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

"For approval"

Expansion storage capacity TP3

Tank pit 3 - Foundation slabs

Weight 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-E40-CN-1732-0001	Datum	17-8-2021

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

1 Index

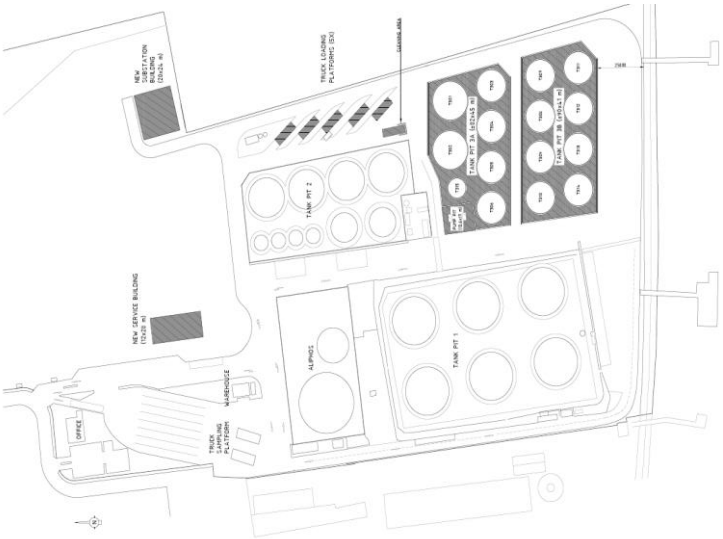
2 Introduction

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

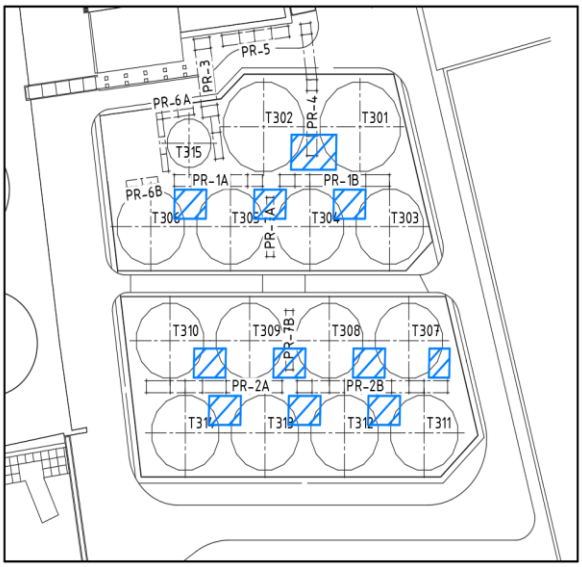
The expansion of the terminal consists of 15 tanks divided over two tank pits. There is a maintenance road between the two tank pits. Both tank pits are connected underground in order to guarantee the buffer capacity of the tank pits. The bund wall shall consist of either a retaining wall or sheet piling 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 the foundation slabs between the tanks 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-1741-0001 Foundations Piperack Tankpit 3A
- 2307-E40-DW-1741-0002 Foundations Piperack Tankpit 3B

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

materials

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

deformations limits

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

foundations

The springs constants are derived from the geotechnical advise. $k_v =$ *50* MN/m

4 Loads and load combinations

4.1 Imposed load

imposed load	q_k =	*5,0*	kN/m²

4.2 Accidental load

specific weight of product	γ =	*10*	kN/m³
height of bund wall	h =	*2,3*	m
product load	q_k =	22,5	kN/m²

4.3 Load from pipe racks

4.3.1 pipe rack 7

width of frame	w =	*1,8*	m
height of frame	h =	*1,8*	m
spacing of frames	s =	*4,5*	m

dead load

piping load	first layer												q_1 =	*1,8*	kN/m²
	second layer												q_2 =	*2,2*	kN/m²
point load from piping		0,5	x(	1,8	+	2,2	)x	1,8	x	4,5	=	F_v =	16,2	kN
applied point load													F_v =	*17,5*	kN

wind load

wind pressure													$q_p(z)$ =	*1,13*	kN/m²
height of pipe													h =	*0,4*	m
force coefficient													c_f =	*0,8*	
horizontal load	2	x	1,13	x(	0,4	+	0,1	x	1,8	)x	0,8	=	F_h =	1,0	kN/m
vertical load							1,0	x	1,8	/	1,8	=	F_v =	1,05	kN
applied point load													F_v =	*5,0*	kN

4.3.2 pipe rack 4

Reaction forces are taken from calculation 2307-E80-CN-1731-0001 Pipe rack 3 and 4

dead / equipment load	F_v =	*60,0*	kN
wind load	F_v =	*20,0*	kN

4.3 Combinations

	ψ_0	ψ_1	ψ_2
category E	1,0	0,9	0,8
wind	0,0	0,2	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

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

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

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

5 Calculation

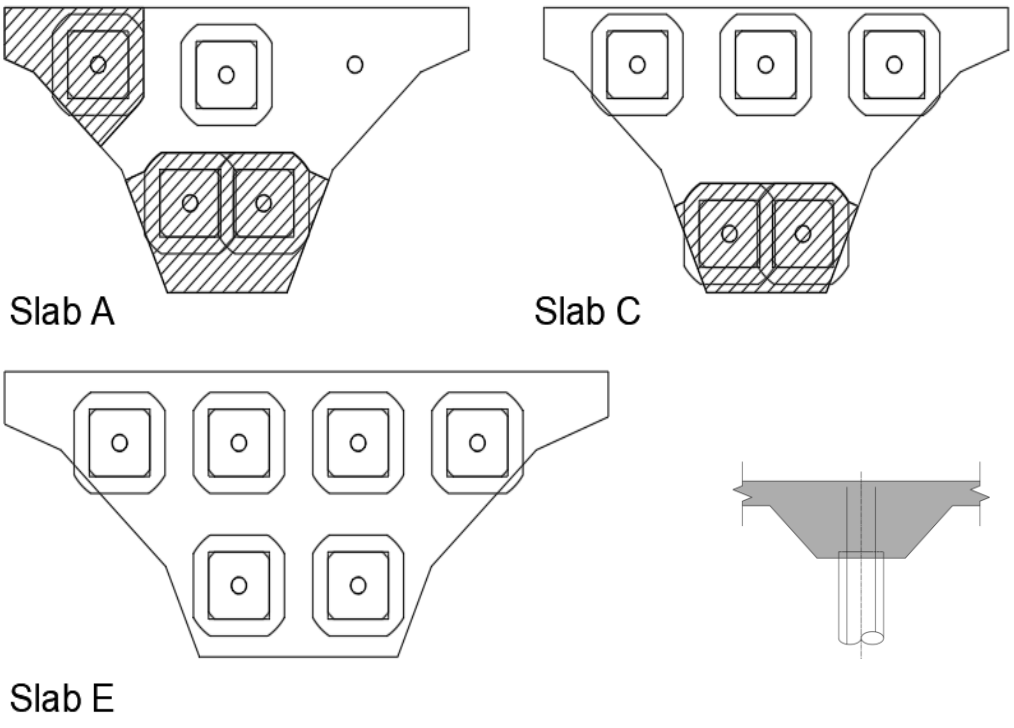
5.1 Punching check

characteristic compressive cylinder strength		f_{ck} =	*30*	N/mm²
concrete cover		c =	*35*	
diameter rebar		$Ø$ =	*16*	
height of slab	h = *250*	d_{eff} =	207	
factor		k =	1,98	
minimum shear resistance	$0{,}035 \times k^{3/2} \times f_{ck}^{1/2}$	v_{min} =	0,54	
surface load		q =	*22,5*	kN/m²

	$V_{Ed,0}$	A	u_1	β	V_{Ed}	v_{Ed}	UC
centre	*360*	*0*	*8870*	*1,2*	360	0,23	0,42
corner	*345*	*9,0*	*3880*	*1,50*	143	0,27	0,50
edge A	*550*	*15,1*	*6017*	*1,40*	210	0,24	0,44
edge C	*490*	*11,1*	*5446*	*1,40*	240	0,30	0,56

$$v_{Ed} = \beta \times V_{Ed} / (u_1 \times d)$$

For punching the reaction forces are reduced with the surface load that is applied within the punching perimeter. These areas and the perimeters are visible in the following image.



