

Slope stability analysis

Input data

Project

Task : Zemeljski plaz pri hiši Fošt 19
 Description : Konzolna pilotna stena
 Customer : Občina Oplotnica
 Author : GEOING d.o.o.
 Date : 11/03/2026

Settings

Slovenia - EN 1997 (130)

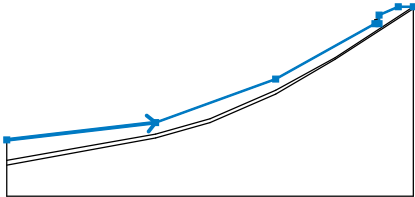
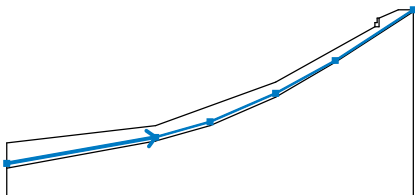
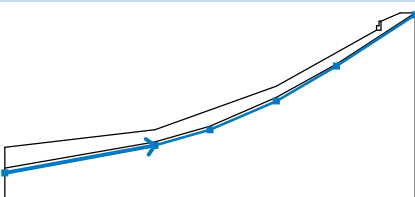
Stability analysis

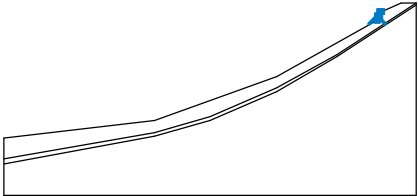
Earthquake analysis : Standard
 Verification methodology : according to EN 1997
 Design approach : 2 - reduction of actions and resistances

Partial factors on actions (A)			
Permanent design situation			
Permanent actions :	$\gamma_G =$	Unfavourable 1,35 [-]	Favourable 1,00 [-]
Variable actions :	$\gamma_Q =$	1,50 [-]	0,00 [-]
Water load :	$\gamma_w =$	1,35 [-]	

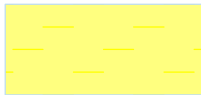
Partial factors for resistances (R)			
Permanent design situation			
Partial factor on sliding resistance (on slip surface) :	$\gamma_{Rs} =$	1,10	[-]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		0,00	7,50	24,00	10,30	43,40	17,30
		59,40	26,25	60,10	26,25	60,10	27,65
		63,20	29,00	65,60	29,00		
2		0,00	4,20	24,00	8,40	32,80	10,90
		43,40	15,50	53,00	20,80	65,60	29,00
3		0,00	3,40	24,00	7,80	32,80	10,30
		43,40	14,90	53,00	20,50	65,60	28,70

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
4		59,40	26,25	59,40	26,95	59,80	26,95
		59,80	27,65	60,10	27,65		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	Glina		23,00	0,00	19,00
2	Preperina		28,00	10,00	21,00
3	Hribina		34,00	30,00	22,00
4	Vezna greda		45,00	100,00	24,00

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	Glina		19,00		
2	Preperina		21,00		
3	Hribina		22,00		
4	Vezna greda		24,00		

Soil parameters

Glina

Unit weight : $\gamma = 19,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 23,00^\circ$
 Cohesion of soil : $c_{ef} = 0,00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

Preperina

Unit weight : $\gamma = 21,00 \text{ kN/m}^3$

Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 28,00^\circ$
 Cohesion of soil : $c_{ef} = 10,00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 21,00 \text{ kN/m}^3$

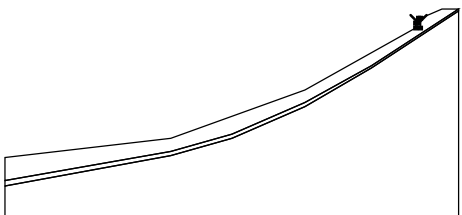
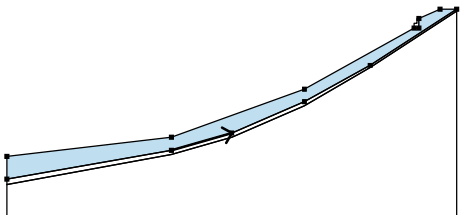
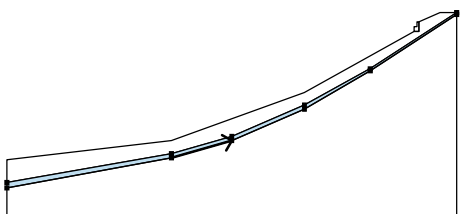
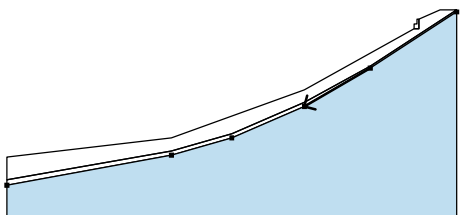
Hribina

Unit weight : $\gamma = 22,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 34,00^\circ$
 Cohesion of soil : $c_{ef} = 30,00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 22,00 \text{ kN/m}^3$

Vezna greda

Unit weight : $\gamma = 24,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 45,00^\circ$
 Cohesion of soil : $c_{ef} = 100,00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 24,00 \text{ kN/m}^3$

