Opgesteld:	LER	Gecontroleerd:	KER	Goedgekeurd:	RIW
Datum	17-8-2021	Datum	17-8-2021	Datum	17-8-2021

"For approval"

Expansion storage capacity TP3

Pipe rack 6

Structural calculation

Klant	Neste Terminals	Klant projectnr.	2307
Project	Expansion storage capacity TP3	KH projectnr.	68685
Locatie	Vlaardingen		
Installatie	Tank pit 3	Revisie	0
documentnr.	2307-E80-CN-1731-0002	Datum	17-8-2021

Revision	Description	Date
0	Released for approval	17-8-2021

1 Index

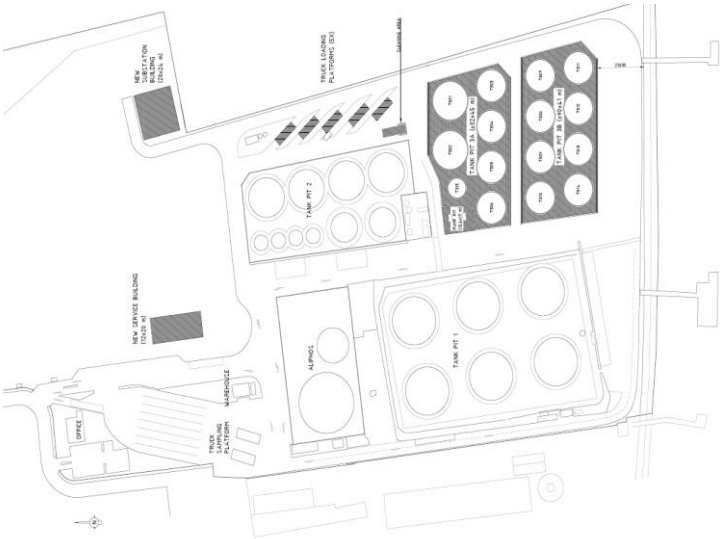
2 Introduction

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

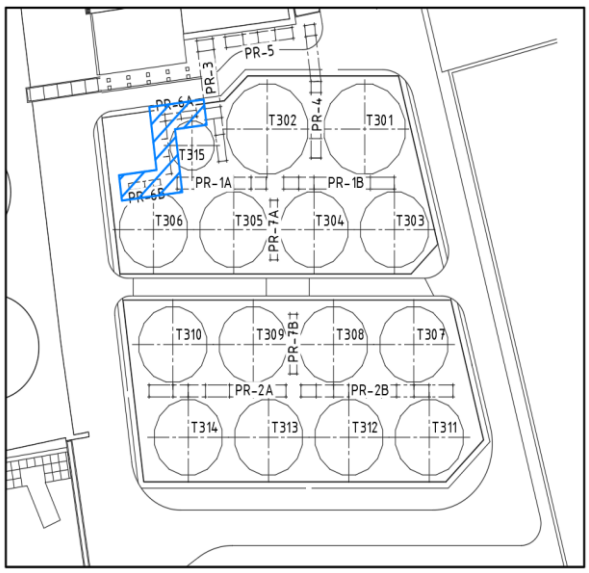
The expansion of the terminal consists of 15 tanks divided over two tank pits. There is a maintenance road between the two tank pits. Both tank pits are connected underground in order to guarantee the buffer capacity of the tank pits. The bund wall shall consist of either a retaining wall or sheet piling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

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

On the north side of the new tank pits an recently built tank pit (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 tank pit is present which is built in approximately 40 years ago (1960).



In this calculation the design of pipe rack 6 and 7 is checked and the piling load is determined.



3 General

3.1 Standards

NEN-EN 1990/NB	Eurocode 0: Basis of structural design
NEN-EN 1991	Eurocode 1: Actions on structures
NEN-EN 1991-1-1/NB	General actions - Densities, self-weight, imposed loads for buildings
NEN-EN 1991-1-4/NB	General actions - Wind actions
NEN-EN 1991-1-5/NB	General actions - Thermal actions
NEN-EN 1992	Eurocode 2: Design of concrete structures
NEN-EN 1992-1-1/NB	General rules and rules for buildings
NEN-EN 1993	Eurocode 3: Design of steel structures
NEN-EN 1993-1-1/NB	General rules and rules for buildings
NEN-EN 1993-1-8/NB	Design of joints
2305-000-JSD-1700-04 Rev.4	Gereral rules for steel structure and civil works
2307-000-DC-1708-0004_0	Calculation Note Assumptions

3.2 Reference documents

drawings:

- 2307-E40-DW-0051-0003 TP3 3D view

other:

- FA01-D02-2101015 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			
steel grade structural steel	*S355*	f_y =	*355*	N/mm²	E = *2,1E+05* N/mm²
concrete class	*C30/37*				

materials

deformations limits

Steel structure:

horizontal and vertical deflections	quasi permanent	$\omega_{lim} = l_{rep} / 250$
	frequent	$\omega_3 = l_{rep} / 333$
horizontal displacement pipe bridge	characteristic	$u = H / 250$

foundations

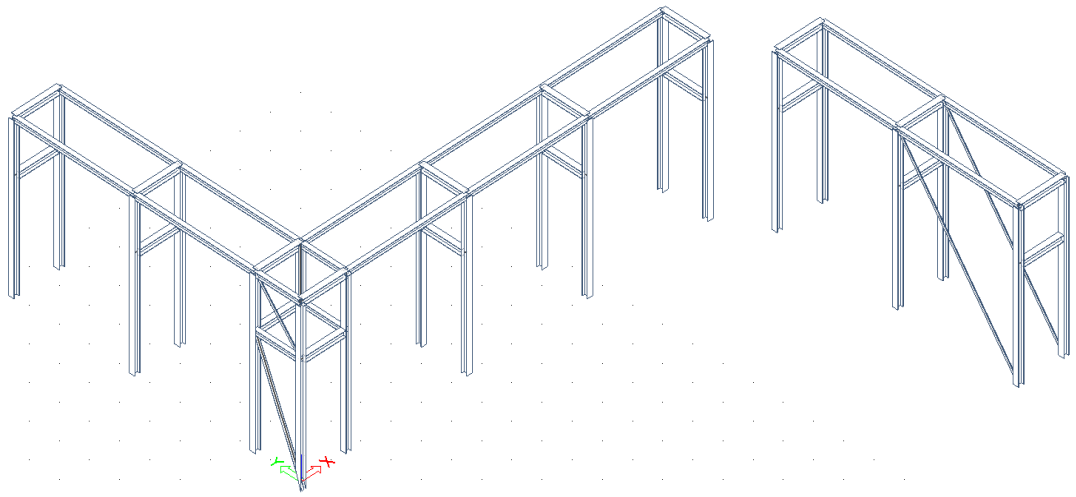
The springs constants are derived from the geotechnical advise. See calculation pipe rack 1 and 2.

k_v = *50* MN/m
k_h = *10* MN/m

analisys

The structure is checked using a first order, linear elastic calculation, with a buckling
equal to system length of the member. This is based on the results of the calculation of pipe rack 1

4 Structure



elevations

top of concrete						toc	=	*2,730* +
top of steel:								
piping 1	layer of 8" pipes	spacing	=	*3,3*	m	tos	=	6,000 +
piping 2	layer of 6" pipes	spacing	=	*1,5*	m	tos	=	7,500 +

center to centre frames (considered as span of pipe)	=	*4,0* m
width of pipe rack	=	*1,5* m
center to centre frames at bracing	=	*1,5* m

The foundation beams of this pipe rack are part of the pump slab.

5 Loads and load combinations

5.1 Dead load

self-weight calculated by calculation software.

5.2 Equipment load

piping	6"	8"	
empty	*0,8*	*1,0*	kN/m²
operating	*1,8*	*2,2*	kN/m²

5.3 Wind load

The reference height for the wind load on the pipe rack is increased due to the larger adjacent tanks.

top of high structure				h_{high} =	*24,5*	m
largest width of high structure				d_{large} =	*16*	m
radius	$h_{high} \leq 2d_{large}$ ->	h_{high}=		r =	24,5	m
reference height	$x \leq r$ ->	0,5r =		z_n =	12,25	m

terrain category	*II*	area not build on			
basic wind velocity			v_b =	*30*	m/s
roughness length			z_0 =	0,2	m
			$z_{0,II}$ =	*0,05*	m
minimum height			z_{min} =	4	m
terrain factor			k_r =	0,209	
roughness factor			$c_r(h)$ =	0,862	
orography factor			$c_0(z)$ =	*1,00*	
mean wind velocity			$v_{m(h)}$ =	25,85	m/s
turbulence factor			k_I =	*1*	
turbulence intensity			$I_v(h)$ =	0,243	
air density			ρ =	*1,25*	kg/m³
peak velocity pressure			$q_p(z)$ =	1,128	
structural factor			$c_s c_d$ =	*1,0*	

5.3.1 wind load on structural members

force coefficient c_f = *2,0*

h =	*133*	*152*	*160*	*180*
q_k =	0,30	0,34	0,36	0,41

5.3.2 wind load piping layer

force coefficient c_f = *0,8*

width of pipe rack b = *1,5* m

		6"	8"	
diameter	Ø =	*0,22*	*0,3*	
wind load	q_k =	0,33	0,42	$(Ø+0{,}1b)q_p(z)c_fc_sc_d$

5.4 Temperature load

longitudinal direction of pipe

vertical bracing F_h = *5* %

top flange of support beam F_h = *10* %

support beam F_h = *10* kN

transverse direction of pipe

frames F_h = *7,5* kN

5.5 Combinations

	ψ_0	ψ_1	ψ_2
industrial - short term	*0,5*	*0,5*	*0,3*
wind	*0,6*	*0,2*	*0,0*
Temperature	*0,6*	*0,5*	*0,0*

$$ULS = \sum_{j\geq 1} \gamma_{G,j} G_{k,j} + \gamma_{Q,1}\psi_{0,1} Q_{k,1} + \sum_{i\geq 1} \gamma_{Q,i}\psi_{0,i} Q_{k,i}$$

$$ULS = \sum_{j\geq 1} \xi\gamma_{G,j} G_{k,j} + \gamma_{Q,1} Q_{k,1} + \sum_{i\geq 1} \gamma_{Q,i}\psi_{0,i} Q_{k,i}$$

ξ = *0,9* γ_G = *1,35* $\gamma_{G,inf}$ = *1,0* γ_Q = *1,5*

$$SLS_{char} = \sum_{j\geq 1} G_{k,j} + Q_{k,1} + \sum_{i>1} \psi_{0,i} Q_{k,i}$$

$$SLS_{freq} = \sum_{j\geq 1} G_{k,j} + \psi_{1,1} Q_{k,1} + \sum_{i>1} \psi_{2,i} Q_{k,i}$$

$$SLS_{quasi} = \sum_{j\geq 1} G_{k,j} + \psi_{2,1} Q_{k,1} + \sum_{i>1} \psi_{2,i} Q_{k,i}$$

6 Conclusion

The structure is checked with Scia engineer, see appendix A. The results of the calculation are as follows.

member check		unity checks ULS	SLS
columns	HEB180	*0,20*	*0,78*
beams	HEA180	*0,27*	*0,01*
	HEA140	*0,08*	*0,02*
bracing	L70.7	*0,19*	-

maximum displacement = *14,3* mm

reaction forces
For pile loads see calculation of pump slab.

