Slope stability analysis

Input data

Project

Task : Sanacija plazu 2 na JP 948 321
Part : P -3
Description : Povratne stabilnostne analize
Customer : Občina Oplotnica
Author : GEOING d.o.o.
Date : 23.2.2023

Settings

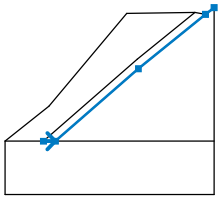
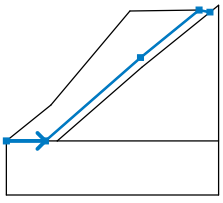
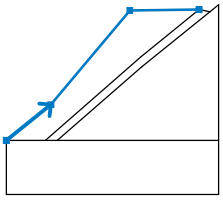
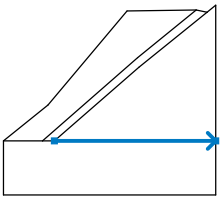
Slovenia - EN 1997 (38)

Stability analysis

Earthquake analysis : Standard
Verification methodology : Safety factors (ASD)

Safety factors			
Permanent design situation			
Safety factor :	SF_s =	1,50	[–]

Interface

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		3,60	0,00	4,70	0,00	12,50	6,80
		18,80	11,90	19,60	12,54		
2		0,00	0,00	3,60	0,00	12,40	7,70
		17,80	12,10	18,80	11,90		
3		0,00	0,00	4,10	3,30	11,40	12,00
		17,80	12,10				
4		4,70	0,00	19,60	0,00		

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Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]
1	Zaglinjeni grušč		30,00	5,00	19,00
2	Preperina		30,00	10,00	21,00
3	Hribina		34,00	30,00	23,00

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m^3]	γ_s [kN/m^3]	n [–]
1	Zaglinjeni grušč		19,00		
2	Preperina		21,00		
3	Hribina		23,00		

Soil parameters

Zaglinjeni grušč

Unit weight : γ = 19,00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 30,00 °
Cohesion of soil : c_{ef} = 5,00 kPa
Saturated unit weight : γ_{sat} = 19,00 kN/m^3

Preperina

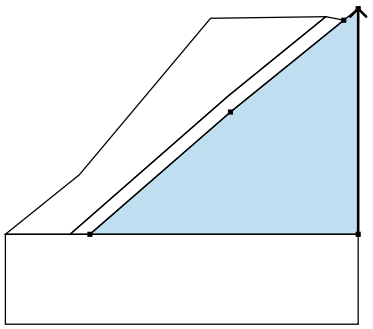
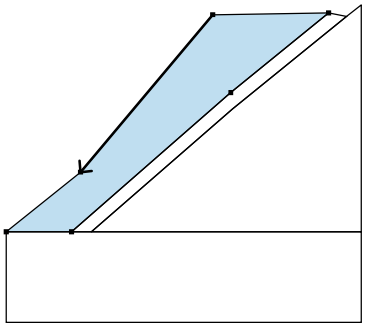
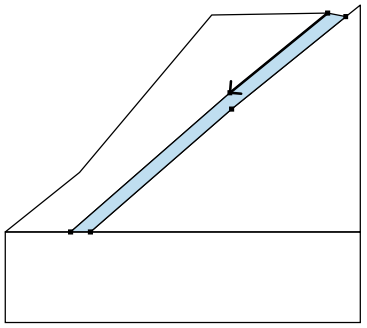
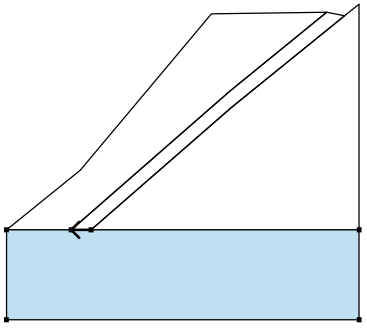
Unit weight : γ = 21,00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 30,00 °
Cohesion of soil : c_{ef} = 10,00 kPa
Saturated unit weight : γ_{sat} = 21,00 kN/m^3

Hribina

Unit weight : γ = 23,00 kN/m^3
Stress-state : effective
Angle of internal friction : φ_{ef} = 34,00 °
Cohesion of soil : c_{ef} = 30,00 kPa
Saturated unit weight : γ_{sat} = 23,00 kN/m^3

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Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		19,60	0,00	19,60	12,54	Hribina
		18,80	11,90	12,50	6,80	
		4,70	0,00			
2		11,40	12,00	4,10	3,30	Zaglinjeni grušč
		0,00	0,00	3,60	0,00	
		12,40	7,70	17,80	12,10	
3		17,80	12,10	12,40	7,70	Preperina
		3,60	0,00	4,70	0,00	
		12,50	6,80	18,80	11,90	
4		4,70	0,00	3,60	0,00	Hribina
		0,00	0,00	0,00	-5,00	
		19,60	-5,00	19,60	0,00	

Water

Water type : No water

Tensile crack

Tensile crack not input.