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		59,80	27,65	59,80	26,95	Vezna greda 
		59,40	26,95	59,40	26,25	
		60,10	26,25	60,10	27,65	
2		24,00	8,40	32,80	10,90	Glina 
		43,40	15,50	53,00	20,80	
		65,60	29,00	63,20	29,00	
		60,10	27,65	60,10	26,25	
		59,40	26,25	43,40	17,30	
		24,00	10,30	0,00	7,50	
		0,00	4,20			
3		24,00	7,80	32,80	10,30	Preperina 
		43,40	14,90	53,00	20,50	
		65,60	28,70	65,60	29,00	
		53,00	20,80	43,40	15,50	
		32,80	10,90	24,00	8,40	
		0,00	4,20	0,00	3,40	
4		53,00	20,50	43,40	14,90	Hribina 
		32,80	10,30	24,00	7,80	
		0,00	3,40	0,00	-1,60	
		65,60	-1,60	65,60	28,70	

Anti-Slide piles

No.	Point		Length l [m]	Pile spacing b [m]	Cross-section [m]	Distribution along the pile	Pile bearing capacity		
	x [m]	z [m]					Max. bearing capacity V_u [kN]	Gradient K [-]	Passive force direction
1	59,75	26,95	5,70	1,00	d = 0,50	linear	150,00	0,50	perpendicular to pile

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
1	strip	permanent	on terrain	x = 63,20	l = 2,40		0,00	q, q ₁ , f, F	q ₂	unit
								75,00		kN/m ²

Surcharges

No.	Name
1	Hiša

Water

Water type : No water

Tensile crack

Tensile crack not input.

Earthquake

Earthquake not included.

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)**Analysis 1****Circular slip surface**

Slip surface parameters					
Center :	x =	23,10 [m]	Angles :	α_1 =	18,42 [°]
	z =	82,13 [m]		α_2 =	38,29 [°]
Radius :	R =	67,69 [m]			
Analysis of the slip surface without optimization.					

The forces acting on the pile

Anti-Slide Pile No. 1 (59,75; 26,95 [m])

Horizontal active force: 93,12 kN/m

Horizontal passive force: 0,00 kN/m The slope in front of anti-slide pile is not satisfactory.

Depth of slip surface: 1,73 m

The length of pile below terrain: 5,70 m

Slope stability verification (Morgenstern-Price)

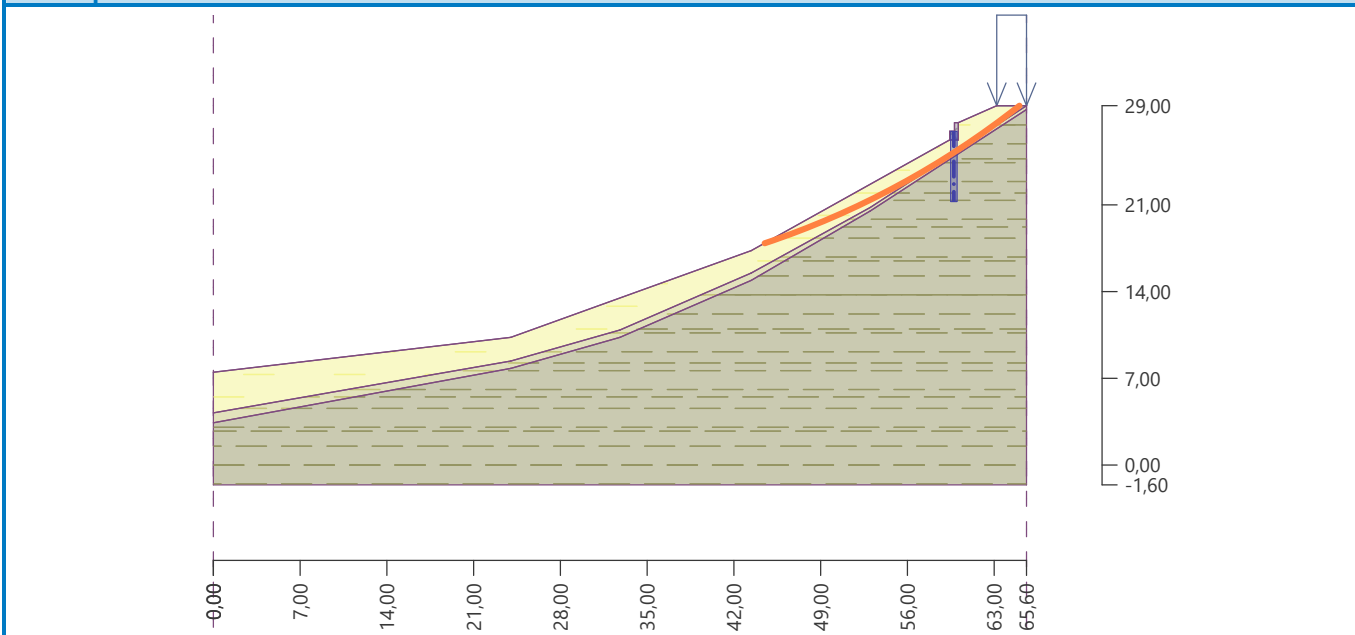
Utilization : 97,2 %

Slope stability ACCEPTABLE

Name : Analysis

Stage - analysis : 1 - 1

Description : Dršina 1



Analysis 2

Circular slip surface

Slip surface parameters					
Center :	x =	60,30 [m]	Angles :	α_1 =	0,00 [°]
	z =	38,27 [m]		α_2 =	28,33 [°]
Radius :	R =	10,53 [m]			
Analysis of the slip surface without optimization.					

The forces acting on the pile

Anti-Slide Pile No. 1 (59,75; 26,95 [m])

The pile do not intersect slip surface, forces acting on pile cannot be computed.

