GAWAC 3.0

Gabion Wall Design

User Guide Manual

Authors

Gabriel Gustavo Pinto

Petrucio Santos Junior

Alyeldeen Gebely

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MACCAFERRI

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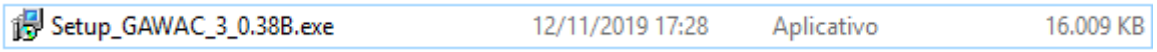
Introduction

The purpose of this document is to guide the user in how to use GawacWin GSC for gabion wall design. Therefore, will be demonstrated, step by step, how to define and to verify a gabion wall on the software.

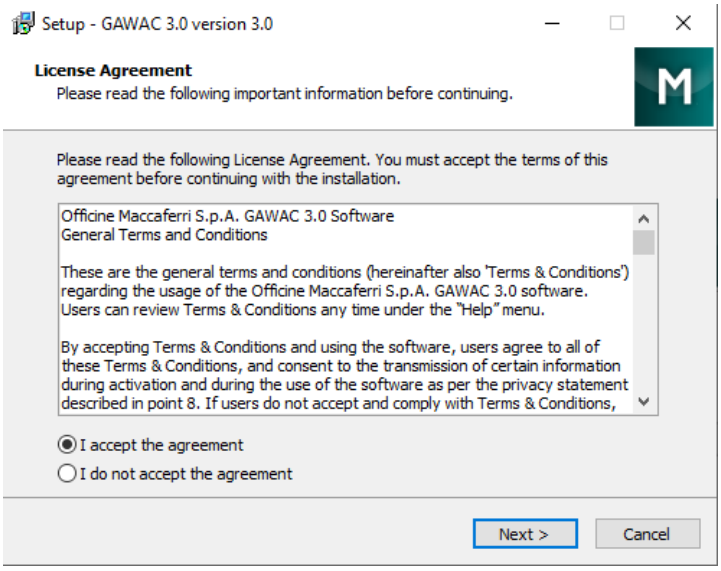
Gabion wall is a kind of application for geotechnical stabilization works. Whenever this solution is indicated for a project, the designer must verify the external analysis in the Ultimate limit state (Sliding, overturning, global stability and bearing capacity). However, the internal stability is an essential analysis to evaluate serviceability state of the gabion. This software contains the new method of serviceability for gabions, the GSC (Gabion serviceability coefficient)

Software Installation

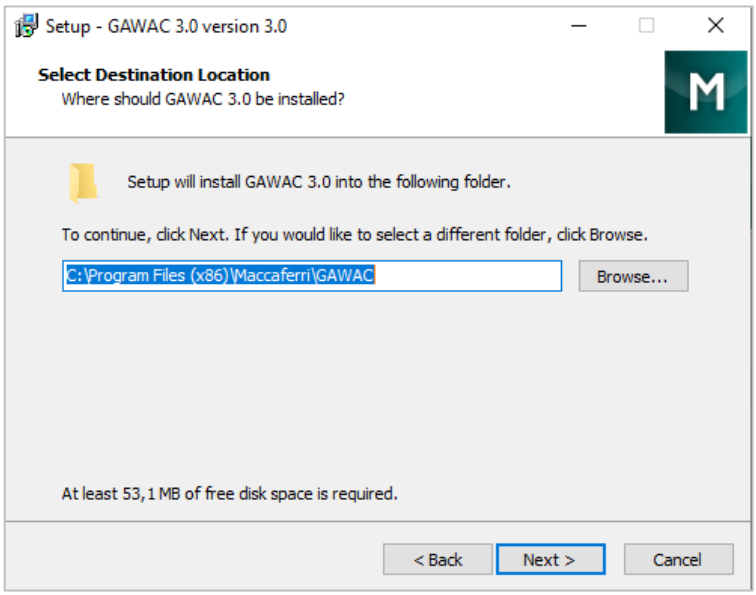
To install the software, execute the file Gawac Set up:



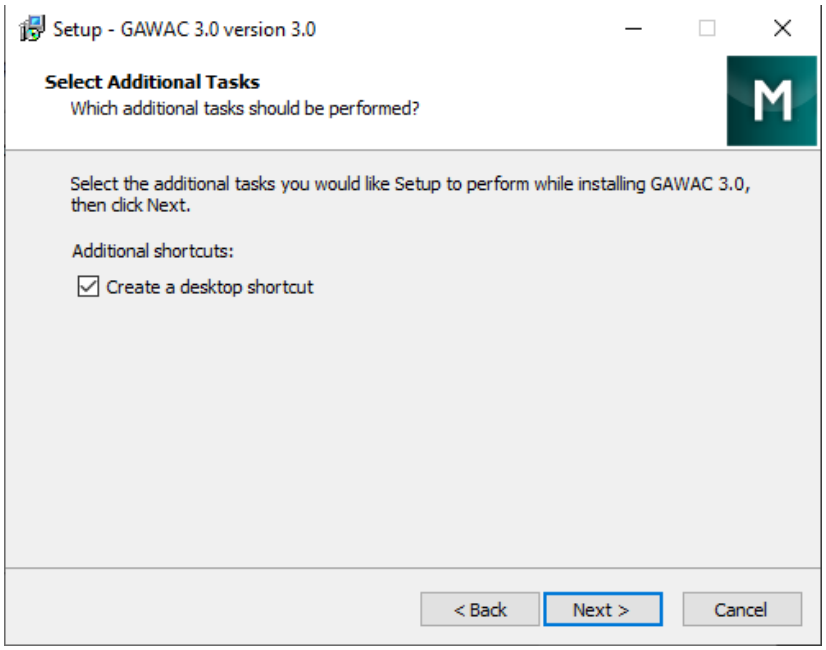
Click on next, then read the agreement. If you accept this, select the option "I accept the agreement" and click on the button next.



Select a folder to install the software:

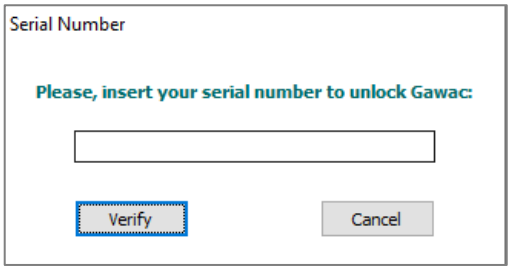


You can create a desktop icon:



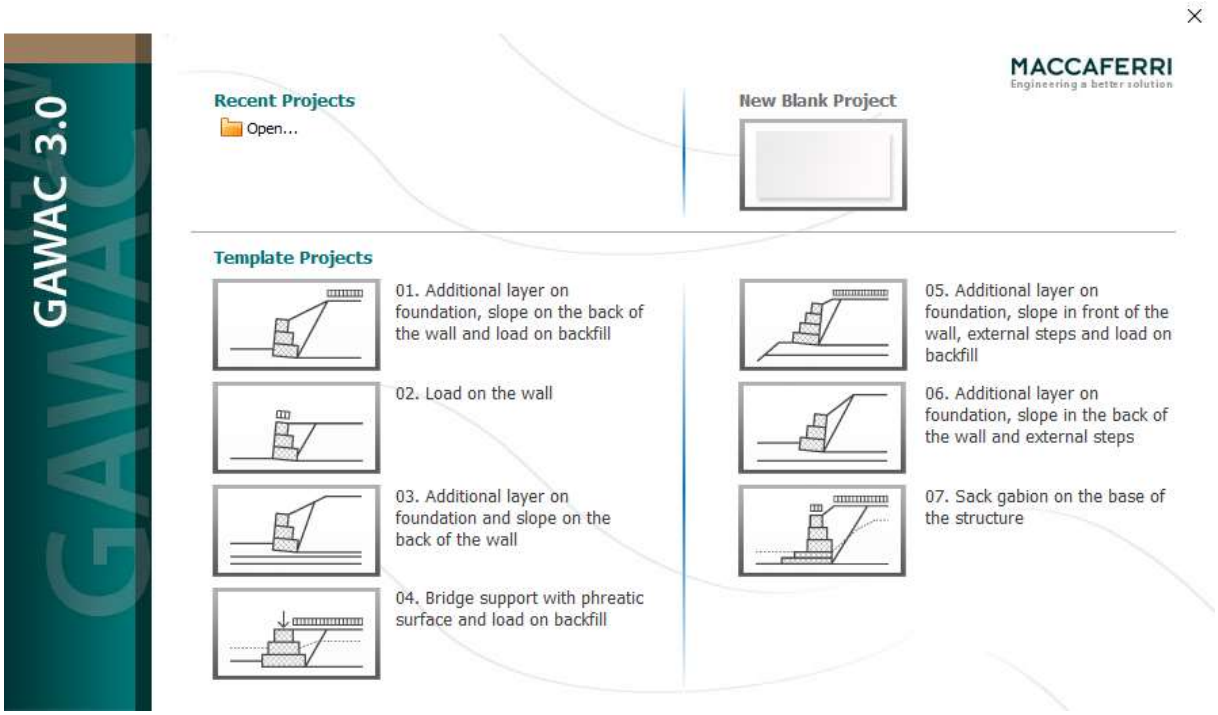
At the end, click on the button "Install" and Finish the installation:

To start the Gawac, you must insert the Serial Code:



Initial Screen

By starting the software, a window with four options will show up: you can open an existent project, open the last saved project, open an example project or select one preset cross section (Template Projects). If you are doing a new project, select the option "New blank project".



The templates are a practical way to start off. After choosing one, you can modify it anyway.

Mesh Setup

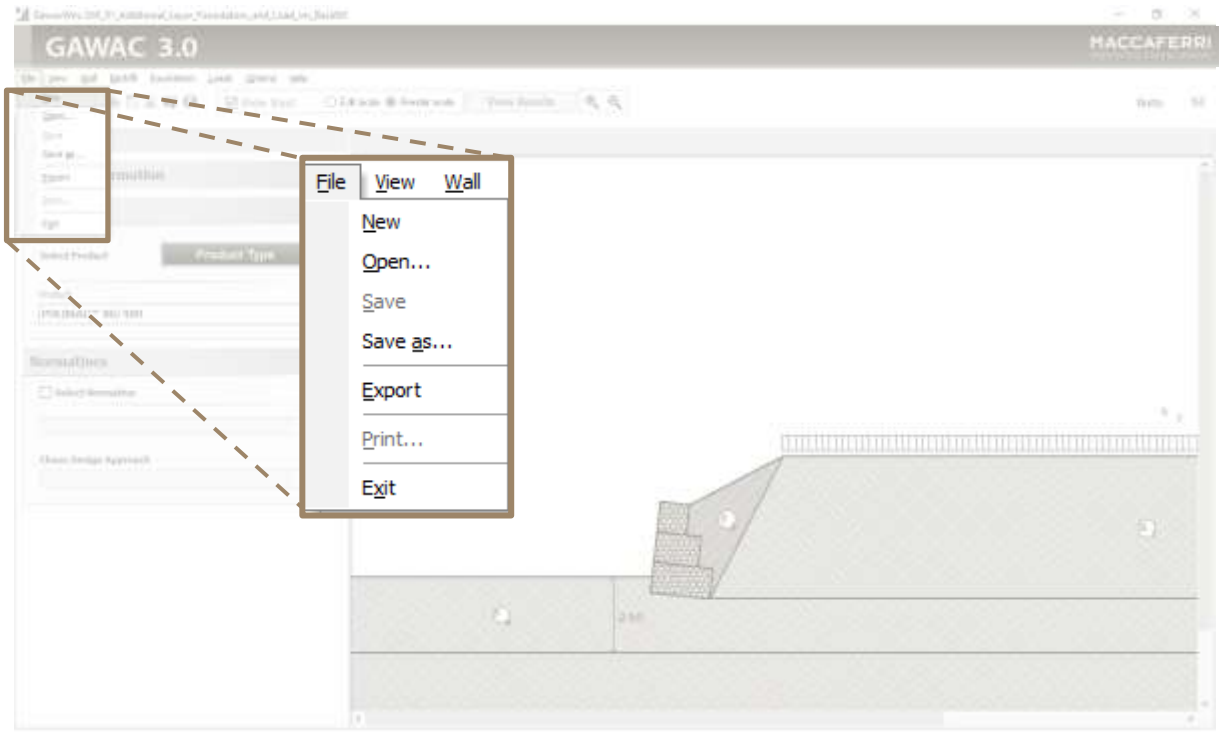
After choosing a template or start a new project, the user can select the ambient of the design **(Low aggressive or High Aggressive),** then the user may choose the type of gabion. To finish this step, click in the button "Confirm".

