

Earth pressure on structure analysis

Input data

Project


Date : 4.11.2005

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.00	5.00
3	0.00	0.00

The origin [0,0] is located at the most upper point of the structure.

Basic soil parametres

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	Gravelly silt, consistency very stiff		29.00	8.00	19.00	9.00	12.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

Gravelly silt, consistency very stiff

Unit weight : $\gamma = 19,00 \text{ kN/m}^3$

Stress-state : effective

Angle of intern. friction : $\varphi_{ef} = 29,00^\circ$


Cohesion of soil : $c_{ef} = 8,00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 12,00^\circ$

Soil : cohesionless

Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	-	Gravelly silt, consistency very stiff	

Terrain profile

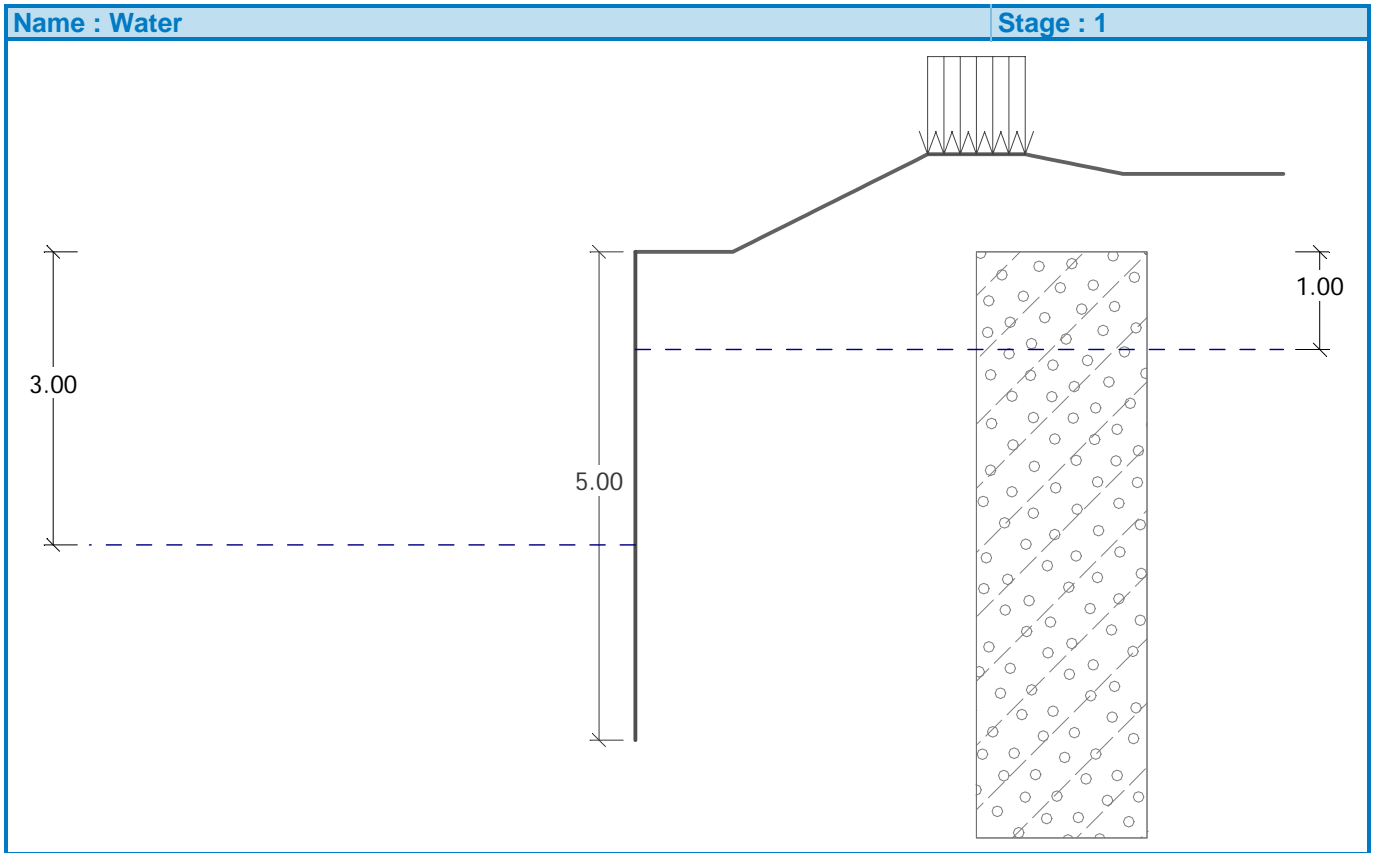
No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	1.00	0.00
3	3.00	-1.00
4	4.00	-1.00
5	5.00	-0.80
6	6.00	-0.80

Origin [0,0] is located in upper right edge of construction.

