Preparation by	141/HAD	Verification by	141/DOV	Approval by	141/RIW
Date	04-08-2021	Date	04-08-2021	Date	04-08-2021

"For approval"

Expansion storage capacity TP03

Weight Calculation Service Building

Client	NESTE	Client project nr.	2307
Project	Expansion storage capacity TP03	KH Project nr.	68685
Location	Vlaardingen		
Unit	TP 03	Revision	0
Document nr.	2307-C50-CN-2028-0001	Date	04-08-2021

Revision	Description	Date
0	For Approval	04-08-2021

1 Index

Appendix	**Description**
Appendix A	Scia Engineer Output

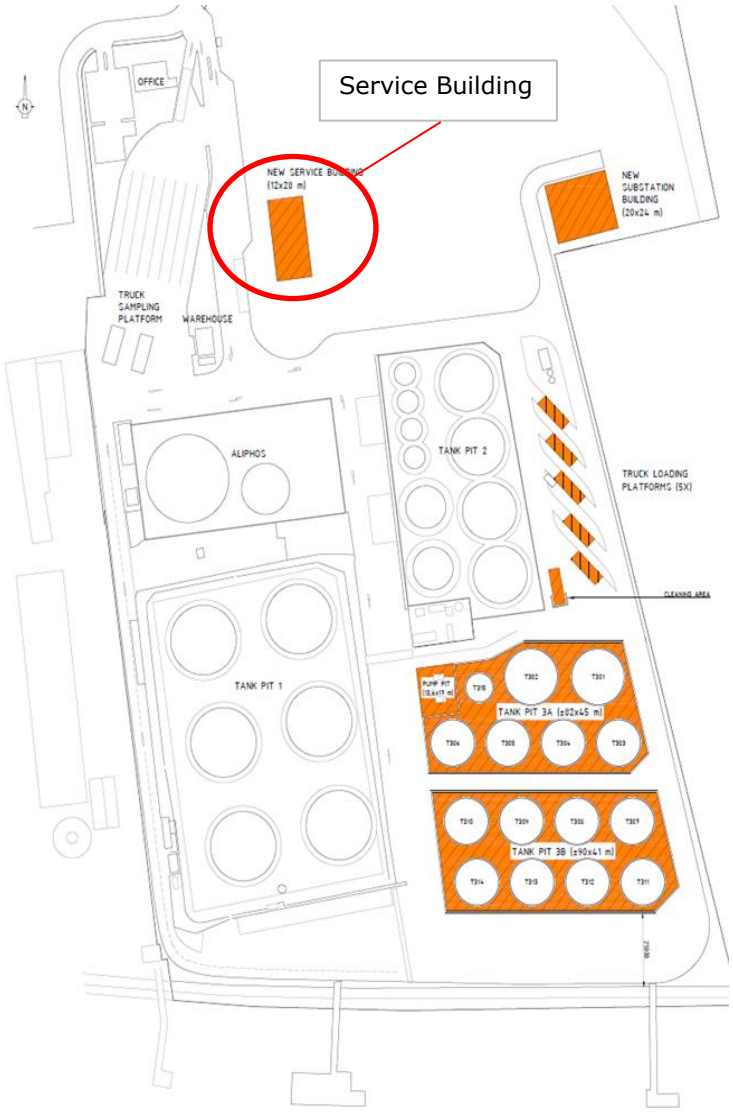
2 Intro

Neste Terminal in Rotterdam has the intention to expand the storage capacity of their tank terminal in Vlaardingen.

The expansion of the terminal consists of 15 tanks divided over two tank pits. There is a maintenance road between the two tank pits. Both tank pits are connected underground in order to guarantee the buffer capacity of the tank pits. The bundwall shall consist of either a retaining wall or sheet piling wall.

At the north-east side there is a new truck loading area with 5 bays.
The new tankpits are connected to the existing tankpit and new loading area by means of pipe racks.

On the north side of the new tankpits a recently built tankpit (built in 2017-2018) so called phase 1 is present. The tanks in this tank bund are founded on a crushed stone ring on a deep soil improvement. At the westside also tankpit is present which is built in approximately 40 years ago (1960).



This calculation sets out the weight calculation of the service building.

3 General

3.1 Standards

NEN-EN 1990+A1+A1/C2/NB:2019	Eurocode 0: Basis of structural design
NEN-EN 1991	Eurocode 1: Actions on structures
NEN-EN 1991-1-1+C1+C11:2019/NB:2019	General actions - Densities, self-weight, etc.
NEN-EN 1991-1-4+A1+C2:2011/NB:2019	General actions - Wind actions
NEN-EN 1991-1-5+C1:2011/NB:2019	General actions - Thermal actions
NEN-EN 1992	Eurocode 2: Design of concrete structures
NEN-EN 1992-1-1+C2:2011/NB+A1:2020	General rules and rules for buildings
NEN 9997-1:2016 /+C2:2017	Geotechnical design of structures - Part 1: General rules
2305-000-JSD-1700-04 Rev.4	Gereral rules for steel structure and civil works

3.2 Reference documents

drawings:

- 2307-C50-DW-1432-0001 Pilingplan Service building
- 2307-C50-DW-1842-0001 Plan drawing steel structure Service building
- 2307-C50-DW-2025-0002 Plan drawing Service building
- 2307-C50-DW-2058-0001 Ground floor plan and sections Service building

reports:

- FA01-D03-2101015 Geotechnical advice TP03 NESTE

3.3 Used programs

SCIA Engineer, version: 20.0.2028
Microsoft Office

3.4 Basis

consequence class	*CC2*	
reliability class	*RC2*	
design working life	*50*	Years

<u>materials</u>

concrete strength class	*C30/37*
reinforcing steel grade	*B500B*

<u>piles</u>

vibro piles Ø406/495
spring stiffness kv = 43 MN/m kh = 11 MN/m

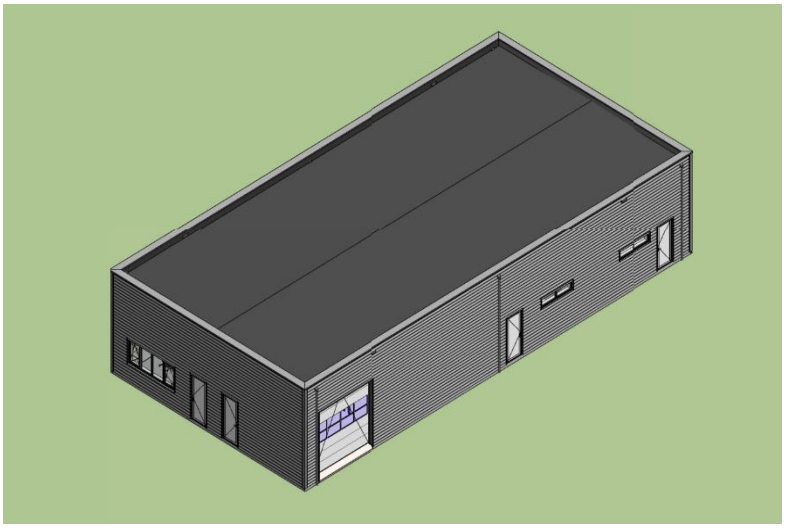
<u>deformations limits</u>

horizontal and vertical deflections quasi permanent $\omega_{lim} = l_{rep} / 250$

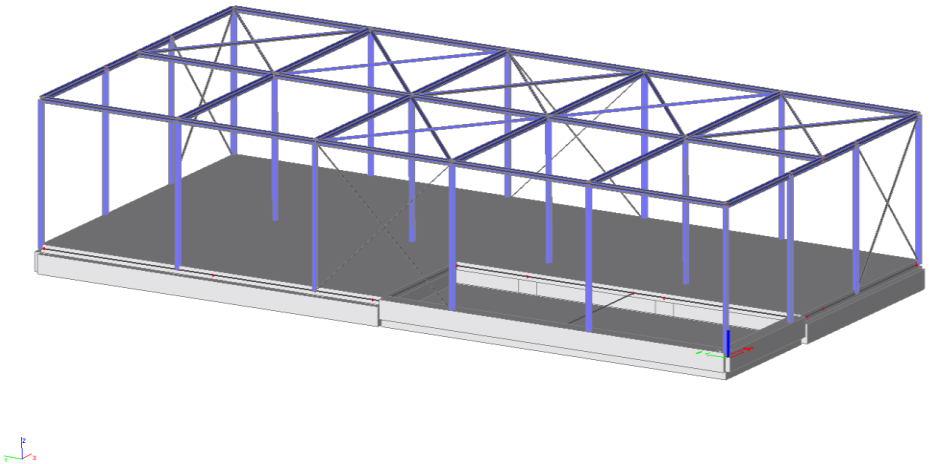
4 Calculation - Model

4.1 Model and assumptions

This calculations sets out the weight calculation of the Service building.
Outer dimensions 24,95m x 12,45m x 5,2m (L x W x H).
The service building is made out of a steel frame with a concrete foundation.
The foundation is a concrete frame with floor on piles.
Internal wall will be made out of sand lime stone.



3D impression of the Service building



3D impression of the main structure of the Service building

5 Loads

5.1 Dead load (DL1) - Self-weight

Self-weight will be calculated by the software

5.2 Dead load (DL2) - Self-weight

Roof (foil, isolation, steel roofing plates)					=	0,4	kN/m²
(135mm PIR + SAB 158R-750/1,25 + 1,5mm EPDM)							
Ceiling (unkown for this stage)					=	0,6	kN/m²
Walls - Sand lime stone	20 kN/m³	thickness = 100	mm		=	2,0	kN/m²
		height = 4,5	mm		=	9,0	kN/m
Outer walls (cladding and insulation)					=	0,2	kN/m²
Floor	20 kN/m²	thickness = 50	mm		=	1,0	kN/m²
False floor					=	0,5	kN/m²

5.3 Live load (LL) - Imposed floor load

Roof	Fk =	kN	qk	=	2	kN/m²
Floor - General	Fk = 7	kN	qk	=	4	kN/m²
Floor - Control house	Fk = 5	kN	qk	=	6	kN/m²
Floor - Storage	Fk = 10	kN	qk	=	7,5	kN/m²

5.4 Wind Load (W)

height	4	5	6	7	8	9	10	15	20	25	30	[m]
$q_p(z)$	0,74	0,81	0,87	0,93	0,98	1,01	1,05	1,21	1,32	1,41	1,49	[kN/m²]

Building dimensions

Building height		=	5,2	m
the height of 6 m is used for the calculation for additonal items on the roof				
Building with		=	12,5	m
Building length		=	25,0	m

interal pressure is also taken into account -0,3 or +0,2

Wind load is applied in SCIA as an pressure coefficient, SCIA combines this with pressure.

5.4.1 Wind load N --> S // S--> N

e = smallest of b or 2h = 10,4 m

into taken account internal pressure			+0,2	-0,30			
Zone A		$c_{pe,10}$ =	-1,20	-1,40	-0,90	=	2,1 m
Zone A/B	averaged first area	$c_{pe,10}$ =	-0,97	-1,17	-0,67		
Zone B		$c_{pe,10}$ =	-0,80	-1,00	-0,50	=	8,3 m
Zone B/C	averaged first area	$c_{pe,10}$ =	-0,54	-0,74	-0,24		
Zone C		$c_{pe,10}$ =	-0,50	-0,70	-0,20	=	14,6 m
Zone D		$c_{pe,10}$ =	0,80	0,60	1,10		
Zone E		$c_{pe,10}$ =	-0,50	-0,70	-0,20		

Zone F	$c_{pe,10}$ =	-1,40	-1,60	-1,10	b	=	2,6	m
					d	=	1,0	m
Zone G	$c_{pe,10}$ =	-0,90	-1,10	-0,60	b	=	19,8	m
					d	=	1,0	m
Zone H	$c_{pe,10}$ =	-0,70	-0,90	-0,40	d	=	4,2	m
Zone F/G/H averaged first area	$c_{pe,10}$ =	-0,76	-0,96	-0,46				
Zone I	$c_{pe,10}$ =	-0,20	-0,40	0,10	d	=	19,8	m
	$c_{pe,10}$ =	0,20	0,00	0,50				
Zone F/G/H/I averaged 2nd area	$c_{pe,10}$ =	0,26	0,06	0,56				

5.4.1 Wind load E --> W // W--> E

Building height = 5,2 m

the height of 6 m is used for the calculation for additonal items on the roof

Building length = 12,5 m

Building with = 25,0

e = smallest of b or 2h = 10,4 m

into taken account internal pressure			+0,2	-0,30			
Zone A	$c_{pe,10}$ =	-1,20	-1,40	-0,90	=	2,1	m
Zone A/B averaged first area	$c_{pe,10}$ =	-1,01	-1,21	-0,71			
Zone B	$c_{pe,10}$ =	-0,80	-1,00	-0,50	=	8,3	m
Zone D	$c_{pe,10}$ =	0,80	0,60	1,10			
Zone E	$c_{pe,10}$ =	-0,50	-0,70	-0,20			

Zone F	$c_{pe,10}$ =	-1,40	-1,60	-1,10	b	=	2,6	m
					d	=	1,0	m
Zone G	$c_{pe,10}$ =	-0,90	-1,10	-0,60	b	=	19,8	m
					d	=	1,0	m
Zone H	$c_{pe,10}$ =	-0,70	-0,90	-0,40	d	=	4,2	m
Zone F/G/H averaged first area	$c_{pe,10}$ =	-0,96	-1,16	-0,66				
Zone I	$c_{pe,10}$ =	-0,20	-0,40	0,10	d	=	7,3	m
	$c_{pe,10}$ =	0,20	0,00	0,50				
Zone F/G/H/I averaged 2nd area	$c_{pe,10}$ =	0,26	0,06	0,56				

6 Results

6.1 Piling loads

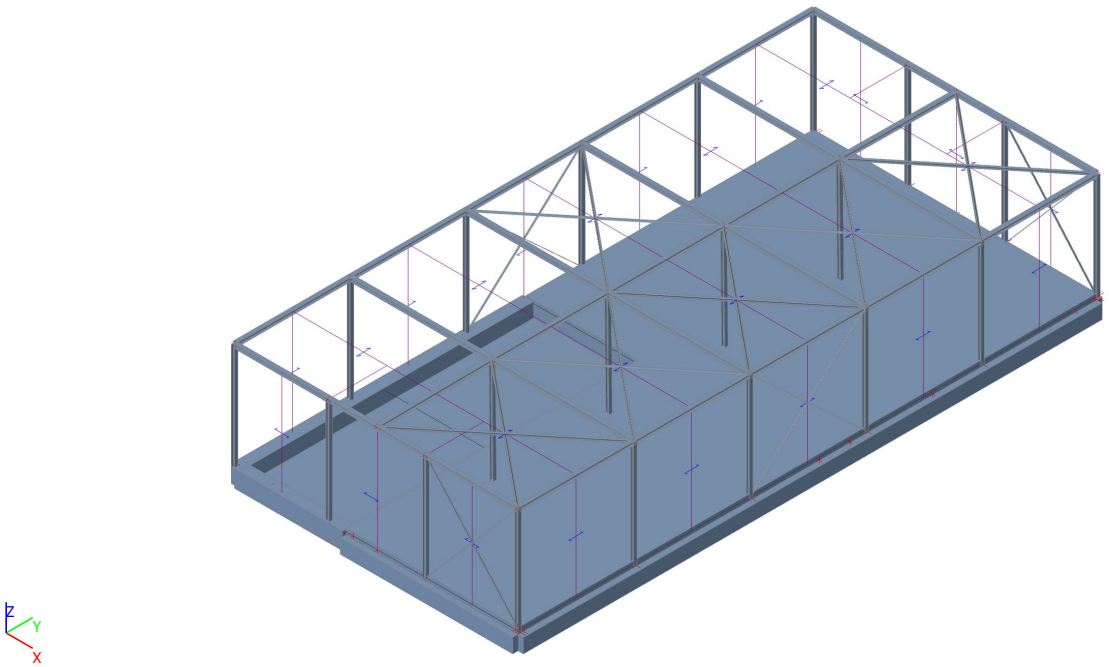
	Occuring ULS [kN]		Allowable ULS [kN]	
vertical compression	577	<	650	**OKÉ**
vertical tension	0	<	0	**OKÉ**
horizontal	18	<	20	**OKÉ**

Appendix A

KH Engineering

1. Table of contents

2. General



2.1. Project

Licence name	KH Engineering
Project	NESTE
Part	Service Building
Description	-
Author	HAD
Date	03.08.2021
Structure	General XYZ
No. of nodes :	122
No. of beams :	77
No. of slabs :	2
No. of solids :	0
No. of used profiles :	6
No. of load cases :	18
No. of used materials :	2
Acceleration of gravity [m/s^2]	10,000
National code	EC - EN

2.2. Setup manager

Psi factors

Load	Psi0	Psi1	Psi2
CategoryA	0.4	0.5	0.3
CategoryB	0.5	0.5	0.3
CategoryC	0.6	0.7	0.6
CategoryD	0.4	0.7	0.6
CategoryE	1	0.9	0.8
CategoryF	0.7	0.7	0.6
CategoryG	0.7	0.5	0.3
CategoryH	0	0	0
Snow	0	0.2	0
Wind	0	0.2	0
Temperature	0	0.5	0
Rain water	0	0	0
Construction loads	1	0	0.2

Load combination factors

Permanent action - unfavorable	1,35
Permanent action - favorable [-]	0,90
Leading variable action	1,50
Accompanying variable action	1,50
Reduction factor ksi [-]	0,89

Permanent action - unfavorable	1,00
Permanent action - favorable	1,00
Leading variable action	1,30
Accompanying variable action	1,30

Reliability class

Reliability class	RC2
RC1 [-]	0,90
RC2 [-]	1,00
RC3 [-]	1,10
RC1 [-]	1,00
RC2 [-]	1,00
RC3 [-]	1,00

