СТАТИЧЕСКИ ИЗЧИСЛЕНИЯ

I. ОБЩИ ПОЛОЖЕНИЯ

Настоящите статически изчисления са направени на базата на изготвени кофражни планове по част „Конструктивна“. Целта на изчисленията е да покаже деформираното и напрегнато състояние на връхната конструкция и долното строене. Изчисленията са направени с програмен продукт работещ по метода на крайните елементи Софистик 2014. Настоящата програма работи в съответствие със Системата Еврокод (въздействия, комбинации, проверка на напрежения и оразмеряване). Проектанта е представил приложение от програмата в настоящият документ.

II. Използвани нормативни документи

Групата нормативни документи от Системата Еврокод, които са използвани при проектирането, са:

- Еврокод БДС EN 1990: Основи на проектирането на строителните конструкции.
- Еврокод БДС EN 1990/A1: Основи на проектирането на строителните конструкции – Приложения A1/A 2.
- Еврокод1: БДС EN 1990/-1-1: Въздействия върху строителните конструкции. Част 1-1: Основни въздействия.Плътност, собствени тегла.
- Еврокод 1: БДС EN 1991-2: Въздействия върху строителните конструкции. Част 2: Подвижни натоварвания от трафик върху мостове.
- Еврокод 1: БДС EN 1991-5: Въздействия върху строителните конструкции. Част 4: Основни въздействия – температурни въздействия.
- Еврокод 2: БДС EN 1992 -1-1: Проектиране на бетонни и стоманобетонни конструкции. Част 1-1: Общи правила и правила за сгради.
- Еврокод 2: БДС EN 1992 : 2: Проектиране на бетонни и стоманобетонни конструкции. Част 2: Стоманобетонни мостове. Правила за проектиране и конструиране.
- Еврокод 7: БДС EN 1997 : 1: Геотехническо проектиране. Част 1: Основни правила.

- Еврокод 8: БДС EN 1998 : 1: Проектиране на конструкциите за сеизмични въздействия. Част 1: Основни правила, сеизмични въздействия и правила за сгради.

- Еврокод 8: БДС EN 1998 : 2: Проектиране на конструкциите за сеизмични въздействия. Част 2: Мостове.

- Еврокод 8: БДС EN 1998 : 5: Проектиране на конструкциите за сеизмични въздействия. Част 5: Фундаменти, опорни конструкции и геотехнически аспекти.

- БДС EN 1337-1 : Лагери в строителството, основни правила

- БДС EN 1337-3 : Еластомерни лагери

1. Въздействия

1.1.1. Постоянни товари**:**

- маса на стоманобетона – 2,5 т/м^3,

- маса на насипите – 2,0 т/м^3,

- маса на настилката върху съоръжението – 2,4 т/м^3,

1.1.2. Земен натиск:

- Постоянен земен натиск – от теглото на почвения масив зад устоите.

Стойността на земният натиск съгласно Еврокод 7 :

- Прието обемно тегло на почвата зад устоите γ=20 kN/m^3,

- Приет ъгъл на вътрешно триене на насипа φ=35°,

- Приет коефициент на страничен земен натиск в покой $k_0 = \sqrt{K_a} = 0,52$, където k_a е коефициента на страничен земен натиск в покой, а $k_{Ka} = \tan^2(45-\varphi/2) = 0,27$.

- Земен натиск от подвижни товари.

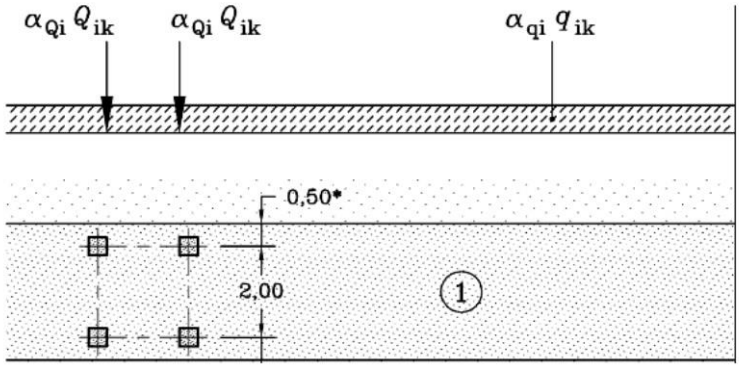
Съгласно Еврокод 1: БДС EN 1991-2 стойността на земният натиск от подвижен товар може да се вземе като равномерно разпределен по цялата височина на устоя. Тандем-системата на товар LM1 се разпределя на площ с размер 3/5 метра.

1.1.3. Подвижни товари:

1.1.3.1. Подвижни товари съгласно Еврокод 1: БДС EN 1991-2:

- Група 1а (съгласно таблица 4.4а) включваща характеристична стойност на вертикалната компонента на товарна система LM1 (TS и UDL). Върху пътното платно на съоръжението се побират две ленти с 3 метра широчина. Графично представяне на товара е представен:

Load Model 1



Стойности на α_{qi}=0,8 за лента 1 Q_{ik}=240kN(24ton) q_{ik}=7,2kN/m

1.1.4. Въздействие от свързването и пълзенето на бетона

Въздействията от свързване и пълзене са отчетени с помоща на вградения модул в програмата CSM, който работи в съответствие с правилата на БДС EN 1992:1-1.

1.1.5. Температурни въздействия

- Съгласно Еврокод 1-5: „Температурни въздействия” и съответното национално приложение за конструкции тип 3 за даденият географски район, температурният диапазон на връхната констуркция е, както следва: $T_{e,max}$=42°C (максимална температура), $T_{e,min}$=-11°C (минимална температура). Приетата температура при изграждане на конструкцията е +10°C.

1.1.6. Сеизмични въздействия

- Проектирането на съоръжение в земетръсни райони съгласно нормативната база на Еврокод се извършва съгласно изискванията на Еврокод 8. Сеизмичният коефициент за референтен период на повтаряемост от 475г. за разглежданият район a_g=0.32. Коефициента на значимост на контрукцията съгласно EN 1998-2-NA γ_I=1.0. Съоръжението е с дуктилно поведение с коефициент на поведение q=3.5. Новопроектираната конструкция поема сеизмичното въздействие с четирите колони ф800 на стълбовете, които са кораво свързани с връхната конструкция. Последната е оразмерена по правилата за капацитивно проектиране съгласно БДС EN 1998-2.

III. Моделиране

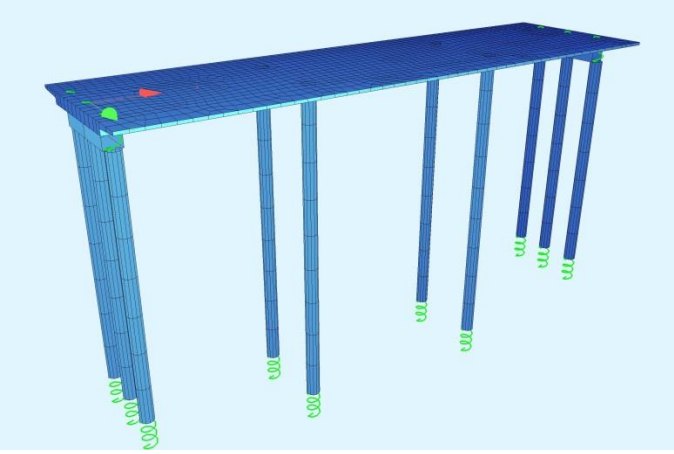
Изчислителният модел на съоръжението е пространстен. Надлъжният наклон е пренебрегнат в модела.

Връхната конструкция е моделирана с помощта на плочести (quad) елементи с дебелини съответни на кофражните размери.

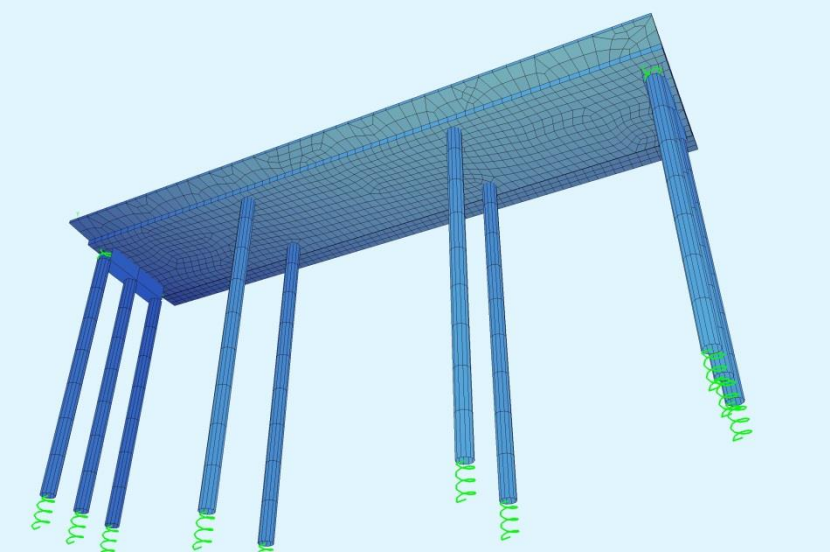
Еластомерните лагери са моделирани като пружинни елементи с използването на вертикална и хоризонтална коравина.

Долното строене е моделирано изцяло с прътови frame елементи.

Изображения на модела са представени по-долу



Фиг. Поглед от горе



Фиг 2. Поглед от долу

IV. ПРИЛОЖЕНИЕ ОТ ПРОГРАМАТА СОФИСТИК

- МАТЕРИАЛИ
- НАПРЕЧНИ СЕЧЕНИЯ
- ВЪЗДЕЙСТВИЯ
- КОМБИНАЦИЯ НА ВЪЗДЕЙСТВИЯТА
- ПРОВЕРКА НА НАПРЕЖЕНИЕ В ГРЕДИТЕ
- РАЗРЕЗНИ УСИЛИЯ

ПЪТ III-804 "ПОПОВИЦА - АСЕНОВГРАД" - МОСТ НА РЕКА ЧЕРКЕЗИЦА ПРИ КМ 0+189 – СТАТИЧЕСКИ ИЗЧИСЛЕНИЯ

София, Октомври 2016 г.

Съставил:	Проверил:
ПЕЧАТ	ПЕЧАТ

Default design code is EuroNorm EN 1992 (2004) Concrete Structures (Europe) V 30.0
Structure and Tab.7.1N: B (Road bridges)
Snow load zone : 1

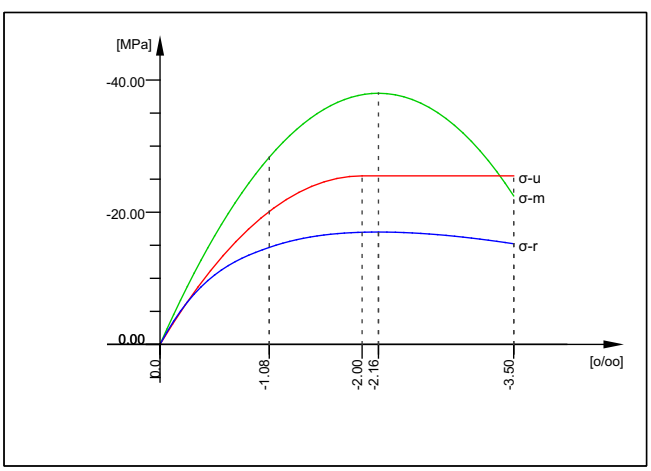
No. 1 C 30/37 (EN 1992)

Young's modulus	E	32837	[N/mm2]	Safetyfactor		1.50	[-]
Poisson ratio	μ	0.20	[-]	Strength	fc	25.50	[MPa]
Shear modulus	G	13682	[N/mm2]	Nominal strength	fck	30.00	[MPa]
Compression modulus	K	18243	[N/mm2]	Tensile strength	fctm	2.90	[MPa]
Weight	γ	25.0	[kN/m3]	Tensile strength	fctk,05	2.03	[MPa]
Density	ρ	2350.00	[kg/m3]	Tensile strength	fctk,95	3.77	[MPa]
Elongation coefficient	α	1.00E-05	[1/K]	Bond strength	fbd	3.04	[MPa]
				Service strength	fcm	38.00	[MPa]
				Fatigue strength	fcd,fat	14.96	[MPa]
				Tensile strength	fctd	1.35	[MPa]

Stress-Strain for serviceability	**ε[o/oo]**	**σ-m[MPa]**	**E-t[N/mm2]**
Is only valid within the defined	0.000	0.00	34478
stress range	-1.081	-28.31	17746
	-2.162	-38.00	0
	-3.500	-22.47	-23499
	Safetyfactor		1.50

Stress-Strain for ultimate load	**ε[o/oo]**	**σ-u[MPa]**	**E-t[N/mm2]**
Is only valid within the defined	0.000	0.00	25500
stress range	-2.000	-25.50	0
	-3.500	-25.50	0
	Safetyfactor		1.50

Stress-Strain of calc. mean values	**ε[o/oo]**	**σ-r[MPa]**	**E-t[N/mm2]**
Is only valid within the defined	0.000	0.00	28732
stress range	-1.081	-14.67	5278
	-2.162	-17.00	0
	-3.500	-15.23	-2279
	Safetyfactor		(1.50)



C 30/37 (EN 1992)

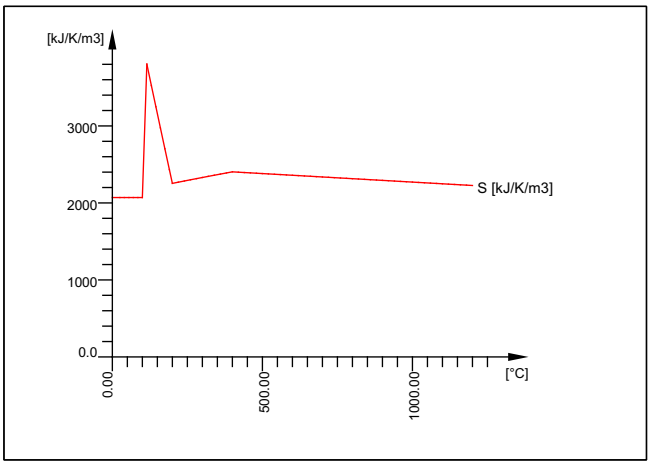
Thermal material constants

No.	T[°C]	S[kJ/K/m3]	Kxx[W/K/m]	Kyy[W/K/m]	Kzz[W/K/m]	
1	AUTO	2.12E+03	1.951E+00	0.000E+00	0.000E+00	C 30/37 (EN 1992)
	0	2.07E+03	1.951E+00			
	100	2.07E+03	1.766E+00			
	115	3.80E+03	1.732E+00			
	200	2.25E+03	1.553E+00			
	300	2.33E+03	1.361E+00			
	400	2.40E+03	1.191E+00			
	500	2.38E+03	1.042E+00			
	600	2.36E+03	9.146E-01			
	700	2.34E+03	8.086E-01			
	800	2.31E+03	7.240E-01			
	900	2.29E+03	6.608E-01			

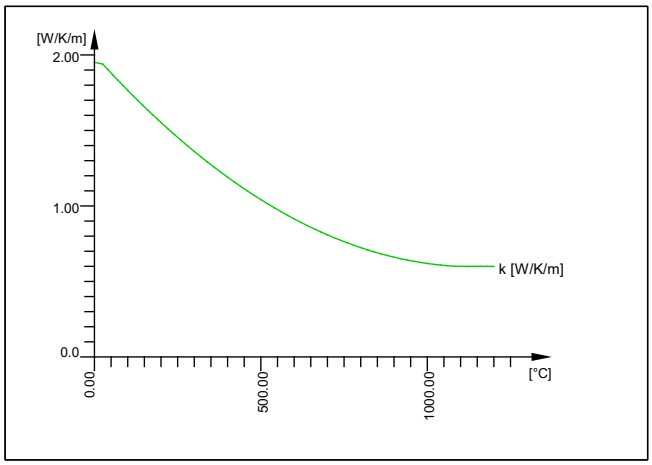
Thermal material constants

No.	T[°C]	S[kJ/K/m3]	Kxx[W/K/m]	Kyy[W/K/m]	Kzz[W/K/m]	
	1000	2.27E+03	6.190E-01			
	1100	2.25E+03	6.000E-01			
	1200	2.23E+03	6.000E-01			

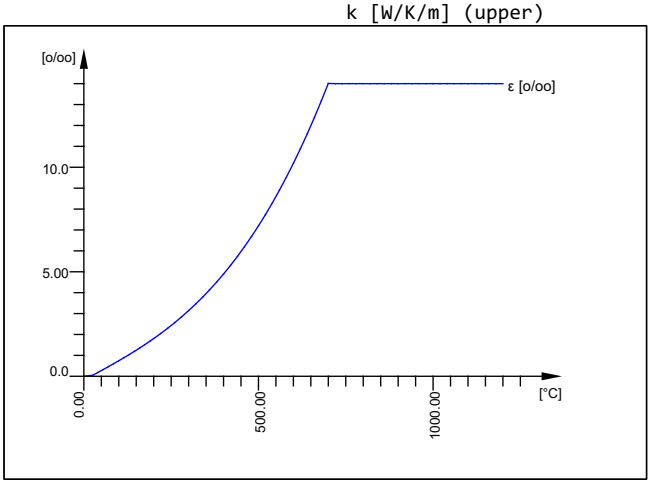
No. material number S Heat capacity
T Temperature Kxx,Kyy,Kzz Heat conductivity



S [kJ/K/m3] Humidity= 2.00 %



k [W/K/m] (upper)



ε [o/oo]

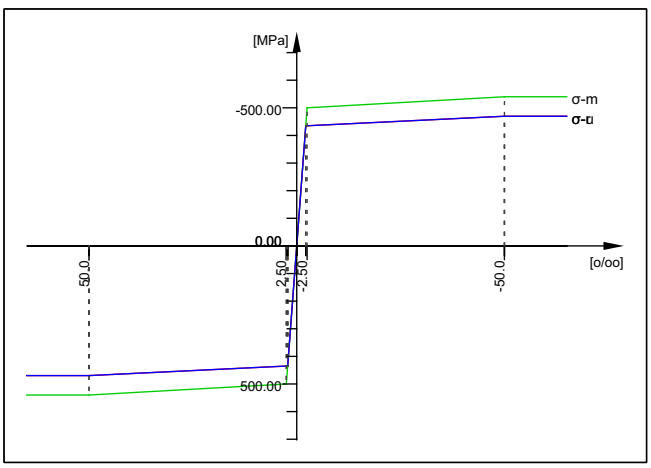
No. 2 B 500 B (EN 1992)

Young's modulus	E	200000	[N/mm2]	Safetyfactor		1.15	[-]
Poisson ratio	μ	0.30	[-]	Yield stress	fy	500.00	[MPa]
Shear modulus	G	76923	[N/mm2]	Compressive yield	fyc	500.00	[MPa]
Compression modulus	K	166667	[N/mm2]	Tensile strength	ft	540.00	[MPa]
Weight	γ	78.5	[kN/m3]	Compressive strength	fc	540.00	[MPa]
Density	ρ	7850.00	[kg/m3]	Ultimate strain		50.00	[o/oo]
Elongation coefficient	α	1.20E-05	[1/K]	relative bond coeff.		1.00	[-]
max. thickness		32.00	[mm]	EN 1992 bond coeff.	k1	0.80	[-]
				Hardening modulus	Eh	0.00	[MPa]
				Proportional limit	fp	500.00	[MPa]
				Dynamic allowance	σ-dyn	152.17	[MPa]

Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
Is also extended beyond the	1000.000	540.00	0
defined stress range	50.000	540.00	0
	2.500	500.00	842
	0.000	0.00	200000
	-2.500	-500.00	842
	-50.000	-540.00	0
	-1000.000	-540.00	0
	Safetyfactor		1.15

Stress-Strain for ultimate load	ε[o/oo]	σ-u[MPa]	E-t[N/mm2]
Is also extended beyond the	1000.000	469.57	0
defined stress range	50.000	469.57	0
	2.174	434.78	727
	0.000	0.00	200000
	-2.174	-434.78	727
	-50.000	-469.57	0
	-1000.000	-469.57	0
	Safetyfactor		(1.15)

Stress-Strain of calc. mean values	ε[o/oo]	σ-r[MPa]	E-t[N/mm2]
Is also extended beyond the	1000.000	469.57	0
defined stress range	50.000	469.57	0
	2.174	434.78	727
	0.000	0.00	200000
	-2.174	-434.78	727
	-50.000	-469.57	0
	-1000.000	-469.57	0
	Safetyfactor		(1.15)



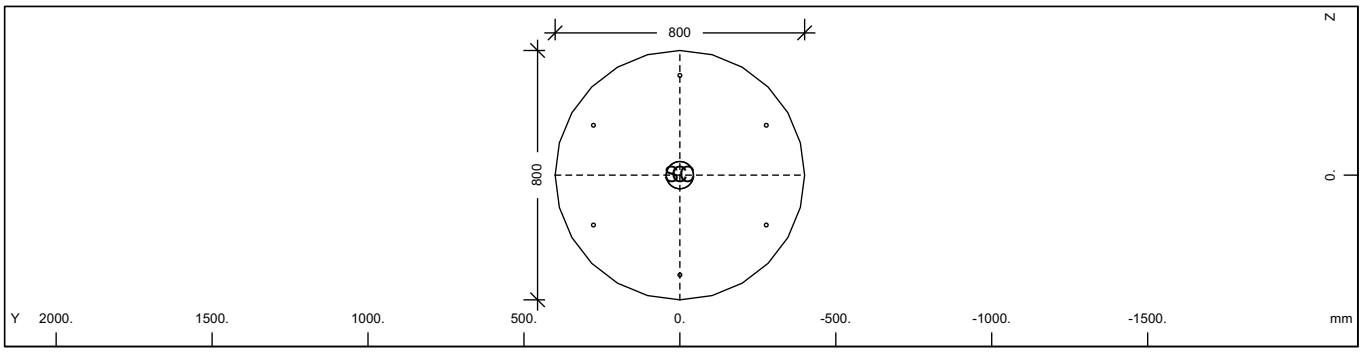
B 500 B (EN 1992)

Default design code is EuroNorm EN 1992 (2004) Concrete Structures (Europe) V 30.0
Structure and Tab.7.1N: B (Road bridges)
Snow load zone : 1

Materials

No. 1 C 30/37 (EN 1992)
No. 2 B 500 B (EN 1992)

Cross section No. 1 - D 800 mm



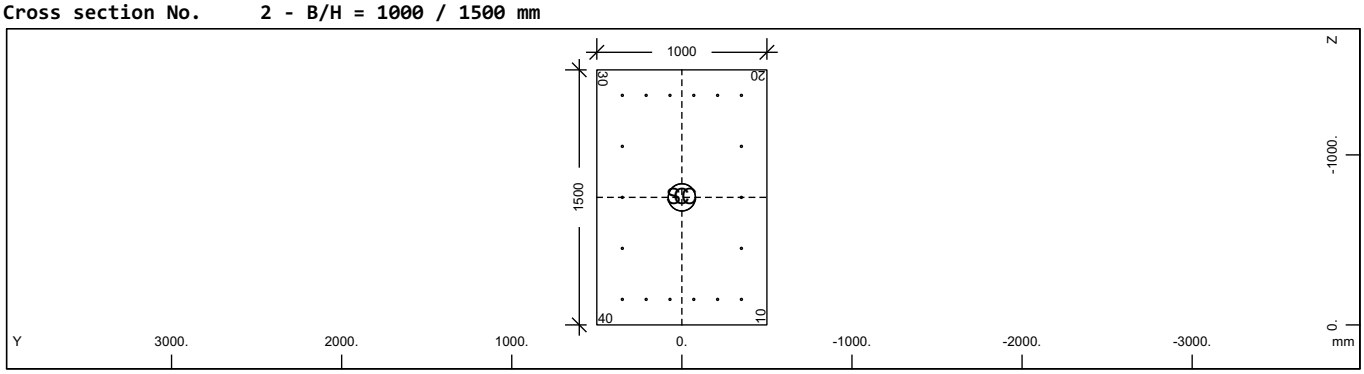
Cross section No. 1 - D 800 mm

Static properties of cross section

No.	Mat	A[m2]	Ay[m2]	Iy[m4]	yc[mm]	ysc[mm]	E[N/mm2]	g[kN/m]
	MRf	It[m4]	Az[m2]	Iz[m4]	zc[mm]	zsc[mm]	G[N/mm2]	
			Ayz[m2]	Iyz[m4]				
1	1	5.0265E-01		2.011E-02	0.0	0.0	32837	12.57
	2	4.021E-02		2.011E-02	0.0	0.0	13682	(COMPR)
	= D 800 mm							
	= (R-As 320 mm)							

No.	section number	ysc,zsc	shear centre
Mat	material number	E	Young's modulus
A	sectional area	g	weight per length
Ay,Az,Ayz	transverse shear deformation area	MRf	reinforcement material number
Iy,Iz,Iyz	bending moment of inertia	It	torsional moment of inertia
yc,zc	centre of gravity	G	Shear modulus

Cross section No. 2 - B/H = 1000 / 1500 mm



Cross section No. 2 - B/H = 1000 / 1500 mm

Static properties of cross section

No.	Mat	A[m2]	Ay[m2]	Iy[m4]	yc[mm]	ysc[mm]	E[N/mm2]	g[kN/m]
	MRf	It[m4]	Az[m2]	Iz[m4]	zc[mm]	zsc[mm]	G[N/mm2]	
			Ayz[m2]	Iyz[m4]				
2	1	1.5000E+00		2.813E-01	0.0	0.0	32837	37.50
	2	2.940E-01		1.250E-01	-750.0	-750.0	13682	(BEAM)
	= B/H = 1000 / 1500 mm							

No.	section number	ysc,zsc	shear centre
Mat	material number	E	Young's modulus
A	sectional area	g	weight per length
Ay,Az,Ayz	transverse shear deformation area	MRf	reinforcement material number
Iy,Iz,Iyz	bending moment of inertia	It	torsional moment of inertia
yc,zc	centre of gravity	G	Shear modulus

Bore Profile No. 1 Bore Profile 1

X[m]	Y[m]	Z[m]	dX[-]	dY[-]	dZ[-]	a[°]
0.000	0.000	0.000	0.000	0.000	1.000	0.0

X,Y,Z	coordinates of the start point
dX,dY,dZ	direction of the bore profile

a	rotation angle of the local axes

Transverse

s [m]	K0-t [kN/m2]	K1-t [kN/m2]	K2-t [kN/m2]	K3-t [kN/m2]	P0 [-]	P1 [-]	P2 [-]	P3 [-]	Pmax [kN/m]
0.000			72000.00		1.00	1.00	1.00	1.00	0.00
15.000									0.00

s	ordinate of the profile axis
K0-t,K1-t,K2-t,K3-t	parameter of the foundation profile
P0,P1,P2,P3	form factor as variation along periphery
Pmax	maximum foundation value

Bore Profile No. 2 Bore Profile 2

X[m]	Y[m]	Z[m]	dX[-]	dY[-]	dZ[-]	a[°]
0.000	0.000	4.200	0.000	0.000	1.000	0.0

X,Y,Z	coordinates of the start point
dX,dY,dZ	direction of the bore profile
a	rotation angle of the local axes

Transverse

s [m]	K0-t [kN/m2]	K1-t [kN/m2]	K2-t [kN/m2]	K3-t [kN/m2]	P0 [-]	P1 [-]	P2 [-]	P3 [-]	Pmax [kN/m]
0.000			96000.00		1.00	1.00	1.00	1.00	0.00
15.000									0.00

s	ordinate of the profile axis
K0-t,K1-t,K2-t,K3-t	parameter of the foundation profile
P0,P1,P2,P3	form factor as variation along periphery
Pmax	maximum foundation value

Actions

type	part	sup	Title	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'
G_1	G	perm	dead load g1	1.35	1.00	1.00	1.00	1.00	1.00	1.00
G_2	G	perm	dead load g2	1.35	1.00	1.00	1.00	1.00	1.00	1.00
R	G	perm	earth pressure	1.35	1.00	1.00	1.00	1.00	0.00	1.00
C	P	perm	creep + shrinkage	1.00	1.00	1.00	1.00	1.00	1.00	1.00
F	Q	cond	settlement	1.00	0.00	1.00	1.00	1.00	1.00	1.00
L_T	Q	excl	Traffic load TS of EC/DIN-FB	1.35	0.00	1.00	0.75	0.75	0.00	0.80
L_U	Q	excl	Traffic load UDL of EC/DIN-FB	1.35	0.00	1.00	0.40	0.40	0.00	0.80
T	Q	excl	temperature loading	1.50	0.00	1.00	0.80	0.60	0.50	0.80
A	A	excl	impact loading	1.00	0.00	1.00	1.00	1.00	0.00	1.00
E	E	usex	Earthquake	1.00	0.00	1.00	1.00	1.00	1.00	1.00
E_2	E	usex	Earthquake	1.00	0.00	1.00	1.00	1.00	1.00	1.00

Reduction coefficient xsi 0.850

Load Case 1 (G_1) Self-weight

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	1.000
unfavourable safety factor		1.350
favourable safety factor		1.000
Combination coefficient ψ-0		1.000 (rare)
Combination coefficient ψ-1'		1.000 (non frequent)
Combination coefficient ψ-1		1.000 (frequent)
Combination coefficient ψ-2		1.000 (permanent)

Load Case 2 (G_2) Asphalt & Barriers

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	1.000
unfavourable safety factor		1.350
favourable safety factor		1.000
Combination coefficient ψ-0		1.000 (rare)
Combination coefficient ψ-1'		1.000 (non frequent)
Combination coefficient ψ-1		1.000 (frequent)
Combination coefficient ψ-2		1.000 (permanent)

Loads

Kind	Referenceto	Projection W[m]	X[m]	Y[m]	Z[m]	Type	Loadvalue
Area			-0.750	3.500	0.000	PG	6.50 [kN/m2]
			34.750	3.500	0.000		6.50 [kN/m2]
			34.750	5.000	0.000		6.50 [kN/m2]
			-0.750	5.000	0.000		6.50 [kN/m2]
	gar 3			activated			100.00 percent
Area			-0.750	3.500	0.000	PG	2.64 [kN/m2]
			34.750	3.500	0.000		2.64 [kN/m2]
			34.750	-3.500	0.000		2.64 [kN/m2]
			-0.750	-3.500	0.000		2.64 [kN/m2]
	gar -mult-			activated			100.00 percent
Area			-0.750	-3.500	0.000	PG	6.50 [kN/m2]
			34.750	-3.500	0.000		6.50 [kN/m2]
			34.750	-5.000	0.000		6.50 [kN/m2]
			-0.750	-5.000	0.000		6.50 [kN/m2]
	gar 2			activated			100.00 percent

Load Case 3 (T) Pos Uniform temperature

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.500
favourable safety factor		0.000
Combination coefficient ψ-0		0.800 (rare)
Combination coefficient ψ-1'		0.800 (non frequent)
Combination coefficient ψ-1		0.600 (frequent)
Combination coefficient ψ-2		0.500 (permanent)

Loads acting on QUAD elements

Elements from	to	inc	Load Type	Prim LC/CC	Load val.	Dimension	Variation dP/dX	dP/dY	dP/dZ
10000	19999		dTxy		36.000	[°C]			

Load Case 4 (T) Neg Uniform temperature

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.500
favourable safety factor		0.000
Combination coefficient ψ-0		0.800 (rare)
Combination coefficient ψ-1'		0.800 (non frequent)
Combination coefficient ψ-1		0.600 (frequent)
Combination coefficient ψ-2		0.500 (permanent)

Loads acting on QUAD elements

Elements from	to	inc	Load Type	Prim LC/CC	Load val.	Dimension	Variation dP/dX	dP/dY	dP/dZ
10000	19999		dTxy		-25.000	[°C]			

Load Case 5 (C) Shrinkage

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.000
favourable safety factor		1.000
Combination coefficient ψ-0		1.000 (rare)
Combination coefficient ψ-1'		1.000 (non frequent)
Combination coefficient ψ-1		1.000 (frequent)
Combination coefficient ψ-2		1.000 (permanent)

Loads acting on QUAD elements

Elements from	to	inc	Load Type	Prim LC/CC	Load val.	Dimension	Variation dP/dX	dP/dY	dP/dZ
10000	19999		dTxy		-15.000	[°C]			

Load Case 6 (T) Pos gradient

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.500
favourable safety factor		0.000
Combination coefficient ψ-0		0.800 (rare)
Combination coefficient ψ-1'		0.800 (non frequent)
Combination coefficient ψ-1		0.600 (frequent)
Combination coefficient ψ-2		0.500 (permanent)

Loads acting on QUAD elements

Elements from	to	inc	Load Type	Prim LC/CC	Load val.	Dimension	Variation dP/dX	dP/dY	dP/dZ
10000	19999		dTz		-10.500	[°C]			

Load Case 7 (T) Neg gradient

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.500
favourable safety factor		0.000
Combination coefficient ψ-0		0.800 (rare)
Combination coefficient ψ-1'		0.800 (non frequent)
Combination coefficient ψ-1		0.600 (frequent)
Combination coefficient ψ-2		0.500 (permanent)

Loads acting on QUAD elements

Elements from	to	inc	Load Type	Prim LC/CC	Load val.	Dimension	Variation dP/dX	dP/dY	dP/dZ
10000	19999		dTz		8.000	[°C]			

Load Case 10 (F) Pier settlement

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.000
favourable safety factor		0.000
Combination coefficient ψ-0		1.000 (rare)
Combination coefficient ψ-1'		1.000 (non frequent)
Combination coefficient ψ-1		1.000 (frequent)
Combination coefficient ψ-2		1.000 (permanent)

Loads acting on Nodes

Node	WX[mm]	WY[mm]	WZ[mm]	DX[mrad]	DY[mrad]	DZ[mrad]
14			10.000			
15			10.000			

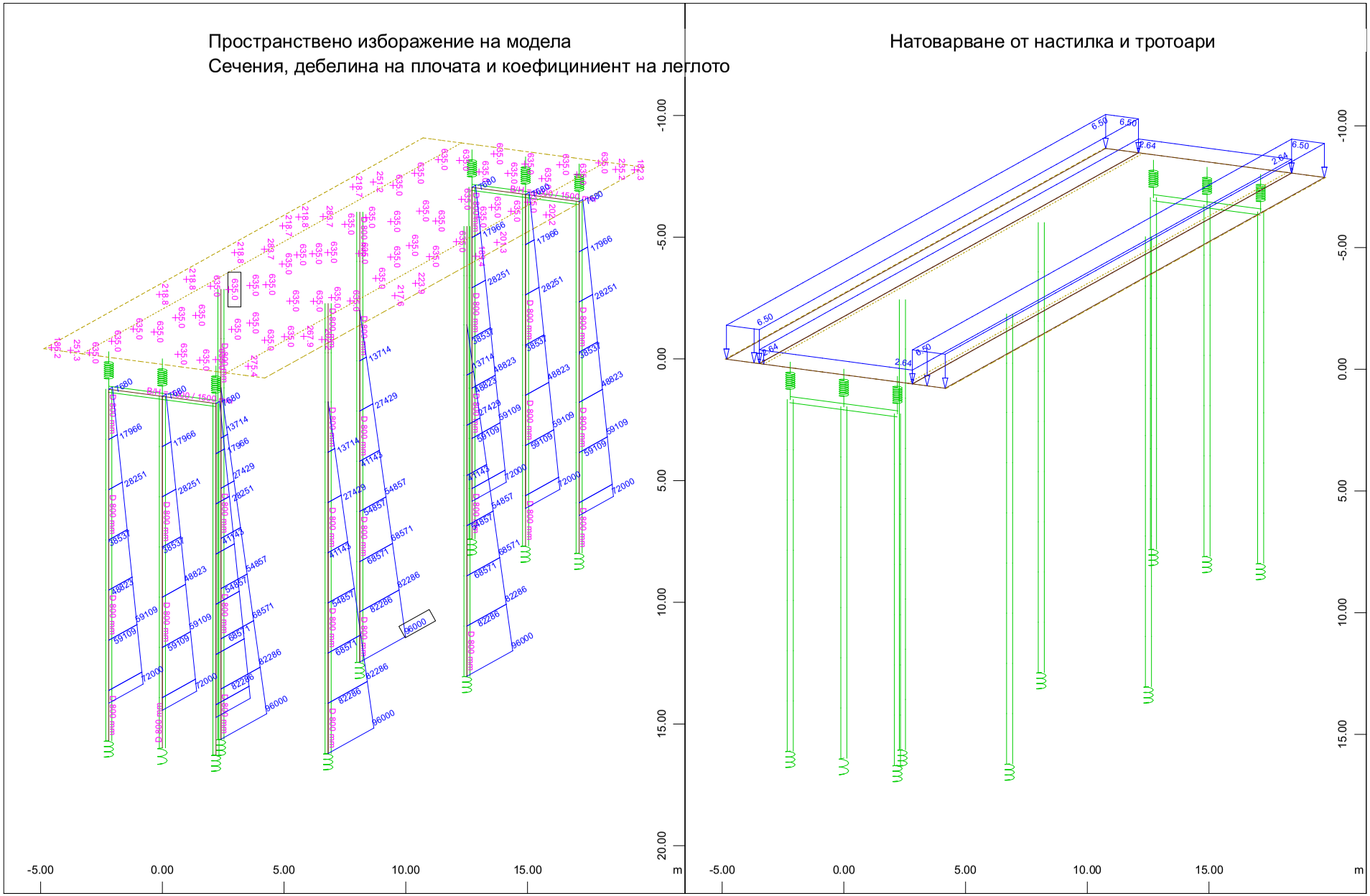
Load Case 11 (F) Pier settlement

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000
unfavourable safety factor		1.000
favourable safety factor		0.000
Combination coefficient ψ-0		1.000 (rare)
Combination coefficient ψ-1'		1.000 (non frequent)
Combination coefficient ψ-1		1.000 (frequent)
Combination coefficient ψ-2		1.000 (permanent)

Loads acting on Nodes

Node	WX[mm]	WY[mm]	WZ[mm]	DX[mrad]	DY[mrad]	DZ[mrad]
16			10.000			
17			10.000			

Пространствено изображение на модела
Сечения, дебелина на плочата и коефициниент на леглото



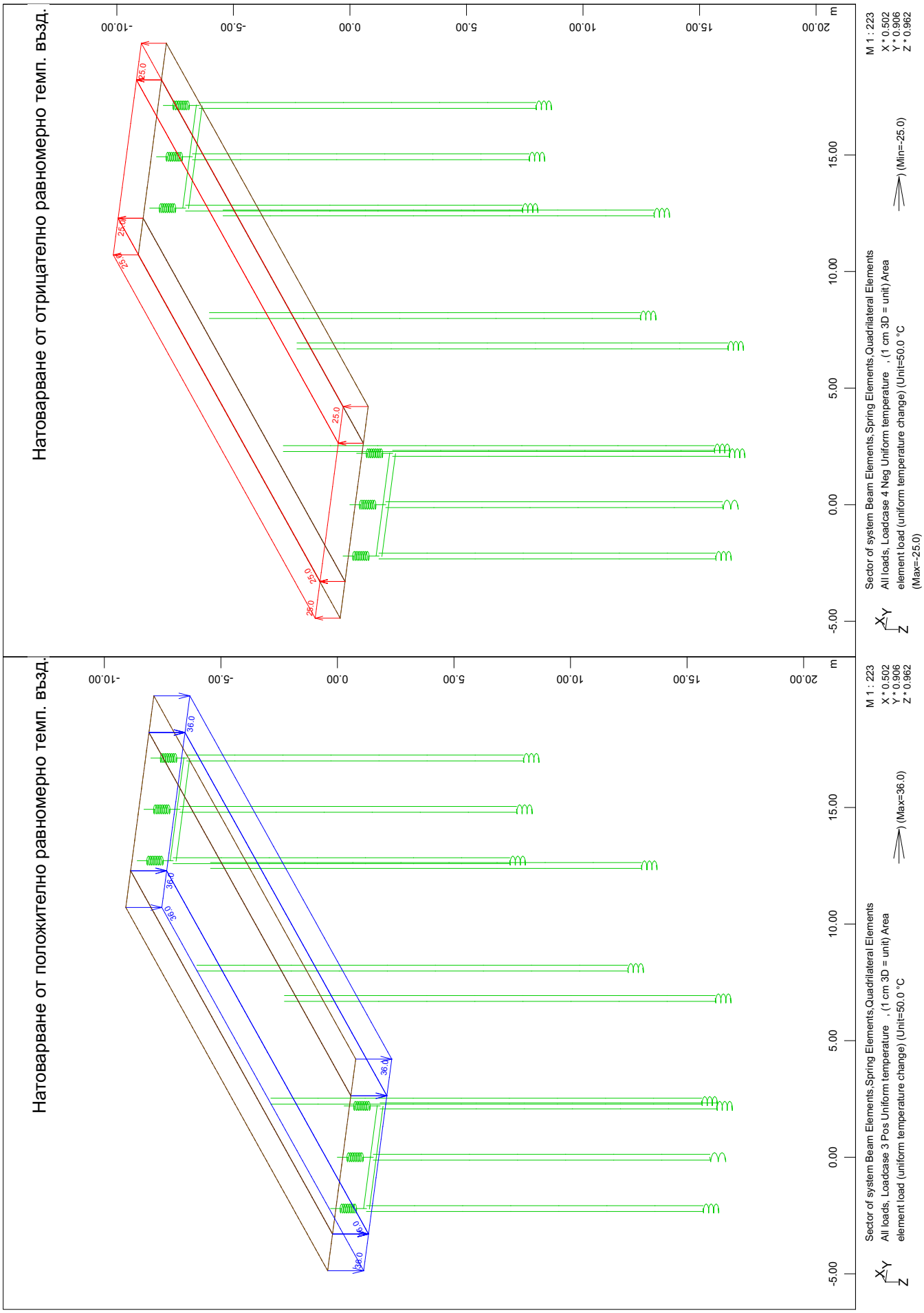
Sector of system Beam Elements,Spring Elements,Quadrilateral Elements
Contour
Beam Elements , Sectional Designations
Average plate thickness in Element in mm (Max=635.0)

M 1 : 223
X * 0.502
Y * 0.906
Z * 0.962

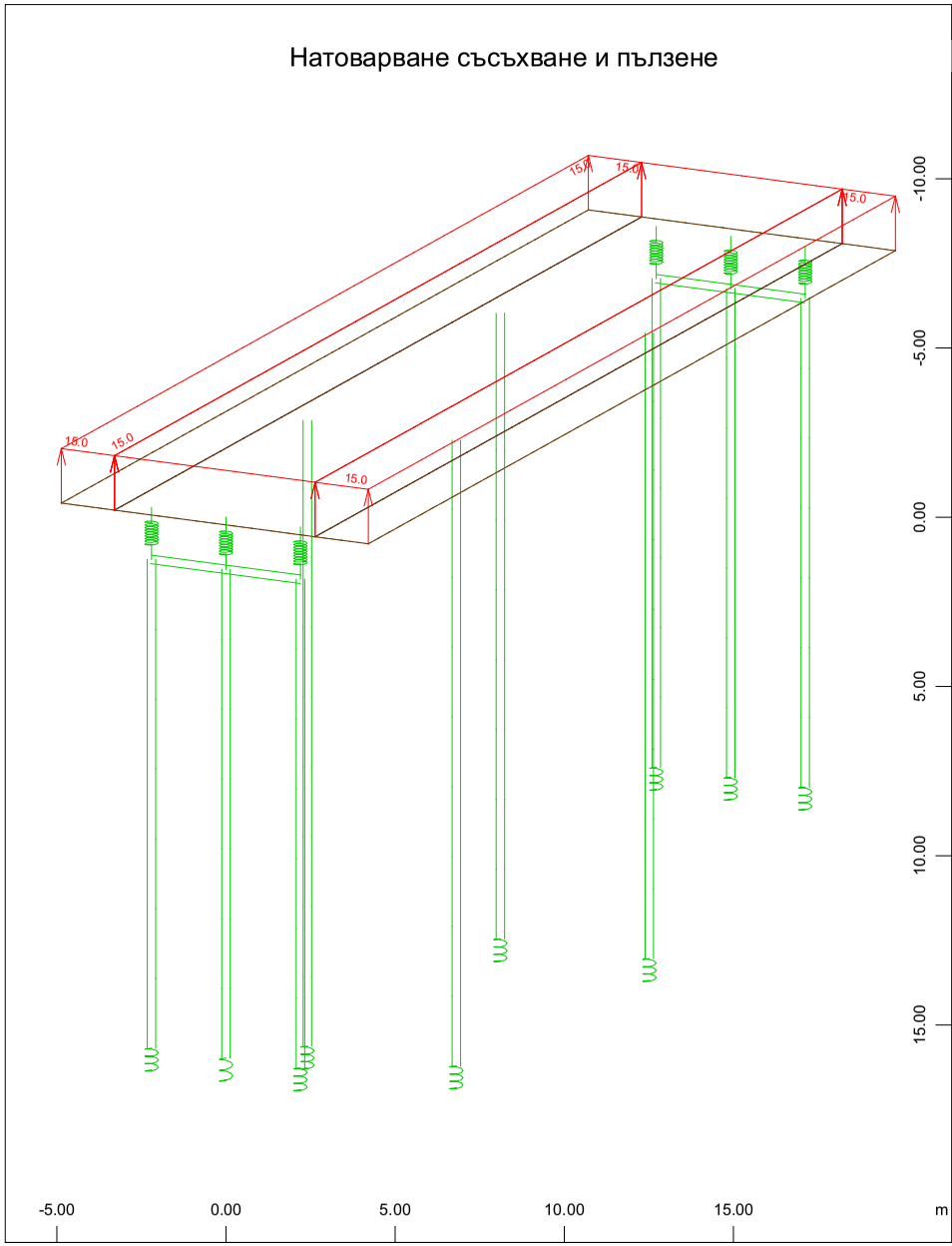
Натоварване от настилка и тротоари

Sector of system Beam Elements,Spring Elements,Quadrilateral Elements
All loads, Loadcase 2 Asphalt & Barriers , (1 cm 3D = unit) Free area
load (force) in global Z (Unit=10.0 kN/m2) (Max=6.50)

M 1 : 223
X * 0.502
Y * 0.906
Z * 0.962



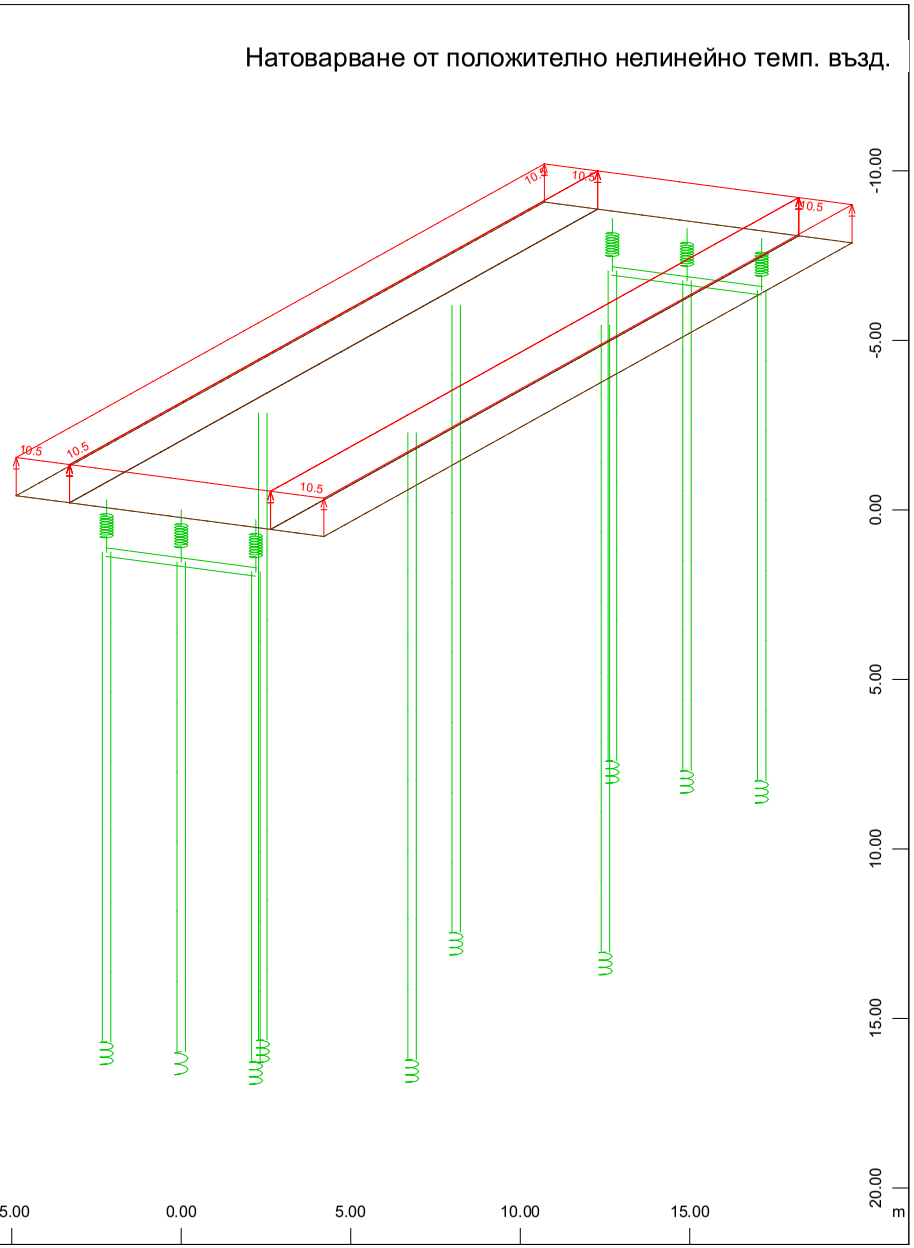
Натоварване съсъхване и пълзене



Sector of system Beam Elements,Spring Elements,Quadrilateral Elements
All loads, Loadcase 5 Shrinkage , (1 cm 3D = unit) Area element load
(uniform temperature change) (Unit=20.0 °C) (Min=-15.0) (Max=-15.0)

M 1 : 223
X * 0.502
Y * 0.906
Z * 0.962

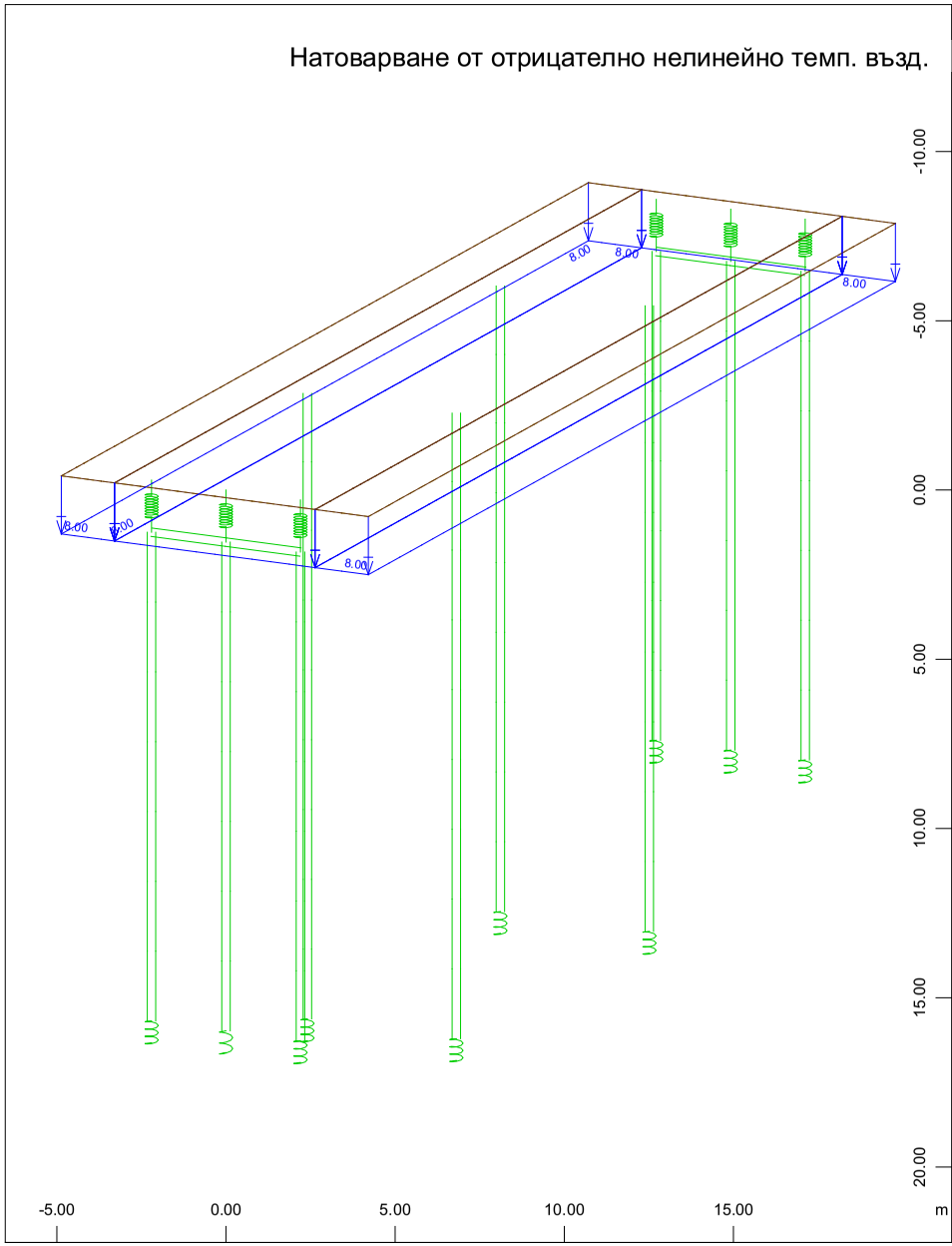
Натоварване от положително нелинейно темп. въздд.



Sector of system Beam Elements,Spring Elements,Quadrilateral Elements
All loads, Loadcase 6 Pos gradient , (1 cm 3D = unit) Area element load
(temperature increase) (Unit=20.0 °C) (Min=-10.5) (Max=-10.5)

M 1 : 223
X * 0.502
Y * 0.906
Z * 0.962

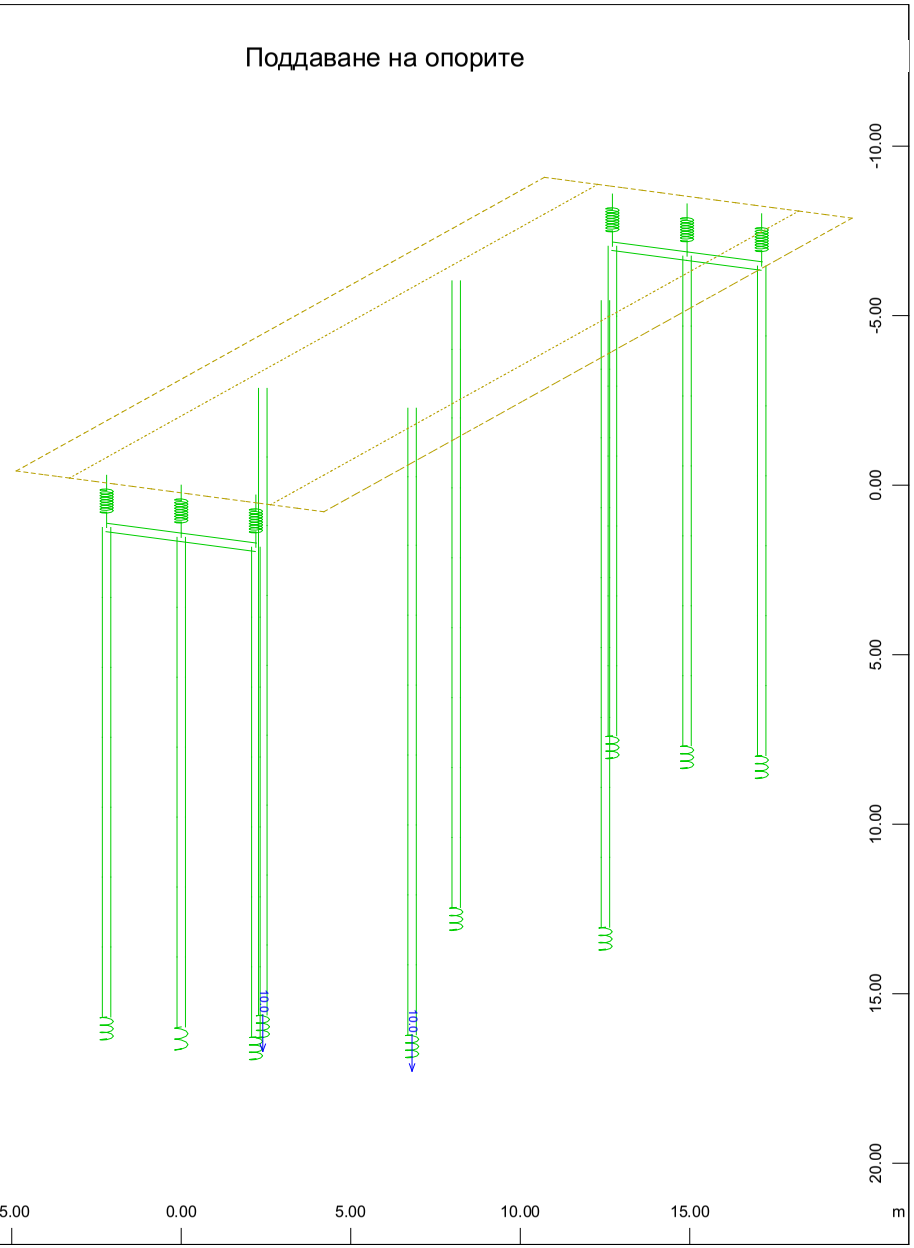
Натоварване от отрицателно нелинейно темп. въздействие



Sector of system Beam Elements,Spring Elements,Quadrilateral Elements
All loads, Loadcase 7 Neg gradient , (1 cm 3D = unit) Area element load
(temperature increase) (Unit=10.0 °C) (Max=8.00)

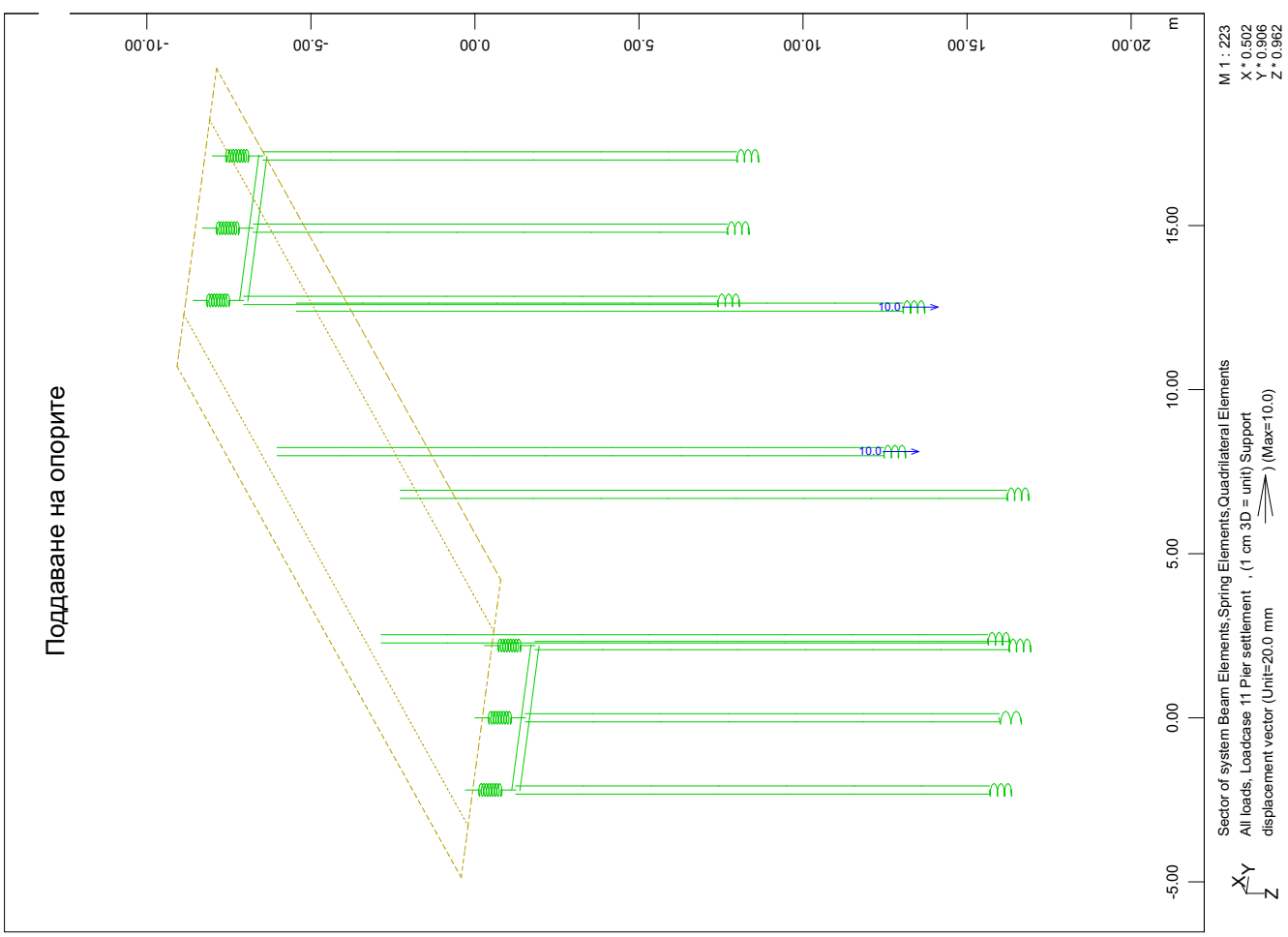
M 1 : 223
X * 0.502
Y * 0.906
Z * 0.962

Поддаване на опорите

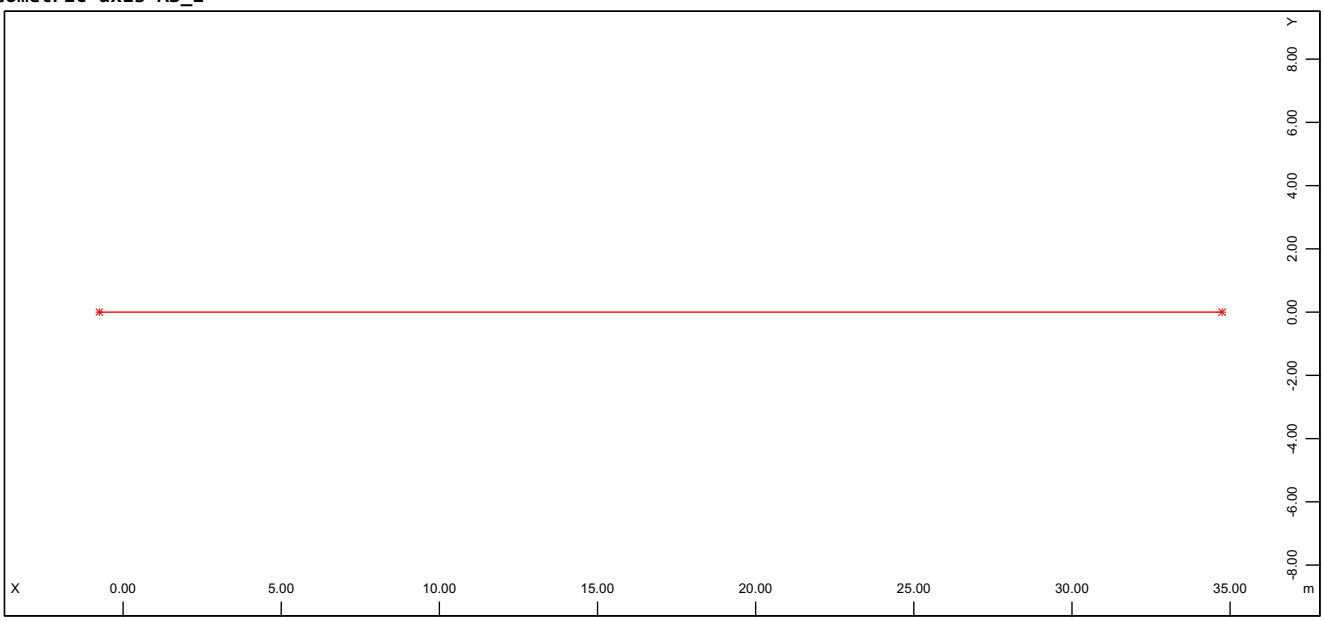


Sector of system Beam Elements,Spring Elements,Quadrilateral Elements
All loads, Loadcase 10 Pier settlement , (1 cm 3D = unit) Support
displacement vector (Unit=20.0 mm) (Max=10.0)

M 1 : 223
X * 0.502
Y * 0.906
Z * 0.962



Geometric axis AS_1



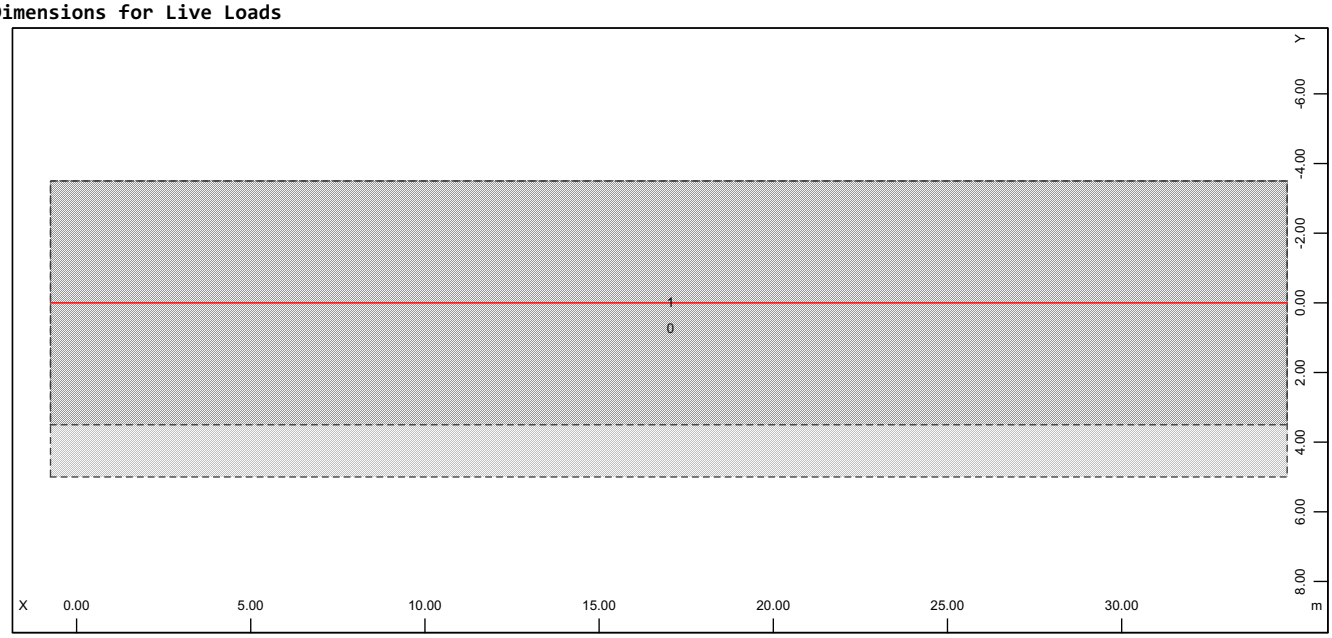
Segments
Y
Z X

Segments

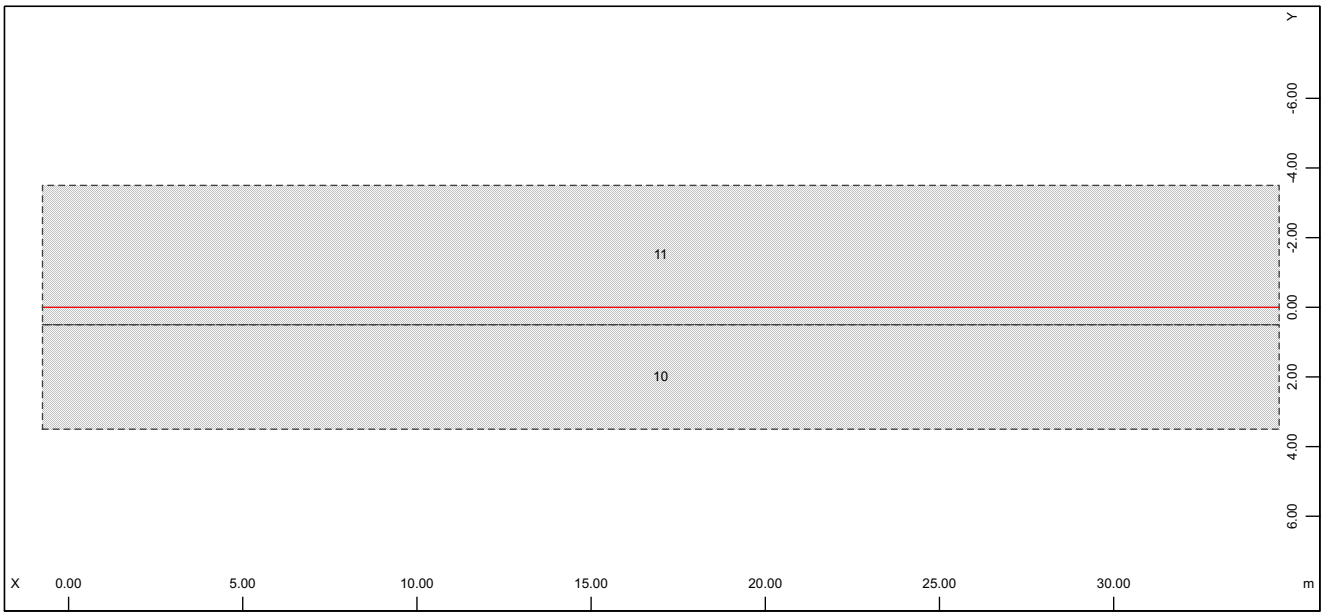
S[-]	L[m]	R[m]	X[m]	Y[m]	Z[m]	DX[-]	DY[-]	DZ[-]
0.000	35.500		-0.750	0.000	0.000	1.000	0.000	0.000
1.000			34.750	0.000	0.000	1.000	0.000	0.000

S station value at start point
L length of the segment
R radius of curvature
X,Y,Z coordinates of start point
DX,DY,DZ component of the direction

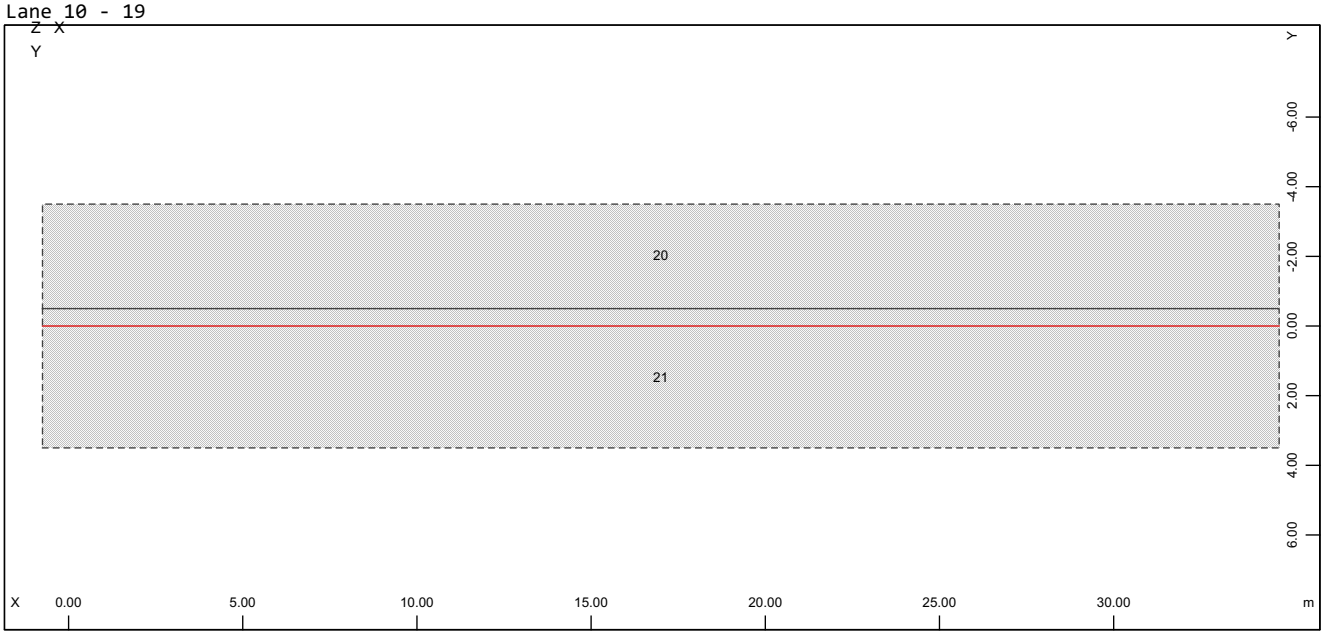
Dimensions for Live Loads



Lane 0 - 9
Z X
Y



Lane 10 - 19



Lane 20 - 29

Z X
Y

Lane 0 - 99

S [-]	n	yc [m]	yr [m]	yl [m]	l-phi [m]	hs [m]	incl [-]	h-eff [m]	b-eff [m]	d-eff [m]	a-sl [m]
0.000	0	0.000	5.000	-3.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000
1.000		0.000	5.000	-3.500		0.000	0.000	inc-d=	0.250		
0.000	1	0.000	3.500	-3.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000
1.000		0.000	3.500	-3.500		0.000	0.000	inc-d=	0.250		
0.000	10	2.000	3.500	0.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000
1.000		2.000	3.500	0.500		0.000	0.000	inc-d=	0.250		
0.000	11	-1.000	0.500	-3.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000
1.000		-1.000	0.500	-3.500		0.000	0.000	inc-d=	0.250		
0.000	20	-2.000	-0.500	-3.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000
1.000		-2.000	-0.500	-3.500		0.000	0.000	inc-d=	0.250		
0.000	21	1.000	3.500	-0.500	35.500	0.000	0.000	0.000	0.000	0.000	0.000
1.000		1.000	3.500	-0.500		0.000	0.000	inc-d=	0.250		

S station value

Actions

type	part	sup	Title	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'
G_1	G	perm	dead load g1	1.35	1.00	1.00	1.00	1.00	1.00	1.00
G_2	G	perm	dead load g2	1.35	1.00	1.00	1.00	1.00	1.00	1.00
R	G	perm	earth pressure	1.35	1.00	1.00	1.00	1.00	0.00	1.00

Actions

type	part	sup	Title	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'
C	P	perm	creep + shrinkage	1.00	1.00	1.00	1.00	1.00	1.00	1.00
F	Q	cond	settlement	1.00	0.00	1.00	1.00	1.00	1.00	1.00
L_T	Q	excl	Traffic load TS of EC/DIN-FB	1.35	0.00	1.00	0.75	0.75	0.00	0.80
L_U	Q	excl	Traffic load UDL of EC/DIN-FB	1.35	0.00	1.00	0.40	0.40	0.00	0.80
T	Q	excl	temperature loading	1.50	0.00	1.00	0.80	0.60	0.50	0.80
A	A	excl	impact loading	1.00	0.00	1.00	1.00	1.00	0.00	1.00
E	E	usex	Earthquake	1.00	0.00	1.00	1.00	1.00	1.00	1.00
E_2	E	usex	Earthquake	1.00	0.00	1.00	1.00	1.00	1.00	1.00

Reduction coefficient xsi 0.850

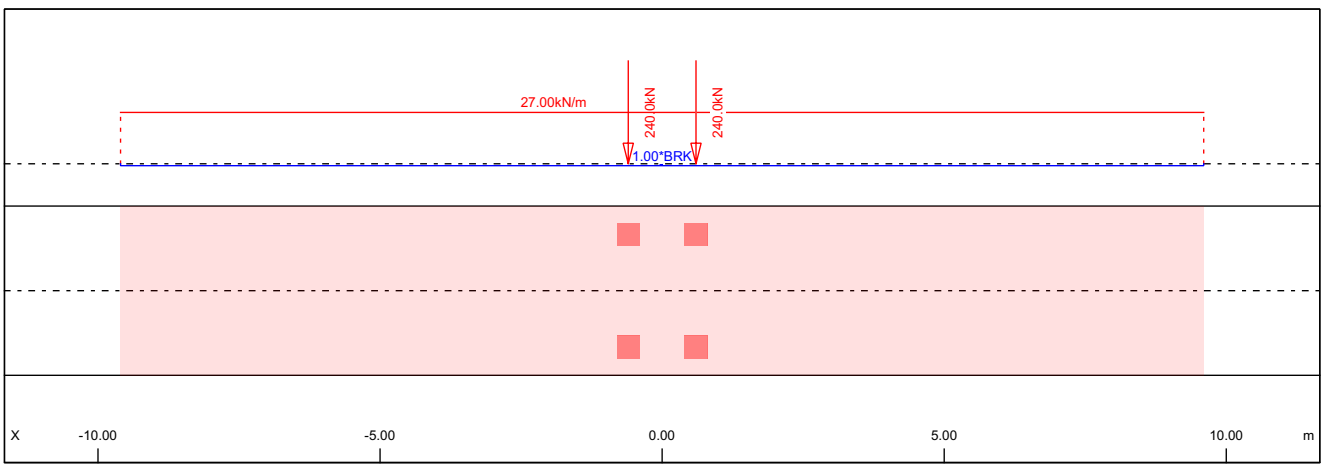
Load Train 1201 EN 1991-2 Load model LM1

Load Train

LM1 / 300 EN 1991-2 Load model LM1

Load Train	300.000 [-]
Axle load	240.0 [kN]
Traffic Lane	9.00 [kN/m2]
Residual Area	2.50 [kN/m2]
Wind Load Height	3.500 [m]
Brake load	900.0 [kN]
Total factor	1.000 [-]
Width of loading	3.000 [m]
Fact.centrifugal	1.000 [-]

Loading travels in both directions



EN 1991-2 Load model LM1

Load elements of Load Train

	Pv [kN/m]	Pl [kN/m]	Pw [kN/m]	Pf [kN/m]	ffav [-]	X [m]	L [m]	y [m]	hw [m]	hs [m]	b [m]	cont@
p	27.00	1.0*BRK	0.00	0.00	0.0			0.000	1.750	0.000	3.000	
	[kN]	[kN]	[kN]	[kN]	[-]	[m]		[m]	[m]	[m]	[m]	
E	240.0	0.0	0.0	240.0	1.0	-0.600		0.000	0.000	0.000	2.000w	
										b/l-Wh	0.400	0.400
E	240.0	0.0	0.0	240.0	1.0	0.600		0.000	0.000	0.000	2.000w	
										b/l-Wh	0.400	0.400

Small w behind the width b: Distance of wheels for two single loadings

Load Train 1202 EN 1991-2 Load model LM1

Load Train

LM1 / 200 EN 1991-2 Load model LM1

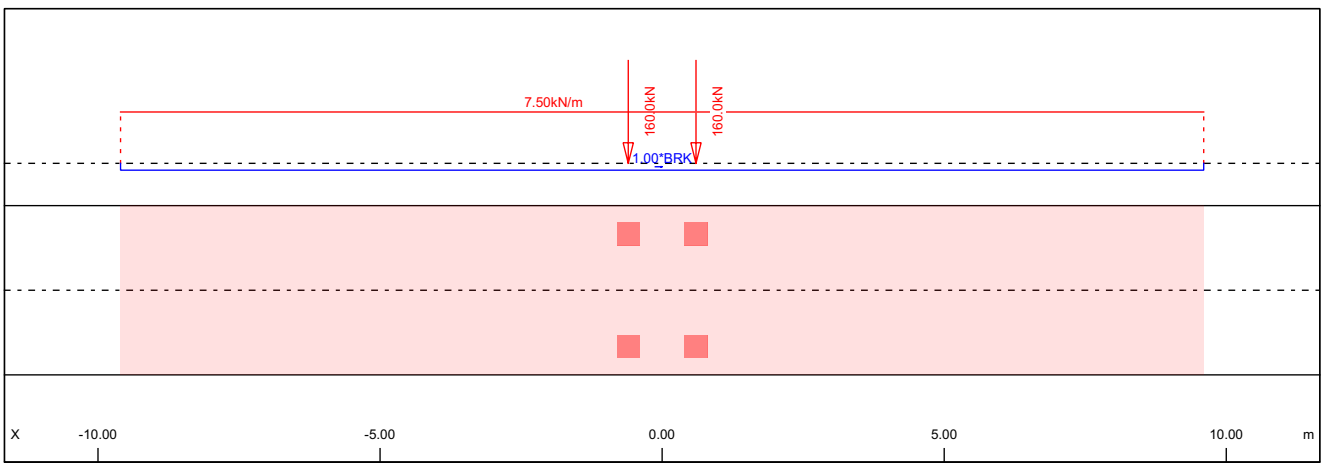
Load Train	200.000 [-]
Axle load	160.0 [kN]
Traffic Lane	2.50 [kN/m2]
Residual Area	2.50 [kN/m2]

Bridge_Popovica
Trains

Load Train

Wind Load Height	3.500 [m]
Brake load	900.0 [kN]
Total factor	1.000 [-]
Width of loading	3.000 [m]
Fact.centrifugal	1.000 [-]

Loading travels in both directions



EN 1991-2 Load model LM1

Load elements of Load Train

	Pv [kN/m]	Pl [kN/m]	Pw [kN/m]	Pf [kN/m]	ffav [-]	X [m]	L [m]	y [m]	hw [m]	hs [m]	b [m]	cont@
p	7.50	1.0*BRK	0.00	0.00	0.0			0.000	1.750	0.000	3.000	
	[kN]	[kN]	[kN]	[kN]	[-]	[m]		[m]	[m]	[m]	[m]	
E	160.0	0.0	0.0	160.0	1.0	-0.600		0.000	0.000	0.000	2.000w	
										b/l-Wh	0.400	0.400
E	160.0	0.0	0.0	160.0	1.0	0.600		0.000	0.000	0.000	2.000w	
										b/l-Wh	0.400	0.400

Small w behind the width b: Distance of wheels for two single loadings

Load Train 1203 EN 1991-2 Load model LM1

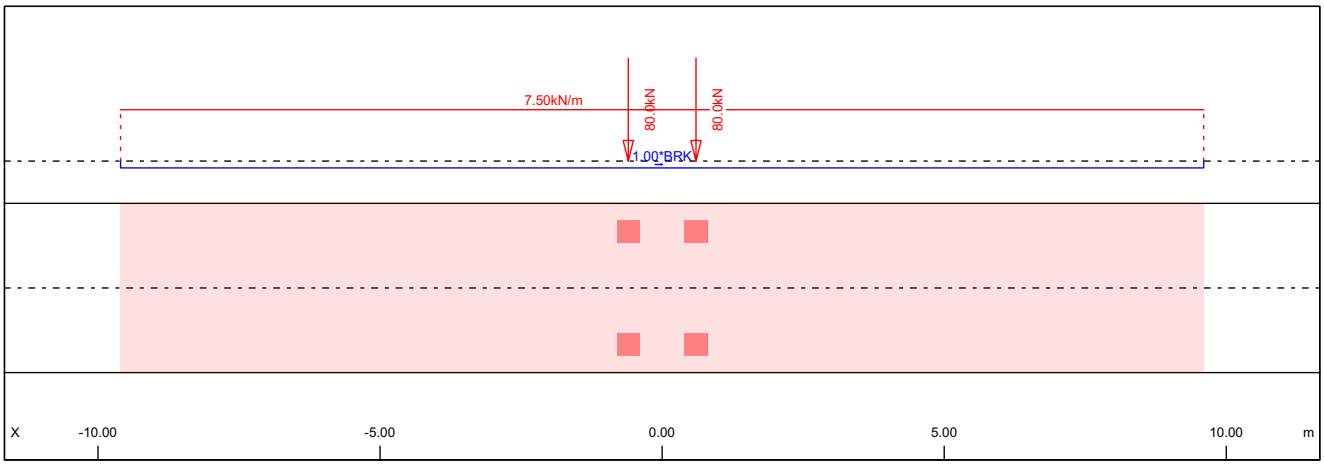
Load Train

LM1 / 100 EN 1991-2 Load model LM1

Load Train	100.000 [-]
Axle load	80.0 [kN]
Traffic Lane	2.50 [kN/m2]
Residual Area	2.50 [kN/m2]
Wind Load Height	3.500 [m]
Brake load	900.0 [kN]
Total factor	1.000 [-]
Width of loading	3.000 [m]
Fact.centrifugal	1.000 [-]

Loading travels in both directions

Bridge_Popovica
Trains



EN 1991-2 Load model LM1

Load elements of Load Train

	Pv [kN/m]	Pl [kN/m]	Pw [kN/m]	Pf [kN/m]	ffav [-]	X [m]	L [m]	y [m]	hw [m]	hs [m]	b [m]	cont@
p	7.50	1.0*BRK	0.00	0.00	0.0			0.000	1.750	0.000	3.000	
	[kN]	[kN]	[kN]	[kN]	[-]	[m]		[m]	[m]	[m]	[m]	
E	80.0	0.0	0.0	80.0	1.0	-0.600		0.000	0.000	0.000	2.000w	
										b/l-Wh	0.400	0.400
E	80.0	0.0	0.0	80.0	1.0	0.600		0.000	0.000	0.000	2.000w	
										b/l-Wh	0.400	0.400

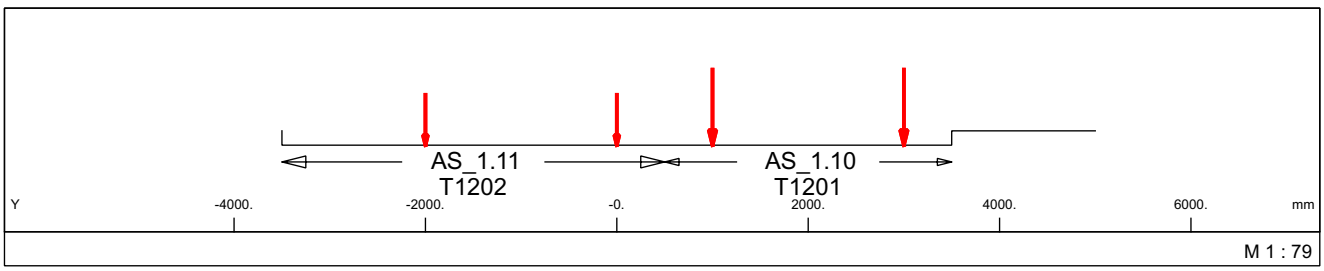
Small w behind the width b: Distance of wheels for two single loadings

Geometry of lane AS_1

polynomial load distribution n= 5 dY= 99.000 dZ= 0.100 B= 3.000 Bwh= 2.000

Evaluation : Case 1 Tandem loads

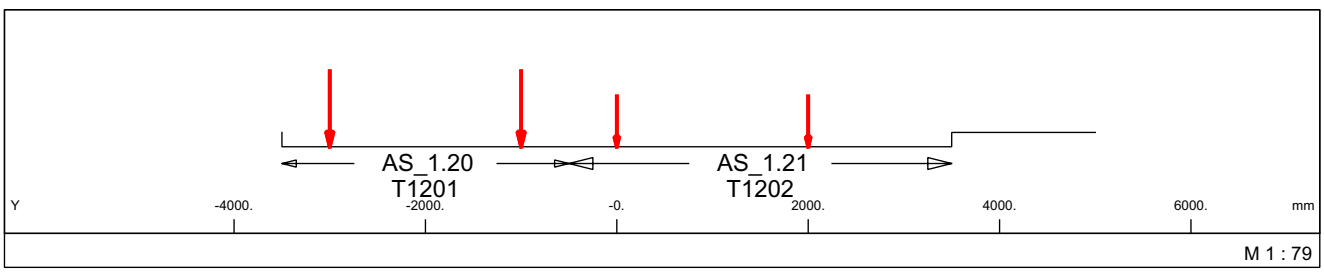
Lane	LC	p[kN/m2]	v[km/h]	yex[m]	PL*	UDL*	RDL*	BRK*	TRA*	FUG*	WIND
AS_1.10	1201 EN 1991-2 Load m	0.00	0.0	0.000	1.00	0.00	0.00	0.00	0.00	0.00	0.00
AS_1.11	1202 EN 1991-2 Load m	0.00	0.0	0.000	1.00	0.00	0.00	0.00	0.00	0.00	0.00



Loadposition case 1

Evaluation : Case 2 Tandem loads

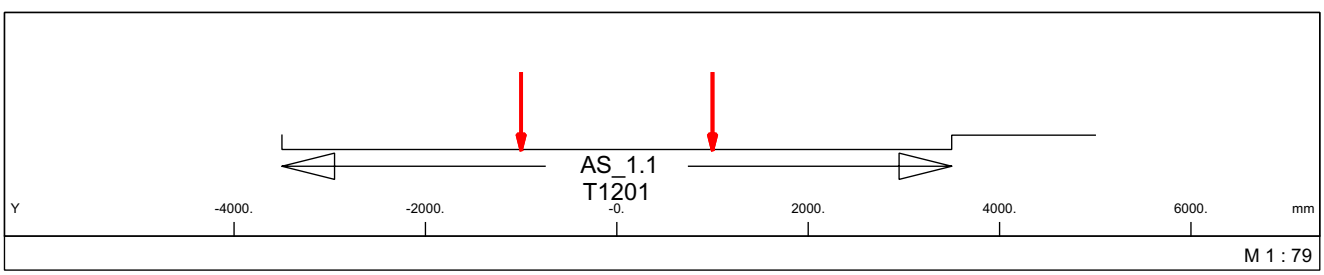
Lane	LC	p[kN/m2]	v[km/h]	yex[m]	PL*	UDL*	RDL*	BRK*	TRA*	FUG*	WIND
AS_1.20	1201 EN 1991-2 Load m	0.00	0.0	0.000	1.00	0.00	0.00	0.00	0.00	0.00	0.00
AS_1.21	1202 EN 1991-2 Load m	0.00	0.0	0.000	1.00	0.00	0.00	0.00	0.00	0.00	0.00



Loadposition case 2

Evaluation : Case 3 Tandem loads

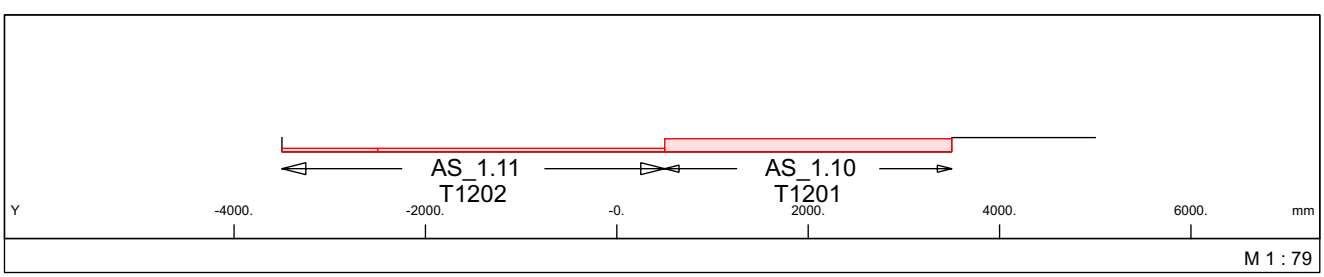
Lane	LC	p[kN/m2]	v[km/h]	yex[m]	PL*	UDL*	RDL*	BRK*	TRA*	FUG*	WIND
AS_1.1	1201 EN 1991-2 Load m	0.00	0.0	0.000	1.00	0.00	0.00	0.00	0.00	0.00	0.00



Loadposition case 3

Evaluation : Case 1 Tandem loads

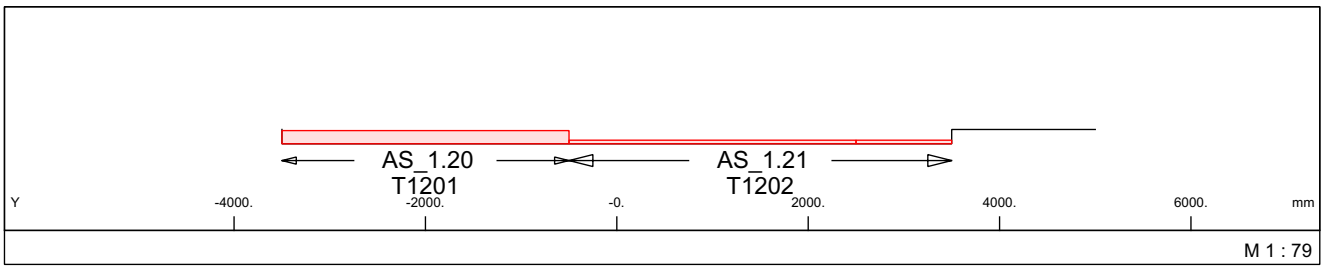
Lane	LC	p[kN/m2]	v[km/h]	yex[m]	PL*	UDL*	RDL*	BRK*	TRA*	FUG*	WIND
AS_1.10	1201 EN 1991-2 Load m	2.50	0.0	0.000	0.00	1.00	1.00	0.00	0.00	0.00	0.00
AS_1.11	1202 EN 1991-2 Load m	2.50	0.0	0.000	0.00	1.00	1.00	0.00	0.00	0.00	0.00



Loadposition case 1

Evaluation : Case 2 Tandem loads

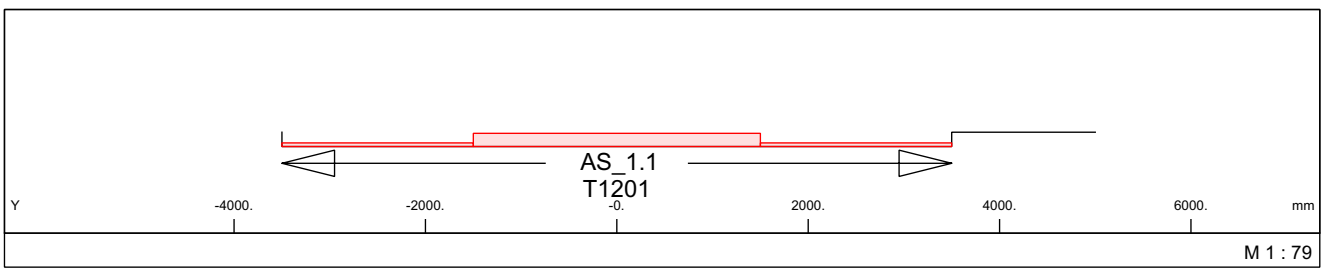
Lane	LC		p[kN/m2]	v[km/h]	yex[m]	PL*	UDL*	RDL*	BRK*	TRA*	FUG*	WIND
AS_1.20	1201	EN 1991-2 Load m	2.50	0.0	0.000	0.00	1.00	1.00	0.00	0.00	0.00	0.00
AS_1.21	1202	EN 1991-2 Load m	2.50	0.0	0.000	0.00	1.00	1.00	0.00	0.00	0.00	0.00



Loadposition case 2

Evaluation : Case 4 Tandem loads

Lane	LC		p[kN/m2]	v[km/h]	yex[m]	PL*	UDL*	RDL*	BRK*	TRA*	FUG*	WIND
AS_1.1	1201	EN 1991-2 Load m	2.50	0.0	0.000	0.00	1.00	1.00	0.00	0.00	0.00	0.00



Loadposition case 4

Actions

type	part	sup	Title	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'
G_1	G	perm	dead load g1	1.35	1.00	1.00	1.00	1.00	1.00	1.00
G_2	G	perm	dead load g2	1.35	1.00	1.00	1.00	1.00	1.00	1.00
R	G	perm	earth pressure	1.35	1.00	1.00	1.00	1.00	0.00	1.00
C	P	perm	creep + shrinkage	1.00	1.00	1.00	1.00	1.00	1.00	1.00
F	Q	cond	settlement	1.00	0.00	1.00	1.00	1.00	1.00	1.00
L_T	Q	excl	Traffic load TS of EC/DIN-FB	1.35	0.00	1.00	0.75	0.75	0.00	0.80
L_U	Q	excl	Traffic load UDL of EC/DIN-FB	1.35	0.00	1.00	0.40	0.40	0.00	0.80
T	Q	excl	temperature loading	1.50	0.00	1.00	0.80	0.60	0.50	0.80
A	A	excl	impact loading	1.00	0.00	1.00	1.00	1.00	0.00	1.00
E	E	usex	Earthquake	1.00	0.00	1.00	1.00	1.00	1.00	1.00
E_2	E	usex	Earthquake	1.00	0.00	1.00	1.00	1.00	1.00	1.00

Reduction coefficient xsi 0.850

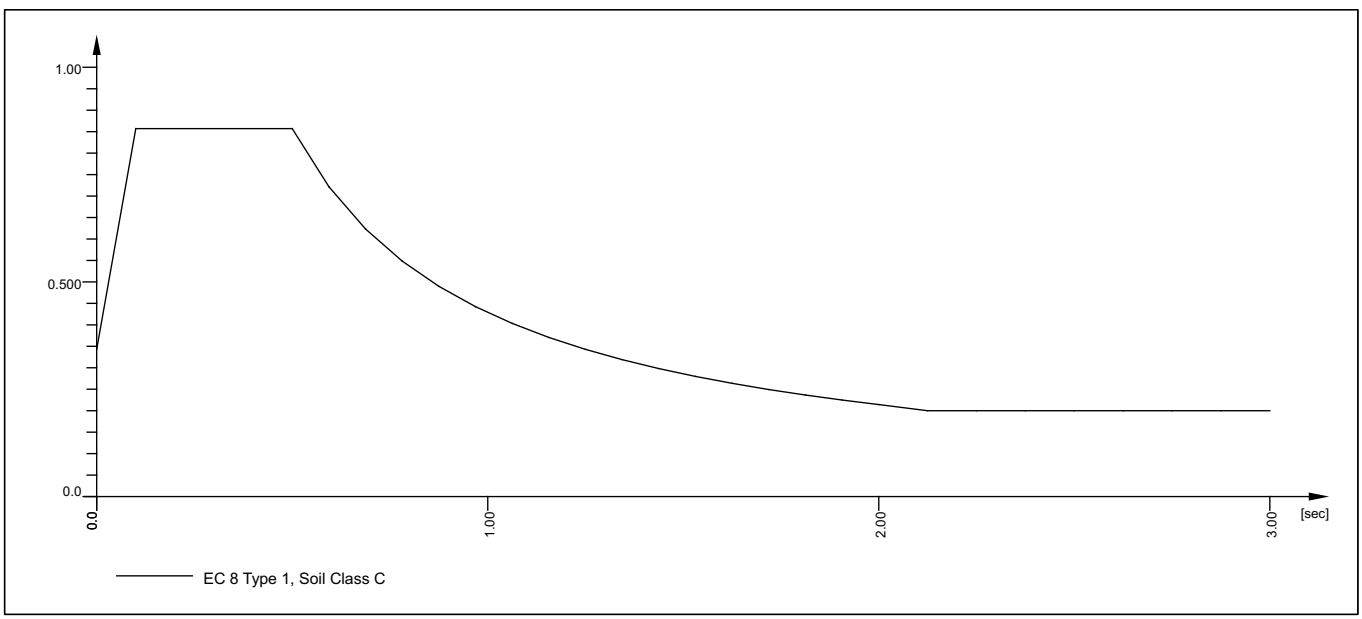
Load Case 990 100% X

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000
Factor dead weight DL-ZZ 0.000

Response spectra EC 8 Type 1, Soil Class C

D[-]	SA[-]	SB[-]	MIN[-]	TB[sec]	TC[sec]	TD[sec]	TE[sec]	K1[-]	K2[-]	A[m/sec2]
3.5000	0.343	0.857	0.200	0.100	0.500	2.000	0.000	1.000	2.000	3.14

Zone = ah =* 1.000 av =* 0.000



100% X

Loads acting on Nodes

Node	A-X [m/sec2]	A-Y [m/sec2]	A-Z [m/sec2]	A-RX [1/sec2]	A-RY [1/sec2]	A-RZ [1/sec2]
0	3.14					

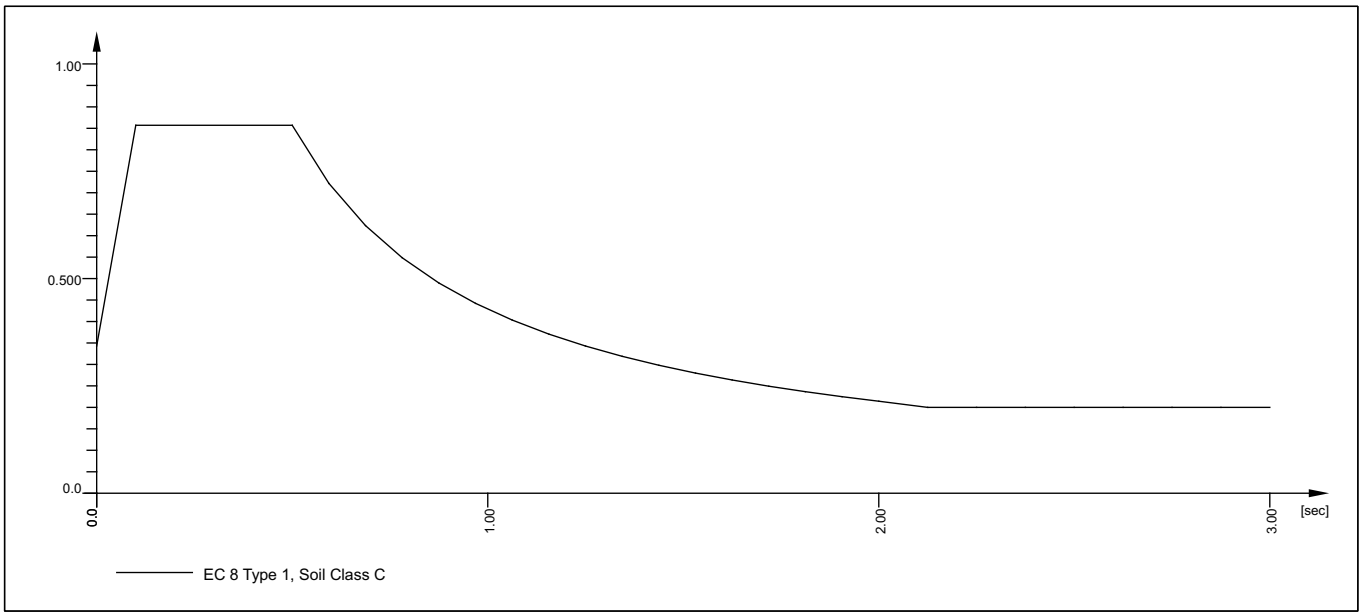
Load Case 991 100% Y

Factor forces and moments 1.000
Factor dead weight DL-XX 0.000
Factor dead weight DL-YY 0.000
Factor dead weight DL-ZZ 0.000

Response spectra EC 8 Type 1, Soil Class C

D[-]	SA[-]	SB[-]	MIN[-]	TB[sec]	TC[sec]	TD[sec]	TE[sec]	K1[-]	K2[-]	A[m/sec2]
3.5000	0.343	0.857	0.200	0.100	0.500	2.000	0.000	1.000	2.000	3.14

Zone = ah =* 1.000 av =* 0.000



100% Y

Loads acting on Nodes

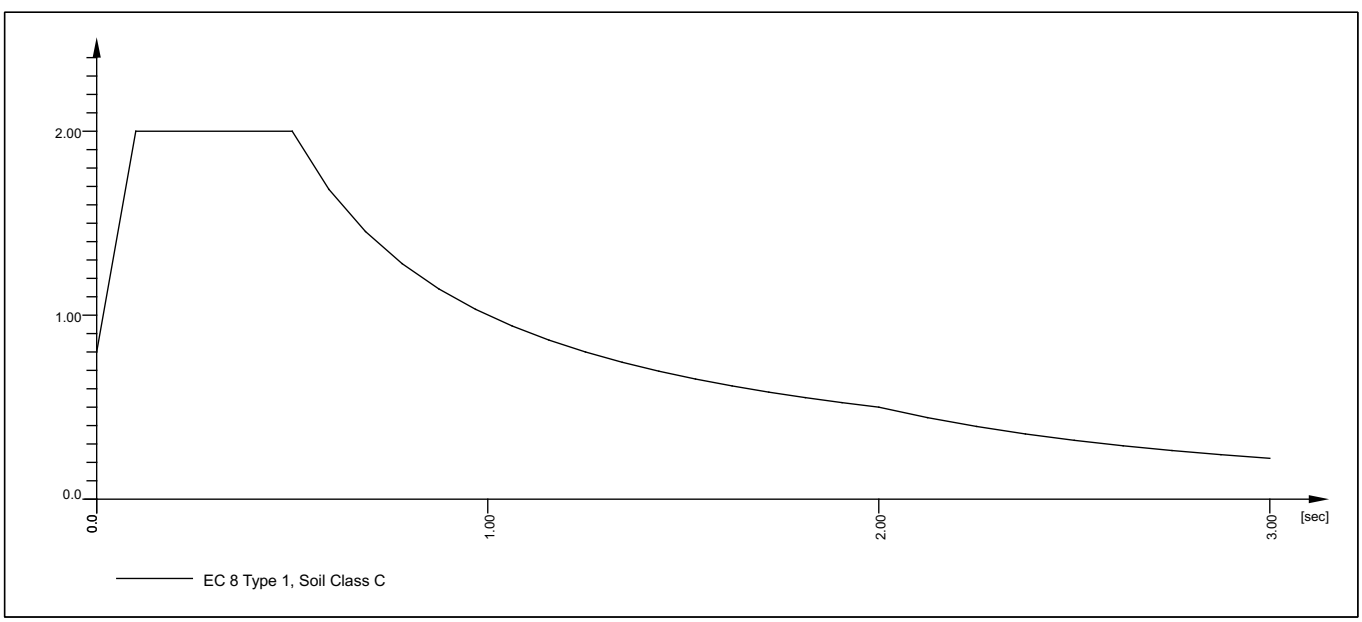
Node	A-X [m/sec2]	A-Y [m/sec2]	A-Z [m/sec2]	A-RX [1/sec2]	A-RY [1/sec2]	A-RZ [1/sec2]
0		3.14				

Load Case 992 100% Z

Factor forces and moments		1.000
Factor dead weight	DL-XX	0.000
Factor dead weight	DL-YY	0.000
Factor dead weight	DL-ZZ	0.000

Response spectra EC 8 Type 1, Soil Class C

D[-]	SA[-]	SB[-]	MIN[-]	TB[sec]	TC[sec]	TD[sec]	TE[sec]	K1[-]	K2[-]	A[m/sec2]
1.5000	0.800	2.000	0.200	0.100	0.500	2.000	0.000	1.000	2.000	3.14
	Zone =			ah =*	0.000	av =*	0.900			



100% Z

Loads acting on Nodes

Node	A-X [m/sec2]	A-Y [m/sec2]	A-Z [m/sec2]	A-RX [1/sec2]	A-RY [1/sec2]	A-RZ [1/sec2]
0			2.83			

Bridge_Popovica
Calculation Of Eigenvalues

Sum of Masses

	TM-X[t]	TM-Y[t]	TM-Z[t]	RM-X[tm2]	RM-Y[tm2]	RM-Z[tm2]
total	826.172	826.172	826.172	27.014	14.918	5.638
activ	826.173	826.173	826.173	27.014	14.918	5.638

Center of mass

X[m]	Y[m]	Z[m]
17.000	0.000	2.438

Parameter of System of Equations

Number of unknowns 9132 DIRECT-SPARSE
Total entries 163837
Total entries after fill in 997029
Mass matrix 9356 (consistent)

Eigenfrequencies

Using Vectoriteration
Iterationsvectors 12
Iterations 24

No.	LC	Eigenvalue [1/Sec2]	Relativ error	frequency [Hertz]	Period [sec]	modal damping
1	9001	1.96295E+01	3.26E-15	0.705	1.418160	0.00000
2	9002	4.41772E+01	1.61E-15	1.058	0.945324	0.00000
3	9003	4.50110E+01	1.58E-15	1.068	0.936528	0.00000
4	9004	1.47622E+03	3.80E-13	6.115	0.163533	0.00000
5	9005	1.99891E+03	3.93E-09	7.116	0.140535	0.00000
6	9006	2.12428E+03	1.83E-07	7.335	0.136324	0.00000
7	9007	2.16538E+03	2.55E-09	7.406	0.135025	0.00000
8	9008	2.74486E+03	6.25E-07	8.338	0.119928	0.00000
9	9009	3.01941E+03	9.43E-13	8.745	0.114345	0.00000
10	9010	3.01941E+03	5.30E-09	8.745	0.114345	0.00000
11		3.61494E+03	7.60E-05	9.569	0.104503	
12		5.64176E+03	1.44E-03	11.954	0.083651	

Modal masses - activated mass

No.	LC	frequency [Hertz]	modal mass X[t]	Y[t]	Z[t]	modal mass factor X[%]	Y[%]	Z[%]	activated mass [%]*
1	9001	0.705	0.0	0.0	0.0	0.00	0.00	0.00	23.39181
2	9002	1.058	0.0	607.8	0.0	0.00	73.57	0.00	71.47814
3	9003	1.068	608.0	0.0	0.0	73.59	0.00	0.00	71.14854
4	9004	6.115	0.0	0.0	138.7	0.00	0.00	16.79	11.94309
5	9005	7.116	0.0	0.0	0.0	0.00	0.00	0.00	9.33925
6	9006	7.335	0.2	0.0	0.0	0.02	0.00	0.00	19.91724
7	9007	7.406	0.0	0.0	518.3	0.00	0.00	62.74	19.65372
8	9008	8.338	0.0	0.0	0.0	0.00	0.00	0.00	9.96540
9	9009	8.745	50.4	0.0	0.0	6.10	0.00	0.00	3.50340
10	9010	8.745	7.3	0.0	0.0	0.89	0.00	0.00	3.50340
		sum	665.9	607.9	657.0	80.60	73.58	79.53	
		System activ	826.2	826.2	826.2				

The modal masses are evaluated for the global X, Y and Z direction,
the "activated mass" also includes torsional and opposite movements
without a global displacement (tuning fork):
* activated mass in % = product u^2*M = displacement^2*mass, in relation to the
sum of active mass, u scaled on a maximum displacement or rotation of 1.00.

Bridge_Popovica
Calculation of Spectras

Control Information

QUAD-elements with higher non conforming modes 3
QUAD-elements with all rotational degrees of freedom
Number of unknowns 9132 (Pure modal analysis)
unknowns per node 6
Number eigenvalues 10

Groups

No.	Option	CS	Factor	RAYLEIGH-A [1/sec]	RAYLEIGH-B [sec]	Wind
1	EXTR		1.000	0.000000	0.000000	0
2	EXTR		1.000	0.000000	0.000000	0
3	EXTR		1.000	0.000000	0.000000	0
4	EXTR		1.000	0.000000	0.000000	0
5	EXTR		1.000	0.000000	0.000000	0

Beam Elements

Finite beam elements without intermediate sections
Shear deformations accounted for with nonconforming SOFiSTiK-Timoshenko beam

Sum of masses and mass moments of inertia

Node	TMX [t]	TMY [t]	TMZ [t]	RMX [tm2]	RMY [tm2]	RMZ [tm2]	RMB [tm2]
total	826.133	826.134	826.134	2.212E+01	1.002E+01	1.283E+00	
on S =	[mm]	[mm]	[mm]	2.398E+04	-3.46E+00	-2.79E-01	
	17000.0	0.0	2438.4	-3.46E+00	1.270E+05	4.456E-02	
				-2.79E-01	4.456E-02	1.136E+05	
activ	826.133	826.134	826.134	2.212E+01	1.002E+01	1.283E+00	
on S =	[mm]	[mm]	[mm]	2.398E+04	-3.46E+00	-2.79E-01	
	17000.0	0.0	2438.4	-3.46E+00	1.270E+05	4.456E-02	
				-2.79E-01	4.456E-02	1.136E+05	

Eigenfrequencies

No.	LC	Eigenvalue [1/sec2]	relative Error	omega [1/sec]	frequency [Hertz]	period [sec]	Damping D[%]	f-XX [%]	f-YY [%]	f-ZZ [%]
1	9001	1.9630E+01		4.431	0.705	1.418	5.000	0.0	0.0	0.0
2	9002	4.4177E+01		6.647	1.058	0.945	5.000	0.0	73.6	0.0
3	9003	4.5011E+01		6.709	1.068	0.937	5.000	73.6	0.0	0.0
4	9004	1.4762E+03		38.422	6.115	0.164	5.000	0.0	0.0	16.8
5	9005	1.9989E+03		44.709	7.116	0.141	5.000	0.0	0.0	0.0
6	9006	2.1243E+03		46.090	7.335	0.136	5.000	0.0	0.0	0.0
7	9007	2.1654E+03		46.534	7.406	0.135	5.000	0.0	0.0	62.7
8	9008	2.7449E+03		52.392	8.338	0.120	5.000	0.0	0.0	0.0
9	9009	3.0194E+03		54.949	8.745	0.114	5.000	6.1	0.0	0.0
10	9010	3.0194E+03		54.949	8.745	0.114	5.000	0.9	0.0	0.0
								80.6	73.6	79.5

Load Cases

-- Spectra 990 EC 8 Type 1, Soil Class C

D[-]	SA[-]	SB[-]	MIN[-]	TB[sec]	TC[sec]	TD[sec]	TE[sec]	K1[-]	K2[-]	A[m/sec2]
3.5000	0.343	0.857	0.200	0.100	0.500	2.000	0.000	1.000	2.000	3.14

a-X [m/sec2]	a-Y [m/sec2]	a-Z [m/sec2]	a-XX [1/sec2]	a-YY [1/sec2]	a-ZZ [1/sec2]
3.14	0.00	0.00			

Modal load contributions per function

funct.	mode	R*V-factor	V*R*V-factor	mode	R*V-factor	V*R*V-factor
990	1	1.364E-02	-2.023E-01	6	1.371E+00	-1.520E-02
	2	-3.357E-01	-6.344E-05	7	-1.570E-03	-1.491E-02
	3	-7.740E+01	-3.140E+00	8	6.352E-03	-7.862E-03
	4	-1.651E-03	-2.015E-02	9	-2.228E+01	-3.092E+00
	5	-3.034E-03	-8.112E-04	10	8.500E+00	-3.092E+00

Modal load contributions per function

funct.	mode	R*V-factor	V*R*V-factor	mode	R*V-factor	V*R*V-factor
	Sq.Sum	6.562E+03	-9.585E+00			

Modal Response

Response of periodic loading is exact including the phases

Contributions of all functions will be added as sum of squares

Fct.	Mode	Response	phase	Mode	Response	phase
990	1	2.100E-04	S= 0.302	2	-3.445E-03	S= 0.453
	3	-7.869E-01	S= 0.458	4	-9.587E-07	S= 0.857
	5	-1.301E-06	S= 0.857	6	5.532E-04	S= 0.857
	7	-6.214E-07	S= 0.857	8	1.984E-06	S= 0.857
	9	-6.326E-03	S= 0.857	10	2.413E-03	S= 0.857

Sum of forces (Base-Shear)

funct.	H[m]	Mode	SX[kN]	SY[kN]	SZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]
990			887.3	0.5	0.0	0.09	458.45	8.43
Nodal Masses			826.172	826.172	826.172	27.014	14.918	5.638

Moments are evaluated relative to the origin of the coordinate system

Nodal Displacements method CQC

Node	u-X-max [mm]	Time [sec]	u-Y-max [mm]	Time [sec]	u-Z-max [mm]	Time [sec]
MAX	32.465		0.035		0.934	

Bridge_Popovica
Calculation of Spectras

Control Information

QUAD-elements with higher non conforming modes 3
QUAD-elements with all rotational degrees of freedom
Number of unknowns 9132 (Pure modal analysis)
unknowns per node 6
Number eigenvalues 10

Groups

No.	Option	CS	Factor	RAYLEIGH-A [1/sec]	RAYLEIGH-B [sec]	Wind
1	EXTR		1.000	0.000000	0.000000	0
2	EXTR		1.000	0.000000	0.000000	0
3	EXTR		1.000	0.000000	0.000000	0
4	EXTR		1.000	0.000000	0.000000	0
5	EXTR		1.000	0.000000	0.000000	0

Beam Elements

Finite beam elements without intermediate sections
Shear deformations accounted for with nonconforming SOFiSTiK-Timoshenko beam

Sum of masses and mass moments of inertia

Node	TMX [t]	TMY [t]	TMZ [t]	RMX [tm2]	RMY [tm2]	RMZ [tm2]	RMB [tm2]
total	826.133	826.134	826.134	2.212E+01	1.002E+01	1.283E+00	
on S =	[mm]	[mm]	[mm]	2.398E+04	-3.46E+00	-2.79E-01	
	17000.0	0.0	2438.4	-3.46E+00	1.270E+05	4.456E-02	
				-2.79E-01	4.456E-02	1.136E+05	
activ	826.133	826.134	826.134	2.212E+01	1.002E+01	1.283E+00	
on S =	[mm]	[mm]	[mm]	2.398E+04	-3.46E+00	-2.79E-01	
	17000.0	0.0	2438.4	-3.46E+00	1.270E+05	4.456E-02	
				-2.79E-01	4.456E-02	1.136E+05	

Eigenfrequencies

No.	LC	Eigenvalue [1/sec2]	relative Error	omega [1/sec]	frequency [Hertz]	period [sec]	Damping D[%]	f-XX [%]	f-YY [%]	f-ZZ [%]
1	9001	1.9630E+01		4.431	0.705	1.418	5.000	0.0	0.0	0.0
2	9002	4.4177E+01		6.647	1.058	0.945	5.000	0.0	73.6	0.0
3	9003	4.5011E+01		6.709	1.068	0.937	5.000	73.6	0.0	0.0
4	9004	1.4762E+03		38.422	6.115	0.164	5.000	0.0	0.0	16.8
5	9005	1.9989E+03		44.709	7.116	0.141	5.000	0.0	0.0	0.0
6	9006	2.1243E+03		46.090	7.335	0.136	5.000	0.0	0.0	0.0
7	9007	2.1654E+03		46.534	7.406	0.135	5.000	0.0	0.0	62.7
8	9008	2.7449E+03		52.392	8.338	0.120	5.000	0.0	0.0	0.0
9	9009	3.0194E+03		54.949	8.745	0.114	5.000	6.1	0.0	0.0
10	9010	3.0194E+03		54.949	8.745	0.114	5.000	0.9	0.0	0.0
								80.6	73.6	79.5

Load Cases

-- Spectra 991 EC 8 Type 1, Soil Class C

D[-]	SA[-]	SB[-]	MIN[-]	TB[sec]	TC[sec]	TD[sec]	TE[sec]	K1[-]	K2[-]	A[m/sec2]
3.5000	0.343	0.857	0.200	0.100	0.500	2.000	0.000	1.000	2.000	3.14

a-X [m/sec2]	a-Y [m/sec2]	a-Z [m/sec2]	a-XX [1/sec2]	a-YY [1/sec2]	a-ZZ [1/sec2]
0.00	3.14	0.00			

Modal load contributions per function

funct.	mode	R*V-factor	V*R*V-factor	mode	R*V-factor	V*R*V-factor
991	1	-1.732E-02	-2.937E+00	6	1.819E-03	-6.333E-04
	2	-7.740E+01	-3.138E+00	7	2.326E-03	-6.821E-04
	3	3.358E-01	-5.946E-05	8	-3.917E-03	-1.914E-01
	4	3.721E-03	-4.296E-04	9	-4.538E-06	-9.576E-14
	5	-4.669E-01	-5.658E-02	10	1.173E-04	-8.345E-09

Modal load contributions per function

funct.	mode	R*V-factor	V*R*V-factor	mode	R*V-factor	V*R*V-factor
	Sq.Sum	5.990E+03	-6.325E+00			

Modal Response

Response of periodic loading is exact including the phases

Contributions of all functions will be added as sum of squares

Fct.	Mode	Response	phase	Mode	Response	phase
991	1	-2.666E-04	S= 0.302	2	-7.943E-01	S= 0.453
	3	3.414E-03	S= 0.458	4	2.160E-06	S= 0.857
	5	-2.002E-04	S= 0.857	6	7.339E-07	S= 0.857
	7	9.209E-07	S= 0.857	8	-1.223E-06	S= 0.857
	9	-1.288E-09	S= 0.857	10	3.329E-08	S= 0.857

Sum of forces (Base-Shear)

funct.	H[m]	Mode	SX[kN]	SY[kN]	SZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]
991			0.5	865.1	0.1	31.88	1.65	14704.61
Nodal Masses			826.172	826.172	826.172	27.014	14.918	5.638

Moments are evaluated relative to the origin of the coordinate system

Nodal Displacements method CQC

Node	u-X-max [mm]	Time [sec]	u-Y-max [mm]	Time [sec]	u-Z-max [mm]	Time [sec]
MAX	0.094		32.680		2.151	

Maximum Forces and Moments

MAX-N	(LC 802)	MIN-N	method	CQC
MAX-Vy	(LC 803)	MIN-Vy	method	CQC
MAX-Vz	(LC 804)	MIN-Vz	method	CQC
MAX-Mt	(LC 805)	MIN-Mt	method	CQC
MAX-My	(LC 806)	MIN-My	method	CQC
MAX-Mz	(LC 807)	MIN-Mz	method	CQC
MAX-m-xx	(LC 808)	MIN-m-xx	method	CQC
MAX-m-yy	(LC 809)	MIN-m-yy	method	CQC

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Calculation of Spectras

Control Information

QUAD-elements with higher non conforming modes 3
QUAD-elements with all rotational degrees of freedom
Number of unknowns 9132 (Pure modal analysis)
unknowns per node 6
Number eigenvalues 10

Groups

No.	Option	CS	Factor	RAYLEIGH-A [1/sec]	RAYLEIGH-B [sec]	Wind
1	EXTR		1.000	0.000000	0.000000	0
2	EXTR		1.000	0.000000	0.000000	0
3	EXTR		1.000	0.000000	0.000000	0
4	EXTR		1.000	0.000000	0.000000	0
5	EXTR		1.000	0.000000	0.000000	0

Beam Elements

Finite beam elements without intermediate sections
Shear deformations accounted for with nonconforming SOFiSTiK-Timoshenko beam

Sum of masses and mass moments of inertia

Node	TMX [t]	TMY [t]	TMZ [t]	RMX [tm2]	RMY [tm2]	RMZ [tm2]	RMB [tm2]
total	826.133	826.134	826.134	2.212E+01	1.002E+01	1.283E+00	
on S =	[mm]	[mm]	[mm]	2.398E+04	-3.46E+00	-2.79E-01	
	17000.0	0.0	2438.4	-3.46E+00	1.270E+05	4.456E-02	
				-2.79E-01	4.456E-02	1.136E+05	
activ	826.133	826.134	826.134	2.212E+01	1.002E+01	1.283E+00	
on S =	[mm]	[mm]	[mm]	2.398E+04	-3.46E+00	-2.79E-01	
	17000.0	0.0	2438.4	-3.46E+00	1.270E+05	4.456E-02	
				-2.79E-01	4.456E-02	1.136E+05	

Eigenfrequencies

No.	LC	Eigenvalue [1/sec2]	relative Error	omega [1/sec]	frequency [Hertz]	period [sec]	Damping D[%]	f-XX [%]	f-YY [%]	f-ZZ [%]
1	9001	1.9630E+01		4.431	0.705	1.418	5.000	0.0	0.0	0.0
2	9002	4.4177E+01		6.647	1.058	0.945	5.000	0.0	73.6	0.0
3	9003	4.5011E+01		6.709	1.068	0.937	5.000	73.6	0.0	0.0
4	9004	1.4762E+03		38.422	6.115	0.164	5.000	0.0	0.0	16.8
5	9005	1.9989E+03		44.709	7.116	0.141	5.000	0.0	0.0	0.0
6	9006	2.1243E+03		46.090	7.335	0.136	5.000	0.0	0.0	0.0
7	9007	2.1654E+03		46.534	7.406	0.135	5.000	0.0	0.0	62.7
8	9008	2.7449E+03		52.392	8.338	0.120	5.000	0.0	0.0	0.0
9	9009	3.0194E+03		54.949	8.745	0.114	5.000	6.1	0.0	0.0
10	9010	3.0194E+03		54.949	8.745	0.114	5.000	0.9	0.0	0.0
								80.6	73.6	79.5

Load Cases

-- Spectra 992 EC 8 Type 1, Soil Class C

D[-]	SA[-]	SB[-]	MIN[-]	TB[sec]	TC[sec]	TD[sec]	TE[sec]	K1[-]	K2[-]	A[m/sec2]
1.5000	0.800	2.000	0.200	0.100	0.500	2.000	0.000	1.000	2.000	3.14

a-X [m/sec2]	a-Y [m/sec2]	a-Z [m/sec2]	a-XX [1/sec2]	a-YY [1/sec2]	a-ZZ [1/sec2]
0.00	0.00	2.83			

Modal load contributions per function

funct.	mode	R*V-factor	V*R*V-factor	mode	R*V-factor	V*R*V-factor
992	1	-8.564E-04	-2.306E-04	6	-2.300E-02	-2.812E+00
	2	-1.705E-03	-2.043E-03	7	6.432E+01	-2.812E+00
	3	-6.183E-04	-6.441E-04	8	-2.286E-02	-2.602E+00
	4	-3.327E+01	-2.808E+00	9	3.704E-07	-7.796E-13
	5	5.537E-01	-2.766E+00	10	-5.847E-06	-1.766E-09

Modal load contributions per function

funct.	mode	R*V-factor	V*R*V-factor	mode	R*V-factor	V*R*V-factor
	Sq.Sum	5.245E+03	-1.380E+01			

Modal Response

Response of periodic loading is exact including the phases

Contributions of all functions will be added as sum of squares

Fct.	Mode	Response	phase	Mode	Response	phase
992	1	-3.076E-05	S= 0.705	2	-4.084E-05	S= 1.058
	3	-1.467E-05	S= 1.068	4	-4.508E-02	S= 2.000
	5	5.540E-04	S= 2.000	6	-2.166E-05	S= 2.000
	7	5.941E-02	S= 2.000	8	-1.666E-05	S= 2.000
	9	2.453E-10	S= 2.000	10	-3.873E-09	S= 2.000

Sum of forces (Base-Shear)

funct.	H[m]	Mode	SX[kN]	SY[kN]	SZ[kN]	MX[kNm]	MY[kNm]	MZ[kNm]
992			0.1	0.1	3188.9	41.09	54211.65	3.49
Nodal Masses			826.172	826.172	826.172	27.014	14.918	5.638

Moments are evaluated relative to the origin of the coordinate system

Nodal Displacements method CQC

Node	u-X-max [mm]	Time [sec]	u-Y-max [mm]	Time [sec]	u-Z-max [mm]	Time [sec]
MAX	0.639		0.119		4.591	

Maximum Forces and Moments

MAX-N	(LC 902)	MIN-N	method	CQC
MAX-Vy	(LC 903)	MIN-Vy	method	CQC
MAX-Vz	(LC 904)	MIN-Vz	method	CQC
MAX-Mt	(LC 905)	MIN-Mt	method	CQC
MAX-My	(LC 906)	MIN-My	method	CQC
MAX-Mz	(LC 907)	MIN-Mz	method	CQC
MAX-m-xx	(LC 908)	MIN-m-xx	method	CQC
MAX-m-yy	(LC 909)	MIN-m-yy	method	CQC

Combination rule Number 1
Design Combination
Resulting loadcases type Earthquake
Loadcase selection

Number	factor	type	Title
701	1.00	Exclusive LC A 1 MAX U	(CQC)
801	0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
701	1.00	Exclusive LC A 1 MAX U	(CQC)
801	0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
701	1.00	Exclusive LC A 1 MAX U	(CQC)
801	-0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
701	1.00	Exclusive LC A 1 MAX U	(CQC)
801	-0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
701	-1.00	Exclusive LC A 1 MAX U	(CQC)
801	0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
701	-1.00	Exclusive LC A 1 MAX U	(CQC)
801	0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
701	-1.00	Exclusive LC A 1 MAX U	(CQC)
801	-0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
701	-1.00	Exclusive LC A 1 MAX U	(CQC)
801	-0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
801	1.00	Exclusive LC A 1 MAX U	(CQC)
701	0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
801	1.00	Exclusive LC A 1 MAX U	(CQC)
701	0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
801	1.00	Exclusive LC A 1 MAX U	(CQC)
701	-0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
801	1.00	Exclusive LC A 1 MAX U	(CQC)
701	-0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
801	-1.00	Exclusive LC A 1 MAX U	(CQC)
701	0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
801	-1.00	Exclusive LC A 1 MAX U	(CQC)
701	0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
801	-1.00	Exclusive LC A 1 MAX U	(CQC)
701	-0.30	Combined with LC MAX U	(CQC)
901	0.30	Combined with LC MAX U	(CQC)
801	-1.00	Exclusive LC A 1 MAX U	(CQC)
701	-0.30	Combined with LC MAX U	(CQC)
901	-0.30	Combined with LC MAX U	(CQC)
702	1.00	Exclusive LC A 1 MAX N	(CQC)
802	0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
702	1.00	Exclusive LC A 1 MAX N	(CQC)
802	0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
702	1.00	Exclusive LC A 1 MAX N	(CQC)
802	-0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
702	1.00	Exclusive LC A 1 MAX N	(CQC)
802	-0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
702	-1.00	Exclusive LC A 1 MAX N	(CQC)
802	0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)

Loadcase selection

Number	factor	type	Title
702	-1.00	Exclusive LC A 1 MAX N	(CQC)
802	0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
702	-1.00	Exclusive LC A 1 MAX N	(CQC)
802	-0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
702	-1.00	Exclusive LC A 1 MAX N	(CQC)
802	-0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
802	1.00	Exclusive LC A 1 MAX N	(CQC)
702	0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
802	1.00	Exclusive LC A 1 MAX N	(CQC)
702	0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
802	1.00	Exclusive LC A 1 MAX N	(CQC)
702	-0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
802	1.00	Exclusive LC A 1 MAX N	(CQC)
702	-0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
802	-1.00	Exclusive LC A 1 MAX N	(CQC)
702	0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
802	-1.00	Exclusive LC A 1 MAX N	(CQC)
702	0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
802	-1.00	Exclusive LC A 1 MAX N	(CQC)
702	-0.30	Combined with LC MAX N	(CQC)
902	0.30	Combined with LC MAX N	(CQC)
802	-1.00	Exclusive LC A 1 MAX N	(CQC)
702	-0.30	Combined with LC MAX N	(CQC)
902	-0.30	Combined with LC MAX N	(CQC)
703	1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	0.30	Combined with LC MAX Vy	(CQC)
903	0.30	Combined with LC MAX Vy	(CQC)
703	1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	0.30	Combined with LC MAX Vy	(CQC)
903	-0.30	Combined with LC MAX Vy	(CQC)
703	1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	-0.30	Combined with LC MAX Vy	(CQC)
903	0.30	Combined with LC MAX Vy	(CQC)
703	1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	-0.30	Combined with LC MAX Vy	(CQC)
903	-0.30	Combined with LC MAX Vy	(CQC)
703	-1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	0.30	Combined with LC MAX Vy	(CQC)
903	0.30	Combined with LC MAX Vy	(CQC)
703	-1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	0.30	Combined with LC MAX Vy	(CQC)
903	-0.30	Combined with LC MAX Vy	(CQC)
703	-1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	-0.30	Combined with LC MAX Vy	(CQC)
903	0.30	Combined with LC MAX Vy	(CQC)
703	-1.00	Exclusive LC A 1 MAX Vy	(CQC)
803	-0.30	Combined with LC MAX Vy	(CQC)
903	-0.30	Combined with LC MAX Vy	(CQC)
803	1.00	Exclusive LC A 1 MAX Vy	(CQC)
703	0.30	Combined with LC MAX Vy	(CQC)
903	0.30	Combined with LC MAX Vy	(CQC)
803	1.00	Exclusive LC A 1 MAX Vy	(CQC)
703	0.30	Combined with LC MAX Vy	(CQC)
903	-0.30	Combined with LC MAX Vy	(CQC)
803	1.00	Exclusive LC A 1 MAX Vy	(CQC)
703	-0.30	Combined with LC MAX Vy	(CQC)
903	0.30	Combined with LC MAX Vy	(CQC)

