



## 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	B nr. 1	90,00	120,00	4,57	1,50

#### Global settings

Analysis carried out according to theory : Volume Loss

Shape of settlement trough : Gauss

#### Settings of the stage of construction

Analysis performed with user-defined values of settings.

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

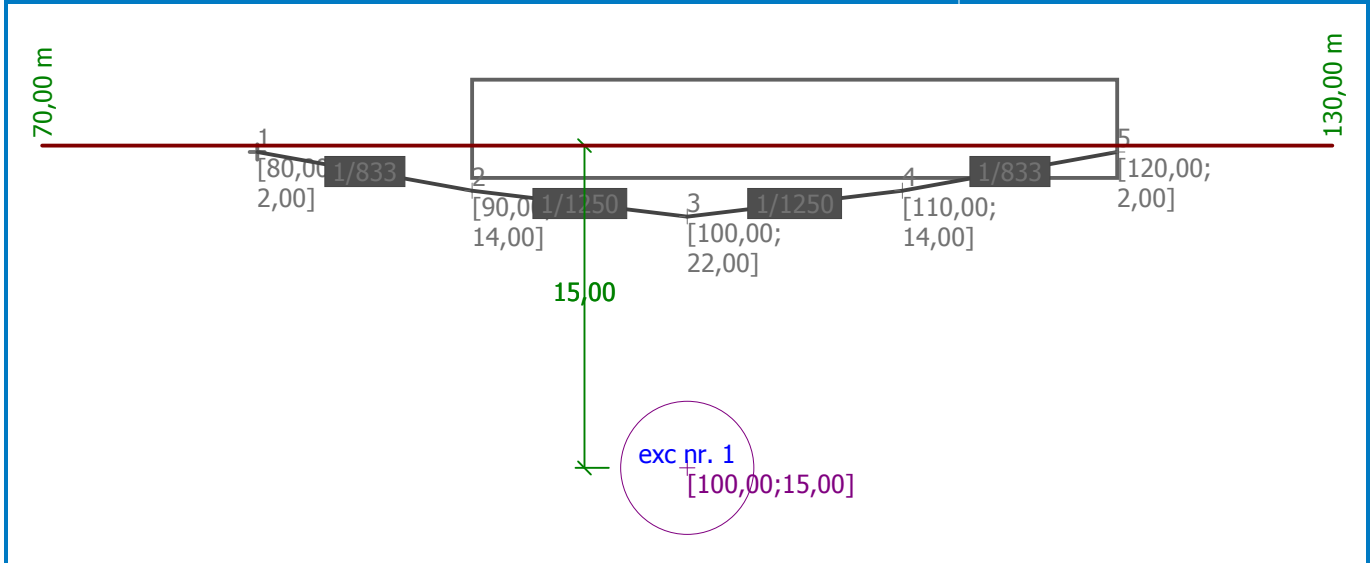
No.	New excavation	Description	Coordinate x[m]	Depth z[m]	Radius r [m]	Area A [m <sup>2</sup> ]
1	Yes	exc nr. 1	100,00	15,00	3,09	30,00

No.	Description	Trough param. k [-]	Volume loss VL [%]
1	exc nr. 1	0,50	3,00



Name : Geometry

Stage - analysis : 1 - 0



Measurement

No.	Description	Coordinate x [m]	Displacement z [mm]
1	Miøení è. 1	80,00	2,00
2	Miøení è. 2	90,00	14,00
3	Miøení è. 3	100,00	22,00
4	Miøení è. 4	110,00	14,00
5	Miøení è. 5	120,00	2,00

Verification No. 1 (Stage of construction 1)

Analysis result - exc nr. 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

Overall results

Depression computed at terrain surface.  
 Max. settlement  $s_{max} = 47,9$  mm  
 Max. horizontal deformation  $h_{max} = 18,3$  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

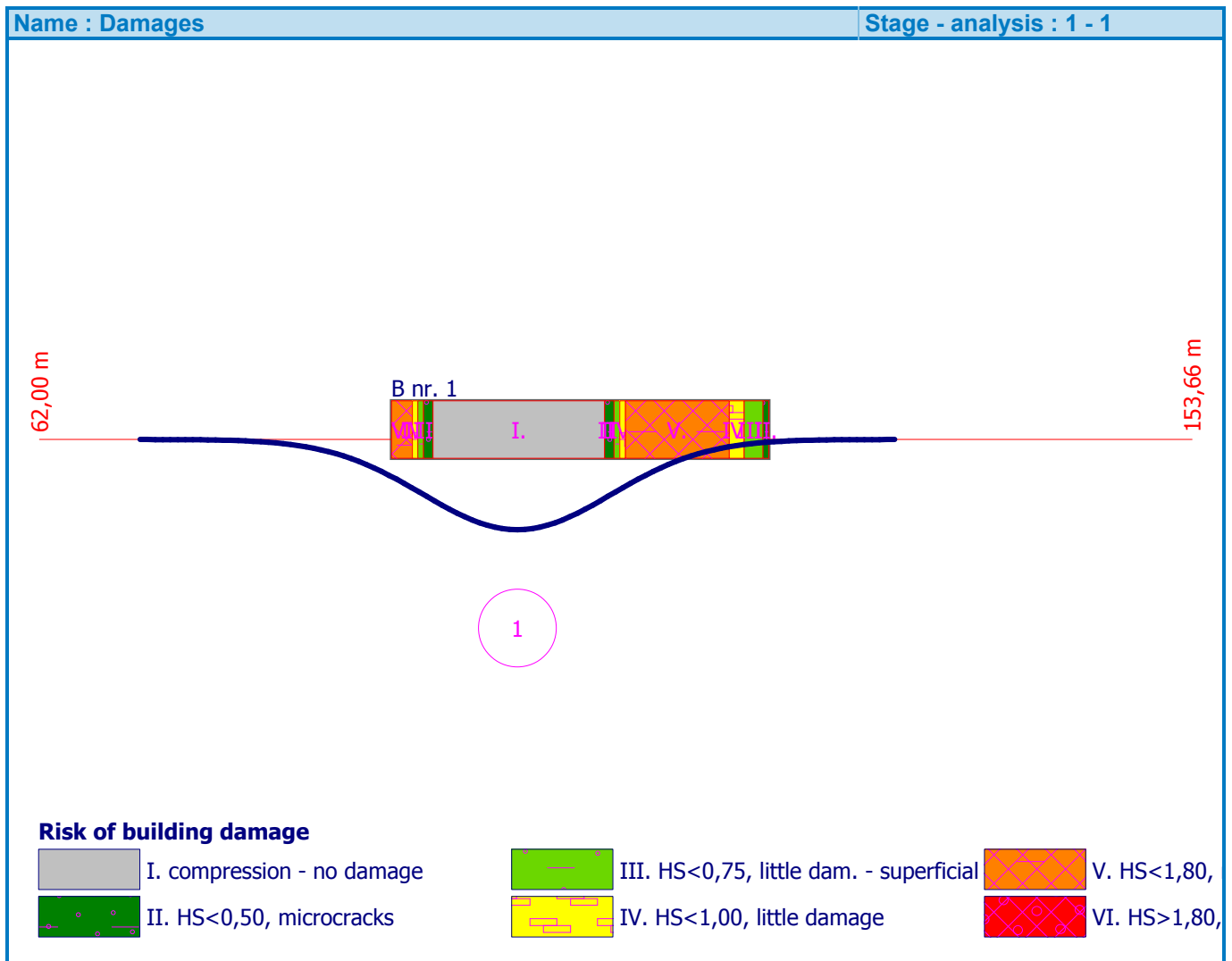
Depression computed at depth 1,00 m.  
 Max. settlement  $s_{max} = 47,8$  mm  
 Max. horizontal deformation  $h_{max} = 17,1$  mm  
 Begin of settlement trough  $x_1 = 71,79$  m  
 End of settlement trough  $x_2 = 128,21$  m  
 Length of settlement trough  $l = 56,41$  m

Damage verification No. 1 (Stage of construction 1)

Type of damage: tensile cracks  
 Building description: B nr. 1



Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
1	90,00	91,65	V. HS<1,80, medium damage
2	91,65	92,10	IV. HS<1,00, little damage
3	92,10	92,55	III. HS<0,75, little dam. - superficial
4	92,55	93,30	II. HS<0,50, microcracks
5	93,30	106,95	I. compression - no damage
6	106,95	107,70	II. HS<0,50, microcracks
7	107,70	108,15	III. HS<0,75, little dam. - superficial
8	108,15 </td <td>108,60</td> <td>IV. HS&lt;1,00, little damage</td>	108,60	IV. HS<1,00, little damage
9	108,60	116,85	V. HS<1,80, medium damage
10	116,85	118,05	IV. HS<1,00, little damage
11	118,05	119,55	III. HS<0,75, little dam. - superficial
12	119,55	120,00	II. HS<0,50, microcracks



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

Type of damage: tensile cracks  
Building description: B nr. 1



Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
1	90,00	91,65	V. HS<1,80, medium damage
2	91,65	92,10	IV. HS<1,00, little damage
3	92,10	92,55	III. HS<0,75, little dam. - superficial
4	92,55	93,30	II. HS<0,50, microcracks
5	93,30	106,95	I. compression - no damage
6	106,95	107,70	II. HS<0,50, microcracks
7	107,70	108,15	III. HS<0,75, little dam. - superficial
8	108,15	108,60	IV. HS<1,00, little damage
9	108,60	116,85	V. HS<1,80, medium damage
10	116,85	118,05	IV. HS<1,00, little damage
11	118,05	119,55	III. HS<0,75, little dam. - superficial
12	119,55	120,00	II. HS<0,50, microcracks

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

Type of damage: relative deflection

Building description: B nr. 1

Max. relative deflection upwards: 0,60 mm/m in distance of: 23,10 m from building starting point.