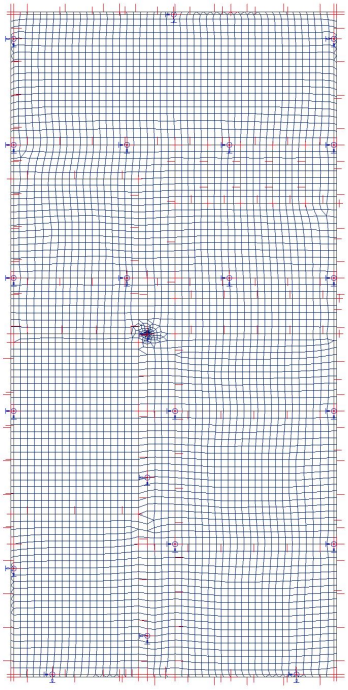
2.3. Solver setup

Name	SolverSetup1
Neglect shear force deformation (Ay, Az >> A)	×
Initial stress	×
Number of thicknesses of rib plate	20
Maximum soil interaction iterations	10
Maximum iterations	20
Number of increments	1
Number of buckling modes	2
Number of sections on average member	10
Step for soil/water pressure [m]	0,500
C1x [MN/m ^{3}]	1,0000e-01
C1y [MN/m ^{3}]	1,0000e-01
C1z [MN/m ^{3}]	1,0000e+01
C2x [MN/m]	5,0000e+00
C2y [MN/m]	5,0000e+00
Coefficient for reinforcement	1
Warning when maximal translation is greater than [mm]	1000,0
Warning when maximal rotation is greater than [mrad]	100,0
Parallelism tolerance [deg]	10,00
Verhouding tot helft - afstand tot aanliggende ligger beff,i/bi [-]	0,20
Verhouding tot effectieve overspanningslengte beff,i/l0 [-]	0,10
Maximale verhouding tot effectieve overspanningslengte beff,i/l0 [-]	0,20
Enkelvoudig opgelegde ligger [-]	1,00
Inwendige overspanning [-]	0,70
Eind overspanning [-]	0,85
Uitkraging, basisverhouding tot huidige overspanning [-]	1,00
Uitkraging, basisverhouding tot aangrenzende overspanning [-]	0,15
Uitkraging, maximale verhouding tot huidige overspanning [-]	1,50
Maximale aangrenzende overspanninglengteverhouding [-]	1,50
Maximale uitkragingslengteverhouding tot aangrenzende overspanning [-]	0,50
Span length ratio Le/beff,i,max (1 side) [-]	8,00
Simply supported beam [-]	1,00
Inner span [-]	0,70
End span [-]	0,85
Cantilever [-]	2,00
Methode gebruikt voor niet-beton en niet-staal / staalbetonliggers	EN 1994-1-1
Solver precision ratio	1
Soil combination	None
Bending theory of plate/shell analysis	Mindlin
Type of solver	Direct
Type of eigen value solver	Lanczos
Method of calculation	Picard

2.4. Mesh setup

Name	NetInstelling1
Generation of eccentric elements on members with variable height	×
Generation of nodes in connections of beam elements	×
Elastic mesh	✓
Use automatic mesh refinement	×
Connect members/nodes	✓
Division on haunches and arbitrary members	5
Division for 2D-1D upgrade	50
Average number of tiles of 1d element	1
Average size of 2d element/curved element [m]	0,250
Minimal length of beam element [m]	0,100
Maximal length of beam element [m]	1000,000
Average size of cables, tendons, elements on subsoil, nonlinear soil spring [m]	1,000
Maximal out of plane angle of a quadrilateral [mrad]	30,0
Predefined mesh ratio	1.5
Minimal distance between definition point and line [m]	0.001

Average size of panel element [m]	1,000
Mesh refinement following the beam type	None
Definition of mesh element size for panels	Manual



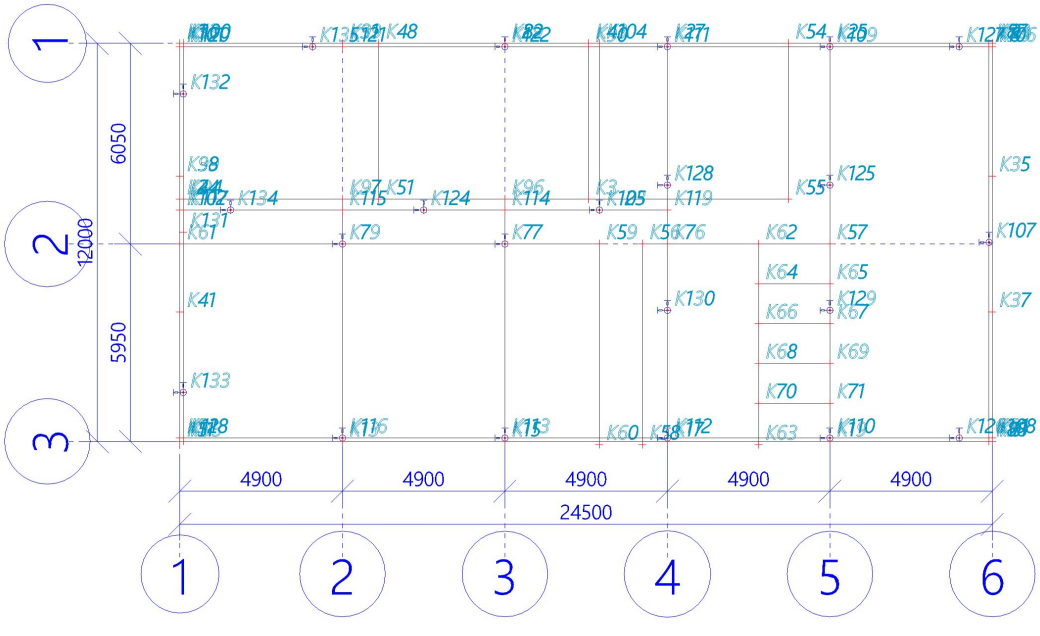
3. Structure

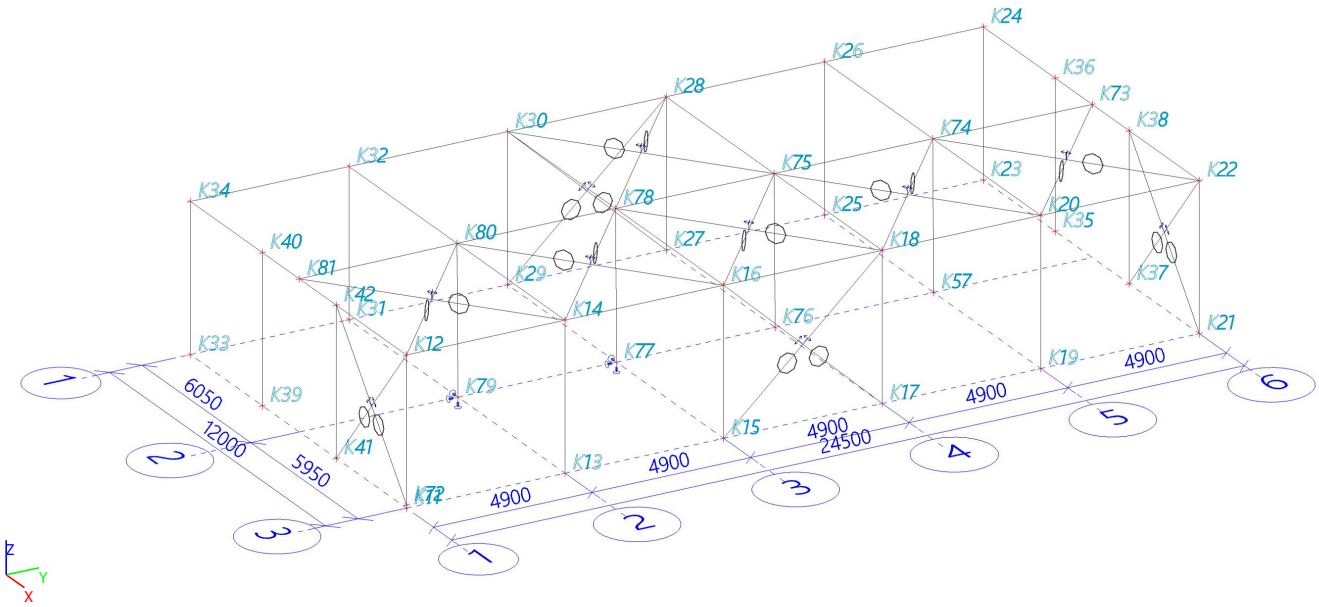
3.1. Nodes

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
K1	0,225	0,225	0,000
K2	4,925	0,225	0,000
K3	4,925	12,550	0,000
K4	0,225	12,550	0,000
K5	12,225	0,225	0,000
K6	12,225	24,725	0,000
K7	0,225	24,725	0,000
K11	12,225	0,225	0,000
K12	12,225	0,225	4,500
K13	12,225	5,125	0,000
K14	12,225	5,125	4,500
K15	12,225	10,025	0,000
K16	12,225	10,025	4,500
K17	12,225	14,925	0,000
K18	12,225	14,925	4,500
K19	12,225	19,825	0,000
K20	12,225	19,825	4,500
K21	12,225	24,725	0,000
K22	12,225	24,725	4,500
K23	0,225	24,725	0,000
K24	0,225	24,725	4,500
K25	0,225	19,825	0,000
K26	0,225	19,825	4,500
K27	0,225	14,925	0,000
K28	0,225	14,925	4,500
K29	0,225	10,025	0,000
K30	0,225	10,025	4,500
K31	0,225	5,125	0,000
K32	0,225	5,125	4,500
K33	0,225	0,225	0,000
K34	0,225	0,225	4,500
K35	4,225	24,725	0,000
K36	4,225	24,725	4,500
K37	8,325	24,725	0,000
K38	8,325	24,725	4,500
K39	4,225	0,225	0,000
K40	4,225	0,225	4,500
K41	8,325	0,225	0,000
K42	8,325	0,225	4,500
K43	0,225	12,550	0,000
K44	4,925	0,225	0,000

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
K45	4,925	0,225	0,000
K48	0,225	6,225	0,000
K51	4,925	6,225	0,000
K54	0,225	18,575	0,000
K55	4,925	18,575	0,000
K56	6,275	14,175	0,000
K57	6,275	19,825	0,000
K58	12,325	14,175	0,000
K59	6,275	12,875	0,000
K60	12,325	12,875	0,000
K61	6,275	0,225	0,000
K62	6,275	17,675	0,000
K63	12,325	17,675	0,000
K64	7,475	17,675	0,000
K65	7,475	19,825	0,000
K66	8,675	17,675	0,000
K67	8,675	19,825	0,000
K68	9,875	17,675	0,000
K69	9,875	19,825	0,000
K70	11,075	17,675	0,000
K71	11,075	19,825	0,000
K72	12,225	0,225	0,094
K73	6,275	24,725	4,500
K74	6,225	19,825	4,500
K75	6,225	14,925	4,500
K76	6,275	14,925	0,000
K77	6,275	10,025	0,000
K78	6,225	10,025	4,500
K79	6,275	5,125	0,000
K80	6,225	5,125	4,500
K81	6,275	0,225	4,500
K82	0,225	10,025	0,000
K84	0,225	12,475	0,000
K85	0,225	12,475	0,000
K87	0,225	24,625	0,000
K88	12,225	24,625	0,000
K89	0,325	24,725	0,000
K90	0,325	12,550	0,000
K91	12,125	24,725	0,000
K92	12,125	0,225	0,000
K93	12,225	0,325	0,000

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
K94	4,925	0,325	0,000
K96	4,925	10,025	0,000
K97	4,925	5,125	0,000
K98	4,225	0,225	0,000
K99	0,225	5,125	0,000
K100	0,225	0,325	0,000
K101	0,325	0,225	0,000
K102	5,250	0,225	0,000
K104	0,225	12,875	0,000
K105	5,250	12,875	0,000
K106	0,325	24,625	0,000
K107	6,225	24,625	0,000
K108	12,125	24,625	0,000
K109	0,325	19,825	0,000
K110	12,125	19,825	0,000
K111	0,325	14,925	0,000
K112	12,125	14,925	0,000
K113	12,125	10,025	0,000
K114	5,250	10,025	0,000
K115	5,250	5,125	0,000
K116	12,125	5,125	0,000
K117	5,250	0,325	0,000
K118	12,125	0,325	0,000
K119	5,250	14,925	0,000
K120	0,325	0,325	0,000
K121	0,325	5,125	0,000
K122	0,325	10,025	0,000
K123	5,253	12,875	0,000
K124	5,250	7,575	0,000
K125	4,500	19,825	0,000
K126	12,125	23,725	0,000
K127	0,325	23,725	0,000
K128	4,500	14,925	0,000
K129	8,275	19,825	0,000
K130	8,275	14,925	0,000
K131	5,925	0,325	0,000
K132	1,750	0,325	0,000
K133	10,750	0,325	0,000
K134	5,250	1,750	0,000
K135	0,325	4,225	0,000



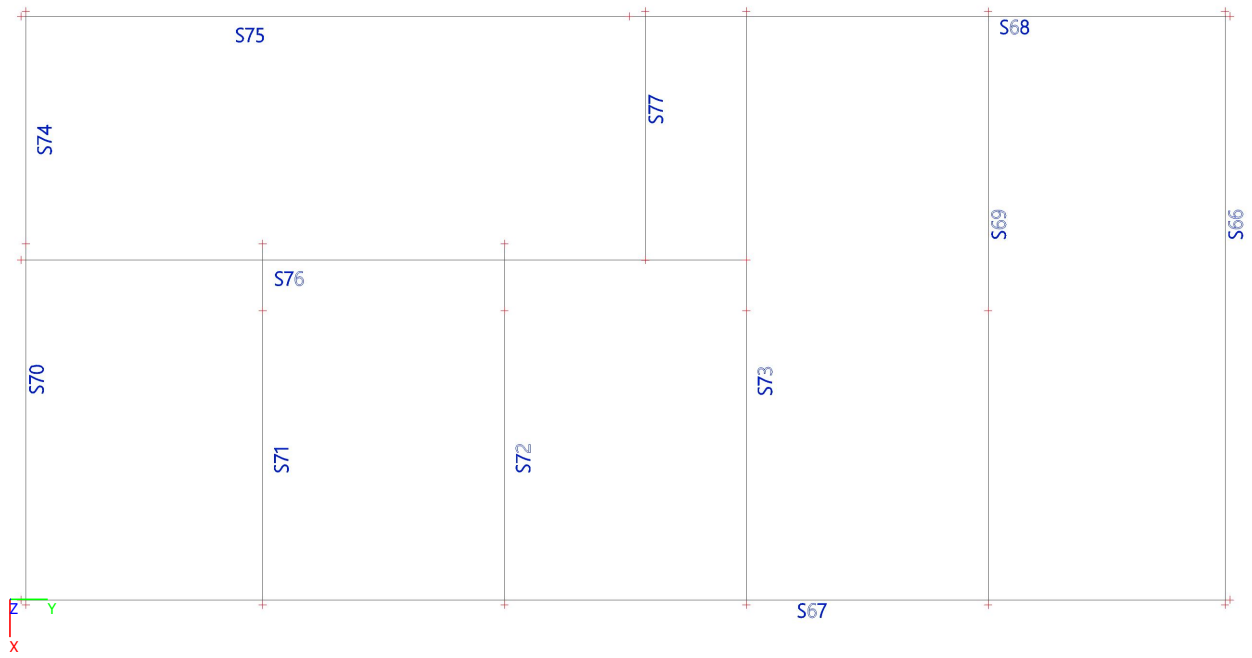


3.2. Members

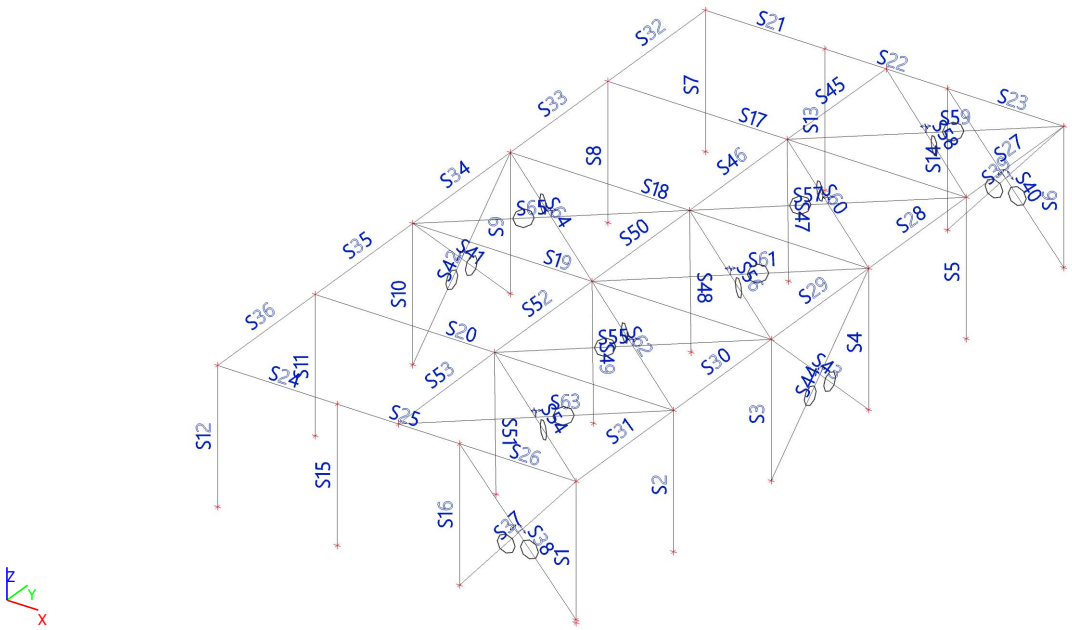
Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
S1	CS2 - HEA140	S 235	4,500	K11	K12	column (100)
S2	CS2 - HEA140	S 235	4,500	K13	K14	column (100)
S3	CS2 - HEA140	S 235	4,500	K15	K16	column (100)
S4	CS2 - HEA140	S 235	4,500	K17	K18	column (100)
S5	CS2 - HEA140	S 235	4,500	K19	K20	column (100)
S6	CS2 - HEA140	S 235	4,500	K21	K22	column (100)
S7	CS2 - HEA140	S 235	4,500	K23	K24	column (100)
S8	CS2 - HEA140	S 235	4,500	K25	K26	column (100)
S9	CS2 - HEA140	S 235	4,500	K27	K28	column (100)
S10	CS2 - HEA140	S 235	4,500	K29	K30	column (100)
S11	CS2 - HEA140	S 235	4,500	K31	K32	column (100)
S12	CS2 - HEA140	S 235	4,500	K33	K34	column (100)
S13	CS2 - HEA140	S 235	4,500	K35	K36	column (100)
S14	CS2 - HEA140	S 235	4,500	K37	K38	column (100)
S15	CS2 - HEA140	S 235	4,500	K39	K40	column (100)
S16	CS2 - HEA140	S 235	4,500	K41	K42	column (100)
S17	CS4 - HEA160	S 235	12,000	K26	K20	beam (80)
S18	CS4 - HEA160	S 235	12,000	K28	K18	beam (80)
S19	CS4 - HEA160	S 235	12,000	K30	K16	beam (80)
S20	CS4 - HEA160	S 235	12,000	K32	K14	beam (80)
S21	CS4 - HEA160	S 235	4,000	K24	K36	beam (80)
S22	CS4 - HEA160	S 235	4,100	K36	K38	beam (80)
S23	CS4 - HEA160	S 235	3,900	K38	K22	beam (80)
S24	CS4 - HEA160	S 235	4,000	K34	K40	beam (80)
S25	CS4 - HEA160	S 235	4,100	K40	K42	beam (80)
S26	CS4 - HEA160	S 235	3,900	K42	K12	beam (80)
S27	CS4 - HEA160	S 235	4,900	K22	K20	beam (80)
S28	CS4 - HEA160	S 235	4,900	K20	K18	beam (80)
S29	CS4 - HEA160	S 235	4,900	K18	K16	beam (80)
S30	CS4 - HEA160	S 235	4,900	K16	K14	beam (80)
S31	CS4 - HEA160	S 235	4,900	K14	K12	beam (80)
S32	CS4 - HEA160	S 235	4,900	K24	K26	beam (80)
S33	CS4 - HEA160	S 235	4,900	K26	K28	beam (80)
S34	CS4 - HEA160	S 235	4,900	K28	K30	beam (80)
S35	CS4 - HEA160	S 235	4,900	K30	K32	beam (80)
S36	CS4 - HEA160	S 235	4,900	K32	K34	beam (80)
S37	CS5 - FL60X8	S 235	5,955	K41	K12	beam (80)
S38	CS5 - FL60X8	S 235	5,884	K72	K42	beam (80)
S39	CS5 - FL60X8	S 235	5,955	K37	K22	beam (80)
S40	CS5 - FL60X8	S 235	5,955	K21	K38	beam (80)
S41	CS5 - FL60X8	S 235	6,653	K27	K30	beam (80)
S42	CS5 - FL60X8	S 235	6,653	K29	K28	beam (80)
S43	CS5 - FL60X8	S 235	6,653	K17	K16	beam (80)

Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
S44	CS5 - FL60X8	S 235	6,653	K15	K18	beam (80)
S45	CS4 - HEA160	S 235	4,900	K73	K74	beam (80)
S46	CS4 - HEA160	S 235	4,900	K74	K75	beam (80)
S47	CS2 - HEA140	S 235	4,500	K57	K74	column (100)
S48	CS2 - HEA140	S 235	4,500	K76	K75	column (100)
S49	CS2 - HEA140	S 235	4,500	K77	K78	column (100)
S50	CS4 - HEA160	S 235	4,900	K75	K78	beam (80)
S51	CS2 - HEA140	S 235	4,500	K79	K80	column (100)
S52	CS4 - HEA160	S 235	4,900	K78	K80	beam (80)
S53	CS4 - HEA160	S 235	4,900	K80	K81	beam (80)
S54	CS6 - HFLeq80x80x8	S 235	7,747	K12	K80	beam (80)
S55	CS6 - HFLeq80x80x8	S 235	7,747	K80	K16	beam (80)
S56	CS6 - HFLeq80x80x8	S 235	7,747	K16	K75	beam (80)
S57	CS6 - HFLeq80x80x8	S 235	7,747	K75	K20	beam (80)
S58	CS6 - HFLeq80x80x8	S 235	7,708	K20	K73	beam (80)
S59	CS6 - HFLeq80x80x8	S 235	7,747	K22	K74	beam (80)
S60	CS6 - HFLeq80x80x8	S 235	7,747	K74	K18	beam (80)
S61	CS6 - HFLeq80x80x8	S 235	7,747	K18	K78	beam (80)
S62	CS6 - HFLeq80x80x8	S 235	7,747	K78	K14	beam (80)
S63	CS6 - HFLeq80x80x8	S 235	7,708	K14	K81	beam (80)
S64	CS6 - HFLeq80x80x8	S 235	7,747	K28	K78	beam (80)
S65	CS6 - HFLeq80x80x8	S 235	7,747	K30	K75	beam (80)
S66	CS7 - Rechthoek (600; 650)	C30/37	12,000	K87	K88	plate rib (92)
S67	CS7 - Rechthoek (600; 650)	C30/37	24,500	K91	K92	plate rib (92)
S68	CS7 - Rechthoek (600; 650)	C30/37	12,175	K89	K90	plate rib (92)
S69	CS7 - Rechthoek (600; 650)	C30/37	12,000	K25	K19	plate rib (92)
S70	CS7 - Rechthoek (600; 650)	C30/37	7,300	K94	K93	plate rib (92)
S71	CS7 - Rechthoek (600; 650)	C30/37	7,300	K13	K97	plate rib (92)
S72	CS7 - Rechthoek (600; 650)	C30/37	7,300	K15	K96	plate rib (92)
S73	CS7 - Rechthoek (600; 650)	C30/37	12,000	K17	K27	plate rib (92)
S74	CS8 - Rechthoek (600; 475)	C30/37	4,700	K94	K100	plate rib (92)
S75	CS8 - Rechthoek (600; 475)	C30/37	12,325	K101	K90	plate rib (92)
S76	CS7 - Rechthoek (600; 650)	C30/37	14,700	K102	K119	plate rib (92)
S77	CS7 - Rechthoek (600; 650)	C30/37	5,028	K104	K123	plate rib (92)

3.3. Concrete members



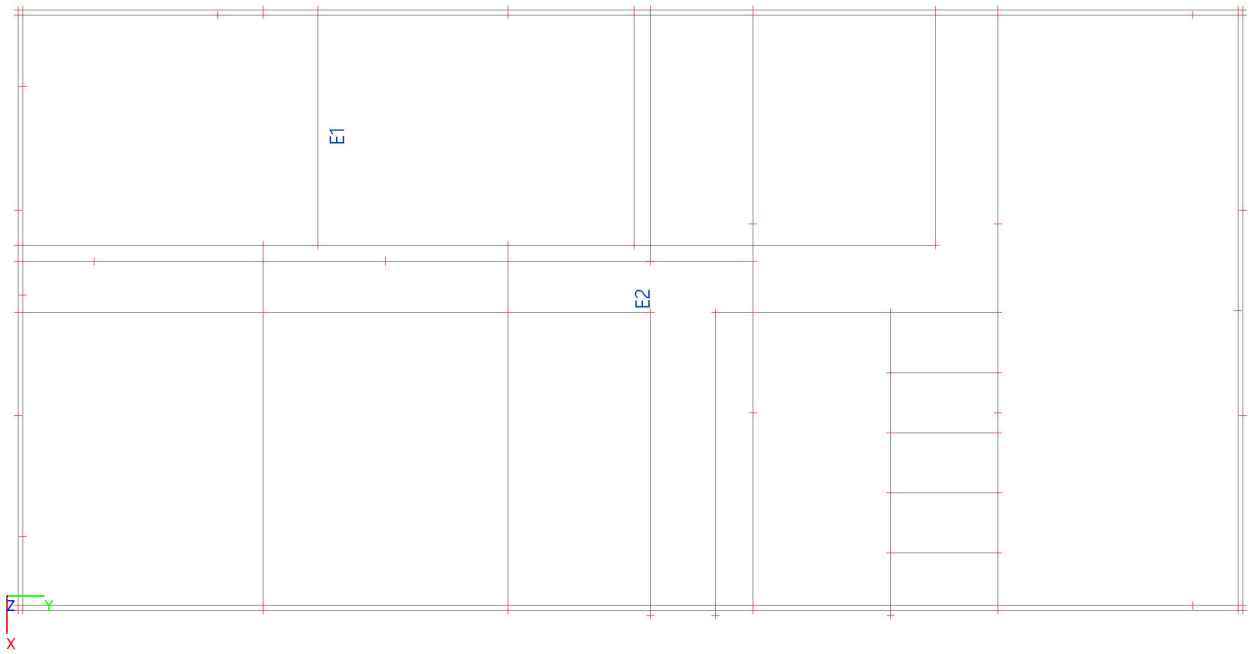
3.4. Steel members



3.5. 2D members

Name	Layer	Type	Element type	Material	Thickness type	Th. [mm]
E1	Fundering	vloer (90)	Standaard	C30/37	constant	250
E2	Fundering	vloer (90)	Standaard	C30/37	constant	250

3.6. 2D members



3.7. 2D member internal edges

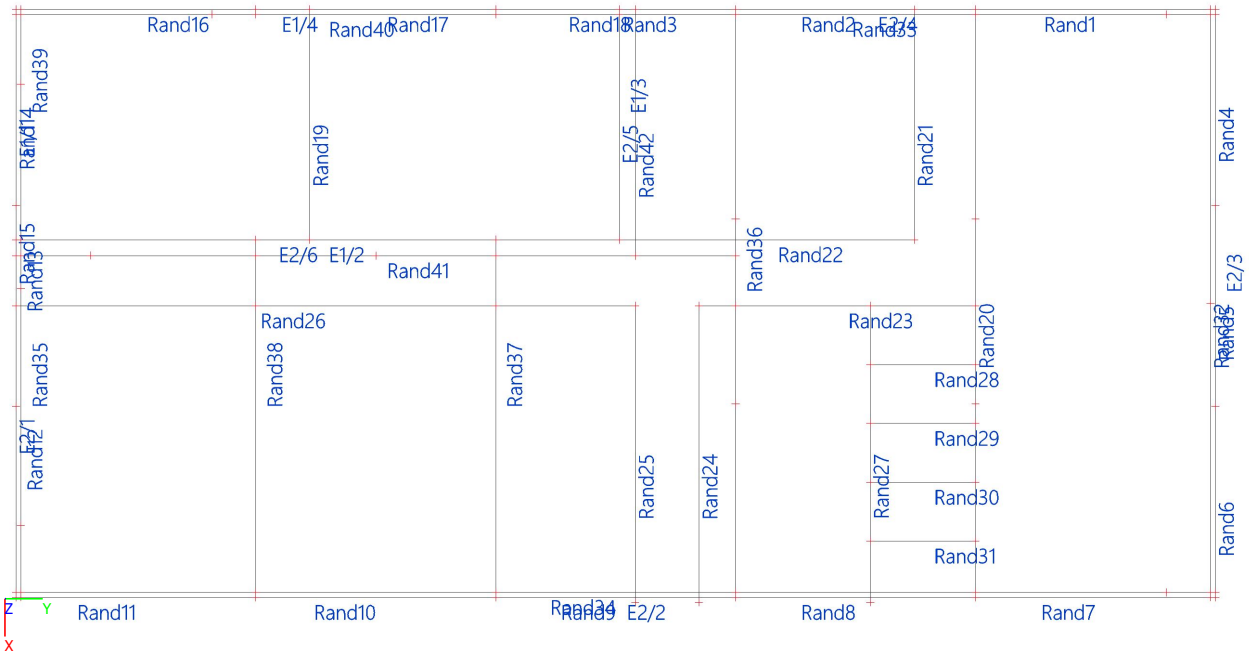
Name	Member 1	Length [m]	Shape	Node	Edge
Rand1	E2	4,900	Lijn	K23 K25	Lijn
Rand2	E2	4,900	Lijn	K25 K27	Lijn

Name	Member 1	Length [m]	Shape	Node	Edge
Rand3	E2	2,375	Lijn	K27 K43	Lijn
Rand4	E2	4,000	Lijn	K23 K35	Lijn

Name	Member 1	Length [m]	Shape	Node	Edge
Rand5	E2	4,100	Lijn	K35 K37	Lijn
Rand6	E2	3,900	Lijn	K37 K21	Lijn
Rand7	E2	4,900	Lijn	K6 K19	Lijn
Rand8	E2	4,900	Lijn	K19 K17	Lijn
Rand9	E2	4,900	Lijn	K17 K15	Lijn
Rand10	E2	4,900	Lijn	K15 K13	Lijn
Rand11	E2	4,900	Lijn	K13 K5	Lijn
Rand12	E2	3,900	Lijn	K5 K41	Lijn
Rand13	E2	3,400	Lijn	K41 K44	Lijn
Rand14	E1	4,000	Lijn	K1 K98	Lijn
Rand15	E1	0,700	Lijn	K98 K2	Lijn
Rand16	E1	4,900	Lijn	K1 K99	Lijn
Rand17	E1	4,900	Lijn	K99 K82	Lijn
Rand18	E1	2,525	Lijn	K82 K4	Lijn
Rand19	E1	4,700	Lijn	K48 K51	Lijn
Rand20	E2	12,000	Lijn	K25 K19	Lijn
Rand21	E2	4,700	Lijn	K54 K55	Lijn
Rand22	E2	6,025	Lijn	K3 K55	Lijn
Rand23	E2	5,650	Lijn	K56 K57	Lijn

Name	Member 1	Length [m]	Shape	Node	Edge
Rand24	E2	6,050	Lijn	K56 K58	Lijn
Rand25	E2	6,050	Lijn	K59 K60	Lijn
Rand26	E2	12,650	Lijn	K59 K61	Lijn
Rand27	E2	6,050	Lijn	K62 K63	Lijn
Rand28	E2	2,150	Lijn	K64 K65	Lijn
Rand29	E2	2,150	Lijn	K66 K67	Lijn
Rand30	E2	2,150	Lijn	K68 K69	Lijn
Rand31	E2	2,150	Lijn	K70 K71	Lijn
Rand32	E2	12,000	Lijn	K87 K88	Lijn
Rand33	E2	12,175	Lijn	K89 K90	Lijn
Rand34	E2	24,500	Lijn	K91 K92	Lijn
Rand35	E2	7,300	Lijn	K93 K94	Lijn
Rand36	E2	12,000	Lijn	K17 K27	Lijn
Rand37	E2	7,300	Lijn	K15 K96	Lijn
Rand38	E2	7,300	Lijn	K13 K97	Lijn
Rand39	E1	4,700	Lijn	K94 K100	Lijn
Rand40	E1	12,325	Lijn	K101 K90	Lijn
Rand41	E2	14,700	Lijn	K102 K119	Lijn
Rand42	E2	5,025	Lijn	K104 K105	Lijn

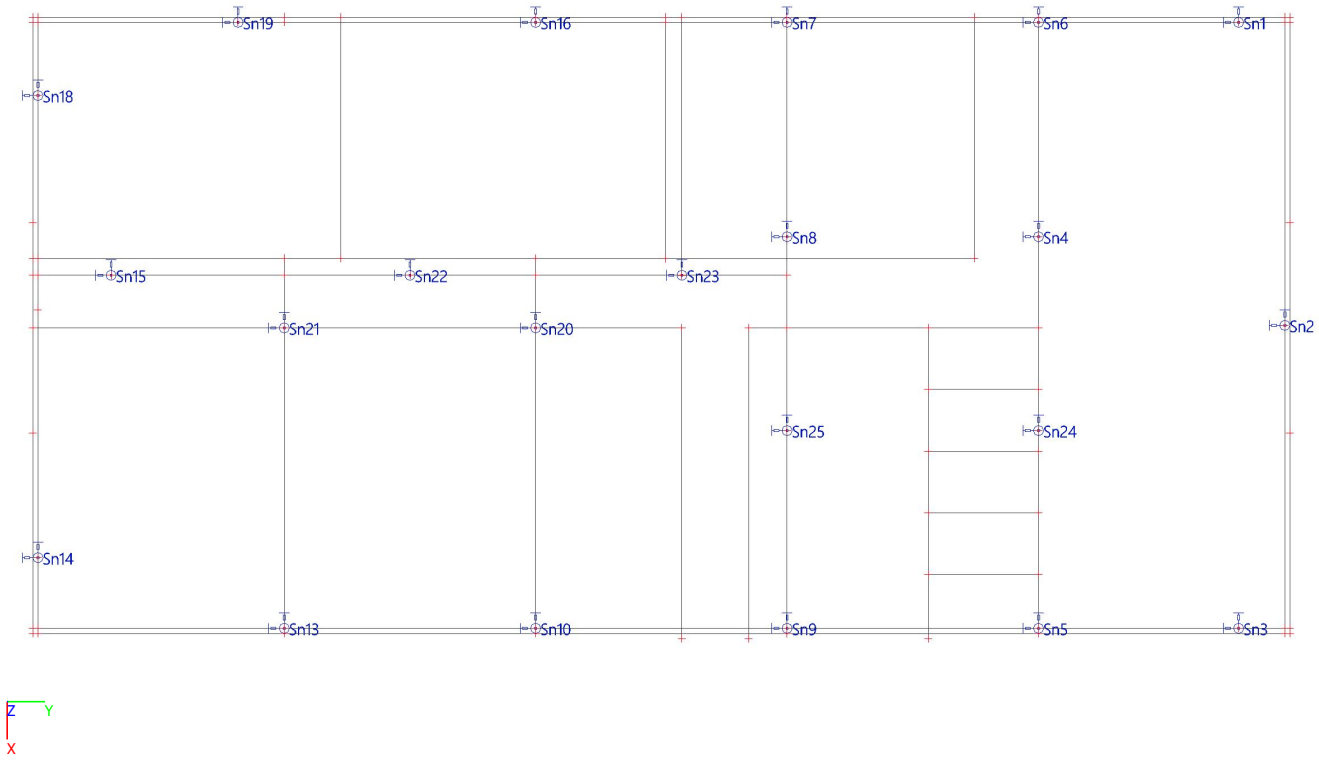
3.8. Internal edges



3.9. Nodal supports

Name	Node	System	Type	X	Stiffness X [MN/m]	Y	Stiffness Y [MN/m]	Z	Stiffness Z [MN/m]	Rx	Ry	Rz
Sn1	K127	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn2	K107	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn3	K126	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn4	K125	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn5	K110	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn6	K109	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn7	K111	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn8	K128	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn9	K112	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn10	K113	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn13	K116	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn14	K133	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn15	K134	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn16	K122	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn18	K132	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn19	K135	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn20	K77	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn21	K79	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn22	K124	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn23	K105	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn24	K129	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free
Sn25	K130	GCS	Standard	Flexible	1,1000e+01	Flexible	1,1000e+01	Flexible	4,3000e+01	Free	Free	Free

3.10. Nodal supports

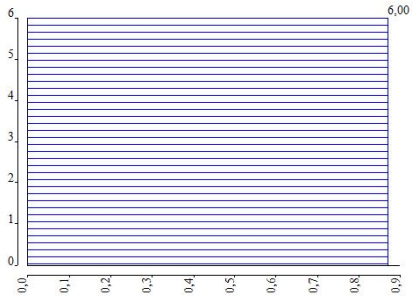


4. loads

4.1. Wind pressures

Name	WP1
Input	user
Height / Pressure	0,000[m] / 0,9[kN/m ²]
	6,000[m] / 0,9[kN/m ²]