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Loadcase selection

Number	factor	type	Title
803	1.00	Exclusive LC A 1	MAX Vy (CQC)
703	-0.30	Combined with LC	MAX Vy (CQC)
903	-0.30	Combined with LC	MAX Vy (CQC)
803	-1.00	Exclusive LC A 1	MAX Vy (CQC)
703	0.30	Combined with LC	MAX Vy (CQC)
903	0.30	Combined with LC	MAX Vy (CQC)
803	-1.00	Exclusive LC A 1	MAX Vy (CQC)
703	0.30	Combined with LC	MAX Vy (CQC)
903	-0.30	Combined with LC	MAX Vy (CQC)
803	-1.00	Exclusive LC A 1	MAX Vy (CQC)
703	-0.30	Combined with LC	MAX Vy (CQC)
903	0.30	Combined with LC	MAX Vy (CQC)
803	-1.00	Exclusive LC A 1	MAX Vy (CQC)
703	-0.30	Combined with LC	MAX Vy (CQC)
903	-0.30	Combined with LC	MAX Vy (CQC)
704	1.00	Exclusive LC A 1	MAX Vz (CQC)
804	0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
704	1.00	Exclusive LC A 1	MAX Vz (CQC)
804	0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
704	1.00	Exclusive LC A 1	MAX Vz (CQC)
804	-0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
704	1.00	Exclusive LC A 1	MAX Vz (CQC)
804	-0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
704	-1.00	Exclusive LC A 1	MAX Vz (CQC)
804	0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
704	-1.00	Exclusive LC A 1	MAX Vz (CQC)
804	0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
704	-1.00	Exclusive LC A 1	MAX Vz (CQC)
804	-0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
704	-1.00	Exclusive LC A 1	MAX Vz (CQC)
804	-0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
804	1.00	Exclusive LC A 1	MAX Vz (CQC)
704	0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
804	1.00	Exclusive LC A 1	MAX Vz (CQC)
704	0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
804	1.00	Exclusive LC A 1	MAX Vz (CQC)
704	-0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
804	1.00	Exclusive LC A 1	MAX Vz (CQC)
704	-0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
804	-1.00	Exclusive LC A 1	MAX Vz (CQC)
704	0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
804	-1.00	Exclusive LC A 1	MAX Vz (CQC)
704	0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
804	-1.00	Exclusive LC A 1	MAX Vz (CQC)
704	-0.30	Combined with LC	MAX Vz (CQC)
904	0.30	Combined with LC	MAX Vz (CQC)
804	-1.00	Exclusive LC A 1	MAX Vz (CQC)
704	-0.30	Combined with LC	MAX Vz (CQC)
904	-0.30	Combined with LC	MAX Vz (CQC)
705	1.00	Exclusive LC A 1	MAX Mt (CQC)
805	0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)

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Loadcase selection

Number	factor	type	Title
705	1.00	Exclusive LC A 1	MAX Mt (CQC)
805	0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
705	1.00	Exclusive LC A 1	MAX Mt (CQC)
805	-0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
705	1.00	Exclusive LC A 1	MAX Mt (CQC)
805	-0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
705	-1.00	Exclusive LC A 1	MAX Mt (CQC)
805	0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
705	-1.00	Exclusive LC A 1	MAX Mt (CQC)
805	0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
705	-1.00	Exclusive LC A 1	MAX Mt (CQC)
805	-0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
705	-1.00	Exclusive LC A 1	MAX Mt (CQC)
805	-0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
805	1.00	Exclusive LC A 1	MAX Mt (CQC)
705	0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
805	1.00	Exclusive LC A 1	MAX Mt (CQC)
705	0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
805	1.00	Exclusive LC A 1	MAX Mt (CQC)
705	-0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
805	1.00	Exclusive LC A 1	MAX Mt (CQC)
705	-0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
805	-1.00	Exclusive LC A 1	MAX Mt (CQC)
705	0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
805	-1.00	Exclusive LC A 1	MAX Mt (CQC)
705	0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
805	-1.00	Exclusive LC A 1	MAX Mt (CQC)
705	-0.30	Combined with LC	MAX Mt (CQC)
905	0.30	Combined with LC	MAX Mt (CQC)
805	-1.00	Exclusive LC A 1	MAX Mt (CQC)
705	-0.30	Combined with LC	MAX Mt (CQC)
905	-0.30	Combined with LC	MAX Mt (CQC)
706	1.00	Exclusive LC A 1	MAX My (CQC)
806	0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
706	1.00	Exclusive LC A 1	MAX My (CQC)
806	0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
706	1.00	Exclusive LC A 1	MAX My (CQC)
806	-0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
706	1.00	Exclusive LC A 1	MAX My (CQC)
806	-0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
706	-1.00	Exclusive LC A 1	MAX My (CQC)
806	0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
706	-1.00	Exclusive LC A 1	MAX My (CQC)
806	0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
706	-1.00	Exclusive LC A 1	MAX My (CQC)
806	-0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)

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Loadcase selection

Number	factor	type	Title
706	-1.00	Exclusive LC A 1	MAX My (CQC)
806	-0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
806	1.00	Exclusive LC A 1	MAX My (CQC)
706	0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
806	1.00	Exclusive LC A 1	MAX My (CQC)
706	0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
806	1.00	Exclusive LC A 1	MAX My (CQC)
706	-0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
806	1.00	Exclusive LC A 1	MAX My (CQC)
706	-0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
806	-1.00	Exclusive LC A 1	MAX My (CQC)
706	0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
806	-1.00	Exclusive LC A 1	MAX My (CQC)
706	0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
806	-1.00	Exclusive LC A 1	MAX My (CQC)
706	-0.30	Combined with LC	MAX My (CQC)
906	0.30	Combined with LC	MAX My (CQC)
806	-1.00	Exclusive LC A 1	MAX My (CQC)
706	-0.30	Combined with LC	MAX My (CQC)
906	-0.30	Combined with LC	MAX My (CQC)
707	1.00	Exclusive LC A 1	MAX Mz (CQC)
807	0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
707	1.00	Exclusive LC A 1	MAX Mz (CQC)
807	0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
707	1.00	Exclusive LC A 1	MAX Mz (CQC)
807	-0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
707	1.00	Exclusive LC A 1	MAX Mz (CQC)
807	-0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
707	-1.00	Exclusive LC A 1	MAX Mz (CQC)
807	0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
707	-1.00	Exclusive LC A 1	MAX Mz (CQC)
807	0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
707	-1.00	Exclusive LC A 1	MAX Mz (CQC)
807	-0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
707	-1.00	Exclusive LC A 1	MAX Mz (CQC)
807	-0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
807	1.00	Exclusive LC A 1	MAX Mz (CQC)
707	0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
807	1.00	Exclusive LC A 1	MAX Mz (CQC)
707	0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
807	1.00	Exclusive LC A 1	MAX Mz (CQC)
707	-0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
807	1.00	Exclusive LC A 1	MAX Mz (CQC)
707	-0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
807	-1.00	Exclusive LC A 1	MAX Mz (CQC)
707	0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)

Loadcase selection

Number	factor	type	Title
807	-1.00	Exclusive LC A 1	MAX Mz (CQC)
707	0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
807	-1.00	Exclusive LC A 1	MAX Mz (CQC)
707	-0.30	Combined with LC	MAX Mz (CQC)
907	0.30	Combined with LC	MAX Mz (CQC)
807	-1.00	Exclusive LC A 1	MAX Mz (CQC)
707	-0.30	Combined with LC	MAX Mz (CQC)
907	-0.30	Combined with LC	MAX Mz (CQC)
708	1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
708	1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
708	1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	-0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
708	1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	-0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
708	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
708	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
708	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	-0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
708	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
808	-0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
808	1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
808	1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
808	1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	-0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
808	1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	-0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
808	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
808	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
808	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	-0.30	Combined with LC	MAX m-xx (CQC)
908	0.30	Combined with LC	MAX m-xx (CQC)
808	-1.00	Exclusive LC A 1	MAX m-xx (CQC)
708	-0.30	Combined with LC	MAX m-xx (CQC)
908	-0.30	Combined with LC	MAX m-xx (CQC)
709	1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
709	1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
709	1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	-0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)

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Loadcase selection

Number	factor	type	Title
709	1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	-0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
709	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
709	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
709	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	-0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
709	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
809	-0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
809	1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
809	1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
809	1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	-0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
809	1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	-0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
809	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
809	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)
809	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	-0.30	Combined with LC	MAX m-yy (CQC)
909	0.30	Combined with LC	MAX m-yy (CQC)
809	-1.00	Exclusive LC A 1	MAX m-yy (CQC)
709	-0.30	Combined with LC	MAX m-yy (CQC)
909	-0.30	Combined with LC	MAX m-yy (CQC)

Generated Load cases

Number	Com	Title
3621	1	MAX-N BEAM
3622	1	MIN-N BEAM
3629	1	MAX-MY BEAM
3630	1	MIN-MY BEAM
3631	1	MAX-MZ BEAM
3632	1	MIN-MZ BEAM
3625	1	MAX-VZ BEAM
3626	1	MIN-VZ BEAM
3623	1	MAX-VY BEAM
3624	1	MIN-VY BEAM
3671	1	MAX-UX NODE
3672	1	MIN-UX NODE
3673	1	MAX-UY NODE
3674	1	MIN-UY NODE
3601	1	MAX-MXX QUAD
3602	1	MIN-MXX QUAD
3601	1	MAX-MXX QUAK
3602	1	MIN-MXX QUAK
3603	1	MAX-MYY QUAD
3604	1	MIN-MYY QUAD
3603	1	MAX-MYY QUAK
3604	1	MIN-MYY QUAK

Superposition according to EuroNorm EN 1992 (2004) Concrete Structures

Combination rule Number 100

SLS perm

Superposition according to manual MAXIMA formula 2.7

$$E_{d,perm} = E\left\{\sum_{j\geq 1} G_{k,j} \oplus P_k \oplus \sum_{i\geq 1} \psi_{2,i} \cdot Q_{k,i}\right\}$$

Resulting loadcases type Service: Permanent combination

Loadcase selection and Actions

Act	type	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'	
	LC	factor	Type of load case						Title
C	P	1.00	1.00	1.00	1.00	1.00	1.00	1.00	creep + shrinkage
	5	1.00	permanent load grouped in actions						Shrinkage
F	Q	1.00	0.00	1.00	1.00	1.00	1.00	1.00	settlement
	10	1.00	Conditional LC						Pier settlement
	11	1.00	Conditional LC						Pier settlement
G_2	G	1.35	1.00	1.00	1.00	1.00	1.00	1.00	dead load g2
	2	1.00	permanent load grouped in actions						Asphalt & Barriers
G_1	G	1.35	1.00	1.00	1.00	1.00	1.00	1.00	dead load g1
	1	1.00	permanent load grouped in actions						Self-weight
L_T	Q	1.35	0.00	1.00	0.75	0.75	0.00	0.80	Traffic load TS of EC/DIN-FB
	249	1.00	Exclusive LC	A75					MAX-N Tandem loads
	250	1.00	Exclusive LC	A75					MIN-N Tandem loads
	251	1.00	Exclusive LC	A75					MAX-m-xx Tandem loads
	252	1.00	Exclusive LC	A75					MIN-m-xx Tandem loads
	253	1.00	Exclusive LC	A75					MAX-m-yy Tandem loads
	254	1.00	Exclusive LC	A75					MIN-m-yy Tandem loads
	255	1.00	Exclusive LC	A75					MAX-v-x Tandem loads
	256	1.00	Exclusive LC	A75					MIN-v-x Tandem loads
	257	1.00	Exclusive LC	A75					MAX-v-y Tandem loads
	258	1.00	Exclusive LC	A75					MIN-v-y Tandem loads
	259	1.00	Exclusive LC	A75					MAX-P Tandem loads
	260	1.00	Exclusive LC	A75					MIN-P Tandem loads
L_U	Q	1.35	0.00	1.00	0.40	0.40	0.00	0.80	Traffic load UDL of EC/DIN-FB
	349	1.00	Exclusive LC	A74					MAX-N Tandem loads
	350	1.00	Exclusive LC	A74					MIN-N Tandem loads
	351	1.00	Exclusive LC	A74					MAX-m-xx Tandem loads
	352	1.00	Exclusive LC	A74					MIN-m-xx Tandem loads
	353	1.00	Exclusive LC	A74					MAX-m-yy Tandem loads
	354	1.00	Exclusive LC	A74					MIN-m-yy Tandem loads
	355	1.00	Exclusive LC	A74					MAX-v-x Tandem loads
	356	1.00	Exclusive LC	A74					MIN-v-x Tandem loads
	357	1.00	Exclusive LC	A74					MAX-v-y Tandem loads
	358	1.00	Exclusive LC	A74					MIN-v-y Tandem loads
	359	1.00	Exclusive LC	A74					MAX-P Tandem loads
	360	1.00	Exclusive LC	A74					MIN-P Tandem loads
T	Q	1.50	0.00	1.00	0.80	0.60	0.50	0.80	temperature loading
	3	1.00	Exclusive LC	A14					Pos Uniform temperature
	4	1.00	Exclusive LC	A14					Neg Uniform temperature
	6	1.00	Exclusive LC	A14					Pos gradient
	7	1.00	Exclusive LC	A14					Neg gradient

Combination rule Number 101

SLS rare

Superposition according to manual MAXIMA formula 2.4

$$E_{d,rare} = E\left\{\sum_{j\geq 1} G_{k,j} \oplus P_k \oplus Q_{k,1} \oplus \sum_{i>1} \psi_{0,i} \cdot Q_{k,i}\right\}$$

Resulting loadcases type Service: Rare combination

Loadcase selection and Actions

Act	type	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'	
	LC	factor	Type of load case						Title
C	P		1.00	1.00	1.00	1.00	1.00	1.00	creep + shrinkage
	5	1.00	permanent load grouped in actions						Shrinkage
F	Q		1.00	0.00	1.00	1.00	1.00	1.00	settlement
	10	1.00	Conditional LC						Pier settlement
	11	1.00	Conditional LC						Pier settlement
G_2	G		1.35	1.00	1.00	1.00	1.00	1.00	dead load g2
	2	1.00	permanent load grouped in actions						Asphalt & Barriers
G_1	G		1.35	1.00	1.00	1.00	1.00	1.00	dead load g1
	1	1.00	permanent load grouped in actions						Self-weight
L_T	Q		1.35	0.00	1.00	0.75	0.75	0.00	0.80 Traffic load TS of EC/DIN-FB
	249	1.00	Exclusive LC	A75					MAX-N Tandem loads
	250	1.00	Exclusive LC	A75					MIN-N Tandem loads
	251	1.00	Exclusive LC	A75					MAX-m-xx Tandem loads
	252	1.00	Exclusive LC	A75					MIN-m-xx Tandem loads
	253	1.00	Exclusive LC	A75					MAX-m-yy Tandem loads
	254	1.00	Exclusive LC	A75					MIN-m-yy Tandem loads
	255	1.00	Exclusive LC	A75					MAX-v-x Tandem loads
	256	1.00	Exclusive LC	A75					MIN-v-x Tandem loads
	257	1.00	Exclusive LC	A75					MAX-v-y Tandem loads
	258	1.00	Exclusive LC	A75					MIN-v-y Tandem loads
	259	1.00	Exclusive LC	A75					MAX-P Tandem loads
	260	1.00	Exclusive LC	A75					MIN-P Tandem loads
L_U	Q		1.35	0.00	1.00	0.40	0.40	0.00	0.80 Traffic load UDL of EC/DIN-FB
	349	1.00	Exclusive LC	A74					MAX-N Tandem loads
	350	1.00	Exclusive LC	A74					MIN-N Tandem loads
	351	1.00	Exclusive LC	A74					MAX-m-xx Tandem loads
	352	1.00	Exclusive LC	A74					MIN-m-xx Tandem loads
	353	1.00	Exclusive LC	A74					MAX-m-yy Tandem loads
	354	1.00	Exclusive LC	A74					MIN-m-yy Tandem loads
	355	1.00	Exclusive LC	A74					MAX-v-x Tandem loads
	356	1.00	Exclusive LC	A74					MIN-v-x Tandem loads
	357	1.00	Exclusive LC	A74					MAX-v-y Tandem loads
	358	1.00	Exclusive LC	A74					MIN-v-y Tandem loads
	359	1.00	Exclusive LC	A74					MAX-P Tandem loads
	360	1.00	Exclusive LC	A74					MIN-P Tandem loads
T	Q		1.50	0.00	1.00	0.80	0.60	0.50	0.80 temperature loading
	3	1.00	Exclusive LC	A14					Pos Uniform temperature
	4	1.00	Exclusive LC	A14					Neg Uniform temperature
	6	1.00	Exclusive LC	A14					Pos gradient
	7	1.00	Exclusive LC	A14					Neg gradient

Combination rule Number 102

ULS

Superposition according to manual MAXIMA formula 2.1

$$E_d = E\left\{\sum_{j\geq 1} \gamma_{G,j} \cdot G_{k,j} \oplus \gamma_P \cdot P_k \oplus \gamma_{Q,1} \cdot Q_{k,1} \oplus \sum_{i>1} \gamma_{Q,i} \cdot \psi_{0,i} \cdot Q_{k,i}\right\}$$

Resulting loadcases type Ultimate Design combination

Loadcase selection and Actions

Act	type	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'	
	LC	factor	Type of load case						Title
F	Q		1.00	0.00	1.00	1.00	1.00	1.00	1.00 settlement
	10	1.00	Conditional LC				Pier settlement		
	11	1.00	Conditional LC				Pier settlement		
G_1	G		1.35	1.00	1.00	1.00	1.00	1.00	1.00 dead load g1
	1	1.00	permanent load grouped in actions						Self-weight
G_2	G		1.35	1.00	1.00	1.00	1.00	1.00	1.00 dead load g2
	2	1.00	permanent load grouped in actions						Asphalt & Barriers
L_T	Q		1.35	0.00	1.00	0.75	0.75	0.00	0.80 Traffic load TS of EC/DIN-FB
	249	1.00	Exclusive LC	A75			MAX-N Tandem loads		
	250	1.00	Exclusive LC	A75			MIN-N Tandem loads		
	251	1.00	Exclusive LC	A75			MAX-m-xx Tandem loads		
	252	1.00	Exclusive LC	A75			MIN-m-xx Tandem loads		
	253	1.00	Exclusive LC	A75			MAX-m-yy Tandem loads		
	254	1.00	Exclusive LC	A75			MIN-m-yy Tandem loads		
	255	1.00	Exclusive LC	A75			MAX-v-x Tandem loads		
	256	1.00	Exclusive LC	A75			MIN-v-x Tandem loads		
	257	1.00	Exclusive LC	A75			MAX-v-y Tandem loads		
	258	1.00	Exclusive LC	A75			MIN-v-y Tandem loads		
	259	1.00	Exclusive LC	A75			MAX-P Tandem loads		
	260	1.00	Exclusive LC	A75			MIN-P Tandem loads		
L_U	Q		1.35	0.00	1.00	0.40	0.40	0.00	0.80 Traffic load UDL of EC/DIN-FB
	349	1.00	Exclusive LC	A74			MAX-N Tandem loads		
	350	1.00	Exclusive LC	A74			MIN-N Tandem loads		
	351	1.00	Exclusive LC	A74			MAX-m-xx Tandem loads		
	352	1.00	Exclusive LC	A74			MIN-m-xx Tandem loads		
	353	1.00	Exclusive LC	A74			MAX-m-yy Tandem loads		
	354	1.00	Exclusive LC	A74			MIN-m-yy Tandem loads		
	355	1.00	Exclusive LC	A74			MAX-v-x Tandem loads		
	356	1.00	Exclusive LC	A74			MIN-v-x Tandem loads		
	357	1.00	Exclusive LC	A74			MAX-v-y Tandem loads		
	358	1.00	Exclusive LC	A74			MIN-v-y Tandem loads		
	359	1.00	Exclusive LC	A74			MAX-P Tandem loads		
	360	1.00	Exclusive LC	A74			MIN-P Tandem loads		
T	Q		1.50	0.00	1.00	0.80	0.60	0.50	0.80 temperature loading
	3	1.00	Exclusive LC	A14			Pos Uniform temperature		
	4	1.00	Exclusive LC	A14			Neg Uniform temperature		
	6	1.00	Exclusive LC	A14			Pos gradient		
	7	1.00	Exclusive LC	A14			Neg gradient		

Combination rule Number 103

ULS-earthquake

Superposition according to manual MAXIMA formula 2.3

$$E_{dAE} = E\left\{\sum_{j\geq 1} G_{k,j} \oplus P_k \oplus \gamma_1 \cdot A_{Ed} \oplus \sum_{i\geq 1} \psi_{2,i} \cdot Q_{k,i}\right\}$$

Resulting loadcases type Ultimate Design combination

Loadcase selection and Actions

Act	type	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'	
	LC	factor	Type of load case						Title
E	E		1.00	0.00	1.00	1.00	1.00	1.00	1.00 Earthquake
	3601	1.00	Exclusive LC	A 1			MAX-MXX QUAD		
	3602	1.00	Exclusive LC	A 1			MIN-MXX QUAD		
	3603	1.00	Exclusive LC	A 1			MAX-MYY QUAD		
	3604	1.00	Exclusive LC	A 1			MIN-MYY QUAD		
	3621	1.00	Exclusive LC	A 1			MAX-N BEAM		
	3622	1.00	Exclusive LC	A 1			MIN-N BEAM		
	3623	1.00	Exclusive LC	A 1			MAX-VY BEAM		
	3624	1.00	Exclusive LC	A 1			MIN-VY BEAM		
	3625	1.00	Exclusive LC	A 1			MAX-VZ BEAM		

Loadcase selection and Actions

Act	type	γ-u	γ-f	γ-a	ψ-0	ψ-1	ψ-2	ψ-1'	
	LC	factor	Type of load case						Title
	3626	1.00	Exclusive LC	A 1					MIN-VZ BEAM
	3629	1.00	Exclusive LC	A 1					MAX-MY BEAM
	3630	1.00	Exclusive LC	A 1					MIN-MY BEAM
	3631	1.00	Exclusive LC	A 1					MAX-MZ BEAM
	3632	1.00	Exclusive LC	A 1					MIN-MZ BEAM
	3671	1.00	Exclusive LC	A 1					MAX-UX NODE
	3672	1.00	Exclusive LC	A 1					MIN-UX NODE
	3673	1.00	Exclusive LC	A 1					MAX-UY NODE
	3674	1.00	Exclusive LC	A 1					MIN-UY NODE
F	Q	1.00	0.00	1.00	1.00	1.00	1.00	1.00	settlement
	10	1.00	Conditional LC						Pier settlement
	11	1.00	Conditional LC						Pier settlement
G_1	G	1.35	1.00	1.00	1.00	1.00	1.00	1.00	dead load g1
	1	1.00	permanent load grouped in actions						Self-weight
G_2	G	1.35	1.00	1.00	1.00	1.00	1.00	1.00	dead load g2
	2	1.00	permanent load grouped in actions						Asphalt & Barriers
L_U	Q	1.35	0.00	1.00	0.40	0.40	0.00	0.80	Traffic load UDL of EC/DIN-FB
	349	1.00	Exclusive LC	A74					MAX-N Tandem loads
	350	1.00	Exclusive LC	A74					MIN-N Tandem loads
	351	1.00	Exclusive LC	A74					MAX-m-xx Tandem loads
	352	1.00	Exclusive LC	A74					MIN-m-xx Tandem loads
	353	1.00	Exclusive LC	A74					MAX-m-yy Tandem loads
	354	1.00	Exclusive LC	A74					MIN-m-yy Tandem loads
	355	1.00	Exclusive LC	A74					MAX-v-x Tandem loads
	356	1.00	Exclusive LC	A74					MIN-v-x Tandem loads
	357	1.00	Exclusive LC	A74					MAX-v-y Tandem loads
	358	1.00	Exclusive LC	A74					MIN-v-y Tandem loads
	359	1.00	Exclusive LC	A74					MAX-P Tandem loads
	360	1.00	Exclusive LC	A74					MIN-P Tandem loads
L_T	Q	1.35	0.00	1.00	0.75	0.75	0.00	0.80	Traffic load TS of EC/DIN-FB
	249	1.00	Exclusive LC	A75					MAX-N Tandem loads
	250	1.00	Exclusive LC	A75					MIN-N Tandem loads
	251	1.00	Exclusive LC	A75					MAX-m-xx Tandem loads
	252	1.00	Exclusive LC	A75					MIN-m-xx Tandem loads
	253	1.00	Exclusive LC	A75					MAX-m-yy Tandem loads
	254	1.00	Exclusive LC	A75					MIN-m-yy Tandem loads
	255	1.00	Exclusive LC	A75					MAX-v-x Tandem loads
	256	1.00	Exclusive LC	A75					MIN-v-x Tandem loads
	257	1.00	Exclusive LC	A75					MAX-v-y Tandem loads
	258	1.00	Exclusive LC	A75					MIN-v-y Tandem loads
	259	1.00	Exclusive LC	A75					MAX-P Tandem loads
	260	1.00	Exclusive LC	A75					MIN-P Tandem loads

Generated Load cases

Number	Com	Title
1121	100	MAXP-N BEAM
1122	100	MINP-N BEAM
1125	100	MAXP-VZ BEAM
1126	100	MINP-VZ BEAM
1123	100	MAXP-VY BEAM
1124	100	MINP-VY BEAM
1129	100	MAXP-MY BEAM
1130	100	MINP-MY BEAM
1131	100	MAXP-MZ BEAM
1132	100	MINP-MZ BEAM
1175	100	MAXP-UZ NODE
1176	100	MINP-UZ NODE
1101	100	MAXP-MXX QUAD
1102	100	MINP-MXX QUAD
1101	100	MAXP-MXX QUAK
1102	100	MINP-MXX QUAK
1103	100	MAXP-MYY QUAD
1104	100	MINP-MYY QUAD
1103	100	MAXP-MYY QUAK
1104	100	MINP-MYY QUAK

Generated Load cases

Number	Com	Title
1107	100	MAXP-VX QUAD
1108	100	MINP-VX QUAD
1107	100	MAXP-VX QUAK
1108	100	MINP-VX QUAK
1109	100	MAXP-VY QUAD
1110	100	MINP-VY QUAD
1109	100	MAXP-VY QUAK
1110	100	MINP-VY QUAK
1221	101	MAXR-N BEAM
1222	101	MINR-N BEAM
1225	101	MAXR-VZ BEAM
1226	101	MINR-VZ BEAM
1223	101	MAXR-VY BEAM
1224	101	MINR-VY BEAM
1229	101	MAXR-MY BEAM
1230	101	MINR-MY BEAM
1231	101	MAXR-MZ BEAM
1232	101	MINR-MZ BEAM
1201	101	MAXR-MXX QUAD
1202	101	MINR-MXX QUAD
1201	101	MAXR-MXX QUAK
1202	101	MINR-MXX QUAK
1203	101	MAXR-MYY QUAD
1204	101	MINR-MYY QUAD
1203	101	MAXR-MYY QUAK
1204	101	MINR-MYY QUAK
1207	101	MAXR-VX QUAD
1208	101	MINR-VX QUAD
1207	101	MAXR-VX QUAK
1208	101	MINR-VX QUAK
1209	101	MAXR-VY QUAD
1210	101	MINR-VY QUAD
1209	101	MAXR-VY QUAK
1210	101	MINR-VY QUAK
2121	102	MAX-N BEAM
2122	102	MIN-N BEAM
2125	102	MAX-VZ BEAM
2126	102	MIN-VZ BEAM
2123	102	MAX-VY BEAM
2124	102	MIN-VY BEAM
2129	102	MAX-MY BEAM
2130	102	MIN-MY BEAM
2131	102	MAX-MZ BEAM
2132	102	MIN-MZ BEAM
2101	102	MAX-MXX QUAD
2102	102	MIN-MXX QUAD
2101	102	MAX-MXX QUAK
2102	102	MIN-MXX QUAK
2103	102	MAX-MYY QUAD
2104	102	MIN-MYY QUAD
2103	102	MAX-MYY QUAK
2104	102	MIN-MYY QUAK
2107	102	MAX-VX QUAD
2108	102	MIN-VX QUAD
2107	102	MAX-VX QUAK
2108	102	MIN-VX QUAK
2109	102	MAX-VY QUAD
2110	102	MIN-VY QUAD
2109	102	MAX-VY QUAK
2110	102	MIN-VY QUAK
2621	103	MAX-N BEAM
2622	103	MIN-N BEAM
2625	103	MAX-VZ BEAM
2626	103	MIN-VZ BEAM
2623	103	MAX-VY BEAM
2624	103	MIN-VY BEAM

Generated Load cases

Number	Com	Title
2629	103	MAX-MY BEAM
2630	103	MIN-MY BEAM
2631	103	MAX-MZ BEAM
2632	103	MIN-MZ BEAM
2627	103	MAX-MT BEAM
2628	103	MIN-MT BEAM

+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 251, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 252, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 253, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 254, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 255, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 256, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 257, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 258, does not contribute anything to superposition
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Element type BEAM Loadcase 259, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 260, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 351, does not contribute anything to superposition
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Element type BEAM Loadcase 352, does not contribute anything to superposition
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Element type BEAM Loadcase 354, does not contribute anything to superposition
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Element type BEAM Loadcase 355, does not contribute anything to superposition
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Element type BEAM Loadcase 356, does not contribute anything to superposition
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Element type BEAM Loadcase 359, does not contribute anything to superposition
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Element type BEAM Loadcase 3673, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type BEAM Loadcase 3674, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type QUAD Loadcase 249, does not contribute anything to superposition
+++++ warning no. 34 in program MUEB
Element type QUAD Loadcase 250, does not contribute anything to superposition

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+++++ warning no.    34 in program MUEB
 Element type QUAD Loadcase 259, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAD Loadcase 260, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAD Loadcase 349, does not contribute anything to superposition
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 Element type QUAD Loadcase 350, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAD Loadcase 359, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAD Loadcase 360, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 249, does not contribute anything to superposition
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 Element type QUAK Loadcase 254, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 255, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 256, does not contribute anything to superposition
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 Element type QUAK Loadcase 257, does not contribute anything to superposition
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 Element type QUAK Loadcase 258, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 259, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 260, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 349, does not contribute anything to superposition
+++++ warning no.    34 in program MUEB
 Element type QUAK Loadcase 350, does not contribute anything to superposition
+++++ warning no. 10989 in program MUEB
Warning 34 has been issued 50 times, further printing will be supressed
+++++ warning no.    67 in program MUEB
 Superposition of QNOD-Results has been supressed, as there are no QNOD-Results
for all sourceloadcases with QUAD-results.
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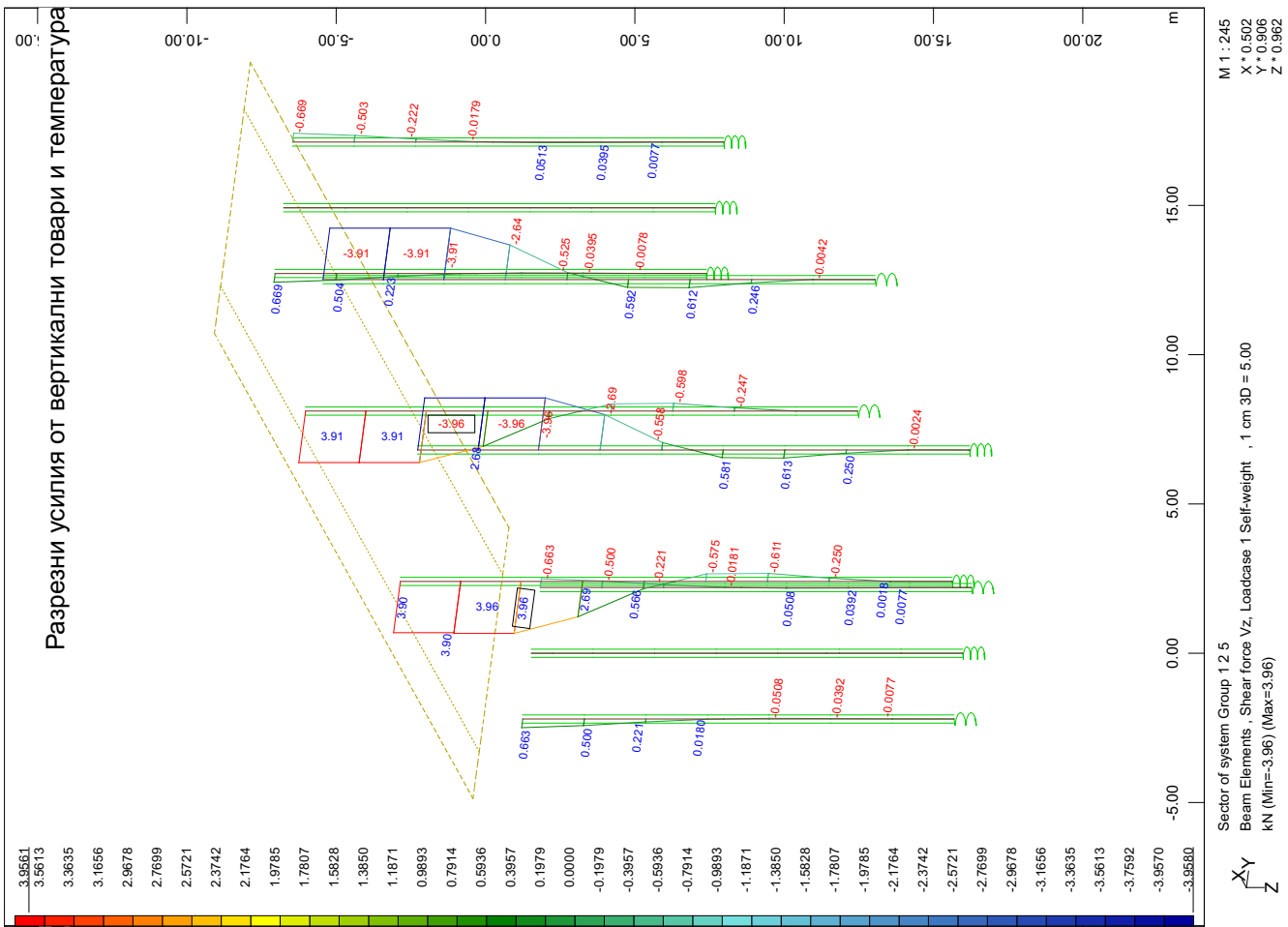
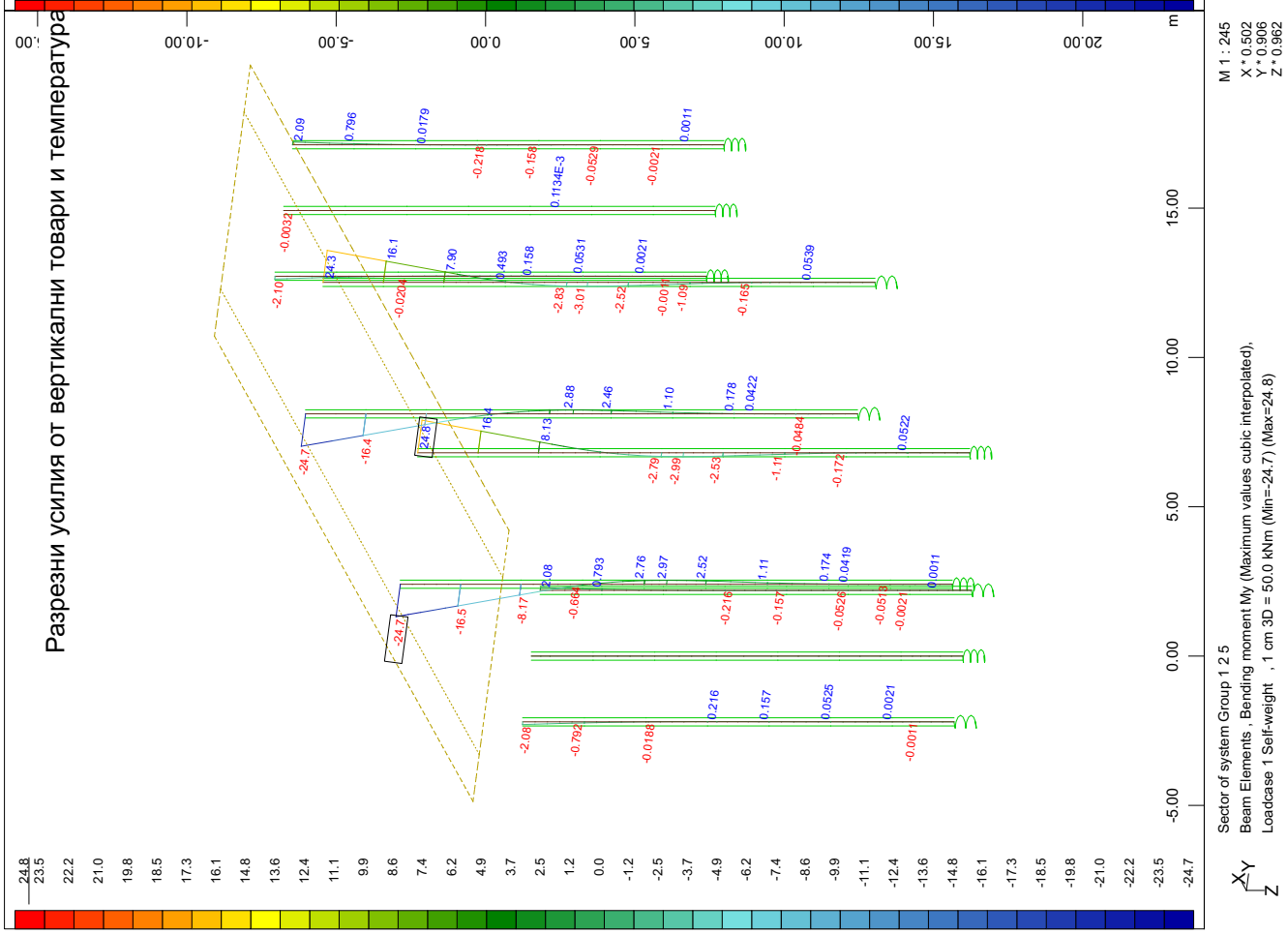
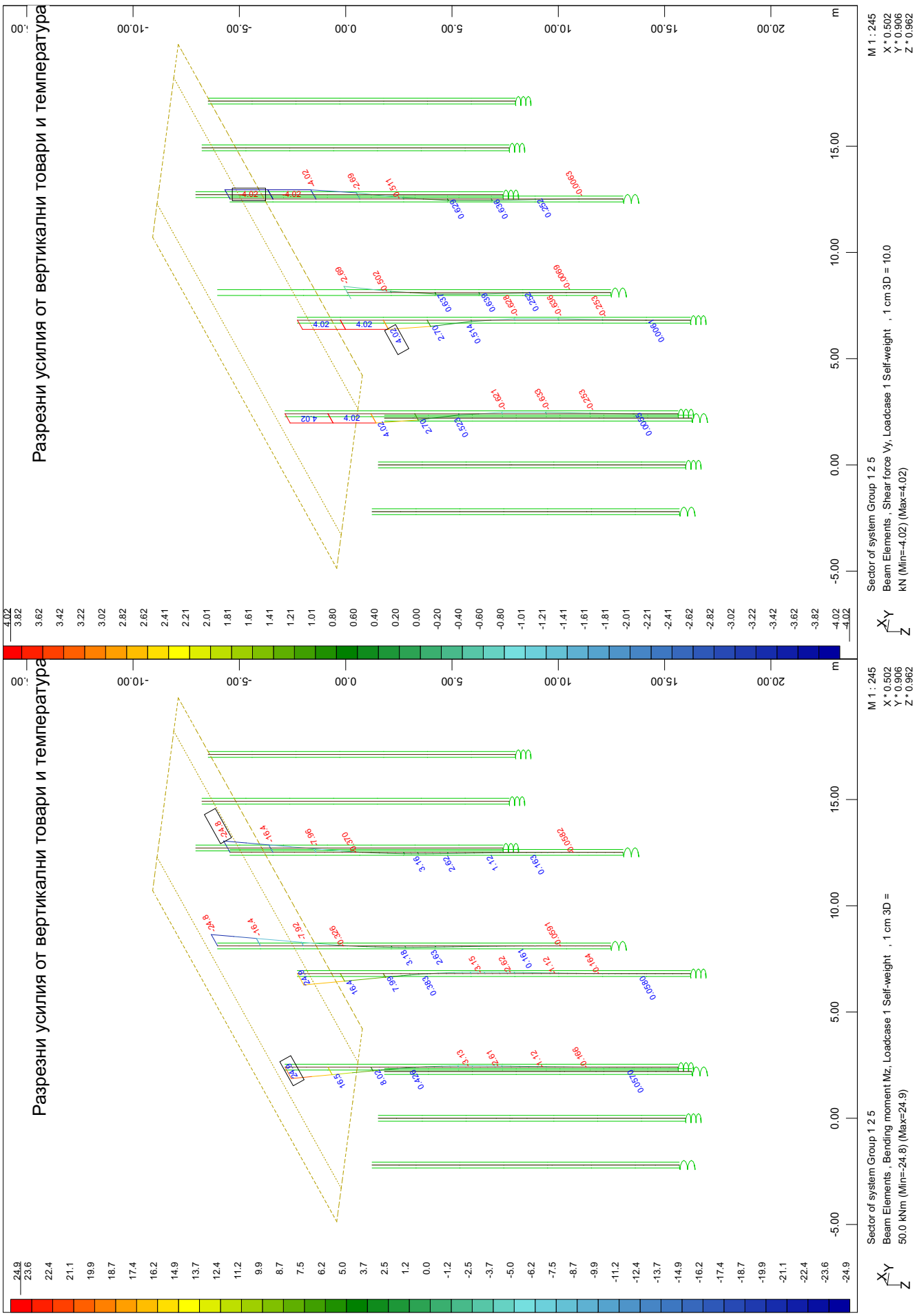
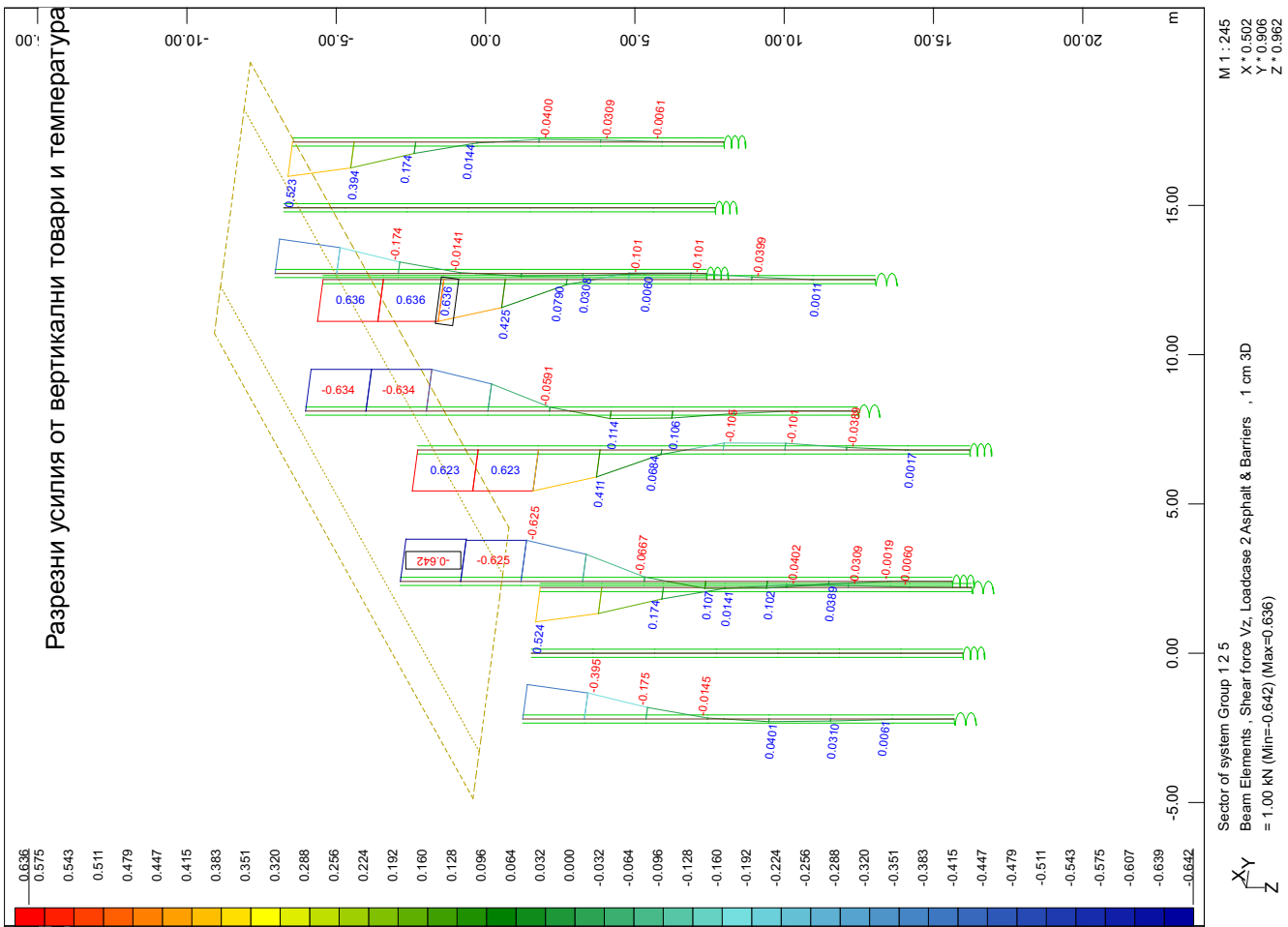
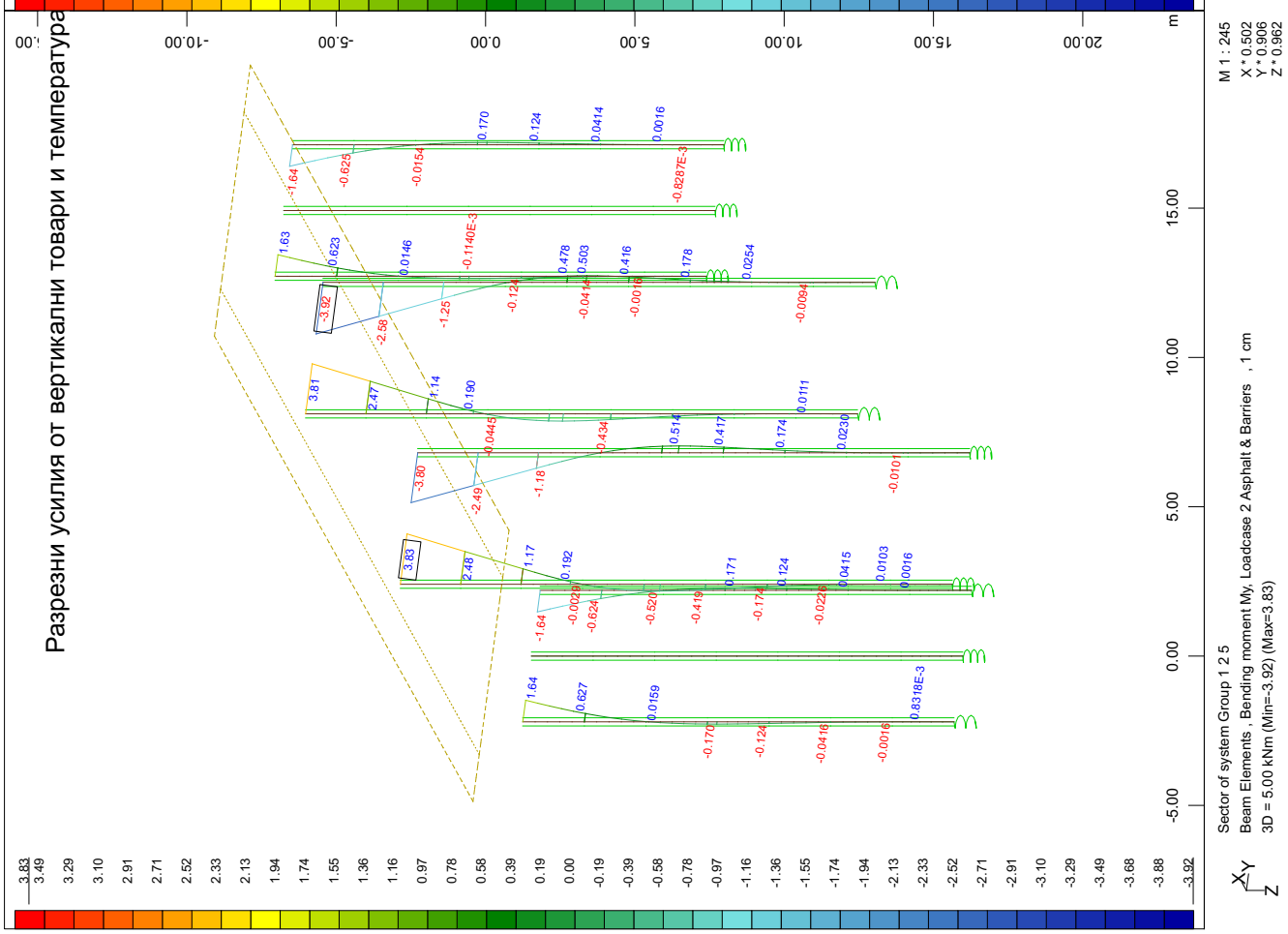
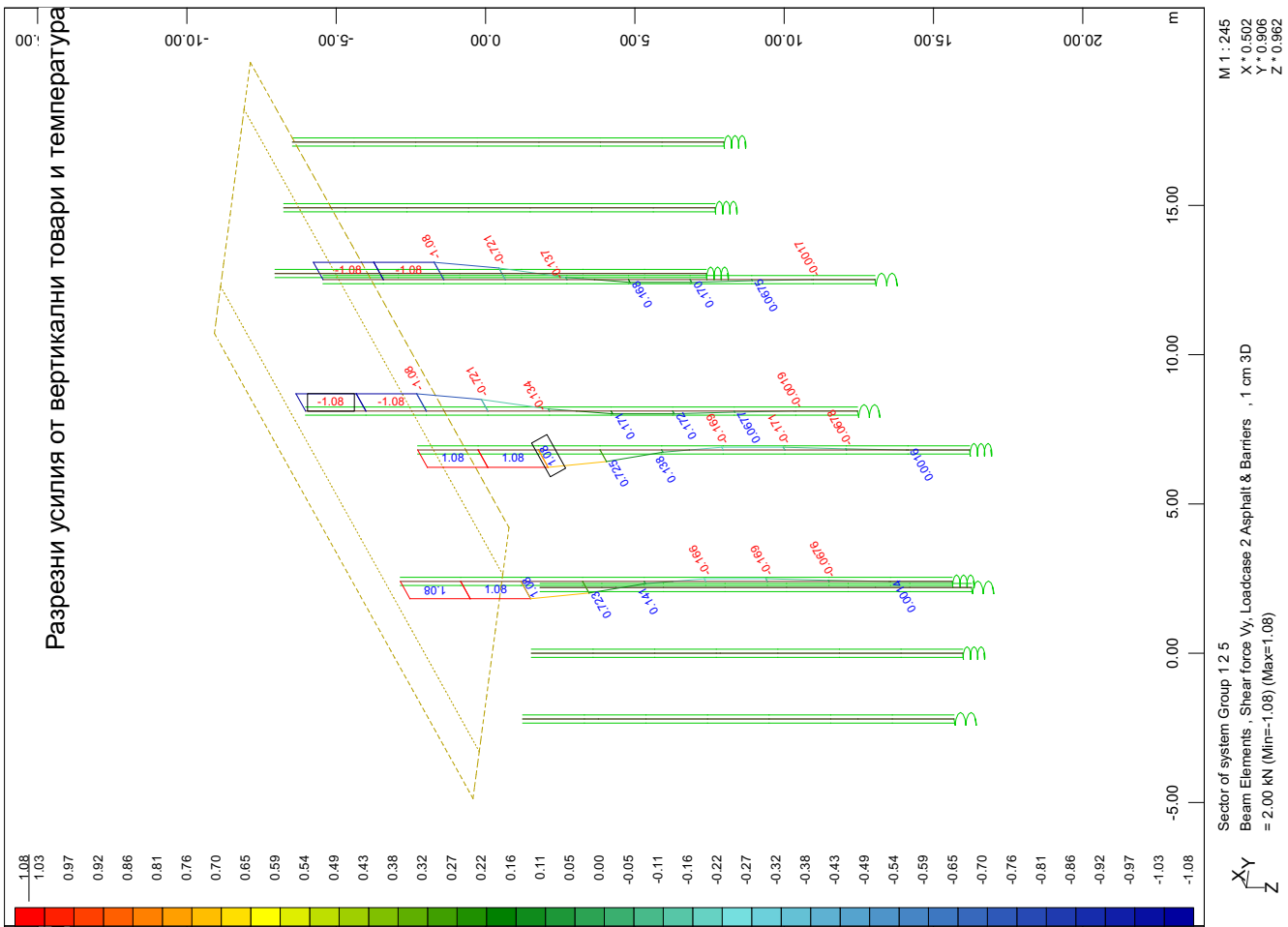