Max. relative deflection downwards: 1,37 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	3,30
3	16,95	30,00

Sagging

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]
2	3,30	16,95

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

Type of damage: section of building

Building to be analyzed: B nr. 1

Distance from building starting point: point 1 = 0,00 m, point 2 = 15,00 m.

Maximum horizontal strain = 1,52 ‰

Relative gradient between x<sub>1</sub>, x<sub>2</sub> = 1/744

Maximum gradient = 1/237

Relative deflection (hogging) = 0,10 mm/m

Relative deflection (sagging) = -1,23 mm/m

### Input data (Stage of construction 2)

Geometry

No.	New excavation	Description	Coordinate x[m]	Depth z[m]	Radius r [m]	Area A [m <sup>2</sup> ]
1	No	exc nr. 1	100,00	15,00	3,09	30,00
2	Yes	exc nar. 2	118,00	15,00	3,09	30,00

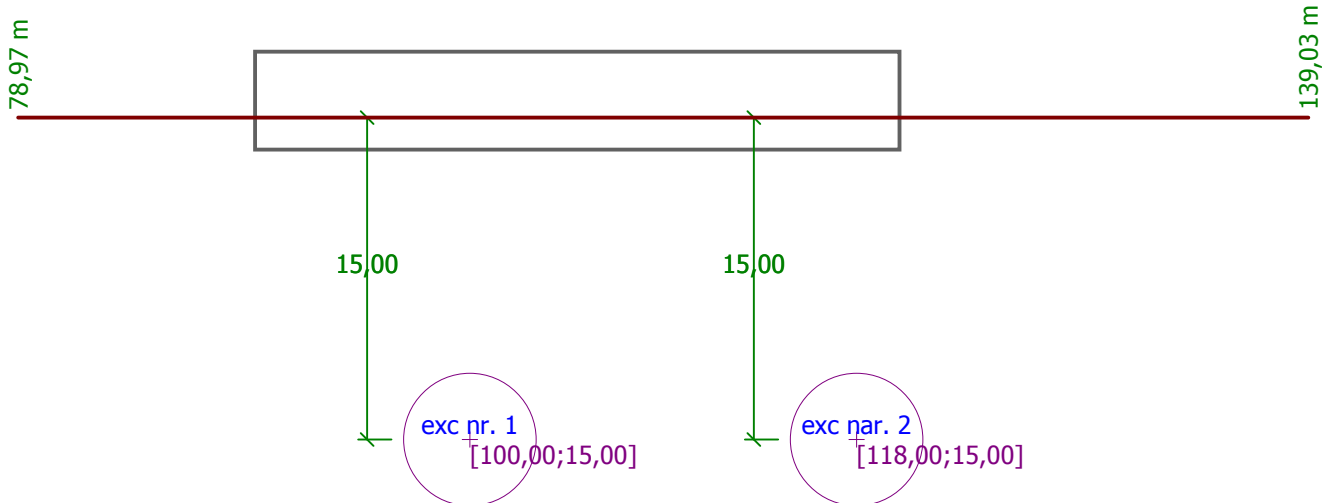
  

No.	Description	Trough param. k [-]	Volume loss VL [%]
1	exc nr. 1	0,50	3,00
2	exc nar. 2	0,50	3,00



Name : Geometry

Stage - analysis : 2 - 0



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

#### Analysis result - exc nr. 1

Distance of point of inflexion from center point  $L_{inf} = 5,26$  m  
Maximum settlement  $S_{max} = 47,4$  mm  
Length of settlement trough  $L_{max} = 21,03$  m

#### Analysis result - exc nar. 2

Distance of point of inflexion from center point  $L_{inf} = 5,26$  m  
Maximum settlement  $S_{max} = 47,4$  mm  
Length of settlement trough  $L_{max} = 21,03$  m

#### Overall results

Depression computed at terrain surface.

Max. settlement  $S_{max} = 51,2$  mm  
Max. horizontal deformation  $h_{max} = 18,6$  mm  
Begin of settlement trough  $x_1 = 70,00$  m  
End of settlement trough  $x_2 = 148,00$  m  
Length of settlement trough  $l = 78,00$  m

#### Digital distributions of variables

Shape of settlement trough (Gauss) - exc nr. 1

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
70,00	0,03	-0,08	0,00	-
70,78	0,04	-0,10	-0,03	-
71,56	0,05	-0,13	-0,04	-
72,34	0,07	-0,16	-0,06	-
73,12	0,09	-0,22	-0,08	-
73,90	0,13	-0,29	-0,11	-
74,68	0,18	-0,38	-0,14	-
75,46	0,24	-0,51	-0,19	1/9973
76,24	0,33	-0,67	-0,24	1/7365
77,02	0,45	-0,89	-0,31	1/5532
77,80	0,62	-1,16	-0,39	1/4181
78,58	0,83	-1,50	-0,49	1/3203



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
79,36	1,10	-1,92	-0,60	1/2491
80,14	1,45	-2,44	-0,73	1/1954
80,92	1,90	-3,06	-0,87	1/1558
81,70	2,46	-3,79	-1,02	1/1253
82,48	3,15	-4,64	-1,17	1/1021
83,26	3,98	-5,62	-1,32	1/845
84,04	4,99	-6,71	-1,47	1/706
84,82	6,19	-7,91	-1,60	1/600
85,60	7,59	-9,20	-1,70	1/515
86,38	9,22	-10,57	-1,77	1/448
87,16	11,08	-11,96	-1,78	1/396
87,94	13,16	-13,35	-1,75	1/355
88,72	15,48	-14,69	-1,65	1/322
89,50	18,00	-15,92	-1,47	1/297
90,28	20,73	-16,99	-1,22	1/279
91,06	23,60	-17,83	-0,90	1/266
91,84	26,60	-18,38	-0,50	1/258
92,62	29,66	-18,61	-0,05	1/255
93,40	32,72	-18,47	0,44	1/257
94,18	35,73	-17,92	0,95	1/265
94,96	38,62	-16,99	1,45	1/279
95,74	41,32	-15,66	1,92	1/303
96,52	43,77	-13,98	2,34	1/339
97,30	45,93	-12,02	2,67	1/394
98,08	47,73	-9,82	2,90	1/483
98,86	49,16	-7,49	3,00	1/630
99,64	50,21	-5,13	2,98	1/919
100,42	50,86	-2,85	2,82	1/1635
101,20	51,16	-0,73	2,53	1/6036
101,98	51,12	1,10	2,13	1/4471
102,76	50,81	2,59	1,64	1/1877
103,54	50,29	3,66	1,09	1/1316
104,32	49,62	4,28	0,51	1/1122
105,10	48,90	4,46	-0,07	1/1080
105,88	48,18	4,17	-0,61	1/1149
106,66	47,54	3,51	-1,05	1/1365
107,44	47,04	2,53	-1,40	1/1899
108,22	46,72	1,32	-1,62	1/3604
109,00	46,60	0,00	-1,69	-
109,78	46,72	-1,32	-1,62	1/3604
110,56	47,04	-2,53	-1,40	1/1899
111,34	47,54	-3,51	-1,05	1/1365
112,12	48,18	-4,17	-0,61	1/1149
112,90	48,90	-4,46	-0,07	1/1080
113,68	49,62	-4,28	0,51	1/1122
114,46	50,29	-3,66	1,09	1/1316
115,24	50,81	-2,59	1,64	1/1877
116,02	51,12	-1,10	2,13	1/4471



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
116,80	51,16	0,73	2,53	1/6036
117,58	50,86	2,85	2,82	1/1635
118,36	50,21	5,13	2,98	1/919
119,14	49,16	7,49	3,00	1/630
119,92	47,73	9,82	2,90	1/483
120,70	45,93	12,02	2,67	1/394
121,48	43,77	13,98	2,34	1/339
122,26	41,32	15,66	1,92	1/303
123,04	38,62	16,99	1,45	1/279
123,82	35,73	17,92	0,95	1/265
124,60	32,72	18,47	0,44	1/257
125,38	29,66	18,61	-0,05	1/255
126,16	26,60	18,38	-0,50	1/258
126,94	23,60	17,83	-0,90	1/266
127,72	20,73	16,99	-1,22	1/279
128,50	18,00	15,92	-1,47	1/297
129,28	15,48	14,69	-1,65	1/322
130,06	13,16	13,35	-1,75	1/355
130,84	11,08	11,96	-1,78	1/396
131,62	9,22	10,57	-1,77	1/448
132,40	7,59	9,20	-1,70	1/515
133,18	6,19	7,91	-1,60	1/600
133,96	4,99	6,71	-1,47	1/706
134,74	3,98	5,62	-1,32	1/845
135,52	3,15	4,64	-1,17	1/1021
136,30	2,46	3,79	-1,02	1/1253
137,08	1,90	3,06	-0,87	1/1558
137,86	1,45	2,44	-0,73	1/1954
138,64	1,10	1,92	-0,60	1/2491
139,42	0,83	1,50	-0,49	1/3203
140,20	0,62	1,16	-0,39	1/4181
140,98	0,45	0,89	-0,31	1/5532
141,76	0,33	0,67	-0,24	1/7365
142,54	0,24	0,51	-0,19	1/9973
143,32	0,18	0,38	-0,14	-
144,10	0,13	0,29	-0,11	-
144,88	0,09	0,22	-0,08	-
145,66	0,07	0,16	-0,06	-
146,44	0,05	0,13	-0,04	-
147,22	0,04	0,10	-0,03	-
148,00	0,03	0,08	0,00	-

