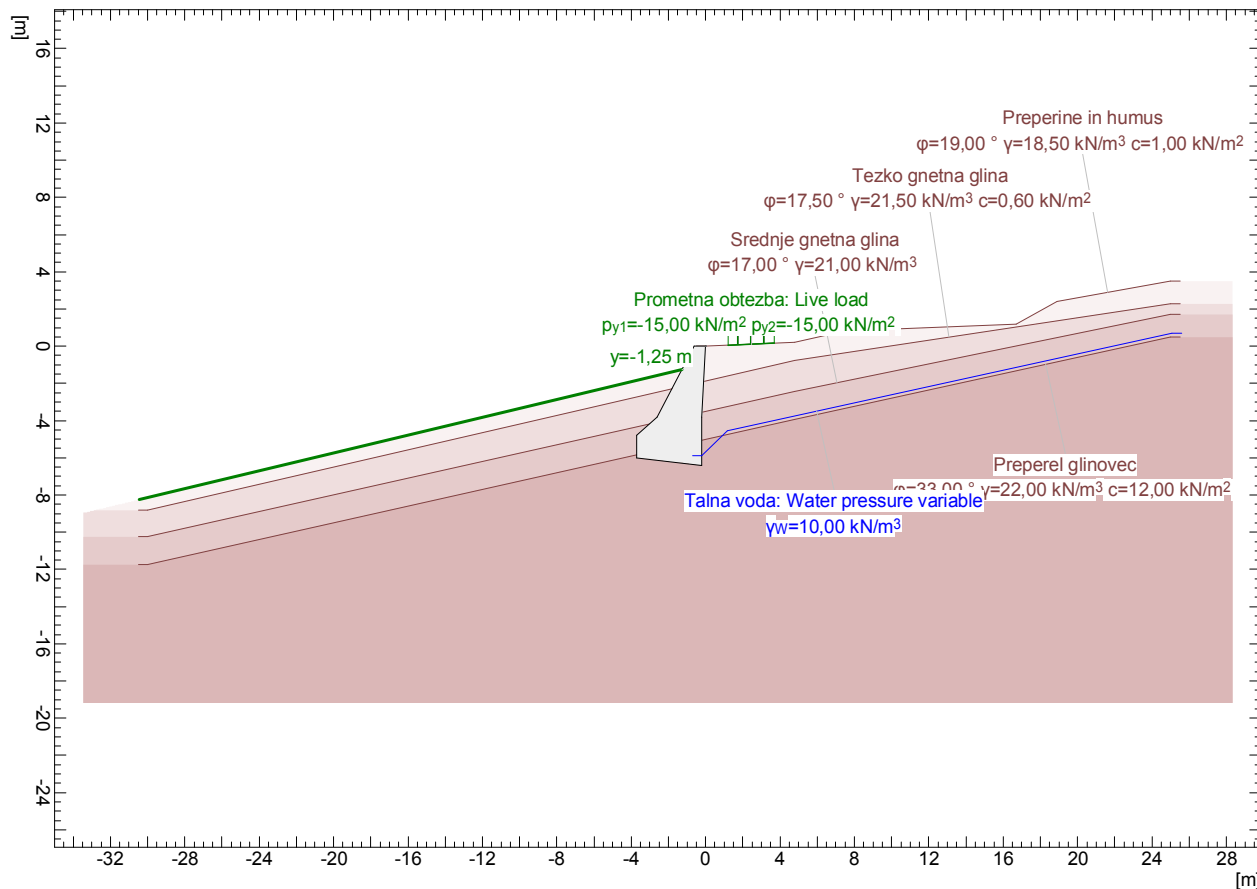
