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Structural Analysis

CLIENT

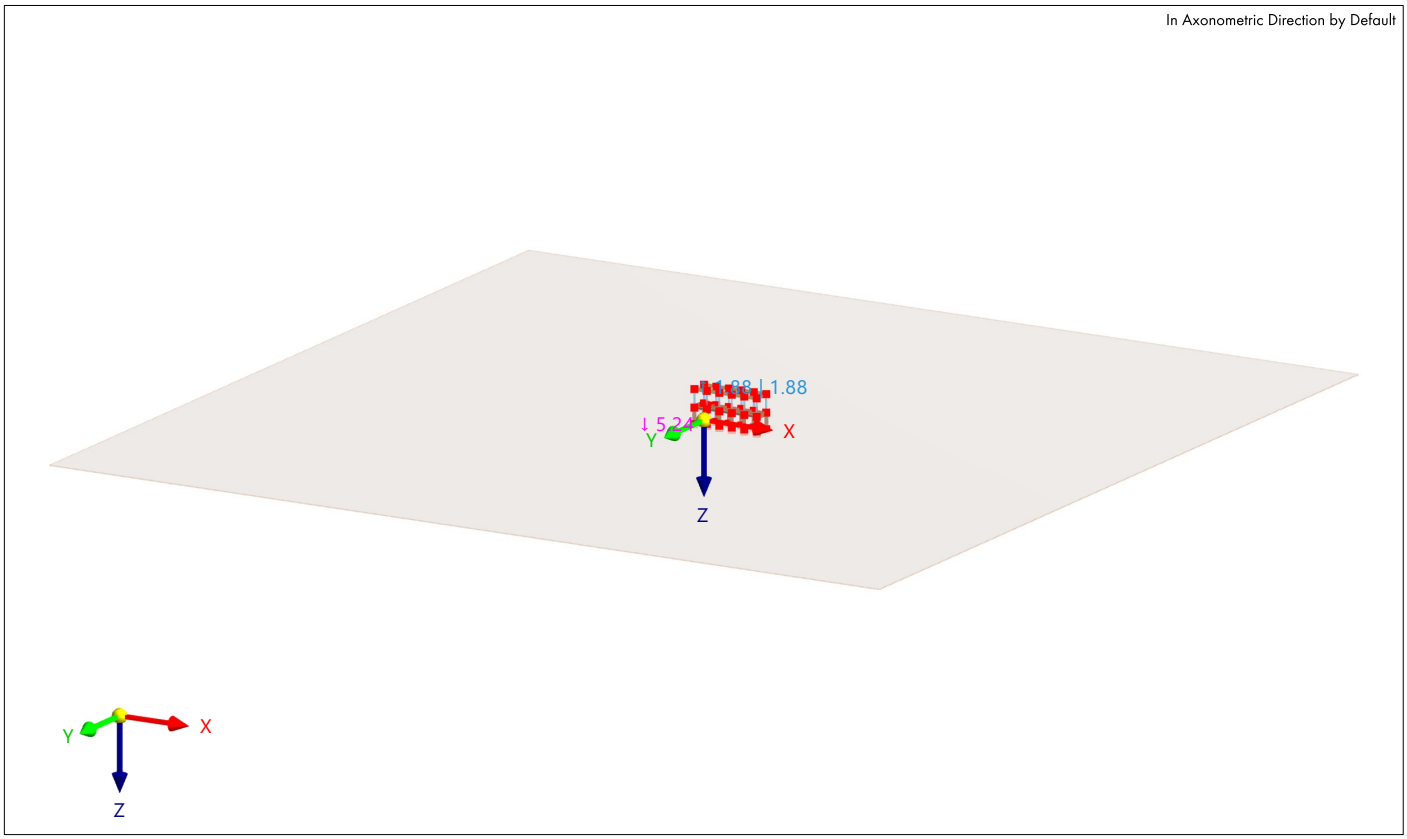
Karel Hlavacek

CREATED BY

PROJECT

Chapters

MODEL



CONTENTS

A MODEL - LOCATION

Location	Country	:	--
	Street	:	
	Zip / Postal code	:	
	City	:	
	State	:	
	Latitude	:	deg
	Longitude	:	deg
	Altitude	:	m

B MODEL - PARAMETERS

Model ID	**{c2cf035c-b7e3-4a35-a477-29a10016b498}** Unique model identifier
Project ID	**{8096c5bb-f640-44a6-9f7e-a83810bfedba}** Unique project identifier
Client name	**Karel Hlavacek**
My new parameter	**not sure what to put here** not sure what to put here too
My new parameter	**not sure what to put here** not sure what to put here too
My new parameter	**not sure what to put here** not sure what to put here too

C MODEL - BASE DATA

Main	Model name	:	EmptyWithReport.rf6
	Model description	:	
	Type of model	:	3D

Add-ons	Dynamic Analysis - Modal Analysis
	Dynamic Analysis - Response Spectrum Analysis
	Concrete Design
	Steel Design
	Timber Design
	Aluminum Design

Standards I	Load case classification & combination wizard	:	EN 1990 | Base + Timber CEN | 2010-04
	Load Wizard	:	EN 1991 CEN | 2015-09
	Standard group for concrete design	:	EN 1992 CEN | 2014-11
	Standard group for steel design	:	EN 1993 CEN | 2015-06
	Standard group for timber design	:	EN 1995 CEN | 2014-05
	Standard group for aluminum design	:	EN 1999 CEN | 2013-12

Standards II	Standard group for geotechnical analysis	:	EN 1997 CEN | 2004
	Standard group for dynamic analysis	:	EN 1998 CEN | 2013-05

Settings & Options	Acceleration of gravity / mass conversion constant	g	:	10.00 m/s²
	Date of day zero in time diagram		:	01.01.2017
	Global axes XYZ		:	Z downward
	Local axes xyz		:	z downward

Tolerances	Tolerance for nodes	:	0.01000 m

C

MODEL - BASE DATA

Tolerance for lines	:	0.01000 m
Tolerance for surfaces/planes	:	0.01000 m
Tolerance for directions	:	0.01000 m

D

LOAD CASES & COMBINATION SETTINGS

Settings & Options

Combination wizard and classification according to standard is active
Combination wizard is active
Enabled result combinations

Statistics

Load Cases	:	8
Actions	:	5
Design Situations	:	1
Action Combinations	:	0
Load Combinations	:	1
Result Combinations	:	1
Combination Wizards	:	0
Relationship Between Load Cases	:	1

1 Basic Objects

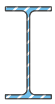
1.1 MATERIALS

Legend
- Concrete Settings
- Stiffness modification
- User-Defined Material

Material No.	Material Name	Material Type	Analysis Model	Options
1	S235 | Isotropic | Linear Elastic	Steel	Isotropic | Linear Elastic	
2	C20/25 | Isotropic | Linear Elastic	Concrete	Isotropic | Linear Elastic	
3	B550S(A) | Isotropic | Linear Elastic	Reinforcing Steel	Isotropic | Linear Elastic	
4	C24 | Isotropic | Linear Elastic	Timber	Isotropic | Linear Elastic	
5	EN AW-3004 H14 | Isotropic | Linear Elastic	Aluminum	Isotropic | Linear Elastic	
11	Gravel, closely graded | Isotropic | Linear Elastic	Soil	Isotropic | Linear Elastic	
12	Sand | Isotropic | Linear Elastic	Soil	Isotropic | Linear Elastic	
13	Clay, slightly plastic | Isotropic | Linear Elastic	Soil	Isotropic | Linear Elastic	

1.2 SECTIONS

IPE 200



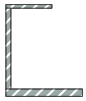
R_M1 500/1000

SQ_M1 500

HEB 200

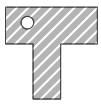
SQ_M1 500

UU 150/75/125/8/6/12/0/0



HEB 200

TestRFEM



Section No.	Material No.	Section Type	Manufacturing Type	I_t [cm⁴] / A [cm²]	I_y [cm⁴] / A_y [cm²]	I_z [cm⁴] / A_z [cm²]	Overall Dimensions b [mm]	Overall Dimensions h [mm]
1	IPE 200 | 1 - S235							
	1	Standardized - Steel	Hot rolled	6.92	1943.00	142.00	100.0	200.0
				28.50	13.97	10.69		
2	R_M1 500/1000 | 2 - C20/25							
	2	Parametric - Massive I		2861002.60	4166666.67	1041666.67	500.0	1000.0
				5000.00	4166.67	4166.67		
3	SQ_M1 500 | 2 - C20/25							
	2	Parametric - Massive I		880208.33	520833.33	520833.33	500.0	500.0
				2500.00	2083.33	2083.33		
4	HEB 200 | 1 - S235							
	1	Standardized - Steel	Hot rolled	59.59	5696.00	2003.00	200.0	200.0
				78.08	48.90	16.47		
5	SQ_M1 500 | 4 - C24							
	4	Parametric - Massive I		880208.33	520833.33	520833.33	500.0	500.0
				2500.00	2083.33	2083.33		
6	UU 150/75/125/8/6/12/0/0 | 5 - EN AW-3004 H14							
	5	Parametric - Thin-Walled	Welded	9.87	1060.91	318.30	125.0	150.0
				30.06	13.66	9.71		
7	HEB 200 | 1 - S235							

1.2 SECTIONS

HEB 200

Section No.	Material No.	Section Type	Manufacturing Type	I_t [cm⁴] / A [cm²]	I_y [cm⁴] / A_y [cm²]	I_z [cm⁴] / A_z [cm²]	Overall Dimensions b [mm]	Overall Dimensions h [mm]
	1	Standardized - Steel	Hot rolled	59.59	5696.00	2003.00	200.0	200.0
				78.08	48.90	16.47		
8	TestRFEM							
	2	General by RSECTION		2392146.44	4286239.97	3241147.66		
				5651.27	3495.62	3016.64		
16	HEB 200 | 1 - S235							
	1	Standardized - Steel	Hot rolled	59.59	5696.00	2003.00	200.0	200.0
				78.08	48.90	16.47		

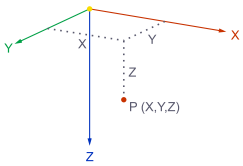
1.3 THICKNESSES

Thick. No.	Type	Assigned to Surface No.	Material	Thickness Symbol	Thickness Value	Thickness Unit	Thickness Nodes	Thickness Direction
1	Uniform | d : 500.0 mm | 2 - C20/25							
	Uniform	1	2	d	500.0	mm		

