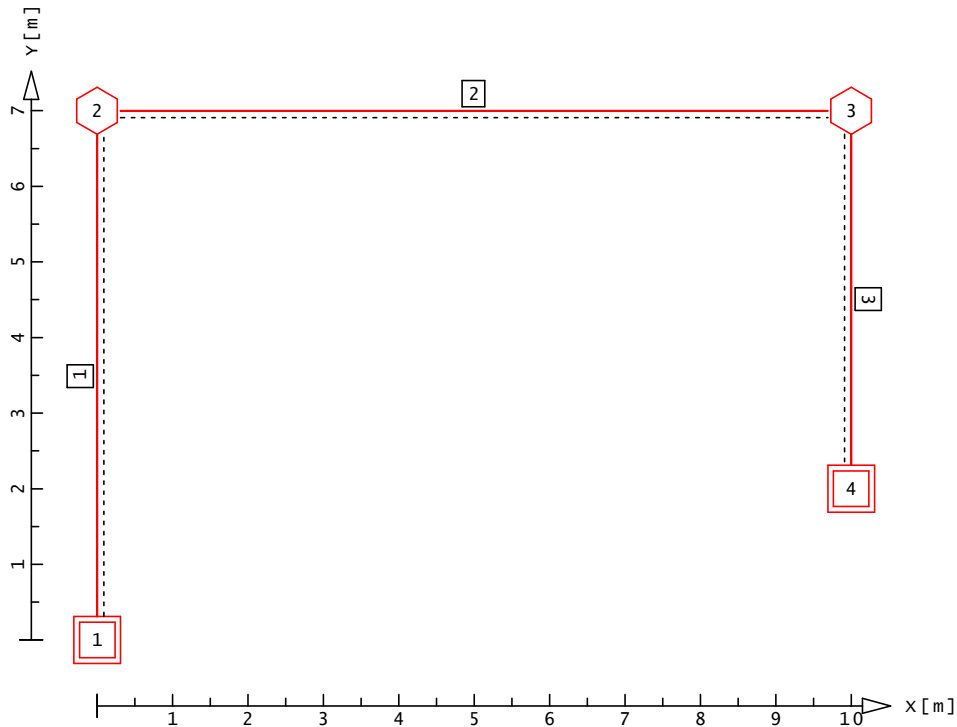


Pos. B610 Ebenes Stabwerk mit Lastfallüberlagerung

Als Verkehrslast sind vorhanden: vertikale Nutzlast, Wind von links bzw. von rechts und eine Anpralllast

System
M 1:100



Knotenbeschreibung		Knoten	X [m]	Y [m]	Knoten	X [m]	Y [m]
		1 XYR	0.00	0.00	2	0.00	7.00
		3	10.00	7.00	4 XYR	10.00	2.00

Festhaltung: x=horizontal Y=vertikal R=Drehung

Stabbeschreibung		St	von Knoten	bis Knoten	I [cm ⁴]	A [cm ²]	h [mm]	Mnr
		1	1	2	14920	118	260	1
		2	2	3	18260	113	290	1
		3	3	4	14920	118	260	1

Materialwerte	Elastizitätsmodul	E	=	210000	MN/m ²
	Temperaturdehnzahl	a _T	=	1.2e-005	1/K

BelastungBild 1
M 1:100

Lastfall 1+2

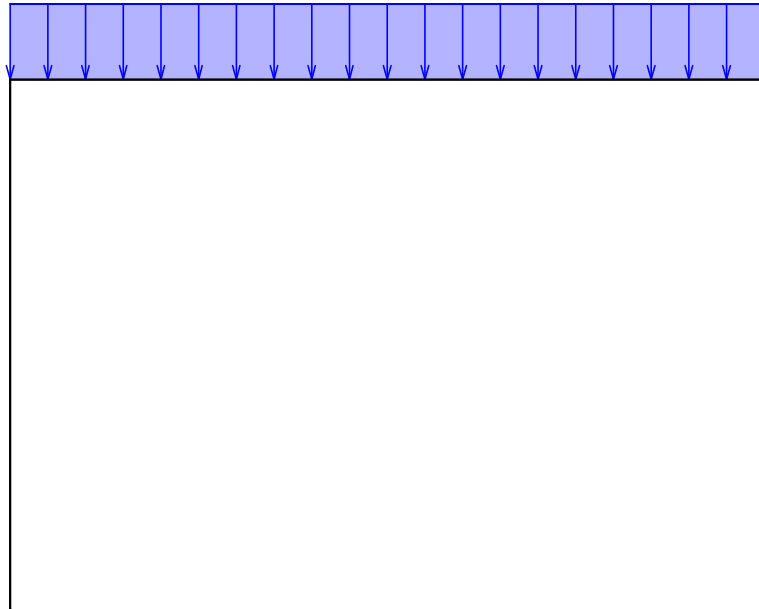


Bild 2
M 1:100

Lastfall 3+5

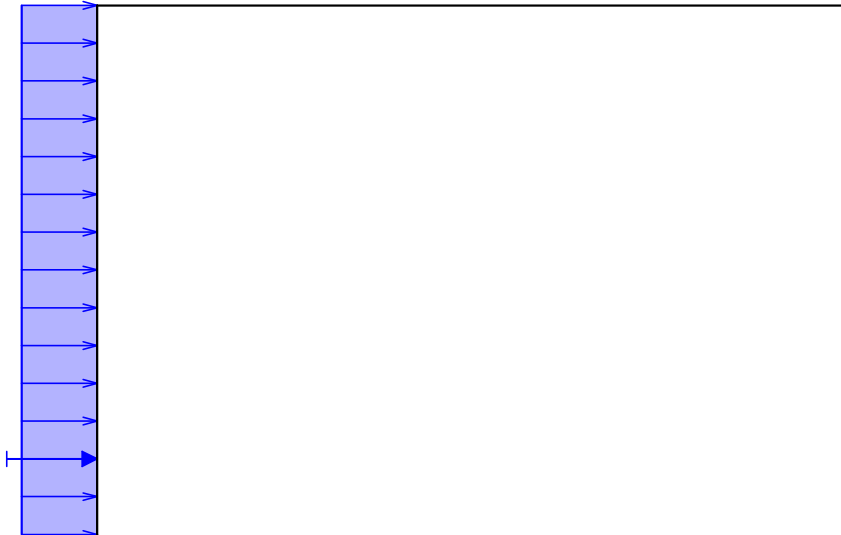


Bild 3
M 1:100

Lastfall 4



Lf	Lastart	St	K	R	s _l /a [m]	s _r /s [m]	q _{li} /Q [kN/m, kN]	q _{re} /M [kN/m, kNm]
1	Gleichlast	2		Y			6.00	6.00
2	Gleichlast	2		Y			2.00	2.00
3	Gleichlast	1		X			2.00	2.00
4	Gleichlast	3		X			-2.00	-2.00
5	Einzellast	1		X	1.00		50.00	

