

OX residences. Internal forces in precast elements

June 18, 2019

Contents

1 Notation	5
1.1 Load cases	5
1.2 Combinations Ultimate Limit States	5
1.3 Combinations Serviceability Limit States	5
1.4 Internal forces sign convention	5
1.5 Units	6
2 Ultimate Limit States	6
2.1 Precast beams. ULS Internal forces	6
2.2 Precast columns. ULS Internal forces	14
3 Serviceability Limit States	33
3.1 Precast beams. SLS internal forces	33
3.2 Precast columns. SLS internal forces	38

List of Figures

1	Precast beams and columns. Model layout and internal forces sign convention	5
2	ULS01: 1.4*D. 1st floor beams, bending moment about local axis y [m.kN]	6
3	ULS01: 1.4*D. 1st floor beams, internal shear force in local direction z [kN]	6
4	ULS02_a: 1.2*D + 1.6*Lru + Lpu + 0.5*S. 1st floor beams, bending moment about local axis y [m.kN]	6
5	ULS02_a: 1.2*D + 1.6*Lru + Lpu + 0.5*S. 1st floor beams, internal shear force in local direction z [kN]	6
6	ULS02_b: 1.2*D + 1.6*Lrs + Lps + 0.5*S. 1st floor beams, bending moment about local axis y [m.kN]	7
7	ULS02_b: 1.2*D + 1.6*Lrs + Lps + 0.5*S. 1st floor beams, internal shear force in local direction z [kN]	7
8	ULS03_a: 1.2*D + 1.6*S + 0.5*Lru + Lpu. 1st floor beams, bending moment about local axis y [m.kN]	7
9	ULS03_a: 1.2*D + 1.6*S + 0.5*Lru + Lpu. 1st floor beams, internal shear force in local direction z [kN]	7
10	ULS03_b: 1.2*D + 1.6*S + 0.5*Lrs + Lps. 1st floor beams, bending moment about local axis y [m.kN]	8
11	ULS03_b: 1.2*D + 1.6*S + 0.5*Lrs + Lps. 1st floor beams, internal shear force in local direction z [kN]	8

12 ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. 1st floor beams, bending moment about local axis y [m.kN]	8
13 ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. 1st floor beams, internal shear force in local direction z [kN]	8
14 ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. 1st floor beams, bending moment about local axis y [m.kN]	9
15 ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. 1st floor beams, internal shear force in local direction z [kN]	9
16 ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. 1st floor beams, bending moment about local axis y [m.kN]	9
17 ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. 1st floor beams, internal shear force in local direction z [kN]	9
18 ULS05_b: $1.2*D + W_NS + 0.5*Lru + Lpu$. 1st floor beams, bending moment about local axis y [m.kN]	10
19 ULS05_b: $1.2*D + W_NS + 0.5*Lru + Lpu$. 1st floor beams, internal shear force in local direction z [kN]	10
20 ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. 1st floor beams, bending moment about local axis y [m.kN]	10
21 ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. 1st floor beams, internal shear force in local direction z [kN]	10
22 ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. 1st floor beams, bending moment about local axis y [m.kN]	11
23 ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. 1st floor beams, internal shear force in local direction z [kN]	11
24 ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. 1st floor beams, bending moment about local axis y [m.kN]	11
25 ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. 1st floor beams, internal shear force in local direction z [kN]	11
26 ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. 1st floor beams, bending moment about local axis y [m.kN]	12
27 ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. 1st floor beams, internal shear force in local direction z [kN]	12
28 ULS07_a: $0.9*D + W_WE$. 1st floor beams, bending moment about local axis y [m.kN]	12
29 ULS07_a: $0.9*D + W_WE$. 1st floor beams, internal shear force in local direction z [kN]	12
30 ULS07_b: $0.9*D + W_NS$. 1st floor beams, bending moment about local axis y [m.kN]	13
31 ULS07_b: $0.9*D + W_NS$. 1st floor beams, internal shear force in local direction z [kN]	13
32 ULS01: $1.4*D$. Columns, internal axial force [kN]	14
33 ULS01: $1.4*D$. Columns, bending moment about local axis y [m.kN]	14
34 ULS01: $1.4*D$. Columns, bending moment about local axis z [m.kN]	14
35 ULS01: $1.4*D$. Columns, internal shear force in local direction y [kN]	14
36 ULS01: $1.4*D$. Columns, internal shear force in local direction z [kN]	15
37 ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. Columns, internal axial force [kN] . .	15
38 ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. Columns, bending moment about local axis y [m.kN]	15
39 ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. Columns, bending moment about local axis z [m.kN]	15
40 ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. Columns, internal shear force in local direction y [kN]	16

41	ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. Columns, internal shear force in local direction z [kN]	16
42	ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, internal axial force [kN]	16
43	ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, bending moment about local axis y [m.kN]	16
44	ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, bending moment about local axis z [m.kN]	17
45	ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, internal shear force in local direction y [kN]	17
46	ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, internal shear force in local direction z [kN]	17
47	ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, internal axial force [kN]	17
48	ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, bending moment about local axis y [m.kN]	18
49	ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]	18
50	ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, internal shear force in local direction y [kN]	18
51	ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, internal shear force in local direction z [kN]	18
52	ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, internal axial force [kN]	19
53	ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, bending moment about local axis y [m.kN]	19
54	ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, bending moment about local axis z [m.kN]	19
55	ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, internal shear force in local direction y [kN]	19
56	ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, internal shear force in local direction z [kN]	20
57	ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, internal axial force [kN]	20
58	ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, bending moment about local axis y [m.kN]	20
59	ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, bending moment about local axis z [m.kN]	20
60	ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, internal shear force in local direction y [kN]	21
61	ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, internal shear force in local direction z [kN]	21
62	ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. Columns, internal axial force [kN]	21
63	ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. Columns, bending moment about local axis y [m.kN]	21
64	ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. Columns, bending moment about local axis z [m.kN]	22
65	ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. Columns, internal shear force in local direction y [kN]	22
66	ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. Columns, internal shear force in local direction z [kN]	22
67	ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. Columns, internal axial force [kN]	22
68	ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. Columns, bending moment about local axis y [m.kN]	23
69	ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]	23

70	ULS05_a: 1.2*D + W_WE + 0.5*Lru + Lpu. Columns, internal shear force in local direction y [kN]	23
71	ULS05_a: 1.2*D + W_WE + 0.5*Lru + Lpu. Columns, internal shear force in local direction z [kN]	23
72	ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, internal axial force [kN] .	24
73	ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, bending moment about local axis y [m.kN]	24
74	ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, bending moment about local axis z [m.kN]	24
75	ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, internal shear force in local direction y [kN]	24
76	ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, internal shear force in local direction z [kN]	25
77	ULS05_c: 1.2*D + W_WE + 0.5*Lrs + Lps. Columns, internal axial force [kN] .	25
78	ULS05_c: 1.2*D + W_WE + 0.5*Lrs + Lps. Columns, bending moment about local axis y [m.kN]	25
79	ULS05_c: 1.2*D + W_WE + 0.5*Lrs + Lps. Columns, bending moment about local axis z [m.kN]	25
80	ULS05_c: 1.2*D + W_WE + 0.5*Lrs + Lps. Columns, internal shear force in local direction y [kN]	26
81	ULS05_c: 1.2*D + W_WE + 0.5*Lrs + Lps. Columns, internal shear force in local direction z [kN]	26
82	ULS05_d: 1.2*D + W_NS + 0.5*Lrs + Lps. Columns, internal axial force [kN] .	26
83	ULS05_d: 1.2*D + W_NS + 0.5*Lrs + Lps. Columns, bending moment about local axis y [m.kN]	26
84	ULS05_d: 1.2*D + W_NS + 0.5*Lrs + Lps. Columns, bending moment about local axis z [m.kN]	27
85	ULS05_d: 1.2*D + W_NS + 0.5*Lrs + Lps. Columns, internal shear force in local direction y [kN]	27
86	ULS05_d: 1.2*D + W_NS + 0.5*Lrs + Lps. Columns, internal shear force in local direction z [kN]	27
87	ULS06_a: 1.2*D + 0.5*Lru + Lpu + 0.2*S. Columns, internal axial force [kN] .	27
88	ULS06_a: 1.2*D + 0.5*Lru + Lpu + 0.2*S. Columns, bending moment about local axis y [m.kN]	28
89	ULS06_a: 1.2*D + 0.5*Lru + Lpu + 0.2*S. Columns, bending moment about local axis z [m.kN]	28
90	ULS06_a: 1.2*D + 0.5*Lru + Lpu + 0.2*S. Columns, internal shear force in local direction y [kN]	28
91	ULS06_a: 1.2*D + 0.5*Lru + Lpu + 0.2*S. Columns, internal shear force in local direction z [kN]	28
92	ULS06_b: 1.2*D + 0.5*Lrs + Lps + 0.2*S. Columns, internal axial force [kN] .	29
93	ULS06_b: 1.2*D + 0.5*Lrs + Lps + 0.2*S. Columns, bending moment about local axis y [m.kN]	29
94	ULS06_b: 1.2*D + 0.5*Lrs + Lps + 0.2*S. Columns, bending moment about local axis z [m.kN]	29
95	ULS06_b: 1.2*D + 0.5*Lrs + Lps + 0.2*S. Columns, internal shear force in local direction y [kN]	29
96	ULS06_b: 1.2*D + 0.5*Lrs + Lps + 0.2*S. Columns, internal shear force in local direction z [kN]	30
97	ULS07_a: 0.9*D + W_WE. Columns, internal axial force [kN]	30
98	ULS07_a: 0.9*D + W_WE. Columns, bending moment about local axis y [m.kN]	30
99	ULS07_a: 0.9*D + W_WE. Columns, bending moment about local axis z [m.kN]	30

LIST OF FIGURES

100	ULS07_a: 0.9*D + W_WE. Columns, internal shear force in local direction y [kN]	31
101	ULS07_a: 0.9*D + W_WE. Columns, internal shear force in local direction z [kN]	31
102	ULS07_b: 0.9*D + W_NS. Columns, internal axial force [kN]	31
103	ULS07_b: 0.9*D + W_NS. Columns, bending moment about local axis y [m.kN]	31
104	ULS07_b: 0.9*D + W_NS. Columns, bending moment about local axis z [m.kN] .	32
105	ULS07_b: 0.9*D + W_NS. Columns, internal shear force in local direction y [kN]	32
106	ULS07_b: 0.9*D + W_NS. Columns, internal shear force in local direction z [kN]	32
107	SLS01: 1.0*D. 1st floor beams, bending moment about local axis y [m.kN]	33
108	SLS01: 1.0*D. 1st floor beams, internal shear force in local direction z [kN] . . .	33
109	SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. 1st floor beams, bending moment about local axis y [m.kN]	33
110	SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. 1st floor beams, internal shear force in local direction z [kN]	33
111	SLS02_b: 1.0*D + 1.0*Lrs + Lps + 0.3*S. 1st floor beams, bending moment about local axis y [m.kN]	34
112	SLS02_b: 1.0*D + 1.0*Lrs + Lps + 0.3*S. 1st floor beams, internal shear force in local direction z [kN]	34
113	SLS03_a: 1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu. 1st floor beams, bending moment about local axis y [m.kN]	34
114	SLS03_a: 1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu. 1st floor beams, internal shear force in local direction z [kN]	34
115	SLS03_b: 1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps. 1st floor beams, bending moment about local axis y [m.kN]	35
116	SLS03_b: 1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps. 1st floor beams, internal shear force in local direction z [kN]	35
117	SLS04_a: 1.0*D + W_WE + 1.0*Lru + Lpu. 1st floor beams, bending moment about local axis y [m.kN]	35
118	SLS04_a: 1.0*D + W_WE + 1.0*Lru + Lpu. 1st floor beams, internal shear force in local direction z [kN]	35
119	SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. 1st floor beams, bending moment about local axis y [m.kN]	36
120	SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. 1st floor beams, internal shear force in local direction z [kN]	36
121	SLS05_a: 1.0*D + W_WE. 1st floor beams, bending moment about local axis y [m.kN]	36
122	SLS05_a: 1.0*D + W_WE. 1st floor beams, internal shear force in local direction z [kN]	36
123	SLS05_b: 1.0*D + W_NS. 1st floor beams, bending moment about local axis y [m.kN]	37
124	SLS05_b: 1.0*D + W_NS. 1st floor beams, internal shear force in local direction z [kN]	37
125	SLS01: 1.0*D. Columns, internal axial force [kN]	38
126	SLS01: 1.0*D. Columns, bending moment about local axis y [m.kN]	38
127	SLS01: 1.0*D. Columns, bending moment about local axis z [m.kN]	38
128	SLS01: 1.0*D. Columns, internal shear force in local direction y [kN]	38
129	SLS01: 1.0*D. Columns, internal shear force in local direction z [kN]	39
130	SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. Columns, internal axial force [kN] . .	39
131	SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. Columns, bending moment about local axis y [m.kN]	39
132	SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. Columns, bending moment about local axis z [m.kN]	39

133	SLS02_a: $1.0*D + 1.0*Lru + Lpu + 0.3*S$. Columns, internal shear force in local direction y [kN]	40
134	SLS02_a: $1.0*D + 1.0*Lru + Lpu + 0.3*S$. Columns, internal shear force in local direction z [kN]	40
135	SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, internal axial force [kN]	40
136	SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, bending moment about local axis y [m.kN]	40
137	SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, bending moment about local axis z [m.kN]	41
138	SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, internal shear force in local direction y [kN]	41
139	SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, internal shear force in local direction z [kN]	41
140	SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, internal axial force [kN]	41
141	SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, bending moment about local axis y [m.kN]	42
142	SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, bending moment about local axis z [m.kN]	42
143	SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, internal shear force in local direction y [kN]	42
144	SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, internal shear force in local direction z [kN]	42
145	SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, internal axial force [kN]	43
146	SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, bending moment about local axis y [m.kN]	43
147	SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, bending moment about local axis z [m.kN]	43
148	SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, internal shear force in local direction y [kN]	43
149	SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, internal shear force in local direction z [kN]	44
150	SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, internal axial force [kN]	44
151	SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, bending moment about local axis y [m.kN]	44
152	SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]	44
153	SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, internal shear force in local direction y [kN]	45
154	SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, internal shear force in local direction z [kN]	45
155	SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. Columns, internal axial force [kN]	45
156	SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. Columns, bending moment about local axis y [m.kN]	45
157	SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]	46
158	SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. Columns, internal shear force in local direction y [kN]	46
159	SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. Columns, internal shear force in local direction z [kN]	46
160	SLS05_a: $1.0*D + W_WE$. Columns, internal axial force [kN]	46
161	SLS05_a: $1.0*D + W_WE$. Columns, bending moment about local axis y [m.kN]	47
162	SLS05_a: $1.0*D + W_WE$. Columns, bending moment about local axis z [m.kN]	47

LIST OF FIGURES

163	SLS05_a: 1.0*D + W_WE. Columns, internal shear force in local direction y [kN]	47
164	SLS05_a: 1.0*D + W_WE. Columns, internal shear force in local direction z [kN]	47
165	SLS05_b: 1.0*D + W_NS. Columns, internal axial force [kN]	48
166	SLS05_b: 1.0*D + W_NS. Columns, bending moment about local axis y [m.kN] .	48
167	SLS05_b: 1.0*D + W_NS. Columns, bending moment about local axis z [m.kN] .	48
168	SLS05_b: 1.0*D + W_NS. Columns, internal shear force in local direction y [kN]	48
169	SLS05_b: 1.0*D + W_NS. Columns, internal shear force in local direction z [kN]	49

1 Notation

1.1 Load cases

D:	dead load
Lru:	live load (uniform on rooms)
Lrs:	live load (staggered pattern on rooms)
Lpu:	live load (uniform on patios)
Lps:	live load (staggered pattern on patios)
S:	snow load
W_WE:	Wind West-East
W_NS:	Wind North-South

1.2 Combinations Ultimate Limit States

ULS01:	1.4*D
ULS02_a:	1.2*D + 1.6*Lru + Lpu + 0.5*S
ULS02_b:	1.2*D + 1.6*Lrs + Lps + 0.5*S
ULS03_a:	1.2*D + 1.6*S + 0.5*Lru + Lpu
ULS03_b:	1.2*D + 1.6*S + 0.5*Lrs + Lps
ULS04_b:	1.2*D + 1.6*S + 0.5*W_NS
ULS04_a:	1.2*D + 1.6*S + 0.5*W_WE
ULS05_a:	1.2*D + W_WE + 0.5*Lru + Lpu
ULS05_b:	1.2*D + W_NS + 0.5*Lru + Lpu
ULS05_c:	1.2*D + W_WE + 0.5*Lrs + Lps
ULS05_d:	1.2*D + W_NS + 0.5*Lrs + Lps
ULS06_a:	1.2*D + 0.5*Lru + Lpu + 0.2*S
ULS06_b:	1.2*D + 0.5*Lrs + Lps + 0.2*S
ULS07_a:	0.9*D + W_WE
ULS07_b:	0.9*D + W_NS

1.3 Combinations Serviceability Limit States

SLS01:	1.0*D
SLS02_a:	1.0*D + 1.0*Lru + Lpu + 0.3*S
SLS02_b:	1.0*D + 1.0*Lrs + Lps + 0.3*S
SLS03_a:	1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu
SLS03_b:	1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps
SLS04_a:	1.0*D + W_WE + 1.0*Lru + Lpu
SLS04_b:	1.0*D + W_NS + 1.0*Lru + Lpu
SLS04_c:	1.0*D + W_WE + 1.0*Lrs + Lps
SLS04_d:	1.0*D + W_NS + 1.0*Lrs + Lps
SLS05_a:	1.0*D + W_WE
SLS05_b:	1.0*D + W_NS

1.4 Internal forces sign convention

See figure 1

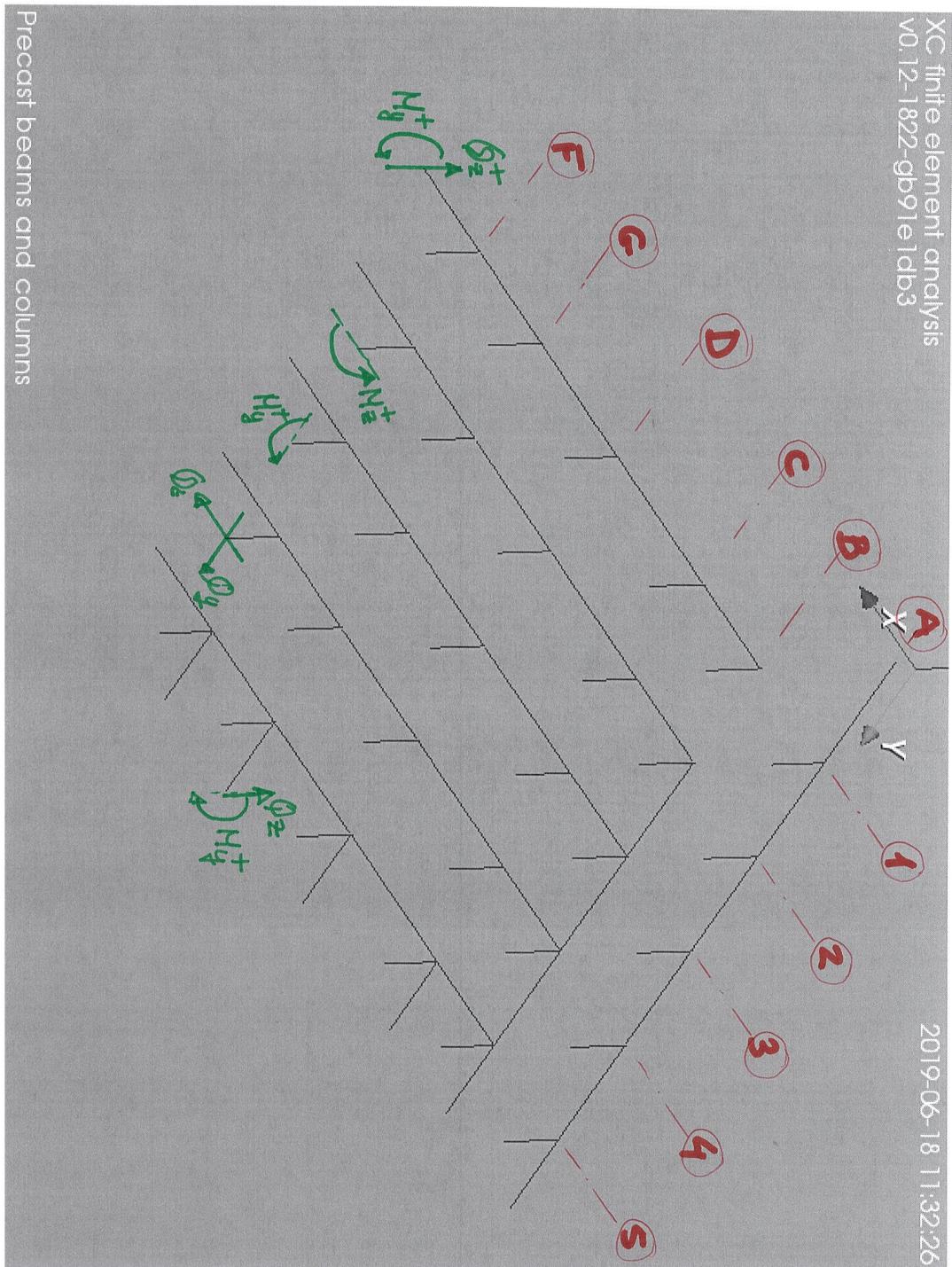


Figure 1: Precast beams and columns. Model layout and internal forces sign convention