Shape of settlement trough (Gauss) - exc nar. 2

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
70,00	0,03	-0,08	0,00	-
70,78	0,04	-0,10	-0,03	-
71,56	0,05	-0,13	-0,04	-



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
72,34	0,07	-0,16	-0,06	-
73,12	0,09	-0,22	-0,08	-
73,90	0,13	-0,29	-0,11	-
74,68	0,18	-0,38	-0,14	-
75,46	0,24	-0,51	-0,19	1/9973
76,24	0,33	-0,67	-0,24	1/7365
77,02	0,45	-0,89	-0,31	1/5532
77,80	0,62	-1,16	-0,39	1/4181
78,58	0,83	-1,50	-0,49	1/3203
79,36	1,10	-1,92	-0,60	1/2491
80,14	1,45	-2,44	-0,73	1/1954
80,92	1,90	-3,06	-0,87	1/1558
81,70	2,46	-3,79	-1,02	1/1253
82,48	3,15	-4,64	-1,17	1/1021
83,26	3,98	-5,62	-1,32	1/845
84,04	4,99	-6,71	-1,47	1/706
84,82	6,19	-7,91	-1,60	1/600
85,60	7,59	-9,20	-1,70	1/515
86,38	9,22	-10,57	-1,77	1/448
87,16	11,08	-11,96	-1,78	1/396
87,94	13,16	-13,35	-1,75	1/355
88,72	15,48	-14,69	-1,65	1/322
89,50	18,00	-15,92	-1,47	1/297
90,28	20,73	-16,99	-1,22	1/279
91,06	23,60	-17,83	-0,90	1/266
91,84	26,60	-18,38	-0,50	1/258
92,62	29,66	-18,61	-0,05	1/255
93,40	32,72	-18,47	0,44	1/257
94,18	35,73	-17,92	0,95	1/265
94,96	38,62	-16,99	1,45	1/279
95,74	41,32	-15,66	1,92	1/303
96,52	43,77	-13,98	2,34	1/339
97,30	45,93	-12,02	2,67	1/394
98,08	47,73	-9,82	2,90	1/483
98,86	49,16	-7,49	3,00	1/630
99,64	50,21	-5,13	2,98	1/919
100,42	50,86	-2,85	2,82	1/1635
101,20	51,16	-0,73	2,53	1/6036
101,98	51,12	1,10	2,13	1/4471
102,76	50,81	2,59	1,64	1/1877
103,54	50,29	3,66	1,09	1/1316
104,32	49,62	4,28	0,51	1/1122
105,10	48,90	4,46	-0,07	1/1080
105,88	48,18	4,17	-0,61	1/1149
106,66	47,54	3,51	-1,05	1/1365
107,44	47,04	2,53	-1,40	1/1899
108,22	46,72	1,32	-1,62	1/3604
109,00	46,60	0,00	-1,69	-





X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
109,78	46,72	-1,32	-1,62	1/3604
110,56	47,04	-2,53	-1,40	1/1899
111,34	47,54	-3,51	-1,05	1/1365
112,12	48,18	-4,17	-0,61	1/1149
112,90	48,90	-4,46	-0,07	1/1080
113,68	49,62	-4,28	0,51	1/1122
114,46	50,29	-3,66	1,09	1/1316
115,24	50,81	-2,59	1,64	1/1877
116,02	51,12	-1,10	2,13	1/4471
116,80	51,16	0,73	2,53	1/6036
117,58	50,86	2,85	2,82	1/1635
118,36	50,21	5,13	2,98	1/919
119,14	49,16	7,49	3,00	1/630
119,92	47,73	9,82	2,90	1/483
120,70	45,93	12,02	2,67	1/394
121,48	43,77	13,98	2,34	1/339
122,26	41,32	15,66	1,92	1/303
123,04	38,62	16,99	1,45	1/279
123,82	35,73	17,92	0,95	1/265
124,60	32,72	18,47	0,44	1/257
125,38	29,66	18,61	-0,05	1/255
126,16	26,60	18,38	-0,50	1/258
126,94	23,60	17,83	-0,90	1/266
127,72	20,73	16,99	-1,22	1/279
128,50	18,00	15,92	-1,47	1/297
129,28	15,48	14,69	-1,65	1/322
130,06	13,16	13,35	-1,75	1/355
130,84	11,08	11,96	-1,78	1/396
131,62	9,22	10,57	-1,77	1/448
132,40	7,59	9,20	-1,70	1/515
133,18	6,19	7,91	-1,60	1/600
133,96	4,99	6,71	-1,47	1/706
134,74	3,98	5,62	-1,32	1/845
135,52	3,15	4,64	-1,17	1/1021
136,30	2,46	3,79	-1,02	1/1253
137,08	1,90	3,06	-0,87	1/1558
137,86	1,45	2,44	-0,73	1/1954
138,64	1,10	1,92	-0,60	1/2491
139,42	0,83	1,50	-0,49	1/3203
140,20	0,62	1,16	-0,39	1/4181
140,98	0,45	0,89	-0,31	1/5532
141,76	0,33	0,67	-0,24	1/7365
142,54	0,24	0,51	-0,19	1/9973
143,32	0,18	0,38	-0,14	-
144,10	0,13	0,29	-0,11	-
144,88	0,09	0,22	-0,08	-
145,66	0,07	0,16	-0,06	-
146,44	0,05	0,13	-0,04	-



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
147,22	0,04	0,10	-0,03	-
148,00	0,03	0,08	0,00	-

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

### Analysis result - exc nr. 1

Distance of point of inflexion from center point  $L_{inf} = 5,26$  m  
 Maximum settlement  $s_{max} = 47,4$  mm  
 Length of settlement trough  $L_{max} = 21,03$  m

### Analysis result - exc nar. 2

Distance of point of inflexion from center point  $L_{inf} = 5,26$  m  
 Maximum settlement  $s_{max} = 47,4$  mm  
 Length of settlement trough  $L_{max} = 21,03$  m

### Overall results

Depression computed at depth 5,00 m.  
 Max. settlement  $s_{max} = 47,5$  mm  
 Max. horizontal deformation  $h_{max} = 12,7$  mm  
 Begin of settlement trough  $x_1 = 78,97$  m  
 End of settlement trough  $x_2 = 139,03$  m  
 Length of settlement trough  $l = 60,06$  m

### Digital distributions of variables

Shape of settlement trough (Gauss) - exc nr. 1

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
78,97	0,03	-0,06	0,00	-
79,57	0,04	-0,07	-0,03	-
80,17	0,05	-0,09	-0,04	-
80,77	0,08	-0,12	-0,06	-
81,37	0,11	-0,17	-0,09	-
81,97	0,15	-0,23	-0,12	-
82,57	0,21	-0,31	-0,17	1/8008
83,17	0,30	-0,43	-0,22	1/5713
83,77	0,42	-0,58	-0,29	1/4137
84,38	0,59	-0,78	-0,38	1/3045
84,98	0,82	-1,04	-0,48	1/2275
85,58	1,12	-1,36	-0,61	1/1725
86,18	1,51	-1,76	-0,74	1/1327
86,78	2,02	-2,26	-0,90	1/1036
87,38	2,67	-2,84	-1,06	1/819
87,98	3,49	-3,53	-1,23	1/658
88,58	4,50	-4,32	-1,40	1/538
89,18	5,72	-5,21	-1,54	1/447
89,78	7,18	-6,18	-1,66	1/377
90,38	8,91	-7,21	-1,74	1/323
90,98	10,90	-8,27	-1,76	1/282
91,58	13,17	-9,32	-1,71	1/250
92,18	15,71	-10,32	-1,58	1/226
92,78	18,49	-11,22	-1,35	1/208



