

Analysis of beam on elastic foundation

Input data

Project

Date : 28.5.2010

Global settings

Loads and combinations : according to EN 1990
Concrete structures : EN 1992 1-1 (EC2)
Parameters of the analysis : calculation of C1 and C2
FE subdivision : 20
Calculate assuming tension cutoff of soils
Compute geostatic stress : from ground
Number of iterations of C1 and C2 : 3

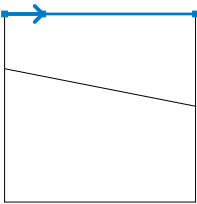
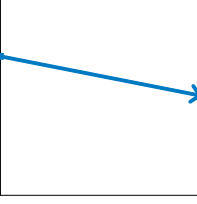
Segments

Number	Length [m]	Width [m]	Depth [m]	Area of cross-section [m ²]	Moment of inertia [m ⁴]	Material
1	10,00	1,00	0,30			C 20/25

Segments materials

Number	Material	Elasticity modulus E _{cm} [MPa]	Shear modulus G [MPa]	Specific weight γ [kN/m ³]
1	C 20/25	29000,00	11340,00	25,00

Interface

Number	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		0,00	1,00	2,00	1,00	10,00	1,00
2		0,00	-1,86	10,00	-3,82		

Location

x : 0,00 m

z : 0,00 m

Soil parameters

Písek

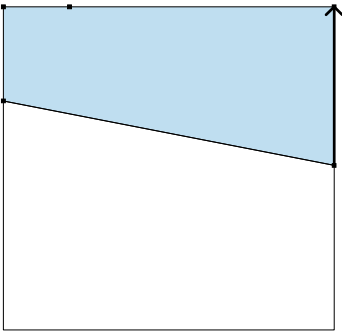

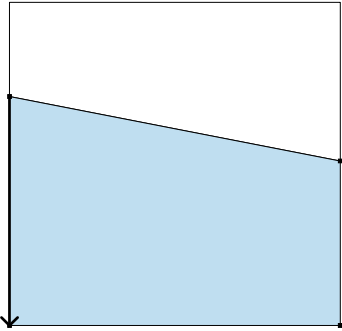
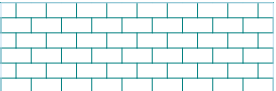
Unit weight : $\gamma = 20,00 \text{ kN/m}^3$
Deformation modulus : $E_{\text{def}} = 75,00 \text{ MPa}$
Poisson's ratio : $\nu = 0,28$
Coeff. of structural strength : $m = 0,20$
Saturated unit weight : $\gamma_{\text{sat}} = 20,00 \text{ kN/m}^3$

Skalní podloží

Unit weight : $\gamma = 20,00 \text{ kN/m}^3$
Deformation modulus : $E_{\text{def}} = 1200,00 \text{ MPa}$
Poisson's ratio : $\nu = 0,28$
Coeff. of structural strength : $m = 0,20$

Saturated unit weight : $\gamma_{\text{sat}} = 20,00 \text{ kN/m}^3$

Assigning and surfaces

Number	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		10,00	-3,82	10,00	1,00	Písek 
		2,00	1,00	0,00	1,00	
		0,00	-1,86			
2		0,00	-1,86	0,00	-8,82	Skalní podloží 
		10,00	-8,82	10,00	-3,82	

Water

Water type : No water

Load case 1

Name	Load case		Type	Coefficient		Active load case
	Code			$\gamma_{f,\text{sup}}$	$\gamma_{f,\text{inf}}$	
G1 vlastní tíha-stálé	Self-weight		Permanent	1,35	0,90	

Number	Type of load	Origin x [m]	Length l [m]	Magnitude		
				f, m, q, q ₁	q ₂	unit
1	distr. uniform on beam segment	0,00	10,00	7,50		[kN/m]

Load case 2

Name	Load case		Type	Coefficient		Active load case
	Code			$\gamma_{f,\text{sup}}$	$\gamma_{f,\text{inf}}$	
G2	Force		Permanent	1,35	0,90	

Number	Type of load	Origin x [m]	Length l [m]	Magnitude		
				f, m, q, q ₁	q ₂	unit
1	distr. uniform on beam segment	0,00	10,00	10,00		[kN/m]

Load case 3

Name	Load case		Type	Coefficient		Active load case
	Code			$\gamma_{f,\text{sup}}$	$\gamma_{f,\text{inf}}$	
Q3	Force		Variable	1,50		Yes

Number	Type of load	Origin x [m]	Length l [m]	Magnitude		
				f, m, q, q ₁	q ₂	unit
1	concentrated force	3,00		120,00		[kN]
2	concentrated force	6,00		120,00		[kN]
3	concentrated force	7,00		120,00		[kN]

Load case 4



Name	Load case		Coefficient		Active load case
	Code	Type	$\gamma_{f,sup}$	$\gamma_{f,inf}$	
Q4	Force	Variable	1,50		

Number	Type of load	Origin x [m]	Length l [m]	Magnitude		unit
				f, m, q, q ₁	q ₂	
1	distr. uniform on beam segment	0,00	10,00	12,00		[kN/m]