1.5 Units

Axial and shear forces:	kN	1 kilonewton = 224.809 pound-force
Bending moments:	kNm	1 kilonewton meter = 0.7375623360 kilopound foot

2 Ultimate Limit States

2.1 Precast beams. ULS Internal forces

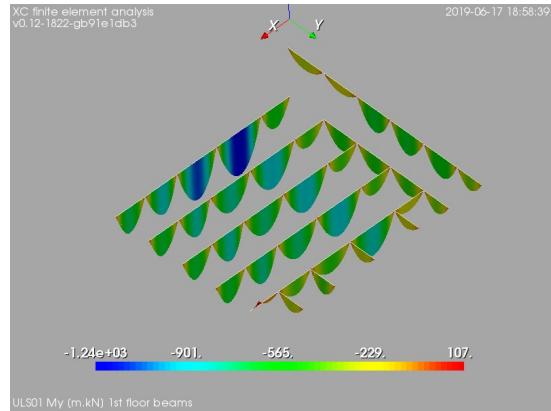


Figure 2: ULS01: $1.4*D$. 1st floor beams, bending moment about local axis y [m.kN]

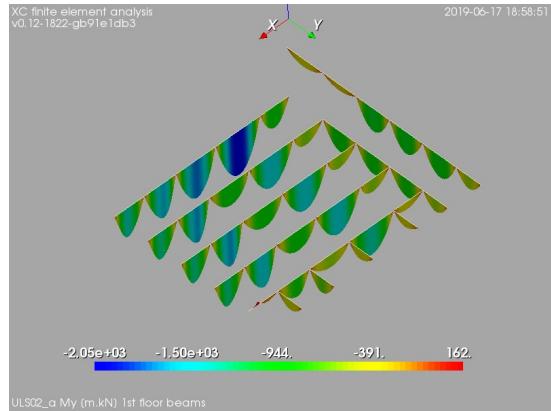


Figure 4: ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. 1st floor beams, bending moment about local axis y [m.kN]

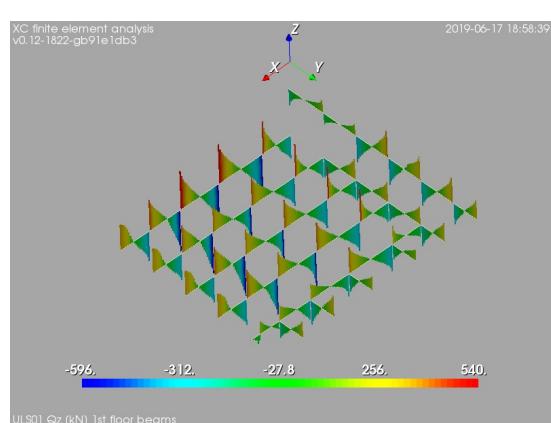


Figure 3: ULS01: $1.4*D$. 1st floor beams, internal shear force in local direction z [kN]

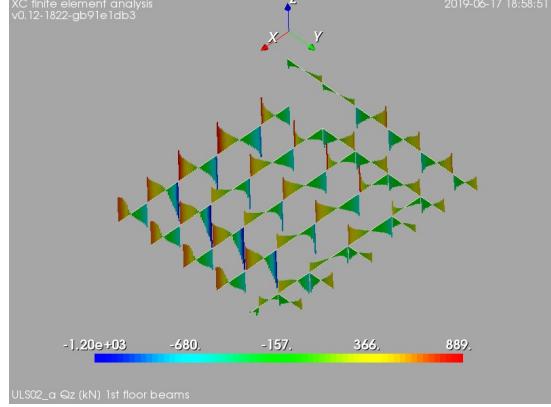


Figure 5: ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. 1st floor beams, internal shear force in local direction z [kN]

2. ULTIMATE LIMIT STATES

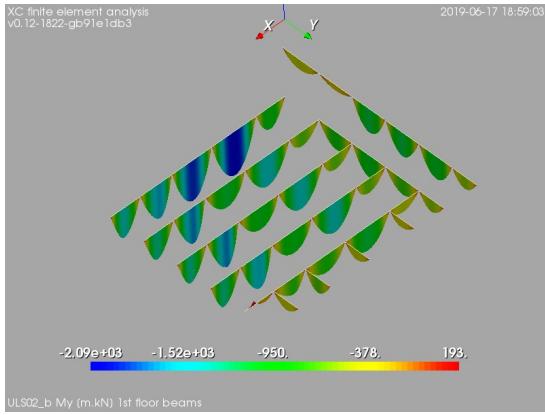


Figure 6: ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. 1st floor beams, bending moment about local axis y [m.kN]

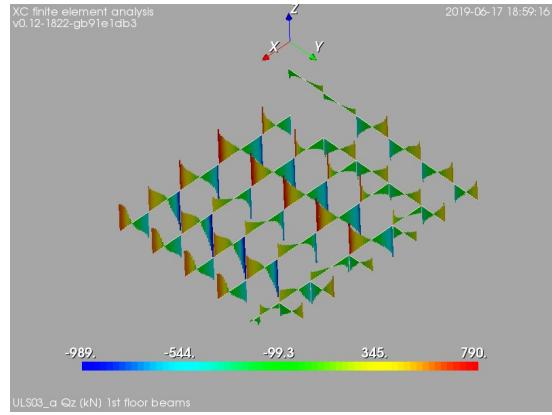


Figure 9: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. 1st floor beams, internal shear force in local direction z [kN]

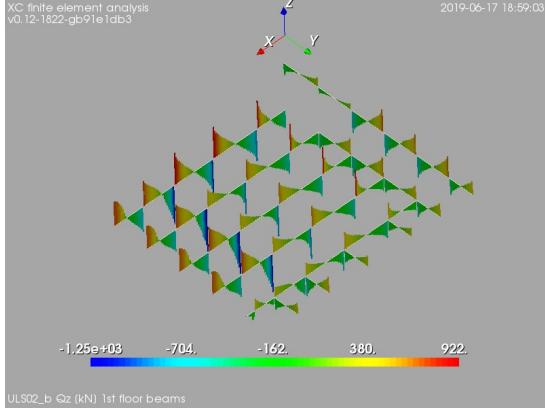


Figure 7: ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. 1st floor beams, internal shear force in local direction z [kN]

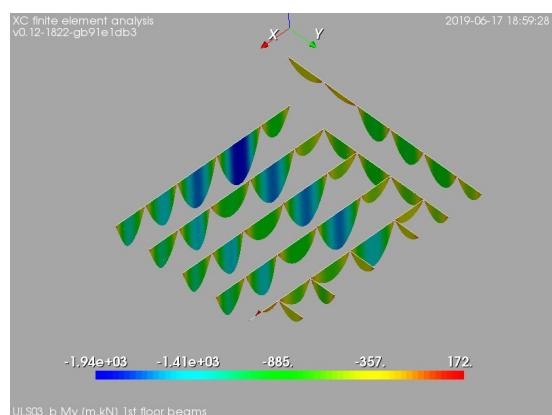


Figure 10: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. 1st floor beams, bending moment about local axis y [m.kN]

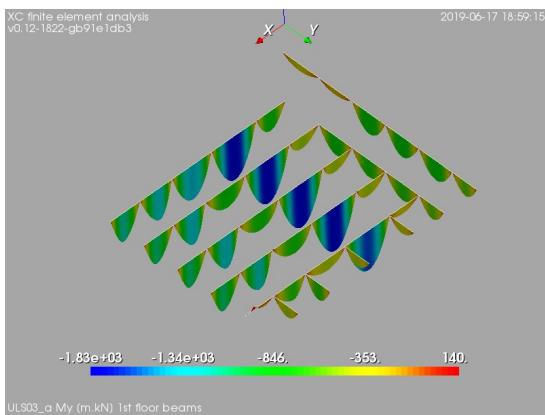


Figure 8: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. 1st floor beams, bending moment about local axis y [m.kN]

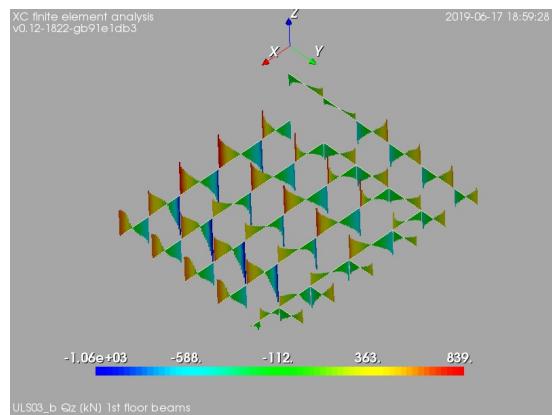


Figure 11: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. 1st floor beams, internal shear force in local direction z [kN]

2. ULTIMATE LIMIT STATES

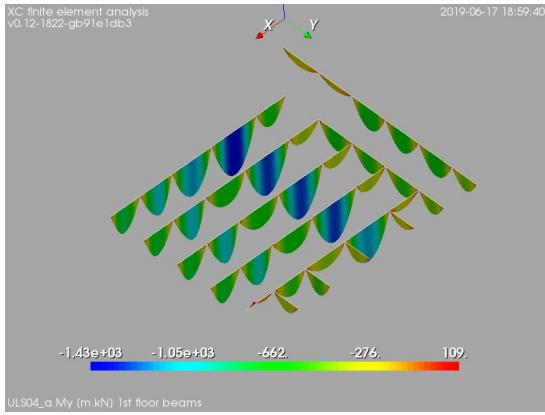


Figure 12: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. 1st floor beams, bending moment about local axis y [m.kN]

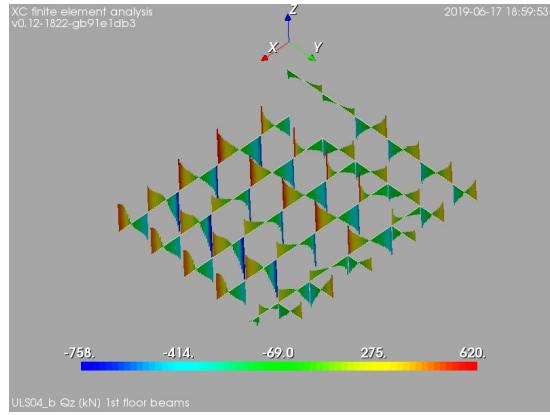


Figure 15: ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. 1st floor beams, internal shear force in local direction z [kN]

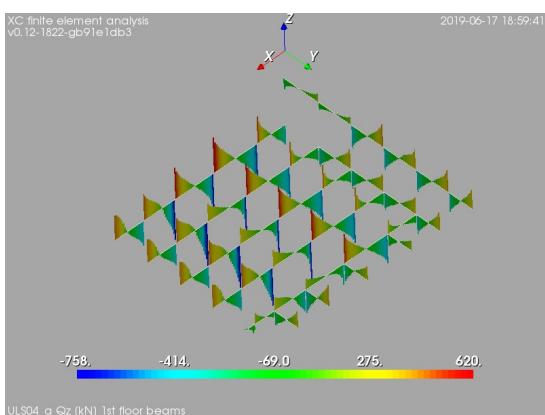


Figure 13: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. 1st floor beams, internal shear force in local direction z [kN]

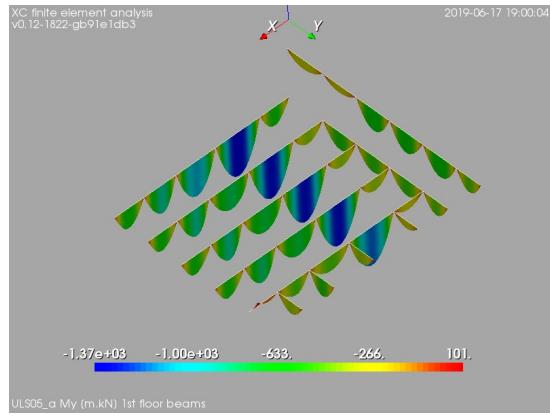


Figure 16: ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. 1st floor beams, bending moment about local axis y [m.kN]

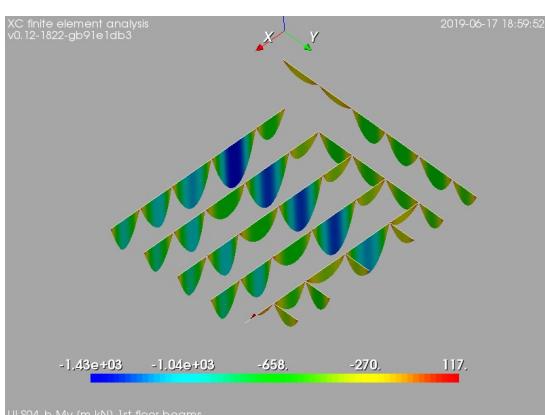


Figure 14: ULS04_b: $1.2*D + 1.6*S + 0.5*W_NS$. 1st floor beams, bending moment about local axis y [m.kN]

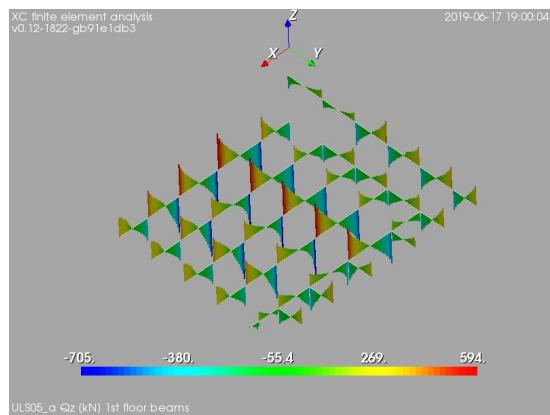
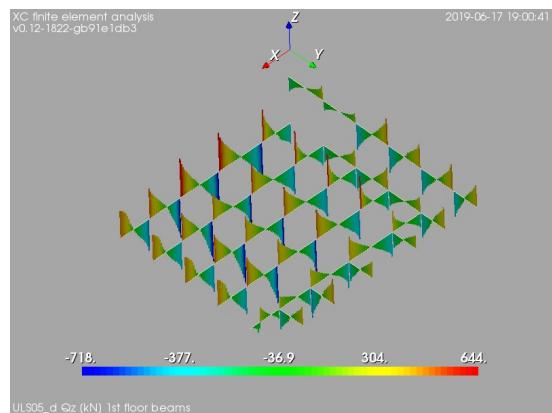
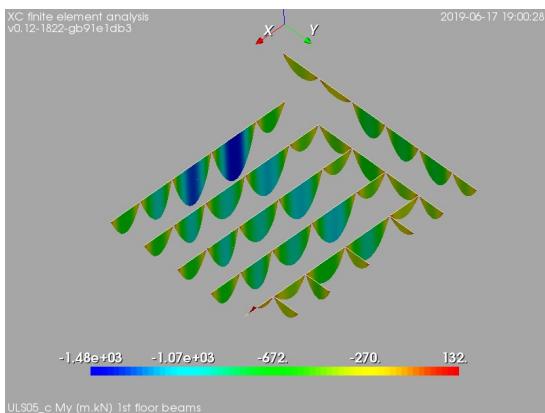
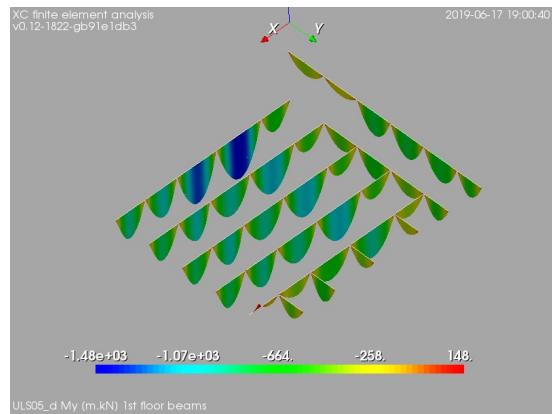
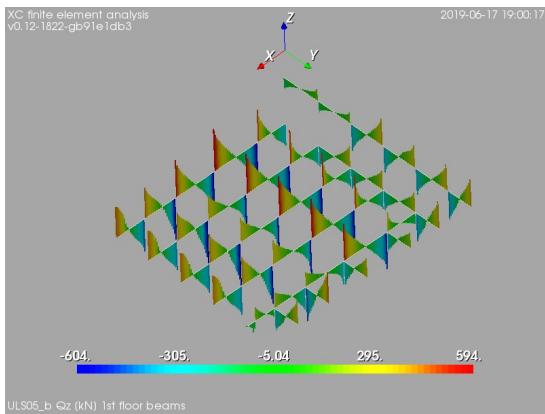
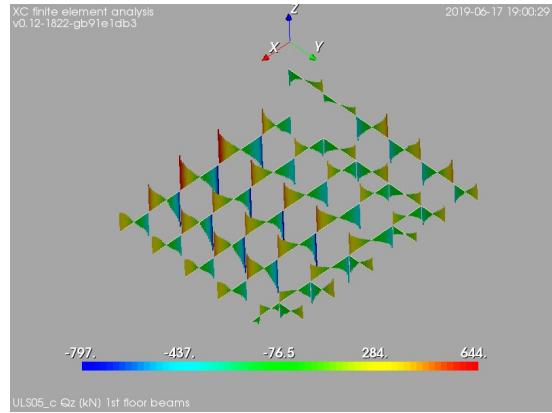
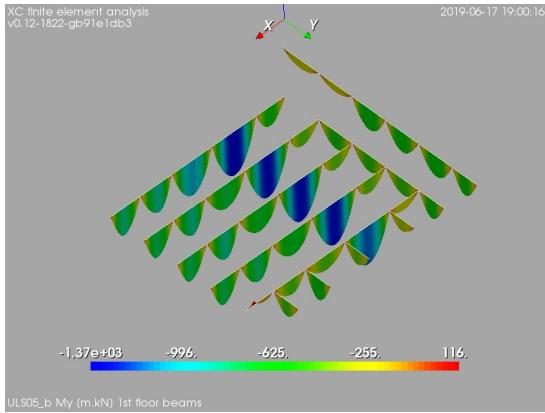
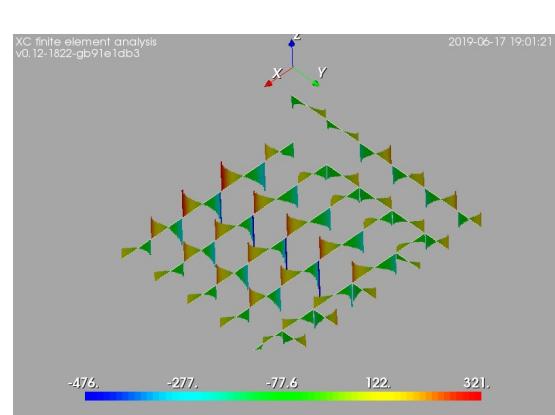
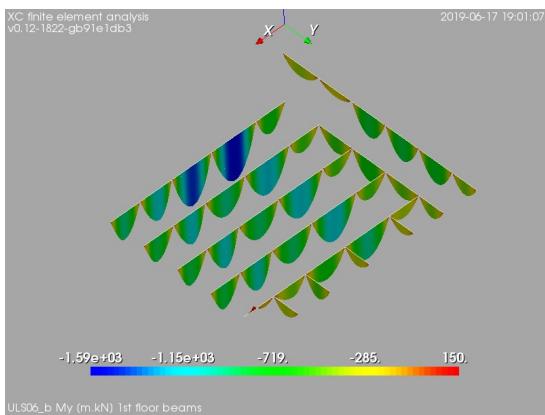
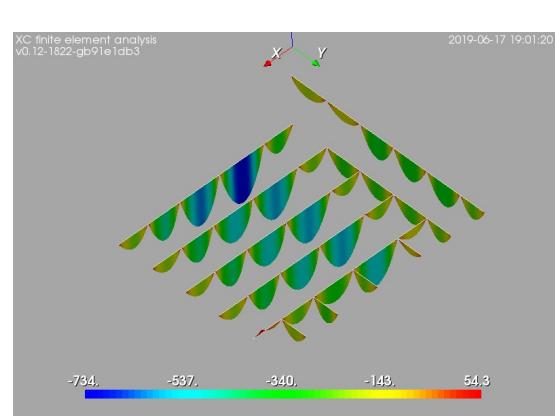
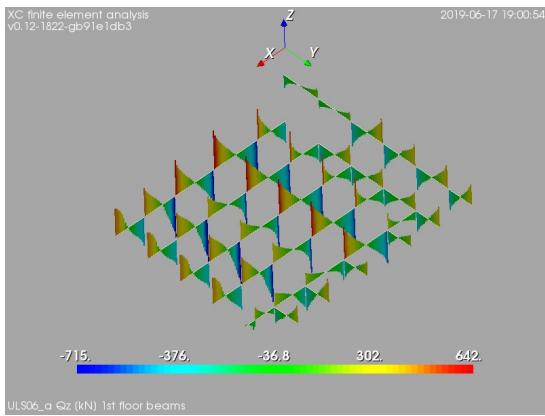
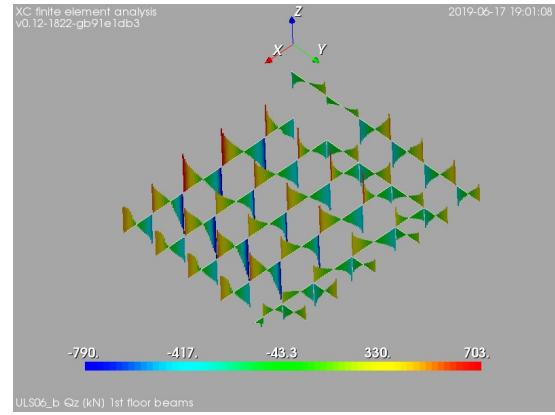
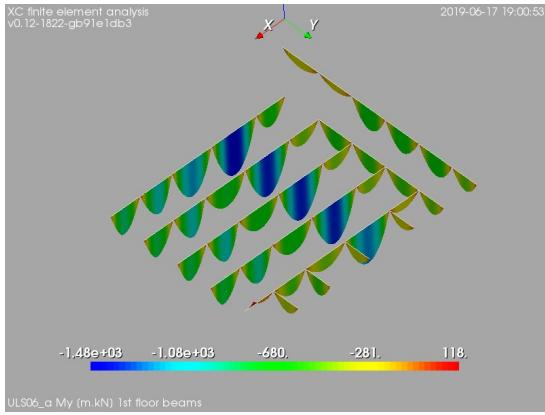