Positive coordinate +z has downward direction.

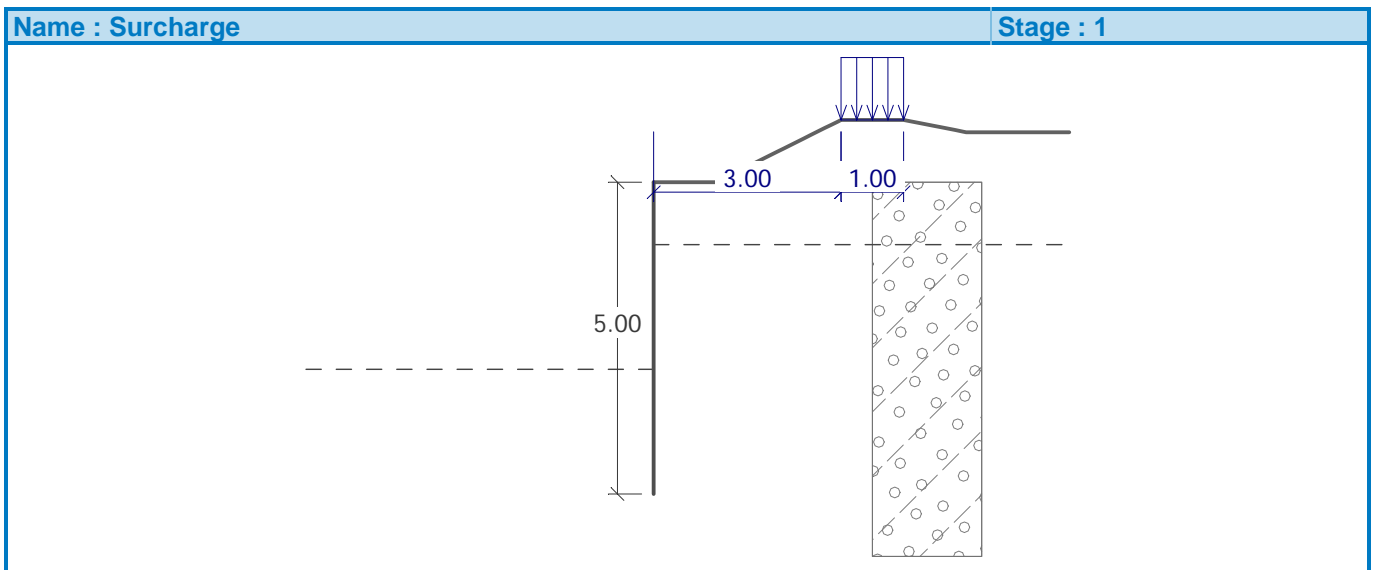
Water influence

GWT behind the structure lies at a depth of 1.00 m
 GWT in front of the structure lies at a depth of 3.00 m
 Subgrade at the heel is not permeable.



Inserted surface loads

No.	Surcharge		Type	Name	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
	new	change							
1	YES		Strip	Surcharge No. 1	12.00		3.00	1.00	on terrain



Analysis settings

Active earth pressure calculation - Coulomb (CSN 730037)

Passive earth pressure calculation - Caquot-Kerisel (CSN 730037)
Analysis carried out according to CSN 730037 standard (with reduction of soil input parameters).