Slope stability verification (Morgenstern-Price)

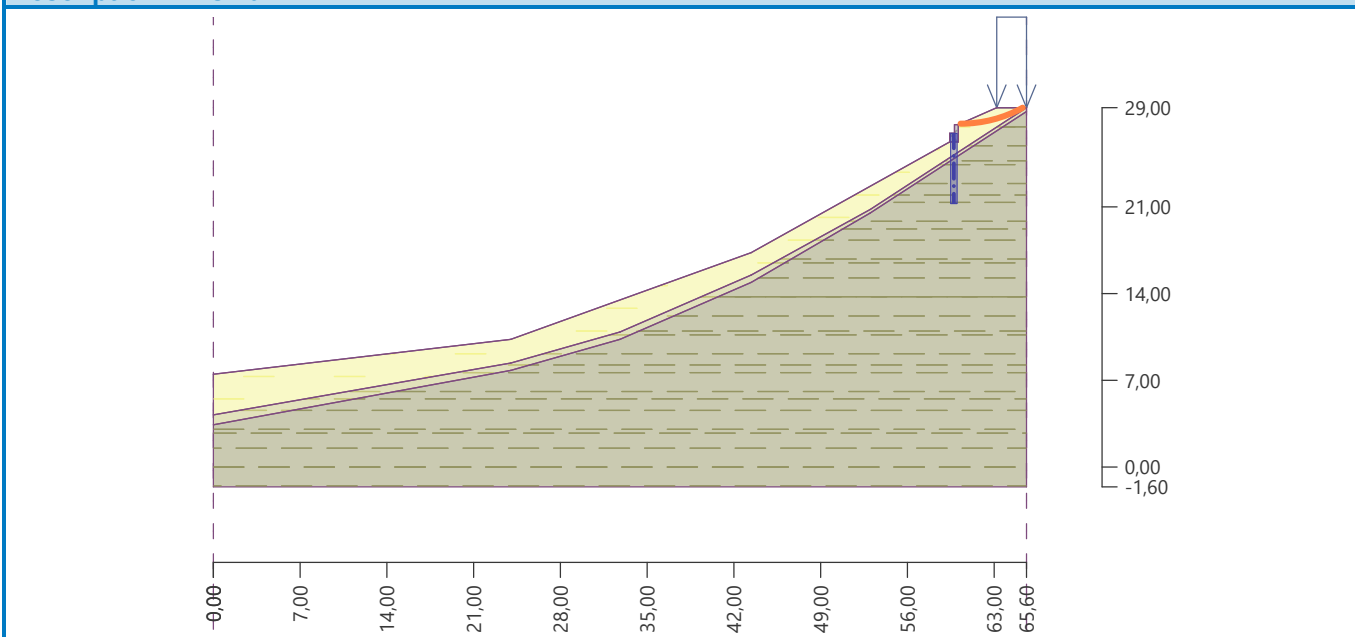
Utilization : 95,1 %

Slope stability ACCEPTABLE

Name : Analysis

Stage - analysis : 1 - 2

Description : Dršina 2

**Piles verification 1**

Anti-Slide pile : Anti-Slide Pile No. 1 (59,75; 26,95 [m])

Analysis : Calculation 1 (slip surface circular)

Method : Morgenstern-Price

Analysis of anti-slide pile**Input data****Settings**

Slovenia - EN 1997 (130)

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)

Coefficients EN 1992-1-1 : standard

Steel structures : EN 1993-1-1 (EC3)

Partial factor on bearing capacity of steel cross section : $\gamma_{M0} = 1,00$ **Pressure analysis**

Active earth pressure calculation : Coulomb

Passive earth pressure calculation : Caquot-Kerisel

Earthquake analysis : Mononobe-Okabe

Modulus of subsoil reaction : standard

Consider reduction of the modulus of subsoil reaction for a braced sheeting

Verification methodology : according to EN 1997

Design approach : 2 - reduction of actions and resistances

Partial factors on actions (A)					
Permanent design situation					
		Unfavourable		Favourable	
Permanent actions :	$\gamma_G =$	1,35	[-]	1,00	[-]
Variable actions :	$\gamma_Q =$	1,50	[-]	0,00	[-]
Water load :	$\gamma_w =$	1,35	[-]		

Partial factors for resistances (R)**Permanent design situation**

Partial factor on earth resistance :	$\gamma_{Re} =$	1,40	[-]
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Anchors

Verification methodology : Limit states (LSD)

Reduction coefficients

Reduction. coeff of steel strength :	$\gamma_s =$	1,35	[-]
Reduction coefficient of pull out resistance (soil) :	$\gamma_e =$	1,35	[-]
Reduction coefficient of pull out resistance (grouting) :	$\gamma_c =$	1,35	[-]

Geometry of structure

Structure length = 5,70 m

Cross-section name : Pile curtain d = 0,50 m; a = 1,00 m

Material of pile : concrete

Computed coefficient of pressure reduction below the ditch = 1,00

Area of cross-section A = 1,96E-01 m²/mMoment of inertia I = 3,07E-03 m⁴/m

Elastic modulus E = 33000,00 MPa

Shear modulus G = 13750,00 MPa

Forces above the slip surfaceDepth of slip surface $h_{s1} = 1,73$ m

Input of active horizontal force : residual active force

Input of passive horizontal force : residual passive force

Active horizontal force T = 93,12 kN/m

Passive horizontal force P = 0,00 kN/m

Distribution of active force : triangle

Distribution of passive force : triangle

Material of structure

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 30/37Cylinder compressive strength $f_{ck} = 30,00$ MPaTensile strength $f_{ctm} = 2,90$ MPaElasticity modulus $E_{cm} = 33000,00$ MPa

Shear modulus G = 13750,00 MPa

Longitudinal steel : B500Yield strength $f_{yk} = 500,00$ MPa**Transverse steel: B500**Yield strength $f_{yk} = 500,00$ MPa**Modulus of reaction**

Modulus of subsoil reaction is computed by method Schmitt.