Earthquake

Earthquake not included.

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Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)

Analysis 1

Circular slip surface

Slip surface parameters							
Center :	x =	-13,87	[m]	Angles :	α_1 =	33,05	[°]
	z =	31,24	[m]		α_2 =	54,60	[°]
Radius :	R =	33,17	[m]				
Analysis of the slip surface without optimization.							

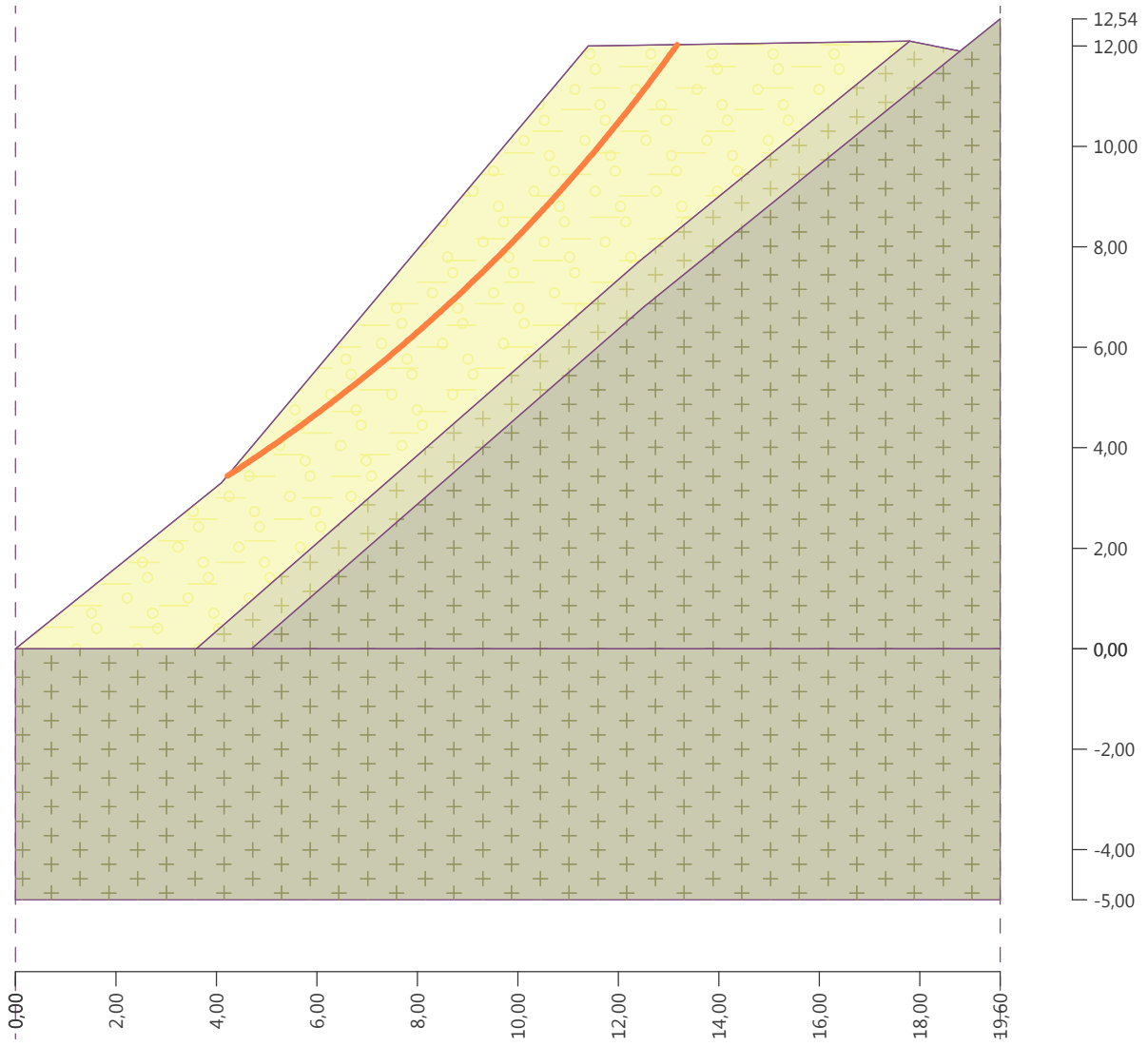
Slope stability verification (Bishop)

Sum of active forces : F_a = 162,92 kN/m
Sum of passive forces : F_p = 159,87 kN/m

Sliding moment : M_a = 5403,95 kNm/m
Resisting moment : M_p = 5302,87 kNm/m
Factor of safety = 0,98 < 1,50
Slope stability NOT ACCEPTABLE

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Name : Analysis	Stage - analysis : 1 - 1
Description : Drsina 1	



Analysis 2

Circular slip surface

Slip surface parameters							
Center :	x =	-10,51	[m]	Angles :	α_1 =	27,41	[°]
	z =	31,49	[m]		α_2 =	52,24	[°]
Radius :	R =	31,75	[m]				
Analysis of the slip surface without optimization.							