Kombinationen

Lk	Art	Bemerkung
1	Min/Max	wind von links
2	Min/Max	wind von rechts
3	Min/Max	außergewöhnl. Kombination + w _l
4	Min/Max	außergewöhnl. Kombination + w _r

Lastkombinationsfaktoren

Lk	*LF 1	LF 2	LF 3	LF 4	LF 5	LF 6
1	1.35	1.50	1.35			
2	1.50			1.50		
3	1.00	1.00	1.00		1.00	
4	1.00	1.00		1.00	1.00	
5	1.00	1.00	1.00			
6	1.00			1.00		
7	1.00	1.00	1.00		1.00	
8	1.00	1.00		1.00	1.00	

* = Lastfall ständig vorhanden

Schnittgrößen
Lastkombination 1

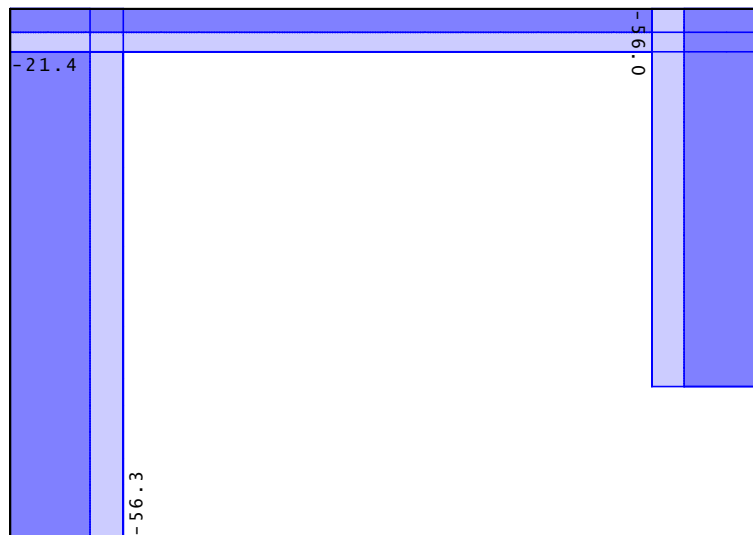
Stab	x [m]	Maximalwerte			Minimalwerte		
		N [kN]	Q [kN]	M [kNm]	N [kN]	Q [kN]	M [kNm]
1	0.00	-39.79	1.80	42.00	-56.31	-16.09	5.69
	0.67				-39.79	0.00	6.29
	1.40	-39.79	-1.98	19.47	-56.31	-16.09	5.56
	2.80	-39.79	-5.76	0.14	-56.31	-16.09	-3.05
	4.20	-39.79	-9.54	-10.57	-56.31	-16.09	-25.58
	5.60	-39.79	-11.74	-26.57	-56.31	-17.67	-48.11
	7.00	-39.79	-11.74	-47.87	-56.31	-21.45	-70.63
2	0.00	-11.74	56.31	-47.87	-21.45	39.79	-70.63
	2.00	-11.74	34.11	20.86	-21.45	23.59	14.44
	4.00	-11.74	11.91	65.81	-21.45	7.39	46.50
	4.91				-17.10	0.00	49.87
	5.07	-16.09	0.00	72.20			
	6.00	-11.74	-7.51	67.43	-21.45	-11.59	45.08
	8.00	-11.74	-23.71	24.65	-21.45	-33.79	11.26
10.00	-11.74	-39.91	-45.63	-21.45	-55.99	-71.85	
3	0.00	-39.91	21.45	-45.63	-55.99	11.74	-71.85
	1.00	-39.91	21.45	-33.89	-55.99	11.74	-50.40
	2.00	-39.91	21.45	-20.75	-55.99	11.74	-30.35
	3.00	-39.91	21.45	-3.65	-55.99	11.74	-14.26
	4.00	-39.91	21.45	13.95	-55.99	11.74	1.33
	5.00	-39.91	21.45	35.40	-55.99	11.74	13.07

Extreme Feldmomente sind fett gedruckt

Auflagerkräfte Lastkombination 1

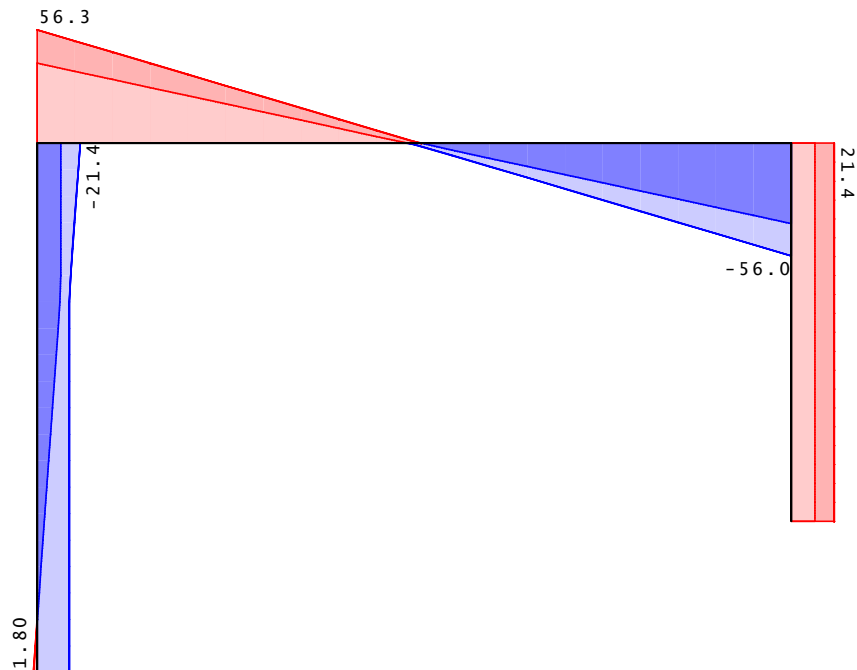
K	Maximalwerte			Minimalwerte		
	X [kN]	Y [kN]	M [kNm]	X [kN]	Y [kN]	M [kNm]
1	16.09	56.31	-42.00	-1.80	39.79	-5.69
	-1.80	39.79	-5.69	16.09	56.31	-42.00
4	-11.74	39.91	13.07	-21.45	55.99	35.40
	-21.45	55.99	35.40	-11.74	39.91	13.07

