Gabion analysis

Input data

Project

Task : Stability at Cellars Clough
Part : Section AA
Description : Gabion Wall 1+2+3+4 Section
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Date : 08/01/2020
Project ID : 6018 CCZ

Material of blocks - filling

No.	Name	g [kN/m3]	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

Soil parameters

MADE GROUND
Unit weight : $\gamma = 20.00$ kN/m3
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 44.00$ °
Cohesion of soil : $c_{ef} = 0.00$ kPa
Angle of friction struc.-soil : $\delta = 30.00$ °
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 : $\varphi_{ef} = 33.00$ °
Cohesion of soil : $c_{ef} = 0.00$ kPa
Angle of friction struc.-soil : $\delta = 25.00$ °
Soil : cohesionless
Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m3

Backfill

Assigned soil : MADE GROUND
Slope = 45.00 °

Foundation

Type of foundation : strip foundation
Unit weight of foundation $\gamma = 25.00$ kN/m3

Geometry of foundation
Foundation thickness $h = 0.60$ m
Offset left $b_l = 0.15$ m
Offset right $b_p = 0.15$ m

Parameters of contact base-soil
Friction coefficient $f = 0.577$
Cohesion $c = 0.00$ kPa

Additional resistance F = 0.00 kN/m

Water influence

Ground water table is located below the structure.

Input surface surcharges

No.	Surcharge new	Surcharge change	Action	Mag.1 [kN/m2]	Mag.2 [kN/m2]	Ord.x x [m]	Length l [m]	Depth z [m]
1	Yes		permanent	84.00	45.00	3.10	2.30	on terrain

No.	Name
1	Wall 2 surcharge

Resistance on front face of the structure

Resistance on front face of the structure: at rest
Soil on front face of the structure - MADE GROUND
Soil thickness in front of structure h = 0.10 m

Terrain in front of structure is flat.

Verification No. 1

Verification of complete wall

Check for overturning stability
Resisting moment M_{res} = 98.40 kNm/m
Overturning moment M_{ovr} = 15.22 kNm/m

Wall for overturning is SATISFACTORY

Check for slip
Resisting horizontal force H_{res} = 49.58 kN/m
Active horizontal force H_{act} = 29.74 kN/m

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 44.39 kPa

Bearing capacity of foundation soil

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification
Max. eccentricity of normal force e = 0.036
Maximum allowable eccentricity e_{alw} = 0.333

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity
Max. stress at footing bottom s = 76.98 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

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	Magnitude q_2	Magnitude unit
1	trapezoid	permanent	on terrain	x = 3.10	l = 2.30		0.00	84.00	45.00	kN/m^2
2	trapezoid	permanent	on terrain	x = 7.34	l = 2.30		0.00	84.00	45.00	kN/m^2
3	trapezoid	permanent	on terrain	x = 10.58	l = 2.30		0.00	84.00	45.00	kN/m^2

Surcharges

No.	Name
1	Wall 2 surcharge
2	Wall 3 surcharge
3	Wall 4 surcharge

Results (Stage of construction 1)

Analysis 1

Slope stability verification (Bishop)
Combination 1
Sum of active forces : F_a = 652.88 kN/m
Sum of passive forces : F_p = 956.81 kN/m

