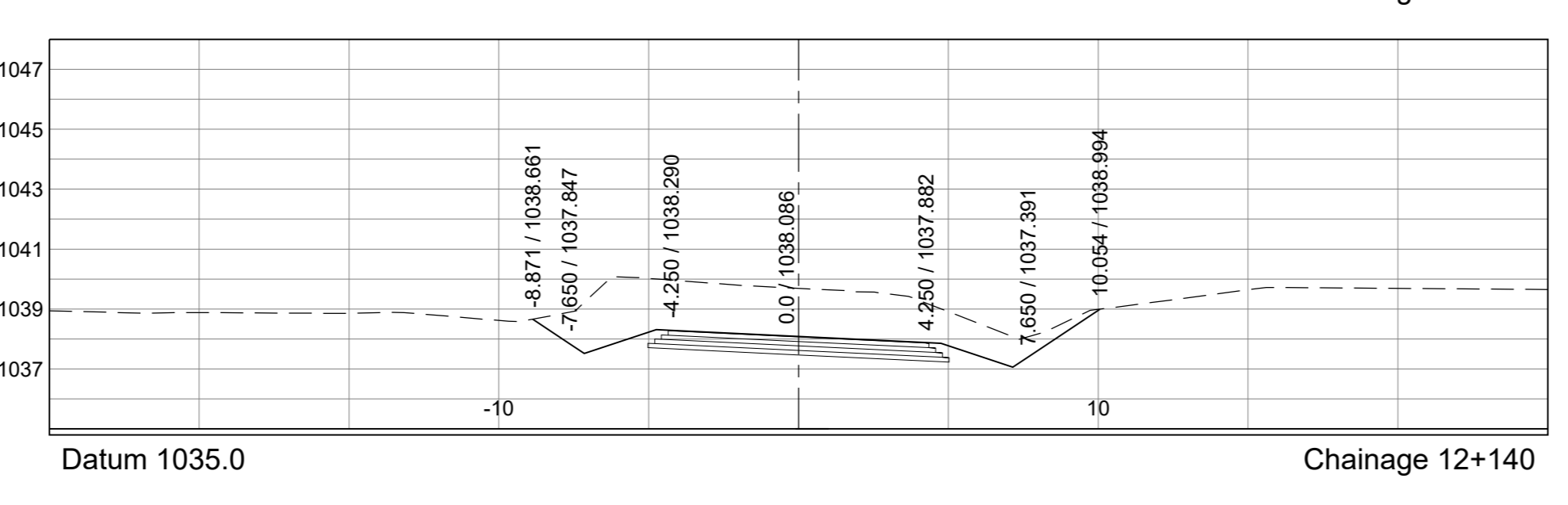
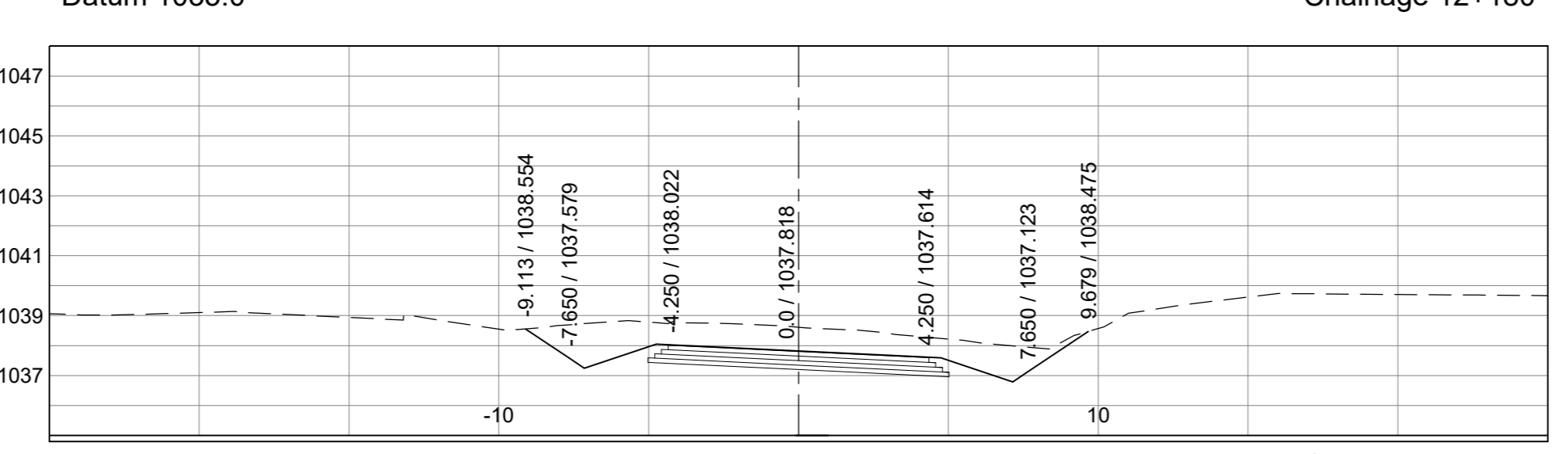
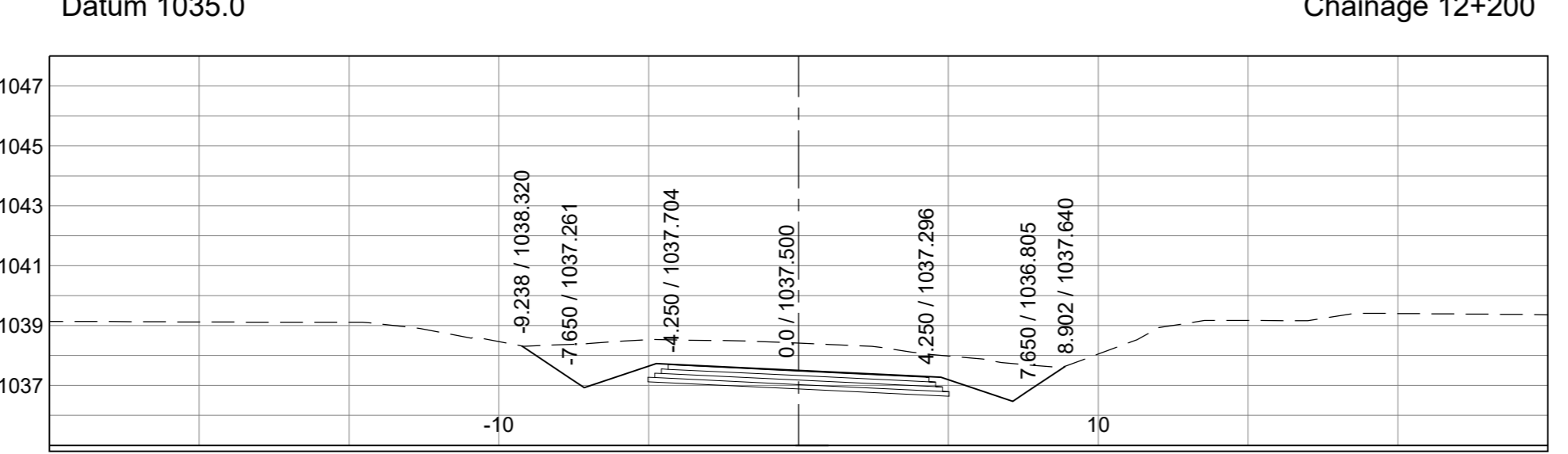
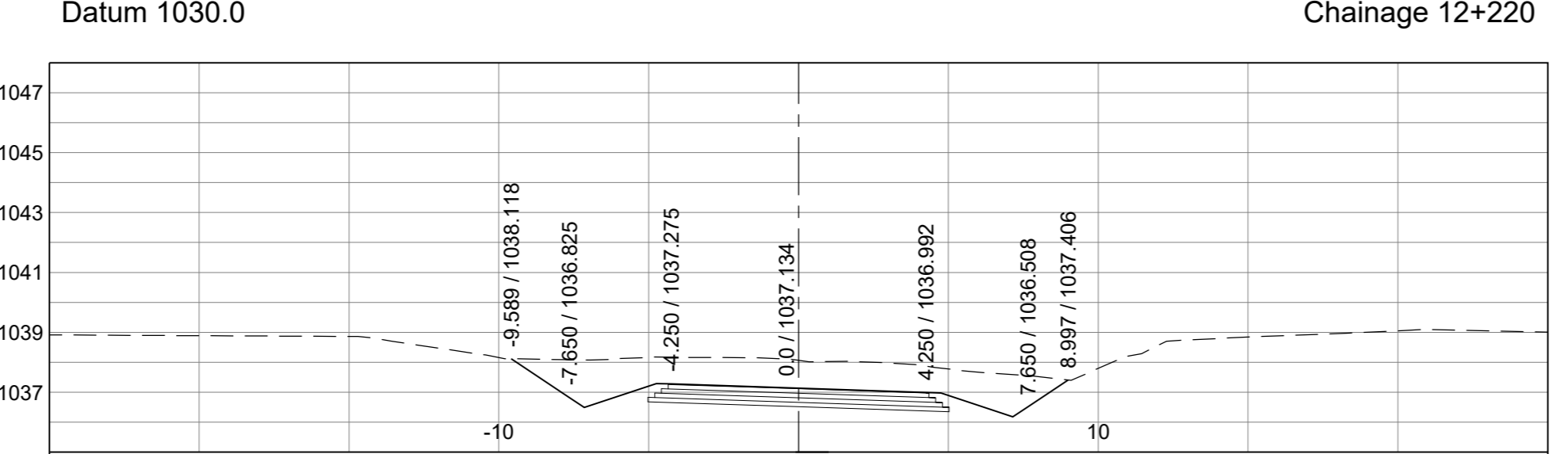
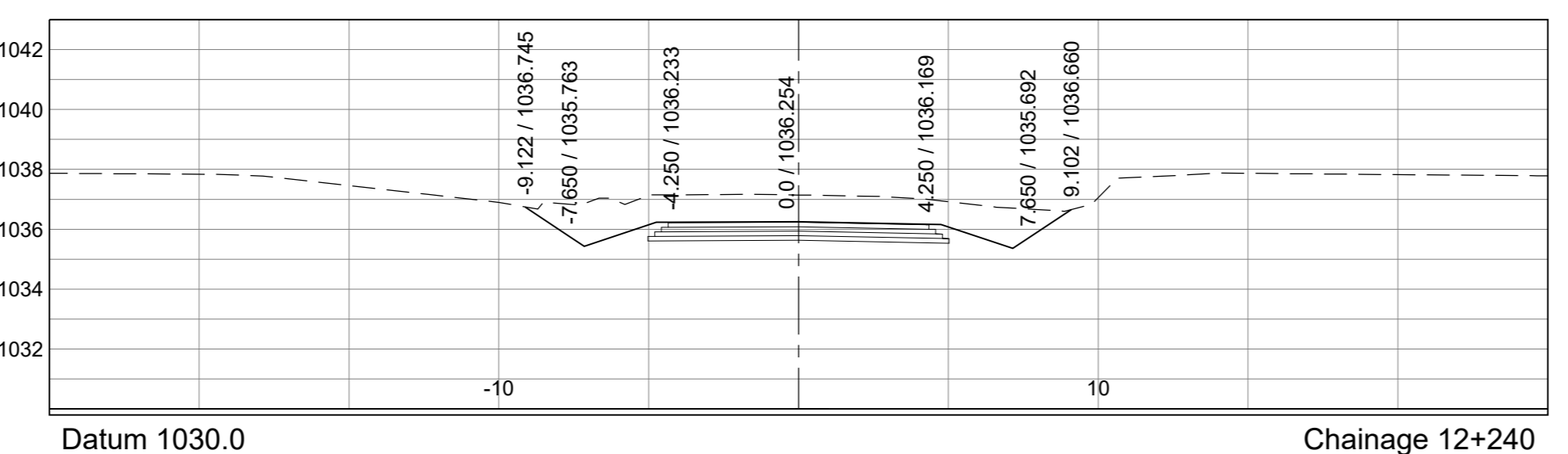
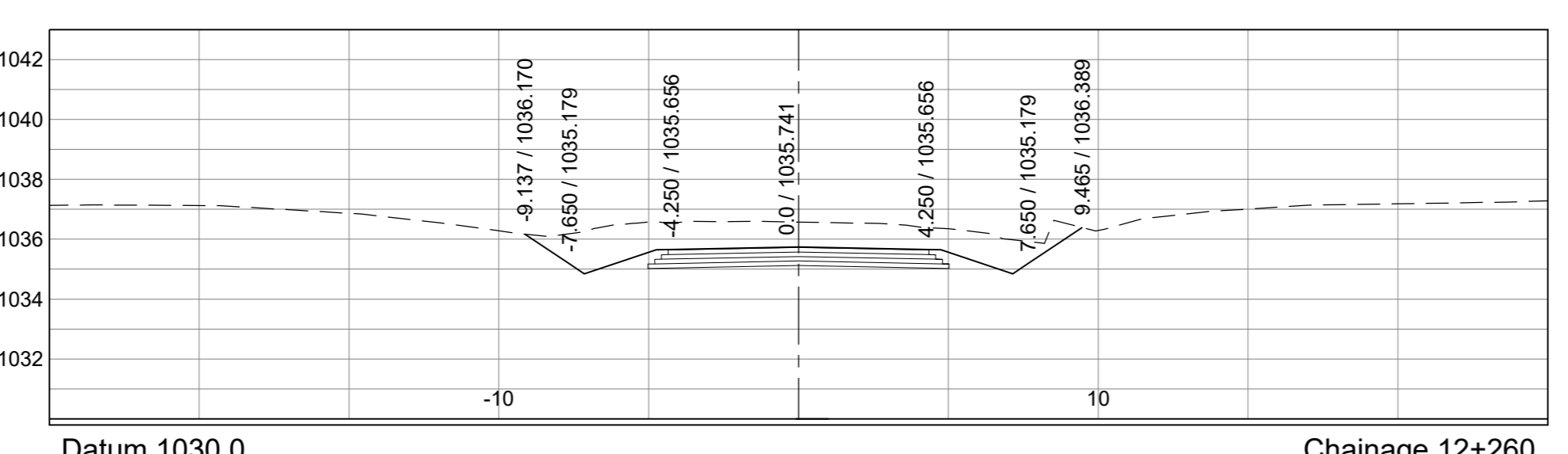
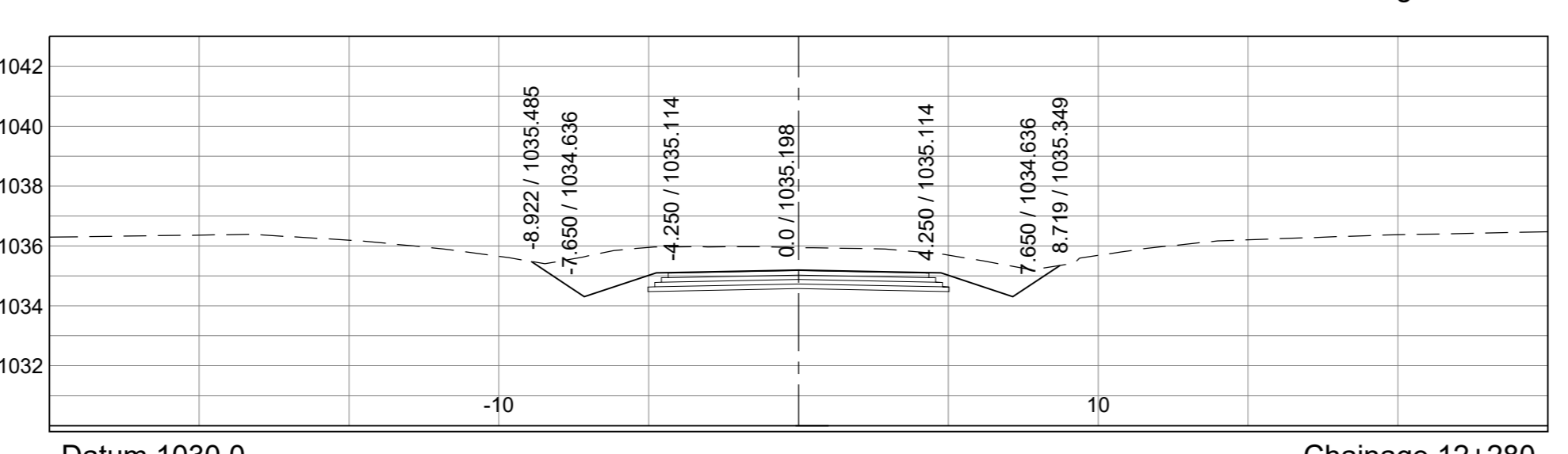
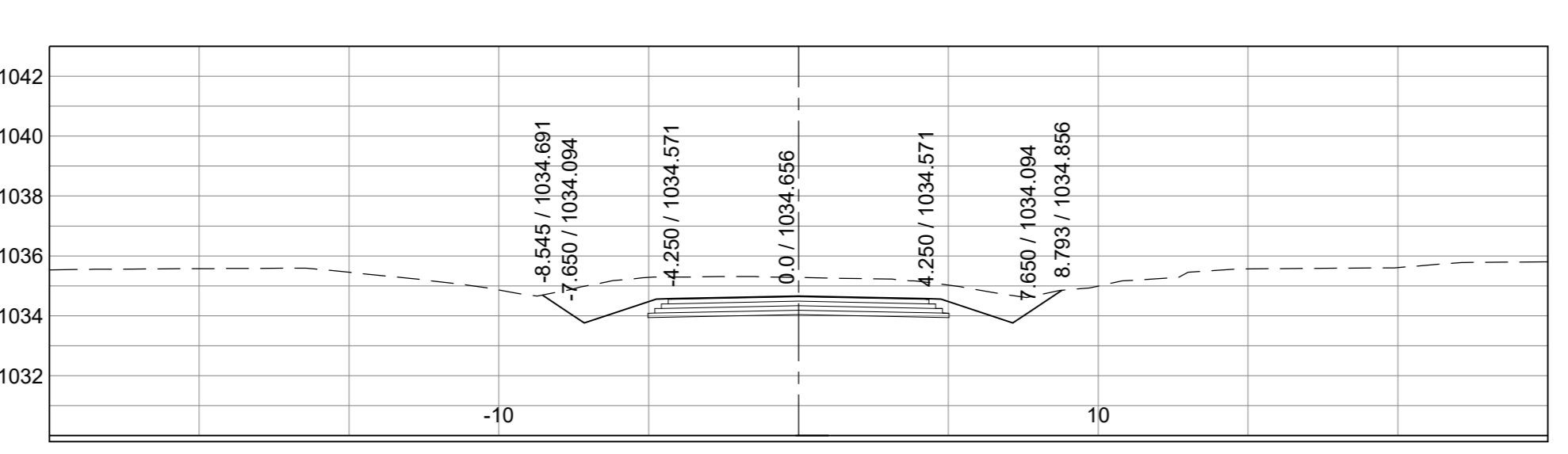
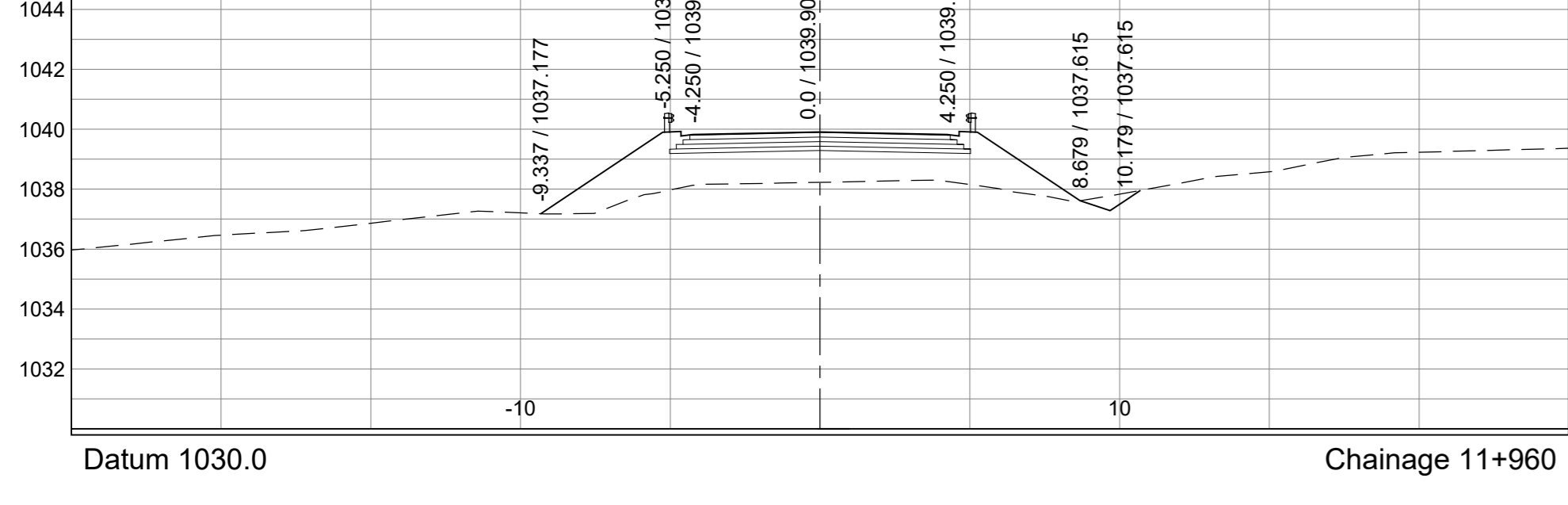
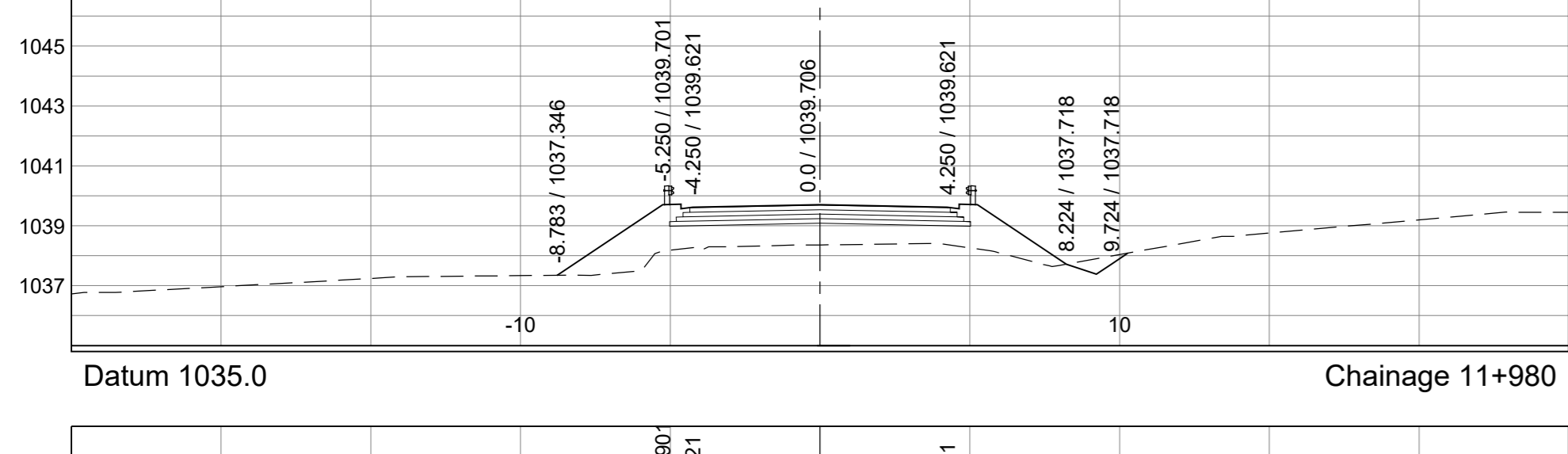
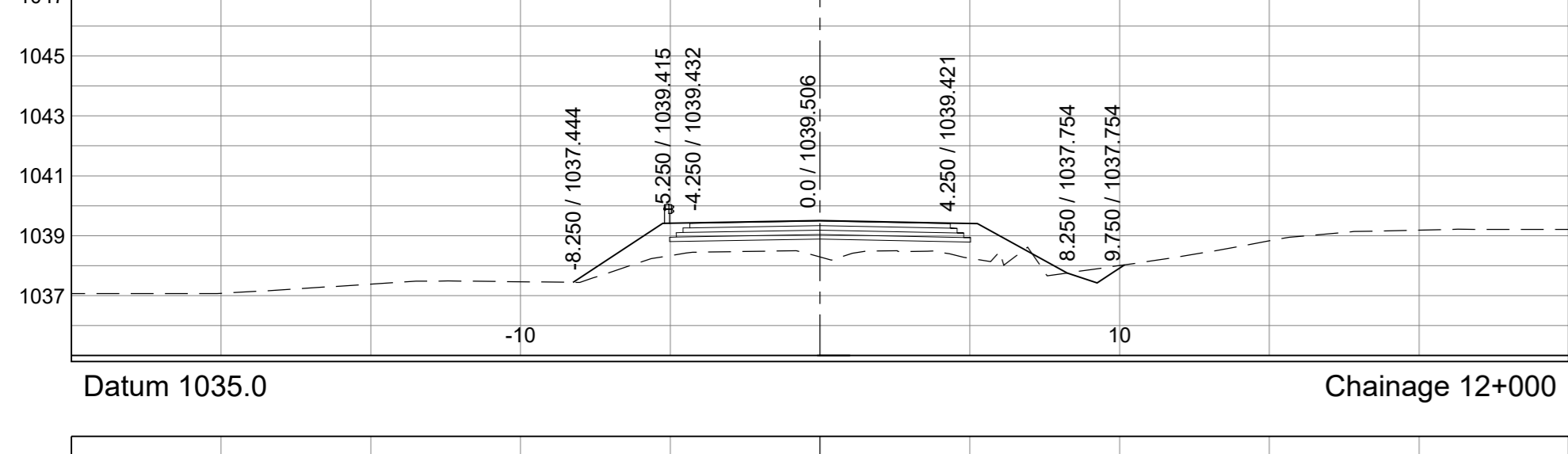
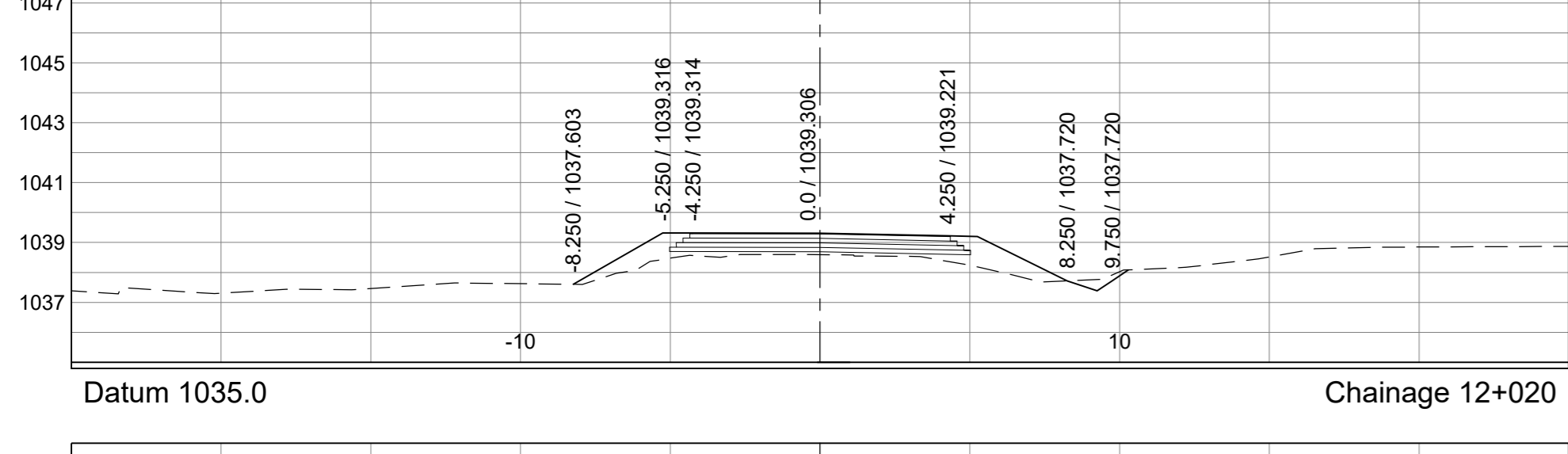
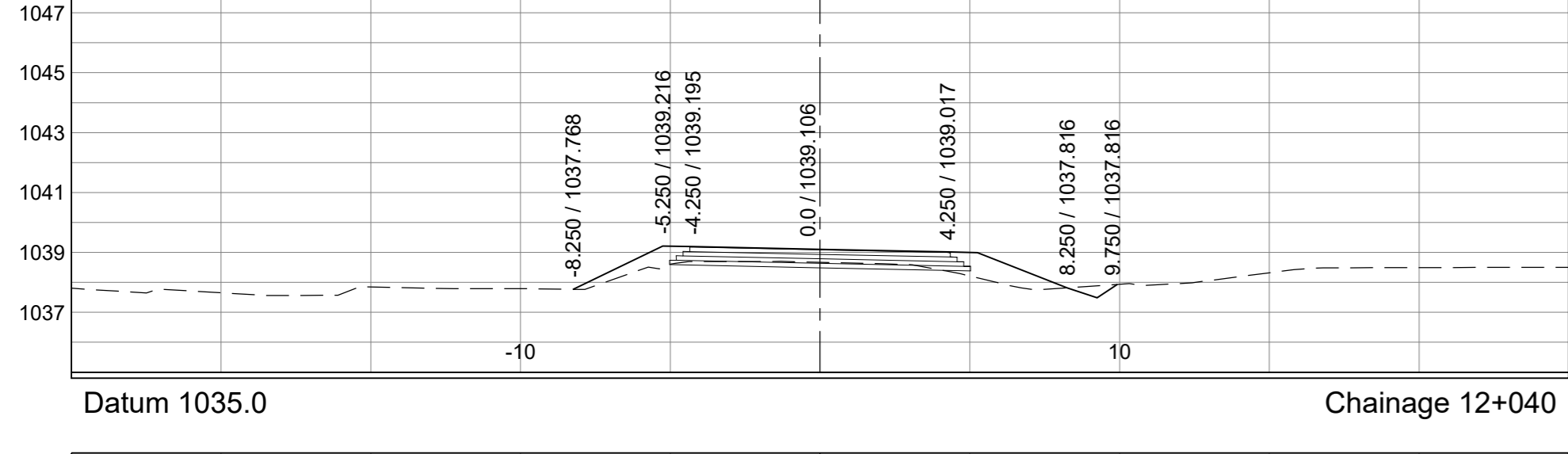
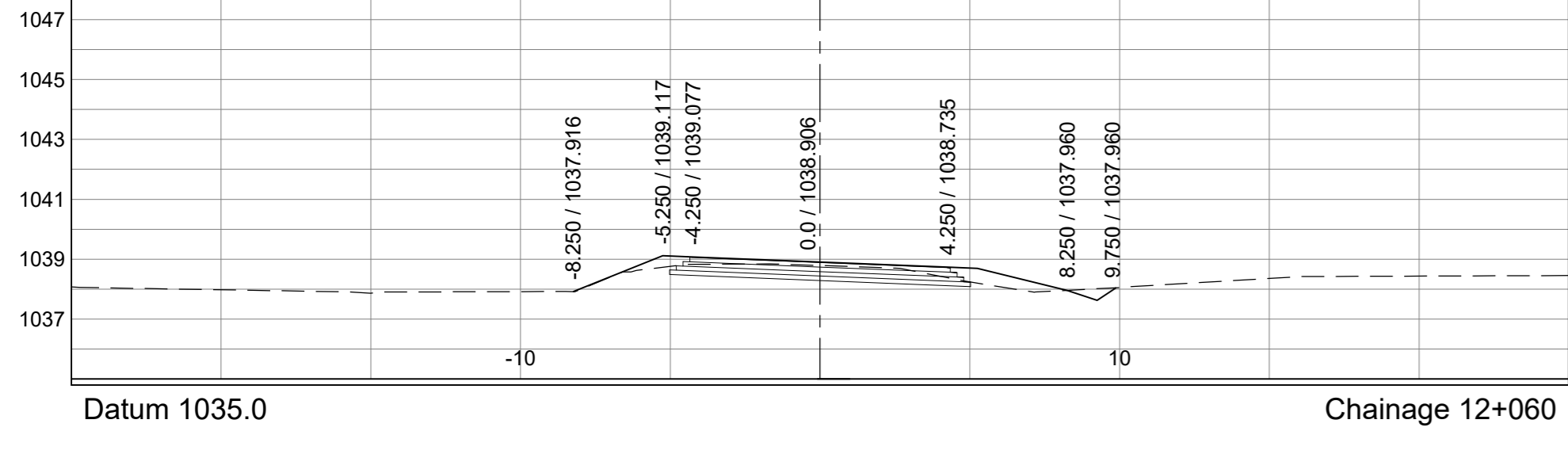
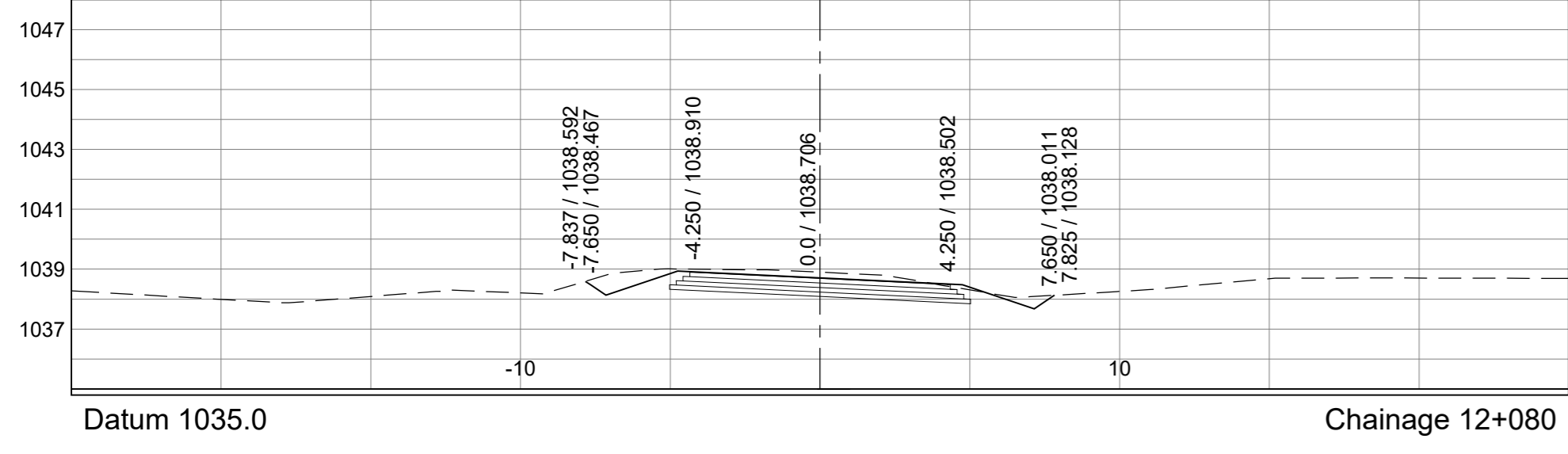
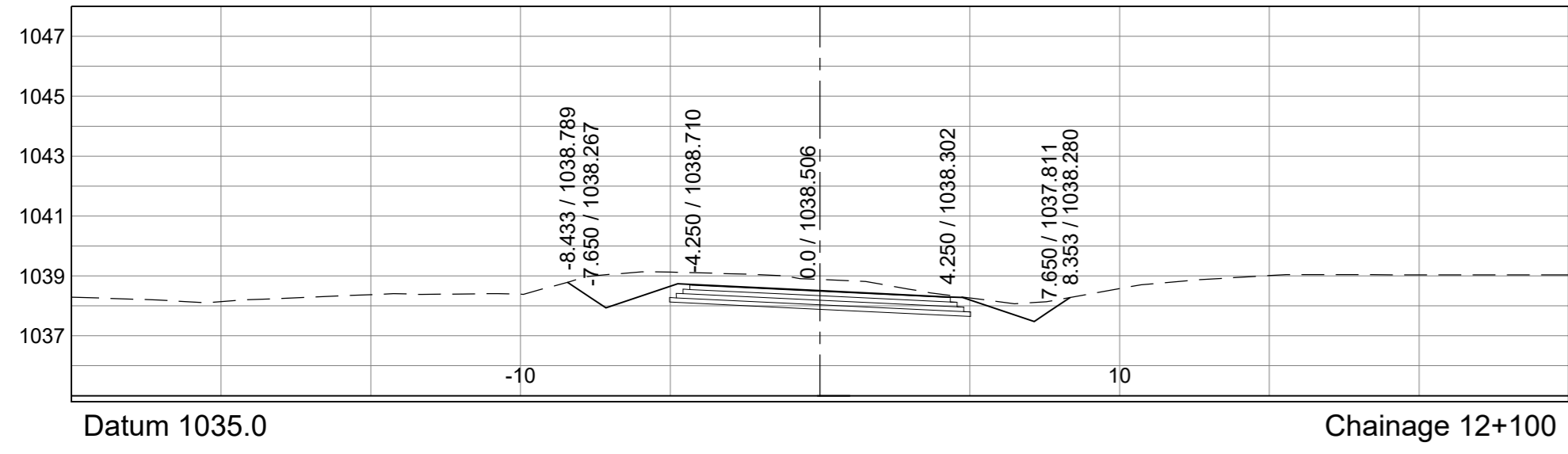
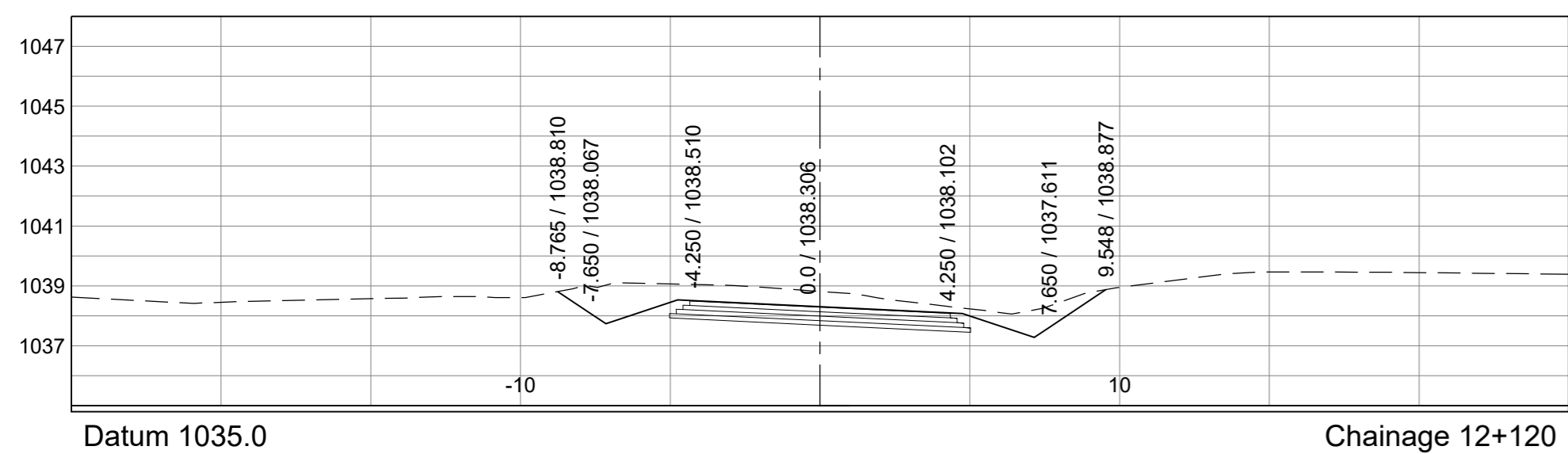
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 2	REVISION:
km 11+340 - km 11+940	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 44331**





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44331	Designed by:-	T. PIKA
Continued on:-	C 44333	Checked by:-	Y. DOMA
Cross Section No:-	C 44332	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44324 - C 44325	Checked by:-	Y. DOMA
Design Plan No:-	C 44314	Date of approval:-	

Designed by: T. PIKA  
 Checked by: Y. DOMA  
 Drawn by: S. ZITHA  
 Checked by: Y. DOMA  
 Date of approval: \_\_\_\_\_



Designed by: **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 01-02-2024 Date

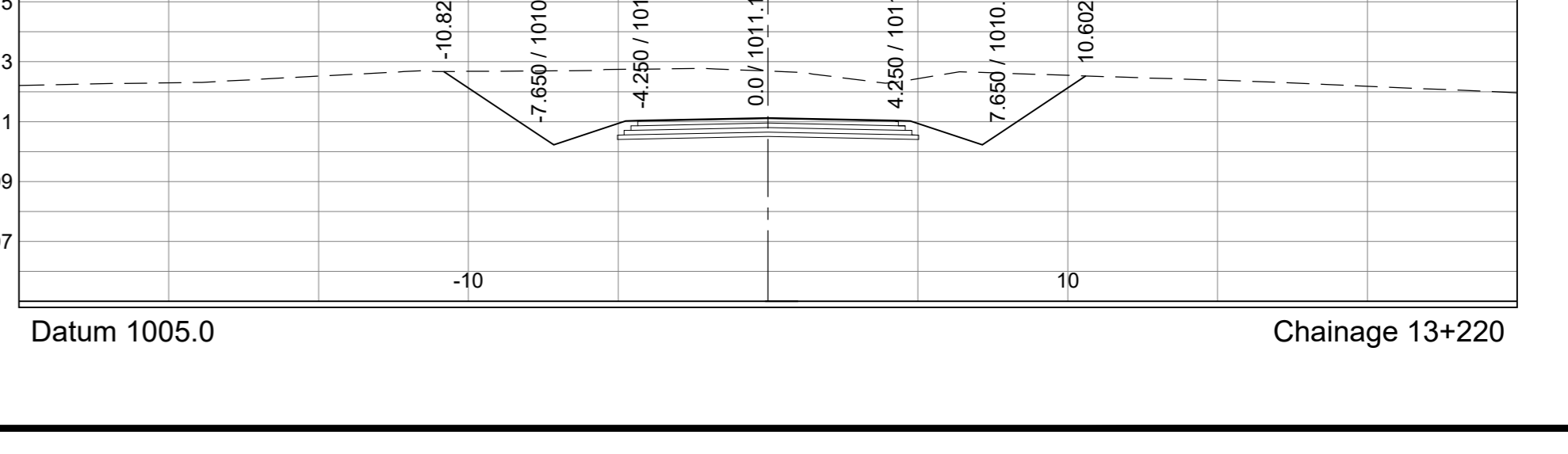
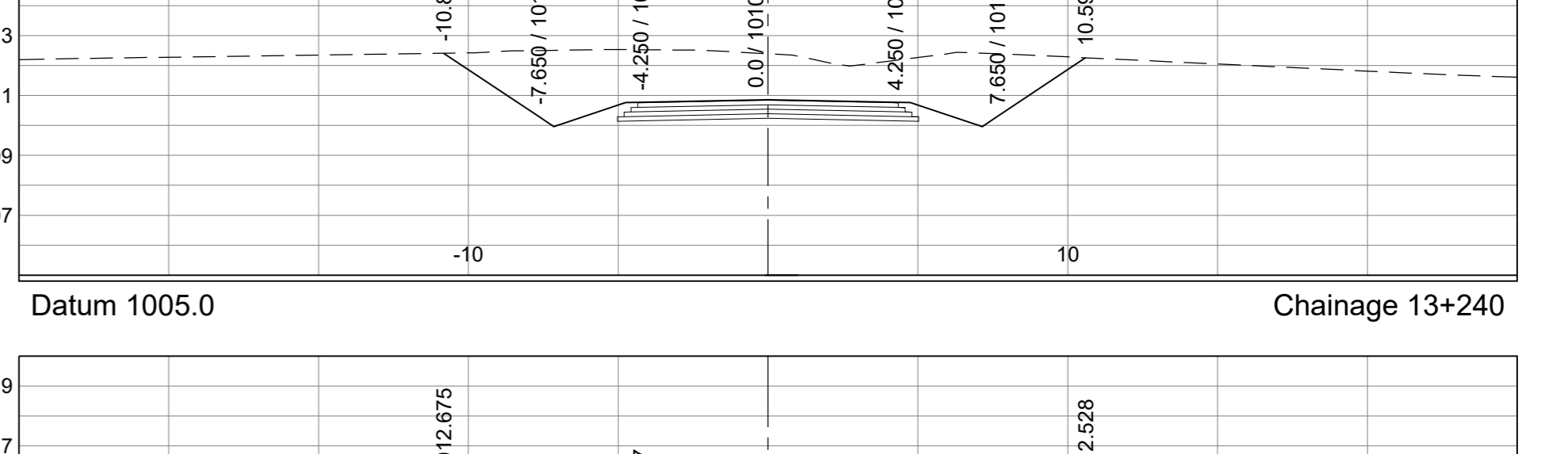
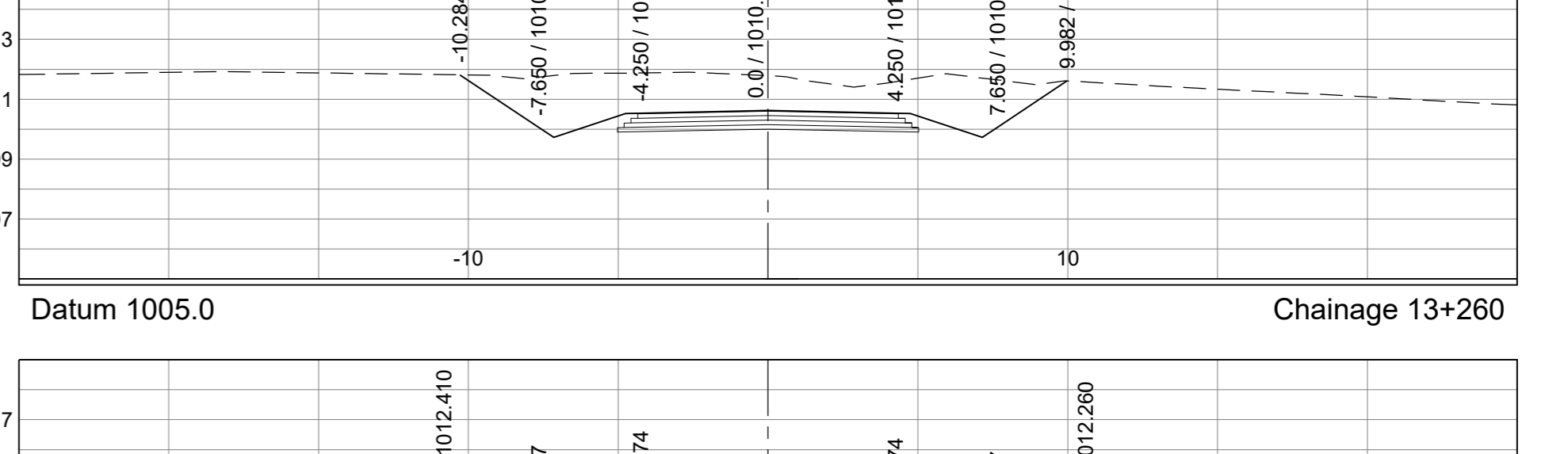
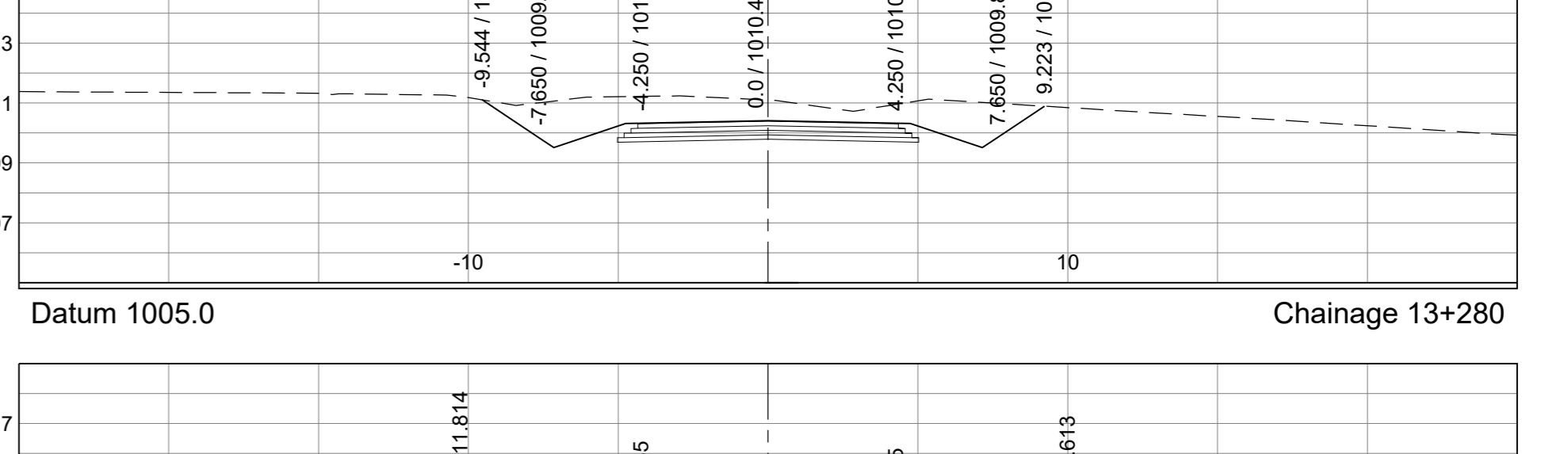
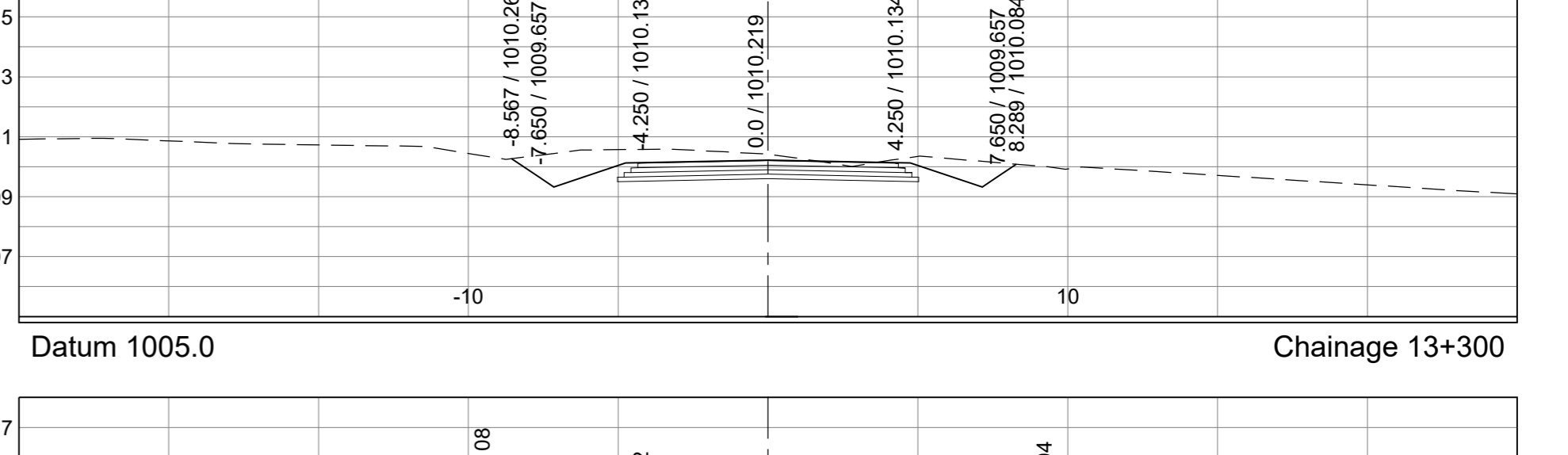
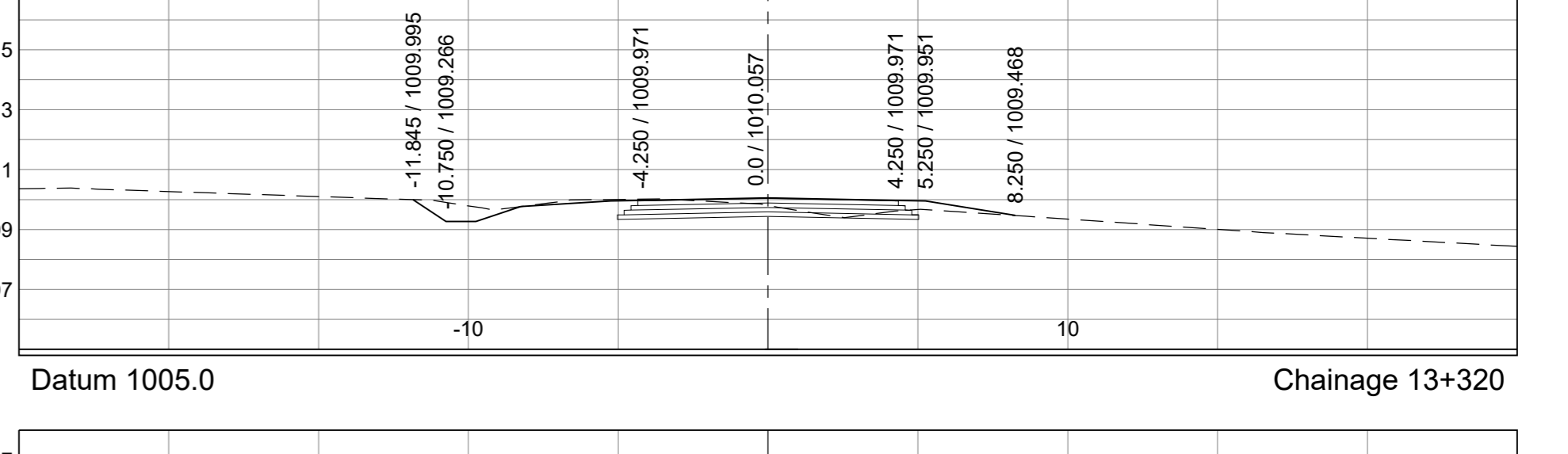
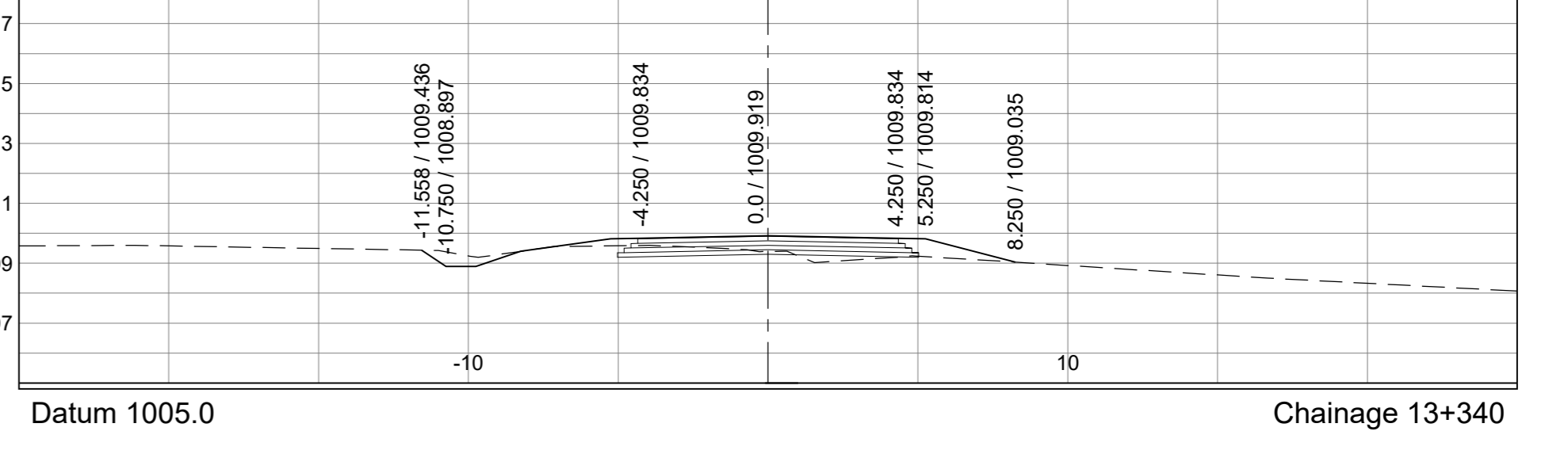
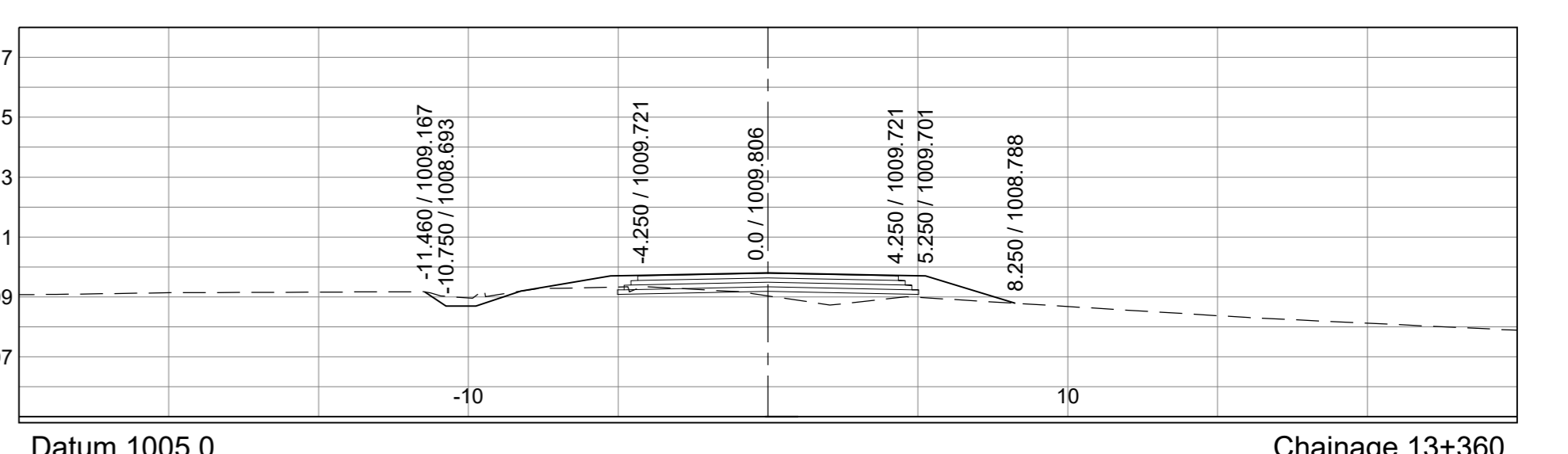
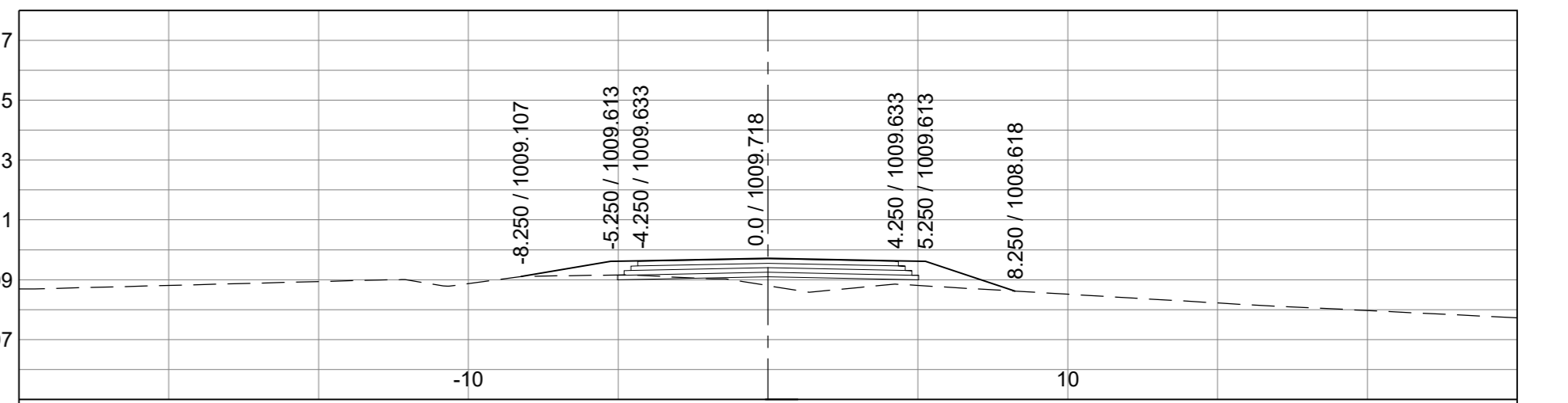
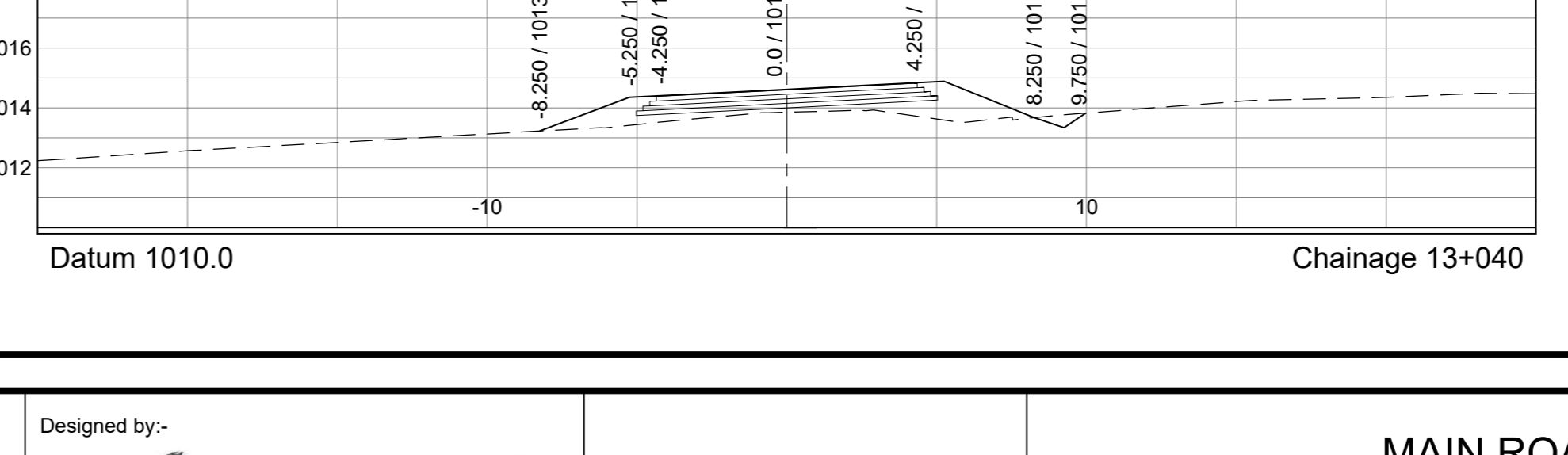
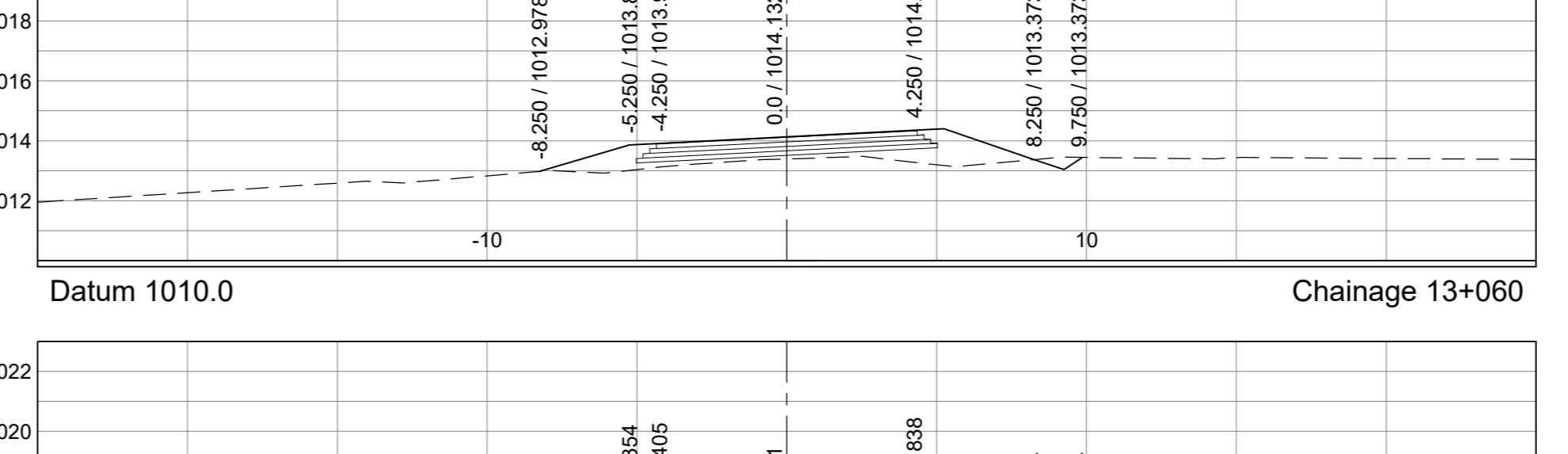
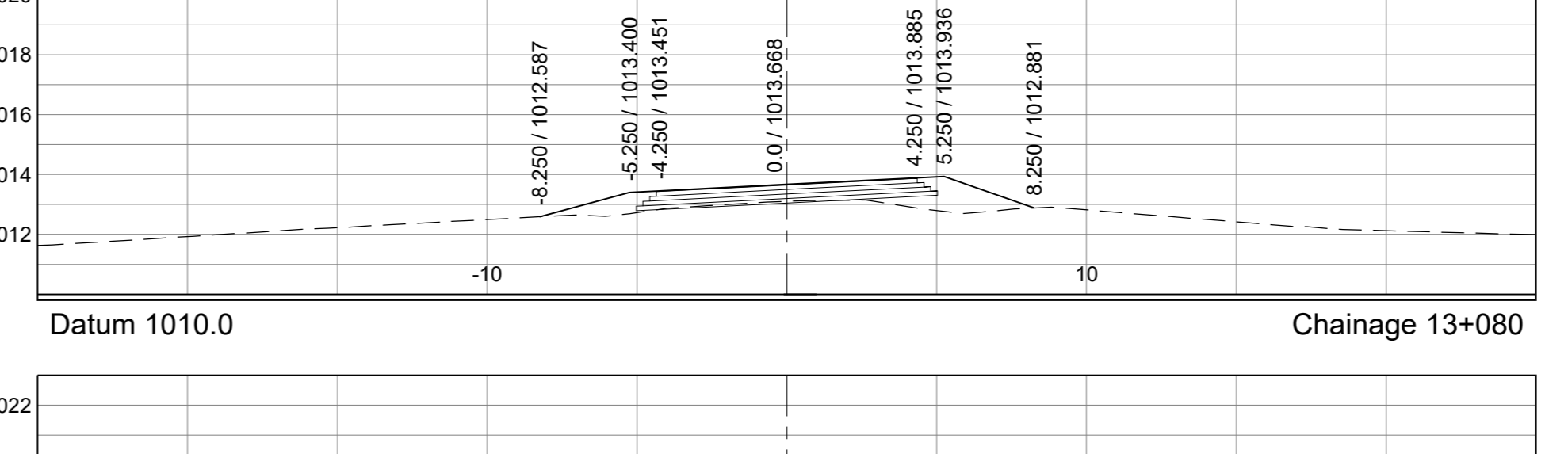
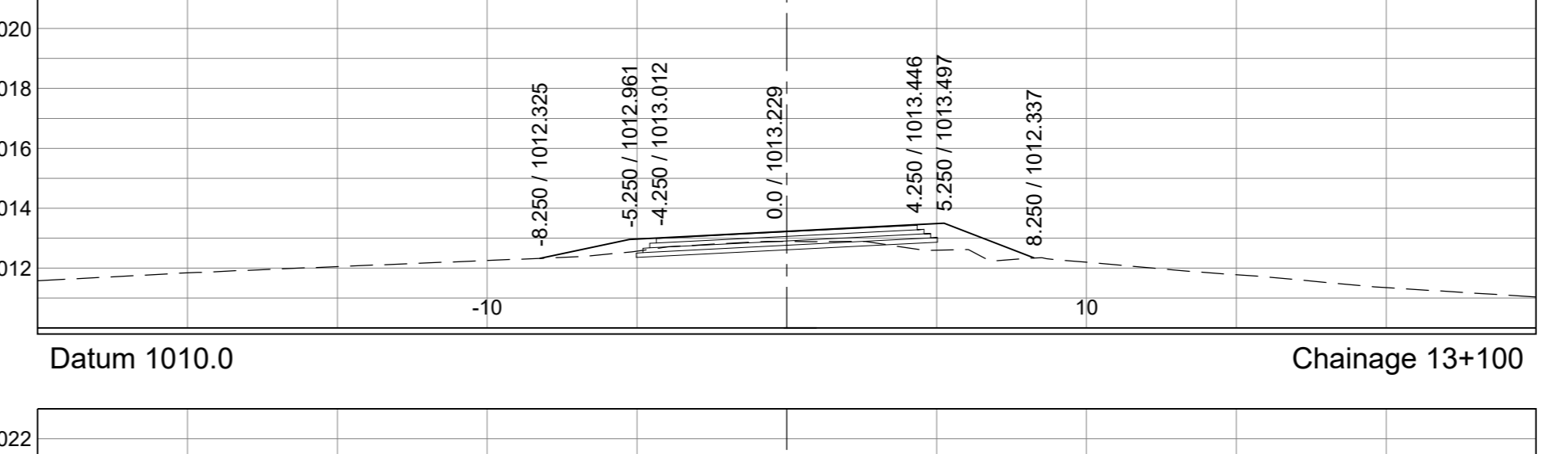
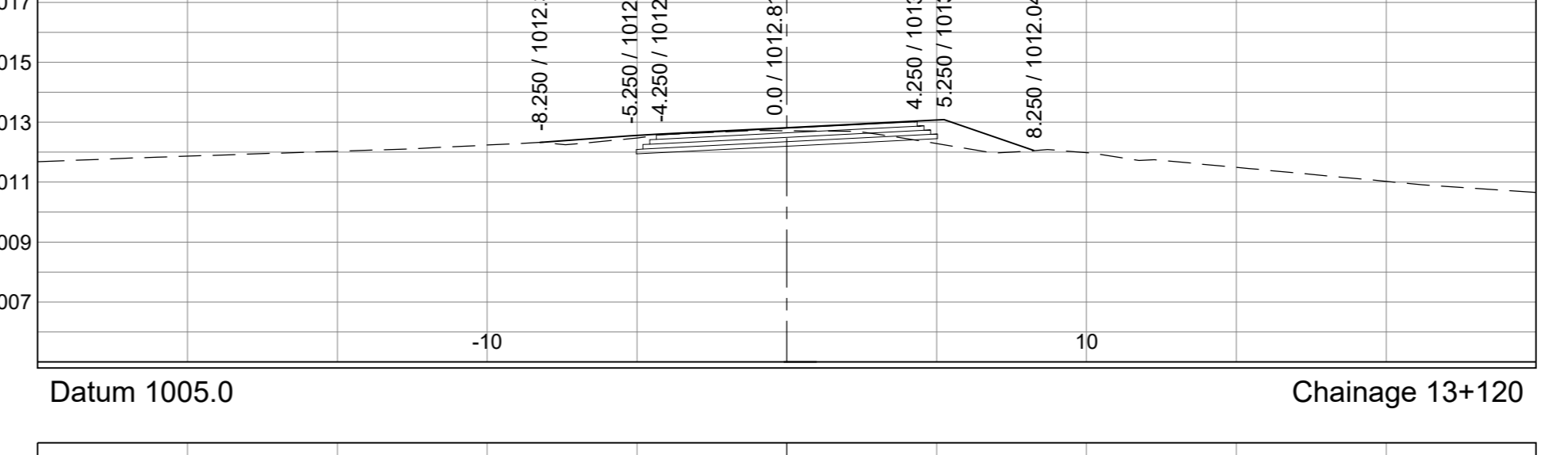
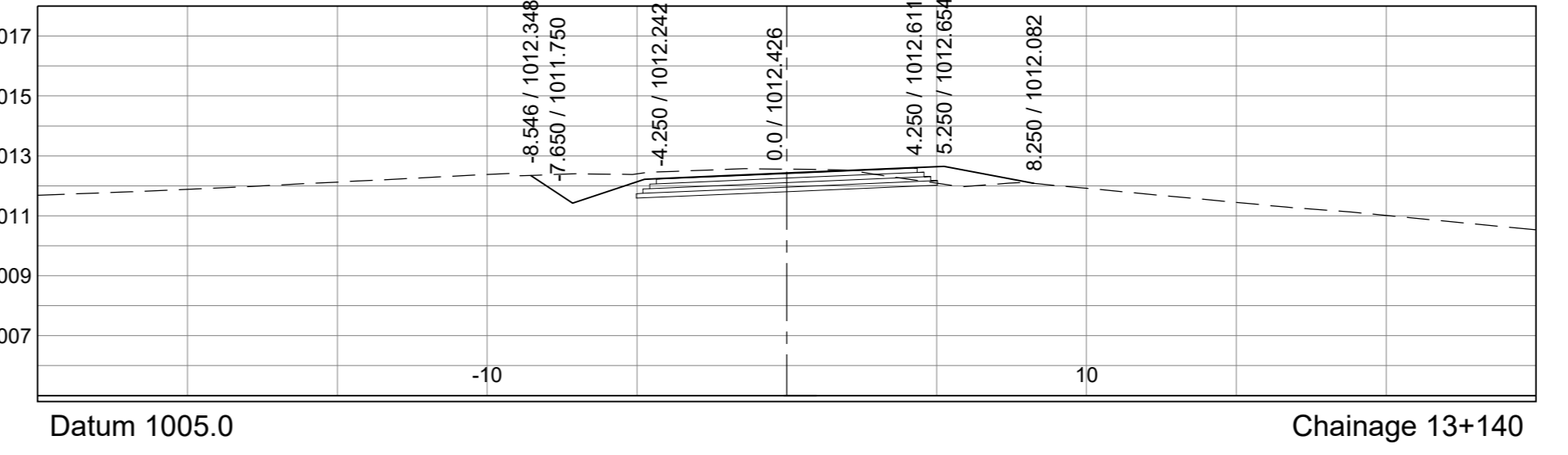
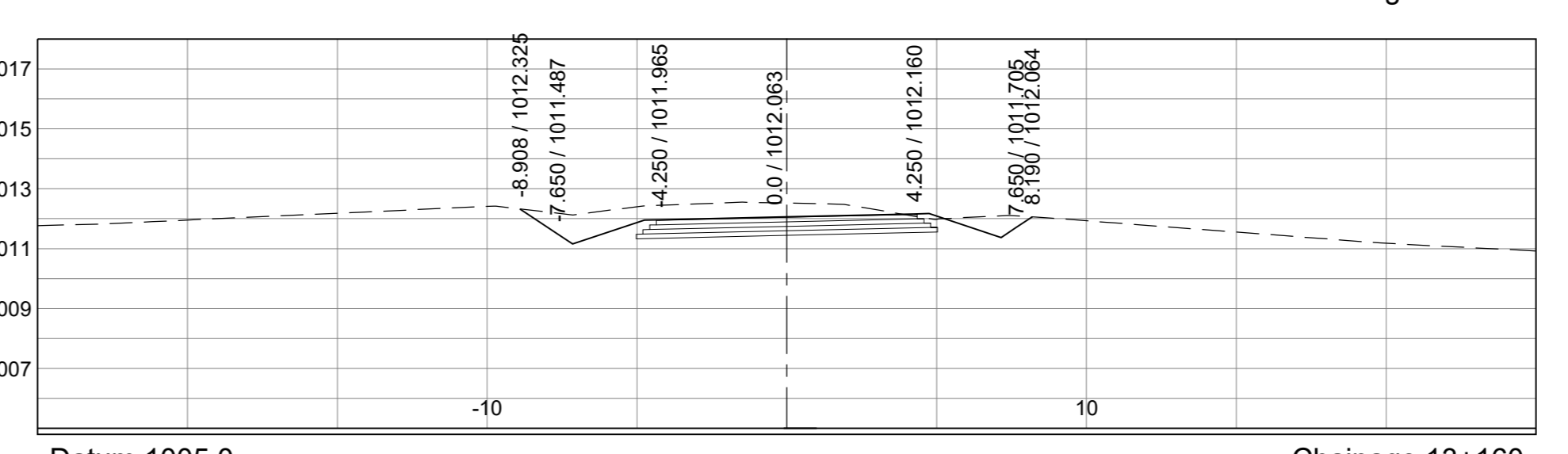
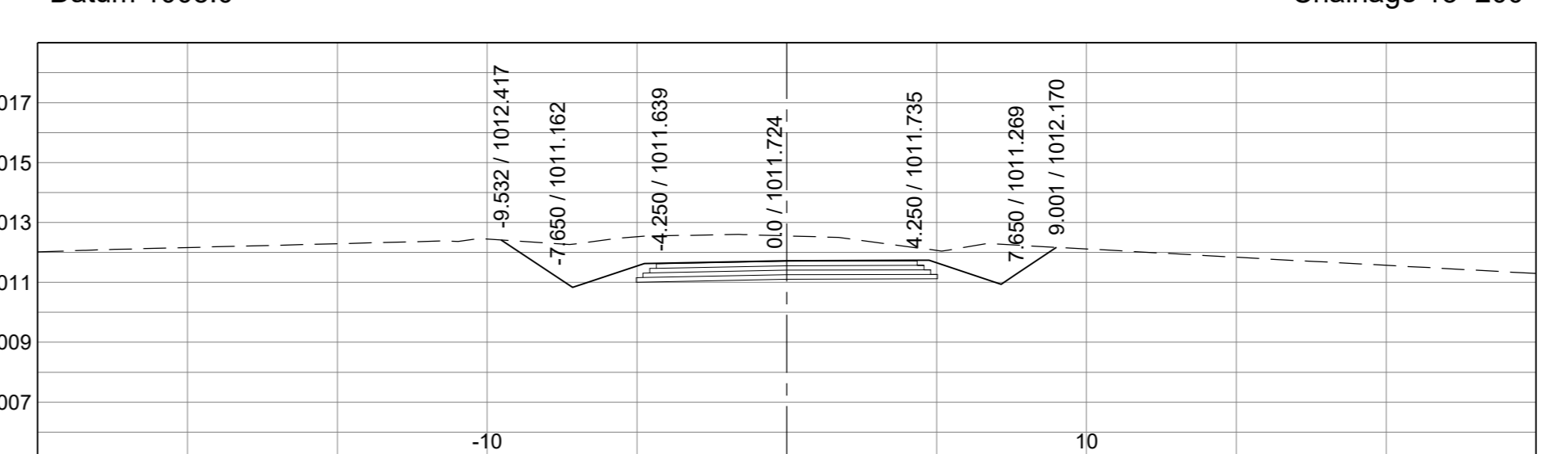
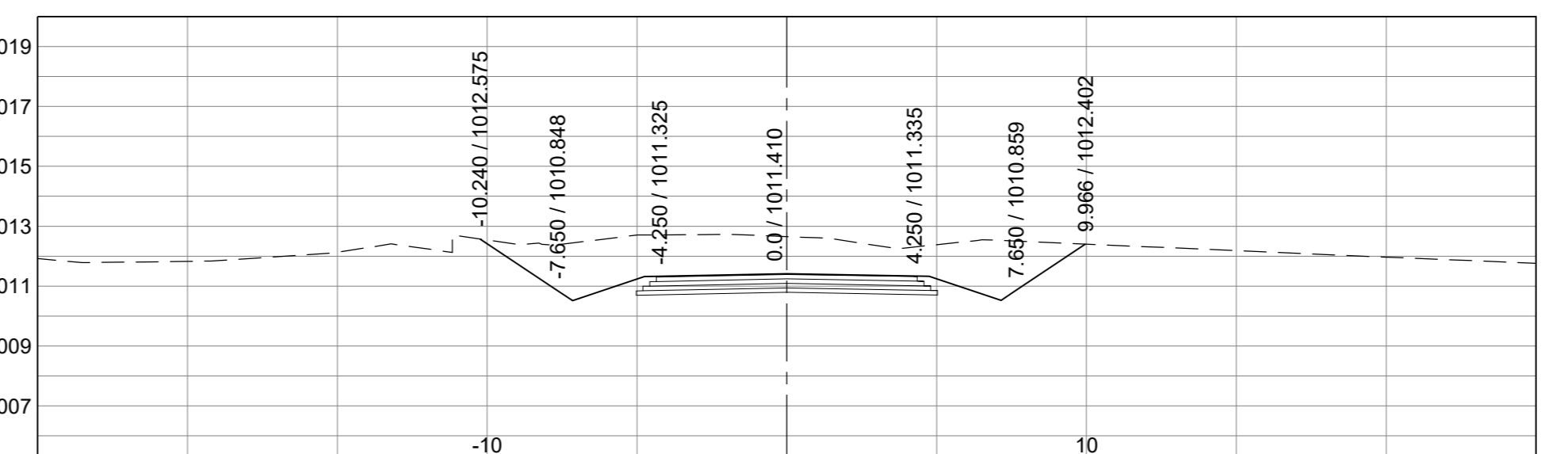
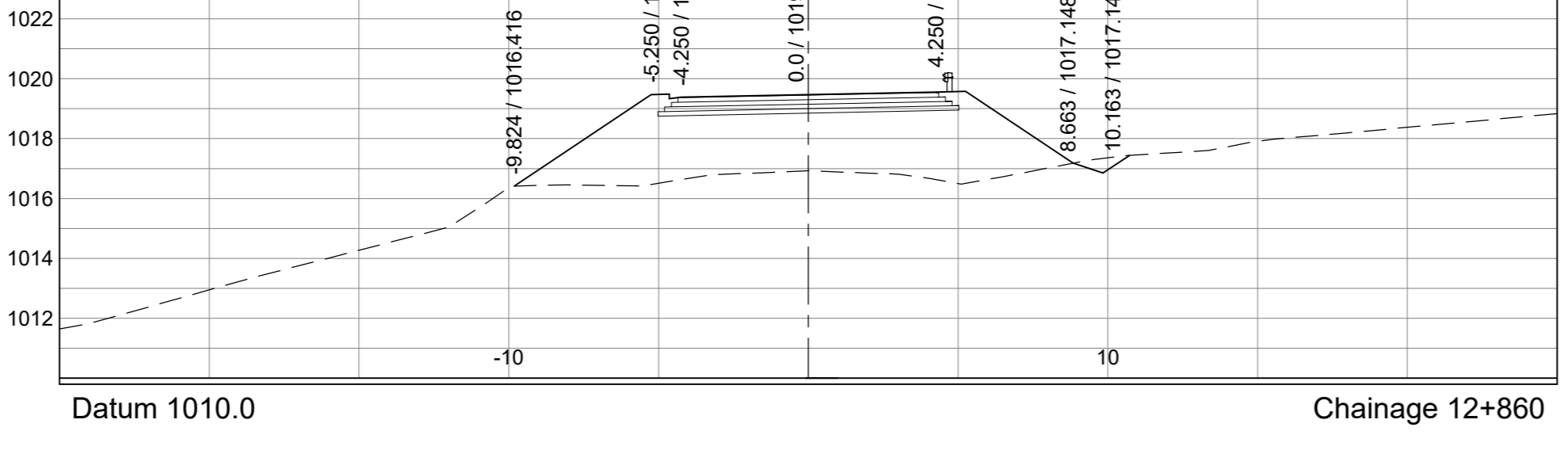
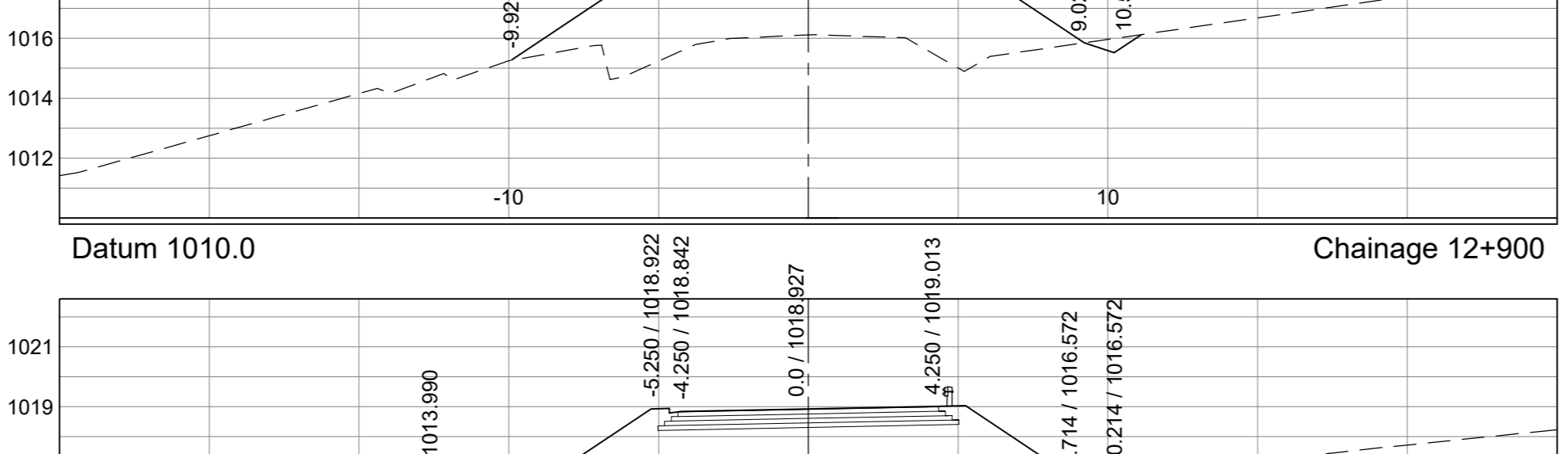
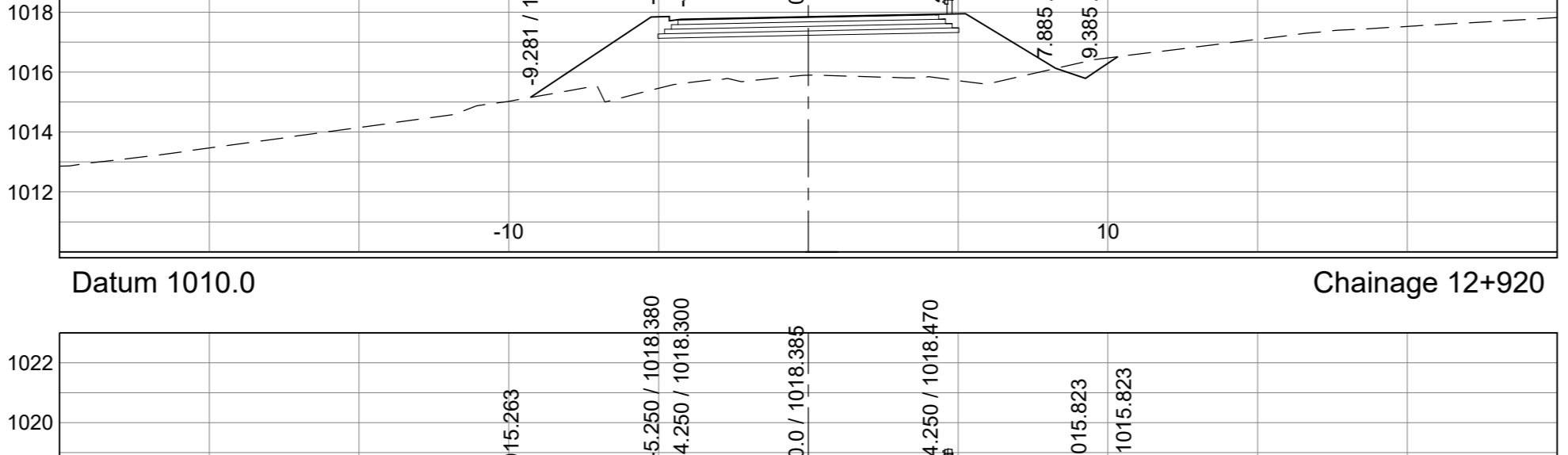
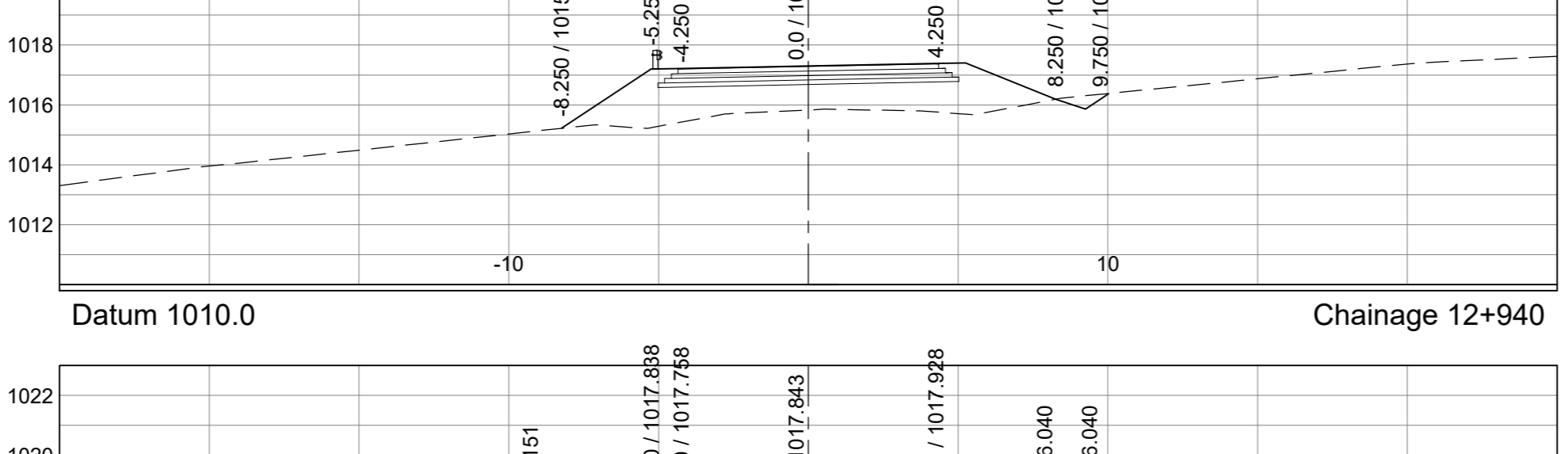
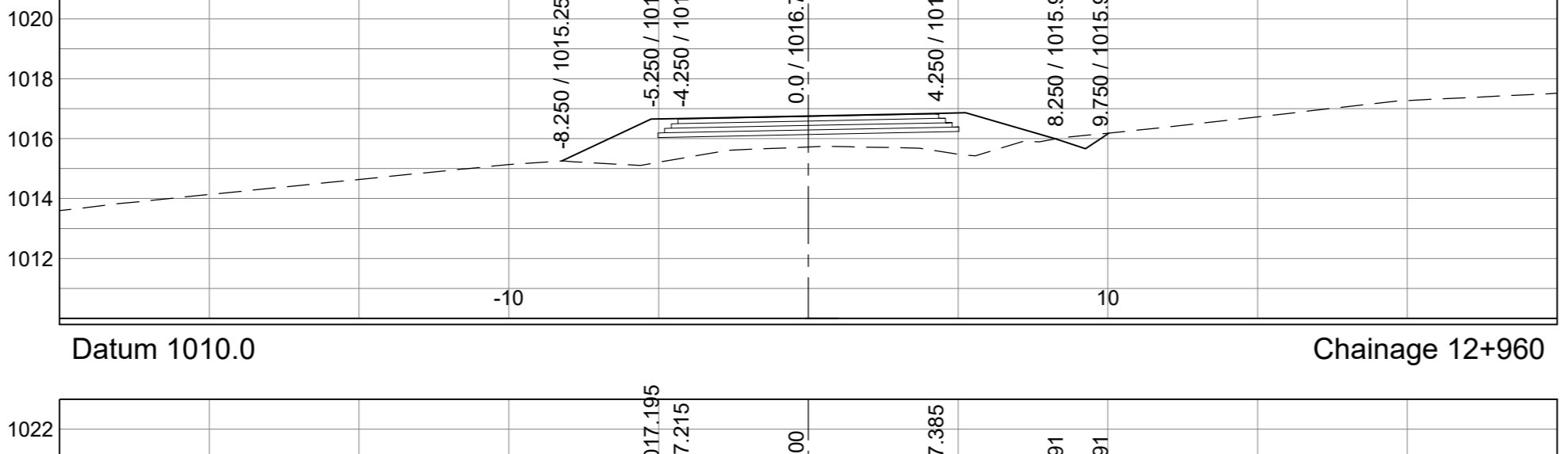
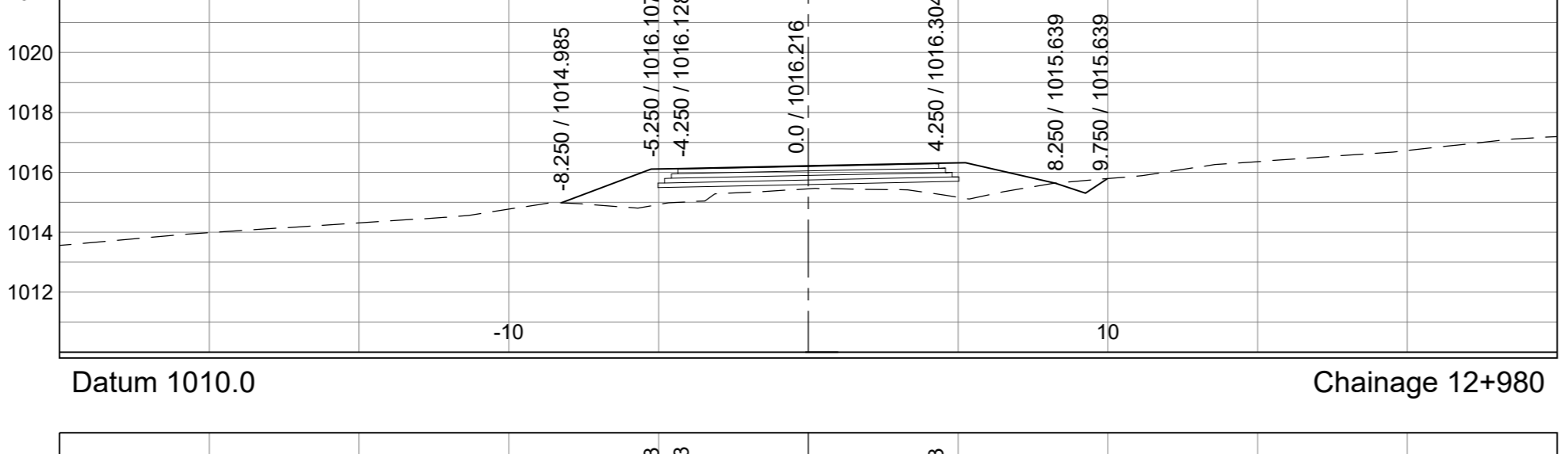
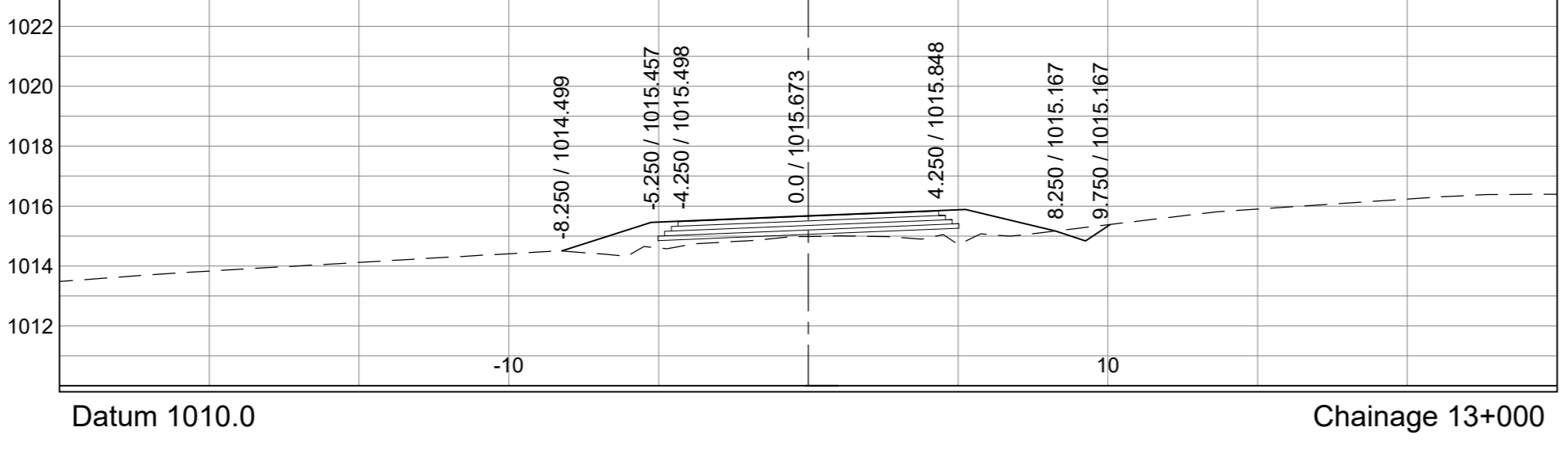
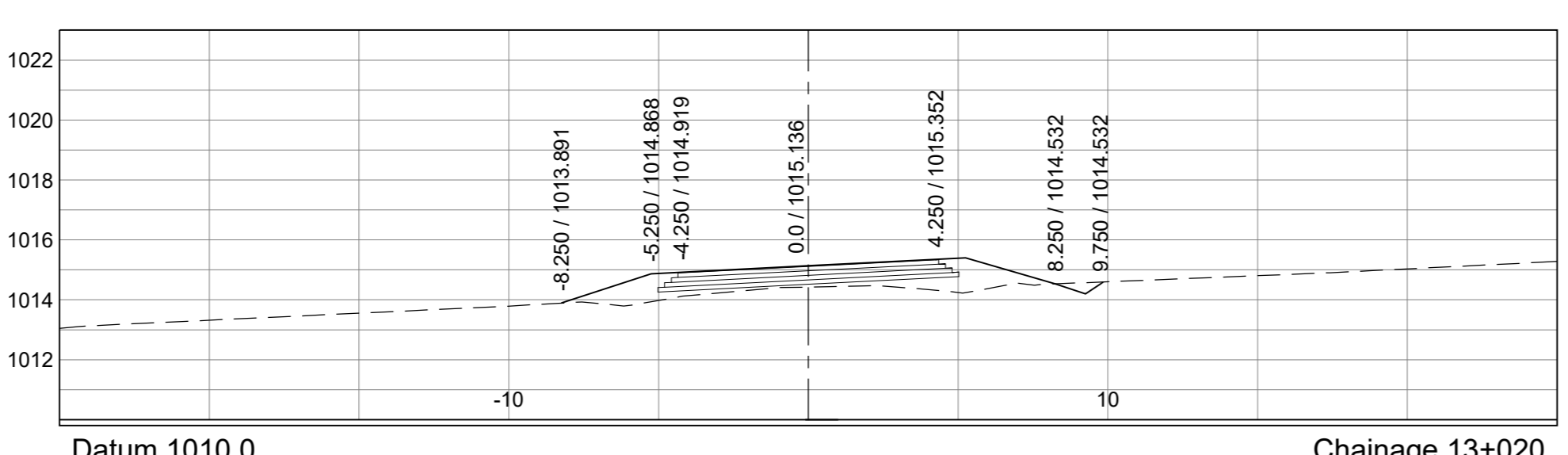
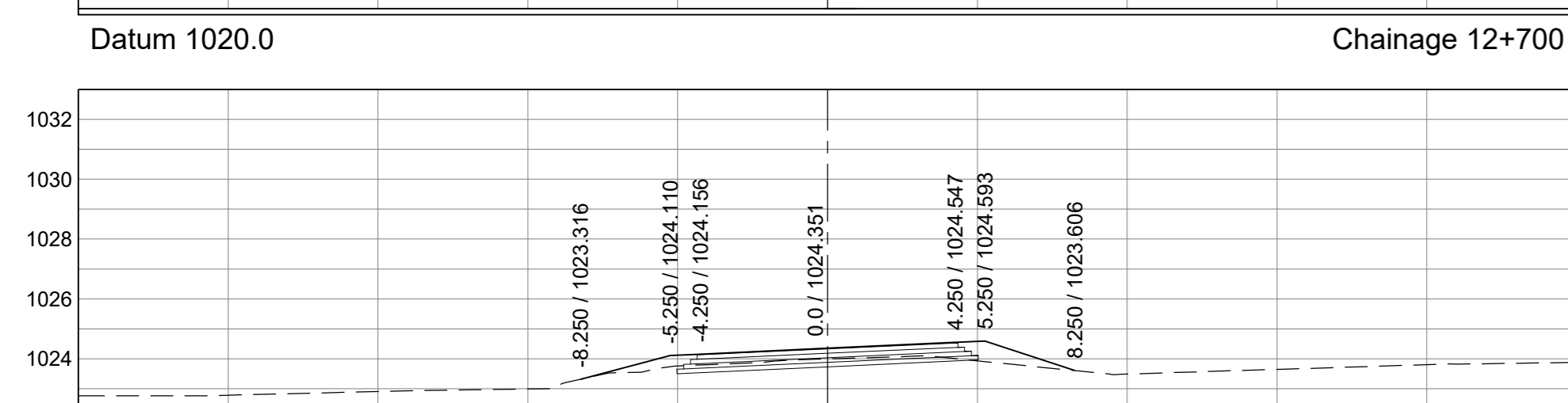
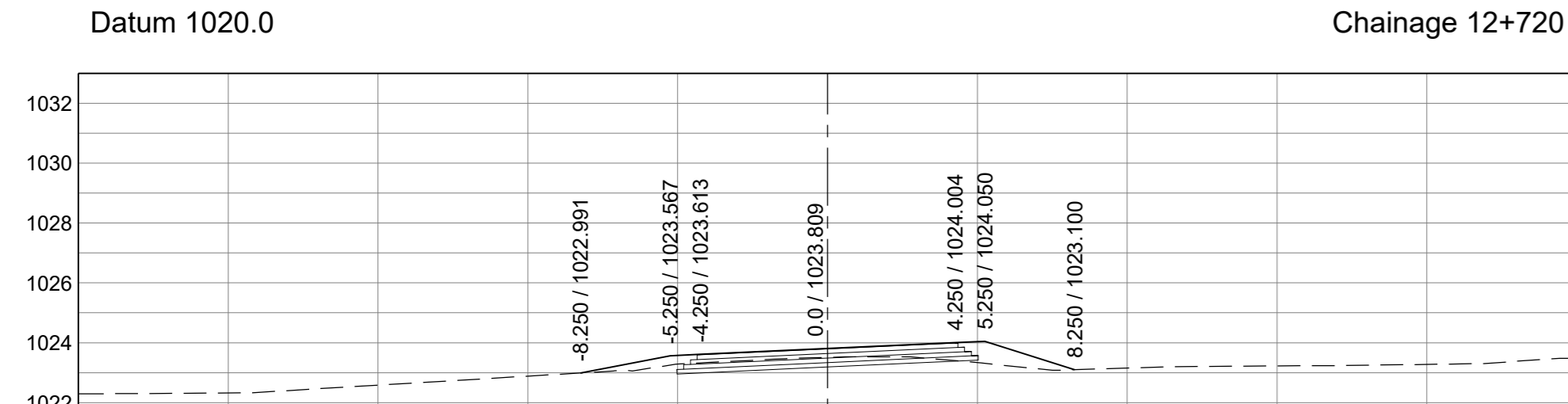
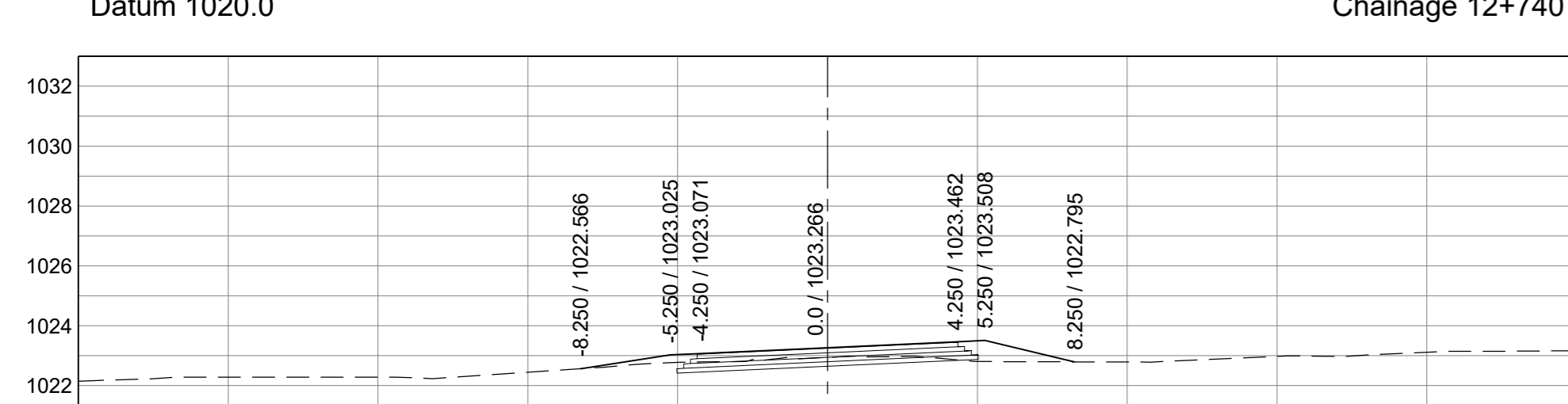
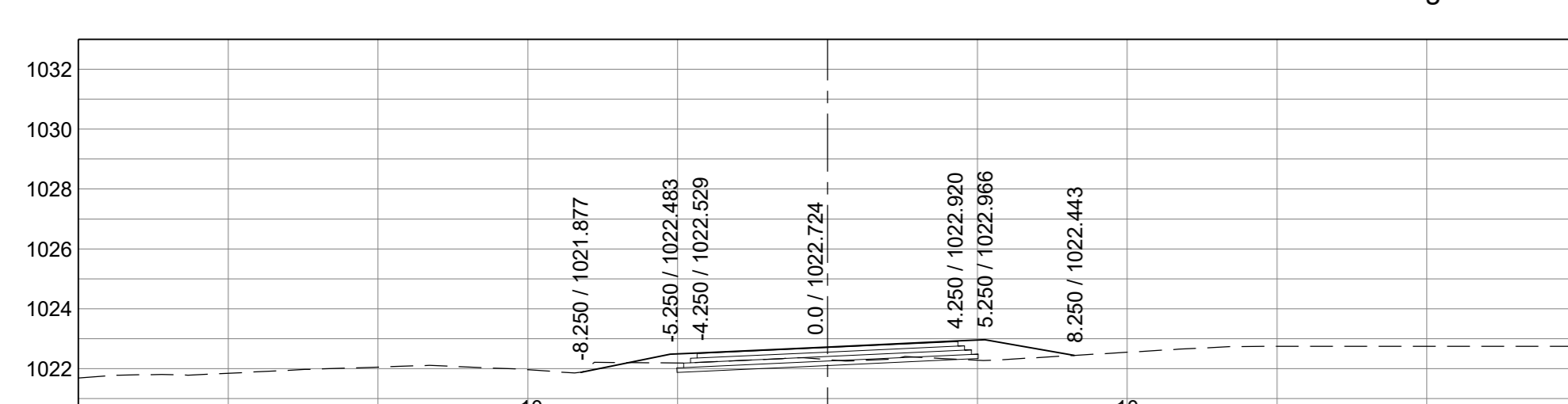
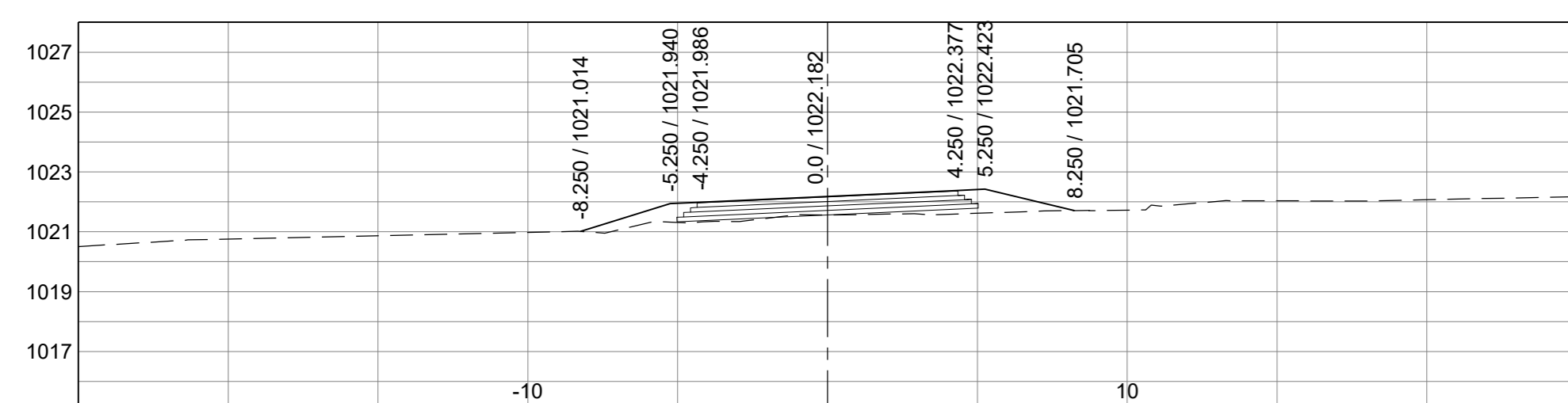
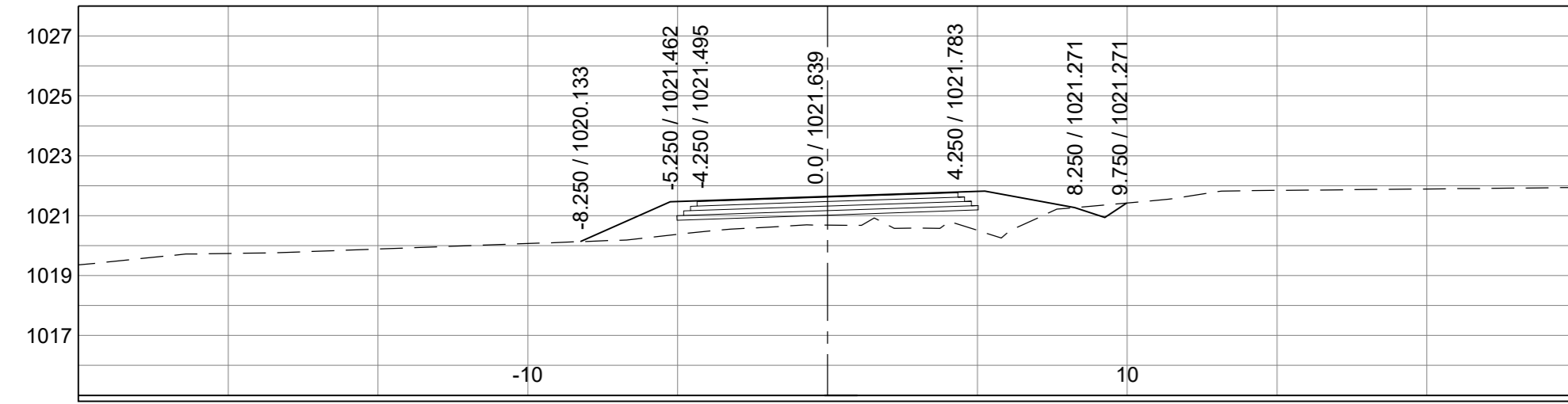
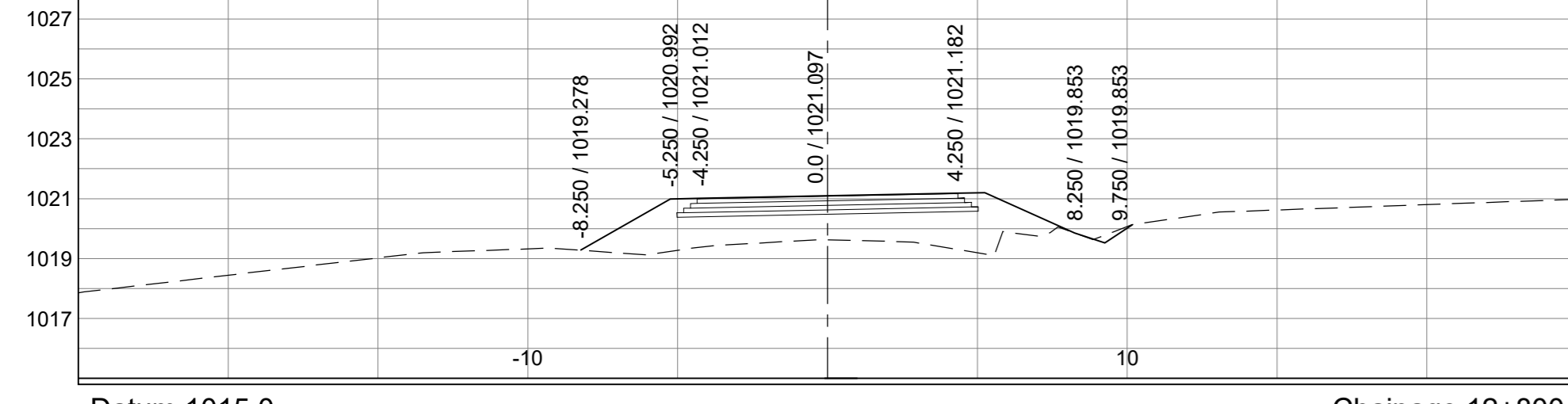
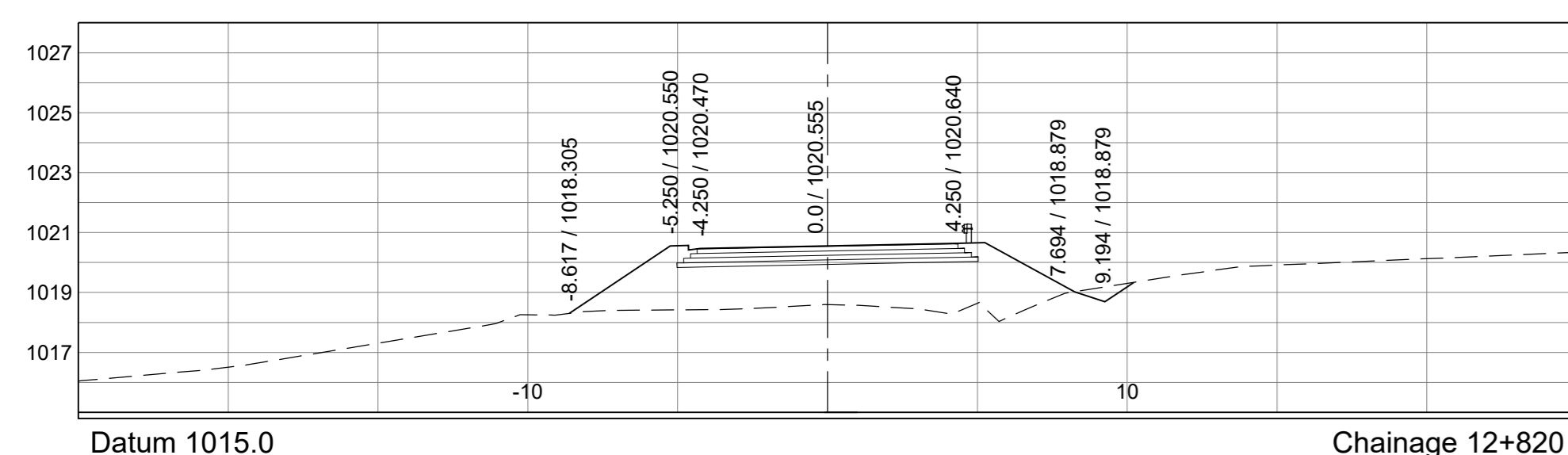
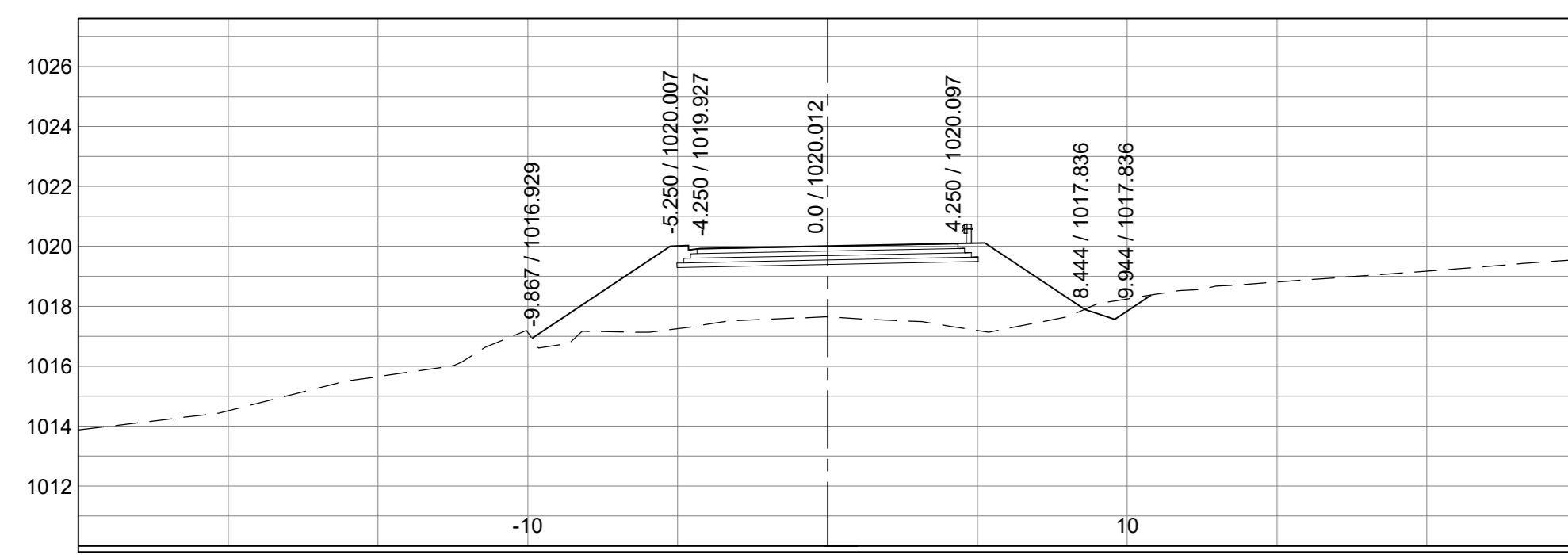
**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 3	REVISION:
km 11+960 - km 12+660	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 44332**





AS BUILT			
Symbol	Date	Description	Checked
A	01-02-2024	ISSUED FOR TENDER	YD
AMENDMENTS			

Continued from:-	C 44332	Designed by:-	T. PIKA
Continued on:-	C 44334	Checked by:-	Y. DOMA
Cross Section No:-	C 44333	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44325 - C 44326	Checked by:-	Y. DOMA
Design Plan No:-	C 44315	Date of approval:-	

Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions  
 01-02-2024  
 Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Transportation Engineer: Chief Engineer  
 Head: Transport

**KWAZULU-NATAL PROVINCE**  
 TRANSPORT  
 REPUBLIC OF SOUTH AFRICA

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU

PORTION  
 Km 12+680 - Km 22+491

UPGRADING OF MAIN ROAD 278 (P278)

