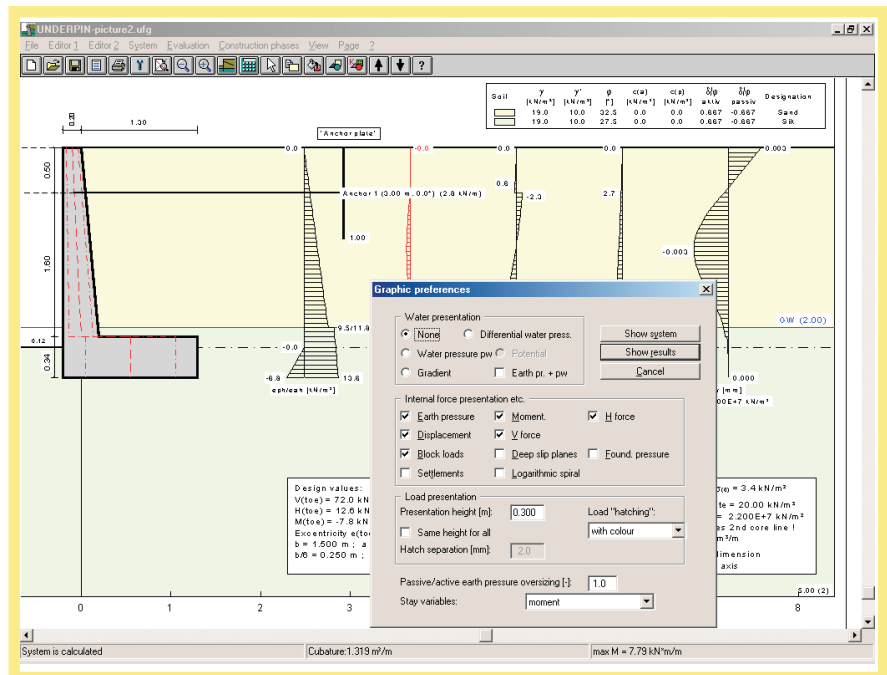
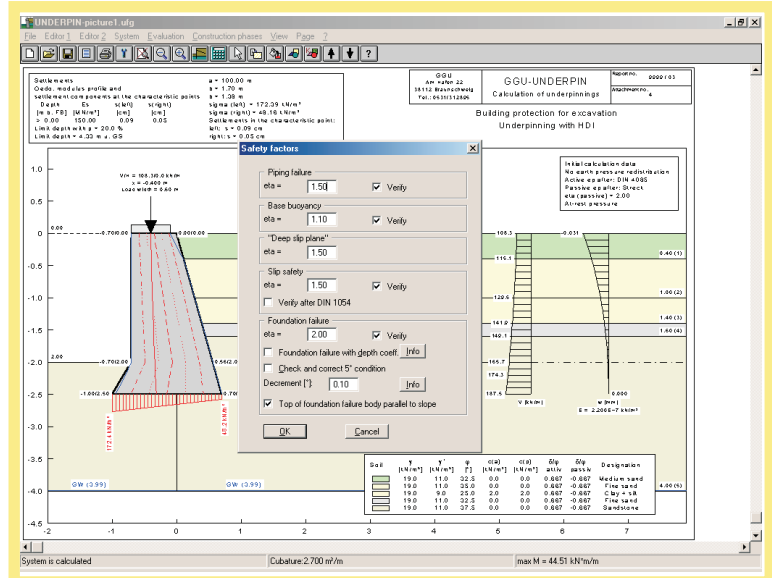


**Description**

**GGU-UNDERPIN** - calculation of underpinning bodies

The GGU-UNDERPIN program allows the calculation of underpinning bodies and, in special cases, of foundations. The program system offers comfortable data input with permanent presentation of the system on the screen. Every change of data is shown on the screen, so that optimum control of data input is given. The many means of graphical presentation, to a high standard of quality, make it possible for you to show your calculation results exactly as you wish to. The basis is the "Recommendations of the Working Group for Building Pits" (EAB). Almost all of the suggestions contained therein are taken into consideration. In particular, with a given system, the program will, if desired, lookup the earth pressure redistribution suggested in the EAB.