5.2 Deflection control

Deflection is calculated with Scia engineer, see appendix A

	l	u		u_{lim}	
field	*4150*	*7,7*	<	16,6	Ok
edge	*2565*	*12*	<	20,5	Ok

6 Conclusion

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

maximum displacement = 11,7 mm

reaction forces

compression $R_{z,max}$ = *360* kN

reinforcement

A basic check for the slab reinforcement is done with Scia engineer. This with a cracking width limit of 0,15 (typical) and 0,3 (bottom of slab). This results in the following:

basic top reinforcement	Ø	16	-	100
basic bottom reinforcement	Ø	12	-	100

Appendix A

Scia report

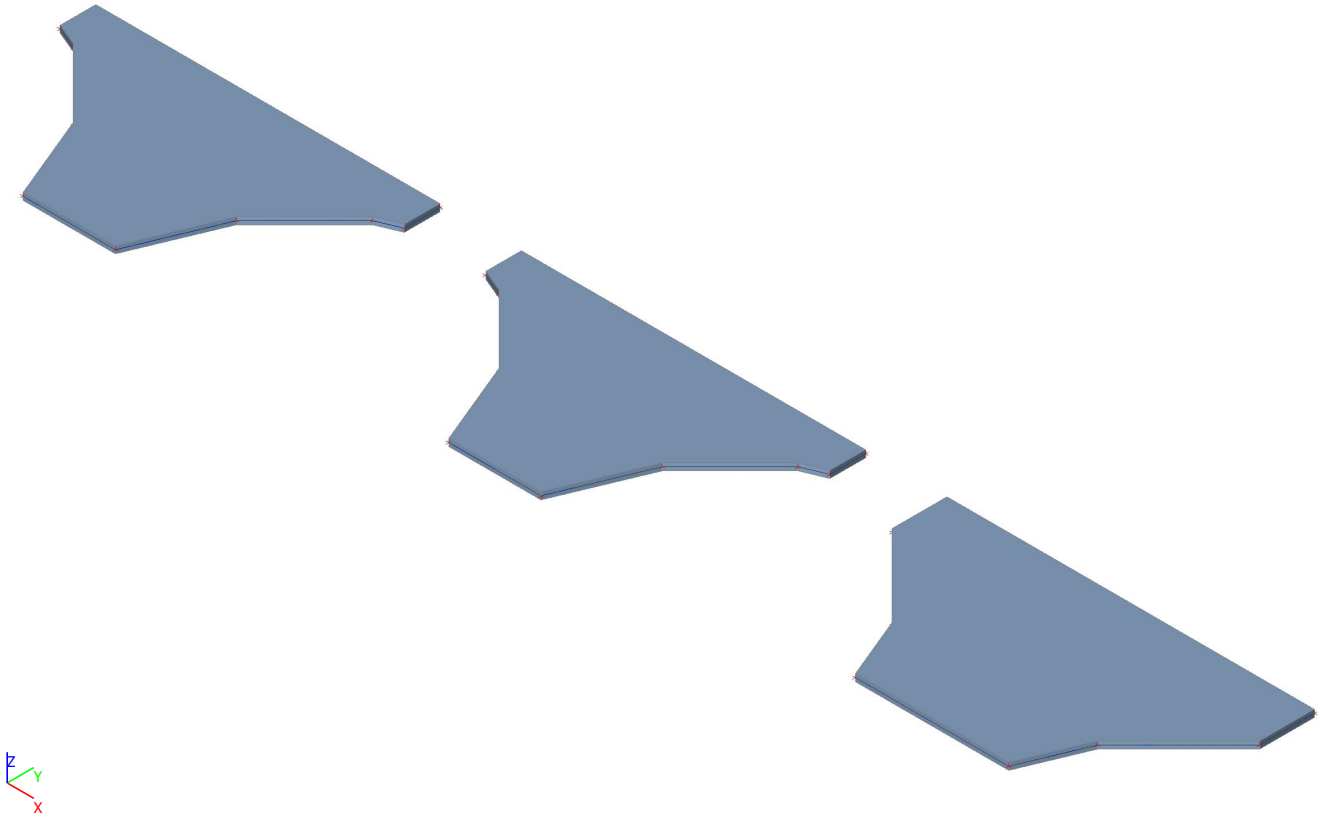
KH Engineering

1. Table of contents

2. General

2.1. Project

Licence name	KH Engineering
Project	Neste - Rotterdam terminal expansion
Part	Tank pit 3 - foundation slabs
Description	Weigth calculation
Author	LER
Date	22. 07. 2021
Structure	Plate XY
No. of nodes :	50
No. of beams :	0
No. of slabs :	3
No. of solids :	0
No. of used profiles :	0
No. of load cases :	6
No. of used materials :	2
Acceleration of gravity [m/s^2]	9,810
National code	EC - EN