Extremwerte (fett gedruckt) mit zugehörigen Größen

Normalkraft (kN) Lastkombination 1
 M 1:100


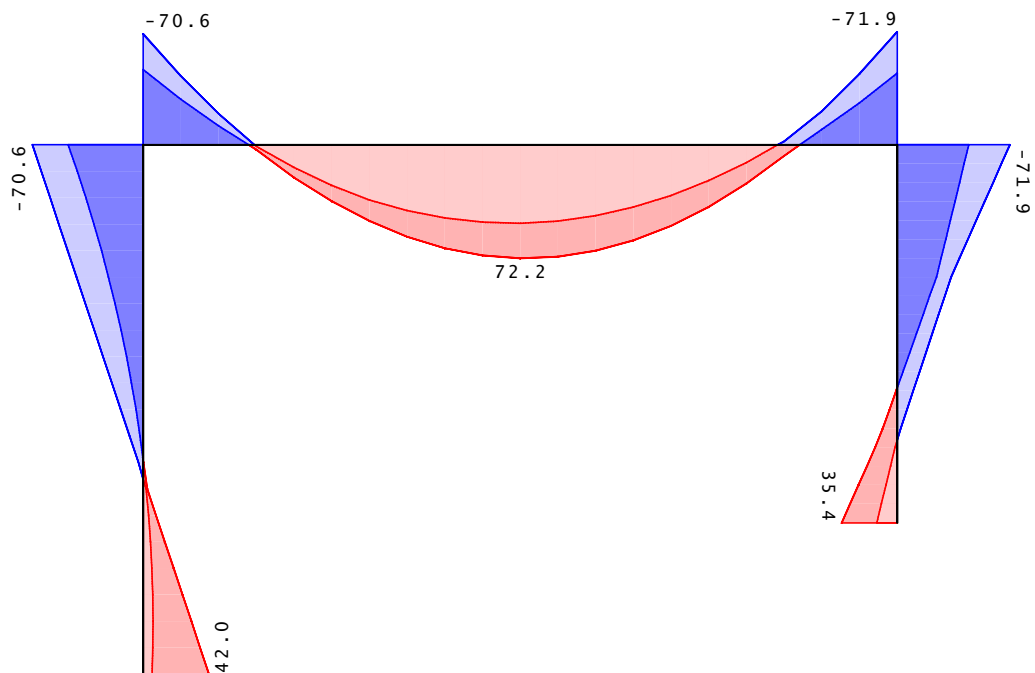
Querkraft (kN)
M 1:100

Lastkombination 1



Biegemoment (kNm)
M 1:100

Lastkombination 1



Schnittgrößen Lastkombination 2

Stab	x [m]	Maximalwerte			Minimalwerte		
		N [kN]	Q [kN]	M [kNm]	N [kN]	Q [kN]	M [kNm]
1	0.00	-45.66	-13.05	41.75	-46.82	-14.95	34.05
	1.40	-45.66	-13.05	20.82	-46.82	-14.95	15.79
	2.80	-45.66	-13.05	-0.11	-46.82	-14.95	-2.48
	4.20	-45.66	-13.05	-20.74	-46.82	-14.95	-21.04
	5.60	-45.66	-13.05	-39.00	-46.82	-14.95	-41.98
	7.00	-45.66	-13.05	-57.27	-46.82	-14.95	-62.91
	2	0.00	-13.05	46.82	-57.27	-14.95	45.66
2.00		-13.05	28.82	16.04	-14.95	27.66	12.73
4.00		-13.05	10.82	53.36	-14.95	9.66	52.37
5.07					-13.05	0.00	58.54
5.20		-14.95	0.00	58.88			
6.00		-13.05	-7.18	56.01	-14.95	-8.34	54.67
8.00		-13.05	-25.18	23.66	-14.95	-26.34	19.98
10.00		-13.05	-43.18	-44.70	-14.95	-44.34	-50.70
3		0.00	-43.18	14.95	-44.70	-44.34	13.05
	1.00	-43.18	13.05	-31.25	-44.34	11.95	-37.66
	2.00	-43.18	13.05	-20.80	-44.34	8.95	-24.61
	3.00	-43.18	13.05	-11.57	-44.34	5.95	-13.35
	4.00	-43.18	13.05	1.48	-44.34	2.95	-8.90
	4.98				-43.18	0.00	-7.44
	5.00	-43.18	13.05	14.53	-44.34	-0.05	-7.44

Extreme Feldmomente sind fett gedruckt

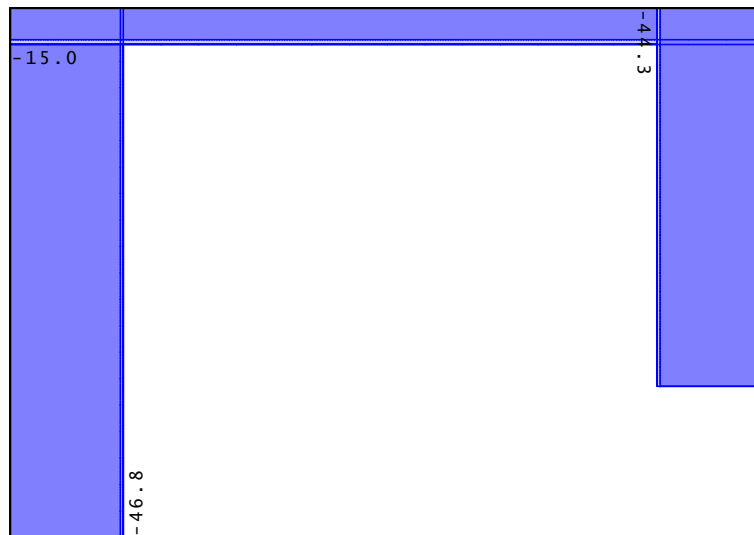
Auflagerkräfte Lastkombination 2

K	Maximalwerte			Minimalwerte		
	X [kN]	Y [kN]	M [kNm]	X [kN]	Y [kN]	M [kNm]
1	14.95	46.82	-41.75	13.05	45.66	-34.05
	13.05	45.66	-34.05	14.95	46.82	-41.75
4	0.05	43.18	-7.44	-13.05	44.34	14.53
	-13.05	44.34	14.53	0.05	43.18	-7.44

