

Gabion analysis

Input data

Project

Task : Stability at Cellars Clough
Part : Section AA
Description : Gabion Wall 1 Section
Author : Mark Richardson
Date : 08/01/2020
Project ID : 6018 CCZ

Material of blocks - filling

No.	Name	γ [kN/m ³]	ϕ [°]	c [kPa]
1	Material No. 1	18.00	44.00	0.00

Material of blocks - mesh

No.	Name	Strength overh. R_t [kN/m]	Spacing of vert. meshes v [m]	Bear.cap. of front joint R_s [kN/m]
1	Material No. 1	20.00	1.00	20.00

Geometry of structure

No.	Width b [m]	Height h [m]	Offset a [m]	Material
2	1.00	1.00	0.00	Material No. 1
1	2.00	1.00	-	Material No. 1

Gabion slope = 0.00 °
Overall height = 2.00 m
Overall wall volume = 3.00 m³/m

Soil parameters

MADE GROUND

Unit weight : $\gamma = 20.00$ kN/m³
Stress-state : effective
Angle of internal friction : $j_{ef} = 40.00$ °
Cohesion of soil : $c_{ef} = 0.00$ kPa
Angle of friction struc.-soil : $d = 30.00$ °
Soil : cohesionless
Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m³

CLAY 1

Unit weight : $\gamma = 20.00$ kN/m³
Stress-state : effective
Angle of internal friction : $j_{ef} = 30.00$ °
Cohesion of soil : $c_{ef} = 0.00$ kPa
Angle of friction struc.-soil : $d = 25.00$ °
Soil : cohesionless
Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m³

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	84.00	45.00	3.10	2.30	on terrain

No.	Name
1	Wall 2 Surcharge

Verification No. 1

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 102.74$ kNm/m

Overturning moment $M_{ovr} = 19.55$ kNm/m

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 50.84$ kN/m

Active horizontal force $H_{act} = 36.07$ kN/m

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 46.66 kPa

Bearing capacity of foundation soil

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0.050$

Maximum allowable eccentricity $e_{alw} = 0.333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity

Max. stress at footing bottom $s = 84.02$ kPa

Bearing capacity of foundation soil $R_d = 100.00$ kPa

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

Slope stability analysis

Input data

Project

Soil parameters

MADE GROUND

Unit weight : $g = 20.00$ kN/m³

Stress-state : effective

Angle of internal friction : $j_{ef} = 40.00$ °

Cohesion of soil : $c_{ef} = 0.00$ kPa

Saturated unit weight : $g_{sat} = 20.00$ kN/m³

CLAY 1

Unit weight : $g = 20.00 \text{ kN/m}^3$
Stress-state : effective
Angle of internal friction : $j_{ef} = 30.00^\circ$
Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
Saturated unit weight : $g_{sat} = 20.00 \text{ kN/m}^3$

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope a [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	trapezoid	permanent	on terrain	x = 3.10	l = 2.30		0.00	84.00	45.00	kN/m ²

Surcharges

No.	Name
1	WALL 2

Water

Water type : No water

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)

Analysis 1

Slope stability verification (Bishop)

Combination 1

Sum of active forces : $F_a = 235.61 \text{ kN/m}$
Sum of passive forces : $F_p = 324.61 \text{ kN/m}$
Sliding moment : $M_a = 1957.95 \text{ kNm/m}$
Resisting moment : $M_p = 2697.54 \text{ kNm/m}$
Utilization : 72.6 %

Slope stability ACCEPTABLE

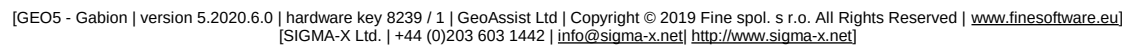
Combination 2

Sum of active forces : $F_a = 185.17 \text{ kN/m}$
Sum of passive forces : $F_p = 228.48 \text{ kN/m}$
Sliding moment : $M_a = 1538.73 \text{ kNm/m}$
Resisting moment : $M_p = 1898.70 \text{ kNm/m}$
Utilization : 81.0 %