2.2. Setup manager

(STR/GEO) alternative

Combination	Eq.6.10a & Eq.6.10b

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

Load	Psi0	Psi1	Psi2
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

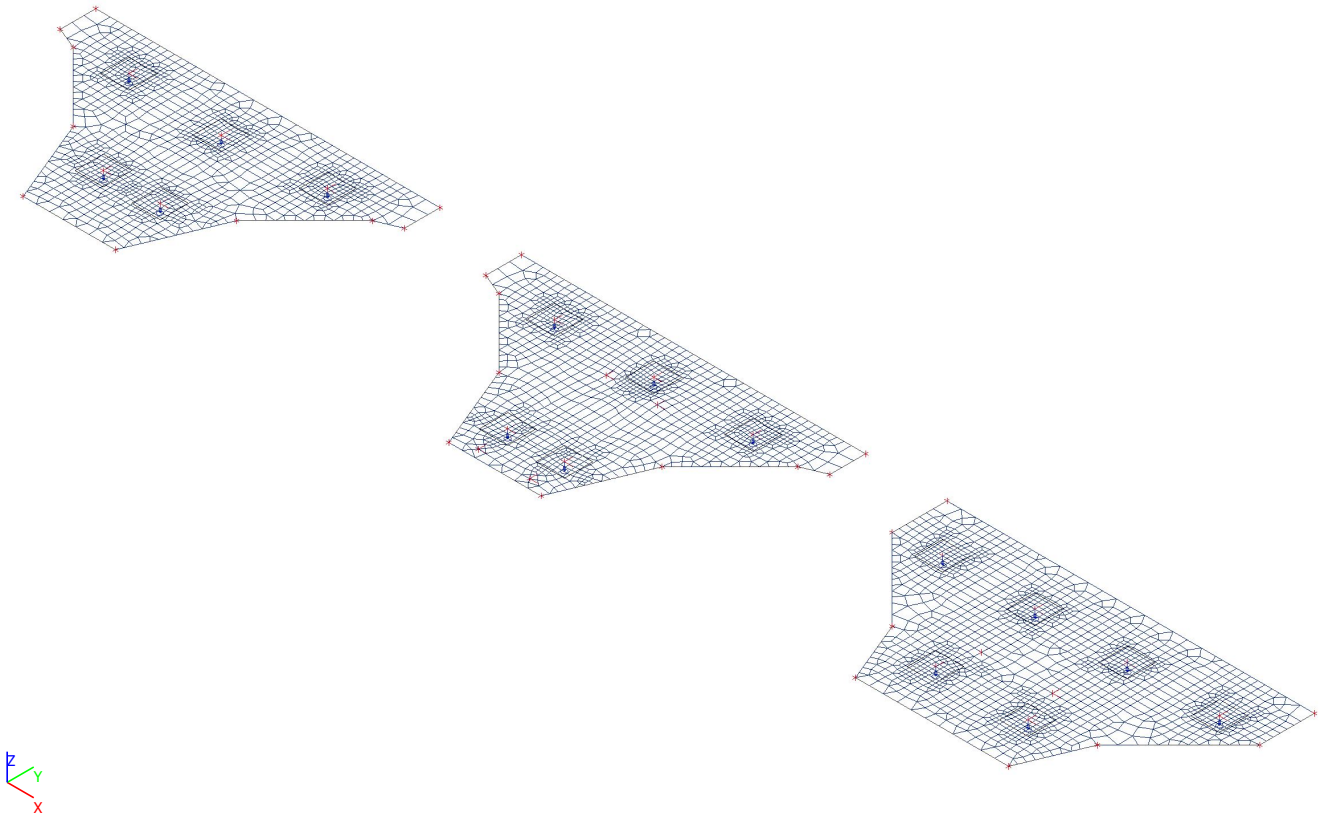
2.3. Solver setup

Name	SolverSetup1
Neglect shear force deformation (Ay, Az >> A)	✖
Initial stress	✖
Number of thicknesses of rib plate	20
Maximum soil interaction iterations	10
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
Ratio to half - distance to adjacent beam beff,i/bi [-]	0,20
Ratio to effective span length beff,i/l0 [-]	0,10
Max ratio to effective span length beff,i/l0 [-]	0,20
Simply supported beam [-]	1,00
Inner span [-]	0,70
End span [-]	0,85
Cantilever, base ratio to current span [-]	1,00
Cantilever, base ratio to adjacent span [-]	0,15
Cantilever, max ratio to current span [-]	1,50
Max adjacent span length ratio [-]	1,50
Max cantilever length ratio to adjacent span [-]	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
Method used for non-concrete and non-steel / composite beams	EN 1994-1-1
Soil combination	None
Bending theory of plate/shell analysis	Mindlin
Type of solver	Direct

2.4. Mesh setup

Name	MeshSetup1
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
Target error for mesh refinement [%]	10
Average size of 2d element/curved element [m]	0,500
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
Group of load cases for automatic mesh refinement	A



2.5. Materials

Name	Type	ρ [kg/m³]	Density in fresh state [kg/m³]	E_{mod} [MPa]	μ	α [m/mK]	$f_{c.k.28}$ [MPa]	Colour
C30/37	Concrete	2500,0	2600,0	3,2800e+04	0.2	0,00	30,00	

Explanations of symbols	
Density in fresh state	The value in the density in fresh state property is used only in case a composite deck is input and its self-weight load is taken into account.

Reinforcement EC2

Name	Type	ρ [kg/m³]	E_{mod} [MPa]	G_{mod} [MPa]	α [m/mK]	$f_{y.k}$ [MPa]
B 500B	Reinforcement steel	7850,0	2,0000e+05	8,3333e+04	0,00	500,0

3. Structure

3.1. Nodes

Name	Coord X [m]	Coord Y [m]
N57	0,000	17,000
N58	0,000	15,746
N59	0,791	15,418
N60	3,188	13,021
N61	4,439	10,000
N62	7,691	10,000
N63	8,942	13,021
N64	11,339	15,418
N65	12,130	15,746
N66	12,130	17,000
N68	7,065	12,200
N69	5,065	12,200
N71	2,565	15,600

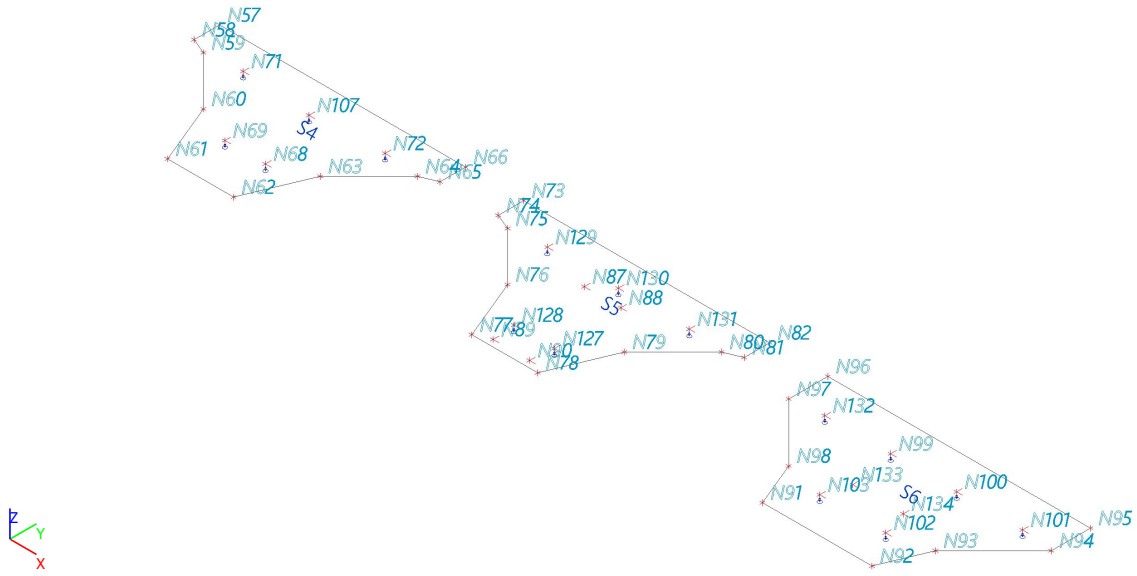
Name	Coord X [m]	Coord Y [m]
N72	9,565	15,600
N73	15,000	17,000
N74	15,000	15,746
N75	15,791	15,418
N76	18,188	13,021
N77	19,439	10,000
N78	22,691	10,000
N79	23,942	13,021
N80	26,339	15,418
N81	27,130	15,746
N82	27,130	17,000
N87	20,165	14,825
N88	21,965	14,825

Name	Coord X [m]	Coord Y [m]
N89	20,165	10,325
N90	21,965	10,325
N91	33,774	10,000
N92	39,176	10,000
N93	40,093	12,216
N94	42,950	15,072
N95	42,950	17,000
N96	30,000	17,000
N97	30,000	15,072
N98	32,857	12,216
N99	34,850	15,250
N100	38,100	15,250
N101	41,350	15,250

Name	Coord X [m]	Coord Y [m]
N102	38,100	11,750
N103	34,850	11,750
N107	6,065	15,350
N127	22,065	11,450
N128	20,065	11,450
N129	17,565	15,600
N130	21,065	15,600
N131	24,565	15,600
N132	31,600	15,250
N133	35,225	12,995
N134	37,725	12,995

3.2. 2D members

Name	Layer	Type	Element type	Material	Thickness type	Th. [mm]
S4	Layer1	plate (90)	Standard	C30/37	constant	250
S5	Layer1	plate (90)	Standard	C30/37	constant	250
S6	Layer1	plate (90)	Standard	C30/37	constant	250