GENERAL ROAD CROSS SECTIONS

Staked km distance  
 km 12+680 - km 13+380

Scale  
 HORIZONTAL 1:200  
 VERTICAL 1:200

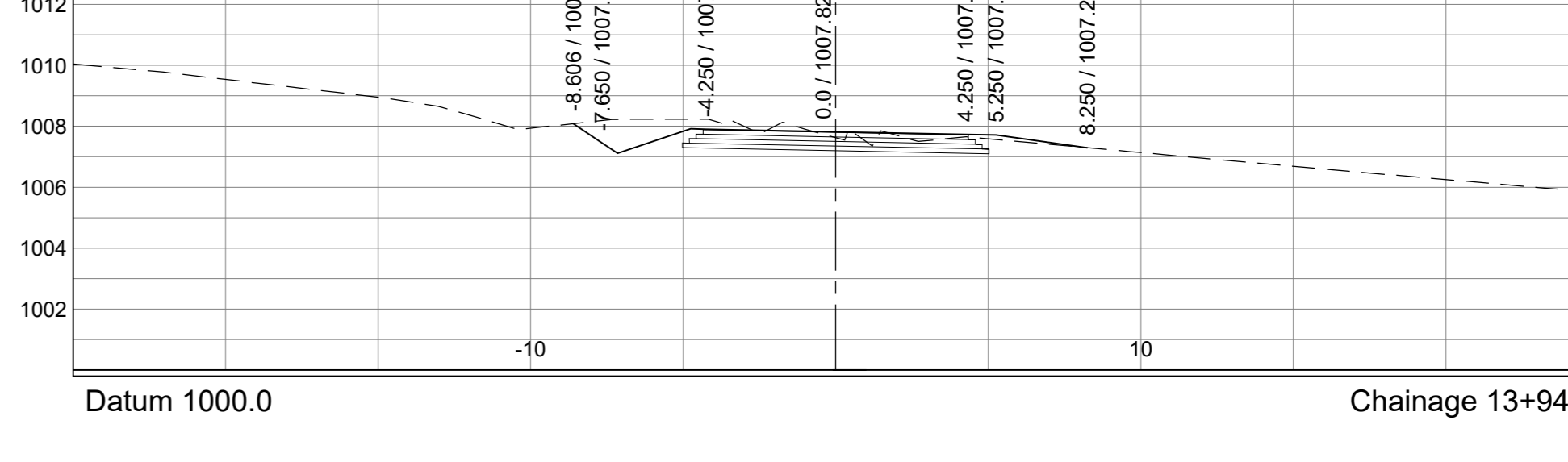
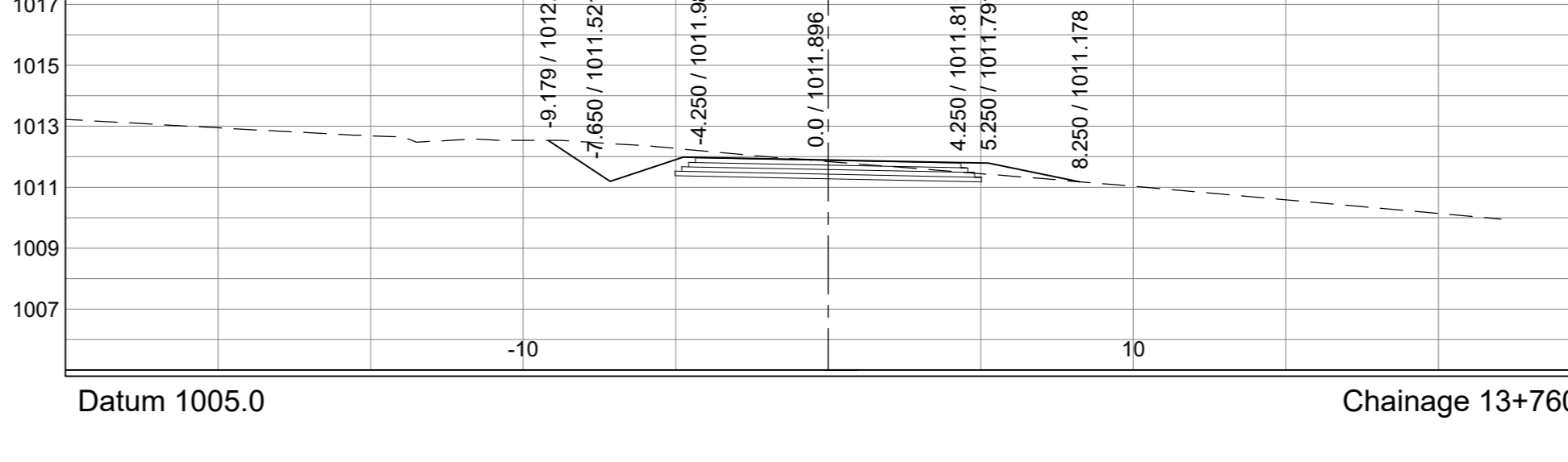
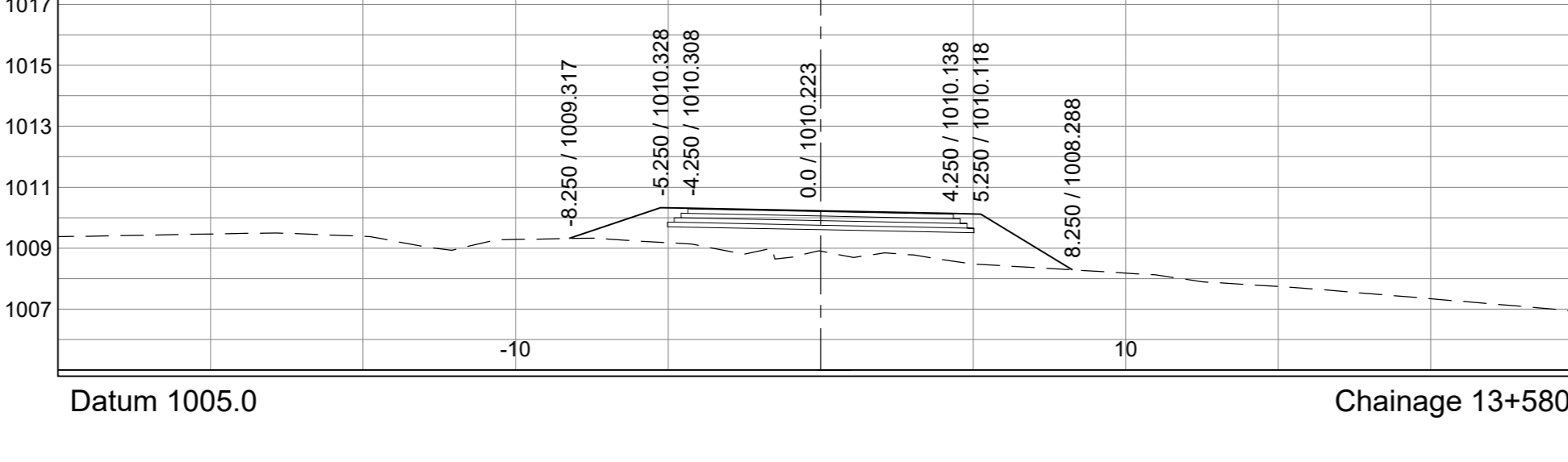
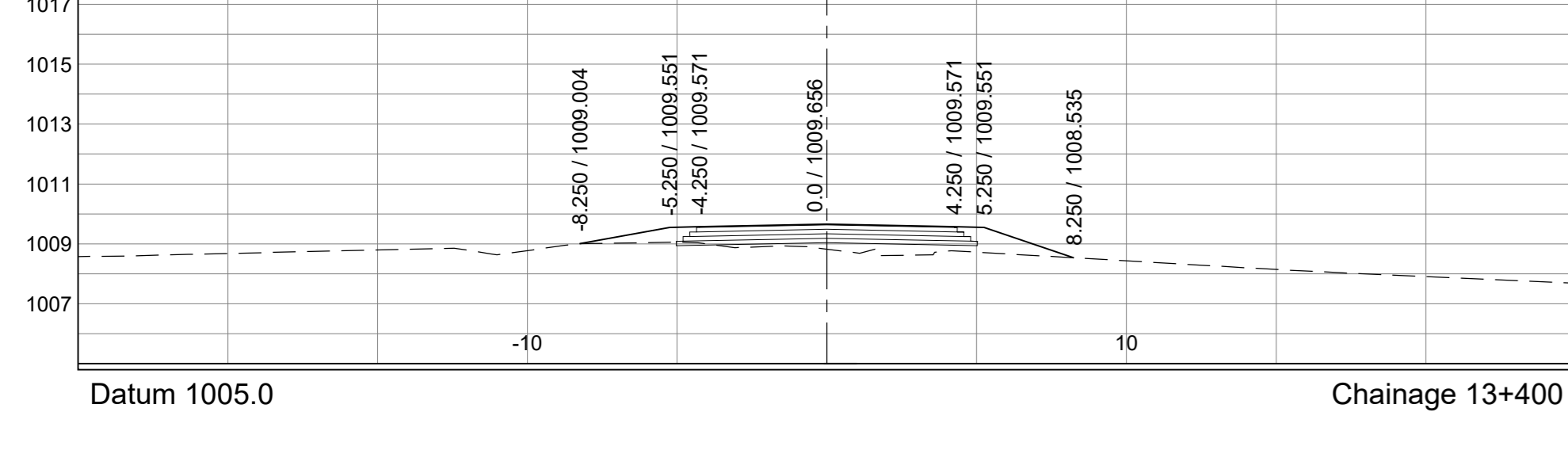
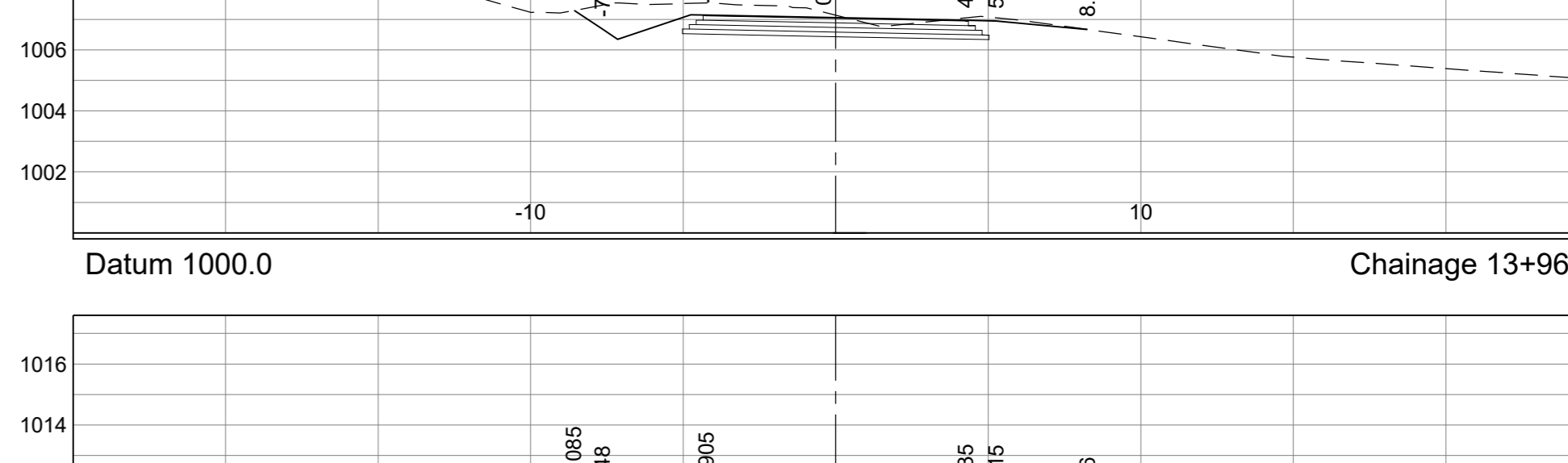
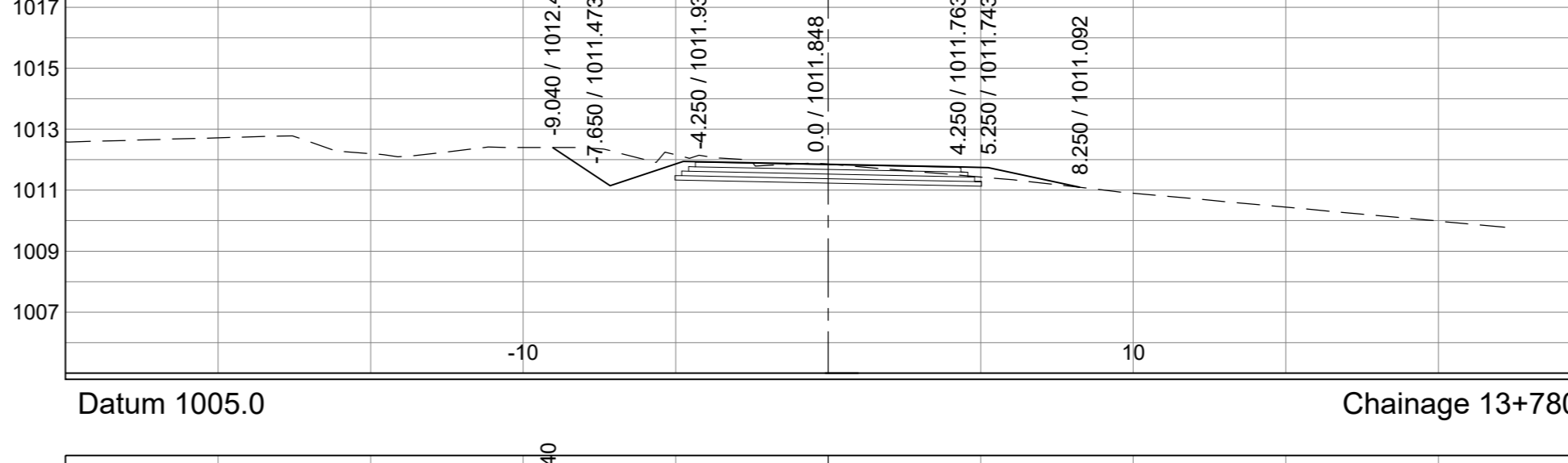
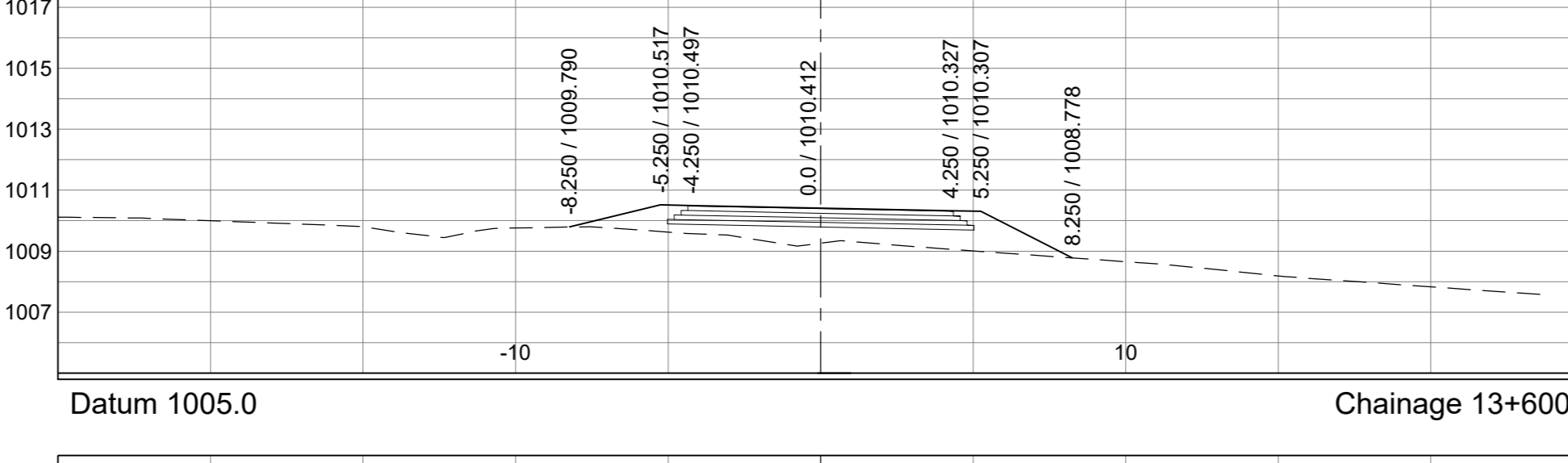
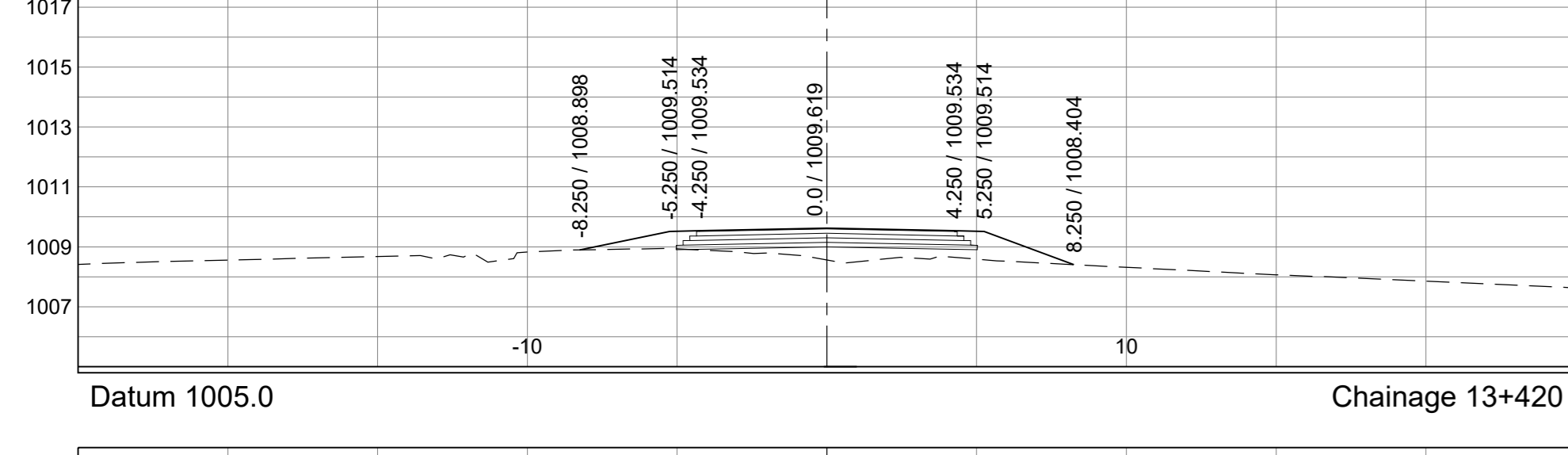
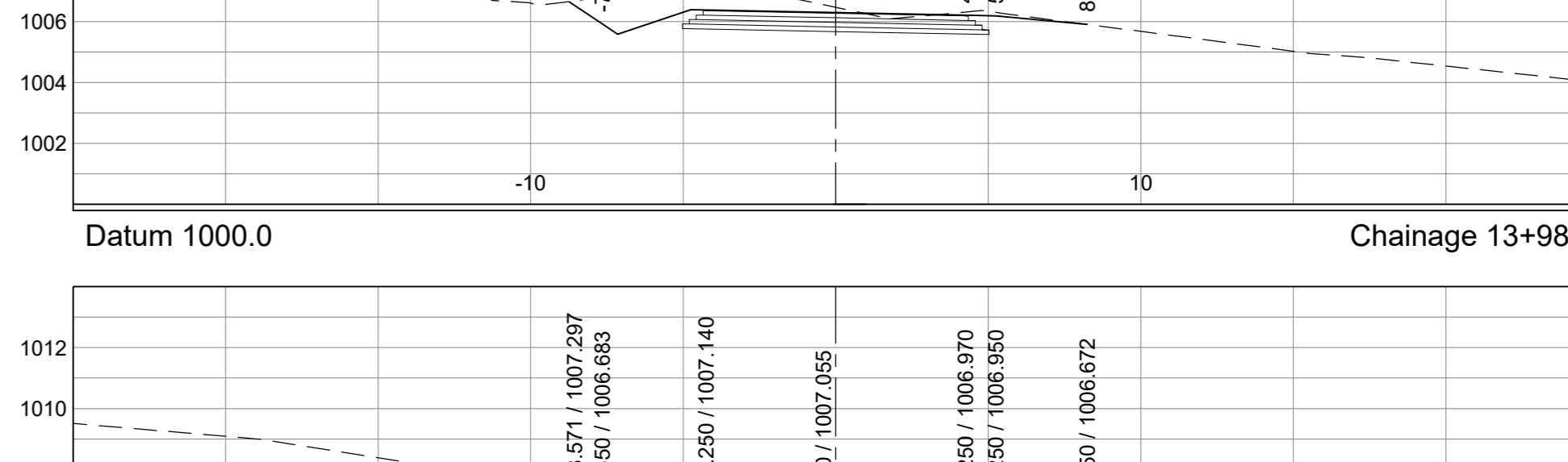
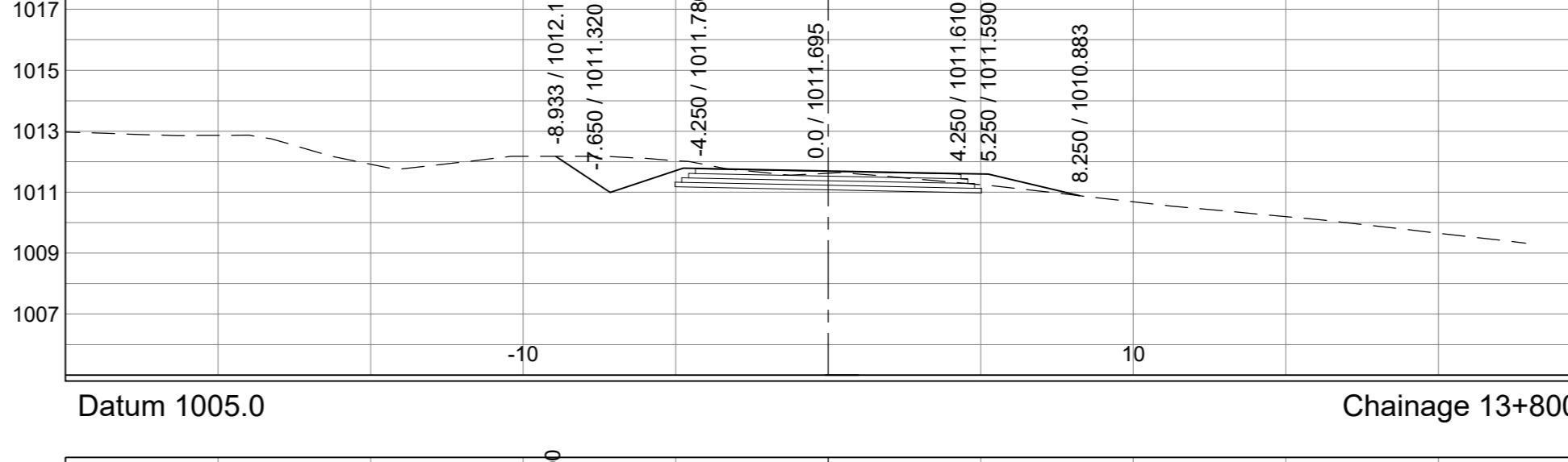
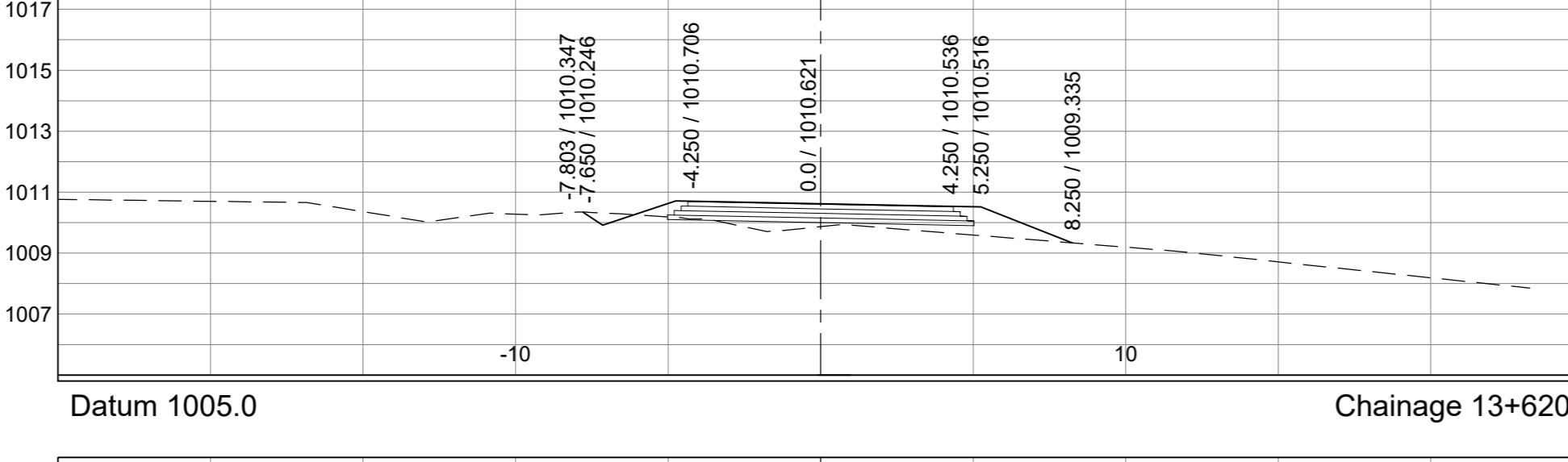
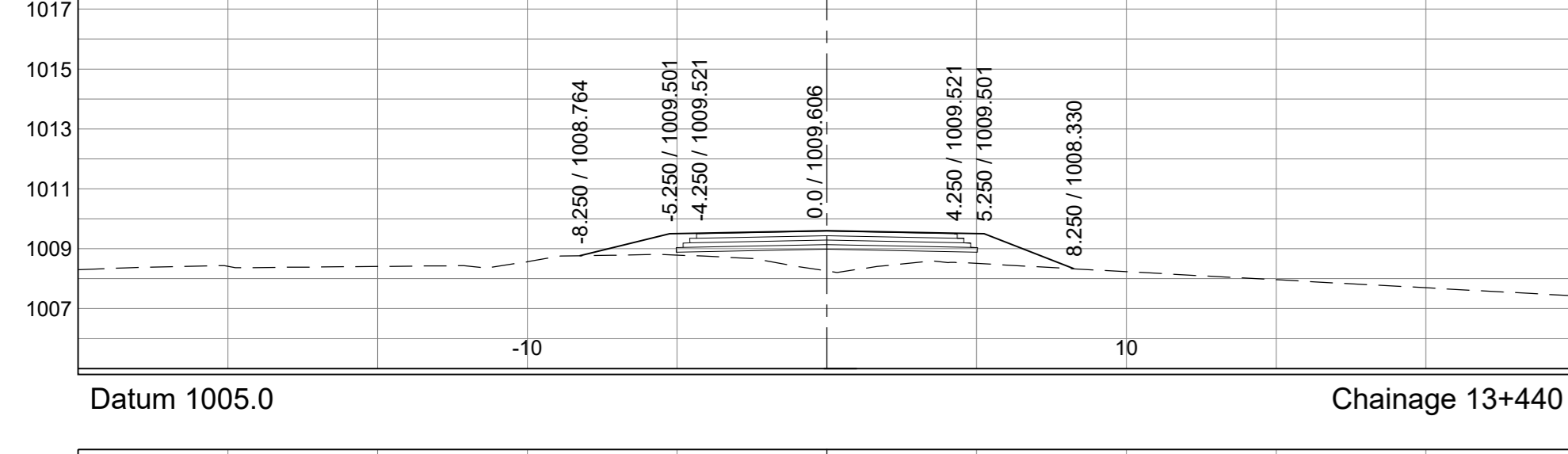
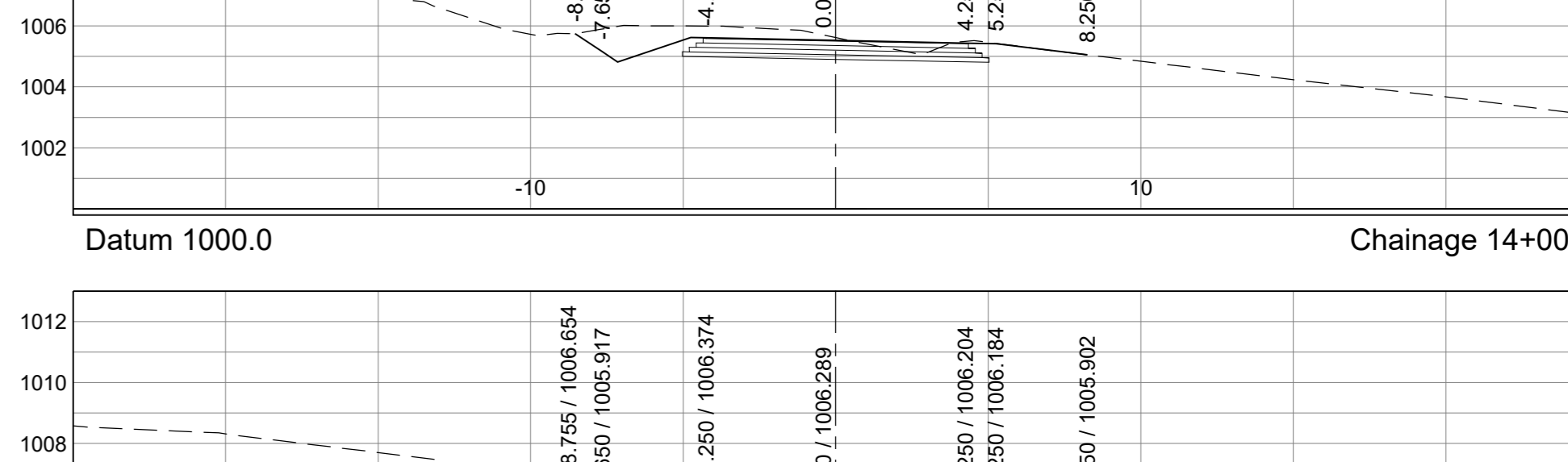
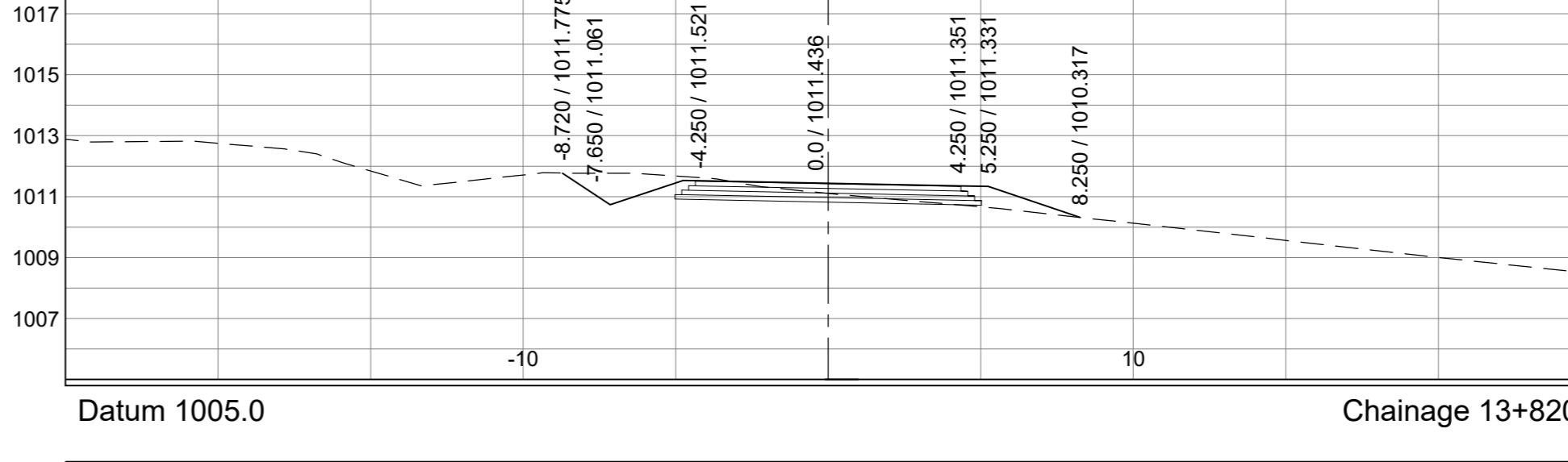
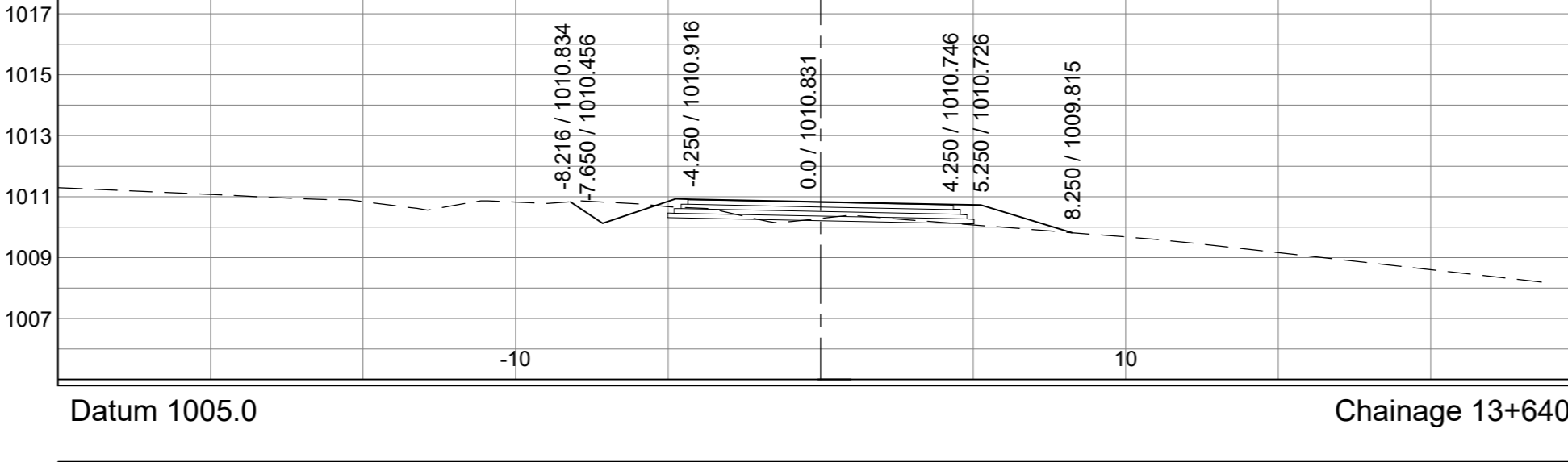
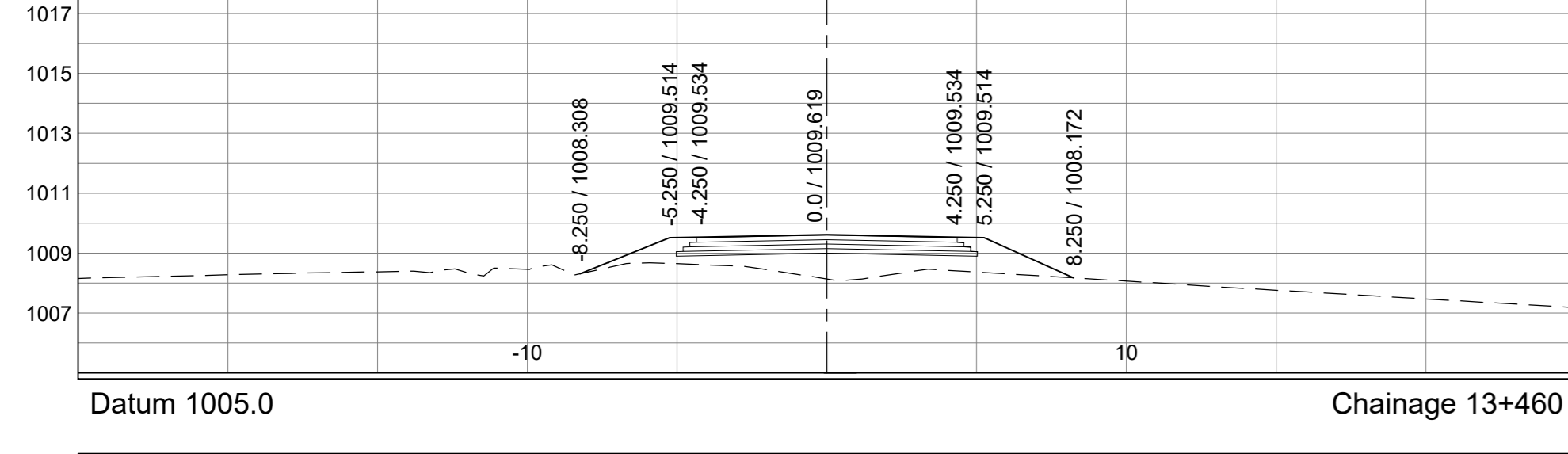
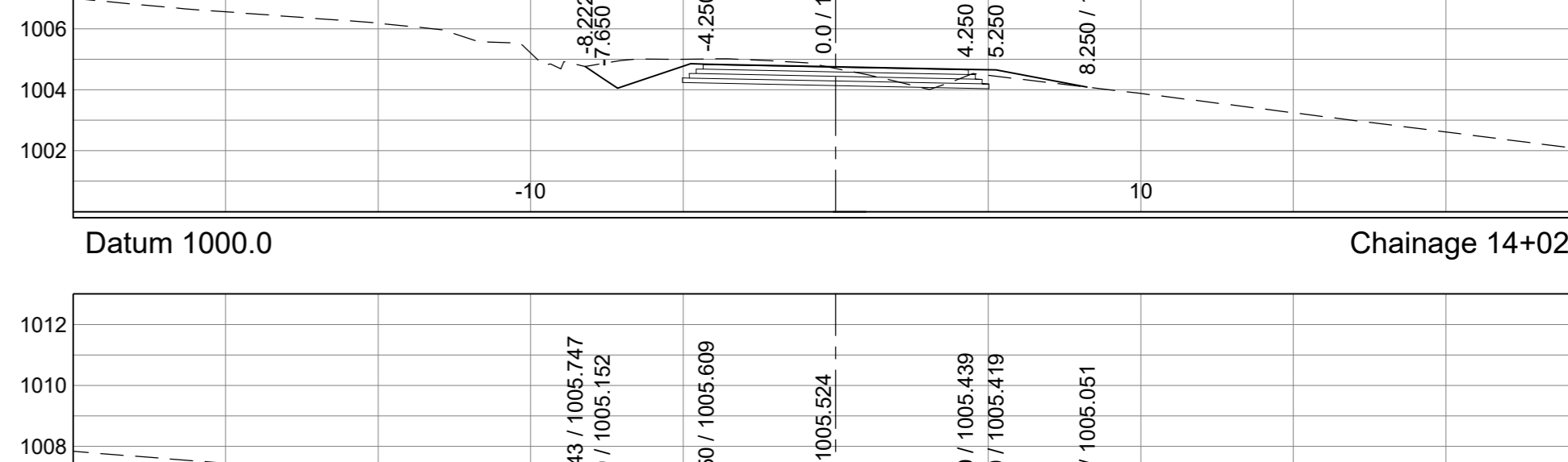
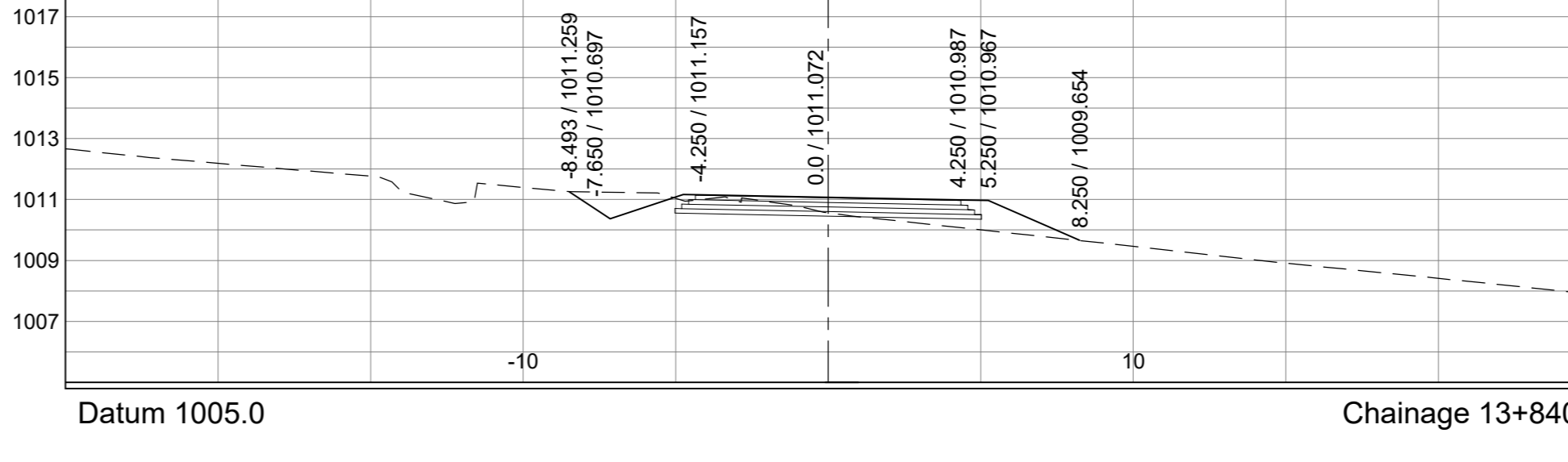
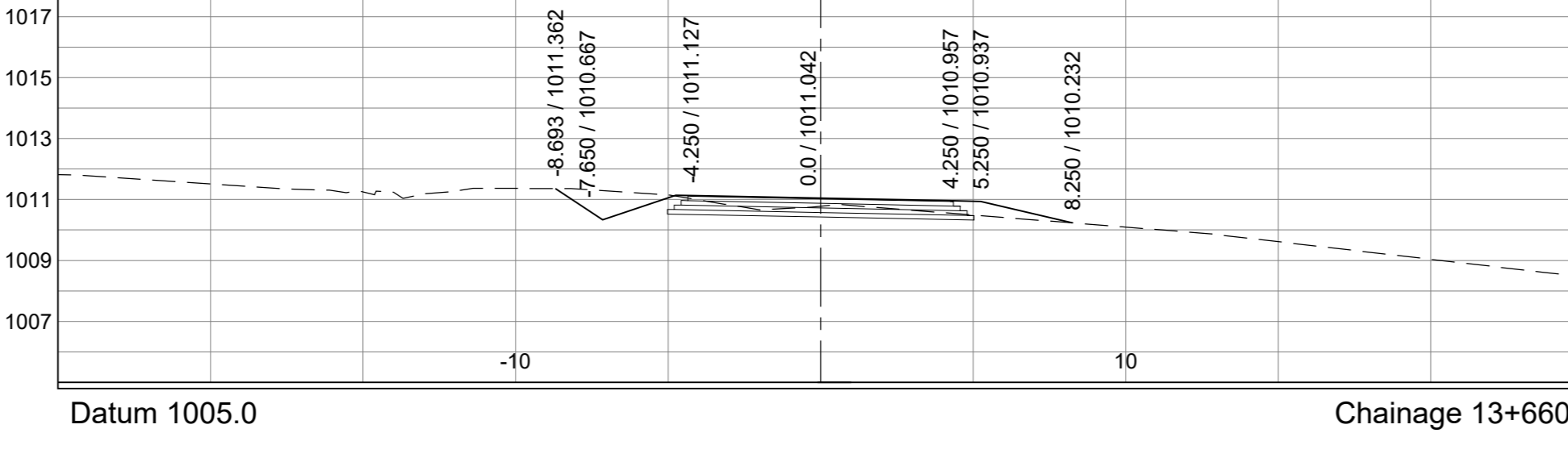
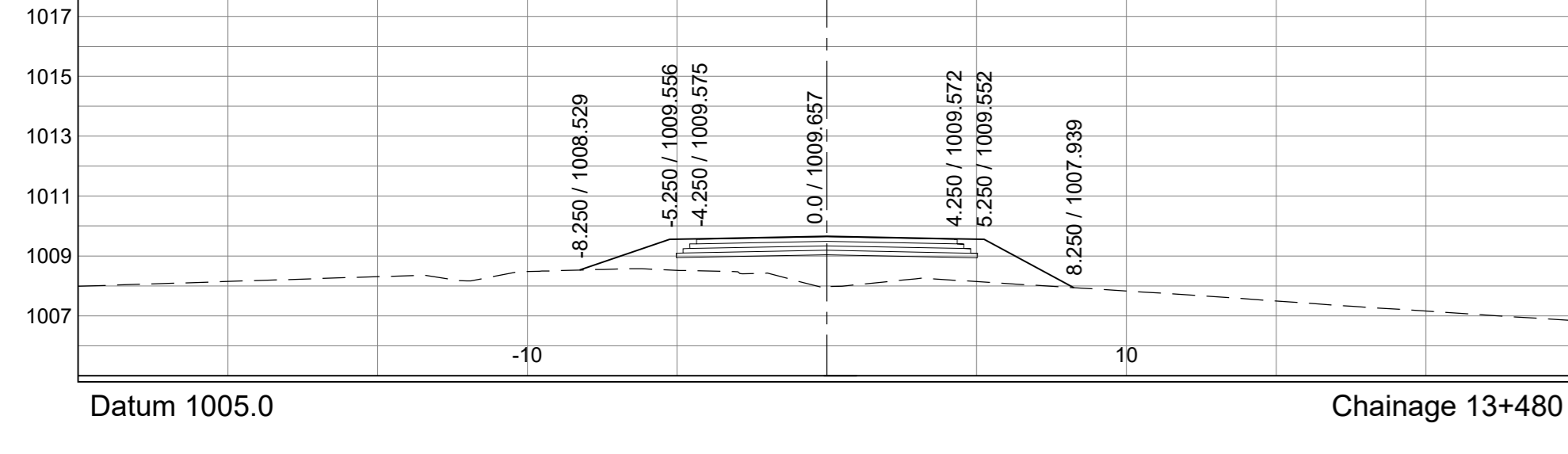
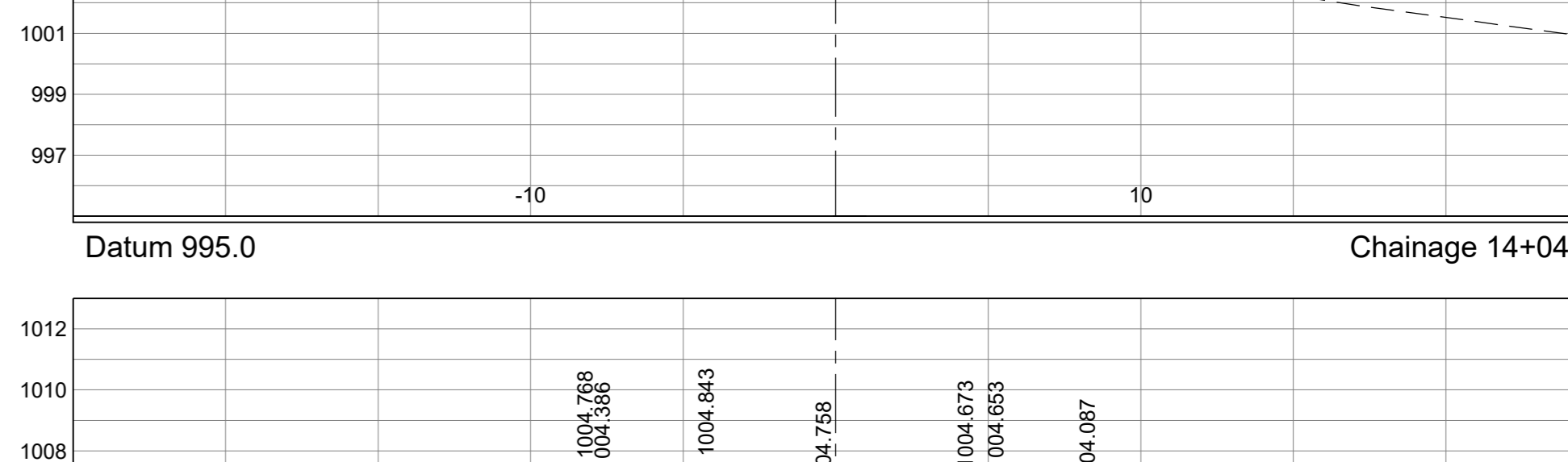
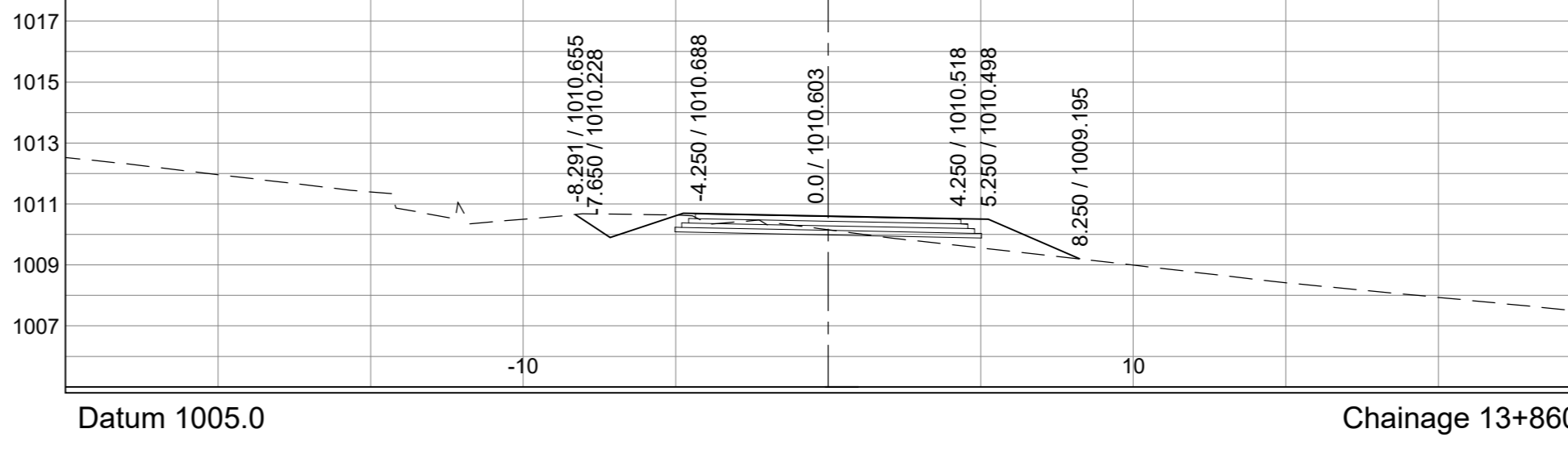
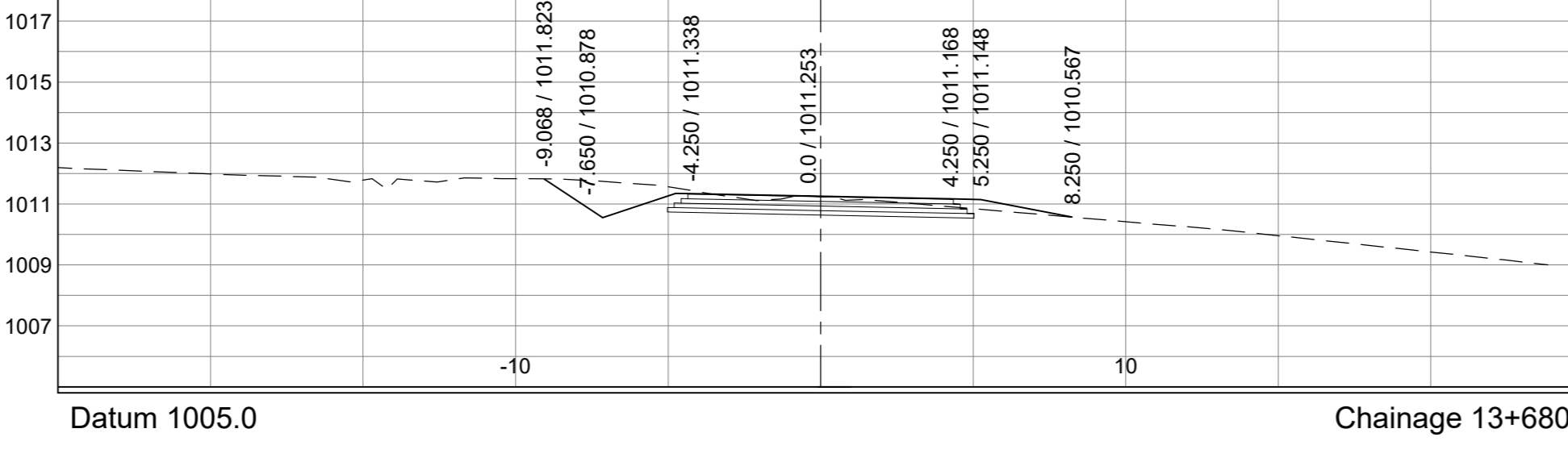
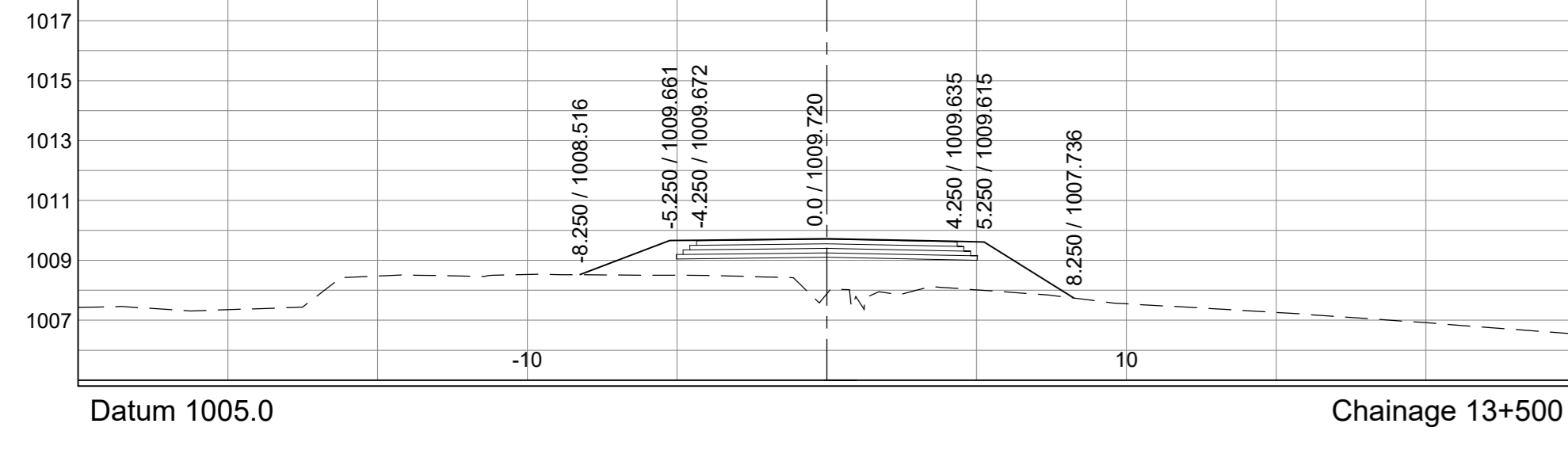
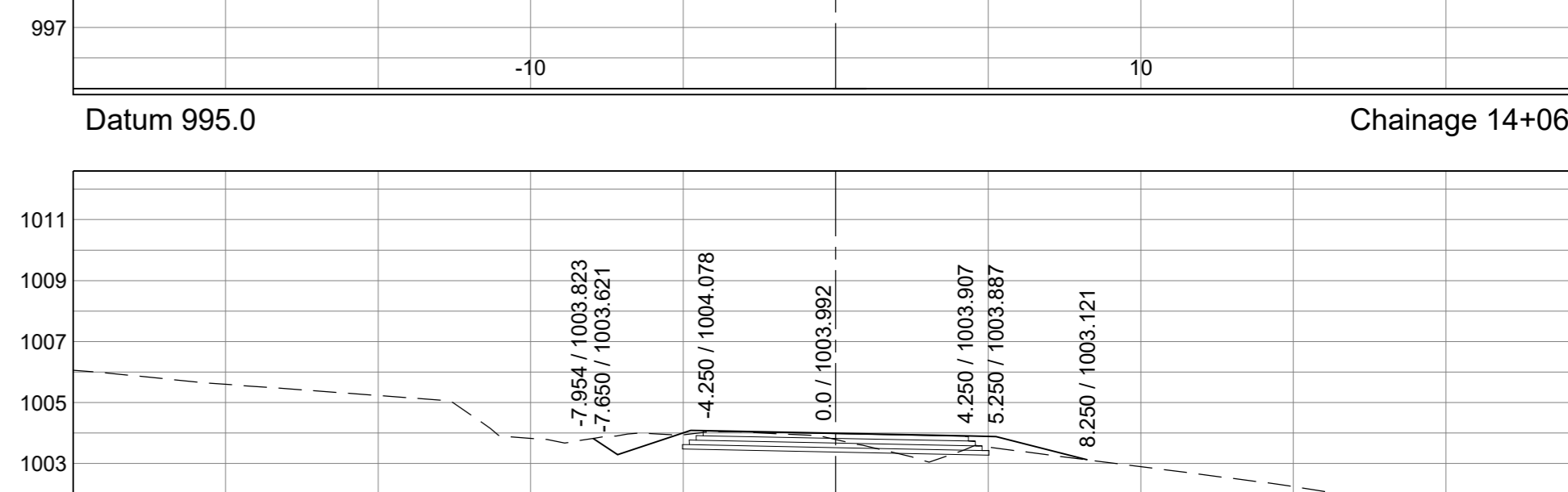
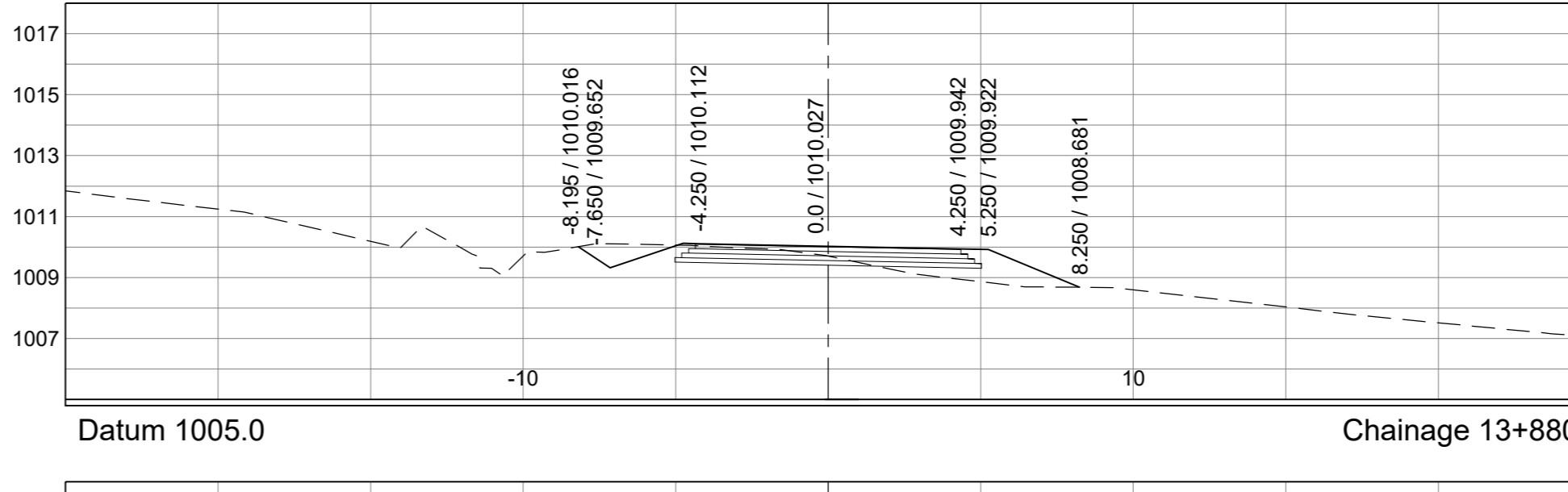
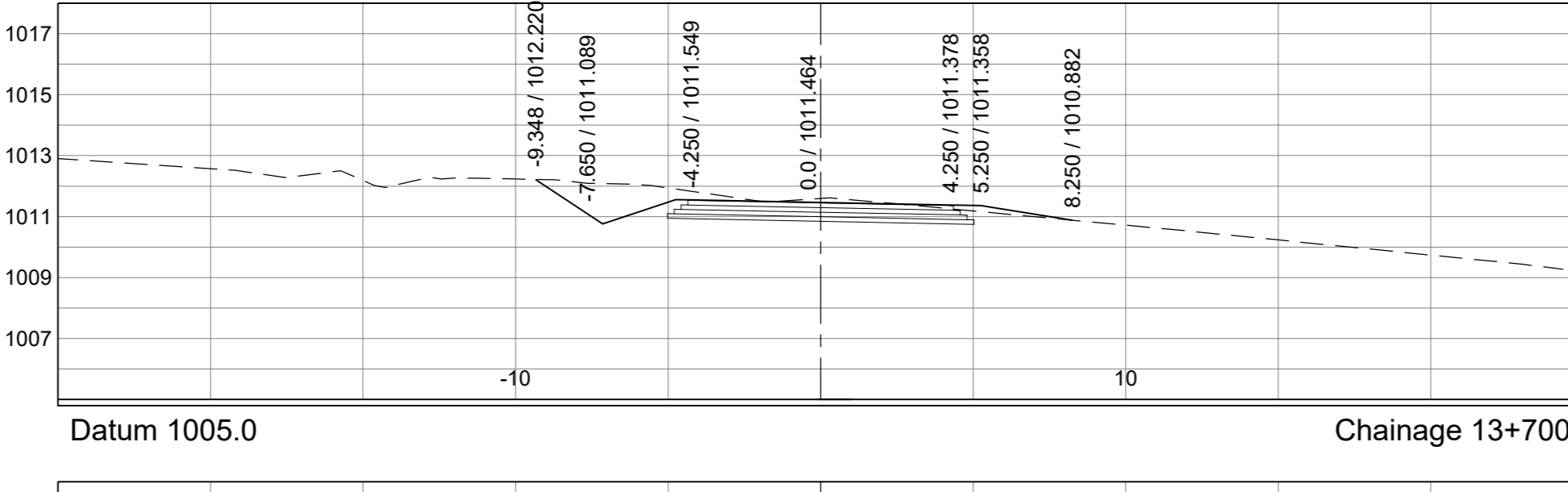
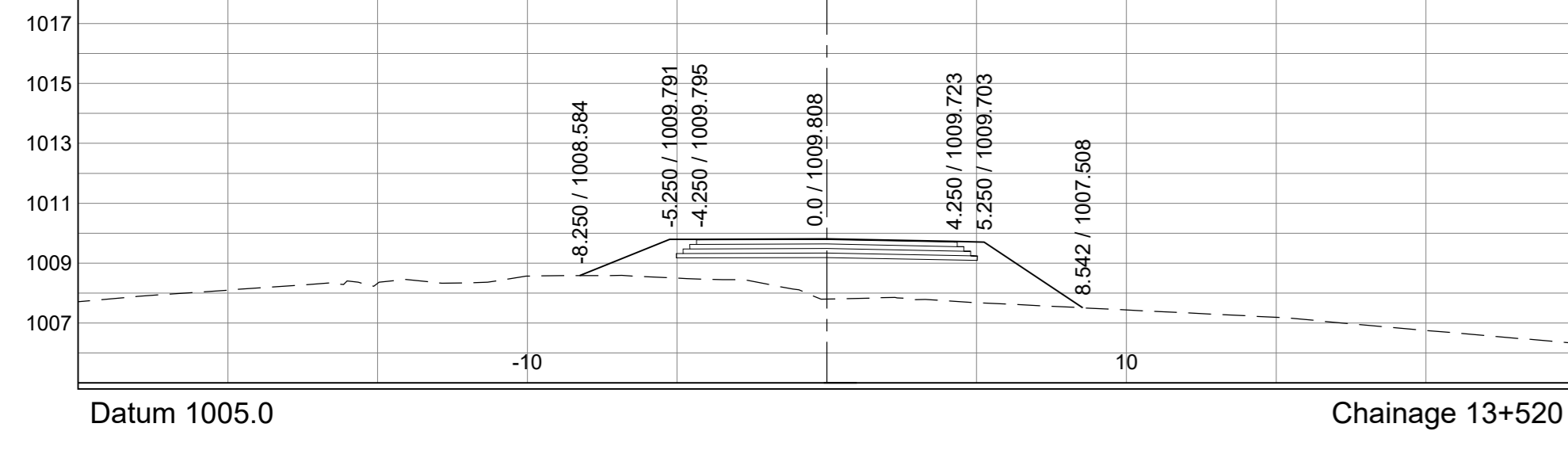
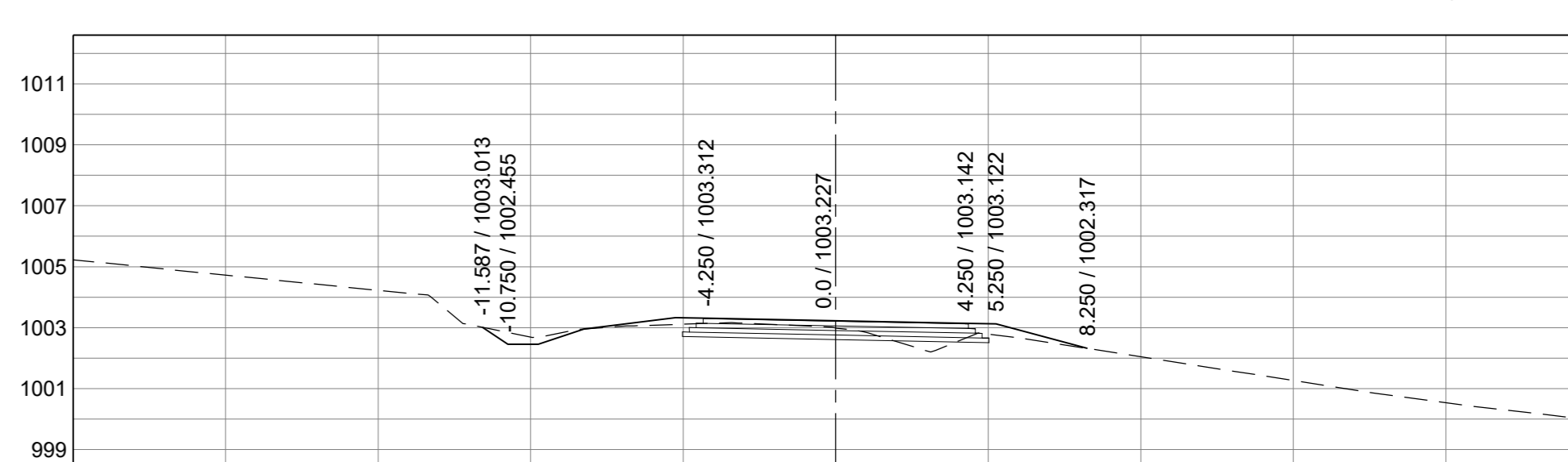
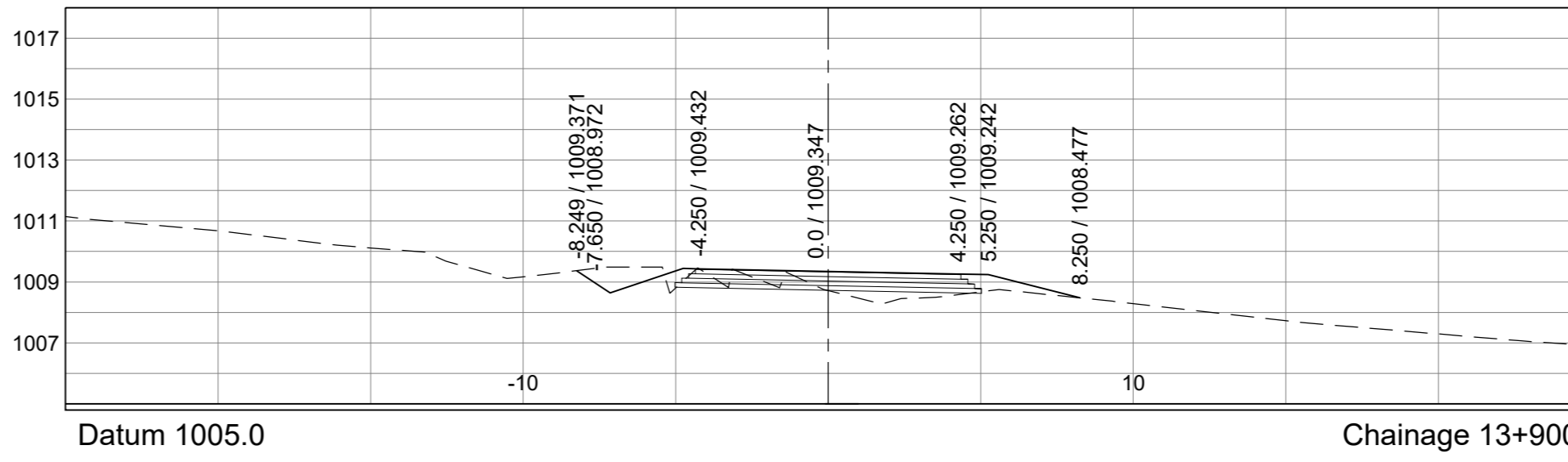
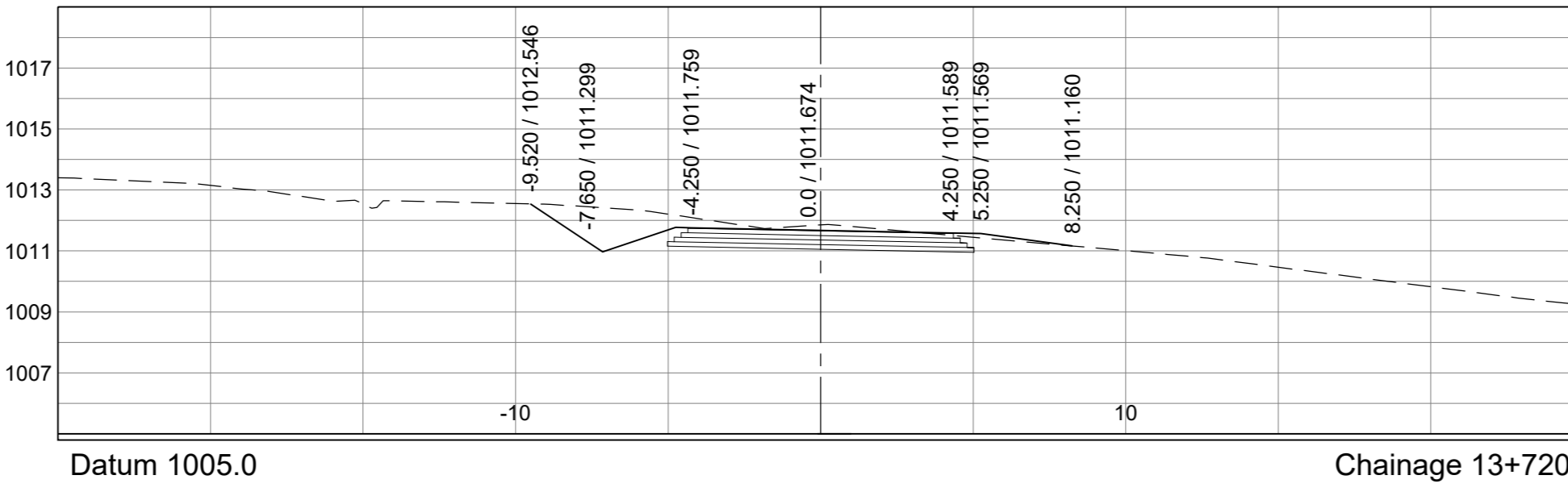
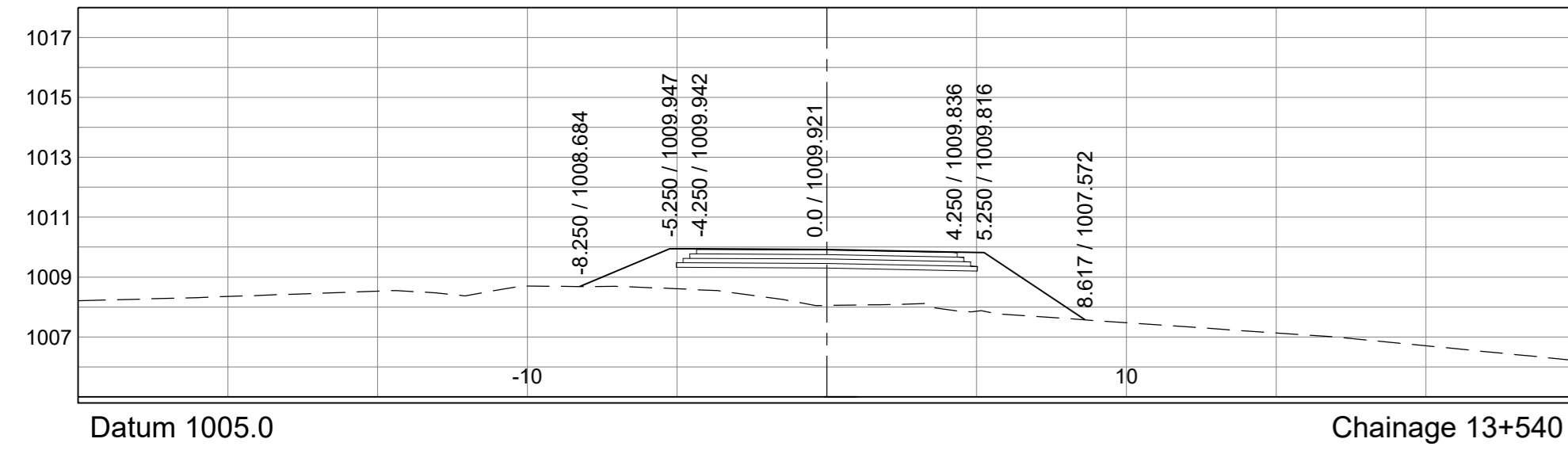
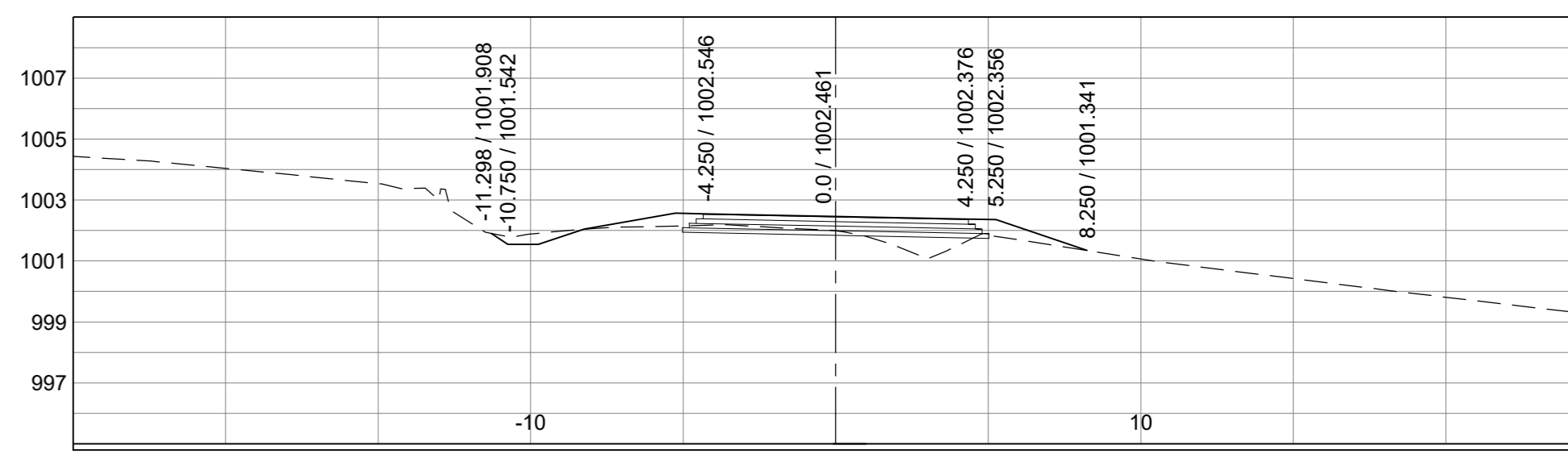
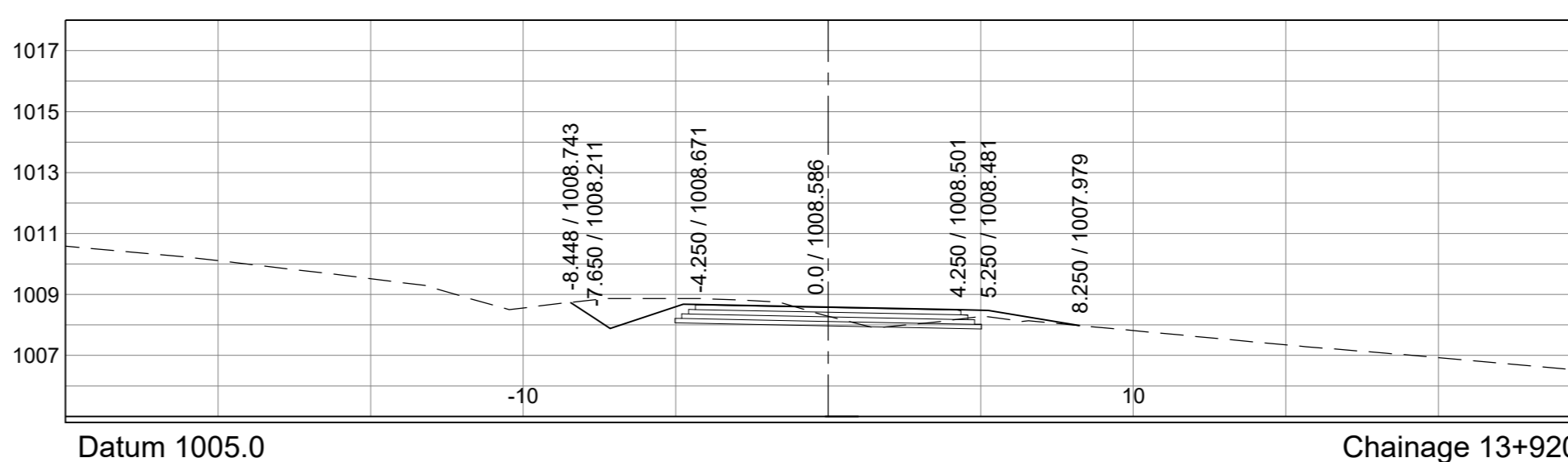
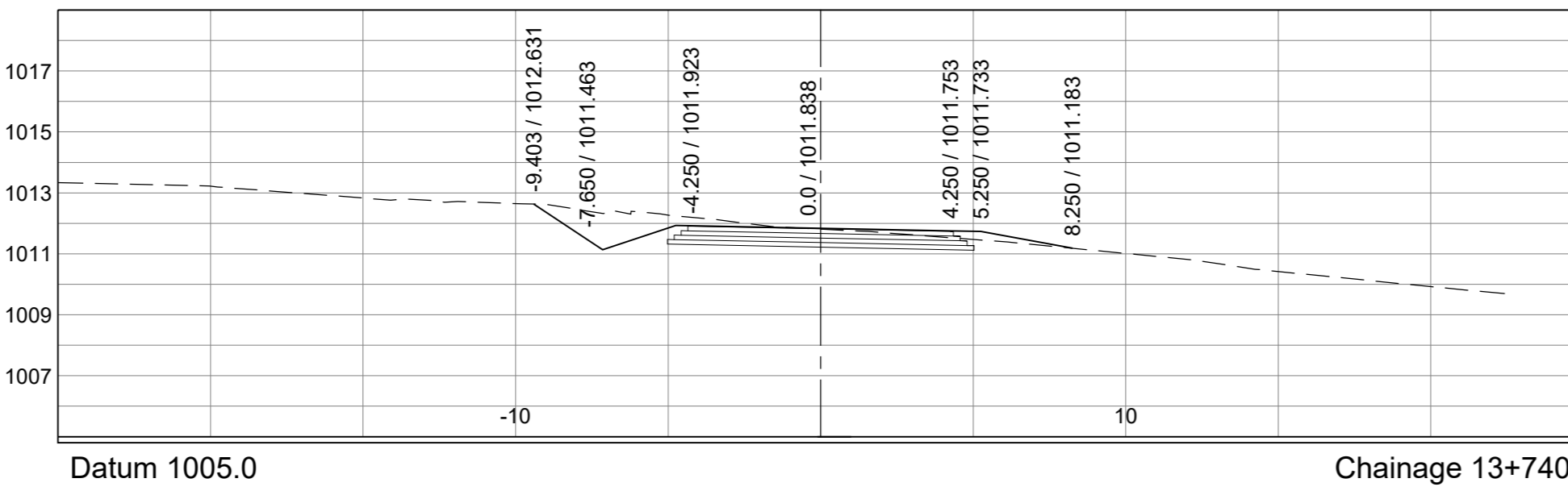
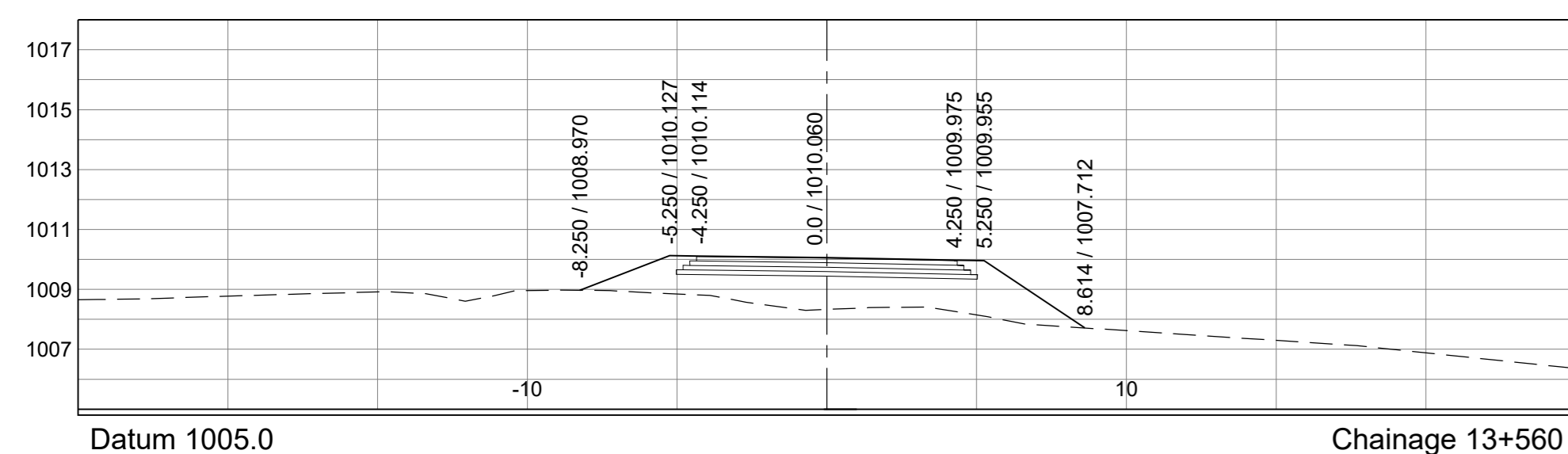
Sheet :- 4  
 of :- 18

REVISION:  
 A

Plan No :-  
**C 44333**

C 44333





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44333	Designed by:-	T. PIKA
Continued on:-	C 44335	Checked by:-	Y. DOMA
Cross Section No:-	C 44334	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44326	Checked by:-	Y. DOMA
Design Plan No:-	C 44316	Date of approval:-	

Designed by:- T. PIKA

Checked by:- Y. DOMA

Drawn by:- S. ZITHA

Checked by:- Y. DOMA

Date of approval:-



Designed by:- **emzansi** ENGINEERS (PTY) LTD

Providing Unrivalled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 13+400 - Km 14+100

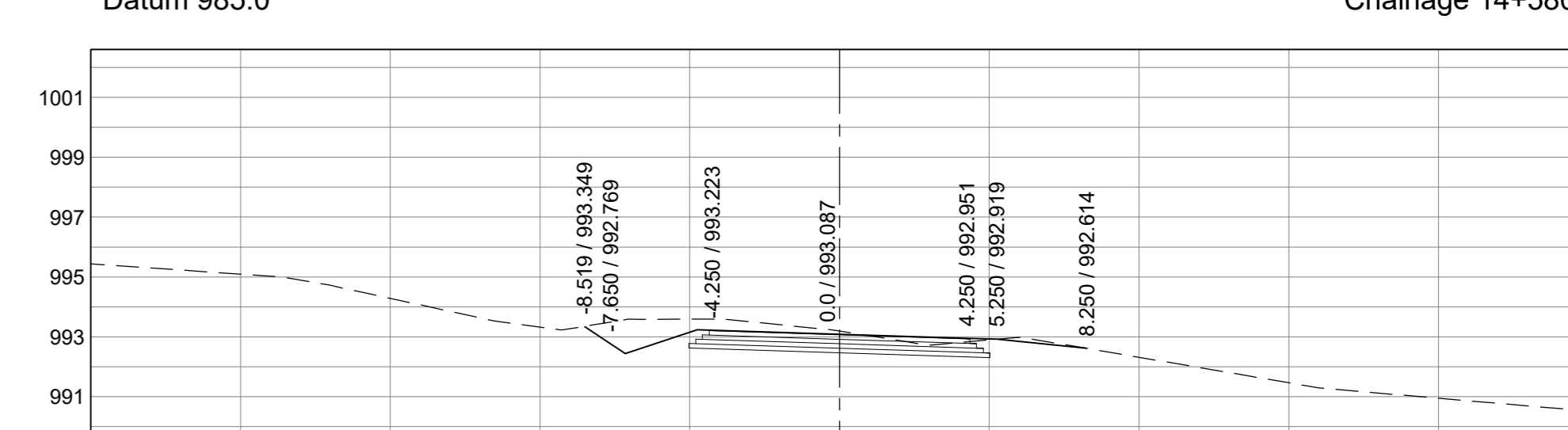
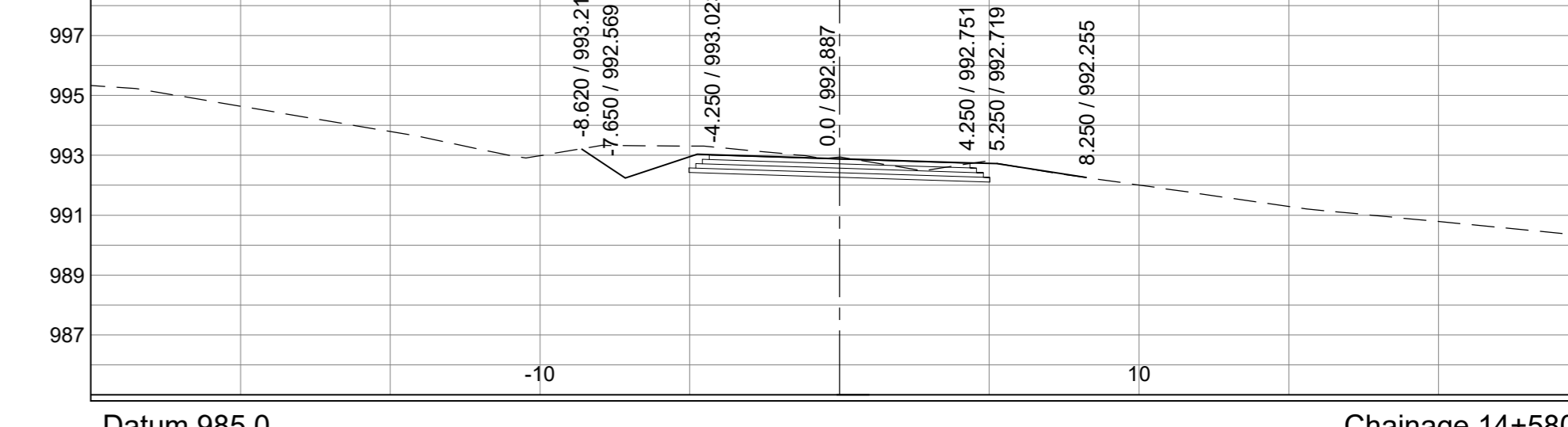
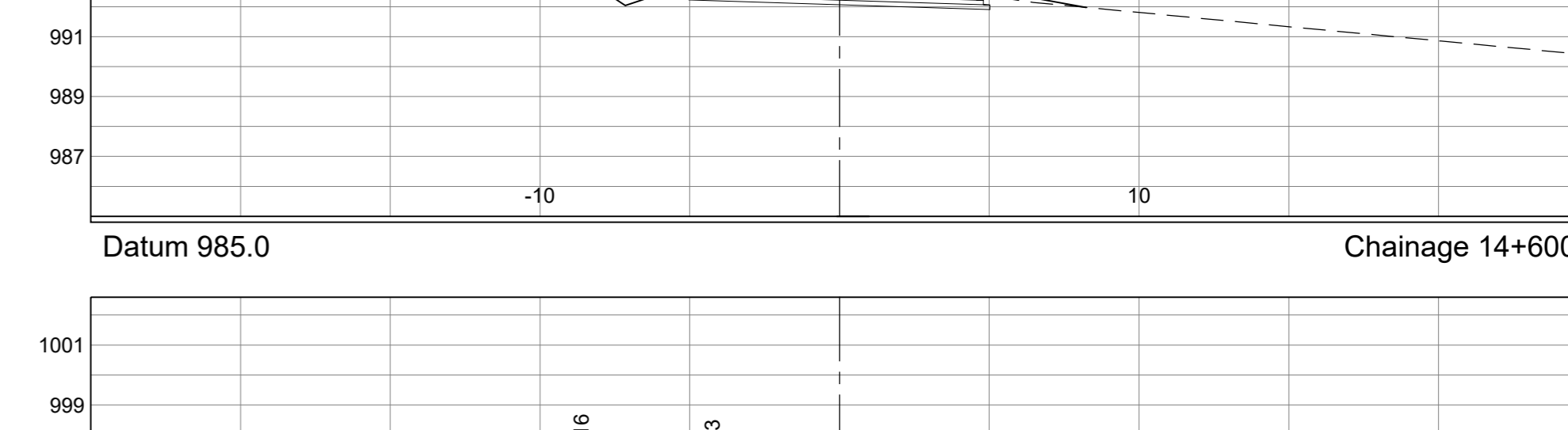
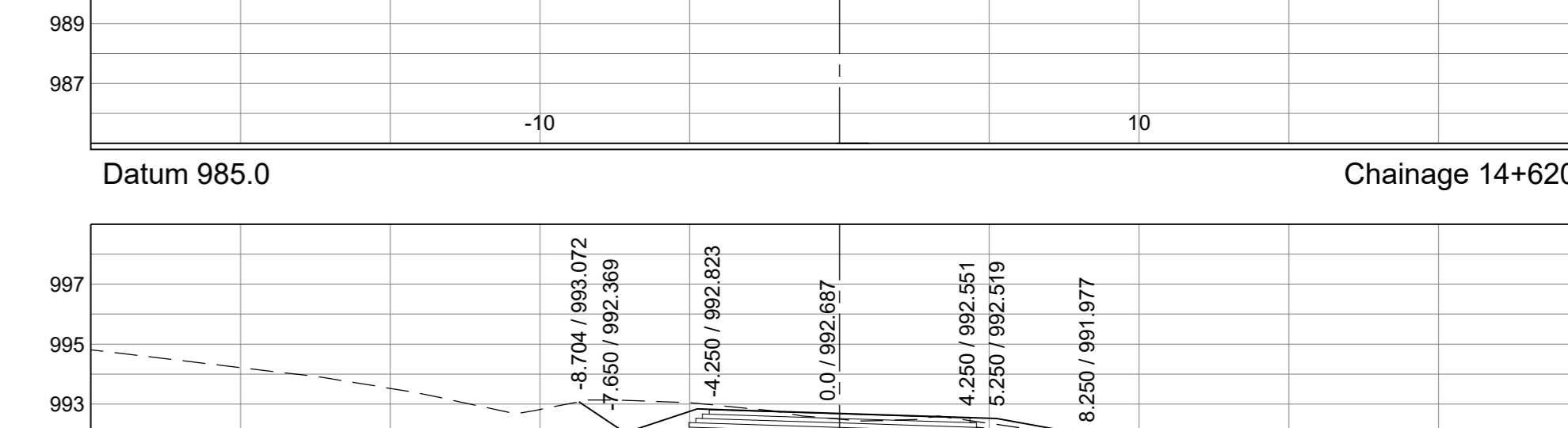
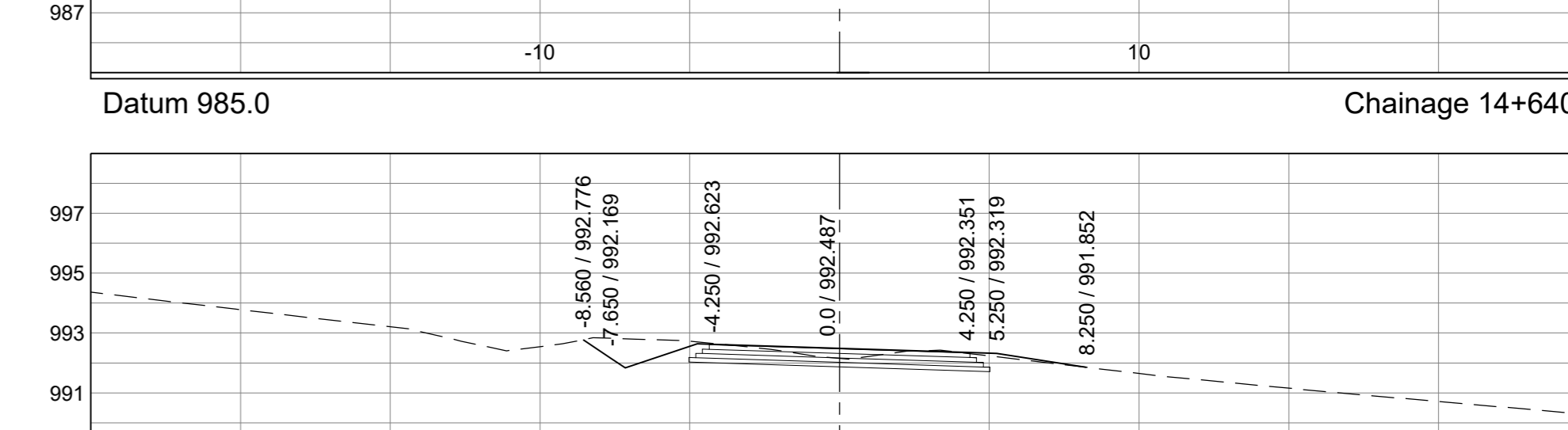
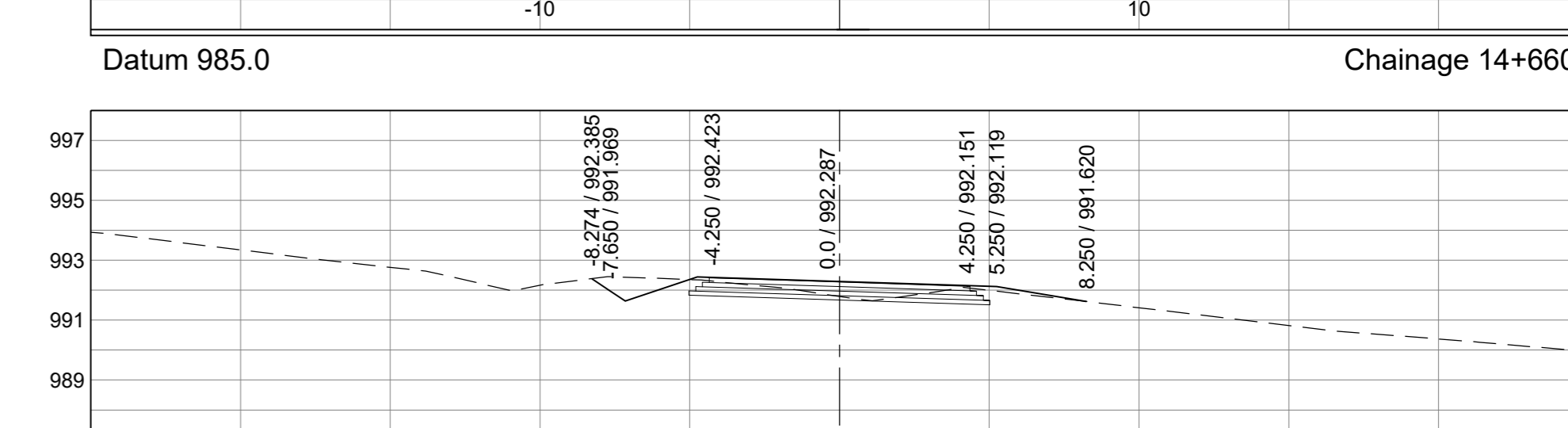
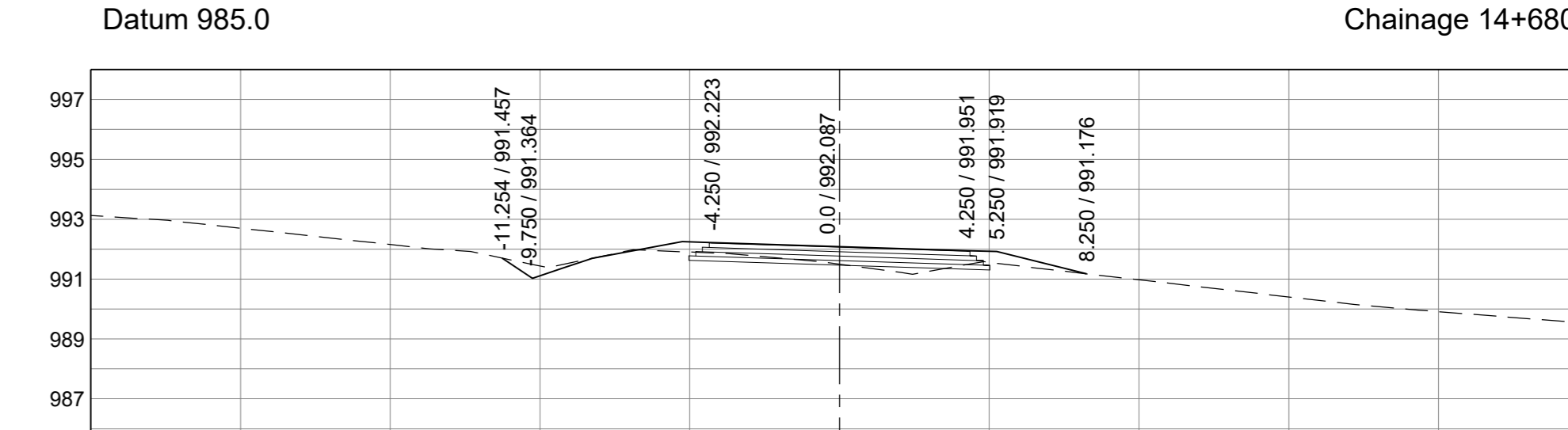
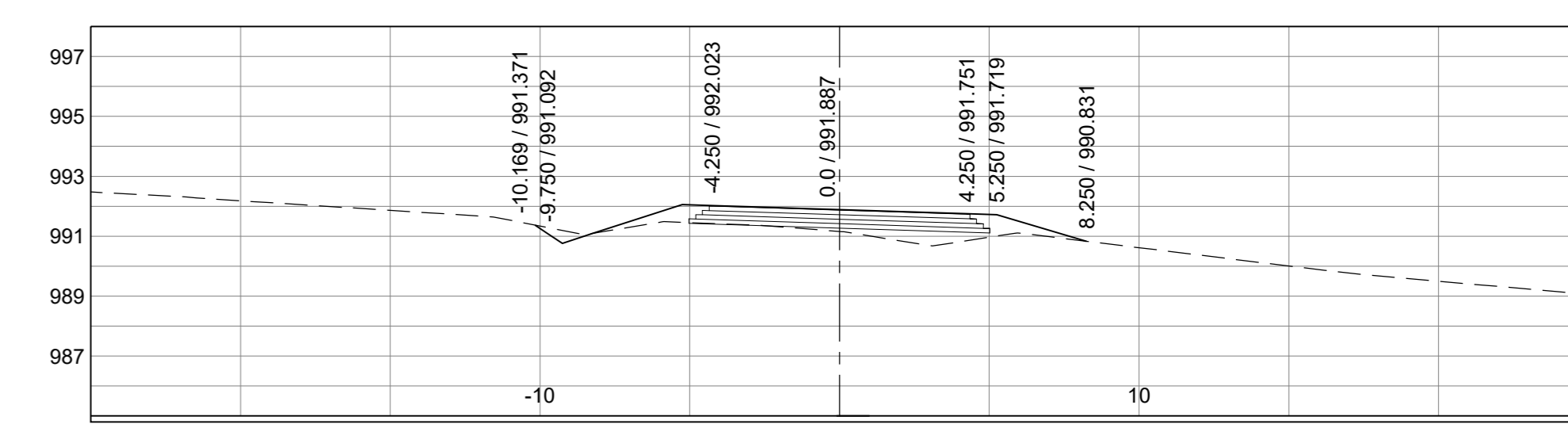
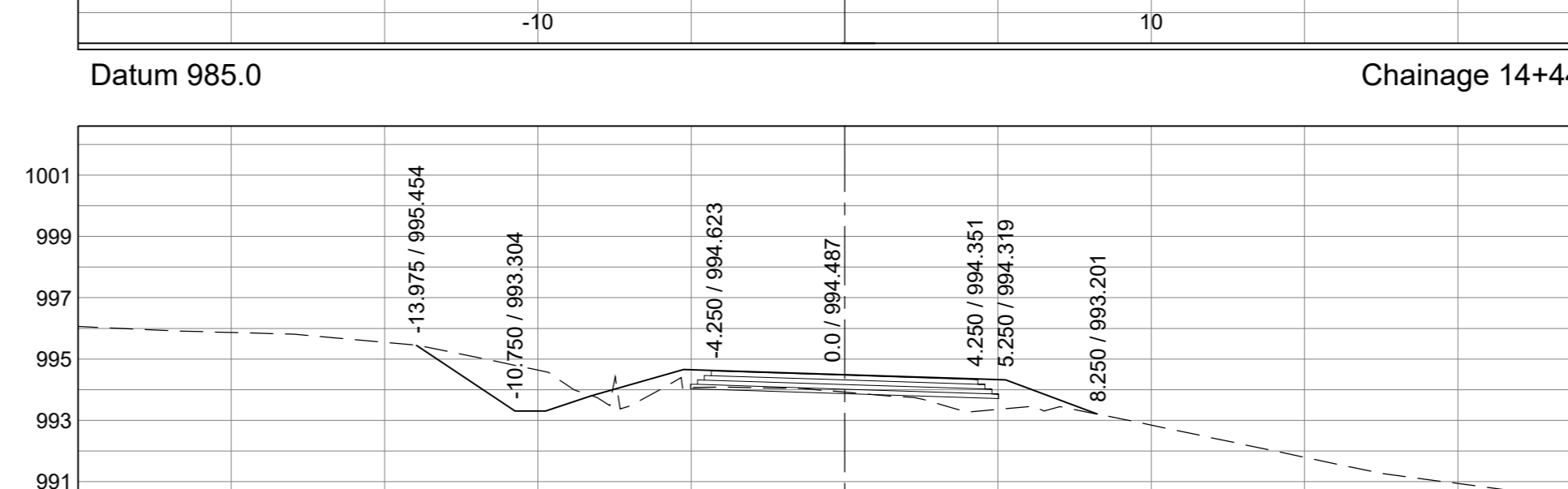
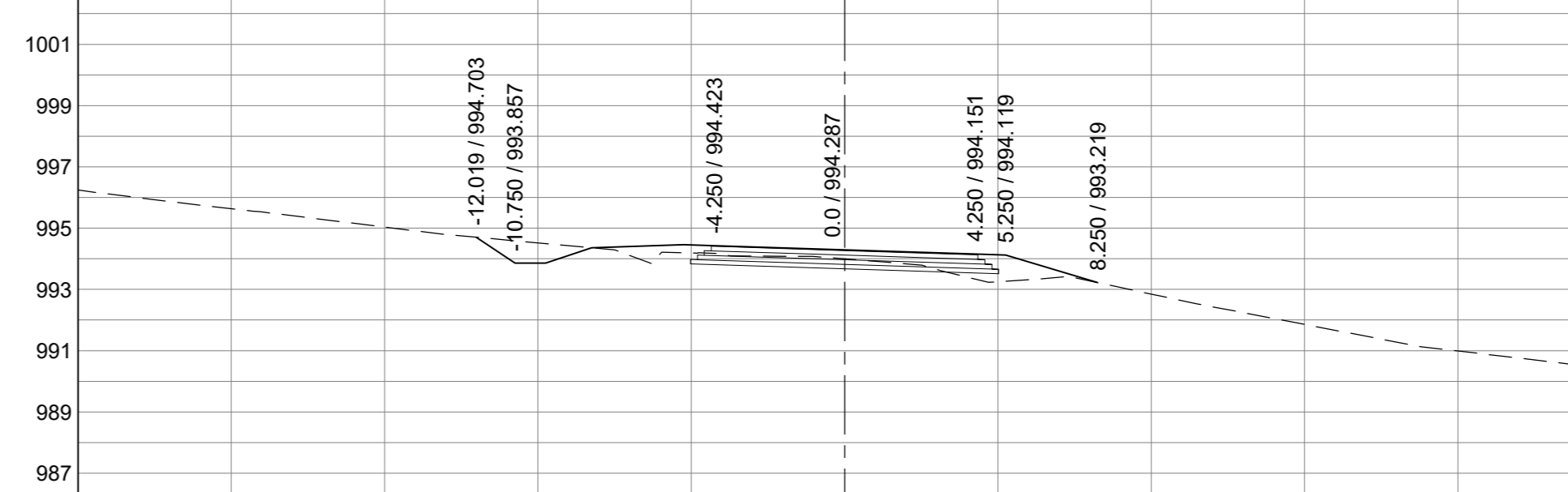
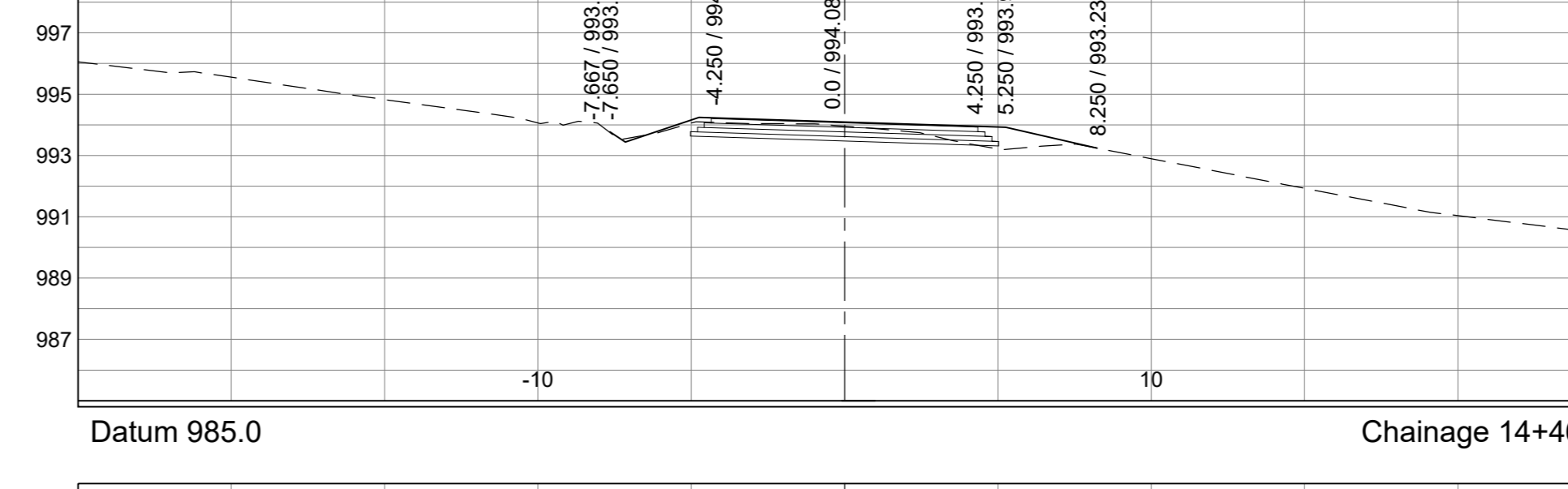
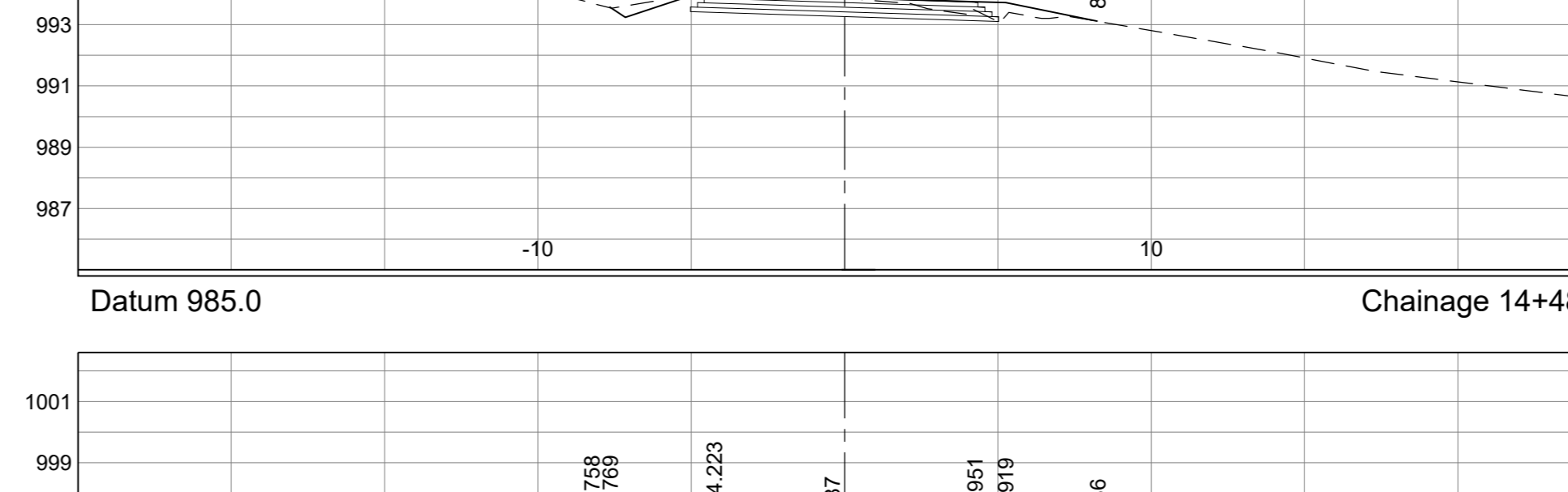
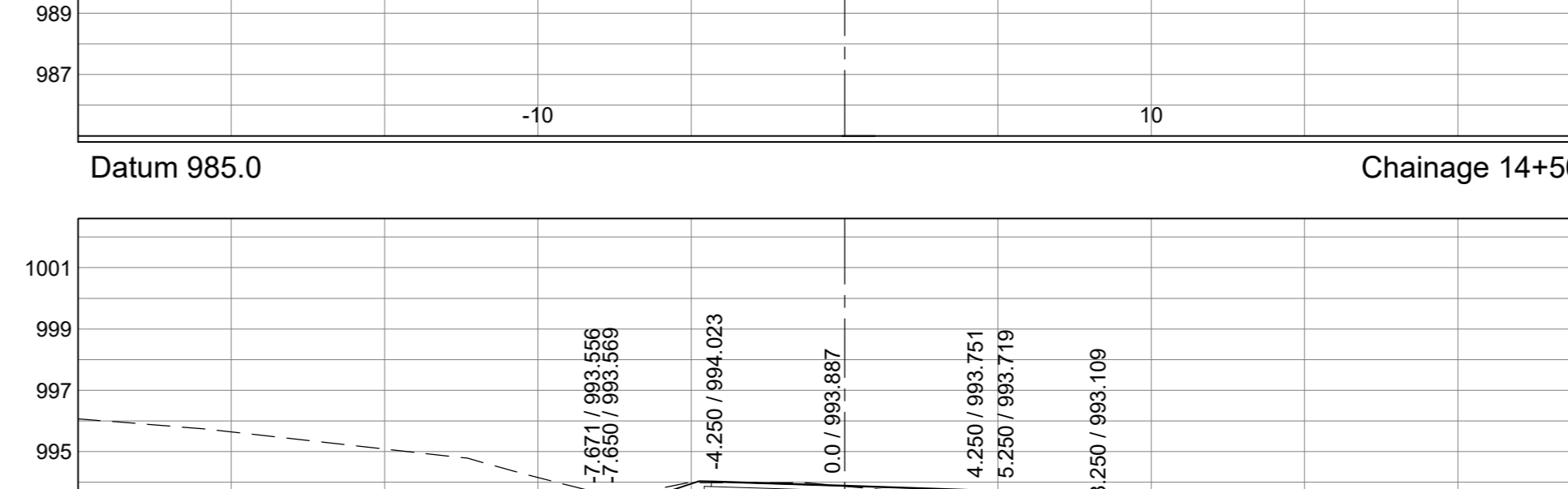
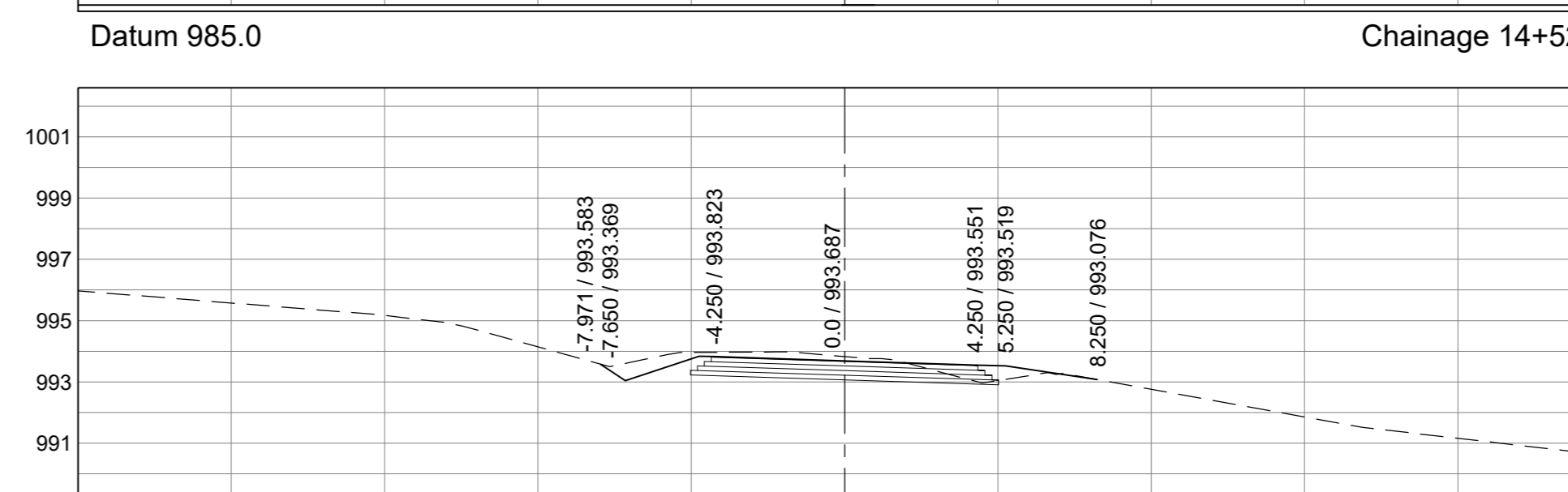
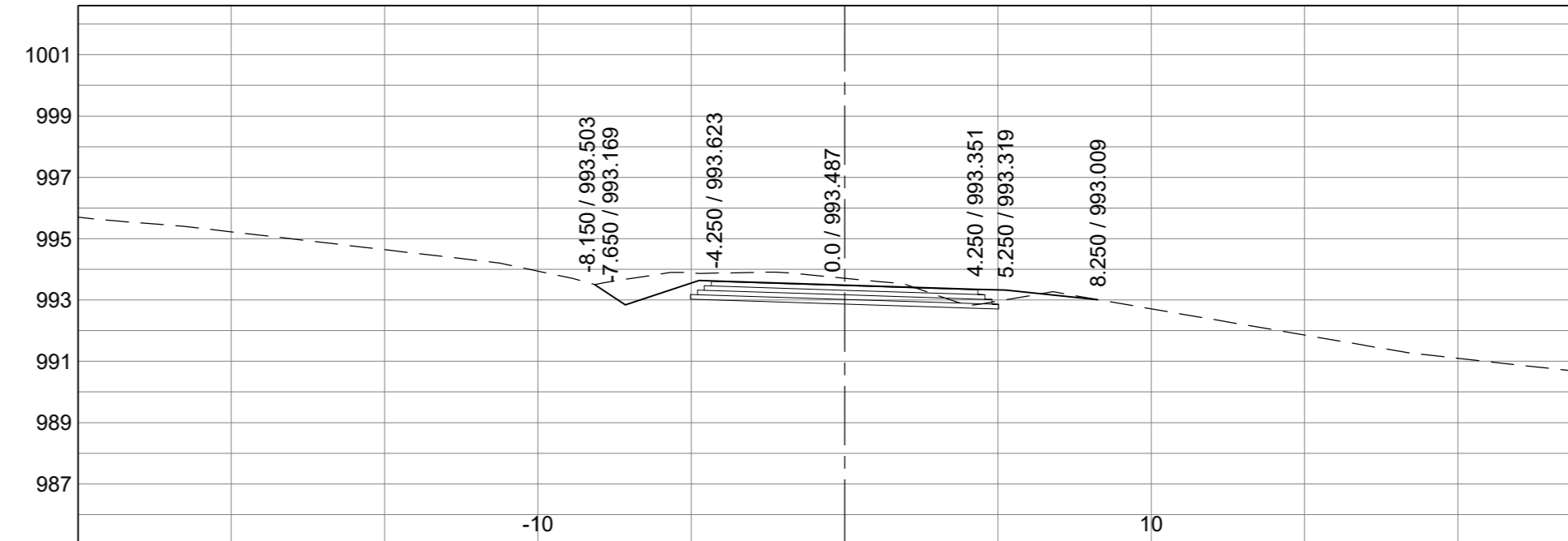
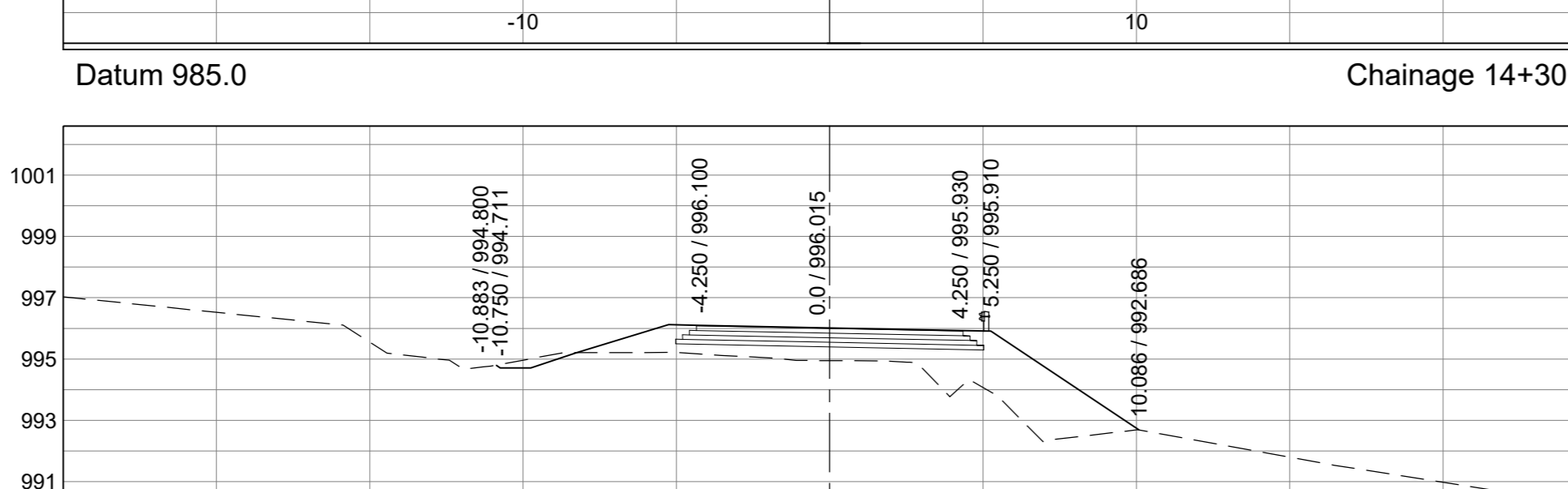
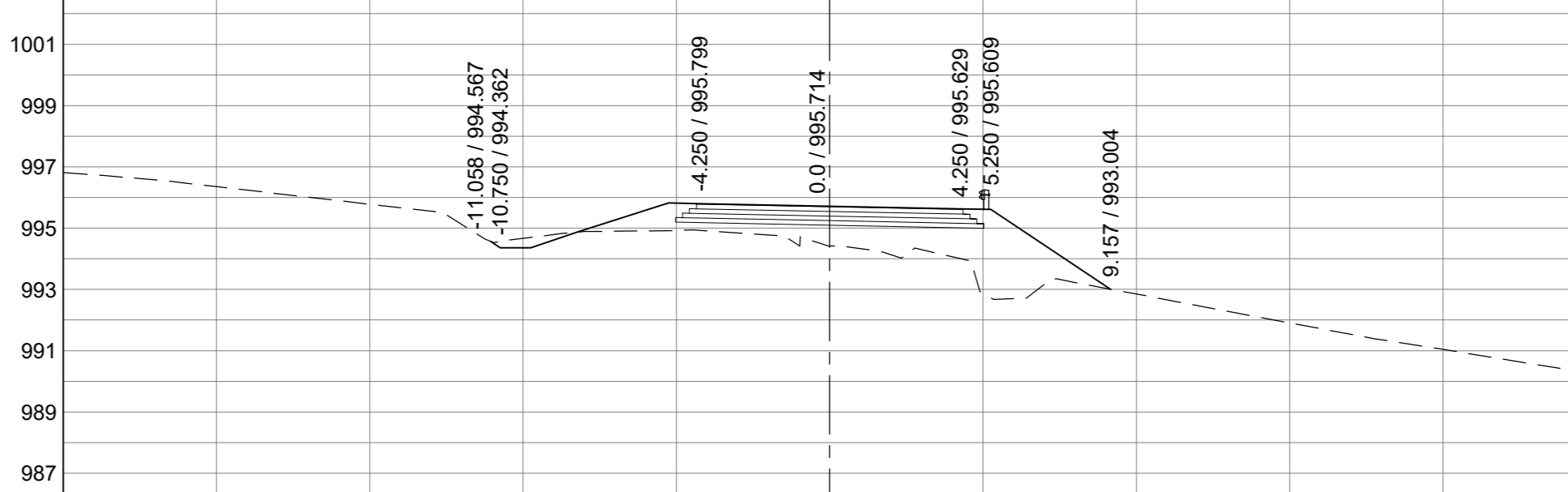
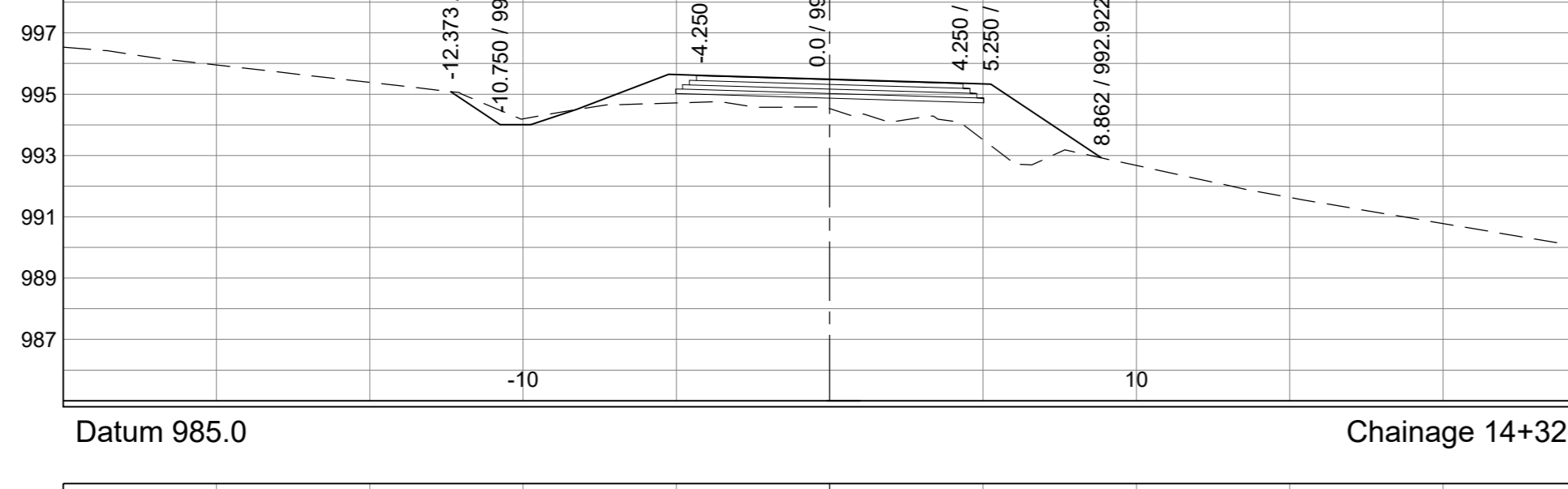
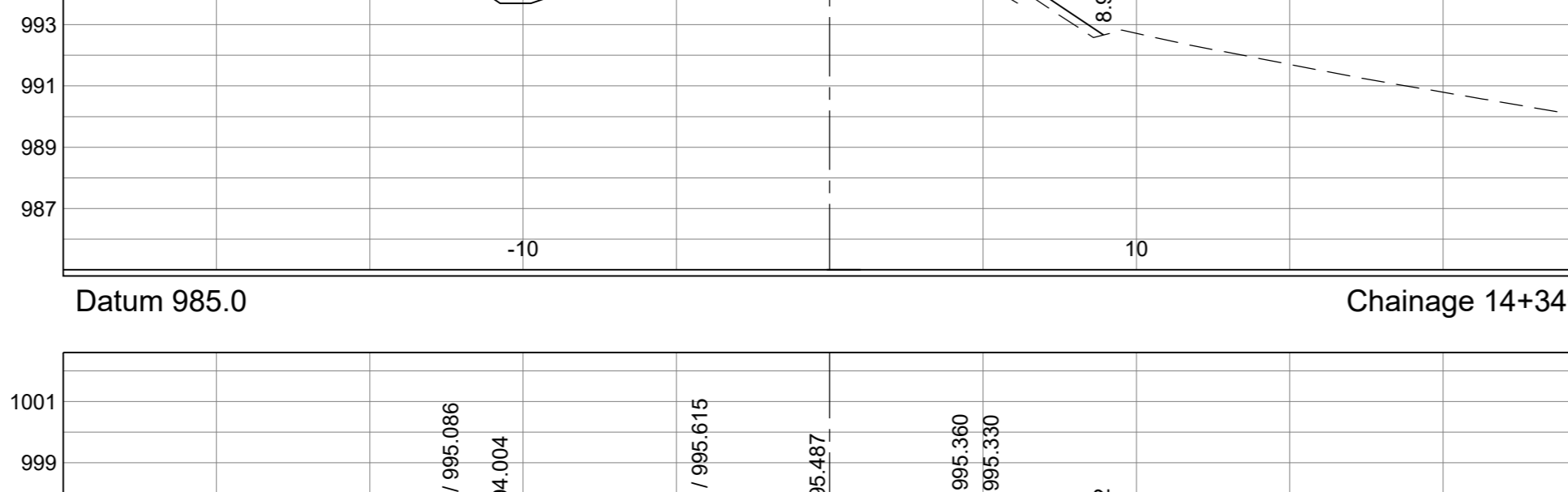
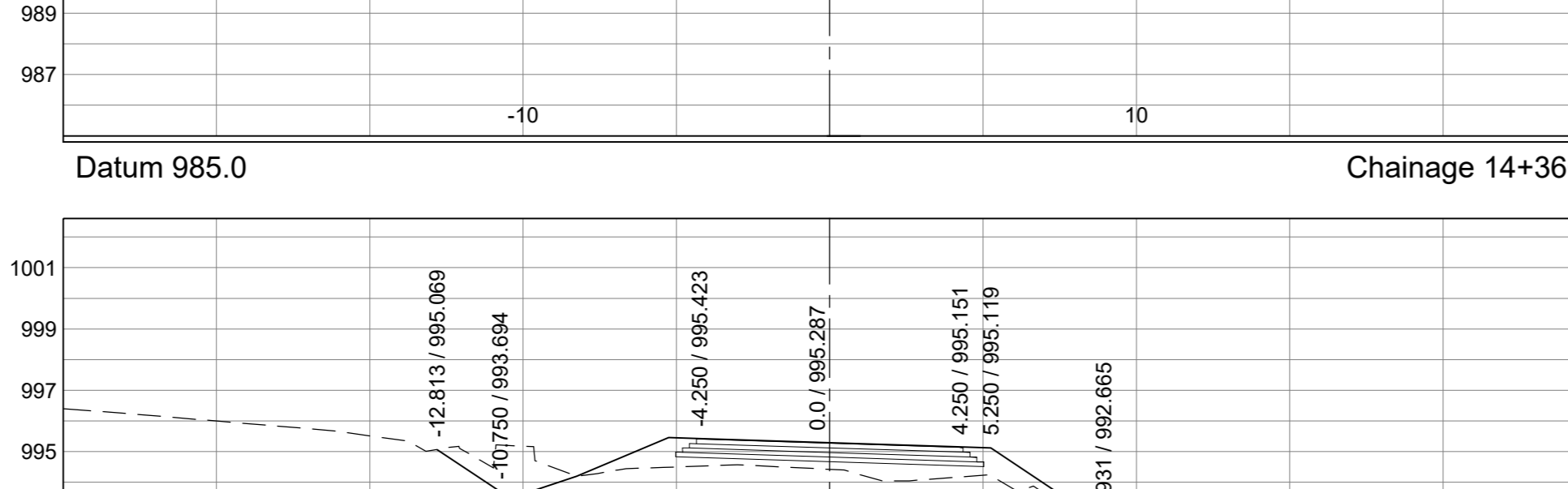
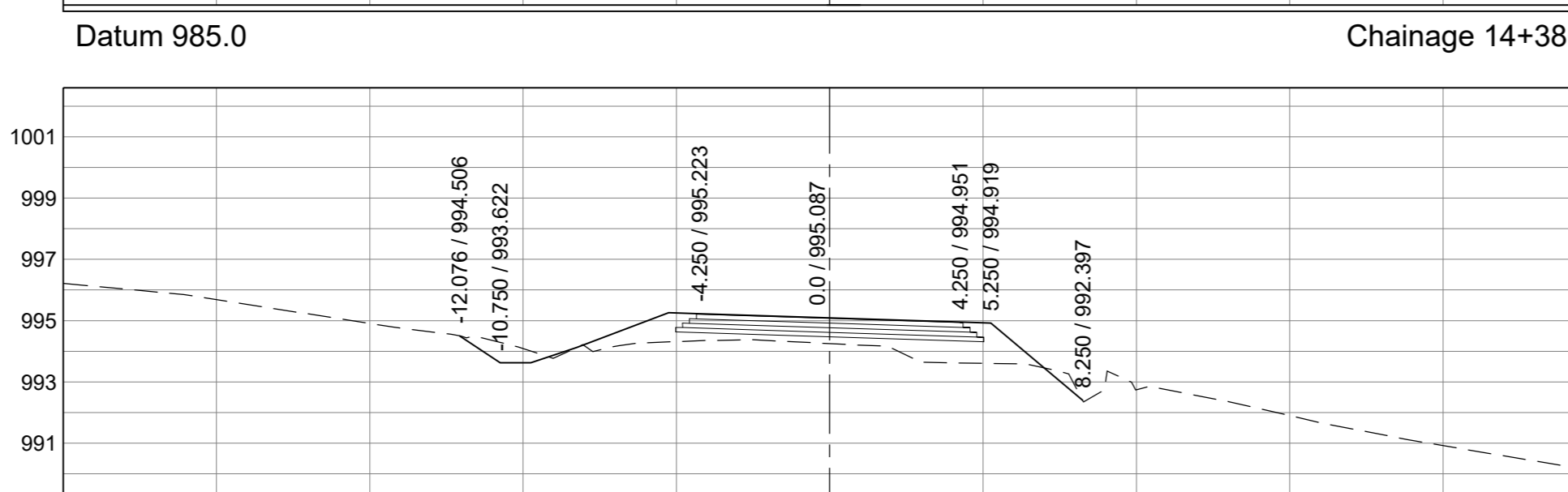
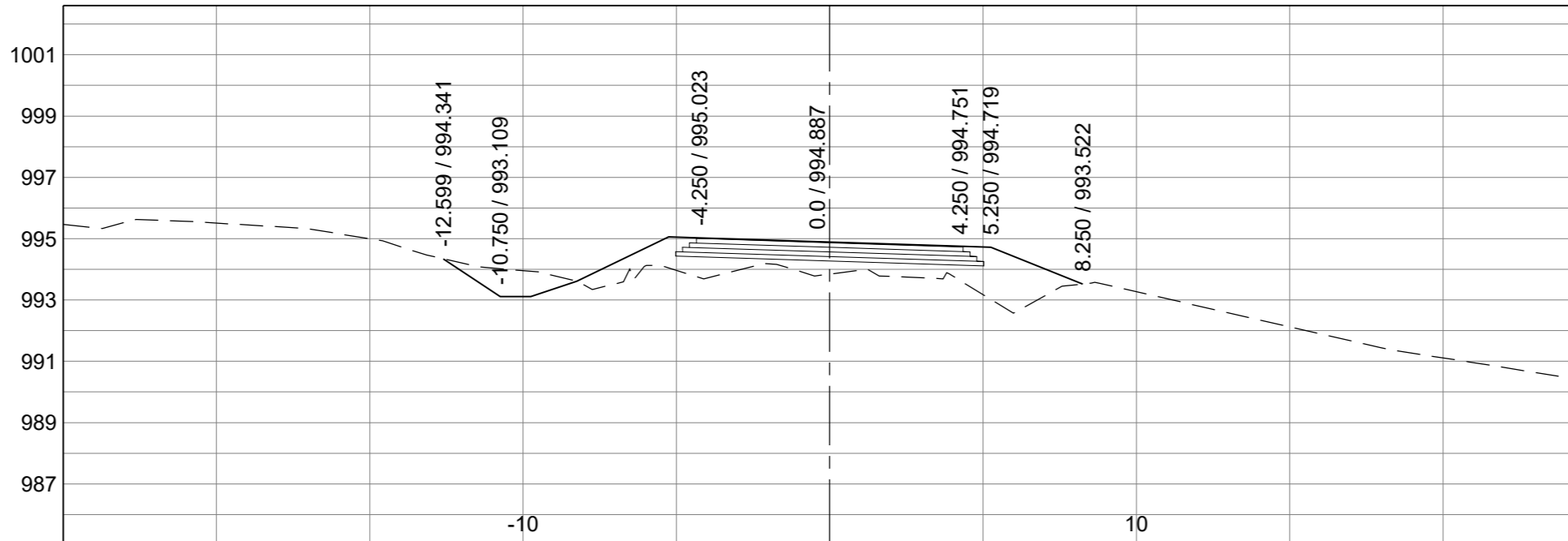
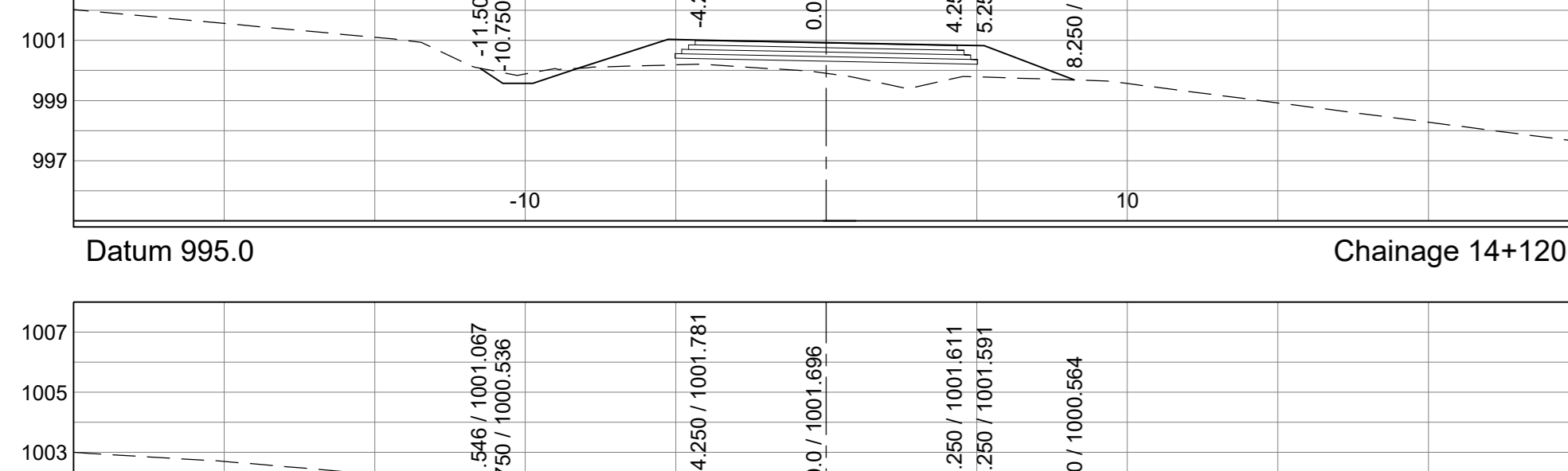
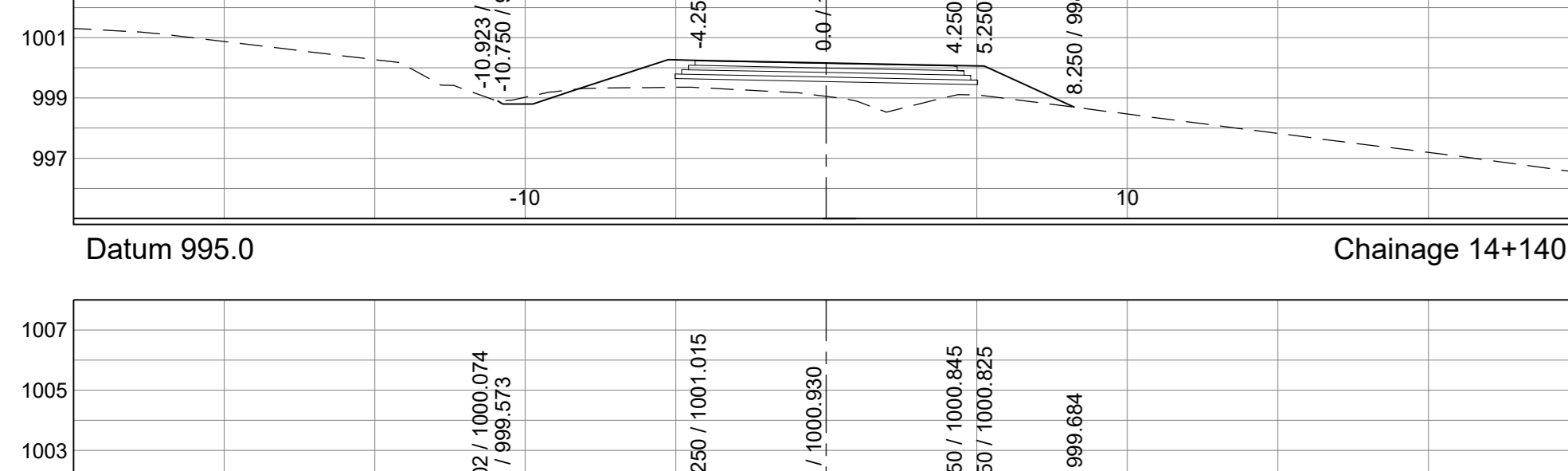
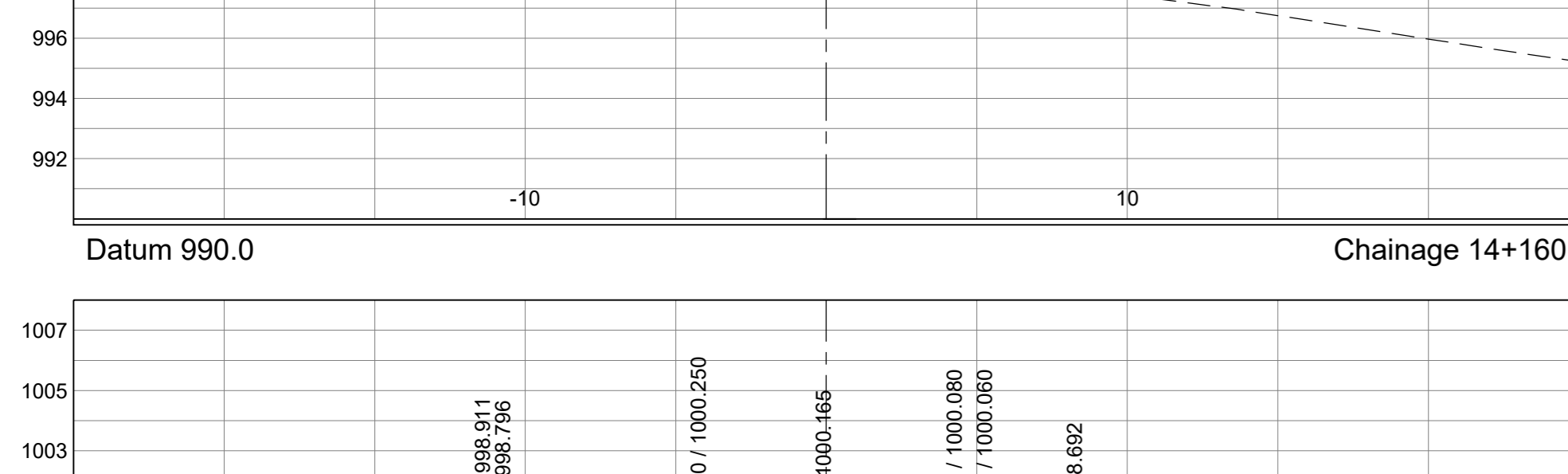
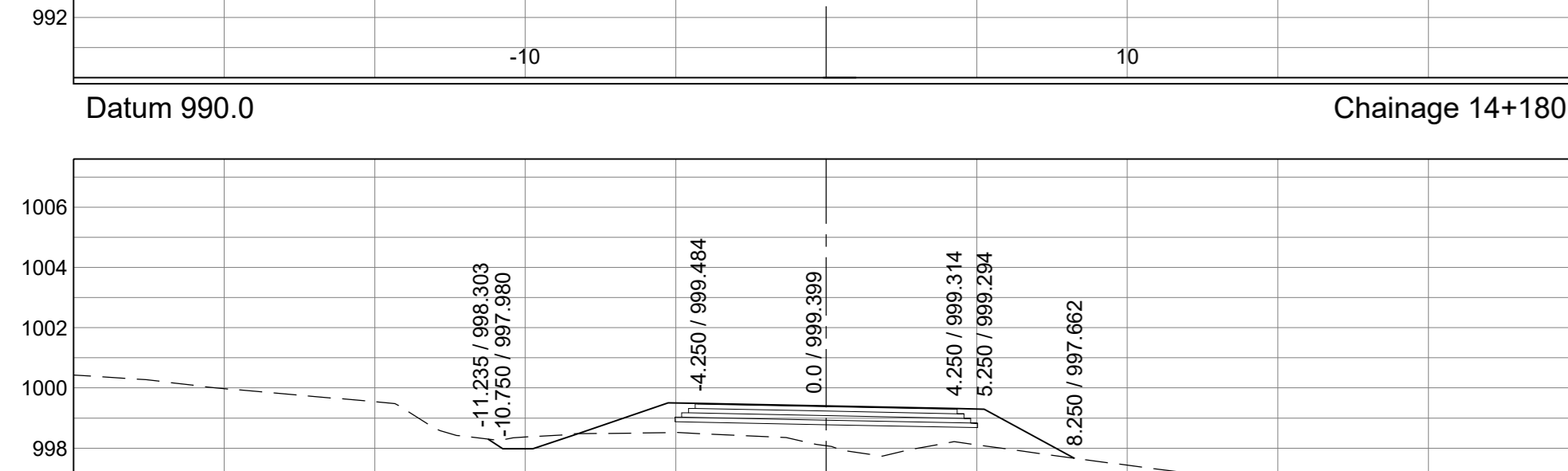
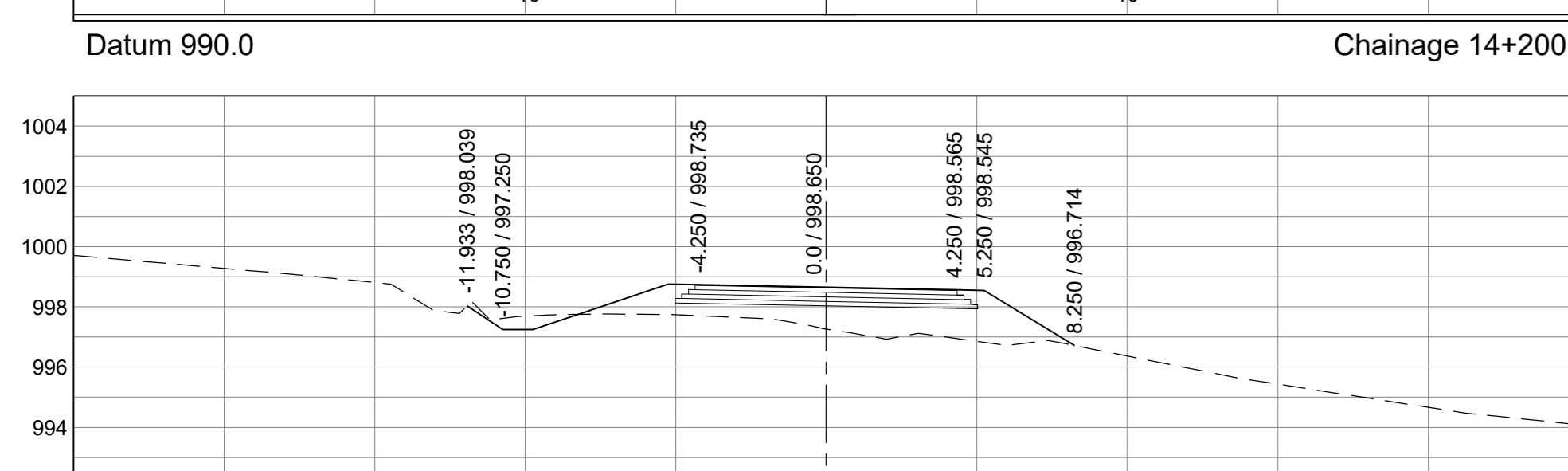
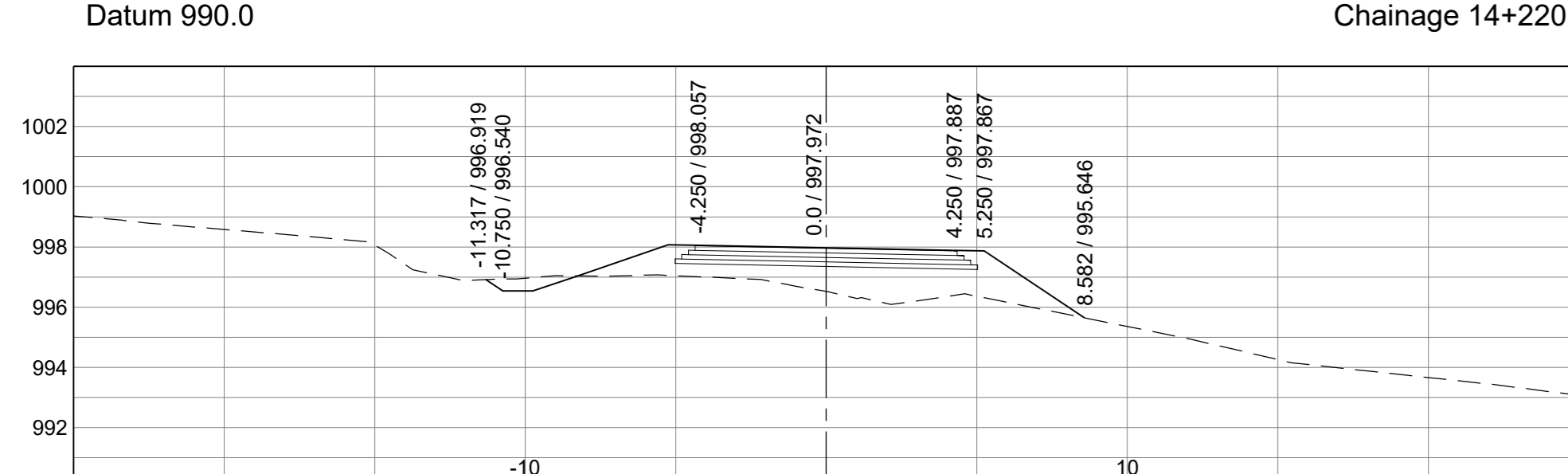
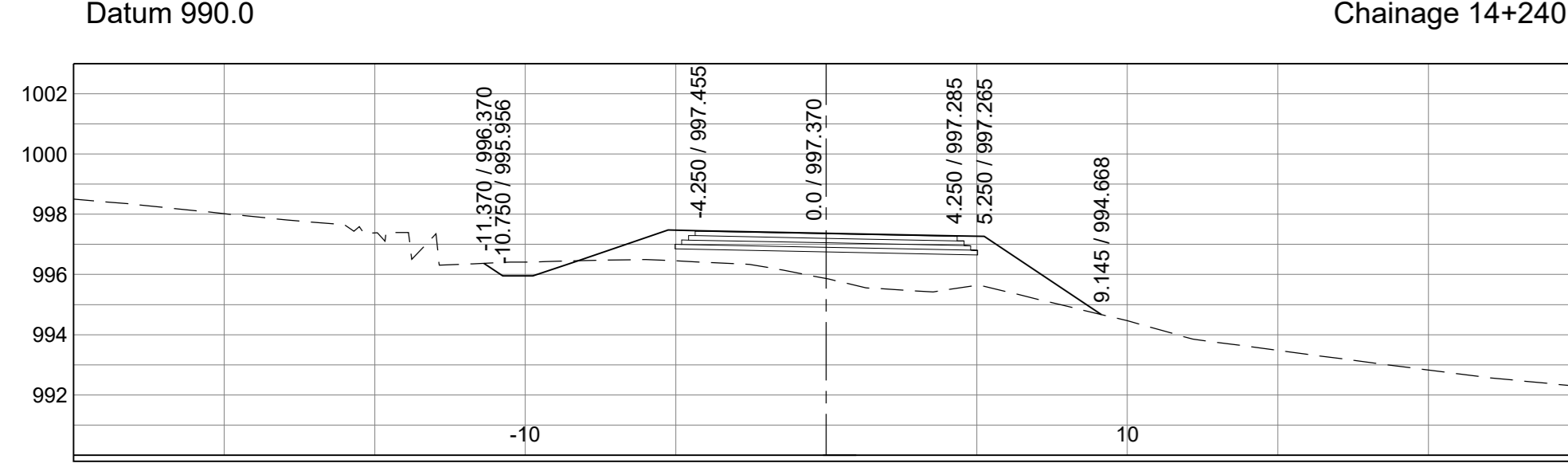
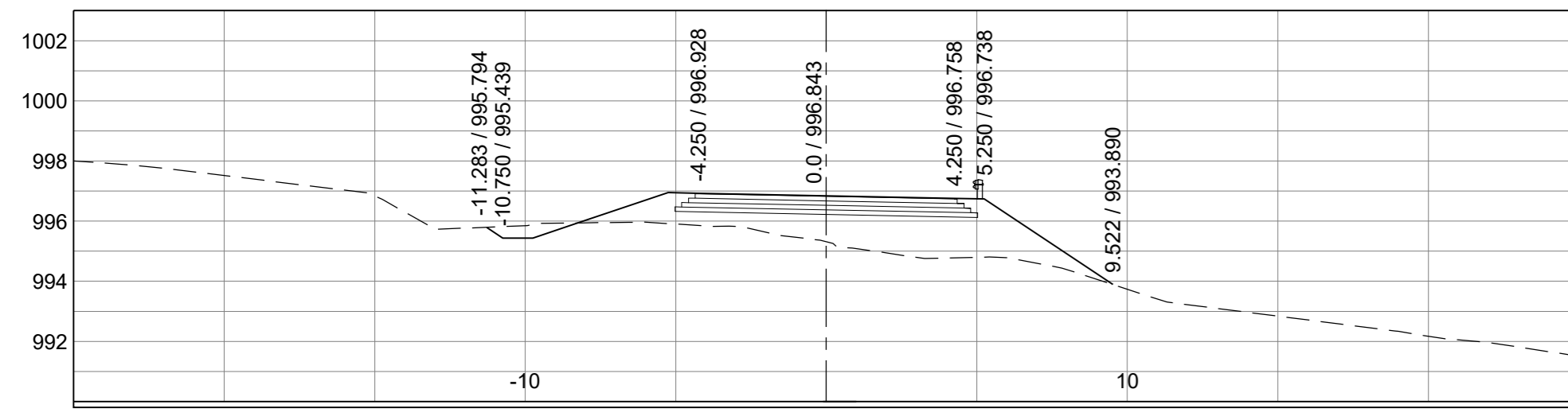
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 5	REVISION:
km 13+400 - km 14+100	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 44334**





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44334	Designed by:-	T. PIKA
Continued on:-	C 44336	Checked by:-	Y. DOMA
Cross Section No:-	C 44335	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44326 - C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44317	Date of approval:-	

Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

01-02-2024

**KWAZULU-NATAL PROVINCE**  
 TRANSPORT  
 REPUBLIC OF SOUTH AFRICA

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491

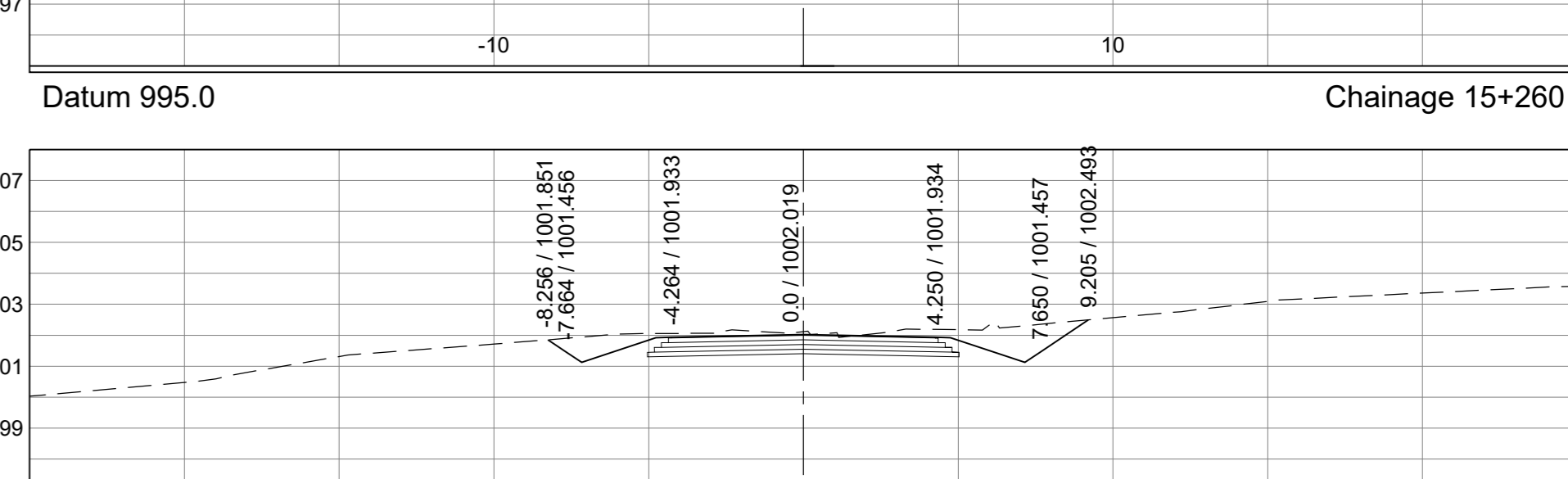
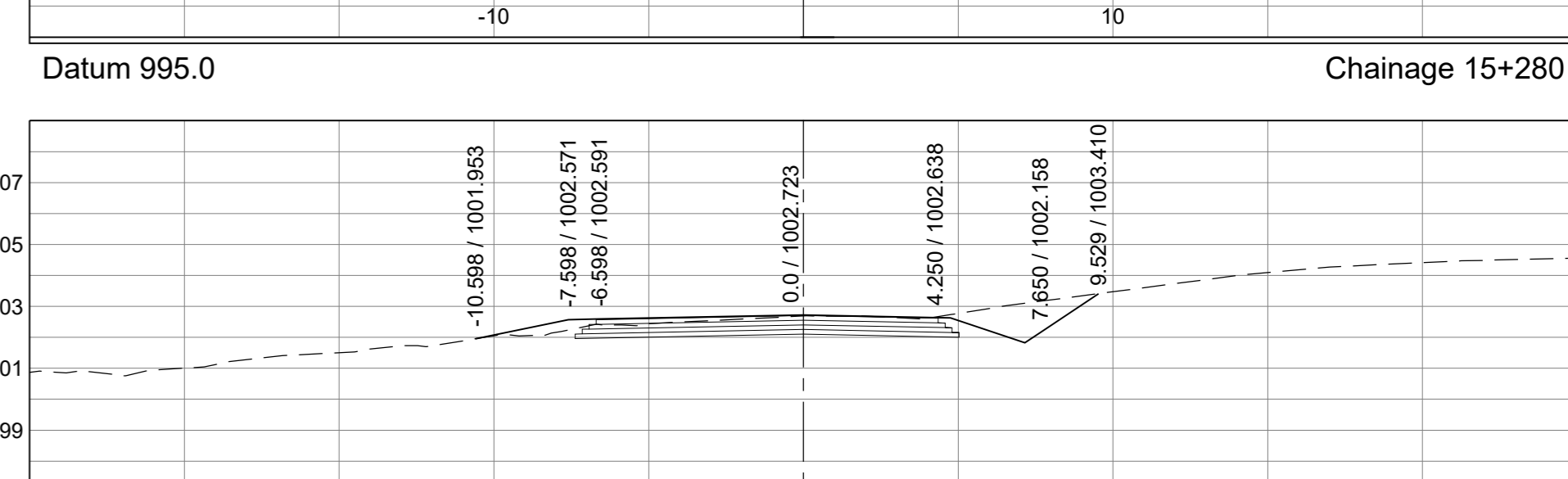
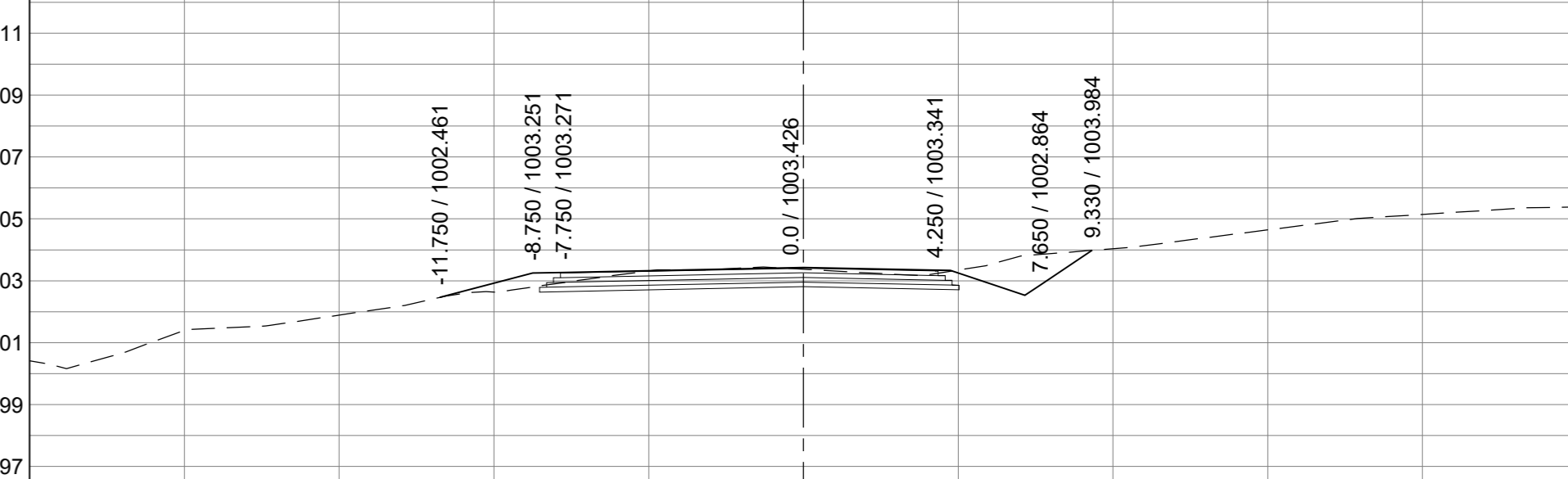
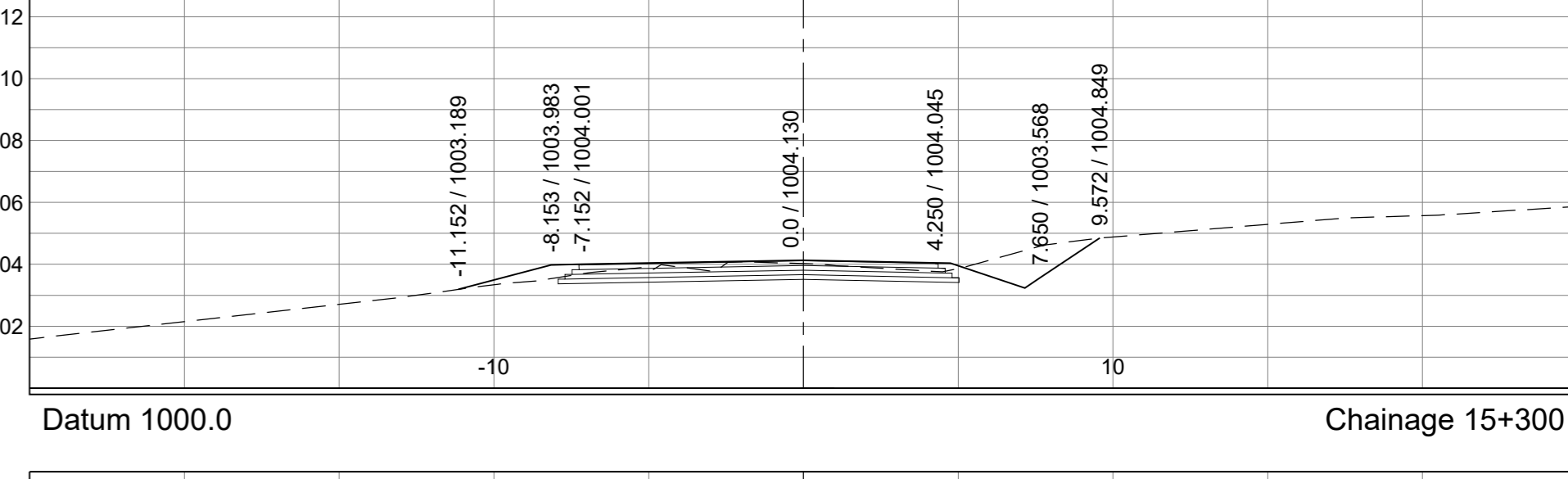
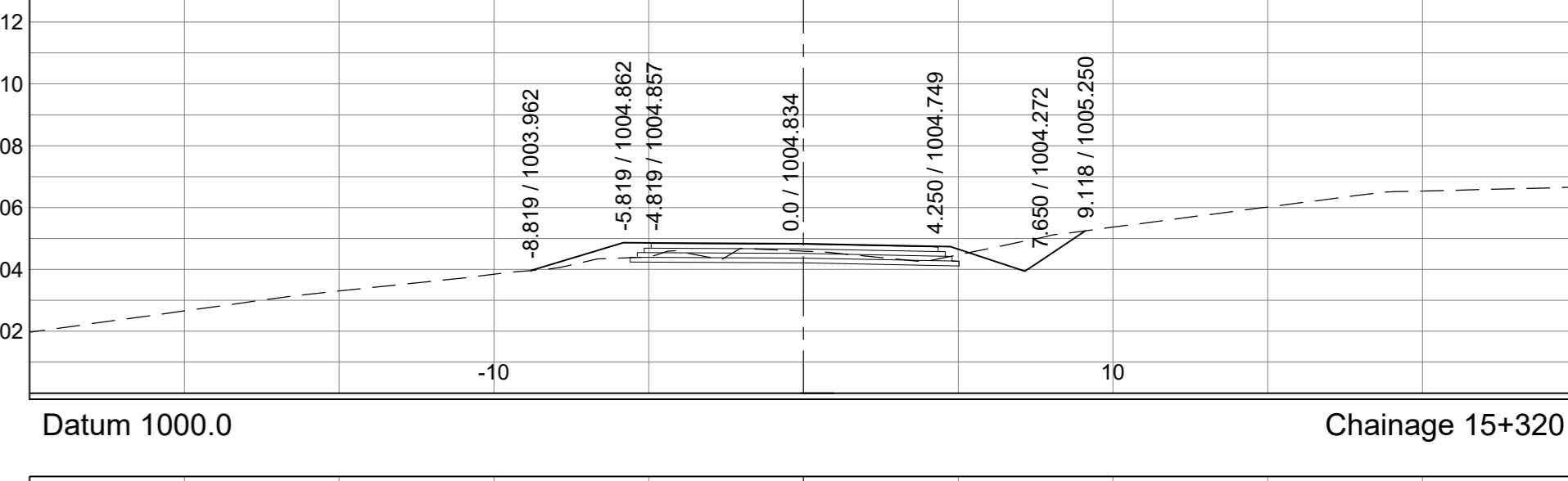
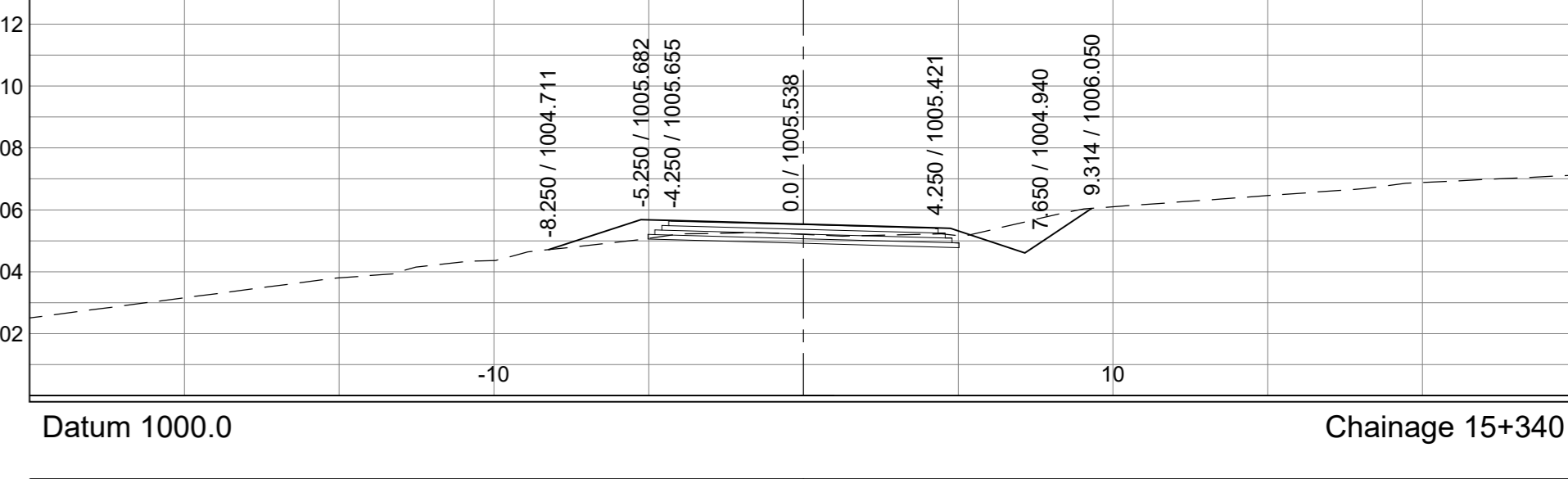
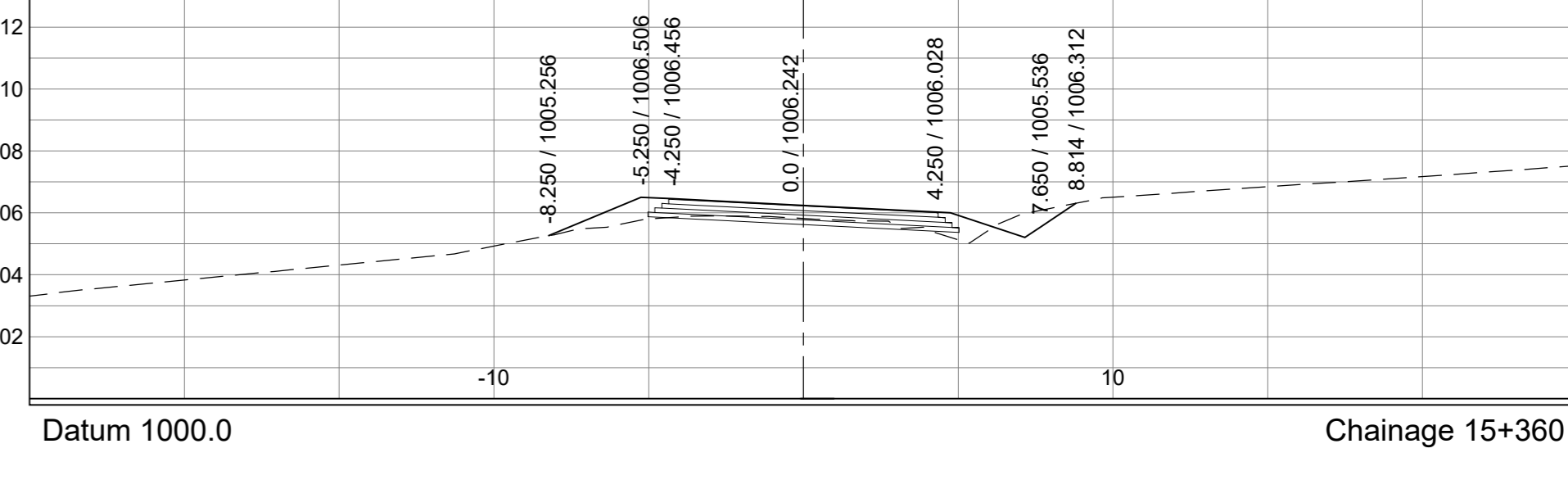
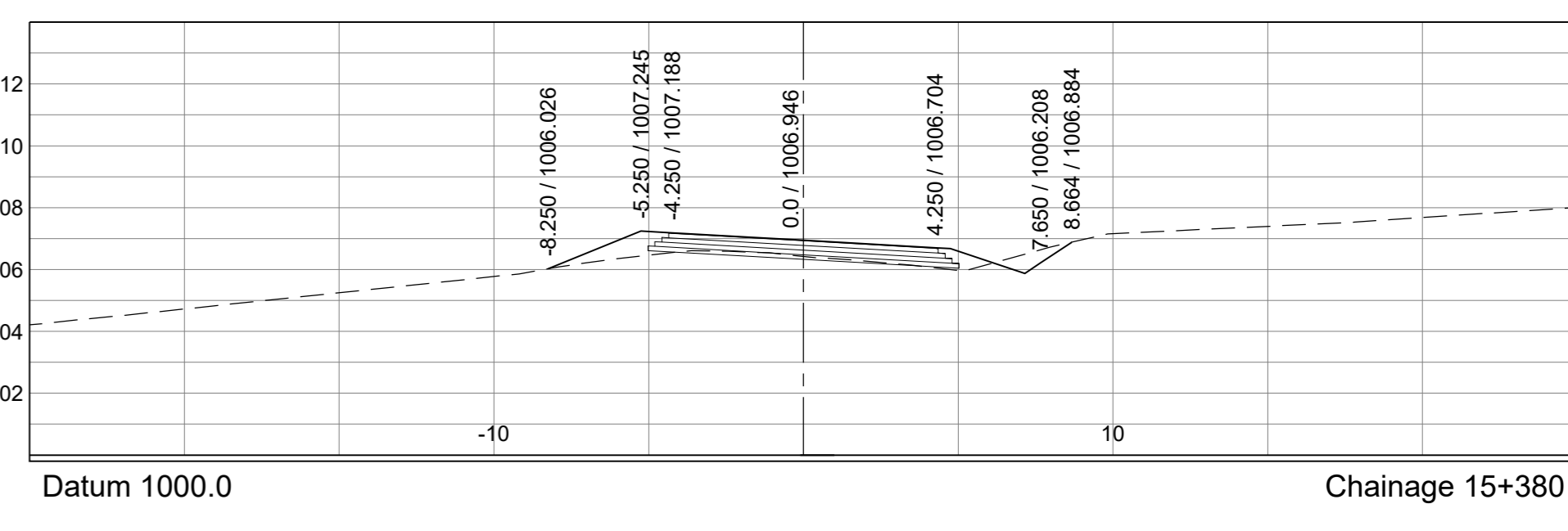
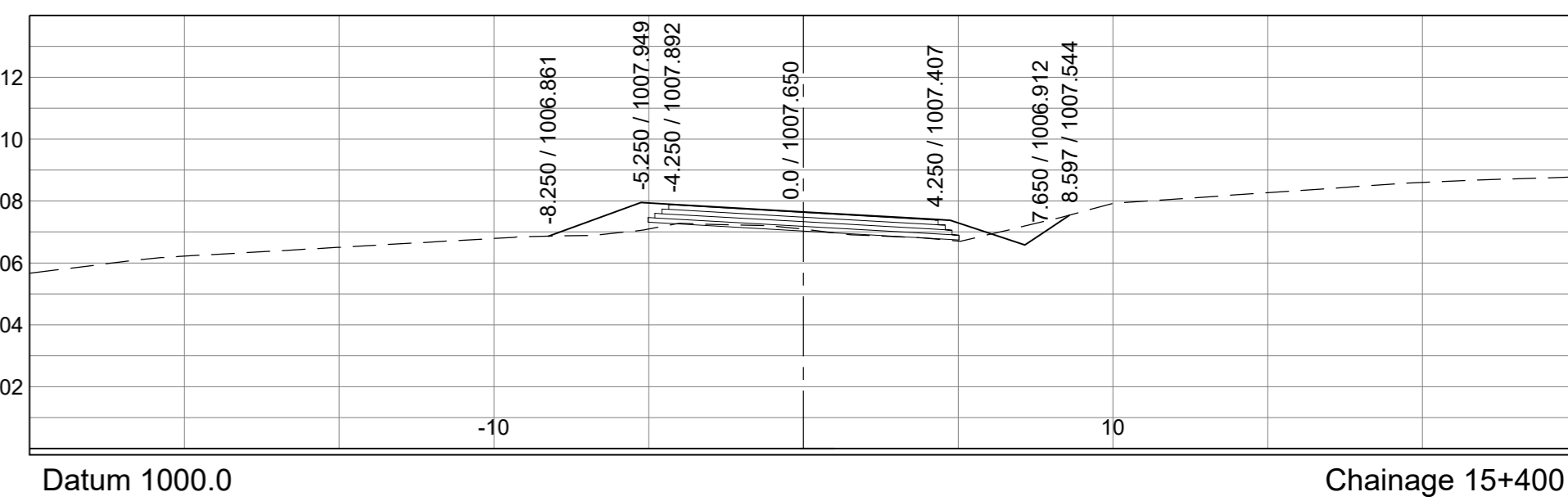
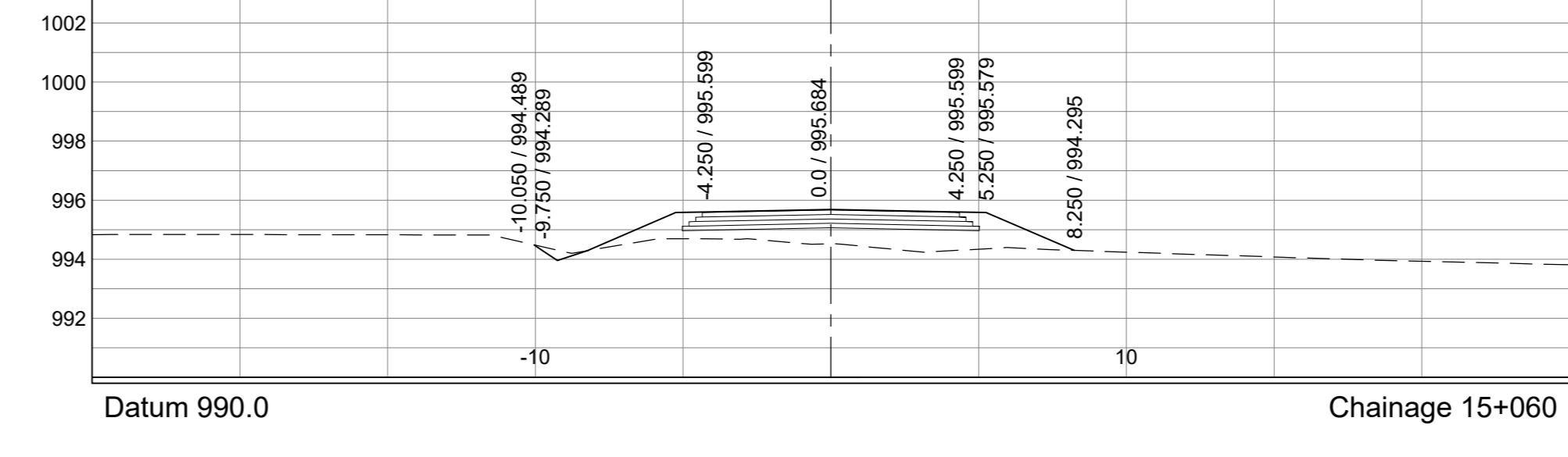
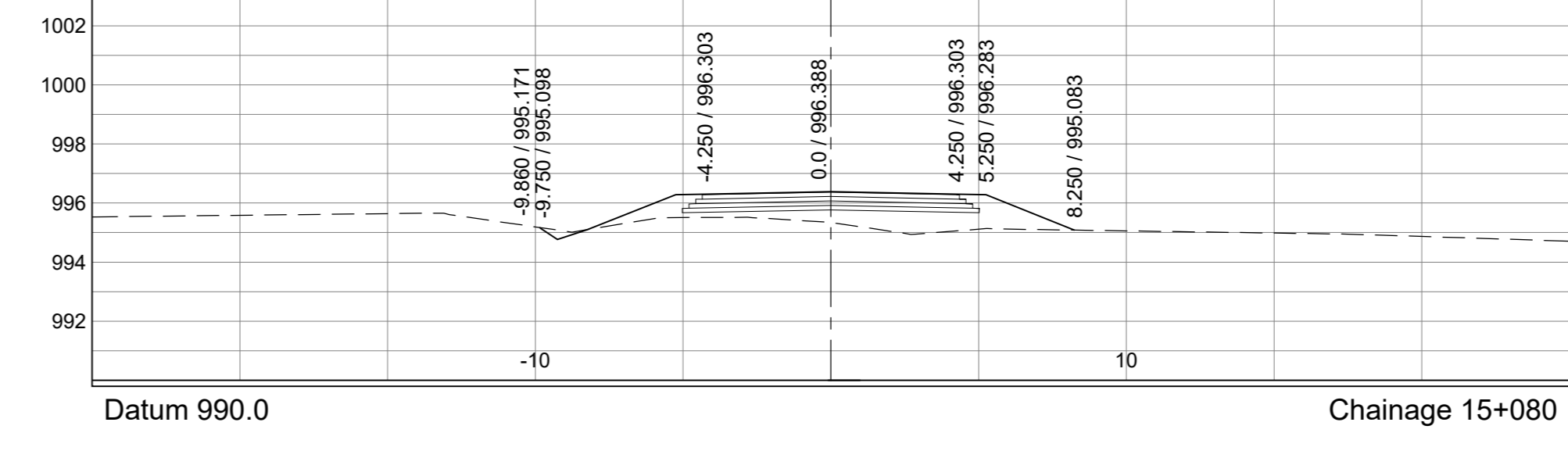
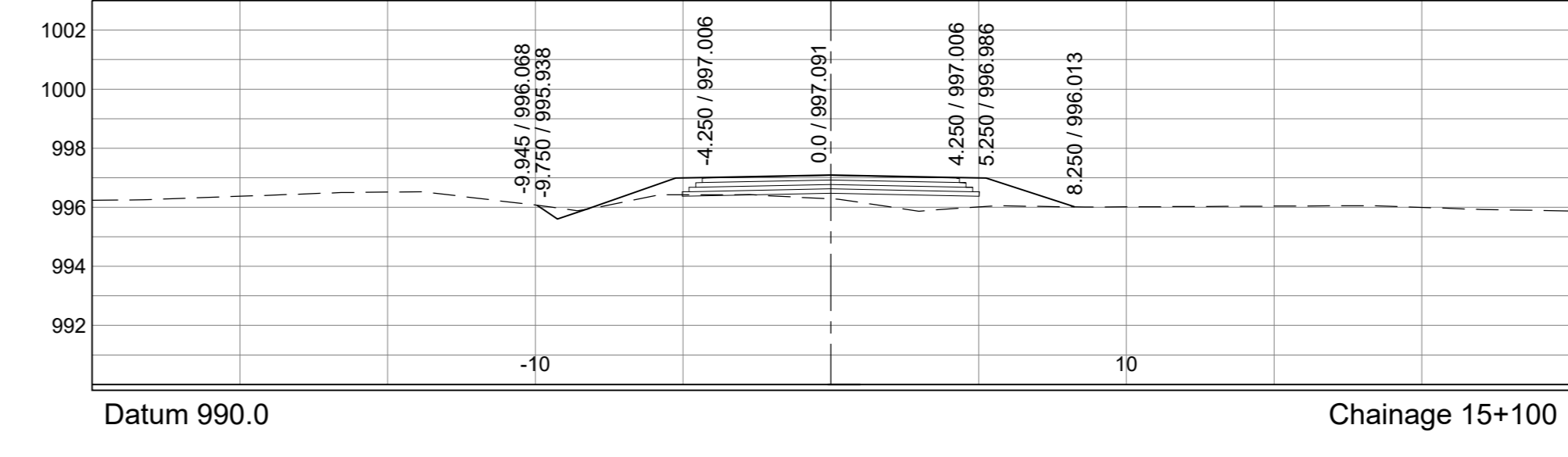
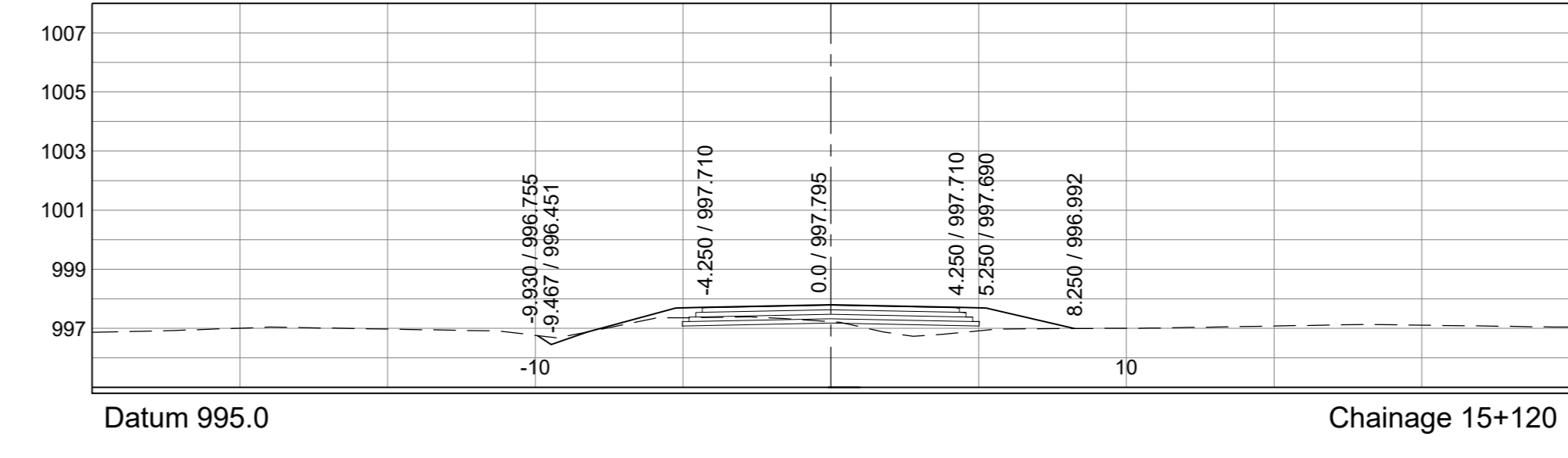
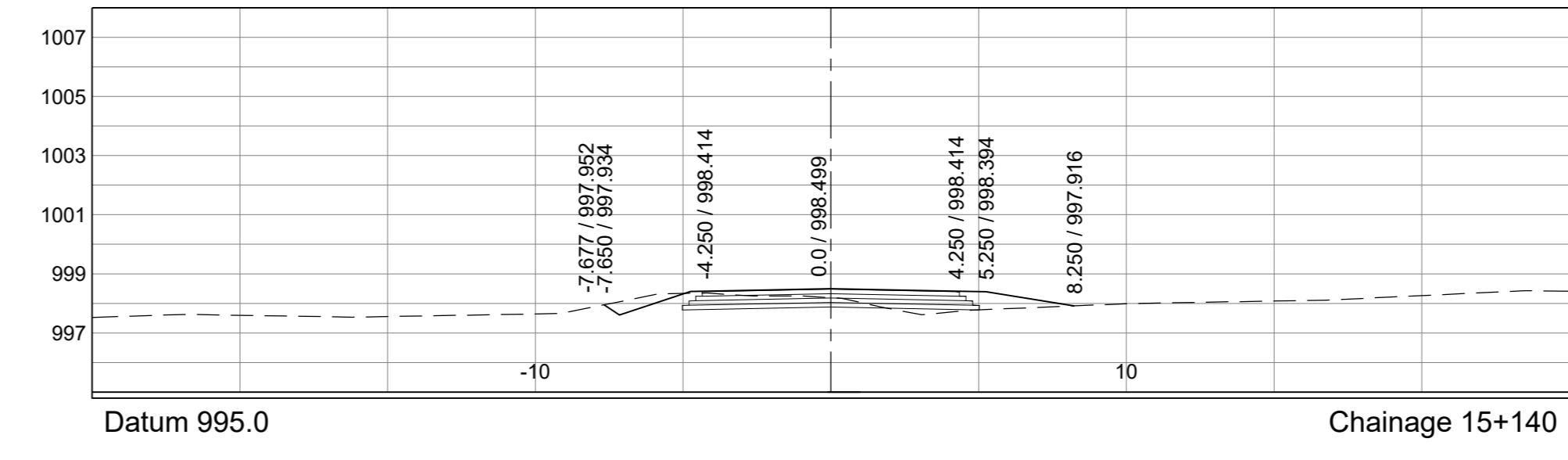
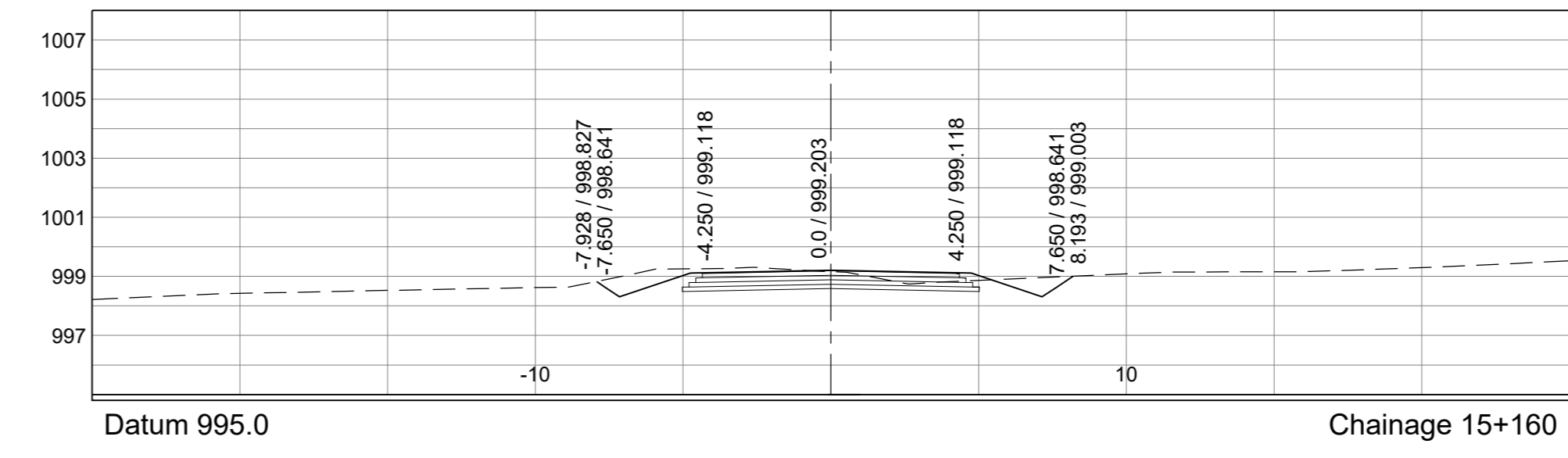
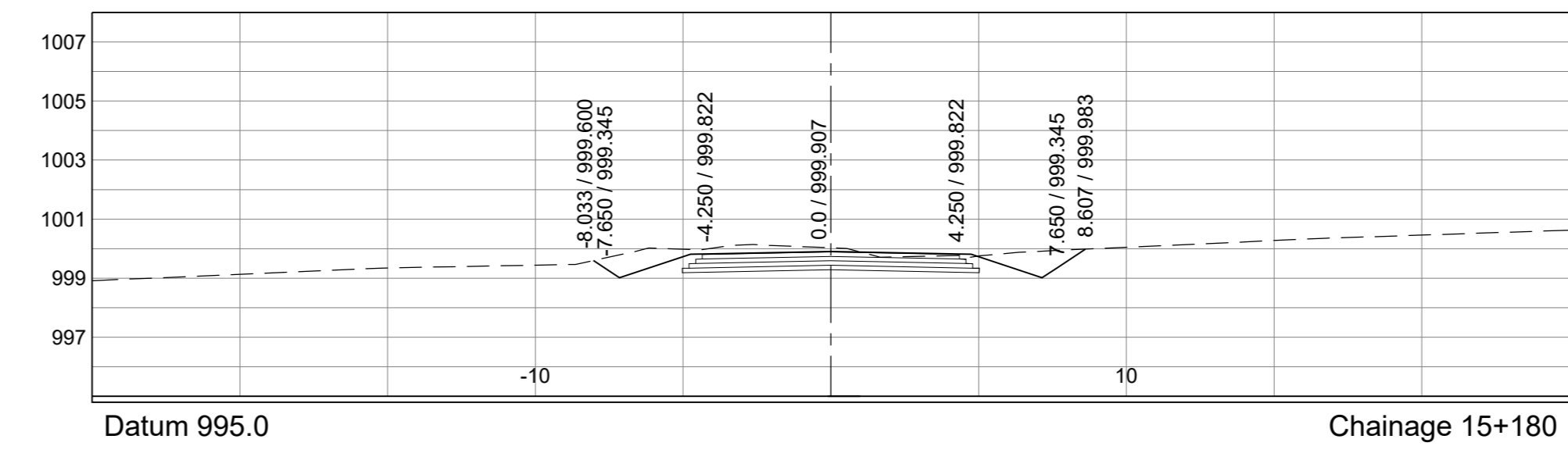
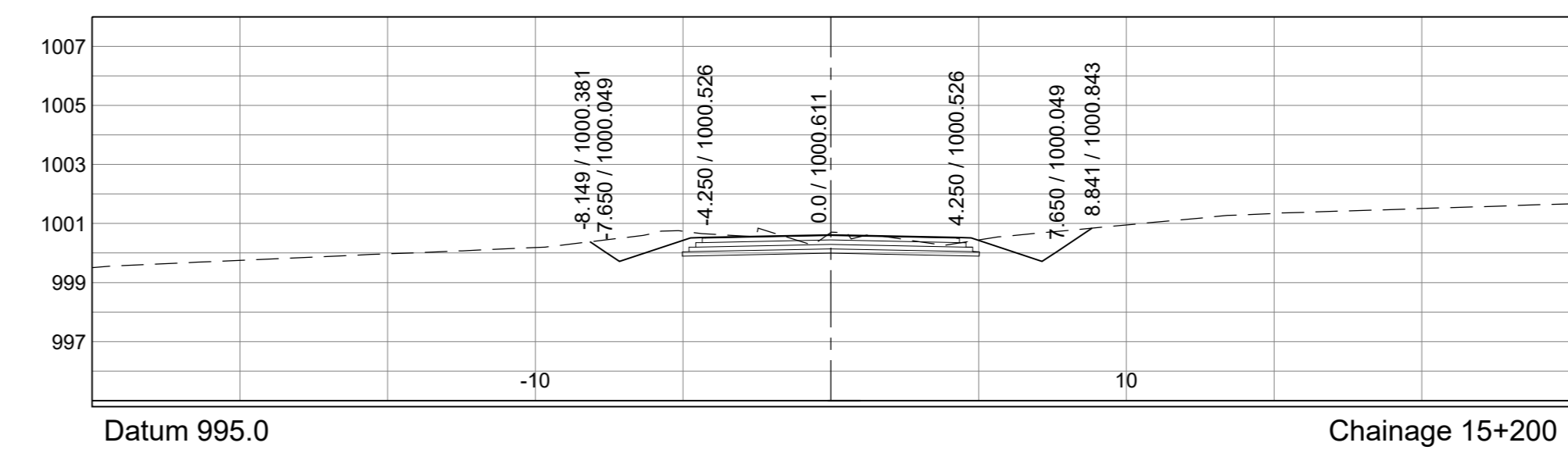
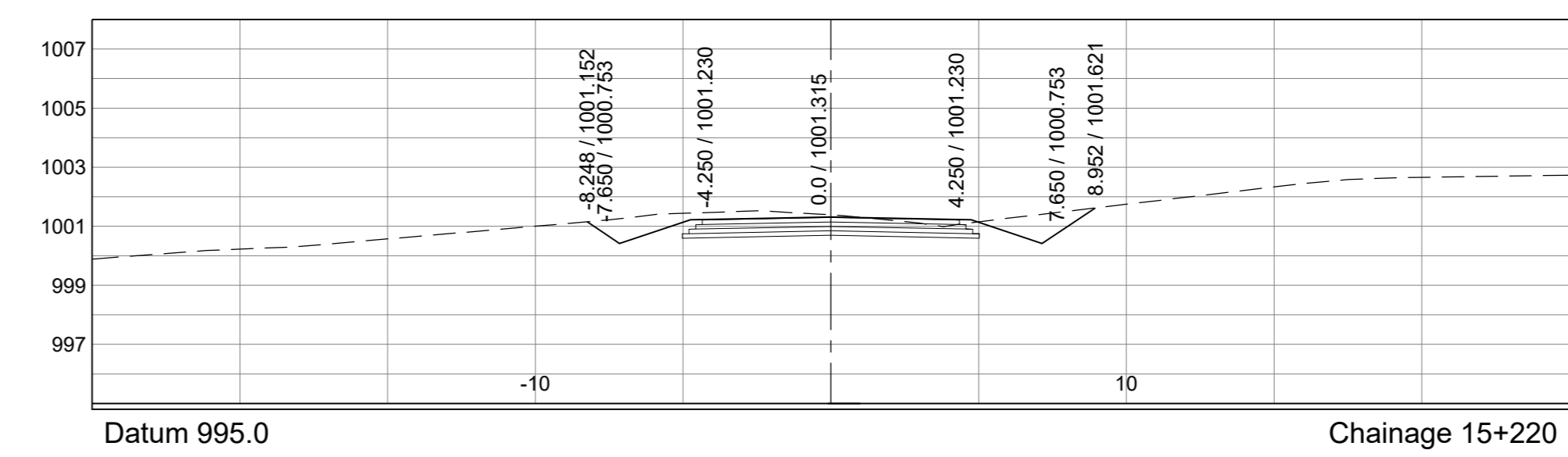
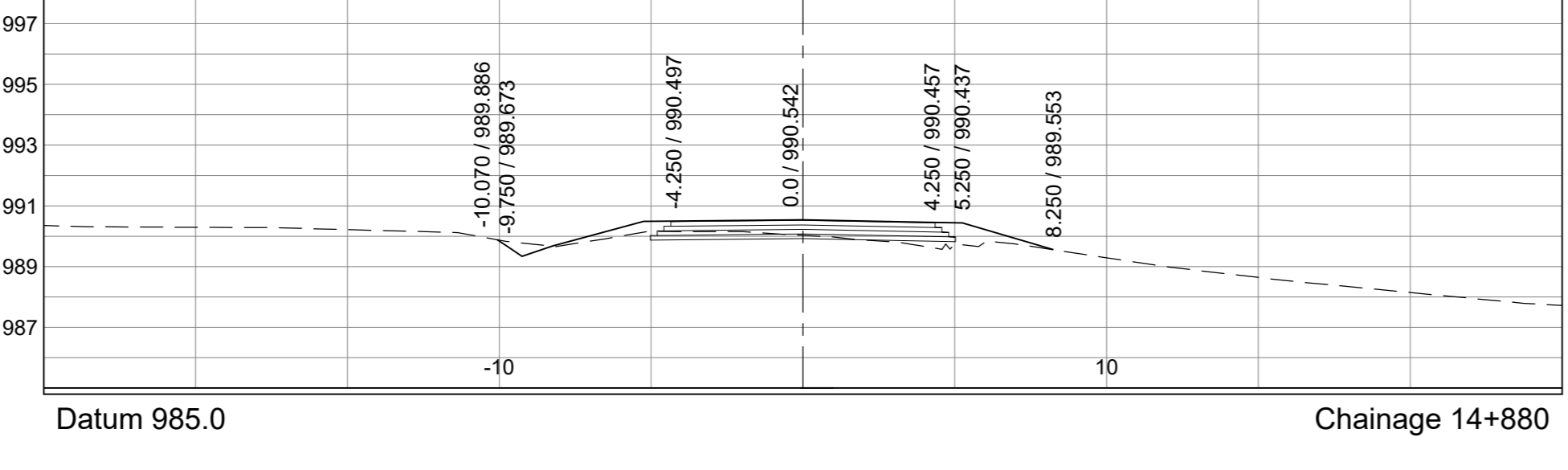
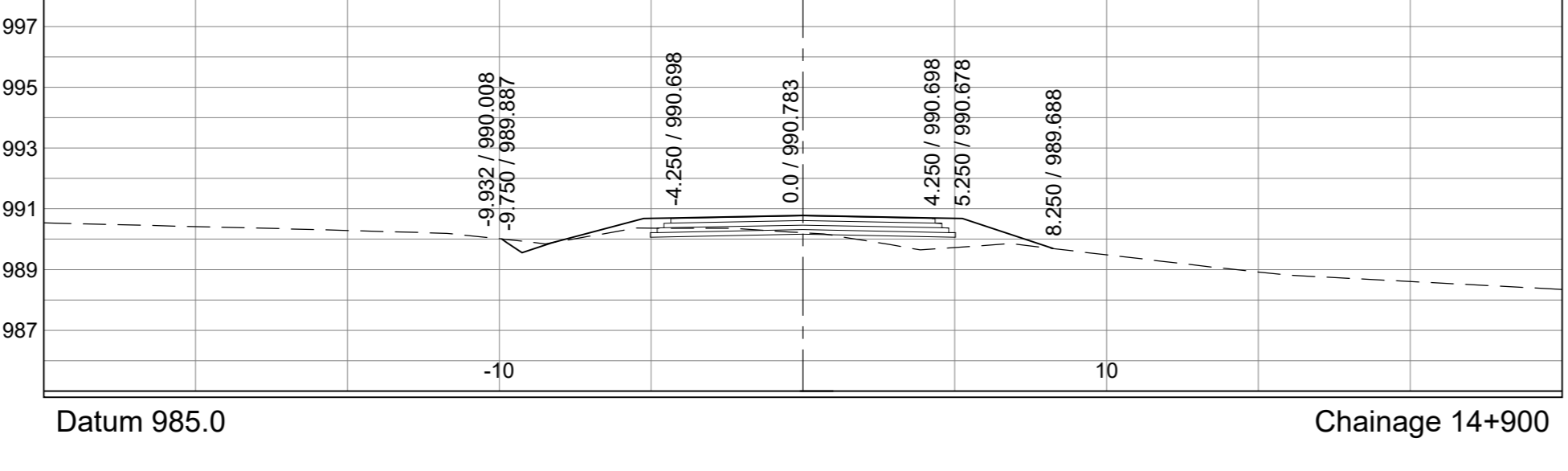
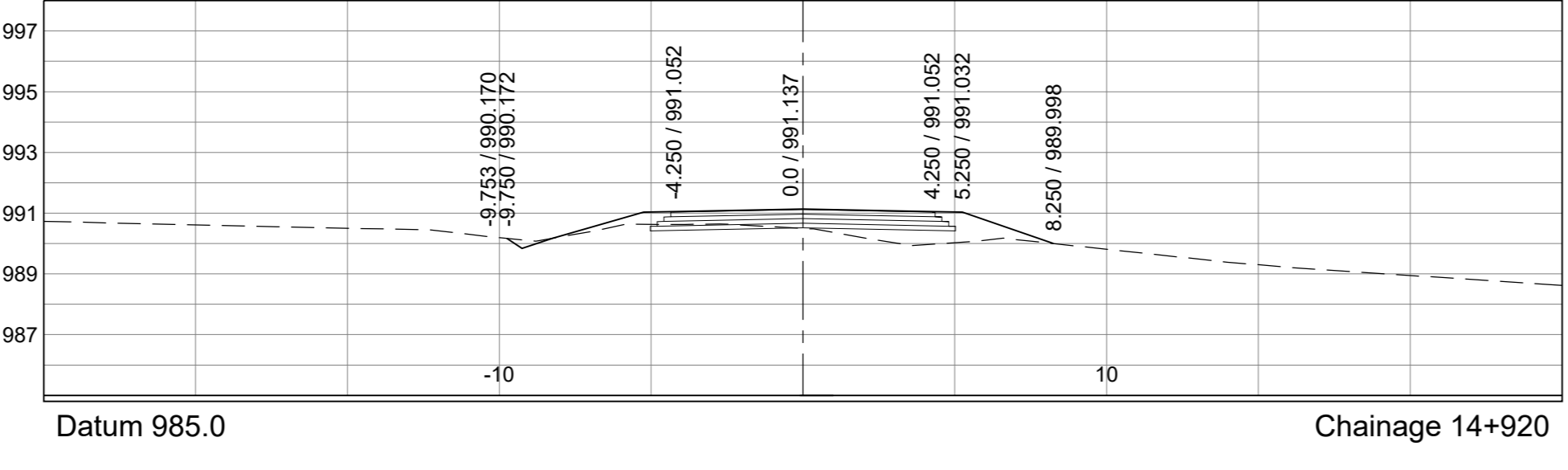
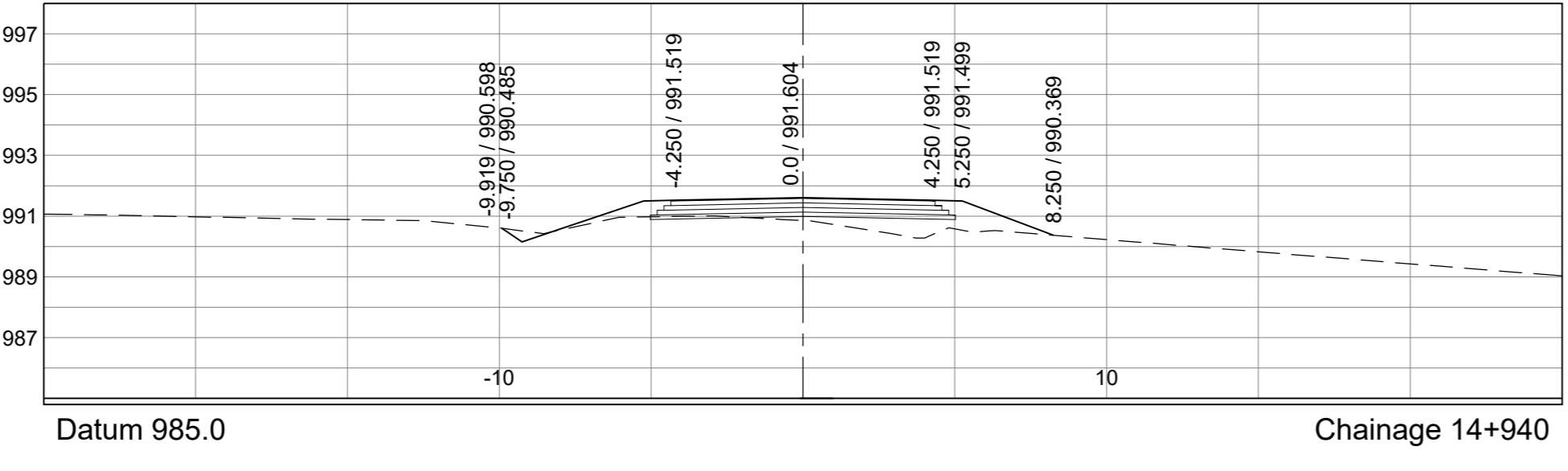
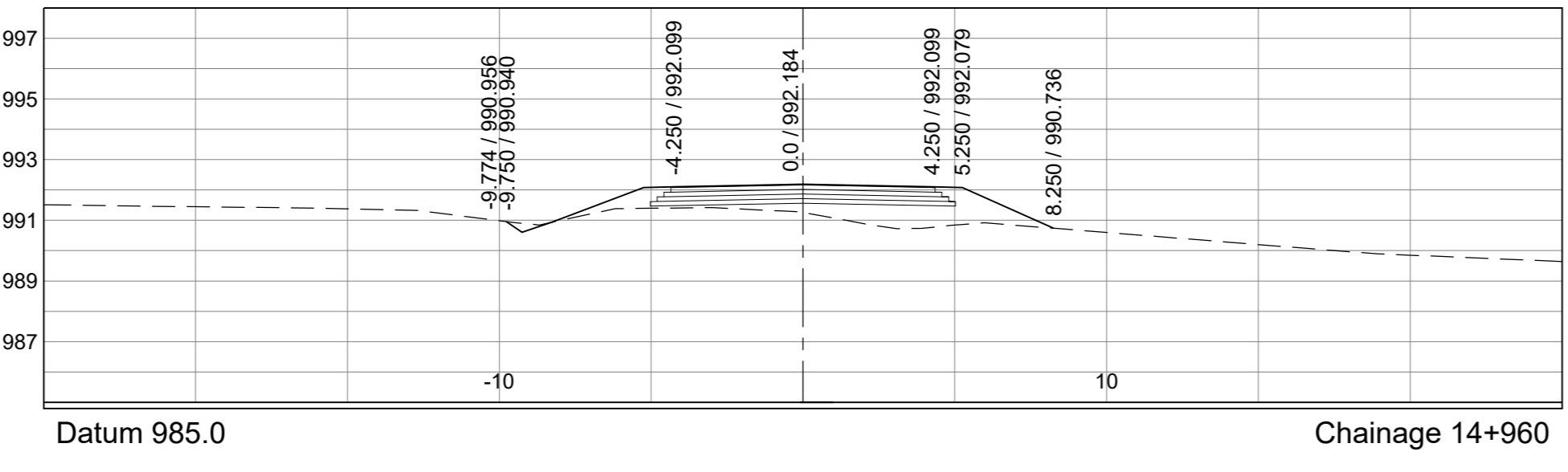
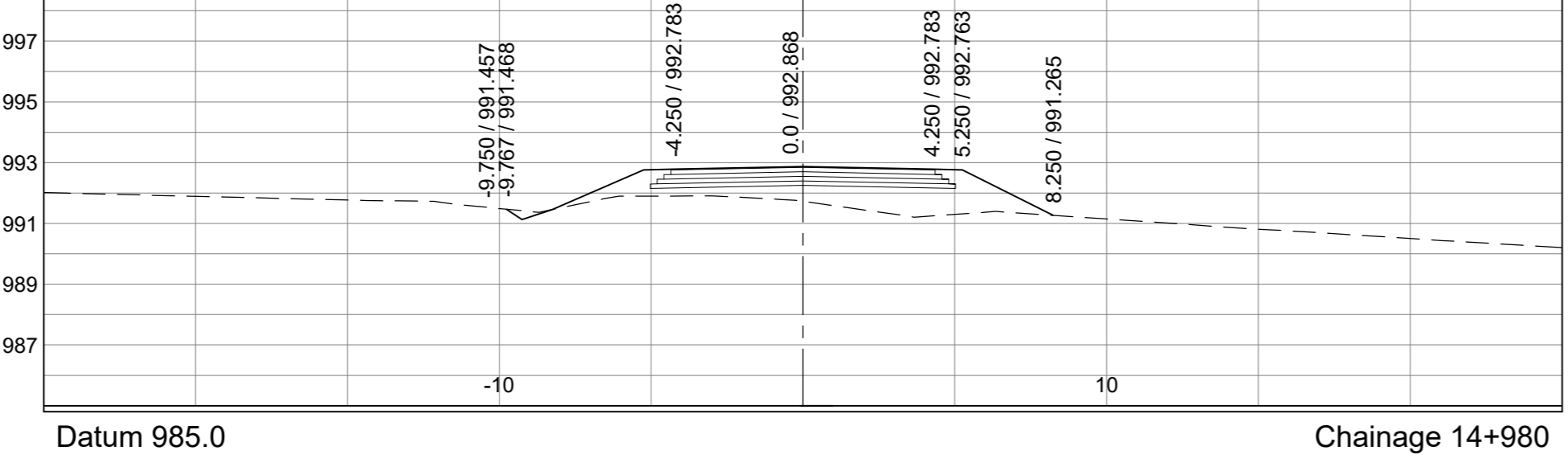
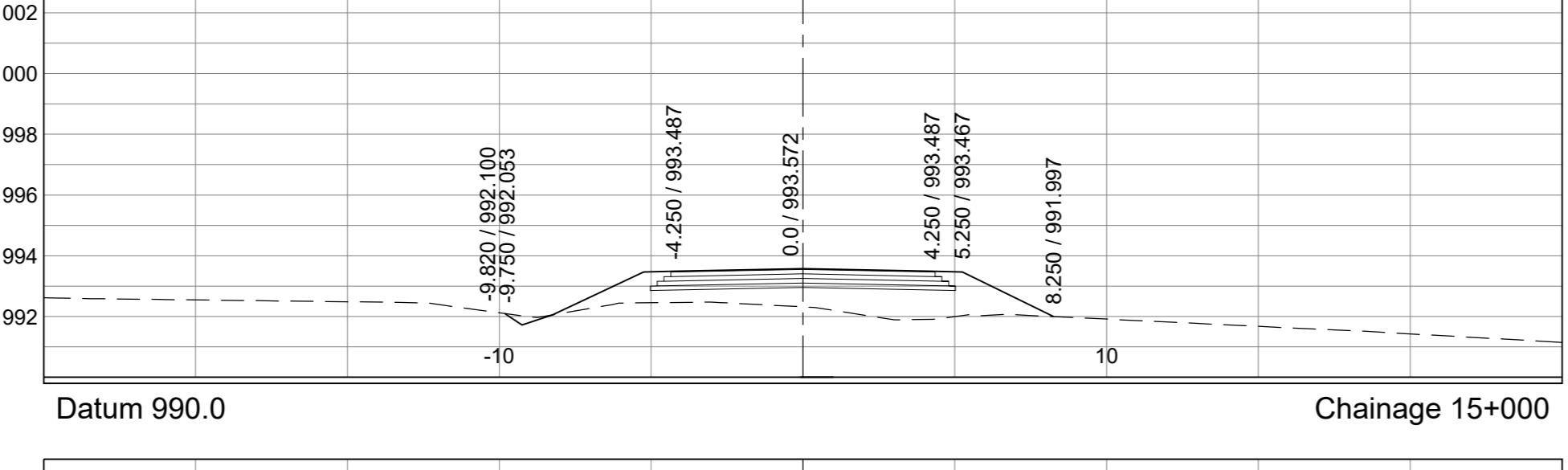
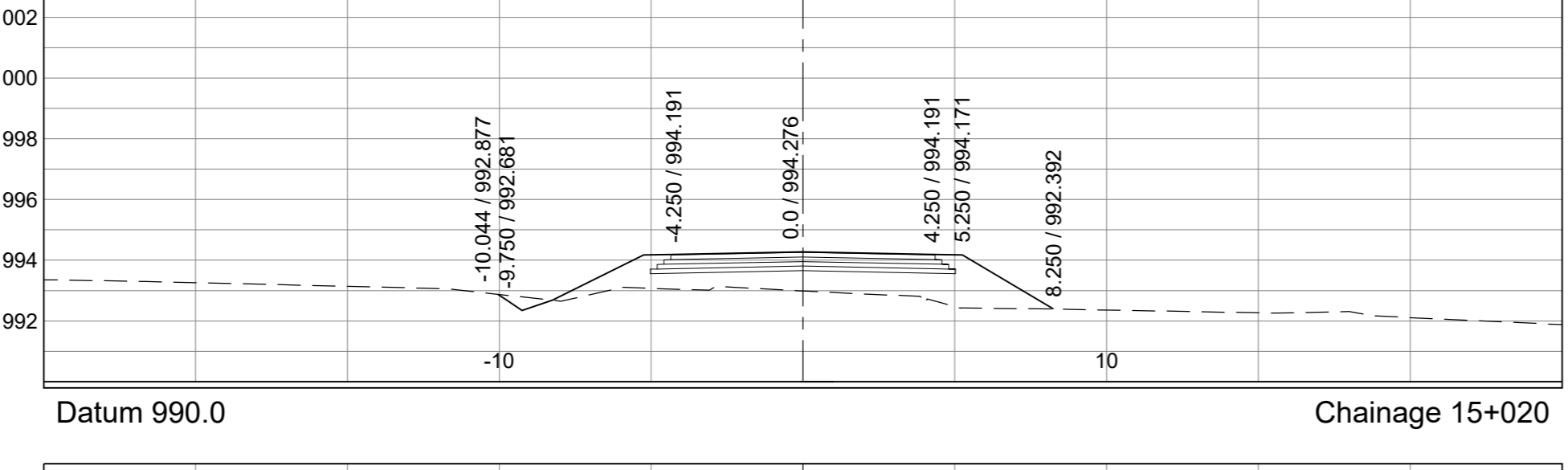
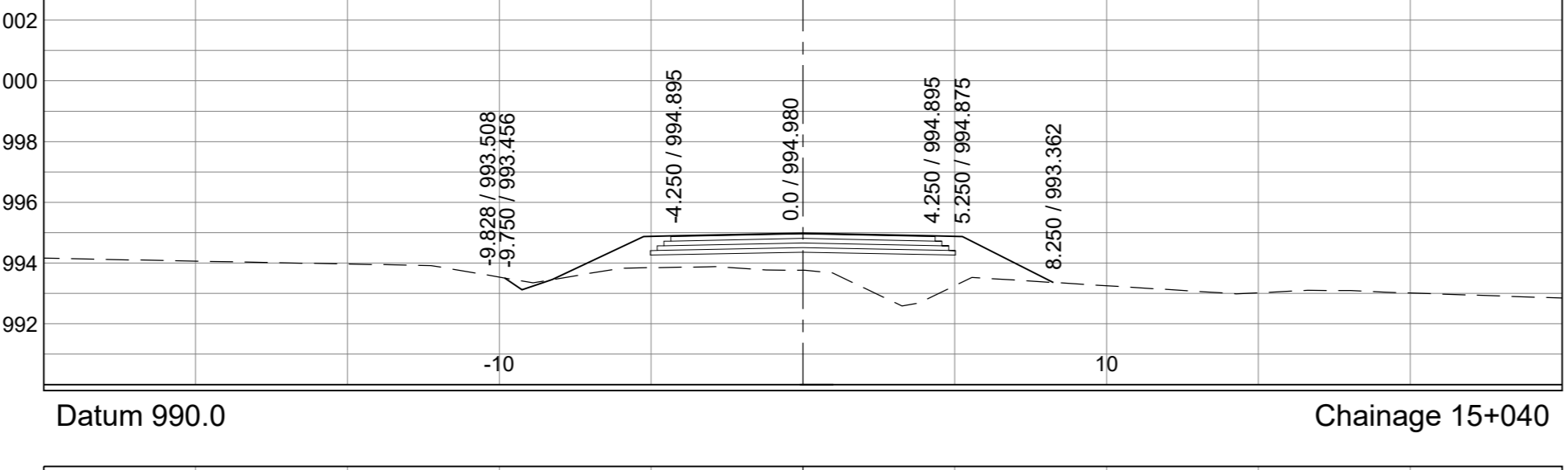
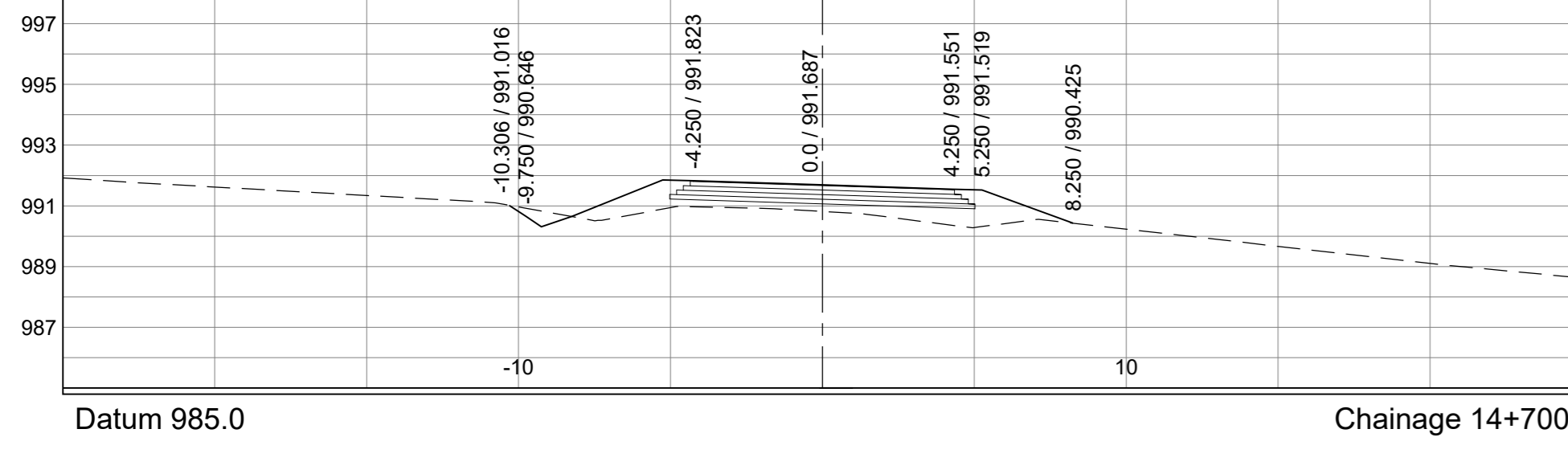
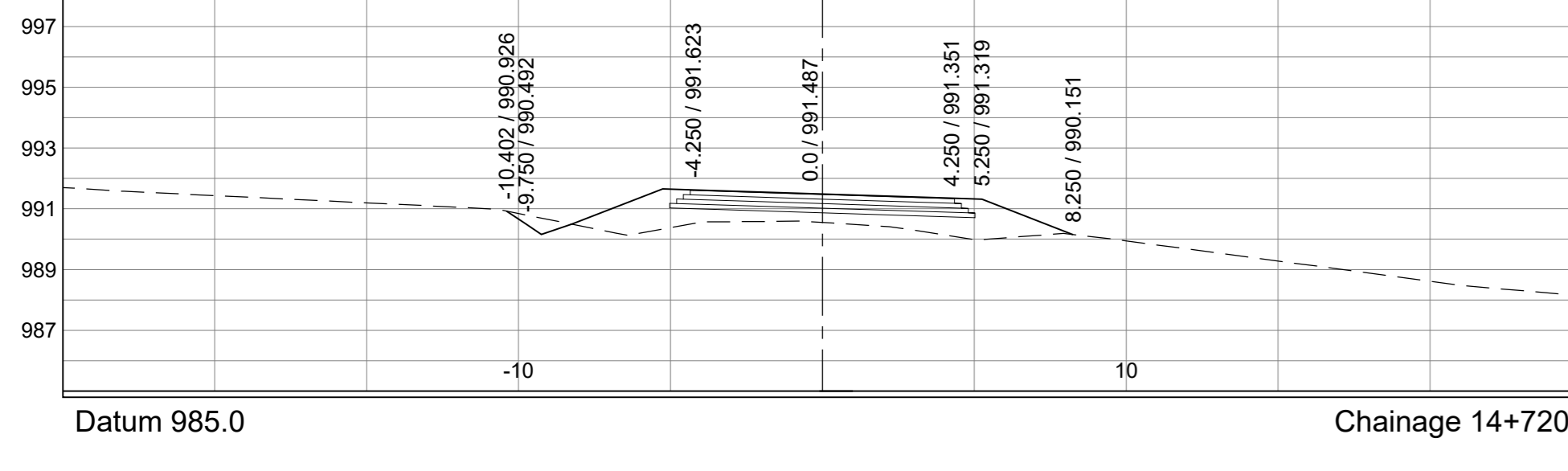
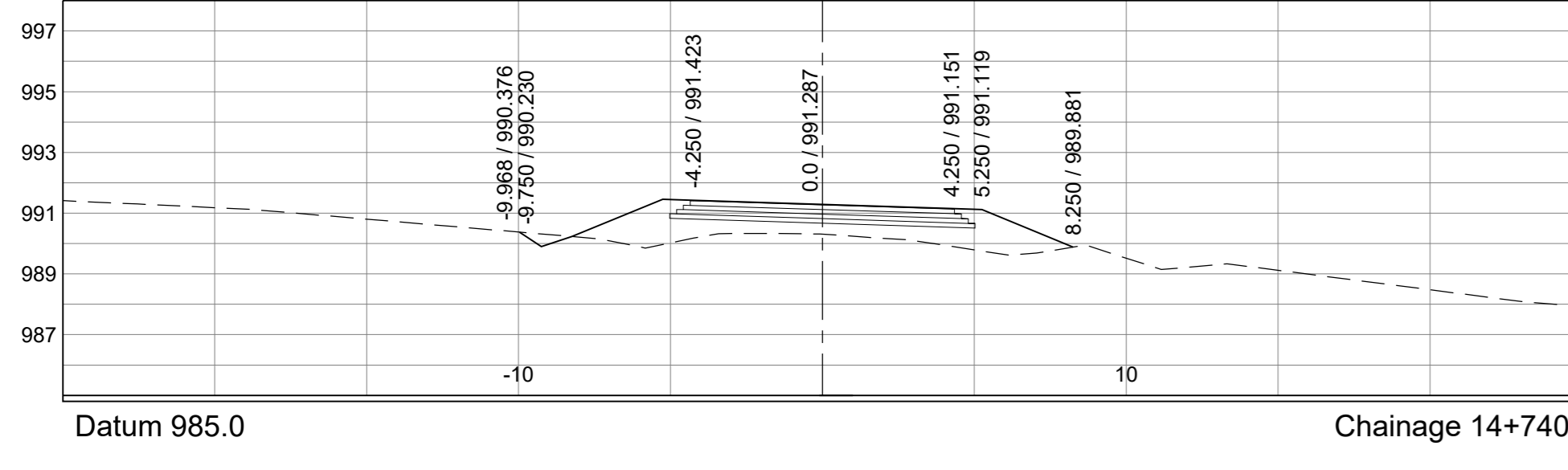
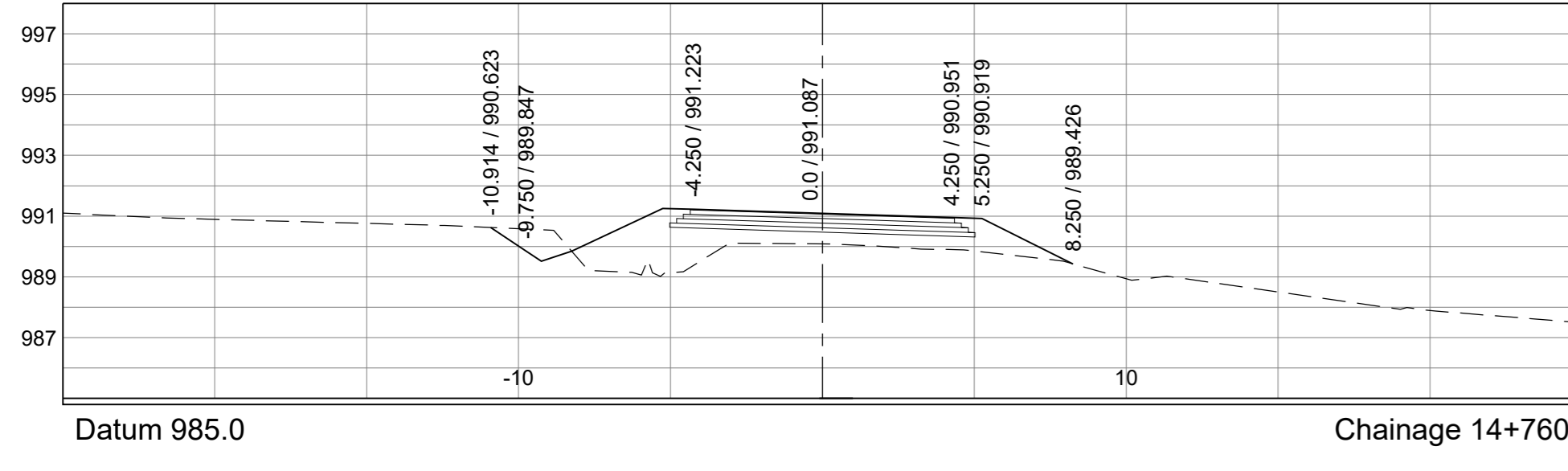
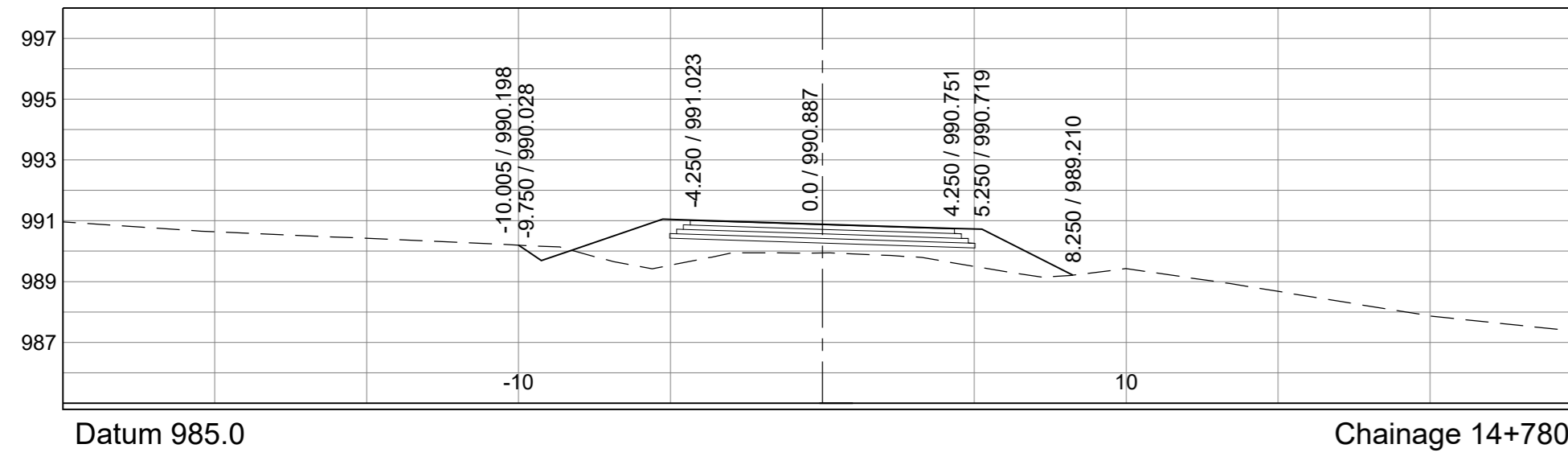
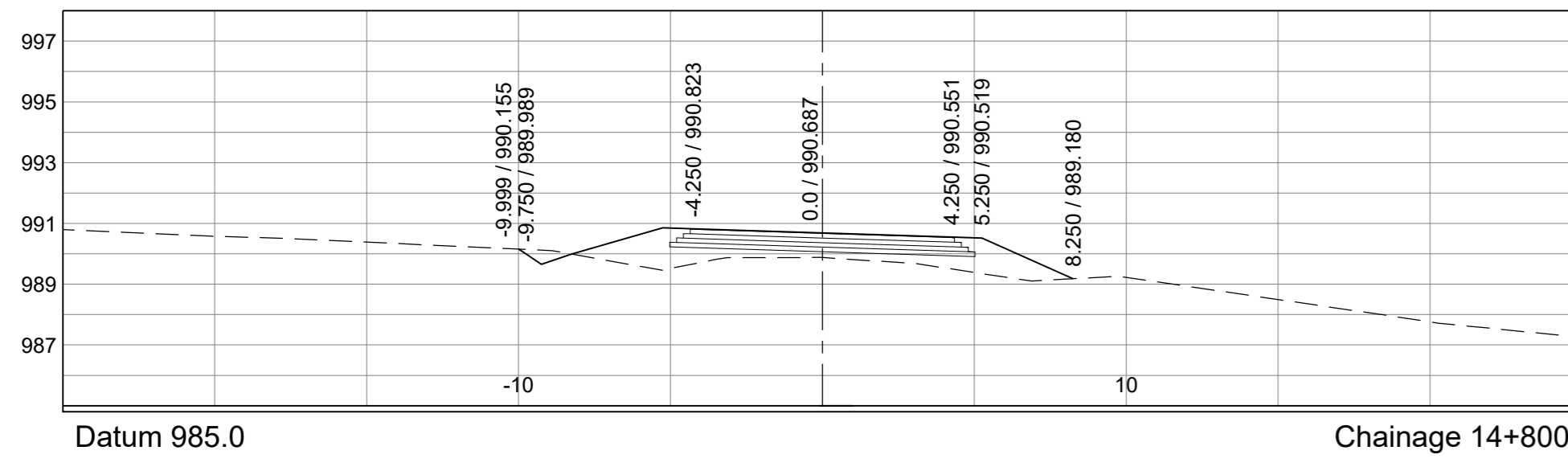
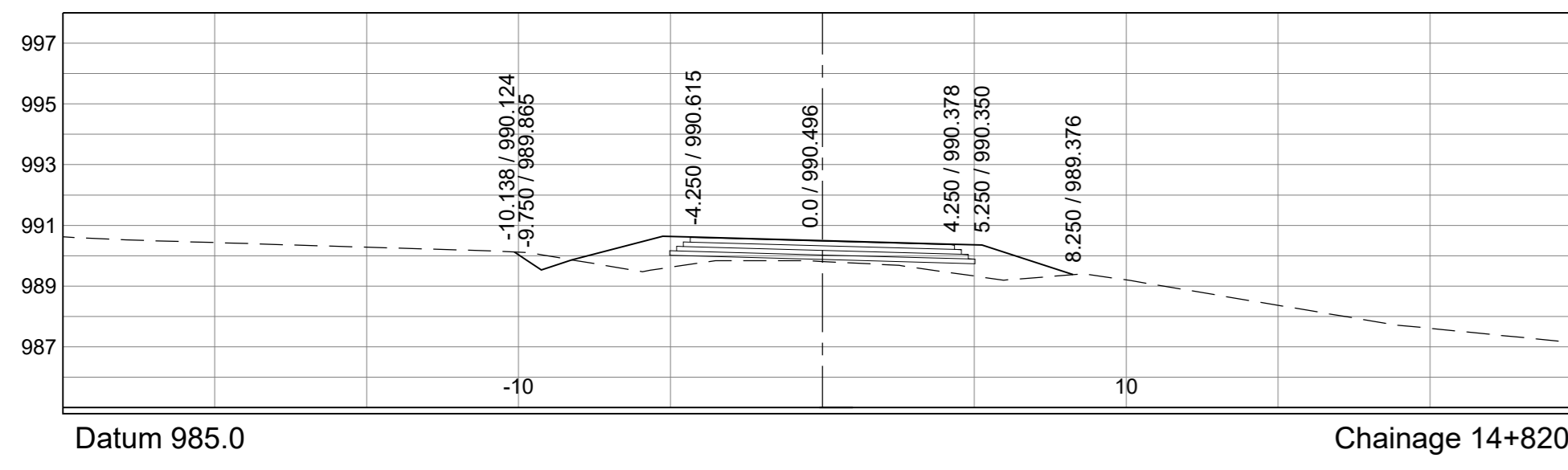
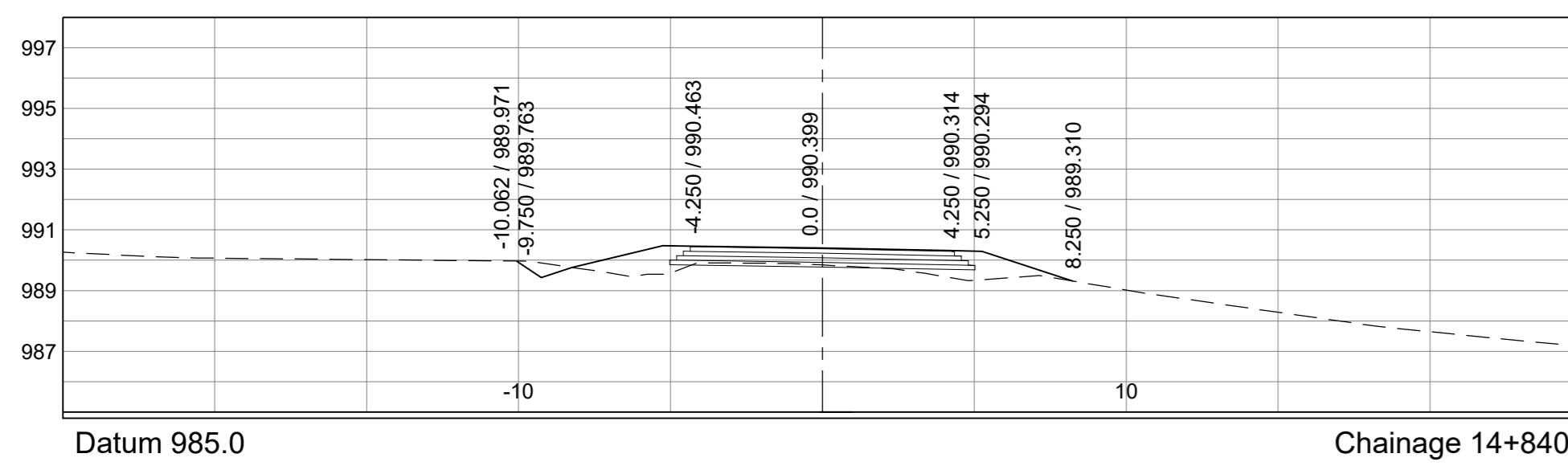
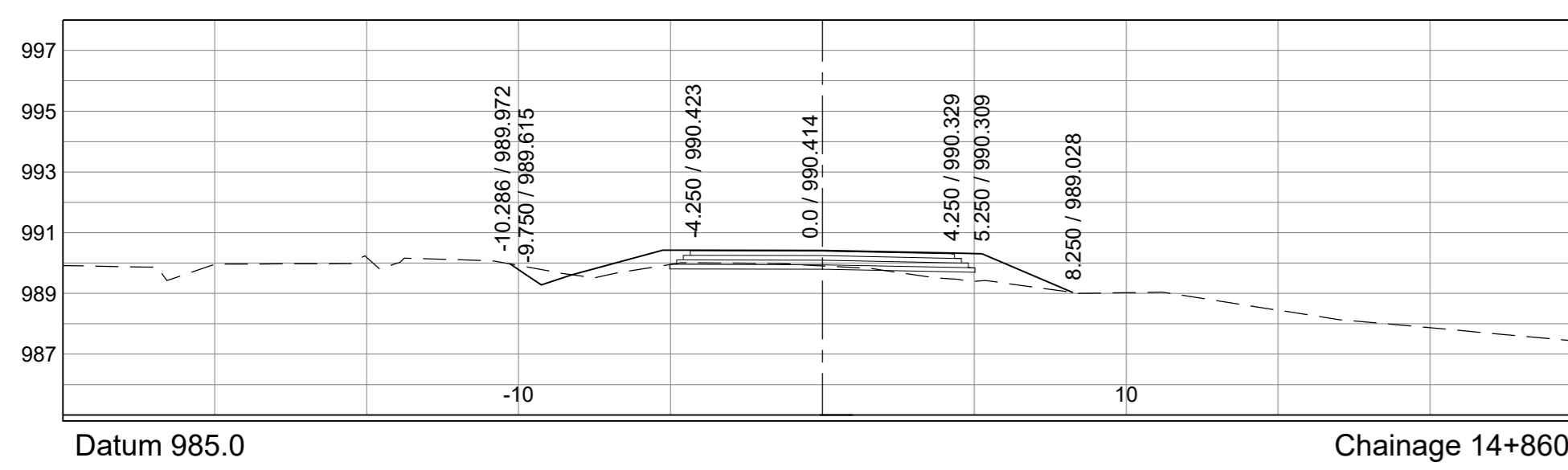
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet -> 6	REVISION:
km 14+120 - km 14+700	of -> 18	A
Scale	Plan No ->	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 44335**





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44335	Designed by:-	T. PIKA
Continued on:-	C 44337	Checked by:-	Y. DOMA
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	

**KWAZULU-NATAL PROVINCE**  
 TRANSPORT  
 REPUBLIC OF SOUTH AFRICA

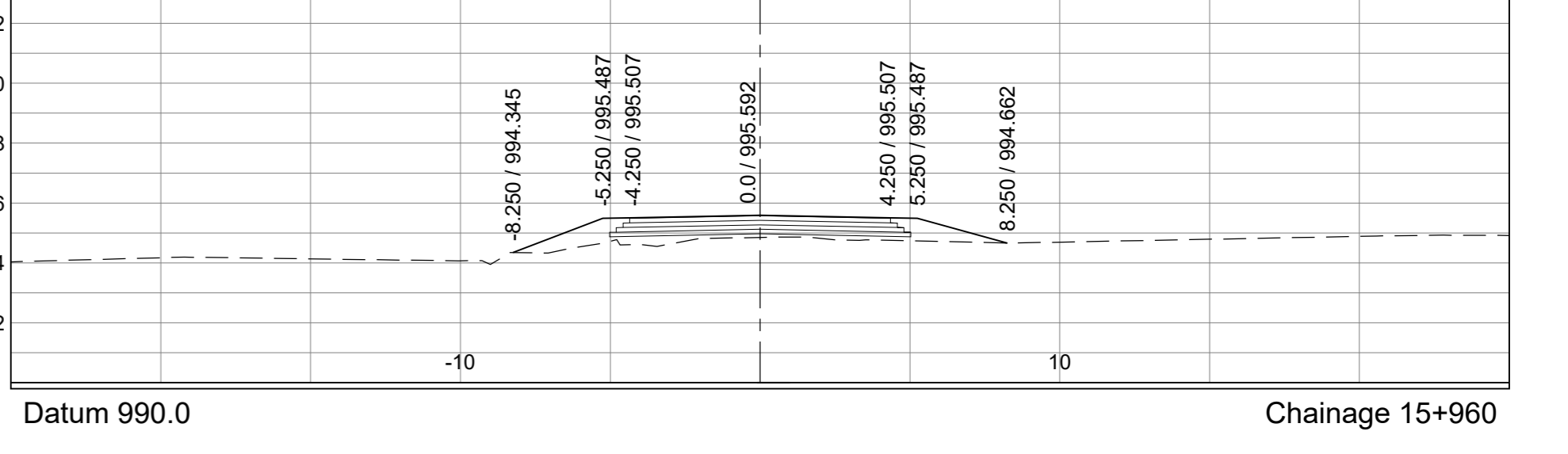
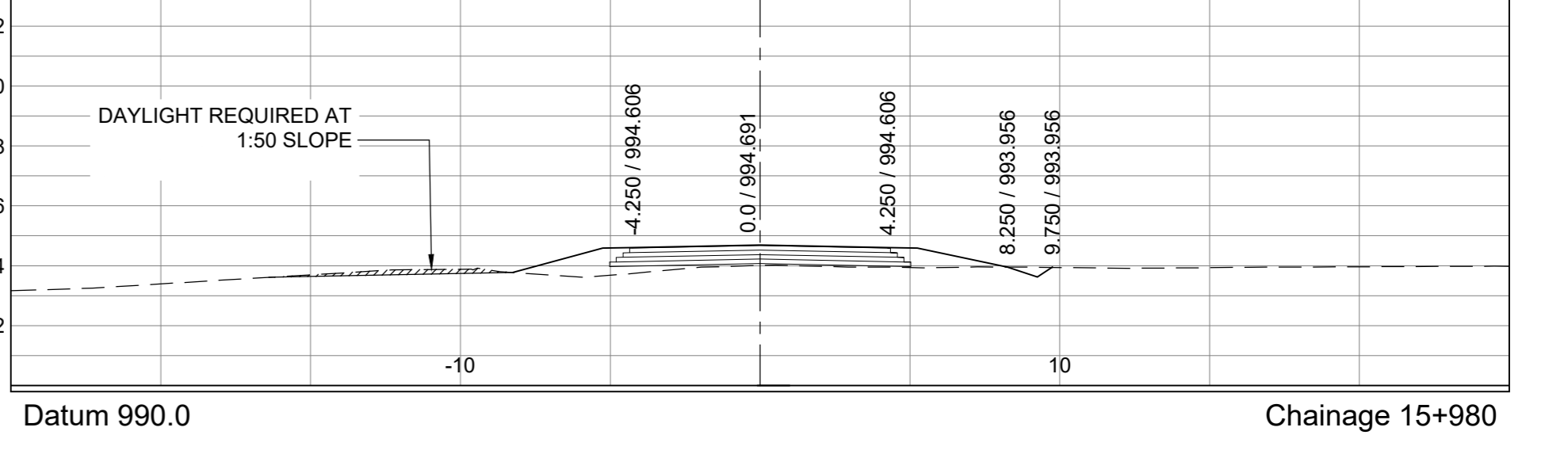
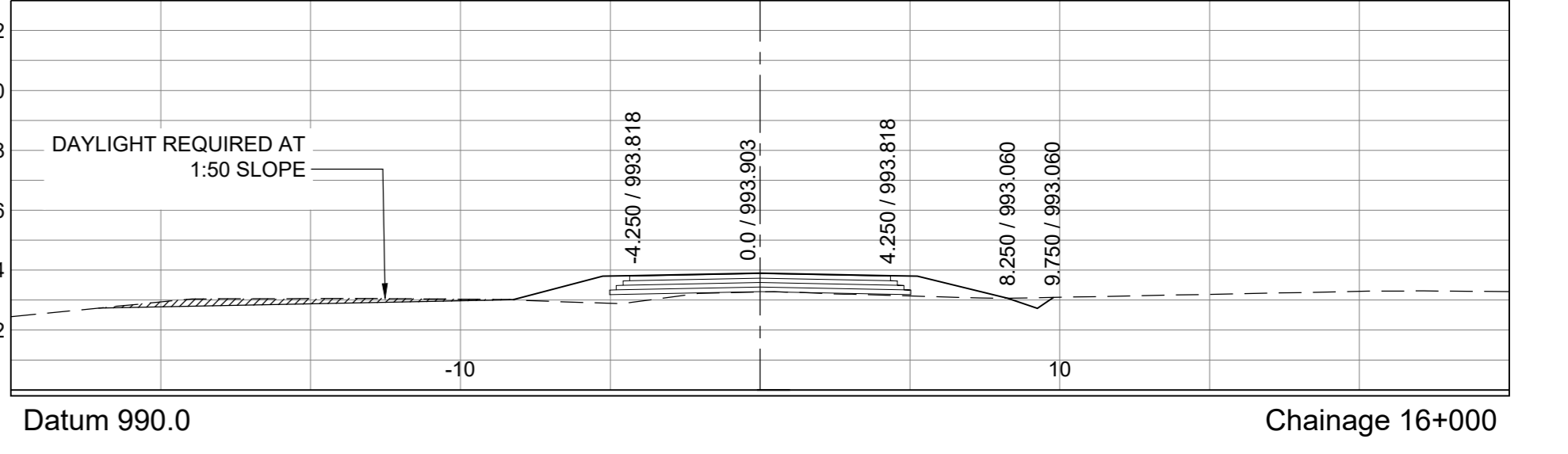
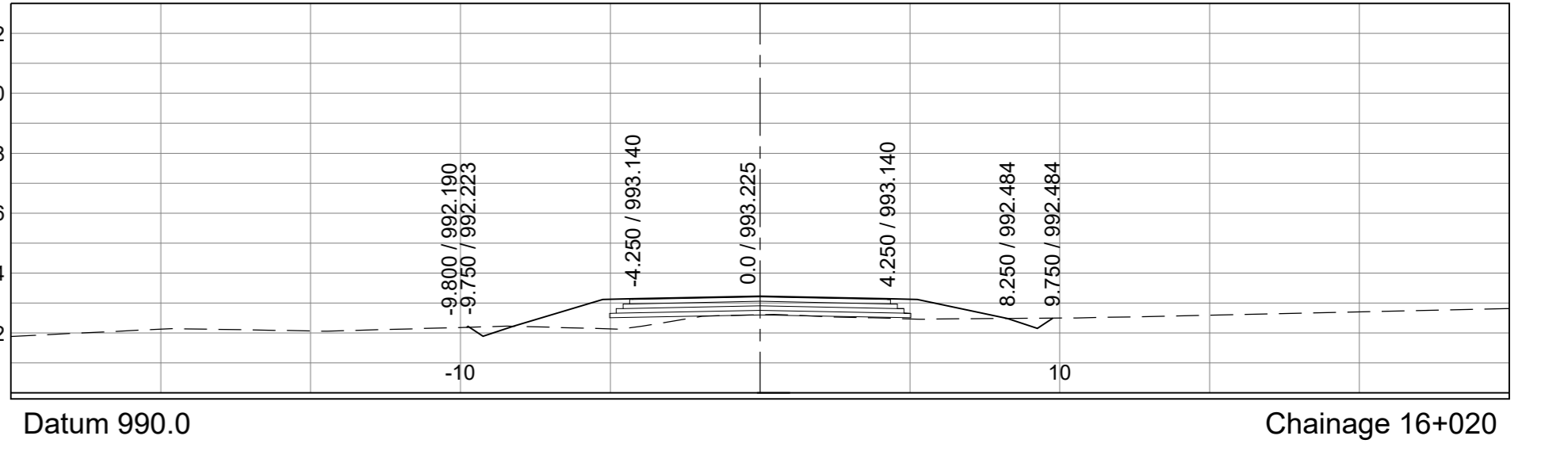
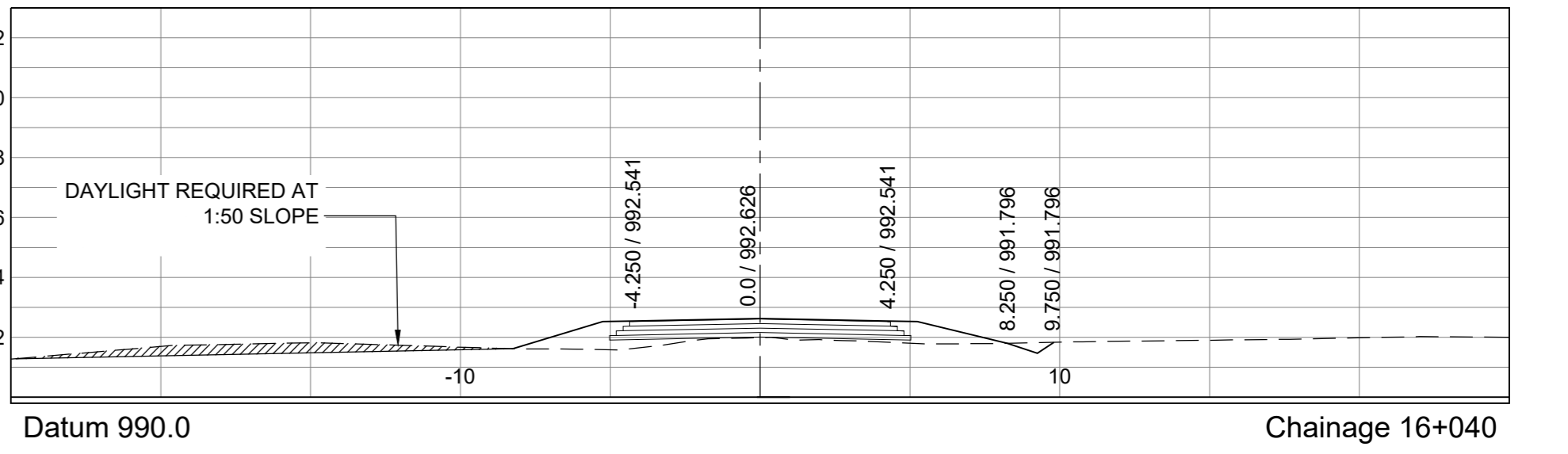
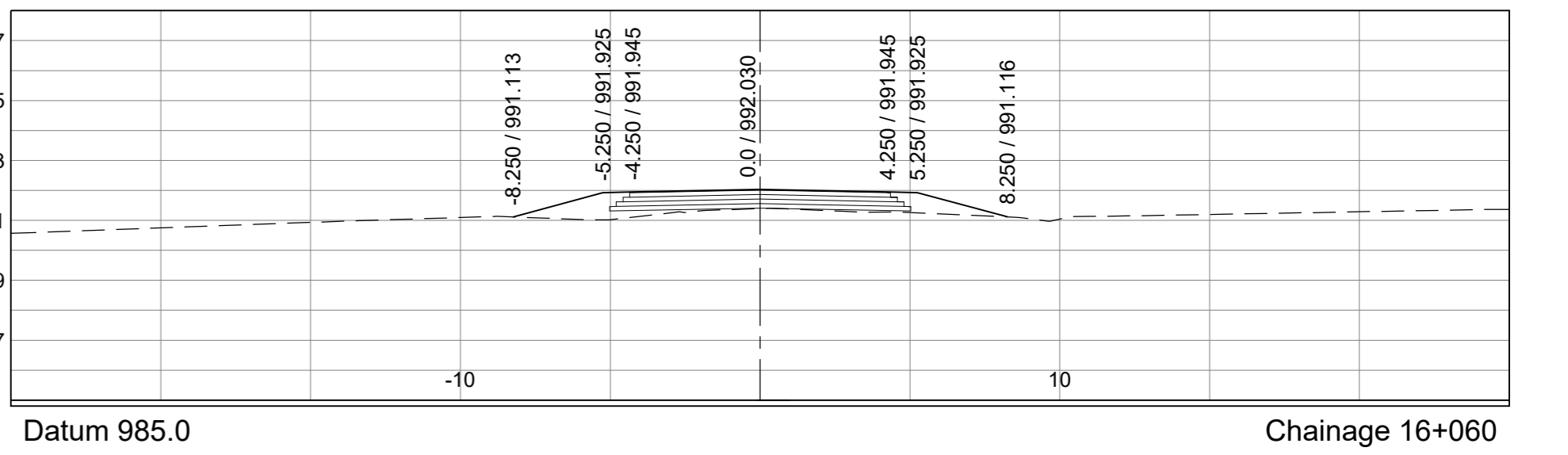
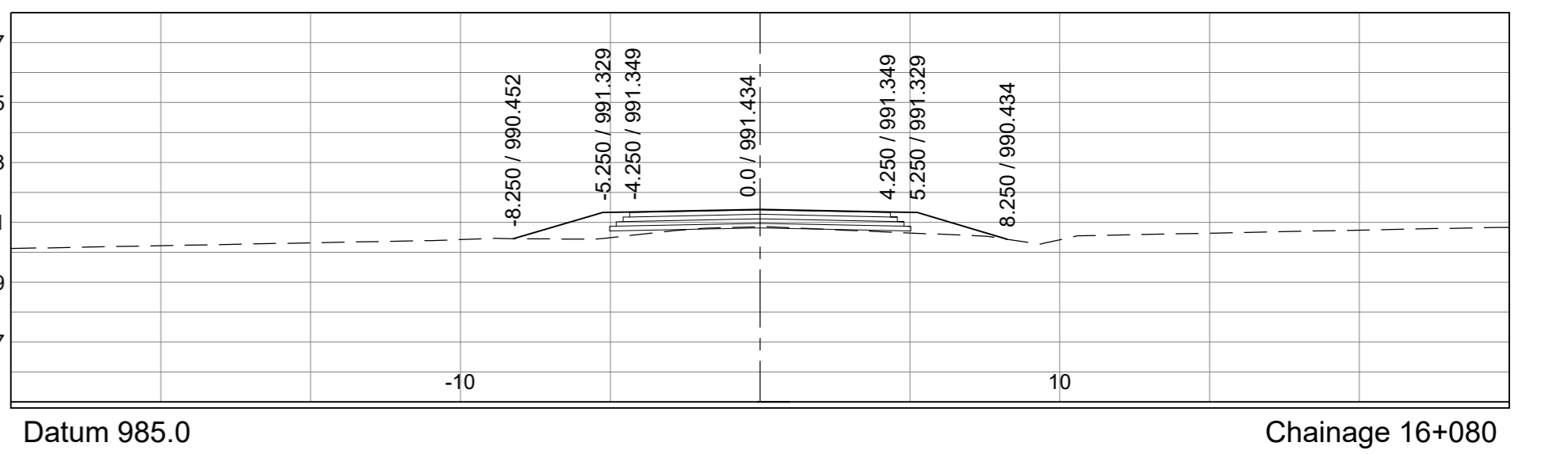
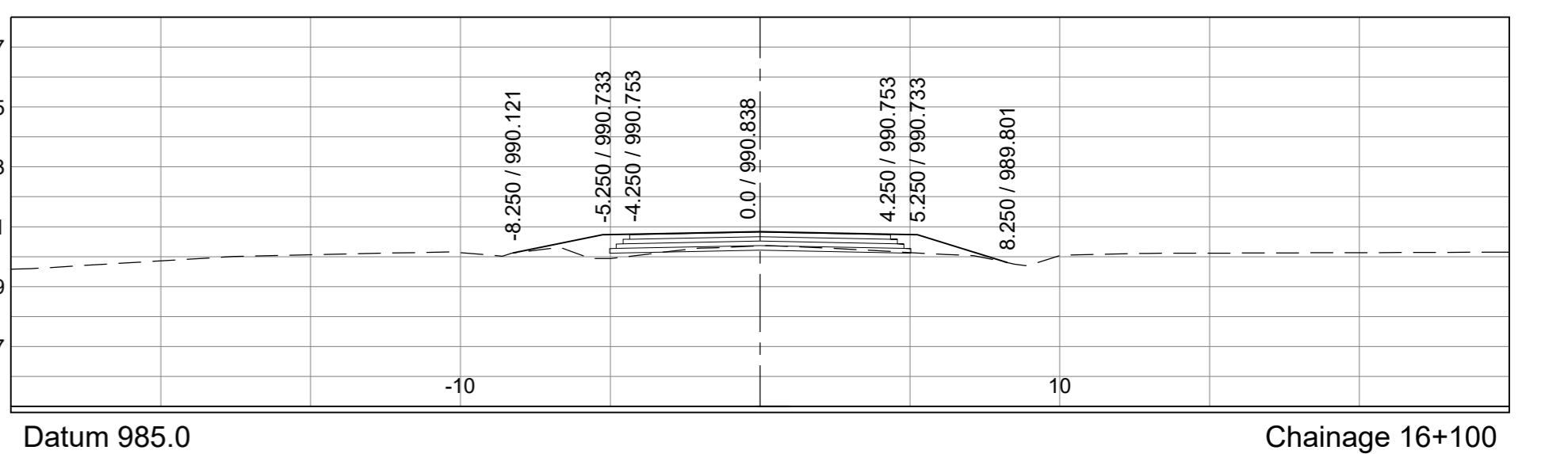
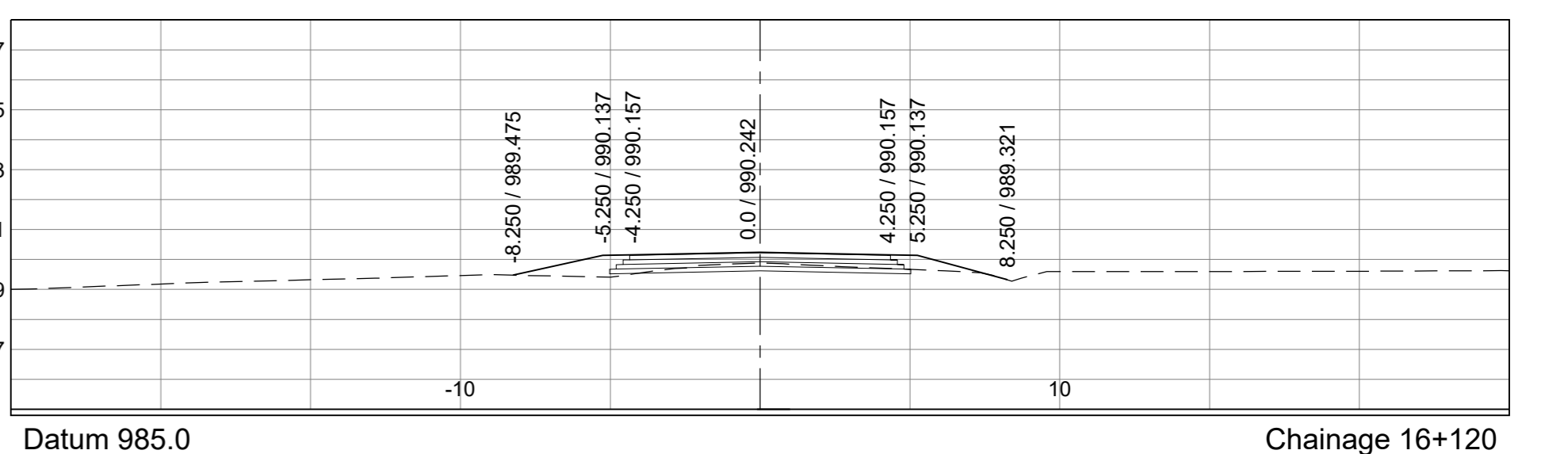
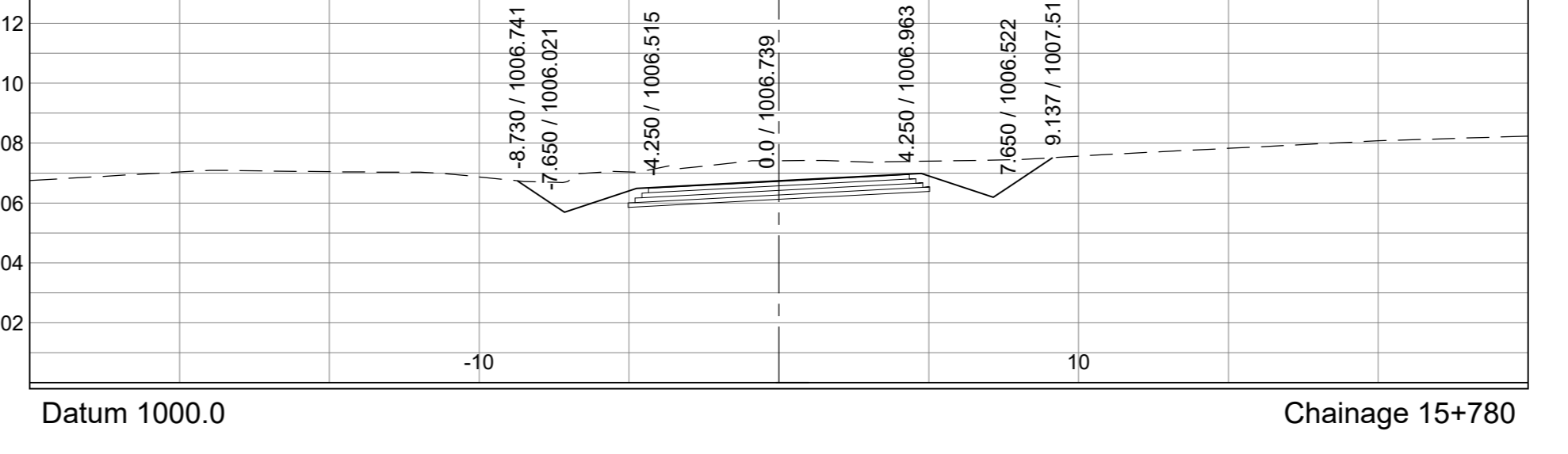
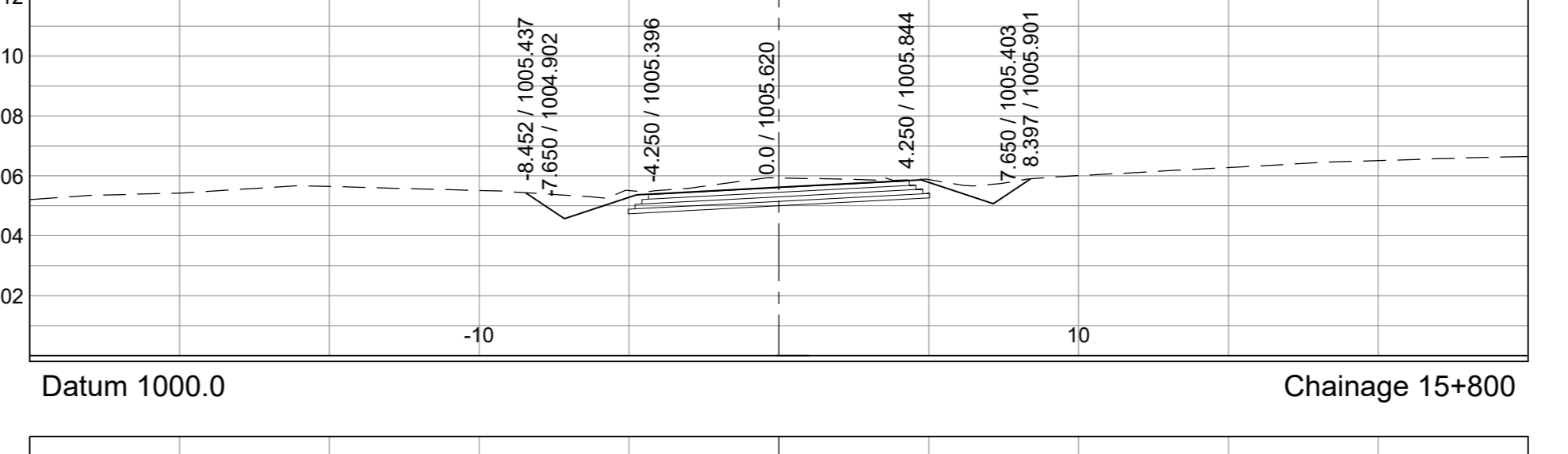
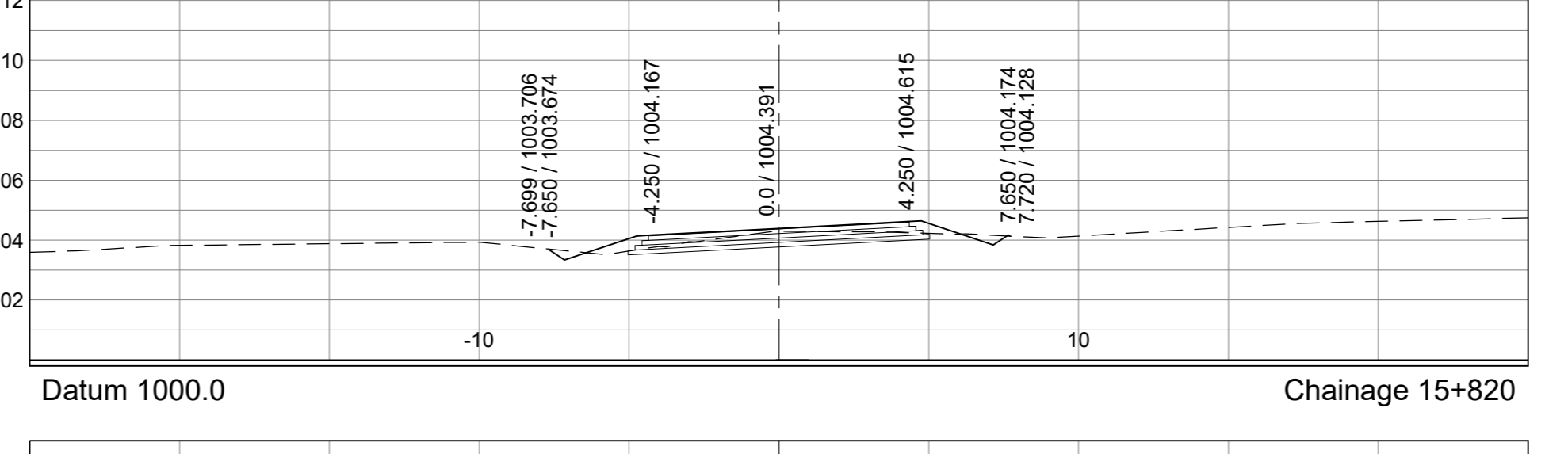
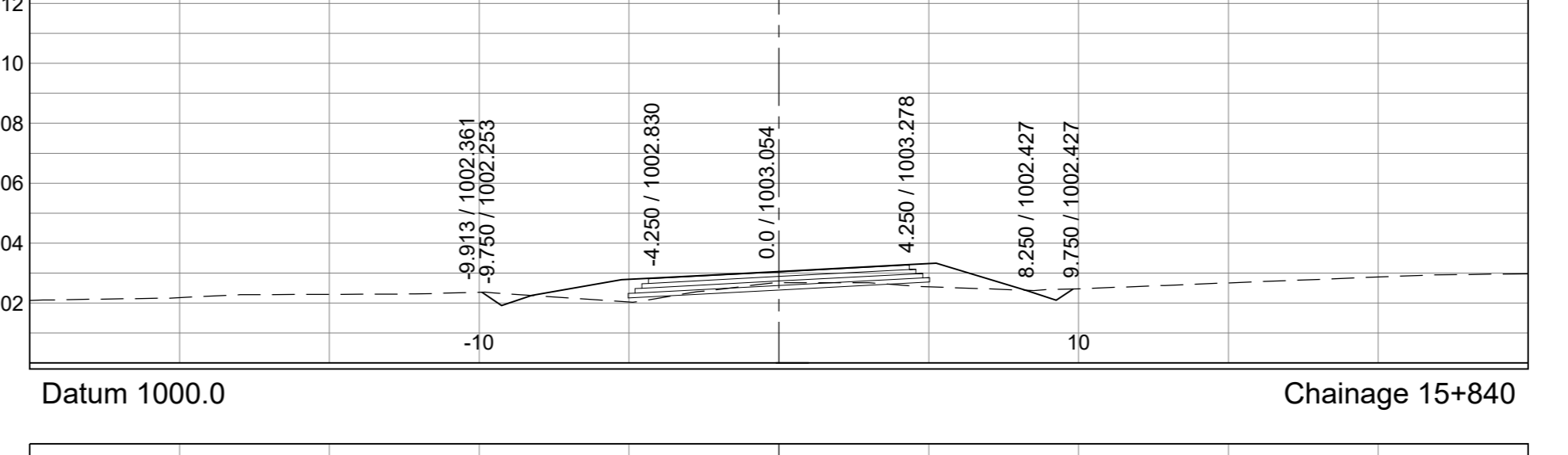
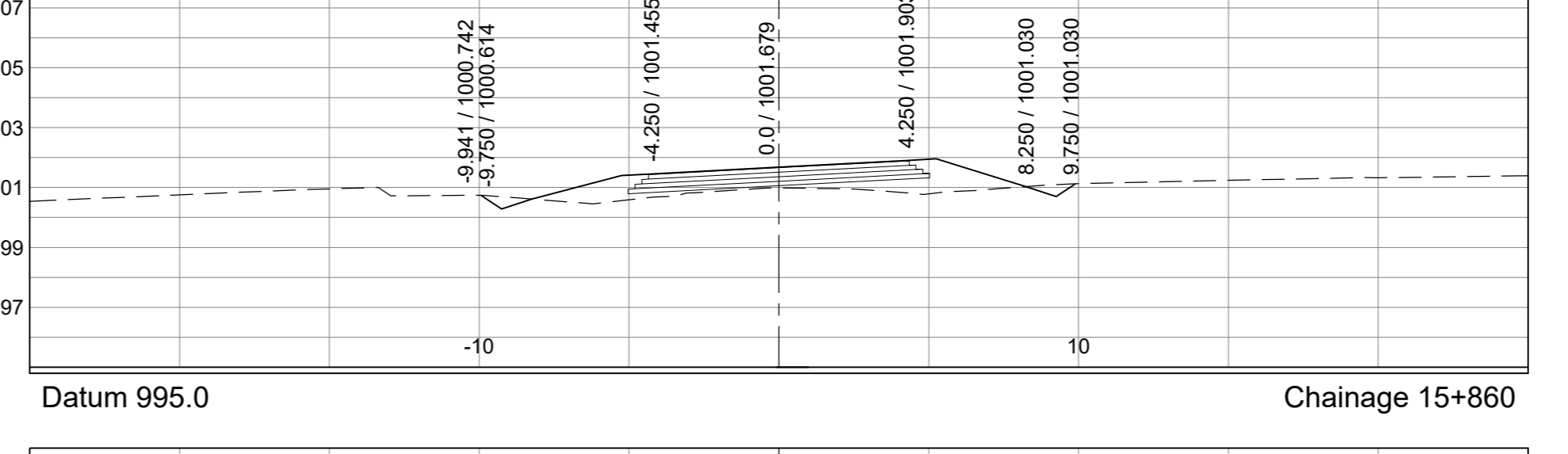
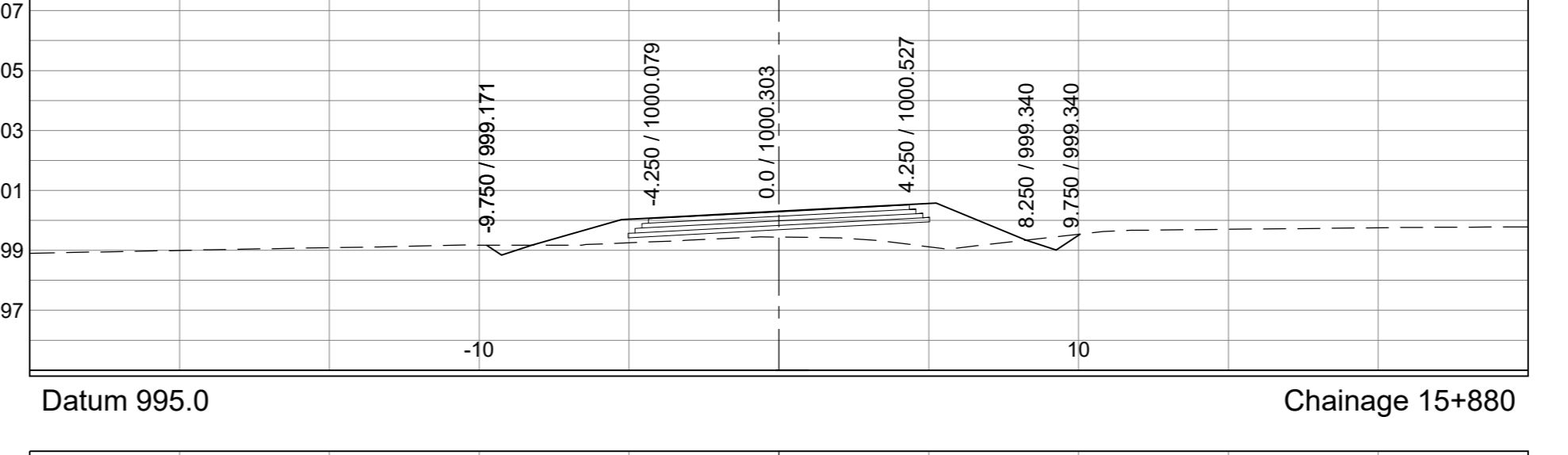
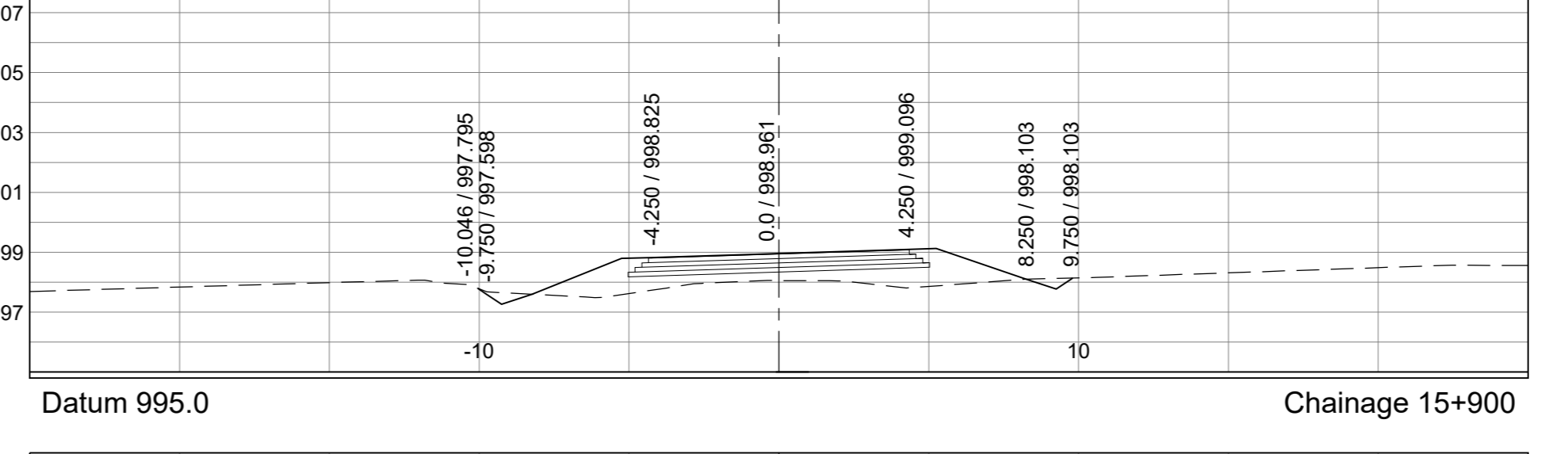
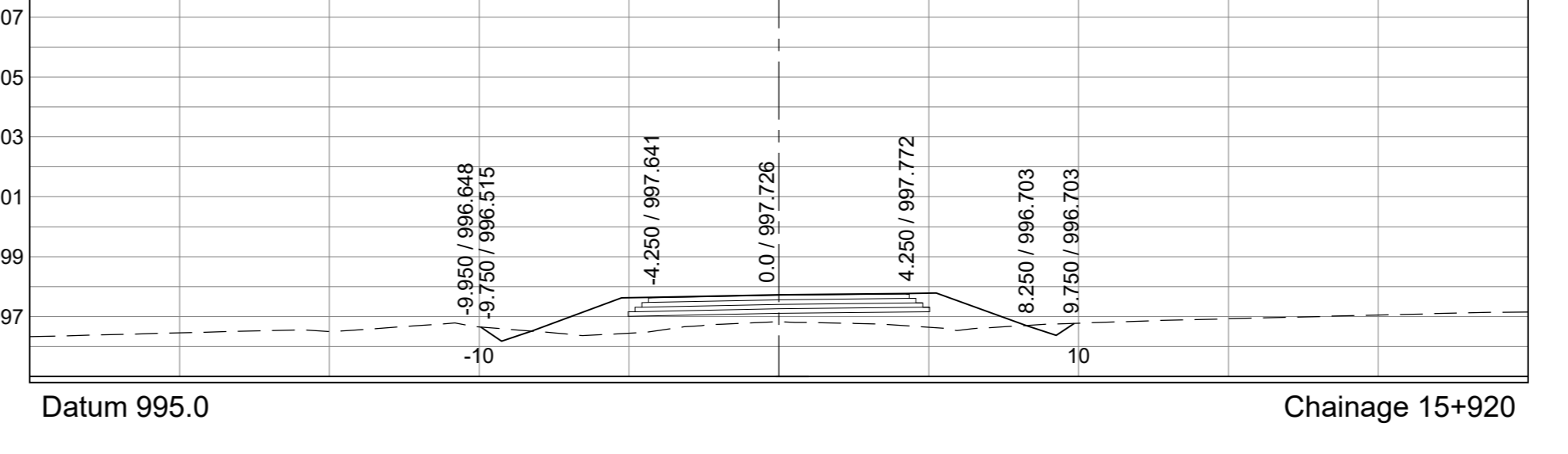
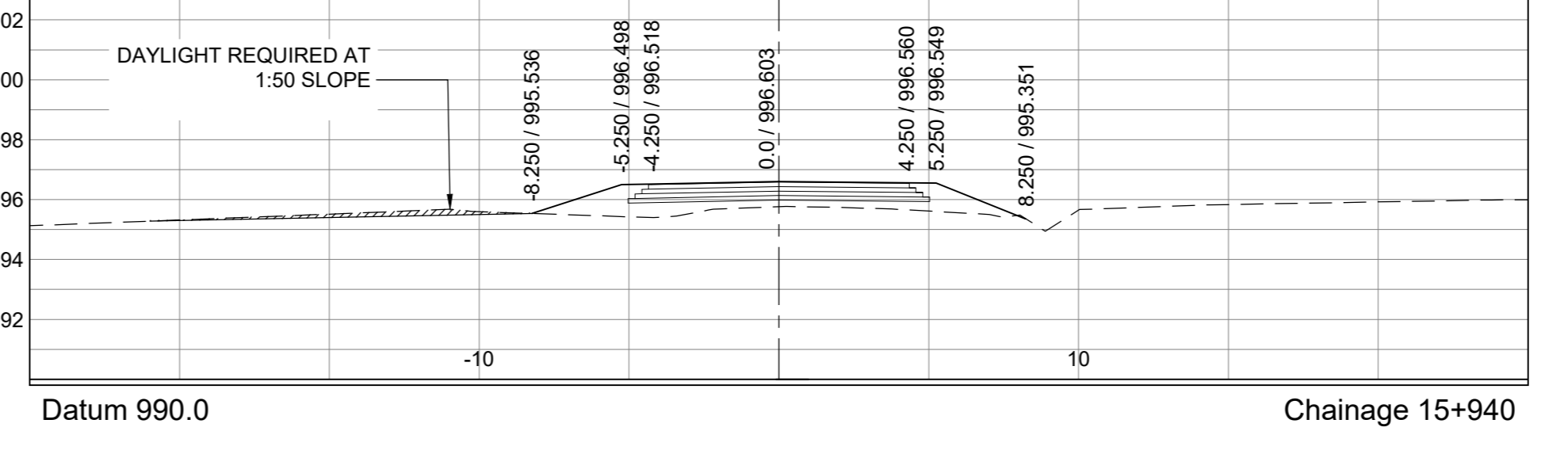
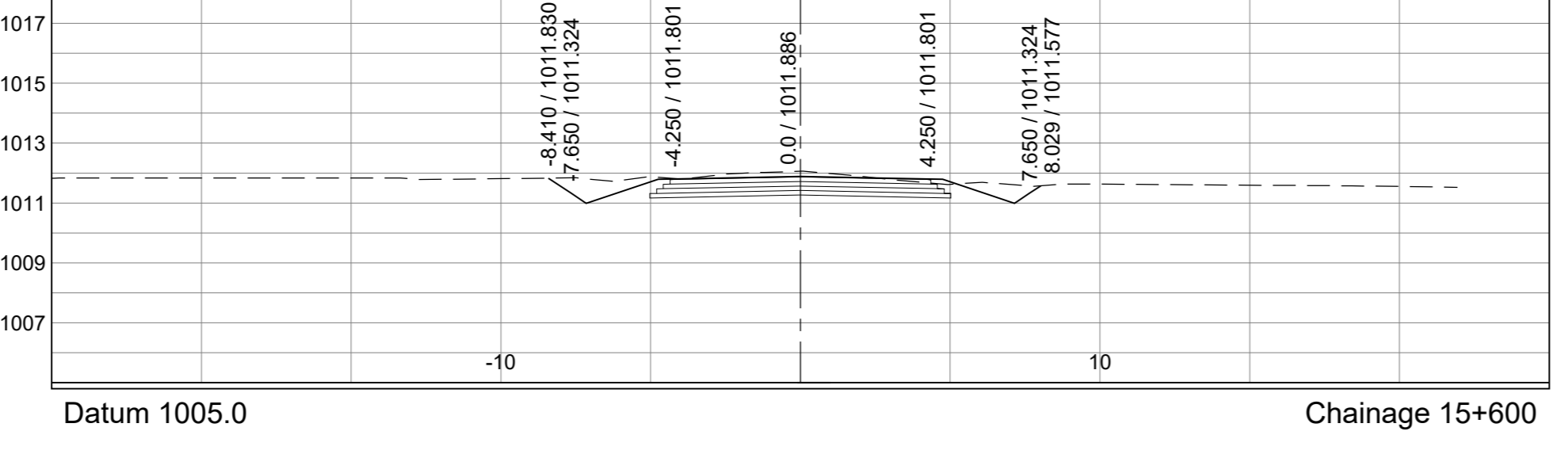
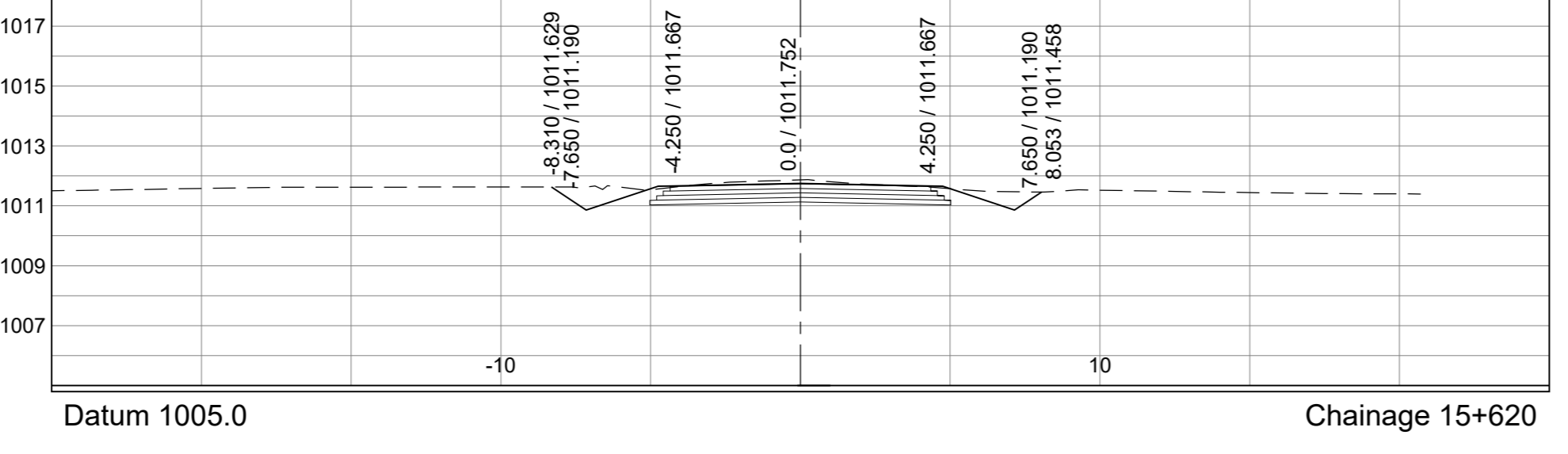
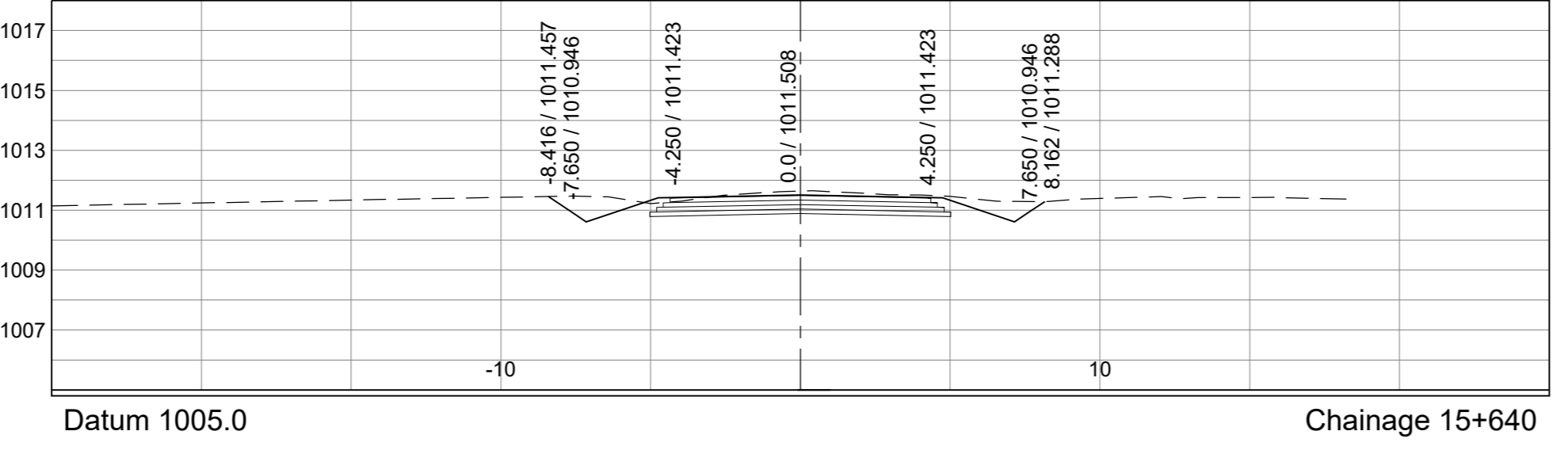
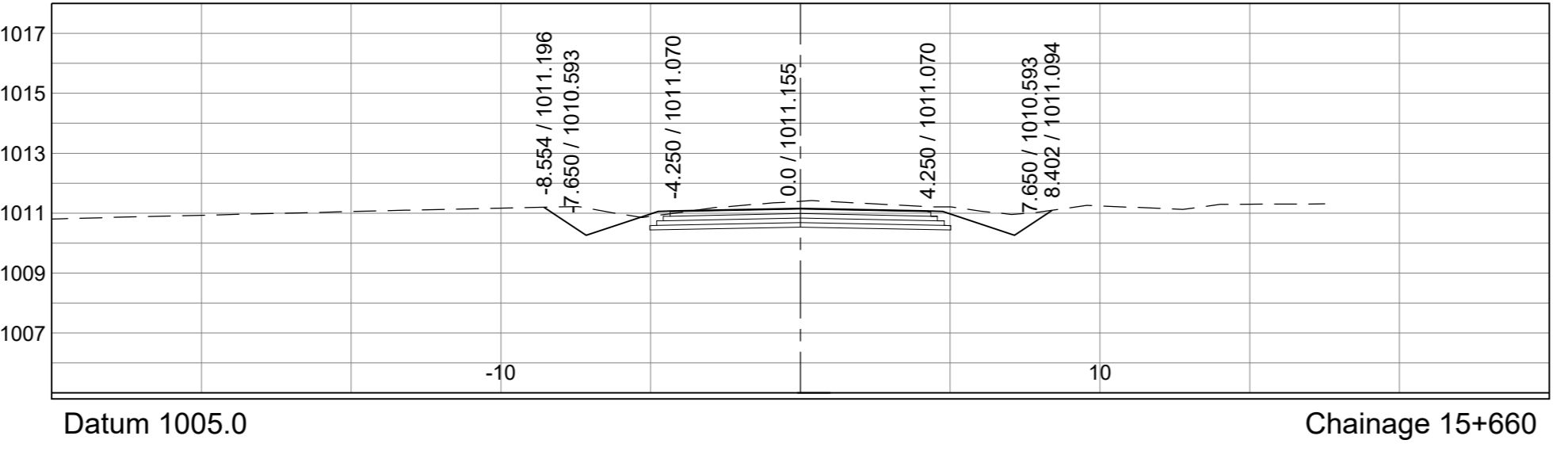
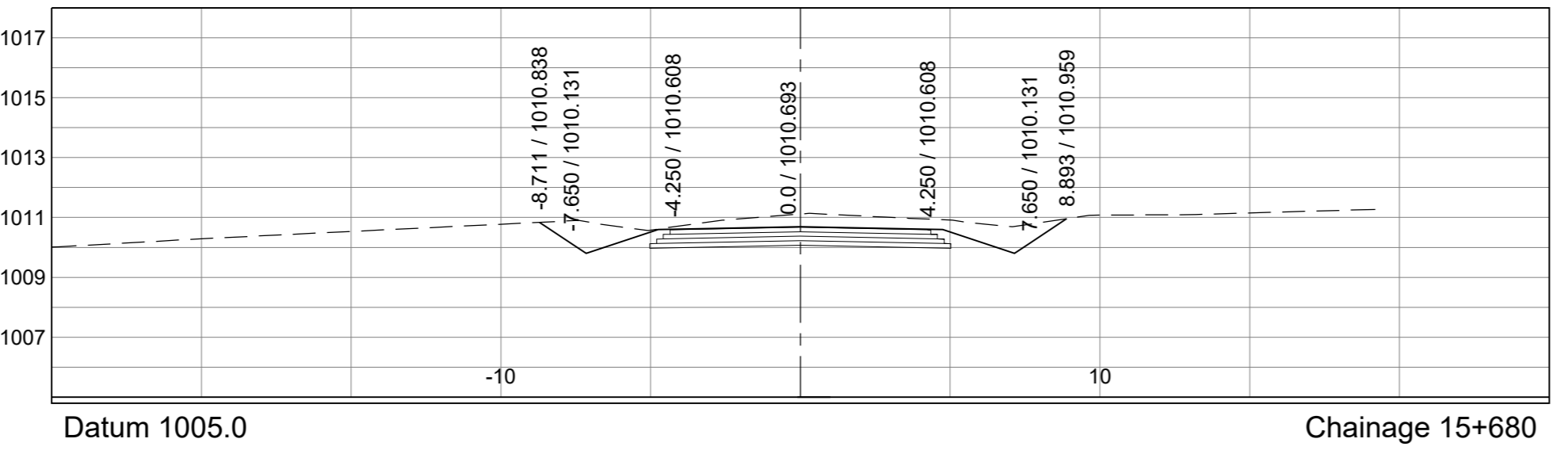
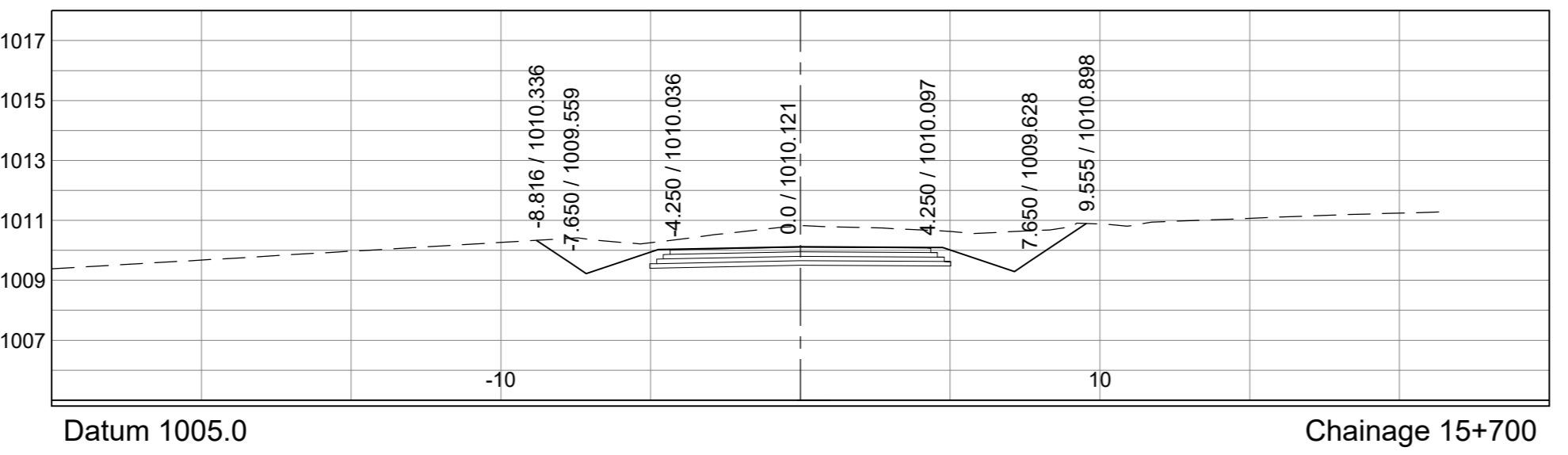
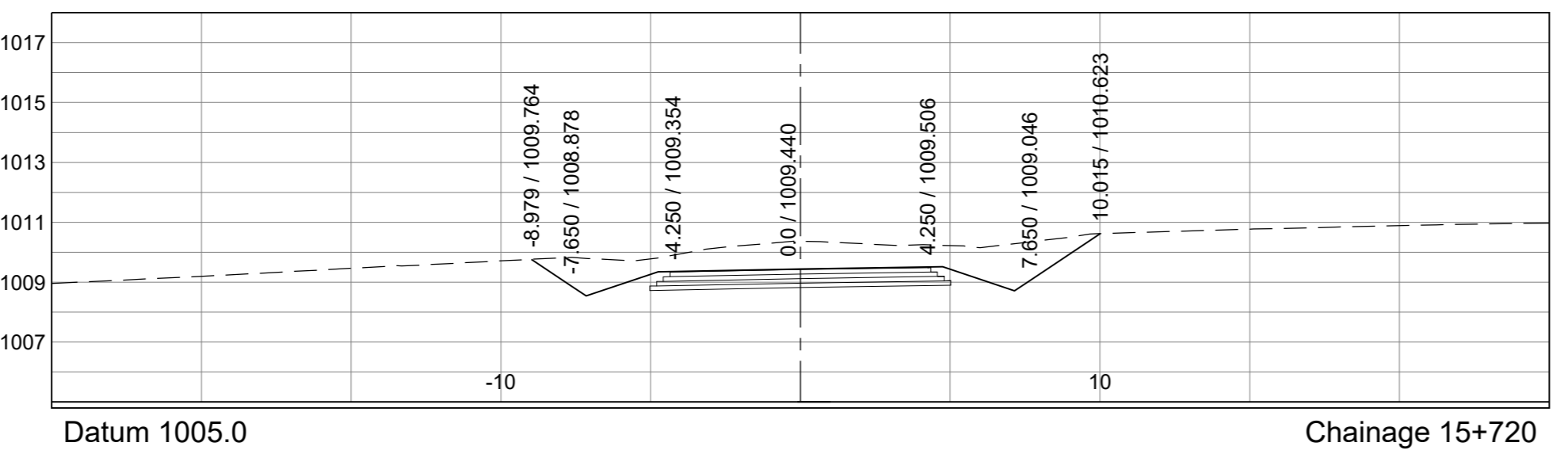
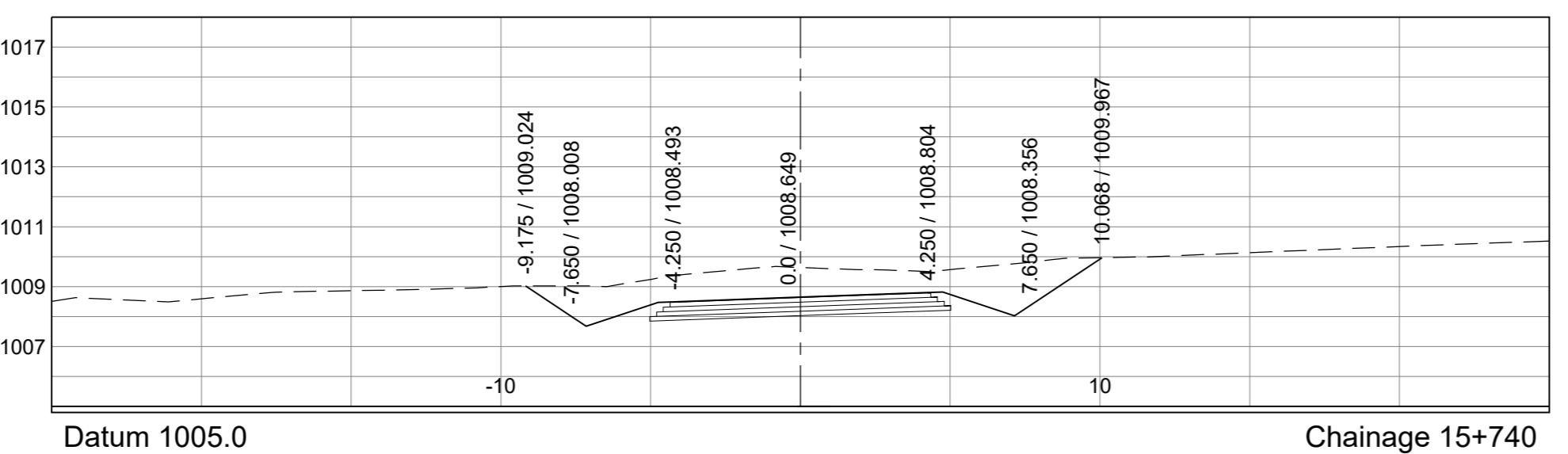
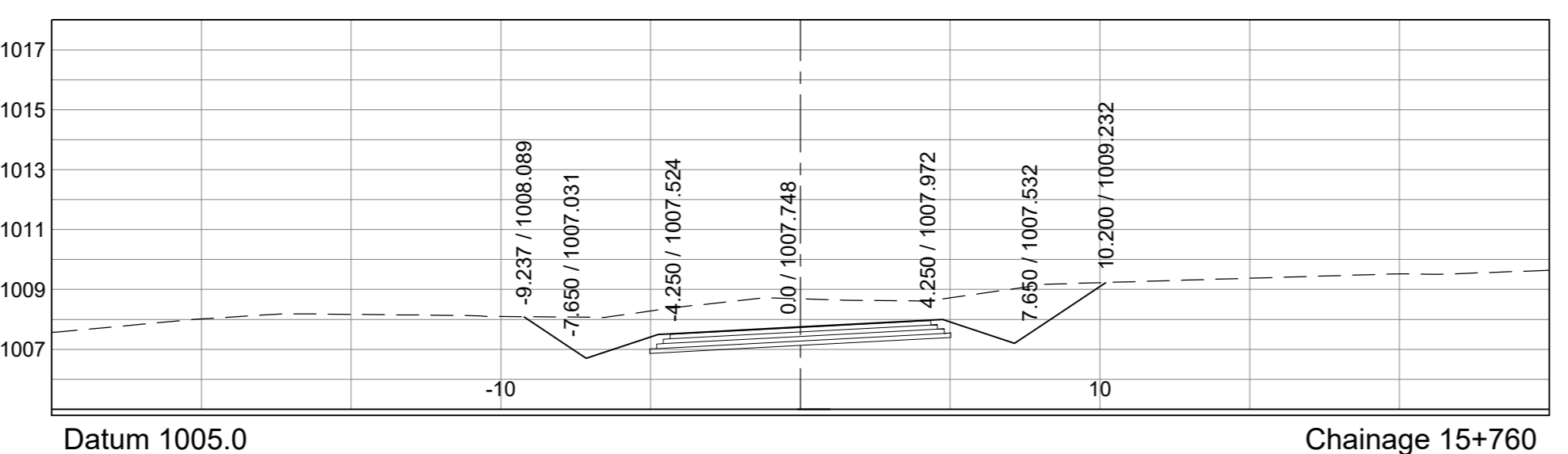
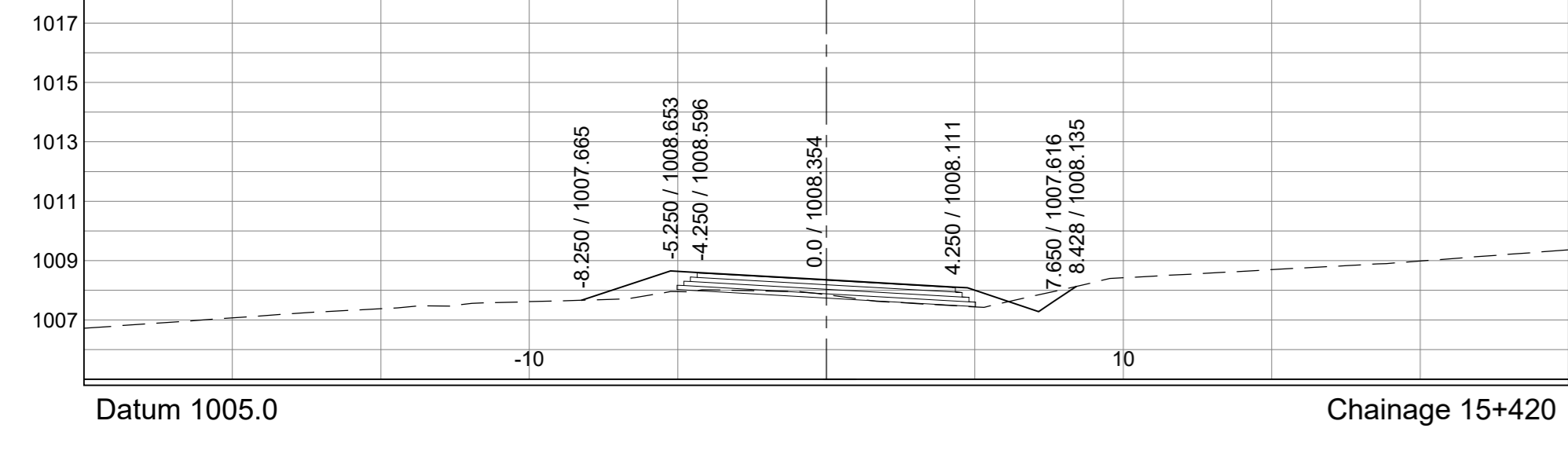
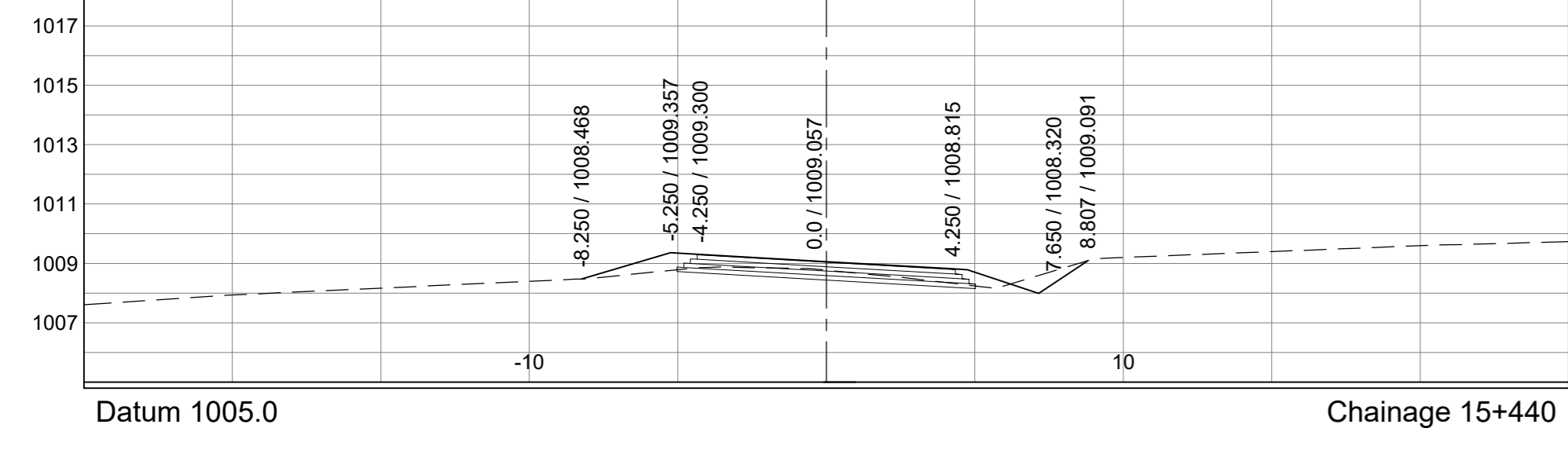
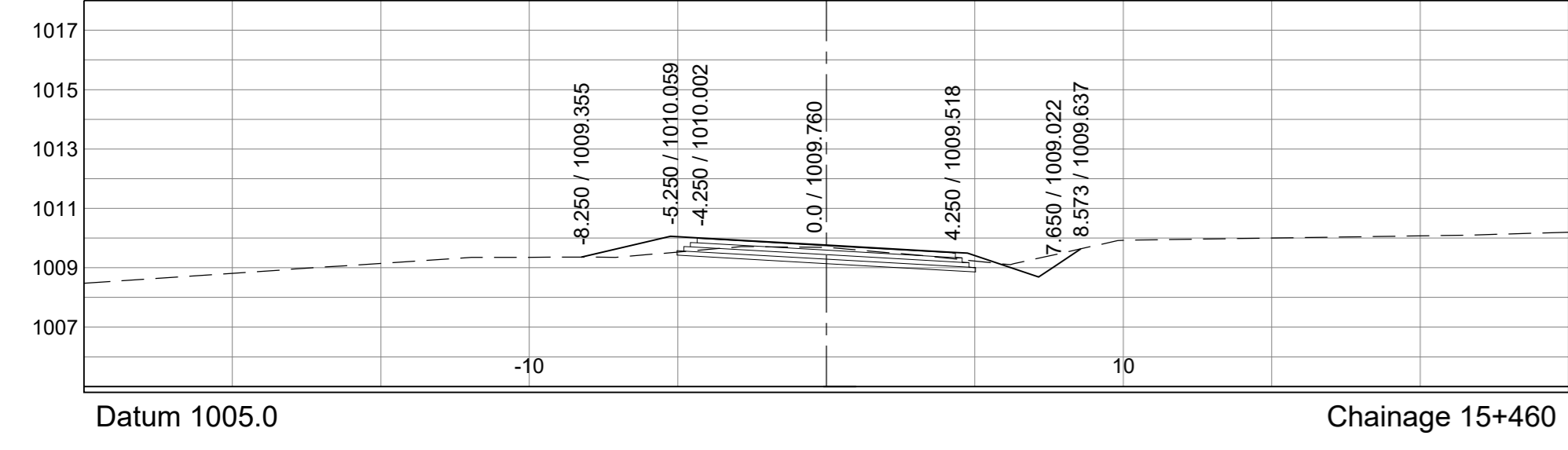
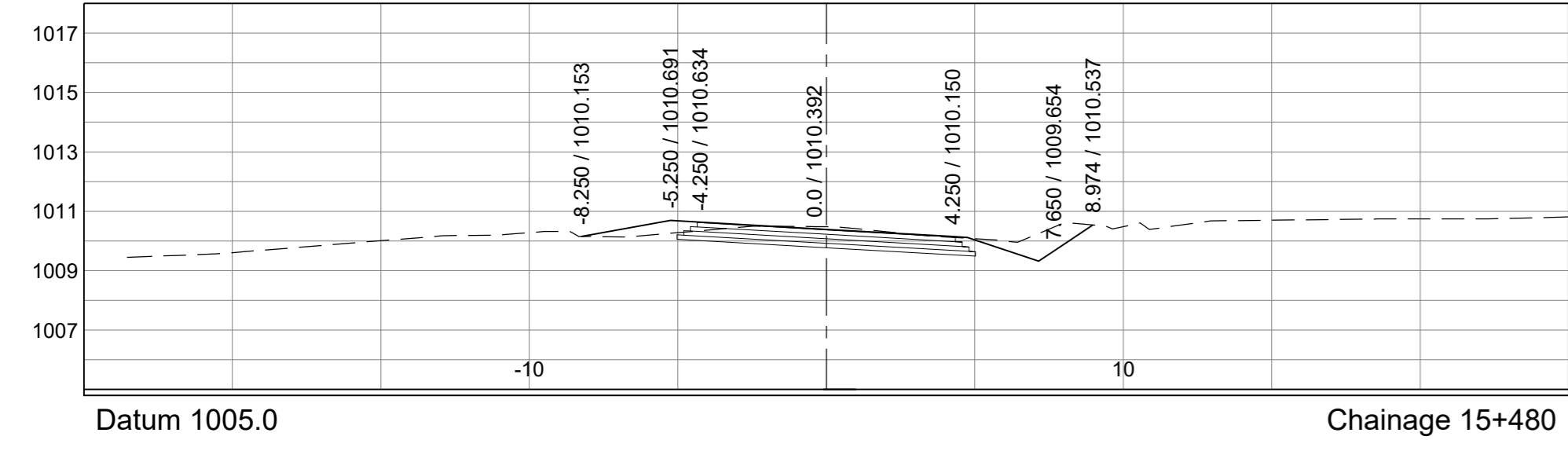
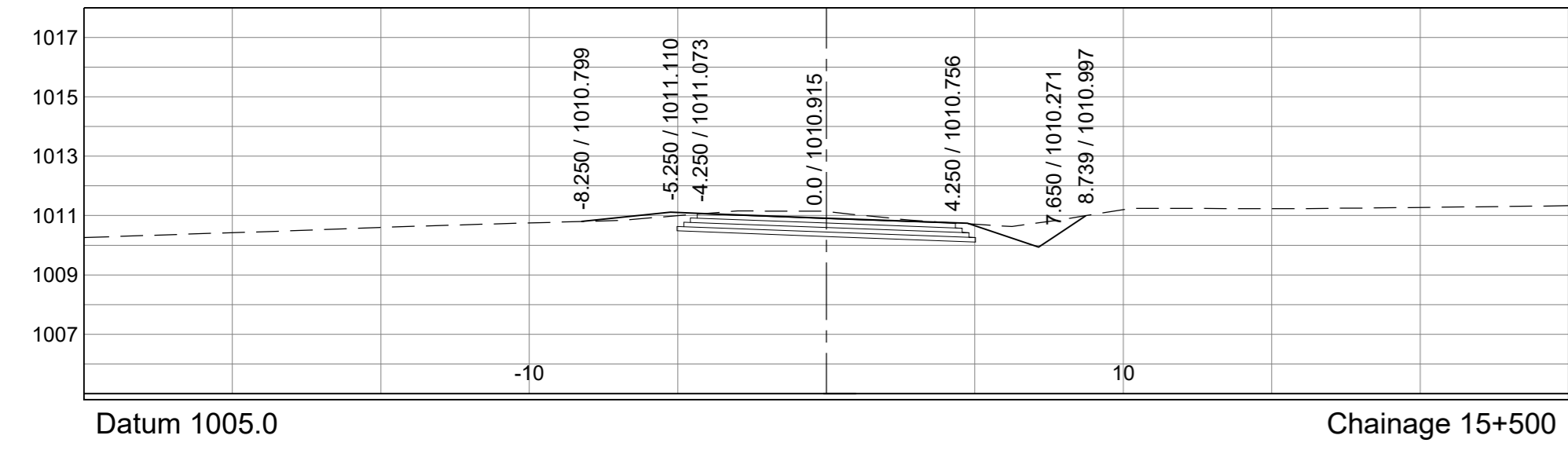
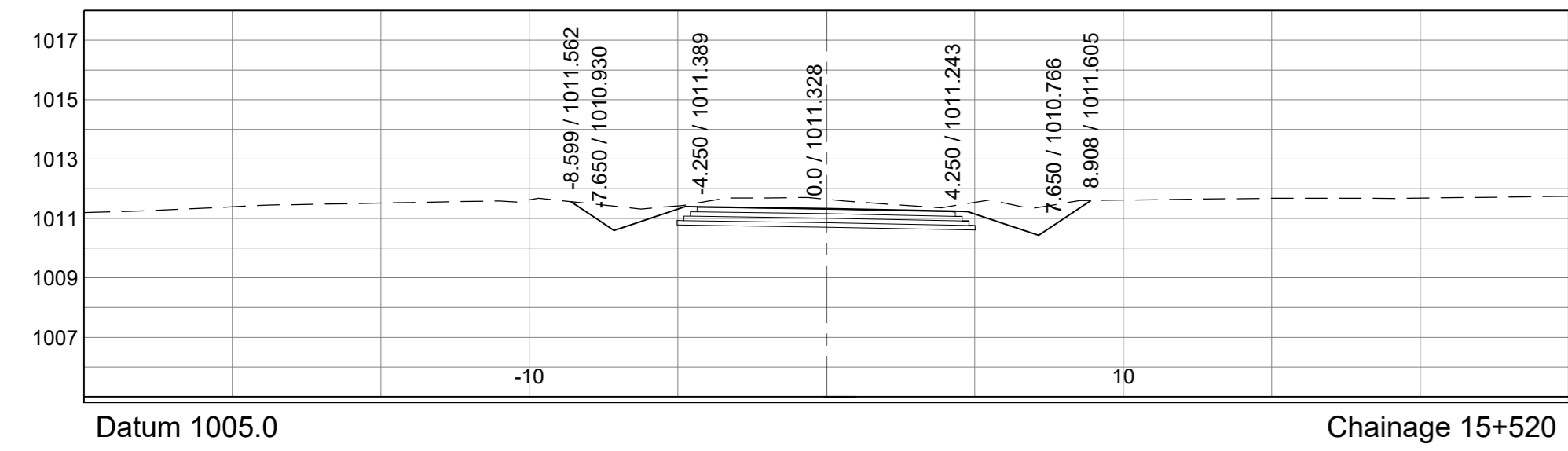
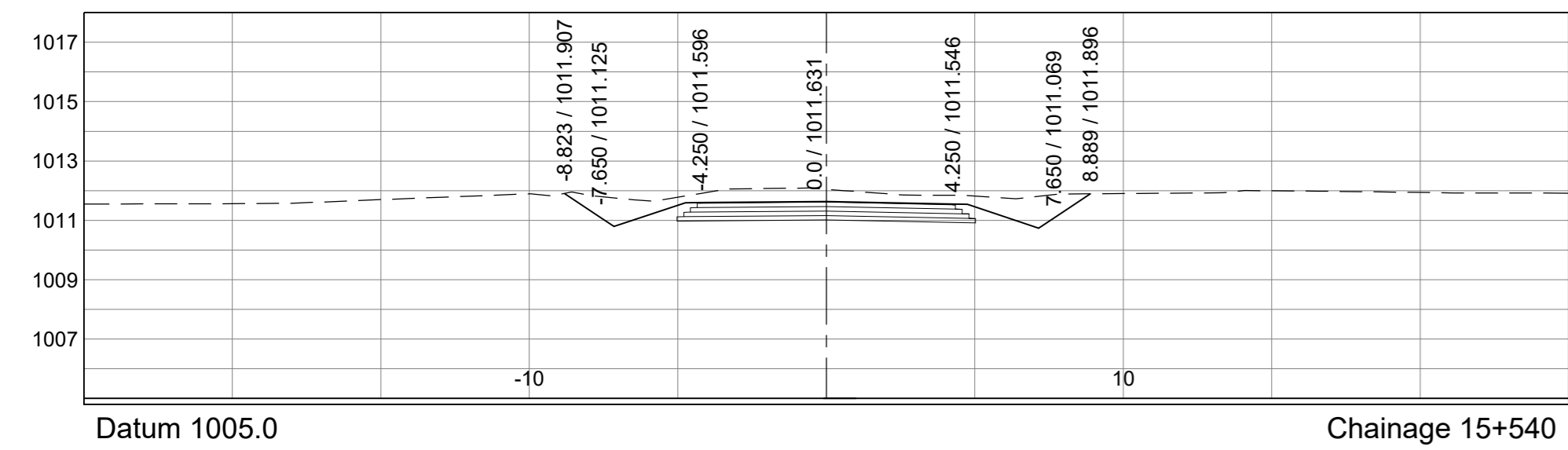
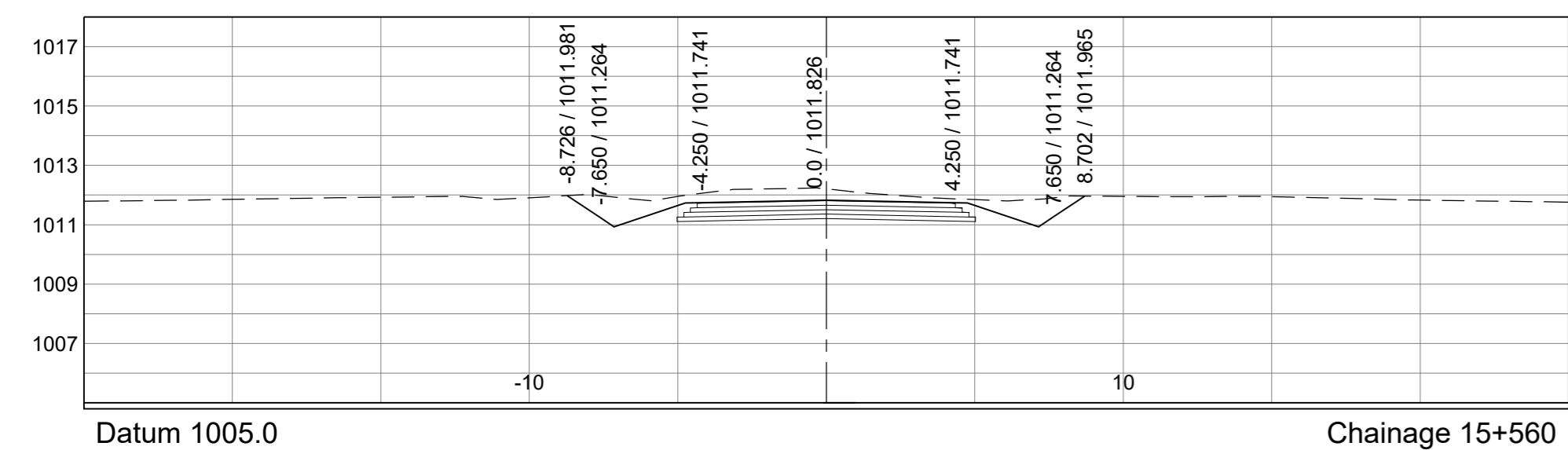
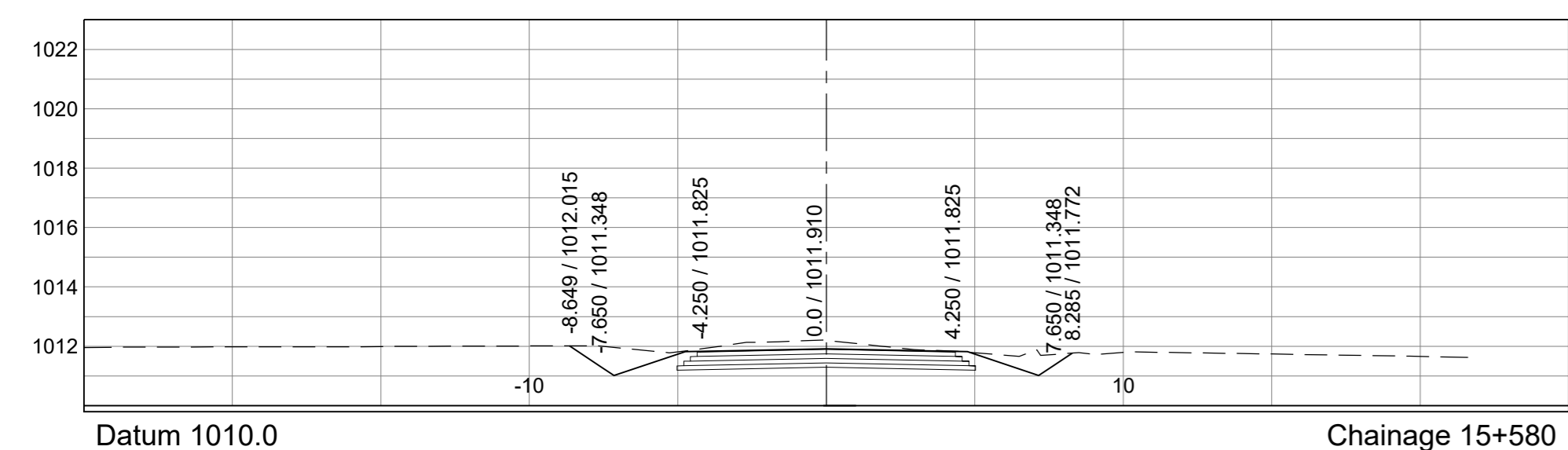
Designed by:-  
**emzansi**  
 ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 01-02-2024  
 Signature: \_\_\_\_\_ Date

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 7	REVISION:
km 14+720 - km 15+420	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		<b>C 44336</b>

C 44336





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44335	Designed by:-	T. PIKA
Continued on:-	C 44337	Checked by:-	Y. DOMA
Cross Section No:-	C 44336	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44318	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