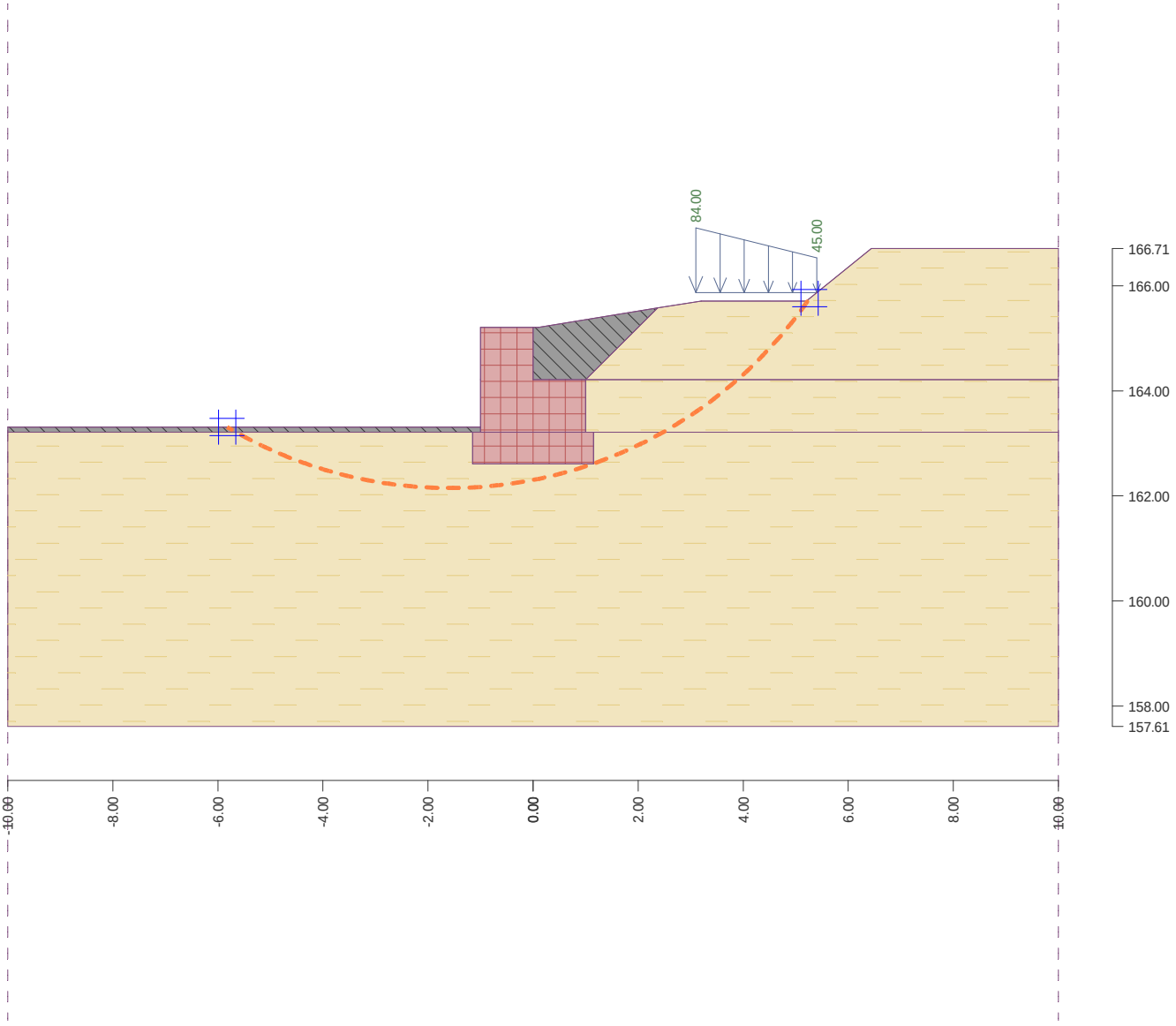
Sliding moment : M_a = 8820.36 kNm/m
Resisting moment : M_p = 12926.52 kNm/m
Utilization : 68.2 %

Slope stability ACCEPTABLE
Combination 2
Sum of active forces : F_a = 544.54 kN/m
Sum of passive forces : F_p = 697.37 kN/m

Sliding moment : M_a = 7356.69 kNm/m
Resisting moment : M_p = 9421.52 kNm/m
Utilization : 78.1 %

Slope stability ACCEPTABLE
Optimized slip surface for : Combination 2

Name :	Stage - analysis : 1 - 1



The slip surface after optimization.

Slope stability verification (Bishop)
Combination 1

Sum of active forces : F_a = 235.61 kN/m
Sum of passive forces : F_p = 324.61 kN/m

Sliding moment : M_a = 1957.95 kNm/m
Resisting moment : M_p = 2697.54 kNm/m
Utilization : 72.6 %