3.3. Nodal supports

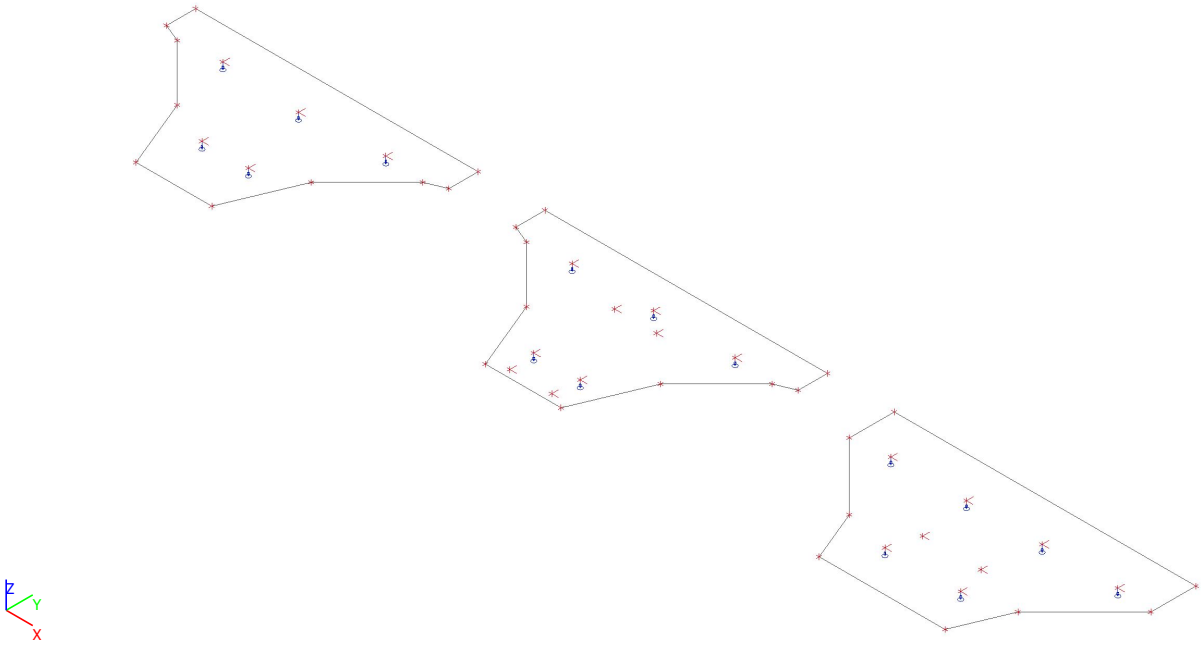
Name	Node	System	Type	Z	Rx	Ry	Stiffness Z [MN/m]
Sn29	N68	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn30	N69	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn32	N71	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn33	N72	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn38	N99	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn39	N100	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn40	N101	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn41	N102	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn42	N103	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn45	N107	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn50	N127	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn51	N128	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn52	N129	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn53	N130	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn54	N131	GCS	Standard	Flexible	Free	Free	5,0000e+01
Sn55	N132	GCS	Standard	Flexible	Free	Free	5,0000e+01

4. Loads

4.1. Load cases

4.1.1. Load cases - DL

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



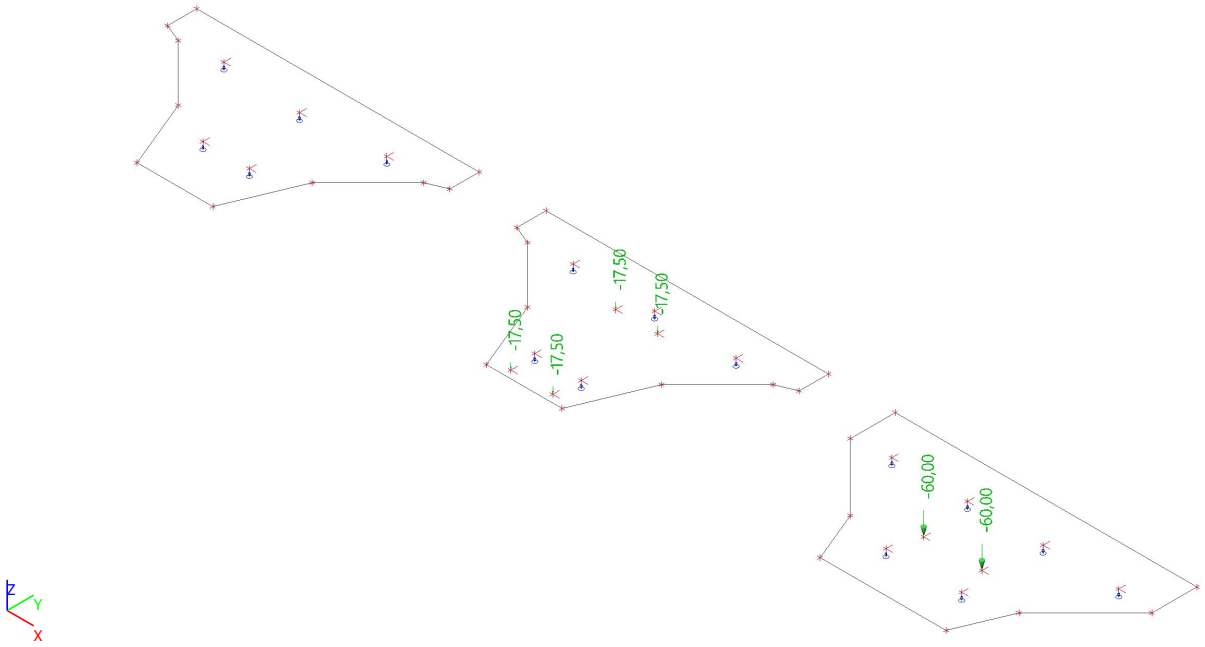
4.1.1.1. Resultant of reactions

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

x [m]	y [m]	z [m]	Case	R_z [kN]	M_x [kNm]	M_y [kNm]
22,156	14,072	0,000	DL	**1054,21**	**156,86**	**-466,51**

4.1.2. Load cases - EO

Name	Description	Action type	Load type	Load group
EO	Equipment load - operation	Permanent	Standard	LG1



4.1.2.1. Point force in node

Name	Node	Load case	System	Dir	Type	Value - F [kN]
F1	N89	EO - Equipment load - operation	GCS	Z	Force	-17,50
F2	N90	EO - Equipment load - operation	GCS	Z	Force	-17,50
F3	N87	EO - Equipment load - operation	GCS	Z	Force	-17,50
F4	N88	EO - Equipment load - operation	GCS	Z	Force	-17,50
F21	N134	EO - Equipment load - operation	GCS	Z	Force	-60,00
F22	N133	EO - Equipment load - operation	GCS	Z	Force	-60,00