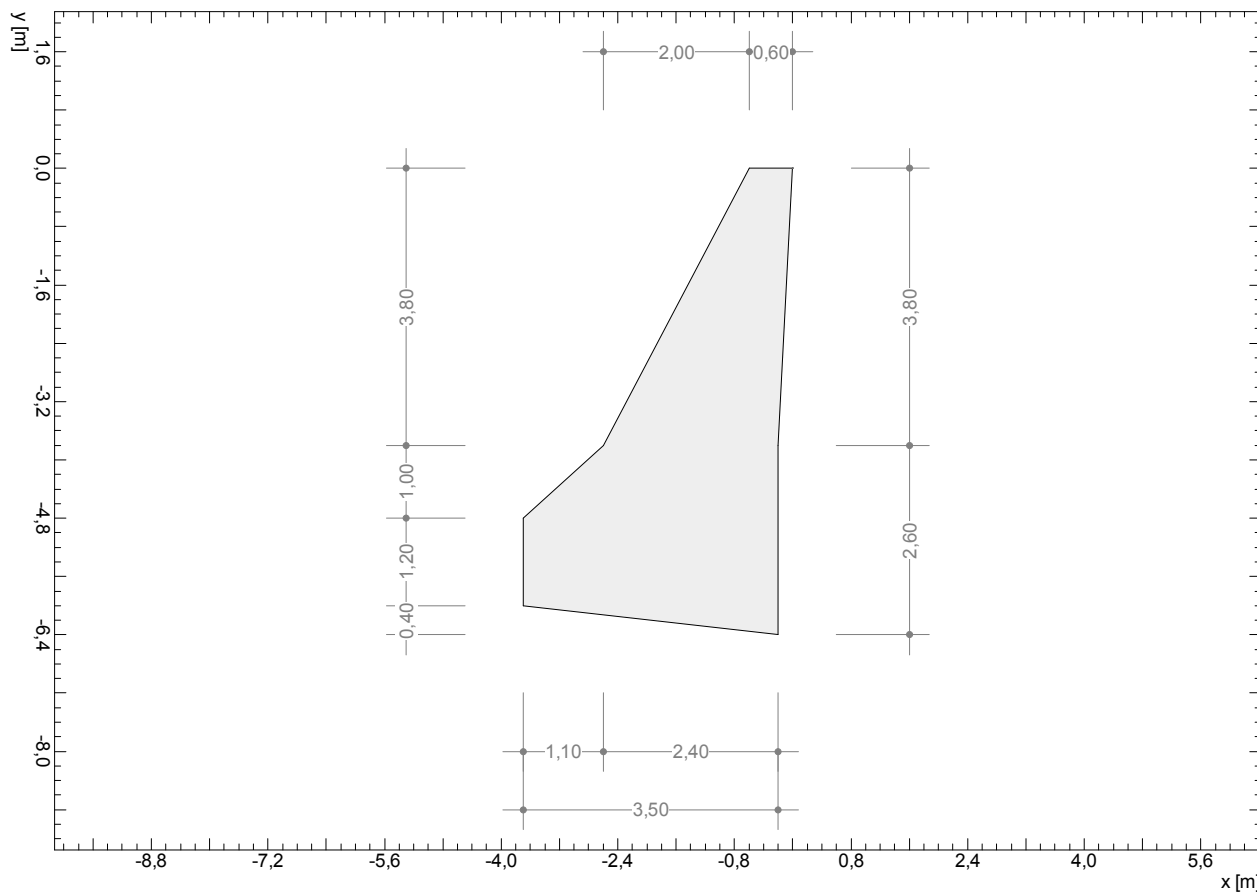