1.4 NODES

Legend
Nodal Support

Cartesian



Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	Node Coordinates X [m]	Node Coordinates Y [m]	Node Coordinates Z [m]	Options	Comment
1	Standard	--	1	Cartesian	0.000	0.000	0.000	✓	concrete part
2	Standard	--	1	Cartesian	0.000	0.000	-3.600		concrete top + steel bottom
3	Standard	--	1	Cartesian	0.000	0.000	-7.600		steel top
4	Standard	--	1	Cartesian	3.000	0.000	0.000	✓	concrete part
5	Standard	--	1	Cartesian	3.000	0.000	-3.600		concrete top + steel bottom
6	Standard	--	1	Cartesian	3.000	0.000	-7.600		steel top
7	Standard	--	1	Cartesian	6.000	0.000	0.000	✓	concrete part
8	Standard	--	1	Cartesian	6.000	0.000	-3.600		concrete top + steel bottom
9	Standard	--	1	Cartesian	6.000	0.000	-7.600		steel top
10	Standard	--	1	Cartesian	9.000	0.000	0.000	✓	concrete part
11	Standard	--	1	Cartesian	9.000	0.000	-3.600		concrete top + steel bottom
12	Standard	--	1	Cartesian	9.000	0.000	-7.600		steel top
13	Standard	--	1	Cartesian	12.000	0.000	0.000	✓	concrete part
14	Standard	--	1	Cartesian	12.000	0.000	-3.600		concrete top + steel bottom
15	Standard	--	1	Cartesian	12.000	0.000	-7.600		steel top
16	Standard	--	1	Cartesian	15.000	0.000	0.000	✓	concrete part
17	Standard	--	1	Cartesian	15.000	0.000	-3.600		concrete top + steel bottom
18	Standard	--	1	Cartesian	15.000	0.000	-7.600		steel top
19	Standard	--	1	Cartesian	0.000	4.000	0.000	✓	concrete part
20	Standard	--	1	Cartesian	0.000	4.000	-3.600		concrete top + steel bottom
21	Standard	--	1	Cartesian	0.000	4.000	-7.600		steel top
22	Standard	--	1	Cartesian	3.000	4.000	0.000	✓	concrete part
23	Standard	--	1	Cartesian	3.000	4.000	-3.600		concrete top + steel bottom
24	Standard	--	1	Cartesian	3.000	4.000	-7.600		steel top
25	Standard	--	1	Cartesian	6.000	4.000	0.000	✓	concrete part

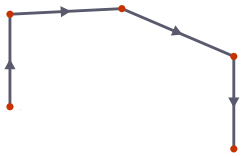
1.4 NODES

Node No.	Node Type	Reference Node	Coordinate System	Coordinate Type	Node Coordinates X [m]	Y [m]	Z [m]	Options	Comment
26	Standard	--	1	Cartesian	6.000	4.000	-3.600		concrete top + steel bottom
27	Standard	--	1	Cartesian	6.000	4.000	-7.600		steel top
28	Standard	--	1	Cartesian	9.000	4.000	0.000		concrete part
29	Standard	--	1	Cartesian	9.000	4.000	-3.600		concrete top + steel bottom
30	Standard	--	1	Cartesian	9.000	4.000	-7.600		steel top
31	Standard	--	1	Cartesian	12.000	4.000	0.000		concrete part
32	Standard	--	1	Cartesian	12.000	4.000	-3.600		concrete top + steel bottom
33	Standard	--	1	Cartesian	12.000	4.000	-7.600		steel top
34	Standard	--	1	Cartesian	15.000	4.000	0.000		concrete part
35	Standard	--	1	Cartesian	15.000	4.000	-3.600		concrete top + steel bottom
36	Standard	--	1	Cartesian	15.000	4.000	-7.600		steel top
37	Standard	--	1	Cartesian	1.000	1.000	-3.600		opening node
38	Standard	--	1	Cartesian	1.000	2.000	-3.600		opening node
39	Standard	--	1	Cartesian	2.000	2.000	-3.600		opening node
40	Standard	--	1	Cartesian	2.000	1.000	-3.600		opening node

1.5 LINES

Legend
Member

Polyline



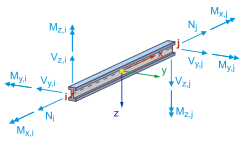
Line No.	Line Type	Nodes No.	Line Length L [m]	Position	Options	Comment
1	Polyline	1,2	3.600	On Z		lines for columns
2	Polyline	2,3	4.000	On Z		lines for columns
3	Polyline	4,5	3.600	|| Z		lines for columns
4	Polyline	5,6	4.000	|| Z		lines for columns
5	Polyline	7,8	3.600	|| Z		lines for columns
6	Polyline	8,9	4.000	|| Z		lines for columns
7	Polyline	10,11	3.600	|| Z		lines for columns
8	Polyline	11,12	4.000	|| Z		lines for columns
9	Polyline	13,14	3.600	|| Z		lines for columns
10	Polyline	14,15	4.000	|| Z		lines for columns
11	Polyline	16,17	3.600	|| Z		lines for columns
12	Polyline	17,18	4.000	|| Z		lines for columns
13	Polyline	19,20	3.600	|| Z		lines for columns
14	Polyline	20,21	4.000	|| Z		lines for columns
15	Polyline	22,23	3.600	|| Z		lines for columns
16	Polyline	23,24	4.000	|| Z		lines for columns
17	Polyline	25,26	3.600	|| Z		lines for columns
18	Polyline	26,27	4.000	|| Z		lines for columns
19	Polyline	28,29	3.600	|| Z		lines for columns
20	Polyline	29,30	4.000	|| Z		lines for columns
21	Polyline	31,32	3.600	|| Z		lines for columns
22	Polyline	32,33	4.000	|| Z		lines for columns
23	Polyline	34,35	3.600	|| Z		lines for columns
24	Polyline	35,36	4.000	|| Z		lines for columns
25	Polyline	2,20	4.000	|| Y		lines for beams
26	Polyline	3,21	4.000	|| Y		lines for beams
27	Polyline	5,23	4.000	|| Y		lines for beams
28	Polyline	6,24	4.000	|| Y		lines for beams
29	Polyline	8,26	4.000	|| Y		lines for beams
30	Polyline	9,27	4.000	|| Y		lines for beams
31	Polyline	11,29	4.000	|| Y		lines for beams
32	Polyline	12,30	4.000	|| Y		lines for beams
33	Polyline	14,32	4.000	|| Y		lines for beams
34	Polyline	15,33	4.000	|| Y		lines for beams
35	Polyline	17,35	4.000	|| Y		lines for beams
36	Polyline	18,36	4.000	|| Y		lines for beams
37	Polyline	3,18	15.000	|| X		lines for timber beam
38	Polyline	21,36	15.000	|| X		lines for timber beam
39	Polyline	3,24	5.000	|| XY		lines for aluminum beam
40	Polyline	2,20,35,17,2	38.000	|| XY		closed line for slab
41	Polyline	37-40,37	4.000	|| XY		closed line for slab

1.6

MEMBERS

Legend
- Boundary Conditions (Steel Design)
- Concrete Durability (Concrete Design)
- Design properties
- Effective Length (Aluminum Design)
- Effective Length (Concrete Design)
- Effective Length (Steel Design)
- Member Transverse Stiffener
- Service Class (Timber Design)

Beam



Member No.	Line No.	Member Type / Section Distribution	Rotation Type	β [deg]	Section i/k/j	Hinge i/j	Eccentricity i/j	Length L [m]	Position
1	1	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	On Z
		concrete column							
2	2	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	On Z
		steel column							
3	3	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
4	4	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
		steel column							
5	5	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
6	6	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
		steel column							
7	7	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
8	8	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
		steel column							
9	9	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
10	10	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
		steel column							
11	11	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
12	12	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
		steel column							
13	13	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
14	14	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
		steel column							
15	15	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
		concrete column							
16	16	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z

1.6 MEMBERS

Member No.	Line No.	Member Type Section Distribution	Rotation Type	β [deg]	Section i/k/j	Hinge i/j	Eccentricity i/j	Length L [m]	Position
	steel column								
17	17	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
	concrete column								
18	18	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
	steel column								
19	19	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
	concrete column								
20	20	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
	steel column								
21	21	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
	concrete column								
22	22	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
	steel column								
23	23	Beam Uniform	Angle	0.00	3	-- --	-- --	3.600	|| Z
	concrete column								
24	24	Beam Uniform	Angle	0.00	4	-- --	-- --	4.000	|| Z
	steel column								
25	25	Beam Uniform	Angle	0.00	2	-- --	-- --	4.000	|| Y
	concrete beam								
26	26	Beam Uniform	Angle	0.00	1	-- --	-- --	4.000	|| Y
	steel beam								
27	27	Beam Uniform	Angle	0.00	2	-- --	-- --	4.000	|| Y
	concrete beam								
28	28	Beam Uniform	Angle	0.00	1	-- --	-- --	4.000	|| Y
	steel beam								
29	29	Beam Uniform	Angle	0.00	2	-- --	-- --	4.000	|| Y
	concrete beam								
30	30	Beam Uniform	Angle	0.00	1	-- --	-- --	4.000	|| Y
	steel beam								
31	31	Beam Uniform	Angle	0.00	2	-- --	-- --	4.000	|| Y
	concrete beam								

1.6 MEMBERS

Member No.	Line No.	Member Type / Section Distribution	Rotation Type	β [deg]	Section i/k/j	Hinge i/j	Eccentricity i/j	Length L [m]	Position
32	32	Beam / Uniform	Angle	0.00	1	-- / --	-- / --	4.000	|| Y
		steel beam							
33	33	Beam / Uniform	Angle	0.00	2	-- / --	-- / --	4.000	|| Y
		concrete beam							
34	34	Beam / Uniform	Angle	0.00	1	-- / --	-- / --	4.000	|| Y
		steel beam							
35	35	Beam / Uniform	Angle	0.00	2	-- / --	-- / --	4.000	|| Y
		concrete beam							
36	36	Beam / Uniform	Angle	0.00	1	-- / --	-- / --	4.000	|| Y
		steel beam							
37	37	Beam / Uniform	Angle	0.00	5	-- / --	-- / --	15.000	|| X
		timber beam							
38	38	Beam / Uniform	Angle	0.00	5	-- / --	-- / --	15.000	|| X
		timber beam							
39	39	Beam / Uniform	Angle	0.00	6	-- / --	-- / --	5.000	|| XY
		Aluminium beam							

