

## Analysis of ground loss

### Input data

#### Project

Date : 28.3.2007

#### Buildings

No.	Description	Coordinate		Height v [m]	Depth h [m]
		x <sub>1</sub> [m]	x <sub>2</sub> [m]		
1	Building No. 1	90.00	120.00	4.57	0.00

#### Analysis setting

Analysis carried out according to theory - Volume Loss

Shape of settlement trough - Gauss

Analysis performed with user-defined values of setting.

Borders of gradient damage

Border 1 = 1 / 1202

Border 2 = 1 / 800

Border 3 = 1 / 500

Border 4 = 1 / 425

Border 5 = 1 / 150

Borders of tensile damage

Border 1 = 0.00 ‰

Border 2 = 0.50 ‰

Border 3 = 0.75 ‰

Border 4 = 1.00 ‰

Border 5 = 1.80 ‰

#### Geometry

No.	New excavation	Description	Coordinate X [m]	Depth Z [m]	Radius r [m]	Area A [m <sup>2</sup> ]
1	YES	Excavation No. 1	100.00	15.00	3.09	30.00

No.	Description	Trough param. k [-]	Volume loss VL [%]
1	Excavation No. 1	0.50	3.00

#### Measurment

No.	Description	Coordinate X [m]	Depth Z [mm]
1	Mižení è. 1	80.00	2.00
2	Mižení è. 2	90.00	14.00
3	Mižení è. 3	100.00	22.00
4	Mižení è. 4	110.00	14.00
5	Mižení è. 5	120.00	2.00

## Verification No. 1 (Stage of construction 1)

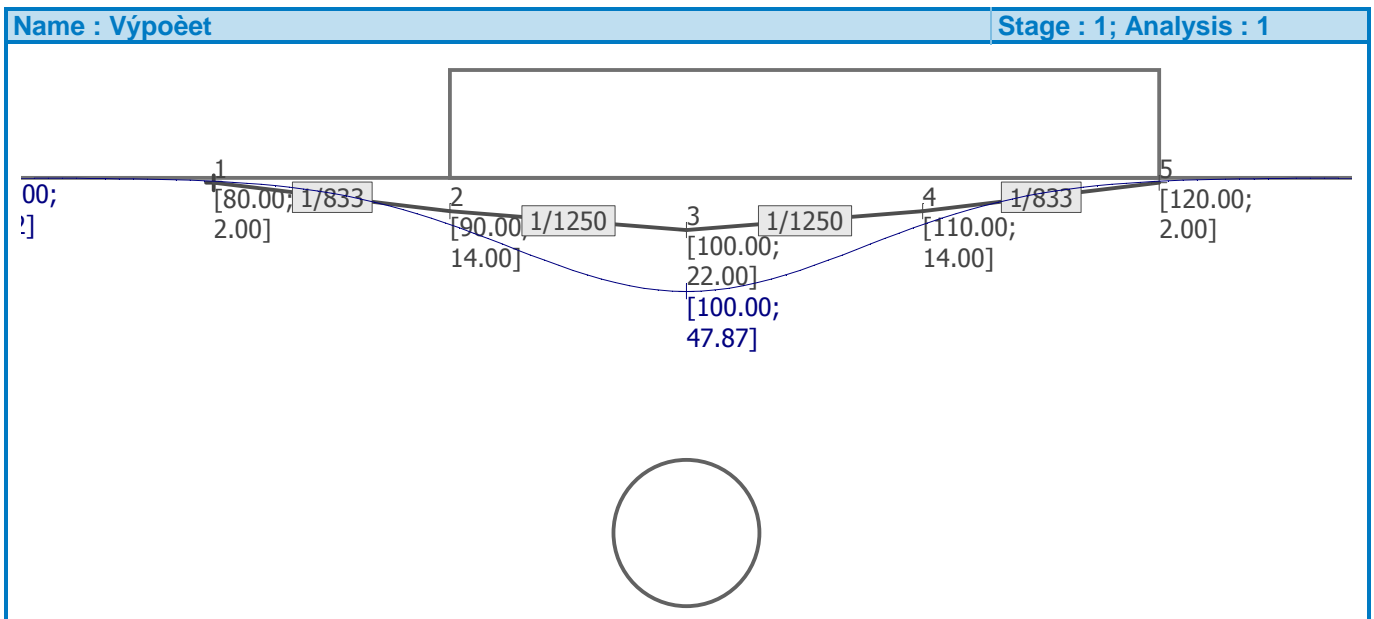
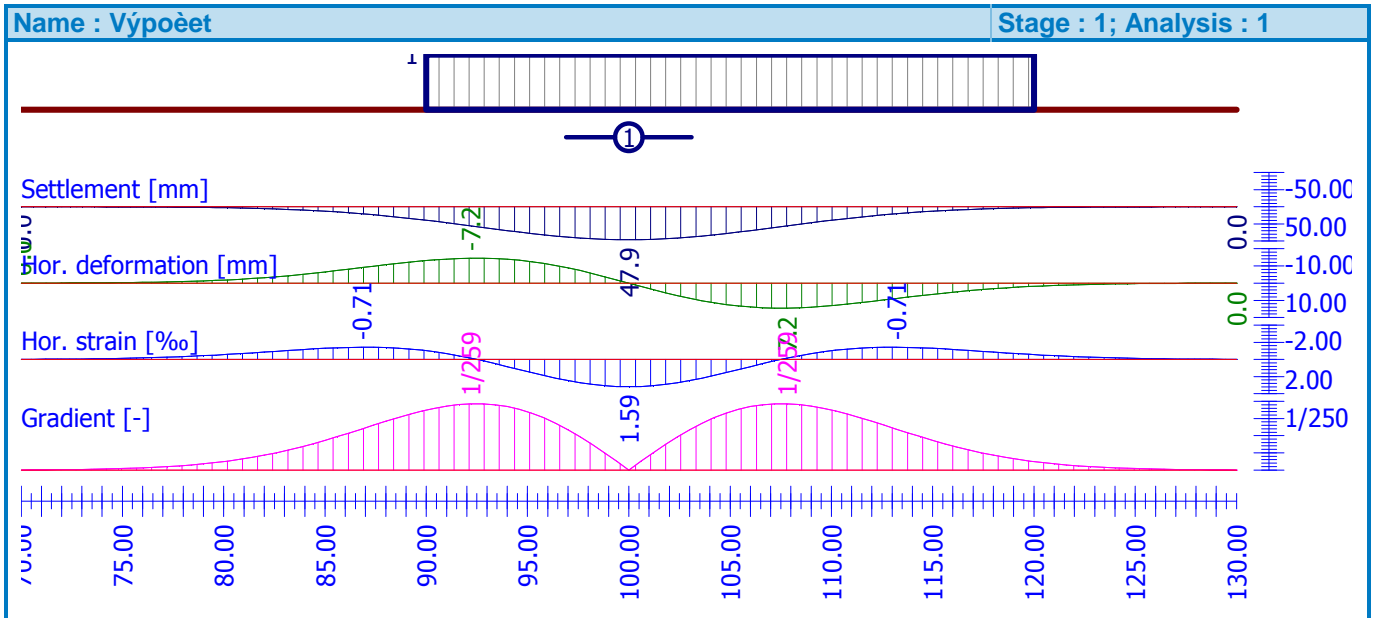
#### Analysis result - Excavation No. 1

