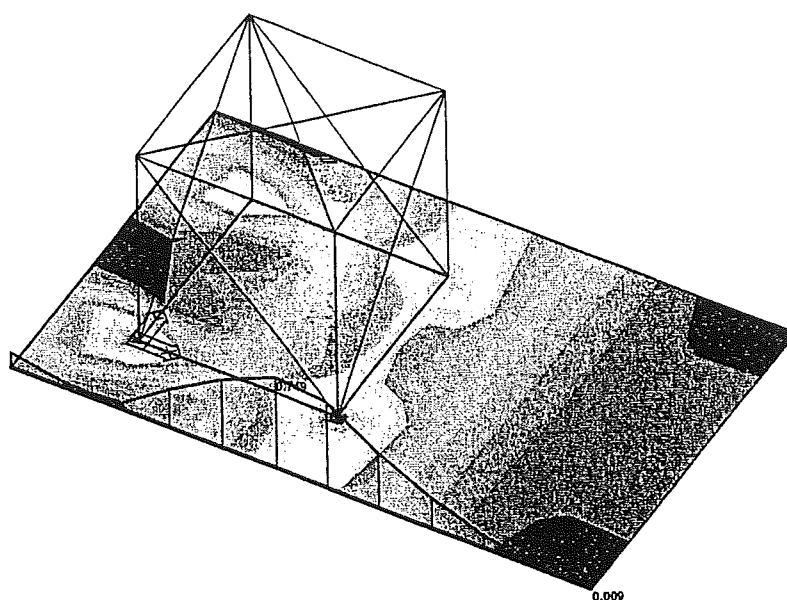


As1- [cm <sup>2</sup> /m]	
4.516	
4.168	
3.821	
3.474	
3.126	
2.779	
2.432	
2.084	
1.737	
1.389	
1.042	
0.695	
0.347	
0.000	

$\phi 10/15cm$

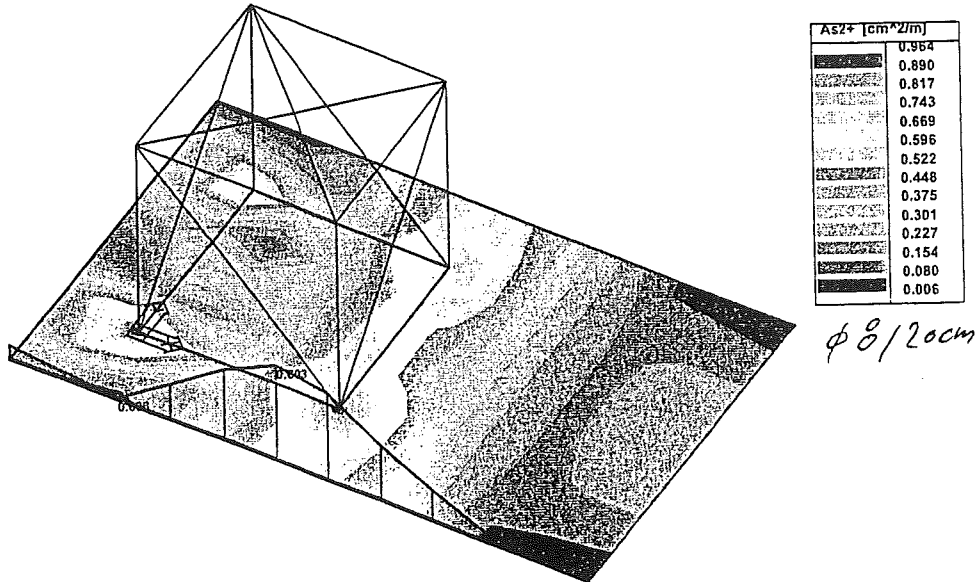
2D reinforcement - As1-



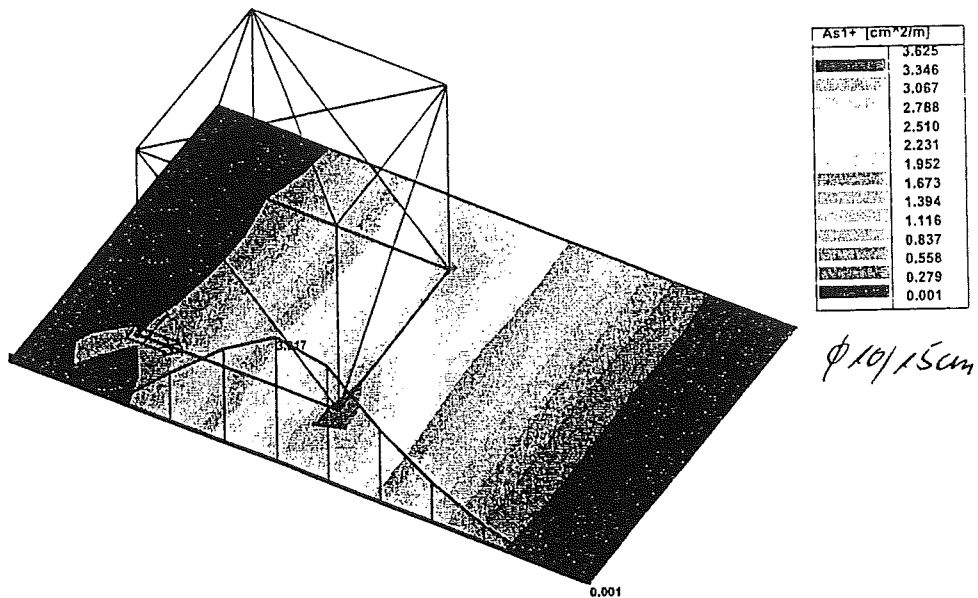
As2- [cm <sup>2</sup> /m]	
1.244	
1.148	
1.052	
0.957	
0.861	
0.765	
0.670	
0.574	
0.478	
0.383	
0.287	
0.191	
0.096	
0.000	

$\phi 8/20cm$

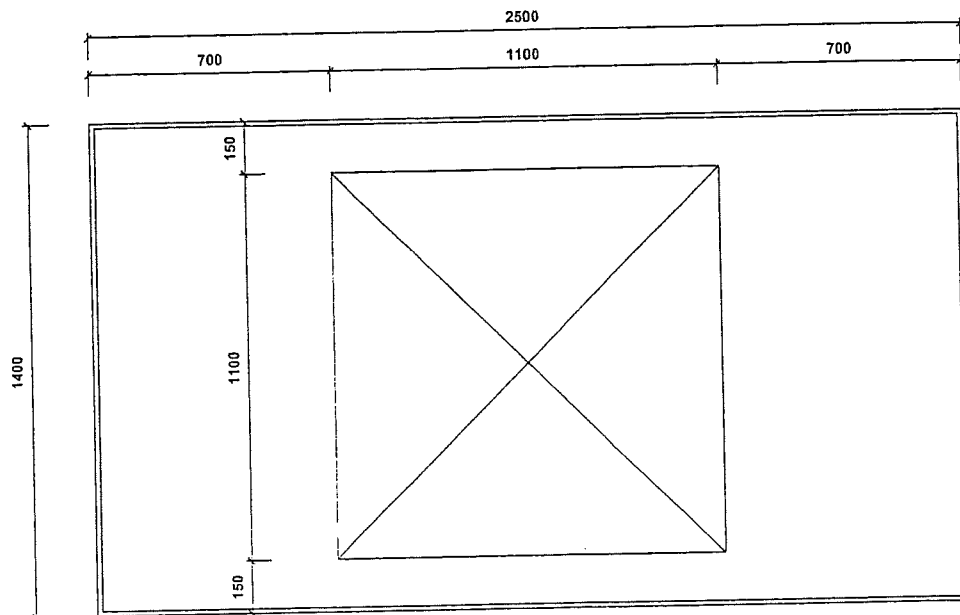
2D reinforcement - As2-



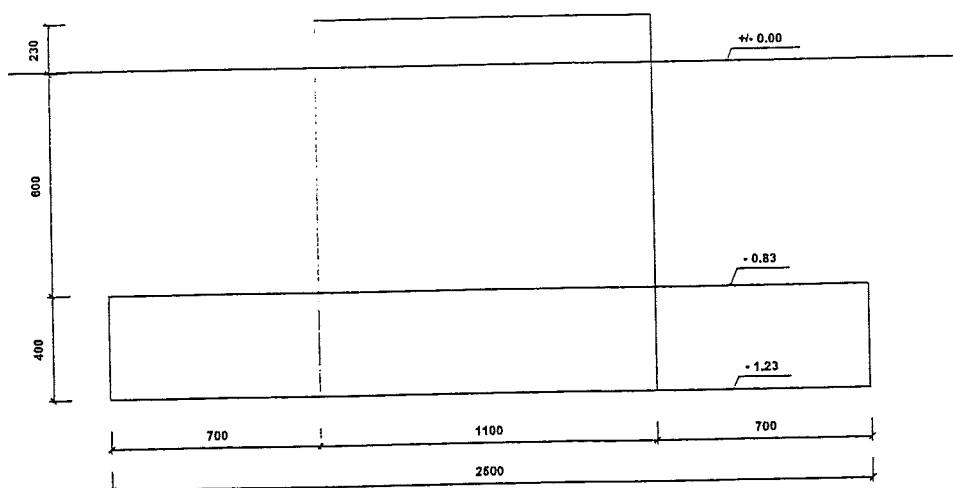
2D reinforcement - As2+



2D reinforcement - As1+



**$h = 40 \text{ cm, B25}$**



**Basic data****Type of structure : General XYZ**

Number of nodes: 13  
 Number of members: 16  
 Number of 1D macros: 11  
 Number of bound. lines: 4  
 Number of 2D macros: 1  
 Number of profiles : 1  
 Number of cases: 6  
 Number of materials: 2

**Material**

Name:

B 25

E modulus 30000.00 MPa  
 Poisson coeff. 0.20  
 Density 2500.000 kg/m<sup>3</sup>  
 Extensibility 0.01 mm/m.K

B 25 gewichtslos

E modulus 30000.00 MPa  
 Poisson coeff. 0.20  
 Density 0.000 kg/m<sup>3</sup>  
 Extensibility 0.01 mm/m.K

**List of material****Group of members :**

1/16

no.	Name:	quality	unit weight kg/m	length m	weight kg
-----	-------	---------	---------------------	-------------	--------------

**List of material - Macro2D****Group of members :**

1/1

no.	Name:	quality	unit volume weight kgm <sup>3</sup>	volume m <sup>3</sup>	weight kg
4	B 25	B 25	2500.00	1.40	3500.00

The total weight of the structure: 3500.00 kg

**Nodes**

node	X m	Y m	Z m	node	X m	Y m	Z m
1	0.450	0.450	0.000	2	1.550	0.450	0.000



node	X m	Y m	Z m	node	X m	Y m	Z m
3	1.550	1.550	0.000	9	1.000	1.000	1.230
4	0.450	1.550	0.000	10	-0.250	0.300	0.000
5	0.450	0.450	1.230	11	2.250	0.300	0.000
6	1.550	0.450	1.230	12	2.250	1.700	0.000
7	0.450	1.550	1.230	13	-0.250	1.700	0.000
8	1.550	1.550	1.230				

## Members

macro	memb	node 1	node 2	length m	Rx deg	profile	quality
1	1	1	5	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
2	2	2	6	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
3	3	4	7	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
4	4	3	8	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
5	5	5	6	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	6	6	8	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	7	8	7	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	8	7	5	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
6	9	5	2	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
7	10	7	3	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
8	11	1	7	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
9	12	2	8	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
10	13	5	9	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	14	9	8	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
11	15	6	9	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	16	9	7	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos

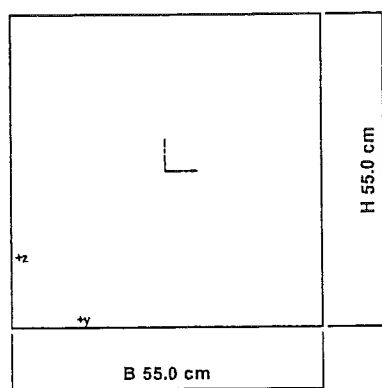
## Boundaries

bound. line	type	node
1	Line	10,11
2	Line	11,12
3	Line	12,13
4	Line	13,10

## 2D Macros

num	type	
1		
	B 25	Thickness 0.40 m
	Boundary:	1,2,3,4
	Nodes :	1,2,3,4

## Profiles



REC (55.0,55.0)

Profile no. 1 - REC (55.0,55.0)

Material : 8 - B 25 gewichtslos

A:	3.025000e+003 cm <sup>2</sup>	Az/A:	0.833
Ay/A:	0.833	Iz:	7.625521e+005 cm <sup>4</sup>
Iy:	7.625521e+005 cm <sup>4</sup>	It:	1.286578e+006 cm <sup>4</sup>
Iyz:	0.000000e+000 cm <sup>4</sup>		
Iw:	0.000000e+000 cm <sup>6</sup>		
Wely:	2.772917e+004 cm <sup>3</sup>	Welz:	2.772917e+004 cm <sup>3</sup>
Wply:	4.159375e+004 cm <sup>3</sup>	Wplz:	4.159375e+004 cm <sup>3</sup>
cy:	27.50 cm	cz:	27.50 cm
iy:	15.88 cm	iz:	15.88 cm
dy:	0.00 cm	dz:	0.00 cm
Outline :			220.00 cm

Type for check: Untypical section

## Nontypical elements

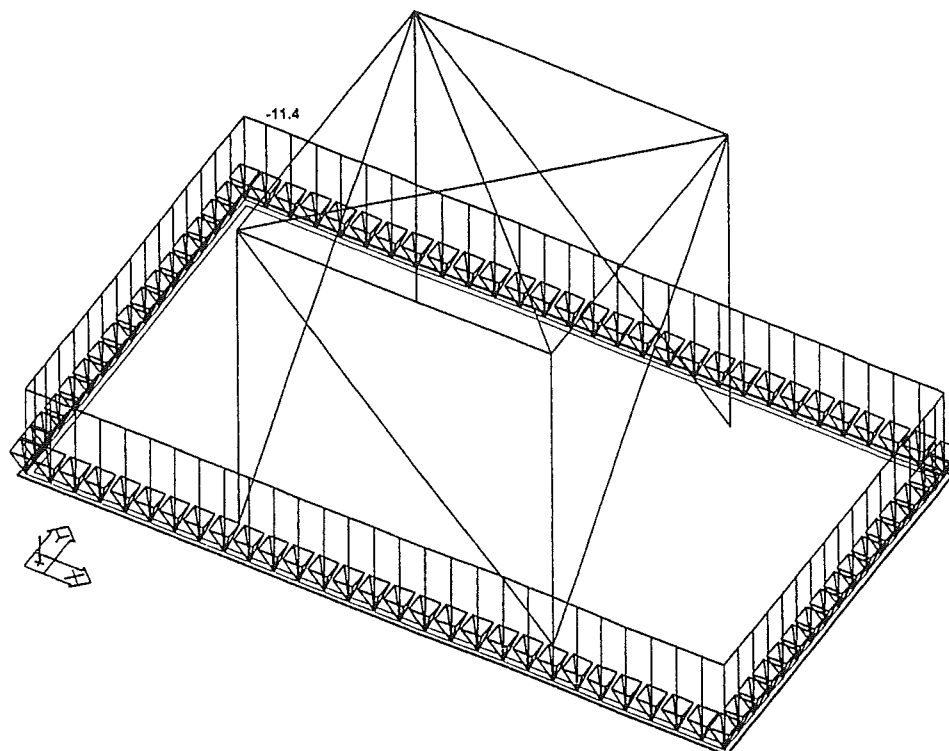
memb	type	memb	type	memb	type
1	X	2	X	3	X
4	X	5	X	6	X
7	X	8	X	9	X
10	X	11	X	12	X

## Soil - 2D macro

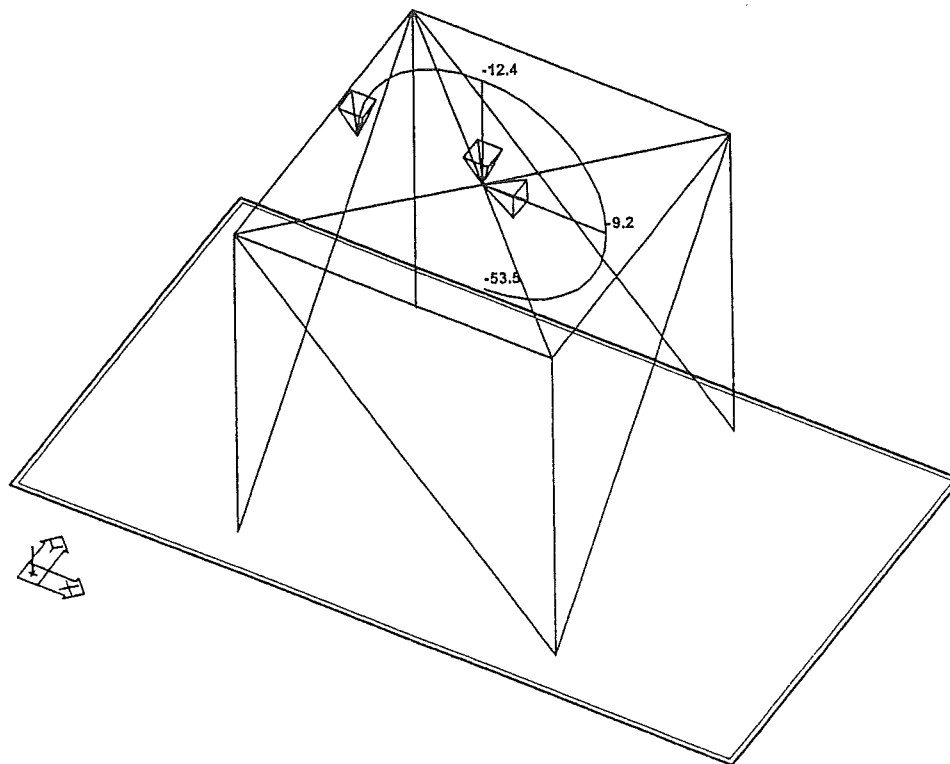
Index	2D macro	Name of subsoil
1	1	gemischtkörniger Sand

**Loadcases**

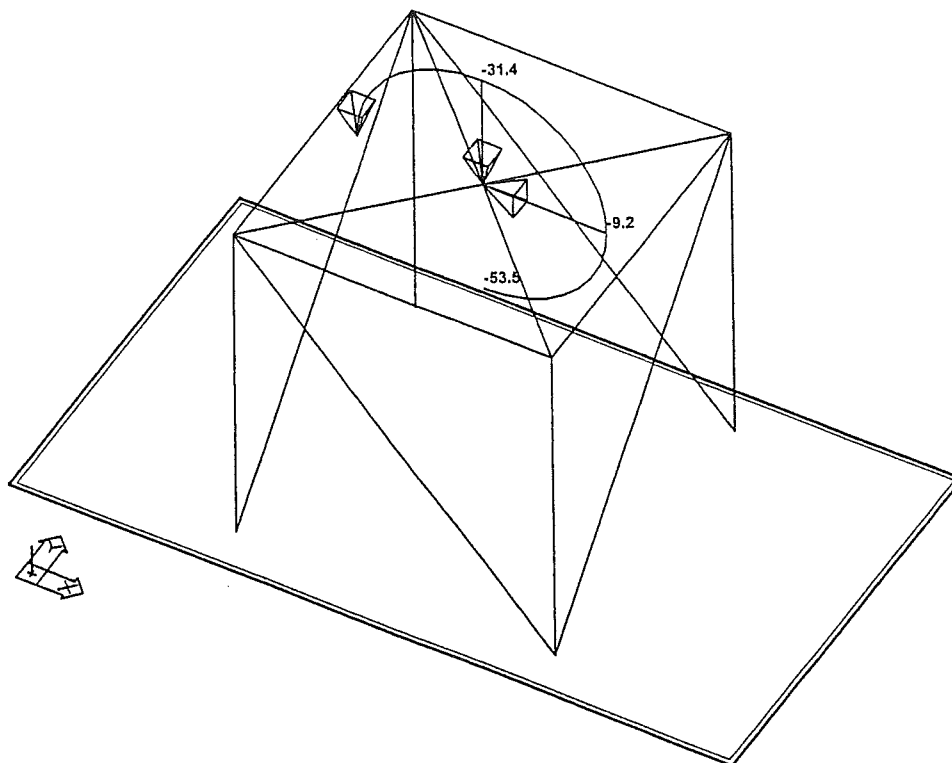
Case	Name:	Description
1	weight	Self weight. Direction -Z
2	G	Permanent - Loads
3	LC1	Variable - p Excl.
4	LC2	Variable - p Excl.
5	LC1(-)	Variable - p Excl.
6	LC2(-)	Variable - p Excl.



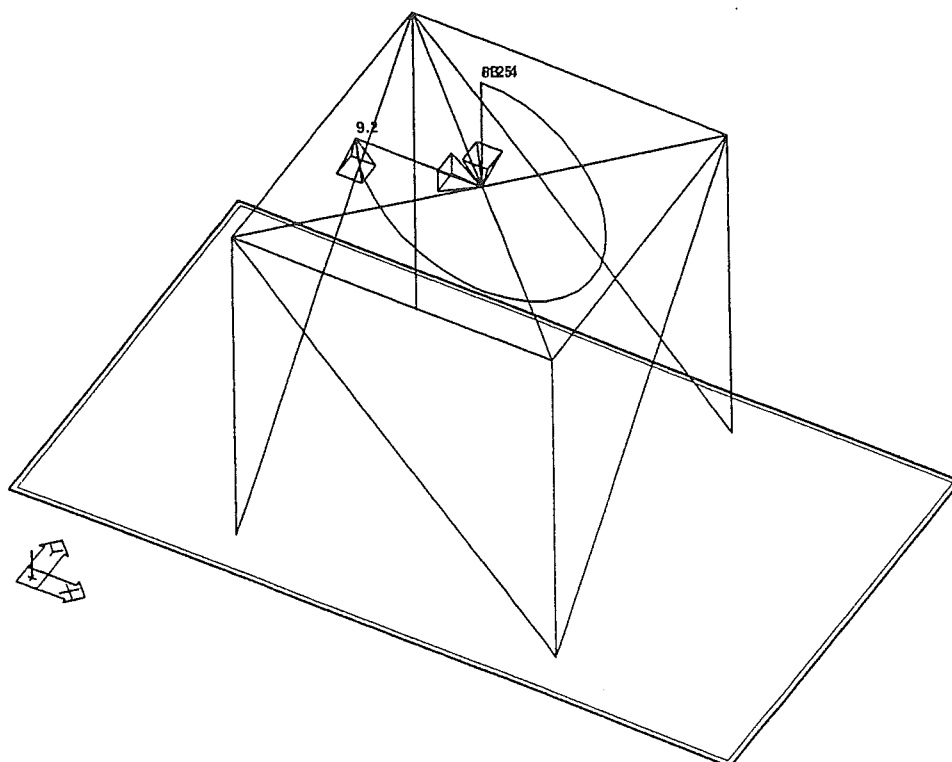
2. G



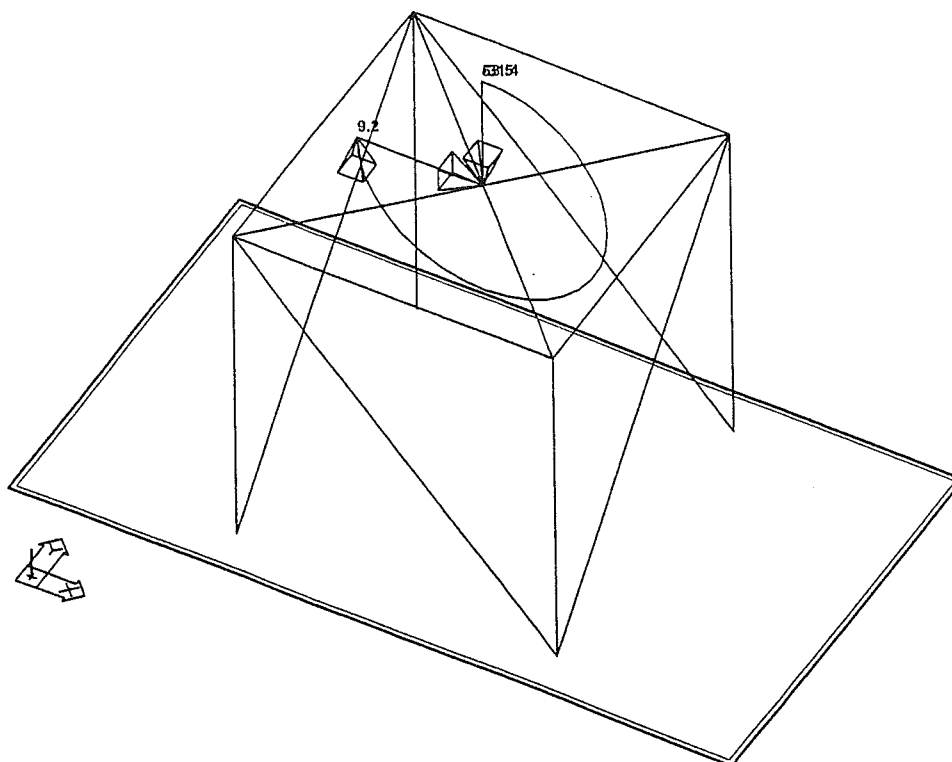
3. LC1




4. LC2



5. LC1(-)



6. LC2(-)

**Variable loads group**Name: 

p Excl.

**Loadcase no. 3 - nodal loads**

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
9	-9.20	0.00	-12.36	0.00	-53.46	0.00

**Loadcase no. 4 - nodal loads**

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
9	-9.20	0.00	-31.39	0.00	-53.46	0.00

**Loadcase no. 5 - nodal loads**

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
9	9.20	0.00	-12.36	0.00	53.46	0.00

**Loadcase no. 6 - nodal loads**

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
9	9.20	0.00	-31.39	0.00	53.46	0.00

**Loadcase no. 2 - Distributed loads 2D**

macro	qx kN/m <sup>2</sup>	qy kN/m <sup>2</sup>	qz kN/m <sup>2</sup>
1	0.00	0.00	-11.40

**Combinations**

Combi	Norm	Case	coeff
1.	User-ultimate	1 weight	1.00
		2 G	1.00
		3 LC1	1.00
		4 LC2	1.00
		5 LC1(-)	1.00
		6 LC2(-)	1.00

Basic rules for generation of ultimate load combinations:

1 : 1.00\*LC1 / 1.00\*LC2 / 1.00\*LC3 / 1.00\*LC4 / 1.00\*LC5 / 1.00\*LC6

## List of extreme ultimate load combinations

- 1/ 1 : +1.00\*LC1+1.00\*LC2+1.00\*LC3  
 2/ 1 : +1.00\*LC1+1.00\*LC2+1.00\*LC4  
 3/ 1 : +1.00\*LC1+1.00\*LC2+1.00\*LC5  
 4/ 1 : +1.00\*LC1+1.00\*LC2+1.00\*LC6

## Nonlinear combination

Combi	Group of init. deformations	dx mm/m	dy mm/m	Group of init. curvatures	Case	coeff
C 1	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	3 LC1	1.00
C 2	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	4 LC2	1.00
C 3	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	5 LC1(-)	1.00
C 4	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	6 LC2(-)	1.00

## Subsoils

Name:	Type of position	C1x kN/m <sup>3</sup>	C1y kN/m <sup>3</sup>	C1z kN/m <sup>3</sup>	C2x kN/m	C2y kN/m	SigZpl kN/m <sup>2</sup>
gemischtkörniger Sand	Under plate, block	1000.000	1000.000	30000.000	0.000	0.000	0.000

## Calculation protocol.

## Linear calculation

Number of 2D elements	51	Number of 2D elements	51
Number of 1D elements	16	Number of 1D elements	16
Number of mesh nodes	65	Number of mesh nodes	65
Number of equations	390	Number of equations	390
Loadcases	LC 1 weight LC 2 G LC 3 LC1 LC 4 LC2 LC 5 LC1(-)	Bending theory	Mindlin
		Start of calculation	19.10.2004 10:33
		End of calculation	19.10.2004 10:33

## Sum of loads and reactions.

		X	Y	Z			X	Y	Z
loadcase 1	loads	0.0	0.0	-35.0	loadcase 3	loads	-9.2	0.0	-12.4
	reactions	0.0	0.0	0.0		reactions	0.0	0.0	0.0
	contact	0.0	-0.0	35.0		contact	9.2	-0.0	12.4
loadcase 2	loads	0.0	0.0	-39.9	loadcase 4	loads	-9.2	0.0	-31.4
	reactions	0.0	0.0	0.0		reactions	0.0	0.0	0.0
	contact	0.0	-0.0	39.9		contact	9.2	-0.0	31.4

		X	Y	Z
loadcase 5	loads	9.2	0.0	-12.4
	reactions	0.0	0.0	0.0
	contact	-9.2	0.0	12.4

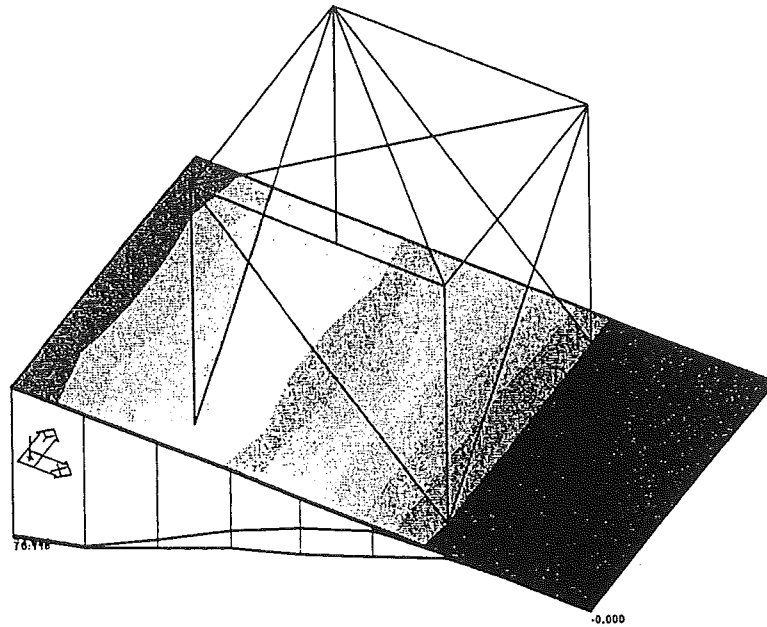
		X	Y	Z
loadcase 6	loads	9.2	0.0	-31.4
	reactions	0.0	0.0	0.0
	contact	-9.2	-0.0	31.4

### Nonlinear calculation

Number of 2D elements 51  
 Number of 1D elements 16  
 Number of mesh nodes 65  
 Number of equations 390  
 Maximum iterations 50  
 Bending theory Mindlin

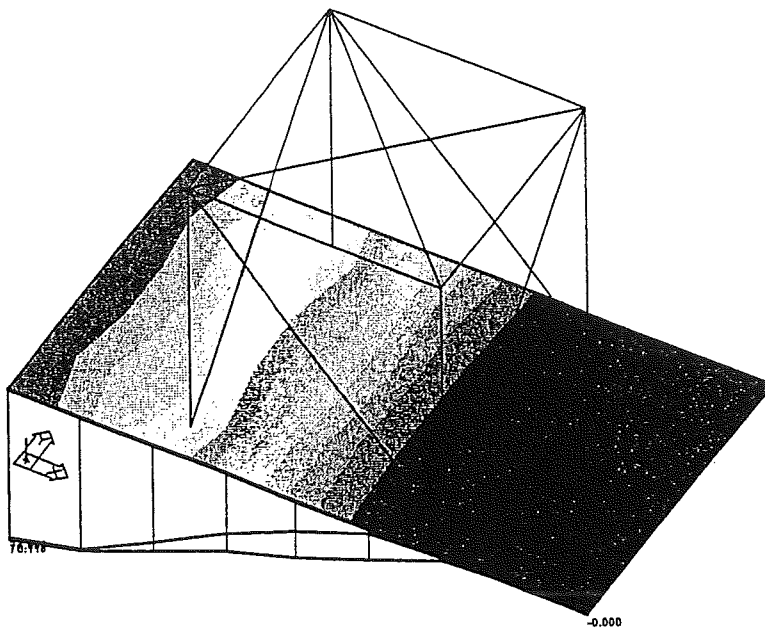
Number Combi	Start	End	NoOfIteration
NC 1	19.10.2004 10:33	19.10.2004 10:33	4
NC 2	19.10.2004 10:33	19.10.2004 10:33	4
NC 3	19.10.2004 10:33	19.10.2004 10:33	3
NC 4	19.10.2004 10:33	19.10.2004 10:33	4





Max sigmz [kPa]	
	76.317
	70.446
	64.576
	58.705
	52.835
	46.964
	41.094
	35.223
	29.353
	23.482
	17.612
	11.741
	5.871
	-0.000

Contact stress - max sigmz - Nonl. Combi : 1/2



Min sigmz [kPa]	
	74.860
	69.078
	63.296
	57.514
	51.732
	45.950
	40.168
	34.386
	28.604
	22.822
	17.040
	11.258
	5.476
	-0.306

Contact stress - min sigmz - Nonl. Combi : 1/2

## RESULTS : CONTACT STRESSES

Nonl. Combi:

NC1

NC2

Global extremes

node	tauxx [kPa]	tauzy [kPa]	sigmz [kPa]
26	4.227	0.004	27.967
12	0.000	0.000	-0.000
41	3.444	0.010	9.326
59	3.445	-0.011	74.206
20	4.226	-0.002	76.317
35	0.845	0.000	-0.306

Selection was done for macros: 1

Code for calculation: DIN 1045 7/88

## Explanation of concrete symbols

Abbreviation	Explanation
betaWN	Concrete cube compression strength.
betaR	Design concrete compression strength.
Tau01	1st shear stress limit according Table 13.
Tau02	2nd shear stress limit according Table 13.
Tau03	3rd shear stress limit according Table 13.