Figure 17: ULS05_a: $1.2*D + W_WE + 0.5*Lru + Lpu$. 1st floor beams, internal shear force in local direction z [kN]

2. ULTIMATE LIMIT STATES



2. ULTIMATE LIMIT STATES



2. ULTIMATE LIMIT STATES

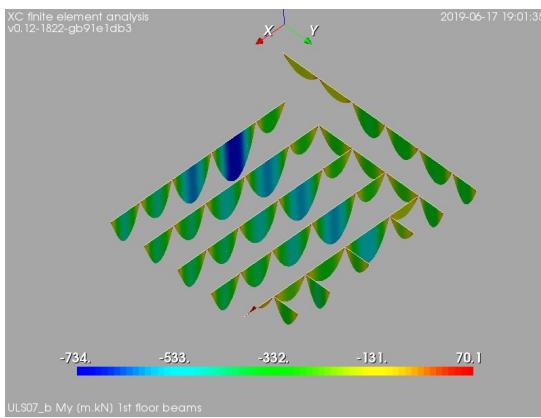


Figure 30: ULS07_b: $0.9*D + W_NS$. 1st floor beams, bending moment about local axis y [m.kN]

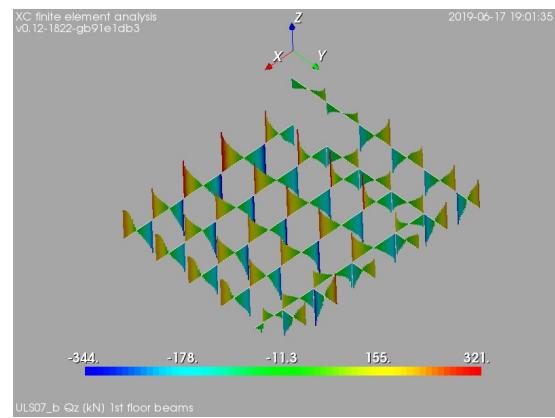


Figure 31: ULS07_b: $0.9*D + W_NS$. 1st floor beams, internal shear force in local direction z [kN]

2.2 Precast columns. ULS Internal forces

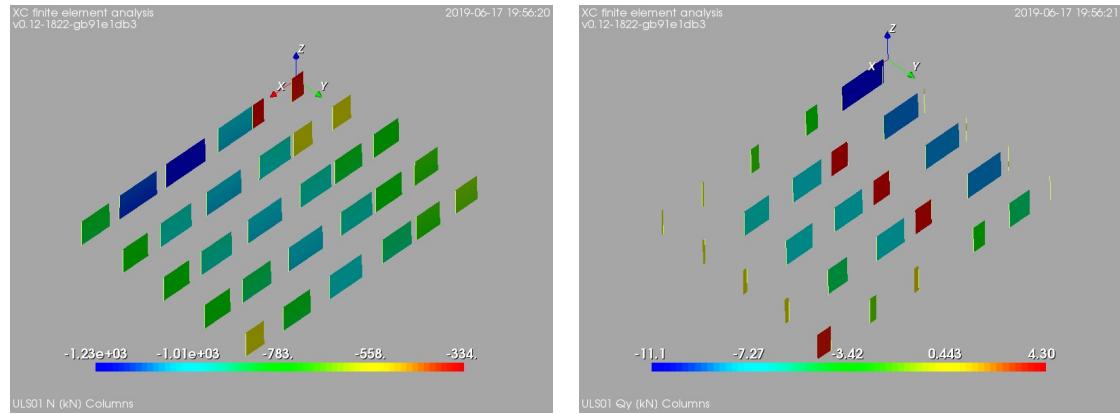


Figure 32: ULS01: 1.4*D. Columns, internal axial force [kN]

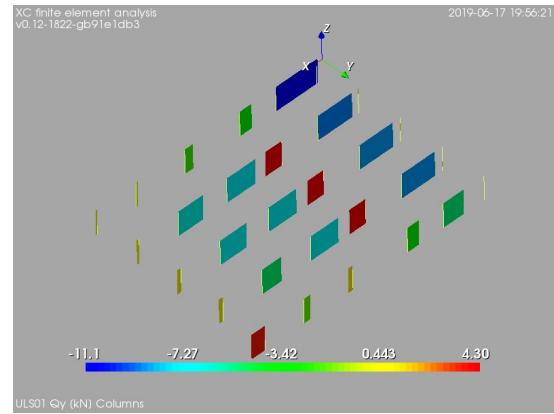


Figure 35: ULS01: 1.4*D. Columns, internal shear force in local direction y [kN]

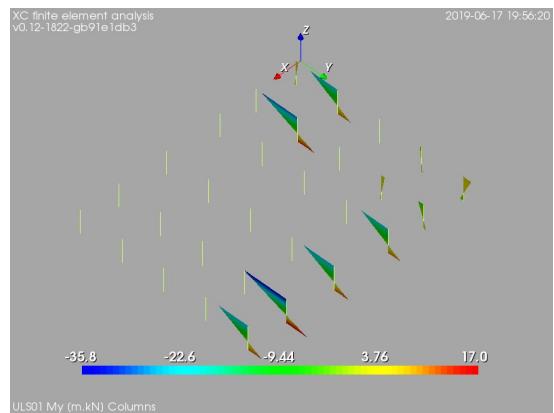


Figure 33: ULS01: 1.4*D. Columns, bending moment about local axis y [m.kN]

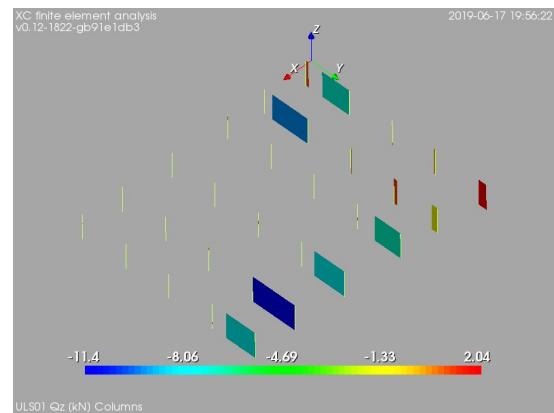


Figure 36: ULS01: 1.4*D. Columns, internal shear force in local direction z [kN]

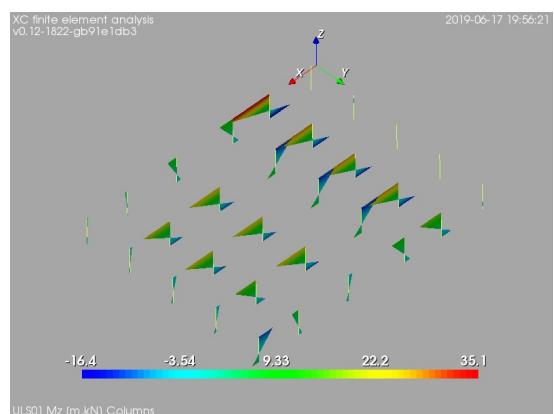


Figure 34: ULS01: 1.4*D. Columns, bending moment about local axis z [m.kN]

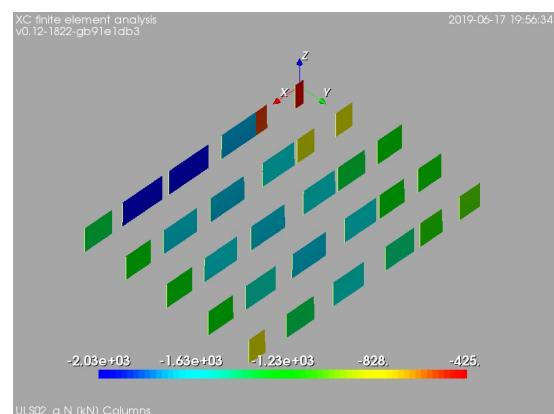


Figure 37: ULS02_a: 1.2*D + 1.6*Lru + Lpu + 0.5*S. Columns, internal axial force [kN]

2. ULTIMATE LIMIT STATES

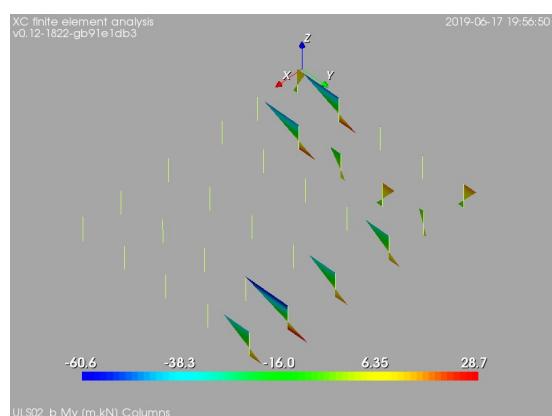
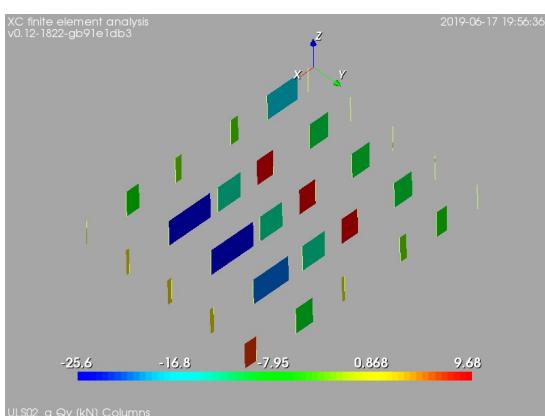
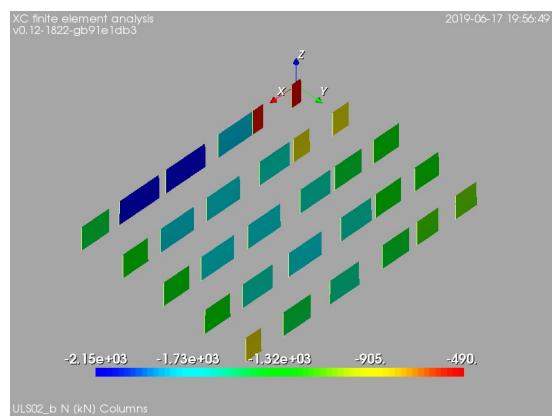
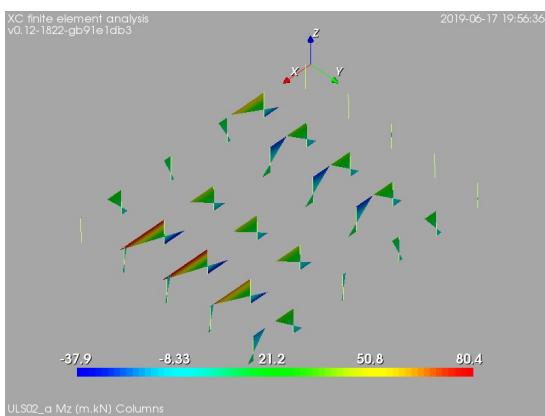
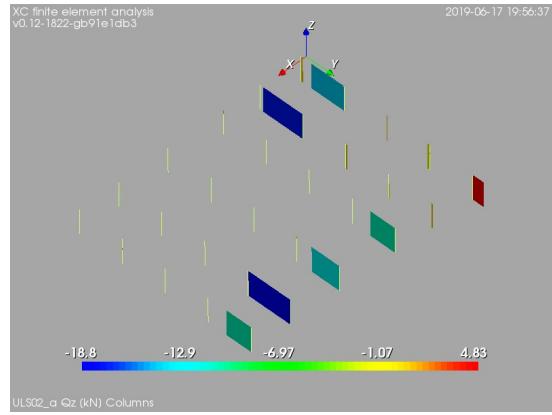
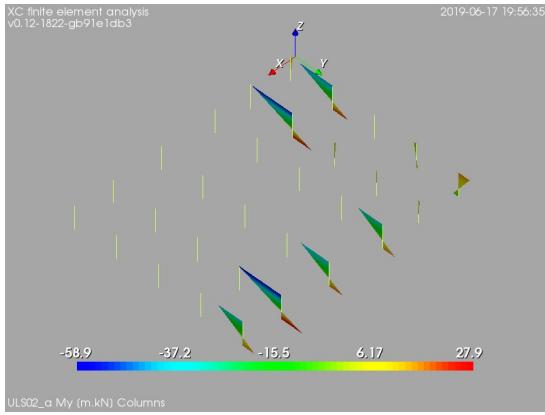


Figure 40: ULS02_a: $1.2*D + 1.6*Lru + Lpu + 0.5*S$. Columns, internal shear force in local direction y [kN]

Figure 43: ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, bending moment about local axis y [m.kN]

2. ULTIMATE LIMIT STATES

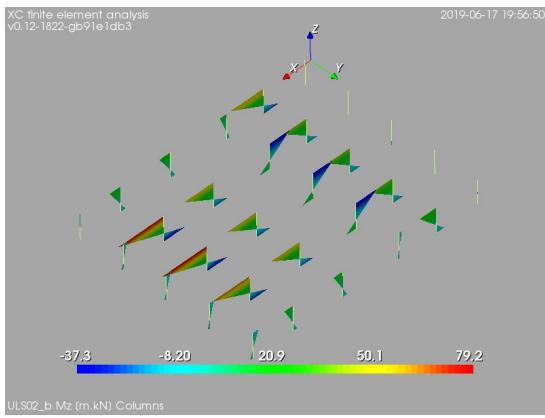


Figure 44: ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, bending moment about local axis z [m.kN]

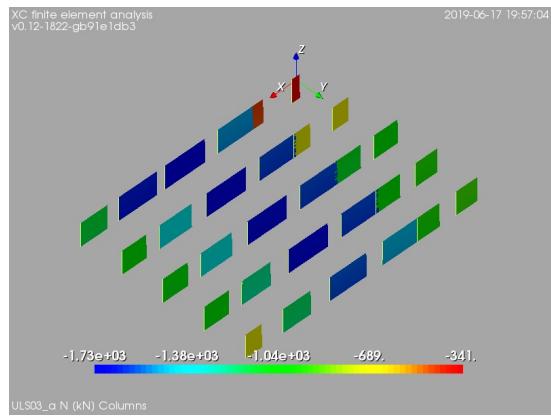


Figure 47: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, internal axial force [kN]

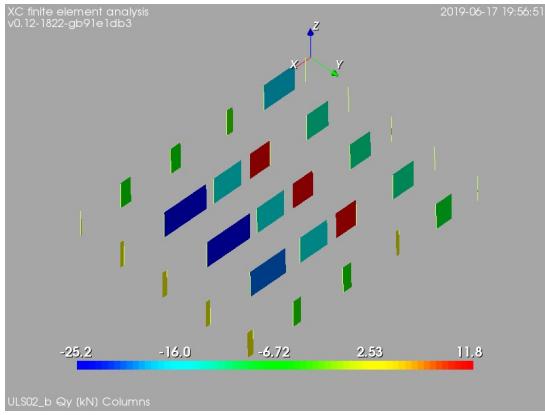


Figure 45: ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, internal shear force in local direction y [kN]

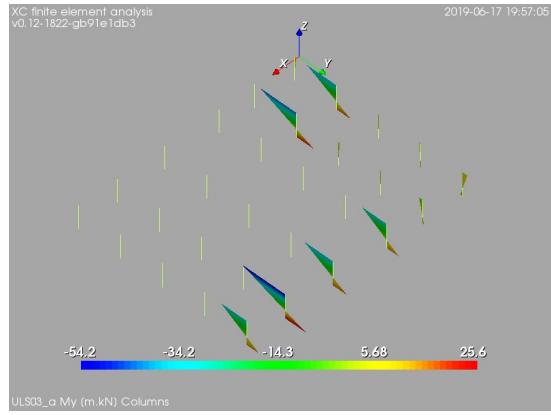


Figure 48: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, bending moment about local axis y [m.kN]

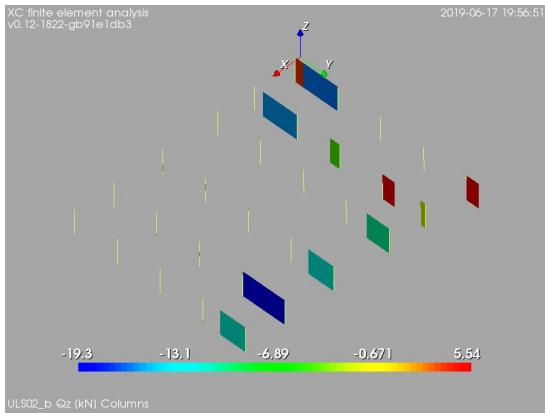


Figure 46: ULS02_b: $1.2*D + 1.6*Lrs + Lps + 0.5*S$. Columns, internal shear force in local direction z [kN]

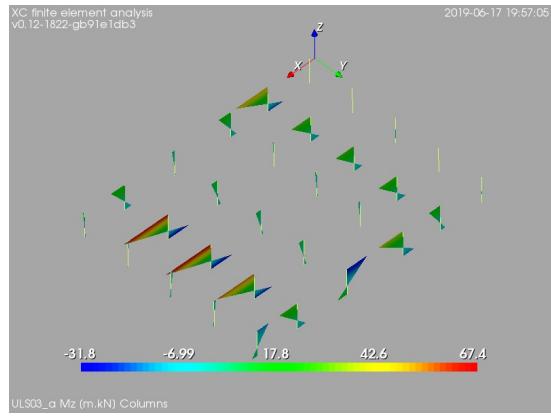


Figure 49: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]