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	Glina		23,00	0,00	19,00	9,00	23,00

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
2	Preperina		28,00	10,00	21,00	11,00	28,00
3	Hribina		34,00	30,00	22,00	12,00	34,00
4	Vezna greda		45,00	100,00	24,00	14,00	45,00

Soil parameters to compute pressure at rest

No.	Name	Pattern	Type calculation	φ_{ef} [°]	ν [-]	OCR [-]	K_r [-]
1	Glina		cohesionless	23,00	-	-	-
2	Preperina		cohesive	-	0,25	-	-
3	Hribina		cohesive	-	0,20	-	-
4	Vezna greda		cohesive	-	0,16	-	-

Parameters of soils to compute modulus of subsoil reaction (Schmitt)

No.	Name	Pattern	ν [-]	E_{oed} [MPa]	E_{def} [MPa]
1	Glina		0,40	2,00	-
2	Preperina		0,25	25,00	-
3	Hribina		0,20	50,00	-
4	Vezna greda		0,16	100,00	-

Soil parameters

Glina

Unit weight : $\gamma = 19,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 23,00^\circ$
 Cohesion of soil : $c_{ef} = 0,00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 23,00^\circ$
 Soil : cohesionless
 Oedometric modulus : $E_{oed} = 2,00 \text{ MPa}$
 Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

Preperina

Unit weight : $\gamma = 21,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 28,00^\circ$
 Cohesion of soil : $c_{ef} = 10,00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 28,00^\circ$
 Soil : cohesive

Poisson's ratio : $\nu = 0,25$
 Oedometric modulus : $E_{\text{oed}} = 25,00 \text{ MPa}$
 Saturated unit weight : $\gamma_{\text{sat}} = 21,00 \text{ kN/m}^3$

Hribina

Unit weight : $\gamma = 22,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{\text{ef}} = 34,00^\circ$
 Cohesion of soil : $c_{\text{ef}} = 30,00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 34,00^\circ$
 Soil : cohesive
 Poisson's ratio : $\nu = 0,20$
 Oedometric modulus : $E_{\text{oed}} = 50,00 \text{ MPa}$
 Saturated unit weight : $\gamma_{\text{sat}} = 22,00 \text{ kN/m}^3$

Vezna greda

Unit weight : $\gamma = 24,00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{\text{ef}} = 45,00^\circ$
 Cohesion of soil : $c_{\text{ef}} = 100,00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 45,00^\circ$
 Soil : cohesive
 Poisson's ratio : $\nu = 0,16$
 Oedometric modulus : $E_{\text{oed}} = 100,00 \text{ MPa}$
 Saturated unit weight : $\gamma_{\text{sat}} = 24,00 \text{ kN/m}^3$

Pile fixed into the rock

Length of wall in the rock $l = 3,00 \text{ m}$
 Bearing capacity of rock $R = 3000,00 \text{ kPa}$

Geological profile and assigned soils**Position information**

Terrain elevation = 26,95 m

Geological profile and assigned soils

No.	Thickness of layer $t \text{ [m]}$	Depth $z \text{ [m]}$	Altitude $[m]$	Assigned soil	Pattern
1	1,40	0,00 .. 1,40	26,95 .. 25,55	Vezna greda	
2	0,89	1,40 .. 2,29	25,55 .. 24,66	Glina	
3	0,30	2,29 .. 2,59	24,66 .. 24,36	Preperina	
4	-	2,59 .. ∞	24,36 .. -	Hribina	

Excavation

Soil in front of wall is excavated to a depth of 0,00 m.

Ditch bottom shape

No.	Coordinate $x \text{ [m]}$	Depth $z \text{ [m]}$
1	0,00	0,01
2	-0,10	0,01

No.	Coordinate x [m]	Depth z [m]
3	-0,10	0,70
4	-16,10	9,65
5	-35,50	16,65
6	-59,50	19,45
7	-60,50	19,45

Origin [0,0] is located at the ditch bottom.
Positive coordinate +z has downward direction.

Terrain profile

No.	Coordinate x [m]	Depth z [m]
1	0,00	0,00
2	0,10	-0,70
3	3,20	-2,05
4	4,20	-2,05

Origin [0,0] is located in upper right edge of construction.
Positive coordinate +z has downward direction.

Water influence

Ground water table is located below the structure.

Input surface surcharges

No.	Surcharge		Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
	new	change						
1	Yes		permanent	75,00		3,20	2,40	on terrain
No.	Name							
1	Hiša							

Global settings

Number of FEs to discretize wall = 100

Analysis of depending pressures : reduce according to analysis settings

Minimum dimensioning pressure is considered as $\sigma_{a,min} = 0,20\sigma_z$

Settings of the stage of construction

Design situation : permanent

Analysis results

Pressure above the slip surface

Depth [m]	Passive pressure [kPa]	Active pressure [kPa]
0	0,00	0,00
0,00	0,00	0,00
0,00	0,00	0,00
1,73	0,00	107,77

Distribution of pressures acting on the structure (in front and behind the wall) - above slip surface