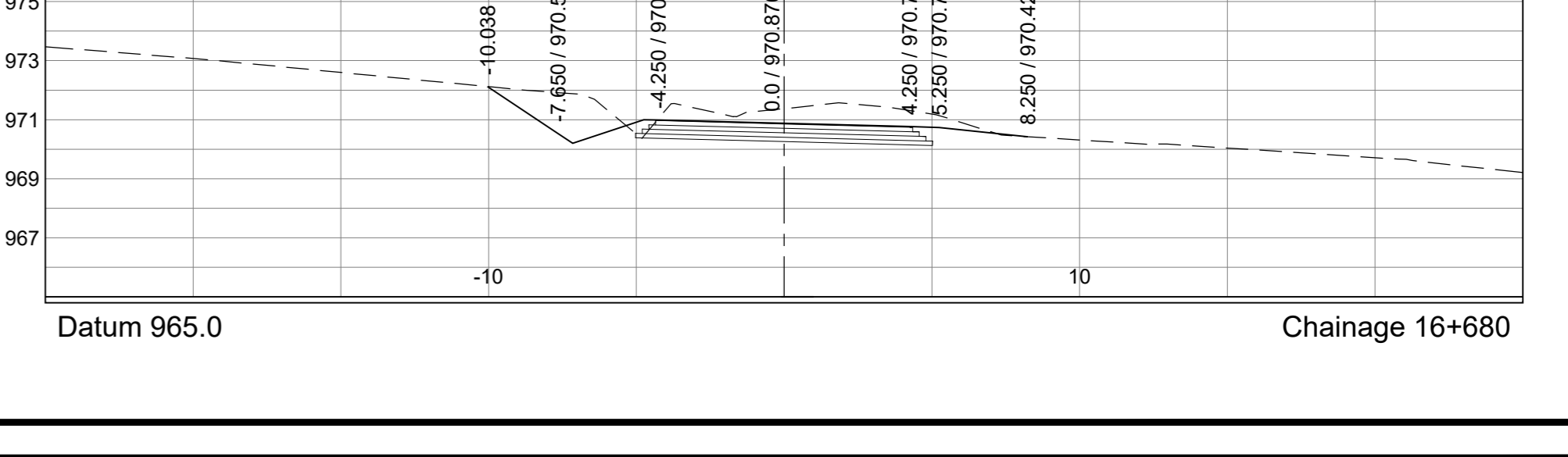
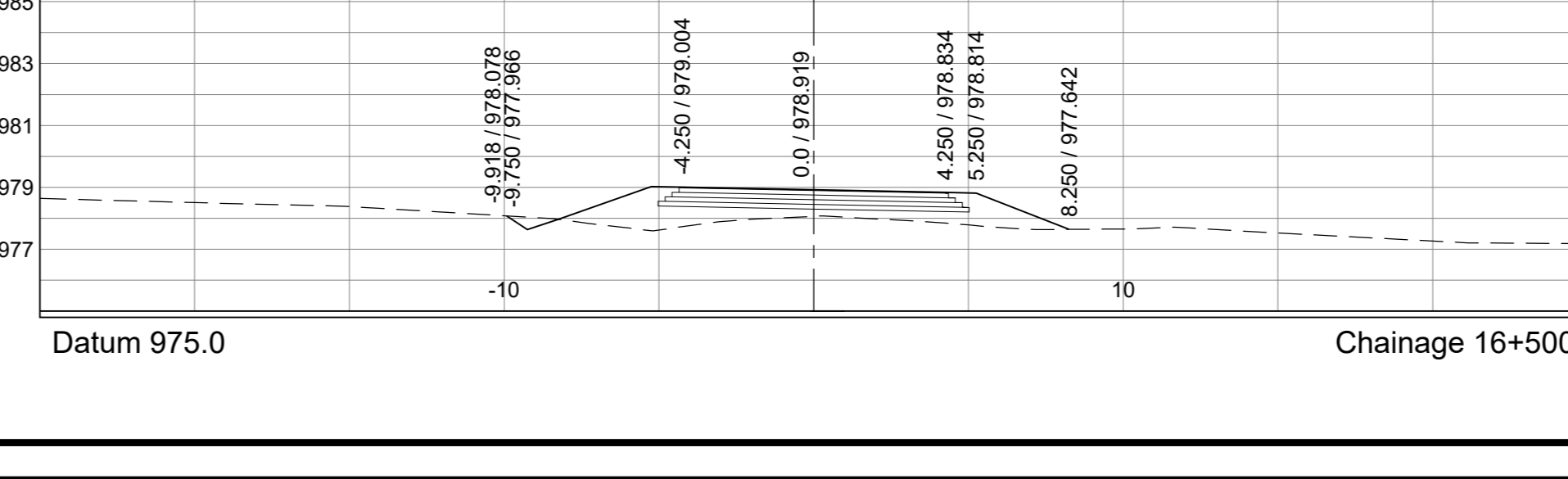
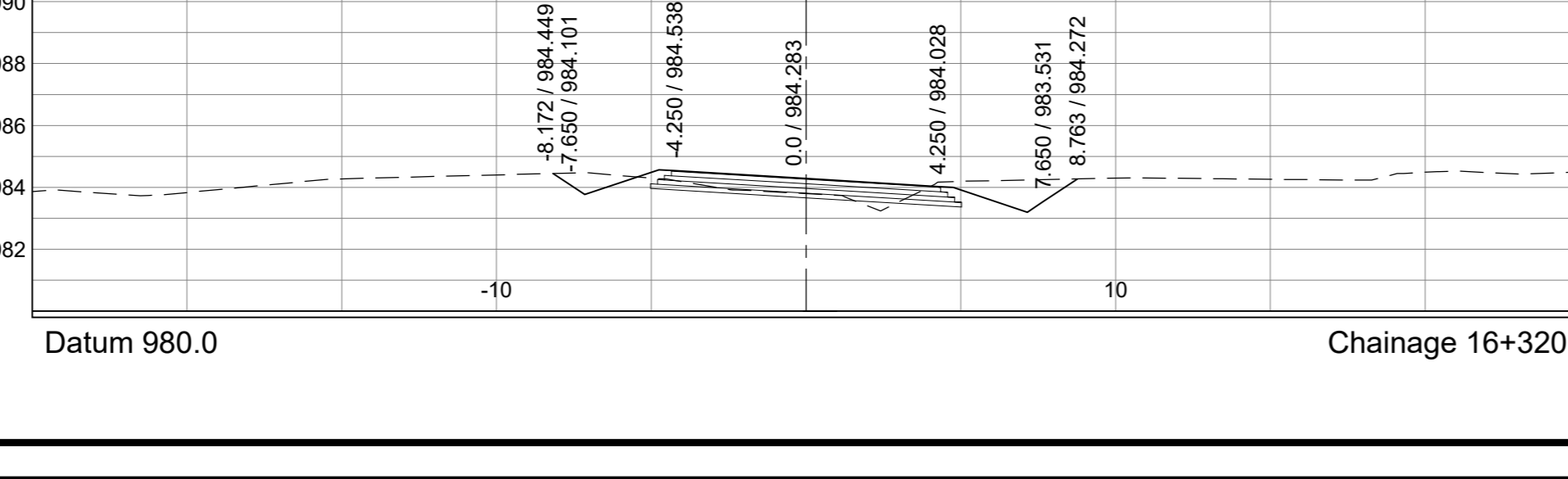
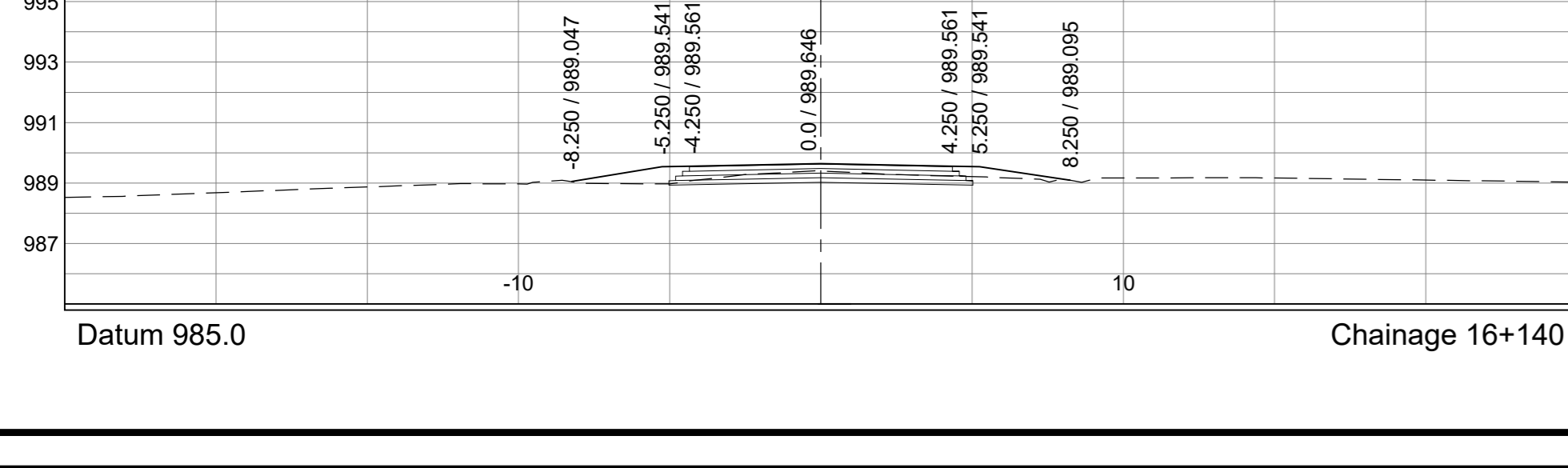
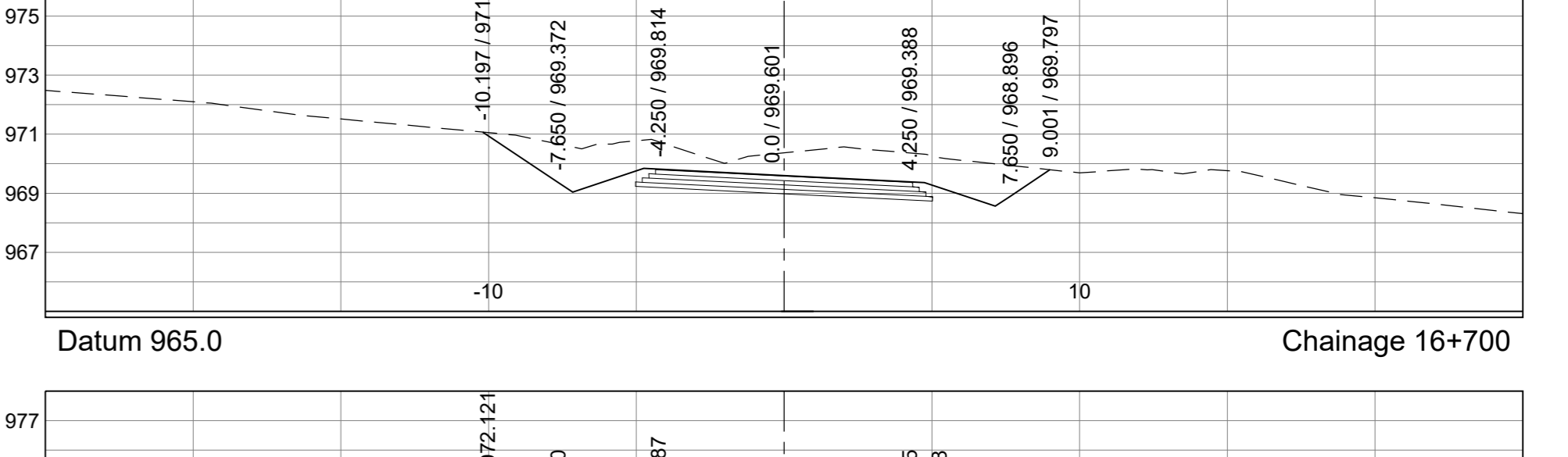
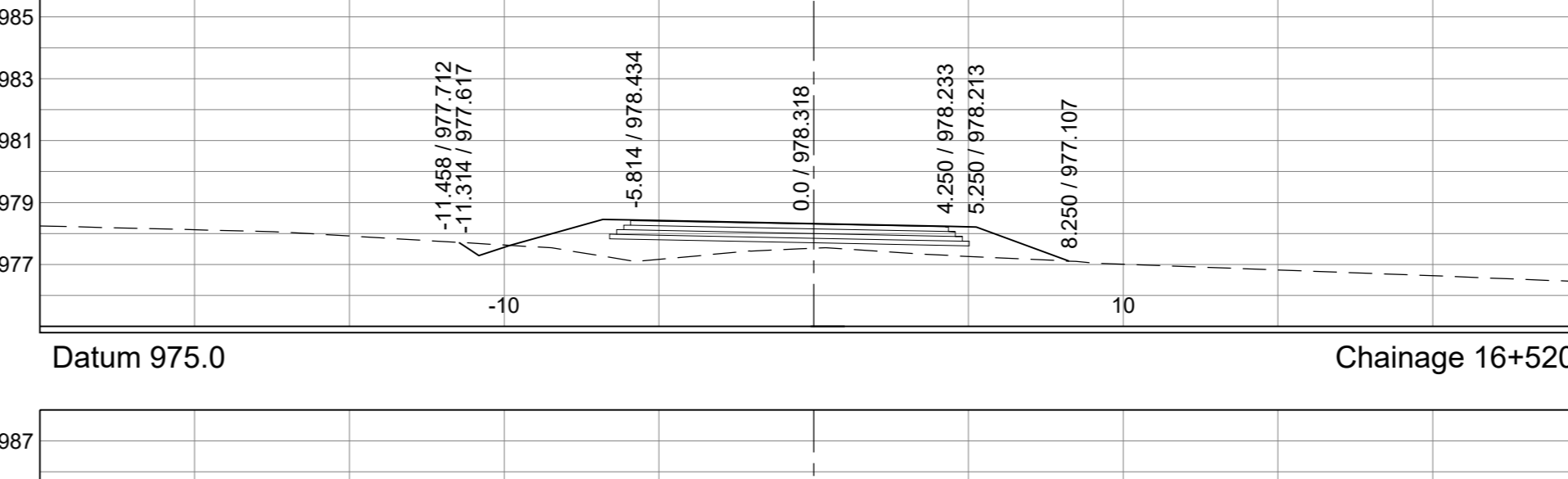
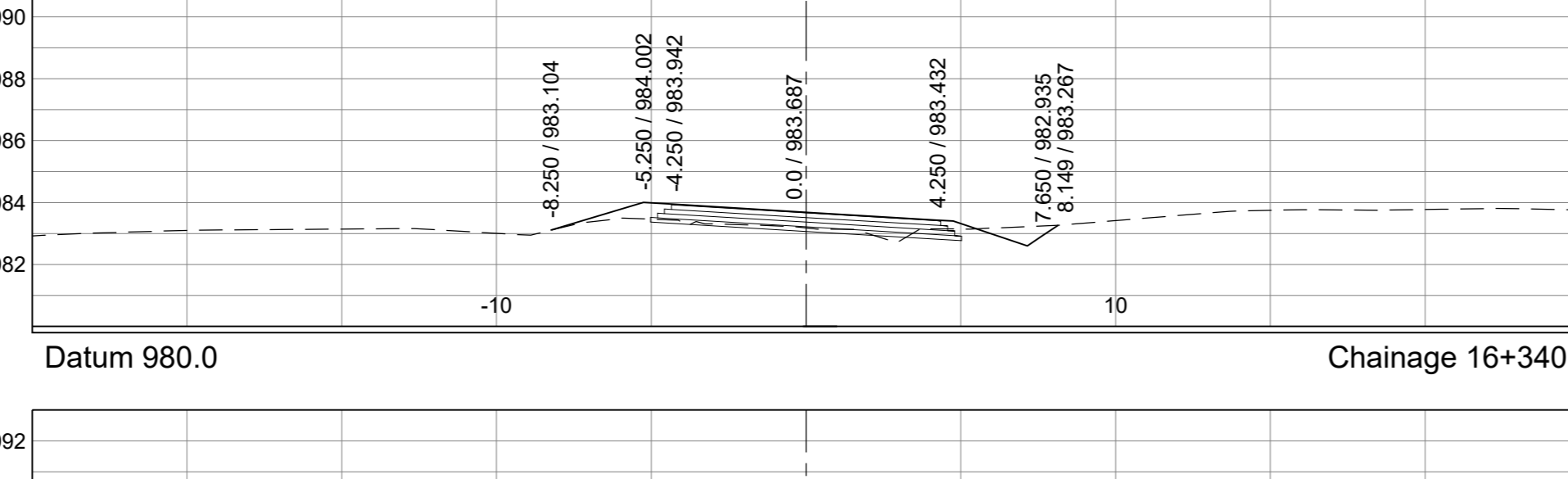
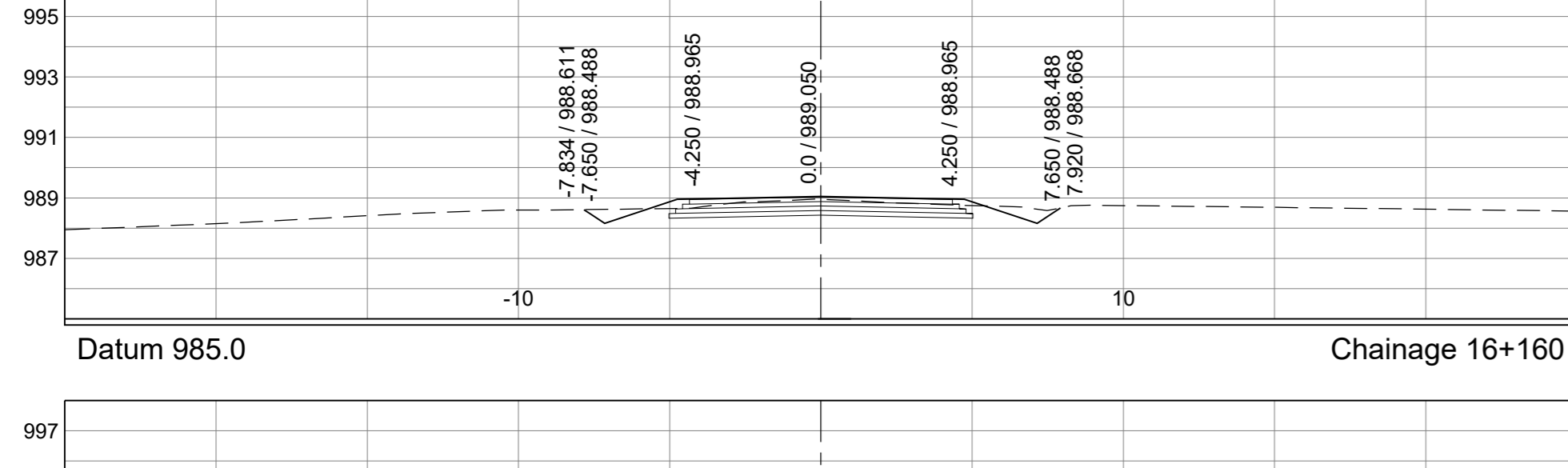
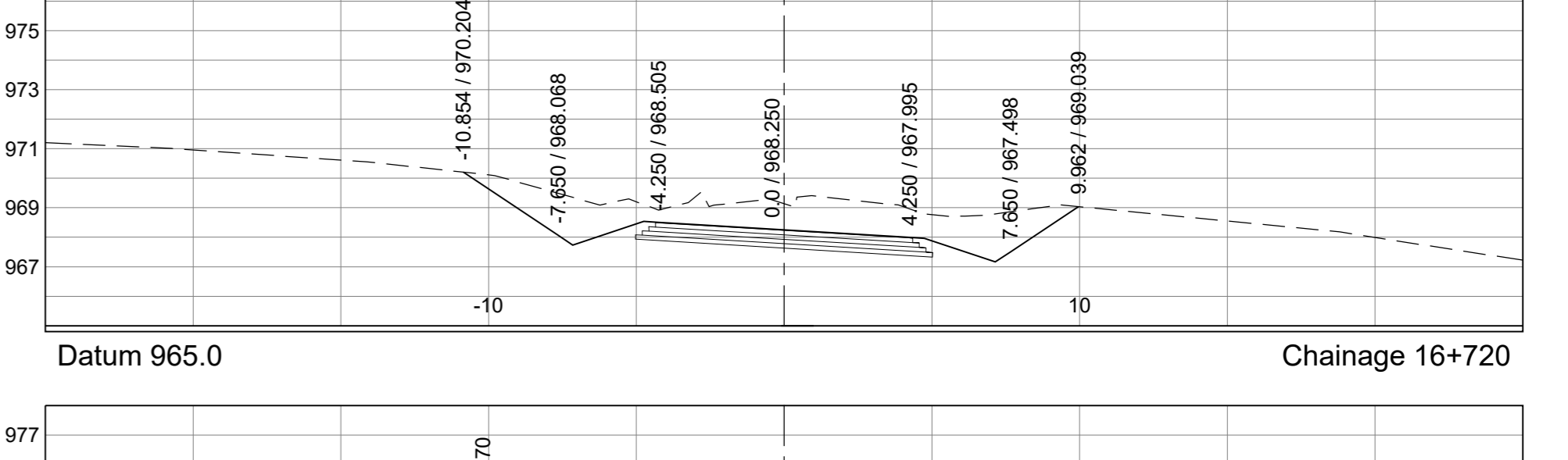
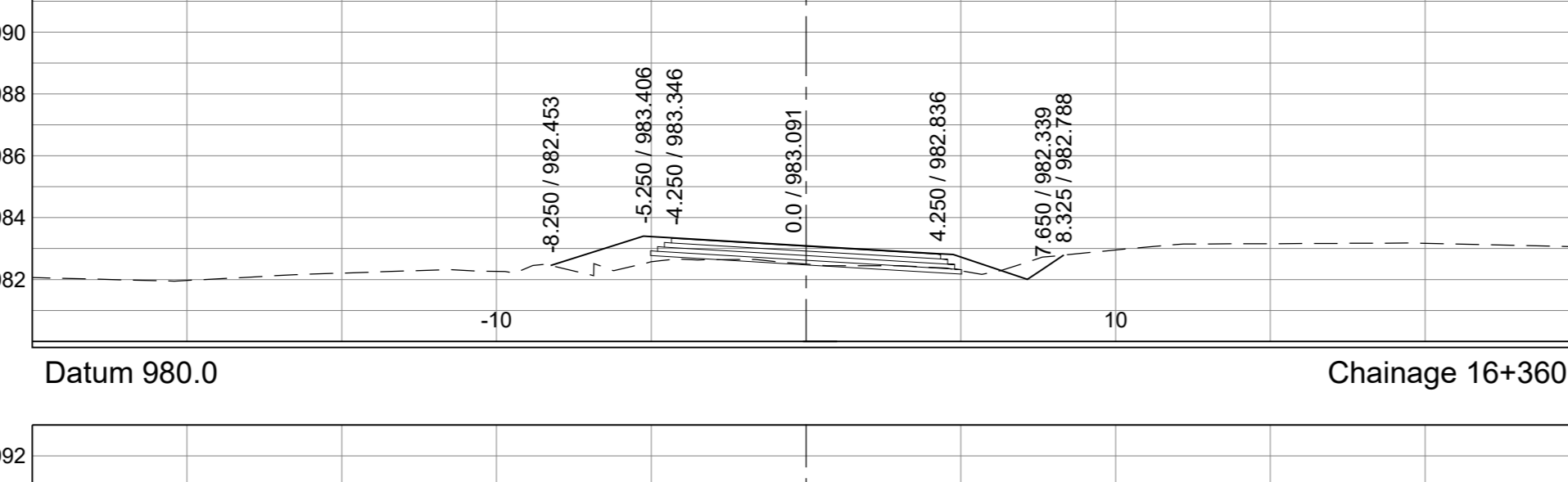
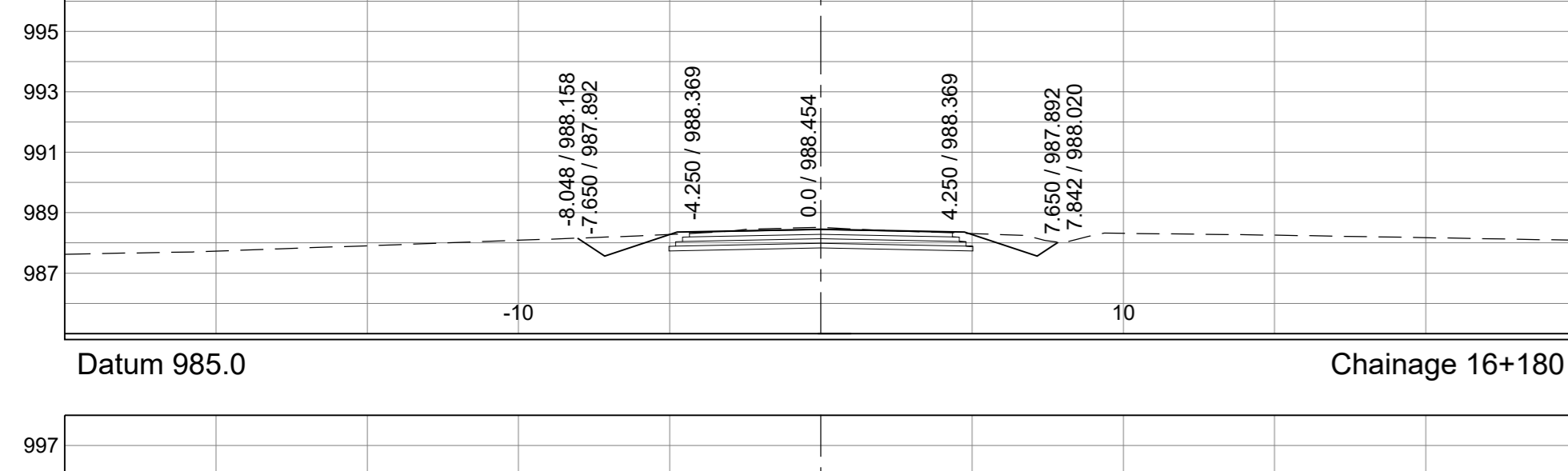
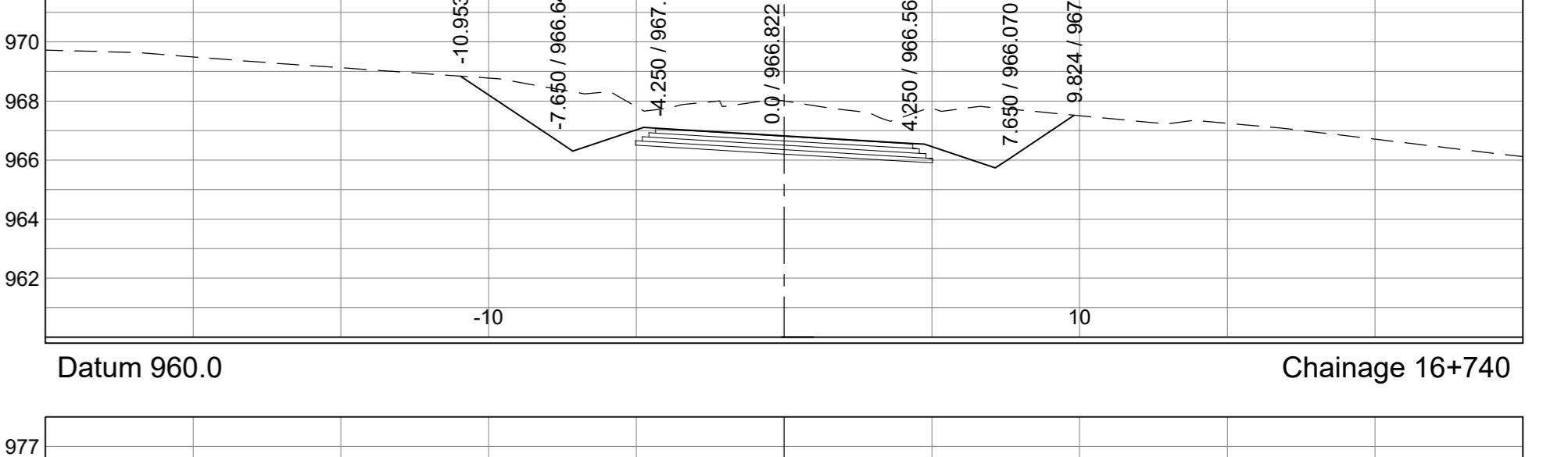
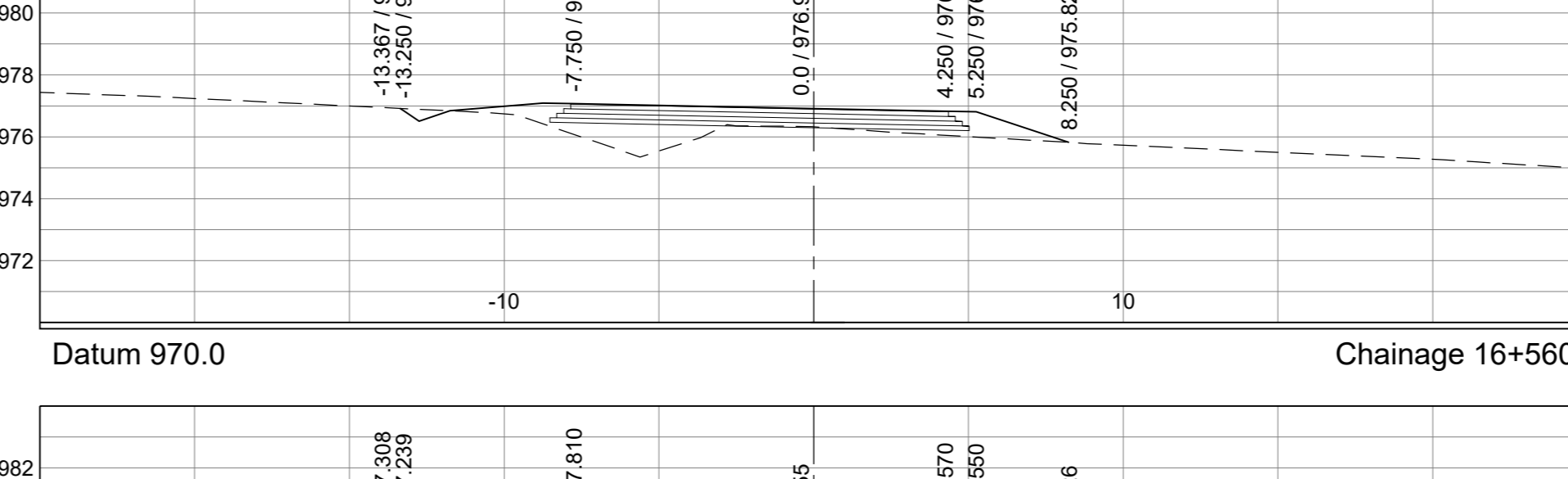
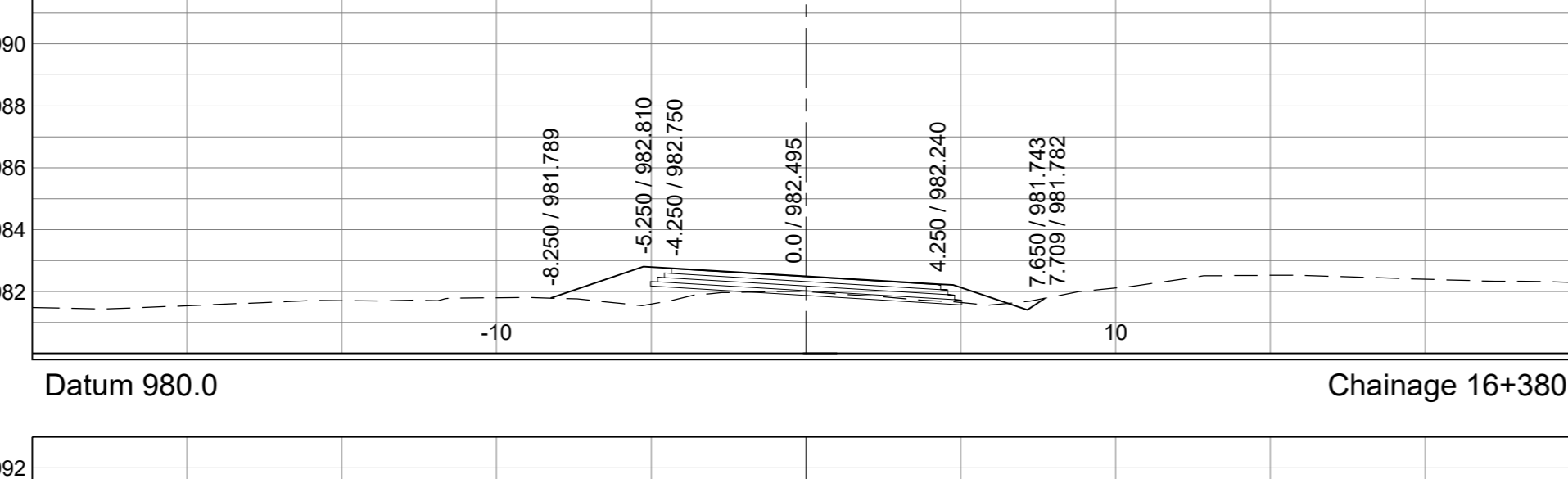
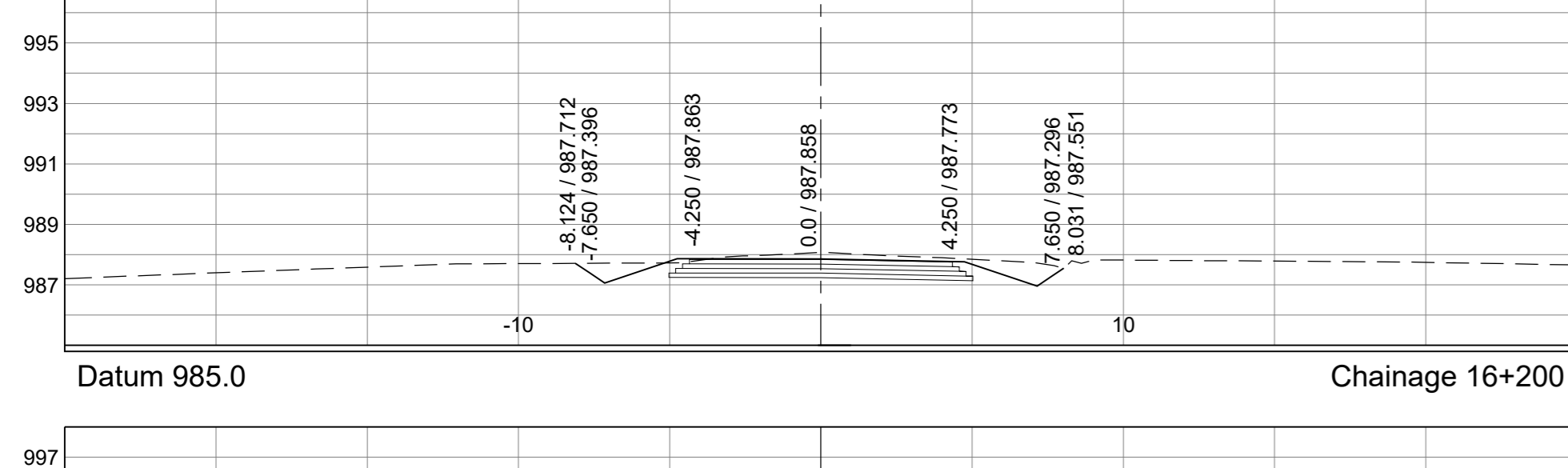
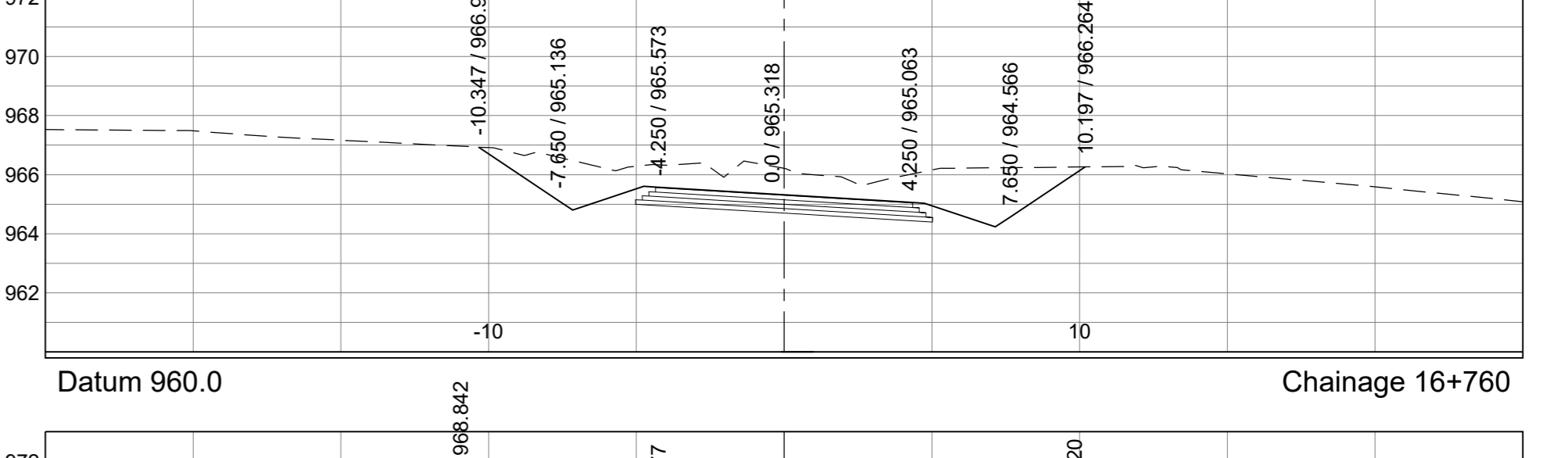
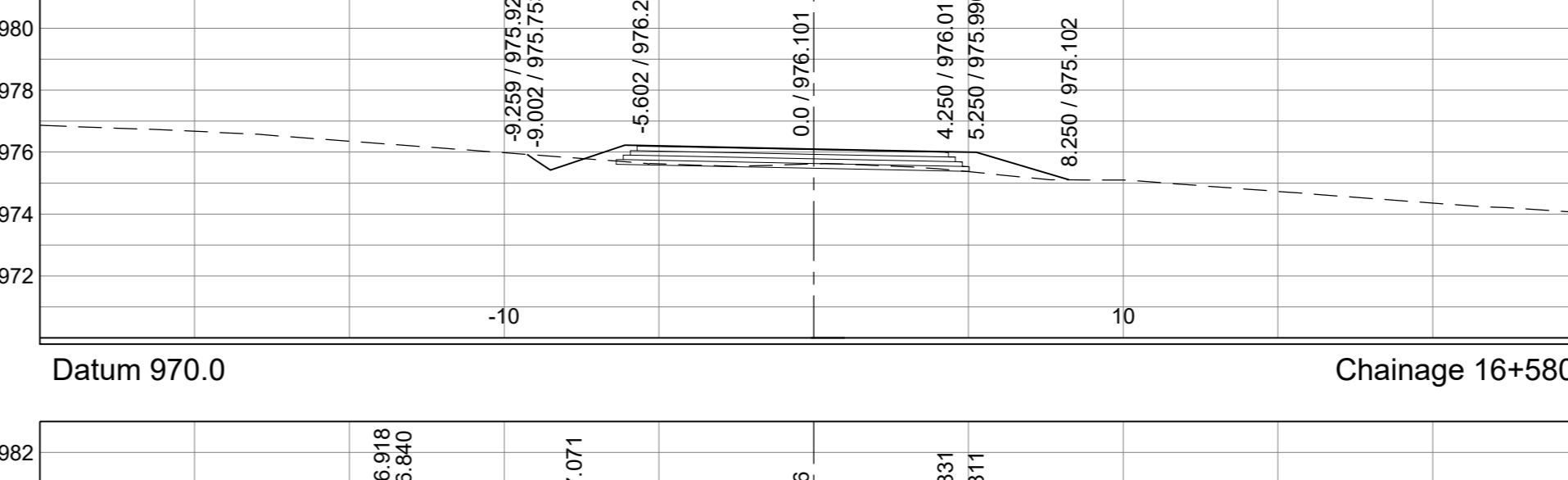
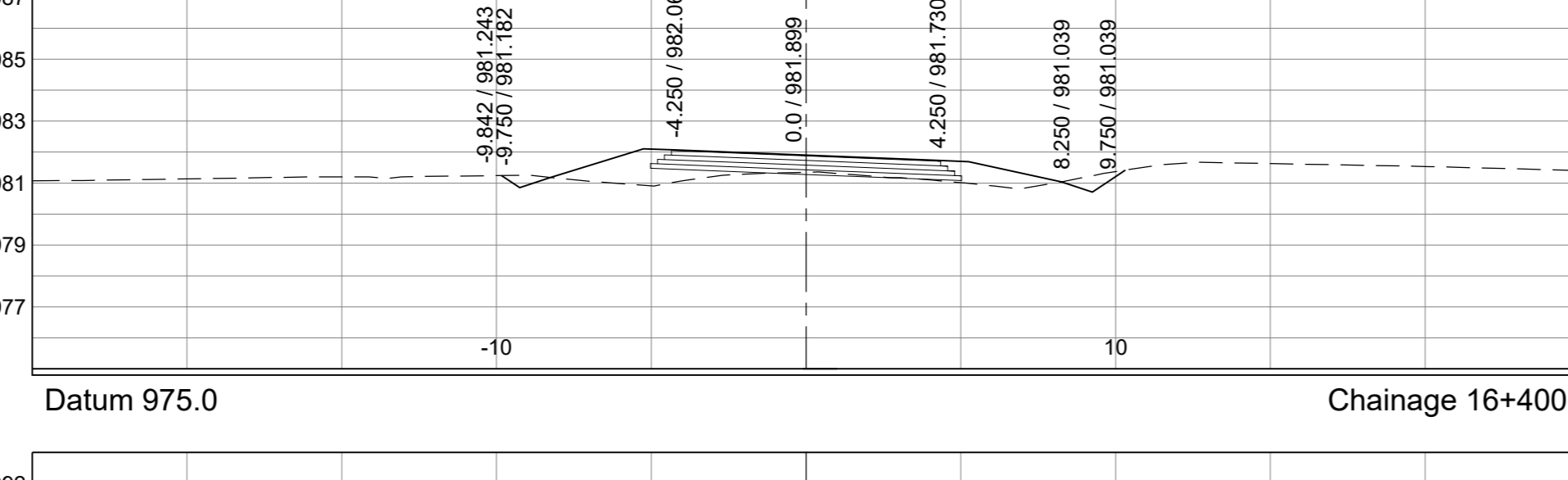
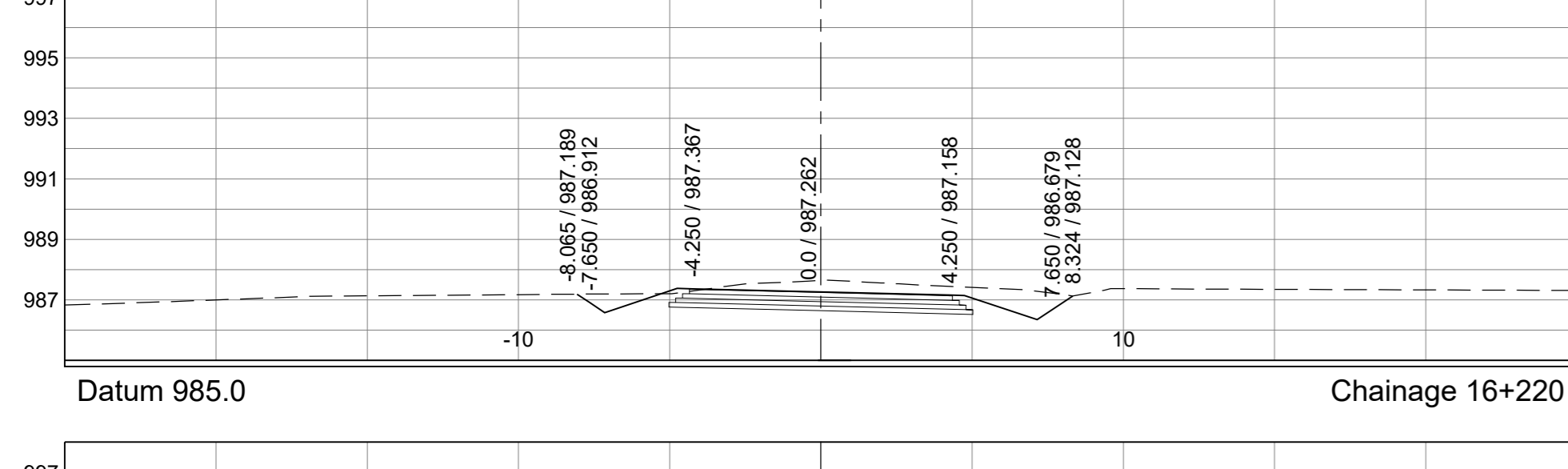
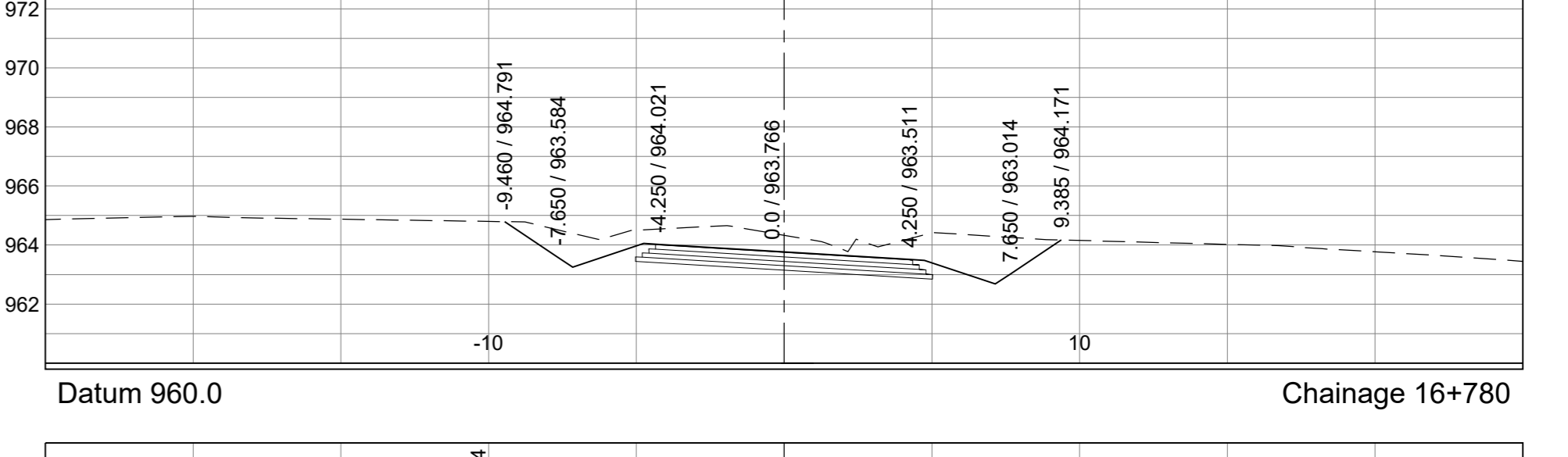
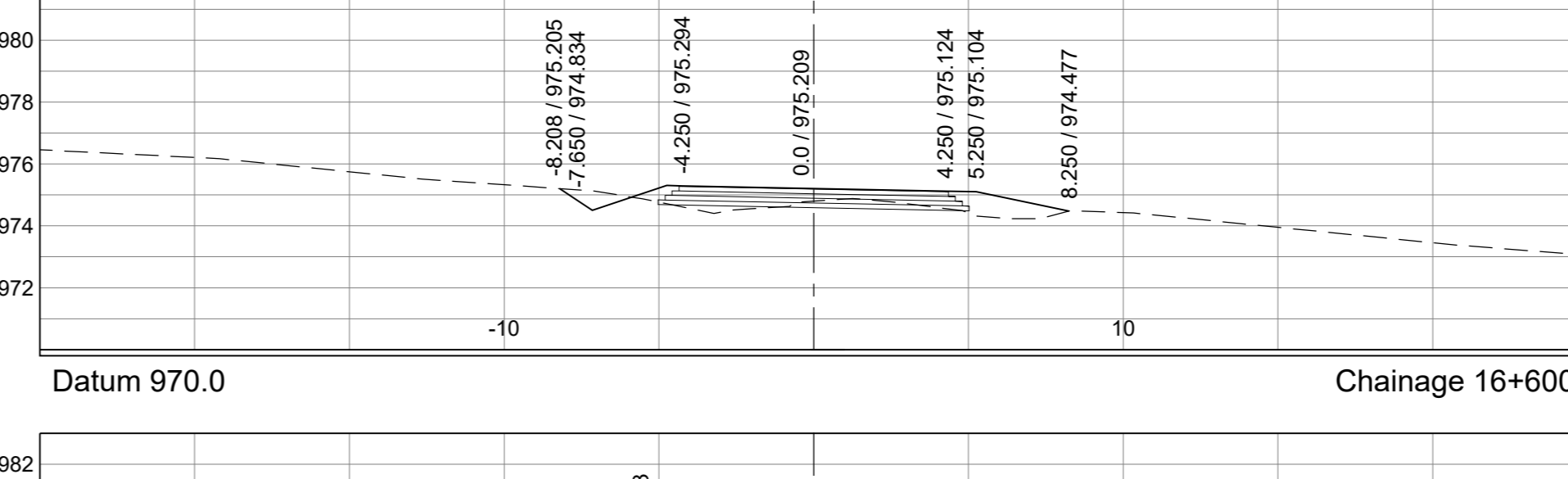
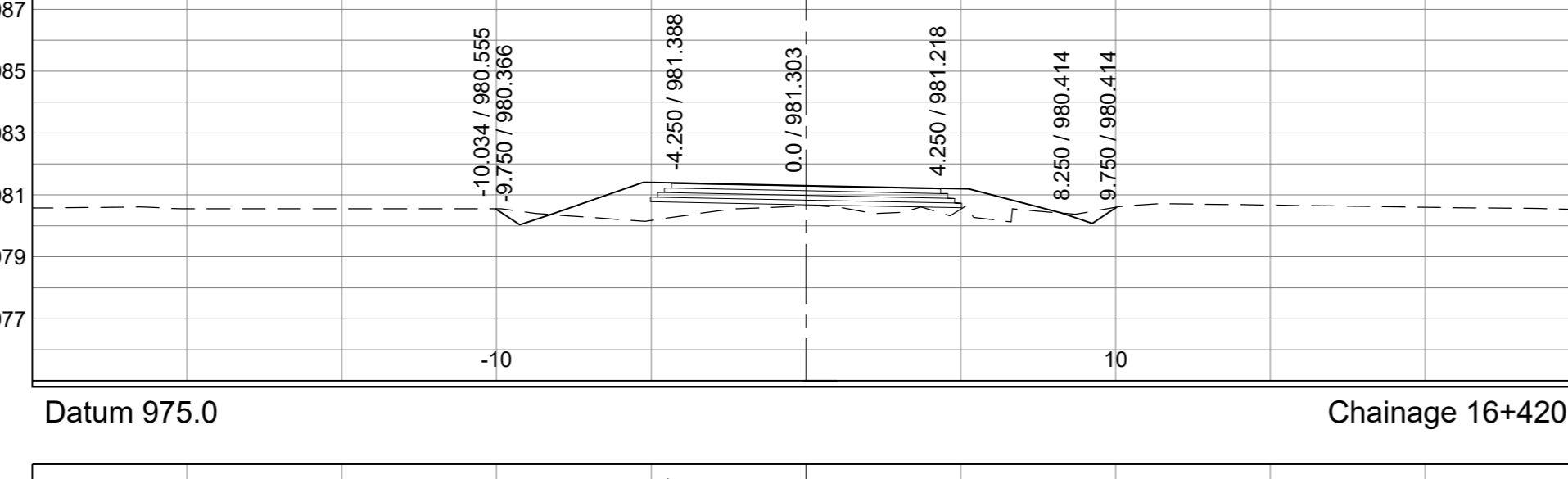
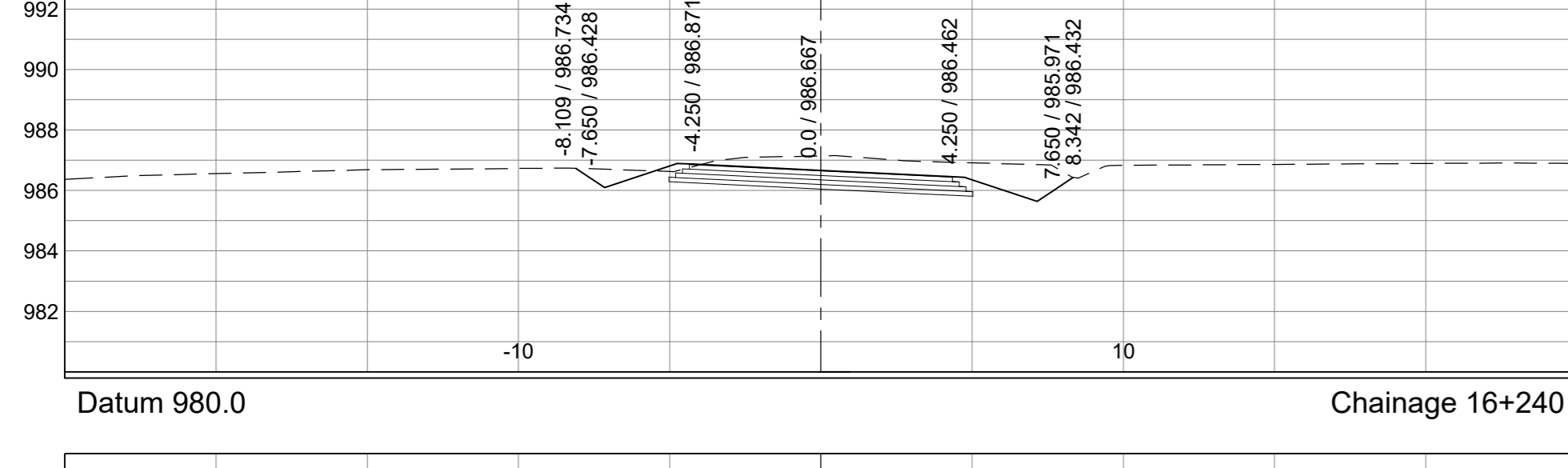
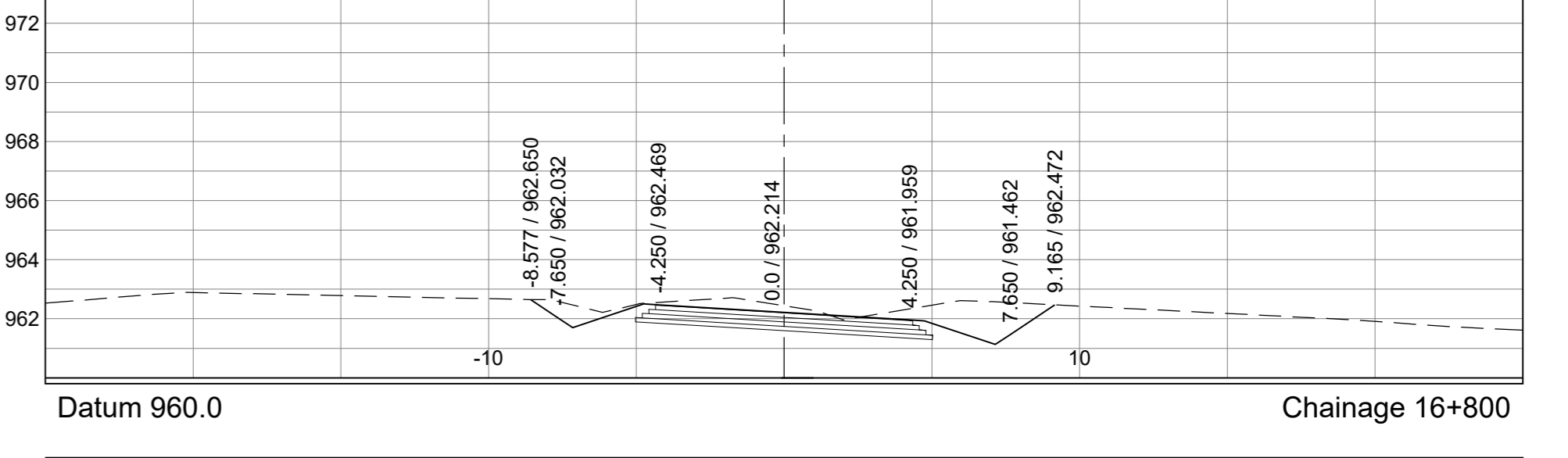
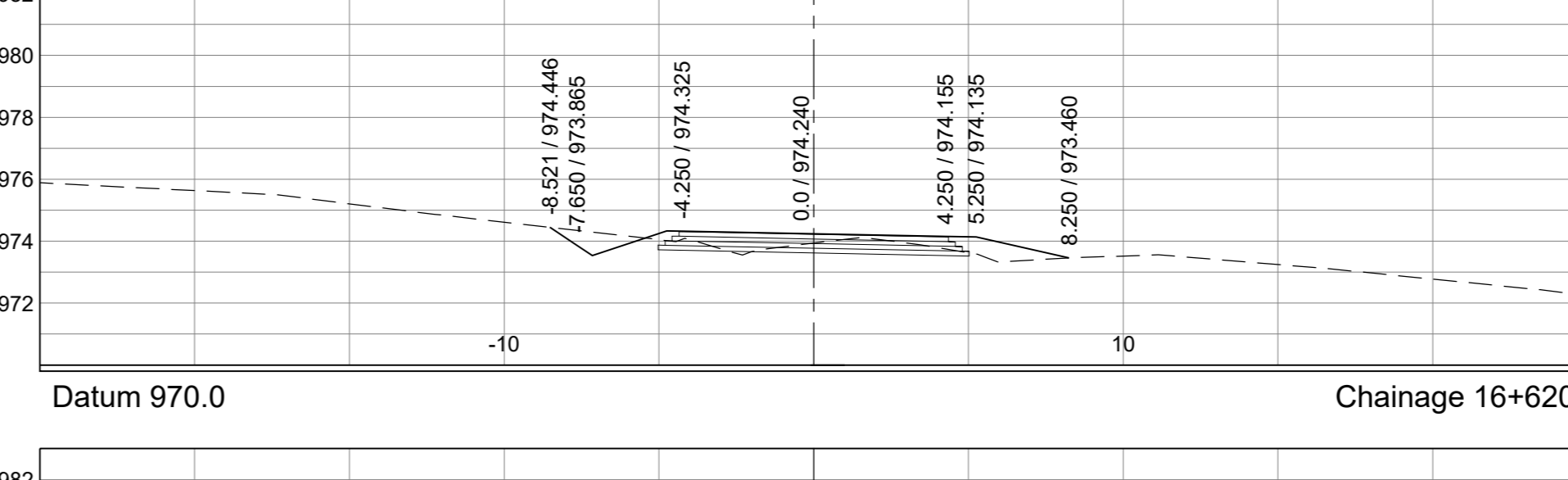
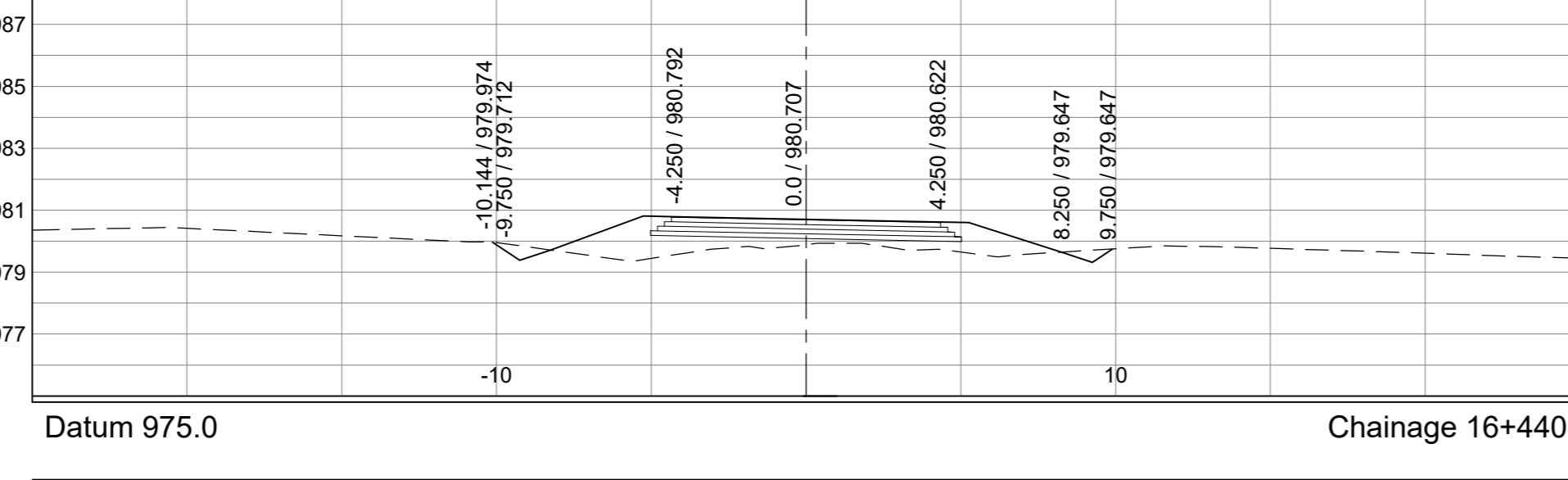
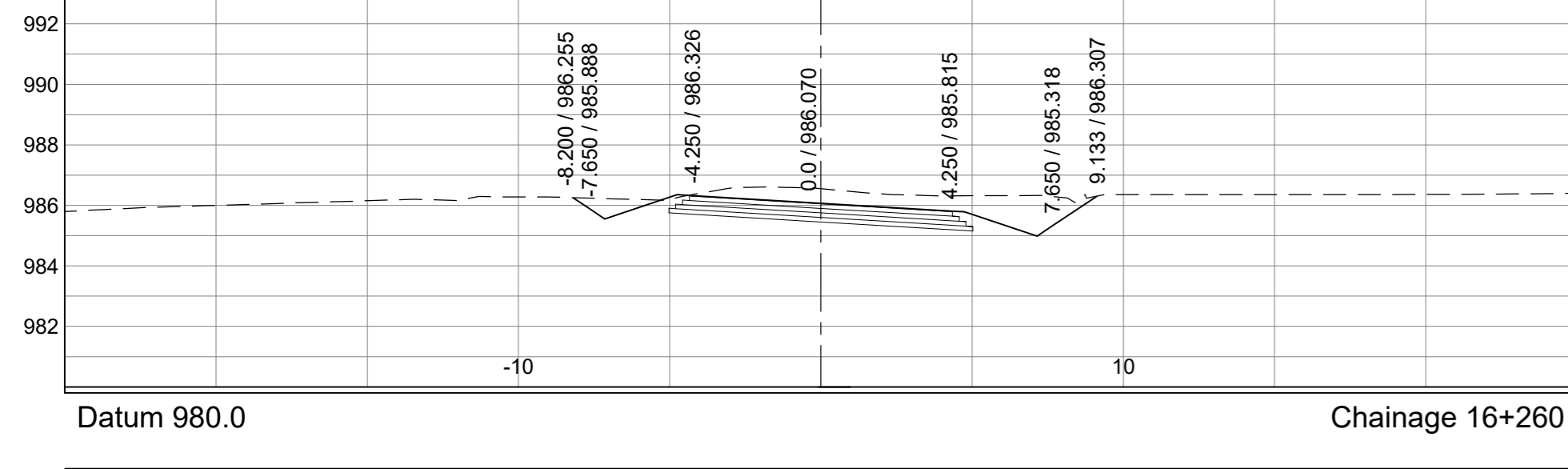
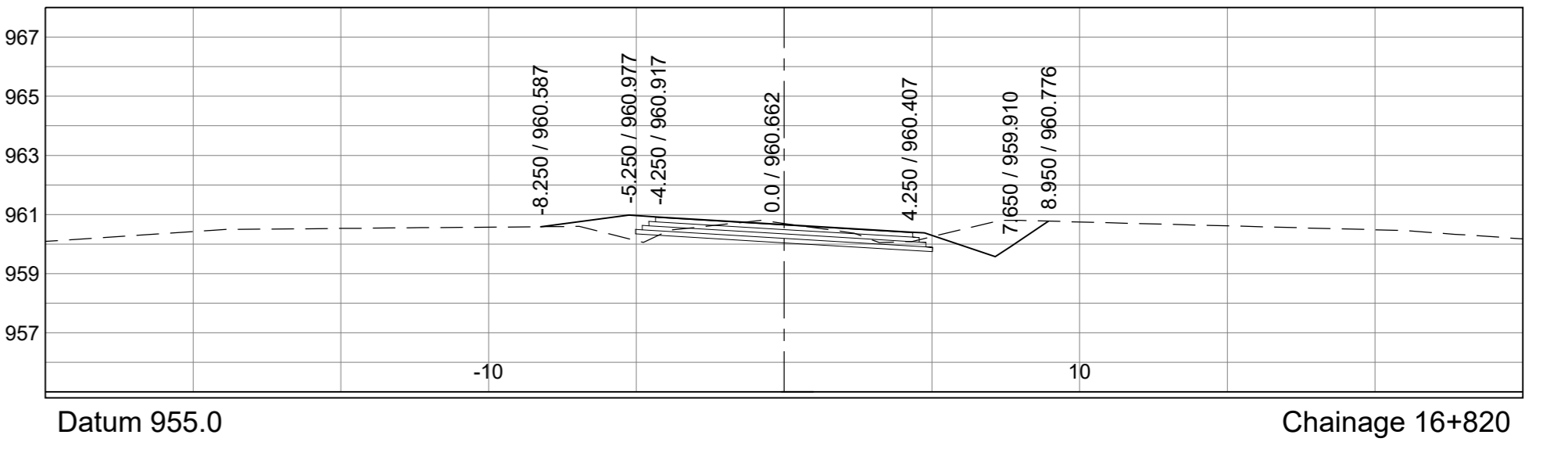
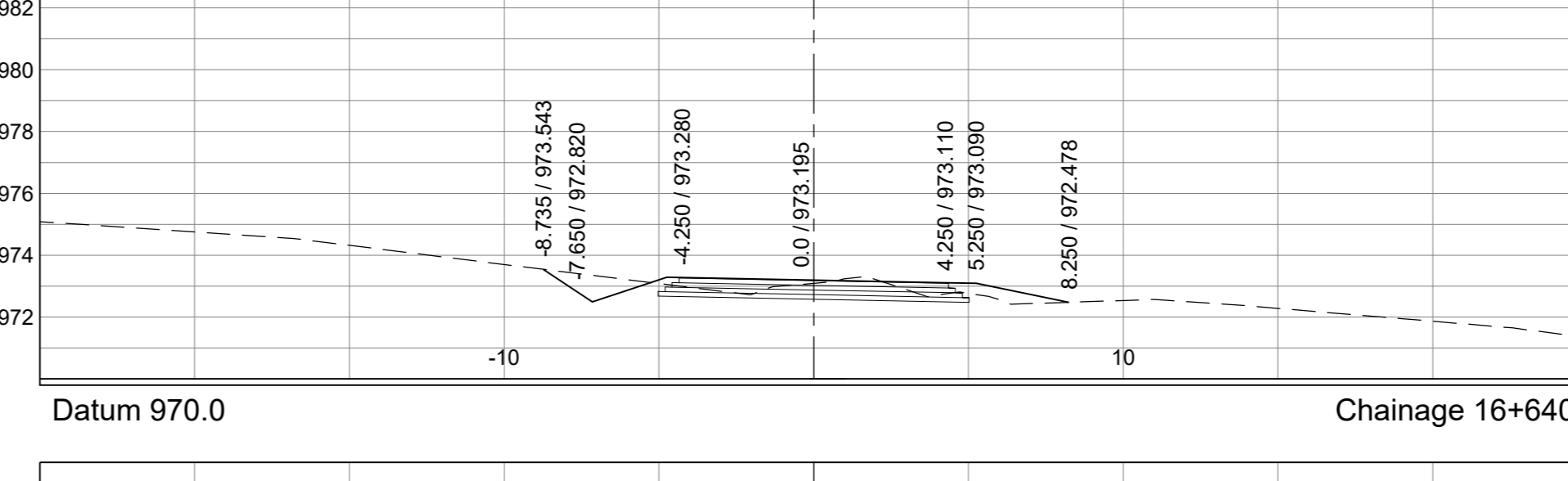
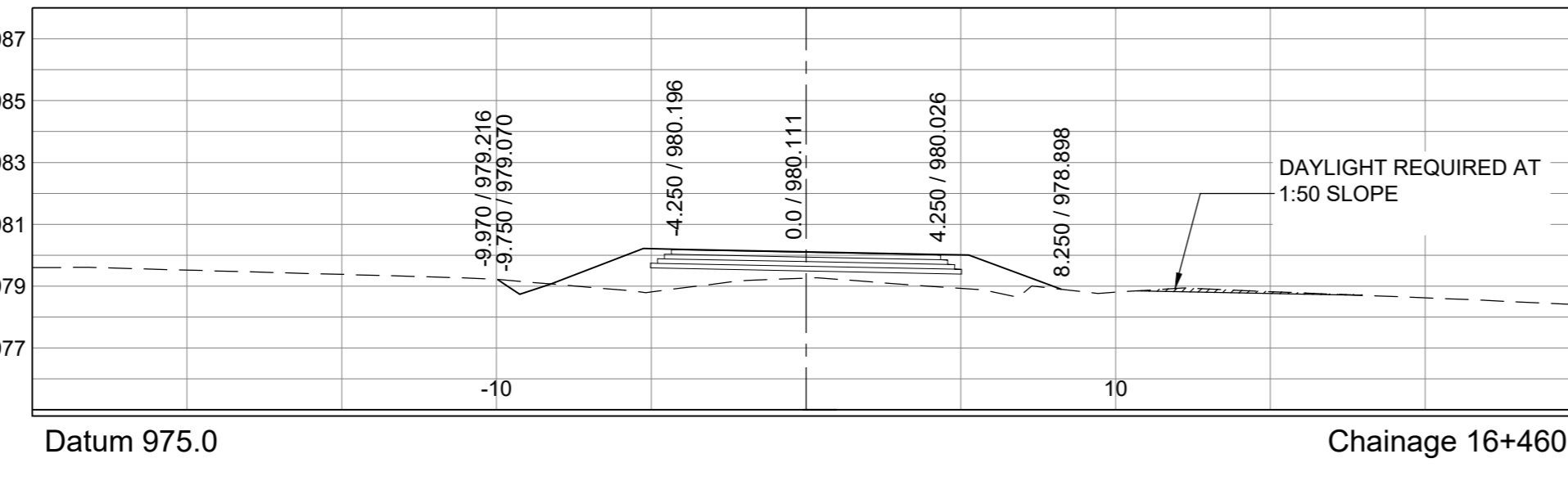
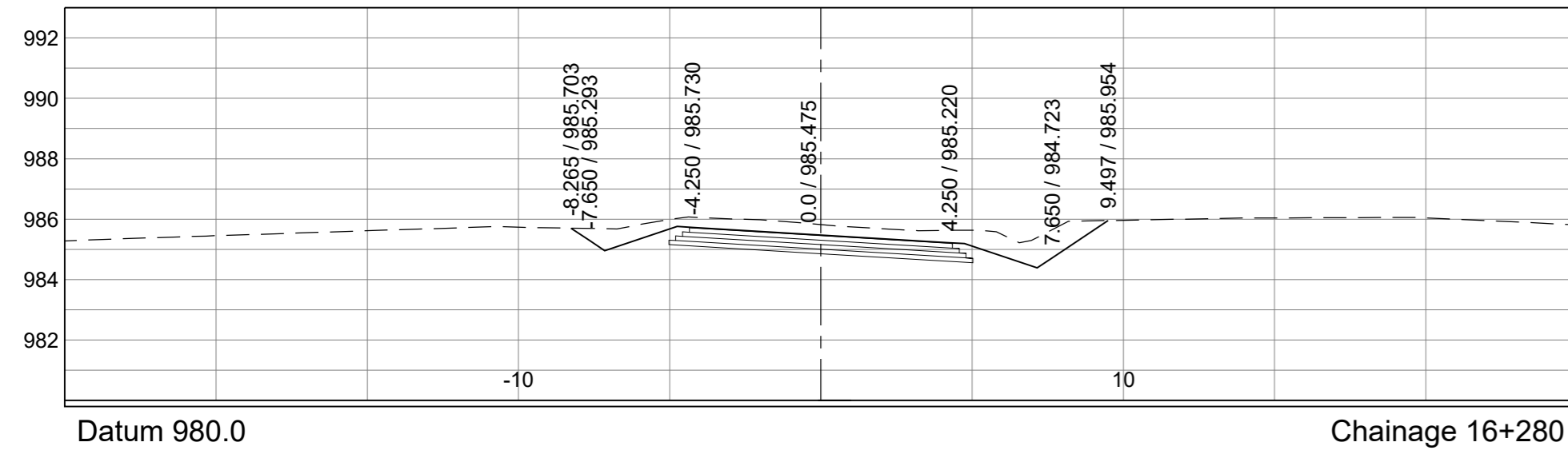
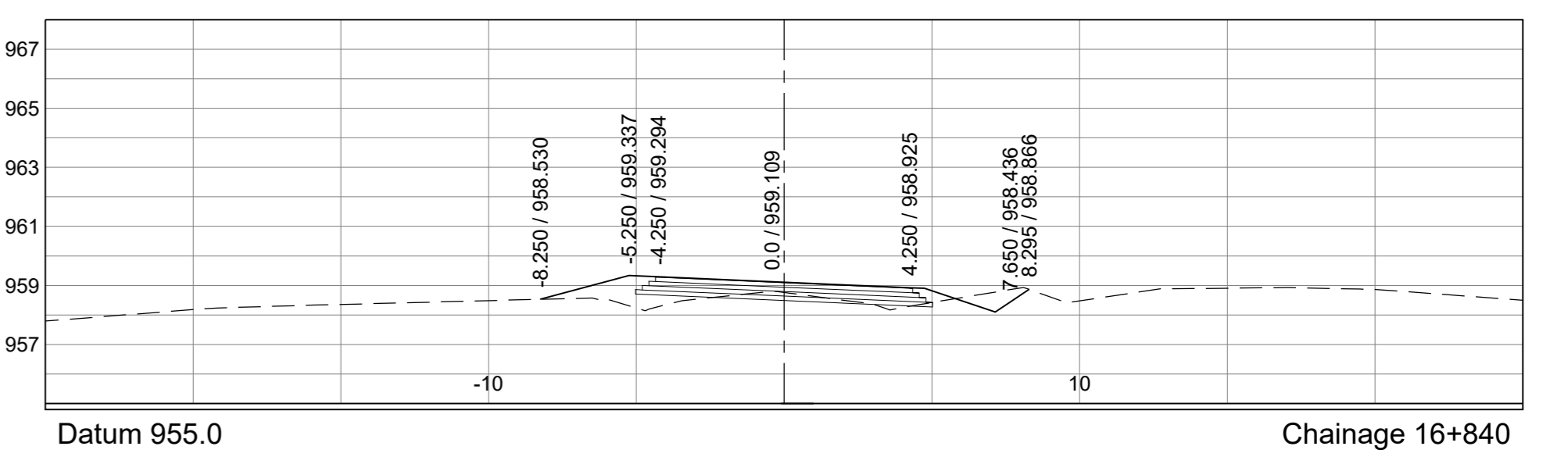
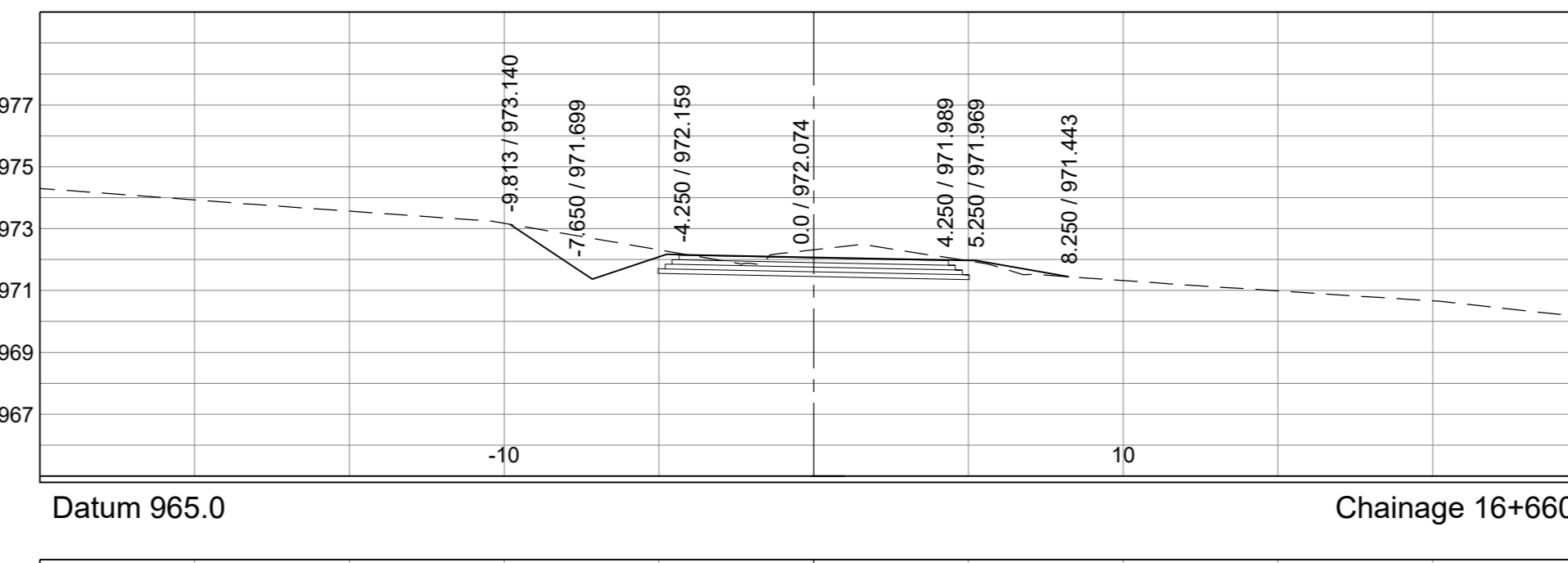
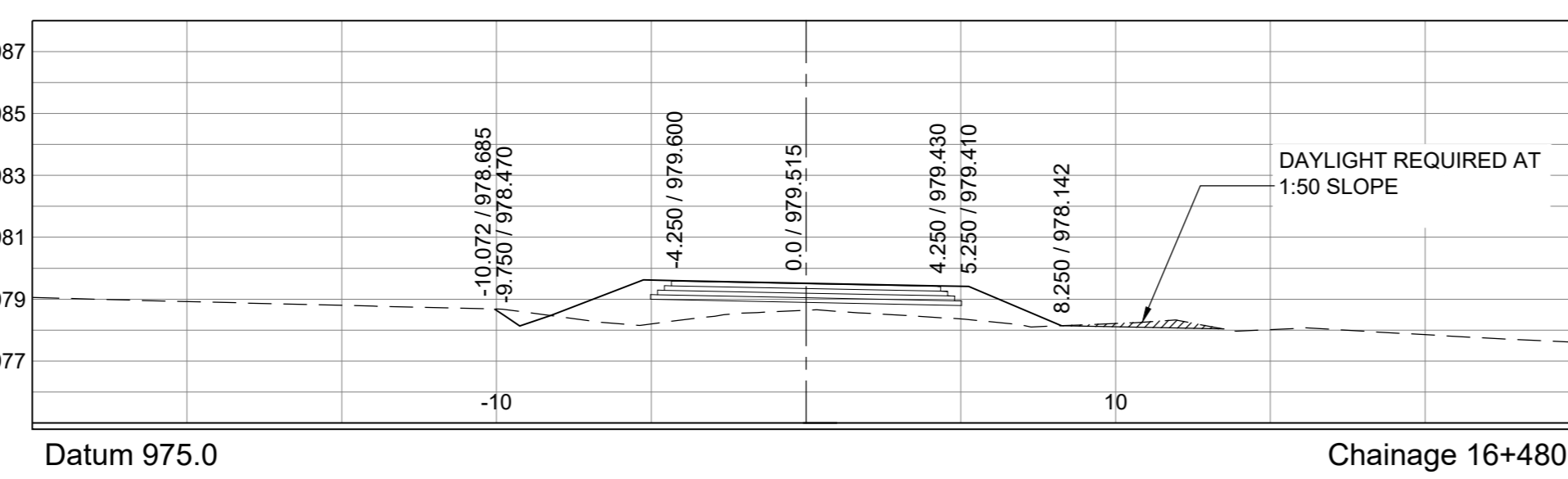
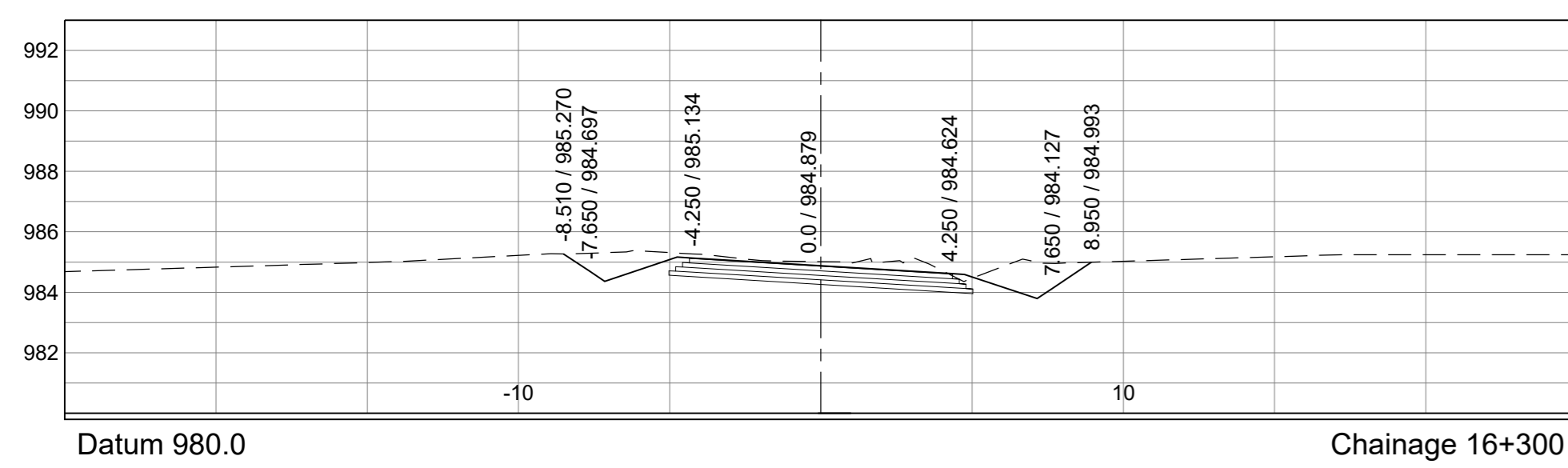
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet -> 8	REVISION:
km 15+440 - km 16+140	of -> 18	A
Scale	Plan No ->	
HORIZONTAL 1:200		
VERTICAL 1:200		

C 44337





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44336	Designed by:-	T. PIKA
Continued on:-	C 44338	Checked by:-	Y. DOMA
Cross Section No:-	C 44337	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44328	Checked by:-	Y. DOMA
Design Plan No:-	C 44320 - C 44321	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

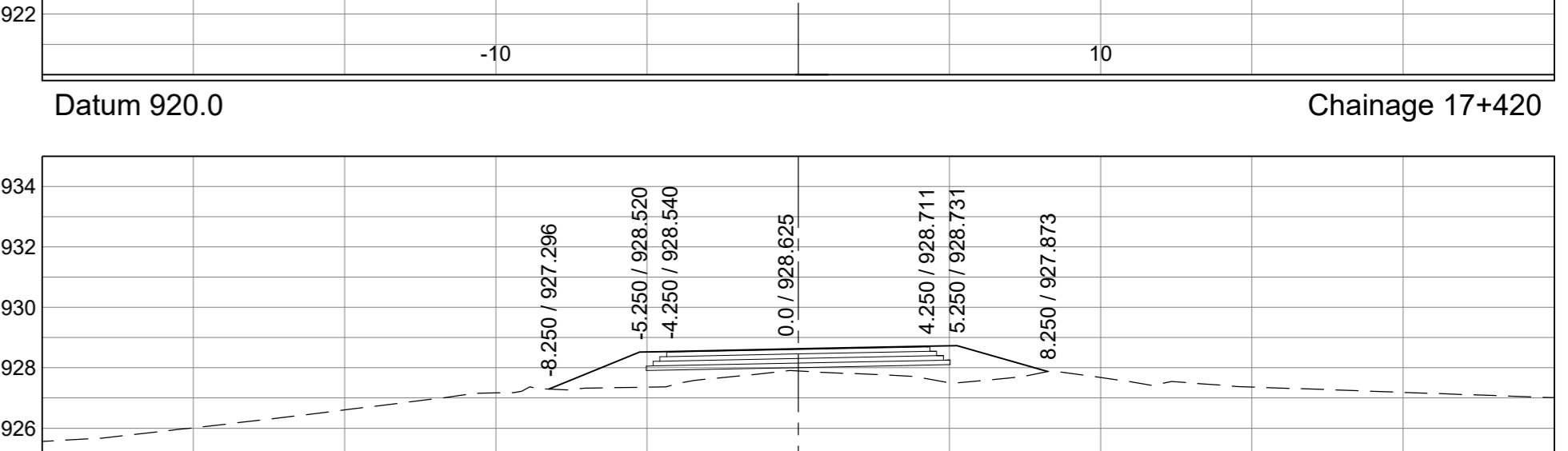
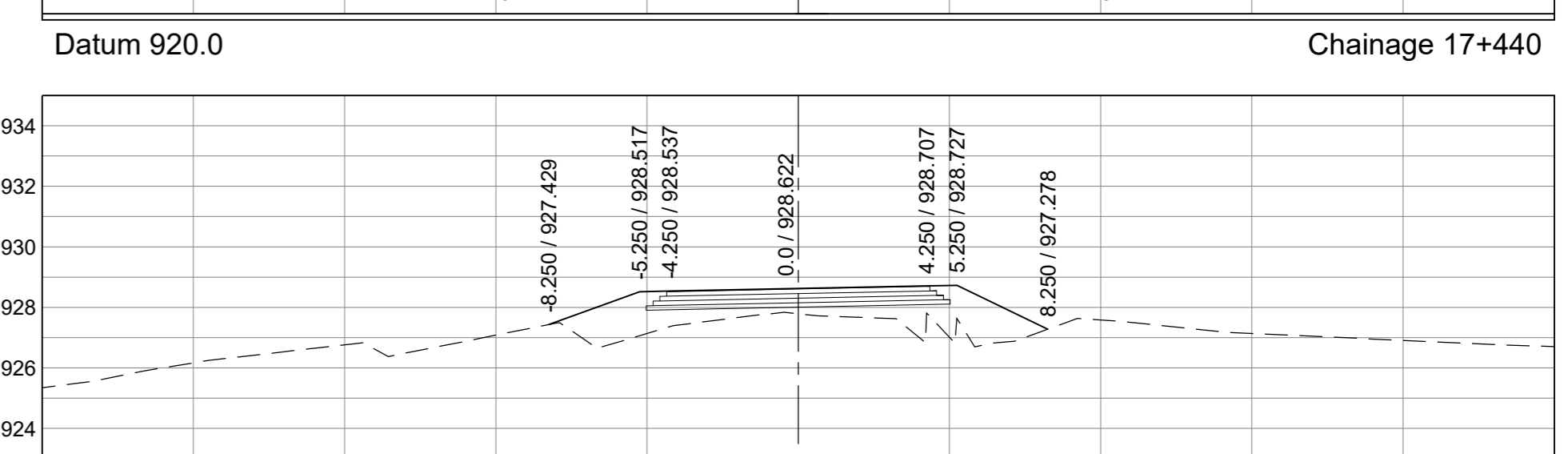
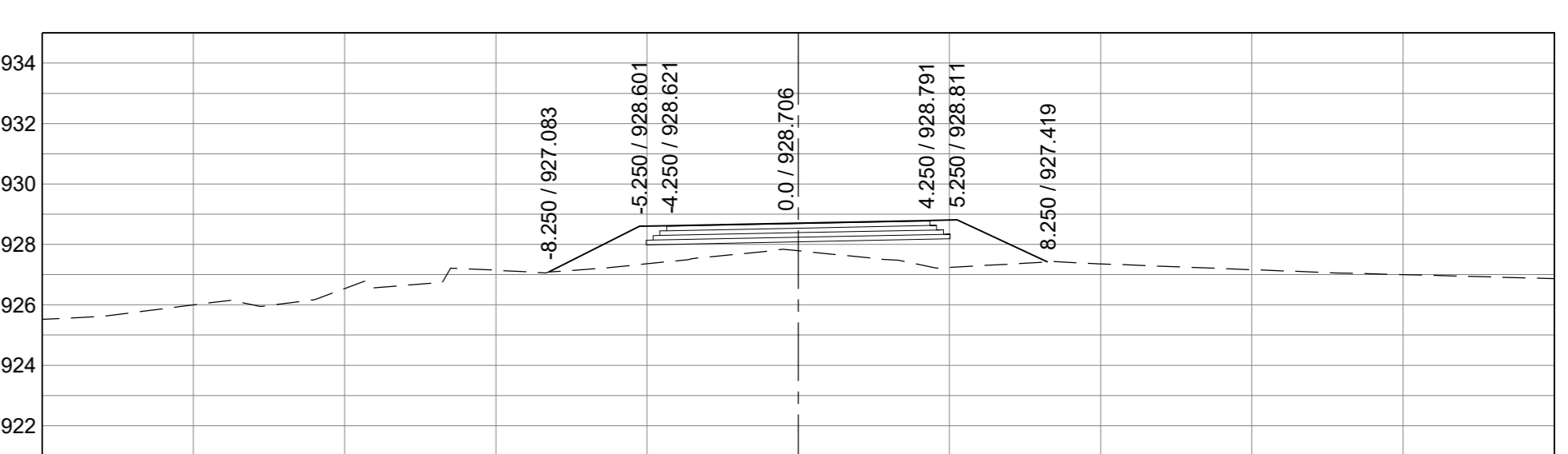
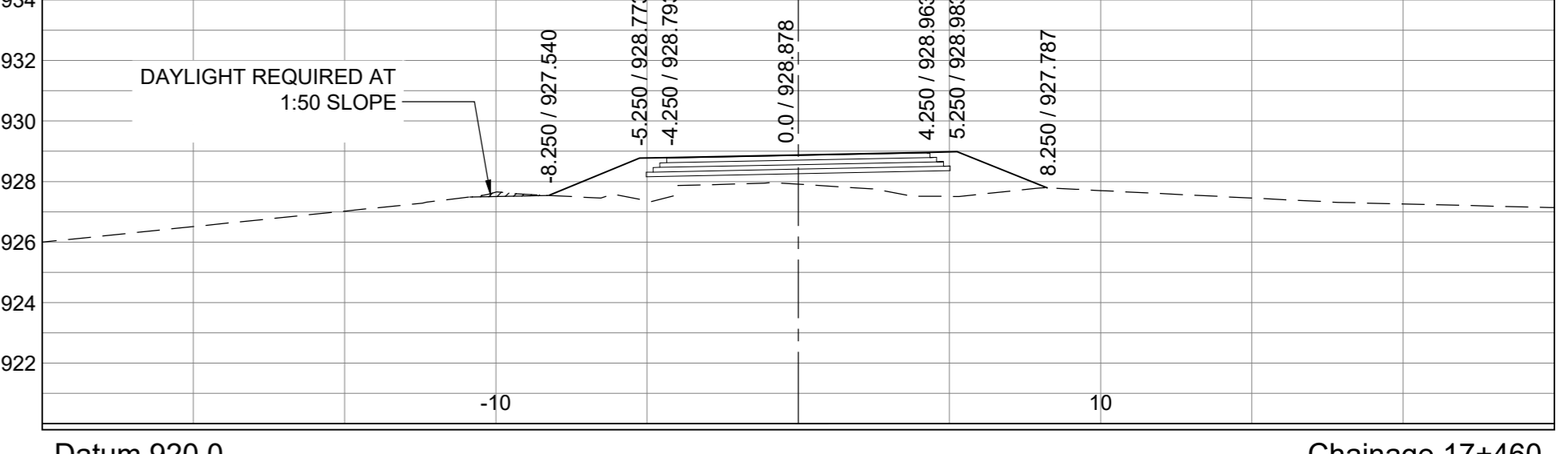
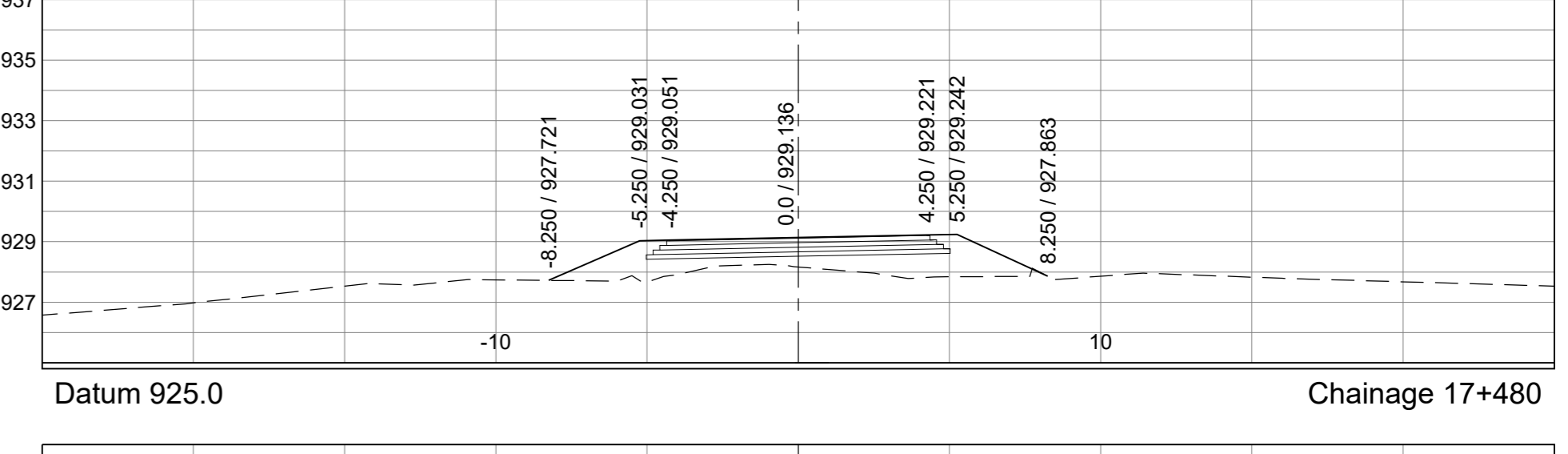
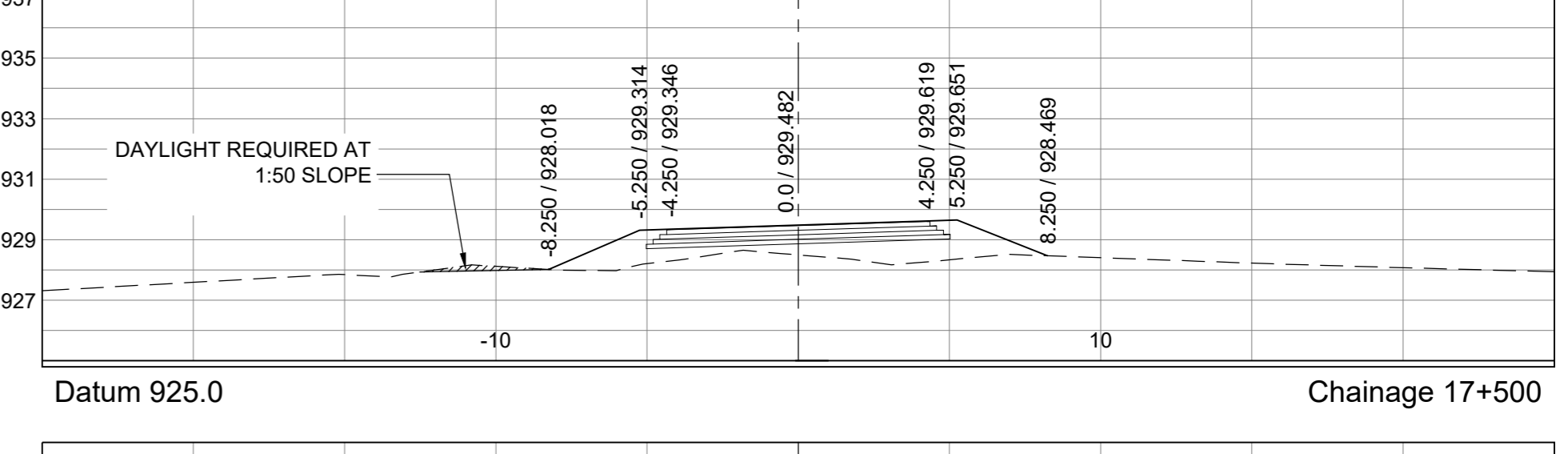
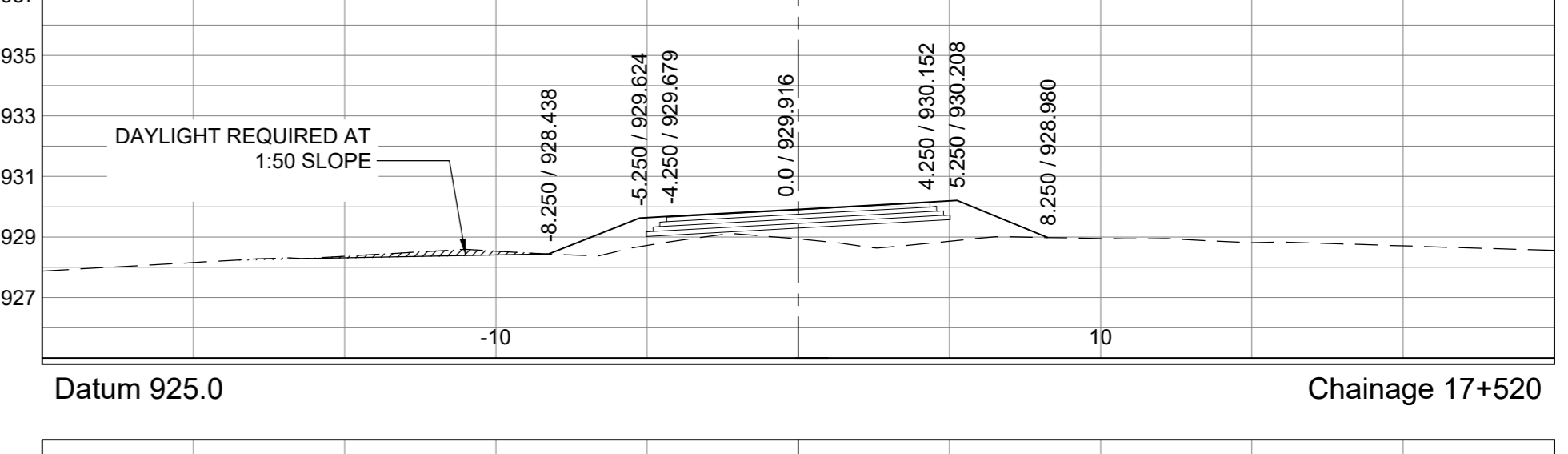
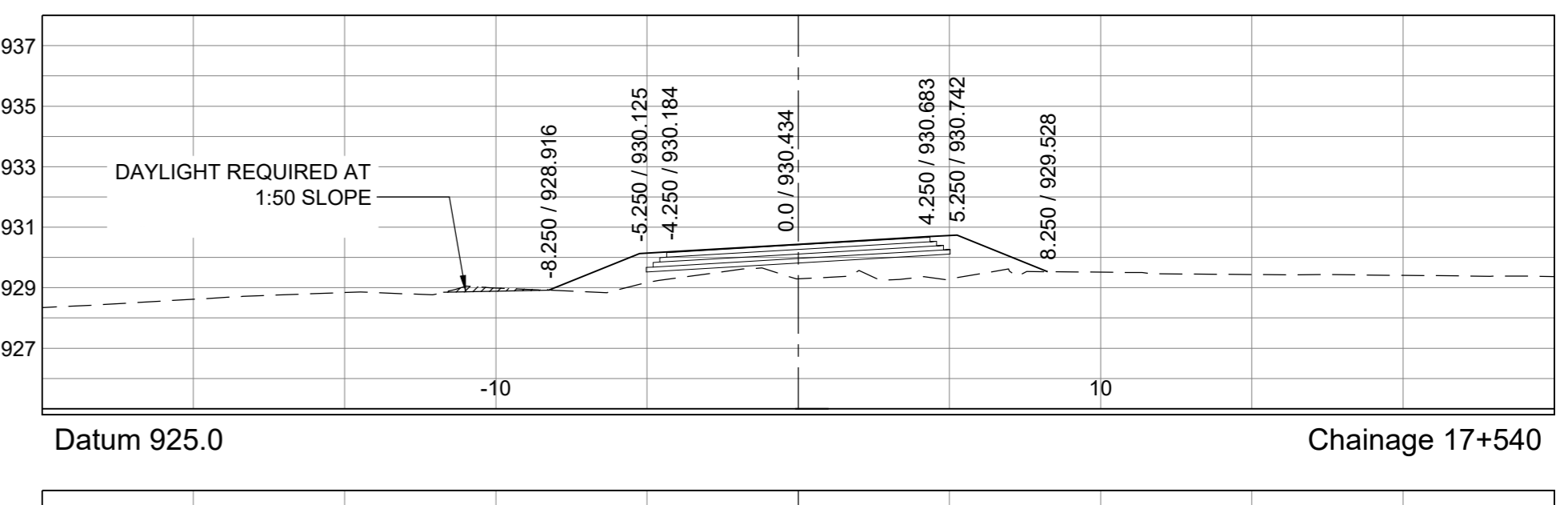
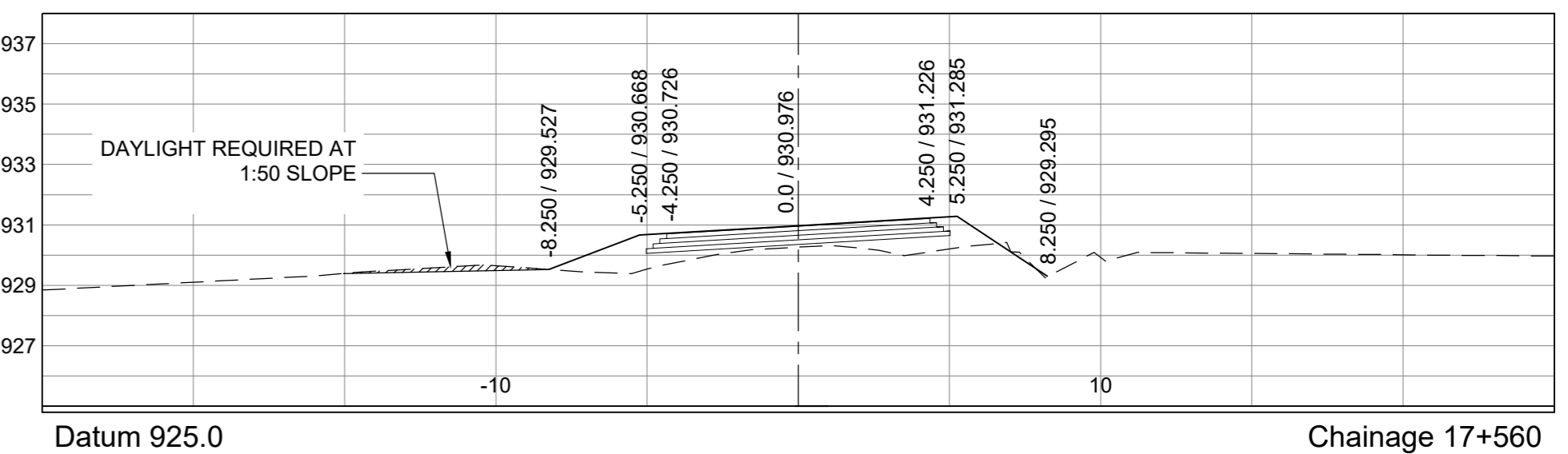
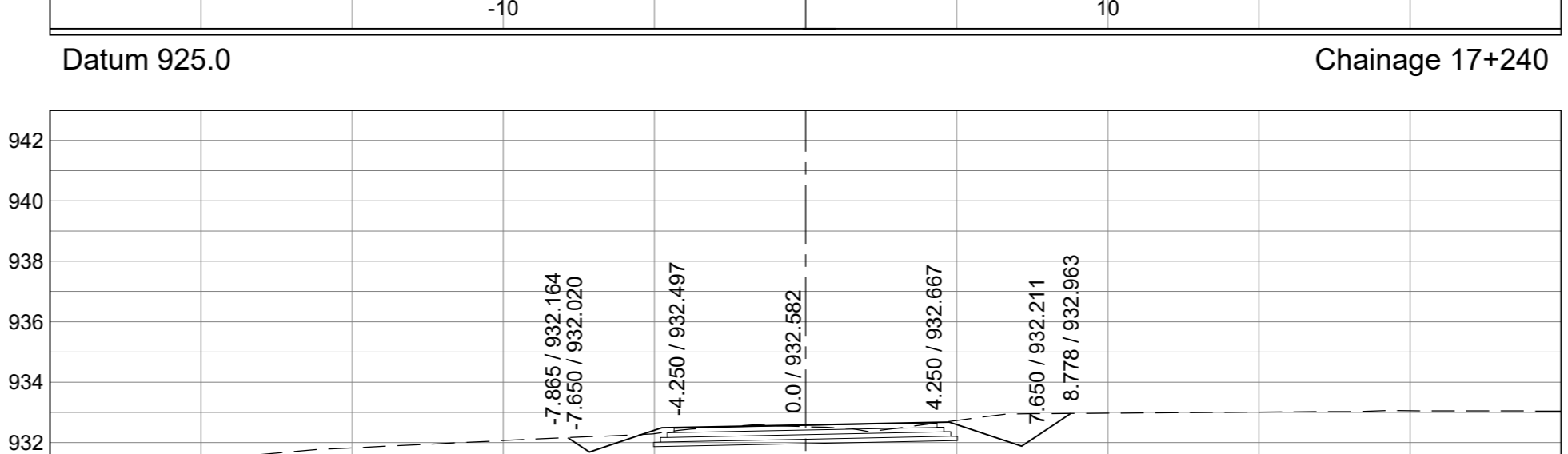
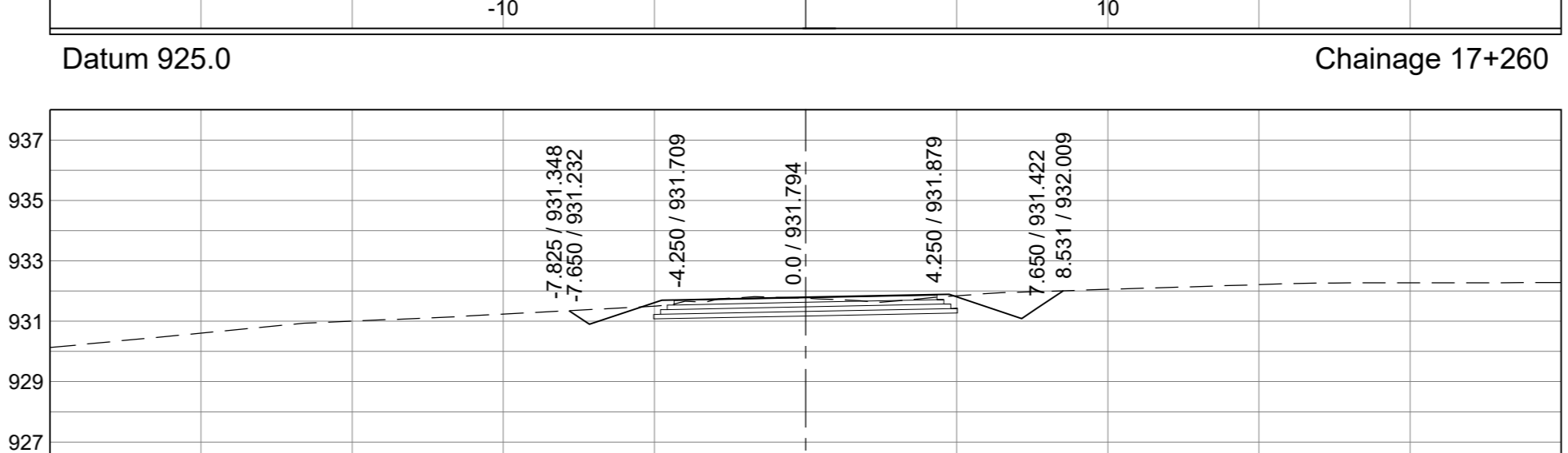
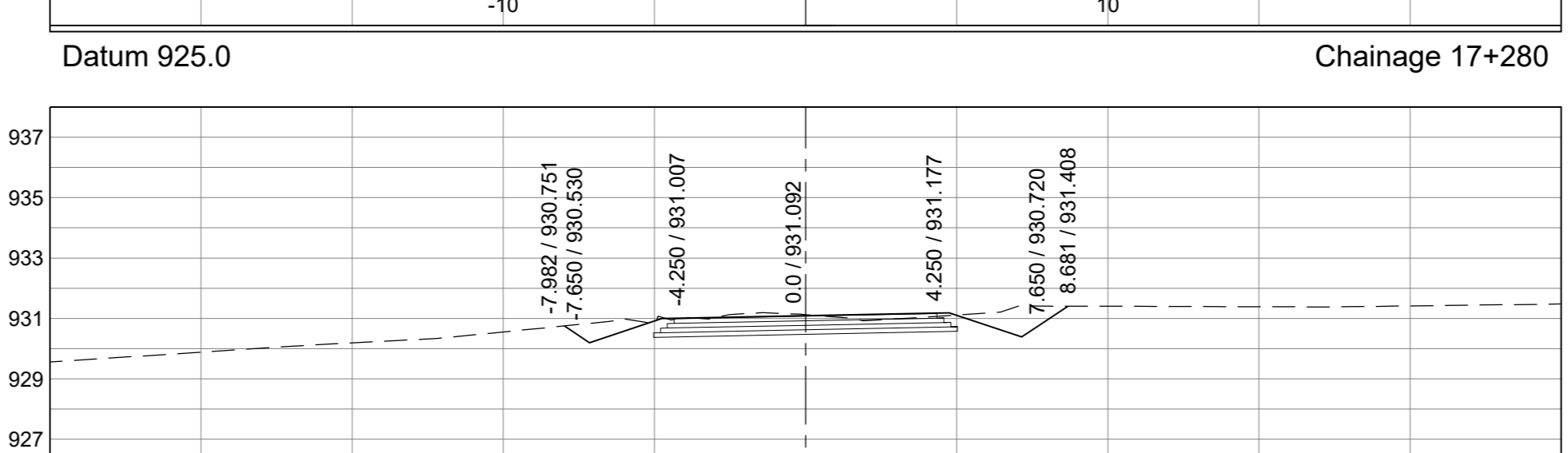
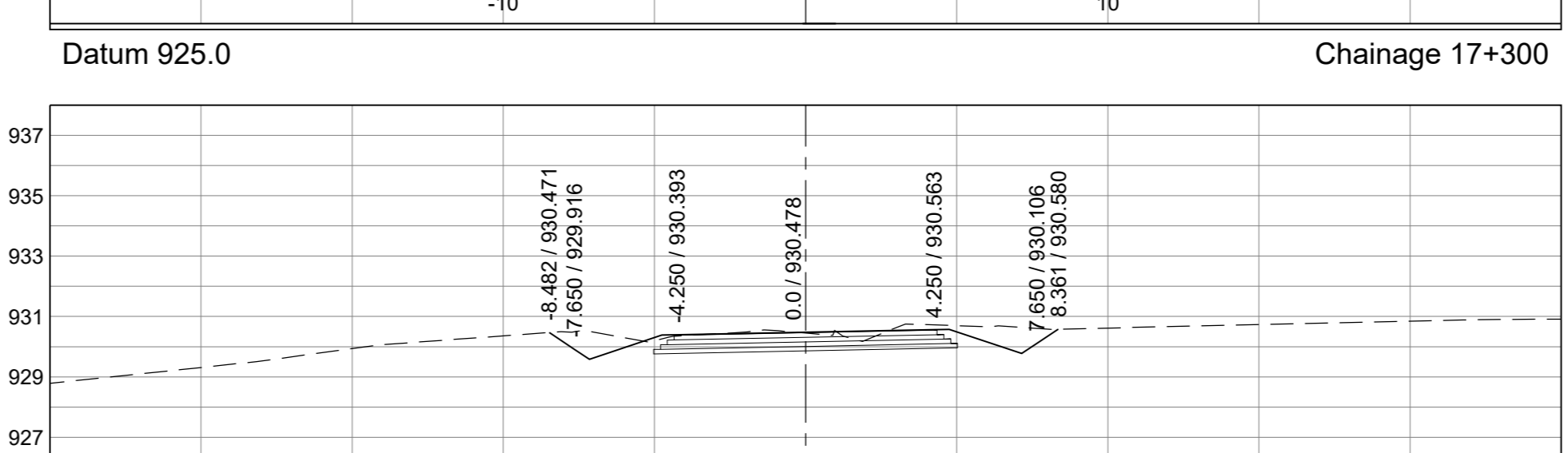
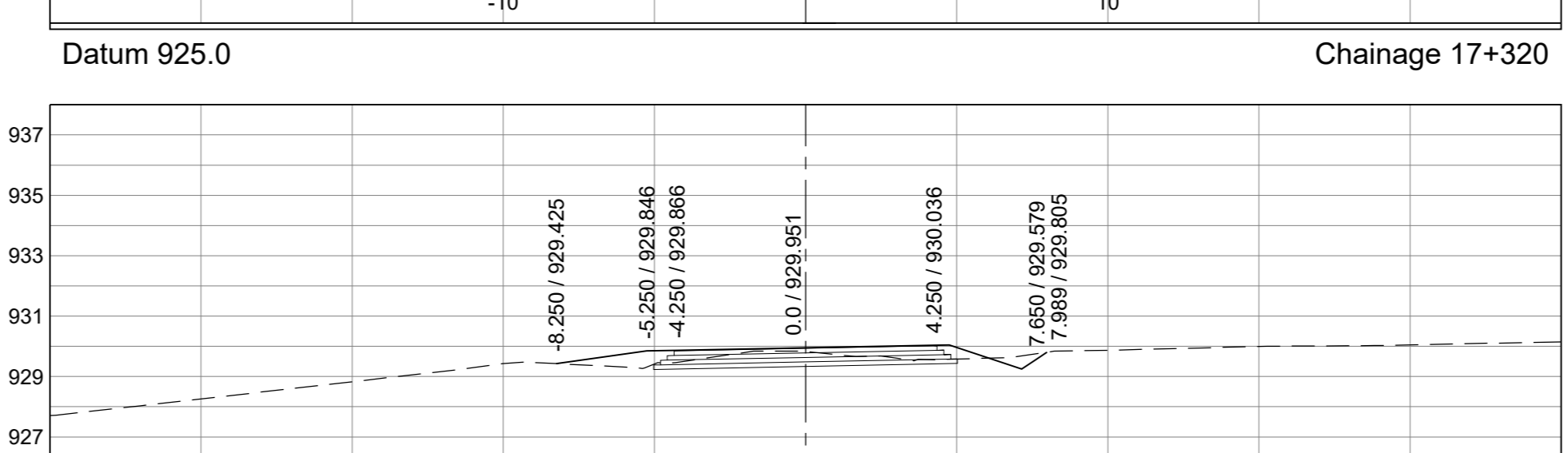
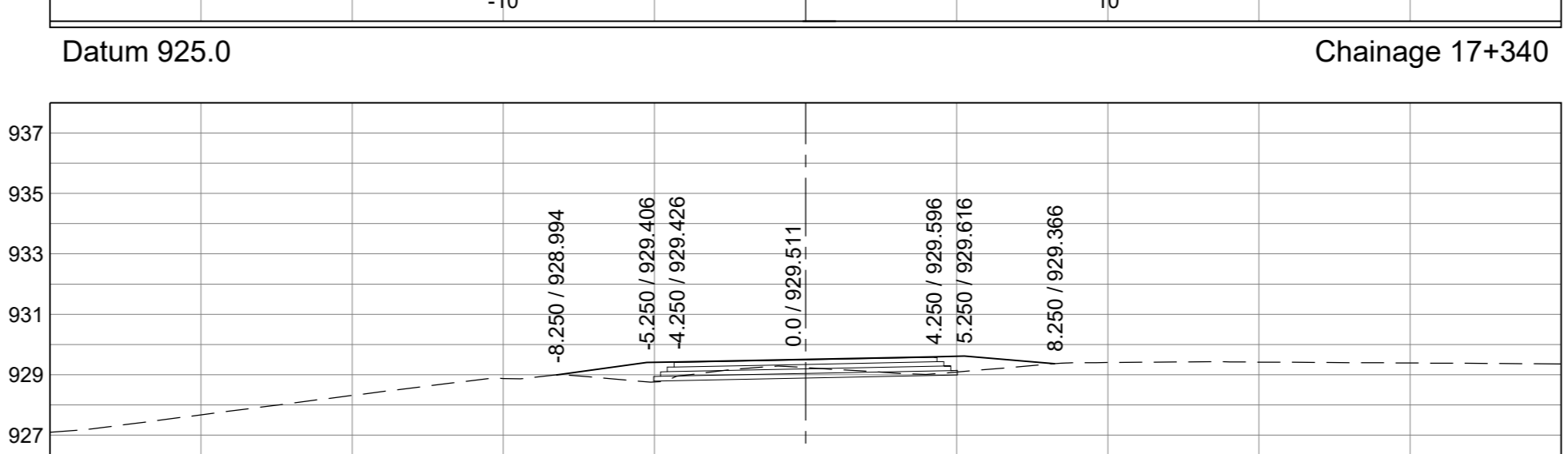
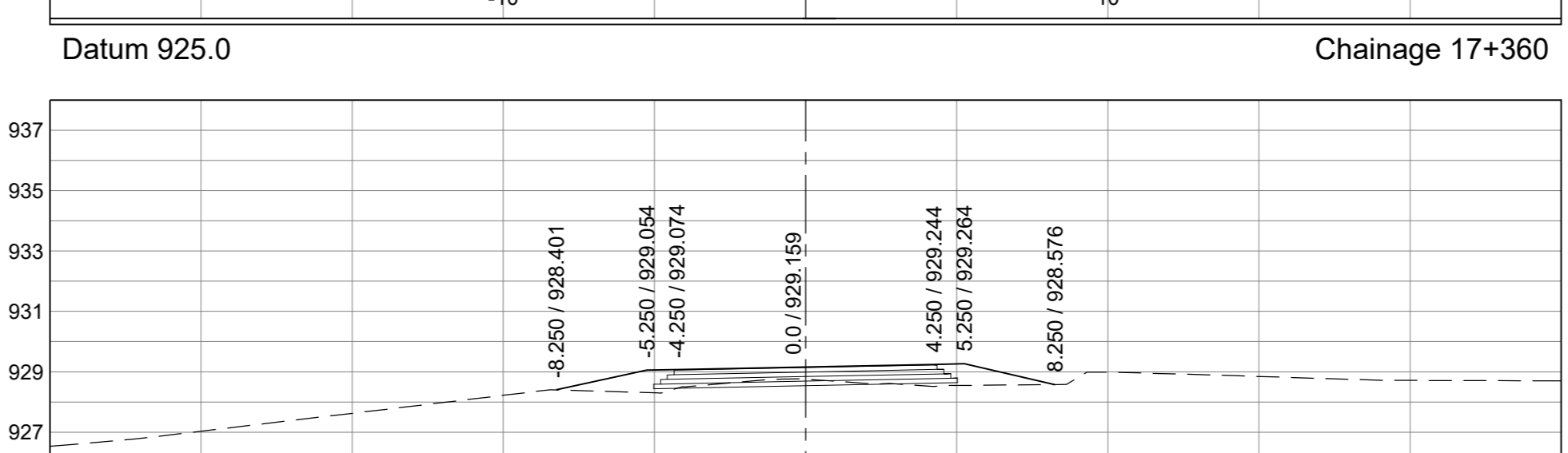
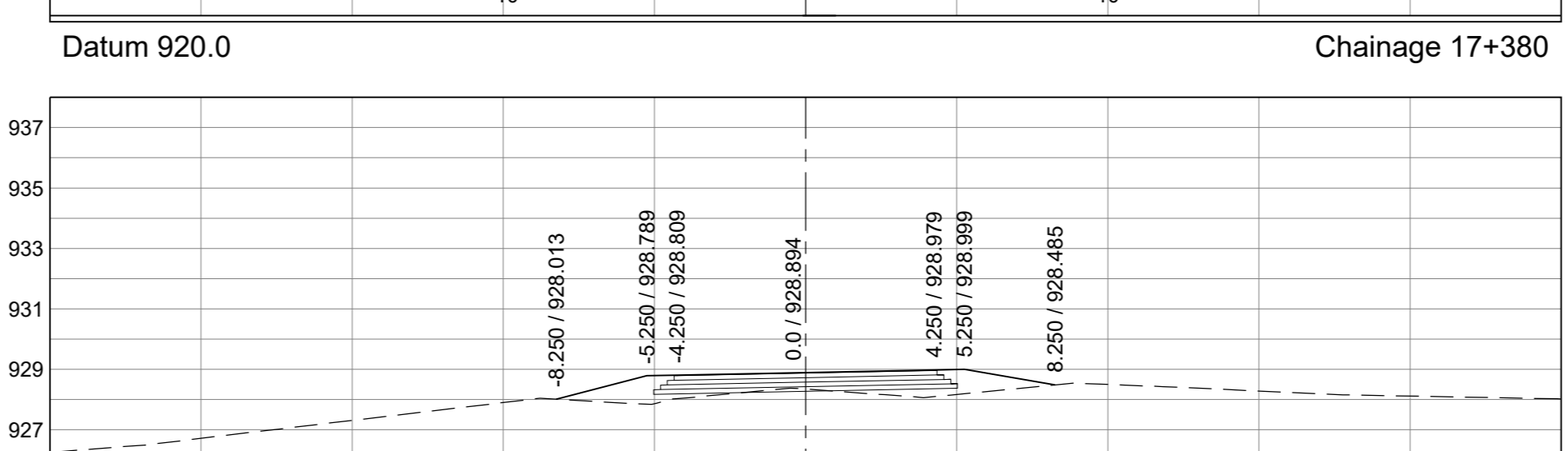
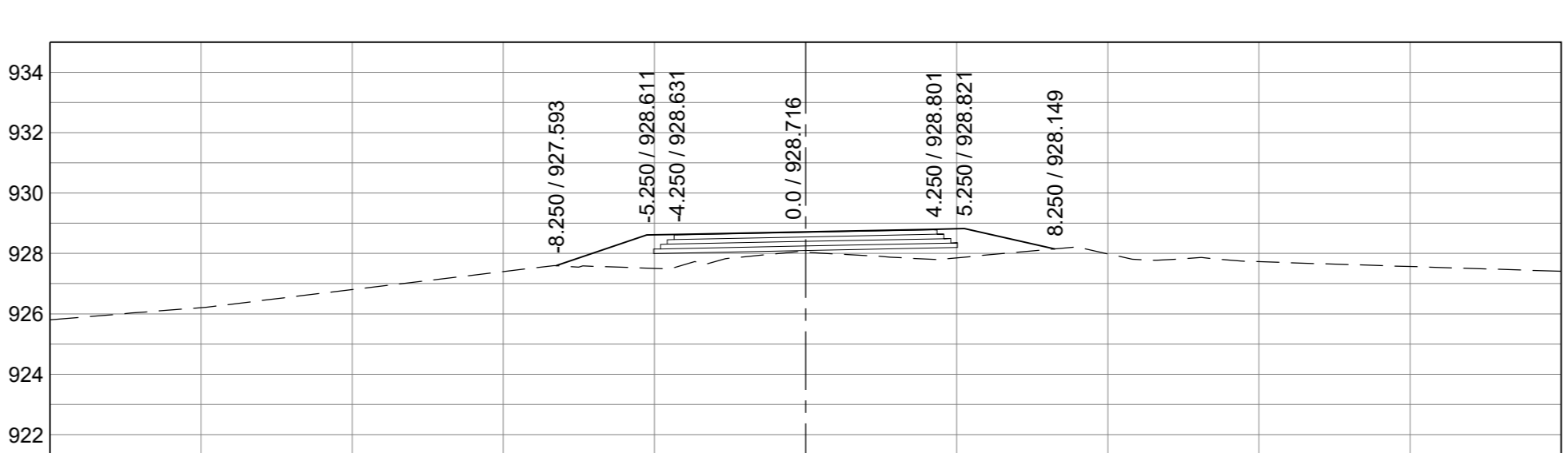
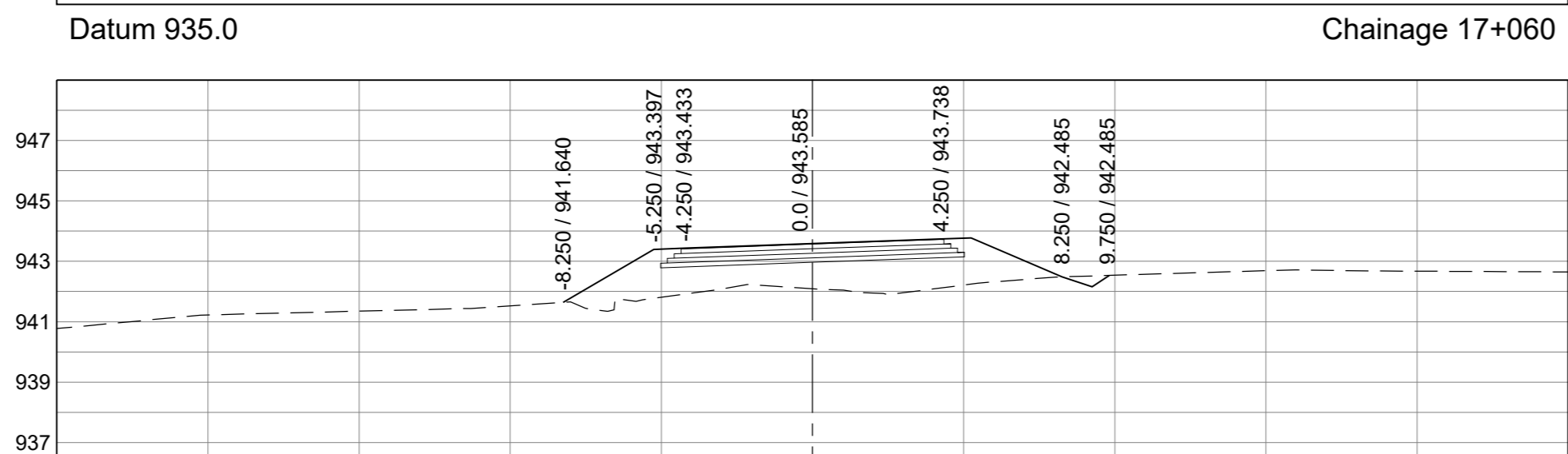
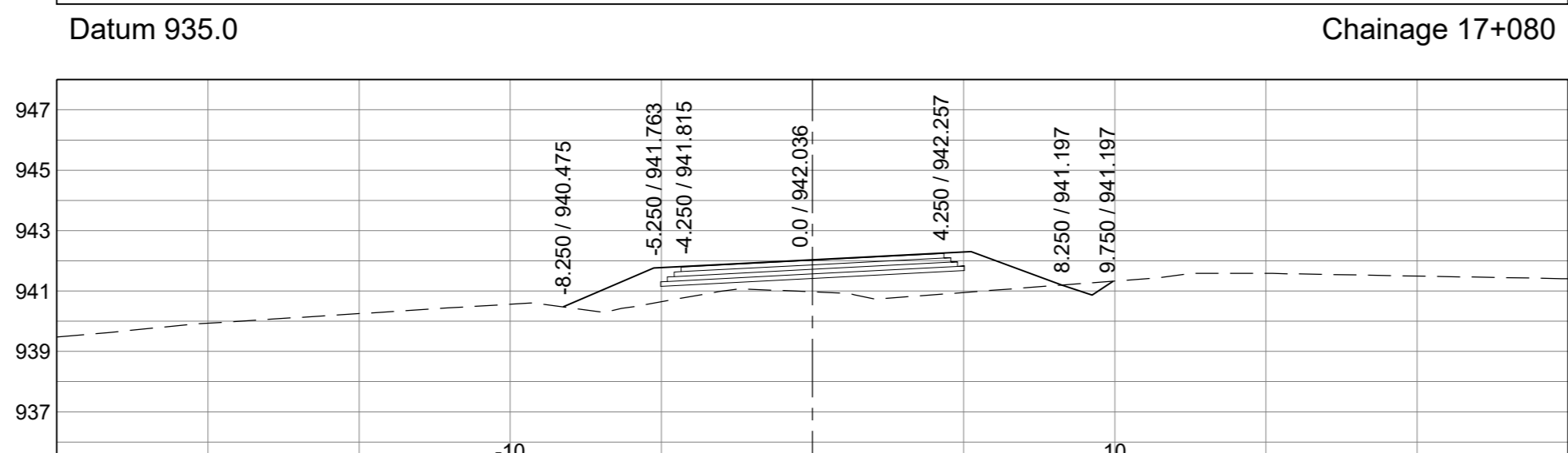
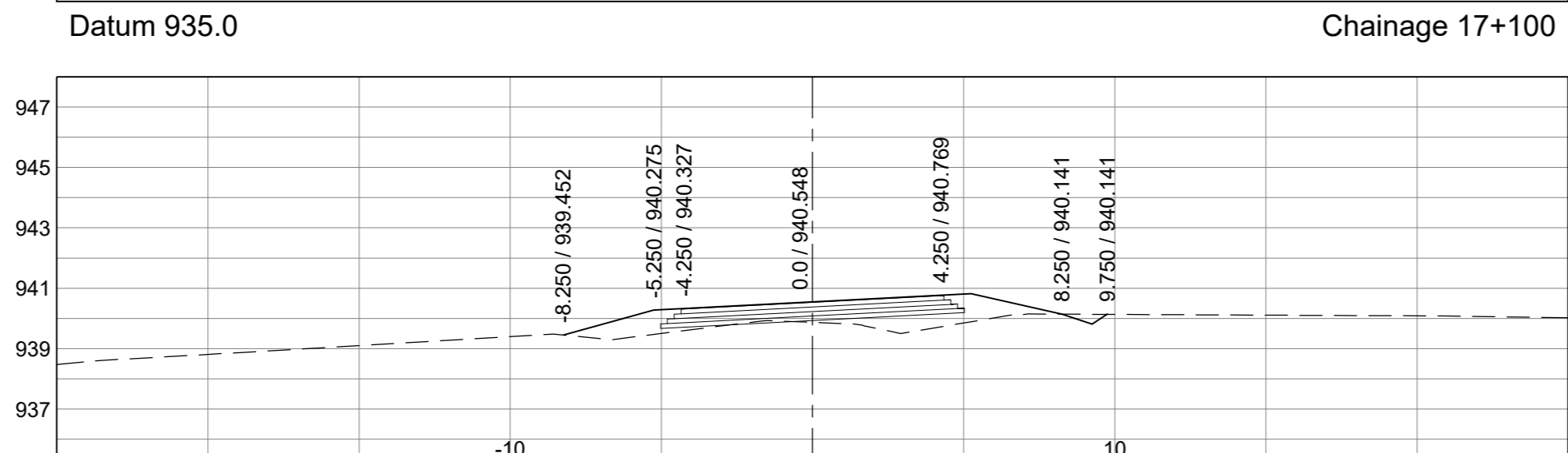
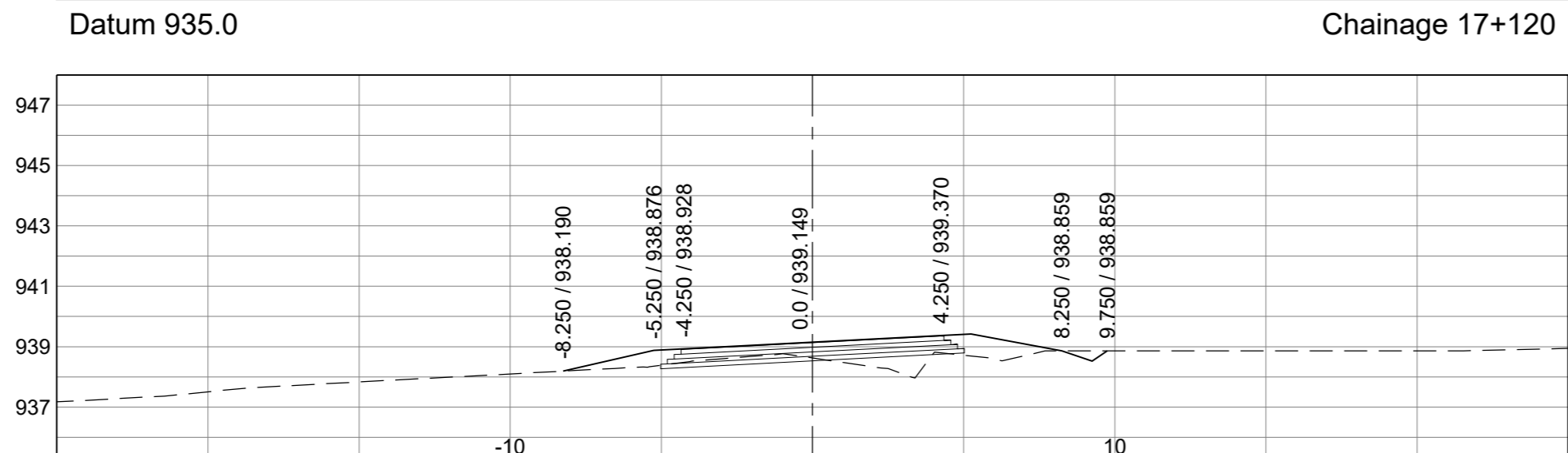
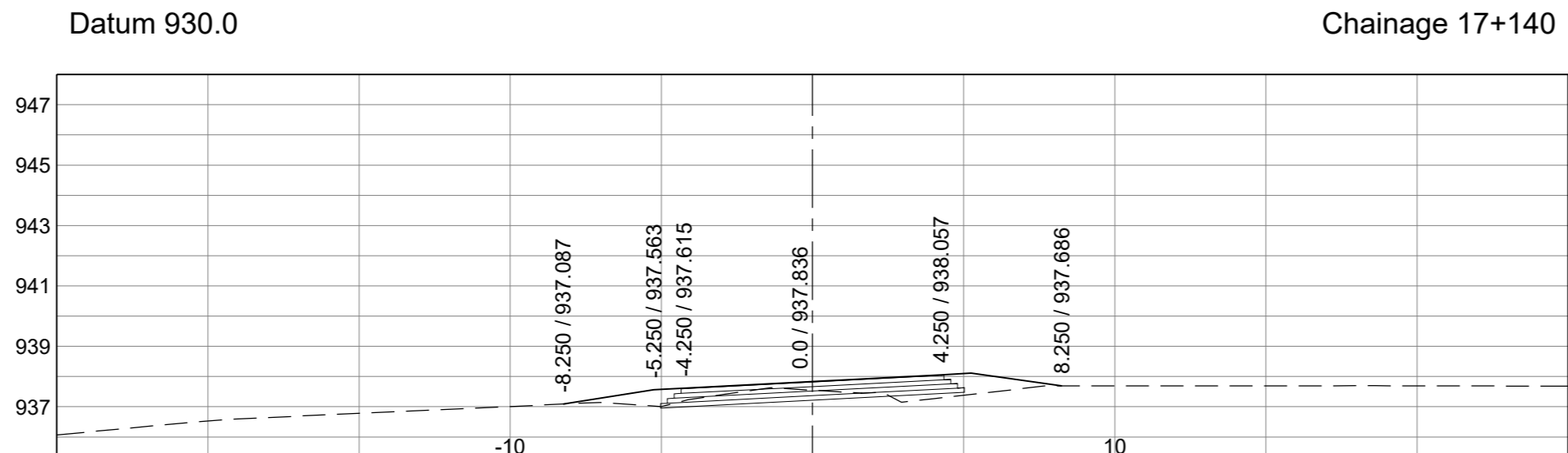
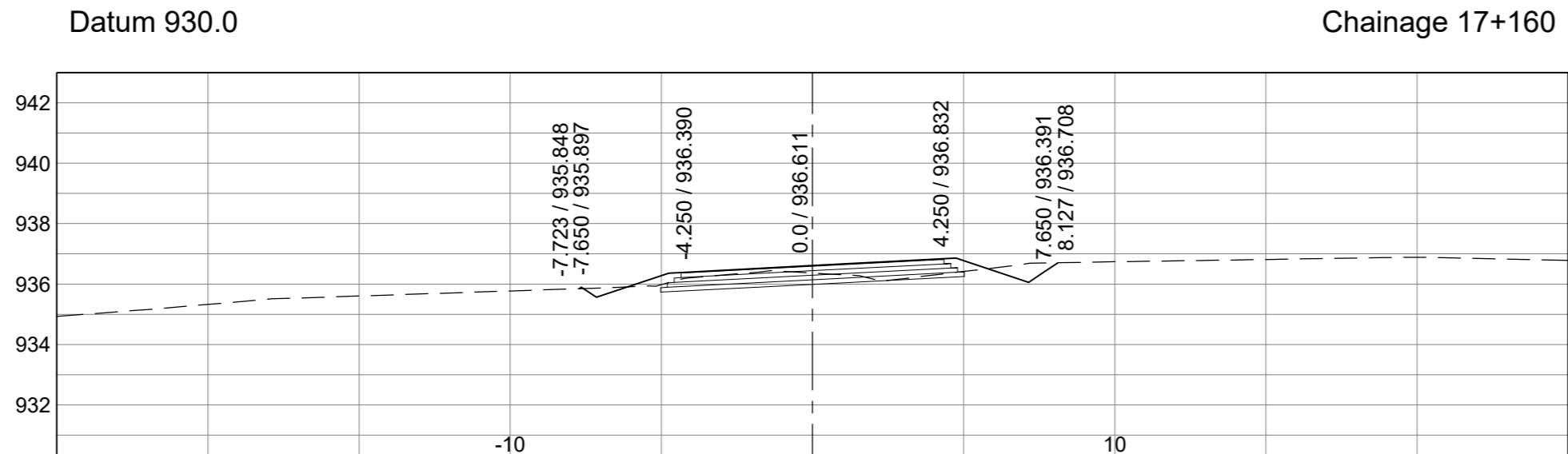
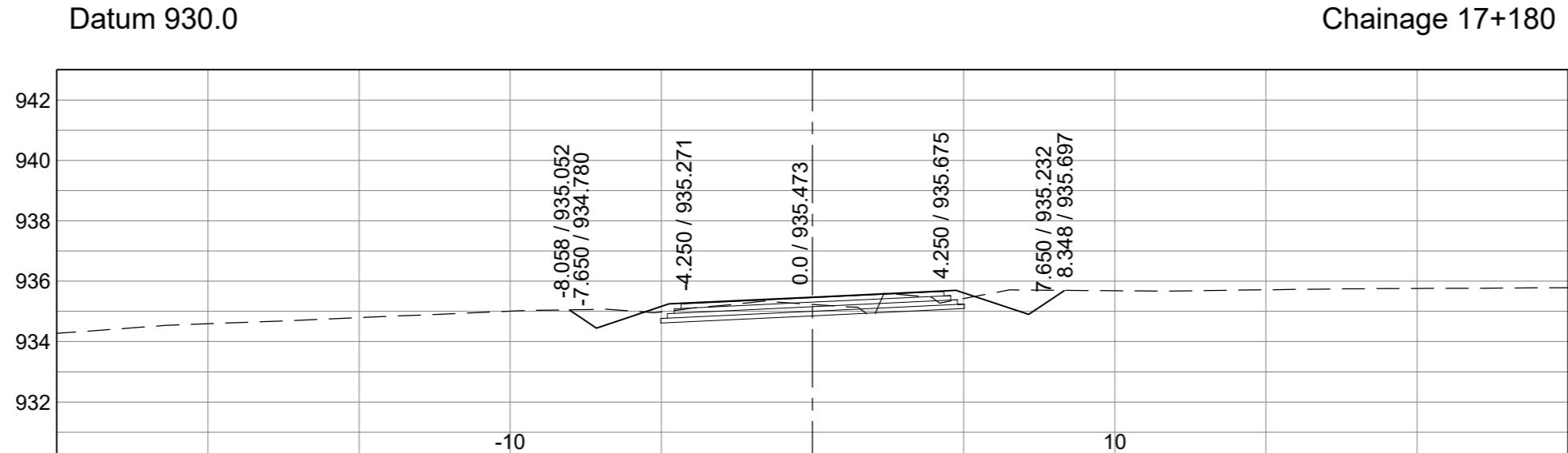
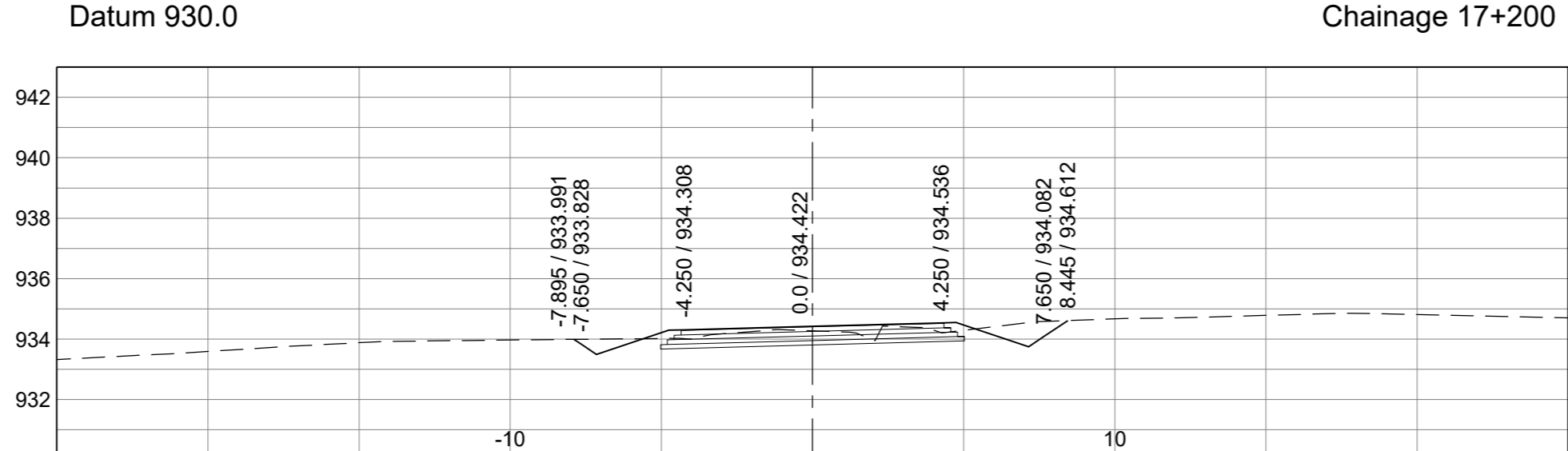
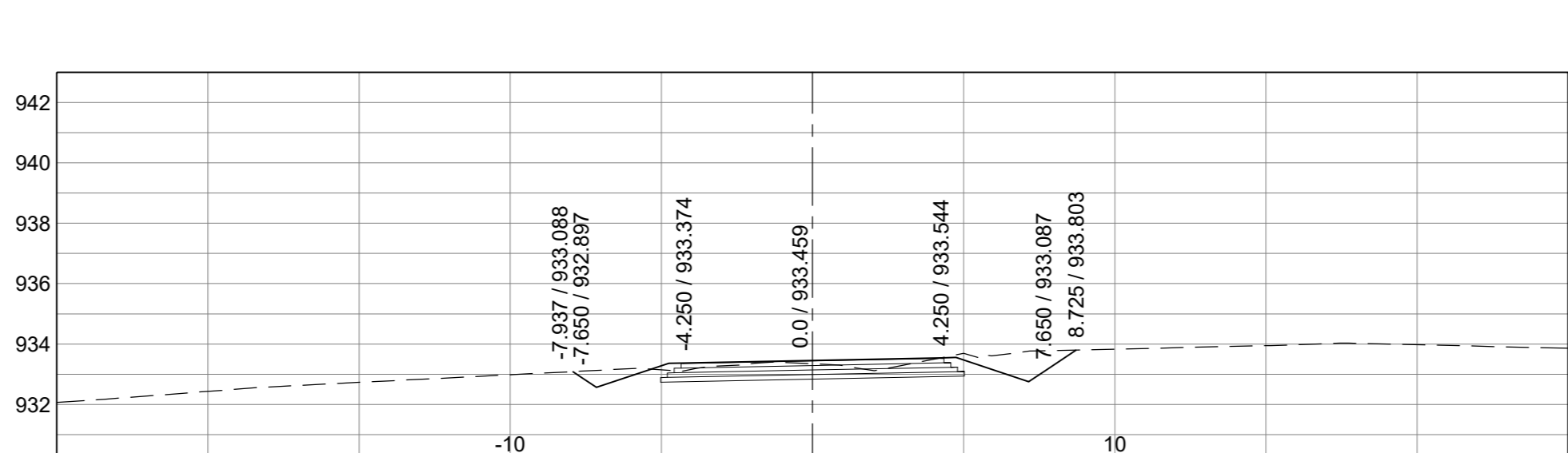
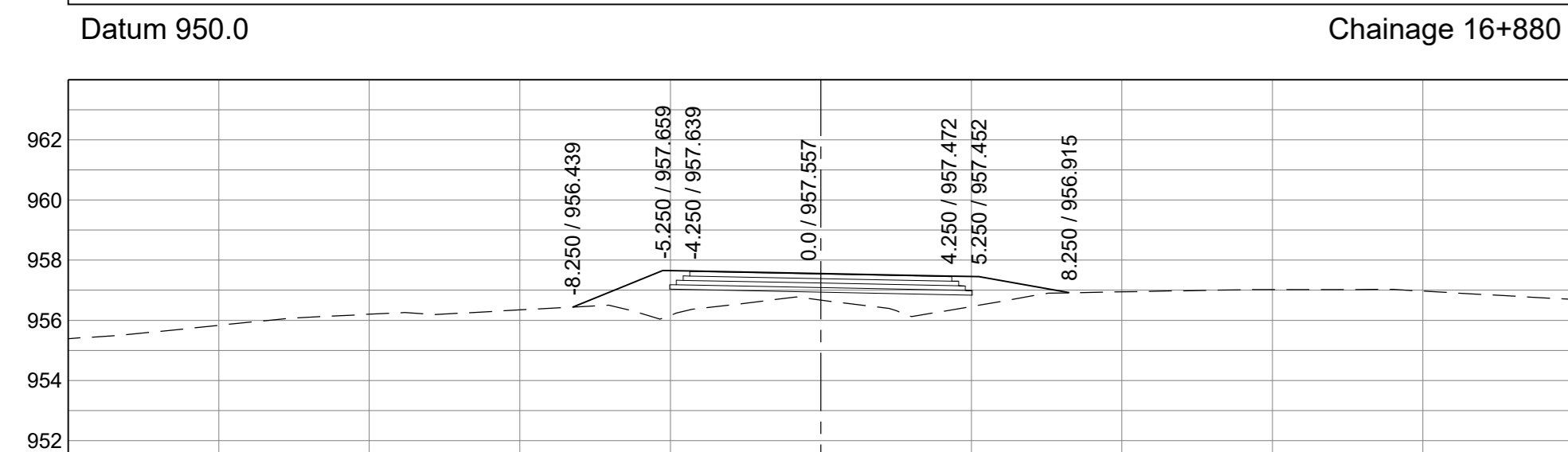
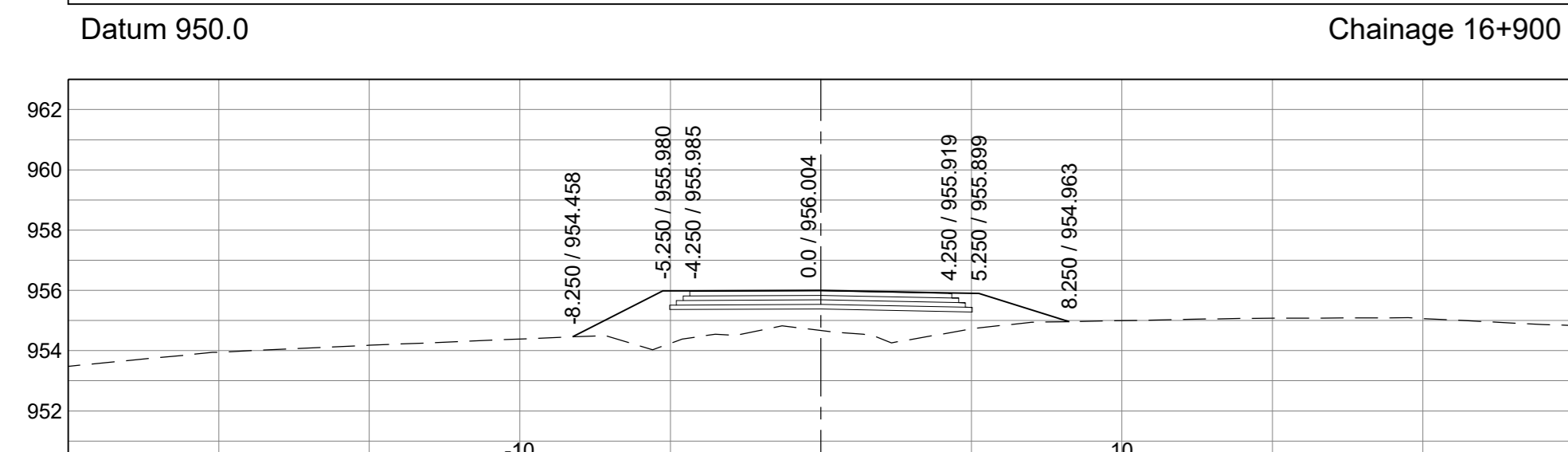
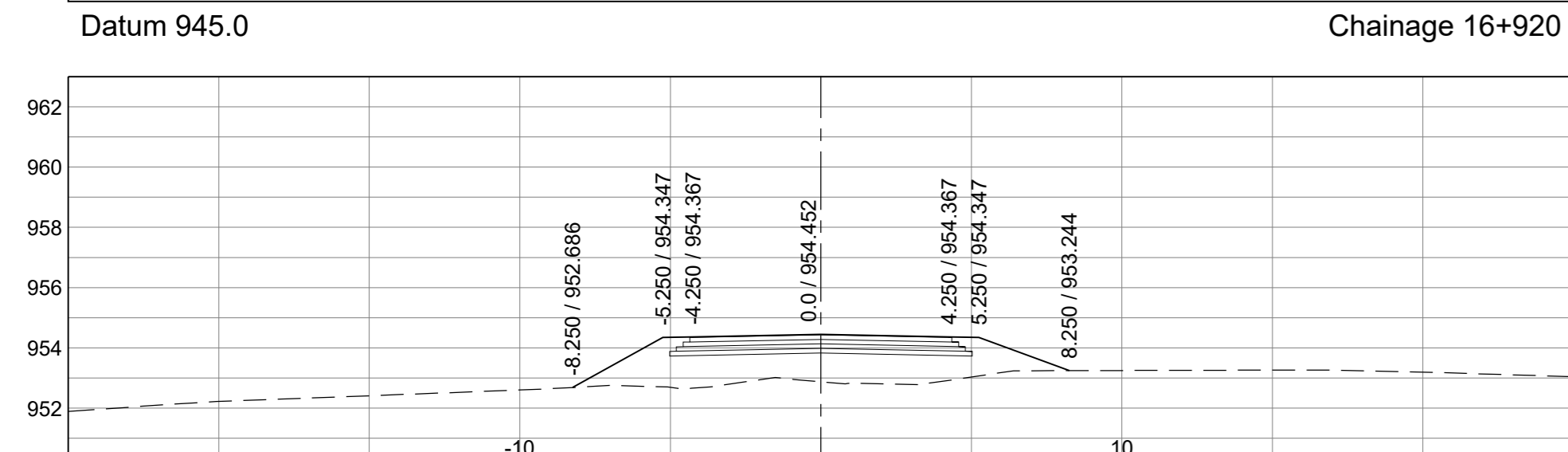
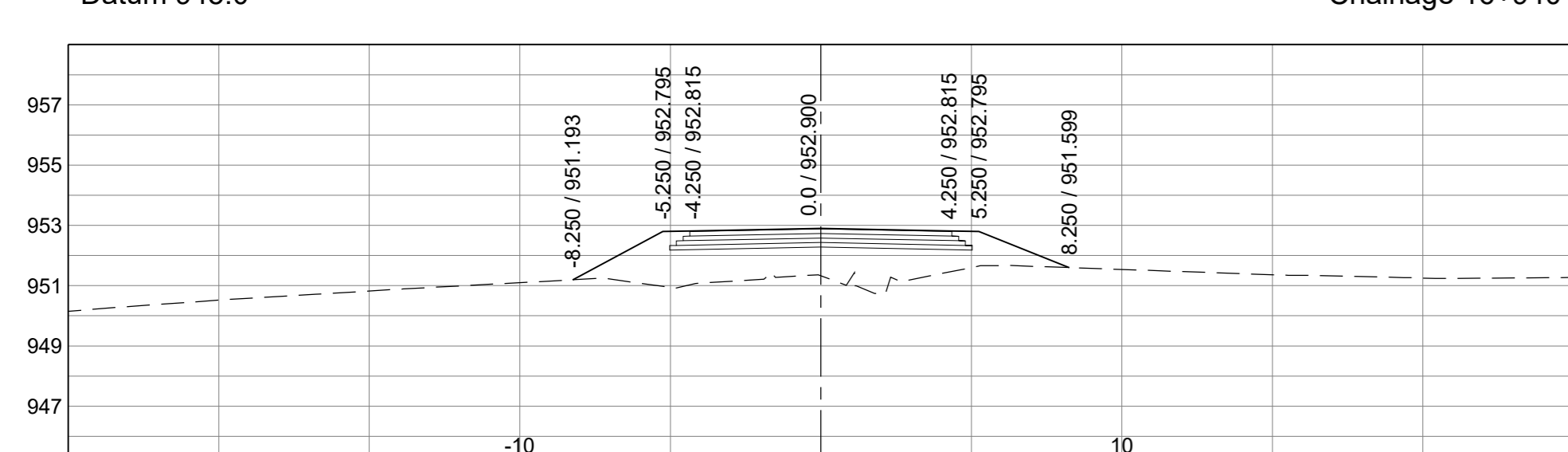
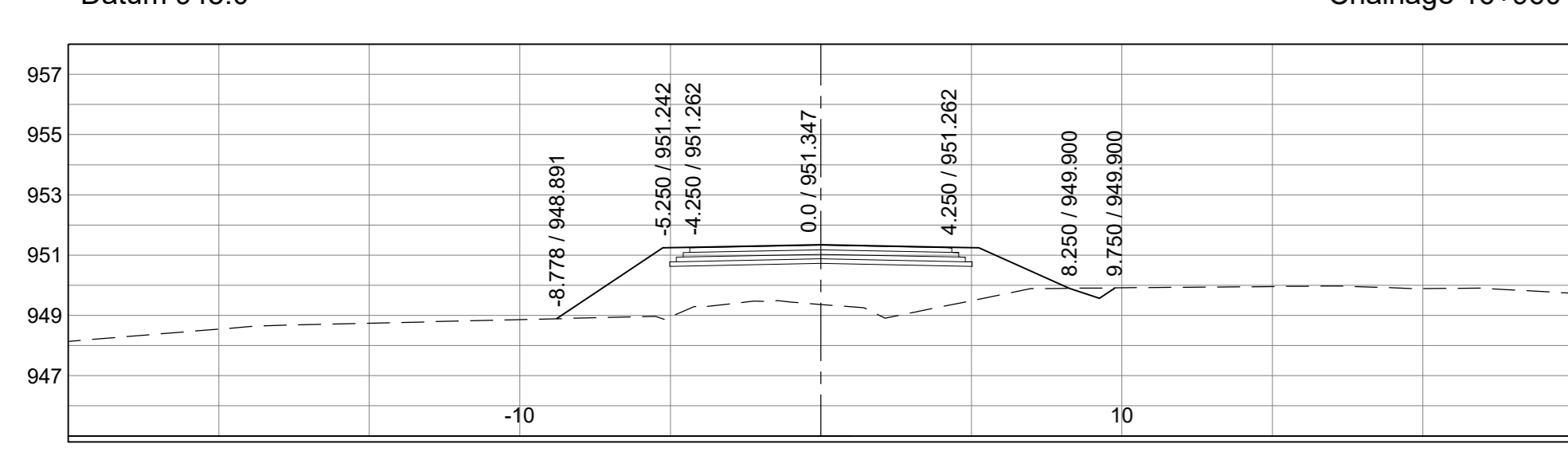
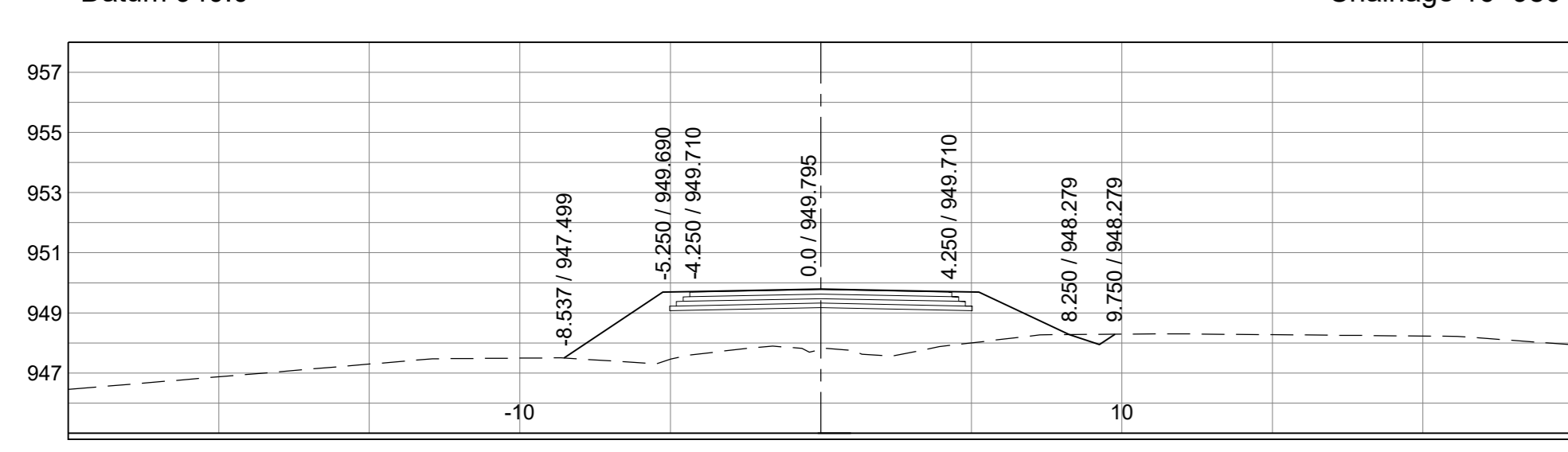
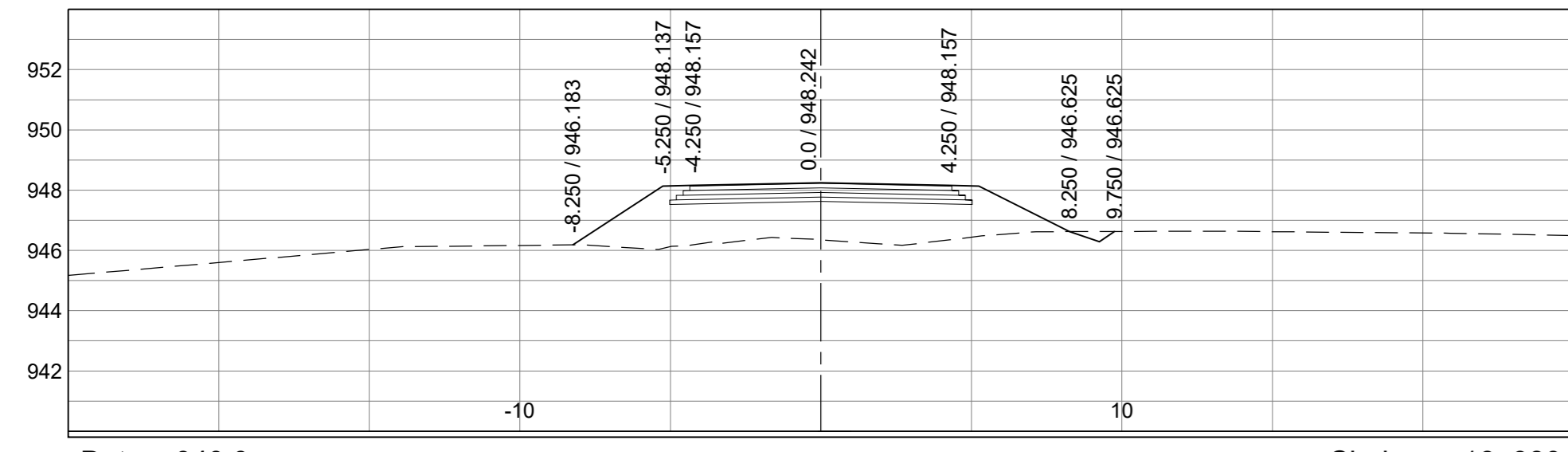
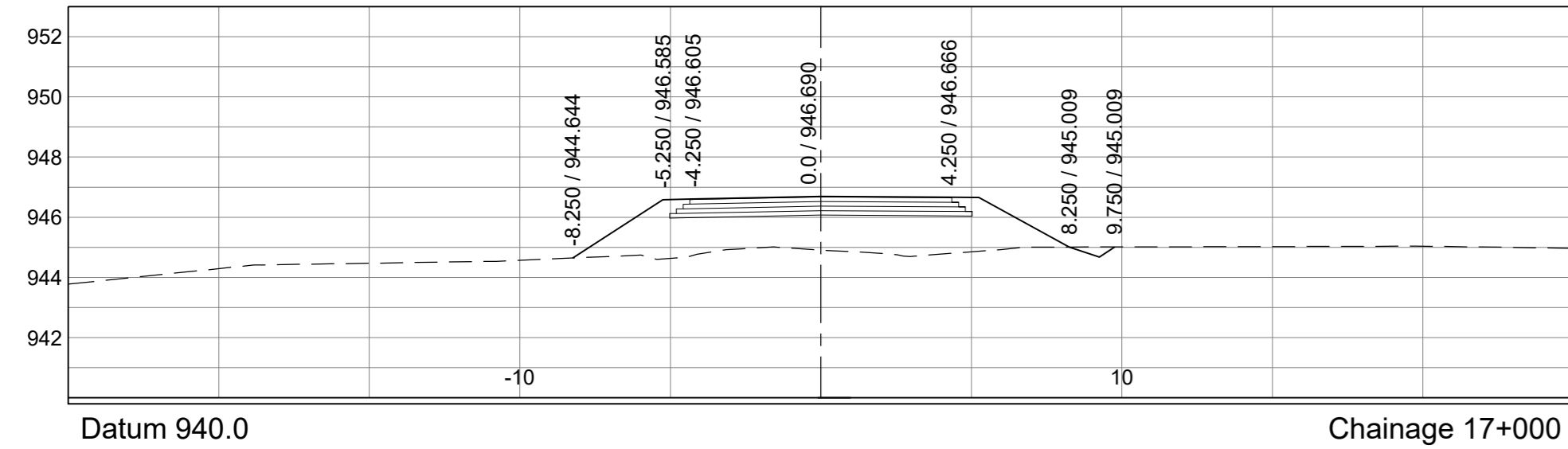
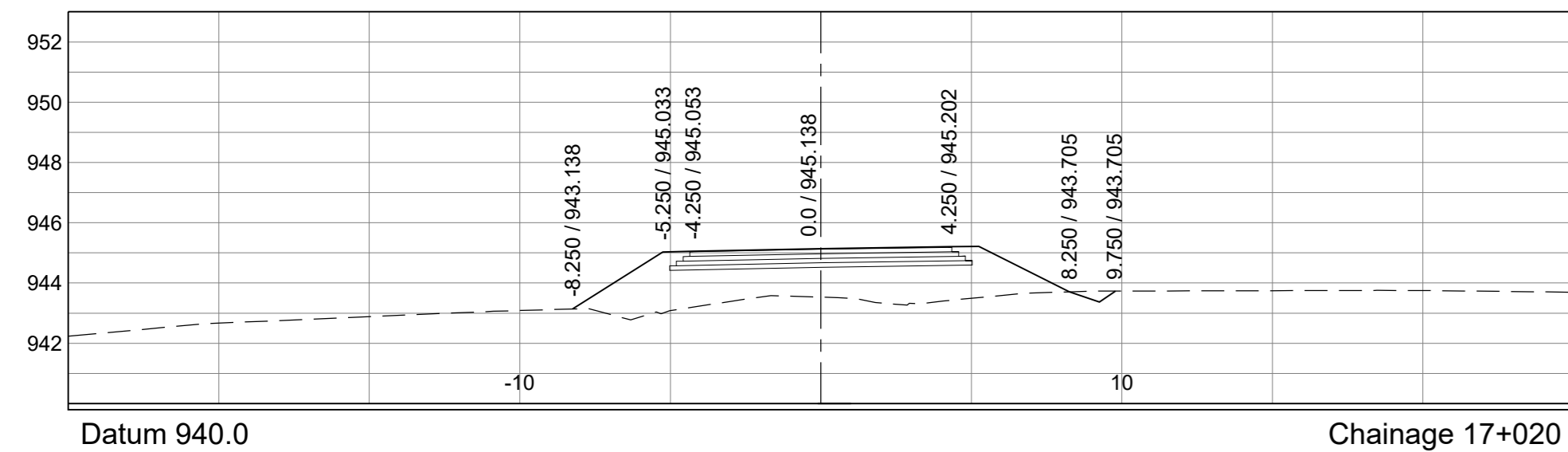
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 9	REVISION:
km 16+160 - km 16+860	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 44338**





AS BUILT			
Supervising Engineer	Date	YD	Checked
A	01-02-2024	ISSUED FOR TENDER	
Symbol	Date	Description	Checked
AMENDMENTS			

Continued from:-	C 44337	Designed by:-	T. PIKA
Continued on:-	C 44339	Checked by:-	Y. DOMA
Cross Section No:-	C 44338	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44328 - C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44321 - C 44322	Date of approval:-	



Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivaled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: \_\_\_\_\_ Date: 01-02-2024

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 GENERAL ROAD CROSS SECTIONS