A low aggressive ambient means: Rural areas, urban areas with low level of pollution, temperate, dry or cold zone, atmospheric environment with short time of wetness.

A high aggressive ambient means: Hydraulic works, high pollution, urban and industrial areas, subtropical and tropical zone (very high time of wetness), marine and coastal areas with high salinity, shelter positions at coastline.

Menu functions

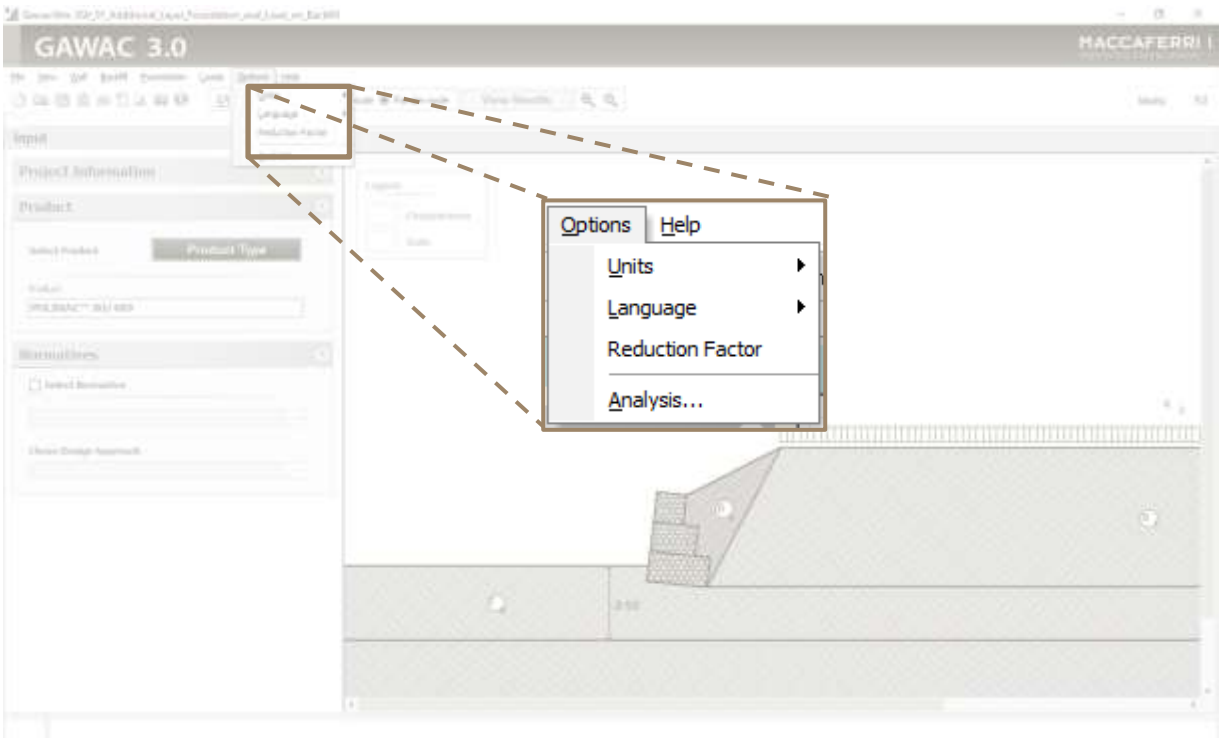
File options



Click on:

New project	To start a new project
Open	To open an existent project
Save	To save the current project
Save as	To save the changes of the current project
Export	To export the model into a dxf. File (Compatible with AutoCAD)
Print	To print the current project
Exit	To close the software

Options

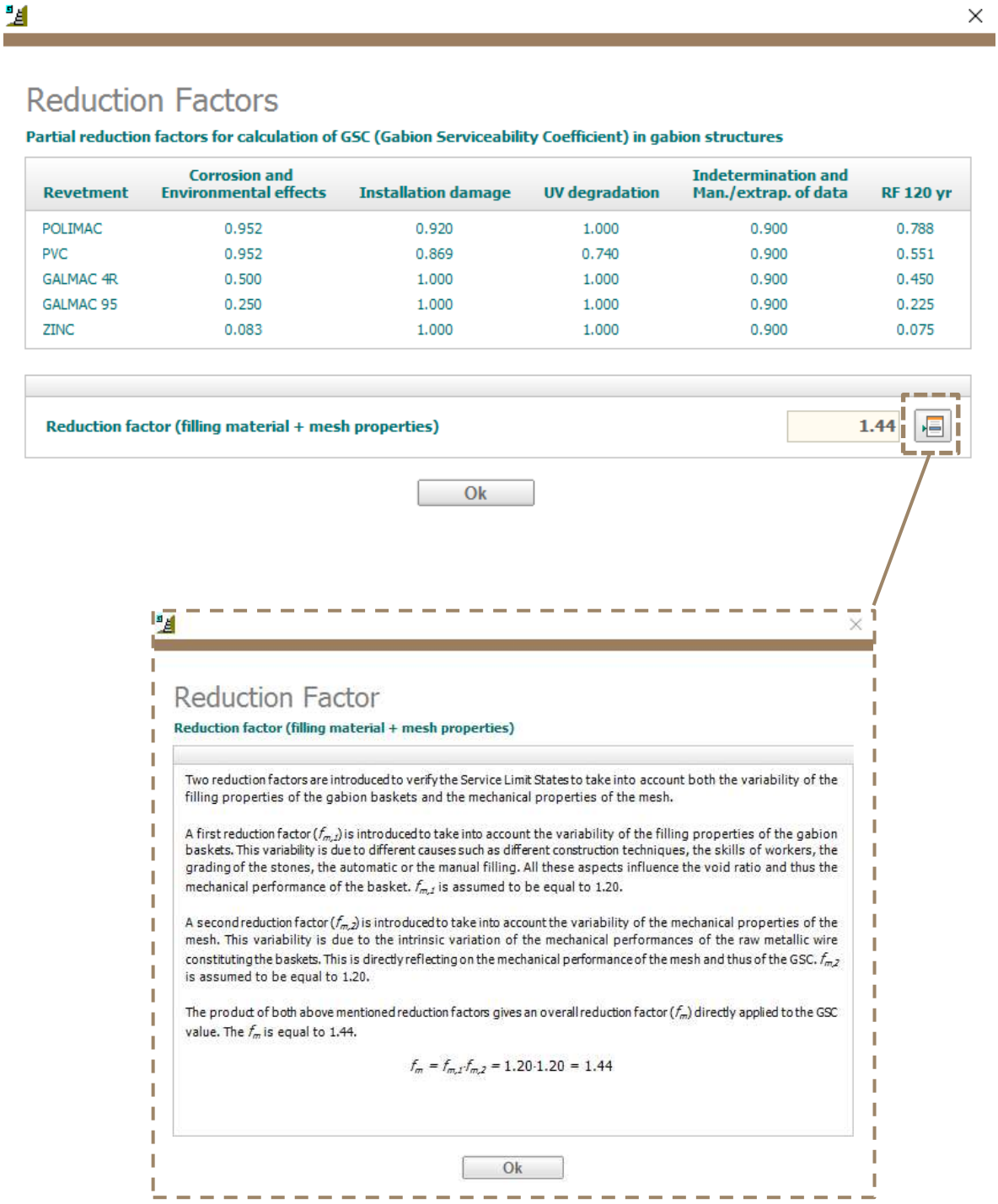


Click on:

Language	To select another language
Reduction Factor	To see the reduction factors

Reduction factors

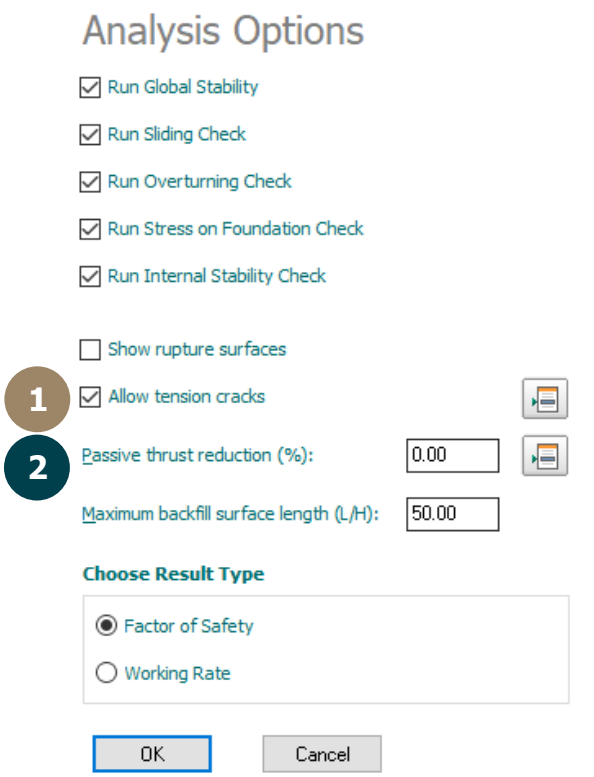
You can visualize the reduction factors of different types of gabion structures.