Depth [m]	Ta,p [kPa]	Tk,p [kPa]	Tp,p [kPa]	Ta,z [kPa]	Tk,z [kPa]	Tp,z [kPa]
0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.00	0.00	0.00	0.62	0.62	0.62
0.05	0.00	0.00	0.00	3.08	3.08	3.08
0.15	0.00	0.00	0.00	9.26	9.26	9.26
0.28	0.00	0.00	0.00	17.77	17.77	17.77
0.50	0.00	0.00	0.00	31.03	31.03	31.03
0.57	0.00	0.00	0.00	35.55	35.55	35.55
0.69	0.00	0.00	0.00	43.03	43.03	43.03
0.79	0.00	0.00	0.00	49.27	49.27	49.27
0.80	0.00	0.00	0.00	49.59	49.59	49.59
0.85	0.00	0.00	0.00	53.32	53.32	53.32
1.14	0.00	0.00	0.00	71.10	71.10	71.10
1.15	0.00	0.00	0.00	71.72	71.72	71.72
1.40	0.00	0.00	0.00	87.31	87.31	87.31
1.42	0.00	0.00	0.00	88.87	88.87	88.87
1.71	0.00	0.00	0.00	106.65	106.65	106.65
1.73	0.00	0.00	0.00	107.77	107.77	107.77

Distribution of pressures acting on the structure (in front and behind the wall) - below the slip surface

Depth [m]	Ta,p [kPa]	Tk,p [kPa]	Tp,p [kPa]	Ta,z [kPa]	Tk,z [kPa]	Tp,z [kPa]
1.73	-10.41	-10.41	-10.41	78.96	78.96	144.93
1.99	-11.70	-11.70	-11.70	79.49	79.49	163.38
2.28	-13.07	-13.07	-13.07	80.06	80.06	183.08
2.29	-3.46	-11.87	-54.86	52.33	52.33	378.11
2.32	-3.60	-12.00	-55.30	52.43	52.43	381.90
2.56	-4.89	-13.19	-59.41	53.33	53.33	400.19
2.59	-5.02	-13.31	-59.82	53.42	53.42	402.03
2.59	0.00	-11.26	-183.81	19.46	36.42	702.04
2.70	0.00	0.00	-188.72	0.00	0.00	715.58
2.70	Rock	Rock	Rock	Rock	Rock	Rock
2.85	Rock	Rock	Rock	Rock	Rock	Rock
3.13	Rock	Rock	Rock	Rock	Rock	Rock
3.42	Rock	Rock	Rock	Rock	Rock	Rock
3.68	Rock	Rock	Rock	Rock	Rock	Rock
3.70	Rock	Rock	Rock	Rock	Rock	Rock
3.99	Rock	Rock	Rock	Rock	Rock	Rock
4.27	Rock	Rock	Rock	Rock	Rock	Rock
4.31	Rock	Rock	Rock	Rock	Rock	Rock
4.56	Rock	Rock	Rock	Rock	Rock	Rock
4.84	Rock	Rock	Rock	Rock	Rock	Rock
5.13	Rock	Rock	Rock	Rock	Rock	Rock
5.41	Rock	Rock	Rock	Rock	Rock	Rock
5.70	Rock	Rock	Rock	Rock	Rock	Rock

Distributions of the modulus of subsoil reaction and internal forces on the structure

Depth [m]	$k_{h,p}$ [MN/m ³]	$k_{h,z}$ [MN/m ³]	Displacement [mm]	Pressure [kPa]	Shear Force [kN/m]	Moment [kNm/m]
0.00	0.00	0.00	-17.84	0.00	-0.00	0.00
0.01	0.00	0.00	-17.76	0.87	-0.01	0.00
0.28	0.00	0.00	-16.32	17.77	-2.53	0.24
0.57	0.00	0.00	-14.80	35.55	-10.13	1.92
0.85	0.00	0.00	-13.28	53.32	-22.80	6.50
1.14	0.00	0.00	-11.77	71.10	-40.53	15.40
1.42	0.00	0.00	-10.27	88.87	-63.32	30.08
1.71	0.00	0.00	-8.80	106.65	-91.18	51.97
1.73	0.00	0.00	-8.69	68.54	-93.39	54.01
1.99	0.00	0.00	-7.37	67.80	-111.32	80.93
2.28	0.00	0.00	-6.00	66.99	-130.52	115.40
2.56	0.00	0.00	-4.72	-6.07	-131.29	152.97
2.85	83.00	0.00	-3.57	-296.54	-65.19	182.82
3.13	83.00	0.00	-2.57	-212.99	7.12	190.53
3.42	83.00	0.00	-1.71	-142.02	57.41	180.85
3.70	83.00	0.00	-1.00	-83.03	89.21	159.56
3.99	83.00	0.00	-0.42	-34.63	105.75	131.45
4.27	0.00	83.00	0.06	5.03	109.78	100.47
4.56	0.00	83.00	0.46	38.00	103.51	69.86
4.84	0.00	83.00	0.80	66.30	88.56	42.29
5.13	0.00	83.00	1.11	91.76	65.99	20.10
5.41	0.00	83.00	1.40	115.84	36.39	5.35
5.70	0.00	83.00	1.68	139.51	0.00	-0.00

Maximum shear force = 132,34 kN/m
 Maximum moment = 190,58 kNm/m
 Maximum displacement = 17,8 mm
 Displacement in the depth of slip surface = 8,7 mm

Verification of rock bearing capacity

Bearing capacity of rock $R = 3000,00$ kPa
 Partial factor on rock bearing capacity $\gamma_{Rr} = 1,40$
 Max. stress $\sigma = 666,83$ kPa
 Design bearing capacity of rock $R_d = 2142,86$ kPa