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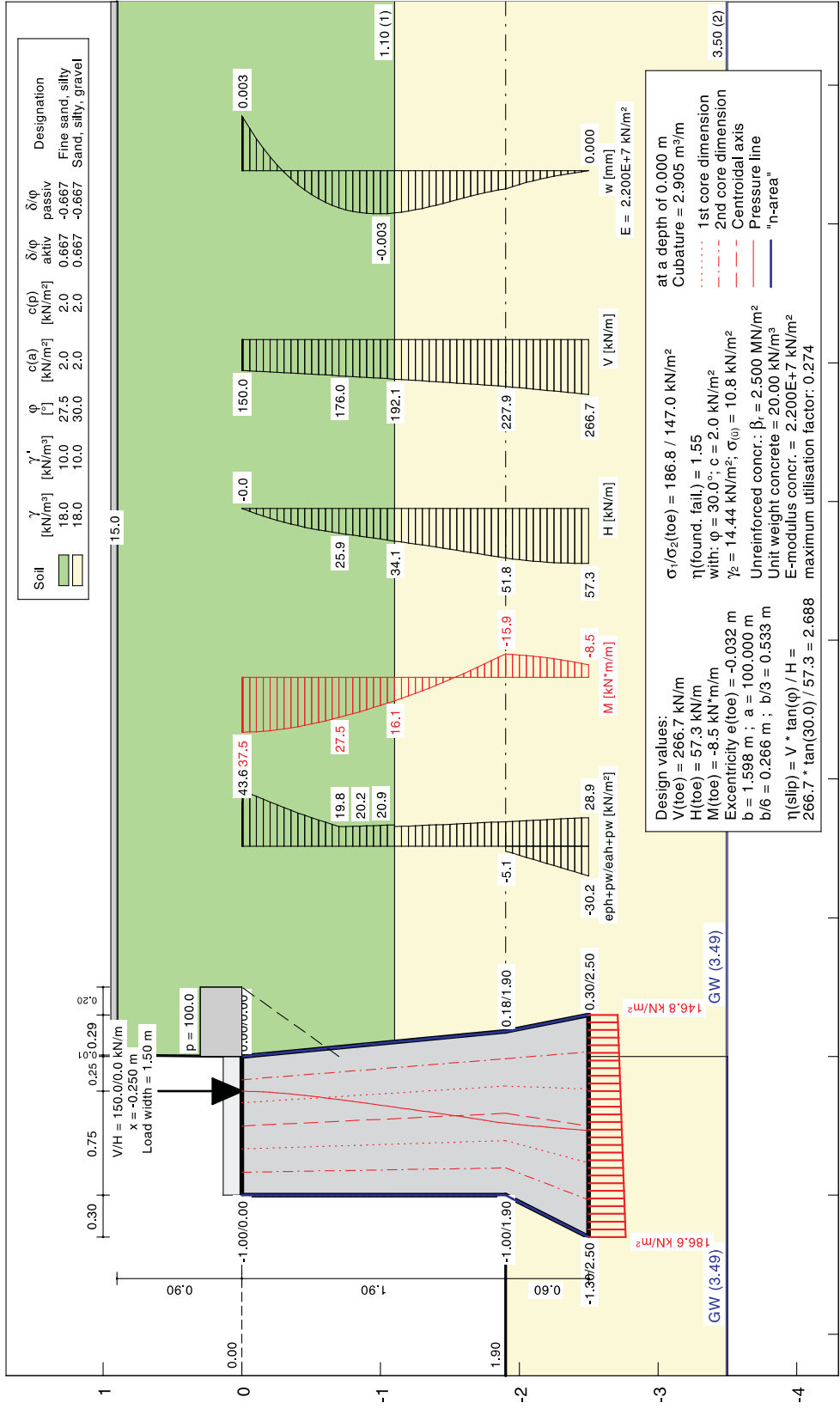
Report no. 9999 / 03  
Attachment no. 6

Initial calculation data  
No earth pressure redistribution  
Active ep after: DIN 4085  
Increased active ep (f = 0.50)  
Increased active ep for block loads (f = 0.50)

Passive ep after: Streck eta (passive) = 2.00

Building protection for excavation Underpinning with HDI

Soil	$\gamma$ [kN/m <sup>3</sup> ]	$\gamma'$ [kN/m <sup>3</sup> ]	$\varphi$ [°]	c(a) [kN/m <sup>2</sup> ]	c(p) [kN/m <sup>2</sup> ]	$\delta/\varphi$ aktiv	$\delta/\varphi$ passiv	Designation
1	18.0	10.0	27.5	2.0	2.0	0.667	-0.667	Fine sand, silty
2	18.0	10.0	30.0	2.0	2.0	0.667	-0.667	Sand, silty, gravel



Design values:  
 $V(\text{toe}) = 266.7 \text{ kN/m}$   
 $H(\text{toe}) = 57.3 \text{ kN/m}$   
 $M(\text{toe}) = -8.5 \text{ kN}^2/\text{m}^2$   
 Eccentricity  $e(\text{toe}) = -0.032 \text{ m}$   
 $b = 1.598 \text{ m}$ ;  $a = 100.000 \text{ m}$   
 $b/6 = 0.266 \text{ m}$ ;  $b/3 = 0.533 \text{ m}$   
 $\eta(\text{slip}) = V * \tan(\varphi) / H = 266.7 * \tan(30.0) / 57.3 = 2.688$   
 at a depth of 0.000 m  
 Cubature = 2.905 m<sup>3</sup>/m  
 1st core dimension  
 2nd core dimension  
 Centroidal axis  
 Pressure line  
 "n-area"  
 $\sigma_1/\sigma_2(\text{toe}) = 186.8 / 147.0 \text{ kN/m}^2$   
 $\eta(\text{found. fail.}) = 1.55$   
 with:  $\varphi = 30.0^\circ$ ;  $c = 2.0 \text{ kN/m}^2$   
 $\gamma_2 = 14.44 \text{ kN/m}^2$ ;  $\sigma_{(0)} = 10.8 \text{ kN/m}^2$   
 Unreinforced concrete:  $\beta = 2.500 \text{ MN/m}^2$   
 Unit weight concr. = 20.00 kN/m<sup>3</sup>  
 E-modulus concr. = 2.200E+7 kN/m<sup>2</sup>  
 maximum utilisation factor: 0.274