Appendix A

Scia report

KH Engineering

1. Table of contents

2. General

2.1. Project

Licence name	KH Engineering
Project	-
Part	-
Description	-
Author	LER
Date	09. 08. 2021
Structure	General XYZ
No. of nodes :	60
No. of beams :	63
No. of slabs :	0
No. of solids :	0
No. of used profiles :	4
No. of load cases :	6
No. of used materials :	1
Acceleration of gravity [m/s^2]	9,810
National code	EC - EN

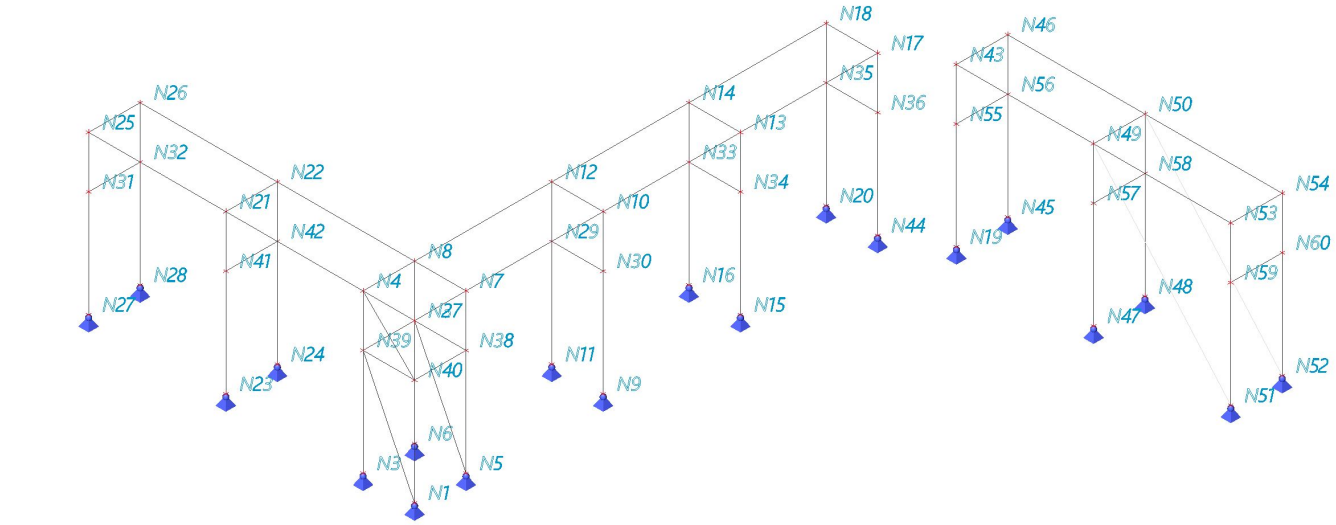
3. Structure

3.1. Nodes

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N1	0,000	0,000	0,000
N2	0,000	0,000	4,600
N3	0,000	1,500	0,000
N4	0,000	1,500	4,600
N5	1,500	0,000	0,000
N6	1,500	1,500	0,000
N7	1,500	0,000	4,600
N8	1,500	1,500	4,600
N9	5,500	0,000	0,000
N10	5,500	0,000	4,600
N11	5,500	1,500	0,000
N12	5,500	1,500	4,600
N13	9,500	0,000	4,600
N14	9,500	1,500	4,600
N15	9,500	0,000	0,000
N16	9,500	1,500	0,000
N17	13,500	0,000	4,600
N18	13,500	1,500	4,600
N19	14,360	-1,435	0,000
N20	13,500	1,500	0,000

Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N21	0,000	5,500	4,600
N22	1,500	5,500	4,600
N23	0,000	5,500	0,000
N24	1,500	5,500	0,000
N25	0,000	9,500	4,600
N26	1,500	9,500	4,600
N27	0,000	9,500	0,000
N28	1,500	9,500	0,000
N29	5,500	1,500	3,100
N30	5,500	0,000	3,100
N31	0,000	9,500	3,100
N32	1,500	9,500	3,100
N33	9,500	1,500	3,100
N34	9,500	0,000	3,100
N35	13,500	1,500	3,100
N36	13,500	0,000	3,100
N37	1,500	1,500	3,100
N38	1,500	0,000	3,100
N39	0,000	1,500	3,100
N40	0,000	0,000	3,100

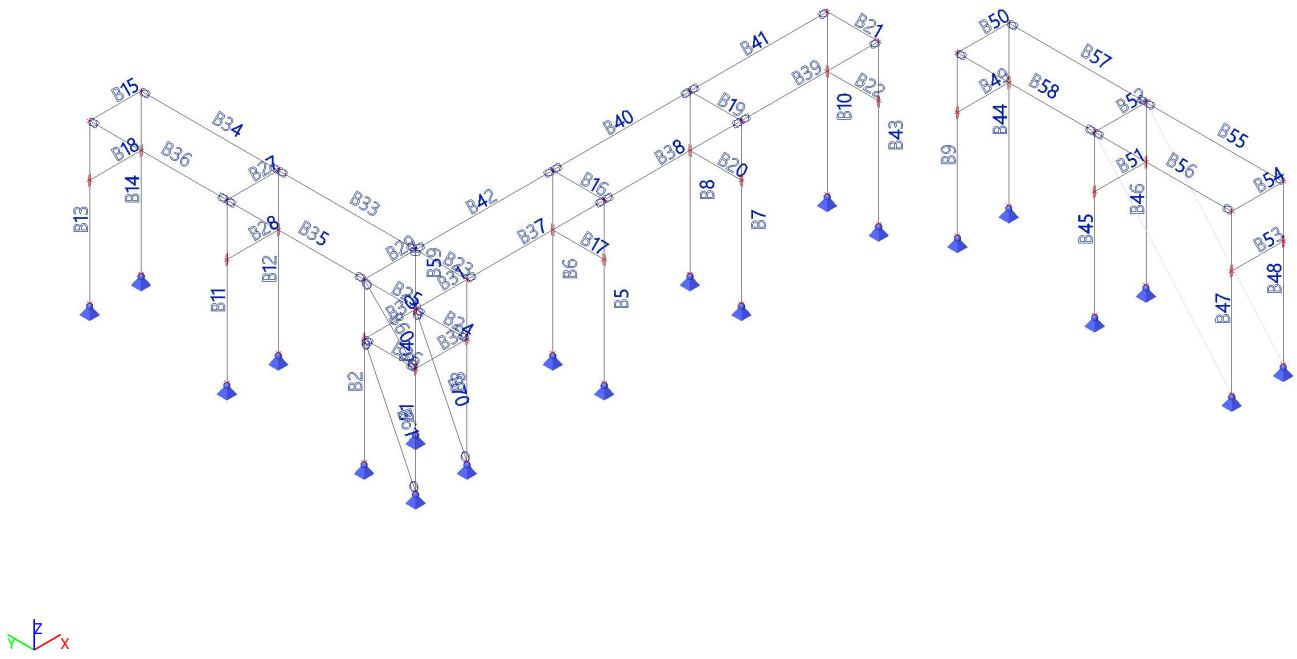
Name	Coord X [m]	Coord Y [m]	Coord Z [m]
N41	0,000	5,500	3,100
N42	1,500	5,500	3,100
N43	14,360	-1,435	4,600
N44	13,500	0,000	0,000
N45	15,860	-1,435	0,000
N46	15,860	-1,435	4,600
N47	14,360	-5,435	0,000
N48	15,860	-5,435	0,000
N49	14,360	-5,435	4,600
N50	15,860	-5,435	4,600
N51	14,360	-9,435	0,000
N52	15,860	-9,435	0,000
N53	14,360	-9,435	4,600
N54	15,860	-9,435	4,600
N55	14,360	-1,435	3,100
N56	15,860	-1,435	3,100
N57	14,360	-5,435	3,100
N58	15,860	-5,435	3,100
N59	14,360	-9,435	3,100
N60	15,860	-9,435	3,100



3.2. Members

Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
B1	CS2 - HEB180	S 355	4,600	N1	N2	general (0)
B2	CS2 - HEB180	S 355	4,600	N3	N4	general (0)
B3	CS2 - HEB180	S 355	4,600	N5	N7	general (0)
B4	CS2 - HEB180	S 355	4,600	N6	N8	general (0)
B5	CS2 - HEB180	S 355	4,600	N9	N10	general (0)
B6	CS2 - HEB180	S 355	4,600	N11	N12	general (0)
B7	CS2 - HEB180	S 355	4,600	N15	N13	general (0)

Name	Cross-section	Material	Length [m]	Beg. node	End node	Type
B8	CS2 - HEB180	S 355	4,600	N16	N14	general (0)
B9	CS2 - HEB180	S 355	4,600	N19	N43	general (0)
B10	CS2 - HEB180	S 355	4,600	N20	N18	general (0)
B11	CS2 - HEB180	S 355	4,600	N23	N21	general (0)
B12	CS2 - HEB180	S 355	4,600	N24	N22	general (0)
B13	CS2 - HEB180	S 355	4,600	N27	N25	general (0)
B14	CS2 - HEB180	S 355	4,600	N28	N26	general (0)
B15	CS1 - HEA180	S 355	1,500	N25	N26	beam (80)
B16	CS1 - HEA180	S 355	1,500	N12	N10	beam (80)
B17	CS1 - HEA180	S 355	1,500	N29	N30	beam (80)
B18	CS1 - HEA180	S 355	1,500	N31	N32	beam (80)
B19	CS1 - HEA180	S 355	1,500	N14	N13	beam (80)
B20	CS1 - HEA180	S 355	1,500	N33	N34	beam (80)
B21	CS1 - HEA180	S 355	1,500	N18	N17	beam (80)
B22	CS1 - HEA180	S 355	1,500	N35	N36	beam (80)
B23	CS3 - HEA140	S 355	1,500	N8	N7	beam (80)
B24	CS3 - HEA140	S 355	1,500	N37	N38	beam (80)
B25	CS3 - HEA140	S 355	1,500	N4	N2	beam (80)
B26	CS3 - HEA140	S 355	1,500	N39	N40	beam (80)
B27	CS1 - HEA180	S 355	1,500	N21	N22	beam (80)
B28	CS1 - HEA180	S 355	1,500	N41	N42	beam (80)
B29	CS1 - HEA180	S 355	1,500	N4	N8	beam (80)
B30	CS1 - HEA180	S 355	1,500	N39	N37	beam (80)
B31	CS1 - HEA180	S 355	1,500	N2	N7	beam (80)
B32	CS1 - HEA180	S 355	1,500	N40	N38	beam (80)
B33	CS3 - HEA140	S 355	4,000	N8	N22	beam (80)
B34	CS3 - HEA140	S 355	4,000	N22	N26	beam (80)
B35	CS3 - HEA140	S 355	4,000	N4	N21	beam (80)
B36	CS3 - HEA140	S 355	4,000	N21	N25	beam (80)
B37	CS3 - HEA140	S 355	4,000	N7	N10	beam (80)
B38	CS3 - HEA140	S 355	4,000	N10	N13	beam (80)
B39	CS3 - HEA140	S 355	4,000	N13	N17	beam (80)
B40	CS3 - HEA140	S 355	4,000	N12	N14	beam (80)
B41	CS3 - HEA140	S 355	4,000	N14	N18	beam (80)
B42	CS3 - HEA140	S 355	4,000	N8	N12	beam (80)
B43	CS2 - HEB180	S 355	4,600	N44	N17	general (0)
B44	CS2 - HEB180	S 355	4,600	N45	N46	general (0)
B45	CS2 - HEB180	S 355	4,600	N47	N49	general (0)
B46	CS2 - HEB180	S 355	4,600	N48	N50	general (0)
B47	CS2 - HEB180	S 355	4,600	N51	N53	general (0)
B48	CS2 - HEB180	S 355	4,600	N52	N54	general (0)
B49	CS1 - HEA180	S 355	1,500	N55	N56	beam (80)
B50	CS1 - HEA180	S 355	1,500	N43	N46	beam (80)
B51	CS1 - HEA180	S 355	1,500	N57	N58	beam (80)
B52	CS1 - HEA180	S 355	1,500	N49	N50	beam (80)
B53	CS1 - HEA180	S 355	1,500	N59	N60	beam (80)
B54	CS1 - HEA180	S 355	1,500	N53	N54	beam (80)
B55	CS3 - HEA140	S 355	4,000	N54	N50	beam (80)
B56	CS3 - HEA140	S 355	4,000	N53	N49	beam (80)
B57	CS3 - HEA140	S 355	4,000	N50	N46	beam (80)
B58	CS3 - HEA140	S 355	4,000	N49	N43	beam (80)
B59	CS4 - L70X7	S 355	2,121	N2	N8	general (0)
B60	CS4 - L70X7	S 355	2,121	N4	N40	general (0)
B61	CS4 - L70X7	S 355	3,444	N1	N39	general (0)
B68	CS4 - L70X7	S 355	6,096	N49	N51	general (0)
B69	CS4 - L70X7	S 355	6,096	N50	N52	general (0)
B70	CS4 - L70X7	S 355	3,444	N5	N37	general (0)