Distance of point of inflexion from center point  $L_{inf} = 7.50$  mMaximum settlement  $s_{max} = 47.9$  mmLength of settlement trough  $L_{max} = 30.00$  m

#### Overall results

Depression computed at terrain surface.

Max. settlement  $s_{max} = 47.9$  mm  
 Max. horizontal deformation  $h_{max} = 7.2$  mm  
 Begin of settlement trough  $x_1 = 70.00$  m  
 End of settlement trough  $x_2 = 130.00$  m  
 Length of settlement trough  $l = 60.00$  m



## Verification No. 2 (Stage of construction 1)

### Overall results

Depression computed at depth 1.00 m.

Max. settlement  $s_{max} = 43.9$  mm  
 Max. horizontal deformation  $h_{max} = 6.2$  mm  
 Begin of settlement trough  $x_1 = 71.79$  m  
 End of settlement trough  $x_2 = 128.21$  m  
 Length of settlement trough  $l = 56.41$  m

**Damage verification No. 1 (Stage of construction 1)**

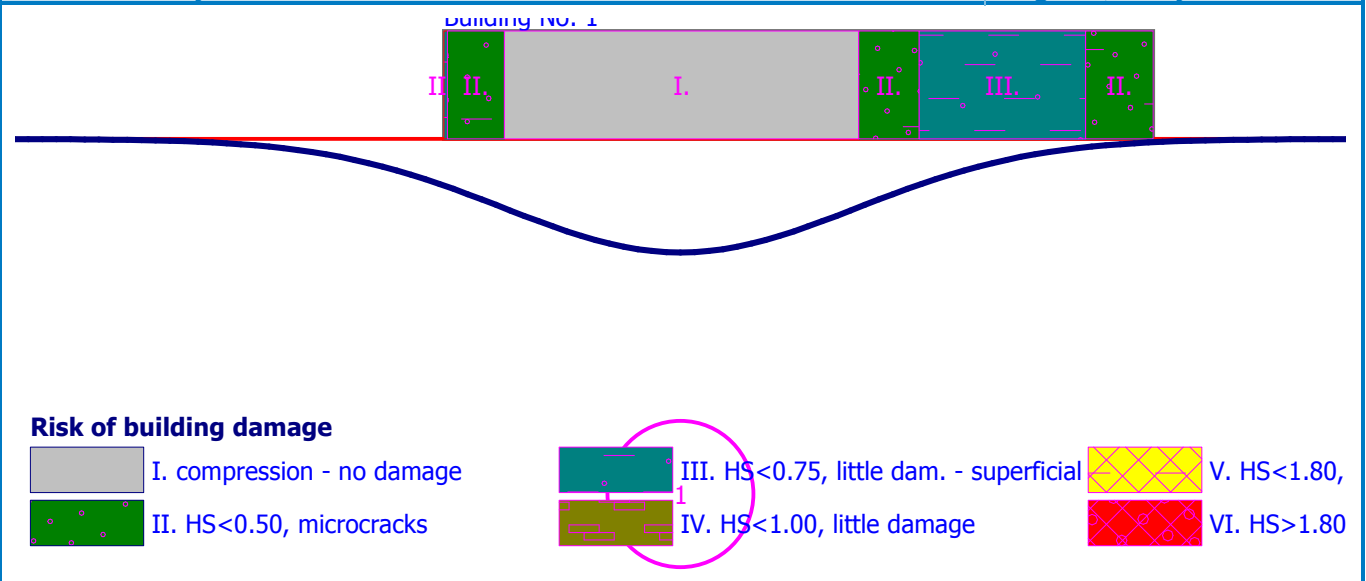
Type of damage: tensile cracks

Building description: Building No. 1

Section	Beg. $x_1$ [m]	End $x_2$ [m]	Description of damage
1	90.00	90.15	III. HS<0.75, little dam. - superficial
2	90.15	92.55	II. HS<0.50, microcracks
3	92.55	107.55	I. compression - no damage
4	107.55	110.10	II. HS<0.50, microcracks
5	110.10	117.15	III. HS<0.75, little dam. - superficial
6	117.15	120.00	II. HS<0.50, microcracks