1.7 SURFACES

Legend
- Concrete Durability (Concrete Design)
- Design properties

Surface No.	Boundary Lines	Stiffness Type	Geometry Type	Thickness	Material	Position	Options
1	40	Standard	Plane	1	2	|| XY	

Grid for Results | Integrated Objects | Reinforcement Direction – Bottom | Reinforcement Direction – Top | Surface Reinforcement Table

1.8 OPENINGS

Opening No.	Surfaces No.	Boundary Lines No.	Area A [m²]	Center of opening [m] Xc	Yc	Zc	Position
1	1	41	1.000	1.400	1.400	-3.600	|| XY

2 Special Objects

2.1 BOREHOLES

Legend
- Groundwater

Borehole No.	Coordinates X [m]	Y [m]	Z [m]	Import Z from Terrain	Total Thickness ∑t [m]	Groundwater Enabled	Z [m]	Options
1	1.000	2.000	0.000		6.000	☒	1.000	
	Soil Sample 1							

3 Types for Nodes

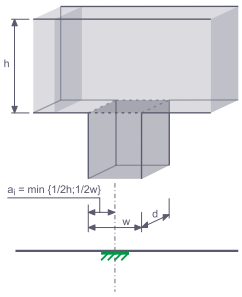
3.1 NODAL SUPPORTS

Support No.	Nodes No.	Coordinate System	Translation Spring [kN/m] $C_{u,X}$	$C_{u,Y}$	$C_{u,Z}$	Rotation Spring [kNm/rad] $C_{\varphi,X}$	$C_{\varphi,Y}$	$C_{\varphi,Z}$
1	☑☑☒ ☑☑☑ | u_Z : Diagram							
	1, 4,7,10,13,16,19,22,25,28,31,34	1 - Global XYZ	☒	☒	☒	☒	☒	☒

4 Types for Members

4.1 DESIGN SUPPORTS

Concrete | Direct support | Monolithic connection | Inner support | z-axis



Concrete

Support No.	Name	Symbol	Value	Unit
1	Concrete design support scripted			
	Design support type		Concrete	
	Assigned to Members and Nodes No.			
	Assigned to members		1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35	
	Assigned to member sets			
	Assigned to nodes		1, 2,4,5,7,8,10,11,13,14,16,17,19,20,22,23,25,26,28,29,31,32, 34,35	
	Activate in z-axis		☒	
	Activate in y-axis		☒	
	Support width z-axis	w	300.0	mm
	Support depth by section width of member		☒	
	Monolithic connection z-axis		☒	
	Inner support z-axis		☒	
	Ratio of moment redistribution z-axis	δ	1.000	--
	Design support orientation z-axis		+z-axis	
	Direct support z-axis		☒	
	Active for deflection design in y-axis		☒	
	Active for deflection design in z-axis		☒	
	scripted support			

5 Types for Concrete Design

5.1 EFFECTIVE LENGTHS

No.	Description	Symbol	Value	Unit
2	Standard (Members : 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35)			
	Assigned to members		1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35	
	Assigned to member sets			
	Flexural buckling about y		☒	
	Flexural buckling about z		☒	
	Structure type about y-axis		Unbraced	
	Structure type about z-axis		Unbraced	
	Intermediate nodes		☐	
	Different properties		☒	

5.1.1 EFFECTIVE LENGTHS - NODAL SUPPORTS

No.	Node Seq. No.	Support Type	Fixed in z/v		Fixed in y/u	Nodes	Comment
2	Start	Fixed in z	☒	2	☐	1, 2,4,5,7,8,10,11,13,14,16,17,19,22,25, 28,31,34	
	End	Fixed all	☒	2	☒	2,5,8,11,14,17,20,23,26,29,32,35	

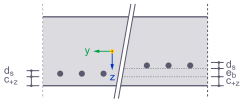
5.1.2 EFFECTIVE LENGTHS - FACTORS

No.	Flexural Buckling k_y [--]	k_z [--]	Unbraced Flexural Buckling $k_{u,y}$ [--]	$k_{u,z}$ [--]	Braced Flexural Buckling $k_{b,y}$ [--]	$k_{b,z}$ [--]	Comment
2	1.00	1.00					

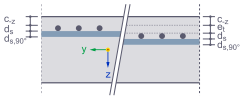
5.2

SURFACE REINFORCEMENTS

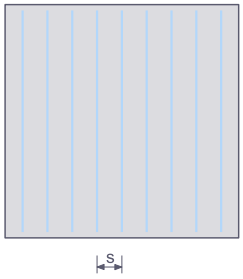
Location Type 'On Surface' | Alignment 'Bottom (+z)'



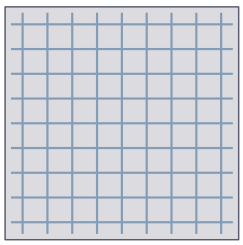
Location Type 'On Surface' | Alignment 'Top (-z)'



Reinforcement Type 'Rebar'

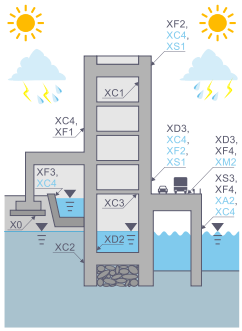


Reinforcement Type 'Mesh'



Reinf. No.	Description	Symbol	Value	Unit
1	On Surface | Rebar | d_s : 10.0 mm | s : 0.150 m | Bottom (+z) (Surfaces : 1)			
	Assigned to Surfaces No.		1	
	Location type		On Surface	
	Material		3 - B550S(A) | Isotropic | Linear Elastic	
	Reinforcement type		Rebar	
	Assigned to side		Bottom (+z)	
	Rebar diameter	d_s	10.0	mm
	Rebar spacing	s	0.150	m
	Additional transverse reinforcement enabled		☐	
	Top alignment enabled		☐	
	Bottom alignment enabled		☒	
	Bottom additional offset to concrete cover	e_b	0.0	mm
	Reinforcement direction type		In reinforcement direction	
	In reinforcement direction of design		$a_{s,1}$	
	Reinforcement area	$a_{s,1}$	5.24	cm²/m
	Reinforcement area	$a_{s,1,+z}$	5.24	cm²/m
	Rebar diameter | Usable diameters enabled		☐	
	Rebar diameter		☐	
	Rebar diameter | Priority	p	1	
	Rebar diameter	$d_{s,min}$	10.0	mm
	Rebar diameter	$d_{s,max}$	20.0	mm
	Rebar spacing		☐	
	Rebar spacing | Priority	p	1	
	Rebar spacing | Increment	Δ_s	0.010	m
	Rebar spacing	s_{min}	0.100	m
	Rebar spacing	s_{max}	0.300	m
2	On Surface | Mesh | Q188A | Top (-z) (Surfaces : 1)			
	Assigned to Surfaces No.		1	
	Location type		On Surface	
	Material		3 - B550S(A) | Isotropic | Linear Elastic	
	Reinforcement type		Mesh	
	Assigned to side		Top (-z)	
	Mesh product range		Germany - 2008-01-01	
	Mesh name		Q188A	
	Mesh shape		Q-Mesh	
	Rebar diameter	d_s	6.0	mm
	Rebar spacing	s	0.150	m
	Additional transverse reinforcement enabled		☒	
	Additional rebar diameter	$d_{s,90°}$	6.0	mm
	Additional rebar spacing	$s_{90°}$	0.150	m
	Top alignment enabled		☒	
	Bottom alignment enabled		☐	
	Top additional offset to concrete cover	e_t	0.0	mm
	Reinforcement direction type		In reinforcement direction	
	In reinforcement direction of design		$a_{s,1}$	
	Reinforcement area	$a_{s,1}$	1.88	cm²/m
	Reinforcement area	$a_{s,2}$	1.88	cm²/m
	Reinforcement area	$a_{s,1,-z}$	1.88	cm²/m
	Reinforcement area	$a_{s,2,-z}$	1.88	cm²/m
	Rebar diameter | Usable diameters enabled		☐	
	Rebar diameter		☐	
	Rebar diameter | Priority	p	1	
	Rebar diameter	$d_{s,min}$	10.0	mm
	Rebar diameter	$d_{s,max}$	20.0	mm
	Rebar spacing		☐	
	Rebar spacing | Priority	p	1	
	Rebar spacing | Increment	Δ_s	0.010	m
	Rebar spacing	s_{min}	0.100	m
	Rebar spacing	s_{max}	0.300	m
	Additional rebar diameter | Usable diameters enabled		☐	
	Additional rebar diameter		☐	
	Additional rebar diameter | Priority	p	1	
	Additional rebar diameter	$d_{s,90°,min}$	10.0	mm
	Additional rebar diameter	$d_{s,90°,max}$	20.0	mm
	Additional rebar spacing		☐	
	Additional rebar spacing | Priority	p	1	
	Additional rebar spacing | Increment	Δ_s	0.010	m
	Additional rebar spacing	$s_{90°,min}$	0.100	m
	Additional rebar spacing	$s_{90°,max}$	0.300	m

5.3 CONCRETE DURABILITIES



Cond. No.	Description	Symbol	Value	Unit
1	XC1 (Members : 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35 | Surfaces : 1)			
	Assigned to Members No.		1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35	
	Assigned to Member Sets No.			
	Assigned to Surfaces No.		1	
	Corrosion induced by carbonation		XC1 - Dry or permanently wet	
	Structural class type		According to standard	
	Increase design working life from 50 to 100 years enabled		☐	
	Position of reinforcement not affected by construction process enabled		☐	
	Special quality control of production enabled		☐	
	Air entrainment of more than 4% enabled		☐	
	Allowance for deviation type		According to standard	

5.4 REINFORCEMENT DIRECTIONS

Direction No.	Type	Surfaces	Reinf. Dir. Rotations About z Related to x		
			φ_1 [deg]	φ_2 [deg]	$\Delta\varphi_2$ [deg]
1	First Reinforcement Direction in x	1			

6 Imperfections

6.1.1 IMPERFECTION CASES

Case No.	Name	Parameters Symbol	Value	Unit
1	LoI			
	Is Active		☐	
	Imperfection Case Type		LoI Local Imperfections	
	Assigned to Load Cases		4	
	Assigned to Load Combinations			
	Assign to all COs without assigned Imperfection Case		☒	