2. ULTIMATE LIMIT STATES

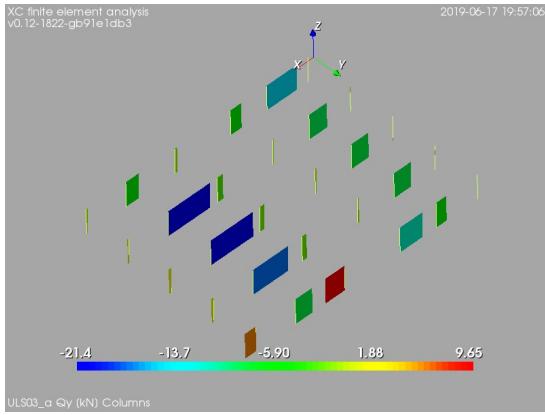


Figure 50: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, internal shear force in local direction y [kN]

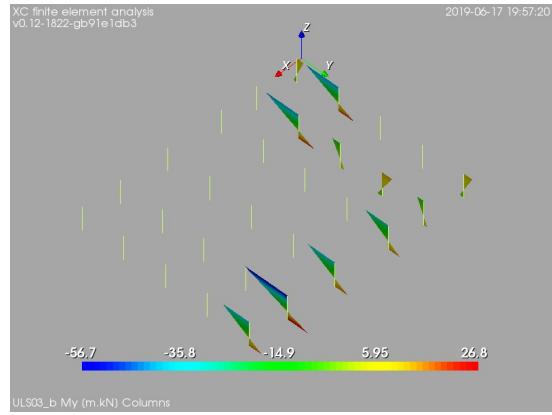


Figure 53: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, bending moment about local axis y [m.kN]

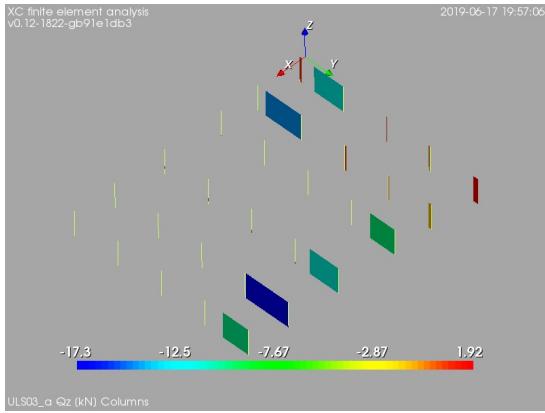


Figure 51: ULS03_a: $1.2*D + 1.6*S + 0.5*Lru + Lpu$. Columns, internal shear force in local direction z [kN]

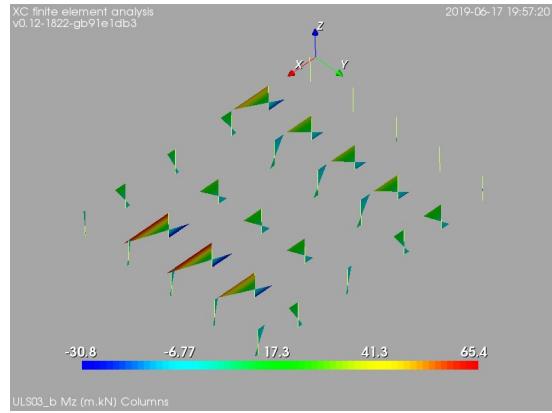


Figure 54: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, bending moment about local axis z [m.kN]

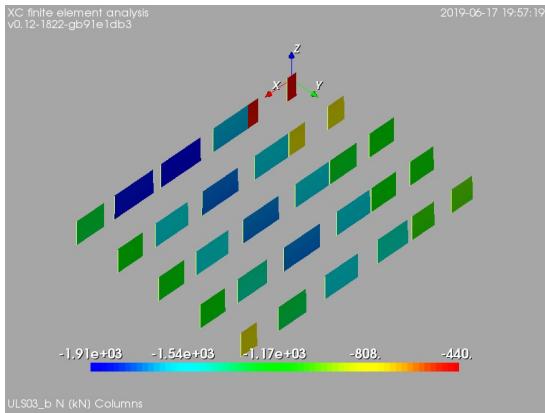


Figure 52: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, internal axial force [kN]

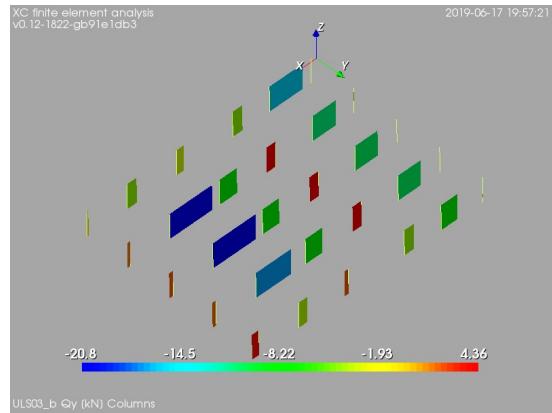


Figure 55: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, internal shear force in local direction y [kN]

2. ULTIMATE LIMIT STATES

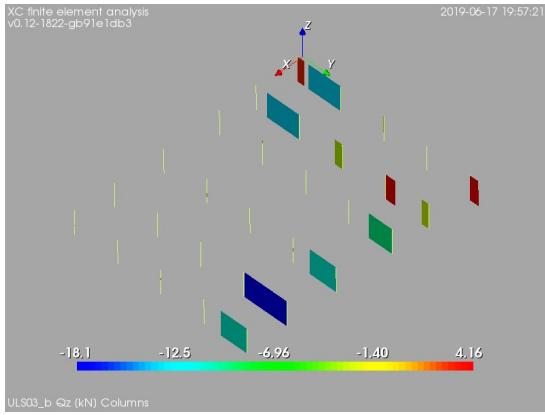


Figure 56: ULS03_b: $1.2*D + 1.6*S + 0.5*Lrs + Lps$. Columns, internal shear force in local direction z [kN]

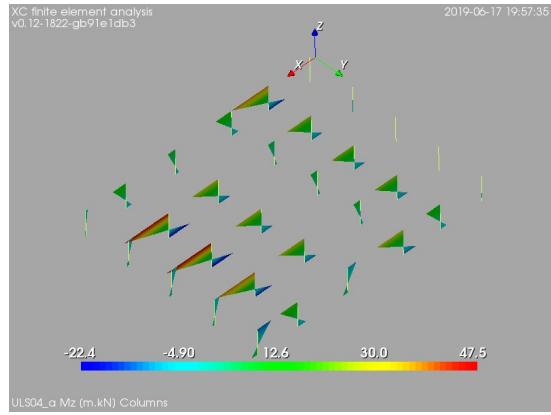


Figure 59: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, bending moment about local axis z [m.kN]

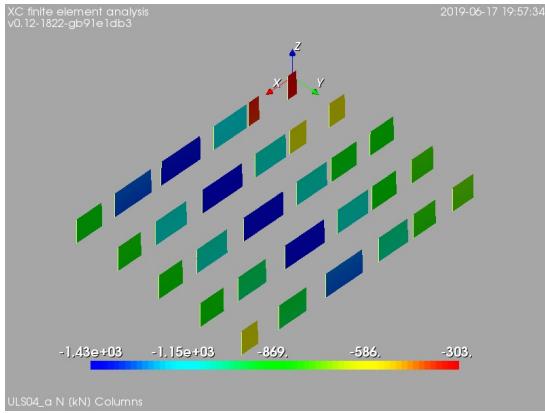


Figure 57: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, internal axial force [kN]

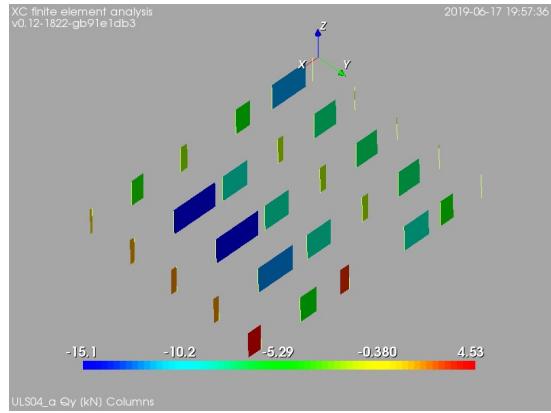


Figure 60: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, internal shear force in local direction y [kN]

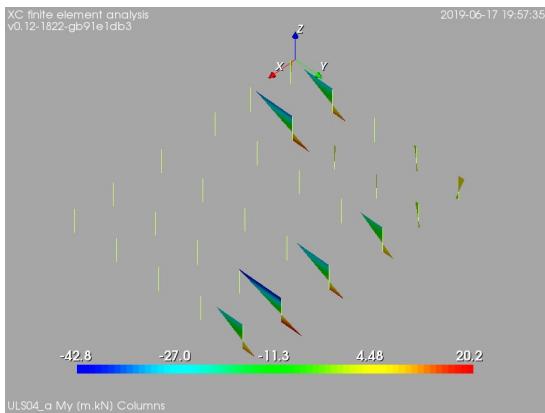


Figure 58: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, bending moment about local axis y [m.kN]

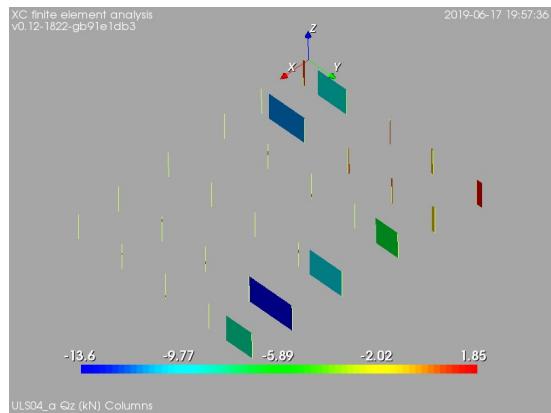


Figure 61: ULS04_a: $1.2*D + 1.6*S + 0.5*W_WE$. Columns, internal shear force in local direction z [kN]

2. ULTIMATE LIMIT STATES

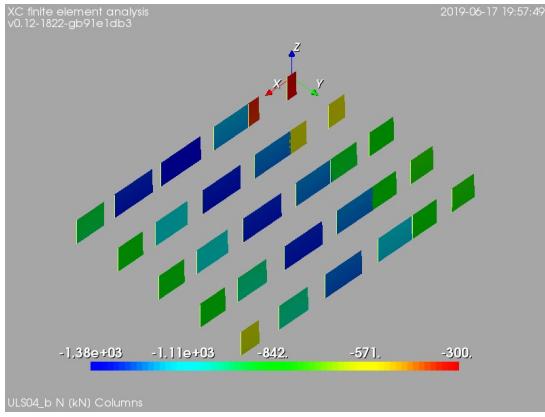


Figure 62: ULS04_b: $1.2*D + 1.6*S + 0.5*W_{NS}$. Columns, internal axial force [kN]

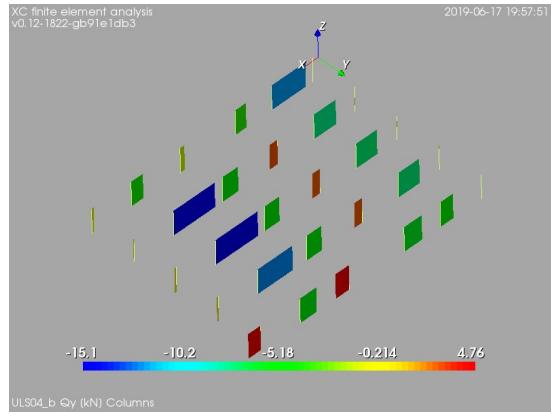


Figure 65: ULS04_b: $1.2*D + 1.6*S + 0.5*W_{NS}$. Columns, internal shear force in local direction y [kN]

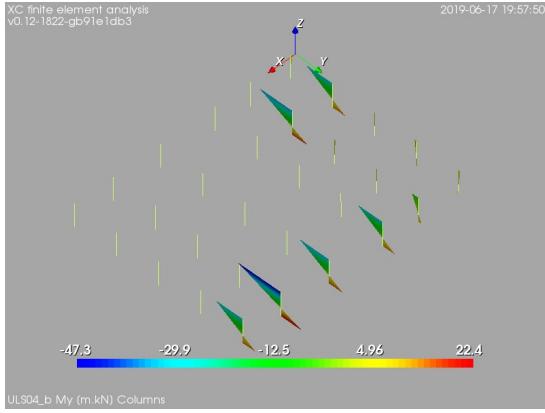


Figure 63: ULS04_b: $1.2*D + 1.6*S + 0.5*W_{NS}$. Columns, bending moment about local axis y [m.kN]

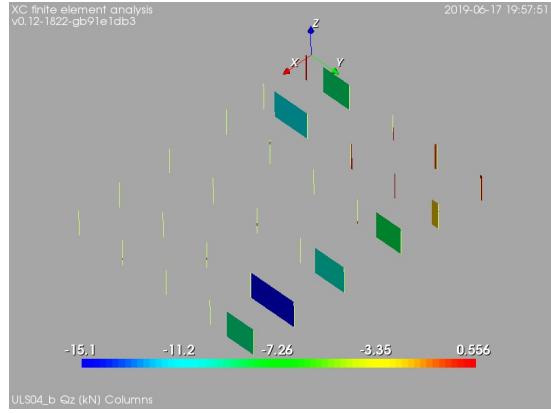


Figure 66: ULS04_b: $1.2*D + 1.6*S + 0.5*W_{NS}$. Columns, internal shear force in local direction z [kN]

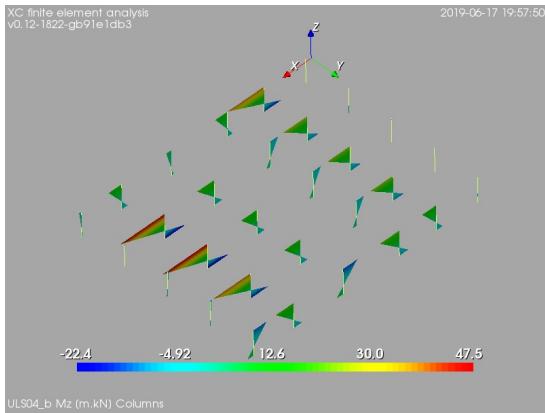


Figure 64: ULS04_b: $1.2*D + 1.6*S + 0.5*W_{NS}$. Columns, bending moment about local axis z [m.kN]

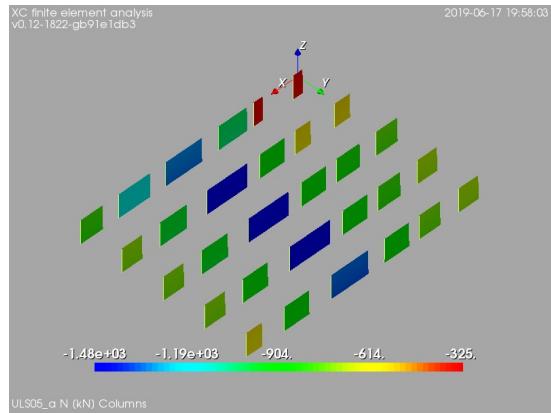


Figure 67: ULS05_a: $1.2*D + W_{WE} + 0.5*L_{ru} + L_{pu}$. Columns, internal axial force [kN]

2. ULTIMATE LIMIT STATES

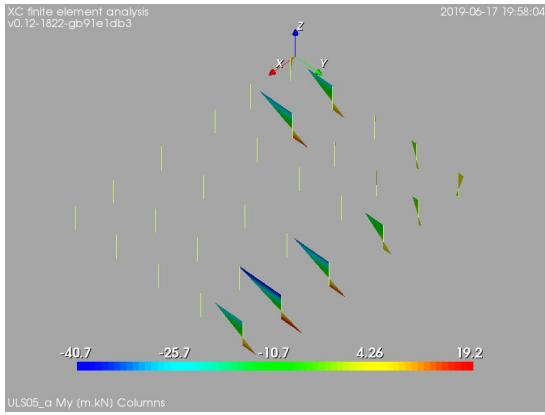


Figure 68: ULS05_a: 1.2*D + W_WE + 0.5*Lru + Lpu. Columns, bending moment about local axis y [m.kN]

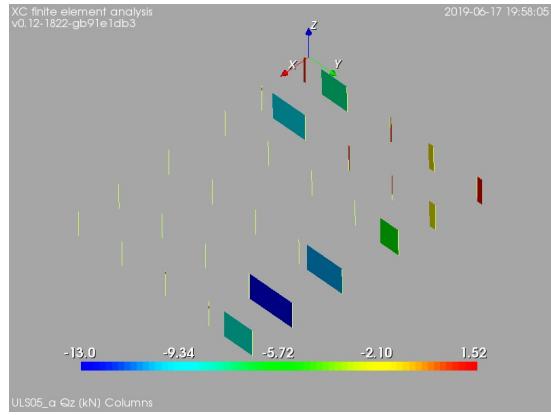


Figure 71: ULS05_a: 1.2*D + W_WE + 0.5*Lru + Lpu. Columns, internal shear force in local direction z [kN]

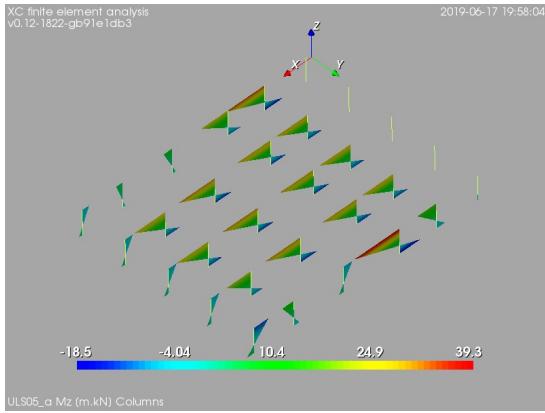


Figure 69: ULS05_a: 1.2*D + W_WE + 0.5*Lru + Lpu. Columns, bending moment about local axis z [m.kN]

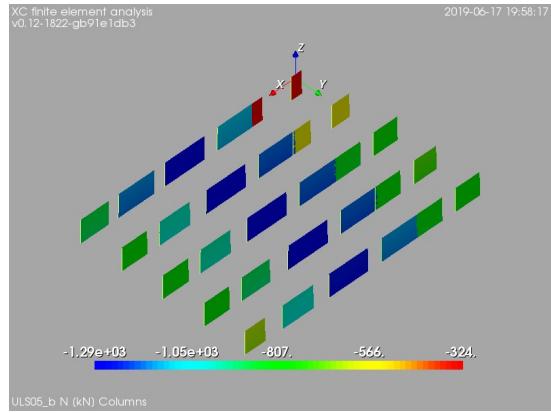


Figure 72: ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, internal axial force [kN]

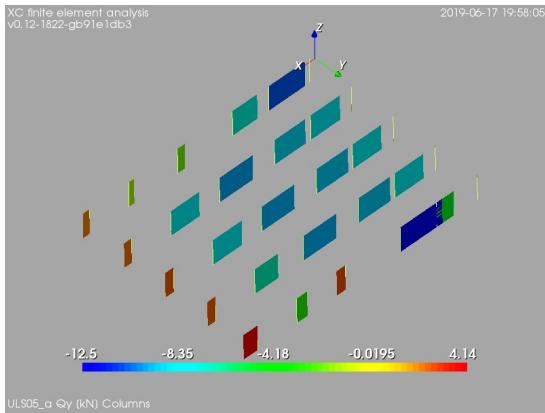


Figure 70: ULS05_a: 1.2*D + W_WE + 0.5*Lru + Lpu. Columns, internal shear force in local direction y [kN]

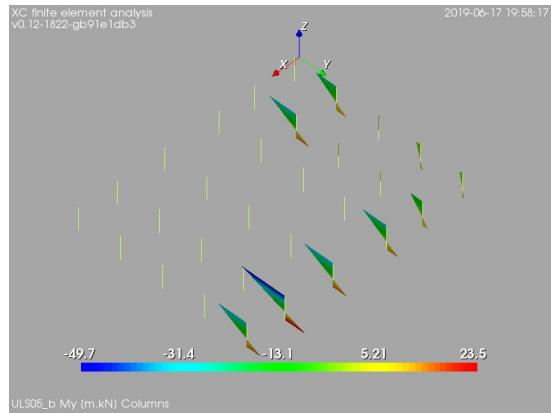


Figure 73: ULS05_b: 1.2*D + W_NS + 0.5*Lru + Lpu. Columns, bending moment about local axis y [m.kN]