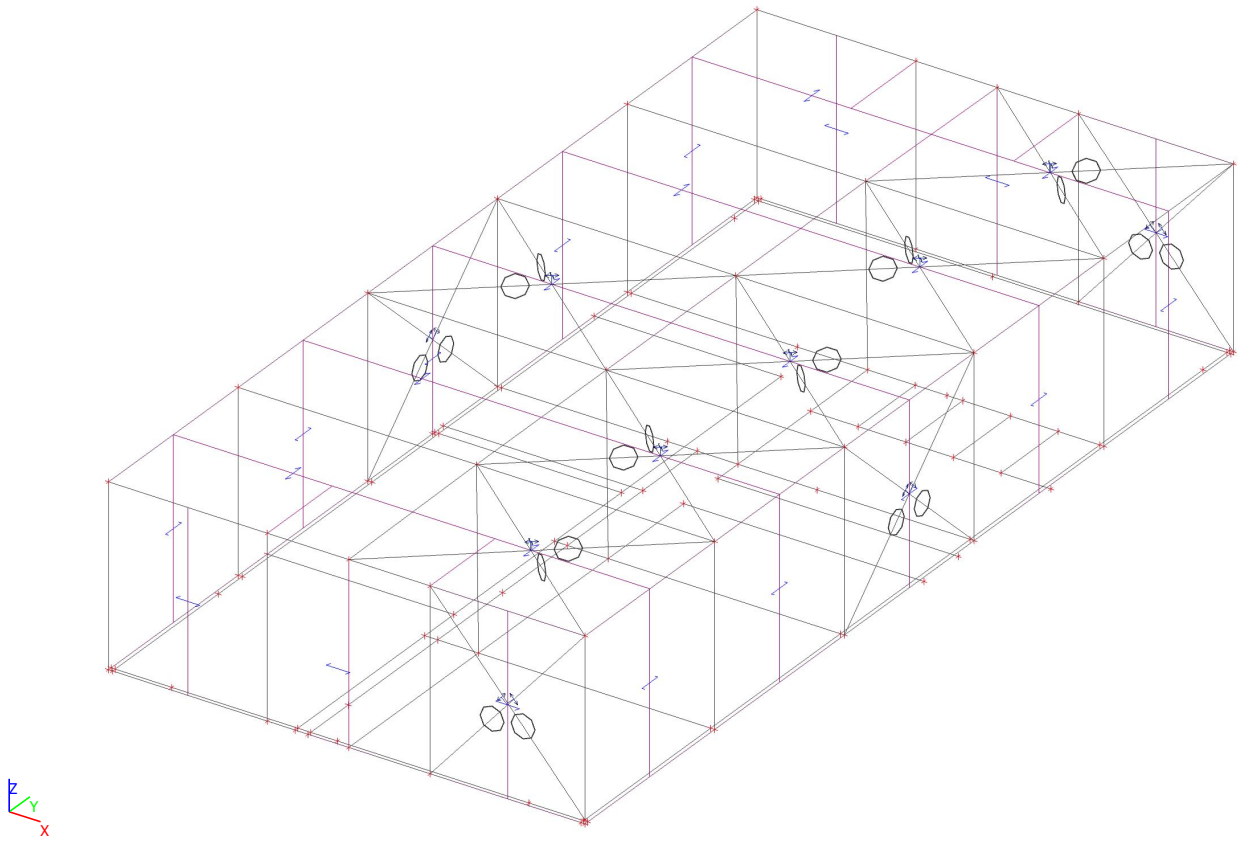
Drawing



4.2. Load cases

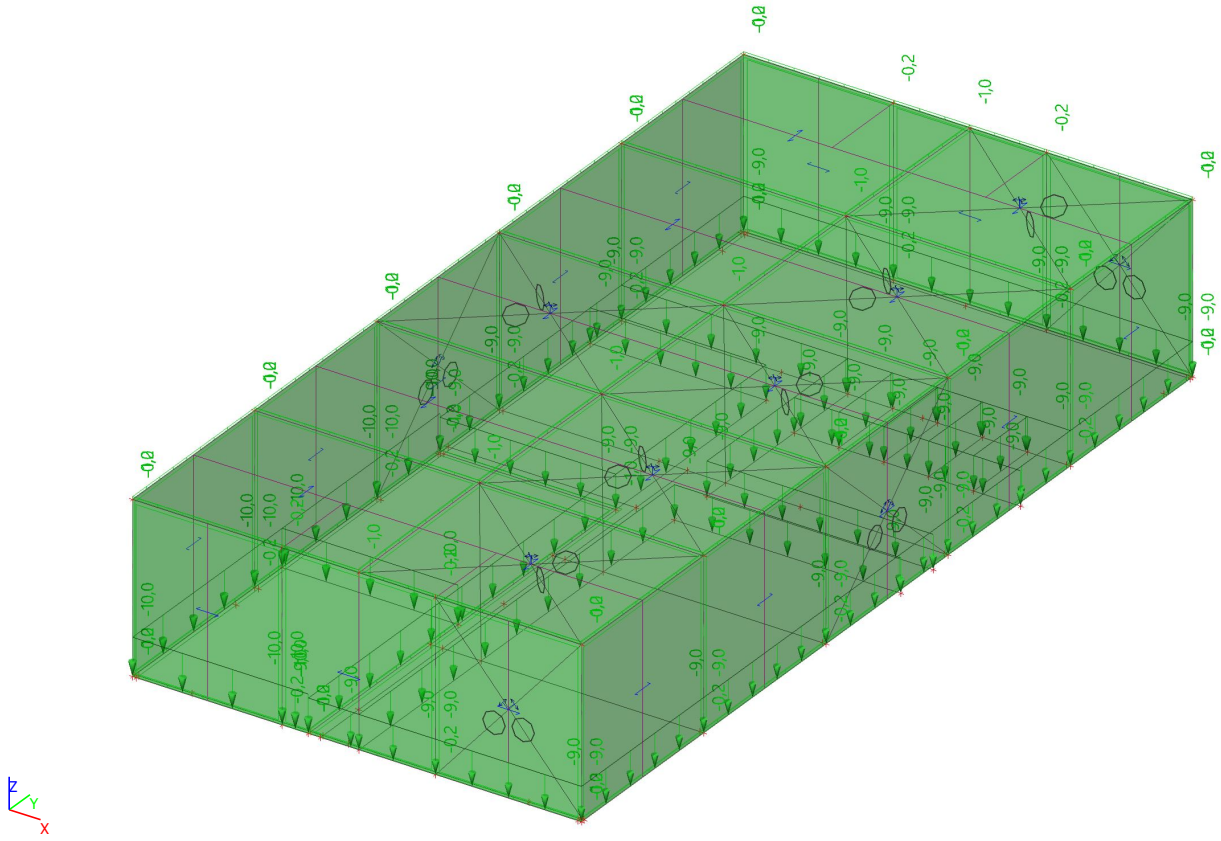
4.2.1. Load cases - DL

Name	Description	Action type	Load type	Load group	Direction
DL	Eigen gewicht	Permanent	Self weight	LG1	-Z



4.2.2. Load cases - DL2

Name	Description	Action type	Load type	Load group
DL2	Eigen gewicht	Permanent	Standard	LG1



4.2.2.1. Line force on 2D member edge

Name	2D member	Internal edge	Type	System	Dir	Distribution	Value - P_1 [kN/m]	Pos x_1	Pos x_2
LFS1		Rand24	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS2		Rand25	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS3		Rand20	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS4		Rand21	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS5		Rand22	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS6		Rand23	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS7		Rand27	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS8		Rand28	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS9		Rand29	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS10		Rand30	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS11		Rand31	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS12		Rand8	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS13		Rand7	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS14		Rand6	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS15		Rand5	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS16		Rand4	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS17		Rand1	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS18		Rand2	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS19		Rand3	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS20		Rand19	Force	LCS	Z	Uniform	-10,0	0.000	1.000
LFS21	E2		Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS22	E2		Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS23		Rand26	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS24		Rand18	Force	LCS	Z	Uniform	-10,0	0.000	1.000
LFS25		Rand17	Force	LCS	Z	Uniform	-10,0	0.000	1.000
LFS26		Rand16	Force	LCS	Z	Uniform	-10,0	0.000	1.000
LFS27		Rand14	Force	LCS	Z	Uniform	-10,0	0.000	1.000
LFS28		Rand15	Force	LCS	Z	Uniform	-10,0	0.000	1.000
LFS29		Rand12	Force	LCS	Z	Uniform	-9,0	0.000	1.000

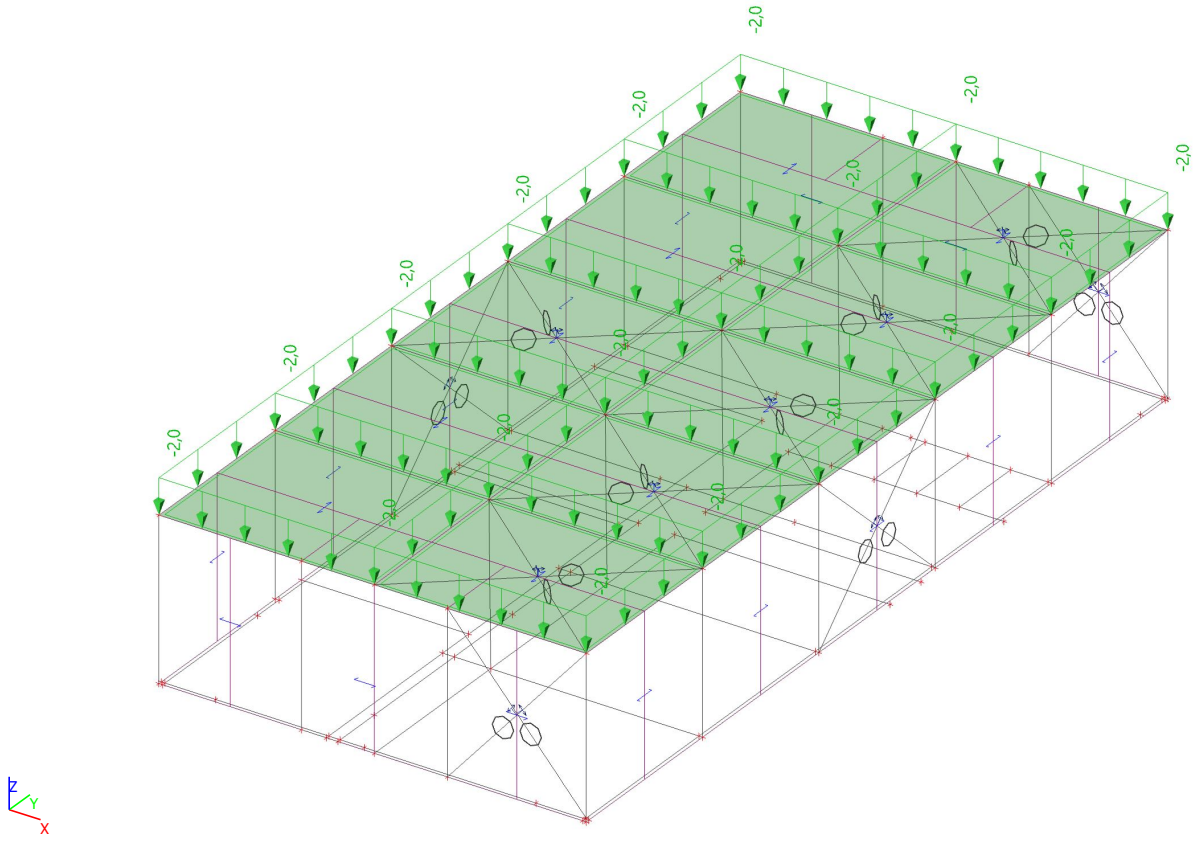
Name	2D member	Internal edge	Type	System	Dir	Distribution	Value - P_1 [kN/m]	Pos x_1	Pos x_2
LFS30		Rand11	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS31		Rand13	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS32		Rand10	Force	LCS	Z	Uniform	-9,0	0.000	1.000
LFS33		Rand9	Force	LCS	Z	Uniform	-9,0	0.000	1.000

4.2.2.2. Surface load

Name	Dir	Type	Value [kN/m²]	2D member	Load case	System	Loc
SF105	Z	Force	-1,0	E1	DL2 - Eigen gewicht	GCS	Length
SF106	Z	Force	-1,0	E2	DL2 - Eigen gewicht	GCS	Length
SF107	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF108	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF109	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF110	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF111	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF112	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF113	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF114	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF115	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF116	Z	Force	-1,0		DL2 - Eigen gewicht	GCS	Length
SF362	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF363	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF364	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF365	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF366	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF367	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF368	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF369	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF370	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF371	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF372	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF373	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF374	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF375	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF376	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length
SF377	Z	Force	-0,2		DL2 - Eigen gewicht	GCS	Length

4.2.3. Load cases - LL1

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL1	Live load - Roof	Standard	Variable	Static	LG2	Short	None

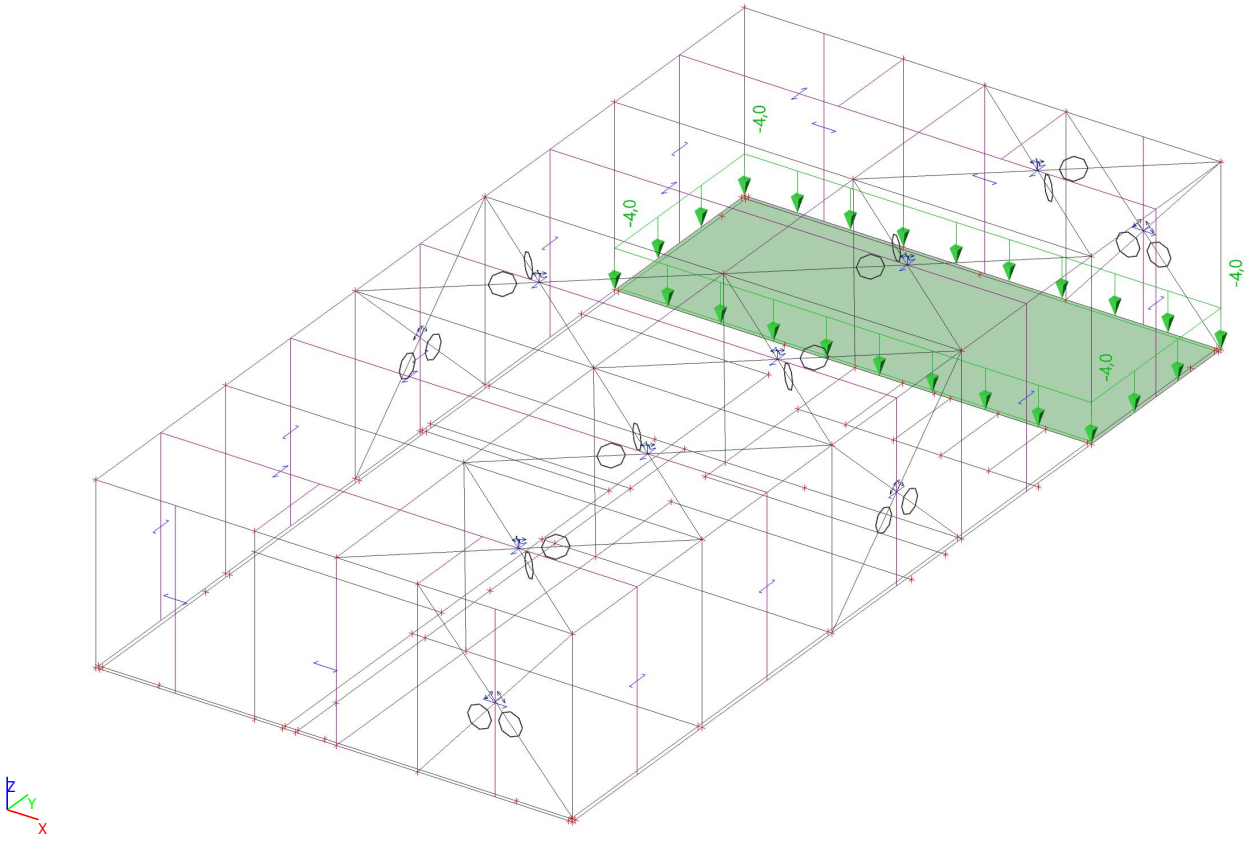


4.2.3.1. Surface load

Name	Dir	Type	Value [kN/m²]	Load case	System	Loc
SF118	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF119	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF120	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF121	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF122	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF123	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF124	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF125	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF126	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length
SF127	Z	Force	-2,0	LL1 - Live load - Roof	GCS	Length

4.2.4. Load cases - LL2

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL2	Live load - General	Standard	Variable	Static	LG2	Short	None

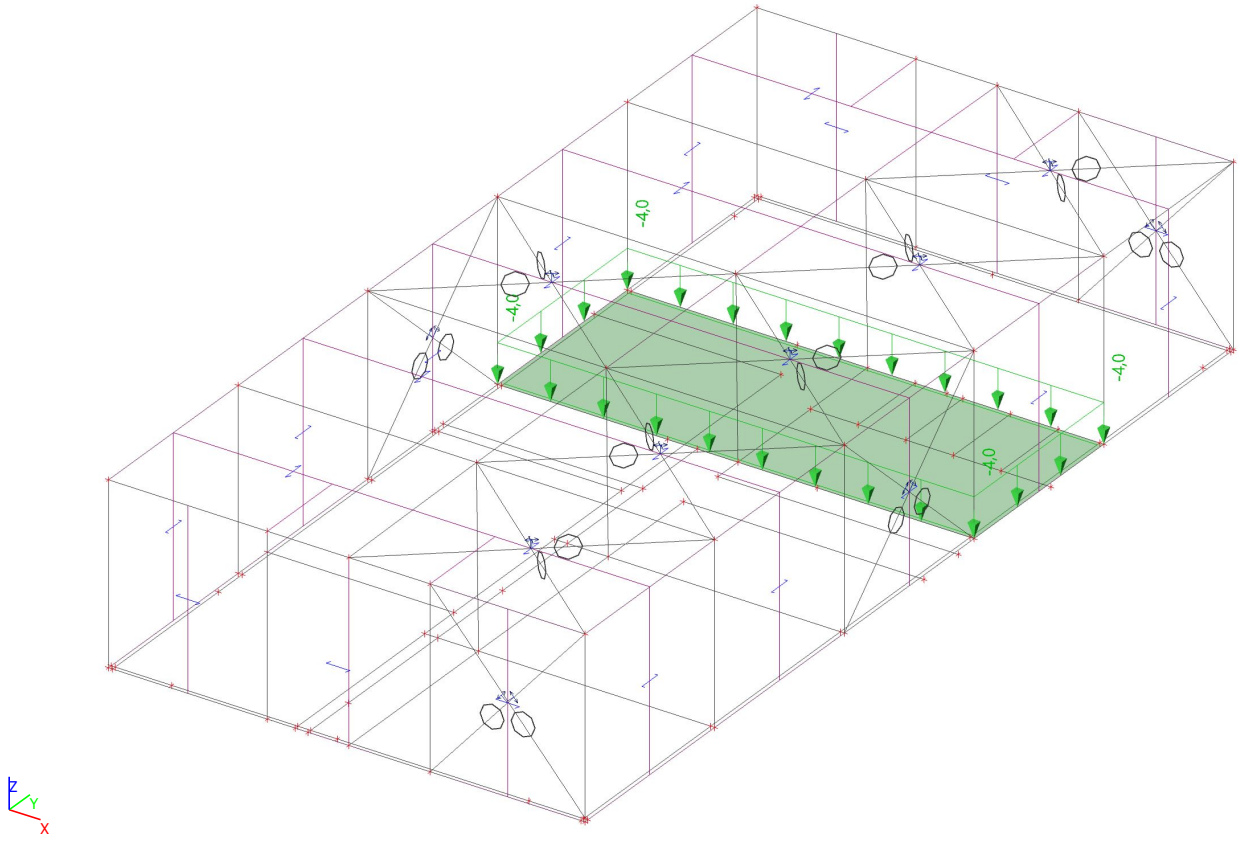


4.2.4.1. Free surface load

Name	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF1	Z	Force	Uniform	-4,0	All	Select	GCS	Length