soil model



Nr.:

GEOTECHNICAL MODEL

Soil layer boundaries

Description	Parameters			Point	Polygon points					
	ϕ [°]	γ [kN/m ³]	c [kN/m ²]		x [m]	y [m]	Point	x [m]	y [m]	
Preperine in humus	19,00	18,50	1,00	1	0	0	2	4,80	0,20	
				3	7,50	0,80	4	16,70	1,20	
				5	18,90	2,40	6	25,00	3,50	
Tezko gnetna glina	17,50	21,50	0,60	1	-30,00	-8,80	2	4,80	-0,75	
				3	25,00	2,30				
Srednje gnetna glina	17,00	21,00	0	1	-30,00	-10,25	2	4,80	-2,45	
				3	25,00	1,70				
Preperel glinovec	33,00	22,00	12,00	1	-30,00	-11,75	2	4,80	-3,95	
				3	25,00	0,50				

Water table

Talna voda: Water pressure variable

γ_w [kN/m ³]	Parameters			Polygon points							
	State	u	Point	x [m]	y [m]	Point	x [m]	y [m]	Point	x [m]	y [m]
10,00	active	dynamic	1	-0,20	-5,90	2	1,17	-4,56	3	25,08	0,70

State : Groundwater active or inactive in the analysis
u : Pore pressure calculated hydrodynamically or hydrostatically

Ground surface below wall

y [m]	dx [m]	β [°]
-1,25	0	13,50

dx : Horizontal part of berm
 β : Slope of berm

Overview of materials: Eurocode ENV/EN

Overview of materials: Eurocode ENV/EN

Material	E [kN/mm ²]	Material class
Concrete	30,0	C20/25
Reinf. steel	200,0	S400

Characteristics of material classes: Eurocode ENV/EN

Concrete

Material class	$-f_{ck,cyl}$ [N/mm ²]	E_{cm} [kN/mm ²]	f_{ctm} [N/mm ²]	τ_{Rd} [N/mm ²]	$f_{ck,cube}$ [N/mm ²]
C20/25	-20,0	30,0	2,2	0,3	25,0

Reinforcement steel

Material class	$-f_{yk}$ [N/mm ²]	E_s [kN/mm ²]	f_{yk} [N/mm ²]	ϵ_{uk} [‰]	f_{tk} [N/mm ²]
S400	-400,0	200,0	400,0	20,0	400,0

LOADS

Distributed load (ground)

Description	Action	x ₁ [m]	y ₁ [m]	x ₂ [m]	y ₂ [m]	p ₁ [kN/m ²]	p ₂ [kN/m ²]	Orientation
Prometna obtezba	Live load	1,20	0,05	3,70	0,15	-15,00	-15,00	y

Nr.:

Resistance factor (1)

Name	LS 1 [-]	LS 2 [-]	LS 3 [-]	Serviceability [-]	global [-]
ME value				1,00	1,00
Shear force in key		1,40		1,00	1,00
Friction angle $\gamma_{M\phi}$		1,20		1,00	1,00
Unit weight γ_{My}		1,00		1,00	1,00
Cohesion γ_{Mc}		1,50		1,00	1,00
Partial safety factor overturning γ_R	1,00				1,50
Partial safety factor sliding γ_R		1,00			1,50
Partial safety factor bearing capacity γ_R		1,00			2,00

Analysis parameters (1)

Name	LS 1	LS 2	LS 3	Serviceability	global	
Part due to earth pressure at rest	0	0		1,000	0	-
Base rotation				2,000	2,000	‰
Minimum earth pressure	5,000	5,000		0	0	kN/m ²
Enlargement fact. for section forces γ_t					1,500	-

Analysis options (1)

Name	LS 1	LS 2	LS 3	Serviceability	global
Active wall friction angle	Yes	Yes		Yes	Yes

Actions (1)

Name	Type	Set	LS Type 1		LS Type 2		LS Type 3		ψ_0 [-]
			γ [-]	γ_{inf} [-]	γ [-]	γ_{inf} [-]	γ [-]	γ_{inf} [-]	
Dead load	permanent		1,10	0,90	1,35	0,80	1,00	1,00	
Live load	variable		1,10		1,35		1,10		0,70
Earth pressure permanent	permanent		1,35	0,80	1,35	0,70	1,00	1,00	
Water pressure variable	variable		1,05		1,20		1,00		0,70

LS Type 1 : Limit state type 1
 LS Type 2 : Limit state type 2
 LS Type 3 : Limit state type 3
 ψ -Factors : Reduction factors

Actions (2)