2. ULTIMATE LIMIT STATES

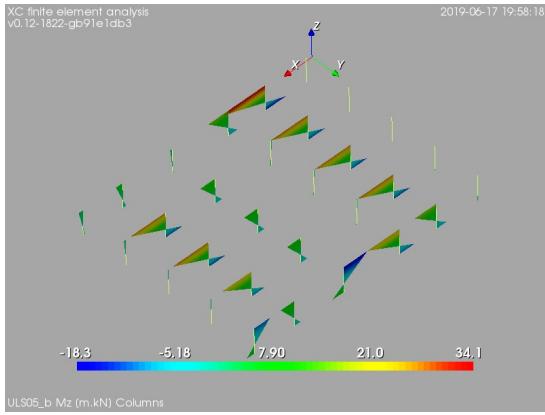


Figure 74: ULS05_b: $1.2*D + W_NS + 0.5*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]

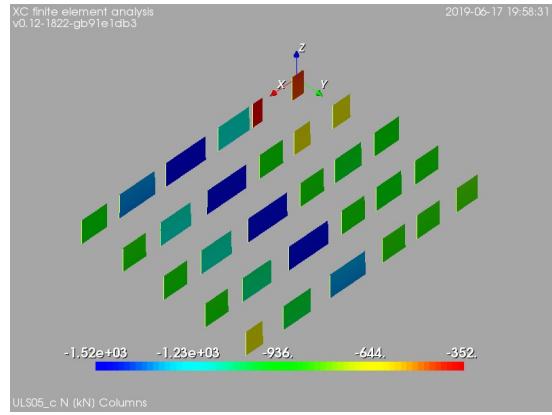


Figure 77: ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. Columns, internal axial force [kN]

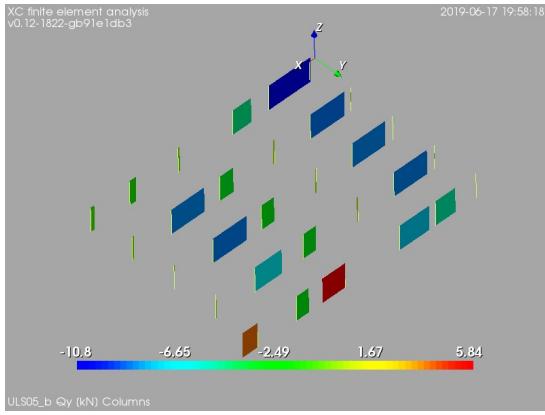


Figure 75: ULS05_b: $1.2*D + W_NS + 0.5*Lru + Lpu$. Columns, internal shear force in local direction y [kN]

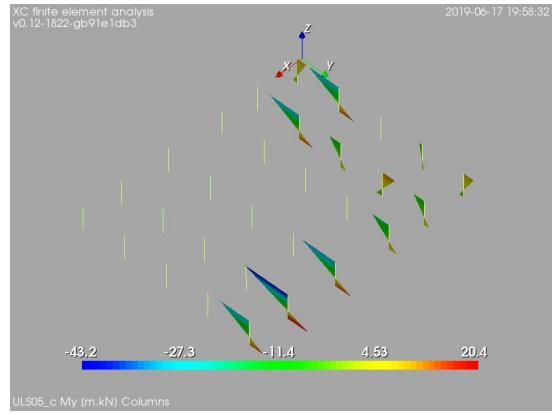


Figure 78: ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. Columns, bending moment about local axis y [m.kN]

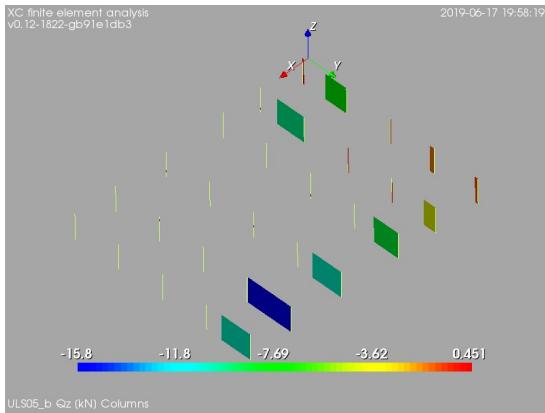


Figure 76: ULS05_b: $1.2*D + W_NS + 0.5*Lru + Lpu$. Columns, internal shear force in local direction z [kN]

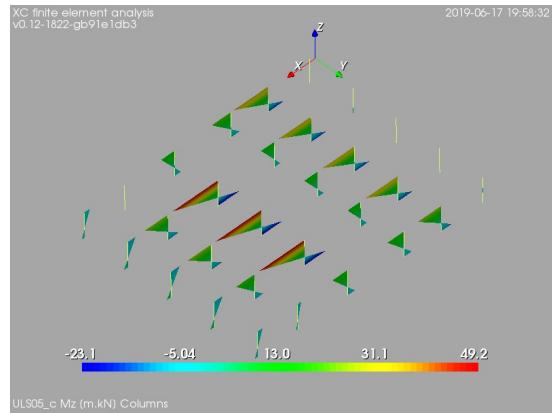


Figure 79: ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. Columns, bending moment about local axis z [m.kN]

2. ULTIMATE LIMIT STATES

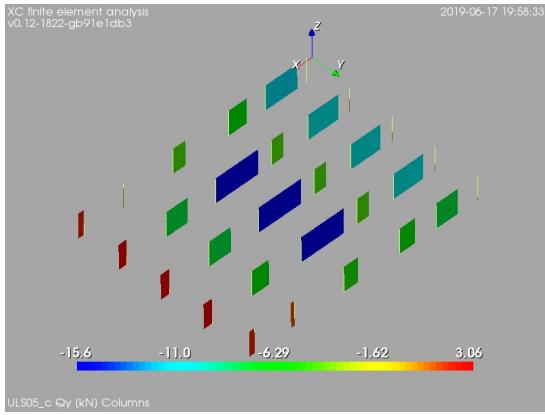


Figure 80: ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. Columns, internal shear force in local direction y [kN]

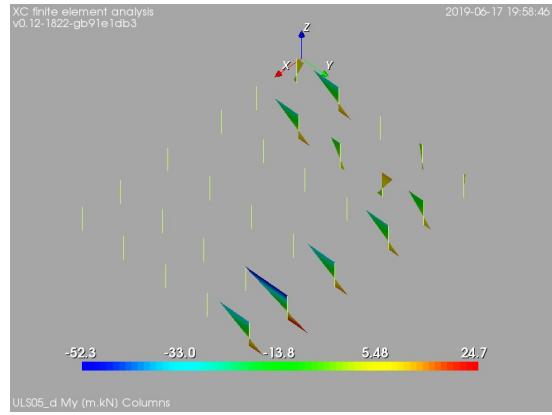


Figure 83: ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. Columns, bending moment about local axis y [m.kN]

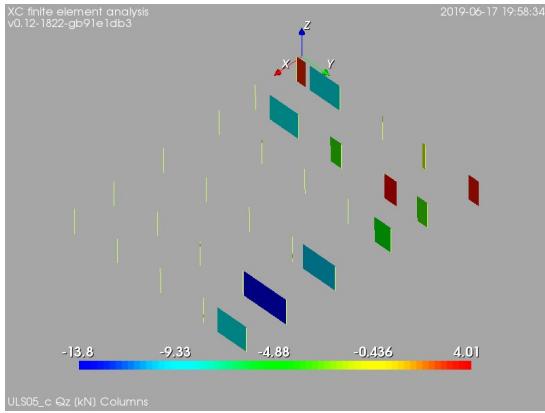


Figure 81: ULS05_c: $1.2*D + W_WE + 0.5*Lrs + Lps$. Columns, internal shear force in local direction z [kN]

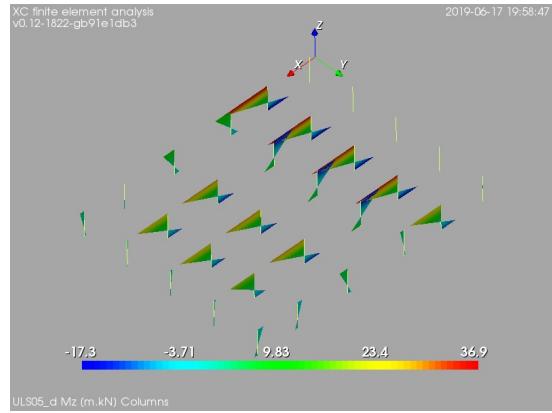


Figure 84: ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. Columns, bending moment about local axis z [m.kN]

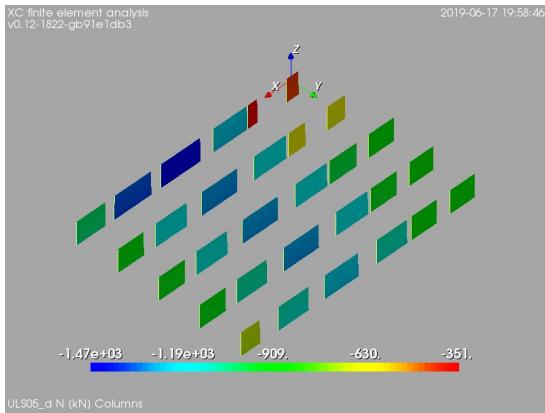


Figure 82: ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. Columns, internal axial force [kN]

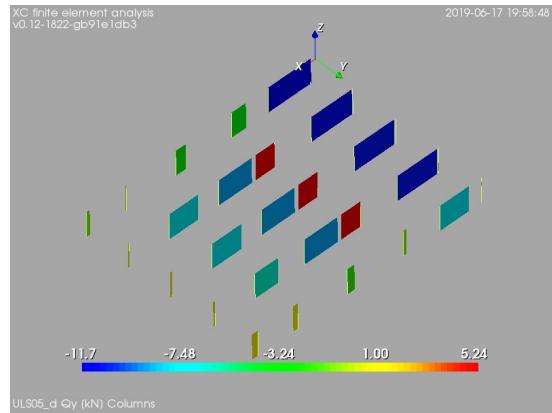


Figure 85: ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. Columns, internal shear force in local direction y [kN]

2. ULTIMATE LIMIT STATES

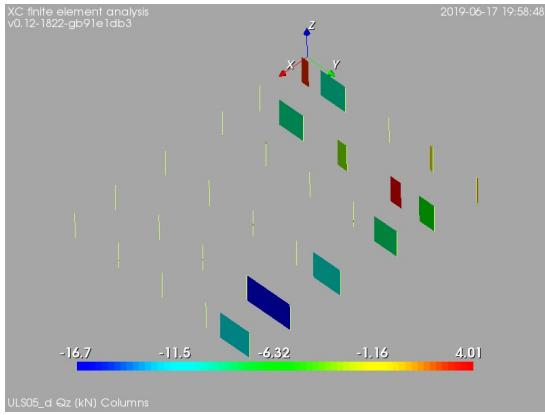


Figure 86: ULS05_d: $1.2*D + W_NS + 0.5*Lrs + Lps$. Columns, internal shear force in local direction z [kN]

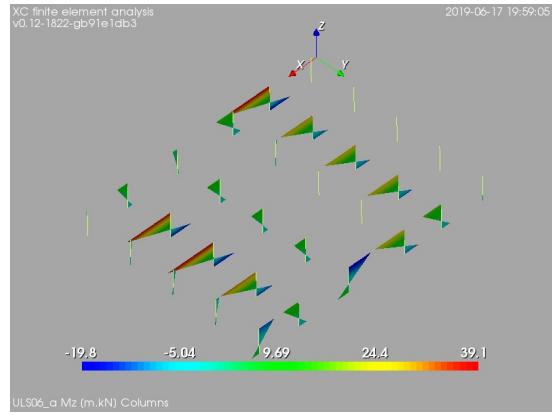


Figure 89: ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. Columns, bending moment about local axis z [m.kN]

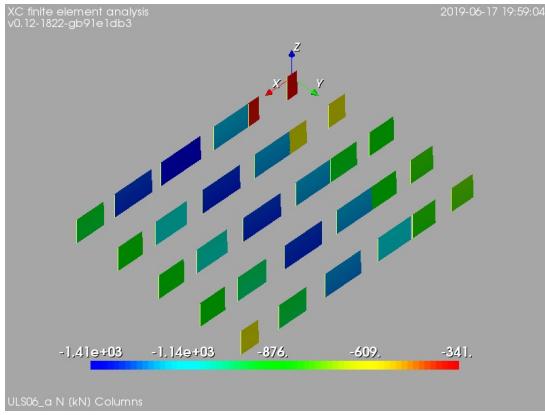


Figure 87: ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. Columns, internal axial force [kN]

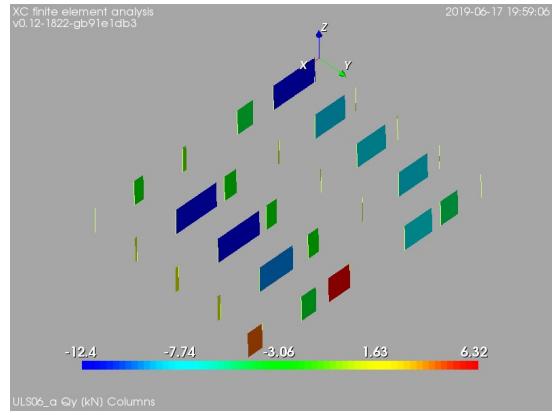


Figure 90: ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. Columns, internal shear force in local direction y [kN]

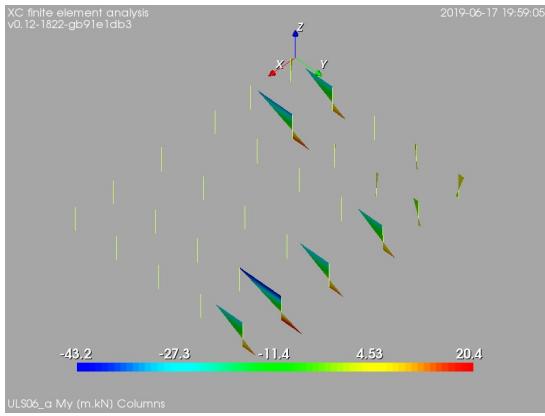


Figure 88: ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. Columns, bending moment about local axis y [m.kN]

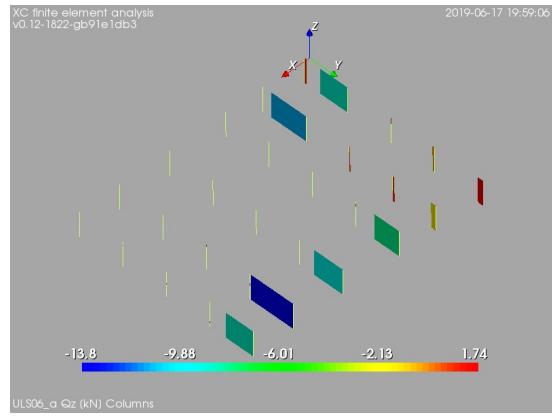


Figure 91: ULS06_a: $1.2*D + 0.5*Lru + Lpu + 0.2*S$. Columns, internal shear force in local direction z [kN]

2. ULTIMATE LIMIT STATES

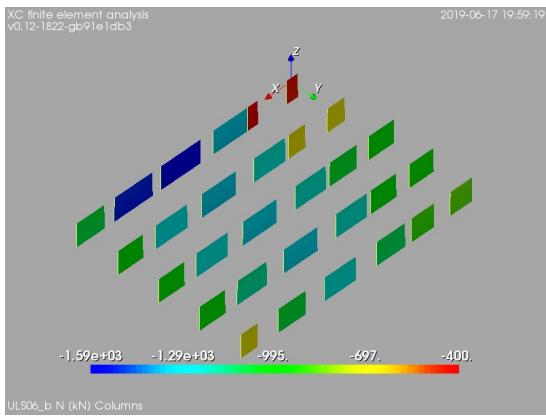


Figure 92: ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. Columns, internal axial force [kN]

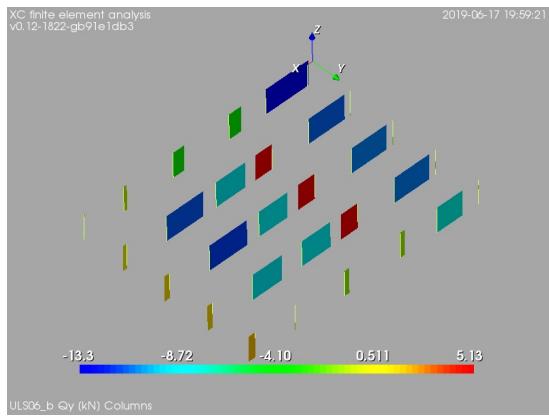


Figure 95: ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. Columns, internal shear force in local direction y [kN]

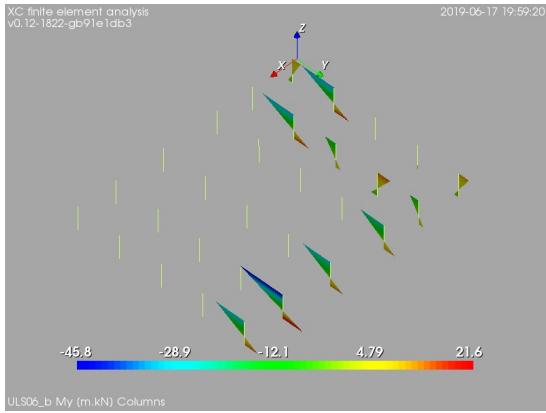


Figure 93: ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. Columns, bending moment about local axis y [m.kN]

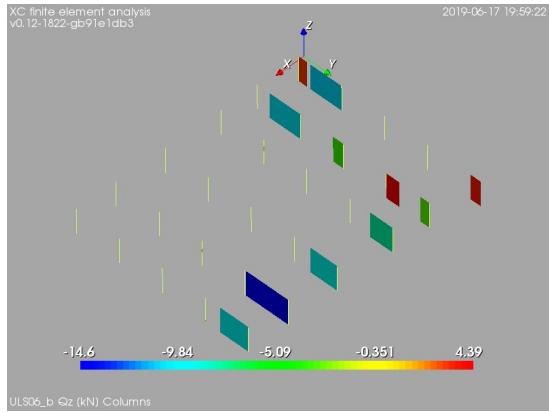


Figure 96: ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. Columns, internal shear force in local direction z [kN]

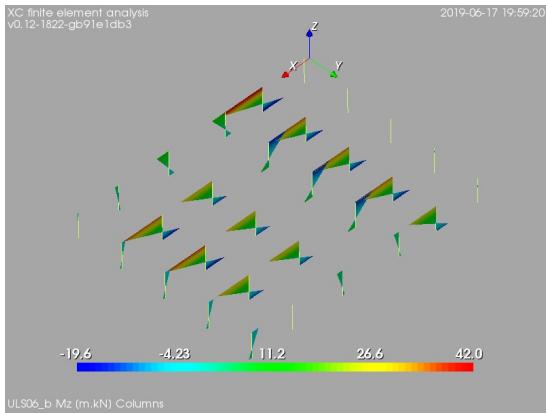


Figure 94: ULS06_b: $1.2*D + 0.5*Lrs + Lps + 0.2*S$. Columns, bending moment about local axis z [m.kN]

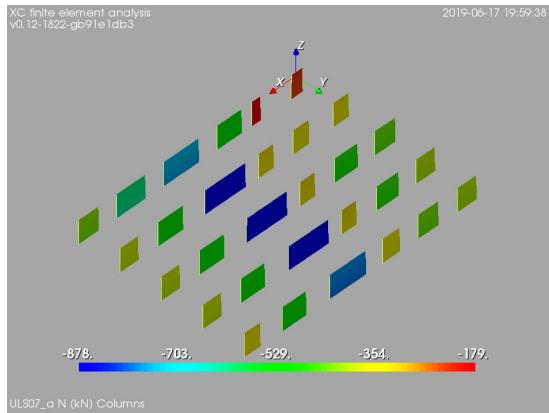


Figure 97: ULS07_a: $0.9*D + W_WE$. Columns, internal axial force [kN]