## Concrete characteristics

	B 25
betaWN	25000.000 kPa
betaR	17500.000 kPa
Tau011_1 plates	350.000 kPa
Tau011_2 plates	500.000 kPa
Tau02 plates	1800.000 kPa
Tau012 beams	750.000 kPa
Tau02 beams	1800.000 kPa
Tau03 beams	3000.000 kPa

## Explanation of reinforcement steel symbols

Abbreviation	Explanation
betaS	Characteristic yield strength of reinforcement

## Steel characteristics

	BSt 420
betaS	420000.000 kPa
E modulus	200000000.000 kPa

**Input parameters**

Description	Percentage
Maximum % of reinforcement	9.00
Minimum % of net reinforcement	0.00
Minimum % of pressure reinforcement	0.50
Minimum % of tension reinforcement	0.00
Minimum % of transverse reinforcement	20.00

**Shear mode**

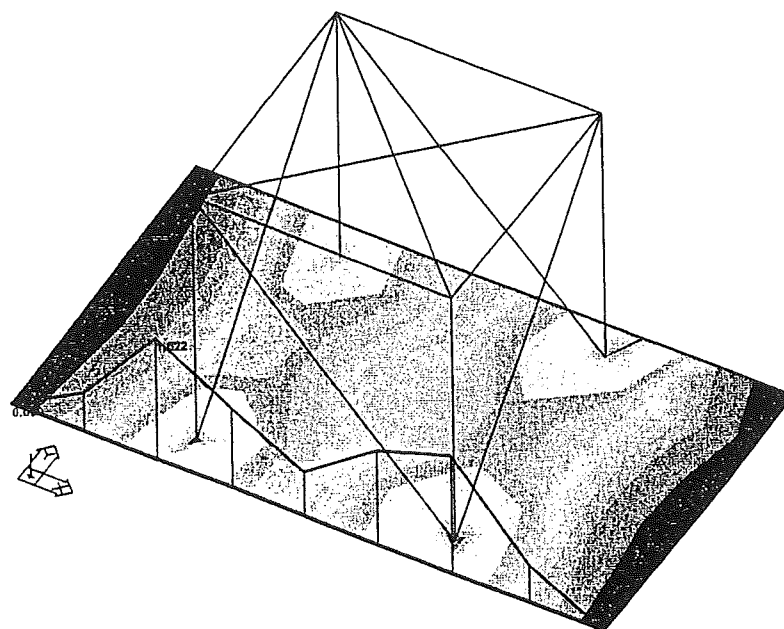
Tension reinforcement is partially anchored in the field.

Description	Value
height < 7 cm represents increase of internal forces ( § 17.2.1 (6) )	ON
Structural reinforcement of deep beam	OFF

**Global extremes**
**Necessary areas**

node	As1+ [cm <sup>2</sup> /m]	As2+ [cm <sup>2</sup> /m]	As3+ [cm <sup>2</sup> /m]	As3- [cm <sup>2</sup> /m]	As2- [cm <sup>2</sup> /m]	As1- [cm <sup>2</sup> /m]	Ass [cm <sup>2</sup> /m <sup>2</sup> ]	tau [MPa]	tau0 [MPa]
1	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
26	0.000	0.251	~	~	0.296	0.588	0.000	0.00	0.10
35	0.360	0.748	~	~	0.342	1.082	0.000	0.00	0.02
11	0.068	0.020	~	~	0.020	0.000	0.000	0.00	0.02
1	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
10	0.059	0.034	~	~	0.010	0.000	0.000	0.00	0.04
2	1.112	0.240	~	~	0.456	2.062	0.000	0.00	0.14
10	0.059	0.034	~	~	0.010	0.000	0.000	0.00	0.04
1	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
	1.135	0.243	~	~	0.461	1.997	0.000	0.00	0.18
38	0.093	0.463	~	~	0.345	0.044	0.000	0.00	0.01

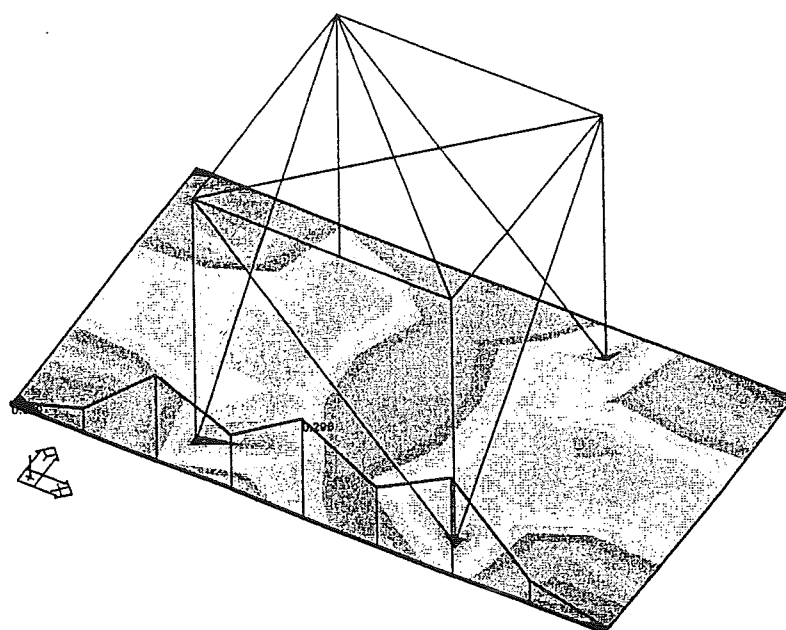
Selection was done for macros: 1



As1- [cm <sup>2</sup> /m]	
2.062	
1.904	
1.745	
1.586	
1.428	
1.269	
1.110	
0.952	
0.793	
0.635	
0.476	
0.317	
0.159	
0.000	

Ø 8/15 cm

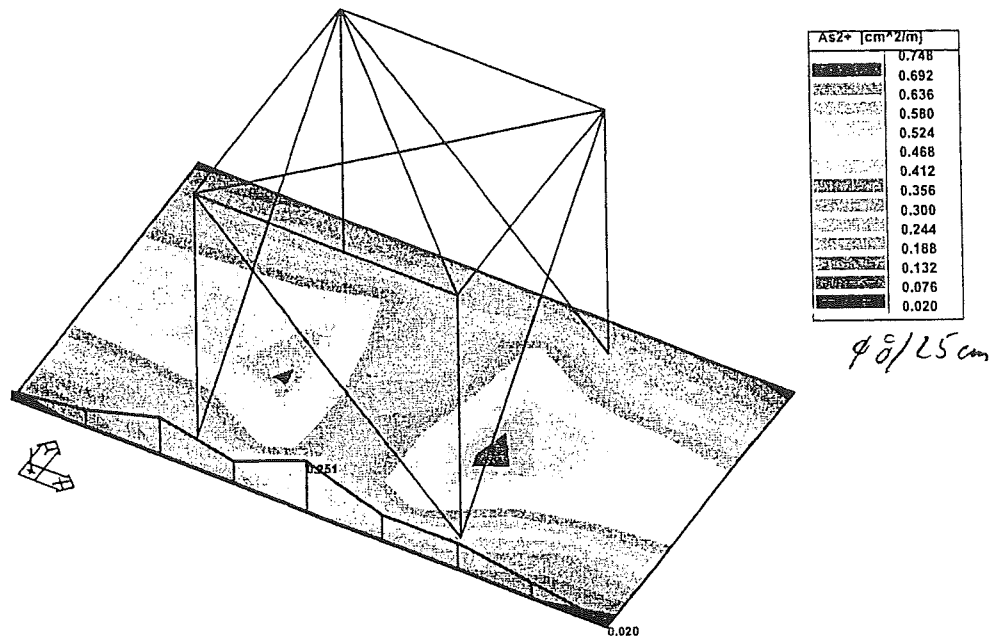
2D reinforcement - As1-



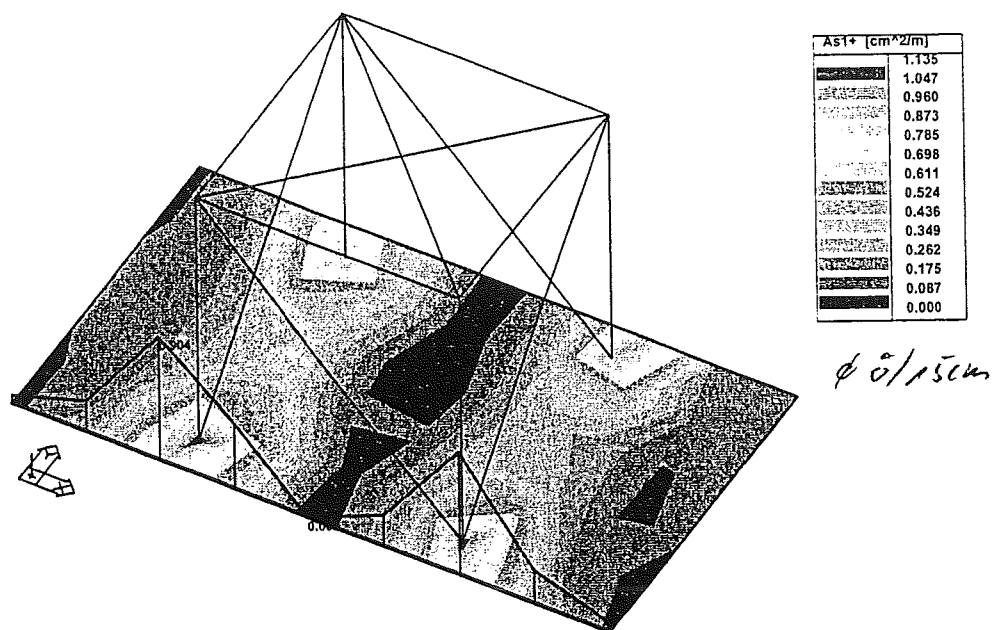
As2- [cm <sup>2</sup> /m]	
0.461	
0.426	
0.392	
0.357	
0.322	
0.288	
0.253	
0.218	
0.184	
0.149	
0.114	
0.080	
0.045	
0.010	

Ø 8/25 cm

2D reinforcement - As2-

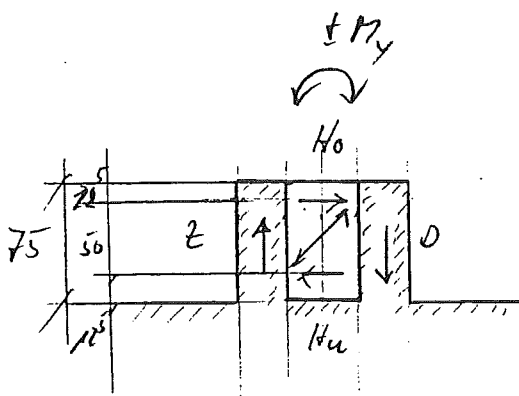


2D reinforcement - As2+



2D reinforcement - As1+

105



$$\max M_y = \pm 100 \text{ kNm}$$

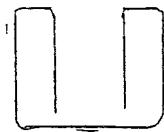
$$R_y = \pm 16,42 \text{ kN}$$

$$\max H_0 \approx \frac{\pm 100 + 16,42 \cdot 0,75}{0,5} = \underline{\underline{224,6 \text{ kN}}}$$

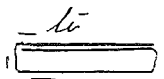
$$H_0 \approx z$$

$$\text{erf. } A_{SH} = A_{sv} = \frac{224,6}{240} = \underline{\underline{9,36 \text{ cm}^2}}$$

BS 4205



$$\text{fav.: } 2 \times 4 \phi 12 (= 9,03 \text{ cm}^2)$$



$$\text{fav.: } 2 \times 2 \phi 12 (= 9,03 \text{ cm}^2)$$

**KIMM**

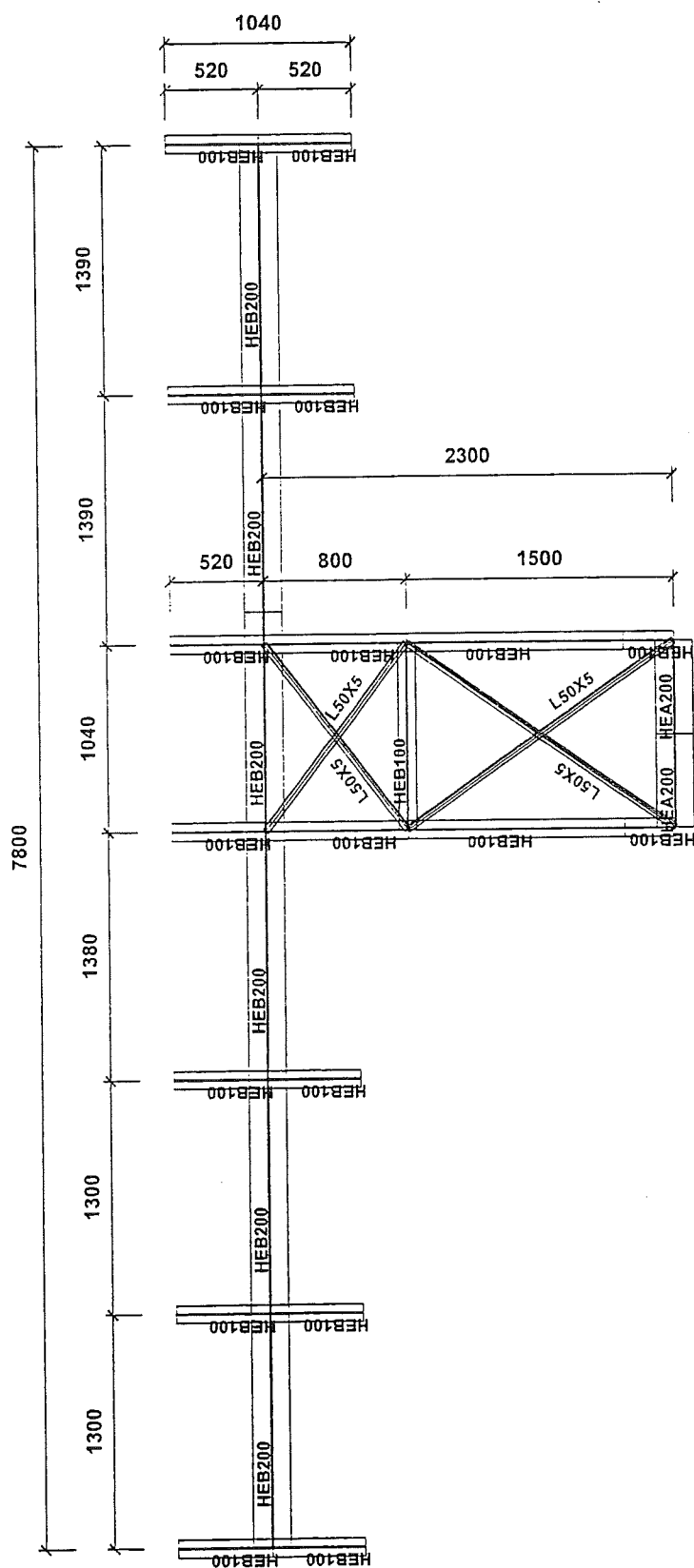
Ingenieurgesellschaft mbH  
Saarbrücker Straße 9  
66130 Saarbrücken-Brebach  
Telefon (0681) 8 83 13-0  
Telefax (0681) 8 83 13 99

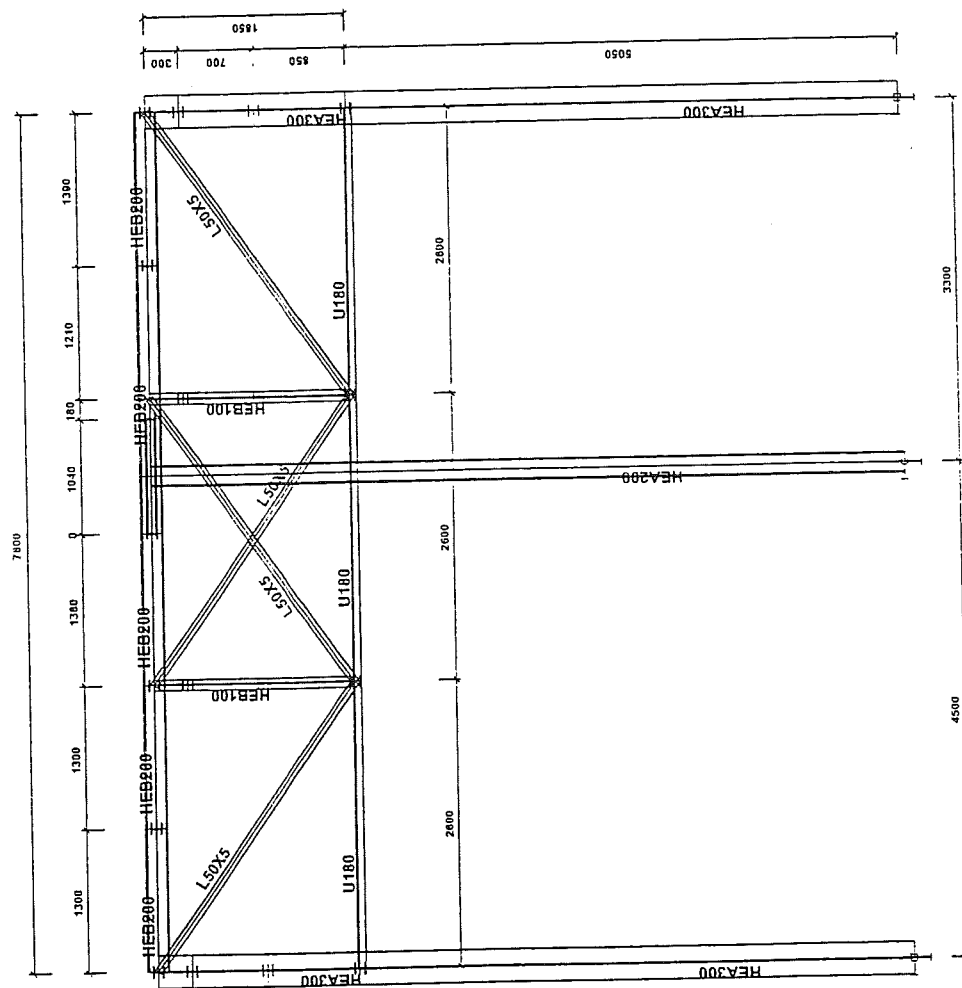
**Inhalt**

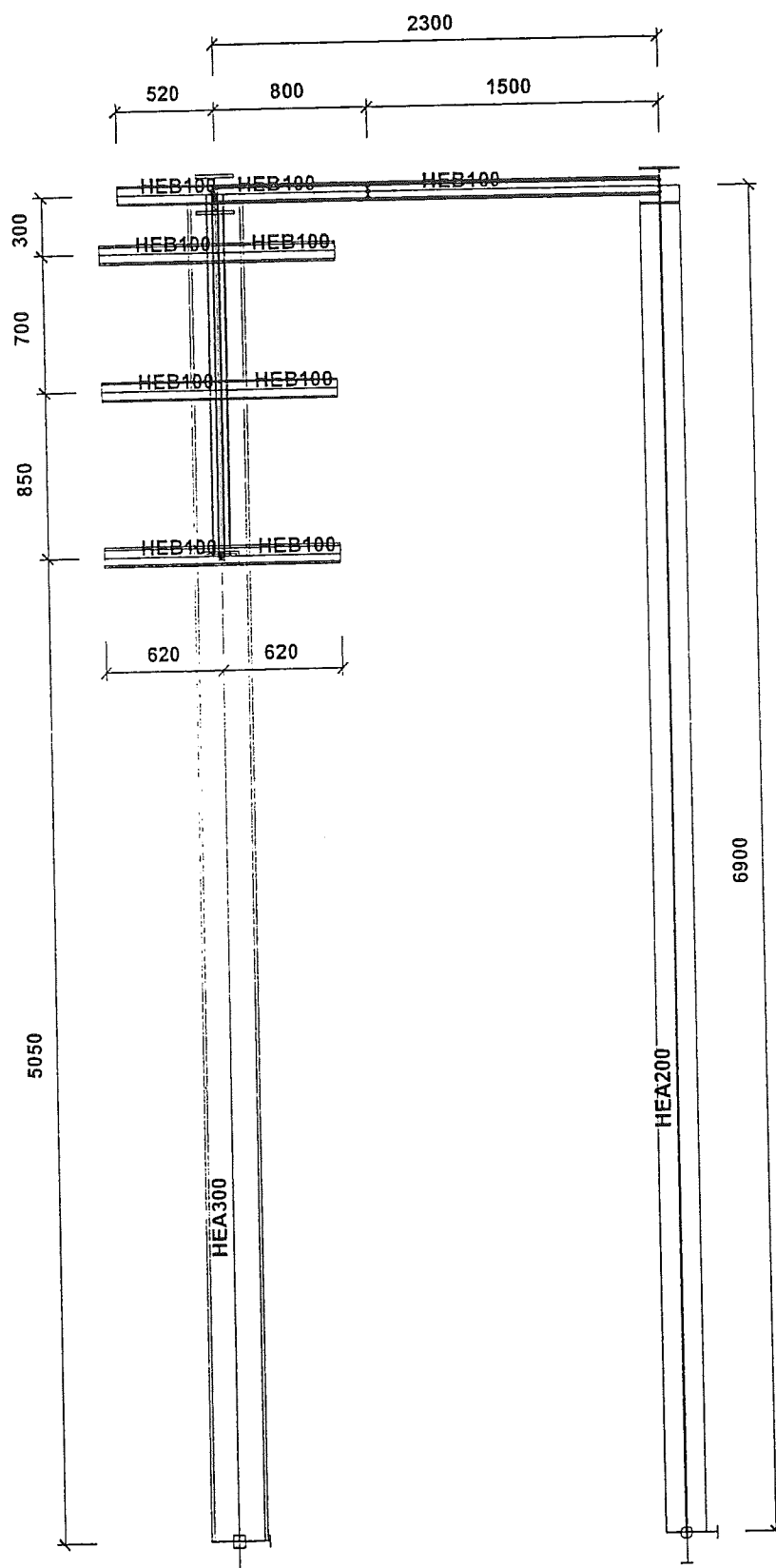
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Internal forces - My on member(s). Ult. combi : 1/151	145
Internal forces - Mz on member(s). Ult. combi : 1/151	146
Internal forces - N on member(s). Ult. combi : 1/151	146
Internal forces - Vz on member(s). Ult. combi : 1/151	147
Internal forces - Vy on member(s). Ult. combi : 1/151	147
Internal forces on member(s) (all), ult. comb (all), global extremes.	148
Internal forces - N on member(s). Ult. combi : 1/151	148
Internal forces on member(s) (all), ult. comb (all), global extremes.	148
Internal forces - My on member(s). Ult. combi : 1/151	149
Internal forces - Vz on member(s). Ult. combi : 1/151	149
Internal forces - N on member(s). Ult. combi : 1/151	150
Internal forces on member(s) (all), ult. comb (all), global extremes.	150

Internal forces - My on member(s). Ult. combi : 1/151	151
Internal forces - N on member(s). Ult. combi : 1/151	151
Internal forces on member(s) (all), ult. comb (all), global extremes.	152
Internal forces - My on member(s). Ult. combi : 1/151	152
Internal forces - Mz on member(s). Ult. combi : 1/151	153
Internal forces - N on member(s). Ult. combi : 1/151	153
Internal forces - Vy on member(s). Ult. combi : 1/151	154
Internal forces - Vz on member(s). Ult. combi : 1/151	154
Internal forces on member(s) (all), ult. comb (all), global extremes.	155
DIN. Profile - 1 all. UC all.	155
DIN. Profile - 2 all. UC all.	156
DIN. Profile - 3 all. UC all.	157
DIN. Profile - 4 all. UC all.	157
DIN. Profile - 5 all. UC all.	158
DIN. Profile - 6 all. UC all.	159









**Basic data****Type of structure : General XYZ**

Number of nodes: 66  
 Number of members: 78  
 Number of 1D macros: 34  
 Number of bound. lines: 0  
 Number of 2D macros: 0  
 Number of profiles : 6  
 Number of cases: 15  
 Number of materials: 1

**Material**

Name:

S 235

Ultimate strength 36.0000 kN/cm<sup>2</sup>  
 Yield design 24.0000 kN/cm<sup>2</sup>  
 E modulus 210000.00 MPa  
 Poisson coeff. 0.30  
 Density 7850.000 kg/m<sup>3</sup>  
 Extensibility 0.012 mm/m.K

**List of material****Group of members :  
1/78**

no.	Name:	quality	unit weight kg/m	length m	weight kg
1	HEB200	S 235	61.29	7.80	478.08
2	HEA300	S 235	88.71	13.80	1224.13
3	L50X5	S 235	3.77	19.04	71.74
4	HEB100	S 235	20.44	31.02	634.09
5	U180	S 235	21.98	7.80	171.44
6	HEA200	S 235	42.23	7.94	335.33

The total weight of the structure: 2914.82 kg  
 Surface for painting: 69.73 m<sup>2</sup>

**Nodes**

node	X m	Y m	Z m	node	X m	Y m	Z m
1	0.600	0.000	-0.300	7	8.400	0.000	-0.300
2	1.900	0.000	-0.300	8	0.600	0.000	-2.150
3	3.200	0.000	-0.300	9	3.200	0.000	-2.150
4	4.580	0.000	-0.300	10	5.800	0.000	-2.150
5	5.800	0.000	-0.300	11	8.400	0.000	-2.150
6	7.010	0.000	-0.300	12	0.600	-0.520	-0.300

node	X m	Y m	Z m	node	X m	Y m	Z m
13	0.600	0.520	-0.300	40	0.600	-0.620	-0.600
14	1.900	-0.520	-0.300	41	0.600	0.620	-0.600
15	1.900	0.520	-0.300	42	3.200	-0.620	-1.300
16	3.200	-0.520	-0.300	43	3.200	0.620	-1.300
17	3.200	0.520	-0.300	44	3.200	-0.620	-0.600
18	4.580	-0.800	-0.300	45	3.200	0.620	-0.600
19	4.580	0.520	-0.300	46	5.800	-0.620	-2.150
20	7.010	-0.520	-0.300	47	5.800	0.620	-2.150
21	7.010	0.520	-0.300	48	5.800	-0.620	-1.300
22	8.400	-0.520	-0.300	49	5.800	0.620	-1.300
23	8.400	0.520	-0.300	50	5.800	-0.620	-0.600
24	3.200	0.000	-1.300	51	5.800	0.620	-0.600
25	3.200	0.000	-0.600	52	8.400	-0.620	-2.150
26	5.800	0.000	-1.300	53	8.400	0.620	-2.150
27	5.800	0.000	-0.600	54	8.400	-0.620	-1.300
28	0.600	0.000	-7.200	55	8.400	0.620	-1.300
29	0.600	0.000	-1.300	56	8.400	-0.620	-0.600
30	0.600	0.000	-0.600	57	8.400	0.620	-0.600
31	8.400	0.000	-7.200	58	5.620	-0.800	-0.300
32	8.400	0.000	-1.300	59	5.620	0.000	-0.300
33	8.400	0.000	-0.600	60	5.620	0.520	-0.300
34	0.600	-0.620	-2.150	61	4.580	-2.300	-0.300
35	0.600	0.620	-2.150	62	4.580	-2.020	-0.300
36	3.200	-0.620	-2.150	63	5.620	-2.300	-0.300
37	3.200	0.620	-2.150	64	5.620	-2.020	-0.300
38	0.600	-0.620	-1.300	65	5.100	-2.300	-0.300
39	0.600	0.620	-1.300	66	5.100	-2.300	-7.200

## Members

macro	memb	node 1	node 2	length m	Rx deg	profile	quality
1	1	1	2	1.300	0.00	1 - HEB200	S 235
	2	2	3	1.300	0.00	1 - HEB200	S 235
	3	3	4	1.380	0.00	1 - HEB200	S 235
	4	4	59	1.040	0.00	1 - HEB200	S 235
	5	59	5	0.180	0.00	1 - HEB200	S 235
	6	5	6	1.210	0.00	1 - HEB200	S 235
	7	6	7	1.390	0.00	1 - HEB200	S 235
2	8	8	9	2.600	270.00	5 - U180	S 235
	9	9	10	2.600	270.00	5 - U180	S 235
	10	10	11	2.600	270.00	5 - U180	S 235
3	11	12	1	0.520	0.00	4 - HEB100	S 235
	12	1	13	0.520	0.00	4 - HEB100	S 235
4	13	14	2	0.520	0.00	4 - HEB100	S 235
	14	2	15	0.520	0.00	4 - HEB100	S 235
5	15	16	3	0.520	0.00	4 - HEB100	S 235
	16	3	17	0.520	0.00	4 - HEB100	S 235
6	17	18	4	0.800	0.00	4 - HEB100	S 235

## Pipe Bridge

Project : 7574 ASU No. 9, Kosice Tank Farm

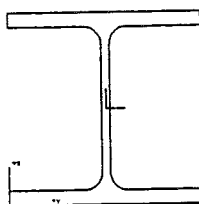
Author : Orth

Date : Freitag, 5. November 2004

macro	memb	node 1	node 2	length m	Rx deg	profile	quality
	18	4	19	0.520	0.00	4 - HEB100	S 235
7	19	20	6	0.520	0.00	4 - HEB100	S 235
	20	6	21	0.520	0.00	4 - HEB100	S 235
8	21	22	7	0.520	0.00	4 - HEB100	S 235
	22	7	23	0.520	0.00	4 - HEB100	S 235
9	23	9	24	0.850	90.00	4 - HEB100	S 235
	24	24	25	0.700	90.00	4 - HEB100	S 235
	25	25	3	0.300	90.00	4 - HEB100	S 235
10	26	10	26	0.850	90.00	4 - HEB100	S 235
	27	26	27	0.700	90.00	4 - HEB100	S 235
	28	27	5	0.300	90.00	4 - HEB100	S 235
11	29	28	8	5.050	90.00	2 - HEA300	S 235
	30	8	29	0.850	90.00	2 - HEA300	S 235
	31	29	30	0.700	90.00	2 - HEA300	S 235
	32	30	1	0.300	90.00	2 - HEA300	S 235
12	33	31	11	5.050	90.00	2 - HEA300	S 235
	34	11	32	0.850	90.00	2 - HEA300	S 235
	35	32	33	0.700	90.00	2 - HEA300	S 235
	36	33	7	0.300	90.00	2 - HEA300	S 235
13	37	1	9	3.191	0.00	3 - L50X5	S 235
	38	9	5	3.191	0.00	3 - L50X5	S 235
14	39	7	10	3.191	0.00	3 - L50X5	S 235
	40	10	3	3.191	0.00	3 - L50X5	S 235
15	41	34	8	0.620	0.00	4 - HEB100	S 235
	42	8	35	0.620	0.00	4 - HEB100	S 235
16	43	36	9	0.620	0.00	4 - HEB100	S 235
	44	9	37	0.620	0.00	4 - HEB100	S 235
17	45	38	29	0.620	0.00	4 - HEB100	S 235
	46	29	39	0.620	0.00	4 - HEB100	S 235
18	47	40	30	0.620	0.00	4 - HEB100	S 235
	48	30	41	0.620	0.00	4 - HEB100	S 235
19	49	42	24	0.620	0.00	4 - HEB100	S 235
	50	24	43	0.620	0.00	4 - HEB100	S 235
20	51	44	25	0.620	0.00	4 - HEB100	S 235
	52	25	45	0.620	0.00	4 - HEB100	S 235
21	53	46	10	0.620	0.00	4 - HEB100	S 235
	54	10	47	0.620	0.00	4 - HEB100	S 235
22	55	48	26	0.620	0.00	4 - HEB100	S 235
	56	26	49	0.620	0.00	4 - HEB100	S 235
23	57	50	27	0.620	0.00	4 - HEB100	S 235
	58	27	51	0.620	0.00	4 - HEB100	S 235
24	59	52	11	0.620	0.00	4 - HEB100	S 235
	60	11	53	0.620	0.00	4 - HEB100	S 235
25	61	54	32	0.620	0.00	4 - HEB100	S 235
	62	32	55	0.620	0.00	4 - HEB100	S 235
26	63	56	33	0.620	0.00	4 - HEB100	S 235
	64	33	57	0.620	0.00	4 - HEB100	S 235
27	65	58	59	0.800	0.00	4 - HEB100	S 235
	66	59	60	0.520	0.00	4 - HEB100	S 235
28	67	18	61	1.500	0.00	4 - HEB100	S 235

macro	memb	node 1	node 2	length m	Rx deg	profile	quality
	68	61	62	0.280	0.00	4 - HEB100	S 235
29	69	58	63	1.500	0.00	4 - HEB100	S 235
	70	63	64	0.280	0.00	4 - HEB100	S 235
30	71	18	58	1.040	0.00	4 - HEB100	S 235
31	72	61	58	1.825	0.00	3 - L50X5	S 235
	73	58	4	1.312	0.00	3 - L50X5	S 235
32	74	63	18	1.825	0.00	3 - L50X5	S 235
	75	18	59	1.312	0.00	3 - L50X5	S 235
33	76	66	65	6.900	0.00	6 - HEA200	S 235
34	77	61	65	0.520	0.00	6 - HEA200	S 235
	78	65	63	0.520	0.00	6 - HEA200	S 235