Name	ψ -Factors			u
	ψ_1 [-]	ψ_2 [-]	$\psi_{1'}$ [-]	
Dead load				Yes
Live load	0,70	0,70	1,00	Yes
Earth pressure permanent				Yes
Water pressure variable	0,70	0,70	1,00	Yes

ψ -Factors : Reduction factors
 u : Action is used

CALCULATION OPTIONS

Earth pressure

Description	Action	δ_A	
Zemeljski pritiski	Earth pressure permane	0,667	

δ_A : Wall friction angle as fraction of soil friction angle

Dead weight of wall

Description	Action	Unit weight [kN/m ³]	
Kamnita zlozba	Dead load	24,00	

Dimensioning of reinforcement

aR [mm]	
40,0	

aR : Outer edge of concrete to axis of axial reinforcement

Verifications

	Analysis method	Cohesion comp.	Shear force in key [kN/m]	
Ultimate bearing capacity	Brinch Hansen	with		
Forward sliding		with	0	
Overturning	(1) Soft ground (subgrade)			

Shear force in key : Additional resistance in the verification of safety against sliding due to a key

(1) : The safety against overturning is verified via the allowable eccentricity of the resultant force

Settlements

ME value [kN/m ²]	f_t	t_{max} [m]	
65000,00	3,000	20,00	

f_t : Depth factor

Limit state specification: !SLS occasional

Description

Standard design situation: Serviceability occasional combination
Analysis parameter: AP1

Action combinations

No	Action Name	Action combinations	
		1	2
1	Dead load	1	1
2	Earth pressure permanent	1	1
3	Live load	1	0,7
4	Water pressure variable	0,7	1

Limit state specification: !ULS type 1

Description

Standard design situation: Ultimate limit state type 1 (1A)
Analysis parameter: AP2

Action combinations

No	Action Name	Action combinations											
		1	2	3	4	5	6	7	8	9	10	11	
1	Dead load	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	1,1	0,9
2	Earth pressure permanent	1,35	1,35	1,35	1,35	1,35	0,8	0,8	0,8	0,8	0,8	0,8	1,35
3	Live load	1,1	1,1	0,77			1,1	1,1	0,77				1,1
4	Water pressure variable		0,735	1,05	1,05			0,735	1,05	1,05			

Action combinations - Continuation

No	Action combinations									
	12	13	14	15	16	17	18	19	20	
1	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	
2	1,35	1,35	1,35	1,35	0,8	0,8	0,8	0,8	0,8	
3	1,1	0,77			1,1	1,1	0,77			
4	0,735	1,05	1,05			0,735	1,05	1,05		

Limit state specification: !ULS type 2

Description

Standard design situation: Ultimate limit state type 2 (1B)
Analysis parameter: AP2

Action combinations

No	Action Name	Action combinations											
		1	2	3	4	5	6	7	8	9	10	11	
1	Dead load	1,35	1,35	1,35	1,35	1,35	1,35	1,35	1,35	1,35	1,35	1,35	0,8
2	Earth pressure permanent	1,35	1,35	1,35	1,35	1,35	0,7	0,7	0,7	0,7	0,7	0,7	1,35
3	Live load	1,35	1,35	0,945			1,35	1,35	0,945				1,35
4	Water pressure variable		0,84	1,2	1,2			0,84	1,2	1,2			

Action combinations - Continuation

No	Action combinations									
	12	13	14	15	16	17	18	19	20	
1	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8	
2	1,35	1,35	1,35	1,35	0,7	0,7	0,7	0,7	0,7	
3	1,35	0,945			1,35	1,35	0,945			
4	0,84	1,2	1,2			0,84	1,2	1,2		

LIMIT VALUES

Dimensioning size of foundation

	[m]	Breadth	Values from
front side	1,05	dimension	!ULS type 2, AC 13

Safety Factors

Verification	F ex [-]	F req [-]	β ex [%]	β max [%]	Values from
Overturning	-				
"Forward slidin	1,28	1,00			!ULS type 2, AC 13
"Bearing capaci	1,04	1,00			!ULS type 2, AC 13
Base rotation			-		

F ex : Existing safety factor
 F req : Required safety factor
 β ex : Existing wall rotation
 β max : Maximum allowable wall rotation
 Hint : Safety factors for the dimensioned breadth of foundation for the critical LSS / AC.

