

# Slope stability analysis

## Input data

### Project

### Settings

Standard - EN 1997 - DA2

### Stability analysis

Earthquake analysis : Standard

Verification methodology : according to EN 1997

Design approach : 2 - reduction of actions and resistances

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

Partial factors for resistances (R)					
Seismic design situation					
Partial factor on sliding resistance (on slip surface) :		$\gamma_{Rs} =$	1,00 [-]		

### Interface

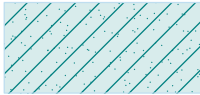
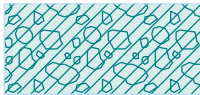

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-13,00	-4,00	-10,00	-3,00	-9,00	-3,00
		-6,00	-2,00	-3,00	-2,00	-2,00	-2,00
		-2,00	-1,00	-1,00	-1,00	-1,00	0,00
		0,00	0,00	4,00	2,00	10,00	2,00
2		-3,00	-2,00	-3,00	-3,00	0,00	-3,00
		0,00	-2,00	0,00	-1,00	0,00	0,00
3		0,00	-2,00	10,00	-2,00		

### Soil parameters - effective stress state

No.	Name	Pattern	$\varphi_{ef}$ [°]	$c_{ef}$ [kPa]	$\gamma$ [kN/m³]
1	Заскалявка		34,00	0,00	22,00
2	обратен насип		32,00	0,00	20,00

No.	Name	Pattern	$\varphi_{ef}$ [°]	$c_{ef}$ [kPa]	$\gamma$ [kN/m <sup>3</sup> ]
3	Речно корито		33,00	0,00	16,00

#### Soil parameters - uplift

No.	Name	Pattern	$\gamma_{sat}$ [kN/m <sup>3</sup> ]	$\gamma_s$ [kN/m <sup>3</sup> ]	n [—]
1	Заскалявка		22,00		
2	обратен насип		20,00		
3	Речно корито		16,00		

#### Soil parameters

##### Заскалявка

Unit weight :  $\gamma = 22,00 \text{ kN/m}^3$   
 Stress-state : effective  
 Angle of internal friction :  $\varphi_{ef} = 34,00^\circ$   
 Cohesion of soil :  $c_{ef} = 0,00 \text{ kPa}$   
 Saturated unit weight :  $\gamma_{sat} = 22,00 \text{ kN/m}^3$

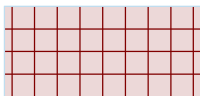
##### обратен насип

Unit weight :  $\gamma = 20,00 \text{ kN/m}^3$   
 Stress-state : effective  
 Angle of internal friction :  $\varphi_{ef} = 32,00^\circ$   
 Cohesion of soil :  $c_{ef} = 0,00 \text{ kPa}$   
 Saturated unit weight :  $\gamma_{sat} = 20,00 \text{ kN/m}^3$

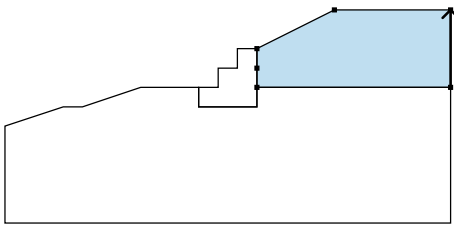
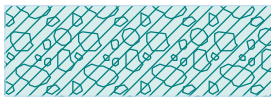
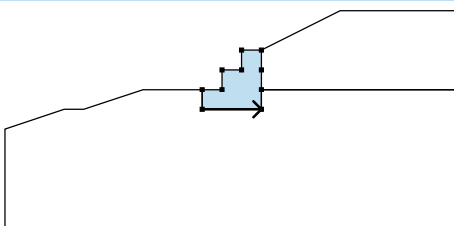
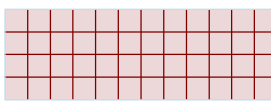
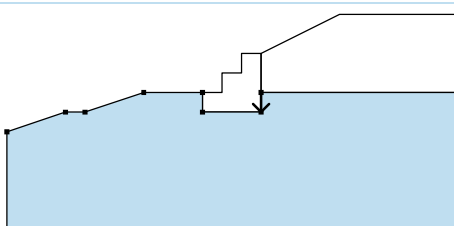

##### Речно корито

Unit weight :  $\gamma = 16,00 \text{ kN/m}^3$   
 Stress-state : effective  
 Angle of internal friction :  $\varphi_{ef} = 33,00^\circ$   
 Cohesion of soil :  $c_{ef} = 0,00 \text{ kPa}$   
 Saturated unit weight :  $\gamma_{sat} = 16,00 \text{ kN/m}^3$

#### Rigid bodies

No.	Name	Sample	$\gamma$ [kN/m <sup>3</sup> ]
1	Wall material		18,00

## Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10,00	-2,00	10,00	2,00	обратен насип 
		4,00	2,00	0,00	0,00	
		0,00	-1,00	0,00	-2,00	
2		-3,00	-3,00	0,00	-3,00	Wall material 
		0,00	-2,00	0,00	-1,00	
		0,00	0,00	-1,00	0,00	
		-1,00	-1,00	-2,00	-1,00	
		-2,00	-2,00	-3,00	-2,00	
3		0,00	-2,00	0,00	-3,00	Речно корито 
		-3,00	-3,00	-3,00	-2,00	
		-6,00	-2,00	-9,00	-3,00	
		-10,00	-3,00	-13,00	-4,00	
		-13,00	-9,00	10,00	-9,00	
		10,00	-2,00			

### Water

Water type : No water

### Tensile crack

Tensile crack not inputted.

### Earthquake

Horizontal seismic coefficient :  $K_h = 0,11$

Vertical seismic coefficient :  $K_v = 0,06$

### Settings of the stage of construction

Design situation : seismic

## Results (Stage of construction 1)

### Analysis 1

#### Circular slip surface

Slip surface parameters					
Center :	x =	-7,40 [m]	Angles :	$\alpha_1$ =	-9,86 [°]
	z =	23,43 [m]		$\alpha_2$ =	38,92 [°]
Radius :	R =	27,54 [m]			
Analysis of the slip surface without optimization.					

#### Slope stability verification (all methods)

Bishop : Utilization = 65,0 % **ACCEPTABLE**

Fellenius / Petterson : Utilization = 67,9 % **ACCEPTABLE**

Spencer : Utilization = 64,8 % **ACCEPTABLE**

Janbu : Utilization = 64,8 % **ACCEPTABLE**

Morgenstern-Price : Utilization = 64,8 % **ACCEPTABLE**