## Profiles



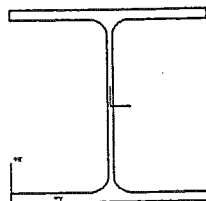
HEB200

Profile no. 1 - HEB200  
 Material : 12 - S 235

A:	7.808000e+001 cm <sup>2</sup>	Az/A:	0.199
Ay/A:	0.656	Iz:	2.003000e+003 cm <sup>4</sup>
Iy:	5.696000e+003 cm <sup>4</sup>	It:	5.928000e+001 cm <sup>4</sup>
Iyz:	0.000000e+000 cm <sup>4</sup>		
Iw:	1.716313e+005 cm <sup>6</sup>		
Wely:	5.696000e+002 cm <sup>3</sup>	Welz:	2.003000e+002 cm <sup>3</sup>
Wply:	6.420000e+002 cm <sup>3</sup>	Wplz:	3.060000e+002 cm <sup>3</sup>
cy:	10.00 cm	cz:	10.00 cm
iy:	8.54 cm	iz:	5.06 cm
dy:	-0.00 cm	dz:	0.00 cm
Outline :			118.20 cm

Type for check: I section

Height	20.00 cm	Width	20.00 cm
Thickness of flange	1.50 cm	Thickness of web	0.90 cm
Radius	1.80 cm		



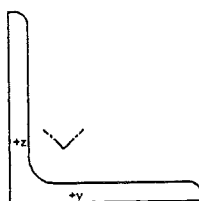
HEA300

Profile no. 2 - HEA300  
Material : 12 - S 235

A:	1.130000e+002 cm <sup>2</sup>	Az/A:	0.200
Ay/A:	0.655	Iz:	6.310000e+003 cm <sup>4</sup>
Iy:	1.830000e+004 cm <sup>4</sup>	It:	8.520000e+001 cm <sup>4</sup>
Iyz:	1.355253e-012 cm <sup>4</sup>		
Iw:	1.203322e+006 cm <sup>6</sup>		
Wely:	1.260000e+003 cm <sup>3</sup>	Welz:	4.210000e+002 cm <sup>3</sup>
Wply:	1.384000e+003 cm <sup>3</sup>	Wplz:	6.420000e+002 cm <sup>3</sup>
cy:	15.00 cm	cz:	14.50 cm
iy:	12.73 cm	iz:	7.47 cm
dy:	-0.00 cm	dz:	-0.00 cm
Outline :	176.30 cm		

Type for check: I section

Height	29.00 cm	Width	30.00 cm
Thickness of flange	1.40 cm	Thickness of web	0.85 cm
Radius	2.70 cm		



L50X5

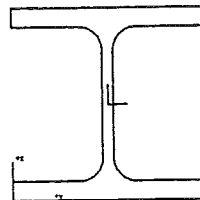
Profile no. 3 - L50X5  
Material : 12 - S 235

A:	4.800000e+000 cm <sup>2</sup>	Az/A:	0.417
Ay/A:	0.419	Iz:	4.590000e+000 cm <sup>4</sup>
Iy:	1.740000e+001 cm <sup>4</sup>	Iz0:	1.100000e+001 cm <sup>4</sup>
Iy0:	1.100000e+001 cm <sup>4</sup>		
alpha:	45.000 deg	It:	4.170000e-001 cm <sup>4</sup>
Iyz:	-6.416260e+000 cm <sup>4</sup>		
Iw:	0.000000e+000 cm <sup>6</sup>	Welz:	2.312529e+000 cm <sup>3</sup>
Wely:	4.921463e+000 cm <sup>3</sup>	Wplz:	4.043261e+000 cm <sup>3</sup>
Wply:	7.825653e+000 cm <sup>3</sup>		
cy:	1.40 cm	cz:	1.40 cm
iy:	1.90 cm	iz:	0.98 cm
dy:	-1.68 cm	dz:	0.00 cm
Outline :	20.00 cm		



Type for check: Angle section

Height 5.00 cm Width 5.00 cm  
Thickness of flange 0.50 cm Radius 0.35 cm



HEB100

Profile no. 4 - HEB100  
Material : 12 - S 235

A:	2.604000e+001 cm <sup>2</sup>	Az/A:	0.194
Ay/A:	0.660	Iz:	1.673000e+002 cm <sup>4</sup>
Iy:	4.495000e+002 cm <sup>4</sup>	It:	9.250000e+000 cm <sup>4</sup>
Iyz:	1.629903e-009 cm <sup>4</sup>		
Iw:	3.384985e+003 cm <sup>6</sup>		
Wely:	8.991000e+001 cm <sup>3</sup>	Welz:	3.345000e+001 cm <sup>3</sup>
Wply:	1.040000e+002 cm <sup>3</sup>	Wplz:	5.100000e+001 cm <sup>3</sup>
cy:	5.00 cm	cz:	5.00 cm
iy:	4.15 cm	iz:	2.53 cm
dy:	0.00 cm	dz:	-0.00 cm
Outline :	58.80 cm		

Type for check: I section

Height 10.00 cm Width 10.00 cm  
Thickness of flange 1.00 cm Thickness of web 0.60 cm  
Radius 1.20 cm



U180

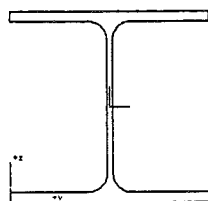
Profile no. 5 - U180  
Material : 12 - S 235

A:	2.800000e+001 cm <sup>2</sup>	Az/A:	0.431
Ay/A:	0.267	Iz:	1.140000e+002 cm <sup>4</sup>
Iy:	1.350000e+003 cm <sup>4</sup>	It:	9.550000e+000 cm <sup>4</sup>
Iyz:	-1.185846e-012 cm <sup>4</sup>		
Iw:	5.570000e+003 cm <sup>6</sup>		
Wely:	1.500000e+002 cm <sup>3</sup>	Welz:	2.240000e+001 cm <sup>3</sup>
Wply:	1.792000e+002 cm <sup>3</sup>	Wplz:	4.820000e+001 cm <sup>3</sup>

A: 2.800000e+001 cm<sup>2</sup>  
cy: 1.96 cm cz: 9.00 cm  
iy: 6.94 cm iz: 2.02 cm  
dy: -4.23 cm dz: 0.00 cm  
Outline : 62.40 cm

Type for check: Channel section

Height 18.00 cm Width 7.00 cm  
Thickness of flange 1.10 cm Thickness of web 0.80 cm  
Radius 1.10 cm



HEA200

Profile no. 6 - HEA200  
Material : 12 - S 235

A: 5.380000e+001 cm<sup>2</sup>  
Ay/A: 0.649 Az/A: 0.206  
Iy: 3.690000e+003 cm<sup>4</sup> Iz: 1.340000e+003 cm<sup>4</sup>  
Iyz: 0.000000e+000 cm<sup>4</sup> It: 2.100000e+001 cm<sup>4</sup>  
Iw: 1.083195e+005 cm<sup>6</sup>  
Wely: 3.890000e+002 cm<sup>3</sup> Welz: 1.340000e+002 cm<sup>3</sup>  
Wply: 4.300000e+002 cm<sup>3</sup> Wplz: 2.040000e+002 cm<sup>3</sup>  
cy: 10.00 cm cz: 9.50 cm  
iy: 8.28 cm iz: 4.99 cm  
dy: 0.00 cm dz: -0.00 cm  
Outline : 116.70 cm

Type for check: I section

Height 19.00 cm Width 20.00 cm  
Thickness of flange 1.00 cm Thickness of web 0.65 cm  
Radius 1.80 cm

### Nontypical elements

memb	type	memb	type	memb	type
37	X	38	X	39	X
40	X	72	X	73	X
74	X	75	X		

**Hinges**

The stiffness values of line hinges are stated in 1 m' of length

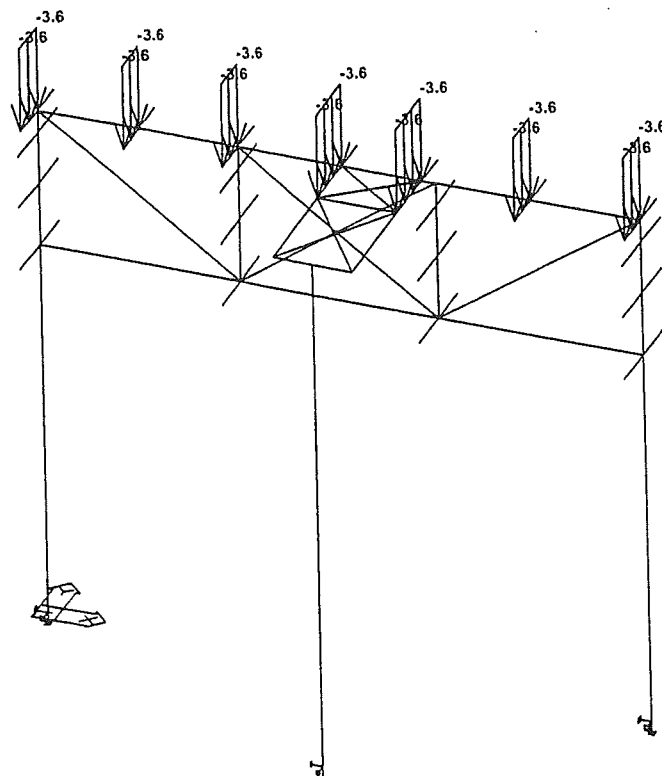
macro	type	pos
1	fiyfiz	beg
1	fiyfiz	end
2	fiyfiz	beg
2	fiyfiz	end

**Supports**

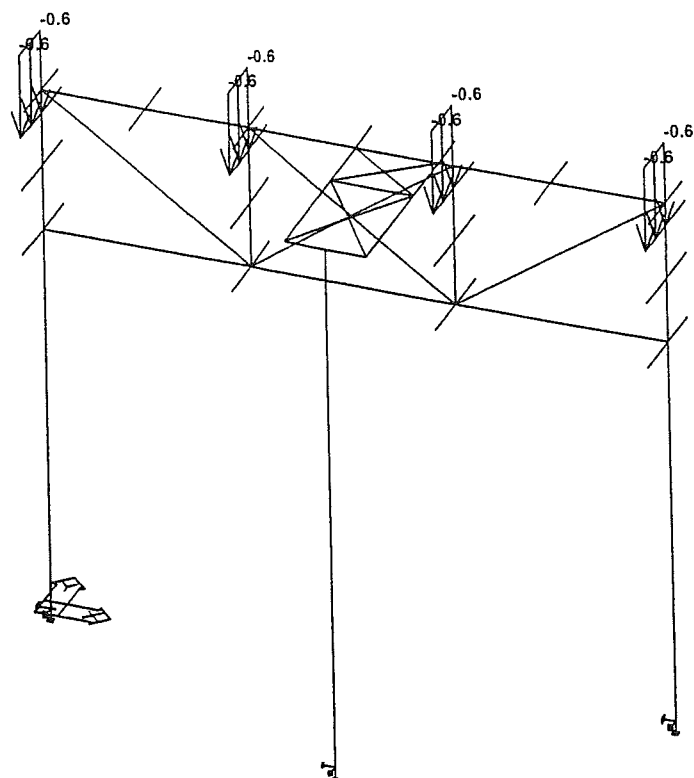
support	node	type	Size m
1	28	XYZRxRyRz	0.20
2	31	XYZRxRyRz	0.20
3	66	XYZ	0.20

**Loadcases**

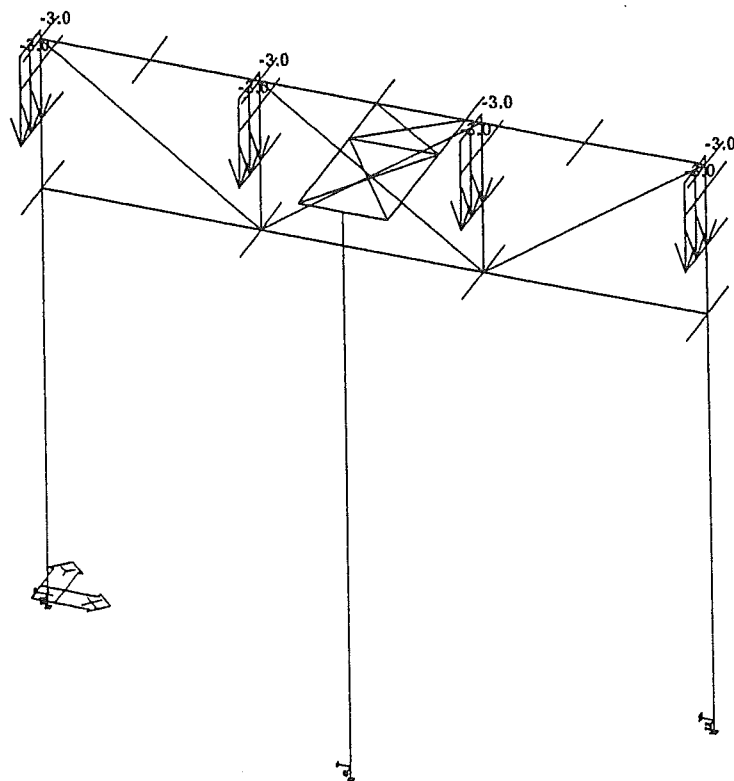
Case	Name:	Description
1	weight of the structural steelwork	Self weight. Direction -Z
2	p1	Variable - P
3	p2	Variable - P
4	p3	Variable - P
5	p4	Variable - P
6	p5	Variable - P
7	p6	Variable - P
8	p7	Variable - P
9	p8	Variable - P
10	p9	Variable - P
11	p10	Variable - P
12	Wind +Y	Variable - Wind Excl.
13	Wind -Y	Variable - Wind Excl.
14	Wind +X	Variable - Wind Excl.
15	Wind -X	Variable - Wind Excl.



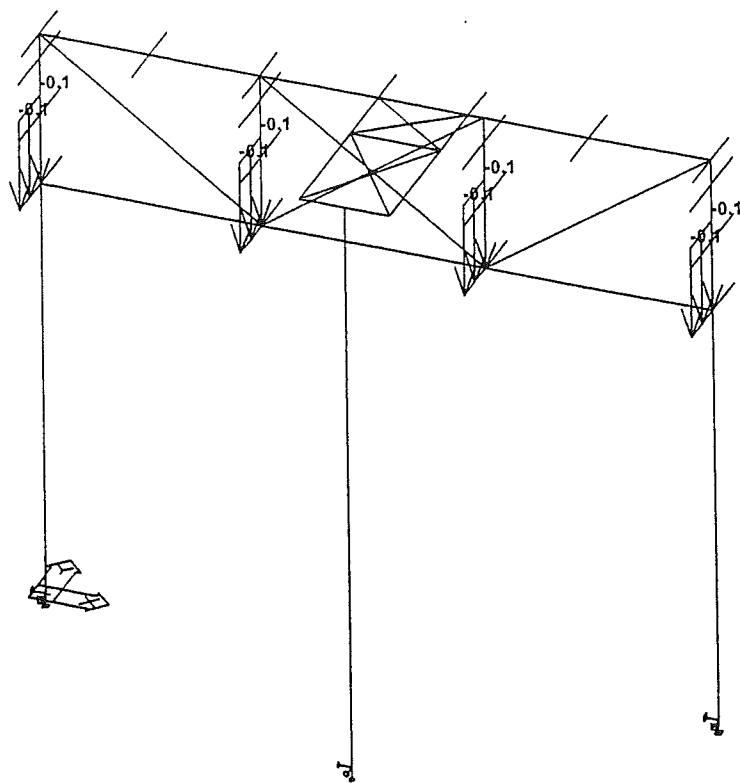
2. p1



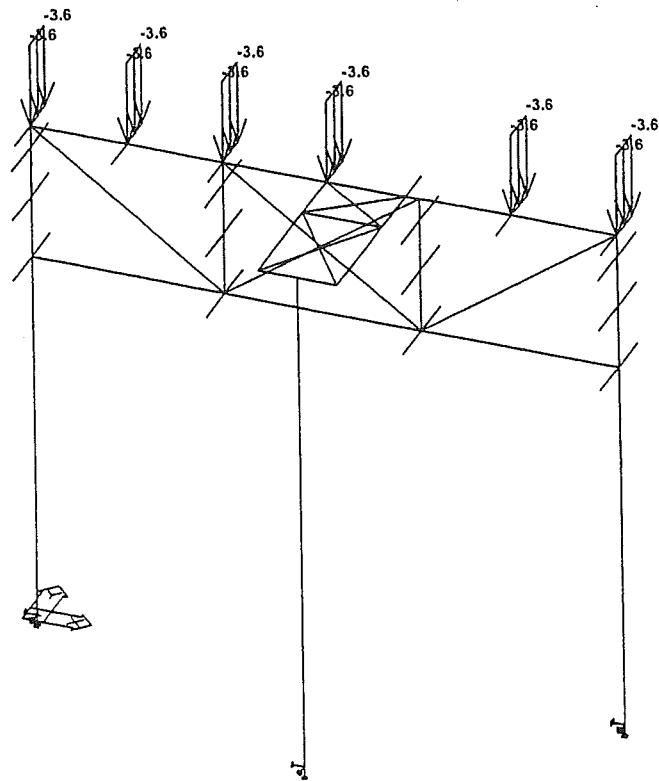
3. p2



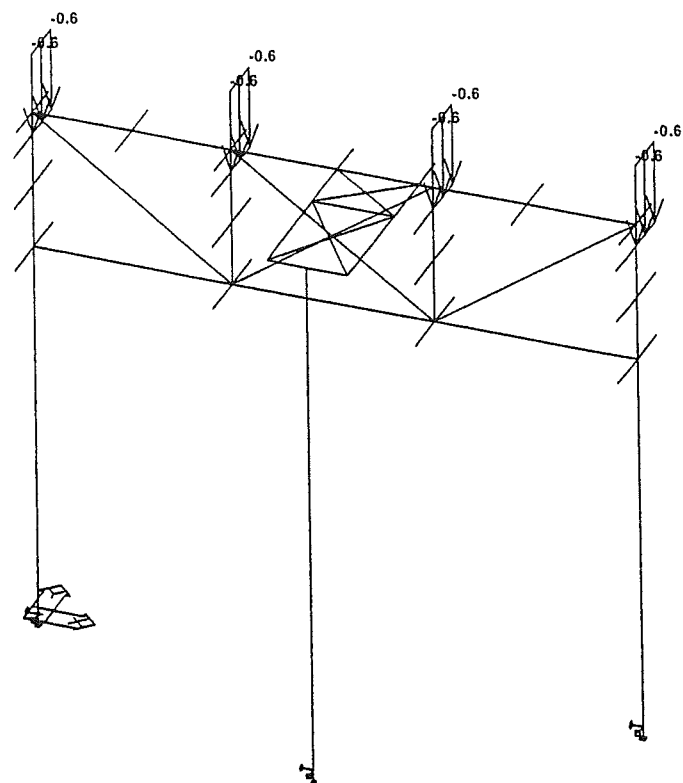
4. p3



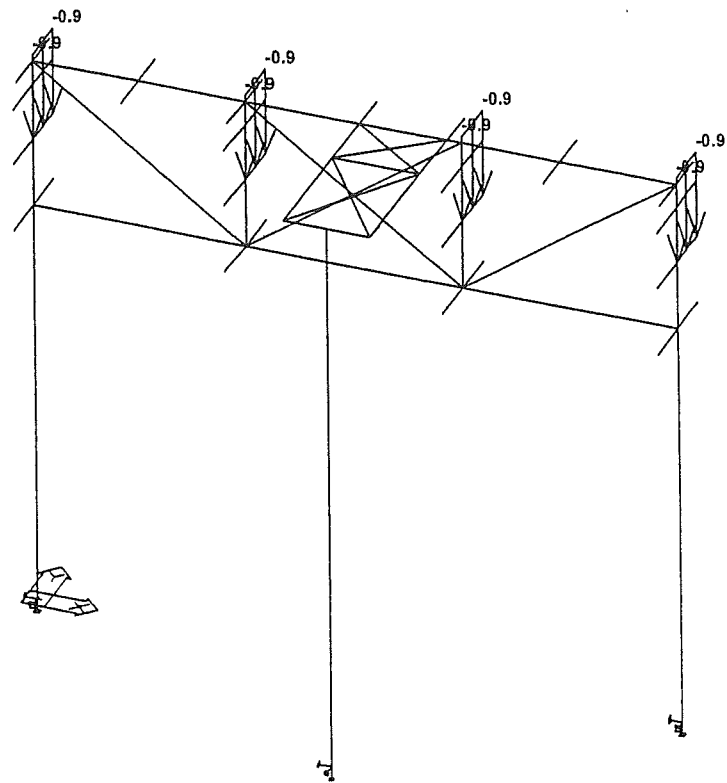
5. p4



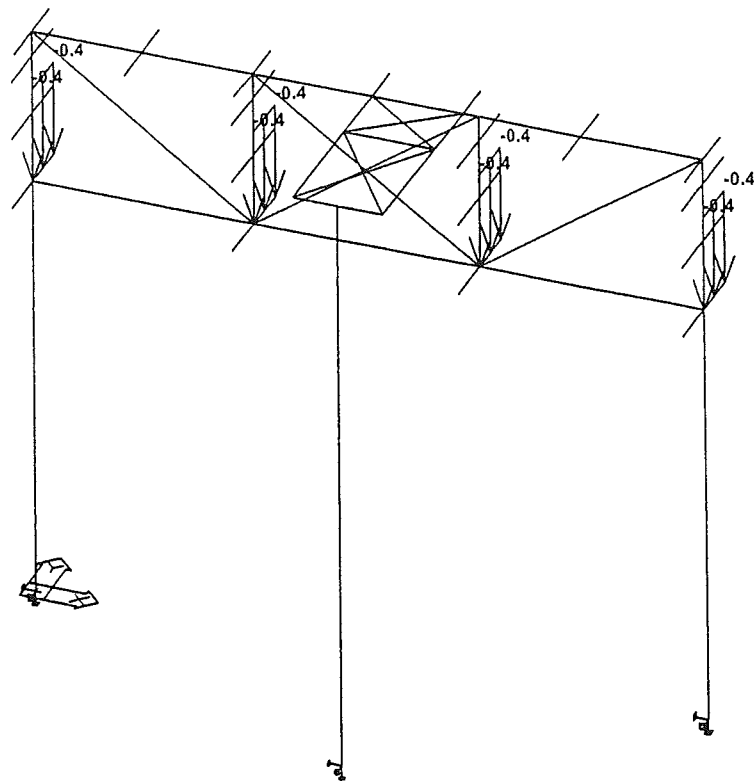
6. p5



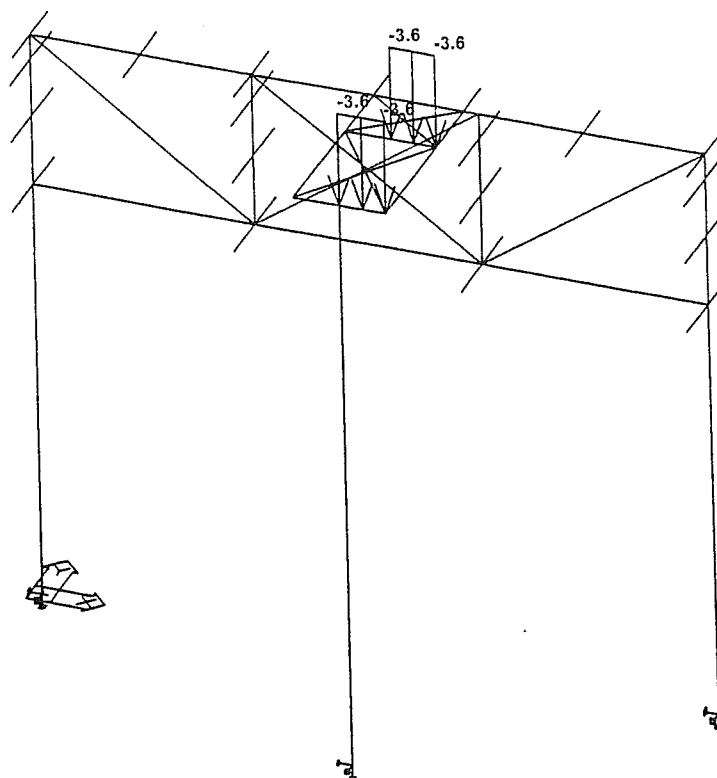
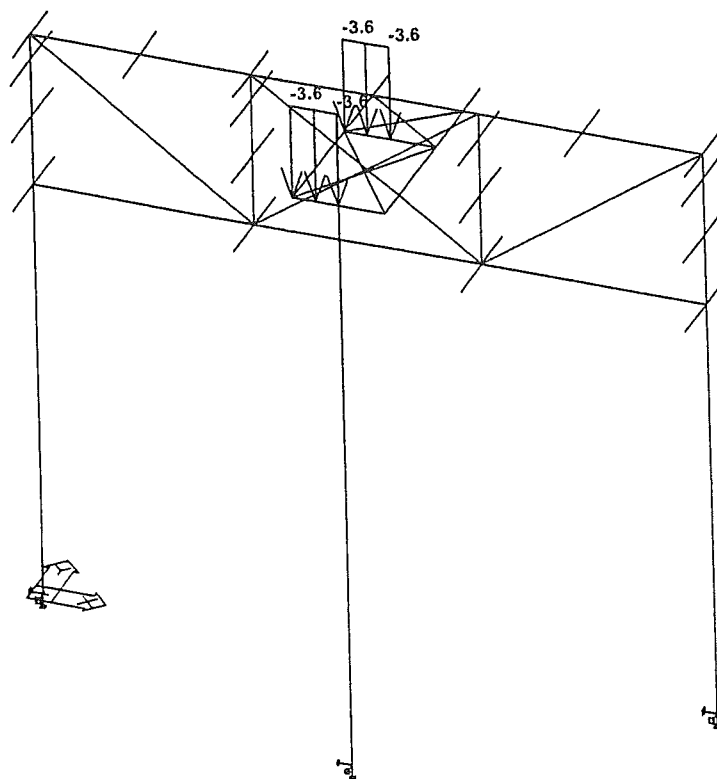
7. p6



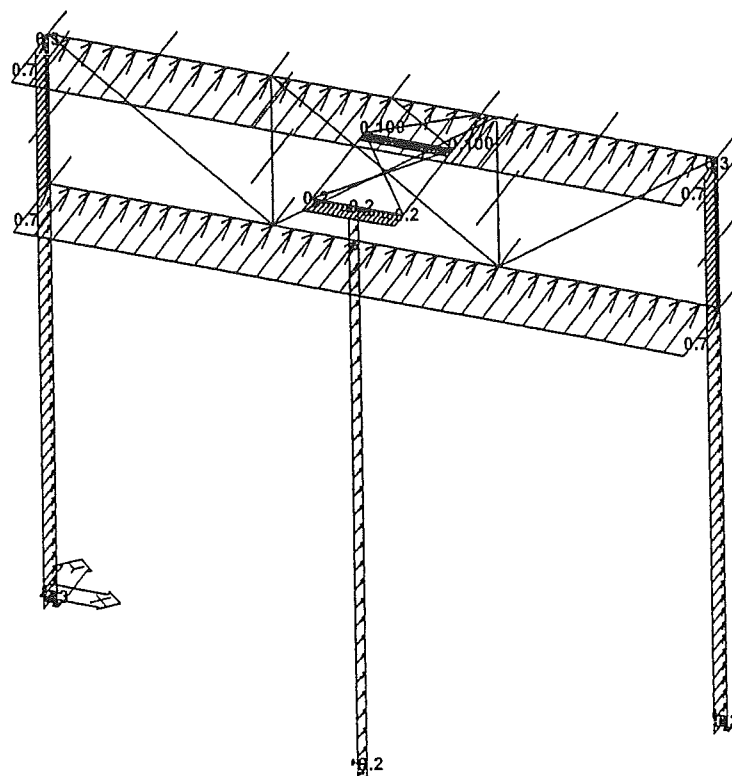
8. p7



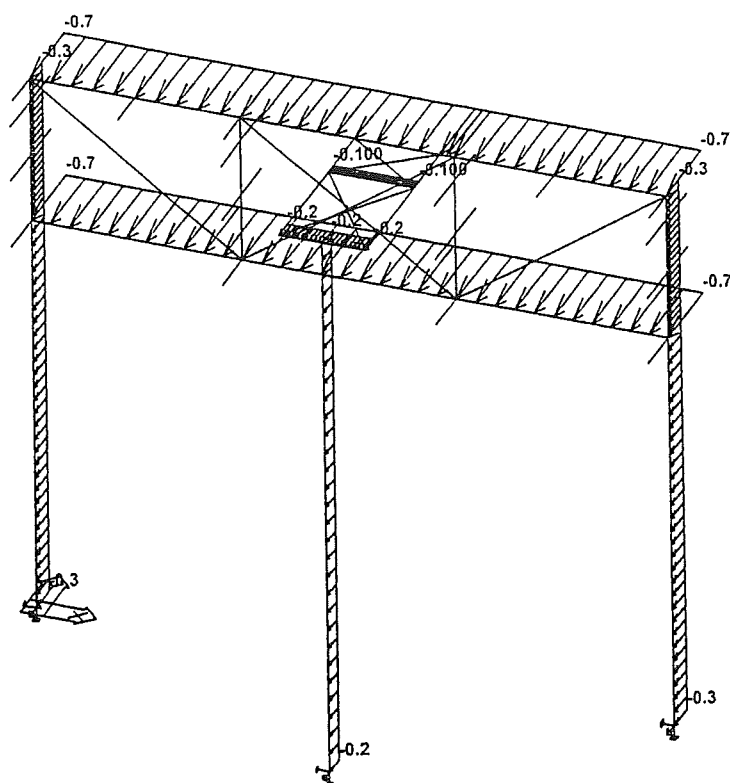
9. p8



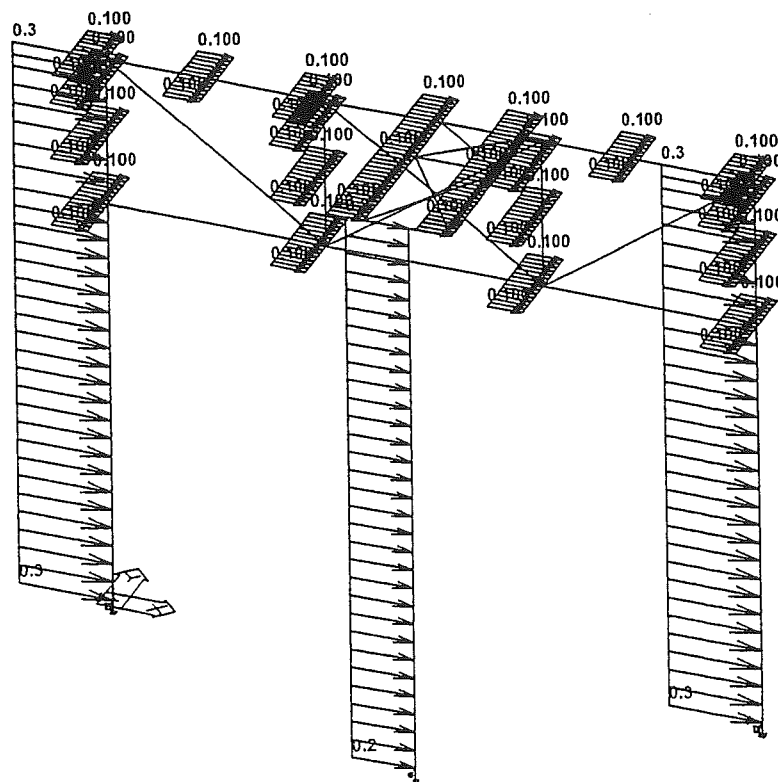




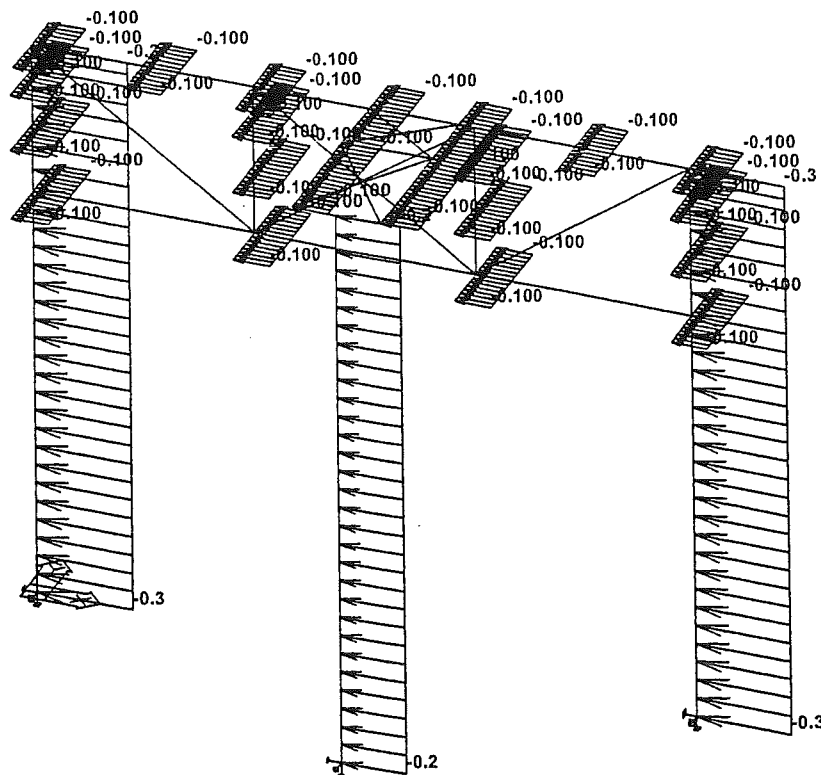
12. Wind +Y



13. Wind -Y



14. Wind +X



15. Wind -X

## Variable loads group

Name: P

P

Wind Excl.