4.2.5. Load cases - LL3

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL3	Live load - General	Standard	Variable	Static	LG2	Short	None

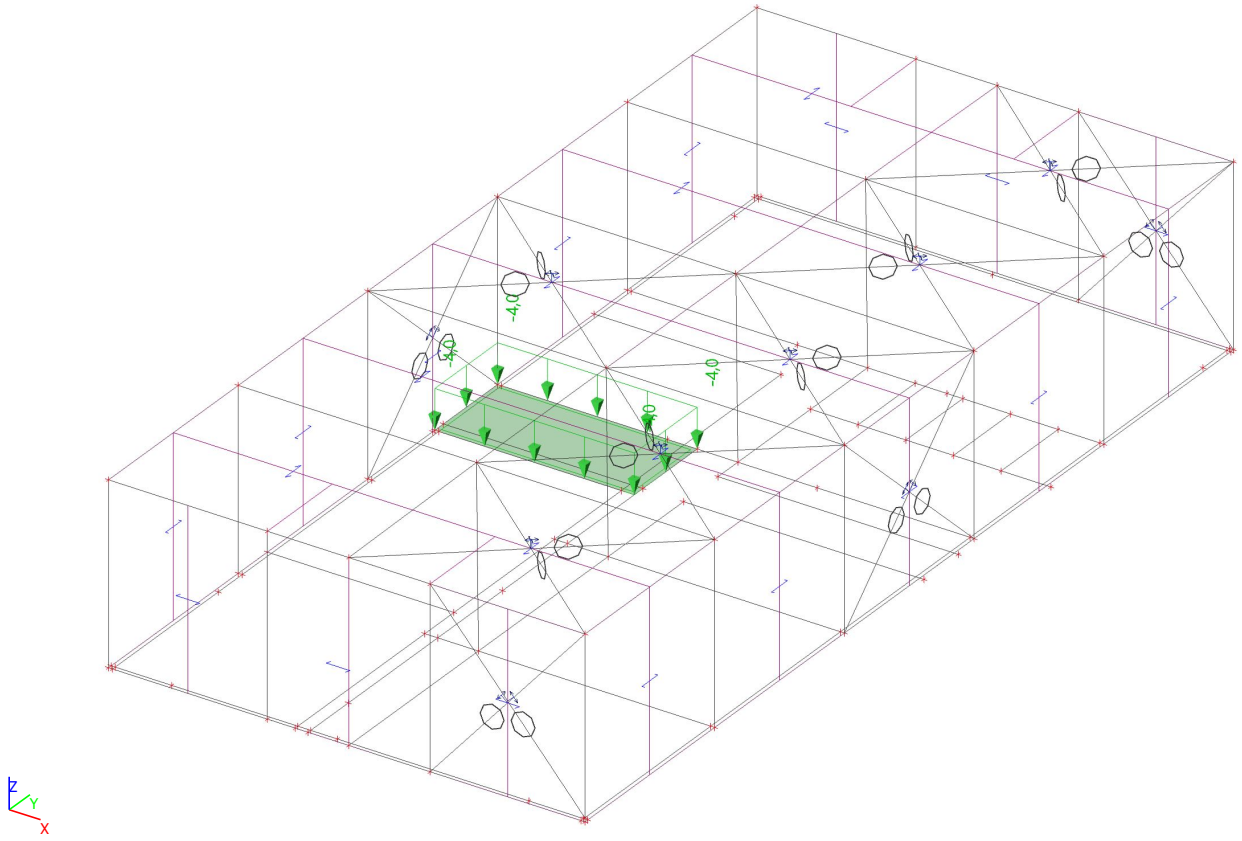


4.2.5.1. Free surface load

Name	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF2	Z	Force	Uniform	-4,0	All	Select	GCS	Length

4.2.6. Load cases - LL4

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL4	Live load - General	Standard	Variable	Static	LG2	Short	None

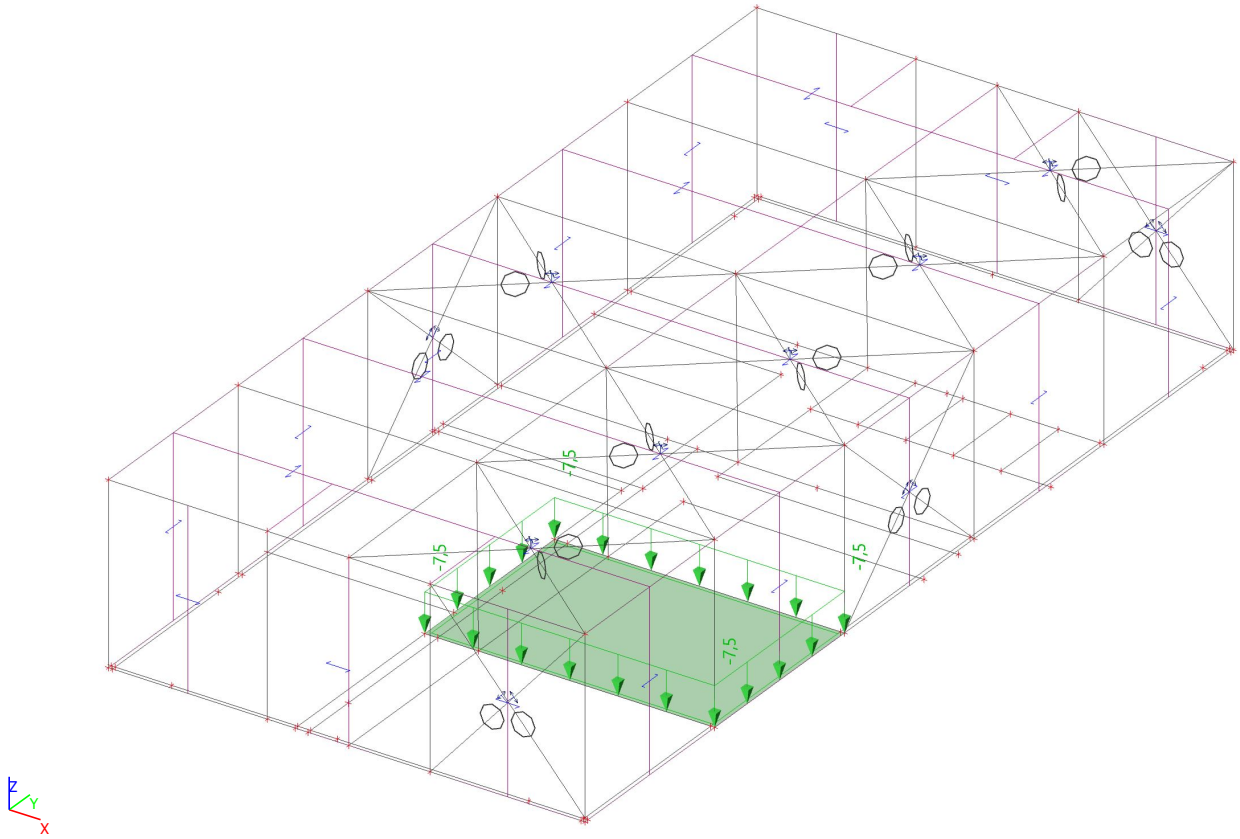


4.2.6.1. Free surface load

Name	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF3	Z	Force	Uniform	-4,0	All	Select	GCS	Length

4.2.7. Load cases - LL5

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL5	Live load - Storrage	Standard	Variable	Static	LG2	Short	None

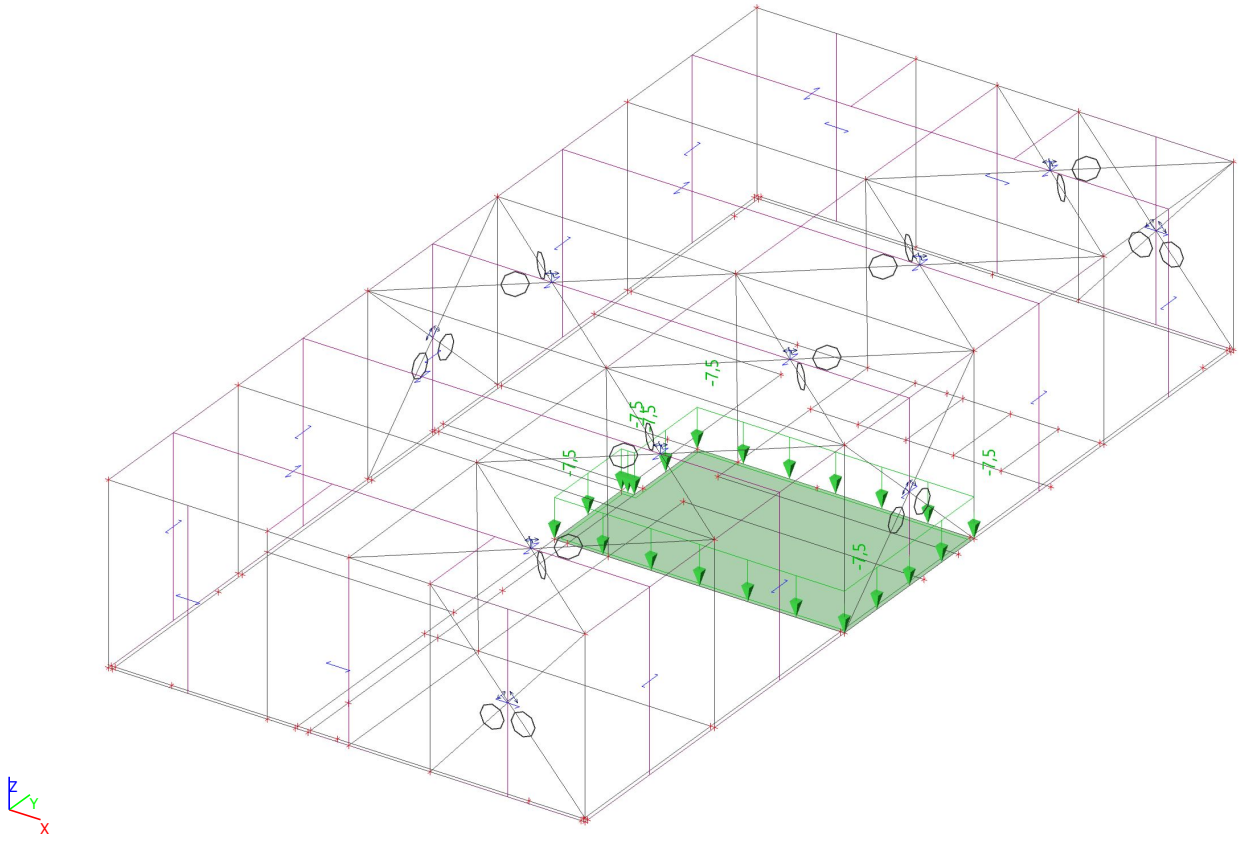


4.2.7.1. Free surface load

Name	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF6	Z	Force	Uniform	-7,5	All	Select	GCS	Length

4.2.8. Load cases - LL6

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL6	Live load - Storrage	Standard	Variable	Static	LG2	Short	None

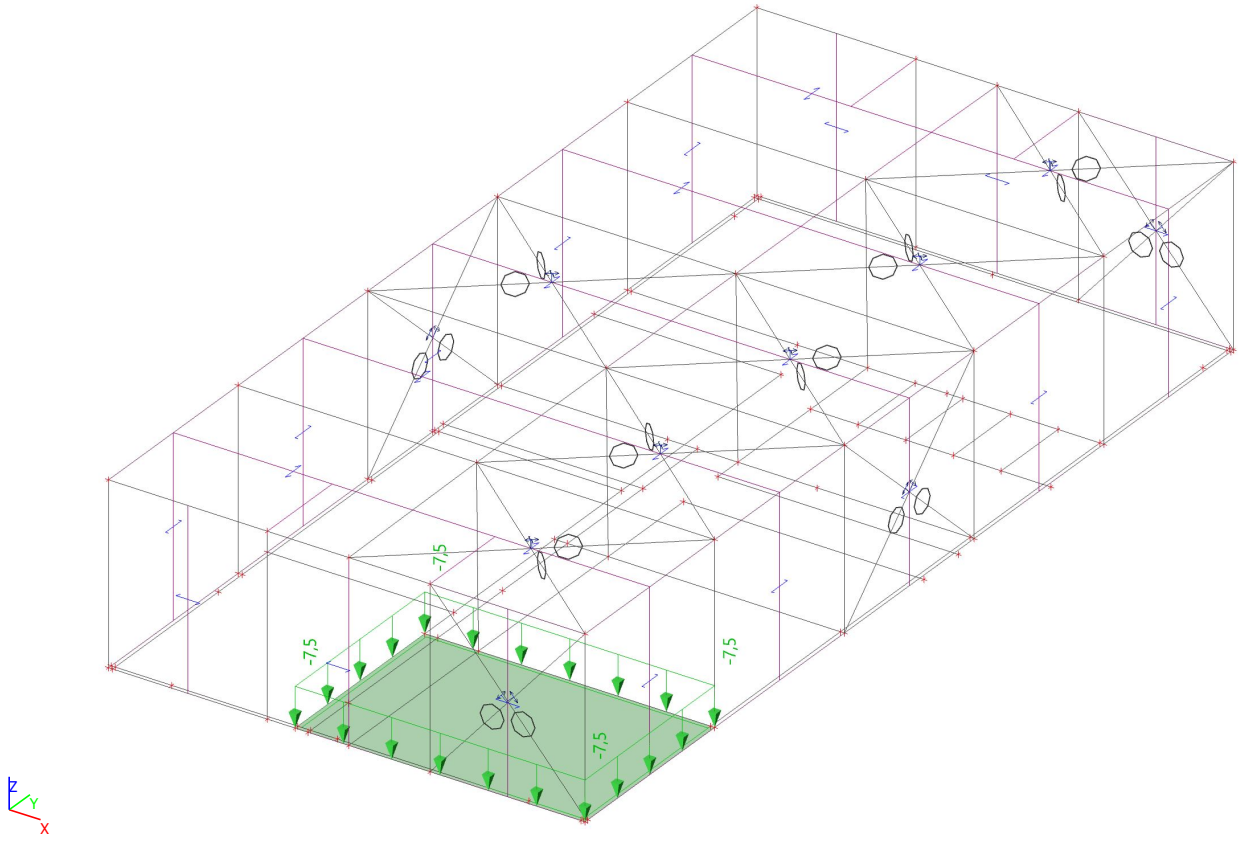


4.2.8.1. Free surface load

Name	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF4	Z	Force	Uniform	-7,5	All	Select	GCS	Length

4.2.9. Load cases - LL7

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL7	Live load - Storrage	Standard	Variable	Static	LG2	Short	None

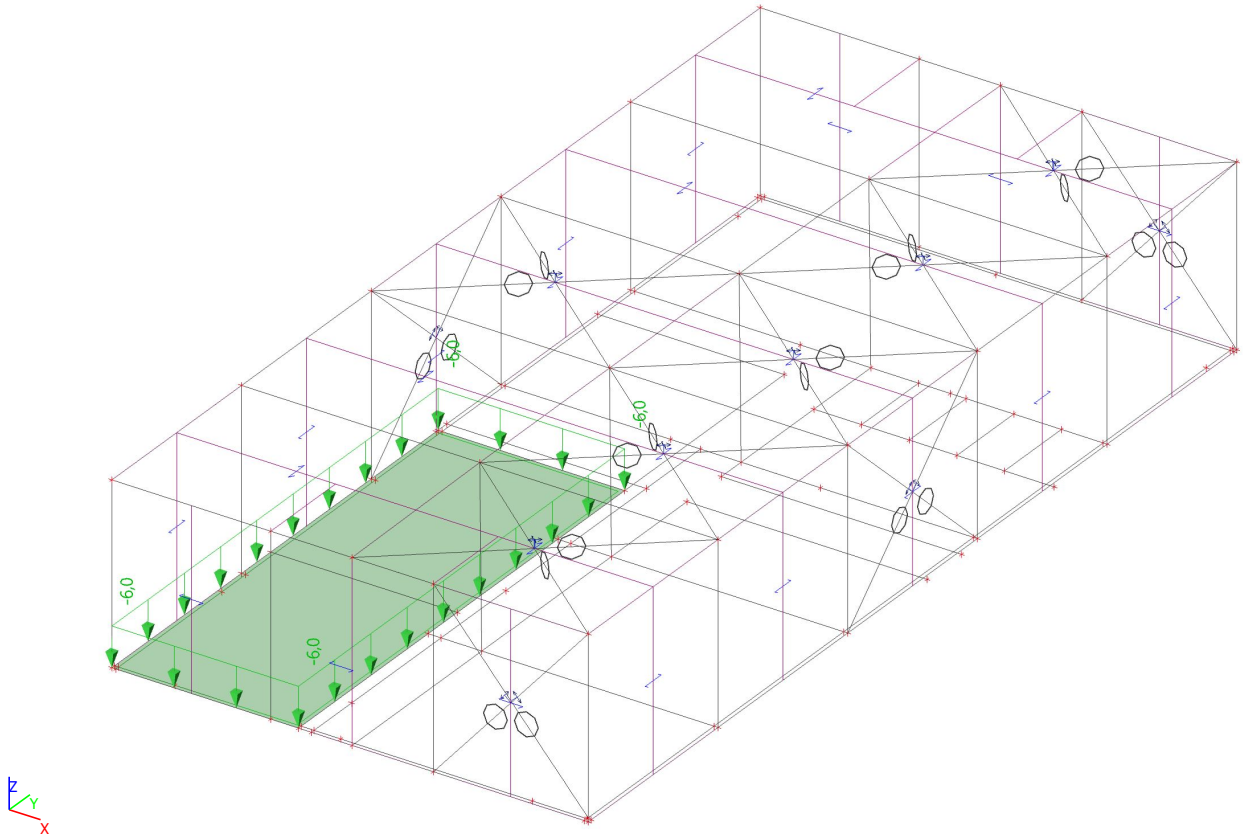


4.2.9.1. Free surface load

Name	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF7	Z	Force	Uniform	-7,5	All	Select	GCS	Length

4.2.10. Load cases - LL8

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL8	Live load - Control room	Standard	Variable	Static	LG2	Short	None