Analysis No. 1

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. Z [m]	F _{vert} [kN/m]	App.Pt. X [m]	Design coefficient
Active pressure	53.56	3.24	10.32	0.00	1.000
Water pressure	60.00	3.44	0.00	0.00	1.000
Surcharge No. 1	6.41	2.31	1.24	0.00	1.000

Overall pressure acting on the structure

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.15	0.00	0.00
4	0.49	2.20	0.42
5	0.49	4.39	0.85
6	0.50	4.47	0.86
7	0.50	4.49	0.87
8	0.95	7.31	1.41
9	1.00	7.60	1.47
10	1.06	8.32	1.50
11	1.06	8.34	1.50
12	2.60	29.16	2.54
13	2.63	29.74	2.58
14	3.00	34.44	2.78
15	5.00	39.94	3.84

Resultant forces

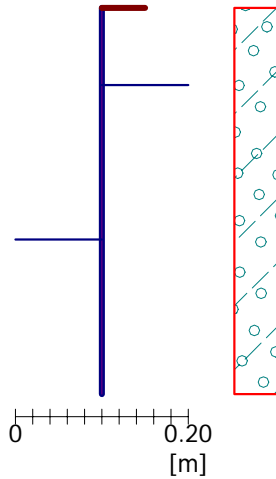
Total horizontal pressure acting on construction = 119.97 kN/m
 Application point of horiz. comp. lies in depth = 3.29 m
 Total vertical pressure acting on construction = 11.56 kN/m
 Dist. of vertical comp. from top of constr. = 0.00 m

Name : Analysis

Stage : 1; Analysis : 1

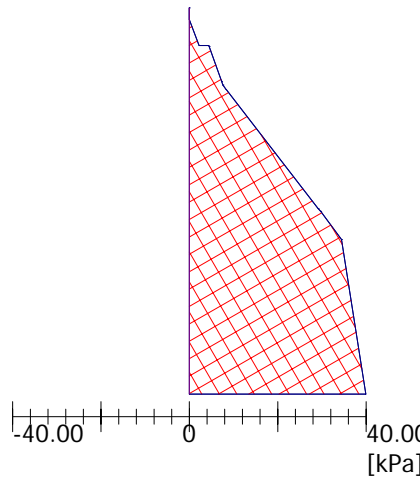
Geometry of structure

Length of structure = 5.00m



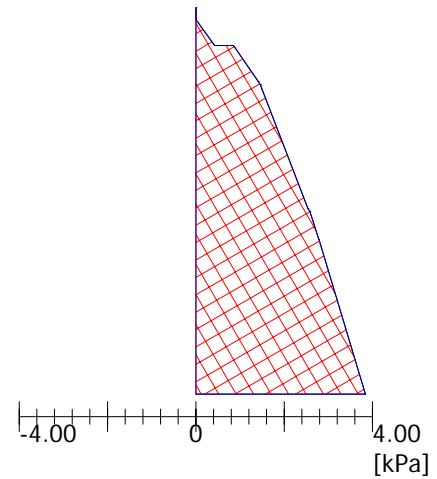
Horizontal component

Overall force = 119.97kN/m
Depth of centroid = 3.29m



Vertical component

Overall force = 11.56kN/m
Shift of centroid = 0.00m



Analysis No. 2

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. Z [m]	F _{vert} [kN/m]	App.Pt. X [m]	Design coefficient
Pressure at rest	130.52	2.96	0.00	0.00	1.000
Water pressure	60.00	3.44	0.00	0.00	1.000
Surcharge No. 1	5.11	2.09	0.00	0.00	1.000

Overall pressure acting on the structure

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	9.53	0.00
2	0.21	11.87	0.00
3	0.42	14.17	0.00
4	0.50	15.08	0.00
5	0.63	16.43	0.00
6	0.83	18.67	0.00
7	1.00	20.43	0.00
8	1.04	21.06	0.00
9	1.25	24.17	0.00
10	1.46	27.26	0.00
11	1.63	29.81	0.00
12	1.67	30.34	0.00
13	1.88	33.41	0.00
14	2.08	36.48	0.00
15	2.29	39.54	0.00
16	2.50	42.60	0.00
17	2.71	45.66	0.00
18	2.92	48.73	0.00
19	3.00	49.95	0.00

Company Name	Project Name
Project Author	Project Part

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
20	3.13	50.54	0.00
21	3.33	51.52	0.00
22	3.54	52.51	0.00
23	3.75	53.50	0.00
24	3.96	54.49	0.00
25	4.17	55.49	0.00
26	4.33	56.27	0.00
27	4.38	56.63	0.00
28	4.58	58.29	0.00
29	4.79	59.95	0.00
30	5.00	61.61	0.00

Resultant forces

Total horizontal pressure acting on construction = 195.63 kN/m
Application point of horiz. comp. lies in depth = 3.08 m
Total vertical pressure acting on construction = 0.00 kN/m
Dist. of vertical comp. from top of constr. = 0.00 m