Combination ULS

Number	Design and type of combination	Assembly
3	Q4:G1+G2	$\gamma_{f,sup,1} * [G1 \text{ vlastní tíha-stálé}] + \gamma_{f,sup,2} * [G2] + \gamma_{f,sup,4} * [Q4]$
4	Q3:G1+G2+Q4	$\gamma_{f,sup,1} * [G1 \text{ vlastní tíha-stálé}] + \gamma_{f,sup,2} * [G2] + \gamma_{f,sup,3} * [Q3] + \gamma_{f,sup,4} * \psi_{0,4} * [Q4]$
5	Q4:G1+G2+Q3	$\gamma_{f,sup,1} * [G1 \text{ vlastní tíha-stálé}] + \gamma_{f,sup,2} * [G2] + \gamma_{f,sup,3} * \psi_{0,3} * [Q3] + \gamma_{f,sup,4} * [Q4]$
6	Q3:G1+G2	$\gamma_{f,sup,1} * [G1 \text{ vlastní tíha-stálé}] + \gamma_{f,sup,2} * [G2] + \gamma_{f,sup,3} * [Q3]$

Combination SLS

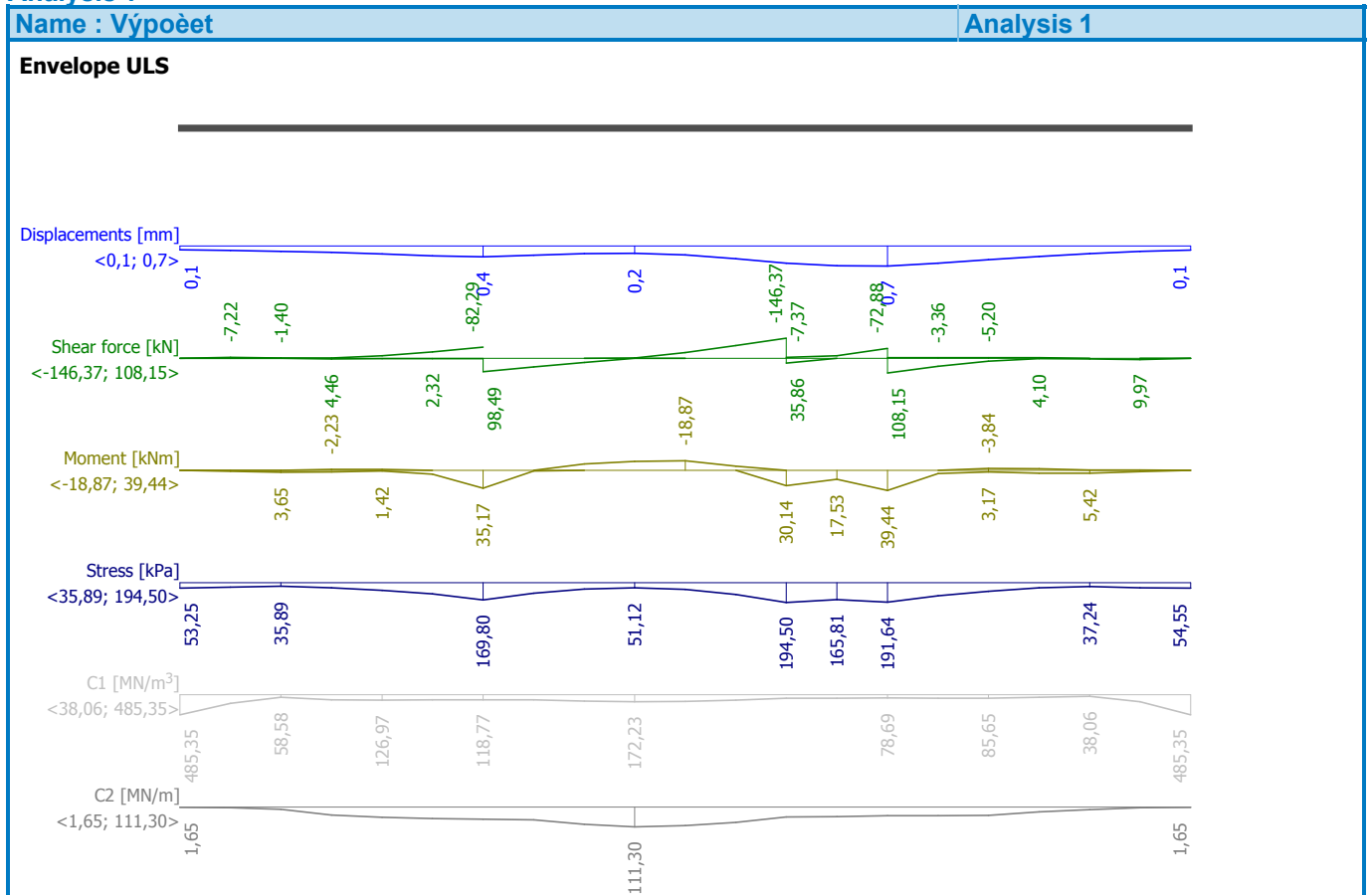
Number	Design and type of combination	Assembly
1	Q4:G1+G2+Q3	$[G1 \text{ vlastní tíha-stálé}] + [G2] + \psi_{0,3} * [Q3] + [Q4]$
2	Q3:G1+G2+Q4	$[G1 \text{ vlastní tíha-stálé}] + [G2] + [Q3] + \psi_{0,4} * [Q4]$

Results

Calculation is carried out.