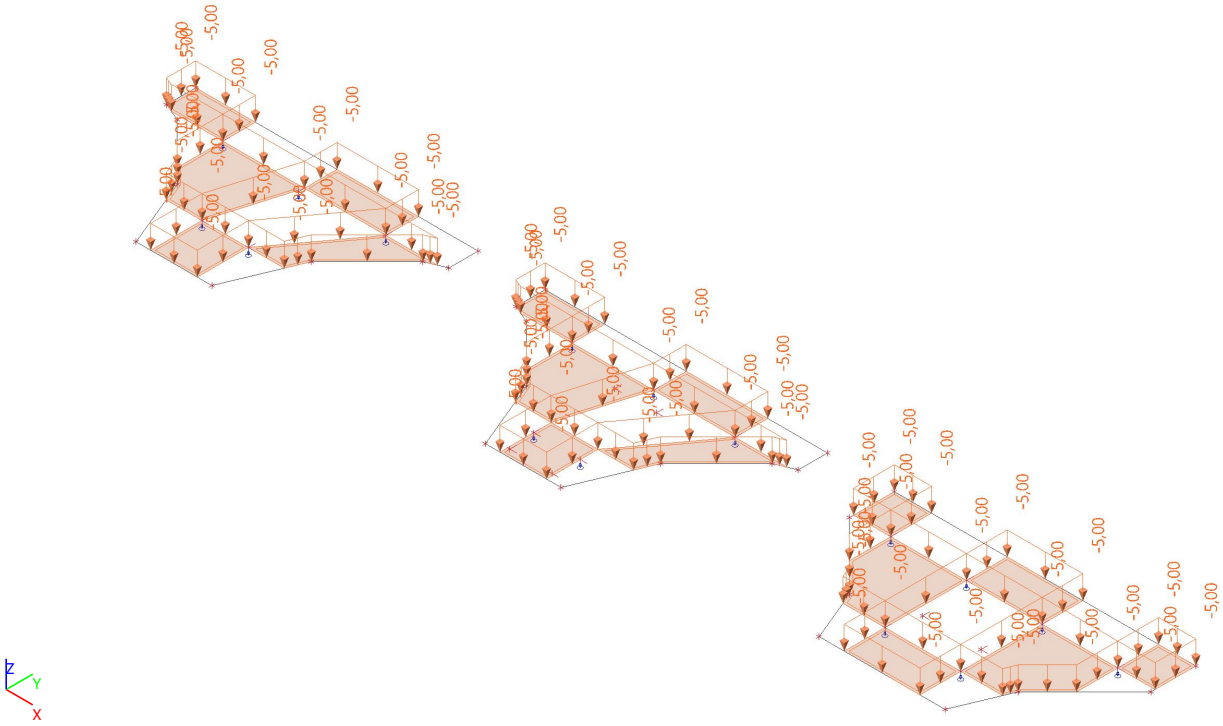
4.1.2.2. Resultant of reactions

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

x [m]	y [m]	z [m]	Case	R_z [kN]	M_x [kNm]	M_y [kNm]
22,156	14,072	0,000	EO	**190,00**	**-234,01**	**-1641,86**

4.1.3. Load cases - LL

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
LL	Imposed load	Standard	Variable	Static	LG2	Short	None



4.1.3.1. Free surface load

Name	Load case	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF33	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF34	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF35	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF36	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF37	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF44	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF45	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF46	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF47	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF48	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF55	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF56	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF57	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF58	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF59	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF60	LL - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length

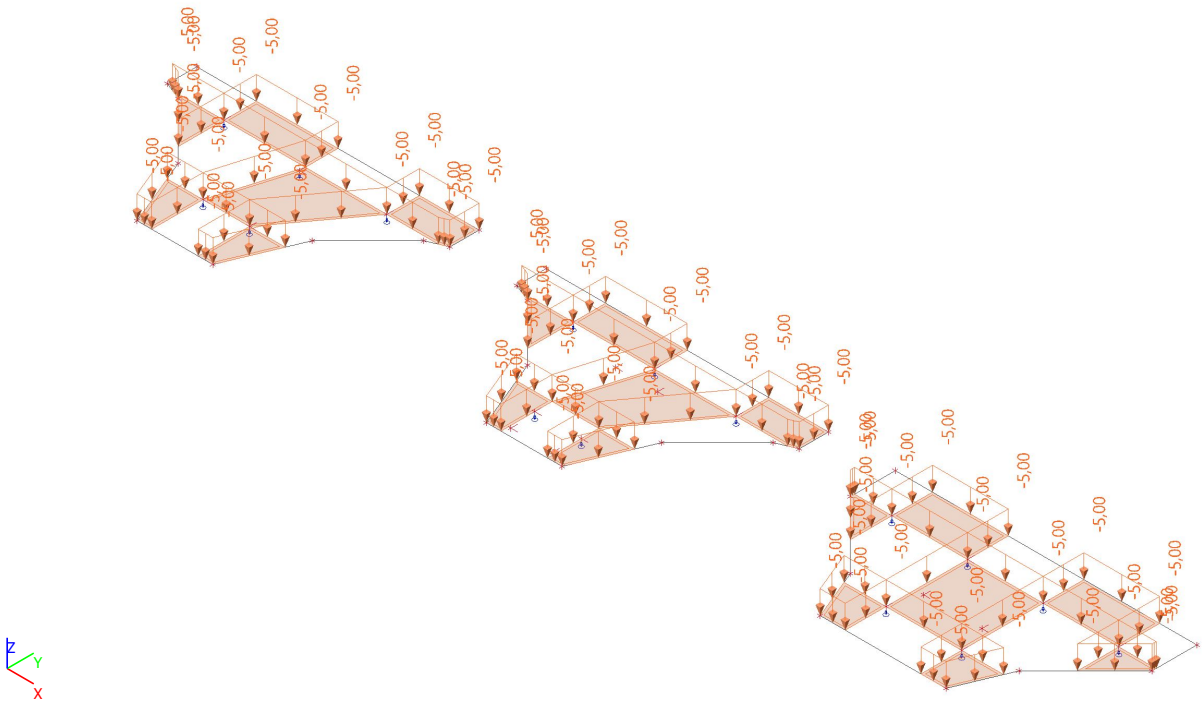
4.1.3.2. Resultant of reactions

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

x [m]	y [m]	z [m]	Case	R_z [kN]	M_x [kNm]	M_y [kNm]
22,156	14,072	0,000	LL	**460,04**	**42,98**	**-179,94**

4.1.4. Load cases - LL1

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



4.1.4.1. Free surface load

Name	Load case	Dir	Type	Distribution	q [kN/m²]	Validity	Select	System	Location
FF38	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF39	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF40	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF41	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF42	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF43	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF49	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF50	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF51	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF52	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF53	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF54	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF61	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF62	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF63	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF64	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF65	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF66	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length
FF67	LL1 - Imposed load	Z	Force	Uniform	-5,00	All	Auto	GCS	Length

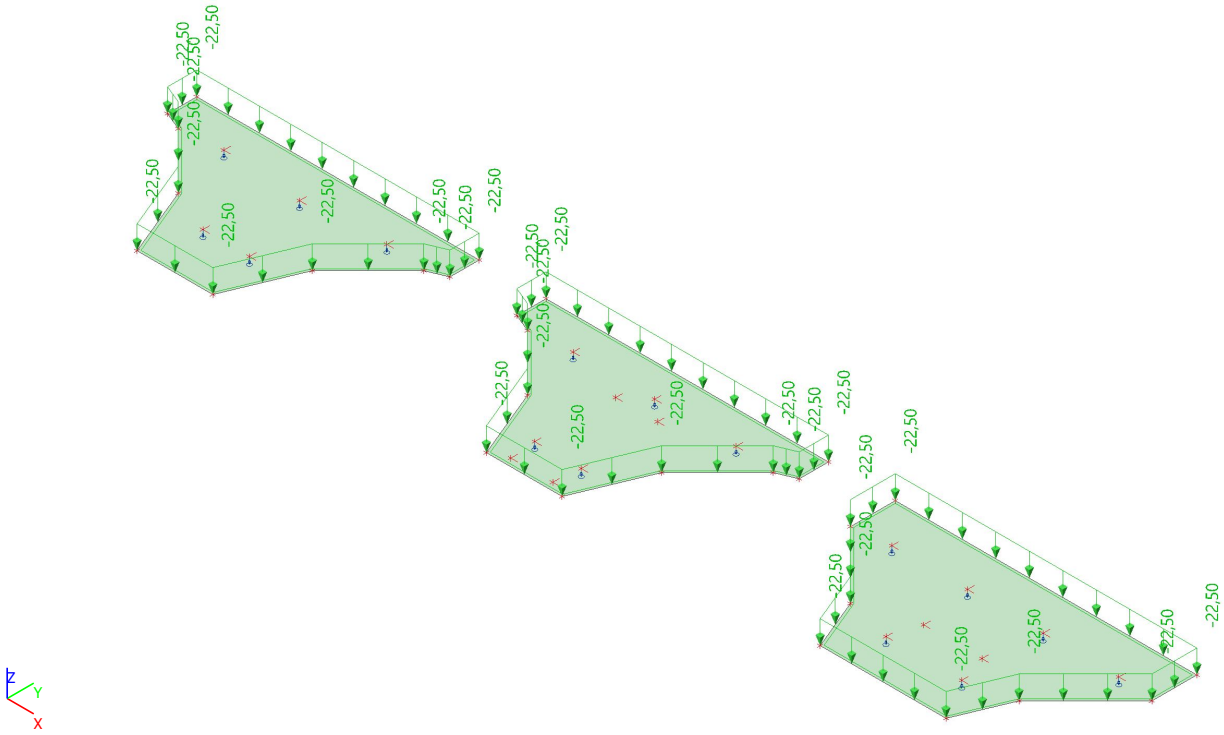
4.1.4.2. Resultant of reactions

Linear calculation
Load case: LL1
Extreme: Global
Selection: All
System: Global

x [m]	y [m]	z [m]	Case	R_z [kN]	M_x [kNm]	M_y [kNm]
22,156	14,072	0,000	LL1	**399,66**	**84,94**	**-200,49**