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
93,38	21,49	-11,95	-1,03	1/195
93,98	24,64	-12,46	-0,62	1/187
94,59	27,90	-12,70	-0,13	1/184
95,19	31,17	-12,62	0,43	1/185
95,79	34,38	-12,19	1,04	1/192
96,39	37,43	-11,38	1,66	1/206
96,99	40,22	-10,19	2,25	1/229
97,59	42,67	-8,67	2,78	1/269
98,19	44,69	-6,85	3,24	1/341
98,79	46,20	-4,78	3,58	1/487
99,39	47,15	-2,55	3,78	1/911
99,99	47,52	-0,24	3,83	1/9744
100,59	47,28	2,05	3,71	1/1136
101,19	46,46	4,22	3,43	1/554
101,79	45,11	6,17	3,00	1/379
102,39	43,29	7,82	2,45	1/299
102,99	41,09	9,11	1,79	1/257
103,59	38,62	9,97	1,07	1/235
104,20	35,97	10,39	0,30	1/225
104,80	33,28	10,34	-0,46	1/226
105,40	30,66	9,84	-1,18	1/238
106,00	28,22	8,92	-1,85	1/262
106,60	26,08	7,62	-2,42	1/307
107,20	24,31	6,01	-2,89	1/389
107,80	22,99	4,15	-3,24	1/563
108,40	22,17	2,12	-3,45	1/1104
109,00	21,90	0,00	-3,52	-
109,60	22,17	-2,12	-3,45	1/1104
110,20	22,99	-4,15	-3,24	1/563
110,80	24,31	-6,01	-2,89	1/389
111,40	26,08	-7,62	-2,42	1/307
112,00	28,22	-8,92	-1,85	1/262
112,60	30,66	-9,84	-1,18	1/238
113,20	33,28	-10,34	-0,46	1/226
113,80	35,97	-10,39	0,30	1/225
114,41	38,62	-9,97	1,07	1/235
115,01	41,09	-9,11	1,79	1/257
115,61	43,29	-7,82	2,45	1/299
116,21	45,11	-6,17	3,00	1/379
116,81	46,46	-4,22	3,43	1/554
117,41	47,28	-2,05	3,71	1/1136
118,01	47,52	0,24	3,83	1/9744
118,61	47,15	2,55	3,78	1/911
119,21	46,20	4,78	3,58	1/487
119,81	44,69	6,85	3,24	1/341
120,41	42,67	8,67	2,78	1/269
121,01	40,22	10,19	2,25	1/229
121,61	37,43	11,38	1,66	1/206



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
122,21	34,38	12,19	1,04	1/192
122,81	31,17	12,62	0,43	1/185
123,41	27,90	12,70	-0,13	1/184
124,02	24,64	12,46	-0,62	1/187
124,62	21,49	11,95	-1,03	1/195
125,22	18,49	11,22	-1,35	1/208
125,82	15,71	10,32	-1,58	1/226
126,42	13,17	9,32	-1,71	1/250
127,02	10,90	8,27	-1,76	1/282
127,62	8,91	7,21	-1,74	1/323
128,22	7,18	6,18	-1,66	1/377
128,82	5,72	5,21	-1,54	1/447
129,42	4,50	4,32	-1,40	1/538
130,02	3,49	3,53	-1,23	1/658
130,62	2,67	2,84	-1,06	1/819
131,22	2,02	2,26	-0,90	1/1036
131,82	1,51	1,76	-0,74	1/1327
132,42	1,12	1,36	-0,61	1/1725
133,02	0,82	1,04	-0,48	1/2275
133,62	0,59	0,78	-0,38	1/3045
134,23	0,42	0,58	-0,29	1/4137
134,83	0,30	0,43	-0,22	1/5713
135,43	0,21	0,31	-0,17	1/8008
136,03	0,15	0,23	-0,12	-
136,63	0,11	0,17	-0,09	-
137,23	0,08	0,12	-0,06	-
137,83	0,05	0,09	-0,04	-
138,43	0,04	0,07	-0,03	-
139,03	0,03	0,06	0,00	-

Shape of settlement trough (Gauss) - exc nar. 2

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
78,97	0,03	-0,06	0,00	-
79,57	0,04	-0,07	-0,03	-
80,17	0,05	-0,09	-0,04	-
80,77	0,08	-0,12	-0,06	-
81,37	0,11	-0,17	-0,09	-
81,97	0,15	-0,23	-0,12	-
82,57	0,21	-0,31	-0,17	1/8008
83,17	0,30	-0,43	-0,22	1/5713
83,77	0,42	-0,58	-0,29	1/4137
84,38	0,59	-0,78	-0,38	1/3045
84,98	0,82	-1,04	-0,48	1/2275
85,58	1,12	-1,36	-0,61	1/1725
86,18	1,51	-1,76	-0,74	1/1327
86,78	2,02	-2,26	-0,90	1/1036
87,38	2,67	-2,84	-1,06	1/819



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
87,98	3,49	-3,53	-1,23	1/658
88,58	4,50	-4,32	-1,40	1/538
89,18	5,72	-5,21	-1,54	1/447
89,78	7,18	-6,18	-1,66	1/377
90,38	8,91	-7,21	-1,74	1/323
90,98	10,90	-8,27	-1,76	1/282
91,58	13,17	-9,32	-1,71	1/250
92,18	15,71	-10,32	-1,58	1/226
92,78	18,49	-11,22	-1,35	1/208
93,38	21,49	-11,95	-1,03	1/195
93,98	24,64	-12,46	-0,62	1/187
94,59	27,90	-12,70	-0,13	1/184
95,19	31,17	-12,62	0,43	1/185
95,79	34,38	-12,19	1,04	1/192
96,39	37,43	-11,38	1,66	1/206
96,99	40,22	-10,19	2,25	1/229
97,59	42,67	-8,67	2,78	1/269
98,19	44,69	-6,85	3,24	1/341
98,79	46,20	-4,78	3,58	1/487
99,39	47,15	-2,55	3,78	1/911
99,99	47,52	-0,24	3,83	1/9744
100,59	47,28	2,05	3,71	1/1136
101,19	46,46	4,22	3,43	1/554
101,79	45,11	6,17	3,00	1/379
102,39	43,29	7,82	2,45	1/299
102,99	41,09	9,11	1,79	1/257
103,59	38,62	9,97	1,07	1/235
104,20	35,97	10,39	0,30	1/225
104,80	33,28	10,34	-0,46	1/226
105,40	30,66	9,84	-1,18	1/238
106,00	28,22	8,92	-1,85	1/262
106,60	26,08	7,62	-2,42	1/307
107,20	24,31	6,01	-2,89	1/389
107,80	22,99	4,15	-3,24	1/563
108,40	22,17	2,12	-3,45	1/1104
109,00	21,90	0,00	-3,52	-
109,60	22,17	-2,12	-3,45	1/1104
110,20	22,99	-4,15	-3,24	1/563
110,80	24,31	-6,01	-2,89	1/389
111,40	26,08	-7,62	-2,42	1/307
112,00	28,22	-8,92	-1,85	1/262
112,60	30,66	-9,84	-1,18	1/238
113,20	33,28	-10,34	-0,46	1/226
113,80	35,97	-10,39	0,30	1/225
114,41	38,62	-9,97	1,07	1/235
115,01	41,09	-9,11	1,79	1/257
115,61	43,29	-7,82	2,45	1/299
116,21	45,11	-6,17	3,00	1/379



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
116,81	46,46	-4,22	3,43	1/554
117,41	47,28	-2,05	3,71	1/1136
118,01	47,52	0,24	3,83	1/9744
118,61	47,15	2,55	3,78	1/911
119,21	46,20	4,78	3,58	1/487
119,81	44,69	6,85	3,24	1/341
120,41	42,67	8,67	2,78	1/269
121,01	40,22	10,19	2,25	1/229
121,61	37,43	11,38	1,66	1/206
122,21	34,38	12,19	1,04	1/192
122,81	31,17	12,62	0,43	1/185
123,41	27,90	12,70	-0,13	1/184
124,02	24,64	12,46	-0,62	1/187
124,62	21,49	11,95	-1,03	1/195
125,22	18,49	11,22	-1,35	1/208
125,82	15,71	10,32	-1,58	1/226
126,42	13,17	9,32	-1,71	1/250
127,02	10,90	8,27	-1,76	1/282
127,62	8,91	7,21	-1,74	1/323
128,22	7,18	6,18	-1,66	1/377
128,82	5,72	5,21	-1,54	1/447
129,42	4,50	4,32	-1,40	1/538
130,02	3,49	3,53	-1,23	1/658
130,62	2,67	2,84	-1,06	1/819
131,22	2,02	2,26	-0,90	1/1036
131,82	1,51	1,76	-0,74	1/1327
132,42	1,12	1,36	-0,61	1/1725
133,02	0,82	1,04	-0,48	1/2275
133,62	0,59	0,78	-0,38	1/3045
134,23	0,42	0,58	-0,29	1/4137
134,83	0,30	0,43	-0,22	1/5713
135,43	0,21	0,31	-0,17	1/8008
136,03	0,15	0,23	-0,12	-
136,63	0,11	0,17	-0,09	-
137,23	0,08	0,12	-0,06	-
137,83	0,05	0,09	-0,04	-
138,43	0,04	0,07	-0,03	-
139,03	0,03	0,06	0,00	-

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

Type of damage: gradient damage

Analysis performed for all stages.