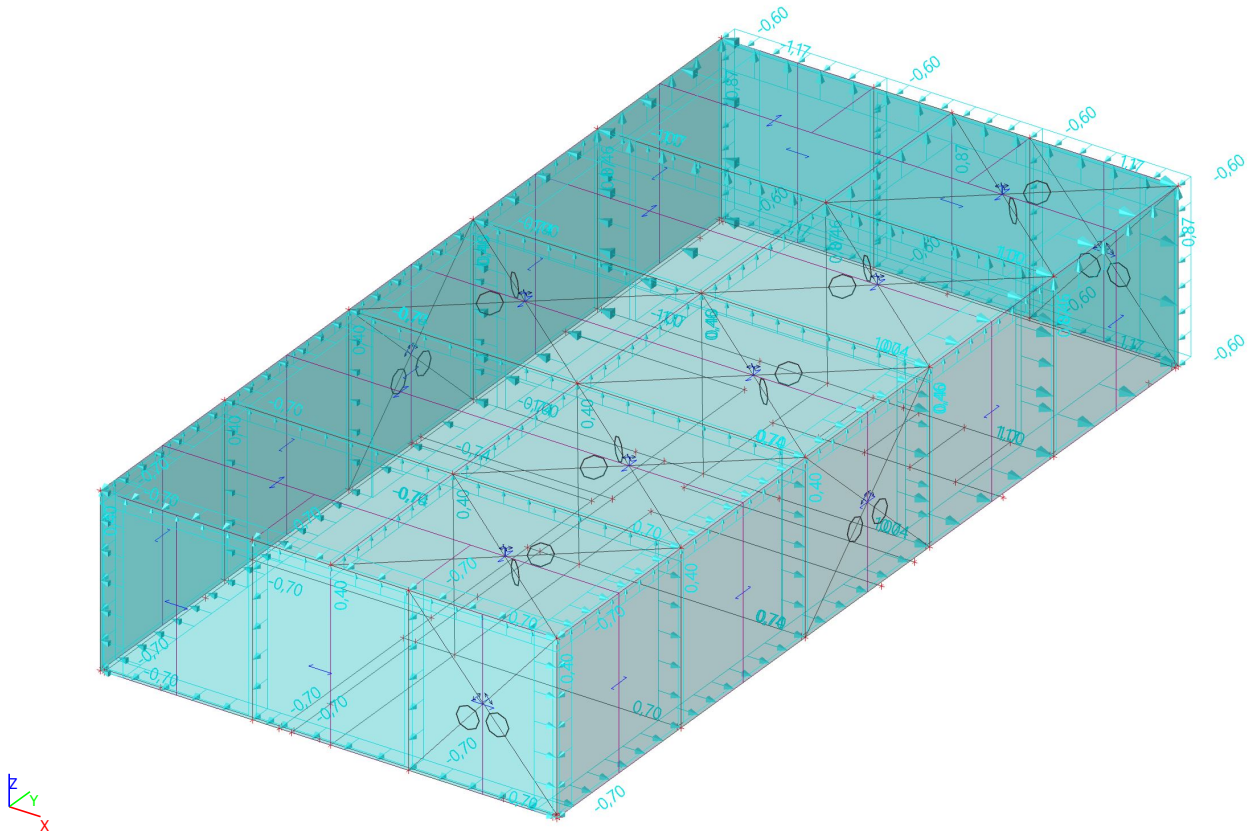


4.2.10.1. Surface load

Name	Dir	Type	Value [kN/m²]	2D member	Load case	System	Loc
SF117	Z	Force	-6,0	E1	LL8 - Live load - Control room	GCS	Length

4.2.11. Load cases - W1

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W1	N-S over	Standard	Variable	Static	LG3	Short	None

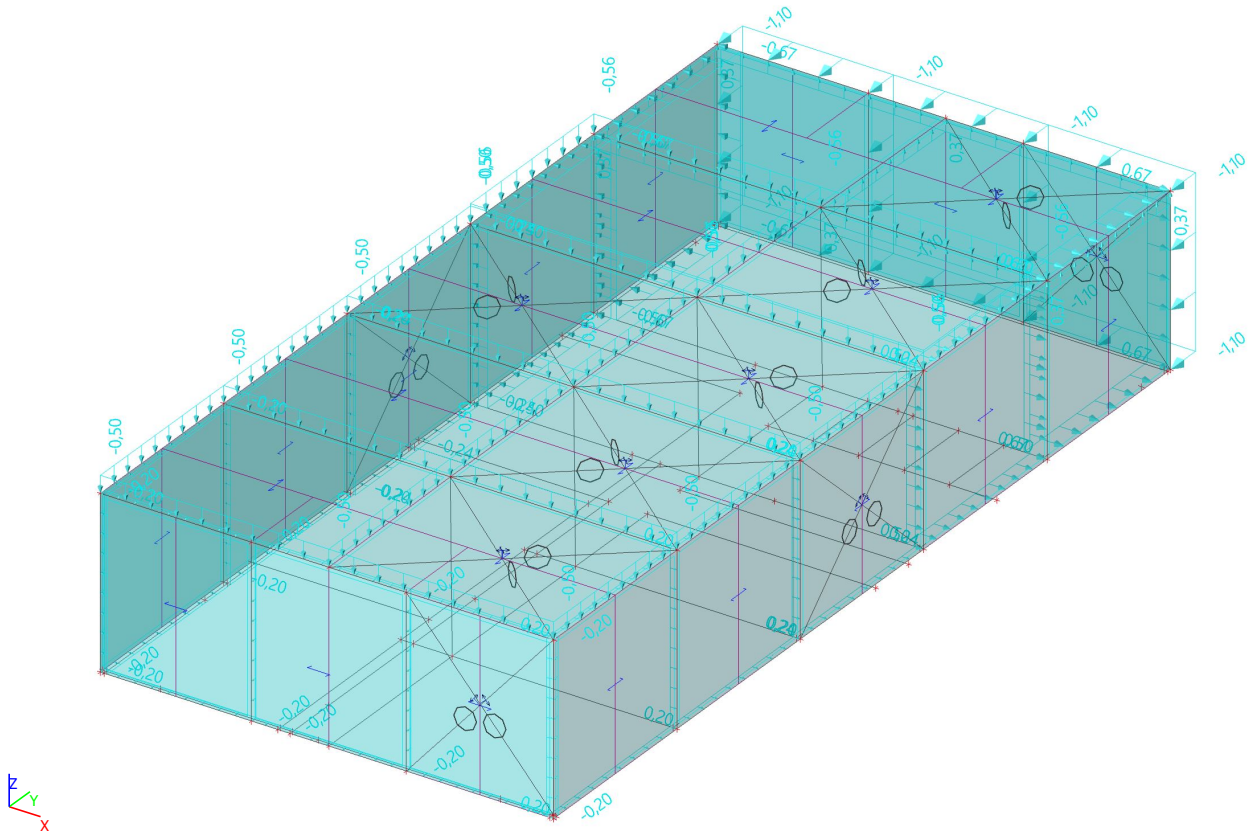


4.2.11.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF1	X	Wind	-1.170	W1 - N-S over	GCS	Length
SF2	X	Wind	1.170	W1 - N-S over	GCS	Length
SF3	X	Wind	-1.000	W1 - N-S over	GCS	Length
SF4	X	Wind	1.000	W1 - N-S over	GCS	Length
SF5	X	Wind	-0.740	W1 - N-S over	GCS	Length
SF6	X	Wind	-0.700	W1 - N-S over	GCS	Length
SF7	X	Wind	-0.700	W1 - N-S over	GCS	Length
SF8	X	Wind	0.740	W1 - N-S over	GCS	Length
SF9	X	Wind	0.700	W1 - N-S over	GCS	Length
SF10	X	Wind	0.700	W1 - N-S over	GCS	Length
SF11	Y	Wind	-0.600	W1 - N-S over	GCS	Length
SF12	Y	Wind	-0.600	W1 - N-S over	GCS	Length
SF13	Y	Wind	-0.600	W1 - N-S over	GCS	Length
SF14	Y	Wind	-0.700	W1 - N-S over	GCS	Length
SF15	Y	Wind	-0.700	W1 - N-S over	GCS	Length
SF16	Y	Wind	-0.700	W1 - N-S over	GCS	Length
SF17	Z	Wind	0.870	W1 - N-S over	GCS	Length
SF18	Z	Wind	0.870	W1 - N-S over	GCS	Length
SF19	Z	Wind	0.460	W1 - N-S over	GCS	Length
SF20	Z	Wind	0.460	W1 - N-S over	GCS	Length
SF21	Z	Wind	0.400	W1 - N-S over	GCS	Length
SF22	Z	Wind	0.400	W1 - N-S over	GCS	Length
SF23	Z	Wind	0.400	W1 - N-S over	GCS	Length
SF24	Z	Wind	0.400	W1 - N-S over	GCS	Length
SF25	Z	Wind	0.400	W1 - N-S over	GCS	Length
SF26	Z	Wind	0.400	W1 - N-S over	GCS	Length

4.2.12. Load cases - W2

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W2	N-S under	Standard	Variable	Static	LG3	Short	None

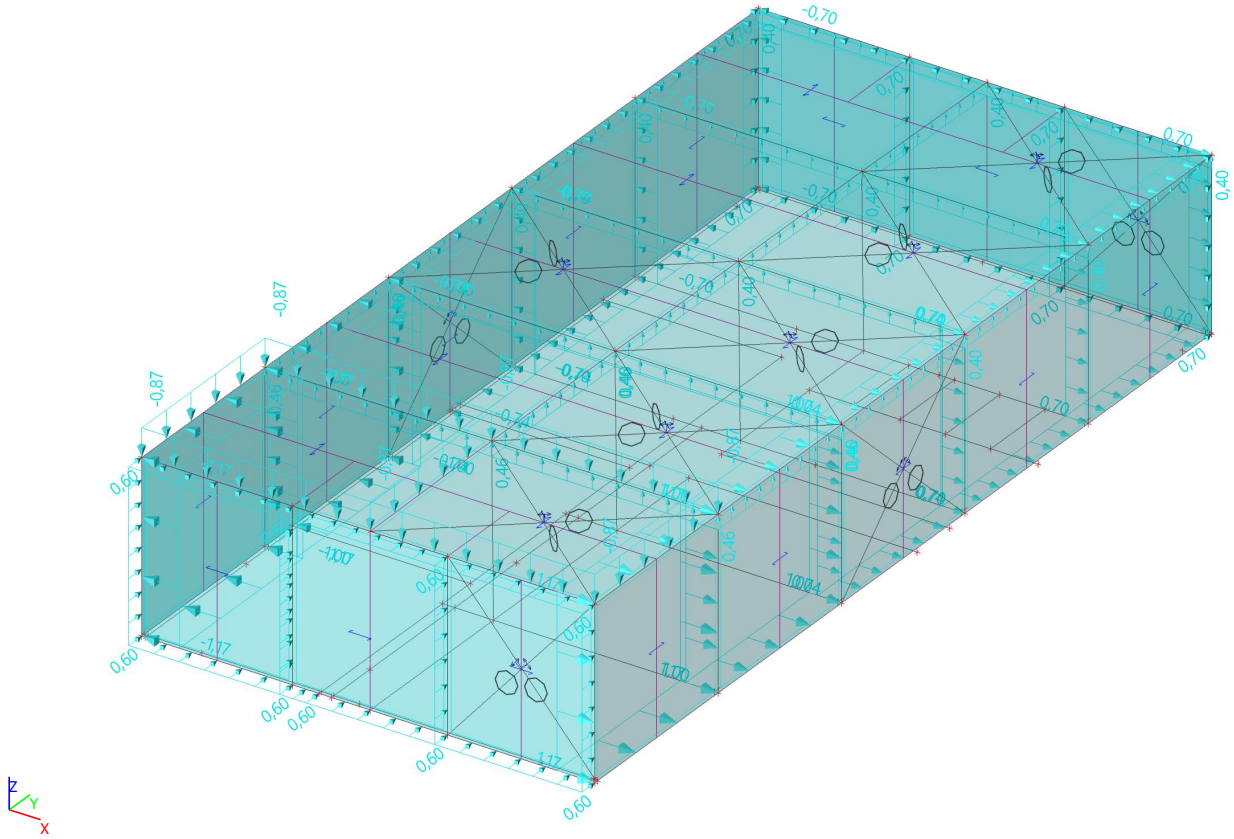


4.2.12.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF27	X	Wind	-0.670	W2 - N-S under	GCS	Length
SF28	X	Wind	0.670	W2 - N-S under	GCS	Length
SF29	X	Wind	-0.500	W2 - N-S under	GCS	Length
SF30	X	Wind	0.500	W2 - N-S under	GCS	Length
SF31	X	Wind	-0.240	W2 - N-S under	GCS	Length
SF32	X	Wind	-0.200	W2 - N-S under	GCS	Length
SF33	X	Wind	-0.200	W2 - N-S under	GCS	Length
SF34	X	Wind	0.240	W2 - N-S under	GCS	Length
SF35	X	Wind	0.200	W2 - N-S under	GCS	Length
SF36	X	Wind	0.200	W2 - N-S under	GCS	Length
SF37	Y	Wind	-1.100	W2 - N-S under	GCS	Length
SF38	Y	Wind	-1.100	W2 - N-S under	GCS	Length
SF39	Y	Wind	-1.100	W2 - N-S under	GCS	Length
SF40	Y	Wind	-0.200	W2 - N-S under	GCS	Length
SF41	Y	Wind	-0.200	W2 - N-S under	GCS	Length
SF42	Y	Wind	-0.200	W2 - N-S under	GCS	Length
SF43	Z	Wind	0.370	W2 - N-S under	GCS	Length
SF44	Z	Wind	0.370	W2 - N-S under	GCS	Length
SF45	Z	Wind	-0.560	W2 - N-S under	GCS	Length
SF46	Z	Wind	-0.560	W2 - N-S under	GCS	Length
SF47	Z	Wind	-0.500	W2 - N-S under	GCS	Length
SF48	Z	Wind	-0.500	W2 - N-S under	GCS	Length
SF49	Z	Wind	-0.500	W2 - N-S under	GCS	Length
SF50	Z	Wind	-0.500	W2 - N-S under	GCS	Length
SF51	Z	Wind	-0.500	W2 - N-S under	GCS	Length
SF52	Z	Wind	-0.500	W2 - N-S under	GCS	Length

4.2.13. Load cases - W3

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W3	S-N Over	Standard	Variable	Static	LG3	Short	None

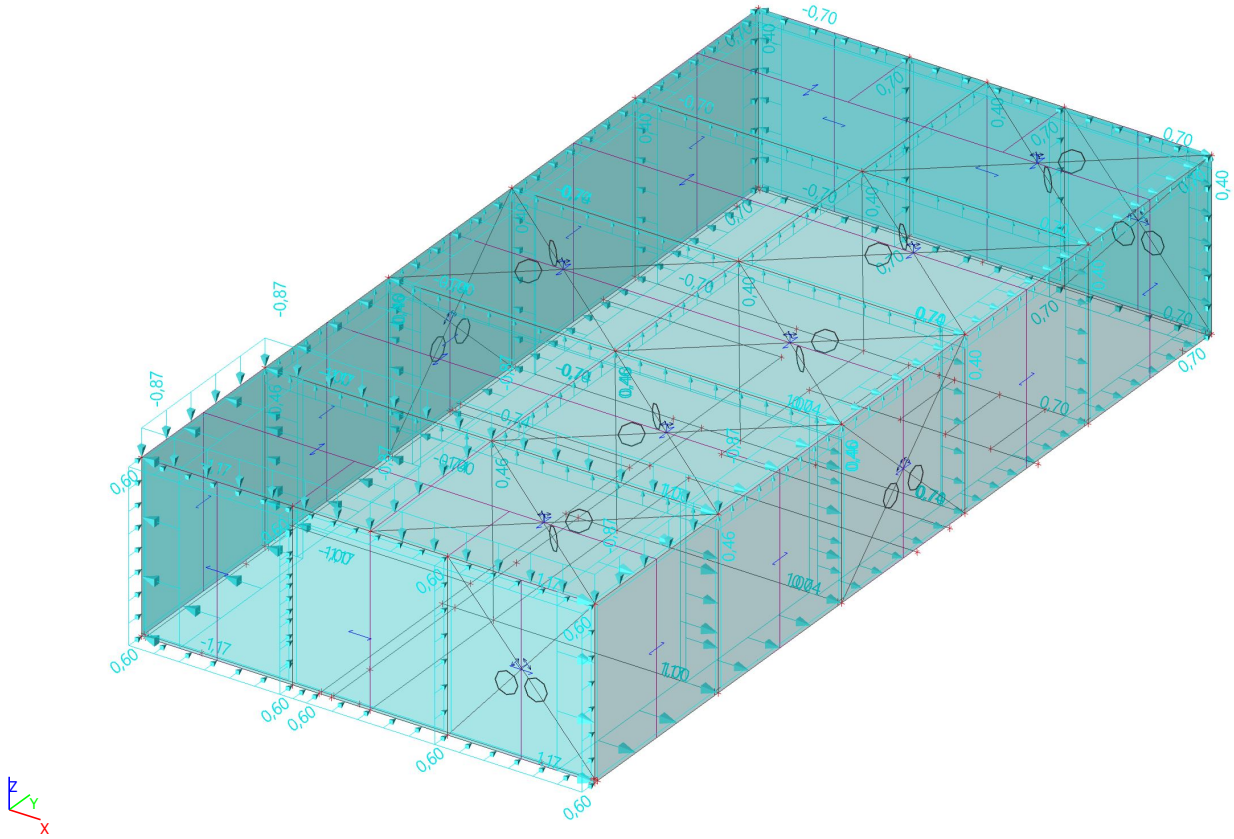


4.2.13.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF53	X	Wind	-0.700	W3 - S-N Over	GCS	Length
SF54	X	Wind	0.700	W3 - S-N Over	GCS	Length
SF55	X	Wind	-0.700	W3 - S-N Over	GCS	Length
SF56	X	Wind	0.700	W3 - S-N Over	GCS	Length
SF57	X	Wind	-0.740	W3 - S-N Over	GCS	Length
SF58	X	Wind	-1.000	W3 - S-N Over	GCS	Length
SF59	X	Wind	-1.170	W3 - S-N Over	GCS	Length
SF60	X	Wind	0.740	W3 - S-N Over	GCS	Length
SF61	X	Wind	1.000	W3 - S-N Over	GCS	Length
SF62	X	Wind	1.170	W3 - S-N Over	GCS	Length
SF63	Y	Wind	0.700	W3 - S-N Over	GCS	Length
SF64	Y	Wind	0.700	W3 - S-N Over	GCS	Length
SF65	Y	Wind	0.700	W3 - S-N Over	GCS	Length
SF66	Y	Wind	0.600	W3 - S-N Over	GCS	Length
SF67	Y	Wind	0.600	W3 - S-N Over	GCS	Length
SF68	Y	Wind	0.600	W3 - S-N Over	GCS	Length
SF69	Z	Wind	0.400	W3 - S-N Over	GCS	Length
SF70	Z	Wind	0.400	W3 - S-N Over	GCS	Length
SF71	Z	Wind	0.400	W3 - S-N Over	GCS	Length
SF72	Z	Wind	0.400	W3 - S-N Over	GCS	Length
SF73	Z	Wind	0.400	W3 - S-N Over	GCS	Length
SF74	Z	Wind	0.400	W3 - S-N Over	GCS	Length
SF75	Z	Wind	0.460	W3 - S-N Over	GCS	Length
SF76	Z	Wind	0.460	W3 - S-N Over	GCS	Length
SF77	Z	Wind	-0.870	W3 - S-N Over	GCS	Length
SF78	Z	Wind	-0.870	W3 - S-N Over	GCS	Length