7 Load Cases & Combinations

7.1 LOAD CASES

Legend
Imperfection Case
Stability Analysis Settings

LC No.	Settings	Value	Unit	To Solve	Options
1	G SelfWeight				
	Analysis type	Static Analysis		☒	
	Static analysis settings	SA1 - MySettingsSecondOrder			
	Action category	G Permanent			
	Self-weight - Factor in direction X	0.000	--		
	Self-weight - Factor in direction Y	0.000	--		
	Self-weight - Factor in direction Z	1.000	--		
	Load duration	Permanent			
	Stability analysis settings	ST101 - My SAS			
2	Gq My load case				
	Analysis type	Static Analysis		☒	
	Static analysis settings	SA1 - MySettingsSecondOrder			
	Action category	Gq Permanent/Imposed			
	Load duration	Permanent			
3	Qs My load case snow				
	Analysis type	Static Analysis		☒	
	Static analysis settings	SA1 - MySettingsSecondOrder			
	Action category	Qs Snow/Ice loads - H > 1000 m			
	Load duration	Medium-term			
4	Qs My load case				
	Analysis type	Static Analysis		☒	
	Static analysis settings	SA1 - MySettingsSecondOrder			
	Action category	Qs Snow/Ice loads - H > 1000 m			
	Load duration	Medium-term			
	Imperfection case	LoI IC1			
5	Qw My load case wind				
	Analysis type	Static Analysis		☒	

7.1 LOAD CASES

LC No.	Settings	Value	Unit	To Solve	Options
	Static analysis settings	SA1 - MySettingsSecondOrder			
	Action category	Qw Wind			
	Load duration	Short-term			
6	G Stability				
	Analysis type	Static Analysis		☒	
	Static analysis settings	SA1 - MySettingsSecondOrder			
	Action category	G Permanent			
	Self-weight - Factor in direction X	0.000	--		
	Self-weight - Factor in direction Y	0.000	--		
	Self-weight - Factor in direction Z	1.000	--		
	Load duration	Permanent			
	Stability analysis settings	ST101 - My SAS			
10	AE My load case for modal analysis				
	Analysis type	Modal Analysis		☒	
	Modal analysis settings	MOS1 - Generated via Script			
	Import masses from	Go LC2			
	Action category	AE Seismic actions			
20	AE Spectral				
	Analysis type	Response Spectrum Analysis		☒	
	Spectral analysis settings	SPS1 - MySRSS			
	Import modal analysis from	AE LC10			
	Action category	AE Seismic actions			
	Load duration	Instantaneous			

7.1.1 LOAD CASES - RESPONSE SPECTRUM

LC No.	Response Spectrum X	Y	Z	Scale Factor X [--]	Y [--]	Z [--]	Rotation α [deg]	Comment
20			RS1			1.000	0.0000	

7.1.2 LOAD CASES - SELECTION OF MODES

LC No.	To Generate	Period T [s]	Frequency f [Hz]	Acceleration [m/s²] S_{aX}	S_{aY}	S_{aZ}	Factor [--] f_{meX}	f_{meY}	f_{meZ}	Damping D [--]	$M_{eff,i}$ / Σ M [--] f_{meX}	f_{meY}	f_{meZ}
20	☒	1.156	0.865			0.58	0.113	0.000	0.000	--	0.423	0.002	0.000
	☒	1.155	0.866			0.58	0.000	0.000	0.000	--			
	☒	1.154	0.866			0.58	0.000	0.000	0.000	--			
	☒	1.104	0.905			0.60	0.298	0.002	0.000	--			
	☒	1.095	0.913			0.61	0.012	0.000	0.000	--			

7.2 LOAD COMBINATIONS

CO No.	Settings	Value	Unit	To Solve
1	EQU ScriptedCombination			
	Analysis type	Static Analysis		☒
	Static analysis settings	SA1 - MySettingsSecondOrder		
	Design Situation	EQU DS1 - ScriptedDS		
	Load duration	Permanent		

7.3 STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
1	MySettingsSecondOrder			
	Analysis type		Second-order (P-Δ)	
	Iterative method for nonlinear analysis		Newton-Raphson	
	Maximum number of iterations		100	
	Number of load increments		1	
	Modify standard precision and tolerance settings		☐	
	Ignore all nonlinearities		☐	
	Modify loading by multiplier factor		☐	
	Consider favorable effect due to tension in members		☒	
	Displacements due to member load of type 'Pipe internal pressure' (Bourdon effect)		☐	
	Refer internal forces to deformed structure		☒	
	Refer internal forces to deformed structure for normal forces		☒	
	Refer internal forces to deformed structure for shear forces		☒	

7.3 STATIC ANALYSIS SETTINGS

Settings No.	Description	Symbol	Value	Unit
	Refer internal forces to deformed structure for moments		☒	
	Method for equation system		Direct	
	Plate bending theory		Mindlin	
	Activate mass conversion to load		☐	
	Asymmetric direct solver		☒	
	Equilibrium for undeformed structure		☐	
	Check of stability based on deformation rate		☐	

7.4 RELATIONSHIP BETWEEN LOAD CASES

Rel. No.	Assigned to	Comment
1	1	

8 Guide Objects

8.1 COORDINATE SYSTEMS

System No.	Type	Coordinates Symbol	Value	Unit	Rotation Sequence	Symbol	Value	Unit	Comment
1	Global XYZ								

9 Parts List

9.1 PARTS LIST - ALL BY MATERIAL

Parts Lists

Material No.	Material Name	Object Type	Tot. Coating C_Σ [m²]	Tot. Volume V_Σ [m³]	Total Mass M_Σ [t]
5	EN AW-3004 H14	Members	3.586	0.015	0.041
Total			3.586	0.015	0.041
4	C24	Members	61.000	7.500	3.750
Total			61.000	7.500	3.750
2	C20/25	Members	170.400	22.800	57.000
		Surfaces	139.000	29.500	73.750
Total			309.400	52.300	130.750
1	S235	Members	73.908	0.443	3.479
Total			73.908	0.443	3.479
Σ Total			447.894	60.258	138.020

10 Static Analysis Results

10.1 SUMMARY

Static Analysis

	Description	Value	Unit	Notes
	G LC1 - SelfWeight			
	Sum of loads and the sum of support forces			
	Sum of loads in X	0.00	kN	
	Sum of support forces in X	0.00	kN	
	Sum of loads in Y	0.00	kN	
	Sum of support forces in Y	0.00	kN	
	Sum of loads in Z	1380.19	kN	
	Sum of support forces in Z	1380.19	kN	Deviation: 0.00 %
	Resultant of reactions			
	Resultant of reactions about X	0.00	kNm	At center of gravity of model (7.553, 2.005, -3.416 m)
	Resultant of reactions about Y	0.00	kNm	At center of gravity of model
	Resultant of reactions about Z	0.00	kNm	At center of gravity of model
	Maximum deformations			
	Maximum displacement in X-direction	-1.2	mm	Member No. 2, x: 2.667 m
	Maximum displacement in Y-direction	-0.1	mm	Member No. 39, x: 1.667 m
	Maximum displacement in Z-direction	10.6	mm	Member No. 38, x: 7.500 m

10.1 SUMMARY

Static Analysis

	Description	Value	Unit	Notes
	Maximum vectorial displacement	10.6	mm	Member No. 38, x: 7.500 m
	Maximum rotation about X-axis	-0.7	mrad	Member No. 39, x: 2.778 m
	Maximum rotation about Y-axis	2.0	mrad	Member No. 38, x: 13.500 m
	Maximum rotation about Z-axis	0.1	mrad	Member No. 39, x: 3.333 m
	Calculation statistic			
	Number of iterations	2		
	Maximum value of element of stiffness matrix on diagonal	1.00e+17	--	
	Minimum value of element of stiffness matrix on diagonal	309669.00	--	
	Stiffness matrix determinant	4.67e+16599	--	
	Infinity Norm	1.00e+17	--	
	Static Analysis Settings No. 1 - MySettingsSecondOrder			
	Analysis type	Second-order (P-Δ)		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	1		
	Modify loading by multiplier factor	☐		
	Consider favorable effects due to tension forces of members	☒		
	Asymmetric direct solver	☒		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		
	Gs LC2 - My load case			
	Sum of loads and the sum of support forces			
	Sum of loads in X	0.00	kN	
	Sum of support forces in X	0.00	kN	
	Sum of loads in Y	0.00	kN	
	Sum of support forces in Y	0.00	kN	
	Sum of loads in Z	2612.92	kN	
	Sum of support forces in Z	2612.92	kN	Deviation: 0.00 %
	Resultant of reactions			
	Resultant of reactions about X	163.89	kNm	At center of gravity of model (7.553, 2.005, -3.416 m)
	Resultant of reactions about Y	203.73	kNm	At center of gravity of model
	Resultant of reactions about Z	0.21	kNm	At center of gravity of model
	Maximum deformations			
	Maximum displacement in X-direction	-18.5	mm	Member No. 2, x: 2.667 m
	Maximum displacement in Y-direction	-18.6	mm	Member No. 39, x: 2.500 m
	Maximum displacement in Z-direction	131.7	mm	Member No. 37, x: 7.500 m
	Maximum vectorial displacement	131.9	mm	Member No. 37, x: 7.500 m
	Maximum rotation about X-axis	-28.1	mrad	Member No. 39, x: 3.889 m
	Maximum rotation about Y-axis	-31.7	mrad	Member No. 39, x: 0.556 m
	Maximum rotation about Z-axis	19.5	mrad	Member No. 39, x: 3.889 m
	Calculation statistic			
	Number of iterations	3		
	Maximum value of element of stiffness matrix on diagonal	1.00e+17	--	
	Minimum value of element of stiffness matrix on diagonal	306451.00	--	
	Stiffness matrix determinant	1.14e+16599	--	
	Infinity Norm	1.00e+17	--	
	Static Analysis Settings No. 1 - MySettingsSecondOrder			
	Analysis type	Second-order (P-Δ)		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	1		
	Modify loading by multiplier factor	☐		
	Consider favorable effects due to tension forces of members	☒		
	Asymmetric direct solver	☒		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		
	Qs LC4 - My load case			
	Sum of loads and the sum of support forces			
	Sum of loads in X	0.00	kN	
	Sum of support forces in X	0.00	kN	
	Sum of loads in Y	0.00	kN	
	Sum of support forces in Y	0.00	kN	
	Sum of loads in Z	0.00	kN	
	Sum of support forces in Z	0.00	kN	
	Resultant of reactions			
	Resultant of reactions about X	0.00	kNm	At center of gravity of model (7.553, 2.005, -3.416 m)
	Resultant of reactions about Y	0.00	kNm	At center of gravity of model
	Resultant of reactions about Z	0.00	kNm	At center of gravity of model