## Loadcase no. 2 - distributed loads

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
11	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
13	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
15	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
17	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
19	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
21	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
65	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65

## Loadcase no. 3 - distributed loads

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
47	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55
51	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55
57	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55
63	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55

## Loadcase no. 4 - distributed loads

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
45	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.00 -3.00
49	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.00 -3.00
55	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.00 -3.00
61	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.00 -3.00

**Loadcase no. 5 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
41	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.11 -0.11
43	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.11 -0.11
53	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.11 -0.11
59	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.11 -0.11

**Loadcase no. 6 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
12	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
14	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
16	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
18	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
20	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65
22	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-3.65 -3.65

**Loadcase no. 7 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
48	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55
52	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55
58	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55
64	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.55 -0.55

**Loadcase no. 8 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
46	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.90 -0.90
50	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.90 -0.90
56	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.90 -0.90
62	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	0.00 0.00	-0.90 -0.90

**Loadcase no. 9 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
42	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-0.39
	kN/m	1.00			len	0.00	0.00	-0.39
44	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-0.39
	kN/m	1.00			len	0.00	0.00	-0.39
54	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-0.39
	kN/m	1.00			len	0.00	0.00	-0.39
60	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-0.39
	kN/m	1.00			len	0.00	0.00	-0.39

**Loadcase no. 10 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
71	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-3.65
	kN/m	0.50			len	0.00	0.00	-3.65
77	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-3.65
	kN/m	1.00			len	0.00	0.00	-3.65

**Loadcase no. 11 - distributed loads**

memb	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
71	force	0.50 rel	0.00	0.00	glo	0.00	0.00	-3.65
	kN/m	1.00			len	0.00	0.00	-3.65
78	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-3.65
	kN/m	1.00			len	0.00	0.00	-3.65

**Loadcase no. 12 - distributed loads**

macro	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
1	force	0.00 rel	0.00	0.00	glo	0.00	0.73	0.00
	kN/m	1.00			len	0.00	0.73	0.00
2	force	0.00 rel	0.00	0.00	glo	0.00	0.73	0.00
	kN/m	1.00			len	0.00	0.73	0.00
11	force	0.00 rel	0.00	0.00	glo	0.00	0.26	0.00
	kN/m	1.00			len	0.00	0.26	0.00
12	force	0.00 rel	0.00	0.00	glo	0.00	0.26	0.00
	kN/m	1.00			len	0.00	0.26	0.00
30	force	0.00 rel	0.00	0.00	glo	0.00	0.10	0.00
	kN/m	1.00			len	0.00	0.10	0.00
33	force	0.00 rel	0.00	0.00	glo	0.00	0.17	0.00
	kN/m	1.00			len	0.00	0.17	0.00
34	force	0.00 rel	0.00	0.00	glo	0.00	0.17	0.00
	kN/m	1.00			len	0.00	0.17	0.00

## Loadcase no. 13 - distributed loads

macro	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
1	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.73 -0.73	0.00 0.00
2	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.73 -0.73	0.00 0.00
11	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.26 -0.26	0.00 0.00
12	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.26 -0.26	0.00 0.00
30	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.10 -0.10	0.00 0.00
33	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.17 -0.17	0.00 0.00
34	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.00 0.00	-0.17 -0.17	0.00 0.00

## Loadcase no. 14 - distributed loads

macro	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
3	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
4	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
5	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
6	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
7	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
8	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
11	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.26 0.26	0.00 0.00	0.00 0.00
12	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.26 0.26	0.00 0.00	0.00 0.00
15	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
16	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
17	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
18	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
19	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
20	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
21	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
22	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
23	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00

macro	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
24	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
25	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
26	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
27	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
28	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
29	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.10 0.10	0.00 0.00	0.00 0.00
33	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	0.17 0.17	0.00 0.00	0.00 0.00

## Loadcase no. 15 - distributed loads

macro	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
3	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
4	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
5	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
6	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
7	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
8	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
11	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.26 -0.26	0.00 0.00	0.00 0.00
12	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.26 -0.26	0.00 0.00	0.00 0.00
15	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
16	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
17	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
18	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
19	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
20	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
21	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
22	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
23	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
24	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00

macro	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
25	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
26	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
27	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
28	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
29	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.10 -0.10	0.00 0.00	0.00 0.00
33	force kN/m	0.00 rel 1.00	0.00	0.00	glo len	-0.17 -0.17	0.00 0.00	0.00 0.00

### Combinations

Combi	Norm	Case	coeff
1.	DIN-ultimate	1 weight of the structural steelwork	1.00
		2 p1	1.00
		3 p2	1.00
		4 p3	1.00
		5 p4	1.00
		6 p5	1.00
		7 p6	1.00
		8 p7	1.00
		9 p8	1.00
		10 p9	1.00
		11 p10	1.00
		12 Wind +Y	1.10
		13 Wind -Y	1.10
		14 Wind +X	1.10
		15 Wind -X	1.10
2.	DIN-serviceability	1 weight of the structural steelwork	1.00
		2 p1	1.00
		3 p2	1.00
		4 p3	1.00
		5 p4	1.00
		6 p5	1.00
		7 p6	1.00
		8 p7	1.00
		9 p8	1.00
		10 p9	1.00
		11 p10	1.00
		12 Wind +Y	1.00
		13 Wind -Y	1.00
		14 Wind +X	1.00
		15 Wind -X	1.00

Basic rules for generation of ultimate load combinations:

1 : 1.35\*LC1

2 : 1.35\*LC1 / 1.50\*LC2 / 1.50\*LC3 / 1.50\*LC4 / 1.50\*LC5 / 1.50\*LC6 / 1.50\*LC7



/ 1.50\*LC8 / 1.50\*LC9 / 1.50\*LC10 / 1.50\*LC11  
 3 : 1.00\*LC1 / 1.50\*LC2 / 1.50\*LC3 / 1.50\*LC4 / 1.50\*LC5 / 1.50\*LC6 / 1.50\*LC7  
 / 1.50\*LC8 / 1.50\*LC9 / 1.50\*LC10 / 1.50\*LC11  
 4 : 1.35\*LC1 / 1.65\*LC12 / 1.65\*LC13 / 1.65\*LC14 / 1.65\*LC15  
 5 : 1.00\*LC1 / 1.65\*LC12 / 1.65\*LC13 / 1.65\*LC14 / 1.65\*LC15  
 6 : 1.35\*LC1 / 1.35\*LC2 / 1.35\*LC3 / 1.35\*LC4 / 1.35\*LC5 / 1.35\*LC6 / 1.35\*LC7  
 / 1.35\*LC8 / 1.35\*LC9 / 1.35\*LC10 / 1.35\*LC11 / 1.49\*LC12 / 1.49\*LC13 / 1.49\*LC14  
 / 1.49\*LC15  
 7 : 1.00\*LC1 / 1.35\*LC2 / 1.35\*LC3 / 1.35\*LC4 / 1.35\*LC5 / 1.35\*LC6 / 1.35\*LC7  
 / 1.35\*LC8 / 1.35\*LC9 / 1.35\*LC10 / 1.35\*LC11 / 1.49\*LC12 / 1.49\*LC13 / 1.49\*LC14  
 / 1.49\*LC15

Basic rules for generation of serviceability load combinations:

1 : 1.00\*LC1  
 2 : 1.00\*LC1 / 1.00\*LC2 / 1.00\*LC3 / 1.00\*LC4 / 1.00\*LC5 / 1.00\*LC6 / 1.00\*LC7  
 / 1.00\*LC8 / 1.00\*LC9 / 1.00\*LC10 / 1.00\*LC11  
 3 : 1.00\*LC1 / 1.00\*LC12 / 1.00\*LC13 / 1.00\*LC14 / 1.00\*LC15  
 4 : 1.00\*LC1 / 0.90\*LC2 / 0.90\*LC3 / 0.90\*LC4 / 0.90\*LC5 / 0.90\*LC6 / 0.90\*LC7  
 / 0.90\*LC8 / 0.90\*LC9 / 0.90\*LC10 / 0.90\*LC11 / 0.90\*LC12 / 0.90\*LC13 / 0.90\*LC14  
 / 0.90\*LC15

List of extreme ultimate load combinations

1/ 3 : +1.00\*LC1  
 2/ 1 : +1.35\*LC1  
 3/ 5 : +1.00\*LC1+1.65\*LC12  
 4/ 5 : +1.00\*LC1+1.65\*LC13  
 5/ 5 : +1.00\*LC1+1.65\*LC14  
 6/ 5 : +1.00\*LC1+1.65\*LC15  
 7/ 2 : +1.35\*LC1+1.50\*LC2  
 8/ 2 : +1.35\*LC1+1.50\*LC3  
 9/ 2 : +1.35\*LC1+1.50\*LC4  
 10/ 2 : +1.35\*LC1+1.50\*LC5  
 11/ 2 : +1.35\*LC1+1.50\*LC6  
 12/ 2 : +1.35\*LC1+1.50\*LC7  
 13/ 2 : +1.35\*LC1+1.50\*LC8  
 14/ 2 : +1.35\*LC1+1.50\*LC9  
 15/ 4 : +1.35\*LC1+1.65\*LC12  
 16/ 4 : +1.35\*LC1+1.65\*LC13  
 17/ 4 : +1.35\*LC1+1.65\*LC14  
 18/ 4 : +1.35\*LC1+1.65\*LC15  
 19/ 7 : +1.00\*LC1+1.35\*LC6+1.49\*LC15  
 20/ 7 : +1.00\*LC1+1.35\*LC10+1.49\*LC12  
 21/ 6 : +1.35\*LC1+1.35\*LC2+1.49\*LC14  
 22/ 6 : +1.35\*LC1+1.35\*LC3+1.49\*LC14  
 23/ 6 : +1.35\*LC1+1.35\*LC5+1.49\*LC14  
 24/ 6 : +1.35\*LC1+1.35\*LC7+1.49\*LC14  
 25/ 6 : +1.35\*LC1+1.35\*LC8+1.49\*LC14  
 26/ 6 : +1.35\*LC1+1.35\*LC9+1.49\*LC14  
 27/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC6+1.49\*LC14  
 28/ 7 : +1.00\*LC1+1.35\*LC4+1.35\*LC6+1.49\*LC14  
 29/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC10+1.49\*LC15  
 30/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC11+1.49\*LC14  
 31/ 7 : +1.00\*LC1+1.35\*LC10+1.35\*LC11+1.49\*LC14  
 32/ 6 : +1.35\*LC1+1.35\*LC4+1.35\*LC6+1.49\*LC14  
 33/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC10+1.49\*LC15  
 34/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC6+1.50\*LC10  
 35/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.49\*LC13  
 36/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.49\*LC15  
 37/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC6+1.35\*LC10+1.49\*LC15  
 38/ 7 : +1.00\*LC1+1.35\*LC7+1.35\*LC8+1.35\*LC10+1.49\*LC12  
 39/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC10+1.35\*LC11+1.49\*LC14  
 40/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC6+1.50\*LC10+1.50\*LC11  
 41/ 3 : +1.00\*LC1+1.50\*LC6+1.50\*LC7+1.50\*LC8+1.50\*LC9  
 42/ 3 : +1.00\*LC1+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC10  
 43/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC6+1.50\*LC10+1.50\*LC11  
 44/ 2 : +1.35\*LC1+1.50\*LC6+1.50\*LC7+1.50\*LC8+1.50\*LC9  
 45/ 2 : +1.35\*LC1+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC10  
 46/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.49\*LC13

47/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC11+1.49\*LC12  
48/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC10+1.49\*LC15  
49/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC11+1.49\*LC14  
50/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC11+1.49\*LC13  
51/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC11+1.49\*LC14  
52/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.49\*LC12  
53/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.49\*LC13  
54/ 7 : +1.00\*LC1+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC12  
55/ 7 : +1.00\*LC1+1.35\*LC4+1.35\*LC6+1.35\*LC10+1.35\*LC11+1.49\*LC15  
56/ 7 : +1.00\*LC1+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC14  
57/ 7 : +1.00\*LC1+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC15  
58/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.49\*LC13  
59/ 6 : +1.35\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.49\*LC13  
60/ 6 : +1.35\*LC1+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7+1.49\*LC13  
61/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC11+1.49\*LC13  
62/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC10+1.35\*LC11+1.49\*LC12  
63/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.49\*LC13  
64/ 6 : +1.35\*LC1+1.35\*LC5+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.49\*LC13  
65/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.49\*LC12  
66/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.49\*LC13  
67/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC7+1.35\*LC10+1.35\*LC11+1.49\*LC15  
68/ 6 : +1.35\*LC1+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC12  
69/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC10  
70/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC6+1.50\*LC11  
71/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC9+1.50\*LC10  
72/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC9+1.50\*LC11  
73/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC8+1.50\*LC9+1.50\*LC10  
74/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC10  
75/ 2 : +1.35\*LC1+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC6+1.50\*LC11  
76/ 2 : +1.35\*LC1+1.50\*LC4+1.50\*LC5+1.50\*LC6+1.50\*LC7+1.50\*LC11  
77/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC4+1.50\*LC6+1.50\*LC10+1.50\*LC11  
78/ 2 : +1.35\*LC1+1.50\*LC5+1.50\*LC6+1.50\*LC7+1.50\*LC8+1.50\*LC11  
79/ 2 : +1.35\*LC1+1.50\*LC6+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC11  
80/ 2 : +1.35\*LC1+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC10+1.50\*LC11  
81/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.49\*LC13  
82/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC11+1.49\*LC12  
83/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC11+1.49\*LC13  
84/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.49\*LC15  
85/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC11+1.49\*LC14  
86/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC12  
87/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC11+1.49\*LC12  
88/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC11+1.49\*LC13  
89/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC11+1.49\*LC14  
90/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC15  
91/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.49\*LC12  
92/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.49\*LC13  
93/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC11+1.49\*LC13  
94/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.49\*LC15  
95/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC11+1.49\*LC14  
96/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC11+1.49\*LC13  
97/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC11+1.49\*LC15  
98/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC4+1.35\*LC7+1.35\*LC8+1.35\*LC10+1.49\*LC15  
99/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC12  
100/ 6 : +1.35\*LC1+1.35\*LC5+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC10+1.49\*LC13  
101/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC15  
102/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC12  
103/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC11+1.49\*LC12  
104/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC11+1.49\*LC14  
105/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC15  
106/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC10+1.50\*LC11  
107/ 3 : +1.00\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC6+1.50\*LC11  
108/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC10+1.50\*LC11  
109/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC10+1.50\*LC11  
110/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC6+1.50\*LC10+1.50\*LC11  
111/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC6+1.50\*LC7+1.50\*LC10+1.50\*LC11  
112/ 2 : +1.35\*LC1+1.50\*LC6+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC10+1.50\*LC11  
113/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.35\*LC11  
+1.49\*LC12

114/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.35\*LC11  
+1.49\*LC13  
115/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC8+1.35\*LC9  
+1.49\*LC14  
116/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
117/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8+1.35\*LC9  
+1.49\*LC15  
118/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC9+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
119/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
120/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
121/ 7 : +1.00\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
122/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC11  
+1.49\*LC13  
123/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC11  
+1.49\*LC14  
124/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC11  
+1.49\*LC15  
125/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
126/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC10+1.35\*LC11  
+1.49\*LC13  
127/ 6 : +1.35\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8+1.35\*LC9  
+1.49\*LC15  
128/ 6 : +1.35\*LC1+1.35\*LC6+1.35\*LC7+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11  
+1.49\*LC12  
129/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC6+1.50\*LC7+1.50\*LC8  
+1.50\*LC9  
130/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC6+1.50\*LC7+1.50\*LC8+1.50\*LC9+1.50\*LC10  
+1.50\*LC11  
131/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC7+1.35\*LC8  
+1.35\*LC9+1.49\*LC14  
132/ 7 : +1.00\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8+1.35\*LC9  
+1.35\*LC11+1.49\*LC14  
133/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC7+1.35\*LC8  
+1.35\*LC9+1.49\*LC14  
134/ 6 : +1.35\*LC1+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8+1.35\*LC9  
+1.35\*LC11+1.49\*LC14  
135/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC6+1.50\*LC7  
+1.50\*LC8+1.50\*LC9  
136/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC6+1.50\*LC7+1.50\*LC8  
+1.50\*LC10+1.50\*LC11  
137/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
+1.35\*LC8+1.35\*LC9+1.49\*LC15  
138/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8  
+1.35\*LC9+1.35\*LC11+1.49\*LC14  
139/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC7+1.35\*LC8  
+1.35\*LC9+1.35\*LC11+1.49\*LC15  
140/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8+1.35\*LC9  
+1.35\*LC10+1.35\*LC11+1.49\*LC15  
141/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC6+1.50\*LC7  
+1.50\*LC8+1.50\*LC9+1.50\*LC11  
142/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
+1.35\*LC8+1.35\*LC9+1.35\*LC11+1.49\*LC14  
143/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.49\*LC15  
144/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC7+1.35\*LC8  
+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC14  
145/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC6+1.35\*LC7+1.35\*LC8  
+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC15  
146/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC14  
147/ 7 : +1.00\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
+1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC15

148/ 2 : +1.35\*LC1+1.50\*LC2+1.50\*LC3+1.50\*LC4+1.50\*LC5+1.50\*LC6+1.50\*LC7  
 +1.50\*LC8+1.50\*LC9+1.50\*LC10+1.50\*LC11  
 149/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
 +1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC12  
 150/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
 +1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC14  
 151/ 6 : +1.35\*LC1+1.35\*LC2+1.35\*LC3+1.35\*LC4+1.35\*LC5+1.35\*LC6+1.35\*LC7  
 +1.35\*LC8+1.35\*LC9+1.35\*LC10+1.35\*LC11+1.49\*LC15

## List of extreme serviceability load combinations

1/ 1 : +1.00\*LC1  
 2/ 2 : +1.00\*LC1+1.00\*LC2  
 3/ 2 : +1.00\*LC1+1.00\*LC3  
 4/ 2 : +1.00\*LC1+1.00\*LC4  
 5/ 2 : +1.00\*LC1+1.00\*LC5  
 6/ 2 : +1.00\*LC1+1.00\*LC6  
 7/ 2 : +1.00\*LC1+1.00\*LC7  
 8/ 2 : +1.00\*LC1+1.00\*LC8  
 9/ 2 : +1.00\*LC1+1.00\*LC9  
 10/ 3 : +1.00\*LC1+1.00\*LC12  
 11/ 3 : +1.00\*LC1+1.00\*LC13  
 12/ 3 : +1.00\*LC1+1.00\*LC14  
 13/ 3 : +1.00\*LC1+1.00\*LC15  
 14/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC14  
 15/ 4 : +1.00\*LC1+0.90\*LC11+0.90\*LC13  
 16/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC10+0.90\*LC15  
 17/ 4 : +1.00\*LC1+0.90\*LC10+0.90\*LC11+0.90\*LC14  
 18/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC4+1.00\*LC6  
 19/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC10+1.00\*LC11  
 20/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC13  
 21/ 4 : +1.00\*LC1+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC13  
 22/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC4+0.90\*LC6+0.90\*LC14  
 23/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC4+0.90\*LC6+0.90\*LC15  
 24/ 4 : +1.00\*LC1+0.90\*LC3+0.90\*LC4+0.90\*LC11+0.90\*LC14  
 25/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC6+0.90\*LC10+0.90\*LC15  
 26/ 4 : +1.00\*LC1+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC12  
 27/ 4 : +1.00\*LC1+0.90\*LC7+0.90\*LC8+0.90\*LC10+0.90\*LC12  
 28/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC10+0.90\*LC11+0.90\*LC14  
 29/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC10+0.90\*LC11+0.90\*LC15  
 30/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC4+1.00\*LC6+1.00\*LC8  
 31/ 2 : +1.00\*LC1+1.00\*LC6+1.00\*LC7+1.00\*LC8+1.00\*LC9  
 32/ 2 : +1.00\*LC1+1.00\*LC7+1.00\*LC8+1.00\*LC9+1.00\*LC10  
 33/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC13  
 34/ 4 : +1.00\*LC1+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC13  
 35/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC10+0.90\*LC14  
 36/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC4+0.90\*LC6+0.90\*LC8+0.90\*LC14  
 37/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC10+0.90\*LC15  
 38/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC11+0.90\*LC14  
 39/ 4 : +1.00\*LC1+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC7+0.90\*LC13  
 40/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC4+0.90\*LC6+0.90\*LC8+0.90\*LC15  
 41/ 4 : +1.00\*LC1+0.90\*LC3+0.90\*LC4+0.90\*LC6+0.90\*LC11+0.90\*LC13  
 42/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC10+0.90\*LC11+0.90\*LC12  
 43/ 4 : +1.00\*LC1+0.90\*LC5+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC13  
 44/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC7+0.90\*LC8+0.90\*LC10+0.90\*LC12  
 45/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC12  
 46/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC13  
 47/ 4 : +1.00\*LC1+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC12  
 48/ 4 : +1.00\*LC1+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC14  
 49/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC9+1.00\*LC10  
 50/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC9+1.00\*LC11  
 51/ 2 : +1.00\*LC1+1.00\*LC3+1.00\*LC4+1.00\*LC5+1.00\*LC6+1.00\*LC11  
 52/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC8+1.00\*LC9+1.00\*LC10  
 53/ 2 : +1.00\*LC1+1.00\*LC4+1.00\*LC5+1.00\*LC6+1.00\*LC7+1.00\*LC11  
 54/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC4+1.00\*LC6+1.00\*LC10+1.00\*LC11  
 55/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC7+1.00\*LC8+1.00\*LC9+1.00\*LC10  
 56/ 2 : +1.00\*LC1+1.00\*LC5+1.00\*LC6+1.00\*LC7+1.00\*LC8+1.00\*LC11  
 57/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC10+0.90\*LC13  
 58/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC11+0.90\*LC13

59/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC10+0.90\*LC14  
60/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC10+0.90\*LC15  
61/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC11+0.90\*LC14  
62/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC6+0.90\*LC11+0.90\*LC13  
63/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC6+0.90\*LC11+0.90\*LC15  
64/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC6+0.90\*LC11+0.90\*LC14  
65/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC12  
66/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC11+0.90\*LC12  
67/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC15  
68/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC11+0.90\*LC14  
69/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC11+0.90\*LC15  
70/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
71/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC5+1.00\*LC6+1.00\*LC11  
72/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC5+1.00\*LC10+1.00\*LC11  
73/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC9+1.00\*LC10+1.00\*LC11  
74/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC11  
+0.90\*LC13  
75/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC11  
+0.90\*LC15  
76/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC10+0.90\*LC11  
+0.90\*LC12  
77/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC10+0.90\*LC11  
+0.90\*LC13  
78/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC9+0.90\*LC10+0.90\*LC11  
+0.90\*LC12  
79/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC11  
+0.90\*LC12  
80/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10  
+0.90\*LC15  
81/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC11  
+0.90\*LC12  
82/ 4 : +1.00\*LC1+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10+0.90\*LC11  
+0.90\*LC12  
83/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
+1.00\*LC9  
84/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
+1.00\*LC10  
85/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
+1.00\*LC11  
86/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC6+0.90\*LC7+0.90\*LC8  
+0.90\*LC9+0.90\*LC14  
87/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC10  
+0.90\*LC11+0.90\*LC13  
88/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC7+0.90\*LC8+0.90\*LC9  
+0.90\*LC10+0.90\*LC12  
89/ 4 : +1.00\*LC1+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC7+0.90\*LC8+0.90\*LC9  
+0.90\*LC11+0.90\*LC14  
90/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC6+0.90\*LC7+0.90\*LC8+0.90\*LC9+0.90\*LC10  
+0.90\*LC11+0.90\*LC12  
91/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC5+1.00\*LC6+1.00\*LC7  
+1.00\*LC8+1.00\*LC9  
92/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
+1.00\*LC9+1.00\*LC10  
93/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
+1.00\*LC10+1.00\*LC11  
94/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC7  
+0.90\*LC8+0.90\*LC9+0.90\*LC15  
95/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC7+0.90\*LC8  
+0.90\*LC9+0.90\*LC11+0.90\*LC14  
96/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC6+0.90\*LC7+0.90\*LC8  
+0.90\*LC9+0.90\*LC11+0.90\*LC15  
97/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC5+1.00\*LC6+1.00\*LC7  
+1.00\*LC8+1.00\*LC9+1.00\*LC10  
98/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC5+1.00\*LC6+1.00\*LC7  
+1.00\*LC8+1.00\*LC9+1.00\*LC11  
99/ 2 : +1.00\*LC1+1.00\*LC2+1.00\*LC3+1.00\*LC4+1.00\*LC6+1.00\*LC7+1.00\*LC8  
+1.00\*LC9+1.00\*LC10+1.00\*LC11  
100/ 4 : +1.00\*LC1+0.90\*LC2+0.90\*LC3+0.90\*LC4+0.90\*LC5+0.90\*LC6+0.90\*LC7

$+0.90*LC8+0.90*LC9+0.90*LC10+0.90*LC12$   
 101/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC6+0.90*LC7$   
 $+0.90*LC8+0.90*LC9+0.90*LC11+0.90*LC14$   
 102/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC6+0.90*LC7$   
 $+0.90*LC8+0.90*LC9+0.90*LC10+0.90*LC15$   
 103/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC6+0.90*LC7$   
 $+0.90*LC8+0.90*LC10+0.90*LC11+0.90*LC14$   
 104/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC7+0.90*LC8$   
 $+0.90*LC9+0.90*LC10+0.90*LC11+0.90*LC12$   
 105/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC7+0.90*LC8$   
 $+0.90*LC9+0.90*LC10+0.90*LC11+0.90*LC14$   
 106/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC6+0.90*LC7+0.90*LC8$   
 $+0.90*LC9+0.90*LC10+0.90*LC11+0.90*LC14$   
 107/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC6+0.90*LC7+0.90*LC8$   
 $+0.90*LC9+0.90*LC10+0.90*LC11+0.90*LC15$   
 108/ 2 :  $+1.00*LC1+1.00*LC2+1.00*LC3+1.00*LC4+1.00*LC5+1.00*LC6+1.00*LC7$   
 $+1.00*LC8+1.00*LC9+1.00*LC10+1.00*LC11$   
 109/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC6+0.90*LC7$   
 $+0.90*LC8+0.90*LC9+0.90*LC10+0.90*LC11+0.90*LC14$   
 110/ 4 :  $+1.00*LC1+0.90*LC2+0.90*LC3+0.90*LC4+0.90*LC5+0.90*LC6+0.90*LC7$   
 $+0.90*LC8+0.90*LC9+0.90*LC10+0.90*LC11+0.90*LC15$

## Calculation protocol.

### Linear calculation

Number of 2D elements 0  
 Number of 1D elements 78  
 Number of mesh nodes 66  
 Number of equations 396  
 Loadcases LC 1 weight of the structural steelwork  
 LC 2 p1  
 LC 3 p2  
 LC 4 p3  
 LC 5 p4  
 LC 6 p5  
 LC 7 p6  
 LC 8 p7  
 LC 9 p8  
 LC 10 p9  
 LC 11 p10  
 LC 12 Wind +Y  
 LC 13 Wind -Y  
 LC 14 Wind +X  
 LC 15 Wind -X  
 Bending theory Mindlin  
 Start of calculation 05.11.2004 09:59  
 End of calculation 05.11.2004 09:59

### Sum of loads and reactions.

			X	Y	Z
loadcase 1	loads		0.0	-0.0	-29.1
	reactions		0.0	-0.0	29.1
	contact		0.0	0.0	0.0
loadcase 2	loads		0.0	0.0	-15.3

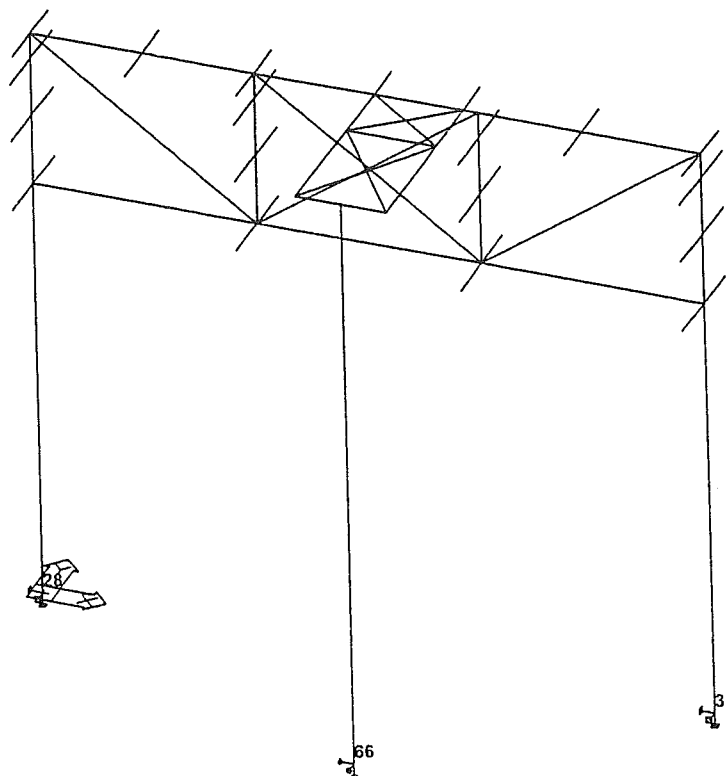
## Pipe Bridge

Project : 7574 ASU No. 9, Kosice Tank Farm

Author : Orth

Date : Freitag, 5. November 2004

			X	Y	Z
		reactions	0.0	0.0	15.3
		contact	0.0	0.0	0.0
loadcase	3	loads	0.0	0.0	-1.4
		reactions	0.0	0.0	1.4
		contact	0.0	0.0	0.0
loadcase	4	loads	0.0	0.0	-7.4
		reactions	0.0	0.0	7.4
		contact	0.0	0.0	0.0
loadcase	5	loads	0.0	0.0	-0.3
		reactions	0.0	0.0	0.3
		contact	0.0	0.0	0.0
loadcase	6	loads	0.0	0.0	-11.4
		reactions	-0.0	-0.0	11.4
		contact	0.0	0.0	0.0
loadcase	7	loads	0.0	0.0	-1.4
		reactions	-0.0	-0.0	1.4
		contact	0.0	0.0	0.0
loadcase	8	loads	0.0	0.0	-2.2
		reactions	-0.0	-0.0	2.2
		contact	0.0	0.0	0.0
loadcase	9	loads	0.0	0.0	-1.0
		reactions	-0.0	-0.0	1.0
		contact	0.0	0.0	0.0
loadcase	10	loads	0.0	0.0	-3.8
		reactions	-0.0	0.0	3.8
		contact	0.0	0.0	0.0
loadcase	11	loads	0.0	0.0	-3.8
		reactions	0.0	0.0	3.8
		contact	0.0	0.0	0.0
loadcase	12	loads	0.0	16.4	-0.0
		reactions	-0.0	-16.4	0.0
		contact	0.0	0.0	0.0
loadcase	13	loads	-0.0	-16.4	0.0
		reactions	0.0	16.4	-0.0
		contact	0.0	0.0	0.0
loadcase	14	loads	7.4	-0.0	0.0
		reactions	-7.4	-0.0	-0.0
		contact	0.0	0.0	0.0
loadcase	15	loads	-7.4	0.0	0.0
		reactions	7.4	0.0	0.0
		contact	0.0	0.0	0.0



Reactions. Load case(s) : 1/15

**Reactions in support(s) - nodal values.**

Group of node(s) : 1/66

Group of load case(s) : 1/15

Foundation table:

Loadcase/Node

**Permanent loads**

LC: 1

	28	31	66
Rx [kN]	0.04	-0.04	0.00
Ry [kN]	-0.00	-0.00	0.00
Rz [kN]	12.49	12.56	4.10
Mx [kNm]	0.01	0.02	0.00
My [kNm]	0.08	-0.08	0.00
Mz [kNm]	-0.00	-0.00	0.00

**Variable loads - not exclusive**

LC2: p1

Rx [kN]	0.04	-0.04	0.00
Ry [kN]	-0.00	-0.01	0.01
Rz [kN]	7.08	7.13	1.12
Mx [kNm]	-1.23	-0.99	0.00
My [kNm]	0.08	-0.09	0.00
Mz [kNm]	-0.00	0.00	0.00

**Variable loads - not exclusive**

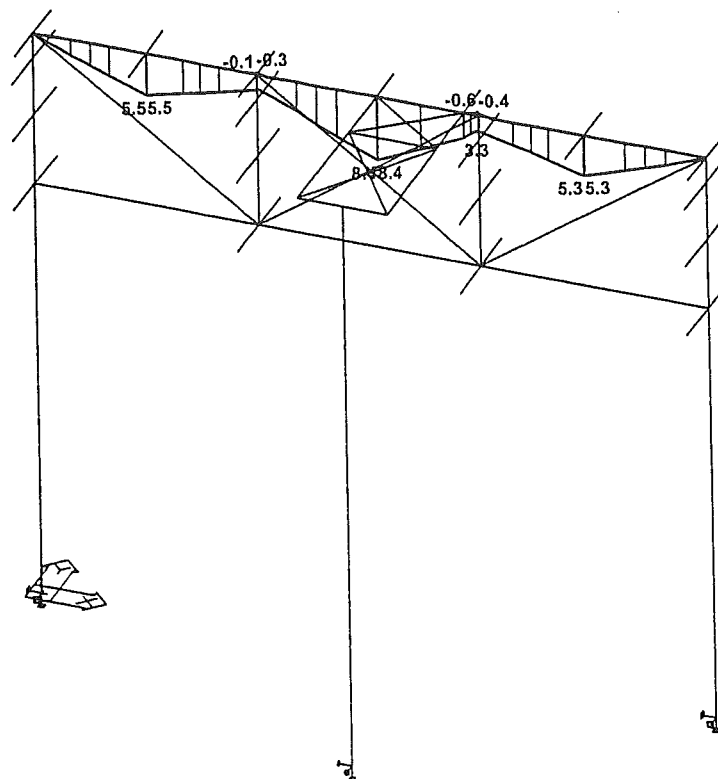
LC3: p2

Rx [kN]	0.00	-0.00	0.00
Ry [kN]	0.00	-0.00	0.00
Rz [kN]	0.67	0.67	0.03
Mx [kNm]	-0.19	-0.17	0.00
My [kNm]	0.00	-0.01	0.00
Mz [kNm]	-0.00	0.00	0.00

