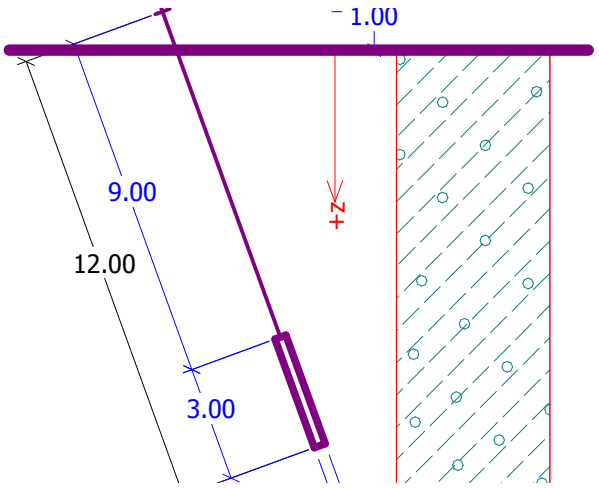
Analysis of micropile

Input data

Project

Date : 8/1/2009

Name : Project	Stage : 1



Soil parameters

Soil no 1

Unit weight :	γ	=	19.01 kN/m^3
Angle of internal friction :	φ_{ef}	=	29.00 °
Cohesion of soil :	c_{ef}	=	5.99 kPa
Saturated unit weight :	γ_{sat}	=	19.01 kN/m^3

Geometry

Diameter		=	121.0 mm
Thickness of web-section		=	7.0 mm
Free length of pile	l	=	9.00 m
Root length	l_r	=	3.00 m
Diameter of root	d_r	=	0.30 m
Pile inclination from vertical	α	=	20.00 °
Pile head offset	l_a	=	1.00 m

Material parameters of structure:

Concrete

Specified characteristic compressive strength	R_{bd}	=	20.00 MPa
Elastic modulus	E_b	=	29000.00 MPa

Steel

Specified characteristic strength of steel	R_{sd}	=	210.00 MPa
Elastic modulus	E_s	=	210000.00 MPa

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	-	Soil no 1	

Load

No.	Force new	Force change	Name	Force N [kN]	Moment M [kNm]
1	YES		Force No. 1	120.00	9.50

Global settings

Verification of stem bearing capacity - geometric method (Euler)
Root bearing capacity calculation - Lizzi theory

Settings of the stage of construction

Masonry friction reduction factor base-soil μ = 0.90
Verification analysis according to the factor of safety
Safety factor for critical force SF_1 = 1.50
Safety factor for cross-section bearing capacity SF_2 = 1.50
Safety factor for root bearing capacity FS_3 = 1.50

Verification No. 1

Cross-section check -calculation no. 1

Calculation with corrosion effect
Intended durability t = 50 [years]
Soil type: native soils

Internal stability checking: geometric method (Euler)
calculation of section effective length - bearing (hinged-hinged).

Modulus of subsoil reaction E_p = 0.80 MN/m^3
Calculate number of halfwaves n = 0.00
Effective length l_{cr} = 2.85 m

Critical normal force N_{cr} = 1167.14 kN
Maximal normal force N_{max} = 120.00 kN