3.3. Hinges

Name	Member	Position	ux	uy	uz	fix	fiy	fiz
H1	B68	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H2	B69	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H3	B59	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H4	B60	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H5	B61	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H8	B55	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H9	B56	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H10	B57	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H11	B58	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H12	B39	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H13	B41	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H14	B38	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H15	B40	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H16	B37	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H17	B42	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H18	B33	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H19	B35	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H20	B34	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H21	B36	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H22	B26	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H23	B24	Both	Rigid	Rigid	Rigid	Rigid	Free	Free
H24	B70	Both	Rigid	Rigid	Rigid	Rigid	Free	Free

3.4. Nodal supports

Name	Node	System	Type	X	Y	Z	Rx	Ry	Rz
Sn1	N1	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn2	N3	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn3	N5	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn4	N6	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn5	N9	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn6	N11	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn7	N15	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn8	N16	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn9	N19	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free

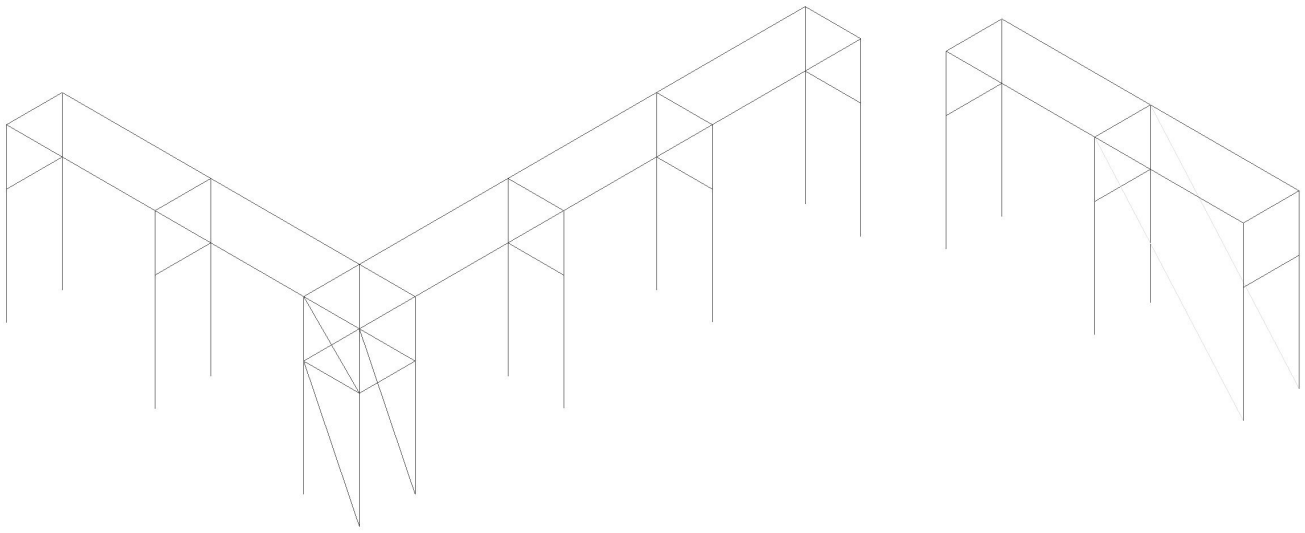
Name	Node	System	Type	X	Y	Z	Rx	Ry	Rz
Sn10	N20	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn11	N23	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn12	N24	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn13	N27	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn14	N28	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn15	N44	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn16	N45	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn17	N47	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn18	N48	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn19	N51	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free
Sn20	N52	GCS	Standard	Rigid	Rigid	Rigid	Free	Free	Free

4. Loads

4.1. Load cases

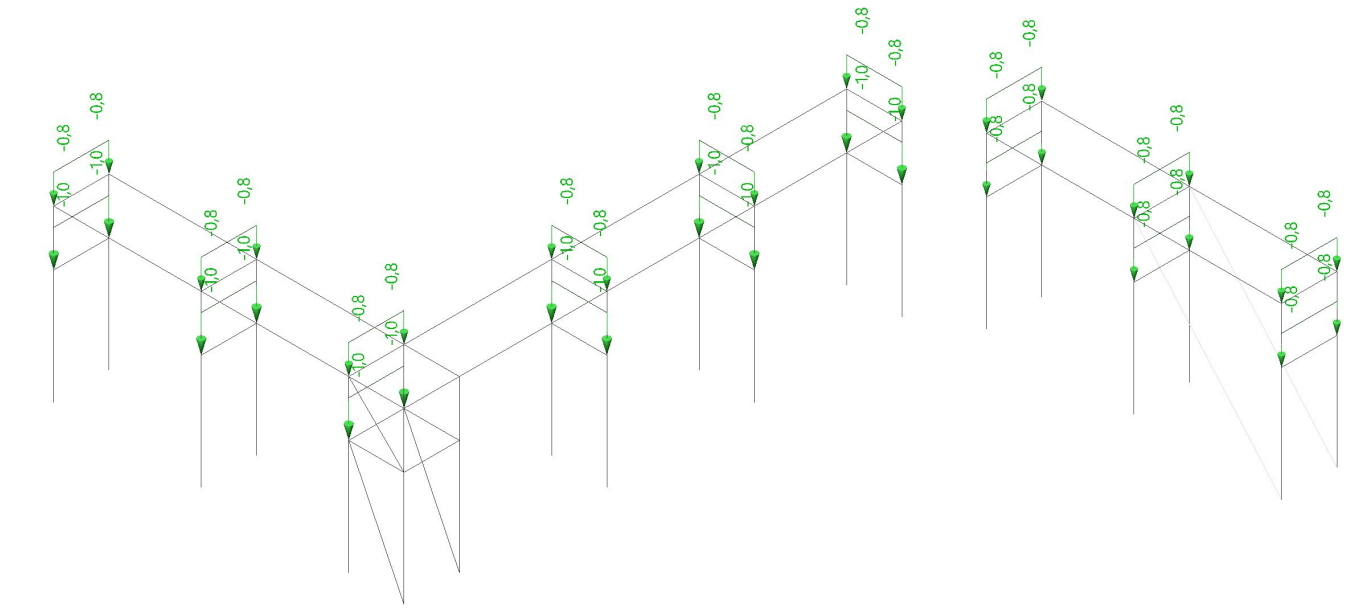
4.1.1. Load cases - DL

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



4.1.2. Load cases - EE

Name	Description	Action type	Load type	Load group
EE	Self weight	Permanent	Standard	LG1

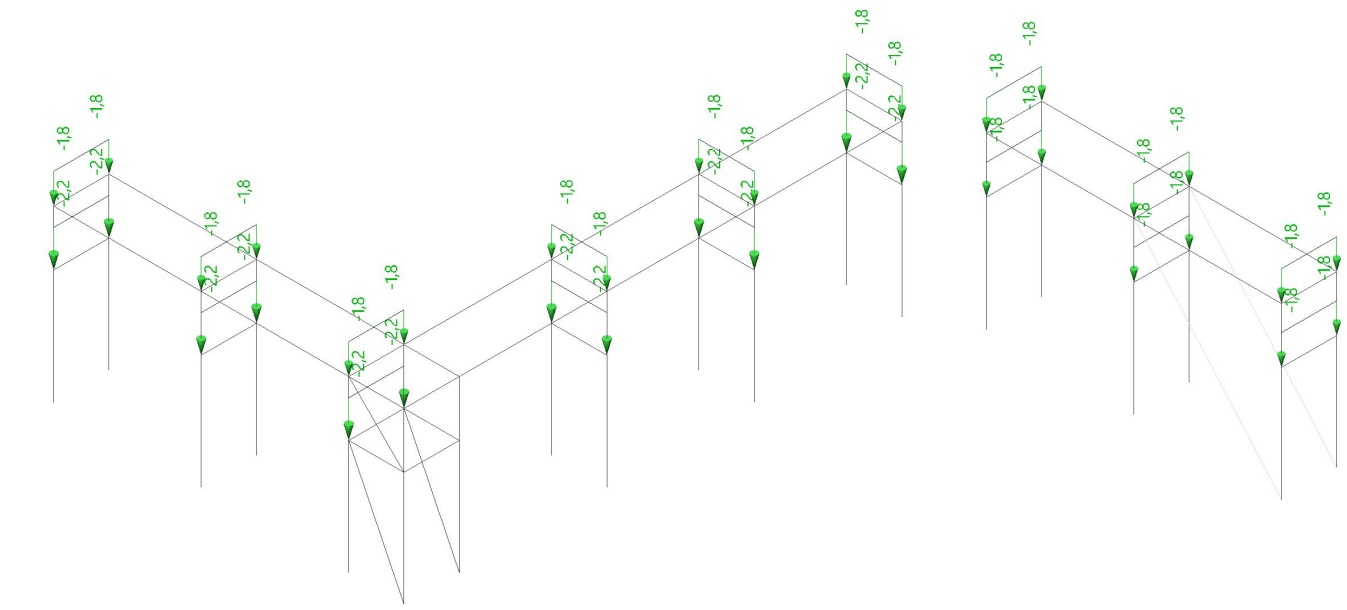


4.1.2.1. Line force

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF1	B15	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF2	B27	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF3	B29	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF4	B16	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF5	B19	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF6	B21	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF7	B50	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF8	B52	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF9	B54	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF12	B53	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF13	B51	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF14	B49	Force	LCS	Z	Uniform	-0,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF15	B22	Force	LCS	Z	Uniform	-1,0		0.000	1.000	Rela	Length	From start	0,000	0,000
LF16	B20	Force	LCS	Z	Uniform	-1,0		0.000	1.000	Rela	Length	From start	0,000	0,000
LF17	B17	Force	LCS	Z	Uniform	-1,0		0.000	1.000	Rela	Length	From start	0,000	0,000
LF18	B28	Force	LCS	Z	Uniform	-1,0		0.000	1.000	Rela	Length	From start	0,000	0,000
LF19	B18	Force	LCS	Z	Uniform	-1,0		0.000	1.000	Rela	Length	From start	0,000	0,000
LF20	B30	Force	LCS	Z	Uniform	-1,0		0.000	1.000	Rela	Length	From start	0,000	0,000