4.1.5. Load cases - A

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
A	calamity	Standard	Variable	Static	LG3	Short	None



4.1.5.1. Surface load

Name	Dir	Type	Value [kN/m²]	2D member	Load case	System	Loc
SF4	Z	Force	-22,50	S4	A - calamity	LCS	Length
SF5	Z	Force	-22,50	S5	A - calamity	LCS	Length
SF6	Z	Force	-22,50	S6	A - calamity	LCS	Length

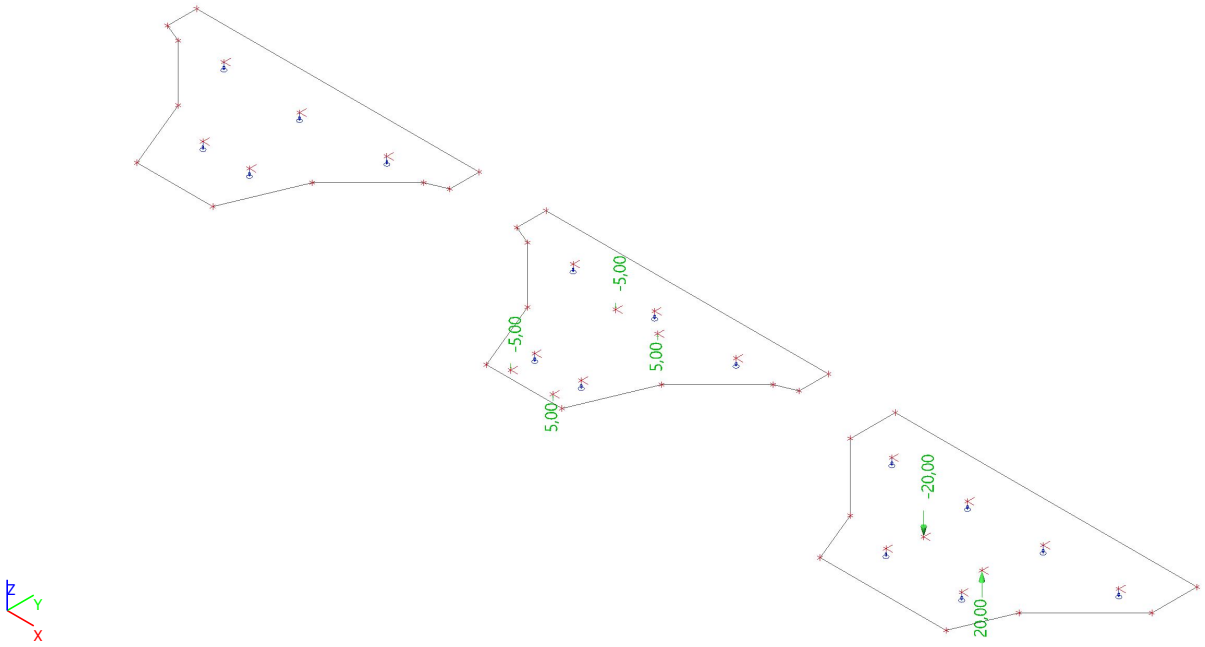
4.1.5.2. Resultant of reactions

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

x [m]	y [m]	z [m]	Case	R_z [kN]	M_x [kNm]	M_y [kNm]
22,156	14,072	0,000	A	**3868,64**	**575,64**	**-1711,96**

4.1.6. Load cases - W

Name	Description	Spec	Action type	Load type	Load group	Duration	Master load case
W	Wind load	Standard	Variable	Static	LG4	Short	None



4.1.6.1. Point force in node

Name	Node	Load case	System	Dir	Type	Value - F [kN]
F5	N89	W - Wind load	GCS	Z	Force	-5,00
F6	N87	W - Wind load	GCS	Z	Force	-5,00
F8	N90	W - Wind load	GCS	Z	Force	5,00
F9	N88	W - Wind load	GCS	Z	Force	5,00
F19	N133	W - Wind load	GCS	Z	Force	-20,00
F20	N134	W - Wind load	GCS	Z	Force	20,00

4.1.6.2. Resultant of reactions

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

x [m]	y [m]	z [m]	Case	R_z [kN]	M_x [kNm]	M_y [kNm]
22,156	14,072	0,000	W	**0,00**	**0,00**	**68,00**

4.2. Load groups

Name	Load	Relation	Type
LG1	Permanent		
LG2	Variable	Standard	Cat E : Storage
LG3	Accidental	Exclusive	
LG4	Variable	Exclusive	Wind

4.3. Combinations

Name	Description	Type	Load cases	Coeff. [-]
CO1		EN-ULS (STR/GEO) Set B	DL - Dead load - Self weight EO - Equipment load - operation LL - Imposed load LL1 - Imposed load W - Wind load	1,00 1,00 1,00 1,00 1,00
CO2		EN-Accidental 1	DL - Dead load - Self weight A - calamity	1,00 1,00
CO3		EN-SLS Frequent	DL - Dead load - Self weight EO - Equipment load - operation LL - Imposed load LL1 - Imposed load W - Wind load	1,00 1,00 1,00 1,00 1,00
CO4		Linear - serviceability	DL - Dead load - Self weight A - calamity	1,00 1,00
CO5		EN-SLS Quasi-permanent	DL - Dead load - Self weight EO - Equipment load - operation LL - Imposed load LL1 - Imposed load W - Wind load	1,00 1,00 1,00 1,00 1,00

4.4. Result classes

Name	List
All ULS	CO1 - EN-ULS (STR/GEO) Set B CO2 - EN-Accidental 1
All SLS	CO3 - EN-SLS Frequent CO4 - Linear - serviceability CO5 - EN-SLS Quasi-permanent
All	CO1 - EN-ULS (STR/GEO) Set B CO2 - EN-Accidental 1 CO3 - EN-SLS Frequent CO4 - Linear - serviceability CO5 - EN-SLS Quasi-permanent