LIMIT VALUES

Safety Factors

Verification	F ex [-]	F req [-]	β ex [‰]	β max [‰]	Values from
Overturning	1,36	1,00			!ULS type 1, AC 13
"Forward sliding	1,30	1,00			!ULS type 2, AC 13
"Bearing capacity	1,10	1,00			!ULS type 2, AC 13
Base rotation			1,78	2,00	!SLS occasional, AC 1

F ex : Existing safety factor
F req : Required safety factor
 β ex : Existing wall rotation
 β max : Maximum allowable wall rotation

Bending moments and corresponding values

(Compact view)

y [m]	Md max				Md min			
	Md [kNm/m]	Nd [kN/m]	Vd [kN/m]	LSS,AC	Md [kNm/m]	Nd [kN/m]	Vd [kN/m]	LSS,AC
-3,80	70,88	-152,29	-70,64	2,11	-33,59	-196,44	10,41	2,10

LSS,AC : Limit state specification, Action combination
LSS 1 = !SLS occasional,
LSS 2 = !ULS type 2,
LSS 3 = !ULS type 1

Shear forces and corresponding values

(Compact view)

y [m]	Vd max				Vd min			
	Vd [kN/m]	Nd [kN/m]	Md [kNm/m]	LSS,AC	Vd [kN/m]	Nd [kN/m]	Md [kNm/m]	LSS,AC
-3,23	10,97	-150,57	-25,03	2,10	-49,49	-115,40	40,69	2,11
-3,80	10,41	-196,44	-33,59	2,10	-70,64	-152,29	70,88	2,11

LSS,AC : Limit state specification, Action combination
LSS 1 = !SLS occasional,
LSS 2 = !ULS type 2,
LSS 3 = !ULS type 1

Normal forces and corresponding values

(Compact view)

y [m]	Nd max				Nd min			
	Nd [kN/m]	Vd [kN/m]	Md [kNm/m]	LSS,AC	Nd [kN/m]	Vd [kN/m]	Md [kNm/m]	LSS,AC
0	0	0	0	2,1	0	0	0	2,1
-3,80	-124,16	-10,51	-0,86	2,20	-224,56	-49,71	38,15	2,2

LSS,AC : Limit state specification, Action combination
LSS 1 = !SLS occasional,
LSS 2 = !ULS type 2,
LSS 3 = !ULS type 1

Reinforcement on back side of wall

(Compact view)

y [m]	As As,back max				As As,back min			
	As [cm ² /m]	Nd [kN/m]	Md [kNm/m]	LSS,AC	As [cm ² /m]	Nd [kN/m]	Md [kNm/m]	LSS,AC
0	0,00	0	0	2,1	0,00	0	0	2,1

LSS,AC : Limit state specification, Action combination
LSS 1 = !SLS occasional,
LSS 2 = !ULS type 2,
LSS 3 = !ULS type 1

Reinforcement on front side of wall

(Compact view)

y [m]	As As,front max				As As,front min			
	As [cm ² /m]	Nd [kN/m]	Md [kNm/m]	LSS,AC	As [cm ² /m]	Nd [kN/m]	Md [kNm/m]	LSS,AC
0	-0,00	0	0	2,1	-0,00	0	0	2,1