Name : Poruchy

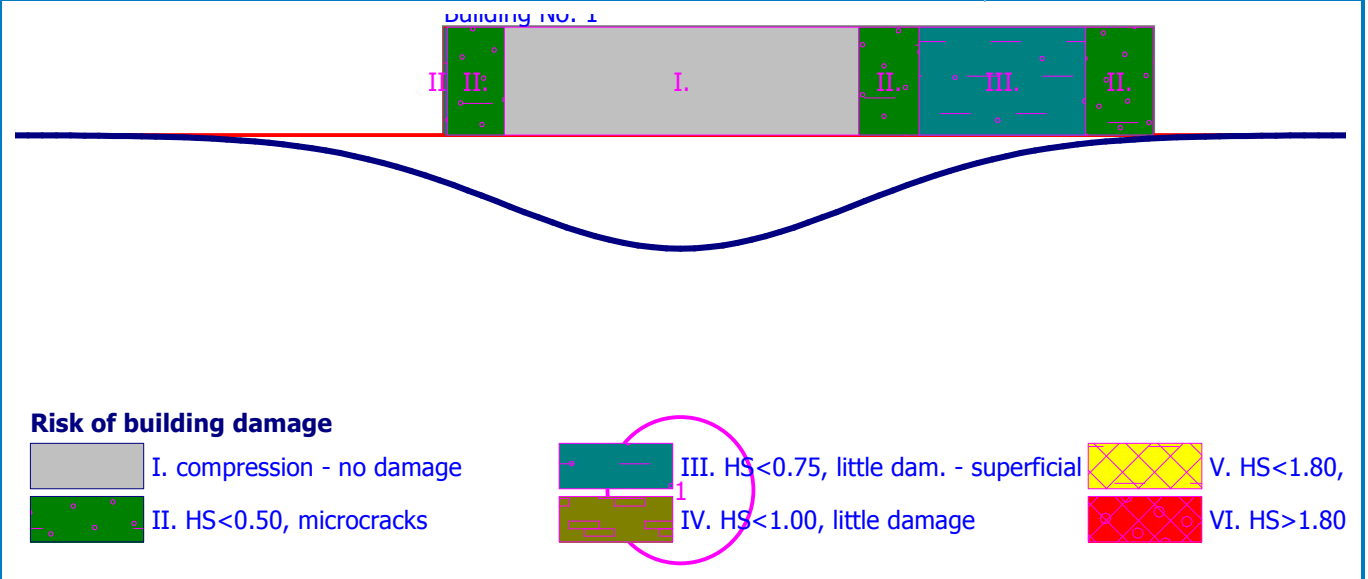
Stage : 1; Analysis : 1

**Damage verification No. 2 (Stage of construction 1)**

Type of damage: tensile cracks

Building description: Building No. 1

Section	Beg. $x_1$ [m]	End $x_2$ [m]	Description of damage
1	90.00	90.15	III. HS<0.75, little dam. - superficial
2	90.15	92.55	II. HS<0.50, microcracks
3	92.55	107.55	I. compression - no damage
4	107.55	110.10	II. HS<0.50, microcracks
5	110.10	117.15	III. HS<0.75, little dam. - superficial
6	117.15	120.00	II. HS<0.50, microcracks



**Damage verification No. 3 (Stage of construction 1)**

Type of damage: relative deflection

Building description: Building No. 1

Max. relative deflection upwards: 0.50 mm/m in distace of: 23.70 m from building starting point.