5. Results

5.1. Reactions

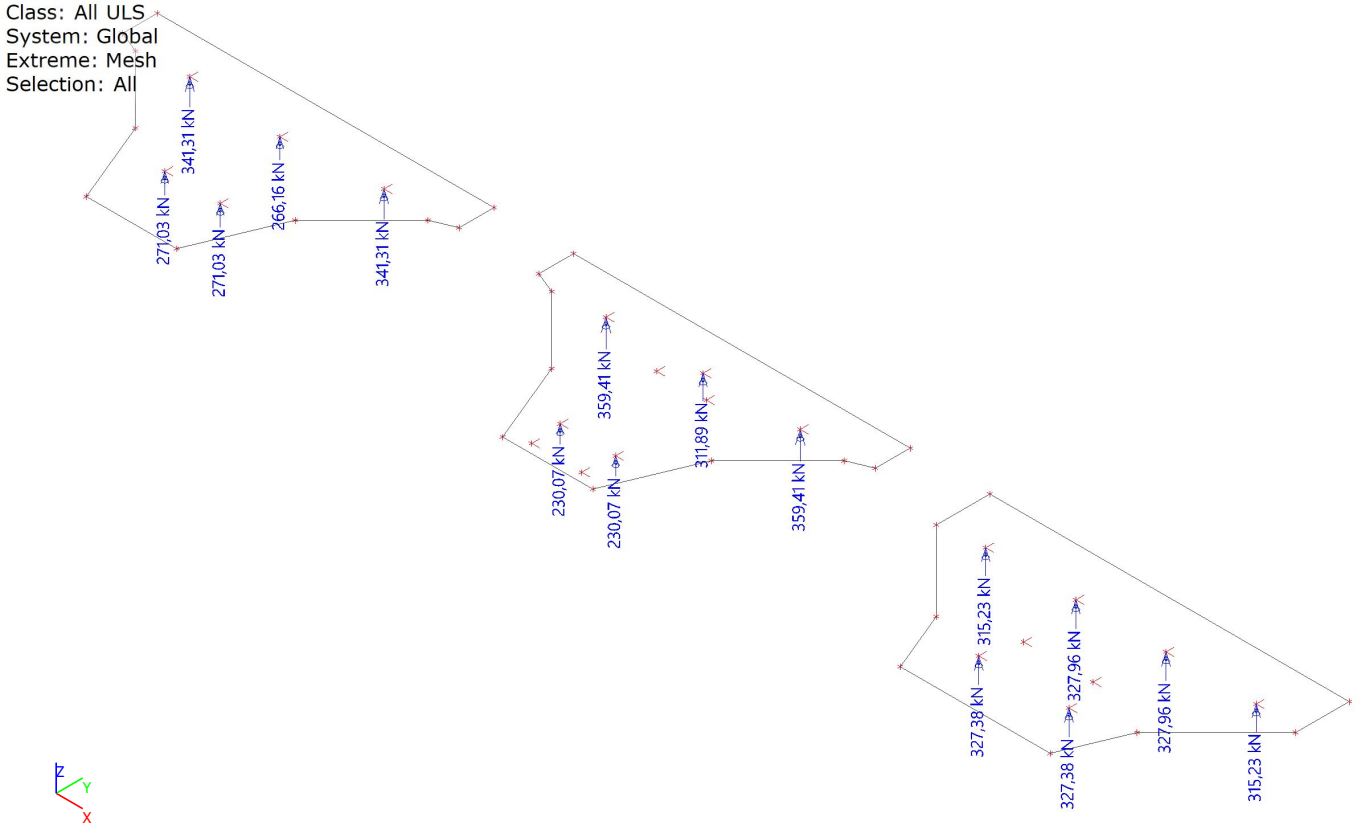
Linear calculation
Class: All ULS
System: Global
Extreme: Global
Selection: All

Nodal reactions

Name	Case	R_z [kN]	M_x [kNm]	M_y [kNm]	e_x [mm]	e_y [mm]
Sn50/N127	CO2/1	**49,27**	0,00	0,00	0,0	0,0
Sn52/N129	CO2/2	**359,41**	**0,00**	**0,00**	0,0	0,0

Name	Combination key
CO2/1	DL
CO2/2	DL + A

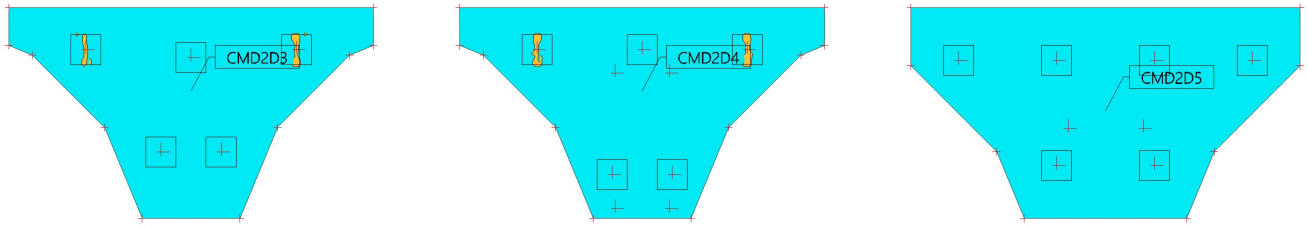
Values: **R_z**
Linear calculation
Class: All ULS
System: Global
Extreme: Mesh
Selection: All



6. Basic reinforcement

6.1. Reinforcement design (ULS+SLS); As,prov,1+

Values: **Reinf**$_{Prov,1+}$
Linear calculation
Class: All
Extreme: Global
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element

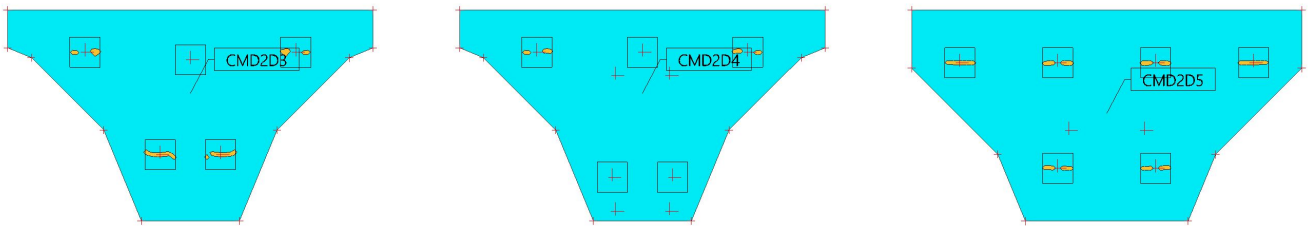


Reinf Prov,1+

☐16,0/100 + ☐12,0/100
☐16,0/100

6.2. Reinforcement design (ULS+SLS); As,prov,2+

Values: **Reinf**$_{Prov,2+}$
Linear calculation
Class: All
Extreme: Global
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element