2. ULTIMATE LIMIT STATES

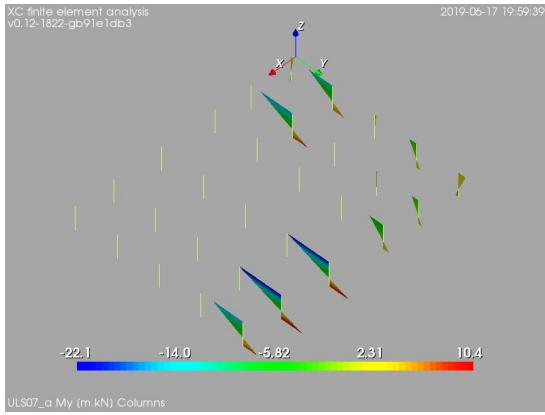


Figure 98: ULS07_a: 0.9*D + W_WE. Columns, bending moment about local axis y [m.kN]

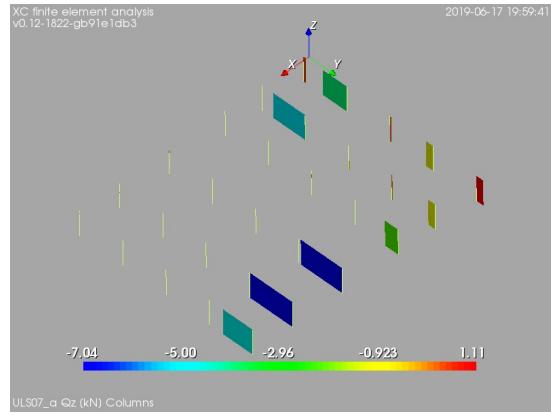


Figure 101: ULS07_a: 0.9*D + W_WE. Columns, internal shear force in local direction z [kN]

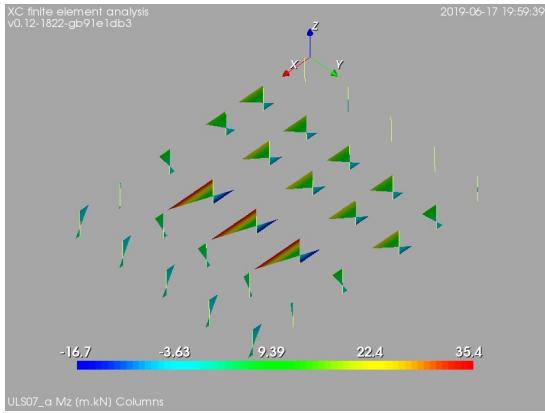


Figure 99: ULS07_a: 0.9*D + W_WE. Columns, bending moment about local axis z [m.kN]

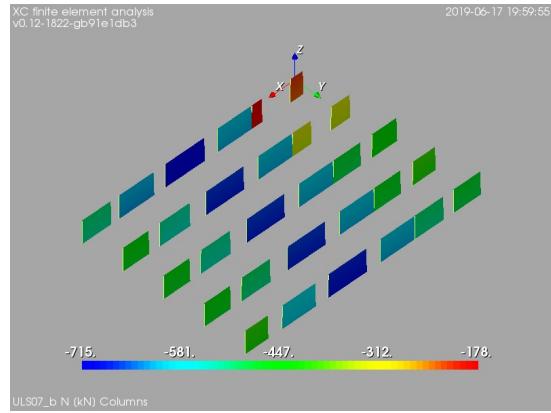


Figure 102: ULS07_b: 0.9*D + W_NS. Columns, internal axial force [kN]

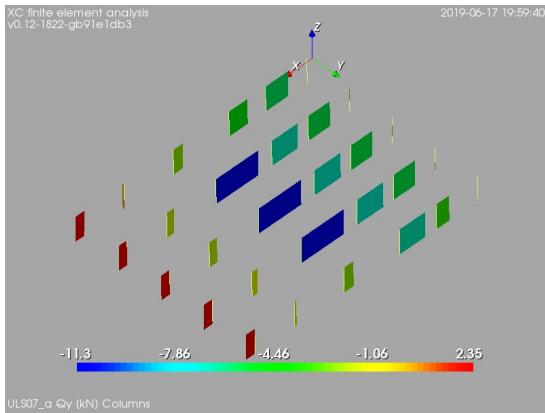


Figure 100: ULS07_a: 0.9*D + W_WE. Columns, internal shear force in local direction y [kN]

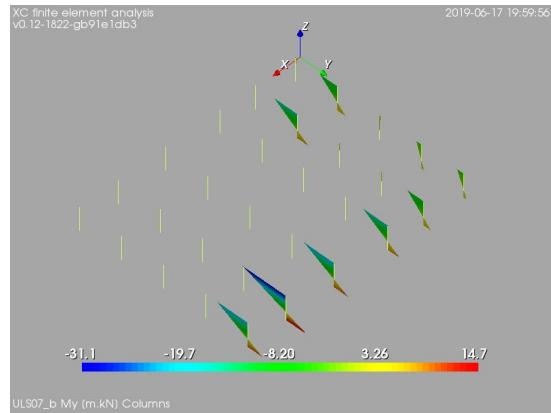


Figure 103: ULS07_b: 0.9*D + W_NS. Columns, bending moment about local axis y [m.kN]

2. ULTIMATE LIMIT STATES

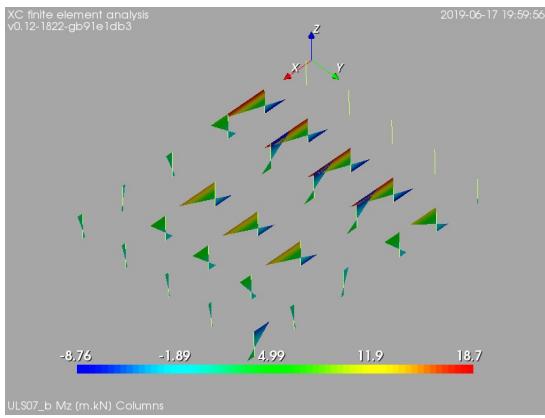


Figure 104: ULS07_b: 0.9*D + W_NS. Columns, bending moment about local axis z [m.kN]

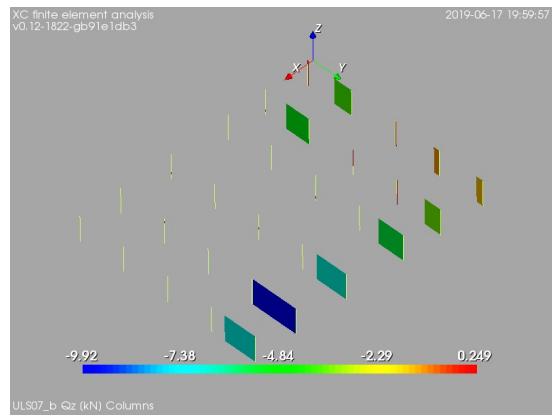


Figure 106: ULS07_b: 0.9*D + W_NS. Columns, internal shear force in local direction z [kN]

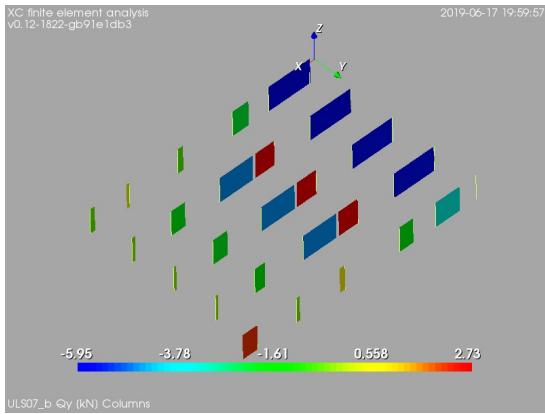


Figure 105: ULS07_b: 0.9*D + W_NS. Columns, internal shear force in local direction y [kN]

3 Serviceability Limit States

3.1 Precast beams. SLS internal forces

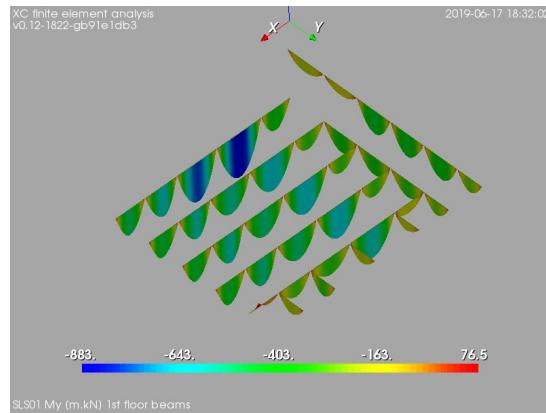


Figure 107: SLS01: 1.0*D. 1st floor beams, bending moment about local axis y [m.kN]

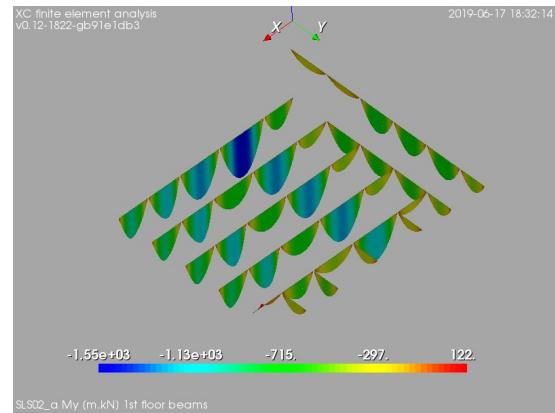


Figure 109: SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. 1st floor beams, bending moment about local axis y [m.kN]

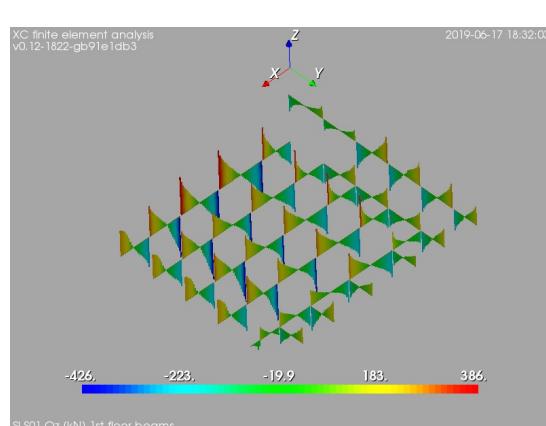


Figure 108: SLS01: 1.0*D. 1st floor beams, internal shear force in local direction z [kN]

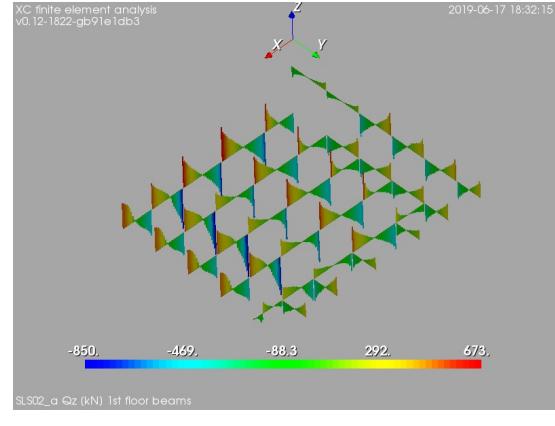


Figure 110: SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. 1st floor beams, internal shear force in local direction z [kN]

3. SERVICEABILITY LIMIT STATES

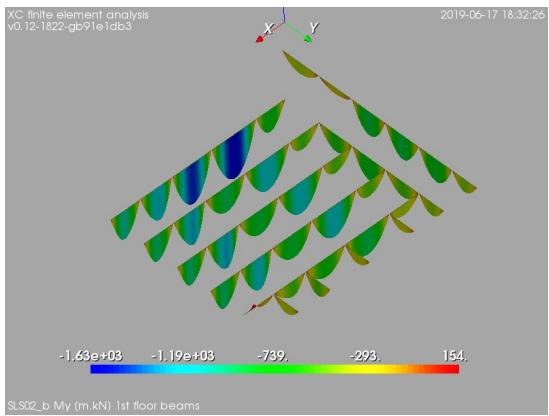


Figure 111: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. 1st floor beams, bending moment about local axis y [m.kN]

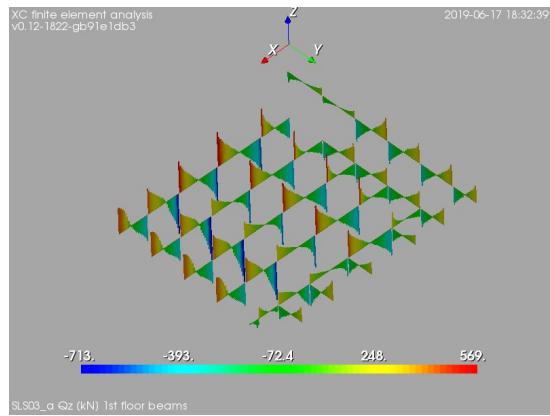


Figure 114: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. 1st floor beams, internal shear force in local direction z [kN]

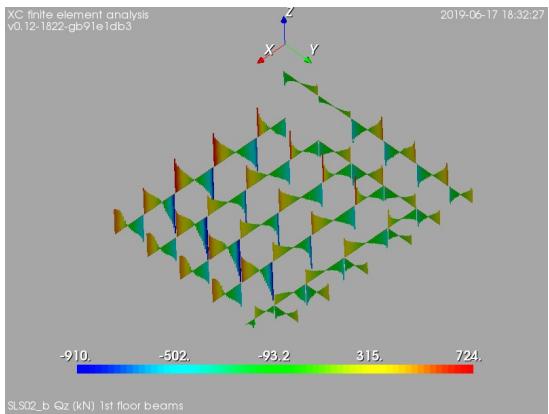


Figure 112: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. 1st floor beams, internal shear force in local direction z [kN]

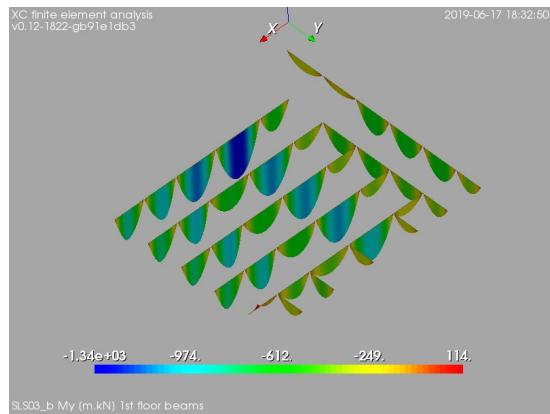


Figure 115: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. 1st floor beams, bending moment about local axis y [m.kN]

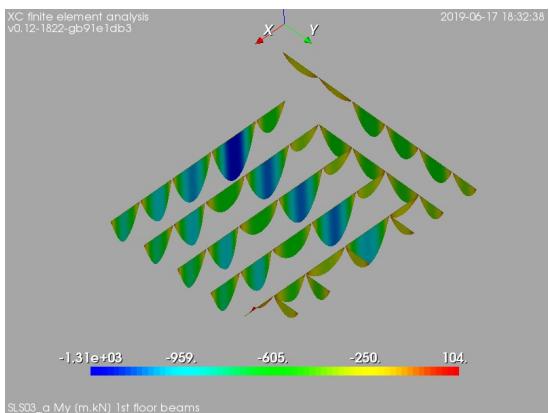


Figure 113: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. 1st floor beams, bending moment about local axis y [m.kN]

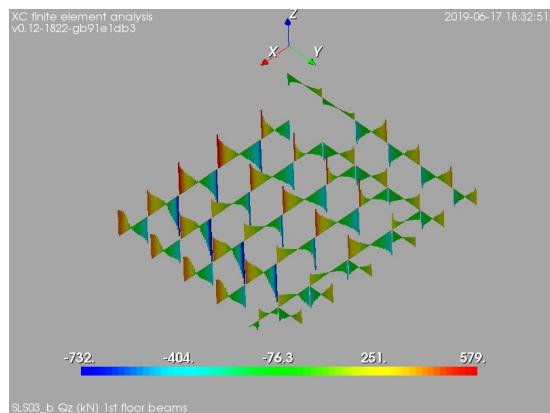


Figure 116: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. 1st floor beams, internal shear force in local direction z [kN]

3. SERVICEABILITY LIMIT STATES

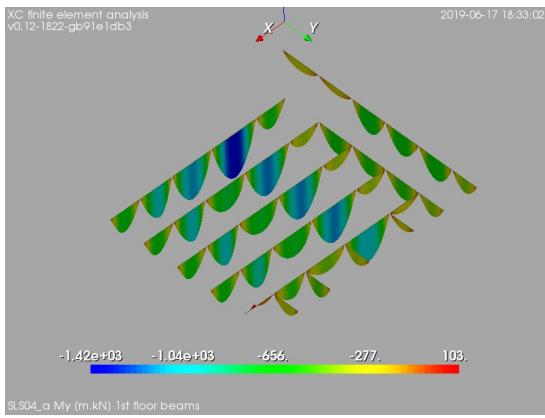


Figure 117: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. 1st floor beams, bending moment about local axis y [m.kN]

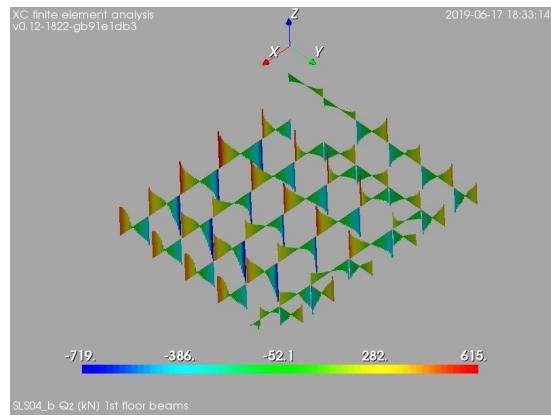


Figure 120: SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. 1st floor beams, internal shear force in local direction z [kN]

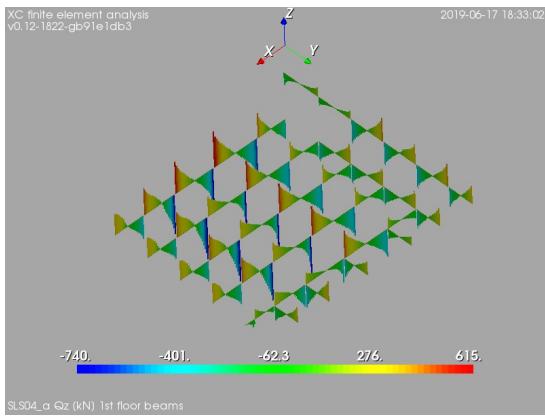


Figure 118: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. 1st floor beams, internal shear force in local direction z [kN]

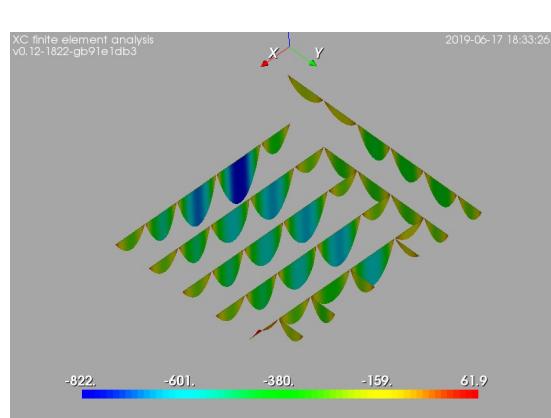


Figure 121: SLS05_a: $1.0*D + W_WE$. 1st floor beams, bending moment about local axis y [m.kN]

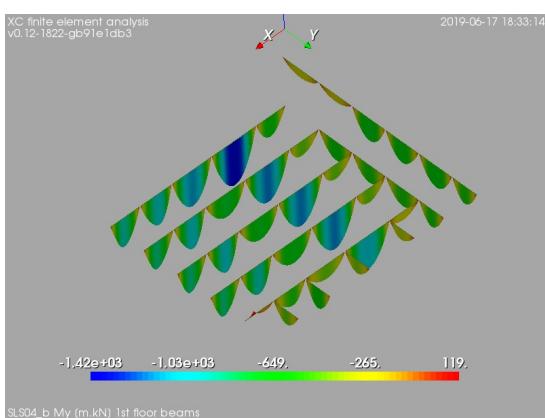


Figure 119: SLS04_b: $1.0*D + W_NS + 1.0*Lru + Lpu$. 1st floor beams, bending moment about local axis y [m.kN]