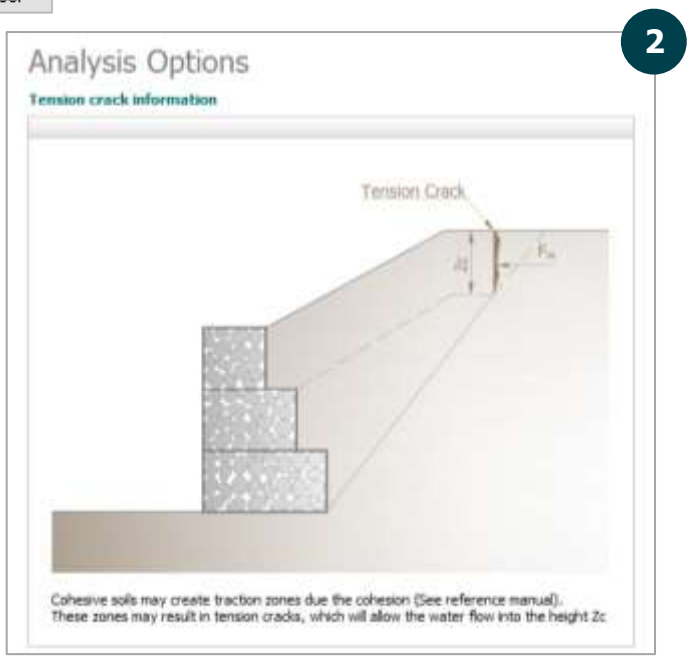


Analysis Options

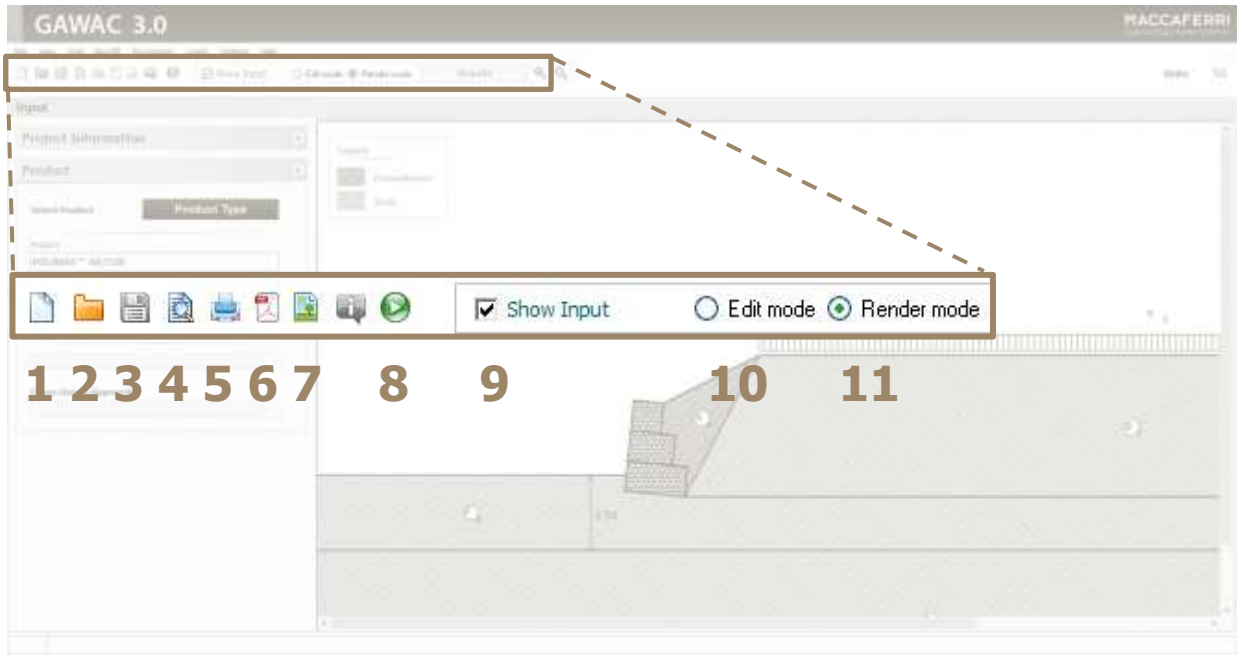
The user can change some considerations in the menu Options > Analysis.

Analysis Options





Quick action bar



Click on:

1 To start a new project

2 To open an existent project

3 To save the changes of the current project

4 To view the report

5 To print the report

6 To generate the report as a "pdf" file

7 To generate the report as a "jpg" file

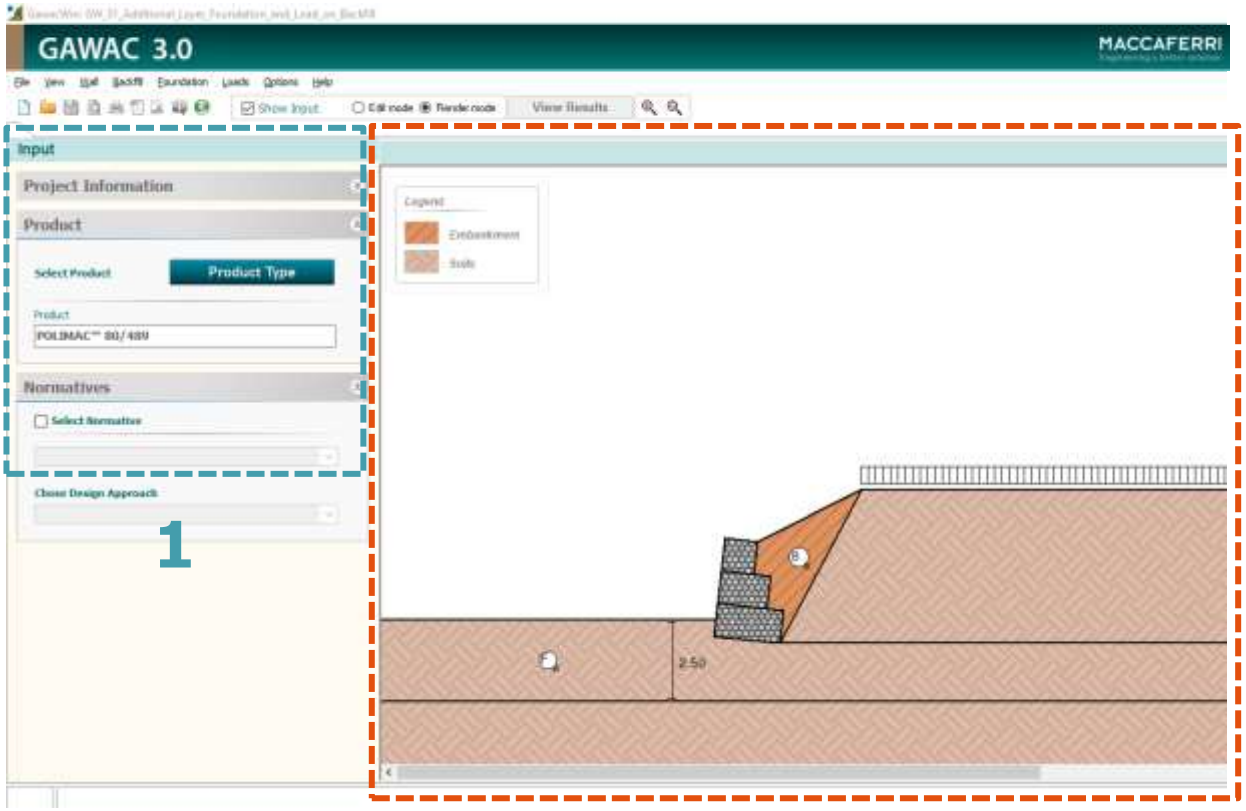
8 To run the calculation after cross section definition

9 To show or hide the Input groups

10 To enable the edit mode

11 To enable the render mode

Input groups and Results



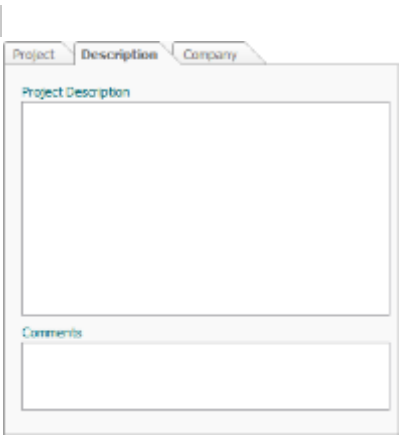
1 - Input Where all input data shall be inserted

2 - Results Where the cross section drawing and results show up

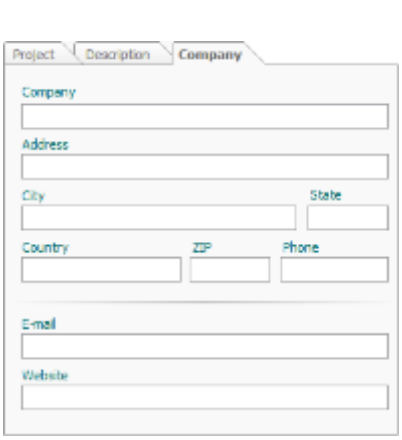
Input groups

Project Information

This tab shows the identification of the project, the Client and the Designer

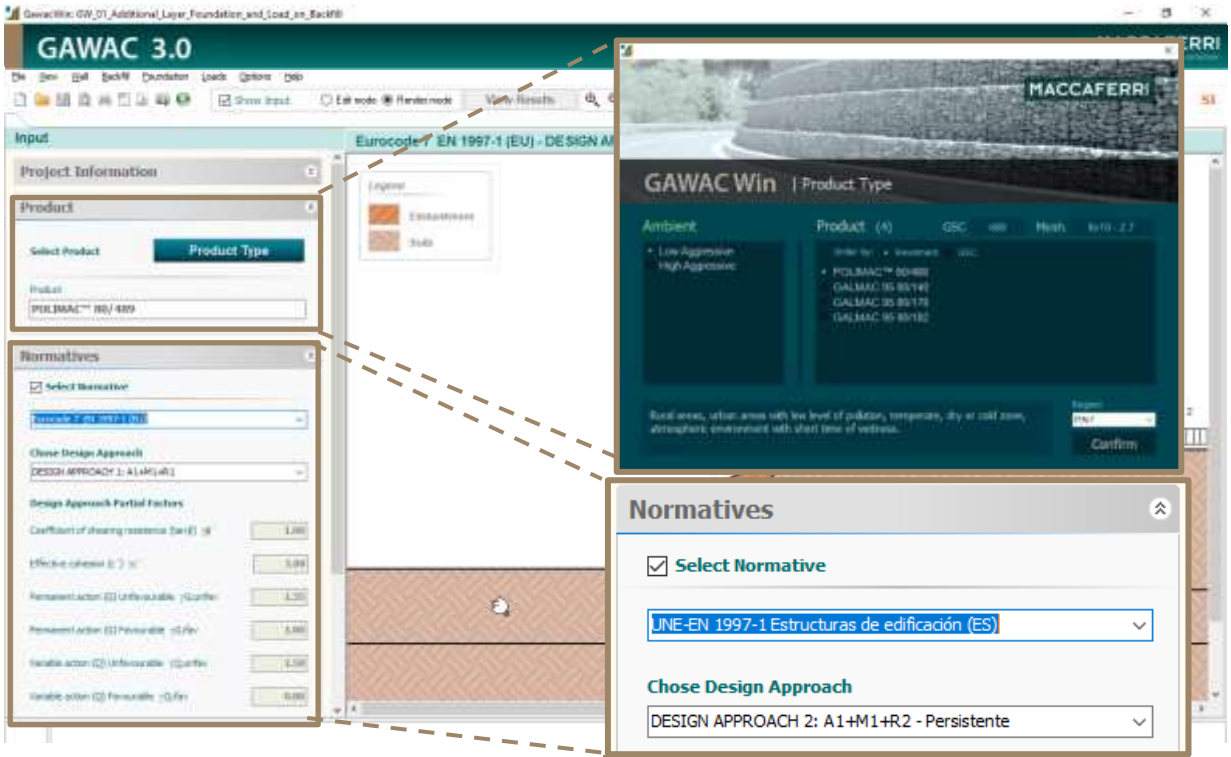


This tab shows the description and the comments about the project



This tab shows the data of the Company that is making the project

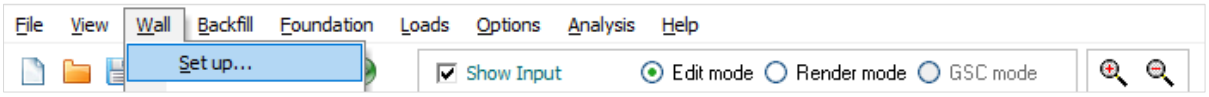
Setup GSC and Normative

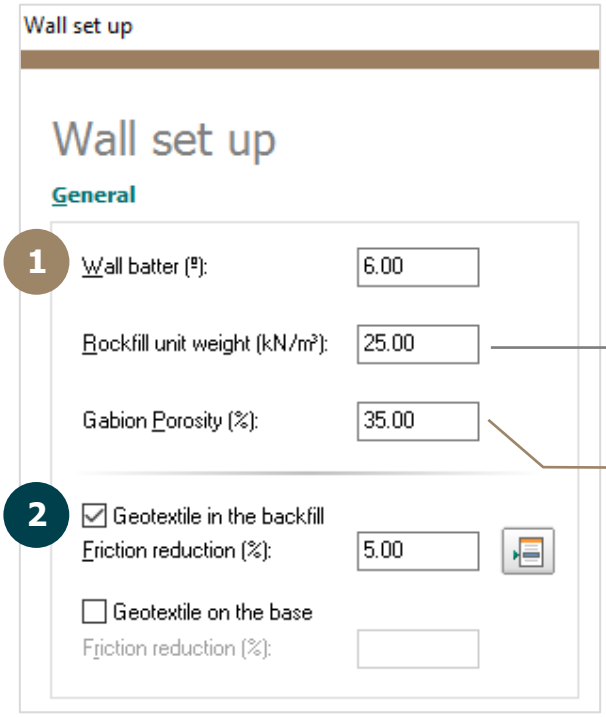


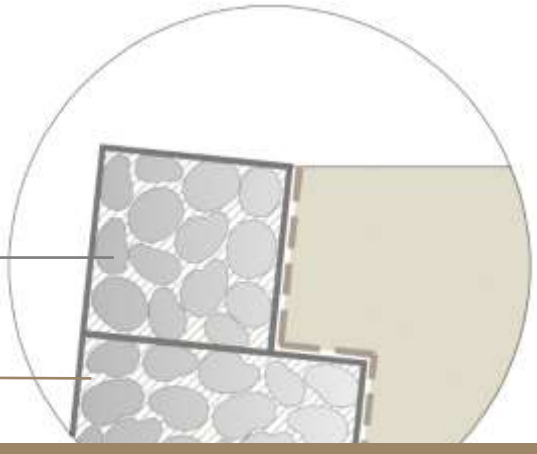
The user can set the normative and the design approach.