Bearing capacity of rock is SATISFACTORY

Terrain settlement behind the structure

Terrain settlement $\delta_{max} = 9,5$ mm

	Coordinate x [m]	Settlement z [mm]
1	0,00	8,1
2	0,41	10,7
3	0,82	12,5
4	1,23	13,6
5	1,64	13,9
6	2,05	13,5
7	2,46	12,3
8	2,87	10,4

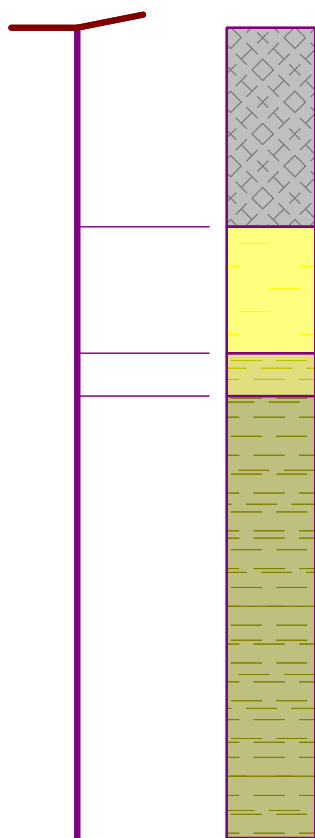
	Coordinate x [m]	Settlement z [mm]
9	3,28	7,7
10	3,69	4,2
11	4,10	0,0
12	4,10	0,0