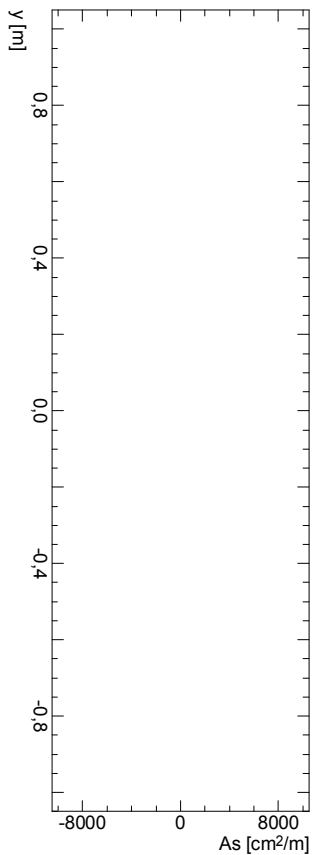
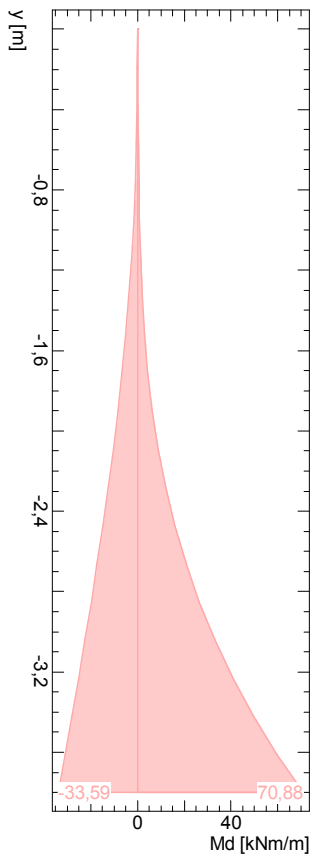
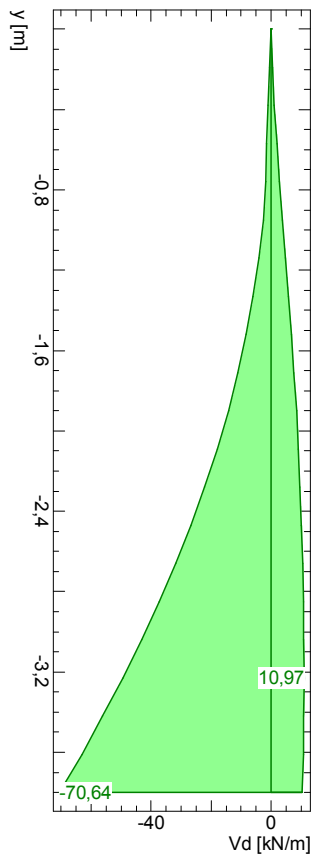
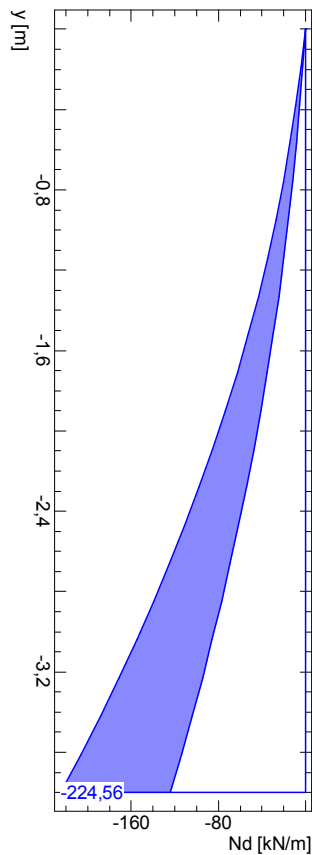
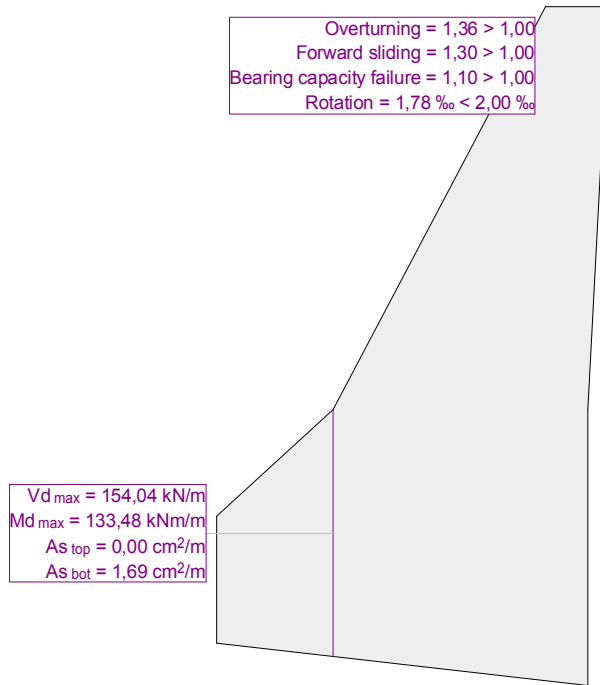
LSS,AC : Limit state specification, Action combination
LSS 1 = !SLS occasional,
LSS 2 = !ULS type 2,
LSS 3 = !ULS type 1