Gabion Wall set up

Select Wall > Set up

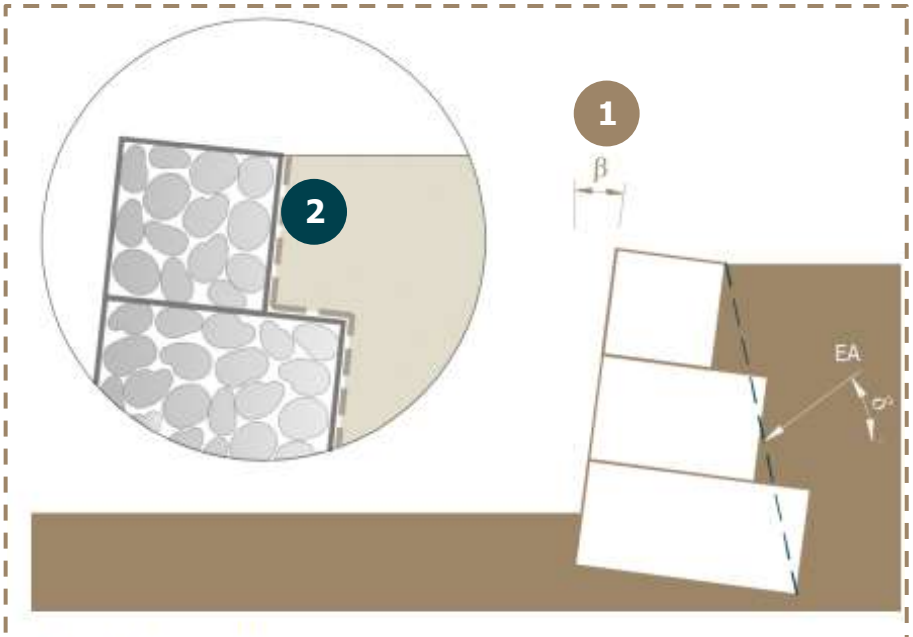




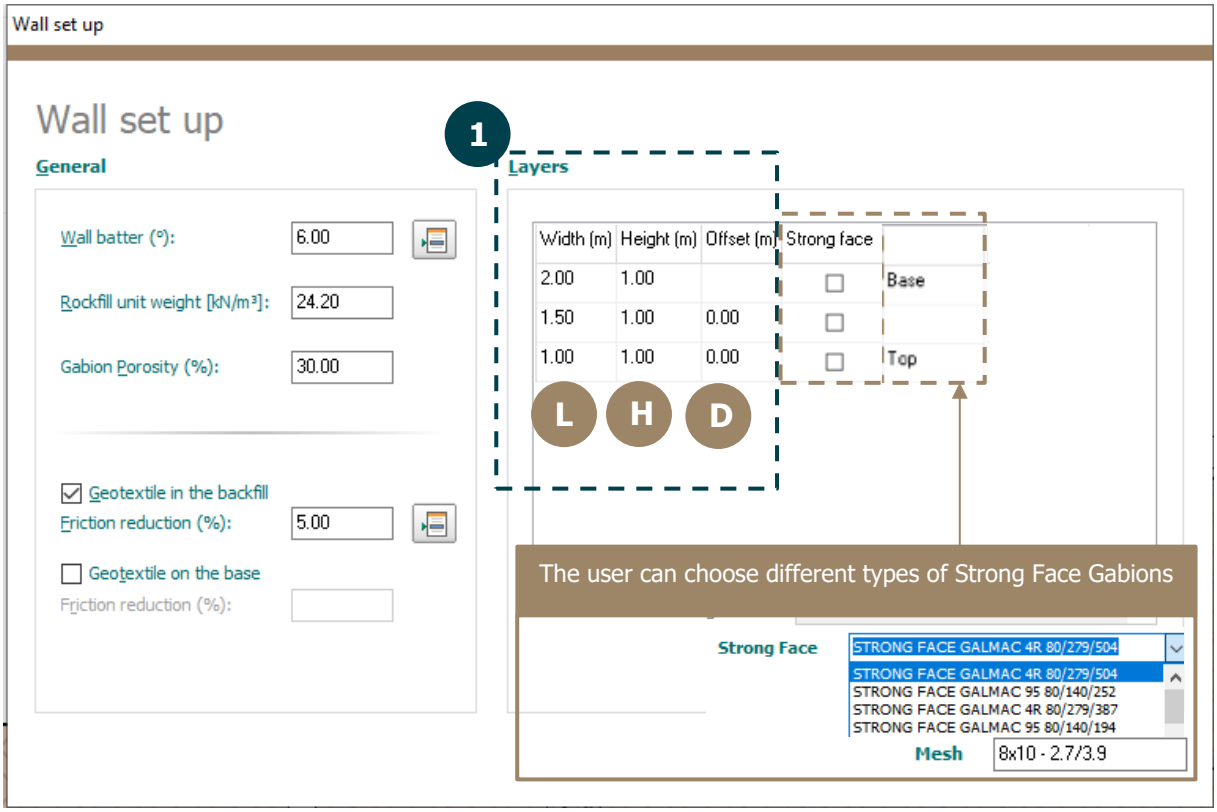


The rockfill unit weight is according to the material, usually in a range 25 to 30 kN/m³.

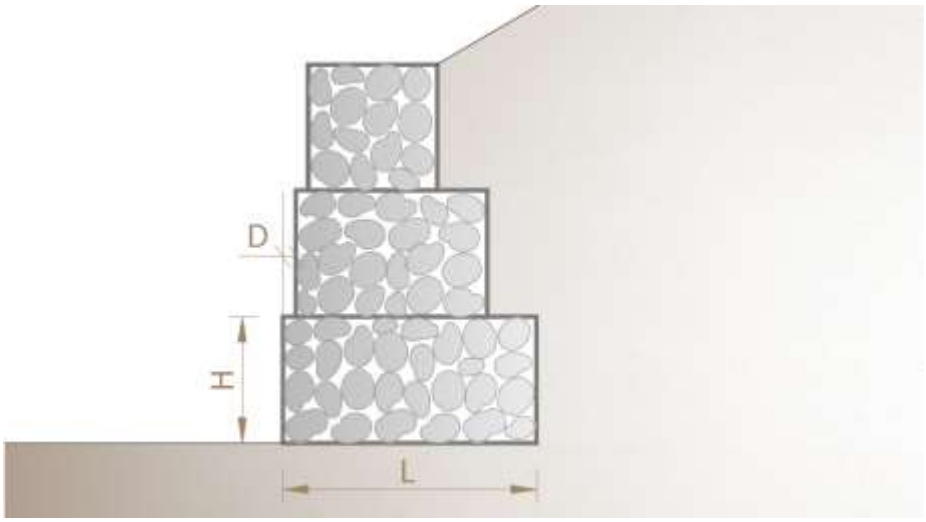
The porosity may vary according to shape of the rocks and filling process. Usually the values can be assumed 40%.



β – Wall batter (Usual 6º)
δ – Inclination of Coloumb Active thurst
δ= φ .(1-Friction reduction by geotextile)
(A value of 5% of friction reduction is reasonable to considerate)

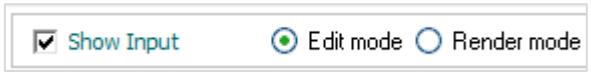

Wall set up
Wall set up
General
Wall batter (°): 6.00
Rockfill unit weight [kN/m³]: 24.20
Gabion Porosity (%): 30.00
Geotextile in the backfill
Friction reduction (%): 5.00
Geotextile on the base
Friction reduction (%):
1
Layers
Width (m) Height (m) Offset (m) Strong face
2.00 1.00 Base
1.50 1.00 0.00
1.00 1.00 0.00 Top
L H D
The user can choose different types of Strong Face Gabions
Strong Face
STRONG FACE GALMAC 4R 80/279/504
STRONG FACE GALMAC 4R 80/279/504
STRONG FACE GALMAC 95 80/140/252
STRONG FACE GALMAC 4R 80/279/387
STRONG FACE GALMAC 95 80/140/194
Mesh 8x10 - 2.7/3.9