Name : Analysis

Stage - analysis : 1 - -1

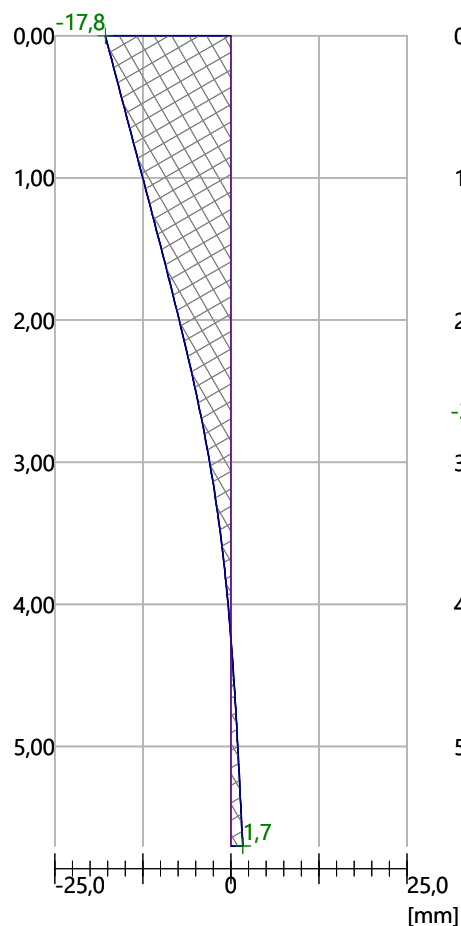
Geometry of structure

Length of structure = 5,70m



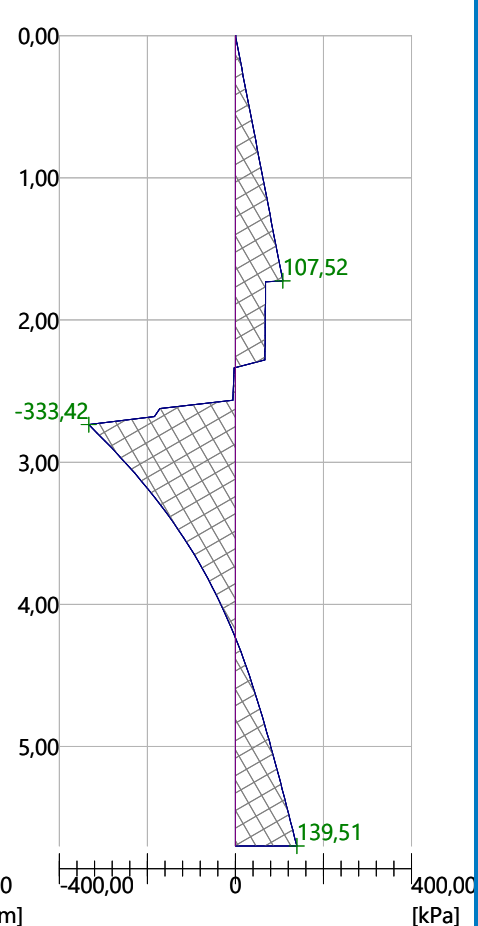
Displacement of structure

Max. disp. = 17,8 mm



Pressure acting on structure

Max. pressure = 333,42 kPa

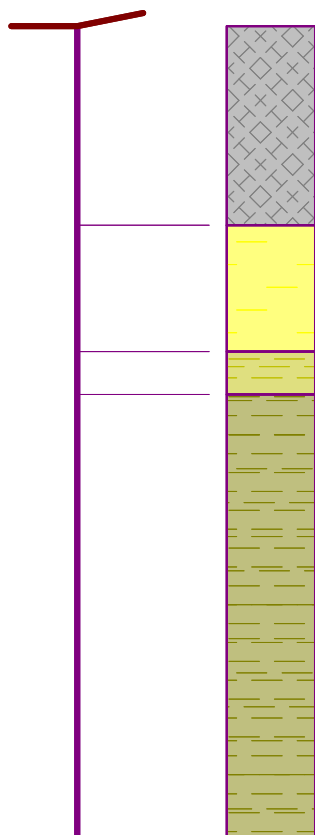


Name : Analysis

Stage - analysis : 1 - -1

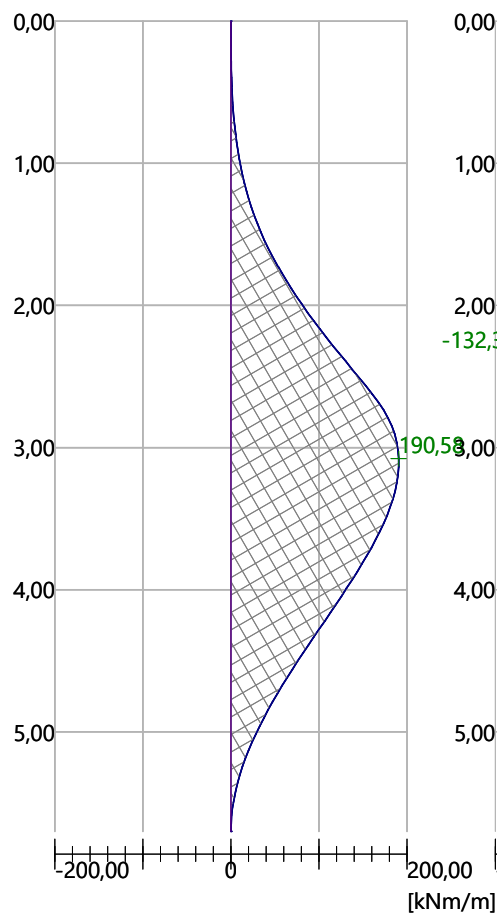
Geometry of structure

Length of structure = 5,70m



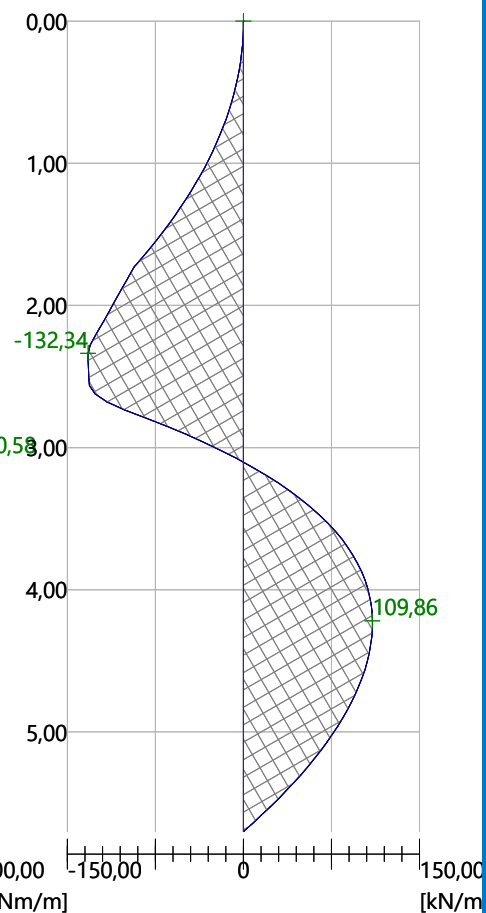
Bending moment

Max. M = 190,58 kNm/m



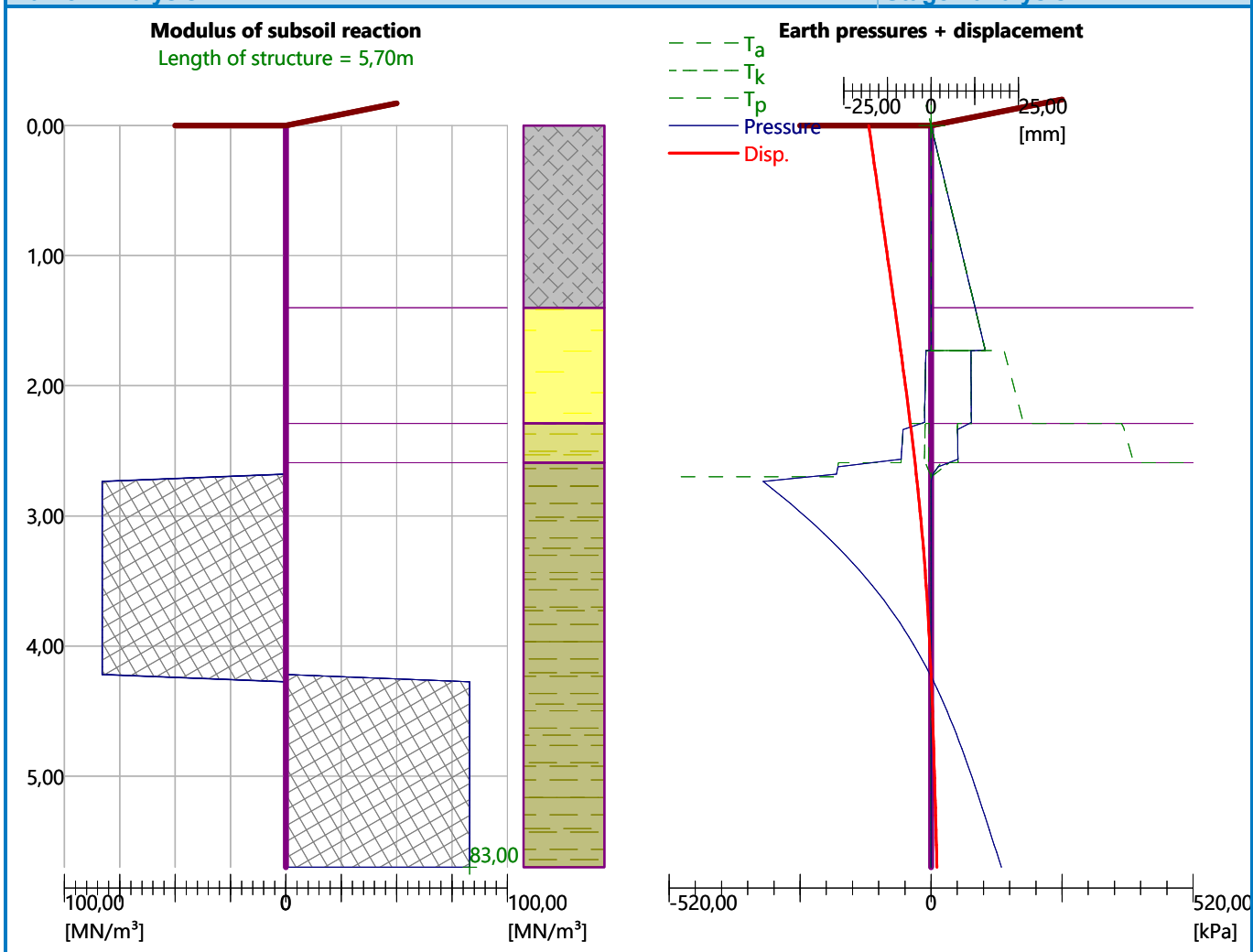
Shear force

Max. Q = 132,34 kN/m



Name : Analysis

Stage - analysis : 1 - -1



Dimensioning No. 1

	Disp. min [mm]	Disp. max [mm]	Shear force min. [kN/m]	Shear force max [kN/m]	Moment min. [kNm/m]	Moment max. [kNm/m]
0.00	-17.84	-17.84	-0.00	-0.00	0.00	0.00
0.01	-17.81	-17.81	-0.00	-0.00	0.00	0.00
0.01	-17.81	-17.81	-0.00	-0.00	0.00	0.00
0.01	-17.76	-17.76	-0.01	-0.01	0.00	0.00
0.01	-17.76	-17.76	-0.01	-0.01	0.00	0.00
0.28	-16.32	-16.32	-2.53	-2.53	0.24	0.24
0.57	-14.80	-14.80	-10.13	-10.13	1.92	1.92
0.85	-13.28	-13.28	-22.80	-22.80	6.50	6.50
1.14	-11.77	-11.77	-40.53	-40.53	15.40	15.40
1.42	-10.27	-10.27	-63.32	-63.32	30.08	30.08
1.71	-8.80	-8.80	-91.18	-91.18	51.97	51.97
1.72	-8.73	-8.73	-92.69	-92.69	53.27	53.27
1.72	-8.73	-8.73	-92.69	-92.69	53.27	53.27
1.73	-8.69	-8.69	-93.39	-93.39	54.01	54.01
1.73	-8.69	-8.69	-93.39	-93.39	54.01	54.01
1.99	-7.37	-7.37	-111.32	-111.32	80.93	80.93

	Disp. min [mm]	Disp. max [mm]	Shear force min. [kN/m]	Shear force max [kN/m]	Moment min. [kNm/m]	Moment max. [kNm/m]