10.1 SUMMARY

Static Analysis

	Description	Value	Unit	Notes
	Maximum deformations			
	Maximum displacement in X-direction	0.0	mm	
	Maximum displacement in Y-direction	0.0	mm	
	Maximum displacement in Z-direction	0.0	mm	
	Maximum vectorial displacement	0.0	mm	
	Maximum rotation about X-axis	0.0	mrad	
	Maximum rotation about Y-axis	0.0	mrad	
	Maximum rotation about Z-axis	0.0	mrad	
	Calculation statistic			
	Number of iterations	2		
	Maximum value of element of stiffness matrix on diagonal	1.00e+17	--	
	Minimum value of element of stiffness matrix on diagonal	309790.00	--	
	Stiffness matrix determinant	4.93e+16599	--	
	Infinity Norm	1.00e+17	--	
	Static Analysis Settings No. 1 - MySettingsSecondOrder			
	Analysis type	Second-order (P-Δ)		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	1		
	Modify loading by multiplier factor	☐		
	Consider favorable effects due to tension forces of members	☒		
	Asymmetric direct solver	☒		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		
	LC6 - Stability			
	Sum of loads and the sum of support forces			
	Sum of loads in X	0.00	kN	
	Sum of support forces in X	0.00	kN	
	Sum of loads in Y	0.00	kN	
	Sum of support forces in Y	0.00	kN	
	Sum of loads in Z	1380.19	kN	
	Sum of support forces in Z	1380.19	kN	Deviation: 0.00 %
	Resultant of reactions			
	Resultant of reactions about X	0.00	kNm	At center of gravity of model (7.553, 2.005, -3.416 m)
	Resultant of reactions about Y	0.00	kNm	At center of gravity of model
	Resultant of reactions about Z	0.00	kNm	At center of gravity of model
	Maximum deformations			
	Maximum displacement in X-direction	-1.2	mm	Member No. 2, x: 2.667 m
	Maximum displacement in Y-direction	-0.1	mm	Member No. 39, x: 1.667 m
	Maximum displacement in Z-direction	10.6	mm	Member No. 38, x: 7.500 m
	Maximum vectorial displacement	10.6	mm	Member No. 38, x: 7.500 m
	Maximum rotation about X-axis	-0.7	mrad	Member No. 39, x: 2.778 m
	Maximum rotation about Y-axis	2.0	mrad	Member No. 38, x: 13.500 m
	Maximum rotation about Z-axis	0.1	mrad	Member No. 39, x: 3.333 m
	Calculation statistic			
	Number of iterations	2		
	Maximum value of element of stiffness matrix on diagonal	1.00e+17	--	
	Minimum value of element of stiffness matrix on diagonal	309669.00	--	
	Stiffness matrix determinant	4.67e+16599	--	
	Infinity Norm	1.00e+17	--	
	Static Analysis Settings No. 1 - MySettingsSecondOrder			
	Analysis type	Second-order (P-Δ)		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	1		
	Modify loading by multiplier factor	☐		
	Consider favorable effects due to tension forces of members	☒		
	Asymmetric direct solver	☒		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		
	EQU CO1 - ScriptedCombination			
	Sum of loads and the sum of support forces			
	Sum of loads in X	0.00	kN	
	Sum of support forces in X	0.00	kN	
	Sum of loads in Y	0.00	kN	
	Sum of support forces in Y	0.00	kN	
	Sum of loads in Z	5782.54	kN	
	Sum of support forces in Z	5782.54	kN	Deviation: 0.00 %

10.1 SUMMARY

Static Analysis

	Description	Value	Unit	Notes
	Resultant of reactions			
	Resultant of reactions about X	244.81	kNm	At center of gravity of model (7.553, 2.005, -3.416 m)
	Resultant of reactions about Y	309.56	kNm	At center of gravity of model
	Resultant of reactions about Z	0.57	kNm	At center of gravity of model
	Maximum deformations			
	Maximum displacement in X-direction	-30.3	mm	Member No. 2, x: 2.667 m
	Maximum displacement in Y-direction	-29.0	mm	Member No. 39, x: 2.500 m
	Maximum displacement in Z-direction	214.3	mm	Member No. 37, x: 7.500 m
	Maximum vectorial displacement	214.5	mm	Member No. 37, x: 7.500 m
	Maximum rotation about X-axis	-43.2	mrad	Member No. 39, x: 3.889 m
	Maximum rotation about Y-axis	-50.4	mrad	Member No. 39, x: 0.556 m
	Maximum rotation about Z-axis	30.4	mrad	Member No. 39, x: 3.889 m
	Calculation statistic			
	Number of iterations	4		
	Maximum value of element of stiffness matrix on diagonal	1.00e+17	--	
	Minimum value of element of stiffness matrix on diagonal	304611.00	--	
	Stiffness matrix determinant	4.84e+16598	--	
	Infinity Norm	1.00e+17	--	
	Static Analysis Settings No. 1 - MySettingsSecondOrder			
	Analysis type	Second-order (P-Δ)		
	Iterative method	Newton-Raphson		
	Maximum number of iterations	100		
	Number of load increments	1		
	Modify loading by multiplier factor	☐		
	Consider favorable effects due to tension forces of members	☒		
	Asymmetric direct solver	☒		
	Method for Equation System	Direct		
	Plate bending theory	Mindlin		

10.2 CALCULATION DIAGRAMS

Static Analysis

Calc. Diagram	Name	Options	Comment
	G LC1 - SelfWeight		
CD1	MyScriptedDiagram		Nodes - Support Forces P_Z (Node No. 19) | Nodes - Support Forces M_Y (Node No. 19)

10.3 NODES - SUPPORT FORCES

Static Analysis

Node No.		Support Forces P_x [kN]	P_y [kN]	P_z [kN]	Support Moments M_x [kNm]	M_y [kNm]	M_z [kNm]	Node Comment Cor. Loading
	G LC1 - SelfWeight							
1		-1.34	-2.63	91.28	-3.06	1.59	-0.02	concrete part
4		-0.09	-3.63	123.65	-4.22	0.11	0.00	concrete part
7		0.00	-3.66	125.49	-4.26	-0.01	0.00	concrete part
10		-0.02	-3.67	125.81	-4.27	0.01	0.00	concrete part
13		0.04	-3.64	127.42	-4.24	-0.05	0.00	concrete part
16		1.39	-2.69	94.89	-3.13	-1.65	0.02	concrete part
19		-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
22		-0.07	3.60	125.69	4.21	0.09	0.00	concrete part
25		0.02	3.67	125.63	4.28	-0.02	0.00	concrete part
28		-0.01	3.68	125.81	4.29	0.01	0.00	concrete part
31		0.04	3.65	127.41	4.25	-0.06	0.00	concrete part
34		1.39	2.69	94.89	3.13	-1.65	-0.02	concrete part
	G LC1 - SelfWeight							
	Total max/min values with corresponding values							
16	P_x	1.39	-2.69	94.89	-3.13	-1.65	0.02	concrete part
19		-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
28	P_y	-0.01	3.68	125.81	4.29	0.01	0.00	concrete part
10		-0.02	-3.67	125.81	-4.27	0.01	0.00	concrete part
13	P_z	0.04	-3.64	127.42	-4.24	-0.05	0.00	concrete part
1		-1.34	-2.63	91.28	-3.06	1.59	-0.02	concrete part
28	M_x	-0.01	3.68	125.81	4.29	0.01	0.00	concrete part
10		-0.02	-3.67	125.81	-4.27	0.01	0.00	concrete part
19	M_y	-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
34		1.39	2.69	94.89	3.13	-1.65	-0.02	concrete part
19	M_z	-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
1		-1.34	-2.63	91.28	-3.06	1.59	-0.02	concrete part
	G LC1 - SelfWeight							
	Sum of loads and the sum of support forces							
		P_X [kN]	P_Y [kN]	P_Z [kN]				

10.3 NODES - SUPPORT FORCES

Static Analysis

Node No.		Support Forces P_x [kN]	P_y [kN]	P_z [kN]	Support Moments M_x [kNm]	M_y [kNm]	M_z [kNm]	Node Comment / Cor. Loading
Σ		0.00	0.00	1380.19	Loads			
Σ		0.00	0.00	1380.19	Support Forces			
	Gq	LC2 - My load case						
1		8.30	-0.49	313.32	-0.56	-9.11	-0.46	concrete part
4		-0.71	-0.52	154.94	-0.54	1.07	0.02	concrete part
7		-0.23	-0.56	167.20	-0.58	0.42	0.00	concrete part
10		0.00	-0.52	166.20	-0.55	0.06	-0.01	concrete part
13		0.10	-0.48	158.78	-0.53	-0.15	-0.02	concrete part
16		-6.66	-1.09	302.19	-1.24	7.46	0.39	concrete part
19		7.05	1.39	291.89	1.56	-7.64	0.47	concrete part
22		-0.95	-0.46	208.75	-0.44	1.35	-0.02	concrete part
25		-0.06	0.65	183.41	0.83	0.21	0.00	concrete part
28		0.03	0.59	179.42	0.75	-0.01	-0.01	concrete part
31		0.20	0.48	171.33	0.59	-0.31	-0.01	concrete part
34		-7.08	1.02	315.48	1.15	7.88	-0.45	concrete part
	Gq	LC2 - My load case						
		Total max/min values with corresponding values						
1	P_x	8.30	-0.49	313.32	-0.56	-9.11	-0.46	concrete part
34		-7.08	1.02	315.48	1.15	7.88	-0.45	concrete part
19	P_y	7.05	1.39	291.89	1.56	-7.64	0.47	concrete part
16		-6.66	-1.09	302.19	-1.24	7.46	0.39	concrete part
34	P_z	-7.08	1.02	315.48	1.15	7.88	-0.45	concrete part
4		-0.71	-0.52	154.94	-0.54	1.07	0.02	concrete part
19	M_x	7.05	1.39	291.89	1.56	-7.64	0.47	concrete part
16		-6.66	-1.09	302.19	-1.24	7.46	0.39	concrete part
34	M_y	-7.08	1.02	315.48	1.15	7.88	-0.45	concrete part
1		8.30	-0.49	313.32	-0.56	-9.11	-0.46	concrete part
19	M_z	7.05	1.39	291.89	1.56	-7.64	0.47	concrete part
1		8.30	-0.49	313.32	-0.56	-9.11	-0.46	concrete part
	Gq	LC2 - My load case						
		Sum of loads and the sum of support forces						
		P_X [kN]	P_Y [kN]	P_Z [kN]				
Σ		0.00	0.00	2612.92	Loads			
Σ		0.00	0.00	2612.92	Support Forces			
	Qs	LC4 - My load case						
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
4		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
7		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
10		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
13		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
16		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
19		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
22		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
25		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
28		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
31		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
34		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	Qs	LC4 - My load case						
		Total max/min values with corresponding values						
1	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	Qs	LC4 - My load case						
		Sum of loads and the sum of support forces						
		P_X [kN]	P_Y [kN]	P_Z [kN]				
Σ		0.00	0.00	0.00	Loads			
Σ		0.00	0.00	0.00	Support Forces			
	G	LC6 - Stability						
1		-1.34	-2.63	91.28	-3.06	1.59	-0.02	concrete part
4		-0.09	-3.63	123.65	-4.22	0.11	0.00	concrete part
7		0.00	-3.66	125.49	-4.26	-0.01	0.00	concrete part