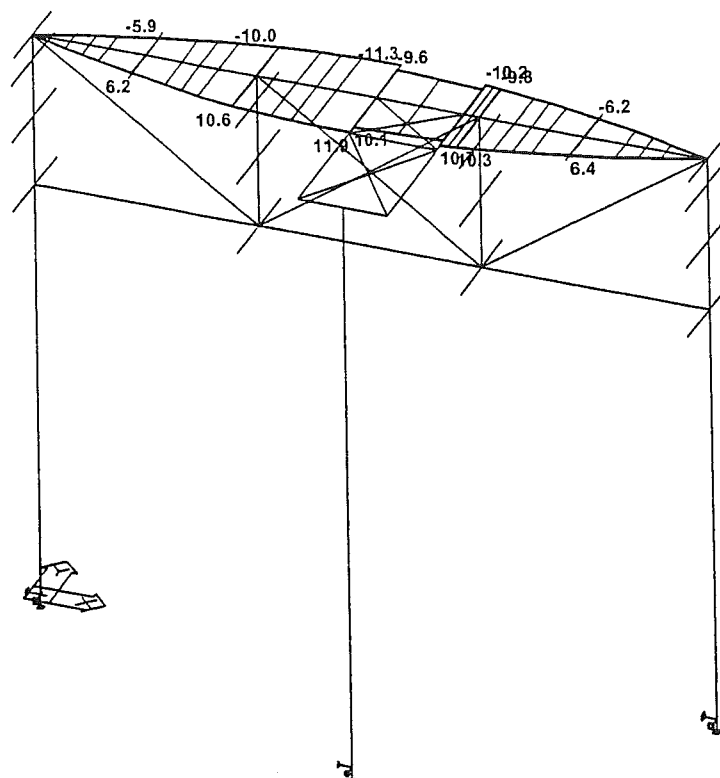


Loadcase/Node	28	31	66
<b>Variable loads - not exclusive</b>			
LC4: p3			
Rx [kN]	0.01	-0.02	0.01
Ry [kN]	0.00	-0.00	0.00
Rz [kN]	3.67	3.65	0.13
Mx [kNm]	-1.05	-0.96	0.00
My [kNm]	0.02	-0.04	0.00
Mz [kNm]	-0.00	0.00	0.00
<b>Variable loads - not exclusive</b>			
LC5: p4			
Rx [kN]	0.00	-0.00	0.00
Ry [kN]	0.00	-0.00	0.00
Rz [kN]	0.13	0.13	0.00
Mx [kNm]	-0.04	-0.04	0.00
My [kNm]	0.00	-0.00	0.00
Mz [kNm]	0.00	-0.00	0.00
<b>Variable loads - not exclusive</b>			
LC6: p5			
Rx [kN]	0.02	-0.03	0.01
Ry [kN]	0.00	-0.00	-0.00
Rz [kN]	6.15	5.56	-0.32
Mx [kNm]	1.21	1.02	0.00
My [kNm]	0.05	-0.07	0.00
Mz [kNm]	0.00	-0.00	0.00
<b>Variable loads - not exclusive</b>			
LC7: p6			
Rx [kN]	0.00	-0.00	-0.00
Ry [kN]	-0.00	0.00	-0.00
Rz [kN]	0.69	0.70	-0.02
Mx [kNm]	0.19	0.18	0.00
My [kNm]	0.01	-0.00	0.00
Mz [kNm]	0.00	-0.00	0.00
<b>Variable loads - not exclusive</b>			
LC8: p7			
Rx [kN]	0.01	-0.00	-0.00
Ry [kN]	-0.00	0.00	-0.00
Rz [kN]	1.13	1.14	-0.03
Mx [kNm]	0.32	0.30	0.00
My [kNm]	0.01	-0.01	0.00
Mz [kNm]	0.00	-0.00	0.00
<b>Variable loads - not exclusive</b>			
LC9: p8			
Rx [kN]	0.00	-0.00	-0.00
Ry [kN]	-0.00	0.00	-0.00
Rz [kN]	0.49	0.49	-0.01
Mx [kNm]	0.14	0.13	0.00
My [kNm]	0.01	-0.00	0.00
Mz [kNm]	-0.00	0.00	0.00
<b>Variable loads - not exclusive</b>			
LC10: p9			
Rx [kN]	0.05	0.04	-0.10
Ry [kN]	-0.03	0.03	0.00
Rz [kN]	0.62	0.63	2.55
Mx [kNm]	0.19	-0.20	0.00
My [kNm]	0.15	0.12	0.00
Mz [kNm]	-0.00	0.00	0.00
<b>Variable loads - not exclusive</b>			
LC11: p10			
Rx [kN]	-0.04	-0.05	0.09

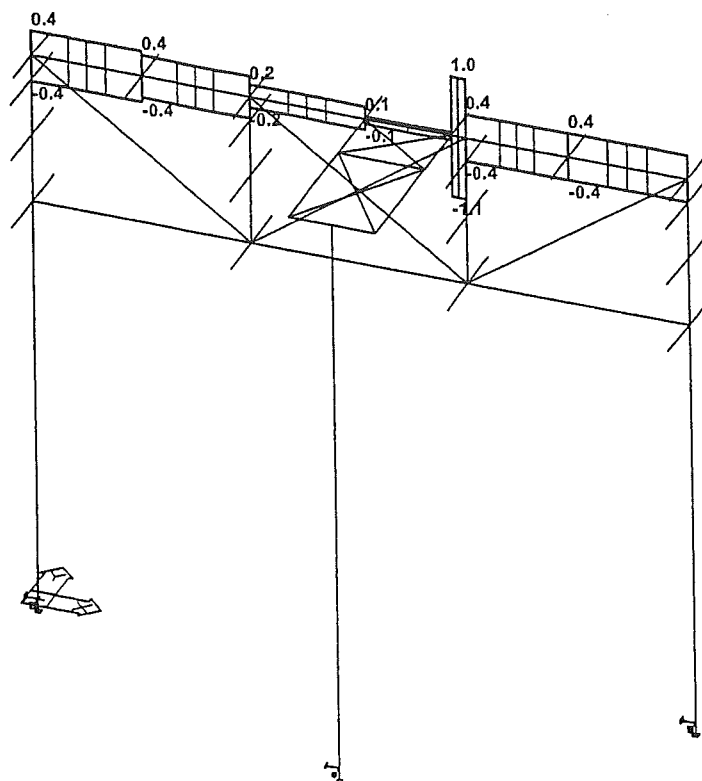
Loadcase/Node	28	31	66
Ry [kN]	0.03	-0.03	0.00
Rz [kN]	0.44	0.82	2.53
Mx [kNm]	-0.21	0.15	0.00
My [kNm]	-0.13	-0.15	0.00
Mz [kNm]	-0.00	-0.00	0.00
<b>Variable loads - exclusive - 12: Wind +Y</b>			
Rx [kN]	0.00	0.00	-0.01
Ry [kN]	-7.85	-7.97	-0.61
Rz [kN]	0.10	0.14	-0.24
Mx [kNm]	42.54	43.32	0.00
My [kNm]	0.01	0.01	0.00
Mz [kNm]	-0.00	0.00	0.00
<b>Variable loads - exclusive - 13: Wind -Y</b>			
Rx [kN]	-0.00	-0.00	0.01
Ry [kN]	7.85	7.97	0.61
Rz [kN]	-0.10	-0.14	0.24
Mx [kNm]	-42.54	-43.32	0.00
My [kNm]	-0.01	-0.01	0.00
Mz [kNm]	0.00	-0.00	0.00
<b>Variable loads - exclusive - 14: Wind +X</b>			
Rx [kN]	-3.40	-3.40	-0.59
Ry [kN]	0.25	-0.25	0.00
Rz [kN]	-2.08	2.08	0.00
Mx [kNm]	-1.73	1.74	0.00
My [kNm]	-8.38	-8.38	0.00
Mz [kNm]	-0.00	-0.00	0.00
<b>Variable loads - exclusive - 15: Wind -X</b>			
Rx [kN]	3.40	3.40	0.59
Ry [kN]	-0.25	0.25	-0.00
Rz [kN]	2.08	-2.08	-0.00
Mx [kNm]	1.73	-1.74	0.00
My [kNm]	8.38	8.38	0.00
Mz [kNm]	0.00	0.00	0.00
<b>Extremes</b>			
Max Rz [kN]	35.64	35.53	10.71
Min Rz [kN]	10.40	10.48	3.48
Max Rx [kN]	3.59	3.40	0.70
Min Rx [kN]	-3.40	-3.60	-0.69
Max Ry [kN]	7.88	8.00	0.63
Min Ry [kN]	-7.88	-8.01	-0.61
Max Mx [kNm]	44.60	45.10	0.00
Min Mx [kNm]	-45.24	-45.66	0.00
Max My [kNm]	8.79	8.42	0.00
Min My [kNm]	-8.43	-8.83	0.00
Max Mz [kNm]	-0.00	-0.00	0.00
Min Mz [kNm]	-0.00	-0.00	0.00



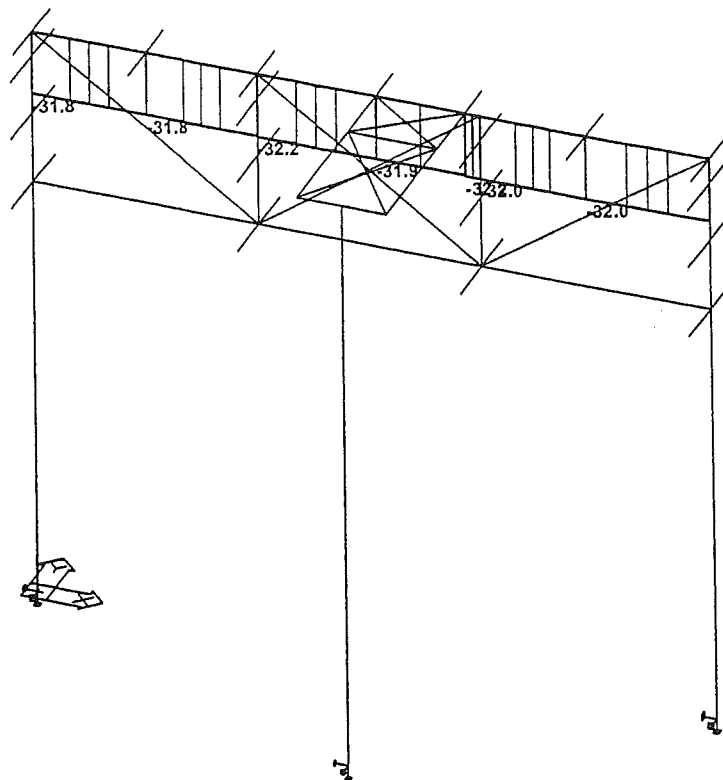
Internal forces - My on member(s). Ult. combi : 1/151



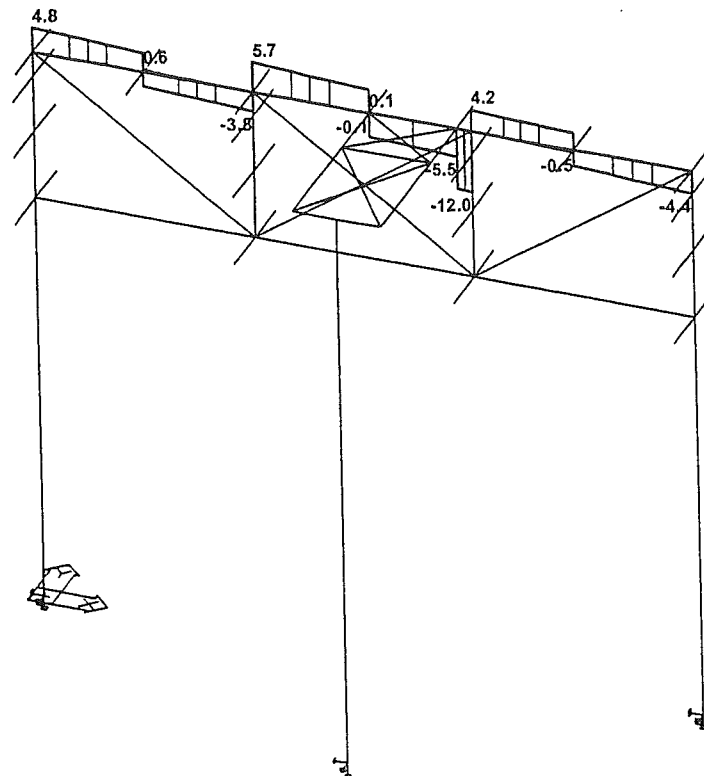
Internal forces - Mz on member(s). Ult. combi : 1/151



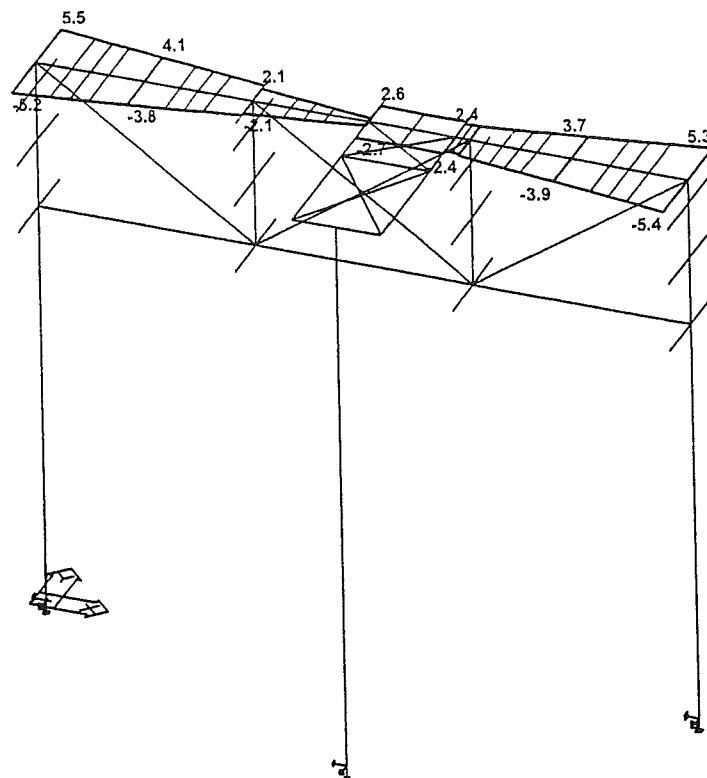
Internal forces - Mx on member(s). Ult. combi : 1/151



Internal forces - N on member(s). Ult. combi : 1/151



Internal forces - Vz on member(s). Ult. combi : 1/151



Internal forces - Vy on member(s). Ult. combi : 1/151

**Internal forces on member(s). Global extreme**

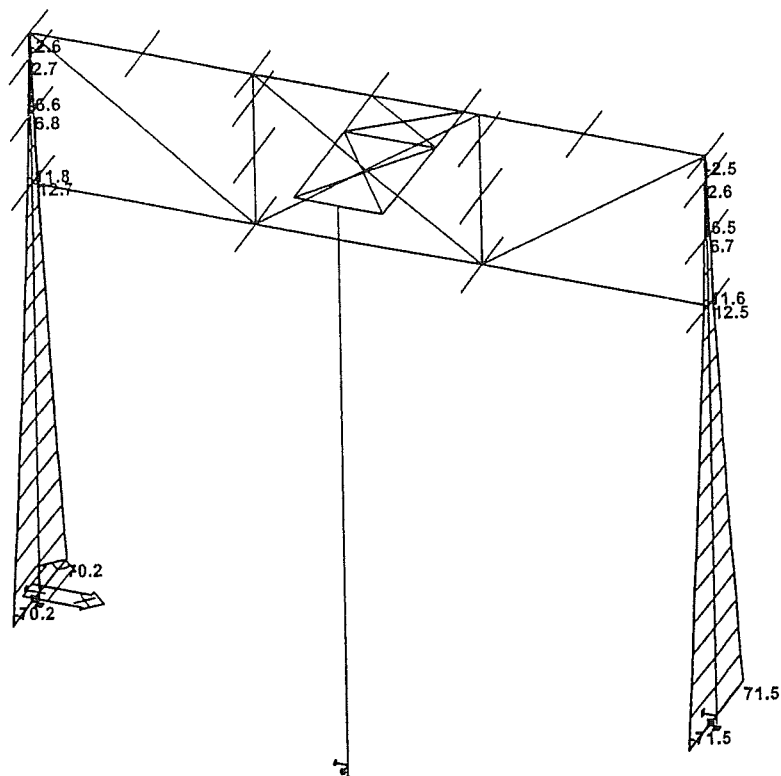
Linear static - extreme or all combinations

Group of member(s) : 1/78

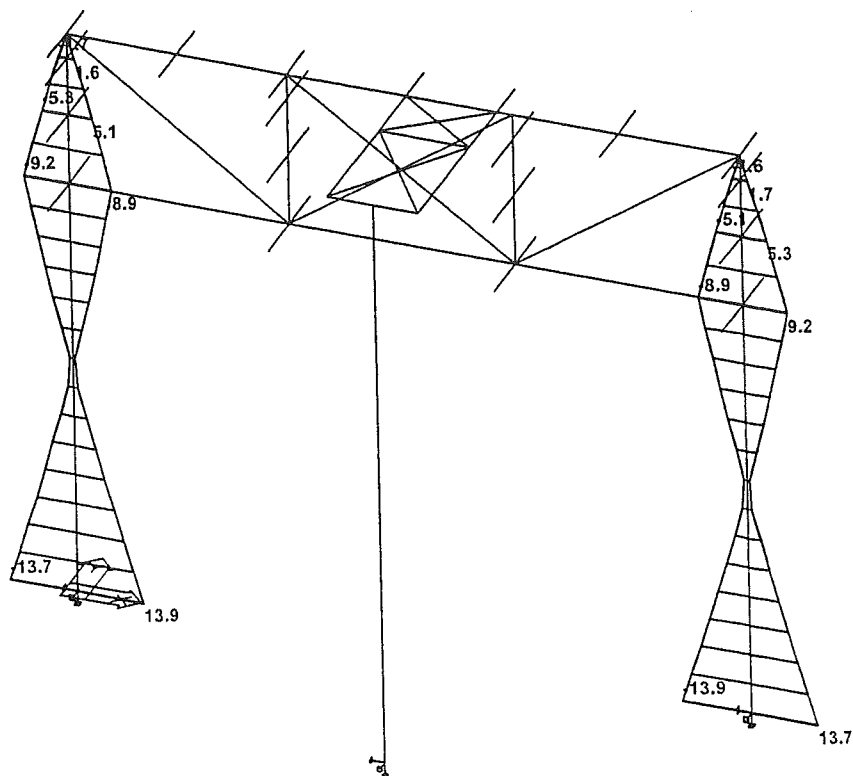
Group of ultimate combi : 1/151

Cross-section : 1 - HEB200

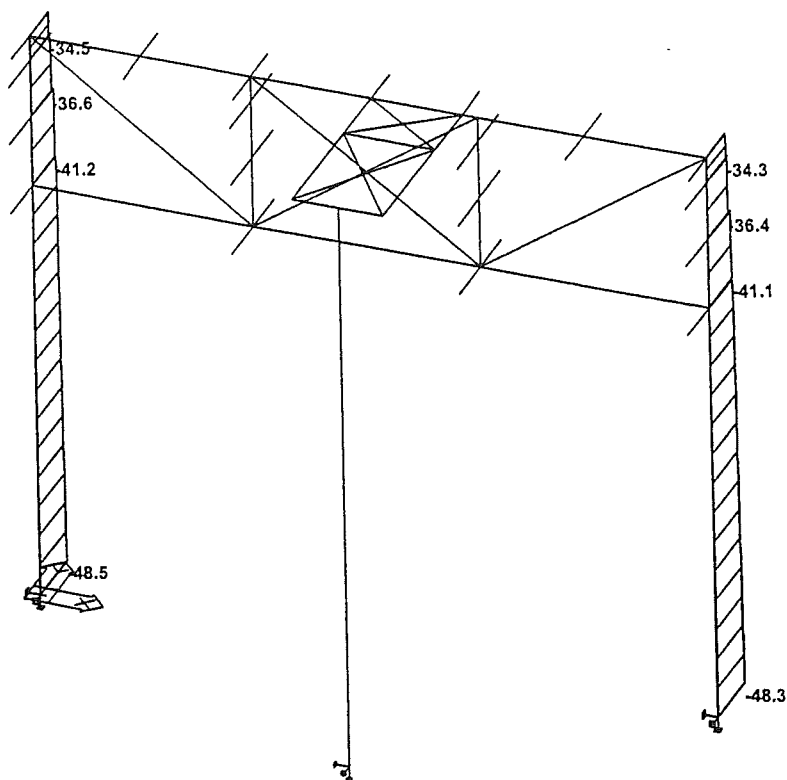
memb	combi	dx [m]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
5	148	0.000	<b>-32.24</b>	0.02	-11.63	-0.04	3.10	0.59
1	83		-17.98	<b>5.47</b>	2.60	-0.36	-0.00	-0.00
7	81	1.390	-18.54	<b>5.37</b>	-2.46	0.31	-0.00	-0.00
3	130	0.000	-27.95	0.06	<b>5.75</b>	-0.04	0.66	-0.52
5		0.180	-27.97	0.08	<b>-11.97</b>	0.38	0.35	-0.38
	121	0.000	-16.18	2.20	-5.95	<b>1.02</b>	1.41	-10.07
	58		-19.35	-2.18	-6.09	<b>-1.07</b>	2.05	10.59
4	148		-31.88	-0.04	-4.68	-0.03	<b>8.41</b>	0.56
5	37	0.180	-19.67	-0.39	-9.33	0.06	<b>-0.60</b>	1.11
3	83	1.380	-18.41	0.23	2.14	0.22	4.42	<b>11.90</b>
	102		-17.10	-0.24	2.21	-0.18	4.50	<b>-11.35</b>



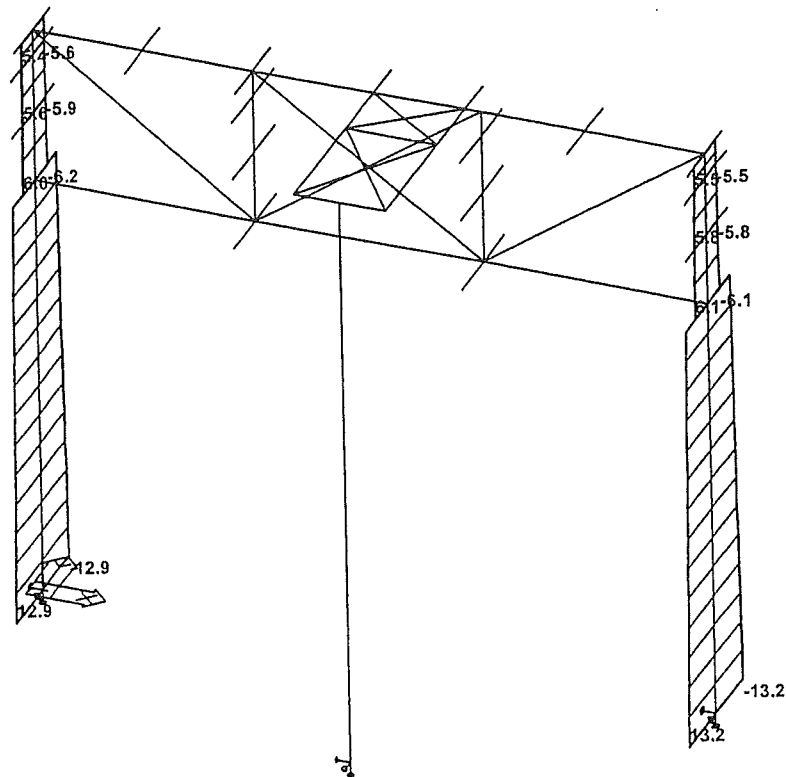
Internal forces - My on member(s). Ult. combi : 1/151



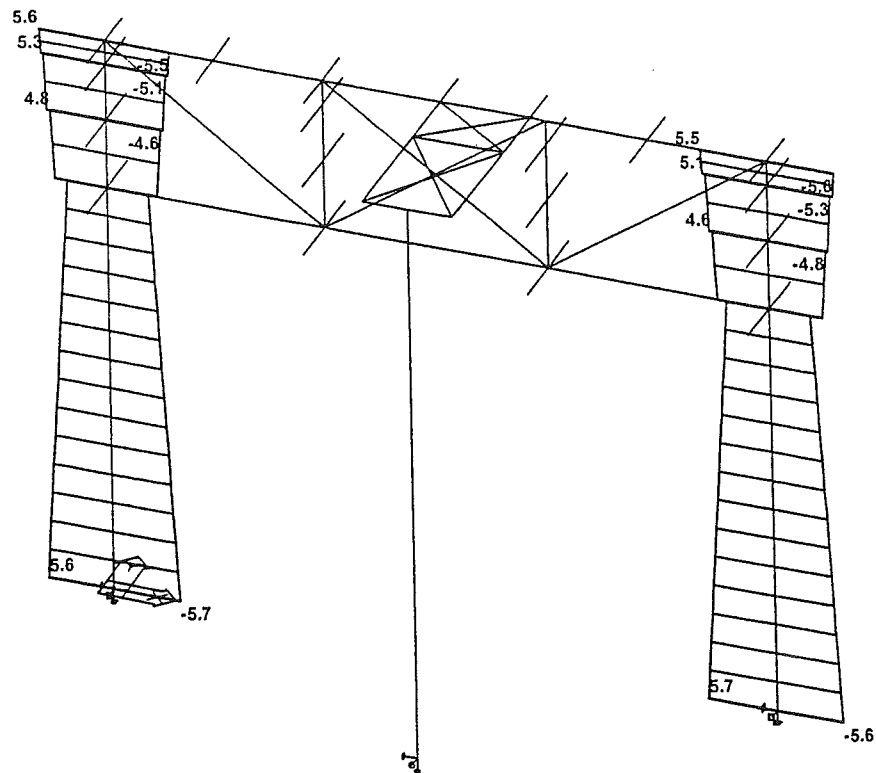
Internal forces - Mz on member(s). Ult. combi : 1/151



Internal forces - N on member(s). Ult. combi : 1/151



Internal forces - Vz on member(s). Ult. combi : 1/151



Internal forces - Vy on member(s). Ult. combi : 1/151



**Internal forces on member(s). Global extreme**

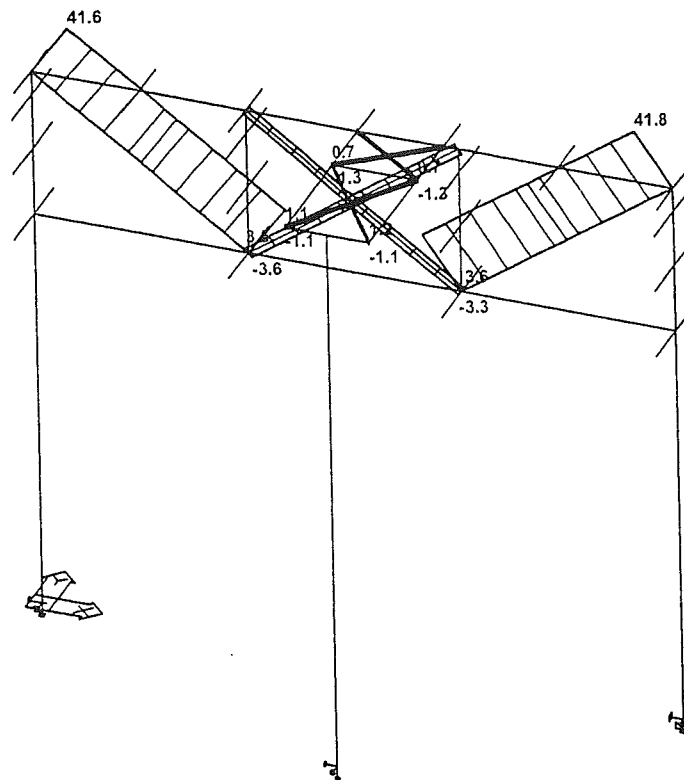
Linear static - extreme or all combinations

Group of member(s) : 1/78

Group of ultimate combi : 1/151

Cross-section : 2 - HEA300

memb	combi	dx [m]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
29	148	0.000	-48.47	-0.21	0.00	-0.00	0.98	0.41
33	17		-20.38	-5.66	0.42	-0.00	-2.90	-13.93
29	18		-20.29	-5.66	0.42	0.00	-2.88	13.93
33	15		-17.18	0.05	13.16	0.00	-71.50	-0.09
	4		-12.33	0.04	-13.15	-0.00	71.45	-0.09



Internal forces - N on member(s). Ult. combi : 1/151

**Internal forces on member(s). Global extreme**

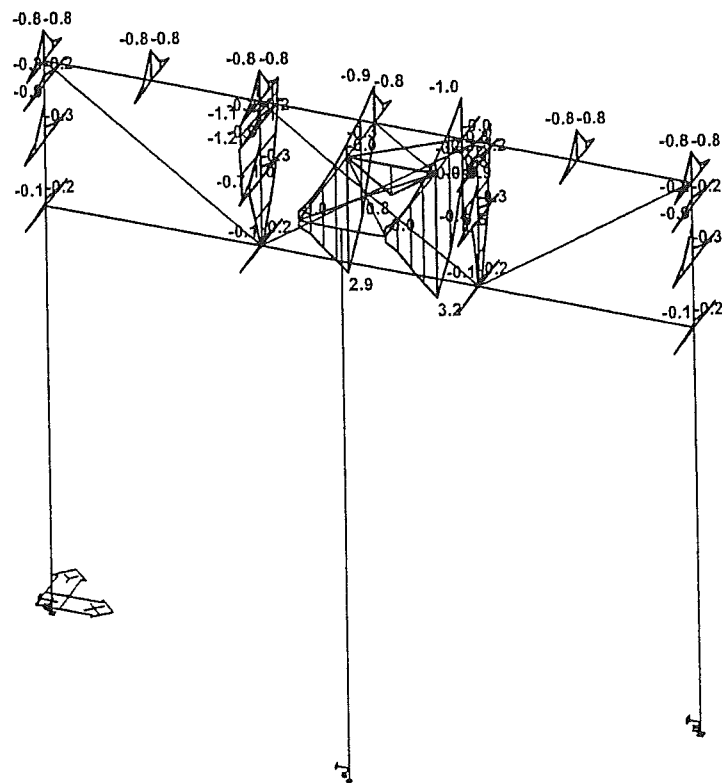
Linear static - extreme or all combinations

Group of member(s) : 1/78

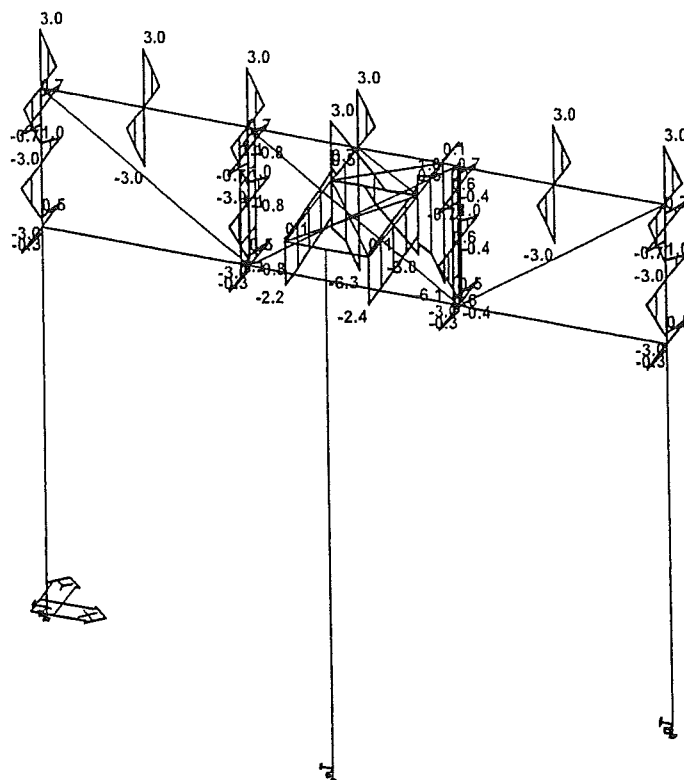
Group of ultimate combi : 1/151

Cross-section : 3 - L50X5

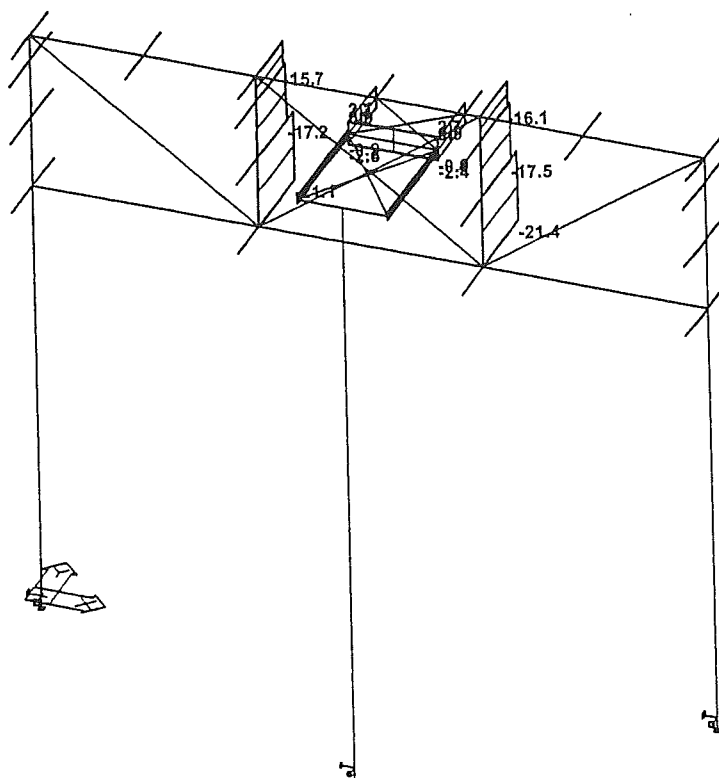
memb	combi	dx [m]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
39	150	0.000	41.80	0.00	0.00	0.00	0.00	0.00
38	67		-3.58	0.00	0.00	0.00	0.00	0.00