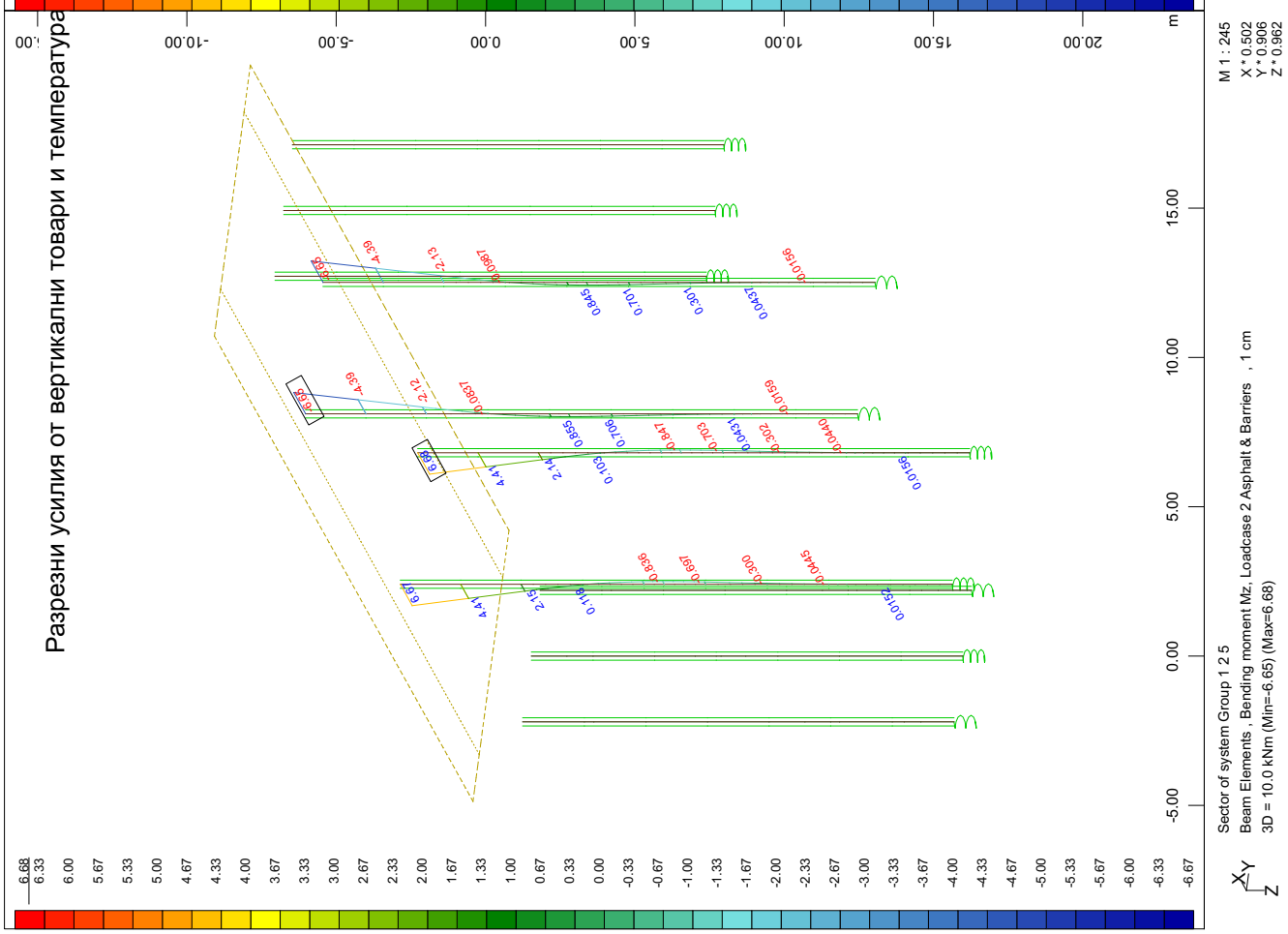


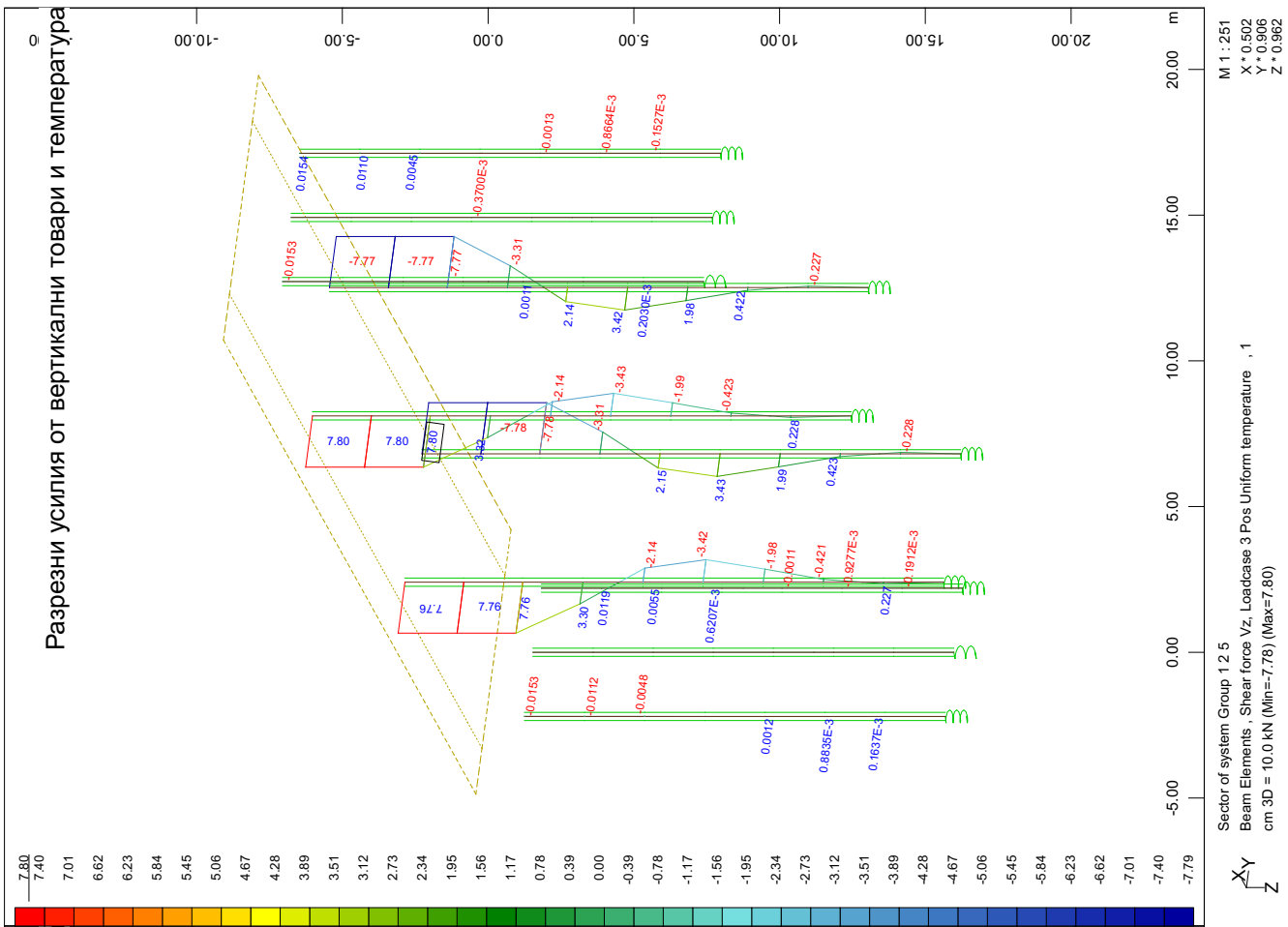


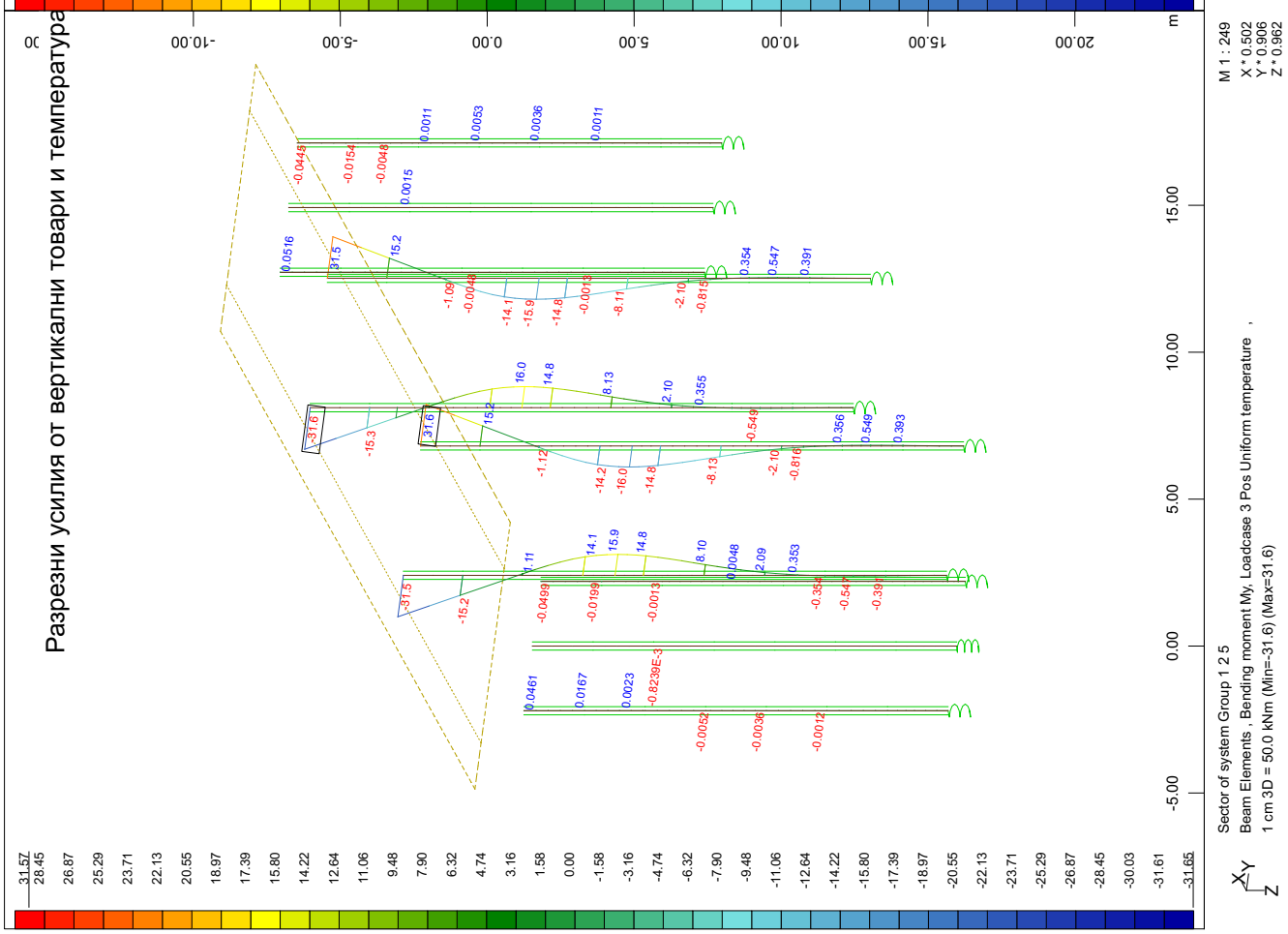


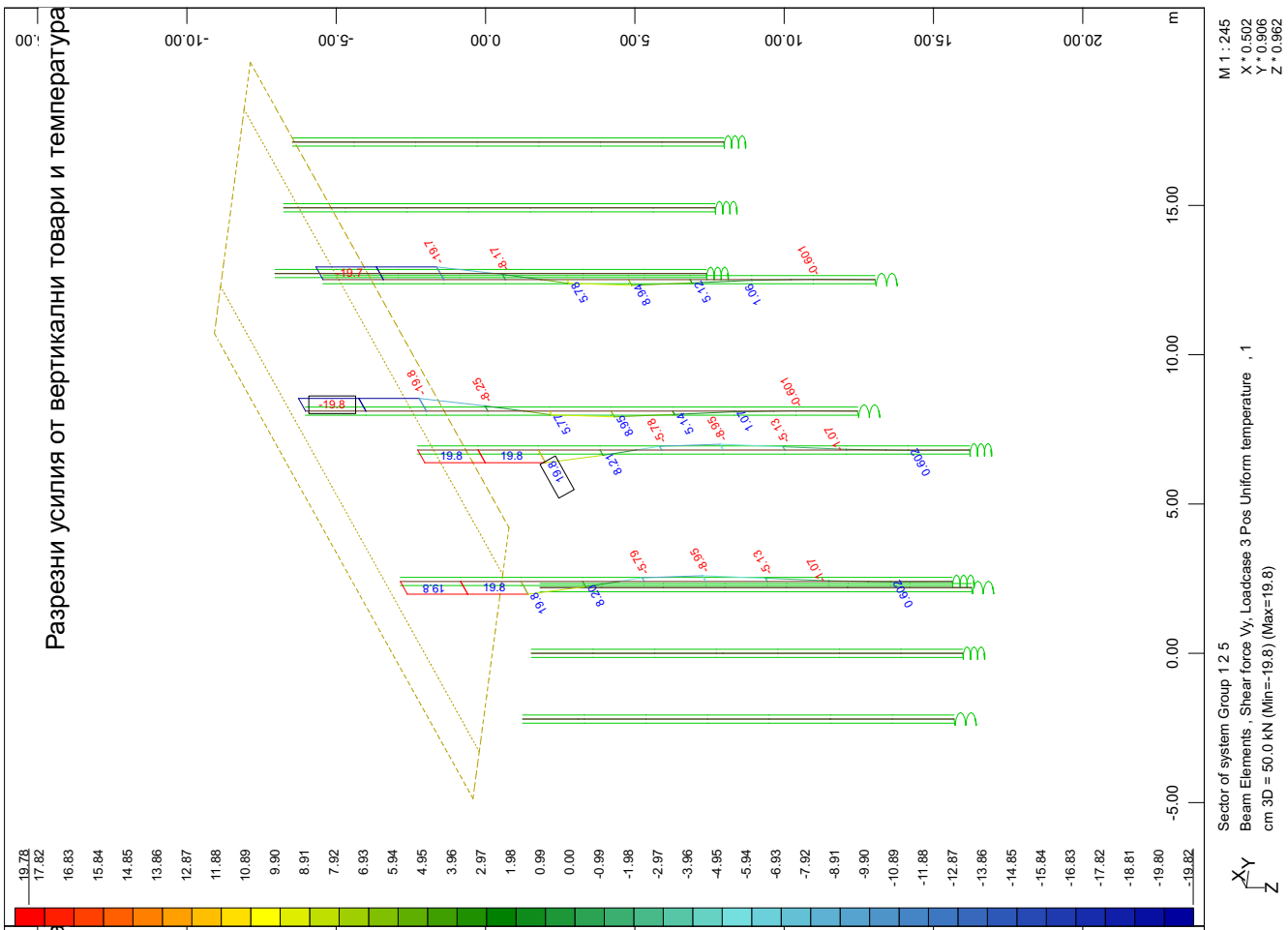


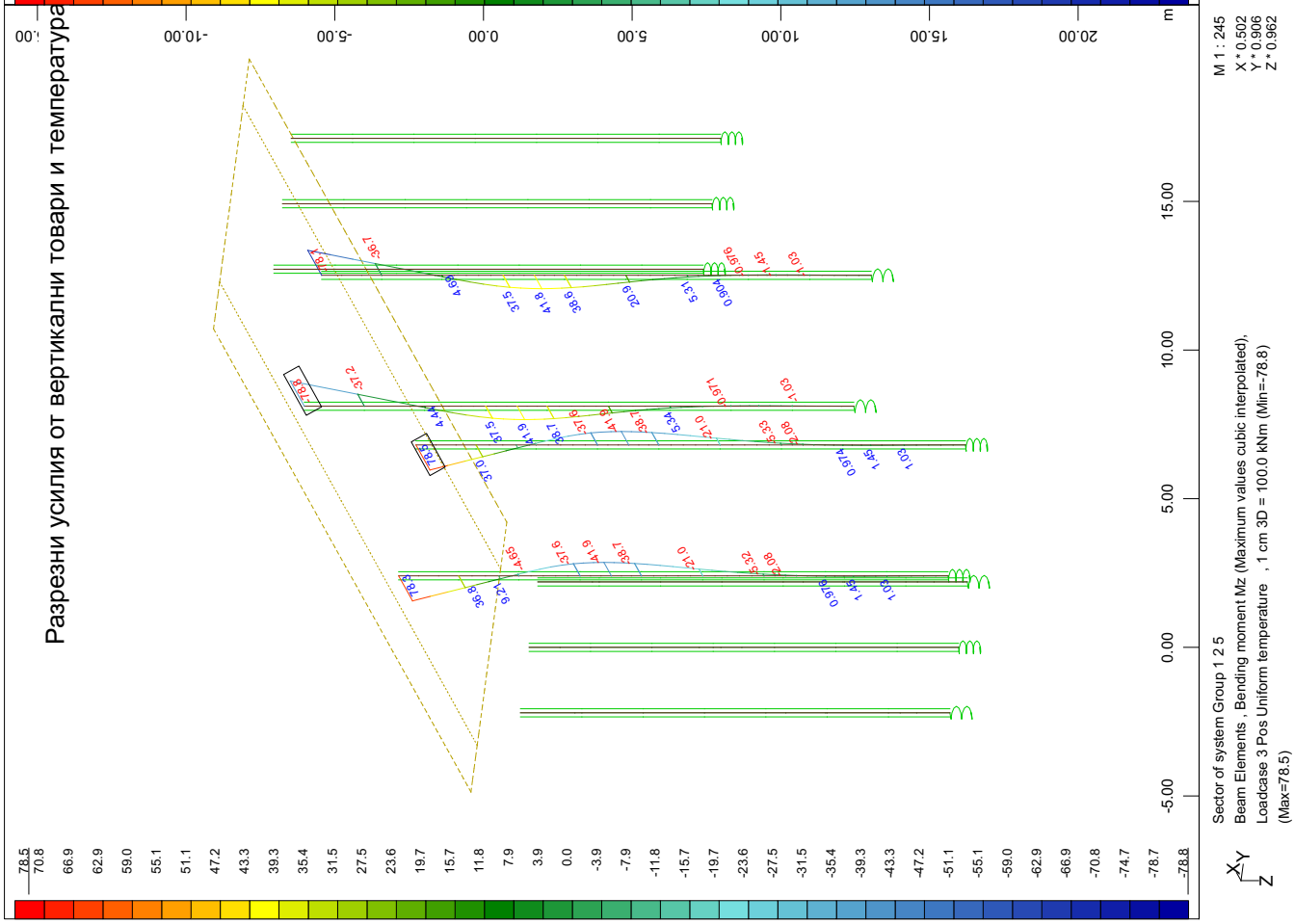


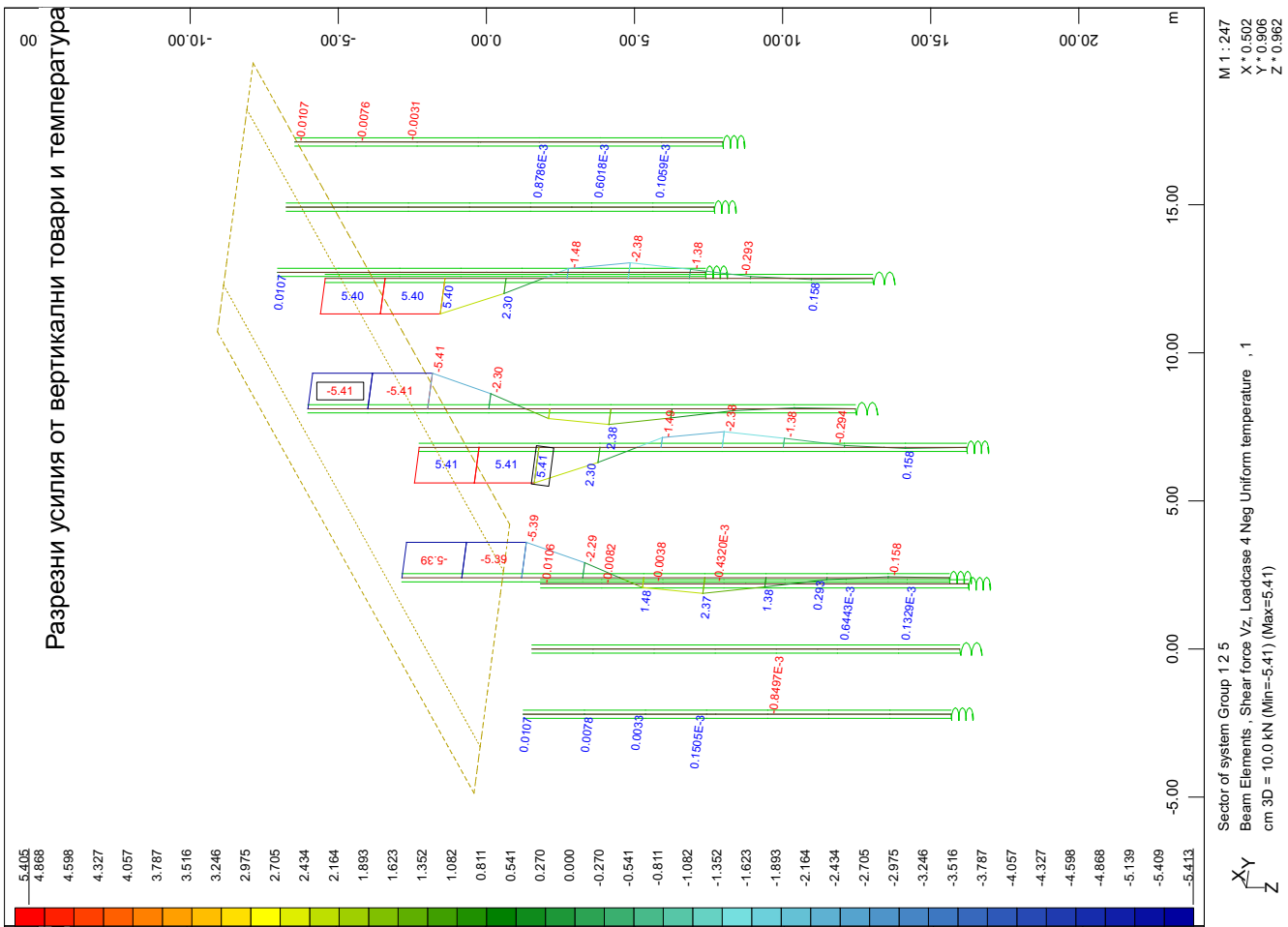


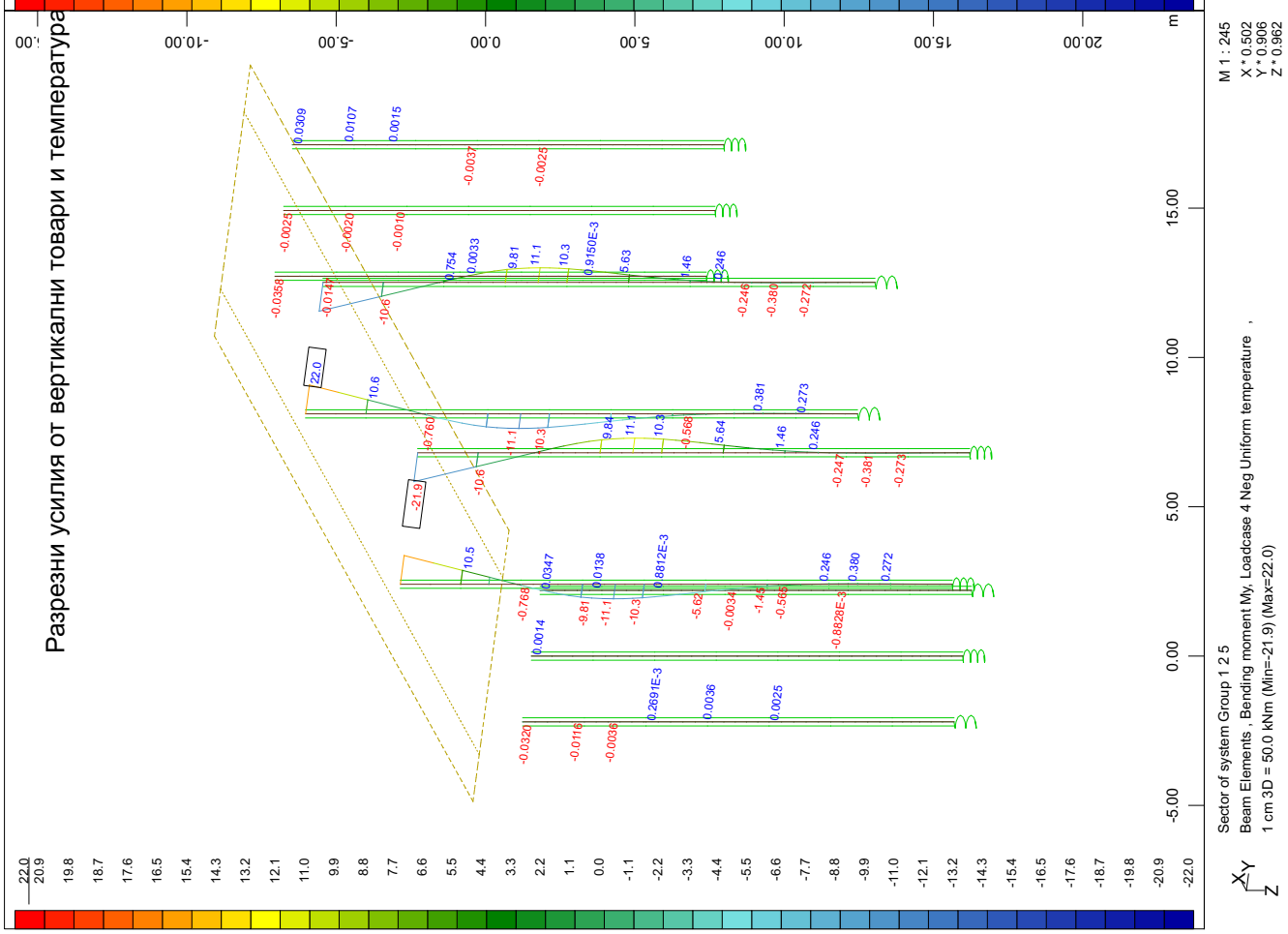


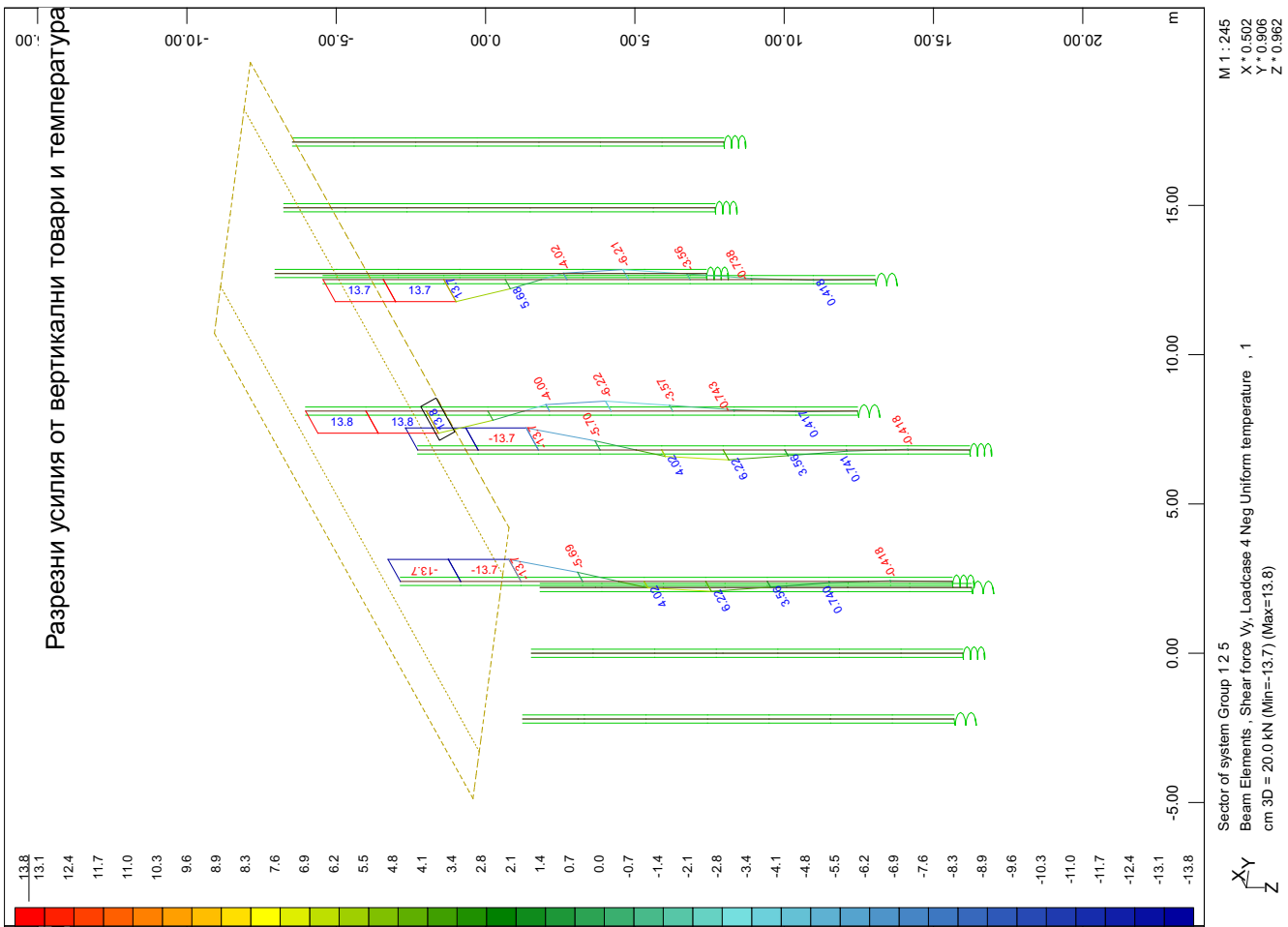


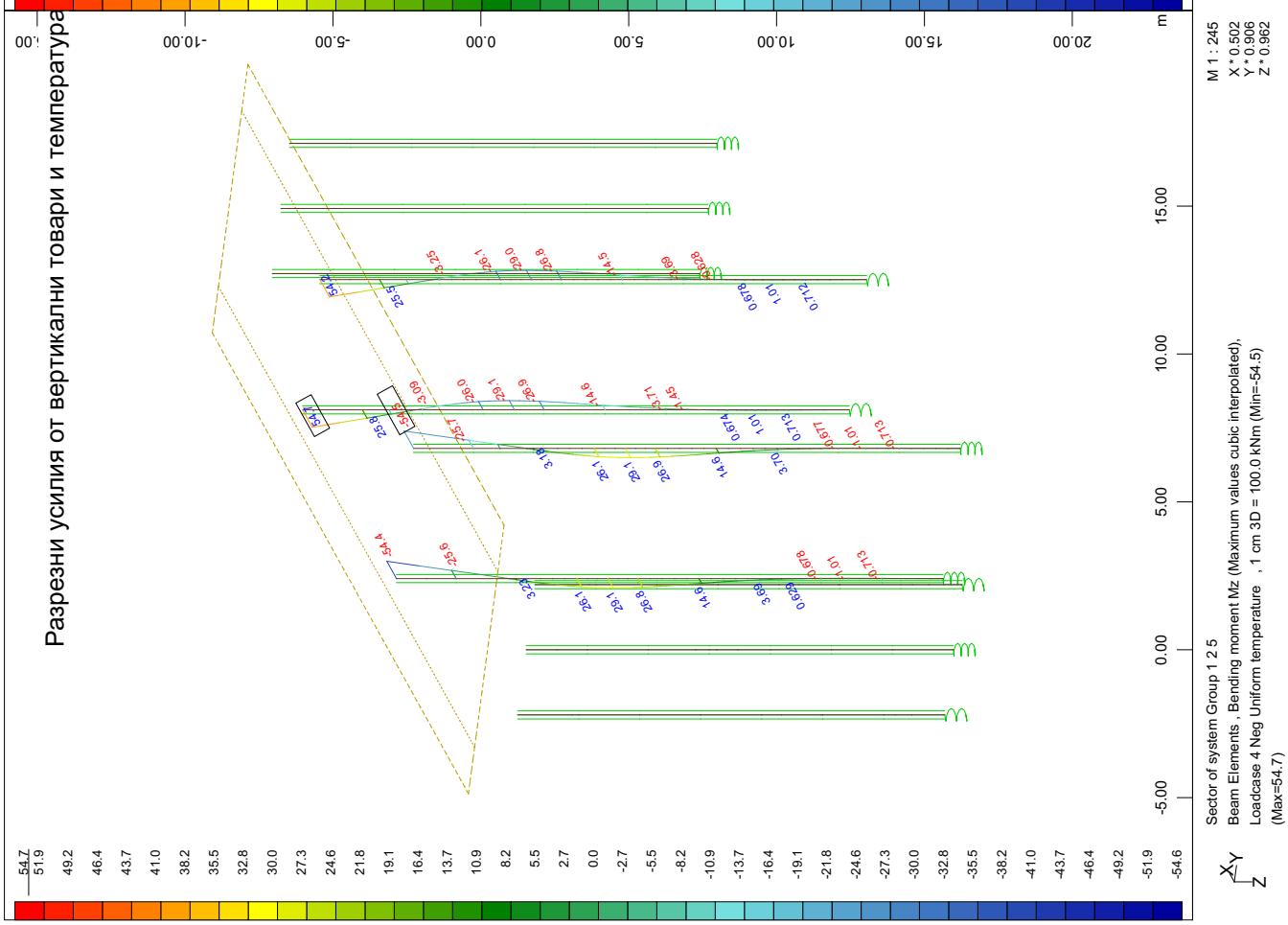


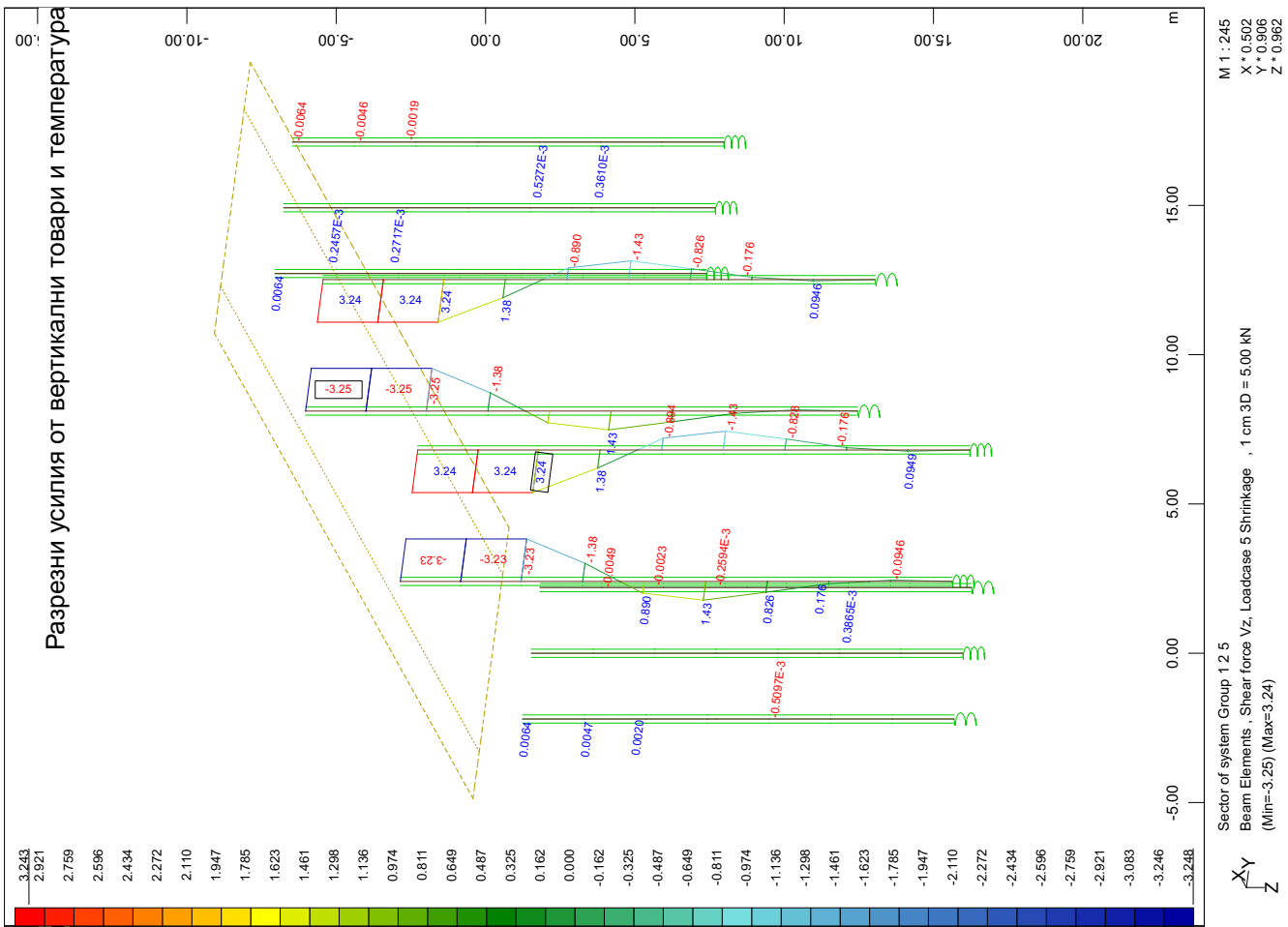


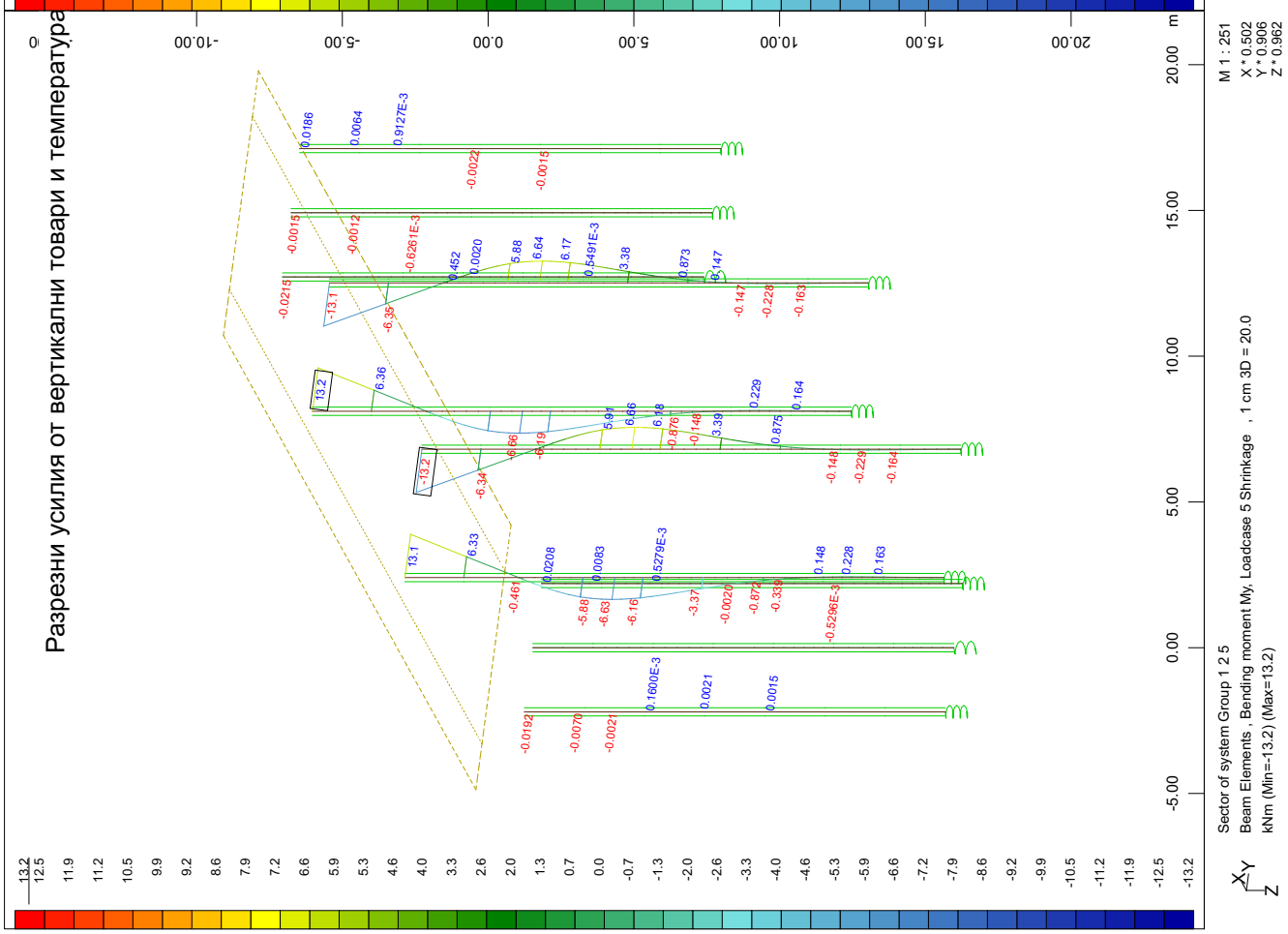


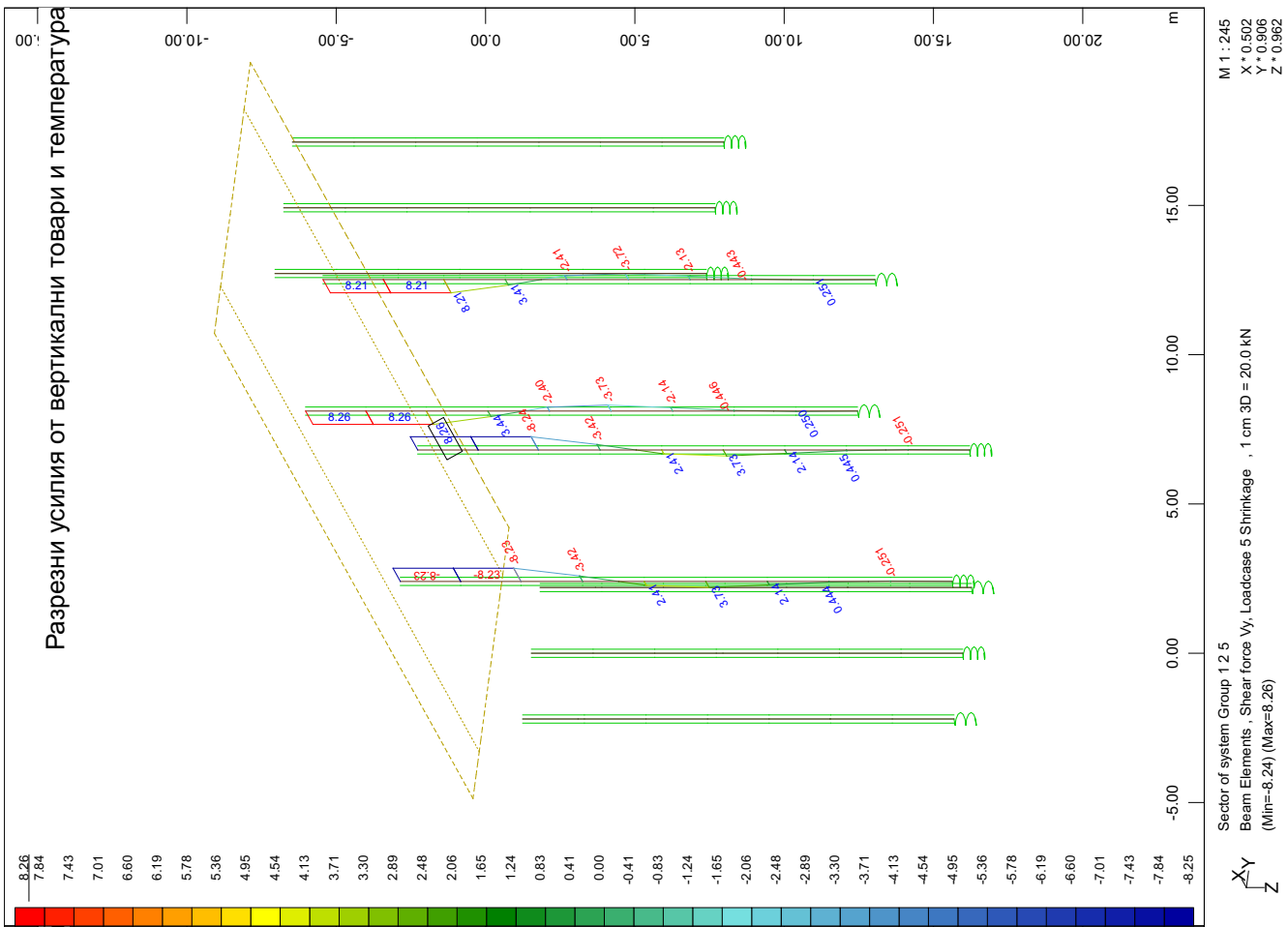


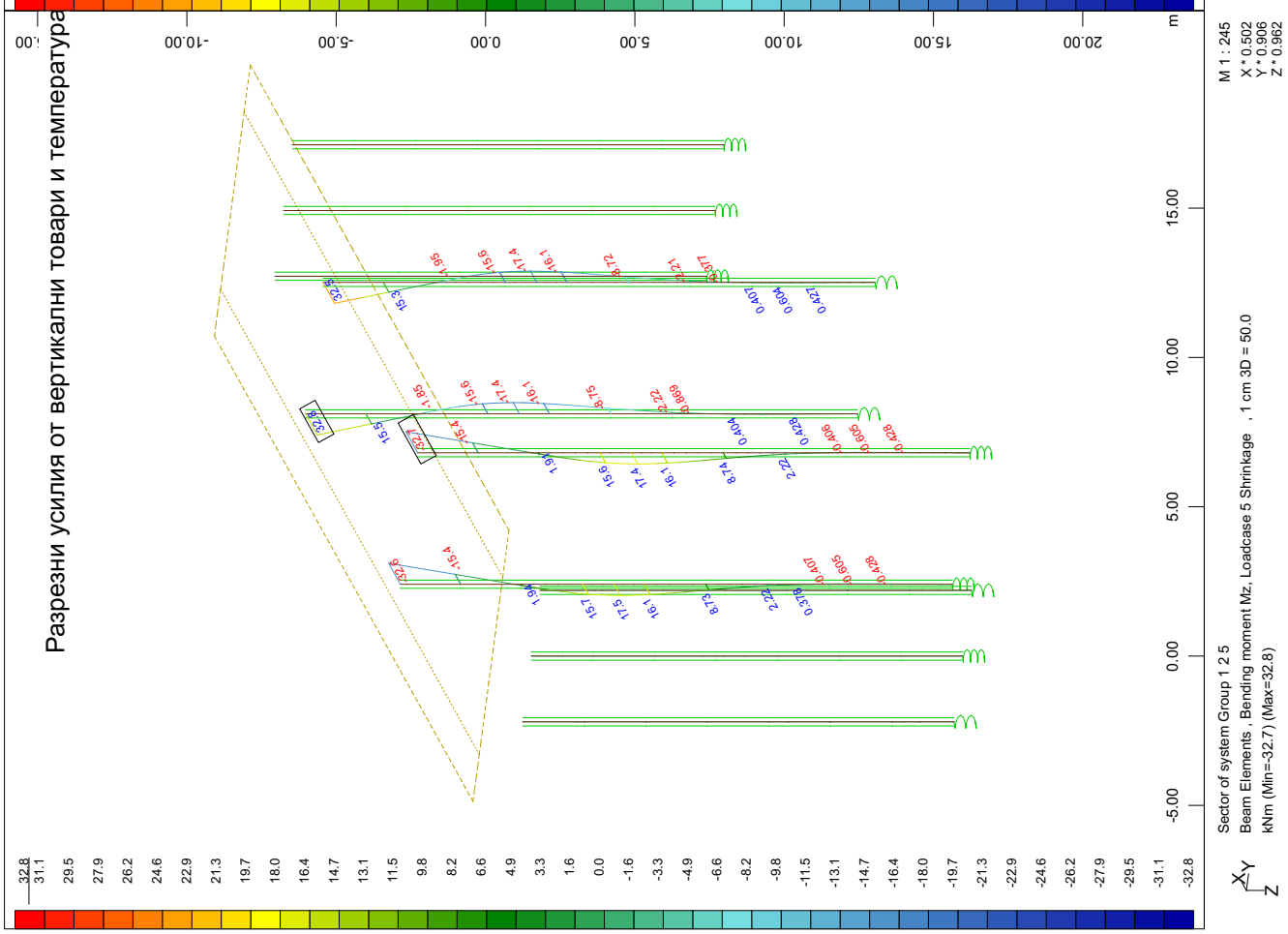


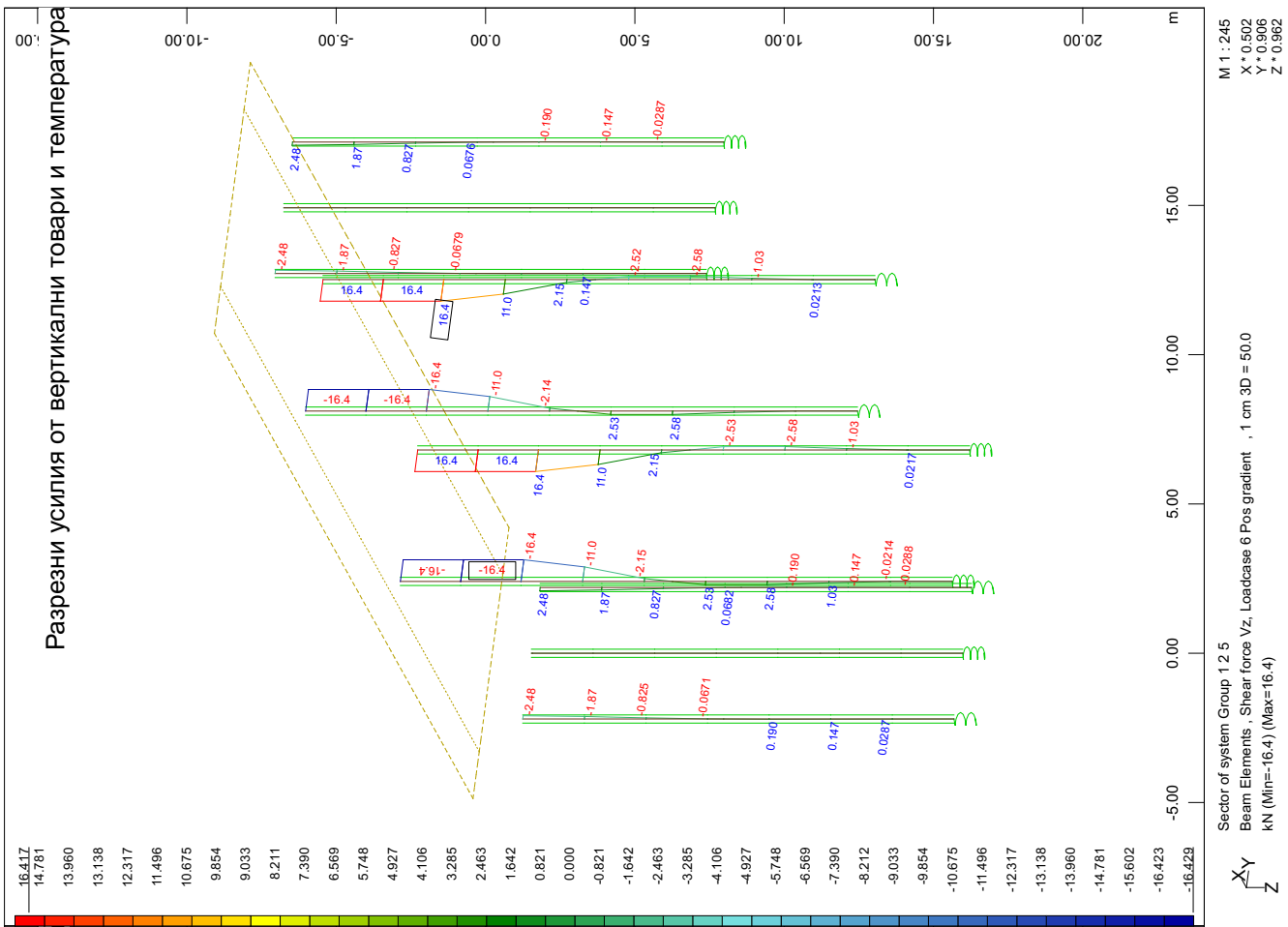


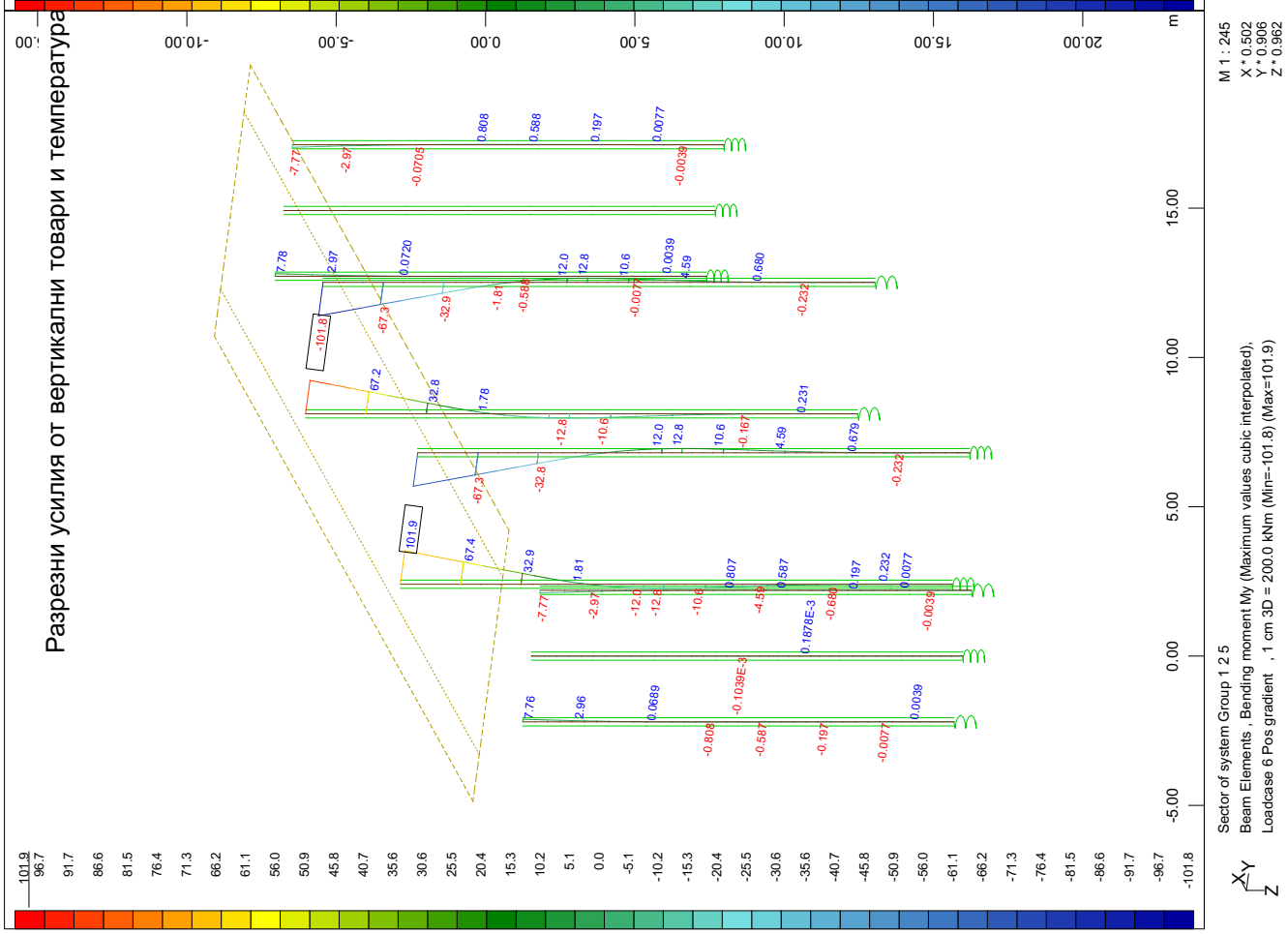


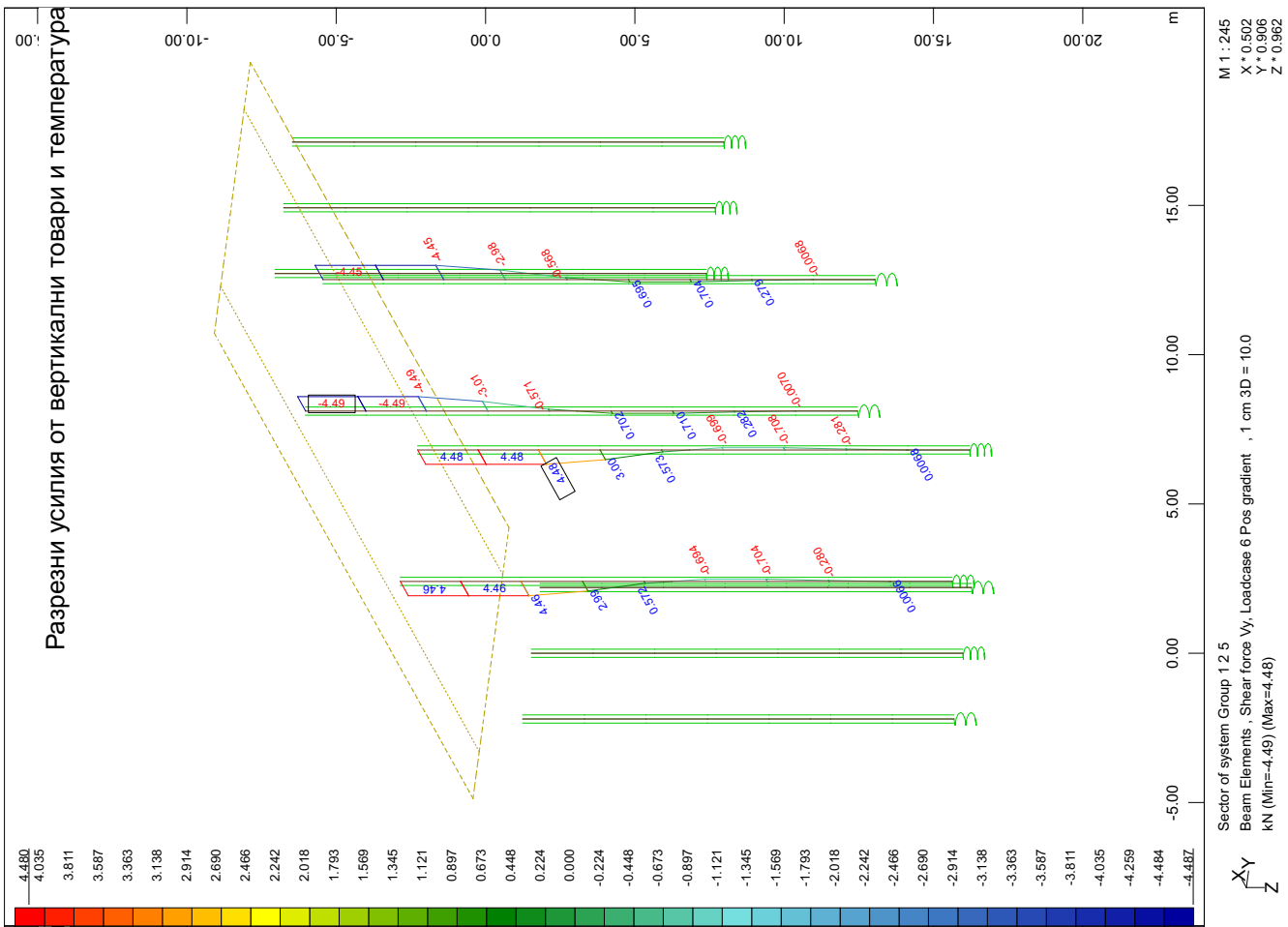


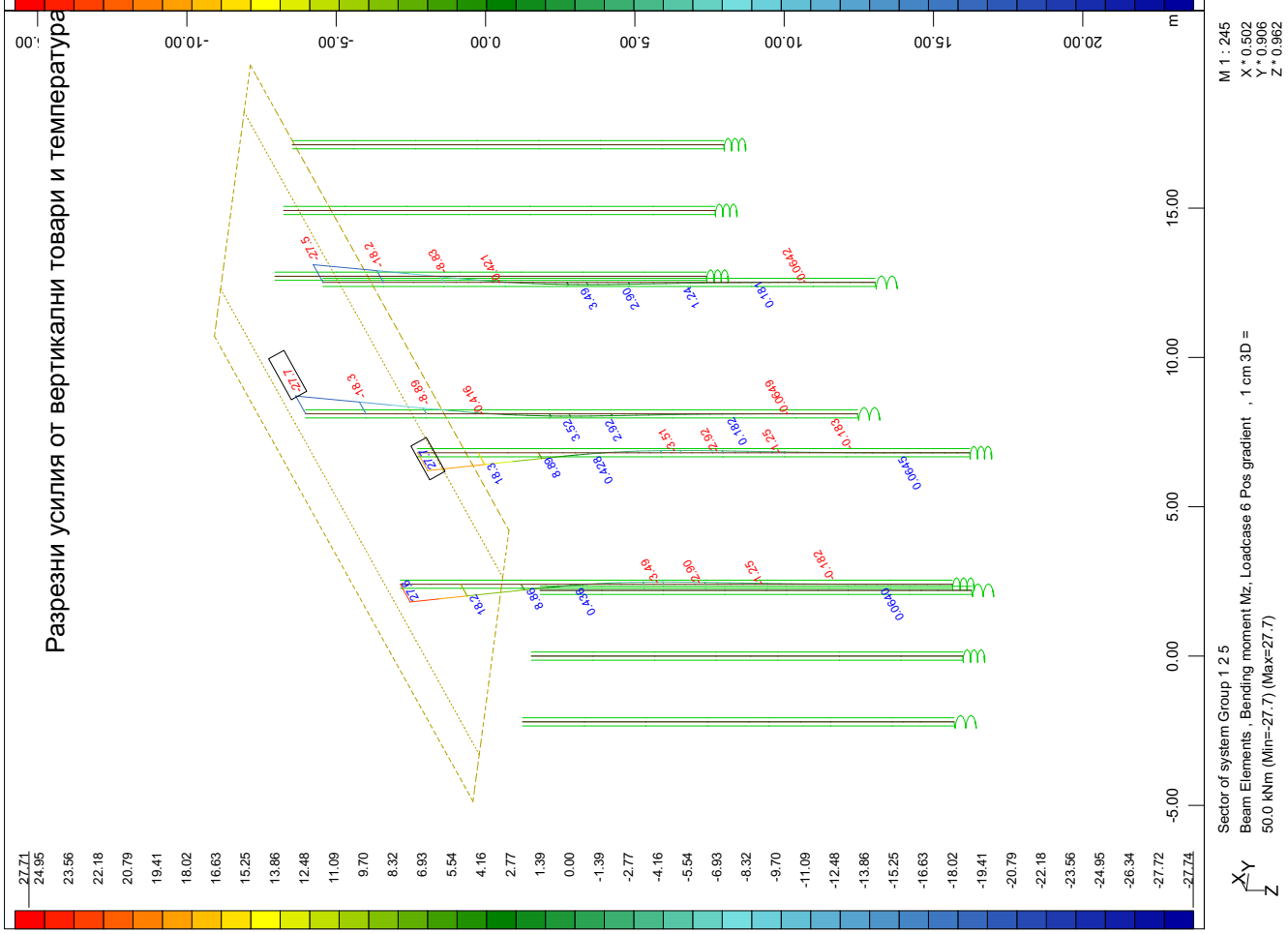


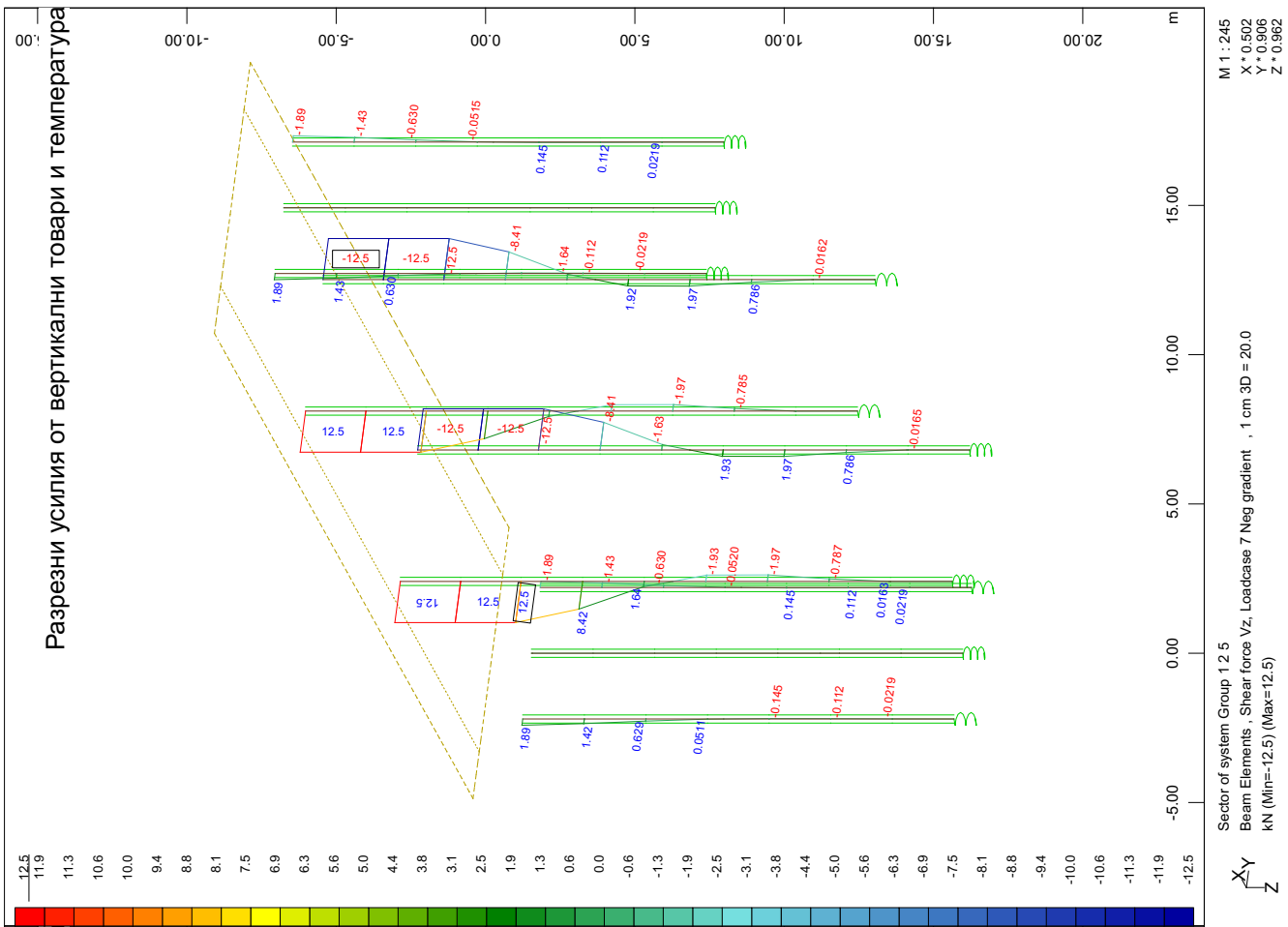


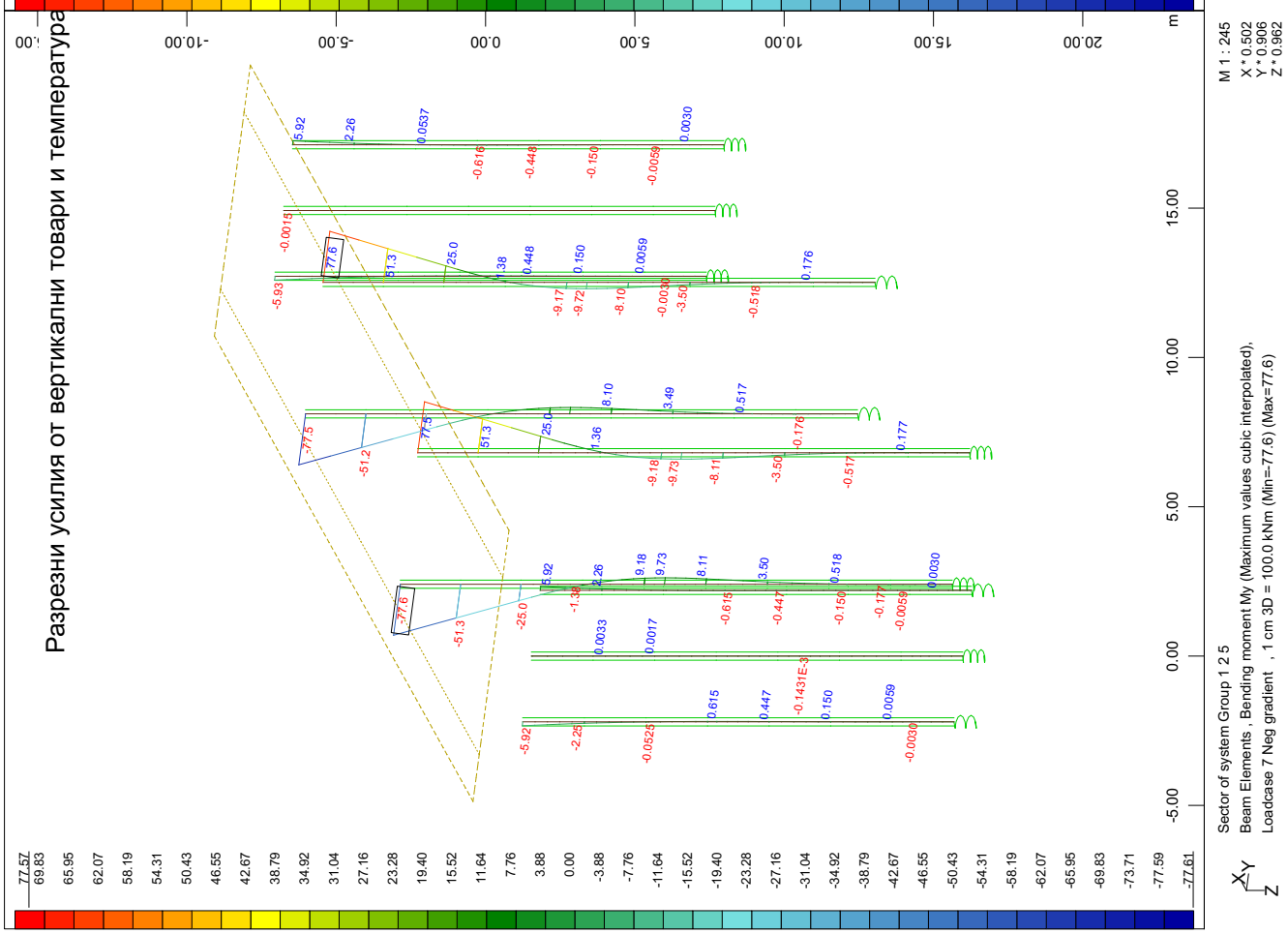


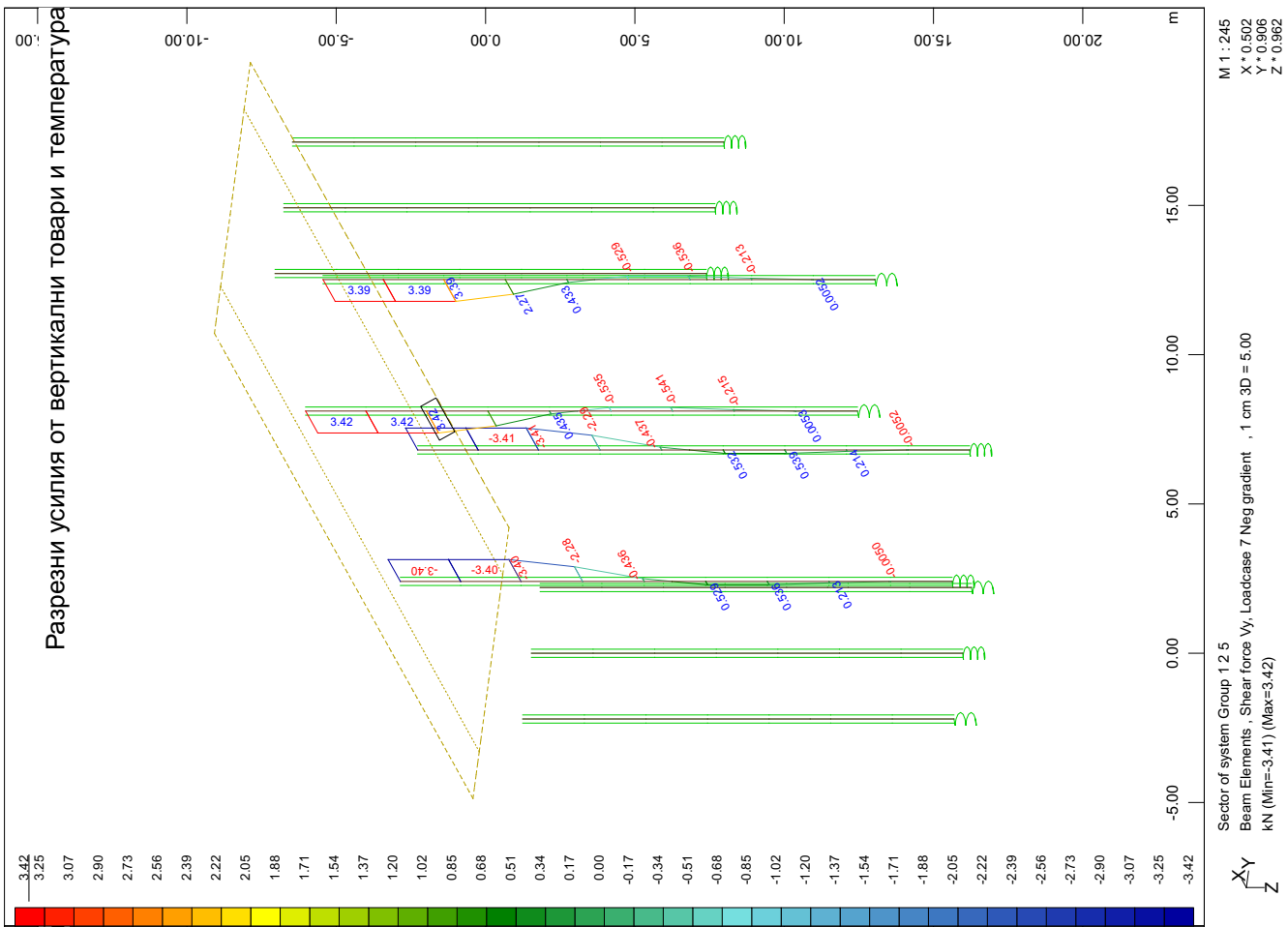


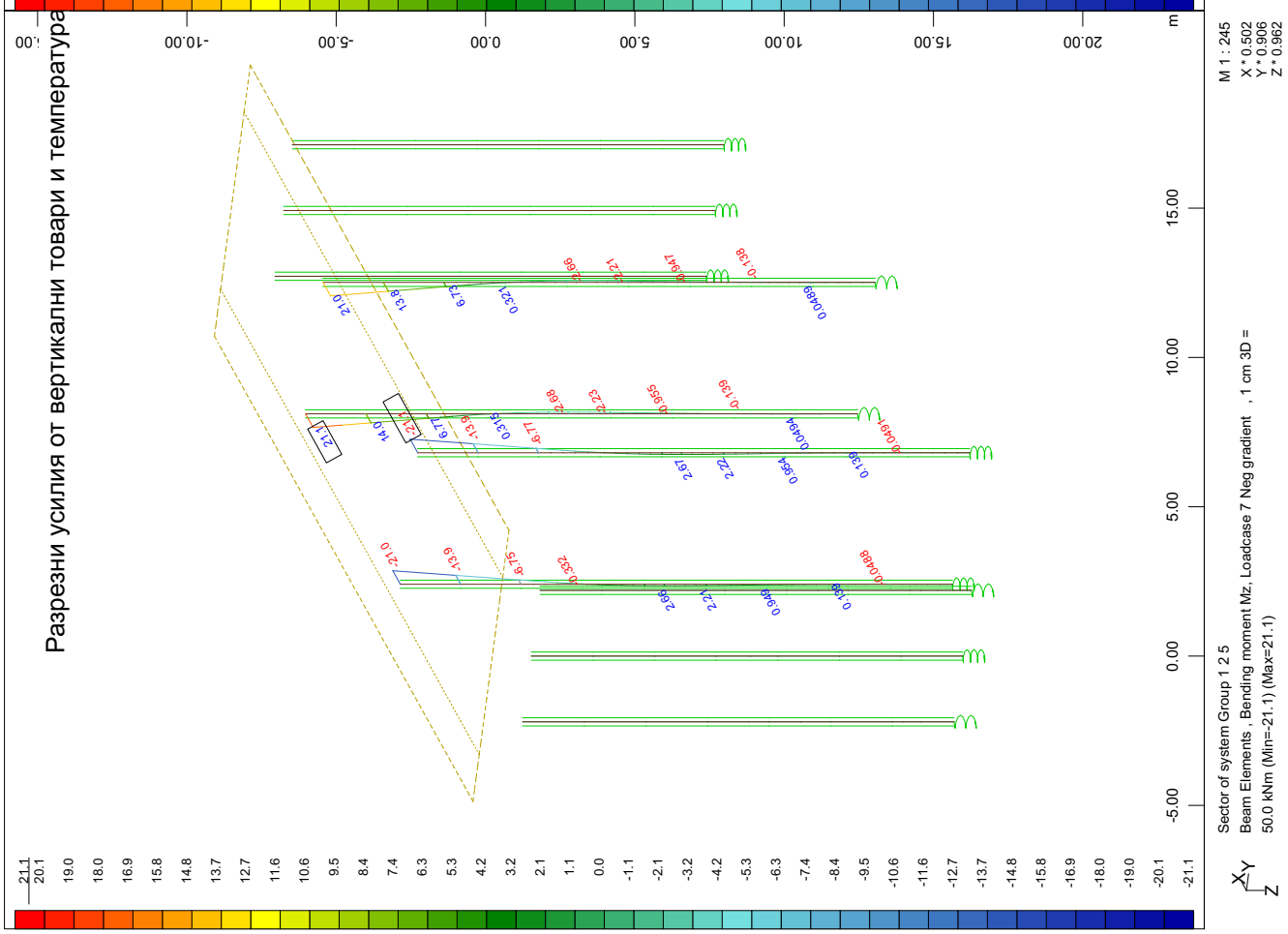


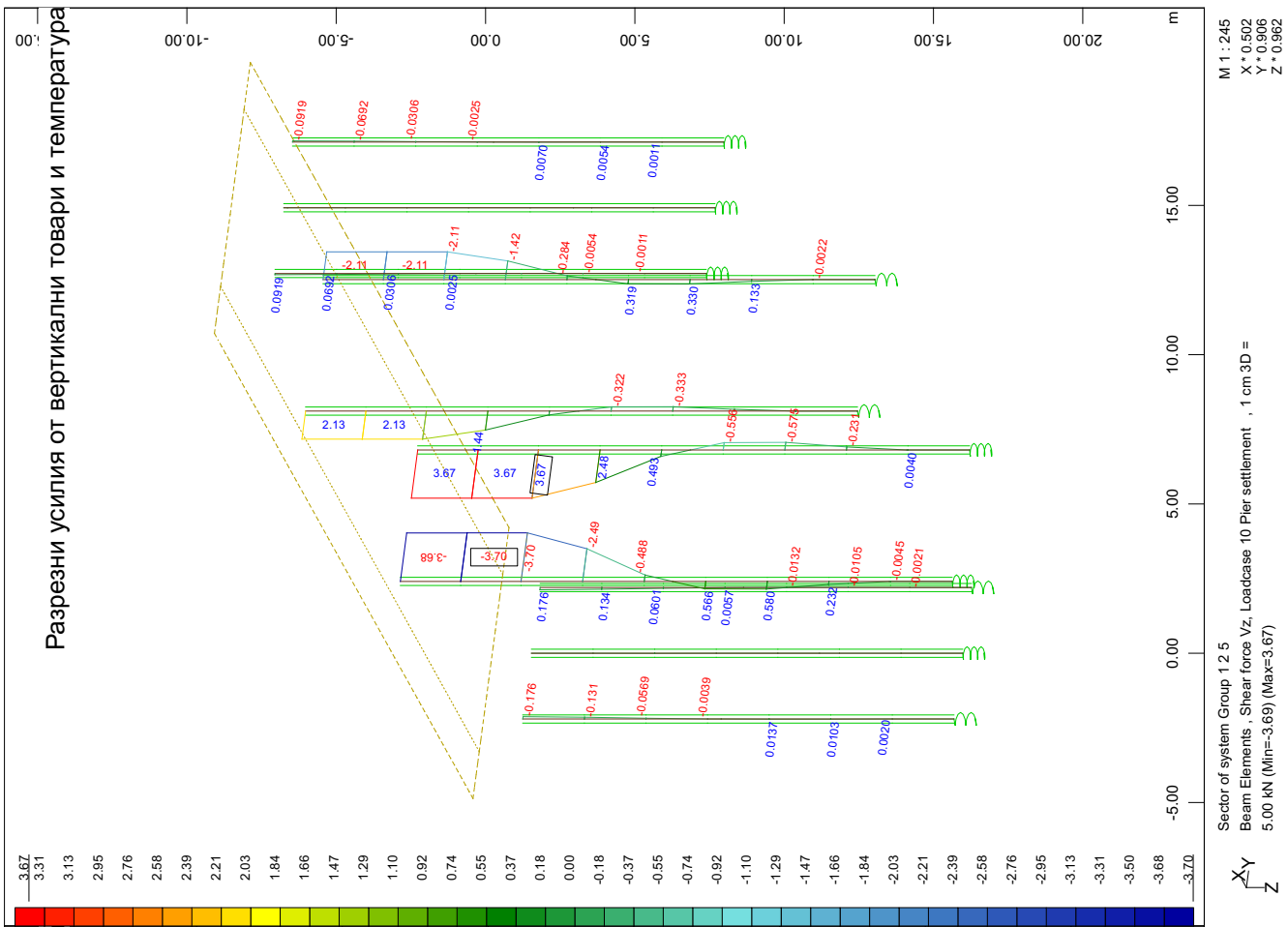


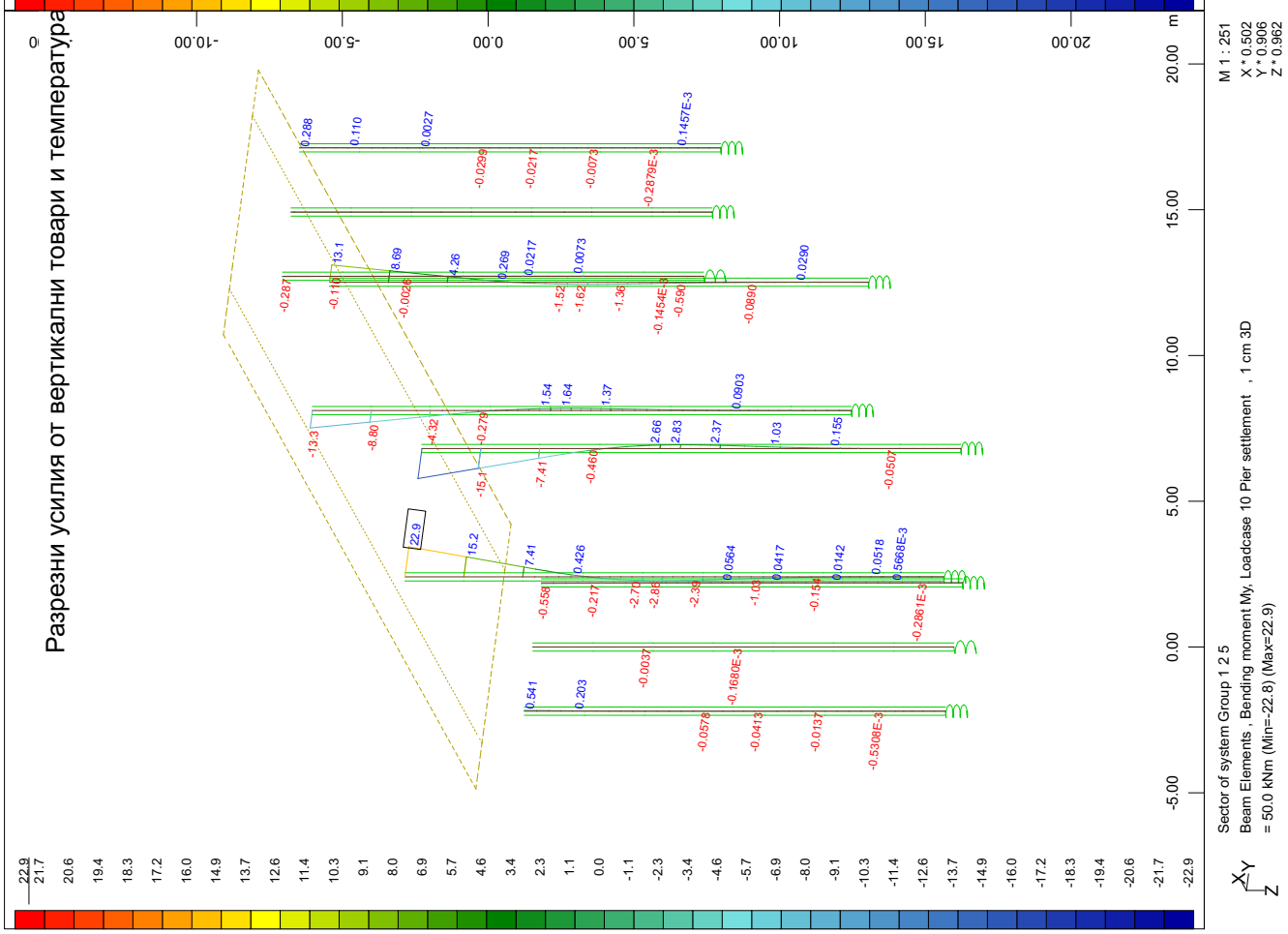


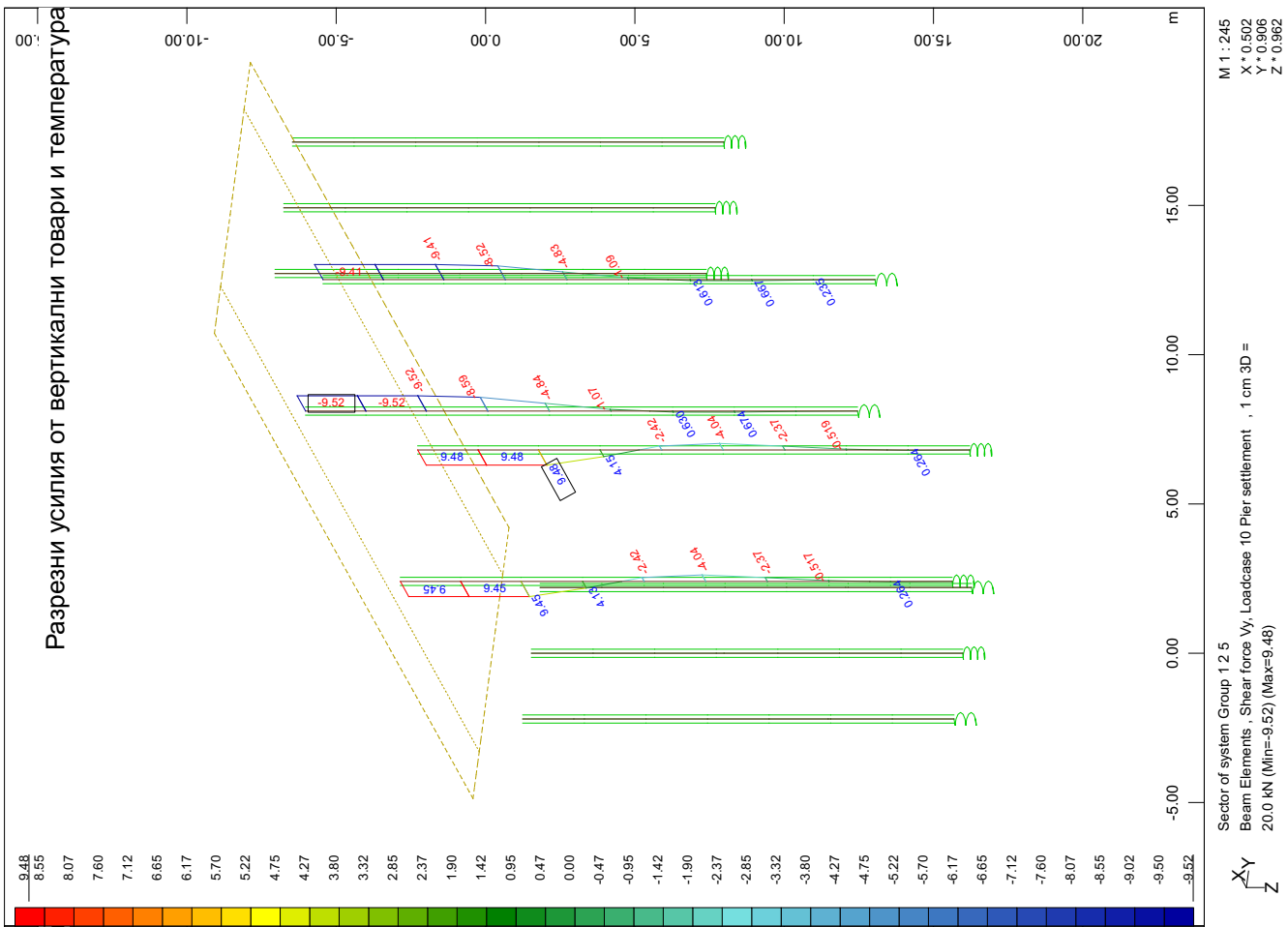


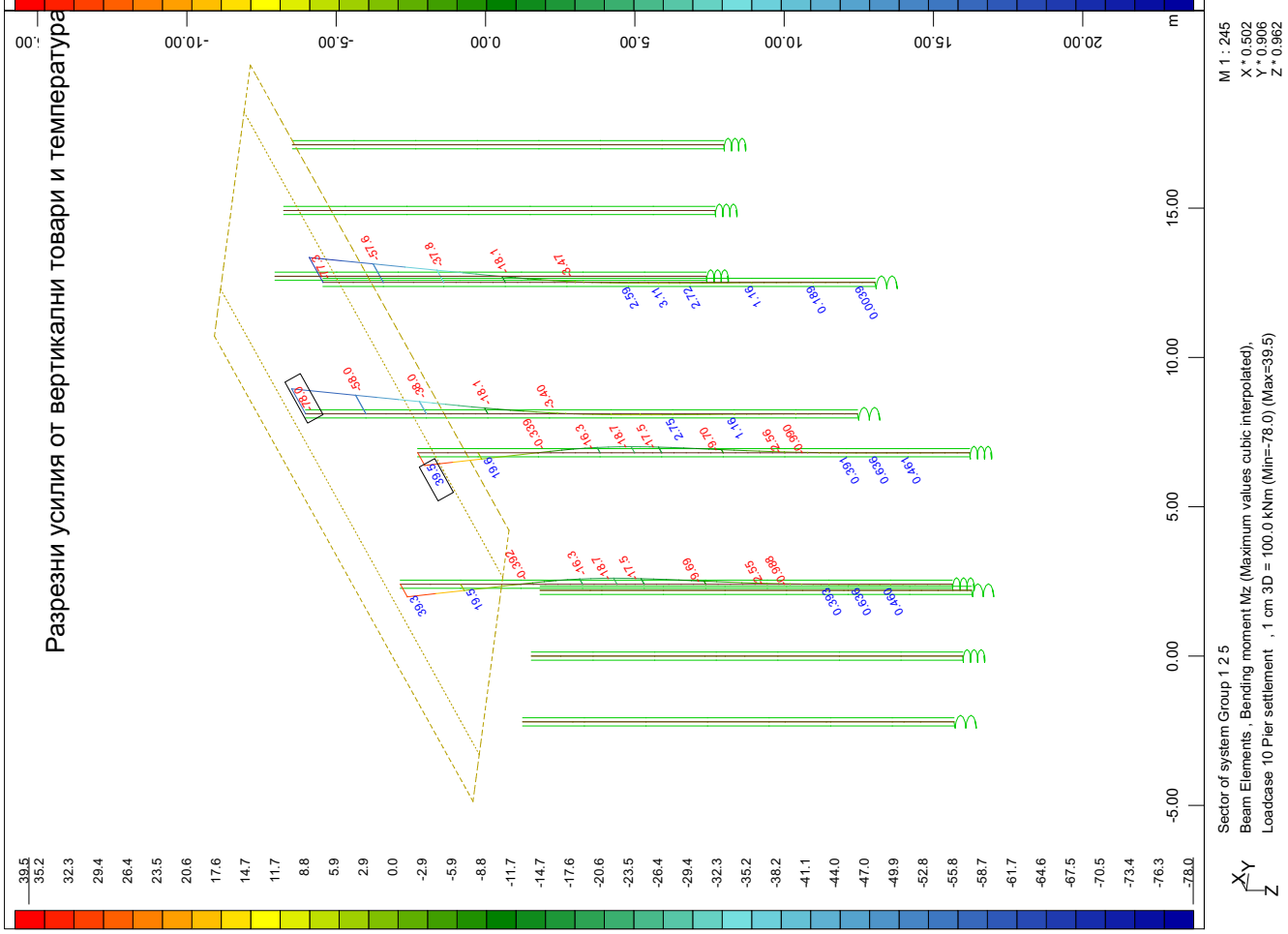


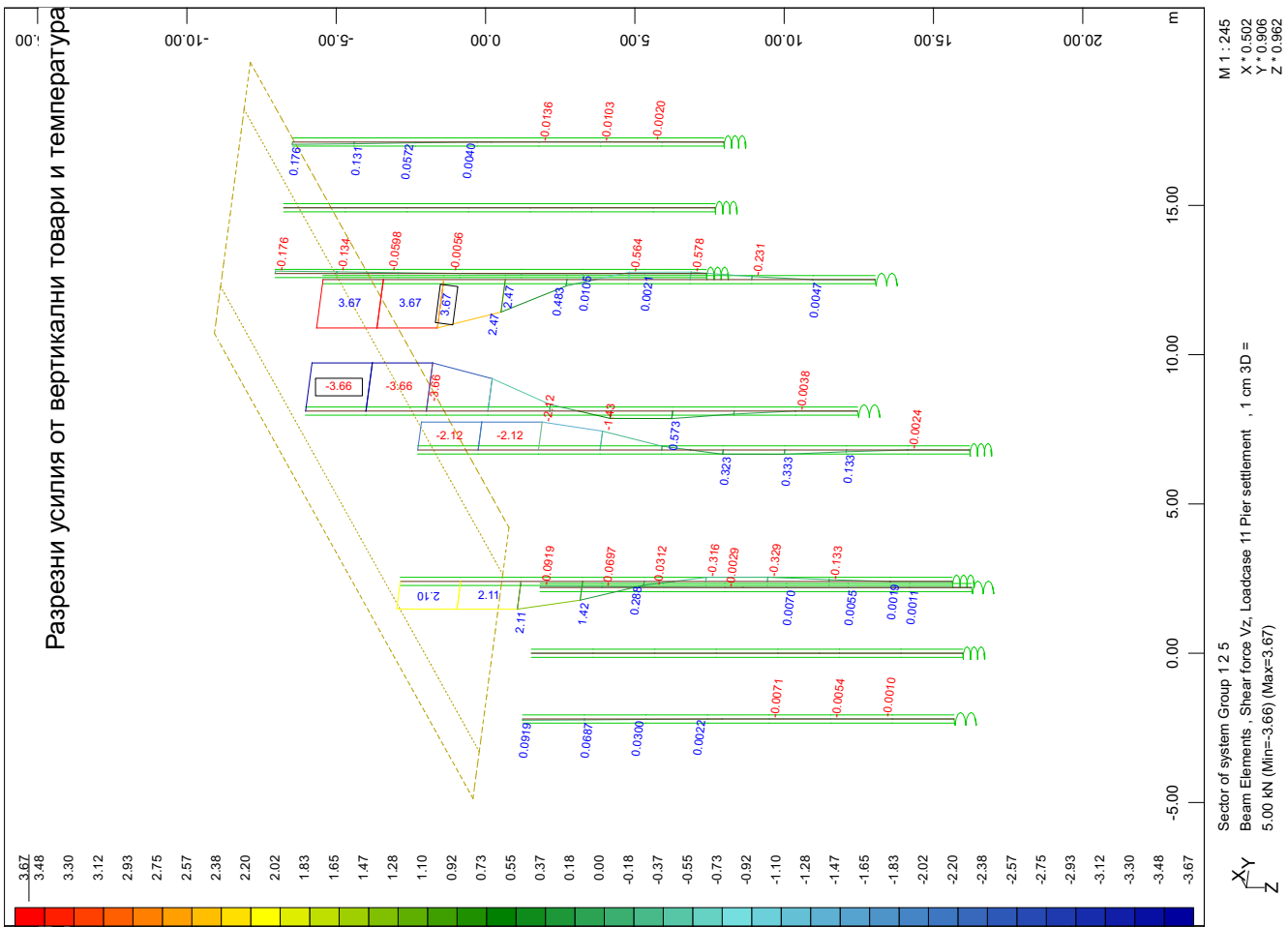


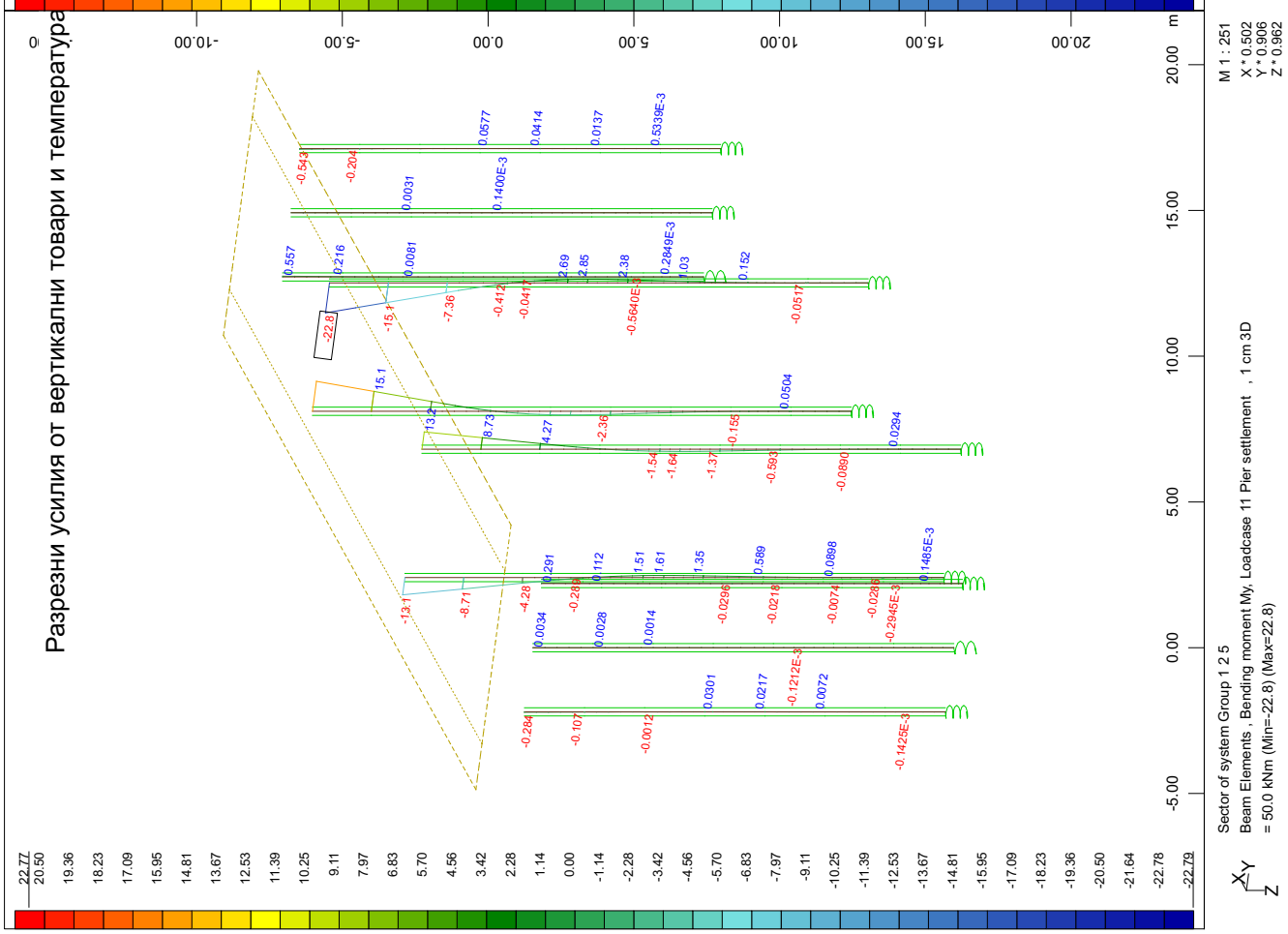


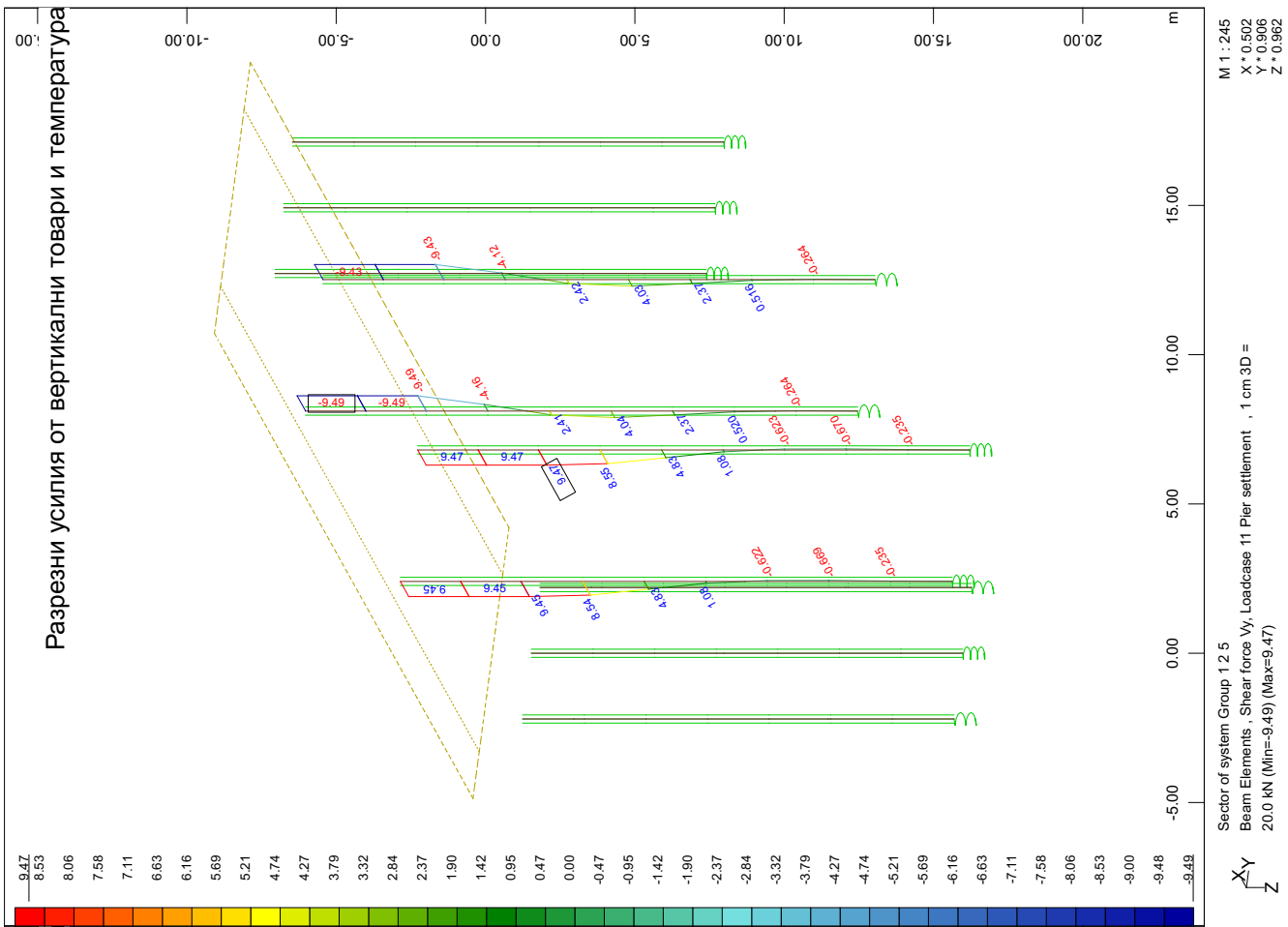


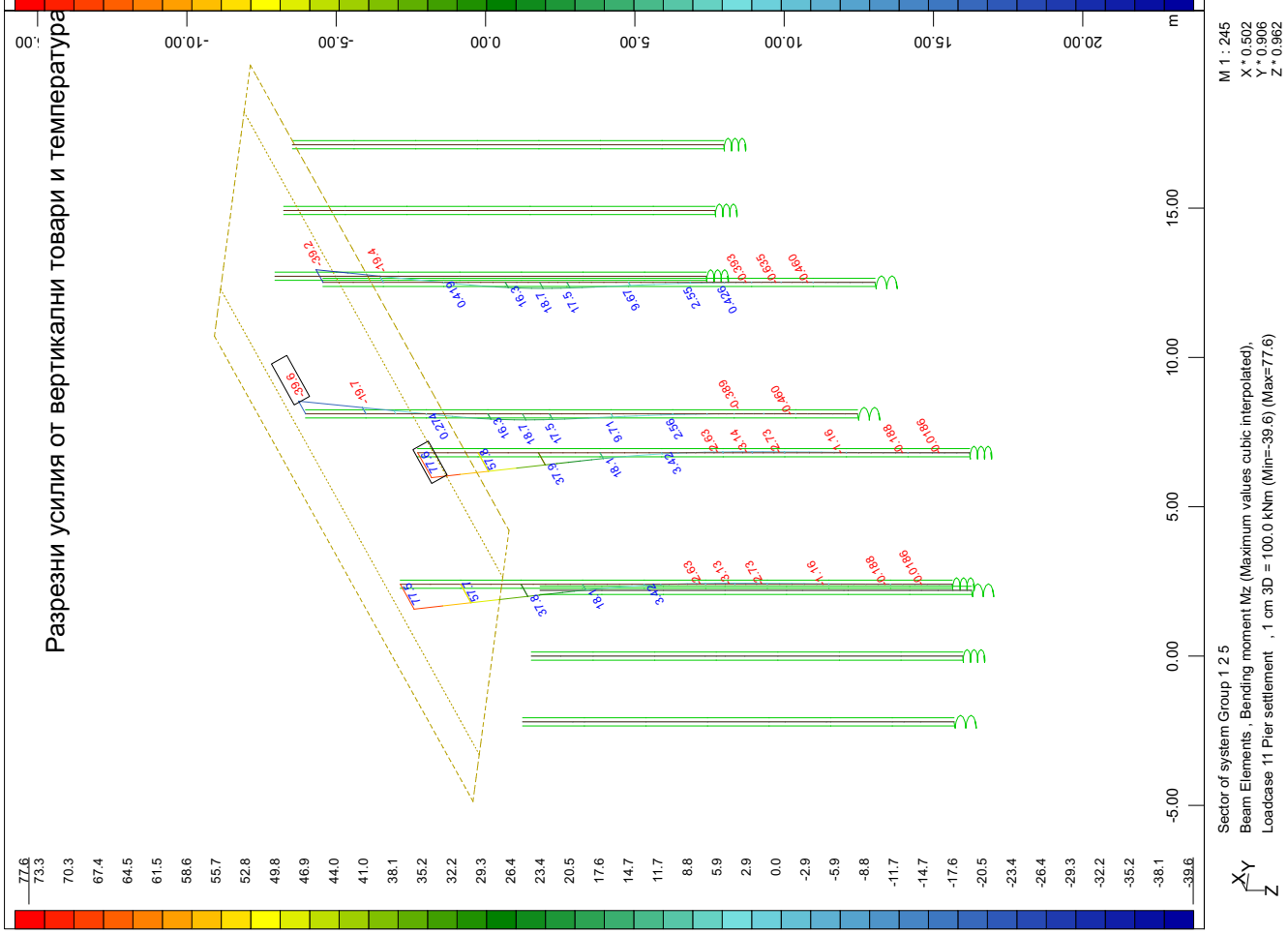


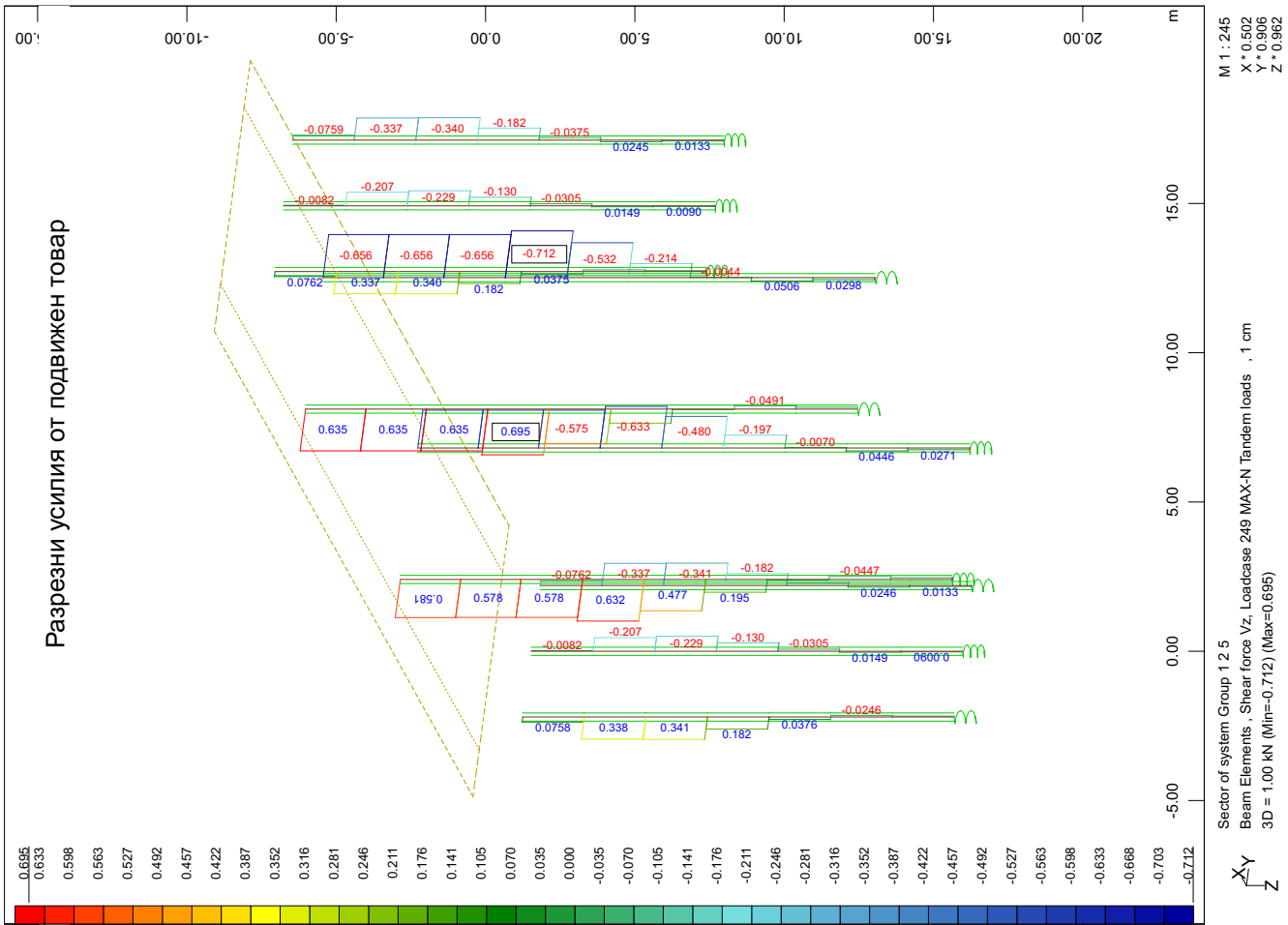


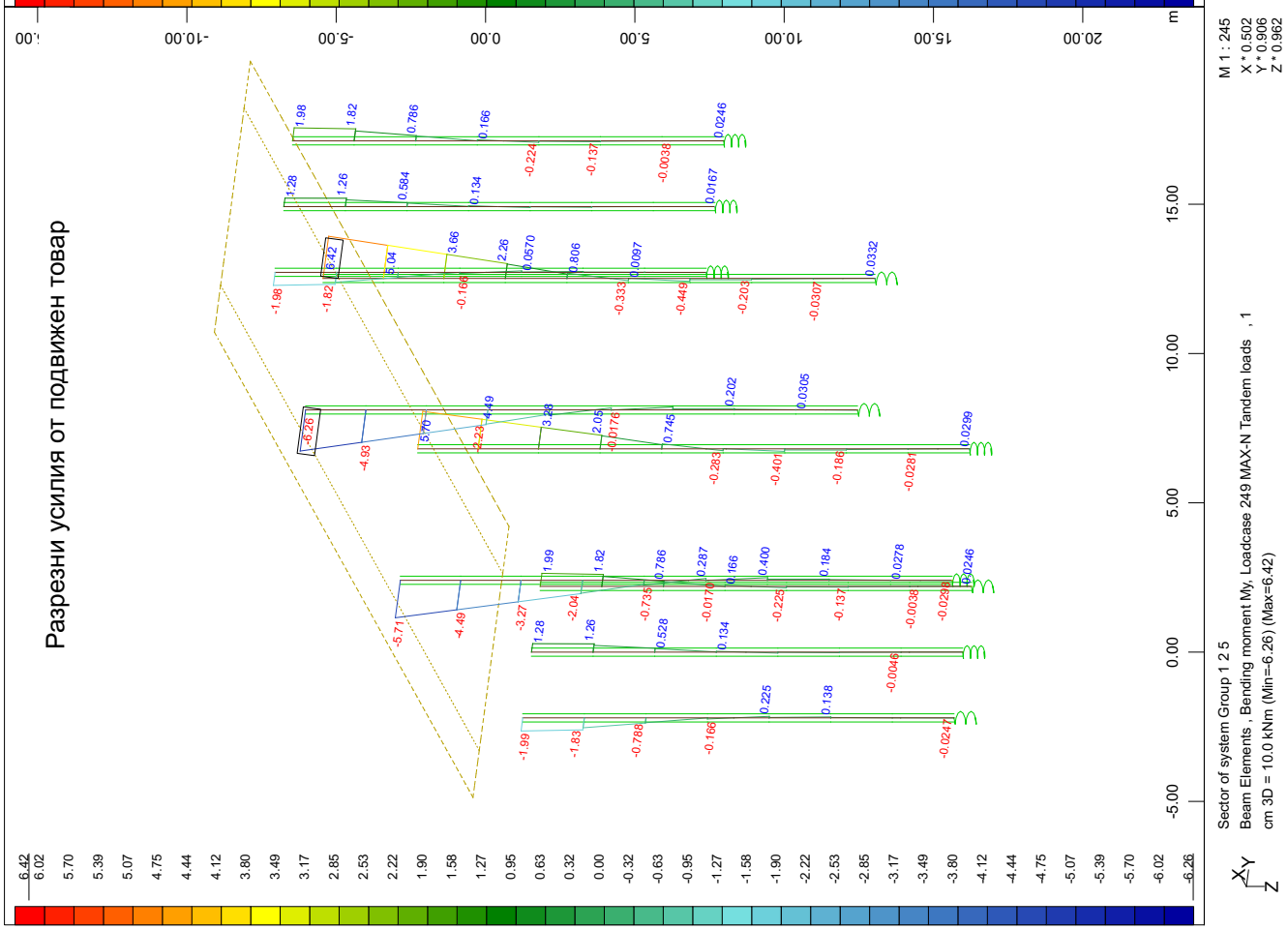


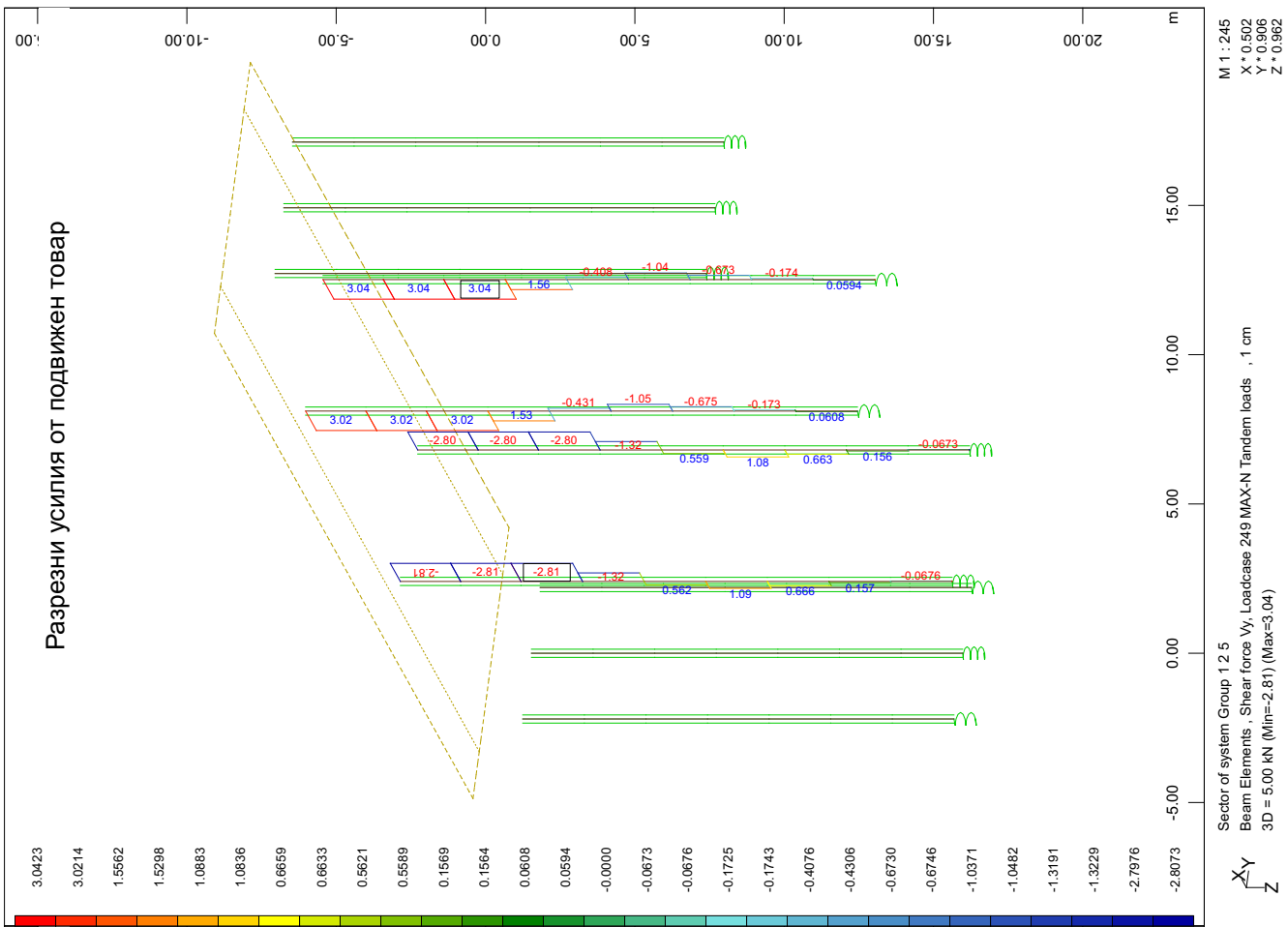


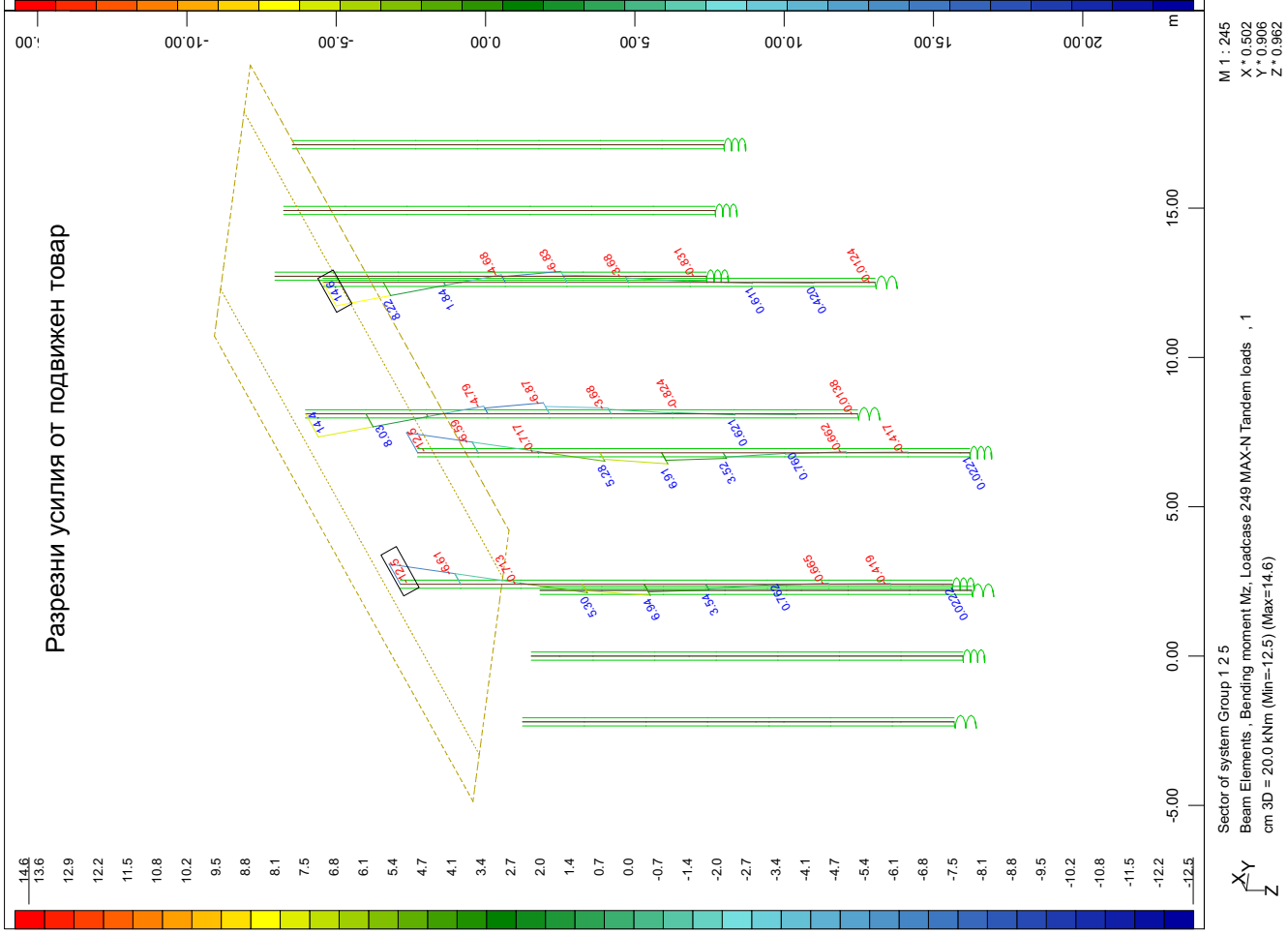


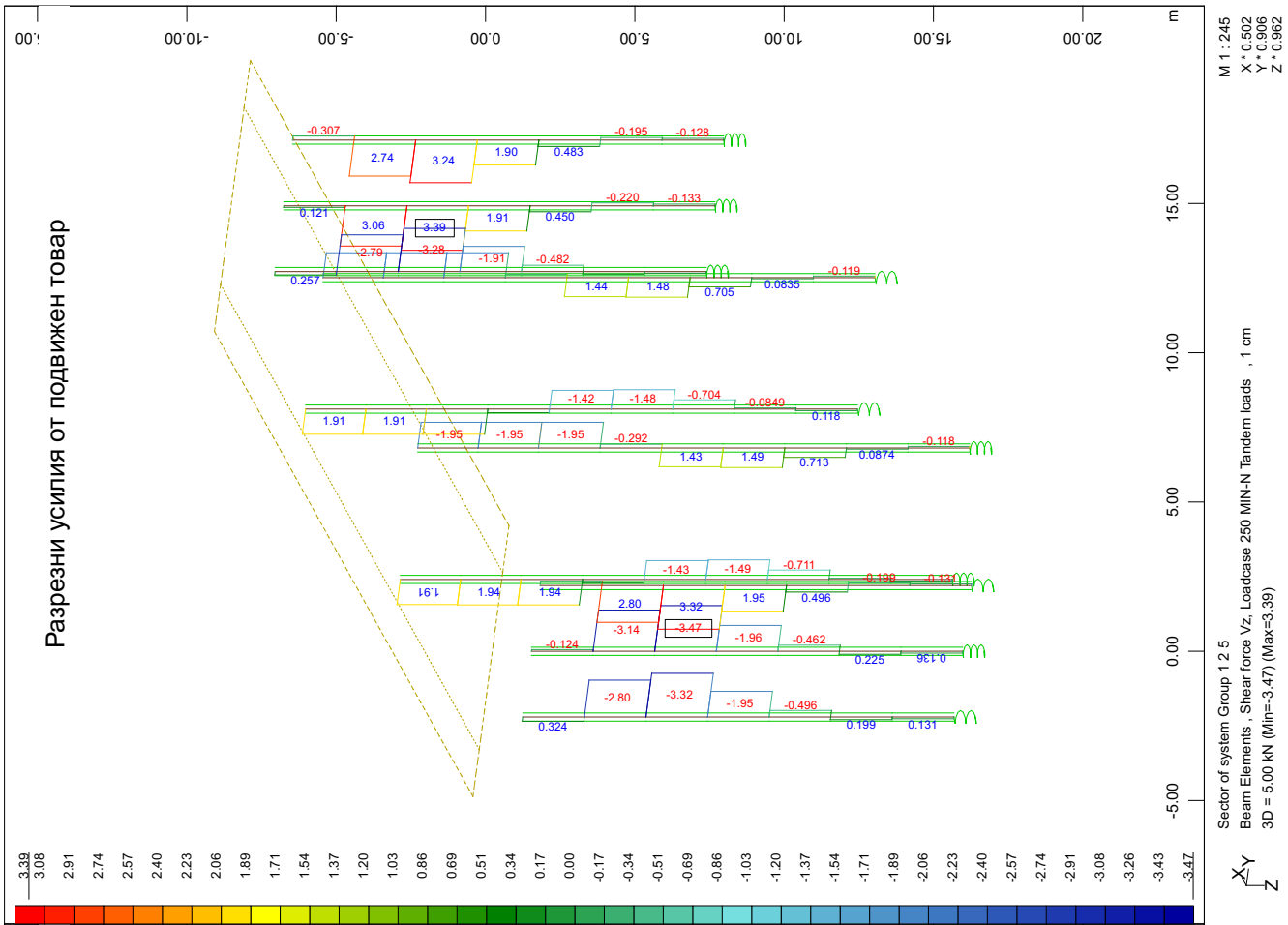


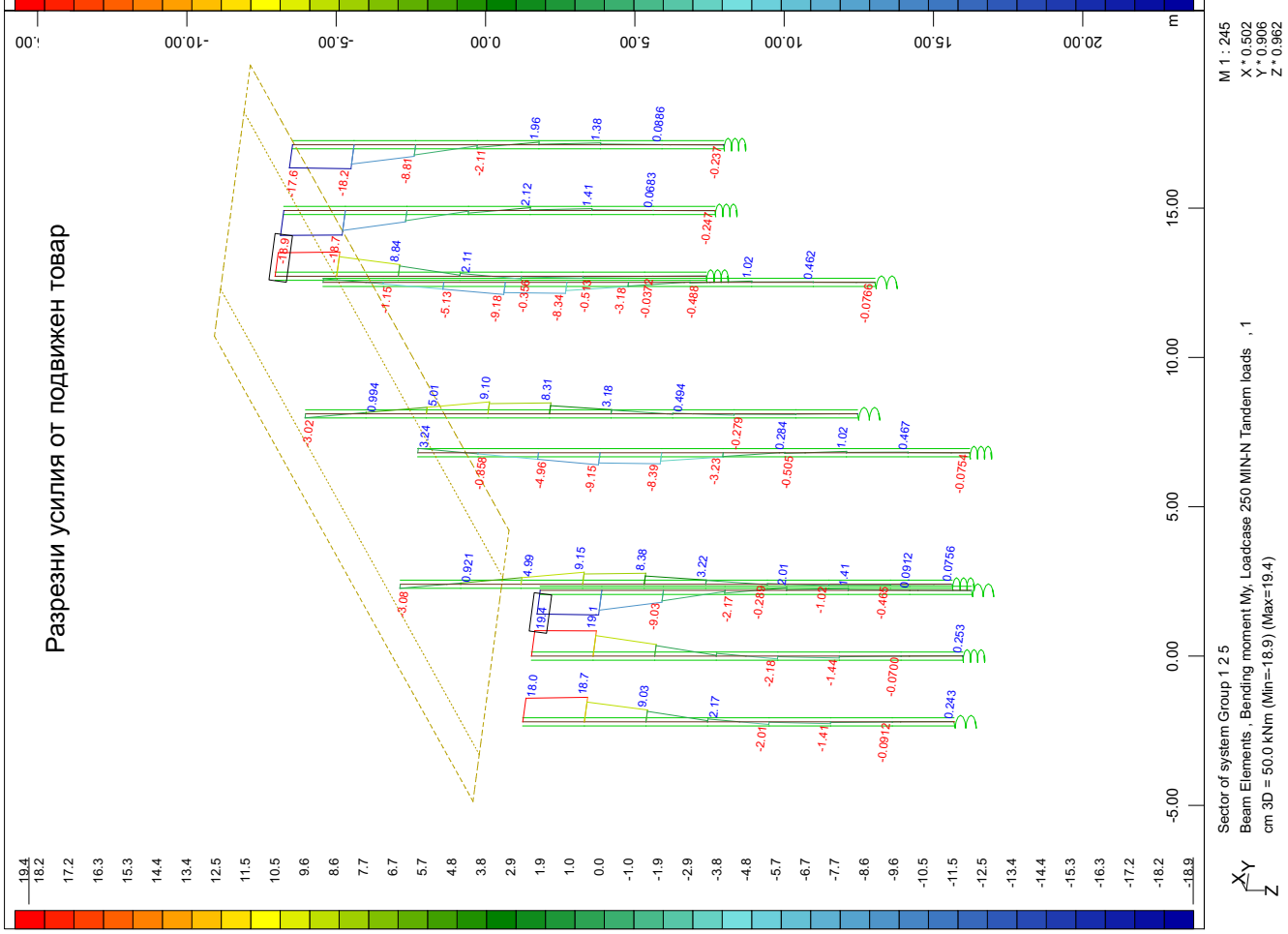


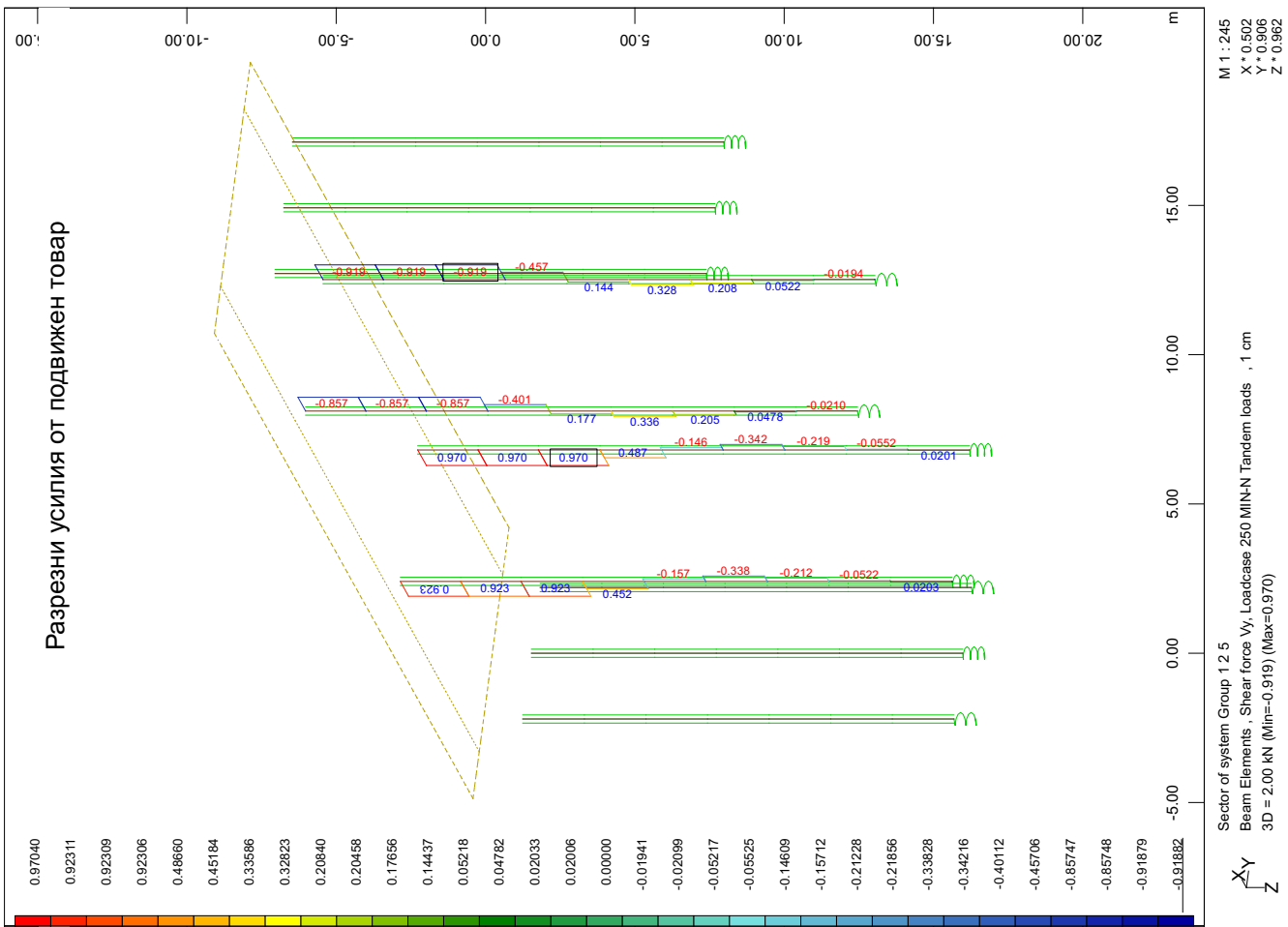


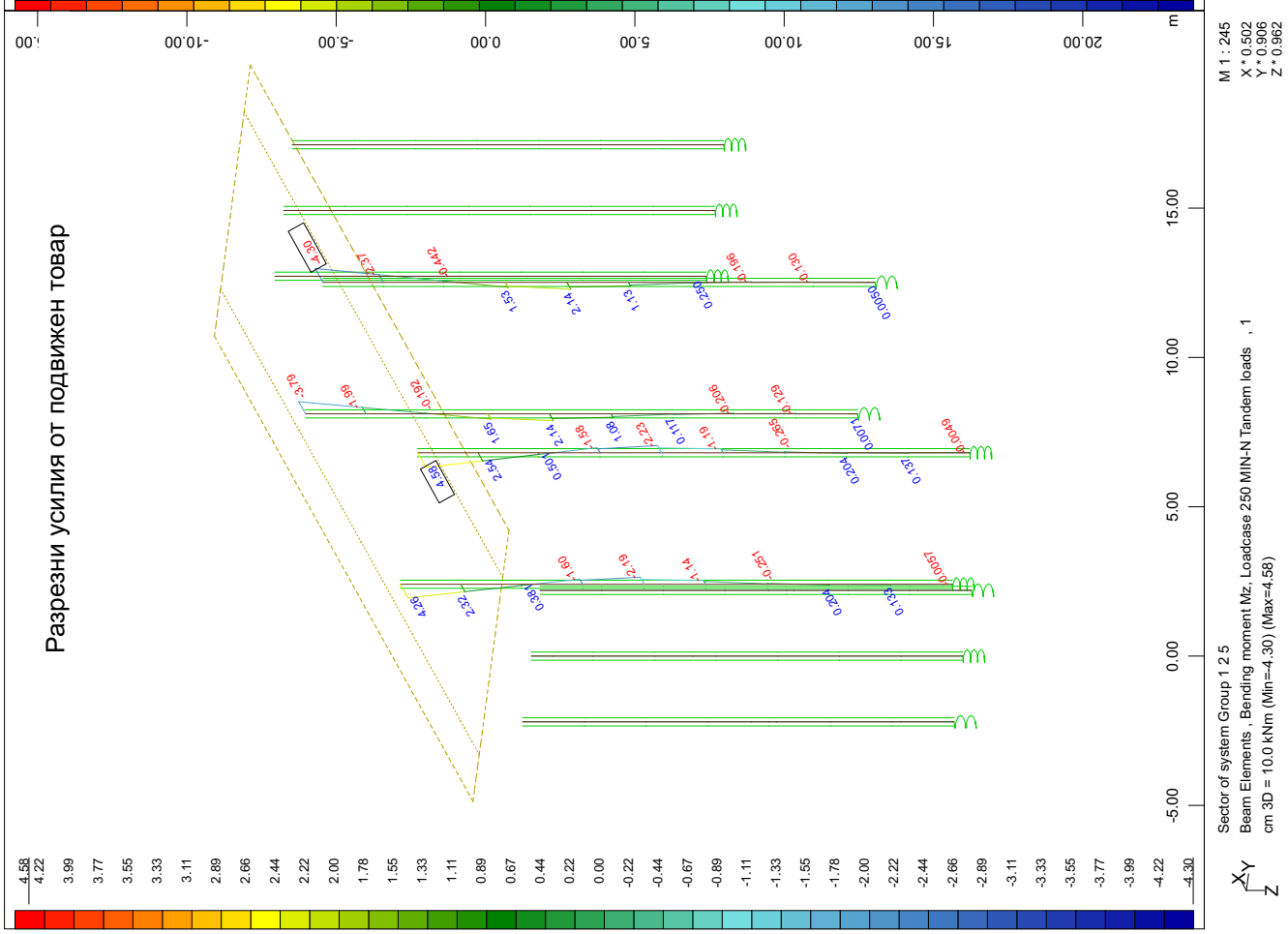


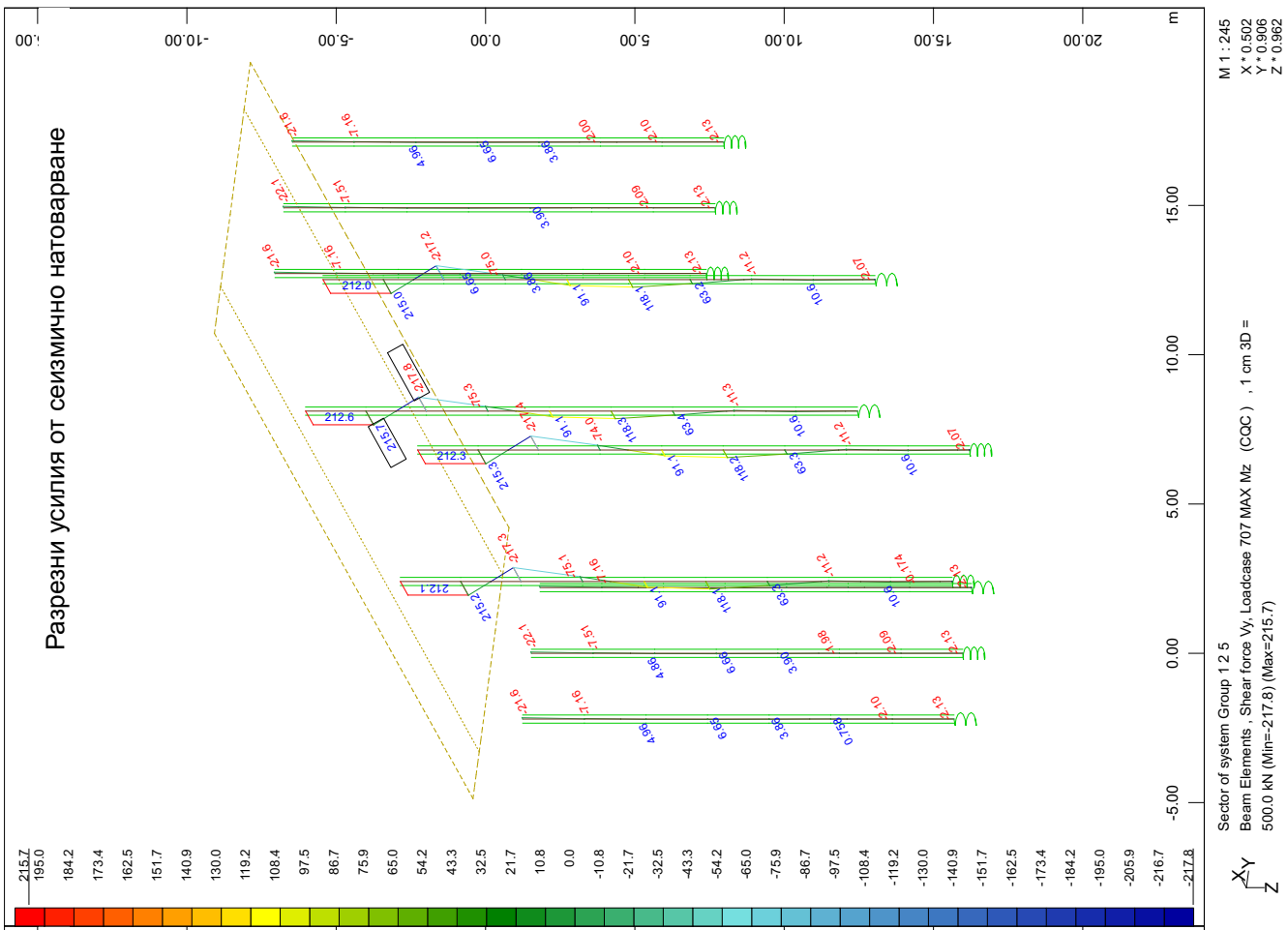


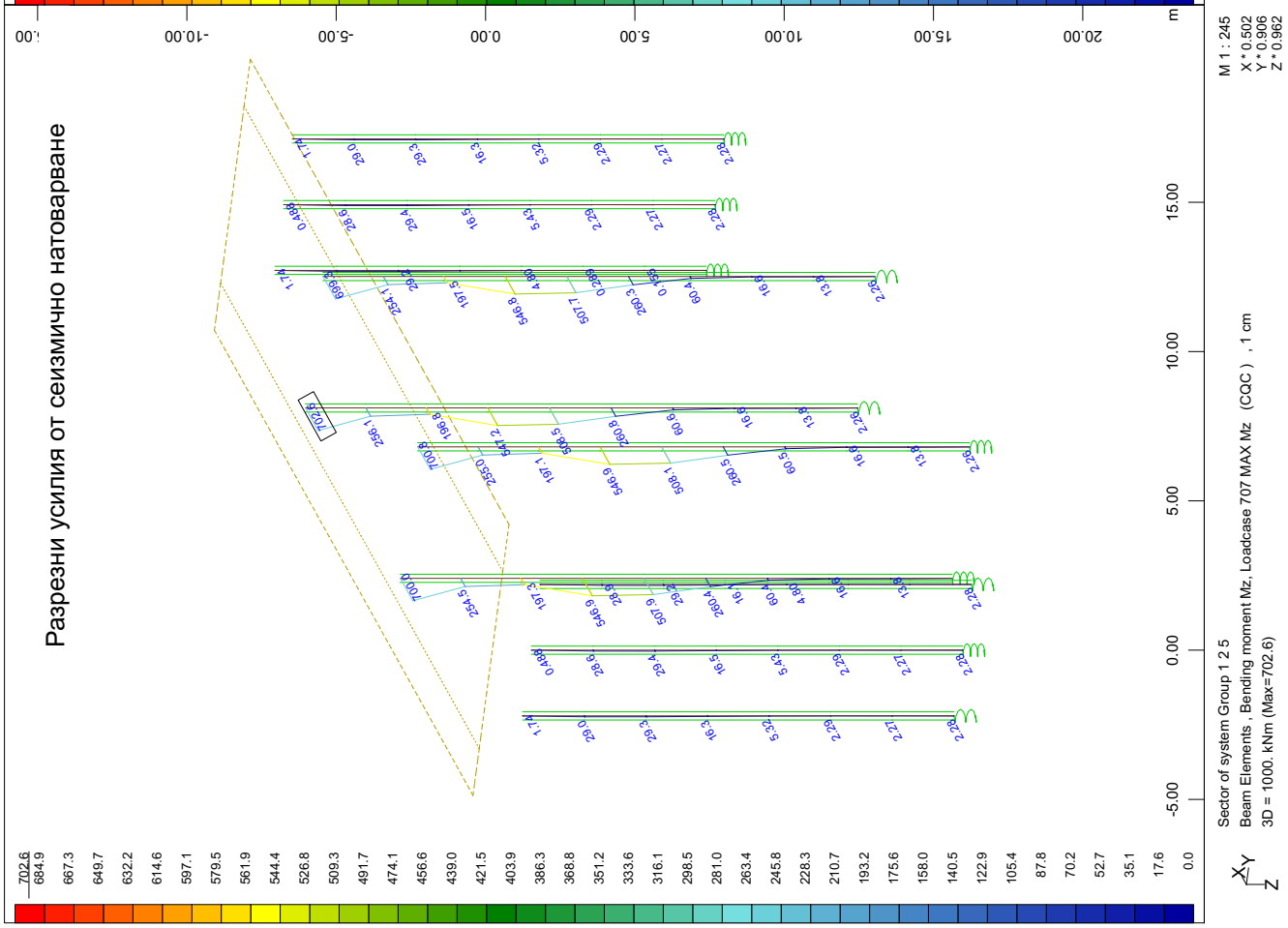


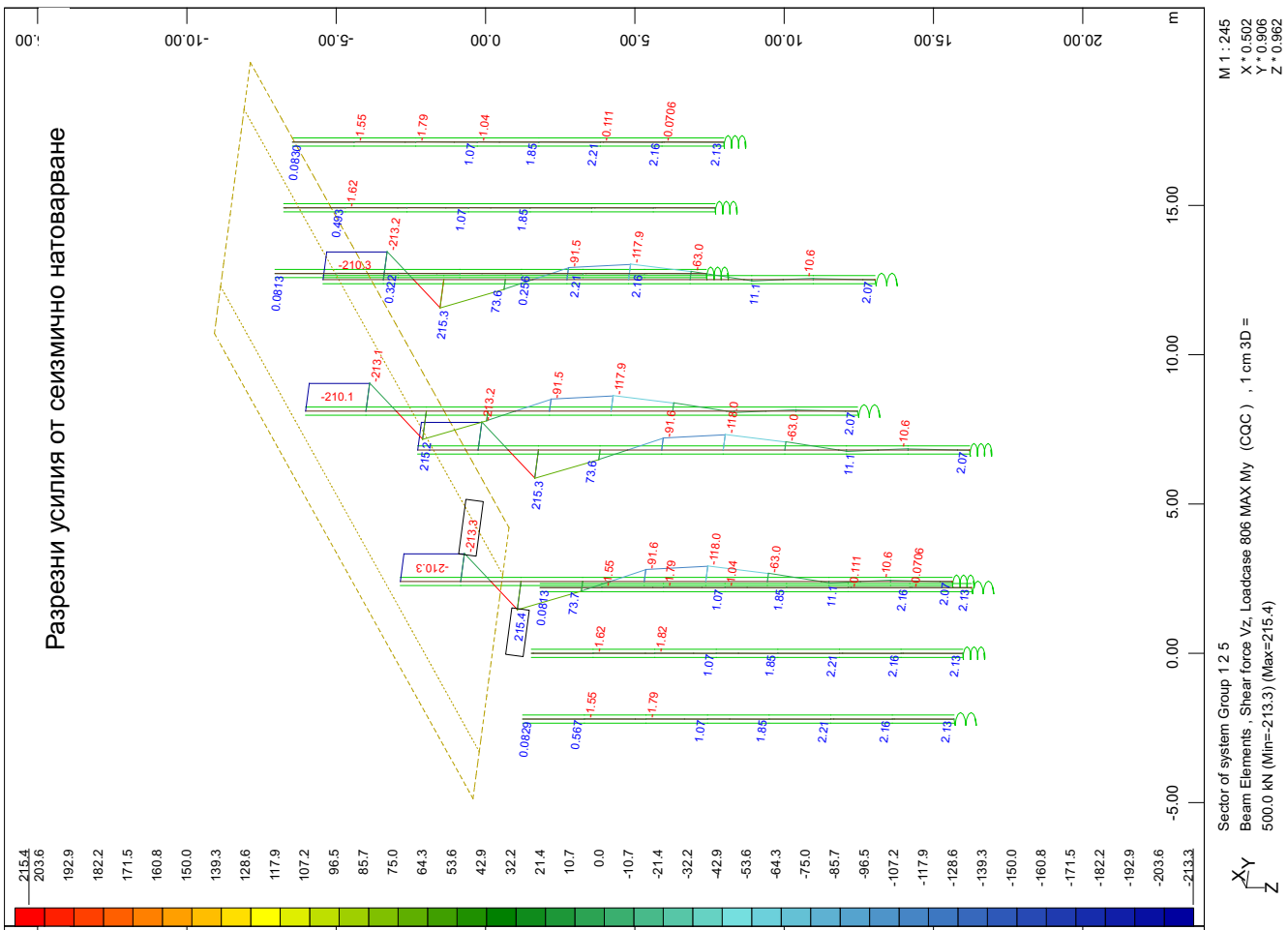


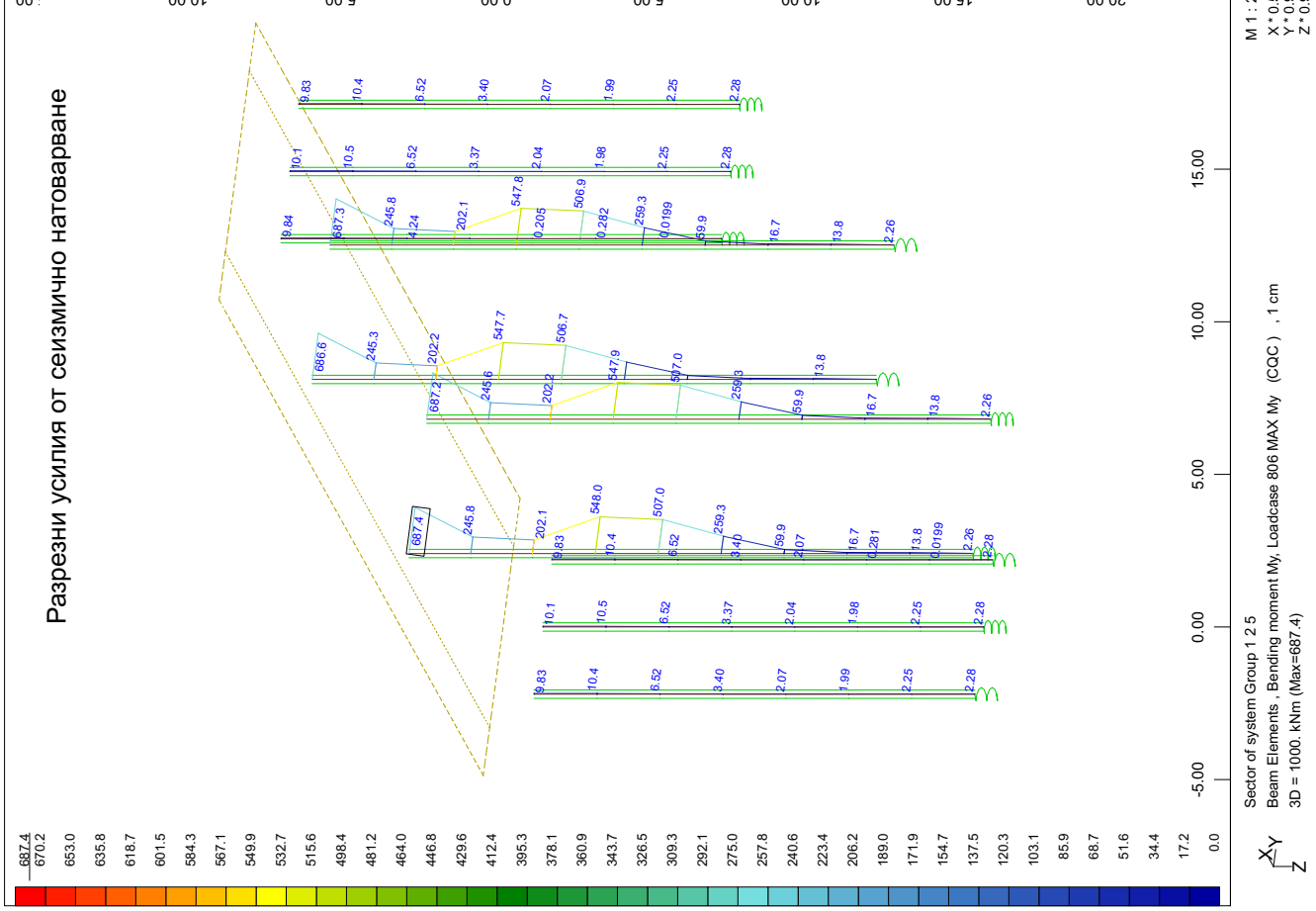


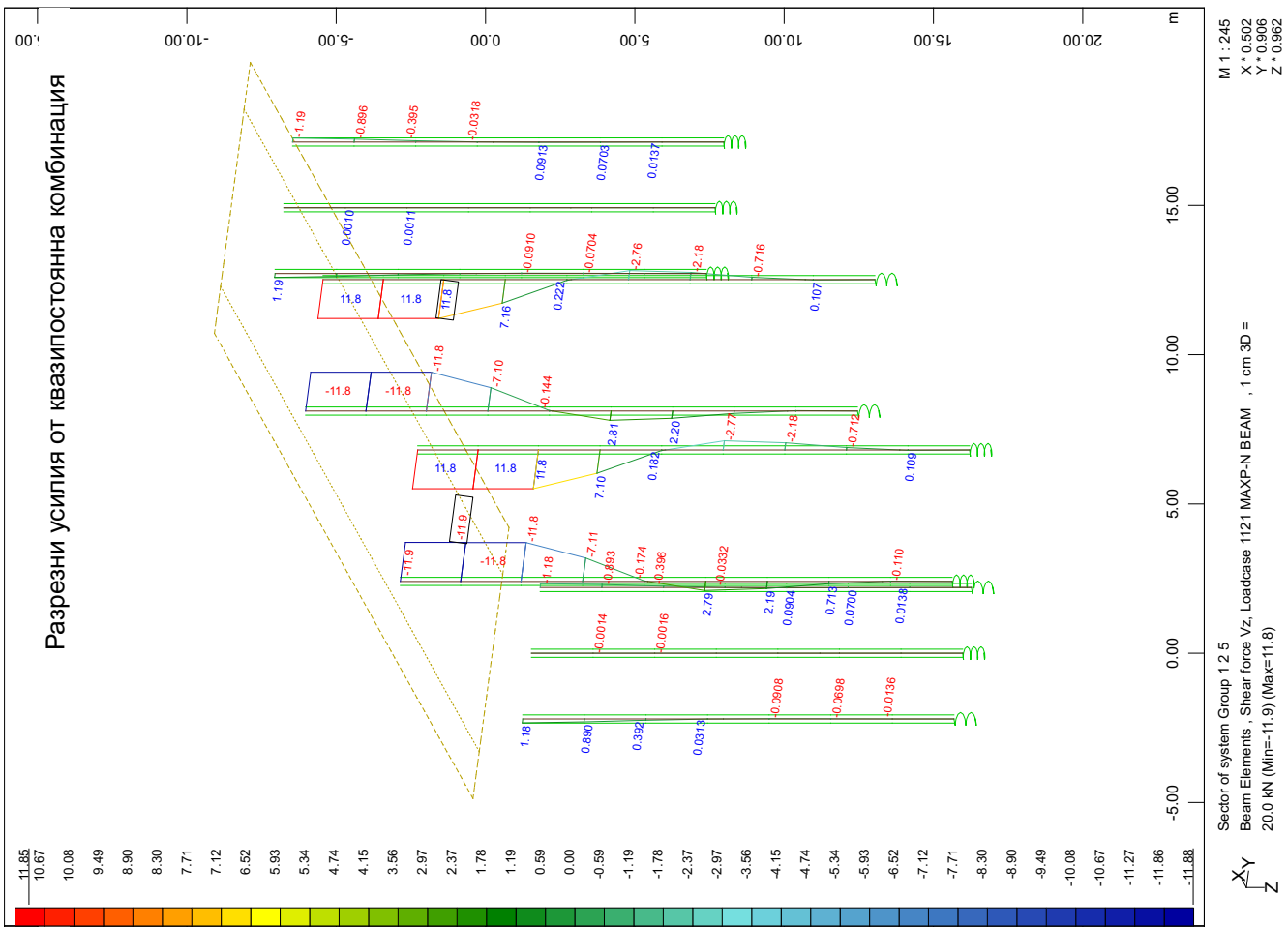


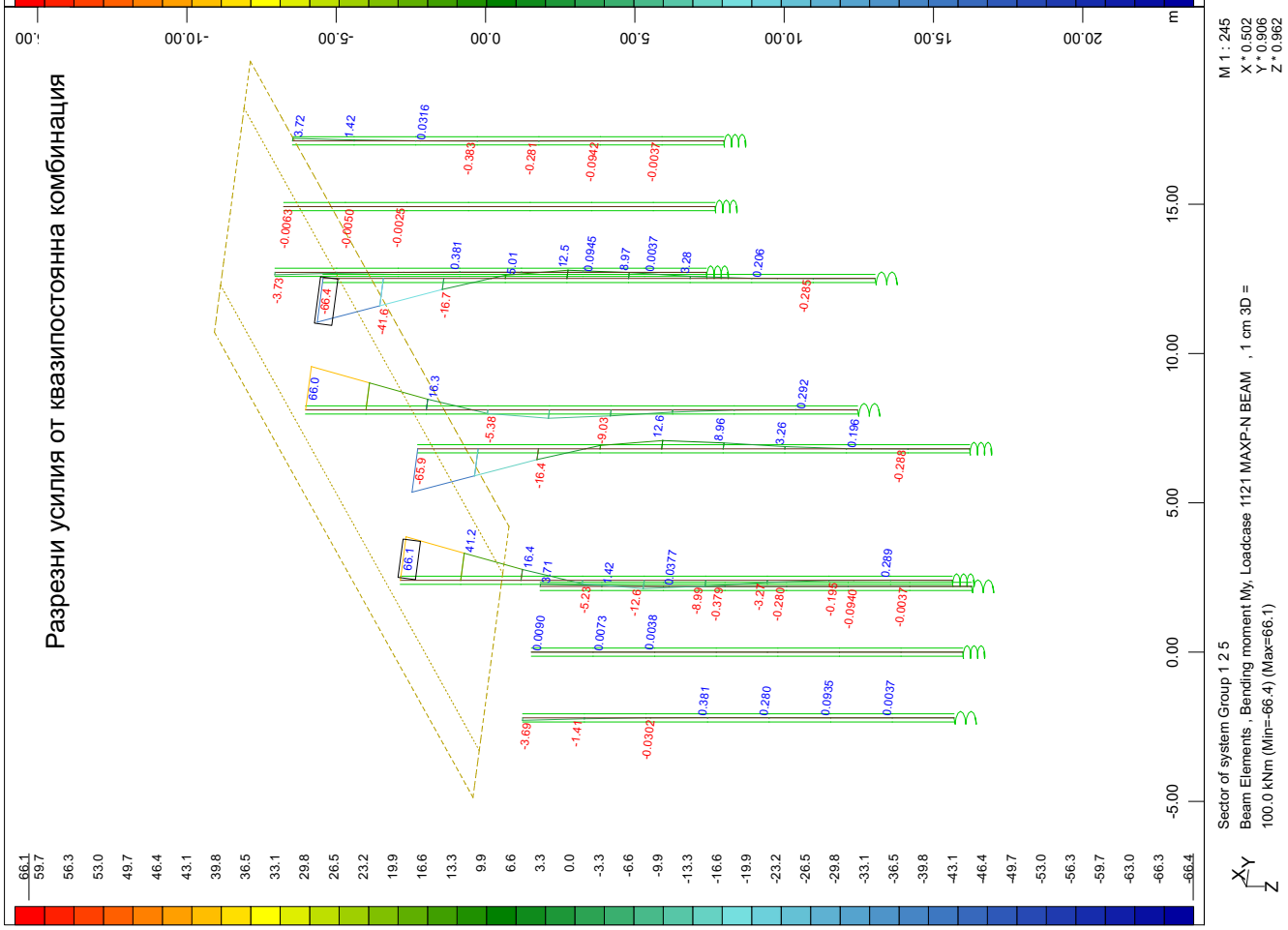


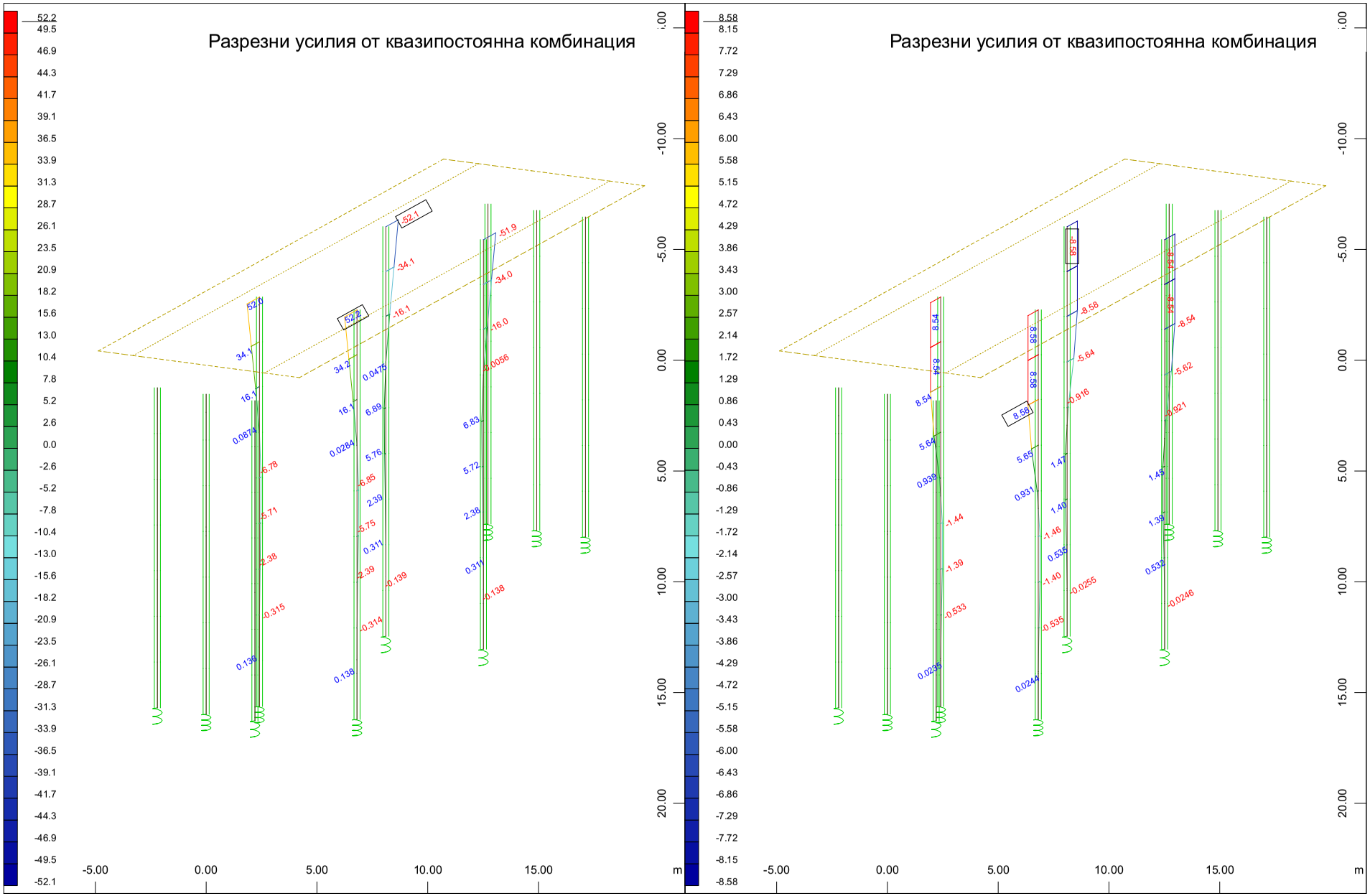










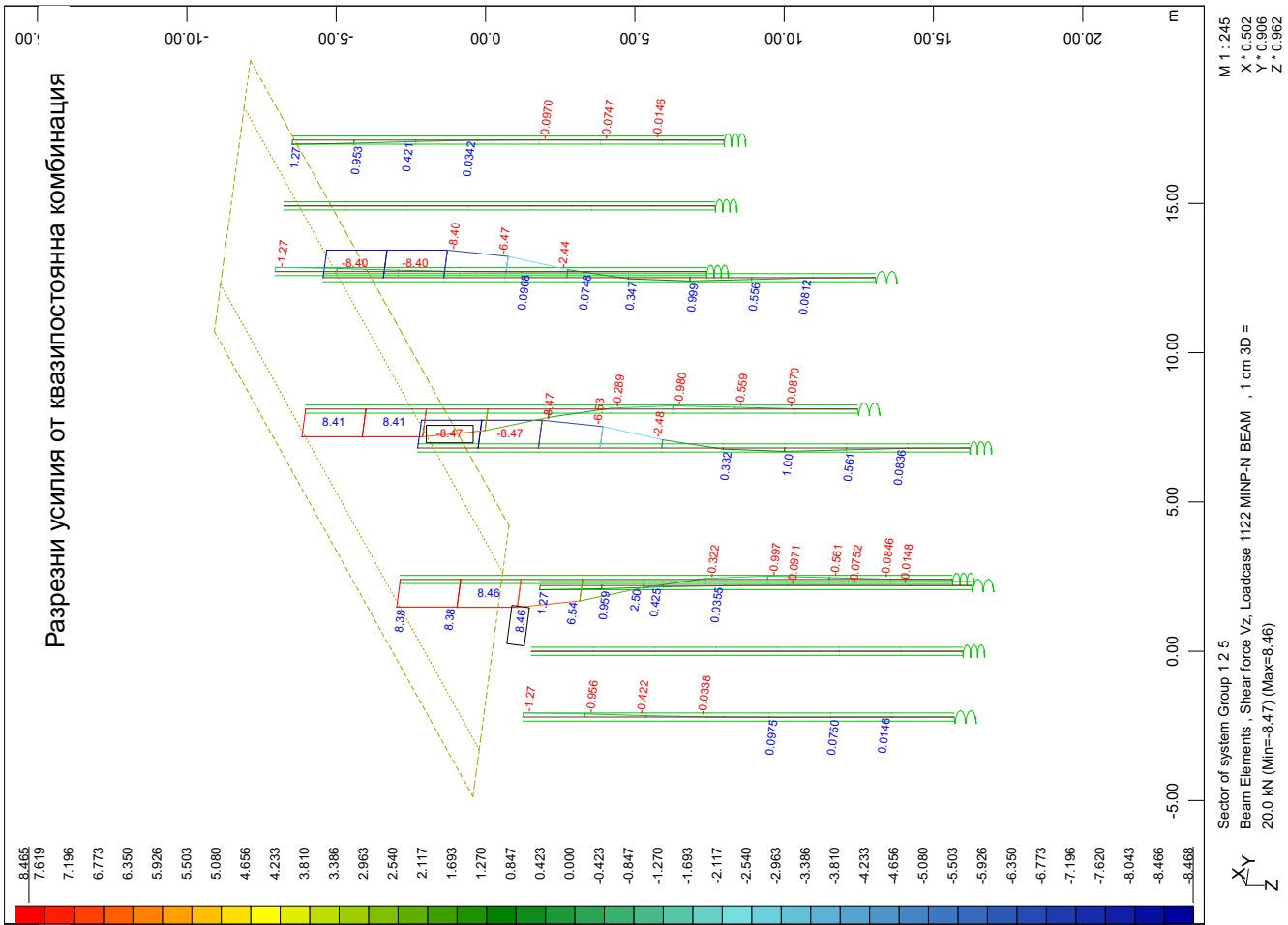


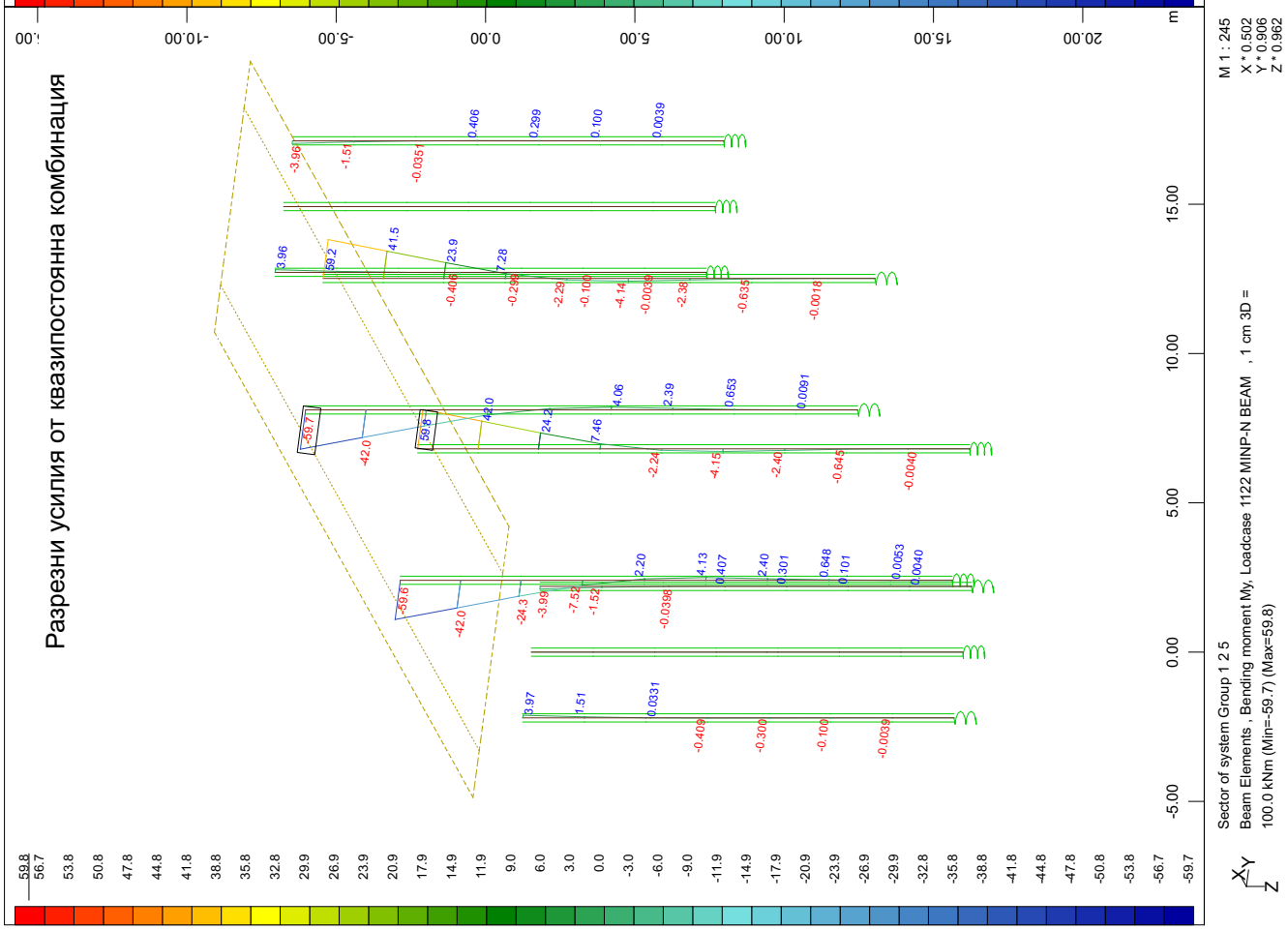
Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 1121 MAXP-N BEAM , 1 cm 3D =
100.0 kNm (Min=-52.1) (Max=52.2)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

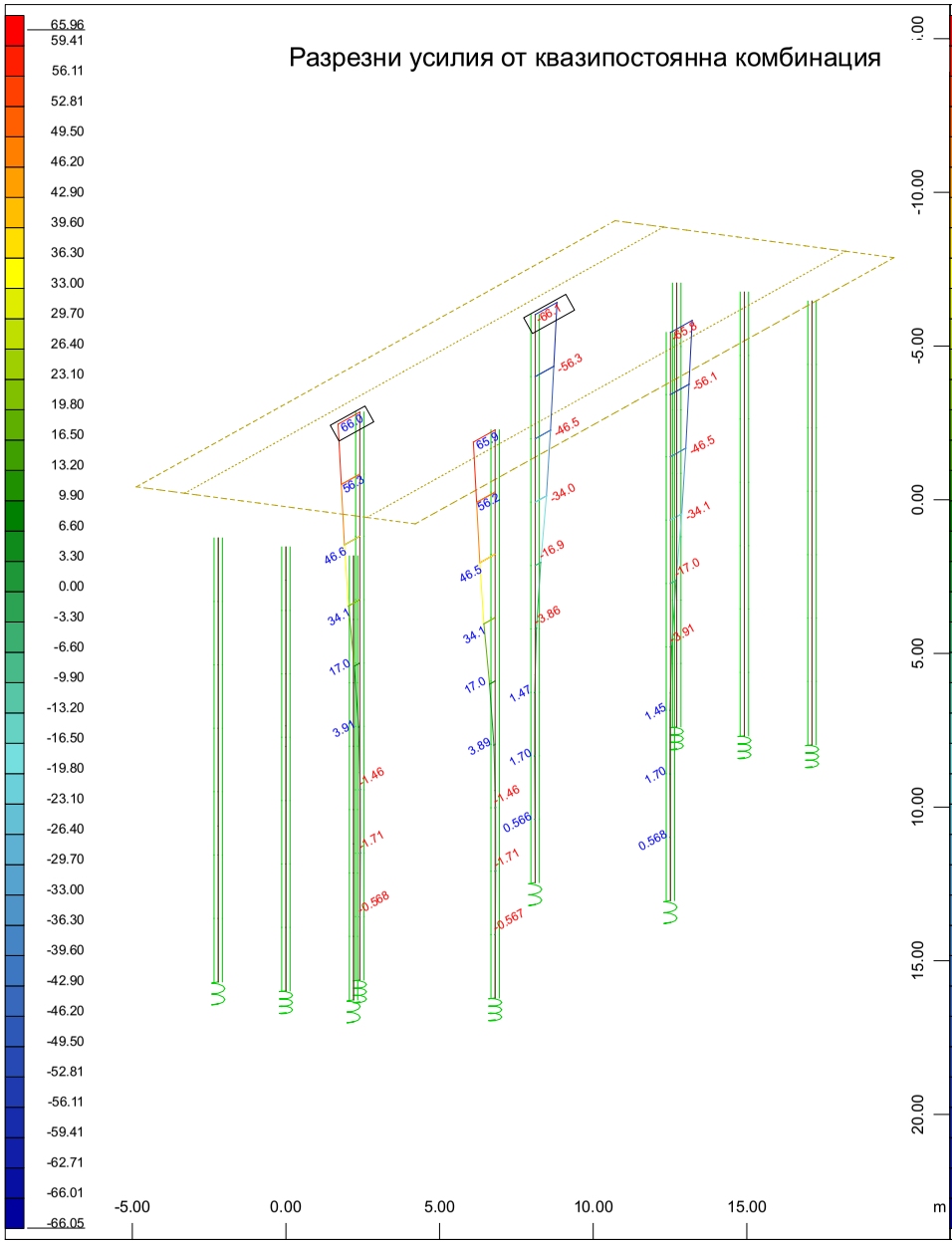
Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 1121 MAXP-N BEAM , 1 cm 3D =
20.0 kN (Min=-8.58) (Max=8.58)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962





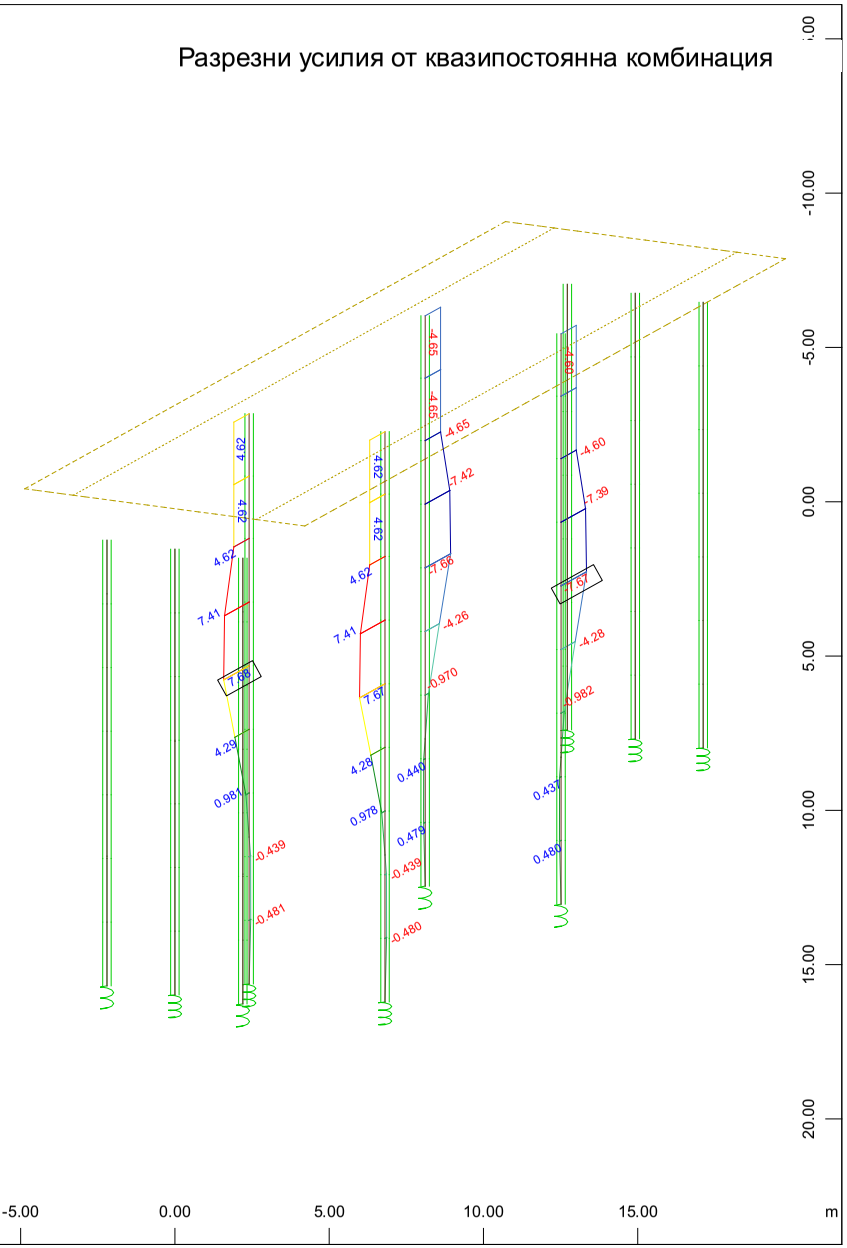
Разрезни усилия от квазипостоянна комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 1122 MINP-N BEAM , 1 cm 3D =
100.0 kNm (Min=-66.1) (Max=66.0)

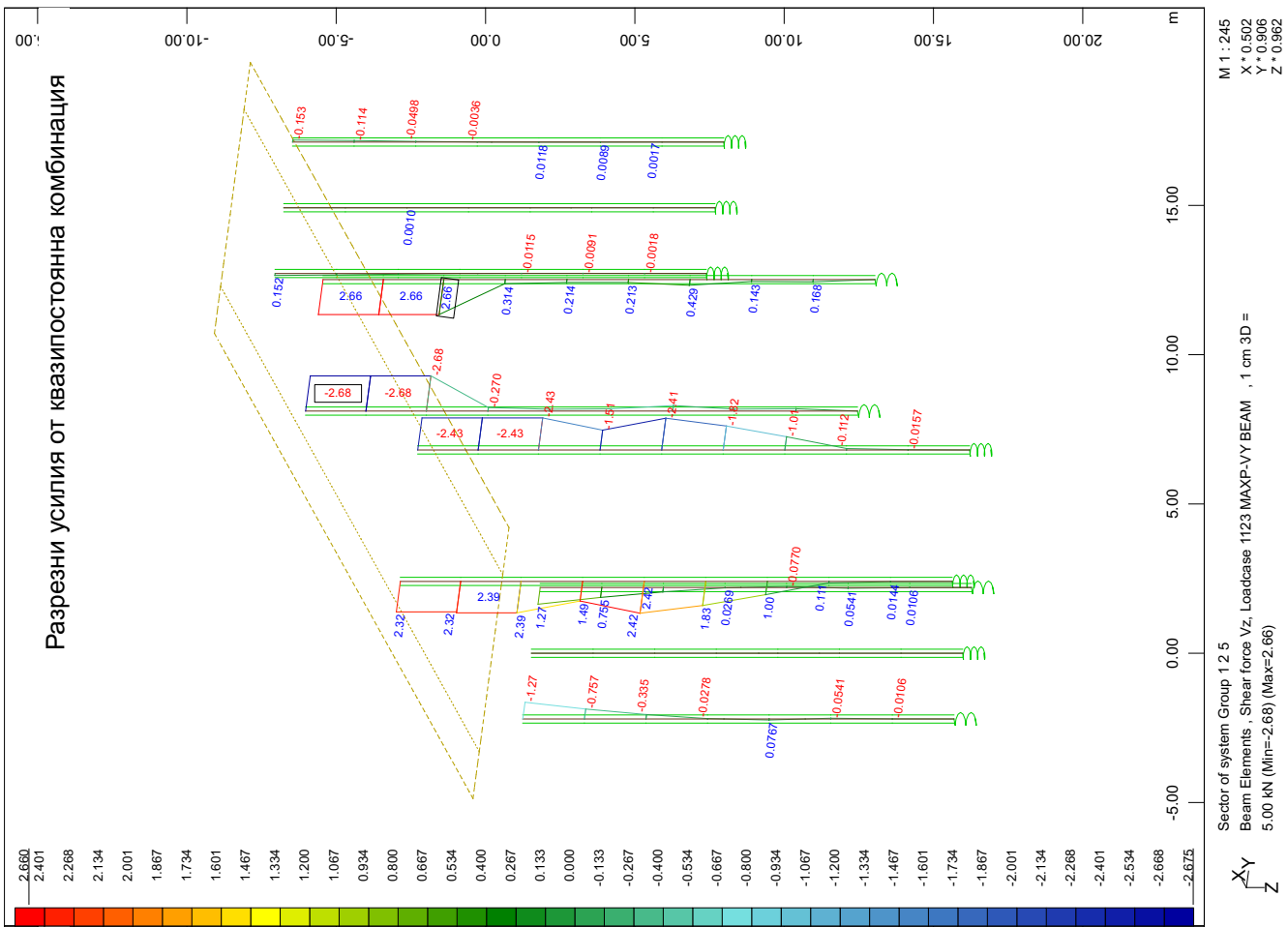
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

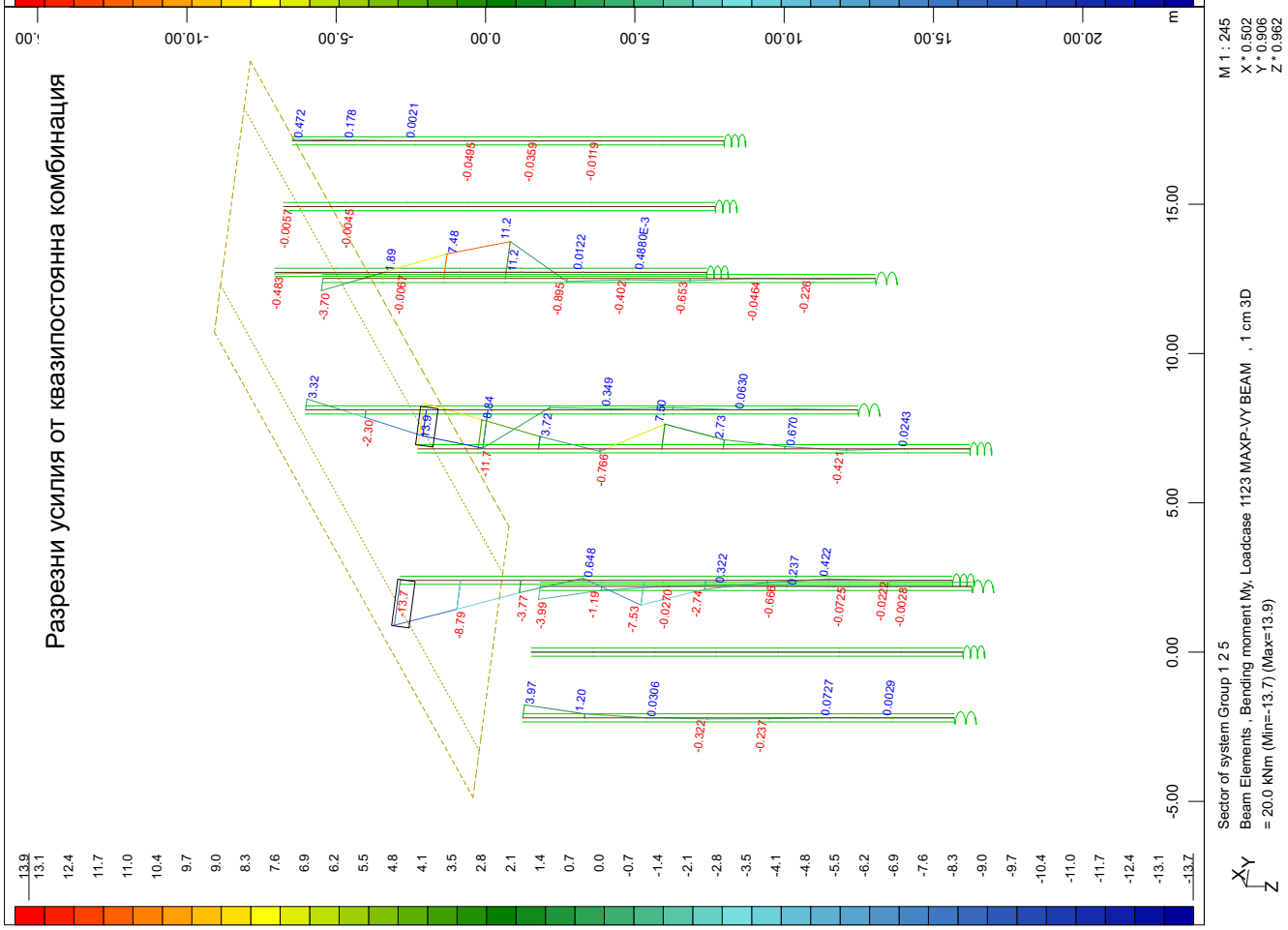
Разрезни усилия от квазипостоянна комбинация

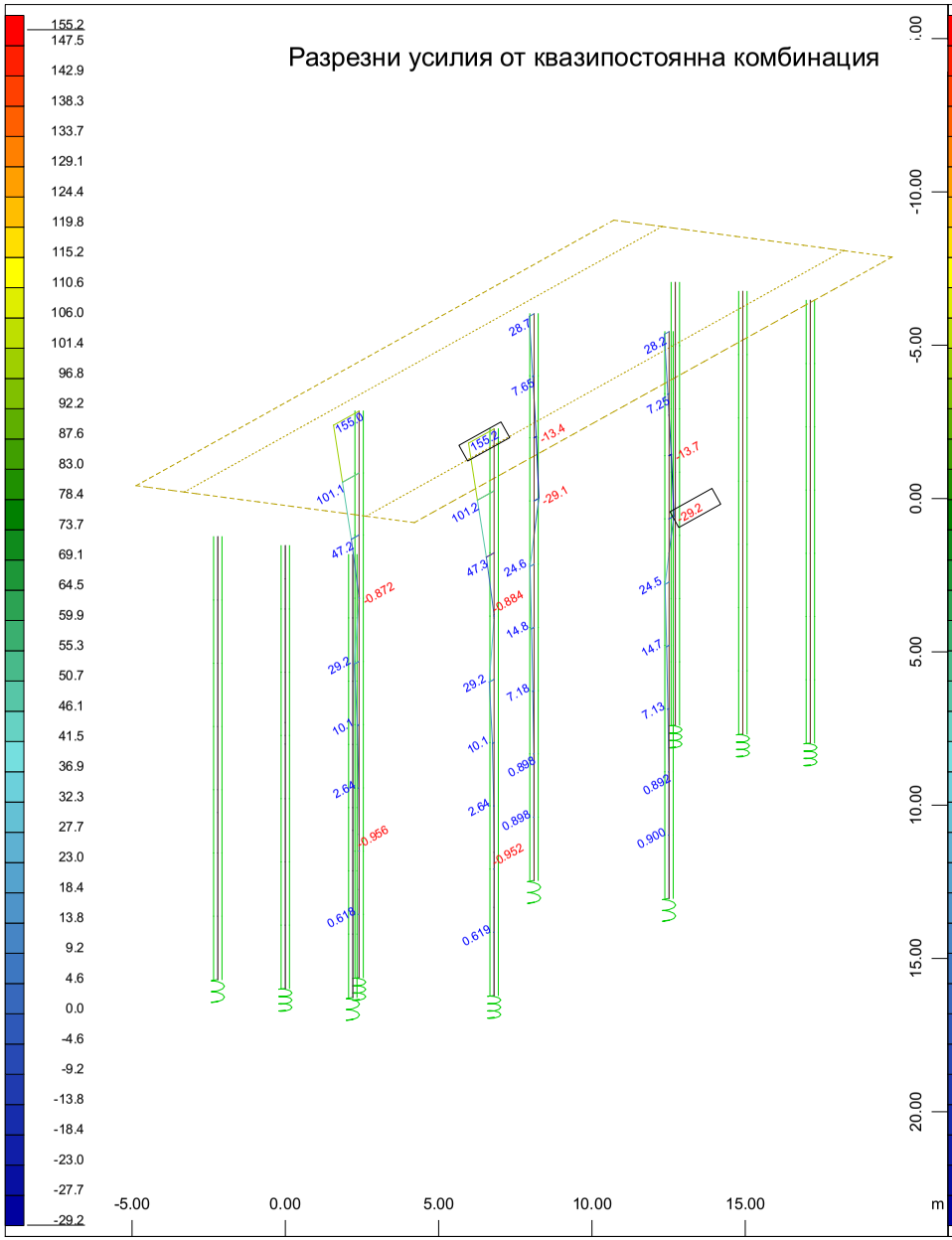


Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 1122 MINP-N BEAM , 1 cm 3D =
10.0 kN (Min=-7.67) (Max=7.68)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

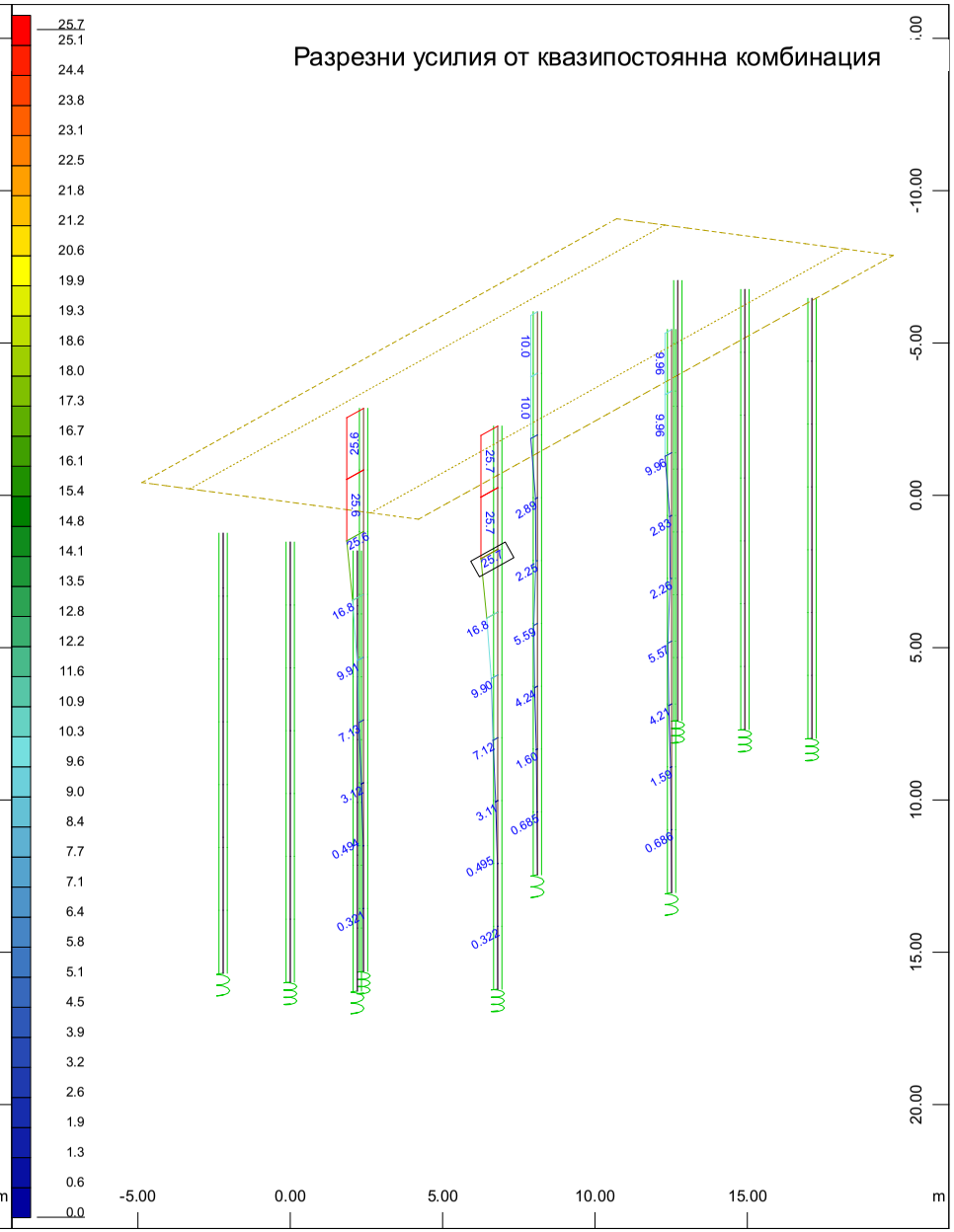






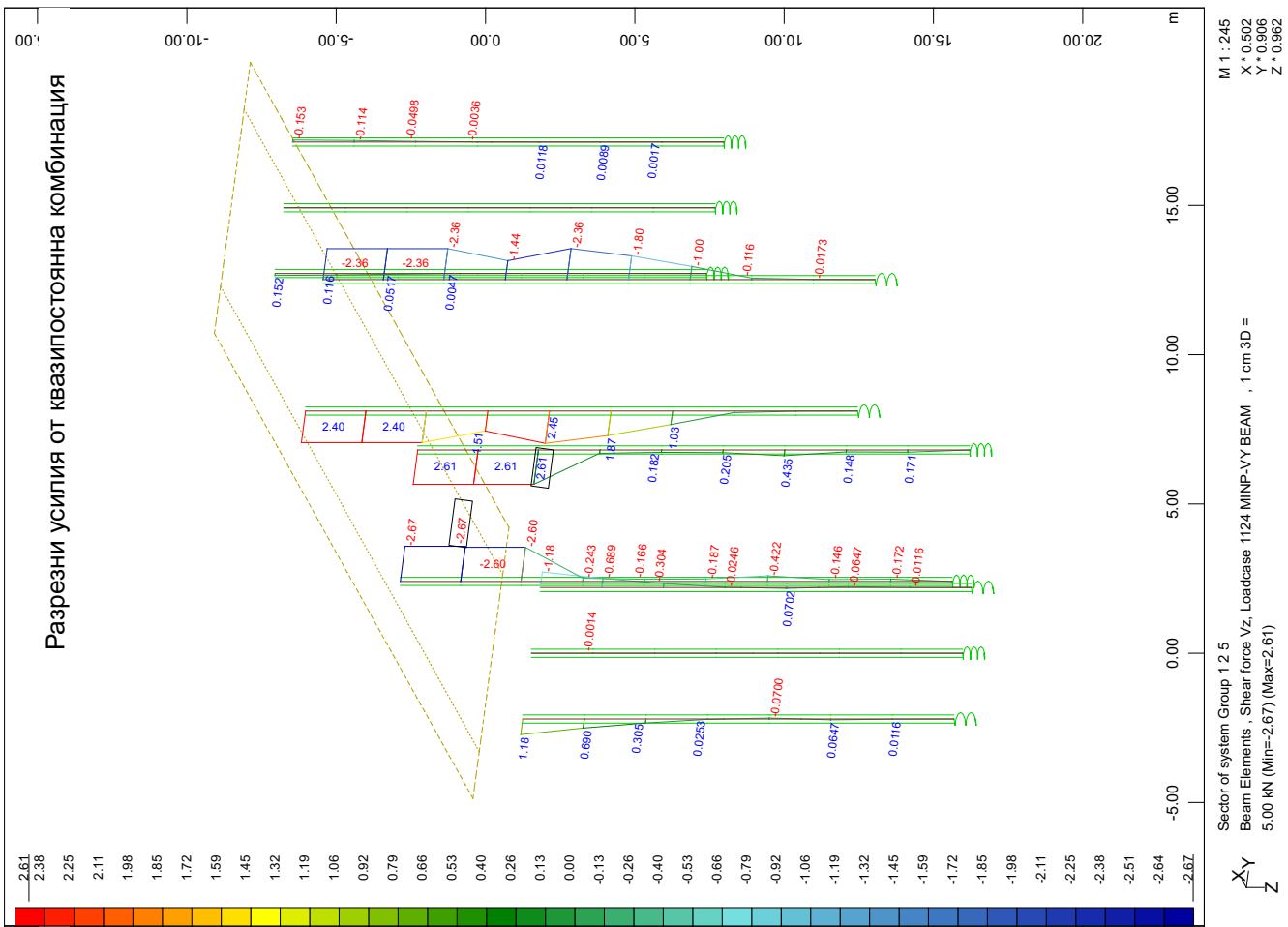
Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 1123 MAXP-VY BEAM , 1 cm 3D
= 200.0 kNm (Min=-29.2) (Max=155.2)

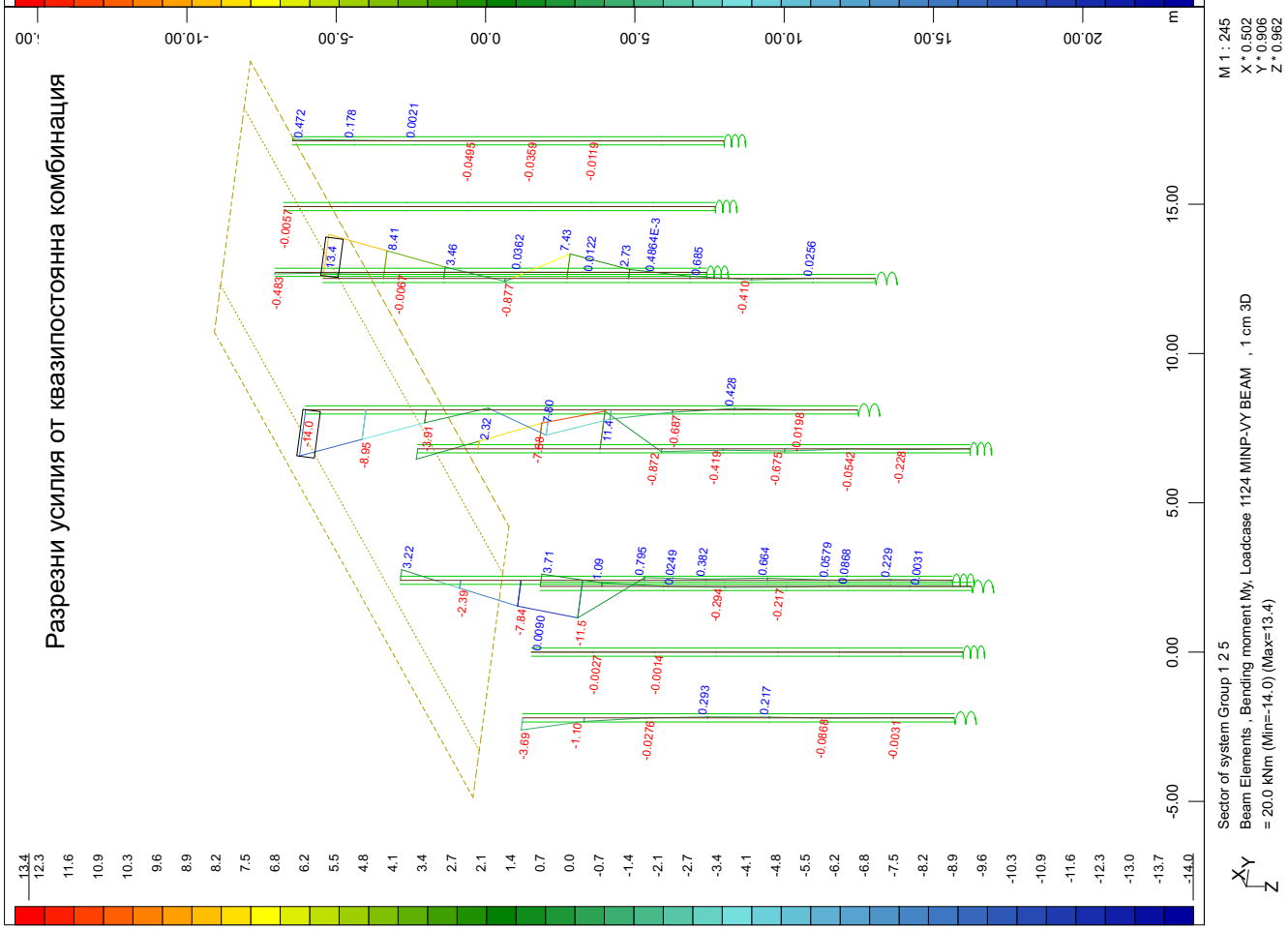
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

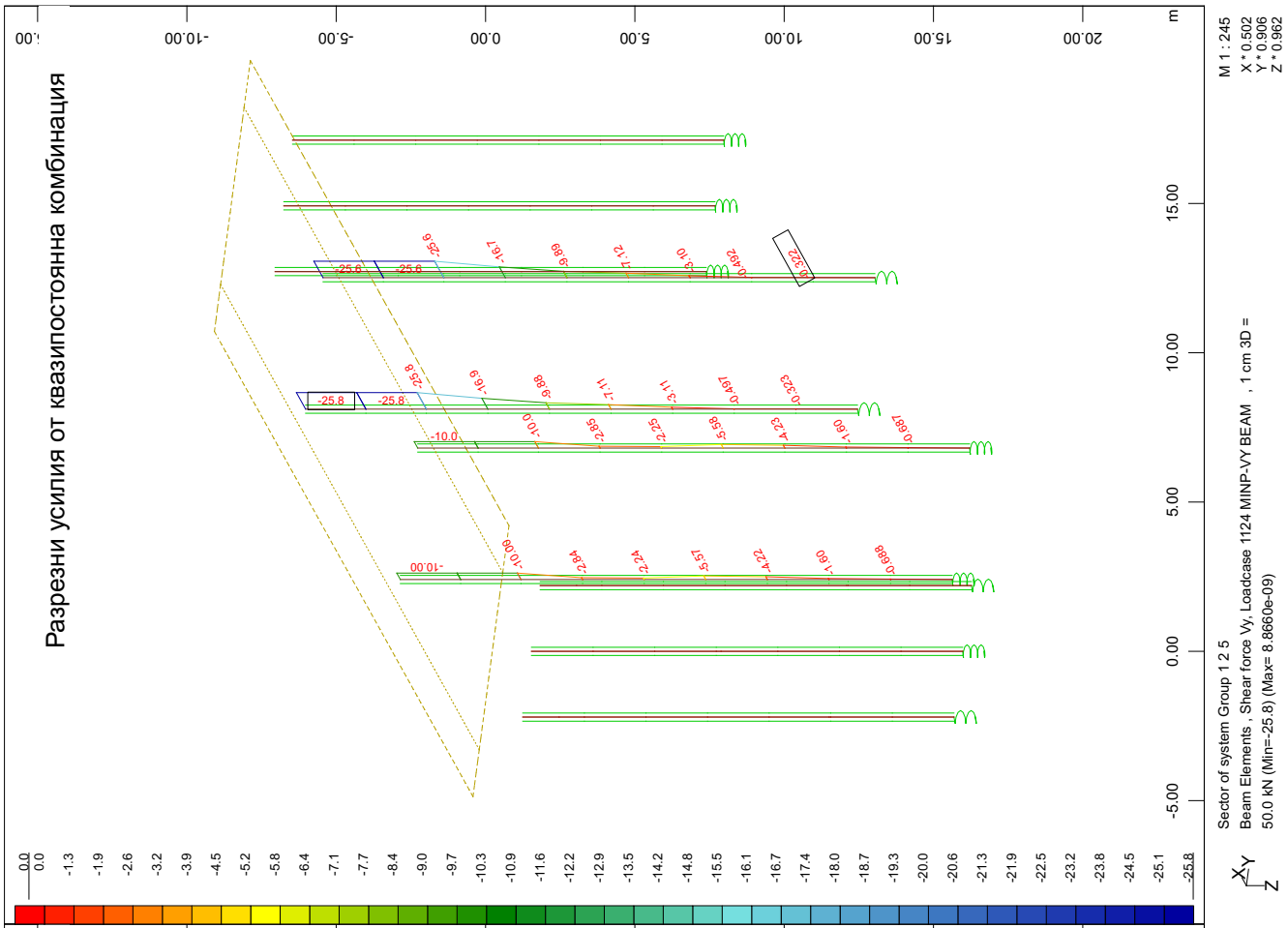


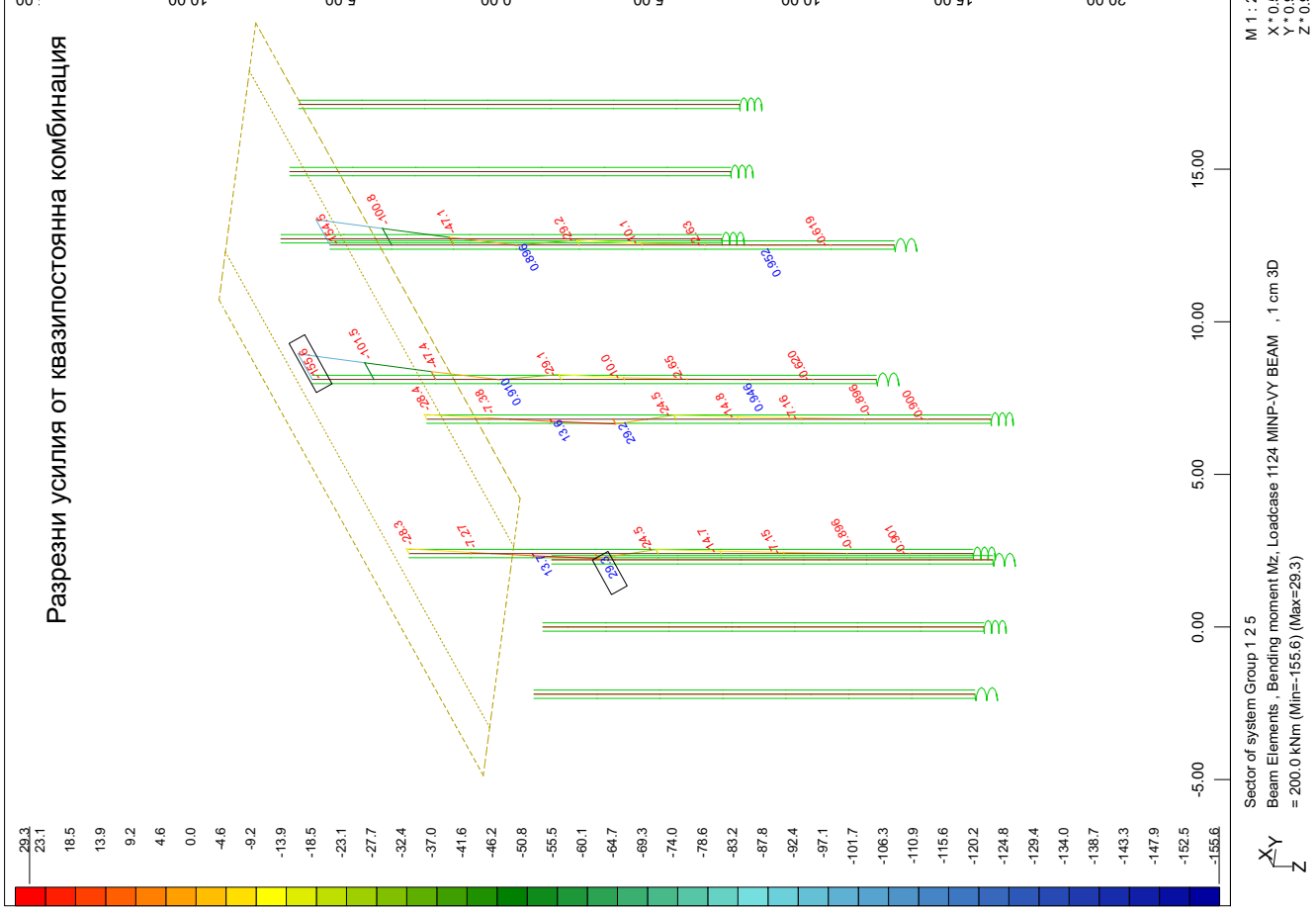
Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 1123 MAXP-VY BEAM , 1 cm 3D =
50.0 kN (Min=-1.7258e-08) (Max=25.7)