10.3 NODES - SUPPORT FORCES

Static Analysis

Node No.		Support Forces P_x [kN]	P_y [kN]	P_z [kN]	Support Moments M_x [kNm]	M_y [kNm]	M_z [kNm]	Node Comment Cor. Loading
10		-0.02	-3.67	125.81	-4.27	0.01	0.00	concrete part
13		0.04	-3.64	127.42	-4.24	-0.05	0.00	concrete part
16		1.39	-2.69	94.89	-3.13	-1.65	0.02	concrete part
19		-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
22		-0.07	3.60	125.69	4.21	0.09	0.00	concrete part
25		0.02	3.67	125.63	4.28	-0.02	0.00	concrete part
28		-0.01	3.68	125.81	4.29	0.01	0.00	concrete part
31		0.04	3.65	127.41	4.25	-0.06	0.00	concrete part
34		1.39	2.69	94.89	3.13	-1.65	-0.02	concrete part
	G	LC6 - Stability						
	Total max/min values with corresponding values							
16	P_x	1.39	-2.69	94.89	-3.13	-1.65	0.02	concrete part
19		-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
28	P_y	-0.01	3.68	125.81	4.29	0.01	0.00	concrete part
10		-0.02	-3.67	125.81	-4.27	0.01	0.00	concrete part
13	P_z	0.04	-3.64	127.42	-4.24	-0.05	0.00	concrete part
1		-1.34	-2.63	91.28	-3.06	1.59	-0.02	concrete part
28	M_x	-0.01	3.68	125.81	4.29	0.01	0.00	concrete part
10		-0.02	-3.67	125.81	-4.27	0.01	0.00	concrete part
19	M_y	-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
34		1.39	2.69	94.89	3.13	-1.65	-0.02	concrete part
19	M_z	-1.34	2.63	92.21	3.07	1.59	0.02	concrete part
1		-1.34	-2.63	91.28	-3.06	1.59	-0.02	concrete part
	G	LC6 - Stability						
	Sum of loads and the sum of support forces							
		P_X [kN]	P_Y [kN]	P_Z [kN]				
Σ		0.00	0.00	1380.19	Loads			
Σ		0.00	0.00	1380.19	Support Forces			
	EQU	CO1 - ScriptedCombination						
1		10.96	-4.28	594.37	-4.98	-11.88	-0.73	concrete part
4		-1.26	-5.68	398.38	-6.52	1.85	0.03	concrete part
7		-0.36	-5.78	420.26	-6.62	0.65	0.00	concrete part
10		-0.04	-5.73	419.18	-6.59	0.14	-0.01	concrete part
13		0.20	-5.62	409.87	-6.51	-0.28	-0.03	concrete part
16		-8.26	-5.27	581.63	-6.09	9.15	0.62	concrete part
19		8.98	5.66	562.49	6.51	-9.54	0.75	concrete part
22		-1.54	4.13	482.49	4.96	2.19	-0.04	concrete part
25		-0.09	5.92	444.72	7.03	0.33	-0.01	concrete part
28		0.01	5.85	439.01	6.93	0.04	-0.01	concrete part
31		0.35	5.62	428.57	6.62	-0.53	-0.02	concrete part
34		-8.95	5.16	601.57	5.95	9.85	-0.71	concrete part
	EQU	CO1 - ScriptedCombination						
	Total max/min values with corresponding values							
1	P_x	10.96	-4.28	594.37	-4.98	-11.88	-0.73	concrete part
34		-8.95	5.16	601.57	5.95	9.85	-0.71	concrete part
25	P_y	-0.09	5.92	444.72	7.03	0.33	-0.01	concrete part
7		-0.36	-5.78	420.26	-6.62	0.65	0.00	concrete part
34	P_z	-8.95	5.16	601.57	5.95	9.85	-0.71	concrete part
4		-1.26	-5.68	398.38	-6.52	1.85	0.03	concrete part
25	M_x	-0.09	5.92	444.72	7.03	0.33	-0.01	concrete part
7		-0.36	-5.78	420.26	-6.62	0.65	0.00	concrete part
34	M_y	-8.95	5.16	601.57	5.95	9.85	-0.71	concrete part
1		10.96	-4.28	594.37	-4.98	-11.88	-0.73	concrete part
19	M_z	8.98	5.66	562.49	6.51	-9.54	0.75	concrete part
1		10.96	-4.28	594.37	-4.98	-11.88	-0.73	concrete part
	EQU	CO1 - ScriptedCombination						
	Sum of loads and the sum of support forces							
		P_X [kN]	P_Y [kN]	P_Z [kN]				
Σ		0.00	0.00	5782.54	Loads			
Σ		0.00	0.00	5782.54	Support Forces			

10.4 MEMBERS - INTERNAL FORCES BY SECTION

Static Analysis

Section No.	Member No.	Node No.	Location x [m]		Forces [kN] N	V_y / V_u	V_z / V_v	Moments [kNm] M_T	M_y / M_u	M_z / M_v	Member Comment Cor. Loading
	G	LC1 - SelfWeight									
	Total max/min values with corresponding values										
1	26	21	4.000	N	-0.09	0.00	-0.36	0.00	-0.14	0.00	
3	9	13	0.000		-127.42	-3.64	0.04	0.00	-0.05	-4.24	
3	19		1.080	V_y / V_u	-119.06	3.68	-0.01	0.00	-0.01	0.32	
3	7		1.080		-119.06	-3.67	-0.02	0.00	0.00	-0.31	

10.4 MEMBERS - INTERNAL FORCES BY SECTION

Static Analysis

Section No.	Member No.	Node No.	Location x [m]		Forces [kN] N	Forces [kN] V_y / V_u	Forces [kN] V_z / V_v	Moments [kNm] M_T	Moments [kNm] M_y / M_u	Moments [kNm] M_z / M_v	Member Comment Cor. Loading
2	33	14	0.000	V_z / V_v	-2.44	-0.02	65.84	0.14	-7.13	0.00	
2	33	32	4.000		-2.44	0.02	-65.84	-0.14	-7.13	0.00	
2	25	20	4.000	M_T	-2.55	0.72	-44.62	5.09	-5.80	0.10	
2	25	2	0.000		-2.44	-0.70	44.37	-5.25	-6.19	0.10	
2	31		2.000 ½	M_y / M_u	-1.32	0.00	0.00	0.00	51.36	0.00	
5	37	3	0.000		-3.07	0.01	9.40	0.02	-8.54	0.14	
3	7	11	3.600	M_z / M_v	-103.31	-3.66	-0.02	0.00	-0.05	8.94	
3	19	29	3.600		-103.31	3.67	-0.01	0.00	-0.04	-8.95	
					Gq LC2 - My load case						
					Total max/min values with corresponding values						
2	27	23	4.000	N	8.72	-1.75	-16.70	-0.66	-17.50	-0.29	
3	23	34	0.000		-315.48	1.02	-7.08	0.45	7.88	1.15	
4	24		1.333 ⅓	V_y / V_u	-202.62	38.62	-6.35	0.09	-0.82	-1.66	
4	2		1.333 ⅓		-201.23	-42.94	13.61	0.19	-2.83	-2.30	
5	38	21	0.000	V_z / V_v	-34.96	-0.17	100.83	0.23	-98.68	0.19	
5	37	18	15.000		-31.94	0.01	-126.06	-0.30	-95.70	-0.34	
2	25	20	4.000	M_T	-6.13	15.08	-30.62	27.07	-4.15	1.67	
2	25	2	0.000		1.06	-15.71	31.32	-30.42	-19.05	1.92	
5	37		7.500 ½	M_y / M_u	-35.15	0.20	6.07	-0.27	332.33	1.06	
5	38	36	15.000		-34.17	0.27	-125.91	0.24	-98.89	-0.61	
4	2	3	4.000	M_z / M_v	-158.19	-37.19	13.03	0.57	32.97	106.46	
4	24	36	4.000		-159.37	33.11	-6.00	0.27	-17.39	-98.88	
					Qs LC4 - My load case						
					Total max/min values with corresponding values						
3	1	1	0.000	N	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000	V_y / V_u	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000	V_z / V_v	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000	M_T	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000	M_y / M_u	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000	M_z / M_v	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
					G LC6 - Stability						
					Total max/min values with corresponding values						
1	26	21	4.000	N	-0.09	0.00	-0.36	0.00	-0.14	0.00	
3	9	13	0.000		-127.42	-3.64	0.04	0.00	-0.05	-4.24	
3	19		1.080	V_y / V_u	-119.06	3.68	-0.01	0.00	-0.01	0.32	
3	7		1.080		-119.06	-3.67	-0.02	0.00	0.00	-0.31	
2	33	14	0.000	V_z / V_v	-2.44	-0.02	65.84	0.14	-7.13	0.00	
2	33	32	4.000		-2.44	0.02	-65.84	-0.14	-7.13	0.00	
2	25	20	4.000	M_T	-2.55	0.72	-44.62	5.09	-5.80	0.10	
2	25	2	0.000		-2.44	-0.70	44.37	-5.25	-6.19	0.10	
2	31		2.000 ½	M_y / M_u	-1.32	0.00	0.00	0.00	51.36	0.00	
5	37	3	0.000		-3.07	0.01	9.40	0.02	-8.54	0.14	
3	7	11	3.600	M_z / M_v	-103.31	-3.66	-0.02	0.00	-0.05	8.94	
3	19	29	3.600		-103.31	3.67	-0.01	0.00	-0.04	-8.95	
					EQU CO1 - ScriptedCombination						
					Total max/min values with corresponding values						
2	27	23	4.000	N	10.06	-2.73	-112.06	-0.37	-36.51	-0.45	
3	23	34	0.000		-601.57	5.16	-8.95	0.71	9.85	5.95	
4	24		1.333 ⅓	V_y / V_u	-318.95	64.14	-9.85	0.23	-0.99	-2.72	
4	2		1.333 ⅓		-317.23	-71.15	21.17	0.49	-5.11	-3.73	
5	38	21	0.000	V_z / V_v	-54.25	-0.48	164.88	0.38	-159.18	0.11	
5	37	18	15.000		-48.69	-0.10	-202.55	-0.42	-153.41	-0.47	
2	25	20	4.000	M_T	-12.86	23.79	-106.16	48.47	-13.50	2.66	
2	25	2	0.000		-1.64	-24.71	107.51	-54.11	-37.67	3.05	
5	37		7.500 ½	M_y / M_u	-57.08	0.35	9.24	-0.33	540.52	1.93	
5	38	21	0.000		-54.25	-0.48	164.88	0.38	-159.18	0.11	
4	2	3	4.000	M_z / M_v	-251.99	-56.26	19.77	1.45	50.19	171.09	