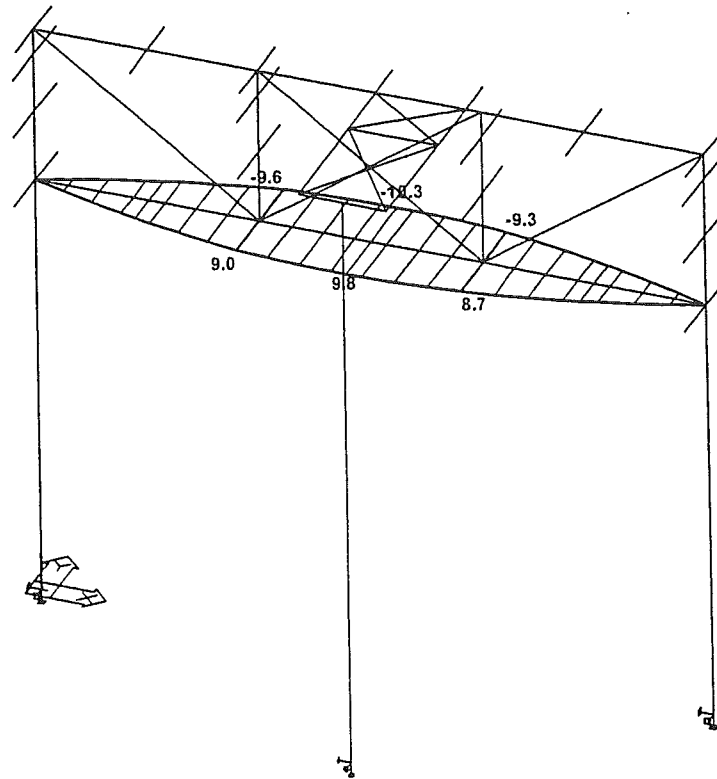
Internal forces - My on member(s). Ult. combi : 1/151



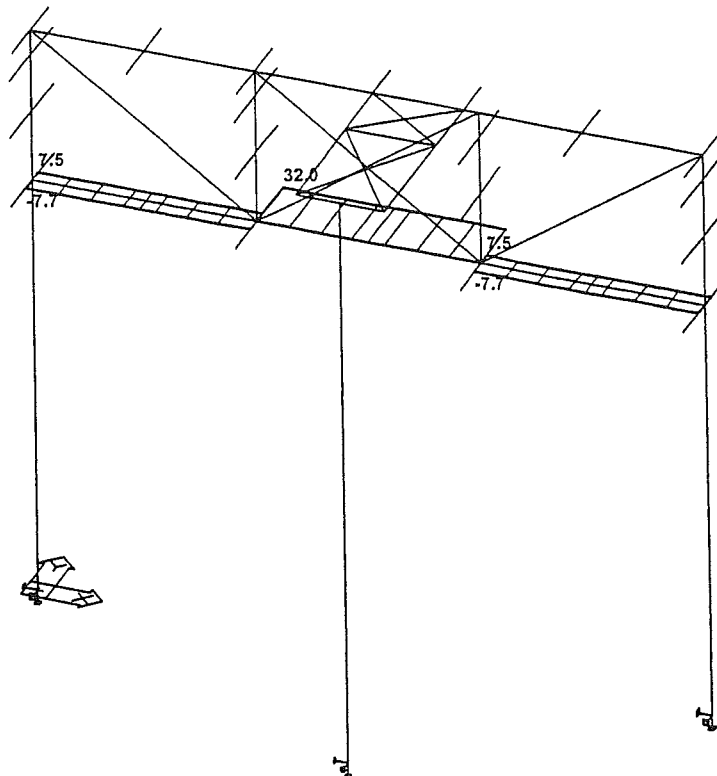
Internal forces - Vz on member(s). Ult. combi : 1/151



Cross-section		Node						
memb	combi	dx [m]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
71	126	0.000	3.08	0.09	2.71	-0.00	-0.01	-0.21
26	136		-21.41	0.29	0.28	-0.00	0.00	-0.16
17	102		-0.57	2.74	-1.95	-0.00	0.72	-0.46
	83		0.97	-2.82	0.28	0.01	1.67	0.47
71	110		0.65	0.00	3.00	-0.00	-0.01	-0.01
17	130	0.800	0.31	0.14	-6.26	0.00	-0.80	0.08
65	96	0.000	0.54	2.52	-0.47	0.01	2.61	-0.41
26	113		-14.09	0.19	0.64	-0.01	-0.01	-0.10
65	109		0.21	0.40	-1.09	0.00	3.18	-0.06
24	76	0.700	-9.30	-0.15	-0.20	0.00	-1.20	-0.15
17	102	0.800	-0.57	2.74	-2.17	-0.00	-0.92	1.73
	83		0.97	-2.82	-3.83	0.01	0.25	-1.79



Internal forces - My on member(s). Ult. combi : 1/151



Internal forces - N on member(s). Ult. combi : 1/151

**Internal forces on member(s). Global extreme**

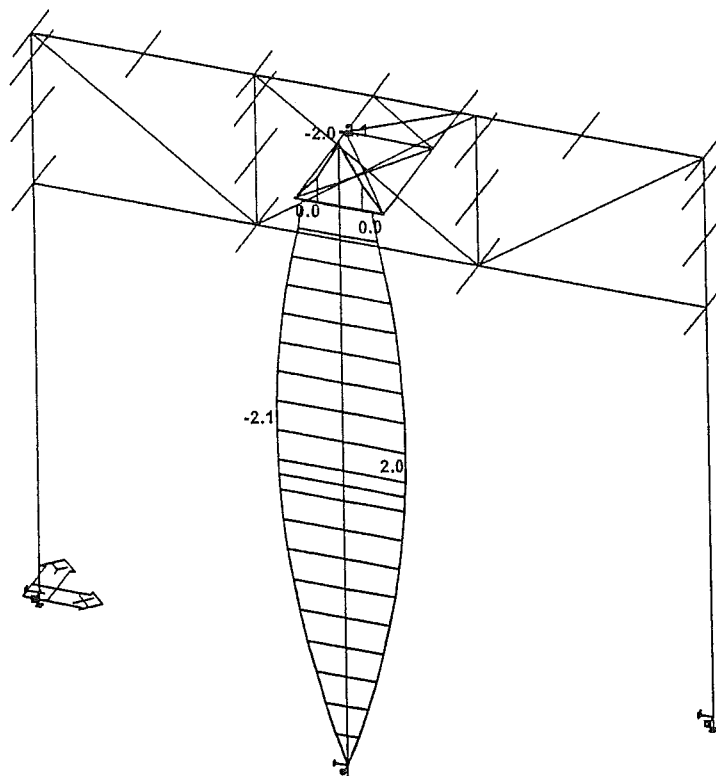
Linear static - extreme or all combinations

Group of member(s) : 1/78

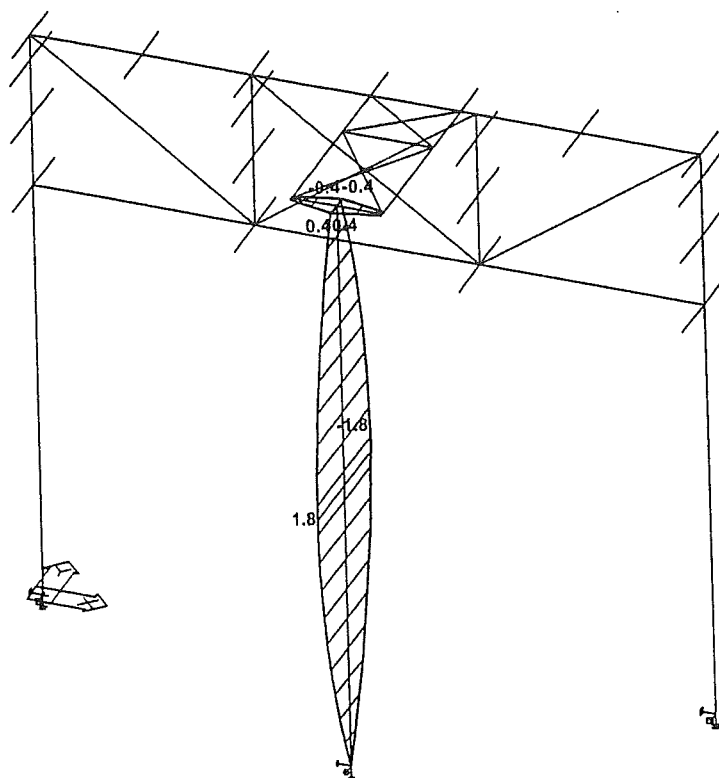
Group of ultimate combi : 1/151

Cross-section : 5 - U180

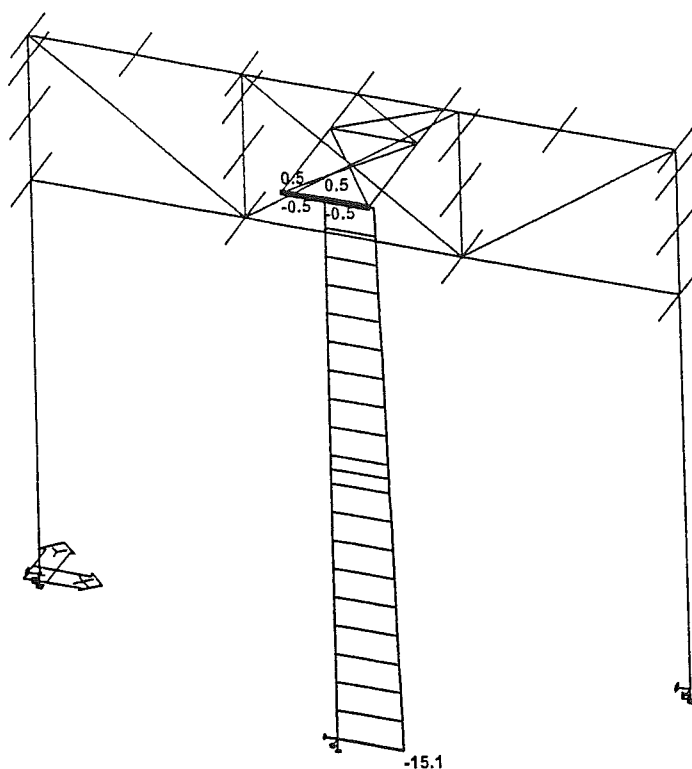
memb	combi	dx [m]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
9	148	0.000	31.98	-0.39	0.00	0.00	-0.65	0.16
8	18		-7.73	-0.33	-0.01	0.00	-0.00	0.00
	17	2.600	7.44	0.47	0.01	-0.00	0.03	0.21
10	18	0.000	7.44	-0.47	-0.00	-0.00	0.00	0.21
	113	2.600	-0.36	0.28	4.98	0.02	0.00	0.00
8		0.000	-0.38	-0.27	-5.09	-0.02	0.00	0.00
10			-0.36	-0.29	2.16	0.02	-9.28	0.02
9	66	1.114	15.17	-0.05	0.09	0.00	9.75	-0.08
	113		20.02	-0.04	-0.09	-0.00	-10.33	-0.06
	18	0.000	7.63	-0.42	0.01	-0.00	-0.02	0.22
10	150	1.300	-7.39	0.01	0.22	0.00	-0.29	-0.26



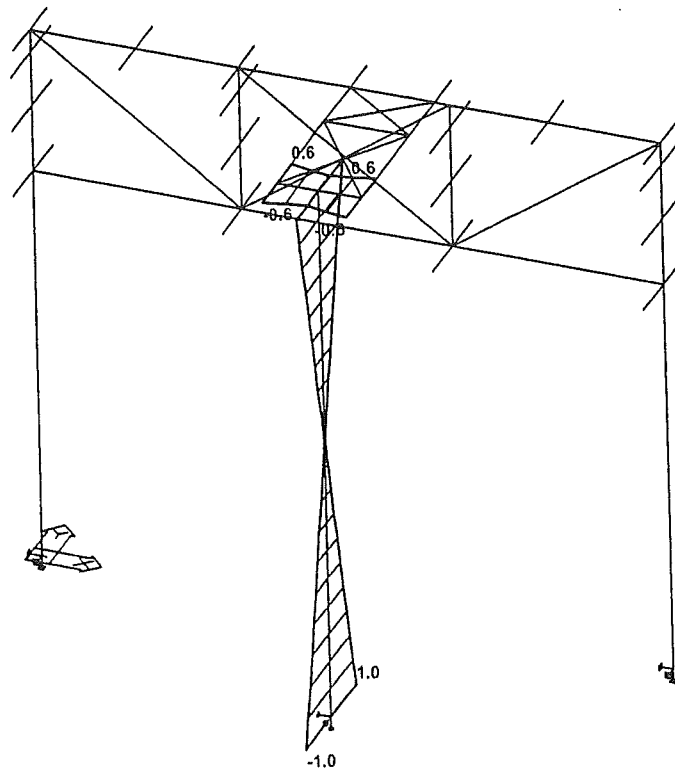
Internal forces - My on member(s). Ult. combi : 1/151



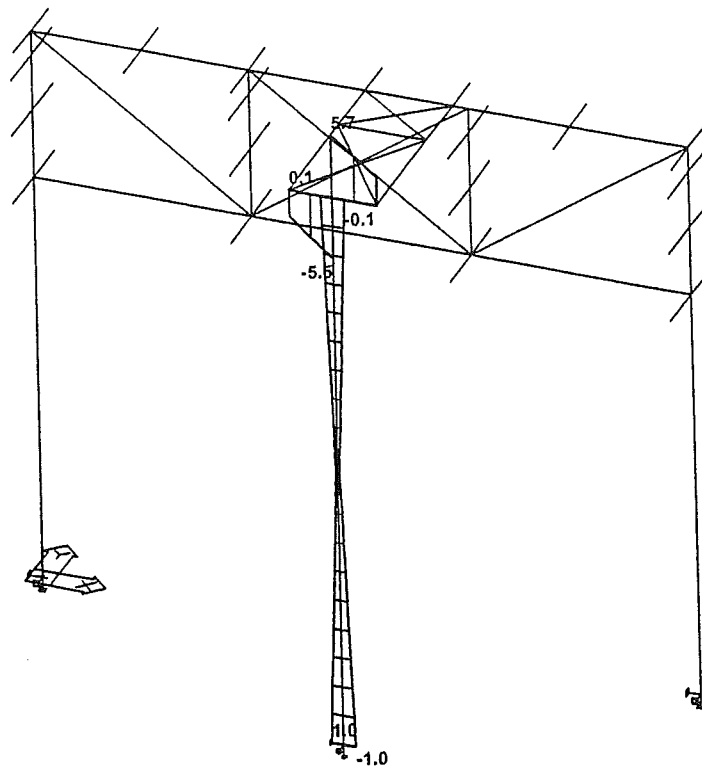
Internal forces - Mz on member(s). Ult. combi : 1/151



Internal forces - N on member(s). Ult. combi : 1/151



Internal forces - Vy on member(s). Ult. combi : 1/151



Internal forces - Vz on member(s). Ult. combi : 1/151

**Internal forces on member(s). Global extreme**

Linear static - extreme or all combinations

Group of member(s) : 1/78

Group of ultimate combi : 1/151

Cross-section : 6 - HEA200

memb	combi	dx [m]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
78	105	0.000	0.53	0.03	0.85	0.01	-0.36	-0.02
76	109		-15.09	0.03	-0.01	0.00	-0.00	-0.00
	16		-5.94	1.01	-0.01	0.00	0.00	0.00
	3		-3.71	-1.01	0.01	0.00	-0.00	-0.00
78	109		-0.05	0.01	5.66	0.10	-2.12	0.01
77		0.520	-0.04	-0.01	5.50	-0.10	-2.04	0.01
78	126	0.000	-0.31	-0.40	5.42	0.22	-2.07	0.33
77			-0.29	0.53	-2.28	-0.23	0.00	0.09
76	56	3.995	-5.78	0.01	-0.00	-0.00	2.00	0.02
	16	3.632	-3.87	-0.00	-0.01	0.00	-0.04	1.83
	3		-2.18	0.01	0.01	0.00	0.04	-1.81

DIN. Profile - 1 all. UC all.

Cross-section : 1 - HEB200

Macro 1 Member 3 HEB200 S 235 Ult. comb 122 0.34

N [kN]	Vy [kN]	Vz [kN]	Mt [kNm]	My [kNm]	Mz [kNm]
-26.16	0.39	3.40	0.17	6.53	11.24

The critical check is on position 1.38 m

Buckling parameters		yy	zz
type		sway	non-sway
Slenderness		30.44	154.00
Reduced slenderness		0.33	1.66
Buckling curve		b	c
Imperfection		0.34	0.49
Reduction factor		0.95	0.27
Length		2.60	7.80 m
Buckling factor		1.00	1.00
Buckling length		2.60	7.80 m
Critical Euler load		17463.94	682.36 kN

LTB	
LTB length	7.80 m
Betaz	1.00
Beta0	1.00
Ksi	1.35



negative influence of load position

**SECTION CHECK**

N	$0.02 < 1$
Vy	$0.00 < 1$
Vz	$0.02 < 1$
M	$0.21 < 1$

**STABILITY CHECK**

Buckling	$0.06 < 1$
LTB	$0.05 < 1$
Compression + Moment	$0.29 < 1$
Compression + LTB	$0.34 < 1$

DIN. Profile - 2 all. UC all.

Cross-section : 2 - HEA300

Macro 12 Member 33 HEA300 S 235 Ult. comb 149 0.31

N [kN]	Vy [kN]	Vz [kN]	Mt [kNm]	My [kNm]	Mz [kNm]
-45.37	0.21	11.86	0.00	-63.55	-0.43

The critical check is on position 0.00 m

**Buckling parameters**

	yy	zz	
type	sway	non-sway	
Slenderness	108.44	184.67	
Reduced slenderness	1.17	1.99	
Buckling curve	b	c	
Imperfection	0.34	0.49	
Reduction factor	0.50	0.20	
Length	6.90	6.90	m
Buckling factor	2.00	2.00	
Buckling length	13.80	13.80	m
Critical Euler load	1991.65	686.74	kN

**LTB**

LTB length	6.90	m
Betaz	1.00	
Beta0	1.00	
Ksi	1.81	

load in center of gravity

**SECTION CHECK**

N	$0.02 < 1$
Vy	$0.00 < 1$
Vz	$0.04 < 1$
M	$0.03 < 1$

**STABILITY CHECK**

Buckling	$0.09 < 1$
LTB	$0.22 < 1$
Compression + Moment	$0.31 < 1$
Compression + LTB	$0.30 < 1$

DIN. Profile - 3 all. UC all.

Cross-section : 3 - L50X5

Macro 13 Member 38 L50X5 S 235 Ult. comb 67 0.48

N [kN]	Vy [kN]	Vz [kN]	Mt [kNm]	My [kNm]	Mz [kNm]
-3.58	0.00	0.00	0.00	0.00	0.00

The critical check is on position 0.00 m

Buckling parameters			Buckling parameters		
	yy	zz		yy	zz
type	sway	sway	Reduction factor	0.23	0.07
Slenderness	167.60	326.32	Length	3.19	3.19 m
Reduced slenderness	1.80	3.51	Buckling factor	1.00	1.00
Buckling curve	c	c	Buckling length	3.19	3.19 m
Imperfection	0.49	0.49	Critical Euler load	35.42	9.34 kN

Warning: slenderness 326.32 is larger then 200.00 !

**SECTION CHECK**

Sigma	$0.03 < 1$
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**STABILITY CHECK**

Buckling	$0.48 < 1$
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DIN. Profile - 4 all. UC all.

Cross-section : 4 - HEB100

Macro 27 Member 65 HEB100 S 235 Ult. comb 81 0.23

N [kN]	Vy [kN]	Vz [kN]	Mt [kNm]	My [kNm]	Mz [kNm]
0.93	2.69	-3.50	0.00	1.00	1.71

The critical check is on position 0.80 m

**LTB**

LTB length 0.80 m  
 Betaz 1.00  
 Beta0 1.00  
 Ksi 1.40

load in center of gravity

**SECTION CHECK**

N 0.00 < 1  
 Vy 0.01 < 1  
 Vz 0.05 < 1  
 M 0.19 < 1

**STABILITY CHECK**

LTB 0.04 < 1  
 Compression + Moment 0.20 < 1  
 Compression + LTB 0.23 < 1

DIN. Profile - 5 all. UC all.

Cross-section : 5 - U180

Macro 2 Member 9 U180 S 235 Ult. comb 125 0.37

N [kN]	Vy [kN]	Vz [kN]	Mt [kNm]	My [kNm]	Mz [kNm]
22.00	-0.00	0.11	-0.00	-10.33	-0.08

The critical check is on position 1.30 m

**LTB**

LTB length 2.60 m

**SECTION CHECK**

Sigma 0.37 < 1  
 tau 0.00 < 1

**STABILITY CHECK**

LTB  $0.33 < 1$   
 Compression + Moment  $0.27 < 1$   
 Compression + LTB  $0.34 < 1$

DIN. Profile - 6 all. UC all.

Cross-section : 6 - HEA200

Macro 33 Member 76 HEA200 S 235 Ult. comb 126 0.15

N [kN]	Vy [kN]	Vz [kN]	Mt [kNm]	My [kNm]	Mz [kNm]
-12.83	0.20	-0.02	0.00	-0.06	1.65

The critical check is on position 2.91 m

Buckling parameters	yy	zz	
type	sway	non-sway	
Slenderness	274.59	136.07	
Reduced slenderness	2.95	1.46	
Buckling curve	b	c	
Imperfection	0.34	0.49	
Reduction factor	0.10	0.33	
Length	6.90	6.90	m
Buckling factor	3.30	0.98	
Buckling length	22.74	6.79	m
Critical Euler load	147.89	602.24	kN

Warning: slenderness 274.59 is larger then 200.00 !

**LTB**

LTB length 6.90 m  
 Betaz 1.00  
 Beta0 1.00  
 Ksi 1.77

load in center of gravity

**SECTION CHECK**

N  $0.01 < 1$   
 Vy  $0.00 < 1$   
 Vz  $0.00 < 1$   
 M  $0.05 < 1$

**STABILITY CHECK**

Buckling	$0.11 < 1$
LTB	$0.00 < 1$
Compression + Moment	$0.15 < 1$
Compression + LTB	$0.08 < 1$

Pos F3:

(Lage 139, Node 28)

Node 31analog F2LC1:  $\max M_x + \text{zy } M_y + \text{zy } N$ 

$$\max M_x = \pm 45,6 \cdot \frac{10\%}{10} = \pm \underline{\underline{5,02 \text{ kNm}}}$$

$$\text{zy } M_y = \underline{\underline{0,0 \text{ kNm}}}$$

$$\text{zy } N_{\min} = \underline{\underline{10,43 \text{ kN}}}$$

$$R_y = 700 \cdot 1,1 = \underline{\underline{8,7 \text{ kN}}}$$

$$R_x = \underline{\underline{3,60 \text{ kN}}}$$

LC2:  $\max M_x + \text{zy } M_y + \max N$ 

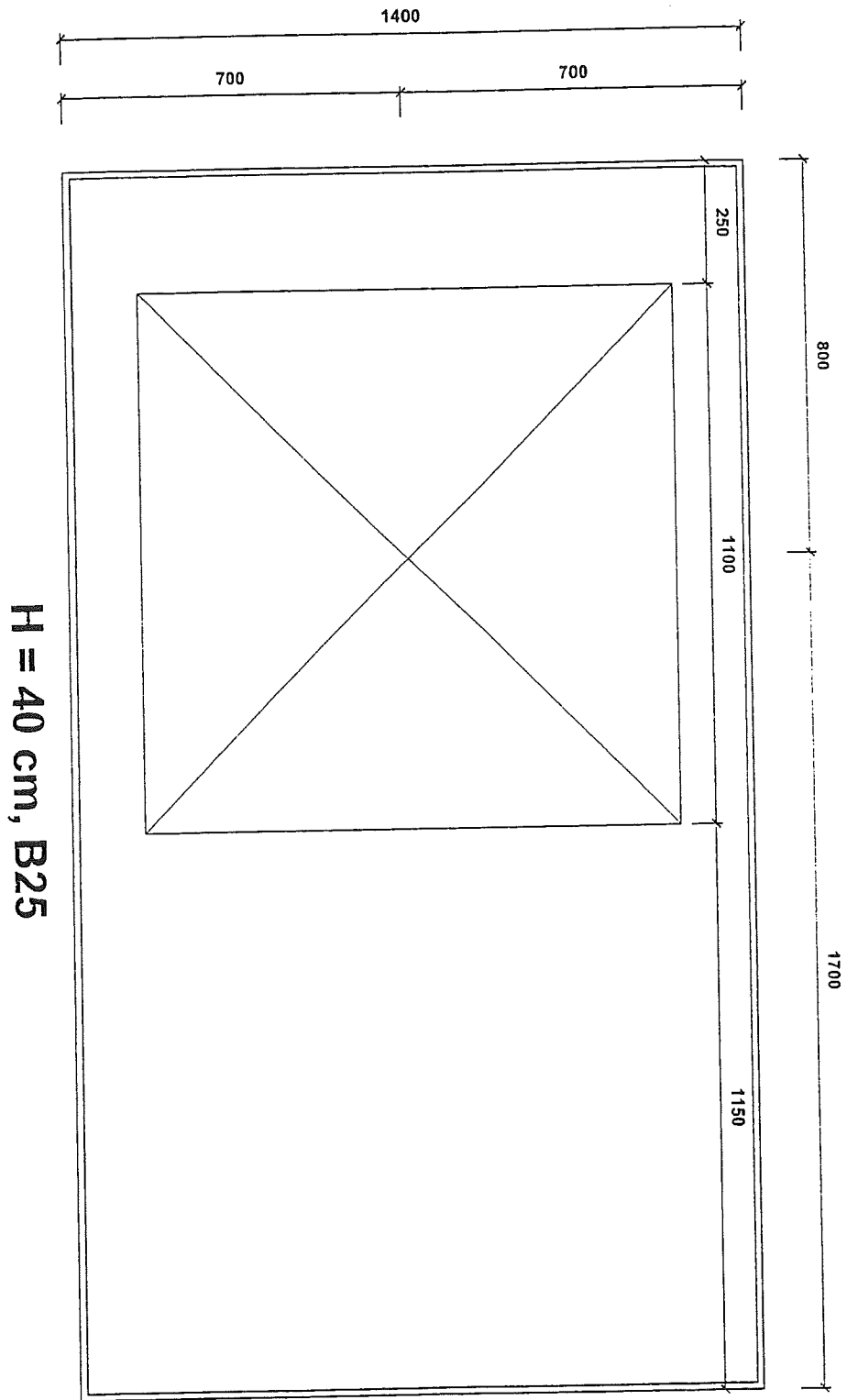
$$\max M_x = \pm 45,6 \cdot 1,1 = \pm \underline{\underline{50,2 \text{ kNm}}}$$

$$M_y = \underline{\underline{8,8 \text{ kNm}}}$$

$$\text{zy } N_{\max} = \underline{\underline{35,64 \text{ kN}}}$$

$$R_y = 700 \cdot 1,1 = \underline{\underline{8,7 \text{ kN}}}$$

$$R_x = \underline{\underline{3,60 \text{ kN}}}$$



**Basic data**

**Type of structure : General XYZ**

Number of nodes: 13  
 Number of members: 16  
 Number of 1D macros: 11  
 Number of bound. lines: 8  
 Number of 2D macros: 1  
 Number of profiles : 1  
 Number of cases: 6  
 Number of materials: 2

**Material**

Name:

B 25

E modulus 30000.00 MPa  
 Poisson coeff. 0.20  
 Density 2500.000 kg/m<sup>3</sup>  
 Extensibility 0.01 mm/m.K

B 25 gewichtslos

E modulus 30000.00 MPa  
 Poisson coeff. 0.20  
 Density 0.000 kg/m<sup>3</sup>  
 Extensibility 0.01 mm/m.K

**List of material**

**Group of members :**  
 1/16

no.	Name:	quality	unit weight kg/m	length m	weight kg
-----	-------	---------	---------------------	-------------	--------------

**List of material - Macro2D**

**Group of members :**  
 1/2

no.	Name:	quality	unit volume weight kgm <sup>3</sup>	volume m <sup>3</sup>	weight kg
4	B 25	B 25	2500.00	1.40	3500.00

The total weight of the structure: 3500.00 kg

**Nodes**

node	X m	Y m	Z m	node	X m	Y m	Z m
1	0.200	0.300	0.000	2	2.700	0.300	0.000



node	X m	Y m	Z m	node	X m	Y m	Z m
3	2.700	1.700	0.000	9	0.450	0.450	1.230
4	0.200	1.700	0.000	10	1.550	0.450	1.230
5	0.450	0.450	0.000	11	0.450	1.550	1.230
6	1.550	0.450	0.000	12	1.550	1.550	1.230
7	1.550	1.550	0.000	13	1.000	1.000	1.230
8	0.450	1.550	0.000				

## Members

macro	memb	node 1	node 2	length m	Rx deg	profile	quality
1	1	5	9	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
2	2	6	10	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
3	3	8	11	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
4	4	7	12	1.230	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
5	5	9	10	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	6	10	12	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	7	12	11	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	8	11	9	1.100	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
6	9	9	6	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
7	10	11	7	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
8	11	5	11	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
9	12	6	12	1.650	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
10	13	9	13	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	14	13	12	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
11	15	10	13	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos
	16	13	11	0.778	0.00	1 - REC (55.0,55.0)	B 25 gewichtslos

## Boundaries

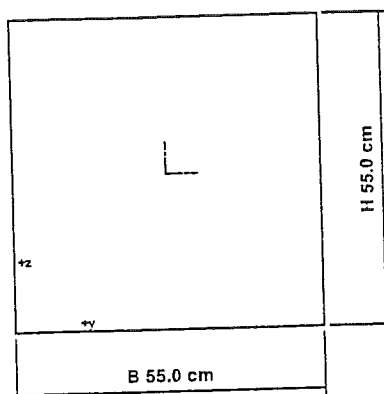
bound. line	type	node
1	Line	1,2
2	Line	2,3
3	Line	3,4
4	Line	4,1
5	Line	5,6
6	Line	6,7
7	Line	7,8
8	Line	8,5

## 2D Macros

num	type
1	B 25 Thickness 0.40 m

num type  
 Boundary: 1,2,3,4  
 Nodes : 5,6,7,8  
 1 Inner line: 5,6,7,8

## Profiles



REC (55.0,55.0)

Profile no. 1 - REC (55.0,55.0)  
 Material : 8 - B 25 gewichtslos

A:	3.025000e+003 cm <sup>2</sup>	Az/A:	0.833
Ay/A:	0.833	Iz:	7.625522e+005 cm <sup>4</sup>
Iy:	7.625522e+005 cm <sup>4</sup>	It:	1.286578e+006 cm <sup>4</sup>
Iyz:	0.000000e+000 cm <sup>4</sup>		
Iw:	0.000000e+000 cm <sup>6</sup>		
Wely:	2.772917e+004 cm <sup>3</sup>	Welz:	2.772917e+004 cm <sup>3</sup>
Wply:	4.159375e+004 cm <sup>3</sup>	Wplz:	4.159375e+004 cm <sup>3</sup>
cy:	27.50 cm	cz:	27.50 cm
iy:	15.88 cm	iz:	15.88 cm
dy:	0.00 cm	dz:	0.00 cm
Outline :	220.00 cm		

Type for check: Untypical section

## Nontypical elements

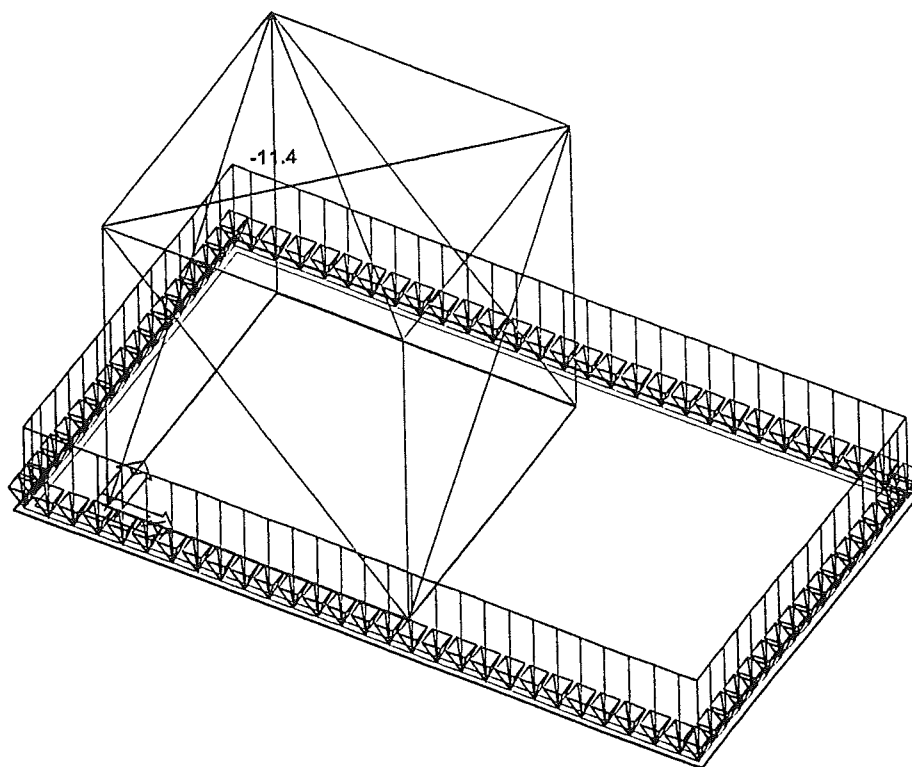
memb	type	memb	type	memb	type
1	X	2	X	3	X
4	X	5	X	6	X
7	X	8	X	9	X
10	X	11	X	12	X