Extremwerte (fett gedruckt) mit zugehörigen Größen

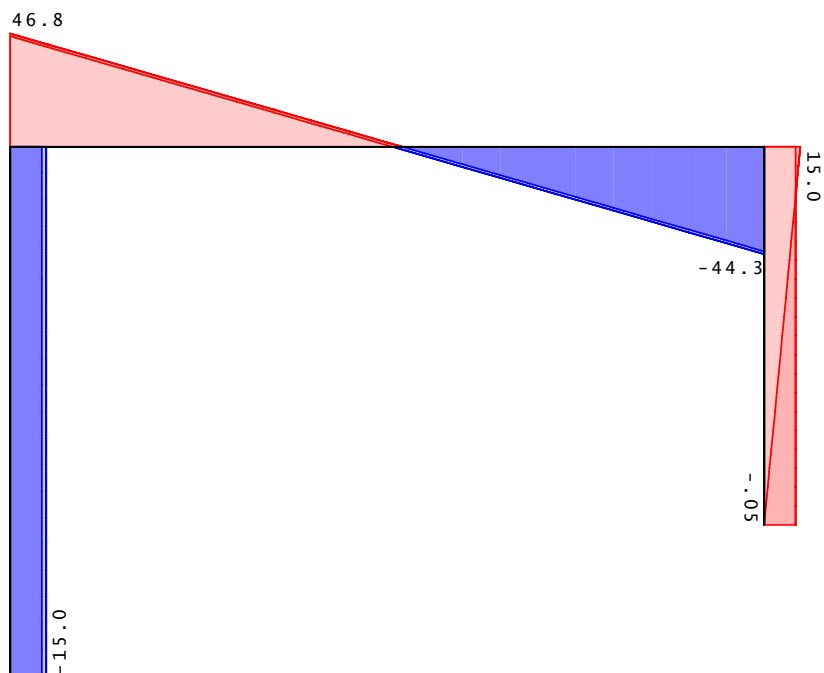
Normalkraft (kN)
M 1:100

Lastkombination 2

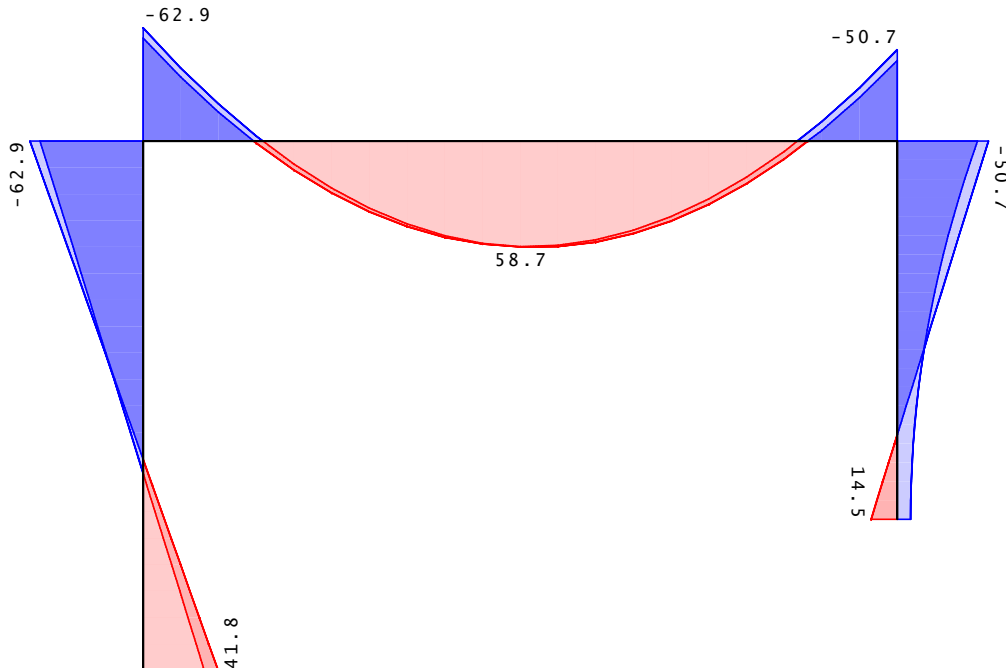


Querkraft (kN)
M 1:100

Lastkombination 2



Biegemoment (kNm) Lastkombination 2
M 1:100



Schnittgrößen Lastkombination 3

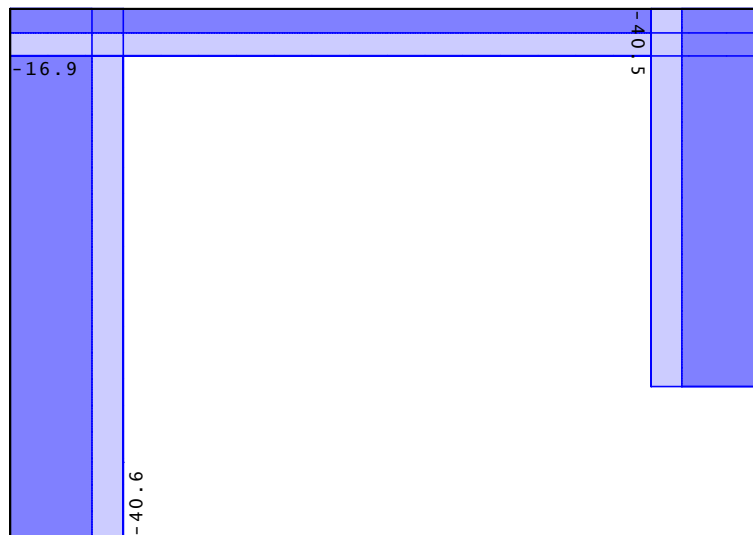
Stab	x [m]	Maximalwerte			Minimalwerte		
		N [kN]	Q [kN]	M [kNm]	N [kN]	Q [kN]	M [kNm]
1	0.00	-29.31	50.04	30.27	-40.58	-11.60	-37.14
	1.00	-29.31	48.04	26.02	-40.58	-11.60	4.55
	1.00	-29.31	-0.67	26.02	-40.58	-12.89	4.55
	1.40	-29.31	-1.47	20.87	-40.58	-12.89	4.12
	2.80	-29.31	-4.27	5.13	-40.58	-12.89	-2.20
	4.20	-29.31	-7.07	-4.61	-40.58	-12.89	-18.44
	5.60	-29.31	-8.70	-18.28	-40.58	-14.06	-34.67
	7.00	-29.31	-8.70	-35.46	-40.58	-16.86	-51.31
2	0.00	-8.70	40.58	-35.46	-16.86	29.31	-51.31
	2.00	-8.70	24.58	15.06	-16.86	17.31	9.97
	4.00	-8.70	8.58	47.43	-16.86	5.31	33.39
	4.89				-13.96	0.00	35.75
	5.07	-11.60	0.00	52.03			
	6.00	-8.70	-5.56	48.60	-16.86	-8.54	32.02
	8.00	-8.70	-17.56	17.76	-16.86	-24.54	6.65
	10.00	-8.70	-29.56	-33.80	-16.86	-40.54	-53.99
3	0.00	-29.56	16.86	-33.80	-40.54	8.70	-53.99
	1.00	-29.56	16.86	-25.11	-40.54	8.70	-37.13
	2.00	-29.56	16.86	-14.81	-40.54	8.70	-21.88
	3.00	-29.56	16.86	-0.85	-40.54	8.70	-10.28
	4.00	-29.56	16.86	13.44	-40.54	8.70	0.99
	5.00	-29.56	16.86	30.30	-40.54	8.70	9.68