4.2.14. Load cases - W4

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W4	S-N Over	Standard	Variable	Static	LG3	Short	None

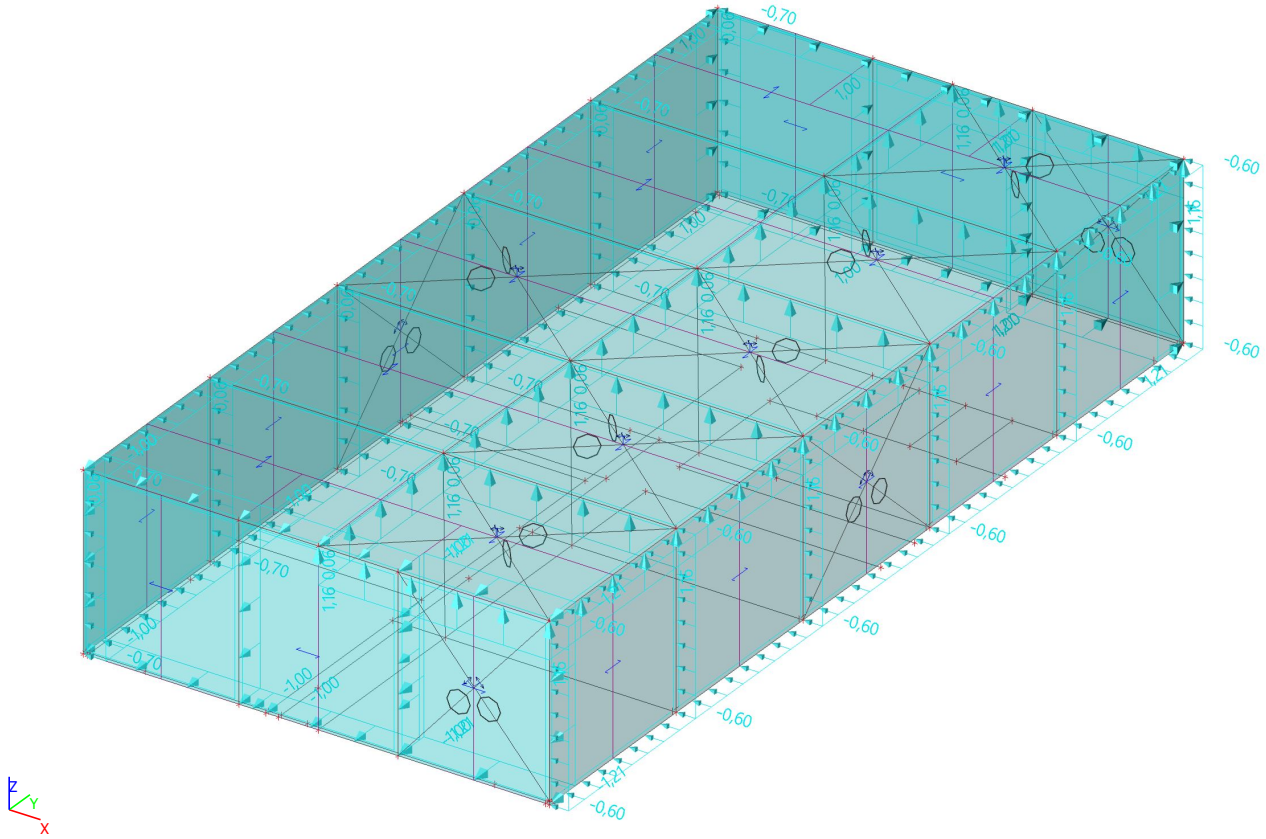


4.2.14.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF79	X	Wind	-0.700	W4 - S-N Over	GCS	Length
SF80	X	Wind	0.700	W4 - S-N Over	GCS	Length
SF81	X	Wind	-0.700	W4 - S-N Over	GCS	Length
SF82	X	Wind	0.700	W4 - S-N Over	GCS	Length
SF83	X	Wind	-0.740	W4 - S-N Over	GCS	Length
SF84	X	Wind	-1.000	W4 - S-N Over	GCS	Length
SF85	X	Wind	-1.170	W4 - S-N Over	GCS	Length
SF86	X	Wind	0.740	W4 - S-N Over	GCS	Length
SF87	X	Wind	1.000	W4 - S-N Over	GCS	Length
SF88	X	Wind	1.170	W4 - S-N Over	GCS	Length
SF89	Y	Wind	0.700	W4 - S-N Over	GCS	Length
SF90	Y	Wind	0.700	W4 - S-N Over	GCS	Length
SF91	Y	Wind	0.700	W4 - S-N Over	GCS	Length
SF92	Y	Wind	0.600	W4 - S-N Over	GCS	Length
SF93	Y	Wind	0.600	W4 - S-N Over	GCS	Length
SF94	Y	Wind	0.600	W4 - S-N Over	GCS	Length
SF95	Z	Wind	0.400	W4 - S-N Over	GCS	Length
SF96	Z	Wind	0.400	W4 - S-N Over	GCS	Length
SF97	Z	Wind	0.400	W4 - S-N Over	GCS	Length
SF98	Z	Wind	0.400	W4 - S-N Over	GCS	Length
SF99	Z	Wind	0.400	W4 - S-N Over	GCS	Length
SF100	Z	Wind	0.400	W4 - S-N Over	GCS	Length
SF101	Z	Wind	0.460	W4 - S-N Over	GCS	Length
SF102	Z	Wind	0.460	W4 - S-N Over	GCS	Length
SF103	Z	Wind	-0.870	W4 - S-N Over	GCS	Length
SF104	Z	Wind	-0.870	W4 - S-N Over	GCS	Length

4.2.15. Load cases - W5

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W5	E-W over	Standard	Variable	Static	LG3	Short	None

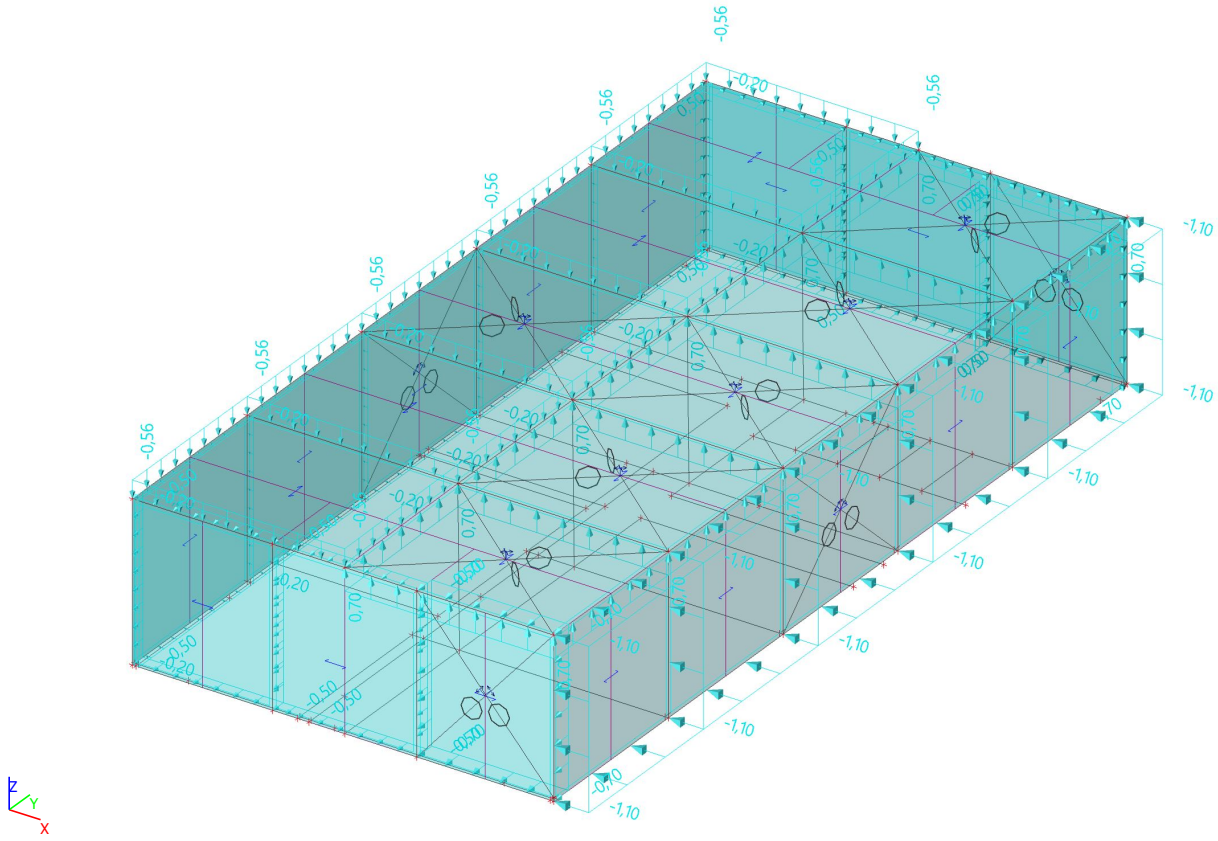


4.2.15.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF128	X	Wind	-0.700	W5 - E-W over	GCS	Length
SF129	X	Wind	-0.600	W5 - E-W over	GCS	Length
SF130	X	Wind	-0.700	W5 - E-W over	GCS	Length
SF131	X	Wind	-0.600	W5 - E-W over	GCS	Length
SF132	X	Wind	-0.700	W5 - E-W over	GCS	Length
SF133	X	Wind	-0.700	W5 - E-W over	GCS	Length
SF134	X	Wind	-0.700	W5 - E-W over	GCS	Length
SF135	X	Wind	-0.600	W5 - E-W over	GCS	Length
SF136	X	Wind	-0.600	W5 - E-W over	GCS	Length
SF137	X	Wind	-0.600	W5 - E-W over	GCS	Length
SF138	Y	Wind	1.000	W5 - E-W over	GCS	Length
SF139	Y	Wind	1.000	W5 - E-W over	GCS	Length
SF140	Y	Wind	1.210	W5 - E-W over	GCS	Length
SF141	Y	Wind	-1.000	W5 - E-W over	GCS	Length
SF142	Y	Wind	-1.000	W5 - E-W over	GCS	Length
SF143	Y	Wind	-1.210	W5 - E-W over	GCS	Length
SF144	Z	Wind	0.060	W5 - E-W over	GCS	Length
SF145	Z	Wind	1.160	W5 - E-W over	GCS	Length
SF146	Z	Wind	0.060	W5 - E-W over	GCS	Length
SF147	Z	Wind	1.160	W5 - E-W over	GCS	Length
SF148	Z	Wind	0.060	W5 - E-W over	GCS	Length
SF149	Z	Wind	1.160	W5 - E-W over	GCS	Length
SF150	Z	Wind	0.060	W5 - E-W over	GCS	Length
SF151	Z	Wind	1.160	W5 - E-W over	GCS	Length
SF152	Z	Wind	1.160	W5 - E-W over	GCS	Length
SF153	Z	Wind	0.060	W5 - E-W over	GCS	Length

4.2.16. Load cases - W6

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W6	E-W under	Standard	Variable	Static	LG3	Short	None

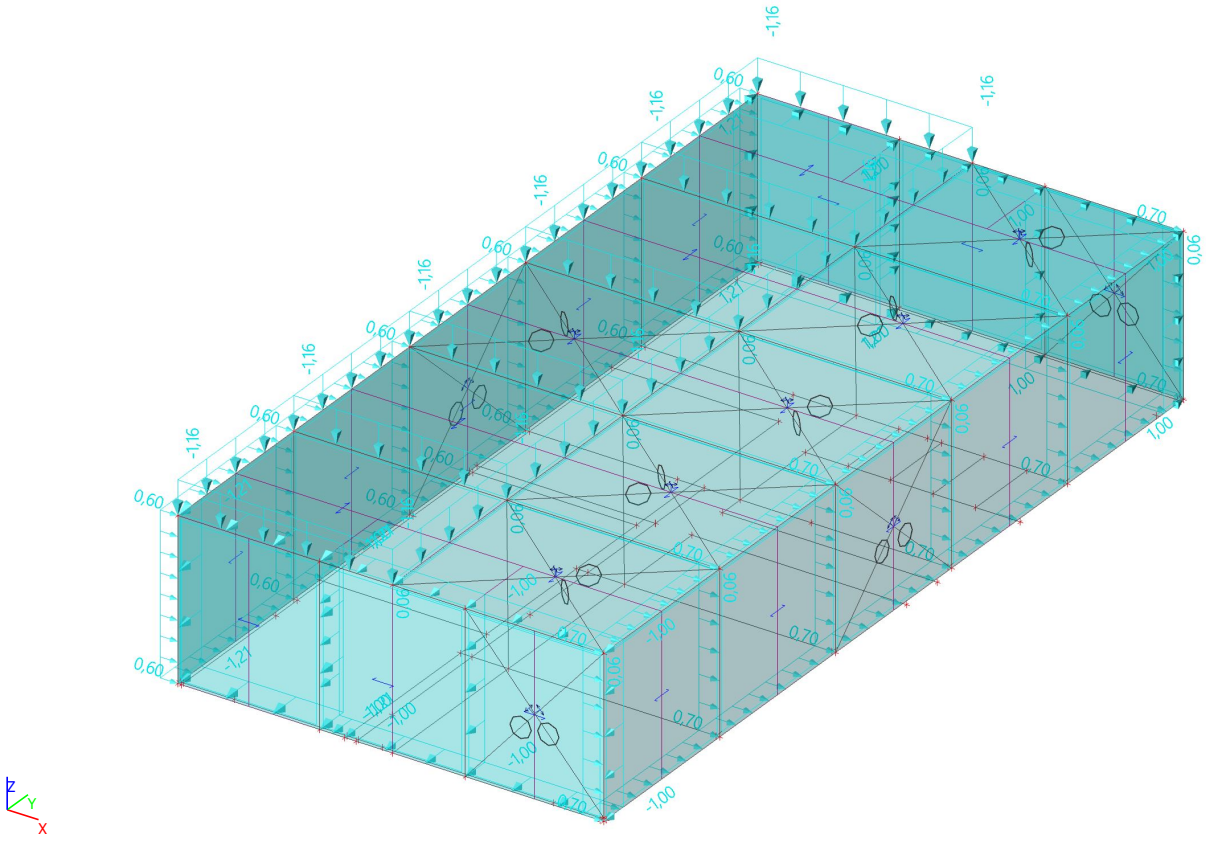


4.2.16.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF310	X	Wind	-0.200	W6 - E-W under	GCS	Length
SF311	X	Wind	-1.100	W6 - E-W under	GCS	Length
SF312	X	Wind	-0.200	W6 - E-W under	GCS	Length
SF313	X	Wind	-1.100	W6 - E-W under	GCS	Length
SF314	X	Wind	-0.200	W6 - E-W under	GCS	Length
SF315	X	Wind	-0.200	W6 - E-W under	GCS	Length
SF316	X	Wind	-0.200	W6 - E-W under	GCS	Length
SF317	X	Wind	-1.100	W6 - E-W under	GCS	Length
SF318	X	Wind	-1.100	W6 - E-W under	GCS	Length
SF319	X	Wind	-1.100	W6 - E-W under	GCS	Length
SF320	Y	Wind	0.500	W6 - E-W under	GCS	Length
SF321	Y	Wind	0.500	W6 - E-W under	GCS	Length
SF322	Y	Wind	0.700	W6 - E-W under	GCS	Length
SF323	Y	Wind	-0.500	W6 - E-W under	GCS	Length
SF324	Y	Wind	-0.500	W6 - E-W under	GCS	Length
SF325	Y	Wind	-0.700	W6 - E-W under	GCS	Length
SF326	Z	Wind	-0.560	W6 - E-W under	GCS	Length
SF327	Z	Wind	0.700	W6 - E-W under	GCS	Length
SF328	Z	Wind	-0.560	W6 - E-W under	GCS	Length
SF329	Z	Wind	0.700	W6 - E-W under	GCS	Length
SF330	Z	Wind	-0.560	W6 - E-W under	GCS	Length
SF331	Z	Wind	0.700	W6 - E-W under	GCS	Length
SF332	Z	Wind	-0.560	W6 - E-W under	GCS	Length
SF333	Z	Wind	0.700	W6 - E-W under	GCS	Length
SF334	Z	Wind	0.700	W6 - E-W under	GCS	Length
SF335	Z	Wind	-0.560	W6 - E-W under	GCS	Length

4.2.17. Load cases - W7

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W7	W-E Over	Standard	Variable	Static	LG3	Short	None