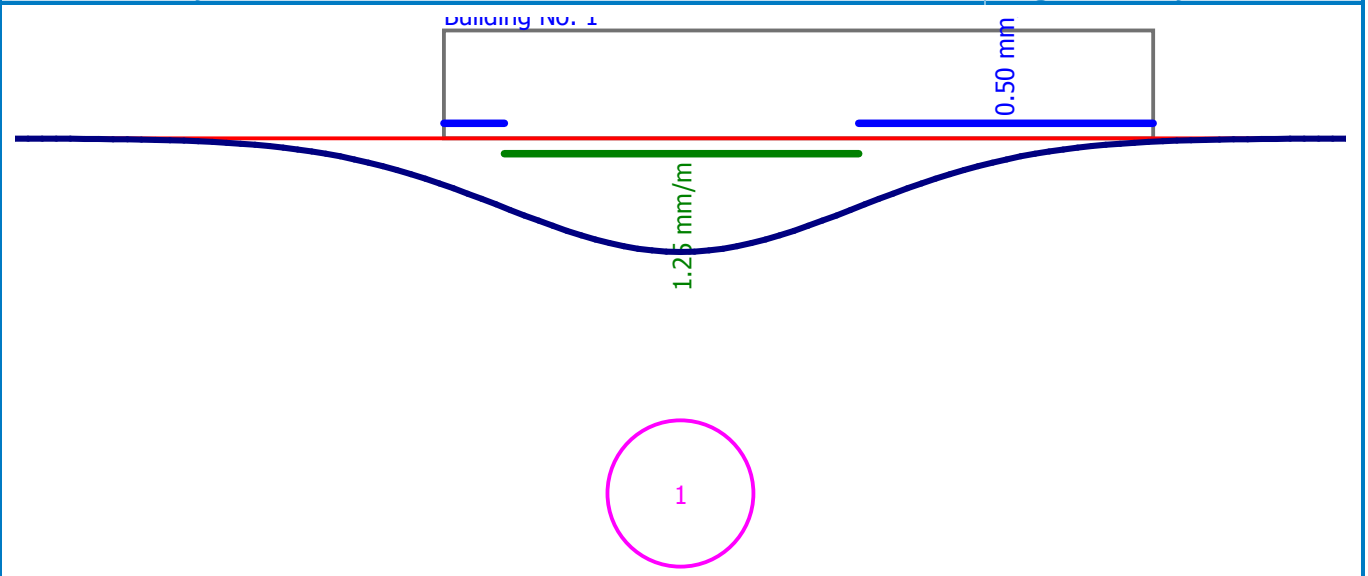
Max. relative deflection downwards: 1.25 mm/m in distance of: 10.05 m from building starting point.

Hogging

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]
2	0.00	2.55
3	17.55	30.00

Sagging

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]
2	2.55	17.55



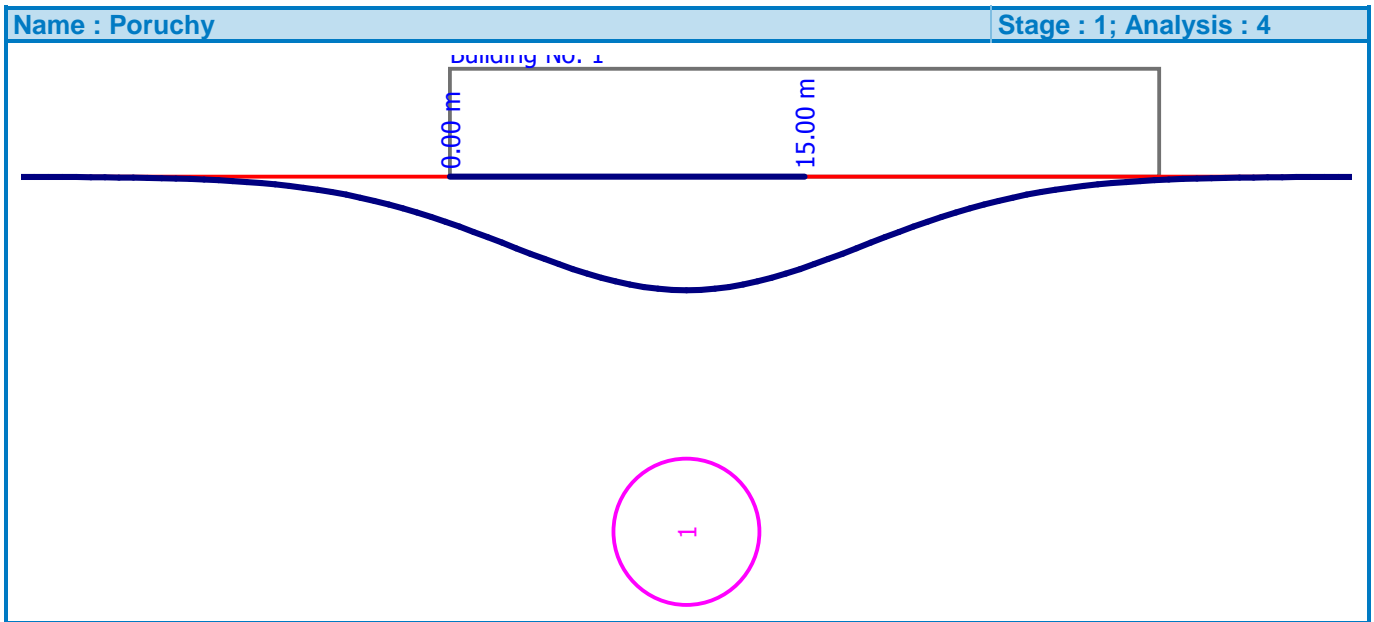
### Damage verification No. 4 (Stage of construction 1)

Type of damage: section of building

Building to be analyzed: Building No. 1

Distance from building starting point: point 1 = 0.00 m, point 2 = 15.00 m.

Maximum horizontal strain = 0.48 ‰  
 Relative gradient between  $x_1, x_2$  = 1/805  
 Maximum gradient = 1/259  
 Relative deflection (hogging) = 0.05 mm/m  
 Relative deflection (sagging) = -1.08 mm/m



### Input data (Stage of construction 4)

#### Geometry

No.	New excavation	Description	Coordinate X [m]	Depth Z [m]	Radius r [m]	Area A [m <sup>2</sup> ]
1	NO	Excavation No. 1	100.00	15.00	3.09	30.00
2	NO	Excavation No. 2	118.00	15.00	3.09	30.00
3	NO	Excavation No. 3	106.00	22.00	3.99	50.00
4	YES	Excavation No. 4	121.00	18.00	5.92	110.00