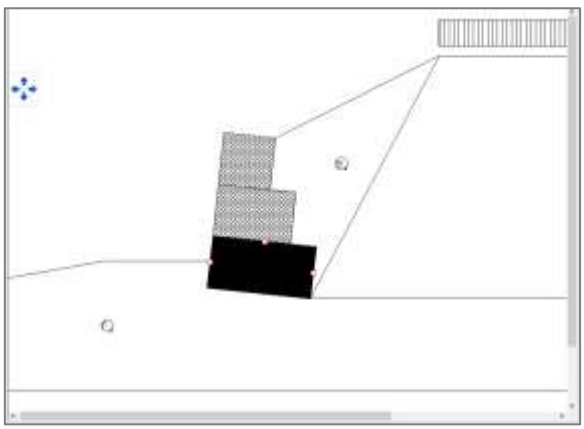
1 Layers

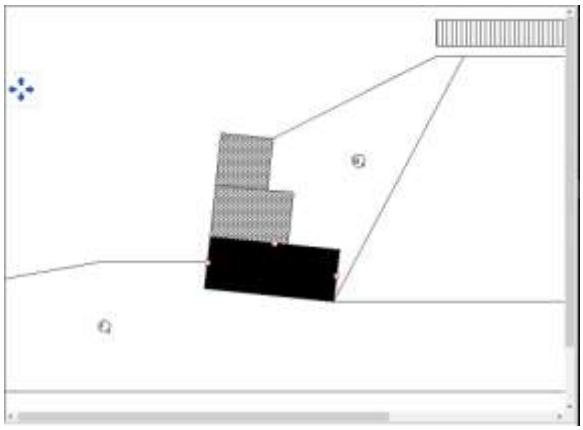

D
H
L

Editing the Gabion Wall

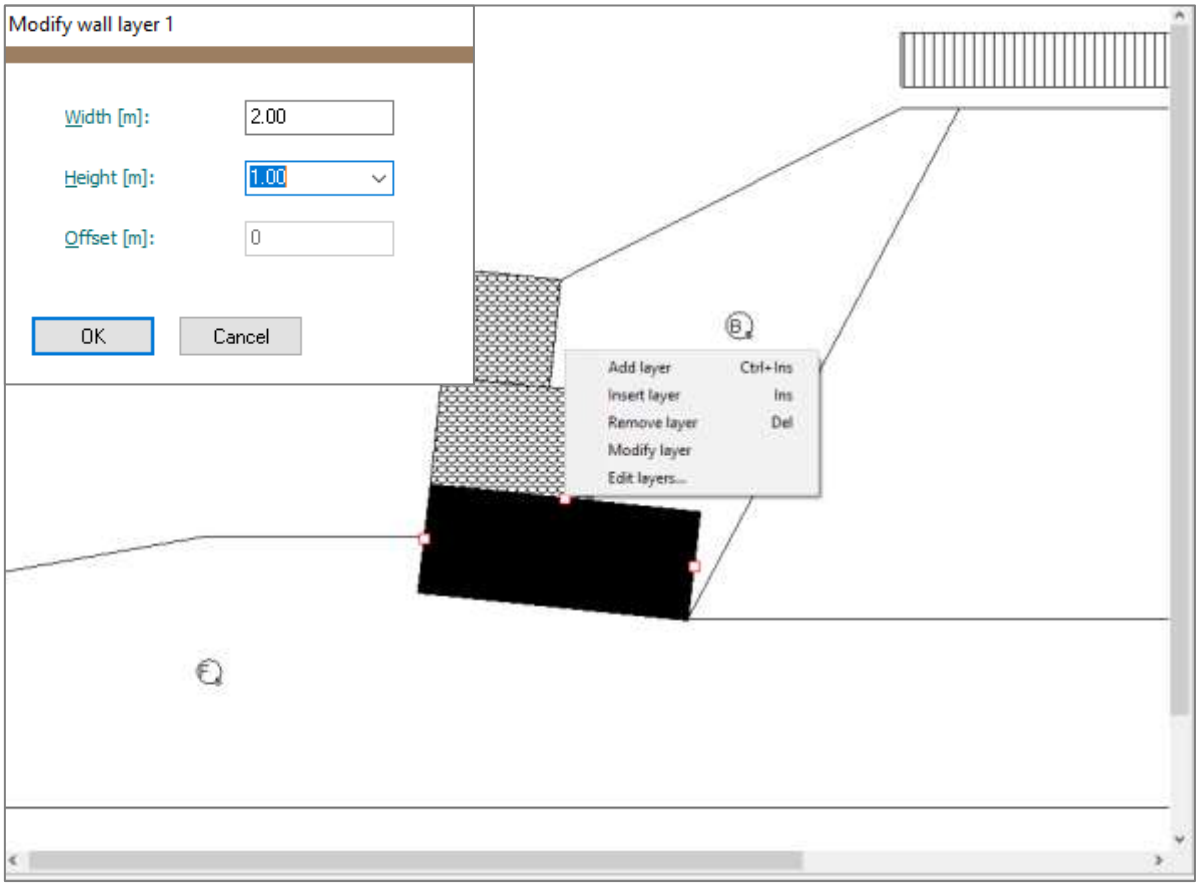
You can edit the gabion layers by activating the **edit mode.**





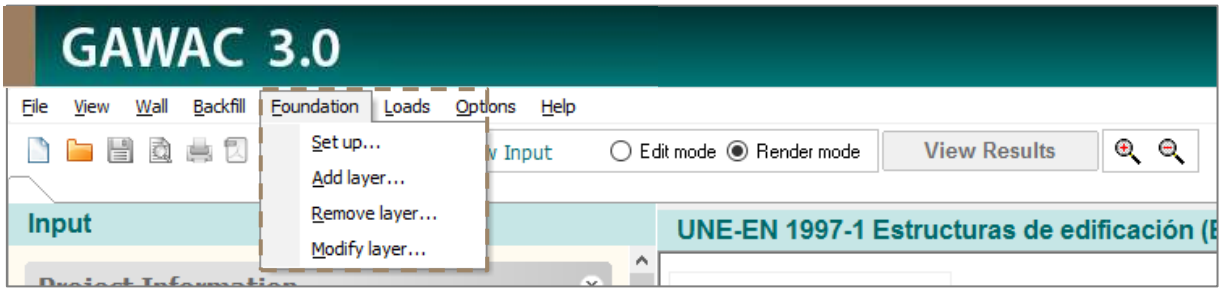


To insert or remove layers, click with the right-button in the gabion box.

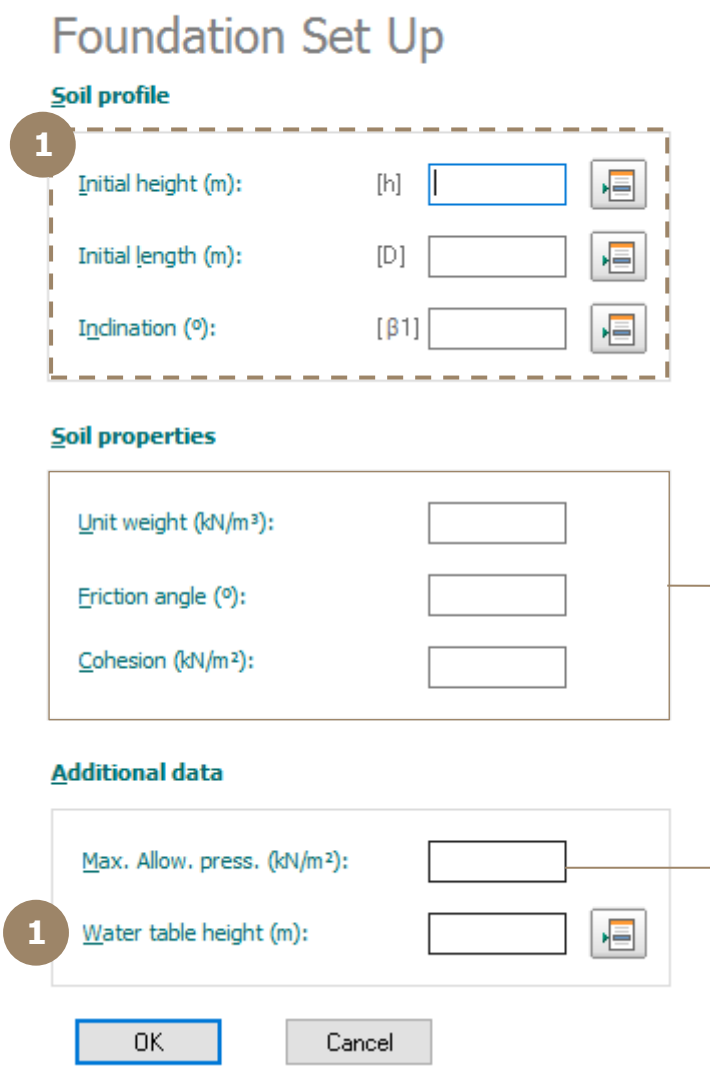


Foundation set up

Select Foundation > Set up



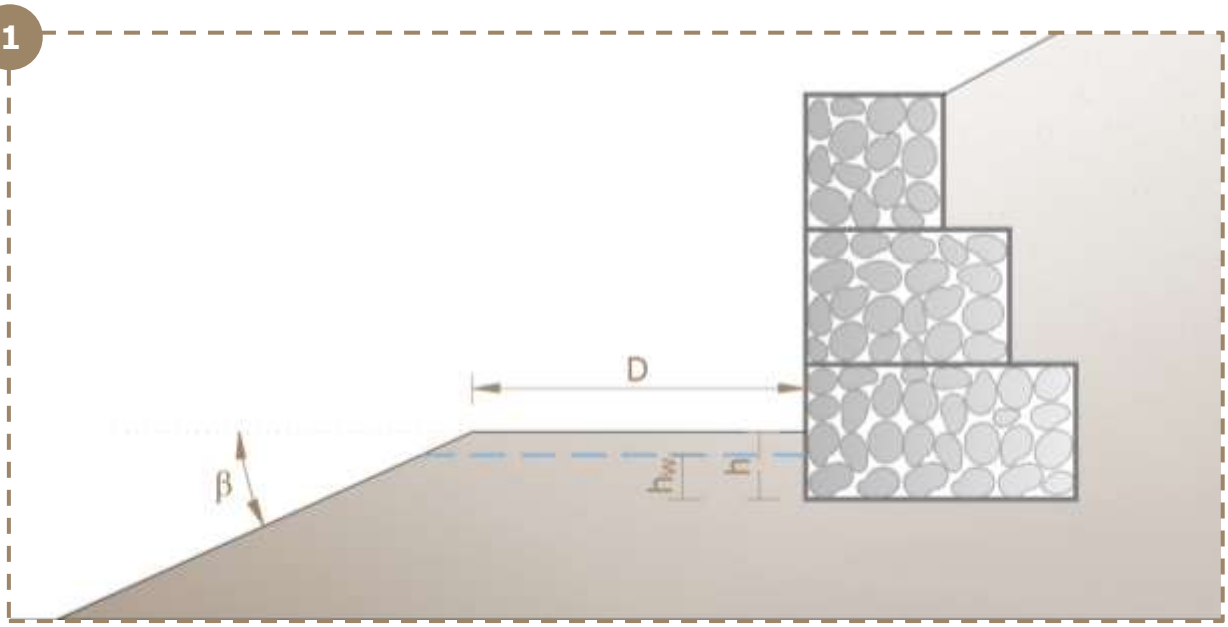
Foundation Set Up



The strength parameters (friction angle and cohesion) must be obtained by specific tests, direct shear or triaxial shear test.

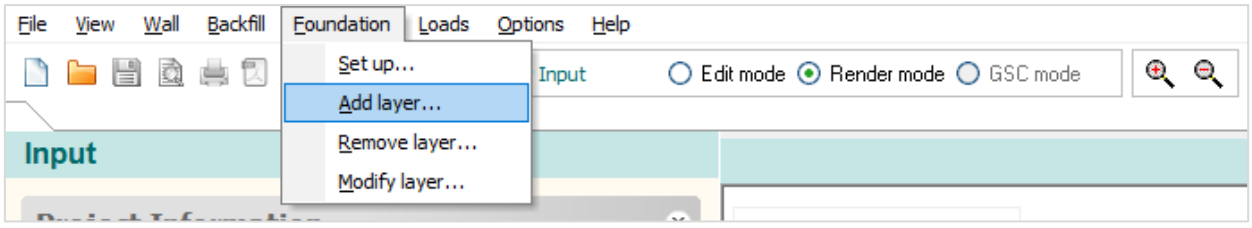
If you know the maximum allowable pressure of the foundation, you can input the value in this field. Otherwise, leave the input empty and the software will calculate the allowable pressure by the Hansen equation.