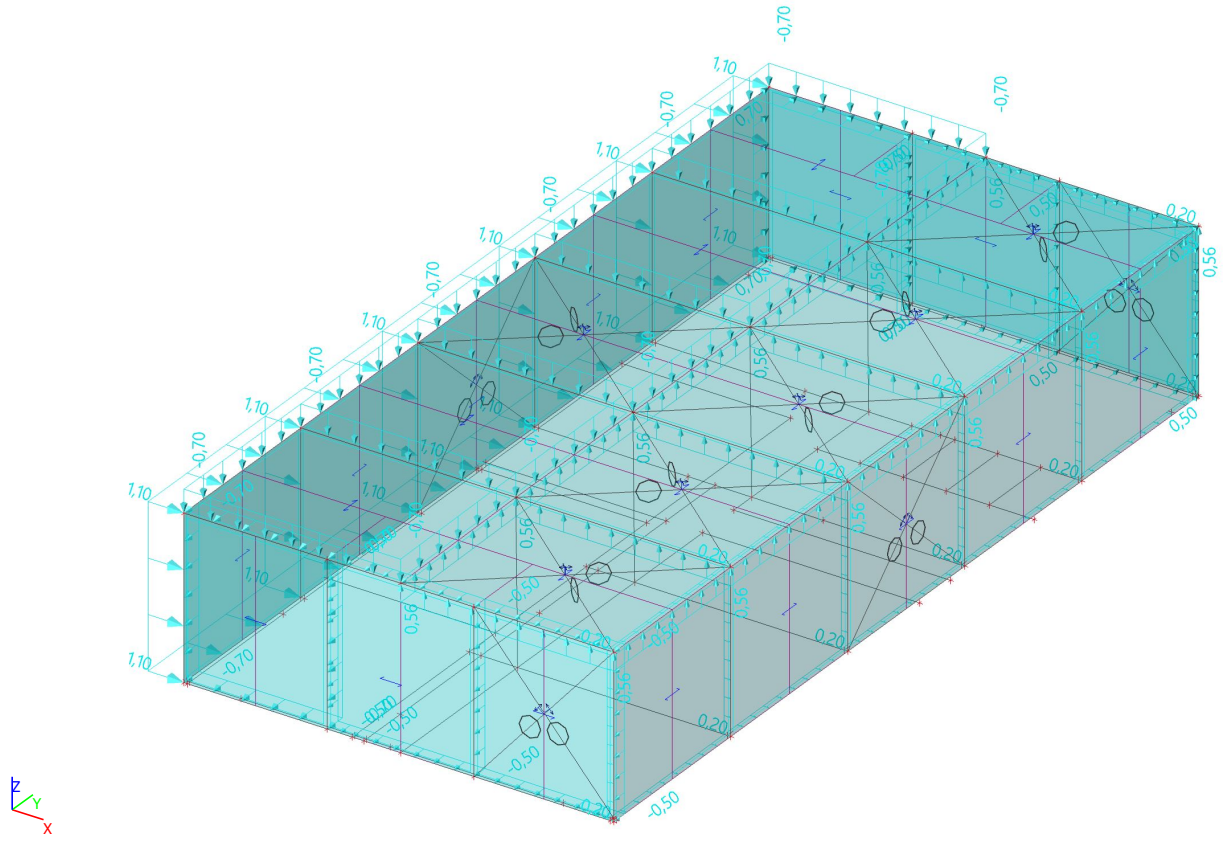


4.2.17.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF336	X	Wind	0.600	W7 - W-E Over	GCS	Length
SF337	X	Wind	0.700	W7 - W-E Over	GCS	Length
SF338	X	Wind	0.600	W7 - W-E Over	GCS	Length
SF339	X	Wind	0.700	W7 - W-E Over	GCS	Length
SF340	X	Wind	0.600	W7 - W-E Over	GCS	Length
SF341	X	Wind	0.600	W7 - W-E Over	GCS	Length
SF342	X	Wind	0.600	W7 - W-E Over	GCS	Length
SF343	X	Wind	0.700	W7 - W-E Over	GCS	Length
SF344	X	Wind	0.700	W7 - W-E Over	GCS	Length
SF345	X	Wind	0.700	W7 - W-E Over	GCS	Length
SF346	Y	Wind	1.210	W7 - W-E Over	GCS	Length
SF347	Y	Wind	1.000	W7 - W-E Over	GCS	Length
SF348	Y	Wind	1.000	W7 - W-E Over	GCS	Length
SF349	Y	Wind	-1.210	W7 - W-E Over	GCS	Length
SF350	Y	Wind	-1.000	W7 - W-E Over	GCS	Length
SF351	Y	Wind	-1.000	W7 - W-E Over	GCS	Length
SF352	Z	Wind	-1.160	W7 - W-E Over	GCS	Length
SF353	Z	Wind	0.060	W7 - W-E Over	GCS	Length
SF354	Z	Wind	-1.160	W7 - W-E Over	GCS	Length
SF355	Z	Wind	0.060	W7 - W-E Over	GCS	Length
SF356	Z	Wind	-1.160	W7 - W-E Over	GCS	Length
SF357	Z	Wind	0.060	W7 - W-E Over	GCS	Length
SF358	Z	Wind	-1.160	W7 - W-E Over	GCS	Length
SF359	Z	Wind	0.060	W7 - W-E Over	GCS	Length
SF360	Z	Wind	0.060	W7 - W-E Over	GCS	Length
SF361	Z	Wind	-1.160	W7 - W-E Over	GCS	Length

4.2.18. Load cases - W8

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W8	W-E Under	Standard	Variable	Static	LG3	Short	None



4.2.18.1. Surface load

Name	Dir	Type	Coeff	Load case	System	Loc
SF284	X	Wind	1.100	W8 - W-E Under	GCS	Length
SF285	X	Wind	0.200	W8 - W-E Under	GCS	Length
SF286	X	Wind	1.100	W8 - W-E Under	GCS	Length
SF287	X	Wind	0.200	W8 - W-E Under	GCS	Length
SF288	X	Wind	1.100	W8 - W-E Under	GCS	Length
SF289	X	Wind	1.100	W8 - W-E Under	GCS	Length
SF290	X	Wind	1.100	W8 - W-E Under	GCS	Length
SF291	X	Wind	0.200	W8 - W-E Under	GCS	Length
SF292	X	Wind	0.200	W8 - W-E Under	GCS	Length
SF293	X	Wind	0.200	W8 - W-E Under	GCS	Length
SF294	Y	Wind	0.700	W8 - W-E Under	GCS	Length
SF295	Y	Wind	0.500	W8 - W-E Under	GCS	Length
SF296	Y	Wind	0.500	W8 - W-E Under	GCS	Length
SF297	Y	Wind	-0.700	W8 - W-E Under	GCS	Length
SF298	Y	Wind	-0.500	W8 - W-E Under	GCS	Length
SF299	Y	Wind	-0.500	W8 - W-E Under	GCS	Length
SF300	Z	Wind	-0.700	W8 - W-E Under	GCS	Length
SF301	Z	Wind	0.560	W8 - W-E Under	GCS	Length
SF302	Z	Wind	-0.700	W8 - W-E Under	GCS	Length
SF303	Z	Wind	0.560	W8 - W-E Under	GCS	Length
SF304	Z	Wind	-0.700	W8 - W-E Under	GCS	Length
SF305	Z	Wind	0.560	W8 - W-E Under	GCS	Length
SF306	Z	Wind	-0.700	W8 - W-E Under	GCS	Length
SF307	Z	Wind	0.560	W8 - W-E Under	GCS	Length
SF308	Z	Wind	0.560	W8 - W-E Under	GCS	Length
SF309	Z	Wind	-0.700	W8 - W-E Under	GCS	Length

4.3. Load groups

Name	Load	Relation	Type
LG1	Permanent		
LG2	Variable	Standard	Cat E : Storage
LG3	Variable	Exclusive	Wind

4.4. Combinations

Name	Description	Type	Load cases	Coeff. [-]
Combi1		EN-ULS (STR/GEO) Set B	DL - Eigen gewicht	1,00
			DL2 - Eigen gewicht	1,00
			LL1 - Live load - Roof	1,00
			LL2 - Live load - General	1,00
			LL3 - Live load - General	1,00
			LL4 - Live load - General	1,00
			LL5 - Live load - Storrage	1,00
			LL6 - Live load - Storrage	1,00
			LL7 - Live load - Storrage	1,00
			LL8 - Live load - Control room	1,00
			W1 - N-S over	1,00
			W2 - N-S under	1,00
			W3 - S-N Over	1,00
			W4 - S-N Over	1,00
			W5 - E-W over	1,00
			W6 - E-W under	1,00
			W7 - W-E Over	1,00
			W8 - W-E Under	1,00
Combi2		EN-SLS Characteristic	DL - Eigen gewicht	1,00
			DL2 - Eigen gewicht	1,00
			LL1 - Live load - Roof	1,00
			LL2 - Live load - General	1,00
			LL3 - Live load - General	1,00
			LL4 - Live load - General	1,00
			LL5 - Live load - Storrage	1,00
			LL6 - Live load - Storrage	1,00
			LL7 - Live load - Storrage	1,00
			LL8 - Live load - Control room	1,00
			W1 - N-S over	1,00
			W2 - N-S under	1,00
			W3 - S-N Over	1,00
			W4 - S-N Over	1,00
			W5 - E-W over	1,00
			W6 - E-W under	1,00
			W7 - W-E Over	1,00
			W8 - W-E Under	1,00

4.5. Result classes

Name	List
All ULS	Combi1 - EN-ULS (STR/GEO) Set B
All SLS	Combi2 - EN-SLS Characteristic
All ULS-NL	NLCombi1 NLCombi2 NLCombi3

5. Results

5.1. Bill of material

Selection: All
Type of sorting: Material

Summary

Material	Mass [kg]	Surface [m²]	Volume [m³]
Steel	7734,5	239,020	9,8528e-01
Concrete	307325,7	616,361	1,2293e+02
Total	315060,2	855,381	1,2392e+02

Note: Value 'Surface' represents for 1D members the total exposed surface area, while for 2D members it corresponds only to the surface area of the centroidal plane.

Steel (1D)

Material	Density [kg/m³]	Mass [kg]	Surface [m²]	Volume [m³]
S 235	7850,0	7734,5	239,020	9,8528e-01
Total		7734,5	239,020	9,8528e-01

Concrete (1D)

Material	Density [kg/m³]	Mass [kg]	Surface [m²]	Volume [m³]
C30/37	2500,0	123575,7	322,361	4,9430e+01
Total		123575,7	322,361	4,9430e+01

Concrete (2D)

Material	Density [kg/m³]	Mass [kg]	Surface [m²]	Volume [m³]
C30/37	2500,0	183750,0	294,000	7,3500e+01
Total		183750,0	294,000	7,3500e+01

5.2. Calculation protocol

Linear calculation

Number of 2D elements	5160
Number of 1D elements	692
Number of mesh nodes	5320
Number of equations	31920
Bending theory	Mindlin
Load cases	DL, DL2, LL1, W1, W2, W3, W4, LL2, LL8, LL6, LL3, LL4, LL5, LL7, W5, W6, W7, W8
Start of calculation	04.08.2021 10:08
End of calculation	04.08.2021 10:09

Sum of loads and reactions

Load case	Value	X [kN]	Y [kN]	Z [kN]
DL	loads	0,0	0,0	-3150,6
	reaction in nodes	0,0	0,0	3150,6
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
DL2	loads	0,0	0,0	-2135,2
	reaction in nodes	0,0	0,0	2135,2
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL1	loads	0,0	0,0	-588,0
	reaction in nodes	0,0	0,0	588,0
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W1	loads	0,0	-61,1	129,4
	reaction in nodes	0,0	61,1	-129,4
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W2	loads	0,0	-61,1	-86,5
	reaction in nodes	0,0	61,1	86,5
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0

Load case	Value	X [kN]	Y [kN]	Z [kN]
W3	loads	0,0	61,1	40,4
	reaction in nodes	0,0	-61,1	-40,4
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W4	loads	0,0	61,1	40,4
	reaction in nodes	0,0	-61,1	-40,4
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL2	loads	0,0	0,0	-235,2
	reaction in nodes	0,0	0,0	235,2
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL8	loads	0,0	0,0	-347,6
	reaction in nodes	0,0	0,0	347,6
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL6	loads	0,0	0,0	-262,5
	reaction in nodes	0,0	0,0	262,5
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL3	loads	0,0	0,0	-235,2
	reaction in nodes	0,0	0,0	235,2
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL4	loads	0,0	0,0	-47,7
	reaction in nodes	0,0	0,0	47,7
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL5	loads	0,0	0,0	-268,3
	reaction in nodes	0,0	0,0	268,3
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
LL7	loads	0,0	0,0	-268,3
	reaction in nodes	0,0	0,0	268,3
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W5	loads	-124,7	0,0	155,8
	reaction in nodes	124,7	0,0	-155,8
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W6	loads	-124,7	0,0	17,6
	reaction in nodes	124,7	0,0	-17,6
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W7	loads	124,7	0,0	-140,9
	reaction in nodes	-124,7	0,0	140,9
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0
W8	loads	124,7	0,0	-18,2
	reaction in nodes	-124,7	0,0	18,2
	reaction on lines	0,0	0,0	0,0
	contact 1D	0,0	0,0	0,0
	contact 2D	0,0	0,0	0,0

5.3. Reactions

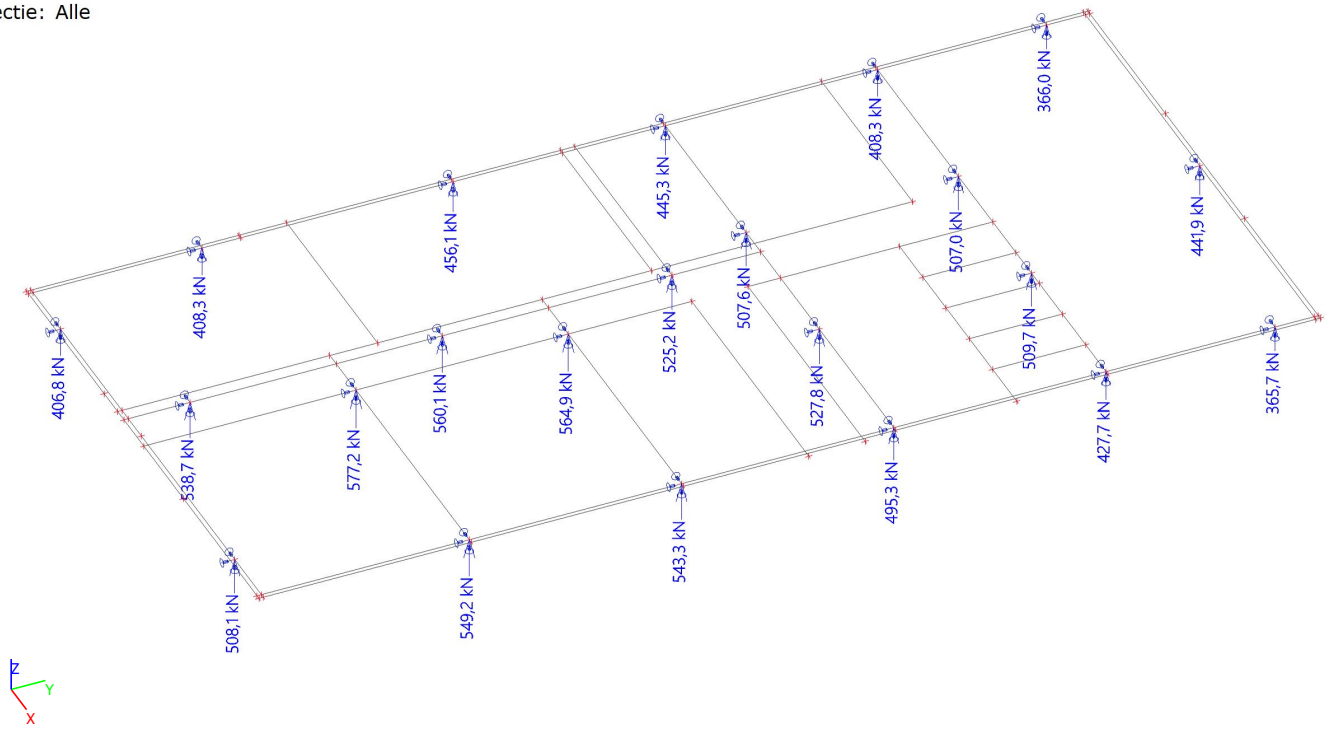
Linear calculation
Class: All ULS
System: Global
Extreme: Global
Selection: All
Nodal reactions

Name	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]	e_x [mm]	e_y [mm]
Sn19/K135	Combi1/1	**-17,6**	-3,5	382,7	0,0	0,0	0,0	0,0	0,0
Sn14/K133	Combi1/2	**11,2**	0,0	322,6	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn18/K132	Combi1/3	-2,4	**-8,3**	384,8	0,0	0,0	0,0	0,0	0,0
Sn15/K134	Combi1/4	-0,2	**5,5**	365,4	0,0	0,0	0,0	0,0	0,0
Sn3/K126	Combi1/5	9,1	0,2	**139,5**	0,0	0,0	0,0	0,0	0,0
Sn21/K79	Combi1/6	1,1	0,0	**577,2**	0,0	0,0	0,0	0,0	0,0

Name	Combination key
Combi1/1	1.20*DL + 1.20*DL2 + 1.50*LL1 + 1.50*LL2 + 1.50*LL8 + 1.50*LL4 + 1.50*LL5 + 1.50*LL7 + 1.50*W8
Combi1/2	1.20*DL + 1.20*DL2 + 1.50*LL1 + 1.50*LL2 + 1.50*LL8 + 1.50*LL6 + 1.50*LL5 + 1.50*W6
Combi1/3	1.20*DL + 1.20*DL2 + 1.50*LL1 + 1.50*W3 + 1.50*LL8 + 1.50*LL4 + 1.50*LL5 + 1.50*LL7
Combi1/4	1.20*DL + 1.20*DL2 + 1.50*W1 + 1.50*LL2 + 1.50*LL3 + 1.50*LL4 + 1.50*LL7
Combi1/5	0.90*DL + 0.90*DL2 + 1.50*LL8 + 1.50*LL6 + 1.50*LL4 + 1.50*LL5 + 1.50*LL7 + 1.50*W5
Combi1/6	1.35*DL + 1.35*DL2 + 1.50*LL1 + 1.50*LL8 + 1.50*LL6 + 1.50*LL4 + 1.50*LL5 + 1.50*LL7

5.4. Reactions ULS

Waardes: **R_z**
Lineaire berekening
Klasse: All ULS
Systeem: Globaal
Extreem: Element
Selectie: Alle



Linear calculation
Class: All SLS
System: Global
Extreme: Global
Selection: All
Nodal reactions

Name	Case	R_x [kN]	R_y [kN]	R_z [kN]	M_x [kNm]	M_y [kNm]	M_z [kNm]	e_x [mm]	e_y [mm]
Sn19/K135	Combi2/1	**-12,4**	-2,6	295,7	0,0	0,0	0,0	0,0	0,0
Sn14/K133	Combi2/2	**7,6**	0,0	263,0	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn18/K132	Combi2/3	-1,8	**-5,8**	296,1	0,0	0,0	0,0	0,0	0,0
Sn15/K134	Combi2/4	-0,1	**3,7**	293,9	0,0	0,0	0,0	0,0	0,0
Sn3/K126	Combi2/5	6,3	0,2	**174,0**	0,0	0,0	0,0	0,0	0,0
Sn21/K79	Combi2/6	0,8	2,7	**418,1**	0,0	0,0	0,0	0,0	0,0

Name	Combination key
Combi2/1	DL + DL2 + LL1 + LL2 + LL8 + LL4 + LL5 + LL7 + W8
Combi2/2	DL + DL2 + LL1 + LL2 + LL8 + LL6 + LL5 + W6
Combi2/3	DL + DL2 + LL1 + W3 + LL8 + LL4 + LL5 + LL7
Combi2/4	DL + DL2 + W1 + LL2 + LL3 + LL4 + LL7
Combi2/5	DL + DL2 + LL8 + LL6 + LL4 + LL5 + LL7 + W5
Combi2/6	DL + DL2 + LL1 + W2 + LL8 + LL6 + LL4 + LL5 + LL7

5.5. Reactions SLS

Waardes: **R_z**
Lineaire berekening
Klasse: All SLS
Systeem: Globaal
Extreem: Element
Selectie: Alle