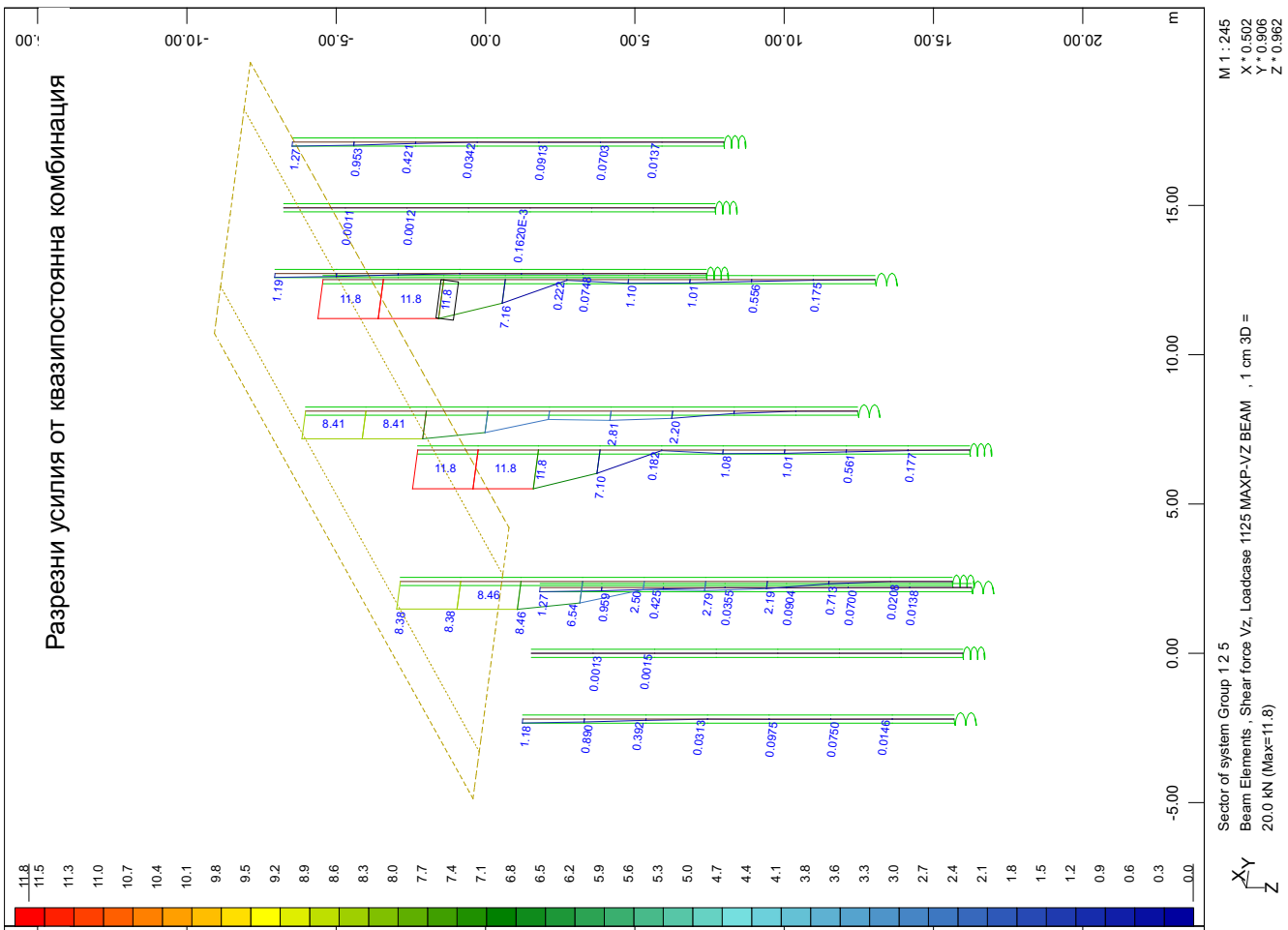
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

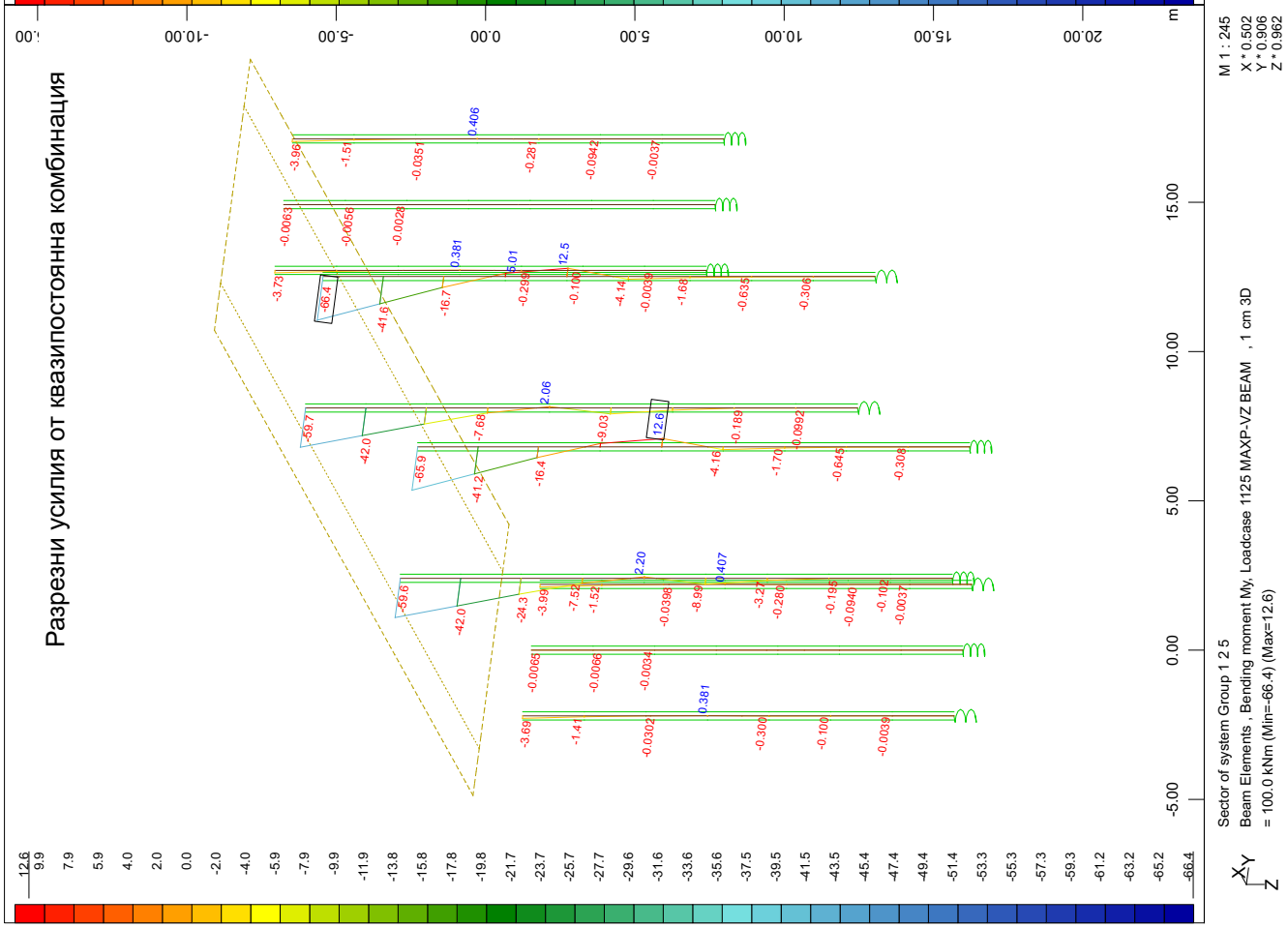


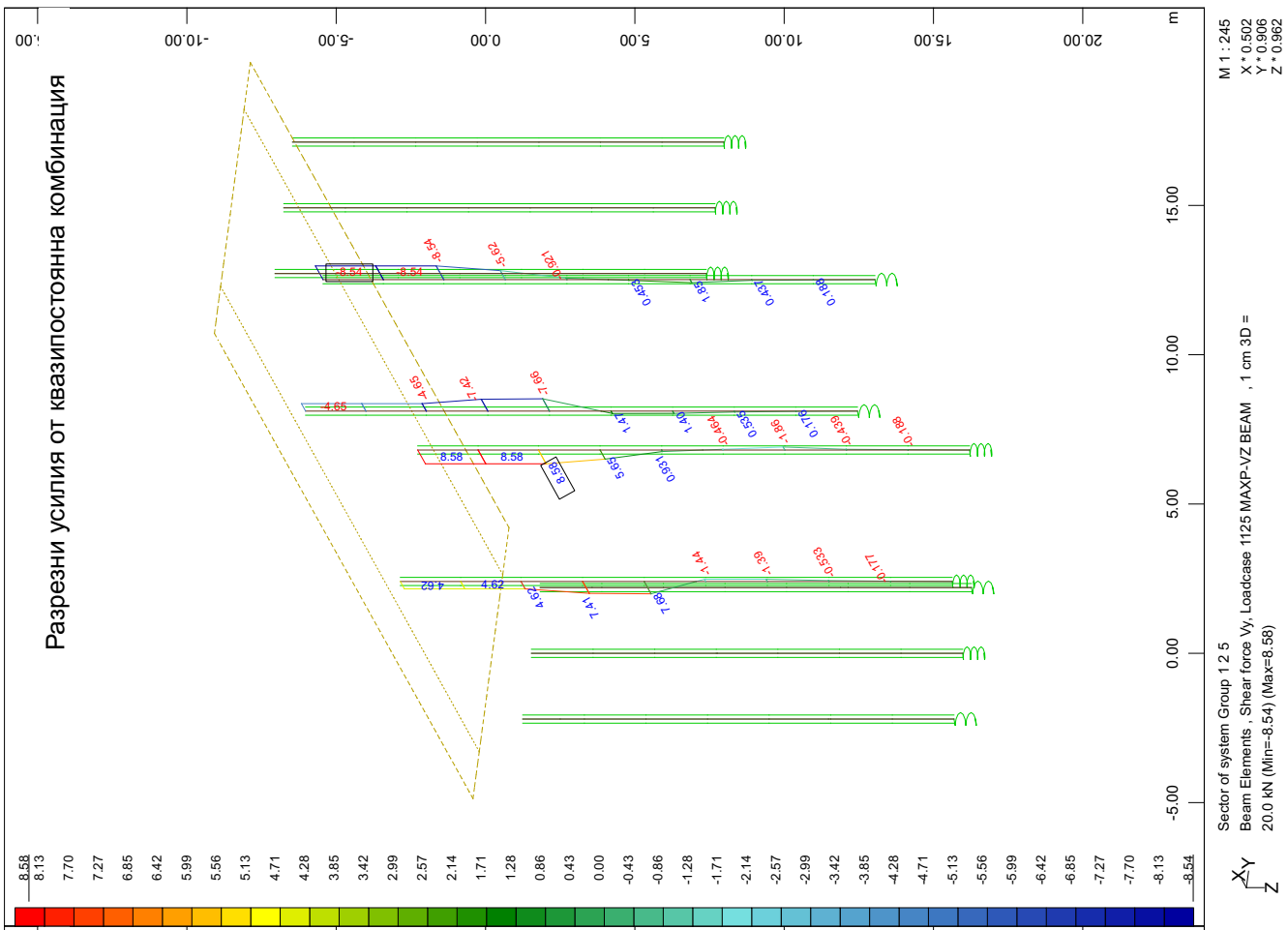


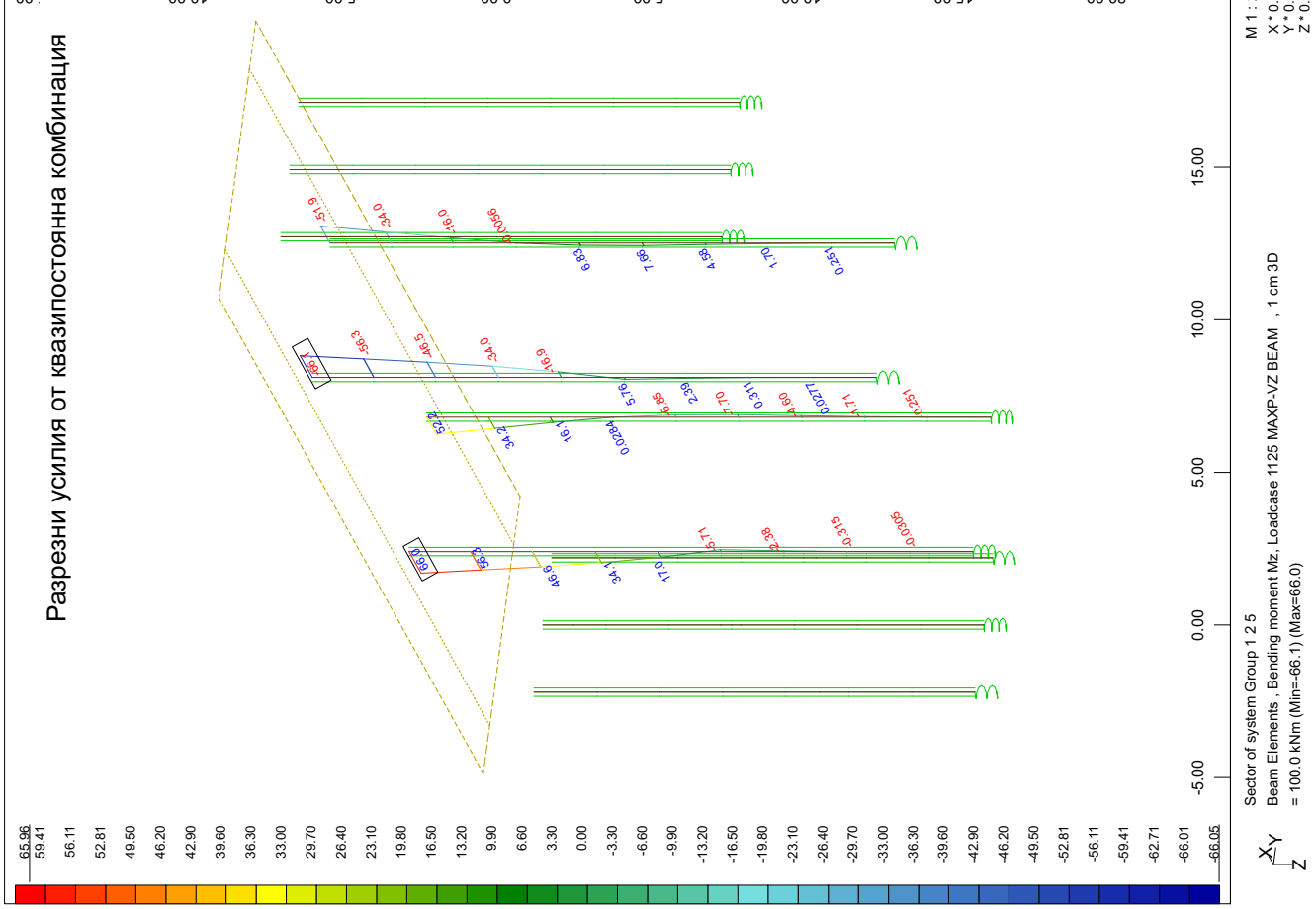


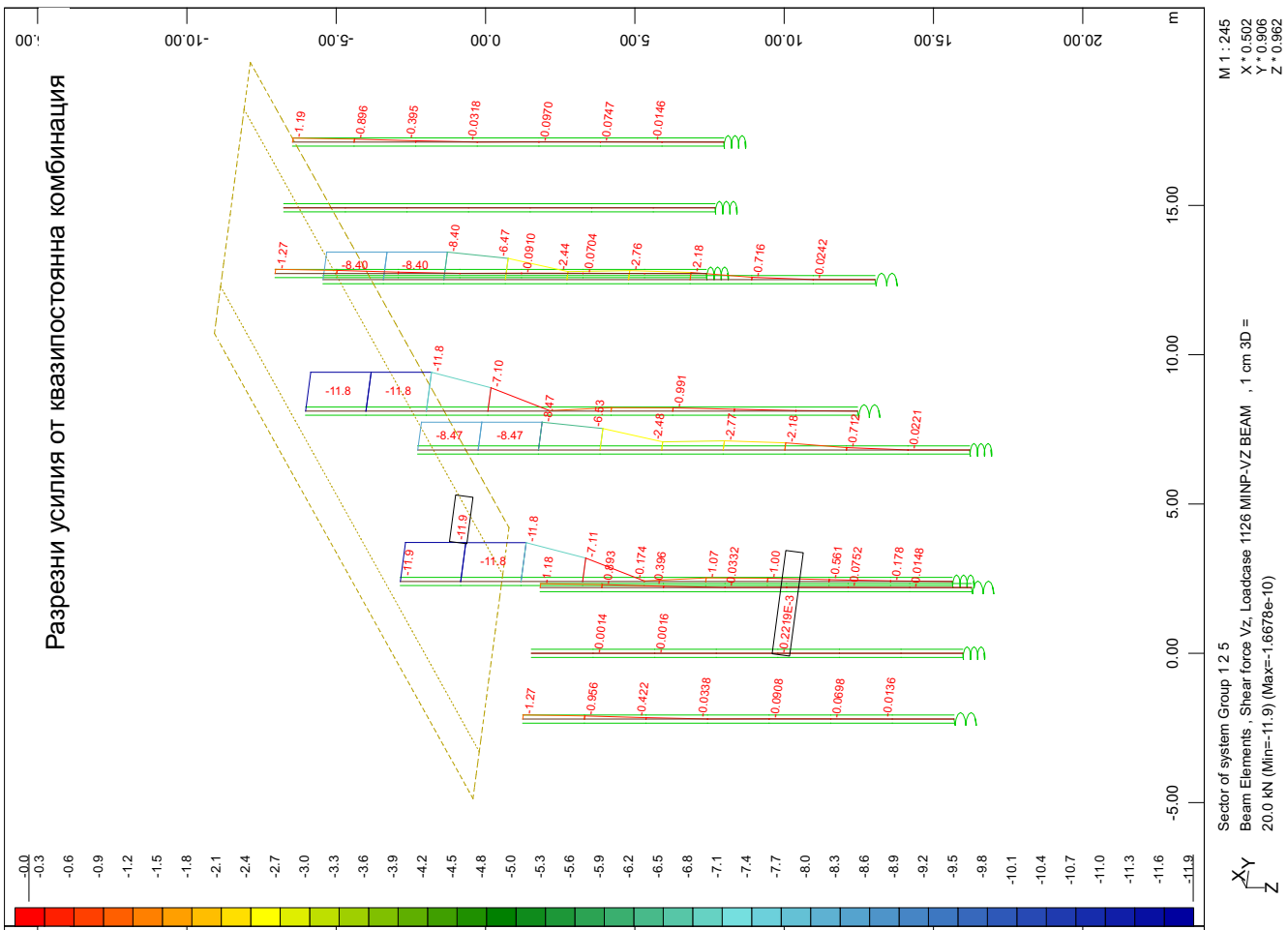


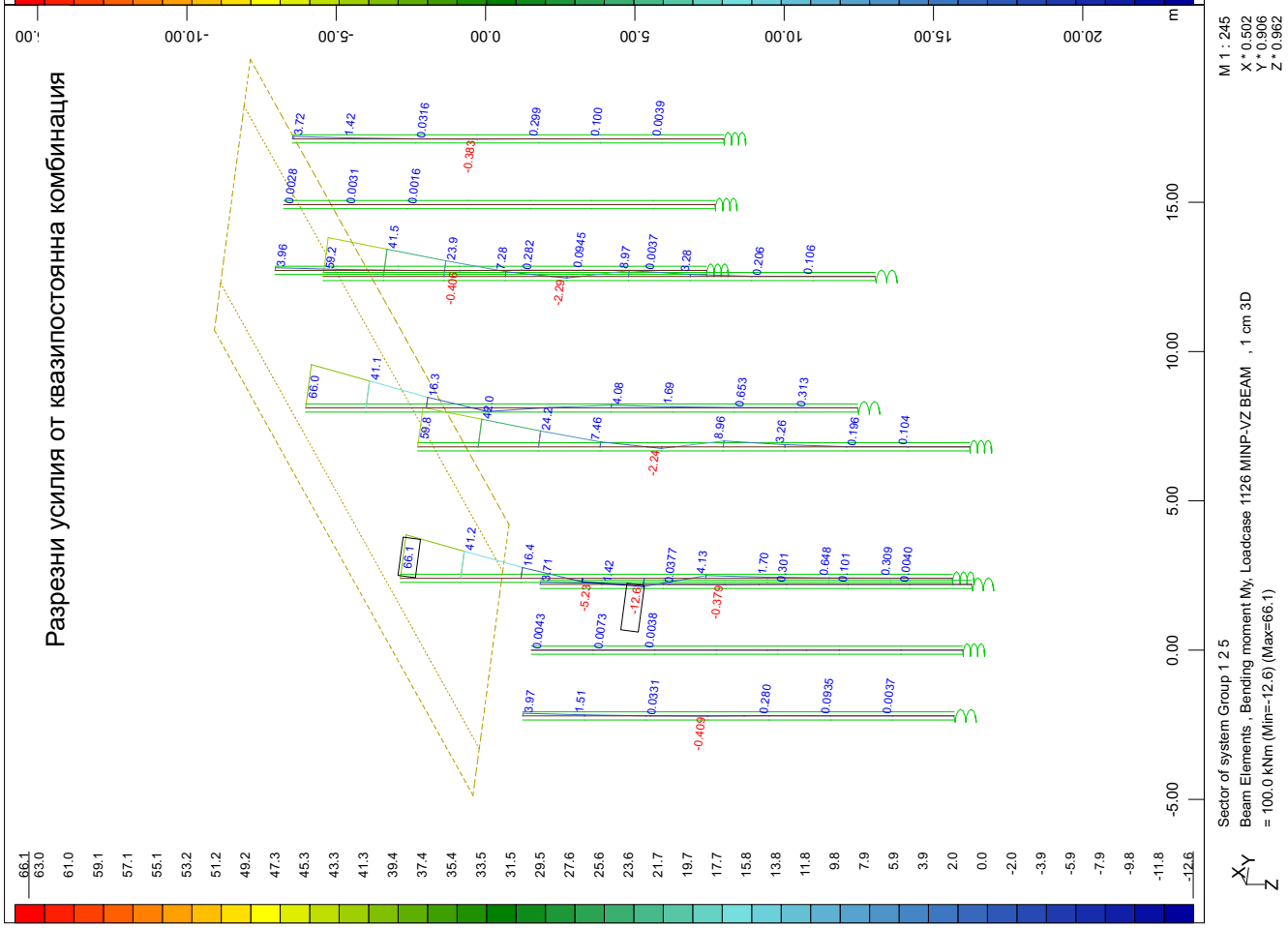


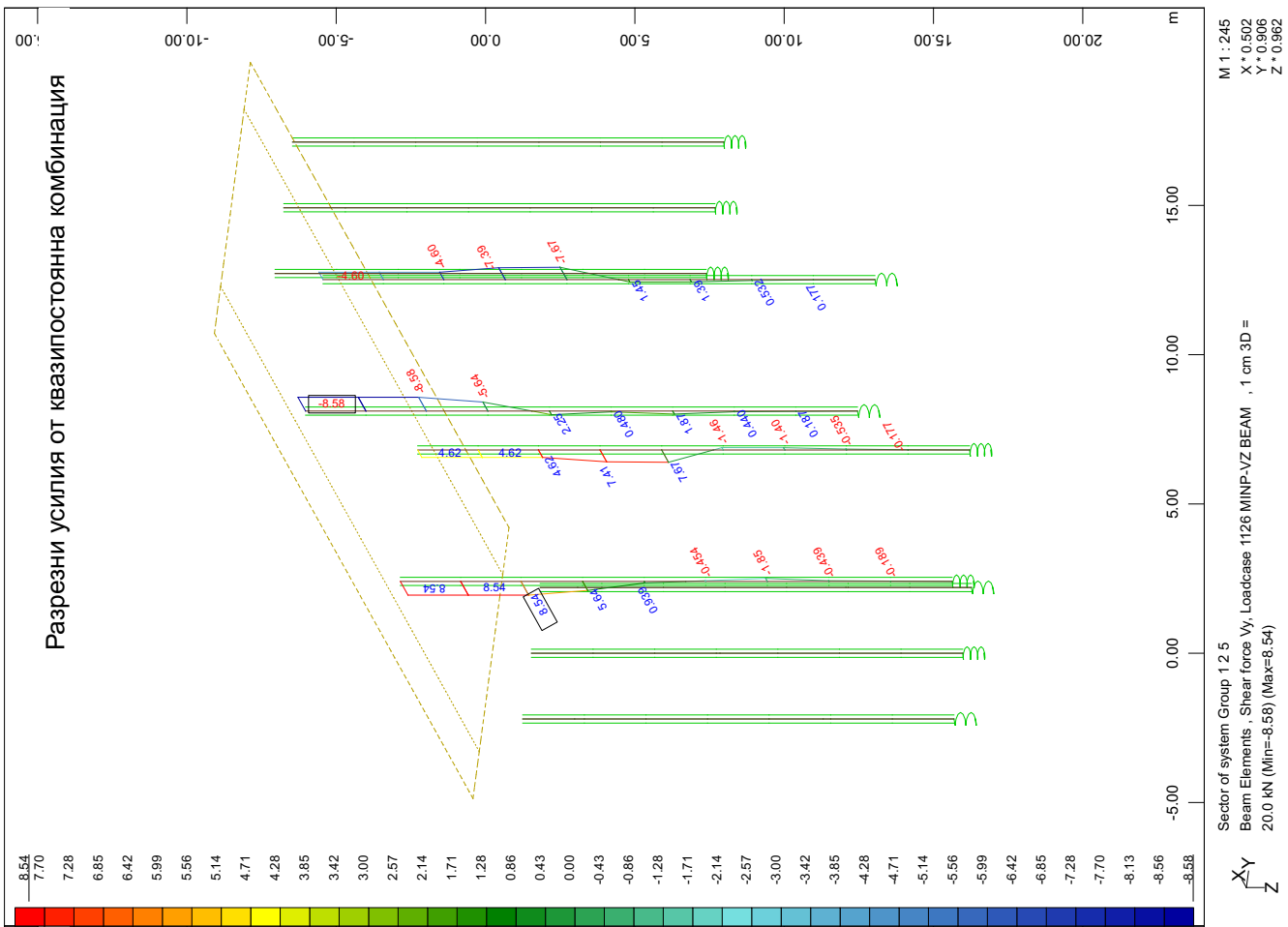


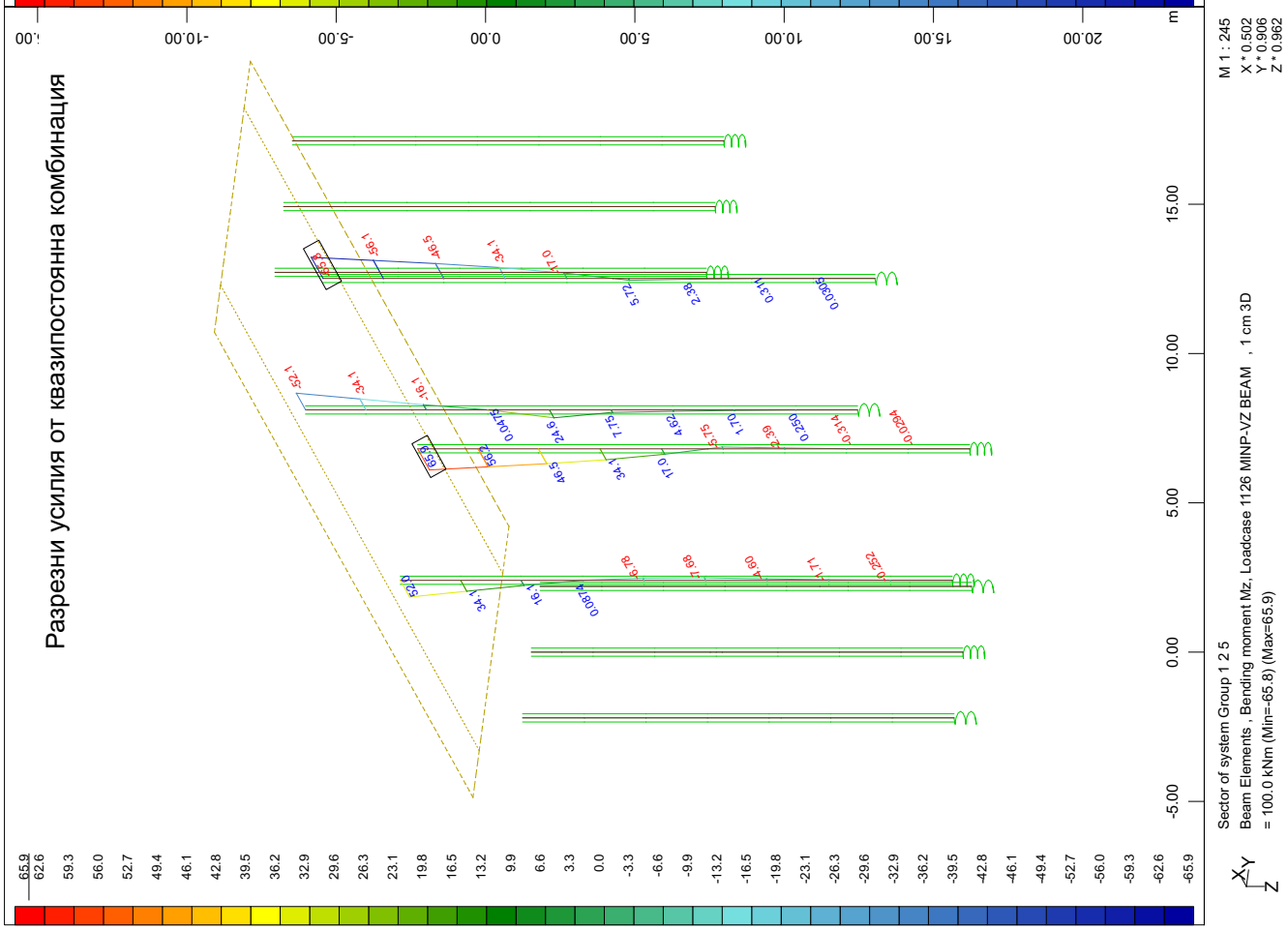


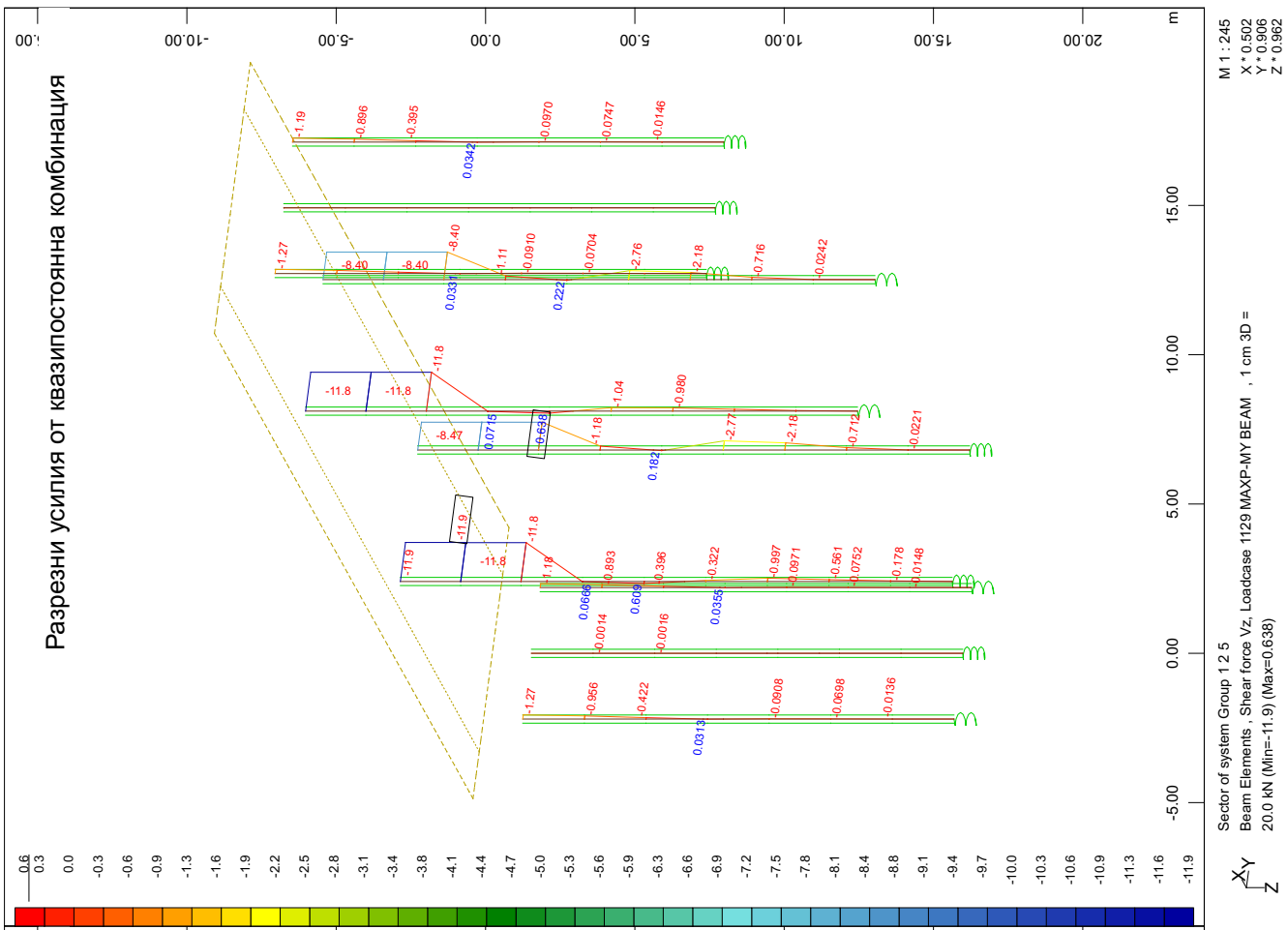


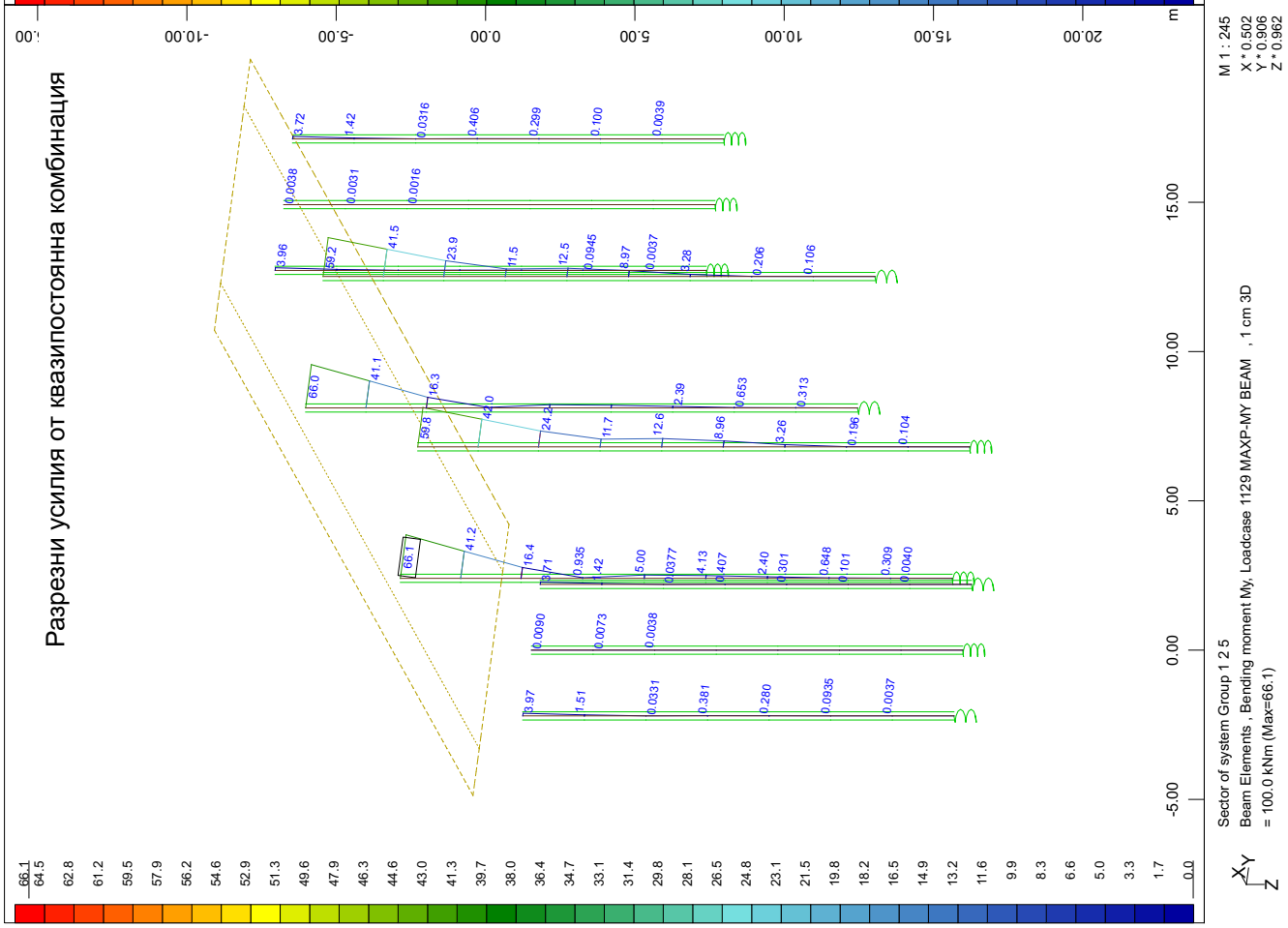


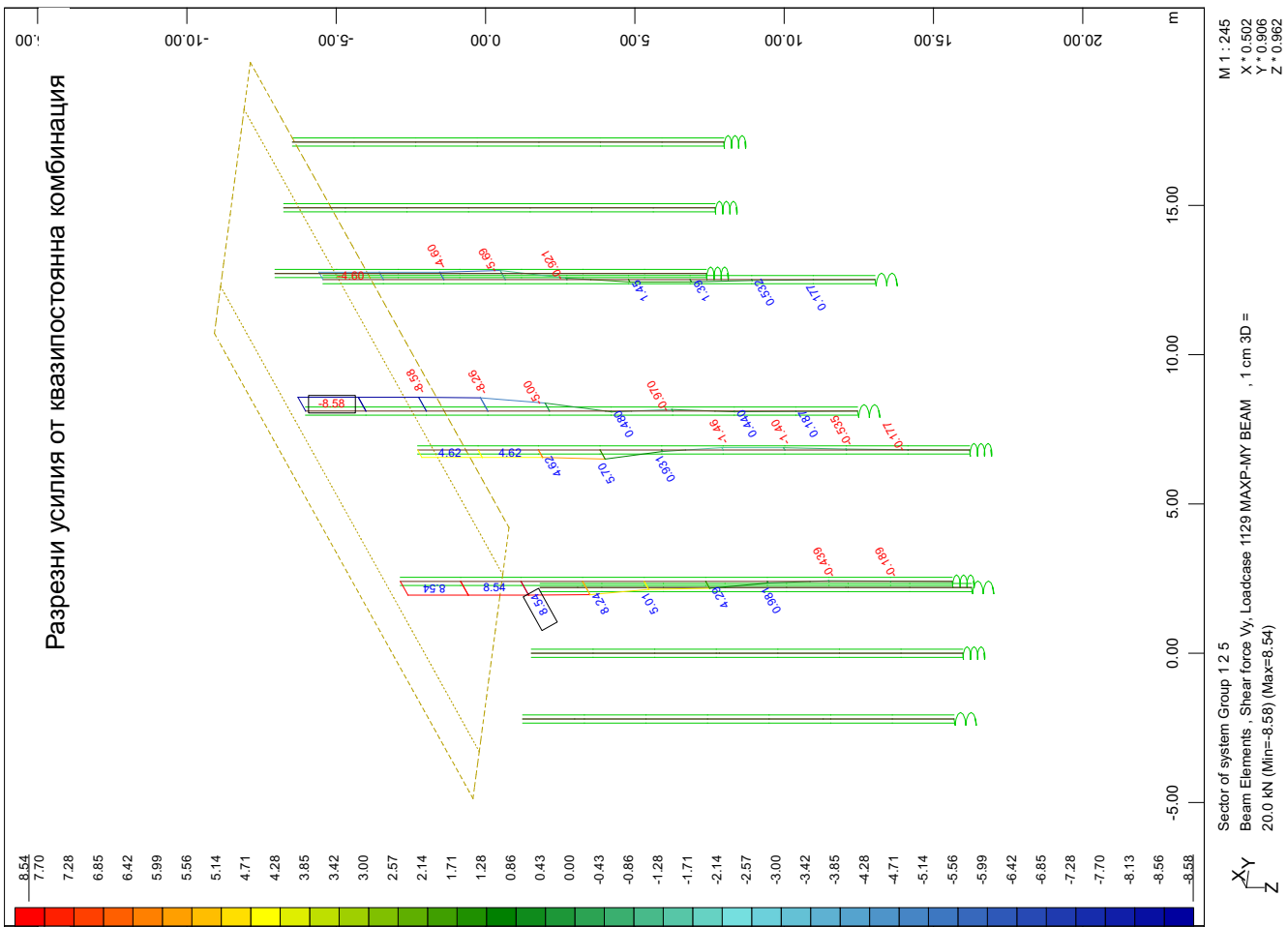


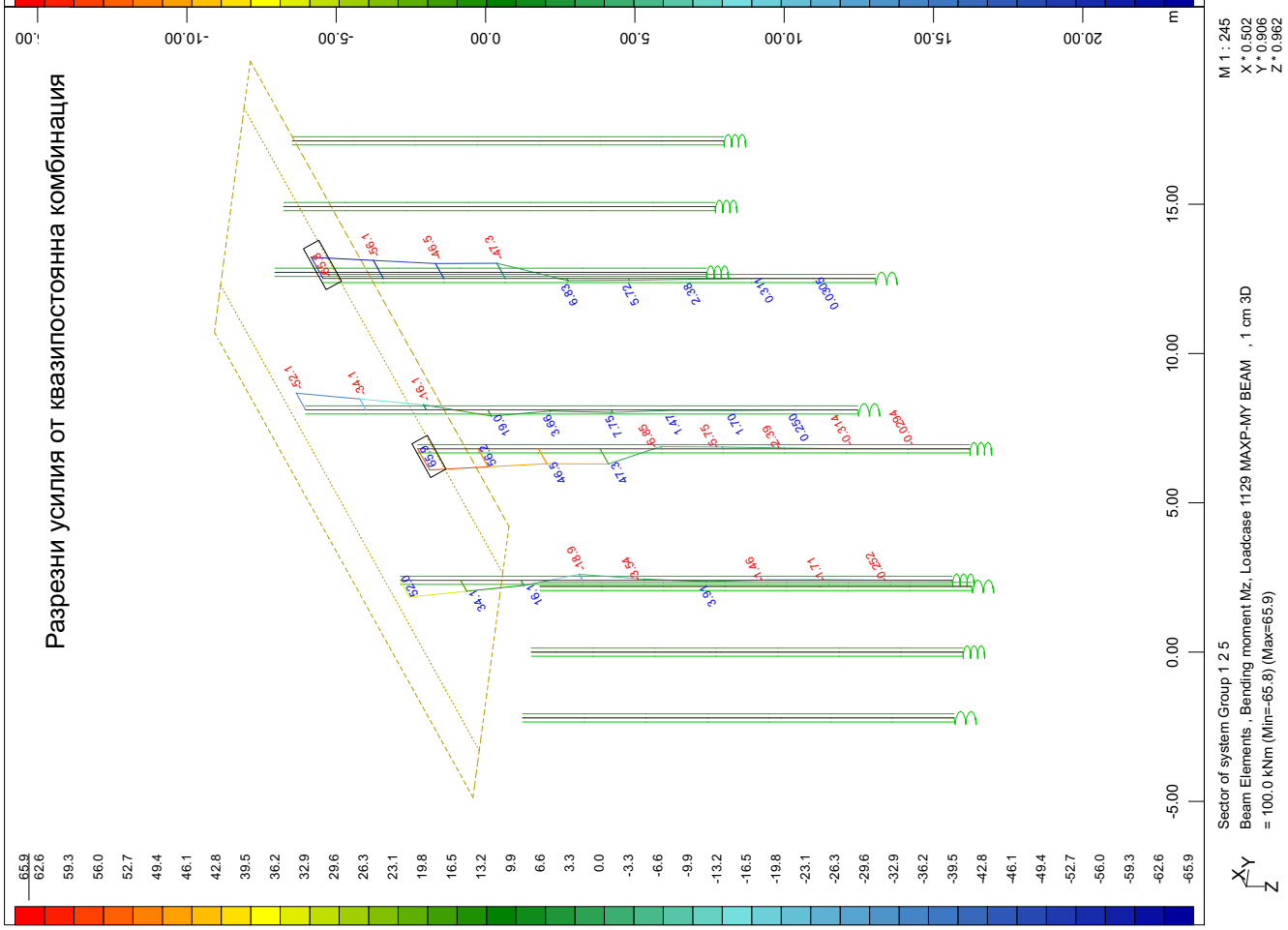


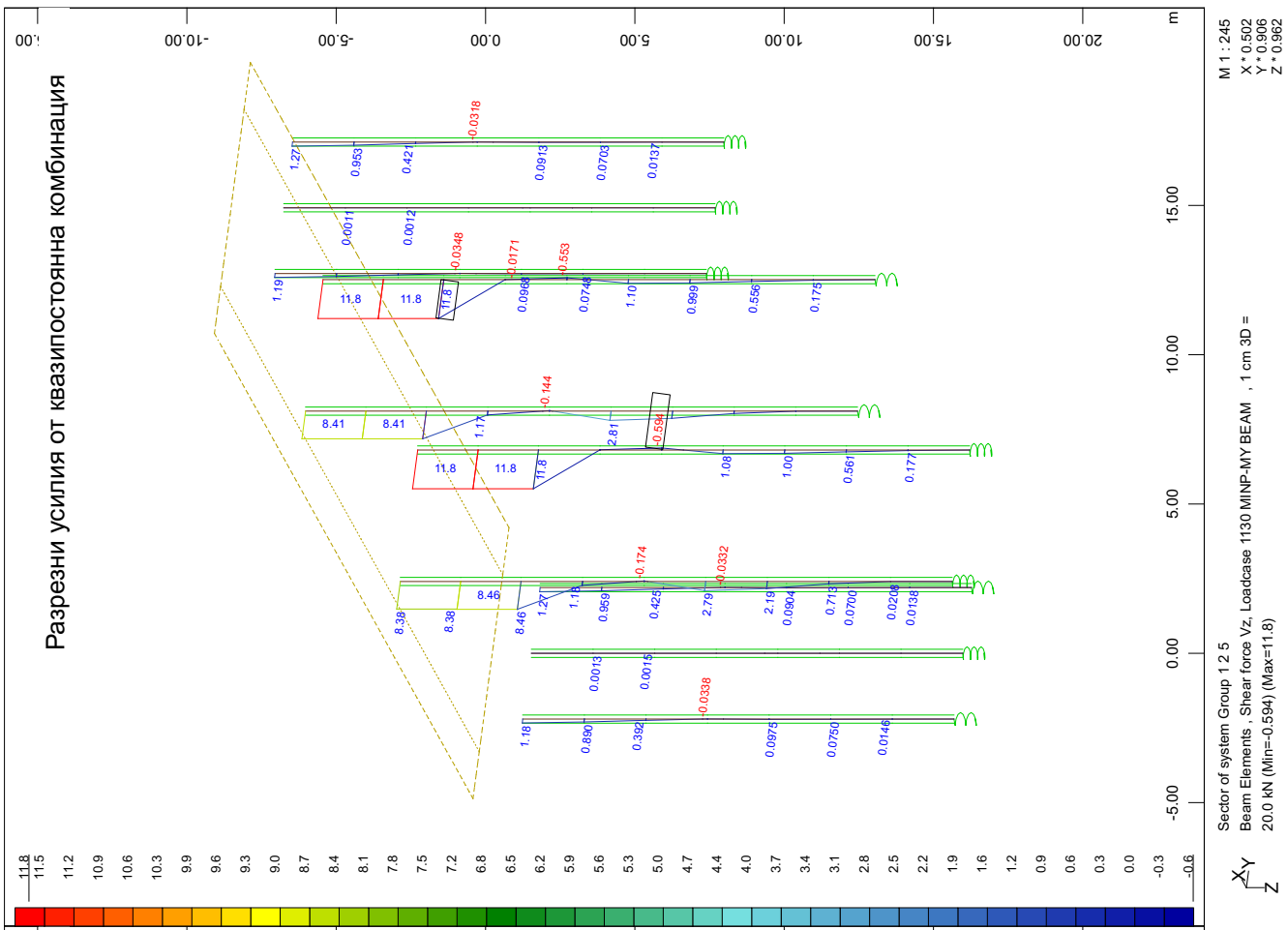


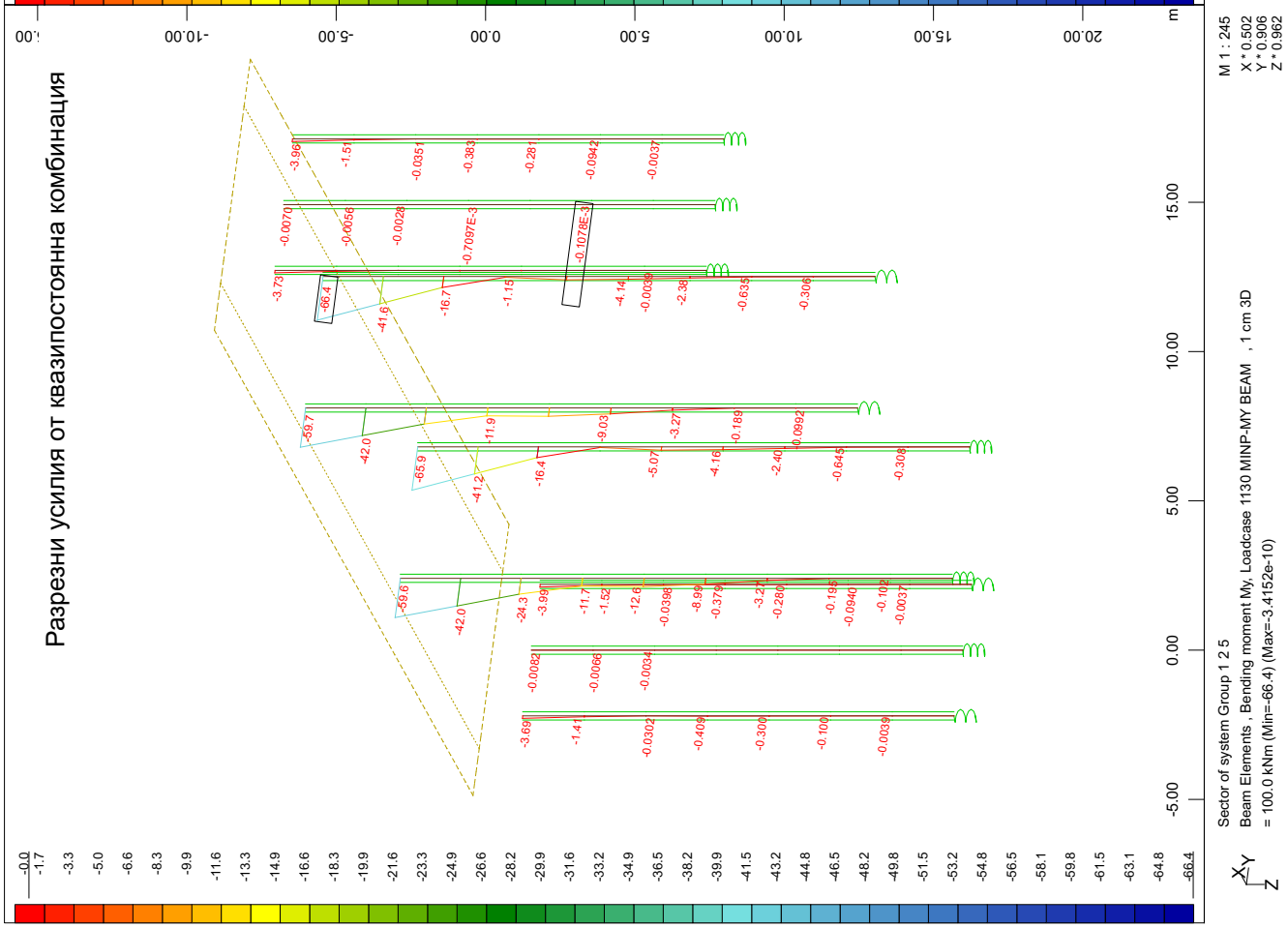


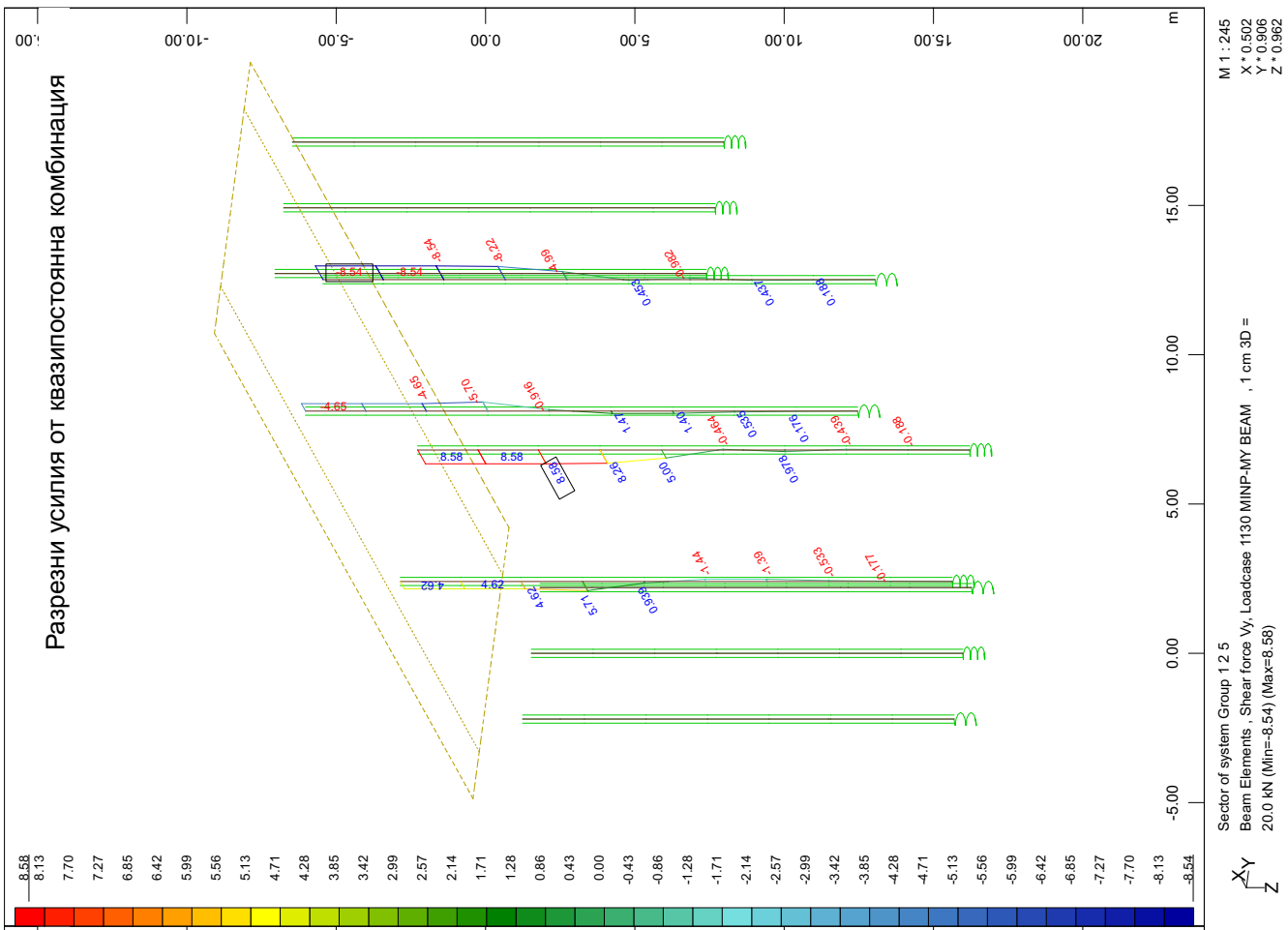


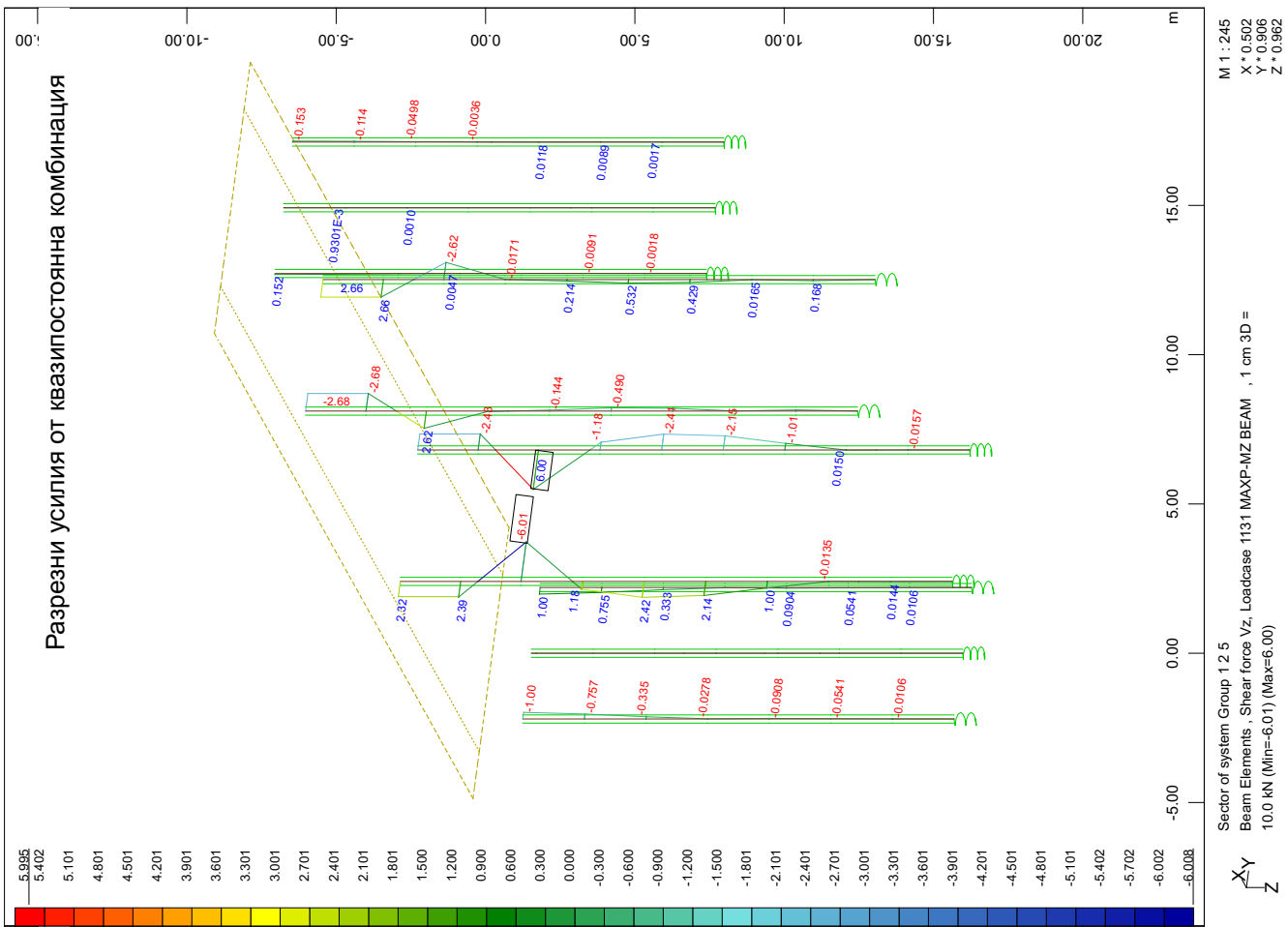


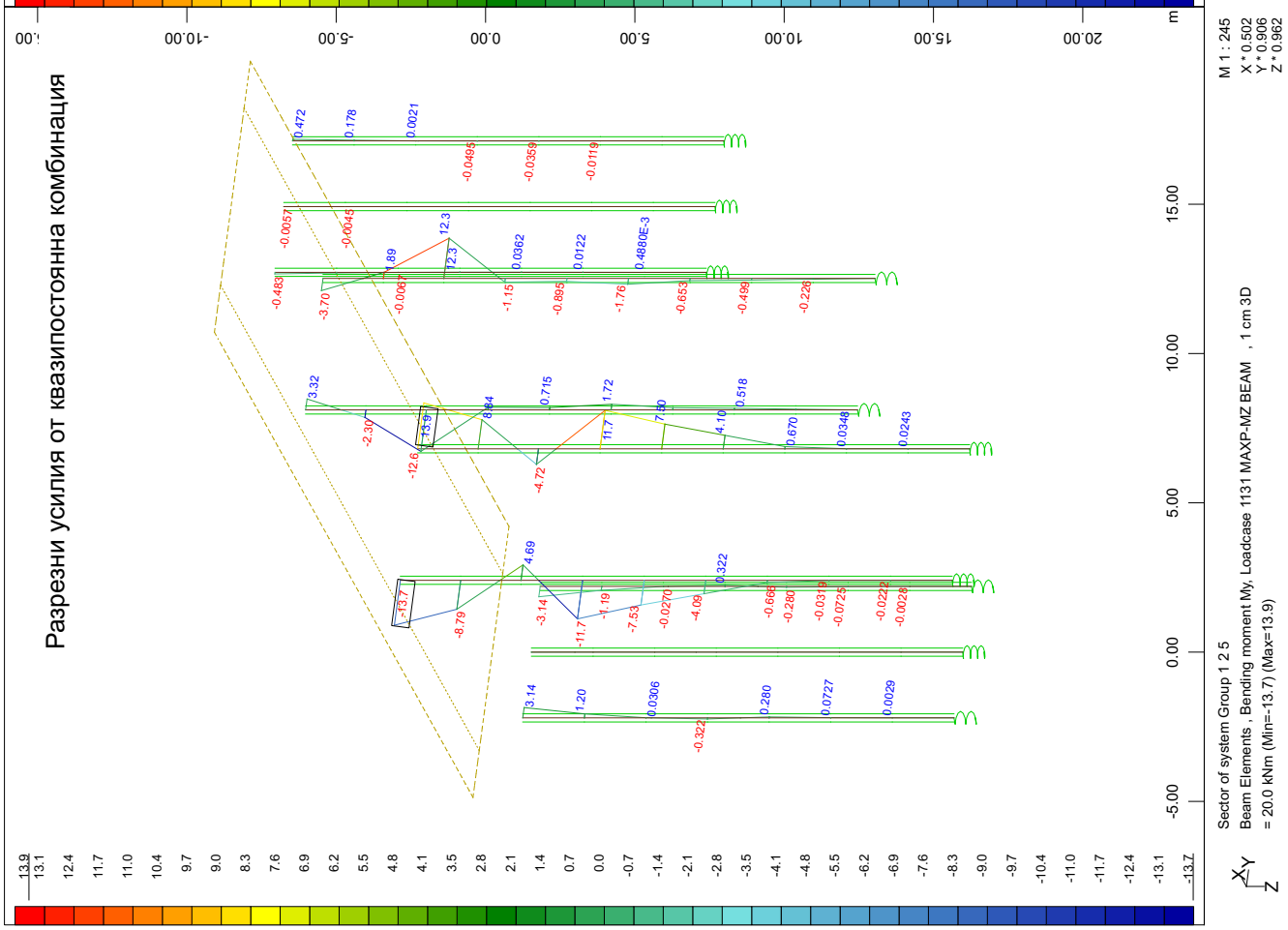




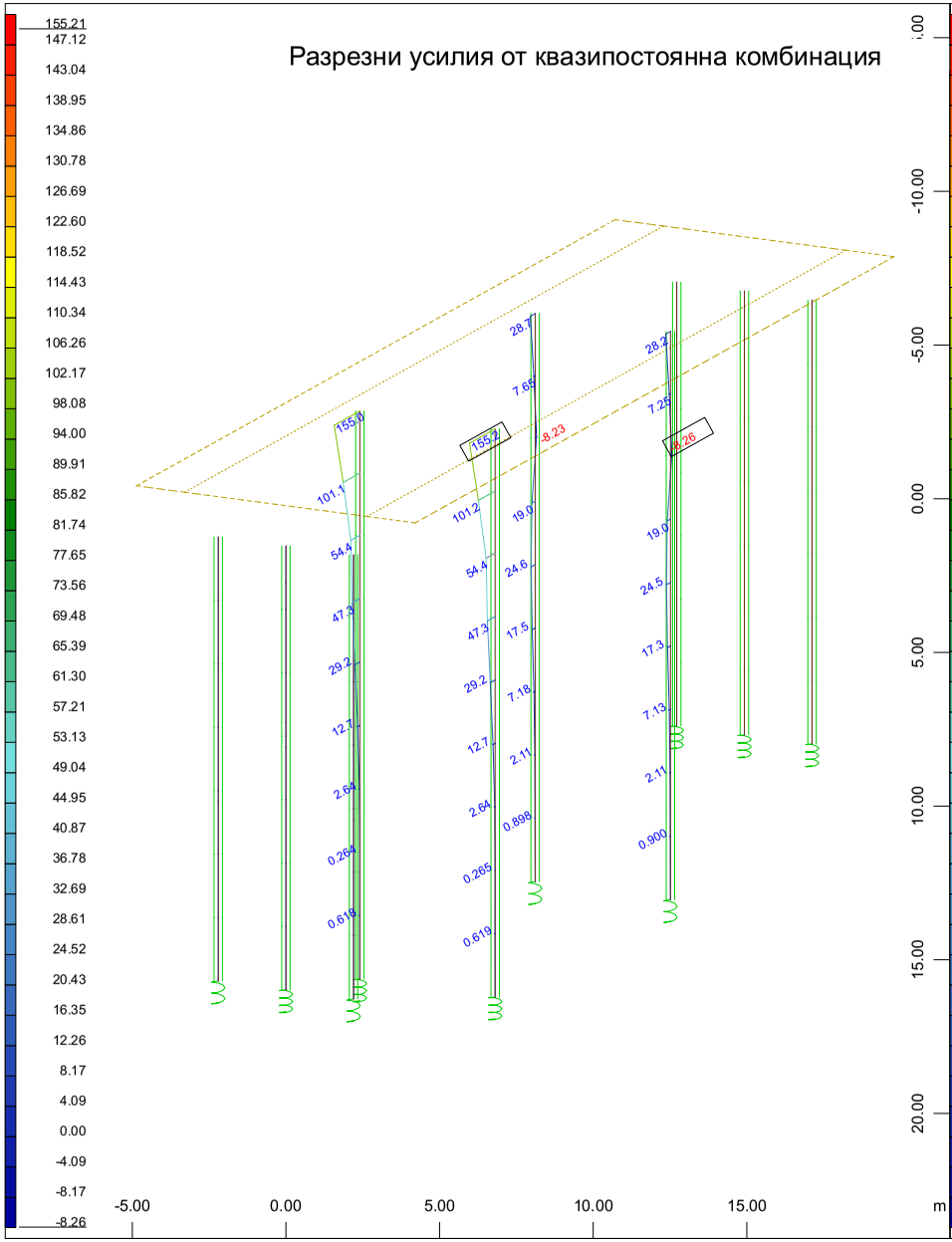








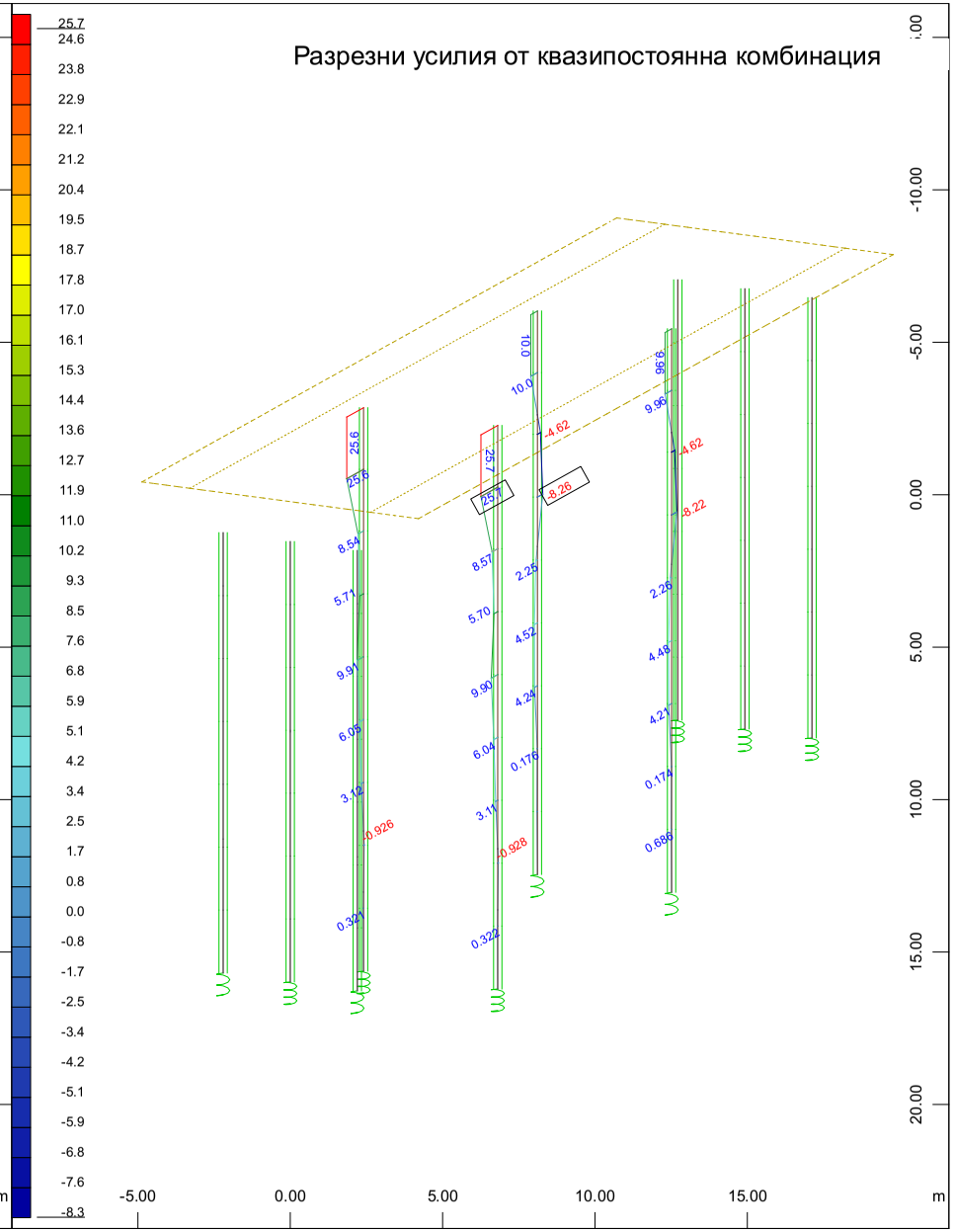
Разрезни усилия от квазипостоянна комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 1131 MAXP-MZ BEAM , 1 cm 3D
= 200.0 kNm (Min=-8.26) (Max=155.2)

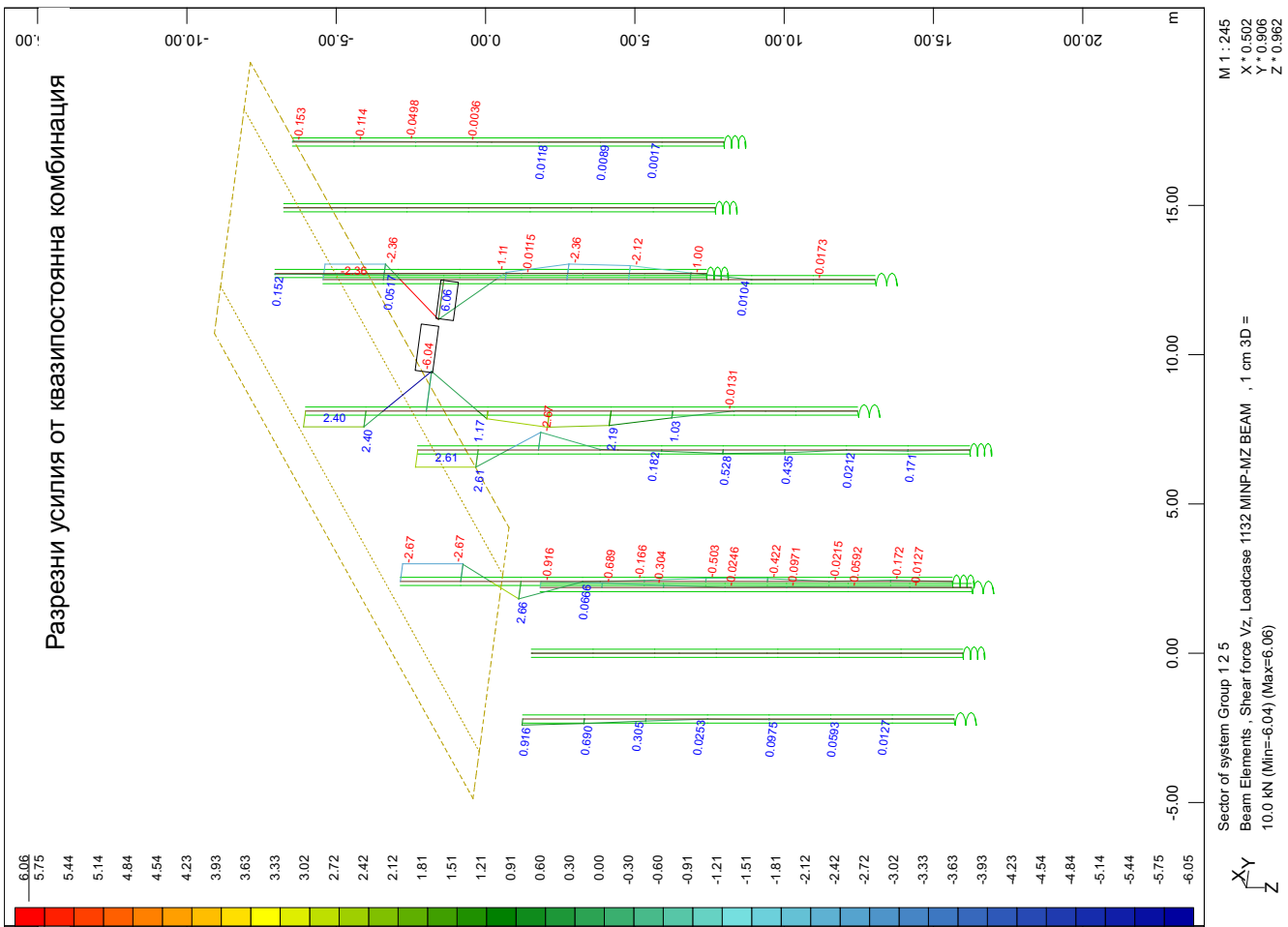
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

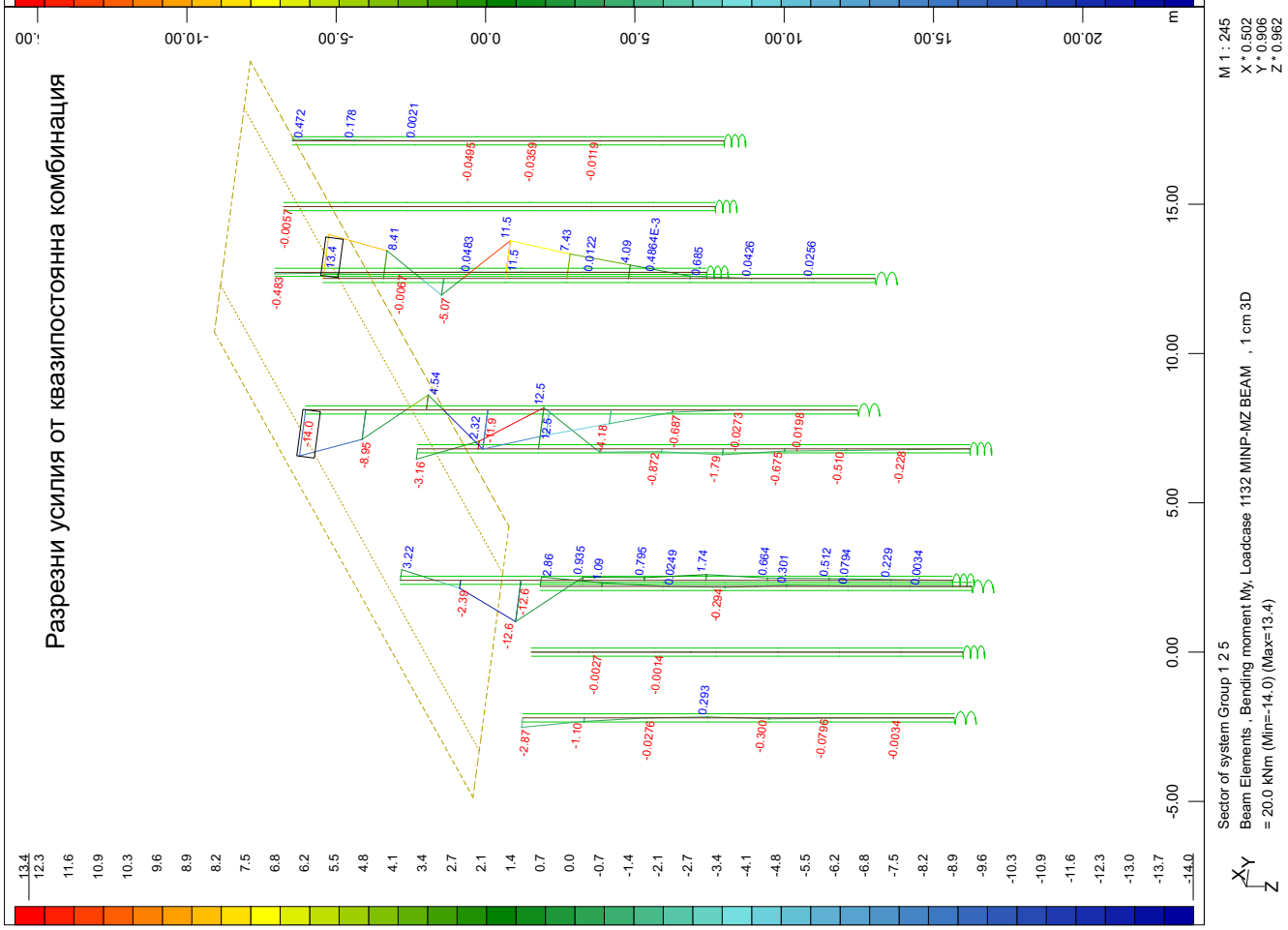
Разрезни усилия от квазипостоянна комбинация

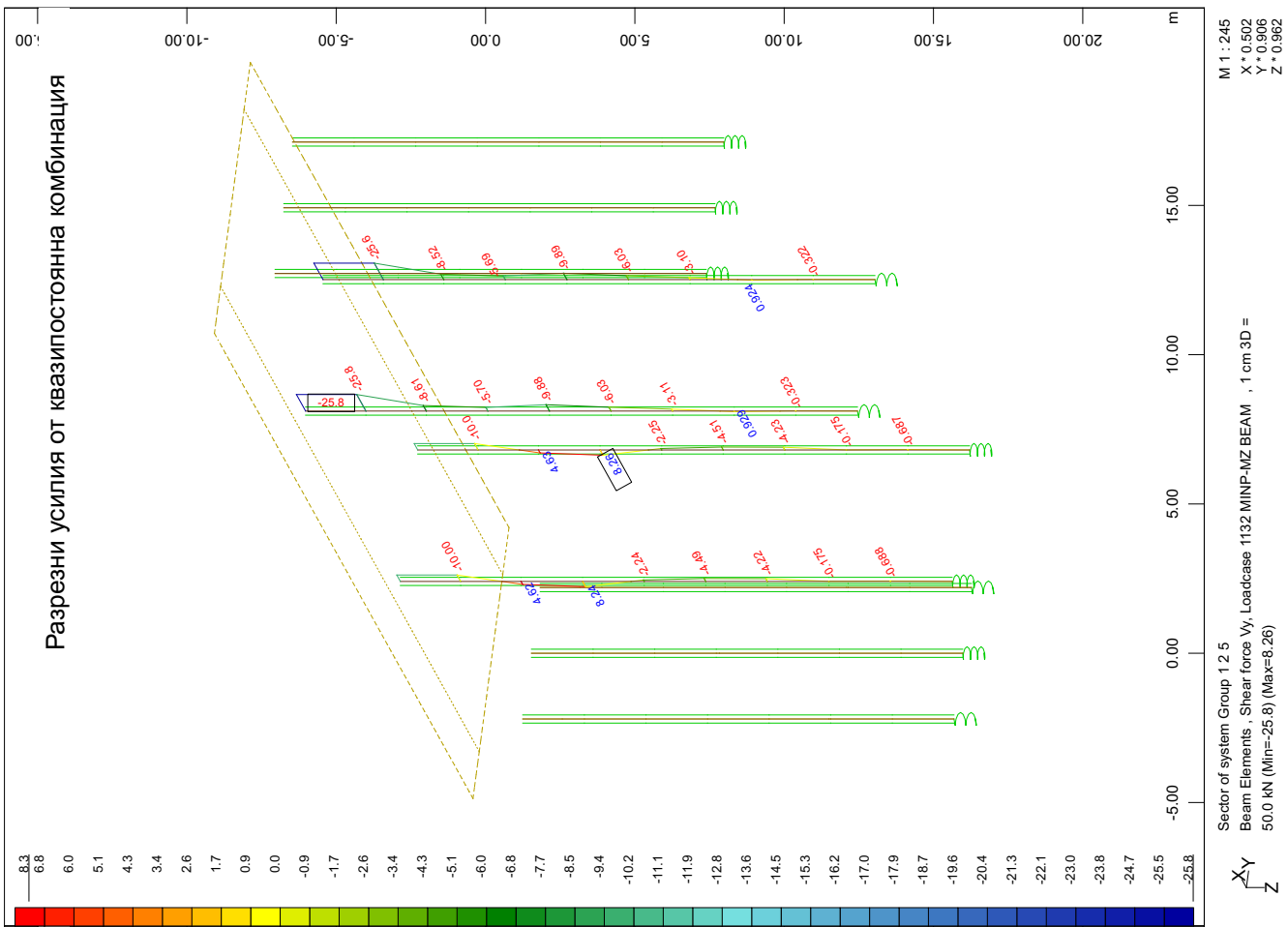


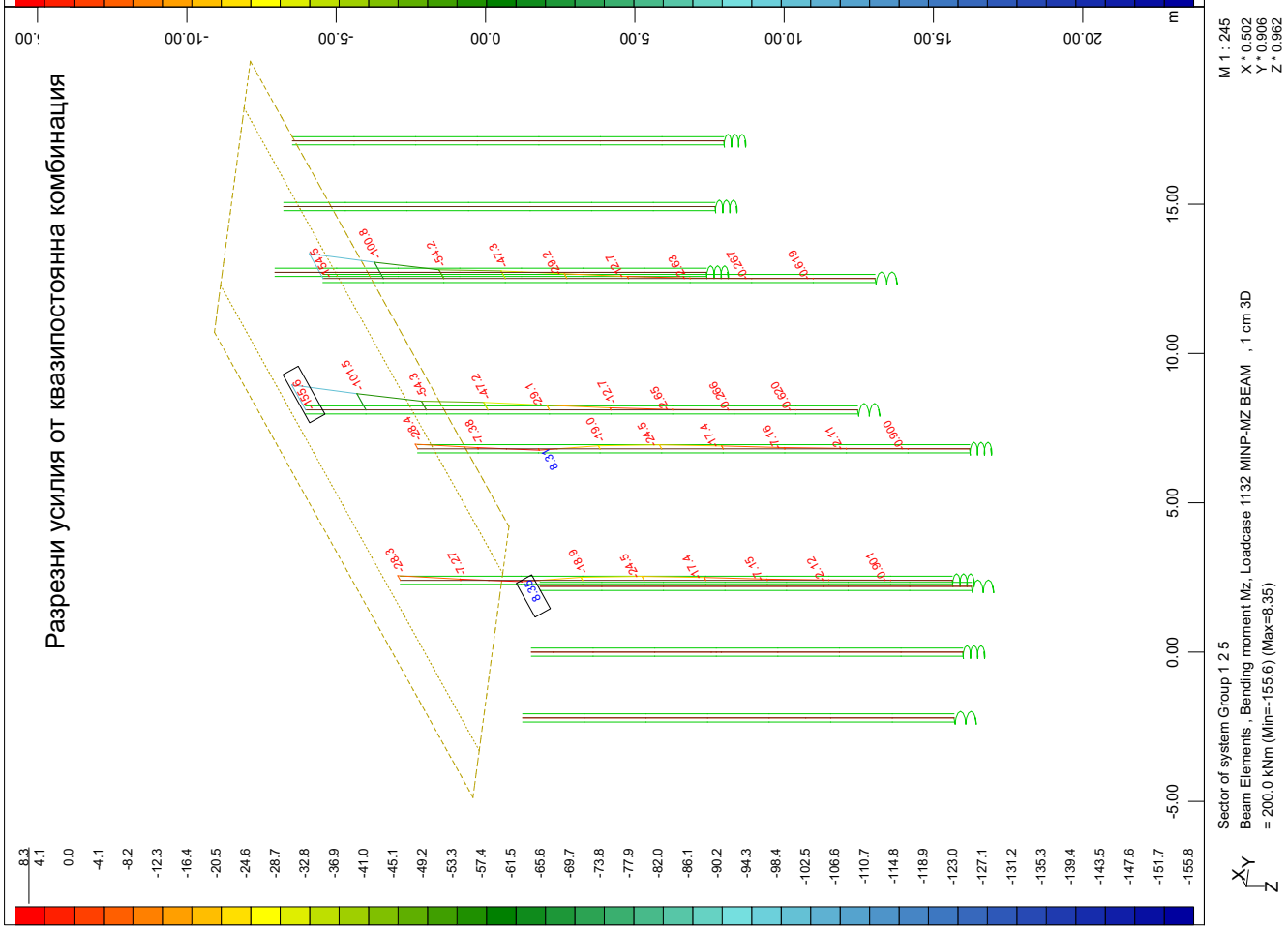
Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 1131 MAXP-MZ BEAM , 1 cm 3D =
50.0 kN (Min=-8.26) (Max=25.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

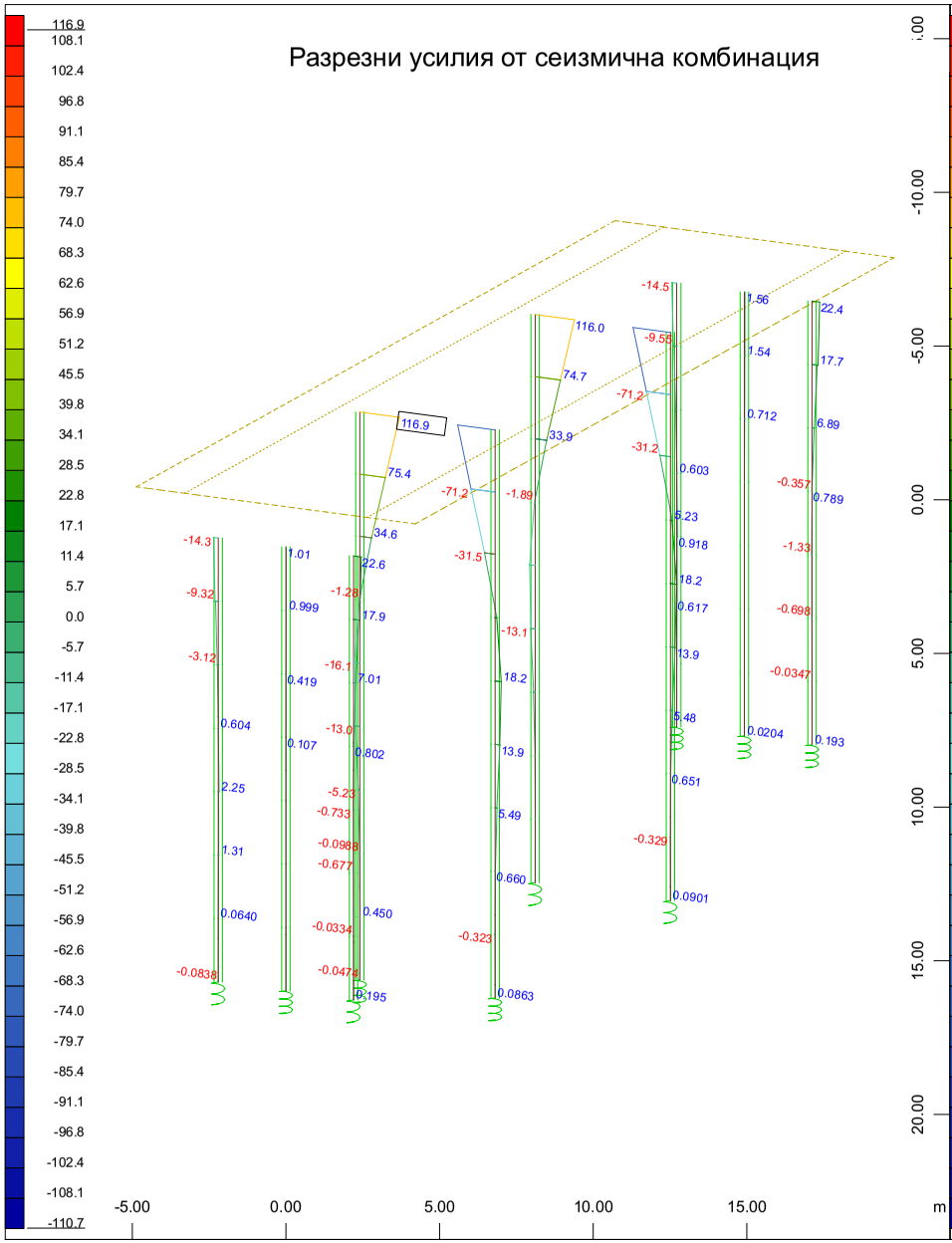








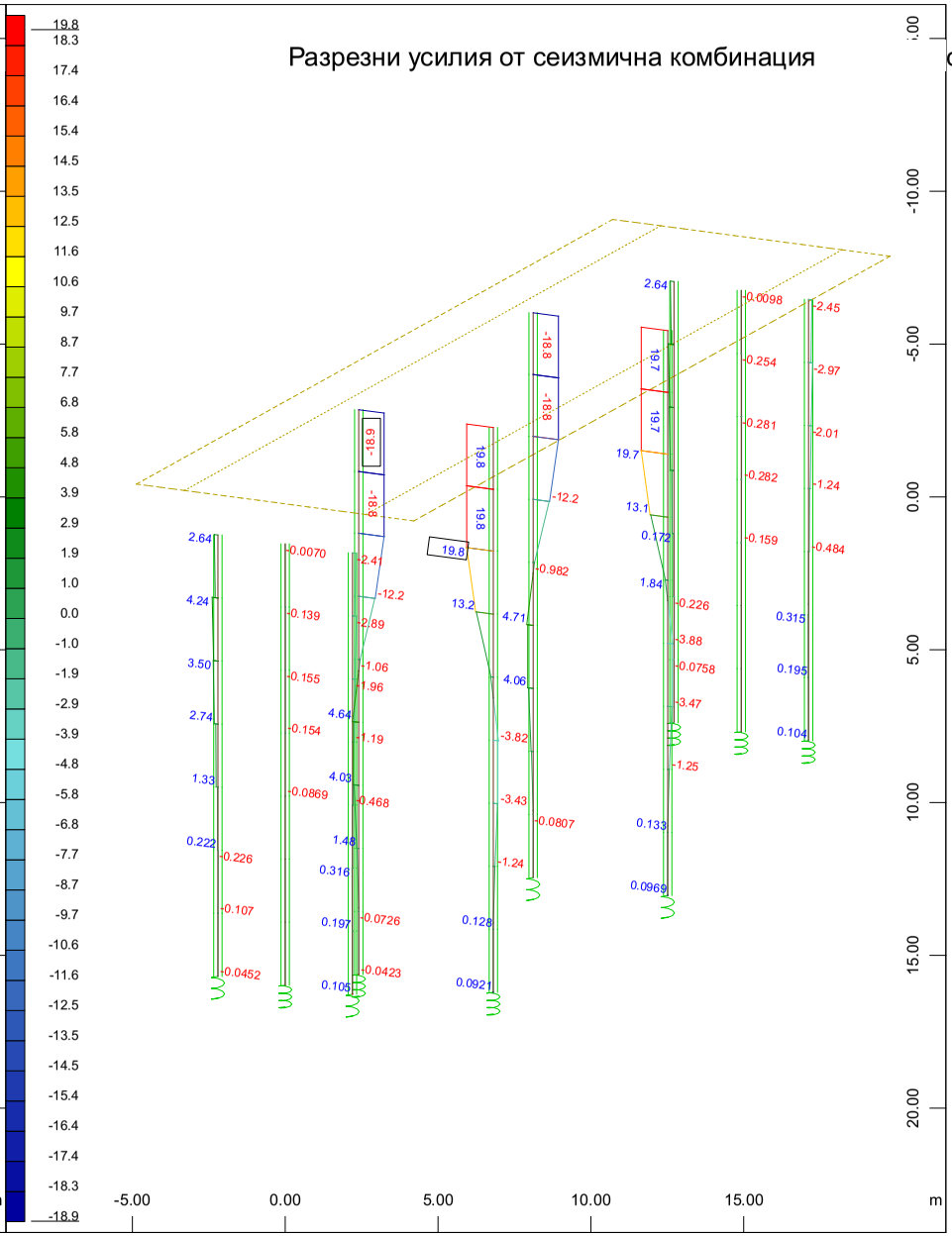
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2121 MAX-N BEAM , 1 cm 3D =
200.0 kNm (Min=-110.7) (Max=116.9)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

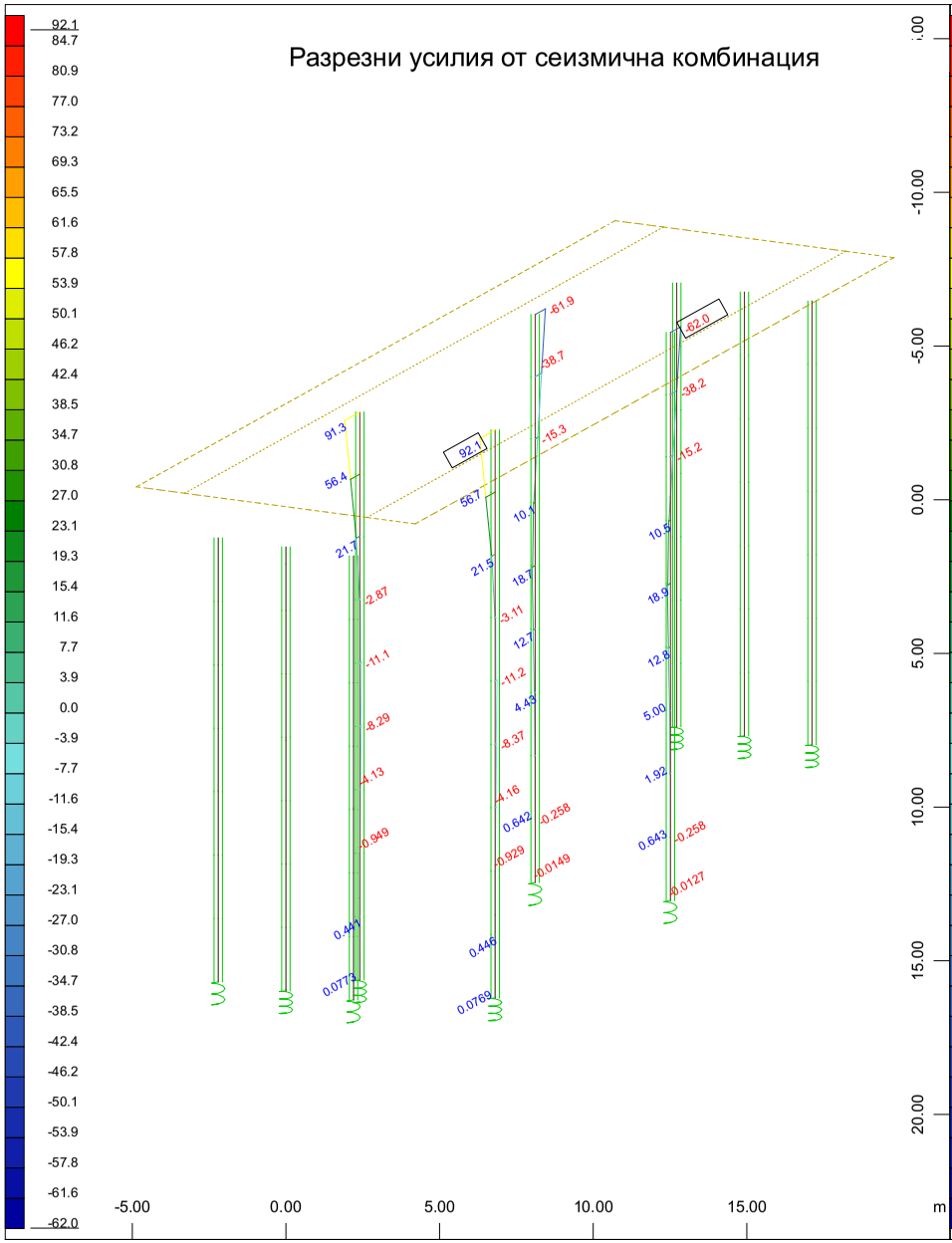
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2121 MAX-N BEAM , 1 cm 3D =
50.0 kN (Min=-18.9) (Max=19.8)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

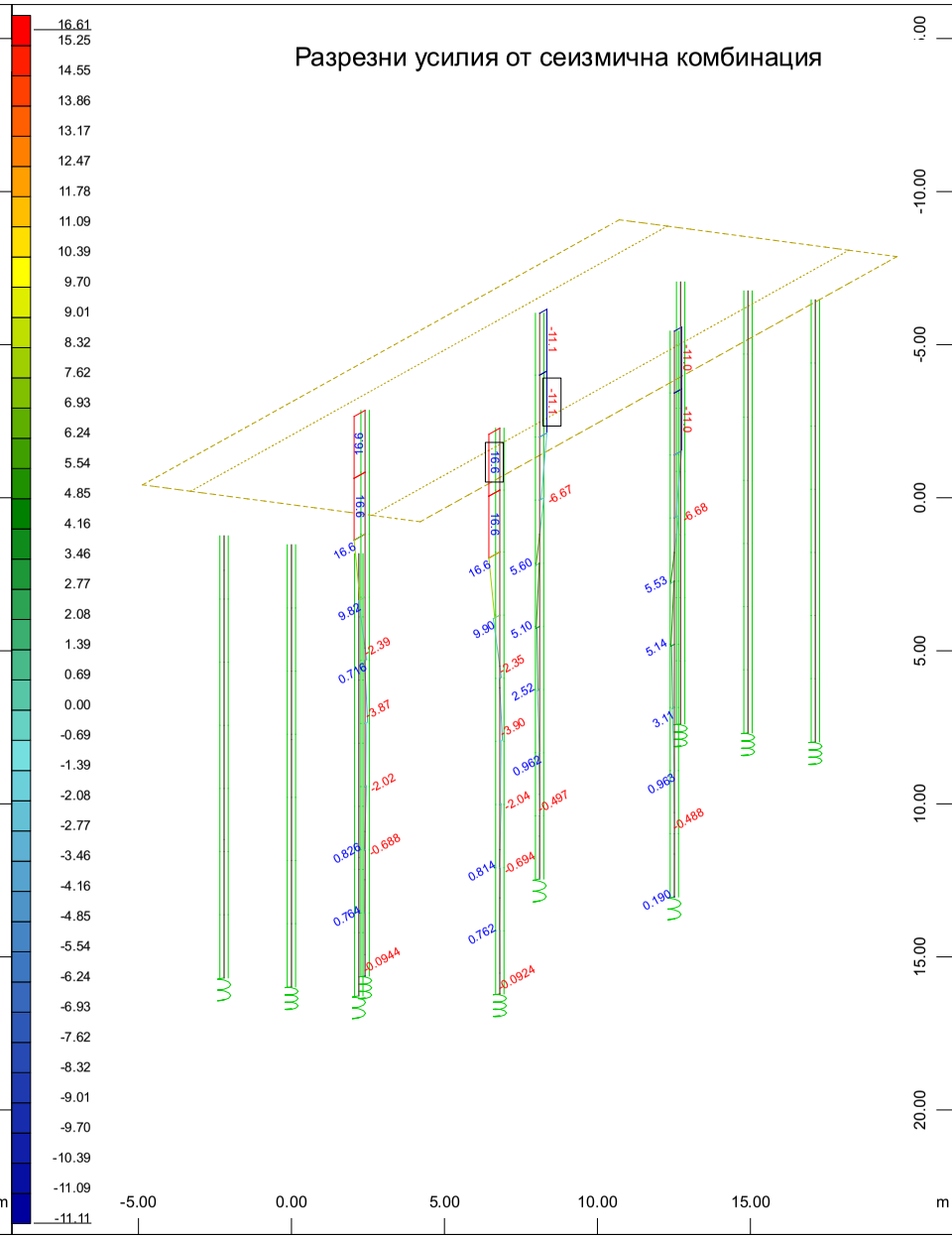
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2121 MAX-N BEAM , 1 cm 3D =
200.0 kNm (Min=-62.0) (Max=92.1)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

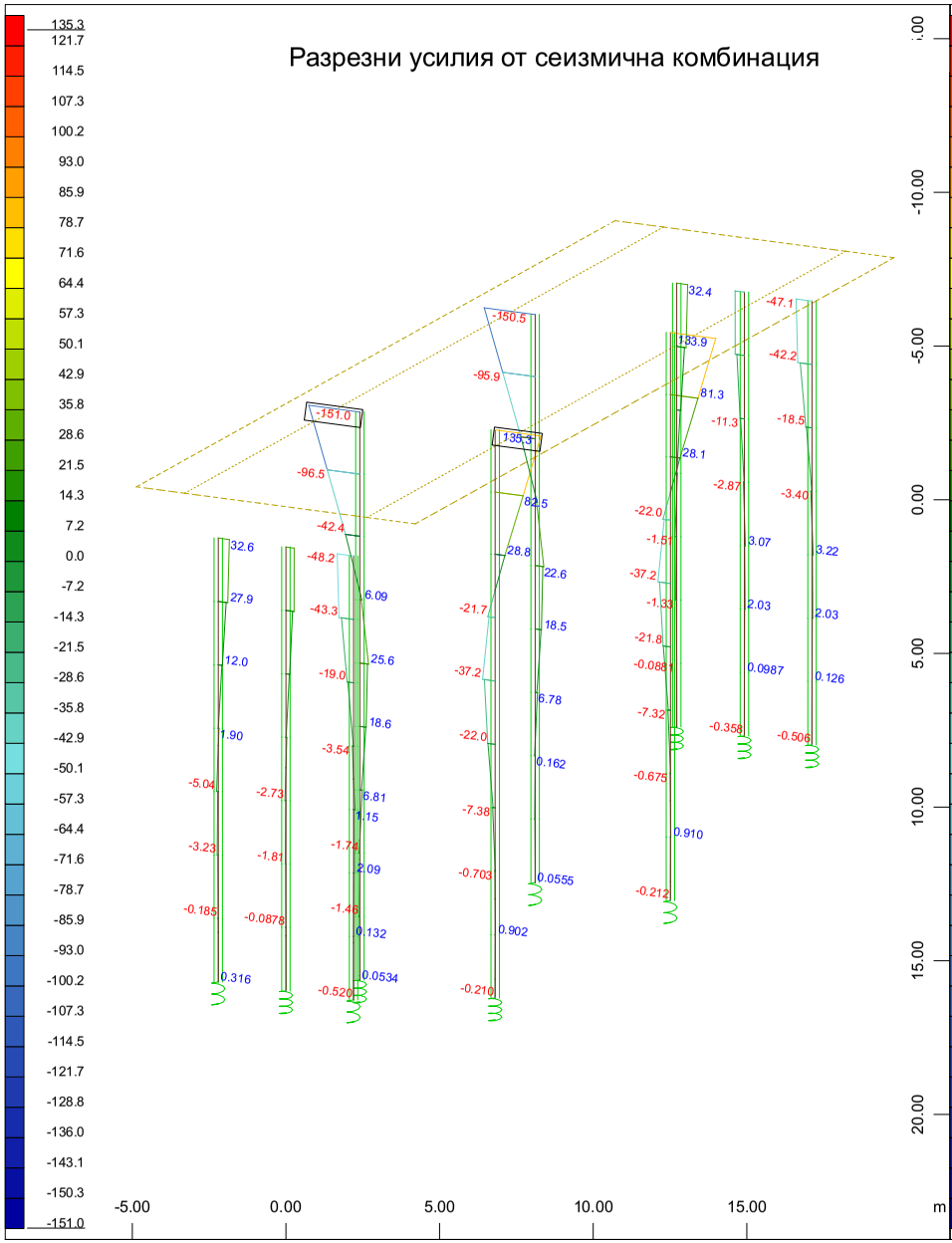
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2121 MAX-N BEAM , 1 cm 3D =
50.0 kN (Min=-11.1) (Max=16.6)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

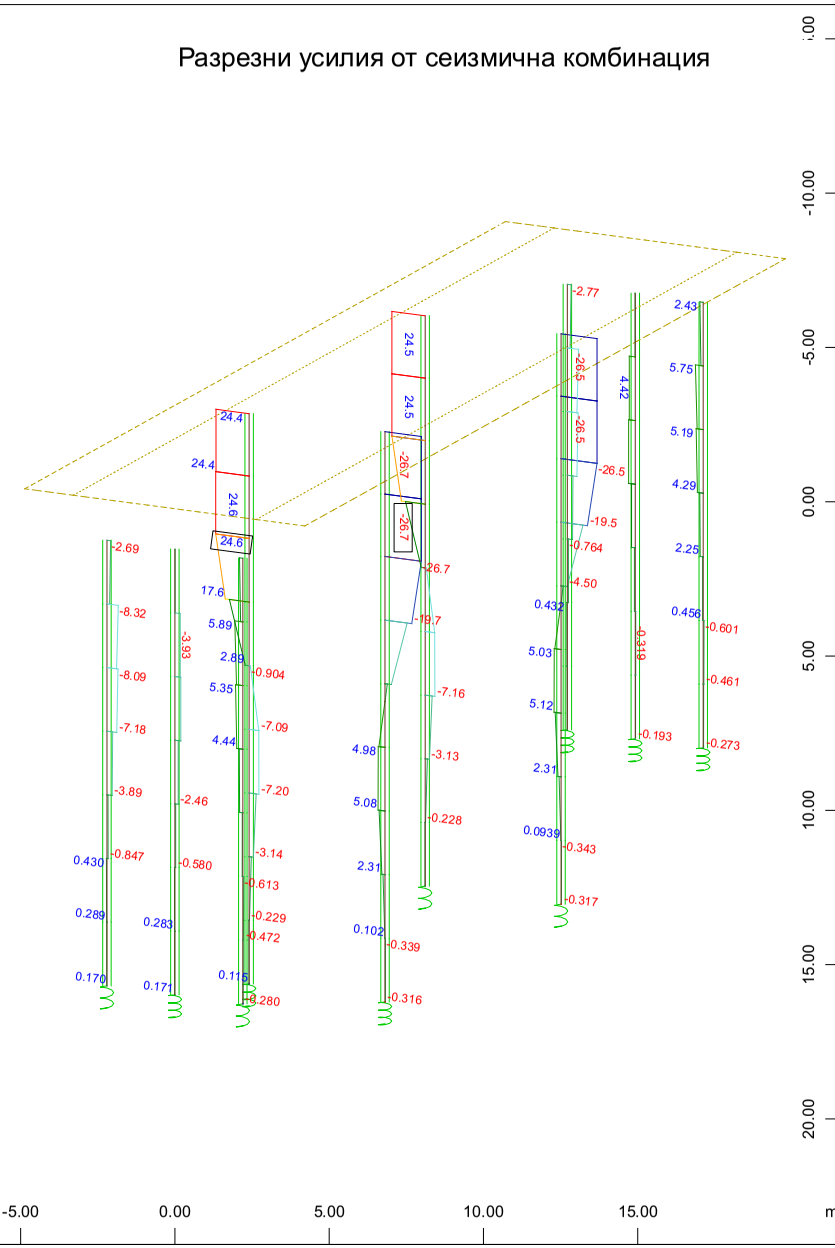
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2122 MIN-N BEAM , 1 cm 3D =
200.0 kNm (Min=-151.0) (Max=135.3)

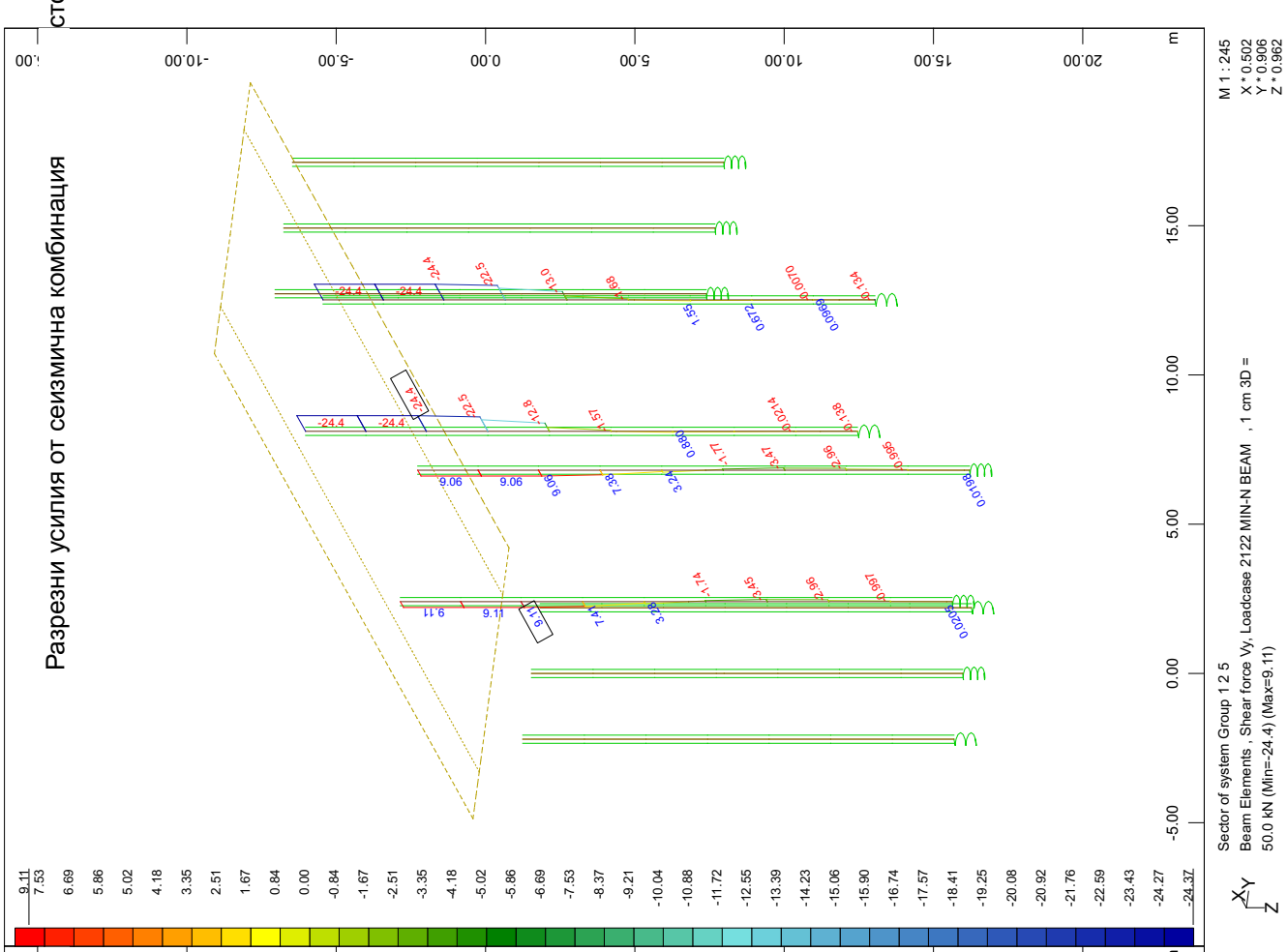
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

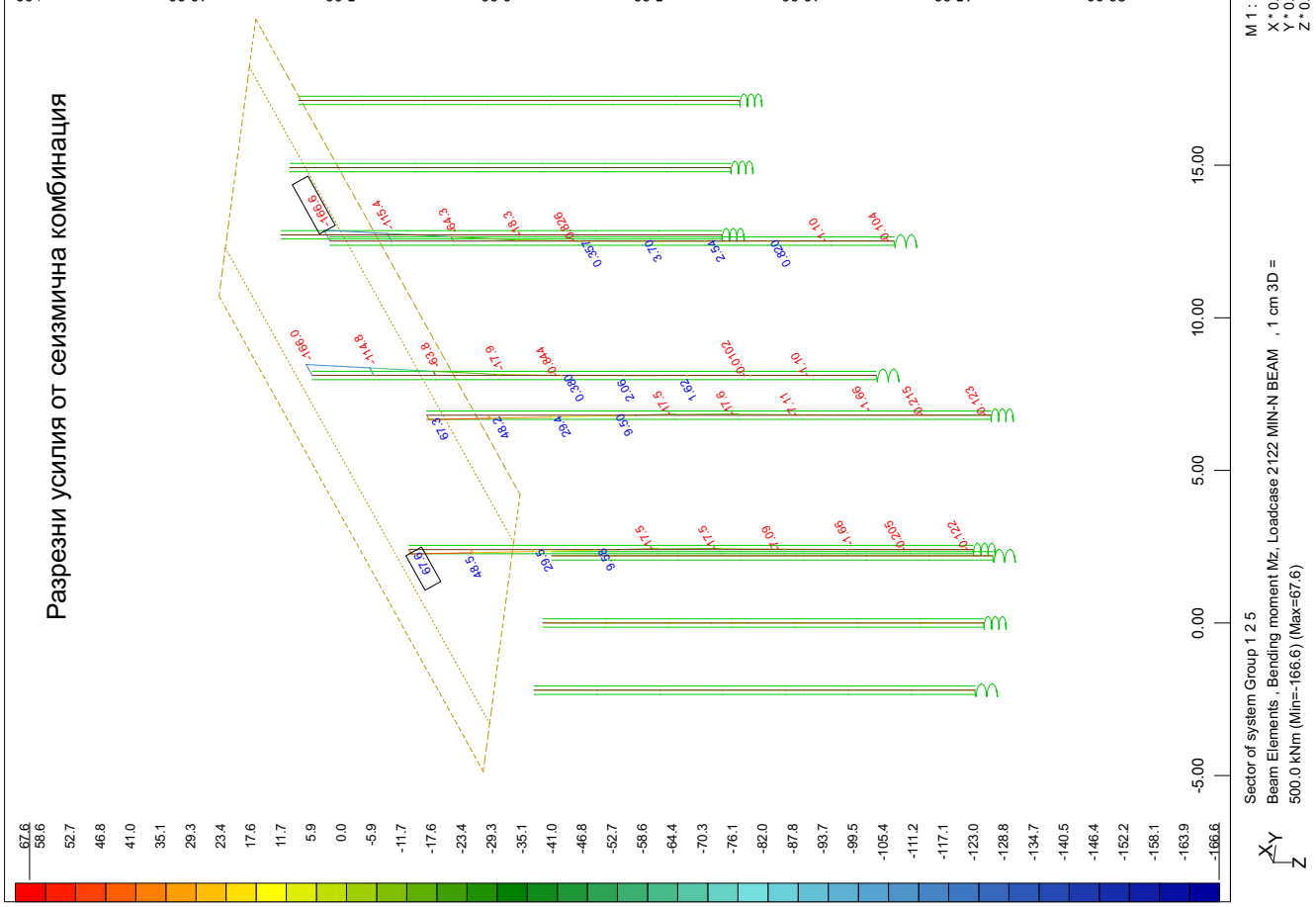
Разрезни усилия от сеизмична комбинация



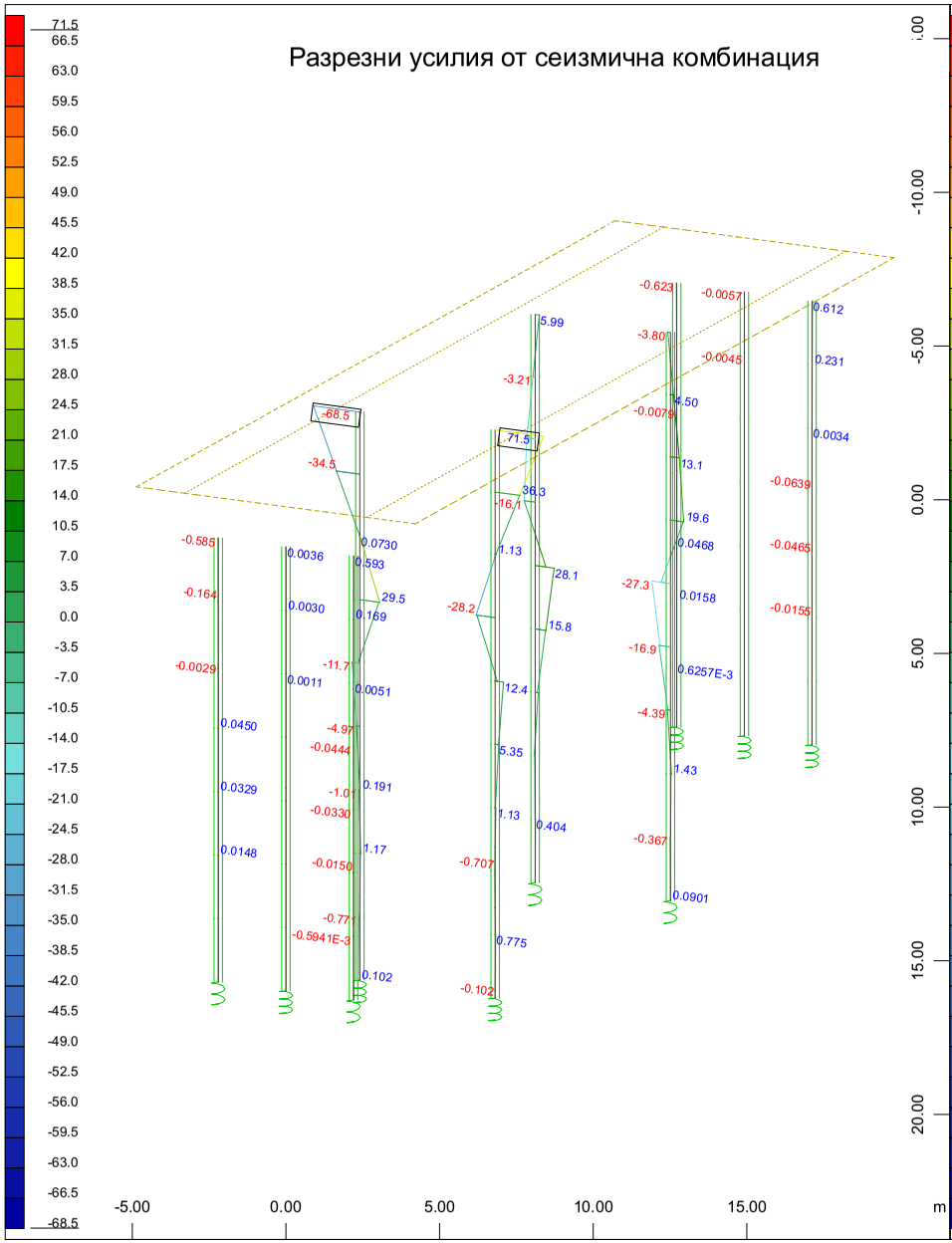
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2122 MIN-N BEAM , 1 cm 3D =
50.0 kN (Min=-26.7) (Max=24.6)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962





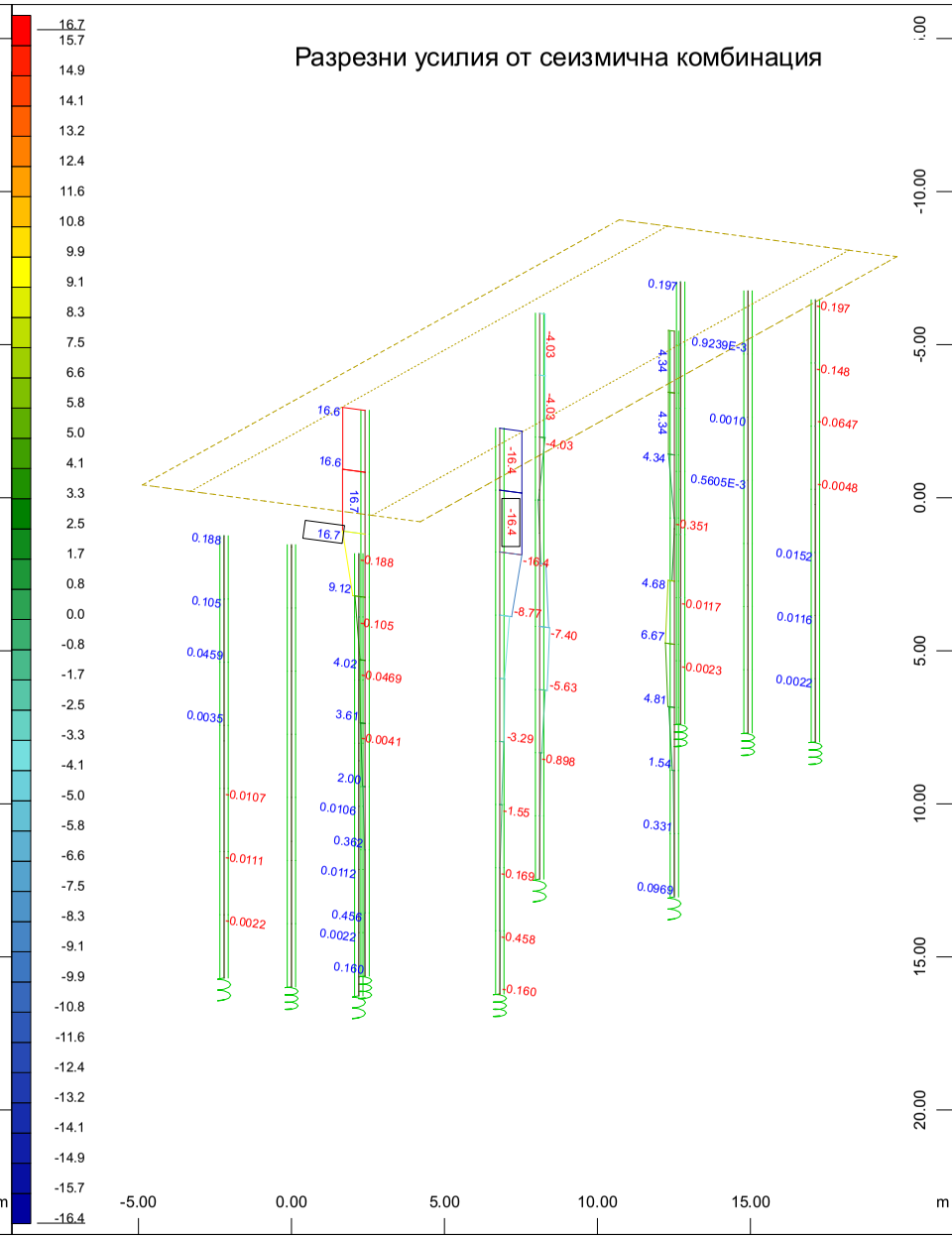
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2123 MAX-VY BEAM , 1 cm 3D =
100.0 kNm (Min=-68.5) (Max=71.5)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

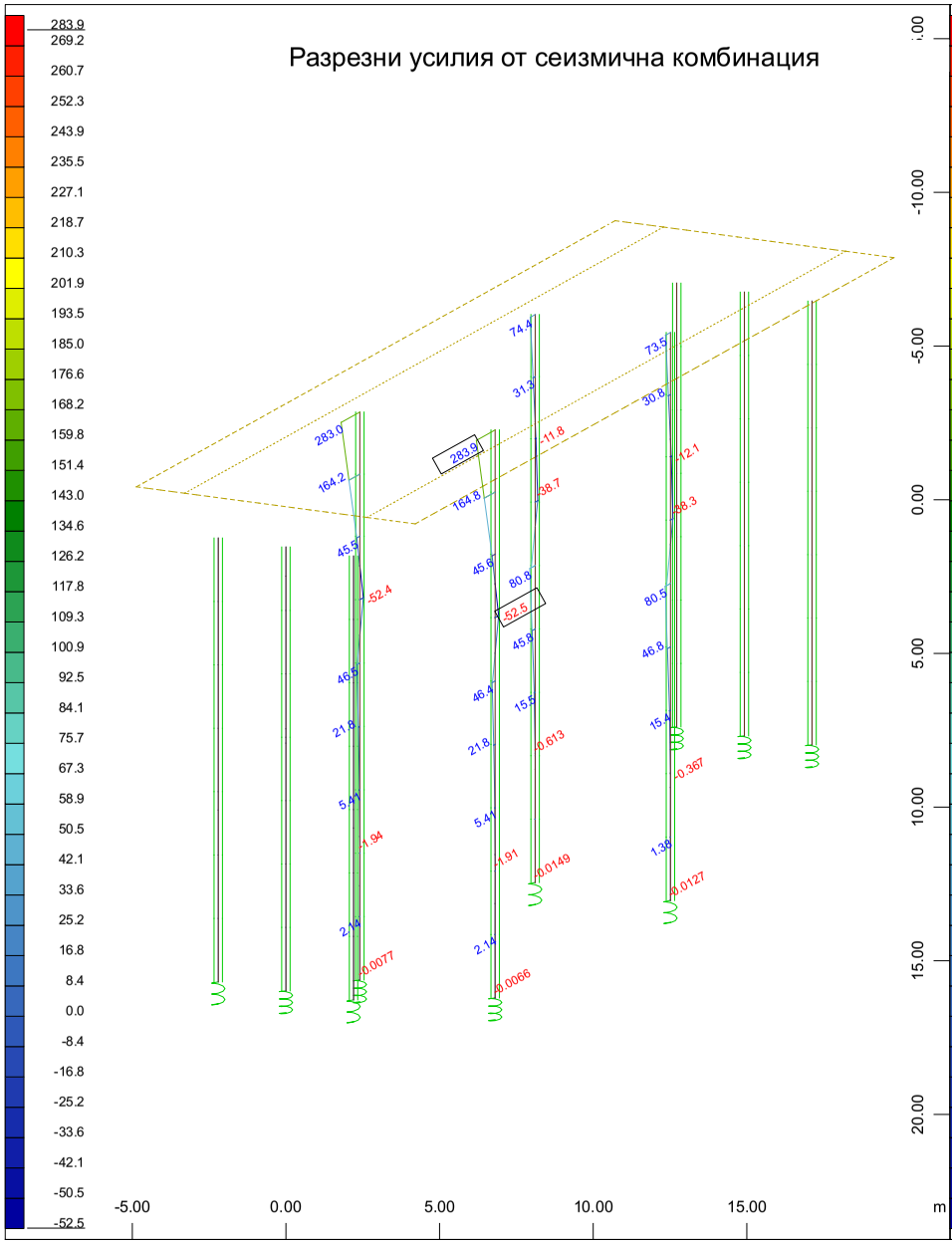
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2123 MAX-VY BEAM , 1 cm 3D =
50.0 kN (Min=-16.4) (Max=16.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

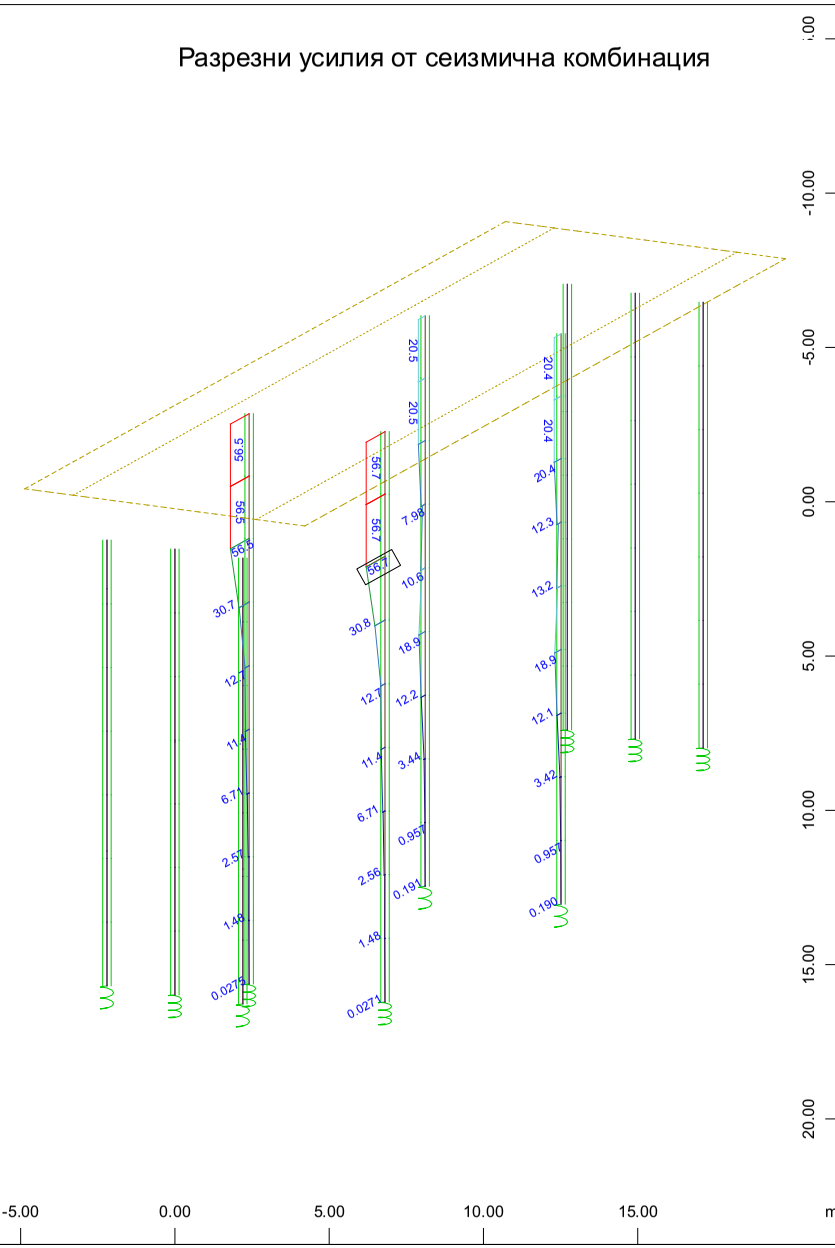
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2123 MAX-VY BEAM , 1 cm 3D =
500.0 kNm (Min=-52.5) (Max=283.9)