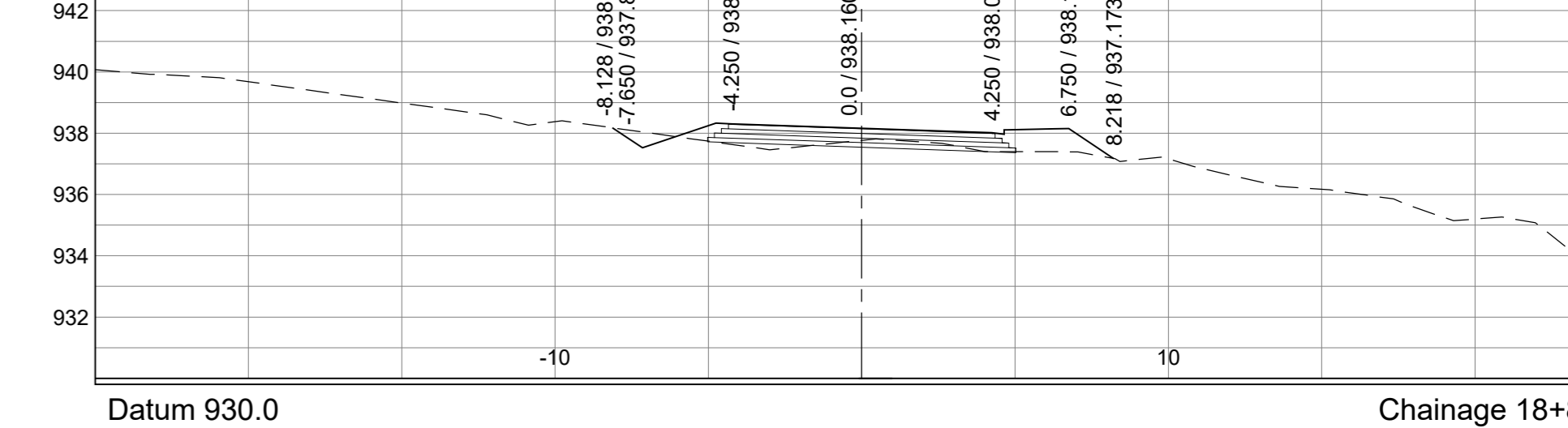
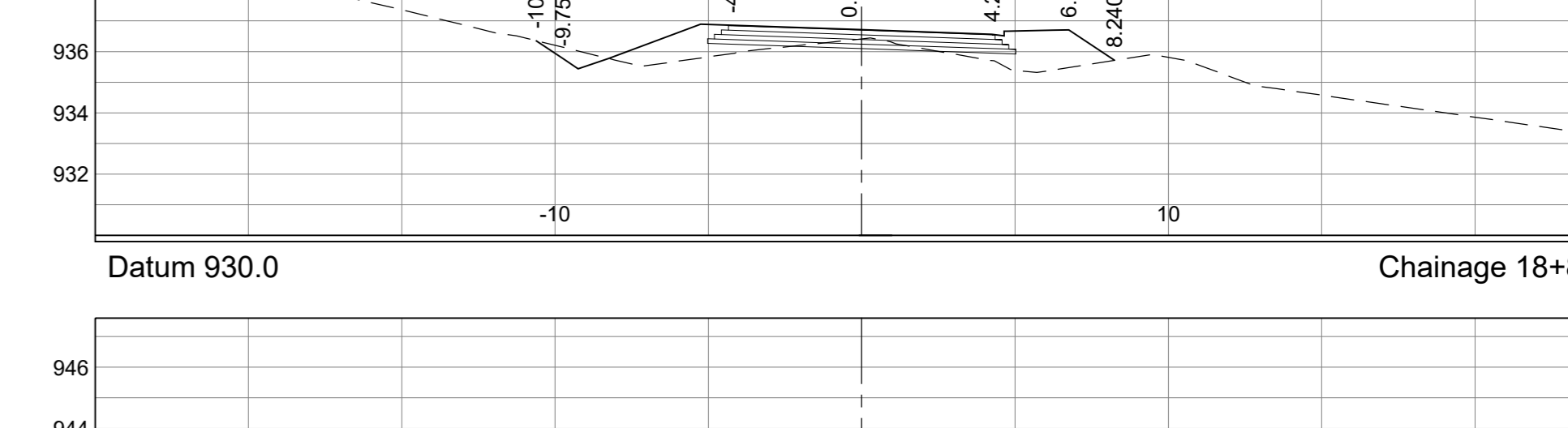
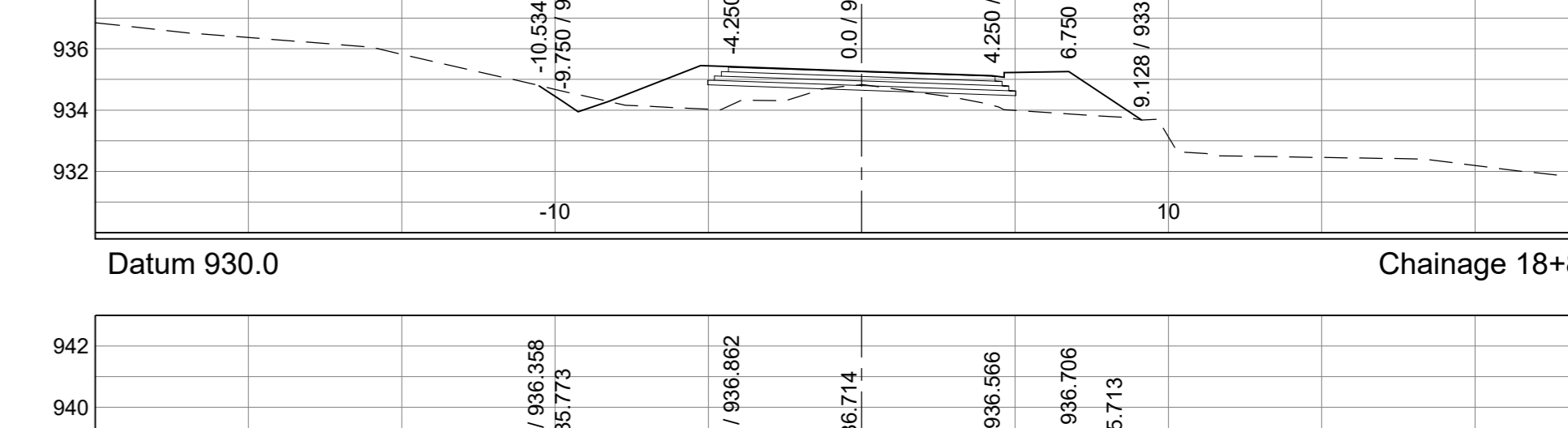
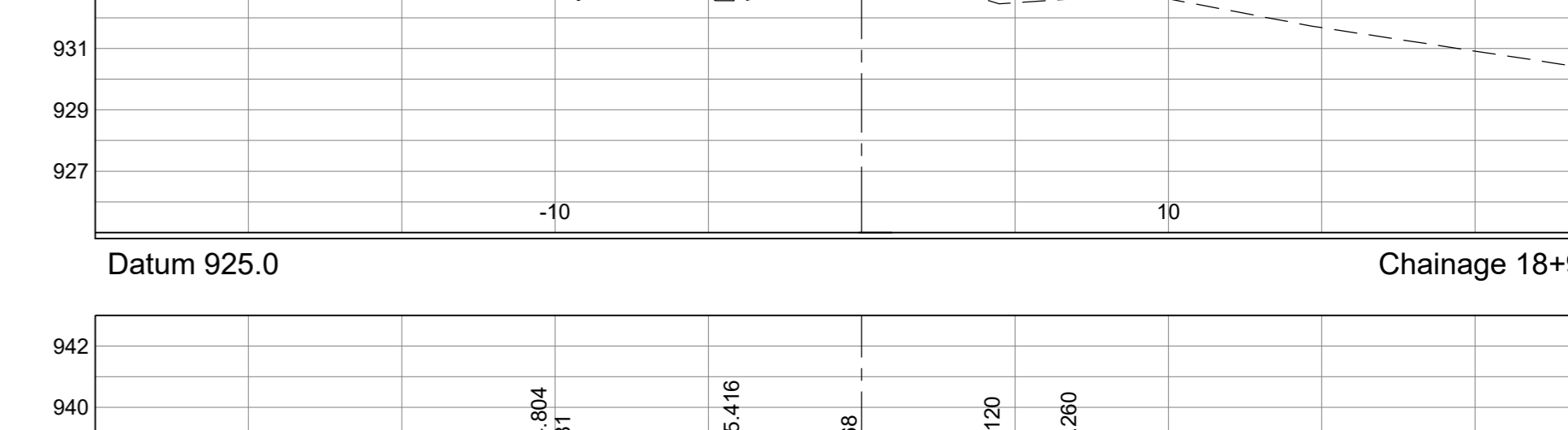
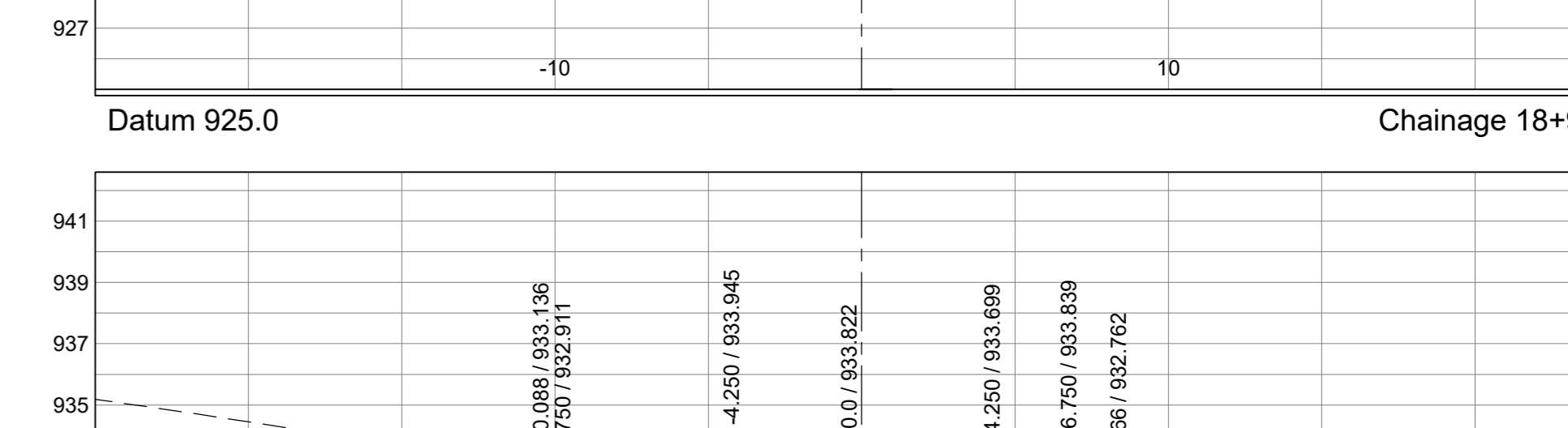
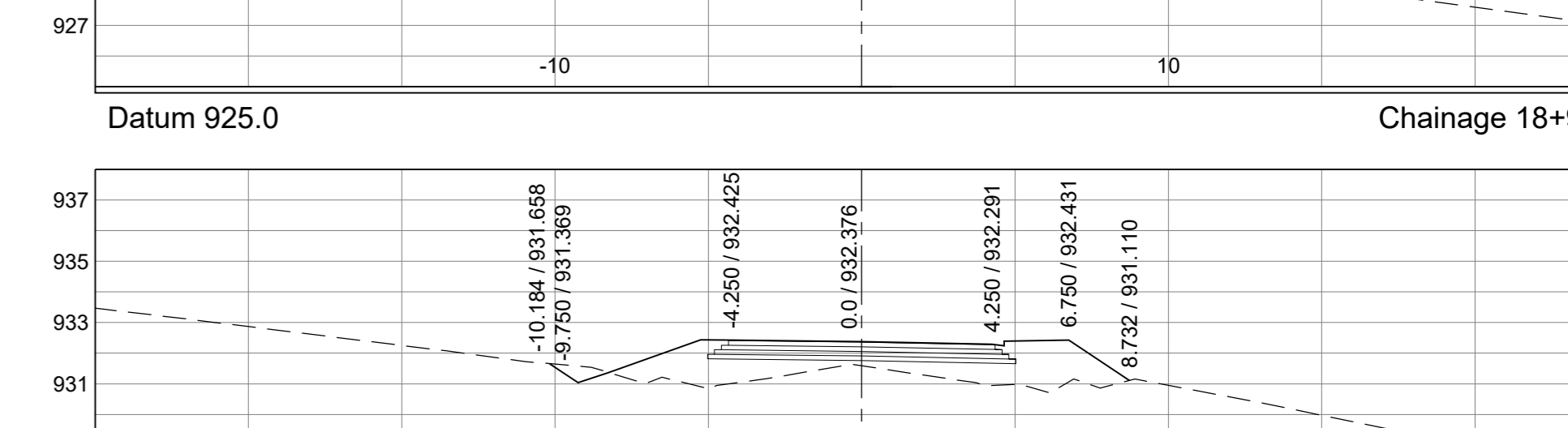
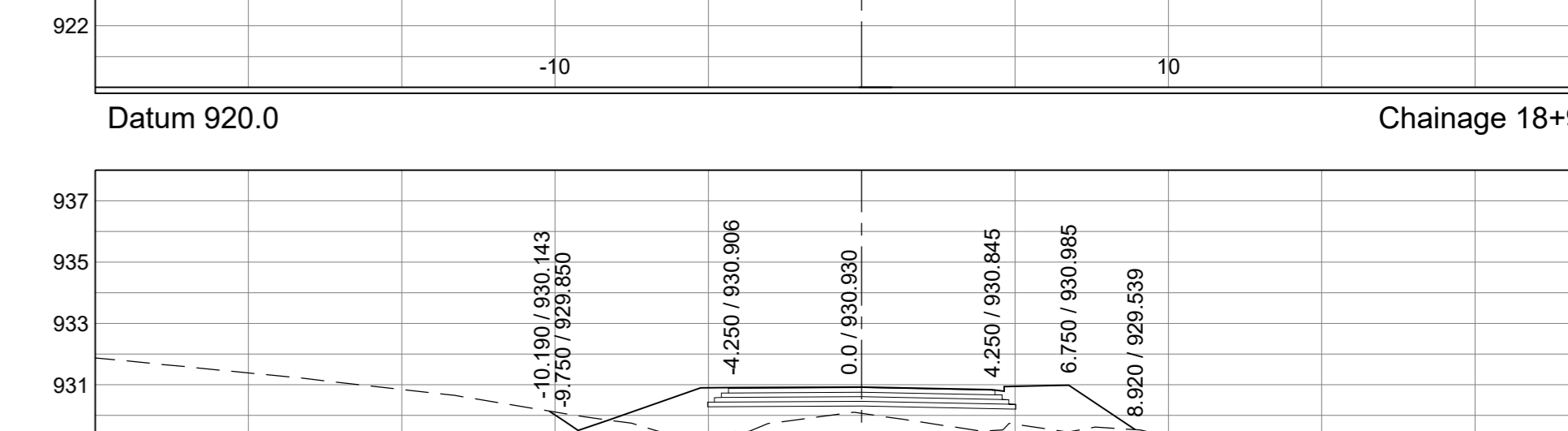
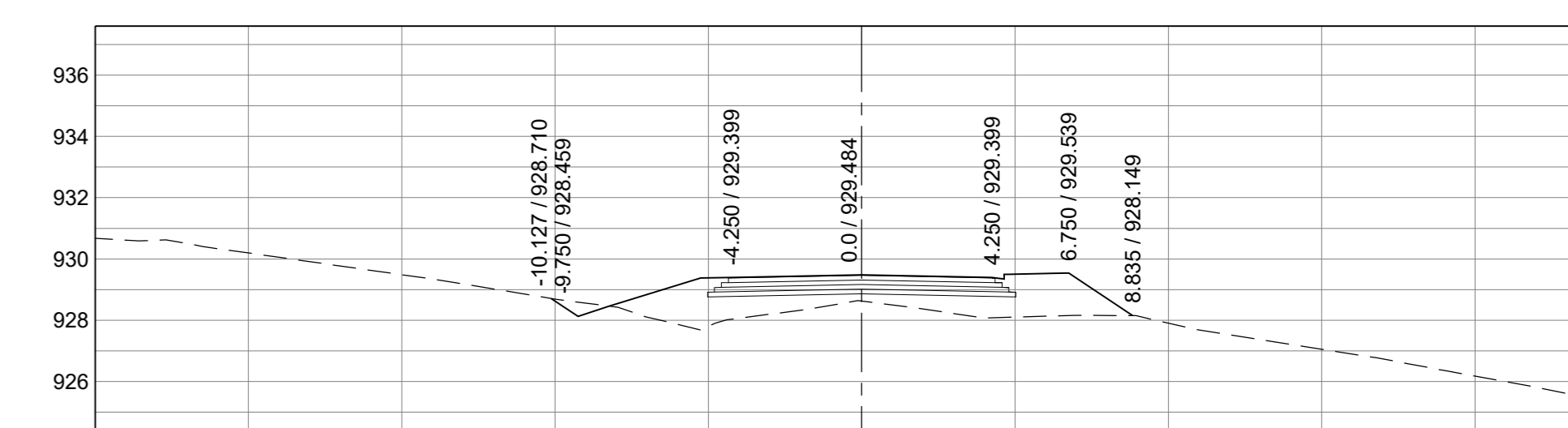
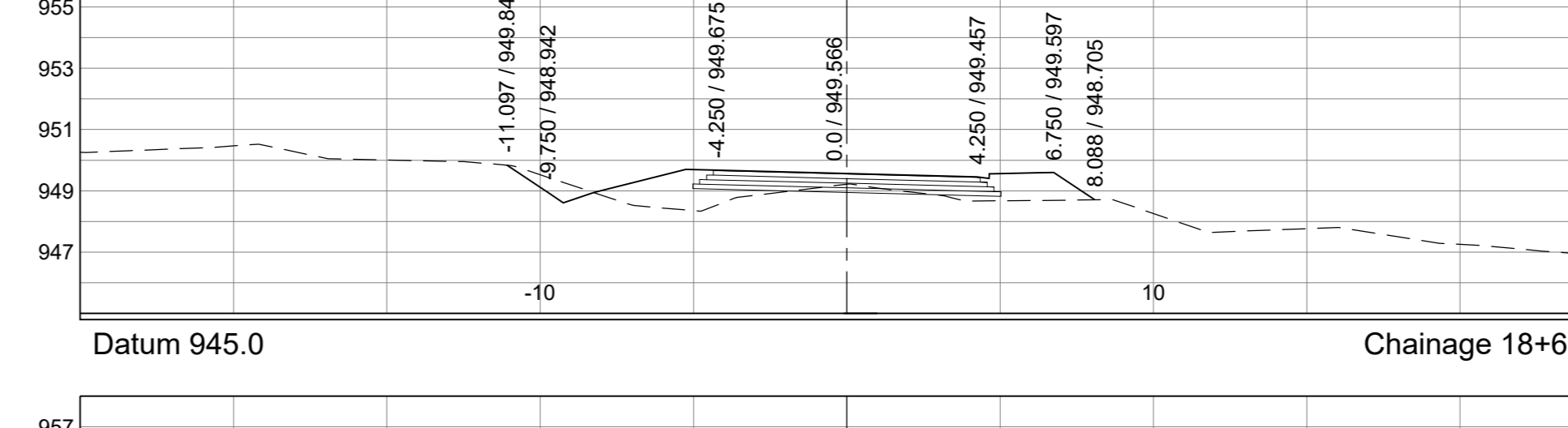
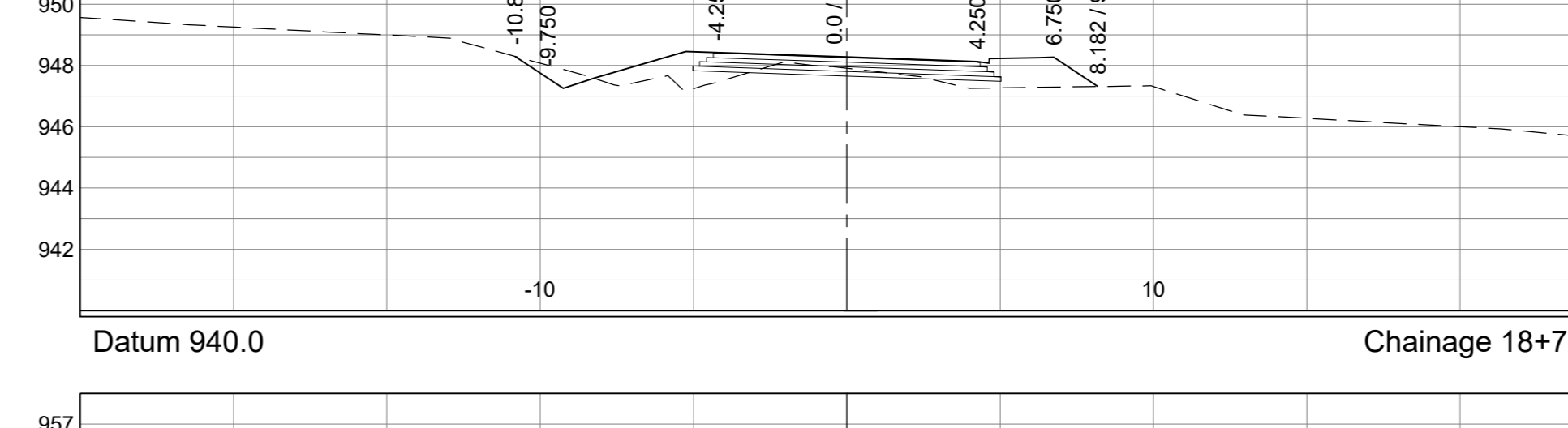
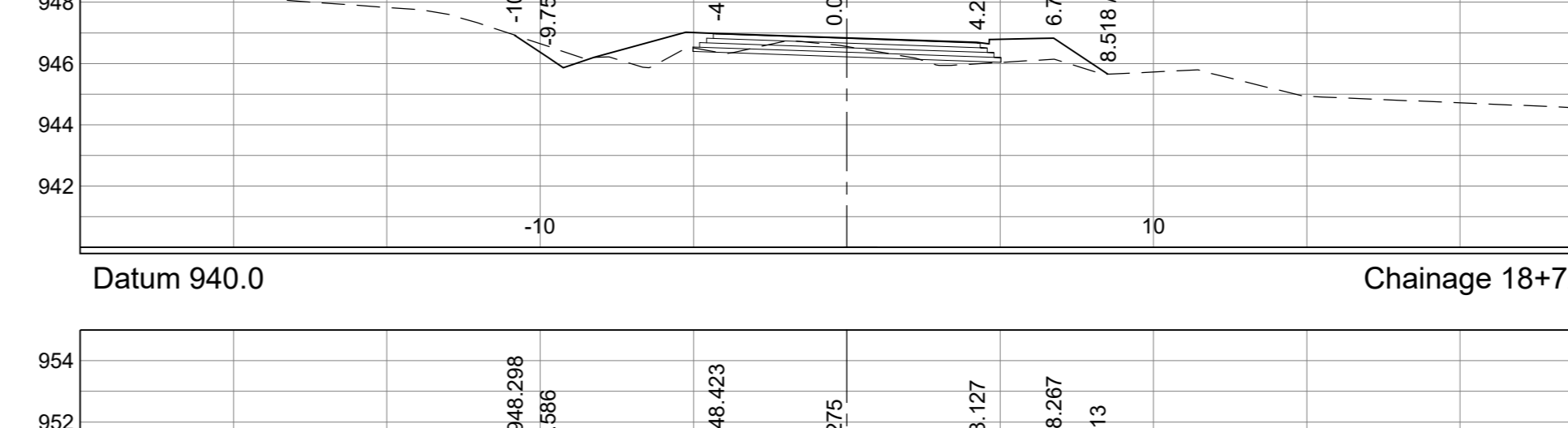
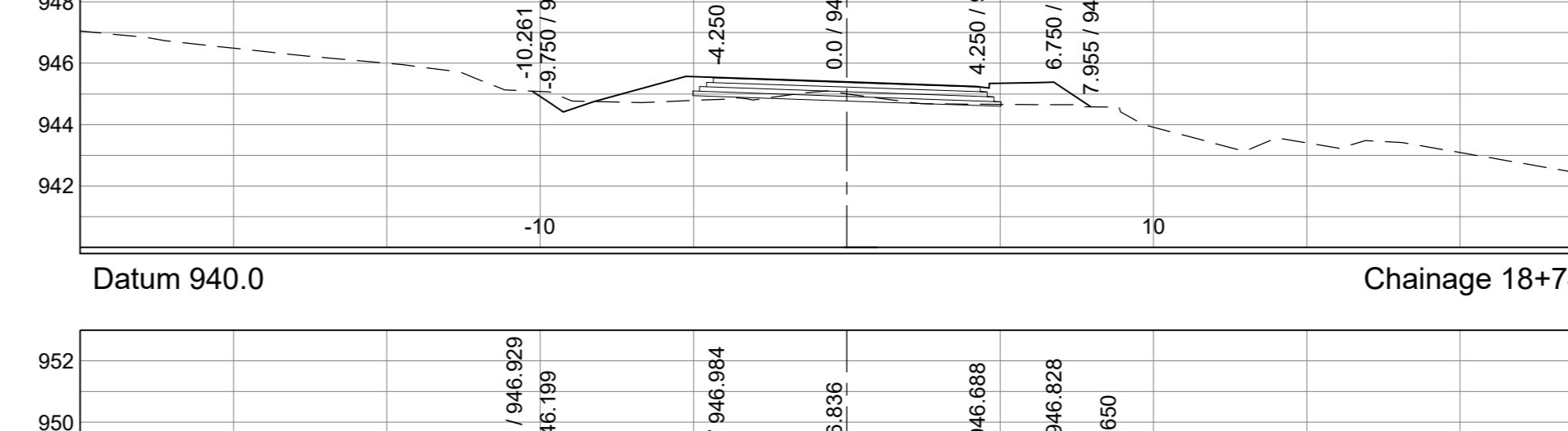
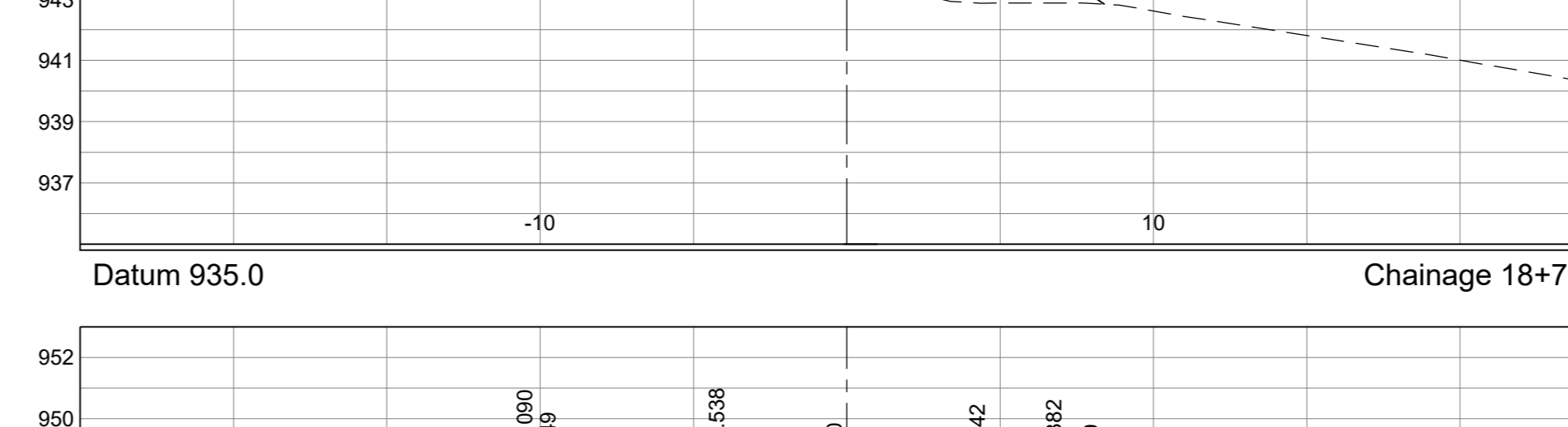
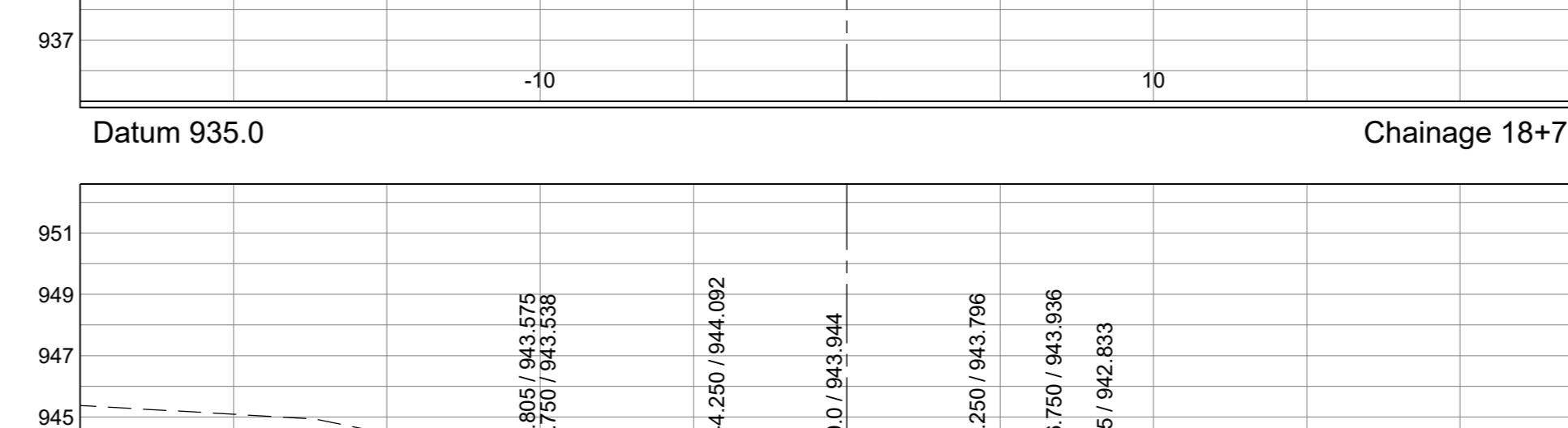
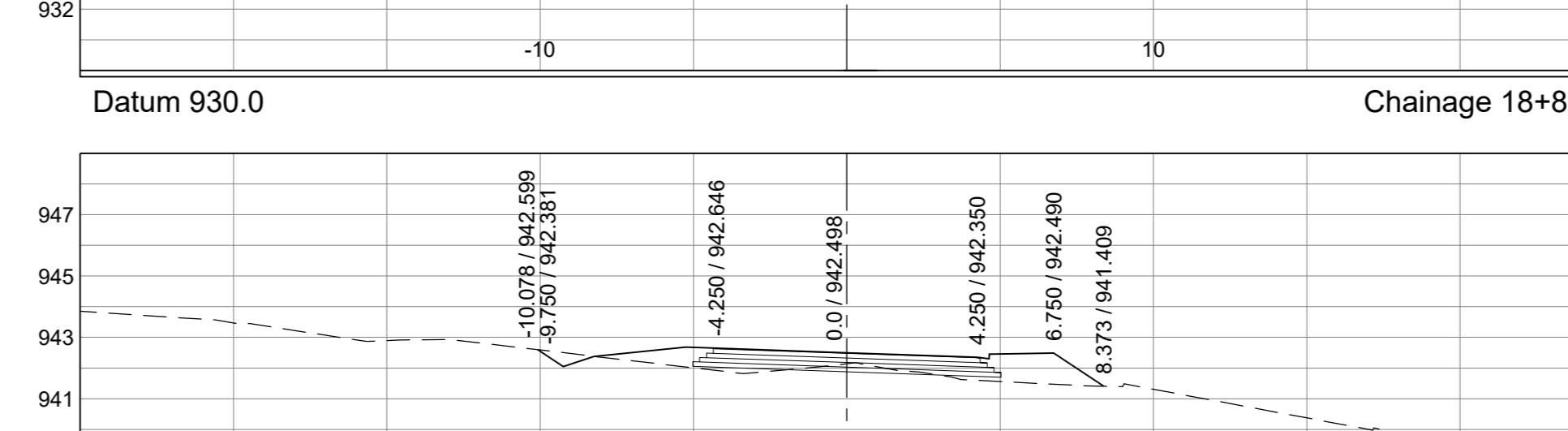
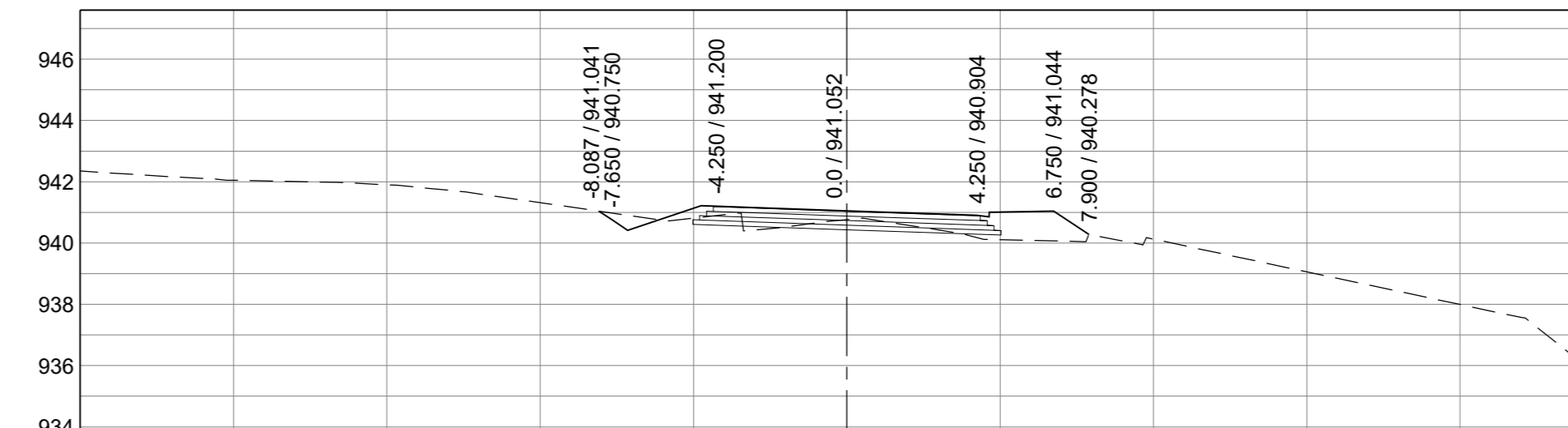
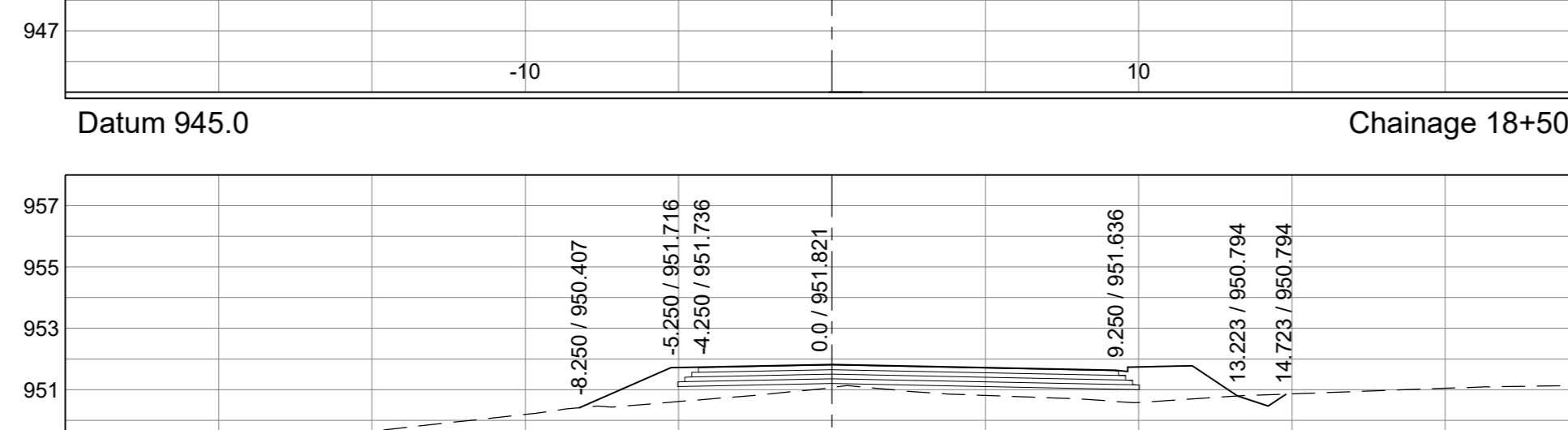
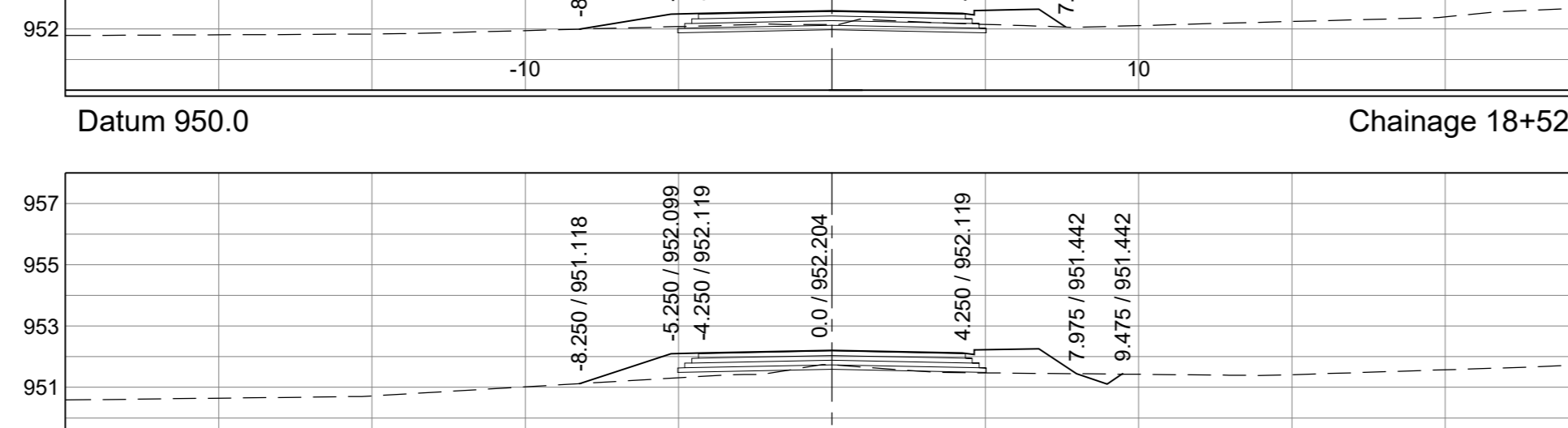
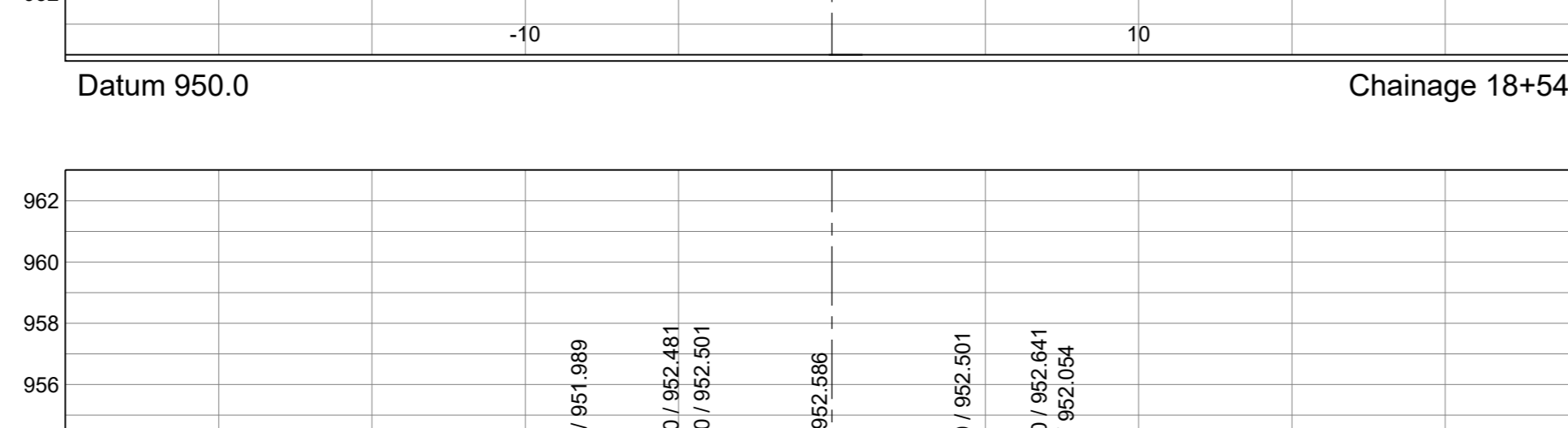
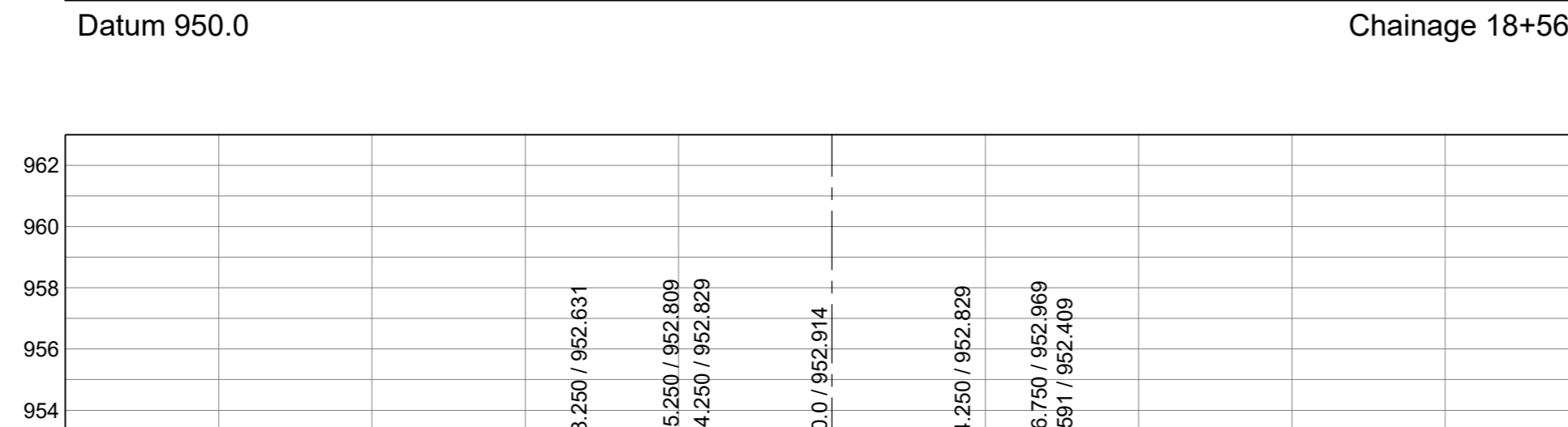
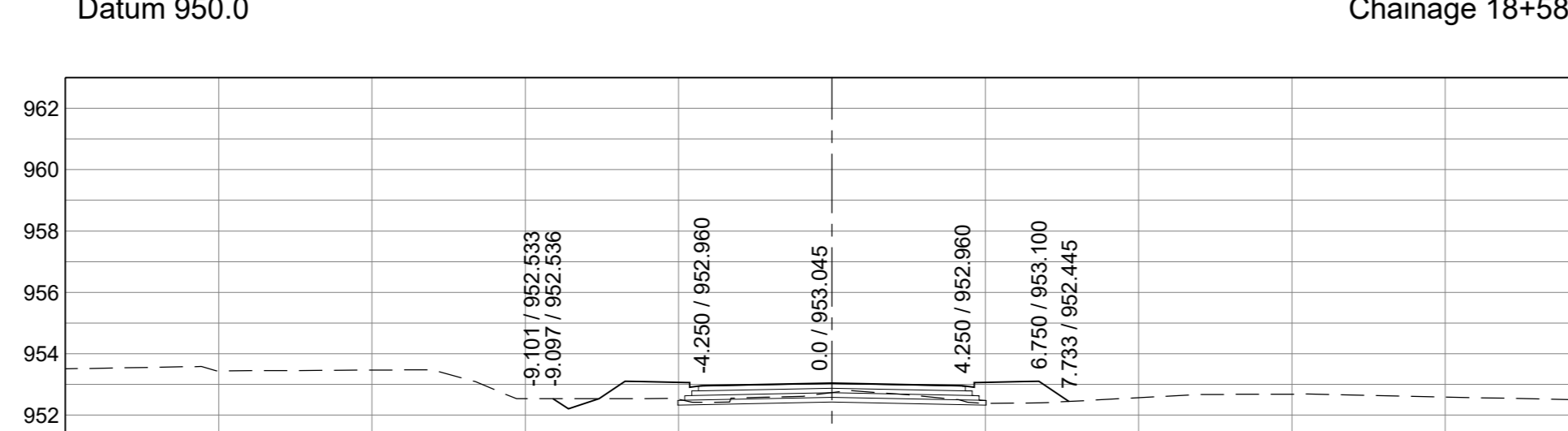
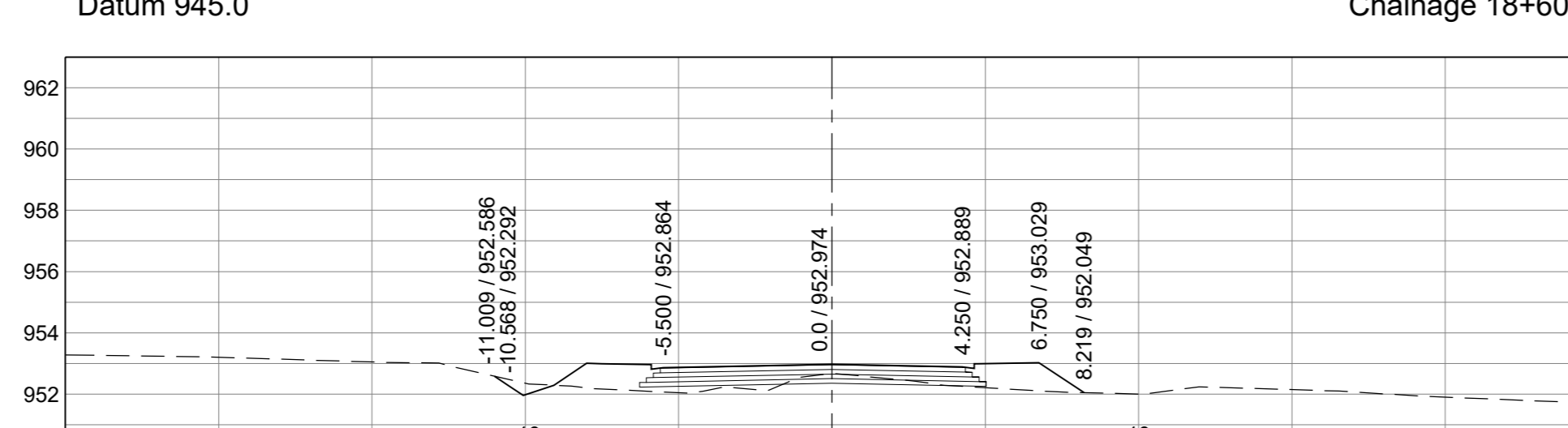
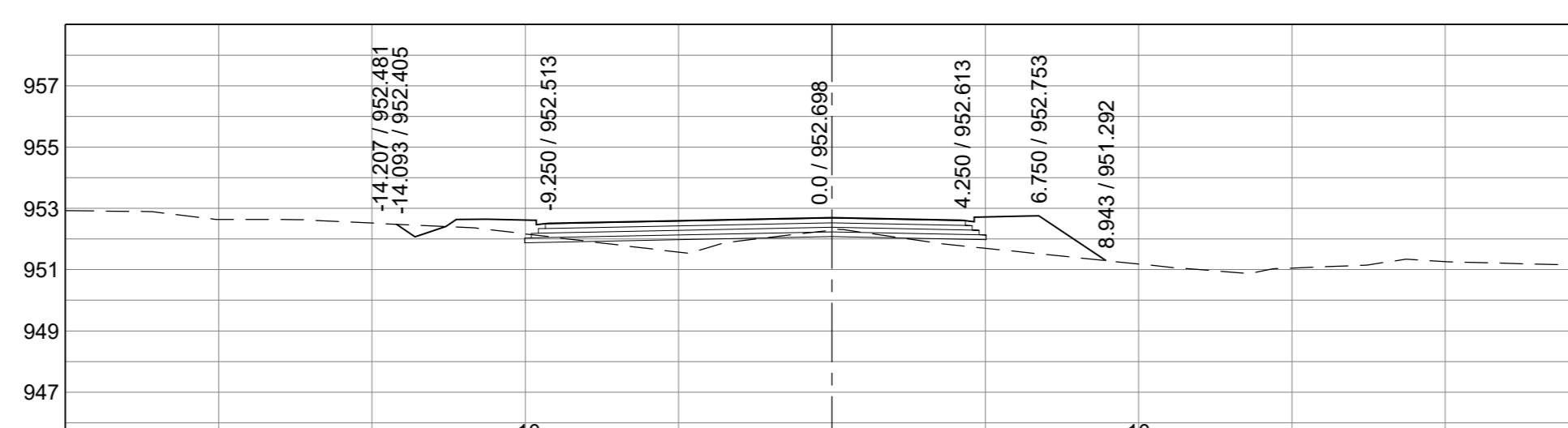
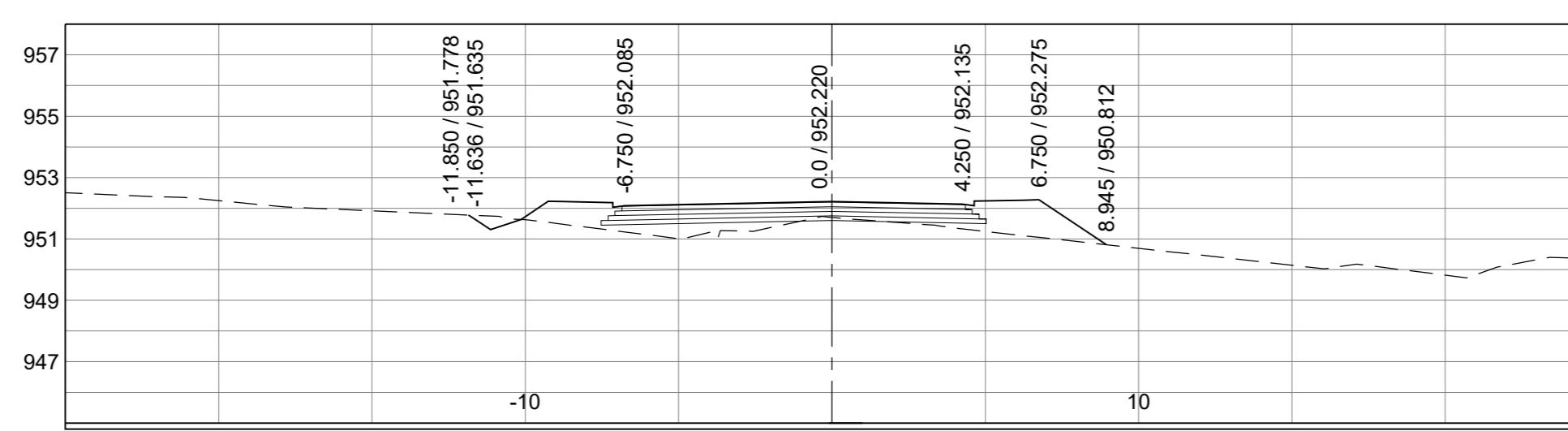
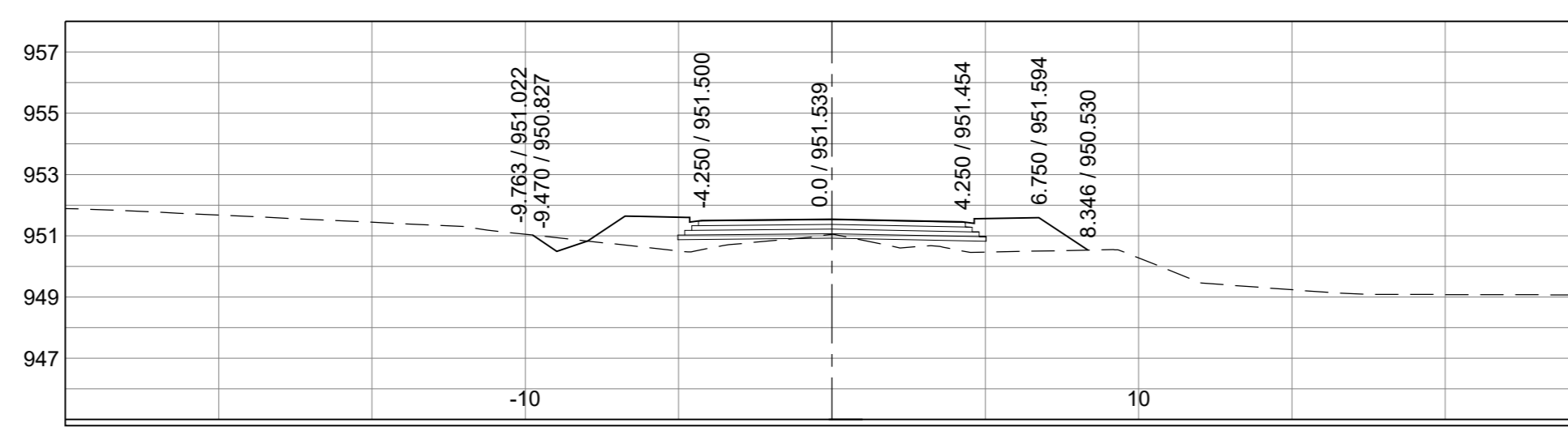
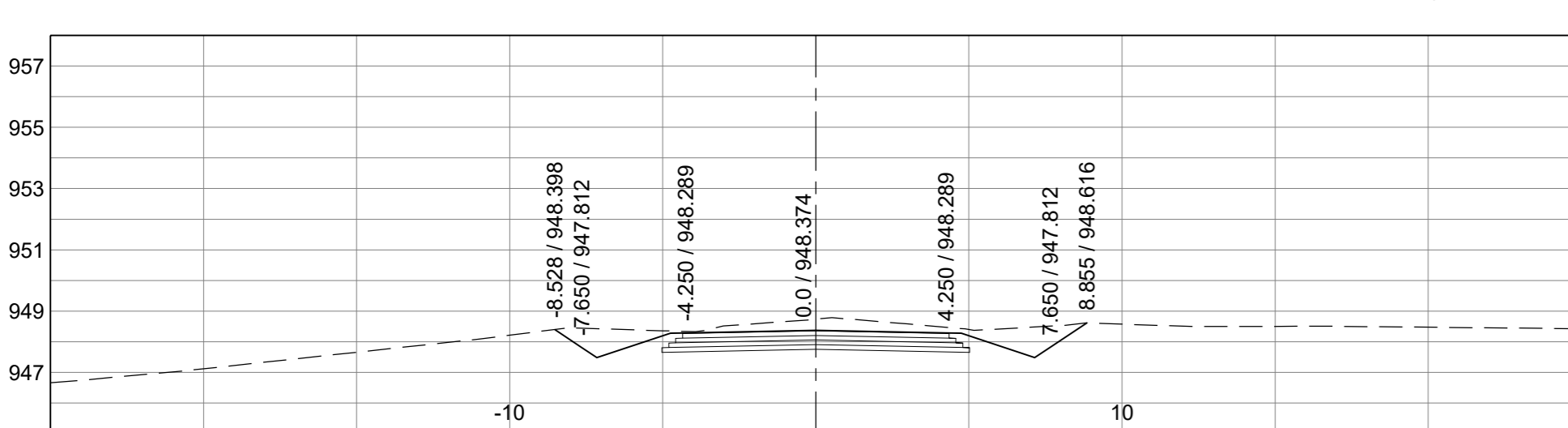
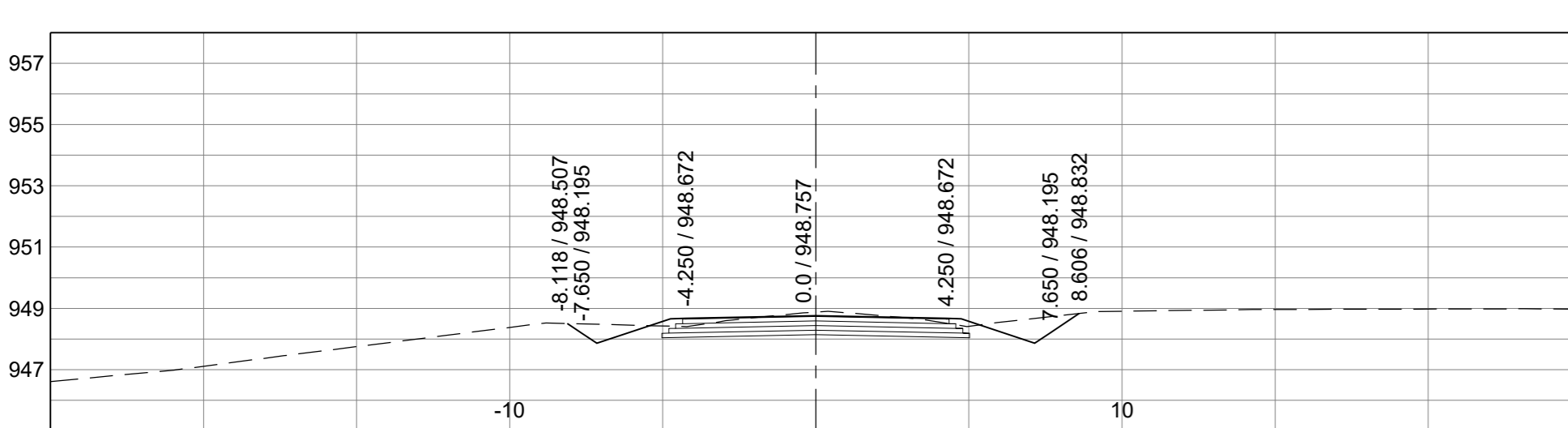
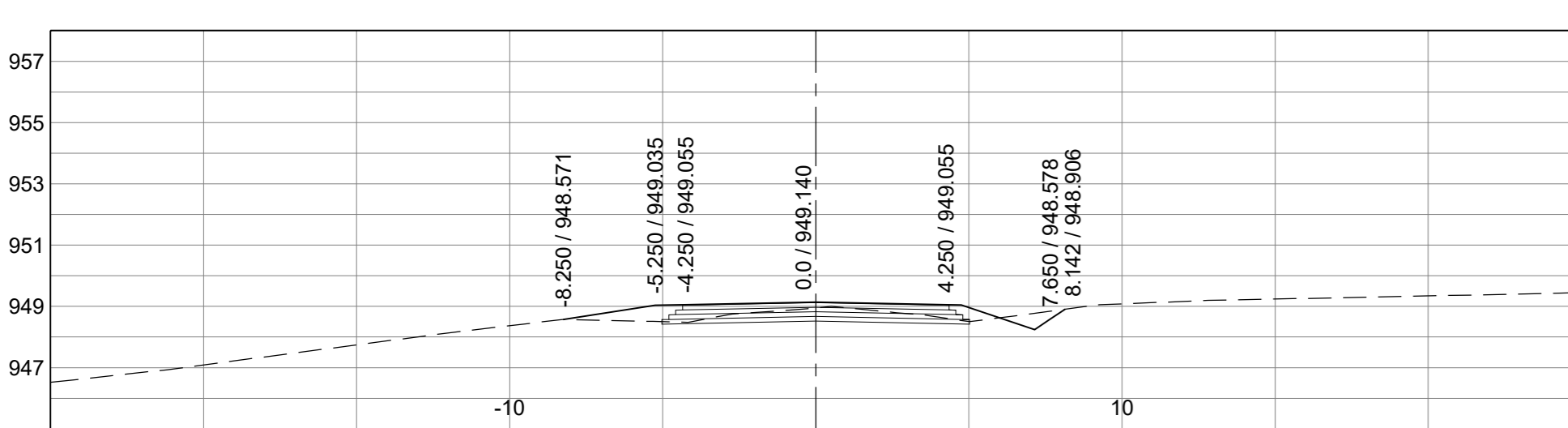
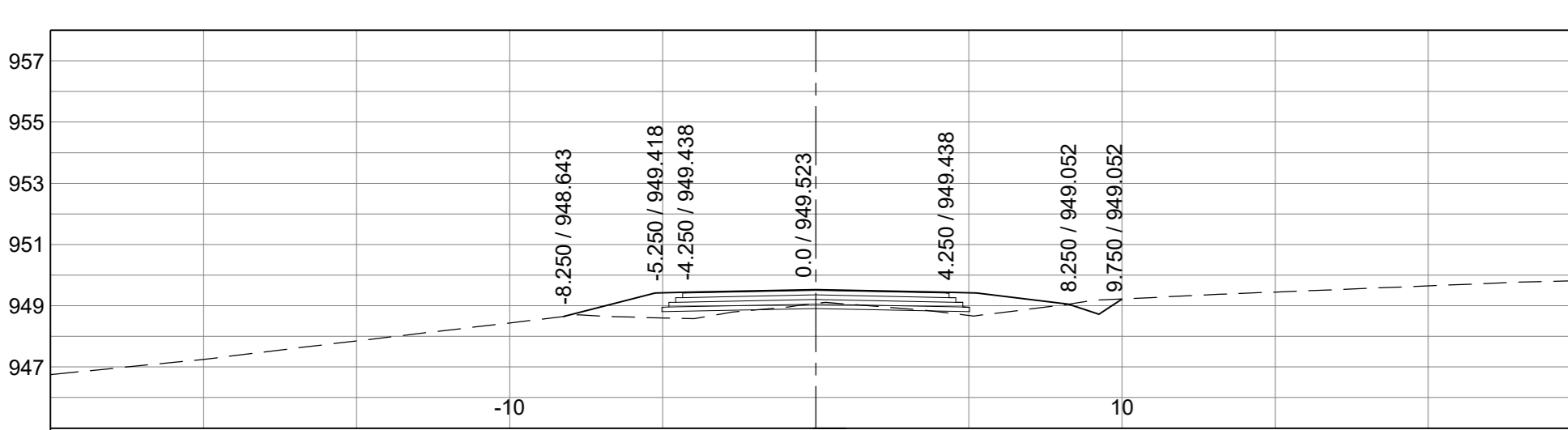
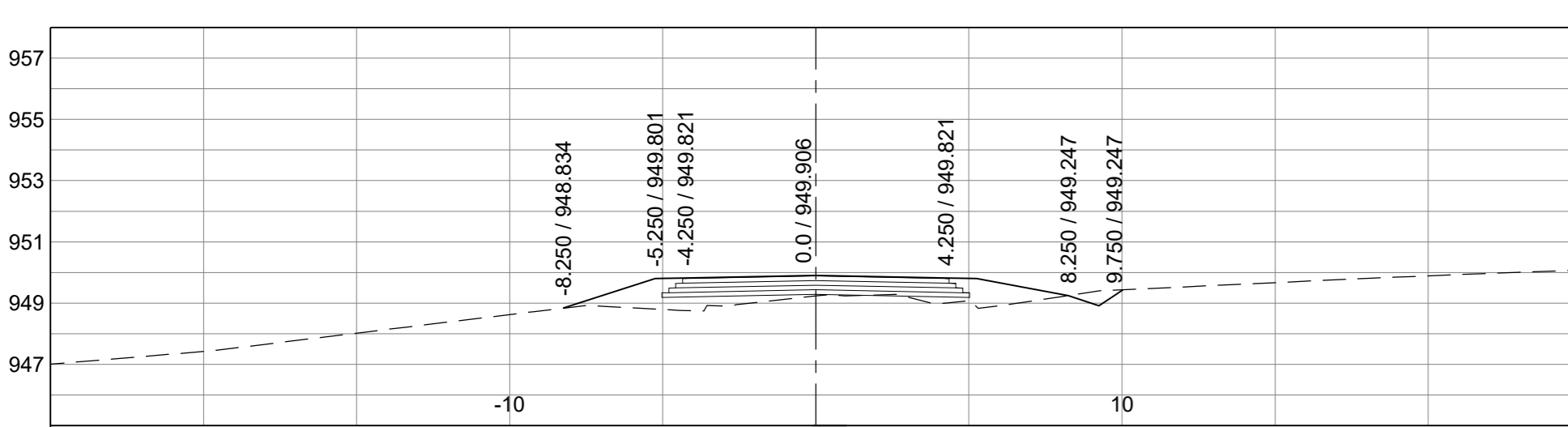
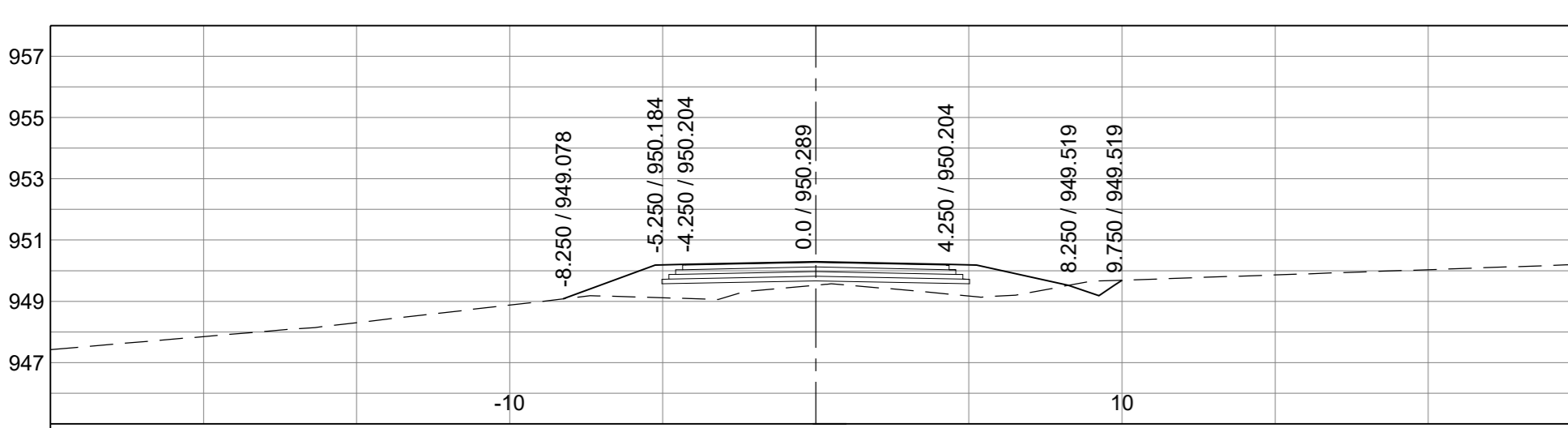
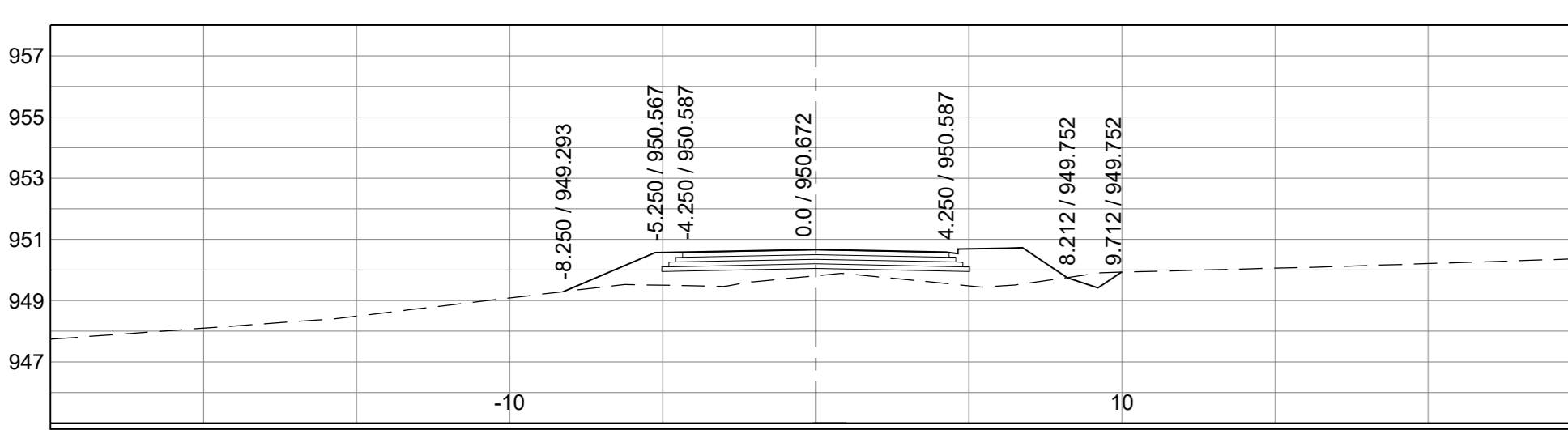
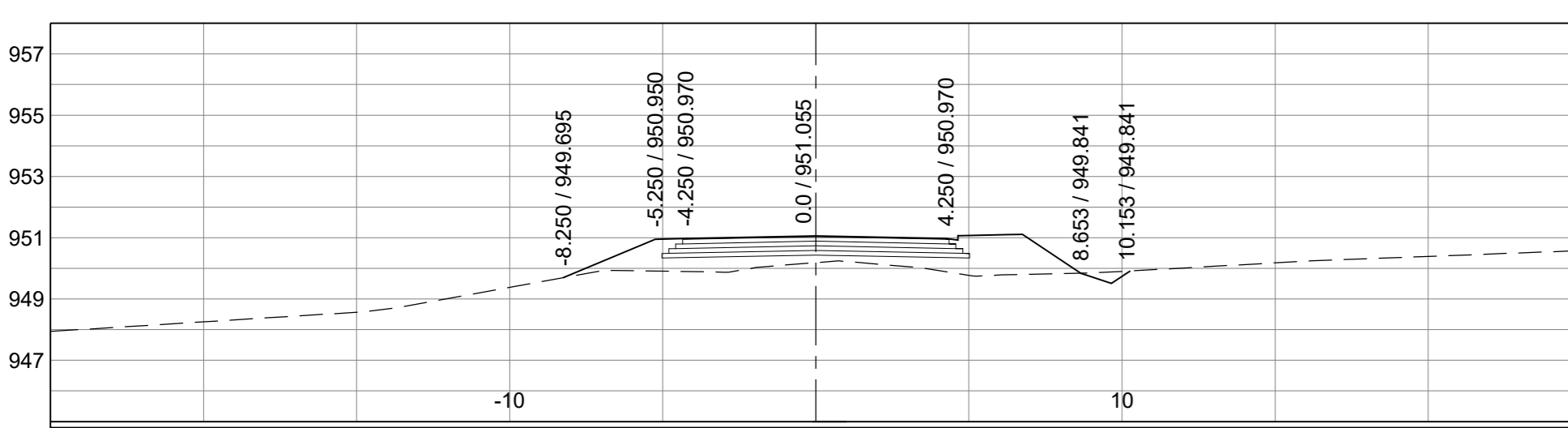
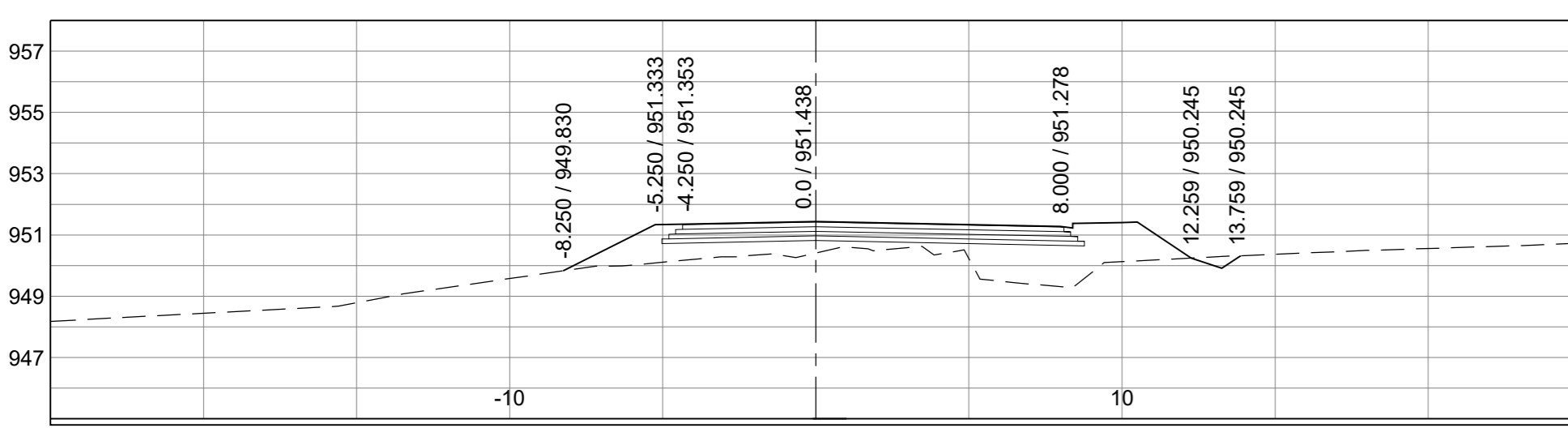
Staked km distance	Sheet -> 10	REVISION:
km 16+880 - km 17+580	of -> 18	A
Scale	Plan No ->	
HORIZONTAL 1:200		
VERTICAL 1:200		
		<b>C 44339</b>

C 44339









Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44339	Designed by:-	T. PIKA
Continued on:-	-	Checked by:-	Y. DOMA
Cross Section No:-	C 44340	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323 - C 44324	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

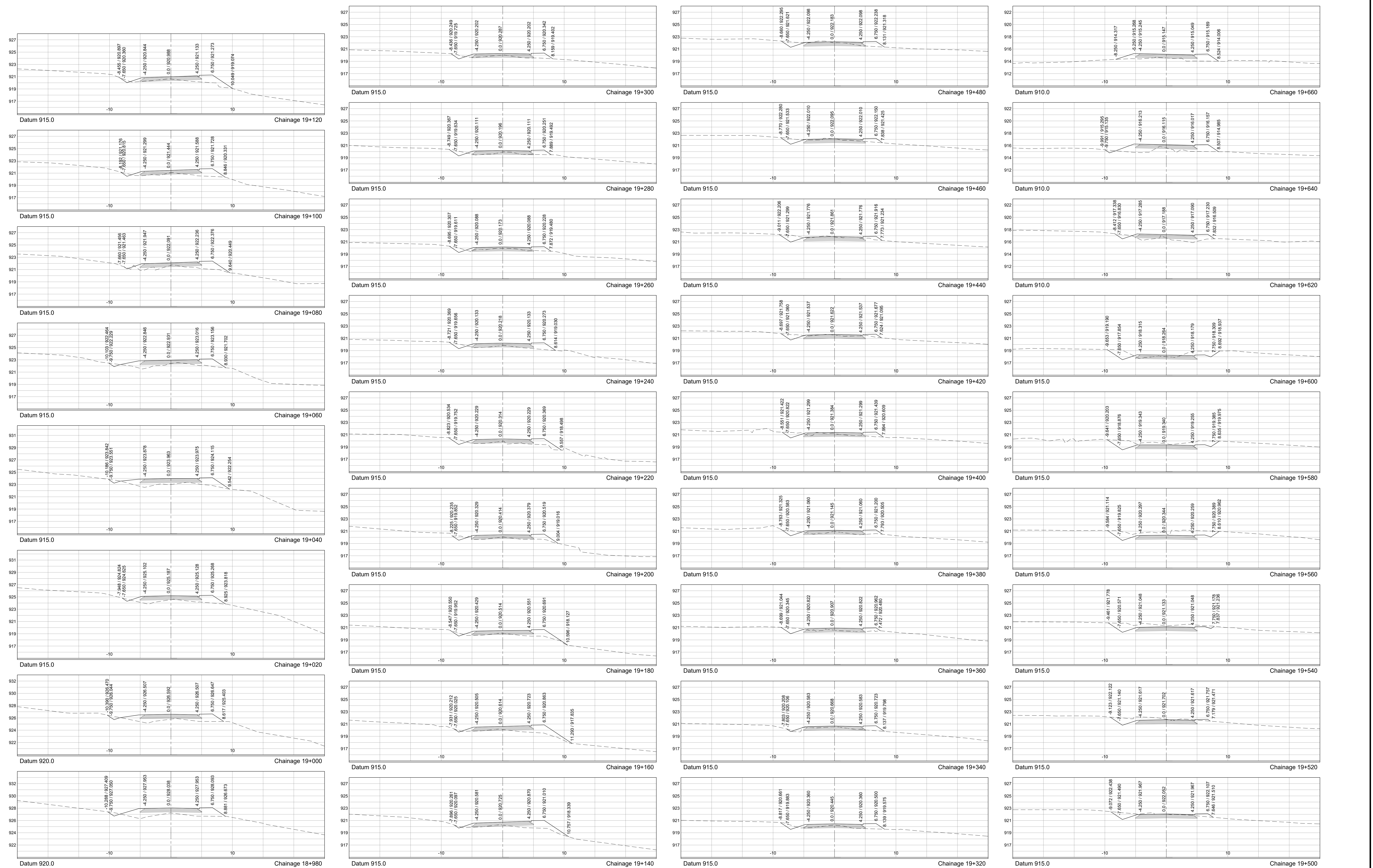
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 12	REVISION:
km 18+320 - km 18+980	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 44341**





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:- C 44339  
 Continued on:-  
 Cross Section No:- C 44340  
 Longitudinal Section No:- C 44329  
 Design Plan No:- C 44323 - C 44324

Designed by:- T. PIKA  
 Checked by:- Y. DOMA  
 Drawn by:- S. ZITHA  
 Checked by:- Y. DOMA  
 Date of approval:-



Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 19+000 - Km 22+491

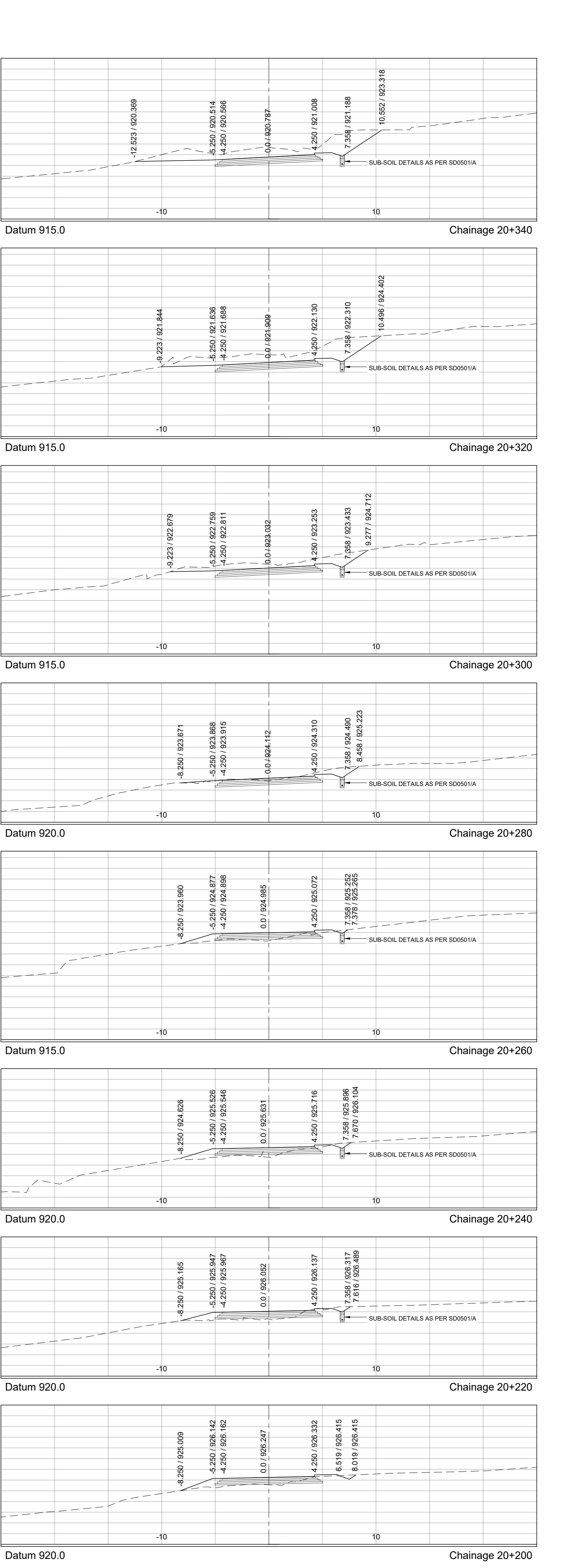
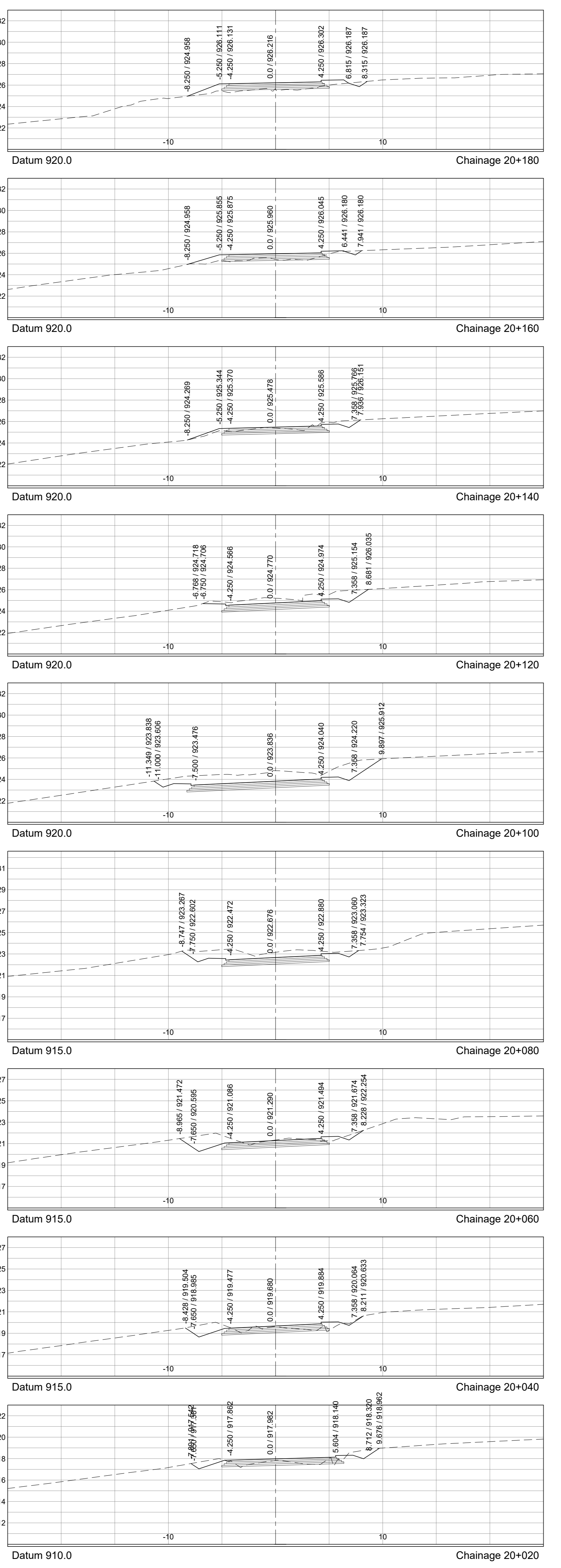
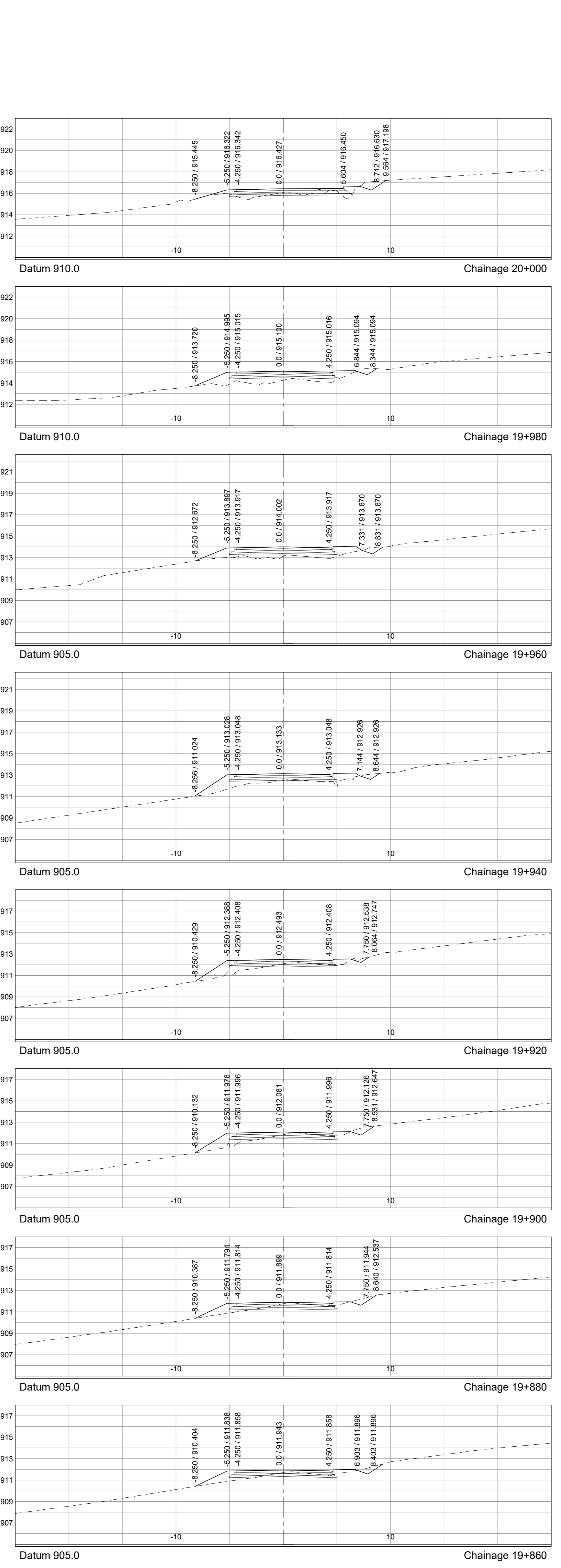
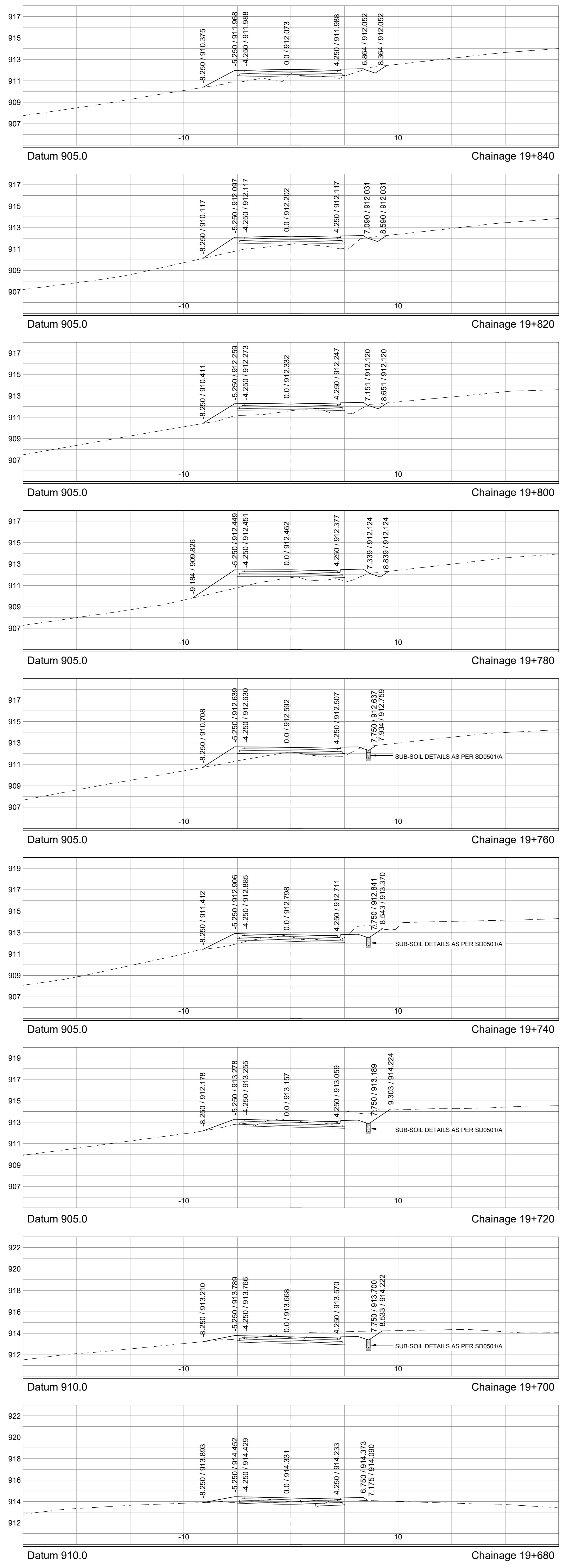
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance: km 19+000 - km 19+680  
 Sheet: 13 of 18  
 REVISION: A  
 Scale: HORIZONTAL 1:200 VERTICAL 1:200  
 Plan No: C 46234

C 46234





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer \_\_\_\_\_ Date \_\_\_\_\_

Supervising Authority \_\_\_\_\_

Continued from:-	C 44339
Continued on:-	-
Cross Section No:-	C 44340
Longitudinal Section No:-	C 44329
Design Plan No:-	C 44323 - C 44324

Designed by:-	T. PIKA
Checked by:-	Y. DOMA
Drawn by:-	S. ZITHA
Checked by:-	Y. DOMA
Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 19+700 - km 22+491

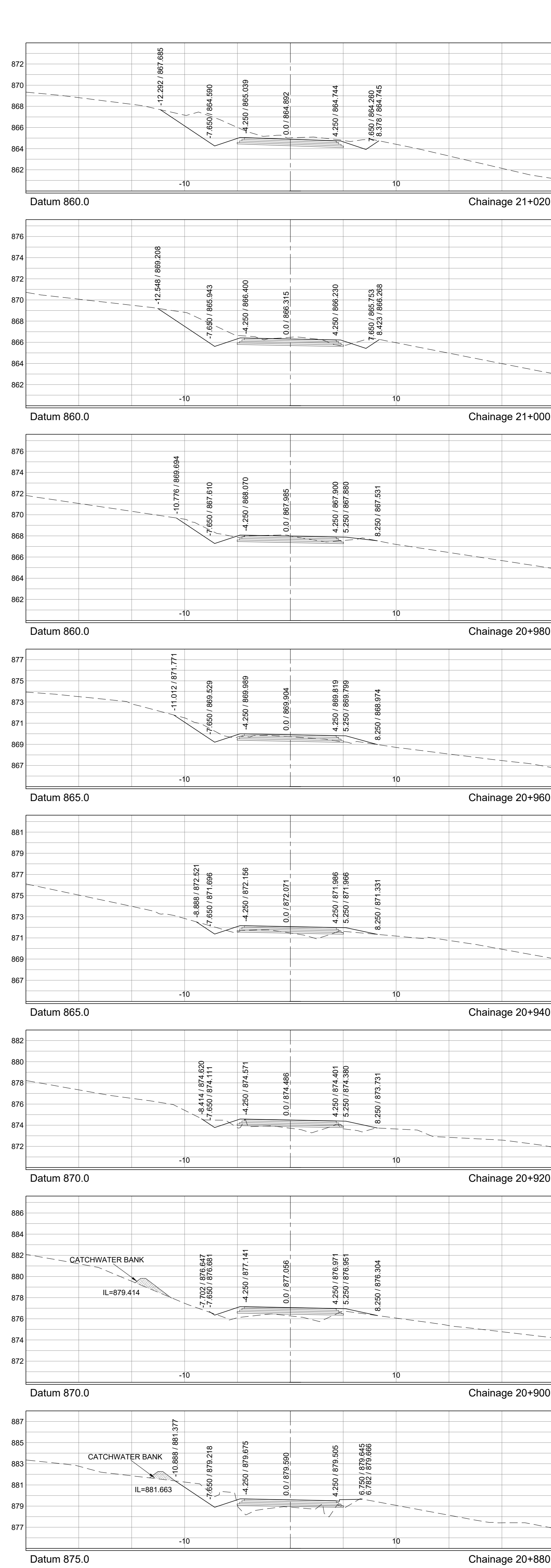
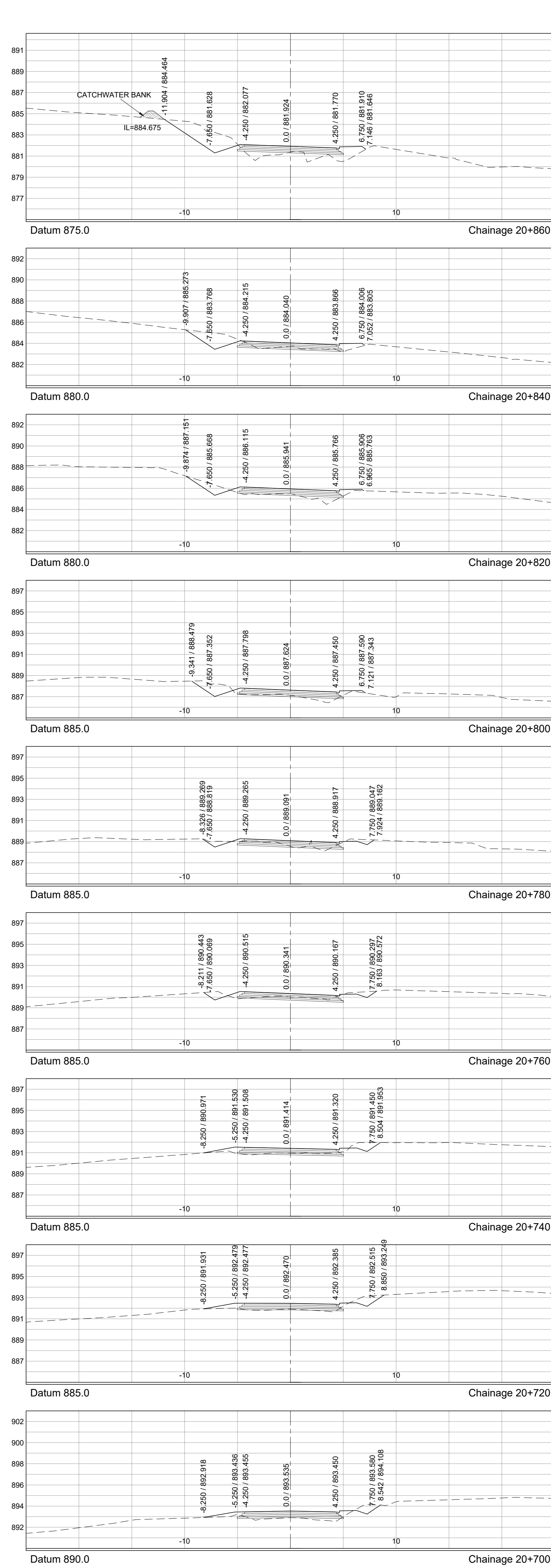
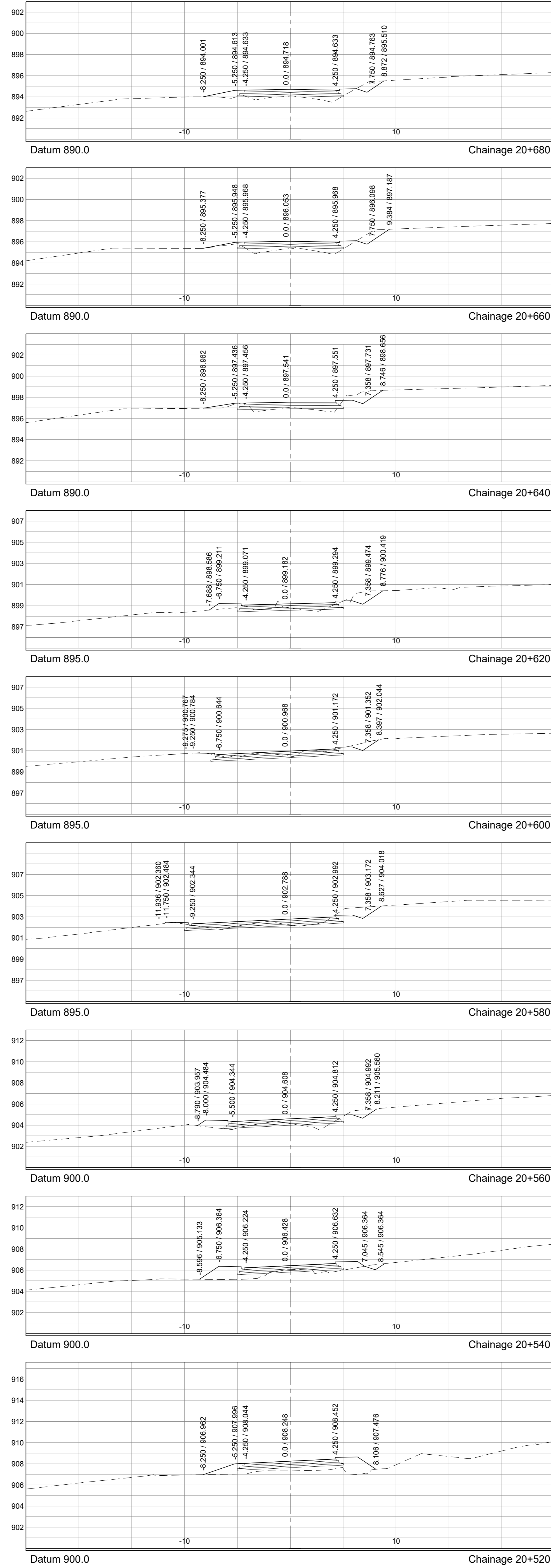
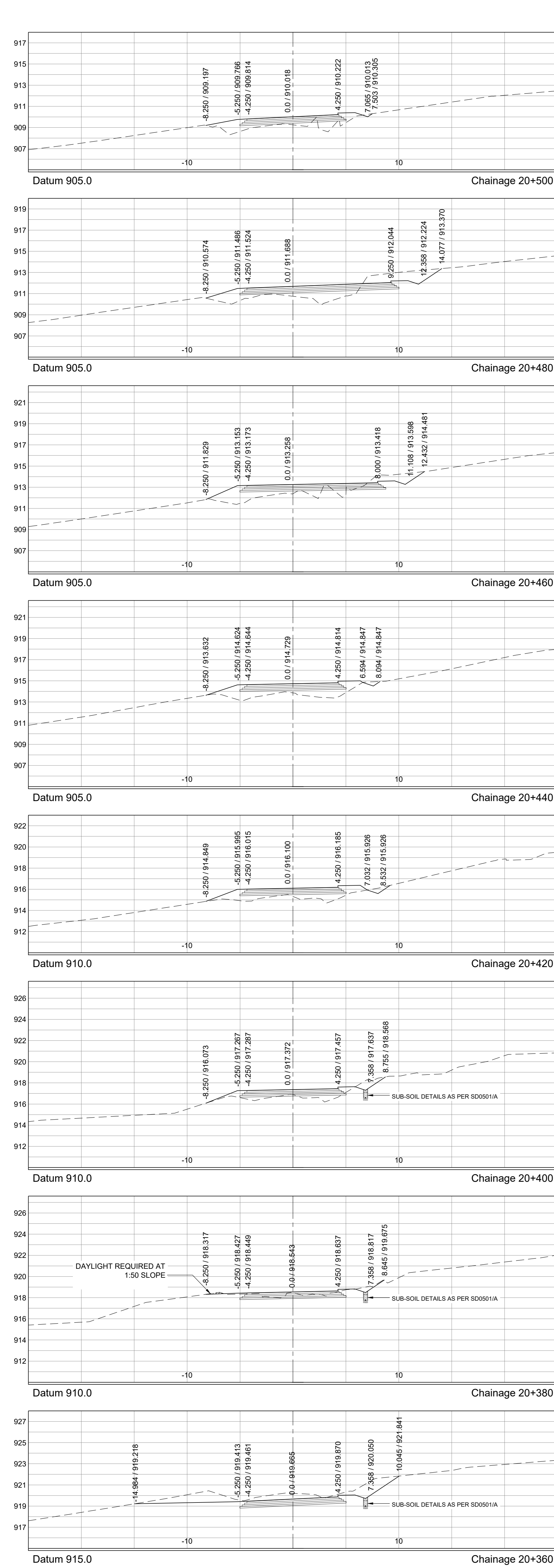
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet -> 14	REVISION:
km 19+700 - km 20+360	of -> 18	A
Scale	Plan No ->	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 46235**

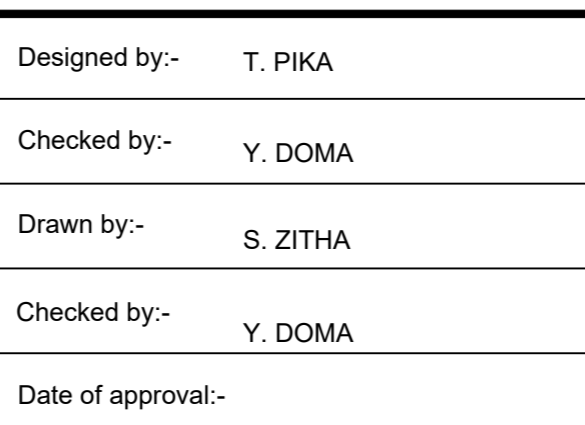




Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44339	Designed by:-	T. PIKA
Continued on:-	-	Checked by:-	Y. DOMA
Cross Section No:-	C 44340	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323 - C 44324	Date of approval:-	



Designed by:-  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Date: 01-02-2024

Signature: \_\_\_\_\_

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+380 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 GENERAL ROAD CROSS SECTIONS

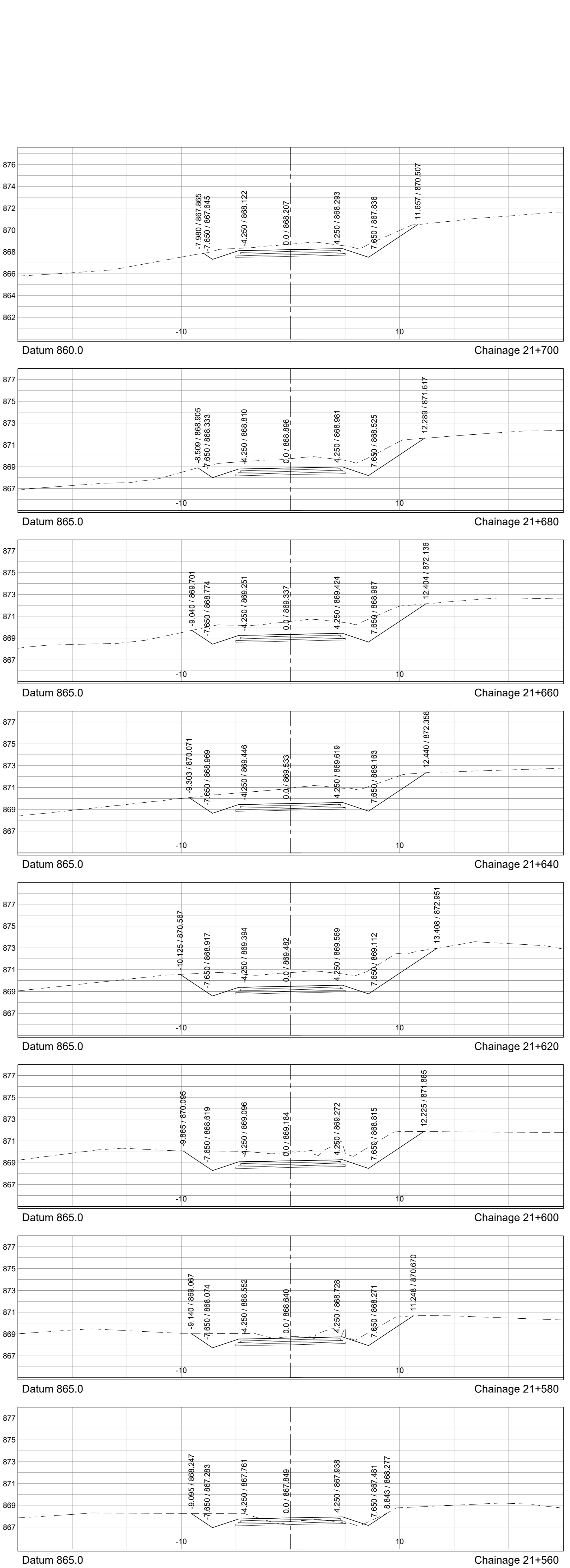
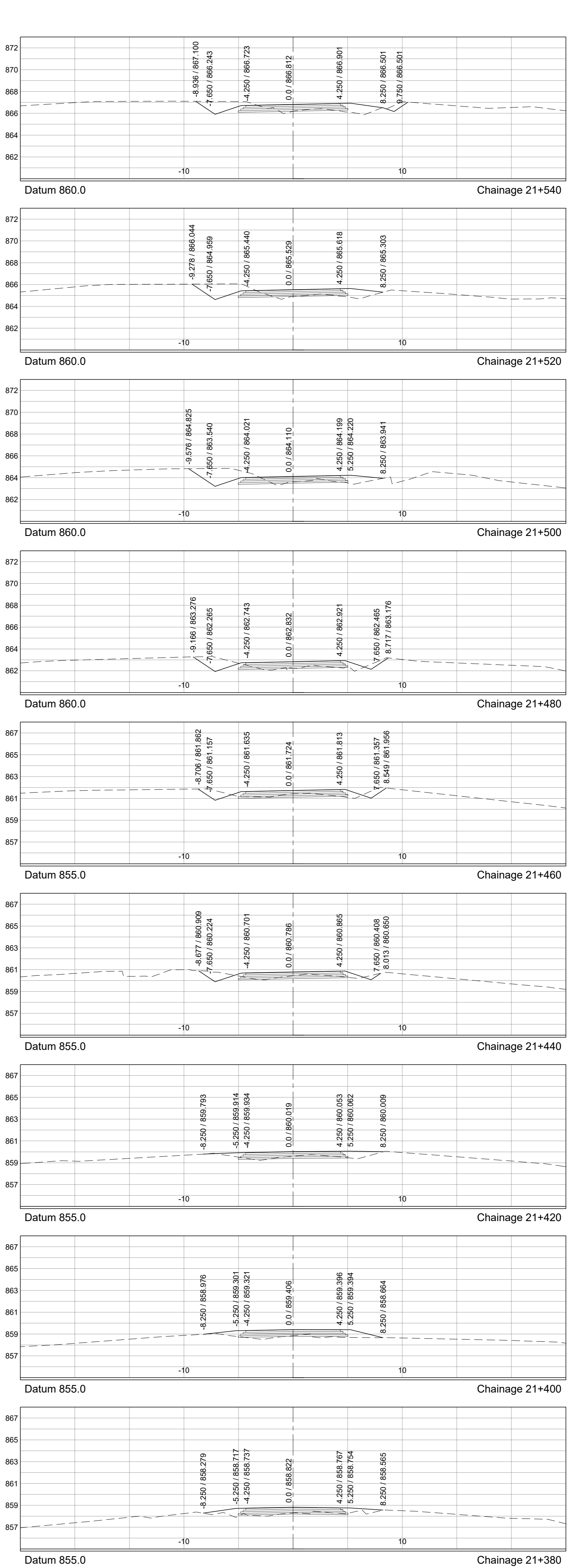
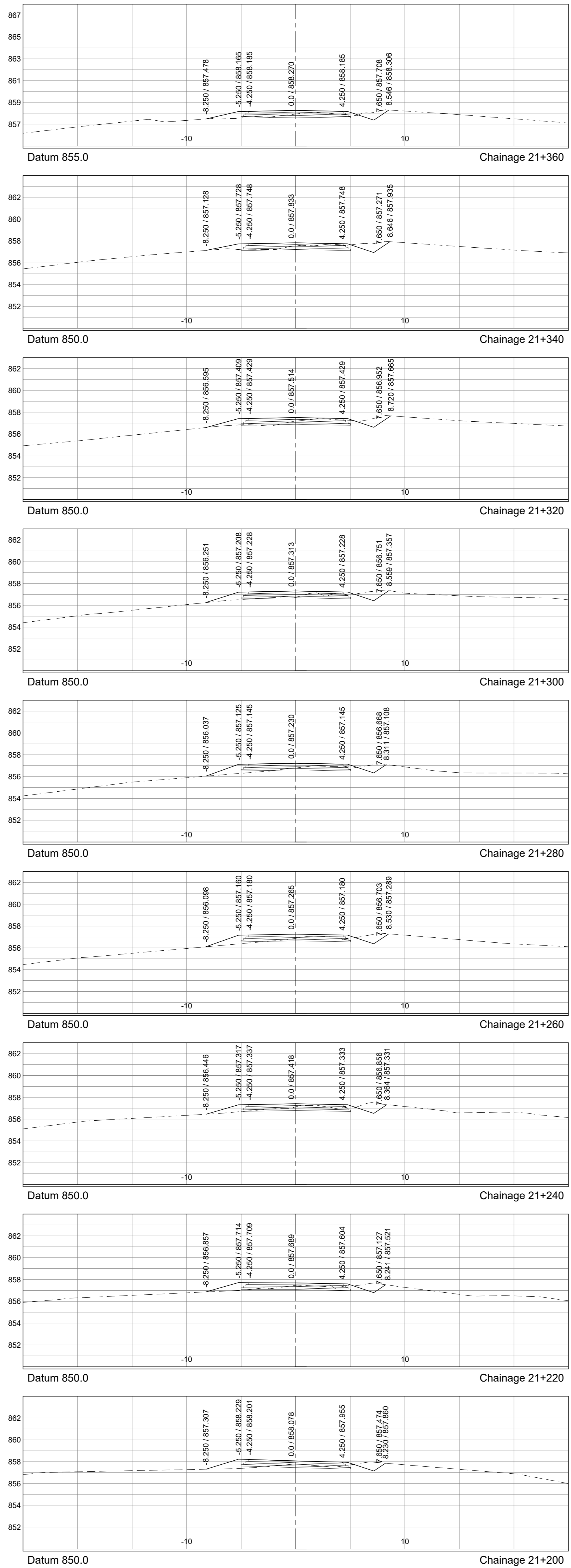
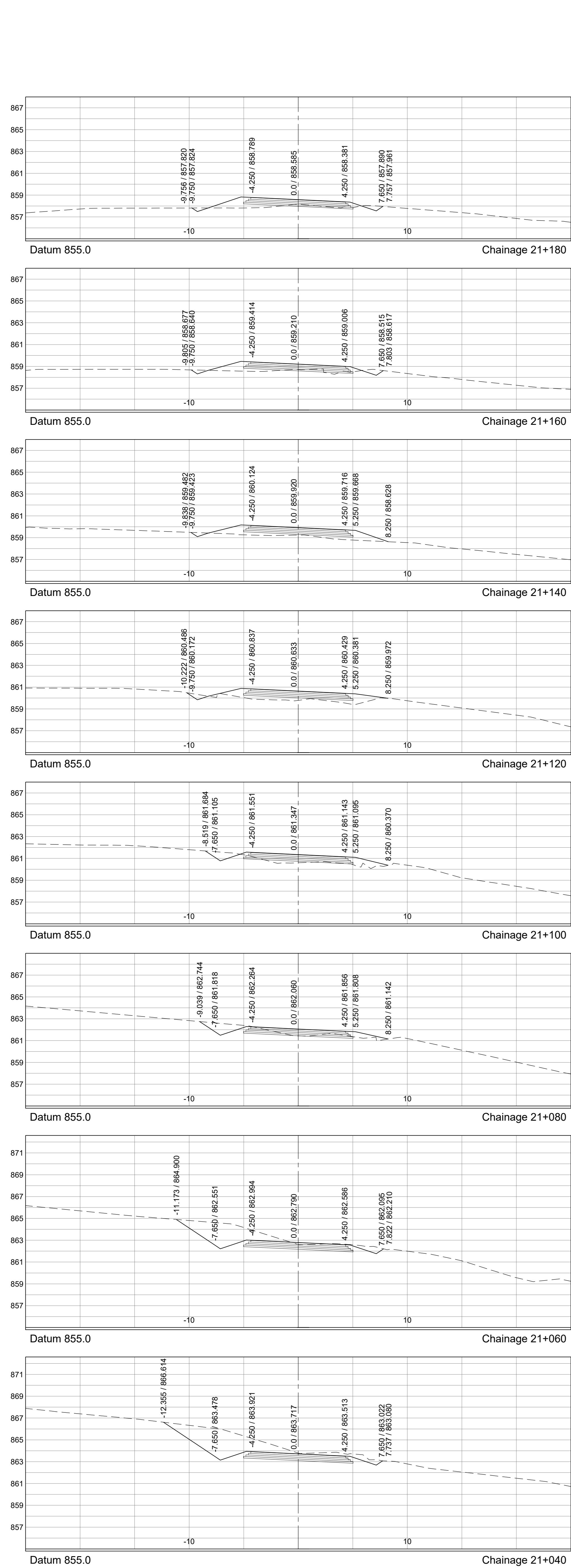
Staked km distance  
 km 20+380 - km 21+020

Sheet - 15  
 of - 18  
 REVISION:  
 A  
 Plan No -  
**C 47644**

Scale  
 HORIZONTAL 1:200  
 VERTICAL 1:200

C 47644





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44339	Designed by:-	T. PIKA
Continued on:-	-	Checked by:-	Y. DOMA
Cross Section No:-	C 44340	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323 - C 44324	Date of approval:-	

Continued from:-	C 44339	Designed by:-	T. PIKA
Continued on:-	-	Checked by:-	Y. DOMA
Cross Section No:-	C 44340	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323 - C 44324	Date of approval:-	



Designed by:-

**emzansi**  
ENGINEERS (PTY) LTD  
Providing Unrivaled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

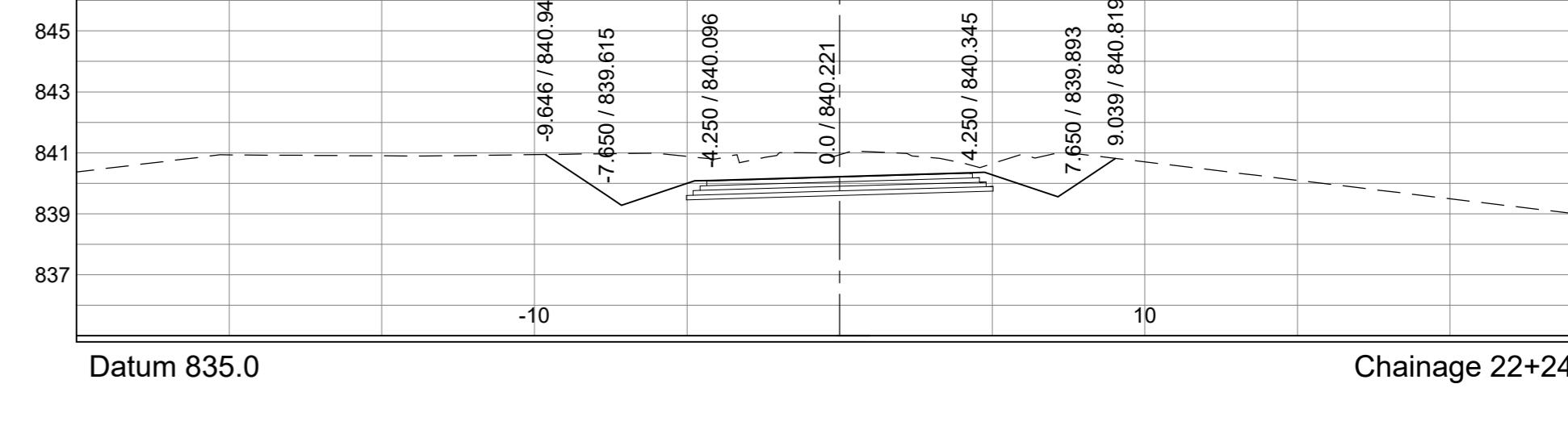
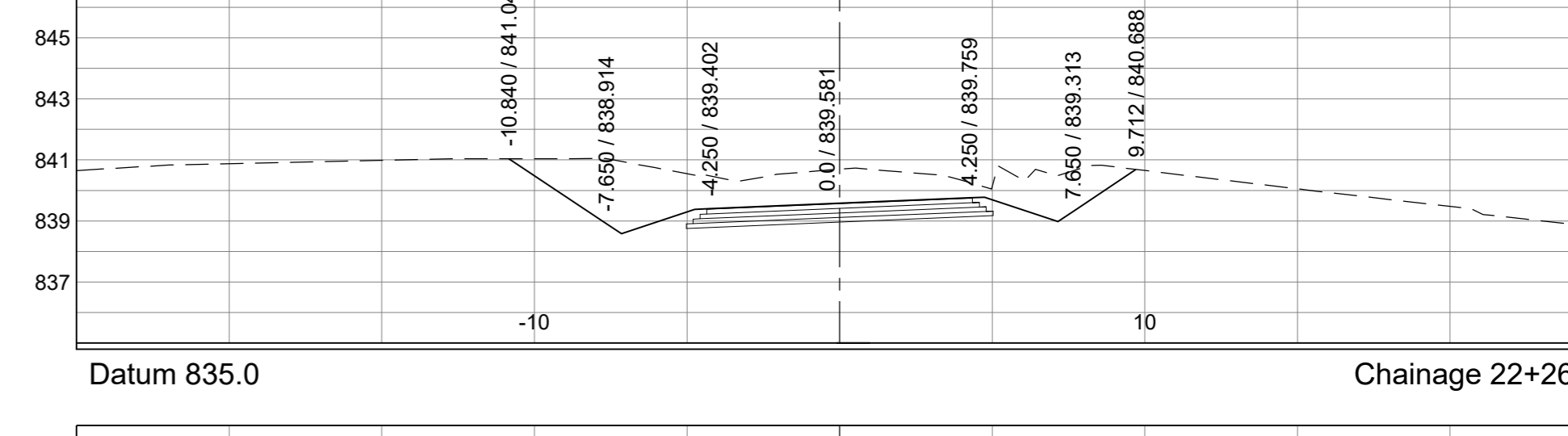
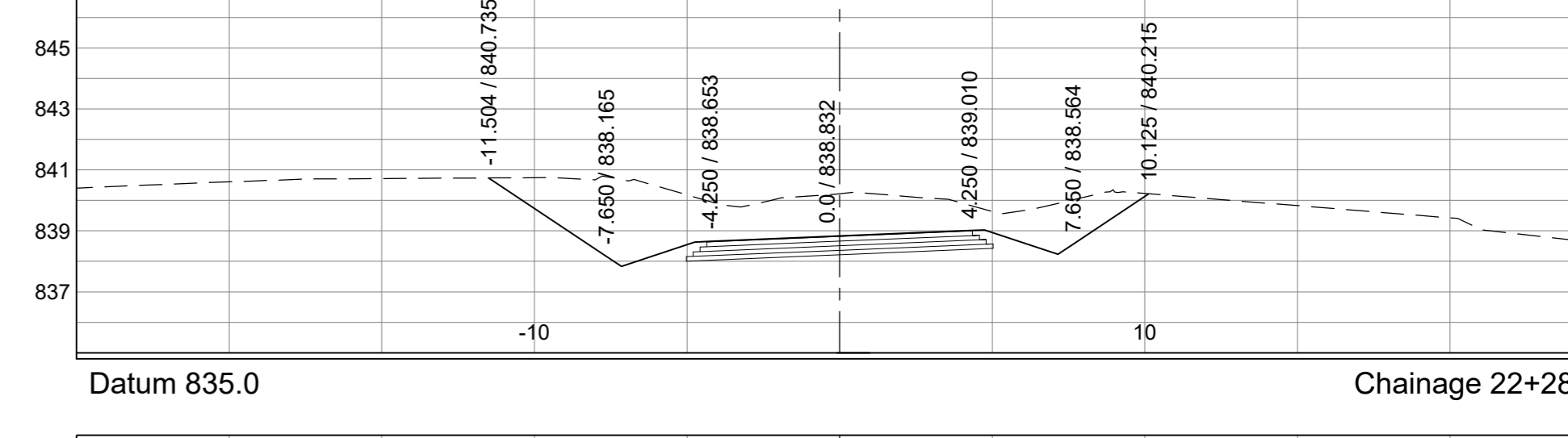
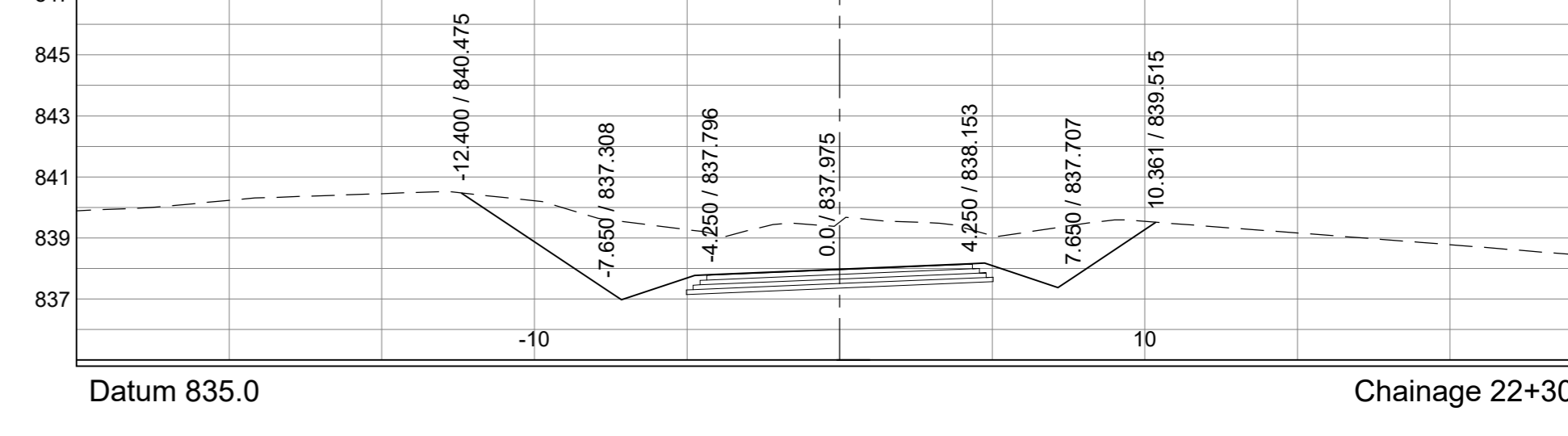
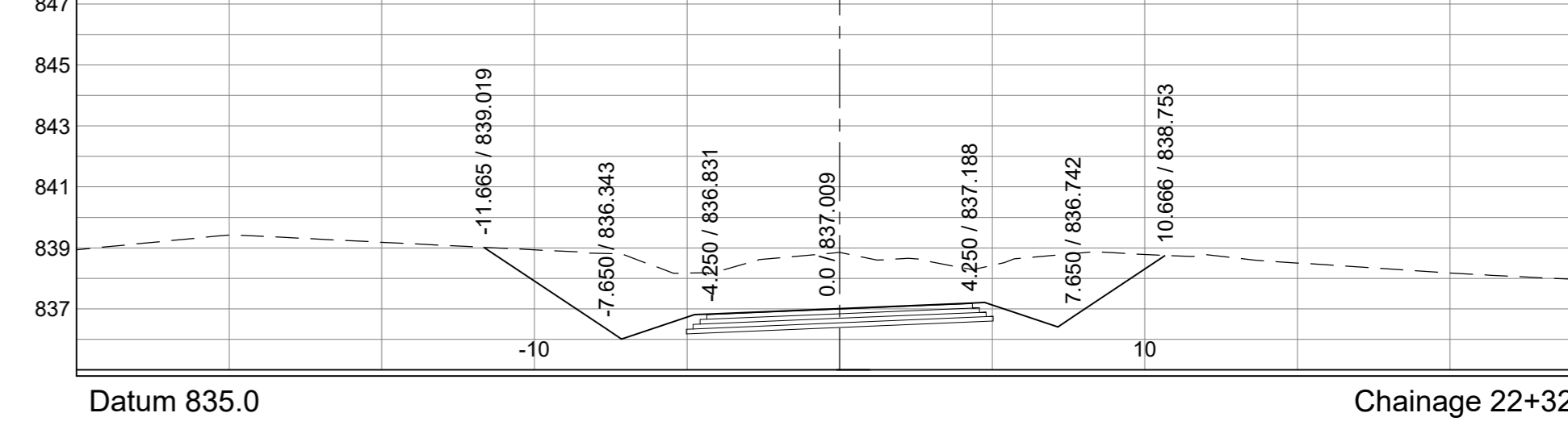
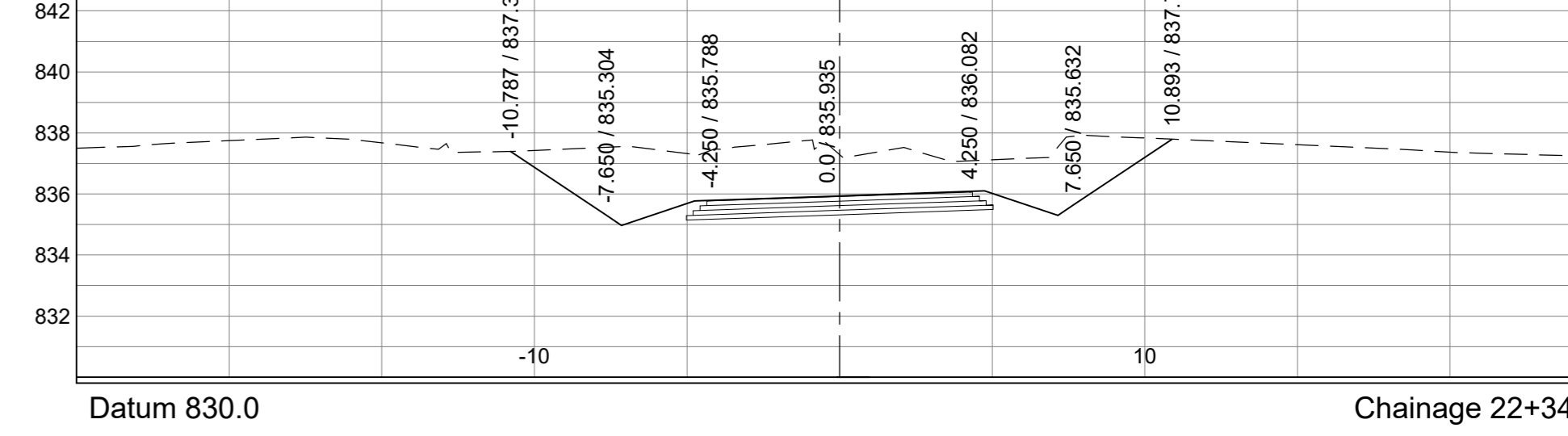
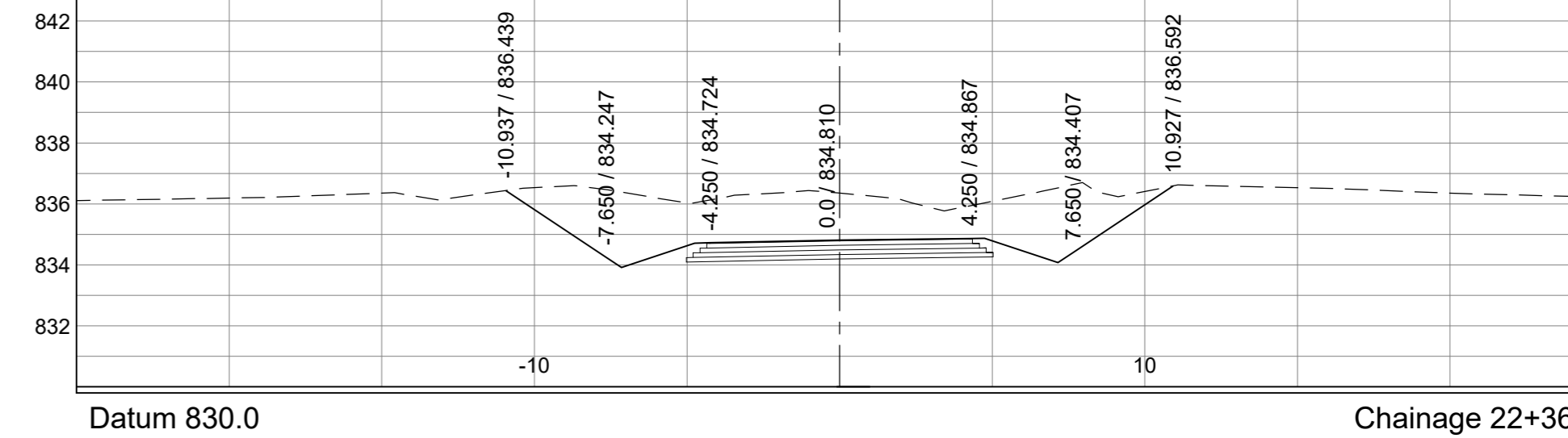
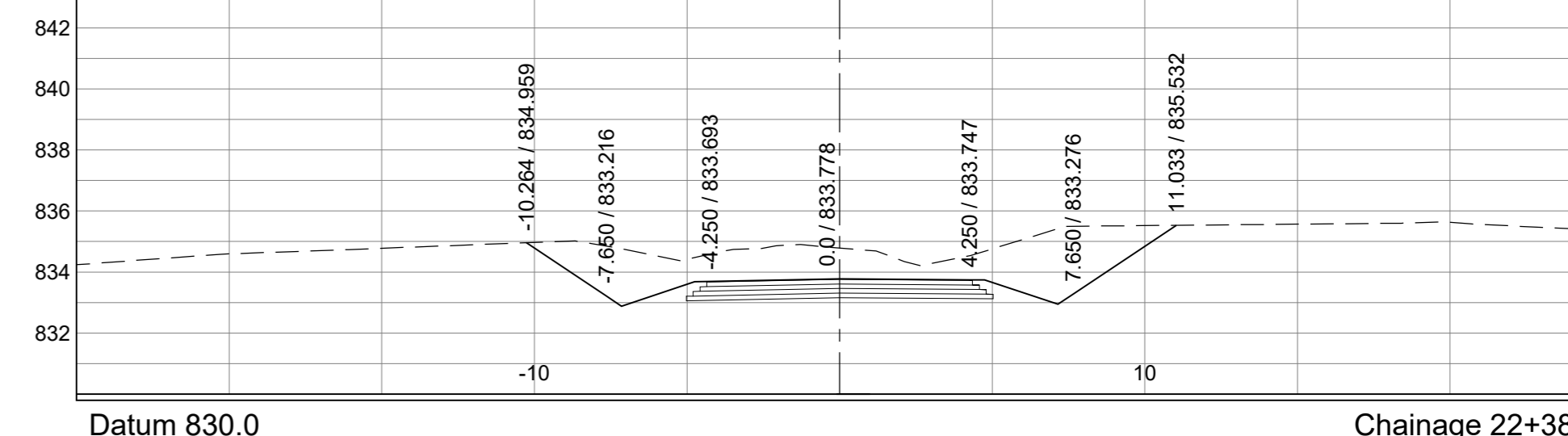
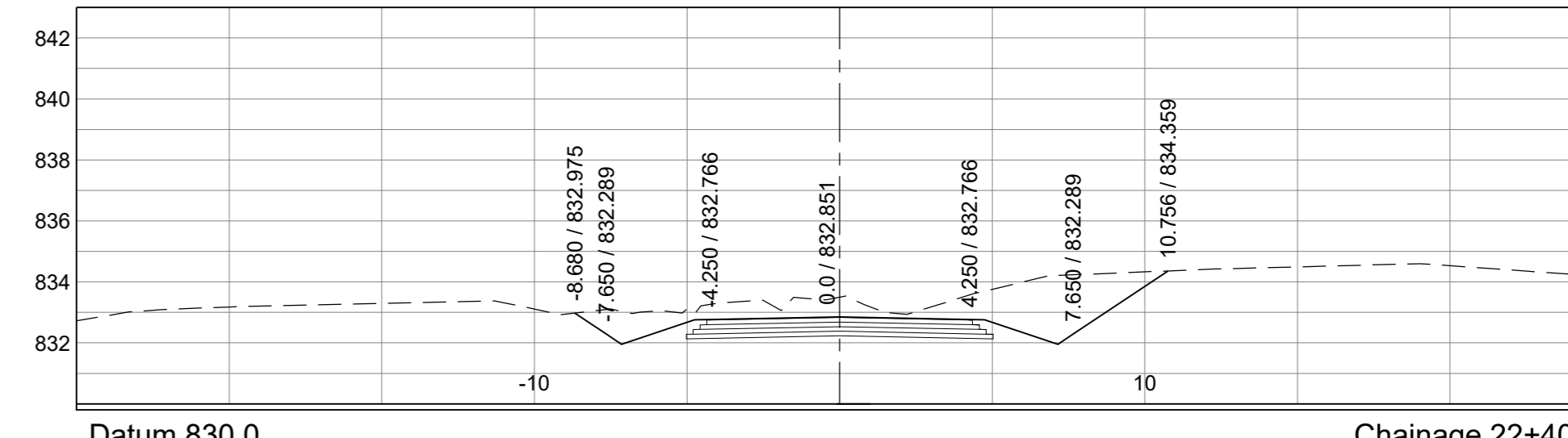
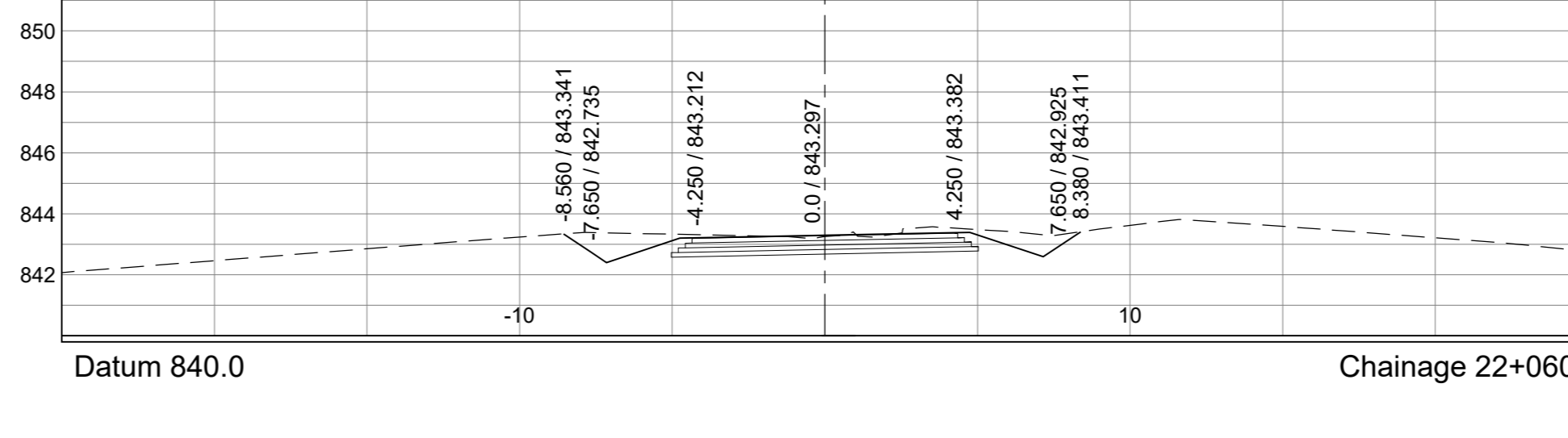
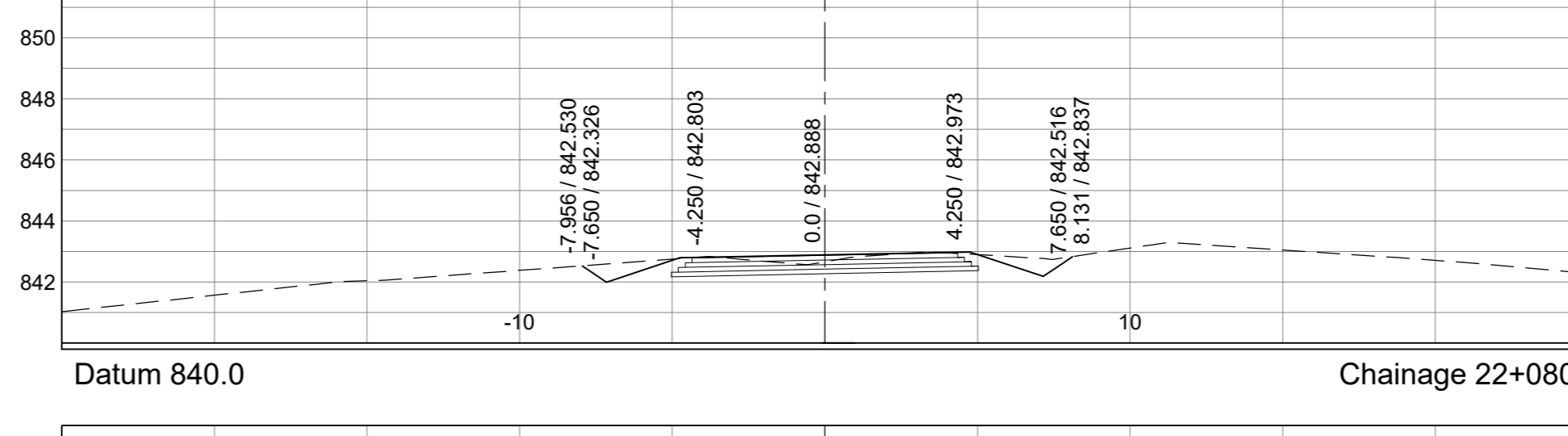
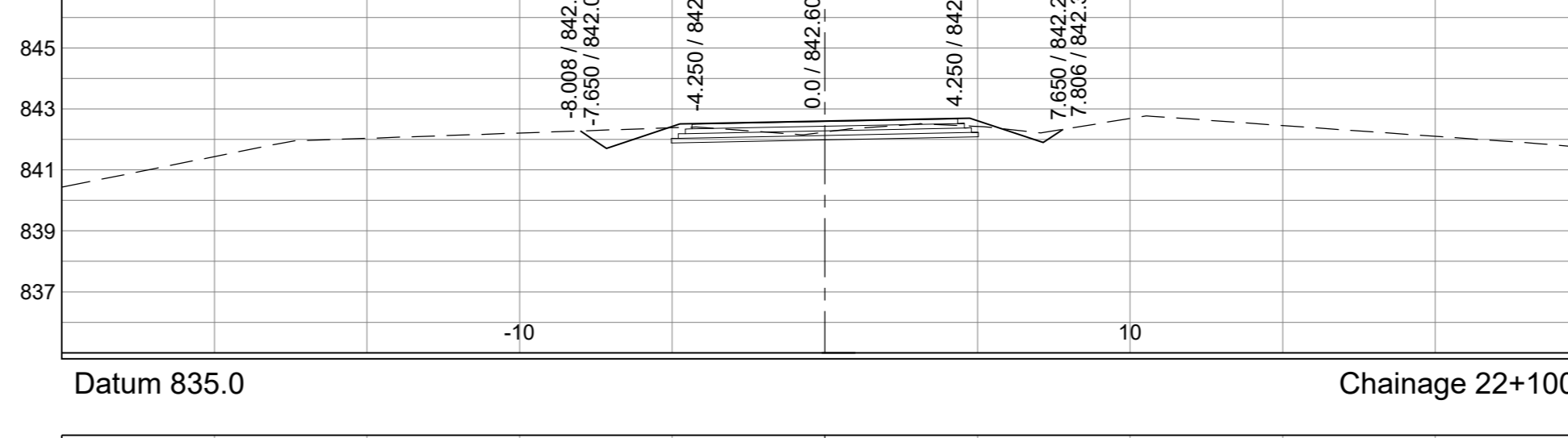
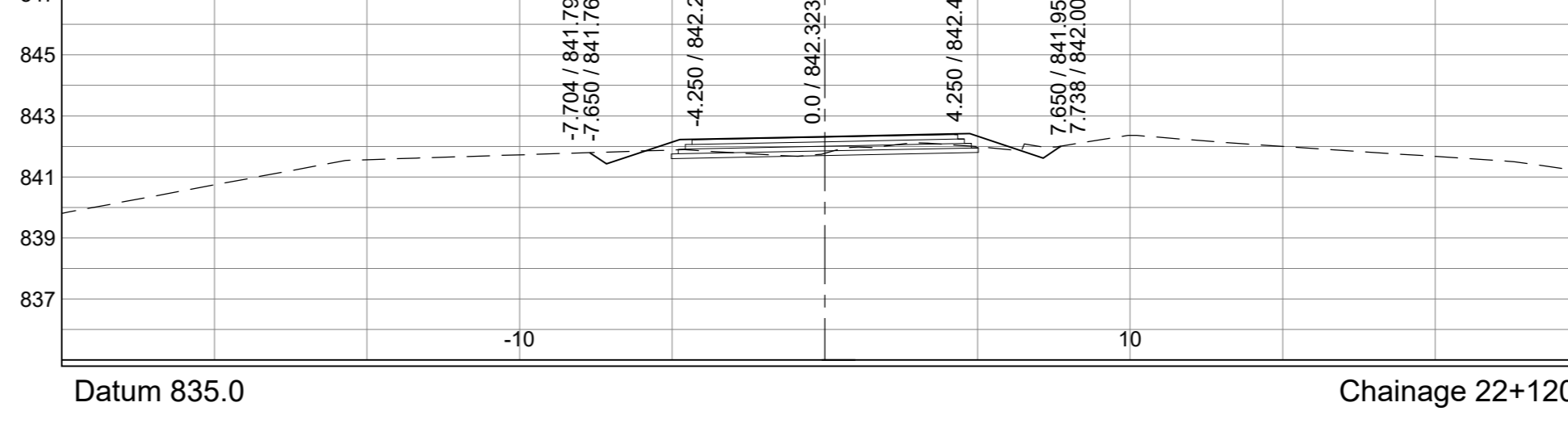
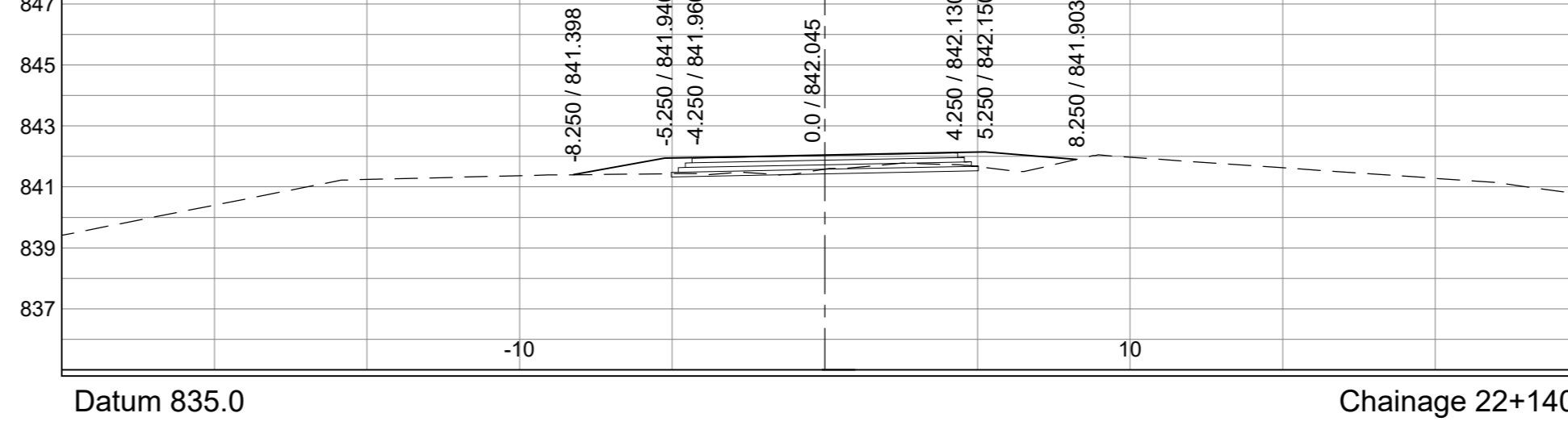
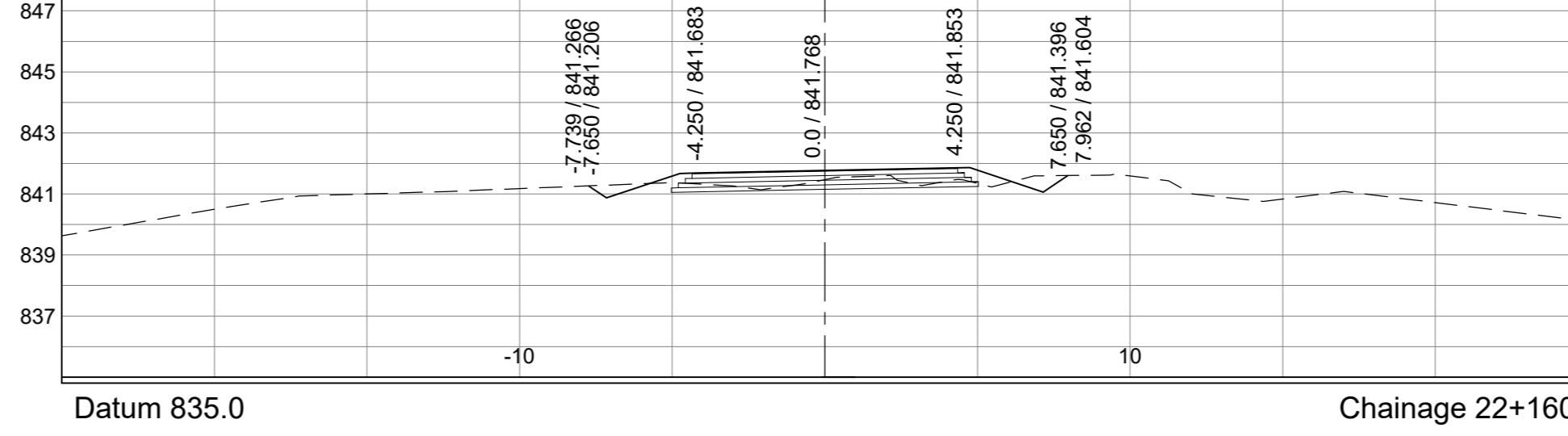
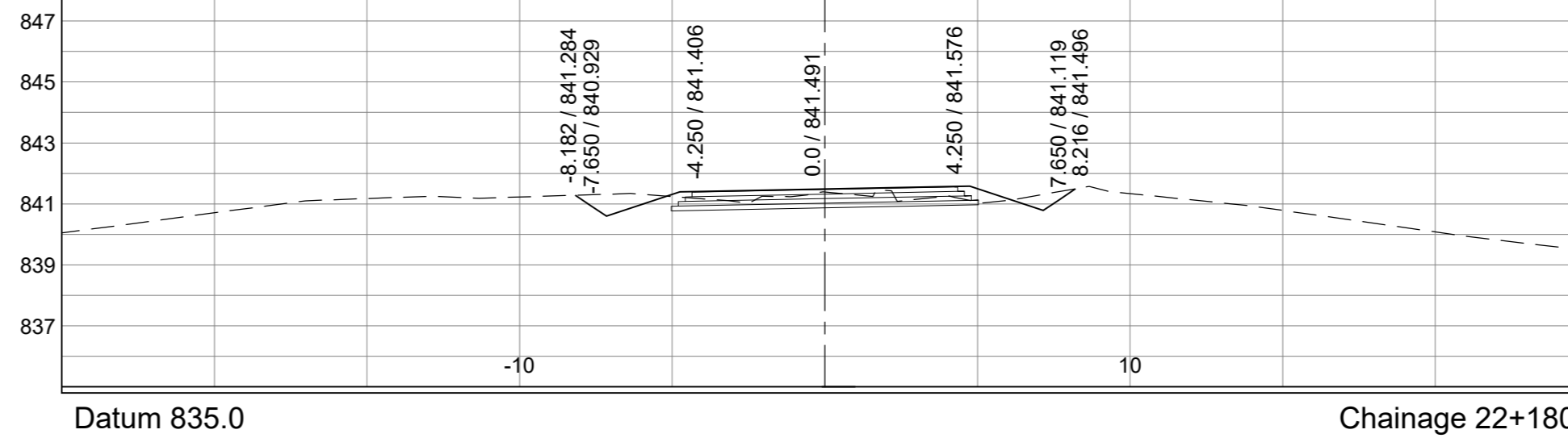
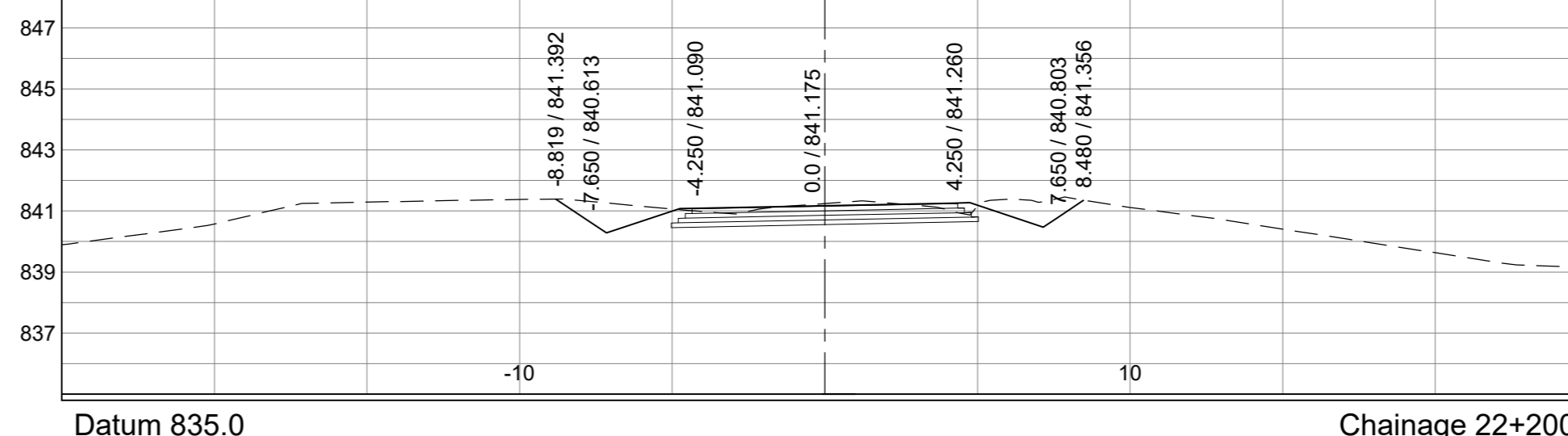
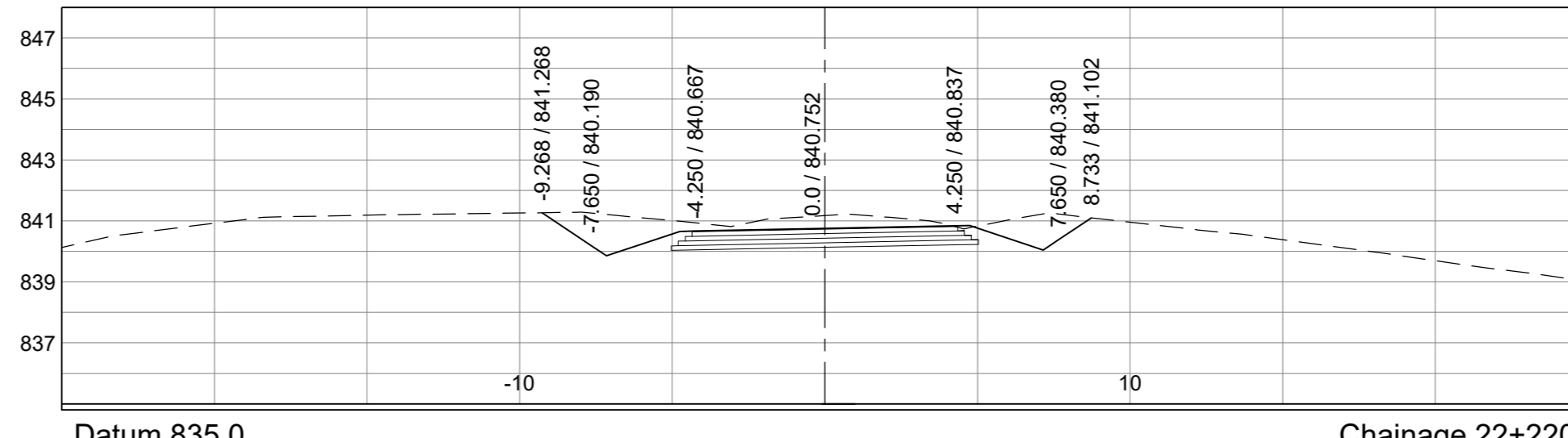
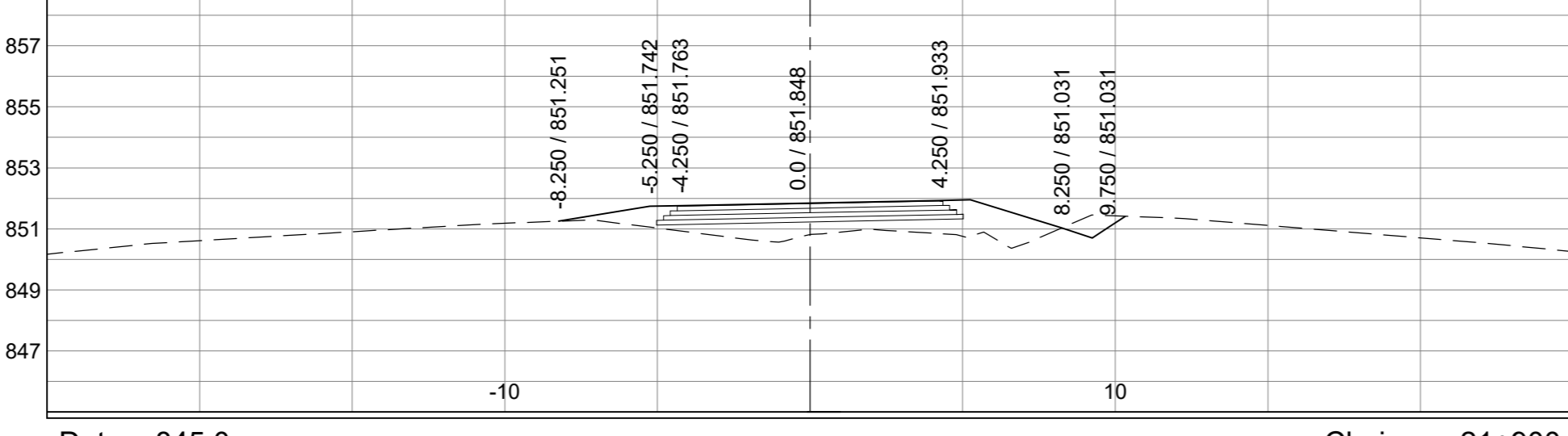
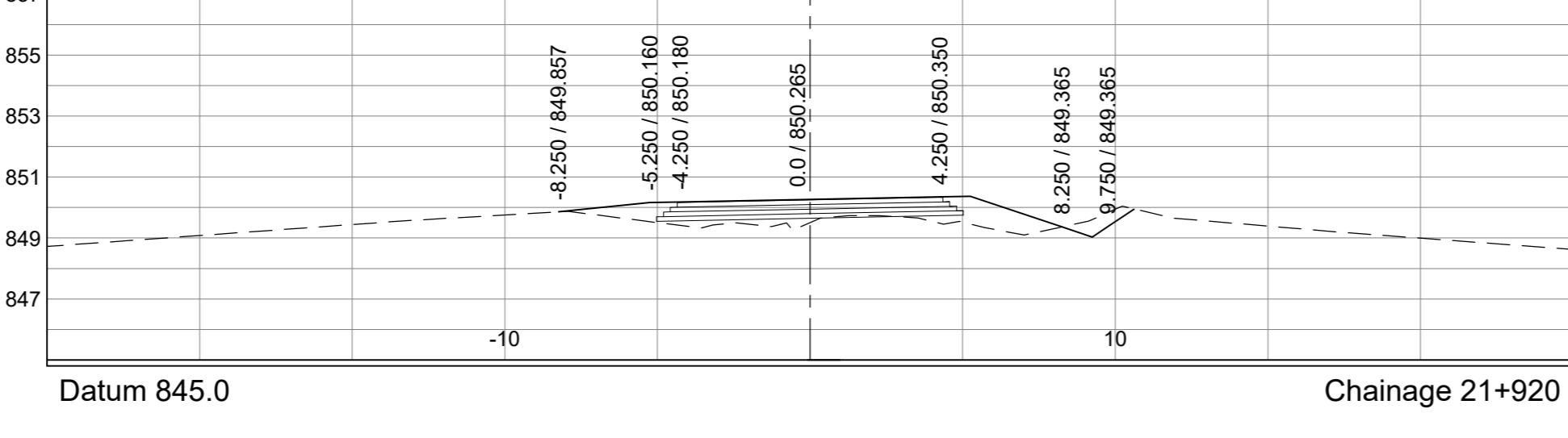
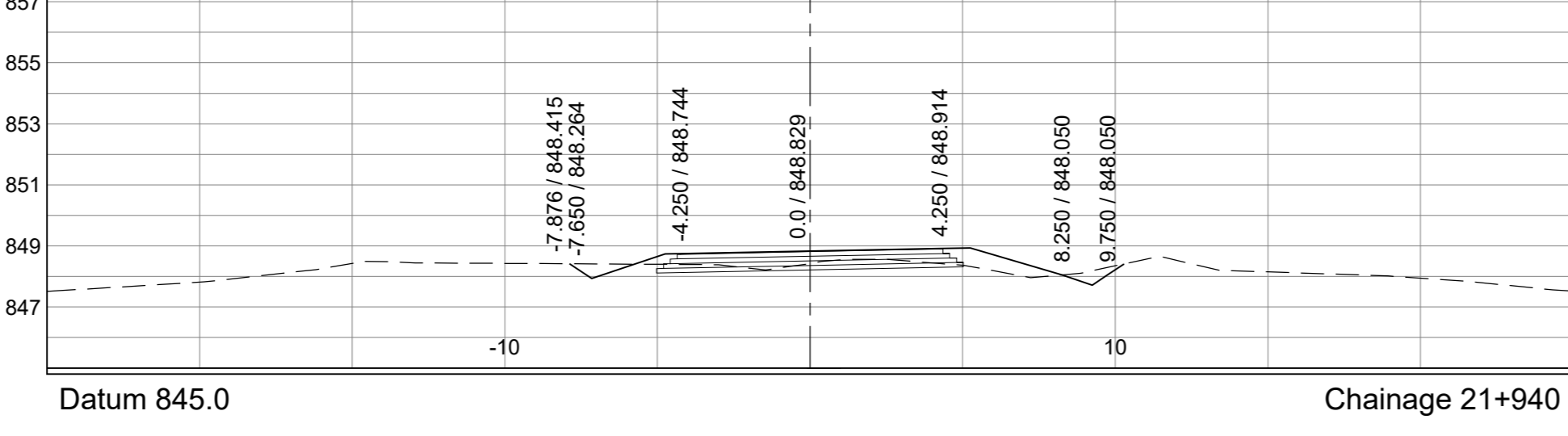
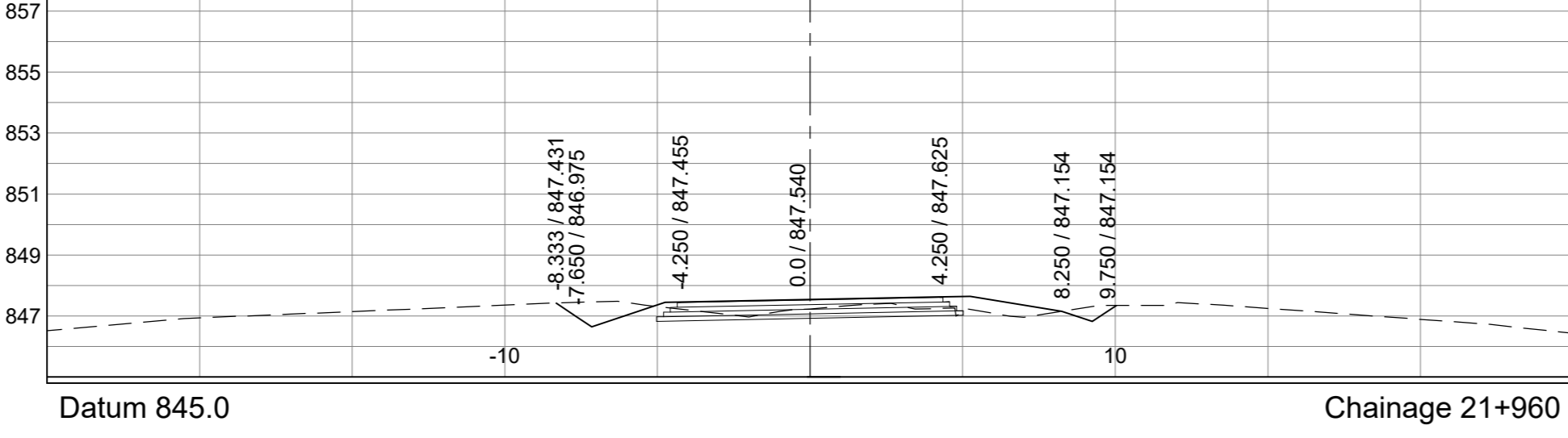
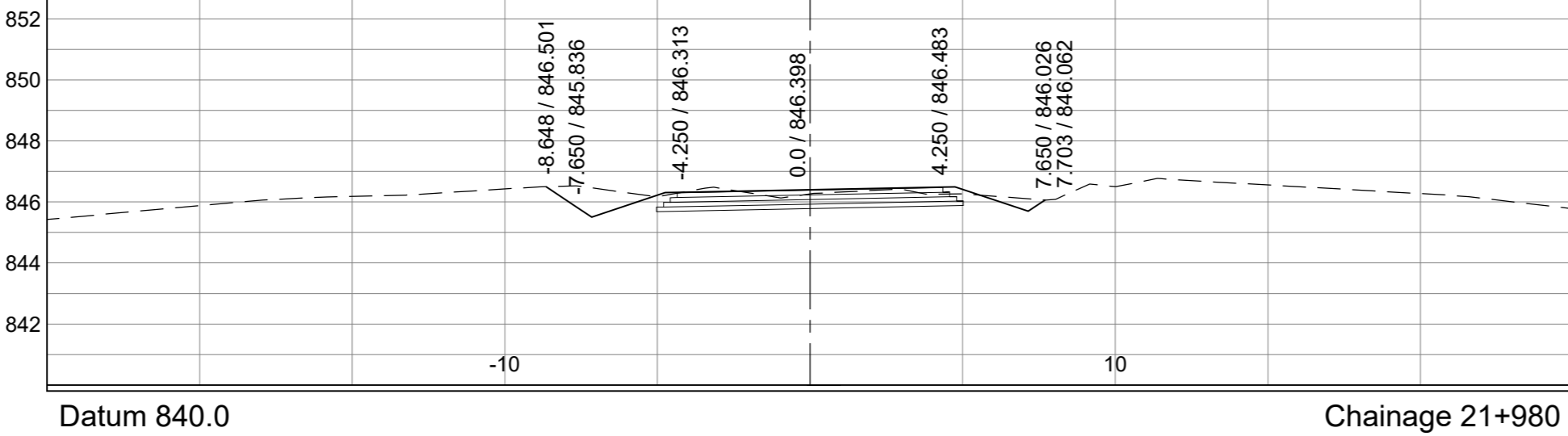
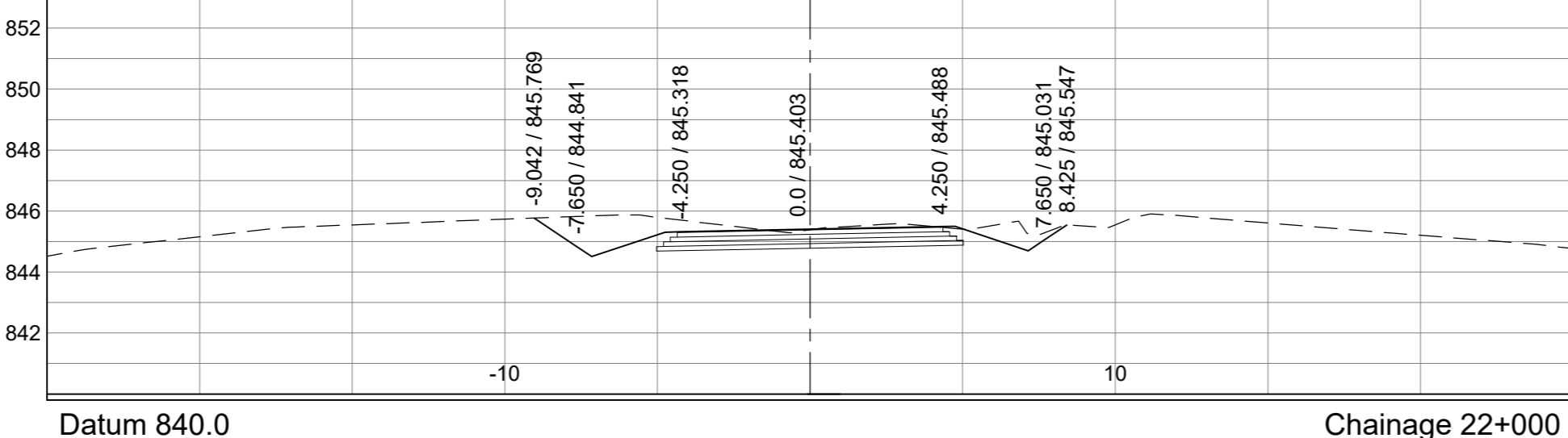
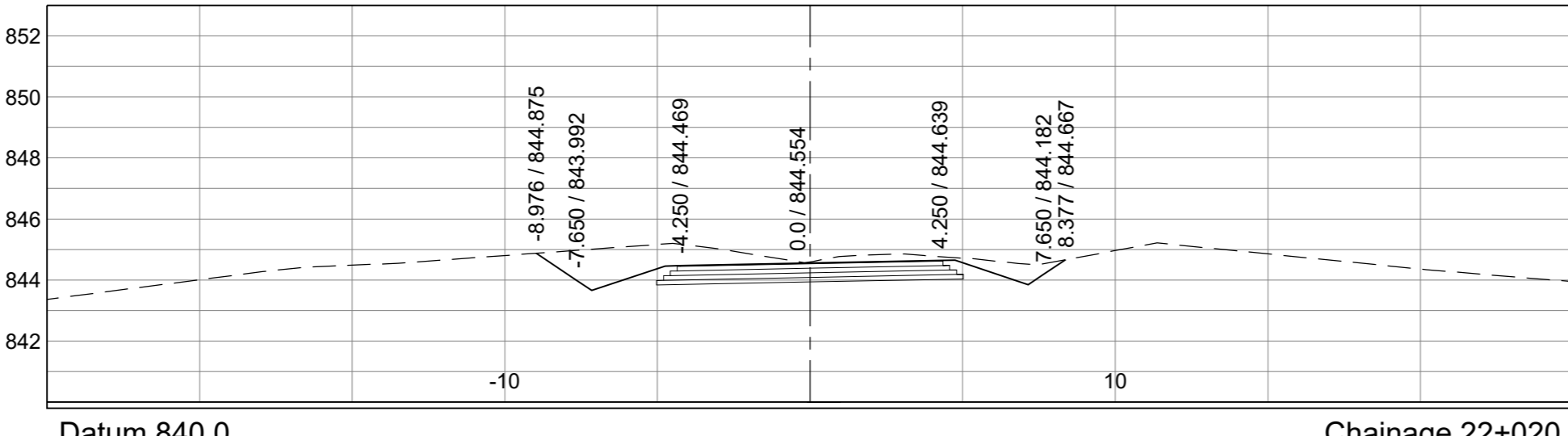
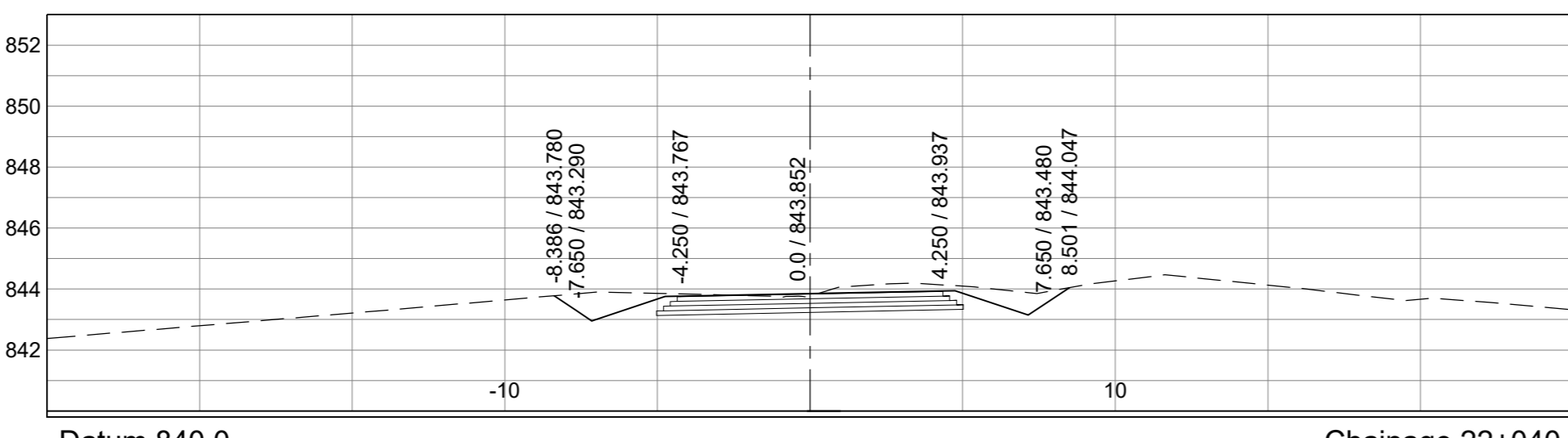
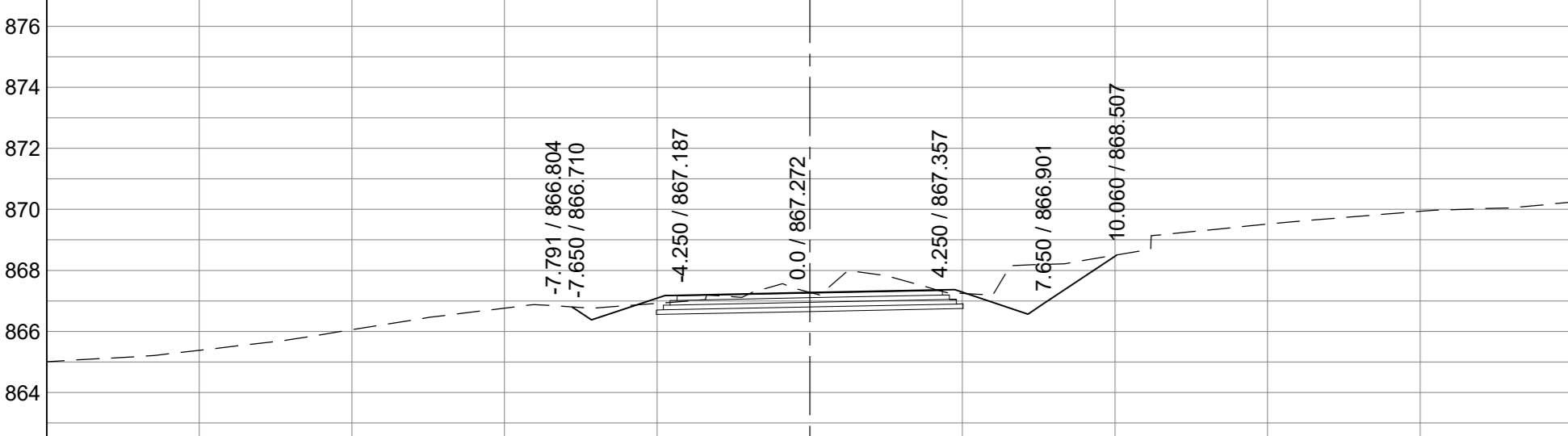
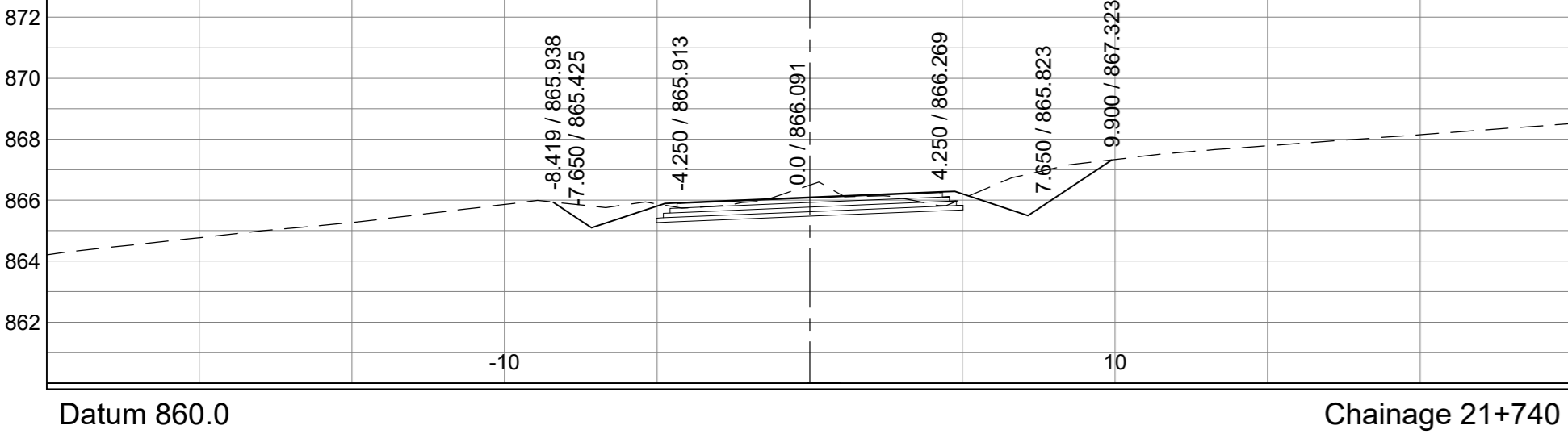
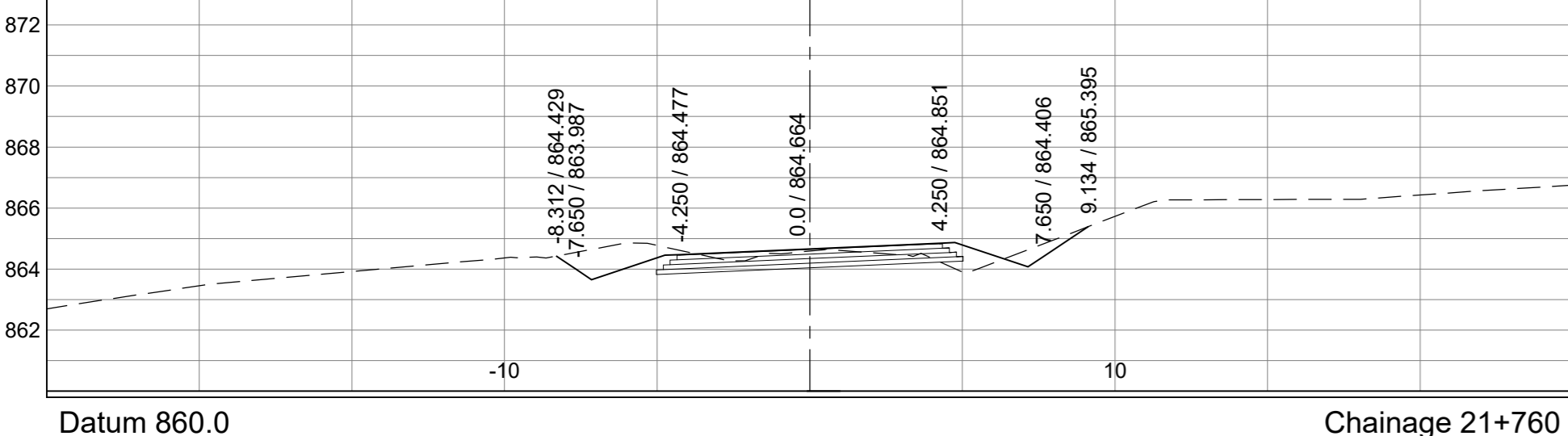
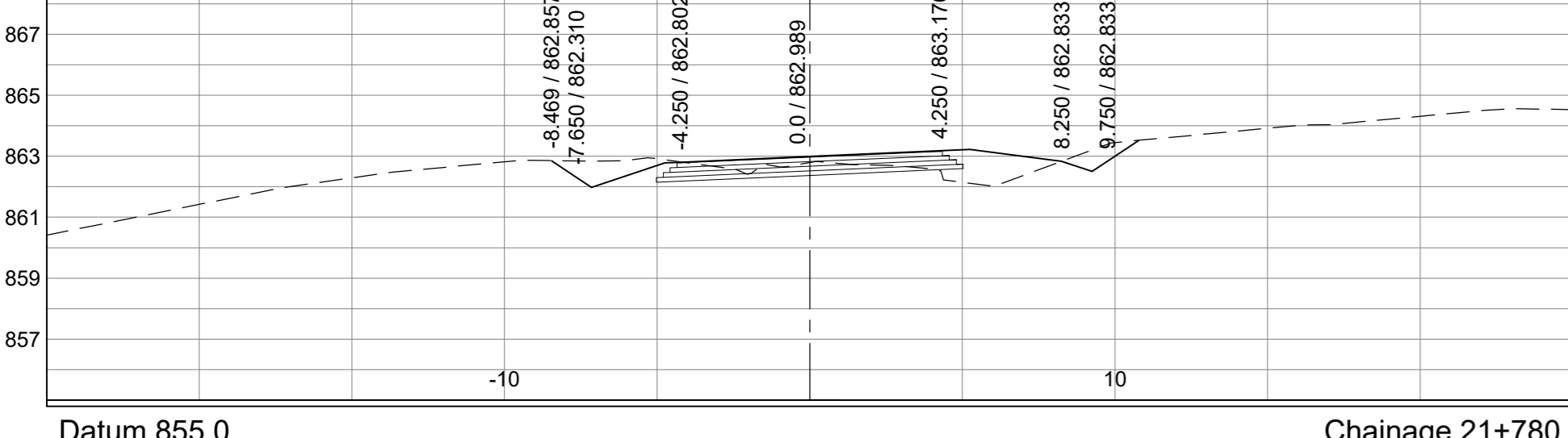
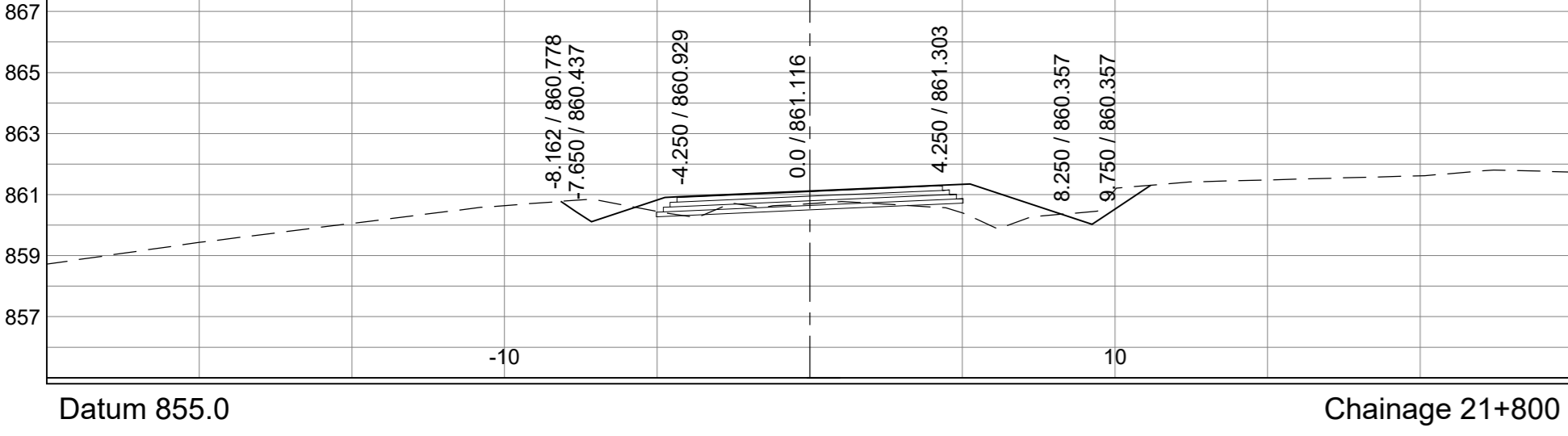
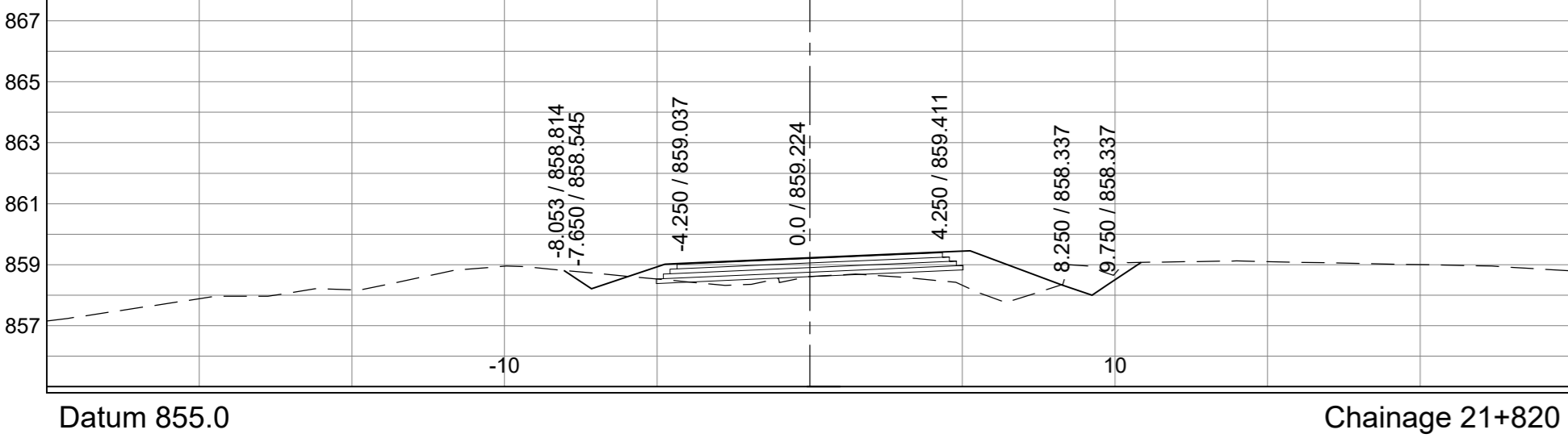
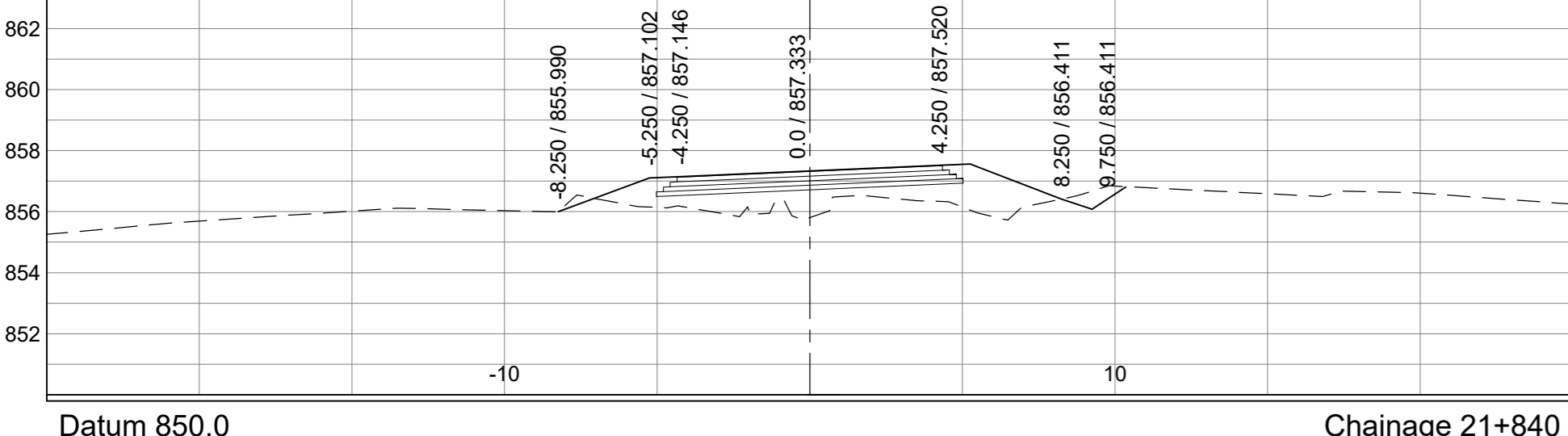
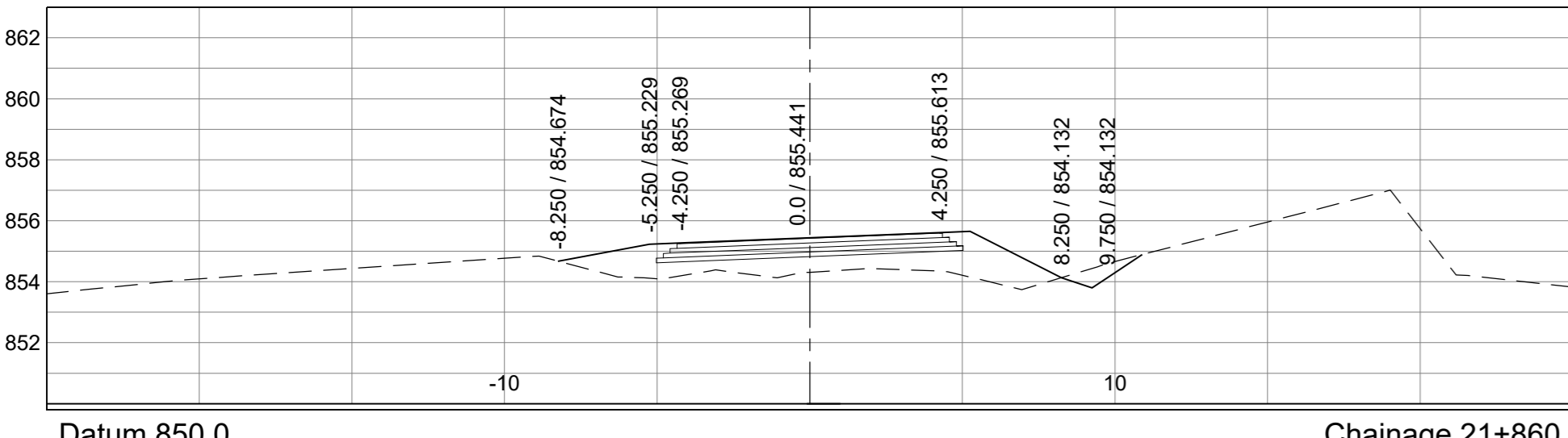
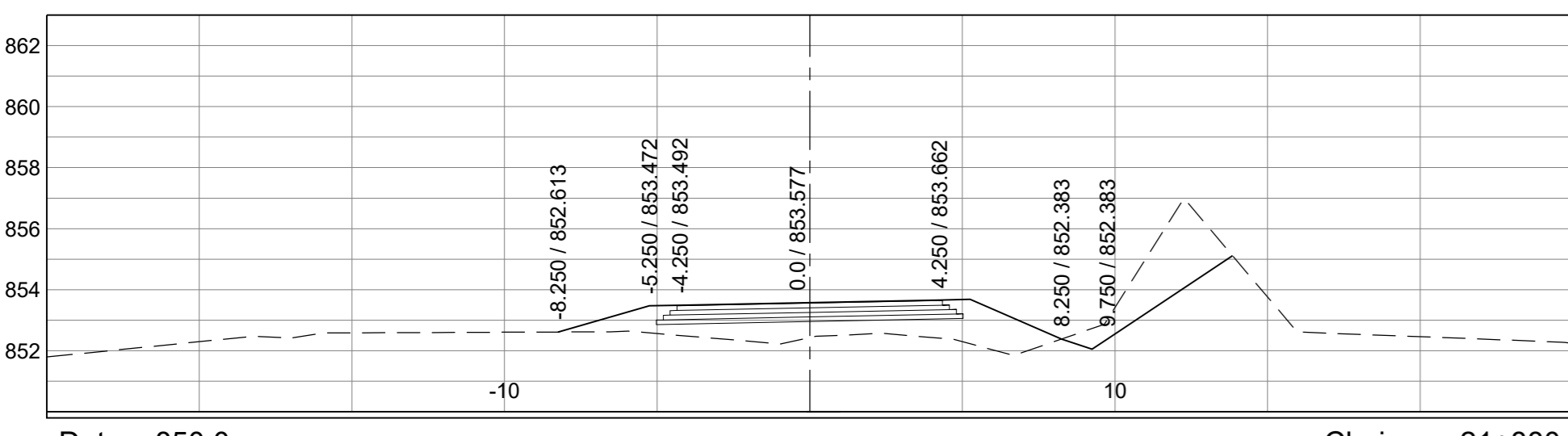
**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 16	REVISION:
km 21+040 - km 21+700	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 47645**