4.1.3. Load cases - EO

Name	Description	Action type	Load type	Load group
EO	Self weight	Permanent	Standard	LG1

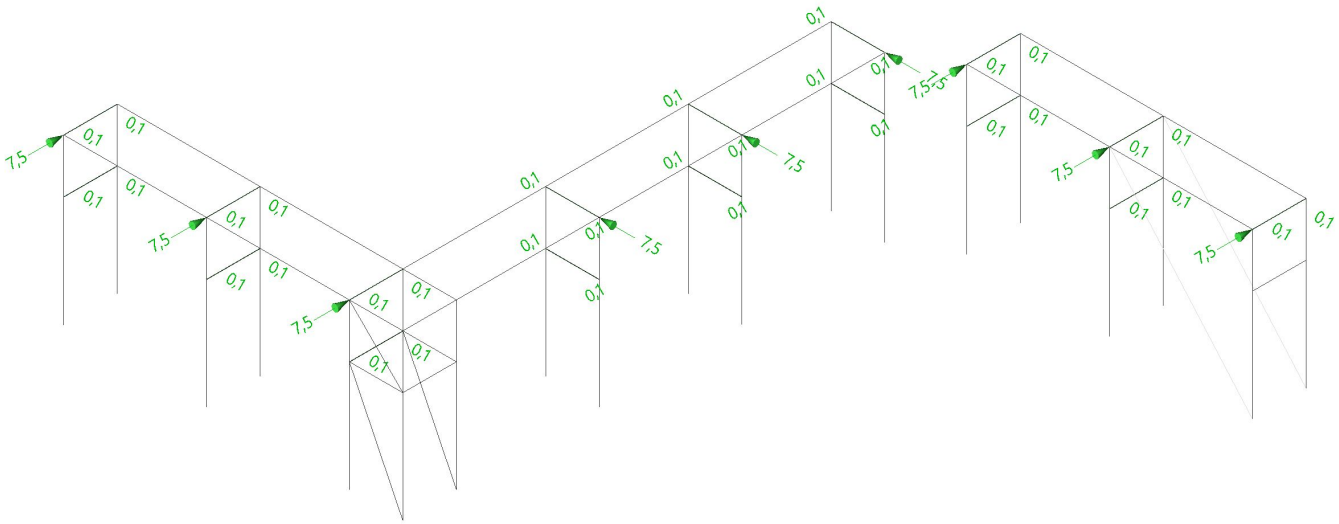


4.1.3.1. Line force

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF21	B29	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF22	B27	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF23	B15	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF24	B16	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF25	B19	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF26	B21	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF27	B50	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF28	B52	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF29	B54	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF32	B53	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF33	B51	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF34	B49	Force	LCS	Z	Uniform	-1,8		0.000	1.000	Rela	Length	From start	0,000	0,000
LF35	B22	Force	LCS	Z	Uniform	-2,2		0.000	1.000	Rela	Length	From start	0,000	0,000
LF36	B20	Force	LCS	Z	Uniform	-2,2		0.000	1.000	Rela	Length	From start	0,000	0,000
LF37	B17	Force	LCS	Z	Uniform	-2,2		0.000	1.000	Rela	Length	From start	0,000	0,000
LF38	B30	Force	LCS	Z	Uniform	-2,2		0.000	1.000	Rela	Length	From start	0,000	0,000
LF39	B28	Force	LCS	Z	Uniform	-2,2		0.000	1.000	Rela	Length	From start	0,000	0,000
LF40	B18	Force	LCS	Z	Uniform	-2,2		0.000	1.000	Rela	Length	From start	0,000	0,000

4.1.4. Load cases - TLs

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
TLs	Self weight	Standard	Variable	Static	LG2	Short	None



4.1.4.1. Point force in node

Name	Node	Load case	System	Dir	Type	Value - F [kN]
F1	N25	TLs - Self weight	GCS	X	Force	7,5
F2	N21	TLs - Self weight	GCS	X	Force	7,5
F3	N43	TLs - Self weight	GCS	X	Force	7,5
F4	N49	TLs - Self weight	GCS	X	Force	7,5
F5	N53	TLs - Self weight	GCS	X	Force	7,5
F7	N4	TLs - Self weight	GCS	X	Force	7,5
F8	N10	TLs - Self weight	GCS	Y	Force	7,5
F9	N13	TLs - Self weight	GCS	Y	Force	7,5
F10	N17	TLs - Self weight	GCS	Y	Force	7,5

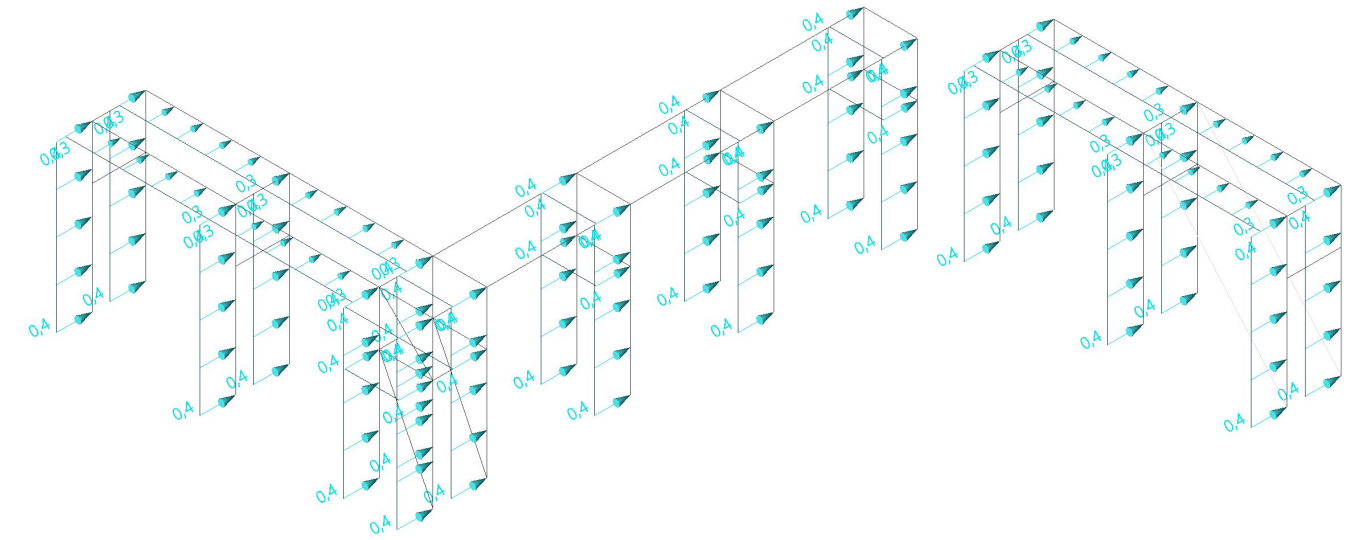
4.1.4.2. Line force

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF41	B27	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF42	B15	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF43	B29	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF44	B50	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF45	B49	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF46	B51	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF47	B52	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF48	B54	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF52	B19	Force	GCS	X	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF54	B16	Force	GCS	X	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF51	B21	Force	GCS	X	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF55	B18	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF56	B28	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF57	B30	Force	GCS	Y	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF58	B22	Force	GCS	X	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF59	B20	Force	GCS	X	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000
LF60	B17	Force	GCS	X	Uniform	0,1		0.000	1.000	Rela	Length	From start	0,000	0,000

4.1.5. Load cases - Wx

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
Wx	Self weight	Standard	Variable	Static	LG3	Short	None



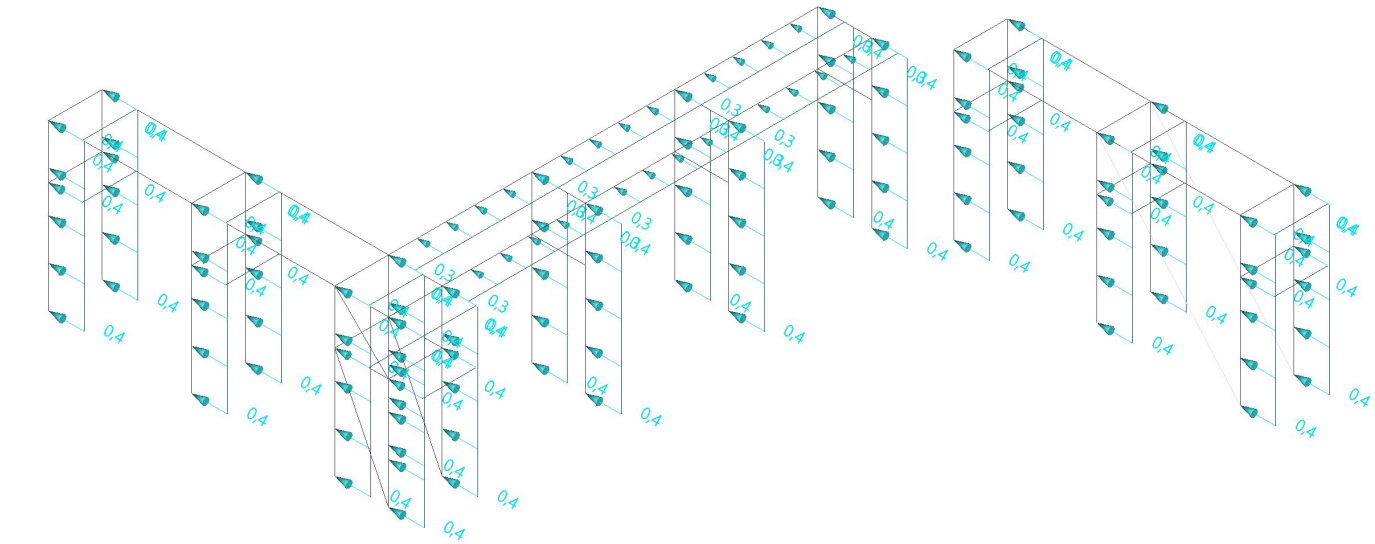
4.1.5.1. Line force

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF61	B47	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF62	B48	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF65	B9	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF66	B44	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF67	B45	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF68	B46	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF69	B1	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF70	B3	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF71	B5	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF72	B7	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF73	B43	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF74	B2	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF75	B4	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF76	B6	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF77	B8	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF78	B10	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF79	B11	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF80	B12	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF81	B13	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF82	B14	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF107	B55	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF108	B56	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF109	B57	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF110	B58	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF111	B33	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF112	B35	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF113	B34	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF114	B36	Wind	GCS	X	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF121	B16	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF122	B17	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF123	B19	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF124	B20	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF125	B21	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF126	B22	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF127	B23	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF128	B24	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF129	B25	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF130	B26	Wind	GCS	X	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000

4.1.6. Load cases - Wy

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
Wy	Self weight	Standard	Variable	Static	LG3	Short	None



4.1.6.1. Line force

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF83	B47	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF84	B48	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF87	B9	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF88	B44	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF89	B45	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF90	B46	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF91	B1	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF92	B3	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF93	B5	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF94	B7	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF95	B43	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF96	B2	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF97	B4	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF98	B6	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF99	B8	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF100	B10	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF101	B11	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF102	B12	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF103	B13	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF104	B14	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF115	B37	Wind	GCS	Y	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF116	B42	Wind	GCS	Y	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF117	B40	Wind	GCS	Y	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF118	B38	Wind	GCS	Y	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF119	B39	Wind	GCS	Y	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF120	B41	Wind	GCS	Y	Uniform	0,3	0,3	0.000	1.000	Rela	Length	From start	0,000	0,000
LF131	B49	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF132	B50	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF133	B51	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000