Slope stability ACCEPTABLE

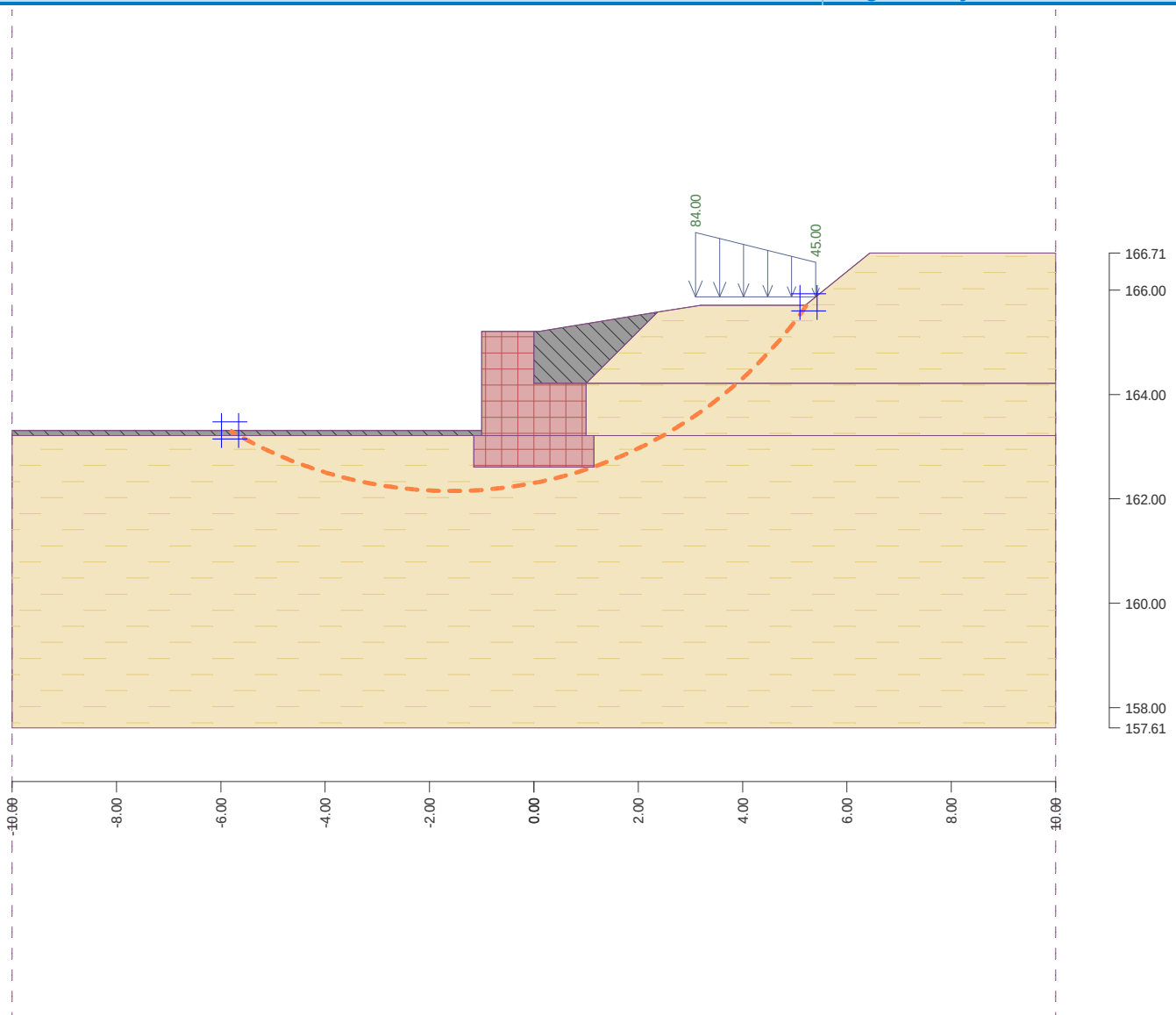
Optimized slip surface for : Combination 2

Stage - analysis : 1 - 1



Name :

Stage - analysis : 1 - 1



The slip surface after optimization.

Slope stability verification (Bishop)

Combination 1

Sum of active forces : $F_a = 235.61 \text{ kN/m}$

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