Slope stability verification (Bishop)

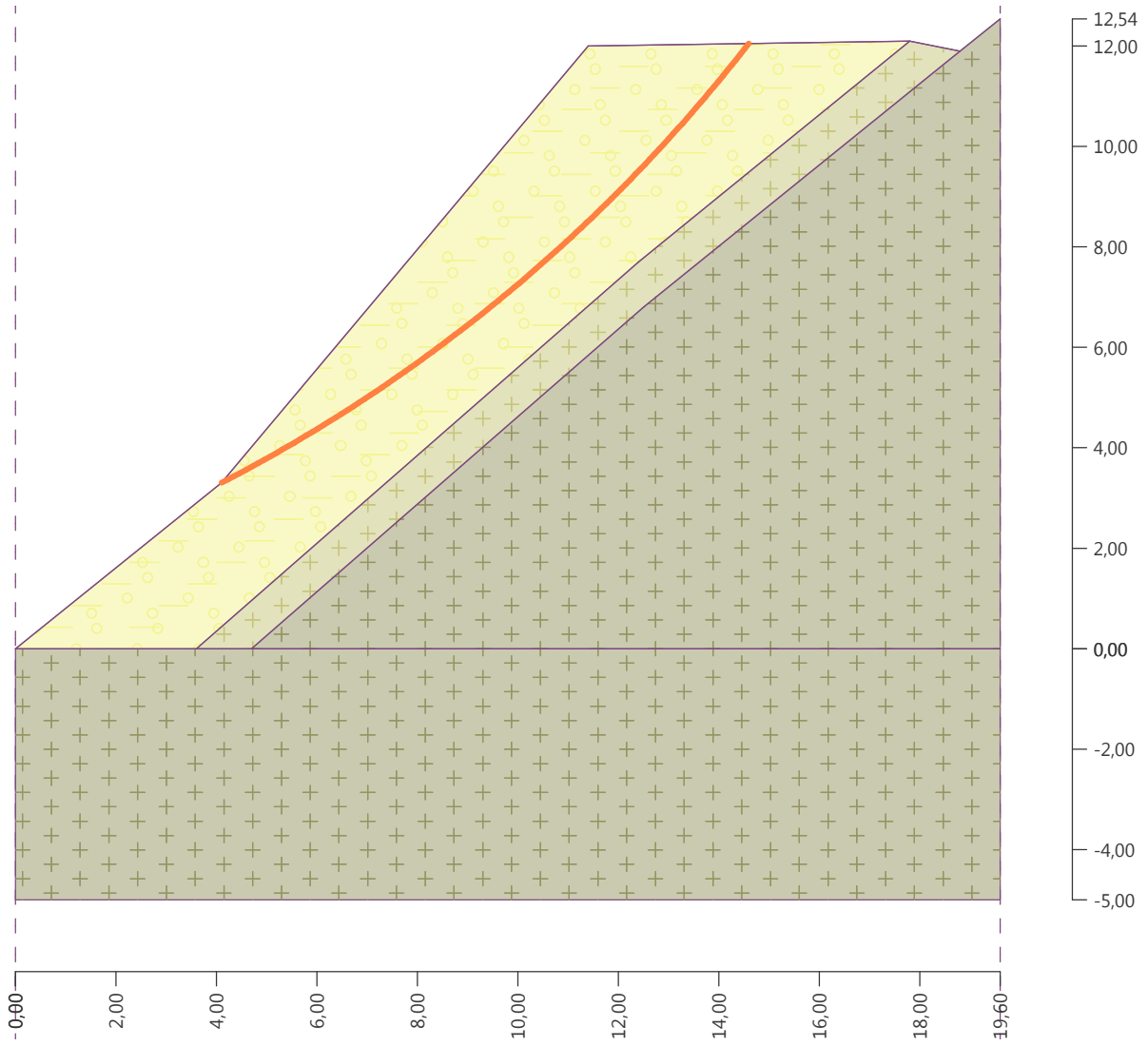
Sum of active forces : F_a = 249,10 kN/m
Sum of passive forces : F_p = 242,10 kN/m

Sliding moment : M_a = 7907,68 kNm/m
Resisting moment : M_p = 7685,55 kNm/m
Factor of safety = 0,97 < 1,50
Slope stability NOT ACCEPTABLE

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Name : Analysis | **Stage - analysis : 1 - 2**

Description : Drsina 2



Analysis 3

Circular slip surface

Slip surface parameters							
Center :	x =	-18,59	[m]	Angles :	α_1 =	27,63	[°]
	z =	46,93	[m]		α_2 =	44,80	[°]
Radius :	R =	49,13	[m]				
Analysis of the slip surface without optimization.							