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-	C 44339	Designed by:-	T. PIKA
Continued on:-	-	Checked by:-	Y. DOMA
Cross Section No:-	C 44340	Drawn by:-	S. ZITHA
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323 - C 44324	Date of approval:-	



Designed by:- **emzansi** ENGINEERS (PTY) LTD

Providing Unrivaled Engineering Solutions

01-02-2024 Date

Head: Transport

Transportation Engineer: Chief Engineer

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

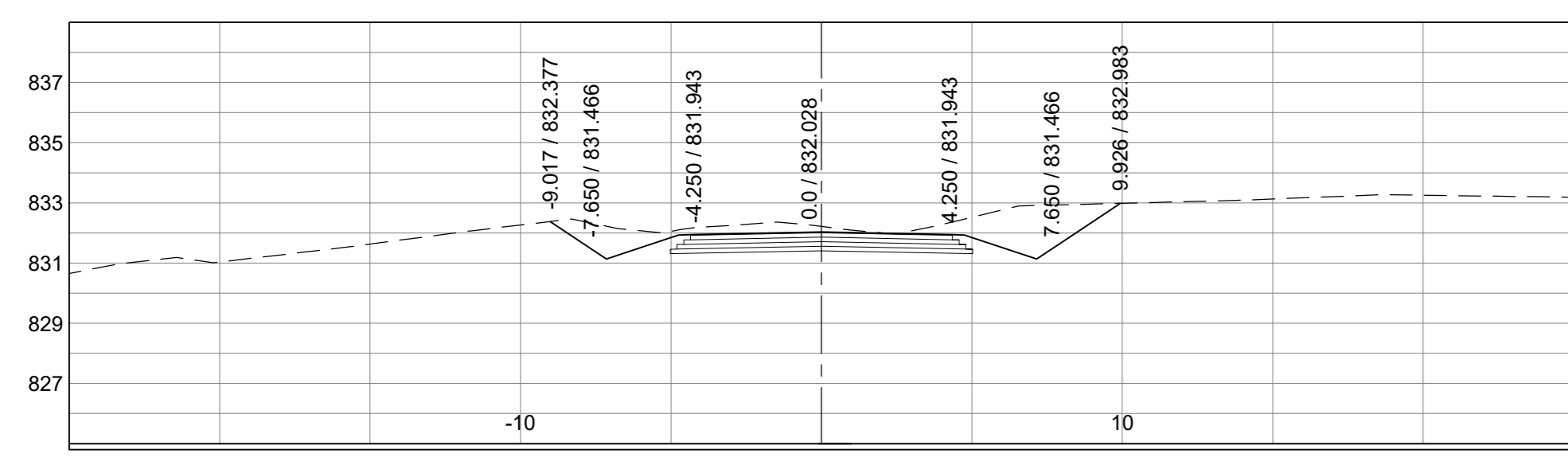
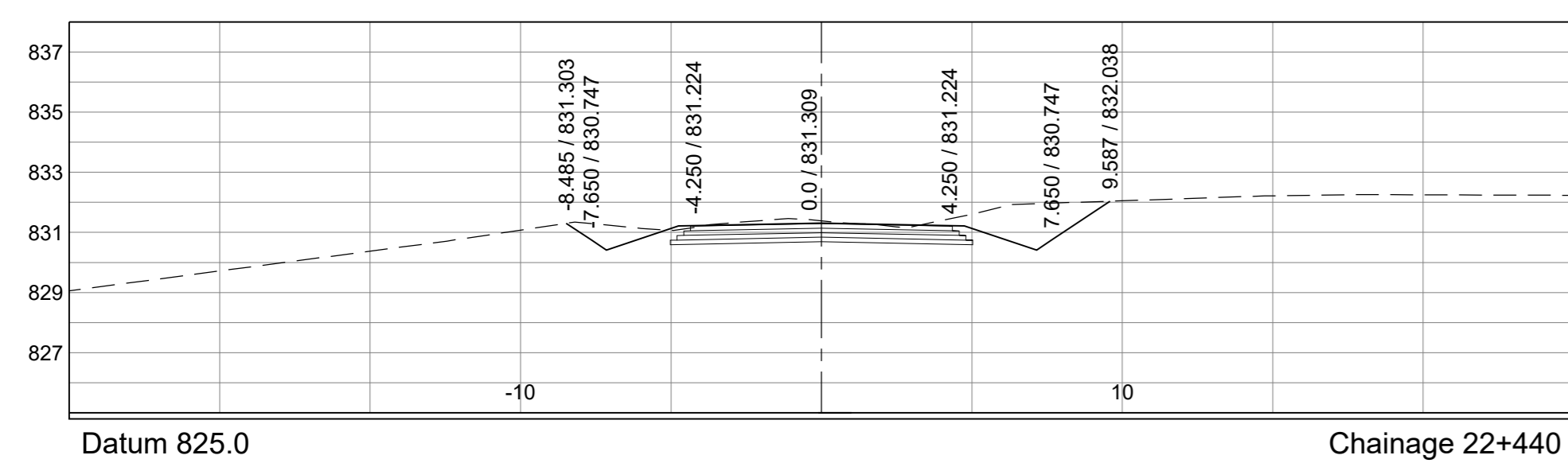
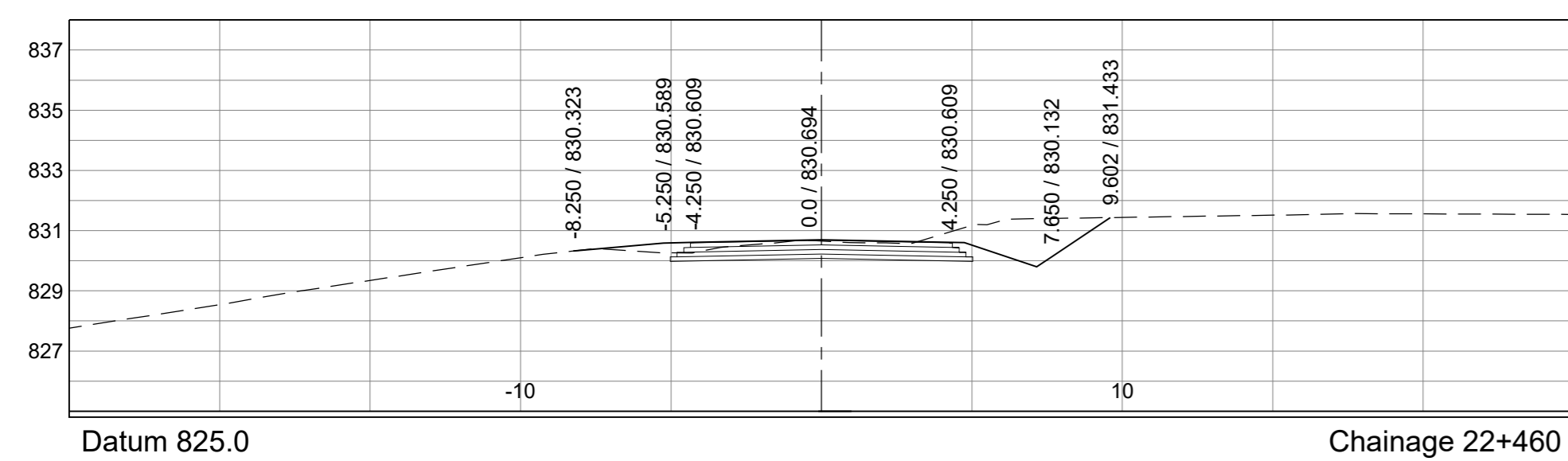
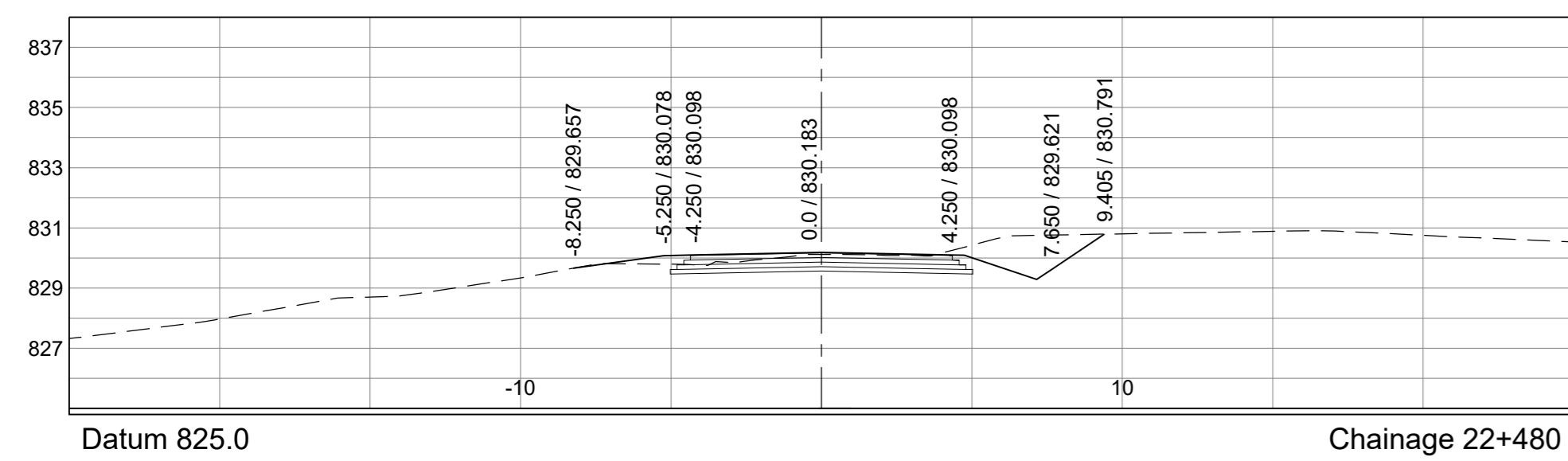
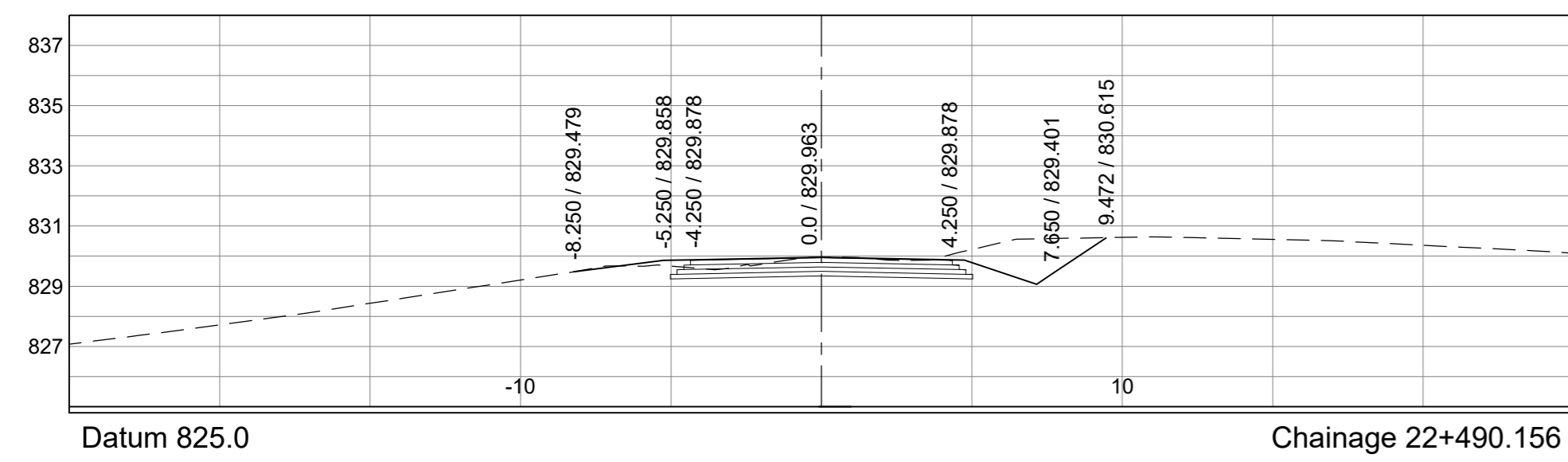
GENERAL ROAD CROSS SECTIONS

Staked km distance	Sheet - 17	REVISION:
km 21+720 - km 22+400	of - 18	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

**C 47646**

C 47646





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer \_\_\_\_\_ Date \_\_\_\_\_

Supervising Authority \_\_\_\_\_

Continued from:-	C 44339
Continued on:-	-
Cross Section No:-	C 44340
Longitudinal Section No:-	C 44329
Design Plan No:-	C 44323 - C 44324

Designed by:-	T. PIKA
Checked by:-	Y. DOMA
Drawn by:-	S. ZITHA
Checked by:-	Y. DOMA
Date of approval:-	



Transportation Engineer: Chief Engineer \_\_\_\_\_

Head: Transport \_\_\_\_\_

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

GENERAL ROAD CROSS SECTIONS

Staked km distance  
km 22+420 - km 22+491

Scale  
HORIZONTAL 1:200  
VERTICAL 1:200

Sheet :- 18  
of :- 18

REVISION:  
A

Plan No :-  
**C 47647**

C 47647

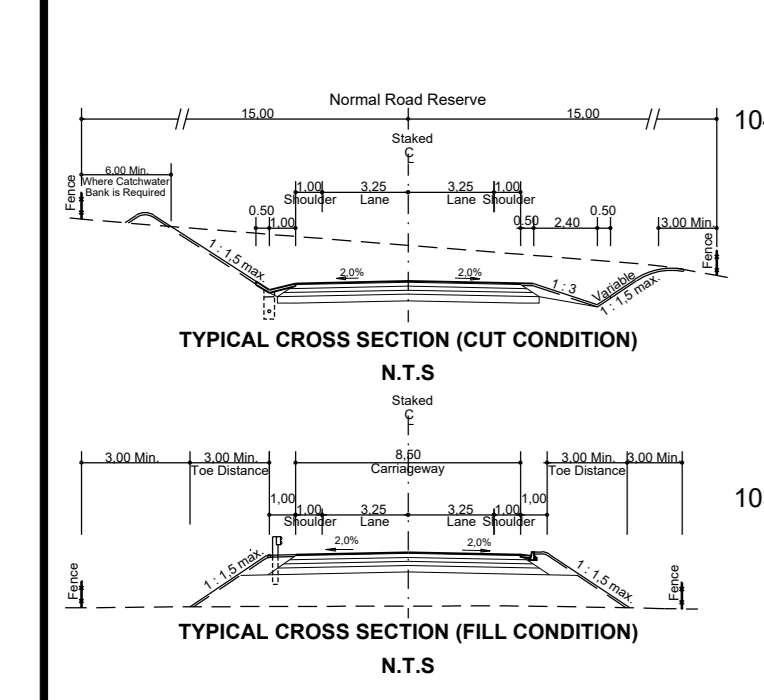




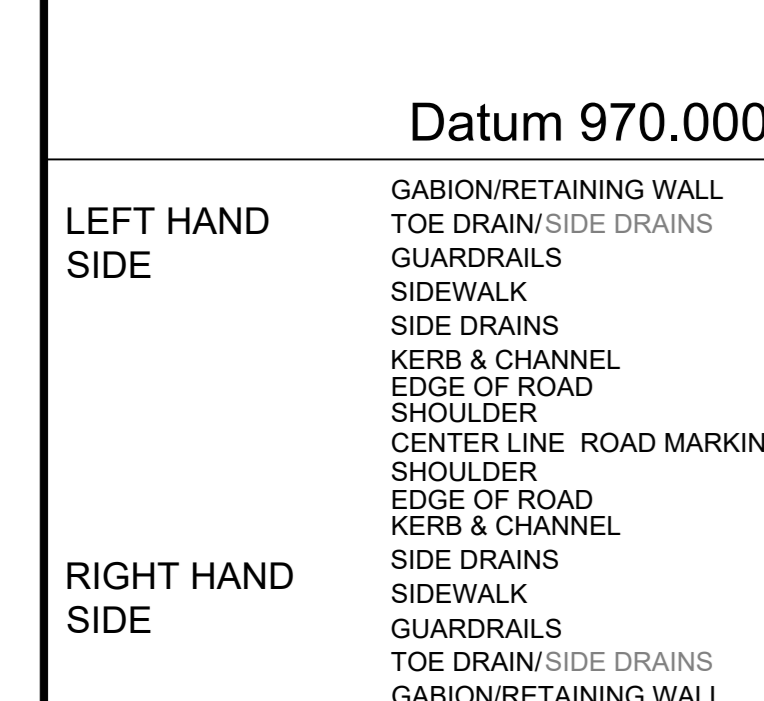


- NOTES:
- ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.
  - CENTRELINE LINE MARKING TO BE 100mm WM3 - WHITE.
  - NO OVERTAKING LINE MARKING TO BE 100mm RM1 - WHITE.
  - SHOULDER LINE MARKING TO BE 100mm RM4.1 - YELLOW.

LONG SECTION  
MAIN ROAD P278  
SCALE : Horizontal 1 : 2000  
Vertical 1 : 200



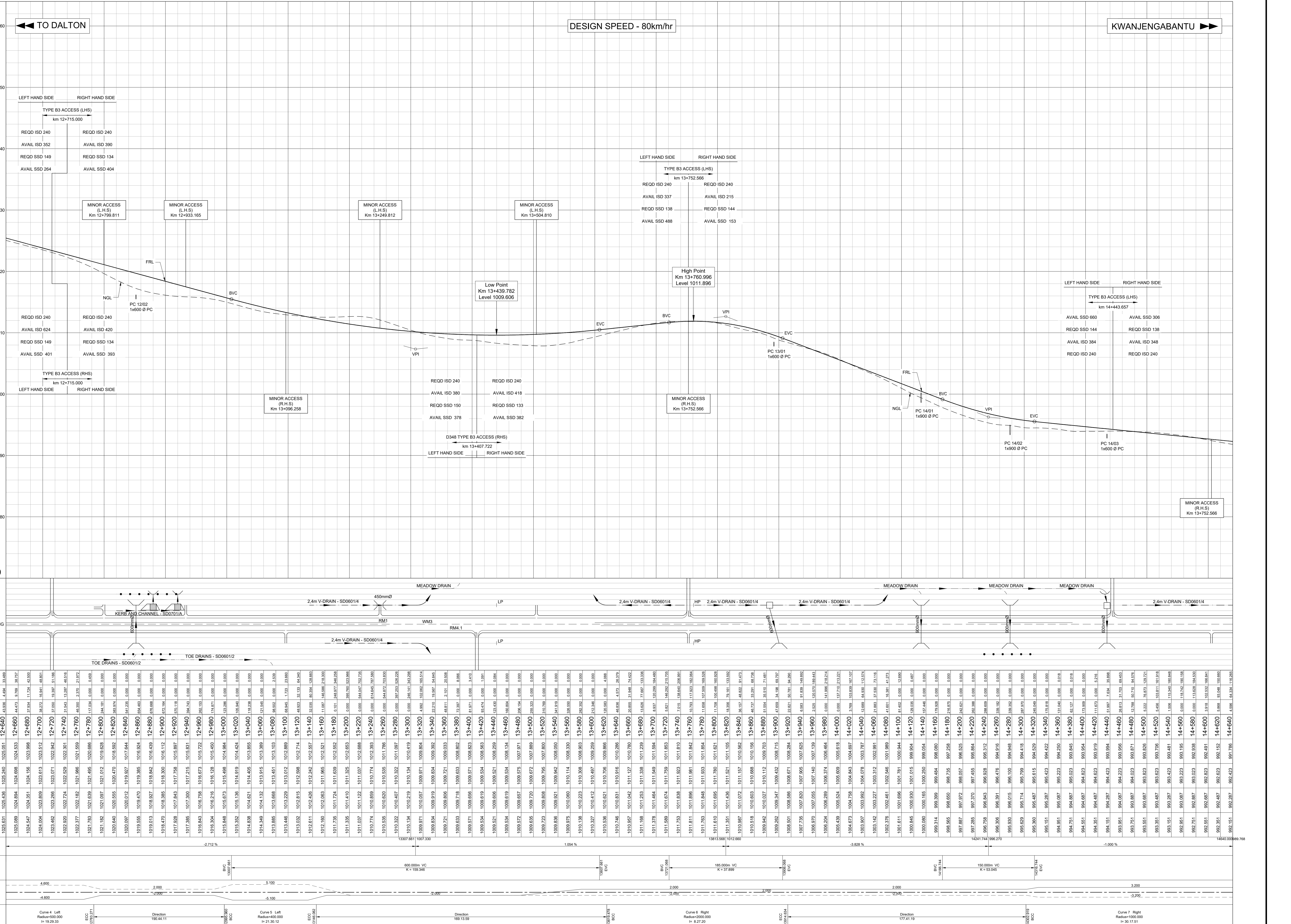
- NOTES:
- ROAD MARKINGS TO BE VERIFIED ON SITE
- LEGEND:
- PIPE CULVERT WITH GRID INLET (SD0602/B) & HEADWALL
  - PIPE CULVERT WITH HEADWALL & HEADWALL
  - PIPE CULVERT WITH DEPRESSED INLET (SD0405/A) & HEADWALL (SD0406)
  - PIPE CULVERT WITH SIDE INLET (SD0703/A) (S1) & HEADWALL (SD0406)
  - DROP INLET & GRID INLET (SD0702/A)
  - NATURAL GROUND LINE
  - FINISHED ROAD LEVEL
  - 1.0m V-DRAIN
  - 2.4m V-DRAIN
  - 500 KERB & CHANNEL
  - GUARDRAILS
  - TOE DRAINS - SD0601/2
  - SIDE WALK GABION RETAINING WALL - SD0901/A
  - FLARED OPEN CHUTE
  - PIPE CHUTE
  - SIDE INLET (D1) & PIPE CHUTE - SD 0703/A
  - SIDE INLET (S1) - SD 0703/A



Datum 970.000

Earthworks Quantities	Cut (m³)	Adj. Cut (m³)	Fill (m³)
12+640	83.96	4.46	34.89
12+660	44.73	0.76	39.72
12+680	27.94	1.78	45.60
12+700	38.72	18.84	48.61
12+720	12.92	18.39	51.98
12+740	11.54	13.29	48.16
12+760	68.39	2.37	21.97
12+780	11.04	0.00	0.00
12+800	44.19	0.00	0.00
12+820	83.74	0.00	0.00
12+840	44.13	0.00	0.00
12+860	94.80	0.00	0.00
12+880	78.66	0.00	0.00
12+900	12.90	0.00	0.00
12+920	12.90	0.00	0.00
12+940	12.90	0.00	0.00
12+960	12.90	0.00	0.00
12+980	12.90	0.00	0.00
13+000	12.90	0.00	0.00
13+020	12.90	0.00	0.00
13+040	12.90	0.00	0.00
13+060	12.90	0.00	0.00
13+080	12.90	0.00	0.00
13+100	12.90	0.00	0.00
13+120	12.90	0.00	0.00
13+140	12.90	0.00	0.00
13+160	12.90	0.00	0.00
13+180	12.90	0.00	0.00
13+200	12.90	0.00	0.00
13+220	12.90	0.00	0.00
13+240	12.90	0.00	0.00
13+260	12.90	0.00	0.00
13+280	12.90	0.00	0.00
13+300	12.90	0.00	0.00
13+320	12.90	0.00	0.00
13+340	12.90	0.00	0.00
13+360	12.90	0.00	0.00
13+380	12.90	0.00	0.00
13+400	12.90	0.00	0.00
13+420	12.90	0.00	0.00
13+440	12.90	0.00	0.00
13+460	12.90	0.00	0.00
13+480	12.90	0.00	0.00
13+500	12.90	0.00	0.00
13+520	12.90	0.00	0.00
13+540	12.90	0.00	0.00
13+560	12.90	0.00	0.00
13+580	12.90	0.00	0.00
13+600	12.90	0.00	0.00
13+620	12.90	0.00	0.00
13+640	12.90	0.00	0.00
13+660	12.90	0.00	0.00
13+680	12.90	0.00	0.00
13+700	12.90	0.00	0.00
13+720	12.90	0.00	0.00
13+740	12.90	0.00	0.00
13+760	12.90	0.00	0.00
13+780	12.90	0.00	0.00
13+800	12.90	0.00	0.00
13+820	12.90	0.00	0.00
13+840	12.90	0.00	0.00
13+860	12.90	0.00	0.00
13+880	12.90	0.00	0.00
13+900	12.90	0.00	0.00
13+920	12.90	0.00	0.00
13+940	12.90	0.00	0.00
13+960	12.90	0.00	0.00
13+980	12.90	0.00	0.00
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14+020	12.90	0.00	0.00
14+040	12.90	0.00	0.00
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14+100	12.90	0.00	0.00
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14+280	12.90	0.00	0.00
14+300	12.90	0.00	0.00
14+320	12.90	0.00	0.00
14+340	12.90	0.00	0.00
14+360	12.90	0.00	0.00
14+380	12.90	0.00	0.00
14+400	12.90	0.00	0.00
14+420	12.90	0.00	0.00
14+440	12.90	0.00	0.00
14+460	12.90	0.00	0.00
14+480	12.90	0.00	0.00
14+500	12.90	0.00	0.00
14+520	12.90	0.00	0.00
14+540	12.90	0.00	0.00
14+560	12.90	0.00	0.00
14+580	12.90	0.00	0.00
14+600	12.90	0.00	0.00
14+620	12.90	0.00	0.00
14+640	12.90	0.00	0.00

Vertical Alignment	Design Road Levels	Grades	Vertical Curves	Superelevation	Horizontal Curves
Left Edge	4.25m	-2.712 %	600.00m VC K = 199.346	L: 4.000 R: -4.000	Curve 4 Left Radius=200.000 I= 19.28.33
	Centre Line				Curve 5 Left Radius=400.000 I= 21.30.12
Right Edge	4.25m	1.954 %	185.00m VC K = 37.899		Curve 6 Right Radius=200.000 I= 8.27.20
		-3.828 %	150.00m VC K = 33.045		Curve 7 Right Radius=1000.000 I= 30.17.51



AS BUILT	Continued from:-	Designed by:-
	C 44324	T. PIKA
	C 44326	Y. DOMA
	C 44331	S. ZITHA
	C 44325	Y. DOMA
	C 44314 - C 44315	

Supervising Engineer	Date	Supervising Authority



Transportation Engineer: Chief Engineer	Date
	01-02-2024

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU

PORTION  
Km 10+880 - Km 22+491

UPGRADING OF MAIN ROAD 278 (P278)  
ROAD LONGITUDINAL SECTION

Staked km distance: km 11+640 - km 12+640  
Sheet - 2 of - 6 REVISION: A  
Scale: HORIZONTAL 1:2000  
VERTICAL 1:200  
Plan No - C 44325

C 44325



NOTES:  
 1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.  
 2. CENTRELINE LINE MARKING TO BE 100mm WM3 - WHITE.  
 3. NO OVERTAKING LINE MARKING TO BE 100mm RM1 - WHITE.  
 4. SHOULDER LINE MARKING TO BE 100mm RM4 1 - YELLOW.

LONG SECTION  
 MAIN ROAD P278  
 SCALE : Horizontal 1 : 200  
 Vertical 1 : 200

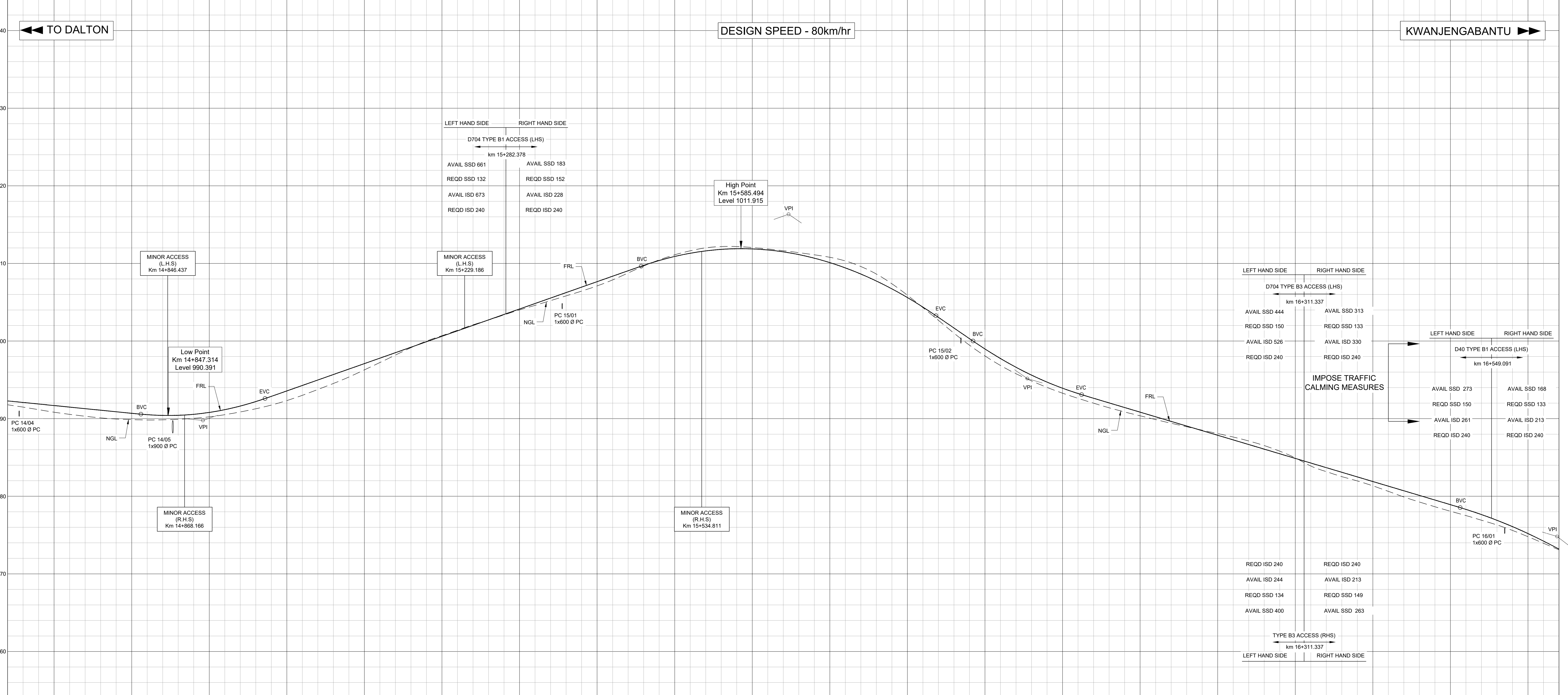
NOTES:  
 1) ROAD MARKINGS TO BE VERIFIED ON SITE

LEGEND:  
 PIPE CULVERT WITH GRID INLET (SD0602/B) & HEADWALL  
 PIPE CULVERT WITH HEADWALL & HEADWALL  
 PIPE CULVERT WITH DEPRESSED INLET (SD0405/A) & HEADWALL (SD0406)  
 PIPE CULVERT WITH SIDE INLET (SD0703/A) (S1) & HEADWALL (SD0406)  
 DROP INLET & GRID INLET (SD0702/A)  
 NATURAL GROUND LINE  
 FINISHED ROAD LEVEL  
 1.0m V-DRAIN  
 2.4m V-DRAIN  
 500 KERB & CHANNEL  
 GUARDRAILS  
 TOE DRAINS - SD0601/2  
 SIDE WALK  
 GABION/RETAINING WALL - SD0910/A  
 FLARED OPEN CHUTE  
 PIPE CHUTE  
 SIDE INLET (D1) & PIPE CHUTE - SD 0703/A  
 SIDE INLET (S1) - SD 0703/A

Datum 950.000

LEFT HAND SIDE  
 GABION/RETAINING WALL  
 TOE DRAIN/SIDE DRAINS  
 GUARDRAILS  
 SIDE WALK  
 KERB & CHANNEL  
 EDGE OF ROAD  
 SHOULDER  
 CENTRE LINE ROAD MARKING  
 SHOULDER  
 EDGE OF ROAD  
 KERB & CHANNEL  
 SIDE DRAINS  
 SIDE WALK  
 GUARDRAILS  
 TOE DRAIN/SIDE DRAINS  
 GABION/RETAINING WALL

RIGHT HAND SIDE



Chainages	Earthworks Quantities		
	Cut (m³)	Fill (m³)	
	Adj. Cut (m³)	Fill (m³)	
14+640	0.00	64.34	116.96
14+660	18.36	20.81	57.23
14+680	39.21	0.00	17.47
14+700	60.83	0.00	0.42
14+720	106.29	0.00	0.00
14+740	184.93	0.00	0.00
14+760	218.19	0.00	0.00
14+780	216.41	0.00	0.00
14+800	170.95	0.00	0.00
14+820	108.95	0.00	0.00
14+840	66.17	0.00	4.17
14+860	30.00	0.00	14.94
14+880	13.39	2.11	21.42
14+900	0.00	11.99	28.97
14+920	0.00	30.30	137.15
15+000	0.00	0.00	0.00
15+100	0.00	0.00	0.00
15+200	0.00	0.00	0.00
15+300	0.00	0.00	0.00
15+400	0.00	0.00	0.00
15+500	0.00	0.00	0.00
15+600	0.00	0.00	0.00
15+700	0.00	0.00	0.00
15+800	0.00	0.00	0.00
15+900	0.00	0.00	0.00
16+000	0.00	0.00	0.00
16+100	0.00	0.00	0.00
16+200	0.00	0.00	0.00
16+300	0.00	0.00	0.00
16+400	0.00	0.00	0.00
16+500	0.00	0.00	0.00
16+600	0.00	0.00	0.00
16+700	0.00	0.00	0.00
16+800	0.00	0.00	0.00
16+900	0.00	0.00	0.00
17+000	0.00	0.00	0.00
17+100	0.00	0.00	0.00
17+200	0.00	0.00	0.00
17+300	0.00	0.00	0.00
17+400	0.00	0.00	0.00
17+500	0.00	0.00	0.00
17+600	0.00	0.00	0.00
17+700	0.00	0.00	0.00
17+800	0.00	0.00	0.00
17+900	0.00	0.00	0.00
18+000	0.00	0.00	0.00
18+100	0.00	0.00	0.00
18+200	0.00	0.00	0.00
18+300	0.00	0.00	0.00
18+400	0.00	0.00	0.00
18+500	0.00	0.00	0.00
18+600	0.00	0.00	0.00
18+700	0.00	0.00	0.00
18+800	0.00	0.00	0.00
18+900	0.00	0.00	0.00
19+000	0.00	0.00	0.00
19+100	0.00	0.00	0.00
19+200	0.00	0.00	0.00
19+300	0.00	0.00	0.00
19+400	0.00	0.00	0.00
19+500	0.00	0.00	0.00
19+600	0.00	0.00	0.00
19+700	0.00	0.00	0.00
19+800	0.00	0.00	0.00
19+900	0.00	0.00	0.00
20+000	0.00	0.00	0.00
20+100	0.00	0.00	0.00
20+200	0.00	0.00	0.00
20+300	0.00	0.00	0.00
20+400	0.00	0.00	0.00
20+500	0.00	0.00	0.00
20+600	0.00	0.00	0.00
20+700	0.00	0.00	0.00
20+800	0.00	0.00	0.00
20+900	0.00	0.00	0.00
21+000	0.00	0.00	0.00
21+100	0.00	0.00	0.00
21+200	0.00	0.00	0.00
21+300	0.00	0.00	0.00
21+400	0.00	0.00	0.00
21+500	0.00	0.00	0.00
21+600	0.00	0.00	0.00
21+700	0.00	0.00	0.00
21+800	0.00	0.00	0.00
21+900	0.00	0.00	0.00
22+000	0.00	0.00	0.00
22+100	0.00	0.00	0.00
22+200	0.00	0.00	0.00
22+300	0.00	0.00	0.00
22+400	0.00	0.00	0.00
22+500	0.00	0.00	0.00
22+600	0.00	0.00	0.00
22+700	0.00	0.00	0.00
22+800	0.00	0.00	0.00
22+900	0.00	0.00	0.00
23+000	0.00	0.00	0.00
23+100	0.00	0.00	0.00
23+200	0.00	0.00	0.00
23+300	0.00	0.00	0.00
23+400	0.00	0.00	0.00
23+500	0.00	0.00	0.00
23+600	0.00	0.00	0.00
23+700	0.00	0.00	0.00
23+800	0.00	0.00	0.00
23+900	0.00	0.00	0.00
24+000	0.00	0.00	0.00
24+100	0.00	0.00	0.00
24+200	0.00	0.00	0.00
24+300	0.00	0.00	0.00
24+400	0.00	0.00	0.00
24+500	0.00	0.00	0.00
24+600	0.00	0.00	0.00
24+700	0.00	0.00	0.00
24+800	0.00	0.00	0.00
24+900	0.00	0.00	0.00
25+000	0.00	0.00	0.00

Vertical Alignment

Design Road Levels	Grades	
	Left Edge	Right Edge
4.25m	0.00%	3.51%
4.25m	-1.00%	-8.87%
	-2.98%	

Superelevation

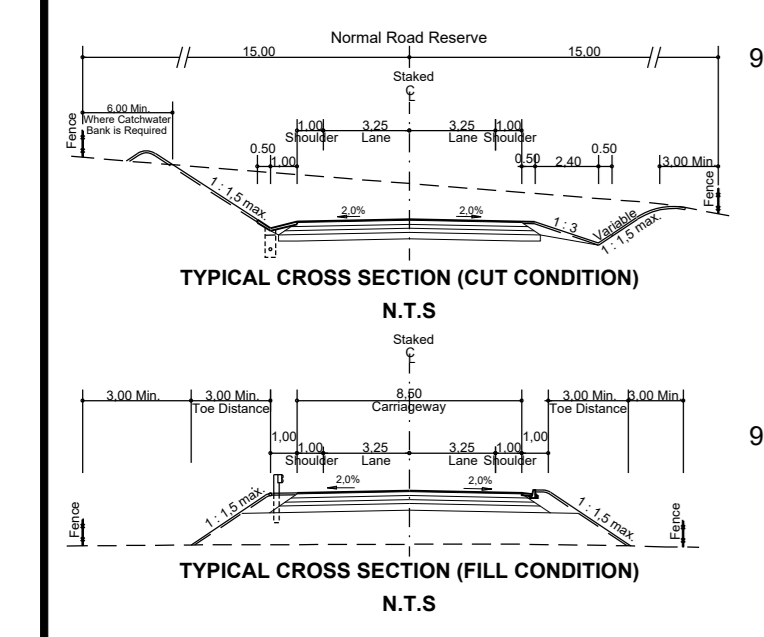
Horizontal Curves

Curve 7 Right Radius=1000.00 R=30.17.51  
 Curve 8 Right Radius=300.00 R=24.51.12  
 Curve 9 Left Radius=1500.00 R=36.10.54  
 Curve 10 Right Radius=250.00 R=30.10.54

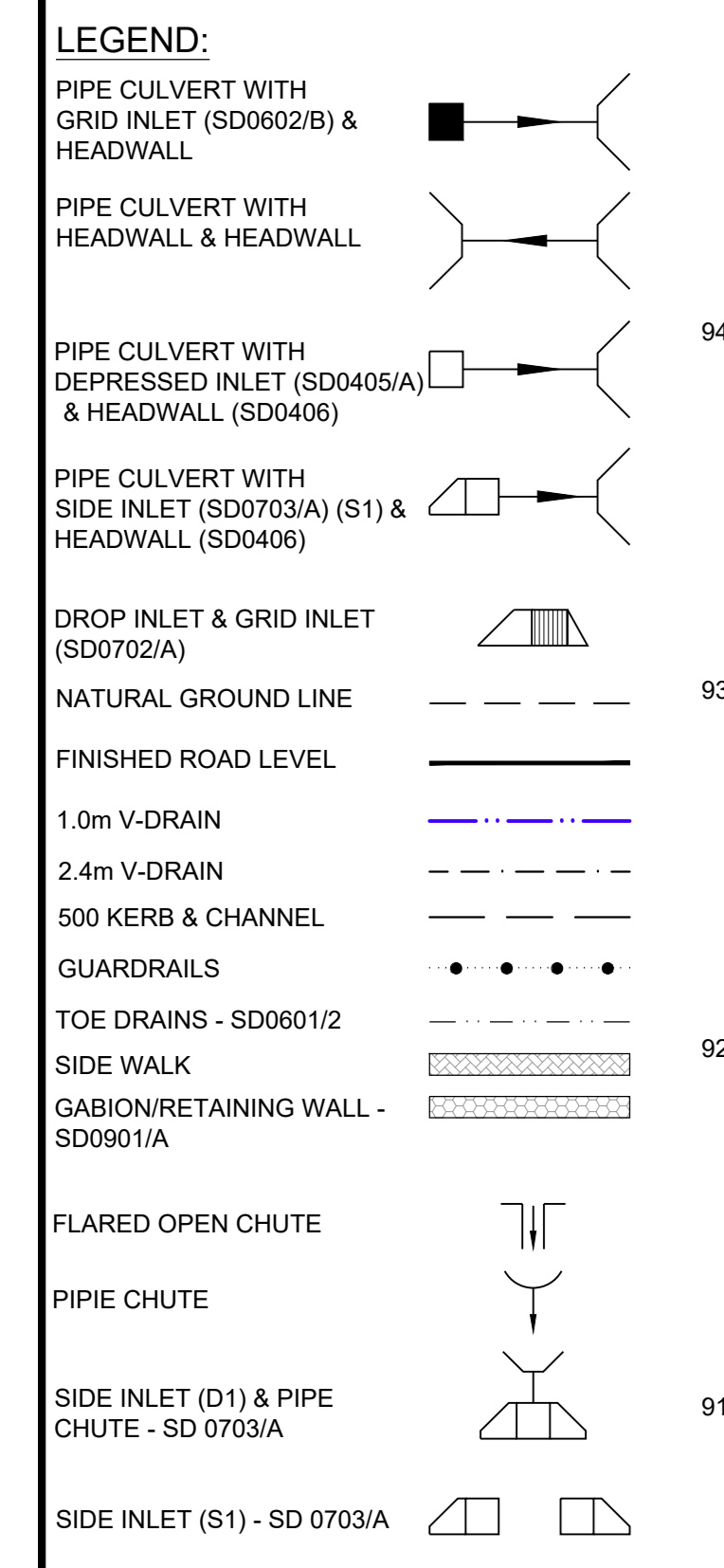


NOTES:  
 1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKING IS TO BE VERIFIED ON SITE.  
 2. CENTRELINE LINE MARKING TO BE 100mm WM3 - WHITE.  
 3. NO OVERTAKING LINE MARKING TO BE 100mm RM1 - WHITE.  
 4. SHOULDER LINE MARKING TO BE 100mm RM4.1 - YELLOW.

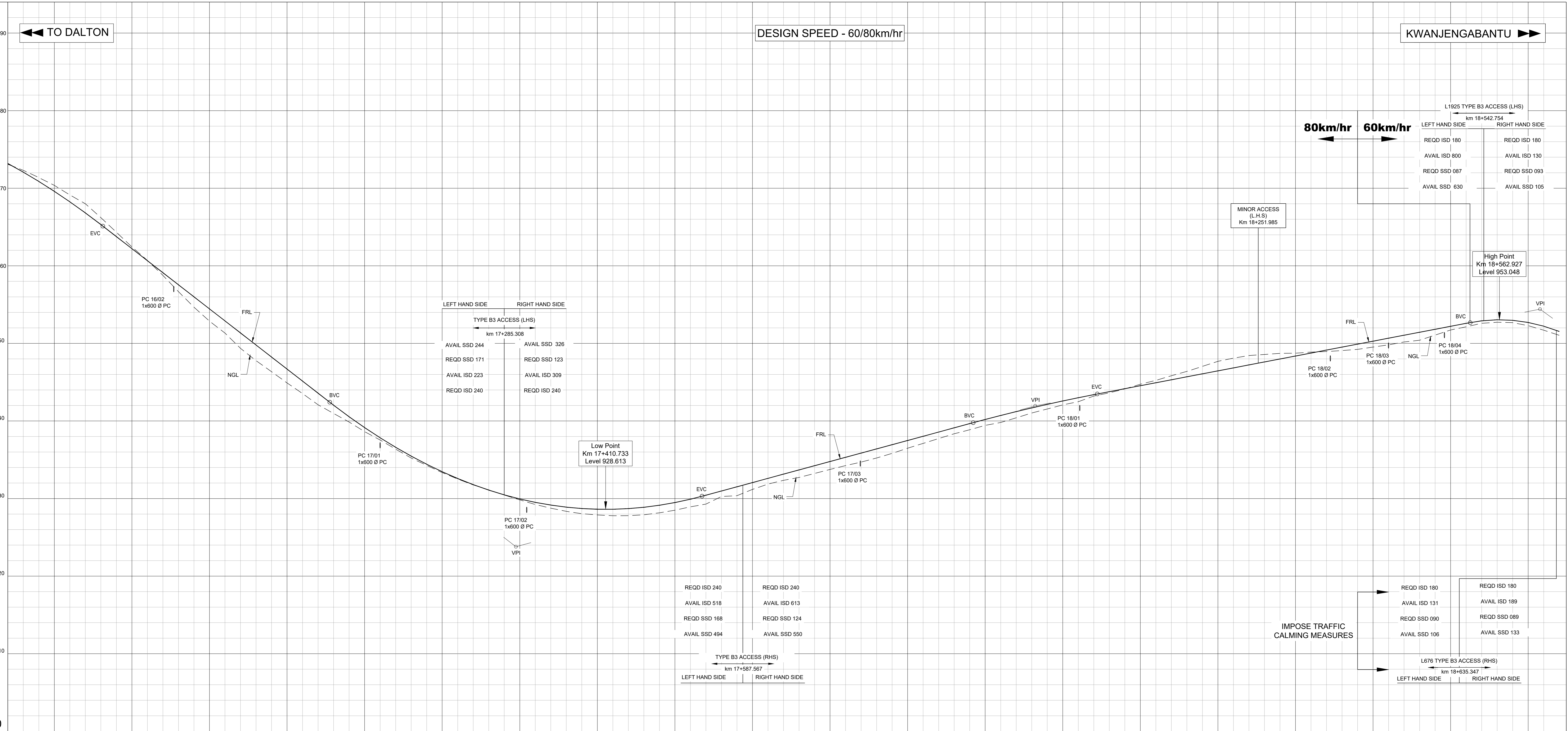
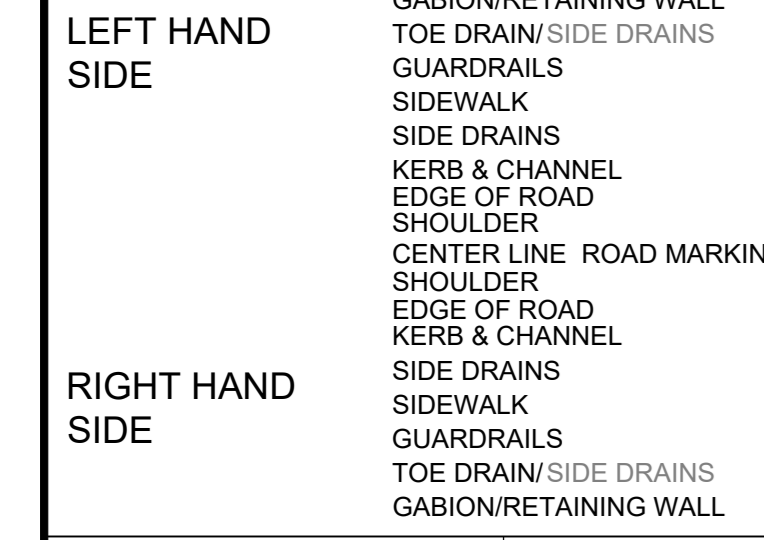
LONG SECTION  
 MAIN ROAD P278  
 SCALE : Horizontal 1 : 200  
 Vertical 1 : 200



NOTES:  
 1) ROAD MARKINGS TO BE VERIFIED ON SITE



Datum 900.000





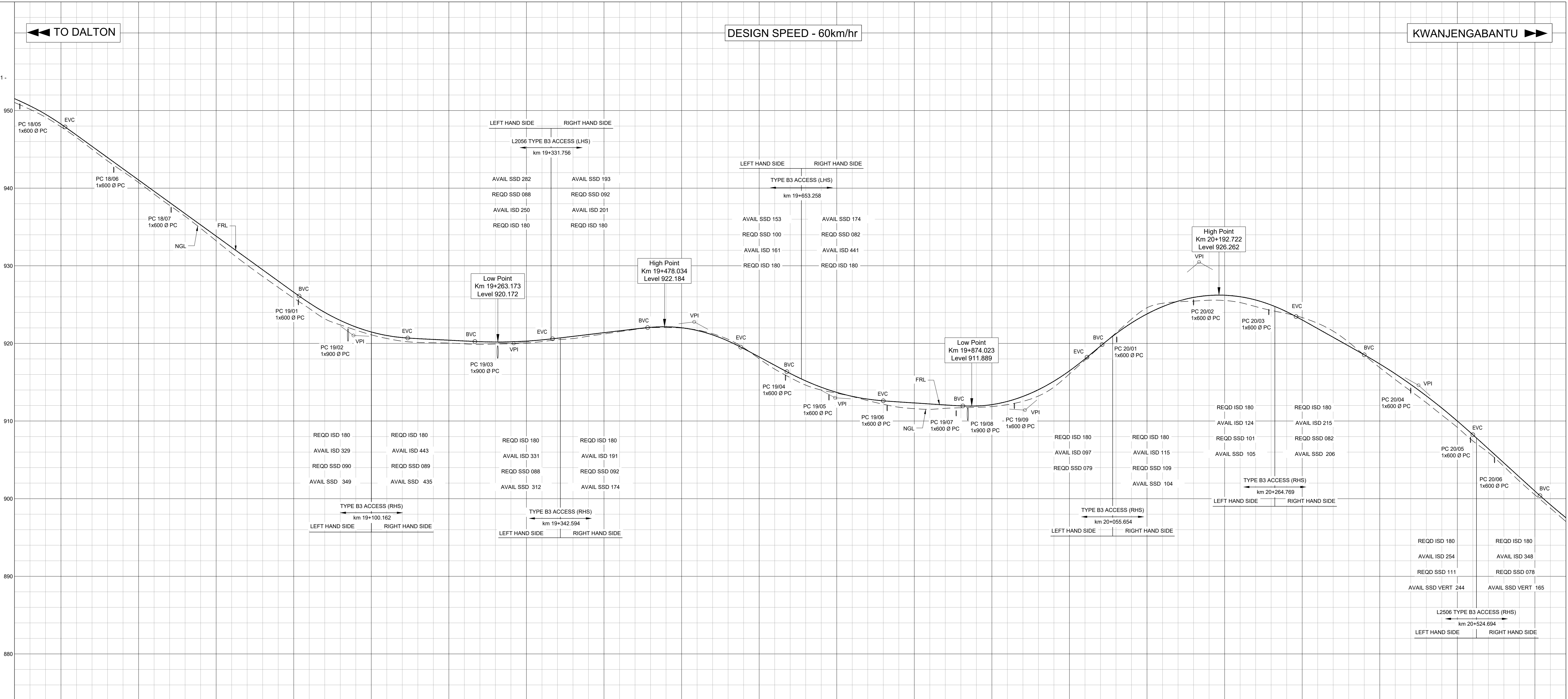
NOTES:  
 1. ALL LEVELS, DIMENSIONS AND SETTING OUT DETAILS ARE TO BE VERIFIED BY THE CONSULTANT AND CONTRACTOR ON SITE PRIOR TO CONSTRUCTION. ALL ROAD MARKINGS IS TO BE VERIFIED ON SITE.  
 2. CENTRELINE LINE MARKING TO BE 100mm WM3 - WHITE.  
 3. NO OVERTAKING LINE MARKING TO BE 100mm RM1 - WHITE.  
 4. SHOULDER LINE MARKING TO BE 100mm RM4.1 - YELLOW.

LONG SECTION  
 MAIN ROAD P278  
 SCALE : Horizontal 1 : 2000  
 Vertical 1 : 200

NOTES:  
 1) ROAD MARKINGS TO BE VERIFIED ON SITE

LEGEND:

- PIPE CULVERT WITH GRID INLET (SD0602B) & HEADWALL
- PIPE CULVERT WITH HEADWALL & HEADWALL
- PIPE CULVERT WITH DEPRESSED INLET (SD0405A) & HEADWALL (SD0406)
- PIPE CULVERT WITH SIDE INLET (SD0703A) (S1) & HEADWALL (SD0406)
- DROP INLET & GRID INLET (SD0702A)
- NATURAL GROUND LINE
- FINISHED ROAD LEVEL
- 1.0m V-DRAIN
- 2.4m V-DRAIN
- 500 KERB & CHANNEL
- GUARDRAILS
- TOE DRAINS - SD0601/2
- SIDE WALK
- GABION RETAINING WALL - SD0901A
- FLARED OPEN CHUTE
- PIPE CHUTE
- SIDE INLET (D1) & PIPE CHUTE - SD 0703A
- SIDE INLET (S1) - SD 0703A

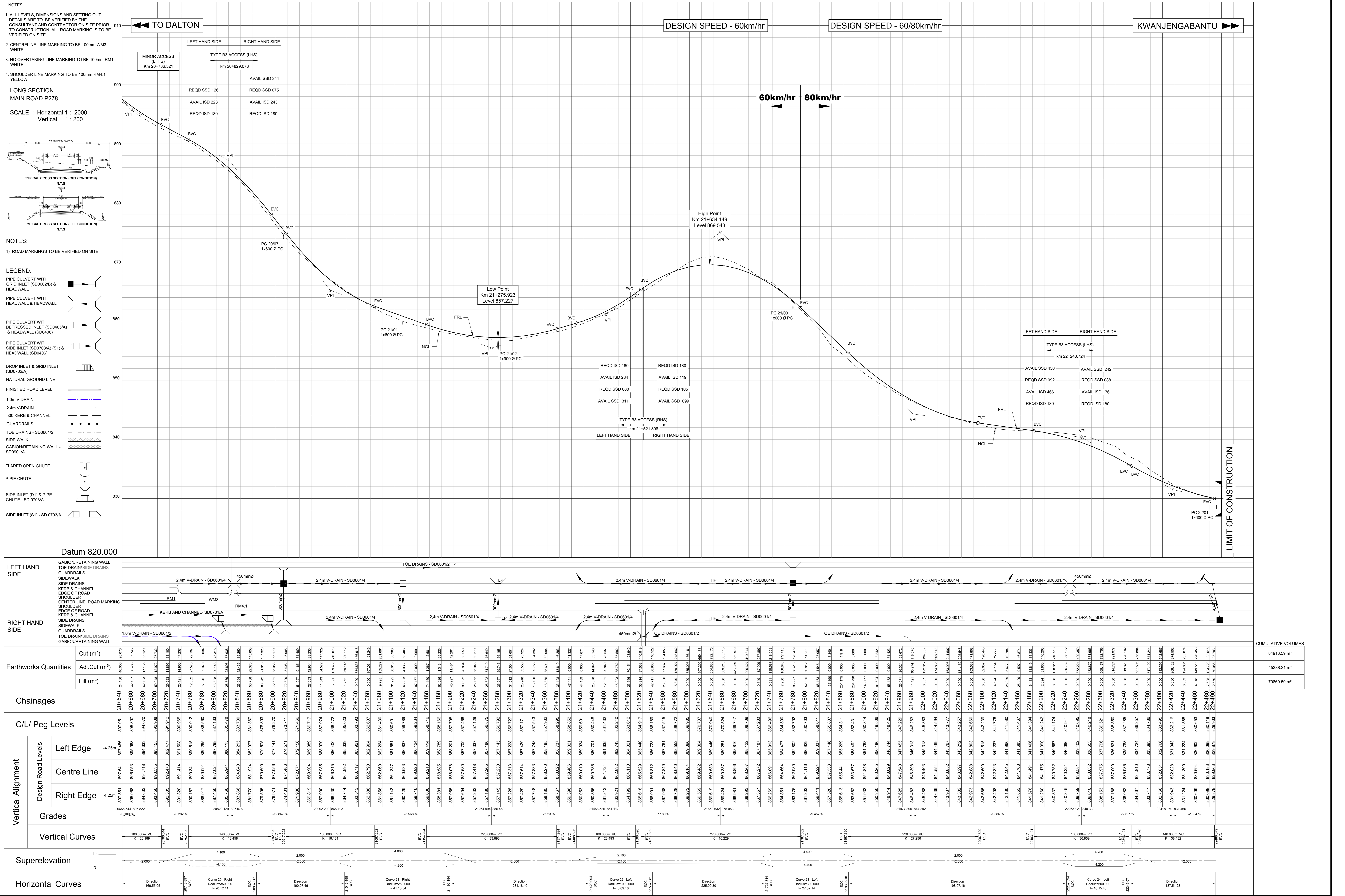


Chainages	Earthworks Quantities		C/L/ Peg Levels	Grades	Vertical Curves	Superelevation	Horizontal Curves
	Cut (m³)	Fill (m³)					
18+640	136,036	0,000	951,043	-7.200%			Curve 14 Right Radius=480.000 R=27.244.95
18+660	12,738	0,000	950,187				
18+680	13,348	0,000	949,216				
18+700	12,898	0,314	948,275				
18+720	8,713	0,261	947,310				
18+740	13,396	0,336	946,326				
18+760	16,737	0,000	945,326				
18+780	16,737	0,000	944,314				
18+800	16,737	0,000	943,286				
18+820	16,737	0,000	942,241				
18+840	16,737	0,000	941,178				
18+860	16,737	0,000	940,100				
18+880	16,737	0,000	939,009				
18+900	16,737	0,000	937,906				
18+920	16,737	0,000	936,791				
18+940	16,737	0,000	935,665				
18+960	16,737	0,000	934,528				
18+980	16,737	0,000	933,380				
19+000	16,737	0,000	932,221				
19+020	16,737	0,000	931,051				
19+040	16,737	0,000	929,871				
19+060	16,737	0,000	928,681				
19+080	16,737	0,000	927,481				
19+100	16,737	0,000	926,271				
19+120	16,737	0,000	925,051				
19+140	16,737	0,000	923,821				
19+160	16,737	0,000	922,591				
19+180	16,737	0,000	921,361				
19+200	16,737	0,000	920,131				
19+220	16,737	0,000	918,901				
19+240	16,737	0,000	917,671				
19+260	16,737	0,000	916,441				
19+280	16,737	0,000	915,211				
19+300	16,737	0,000	913,981				
19+320	16,737	0,000	912,751				
19+340	16,737	0,000	911,521				
19+360	16,737	0,000	910,291				
19+380	16,737	0,000	909,061				
19+400	16,737	0,000	907,831				
19+420	16,737	0,000	906,601				
19+440	16,737	0,000	905,371				
19+460	16,737	0,000	904,141				
19+480	16,737	0,000	902,911				
19+500	16,737	0,000	901,681				
19+520	16,737	0,000	900,451				
19+540	16,737	0,000	899,221				
19+560	16,737	0,000	897,991				
19+580	16,737	0,000	896,761				
19+600	16,737	0,000	895,531				
19+620	16,737	0,000	894,301				
19+640	16,737	0,000	893,071				
19+660	16,737	0,000	891,841				
19+680	16,737	0,000	890,611				
19+700	16,737	0,000	889,381				
19+720	16,737	0,000	888,151				
19+740	16,737	0,000	886,921				
19+760	16,737	0,000	885,691				
19+780	16,737	0,000	884,461				
19+800	16,737	0,000	883,231				
19+820	16,737	0,000	882,001				
19+840	16,737	0,000	880,771				
19+860	16,737	0,000	879,541				
19+880	16,737	0,000	878,311				
19+900	16,737	0,000	877,081				
19+920	16,737	0,000	875,851				
19+940	16,737	0,000	874,621				
19+960	16,737	0,000	873,391				
19+980	16,737	0,000	872,161				
20+000	16,737	0,000	870,931				
20+020	16,737	0,000	869,701				
20+040	16,737	0,000	868,471				
20+060	16,737	0,000	867,241				
20+080	16,737	0,000	866,011				
20+100	16,737	0,000	864,781				
20+120	16,737	0,000	863,551				
20+140	16,737	0,000	862,321				
20+160	16,737	0,000	861,091				
20+180	16,737	0,000	859,861				
20+200	16,737	0,000	858,631				
20+220	16,737	0,000	857,401				
20+240	16,737	0,000	856,171				
20+260	16,737	0,000	854,941				
20+280	16,737	0,000	853,711				
20+300	16,737	0,000	852,481				
20+320	16,737	0,000	851,251				
20+340	16,737	0,000	850,021				
20+360	16,737	0,000	848,791				
20+380	16,737	0,000	847,561				
20+400	16,737	0,000	846,331				
20+420	16,737	0,000	845,101				
20+440	16,737	0,000	843,871				
20+460	16,737	0,000	842,641				
20+480	16,737	0,000	841,411				
20+500	16,737	0,000	840,181				
20+520	16,737	0,000	838,951				
20+540	16,737	0,000	837,721				
20+560	16,737	0,000	836,491				
20+580	16,737	0,000	835,261				
20+600	16,737	0,000	834,031				
20+620	16,737	0,000	832,801				
20+640	16,737	0,000	831,571				

<b>AS BUILT</b> Supervising Engineer: _____ Date: _____ Supervising Authority: _____		Continued from:- C 44324 Continued on:- C 44326 Cross Section No:- C 44331 Longitudinal Section No:- C 44325 Design Plan No:- C 44314 - C 44315	Designed by:- T. PIKA Checked by:- Y. DOMA Drawn by:- S. ZITHA Checked by:- Y. DOMA Date of approval: _____		 emzansi ENGINEERS (PTY) LTD Providing Unbiased Engineering Solutions 01-02-2024 Date Signature: _____	Transportation Engineer: Chief Engineer Head: Transport	<b>MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU</b> PORTION Km 10+880 - Km 22+491 <b>UPGRADING OF MAIN ROAD 278 (P278)</b> ROAD LONGITUDINAL SECTION	Staked km distance: km 14+640 - km 15+640 Scale: HORIZONTAL 1:2000 VERTICAL 1:200 Sheet: 5 of 6 REVISION: A Plan No: C 44328
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C 44328





AS BUILT		Continued from:-		Designed by:-		Continued on:-		Checked by:-		Designed by:-	
Supervising Engineer		Date		T. PIKA		Supervising Authority		Y. DOMA		emzansi ENGINEERS (PTY) LTD	
A 01-02-2024		ISSUED FOR TENDER		C 44324		YD		S. ZITHA		TRANSPORTATION ENGINEER: Chief Engineer	
Symbol		Date		C 44325		Checked		Y. DOMA		Head: Transport	
AMENDMENTS		Description		C 44314 - C 44315		Checked		Date of approval:-		01-02-2024	

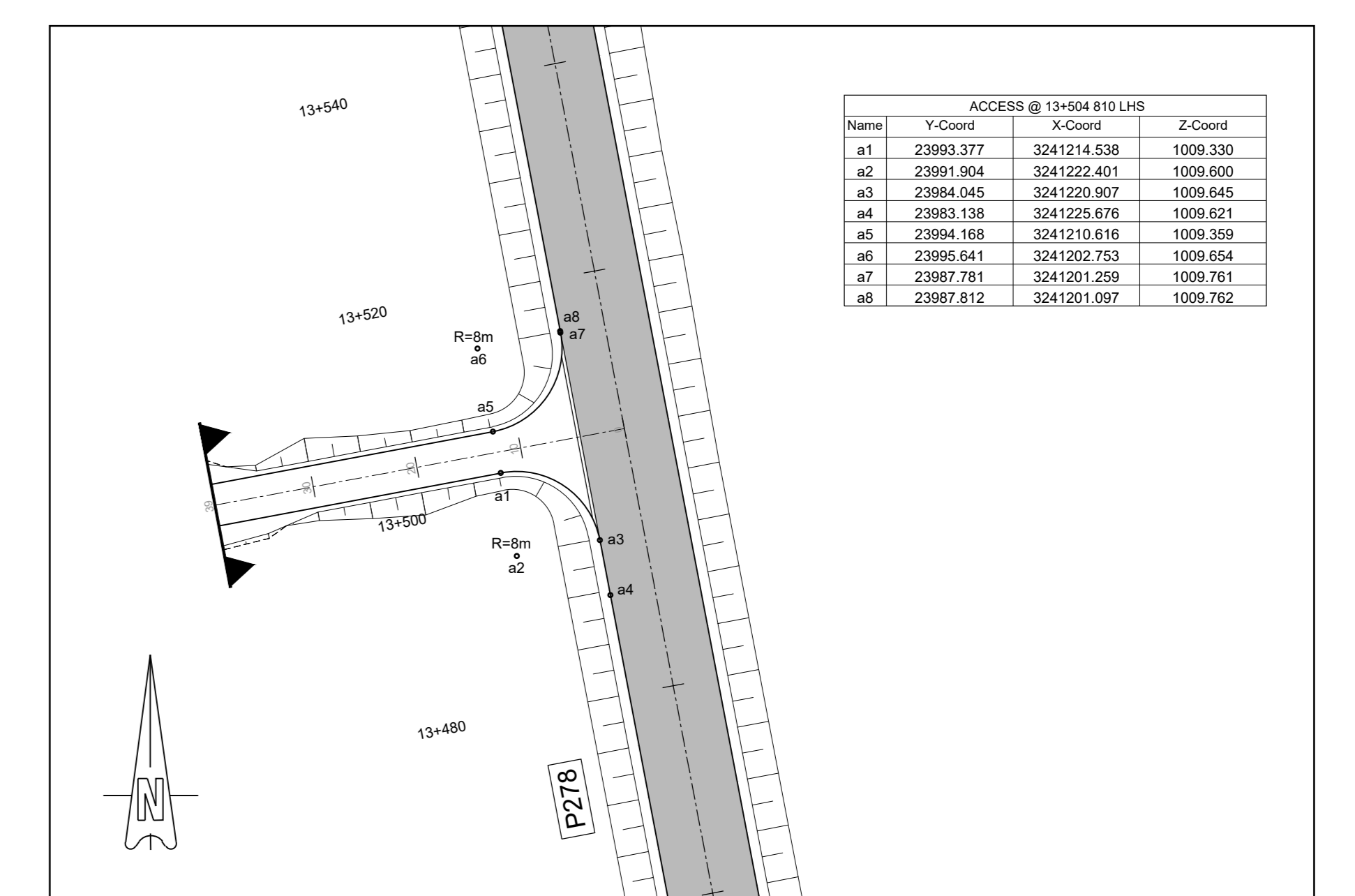
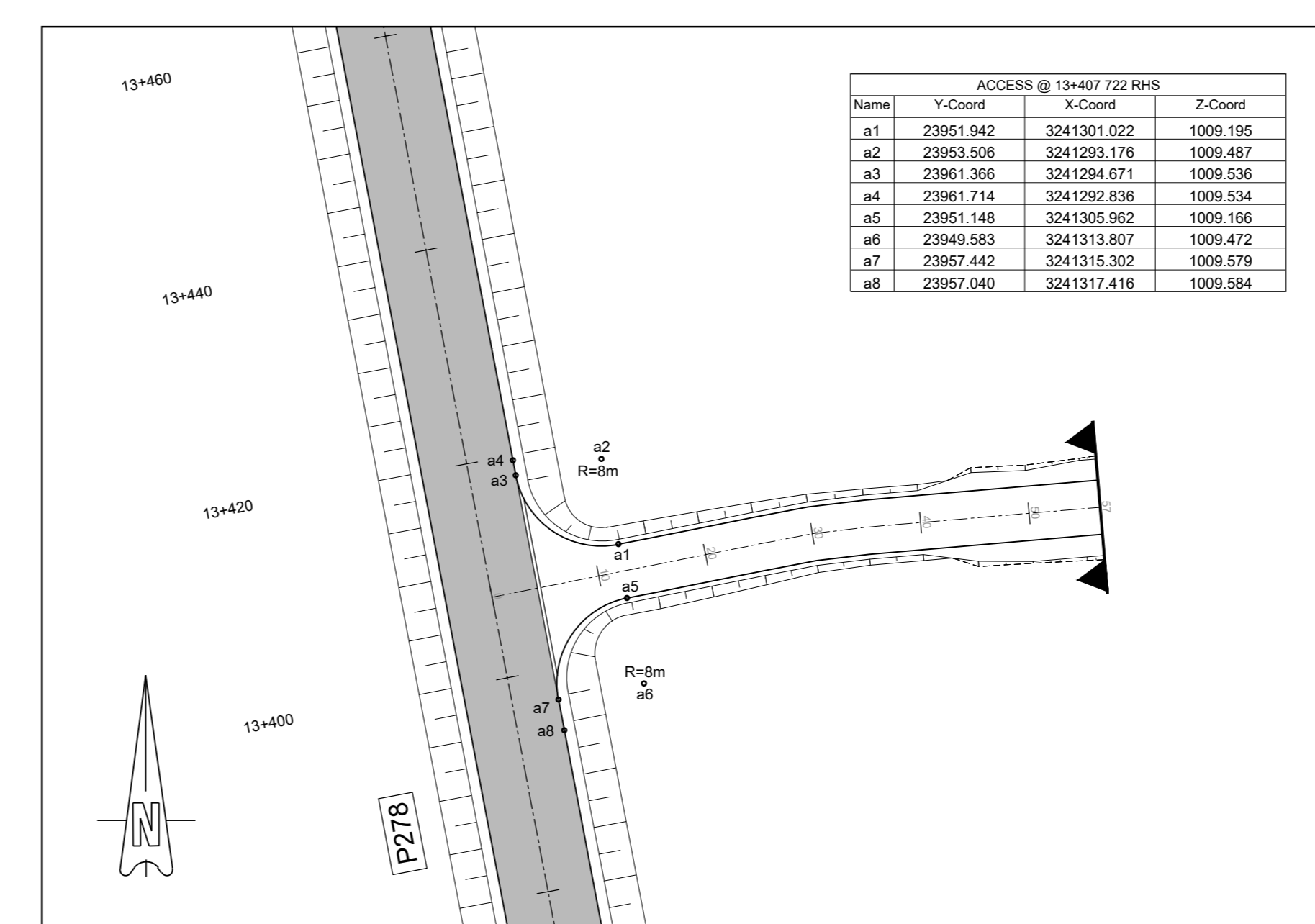
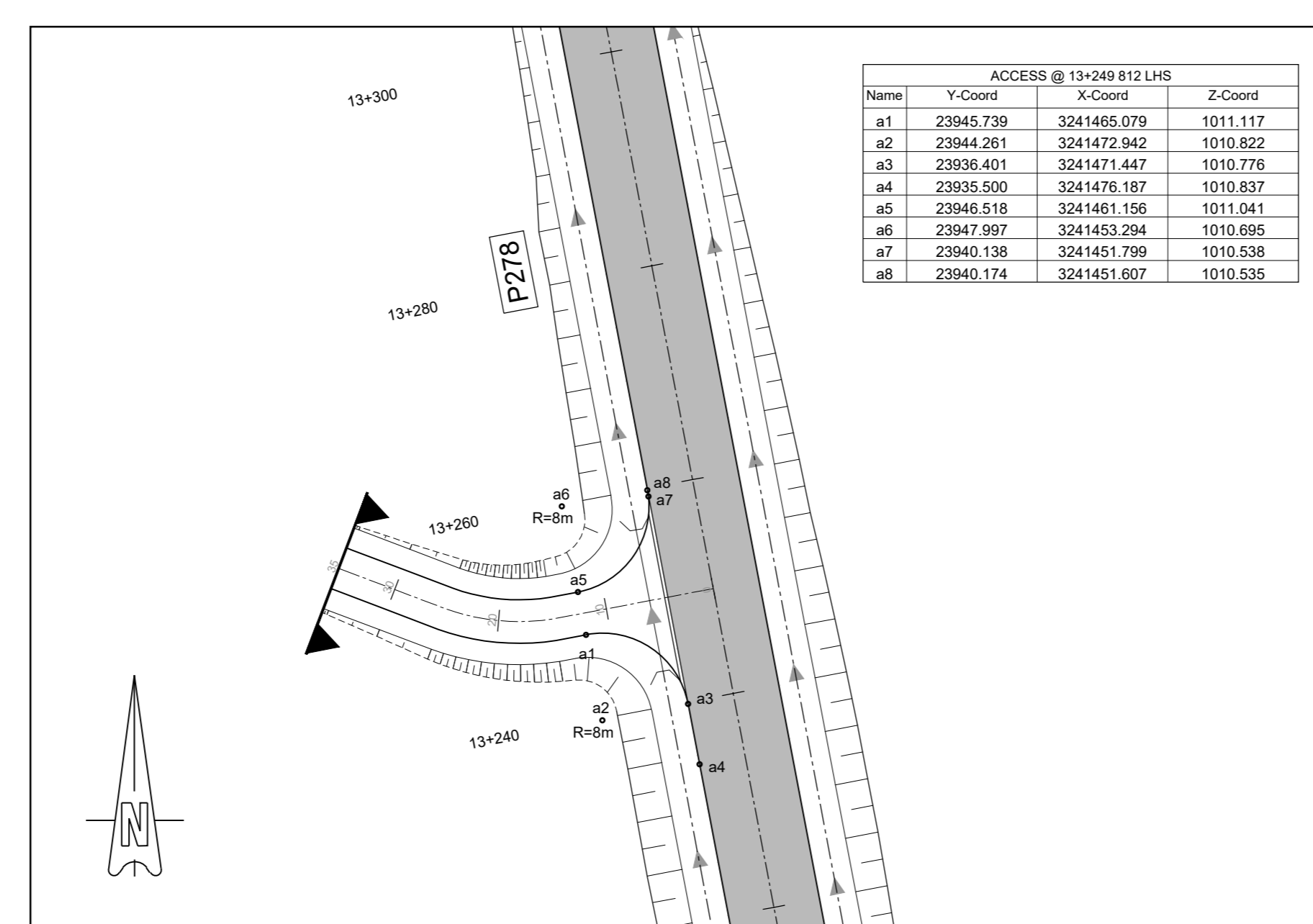
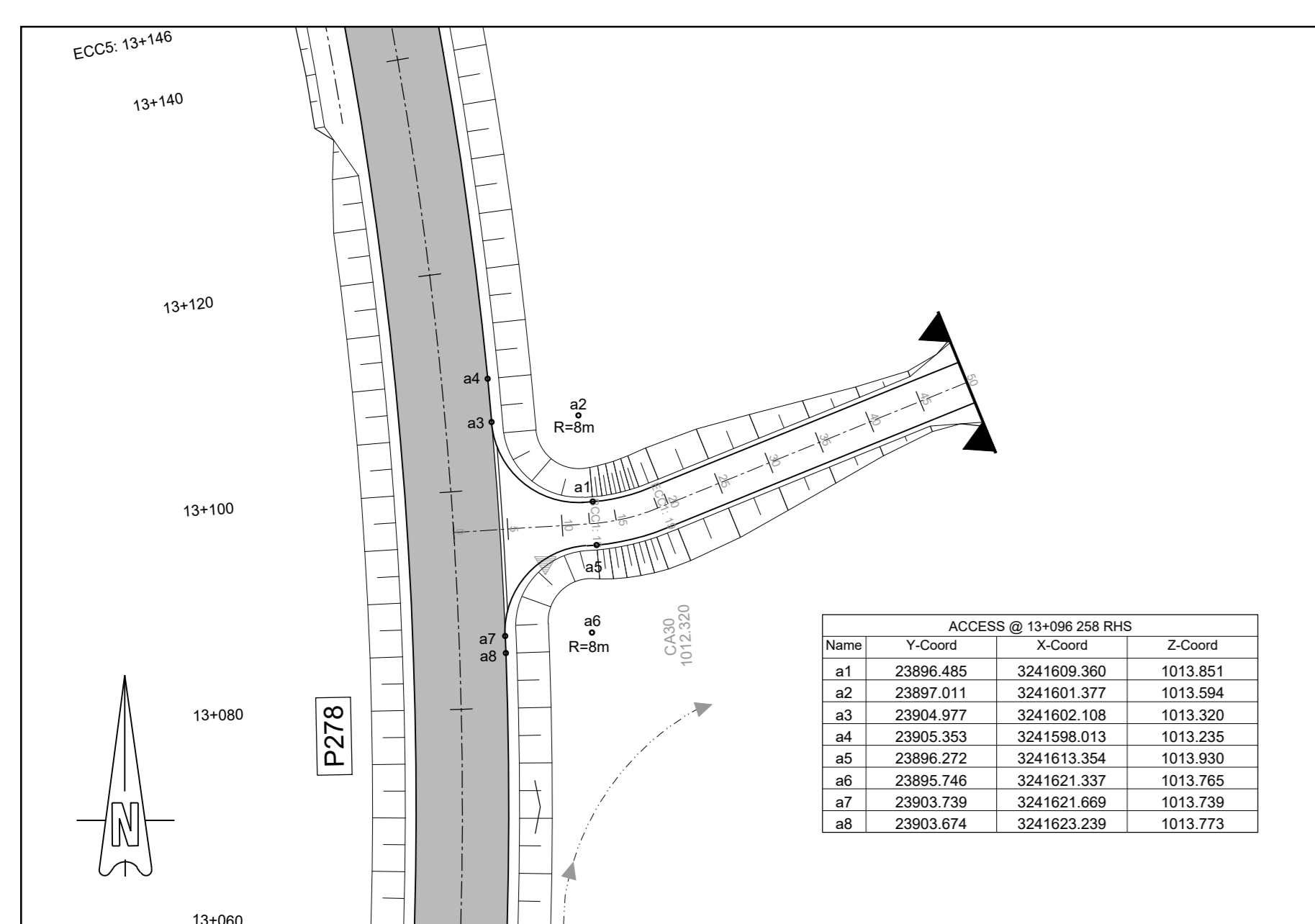
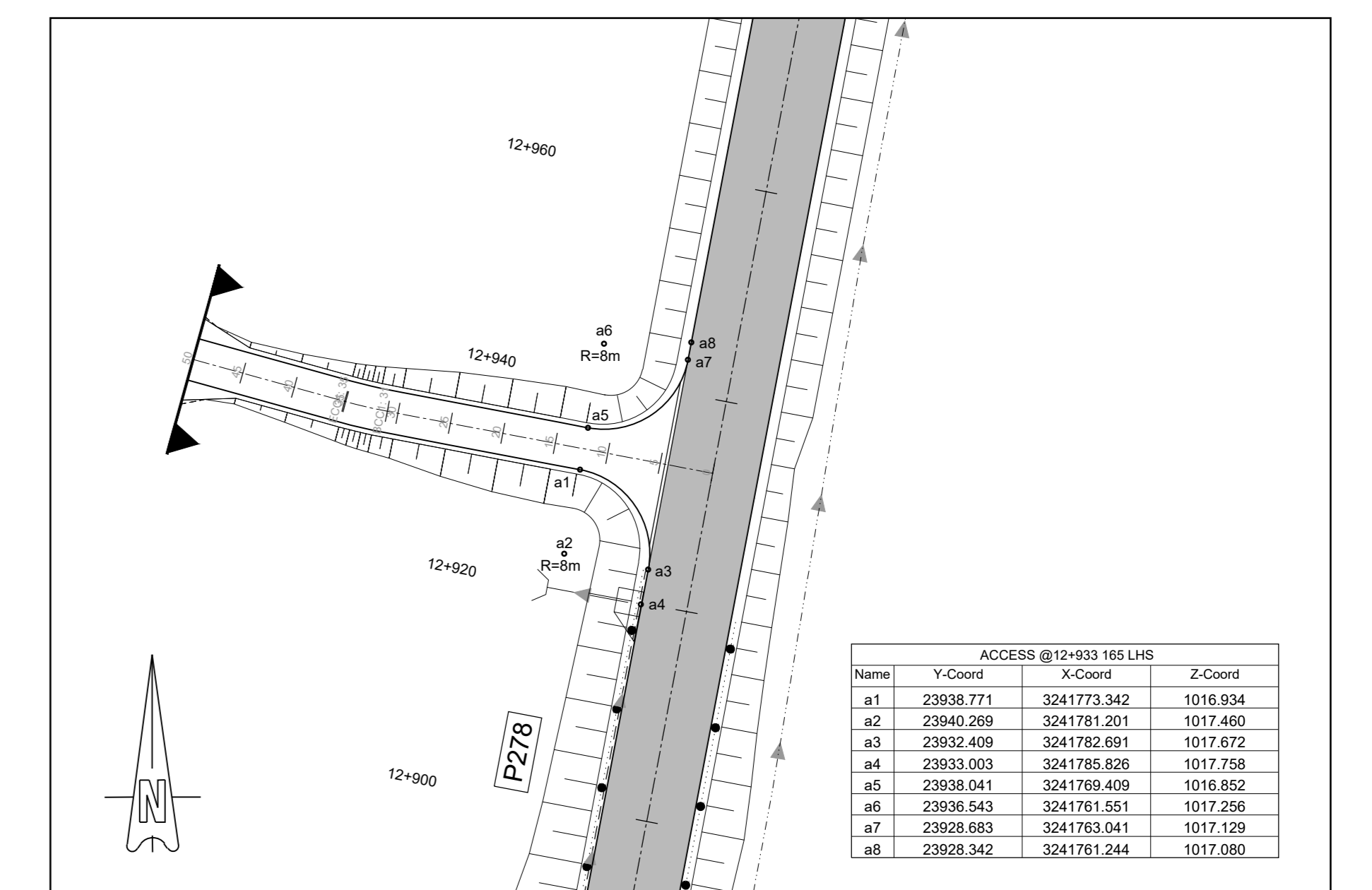
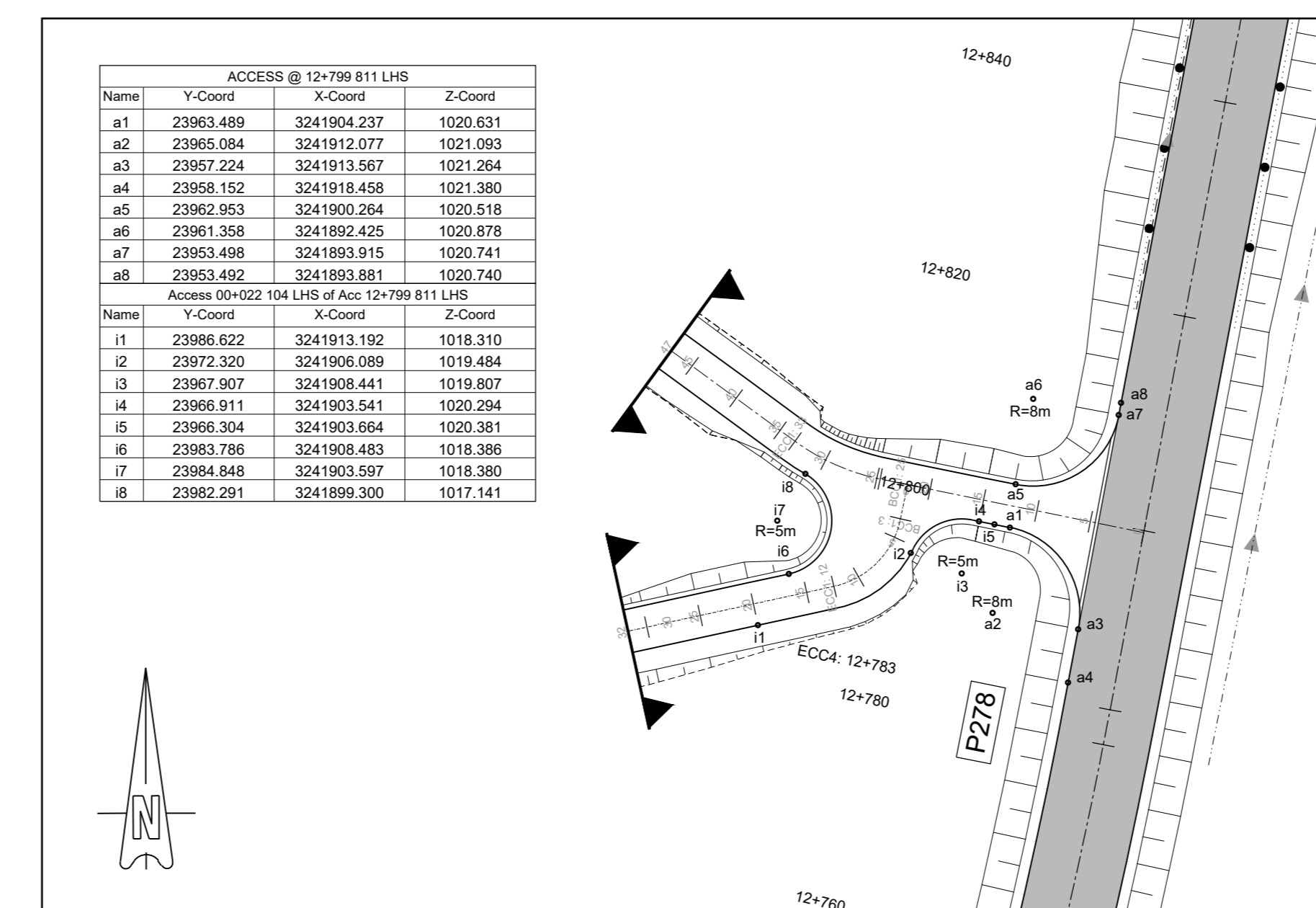
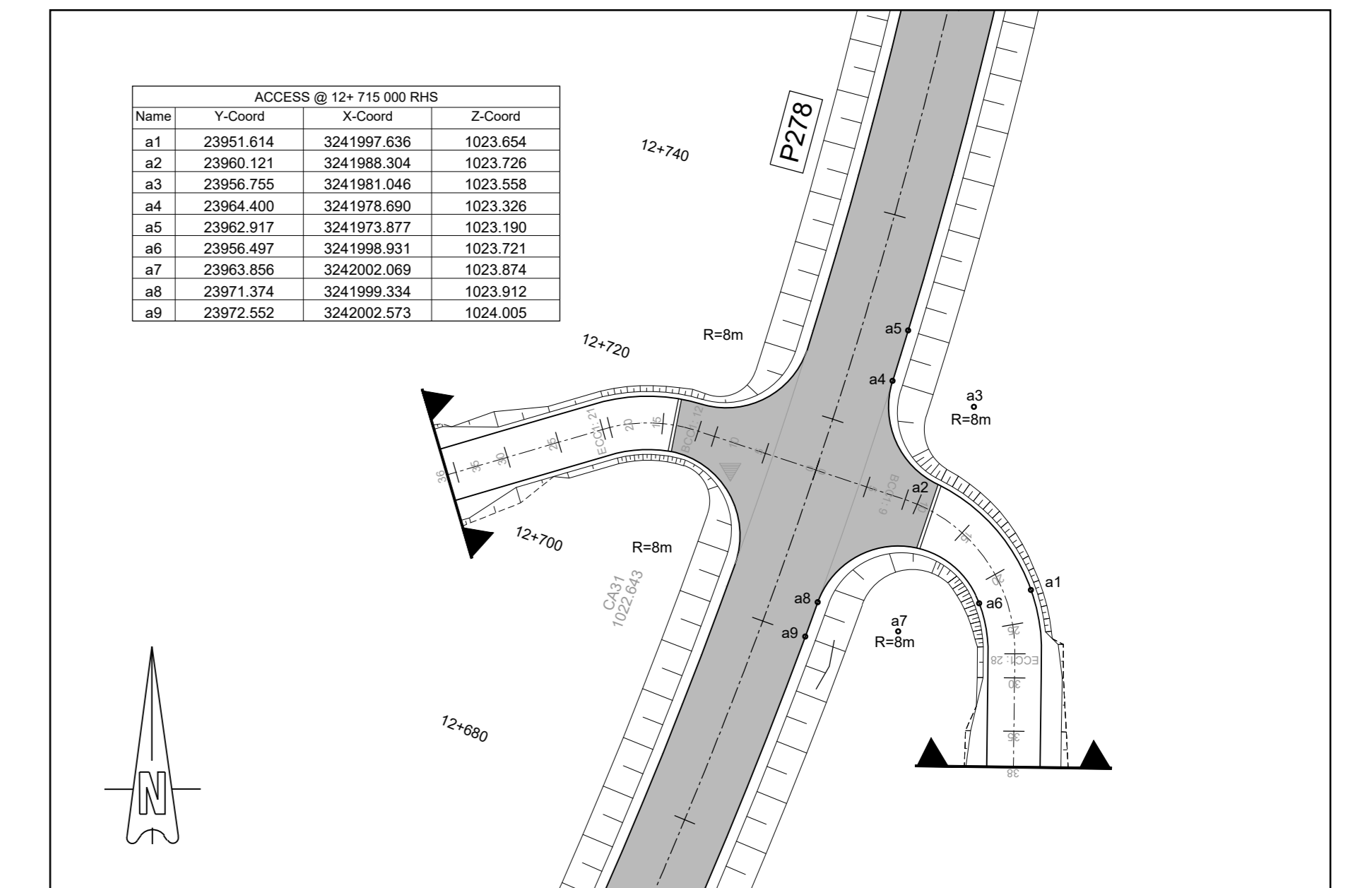
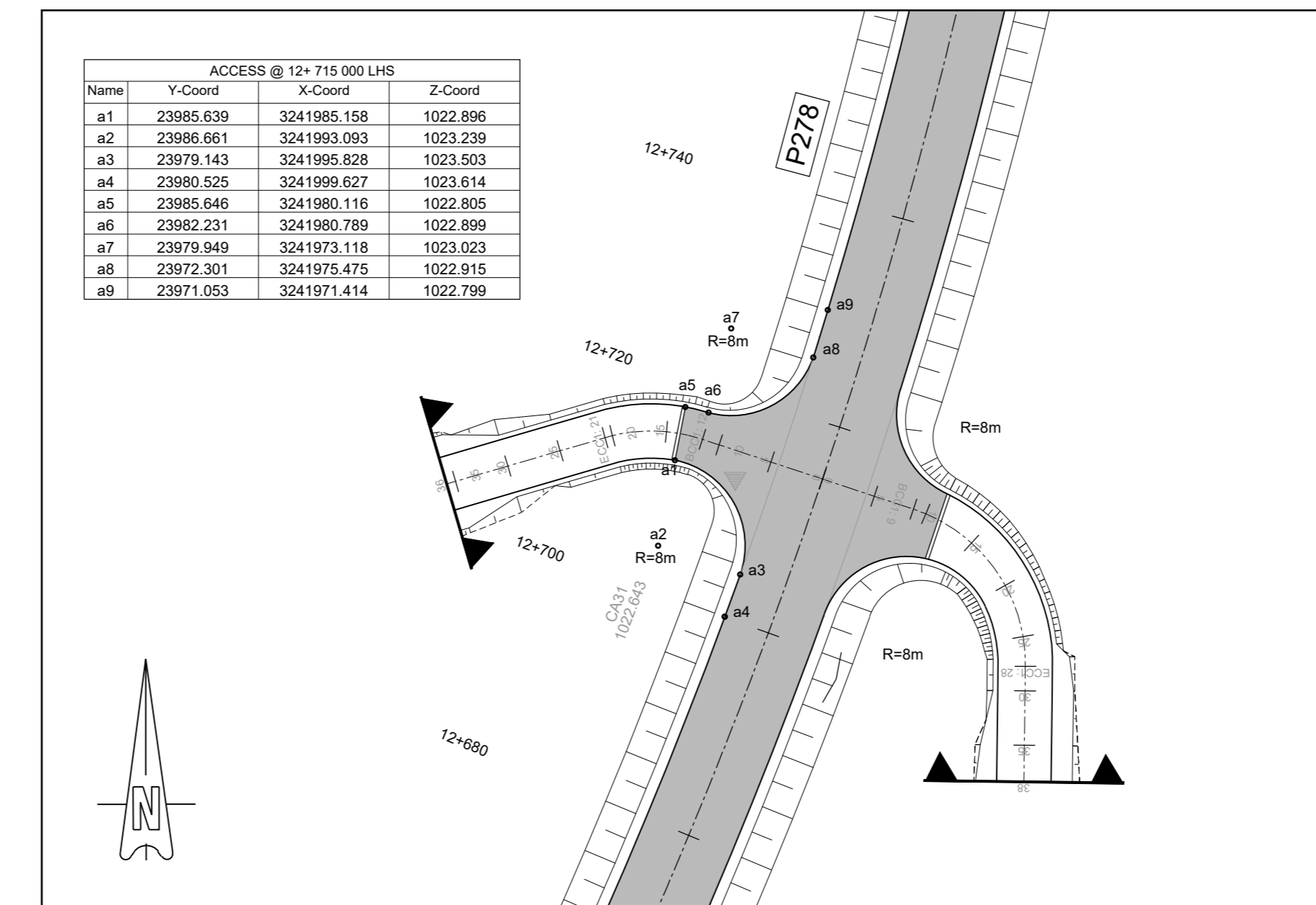
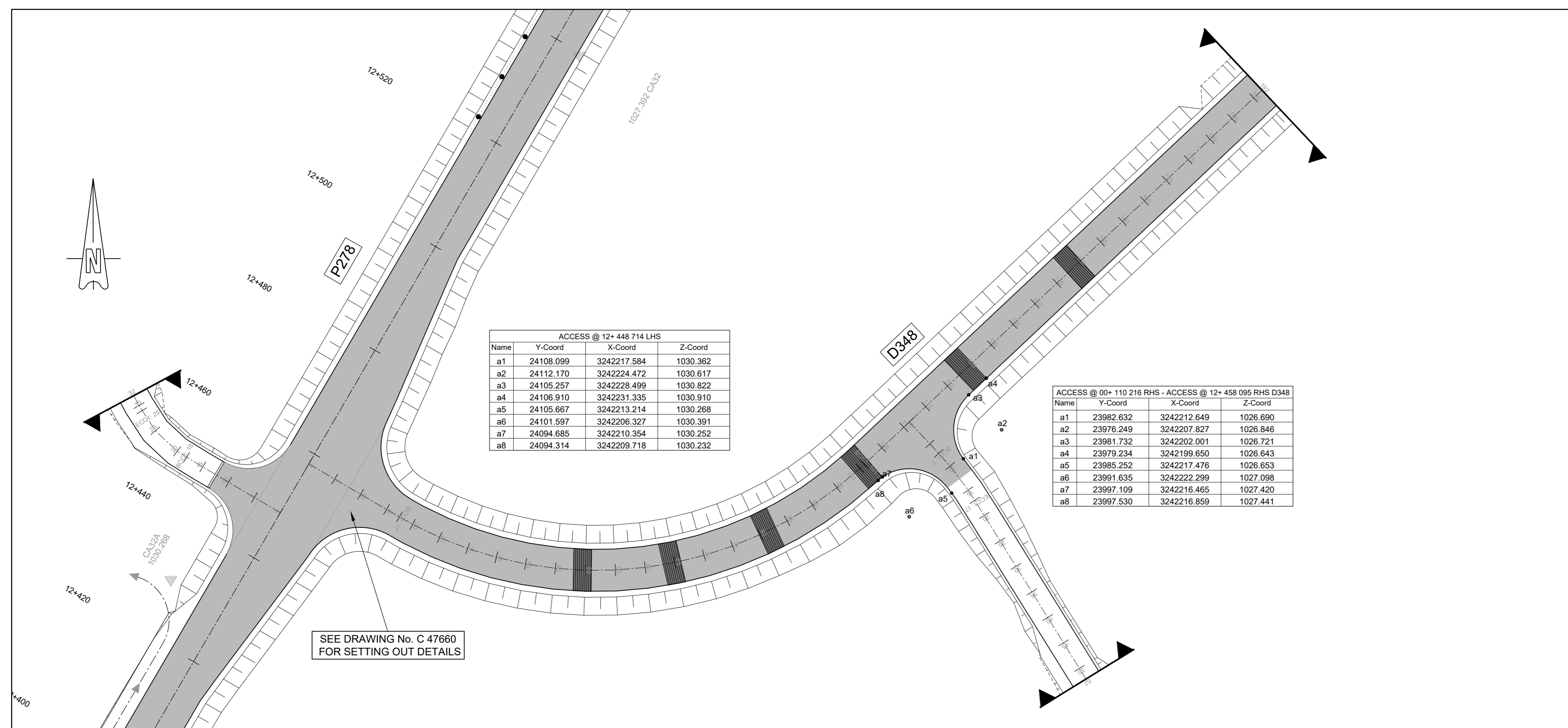
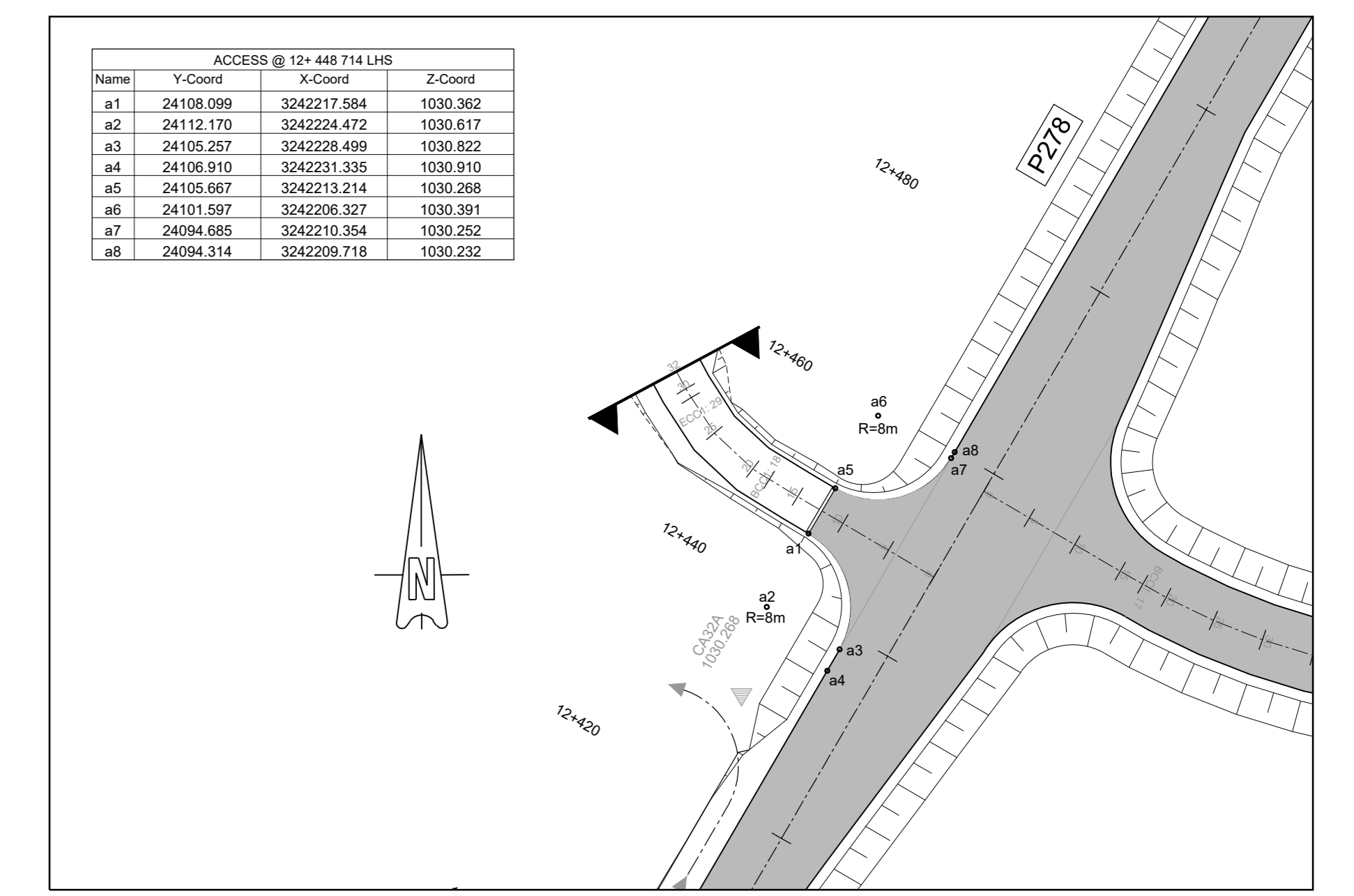
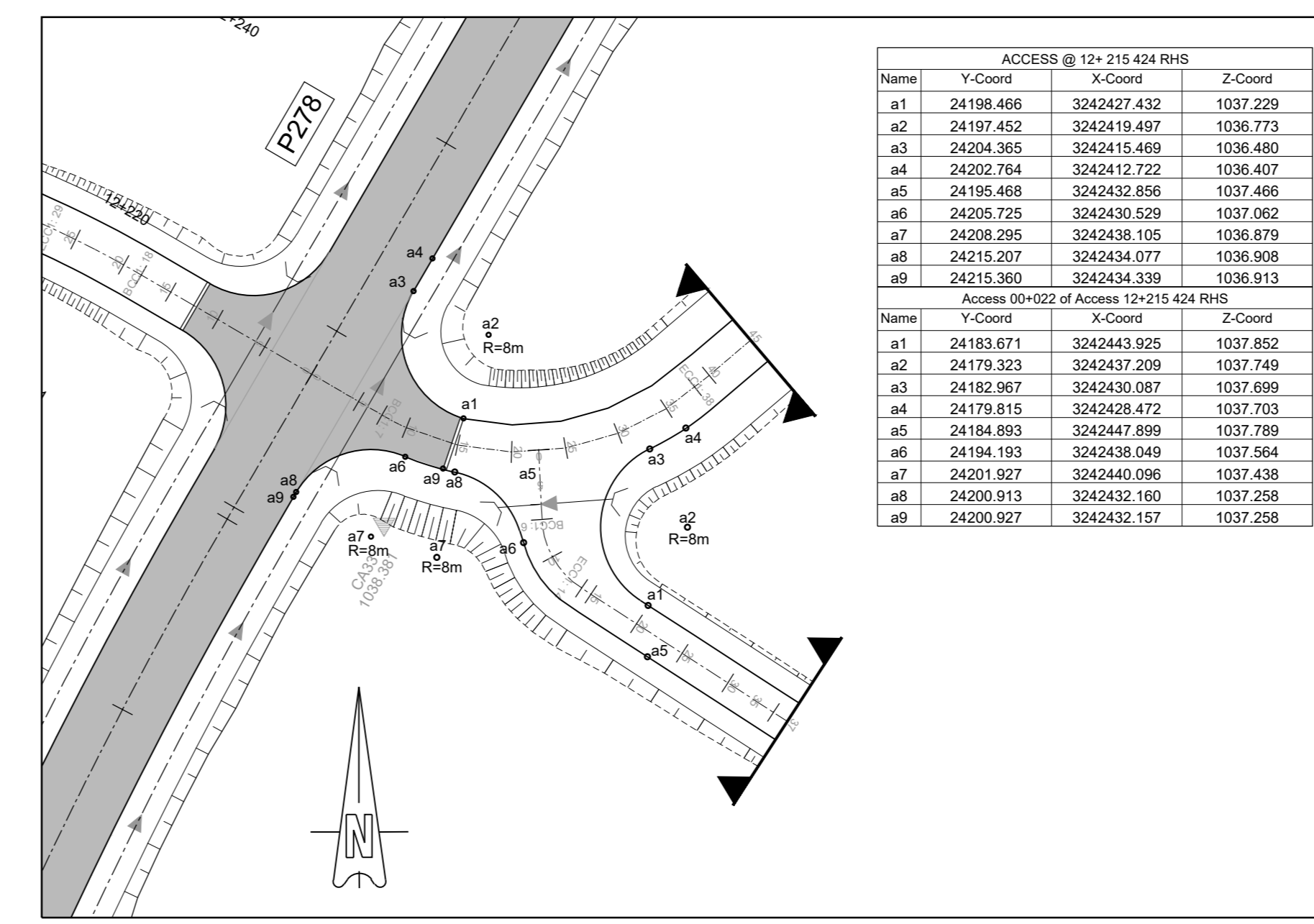
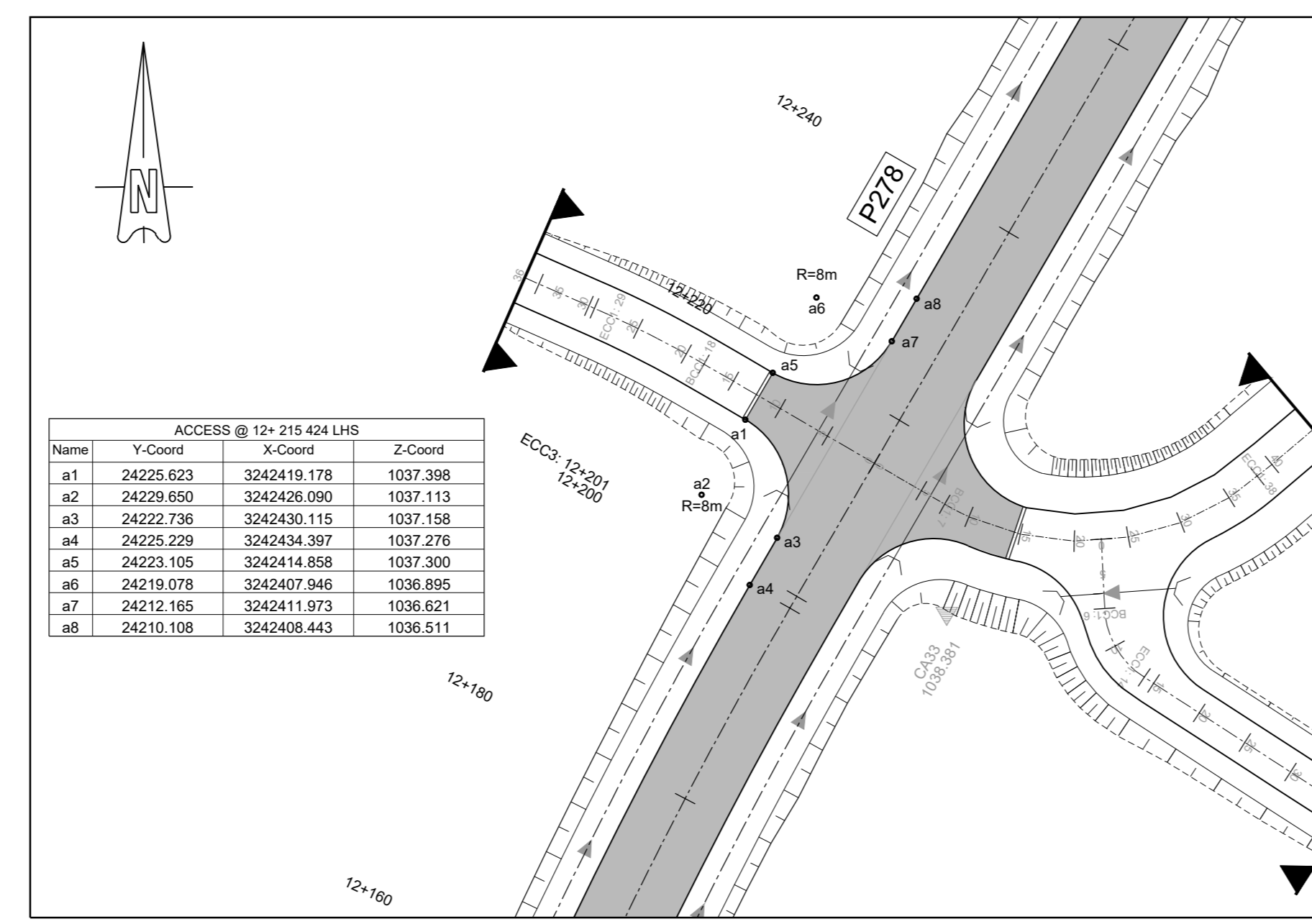
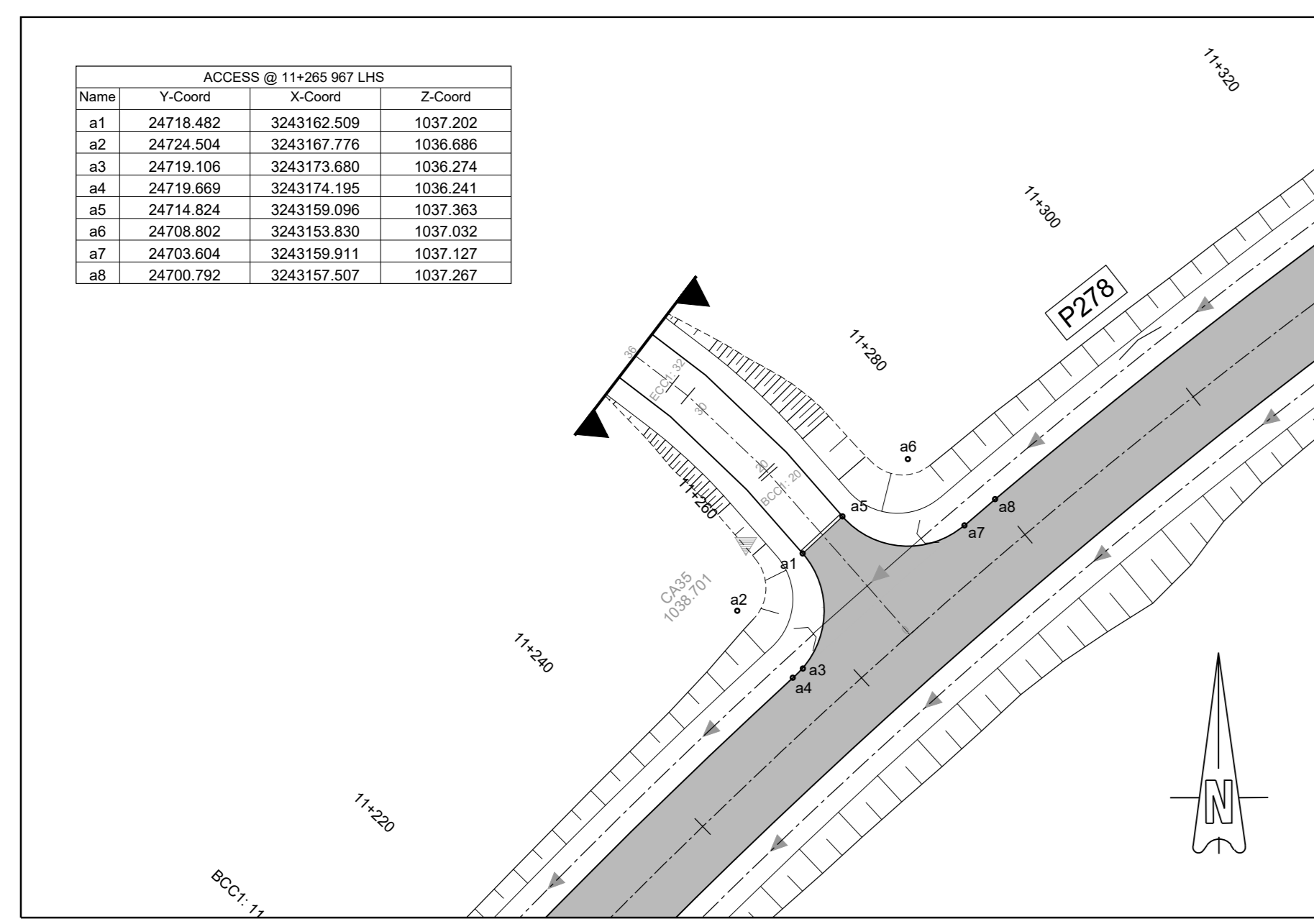


**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 ROAD LONGITUDINAL SECTION

Staked km distance	Sheet - 6	REVISION:
km 15+640 - km 16+640	of - 6	A
Scale	Plan No -	
HORIZONTAL 1:2000		
VERTICAL 1:200		