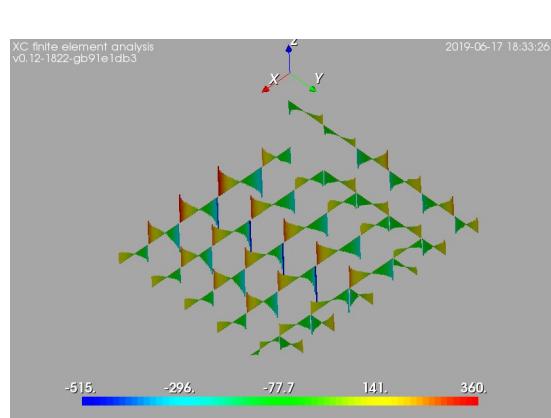


Figure 122: SLS05_a: $1.0*D + W_WE$. 1st floor beams, internal shear force in local direction z [kN]

3. SERVICEABILITY LIMIT STATES

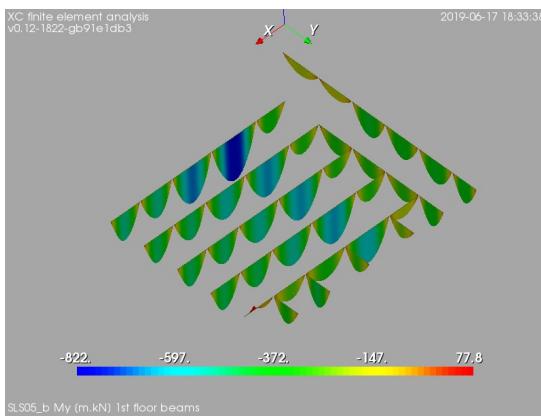


Figure 123: SLS05_b: 1.0*D + W_NS. 1st floor beams, bending moment about local axis y [m.kN]

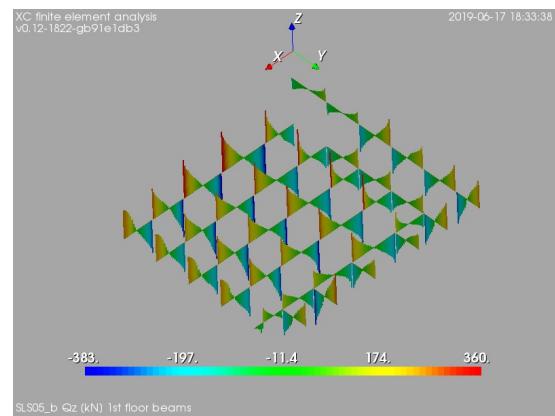


Figure 124: SLS05_b: 1.0*D + W_NS. 1st floor beams, internal shear force in local direction z [kN]

3.2 Precast columns. SLS internal forces

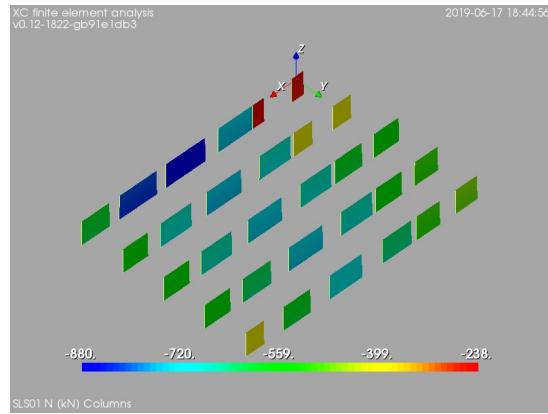


Figure 125: SLS01: 1.0*D. Columns, internal axial force [kN]

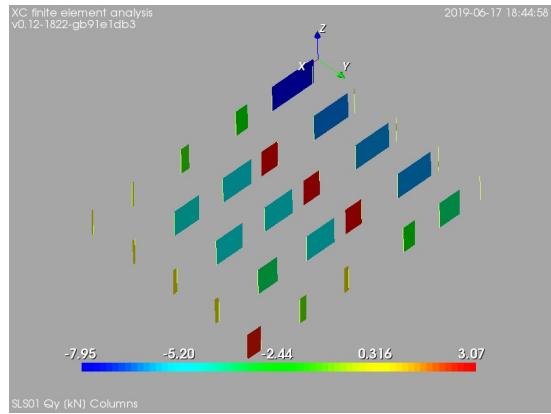


Figure 128: SLS01: 1.0*D. Columns, internal shear force in local direction y [kN]

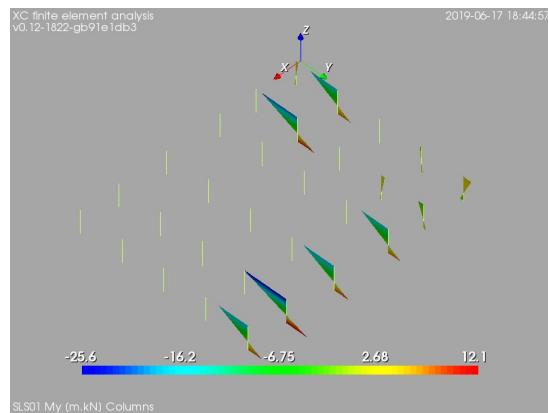


Figure 126: SLS01: 1.0*D. Columns, bending moment about local axis y [m.kN]

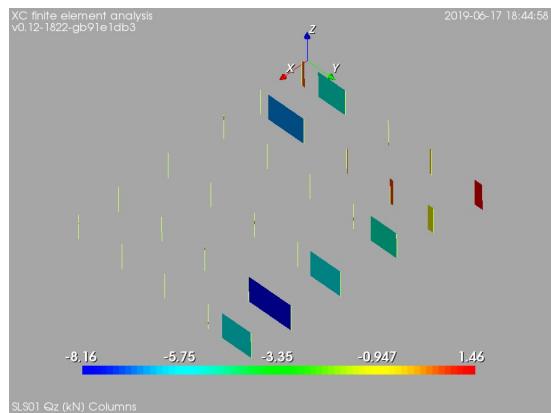


Figure 129: SLS01: 1.0*D. Columns, internal shear force in local direction z [kN]

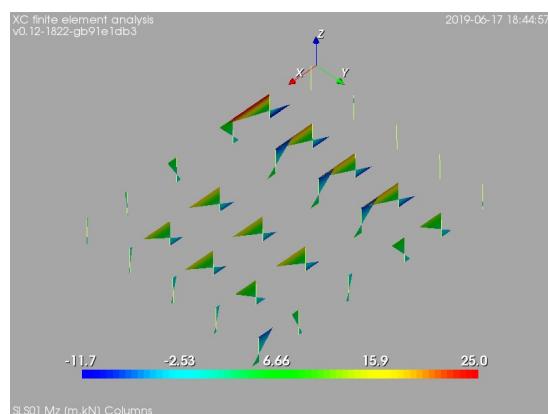


Figure 127: SLS01: 1.0*D. Columns, bending moment about local axis z [m.kN]

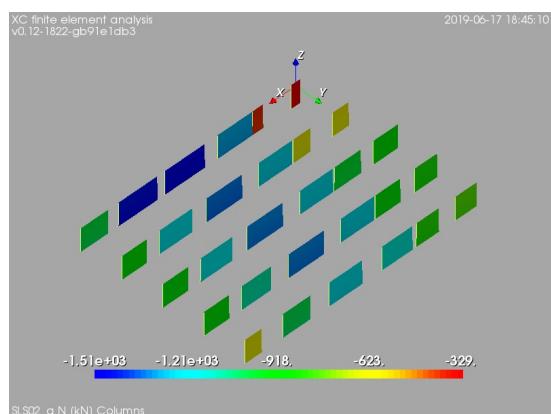


Figure 130: SLS02_a: 1.0*D + 1.0*Lru + Lpu + 0.3*S. Columns, internal axial force [kN]

3. SERVICEABILITY LIMIT STATES

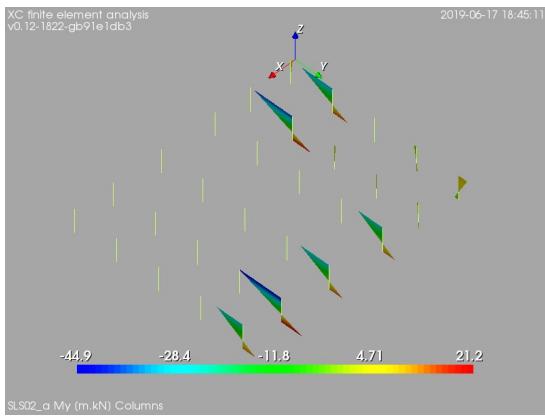


Figure 131: SLS02_a: $1.0*D + 1.0*Lru + Lpu + 0.3*S$.
Columns, bending moment about local axis y [m.kN]

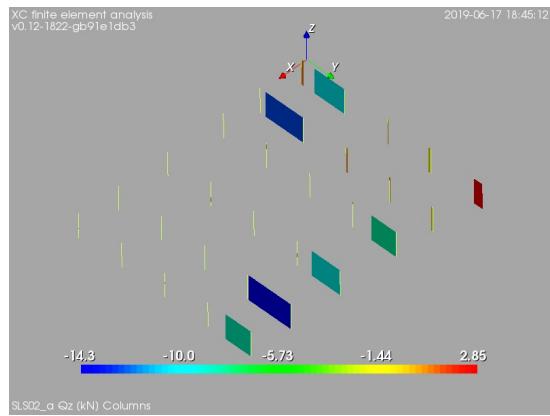


Figure 134: SLS02_a: $1.0*D + 1.0*Lru + Lpu + 0.3*S$.
Columns, internal shear force in local direction z [kN]

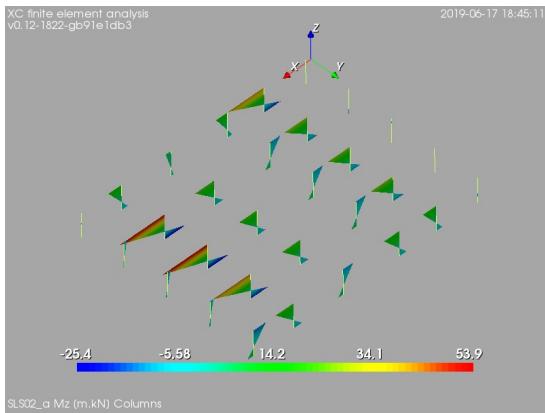


Figure 132: SLS02_a: $1.0*D + 1.0*Lru + Lpu + 0.3*S$.
Columns, bending moment about local axis z [m.kN]

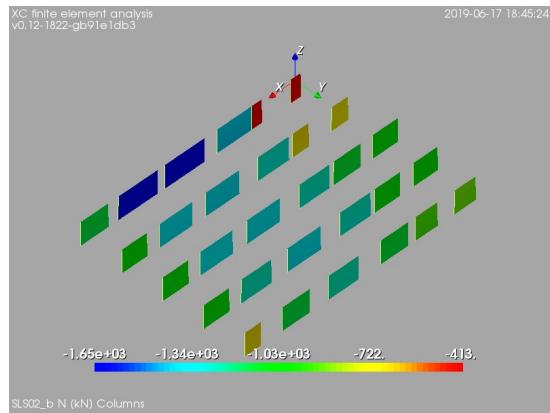


Figure 135: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$.
Columns, internal axial force [kN]

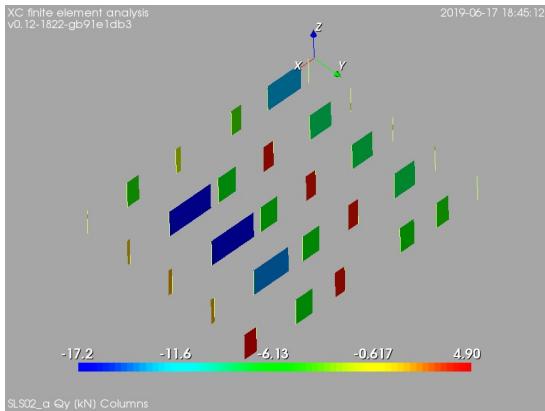


Figure 133: SLS02_a: $1.0*D + 1.0*Lru + Lpu + 0.3*S$.
Columns, internal shear force in local direction y [kN]

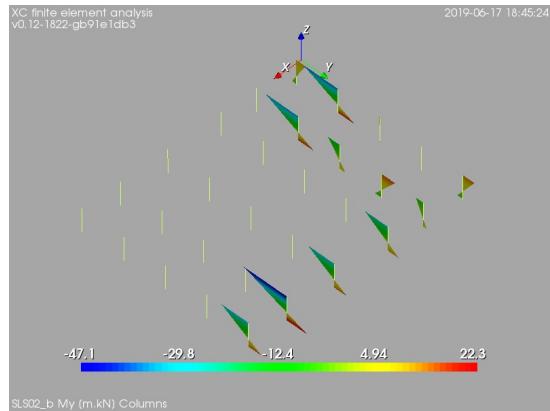


Figure 136: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$.
Columns, bending moment about local axis y [m.kN]

3. SERVICEABILITY LIMIT STATES

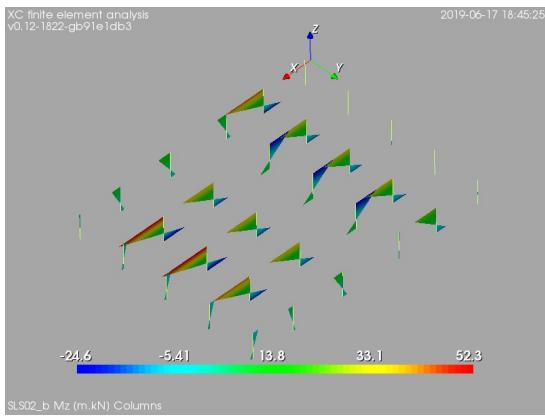


Figure 137: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, bending moment about local axis z [m.kN]

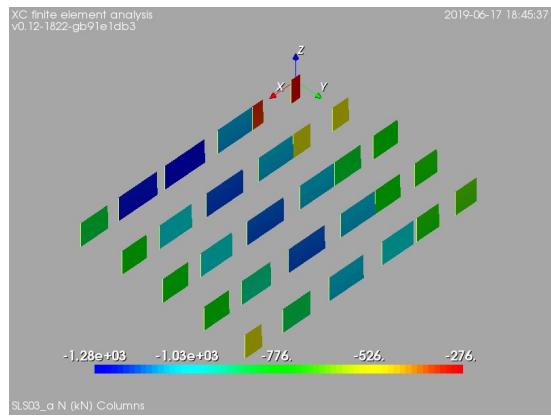


Figure 140: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, internal axial force [kN]

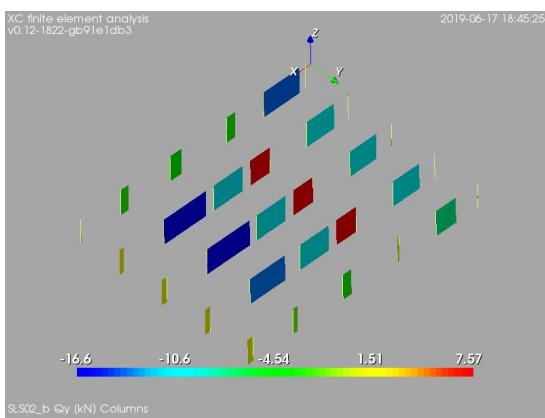


Figure 138: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, internal shear force in local direction y [kN]

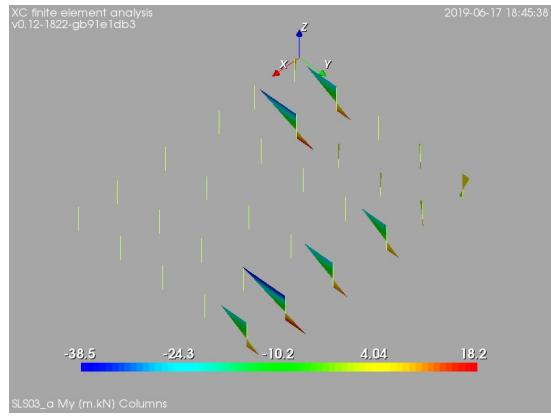


Figure 141: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, bending moment about local axis y [m.kN]

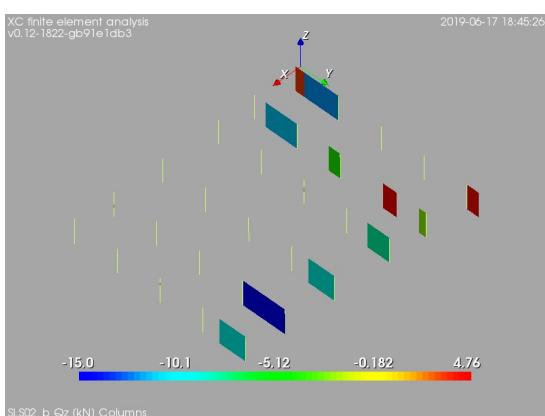


Figure 139: SLS02_b: $1.0*D + 1.0*Lrs + Lps + 0.3*S$. Columns, internal shear force in local direction z [kN]

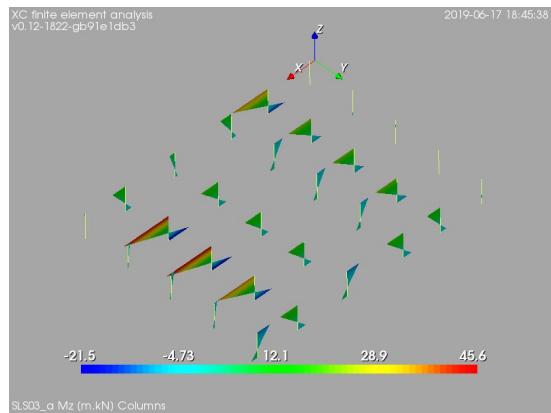


Figure 142: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, bending moment about local axis z [m.kN]

3. SERVICEABILITY LIMIT STATES

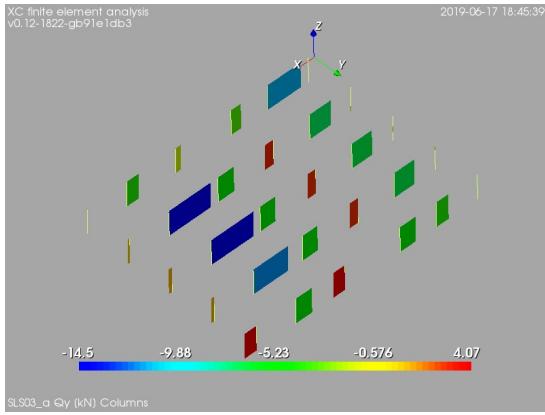


Figure 143: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, internal shear force in local direction y [kN]

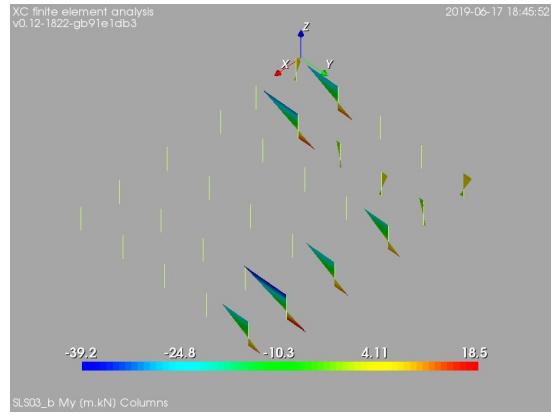


Figure 146: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, bending moment about local axis y [m.kN]

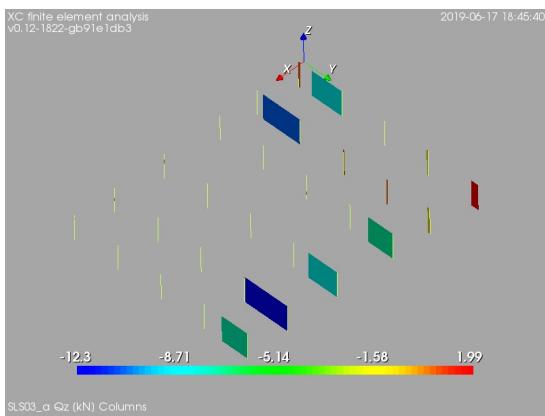


Figure 144: SLS03_a: $1.0*D + 1.0*S + 0.3*Lru + 0.3*Lpu$. Columns, internal shear force in local direction z [kN]