2.28	-6.00	-6.00	-130.52	-130.52	115.40	115.40
2.56	-4.72	-4.72	-131.29	-131.29	152.97	152.97
2.85	-3.57	-3.57	-65.19	-65.19	182.82	182.82
3.13	-2.57	-2.57	7.12	7.12	190.53	190.53
3.42	-1.71	-1.71	57.41	57.41	180.85	180.85
3.70	-1.00	-1.00	89.21	89.21	159.56	159.56
3.99	-0.42	-0.42	105.75	105.75	131.45	131.45
4.27	0.06	0.06	109.78	109.78	100.47	100.47
4.56	0.46	0.46	103.51	103.51	69.86	69.86
4.84	0.80	0.80	88.56	88.56	42.29	42.29
5.13	1.11	1.11	65.99	65.99	20.10	20.10
5.41	1.40	1.40	36.39	36.39	5.35	5.35
5.70	1.68	1.68	0.00	0.00	-0.00	-0.00

Maximum values of internal forces

Maximum displacement = -17,8 mm
 Minimum displacement = 1,7 mm
 Maximum bending moment = 190,58 kNm/m
 Minimum bending moment = 0,00 kNm/m
 Maximum shear force = 132,34 kN/m

Verification of RC cross section (Pile curtain $d = 0,50$ m; $a = 1,00$ m)

All construction stages are taken into the analysis.
 Reduct. coefficient of bearing capacity = 1,00

Verification of cross section in bending:

Reinforcement - 10 pc bars 20,0 mm; cover 50,0 mm
 Type of structure (reinforcement ratio) : beam
 Reinforcement ratio $\rho = 0,800 \% > 0,151 \% = \rho_{\min}$
 Load : $M_{Ed} = 190,58$ kNm
 Bearing capacity : $M_{Rd} = 230,96$ kNm

Designed pile reinforcement is SATISFACTORY

Verification of cross section in shear:

Shear reinf. - 2 profile 10,0 mm; distance 200,0 mm
 $A_{sw} = 785,4$ mm²
 Ultimate shear force: $V_{Rd} = 307,33$ kN $> 132,34$ kN = V_{Ed}

Cross-section is SATISFACTORY.

Overall verification: Cross-section is SATISFACTORY

Name : Dimensioning

Stage - analysis : 1 - 1