Name	Member	Type	Sys.	Dir	Distr.	P1 [kN/m]	P2 [kN/m]	Pos x_1	Pos x_2	Coor	Loc	Orig	Ecc ey [m]	Ecc ez [m]
LF134	B52	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF135	B53	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF136	B54	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF139	B15	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF140	B18	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF141	B27	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF142	B28	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF143	B29	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF144	B30	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF145	B31	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000
LF146	B32	Wind	GCS	Y	Uniform	0,4	0,4	0.000	1.000	Rela	Length	From start	0,000	0,000

4.2. Load groups

Name	Load	Relation	Type
LG1	Permanent		
LG2	Variable	Standard	Temperature
LG3	Variable	Exclusive	Wind

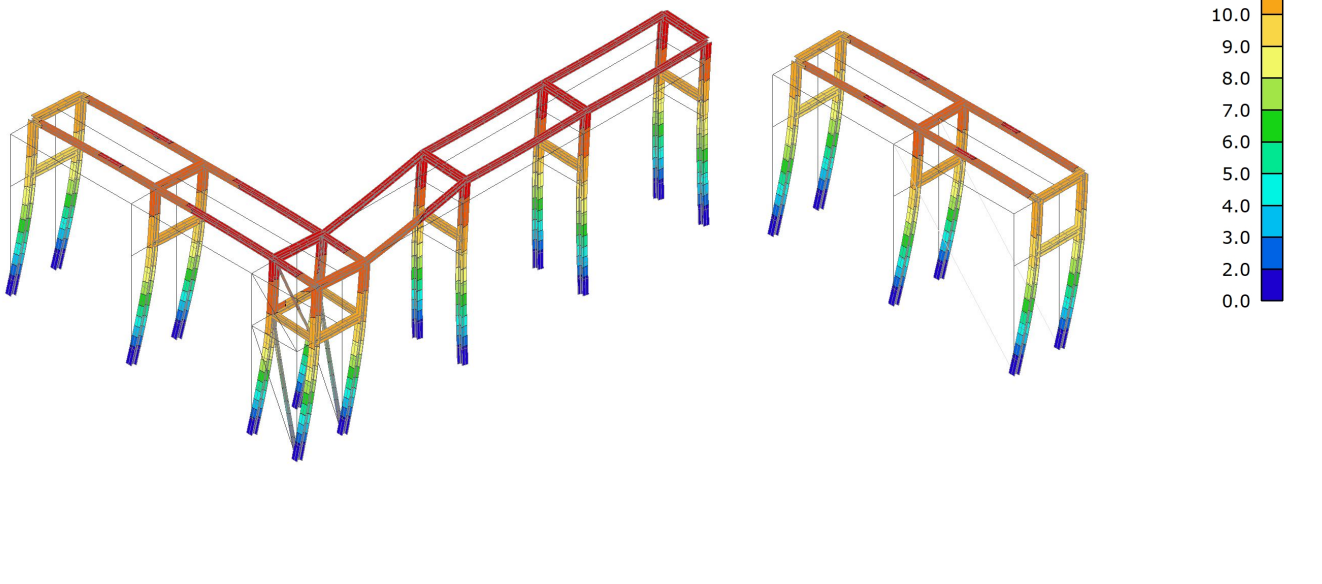
4.3. Combinations

Name	Description	Type	Load cases	Coeff. [-]
ULS		EN-ULS (STR/GEO) Set B	DL - Self weight EE - Self weight EO - Self weight TLs - Self weight Wx - Self weight Wy - Self weight	1,00 1,00 1,00 1,00 1,00 1,00
SLS_Char		EN-SLS Characteristic	DL - Self weight EE - Self weight EO - Self weight TLs - Self weight Wx - Self weight Wy - Self weight	1,00 1,00 1,00 1,00 1,00 1,00
SLS_Freq		EN-SLS Frequent	DL - Self weight EE - Self weight EO - Self weight TLs - Self weight Wx - Self weight Wy - Self weight	1,00 1,00 1,00 1,00 1,00 1,00
SLS_Quasi		EN-SLS Quasi-permanent	DL - Self weight EE - Self weight EO - Self weight TLs - Self weight Wx - Self weight Wy - Self weight	1,00 1,00 1,00 1,00 1,00 1,00

5. Results

5.1. 3D displacement; U_total

Values: U_{total}
Linear calculation
Combination: SLS_Char
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



5.2. Reactions

5.2.1. Reactions - DL

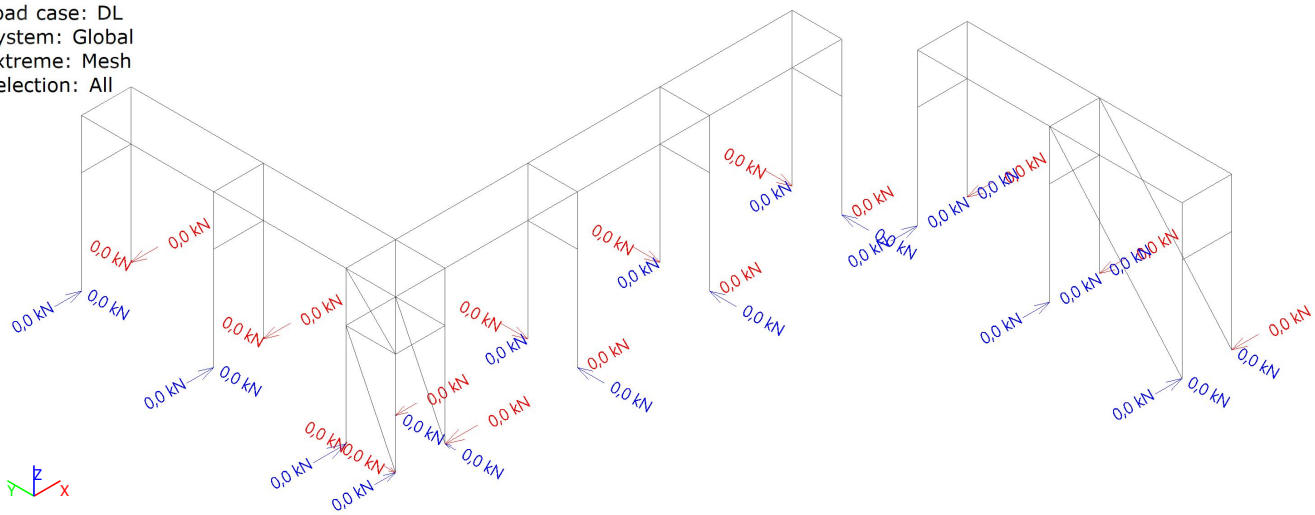
Name	Description	Action type	Load type	Load group	Direction
DL	Self weight	Permanent	Self weight	LG1	-Z

Linear calculation
Load case: DL
System: Global
Extreme: Global
Selection: All

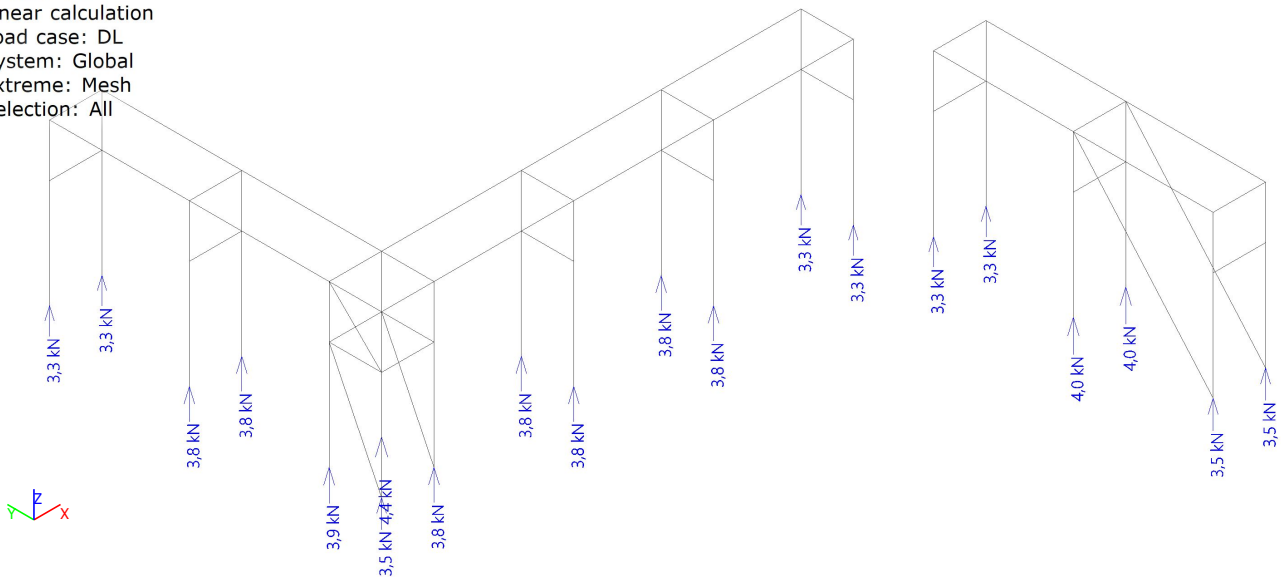
Nodal reactions

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]
Sn3/N5	DL	**0,0**	0,0	3,8	0,0	0,0	0,0	0,0	0,0
Sn2/N3	DL	**0,0**	0,0	3,9	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn8/N16	DL	0,0	**0,0**	3,8	0,0	0,0	0,0	0,0	0,0
Sn7/N15	DL	0,0	**0,0**	3,8	0,0	0,0	0,0	0,0	0,0
Sn9/N19	DL	0,0	0,0	**3,3**	0,0	0,0	0,0	0,0	0,0
Sn4/N6	DL	0,0	0,0	**4,4**	0,0	0,0	0,0	0,0	0,0

Values: R_x, R_y
Linear calculation
Load case: DL
System: Global
Extreme: Mesh
Selection: All



Values: R_z
Linear calculation
Load case: DL
System: Global
Extreme: Mesh
Selection: All



5.2.2. Reactions - EE

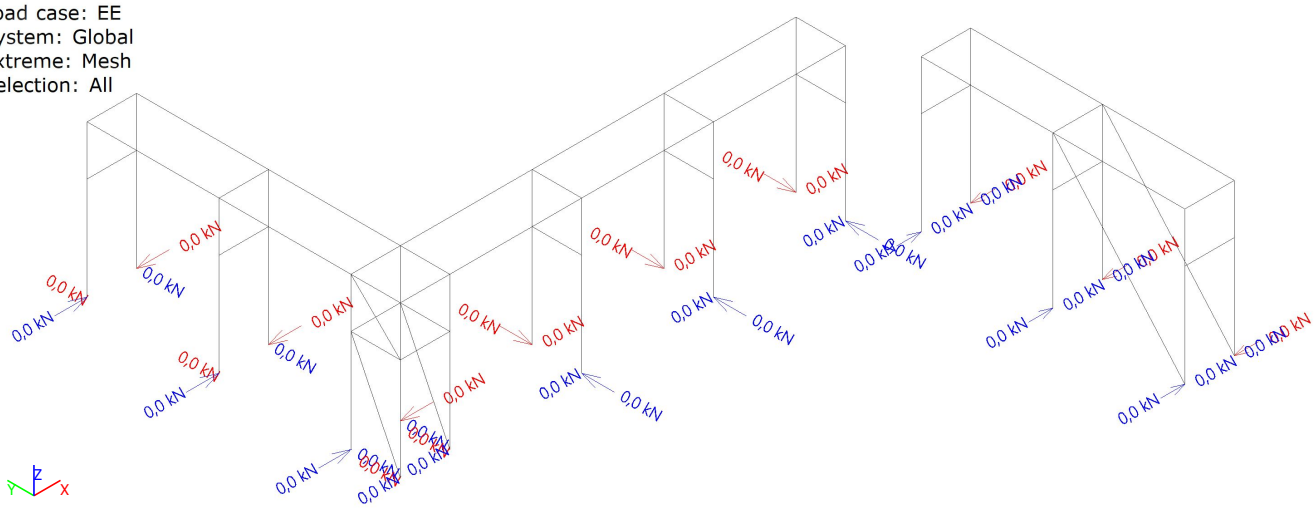
Name	Description	Action type	Load type	Load group
EE	Self weight	Permanent	Standard	LG1