No.	Description	Trough param. k [-]	Volume loss VL [%]
1	Excavation No. 1	0.50	3.00
2	Excavation No. 2	0.50	3.00
3	Excavation No. 3	0.50	1.50
4	Excavation No. 4	0.50	2.00

### Verification No. 1 (Stage of construction 4)

#### Analysis result - Excavation No. 1

Distance of point of inflexion from center point  $L_{inf}$  = 7.50 m

Maximum settlement  $s_{max}$  = 47.9 mm

Length of settlement trough  $L_{max}$  = 30.00 m

**Analysis result - Excavation No. 2**

Distance of point of inflexion from center point  $L_{inf} = 7.50 \text{ m}$   
 Maximum settlement  $S_{max} = 47.9 \text{ mm}$   
 Length of settlement trough  $L_{max} = 30.00 \text{ m}$

**Analysis result - Excavation No. 3**

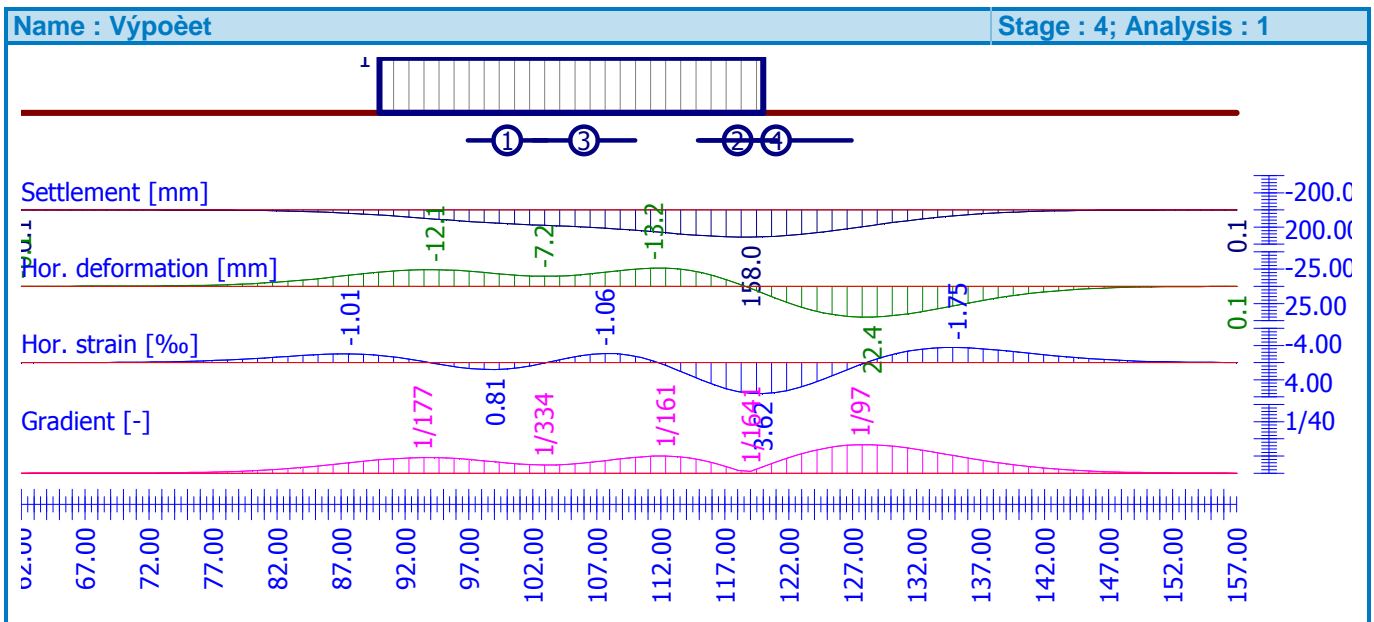
Distance of point of inflexion from center point  $L_{inf} = 11.00 \text{ m}$   
 Maximum settlement  $S_{max} = 27.2 \text{ mm}$   
 Length of settlement trough  $L_{max} = 44.00 \text{ m}$