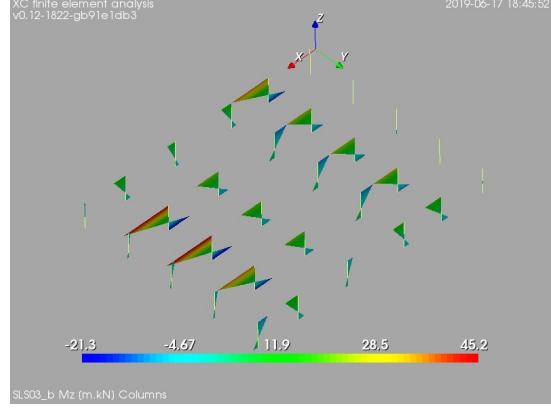


Figure 147: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, bending moment about local axis z [m.kN]

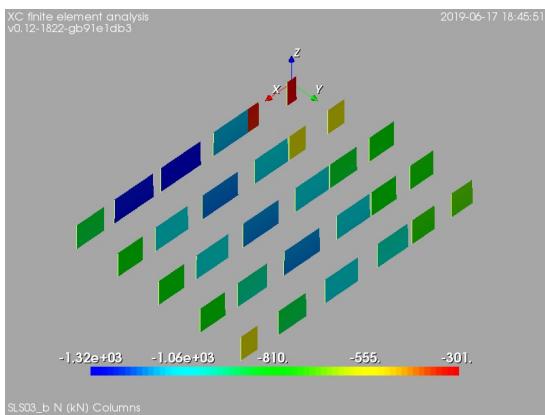


Figure 145: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, internal axial force [kN]

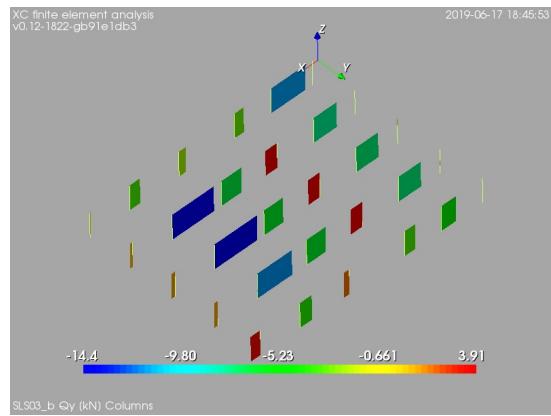


Figure 148: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, internal shear force in local direction y [kN]

3. SERVICEABILITY LIMIT STATES

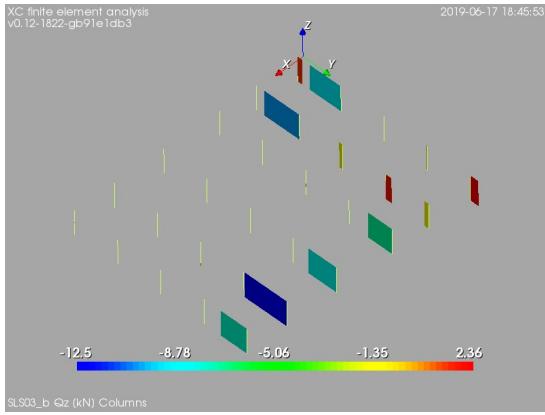


Figure 149: SLS03_b: $1.0*D + 1.0*S + 0.3*Lrs + 0.3*Lps$. Columns, internal shear force in local direction z [kN]

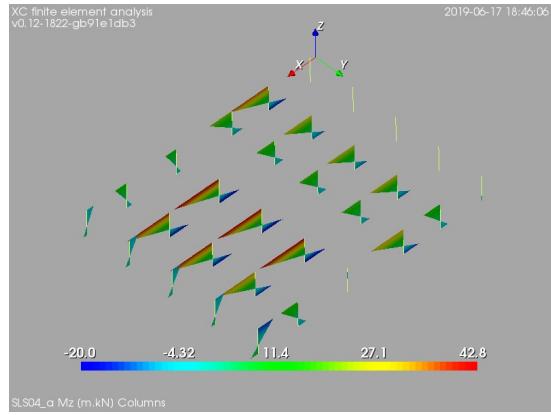


Figure 152: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, bending moment about local axis z [m.kN]

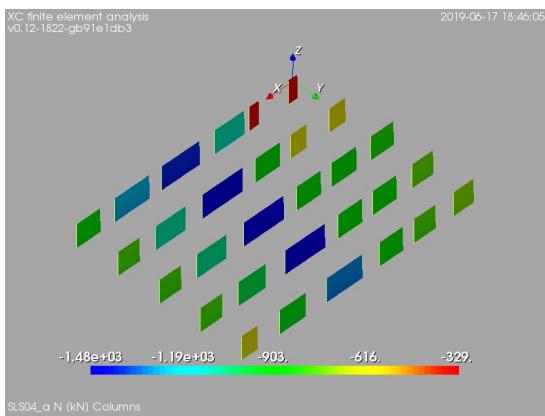


Figure 150: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, internal axial force [kN]

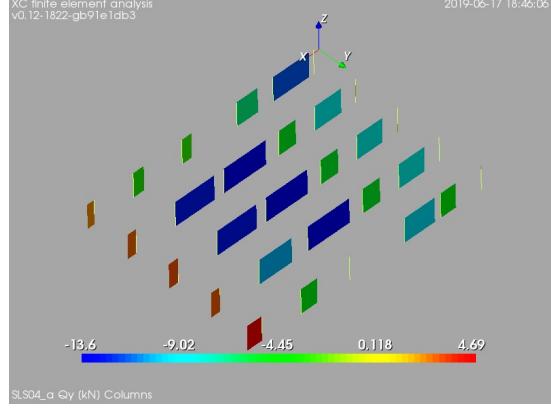


Figure 153: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, internal shear force in local direction y [kN]

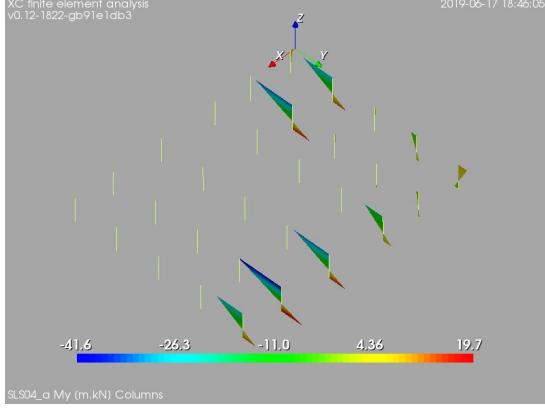


Figure 151: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, bending moment about local axis y [m.kN]

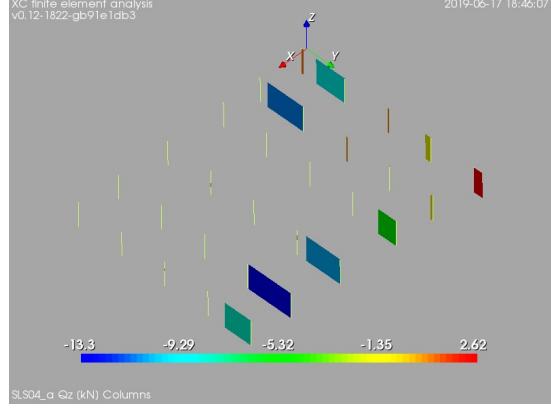


Figure 154: SLS04_a: $1.0*D + W_WE + 1.0*Lru + Lpu$. Columns, internal shear force in local direction z [kN]

3. SERVICEABILITY LIMIT STATES

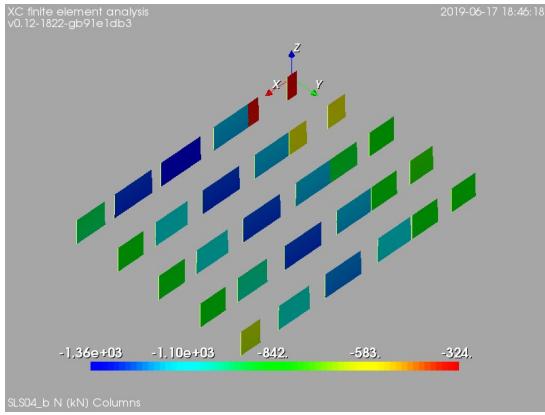


Figure 155: SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. Columns, internal axial force [kN]

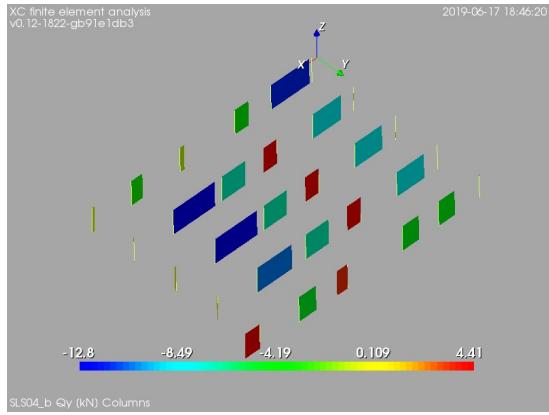


Figure 158: SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. Columns, internal shear force in local direction y [kN]

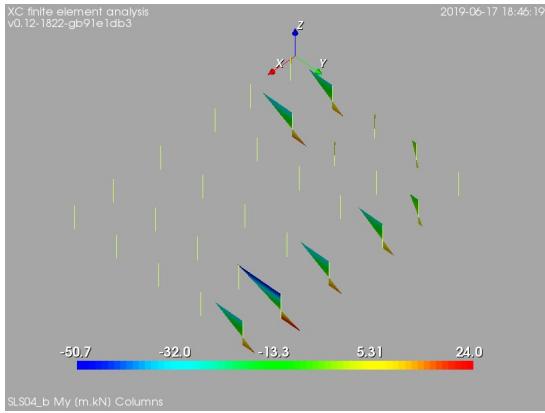


Figure 156: SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. Columns, bending moment about local axis y [m.kN]

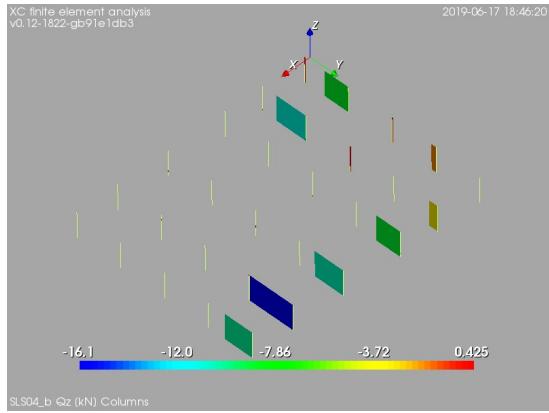


Figure 159: SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. Columns, internal shear force in local direction z [kN]

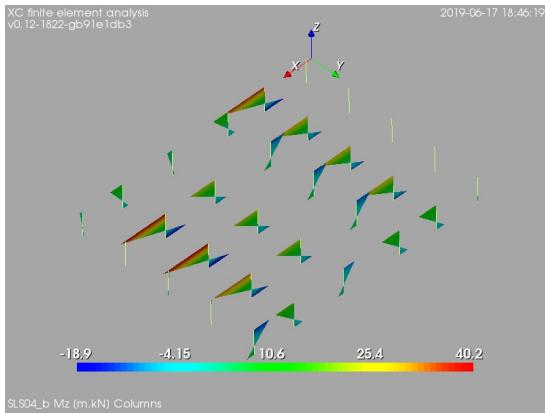


Figure 157: SLS04_b: 1.0*D + W_NS + 1.0*Lru + Lpu. Columns, bending moment about local axis z [m.kN]

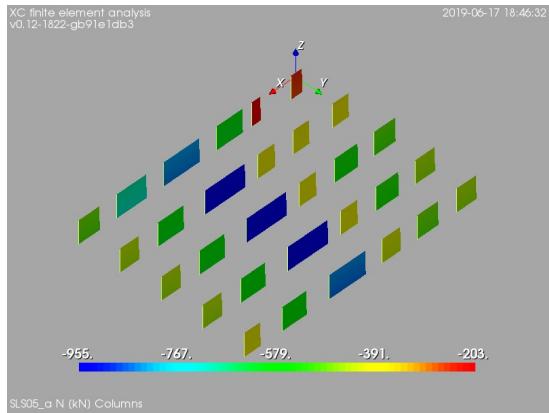


Figure 160: SLS05_a: 1.0*D + W_WE. Columns, internal axial force [kN]

3. SERVICEABILITY LIMIT STATES

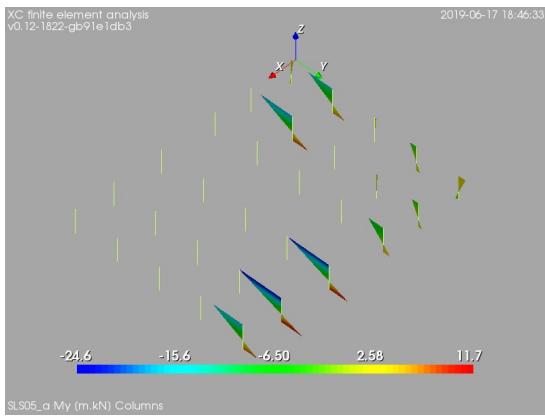


Figure 161: SLS05_a: 1.0*D + W_WE. Columns, bending moment about local axis y [m.kN]

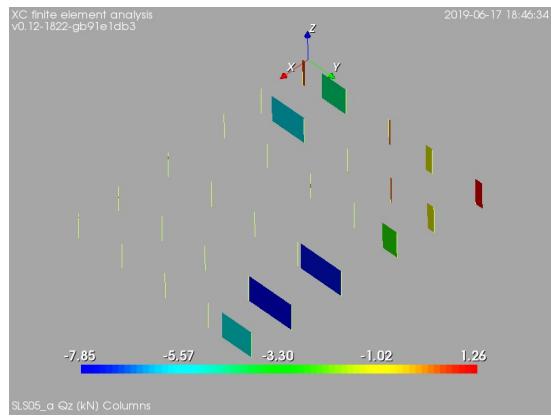


Figure 164: SLS05_a: 1.0*D + W_WE. Columns, internal shear force in local direction z [kN]

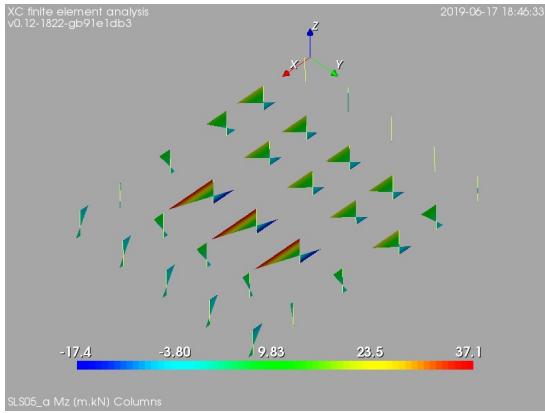


Figure 162: SLS05_a: 1.0*D + W_WE. Columns, bending moment about local axis z [m.kN]

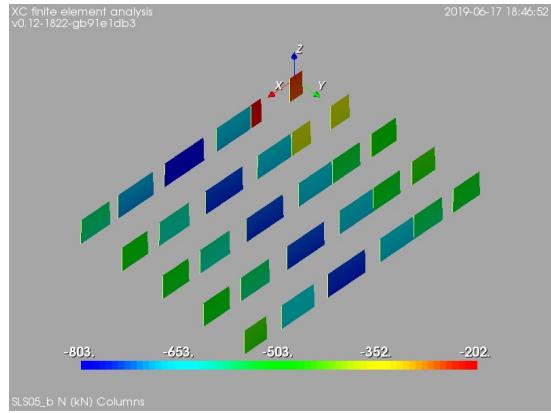


Figure 165: SLS05_b: 1.0*D + W_NS. Columns, internal axial force [kN]

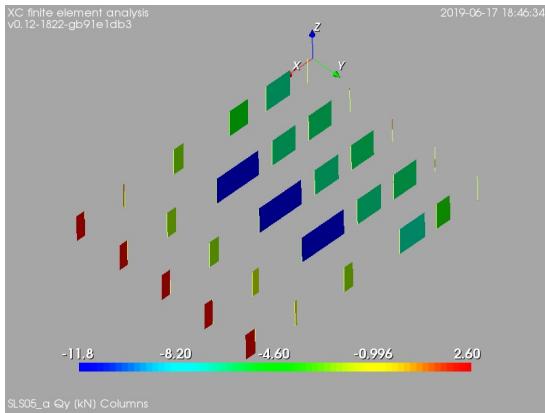


Figure 163: SLS05_a: 1.0*D + W_WE. Columns, internal shear force in local direction y [kN]

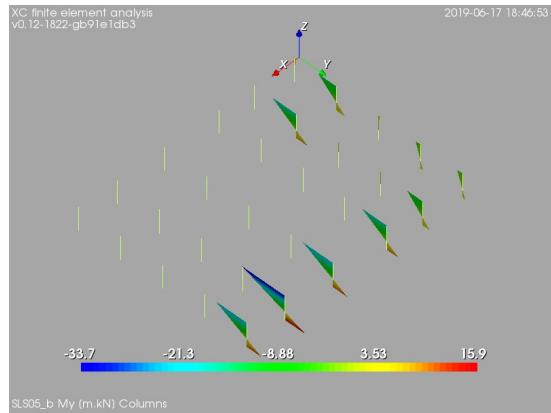


Figure 166: SLS05_b: 1.0*D + W_NS. Columns, bending moment about local axis y [m.kN]

3. SERVICEABILITY LIMIT STATES

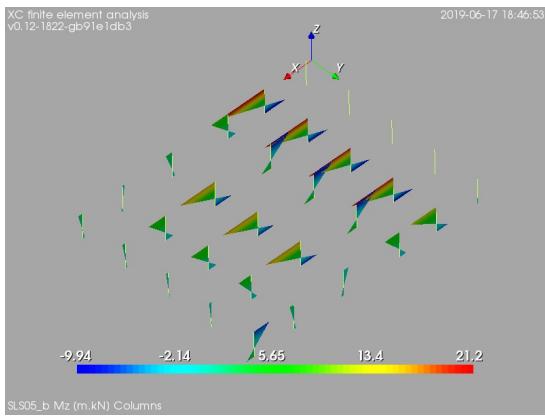


Figure 167: SLS05_b: 1.0*D + W_NS. Columns, bending moment about local axis z [m.kN]

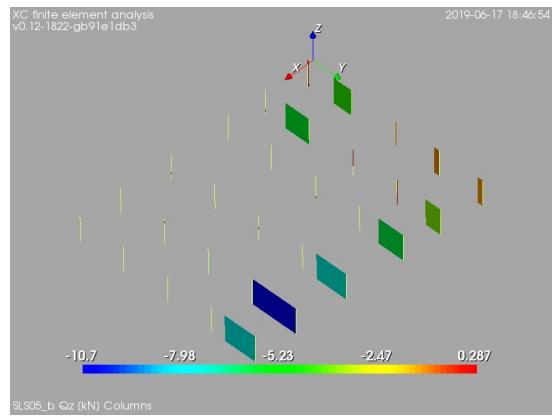


Figure 169: SLS05_b: 1.0*D + W_NS. Columns, internal shear force in local direction z [kN]

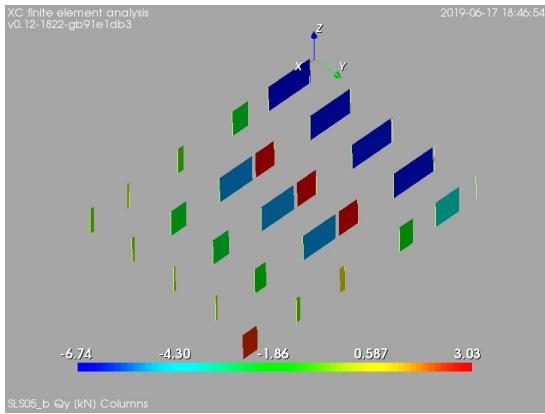


Figure 168: SLS05_b: 1.0*D + W_NS. Columns, internal shear force in local direction y [kN]