Extreme Feldmomente sind fett gedruckt

Auflagerkräfte Lastkombination 3

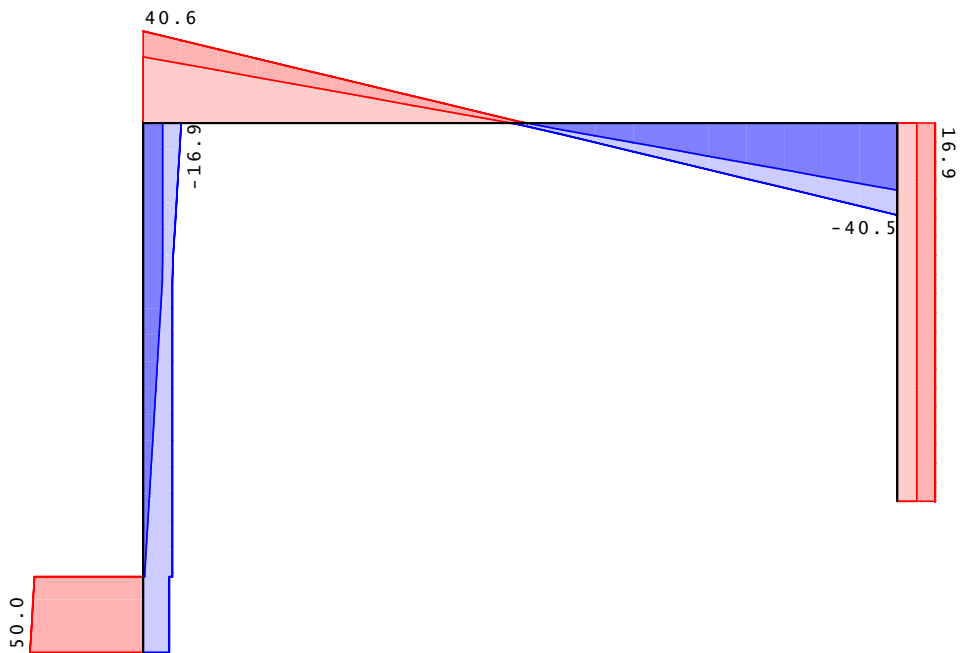
K	Maximalwerte			Minimalwerte		
	X [kN]	Y [kN]	M [kNm]	X [kN]	Y [kN]	M [kNm]
1	11.60	40.58	-30.27	-50.04	29.31	37.14
	-50.04	29.31	37.14	11.60	40.58	-30.27
4	-8.70	29.56	9.68	-16.86	40.54	30.30
	-16.86	40.54	30.30	-8.70	29.56	9.68