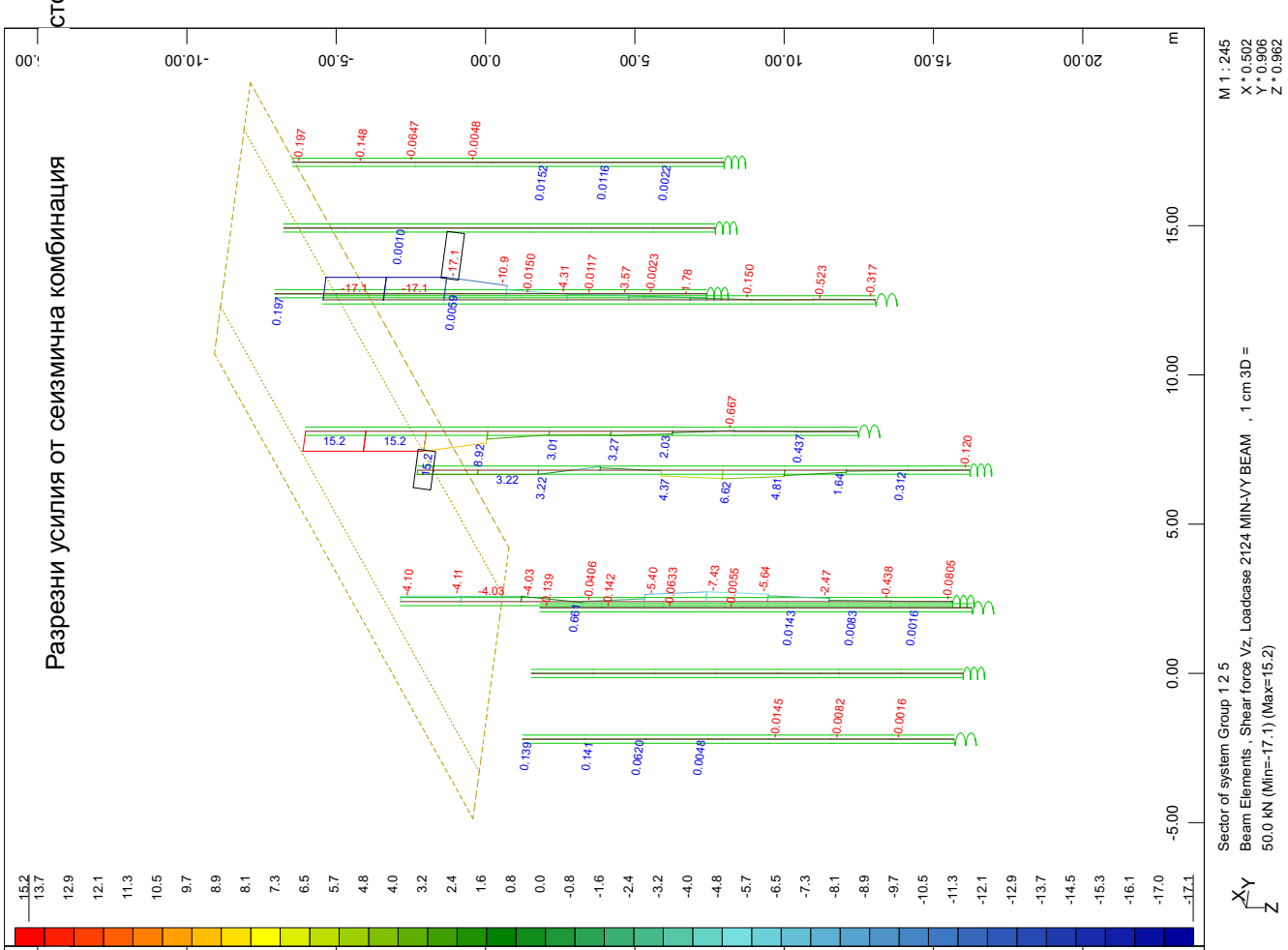
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

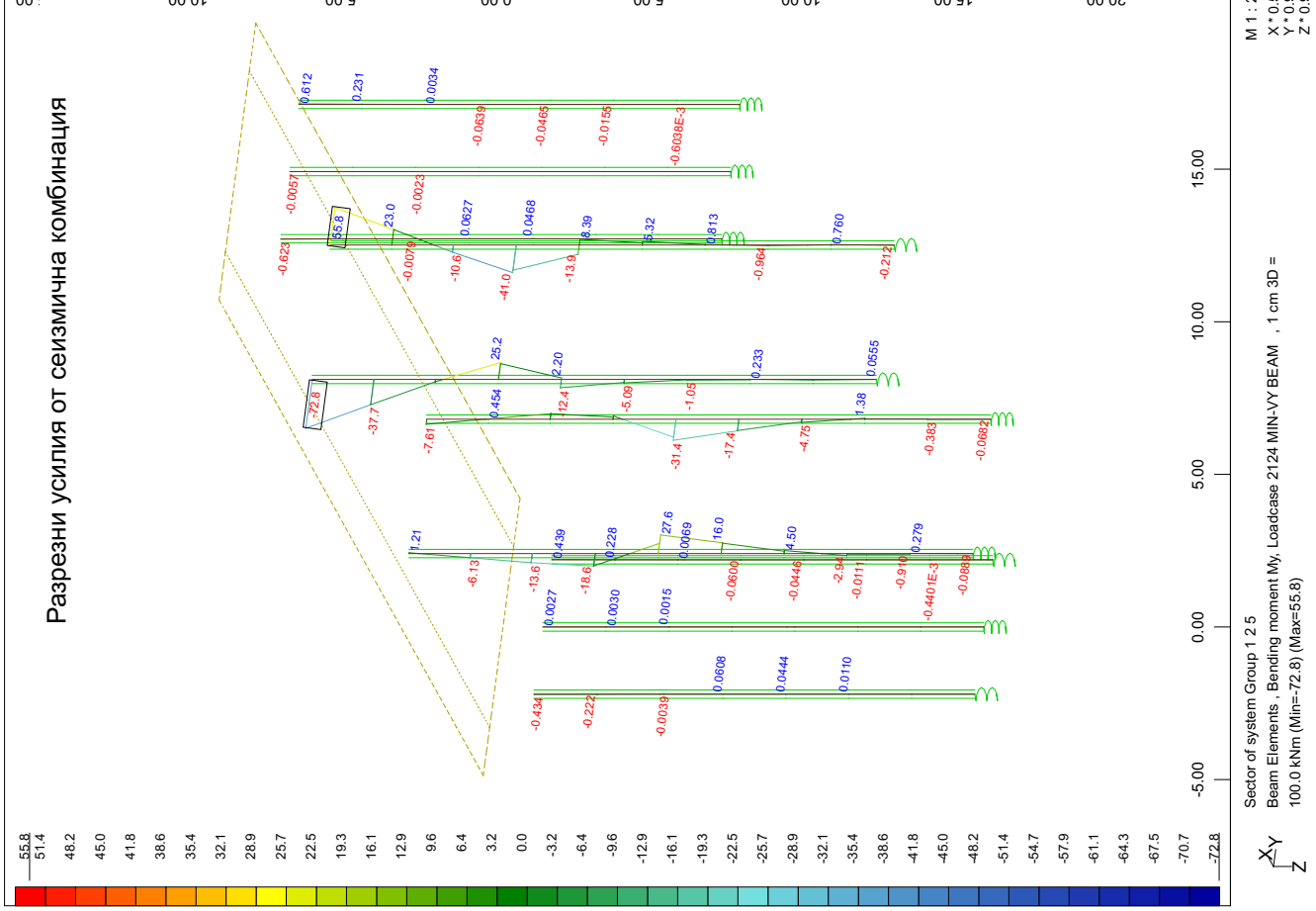
Разрезни усилия от сеизмична комбинация



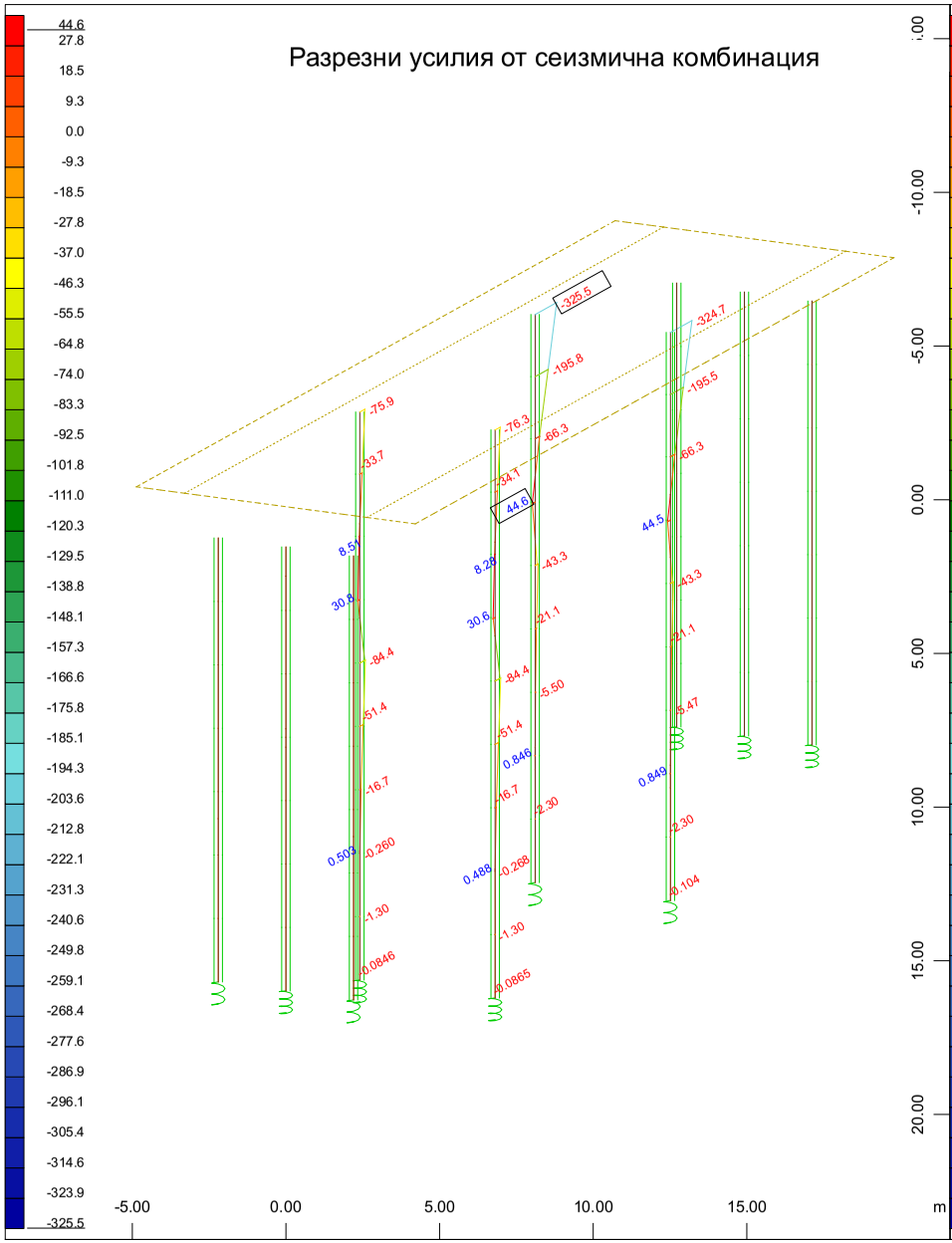
Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2123 MAX-VY BEAM , 1 cm 3D =
100.0 kN (Min=-1.8483e-08) (Max=56.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962





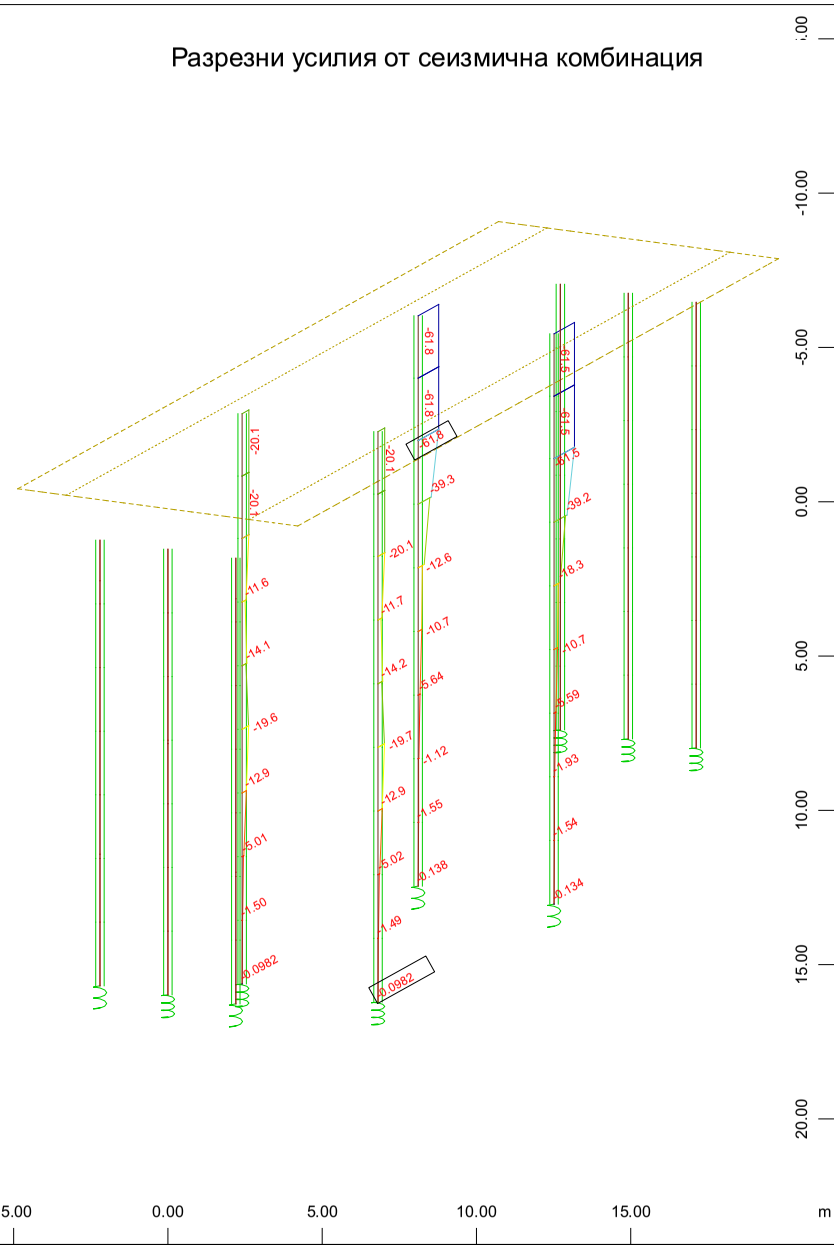
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2124 MIN-VY BEAM , 1 cm 3D =
500.0 kNm (Min=-325.5) (Max=44.6)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

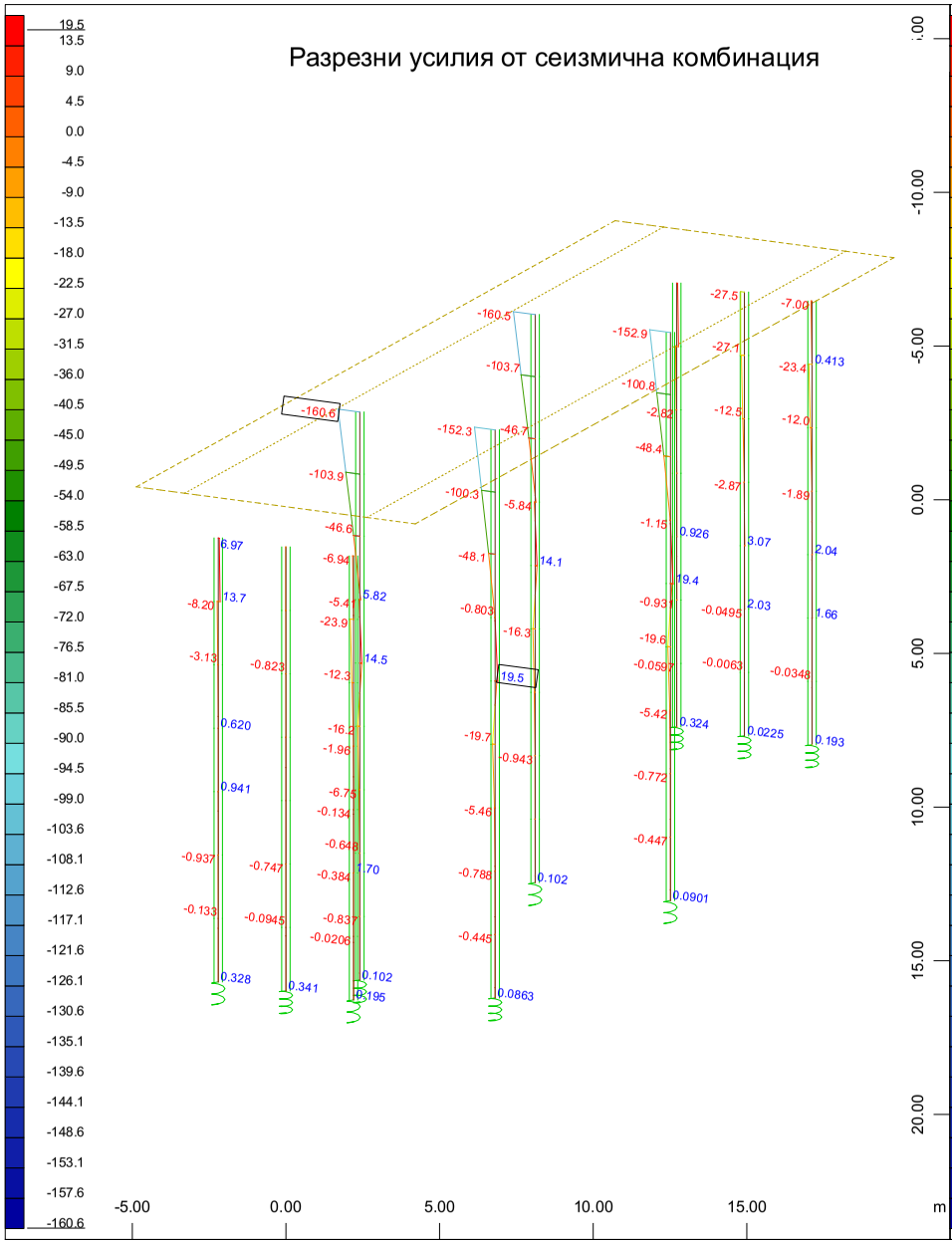
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2124 MIN-VY BEAM , 1 cm 3D =
100.0 kN (Min=-61.8) (Max= 9.9420e-09)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

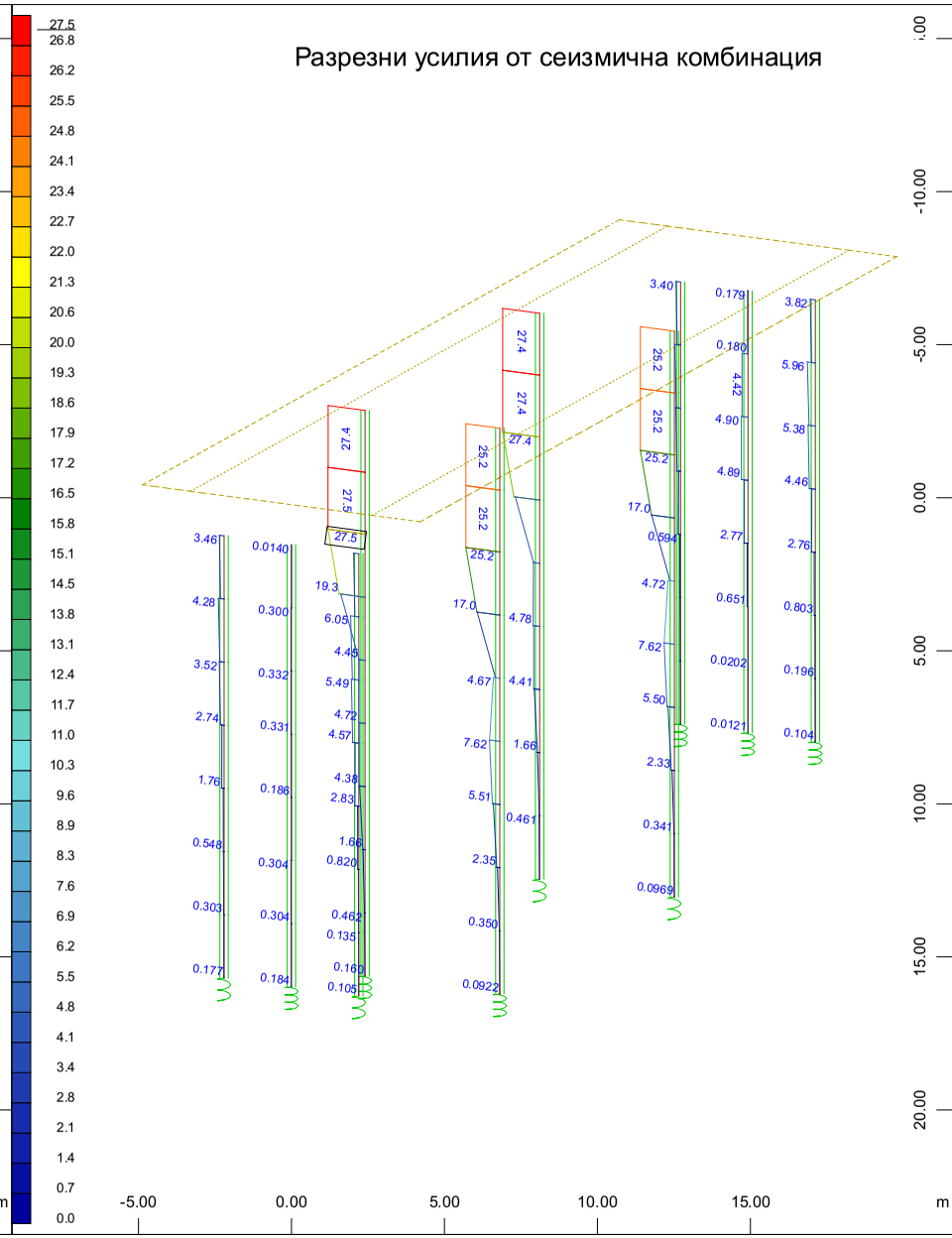
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2125 MAX-VZ BEAM , 1 cm 3D =
500.0 kNm (Min=-160.6) (Max=19.5)

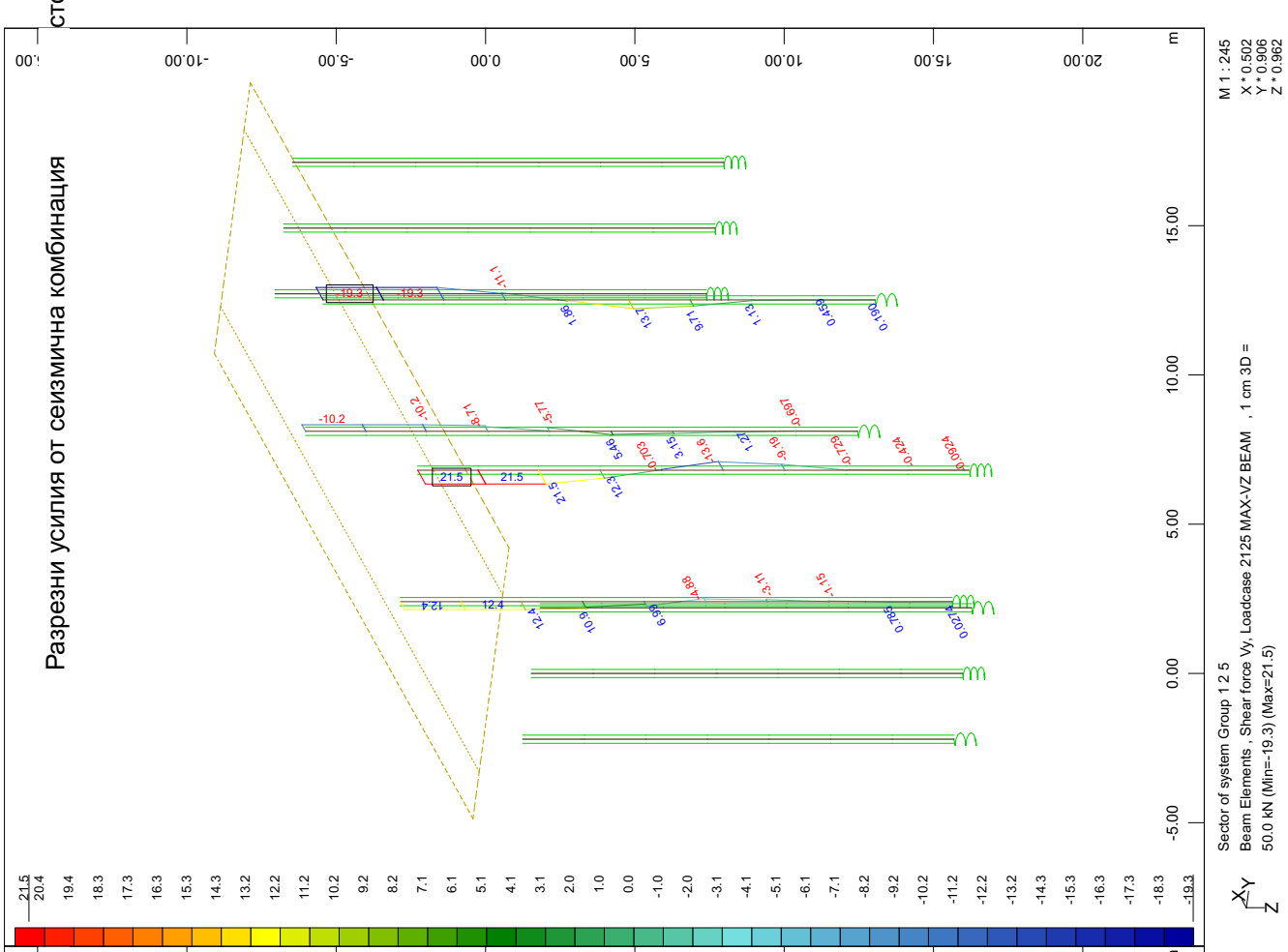
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

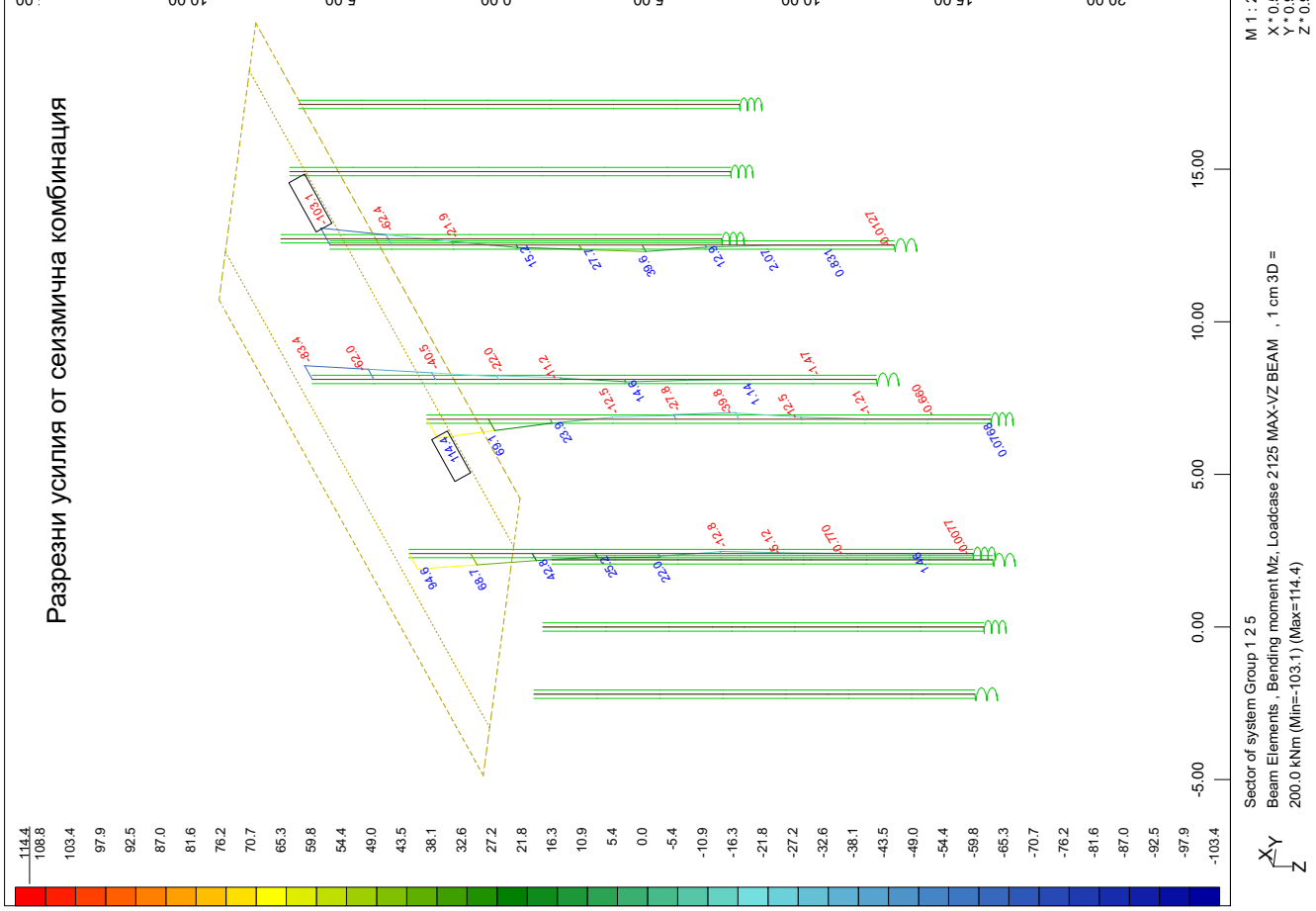
Разрезни усилия от сеизмична комбинация



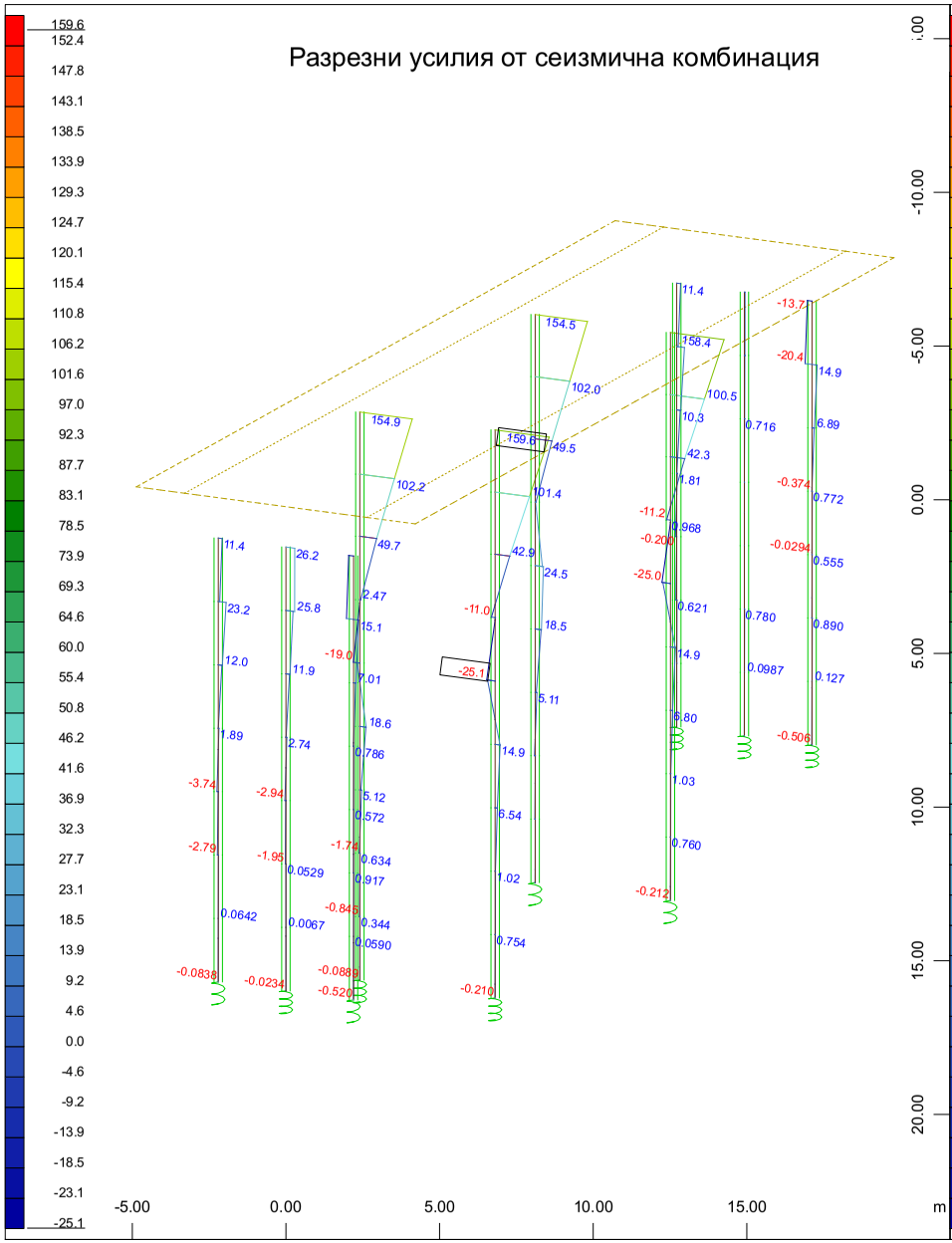
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2125 MAX-VZ BEAM , 1 cm 3D =
50.0 kN (Max=27.5)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962





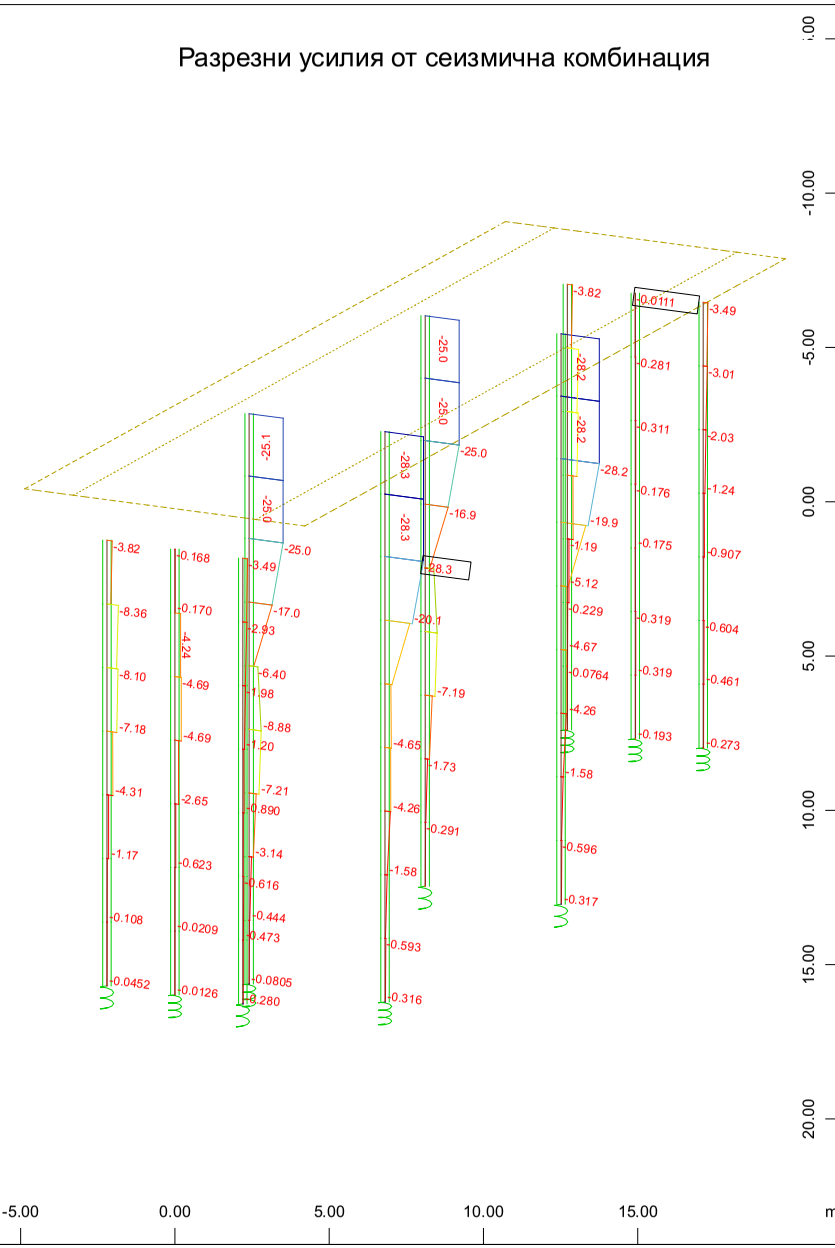
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2126 MIN-VZ BEAM , 1 cm 3D =
200.0 kNm (Min=-25.1) (Max=159.6)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

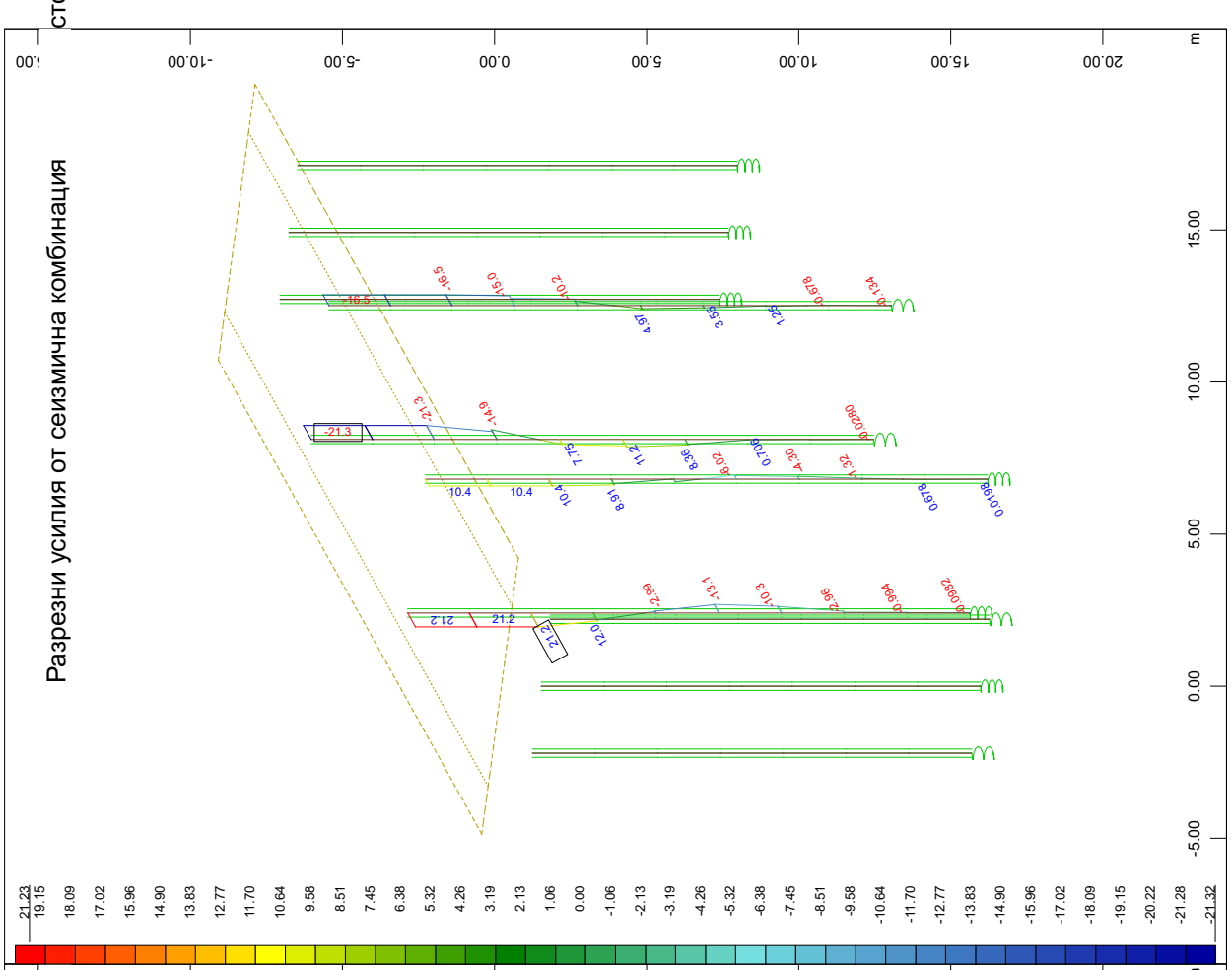
Разрезни усилия от сеизмична комбинация

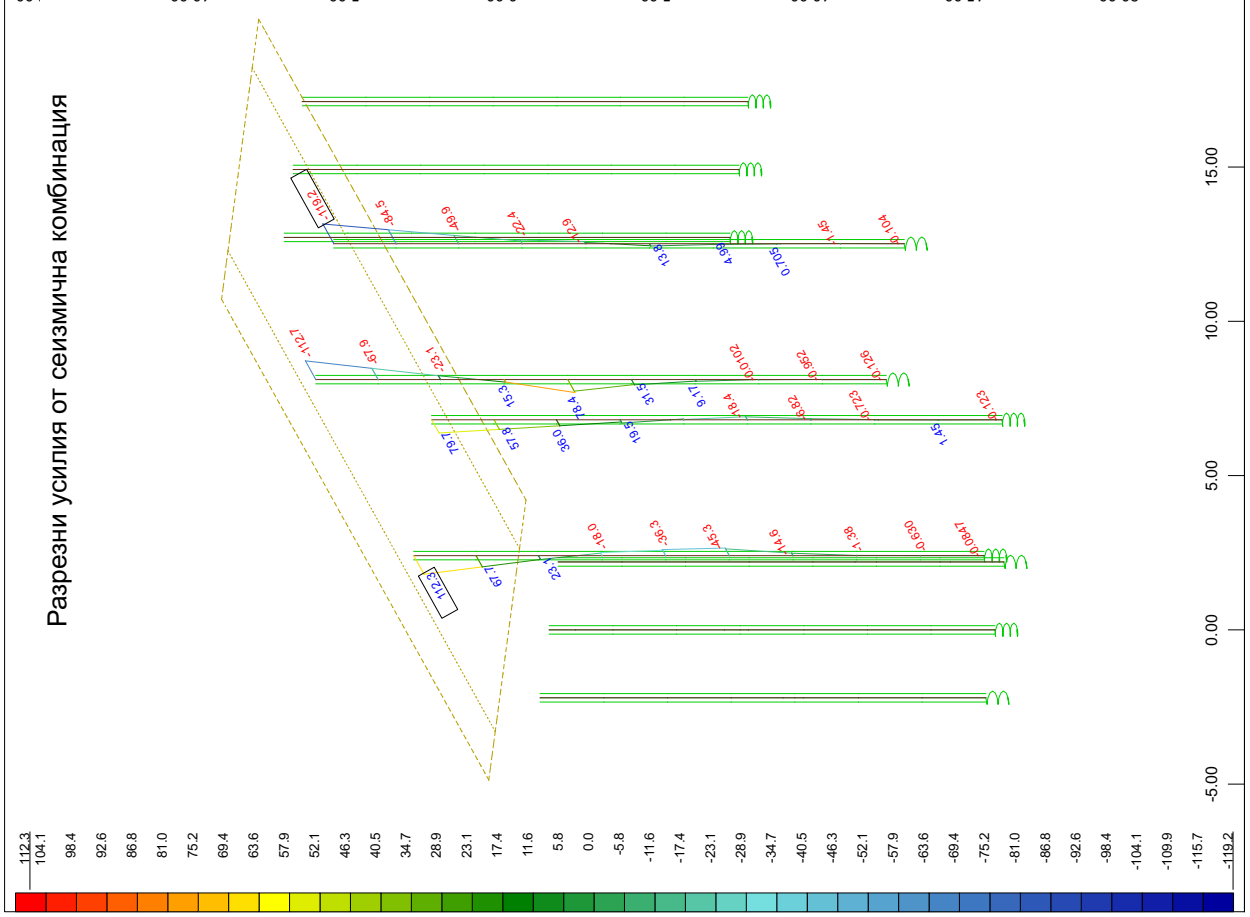


Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2126 MIN-VZ BEAM , 1 cm 3D =
50.0 kN (Min=-28.3) (Max=-0.0111)

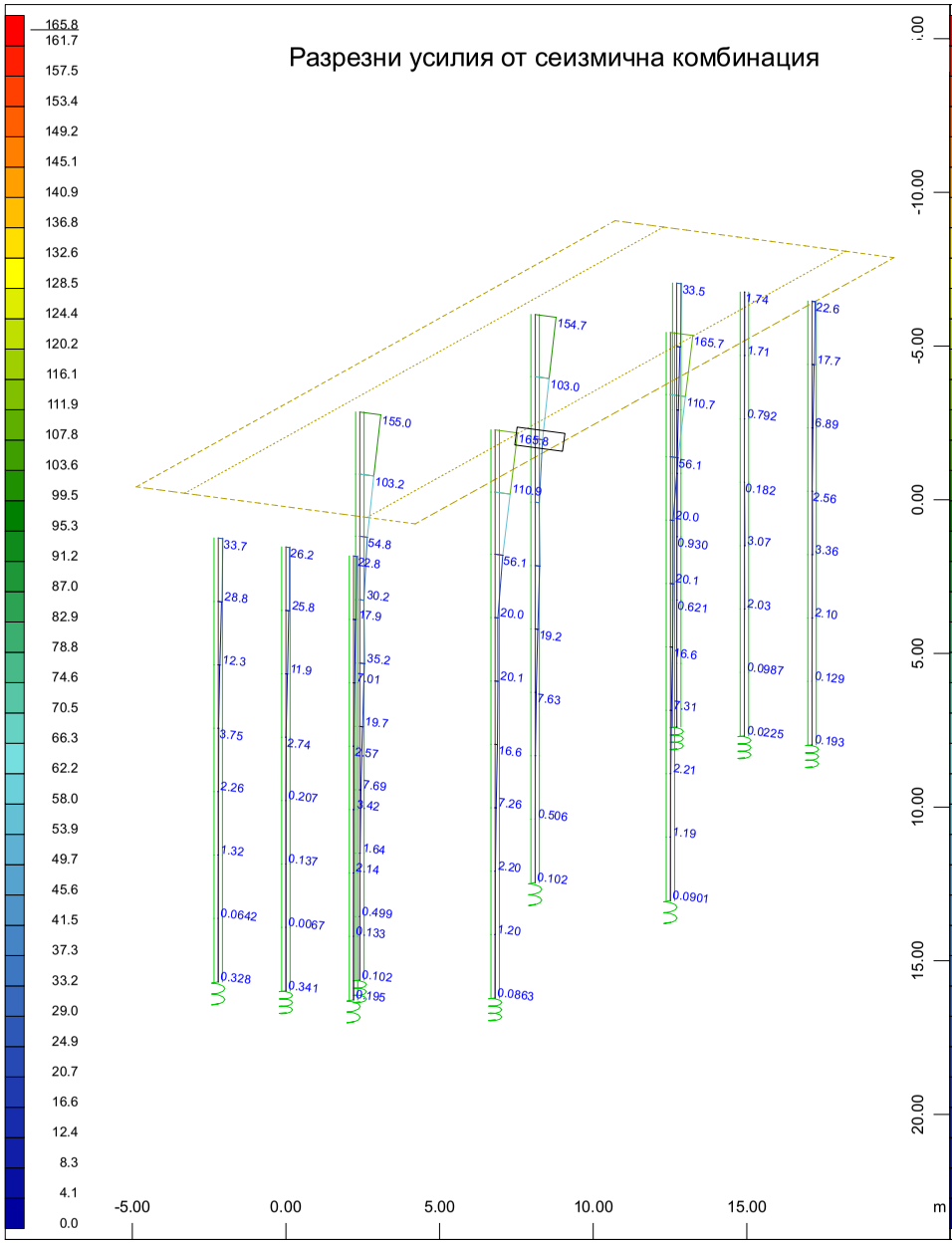
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

стоянe





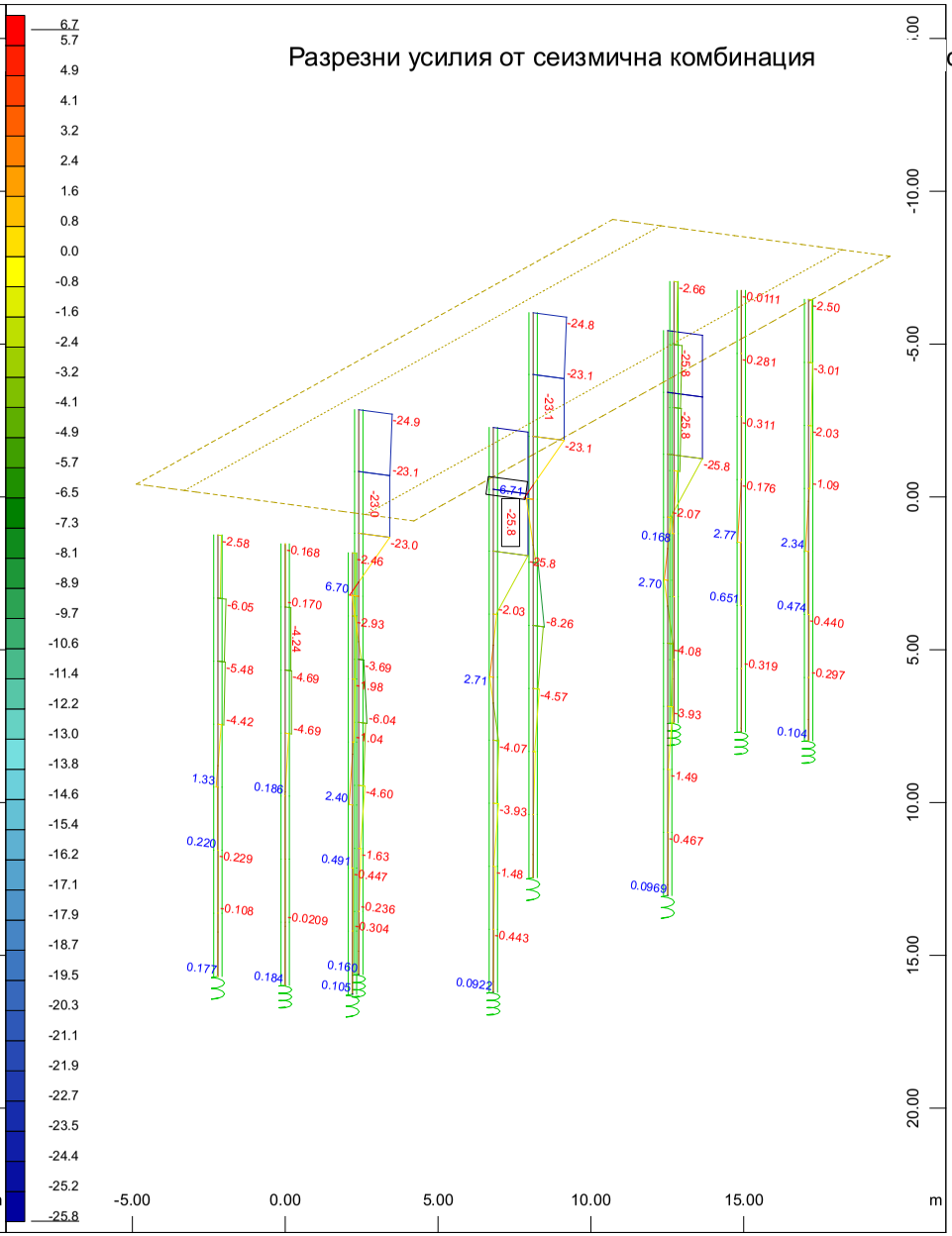
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2129 MAX-MY BEAM , 1 cm 3D =
500.0 kNm (Max=165.8)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

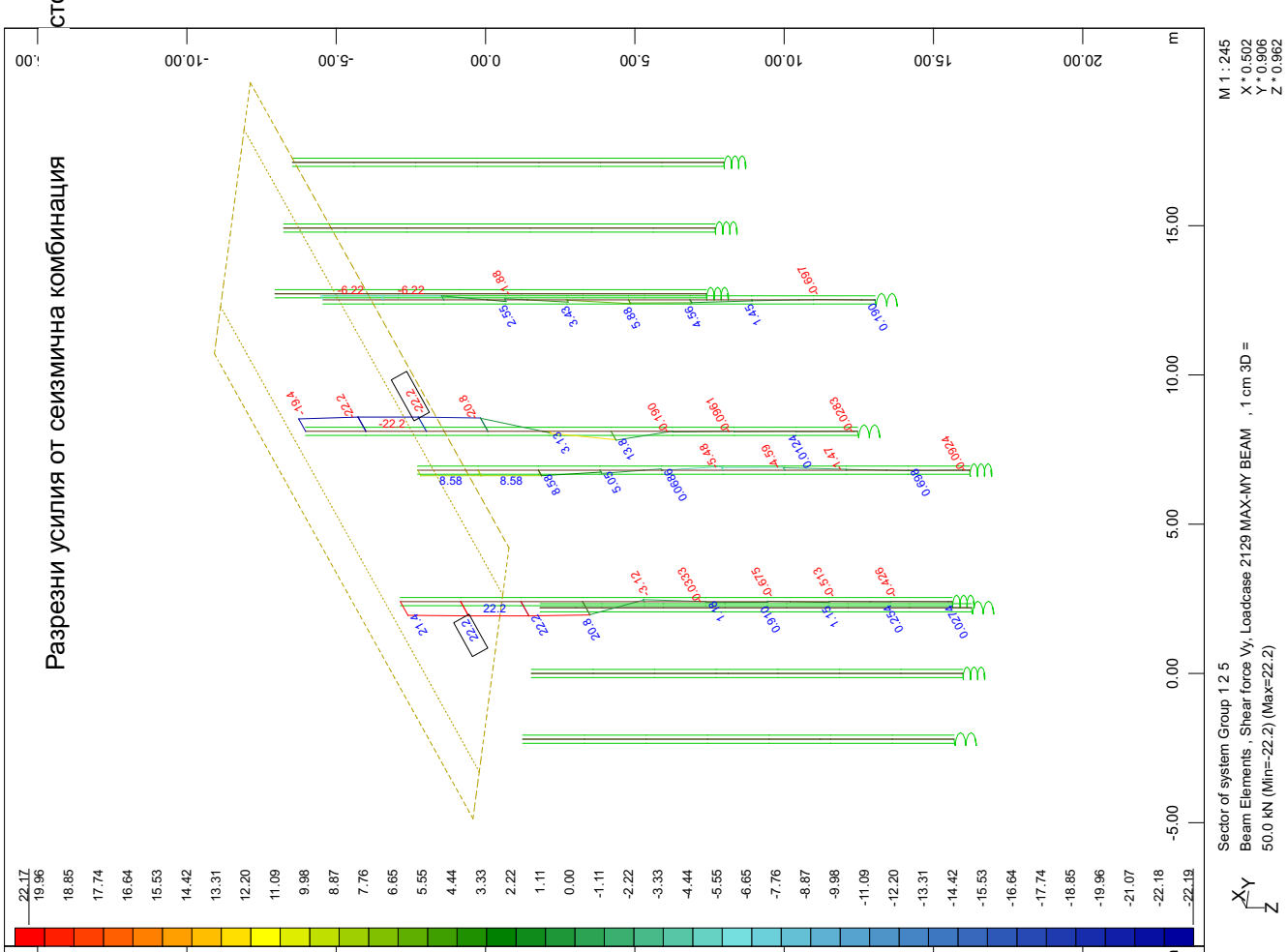
Разрезни усилия от сеизмична комбинация

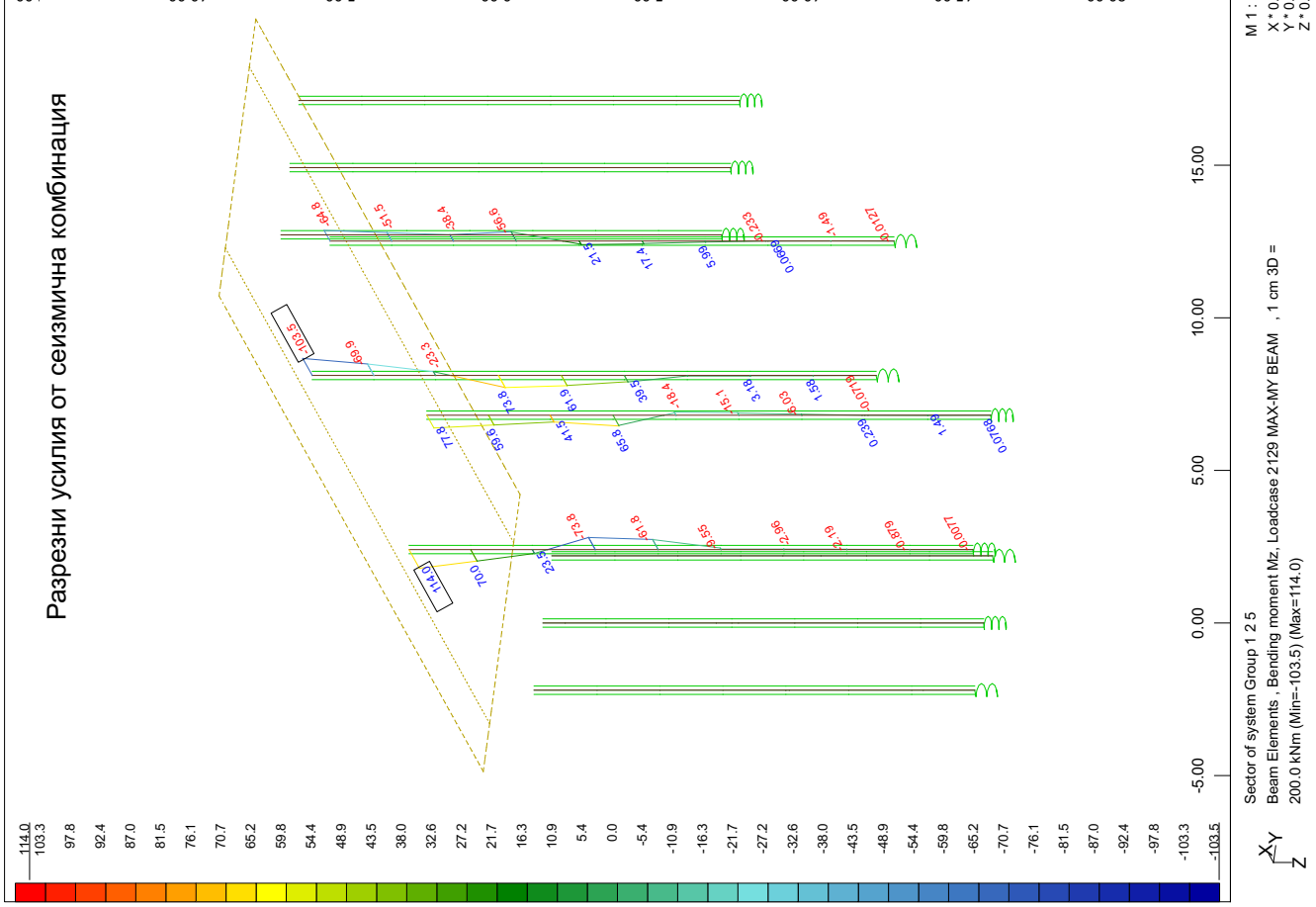


Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2129 MAX-MY BEAM , 1 cm 3D =
50.0 kN (Min=-25.8) (Max=6.71)

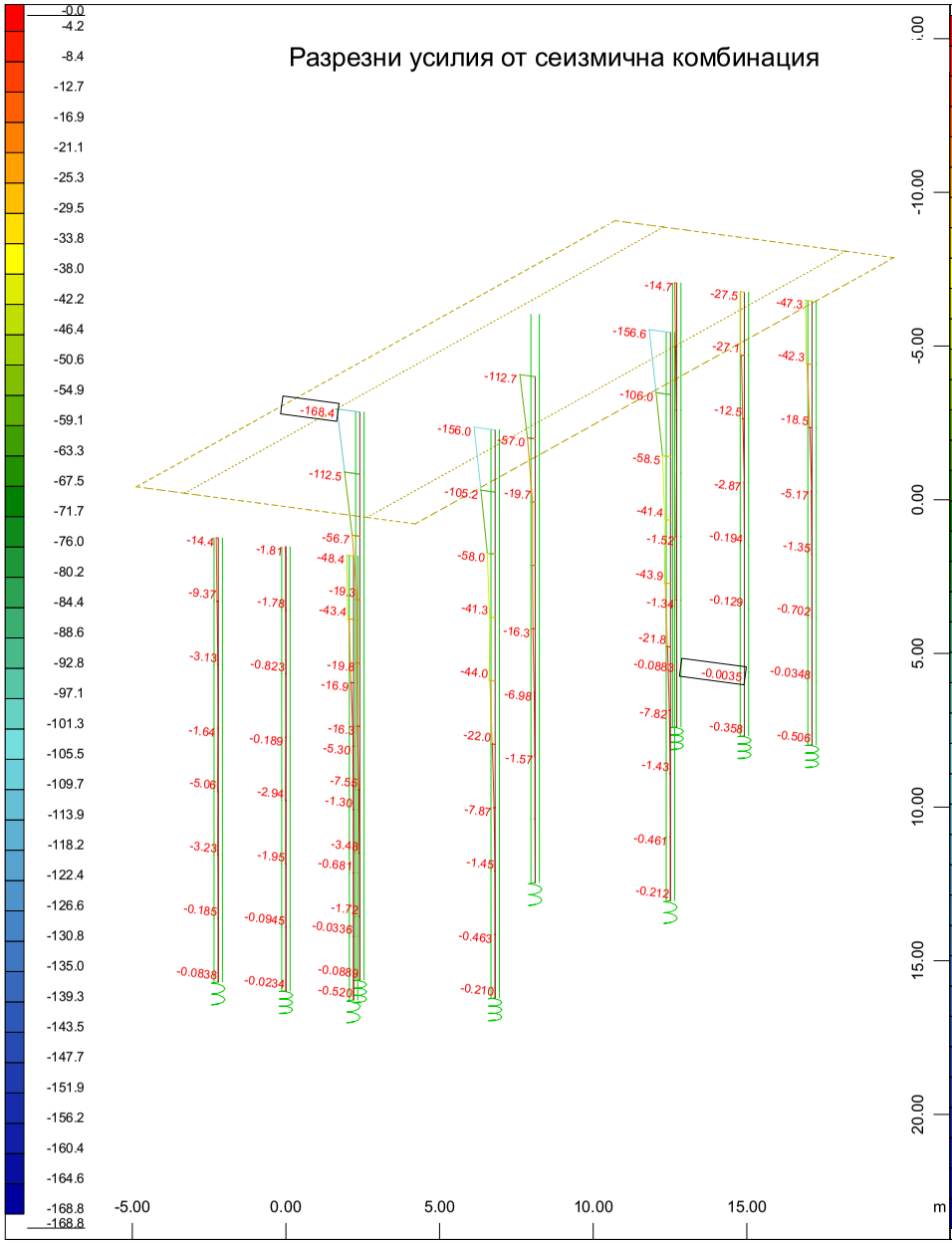
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

стояне





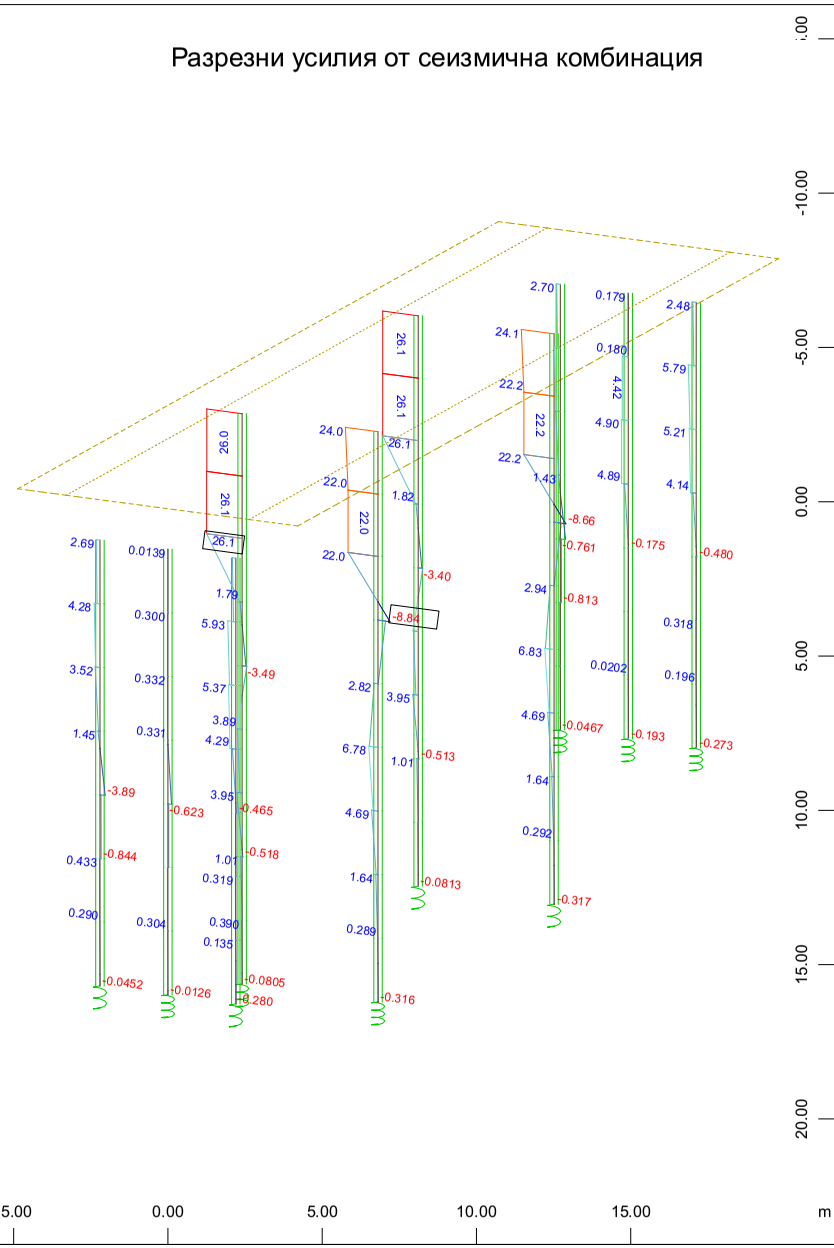
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2130 MIN-MY BEAM , 1 cm 3D =
500.0 kNm (Min=-168.8) (Max=-0.0035)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

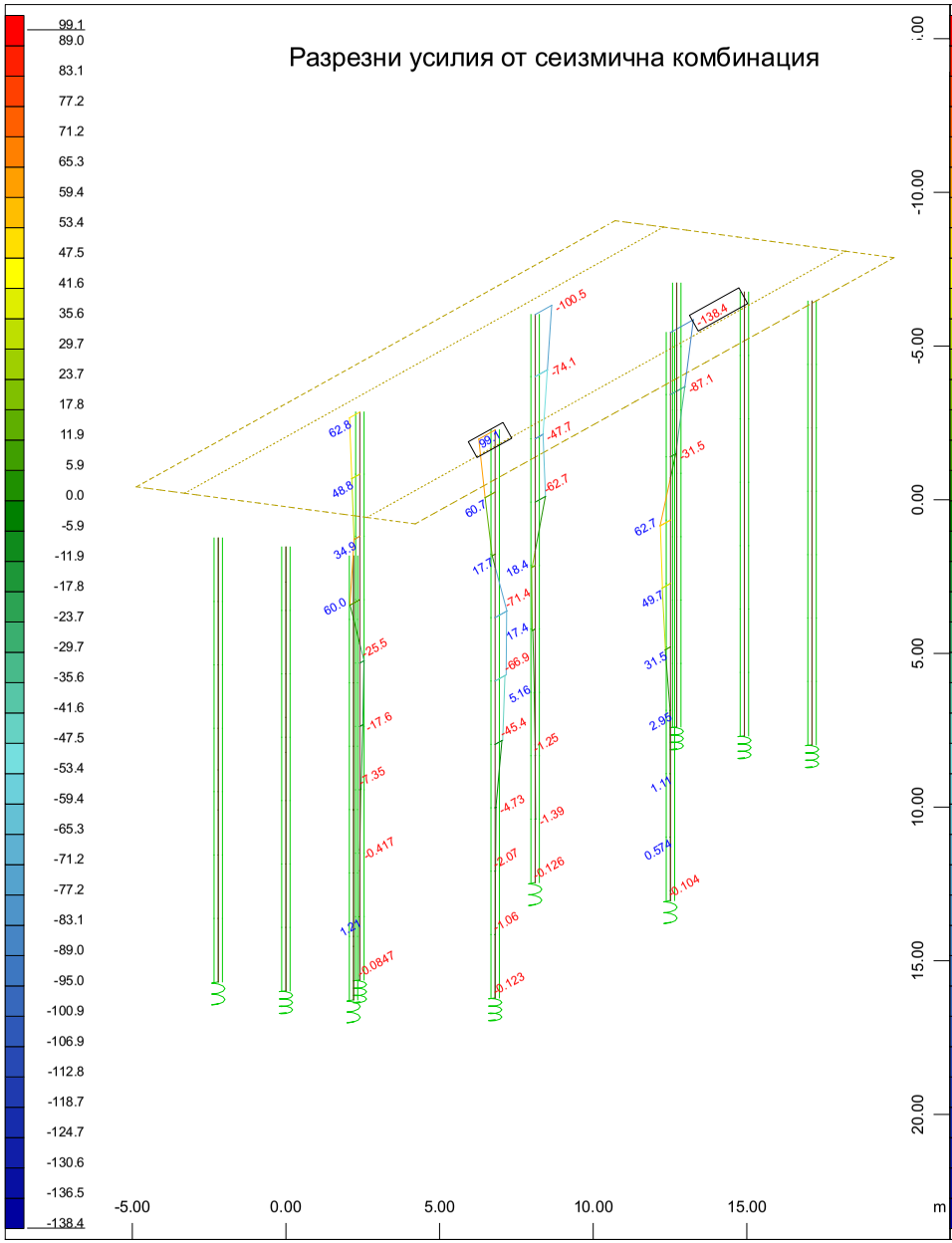
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2130 MIN-MY BEAM , 1 cm 3D =
50.0 kN (Min=-8.84) (Max=26.1)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

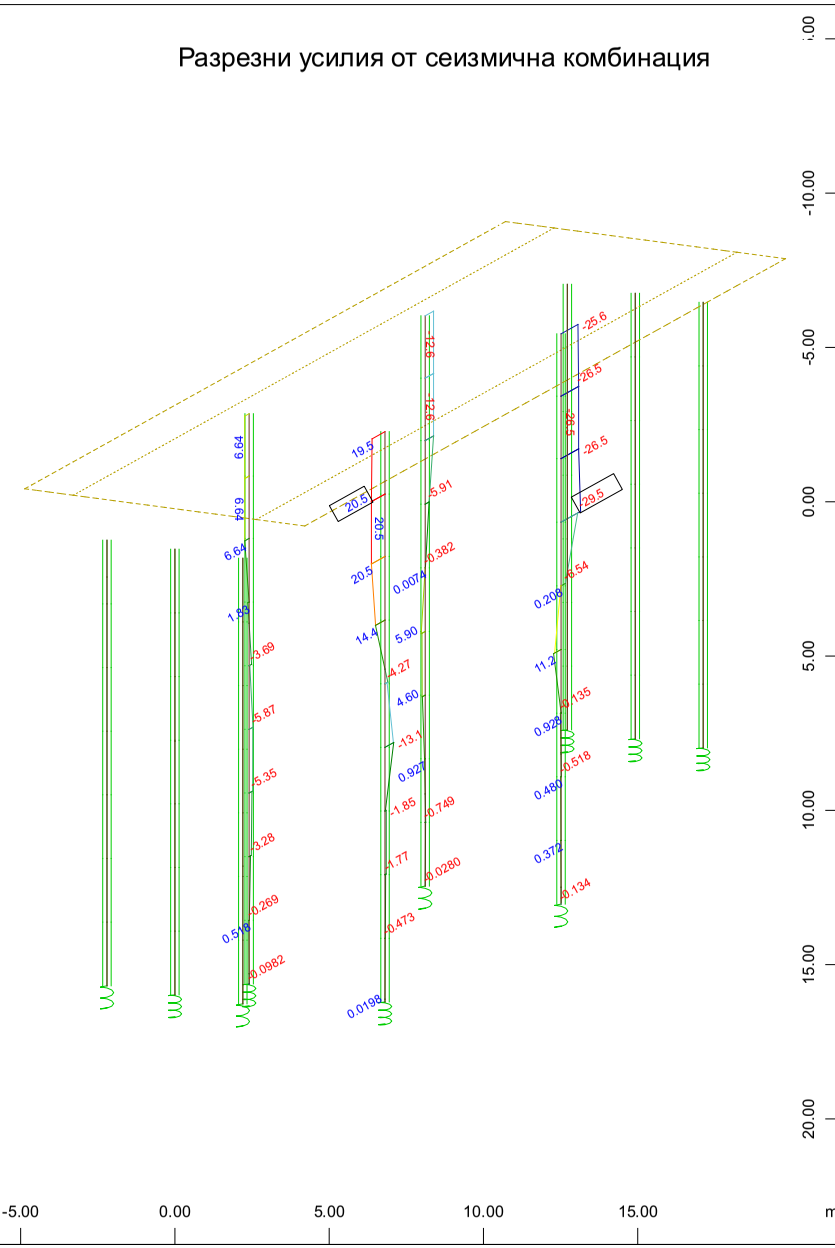
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2130 MIN-MY BEAM , 1 cm 3D =
200.0 kNm (Min=-138.4) (Max=99.1)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

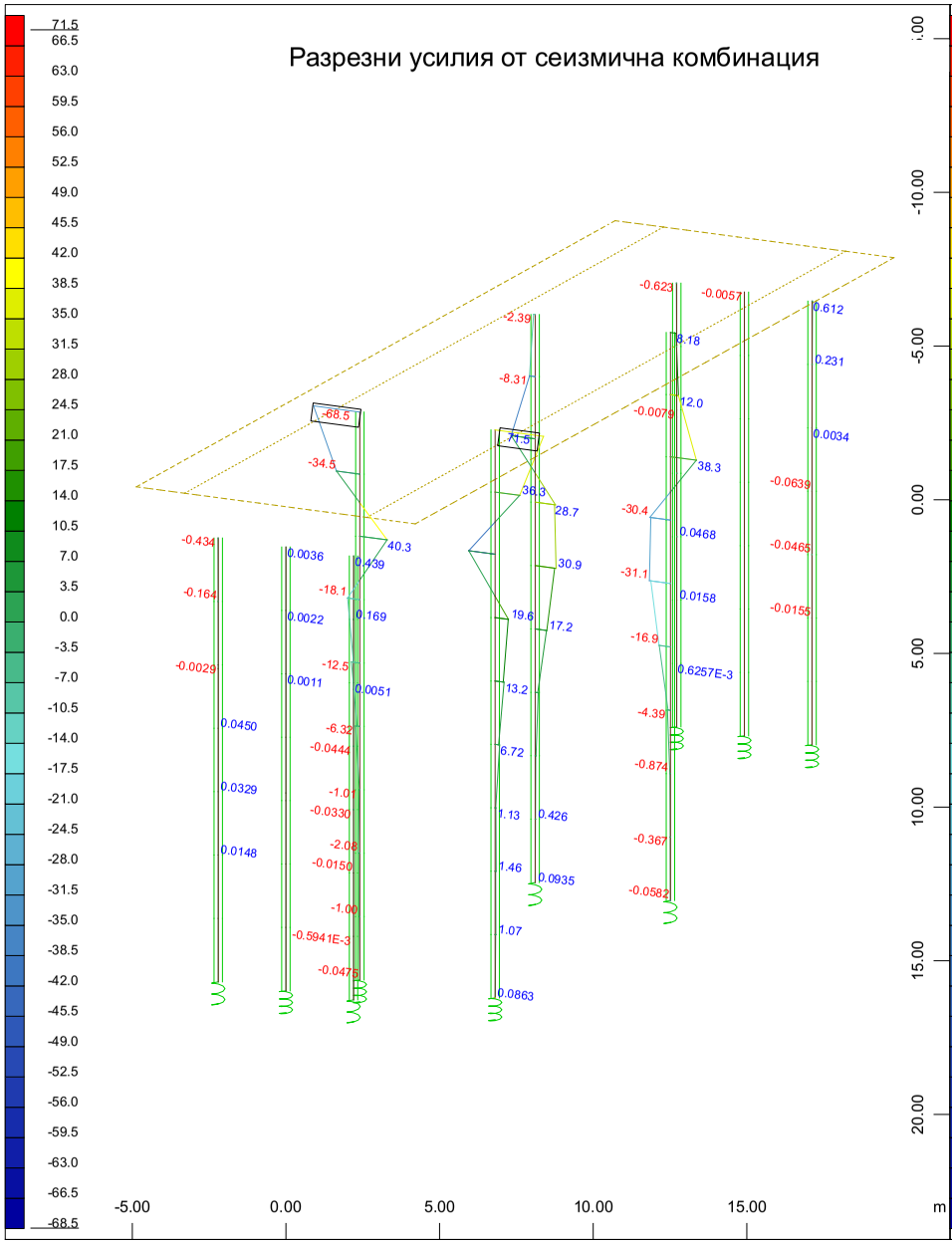
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2130 MIN-MY BEAM , 1 cm 3D =
50.0 kN (Min=-29.5) (Max=20.5)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

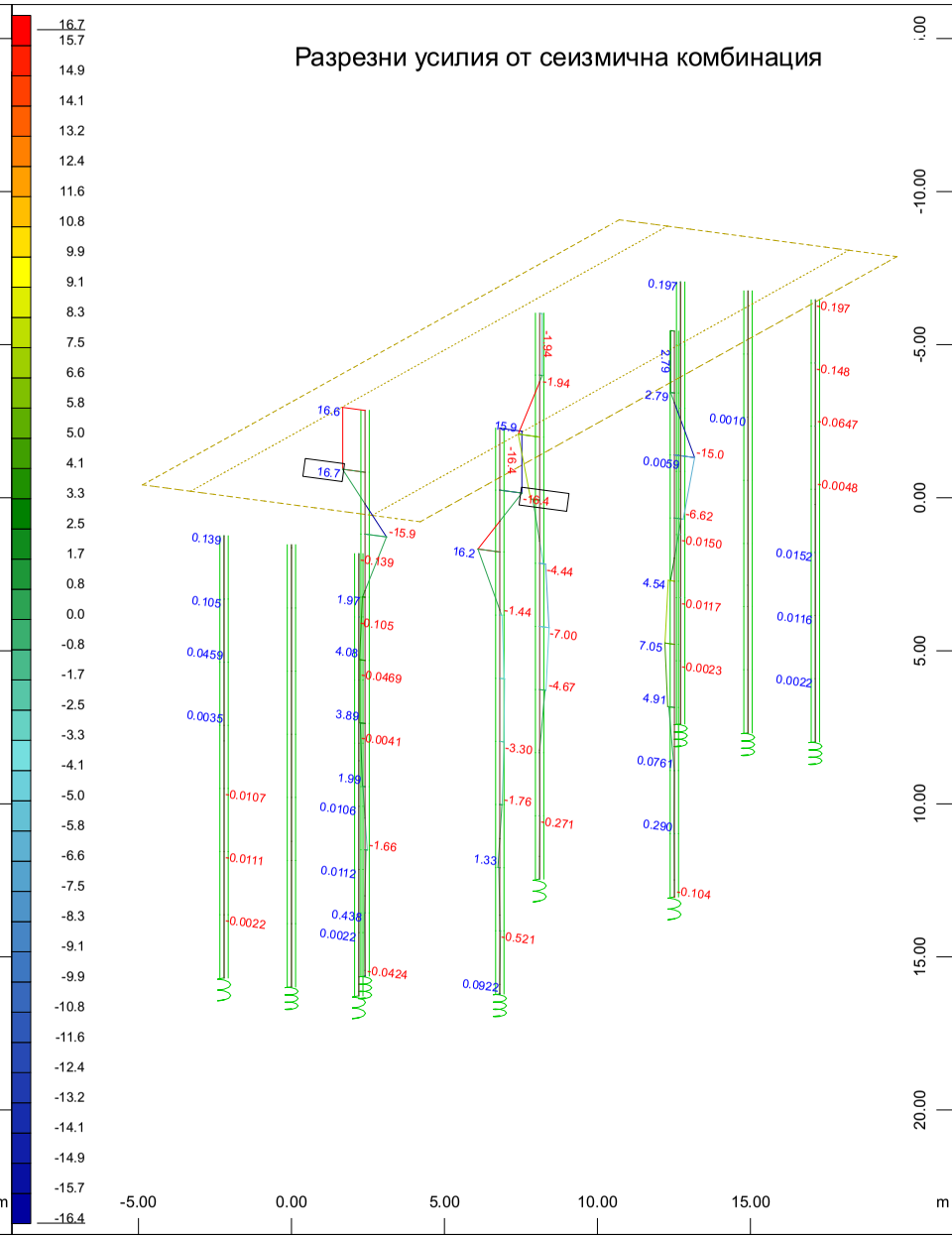
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2131 MAX-MZ BEAM , 1 cm 3D =
100.0 kNm (Min=-68.5) (Max=71.5)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

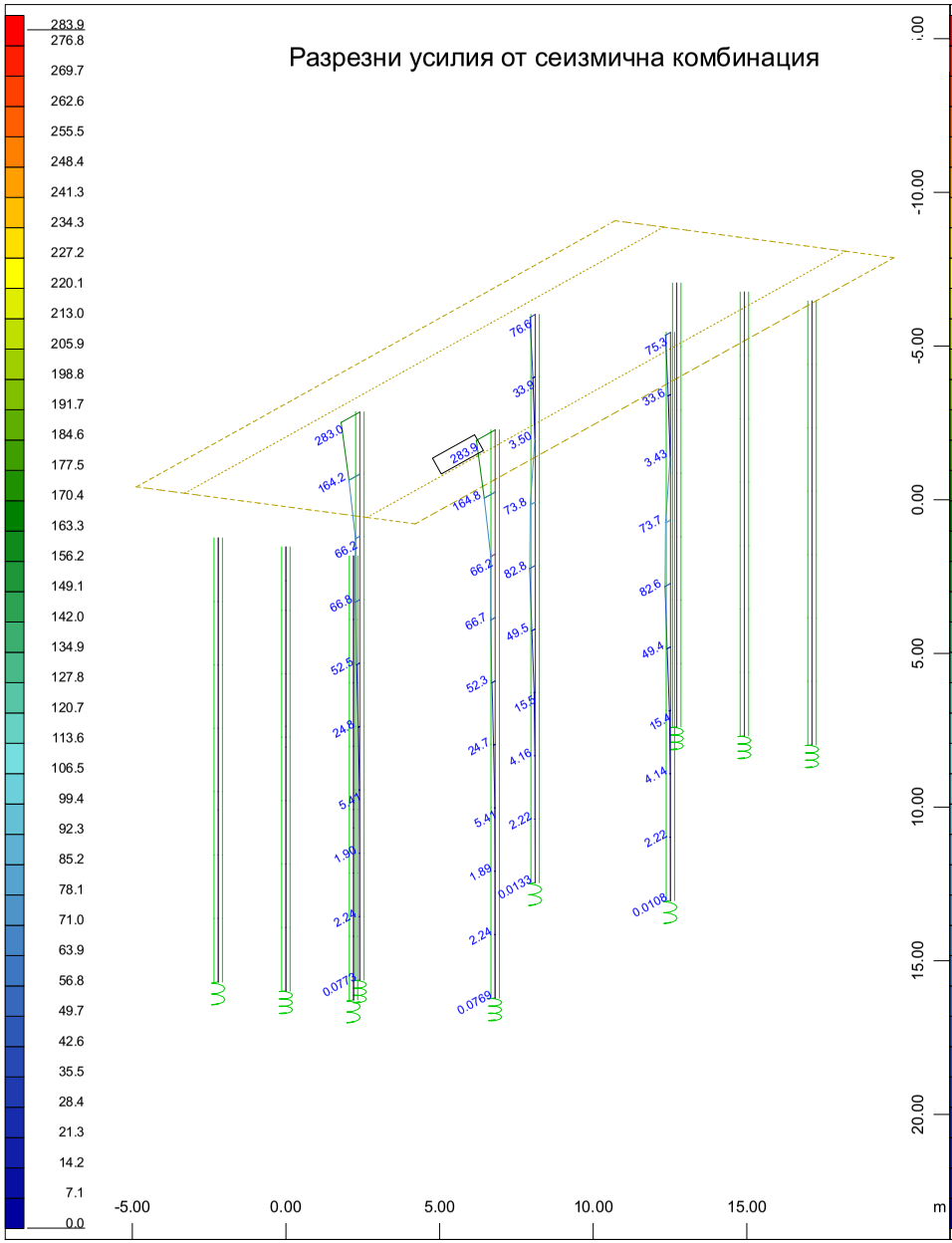
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2131 MAX-MZ BEAM , 1 cm 3D =
50.0 kN (Min=-16.4) (Max=16.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

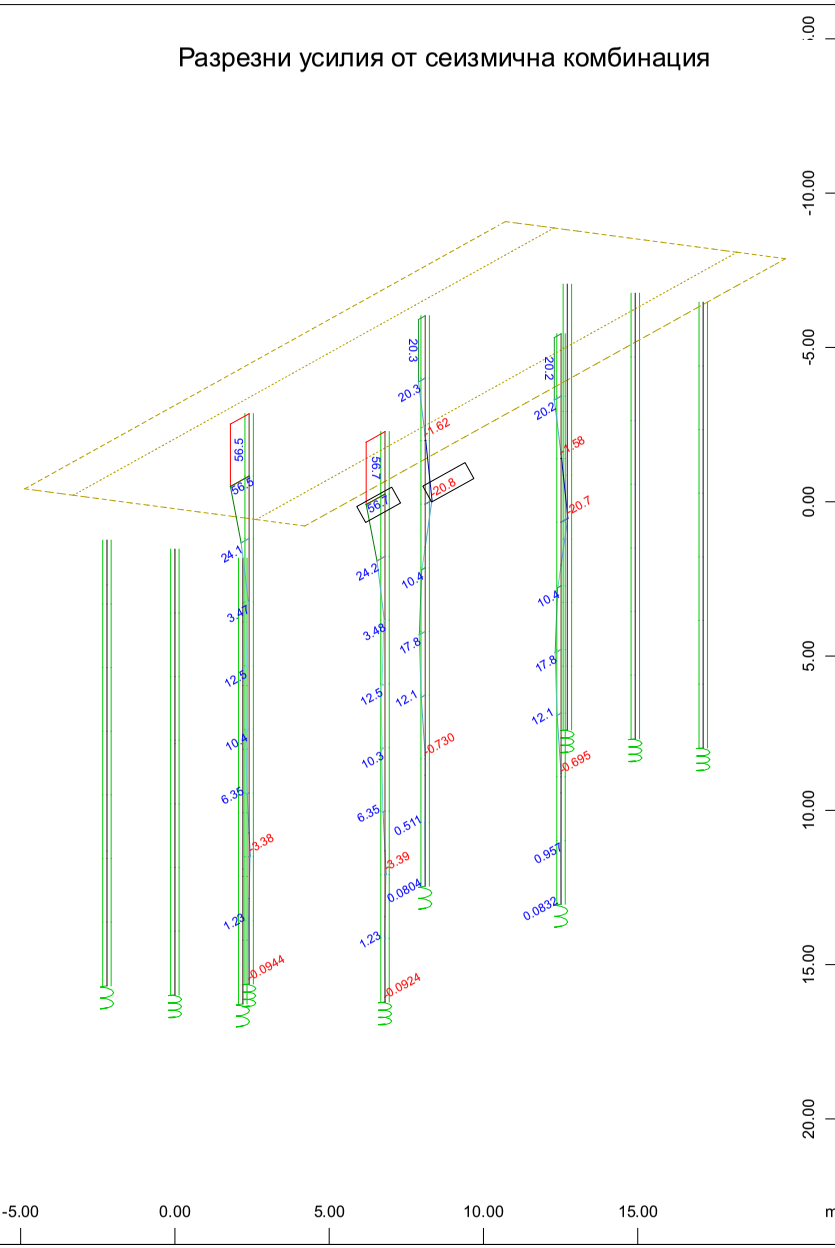
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2131 MAX-MZ BEAM , 1 cm 3D =
500.0 kNm (Min=-3.7154e-08) (Max=283.9)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

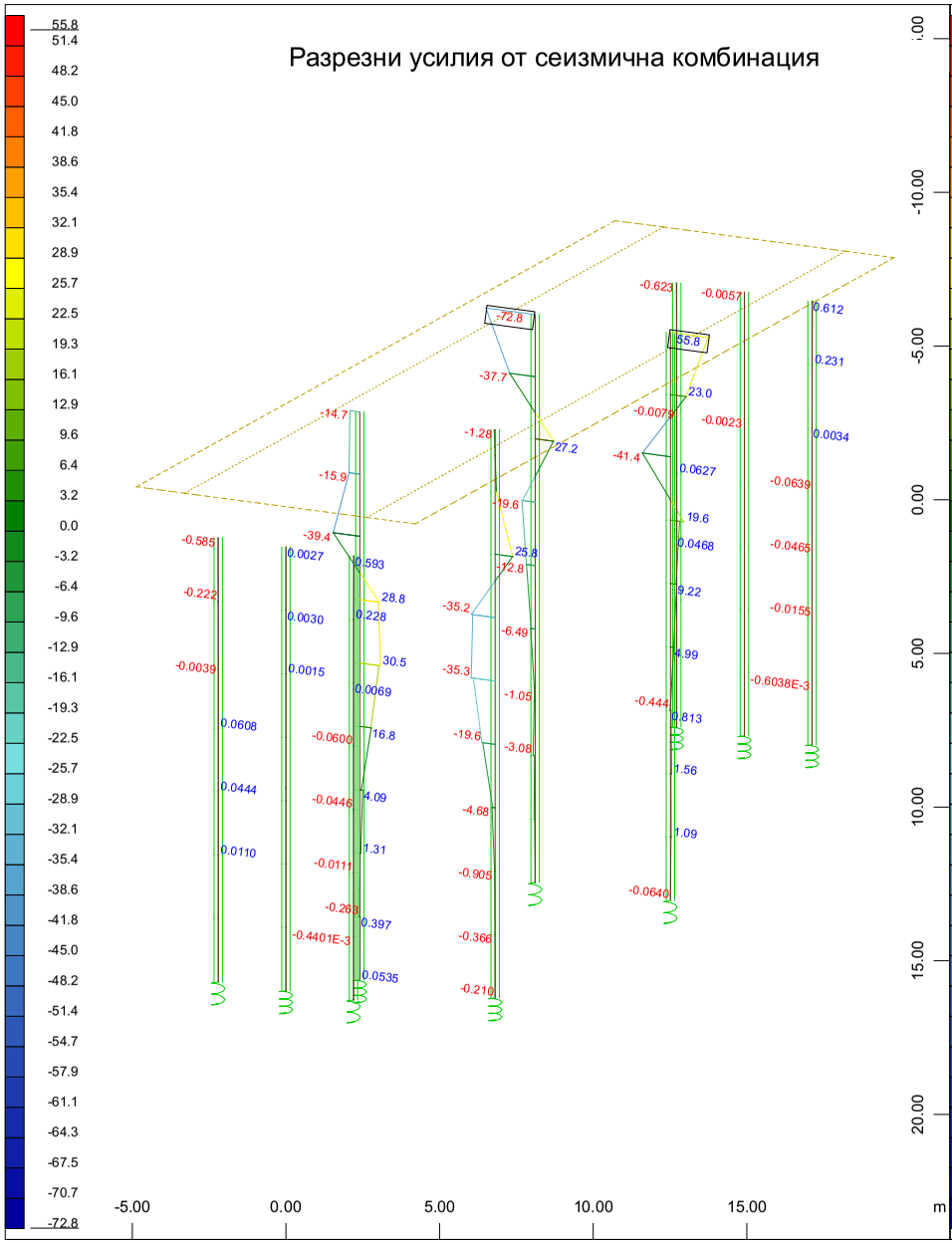
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2131 MAX-MZ BEAM , 1 cm 3D =
100.0 kN (Min=-20.8) (Max=56.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

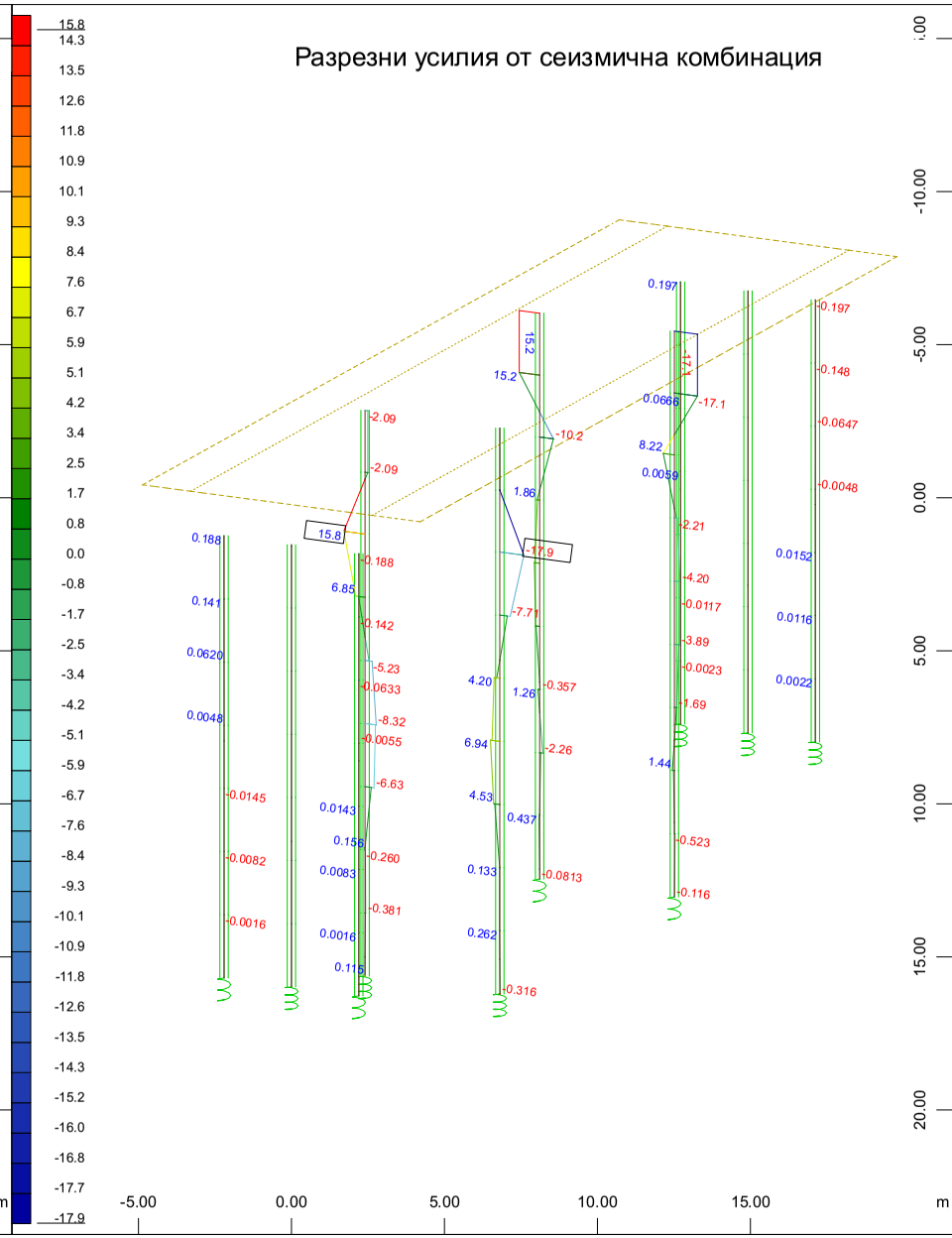
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2132 MIN-MZ BEAM , 1 cm 3D =
100.0 kNm (Min=-72.8) (Max=55.8)

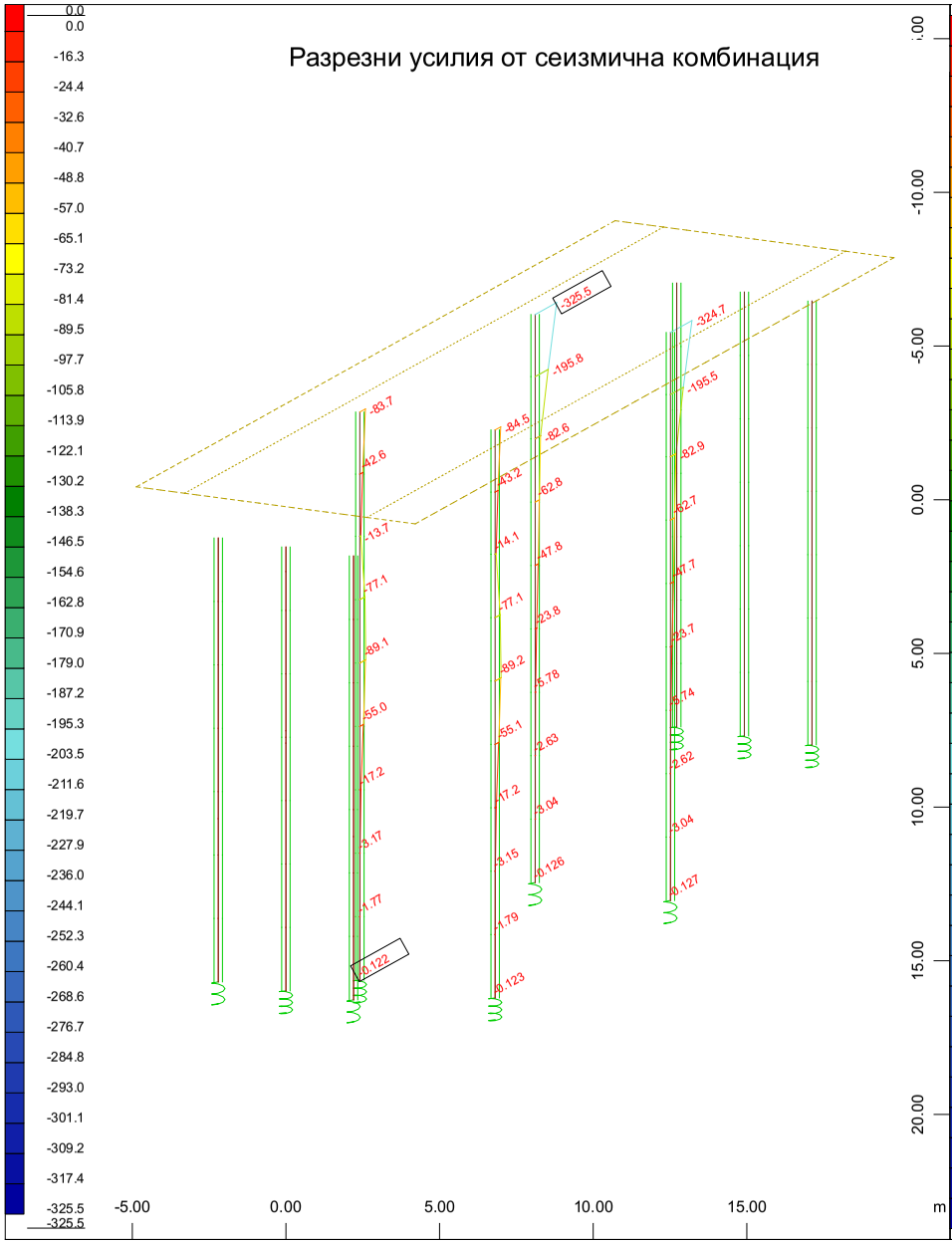
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

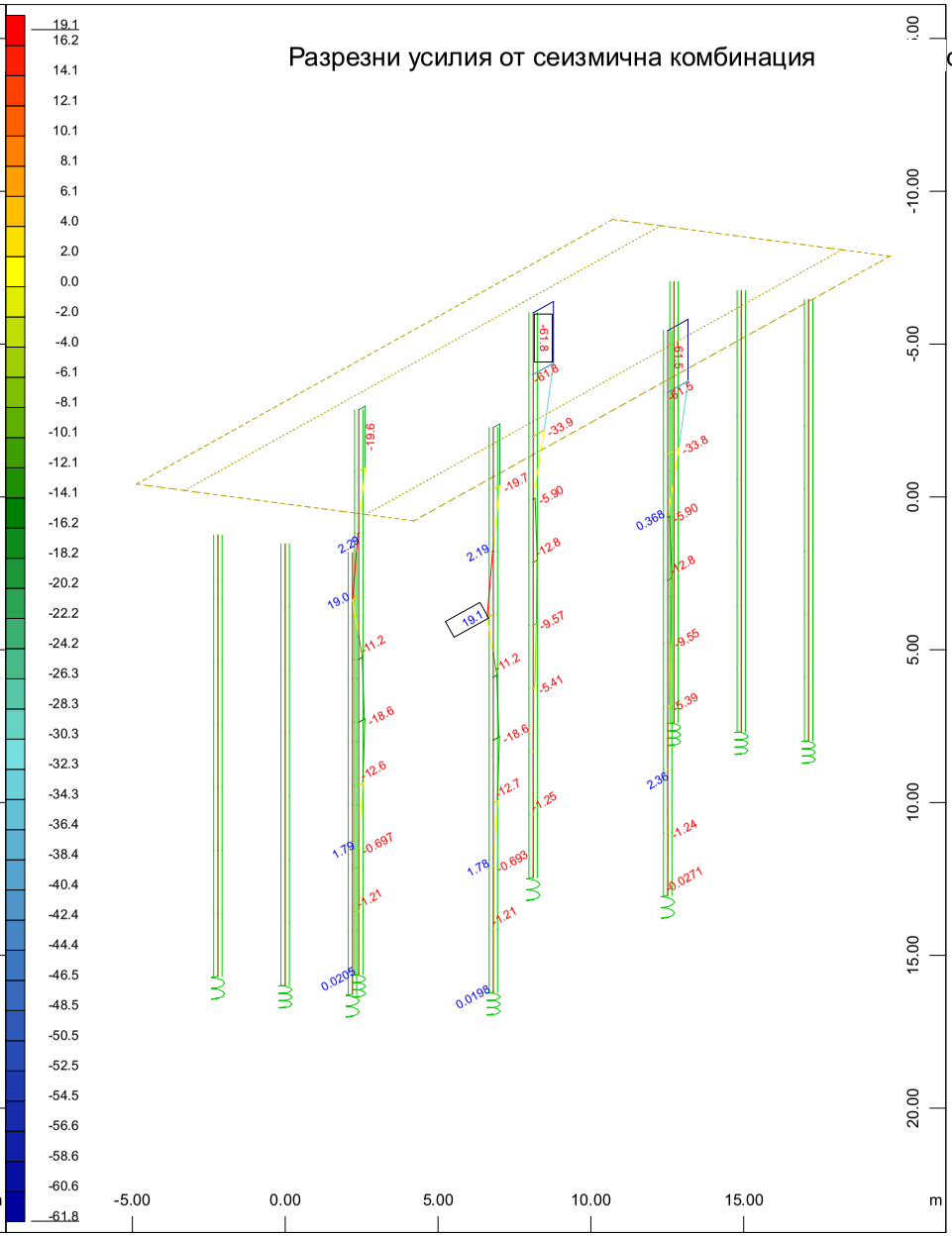
Разрезни усилия от сеизмична комбинация



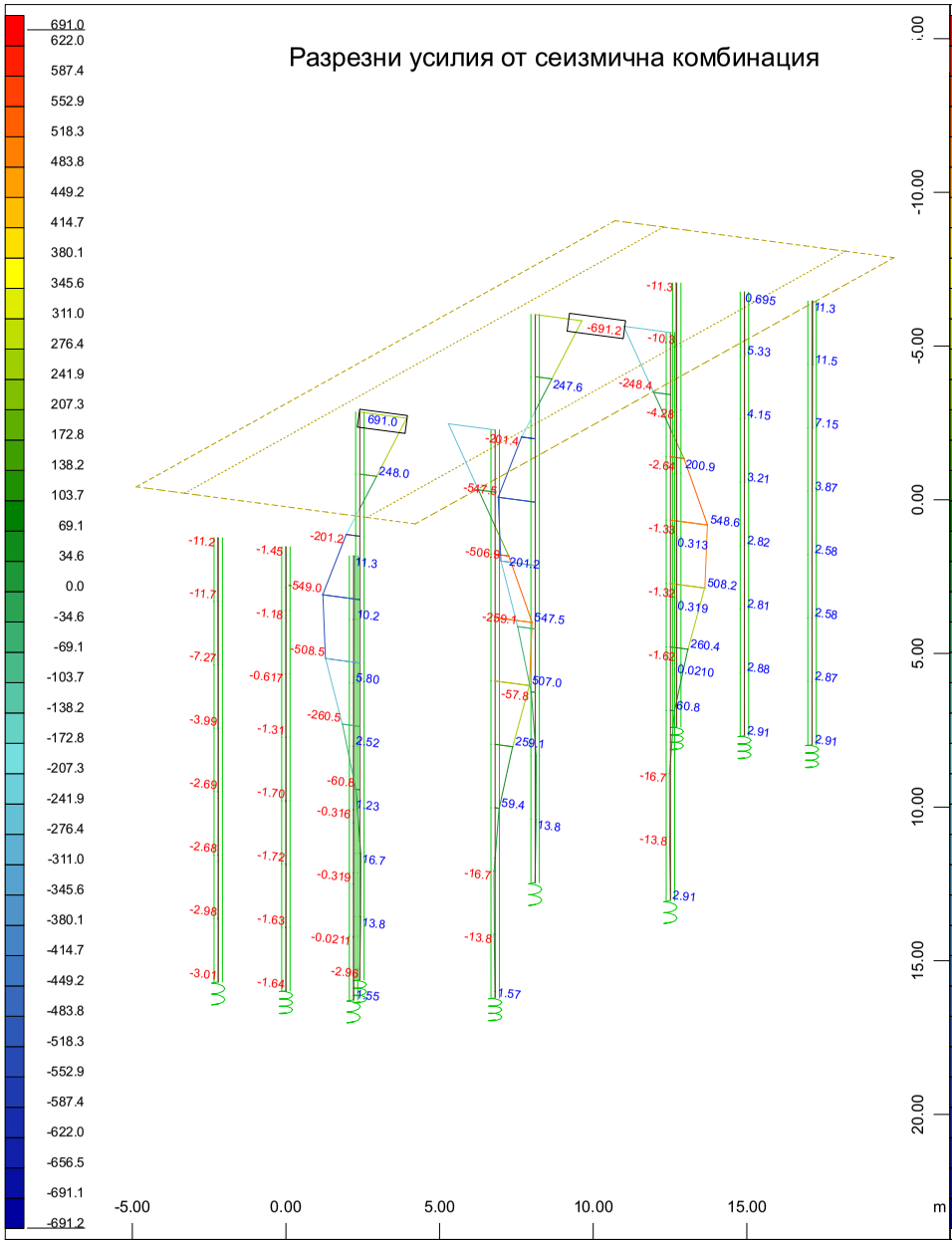
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2132 MIN-MZ BEAM , 1 cm 3D =
50.0 kN (Min=-17.9) (Max=15.8)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962


Разрезни усилия от сеизмична комбинация
0.0
-16.3
-24.4
-32.6
-40.7
-48.8
-57.0
-65.1
-73.2
-81.4
-89.5
-97.7
-105.8
-113.9
-122.1
-130.2
-138.3
-146.5
-154.6
-162.8
-170.9
-179.0
-187.2
-195.3
-203.5
-211.6
-219.7
-227.9
-236.0
-244.1
-252.3
-260.4
-268.6
-276.7
-284.8
-293.0
-301.1
-309.2
-317.4
-325.5
-325.5
-325.5
-195.8
-195.5
-324.7
-83.7
-42.6
-13.7
-177.1
-89.1
-55.0
-17.2
-3.17
-1.77
-0.122
-84.5
-43.2
-14.1
-177.1
-89.2
-55.1
-17.2
-3.15
-1.79
-0.123
-82.6
-62.8
-47.8
-23.8
-5.78
-2.63
-3.04
-0.126
-82.9
-62.7
-47.7
-23.7
-5.74
-2.62
-3.04
-0.127
-5.00
0.00
5.00
10.00
15.00
m
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2132 MIN-MZ BEAM , 1 cm 3D =
500.0 kNm (Min=-325.5) (Max= 9.1062e-09)
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962


Разрезни усилия от сеизмична комбинация
19.1
16.2
14.1
12.1
10.1
8.1
6.1
4.0
2.0
0.0
-2.0
-4.0
-6.1
-8.1
-10.1
-12.1
-14.1
-16.2
-18.2
-20.2
-22.2
-24.2
-26.3
-28.3
-30.3
-32.3
-34.3
-36.4
-38.4
-40.4
-42.4
-44.4
-46.5
-48.5
-50.5
-52.5
-54.5
-56.6
-58.6
-60.6
-61.8
-61.8
-19.6
-19.7
-33.9
-5.90
-12.8
-9.57
-5.41
-18.6
-12.7
-1.25
-0.693
-1.21
-51.5
-33.8
-5.90
-12.8
-9.55
-5.39
-1.24
-0.0271
-5.00
0.00
5.00
10.00
15.00
m
-10.00
-5.00
0.00
5.00
10.00
15.00
20.00
Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2132 MIN-MZ BEAM , 1 cm 3D =
100.0 kN (Min=-61.8) (Max=19.1)
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

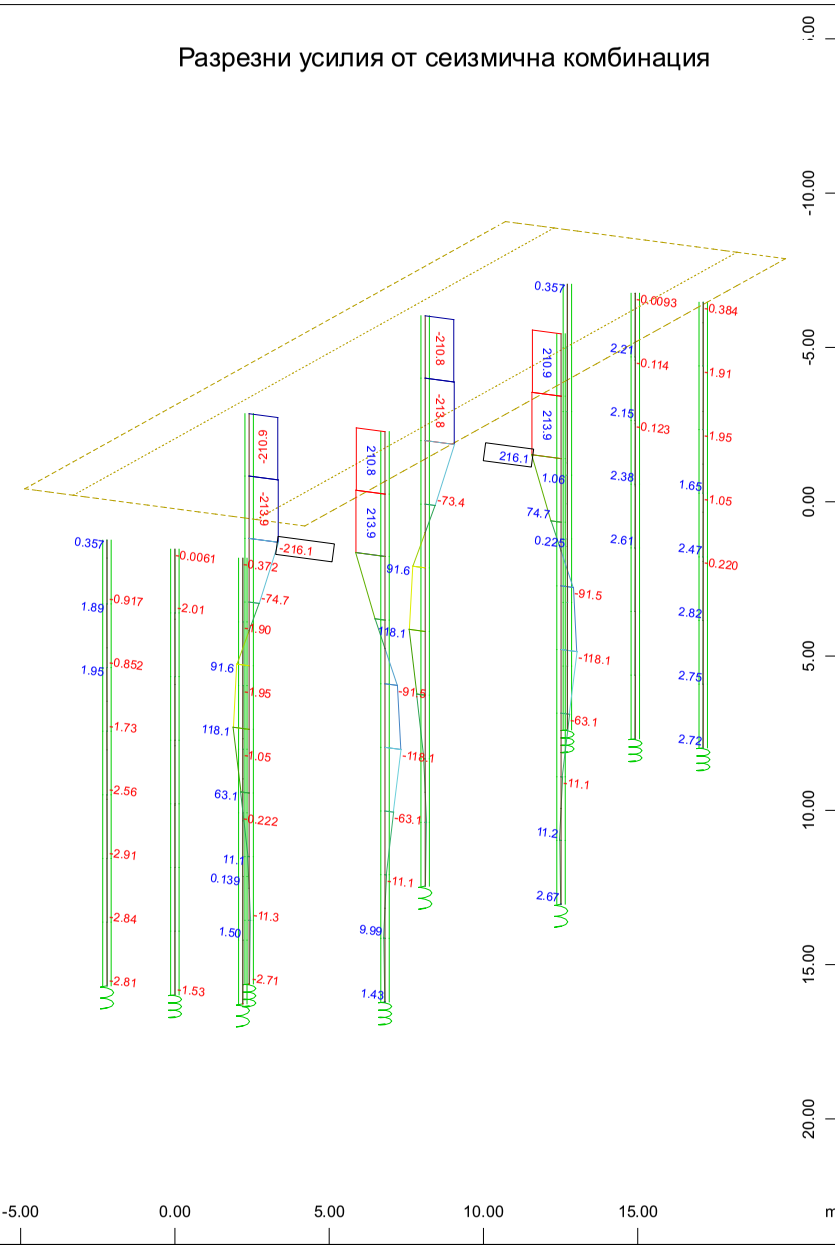
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2621 MAX-N BEAM , 1 cm 3D =
1000. kNm (Min=-691.2) (Max=691.0)

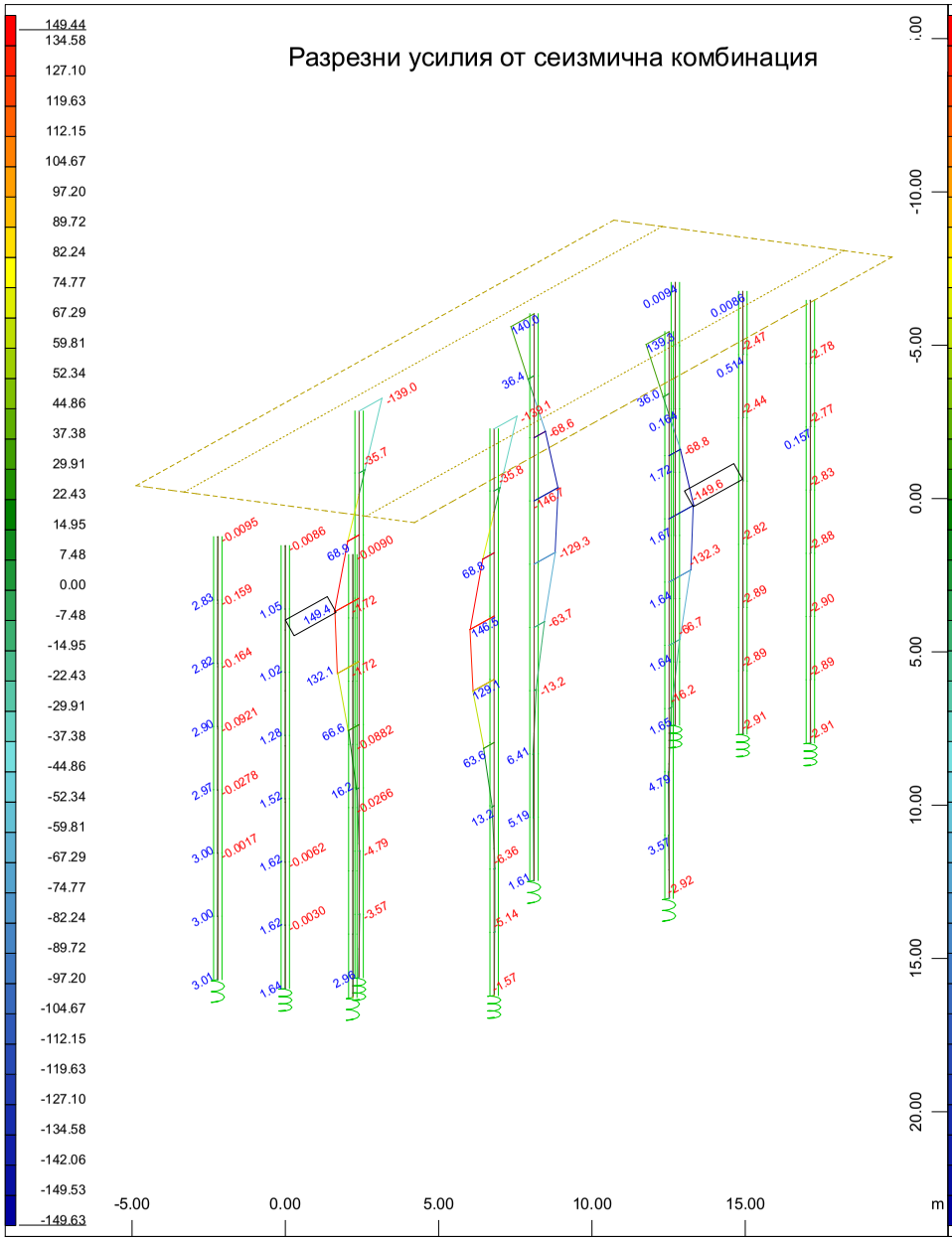
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

Разрезни усилия от сеизмична комбинация



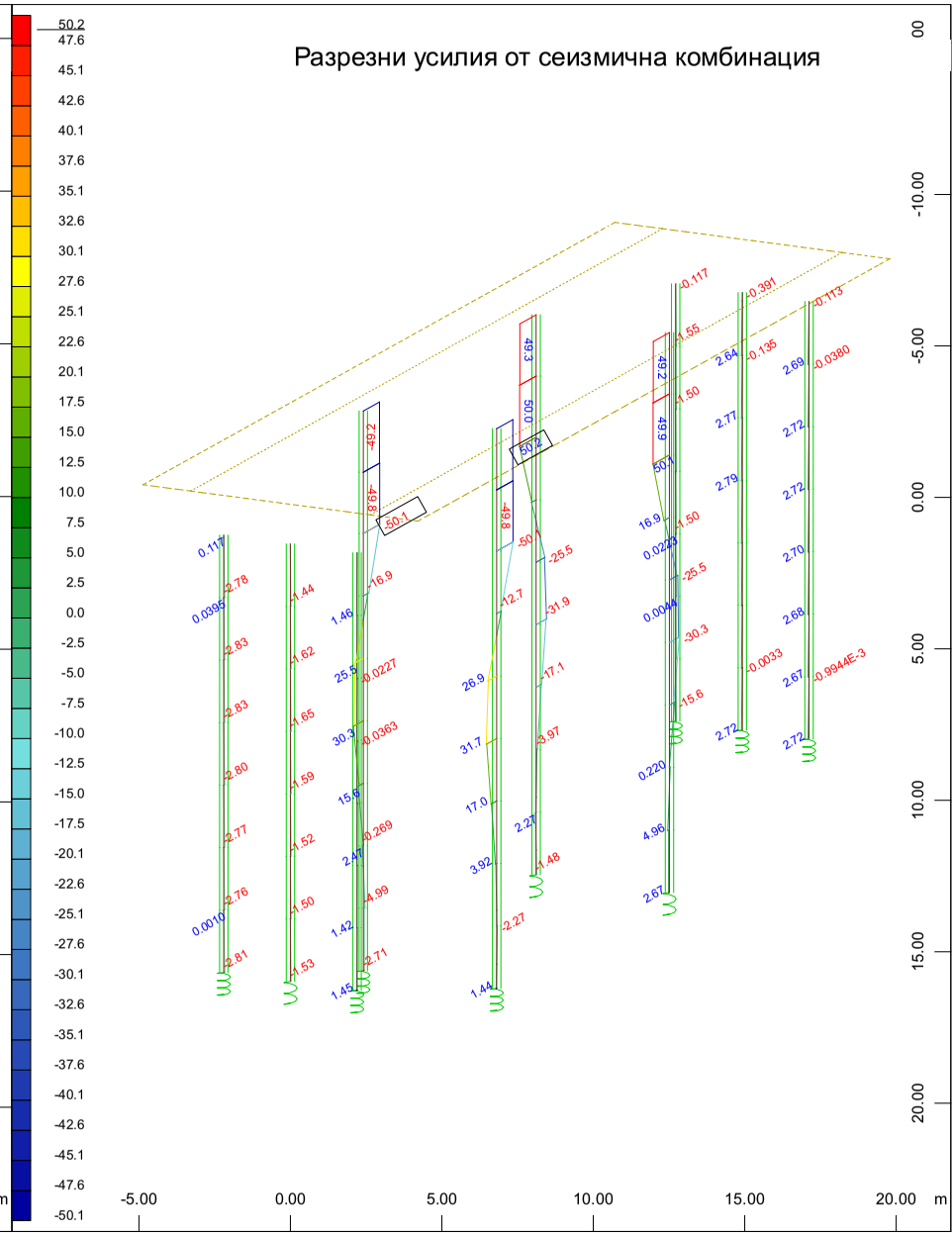
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2621 MAX-N BEAM , 1 cm 3D =
500.0 kN (Min=-216.1) (Max=216.1)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2621 MAX-N BEAM , 1 cm 3D =
200.0 kNm (Min=-149.6) (Max=149.4)

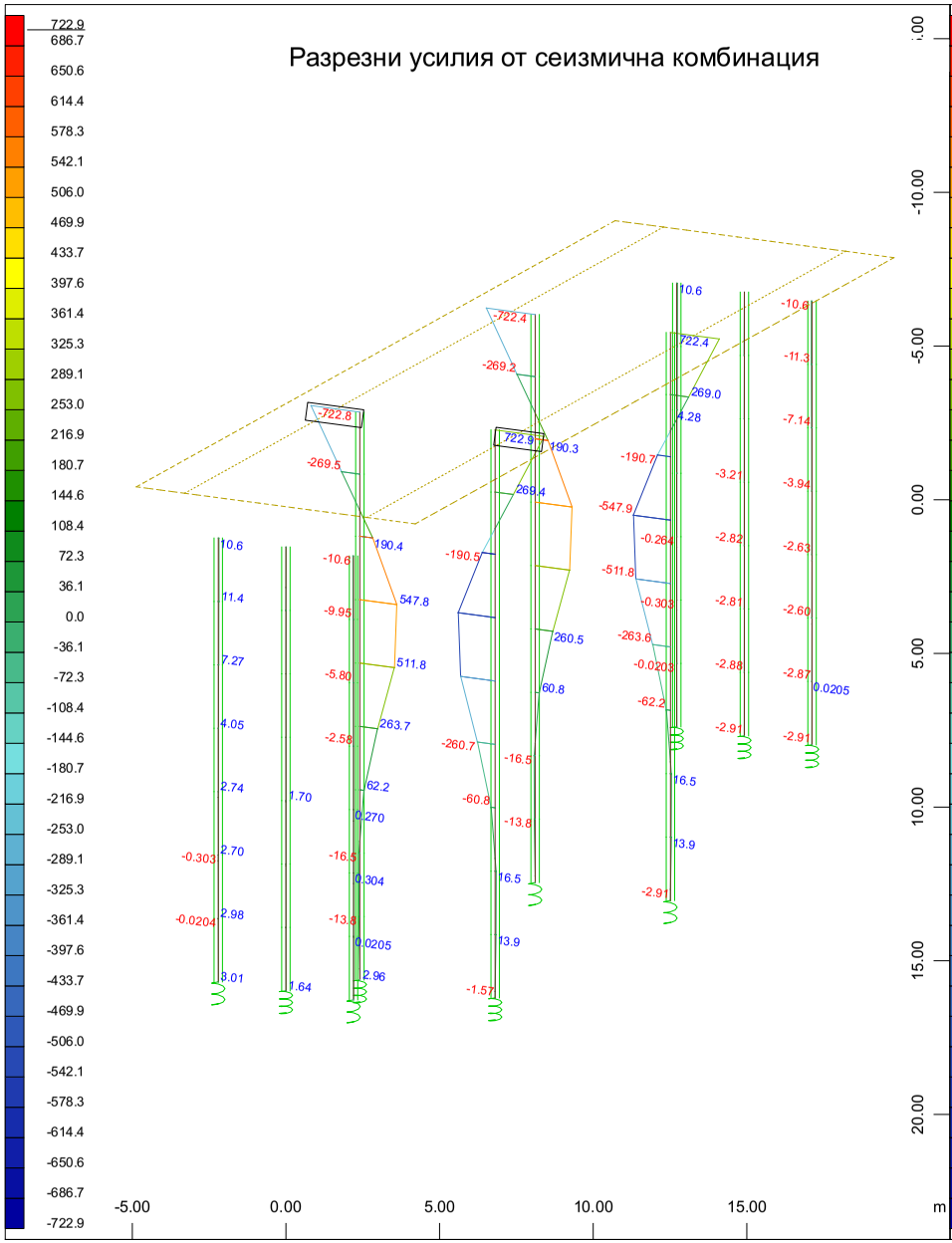
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2621 MAX-N BEAM , 1 cm 3D =
100.0 kN (Min=-50.1) (Max=50.2)

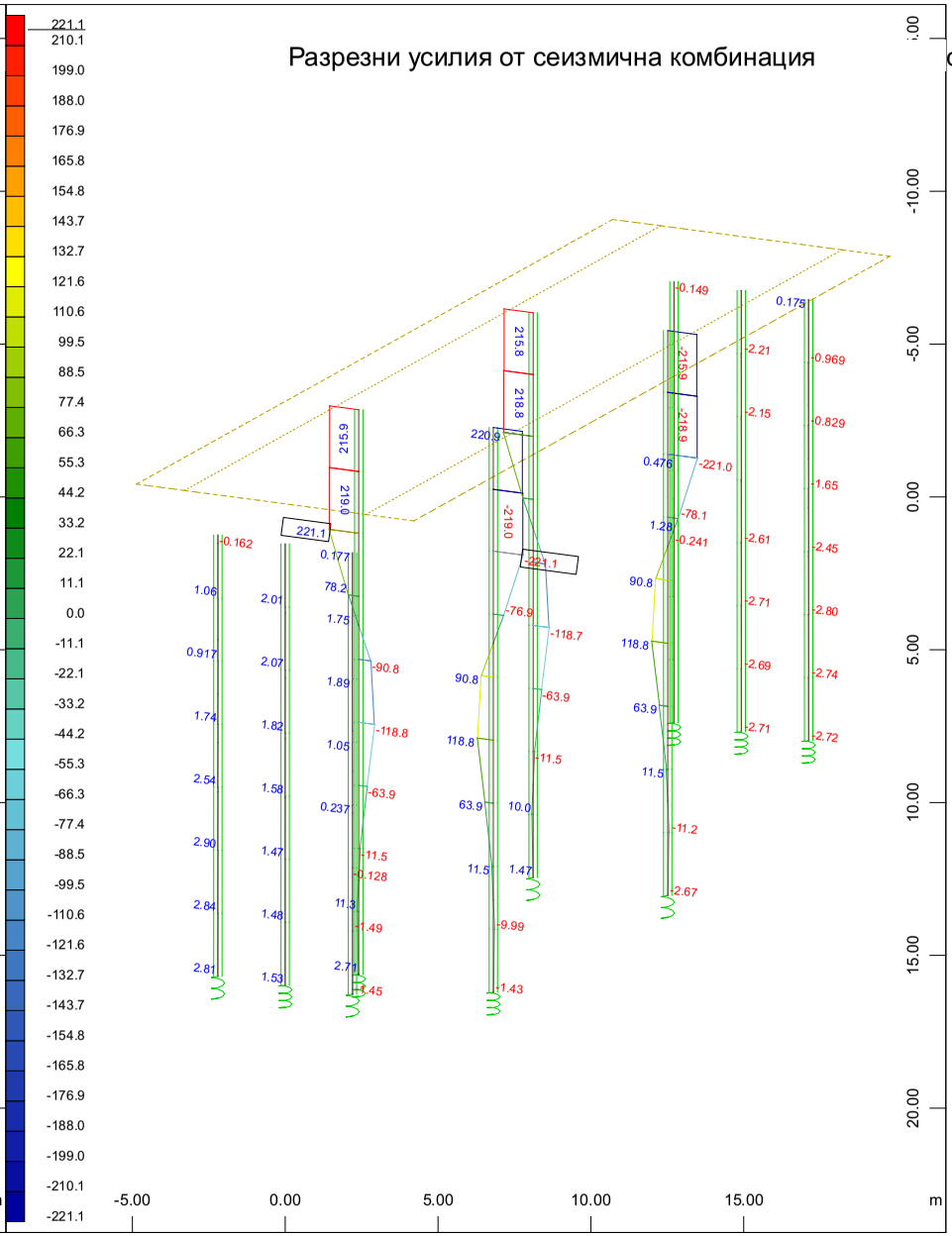
M 1 : 247
X * 0.502
Y * 0.906
Z * 0.962

Bridge_Popovica
Разрезни усилия в стълбовете
стоянке



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2622 MIN-N BEAM , 1 cm 3D =
1000. kNm (Min=-722.8) (Max=722.9)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