C 44329





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from: -

Continued on: C 47658

Cross Section No.: C 44330 - C 44341  
C 46234 - C 46235  
C 47644 - C 47644

Longitudinal Section No.: C 44324 - C 44329

Design Plan No.: C 44312 - C 44323

Designed by: Y. DOMA

Checked by: T. PIKA

Drawn by: K. NAIDOO

Checked by: Y. DOMA

Date of approval: \_\_\_\_\_

Designed by: **emzansi** ENGINEERS (PTY) LTD

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS SETTING OUT

Staked km distance: km 10+880 - km 22+491

Scale: 1 : 500

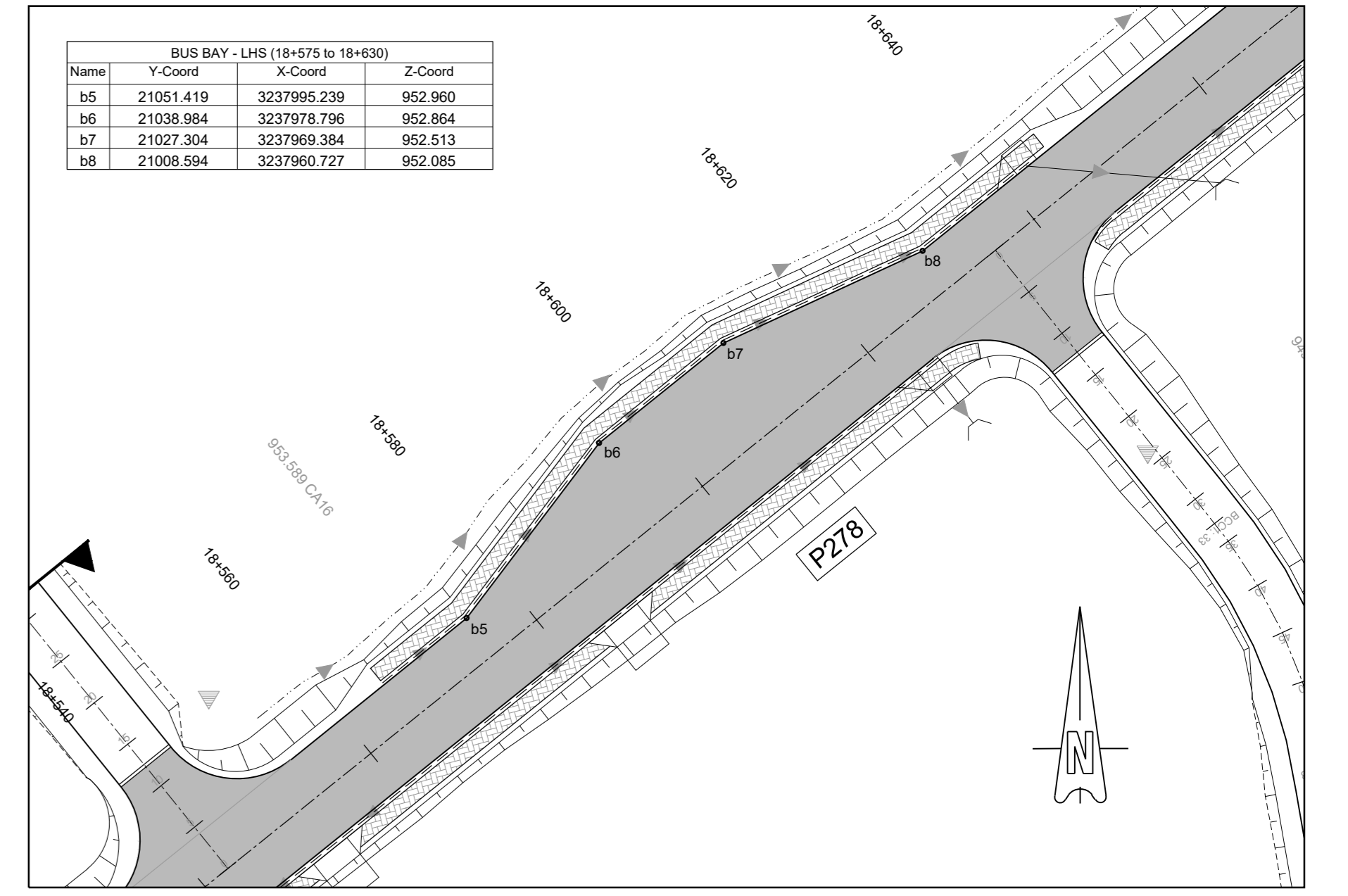
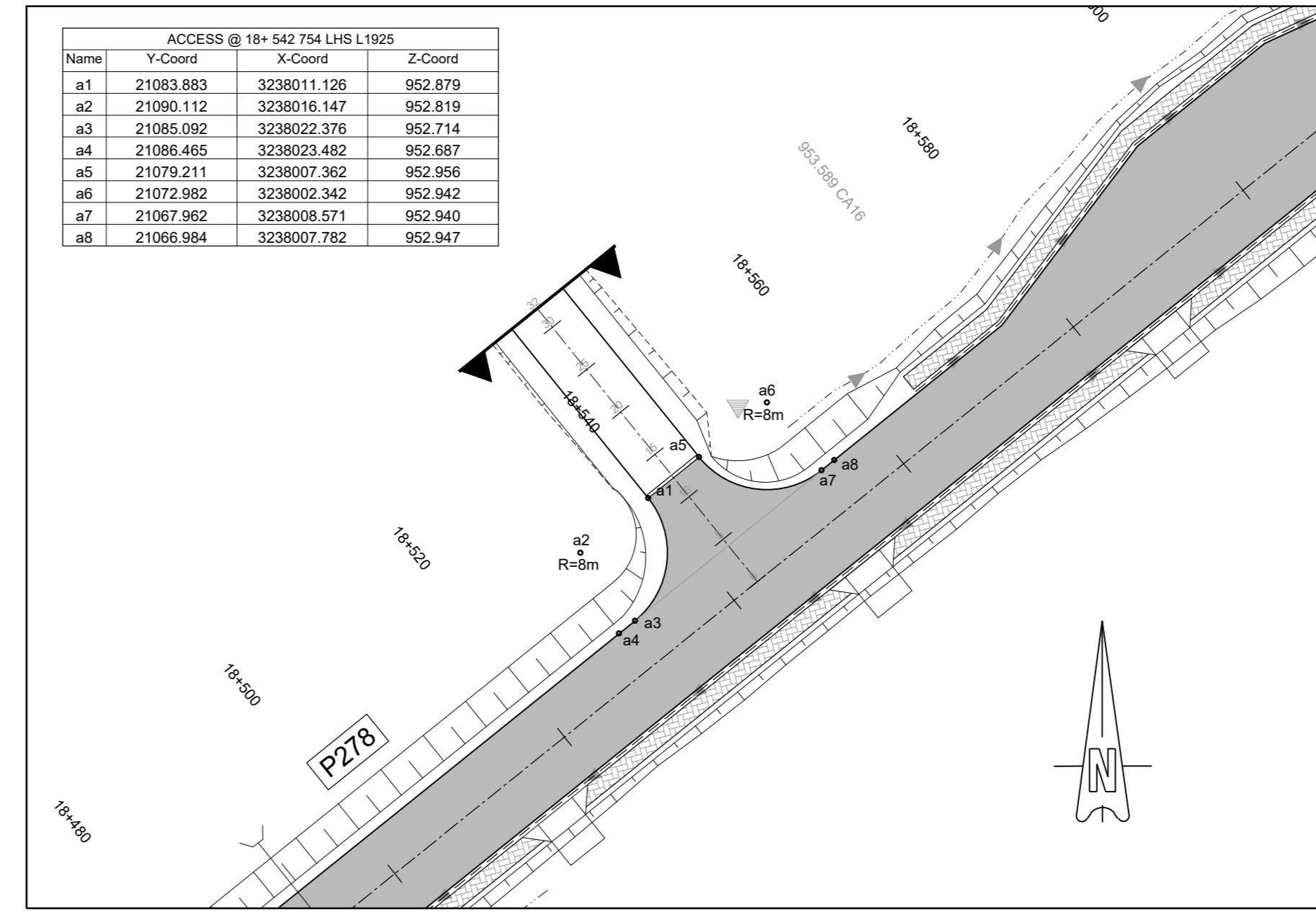
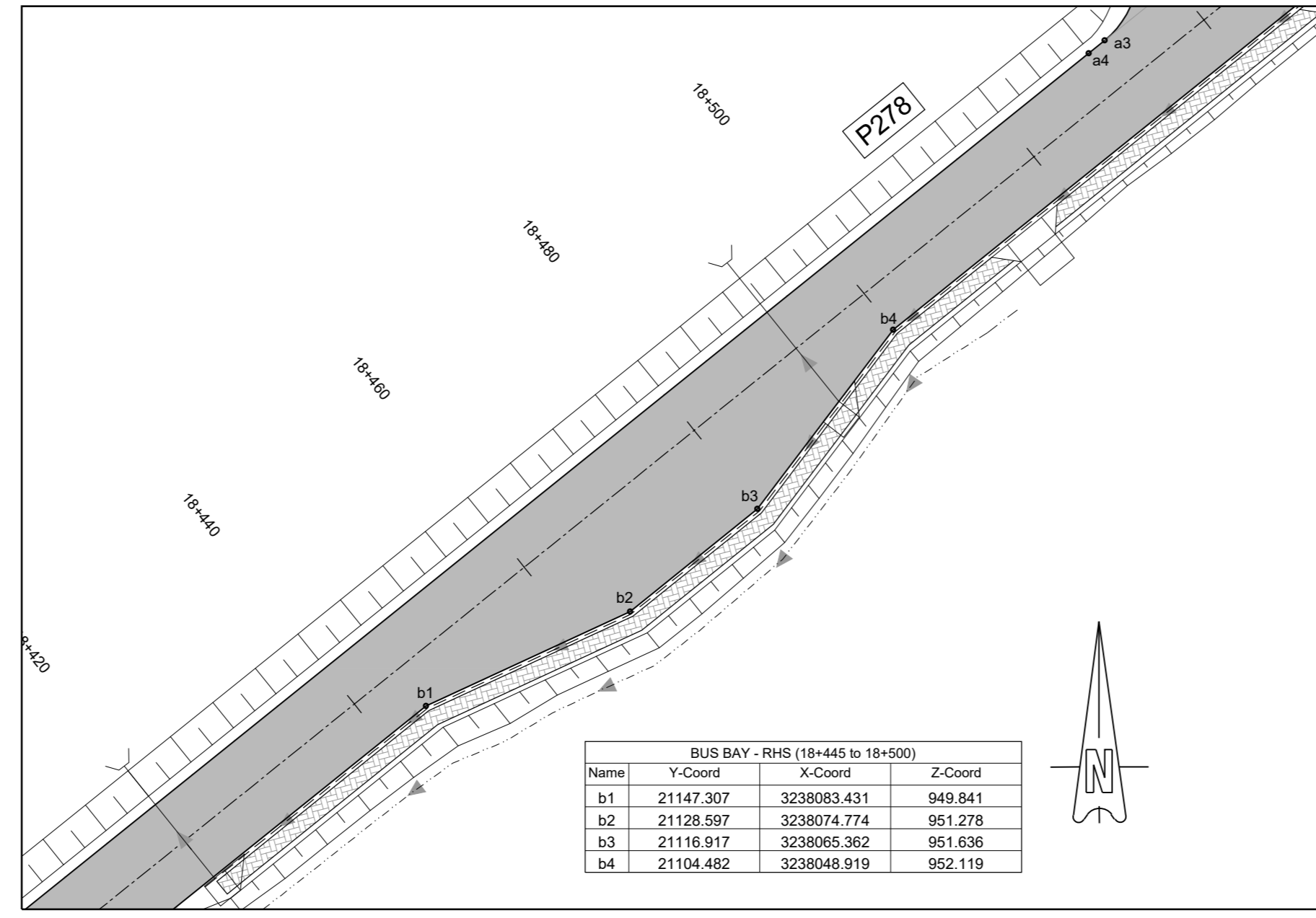
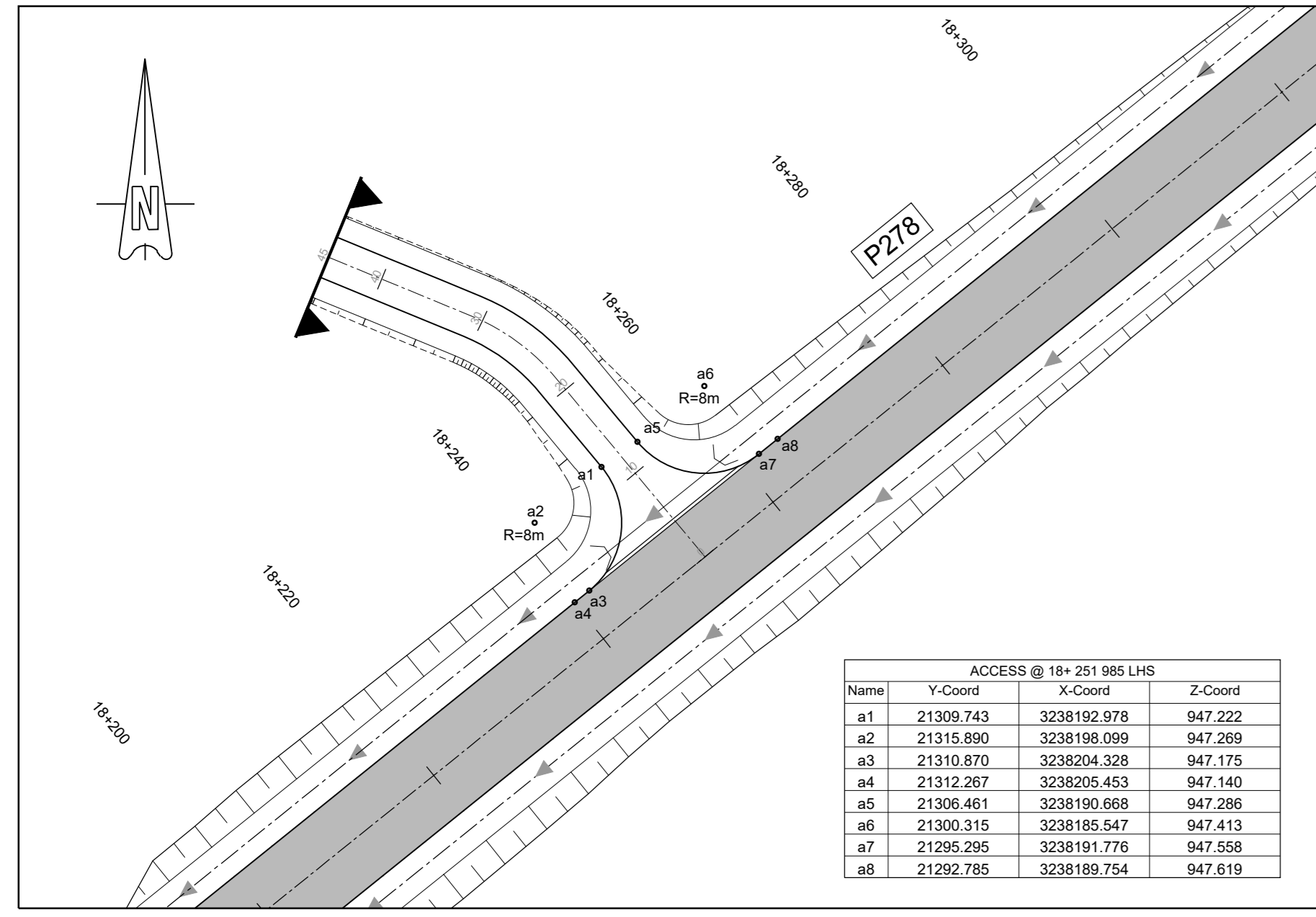
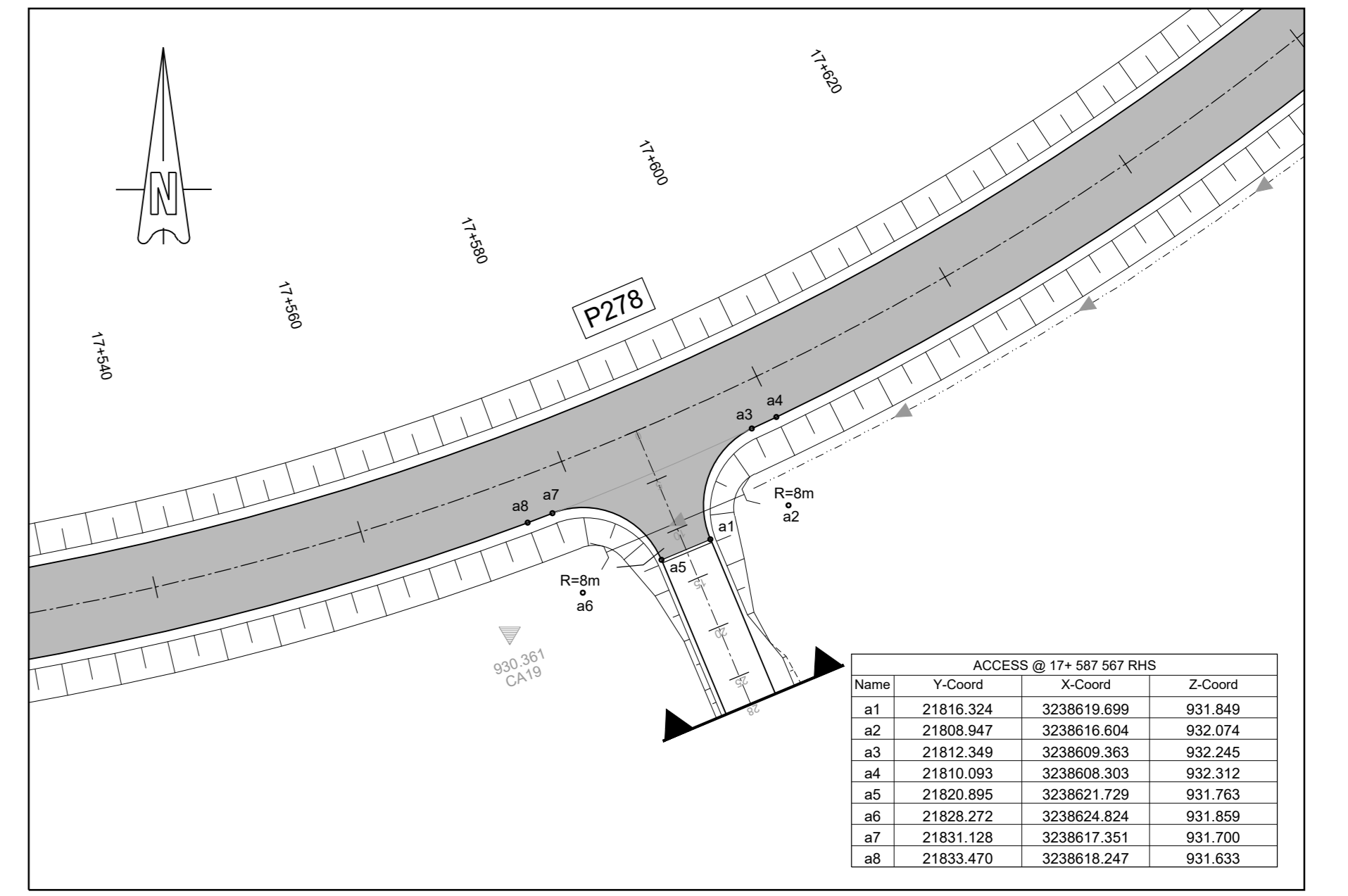
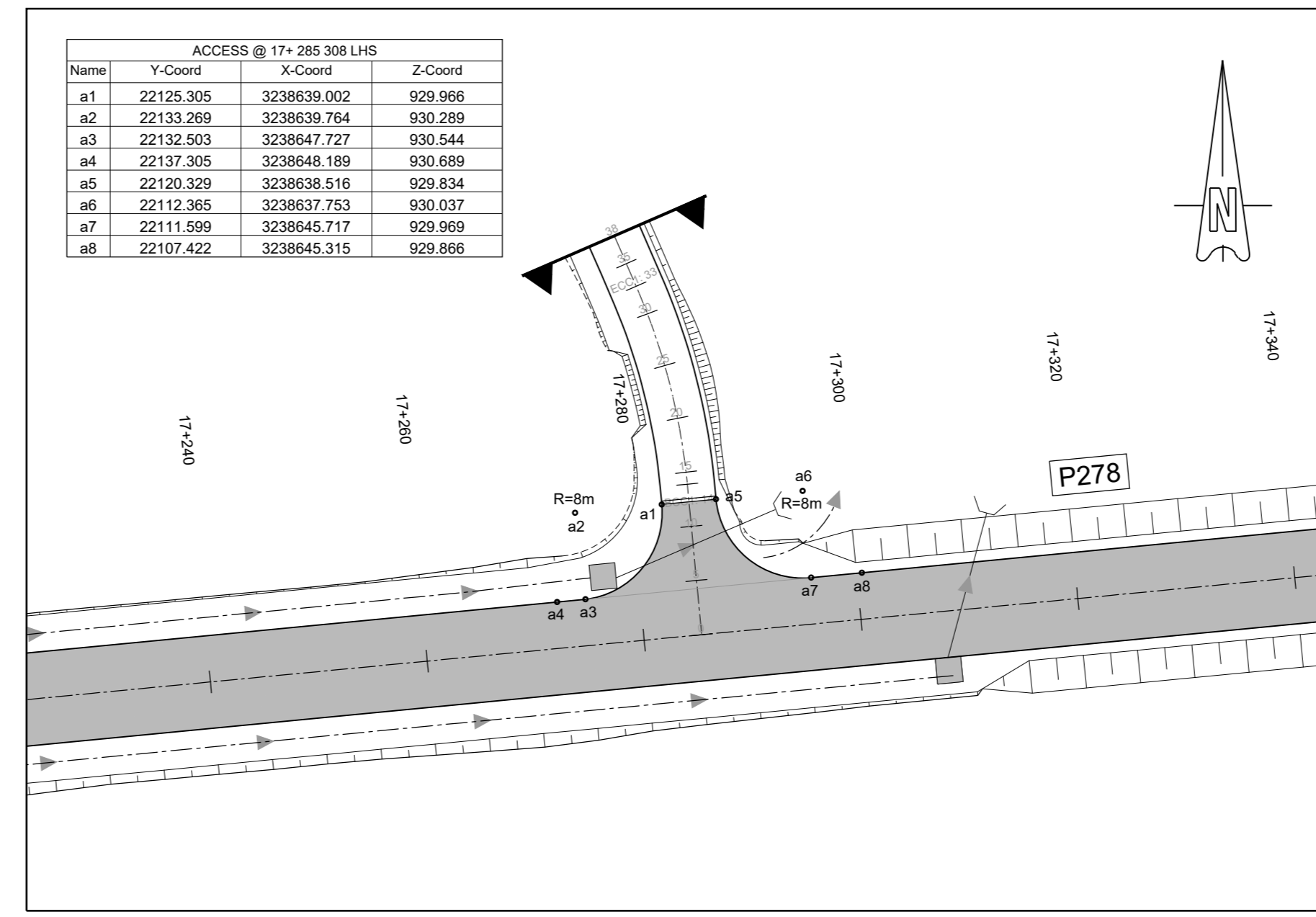
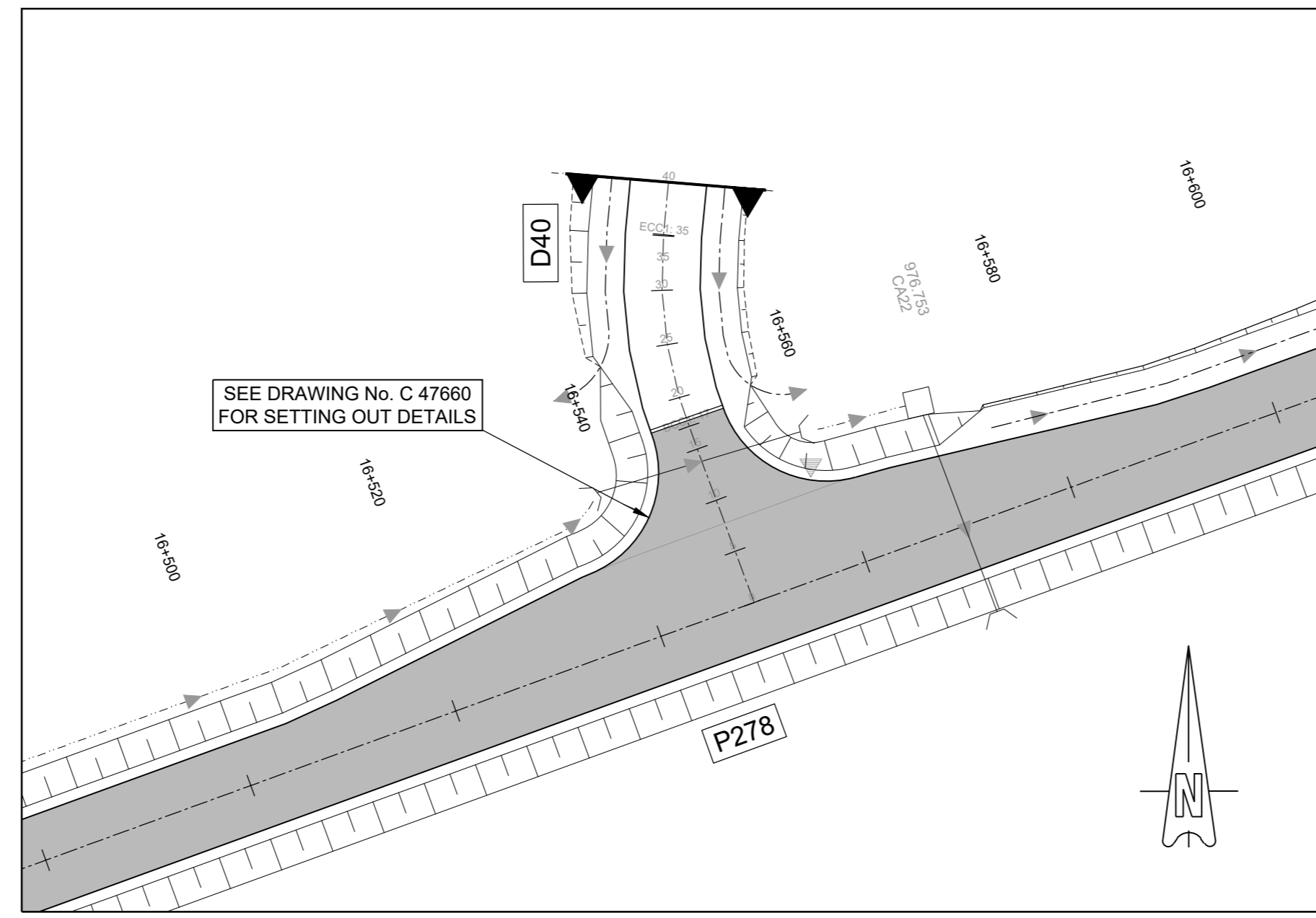
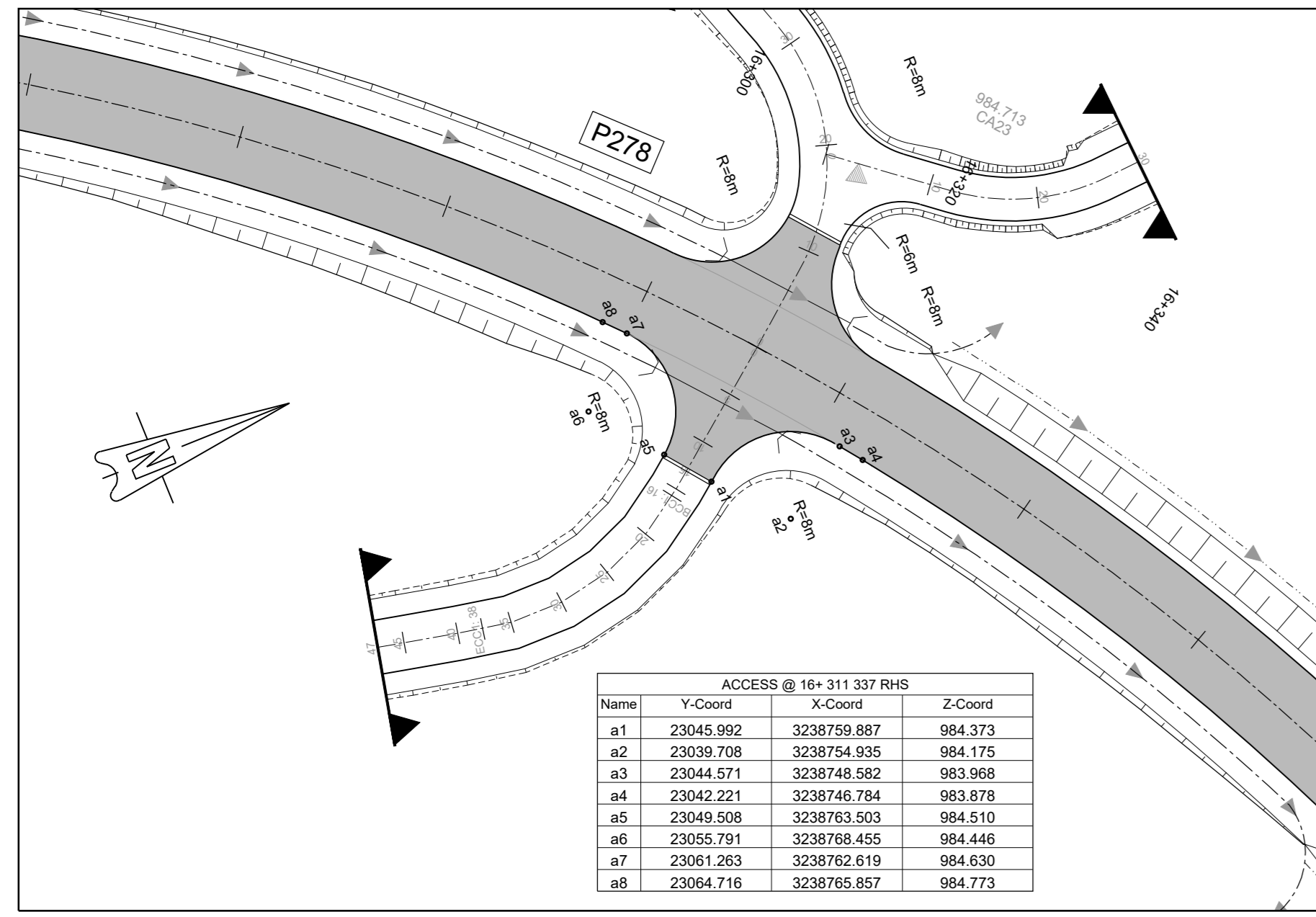
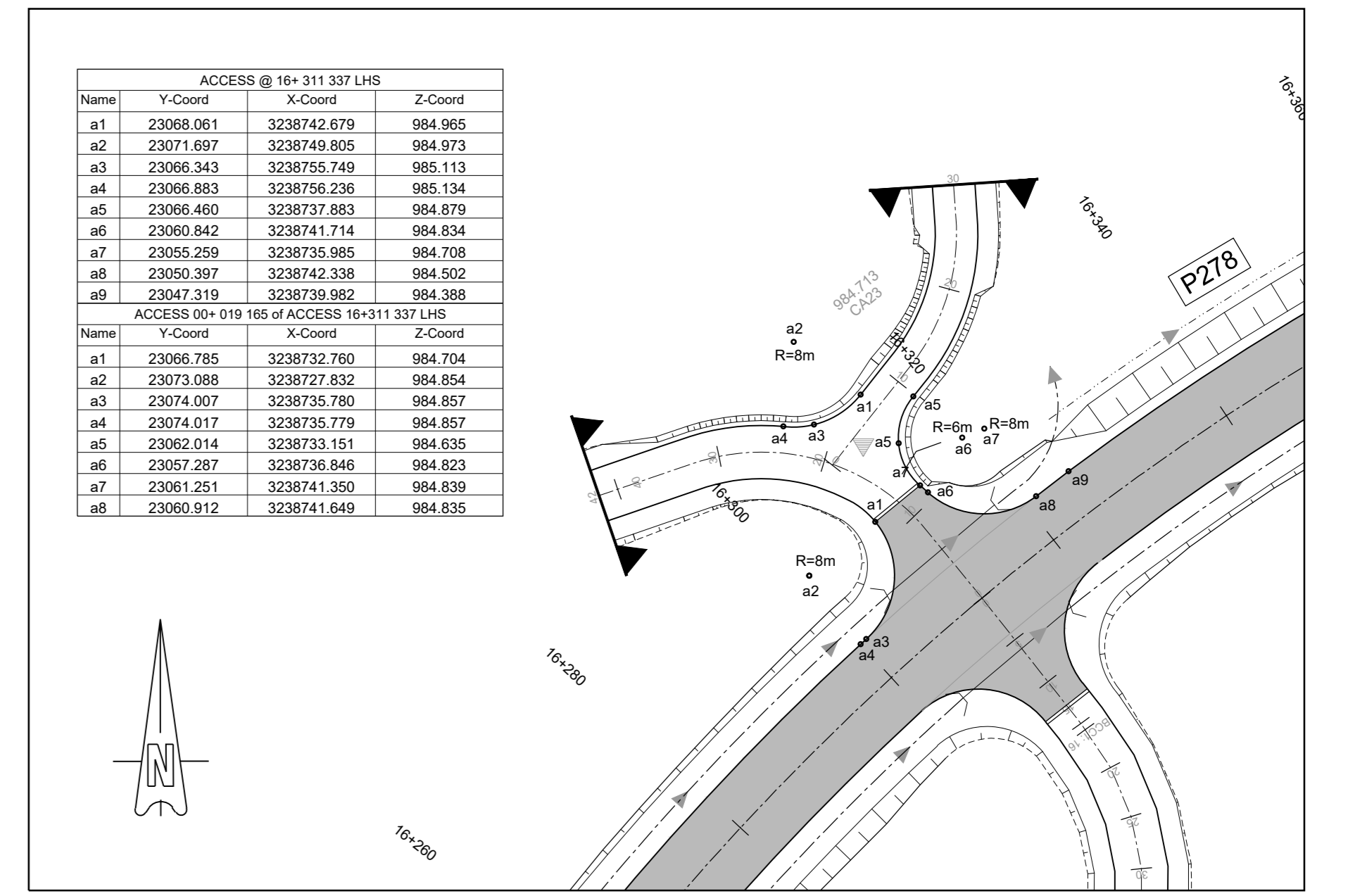
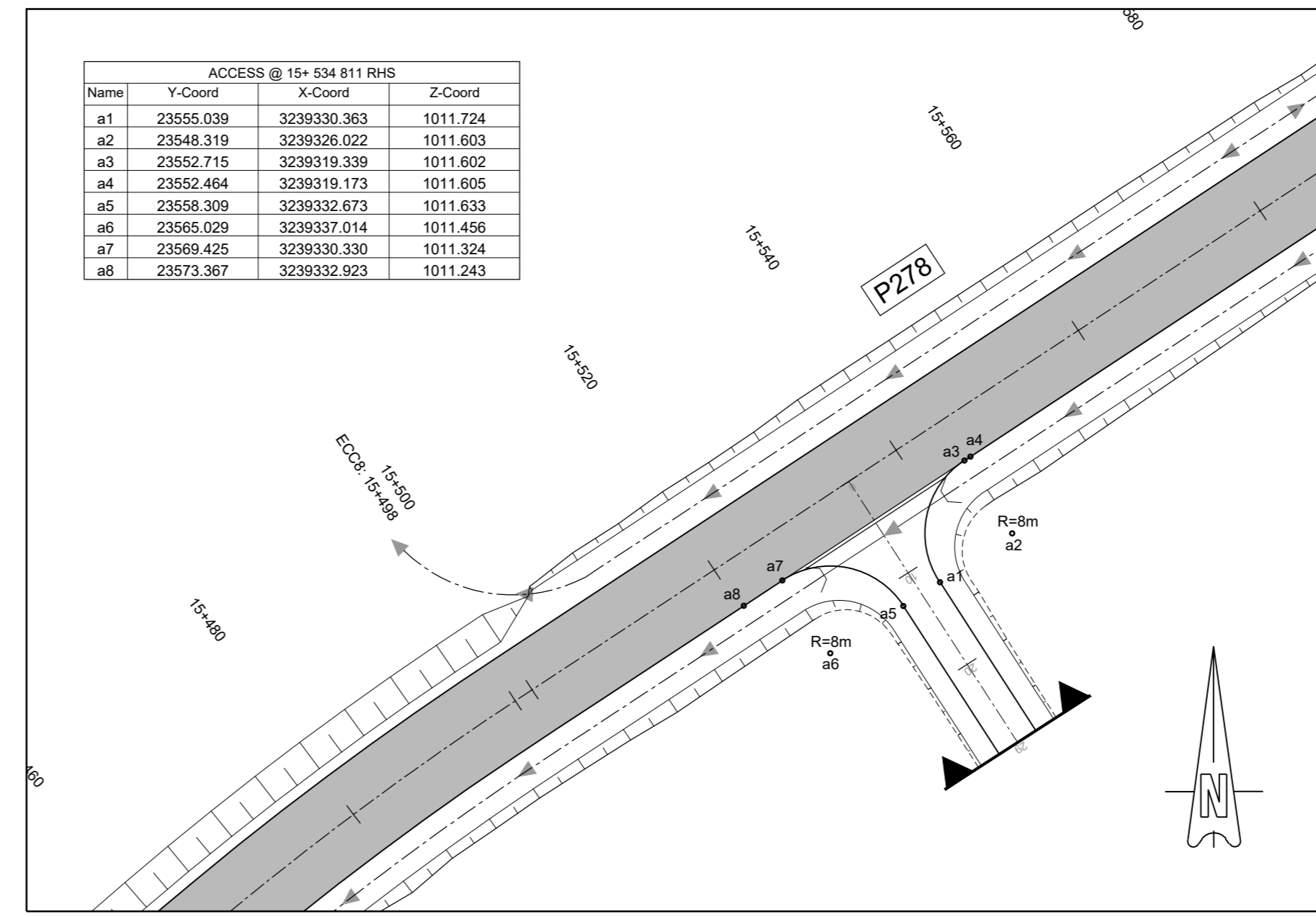
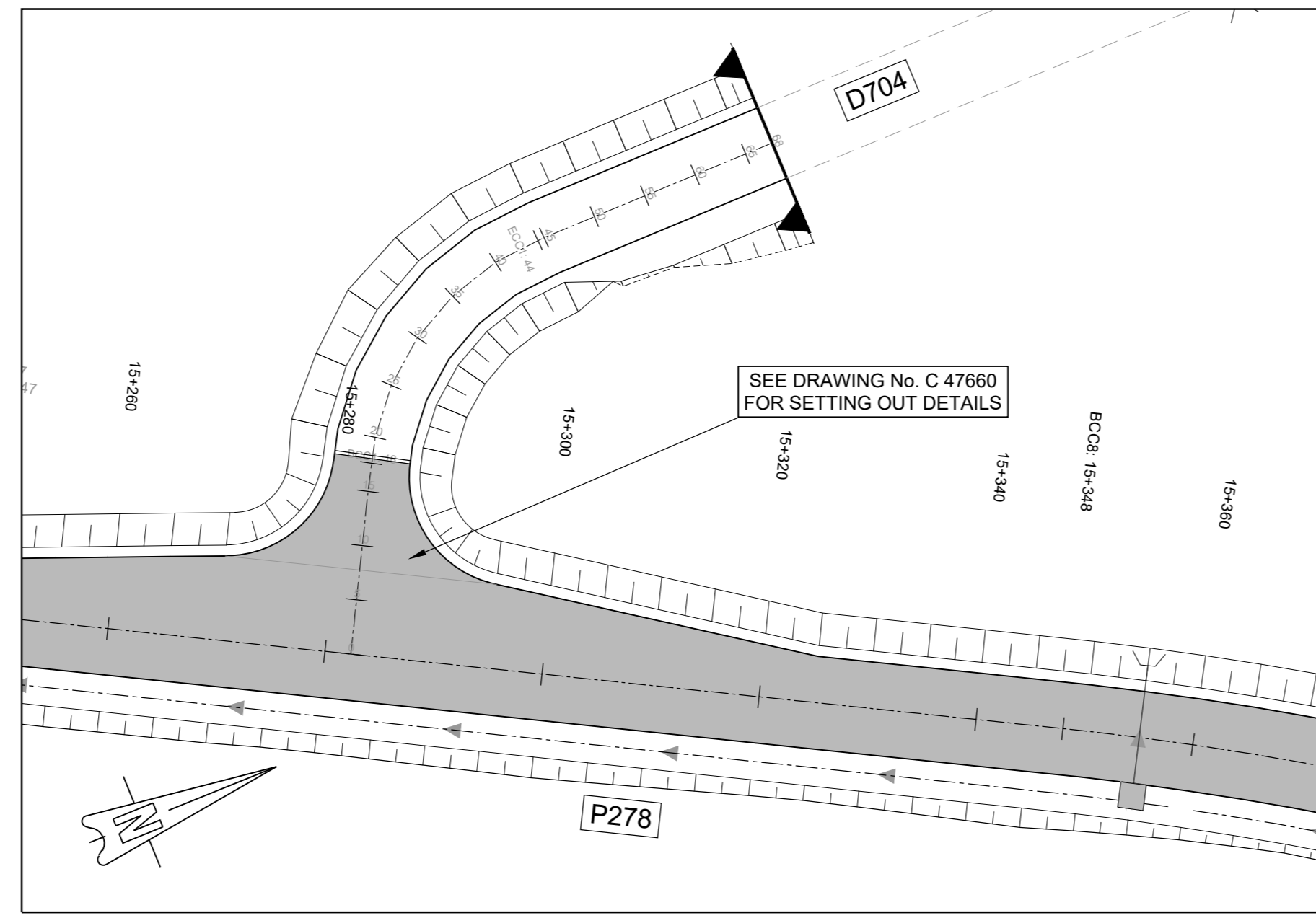
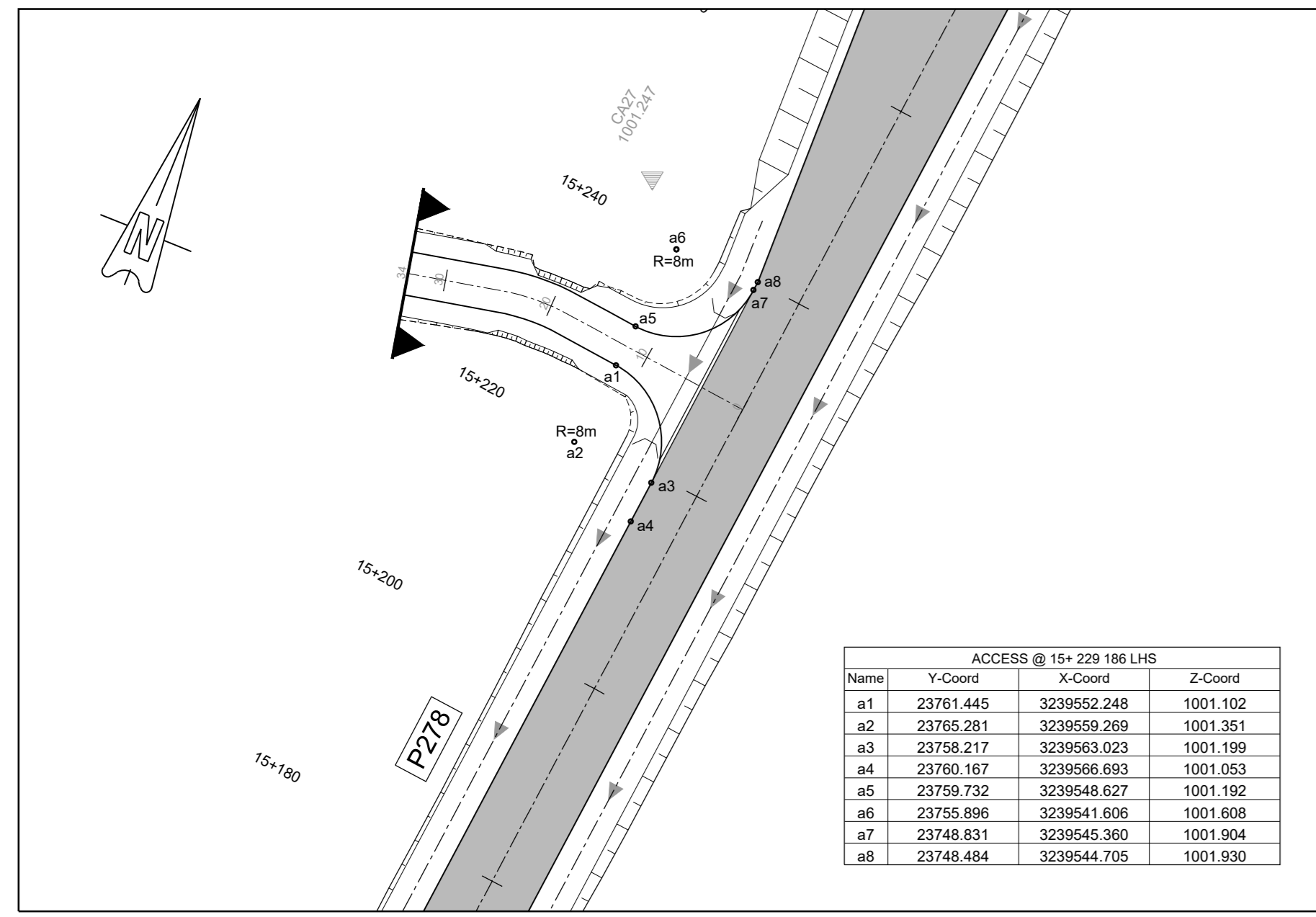
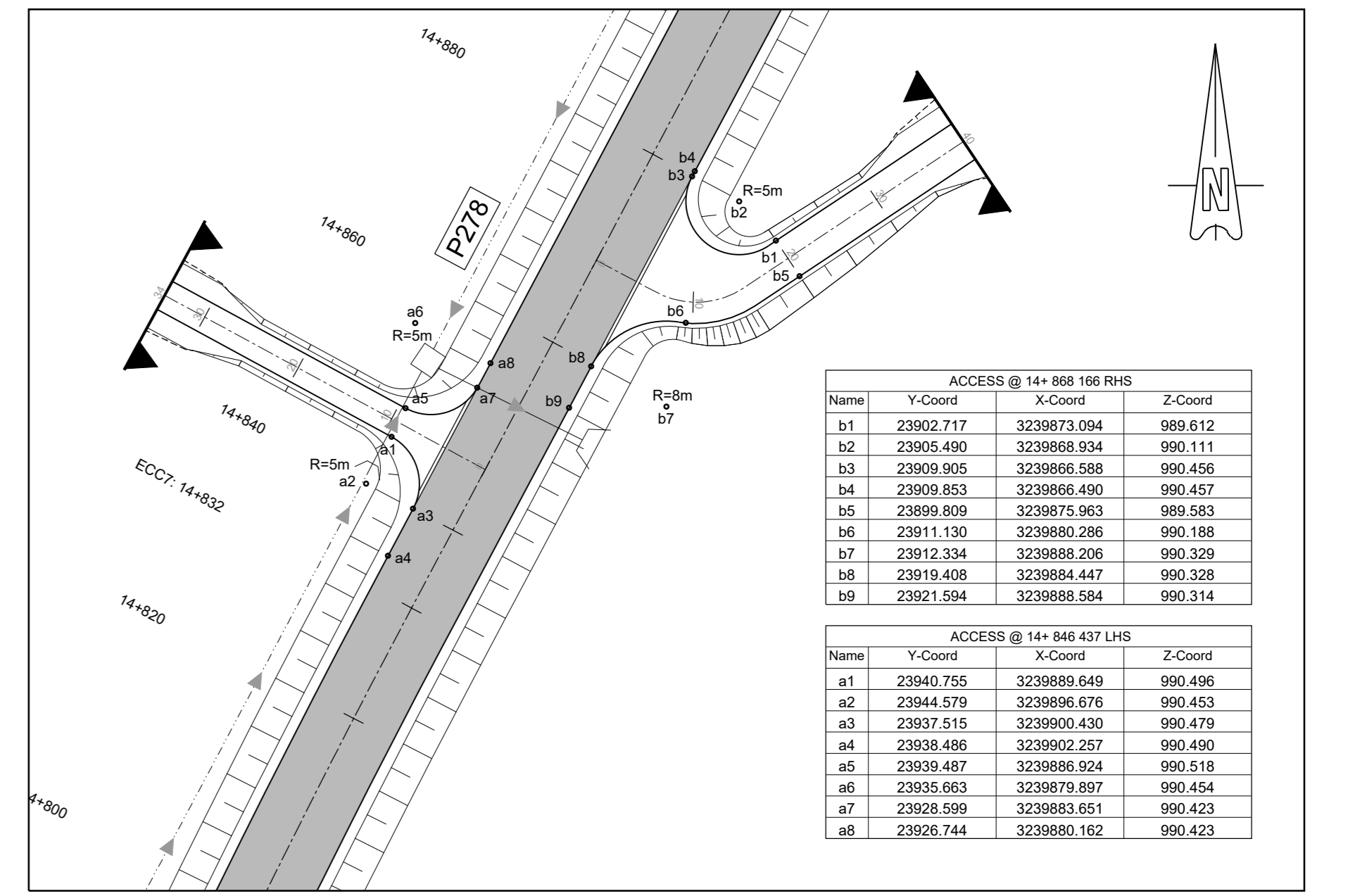
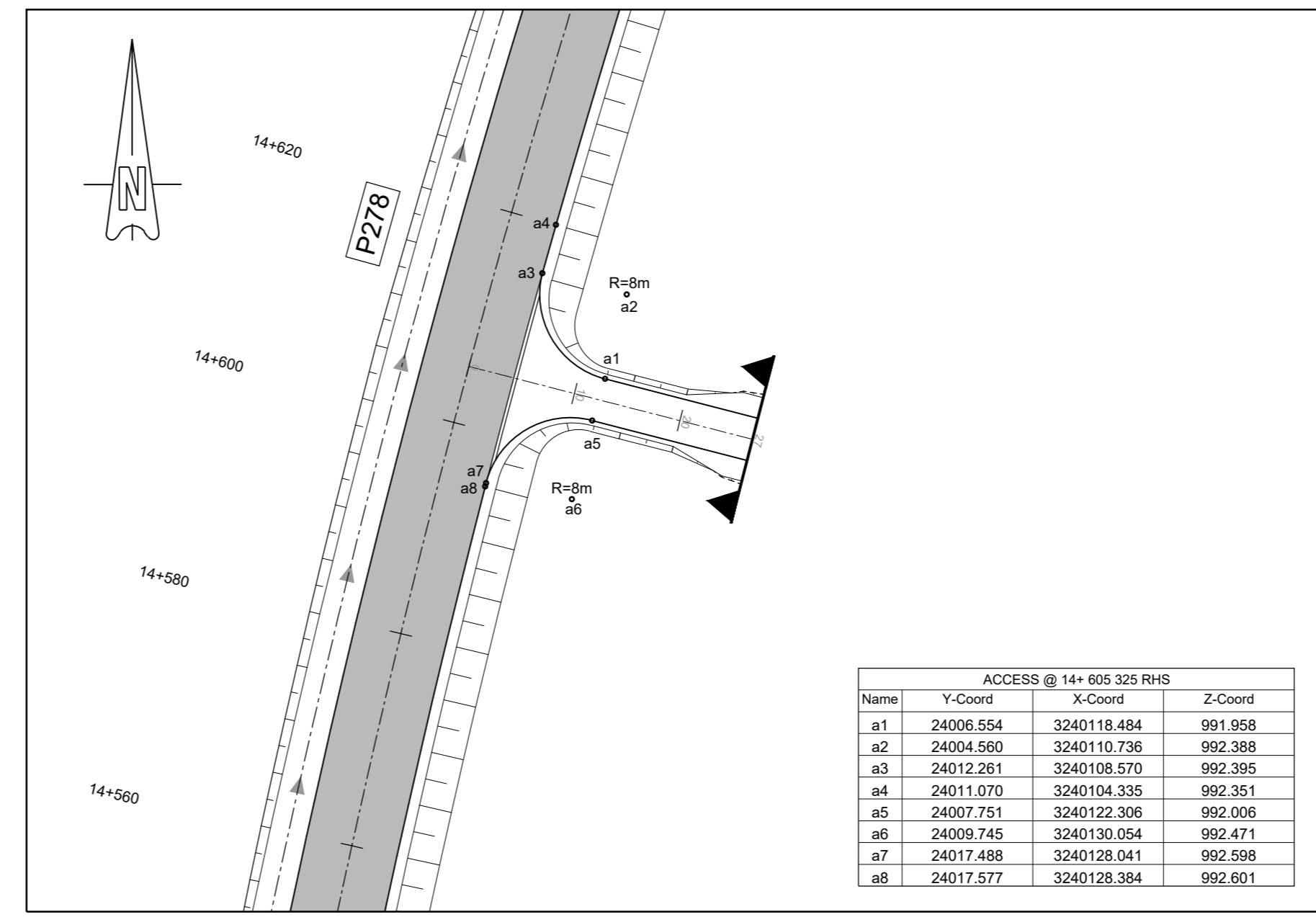
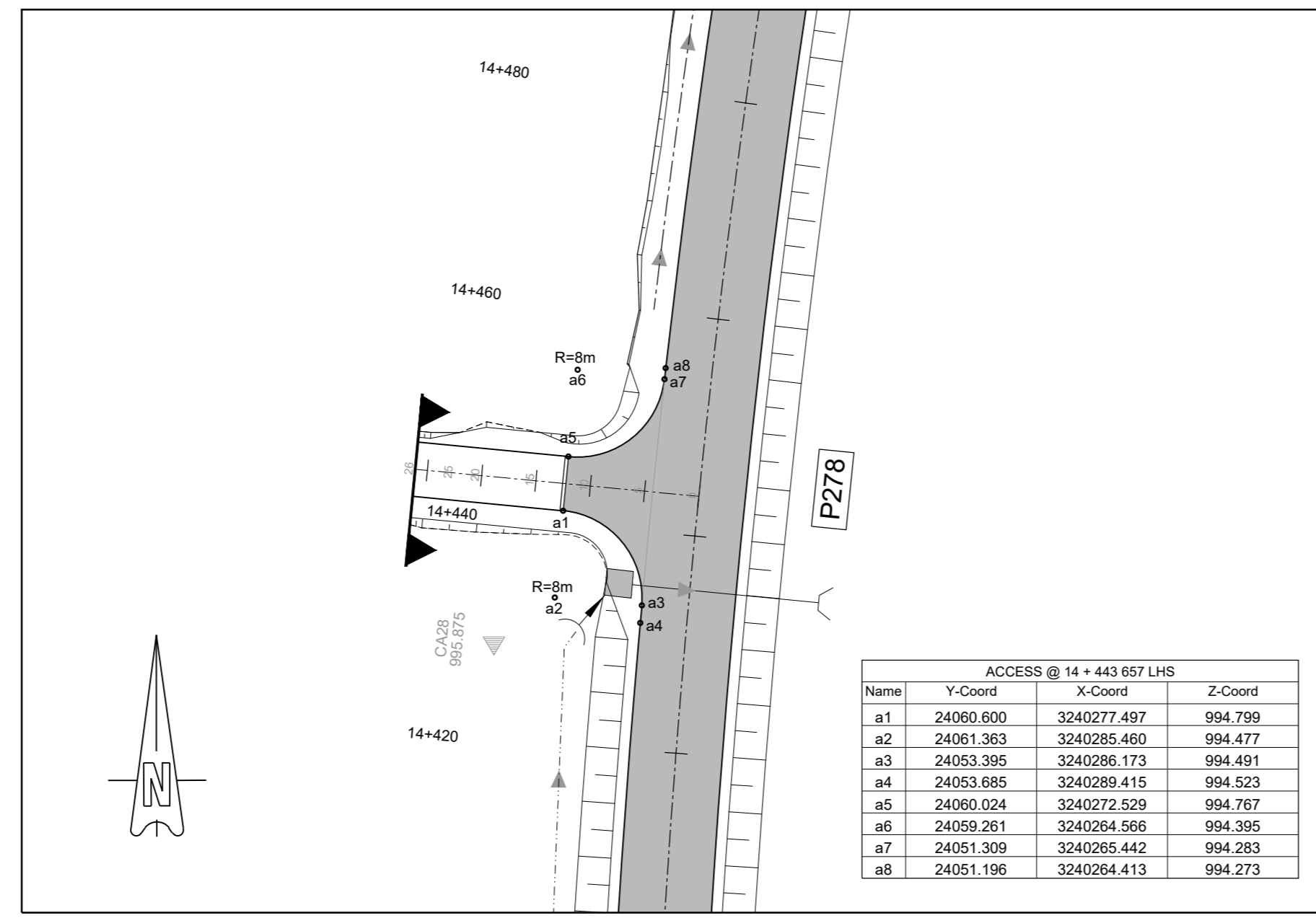
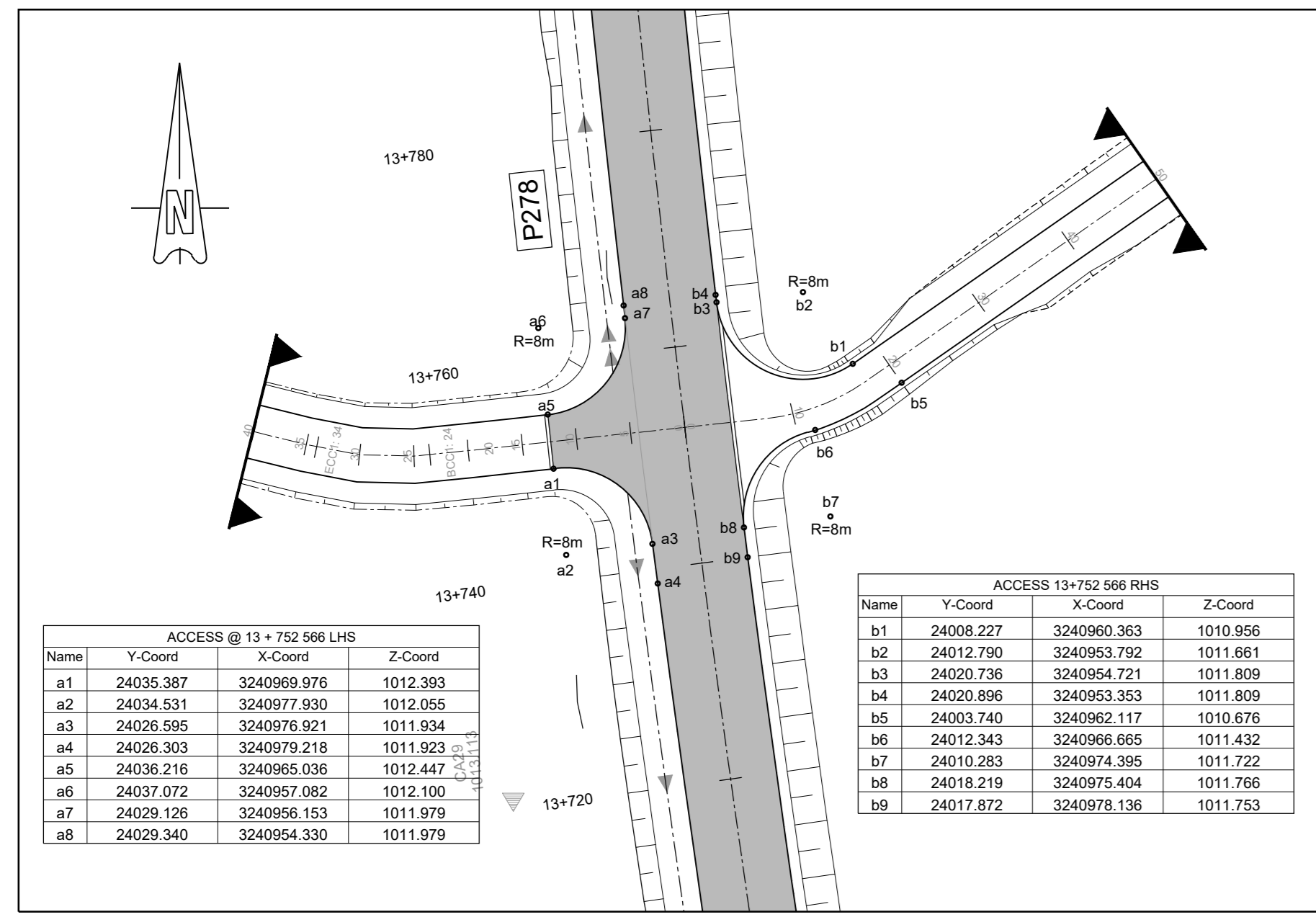
Sheet: 1 of 3

REVISION: A

Plan No.: C 47657

C 47657





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:- C 47657  
 Checked by:- Y. DOMA

Continued on:- C 47659  
 Checked by:- T. PIKA

Cross Section No:- C 44330 - C 44341  
 C 46234 - C 46235  
 C 47654 - C 47654

Drawn by:- K. NAIDOO

Longitudinal Section No:- C 44324 - C 44329  
 Checked by:- Y. DOMA

Design Plan No:- C 44312 - C 44323  
 Date of approval:-



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivaled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

ACCESS ROADS SETTING OUT

Staked km distance: km 10+880 - km 22+491

Sheet - 2 of - 3

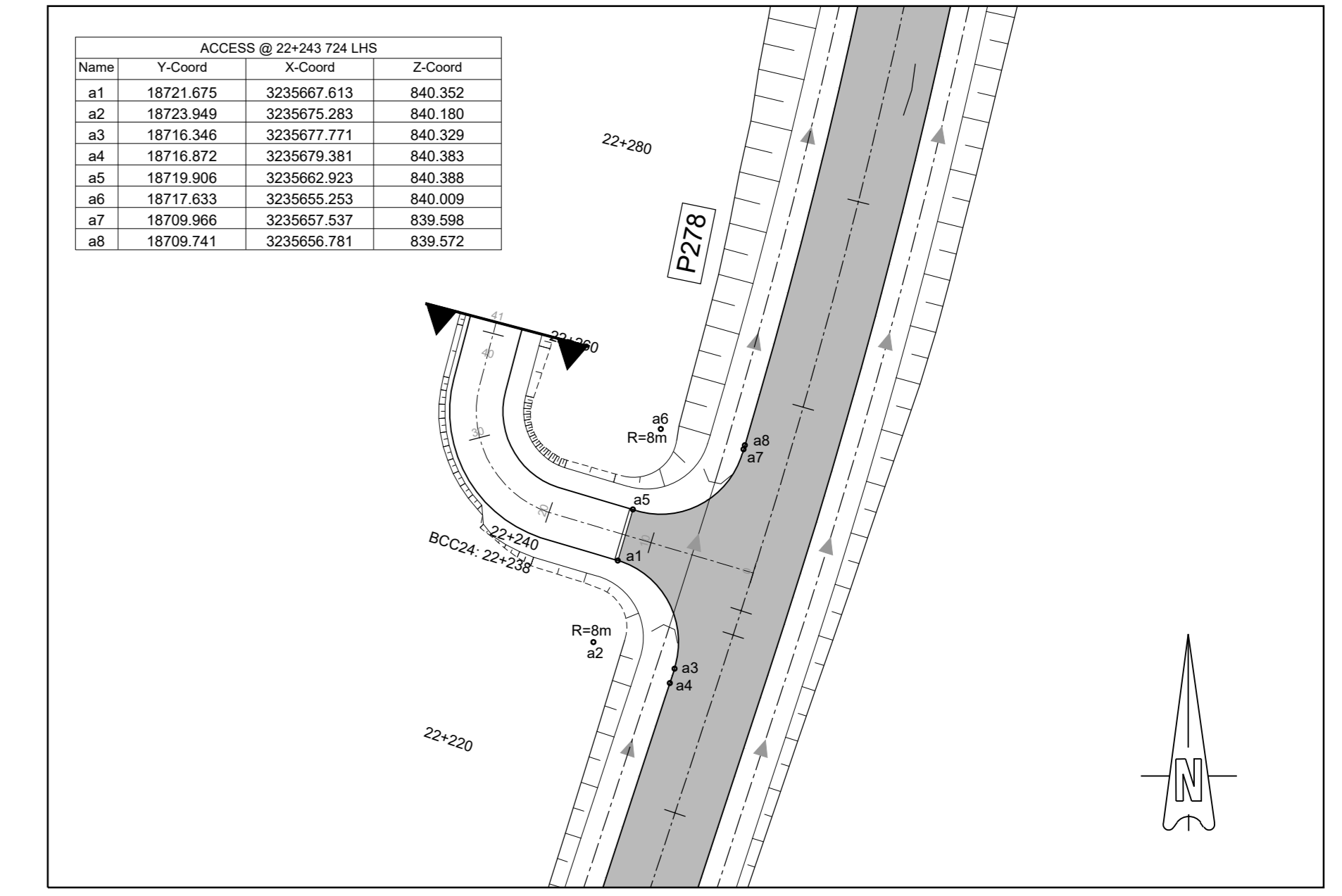
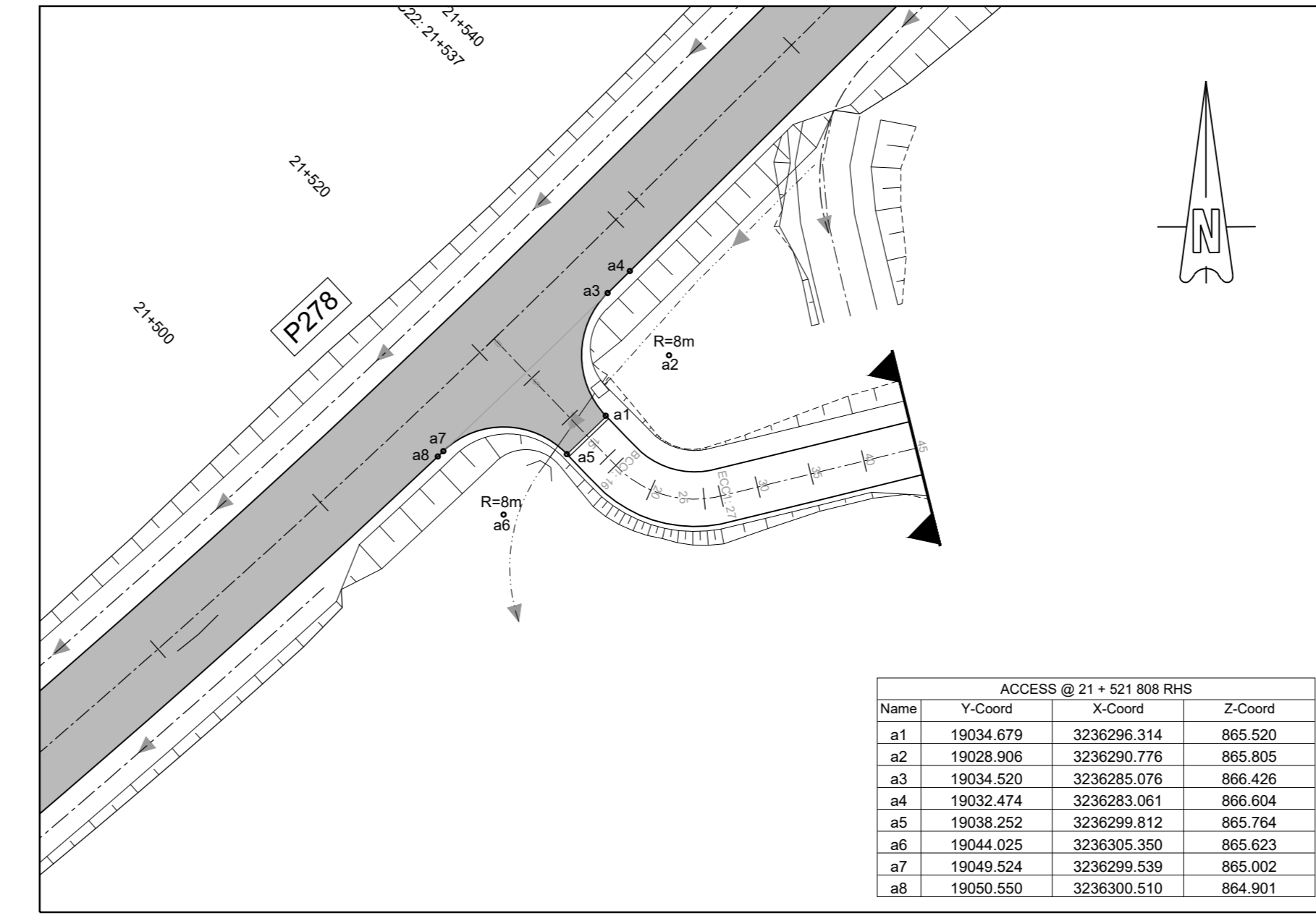
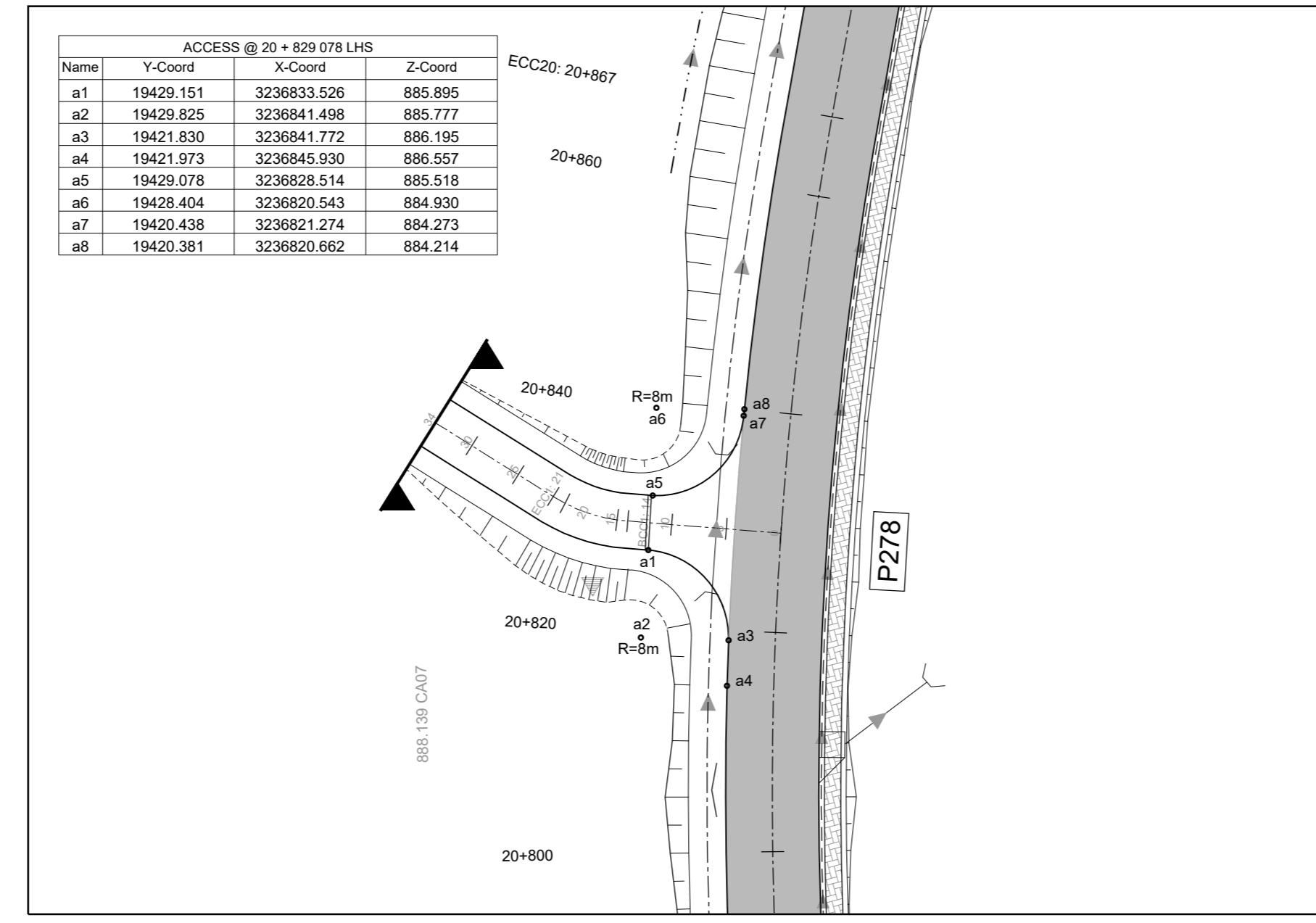
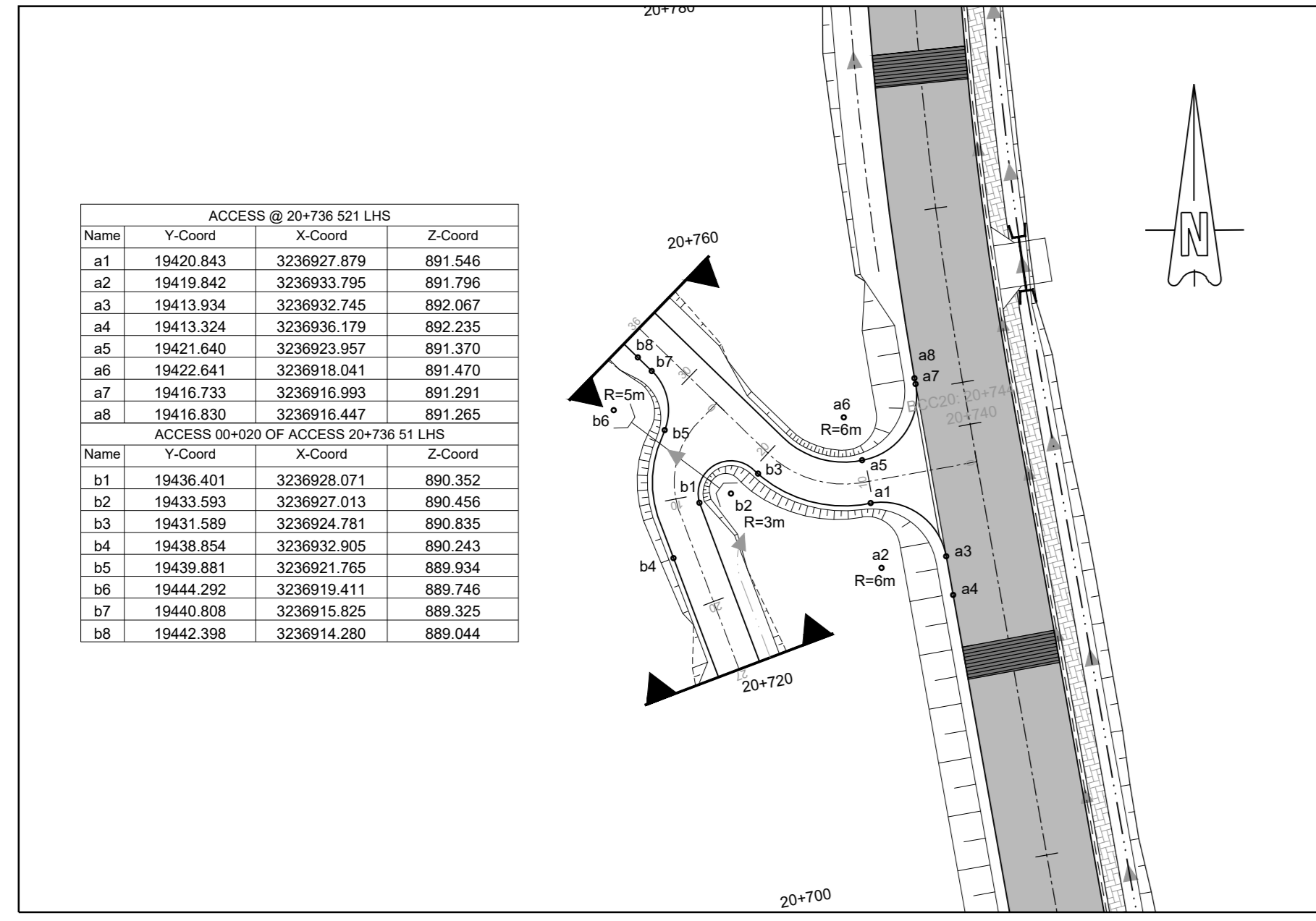
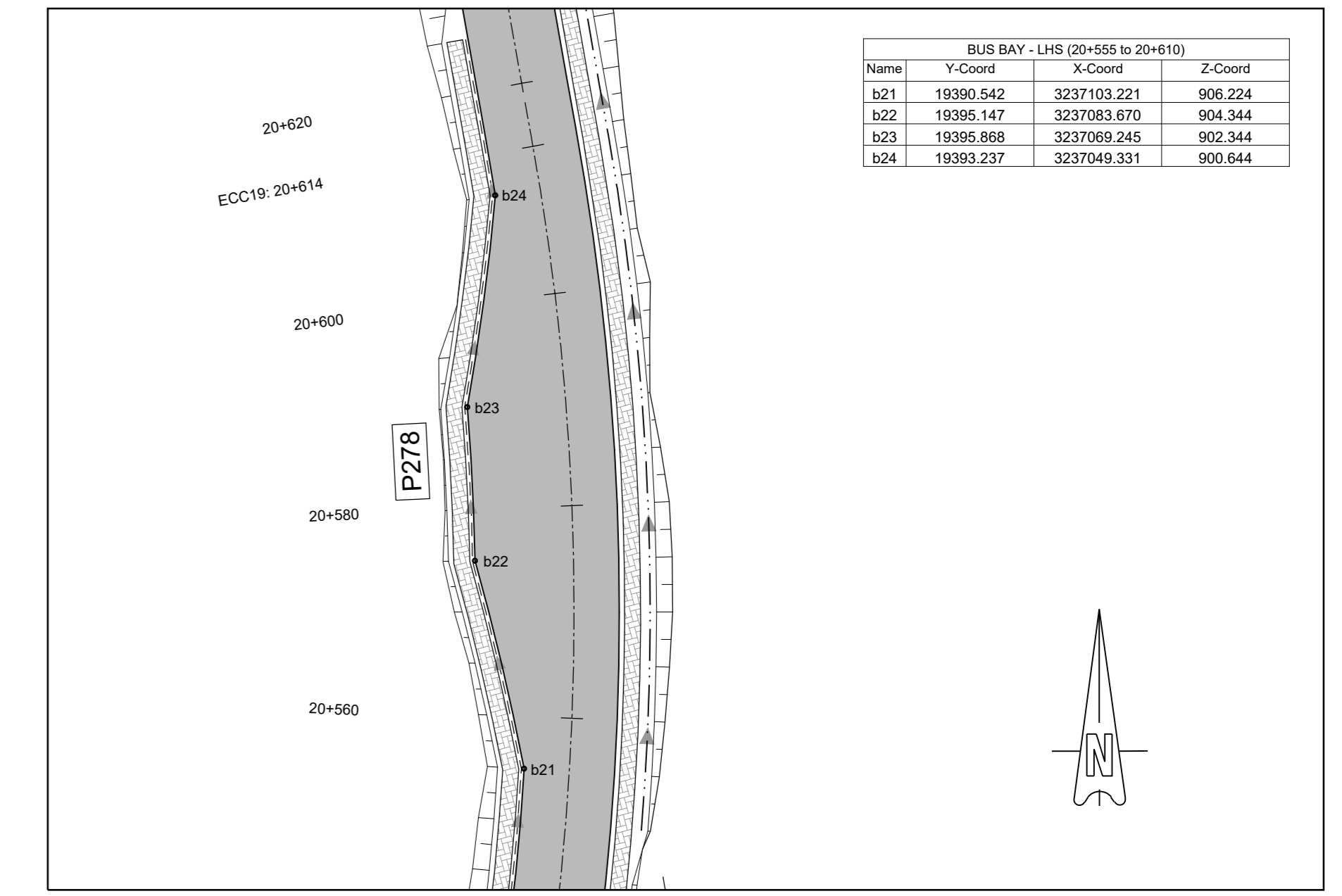
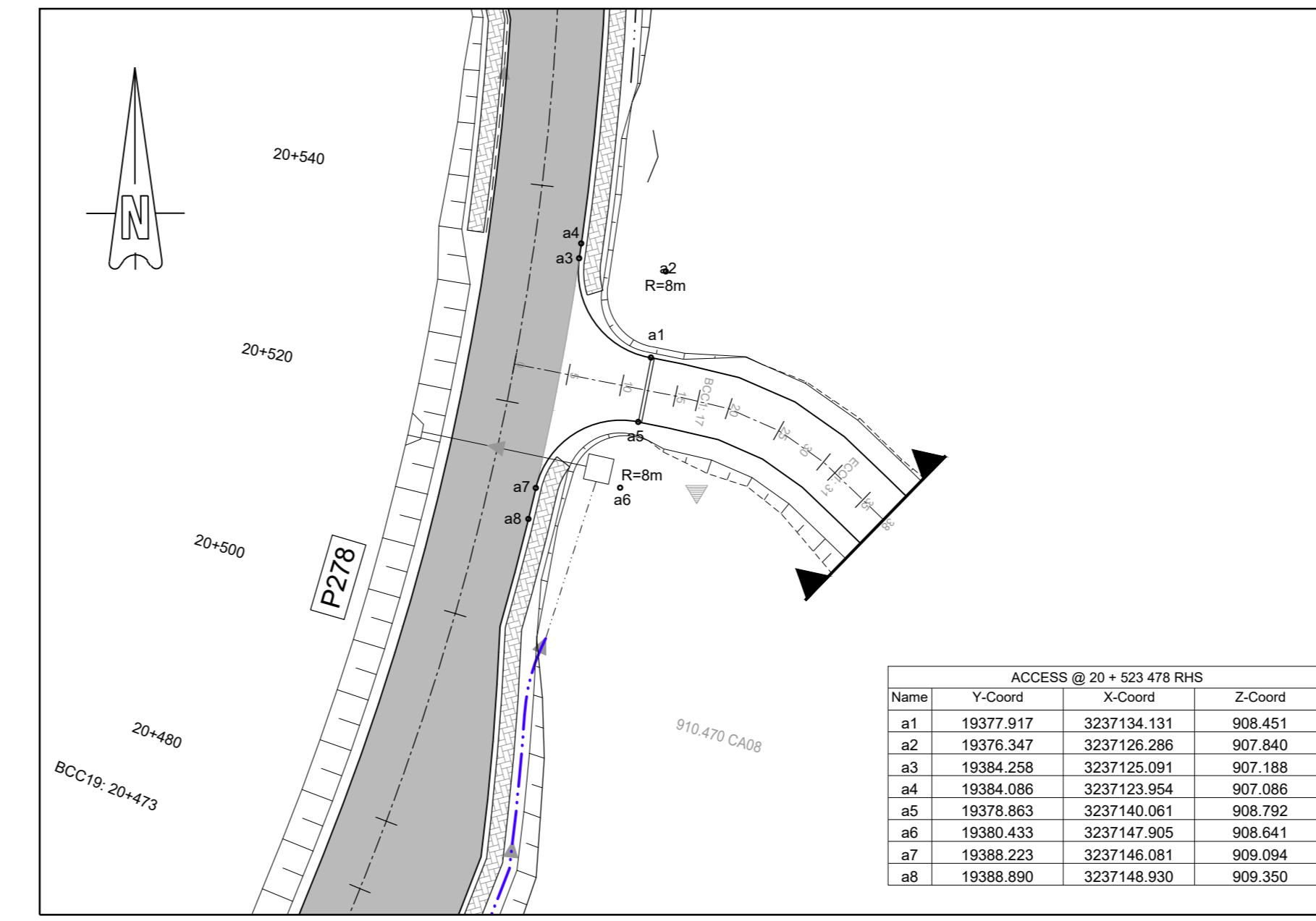
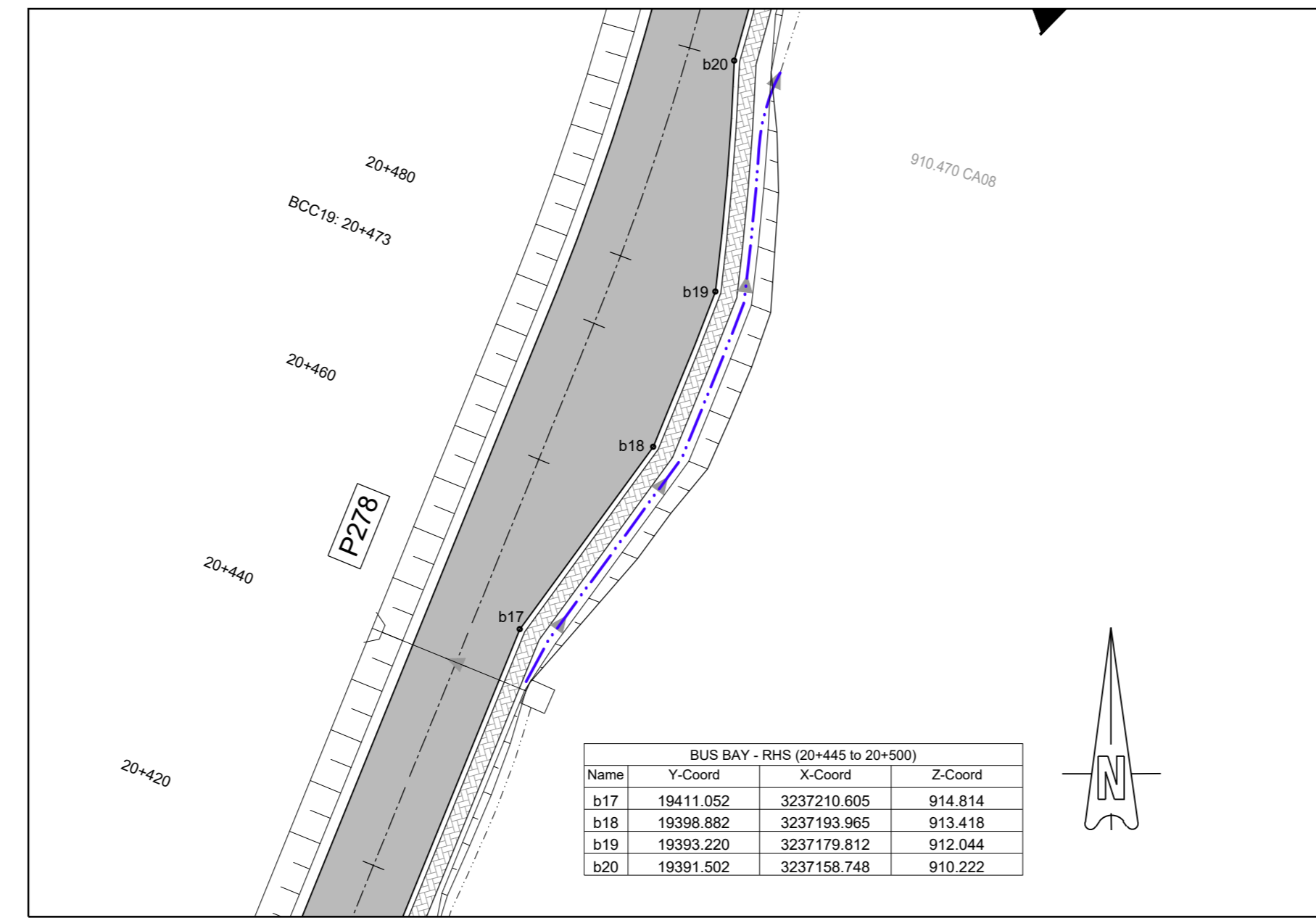
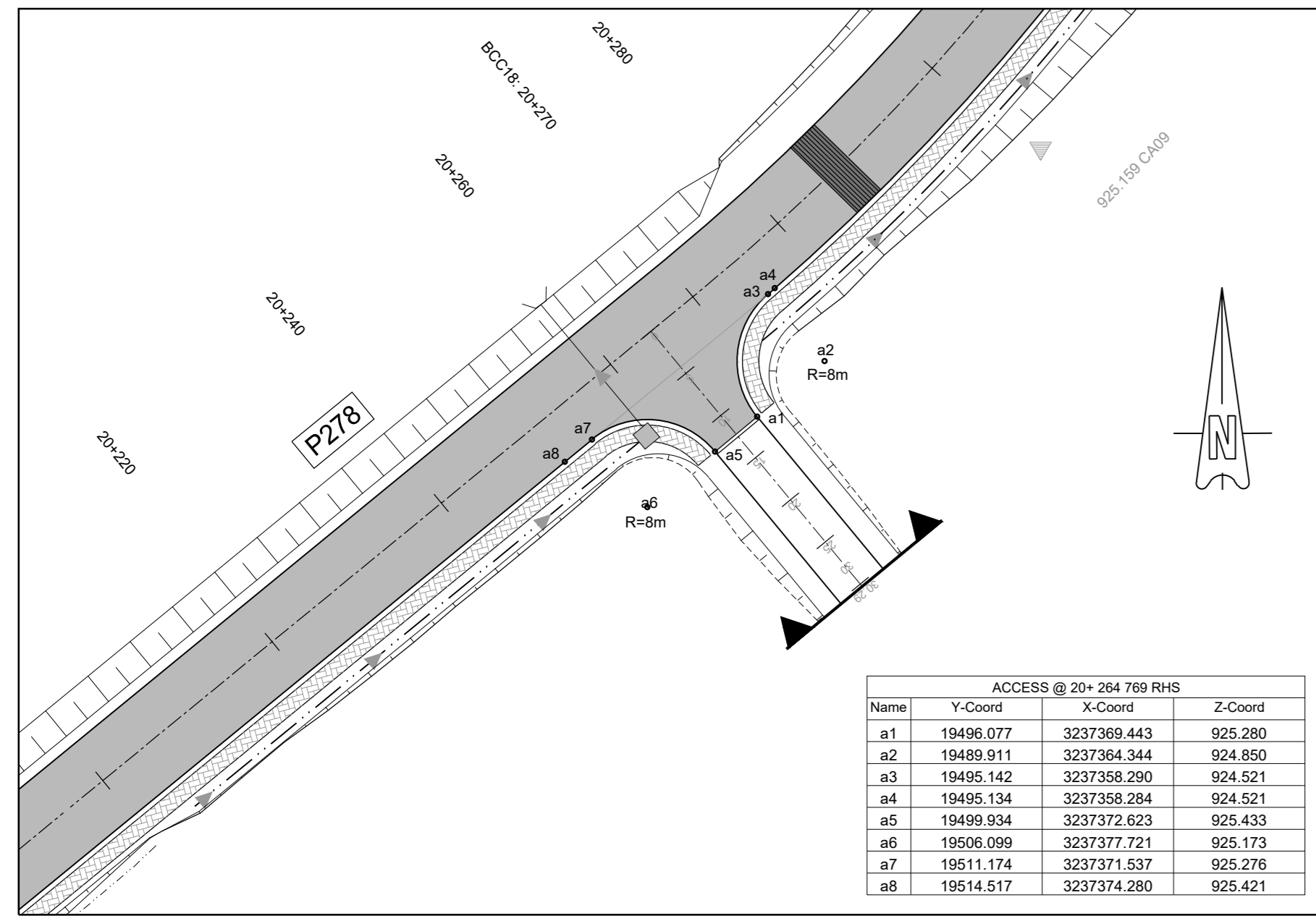
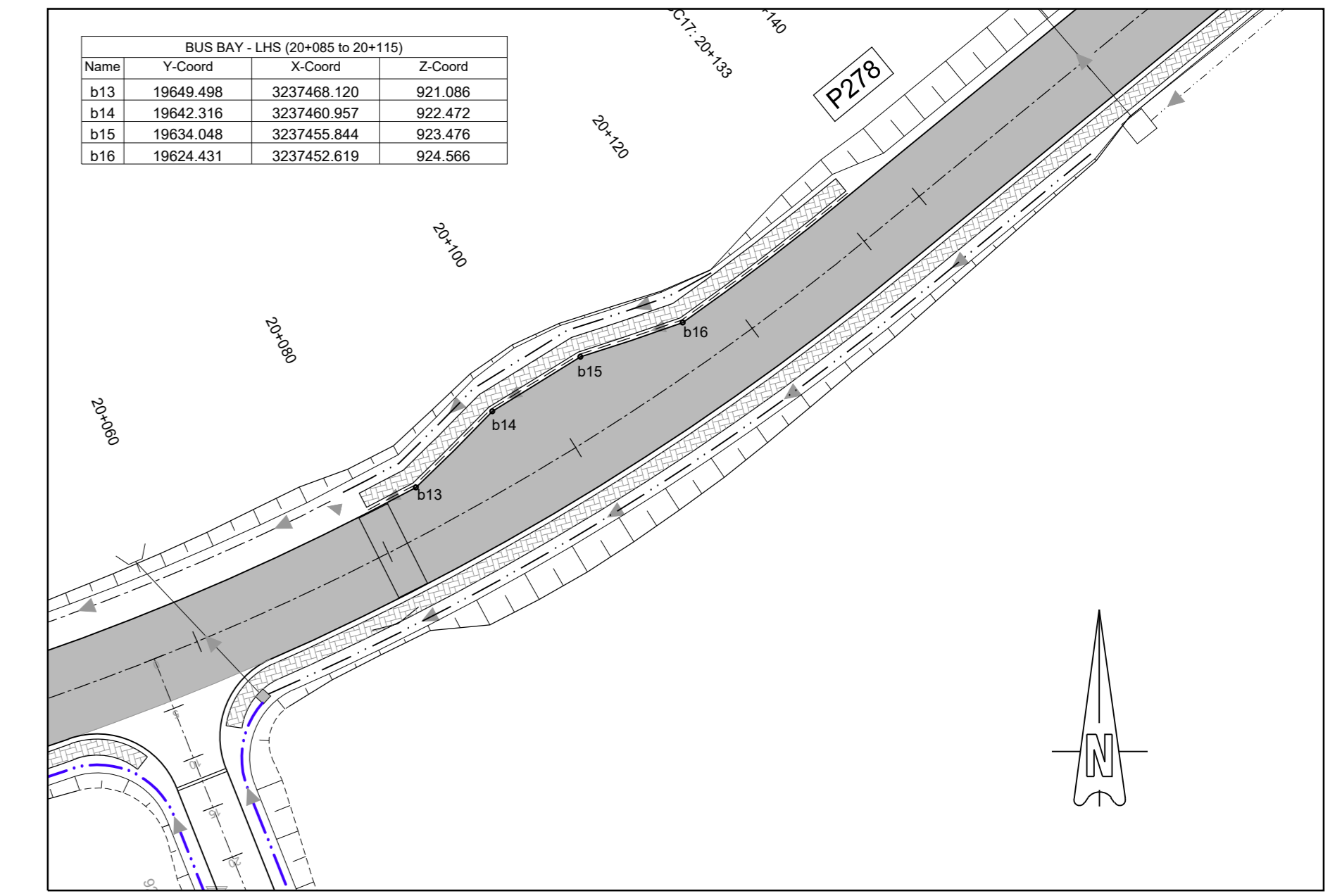
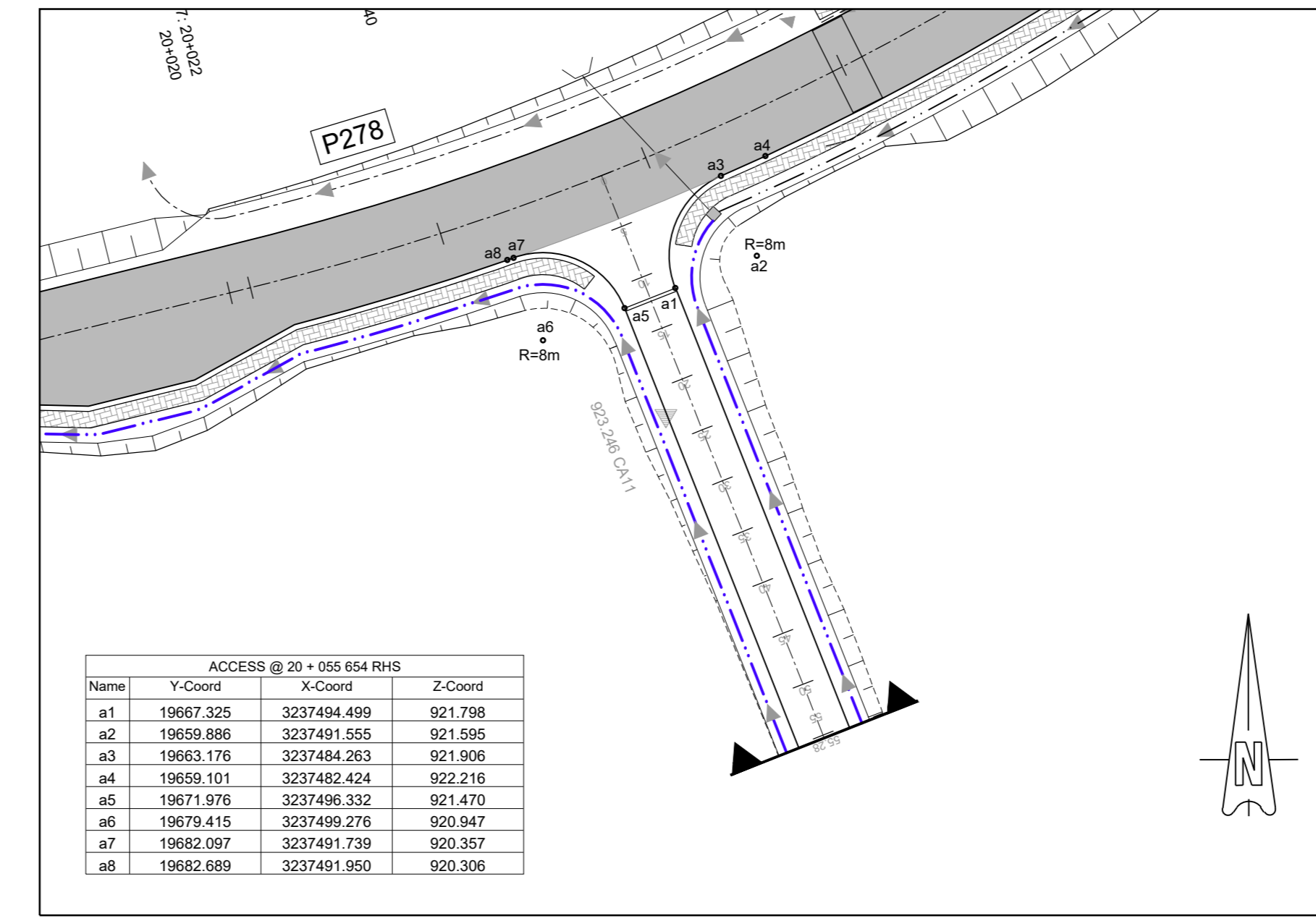
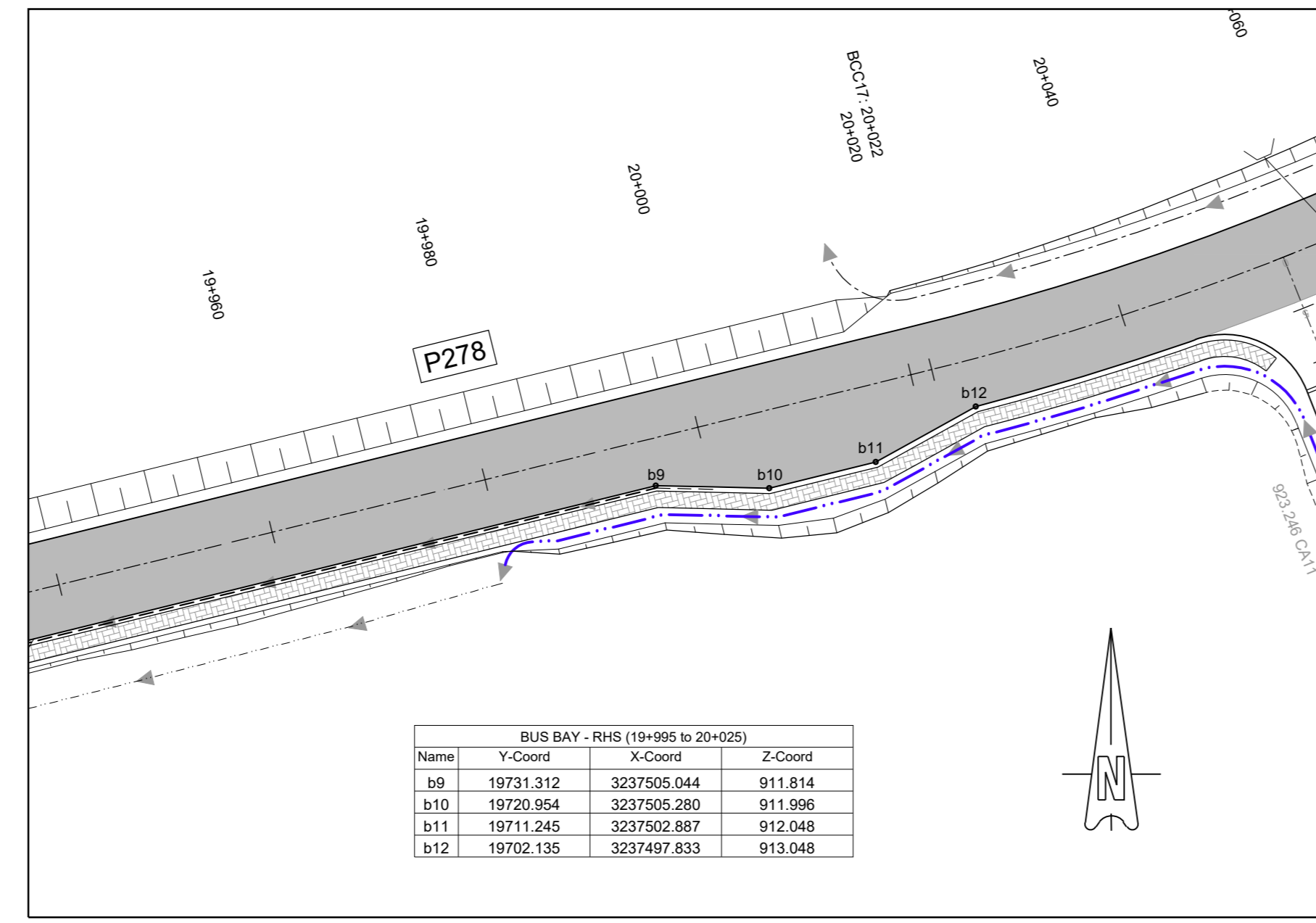
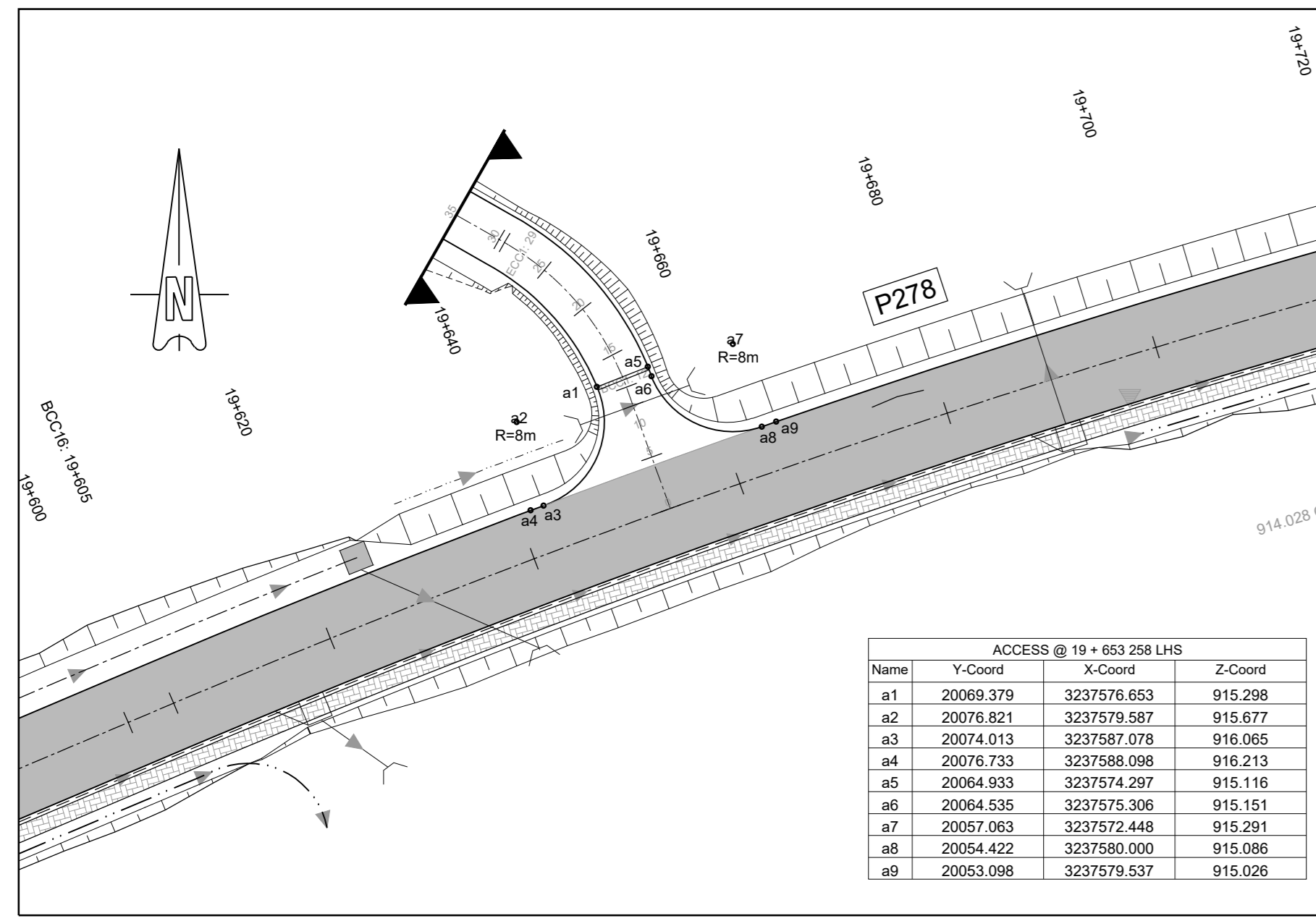
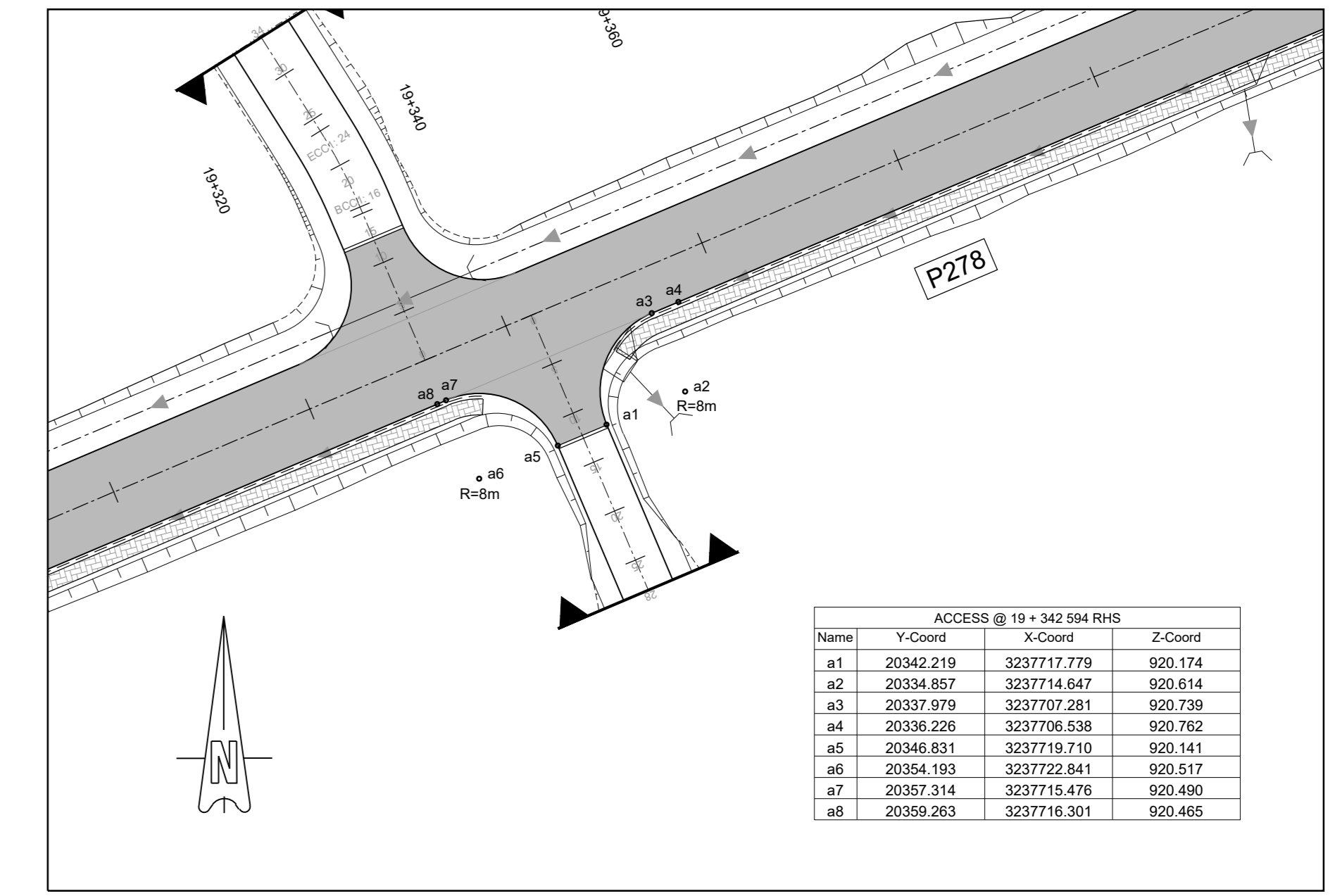
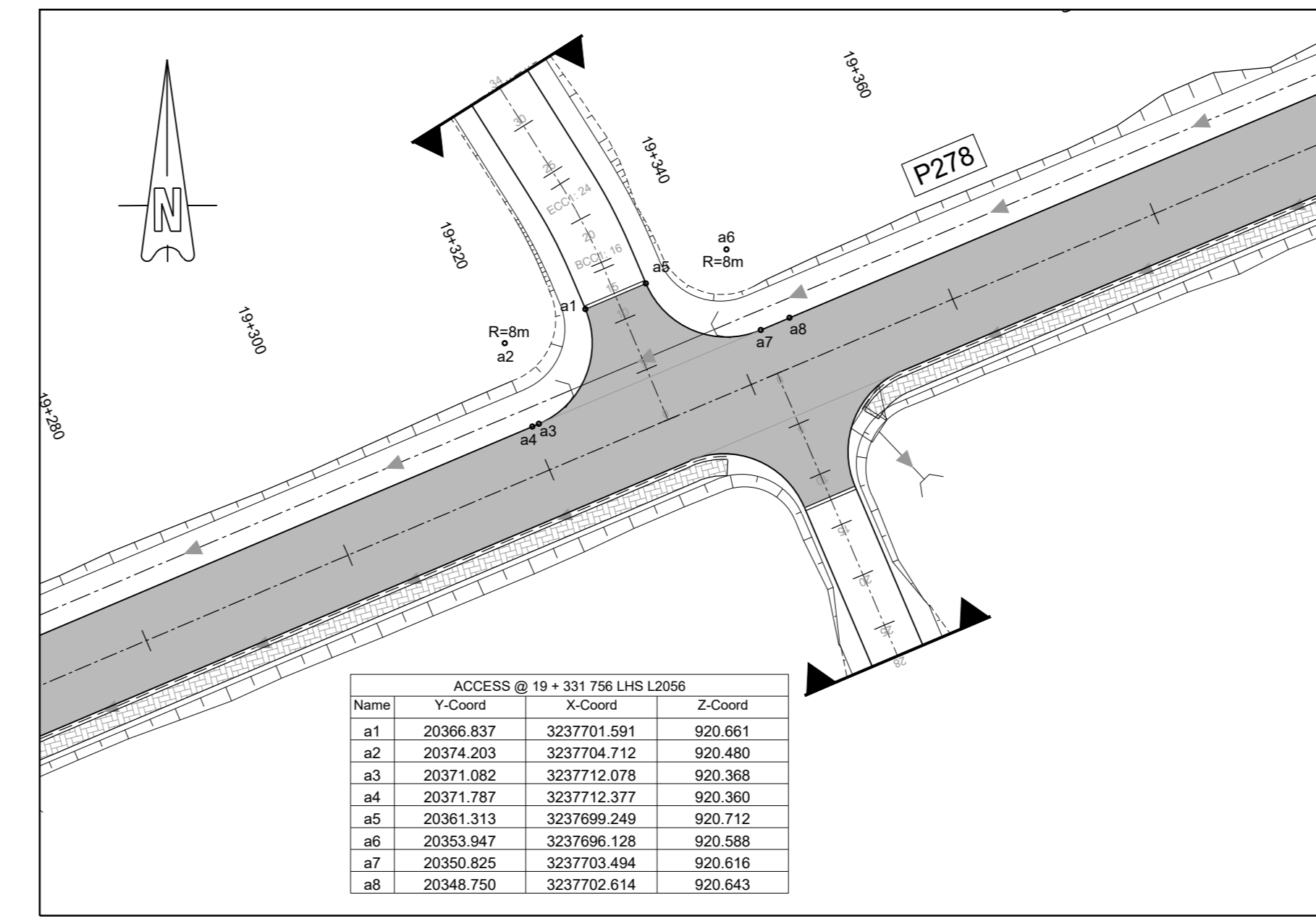
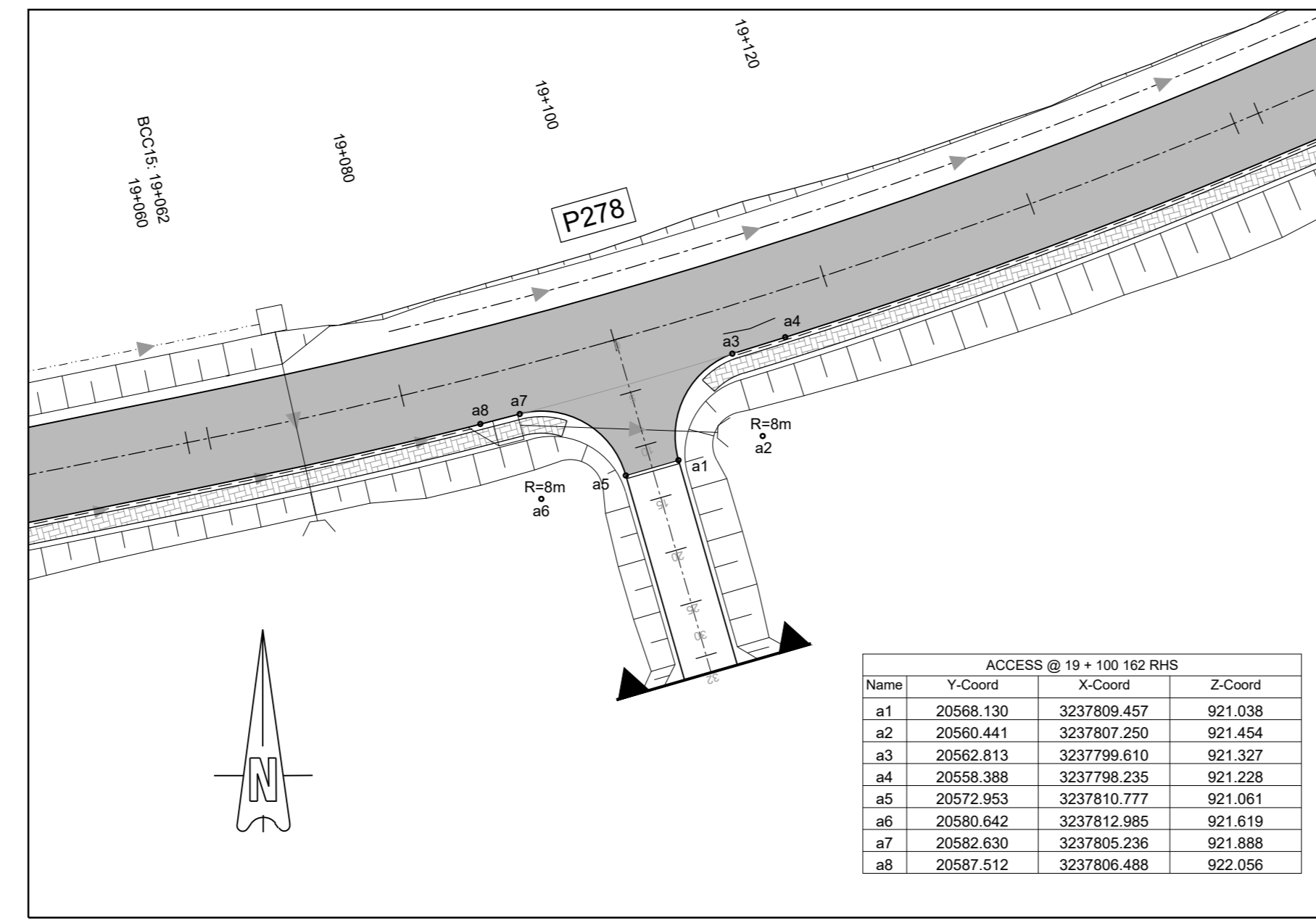
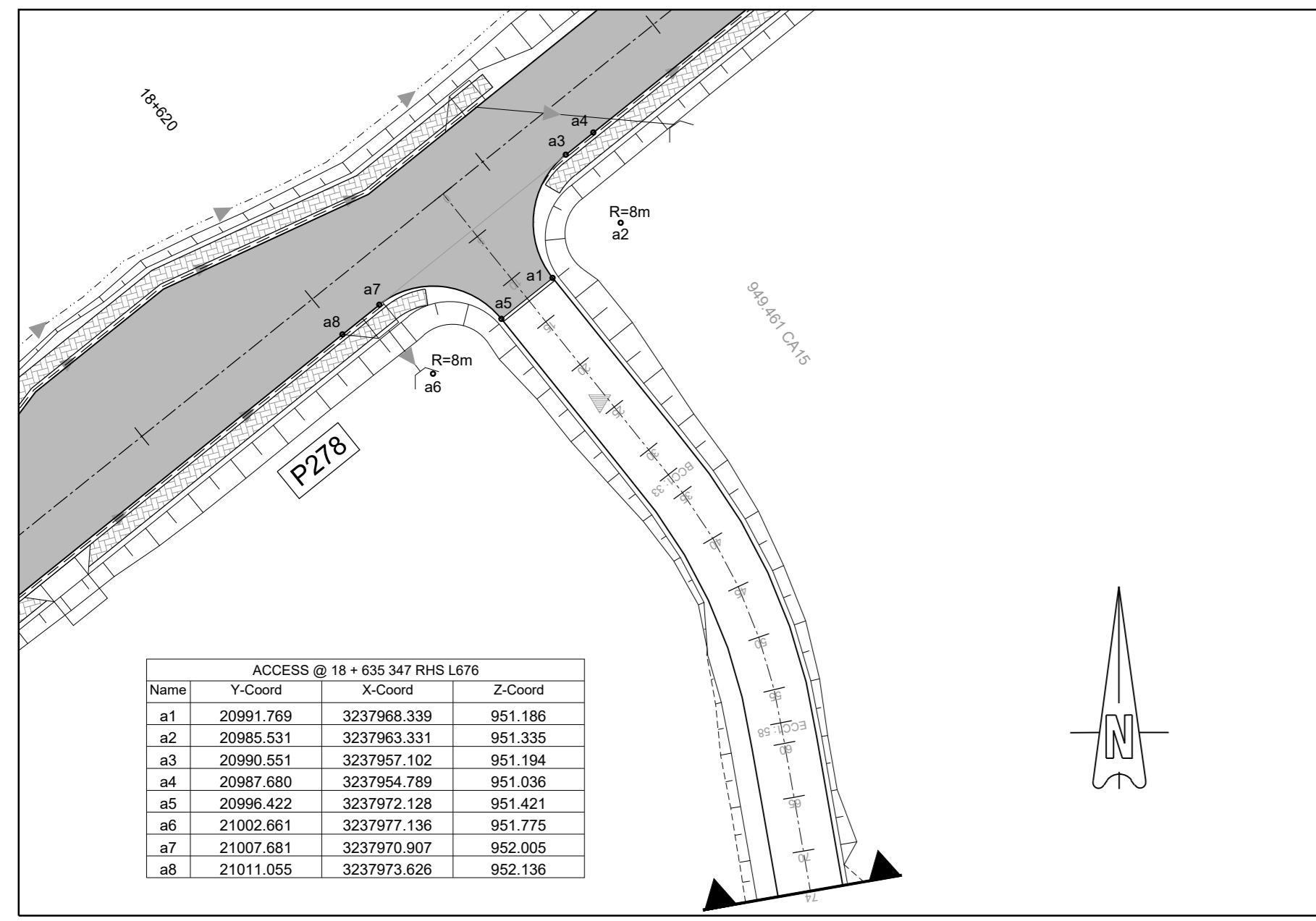
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Plan No - C 47658

REVISION: A

C 47658





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 47658	Designed by:-	Y. DOMA
Continued on:-	-	Checked by:-	T. PIKA
Cross Section No:-	C 44330 - C 44341 C 46234 - C 46235 C 47654 - C 47654	Drawn by:-	K. NAIIDOO
Longitudinal Section No:-	C 44324 - C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44312 - C 44323	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport

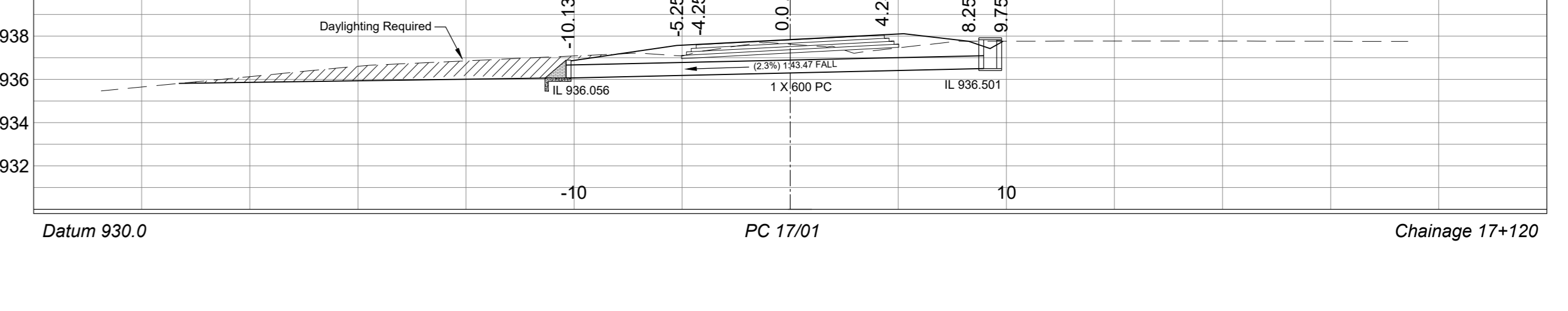
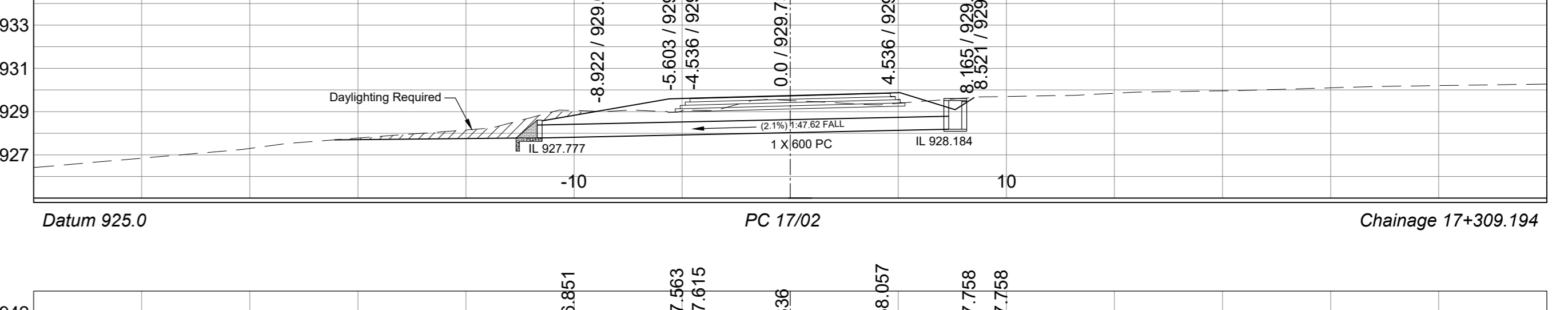
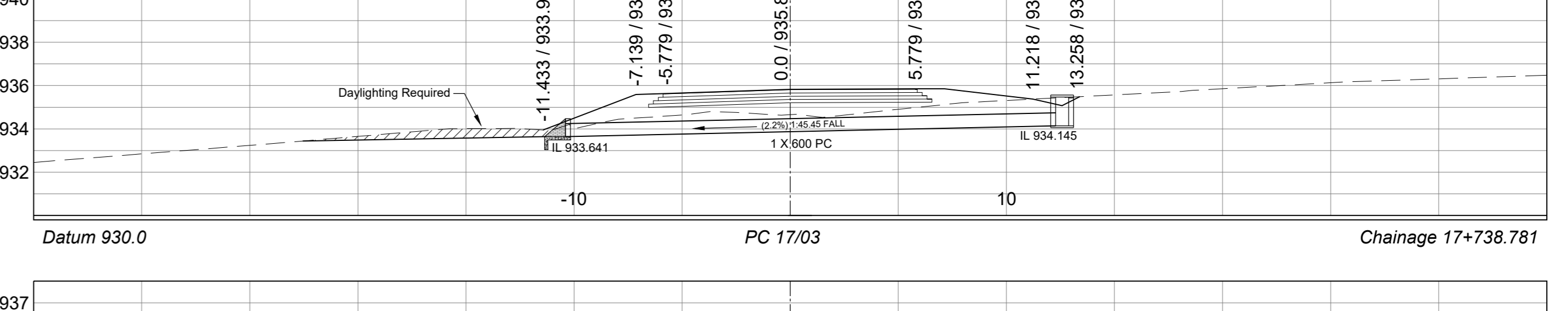
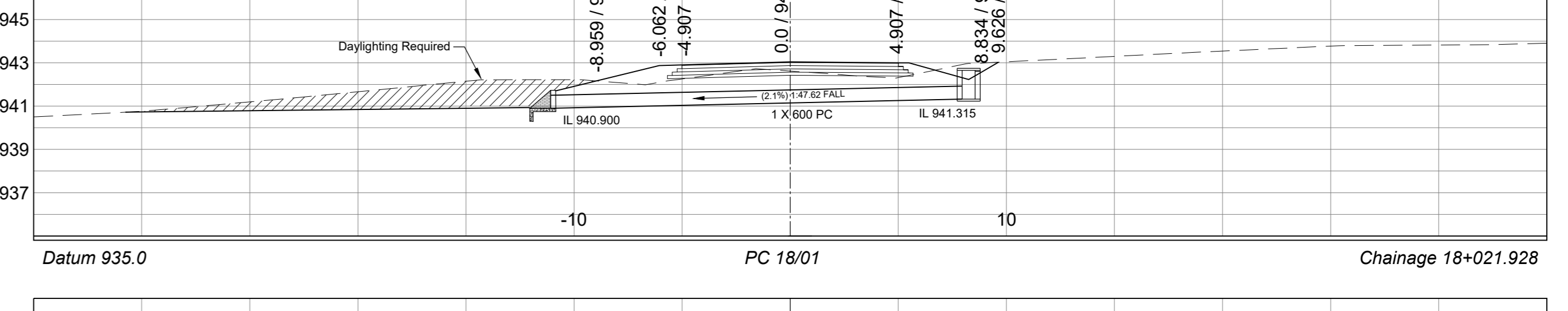
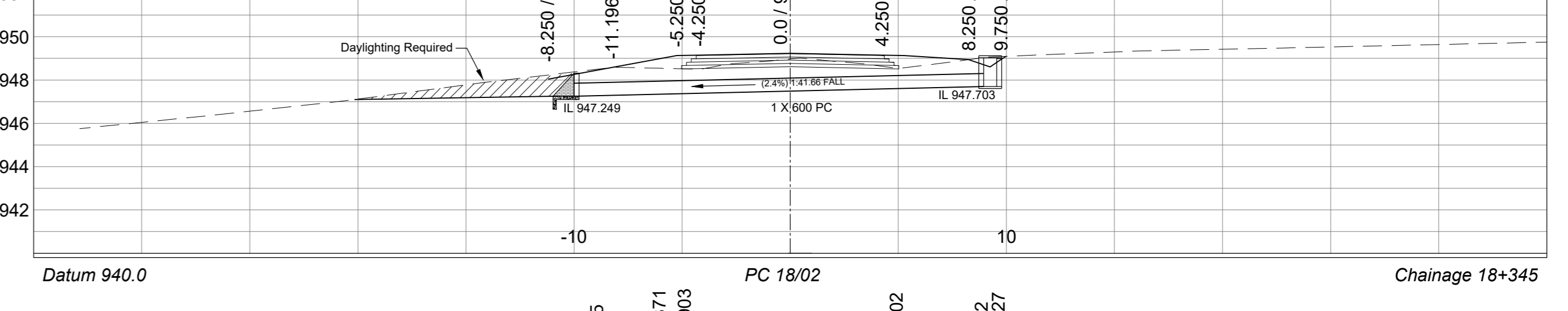
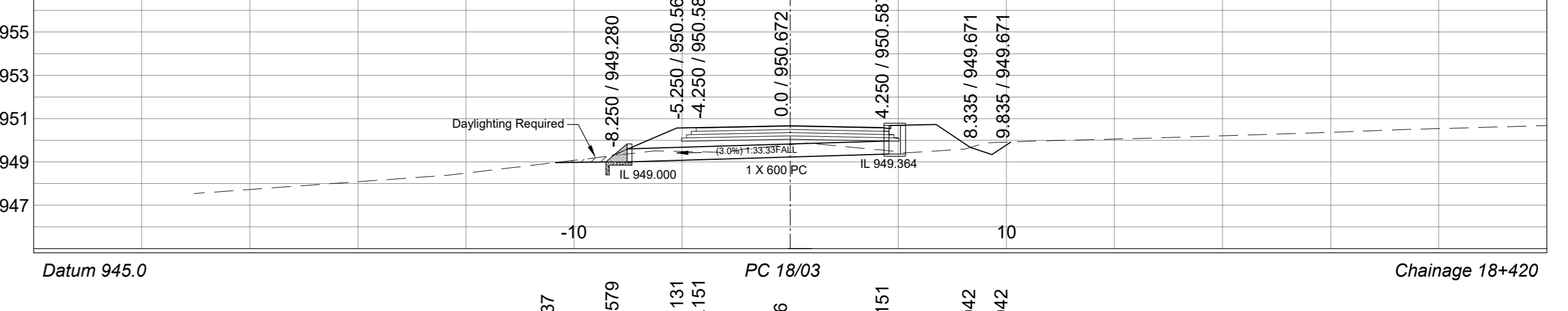
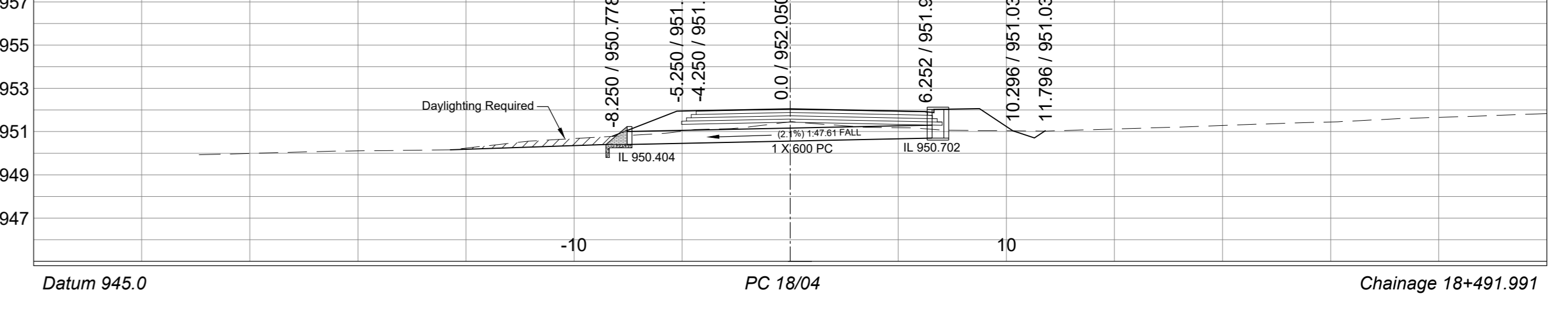
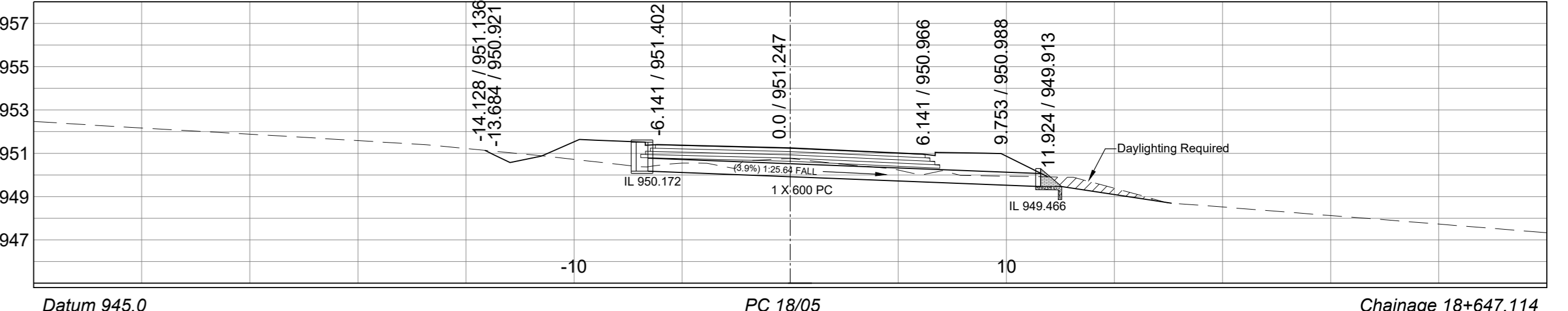
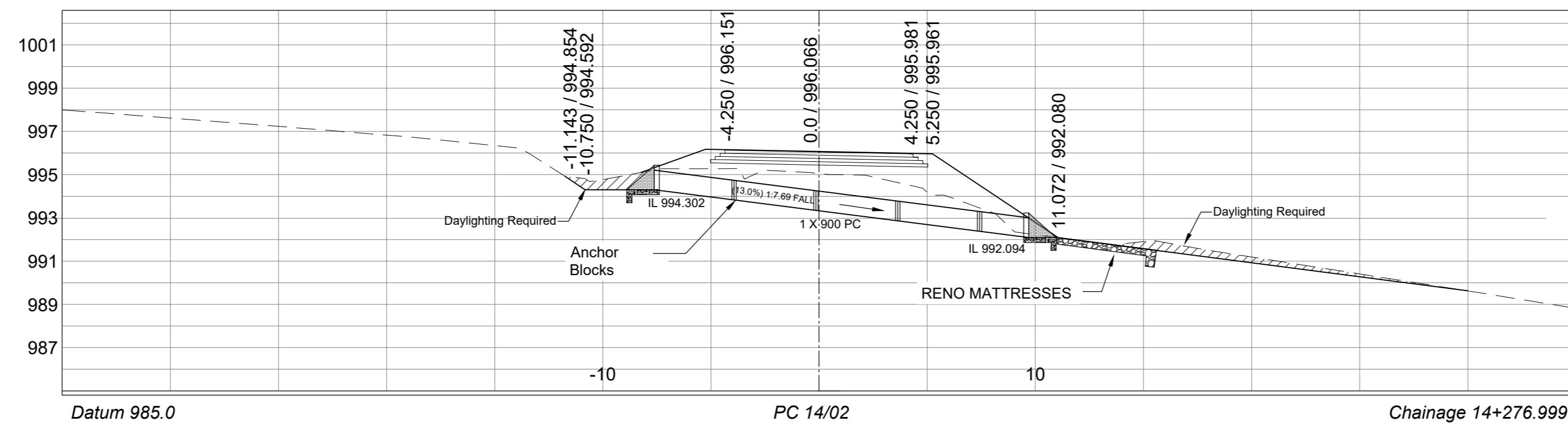
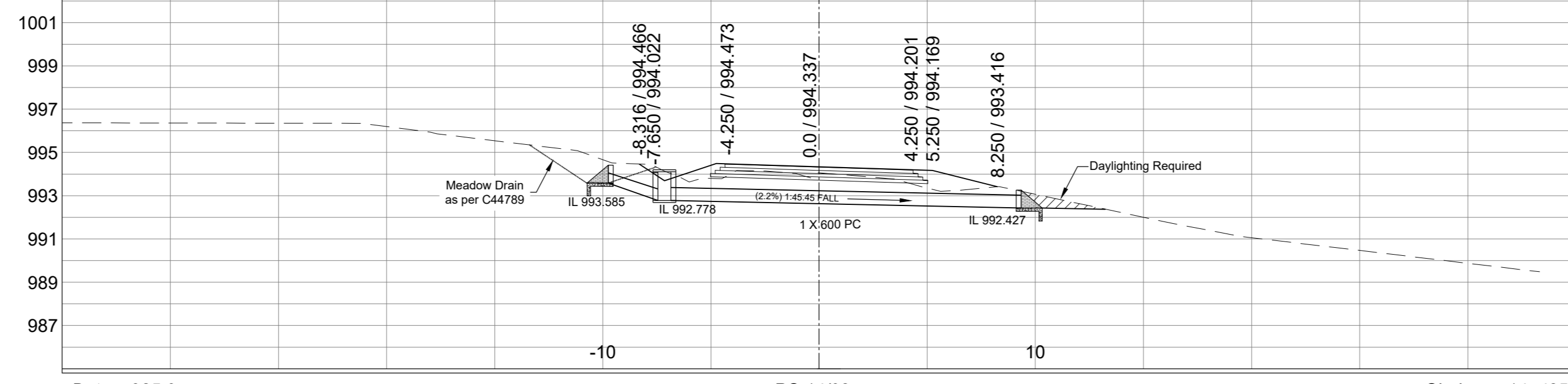
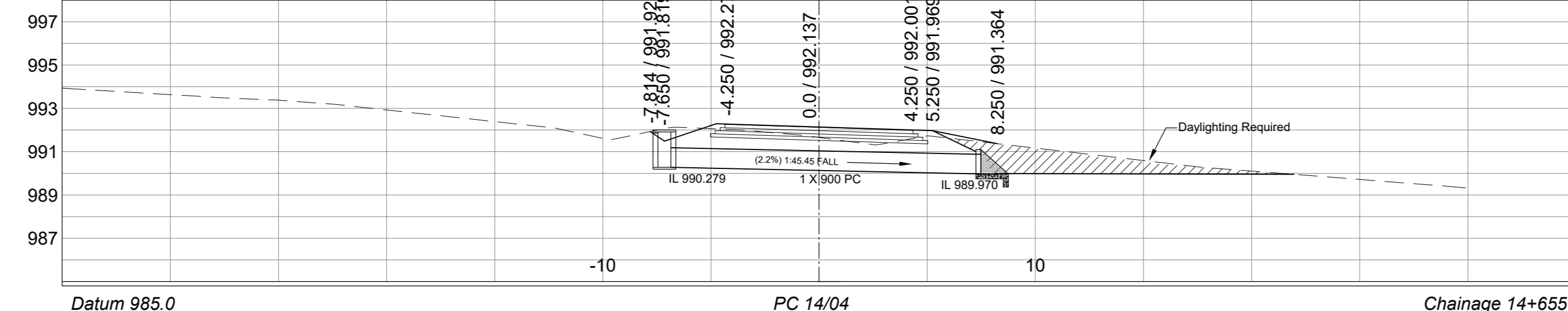
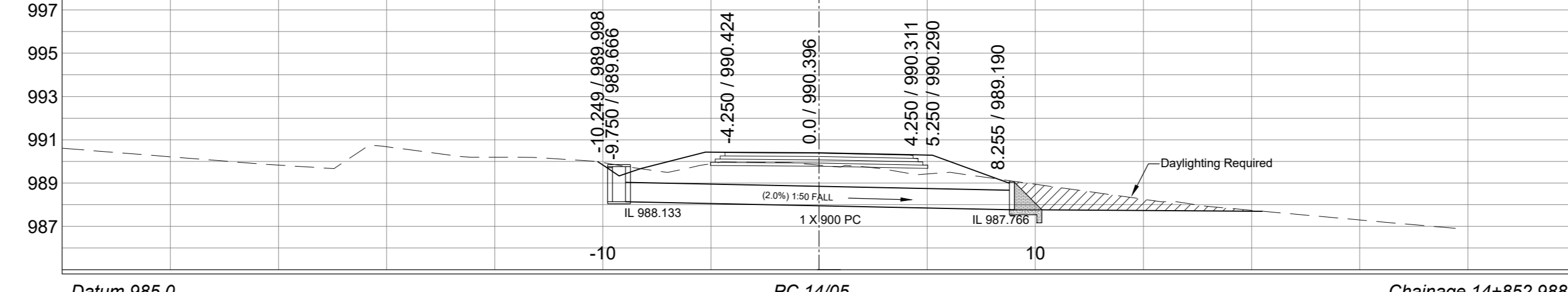
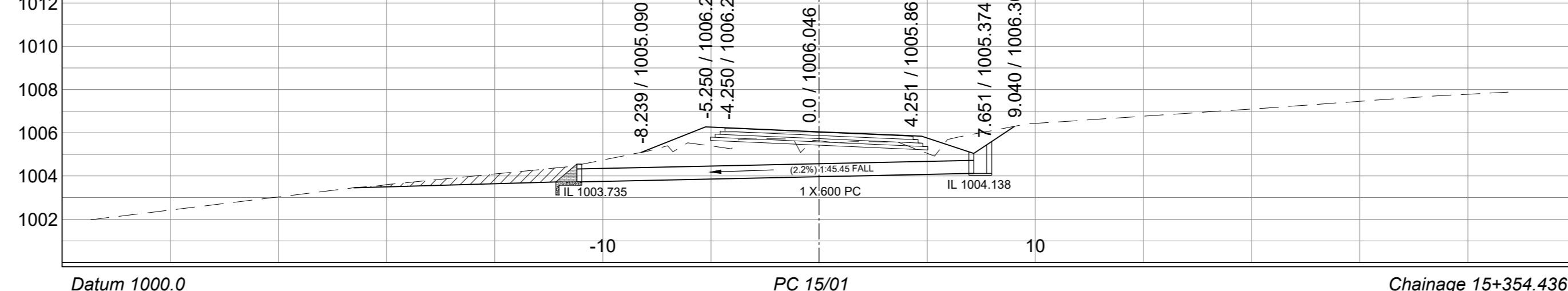
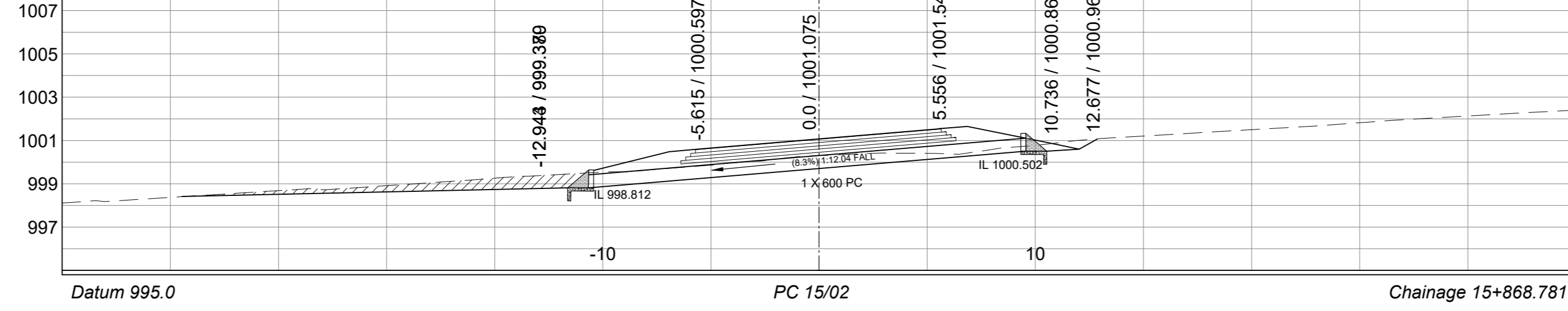
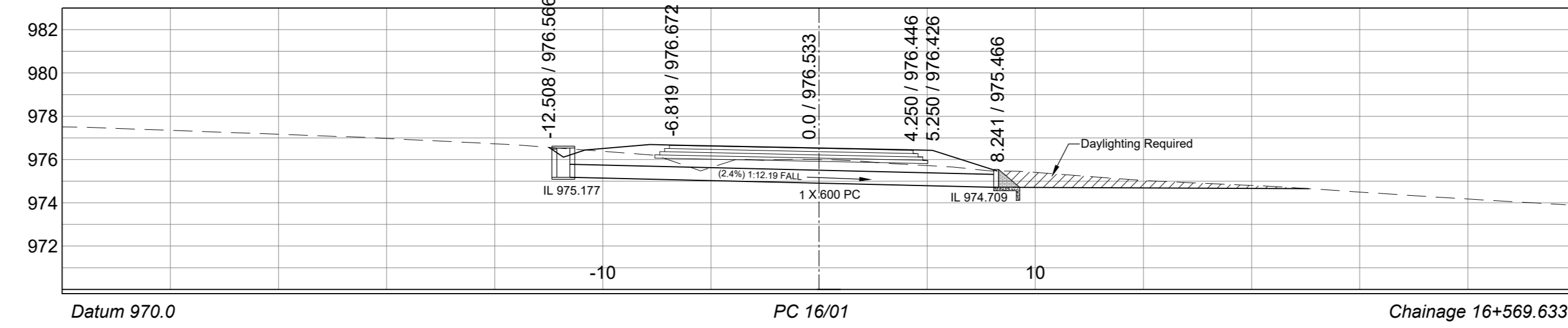
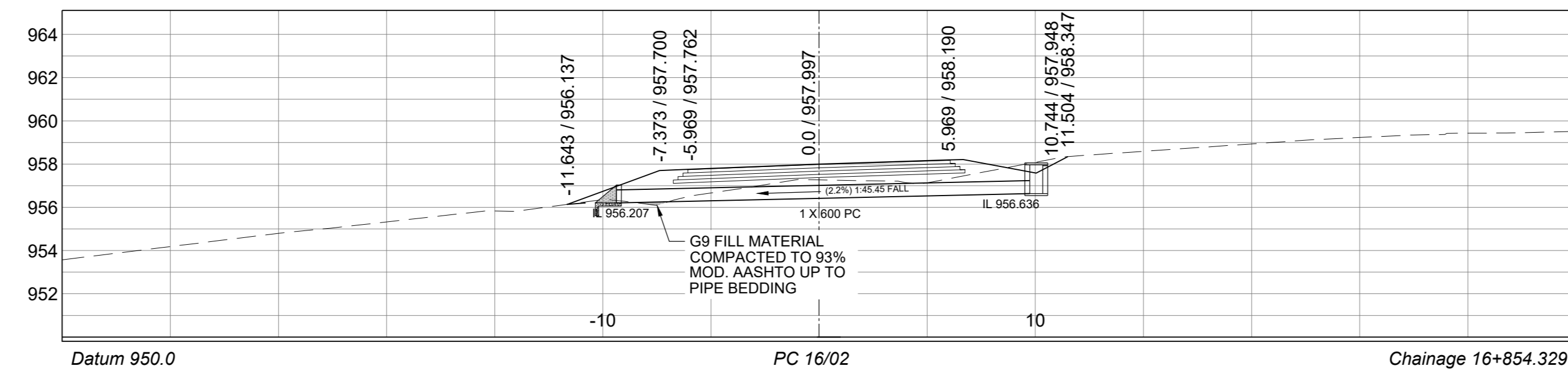
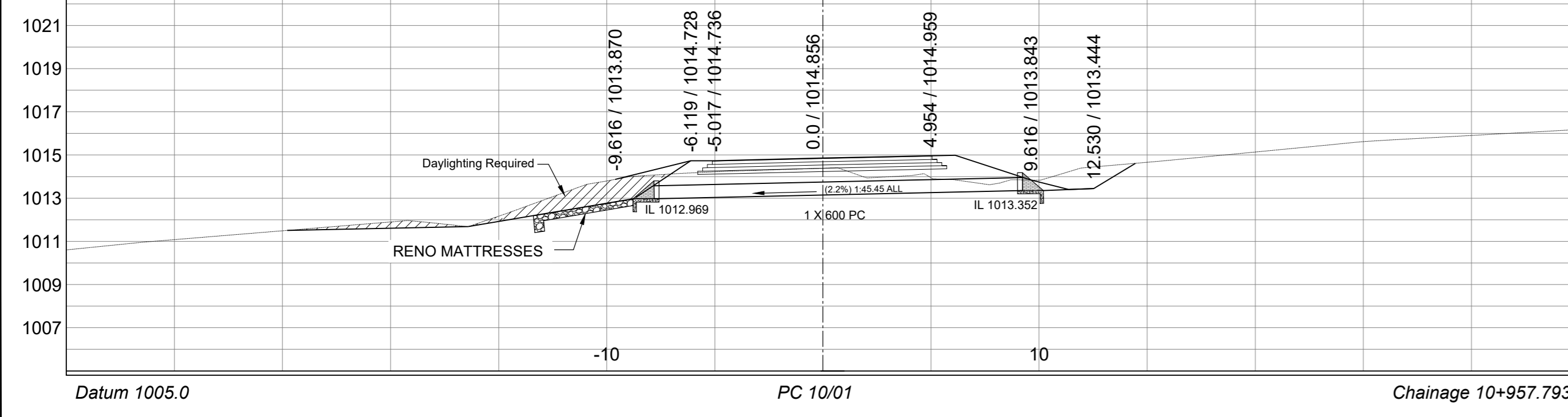
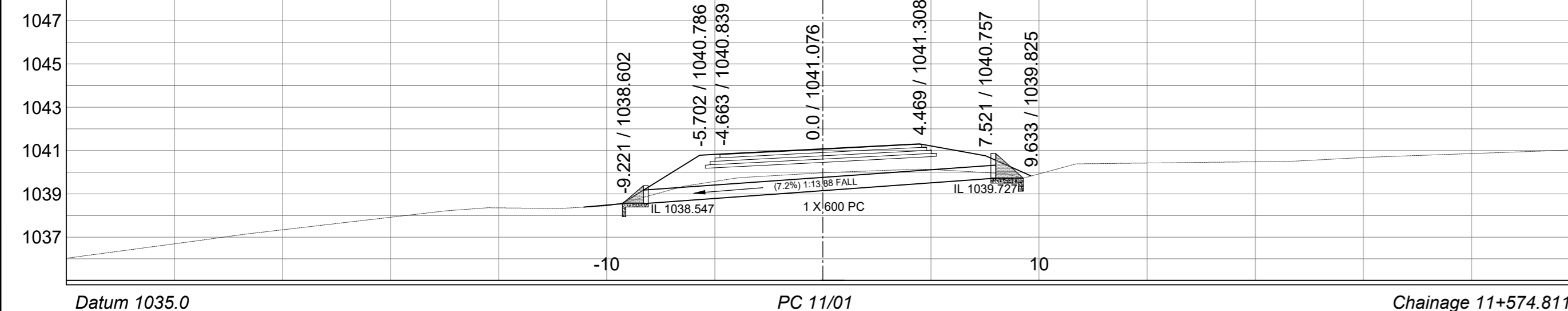
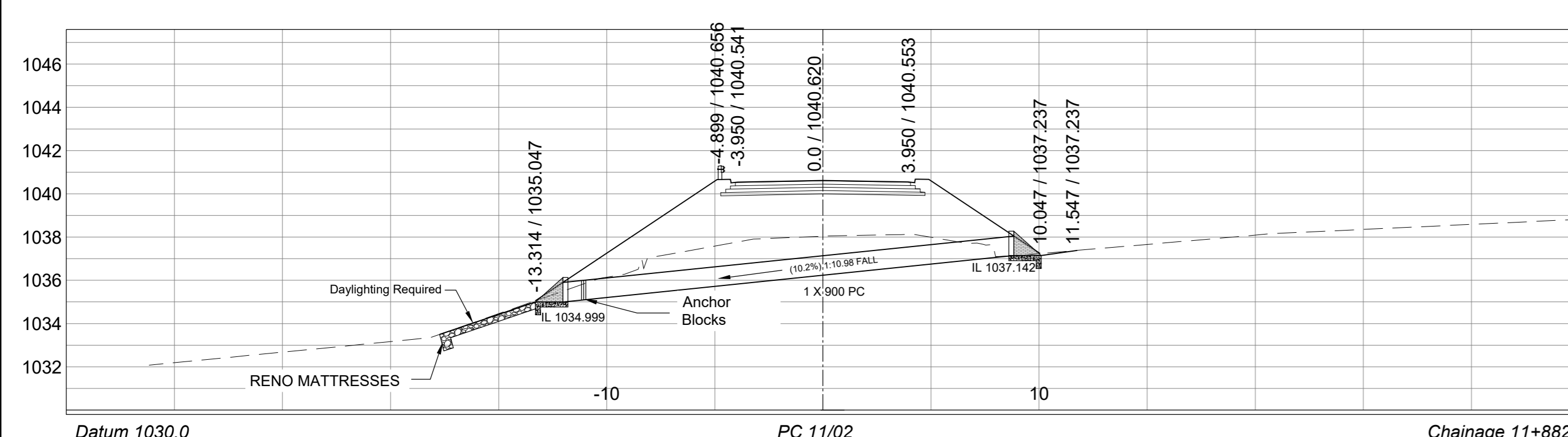
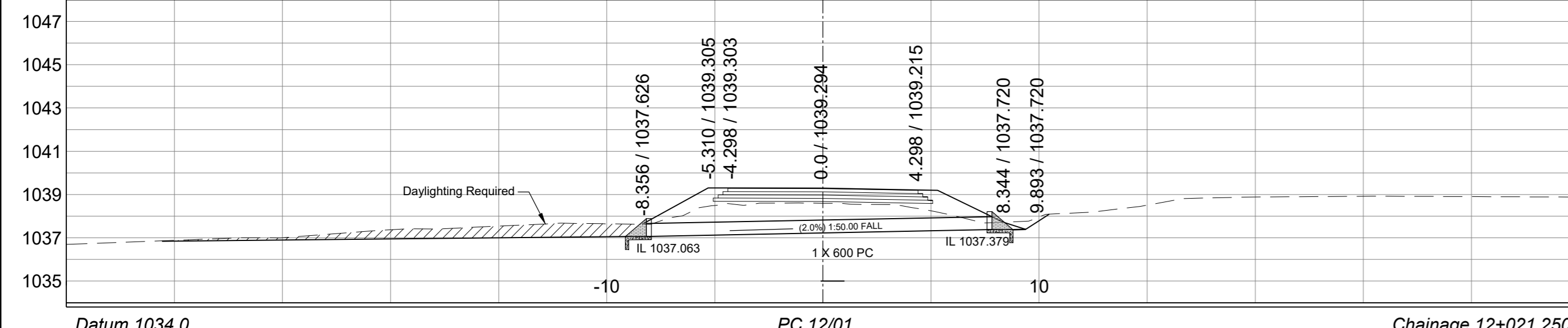
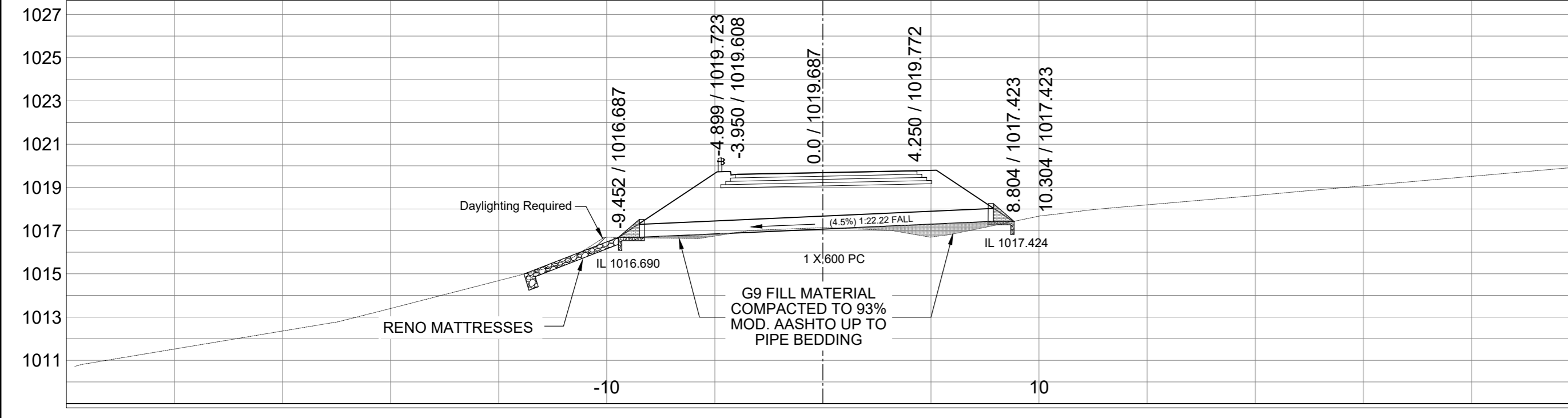
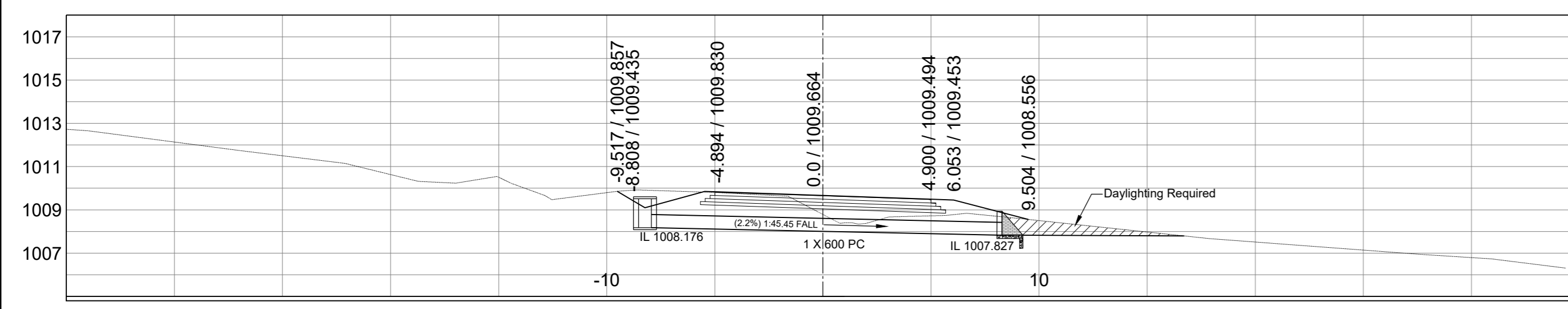
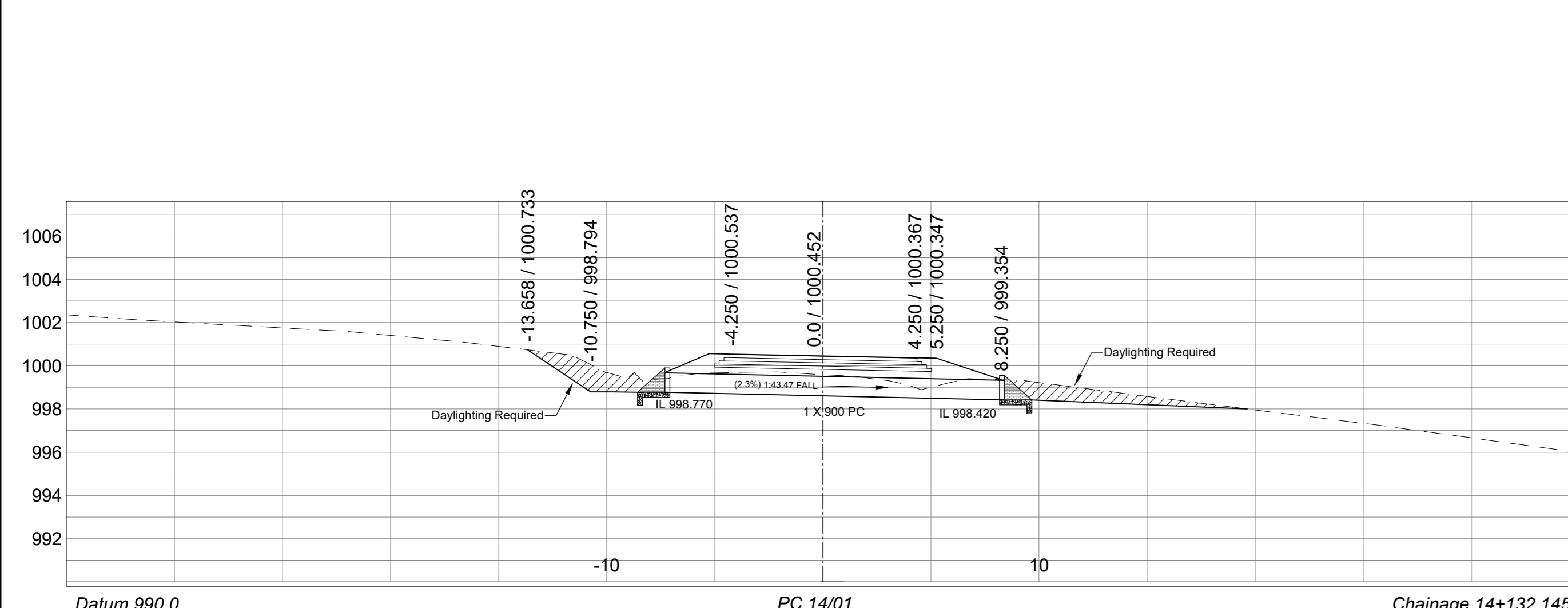
Signature: \_\_\_\_\_ Date: 01-02-2024