Characteristic combinations for subsoil analysis : SLS: Q3:G1+G2+Q4

Analysis 1

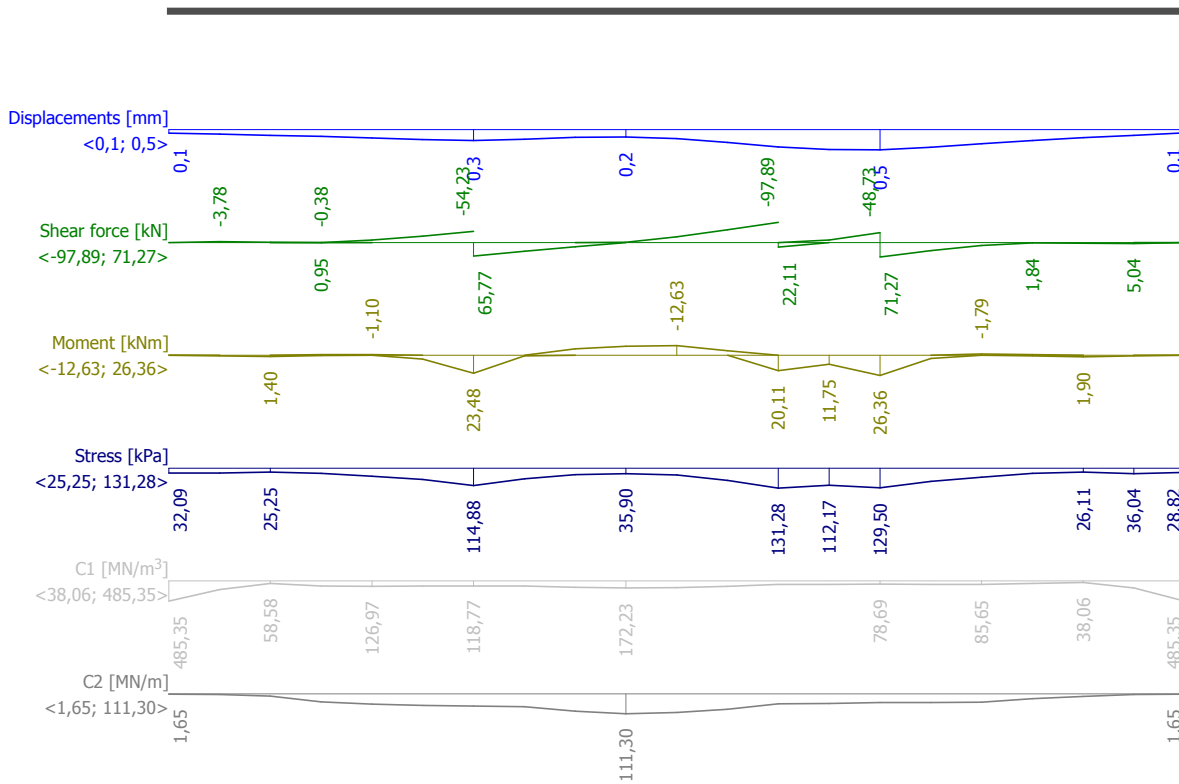


Analysis 2

Name : Výpočet

Analysis 2

Envelope SLS



Distributions - C1 and C2

x [m]	C1 [MN/m³]	C2 [MN/m]
0.00	485.35	1.65
0.50	207.03	3.52
1.00	58.58	12.62
1.50	119.70	44.53
2.00	126.97	58.25
2.50	123.28	64.19
3.00	118.77	67.35
3.50	119.83	72.18
4.00	154.31	96.96
4.50	172.23	111.30
5.00	157.69	103.53
5.50	129.73	85.57
6.00	85.86	56.28
6.50	83.70	53.87
7.00	78.69	49.03
7.50	82.45	48.89
8.00	85.65	47.06
8.50	56.54	27.49
9.00	38.06	14.50
9.50	172.13	4.10
10.00	485.35	1.65

Overall results - Envelope ULS



Maximum structure moment : 39,44 kNm
Minimum structure moment : -18,87 kNm
Maximum structure shear force : 108,15 kN
Maximum structure deflection : 0,68 mm
Maximum interfacial stress : 194,50 kPa

Overall results - Envelope SLS

Maximum structure moment : 26,36 kNm
Minimum structure moment : -12,63 kNm
Maximum structure shear force : 71,27 kN
Maximum structure deflection : 0,46 mm
Maximum interfacial stress : 131,28 kPa