Extremwerte (fett gedruckt) mit zugehörigen Größen

Normalkraft (kN) Lastkombination 3
 M 1:100


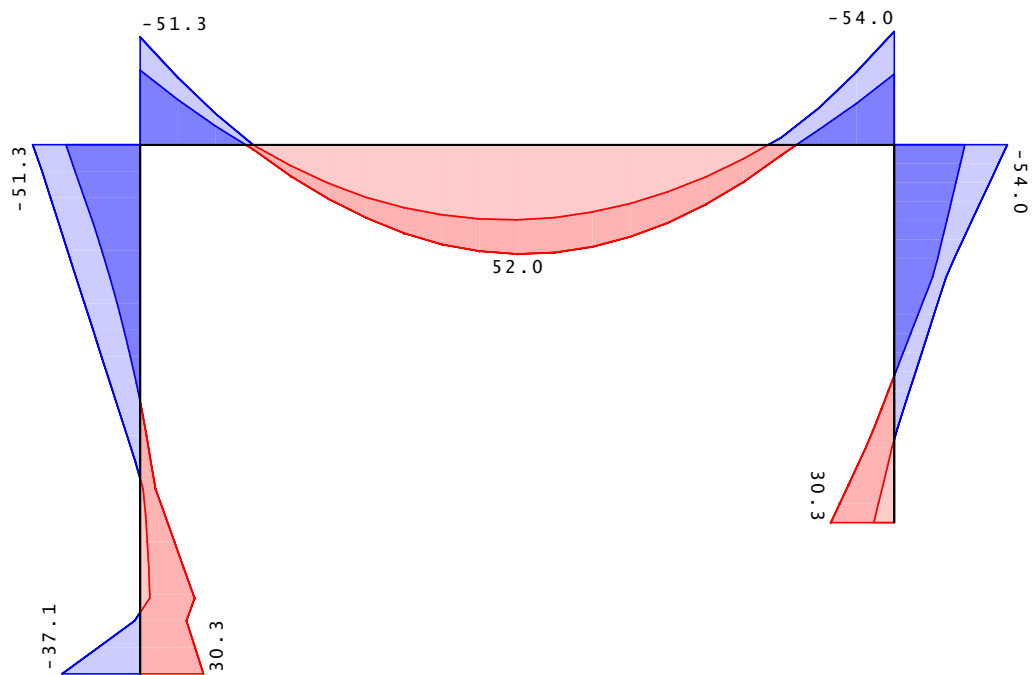
Querkraft (kN)
M 1:100

Lastkombination 3



Biegemoment (kNm)
M 1:100

Lastkombination 3



Schnittgrößen Lastkombination 4

Stab	x [m]	Maximalwerte			Minimalwerte		
		N [kN]	Q [kN]	M [kNm]	N [kN]	Q [kN]	M [kNm]
1	0.00	-30.28	40.01	35.40	-41.36	-12.87	-18.65
	1.00	-30.28	40.01	29.89	-41.36	-12.87	14.00
	1.00	-30.28	-8.70	29.89	-41.36	-14.16	14.00
	1.40	-30.28	-8.70	24.22	-41.36	-14.16	10.53
	2.80	-30.28	-8.70	4.95	-41.36	-14.16	-2.20
	4.20	-30.28	-8.70	-10.61	-41.36	-14.16	-18.64
	5.60	-30.28	-8.70	-24.60	-41.36	-14.16	-36.65
	7.00	-30.28	-8.70	-38.18	-41.36	-14.16	-55.07
2	0.00	-8.70	41.36	-38.18	-14.16	30.28	-55.07
	2.00	-8.70	25.36	14.26	-14.16	18.28	7.76
	4.00	-8.70	9.36	47.43	-14.16	6.28	33.87
	5.05				-9.99	0.00	37.80
	5.17	-12.87	0.00	52.25			
	6.00	-8.70	-4.79	49.49	-14.16	-7.58	35.07
	8.00	-8.70	-16.79	20.21	-14.16	-23.58	11.63
	10.00	-8.70	-28.79	-29.80	-14.16	-39.58	-47.09
3	0.00	-28.79	14.16	-29.80	-39.58	8.70	-47.09
	1.00	-28.79	12.89	-20.83	-39.58	7.97	-34.20
	2.00	-28.79	12.89	-13.30	-39.58	5.97	-21.88
	3.00	-28.79	12.89	-5.85	-39.58	3.97	-11.47
	4.00	-28.79	12.89	4.46	-39.58	1.97	-5.93
	4.98				-28.79	0.00	-4.96
	5.00	-28.79	12.89	17.35	-39.58	-0.03	-4.96

Extreme Feldmomente sind fett gedruckt

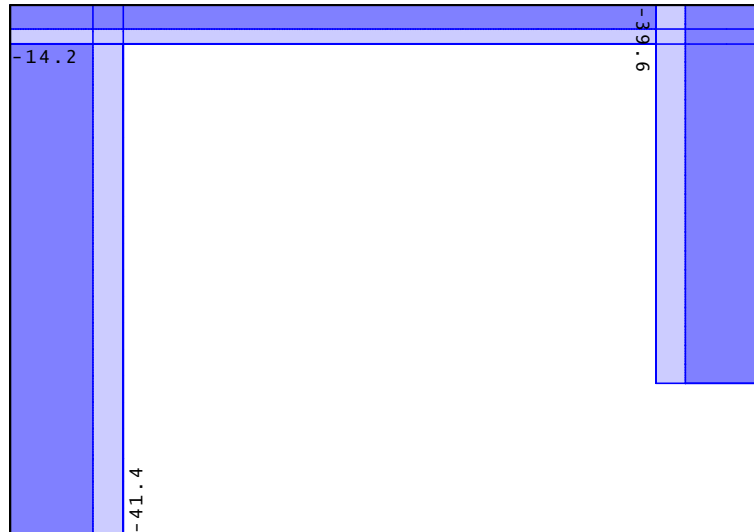
Auflagerkräfte Lastkombination 4

K	Maximalwerte			Minimalwerte		
	X [kN]	Y [kN]	M [kNm]	X [kN]	Y [kN]	M [kNm]
1	12.87	41.36	-35.40	-40.01	30.28	18.65
	-40.01	30.28	18.65	12.87	41.36	-35.40
4	0.03	28.79	-4.96	-12.89	39.58	17.35
	-12.89	39.58	17.35	0.03	28.79	-4.96