1



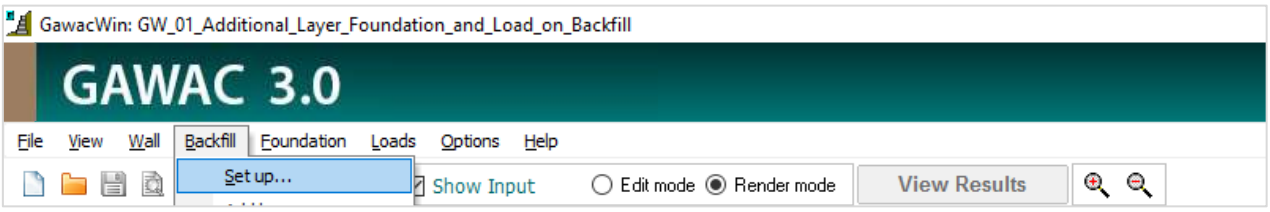
1.1 Add layer in foundation

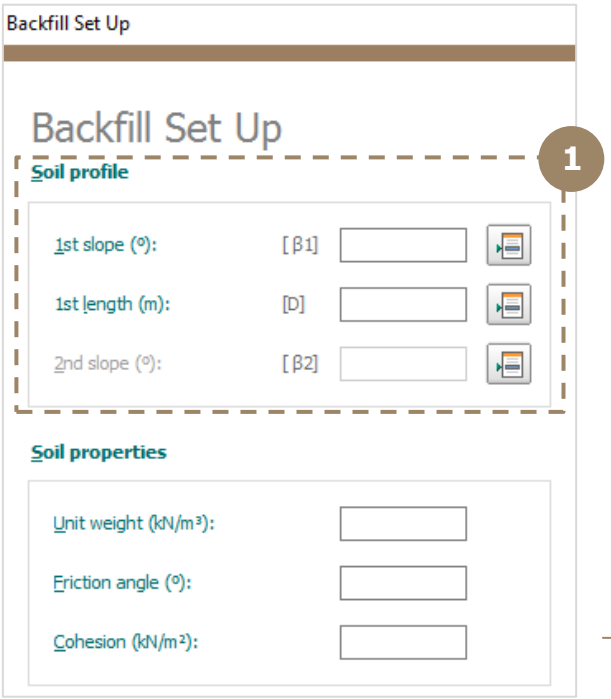
Select Foundation > Add Layer



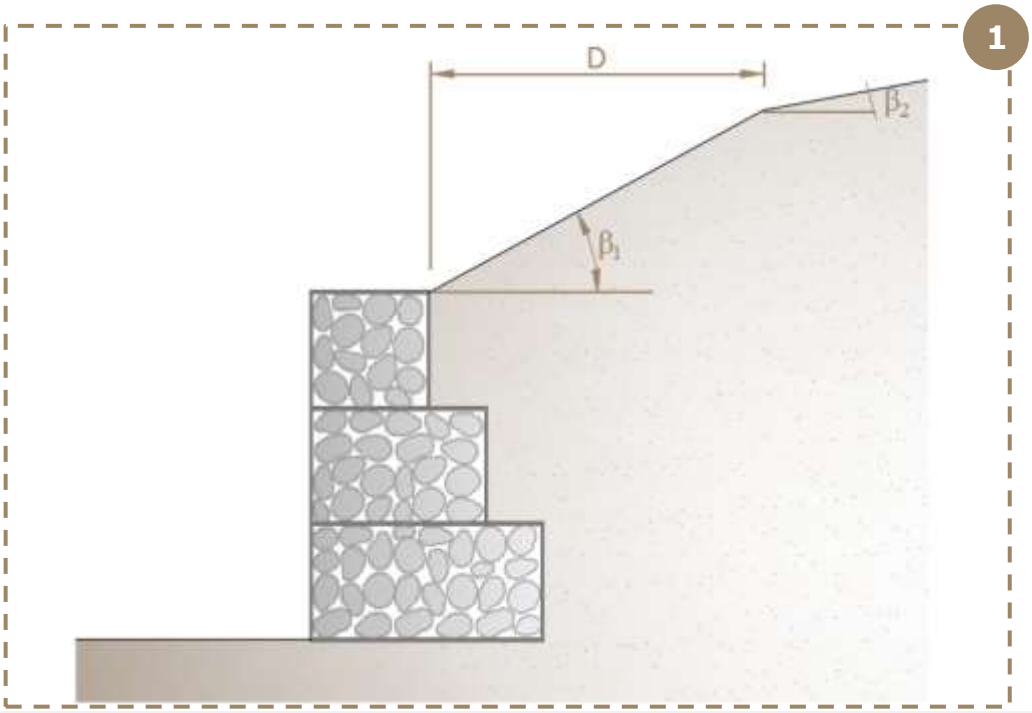
Backfill set up

Select Backfill > Set up



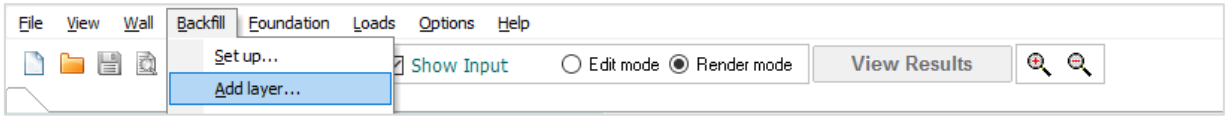


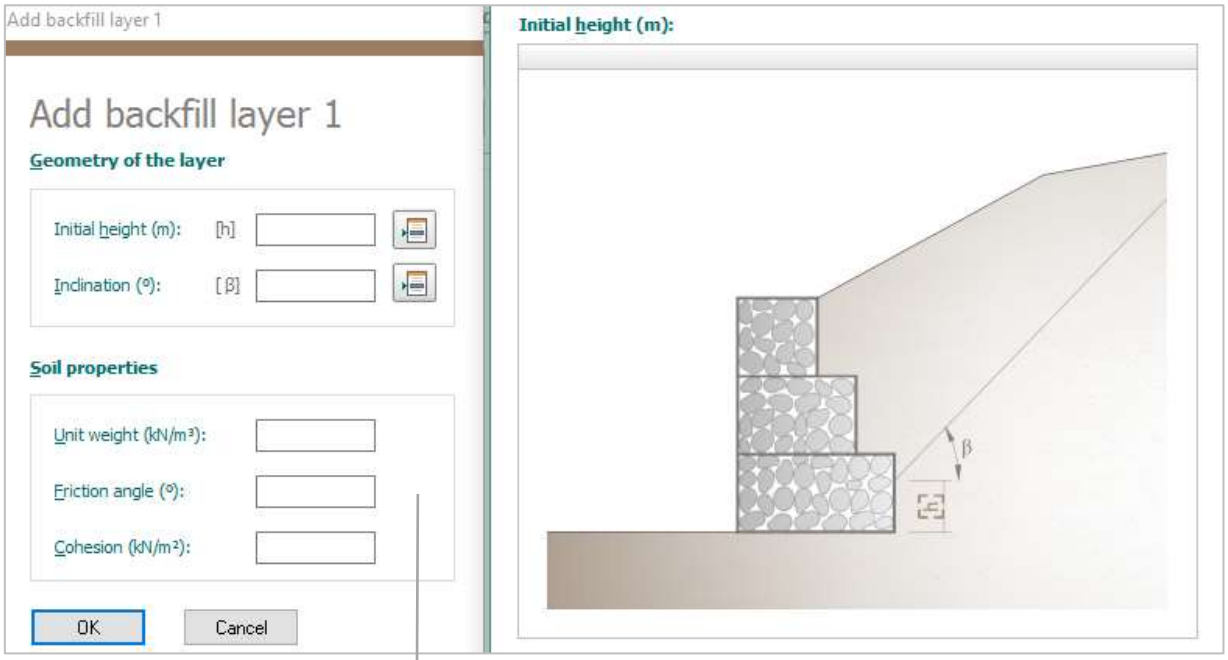
The strength parameters (friction angle and cohesion) can be obtained by specific tests, direct shear or triaxial shear test.



Add layer in backfill

Select Backfill > Add Layer





The strength parameters (friction angle and cohesion) can be obtained by specific tests, direct shear or triaxial shear test.

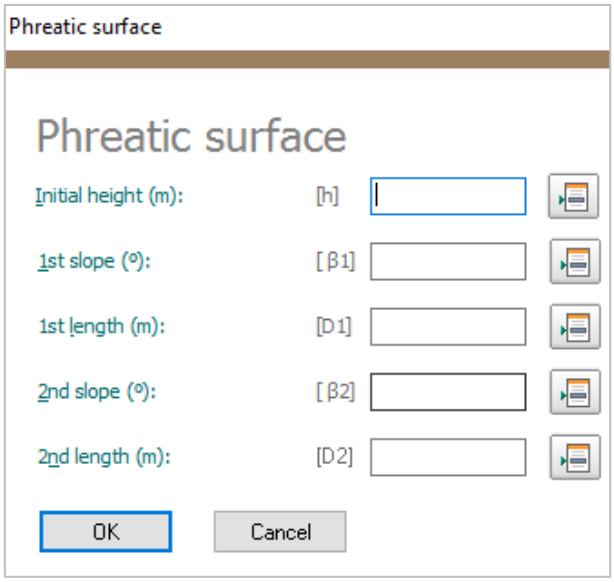
You can also remove or modify a layer clicking in the options.

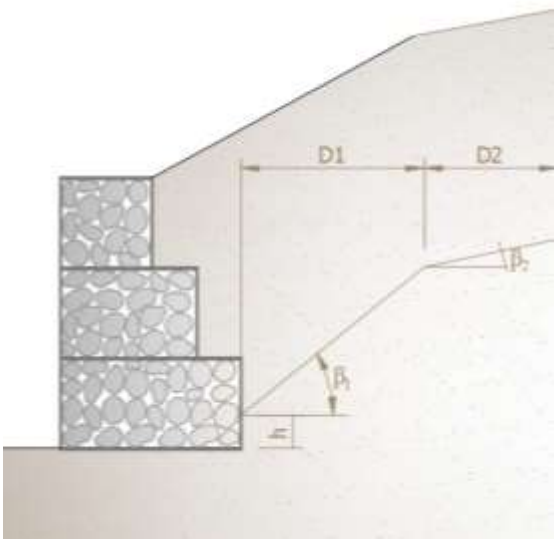
To modify layers you can do a double-click in the line (Edit mode).

Add phreatic surface in Backfill

Whenever the embankment has a phreatic surface, it can be considered through the menu Backfill > Phreatic surface.

The dimensions and angles of stretches can be defined in this menu.



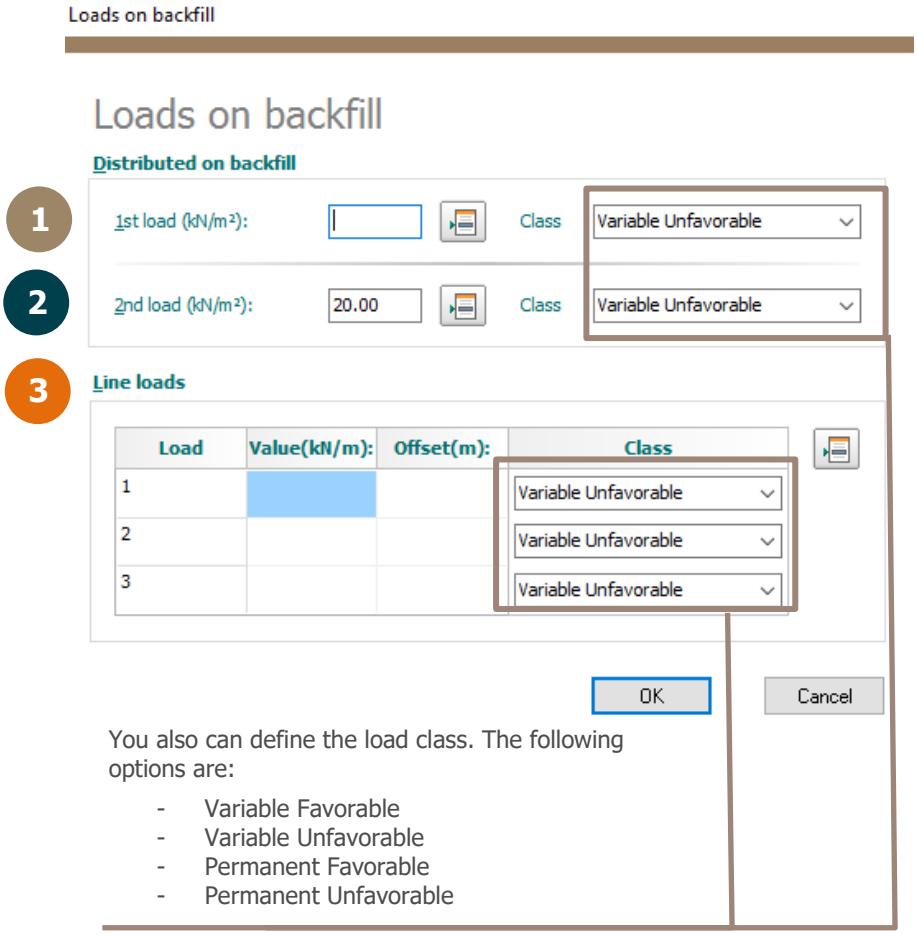


Load Input

The user can insert static loads by clicking in menu Loads.