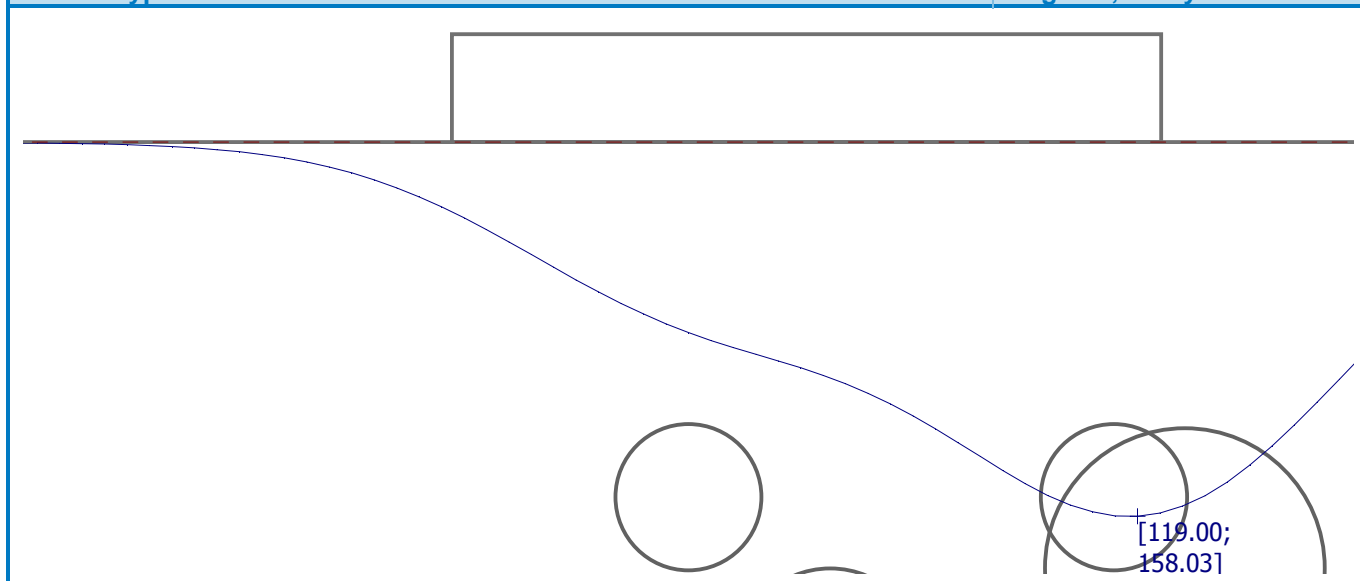
**Analysis result - Excavation No. 4**

Distance of point of inflexion from center point  $L_{inf} = 9.00 \text{ m}$   
 Maximum settlement  $S_{max} = 97.5 \text{ mm}$   
 Length of settlement trough  $L_{max} = 36.00 \text{ m}$

**Overall results**

Depression computed at depth 0.00 m.  
 Max. settlement  $S_{max} = 158.0 \text{ mm}$   
 Max. horizontal deformation  $h_{max} = 22.4 \text{ mm}$   
 Begin of settlement trough  $x_1 = 62.00 \text{ m}$   
 End of settlement trough  $x_2 = 157.00 \text{ m}$   
 Length of settlement trough  $l = 95.00 \text{ m}$





## Verification No. 2 (Stage of construction 4)

### Analysis result - Excavation No. 1

Distance of point of inflexion from center point  $L_{inf} = 7.50$  m  
 Maximum settlement  $s_{max} = 47.9$  mm  
 Length of settlement trough  $L_{max} = 30.00$  m

### Analysis result - Excavation No. 2

Distance of point of inflexion from center point  $L_{inf} = 7.50$  m  
 Maximum settlement  $s_{max} = 47.9$  mm  
 Length of settlement trough  $L_{max} = 30.00$  m

### Analysis result - Excavation No. 3

Distance of point of inflexion from center point  $L_{inf} = 11.00$  m  
 Maximum settlement  $s_{max} = 27.2$  mm  
 Length of settlement trough  $L_{max} = 44.00$  m

### Analysis result - Excavation No. 4

Distance of point of inflexion from center point  $L_{inf} = 9.00$  m  
 Maximum settlement  $s_{max} = 97.5$  mm  
 Length of settlement trough  $L_{max} = 36.00$  m

### Overall results

Depression computed at depth 2.00 m.

Max. settlement  $s_{max} = 129.4$  mm  
 Max. horizontal deformation  $h_{max} = 16.4$  mm  
 Begin of settlement trough  $x_1 = 65.64$  m  
 End of settlement trough  $x_2 = 153.66$  m  
 Length of settlement trough  $l = 88.02$  m

## Damage verification No. 1 (Stage of construction 4)

Type of damage: tensile cracks

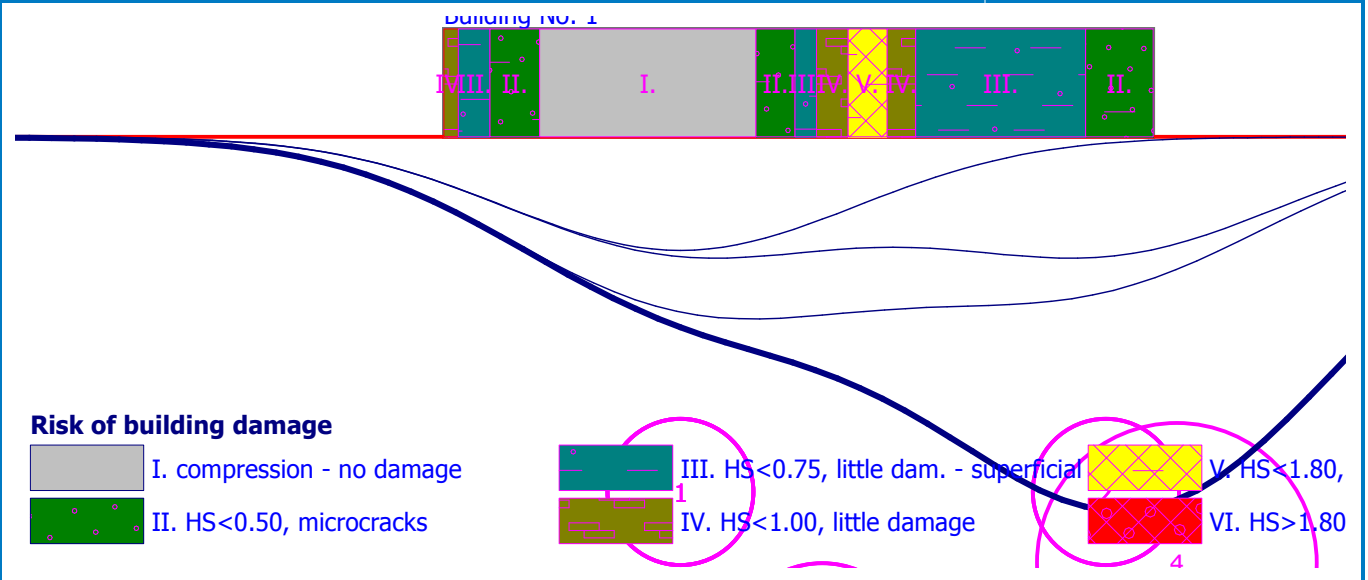
Analysis performed for all stages.