Slope stability ACCEPTABLE

Combination 2

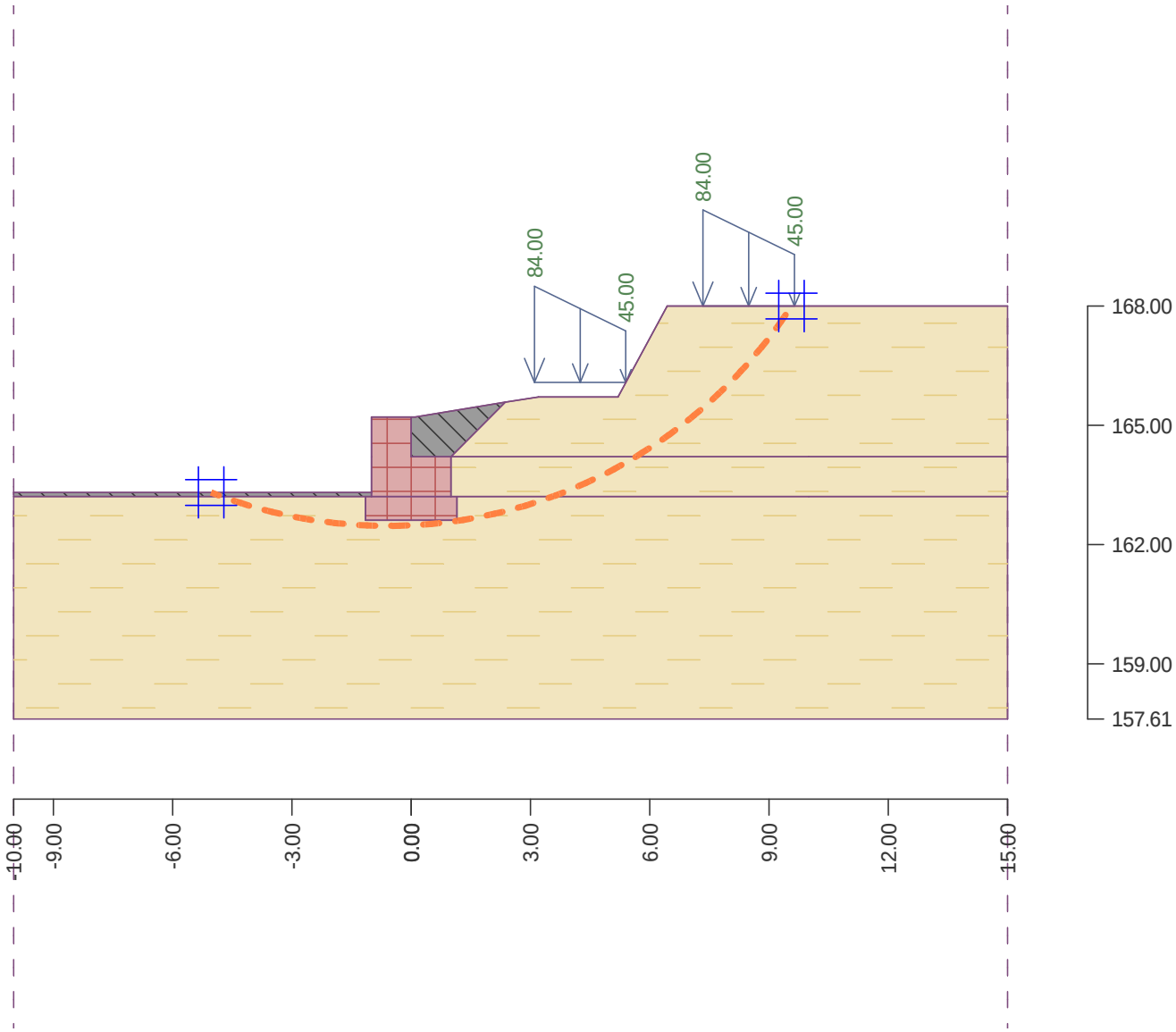
Sum of active forces : F_a = 185.17 kN/m
Sum of passive forces : F_p = 228.48 kN/m

Sliding moment : M_a = 1538.73 kNm/m
Resisting moment : M_p = 1898.70 kNm/m
Utilization : 81.0 %

Slope stability ACCEPTABLE

Optimized slip surface for : Combination 2

Name :	Stage - analysis : 1 - 1



The slip surface after optimization.