Nr.:

Stressing of foundation

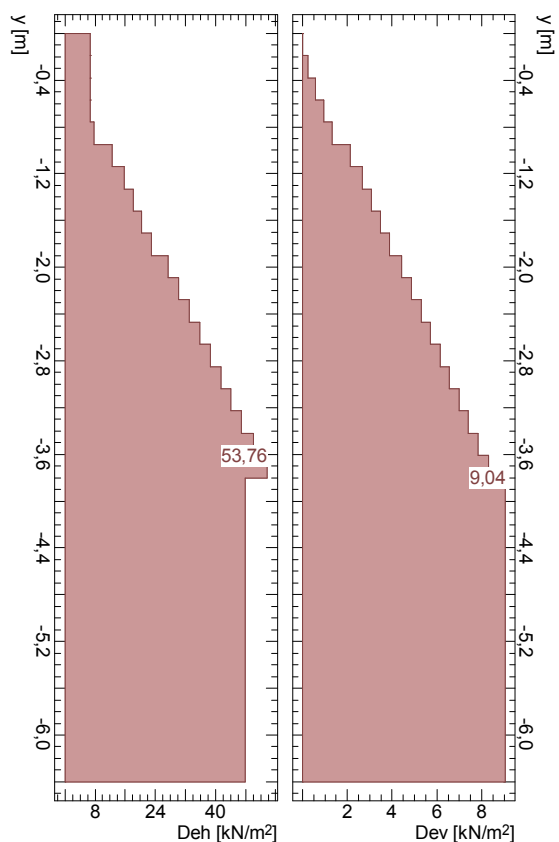
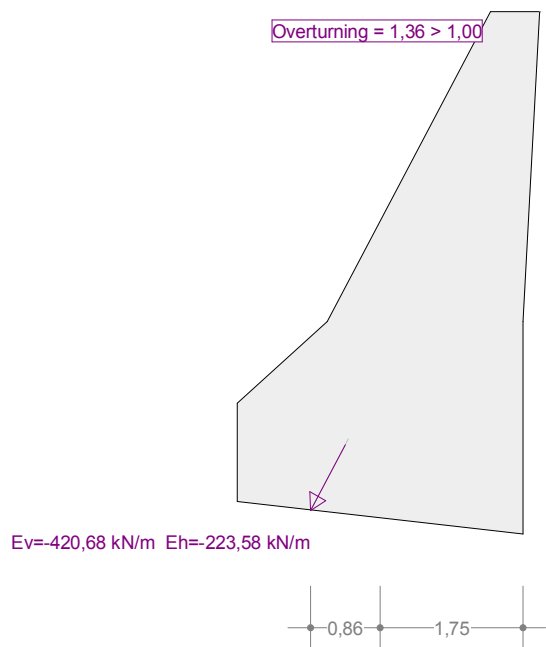
	Breadth [m]	Vd max [kN/m]	Section forces				As	
			Vd min [kN/m]	Md max [kNm/m]	Md min [kNm/m]	above [cm ² /m]	below [cm ² /m]	
front side	1,10	154,04	39,67	133,48	58,07	0,00	1,69	

Limit state values



Nr.:

!ULS type 1 / AC 13



ISLS occasional / AC 1