Linear calculation
Load case: EE
System: Global
Extreme: Global
Selection: All

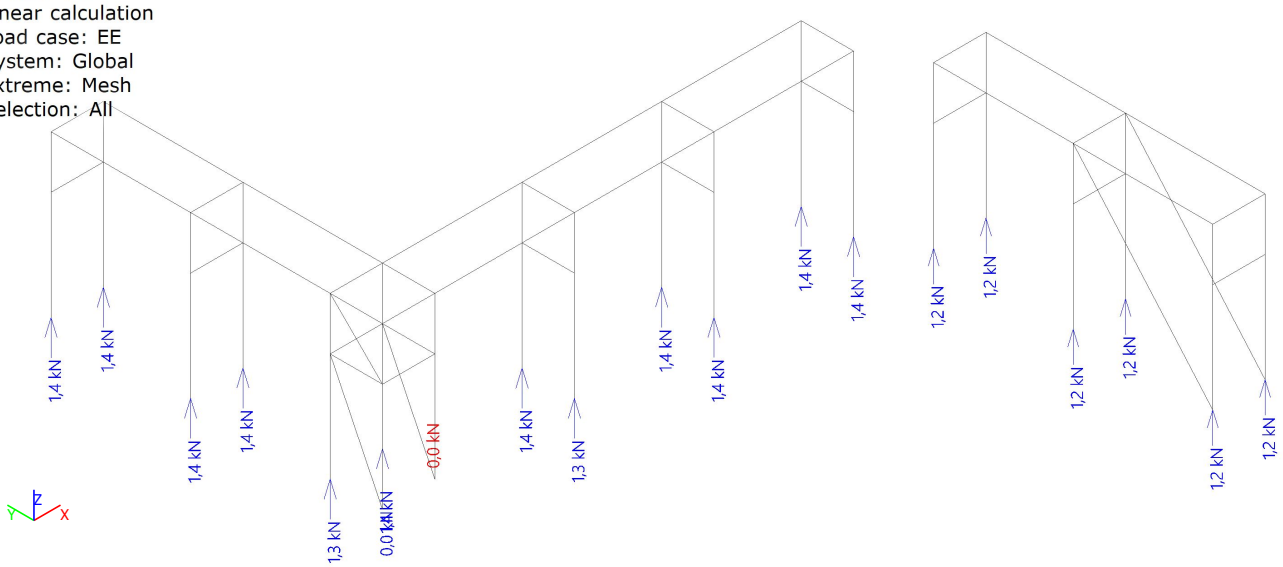
Nodal reactions

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]
Sn4/N6	EE	**0,0**	0,0	**1,4**	0,0	0,0	0,0	0,0	0,0
Sn11/N23	EE	**0,0**	0,0	1,4	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn6/N11	EE	0,0	**0,0**	1,4	0,0	0,0	0,0	0,0	0,0
Sn5/N9	EE	0,0	**0,0**	1,3	0,0	0,0	0,0	0,0	0,0
Sn3/N5	EE	0,0	0,0	**0,0**	0,0	0,0	0,0	0,0	0,0

Values: R_x, R_y
Linear calculation
Load case: EE
System: Global
Extreme: Mesh
Selection: All



Values: R_z
Linear calculation
Load case: EE
System: Global
Extreme: Mesh
Selection: All



5.2.3. Reactions - EO

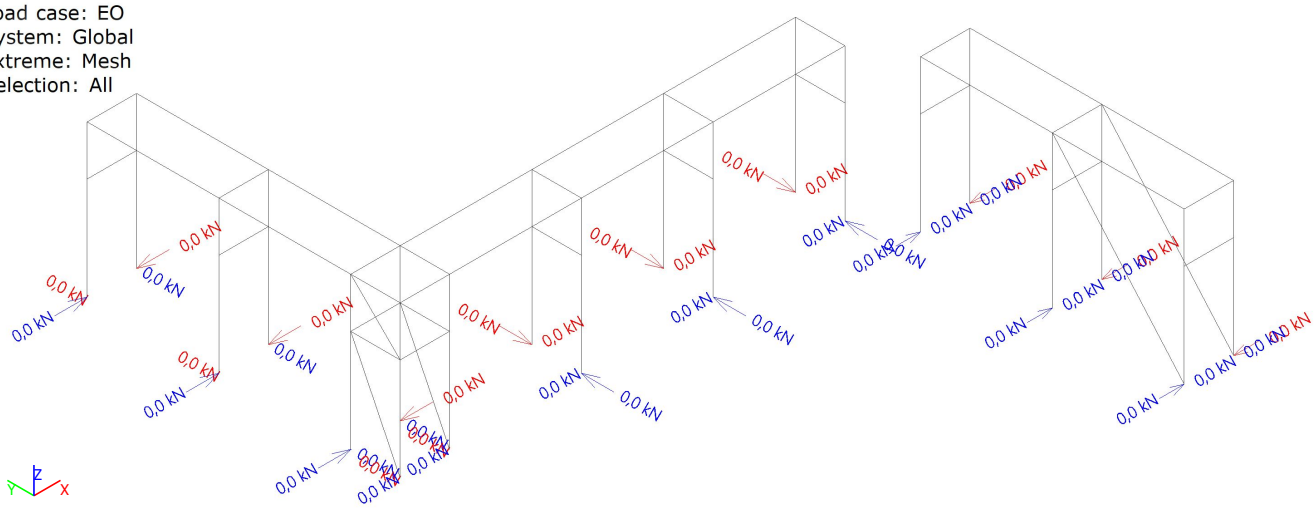
Name	Description	Action type	Load type	Load group
EO	Self weight	Permanent	Standard	LG1

Linear calculation
Load case: EO
System: Global
Extreme: Global
Selection: All

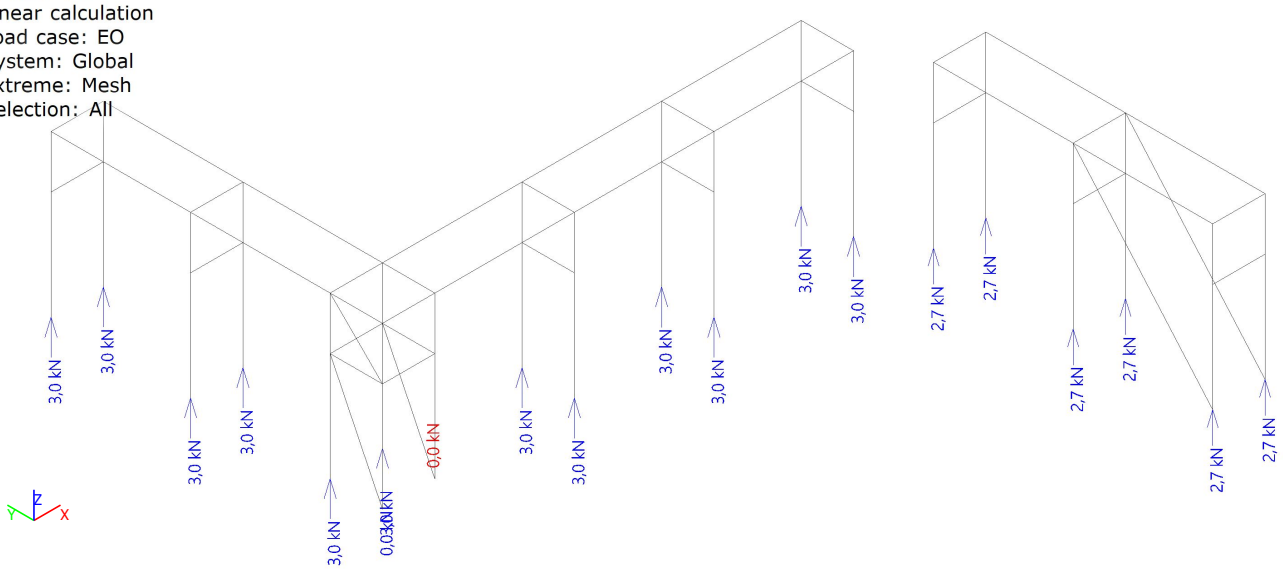
Nodal reactions

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]
Sn4/N6	EO	**0,0**	0,0	**3,0**	0,0	0,0	0,0	0,0	0,0
Sn11/N23	EO	**0,0**	0,0	3,0	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn6/N11	EO	0,0	**0,0**	3,0	0,0	0,0	0,0	0,0	0,0
Sn5/N9	EO	0,0	**0,0**	3,0	0,0	0,0	0,0	0,0	0,0
Sn3/N5	EO	0,0	0,0	**0,0**	0,0	0,0	0,0	0,0	0,0

Values: R_x, R_y
Linear calculation
Load case: EO
System: Global
Extreme: Mesh
Selection: All



Values: R_z
Linear calculation
Load case: EO
System: Global
Extreme: Mesh
Selection: All



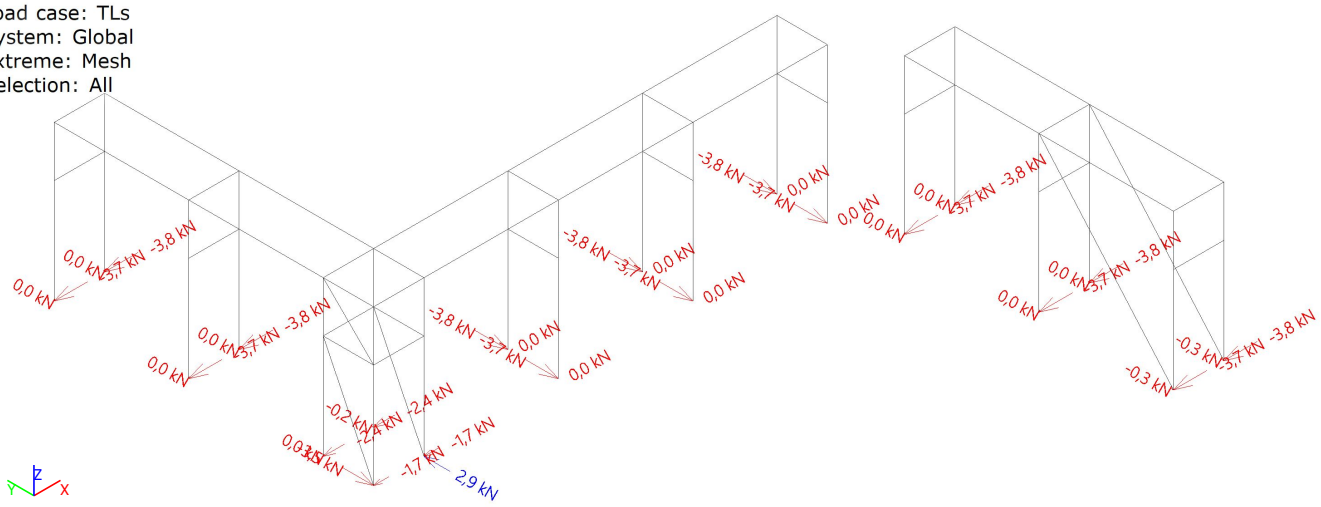
5.2.4. Reactions - TLs

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
TLs	Self weight	Standard	Variable	Static	LG2	Short	None