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
ACCESS ROADS SETTING OUT

Staked km distance	Sheet -> 3	REVISION:
km 10+880 - km 22+491	of -> 3	A
Scale	Plan No ->	
1 : 500		C 47659

C 47659





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	Designed by:- T. PIKA
Continued on:-	Checked by:- Y. DOMA
Cross Section No:-	Drawn by:- T. PIKA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



Designed by:- emzansi ENGINEERS (PTY) LTD	Transportation Engineer: Chief Engineer
Signature: [Signature]	Head: Transport
Date: 01-02-2024	

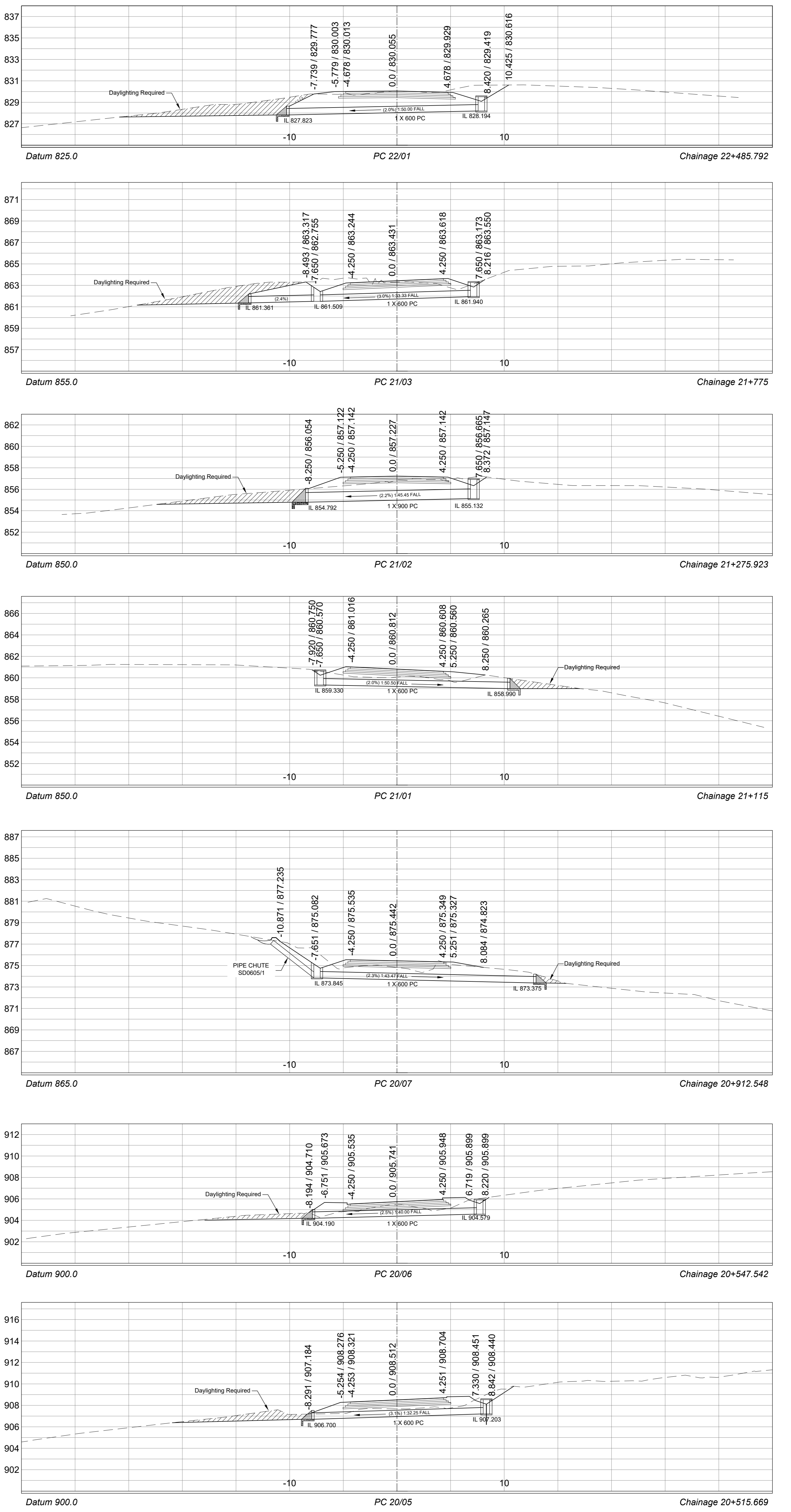
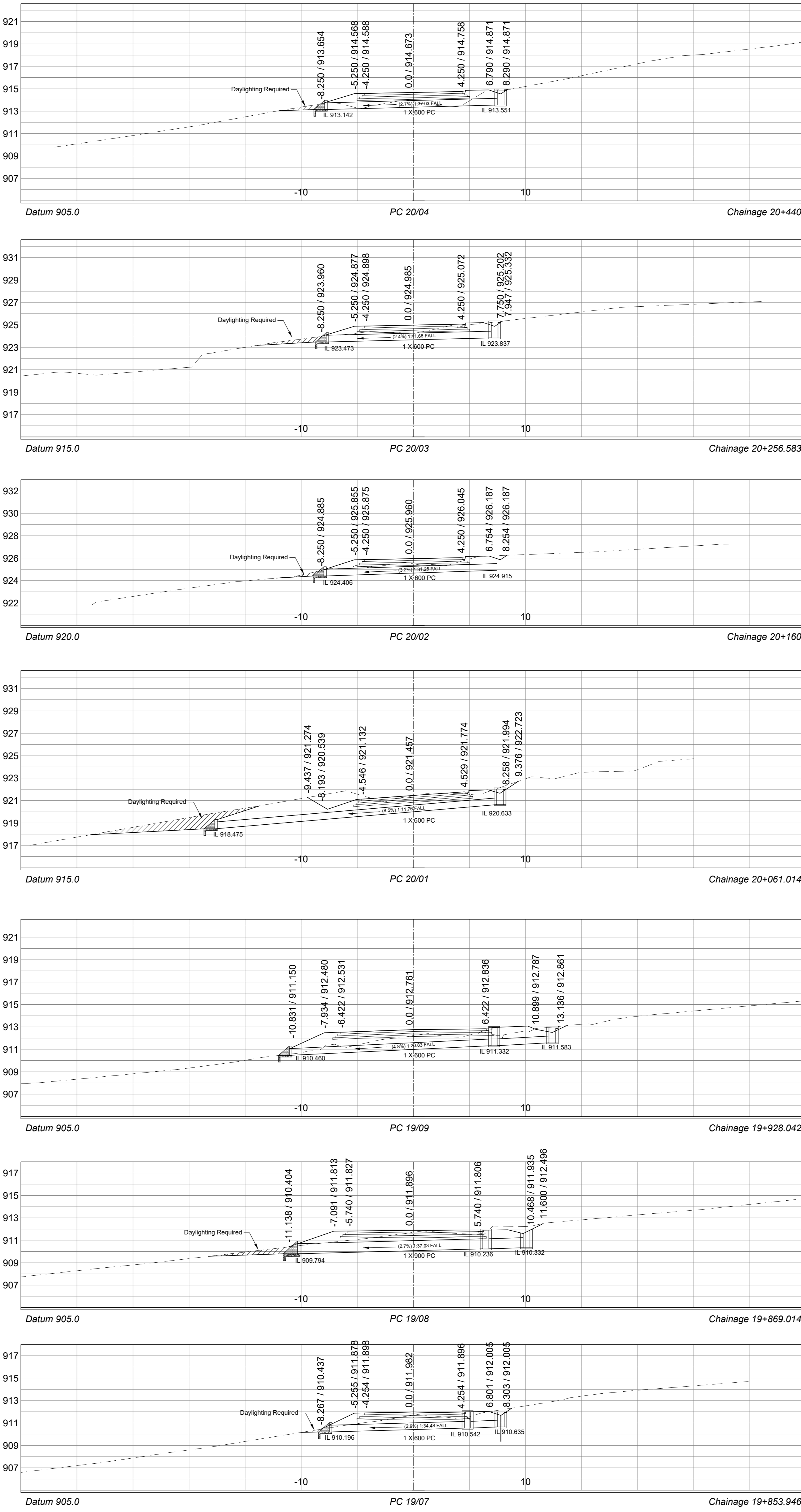
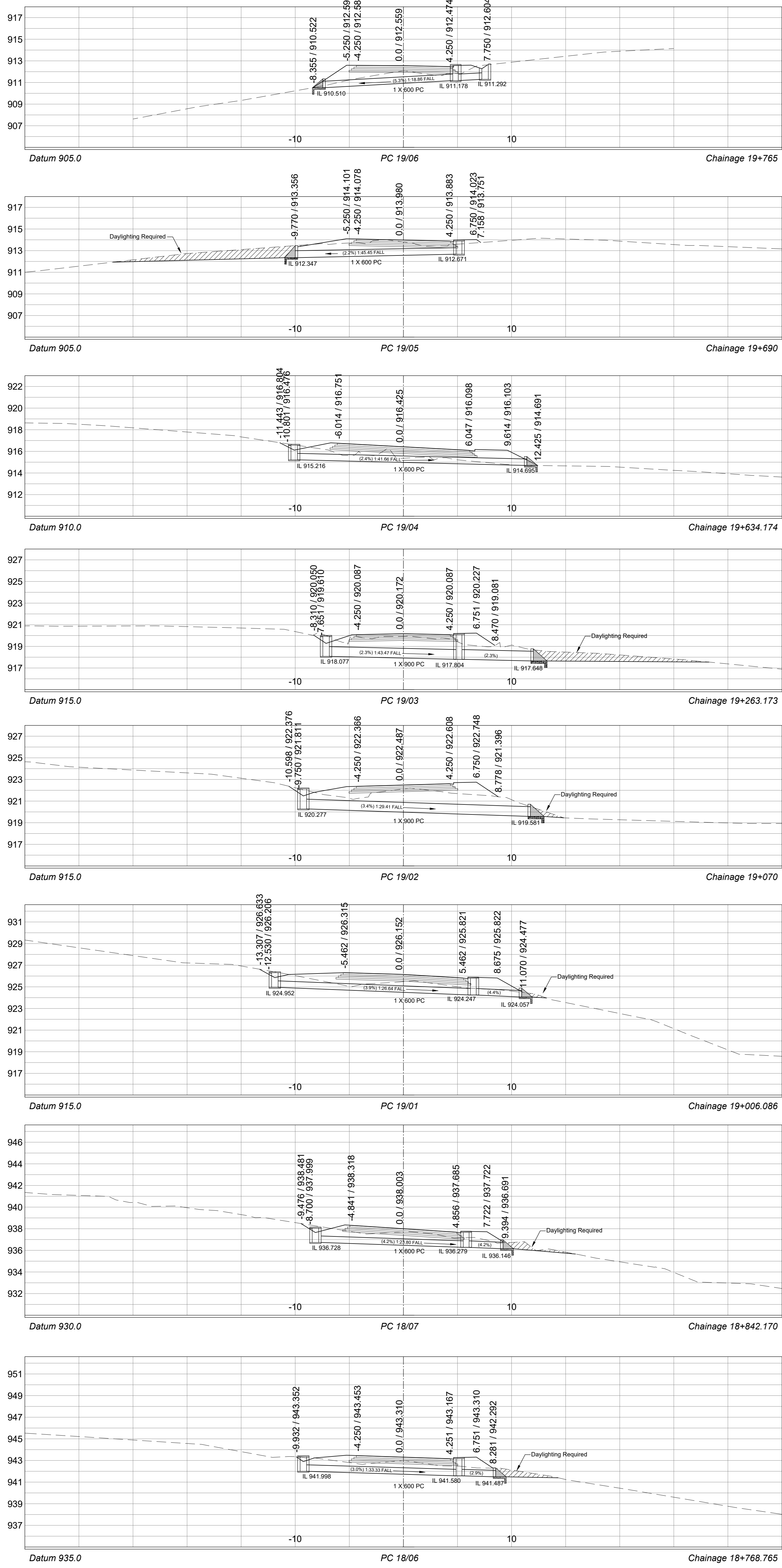
MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 PIPE CROSS SECTIONS

Staked km distance	Sheet - 01	REVISION:
km 10+880 - km 22+491	of - 02	A
Scale	Plan No -	
HORIZONTAL 1:200		
VERTICAL 1:200		

C 44831

C 44831





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	Designed by:- T. PIKA
Continued on:-	Checked by:- Y. DOMA
Cross Section No:-	Drawn by:- T. PIKA
Longitudinal Section No:-	Checked by:- Y. DOMA
Design Plan No:-	Date of approval:-



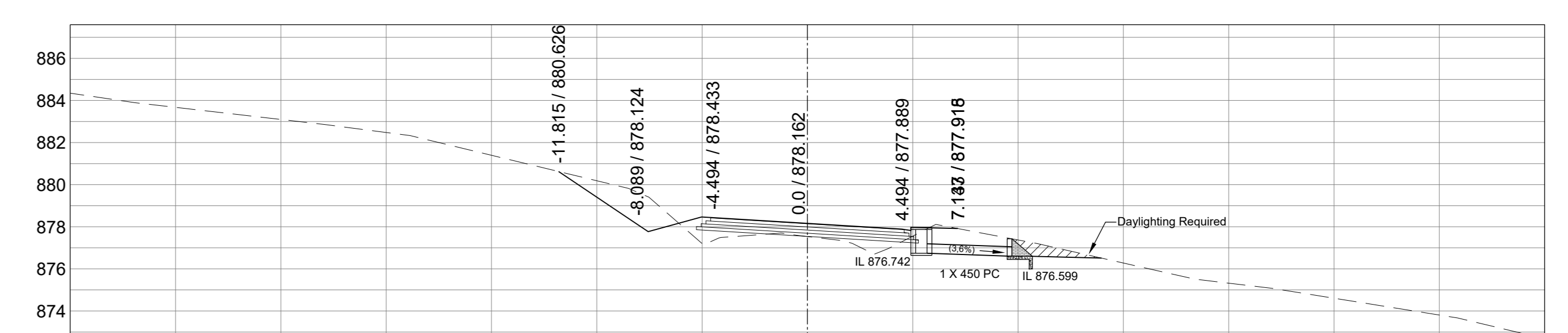
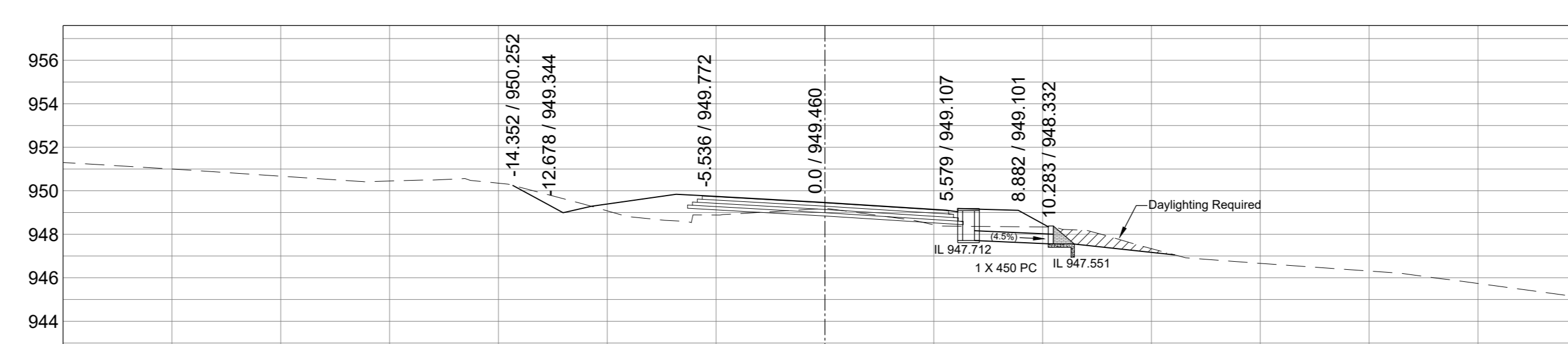
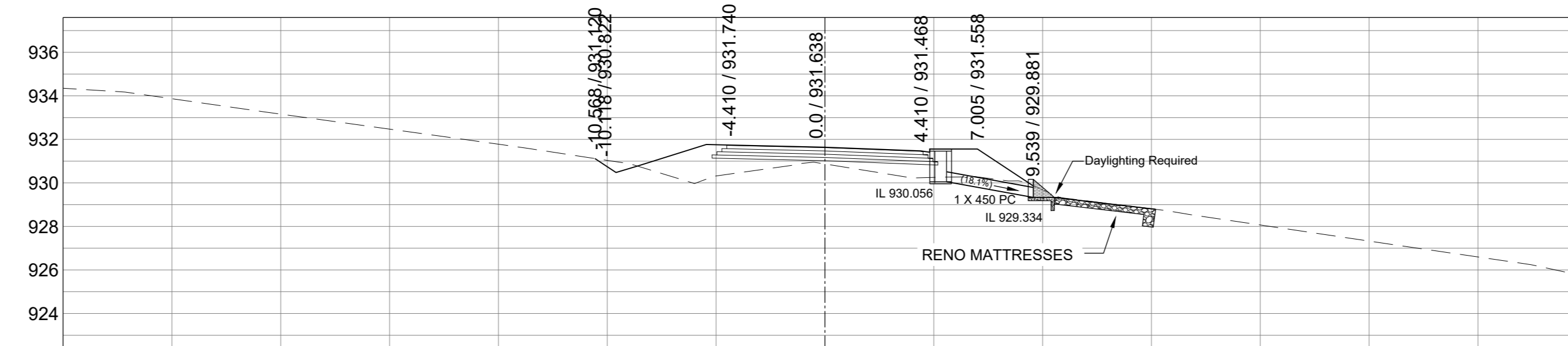
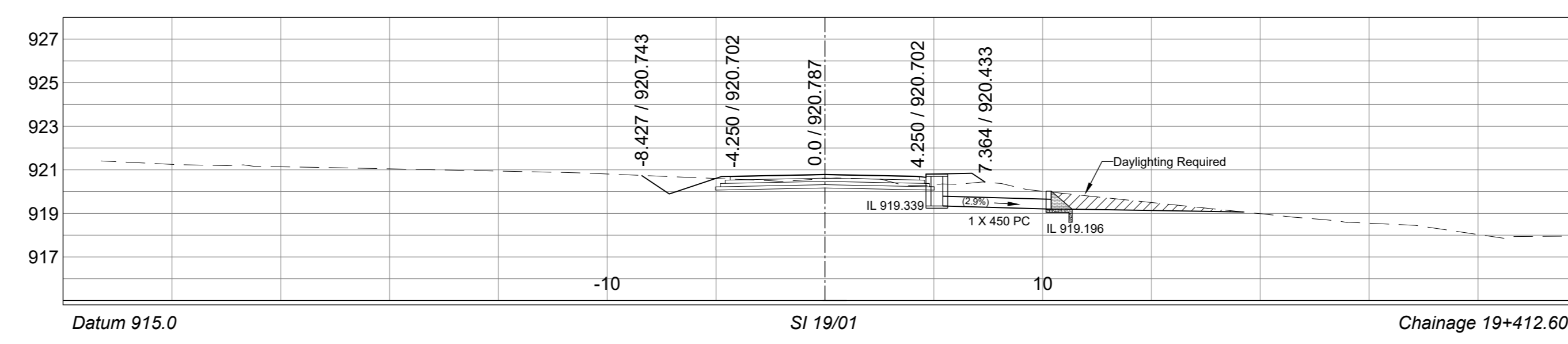
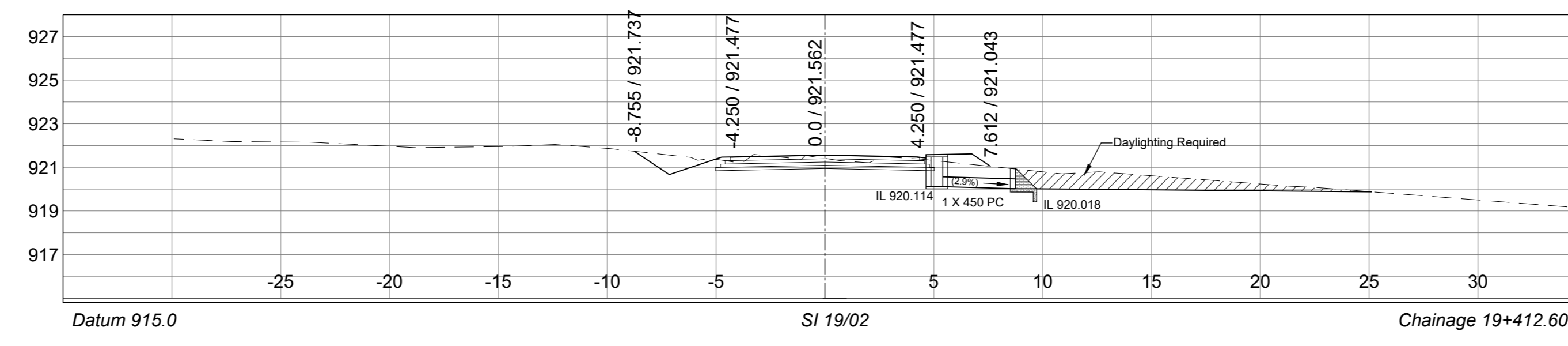
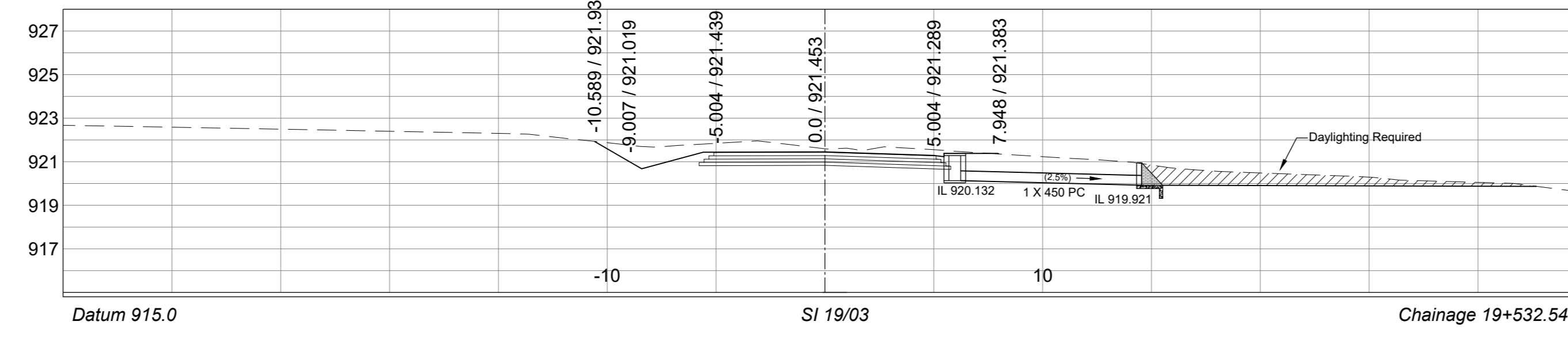
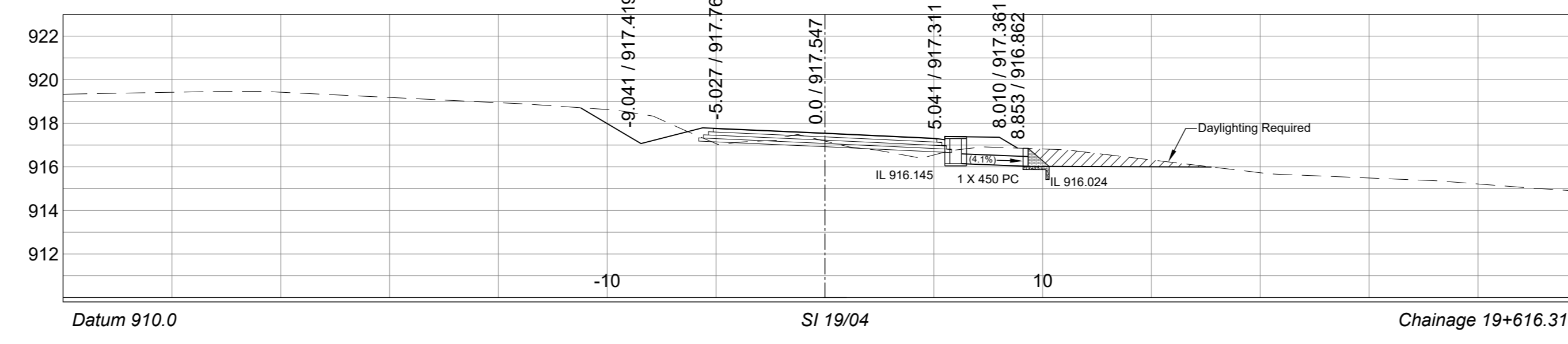
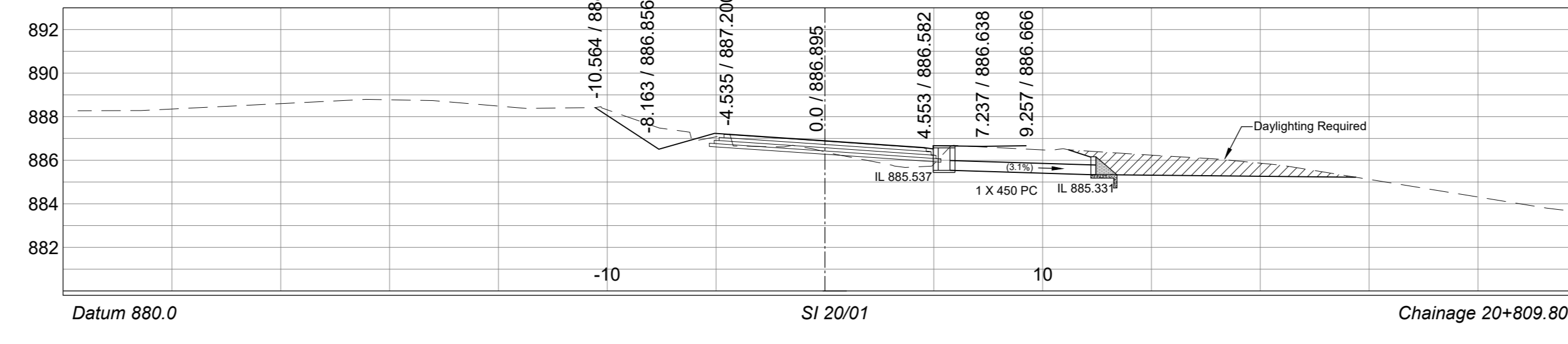
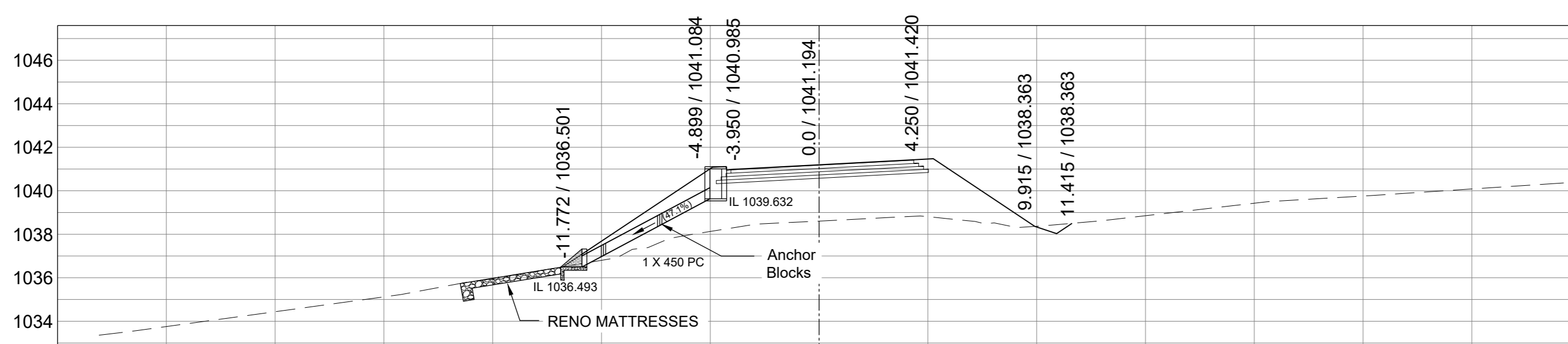
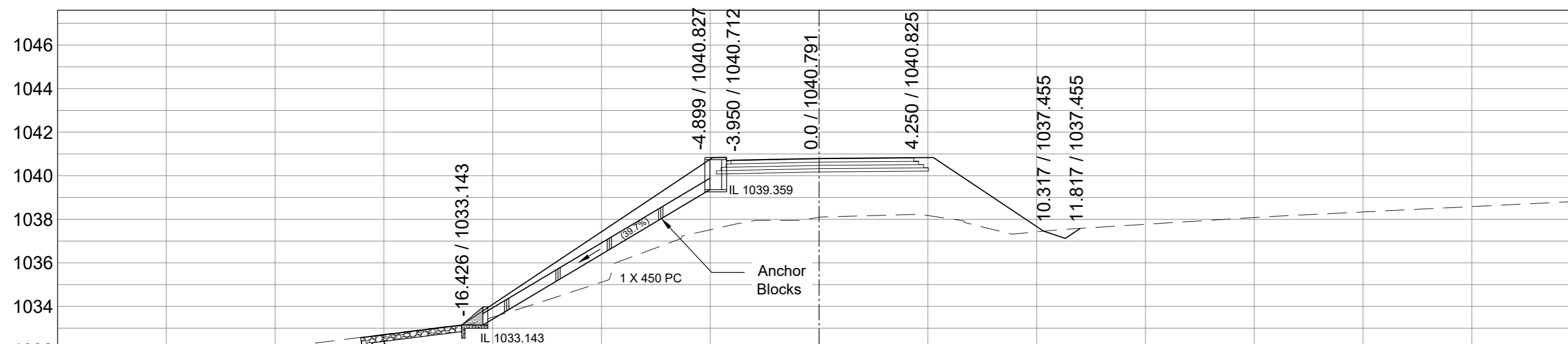
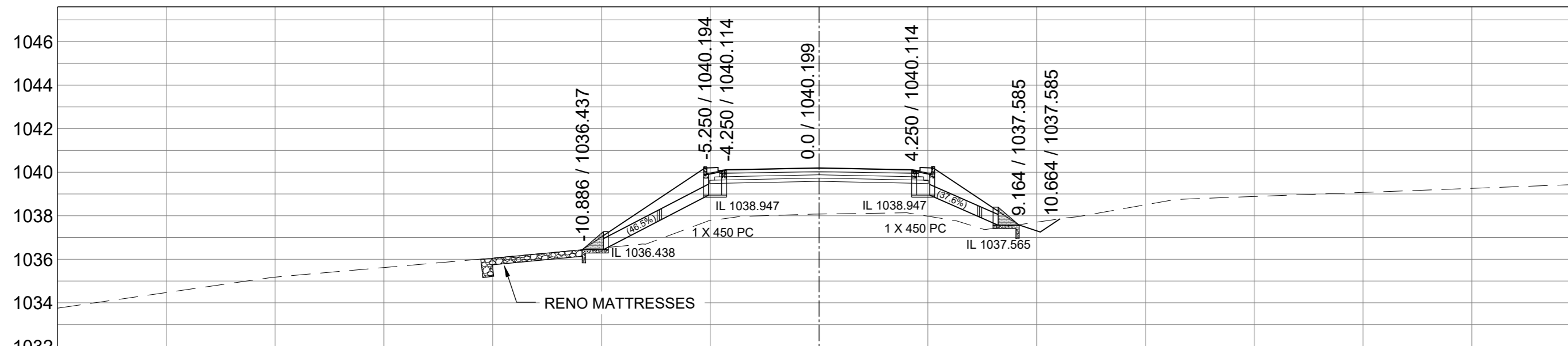
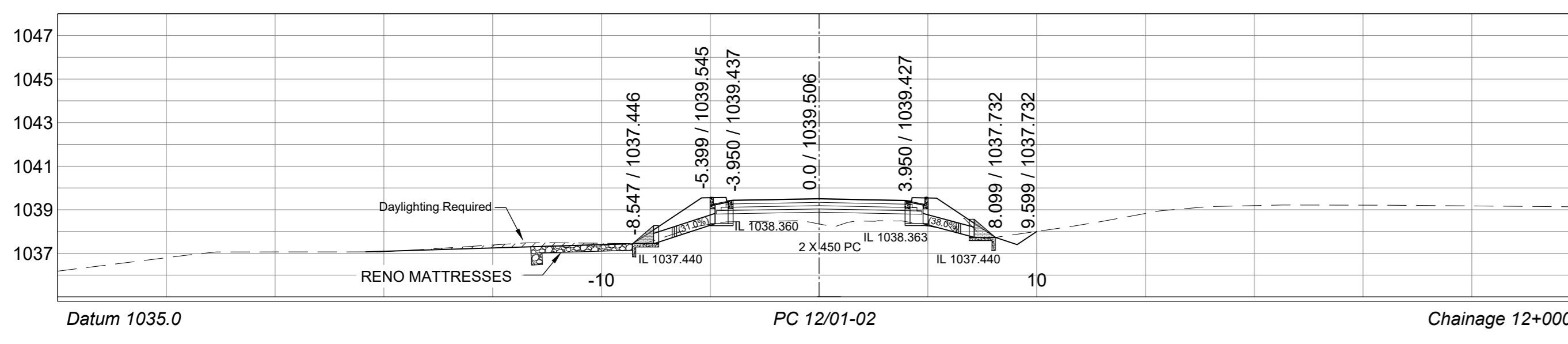
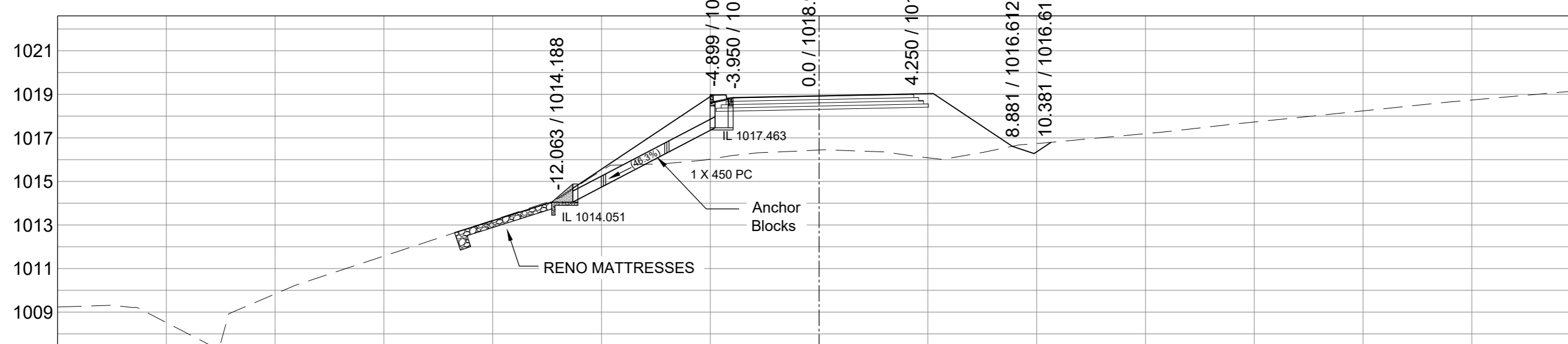
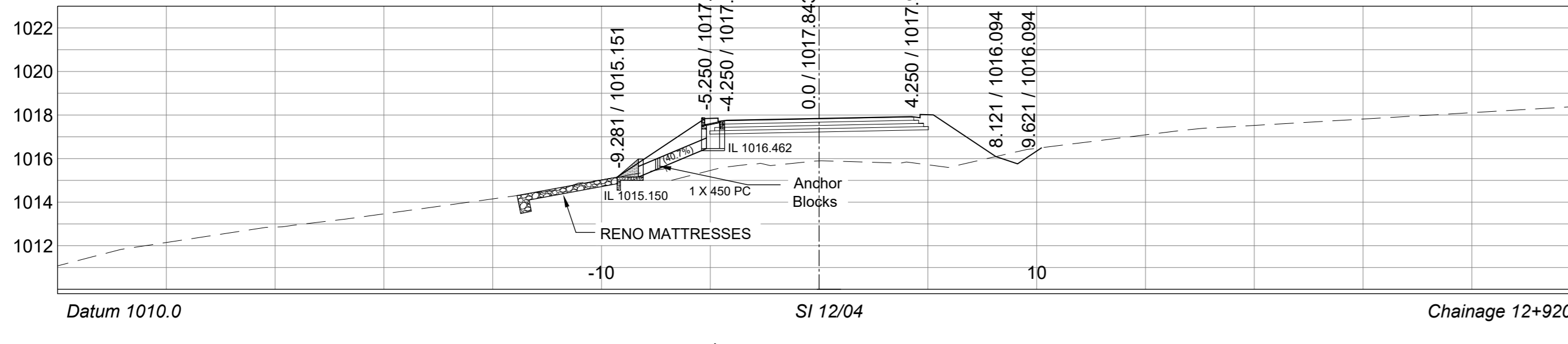
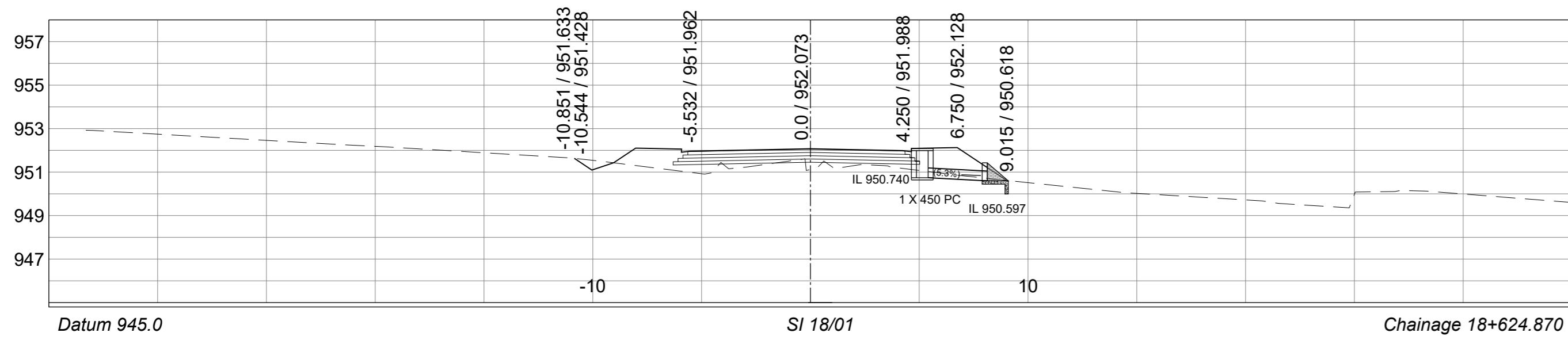
Designed by:- **emzansi** ENGINEERS (PTY) LTD  
 Providing Unrivaled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Date: 01-02-2024

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
 PORTION  
 Km 10+880 - Km 22+491  
 UPGRADING OF MAIN ROAD 278 (P278)  
 PIPE CROSS SECTIONS

Staked km distance km 10+880 - km 22+491	Sheet - 02 of - 02	REVISION: A
Scale HORIZONTAL 1:200 VERTICAL 1:200	Plan No -	C 47654

C 47654





Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:-  
 Continued on:-  
 Cross Section No:-  
 Longitudinal Section No:-  
 Design Plan No:-

Designed by:- T. PIKA  
 Checked by:- Y. DOMA  
 Drawn by:- T. PIKA  
 Checked by:- Y. DOMA  
 Date of approval:-



Designed by:- emzansi ENGINEERS (PTY) LTD  
 Providing Unrivaled Engineering Solutions

Transportation Engineer: Chief Engineer  
 Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491

**UPGRADING OF MAIN ROAD 278 (P278)**

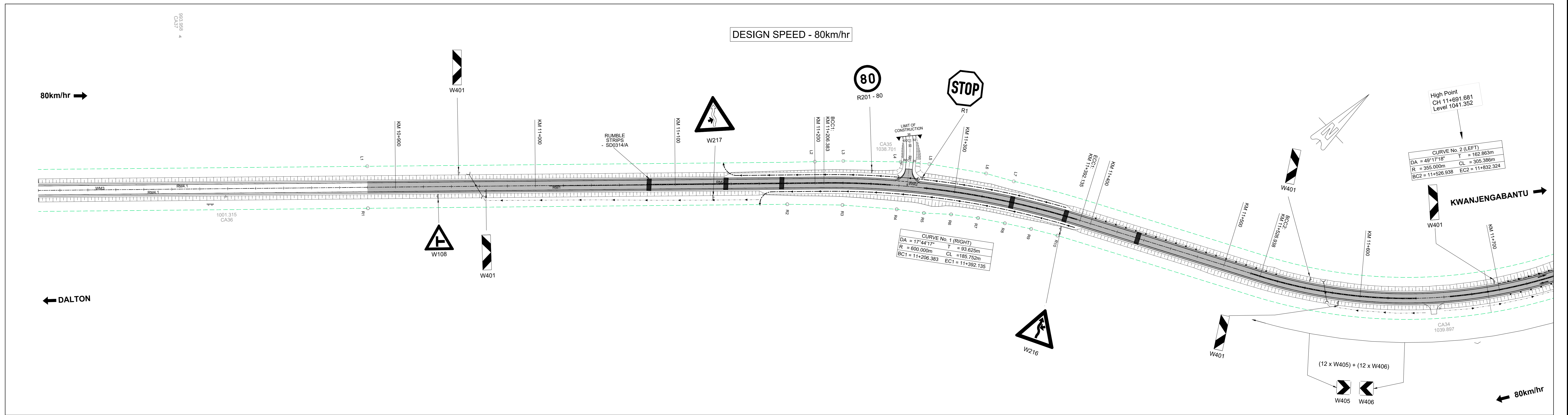
SIDE INLET CROSS SECTIONS

Staked km distance: km 10+880 - km 22+491  
 Sheet: 01 of 01  
 REVISION: A

Scale: HORIZONTAL 1:200 VERTICAL 1:200  
 Plan No: C 47655

C 47655





ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS	
								NUMBER	FOUNDATION	POLE LENGTH			
								POSTS	STAYS	WIDTH (mm)	DEPTH (m)	L (MIN)	
10945 - LHS 10945 - RHS 11565 - LHS 11585 - RHS 11695 - LHS	P278	W401	N/A	N/A	ARROWS; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	5		150mmØ		300	1.2	TBC	NEW GROUND
11240 - LHS	P278	R201-80	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ		900	1.2	TBC	NEW GROUND MOUNTED
10930 - RHS	P278	W108	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ		1200	1.2	TBC	NEW GROUND MOUNTED
11530 - 11835 RHS	P278	W405	N/A	N/A	ARROWS; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	12		150mmØ		450	1.2	TBC	NEW GROUND MOUNTED AT 25M SPACING
11530 - 11835 RHS	P278	W405	N/A	N/A	ARROWS; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	12		150mmØ		450	1.2	TBC	NEW GROUND MOUNTED AT 25M SPACING
11380 - RHS	P278	W217	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ		1200	2.1	TBC	NEW GROUND MOUNTED
ACCESSES	11266	R1	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND; BLACK SEMI-MATT ("BMOD") - CLASS 1	3		150mmØ		900	1.2	TBC	NEW GROUND MOUNTED
11135 - LHS	P278	W216	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ		1200	2.1	TBC	NEW GROUND MOUNTED

P278 CENTRE LINE MARKING			
START KM	END KM	LINE MARKING	DESCRIPTION
10+880	22+490	WM3	Dividing line
11+080	11+254	RM2	No crossing Line
11+278	11+390	RM2	No crossing Line
11+520	11+640	RM2	No crossing Line
11+664	11+830	RM2	No crossing Line

P278 EDGE LINE MARKING SCHEDULE - RHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
10+880	12+205	RM4.1	Yellow left edge line

P278 EDGE LINE MARKING SCHEDULE - LHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
10+880	11+256	RM4.1	Yellow left edge line
11+278	12+205	RM4.1	Yellow left edge line
11+256	11+276	WM2	Continuity line

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	-	Designed by:-	Y. DOMA
Continued on:-	C.44792	Checked by:-	N. NGUBANE
Cross Section No:-	C.44330, C.44331	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C.44324	Checked by:-	Y. DOMA
Design Plan No:-	C.44312	Date of approval:-	



MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU	
Staked km distance	km 10+880 - km 11+700
Scale	1: 1000
PORTION	Km 10+880 - Km 22+491
UPGRADING OF MAIN ROAD 278 (P278)	
SIGNAGE PLAN	

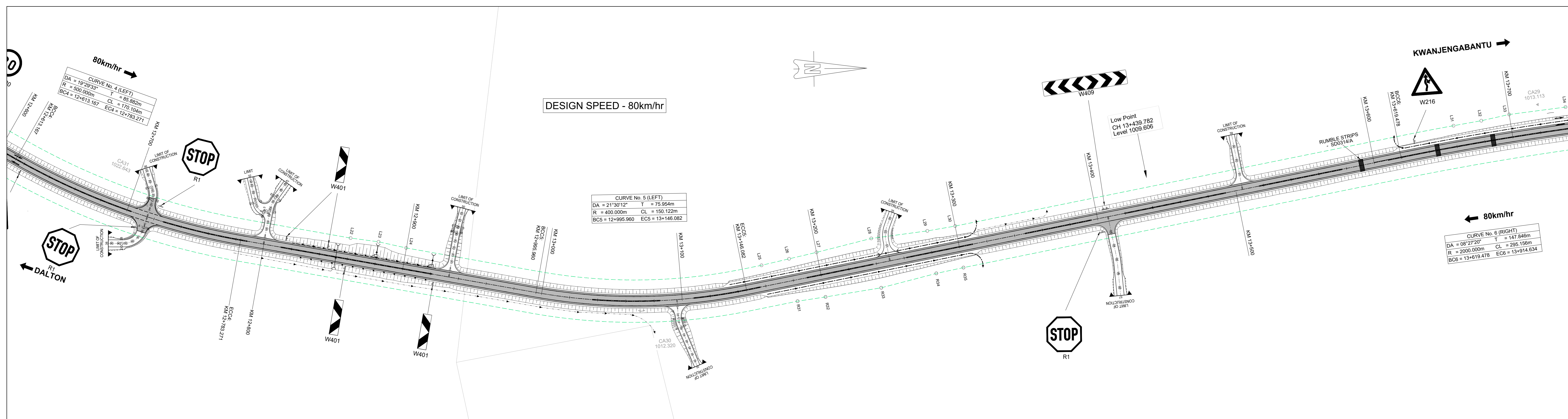
Sheet :-	1	REVISION:
of :-	12	A
Plan No :-	C 44791	

C 44791









P278 CENTRE LINE MARKING			
START KM	END KM	LINE MARKING	DESCRIPTION
10+880	22+490	WM3	Dividing line
12+470	12+703	RM2	No crossing Line
12+727	12+788	RM2	No crossing Line
12+812	12+921	RM2	No crossing Line
13+036	13+084	RM2	No crossing Line
13+108	13+156	RM2	No crossing Line
13+190	13+238	RM2	No crossing Line
13+282	13+310	RM2	No crossing Line
13+347	13+395	RM2	No crossing Line
13+419	13+493	RM2	No crossing Line
13+517	13+577	RM2	No crossing Line
13+610	13+740	RM2	No crossing Line

P278 EDGE LINE MARKING SCHEDULE - RHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
12+501	12+704	RM4.1	Yellow left edge line
12+726	16+300	RM4.1	Yellow left edge line
12+704	12+726	WM2	Continuity line

P278 EDGE LINE MARKING SCHEDULE - LHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
12+459	12+705	RM4.1	Yellow left edge line
12+725	13+742	RM4.1	Yellow left edge line
12+705	12+725	WM2	Continuity line
13+742	13+763	WM2	Continuity line

ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS	
								NUMBER	FOUNDATION	POLE LENGTH			
								POSTS	STAYS	WIDTH (mm)	DEPTH (m)	L (MIN)	
13630 - LHS	P278	W216	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200	1.2	TBC	NEW GROUND MOUNTED
12815 - LHS 12945 - LHS 12860 - RHS 12925 - RHS	P278	W401	N/A	N/A	ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	4		150mmØ	-	300	1.2	TBC	NEW GROUND MOUNTED
ACCESS	12710 12718 13400	R1	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND: BLACK SEMI-MATT ("BMOD") - CLASS 1	3		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED
13405 - LHS	P278	W409	N/A	N/A	FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		2 X 150mmØ	-	2700	1.2	TBC	NEW GROUND MOUNTED

AS BUILT				
Supervising Engineer	Date	Checked	Signed	AMENDMENTS

Continued from:-	C 44792	Designed by:-	Y. DOMA
Continued on:-	C 44794	Checked by:-	N. NGUBANE
Cross Section No:-	C 44333, C 44334	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C 44325	Checked by:-	Y. DOMA
Design Plan No:-	C 44314	Date of approval:-	



Transportation Engineer: Chief Engineer  
Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
SIGNAGE PLAN

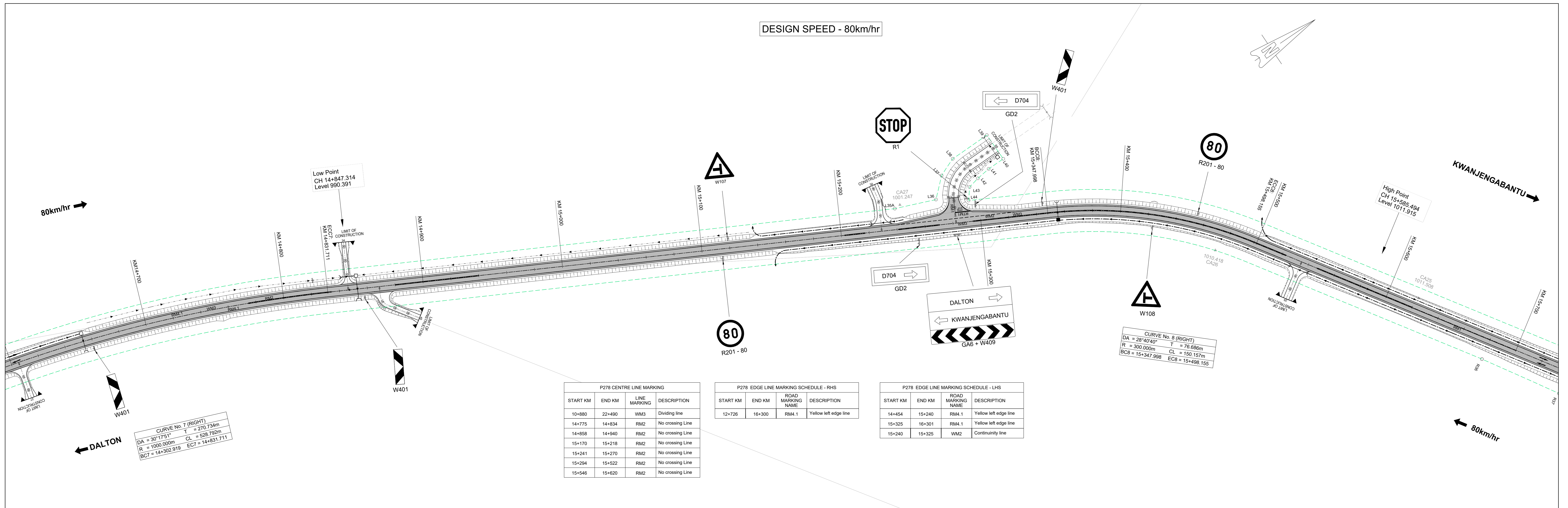
Staked km distance km 12.900 - km 13.900	Sheet :- 3 of :- 12	REVISION: A
Scale 1 : 1000	Plan No :-	C 44793

C 44793





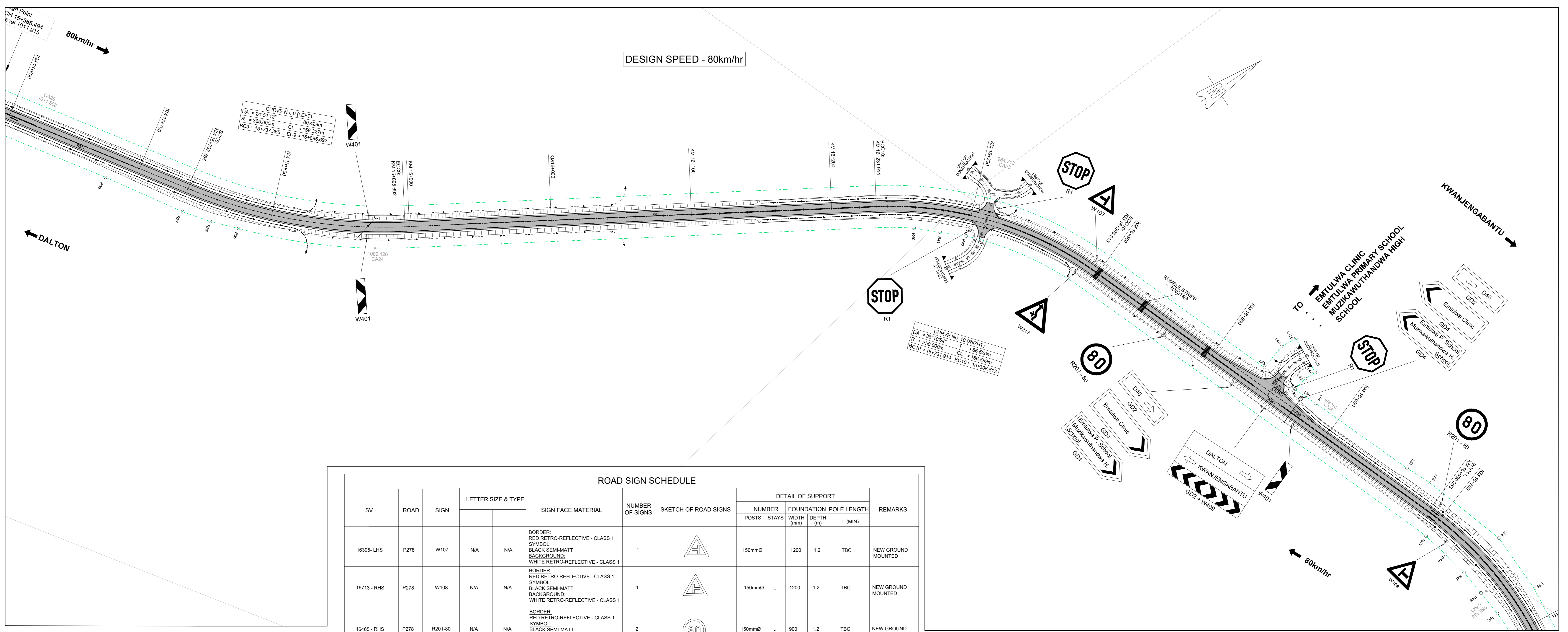




ROAD SIGN SCHEDULE												
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS
								NUMBER	FOUNDATION	POLE LENGTH		
14660 - LHS 14850 - RHS 15345 - LHS	P278	W401	N/A	N/A	ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	3		150mmØ	300	1.2	TBC	NEW GROUND MOUNTED
15120 - LHS	P278	W107	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	1200	1.2	TBC	NEW GROUND MOUNTED
15115 - RHS 15450 - LHS	P278	R201-80	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	2		150mmØ	900	1.2	TBC	NEW GROUND MOUNTED
15425 - RHS	P278	W108	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	1200	1.2	TBC	NEW GROUND MOUNTED
ACCESS	D704	R1	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND: BLACK SEMI-MATT ("BMOD") - CLASS 1	1		150mmØ	900	1.2	TBC	NEW GROUND MOUNTED
15281 - RHS	D704	GD2 + W409	N/A	N/A	FOR GD2: BORDER & ARROWS: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1 STREET NAME: BLACK SEMI-MATT ON WHITE RETRO-REFLECTIVE BACKGROUND- CLASS 1 FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		2 x 150mmØ	2700	1.2	TBC	NEW GROUND MOUNTED
15295 - LHS 15295 - RHS	P278	GD2	N/A	N/A	FOR GD2: BORDER, ARROWS & TEXT: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	VARIABLES	1.2	TBC	NEW GROUND MOUNTED

C 44795





ROAD SIGN SCHEDULE												
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT			REMARKS	
								NUMBER POSTS	STAYS	POLE LENGTH WIDTH (mm) DEPTH (m) L (MIN)		
16395 - LHS	P278	W107	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200 1.2	TBC	NEW GROUND MOUNTED
16713 - RHS	P278	W108	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200 1.2	TBC	NEW GROUND MOUNTED
16465 - RHS 16695 - LHS	P278	R201-80	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	2		150mmØ	-	900 1.2	TBC	NEW GROUND MOUNTED
ACCESSES 16300 16320 D40		R1	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND: BLACK SEMI-MATT ("BMOD") - CLASS 1	3		150mmØ	-	900 1.2	TBC	NEW GROUND MOUNTED
16568 - LHS	P278	GD4	N/A	N/A	BORDER: WHITE RETRO-REFLECTIVE - CLASS 1 SYMBOL: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: BROWN SEMI-MATT OR RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	-	VARIES 1.2	TBC	NEW GROUND MOUNTED
16530 - RHS	P278	GD4	N/A	N/A	BORDER: WHITE RETRO-REFLECTIVE - CLASS 1 SYMBOL: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: BROWN SEMI-MATT OR RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	-	VARIES 1.2	TBC	NEW GROUND MOUNTED
16553 - RHS	D40	GD2 + W409	N/A	N/A	FOR GD2: BORDER & ARROWS: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: GREEN RETRO-REFLECTIVE - CLASS 1 STREET NAME: BLACK SEMI-MATT ON WHITE RETRO-REFLECTIVE BACKGROUND-CLASS 1 FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		2 x 150mmØ	-	2700 1.2	TBC	NEW GROUND MOUNTED
16530 - RHS 16568 - LHS	P278	GD2	N/A	N/A	FOR GD2 BORDER, ARROWS & TEXT: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	-	VARIES 1.2	TBC	NEW GROUND MOUNTED
15870 - LHS 15970 - RHS 16575 - RHS	P278	W401	N/A	N/A	ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	2		150mmØ	-	300 1.2	TBC	NEW GROUND MOUNTED
16385 - RHS	P278	W217	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200 1.2	TBC	NEW GROUND MOUNTED

ROAD SIGN SCHEDULE												
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT			REMARKS	
								NUMBER POSTS	STAYS	POLE LENGTH WIDTH (mm) DEPTH (m) L (MIN)		
16385 - RHS	P278	W217	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200 1.2	TBC	NEW GROUND MOUNTED

P278 CENTRE LINE MARKING			
START KM	END KM	LINE MARKING	DESCRIPTION
10+880	22+490	WM3	Dividing line
16+100	16+299	RM2	No crossing Line
16+324	16+537	RM2	No crossing Line
16+562	16+920	RM2	No crossing Line

P278 EDGE LINE MARKING SCHEDULE - RHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
12+726	16+300	RM4.1	Yellow left edge line
16+322	17+577	RM4.1	Yellow left edge line
16+300	16+322	WM2	Continuity line

P278 EDGE LINE MARKING SCHEDULE - LHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
15+325	16+301	RM4.1	Yellow left edge line
16+322	16+507	RM4.1	Yellow left edge line
16+592	17+275	RM4.1	Yellow left edge line
16+301	16+322	WM2	Continuity line
16+507	16+592	WM2	Continuity line

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44795	Designed by:-	Y. DOMA
Continued on:-	C 44797	Checked by:-	N. NGUBANE
Cross Section No:-	C 44337 - C 44338	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C 44326, C 44327	Checked by:-	Y. DOMA
Design Plan No:-	C 44317	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions

Transportation Engineer: Chief Engineer

Head: Transport

Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491

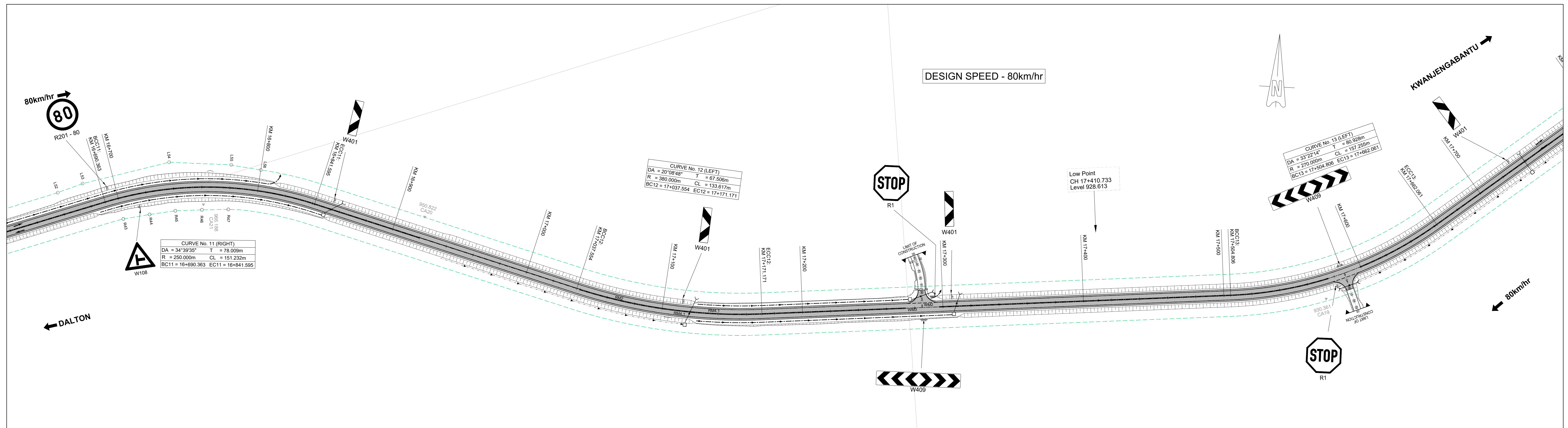
**UPGRADING OF MAIN ROAD 278 (P278)**

SIGNAGE PLAN

Staked km distance	Sheet - 6	REVISION:
km 15.900 - km 16.900	of - 12	A
Scale	Plan No -	
1 : 1000	<b>C 44796</b>	

C 44796





ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS	
								NUMBER	FOUNDATION	POLE LENGTH			
								POSTS	STAYS	WIDTH (mm)	DEPTH (m)	L (MIN)	
16855 - LHS 17115 - LHS 17305 - LHS 17730 - LHS	P278	W401	N/A	N/A	ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	4		150mmØ	-	300	1.2	TBC	NEW GROUND MOUNTED
10 - RHS (Access) 10 - LHS (Access)	17285 17590	W409	N/A	N/A	FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	2		2 X 150mmØ	-	2700	1.2	TBC	NEW GROUND MOUNTED
ACCESSES	17295 17580	R1	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND: BLACK SEMI-MATT ("BMOD") - CLASS 1	2		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED
16695 - LHS	P278	R201-80	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED
16713 - RHS	P278	W108	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200	1.2	TBC	NEW GROUND MOUNTED

P278 CENTRE LINE MARKING			
START KM	END KM	LINE MARKING	DESCRIPTION
10+880	22+490	WM3	Dividing line
16+582	16+920	RM2	No crossing Line
17+040	17+273	RM2	No crossing Line
17+208	17+575	RM2	No crossing Line
17+600	17+800	RM2	No crossing Line

P278 EDGE LINE MARKING SCHEDULE - RHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
16+322	17+577	RM4.1	Yellow left edge line
17+598	18+624	RM4.1	Yellow left edge line
17+577	17+598	WM2	Continuity line

P278 EDGE LINE MARKING SCHEDULE - LHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
16+592	17+275	RM4.1	Yellow left edge line
17+296	18+532	RM4.1	Yellow left edge line
17+275	17+296	WM2	Continuity line

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER		

**AS BUILT**

Supervising Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Supervising Authority: \_\_\_\_\_

Continued from:- C 44796  
 Designed by:- Y. DOMA  
 Checked by:- N. NGUBANE  
 Cross Section No:- C 44338 - C 44340  
 Drawn by:- S. MHLONGO  
 Longitudinal Section No:- C 44327  
 Checked by:- Y. DOMA  
 Design Plan No:- C 44318  
 Date of approval:- \_\_\_\_\_



Designed by: **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 Signature: \_\_\_\_\_ Date: 01-02-2024

Transportation Engineer: Chief Engineer  
 Head: Transport

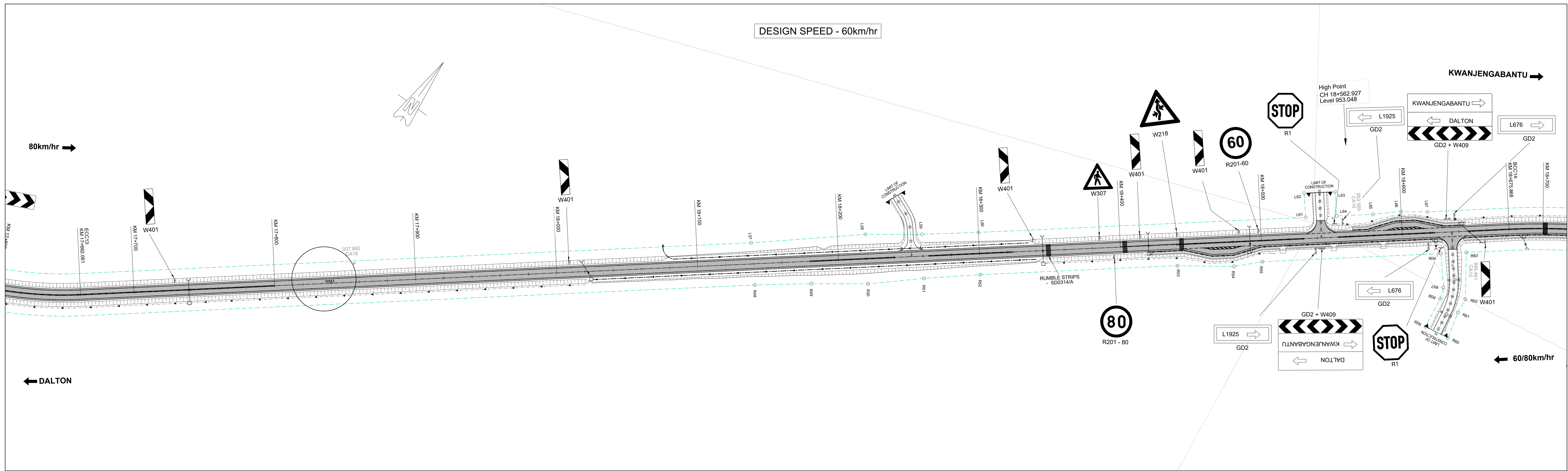
**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**

PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 SIGNAGE PLAN

Staked km distance: km 16.900 - km 17.900  
 Sheet: 7 of 12  
 Scale: 1 : 1000  
 Plan No: C 44797  
 REVISION: A

C 44797





ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS	
								NUMBER OF POSTS	STAYS	WIDTH (mm)	DEPTH (mm)		POLE LENGTH L (MIN)
17730 - LHS 18010 - LHS 18340 - LHS 18415 - LHS 18490 - LHS 18660 - RHS	P278	W401	N/A	N/A	ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	6		150mmØ	-	300	1.2	TBC	NEW GROUND MOUNTED
18395 - RHS	P278	R201-80	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED
18385 - LHS	P278	W307	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200	1.2	TBC	NEW GROUND MOUNTED
ACCESSES	L1925 L676	R1	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND: BLACK SEMI-MATT ("BMOD") - CLASS 1	2		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED
18547 - RHS	P278	GD2 + W409	N/A	N/A	FOR GD2 BORDER & ARROWS: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1 STREET NAME: BLACK SEMI-MATT ON WHITE RETRO-REFLECTIVE BACKGROUND- CLASS 1 FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		2 X 150mmØ	-	2700	1.2	TBC	NEW GROUND MOUNTED
18630 - LHS	P278	GD2 + W409	N/A	N/A	FOR GD2 BORDER & ARROWS: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1 STREET NAME: BLACK SEMI-MATT ON WHITE RETRO-REFLECTIVE BACKGROUND- CLASS 1 FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		2 X 150mmØ	-	2700	1.2	TBC	NEW GROUND MOUNTED
18555 - LHS 18540 - RHS	P278	GD2	N/A	N/A	FOR GD2 BORDER, ARROWS & TEXT: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	-	VARIES	1.2	TBC	NEW GROUND MOUNTED

ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS	
								NUMBER OF POSTS	STAYS	WIDTH (mm)	DEPTH (mm)		POLE LENGTH L (MIN)
18640 - LHS 18620 - RHS	P278	GD2	N/A	N/A	FOR GD2 BORDER, ARROWS & TEXT: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND: GREEN RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	-	VARIES	1.2	TBC	NEW GROUND MOUNTED
18500 - LHS	P278	R201-60	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	900 1200	1.2	TBC	NEW GROUND MOUNTED
18440 - LHS 18720 - RHS	P278	W218	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	2		150mmØ	-	1200	2.1	TBC	NEW GROUND MOUNTED

P278 CENTRE LINE MARKING			
START KM	END KM	LINE MARKING	DESCRIPTION
10+880	22+490	WM3	Dividing line
16+562	16+920	RM2	No crossing Line
17+040	17+273	RM2	No crossing Line
17+298	17+575	RM2	No crossing Line
17+600	17+800	RM2	No crossing Line

P278 EDGE LINE MARKING SCHEDULE - RHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
17+598	18+624	RM4.1	Yellow left edge line
18+624	18+646	WM2	Continuity line

P278 EDGE LINE MARKING SCHEDULE - LHS			
START KM	END KM	ROAD MARKING NAME	DESCRIPTION
17+296	18+532	RM4.1	Yellow left edge line
18+554	19+321	RM4.1	Yellow left edge line
18+532	18+554	WM2	Continuity line

AS BUILT				
Supervising Engineer	Date	Supervising Authority	Checked	Signed

Continued from:-	C 44797	Designed by:-	Y. DOMA
Continued on:-	C 44799	Checked by:-	N. NGUBANE
Cross Section No:-	C 44340 - C 44341	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C 44327, C 44328	Checked by:-	Y. DOMA
Design Plan No:-	C 44319	Date of approval:-	

Continued from:-	C 44797	Designed by:-	Y. DOMA
Continued on:-	C 44799	Checked by:-	N. NGUBANE
Cross Section No:-	C 44340 - C 44341	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C 44327, C 44328	Checked by:-	Y. DOMA
Design Plan No:-	C 44319	Date of approval:-	



Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 Transportation Engineer: Chief Engineer  
 Head: Transport  
 Signature: \_\_\_\_\_ Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 SIGNAGE PLAN

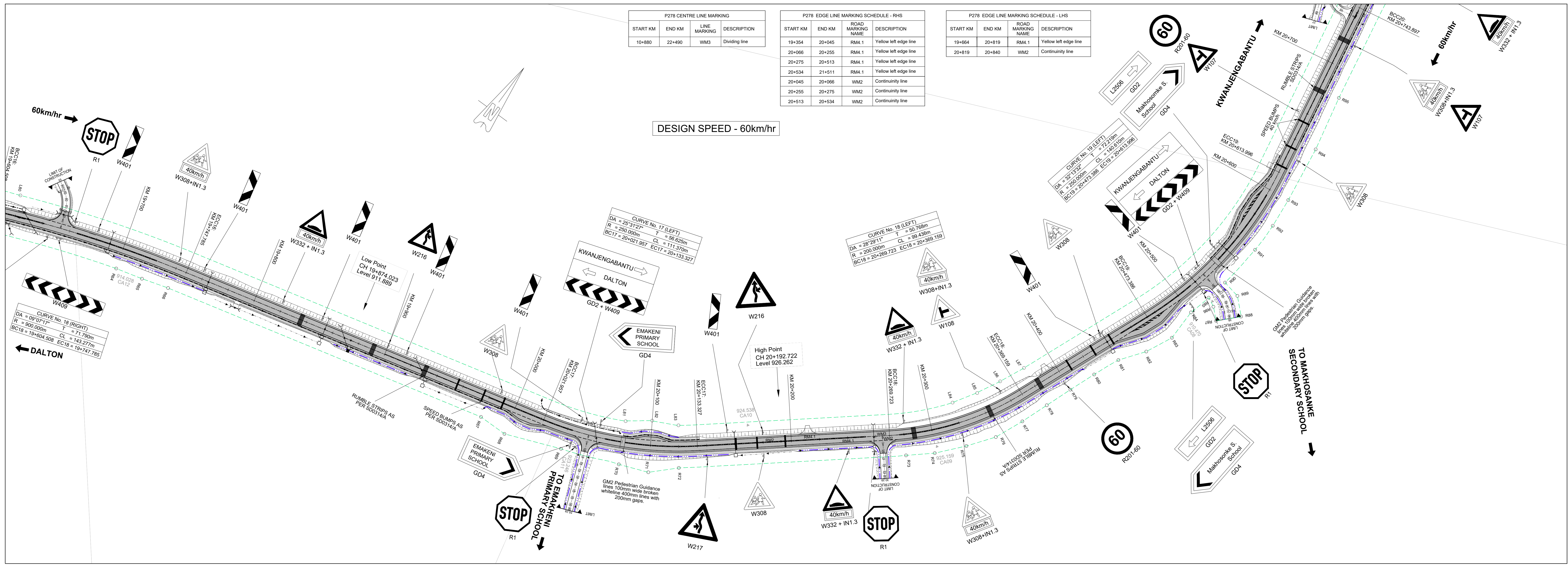
Staked km distance	km 17,900 - km 18,900	Sheet - 8	REVISION:
Scale	1 : 1000	of - 12	A
Plan No -	C 44798		

C 44798









ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT			REMARKS		
								NUMBER	FOUNDATION	POLE LENGTH			
							POSTS	STAYS	WIDTH (mm)	DEPTH (mm)	L (MIN)		
19660 - LHS 19760 - LHS 19850 - LHS 19910 - LHS 20050 - LHS 20155 - LHS 20435 - LHS 20510 - LHS	P278	W401	N/A	N/A	ARROWS; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	8			150mmØ	300	1.2	TBC	NEW GROUND MOUNTED
20355 - LHS	P278	W108 W308+IN1.3	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1			150mmØ	1200	1.2	TBC	NEW GROUND MOUNTED
20400 - RHS	P278	R201-60	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1			150mmØ	900	2.1	TBC	NEW GROUND MOUNTED
20685 - LHS 20045 - RHS	P278	GD4	N/A	N/A	BORDER: WHITE RETRO-REFLECTIVE - CLASS 1 SYMBOL: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND; BROWN SEMI-MATT OR RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	VARIABLE	1.2	TBC	NEW GROUND MOUNTED	
ACCESSES 19660 20050 20250 20515	P278	R1	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND: BLACK SEMI-MATT ("BMOD") - CLASS 1	4			150mmØ	900	1.2	TBC	NEW GROUND MOUNTED
20050 - LHS 20525 - LHS	P278	GD2 + W409	N/A	N/A	FOR GD2 BORDER & ARROWS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND; GREEN RETRO-REFLECTIVE - CLASS 1 STREET NAME: BLACK SEMI-MATT ON WHITE RETRO-REFLECTIVE BACKGROUND- CLASS 1	2		2 x 150mmØ		2700	1.2	TBC	NEW GROUND MOUNTED
20720 - RHS	P278	W107 W308+IN1.3	N/A	N/A	FOR W409: ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1			150mmØ	1200	1.2	TBC	NEW GROUND MOUNTED

ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT			REMARKS		
								NUMBER	FOUNDATION	POLE LENGTH			
							POSTS	STAYS	WIDTH (mm)	DEPTH (mm)	L (MIN)		
18740 - LHS 20360 - LHS 20320 - RHS	P278	W308+IN1.3	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	3			150mmØ	1200	2.1	TBC	NEW GROUND MOUNTED
20660 - LHS	P278	R201-60 W107	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	2			150mmØ	900 1200	1.2	TBC	NEW GROUND MOUNTED
20510 - RHS 20520 - LHS	P278	GD2	N/A	N/A	FOR GD2 BORDER, ARROWS & TEXT: WHITE RETRO-REFLECTIVE - CLASS 1 LEGENDS: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND; GREEN RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	VARIABLE	1.2	TBC	NEW GROUND MOUNTED	
20520 - LHS 20510 - RHS	P278	GD4	N/A	N/A	BORDER: WHITE RETRO-REFLECTIVE - CLASS 1 SYMBOL: WHITE RETRO-REFLECTIVE - CLASS 1 BACKGROUND; BROWN SEMI-MATT OR RETRO-REFLECTIVE - CLASS 1	2		2 x 150mmØ	VARIABLE	1.2	TBC	NEW GROUND MOUNTED	
19820 - LHS 19945 - LHS 20240 - RHS 20280 - LHS 20670 - RHS	P278	W332 + IN1.3	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	5			150mmØ	1200	1.2	TBC	NEW GROUND MOUNTED
19985 - LHS 20440 - LHS 20630 - RHS	P278	W308	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	3			150mmØ	1200	1.2	TBC	NEW GROUND MOUNTED
19940 - LHS 20140 - RHS	P278	W216	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1			150mmØ	1200	2.1	TBC	NEW GROUND MOUNTED

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44799	Designed by:-	Y. DOMA
Continued on:-	C 44801	Checked by:-	N. NGUBANE
Cross Section No:-	C 46235, C 47644	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C 44328, C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44321	Date of approval:-	

Designed by:- **emzansi ENGINEERS (PTY) LTD**  
 Providing Unrivalled Engineering Solutions  
 01-02-2024  
 Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Transportation Engineer: Chief Engineer  
 Head: Transport

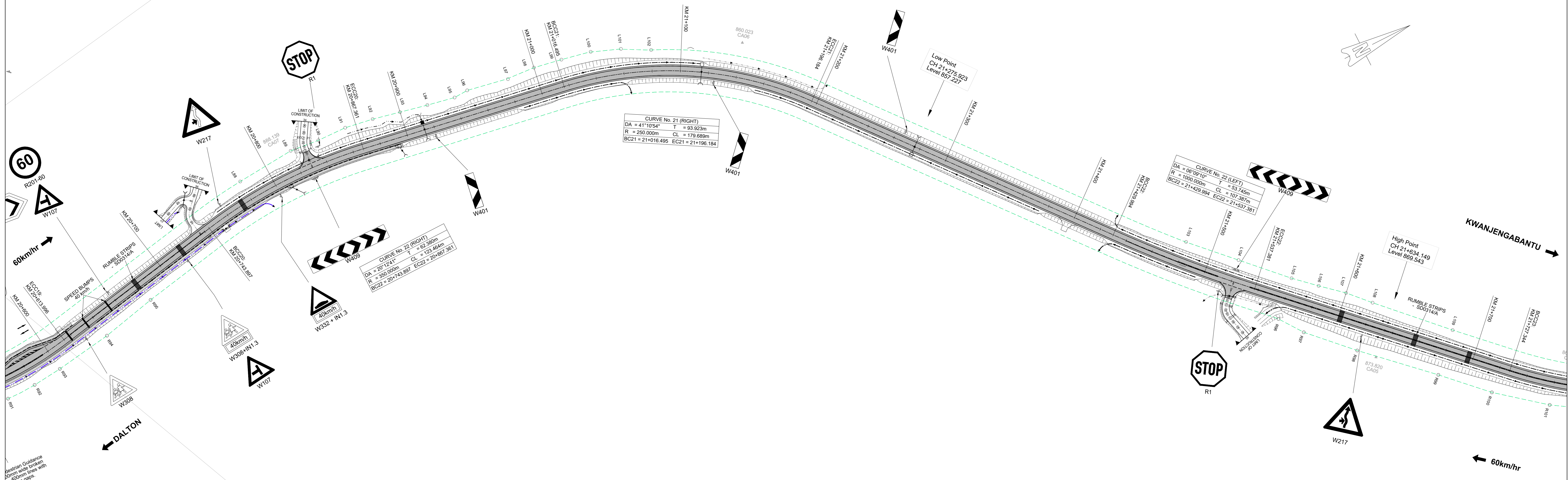
**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
 PORTION  
 Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
 SIGNAGE PLAN

Staked km distance	Sheet - 10	REVISION:
km 19 900 - km 20 900	of - 12	A
Scale	Plan No -	
1 : 1000	<b>C 44800</b>	

C 44800



DESIGN SPEED - 60km/hr



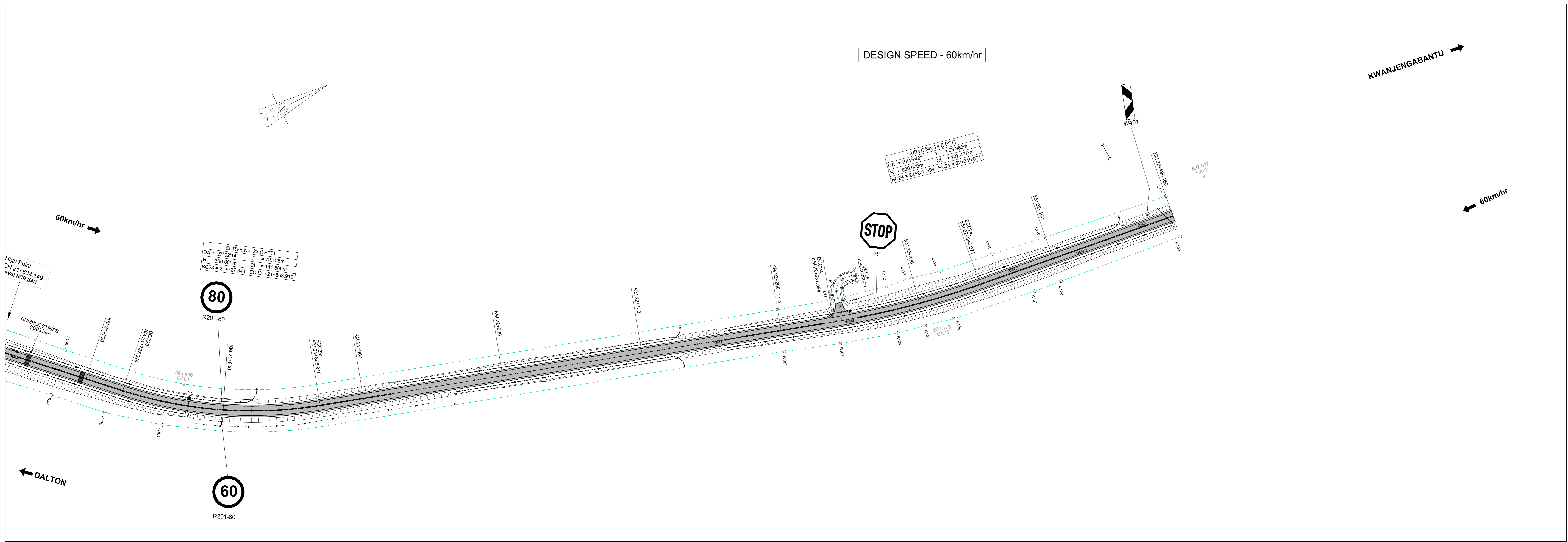
ROAD SIGN SCHEDULE													
SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT			REMARKS		
								NUMBER	FOUNDATION	POLE LENGTH			
								POSTS	STAYS	WIDTH (mm)	DEPTH (m)	L (MIN)	
20920 - RHS 21125 - RHS 21270 - LHS	P278	W401	N/A	N/A	ARROWS; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	3		150mmØ	-	300	1.2	TBC	NEW GROUND MOUNTED
10 - RHS (Access) 10 - LHS (Access)	20830 21515	W409	N/A	N/A	FOR W409; ARROWS; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	2		2 X 150mmØ	-	2700	1.2	TBC	NEW GROUND MOUNTED
ACCESSES	20830 21525 22250	R1	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1 LEGEND; BLACK SEMI-MATT ("BMOD") - CLASS 1	3		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED
20750 - RHS	P278	W107 W308+IN1.3	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200	2.1	TBC	NEW GROUND MOUNTED
20630 - RHS	P278	W308	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	3		150mmØ	-	1200	1.2	TBC	NEW GROUND MOUNTED
20760 - LHS 21620 - RHS		W217	N/A	N/A	BORDER; RED RETRO-REFLECTIVE - CLASS 1 SYMBOL; BLACK SEMI-MATT BACKGROUND; WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	1200	2.1	TBC	NEW GROUND MOUNTED

P278 CENTRE LINE MARKING				P278 EDGE LINE MARKING SCHEDULE - RHS				P278 EDGE LINE MARKING SCHEDULE - LHS			
START KM	END KM	LINE MARKING	DESCRIPTION	START KM	END KM	ROAD MARKING NAME	DESCRIPTION	START KM	END KM	ROAD MARKING NAME	DESCRIPTION
10+880	22+490	WM3	Dividing line	20+534	21+511	RM4.1	Yellow left edge line	19+664	20+819	RM4.1	Yellow left edge line
				21+532	22+490	RM4.1	Yellow left edge line	20+840	22+490	RM4.1	Yellow left edge line
				21+511	21+532	WM2	Continuity line	20+819	20+840	WM2	Continuity line

<b>AS BUILT</b> Supervising Engineer: _____ Date: _____ Supervising Authority: _____		Continued from:- C 44800 Continued on:- C 44802 Cross Section No:- C 47644, C 47645 Longitudinal Section No:- C 44329 Design Plan No:- C 44322	Designed by:- Y. DOMA Checked by:- N. NGUBANE Drawn by:- S. MHLONGO Checked by:- Y. DOMA Date of approval:-	 <b>KWAZULU-NATAL PROVINCE</b> TRANSPORT REPUBLIC OF SOUTH AFRICA	 <b>emzansi</b> ENGINEERS (PTY) LTD Providing Unrivalled Engineering Solutions 01-02-2024 Date	Transportation Engineer: Chief Engineer Head: Transport	<b>MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU</b> PORTION Km 10+880 - Km 22+491 <b>UPGRADING OF MAIN ROAD 278 (P278)</b> SIGNAGE PLAN	Staked km distance km 20,900 - km 21,900 Scale <b>1 : 1000</b>	Sheet :- 11 of :- 12 Plan No :- <b>C 44801</b>	REVISION: A
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C 44801





ROAD SIGN SCHEDULE

SV	ROAD	SIGN	LETTER SIZE & TYPE		SIGN FACE MATERIAL	NUMBER OF SIGNS	SKETCH OF ROAD SIGNS	DETAIL OF SUPPORT				REMARKS	
								NUMBER POSTS	FOUNDATION STAYS	FOUNDATION WIDTH (mm)	FOUNDATION DEPTH (m)		POLE LENGTH L (MIN)
22475 - LHS	P278	W401	N/A	N/A	ARROWS: RED RETRO-REFLECTIVE - CLASS 1 BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	300	1.2	TBC	NEW GROUND MOUNTED
21800 - RHS	P278	R201-60	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	900 1200	1.2	TBC	NEW GROUND MOUNTED
21800 - LHS	P278	R201-80	N/A	N/A	BORDER: RED RETRO-REFLECTIVE - CLASS 1 SYMBOL: BLACK SEMI-MATT BACKGROUND: WHITE RETRO-REFLECTIVE - CLASS 1	1		150mmØ	-	900	1.2	TBC	NEW GROUND MOUNTED

START KM	END KM	LINE MARKING	DESCRIPTION
10+880	22+490	WMS	Dividing line

START KM	END KM	ROAD MARKING NAME	DESCRIPTION
21+532	22+490	RM4.1	Yellow left edge line

START KM	END KM	ROAD MARKING NAME	DESCRIPTION
20+840	22+490	RM4.1	Yellow left edge line

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44801	Designed by:-	Y. DOMA
Continued on:-	-	Checked by:-	N. NGUBANE
Cross Section No:-	C 47645 - C 47647	Drawn by:-	S. MHLONGO
Longitudinal Section No:-	C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44323	Date of approval:-	



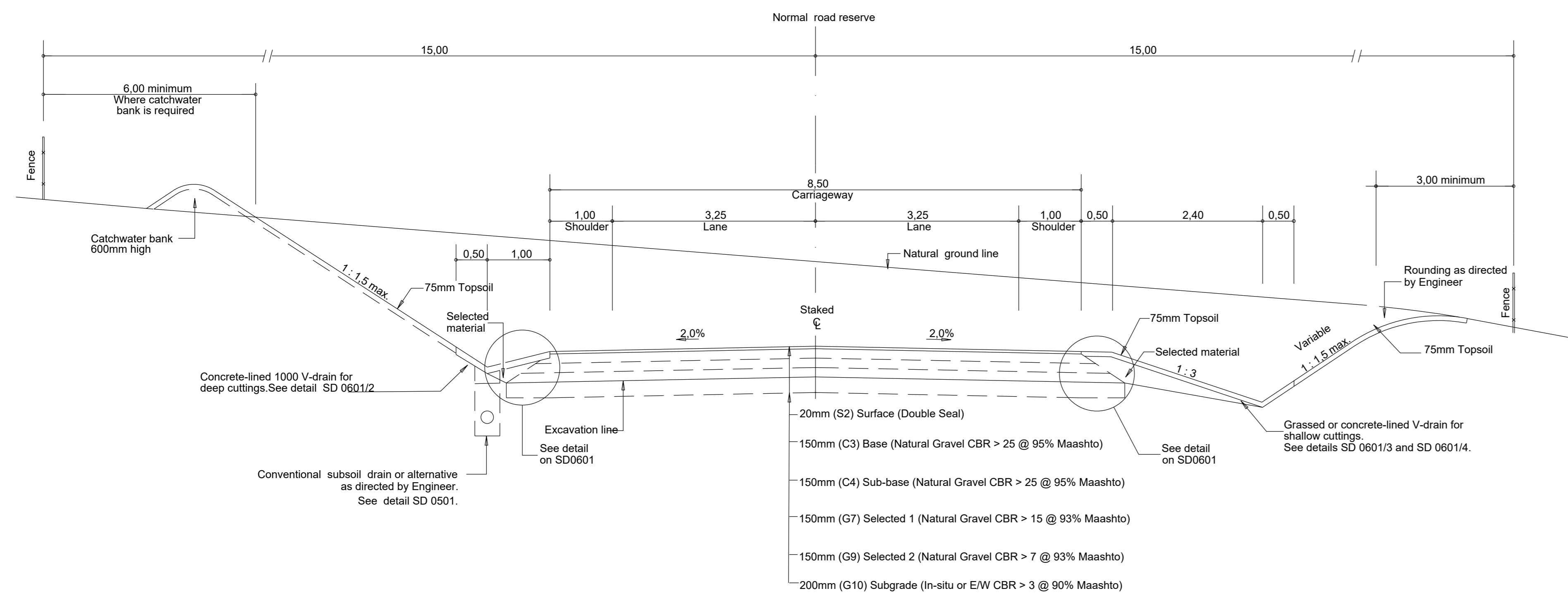
Designed by:-	<b>emzansi</b> ENGINEERS (PTY) LTD Providing Unrivalled Engineering Solutions
Transportation Engineer: Chief Engineer	
Head: Transport	

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU	
Staked km distance	km 21,900 - km 22,946
Scale	1 : 1000
PORTION	Km 10+880 - Km 22+491
UPGRADING OF MAIN ROAD 278 (P278)	
SIGNAGE PLAN	

Sheet	of	REVISION:
12	12	A
Plan No :-		C 44802

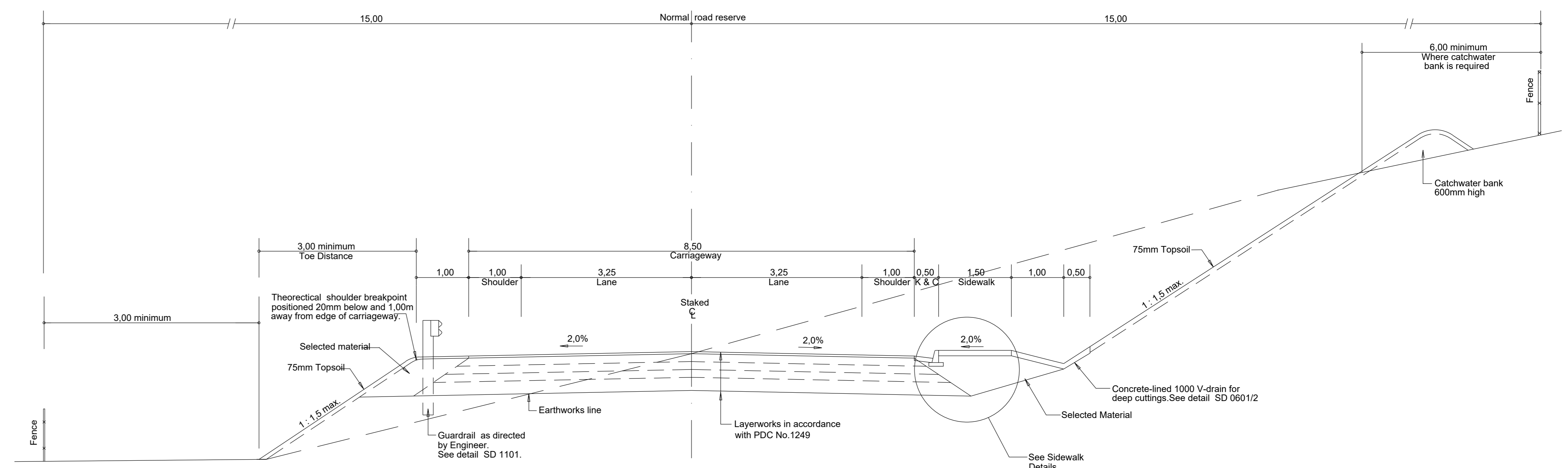
C 44802



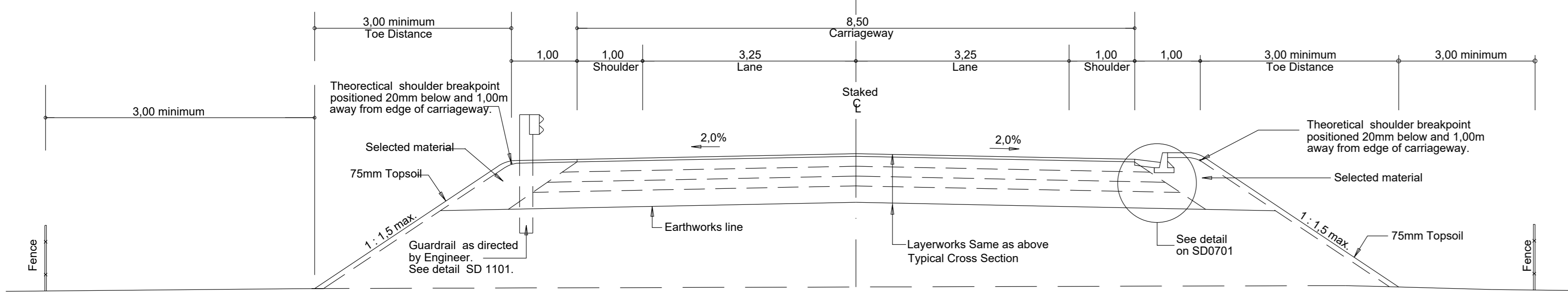


**TYPE 3 TYPICAL CROSS SECTION**  
(CUT CONDITION)  
NTS

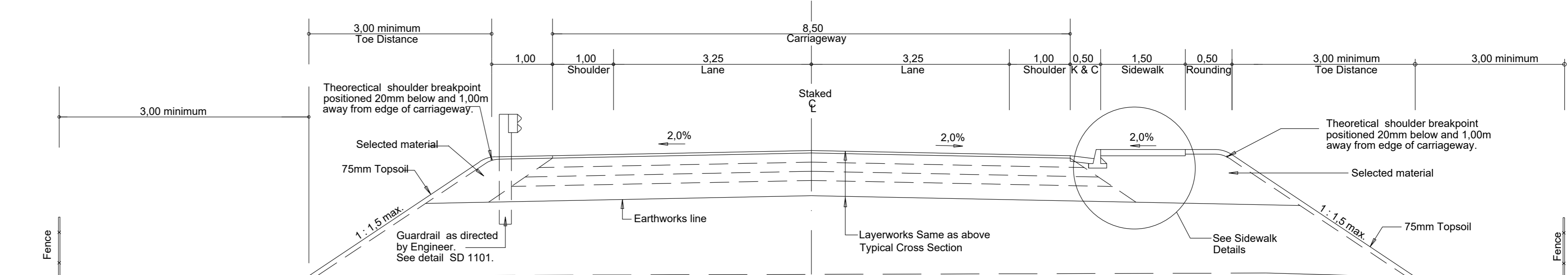
**NOTES**  
LAYERWORKS IN ACCORDANCE WITH PDC No. 1249



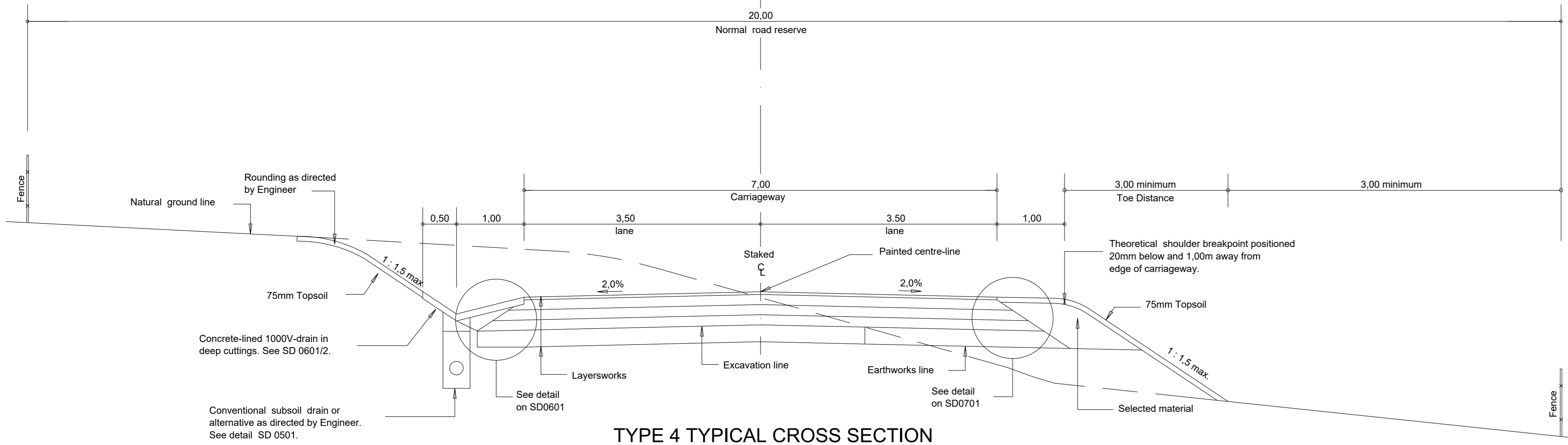
**TYPE 3 TYPICAL CROSS SECTION**  
(CONCRETE SIDEWALK IN CUT CONDITION)  
NTS



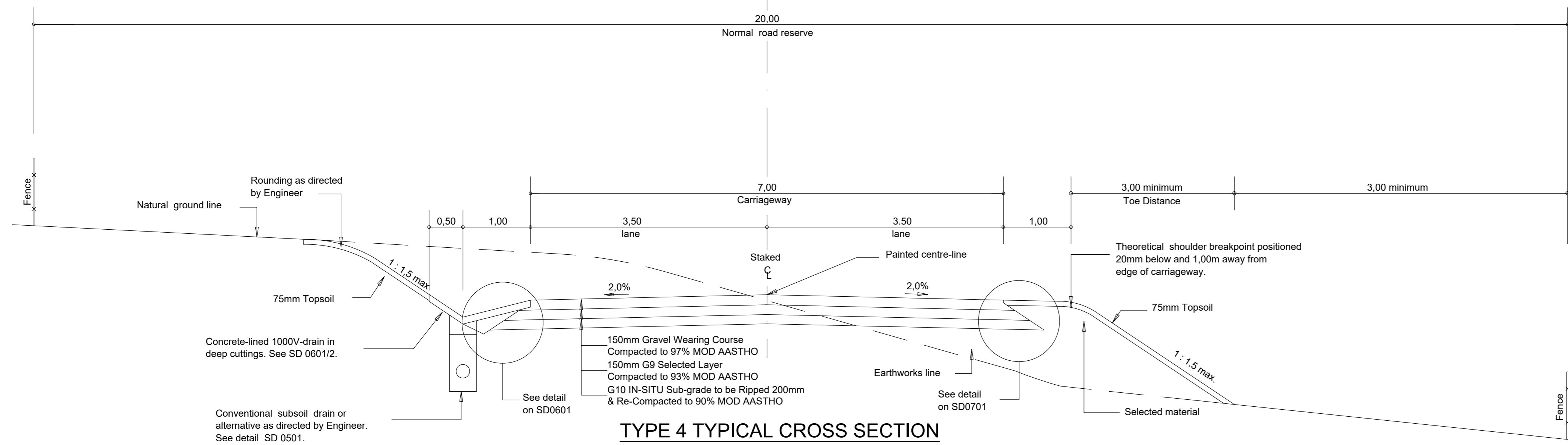
**TYPE 3 TYPICAL CROSS SECTION**  
(FILL CONDITION)  
NTS



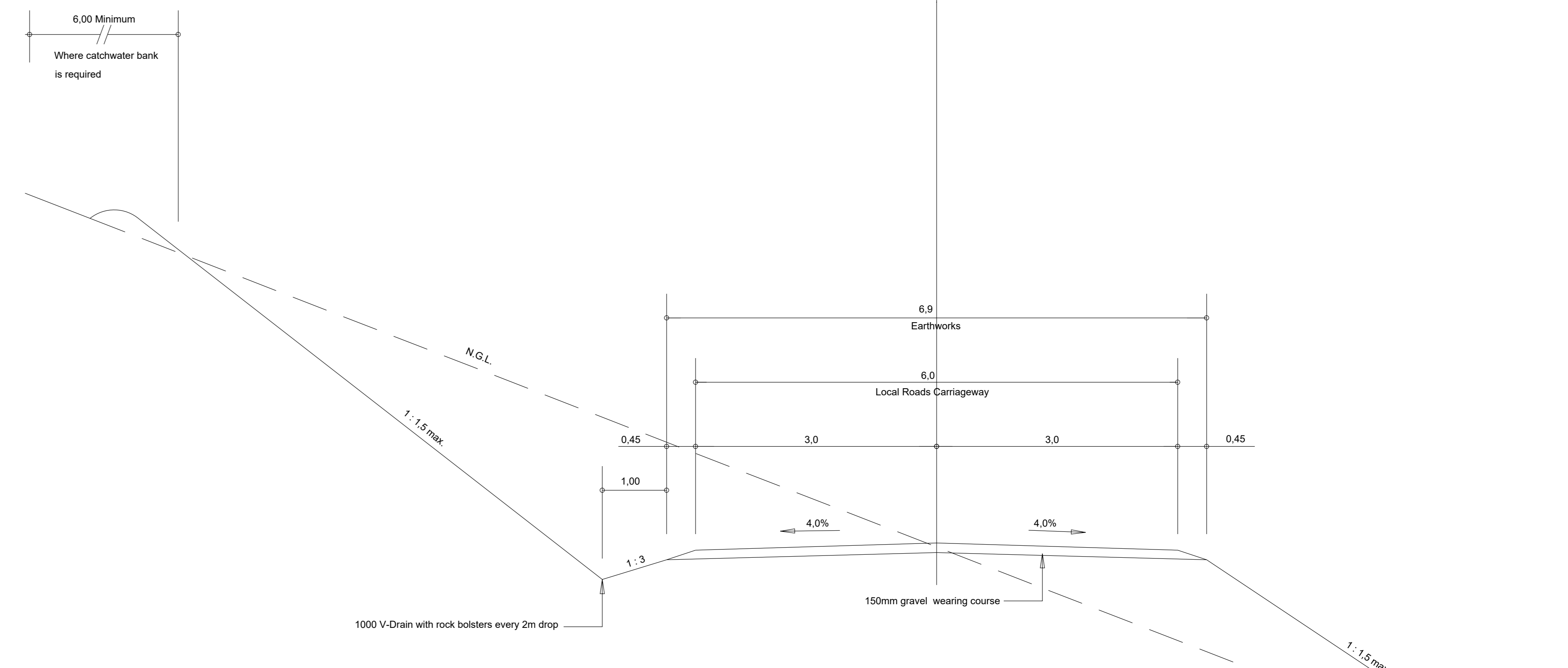
**TYPE 3 TYPICAL CROSS SECTION**  
(CONCRETE SIDEWALK IN FILL CONDITION)  
NTS



**TYPE 4 TYPICAL CROSS SECTION**  
D348 (KM 0+000 - 0+192) - D704 & D40 (TO BELLMOUTH)  
NTS



**TYPE 4 TYPICAL CROSS SECTION**  
(FOR DISTRICT ROADS (GRAVEL)  
NTS



**TYPE 6 TYPICAL CROSS SECTION**  
(FOR FORMAL ACCESSES)  
NTS

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	-	Designed by:-	T. PIKA
Continued on:-	C 44789	Checked by:-	Y. DOMA
Cross Section No:-	C 44330 - C 44341 C 46234 - C 46235 C 47544 - C 47544	Drawn by:-	K. NAIDOO
Longitudinal Section No:-	C 44324 - C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44312 - C 44323	Date of approval:-	



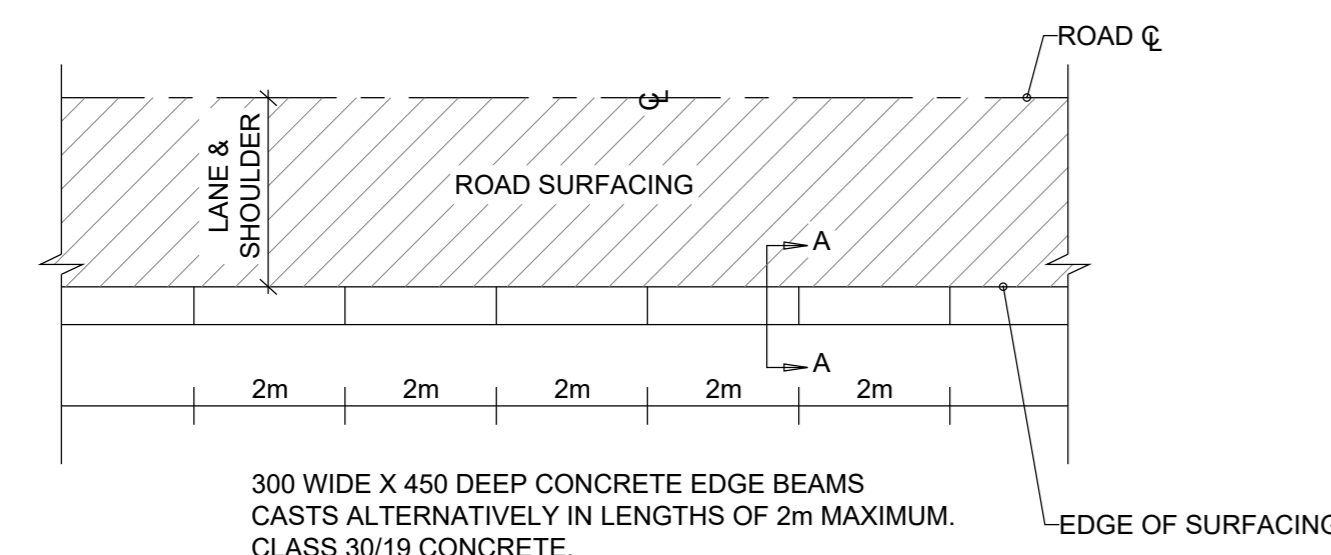
Designed by:- **emzansi ENGINEERS (PTY) LTD**  
Transportation Engineer: Chief Engineer  
Head: Transport  
Date: 01-02-2024

**MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU**  
PORTION  
Km 10+880 - Km 22+491  
**UPGRADING OF MAIN ROAD 278 (P278)**  
DOT GEOMETRIC STANDARD DETAILS: TYPE 3 SECONDARY ROAD SHEET 1 OF 2

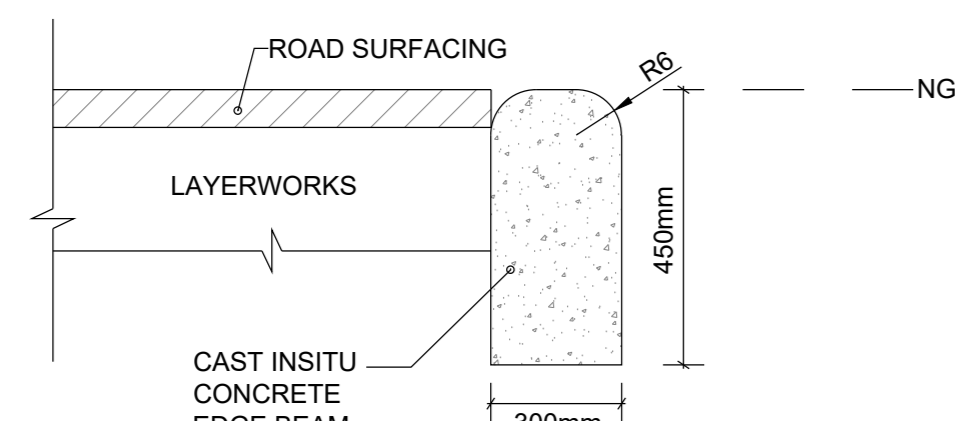
Staked km distance	Sheet - 1	REVISION:
km 10.880 - km 22.491	of - 2	A
Scale	Plan No -	
AS SHOWN	<b>C 44324</b>	

C 44324





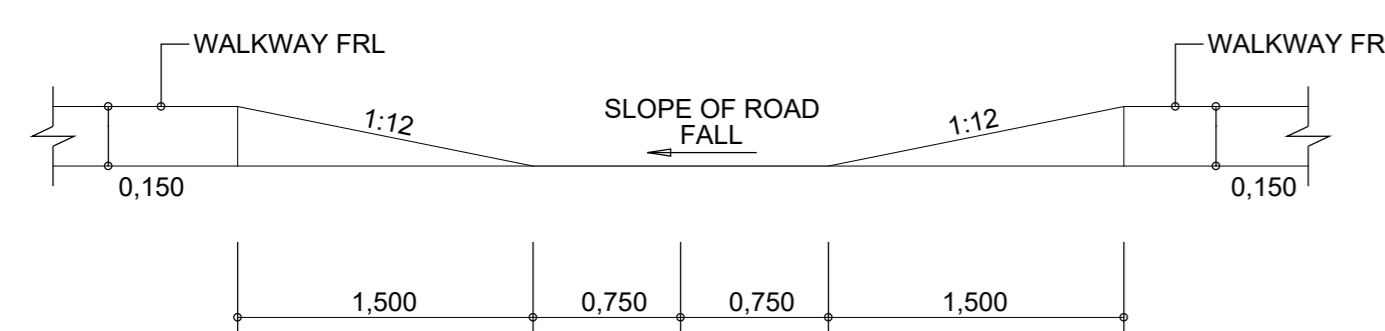
PLAN AT EDGE BEAM



SECTION A-A

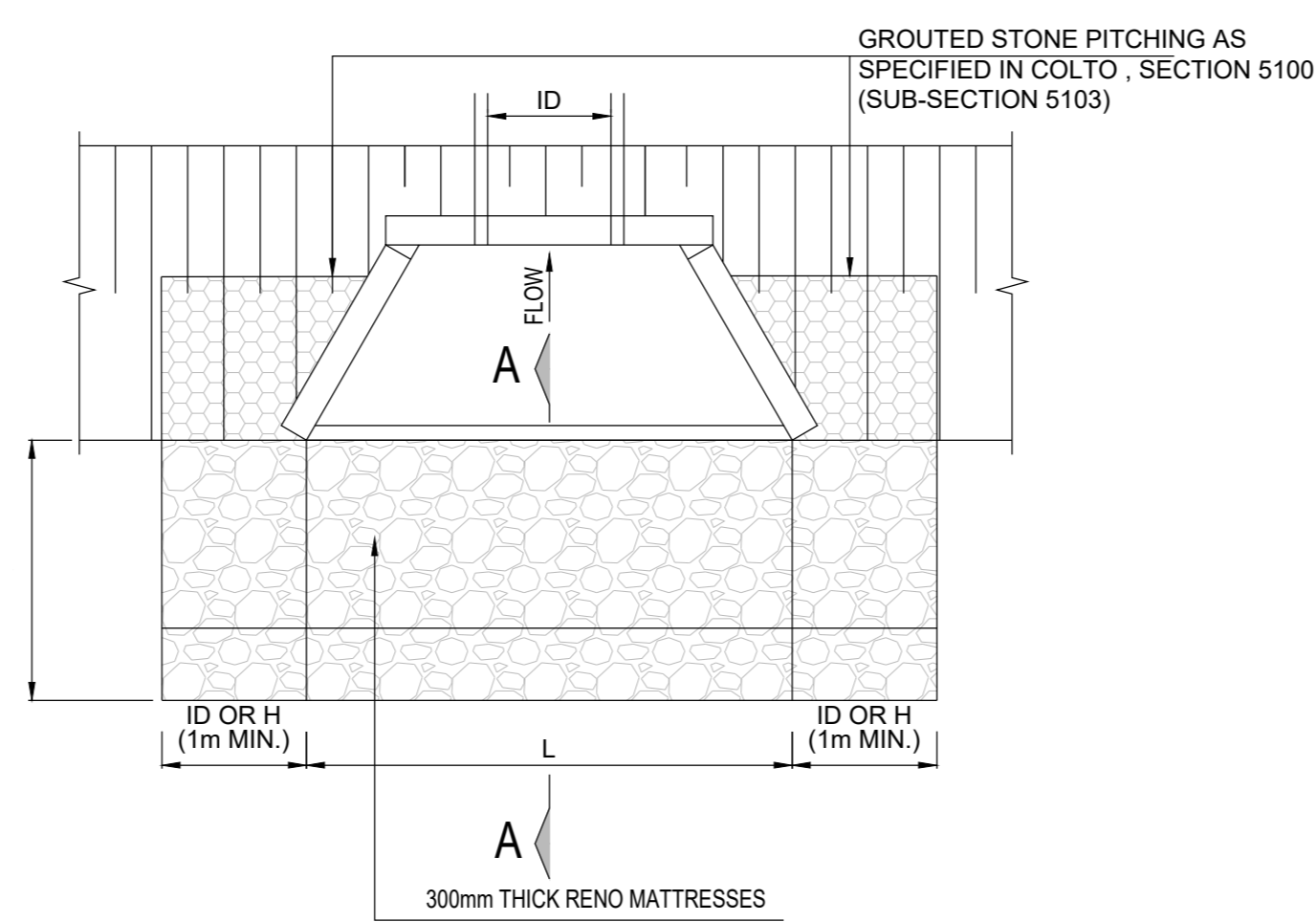
EDGE BEAM DETAIL

NTS



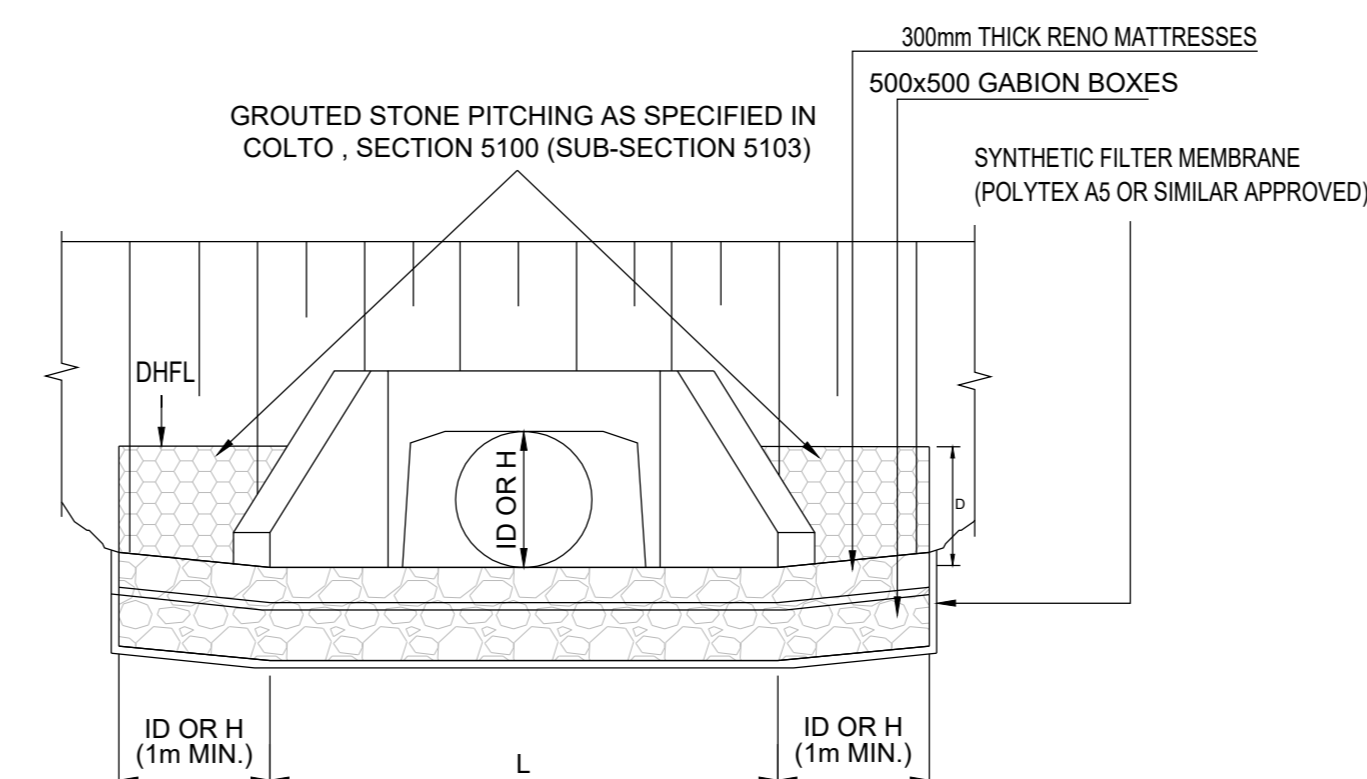
FLARED OPEN CHUTE ON WALKWAY

NTS



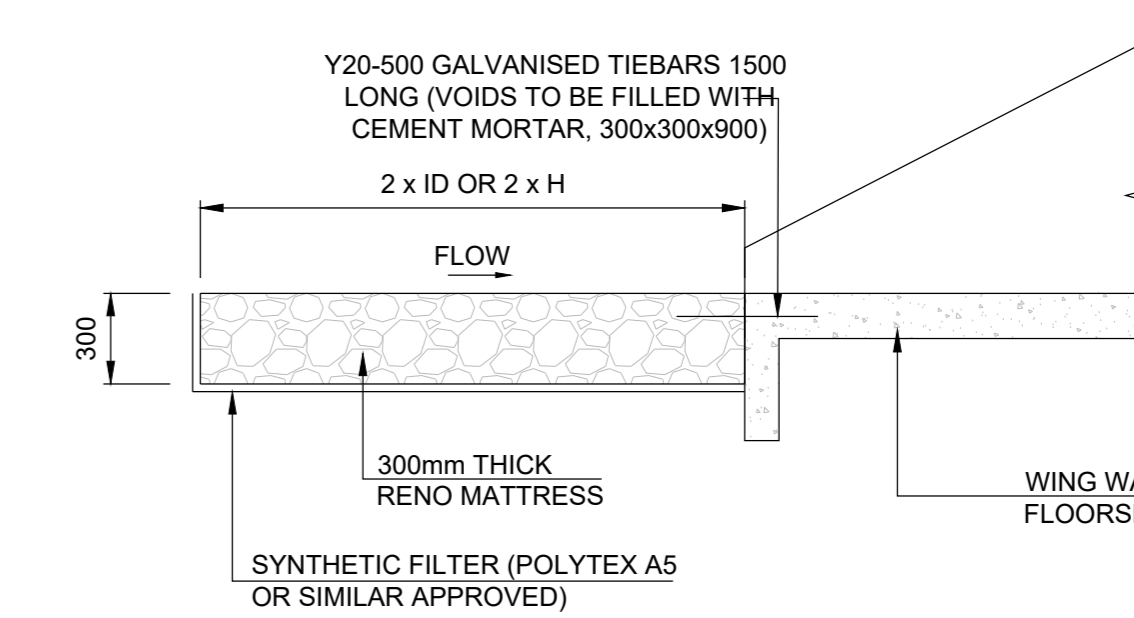
PLAN OF CULVERT (INLET)

SCALE 1:50



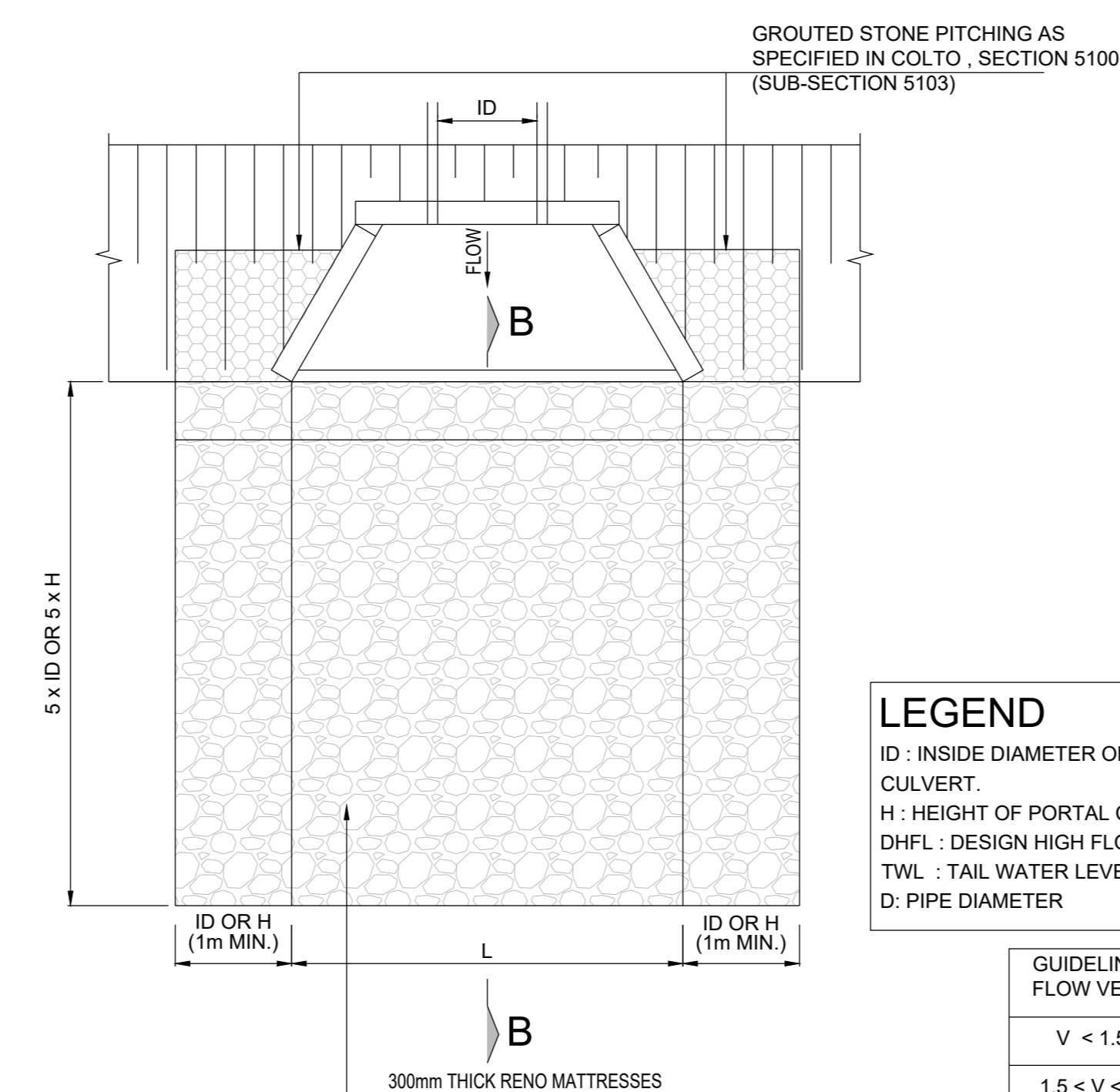
ELEVATION OF CULVERT (INLET)

SCALE 1:50



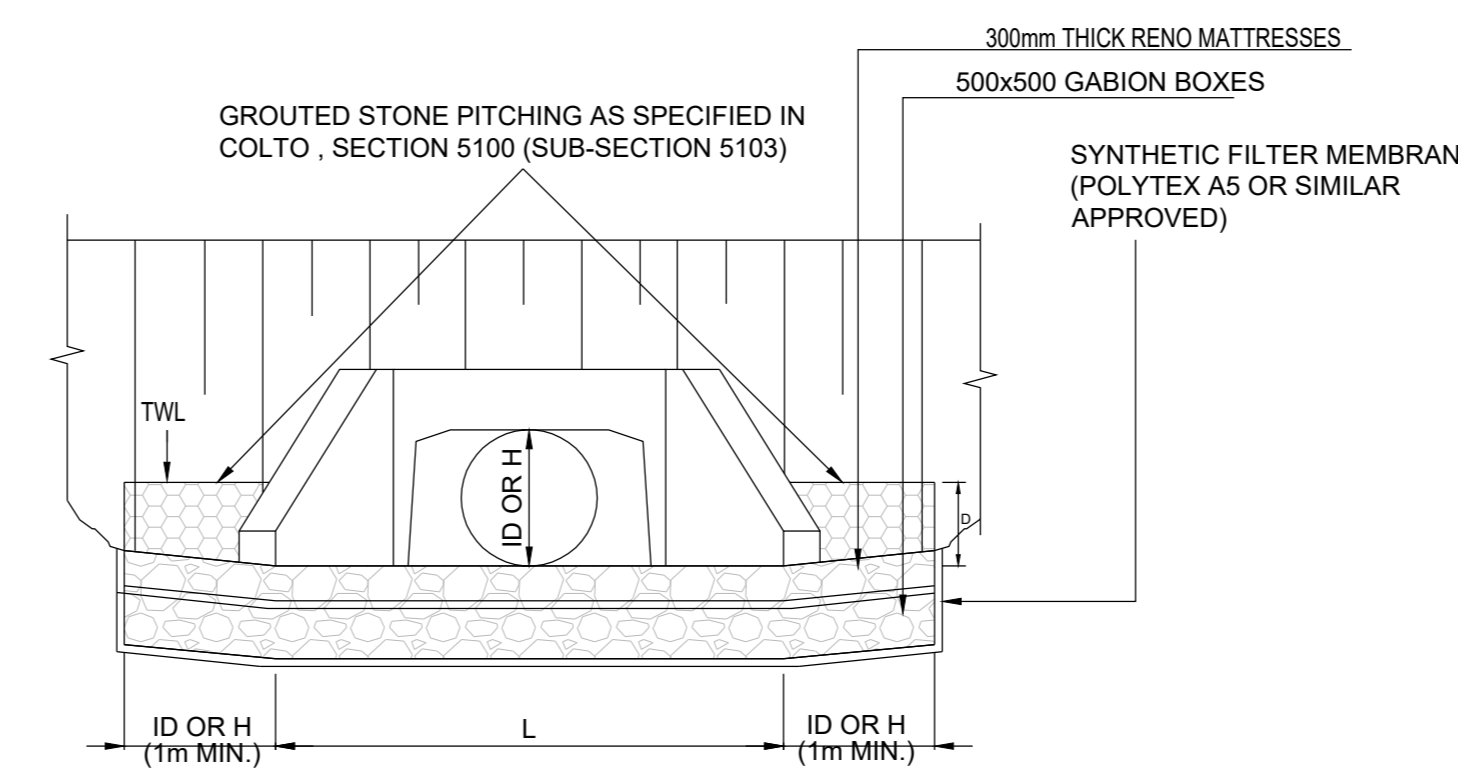
SECTION A-A (INLET)

SCALE 1:25



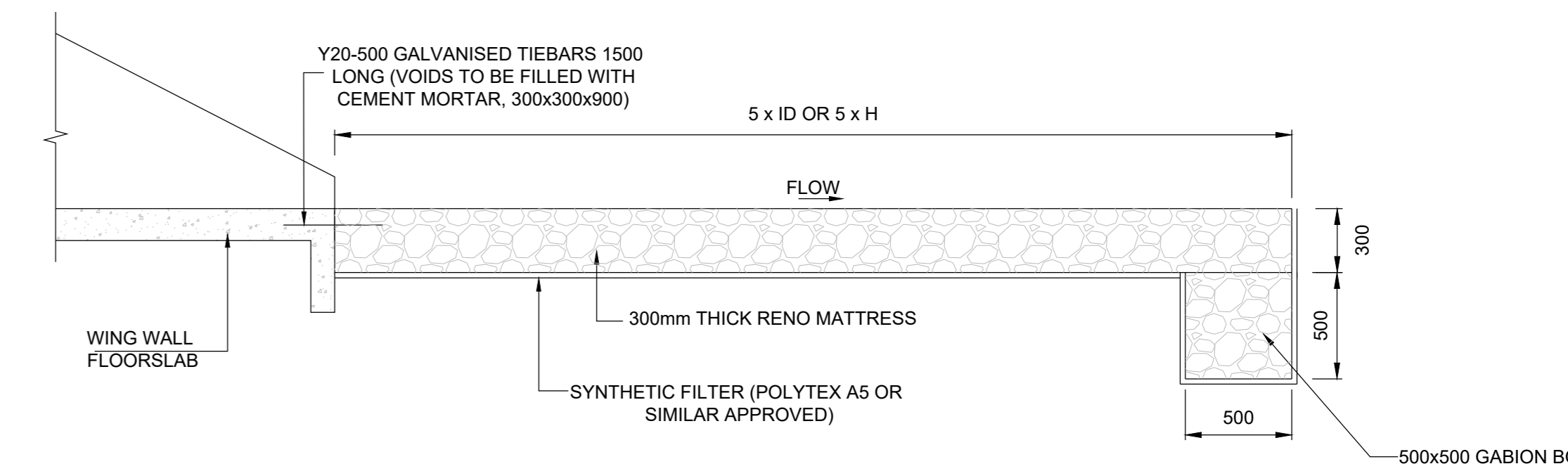
PLAN OF CULVERT (OUTLET)

SCALE 1:50



ELEVATION OF CULVERT (OUTLET)

SCALE 1:50



SECTION B-B (OUTLET)

SCALE 1:25

LEGEND

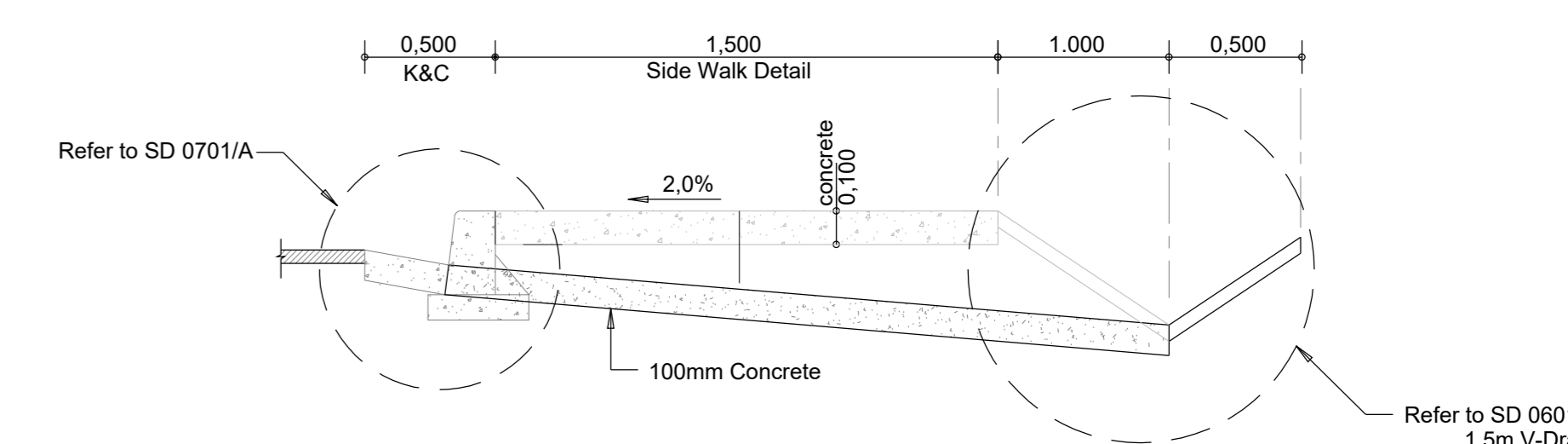
ID : INSIDE DIAMETER OF PIPE CULVERT.  
H : HEIGHT OF PORTAL CULVERT.  
DHL : DESIGN HIGH FLOOD LEVEL.  
TWL : TAIL WATER LEVEL.  
D : PIPE DIAMETER

GUIDELINE FLOW VELOCITY (m/s)	PROTECTION MEASURE*
V < 1.5	FIELD GRASS
1.5 < V < 3.5	GRASS SODS
3.5 < V < 6.5	GABIION MATTRESS (300mm)
6.5 < V < 8	GABIIONS (500mm MIN)

NOTE

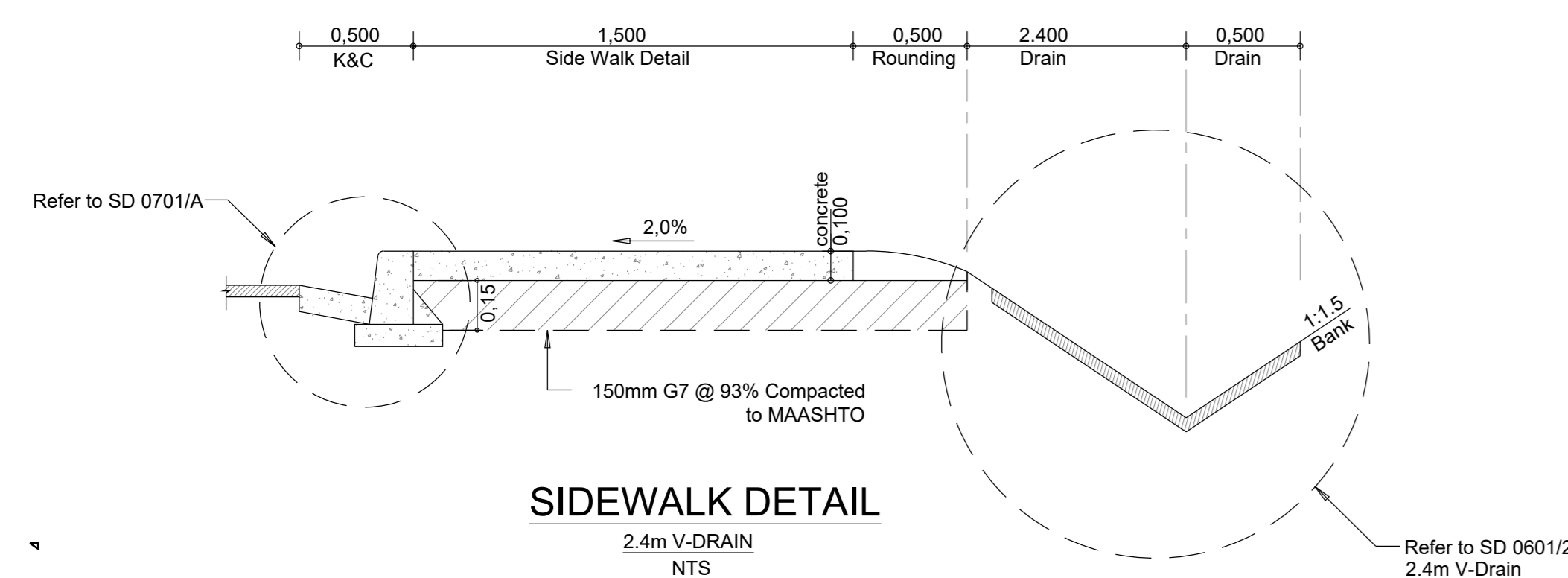
1. GABIION BOXES AND RENO MATTRESSES (MACCAFERTI SA OR SIMILAR APPROVED) DIMENSIONS, SPECIFICATIONS AND ASSEMBLY DETAILS AS PER MANUFACTURERS REQUIREMENTS.  
2. FOR GRASS STONE PITCHING CONCRETE A EROSION PROTECTIVE MEASURES REFER TO CHAPTER 7 OF THE ROAD DRAINAGE MANUAL, 5th EDITION, 2008.

EROSION PROTECTION AT STORMWATER OUTLET STRUCTURE



"Modified Side Inlet" (at KM 20+730)

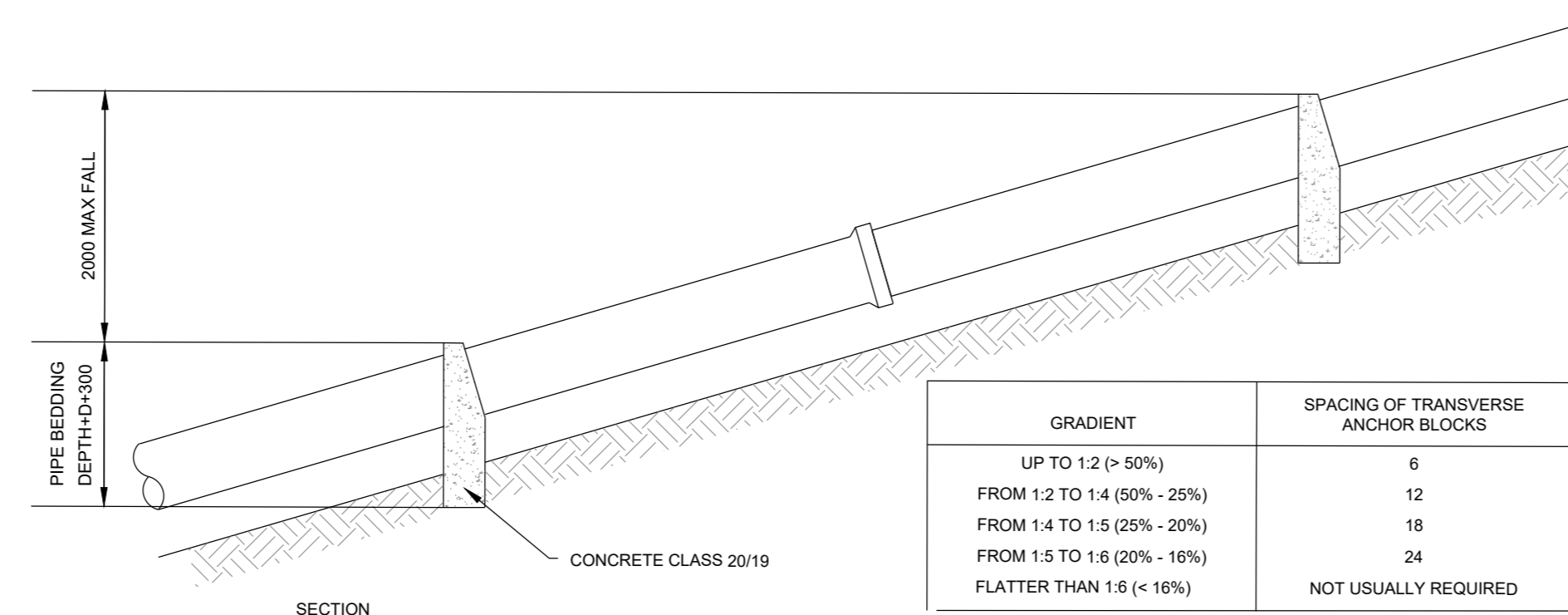
NTS



SIDEWALK DETAIL

2.4m V-Drain

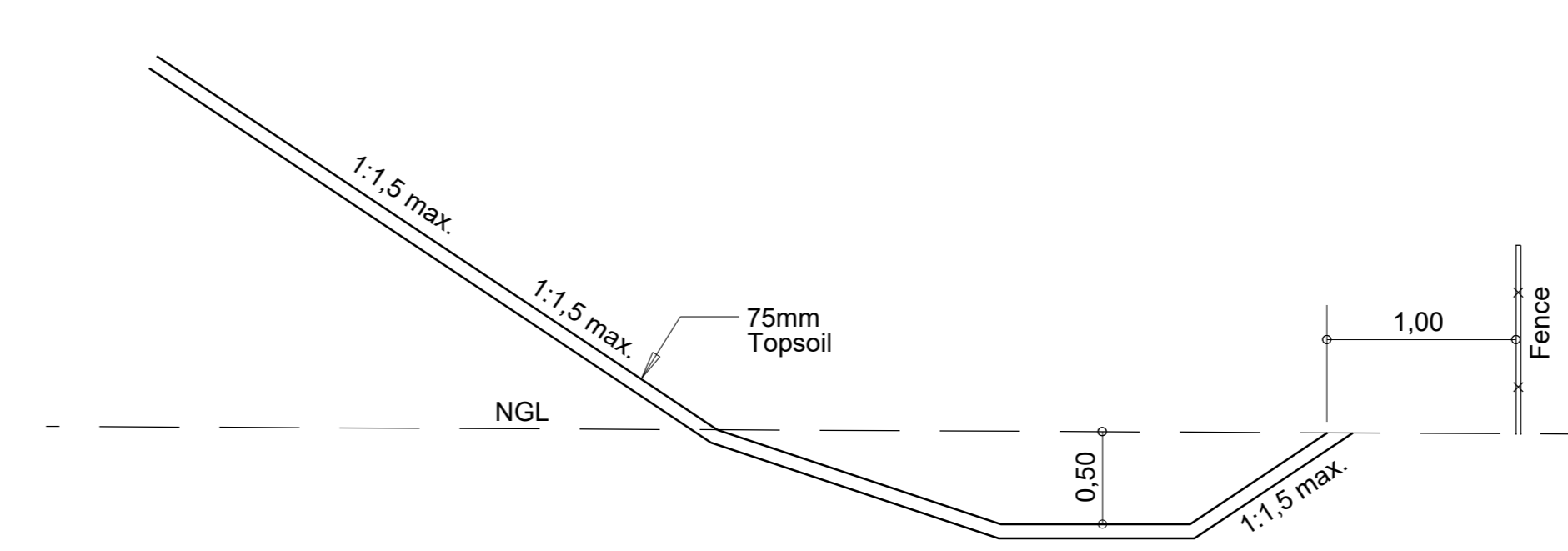
NTS



DETAIL OF ANCHOR BLOCK FOR STORMWATER PIPES

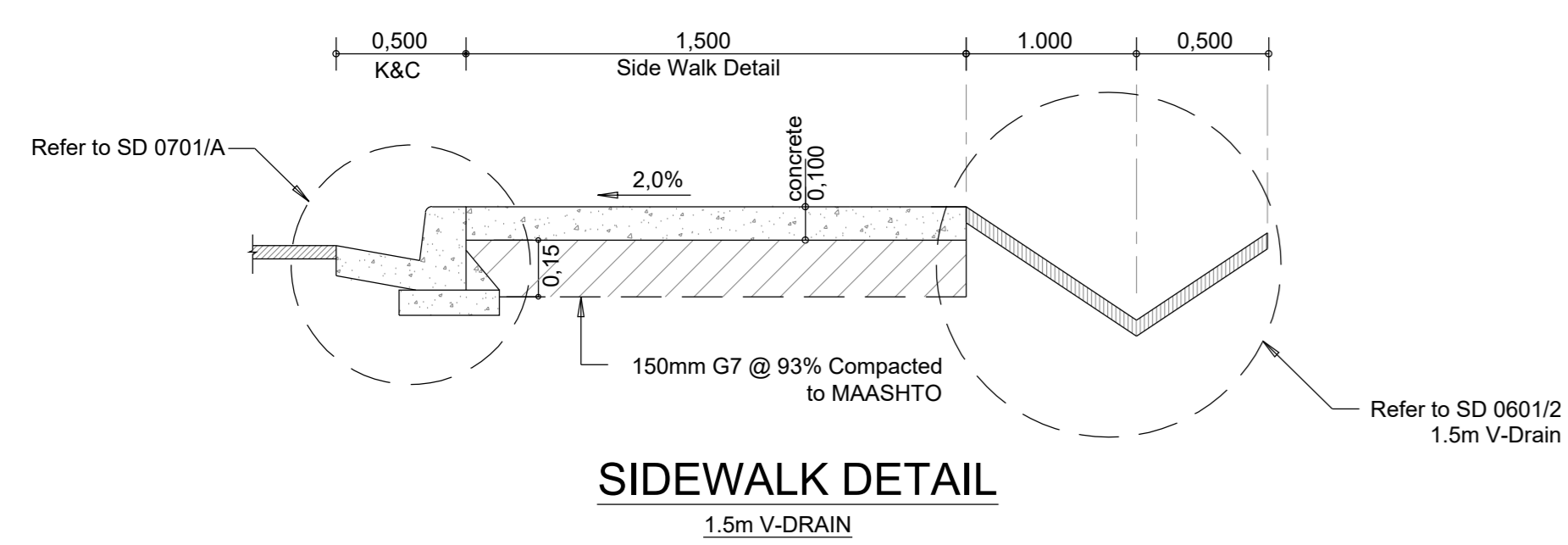
GRADIENT	SPACING OF TRANSVERSE ANCHOR BLOCKS
UP TO 1:2 (+ 50%)	6
FROM 1:2 TO 1:4 (50% - 25%)	12
FROM 1:4 TO 1:5 (25% - 20%)	18
FROM 1:5 TO 1:6 (20% - 16%)	24
FLATTER THAN 1:6 (< 16%)	NOT USUALLY REQUIRED

NOTES:  
1. PIPE BEDDING NOT SHOWN  
2. 'D' IS THE OUTSIDE DIAMETER



GRASSED MEADOW TOE DRAIN IN FILLS

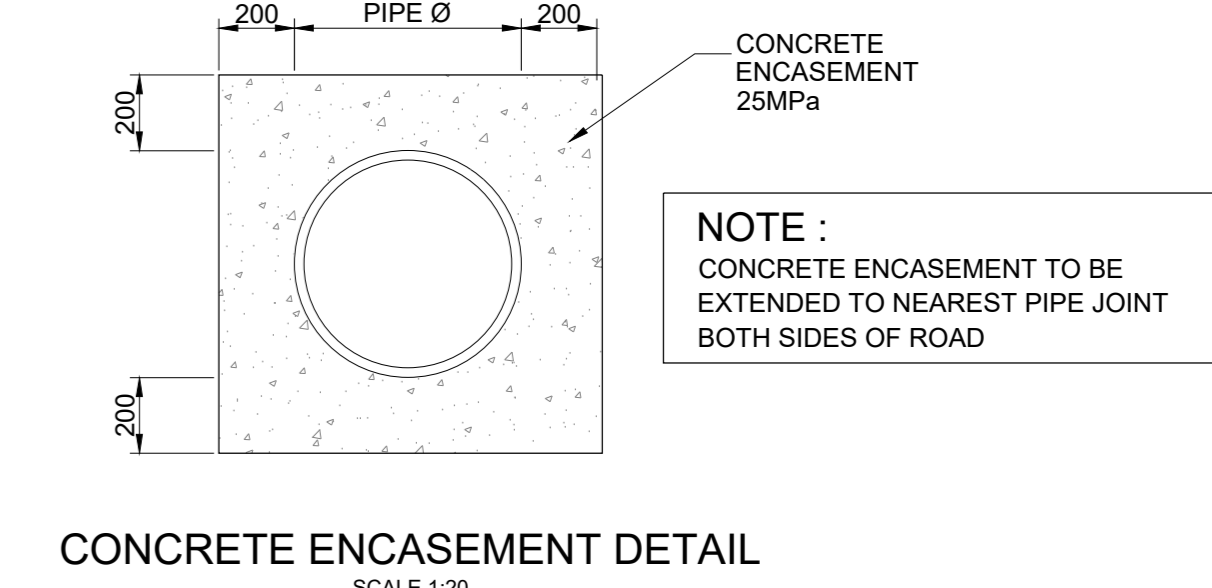
NTS



SIDEWALK DETAIL

1.5m V-Drain

NTS



CONCRETE ENCASEMENT DETAIL

SCALE 1:20

Symbol	Date	Description	Checked	Signed
A	01-02-2024	ISSUED FOR TENDER	YD	
AMENDMENTS				

AS BUILT	
Supervising Engineer	Date
Supervising Authority	

Continued from:-	C 44324	Designed by:-	T. PIKA
Continued on:-		Checked by:-	Y. DOMA
Cross Section No:-	C 44330 - C 44341 C 46234 - C 46235 C 47564 - C 47564	Drawn by:-	K. NAIDOO
Longitudinal Section No:-	C 44324 - C 44329	Checked by:-	Y. DOMA
Design Plan No:-	C 44312 - C 44323	Date of approval:-	



Transportation Engineer: Chief Engineer
Head: Transport

MAIN ROAD 278 (P278): DALTON TO KWA NJENGABANTU  
PORTION  
Km 10+880 - Km 22+491  
UPGRADING OF MAIN ROAD 278 (P278)  
DOT GEOMETRIC STANDARD DETAILS: TYPE 3 SECONDARY ROAD SHEET 2 OF 2

Staked km distance	Sheet - 2	REVISION:
km 10.880 - km 22.491	of - 2	A
Scale	Plan No -	
AS SHOWN	C 44789	

C 44789