Building description: Building No. 1

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
1	90.00	90.60	IV. HS<1.00, little damage
2	90.60	91.95	III. HS<0.75, little dam. - superficial
3	91.95	94.05	II. HS<0.50, microcracks
4	94.05	103.20	I. compression - no damage
5	103.20	104.85	II. HS<0.50, microcracks
6	104.85	105.75	III. HS<0.75, little dam. - superficial
7	105.75	107.10	IV. HS<1.00, little damage
8	107.10	108.75	V. HS<1.80, medium damage
9	108.75	109.95	IV. HS<1.00, little damage
10	109.95	117.15	III. HS<0.75, little dam. - superficial
11	117.15	120.00	II. HS<0.50, microcracks

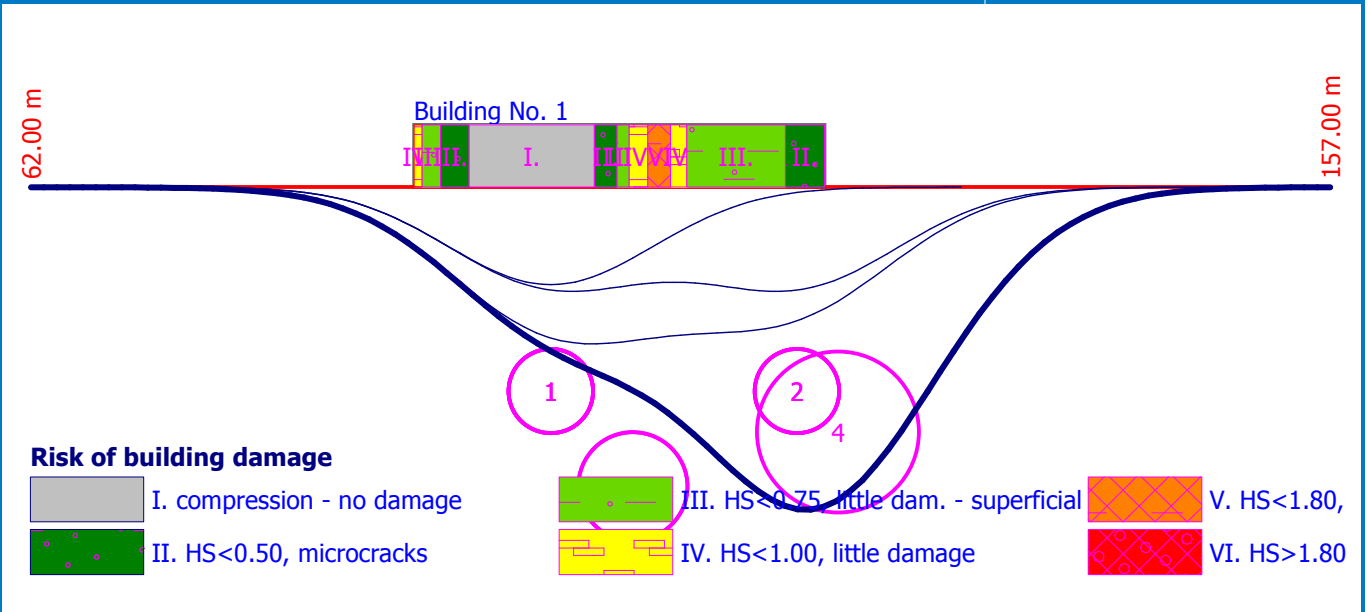
Name : Poruchy

Stage : 4; Analysis : 1



Name : Damages

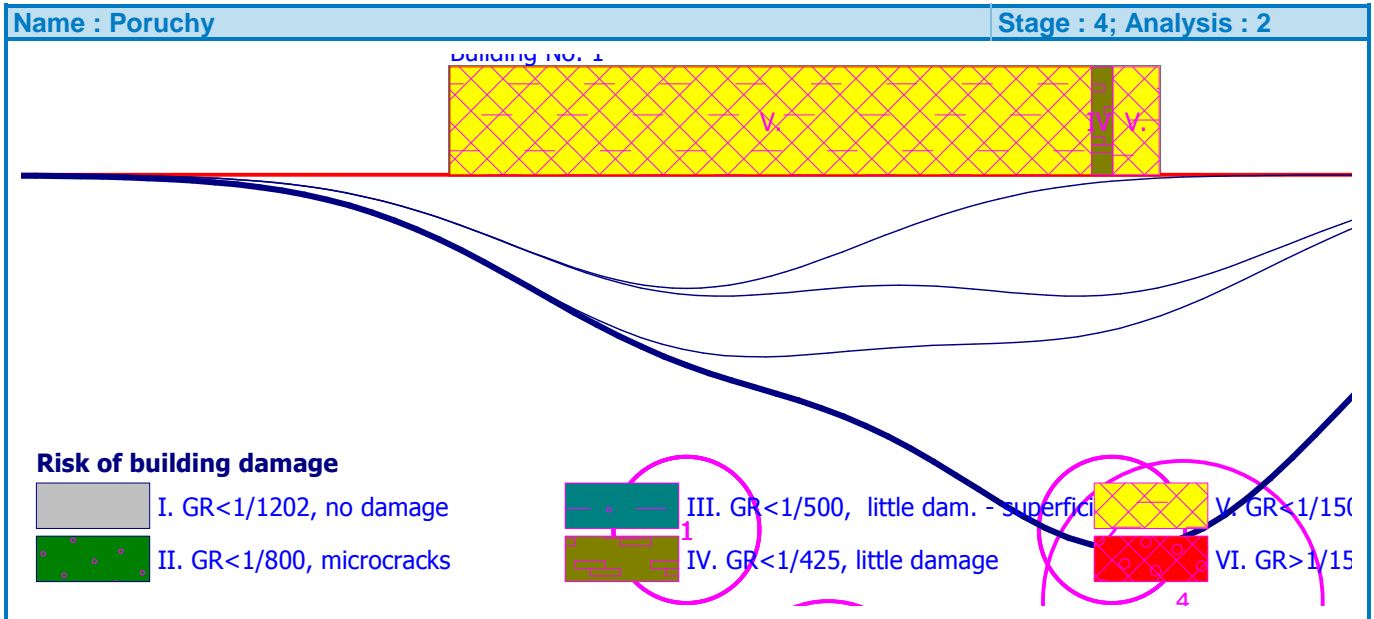
Stage : 4; Analysis : 1



### Damage verification No. 2 (Stage of construction 4)

Type of damage: gradient damage  
 Analysis performed for stages: 1,2,3,4  
 Building description: Building No. 1

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
1	90.00	117.15	V. GR<1/150, medium damage
2	117.15	118.05	IV. GR<1/425, little damage