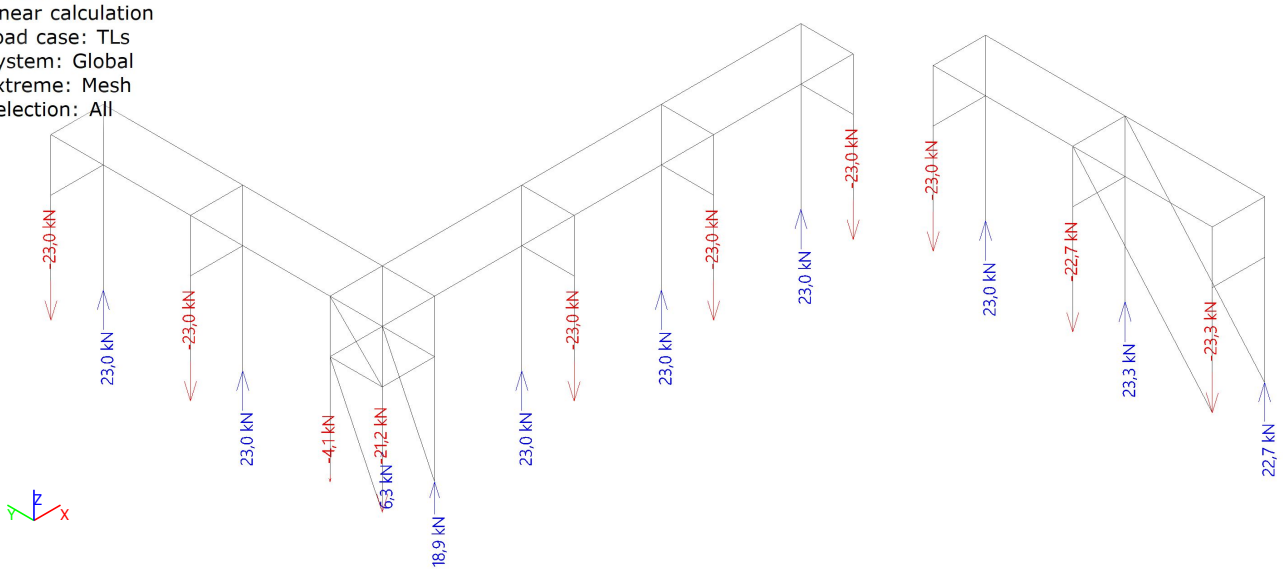
Linear calculation
Load case: TLs
System: Global
Extreme: Global
Selection: All
Nodal reactions

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]
Sn5/N9	TLs	**0,0**	-3,7	-23,0	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn6/N11	TLs	0,0	**-3,8**	23,0	0,0	0,0	0,0	0,0	0,0
Sn3/N5	TLs	-1,7	**2,9**	18,9	0,0	0,0	0,0	0,0	0,0
Sn19/N51	TLs	-3,7	-0,3	**-23,3**	0,0	0,0	0,0	0,0	0,0
Sn18/N48	TLs	**-3,8**	0,0	**23,3**	0,0	0,0	0,0	0,0	0,0

Values: R_x, R_y
Linear calculation
Load case: TLs
System: Global
Extreme: Mesh
Selection: All



Values: R_z
Linear calculation
Load case: TLs
System: Global
Extreme: Mesh
Selection: All



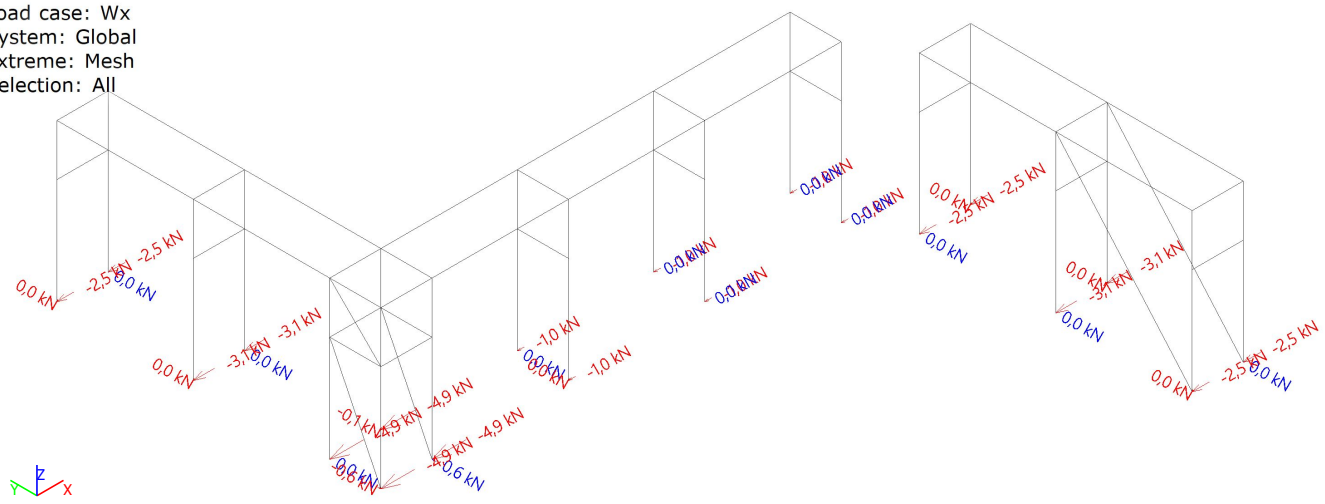
5.2.5. Reactions - Wx

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
Wx	Self weight	Standard	Variable	Static	LG3	Short	None

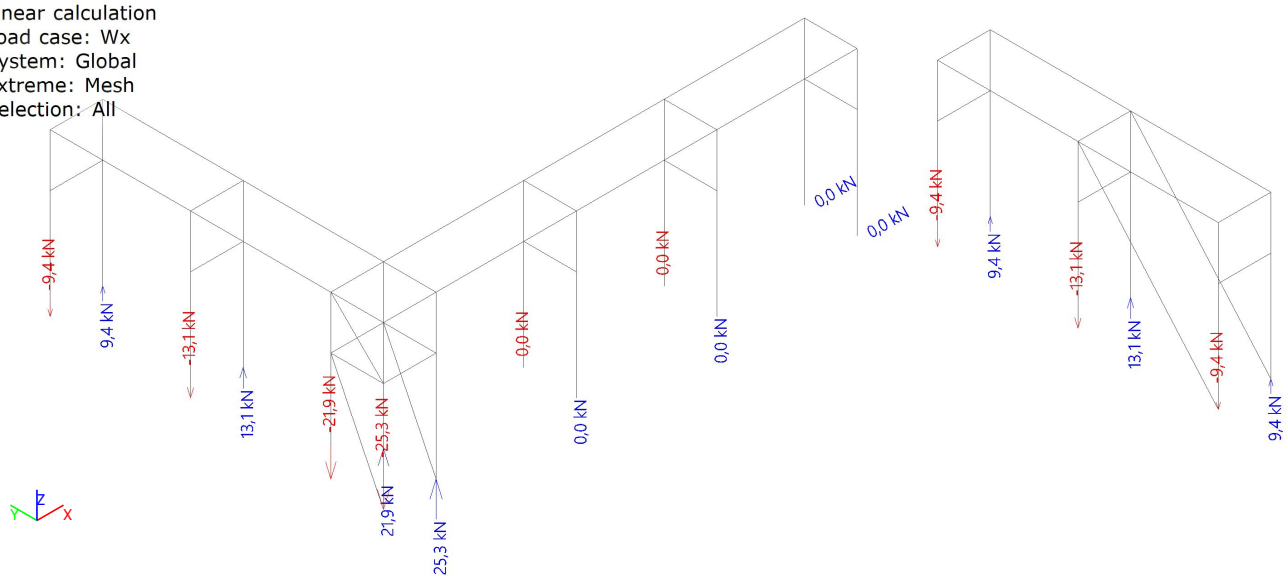
Linear calculation
Load case: Wx
System: Global
Extreme: Global
Selection: All
Nodal reactions

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]
Sn2/N3	Wx	**-4,9**	0,0	-21,9	0,0	0,0	0,0	0,0	0,0
Sn5/N9	Wx	**-1,0**	0,0	0,0	**0,0**	**0,0**	**0,0**	-	-
Sn3/N5	Wx	-4,9	**0,6**	**25,3**	0,0	0,0	0,0	0,0	0,0
Sn1/N1	Wx	-4,9	**-0,6**	**-25,3**	0,0	0,0	**0,0**	0,0	0,0

Values: R_x, R_y
Linear calculation
Load case: Wx
System: Global
Extreme: Mesh
Selection: All



Values: R_z
Linear calculation
Load case: Wx
System: Global
Extreme: Mesh
Selection: All



5.2.6. Reactions - Wy

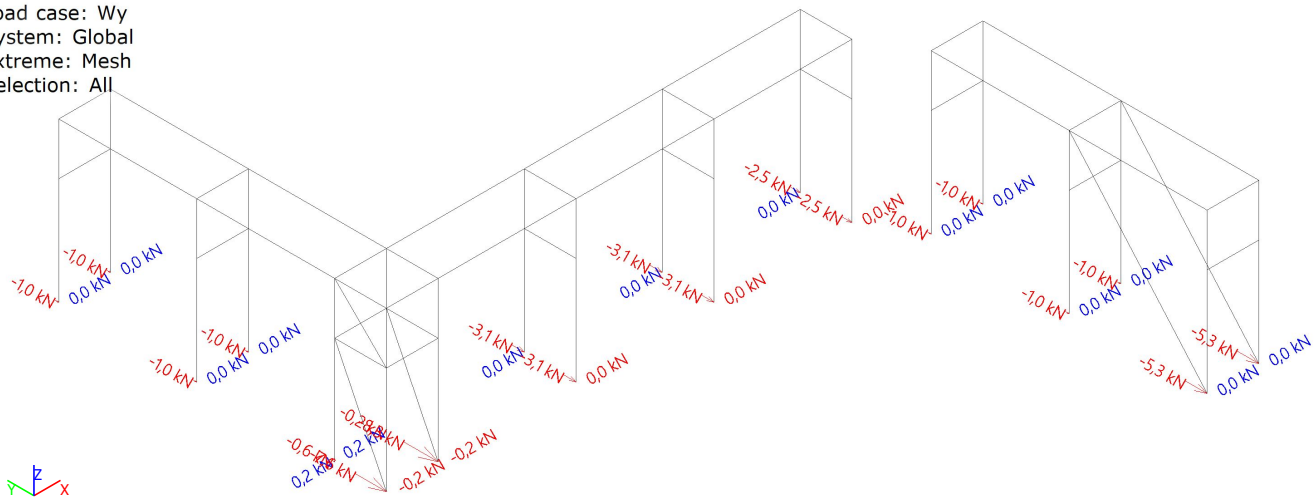
Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
Wy	Self weight	Standard	Variable	Static	LG3	Short	None