Extremwerte (fett gedruckt) mit zugehörigen Größen

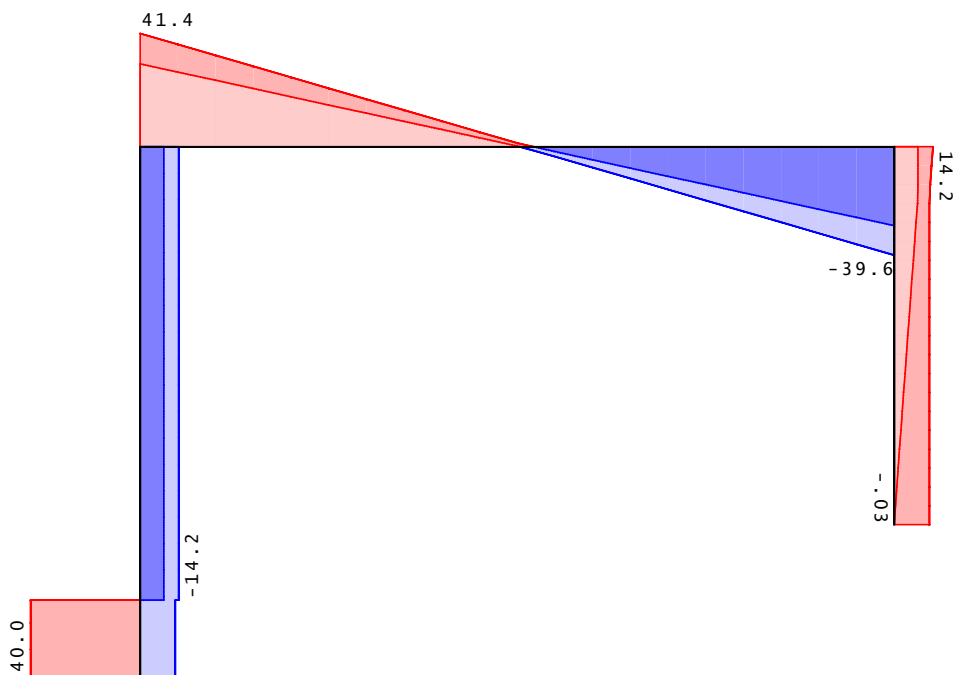
Normalkraft (kN)
M 1:100

Lastkombination 4

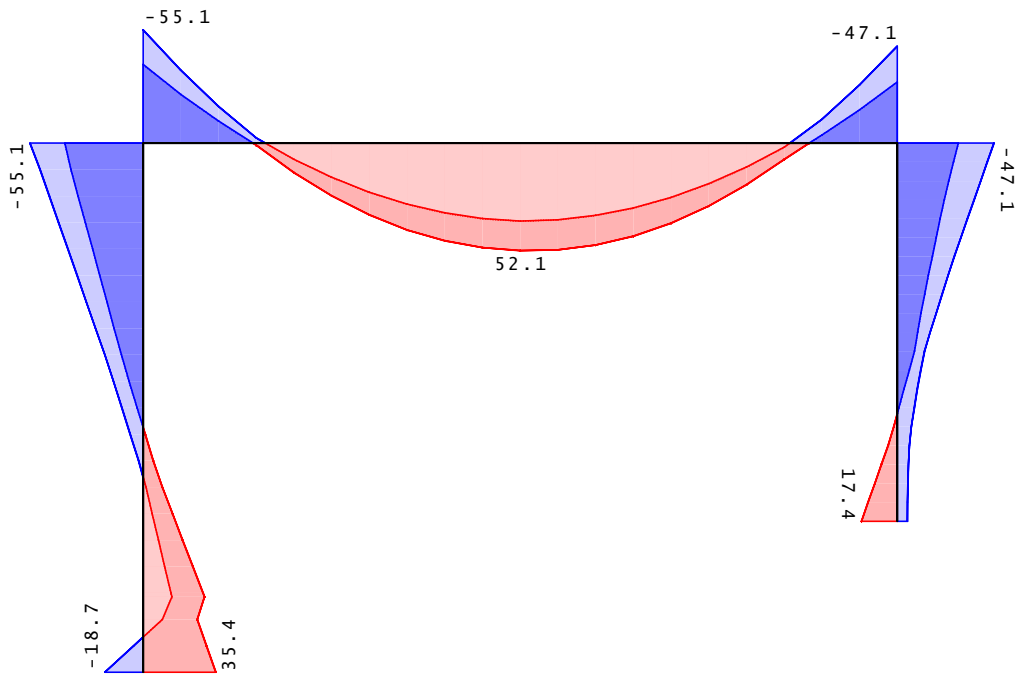


Querkraft (kN)
M 1:100

Lastkombination 4

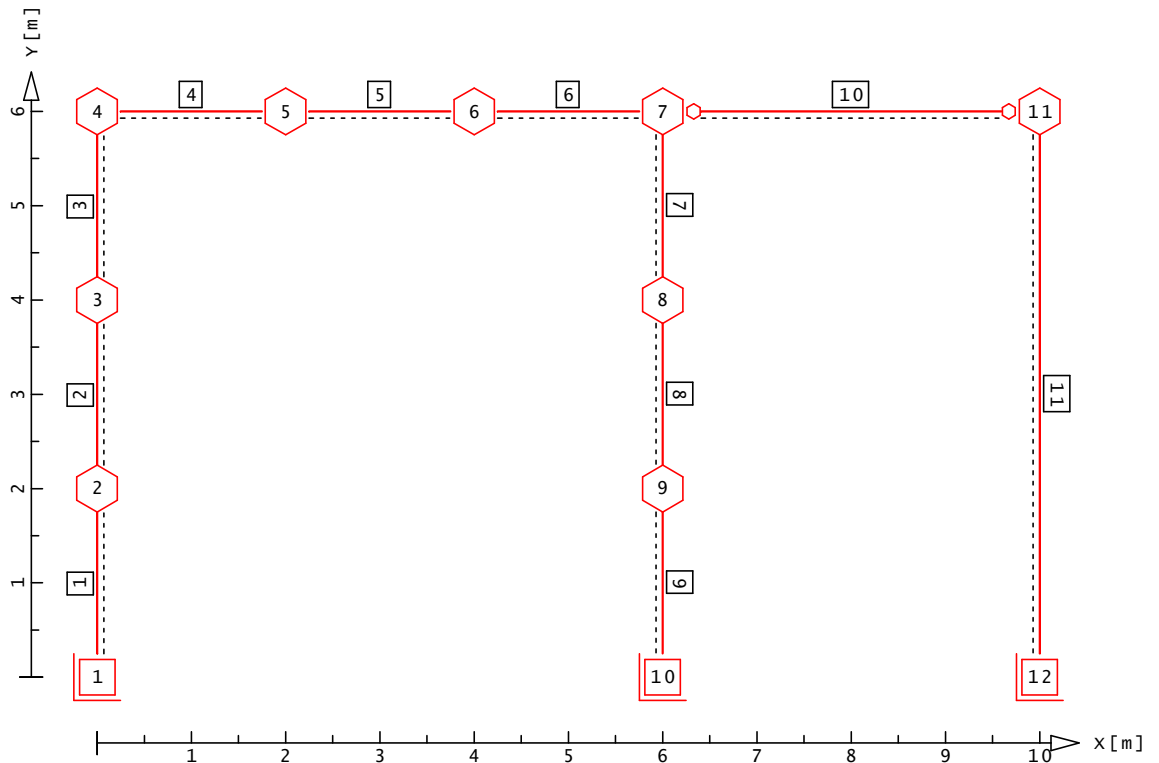


Biegemoment (kNm) Lastkombination 4
M 1:100



Pos. B610a
Ebenes Stabwerk Theorie II. Ordnung

Beispiel nach Stahl im Hochbau, Band I/Teil 2, Seite 260ff., 14. Auflage
 Um die Verformung der Stäbe besser zu erfassen werden jeweils zwei zusätzliche Knoten eingefügt.

System
M 1:80

Knotenbeschreibung

Knoten	X [m]	Y [m]	Knoten	X [m]	Y [m]
1 XY	0.00	0.00	2	0.00	2.00
3	0.00	4.00	4	0.00	6.00
5	2.00	6.00	6	4.00	6.00
7	6.00	6.00	8	6.00	4.00
9	6.00	2.00	10 XY	6.00	0.00
11	10.00	6.00	12 XY	10.00	0.00

Festhaltung: x=horizontal Y=vertikal R=Drehung

Stabbeschreibung

St	von Knoten	bis Knoten	I [cm ⁴]	A [cm ²]	h [mm]	Mnr
1	1	2	200000	5000		1
2	2	3	200000	5000		1
3	3	4	200000	5000		1
4	4	5	100000	5000		1
5	5	6	100000	5000		1
6	6	7	100000	5000		1

St	von Knoten	bis Knoten	I [cm ⁴]	A [cm ²]	h [mm]	Mnr
7	7	8	200000	5000		1
8	8	9	200000	5000		1
9	9	10	200000	5000		1
10	7 M	11 M	100000	5000		1
11	11	12	200000	5000		1