## Soil - 2D macro

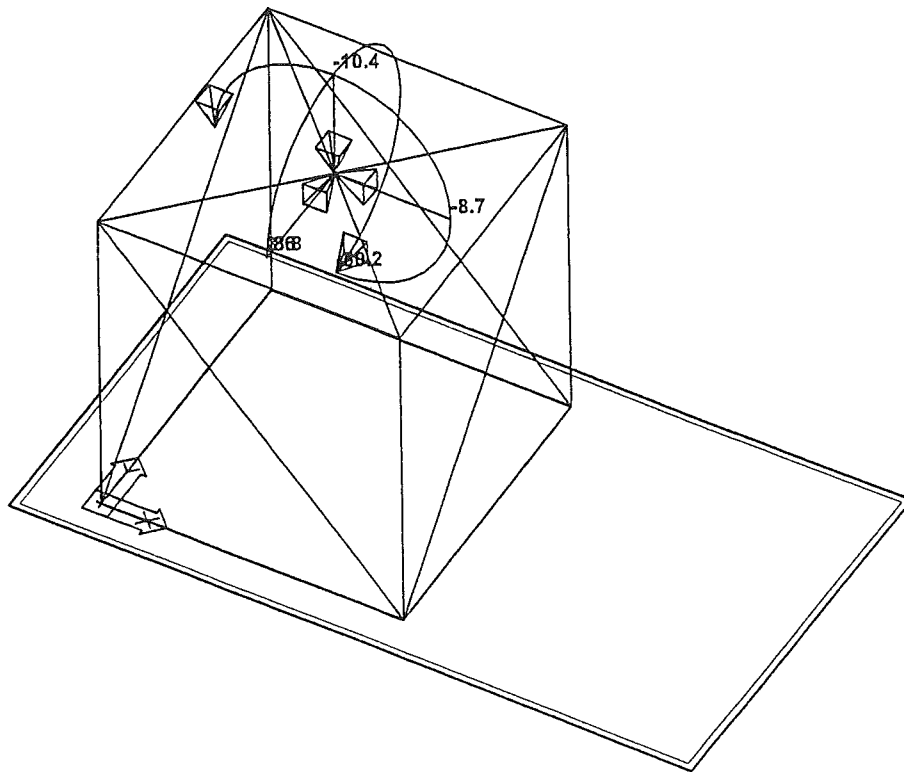
Index	2D macro	Name of subsoil
1	1	gemischtkörniger Sand

## Loadcases

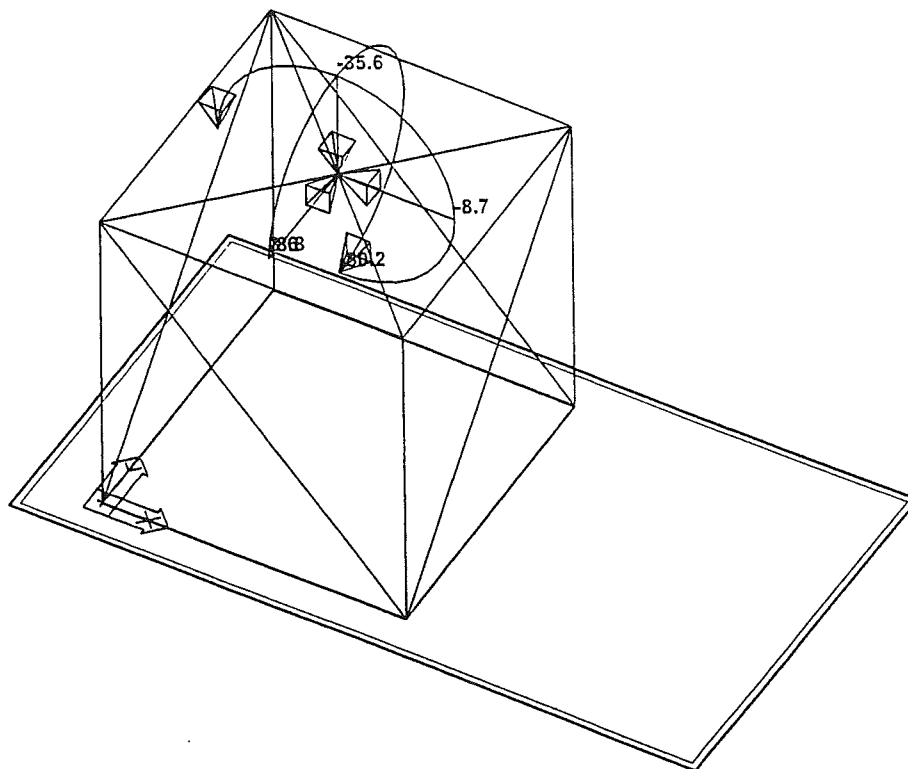
Case	Name:	Description
1	weight	Self weight. Direction -Z
2	G	Permanent - Loads
3	LC1	Variable - p Excl.
4	LC2	Variable - p Excl.
5	LC1(-)	Variable - p Excl.
6	LC2(-)	Variable - p Excl.



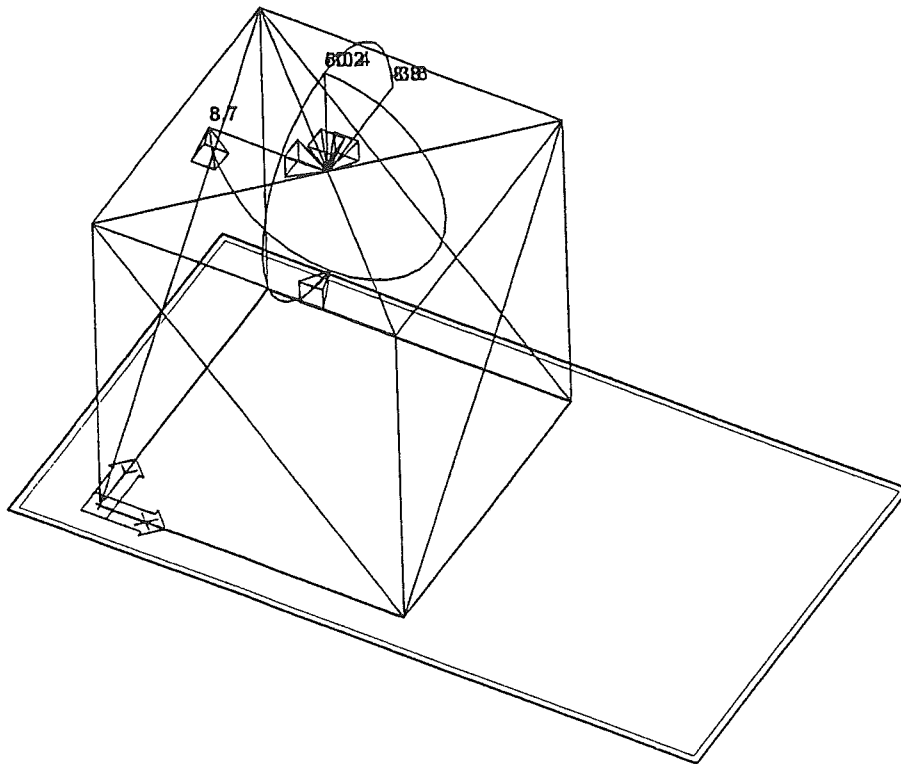
2. G



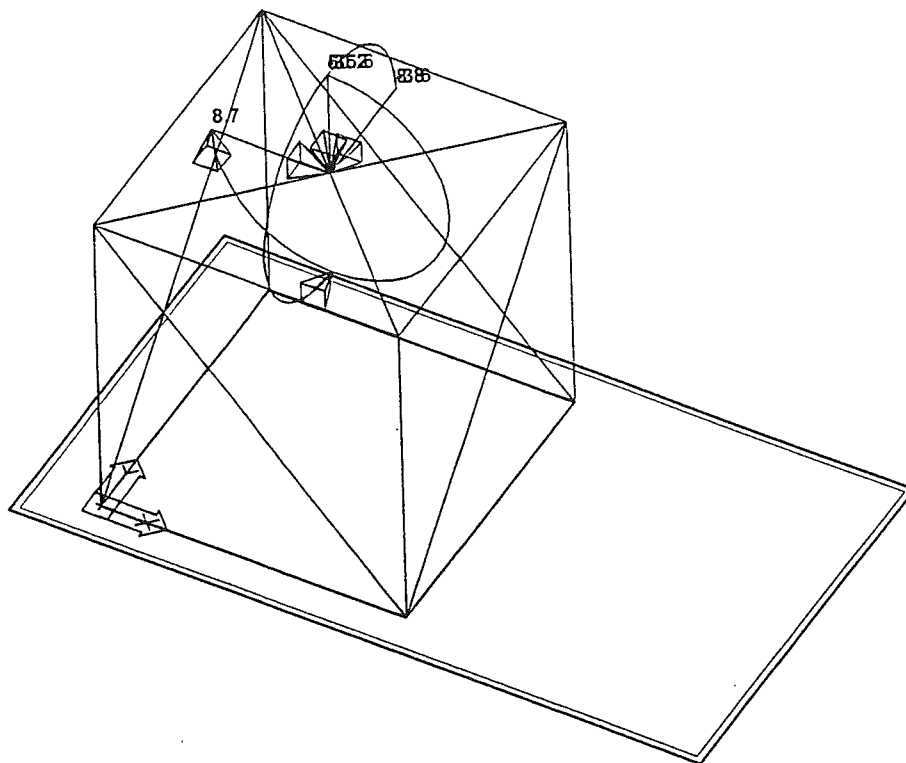
3. LC1



4. LC2



5. LC1(-)



6. LC2(-)

## Variable loads group

Name:

p Excl.

## Loadcase no. 3 - nodal loads

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
13	-8.70	3.60	-10.40	-8.80	-50.20	0.00

## Loadcase no. 4 - nodal loads

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
13	-8.70	3.60	-35.64	-8.80	-50.20	0.00

## Loadcase no. 5 - nodal loads

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
13	8.70	-3.60	-10.40	8.80	50.20	0.00

## Loadcase no. 6 - nodal loads

node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
13	8.70	-3.60	-35.64	8.80	50.20	0.00

## Loadcase no. 2 - Distributed loads 2D

macro	qx kN/m^2	qy kN/m^2	qz kN/m^2
1	0.00	0.00	-11.40

## Combinations

Combi	Norm	Case	coeff
1.	User-ultimate	1 weight	1.00
		2 G	1.00
		3 LC1	1.00
		4 LC2	1.00
		5 LC1(-)	1.00
		6 LC2(-)	1.00

Basic rules for generation of ultimate load combinations:

1 : 1.00\*LC1 / 1.00\*LC2 / 1.00\*LC3 / 1.00\*LC4 / 1.00\*LC5 / 1.00\*LC6

## List of extreme ultimate load combinations

1/	1	:	+1.00*LC1+1.00*LC2+1.00*LC3
2/	1	:	+1.00*LC1+1.00*LC2+1.00*LC4
3/	1	:	+1.00*LC1+1.00*LC2+1.00*LC5
4/	1	:	+1.00*LC1+1.00*LC2+1.00*LC6

## Nonlinear combination

Combi	Group of init. deformations	dx mm/m	dy mm/m	Group of init. curvatures	Case	coeff
C 1	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	3 LC1	1.00
C 2	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	4 LC2	1.00
C 3	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	5 LC1(-)	1.00
C 4	0	0.00	0.00	0	1 weight	1.00
	0	0.00	0.00	0	2 G	1.00
	0	0.00	0.00	0	6 LC2(-)	1.00

## Subsoils

Name:	Type of position	C1x kN/m <sup>3</sup>	C1y kN/m <sup>3</sup>	C1z kN/m <sup>3</sup>	C2x kN/m	C2y kN/m	SigZpl kN/m <sup>2</sup>
gemischtkörniger Sand	Under plate, block	1000.000	1000.000	30000.000	0.000	0.000	0.000

## Calculation protocol.

## Linear calculation

Number of 2D elements	57	Number of 2D elements	57
Number of 1D elements	16	Number of 1D elements	16
Number of mesh nodes	68	Number of mesh nodes	68
Number of equations	408	Number of equations	408
Loadcases	LC 1 weight		LC 6 LC2(-)
	LC 2 G	Bending theory	Mindlin
	LC 3 LC1	Start of calculation	05.11.2004 11:42
	LC 4 LC2	End of calculation	05.11.2004 11:42
	LC 5 LC1(-)		

## Sum of loads and reactions.

		X	Y	Z			X	Y	Z
loadcase 1	loads	0.0	0.0	-35.0	loadcase 3	loads	-8.7	3.6	-10.4
	reactions	0.0	0.0	0.0		reactions	0.0	0.0	0.0
	contact	0.0	0.0	35.0		contact	8.7	-3.6	10.4
loadcase 2	loads	0.0	0.0	-39.9	loadcase 4	loads	-8.7	3.6	-35.6
	reactions	0.0	0.0	0.0		reactions	0.0	0.0	0.0
	contact	0.0	0.0	39.9		contact	8.7	-3.6	35.6

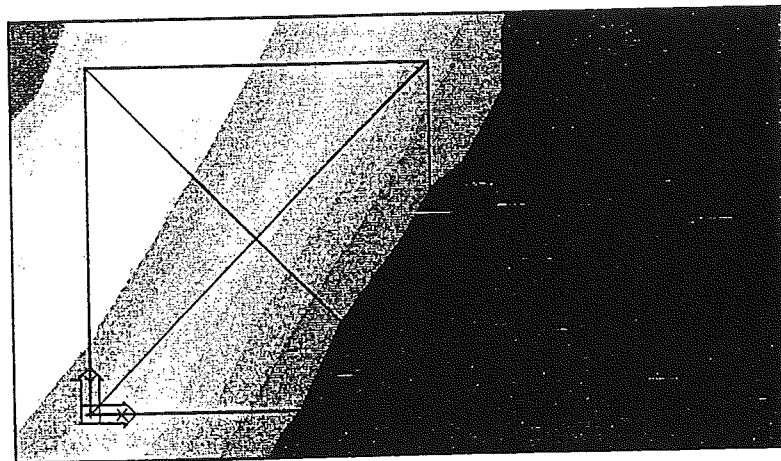
			X	Y	Z
loadcase	5	loads	8.7	-3.6	-10.4
		reactions	0.0	0.0	0.0
		contact	-8.7	3.6	10.4

		X	Y	Z	
loadcase	6	loads	8.7	-3.6	-35.6
		reactions	0.0	0.0	0.0
		contact	-8.7	3.6	35.6

### Nonlinear calculation

Number of 2D elements	57
Number of 1D elements	16
Number of mesh nodes	68
Number of equations	408
Maximum iterations	50
Bending theory	Mindlin

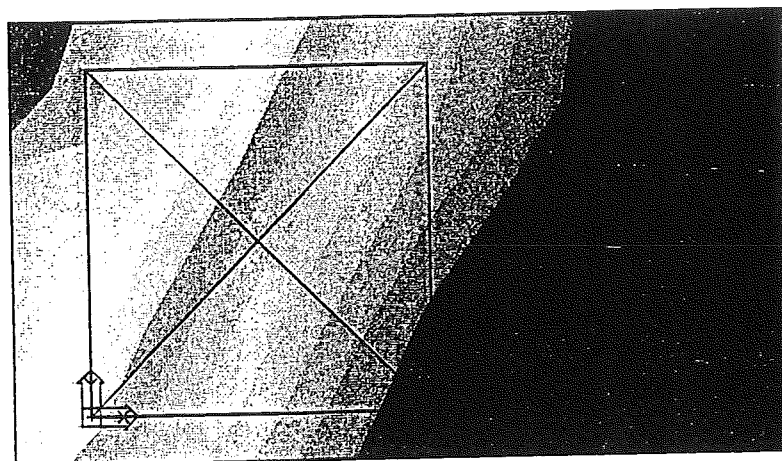
Number Combi	Start	End	NoOfIteration
NC 1	05.11.2004 11:42	05.11.2004 11:42	6
NC 2	05.11.2004 11:42	05.11.2004 11:42	4
NC 3	05.11.2004 11:42	05.11.2004 11:42	4
NC 4	05.11.2004 11:42	05.11.2004 11:42	3



sigma_z (kPa)
108.892
98.389
90.135
81.801
73.667
65.434
57.200
48.966
40.733
32.499
24.265
16.032
7.798
-0.436

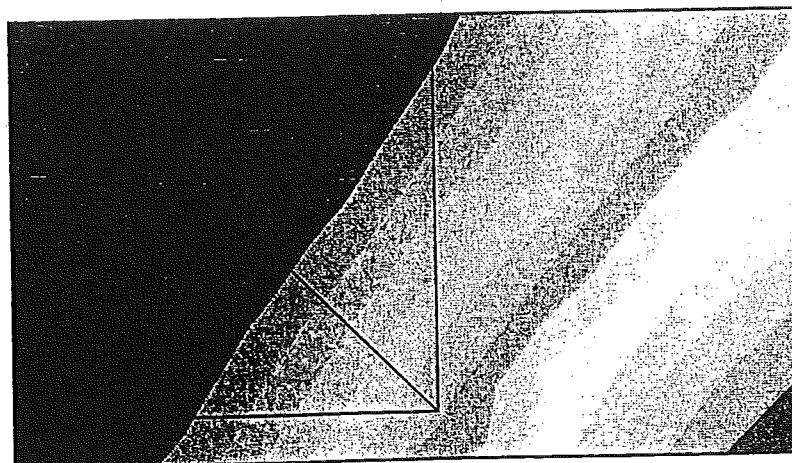
Contact stress - sigma\_z - Nonl. Combi : 1





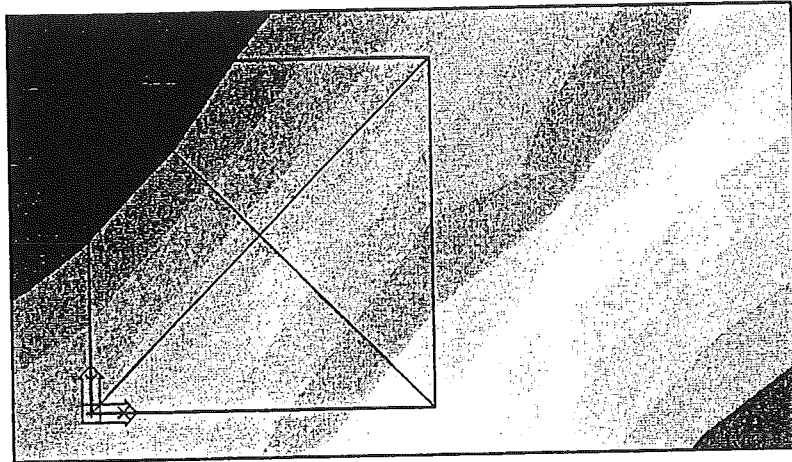
sigmz [kPa]	
112.720	
104.036	
95.344	
86.651	
77.958	
69.265	
60.572	
51.879	
43.187	
34.494	
25.801	
17.108	
8.415	
-0.278	

Contact stress - sigmz - Nonl. Combi : 2



sigmz [kPa]	
88.633	
81.763	
74.893	
68.023	
61.153	
54.283	
47.413	
40.543	
33.673	
26.803	
19.933	
13.063	
6.192	
-0.678	

Contact stress - sigmz - Nonl. Combi : 3



sigmz [kPa]	
75.501	
69.893	
63.878	
58.063	
52.248	
46.434	
40.619	
34.804	
28.989	
23.174	
17.360	
11.545	
5.730	
-0.085	

Contact stress - sigmz - Nonl. Combi : 4

## RESULTS : CONTACT STRESSES

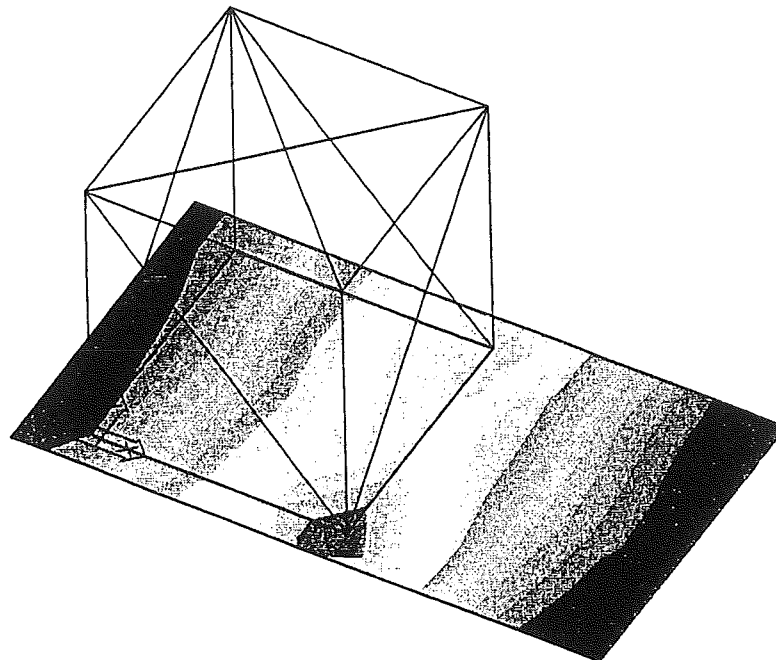
Nonl. Combi:

NC1  
NC2  
NC3  
NC4

Global extremes

node	tauxx [kPa]	tauyy [kPa]	sigmz [kPa]
41	-4.811	4.023	33.640
43	-5.119	-0.938	-0.000
41	4.811	4.023	33.640
63	-2.839	-2.098	-0.000
4	4.365	0.000	112.729
24	-2.243	-1.749	-0.678

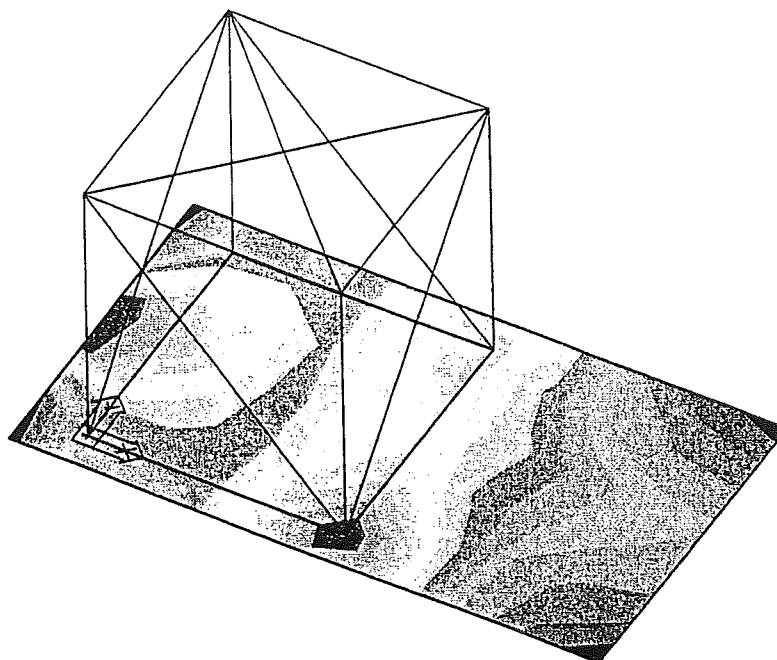
Selection was done for macros: 1



As1- [cm <sup>2</sup> /m]	
3.125	
2.885	
2.645	
2.404	
2.164	
1.923	
1.683	
1.442	
1.202	
0.962	
0.721	
0.481	
0.240	
0.000	

ø 8/15 cm

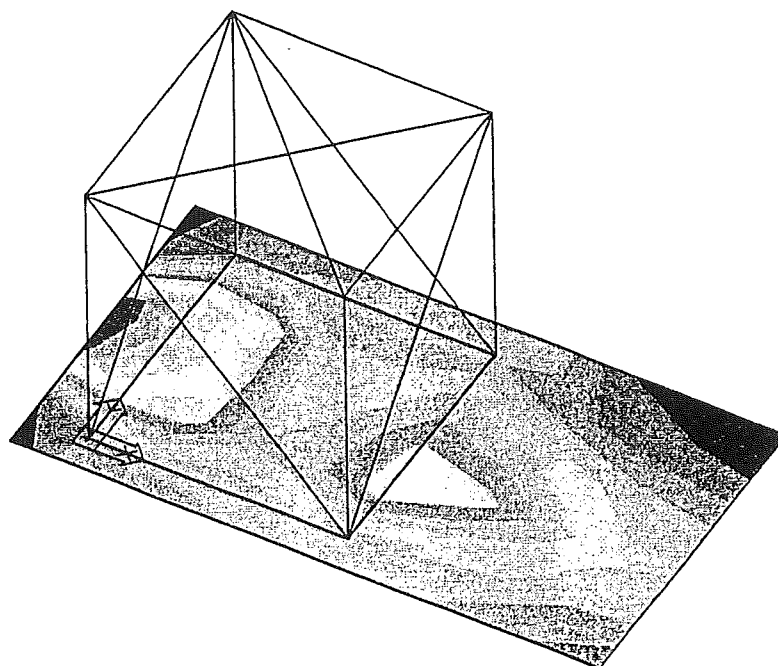
2D reinforcement - As1-



As2- [cm <sup>2</sup> /m]	
0.659	
0.608	
0.557	
0.507	
0.456	
0.405	
0.355	
0.304	
0.253	
0.203	
0.152	
0.101	
0.051	
0.000	

ø 8/25 cm

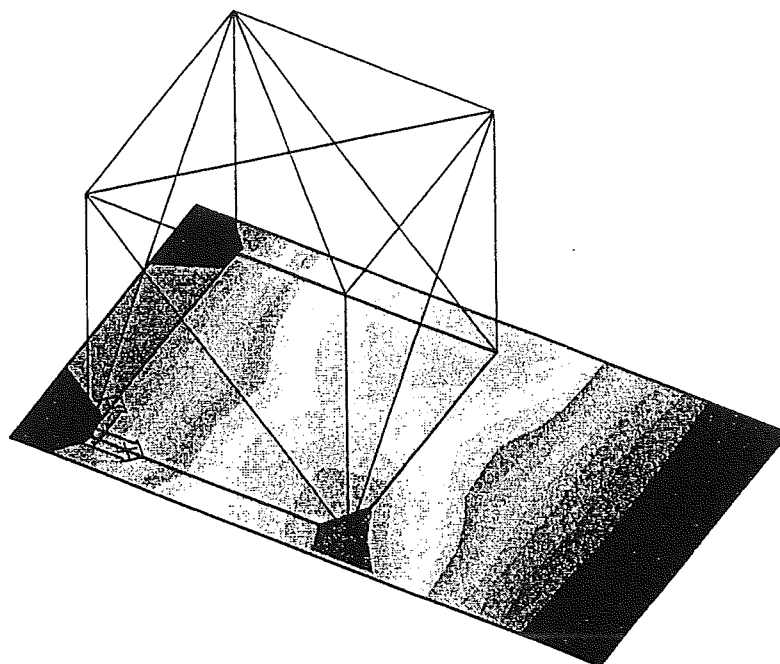
2D reinforcement - As2-



As2+ [cm²/m]	
1.174	
1.083	
0.993	
0.903	
0.813	
0.722	
0.632	
0.542	
0.451	
0.361	
0.271	
0.181	
0.090	
0.000	

φ 8/25 cm

2D reinforcement - As2+



As1+ [cm²/m]	
1.878	
1.733	
1.589	
1.444	
1.300	
1.156	
1.011	
0.867	
0.722	
0.578	
0.433	
0.289	
0.144	
0.000	

φ 8/15 cm

2D reinforcement - As1+

Code for calculation: DIN 1045 7/88

### Explanation of concrete symbols

Abbreviation	Explanation
betaWN	Concrete cube compression strength.
betaR	Design concrete compression strength.
Tau01	1st shear stress limit according Table 13.
Tau02	2nd shear stress limit according Table 13.
Tau03	3rd shear stress limit according Table 13.

### Concrete characteristics

	B 25
betaWN	25000.000 kPa
betaR	17500.000 kPa
Tau011_1 plates	350.000 kPa
Tau011_2 plates	500.000 kPa
Tau02 plates	1800.000 kPa
Tau012 beams	750.000 kPa
Tau02 beams	1800.000 kPa
Tau03 beams	3000.000 kPa

### Explanation of reinforcement steel symbols

Abbreviation	Explanation
betaS	Characteristic yield strength of reinforcement

### Steel characteristics

	BSt 420
betaS	420000.000 kPa
E modulus	200000000.000 kPa

### Input parameters

Description	Percentage
Maximum % of reinforcement	9.00
Minimum % of net reinforcement	0.00
Minimum % of pressure reinforcement	0.50
Minimum % of tension reinforcement	0.00
Minimum % of transverse reinforcement	20.00

### Shear mode

Tension reinforcement is partially anchored in the field.