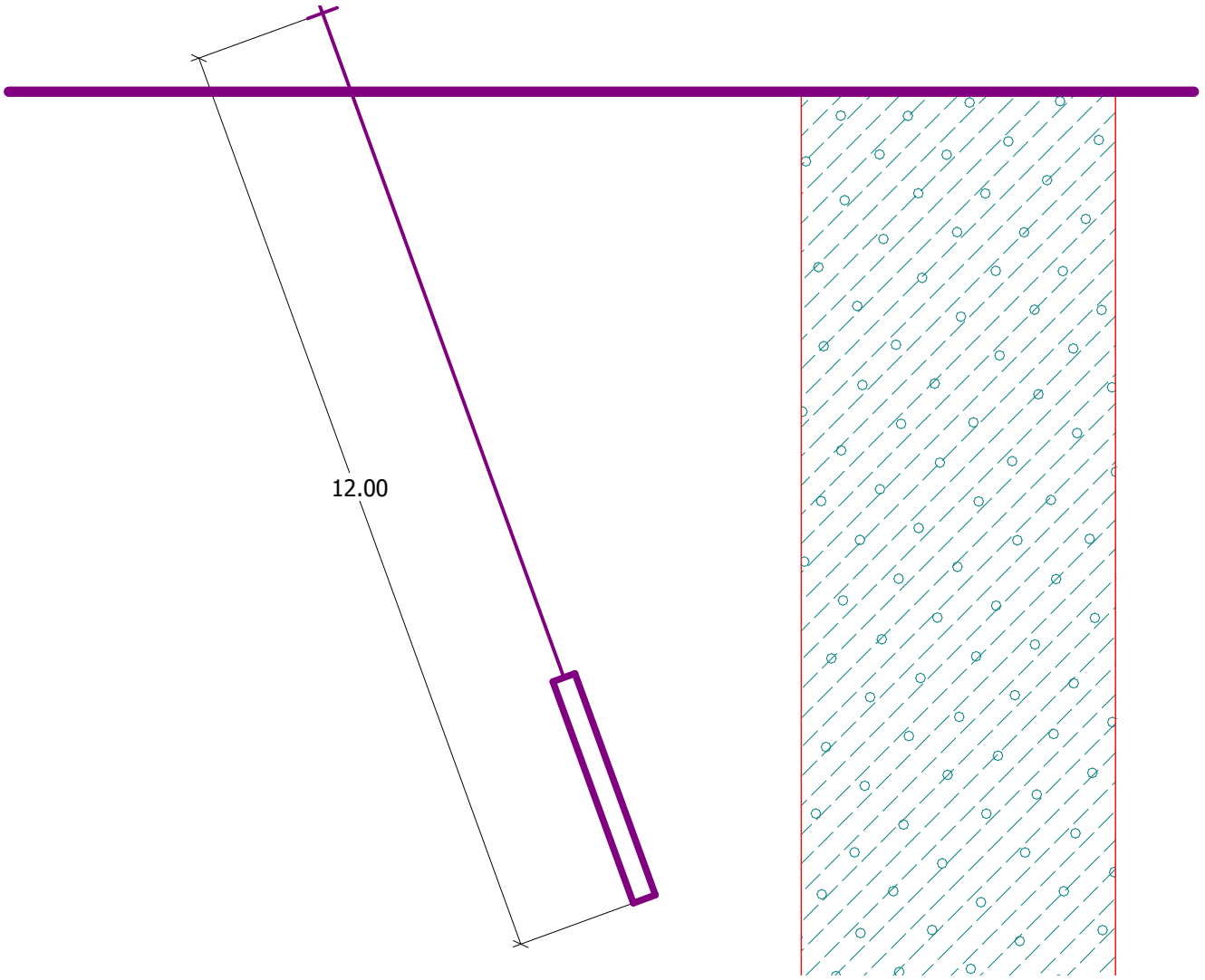
Safety factor = 9.73 > 1.50
Internal stability of micropile section is SATISFACTORY

Evaluation of coupled section bearing capacity:
Area of ideal cross-section A_i = 3.522E+03 mm^2
Moment of inertia of ideal cross-section J_i = 4.565E+06 mm^4
Beam slenderness λ = 79.082
Buckling coefficient κ = 0.719
Location of neutral axis = -26.5 mm

Stress in steel σ = 119.91 MPa
Steel strenght σ_{rd} = 210.00 MPa

Safety factor = 1.75 > 1.50
Coupled section of micropile is SATISFACTORY

Name : Section calculation | **Stage : 1; Verification : 1**



Verification No. 1

Root evaluation - calculation number 1

Calculation method - Lizzi theory.
Coefficient of root diameter influence = 0.80
Average limit skin friction q_{sav} = 120.00 kPa
Total bearing capacity of micropile root = 271.43 kN

Bearing capacity of the micropile Q = 271.43 kN
Maximal normal force N_{max} = 120.00 kN

Safety factor = 2.26 > 1.50
Bearing capacity of the root is SATISFACTORY

Name : Calculation root **Stage : 1; Verification : 1**