Building description: B nr. 1

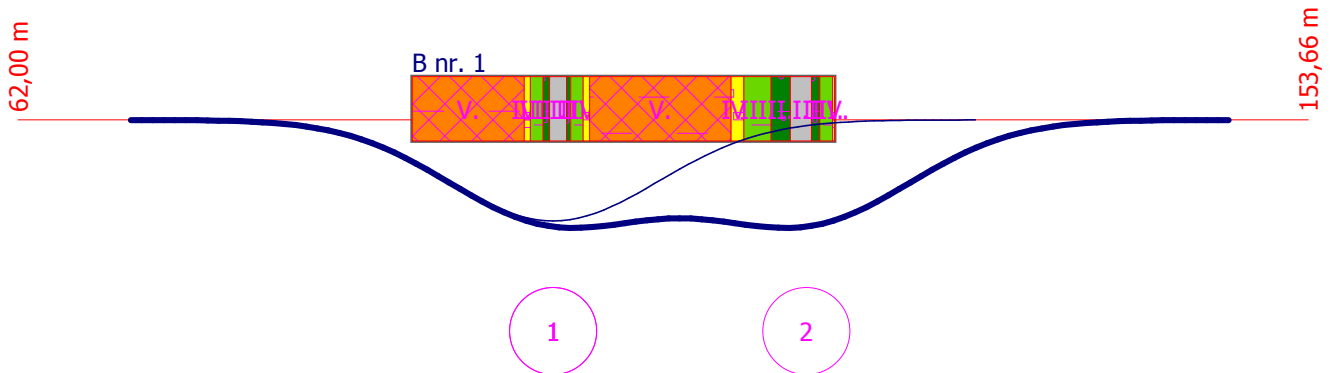
Section	Beg. $x_1$ [m]	End $x_2$ [m]	Description of damage
1	90,00	97,95	V. GR<1/150, medium damage
2	97,95	98,40	IV. GR<1/425, little damage
3	98,40	99,30	III. GR<1/500, little dam. - superficial



Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
4	99,30	99,75	II. GR<1/800, microcracks
5	99,75	100,95	I. GR<1/1202, no damage
6	100,95	101,25	II. GR<1/800, microcracks
7	101,25	102,15	III. GR<1/500, little dam. - superficial
8	102,15	102,60	IV. GR<1/425, little damage
9	102,60	112,65	V. GR<1/150, medium damage
10	112,65	113,55	IV. GR<1/425, little damage
11	113,55	115,50	III. GR<1/500, little dam. - superficial
12	115,50	116,85	II. GR<1/800, microcracks
13	116,85	118,35	I. GR<1/1202, no damage
14	118,35	118,95	II. GR<1/800, microcracks
15	118,95	119,85	III. GR<1/500, little dam. - superficial
16	119,85	120,00	IV. GR<1/425, little damage

Name : Damages

Stage - analysis : 2 - 1



**Risk of building damage**

- I. GR<1/1202, no damage
- III. GR<1/500, little dam. - superficial
- V. GR<1/150
- II. GR<1/800, microcracks
- IV. GR<1/425, little damage
- VI. GR>1/150



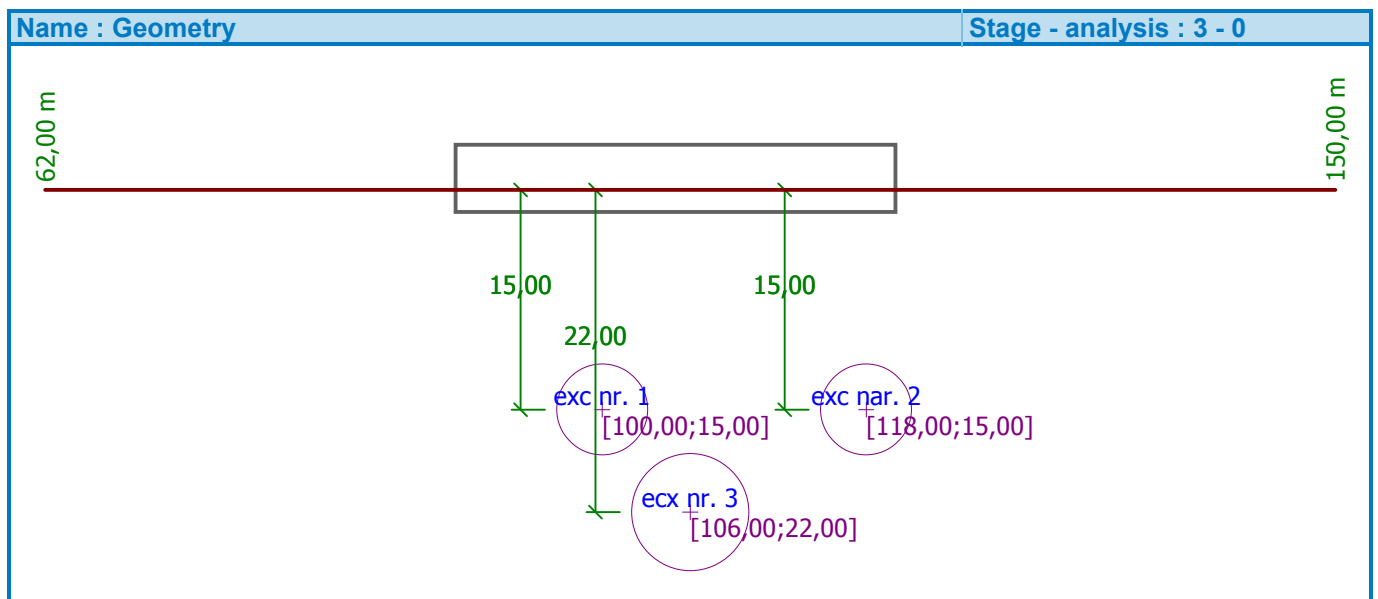
## Input data (Stage of construction 3)

### Geometry

No.	New excavation	Description	Coordinate x[m]	Depth z[m]	Radius r [m]	Area A [m <sup>2</sup> ]
1	No	exc nr. 1	100,00	15,00	3,09	30,00
2	No	exc nar. 2	118,00	15,00	3,09	30,00
3	Yes	ecx nr. 3	106,00	22,00	3,99	50,00

No.	Description	Trough param. k [-]	Volume loss VL [%]
1	exc nr. 1	0,50	3,00
2	exc nar. 2	0,50	3,00
3	ecx nr. 3	0,50	1,50



### Verification No. 1 (Stage of construction 3)

#### Analysis result - exc nr. 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 - exc nar. 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 - ecx nr. 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

#### Overall results

Depression computed at terrain surface.  
 Max. settlement  $s_{max} = 76,9$  mm  
 Max. horizontal deformation  $h_{max} = 28,3$  mm  
 Begin of settlement trough  $x_1 = 62,00$  m





End of settlement trough  $x_2 = 150,00$  m  
Length of settlement trough  $l = 88,00$  m

### Digital distributions of variables

Shape of settlement trough (Gauss) - exc nr. 1

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
62,00	0,04	-0,10	0,00	-
62,88	0,04	-0,11	-0,01	-
63,76	0,05	-0,12	-0,01	-
64,64	0,06	-0,13	-0,02	-
65,52	0,06	-0,15	-0,02	-
66,40	0,07	-0,17	-0,03	-
67,28	0,09	-0,20	-0,04	-
68,16	0,11	-0,23	-0,04	-
69,04	0,13	-0,28	-0,06	-
69,92	0,16	-0,33	-0,08	-
70,80	0,20	-0,42	-0,11	-
71,68	0,26	-0,53	-0,15	-
72,56	0,34	-0,67	-0,19	1/9596
73,44	0,45	-0,86	-0,24	1/7356
74,32	0,58	-1,09	-0,30	1/5658
75,20	0,76	-1,39	-0,38	1/4368
76,08	0,99	-1,75	-0,47	1/3387
76,96	1,28	-2,21	-0,58	1/2641
77,84	1,65	-2,78	-0,72	1/2072
78,72	2,13	-3,47	-0,87	1/1636
79,60	2,73	-4,31	-1,04	1/1302
80,48	3,48	-5,31	-1,24	1/1045
81,36	4,41	-6,48	-1,44	1/847
82,24	5,56	-7,85	-1,66	1/694
83,12	6,95	-9,40	-1,87	1/575
84,00	8,62	-11,15	-2,08	1/482
84,88	10,60	-13,06	-2,25	1/409
85,76	12,92	-15,10	-2,38	1/352
86,64	15,60	-17,24	-2,45	1/307
87,52	18,64	-19,41	-2,44	1/272
88,40	22,06	-21,54	-2,35	1/245
89,28	25,84	-23,54	-2,15	1/223
90,16	29,94	-25,32	-1,83	1/208
91,04	34,32	-26,77	-1,41	1/196
91,92	38,90	-27,80	-0,88	1/189
92,80	43,61	-28,32	-0,26	1/186
93,68	48,34	-28,26	0,42	1/187
94,56	53,00	-27,58	1,13	1/193
95,44	57,47	-26,28	1,82	1/204
96,32	61,64	-24,37	2,47	1/221
97,20	65,42	-21,93	3,02	1/249
98,08	68,72	-19,05	3,45	1/290
98,96	71,48	-15,85	3,73	1/356
99,84	73,66	-12,49	3,83	1/466