N=Normalkraft-, Q=Querkraft-, M=Momentengelenk

Materialwerte

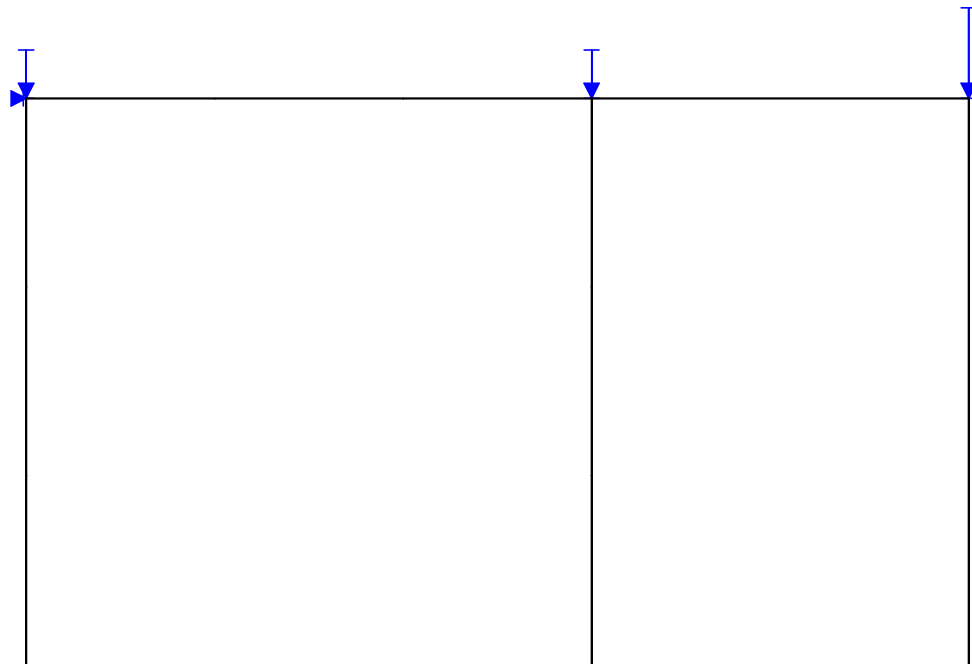
 Elastizitätsmodul
 Temperaturdehnzahl

 E = 60000 MN/m²
 α_T = 1.2e-005 1/K

Belastung

 Bild 1
 M 1:80

Lastfall 1



Lf	Lastart	St	K	R	s _l /a [m]	s _r /s [m]	q _{li} /Q [kN/m, kN]	q _{re} /M [kN/m, kNm]
1	Einzellast		4	Y			800.00	
			4	X			50.00	
			7	Y			800.00	
			11	Y			1500.00	

Kombinationen

Lk	Art	Bemerkung
1	Th. II.Ord.	

Lastkombinationsfaktoren

Lk	*LF 1	LF 2	LF 3	LF 4	LF 5	LF 6
1	1.50					
2	1.00					

* = Lastfall ständig vorhanden

Theorie II.Ord.

Anz. der Iterationen	An	=	50	
zulässiger Fehler	F	=	0.001	%
Sicherheitsfaktor	Ny	=	1.00	

Schnittgrößen

Lastkombination 1

Stab	x [m]	N [kN]	Q [kN]	M [kNm]
1	0.00	-1057.36	74.25	0.00
	0.40	-1057.36	74.25	29.69
	0.80	-1057.36	74.25	59.39
	1.20	-1057.36	74.25	89.08
	1.60	-1057.36	74.25	118.78
	2.00	-1057.36	74.25	148.47
2	0.00	-1057.54	71.65	148.47
	0.40	-1057.54	71.65	177.13
	0.80	-1057.54	71.65	205.78
	1.20	-1057.54	71.65	234.44
	1.60	-1057.54	71.65	263.09
	2.00	-1057.54	71.65	291.75
3	0.00	-1057.87	66.54	291.75
	0.40	-1057.87	66.54	318.36
	0.80	-1057.87	66.54	344.97
	1.20	-1057.87	66.54	371.59
	1.60	-1057.87	66.54	398.20
	2.00	-1057.87	66.54	424.81
4	0.00	-19.56	-141.47	424.81
	0.40	-19.56	-141.47	368.22
	0.80	-19.56	-141.47	311.64
	1.20	-19.56	-141.47	255.05
	1.60	-19.56	-141.47	198.46
	2.00	-19.56	-141.47	141.87
5	0.00	-18.89	-141.56	141.87
	0.40	-18.89	-141.56	85.25
	0.80	-18.89	-141.56	28.63
	1.20	-18.89	-141.56	-28.00
	1.60	-18.89	-141.56	-84.62
	2.00	-18.89	-141.56	-141.24
6	0.00	-19.55	-141.47	-141.24
	0.40	-19.55	-141.47	-197.83
	0.80	-19.55	-141.47	-254.42
	1.20	-19.55	-141.47	-311.01
	1.60	-19.55	-141.47	-367.59
	2.00	-19.55	-141.47	-424.18
7	0.00	-1340.90	65.26	-424.18
	0.40	-1340.90	65.26	-398.08

Stab	x [m]	N [kN]	Q [kN]	M [kNm]
	0.80	-1340.90	65.26	-371.98
	1.20	-1340.90	65.26	-345.88
	1.60	-1340.90	65.26	-319.78
	2.00	-1340.90	65.26	-293.68
8	0.00	-1340.57	71.77	-293.68
	0.40	-1340.57	71.77	-264.98
	0.80	-1340.57	71.77	-236.27
	1.20	-1340.57	71.77	-207.57
	1.60	-1340.57	71.77	-178.87
	2.00	-1340.57	71.77	-150.17
9	0.00	-1340.39	75.10	-150.17
	0.40	-1340.39	75.10	-120.13
	0.80	-1340.39	75.10	-90.10
	1.20	-1340.39	75.10	-60.07
	1.60	-1340.39	75.10	-30.03
	2.00	-1340.39	75.10	0.00
10	0.00	32.19	0.00	0.00
	0.80	32.19	0.00	0.00
	1.60	32.19	0.00	0.00
	2.40	32.19	0.00	0.00
	3.20	32.19	0.00	0.00
	4.00	32.19	0.00	0.00
11	0.00	-2250.23	0.00	0.00
	1.20	-2250.23	0.00	0.00
	2.40	-2250.23	0.00	0.00
	3.60	-2250.23	0.00	0.00
	4.80	-2250.23	0.00	0.00
	6.00	-2250.23	0.00	0.00