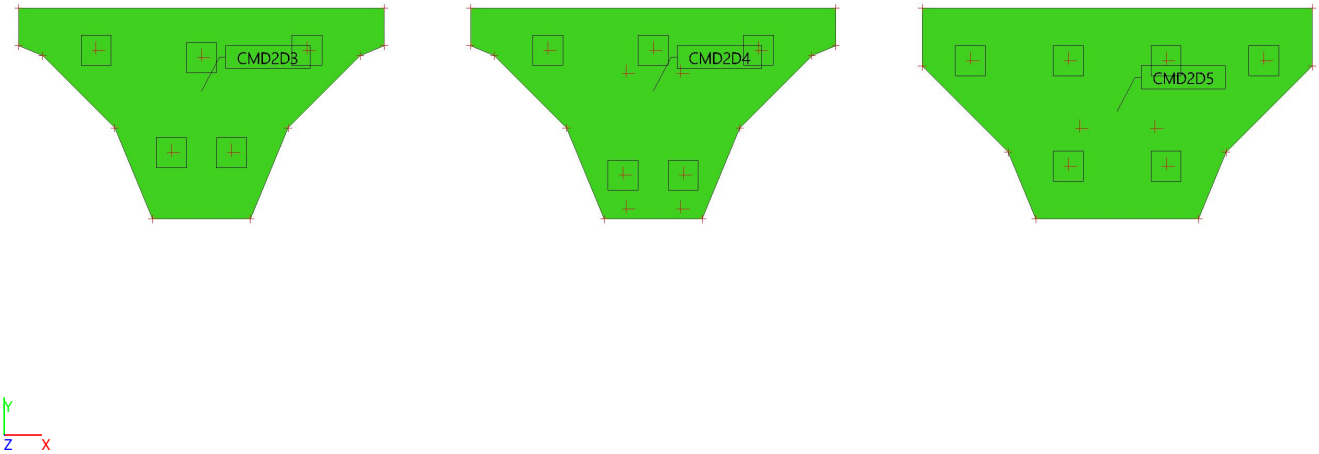


Reinf Prov,2+

☐16,0/100 + ☐12,0/100
☐16,0/100

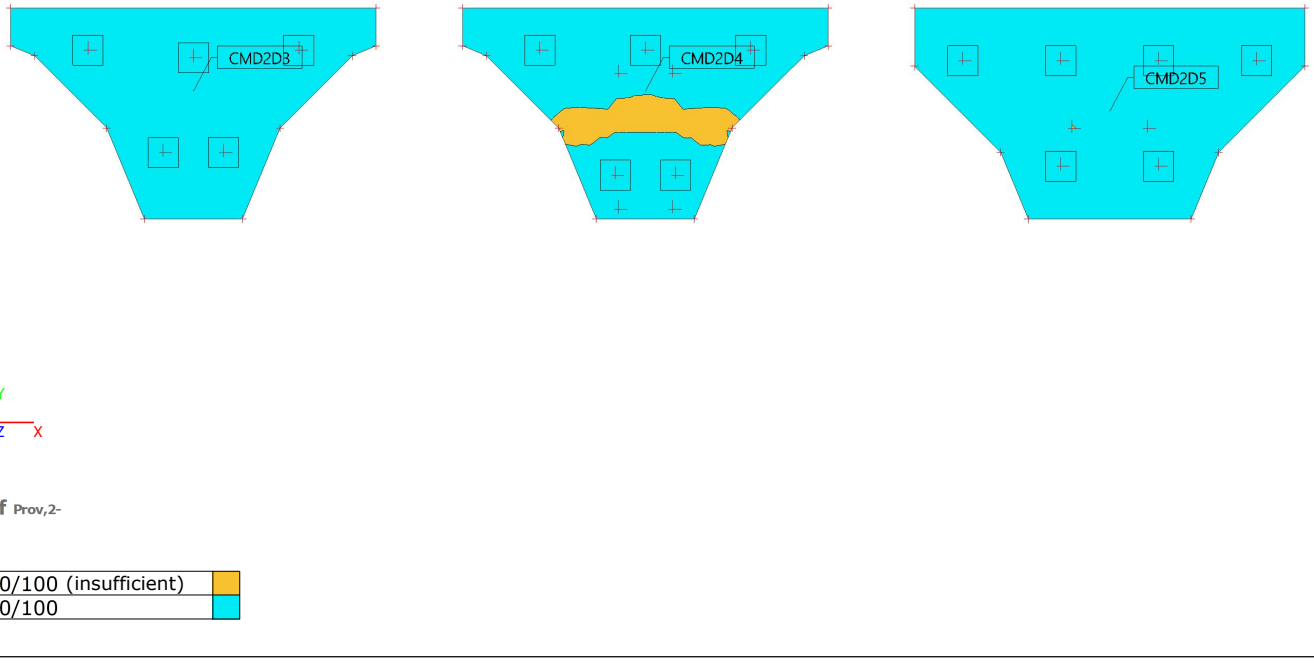
6.3. Reinforcement design (ULS+SLS); As,prov,1-

Values: **Reinf$_{Prov,1-}$**
Linear calculation
Class: All
Extreme: Global
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



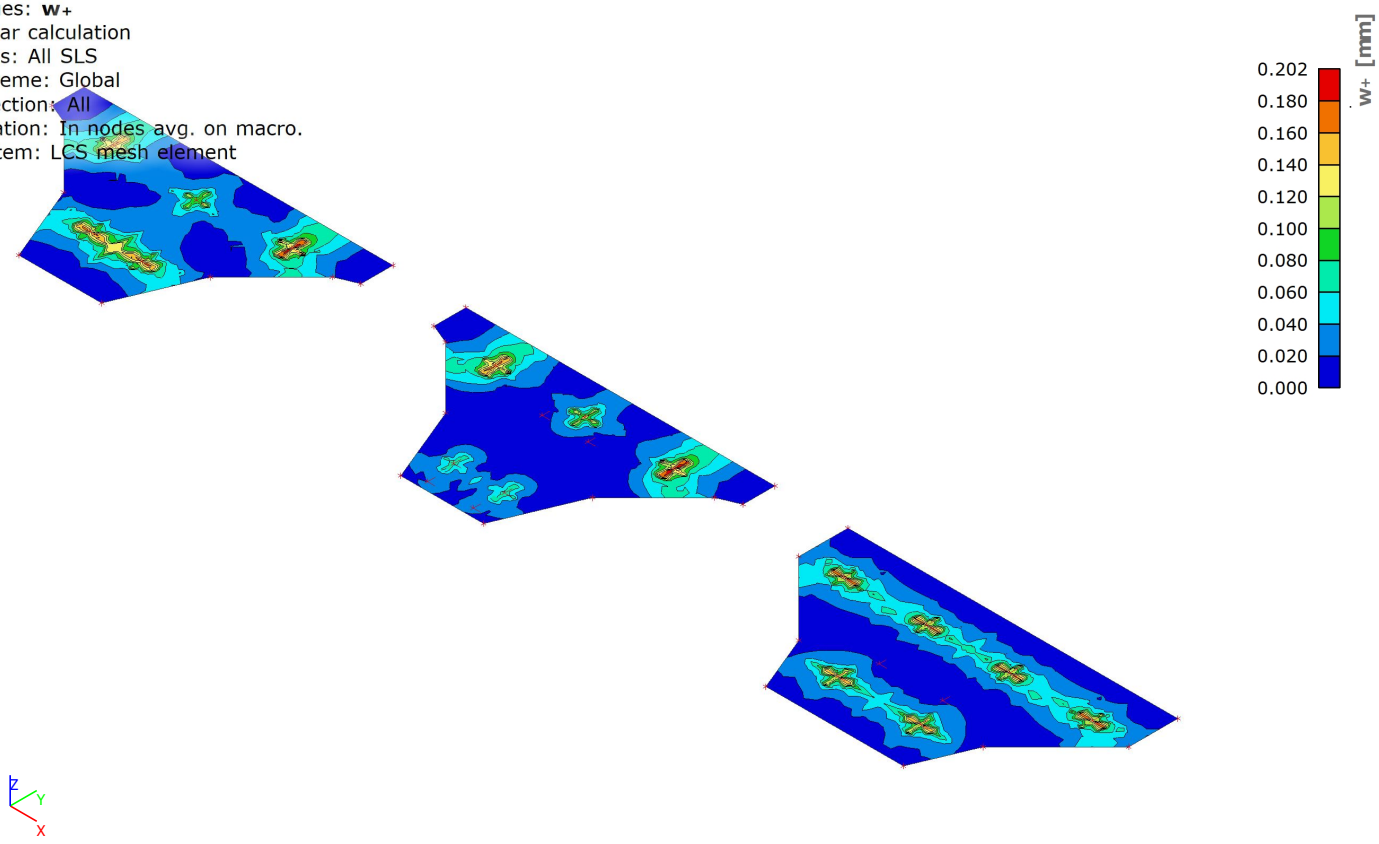
6.4. Reinforcement design (ULS+SLS); As,prov,2-

Values: **Reinf$_{Prov,2-}$**
Linear calculation
Class: All
Extreme: Global
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



6.5. Crack width (SLS); w+

Values: **w+**
Linear calculation
Class: All SLS
Extreme: Global
Selection: All
Location: In nodes avg. on macro.
System: LCS mesh element



6.6. Code dependent deflection; δ^{tot}