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
100,72	75,26	-9,12	3,75	1/671
101,60	76,28	-5,89	3,50	1/1145
102,48	76,79	-2,95	3,11	1/3095
103,36	76,85	-0,42	2,60	1/7344
104,24	76,55	1,62	2,01	1/2047
105,12	75,99	3,13	1,41	1/1377
106,00	75,27	4,10	0,83	1/1175
106,88	74,49	4,59	0,33	1/1144
107,76	73,74	4,68	-0,06	1/1226
108,64	73,06	4,49	-0,29	1/1424
109,52	72,50	4,16	-0,37	1/1772
110,40	72,07	3,84	-0,28	1/2309
111,28	71,74	3,66	-0,05	1/2947
112,16	71,47	3,76	0,31	1/3232
113,04	71,19	4,21	0,76	1/2751
113,92	70,83	5,09	1,24	1/1945
114,80	70,29	6,40	1,73	1/1308
115,68	69,48	8,13	2,16	1/901
116,56	68,34	10,20	2,49	1/651
117,44	66,78	12,51	2,70	1/495
118,32	64,78	14,95	2,77	1/394
119,20	62,31	17,38	2,67	1/326
120,08	59,38	19,66	2,43	1/280
120,96	56,04	21,66	2,06	1/249
121,84	52,32	23,28	1,58	1/228
122,72	48,32	24,44	1,03	1/215
123,60	44,13	25,09	0,44	1/207
124,48	39,82	25,21	-0,15	1/204
125,36	35,52	24,82	-0,71	1/206
126,24	31,29	23,96	-1,20	1/213
127,12	27,23	22,70	-1,61	1/223
128,00	23,41	21,12	-1,93	1/239
128,88	19,87	19,31	-2,14	1/261
129,76	16,66	17,35	-2,25	1/290
130,64	13,80	15,35	-2,27	1/328
131,52	11,29	13,36	-2,22	1/376
132,40	9,12	11,44	-2,10	1/439
133,28	7,28	9,65	-1,94	1/521
134,16	5,74	8,02	-1,75	1/627
135,04	4,48	6,57	-1,54	1/767
135,92	3,45	5,31	-1,33	1/952
136,80	2,63	4,23	-1,12	1/1198
137,68	1,98	3,33	-0,93	1/1529
138,56	1,48	2,59	-0,76	1/1979
139,44	1,09	1,99	-0,61	1/2596
140,32	0,80	1,51	-0,48	1/3450
141,20	0,58	1,14	-0,37	1/4641
142,08	0,42	0,85	-0,29	1/6319



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
142,96	0,30	0,63	-0,22	1/8700
143,84	0,22	0,47	-0,16	-
144,72	0,16	0,35	-0,12	-
145,60	0,11	0,26	-0,09	-
146,48	0,08	0,20	-0,06	-
147,36	0,06	0,15	-0,04	-
148,24	0,05	0,12	-0,02	-
149,12	0,04	0,11	-0,01	-
150,00	0,04	0,10	0,00	-

Shape of settlement trough (Gauss) - exc nar. 2

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
62,00	0,04	-0,10	0,00	-
62,88	0,04	-0,11	-0,01	-
63,76	0,05	-0,12	-0,01	-
64,64	0,06	-0,13	-0,02	-
65,52	0,06	-0,15	-0,02	-
66,40	0,07	-0,17	-0,03	-
67,28	0,09	-0,20	-0,04	-
68,16	0,11	-0,23	-0,04	-
69,04	0,13	-0,28	-0,06	-
69,92	0,16	-0,33	-0,08	-
70,80	0,20	-0,42	-0,11	-
71,68	0,26	-0,53	-0,15	-
72,56	0,34	-0,67	-0,19	1/9596
73,44	0,45	-0,86	-0,24	1/7356
74,32	0,58	-1,09	-0,30	1/5658
75,20	0,76	-1,39	-0,38	1/4368
76,08	0,99	-1,75	-0,47	1/3387
76,96	1,28	-2,21	-0,58	1/2641
77,84	1,65	-2,78	-0,72	1/2072
78,72	2,13	-3,47	-0,87	1/1636
79,60	2,73	-4,31	-1,04	1/1302
80,48	3,48	-5,31	-1,24	1/1045
81,36	4,41	-6,48	-1,44	1/847
82,24	5,56	-7,85	-1,66	1/694
83,12	6,95	-9,40	-1,87	1/575
84,00	8,62	-11,15	-2,08	1/482
84,88	10,60	-13,06	-2,25	1/409
85,76	12,92	-15,10	-2,38	1/352
86,64	15,60	-17,24	-2,45	1/307
87,52	18,64	-19,41	-2,44	1/272
88,40	22,06	-21,54	-2,35	1/245
89,28	25,84	-23,54	-2,15	1/223
90,16	29,94	-25,32	-1,83	1/208
91,04	34,32	-26,77	-1,41	1/196
91,92	38,90	-27,80	-0,88	1/189



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
92,80	43,61	-28,32	-0,26	1/186
93,68	48,34	-28,26	0,42	1/187
94,56	53,00	-27,58	1,13	1/193
95,44	57,47	-26,28	1,82	1/204
96,32	61,64	-24,37	2,47	1/221
97,20	65,42	-21,93	3,02	1/249
98,08	68,72	-19,05	3,45	1/290
98,96	71,48	-15,85	3,73	1/356
99,84	73,66	-12,49	3,83	1/466
100,72	75,26	-9,12	3,75	1/671
101,60	76,28	-5,89	3,50	1/1145
102,48	76,79	-2,95	3,11	1/3095
103,36	76,85	-0,42	2,60	1/7344
104,24	76,55	1,62	2,01	1/2047
105,12	75,99	3,13	1,41	1/1377
106,00	75,27	4,10	0,83	1/1175
106,88	74,49	4,59	0,33	1/1144
107,76	73,74	4,68	-0,06	1/1226
108,64	73,06	4,49	-0,29	1/1424
109,52	72,50	4,16	-0,37	1/1772
110,40	72,07	3,84	-0,28	1/2309
111,28	71,74	3,66	-0,05	1/2947
112,16	71,47	3,76	0,31	1/3232
113,04	71,19	4,21	0,76	1/2751
113,92	70,83	5,09	1,24	1/1945
114,80	70,29	6,40	1,73	1/1308
115,68	69,48	8,13	2,16	1/901
116,56	68,34	10,20	2,49	1/651
117,44	66,78	12,51	2,70	1/495
118,32	64,78	14,95	2,77	1/394
119,20	62,31	17,38	2,67	1/326
120,08	59,38	19,66	2,43	1/280
120,96	56,04	21,66	2,06	1/249
121,84	52,32	23,28	1,58	1/228
122,72	48,32	24,44	1,03	1/215
123,60	44,13	25,09	0,44	1/207
124,48	39,82	25,21	-0,15	1/204
125,36	35,52	24,82	-0,71	1/206
126,24	31,29	23,96	-1,20	1/213
127,12	27,23	22,70	-1,61	1/223
128,00	23,41	21,12	-1,93	1/239
128,88	19,87	19,31	-2,14	1/261
129,76	16,66	17,35	-2,25	1/290
130,64	13,80	15,35	-2,27	1/328
131,52	11,29	13,36	-2,22	1/376
132,40	9,12	11,44	-2,10	1/439
133,28	7,28	9,65	-1,94	1/521
134,16	5,74	8,02	-1,75	1/627



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
135,04	4,48	6,57	-1,54	1/767
135,92	3,45	5,31	-1,33	1/952
136,80	2,63	4,23	-1,12	1/1198
137,68	1,98	3,33	-0,93	1/1529
138,56	1,48	2,59	-0,76	1/1979
139,44	1,09	1,99	-0,61	1/2596
140,32	0,80	1,51	-0,48	1/3450
141,20	0,58	1,14	-0,37	1/4641
142,08	0,42	0,85	-0,29	1/6319
142,96	0,30	0,63	-0,22	1/8700
143,84	0,22	0,47	-0,16	-
144,72	0,16	0,35	-0,12	-
145,60	0,11	0,26	-0,09	-
146,48	0,08	0,20	-0,06	-
147,36	0,06	0,15	-0,04	-
148,24	0,05	0,12	-0,02	-
149,12	0,04	0,11	-0,01	-
150,00	0,04	0,10	0,00	-

Shape of settlement trough (Gauss) - ecx nr. 3

X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
62,00	0,04	-0,10	0,00	-
62,88	0,04	-0,11	-0,01	-
63,76	0,05	-0,12	-0,01	-
64,64	0,06	-0,13	-0,02	-
65,52	0,06	-0,15	-0,02	-
66,40	0,07	-0,17	-0,03	-
67,28	0,09	-0,20	-0,04	-
68,16	0,11	-0,23	-0,04	-
69,04	0,13	-0,28	-0,06	-
69,92	0,16	-0,33	-0,08	-
70,80	0,20	-0,42	-0,11	-
71,68	0,26	-0,53	-0,15	-
72,56	0,34	-0,67	-0,19	1/9596
73,44	0,45	-0,86	-0,24	1/7356
74,32	0,58	-1,09	-0,30	1/5658
75,20	0,76	-1,39	-0,38	1/4368
76,08	0,99	-1,75	-0,47	1/3387
76,96	1,28	-2,21	-0,58	1/2641
77,84	1,65	-2,78	-0,72	1/2072
78,72	2,13	-3,47	-0,87	1/1636
79,60	2,73	-4,31	-1,04	1/1302
80,48	3,48	-5,31	-1,24	1/1045
81,36	4,41	-6,48	-1,44	1/847
82,24	5,56	-7,85	-1,66	1/694
83,12	6,95	-9,40	-1,87	1/575
84,00	8,62	-11,15	-2,08	1/482