There are three type of loads:

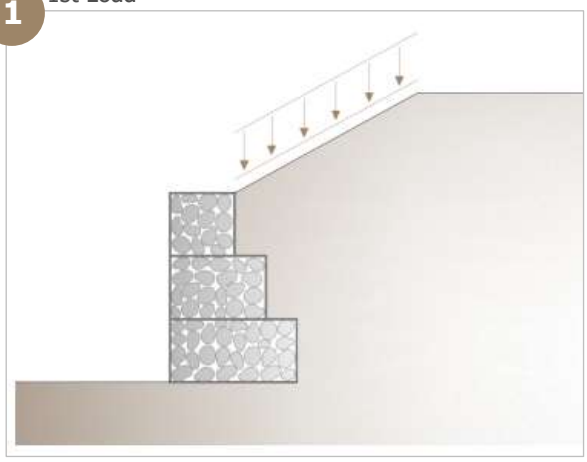
Load on backfill



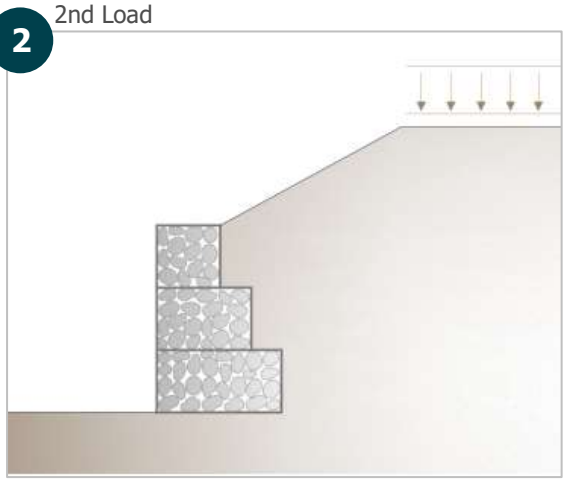
You also can define the load class. The following options are:

- Variable Favorable
- Variable Unfavorable
- Permanent Favorable
- Permanent Unfavorable

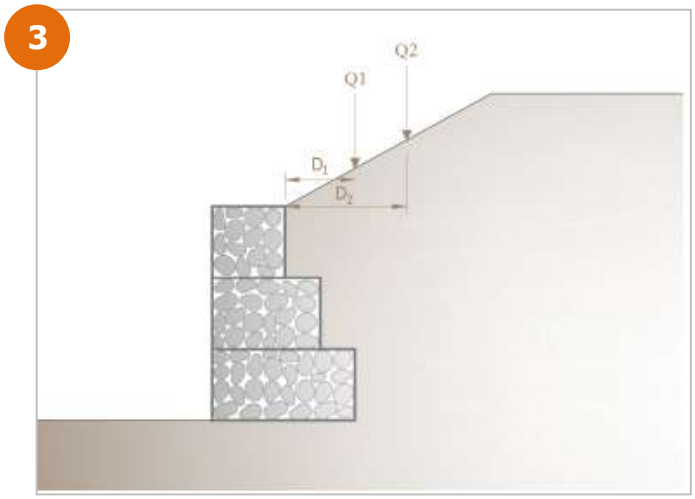
1 1st Load



2 2nd Load

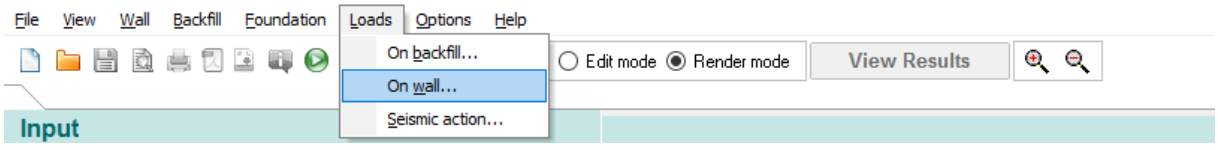


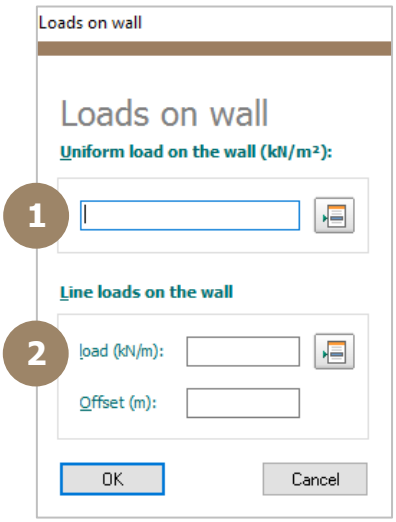
Line Loads

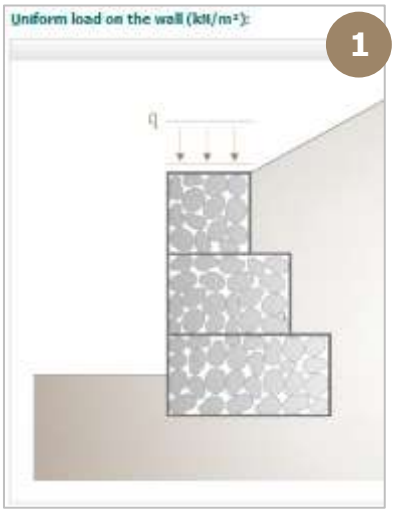


Load on wall

You can insert uniform or line loads on the wall, such as (fences, static loads, walls, etc.)

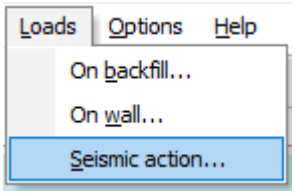


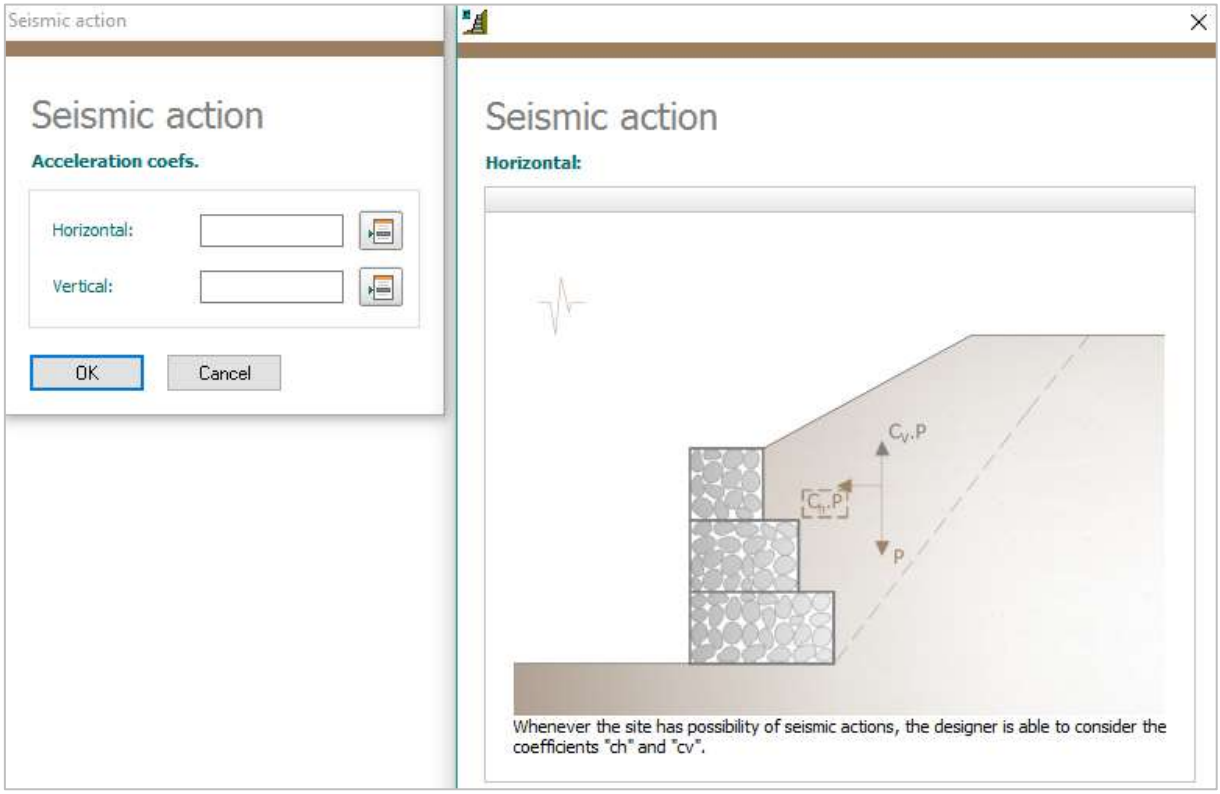




Seismic action

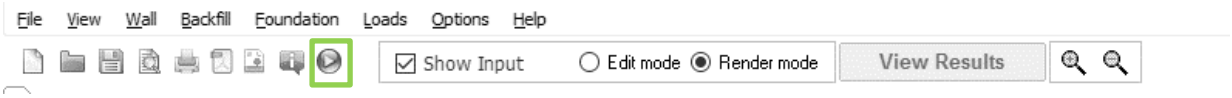
Whenever the wall is calculated under earthquake effects, the user can insert seismic loads by inserting the acceleration coefficients.



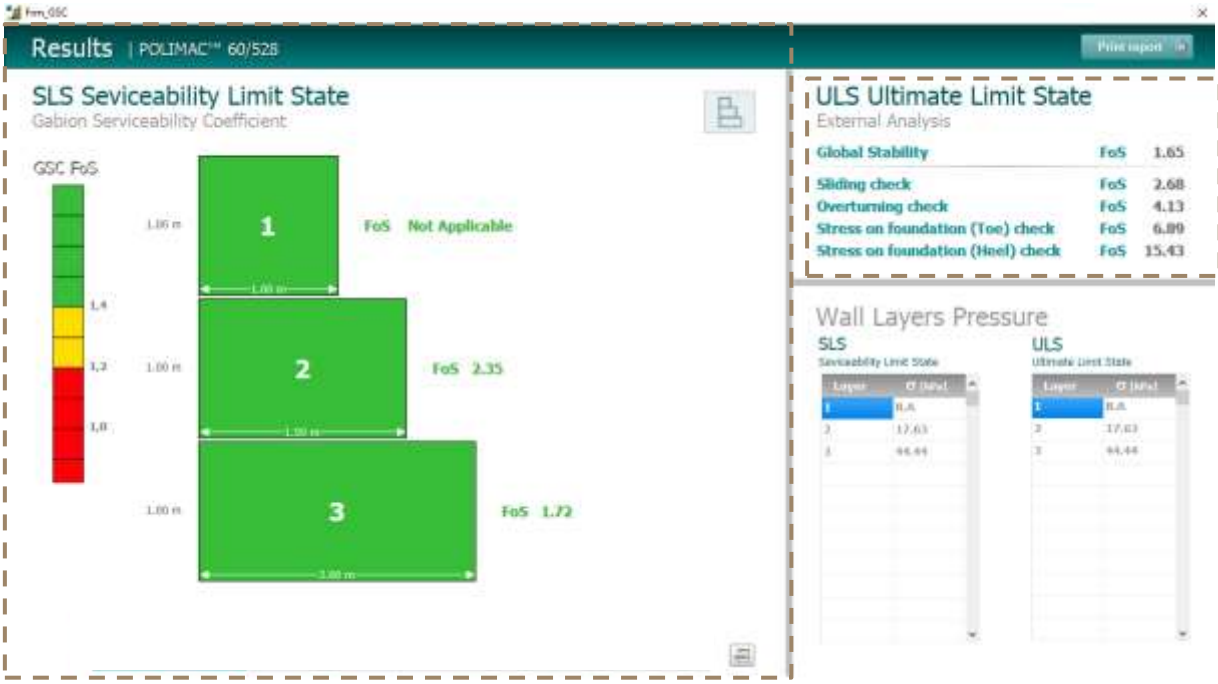


Analysis

To run the calculations, click in the icon 



Summary of results:



SLS | Serviceability Limit State

The serviceability limit state analysis is based in Gabion Serviceability Analysis Method (See GSC Reference Manual). You can optimize the safety factors by choosing a gabion with high performance, which means a mesh with high wire diameter and high durability.