Slope stability verification (Bishop)

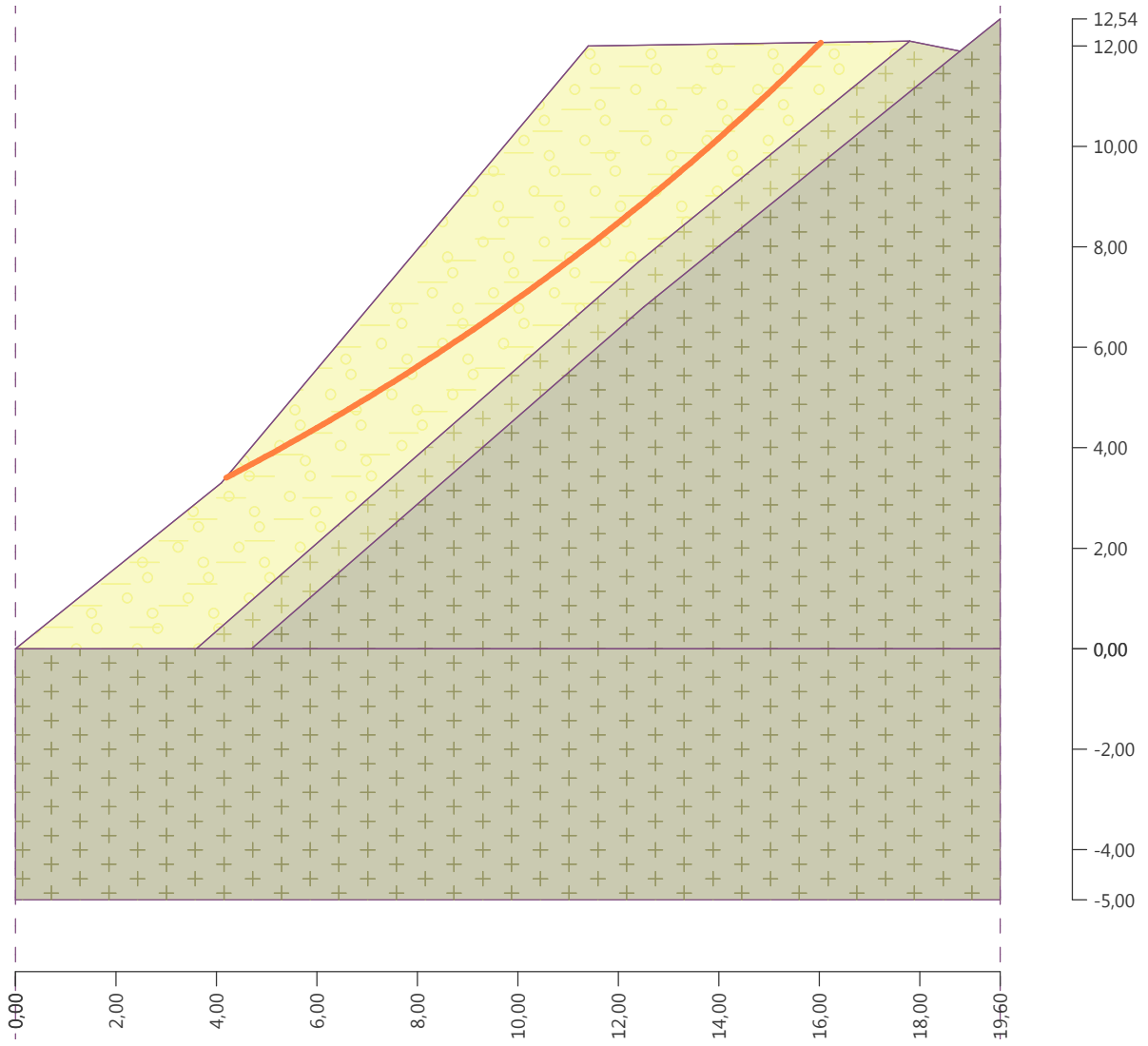
Sum of active forces : F_a = 280,47 kN/m
Sum of passive forces : F_p = 295,00 kN/m

Sliding moment : M_a = 13778,32 kNm/m
Resisting moment : M_p = 14492,05 kNm/m
Factor of safety = 1,05 < 1,50
Slope stability NOT ACCEPTABLE

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Name : Analysis | **Stage - analysis : 1 - 3**

Description : Drsina 3



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