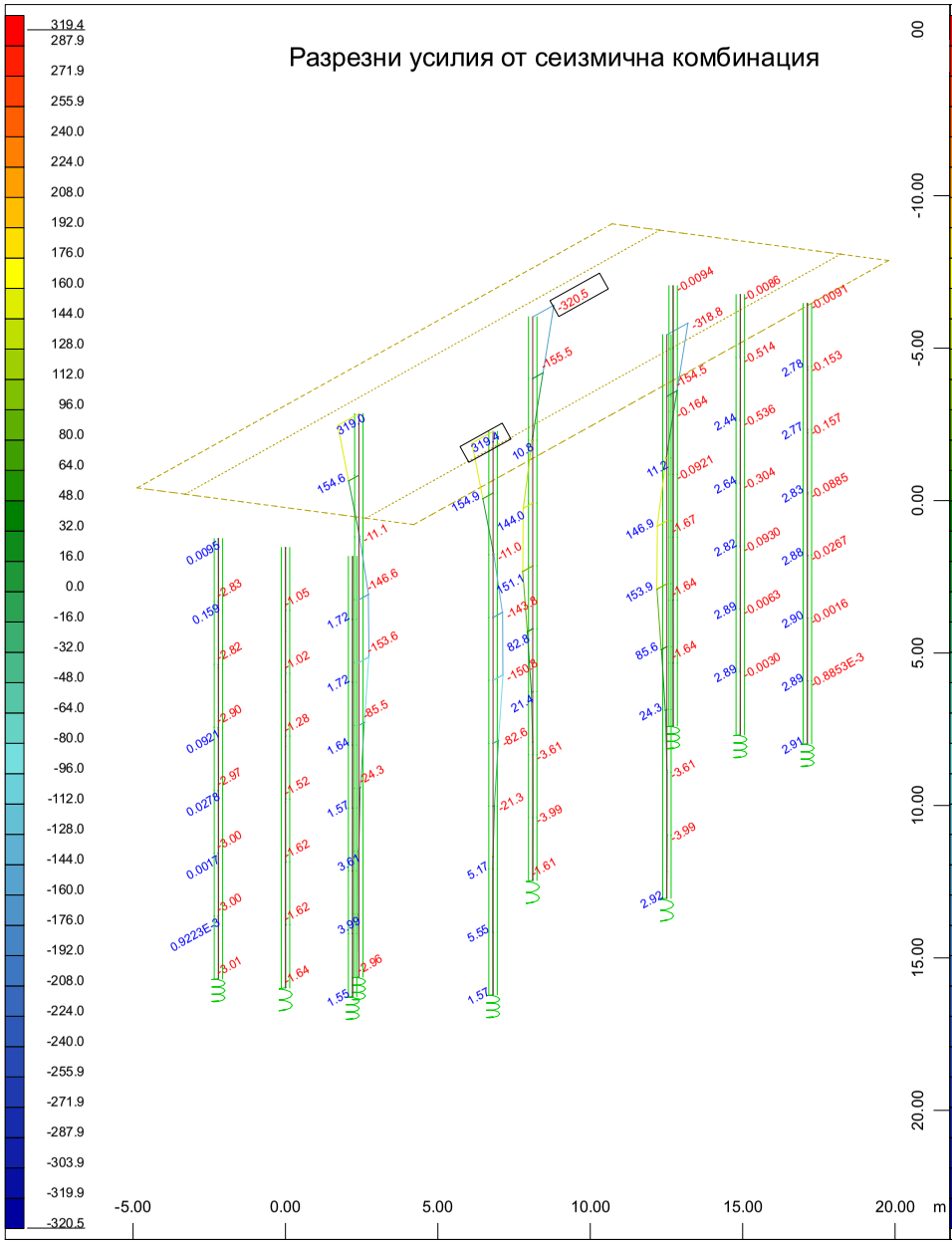


Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2622 MIN-N BEAM , 1 cm 3D =
500.0 kN (Min=-221.1) (Max=221.1)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

Bridge_Popovica
Разрезни усилия в стълбовете
стояне

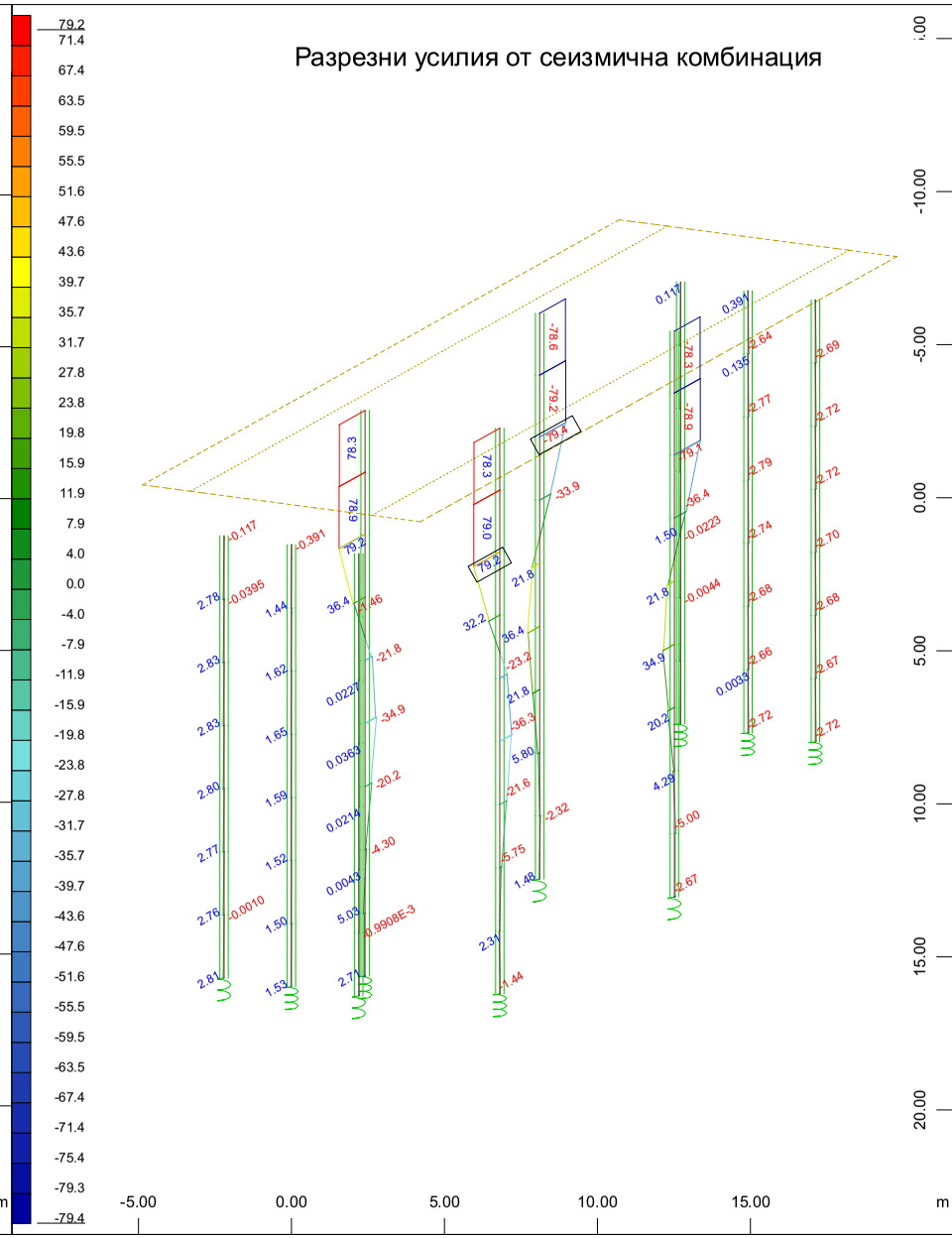
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2622 MIN-N BEAM , 1 cm 3D =
500.0 kNm (Min=-320.5) (Max=319.4)

M 1 : 247
X * 0.502
Y * 0.906
Z * 0.962

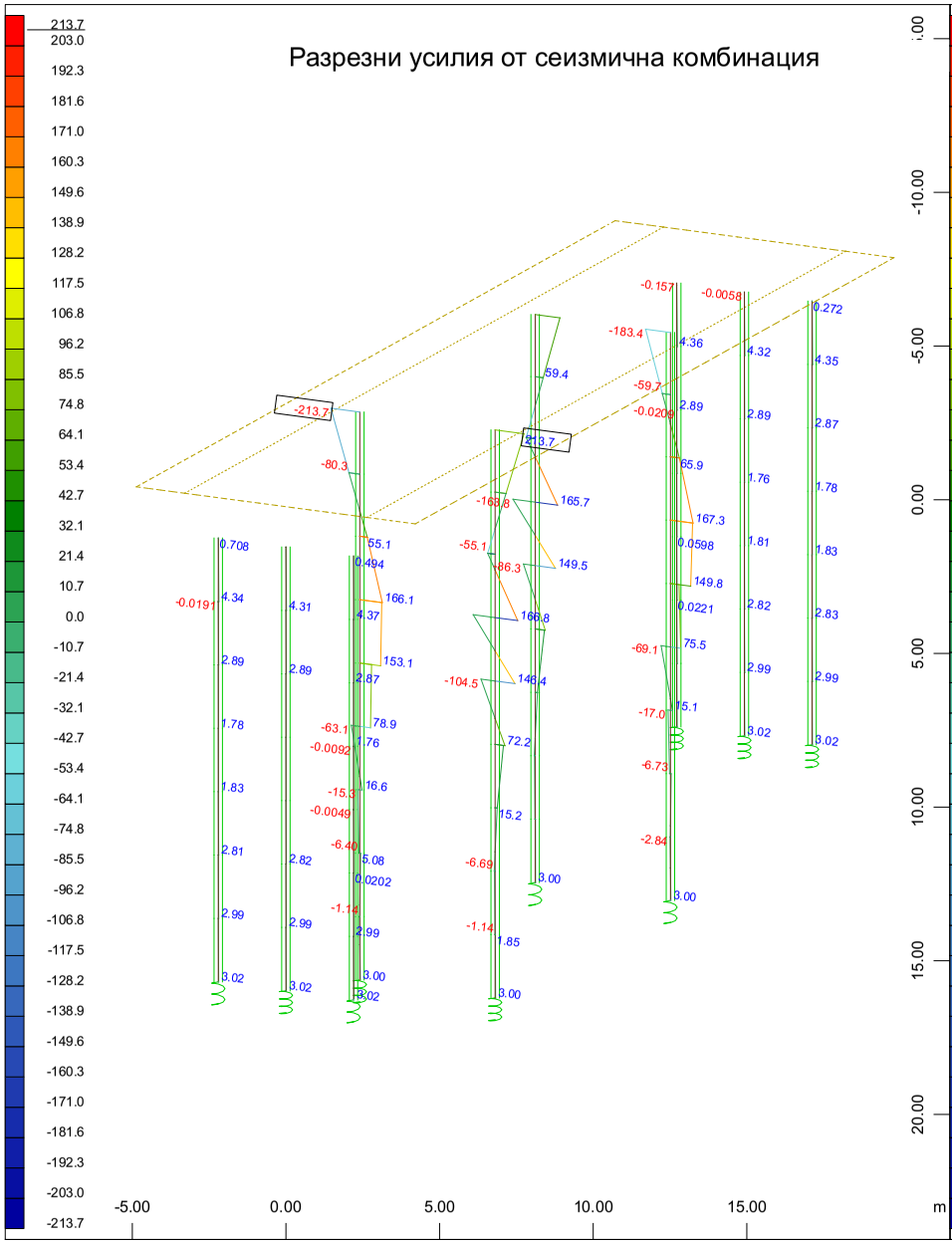
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2622 MIN-N BEAM , 1 cm 3D =
100.0 kN (Min=-79.4) (Max=79.2)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

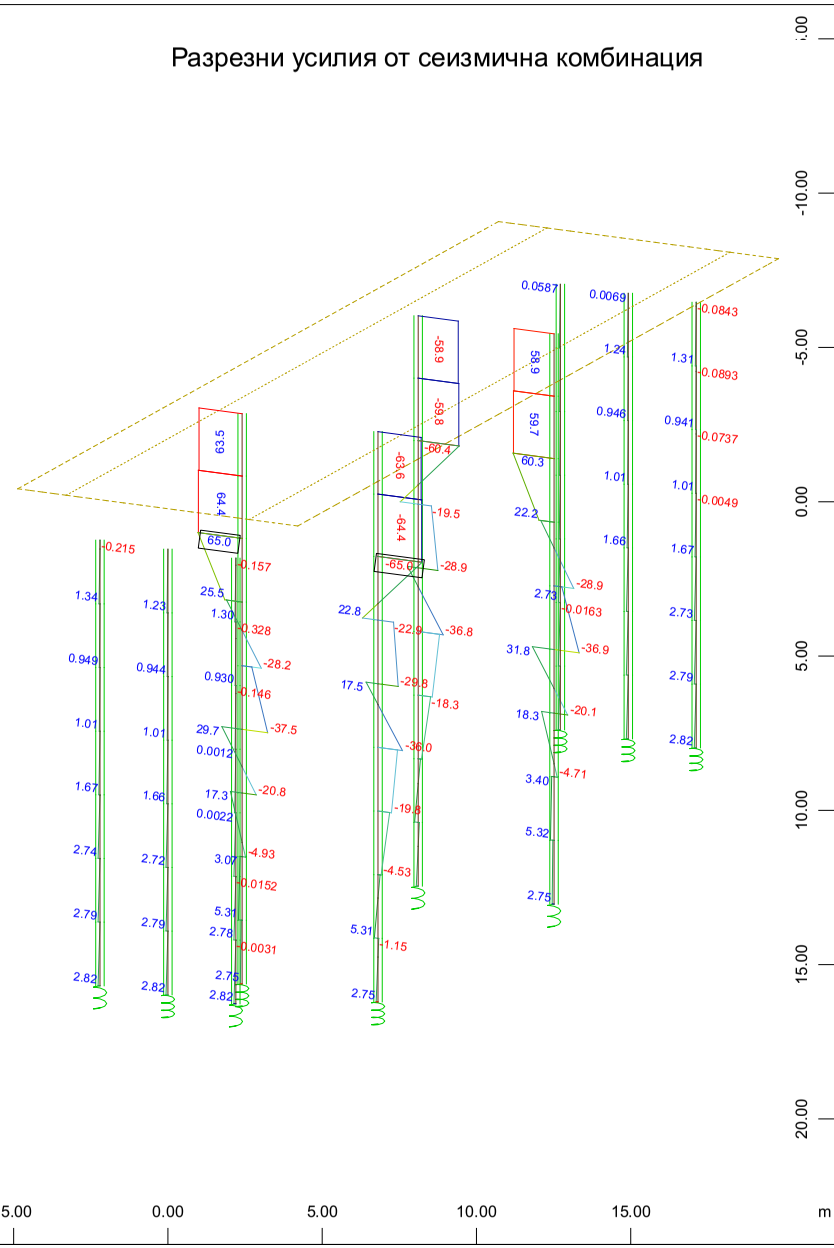
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2623 MAX-VY BEAM , 1 cm 3D =
500.0 kNm (Min=-213.7) (Max=213.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

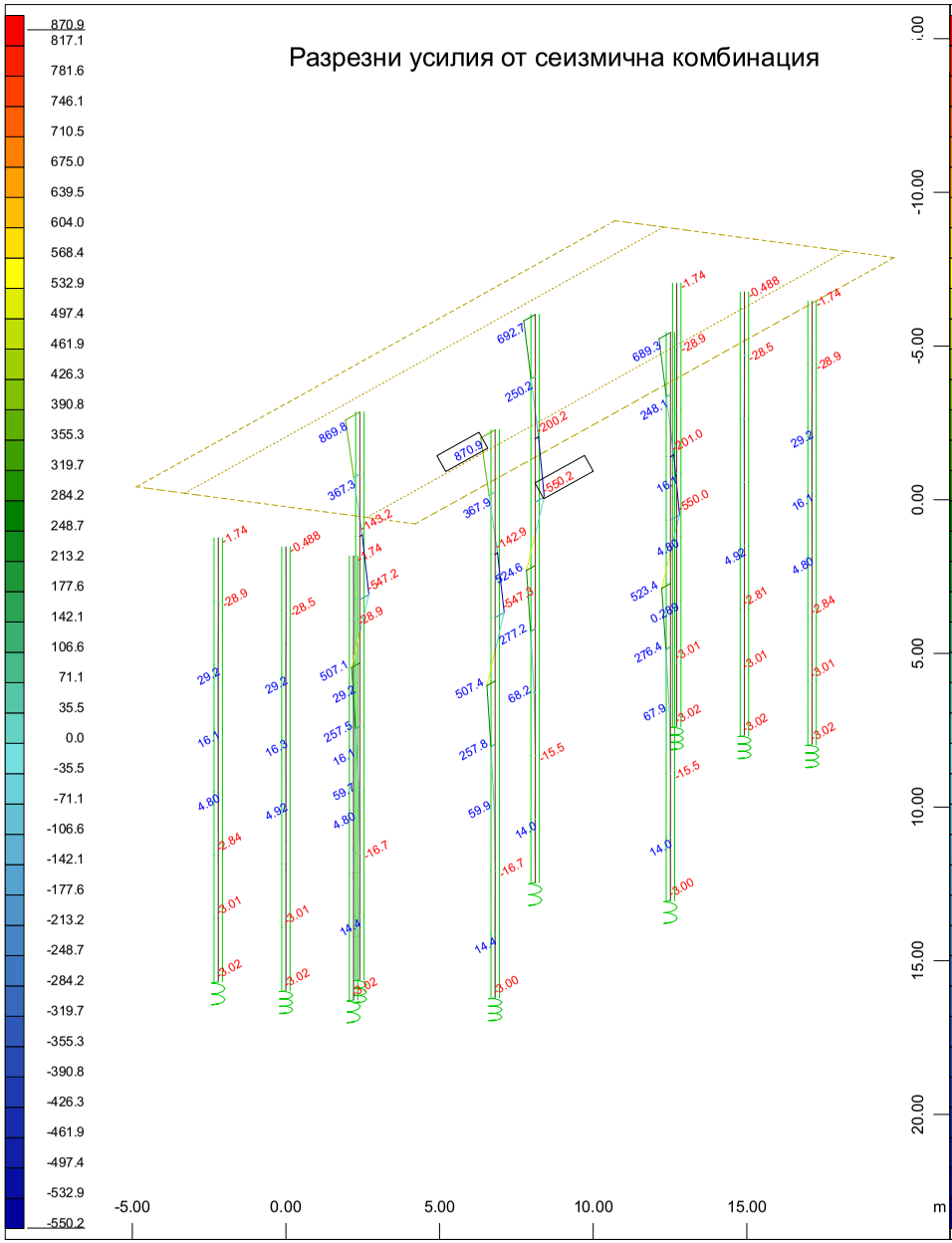
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2623 MAX-VY BEAM , 1 cm 3D =
100.0 kN (Min=-65.0) (Max=65.0)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

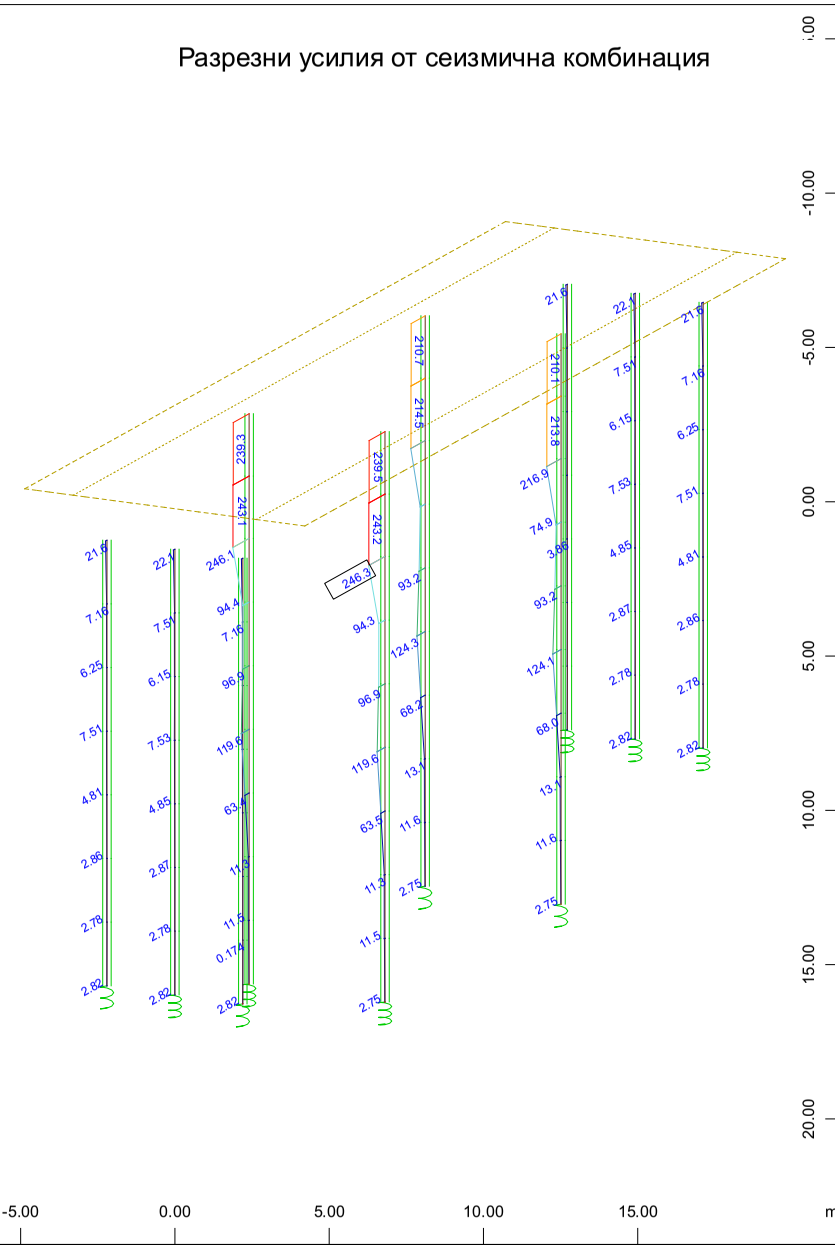
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2623 MAX-VY BEAM , 1 cm 3D =
2000. kNm (Min=-550.2) (Max=870.9)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

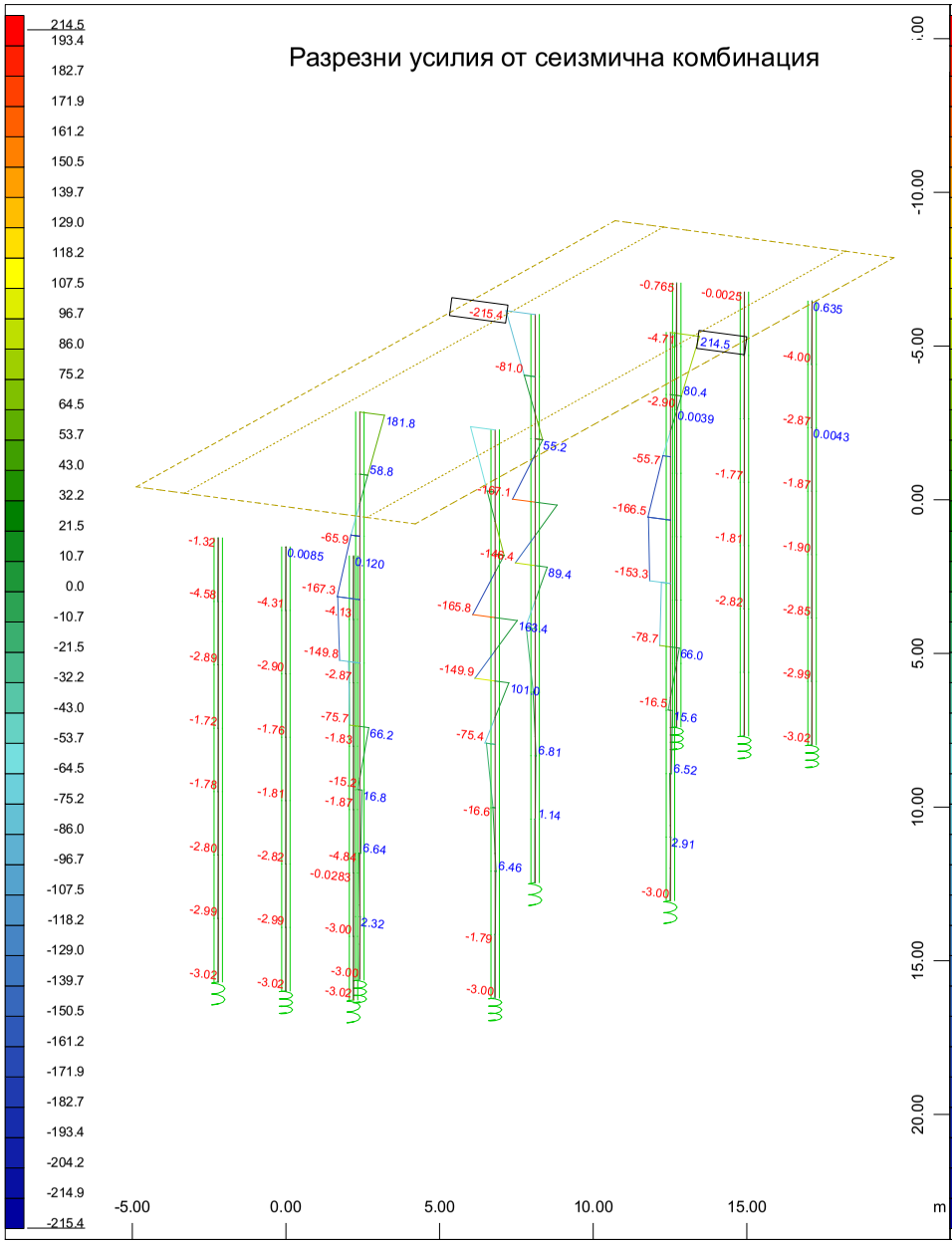
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2623 MAX-VY BEAM , 1 cm 3D =
500.0 kN (Max=246.3)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

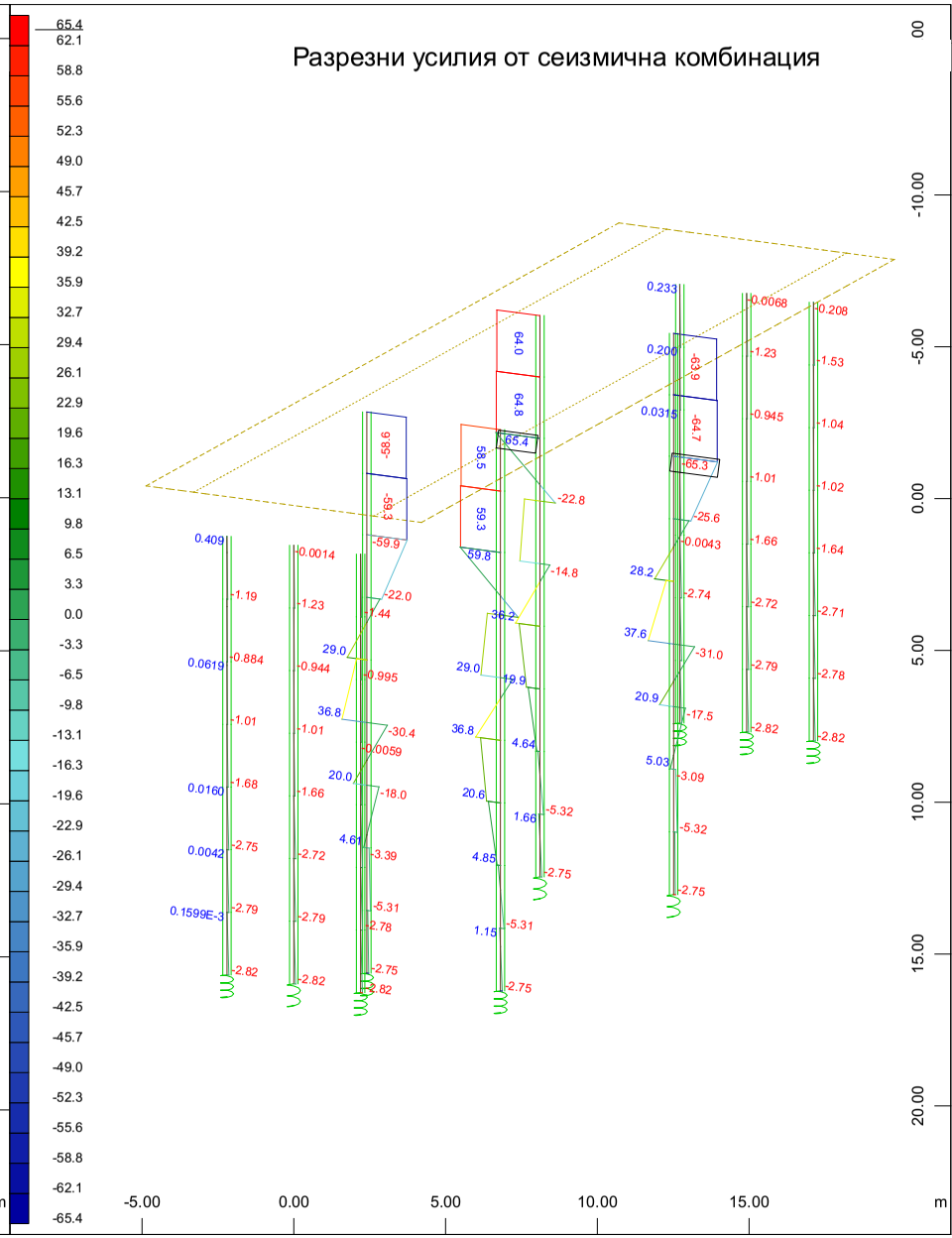
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2624 MIN-VY BEAM , 1 cm 3D =
500.0 kNm (Min=-215.4) (Max=214.5)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

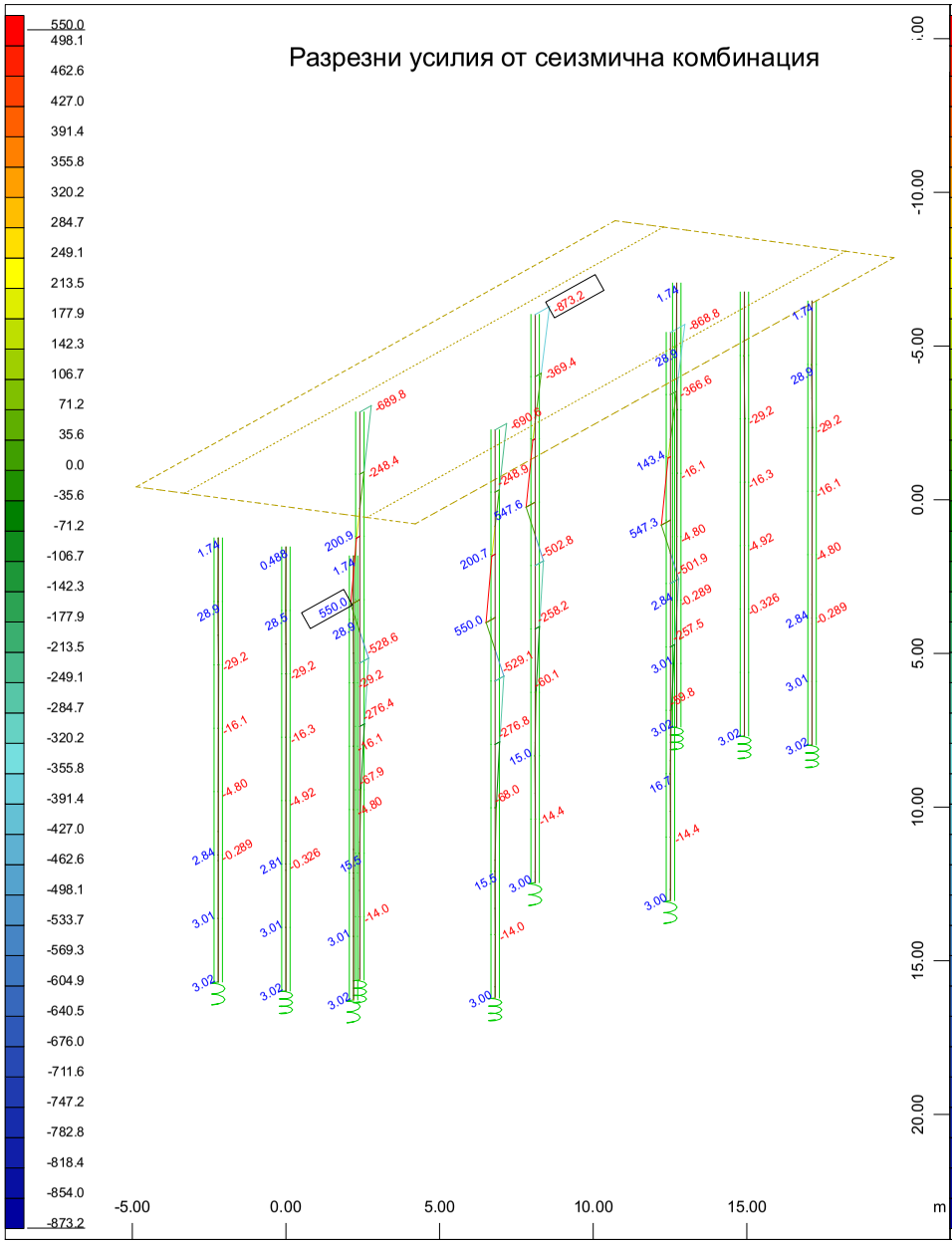
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2624 MIN-VY BEAM , 1 cm 3D =
100.0 kN (Min=-65.3) (Max=65.4)

M 1 : 247
X * 0.502
Y * 0.906
Z * 0.962

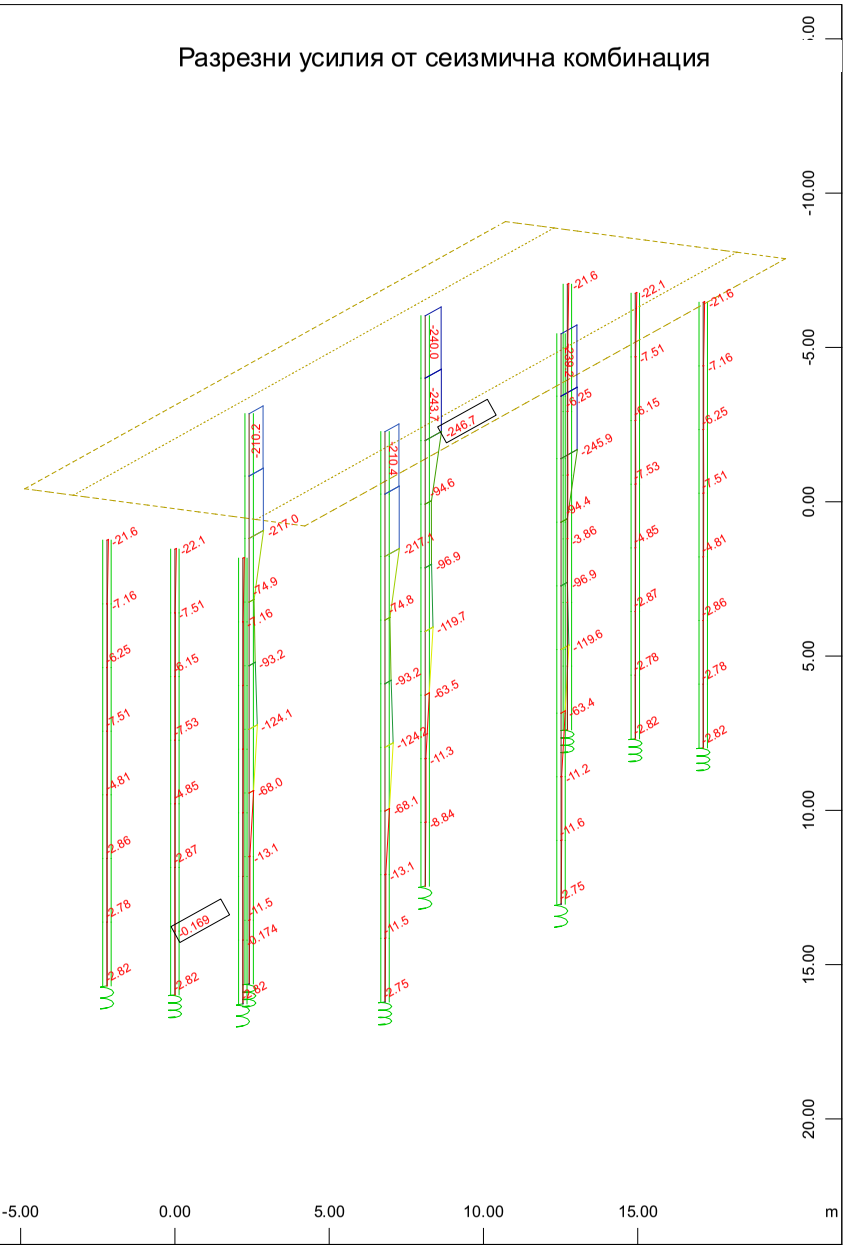
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2624 MIN-VY BEAM , 1 cm 3D = 2000. kNm (Min=-873.2) (Max=550.0)

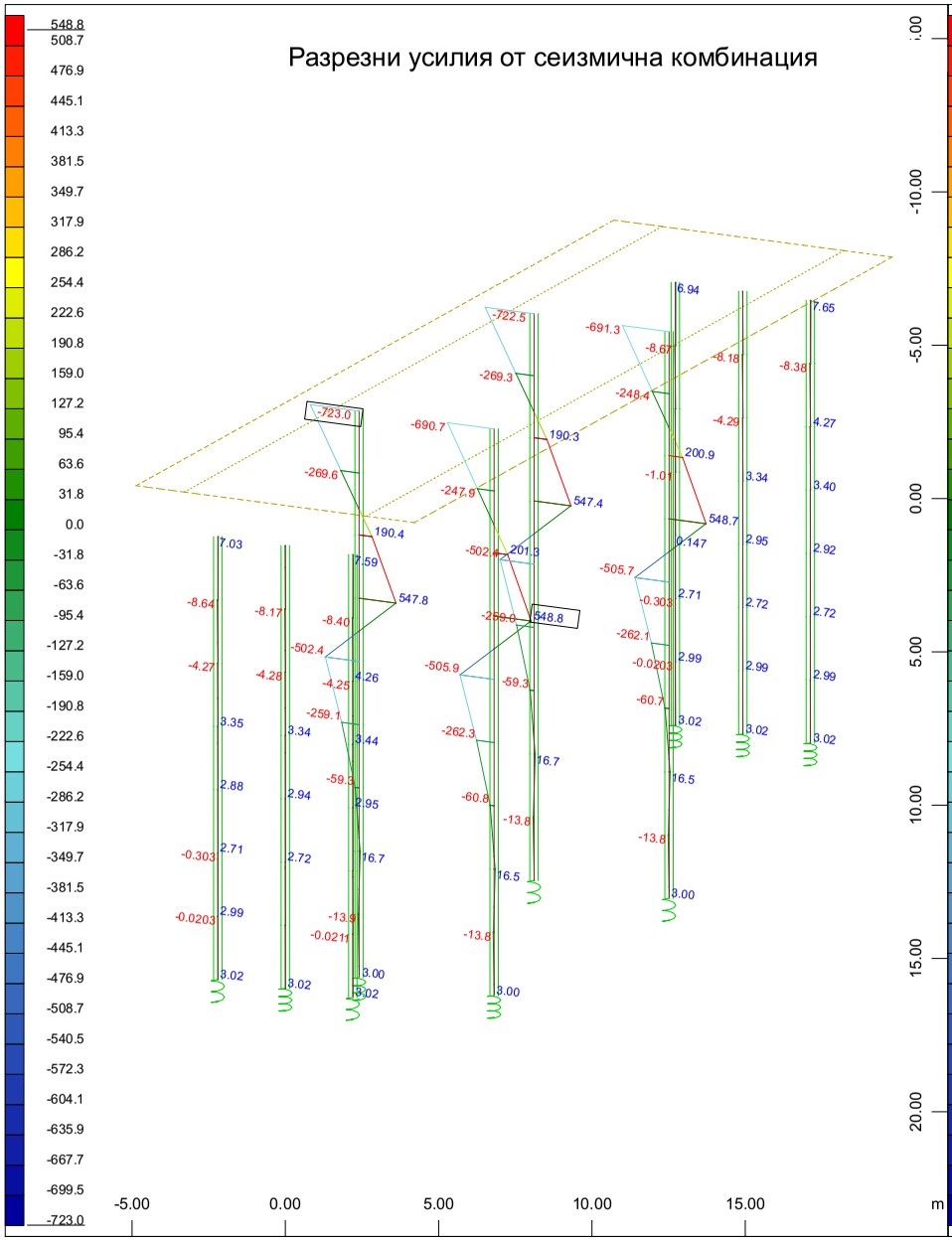
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

Разрезни усилия от сеизмична комбинация



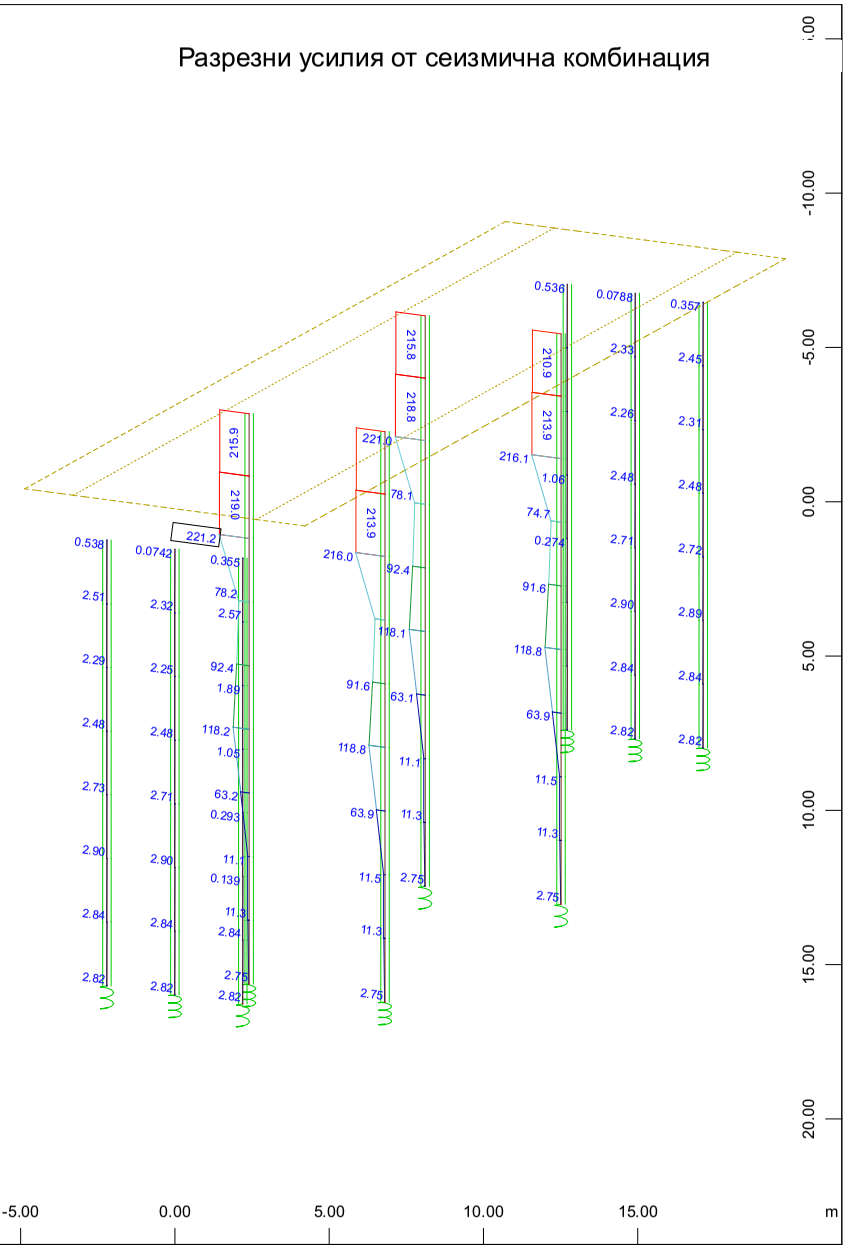
Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2624 MIN-VY BEAM , 1 cm 3D = 500.0 kN (Min=-246.7) (Max=-0.169)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2625 MAX-VZ BEAM , 1 cm 3D =
1000. kNm (Min=-723.0) (Max=548.8)

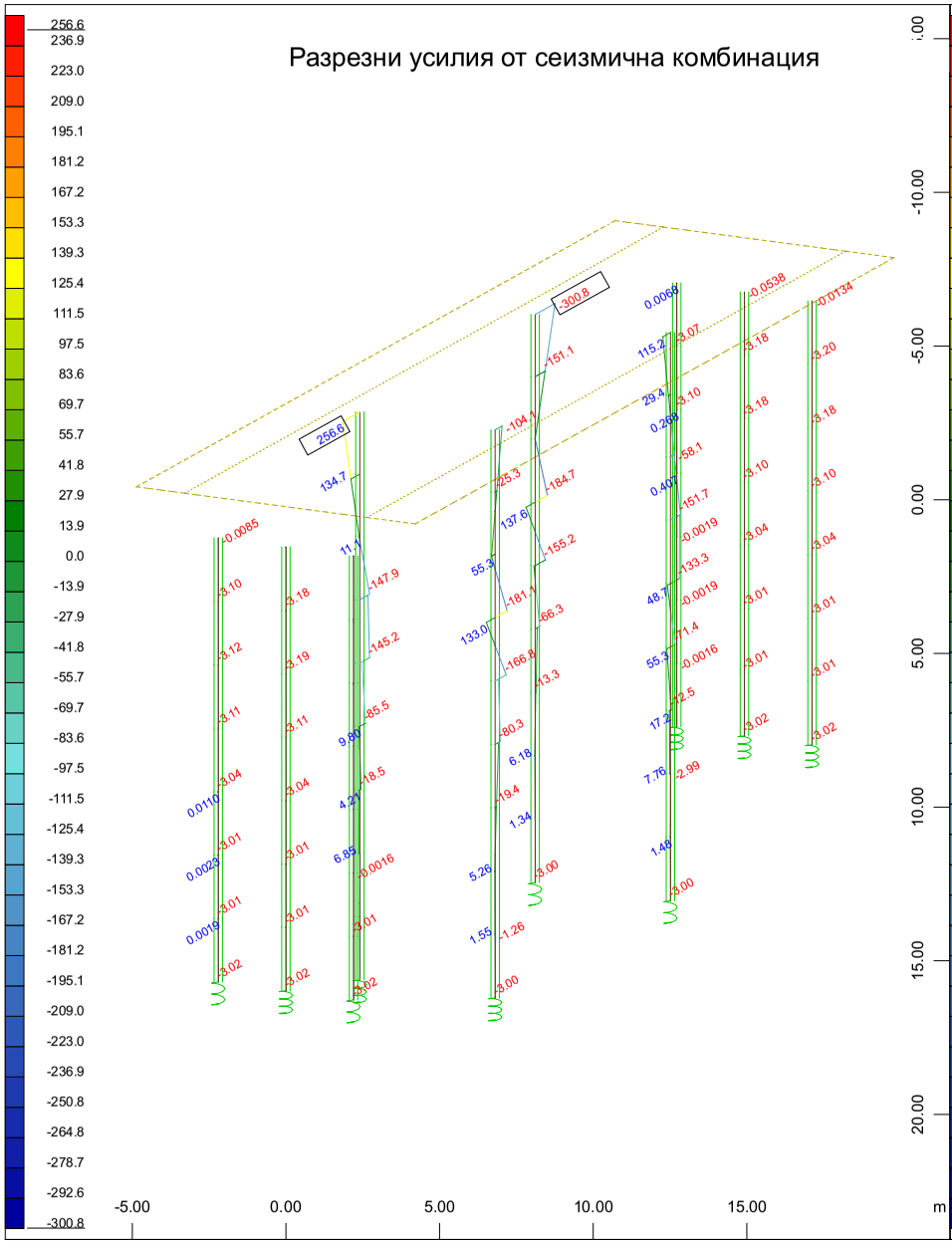
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

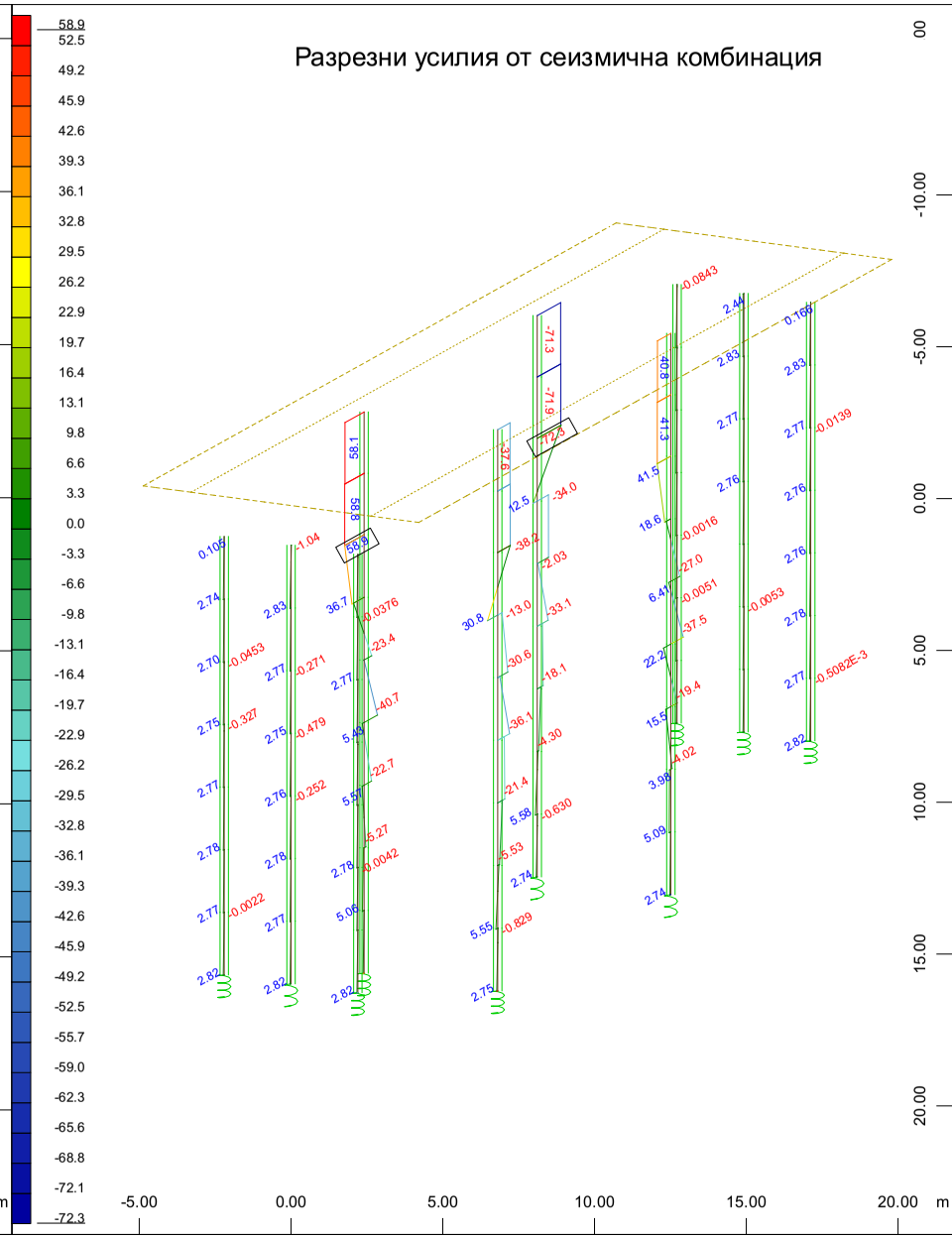


Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2625 MAX-VZ BEAM , 1 cm 3D =
500.0 kN (Max=221.2)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

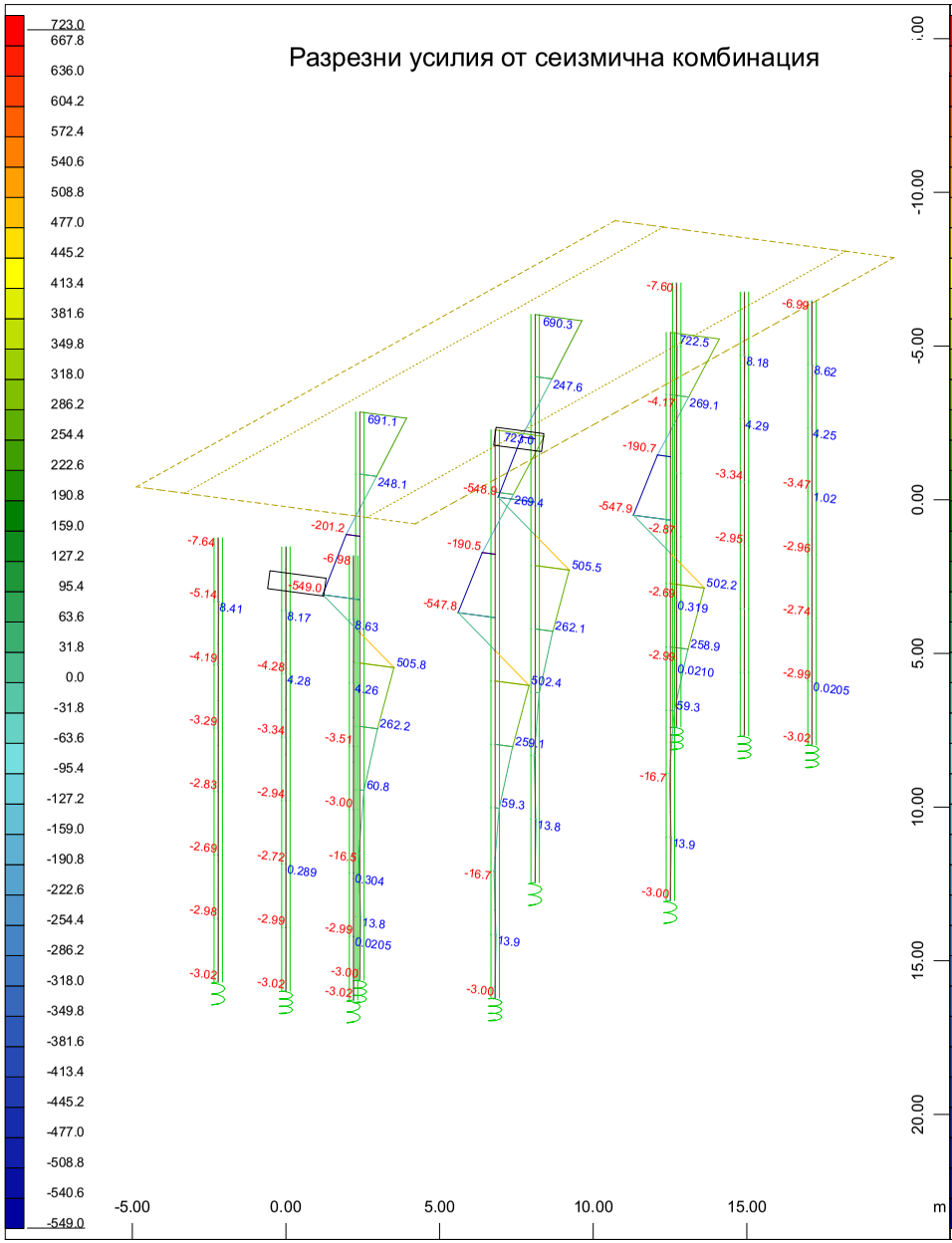
Bridge_Popovica
Разрезни усилия в стълбовете
стояне





Bridge_Popovica
Разрезни усилия в стълбовете
стояне

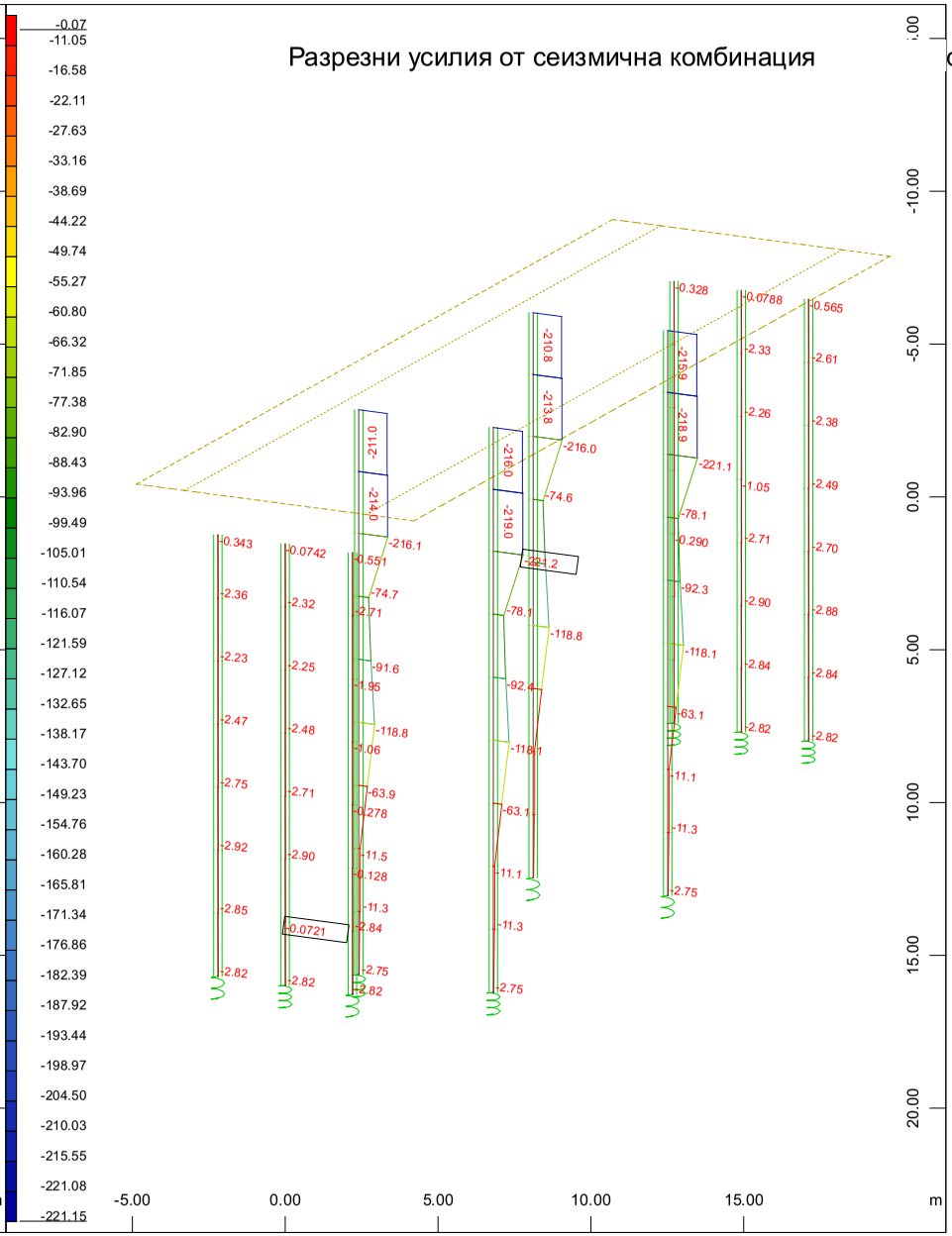
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2626 MIN-VZ BEAM , 1 cm 3D =
1000. kNm (Min=-549.0) (Max=723.0)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

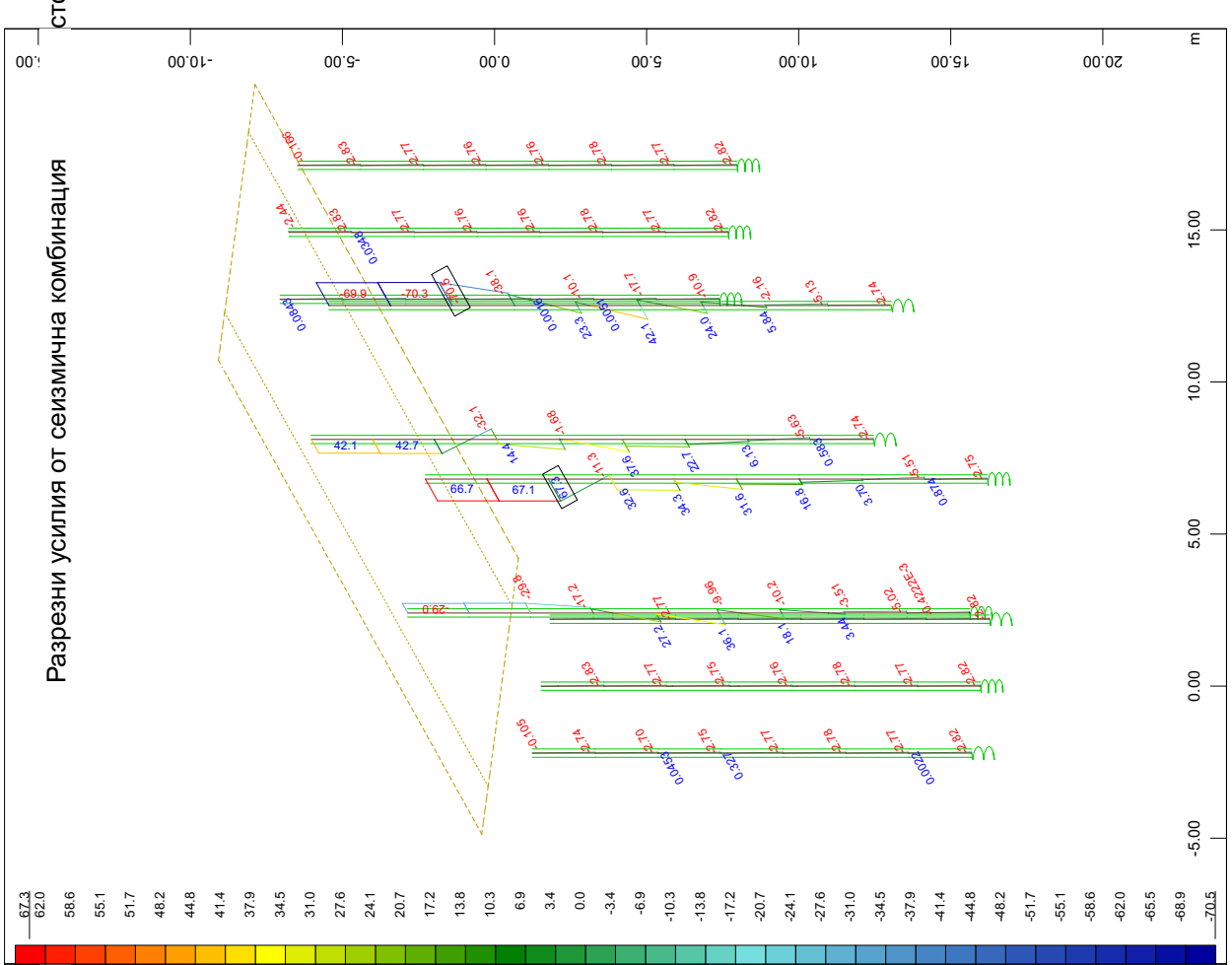
Разрезни усилия от сеизмична комбинация

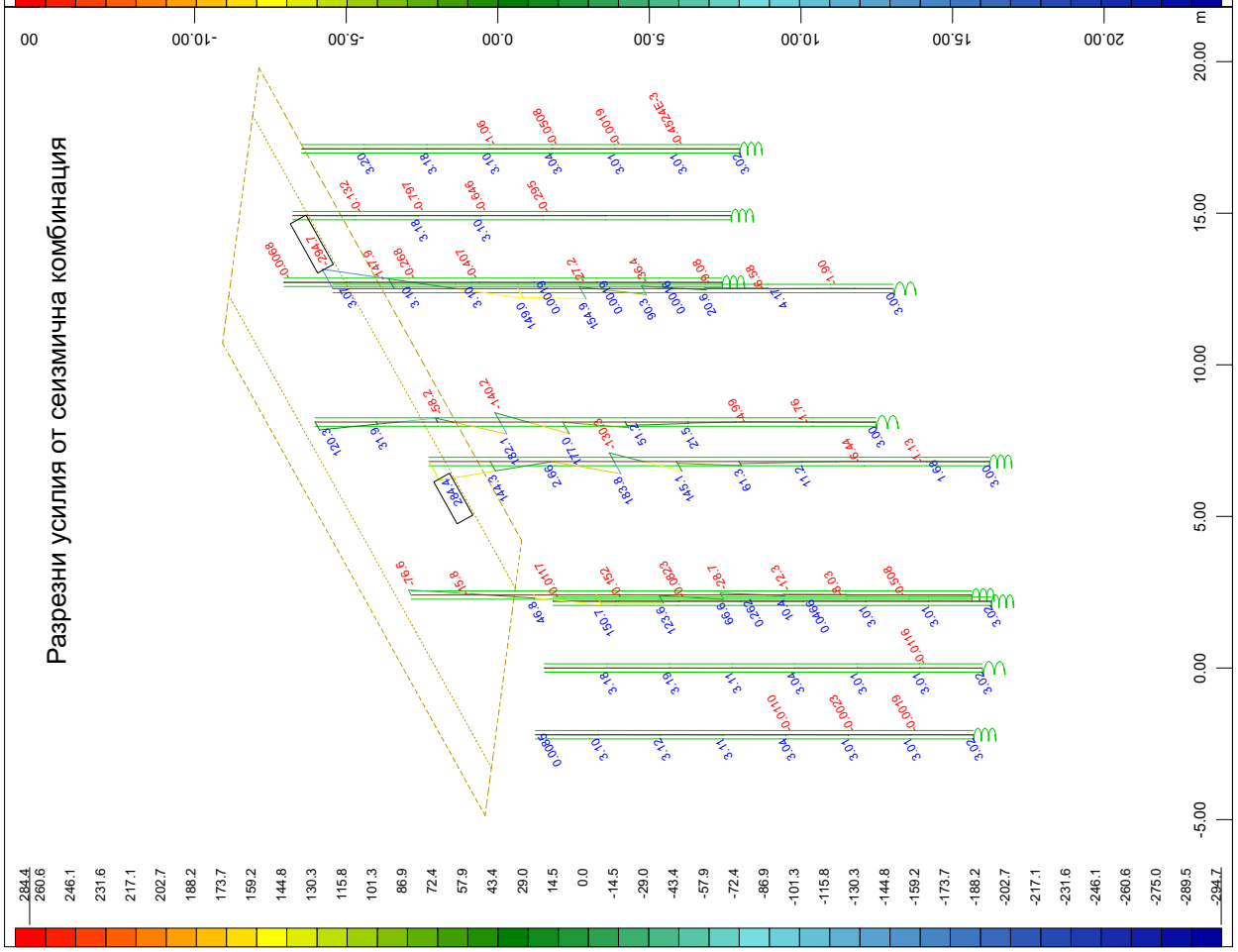


Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2626 MIN-VZ BEAM , 1 cm 3D =
500.0 kN (Min=-221.2) (Max=-0.0721)

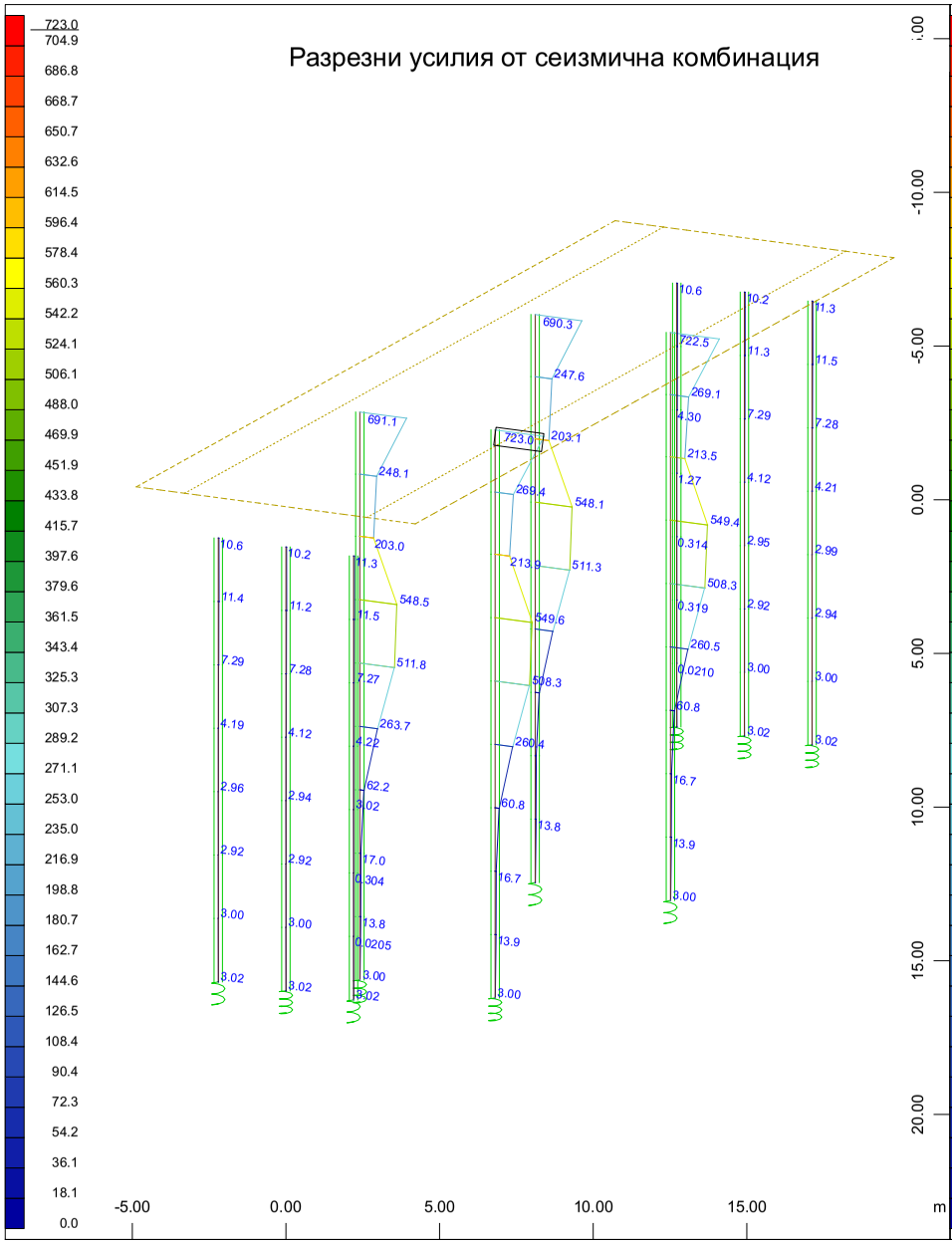
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

стоянке





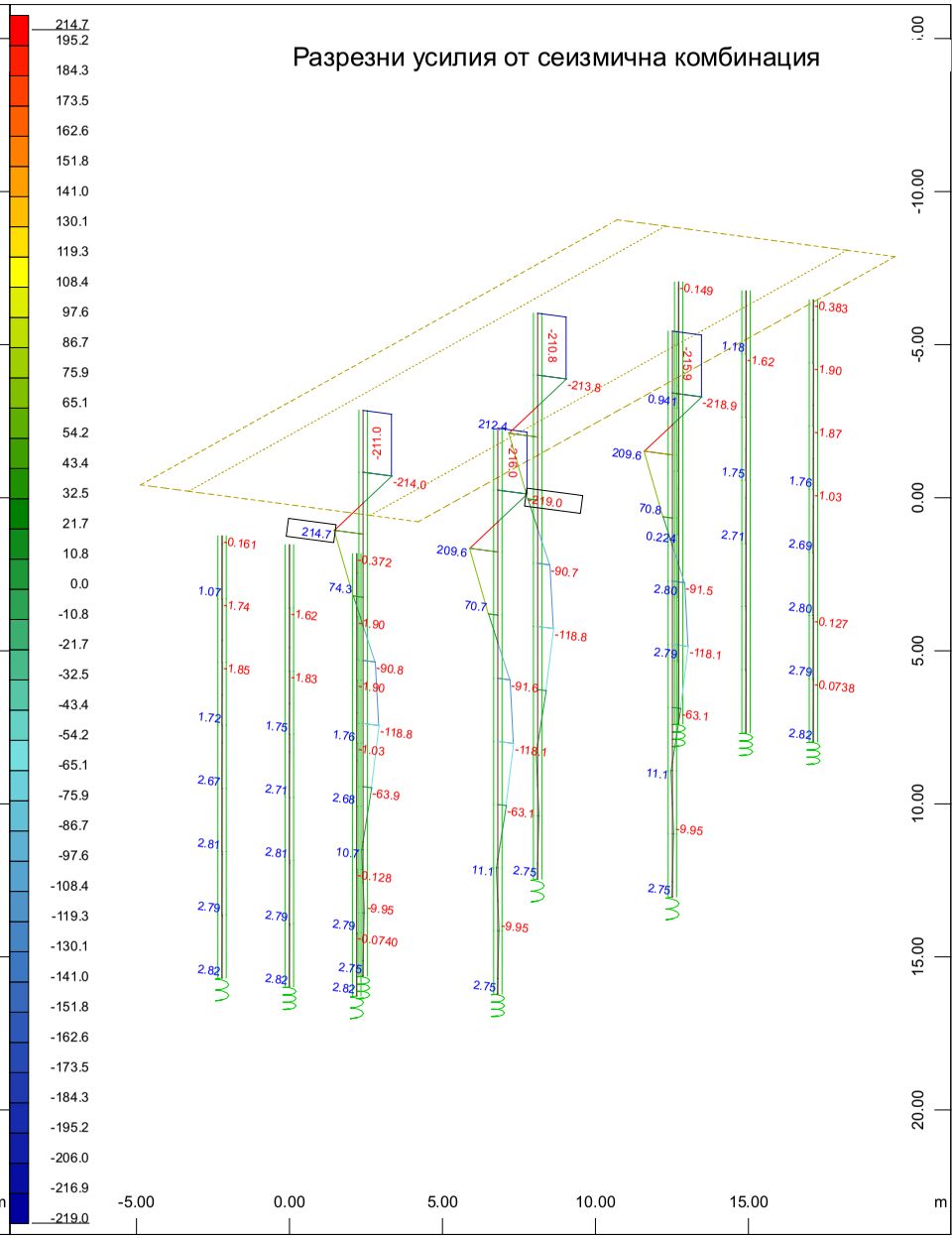
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2629 MAX-MY BEAM , 1 cm 3D = 1000. kNm (Max=723.0)

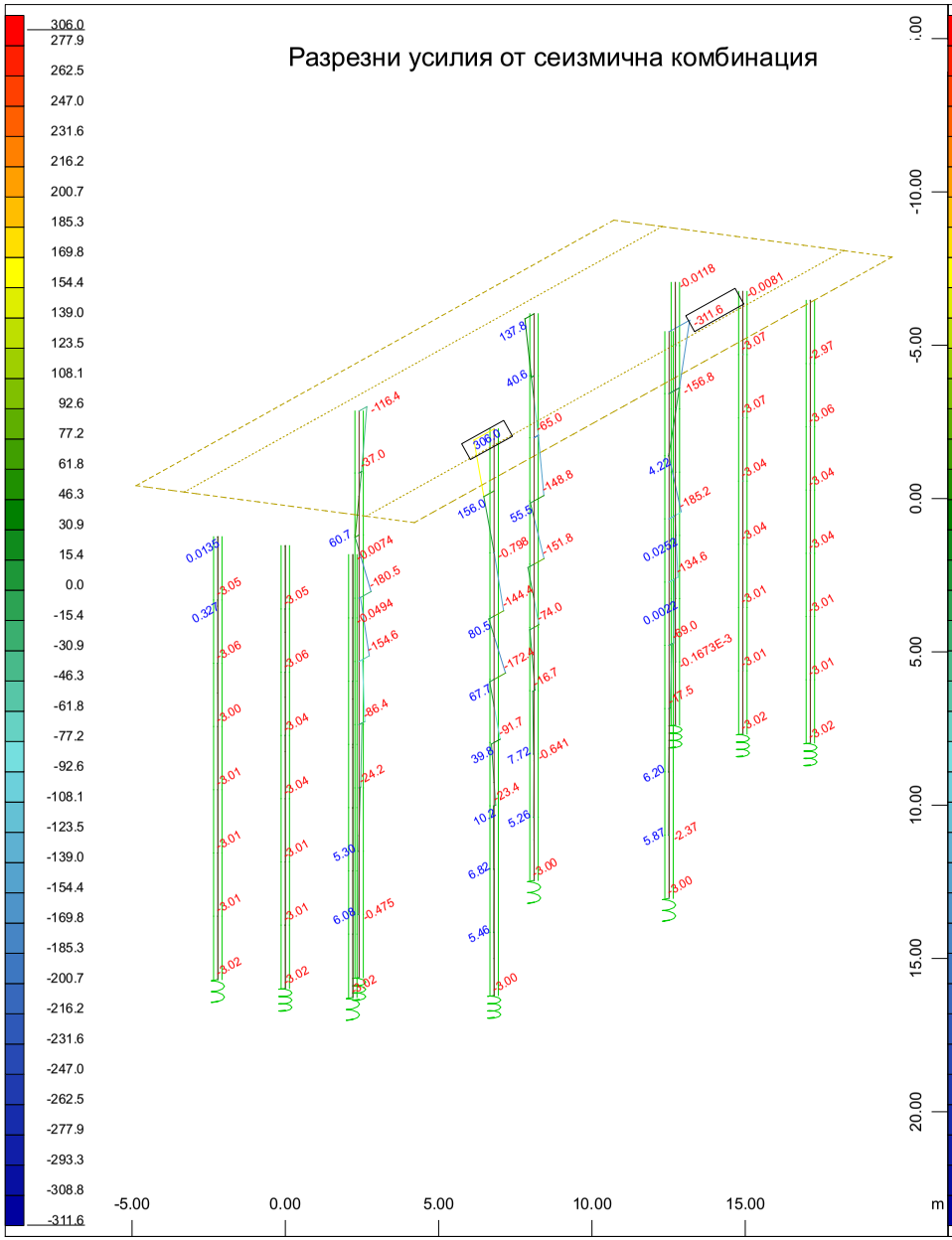
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

Разрезни усилия от сеизмична комбинация



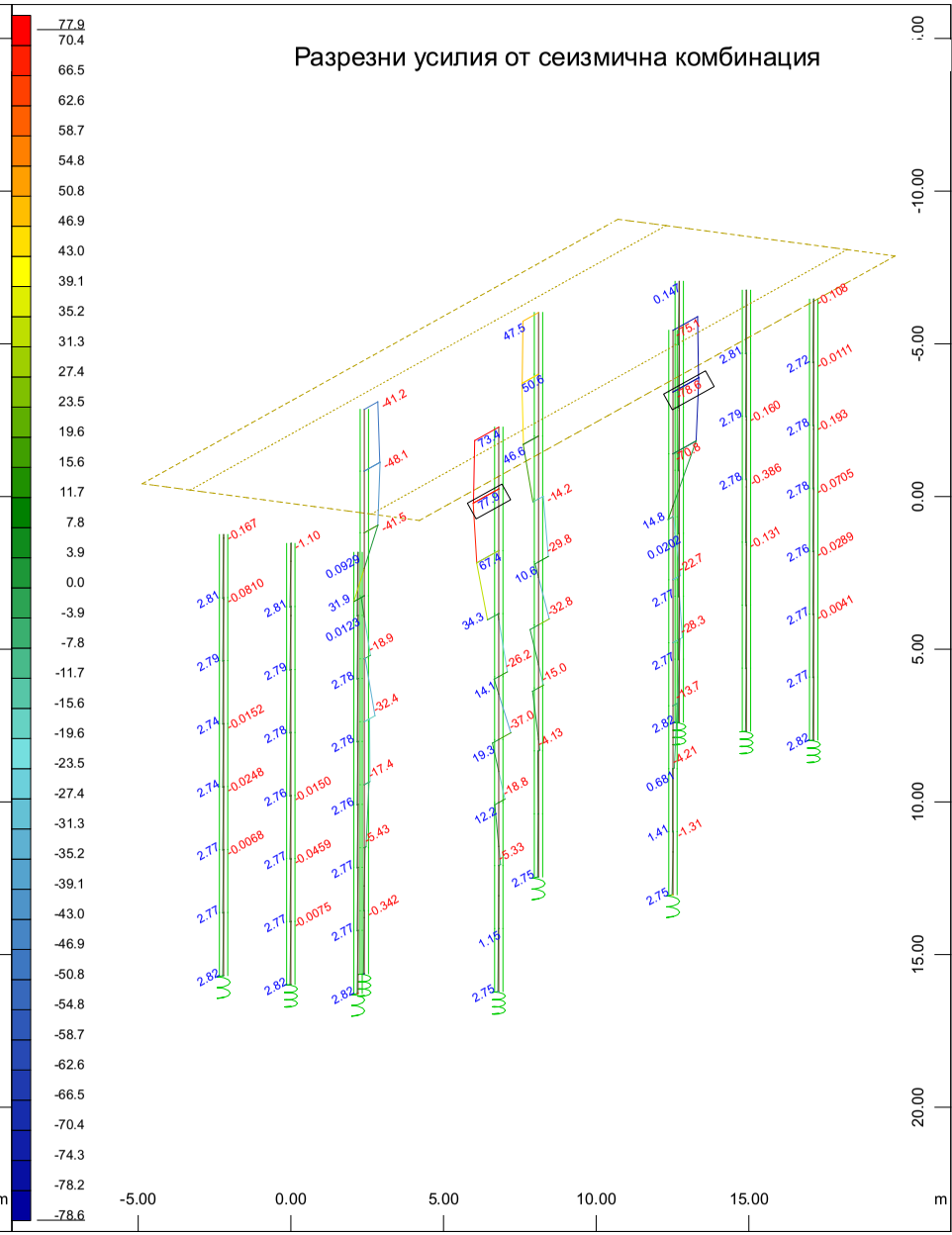
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2629 MAX-MY BEAM , 1 cm 3D = 500.0 kN (Min=-219.0) (Max=214.7)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2629 MAX-MY BEAM , 1 cm 3D =
500.0 kNm (Min=-311.6) (Max=306.0)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

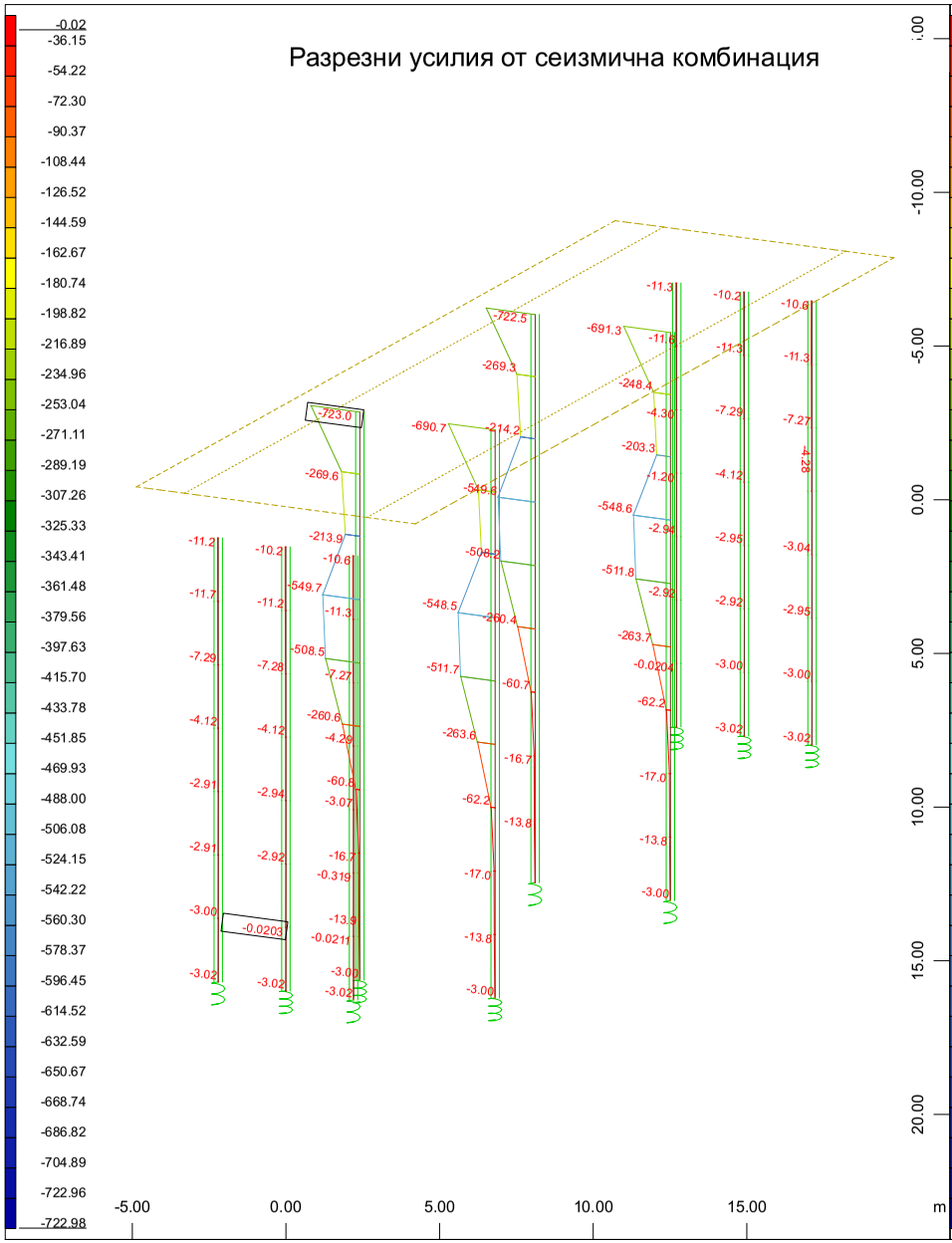


Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2629 MAX-MY BEAM , 1 cm 3D =
100.0 kN (Min=-78.6) (Max=77.9)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

Bridge_Popovica
Разрезни усилия в стълбовете
стояне

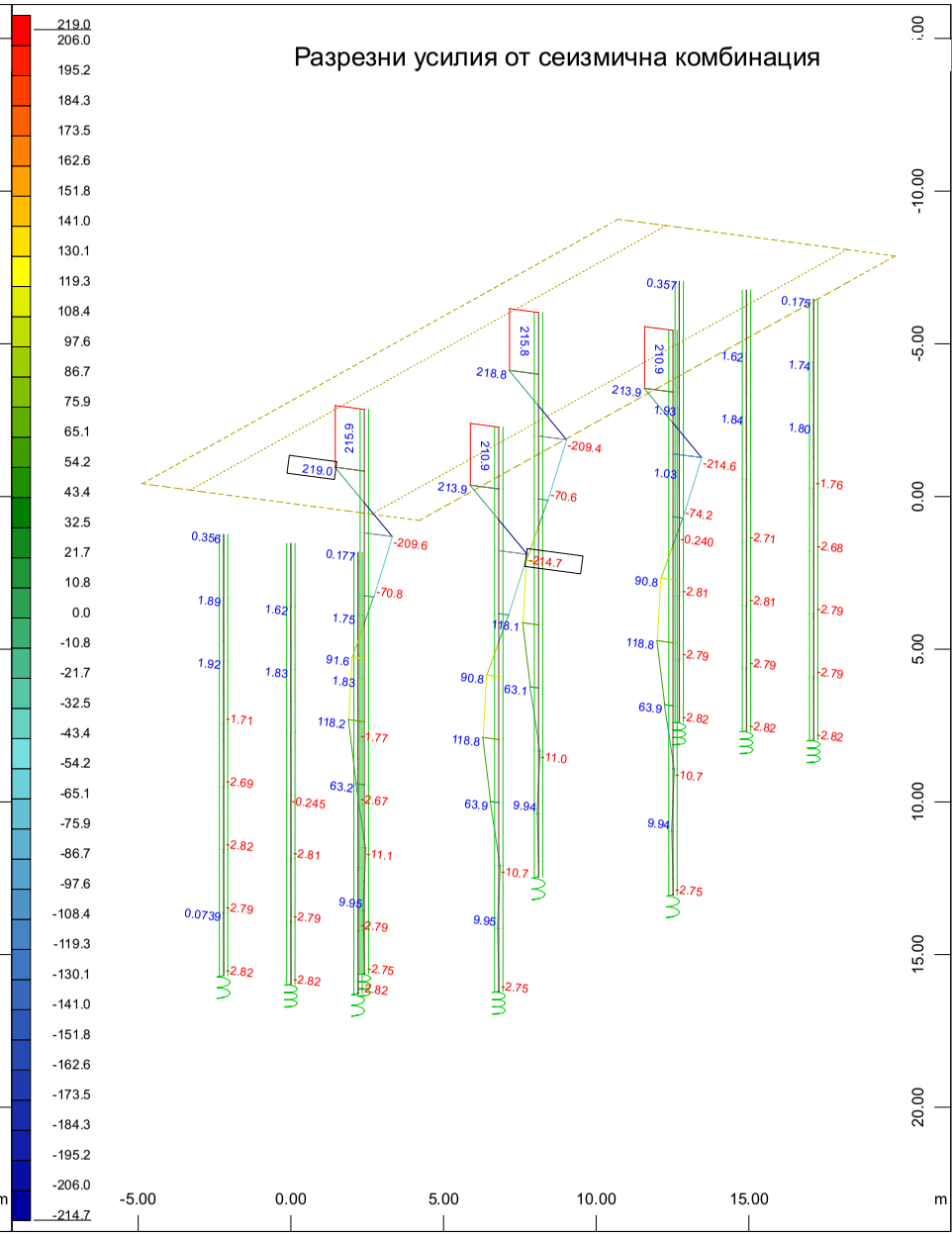
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2630 MIN-MY BEAM , 1 cm 3D =
1000. kNm (Min=-723.0) (Max=-0.0203)

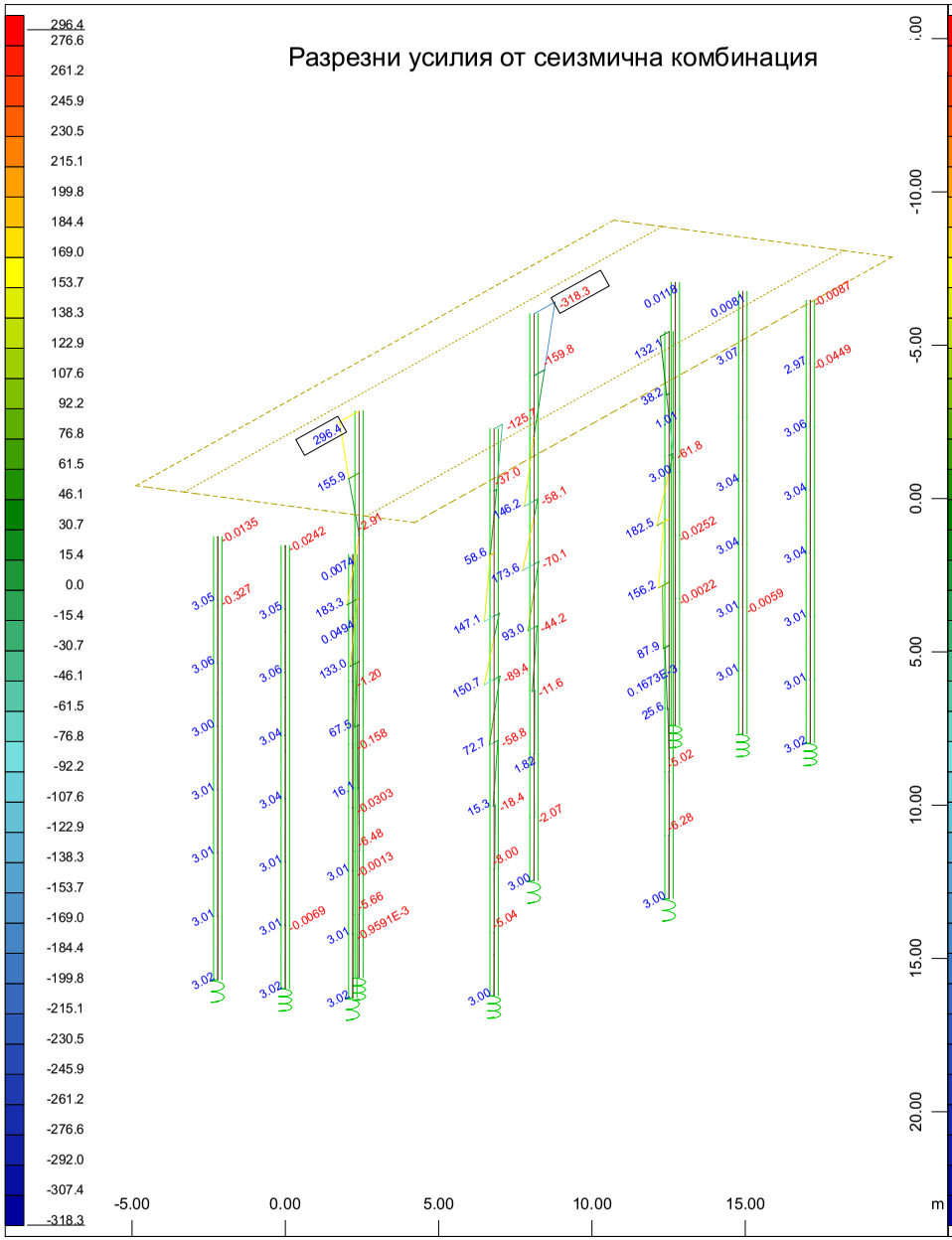
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

Разрезни усилия от сеизмична комбинация



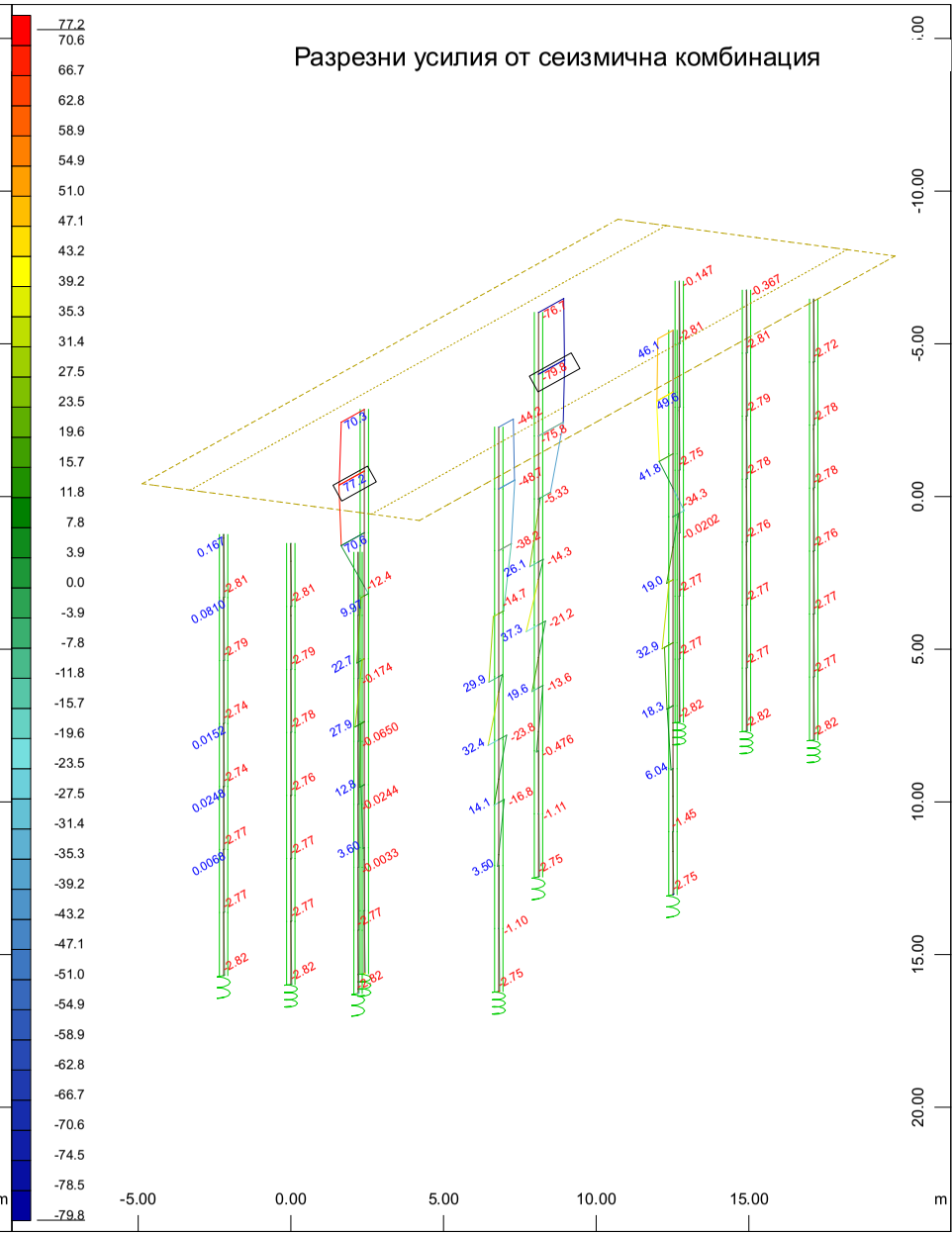
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2630 MIN-MY BEAM , 1 cm 3D =
500.0 kN (Min=-214.7) (Max=219.0)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962



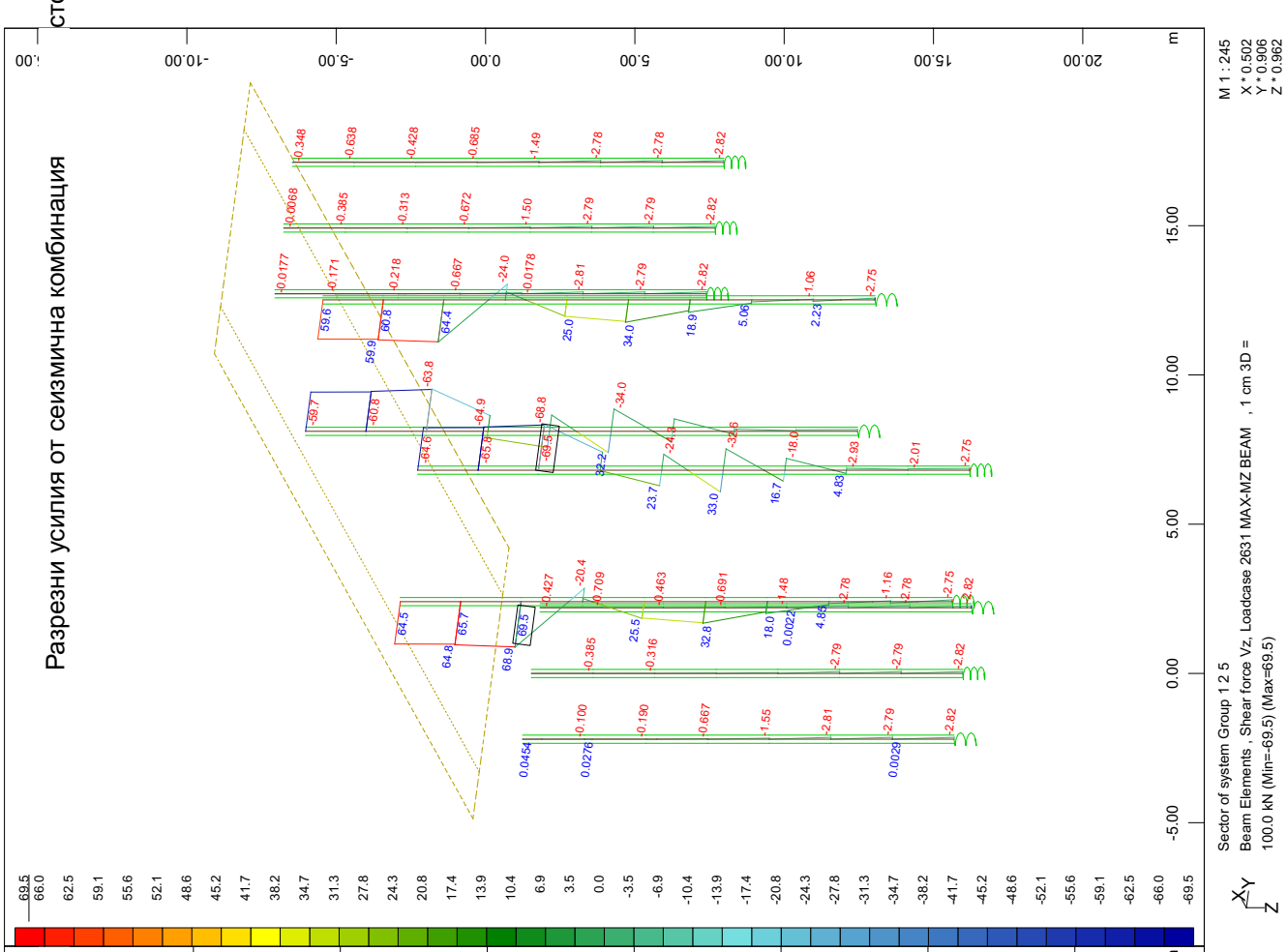
Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2630 MIN-MY BEAM , 1 cm 3D =
500.0 kNm (Min=-318.3) (Max=296.4)

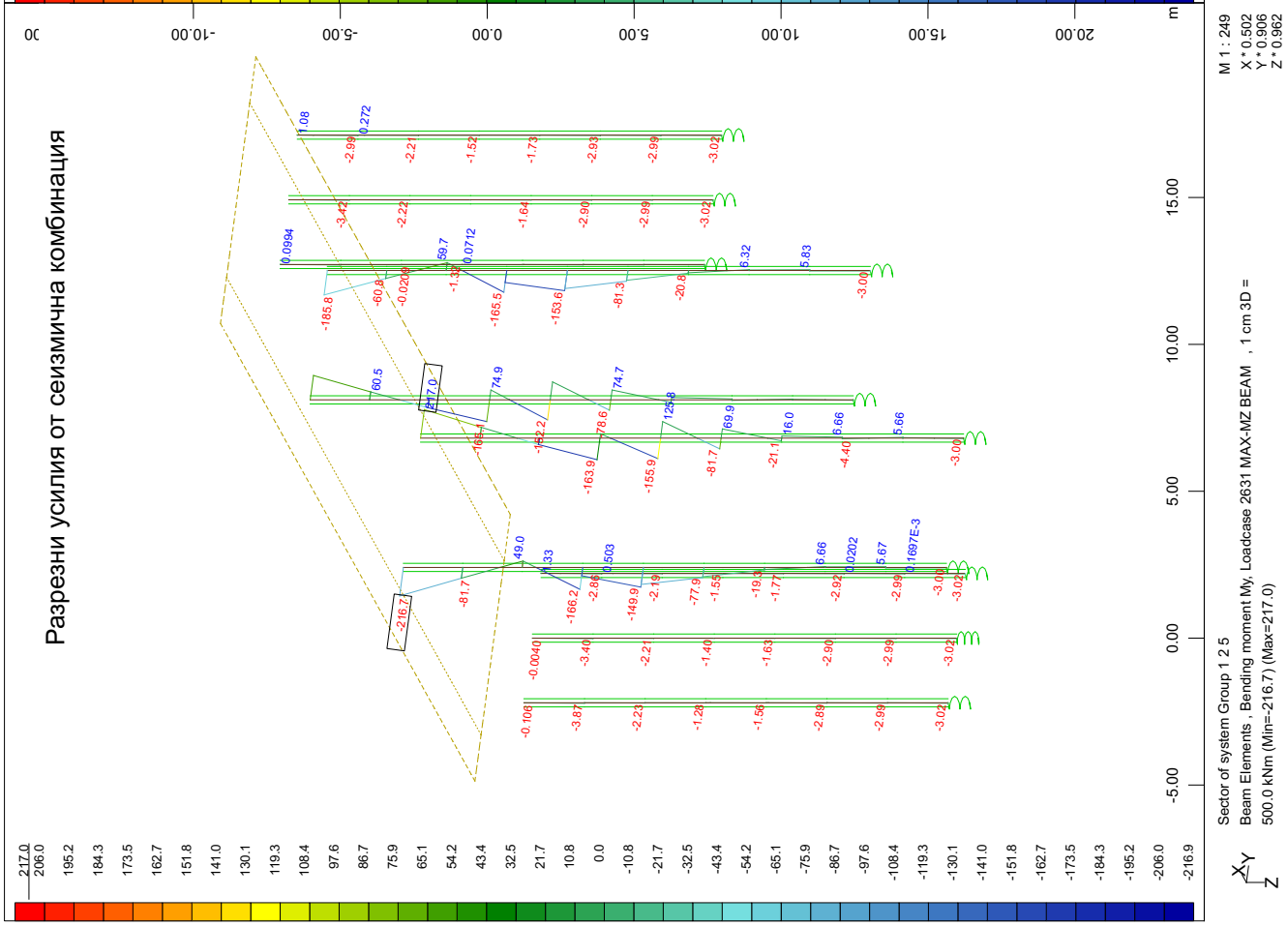
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

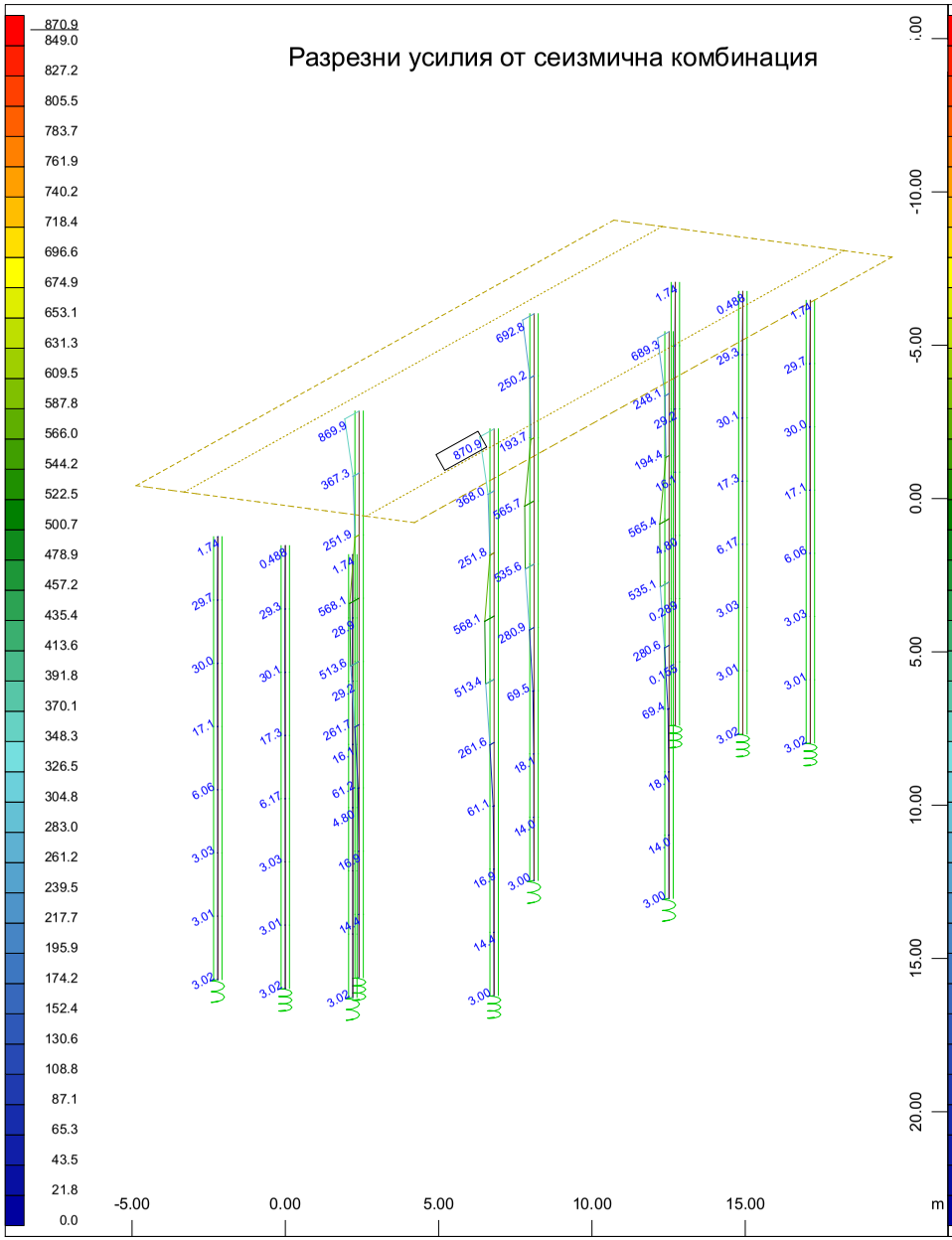


Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2630 MIN-MY BEAM , 1 cm 3D =
100.0 kN (Min=-79.8) (Max=77.2)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

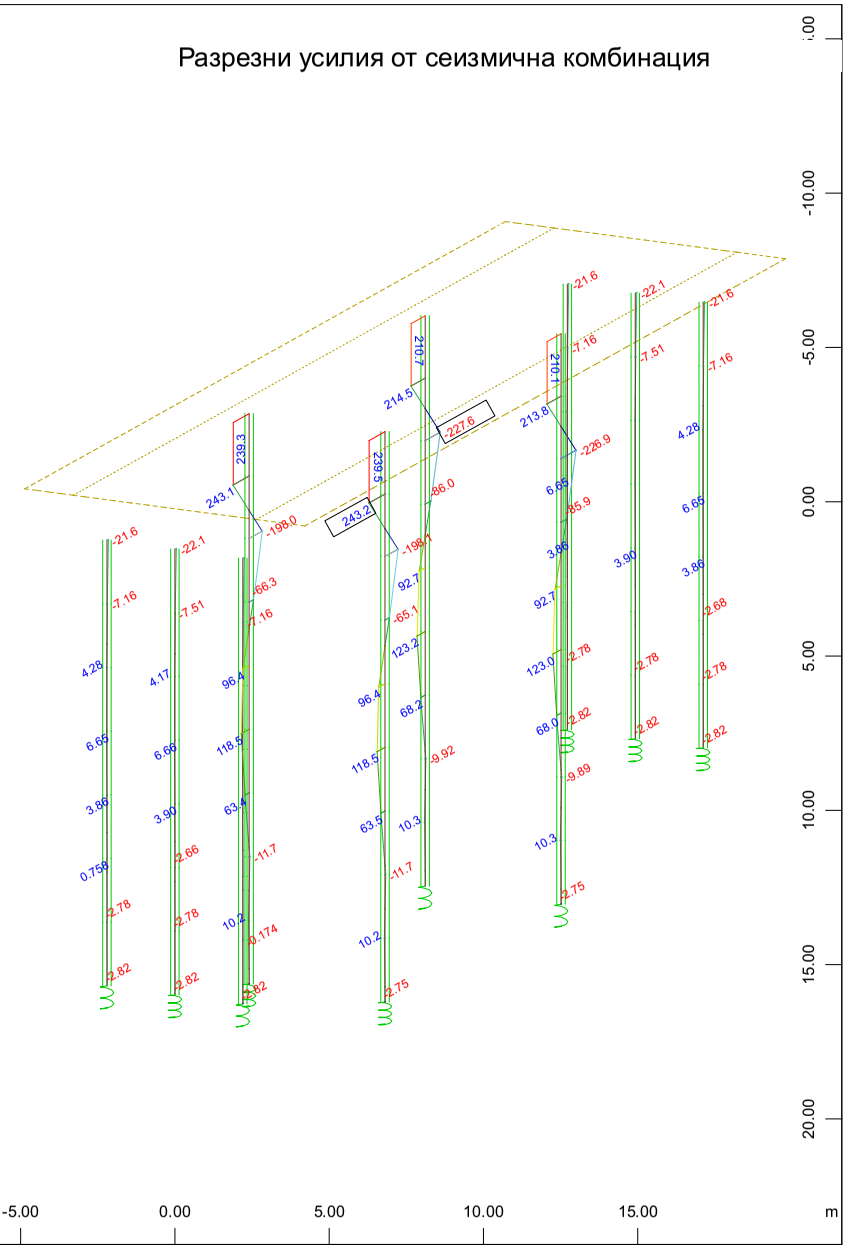






Sector of system Group 1 2 5
Beam Elements , Bending moment Mz, Loadcase 2631 MAX-MZ BEAM , 1 cm 3D = 2000. kNm (Max=870.9)

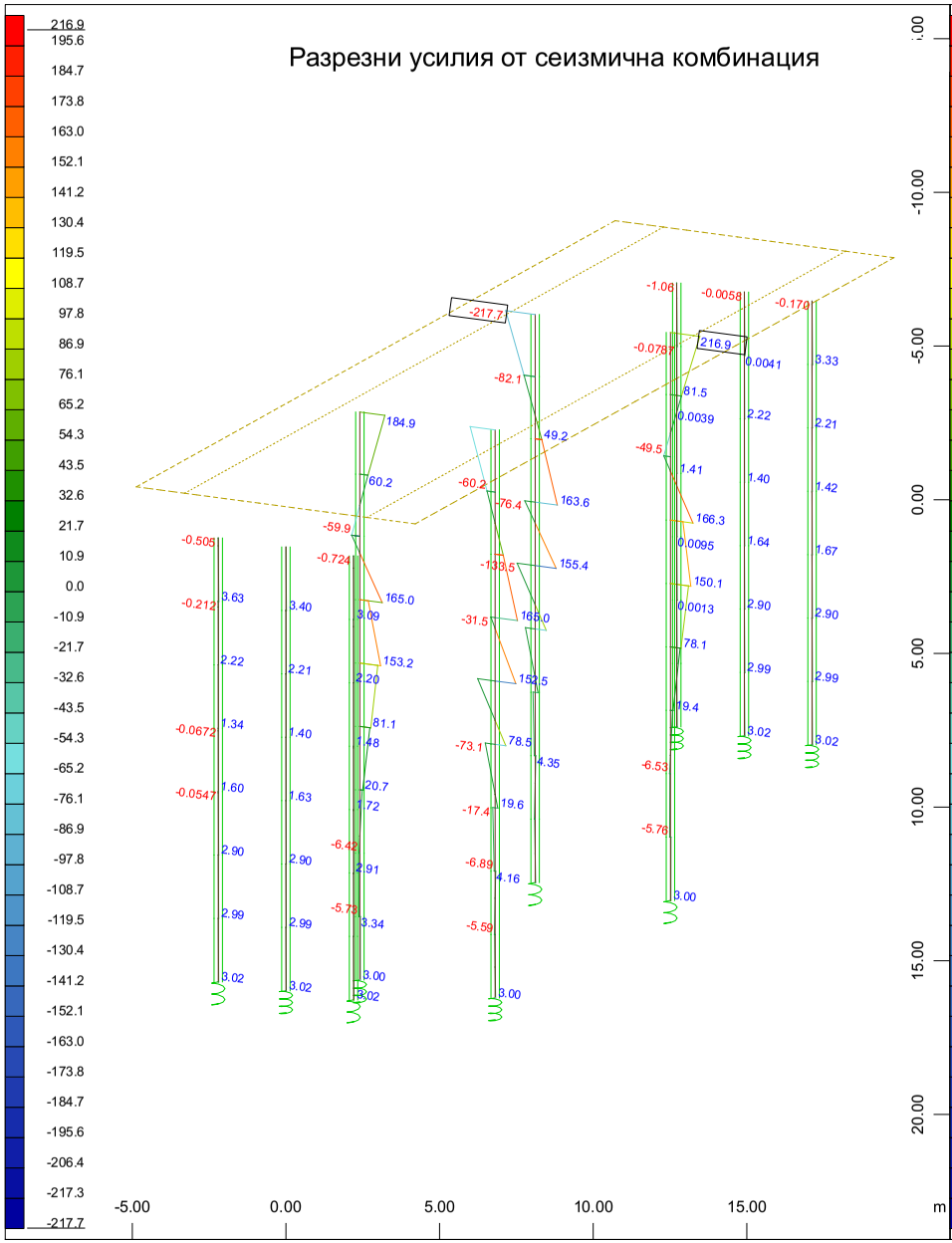
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 1 2 5
Beam Elements , Shear force Vy, Loadcase 2631 MAX-MZ BEAM , 1 cm 3D = 500.0 kN (Min=-227.6) (Max=243.2)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

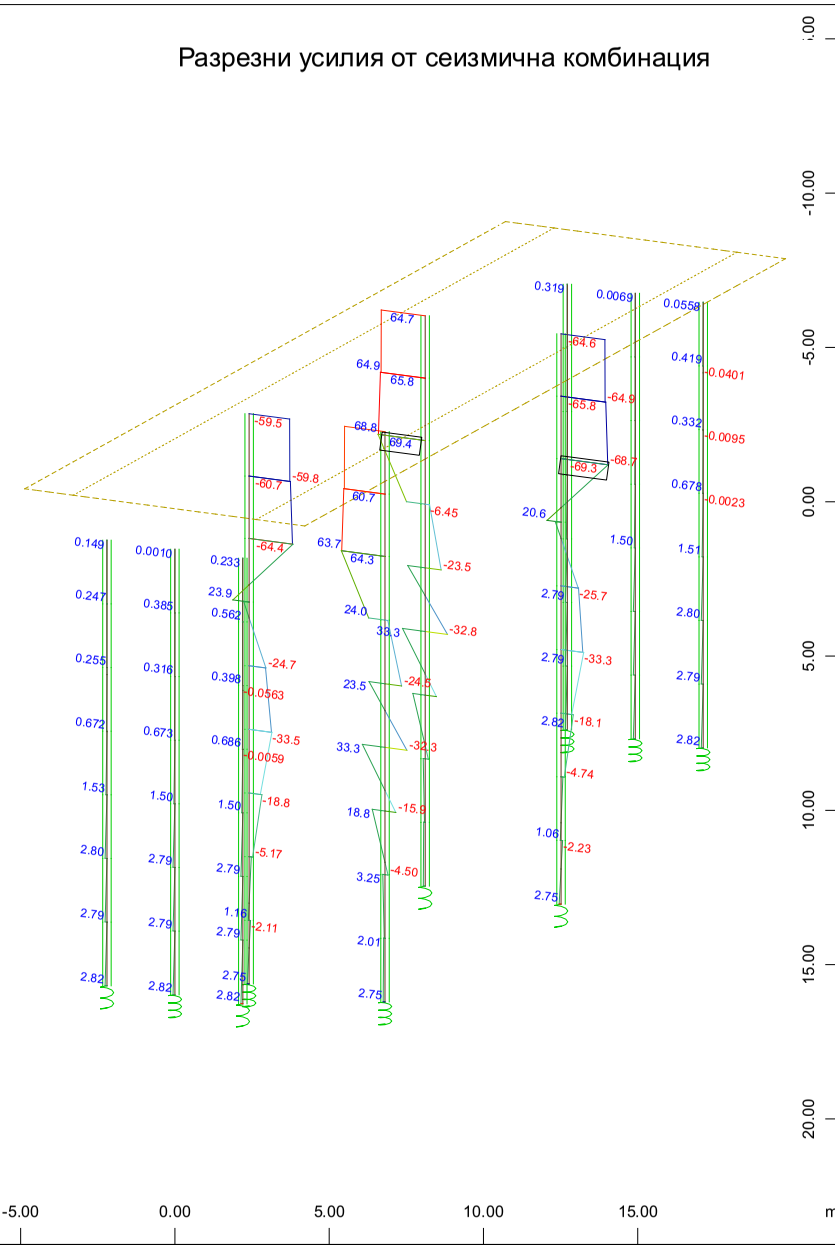
Разрезни усилия от сеизмична комбинация



Sector of system Group 1 2 5
Beam Elements , Bending moment My, Loadcase 2632 MIN-MZ BEAM , 1 cm 3D =
500.0 kNm (Min=-217.7) (Max=216.9)

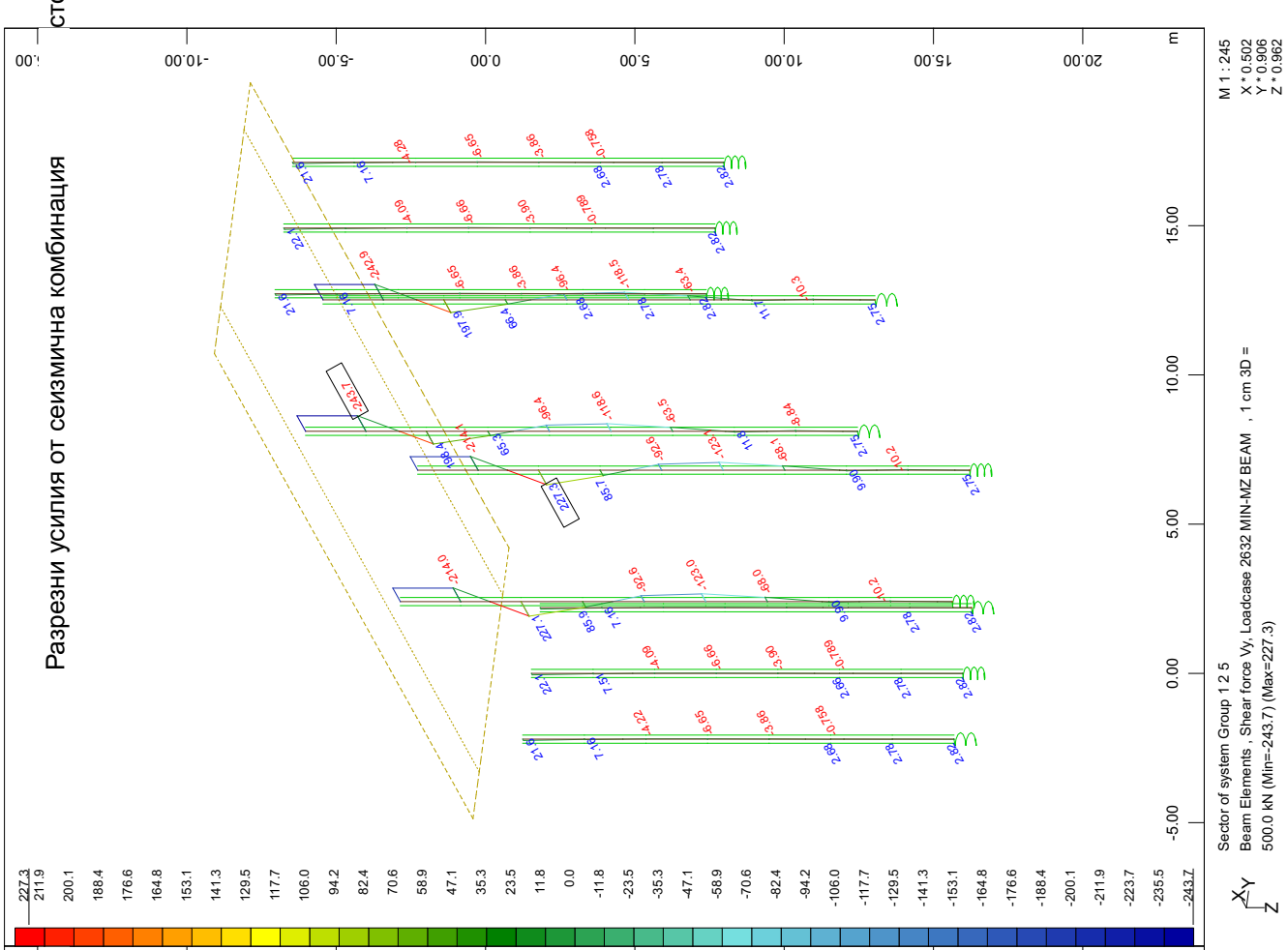
M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962

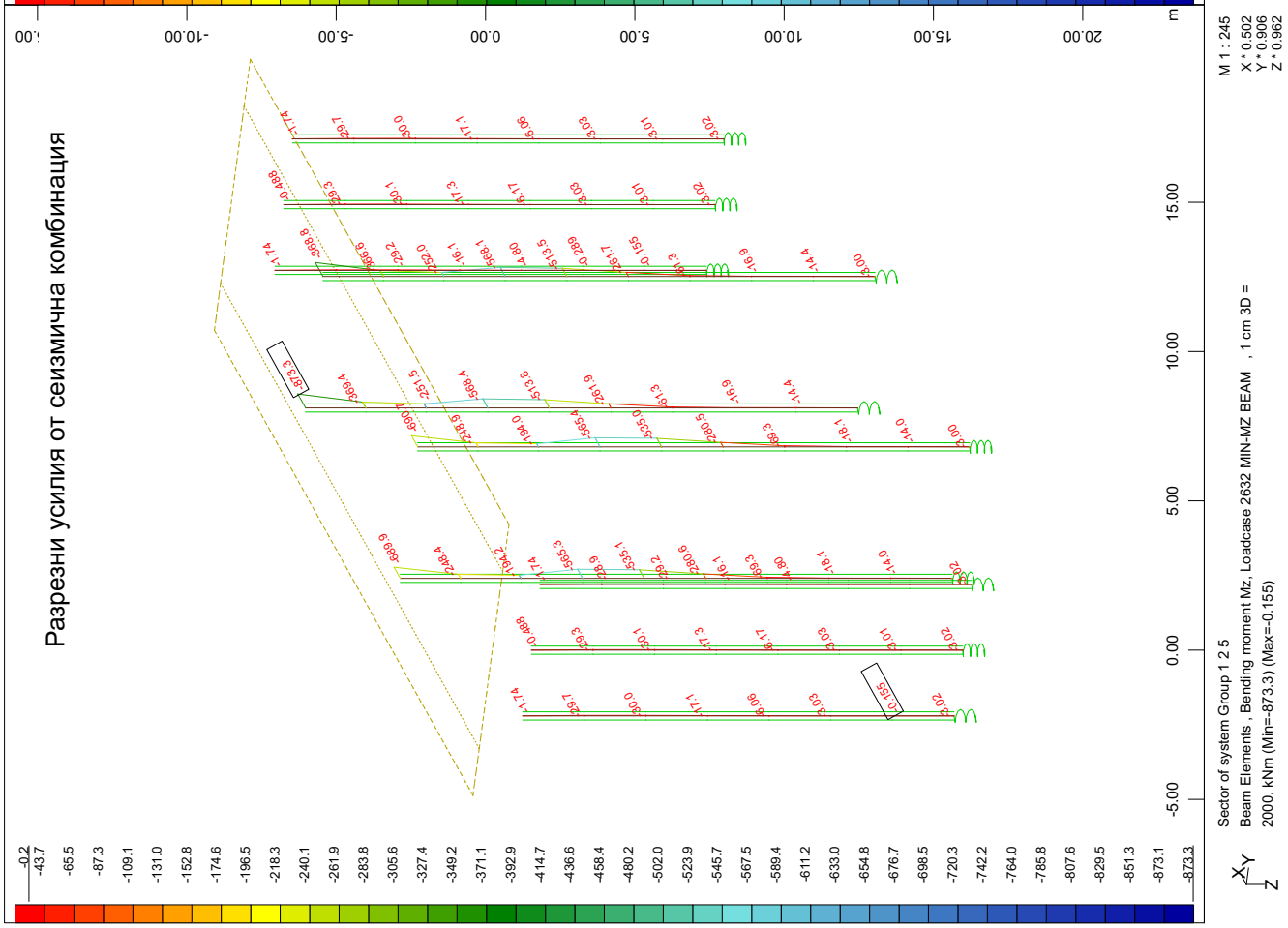
Разрезни усилия от сеизмична комбинация



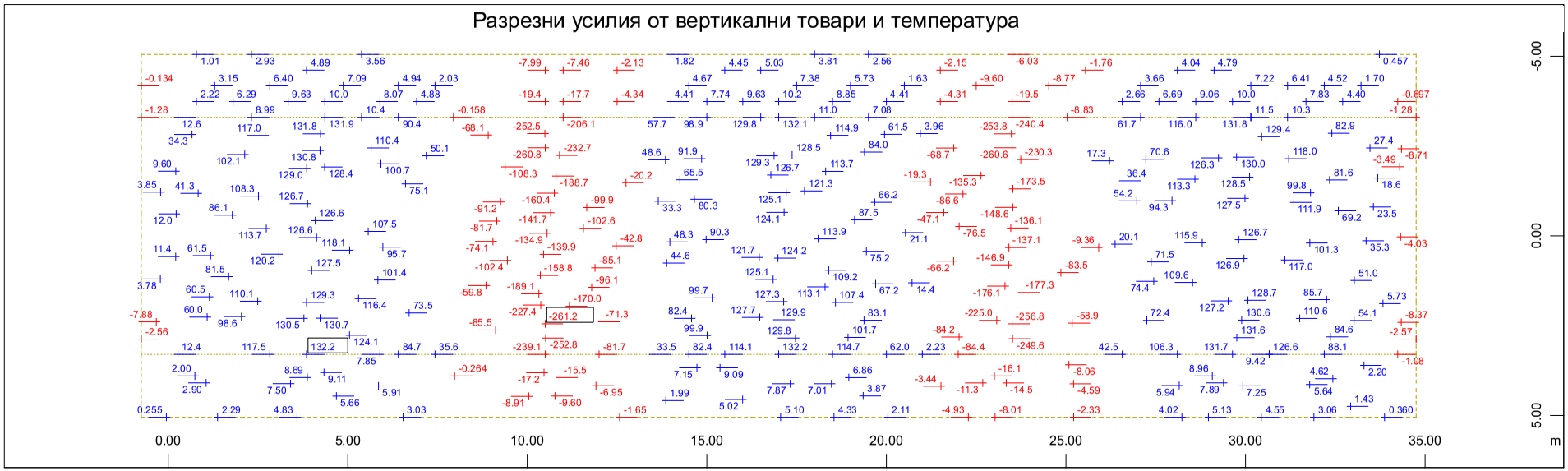
Sector of system Group 1 2 5
Beam Elements , Shear force Vz, Loadcase 2632 MIN-MZ BEAM , 1 cm 3D =
100.0 kN (Min=-69.3) (Max=69.4)

M 1 : 245
X * 0.502
Y * 0.906
Z * 0.962





Разрезни усилия от вертикални товари и температура



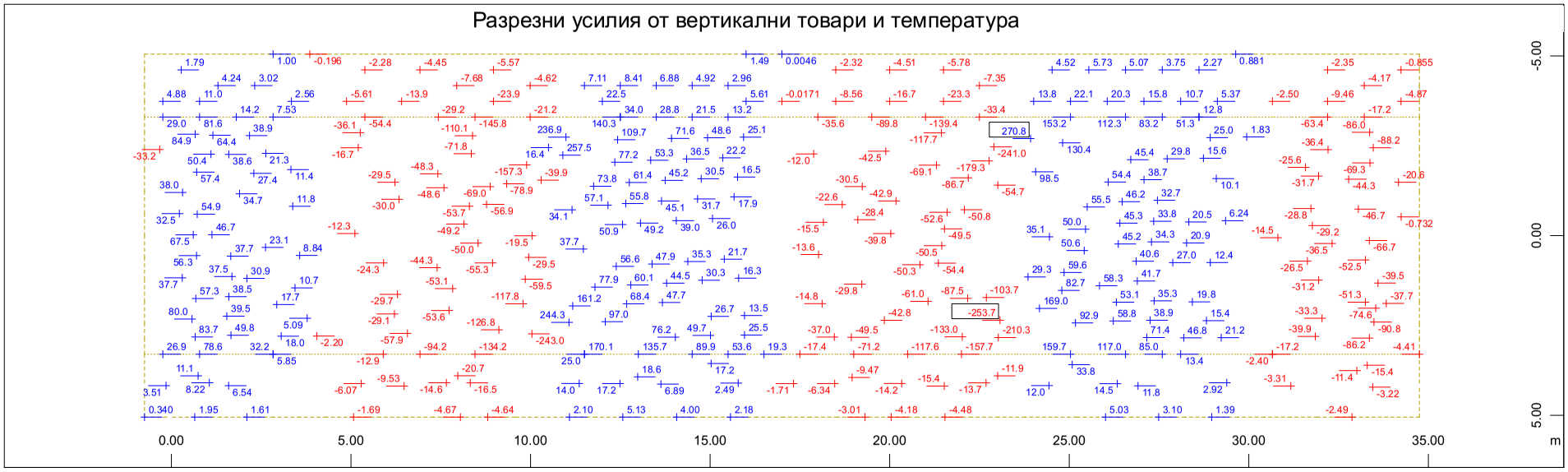
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1 Self-weight (Min=-261.2) (Max=132.2)

