

Description

GGU-CONSOLIDATE - consolidation processes

Calculation of one-dimensional consolidation processes in multi-horizon systems using any pore water pressure distribution and time-dependent loading function.

The initial pore water pressure distribution at time $t = 0$ can be defined as you wish. Pore water pressure distribution resulting from foundation loads can be generated. The drainage conditions at the top and the base of the horizon are given separately.

Additionally, the system loading can be given as a function of time. Apart from the calculation of analytically derived solutions according to the consolidation theory for single-horizon systems, developed by Terzaghi, GGU-CONSOLIDATE can also numerically calculate for multi-horizon systems. Further to conventional consolidation theory, systems with vertical drainage can also be examined.

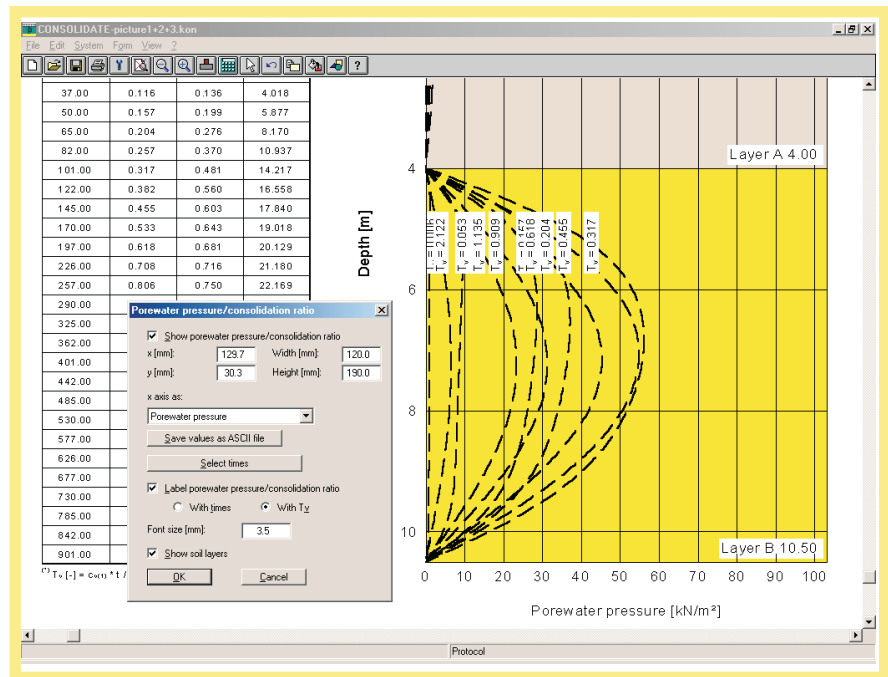
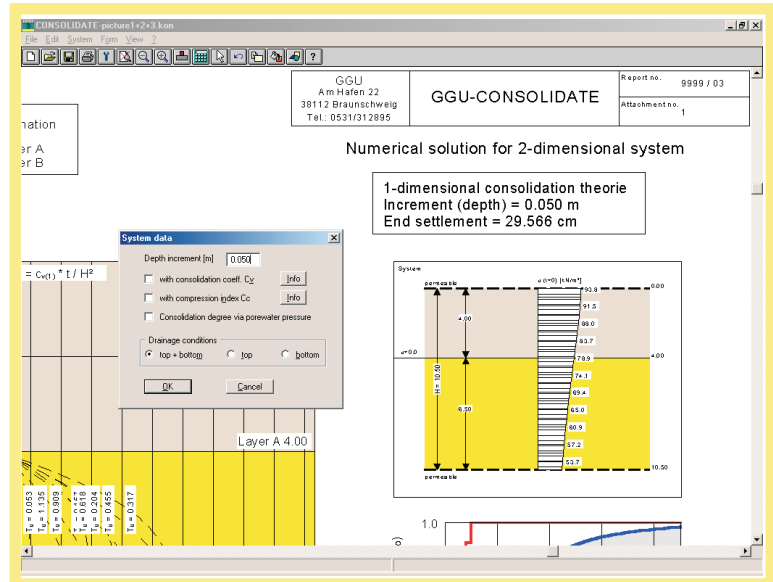
Four different types are offered:

Consolidation (analytically)

One-dimensional consolidation theory according to Terzaghi, for a system with one horizon and a constant pore water pressure distribution above this horizon at time $t = 0$.

Consolidation (numerically)

One-dimensional consolidation theory according to Terzaghi, for a multi-horizon system and any pore water pressure distribution at d as a function of time. The calculations are carried out using difference equations.



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Soil	E_s [kN/m ²]	k [m/s]	C_v [m ² /s]	Designation
Light grey	4000.0	$1.00 \cdot 10^{-8}$	$4.00 \cdot 10^{-6}$	Layer A
Yellow	20000.0	$1.00 \cdot 10^{-9}$	$2.00 \cdot 10^{-7}$	Layer B

Numerical solution for 2-dimensional system

1-dimensional consolidation theorie
Increment (depth) = 0.050 m
End settlement = 29.566 cm

Time [Days]	$T_v^{(t)}$ [-]	U [-]	s [cm]
1.00	0.003	0.001	0.019
2.00	0.006	0.002	0.064
5.00	0.016	0.008	0.247
10.00	0.031	0.023	0.693
17.00	0.053	0.049	1.455
26.00	0.082	0.086	2.556
37.00	0.116	0.136	4.018
50.00	0.157	0.199	5.877
65.00	0.204	0.276	8.170
82.00	0.257	0.370	10.937
101.00	0.317	0.481	14.217
122.00	0.382	0.560	16.558
145.00	0.455	0.603	17.840
170.00	0.533	0.643	19.018
197.00	0.618	0.681	20.129
226.00	0.708	0.716	21.180
257.00	0.806	0.750	22.169
290.00	0.909	0.781	23.093
325.00	1.019	0.810	23.946
362.00	1.135	0.836	24.725
401.00	1.257	0.860	25.431
442.00	1.386	0.881	26.061
485.00	1.520	0.900	26.620
530.00	1.661	0.917	27.109
577.00	1.809	0.931	27.534
626.00	1.962	0.944	27.898
677.00	2.122	0.954	28.208
730.00	2.288	0.963	28.470
785.00	2.461	0.970	28.688
842.00	2.639	0.976	28.868
901.00	2.824	0.981	29.016

(*) $T_v^{(t)} = c_v(t) \cdot t / H^2$