Linear calculation
Load case: Wy
System: Global
Extreme: Global
Selection: All

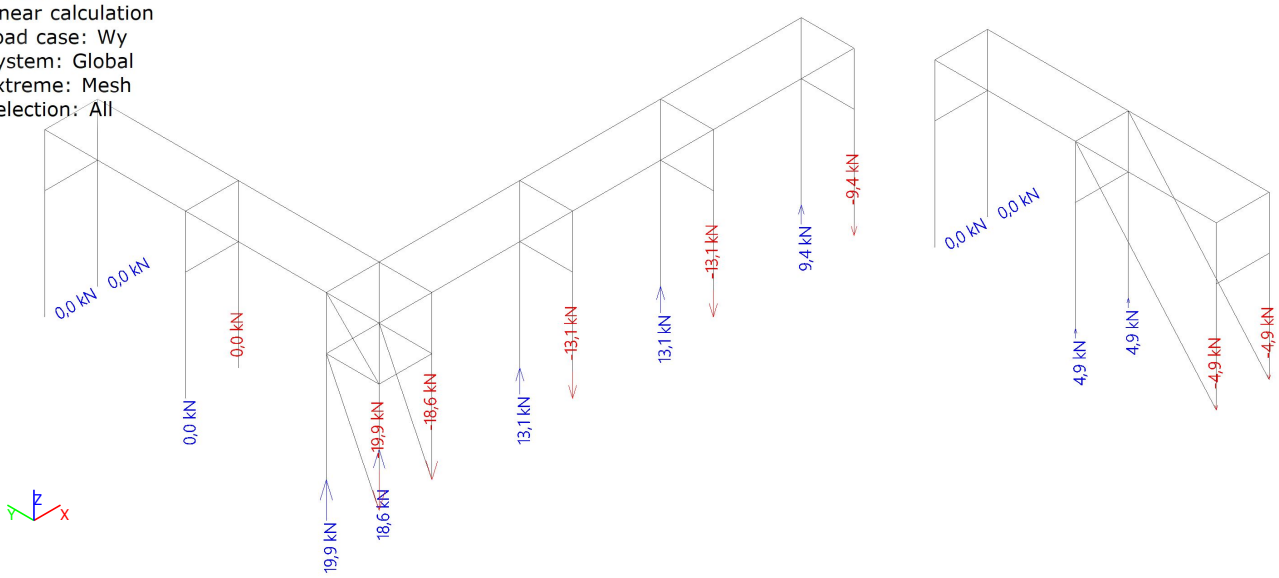
Nodal reactions

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]
Sn3/N5	Wy	**-0,2**	**-8,3**	-18,6	0,0	0,0	0,0	0,0	0,0
Sn4/N6	Wy	0,2	**-0,2**	18,6	**0,0**	**0,0**	**0,0**	0,0	0,0
Sn2/N3	Wy	**0,2**	-0,6	**19,9**	0,0	0,0	0,0	0,0	0,0
Sn1/N1	Wy	-0,2	-7,6	**-19,9**	0,0	0,0	**0,0**	0,0	0,0

Values: R_x, R_y
Linear calculation
Load case: Wy
System: Global
Extreme: Mesh
Selection: All



Values: R_z
Linear calculation
Load case: Wy
System: Global
Extreme: Mesh
Selection: All



6. Steel check

6.1. Steel slenderness

Linear calculation

Member	CS Name	Part	Sway y	Sway z	Ly [m]	Lz [m]	ky [-]	kz [-]	Iy [m]	Iz [m]	Lam y [-]	Lam z [-]	Iyz [m]	l LTB [m]
B1	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B1	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B2	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B2	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B3	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B3	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B4	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B4	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B5	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B5	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B6	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B6	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B7	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B7	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B8	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B8	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B9	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B9	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B10	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B10	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B11	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B11	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B12	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B12	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B13	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B13	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B14	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B14	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B15	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B16	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B17	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B18	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B19	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B20	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B21	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B22	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B23	CS3	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	26,19	42,62	1,500	1,500
B24	CS3	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	26,19	42,62	1,500	1,500
B25	CS3	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	26,19	42,62	1,500	1,500
B26	CS3	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	26,19	42,62	1,500	1,500
B27	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B28	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B29	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B30	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B31	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B32	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B33	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B34	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B35	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B36	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B37	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B38	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B39	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B40	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B41	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B42	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B43	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B43	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B44	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B44	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B45	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B45	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B46	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B46	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B47	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B47	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B48	CS2	1	Yes	No	3,100	4,600	1,00	1,00	3,100	4,600	40,46	100,65	4,600	4,600
B48	CS2	2	Yes	No	1,500	4,600	1,00	1,00	1,500	4,600	19,58	100,65	4,600	4,600
B49	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B50	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500

Member	CS Name	Part	Sway y	Sway z	Ly [m]	Lz [m]	ky [-]	kz [-]	Iy [m]	Iz [m]	Lam y [-]	Lam z [-]	Iyz [m]	l LTB [m]
B51	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B52	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B53	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B54	CS1	1	Yes	No	1,500	1,500	1,00	1,00	1,500	1,500	20,15	33,19	1,500	1,500
B55	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B56	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B57	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B58	CS3	1	Yes	No	4,000	4,000	1,00	1,00	4,000	4,000	69,84	113,64	4,000	4,000
B59	CS4	1	Yes	No	2,121	2,121	1,00	1,00	2,121	2,121	79,40	155,03	2,121	2,121
B60	CS4	1	Yes	No	2,121	2,121	1,00	1,00	2,121	2,121	79,40	155,03	2,121	2,121
B61	CS4	1	Yes	No	3,444	3,444	1,00	1,00	3,444	3,444	128,90	251,68	3,444	3,444
B68	CS4	1	Yes	No	6,096	6,096	1,00	1,00	6,096	6,096	228,16	445,50	6,096	6,096
B69	CS4	1	Yes	No	6,096	6,096	1,00	1,00	6,096	6,096	228,16	445,50	6,096	6,096

6.2. EC-EN 1993 Steel check ULS

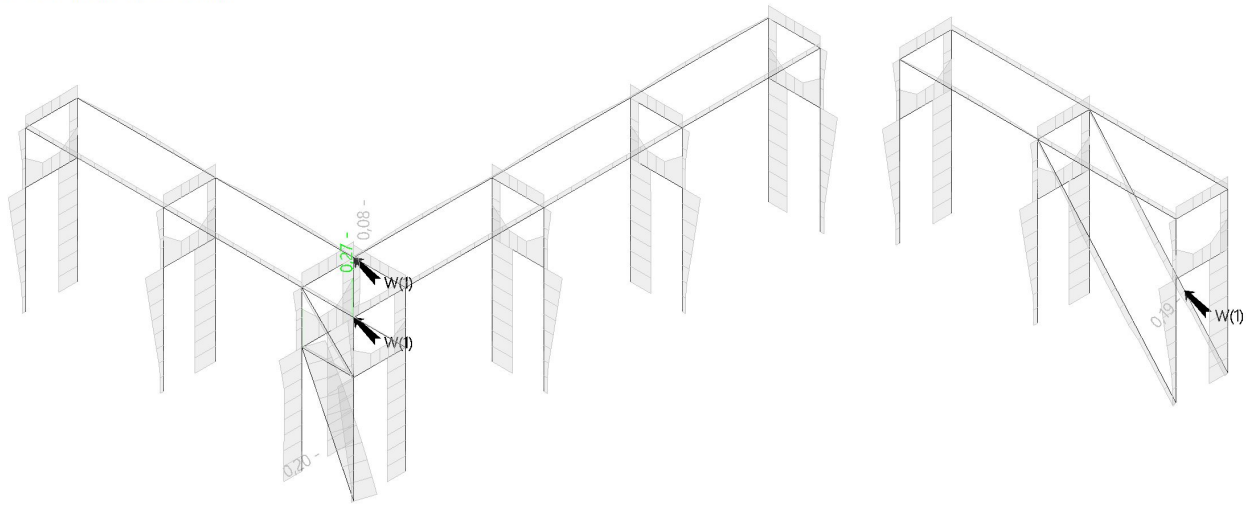
Linear calculation
Combination: ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All
There are 1 warnings on selected members. 1 of them are shown.
Overall Unity Check

Name	dx [m]	Case	Cross-section	Material	$UC_{Overall}$ [-]	UC_{Sec} [-]	UC_{Stab} [-]	Errors, warnings, notes
B4	0,000	ULS/1	CS2 - HEB180	S 355	**0,20**	0,03	0,20	
B30	1,500	ULS/1	CS1 - HEA180	S 355	**0,27**	0,27	0,00	W30
B23	0,000	ULS/2	CS3 - HEA140	S 355	**0,08**	0,08	0,08	W30
B69	4,191	ULS/3	CS4 - L70X7	S 355	**0,19**	0,07	0,19	W30

Name	Combination key
ULS/1	1.20*DL + 1.20*EE + 1.20*EO + 0.90*TLs + 1.50*Wx
ULS/2	1.20*DL + 1.20*EE + 1.20*EO + 1.50*Wy
ULS/3	1.35*DL + 1.35*EE + 1.35*EO + 0.90*Wx

E/W/N	Present on members
W30	B15, B16, B17, B18, B19, B20, B21, B22, B23, B24, B25, B26, B27, B28, B29, B30, B31, B32, B49, B50, B51, B52, B53, B54, B59, B60, B61, B68, B69

Values: **$UC_{Overall}$**
Linear calculation
Combination: ULS
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All
There are 1 warnings on selected members. 1 of them are shown.



6.3. EC-EN 1993 Steel Check SLS

Linear calculation
Combination: SLS_Freq
Coordinate system: Principal
Extreme 1D: Cross-section
Selection: All
Overall Unity Check

Name	dx [m]	Case	Cross-section	$u_{y,max}$ [mm] $u_{z,max}$ [mm]	$u_{y,var}$ [mm] $u_{z,var}$ [mm]	Lim. $u_{y,max}$ [mm] Lim. $u_{z,max}$ [mm]	Lim. $u_{y,var}$ [mm] Lim. $u_{z,var}$ [mm]	Check $u_{y,max}$ [-] Check $u_{z,max}$ [-]	Check $u_{y,var}$ [-] Check $u_{z,var}$ [-]	Camber dx u_z [mm] Camber [mm]	Check Overall [-]
B8	1,938	SLS_Freq/1	CS2 - HEB180	0,0 -0,5	0,0 -0,4	18,4 12,4	13,8 9,3	0,00 0,04	0,00 0,05	- -	**0,05**
B20	1,000	SLS_Freq/1	CS1 - HEA180	0,0 -0,1	0,0 0,0	6,0 6,0	4,5 4,5	0,00 0,01	0,00 0,01	- -	**0,01**
B38	2,000	SLS_Freq/2	CS3 - HEA140	0,2 -0,4	0,2 0,0	16,0 16,0	12,0 12,0	0,02 0,02	0,02 0,00	- -	**0,02**
B69	3,048	SLS_Freq/2	CS4 - L70X7	-16,3 -4,3	0,0 0,0	24,4 24,4	18,3 18,3	0,67 0,18	0,00 0,00	- -	**0,67**

Name	Combination key
SLS_Freq/1	DL + EE + EO + 0.50*TLs
SLS_Freq/2	DL + EE + EO + 0.20*Wy

Values: **Check Overall**
Linear calculation
Combination: SLS_Char
Coordinate system: Principal
Extreme 1D: Global
Selection: All