3	118.05	120.00	V. GR<1/150, medium damage



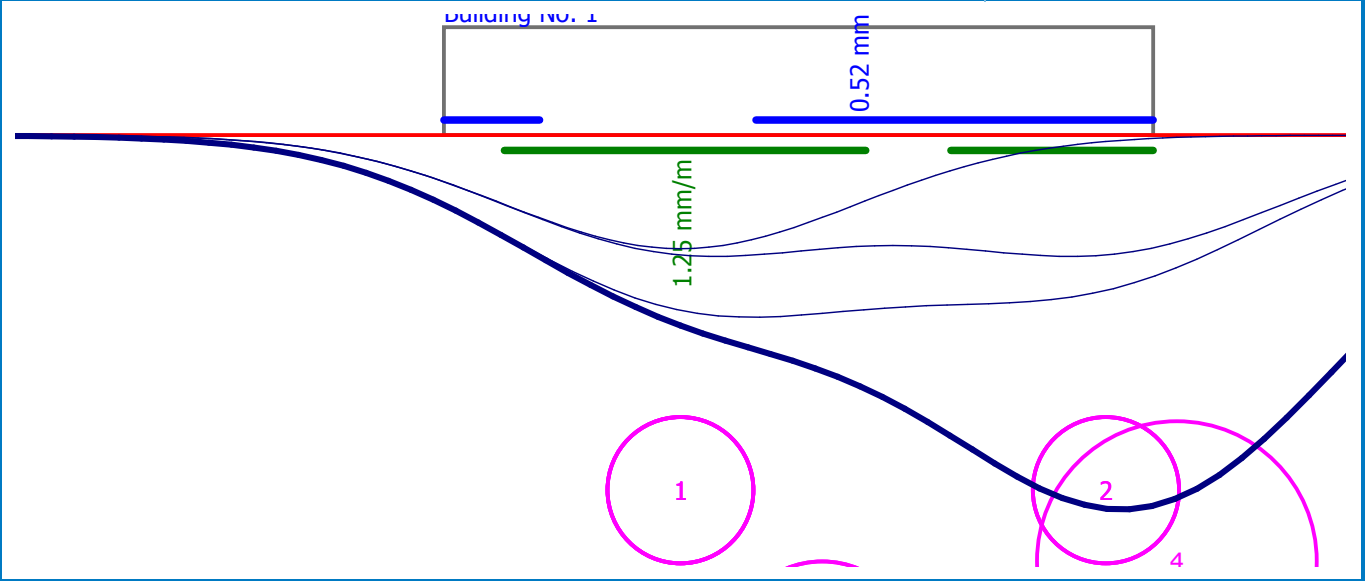
### Damage verification No. 3 (Stage of construction 4)

Type of damage: relative deflection  
 Analysis performed for stages: 1,2,3,4  
 Building description: Building No. 1  
 Max. relative deflection upwards: 0.52 mm/m in distance of: 17.55 m from building starting point.  
 Max. relative deflection downwards: 1.25 mm/m in distance of: 10.05 m from building starting point.  
 Hogging

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]
2	0.00	4.05
3	13.20	30.00

Sagging

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]
2	2.55	17.85
3	21.45	30.00



**Damage verification No. 4 (Stage of construction 4)**

Type of damage: section of building

Analysis performed for stages: 1,2,3,4

Building to be analyzed: Building No. 1

Distance from building starting point: point 1 = 0.00 m, point 2 = 15.00 m.

- Maximum horizontal strain = 0.81 ‰
- Relative gradient between  $x_1, x_2$  = 1/225
- Maximum gradient = 1/177
- Relative deflection (hogging) = 0.11 mm/m
- Relative deflection (sagging) = -1.08 mm/m