Разрезни усилия от вертикални товари и температура

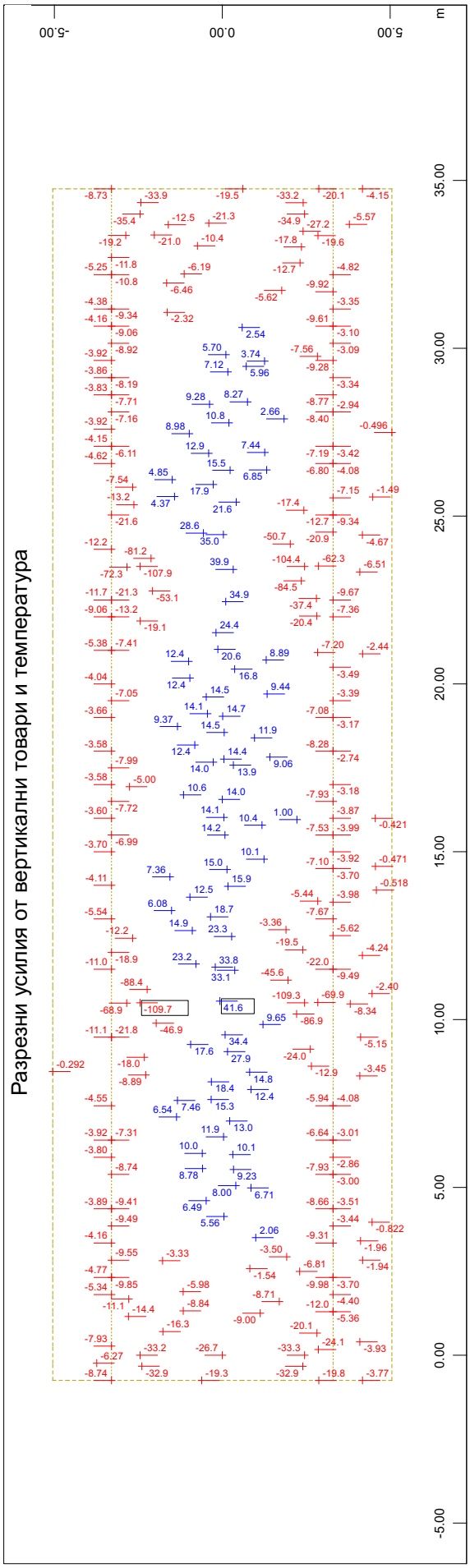


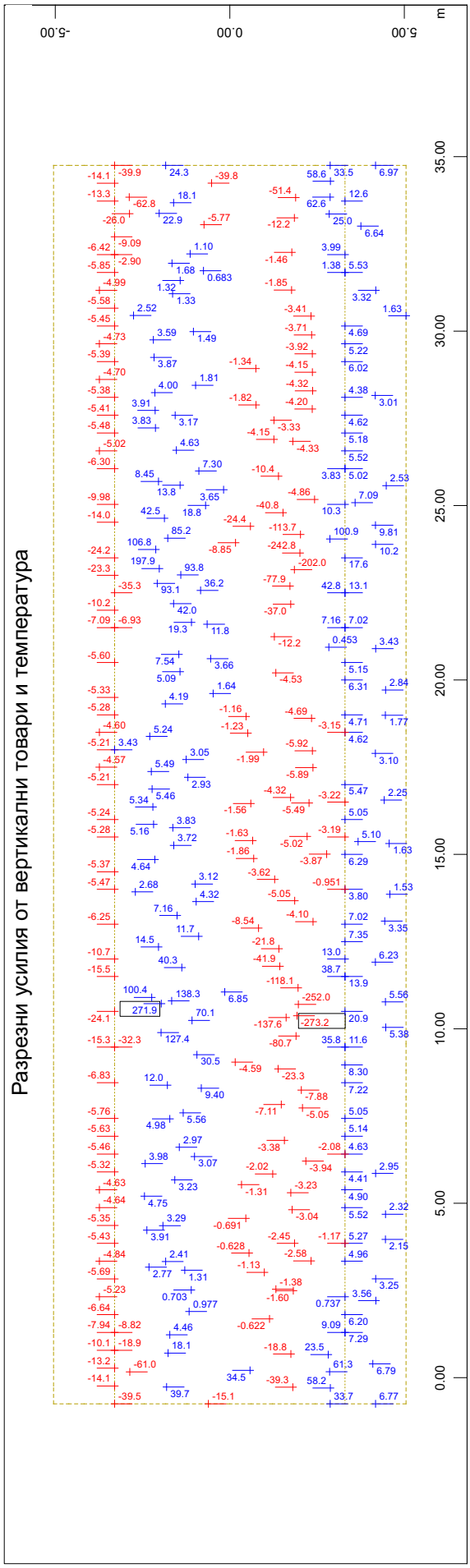
Sector of system Group 1

M 1 : 173

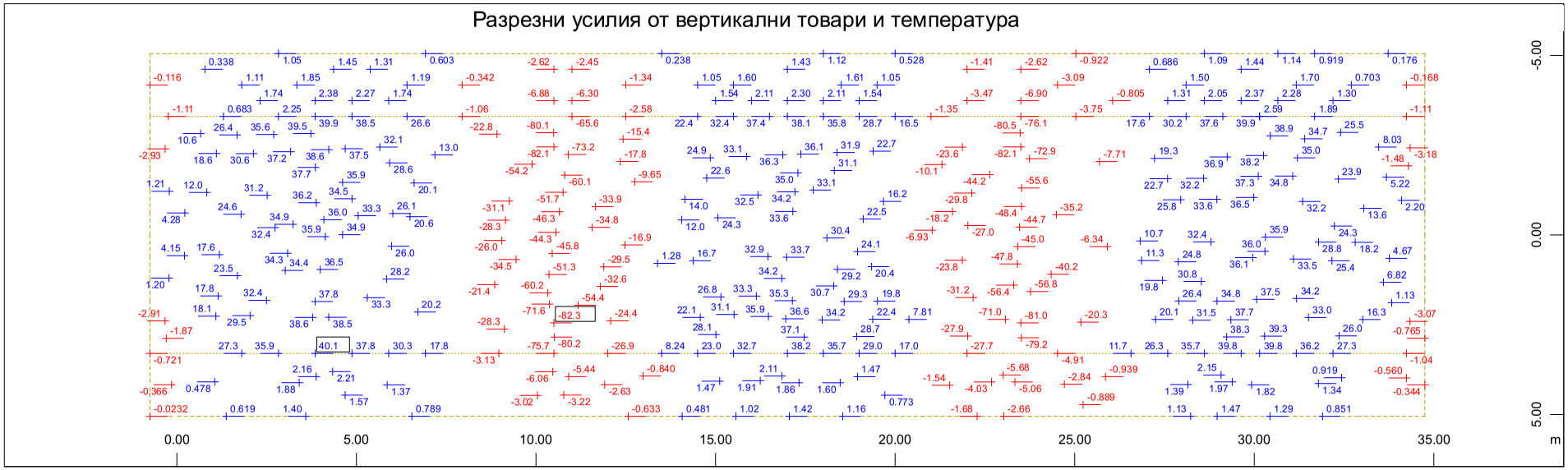
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1 Self-weight (Min=-253.7) (Max=270.8)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 185
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 1 Self-weight (Min=-109.7) (Max=41.6)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 178
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 1 Self-weight (Min=-273.2) (Max=271.9)
Z
X
Y

Разрезни усилия от вертикални товари и температура



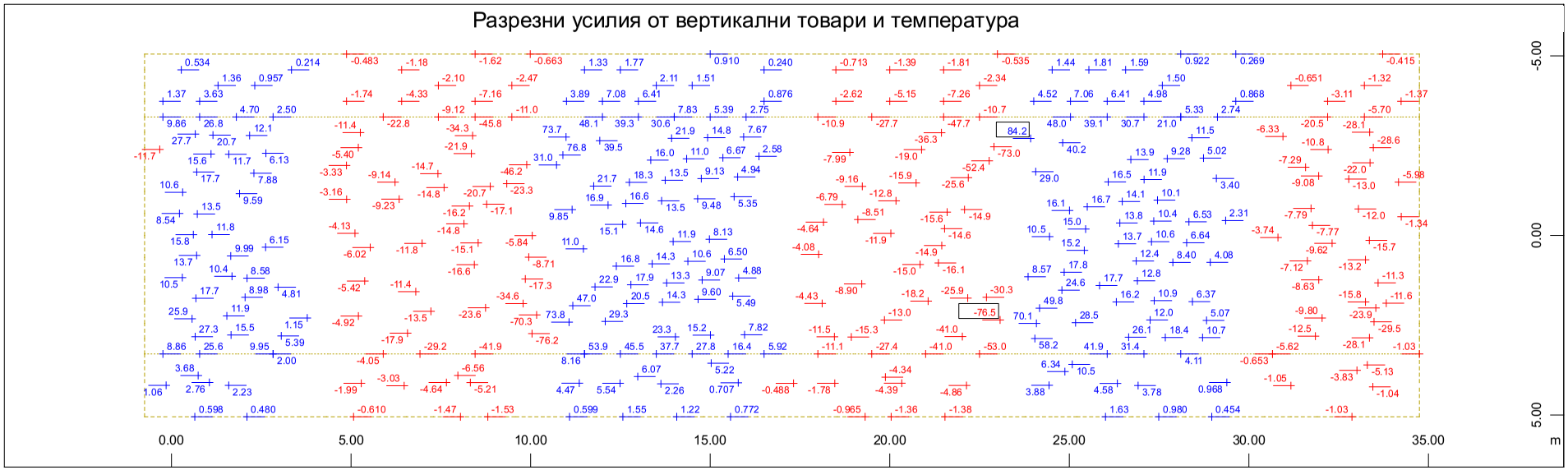
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2 Asphalt & Barriers (Min=-82.3) (Max=40.1)

Разрезни усилия от вертикални товари и температура

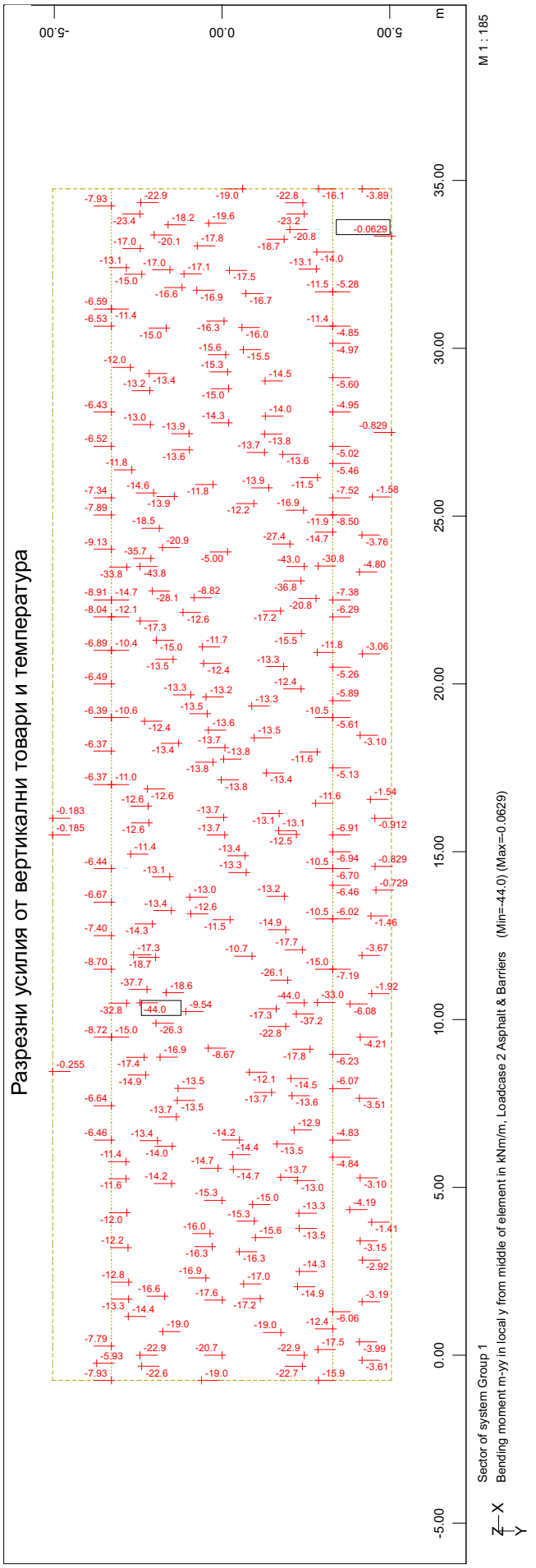


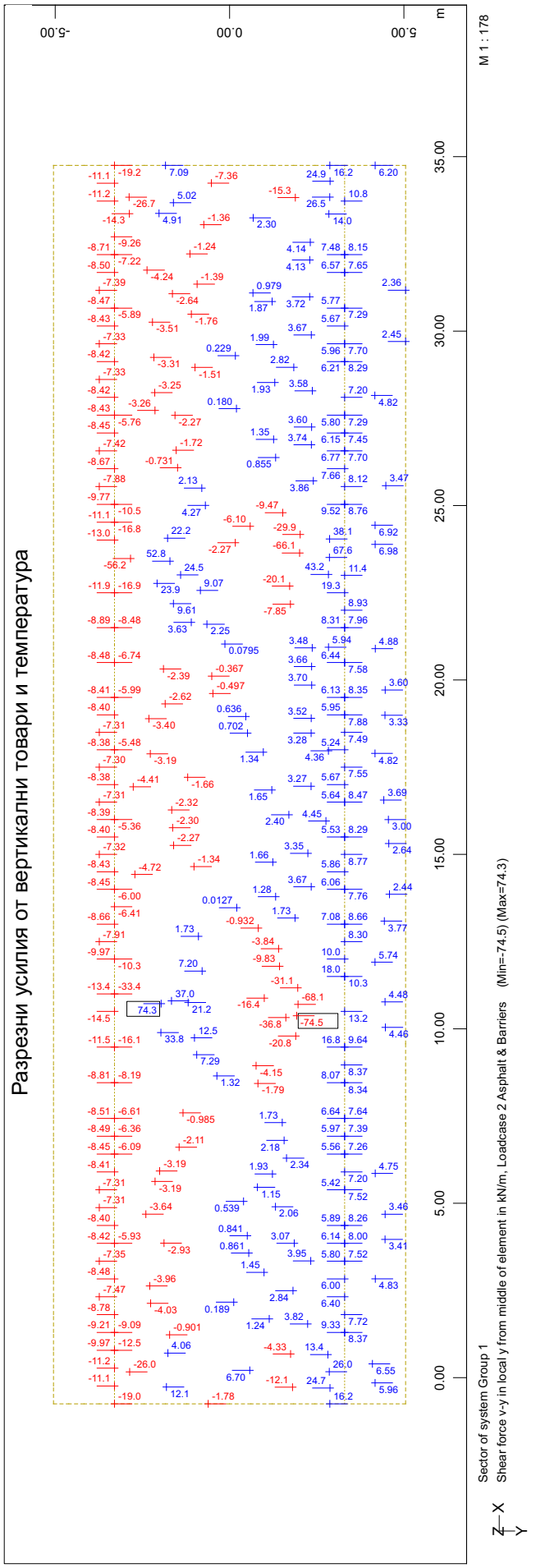
Sector of system Group 1

M 1 : 173

Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2 Asphalt & Barriers (Min=-76.5) (Max=84.2)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 185
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 2 Asphalt & Barriers (Min=-44.0) (Max=-0.0629)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 178
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 2 Asphalt & Barriers (Min=-74.5) (Max=74.3)
Z
X
Y

Разрезни усилия от вертикални товари и температура

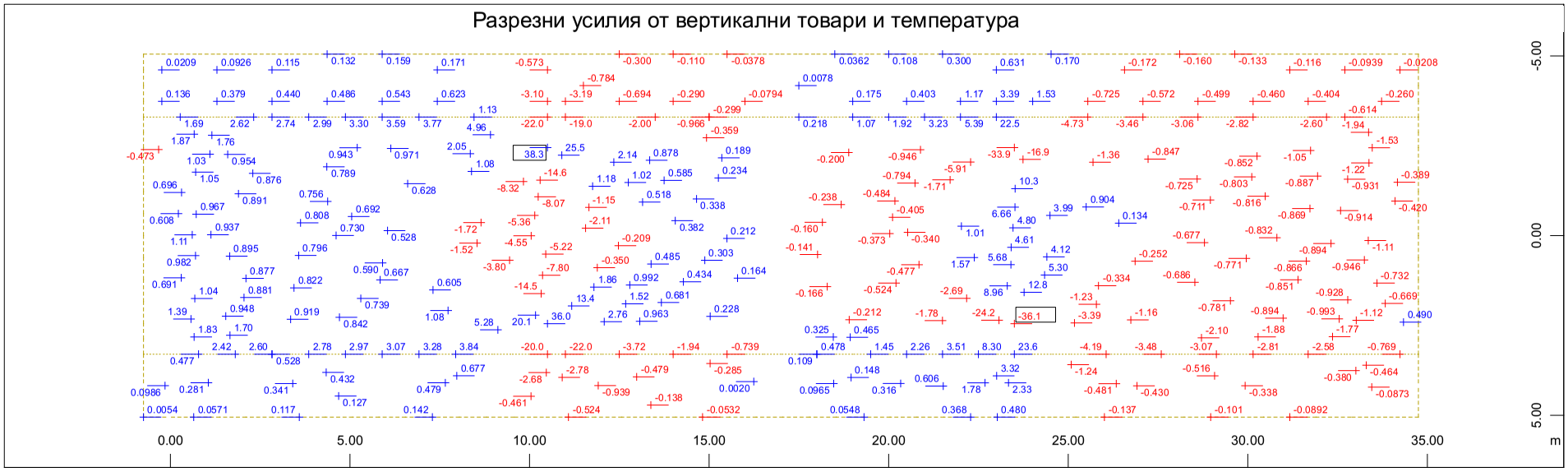
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 3 Pos Uniform temperature (Min=-21.3) (Max=26.0)

Разрезни усилия от вертикални товари и температура

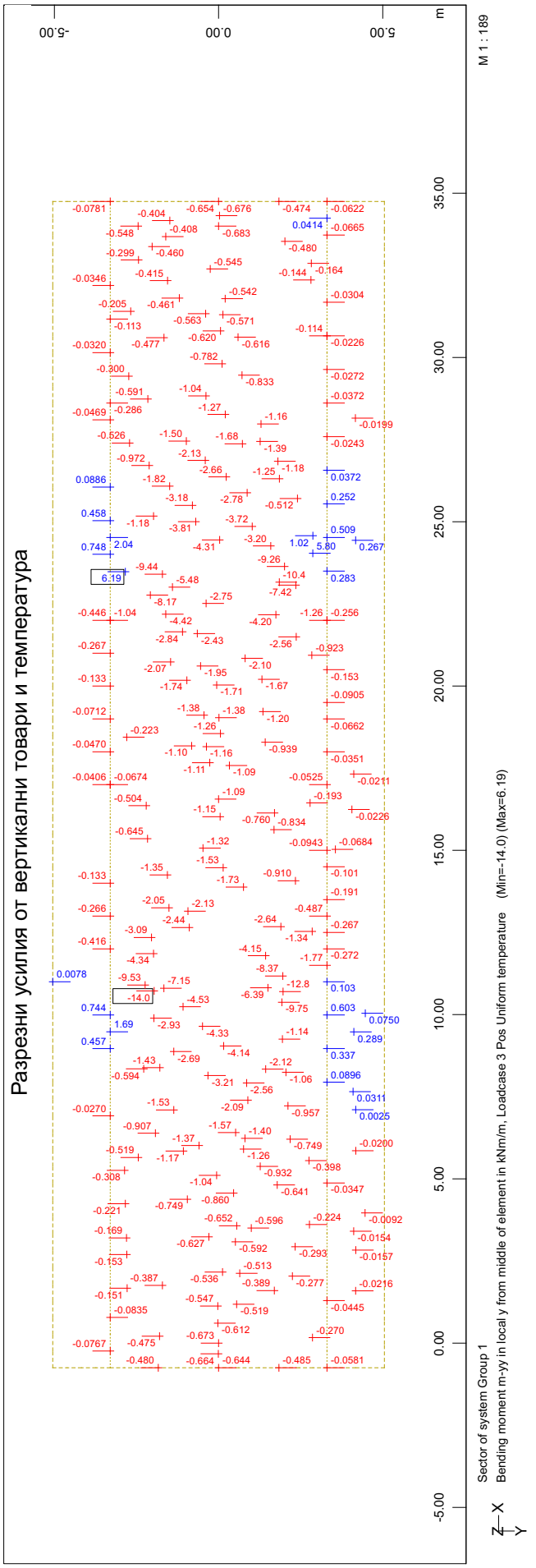


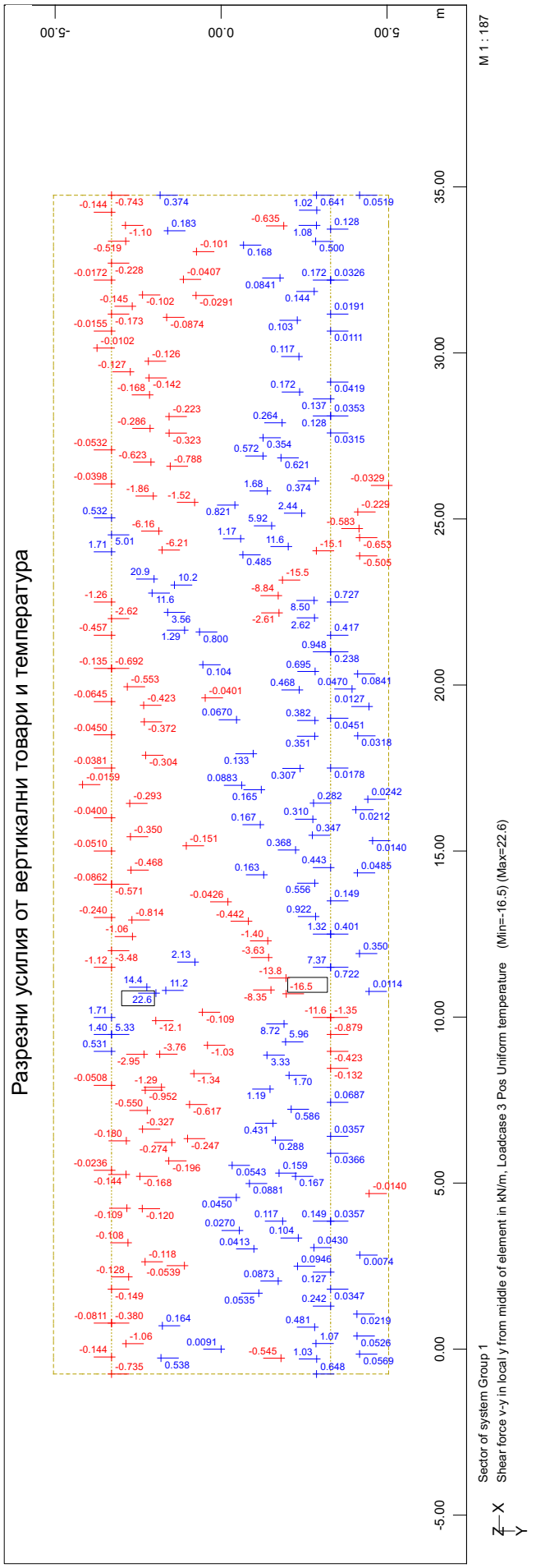
Sector of system Group 1

M 1 : 173

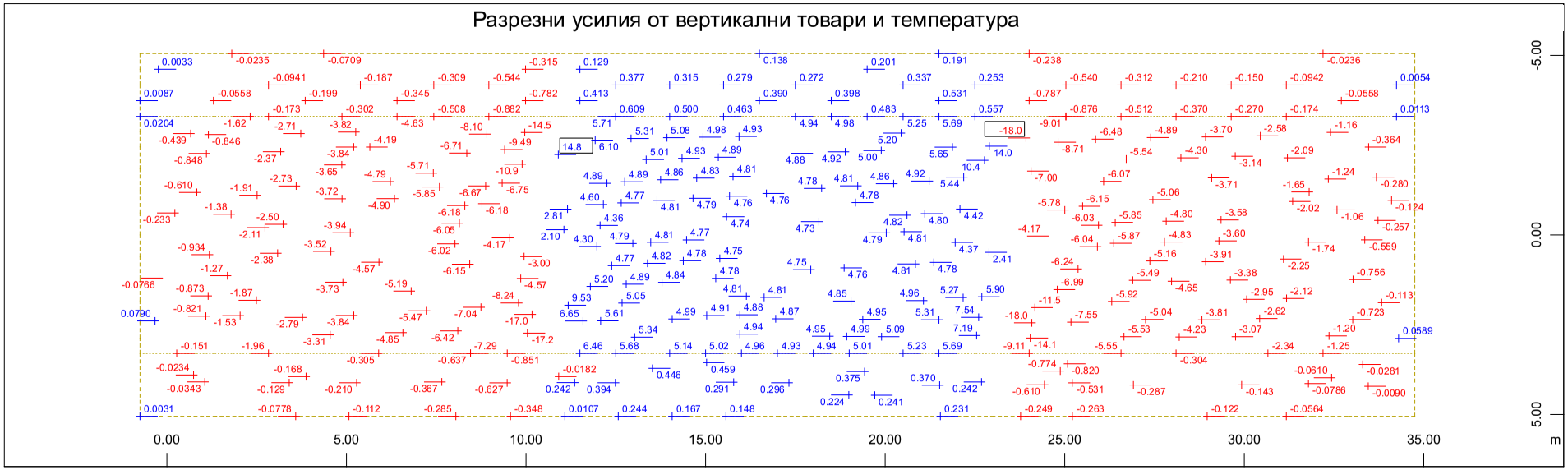
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 3 Pos Uniform temperature (Min=-36.1) (Max=38.3)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 189
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 3 Pos Uniform temperature (Min=-14.0) (Max=6.19)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 187
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 3 Pos Uniform temperature (Min=-16.5) (Max=22.6)
Z
X
Y

Разрезни усилия от вертикални товари и температура



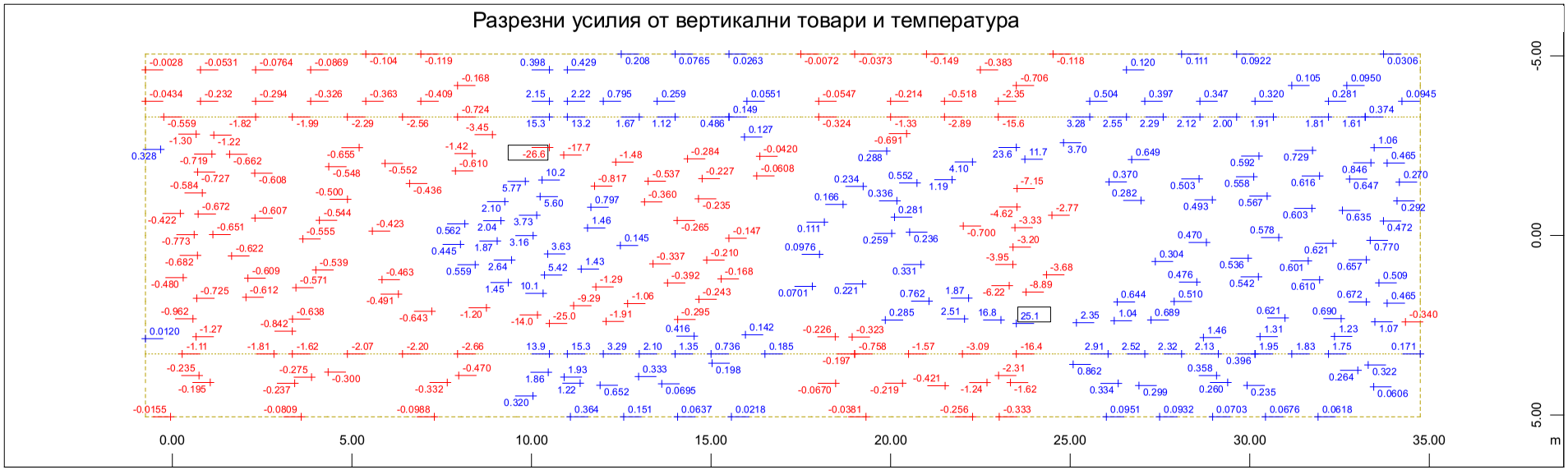
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 4 Neg Uniform temperature (Min=-18.0) (Max=14.8)

Разрезни усилия от вертикални товари и температура

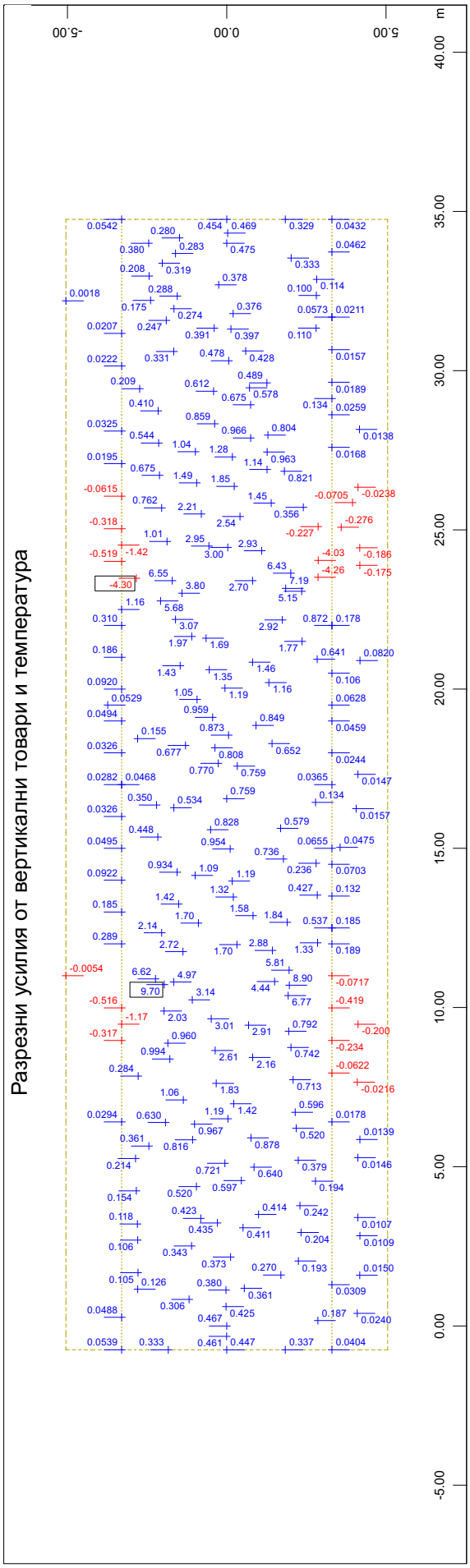


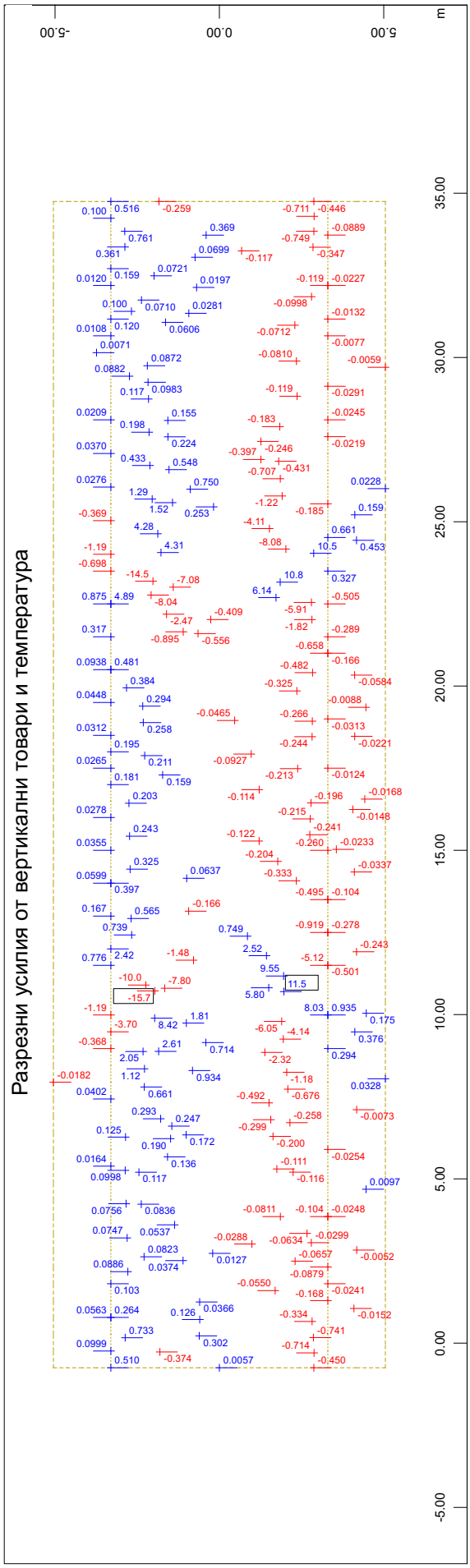
Sector of system Group 1

M 1 : 173

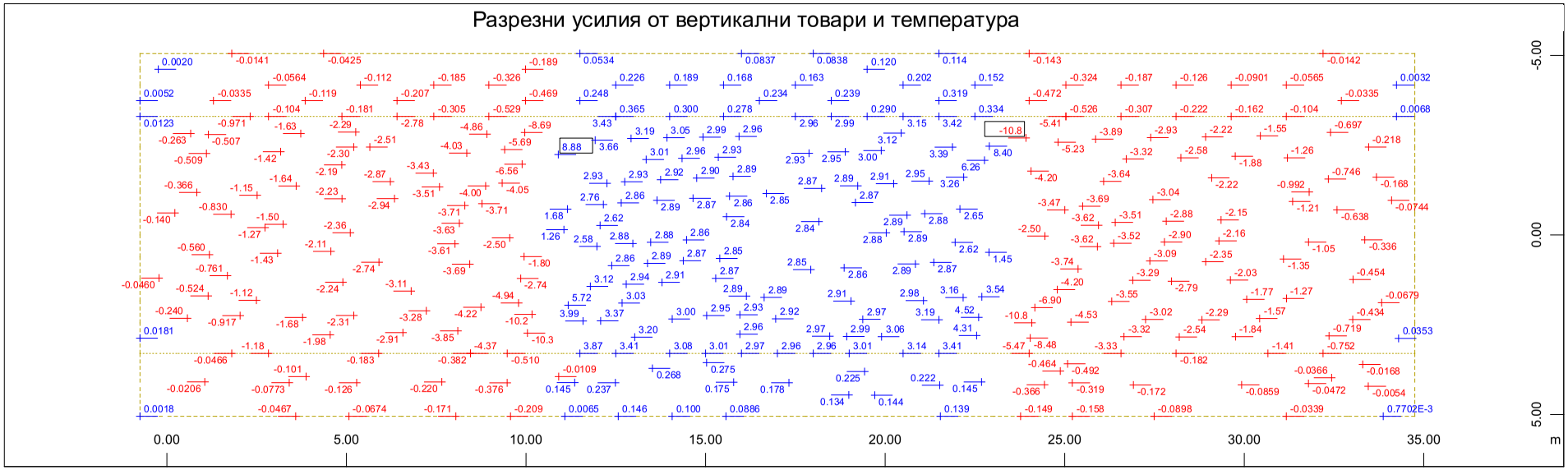
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 4 Neg Uniform temperature (Min=-26.6) (Max=25.1)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 195
m
-5.00
0.00
5.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 4 Neg Uniform temperature (Min=-4.30) (Max=9.70)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 189
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 4 Neg Uniform temperature (Min=-15.7) (Max=11.5)
Z
X
Y

Разрезни усилия от вертикални товари и температура



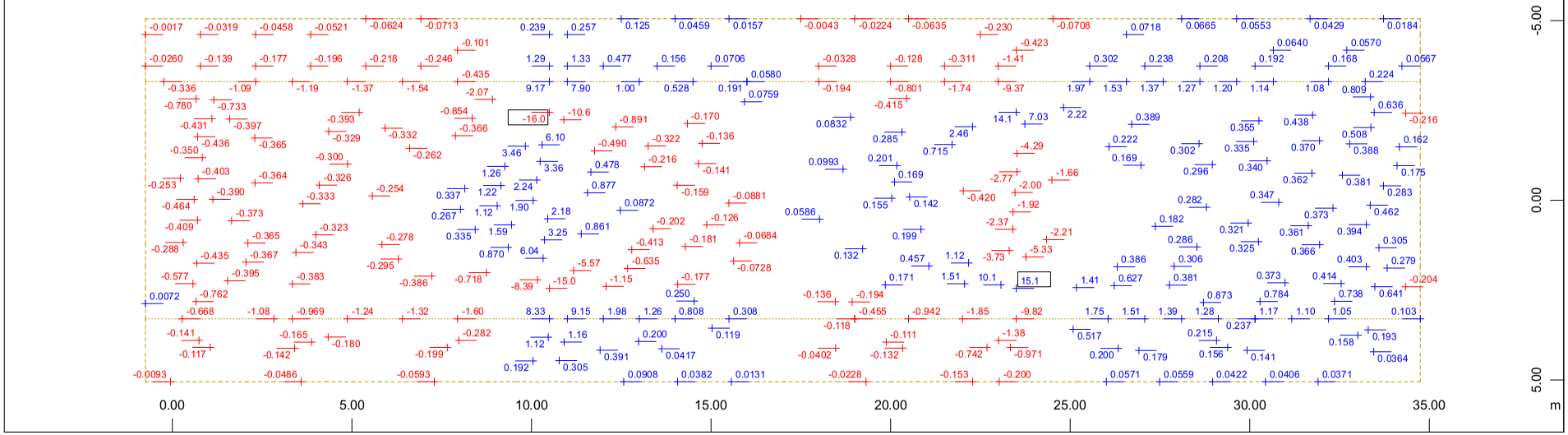
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 5 Shrinkage (Min=-10.8) (Max=8.88)

Разрезни усилия от вертикални товари и температура

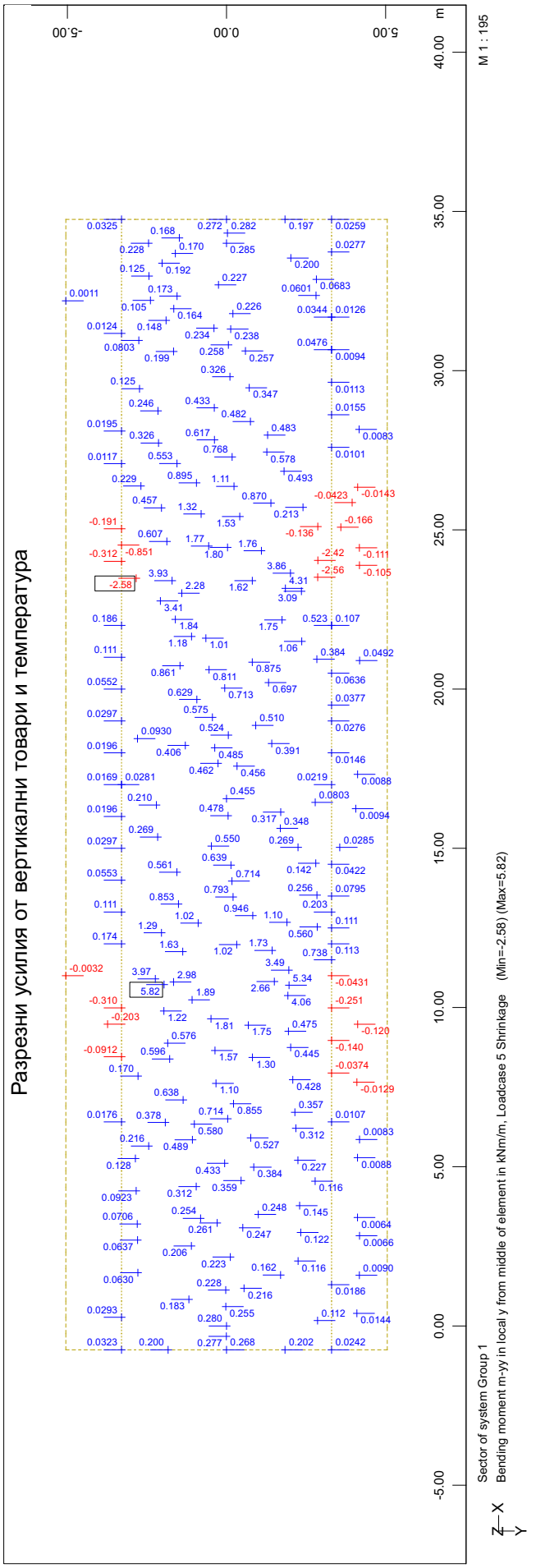


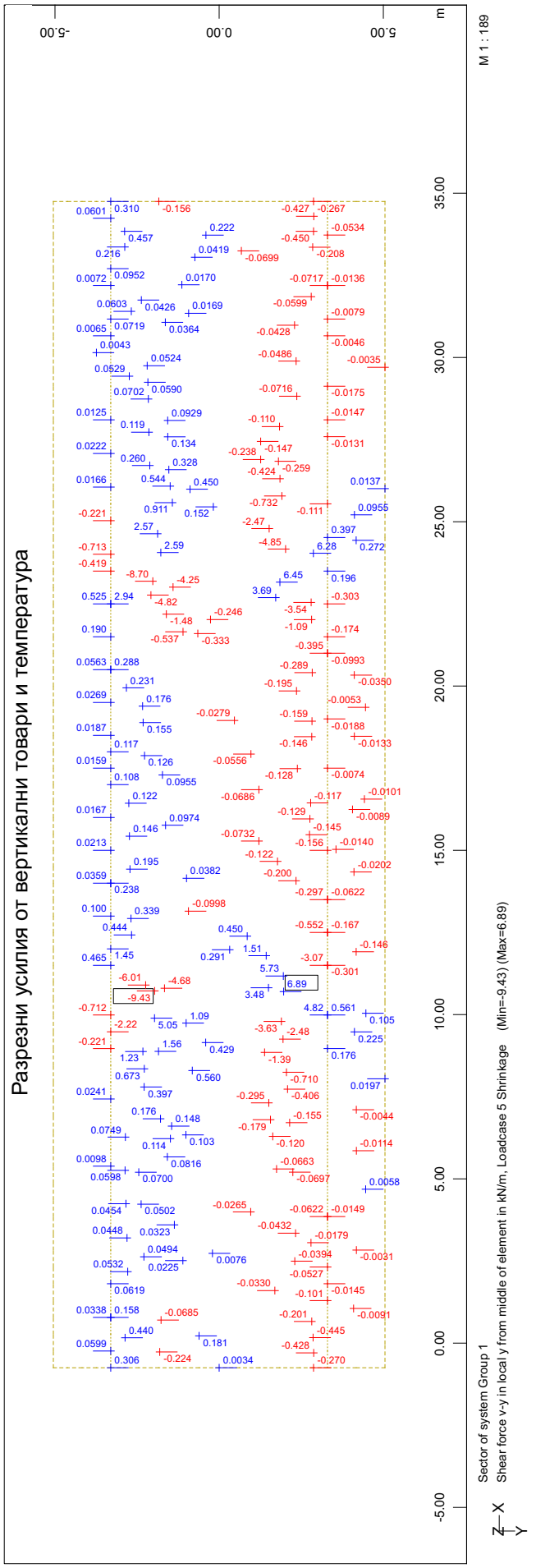
Sector of system Group 1

M 1 : 173

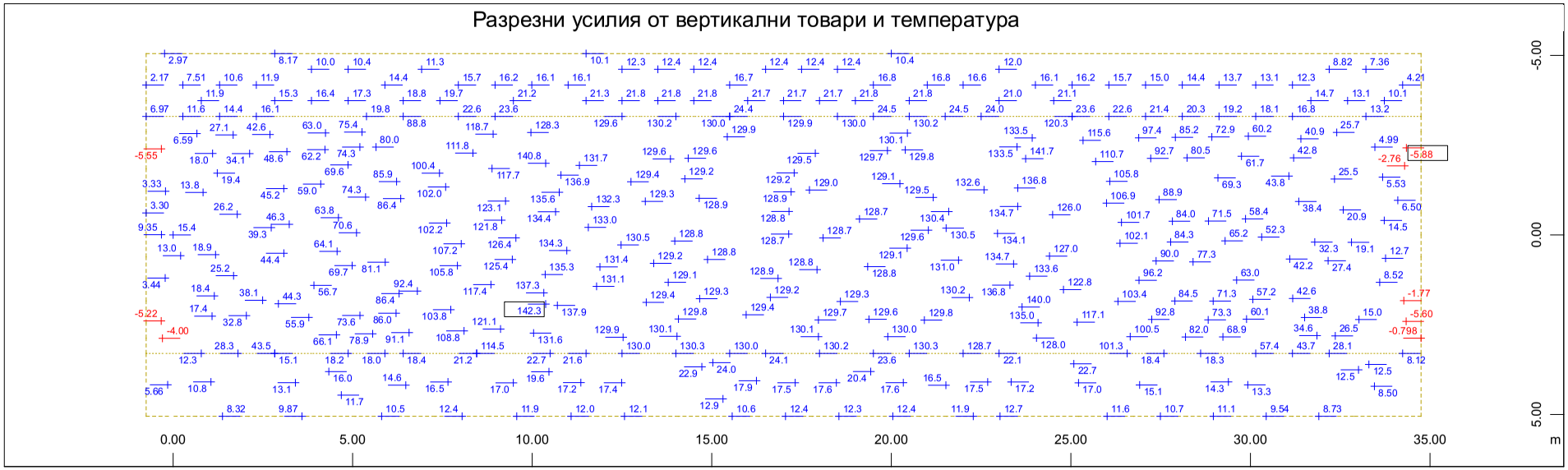
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 5 Shrinkage (Min=-16.0) (Max=15.1)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
m
-5.00
0.00
5.00
M 1 : 195
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 5 Shrinkage (Min=-2.58) (Max=5.82)
Z
X
Y


Разрезни усилия от вертикални товари и температура
m
-5.00
0.00
5.00
M 1 : 189
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 5 Shrinkage (Min=-9.43) (Max=6.89)
Z
X
Y

Разрезни усилия от вертикални товари и температура



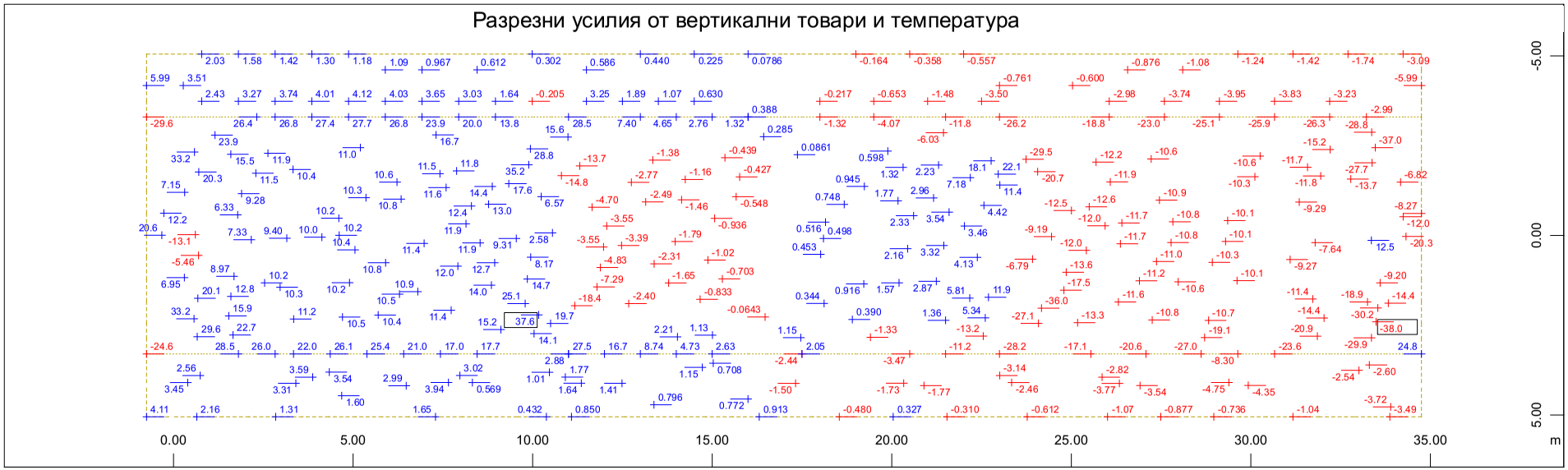
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 6 Pos gradient (Min=-5.88) (Max=142.3)

Разрезни усилия от вертикални товари и температура

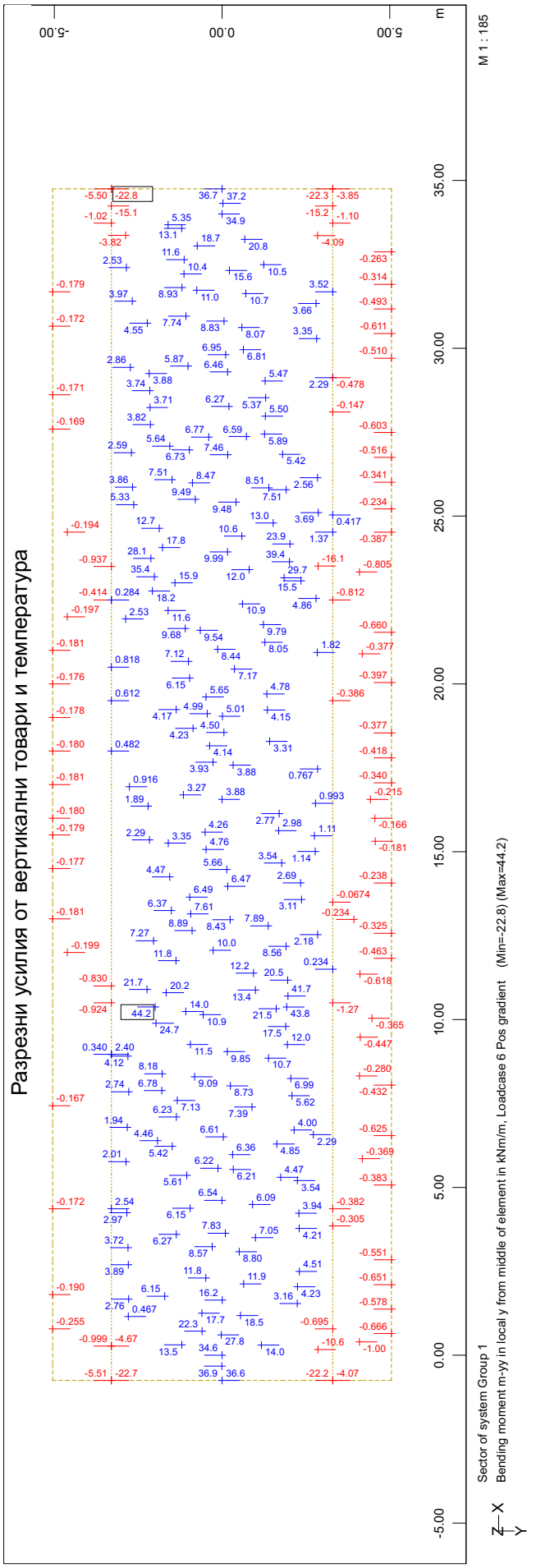


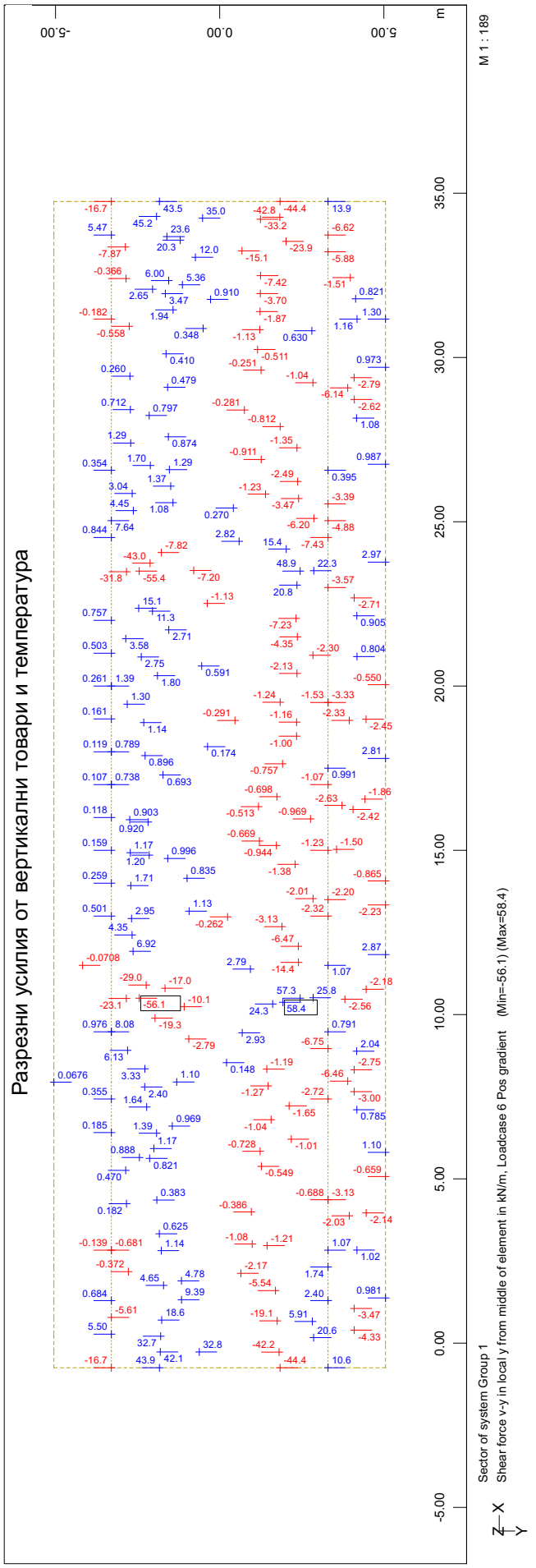
Sector of system Group 1

M 1 : 173

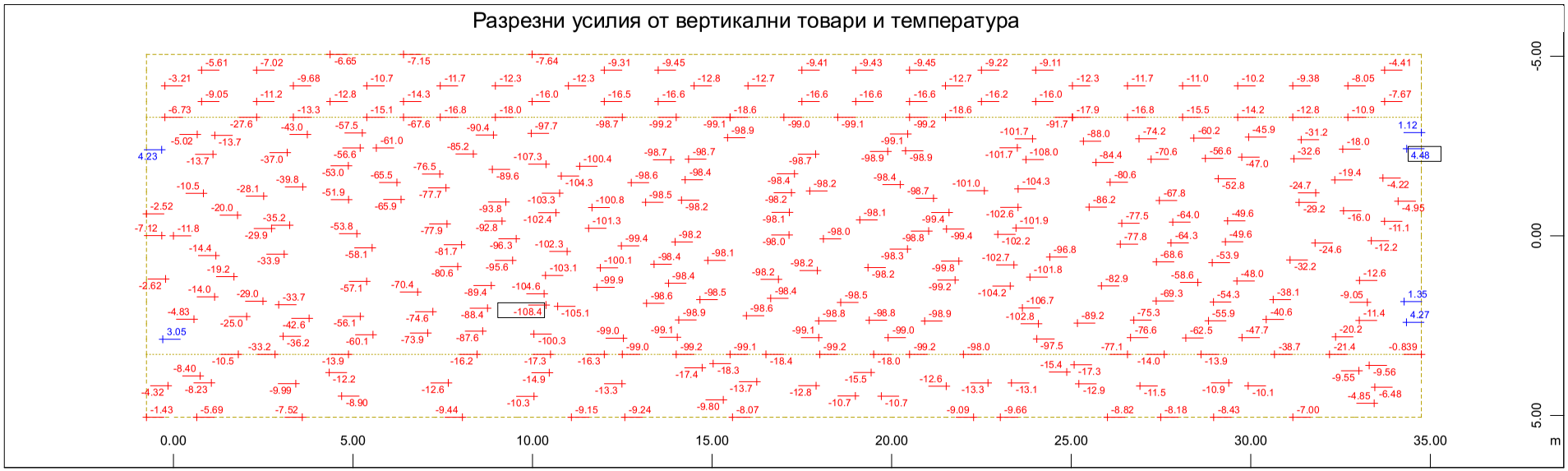
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 6 Pos gradient (Min=-38.0) (Max=37.6)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 185
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 6 Pos gradient (Min=-22.8) (Max=44.2)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 189
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 6 Pos gradient (Min=-56.1) (Max=58.4)
Z
X
Y

Разрезни усилия от вертикални товари и температура



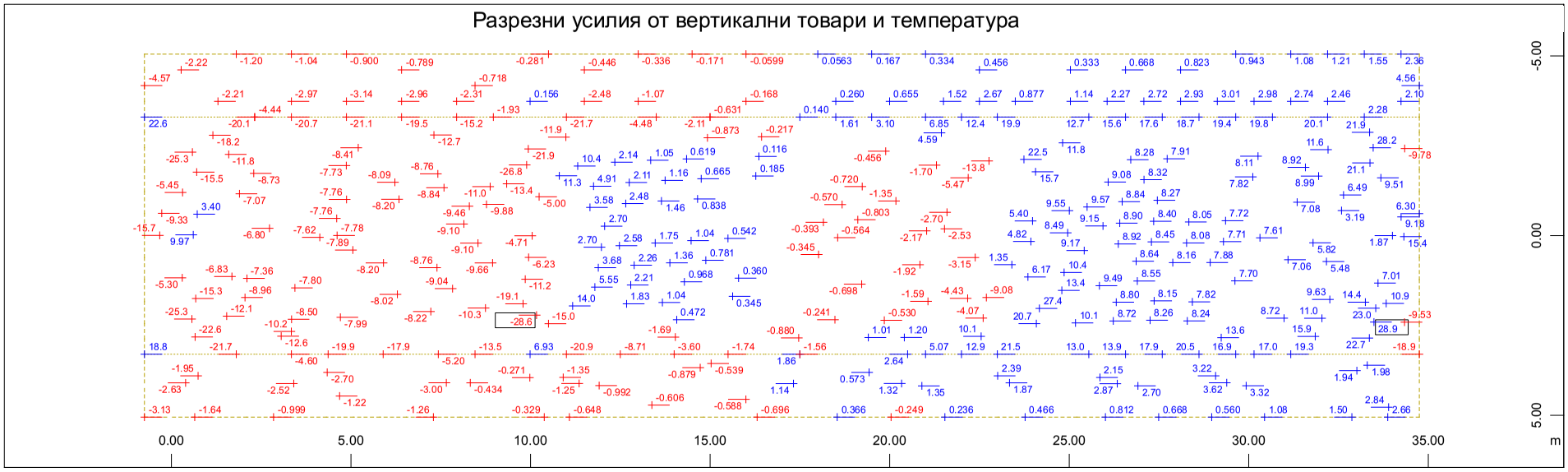
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 7 Neg gradient (Min=-108.4) (Max=4.48)

Разрезни усилия от вертикални товари и температура

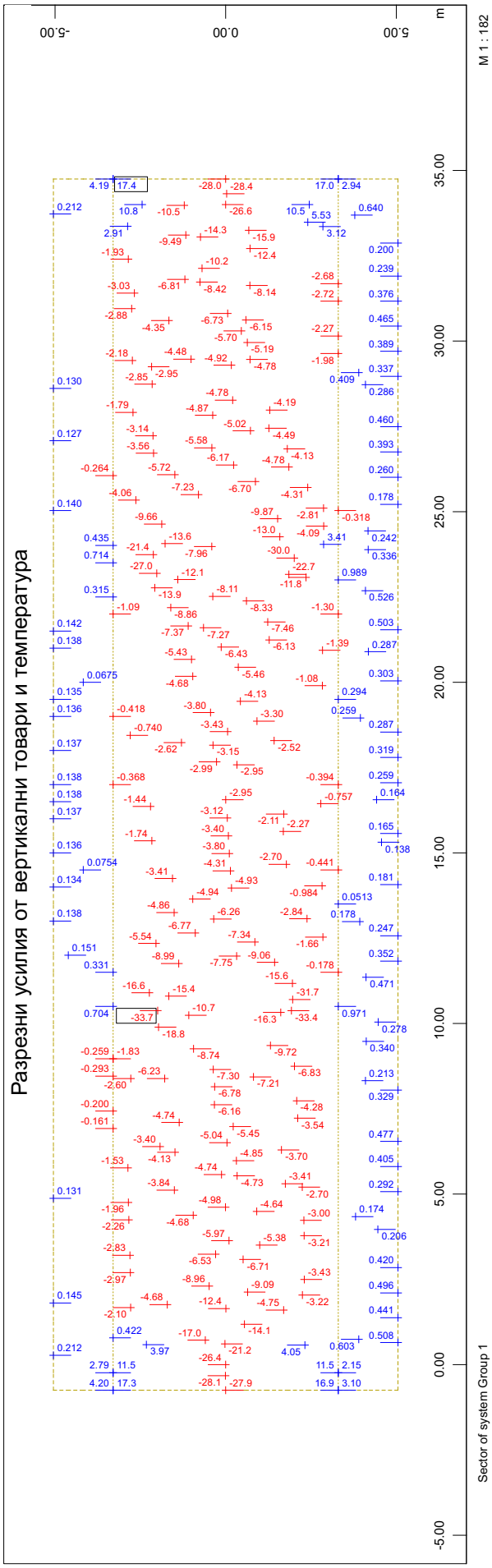


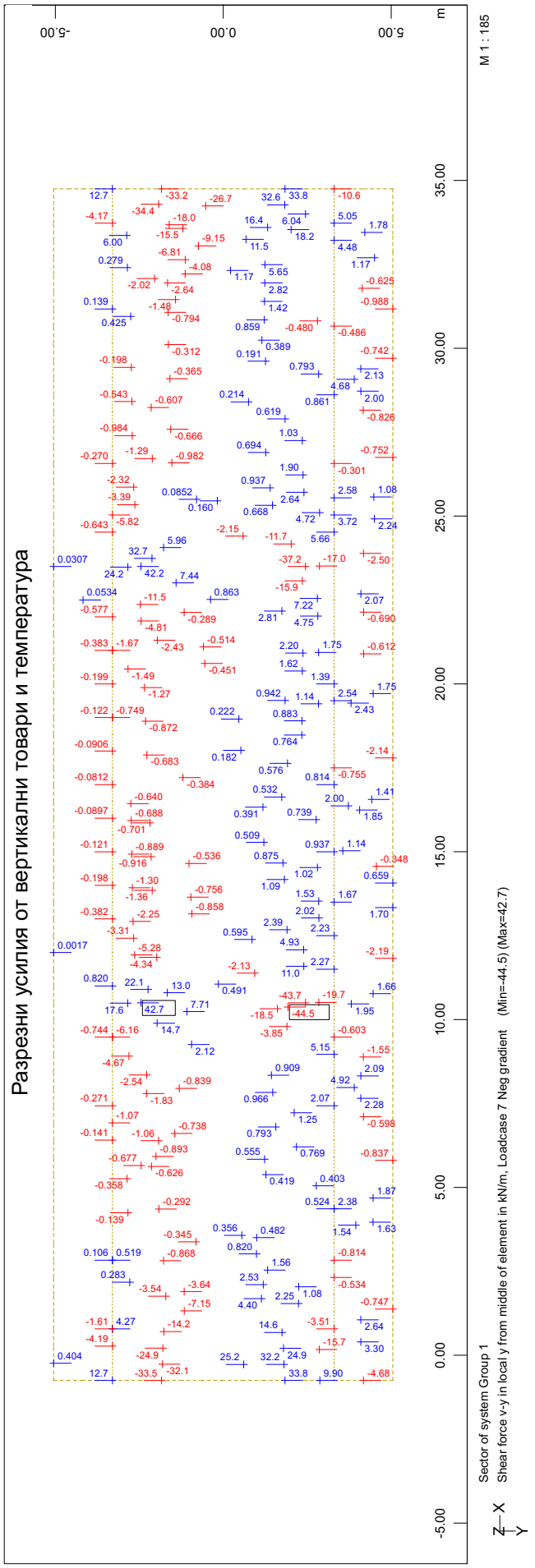
Sector of system Group 1

M 1 : 173

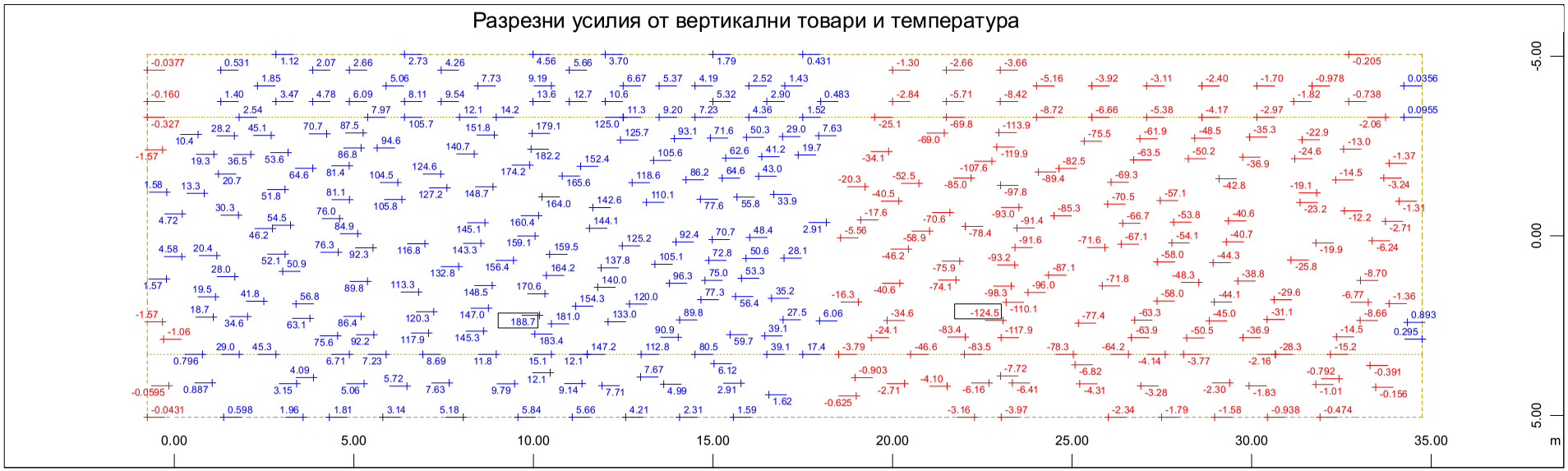
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 7 Neg gradient (Min=-28.6) (Max=28.9)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 182
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 7 Neg gradient (Min=-33.7) (Max=17.4)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 185
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 7 Neg gradient (Min=-44.5) (Max=42.7)
Z
X
Y

Разрезни усилия от вертикални товари и температура



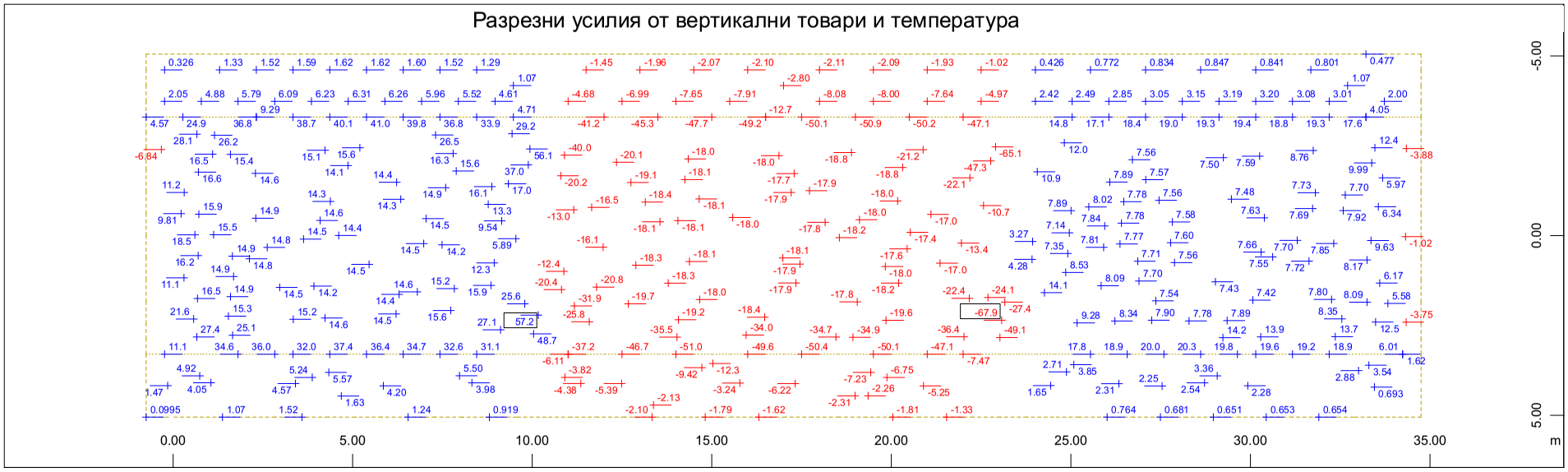
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 10 Pier settlement (Min=-124.5) (Max=188.7)

Разрезни усилия от вертикални товари и температура

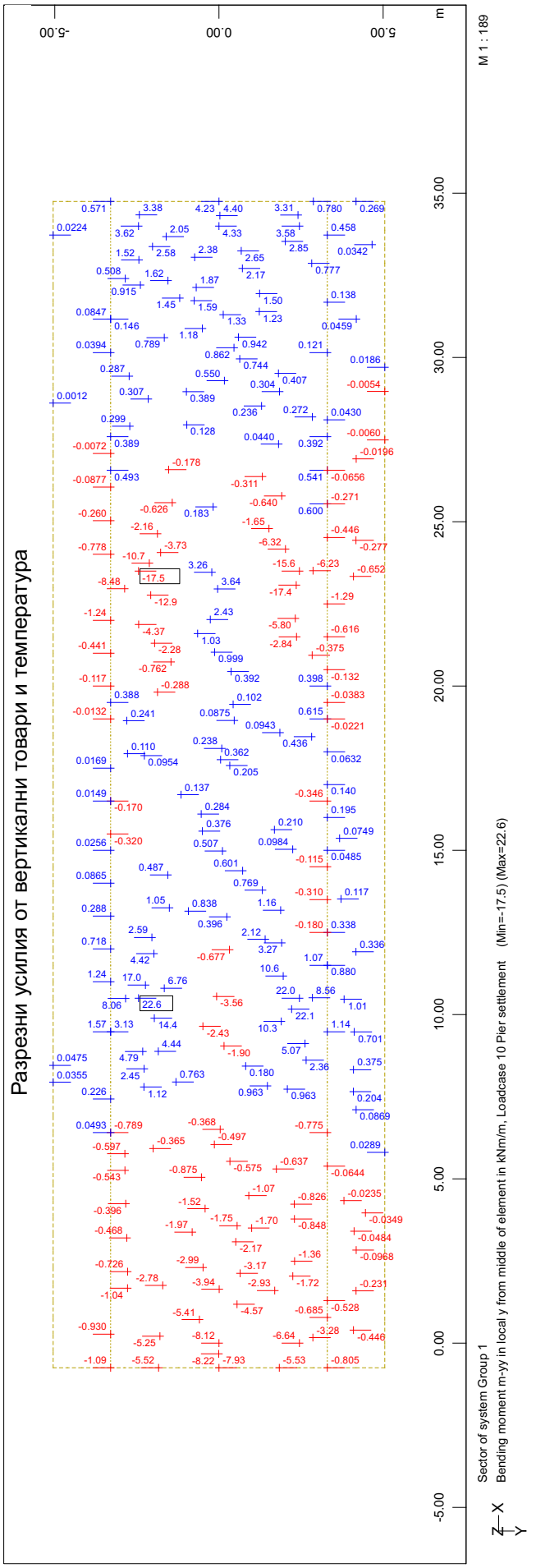


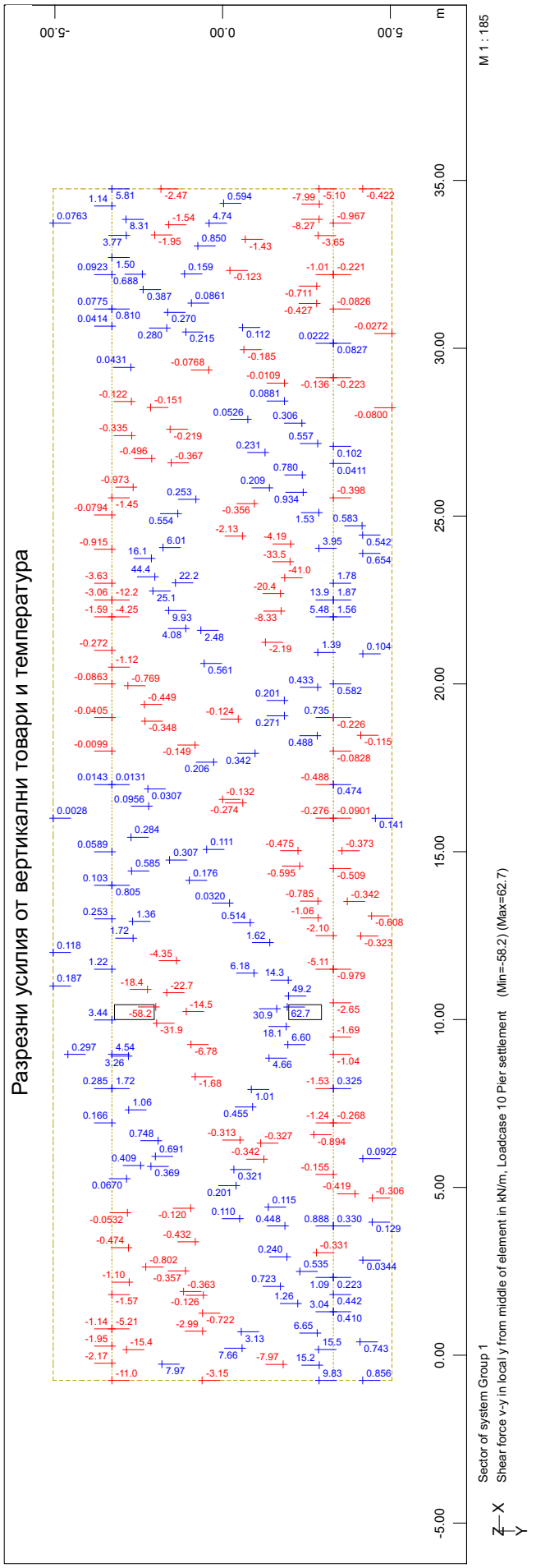
Sector of system Group 1

M 1 : 173

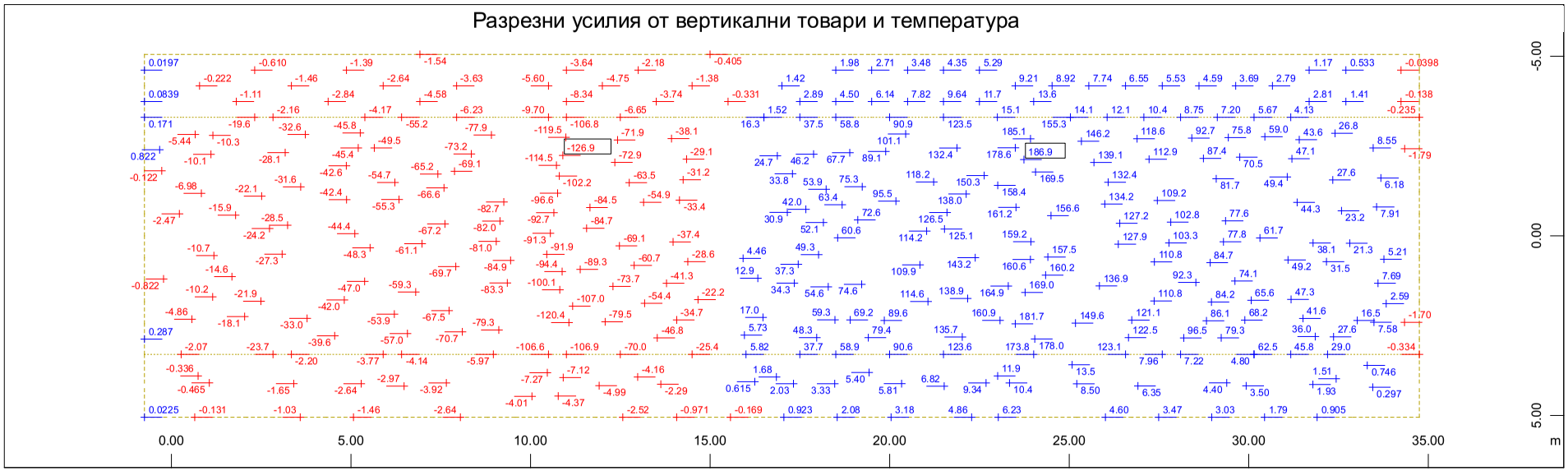
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 10 Pier settlement (Min=-67.9) (Max=57.2)


Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 189
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 10 Pier settlement (Min=-17.5) (Max=22.6)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 185
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 10 Pier settlement (Min=-58.2) (Max=62.7)
Z
X
Y

Разрезни усилия от вертикални товари и температура



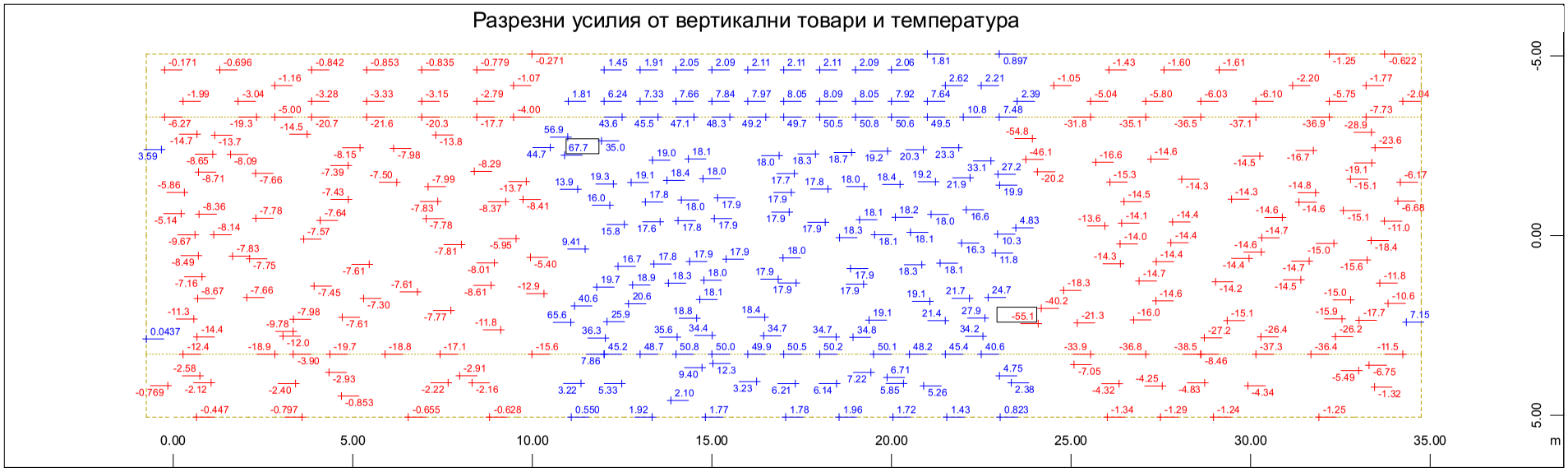
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 11 Pier settlement (Min=-126.9) (Max=186.9)

Разрезни усилия от вертикални товари и температура

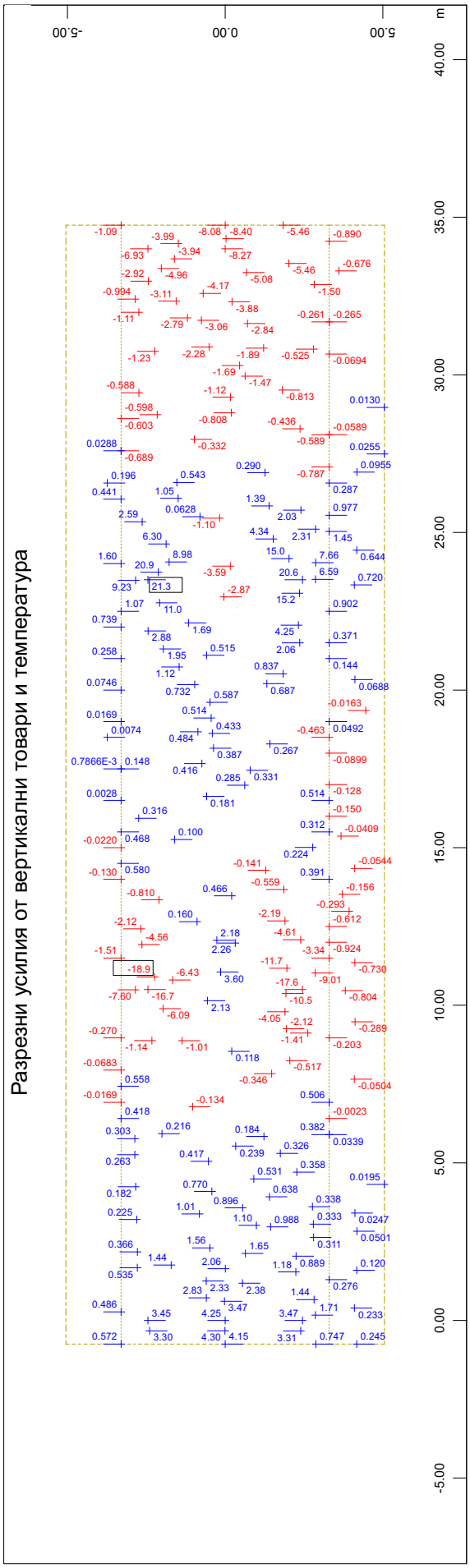


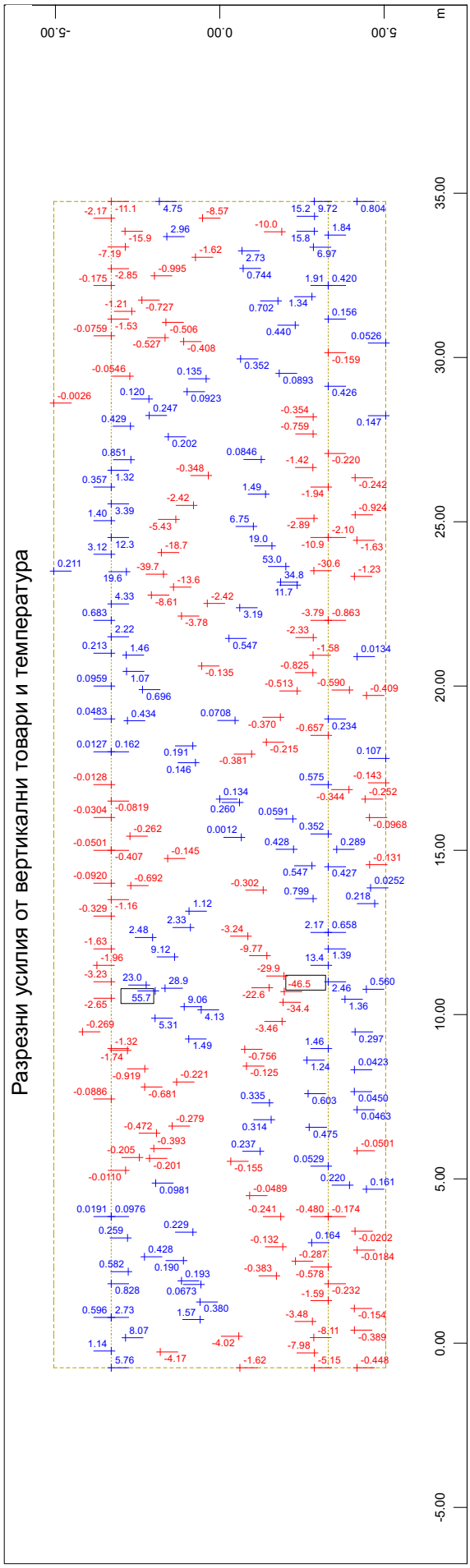
Sector of system Group 1

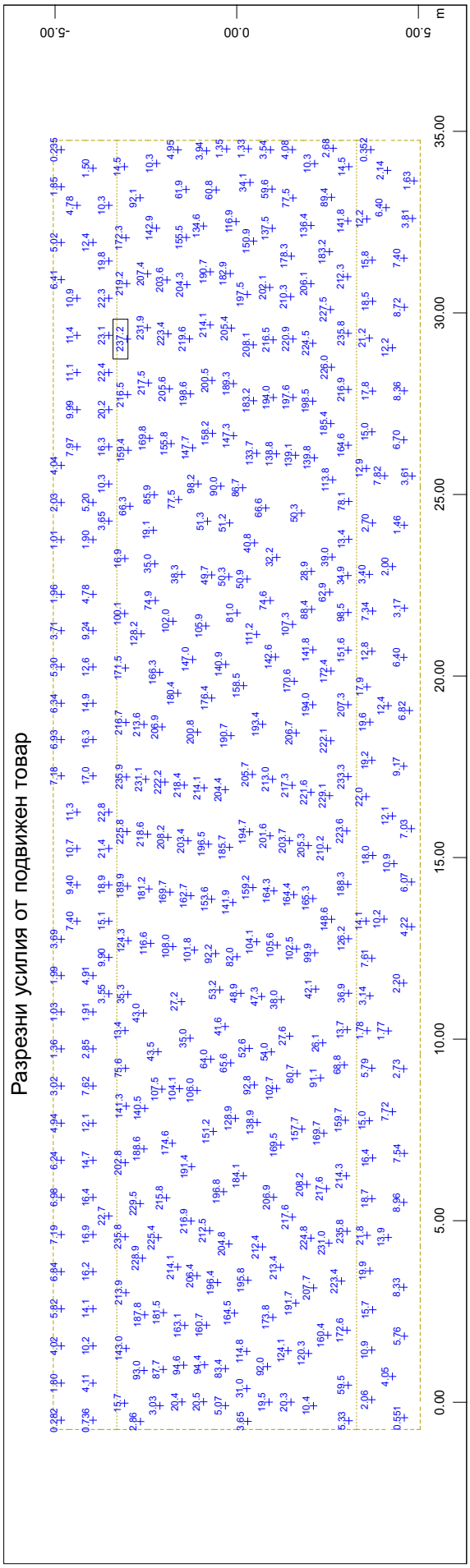
M 1 : 173

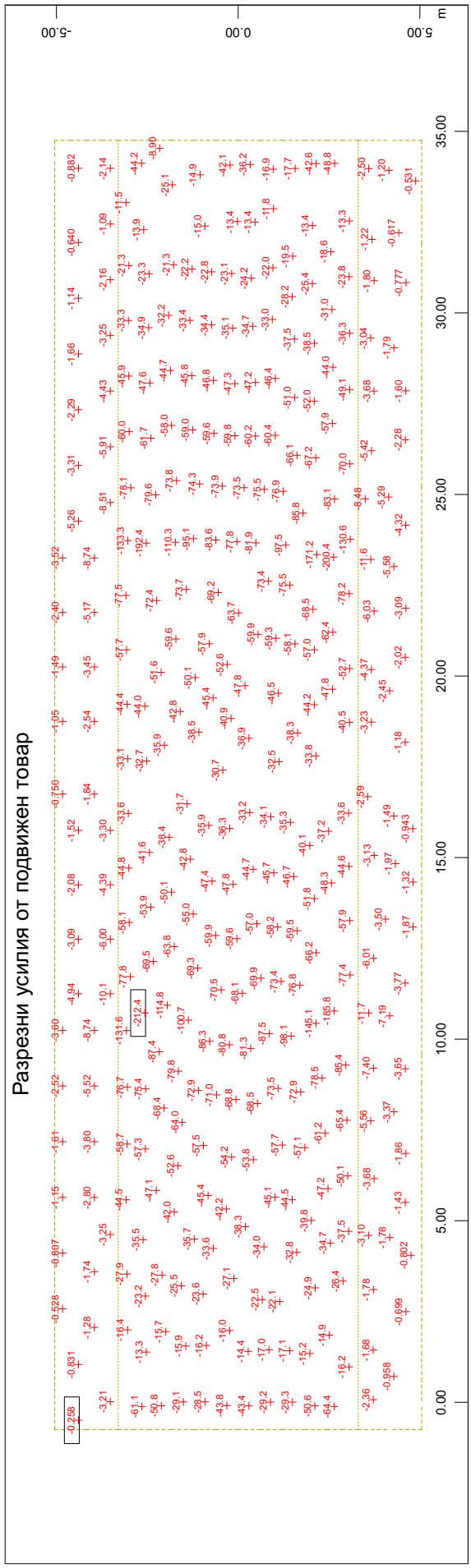
Z X Y

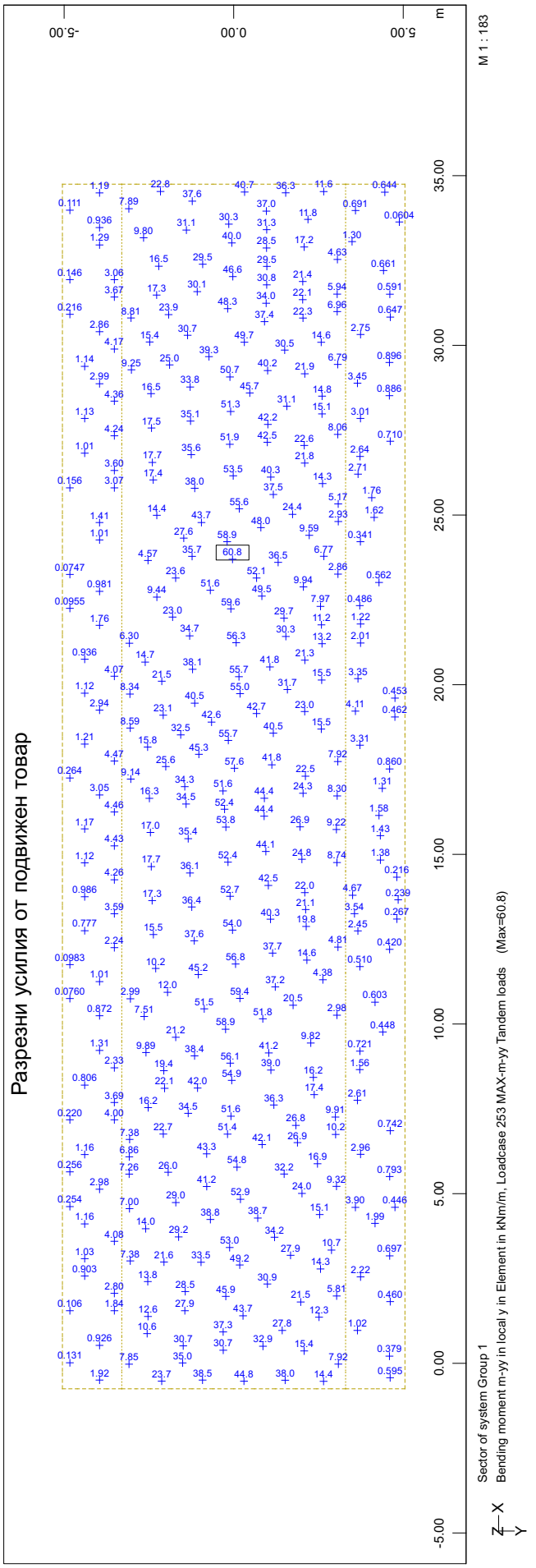
Shear force v-x in local x from middle of element in kN/m, Loadcase 11 Pier settlement (Min=-55.1) (Max=67.7)

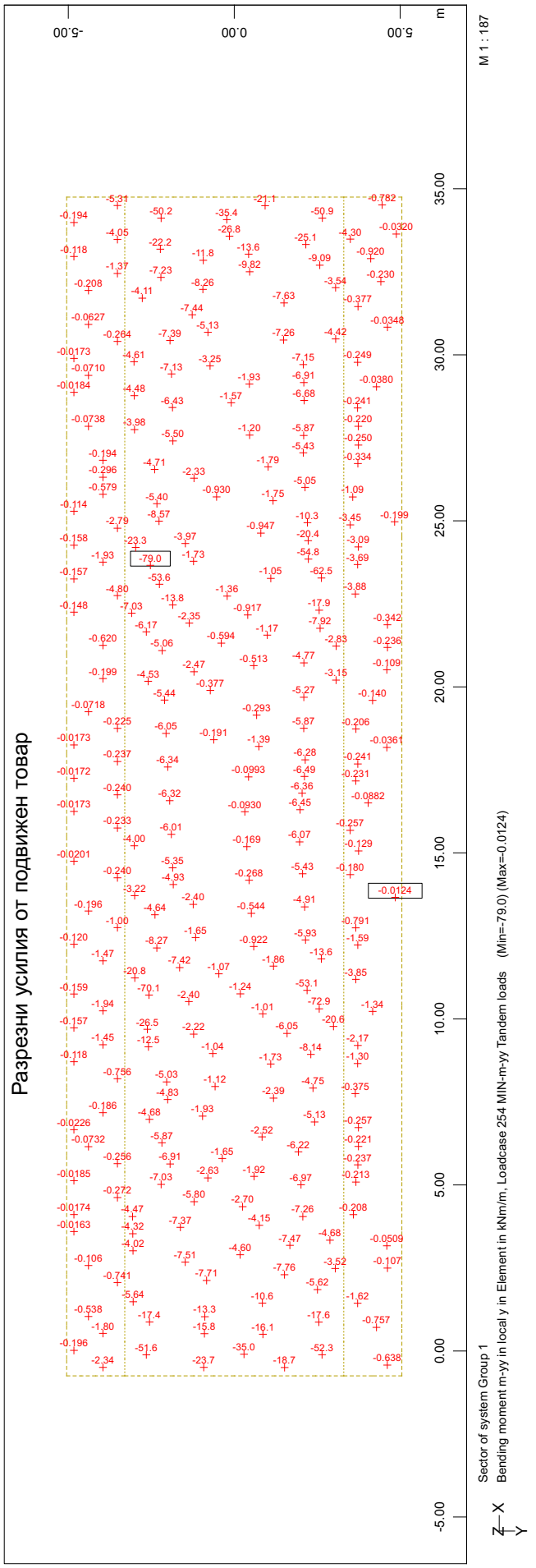

Разрезни усилия от вертикални товари и температура
SOFiSTiK AG - www.sofistik.de
M 1 : 197
m
-5.00
0.00
5.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 11 Pier settlement (Min=-18.9) (Max=21.3)
Z
X
Y


Разрезни усилия от вертикални товари и температура
M 1 : 189
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 11 Pier settlement (Min=-46.5) (Max=55.7)
Z
X
Y

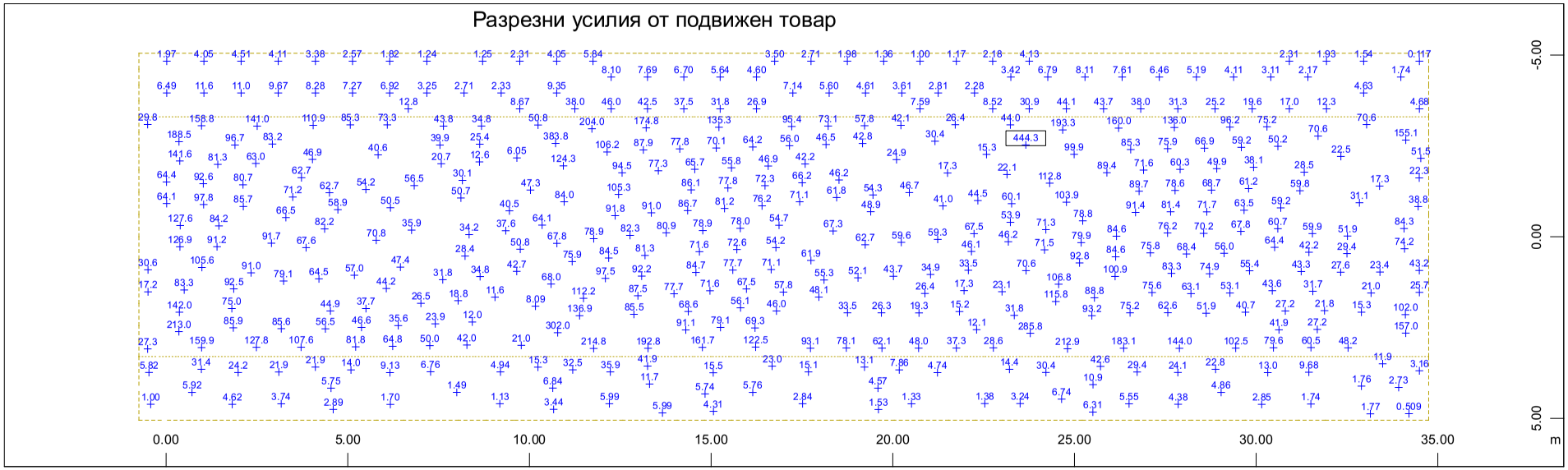








Разрезни усилия от подвижен товар



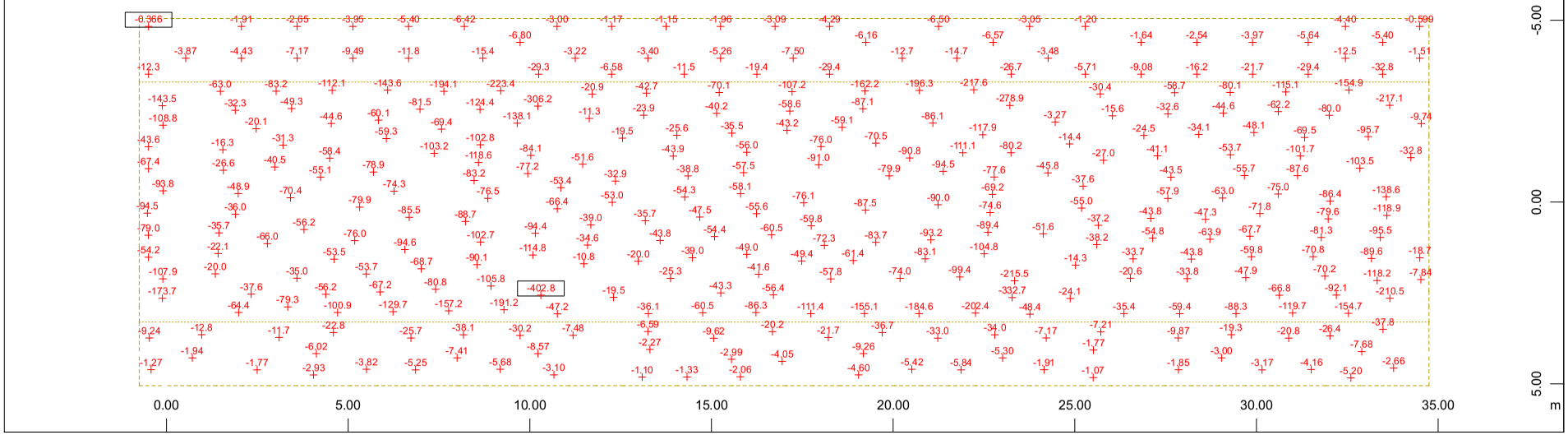
Sector of system Group 1

M 1 : 171

Z X
Y

Shear force v-x in local x in Element in kN/m, Loadcase 255 MAX-v-x Tandem loads (Max=444.3)

Разрезни усилия от подвижен товар

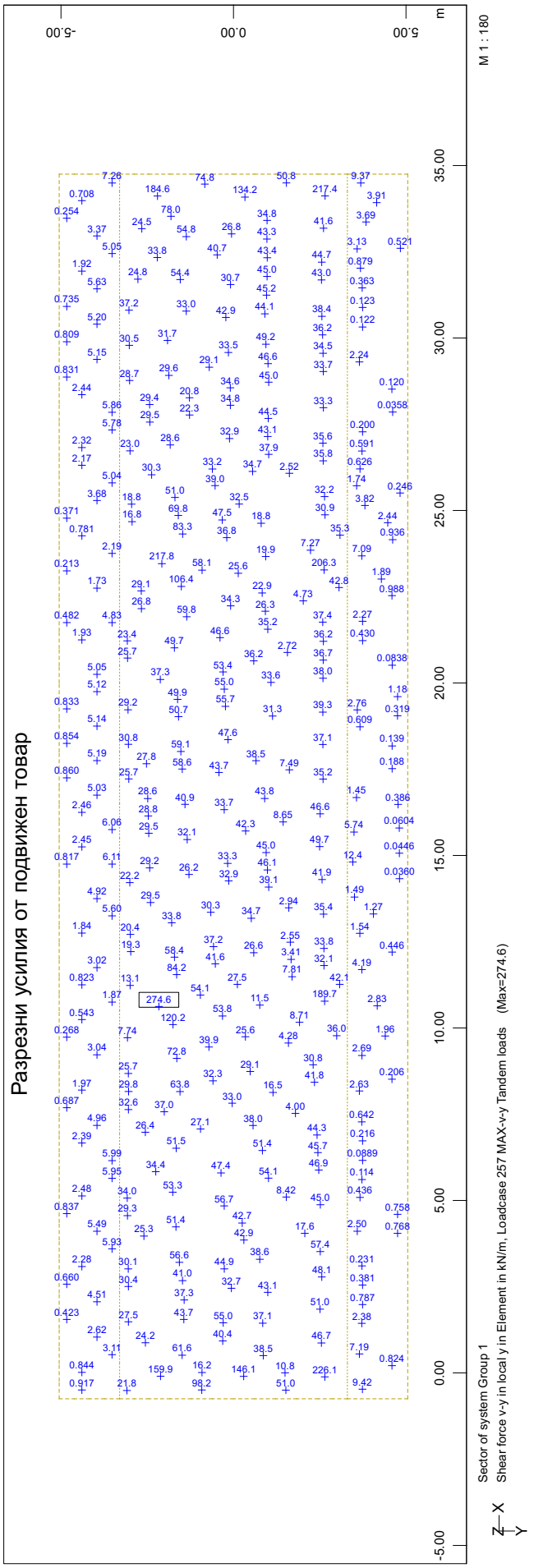


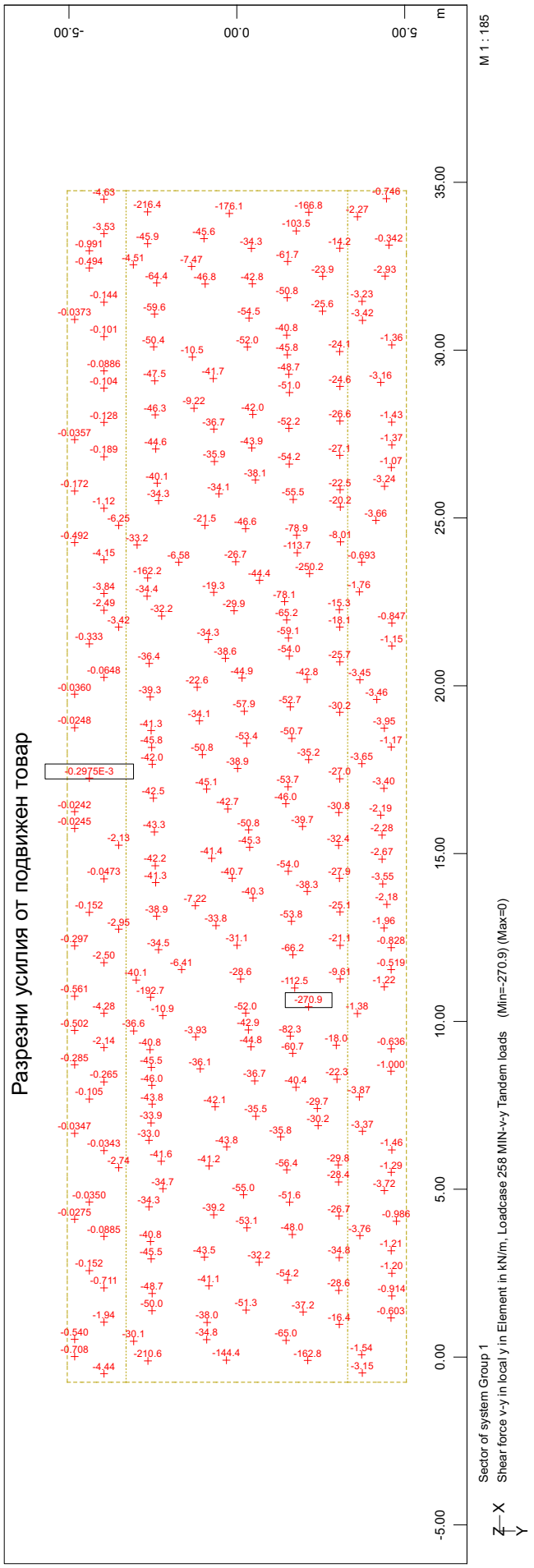
Sector of system Group 1

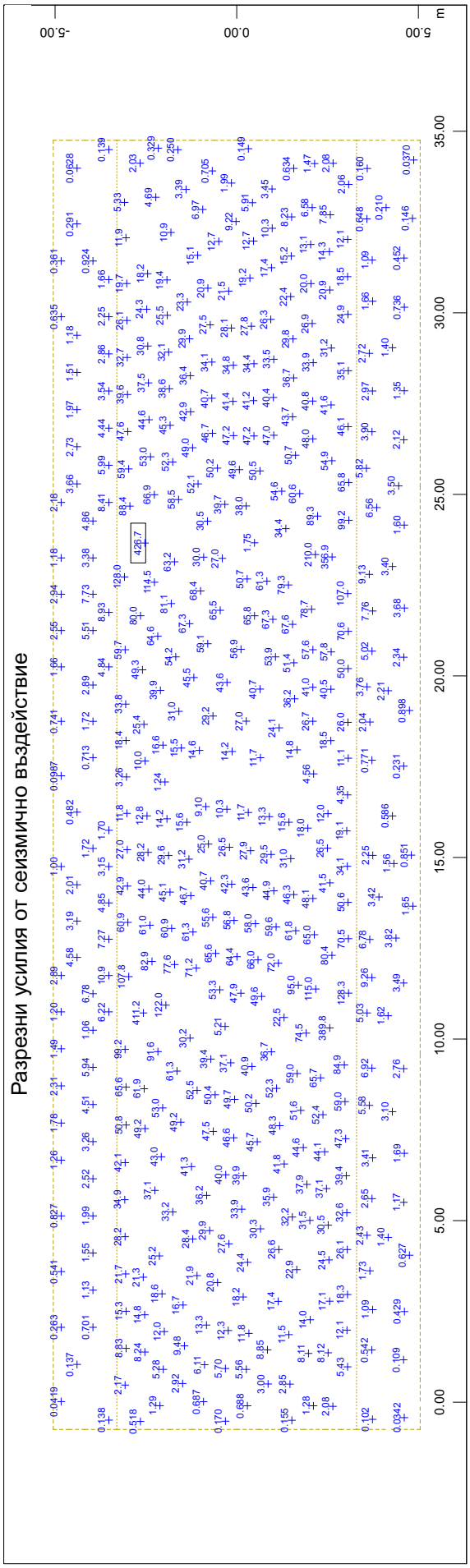
M 1 : 171

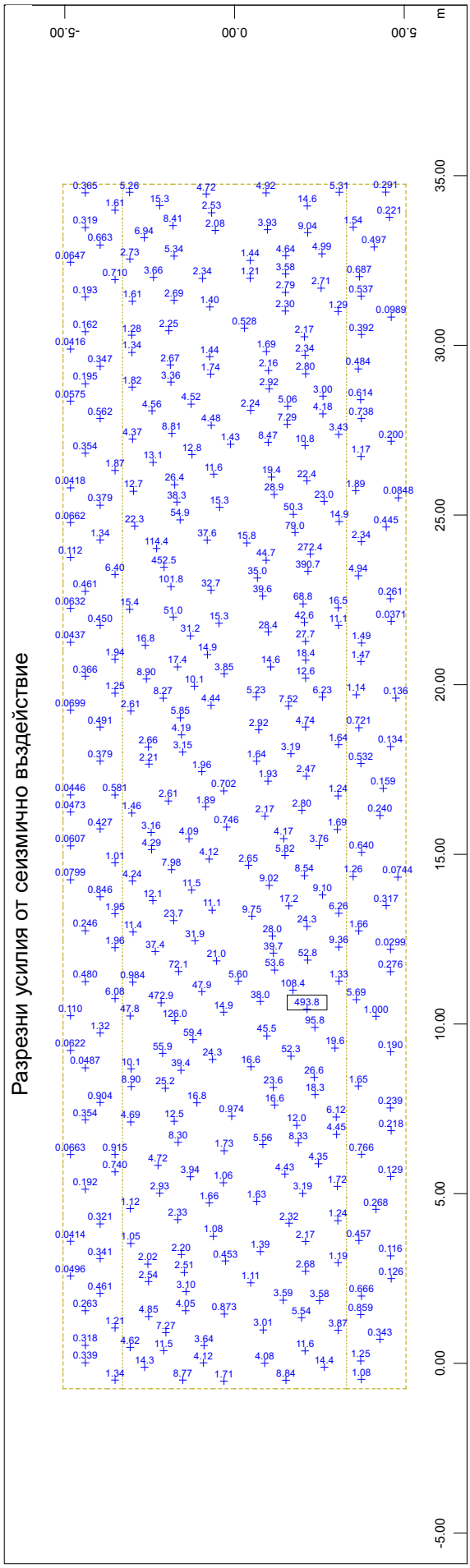
Z X
Y

Shear force v-x in local x in Element in kN/m, Loadcase 256 MIN-v-x Tandem loads (Min=-402.8) (Max=-0.366)

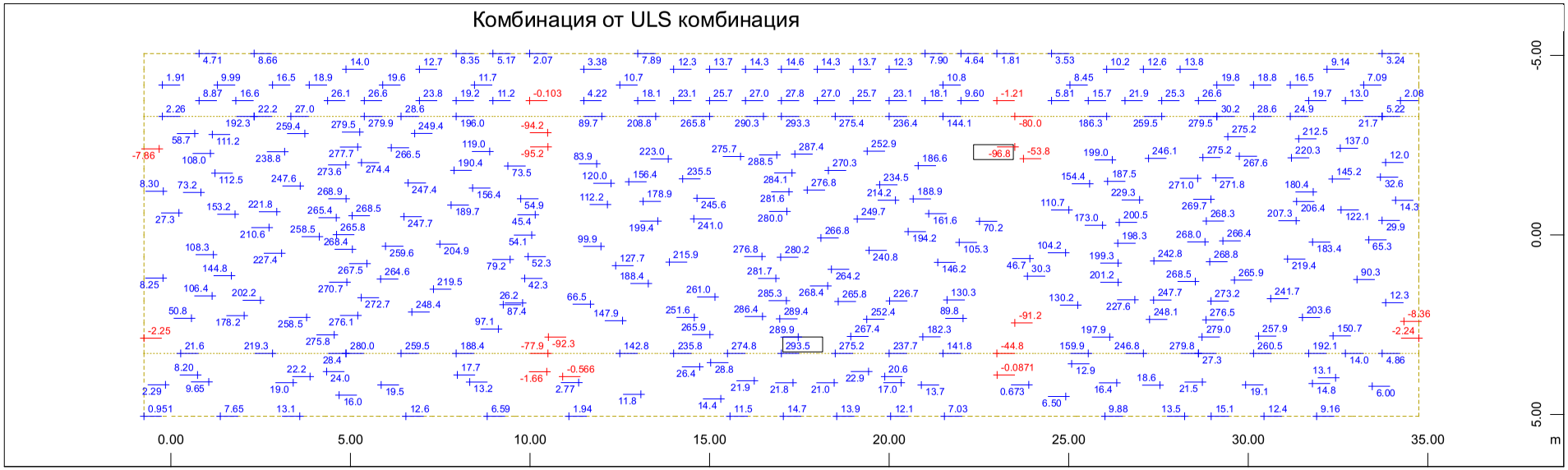





Разрезни усилия от сеизмично въздействие
SOFiSTiK AG - www.sofistik.de
M 1 : 171
m
-5.00
0.00
5.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
426.7
Sector of system Group 1
Bending moment m-xx in local x in Element in kNm/m, Loadcase 708 MAX m-xx (CQC) (Max=426.7)
Z
X
Y


Разрезни усилия от сеизмично въздействие
M 1 : 183
m
-5.00
0.00
5.00
-5.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
35.00
493.8
Sector of system Group 1
Bending moment m-yy in local y in Element in kNm/m, Loadcase 809 MAX m-yy (CQC) (Max=493.8)
Z
X
Y

Комбинация от ULS комбинация



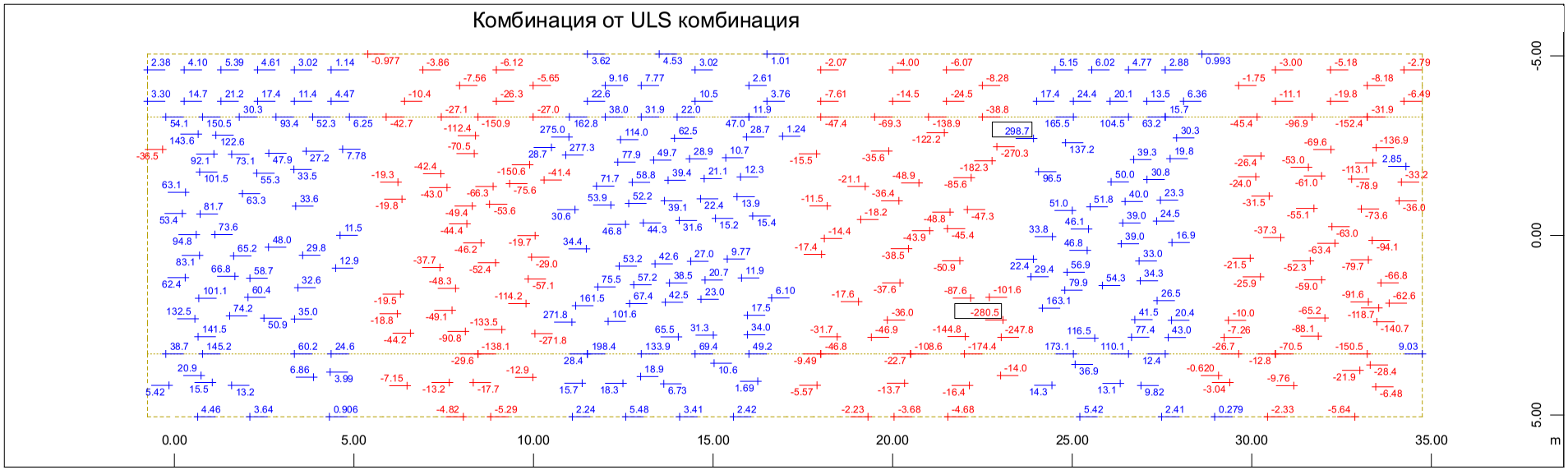
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1101 MAXP-MXX QUAD (Min=-96.8) (Max=293.5)

Комбинация от ULS комбинация

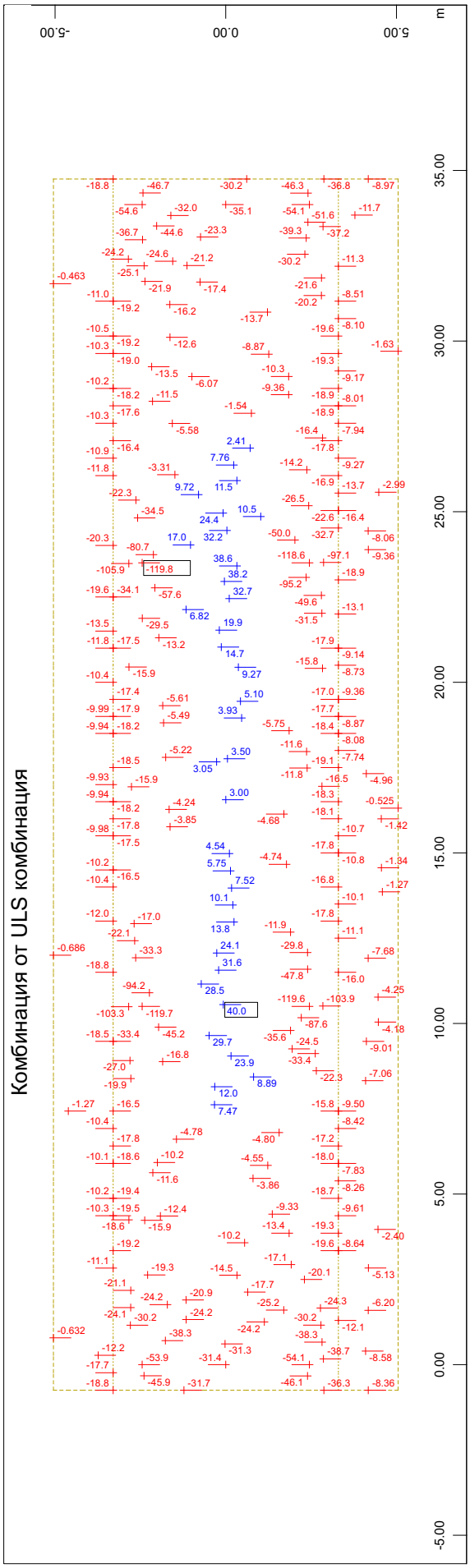


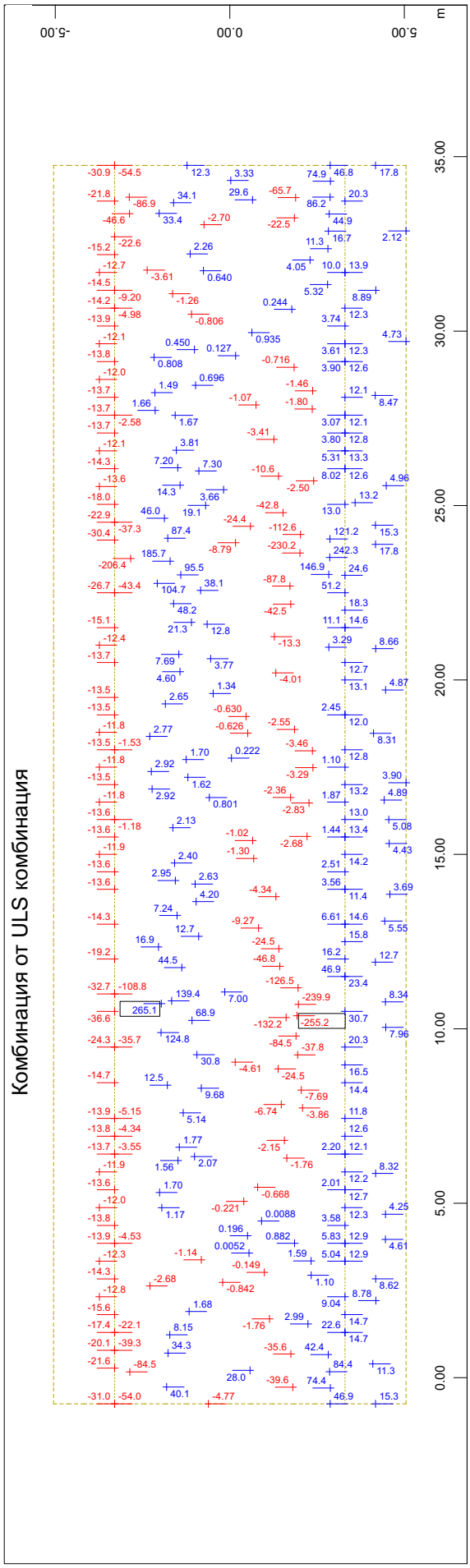
Sector of system Group 1

M 1 : 173

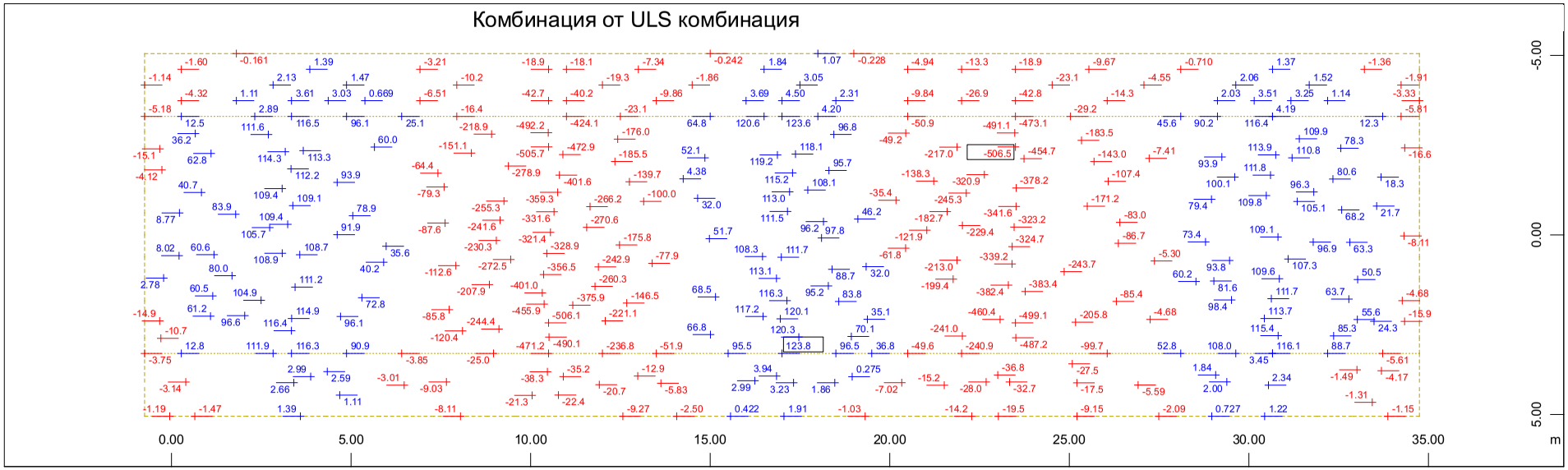
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1101 MAXP-MXX QUAD (Min=-280.5) (Max=298.7)





Комбинация от ULS комбинация



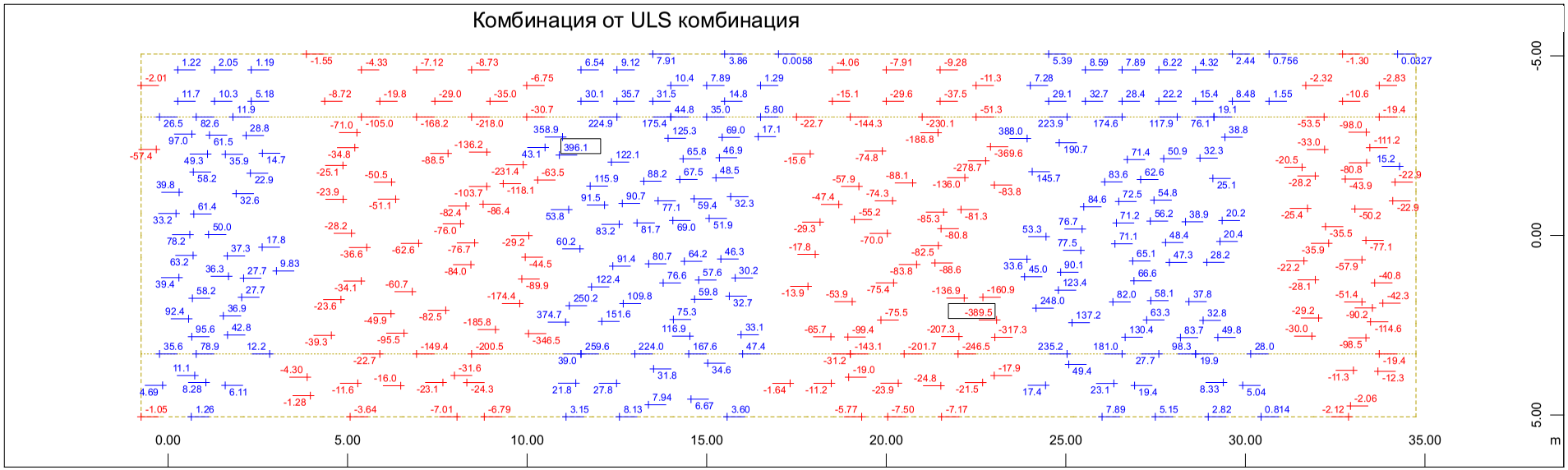
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1102 MINP-MXX QUAD (Min=-506.5) (Max=123.8)

Комбинация от ULS комбинация

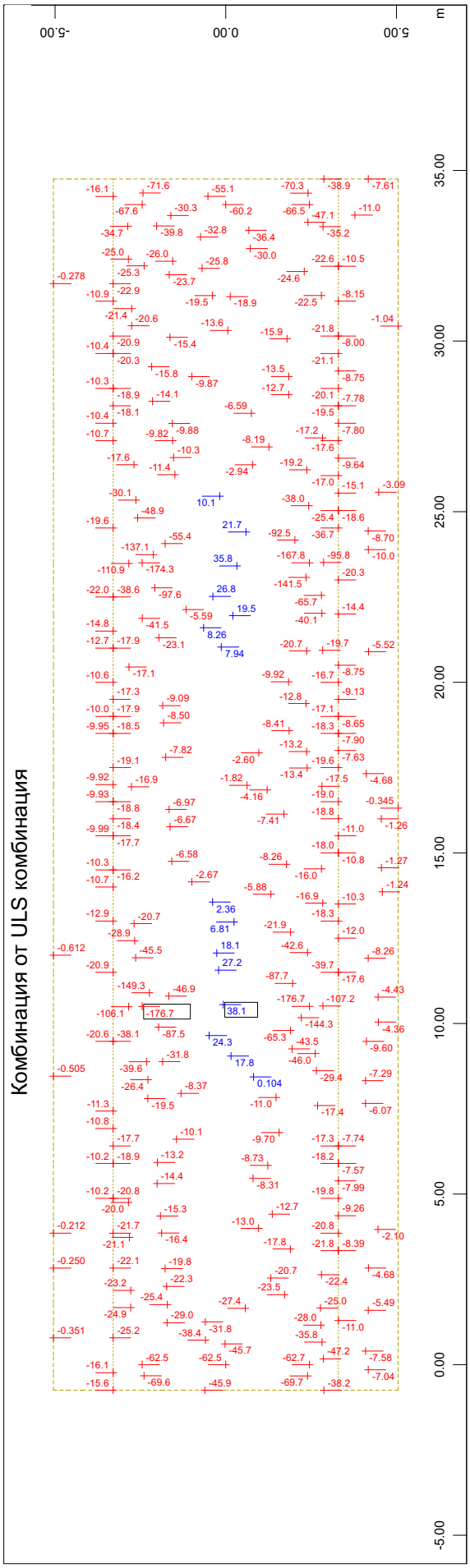


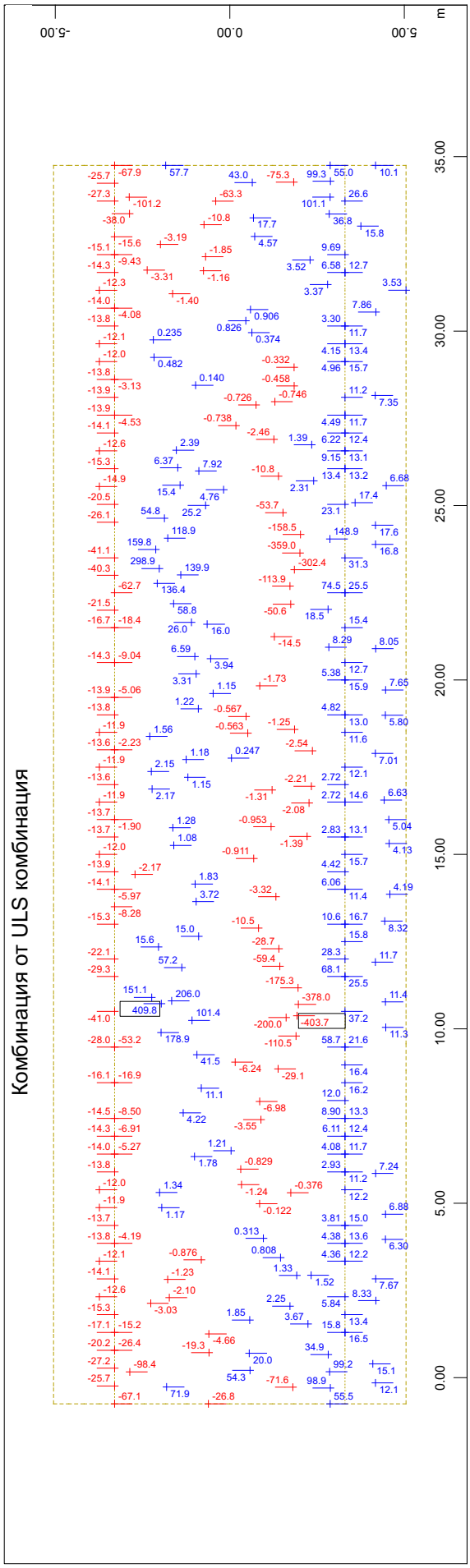
Sector of system Group 1

M 1 : 173

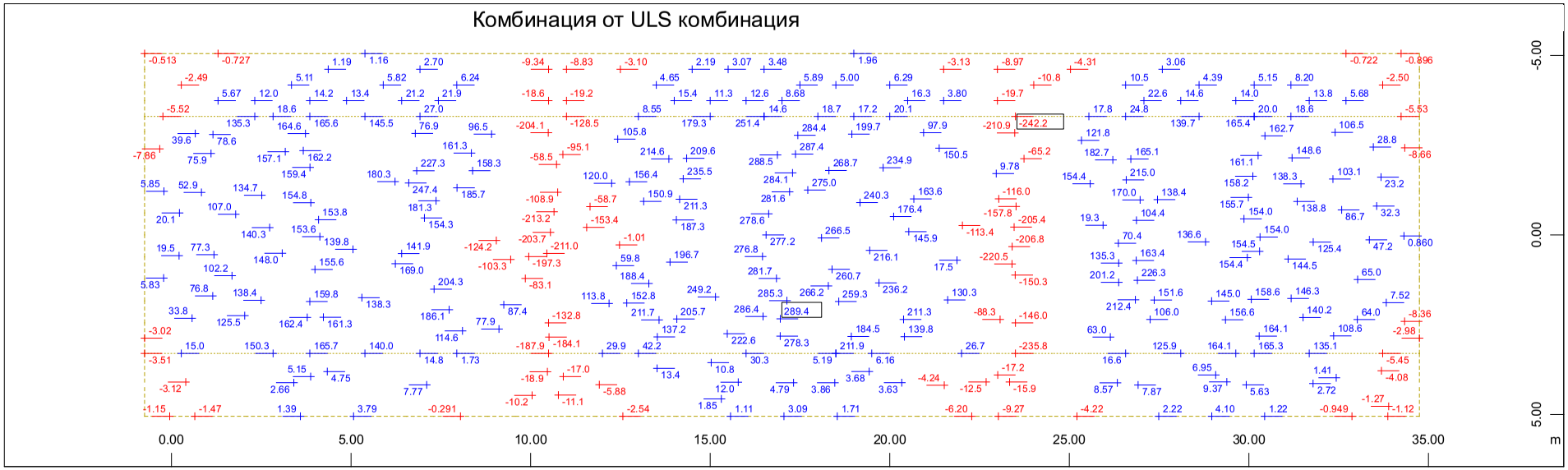
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1102 MINP-MXX QUAD (Min=-389.5) (Max=396.1)