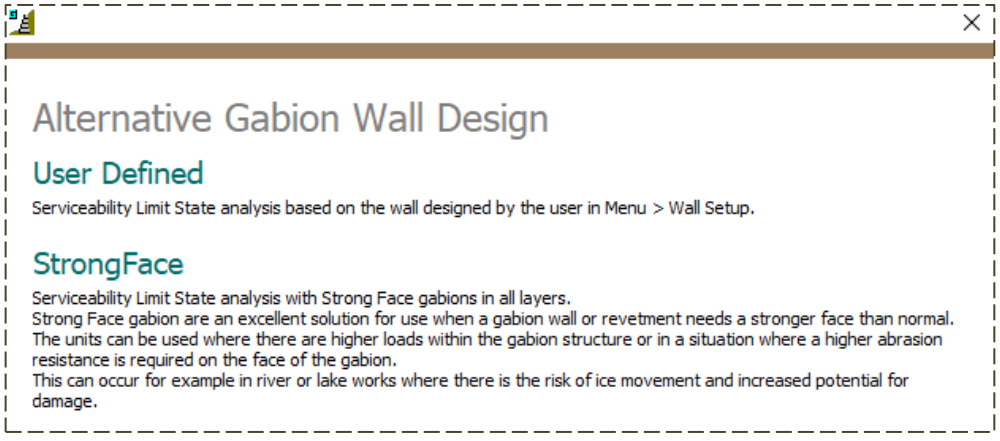
ULS | Ultimate Limit State

The external analysis (Sliding check, overturning check, foundation check) can be calculated in ultimate limit state analysis. Whenever the Eurocode is considered, the partial factors will be applied on soil parameters, loads and active thrust.

Both of analysis (SLS and ULS) can be considered with or without Normative.

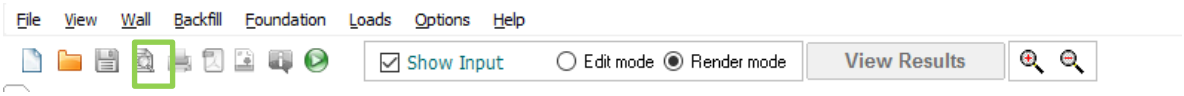
Design with StrongFace Gabion

The user can design with StrongFace by clicking in the options below the section:

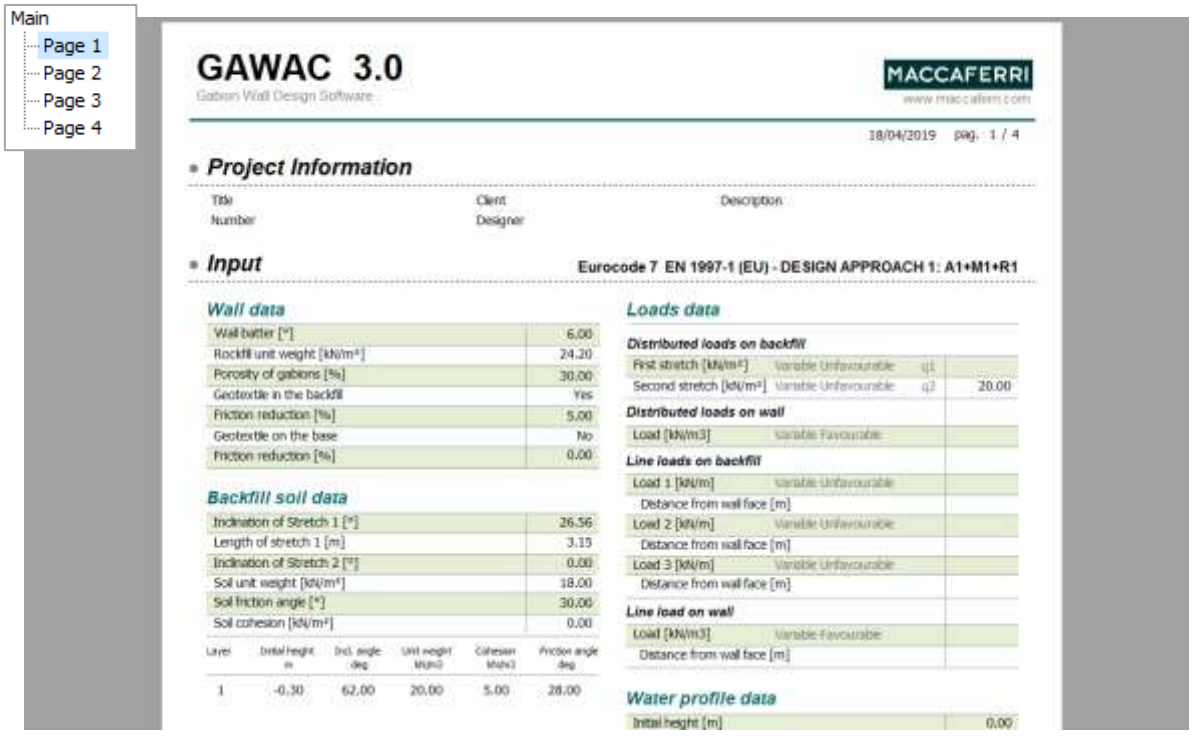


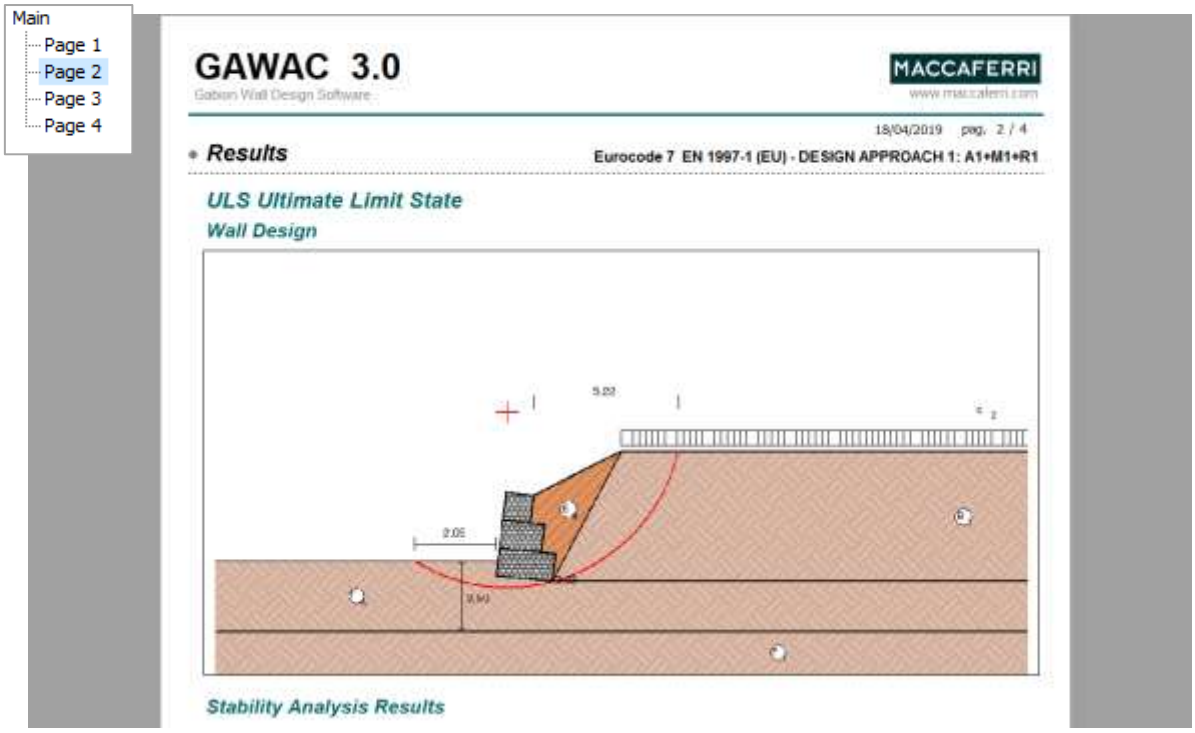
Report

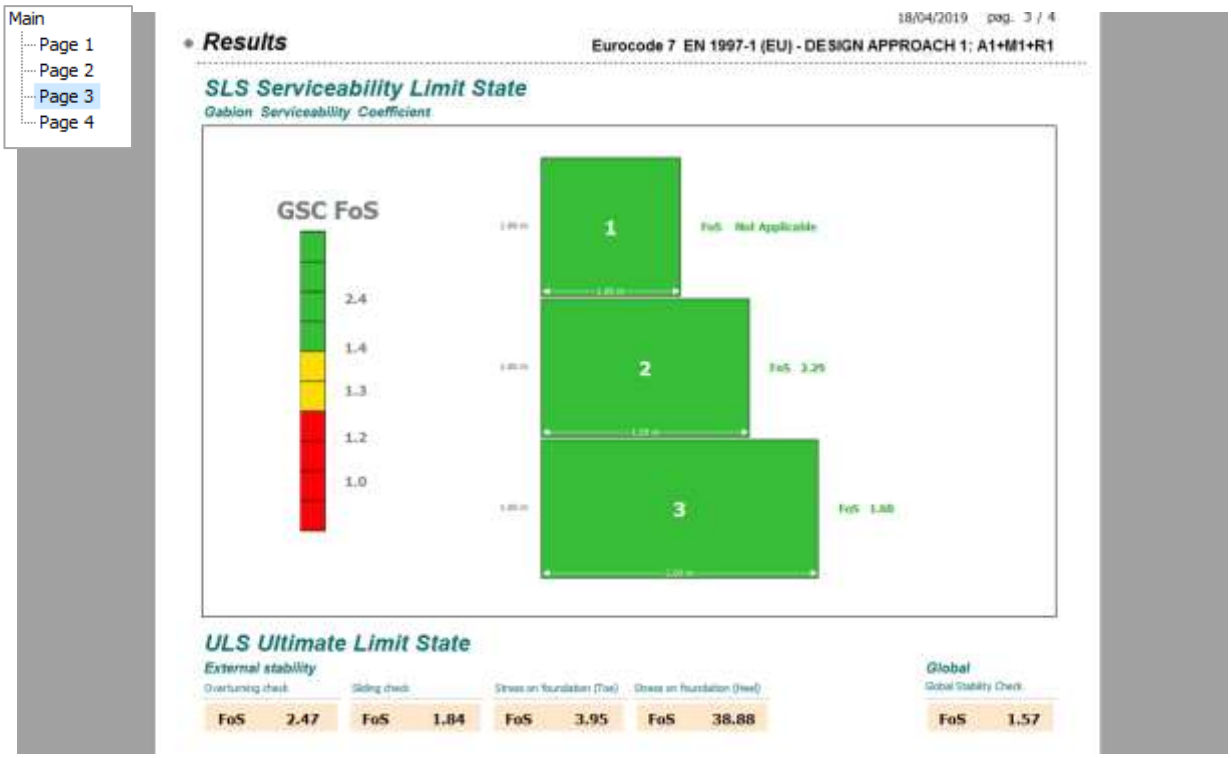
To generate the report, click in the icon 



You can navigate in the report by clicking in the pages:







Page 4 will only appear if you select a normative.