Slope stability verification (Bishop)
Combination 1

Sum of active forces : F_a = 406.79 kN/m
Sum of passive forces : F_p = 581.75 kN/m

Sliding moment : M_a = 4926.22 kNm/m
Resisting moment : M_p = 7044.96 kNm/m
Utilization : 69.9 %

Slope stability ACCEPTABLE

Combination 2

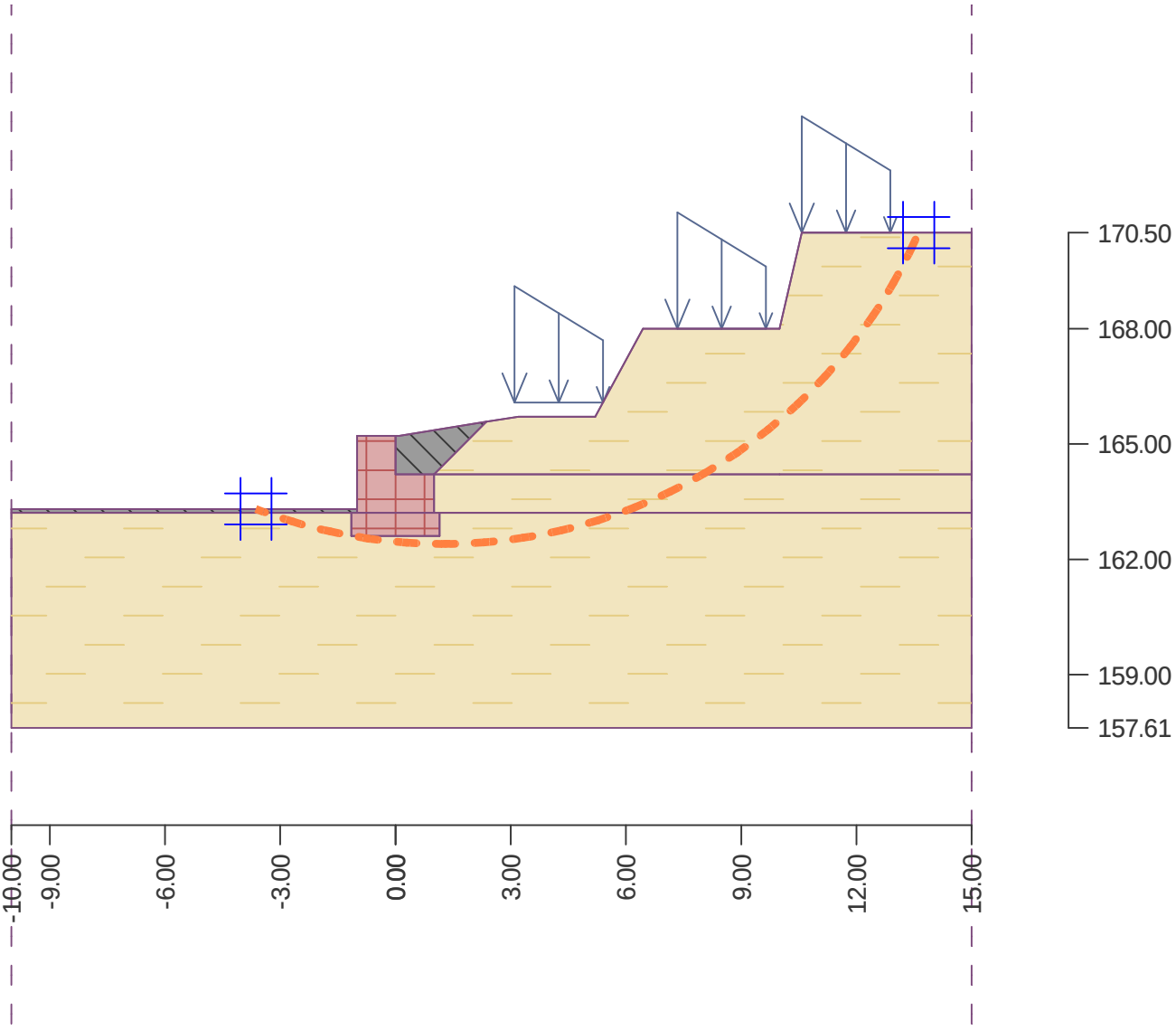
Sum of active forces : F_a = 336.19 kN/m
Sum of passive forces : F_p = 420.05 kN/m

Sliding moment : M_a = 4071.26 kNm/m
Resisting moment : M_p = 5086.80 kNm/m
Utilization : 80.0 %

Slope stability ACCEPTABLE

Optimized slip surface for : Combination 2

Name :	Stage - analysis : 1 - 1



The slip surface after optimization.

Slope stability verification (Bishop)
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Slope stability ACCEPTABLE

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