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
84,88	10,60	-13,06	-2,25	1/409
85,76	12,92	-15,10	-2,38	1/352
86,64	15,60	-17,24	-2,45	1/307
87,52	18,64	-19,41	-2,44	1/272
88,40	22,06	-21,54	-2,35	1/245
89,28	25,84	-23,54	-2,15	1/223
90,16	29,94	-25,32	-1,83	1/208
91,04	34,32	-26,77	-1,41	1/196
91,92	38,90	-27,80	-0,88	1/189
92,80	43,61	-28,32	-0,26	1/186
93,68	48,34	-28,26	0,42	1/187
94,56	53,00	-27,58	1,13	1/193
95,44	57,47	-26,28	1,82	1/204
96,32	61,64	-24,37	2,47	1/221
97,20	65,42	-21,93	3,02	1/249
98,08	68,72	-19,05	3,45	1/290
98,96	71,48	-15,85	3,73	1/356
99,84	73,66	-12,49	3,83	1/466
100,72	75,26	-9,12	3,75	1/671
101,60	76,28	-5,89	3,50	1/1145
102,48	76,79	-2,95	3,11	1/3095
103,36	76,85	-0,42	2,60	1/7344
104,24	76,55	1,62	2,01	1/2047
105,12	75,99	3,13	1,41	1/1377
106,00	75,27	4,10	0,83	1/1175
106,88	74,49	4,59	0,33	1/1144
107,76	73,74	4,68	-0,06	1/1226
108,64	73,06	4,49	-0,29	1/1424
109,52	72,50	4,16	-0,37	1/1772
110,40	72,07	3,84	-0,28	1/2309
111,28	71,74	3,66	-0,05	1/2947
112,16	71,47	3,76	0,31	1/3232
113,04	71,19	4,21	0,76	1/2751
113,92	70,83	5,09	1,24	1/1945
114,80	70,29	6,40	1,73	1/1308
115,68	69,48	8,13	2,16	1/901
116,56	68,34	10,20	2,49	1/651
117,44	66,78	12,51	2,70	1/495
118,32	64,78	14,95	2,77	1/394
119,20	62,31	17,38	2,67	1/326
120,08	59,38	19,66	2,43	1/280
120,96	56,04	21,66	2,06	1/249
121,84	52,32	23,28	1,58	1/228
122,72	48,32	24,44	1,03	1/215
123,60	44,13	25,09	0,44	1/207
124,48	39,82	25,21	-0,15	1/204
125,36	35,52	24,82	-0,71	1/206
126,24	31,29	23,96	-1,20	1/213



X-coord. [m]	Settlement [mm]	Horizontal deformation [mm]	Horizontal strain [‰]	Gradient [-]
127,12	27,23	22,70	-1,61	1/223
128,00	23,41	21,12	-1,93	1/239
128,88	19,87	19,31	-2,14	1/261
129,76	16,66	17,35	-2,25	1/290
130,64	13,80	15,35	-2,27	1/328
131,52	11,29	13,36	-2,22	1/376
132,40	9,12	11,44	-2,10	1/439
133,28	7,28	9,65	-1,94	1/521
134,16	5,74	8,02	-1,75	1/627
135,04	4,48	6,57	-1,54	1/767
135,92	3,45	5,31	-1,33	1/952
136,80	2,63	4,23	-1,12	1/1198
137,68	1,98	3,33	-0,93	1/1529
138,56	1,48	2,59	-0,76	1/1979
139,44	1,09	1,99	-0,61	1/2596
140,32	0,80	1,51	-0,48	1/3450
141,20	0,58	1,14	-0,37	1/4641
142,08	0,42	0,85	-0,29	1/6319
142,96	0,30	0,63	-0,22	1/8700
143,84	0,22	0,47	-0,16	-
144,72	0,16	0,35	-0,12	-
145,60	0,11	0,26	-0,09	-
146,48	0,08	0,20	-0,06	-
147,36	0,06	0,15	-0,04	-
148,24	0,05	0,12	-0,02	-
149,12	0,04	0,11	-0,01	-
150,00	0,04	0,10	0,00	-

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

Type of damage: tensile cracks

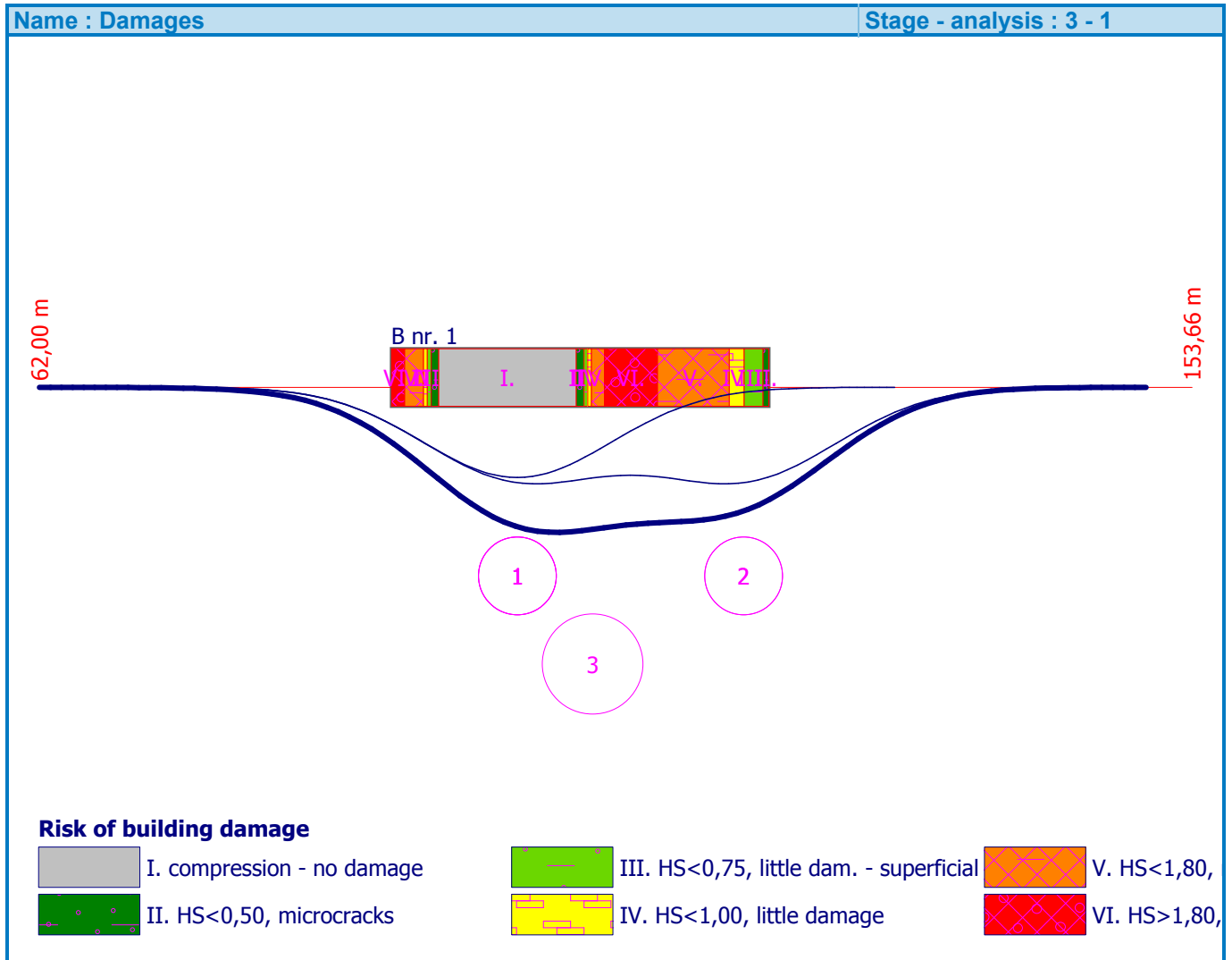
Analysis performed for all stages.

Building description: B nr. 1

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
1	90,00	91,05	VI. HS>1,80, large damage
2	91,05	92,55	V. HS<1,80, medium damage
3	92,55	92,85	IV. HS<1,00, little damage
4	92,85	93,15	III. HS<0,75, little dam. - superficial
5	93,15	93,75	II. HS<0,50, microcracks
6	93,75	104,70	I. compression - no damage
7	104,70	105,30	II. HS<0,50, microcracks
8	105,30	105,60	III. HS<0,75, little dam. - superficial
9	105,60	105,90	IV. HS<1,00, little damage
10	105,90	106,95	V. HS<1,80, medium damage
11	106,95	111,15	VI. HS>1,80, large damage
12	111,15	116,85	V. HS<1,80, medium damage
13	116,85	118,05	IV. HS<1,00, little damage
14	118,05	119,55	III. HS<0,75, little dam. - superficial



Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
15	119,55	120,00	II. HS<0,50, microcracks



### 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	exc nr. 1	100,00	15,00	3,09	30,00
2	No	exc nar. 2	118,00	15,00	3,09	30,00
3	No	ecx nr. 3	106,00	22,00	3,99	50,00
4	Yes	ecx nr. 4	121,00	18,00	5,92	110,00