10.4 MEMBERS - INTERNAL FORCES BY SECTION

Static Analysis

Section No.	Member No.	Node No.	Location x [m]		Forces [kN] N	Forces [kN] V_y / V_u	Forces [kN] V_z / V_v	Moments [kNm] M_T	Moments [kNm] M_y / M_u	Moments [kNm] M_z / M_v	Member Comment Cor. Loading
4	24	36	4.000	M_z / M_v	-253.16	49.88	-9.02	0.67	-26.39	-158.79	

11 Stability Analysis Results

11.1 CRITICAL LOAD FACTORS

Stability Analysis

Mode No.	Critical Load Factor f [--]	Magnification Factor α [--]
	LC1 - SelfWeight	
1	218.022	1.005
2	243.650	1.004
3	321.588	1.003
4	322.976	1.003
	LC6 - Stability	
1	218.022	1.005
2	243.650	1.004
3	321.588	1.003
4	322.976	1.003

12 Modal Analysis Results

12.1 NATURAL FREQUENCIES

Modal Analysis

Mode No.	Eigenvalue λ [1/s²]	Angular Frequency ω [rad/s]	Natural Frequency f [Hz]	Natural Period T [s]
	LC10 - My load case for modal analysis			
1	29.536	5.435	0.865	1.156
2	29.613	5.442	0.866	1.155
3	29.625	5.443	0.866	1.154
4	32.366	5.689	0.905	1.104
5	32.928	5.738	0.913	1.095

12.2 EFFECTIVE MODAL MASSES

Modal Analysis

Mode No.	Modal Mass M_i [kg]	Transl. Eff. Modal Mass [kg] m_{eX}	m_{eY}	m_{eZ}	Rotat. Eff. Modal Mass [kgm²] $m_{e\varphi X}$	$m_{e\varphi Y}$	$m_{e\varphi Z}$	Transl. Eff. Modal Mass Factor [--] f_{meX}	f_{meY}	f_{meZ}	Rotat. Eff. Modal Mass Factor [--] $f_{m\varphi X}$	$f_{m\varphi Y}$	$f_{m\varphi Z}$
	LC10 - My load case for modal analysis												
1	18808.9	29424.8	0.6	0.0	3.55	168246.00	65344.40	0.113	0.000	0.000	0.000	0.017	0.007
2	9357.5	99.2	0.0	0.0	0.03	564.89	207.94	0.000	0.000	0.000	0.000	0.000	0.000
3	13212.3	0.1	0.0	0.0	0.00	0.33	0.03	0.000	0.000	0.000	0.000	0.000	0.000
4	31799.4	77979.2	474.5	0.0	2737.63	445929.00	1079.83	0.298	0.002	0.000	0.001	0.044	0.000
5	13546.6	3141.7	34.0	0.0	196.09	17829.50	100259.00	0.012	0.000	0.000	0.000	0.002	0.011
Σ	86724.8	110645.0	509.1	0.0	2937.31	632570.00	166891.00	0.423	0.002	0.000	0.001	0.063	0.018
Σ_M		261300.0	261300.0	261300.0	2734430.00	10068900.00	9233480.00						
%		42.34 %	0.19 %	0.00 %	0.11 %	6.28 %	1.81 %						

13 Spectral Analysis Results

13.1 SUMMARY

Spectral Analysis

Description	Value	Unit	Notes
LC20 - Spectral | Z			
Maximum deformations			
Maximum displacement in X-direction	0.0	mm	Member No. 16, x: 4.000 m
Maximum displacement in Y-direction	0.0	mm	
Maximum displacement in Z-direction	0.0	mm	
Maximum vectorial displacement	0.0	mm	Member No. 16, x: 4.000 m
Maximum rotation about X-axis	0.0	mrad	
Maximum rotation about Y-axis	0.0	mrad	
Maximum rotation about Z-axis	0.0	mrad	

13.2 NODES - SUPPORT FORCES

Spectral Analysis

Node No.		Support Forces [kN] P_x	P_y	P_z	Support Moments [kNm] M_x	M_y	M_z	Node Comment / Cor. Loading
	AE LC20 - Spectral | Z							
1	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
1		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
4	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
4		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
7	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
7		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
10	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
10		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
13	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part

13.2 NODES - SUPPORT FORCES

Spectral Analysis

Node No.		Support Forces [kN] P_x	P_y	P_z	Support Moments [kNm] M_x	M_y	M_z	Node Comment / Cor. Loading
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
13		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
16	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
16		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
19	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
19		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
22	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
22		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
25	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
25		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
28	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part

13.2 NODES - SUPPORT FORCES

Spectral Analysis

Node No.		Support Forces [kN] P_x	P_y	P_z	Support Moments [kNm] M_x	M_y	M_z	Node Comment Cor. Loading
28	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
28		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
31	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
31		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
34	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
Extremes		0.00	0.00	0.00	0.00	0.00	0.00	
34		0.00	0.00	0.00	0.00	0.00	0.00	
	AE LC20 - Spectral | Z							
	Total max/min values with corresponding values							
25	P_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
25		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
34	P_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
34		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1	P_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
1		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
34	M_x	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
34		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
25	M_y	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
25		0.00	0.00	0.00	0.00	0.00	0.00	concrete part
16	M_z	0.00	0.00	0.00	0.00	0.00	0.00	concrete part
16		0.00	0.00	0.00	0.00	0.00	0.00	concrete part

13.3 MEMBERS - INTERNAL FORCES BY SECTION

Spectral Analysis

Section No.	Member No.	Node No.	Location x [m]		Forces [kN] N	V_y / V_u	V_z / V_v	Moments [kNm] M_T	M_y / M_u	M_z / M_v	Member Comment Cor. Loading
	AE LC20 - Spectral | Z										
	Total max/min values with corresponding values										
3	1	1	0.000	N	0.00	0.00	0.00	0.00	0.00	0.00	
3	1	1	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
4	2	2	0.000	V_y / V_u	0.00	0.00	0.00	0.00	0.00	0.00	
4	2	2	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
2	25	2	0.000	V_z / V_v	0.00	0.00	0.00	0.00	0.00	0.00	
2	25	2	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
2	35	17	0.000	M_T	0.00	0.00	0.00	0.00	0.00	0.00	
2	35	17	0.000		0.00	0.00	0.00	0.00	0.00	0.00	
5	37	18	15.000	M_y / M_u	0.00	0.00	0.00	0.00	0.00	0.00	
5	37	18	15.000		0.00	0.00	0.00	0.00	0.00	0.00	
4	2	2	0.000	M_z / M_v	0.00	0.00	0.00	0.00	0.00	0.00	
4	2	2	0.000		0.00	0.00	0.00	0.00	0.00	0.00	

14 Concrete Design

14.1 OBJECTS TO DESIGN

	Object Type	Design All	Objects to Design: Selected	To Design	Removed	Not Valid / Deact.	Comment
	Members	☒	1-39			1-39	
	Surfaces	☒	1	1			
	Nodes	☒	1-40			1-40	

14.2 DESIGN SITUATIONS

DS No.	EN 1990 | Base + Timber | CEN | 2010-0 Design Situation Type	To Design	Active	EN 1992 | CEN | 2014-11 Design Situation Type	Combinations to Design for Enumeration Method
1	EQU ULS (EQU) - Permanent and transient	☒	☒	ULS ULS (STR/GEO) - Seismic	All

14.3 MATERIALS

Legend
- Concrete Settings
- Stiffness modification
- User-Defined Material

Material No.	Name	To Design	Material Type	Options	Comment
1	S235	☒	Steel		
2	C20/25	☒	Concrete	⚙	
3	B550S(A)	☒	Reinforcing Steel		
4	C24	☒	Timber	%	
5	EN AW-3004 H14	☒	Aluminum		
11	Gravel, closely graded	☒	Soil	✎	
12	Sand	☒	Soil	✎	
13	Clay, slightly plastic	☒	Soil	✎	

14.3.1 MATERIALS - CONCRETE SETTINGS

Material No.	Description	Symbol	Value	Unit	Comment
2	C20/25 | Isotropic | Linear Elastic				
	Maximum aggregate size	d_g	16.0	mm	
	Aggregate type		Quartzite (siliceous)		
	Cement class		N (normal)		
	Concrete type		Monolithic		

14.3.2 MATERIALS - TIME-DEPENDENT PROPERTIES OF CONCRETE

Legend
- Concrete Settings

Material No.	Description	Symbol	Value	Unit	Options
2	C20/25 | Isotropic | Linear Elastic				
	Creep		☐		⚙
	Shrinkage		☐		

14.4 SECTIONS

Legend
- Section is rotated and/or mirrored
- Thin-walled model
- Warping stiffness deactivated

Section No.	Name	Material	To Design	Section Type	Use Other Section for Design	Options
1	IPE 200	1	☒	Standardized - Steel	--	
2	R_M1 500/1000	2	☒	Parametric - Massive I	--	
3	SQ_M1 500	2	☒	Parametric - Massive I	--	
4	HEB 200	1	☒	Standardized - Steel	--	
5	SQ_M1 500	4	☒	Parametric - Massive I	--	
6	UU 150/75/125/8/6/12/0/0	5	☒	Parametric - Thin-Walled	--	
7	HEB 200	1	☒	Standardized - Steel	--	
8	TestRFEM	2	☒	General by RSECTION	--	
16	HEB 200	1	☒	Standardized - Steel	--	