Description	Value
height < 7 cm represents increase of internal forces ( § 17.2.1 (6) )	ON
Structural reinforcement of deep beam	OFF

### Global extremes

Necessary areas

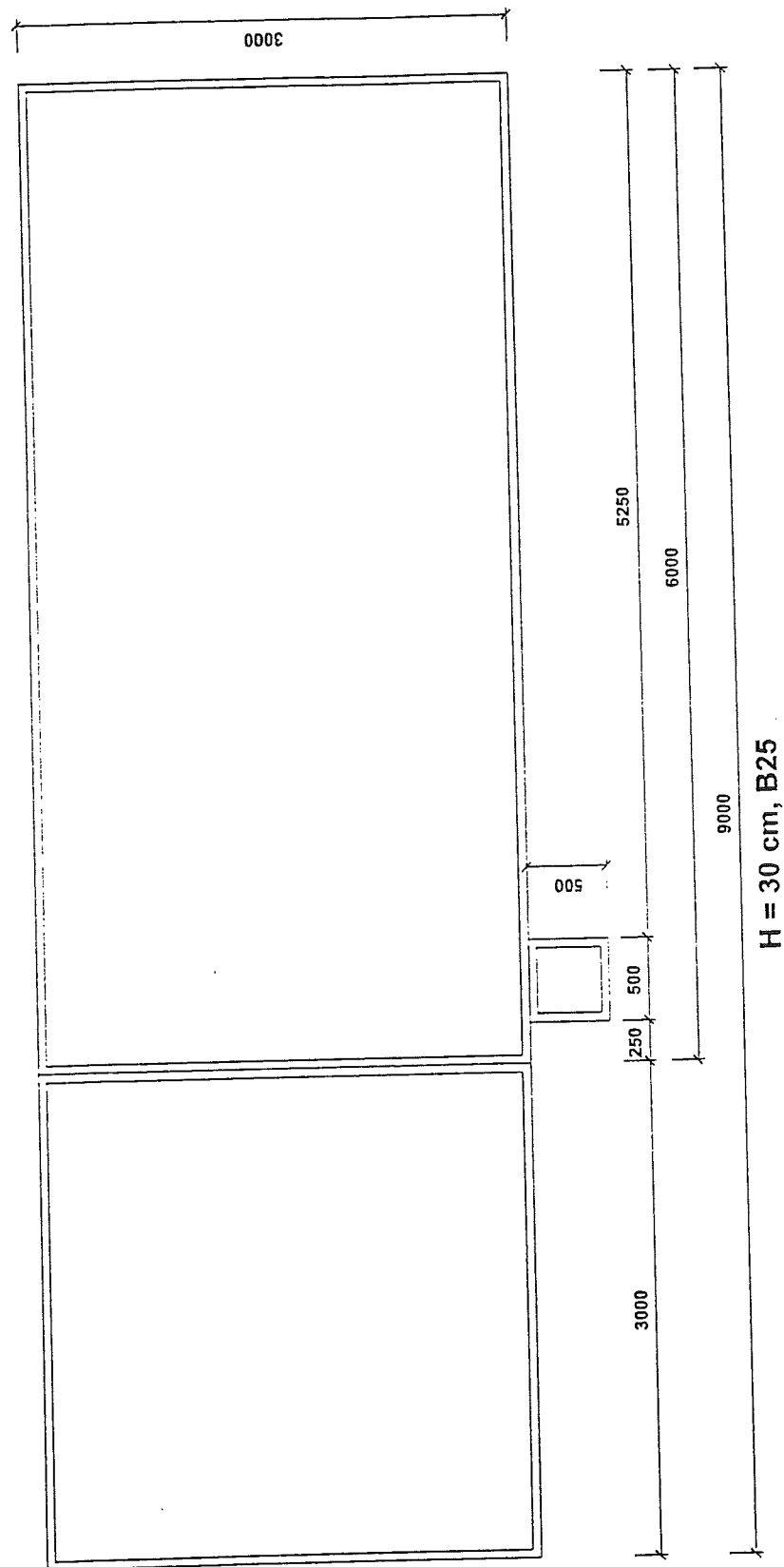
node	As1+ [cm^2/m]	As2+ [cm^2/m]	As3+ [cm^2/m]	As3- [cm^2/m]	As2- [cm^2/m]	As1- [cm^2/m]	Ass [cm^2/m^2]	tau [MPa]	tau0 [MPa]
6	2.530	0.422	~	~	0.602	2.899	0.000	0.00	0.14
3	0.000	0.000	~	~	0.000	0.000	0.000	0.00	0.02
62	0.181	1.141	~	~	0.710	0.088	0.000	0.00	0.04
3	0.000	0.000	~	~	0.000	0.000	0.000	0.00	0.02
62	0.181	1.141	~	~	0.710	0.088	0.000	0.00	0.04
1	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00
6	2.530	0.422	~	~	0.602	2.899	0.000	0.00	0.14
1	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00
	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00
	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00
	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00
	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00
6	2.530	0.422	~	~	0.602	2.899	0.000	0.00	0.14
1	0.002	0.024	~	~	0.000	0.000	0.000	0.00	0.00

Selection was done for macros: 1

## Foundation Control Box



Ingenieurgesellschaft mbH  
Saarbrücker Straße 9  
66130 Saarbrücken-Brebach  
Telefon (0681) 8 83 13-0  
Telefax (0681) 8 83 13-88  
E-Mail [info@kmw-ino.de](mailto:info@kmw-ino.de)





**Basic data****Type of structure : General XYZ**

Number of nodes: 10  
 Number of members: 0  
 Number of 1D macros: 0  
 Number of bound. lines: 11  
 Number of 2D macros: 3  
 Number of profiles : 0  
 Number of cases: 7  
 Number of materials: 1

**Material**

Name: B 25

B 25

E modulus 30000.00 MPa  
 Poisson coeff. 0.20  
 Density 2500.000 kg/m<sup>3</sup>  
 Extensibility 0.01 mm/m.K

**List of material - Macro2D****Group of members :**

1/3

no.	Name:	quality	unit volume weight kgm <sup>3</sup>	volume m <sup>3</sup>	weight kg
4	B 25	B 25	2500.00	8.17	20437.50

The total weight of the structure: 20437.50 kg

**Nodes**

node	X m	Y m	Z m	node	X m	Y m	Z m
1	0.000	0.000	0.000	6	-3.000	3.000	0.000
2	6.000	0.000	0.000	7	0.250	-0.500	0.000
3	6.000	3.000	0.000	8	0.750	-0.500	0.000
4	0.000	3.000	0.000	9	0.750	0.000	0.000
5	-3.000	0.000	0.000	10	0.250	0.000	0.000

**Boundaries**

bound. line	type	node	bound. line	type	node	bound. line	type	node
1	Line	1,2	4	Line	4,1	7	Line	6,5
2	Line	2,3	5	Line	5,1	8	Line	7,8
3	Line	3,4	6	Line	4,6	9	Line	8,9

bound. line	type	node	bound. line	type	node
10	Line	9,10	11	Line	10,7

## 2D Macros

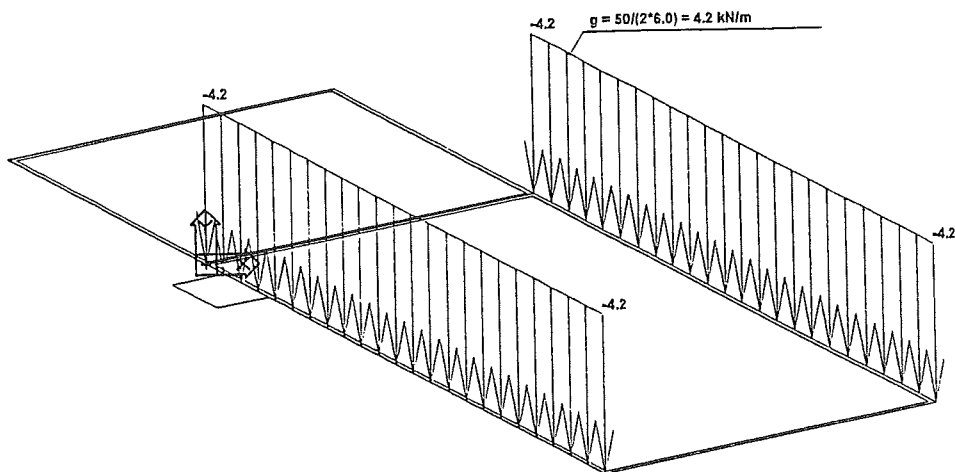
num	type		num	type	
1	B 25	Thickness 0.30 m	3	B 25	Thickness 0.30 m
	Boundary:	1,2,3,4		Boundary:	5,4,6,7
2	B 25	Thickness 0.30 m		Boundary:	8,9,10,11

## Soil - 2D macro

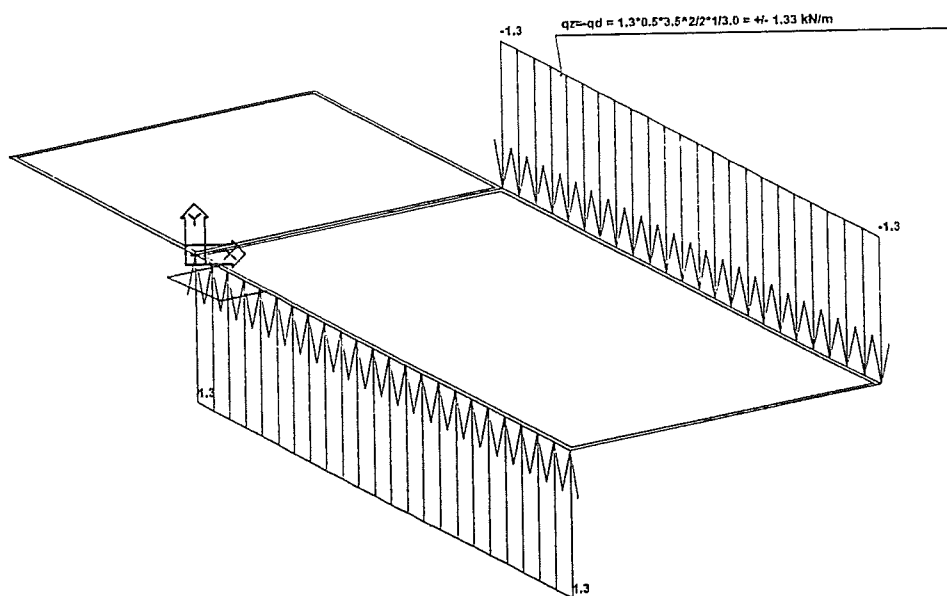
Index	2D macro	Name of subsoil
1	1	gemischtkörniger Sand
2	2	gemischtkörniger Sand
3	3	gemischtkörniger Sand

## Loadcases

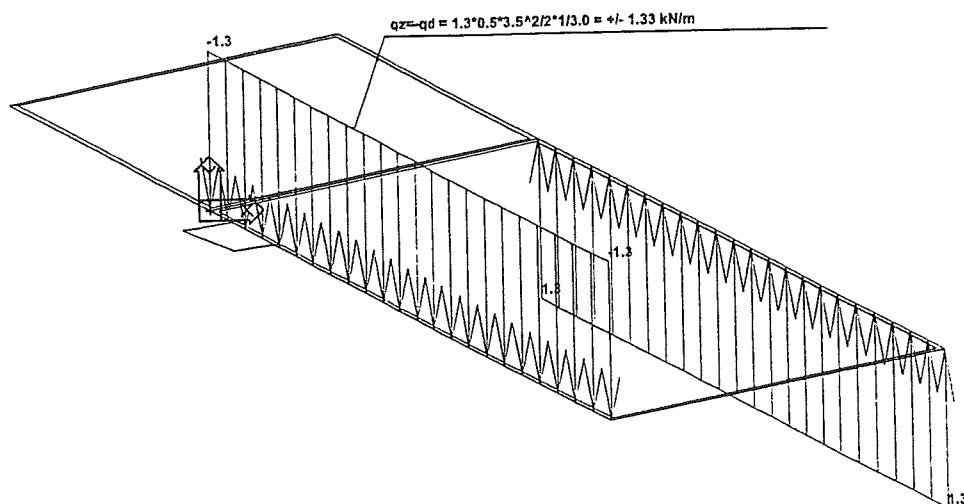
Case	Name:	Description
1	weight of the concrete	Self weight. Direction -Z
2	weight Control Box	Permanent - Loads
3	Wind +Y	Variable - Wind Excl.
4	Wind -Y	Variable - Wind Excl.
5	Snow	Variable - Snow
6	Pipe Bridge min V	Variable - P
7	Pipe Bridge max V	Variable - P



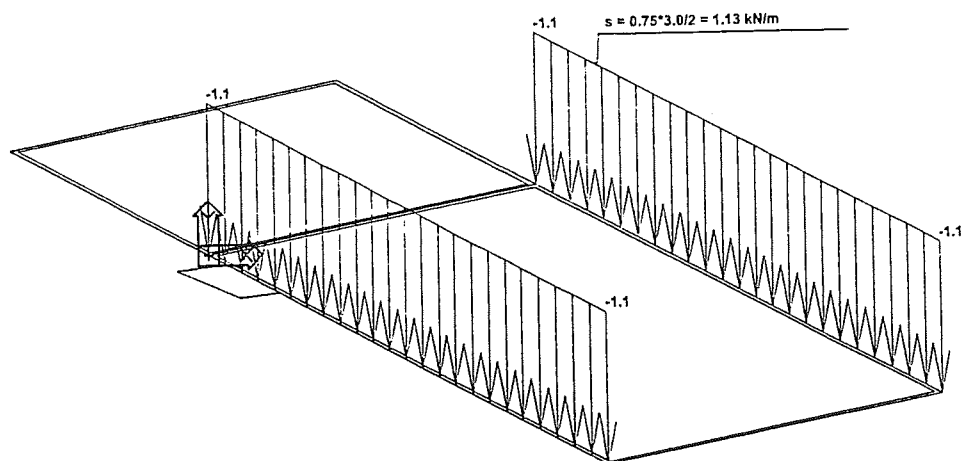
## 2. weight Control Box



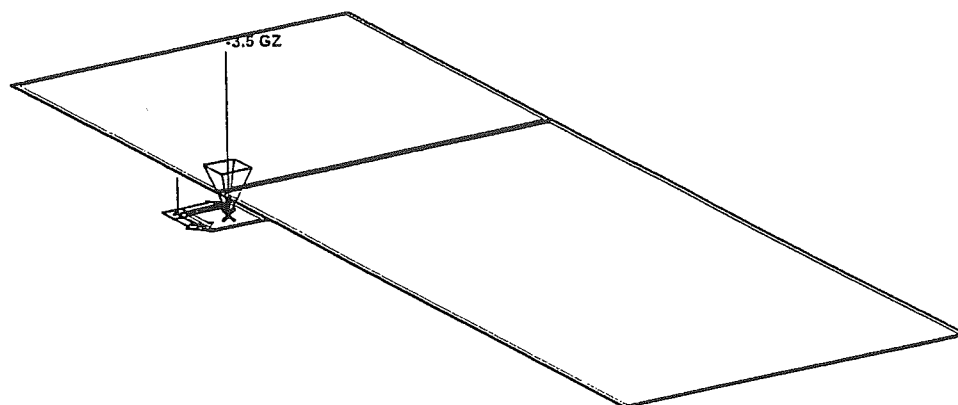
## 3. Wind +Y



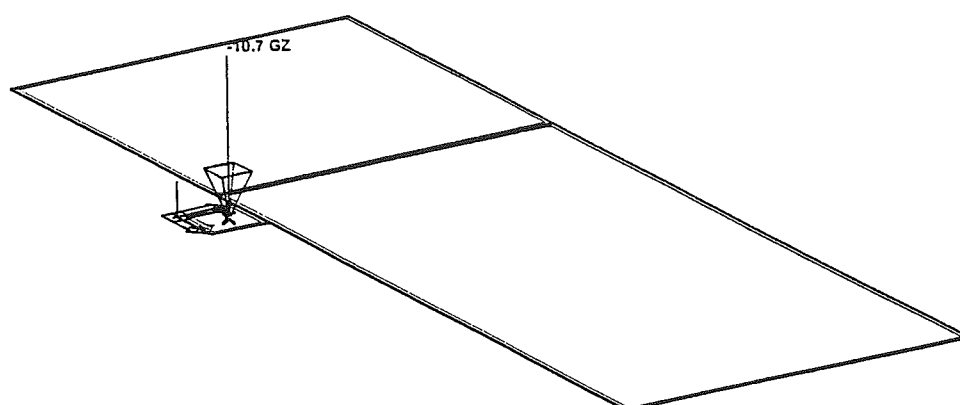
#### 4. Wind -Y



#### 5. Snow



6. Pipe Bridge min V



7. Pipe Bridge max V

## Variable loads group

Name: **WIND**

Wind Excl.

Snow

P

## Loadcase no. 2 - distributed loads

bound	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
1	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-4.20
	kN/m	1.00			len	0.00	0.00	-4.20
3	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-4.20
	kN/m	1.00			len	0.00	0.00	-4.20

## Loadcase no. 3 - distributed loads

bound	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
1	force	0.00 rel	0.00	0.00	glo	0.00	0.00	1.33
	kN/m	1.00			len	0.00	0.00	1.33
3	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-1.33
	kN/m	1.00			len	0.00	0.00	-1.33

## Loadcase no. 4 - distributed loads

bound	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
1	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-1.33
	kN/m	1.00			len	0.00	0.00	-1.33
3	force	0.00 rel	0.00	0.00	glo	0.00	0.00	1.33
	kN/m	1.00			len	0.00	0.00	1.33

## Loadcase no. 5 - distributed loads

bound	type	dx m	exY m	exZ m		X beg end	Y beg end	Z beg end
1	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-1.13
	kN/m	1.00			len	0.00	0.00	-1.13
3	force	0.00 rel	0.00	0.00	glo	0.00	0.00	-1.13
	kN/m	1.00			len	0.00	0.00	-1.13

## Loadcase no. 6 - Free loads

## Forces/Moments

Index	x m	y m	Fx / Mx kN / kNm	Fy / My kN / kNm	Fz / Mz kN / kNm	System	Validity
1	0.25	0.30	0.00	0.00	-3.48	Global	All

## Loadcase no. 7 - Free loads

## Forces/Moments

Index	x m	y m	Fx / Mx kN / kNm	Fy / My kN / kNm	Fz / Mz kN / kNm	System	Validity
1	0.25	0.30	0.00	0.00	-10.71	Global	All

## Combinations

Combi	Norm	Case	coeff
1.	User-ultimate	1 weight of the concrete	1.00
		2 weight Control Box	1.00
		3 Wind +Y	1.00
		4 Wind -Y	1.00
		5 Snow	1.00
		6 Pipe Bridge min V	1.00
		7 Pipe Bridge max V	1.00

Basic rules for generation of ultimate load combinations:

1 : 1.00\*LC1 / 1.00\*LC2 / 1.00\*LC3 / 1.00\*LC4 / 1.00\*LC5 / 1.00\*LC6 / 1.00\*LC7

## Subsoils

Name:	Type of position	C1x kN/m <sup>3</sup>	C1y kN/m <sup>3</sup>	C1z kN/m <sup>3</sup>	C2x kN/m	C2y kN/m	SigZpl kN/m <sup>2</sup>
gemischtkörniger Sand	Under plate, block	1000.000	1000.000	30000.000	0.000	0.000	0.000

## Calculation protocol.

## Linear calculation

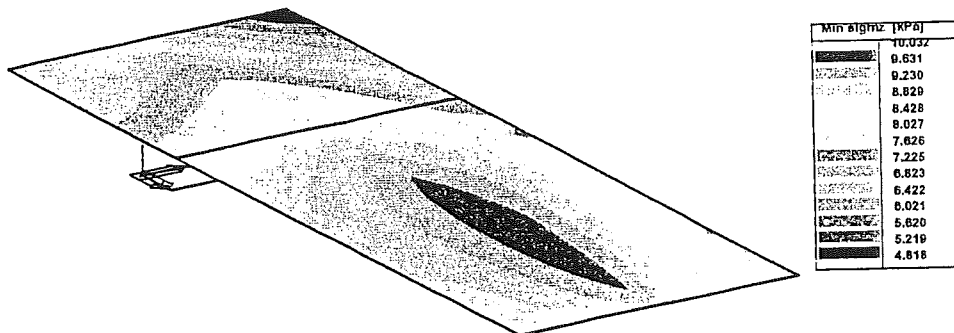
Number of 2D elements	329
Number of 1D elements	0
Number of mesh nodes	373
Number of equations	2238
Loadcases	LC 1 weight of the concrete
	LC 2 weight Control Box
	LC 3 Wind +Y
	LC 4 Wind -Y
	LC 5 Snow
	LC 6 Pipe Bridge min V
	LC 7 Pipe Bridge max V
Bending theory	Mindlin
Start of calculation	08.11.2004 07:47

Number of 2D elements 329  
 Number of 1D elements 0  
 Number of mesh nodes 373  
 Number of equations 2238  
 End of calculation 08.11.2004 07:47

## Sum of loads and reactions.

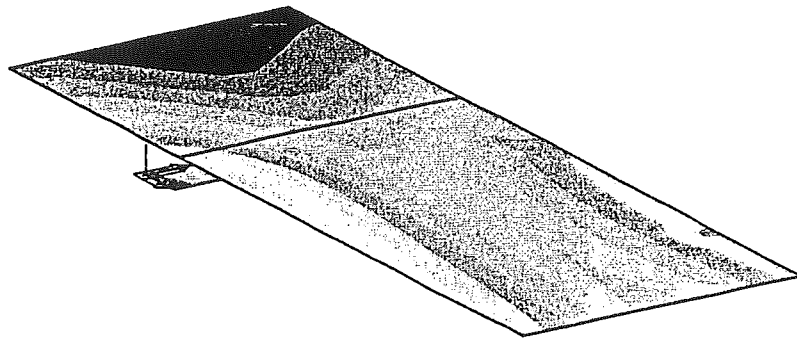
		X	Y	Z
loadcase 1	loads	0.0	0.0	-204.4
	reactions	0.0	0.0	0.0
	contact	0.0	0.0	204.4
loadcase 2	loads	0.0	0.0	-50.4
	reactions	0.0	0.0	0.0
	contact	0.0	0.0	50.4
loadcase 3	loads	0.0	0.0	-0.0
	reactions	0.0	0.0	0.0
	contact	0.0	0.0	-0.0
loadcase 4	loads	0.0	0.0	0.0
	reactions	0.0	0.0	0.0

		X	Y	Z
loadcase 5	contact	0.0	0.0	0.0
	loads	0.0	0.0	-13.6
	reactions	0.0	0.0	0.0
loadcase 6	contact	0.0	0.0	13.6
	loads	0.0	0.0	-3.5
	reactions	0.0	0.0	0.0
loadcase 7	contact	0.0	0.0	3.5
	loads	0.0	0.0	-10.7
	reactions	0.0	0.0	0.0
	contact	0.0	0.0	10.7



Contact stress - min sigmz - FEM Combi : 1





Max sigmz [kPa]	
10.436	10.436
16.475	16.475
17.512	17.512
16.540	16.540
15.587	15.587
14.624	14.624
13.661	13.661
12.698	12.698
11.735	11.735
10.772	10.772
9.809	9.809
8.847	8.847
7.884	7.884
6.921	6.921

Contact stress - max sigmz - FEM Combi : 1

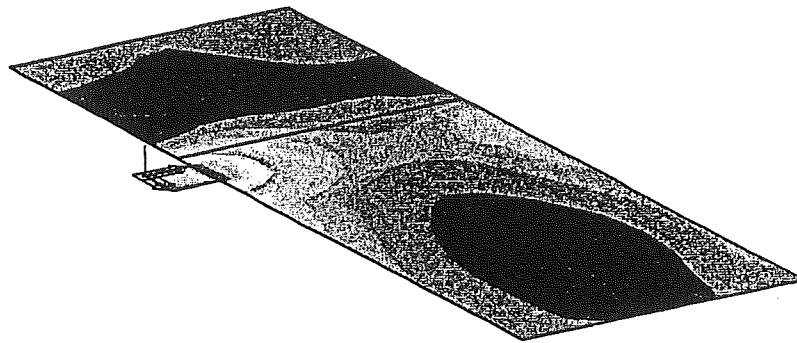
## RESULTS : CONTACT STRESSES

FEM Combi:  
C1 User-ultimate

### Global extremes

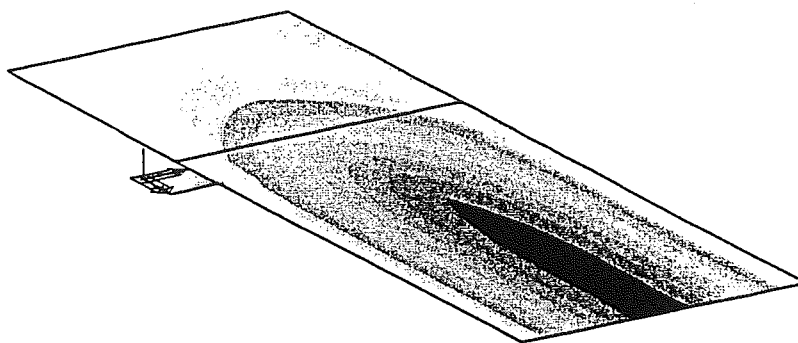
node	sigmz [kPa]
8	19.438
6	4.818

Selection was done for macros: 1/3



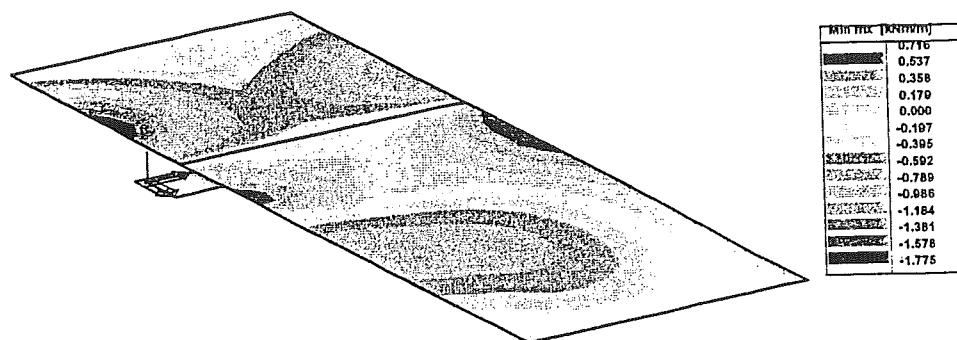
Max mx [kNm/m]
5.409
4.958
4.607
4.057
3.806
3.155
2.704
2.254
1.803
1.352
0.901
0.451
0.000
-0.348

Internal force - max mx - FEM Combi : 1

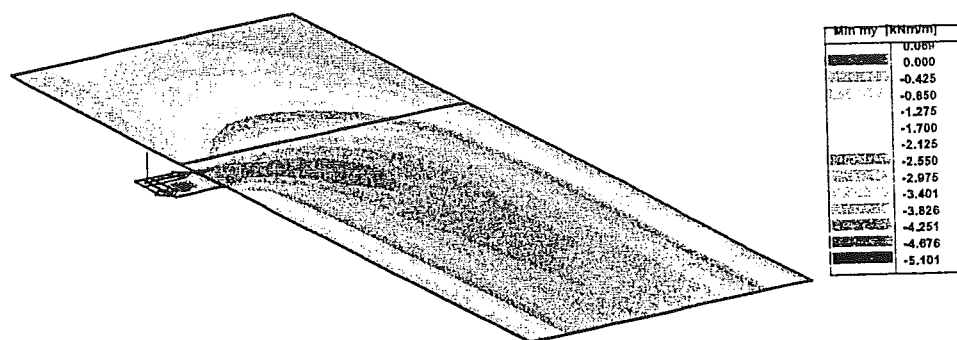


Max my [kNm/m]
1.285
0.965
0.643
0.322
0.000
-0.328
-0.656
-0.984
-1.312
-1.640
-1.968
-2.296
-2.623
-2.951

Internal force - max my - FEM Combi : 1



Internal force - min mx - FEM Combi : 1



Internal force - min my - FEM Combi : 1

**RESULTS : INTERNAL FORCES**

**FEM Combi:**

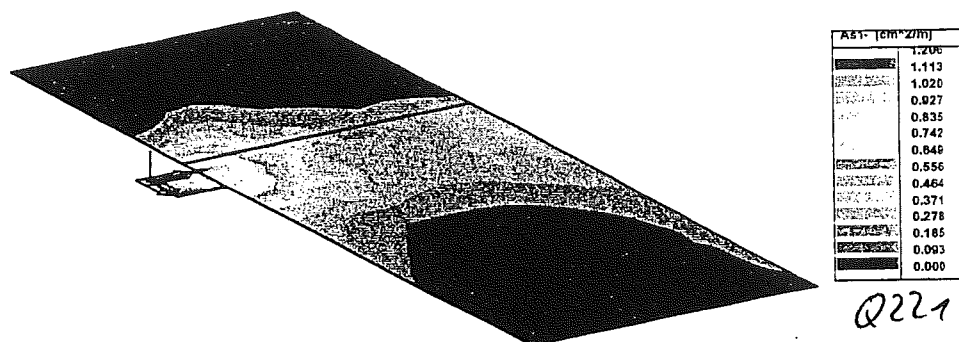
C1 Eigen-Tragfähigk.

**Global extremes**

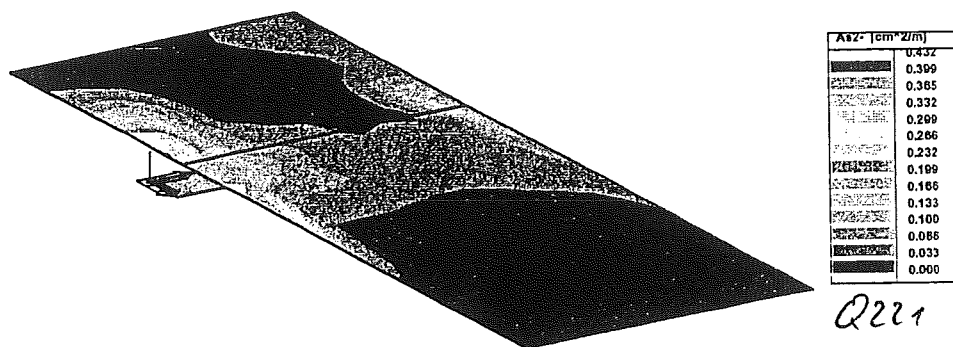
Rotation of the local system: No  
Basic magnitudes - bending

node	mx [kNm/m]	my [kNm/m]	mxy [kNm/m]	qx [kN/m]	qy [kN/m]
9	5.409	1.286	1.041	7.352	-0.657
264	-1.775	-0.066	-0.021	-0.402	-0.755
9	5.409	1.286	1.041	7.352	-0.657
10	0.419	-5.101	0.068	1.733	-24.247
1	2.273	0.004	3.271	42.984	-1.400
246	0.716	0.055	-2.032	-29.289	-8.455
1	2.273	0.004	3.271	42.984	-1.400
246	0.716	0.055	-2.032	-29.289	-8.455
3	0.211	0.128	0.010	0.001	6.226
371	-0.311	-0.946	-0.621	0.352	-33.207

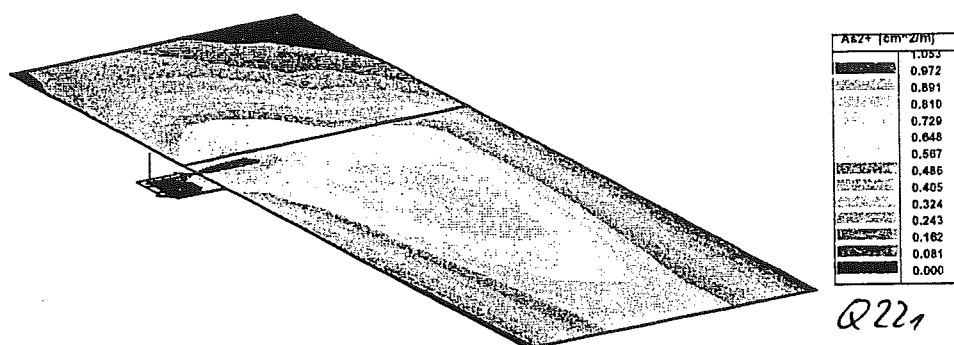
Selection was done for macros: 1/3



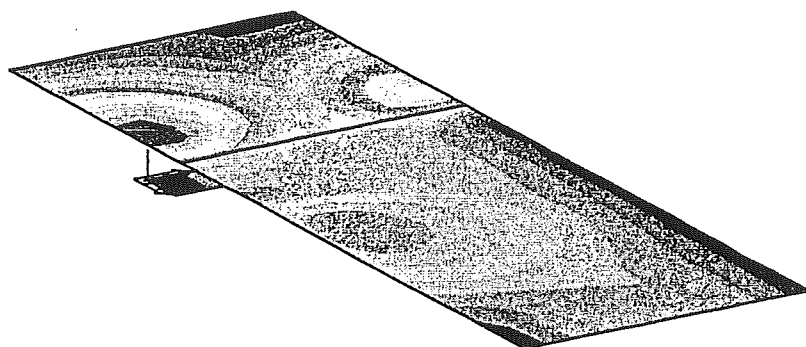
2D reinforcement - As1-



2D reinforcement - As2-



2D reinforcement - As2+



As1+ [cm²/m]	
0.536	
0.513	
0.471	
0.428	
0.385	
0.342	
0.299	
0.257	
0.214	
0.171	
0.128	
0.086	
0.043	
0.000	

Q221

2D reinforcement - As1+

Code for calculation: DIN 1045 7/88

### Explanation of concrete symbols

Abbreviation	Explanation
betaWN	Concrete cube compression strength.
betaR	Design concrete compression strength.
Tau01	1st shear stress limit according Table 13.
Tau02	2nd shear stress limit according Table 13.
Tau03	3rd shear stress limit according Table 13.

### Concrete characteristics

	B 25
betaWN	25000.000 kPa
betaR	17500.000 kPa
Tau011_1 plates	350.000 kPa
Tau011_2 plates	500.000 kPa
Tau02 plates	1800.000 kPa
Tau012 beams	750.000 kPa
Tau02 beams	1800.000 kPa
Tau03 beams	3000.000 kPa

## Explanation of reinforcement steel symbols

Abbreviation	Explanation
betaS	Characteristic yield strength of reinforcement

## Steel characteristics

	BSt-420
betaS	420000.000 kPa
E modulus	200000000.000 kPa

## Input parameters

Description	Percentage
Maximum % of reinforcement	9.00
Minimum % of net reinforcement	0.00
Minimum % of pressure reinforcement	0.50
Minimum % of tension reinforcement	0.00
Minimum % of transverse reinforcement	20.00

## Shear mode

Tension reinforcement is partially anchored in the field.

Description	Value
height < 7 cm represents increase of internal forces ( § 17.2.1 (6) )	ON
Structural reinforcement of deep beam	OFF

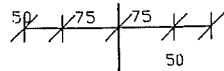
## Global extremes

## Necessary areas

node	As1+ [cm <sup>2</sup> /m]	As2+ [cm <sup>2</sup> /m]	As3+ [cm <sup>2</sup> /m]	As3- [cm <sup>2</sup> /m]	As2- [cm <sup>2</sup> /m]	As1- [cm <sup>2</sup> /m]	Ass [cm <sup>2</sup> /m <sup>2</sup> ]	tau [MPa]	tau0 [MPa]
267	0.556	0.450	~	~	0.219	0.117	0.000	0.00	0.01
2	0.000	0.000	~	~	0.005	0.026	0.000	0.00	0.01
10	0.158	1.053	~	~	0.214	1.206	0.000	0.00	0.02
2	0.000	0.000	~	~	0.005	0.026	0.000	0.00	0.01
270	0.436	0.416	~	~	0.432	0.364	0.000	0.00	0.04
117	0.127	0.633	~	~	0.000	0.000	0.000	0.00	0.00
10	0.158	1.053	~	~	0.214	1.206	0.000	0.00	0.02
7	0.004	0.000	~	~	0.022	0.000	0.000	0.00	0.00
1	0.232	0.610	~	~	0.369	0.851	0.000	0.00	0.04
	0.232	0.610	~	~	0.369	0.851	0.000	0.00	0.04
	0.232	0.610	~	~	0.369	0.851	0.000	0.00	0.04
	0.232	0.610	~	~	0.369	0.851	0.000	0.00	0.04
266	0.550	0.291	~	~	0.268	0.087	0.000	0.00	0.06
5	0.049	0.049	~	~	0.009	0.009	0.000	0.00	0.00

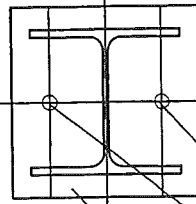
Selection was done for macros: 1/3

TOP VIEW



FORMWORK FLOOR SLAB FOR CONTROL\_BOX  
SEE DRAWING NO 7574-13

HEA 200



SECTION



2x HST M16

BASE PLATE  
250x25x250mm  
STEEL S 235 JR

ARE IN mm

30



Rev.	Revisions	Date	Name	checked

Plan-Nr. :

FORMWORK FLOOR SLAB FOR CONTROL\_BOX  
SEE DRAWING NO 7574-13

PIPE AND CABLE BRIDGE  
SEE DRAWING NO 7574-7

Dipl.-Ing. Mühlhäusler  
Dipl.-Ing. Weisong



Saarbrücker Strasse 9 - 10  
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AIR LIQUIDE

Air Liquide AGS GmbH

Date :	Name :	Checked :	History file :
24.01.2005	Speicher		
Job code: K70101	Reference: ASU No. 9 KOSICE	Scale	Original format A4
Title:	Drawing No.:	Sheet:	of Sheets
Replaces: 79_-----	Replaced by: 79_-----		Rev.
PIPE AND CABLE BRIDGE			