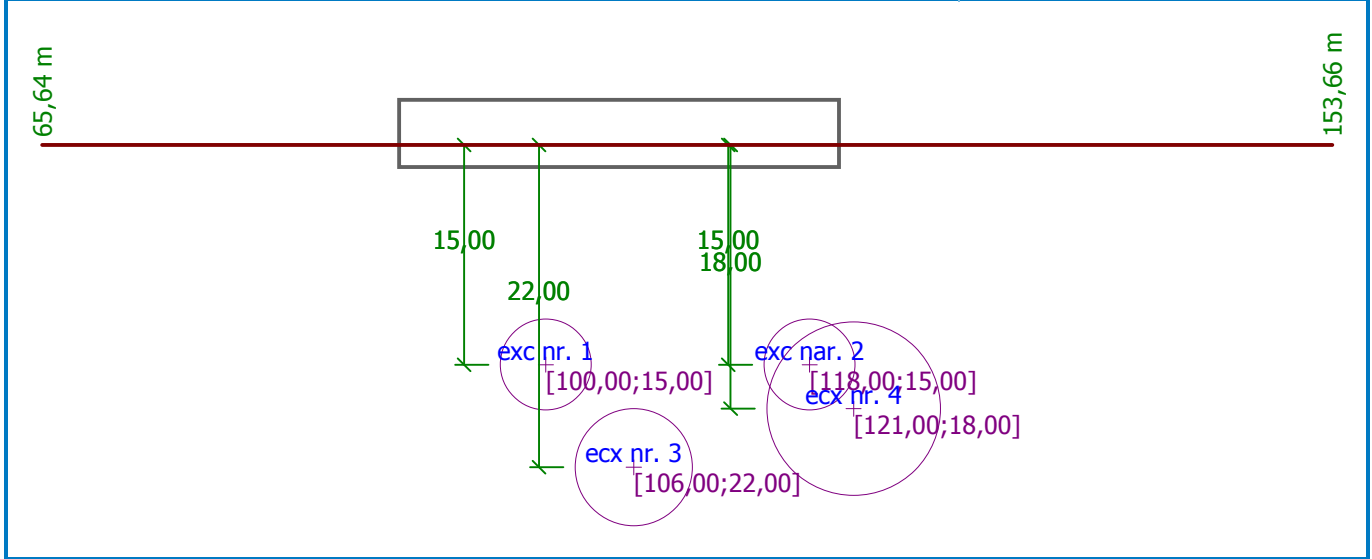
No.	Description	Trough param. k [-]	Volume loss VL [%]
1	exc nr. 1	0,50	3,00
2	exc nar. 2	0,50	3,00
3	ecx nr. 3	0,50	1,50
4	ecx nr. 4	0,50	2,00





Name : Geometry

Stage - analysis : 4 - 0



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

#### Analysis result - exc nr. 1

Distance of point of inflexion from center point  $L_{inf} = 6,60$  m  
Maximum settlement  $S_{max} = 47,7$  mm  
Length of settlement trough  $L_{max} = 26,41$  m

#### Analysis result - exc nar. 2

Distance of point of inflexion from center point  $L_{inf} = 6,60$  m  
Maximum settlement  $S_{max} = 47,7$  mm  
Length of settlement trough  $L_{max} = 26,41$  m

#### Analysis result - ecx nr. 3

Distance of point of inflexion from center point  $L_{inf} = 10,09$  m  
Maximum settlement  $S_{max} = 27,5$  mm  
Length of settlement trough  $L_{max} = 40,36$  m

#### Analysis result - ecx nr. 4

Distance of point of inflexion from center point  $L_{inf} = 8,16$  m  
Maximum settlement  $S_{max} = 91,2$  mm  
Length of settlement trough  $L_{max} = 32,66$  m

#### Overall results

Depression computed at depth 0,00 m.  
Max. settlement  $S_{max} = 158,0$  mm  
Max. horizontal deformation  $h_{max} = 62,9$  mm  
Begin of settlement trough  $x_1 = 62,00$  m  
End of settlement trough  $x_2 = 157,00$  m  
Length of settlement trough  $l = 95,00$  m

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

#### Analysis result - exc nr. 1

Distance of point of inflexion from center point  $L_{inf} = 6,60$  m  
Maximum settlement  $S_{max} = 47,7$  mm  
Length of settlement trough  $L_{max} = 26,41$  m



### Analysis result - exc nr. 2

Distance of point of inflexion from center point  $L_{inf} = 6,60$  m  
Maximum settlement  $s_{max} = 47,7$  mm  
Length of settlement trough  $L_{max} = 26,41$  m

### Analysis result - ecx nr. 3

Distance of point of inflexion from center point  $L_{inf} = 10,09$  m  
Maximum settlement  $s_{max} = 27,5$  mm  
Length of settlement trough  $L_{max} = 40,36$  m

### Analysis result - ecx nr. 4

Distance of point of inflexion from center point  $L_{inf} = 8,16$  m  
Maximum settlement  $s_{max} = 91,2$  mm  
Length of settlement trough  $L_{max} = 32,66$  m

### Overall results

Depression computed at depth 2,00 m.  
Max. settlement  $s_{max} = 148,2$  mm  
Max. horizontal deformation  $h_{max} = 52,6$  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)

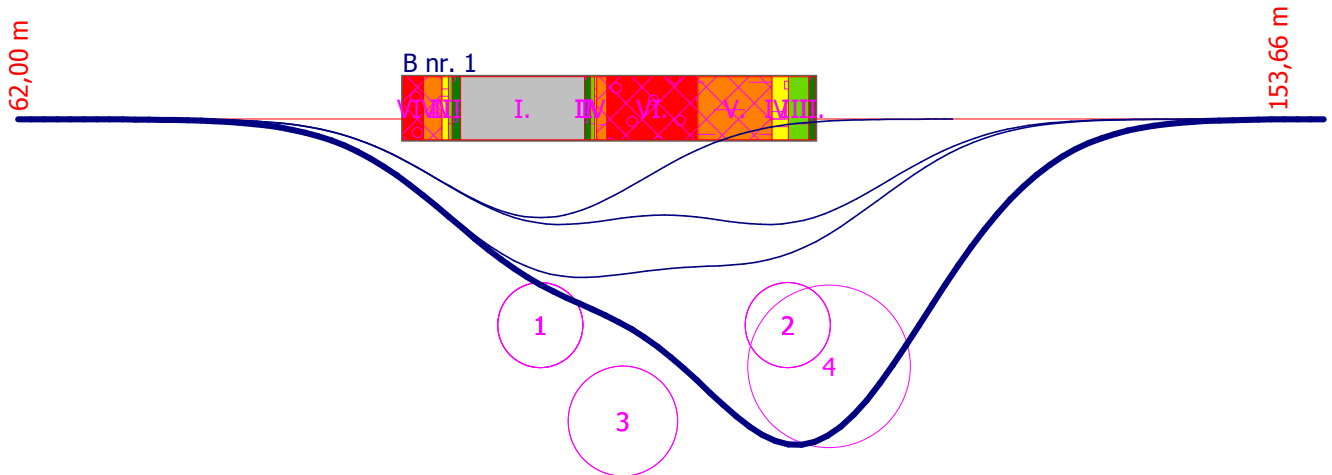
Type of damage: tensile cracks  
Analysis performed for all stages.  
Building description: B nr. 1

Section	Beg. $x_1$ [m]	End $x_2$ [m]	Description of damage
1	90,00	91,50	VI. HS>1,80, large damage
2	91,50	92,85	V. HS<1,80, medium damage
3	92,85	93,30	IV. HS<1,00, little damage
4	93,30	93,60	III. HS<0,75, little dam. - superficial
5	93,60	94,20	II. HS<0,50, microcracks
6	94,20	103,20	I. compression - no damage
7	103,20	103,65	II. HS<0,50, microcracks
8	103,65	103,95	III. HS<0,75, little dam. - superficial
9	103,95	104,10	IV. HS<1,00, little damage
10	104,10	104,85	V. HS<1,80, medium damage
11	104,85	111,45	VI. HS>1,80, large damage
12	111,45	116,85	V. HS<1,80, medium damage
13	116,85	118,05	IV. HS<1,00, little damage
14	118,05	119,55	III. HS<0,75, little dam. - superficial
15	119,55	120,00	II. HS<0,50, microcracks



Name : Damages

Stage - analysis : 4 - 1



**Risk of building damage**

	I. compression - no damage		III. HS<0,75, little dam. - superficial		V. HS<1,80,
	II. HS<0,50, microcracks		IV. HS<1,00, little damage		VI. HS>1,80,

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

Type of damage: gradient damage  
Analysis performed for stages: 1,2,3,4  
Building description: B nr. 1

Section	Beg. x <sub>1</sub> [m]	End x <sub>2</sub> [m]	Description of damage
1	90,00	101,25	V. GR<1/150, medium damage
2	101,25	102,60	IV. GR<1/425, little damage
3	102,60	111,45	V. GR<1/150, medium damage
4	111,45	114,00	VI. GR>1/150, large damage
5	114,00	117,60	V. GR<1/150, medium damage
6	117,60	118,35	IV. GR<1/425, little damage
7	118,35	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: B nr. 1  
Max. relative deflection upwards: 0,86 mm/m in distance of: 17,85 m from building starting point.  
Max. relative deflection downwards: 1,37 mm/m in distance of: 10,05 m from building starting point.  
Hogging



Section	Beg. $x_1$ [m]	End $x_2$ [m]
2	0,00	4,20
3	13,20	30,00

Sagging

Section	Beg. $x_1$ [m]	End $x_2$ [m]
2	3,30	16,95
3	22,50	30,00

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

Type of damage: relative deflection

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

Building description: B nr. 1

Max. relative deflection upwards: 0,86 mm/m in distance of: 17,85 m from building starting point.

Max. relative deflection downwards: 1,37 mm/m in distance of: 10,05 m from building starting point.

Hogging

Section	Beg. $x_1$ [m]	End $x_2$ [m]
2	0,00	4,20
3	13,20	30,00

Sagging

Section	Beg. $x_1$ [m]	End $x_2$ [m]
2	3,30	16,95
3	22,50	30,00