14.5 THICKNESSES

Thick. No.	Name	Type	Material	To Design	Use Other Thick. d [mm] for Design
1	Uniform | d : 500.0 mm | 2 - C20/25	Uniform	2	☒	--

14.6 ULTIMATE CONFIGURATIONS

Config. No.	Name	Assigned to Nodes	Members	Member Sets	Surfaces	Surface Sets	Comment
2	ScriptedULSConfiguration		All		All		

14.6.1 ULTIMATE CONFIGURATIONS - SETTINGS - MEMBERS

Config. No.	Description	Symbol	Value	Unit
2	ScriptedULSConfiguration			
	Consider Internal Forces for Concrete Design			
	☒ Axial forces N_{Ed}			
	☒ Bending moments $M_{y,Ed}$			
	☒ Bending moments $M_{z,Ed}$			
	☒ Torsional moments $M_{T,Ed}$			
	☒ Shear forces $V_{y,Ed}$			
	☒ Shear forces $V_{z,Ed}$			
	Reductions of Internal Forces in z-Direction			
	☐ Consideration of limited moment redistribution of the supporting moments according to 5.5			
	☐ Reduction of the moments or dimensioning for the moments at the face of a monolithic support according to 5.3.2.2			
	☒ Reduction of the shear forces in the support face and distance d acc. to 6.2.1(8)			
	☐ Reduction of the shear forces with concentrated load acc. to 6.2.2(6) and 6.2.3(8)			
	☐ Consideration of minimum eccentricity acc. to 6.1(4)			
	Required Longitudinal Reinforcement			
	Reinforcement layout		Optimize provided reinforcement	
	☐ Distribute reinforcement evenly over complete slab width			
	☒ Include tensile force due to shear in required longitudinal reinforcement			
	Detailing and Particular Rules			
	☒ Minimum longitudinal reinforcement acc. to standard			
	☒ User-defined minimum longitudinal reinforcement area			
	☒ Minimum reinforcement area			
	Top reinforcement area	$A_{s,min,-z\ (top)}$	0.00	cm^2
	Bottom reinforcement area	$A_{s,min,+z\ (bottom)}$	0.00	cm^2
	Total reinforcement area	$A_{s,min,tot}$	0.00	cm^2
	☒ Minimum reinforcement percentage			
	Total reinforcement area	$\rho_{l,min,tot}$	0.00	%
	☒ Minimum shear reinforcement acc. to standard			
	☐ Compression longitudinal reinforcement for maximum stirrup spacing acc. to 9.2.1.2(3)			
	☒ Minimum construction reinforcement acc. to 9.2.1.2(1), 9.2.1.4(1)			
	☒ Design check for tensile force in longitudinal reinforcement, including tension due to shear acc. to 9.2.1.3(2)			
	Required Shear Reinforcement - Shear Capacity			
	◉ Use required longitudinal reinforcement			
	○ Use provided longitudinal reinforcement			
	○ Automatically increase required longitudinal reinf. to avoid shear reinf.			
	Shear Joint			
	☒ Design of shear joint			
	Analysis method for shear stress in joint			
	◉ Analytical with shear force $V_{z,Ed}$ and β-factor acc. to Eq. 6.24 ($M_{z,Ed}$ not considered)			
	○ General integration of axial stresses into section parts			
	☐ Fatigue or dynamic loads acc. to 6.2.5 (5)			
	Normal stress across joint surfaces (tension negative)	σ_n	0.000	N/mm^2
	☐ Design of flange connections on segmented cross-sections			
	Neutral Axis Depth Limitation			
	☐ Consider neutral axis depth limitation acc. to 5.6.2(2), 5.6.3(2)			
	Calculation Setting			
	☐ Net concrete area			
	Settings for Stability Design			
	Slenderness			
	Limiting slenderness about y-axis			
	☐ Determine factor A_y			
	☐ Determine factor B_y			
	☐ Determine factor C_y			

14.6.1 ULTIMATE CONFIGURATIONS - SETTINGS - MEMBERS

Config. No.	Description	Symbol	Value	Unit
	Limiting slenderness about z-axis			
	☐ Determine factor A_z			
	☐ Determine factor B_z			
	☐ Determine factor C_z			
	Load Distribution			
	☒ Structural system of isolated columns			
	Biaxial Bending			
	☐ Separate design in each principal direction acc. to 5.8.9			
	☐ Use simplified criterion acc. to Equation 5.39			
	Curvature for Required Reinforcement			
	◉ Factor K_r acc. to 5.8.8.3			
	○ User-Defined			
	Required Reinforcement			
	Reinforcement layout		Uniformly surrounding	
	Reinforcement diameter for preliminary design		Max of all	

14.6.2 ULTIMATE CONFIGURATIONS - SETTINGS - SURFACES

Config. No.	Description	Symbol	Value	Unit
2	ScriptedULSConfiguration			
	Design Method			
	○ No optimization of design internal forces (recommended for predominantly pressure-stressed components)			
	◉ Optimization of design internal forces (recommended for components subject to additional or tensile stress)			
	Internal Forces Diagram Used for Design			
	☒ Subtraction of rib components for the ULS calculation and for the analytic method of SLS calculation			
	Limits of Reinforcement Areas			
	☒ Minimum longitudinal reinforcement acc. to standard			
	◉ Minimum longitudinal reinforcement for plates acc. to 9.3.1			
	Direction of minimum reinforcement			
	◉ Direction with main tension in the element			
	○ Direction with main tension in the surface			
	○ Defined			
	○ Minimum longitudinal reinforcement for walls acc. to 9.6			
	☐ User-defined minimum longitudinal reinforcement percentage			
	☒ Maximum longitudinal reinforcement acc. to standard			
	◉ Maximum longitudinal reinforcement for plates acc. to 9.3.1			
	○ Maximum longitudinal reinforcement for walls acc. to 9.6			
	☐ User-defined maximum longitudinal reinforcement percentage			
	☒ Minimum shear reinforcement acc. to 9.3.2			
	☐ User-defined minimum shear reinforcement percentage			
	Required Longitudinal Reinforcement			
	☐ Include tensile force due to shear in required longitudinal reinforcement			
	Required Shear Reinforcement - Shear Capacity			
	◉ Use required longitudinal reinforcement			
	○ Use provided longitudinal reinforcement			
	○ Automatically increase required longitudinal reinf. to avoid shear reinf.			
	Neutral Axis Depth Limitation			
	☐ Consider neutral axis depth limitation acc. to 5.6.2(2), 5.6.3(2)			

14.6.3 ULTIMATE CONFIGURATIONS - SETTINGS - PUNCHING

Config. No.	Description	Symbol	Value	Unit
2	ScriptedULSConfiguration			
	Structural Element			
	Structural element type		Auto	
	Punching Load			
	Used punching load for columns		Single force from column / load / nodal support	
	Used punching load for walls		Smoothed shear force over the critical perimeter	

14.6.3 ULTIMATE CONFIGURATIONS - SETTINGS - PUNCHING

Config. No.	Description	Symbol	Value	Unit
	☐ Consider surface load inside critical perimeter			
	Deductible surface load for foundation		Automatically	
	Deductible portion		100.00	%
	Maximum distance of deductible surface		a_crit	
	☐ Deductible surface load for slab			
	Factor β			
	Applied method for determining factor β		6.4.3(3) - Full-plastic shear distribution	
	Basic control perimeter			
	☐ Define critical section for slab			
	☐ Define iterative critical section for foundation			
	Mean effective depth			
	☐ Define area for detection of effective depth			
	☐ Column penetration			
	Punching shear reinforcement			
	Minimum Spacing of Reinforcement Perimeters	$s_{r,min}$	0.100	m
	Required Punching Reinforcement - Punching Shear Capacity			
	○ Use provided longitudinal reinforcement			
	◉ Calculate required longitudinal reinforcement to avoid punching reinforcement or fulfill Eq. 6.52			
	Minimum Reinforcement Acc. to Standard.			
	☒ Minimum punching reinforcement acc. to 9.4.3(2)			

14.7 SERVICEABILITY CONFIGURATIONS

Config. No.	Name	Assigned to Nodes	Members	Member Sets	Surfaces	Surface Sets	Comment
2	ScriptedSLSConfiguration		All		All		

14.7.1 SERVICEABILITY CONFIGURATIONS - SETTINGS

Config. No.	Description	Symbol	Value	Unit
2	ScriptedSLSConfiguration			
	Stress Analysis			
	☐ Limitation of concrete pressure stress σ_c			
	☒ Limitation of steel stress σ_s			
	Crack Analysis			
	◉ Limit values of allowable crack width acc. to standard			
	Top (-z) limit values of allowable crack width		Automatically	
	Bottom (+z) limit values of allowable crack width		Automatically	
	○ User-defined limit values of allowable crack width			
	☒ Design without direct crack width calculation			
	☒ Calculation of limit diameter lim d_s			
	☒ Calculation of maximum member spacing lim s_l			
	☒ Design with direct crack width calculation			
	☐ Use Eq. (7.14) for $s_{r,max}$			
	Effective concrete tensile strength at time of cracking	$k_{ct,eff,wk}$	1.000	--
	☐ Crack width control for $\sigma_{c,I,Ed} \le f_{ct,eff,wk}$			
	$A_{s,min}$ for Effects Due to Restraint			
	☒ Calculation of minimum reinforcement area $A_{s,min}$			
	Stress distribution within the section prior to cracking			
	◉ Depending on the defined load (k_c = 0.0 ... 1.0)			
	○ Approach of pure tension restraint (k_c = 1.0)			
	○ Approach of bending restraint (k_c = 0.4)			
	$A_{s,min}$ layout on member		Tension side	
	$A_{s,min}$ layout on surface			
	☒ Top (-z) reinforcement φ_1			
	☒ Top (-z) reinforcement φ_2			
	☒ Bottom (+z) reinforcement φ_1			
	☒ Bottom (+z) reinforcement φ_2			

14.7.1 SERVICEABILITY CONFIGURATIONS - SETTINGS

Config. No.	Description	Symbol	Value	Unit
	☐ Crack formation within the first 28 days			
	Deflection Analysis			
	☒ Limitation of deflection			
	Limit values of allowable deflection			
	Support on both sides			
	Quasi-permanent	L /	250	
	One-sided support			
	Quasi-permanent	L_c /	250	
	☒ Consider resistance of concrete between cracks (tension stiffening effect)			
	☐ Consider minimum value of distribution factor			
	Crack state detection			
	◉ Crack state calculated from associated load			
	○ Crack state determined as envelope from all SLS design situations			
	○ Crack state independent of load			