Комбинация от ULS комбинация



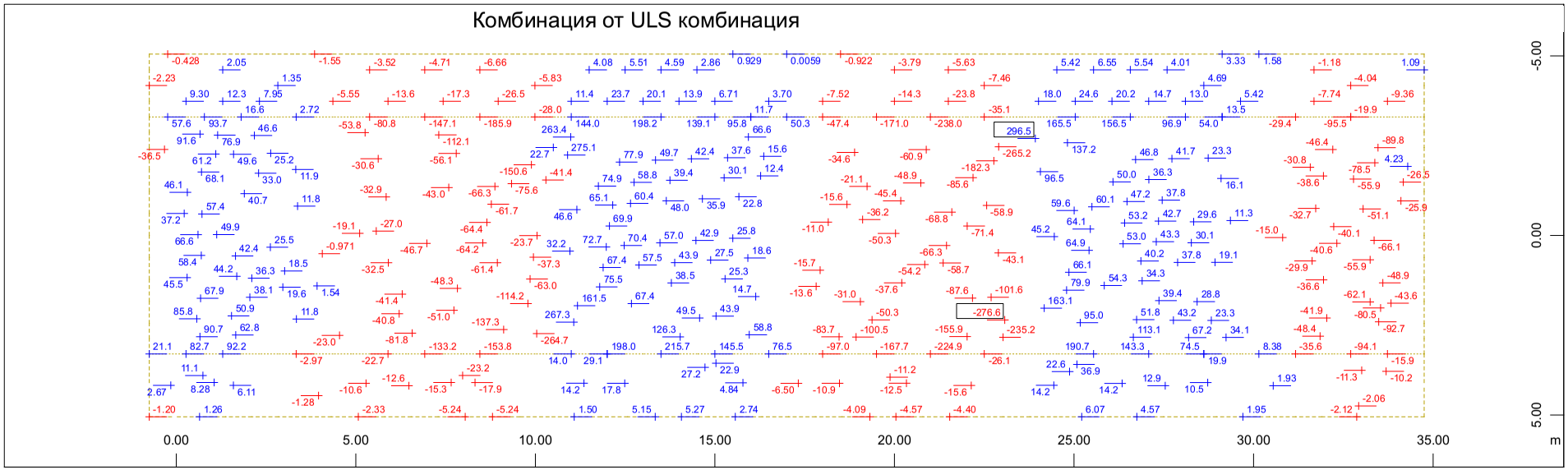
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1103 MAXP-MYY QUAD (Min=-242.2) (Max=289.4)

Комбинация от ULS комбинация

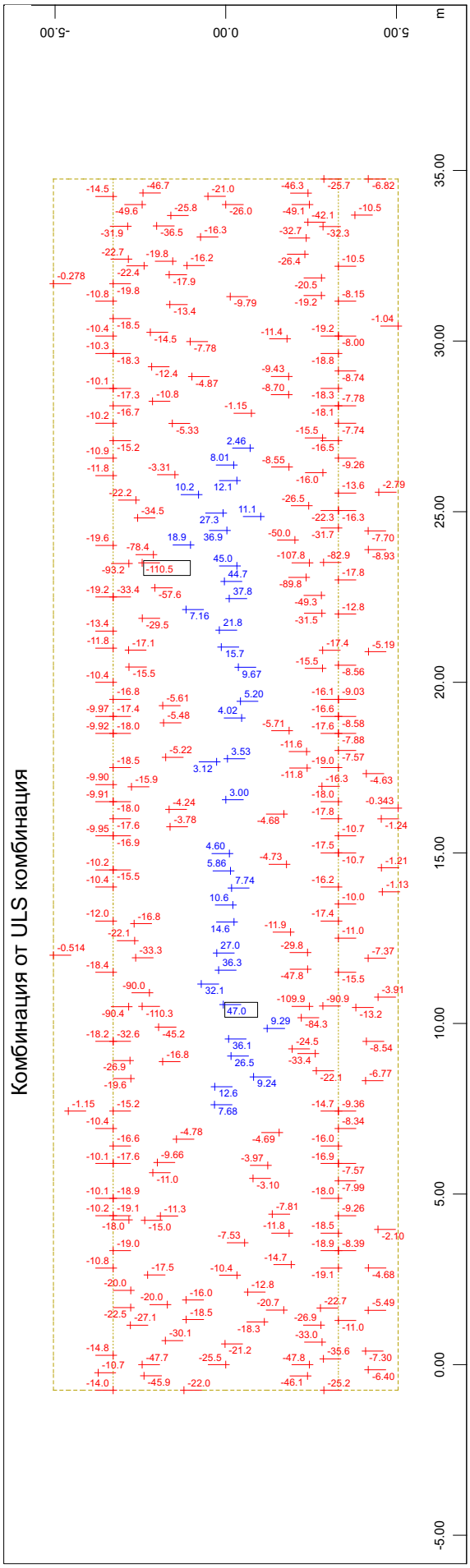


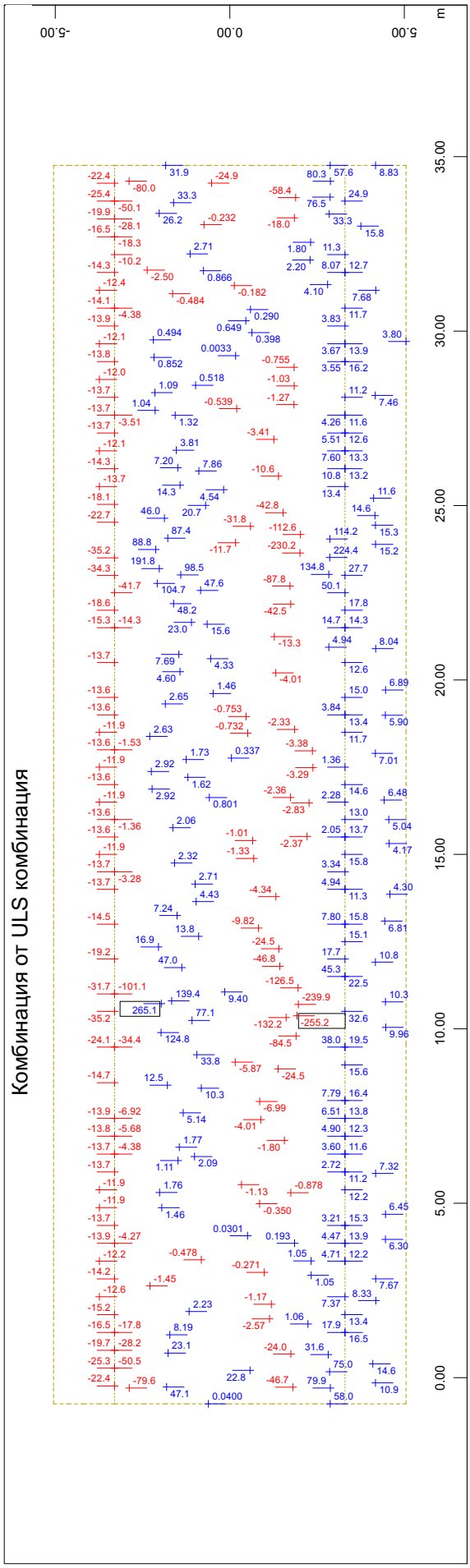
Sector of system Group 1

M 1 : 173

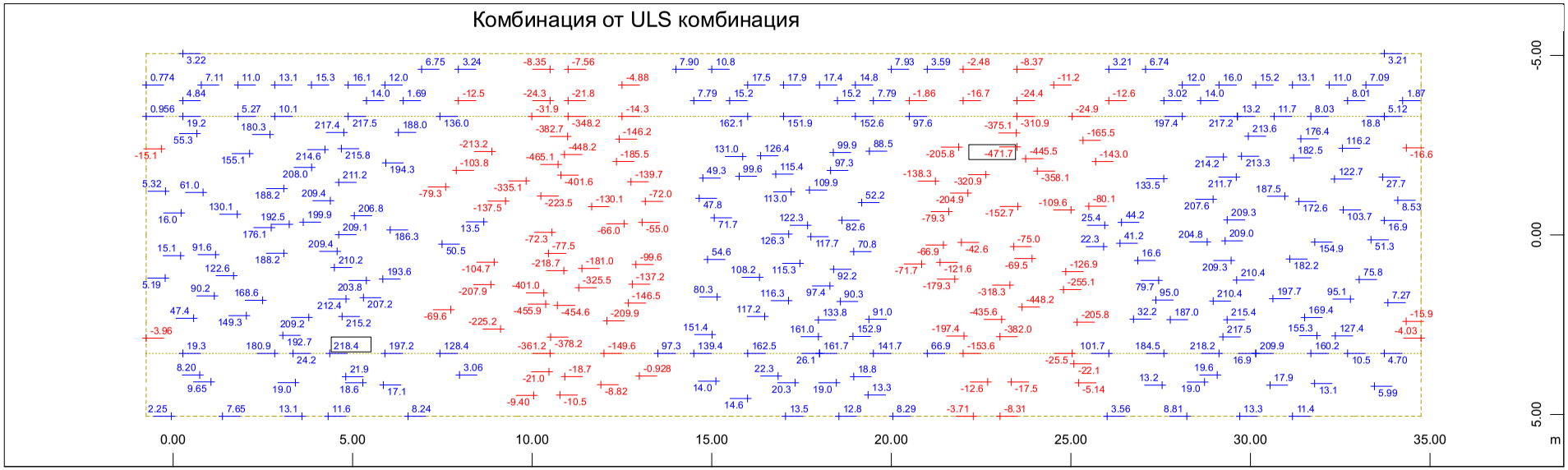
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1103 MAXP-MYY QUAD (Min=-276.6) (Max=296.5)





Комбинация от ULS комбинация



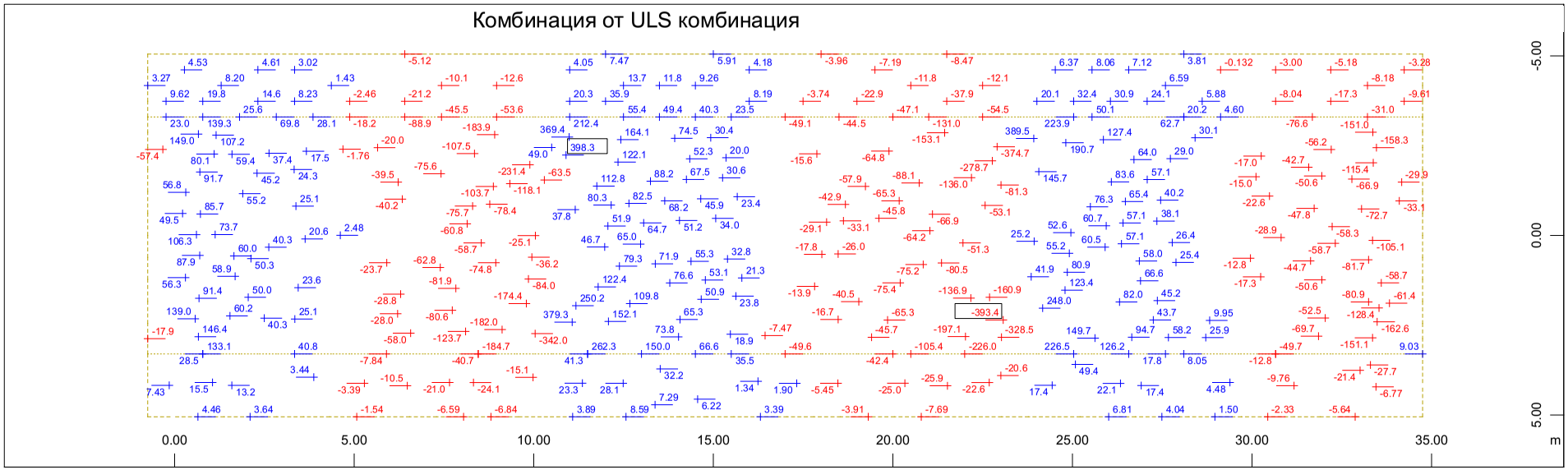
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1104 MINP-MYY QUAD (Min=-471.7) (Max=218.4)

Комбинация от ULS комбинация

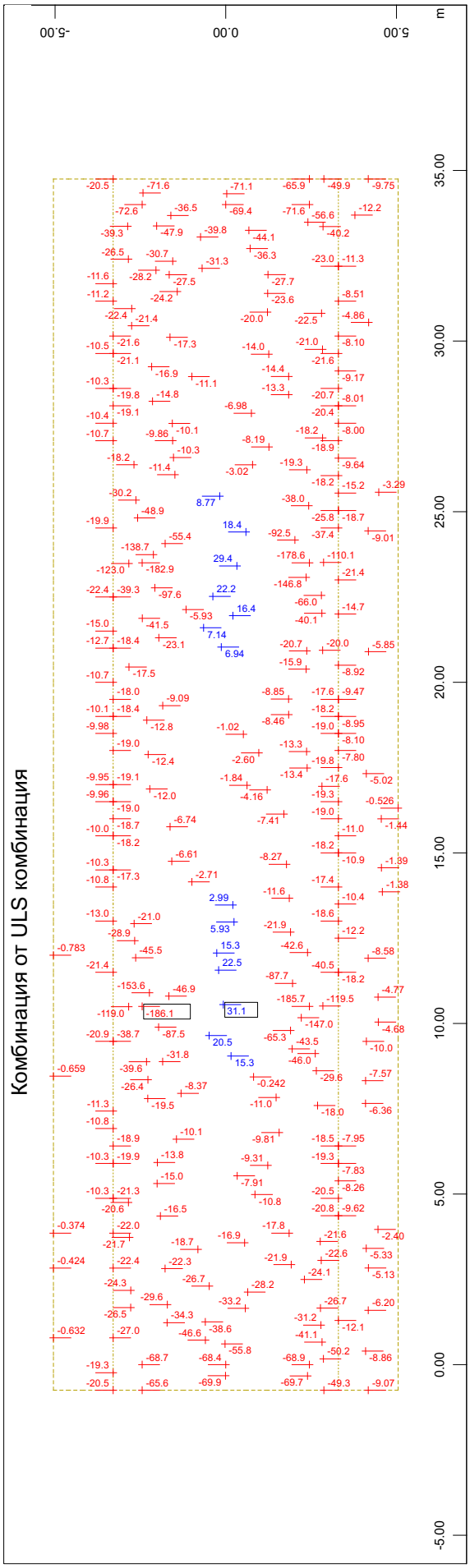


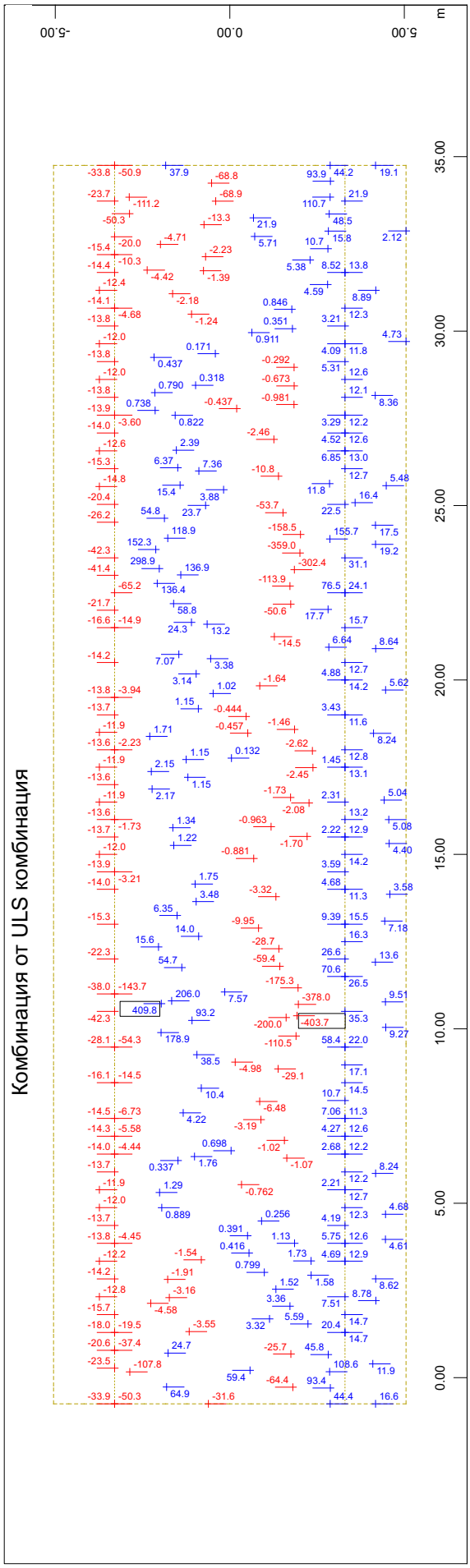
Sector of system Group 1

M 1 : 173

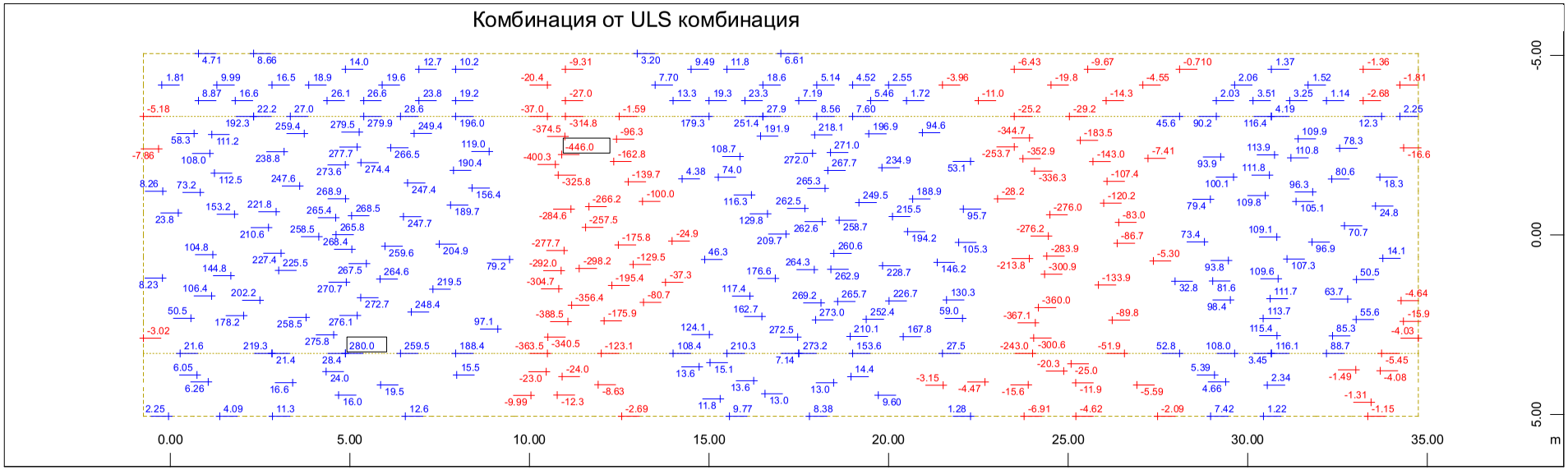
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1104 MINP-MYY QUAD (Min=-393.4) (Max=398.3)





Комбинация от ULS комбинация



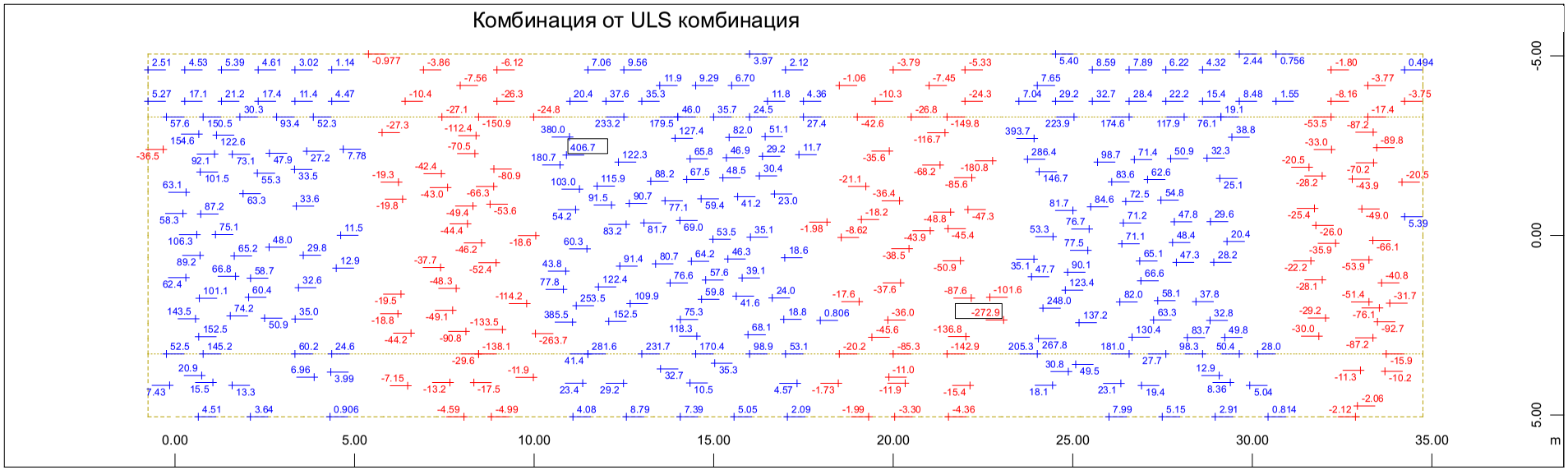
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1107 MAXP-VX QUAD (Min=-446.0) (Max=280.0)

Комбинация от ULS комбинация

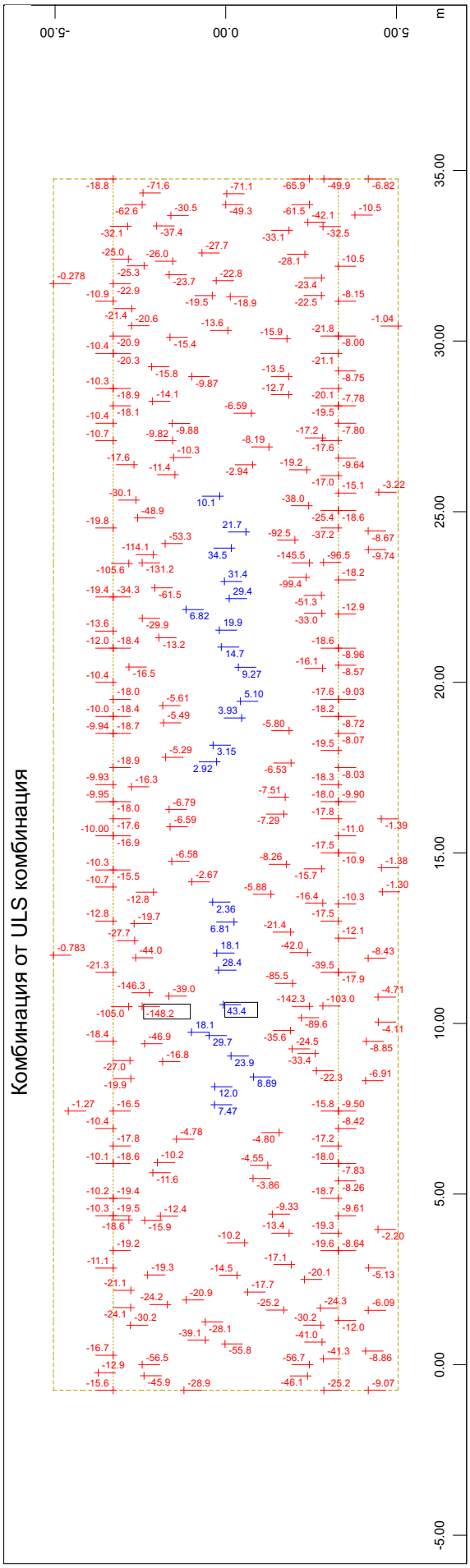


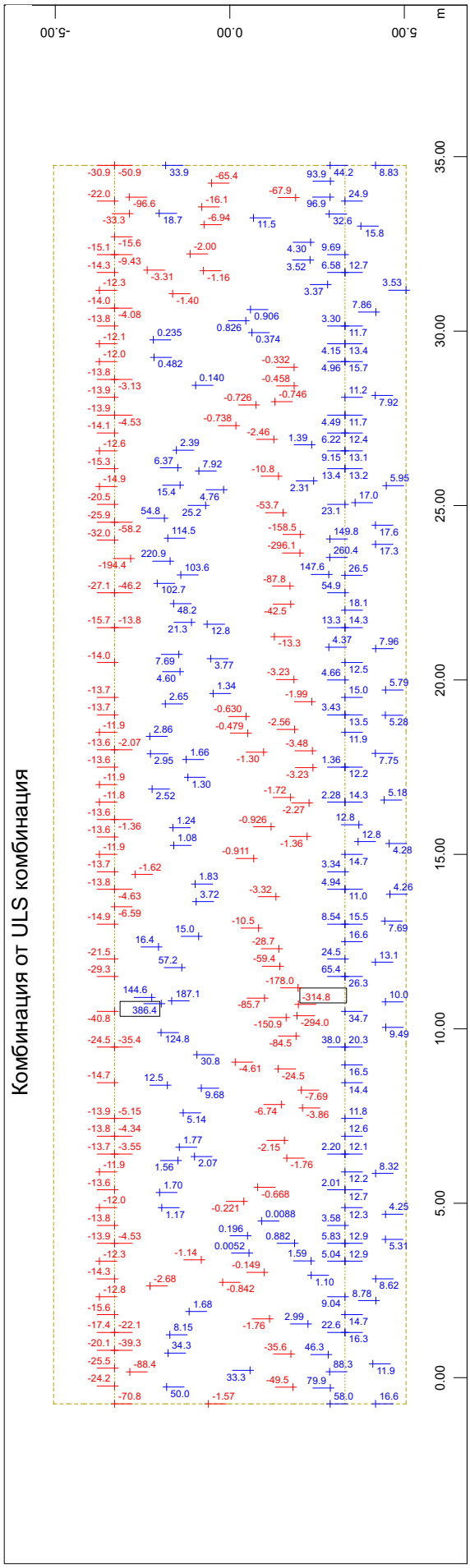
Sector of system Group 1

M 1 : 173

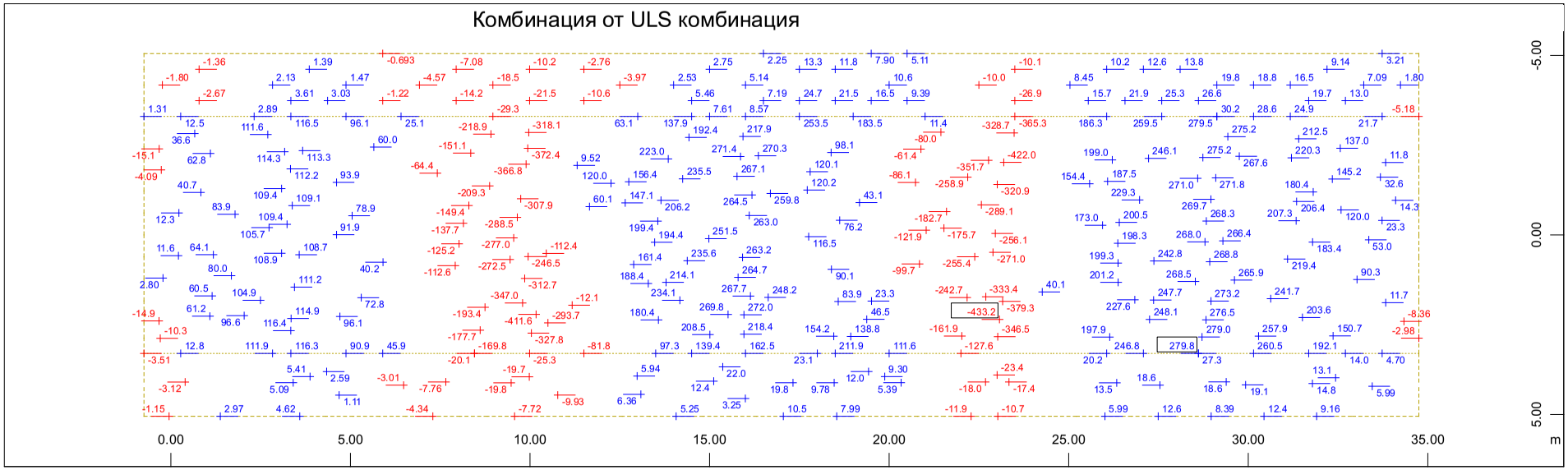
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1107 MAXP-VX QUAD (Min=-272.9) (Max=406.7)





Комбинация от ULS комбинация



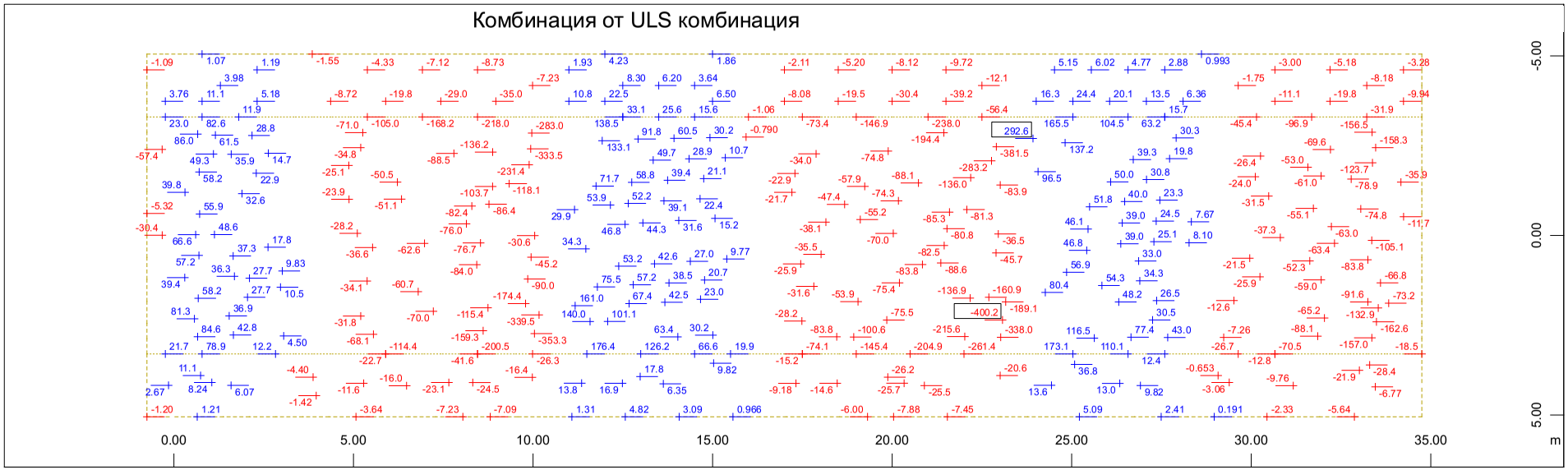
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1108 MINP-VX QUAD (Min=-433.2) (Max=279.8)

Комбинация от ULS комбинация

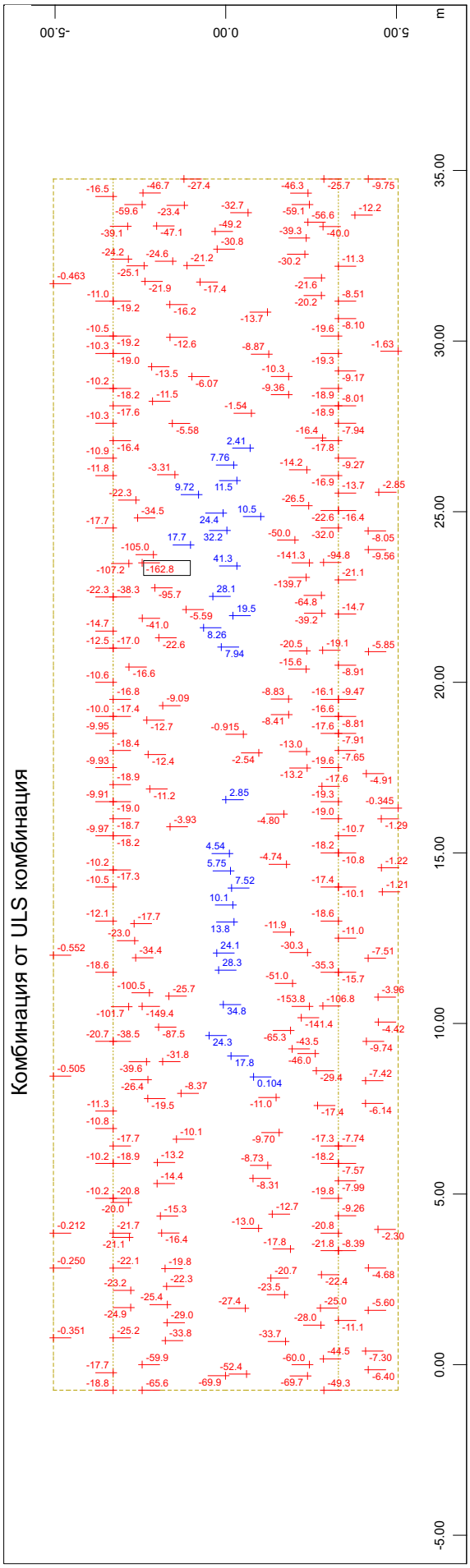


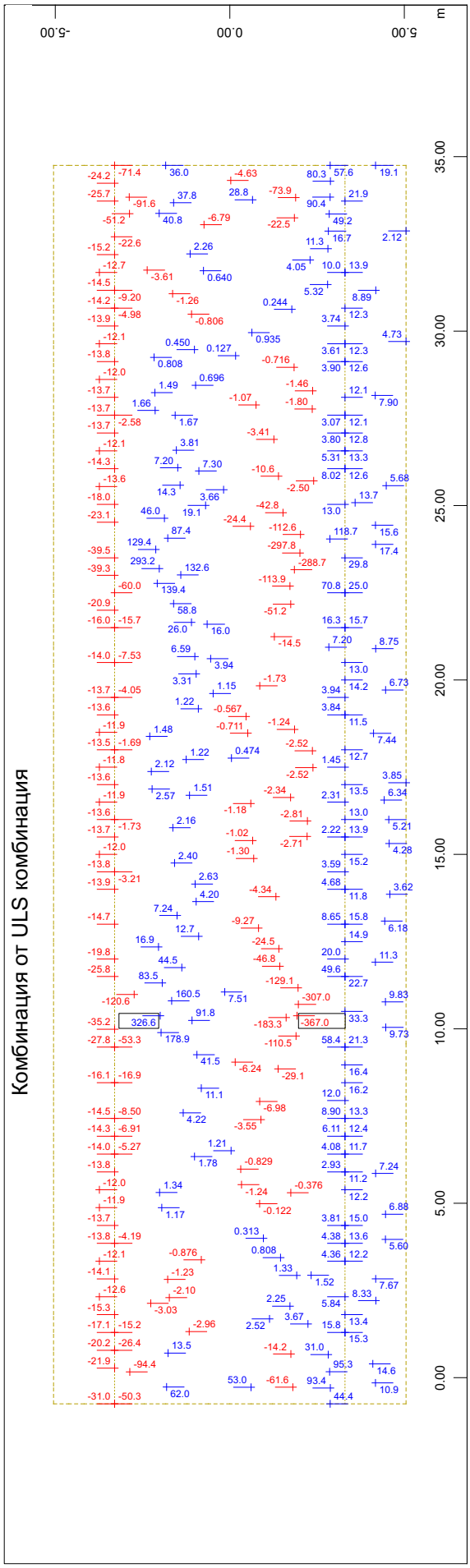
Sector of system Group 1

M 1 : 173

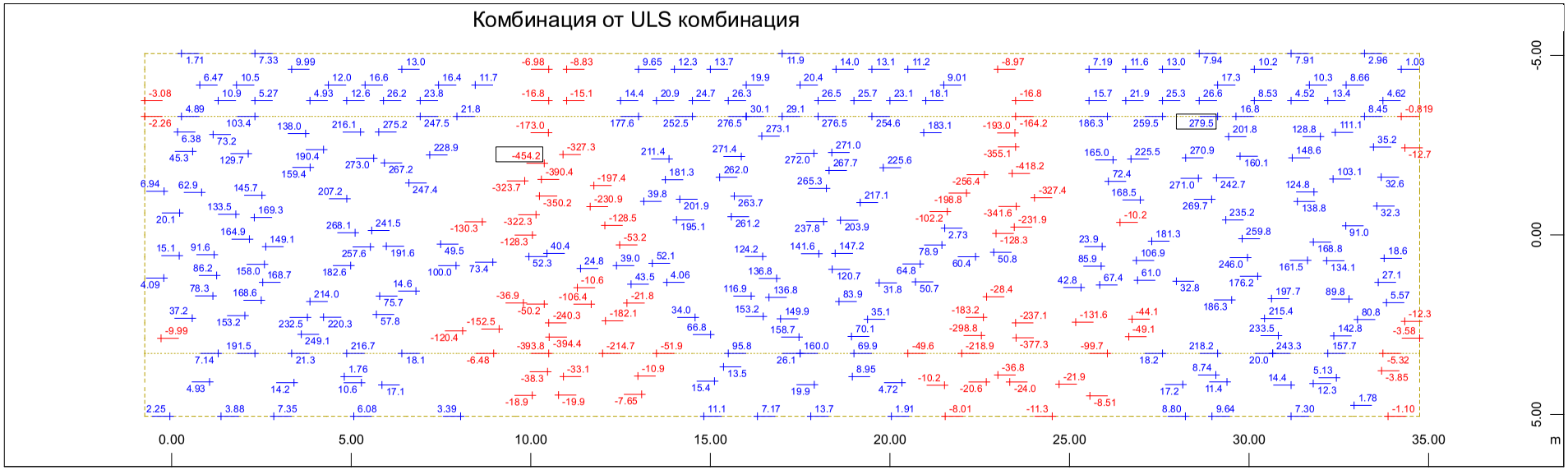
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1108 MINP-VX QUAD (Min=-400.2) (Max=292.6)


Комбинация от ULS комбинация
SOFiSTiK AG - www.sofistik.de
M 1 : 182
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 1108 MINP-VX QUAD (Min=-162.8) (Max=42.2)
Z
X
Y


Комбинация от ULS комбинация
M 1 : 178
m
-5.00
0.00
5.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 1108 MINP-VX QUAD (Min=-367.0) (Max=326.6)
Z
X
Y

Комбинация от ULS комбинация



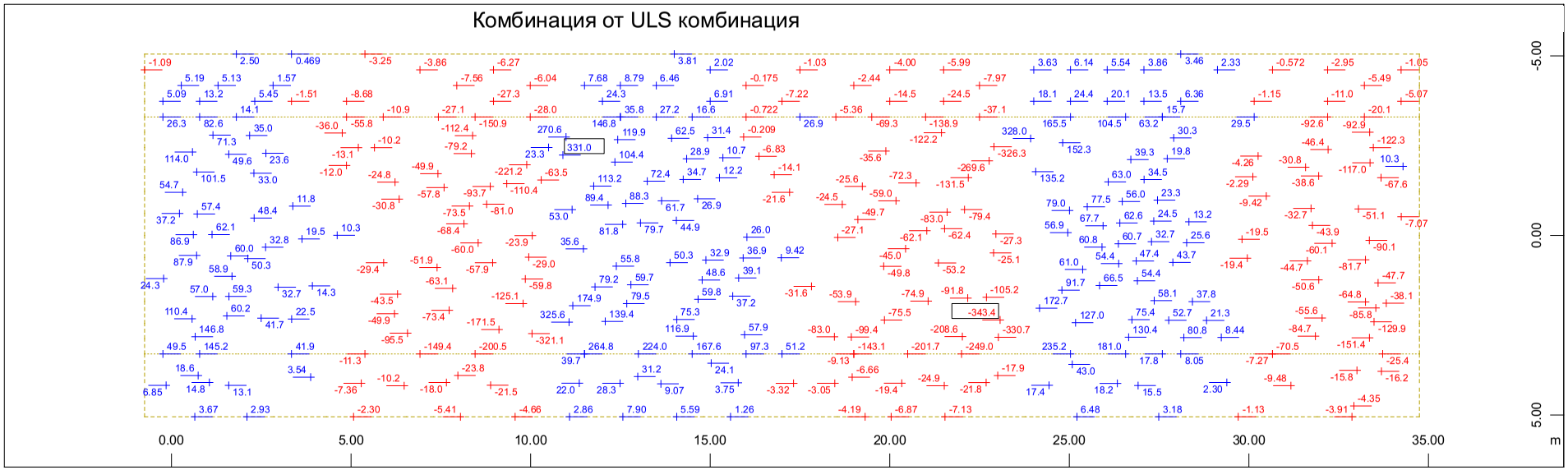
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1109 MAXP-VY QUAD (Min=-454.2) (Max=279.5)

Комбинация от ULS комбинация

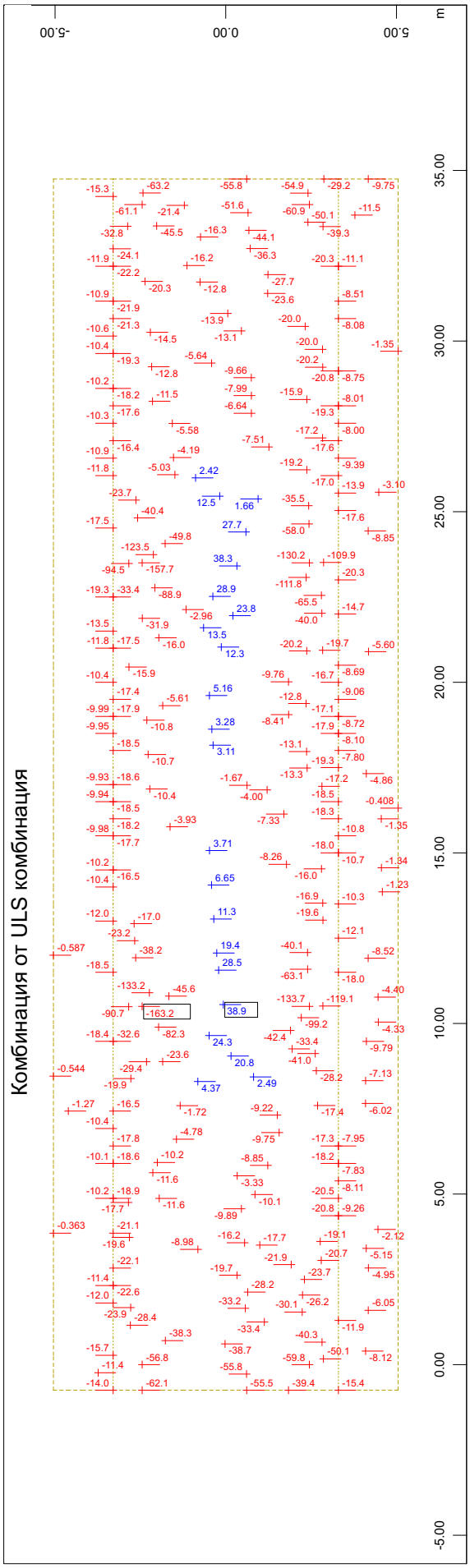


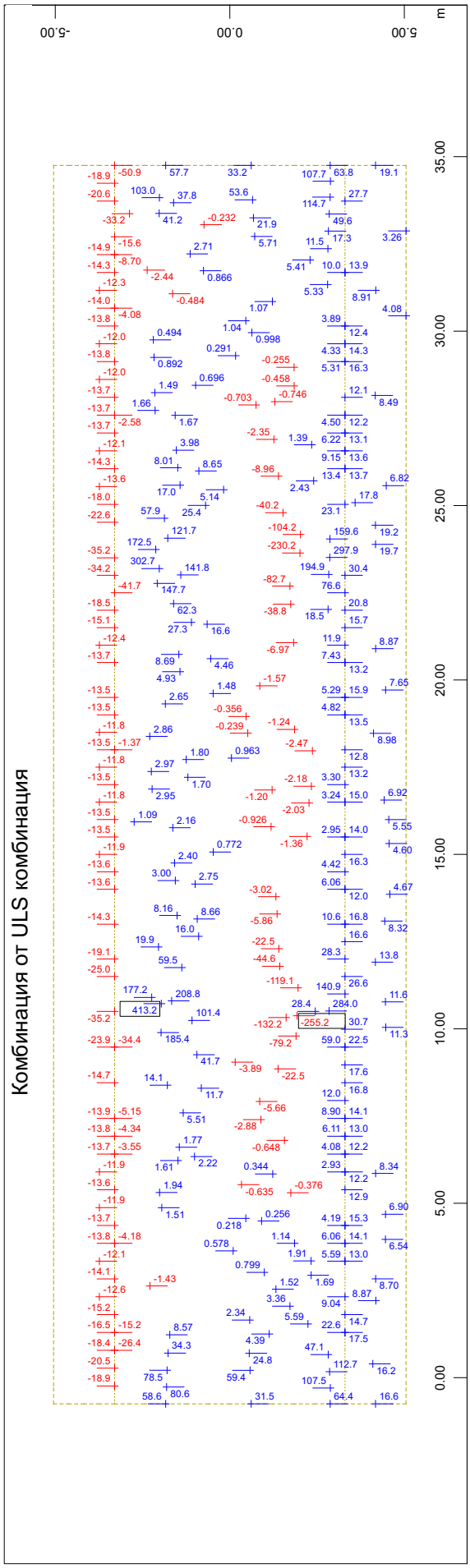
Sector of system Group 1

M 1 : 173

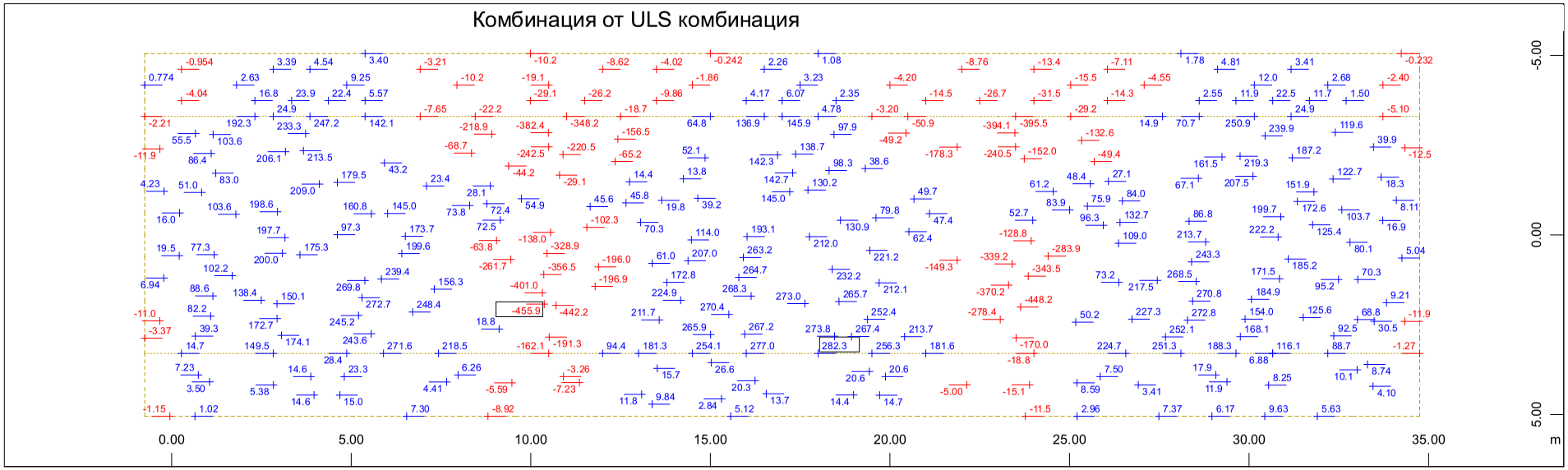
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1109 MAXP-VY QUAD (Min=-343.4) (Max=331.0)





Комбинация от ULS комбинация



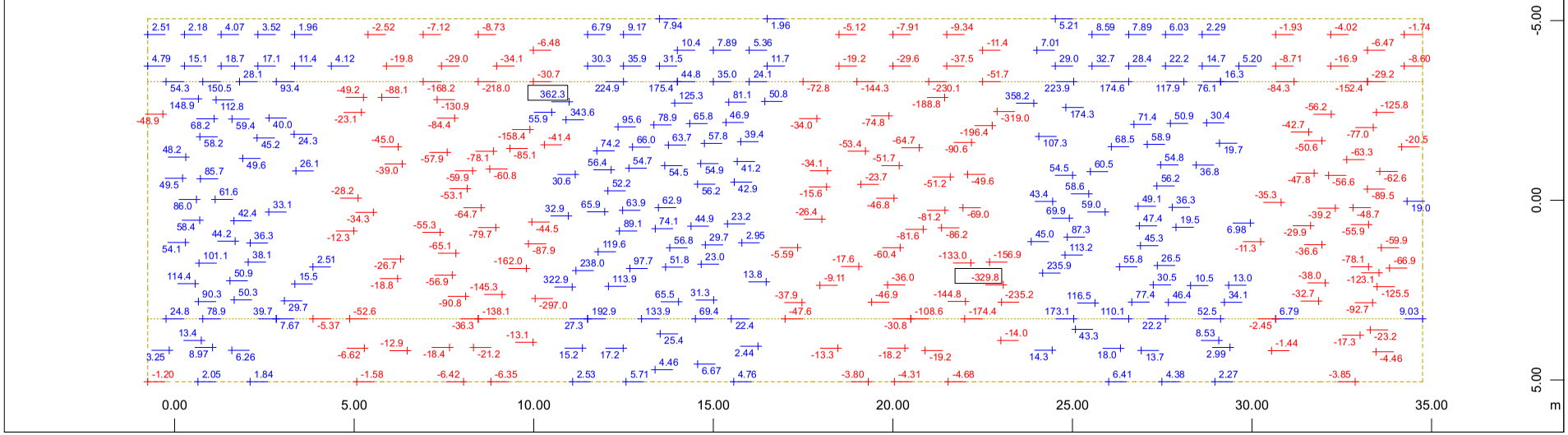
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 1110 MINP-VY QUAD (Min=-455.9) (Max=282.3)

Комбинация от ULS комбинация

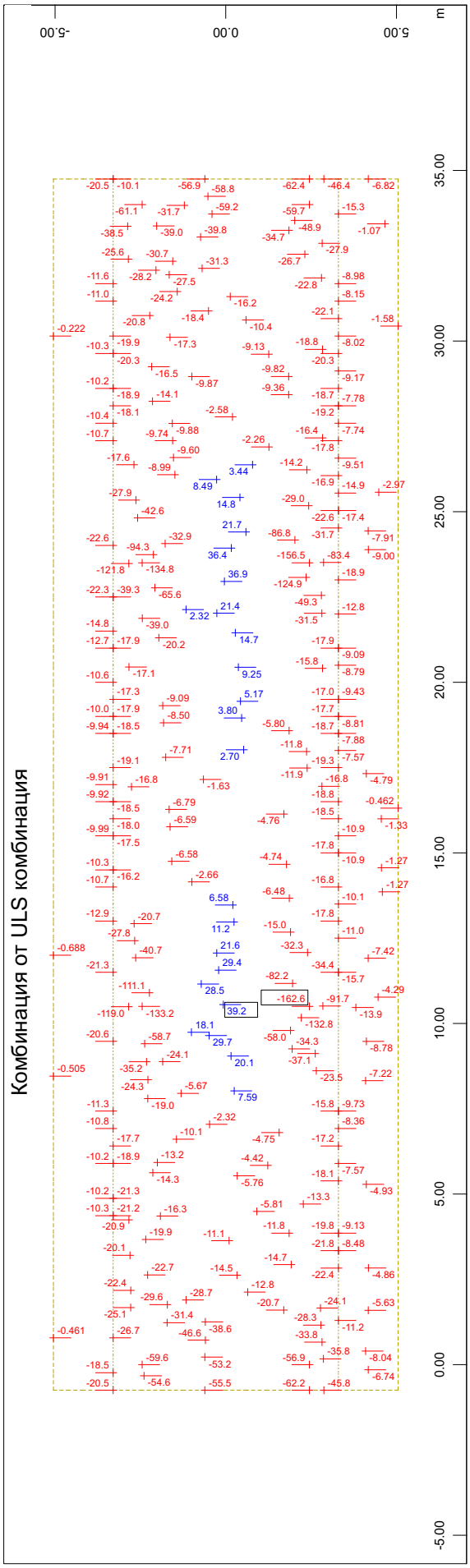


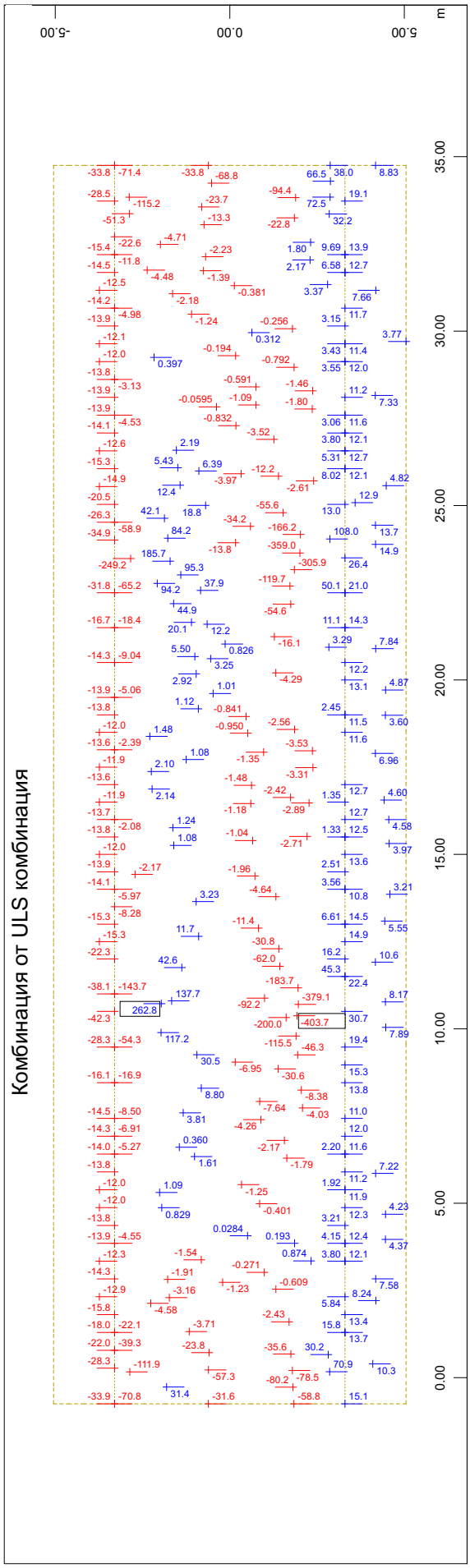
Sector of system Group 1

M 1 : 173

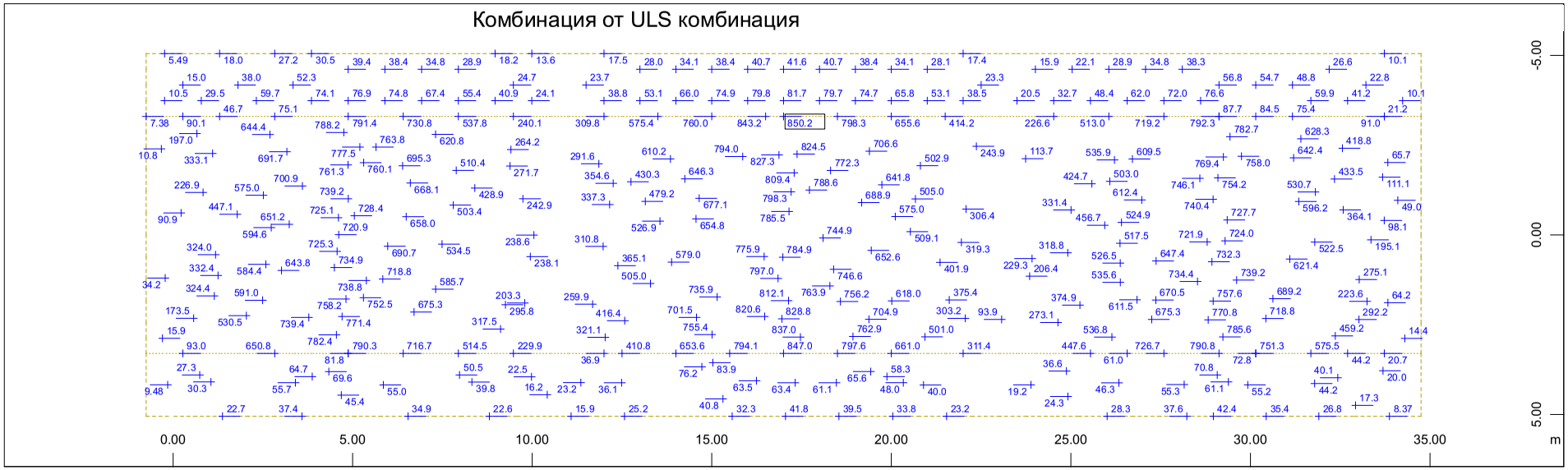
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 1110 MINP-VY QUAD (Min=-329.8) (Max=362.3)





Комбинация от ULS комбинация



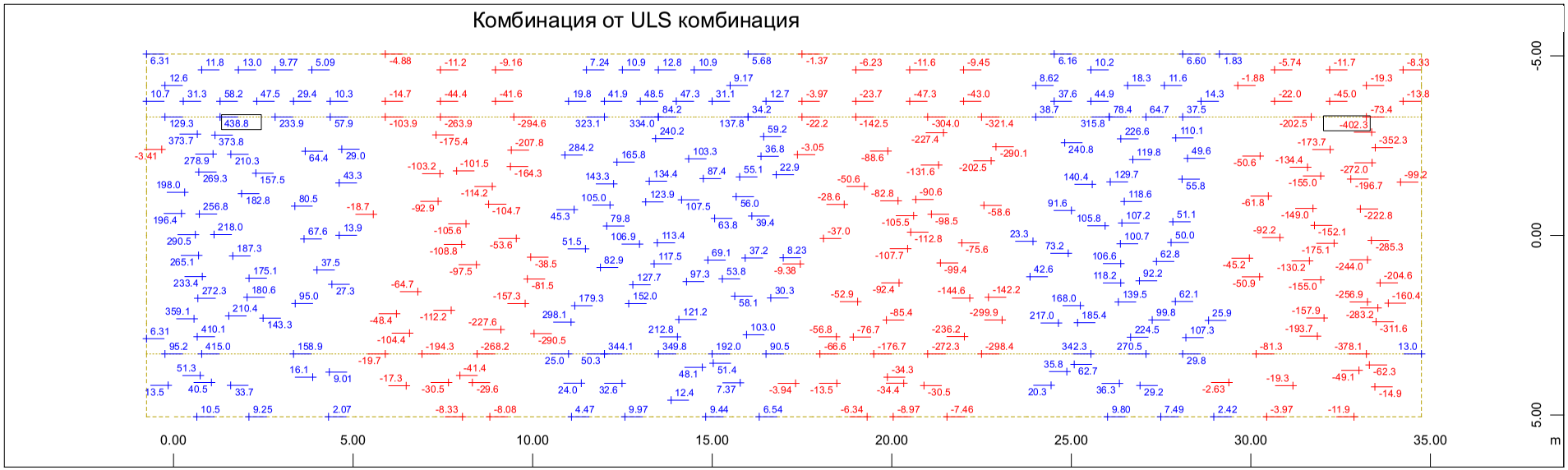
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2101 MAX-MXX QUAD (Max=850.2)

Комбинация от ULS комбинация

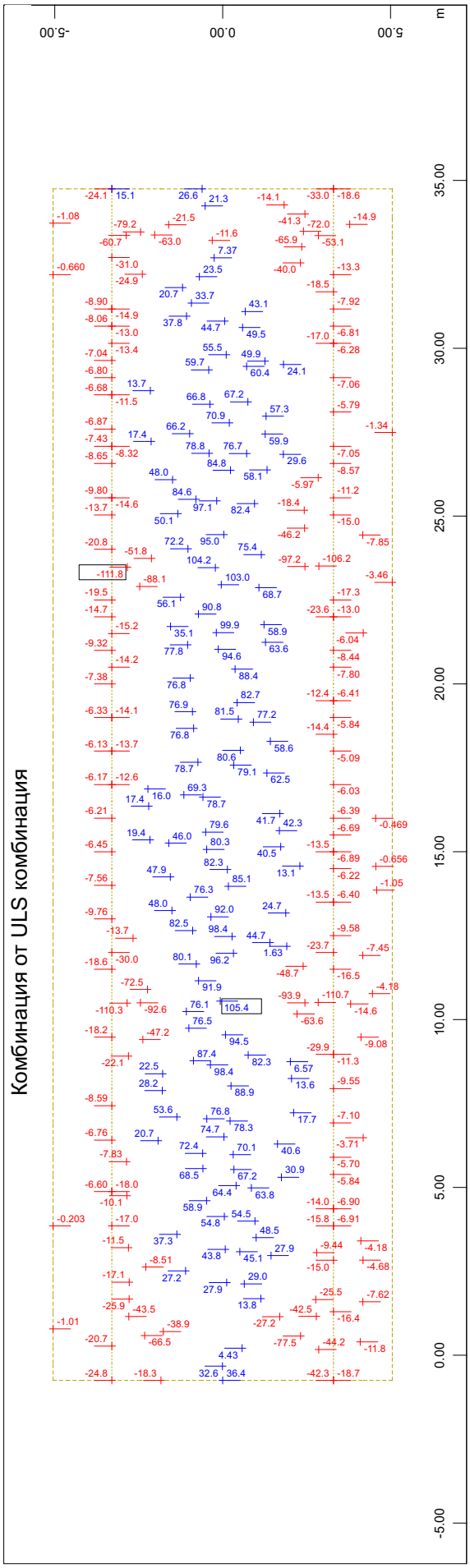


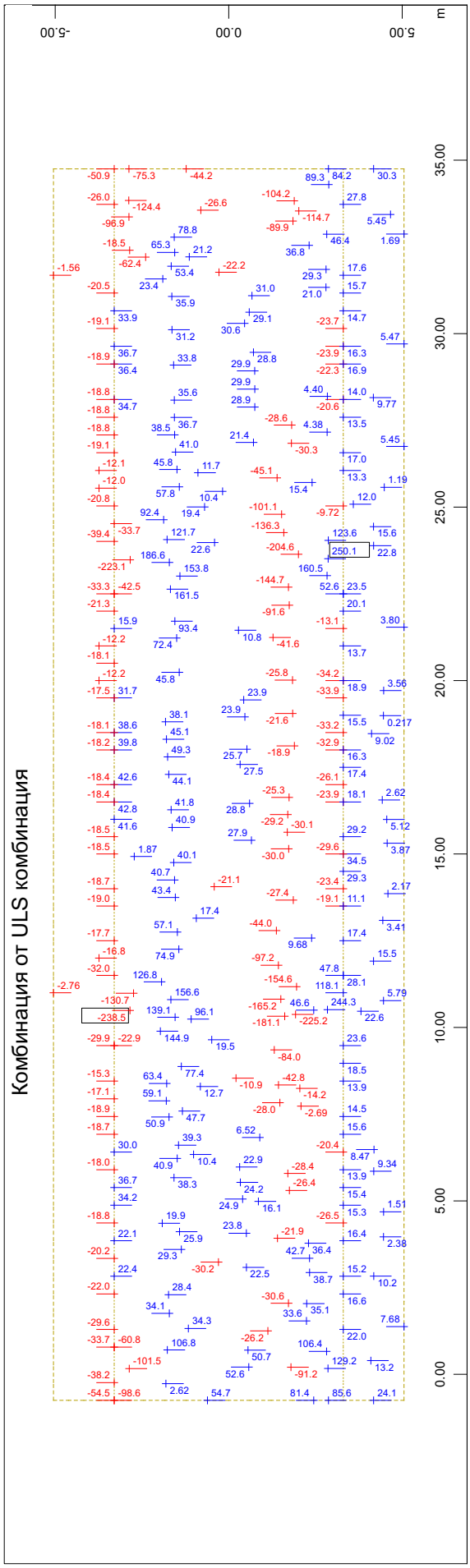
Sector of system Group 1

M 1 : 173

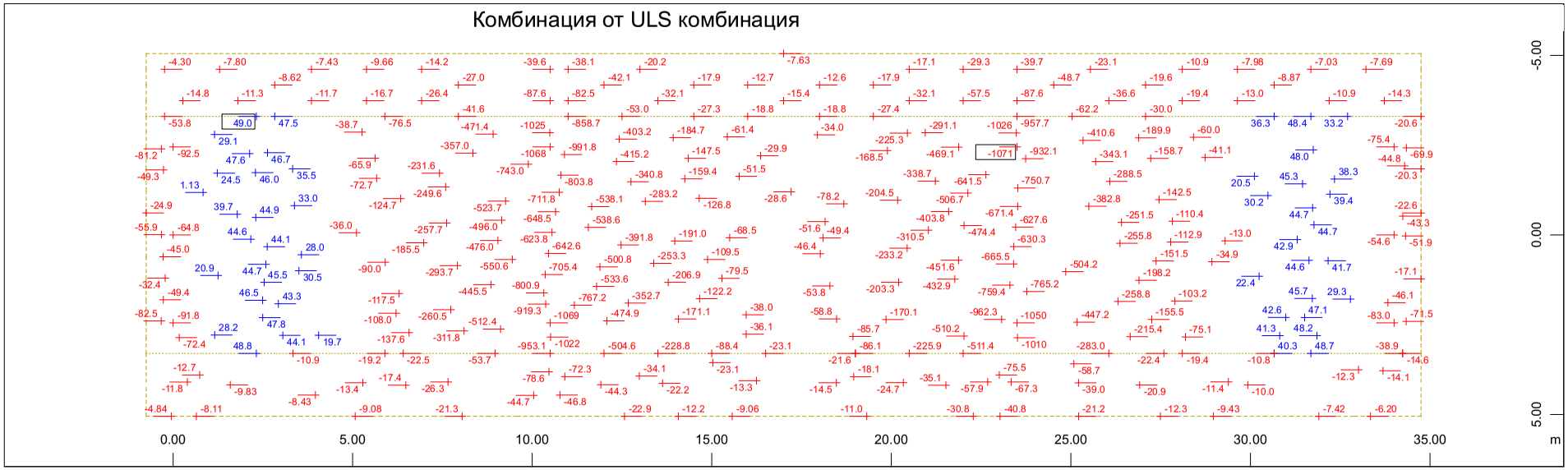
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2101 MAX-MXX QUAD (Min=-402.3) (Max=438.8)





Комбинация от ULS комбинация



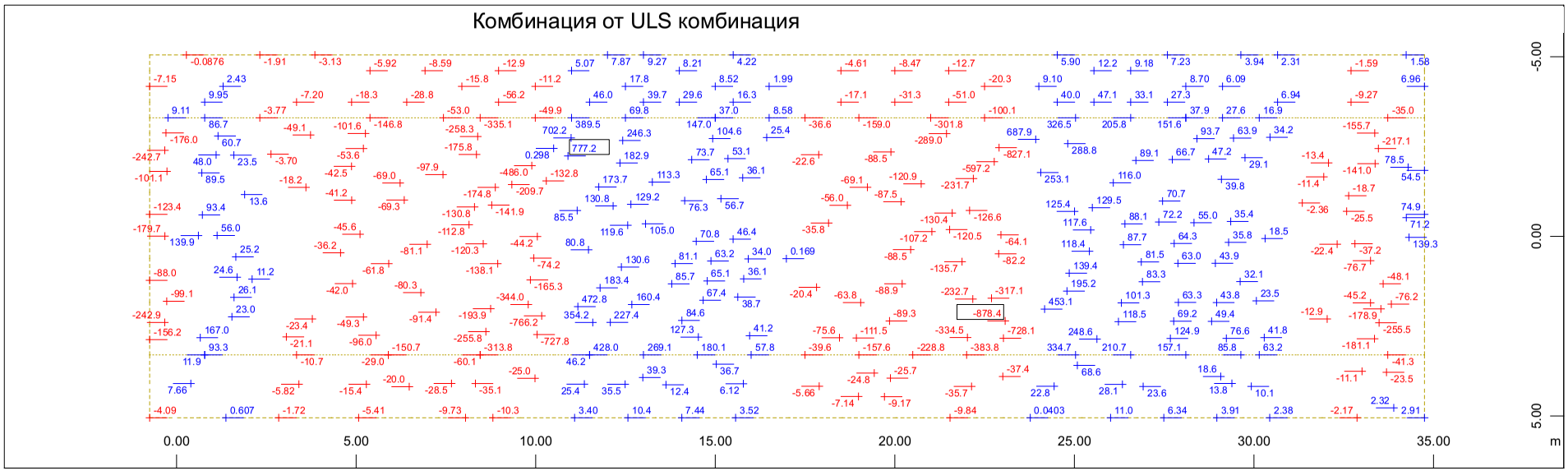
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2102 MIN-MXX QUAD (Min=-1071.) (Max=49.0)

Комбинация от ULS комбинация

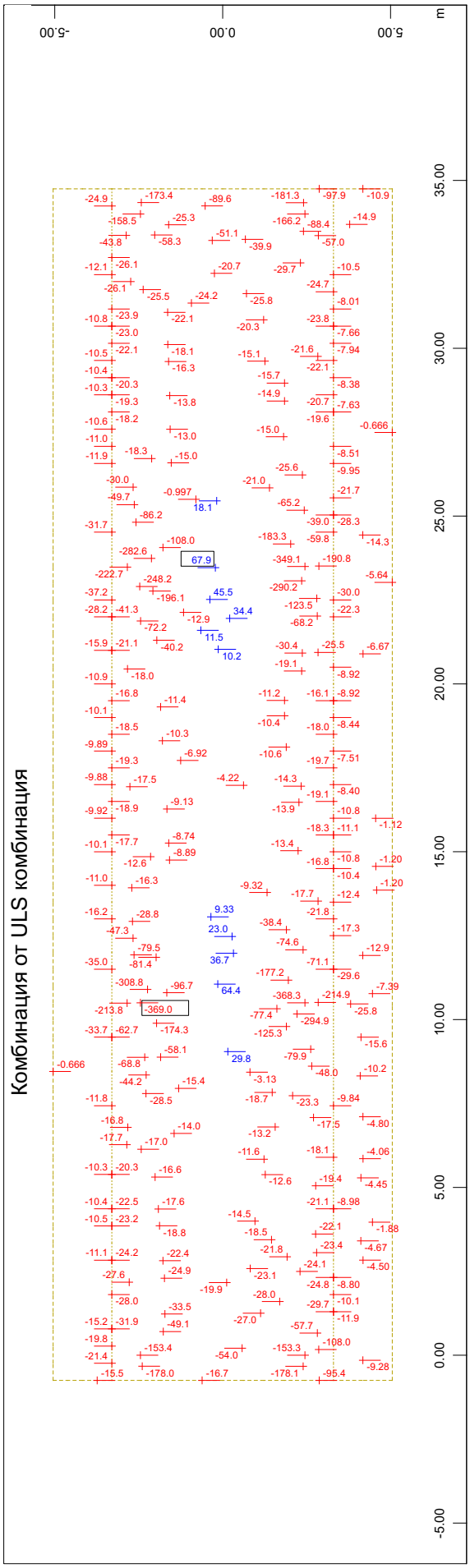


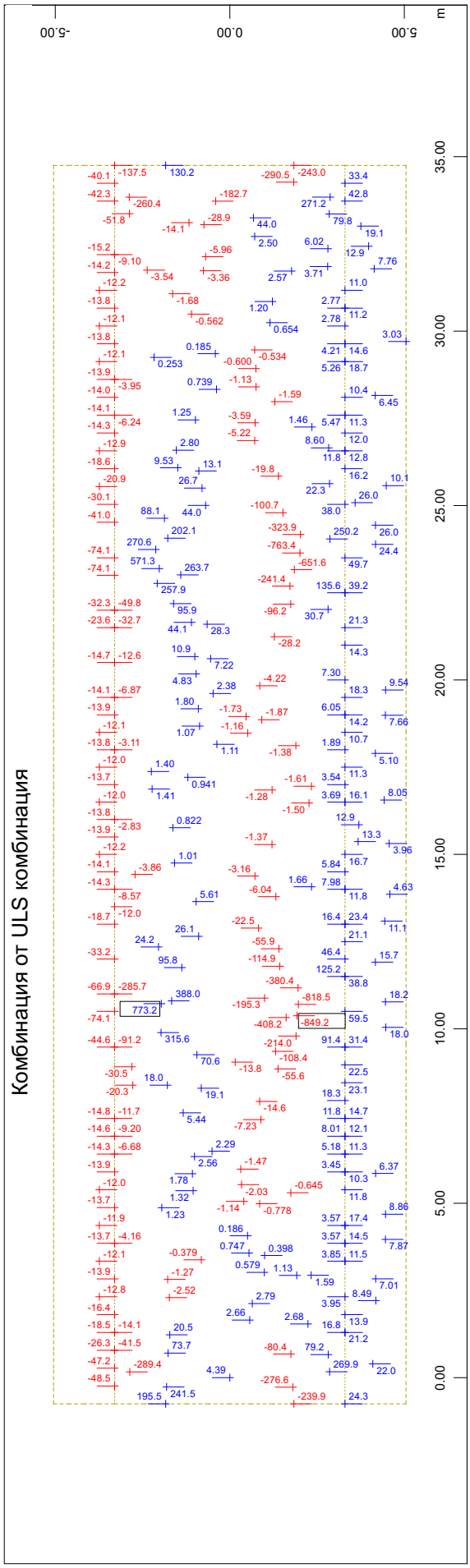
Sector of system Group 1

M 1 : 173

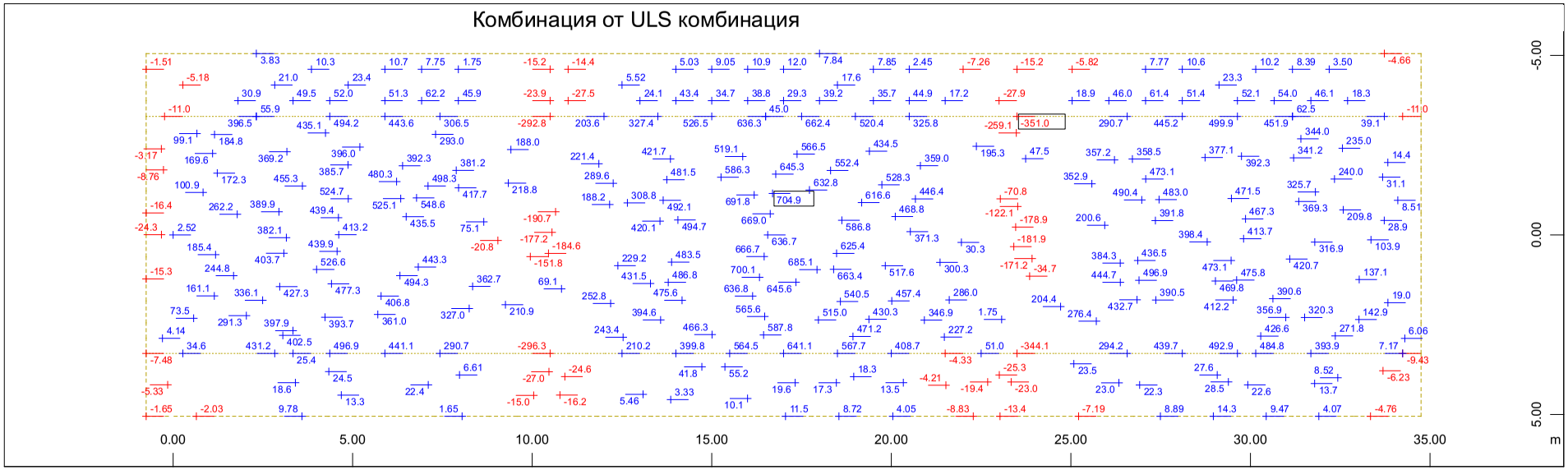
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2102 MIN-MXX QUAD (Min=-878.4) (Max=777.2)





Комбинация от ULS комбинация



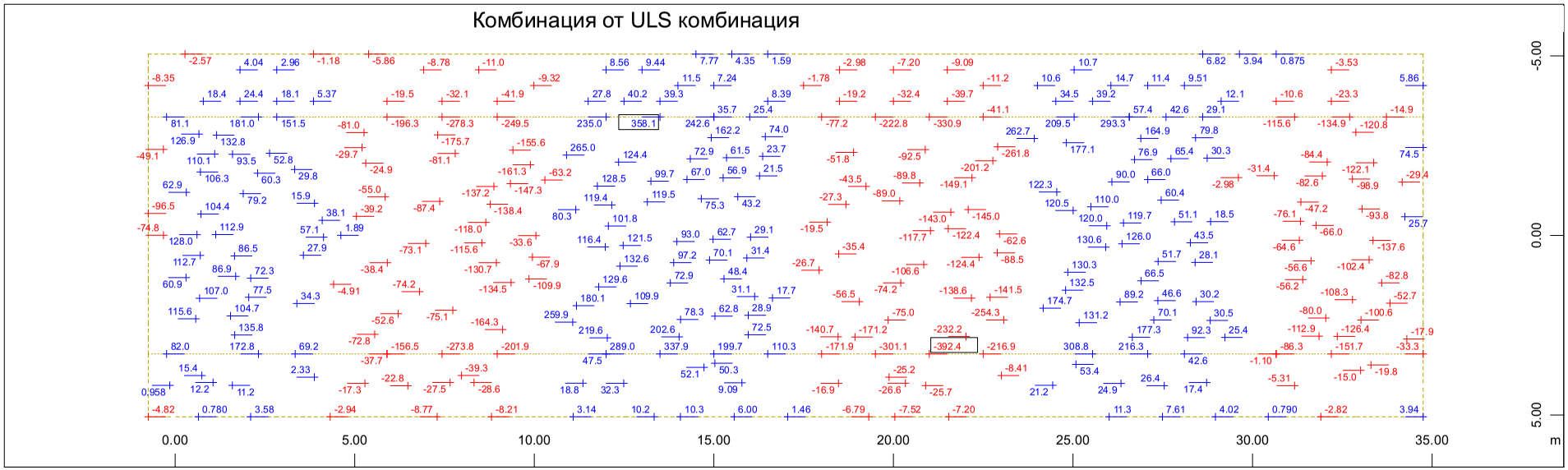
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2103 MAX-MYY QUAD (Min=-351.0) (Max=704.9)

Комбинация от ULS комбинация

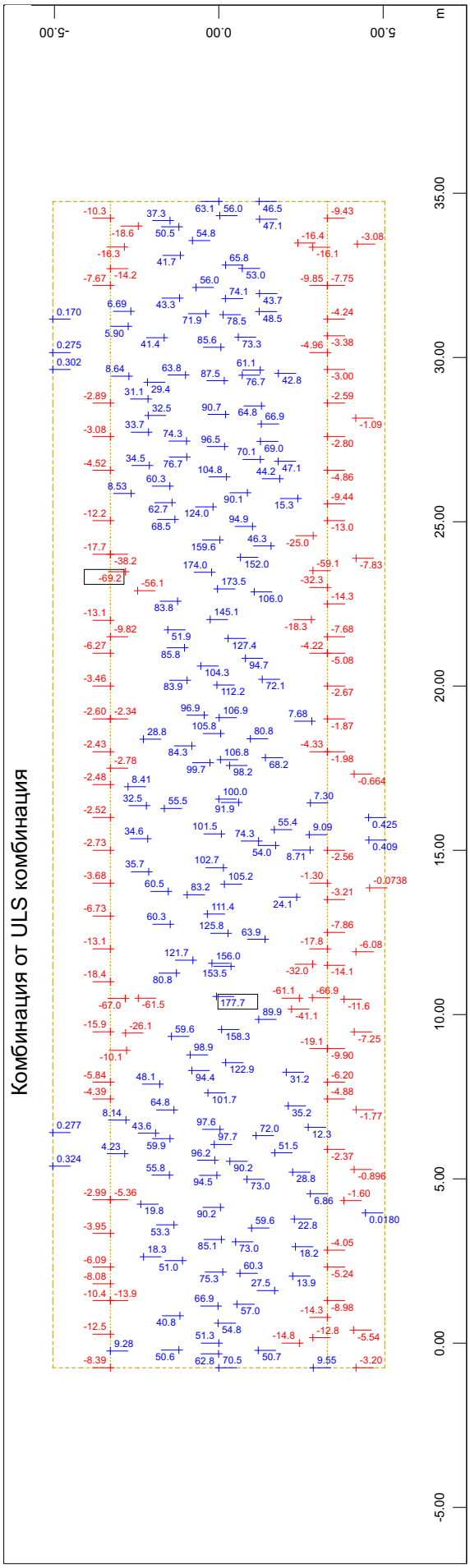


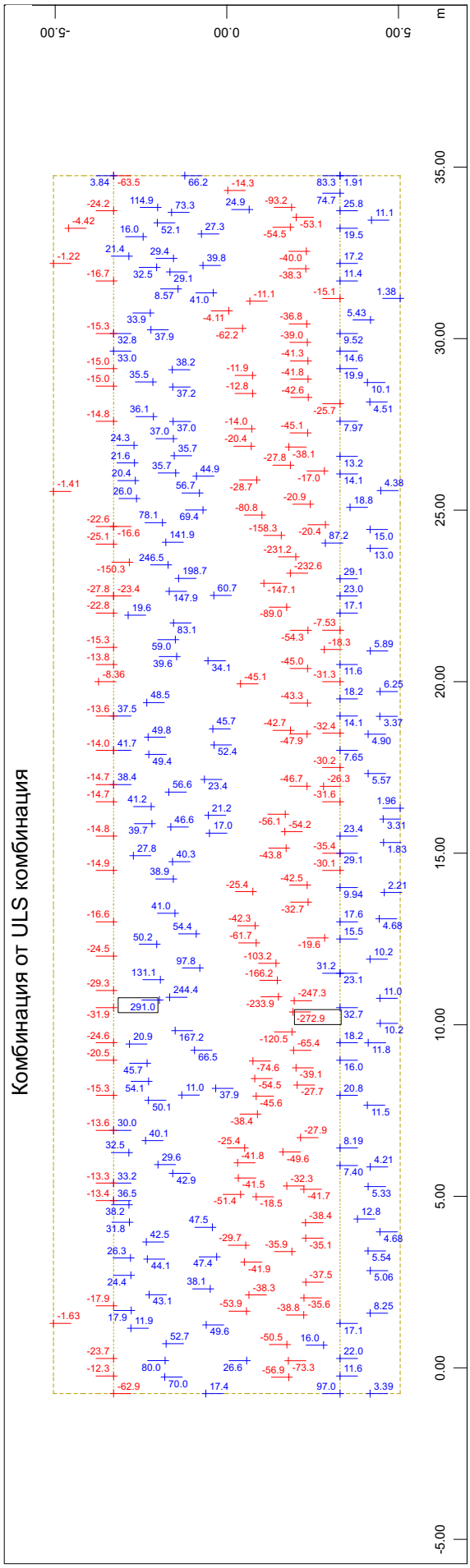
Sector of system Group 1

M 1 : 173

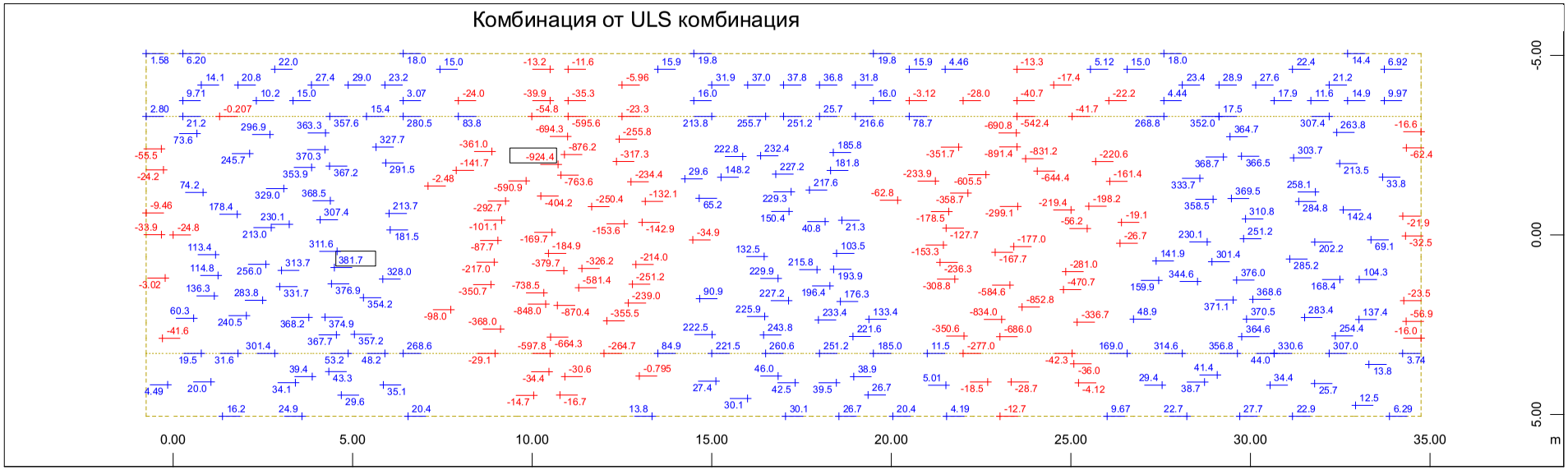
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2103 MAX-MYY QUAD (Min=-392.4) (Max=358.1)





Комбинация от ULS комбинация



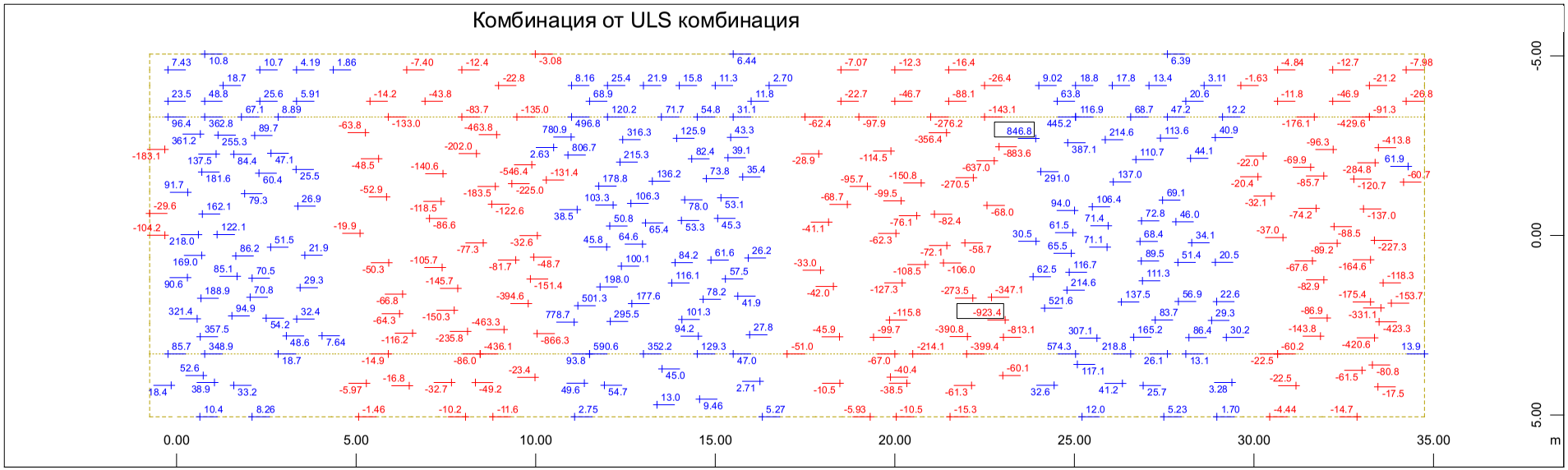
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2104 MIN-MYY QUAD (Min=-924.4) (Max=381.7)

Комбинация от ULS комбинация

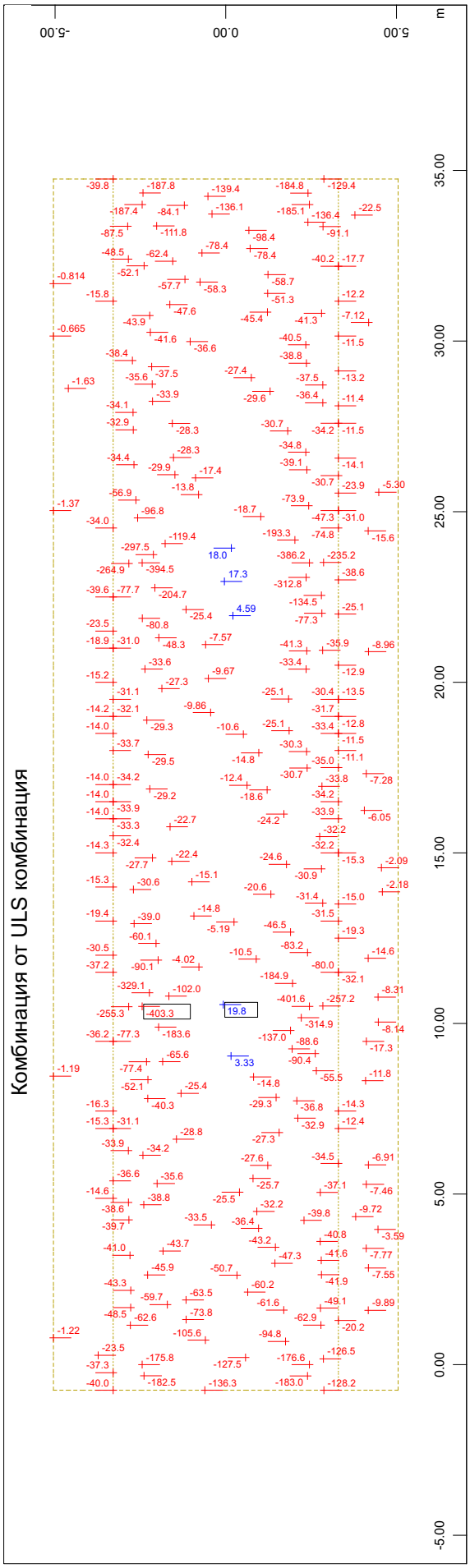


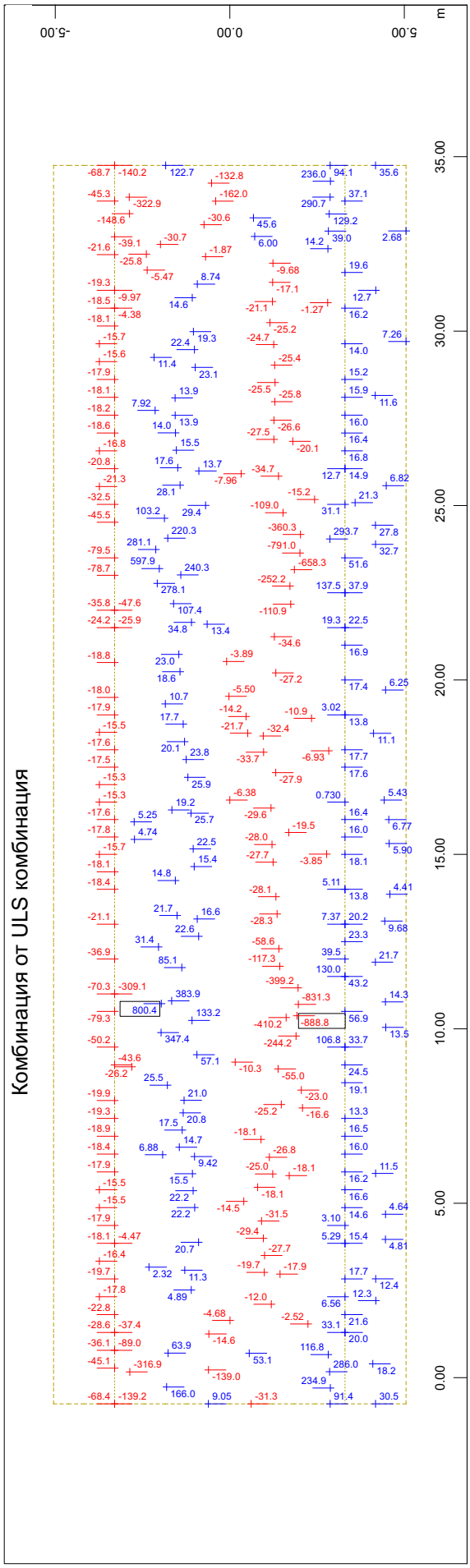
Sector of system Group 1

M 1 : 173

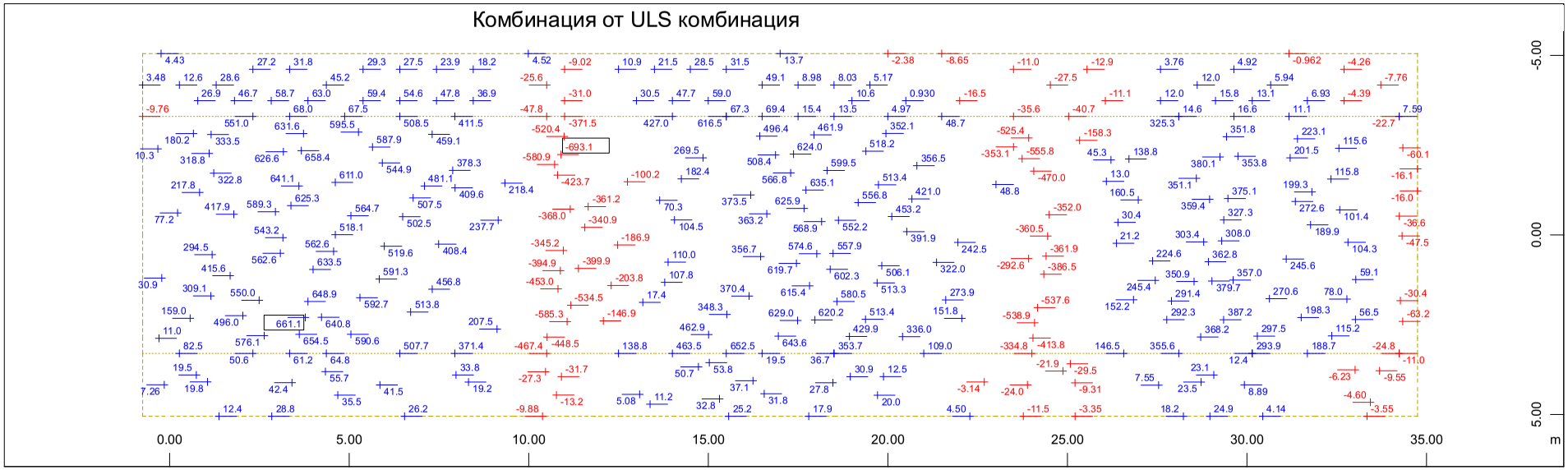
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2104 MIN-MYY QUAD (Min=-923.4) (Max=846.8)


Комбинация от ULS комбинация
M 1 : 182
Sector of system Group 1
Bending moment m-yy in local y from middle of element in kNm/m, Loadcase 2104 MIN-MYY QUAD (Min=-403.3) (Max=19.8)
SOFiSTiK AG - www.sofistik.de


Комбинация от ULS комбинация
M 1 : 178
Sector of system Group 1
Shear force v-y in local y from middle of element in kN/m, Loadcase 2104 MIN-MYY QUAD (Min=-888.8) (Max=800.4)

Комбинация от ULS комбинация



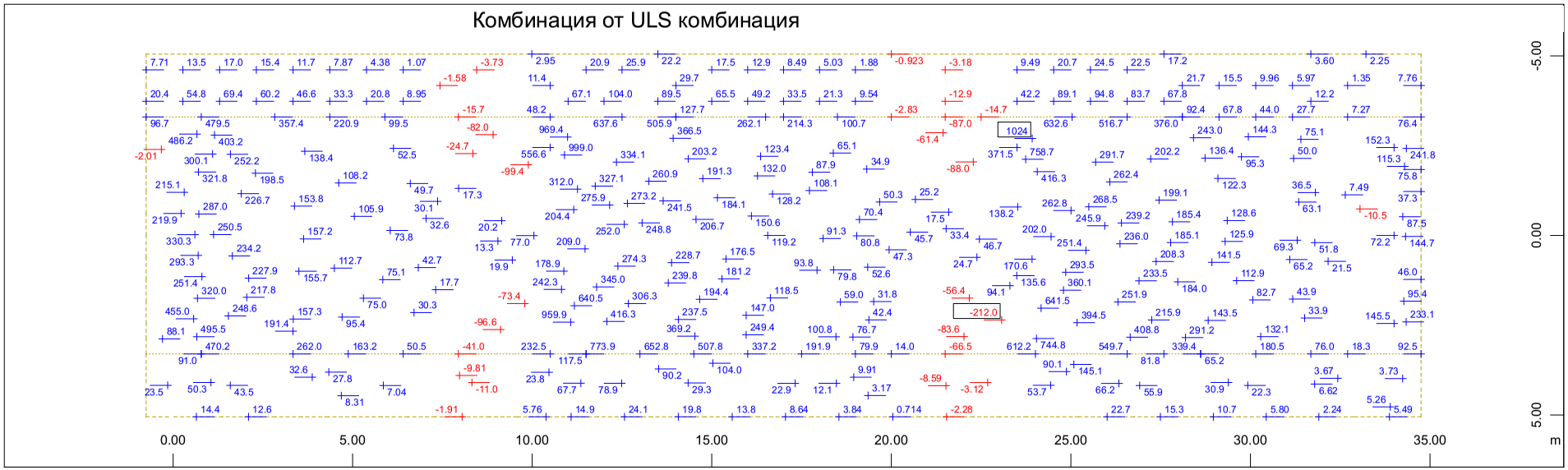
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2107 MAX-VX QUAD (Min=-693.1) (Max=661.1)

Комбинация от ULS комбинация

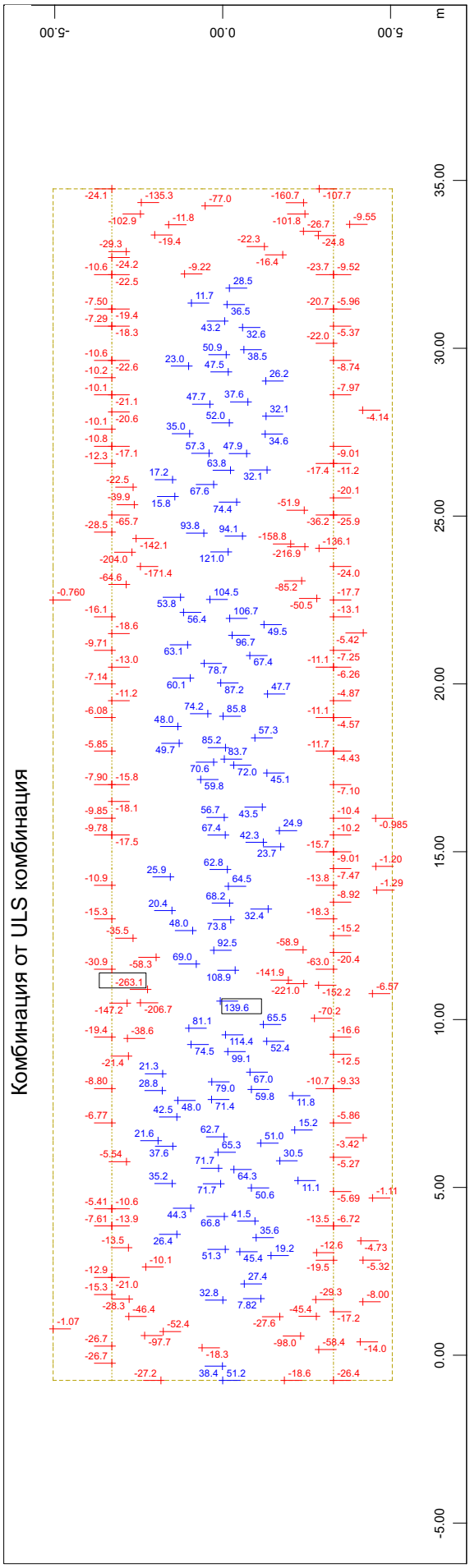


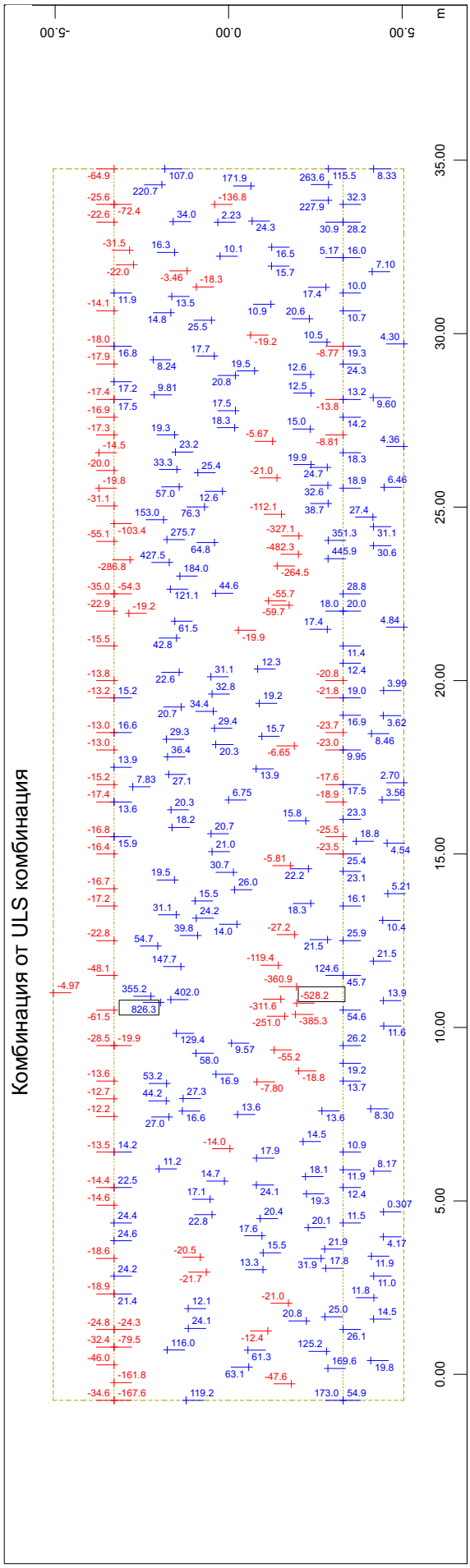
Sector of system Group 1

M 1 : 173

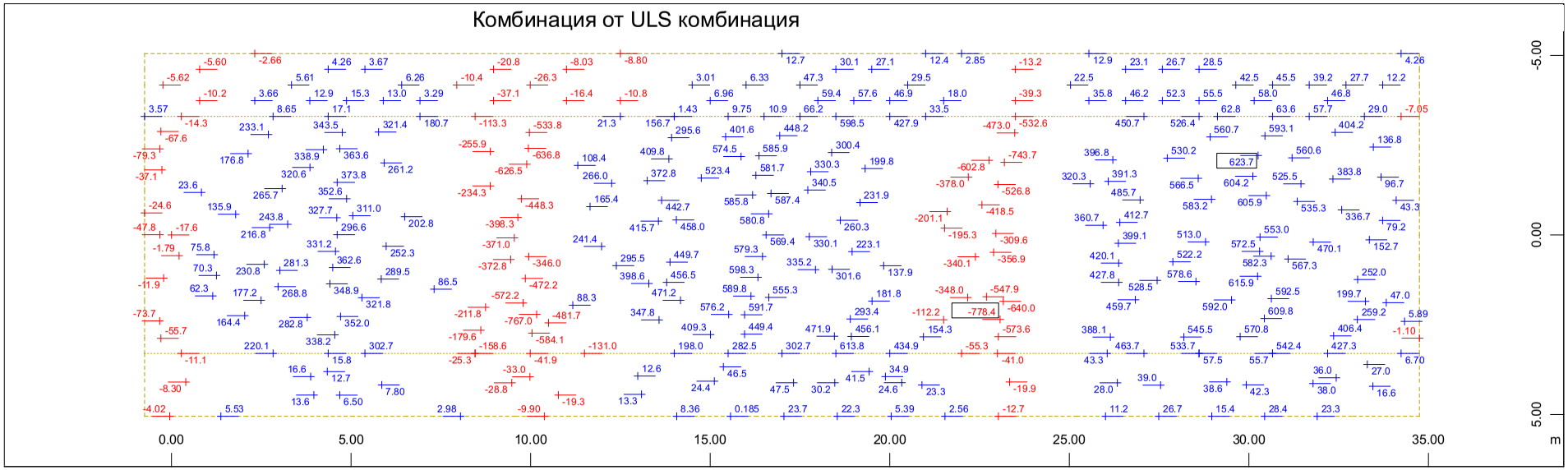
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2107 MAX-VX QUAD (Min=-212.0) (Max=1024.)





Комбинация от ULS комбинация



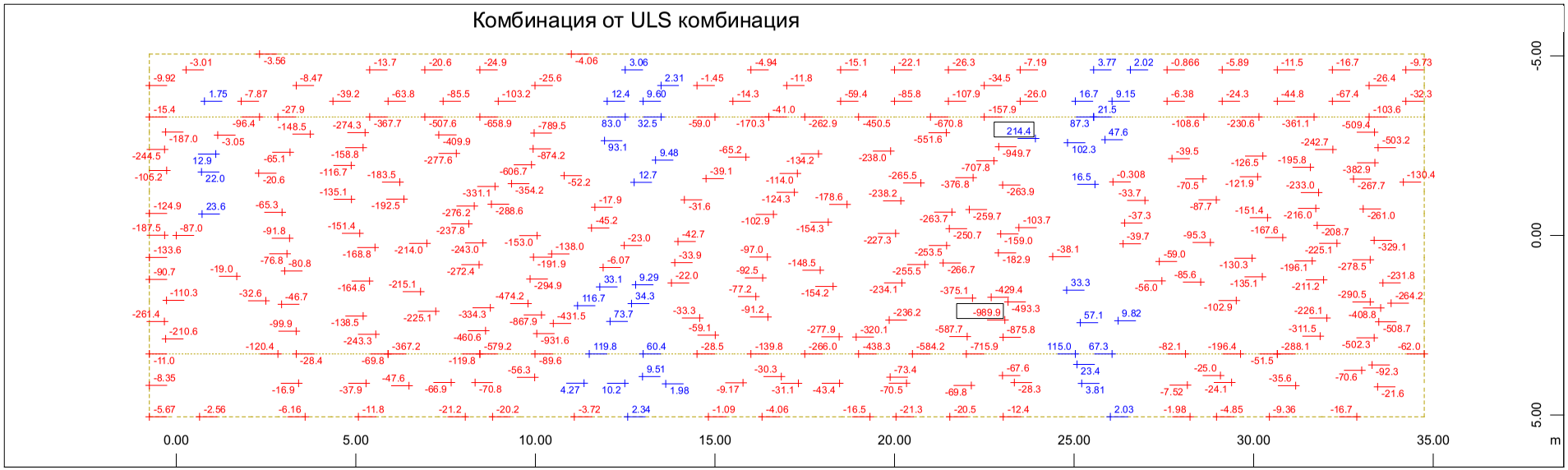
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2108 MIN-VX QUAD (Min=-778.4) (Max=623.7)

Комбинация от ULS комбинация

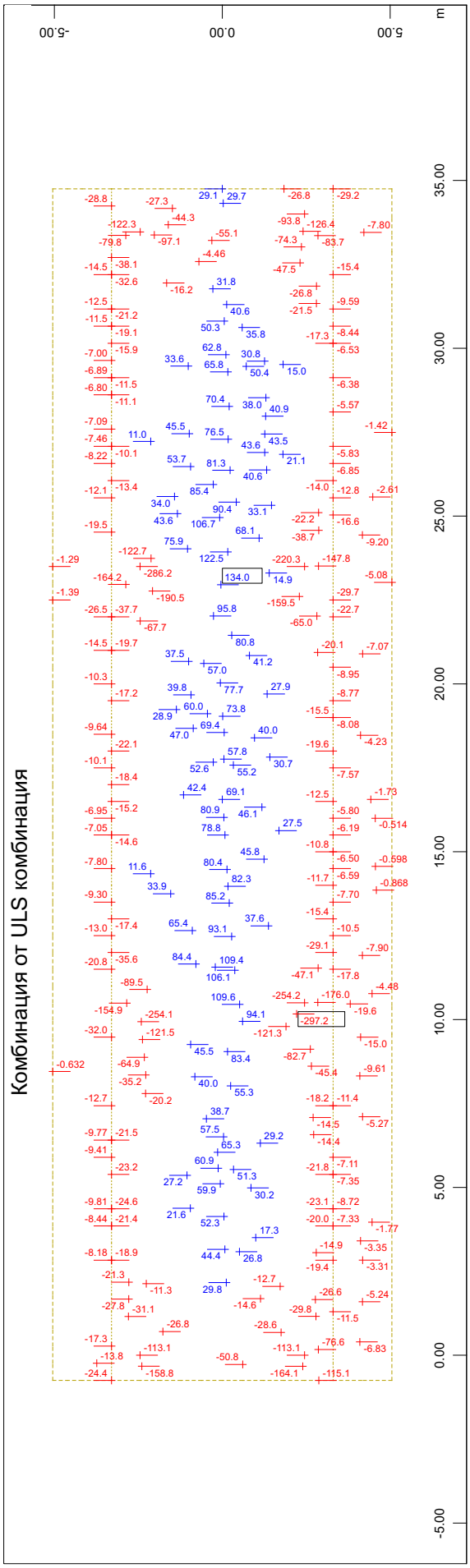


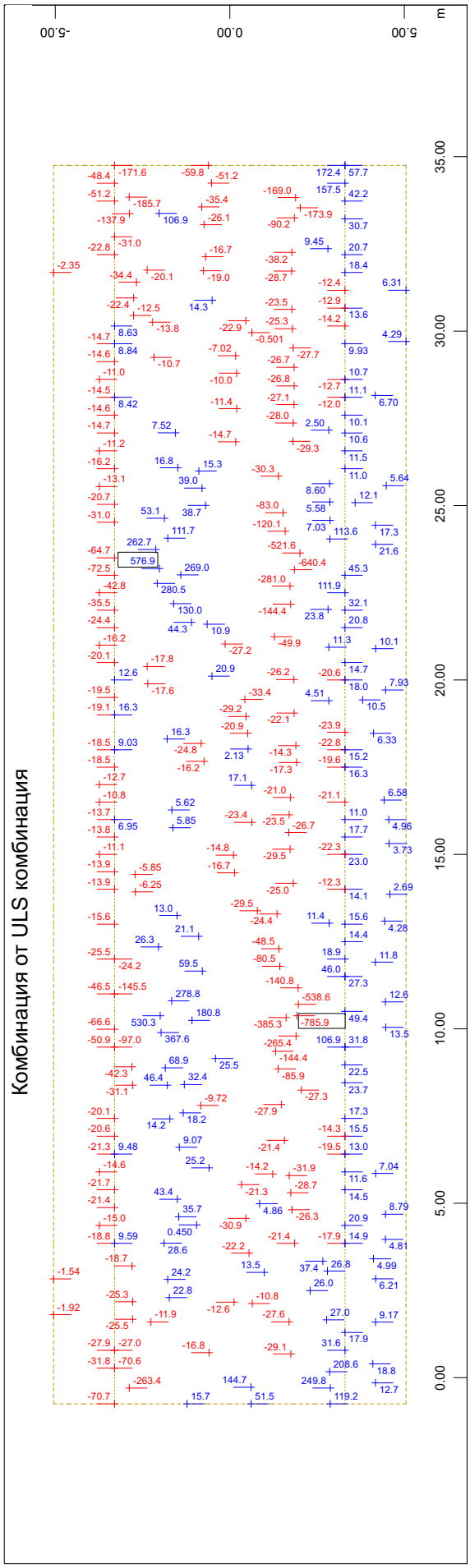
Sector of system Group 1

M 1 : 173

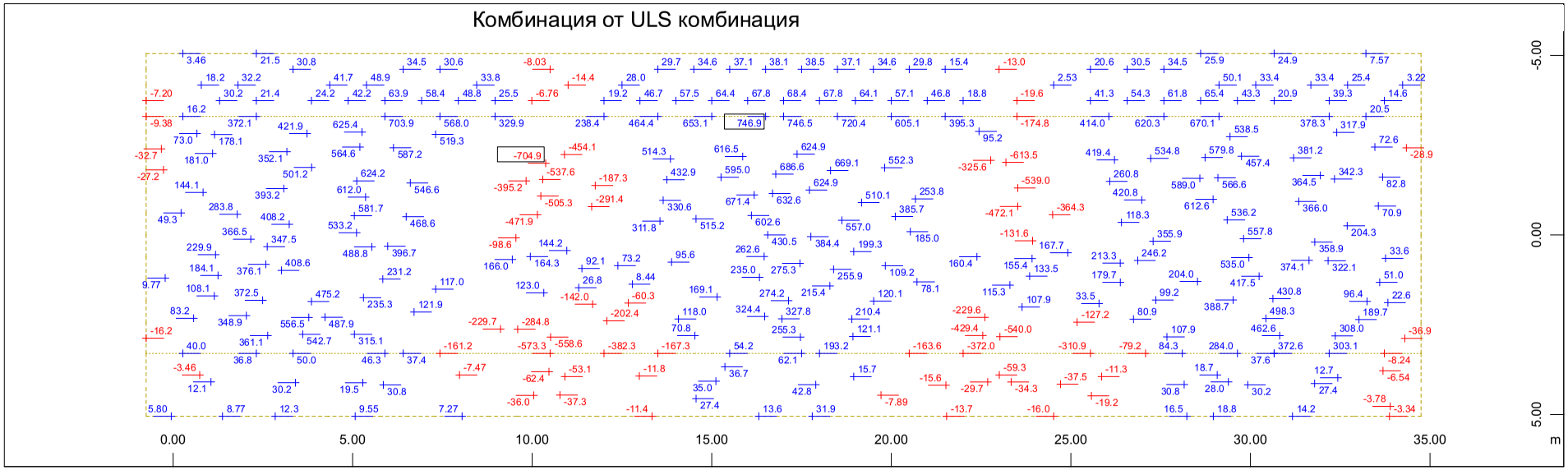
Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2108 MIN-VX QUAD (Min=-989.9) (Max=214.4)





Комбинация от ULS комбинация



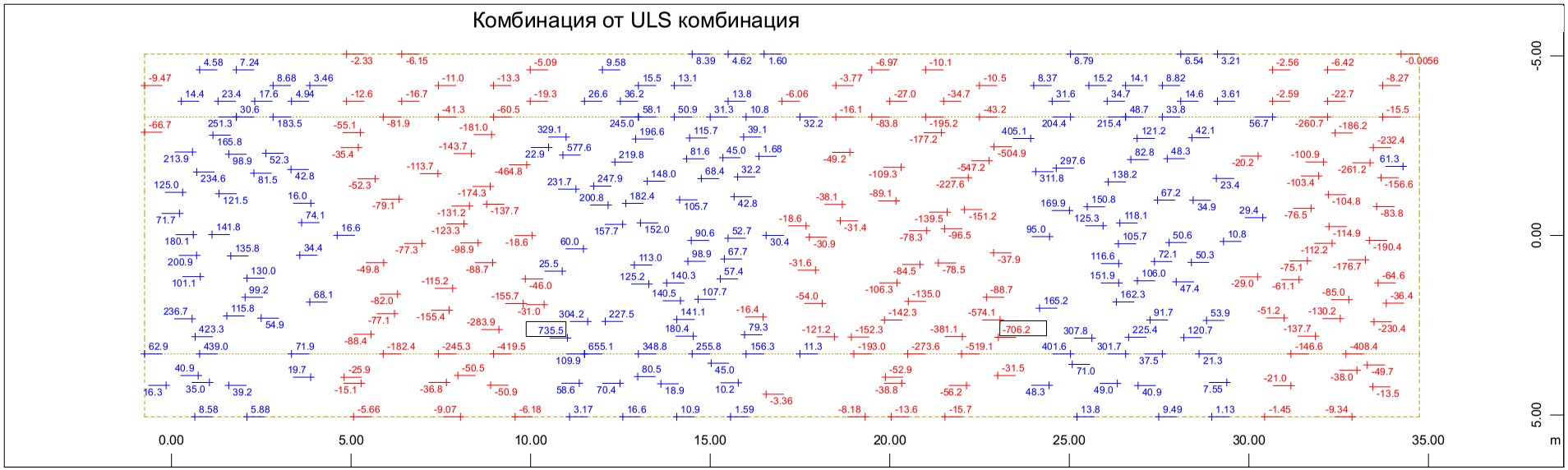
Sector of system Group 1

M 1 : 173

Z X
Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2109 MAX-VY QUAD (Min=-704.9) (Max=746.9)

Комбинация от ULS комбинация

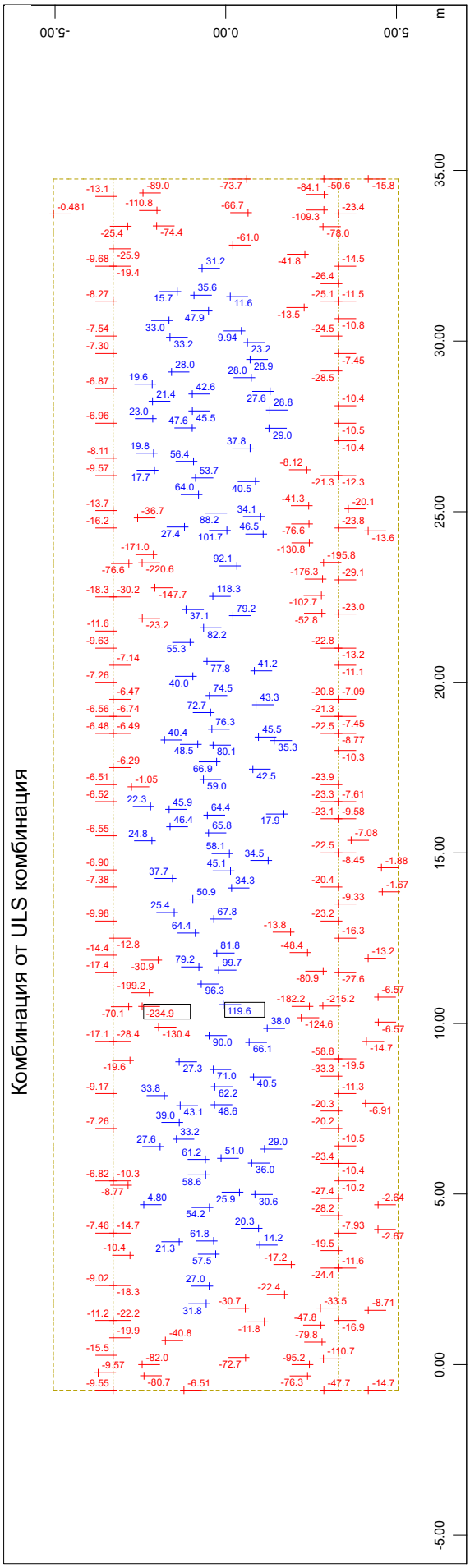


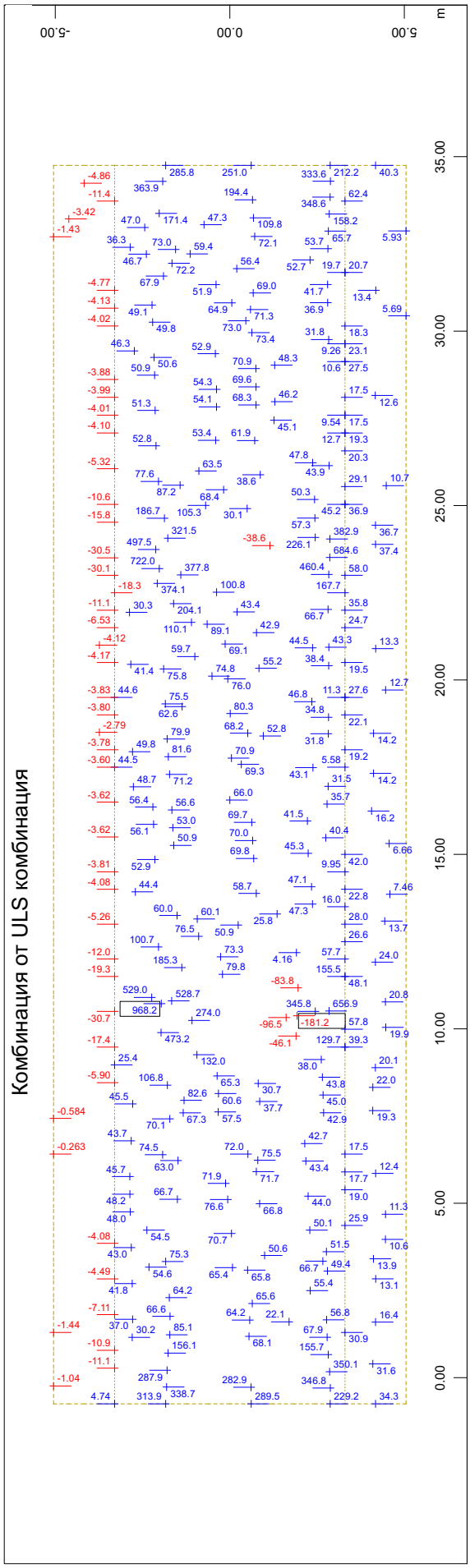
Sector of system Group 1

M 1 : 173

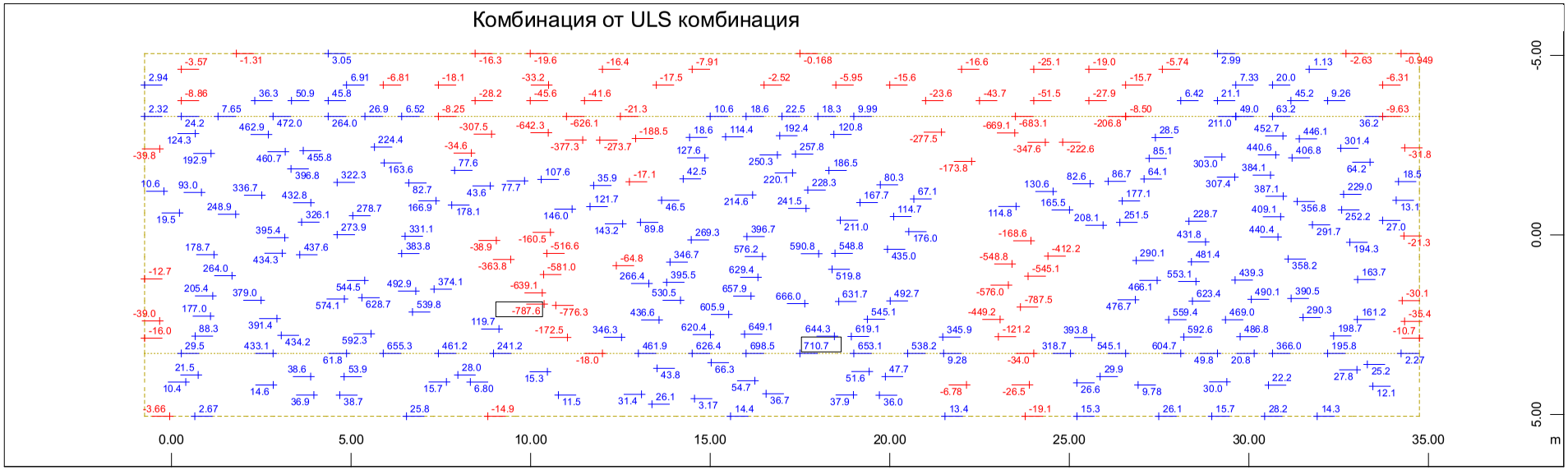
Z X
Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2109 MAX-VY QUAD (Min=-706.2) (Max=735.5)





Комбинация от ULS комбинация



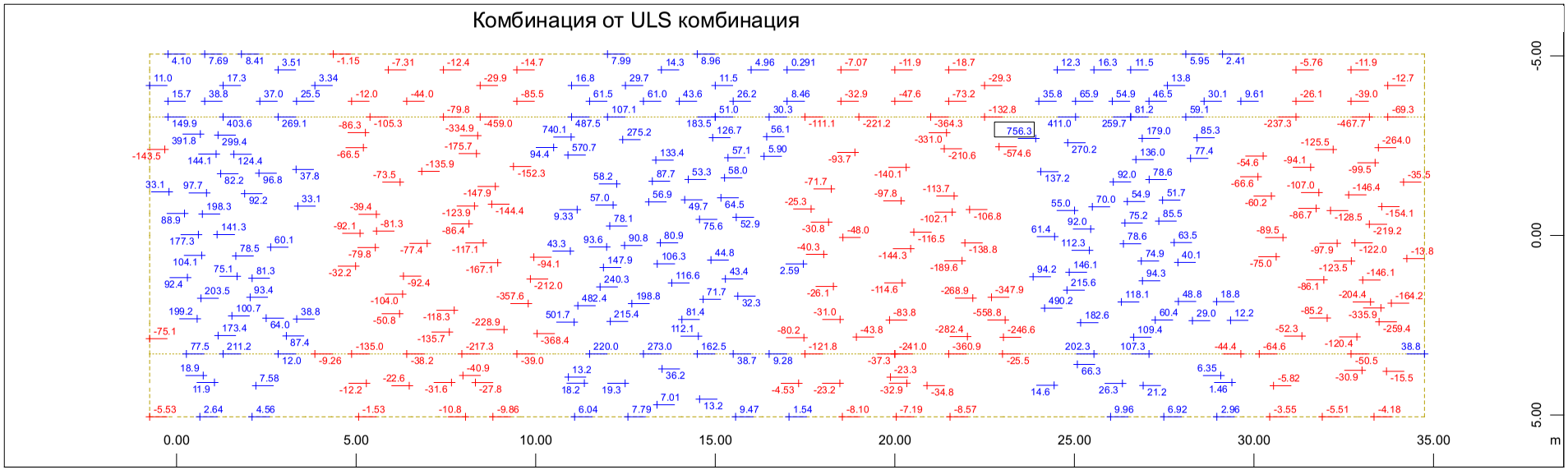
Sector of system Group 1

M 1 : 173

Z X Y

Bending moment m-xx in local x from middle of element in kNm/m, Loadcase 2110 MIN-VY QUAD (Min=-787.6) (Max=710.7)

Комбинация от ULS комбинация

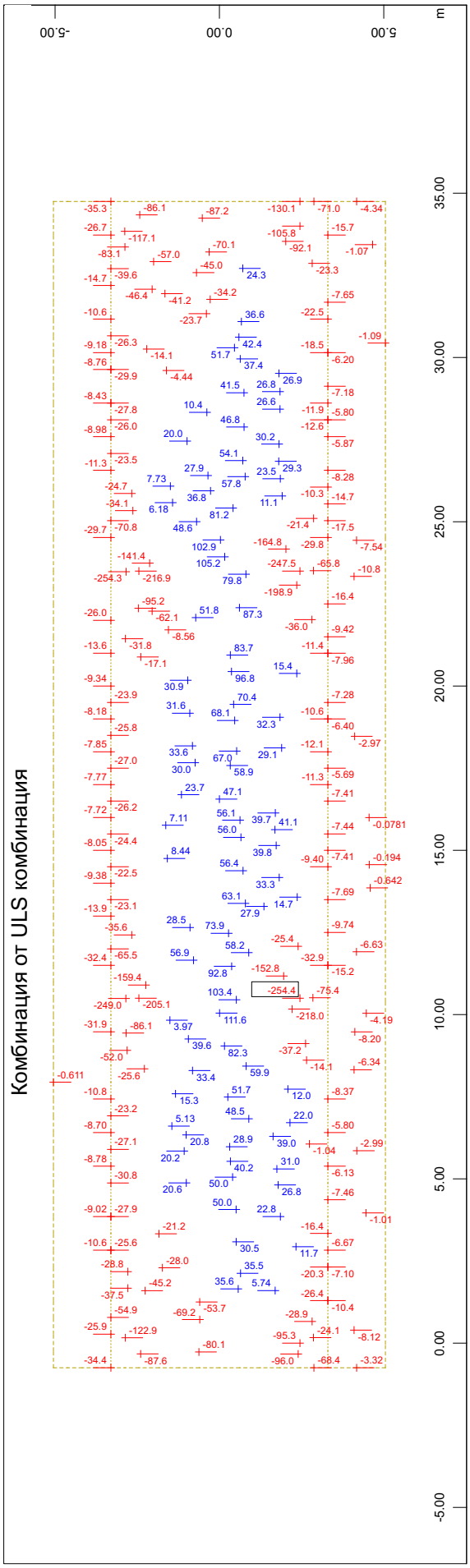


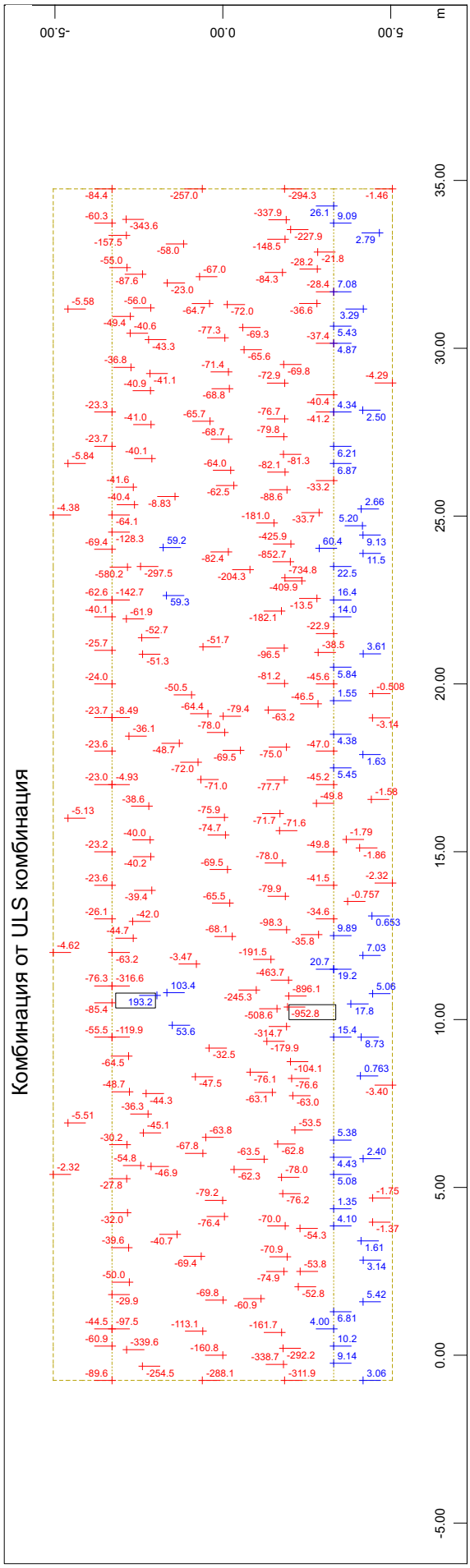
Sector of system Group 1

M 1 : 173

Z X Y

Shear force v-x in local x from middle of element in kN/m, Loadcase 2110 MIN-VY QUAD (Min=-724.1) (Max=756.3)





Reinforcementparameter two layer reinforcement

Selection		distance		bar-diameter		crackwidth		steelstress		min.reinf.	
Grp	elem	d1-u	2.lay	ds-u	2.lay	wk-u	2.lay	sigsu	2.lay	asu	2.lay
no.	no.	d1-l	2.lay	ds-l	2.lay	wk-l	2.lay	sigsl	2.lay	asl	2.lay
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[MPa]	[MPa]	[cm2/m]	[cm2/m]
default		35.0	45.0	10	10	-	-	-	-	-	-
		35.0	45.0	10	10	-	-	-	-	-	-

distance	upper / lower distance center of bar to surface
bar-diameter	upper / lower bar diameter
crackwidth	upper / lower required crack width
steelstress	upper / lower maximum steel stress in SLS check
min.reinf.	upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
With the input of a steel stress sigsu... the 'crack design according tables'
uses this given stress sigsu for the corresponding layer. With this input,
the check can be done for bar distances instead of bar diameters.

Bridge_Popovica
ULS design

Design according to EN 1992-1-1:2004
Loadcases have been calculated in the Ultimate Limit State
In BEMESS no additional load safety factor is applied.

Load Cases for the Design

Loadcase	factor	Title
2101	1.000	MAX-MXX QUAD
2102	1.000	MIN-MXX QUAD
2103	1.000	MAX-MYY QUAD
2104	1.000	MIN-MYY QUAD
2107	1.000	MAX-VX QUAD
2108	1.000	MIN-VX QUAD
2109	1.000	MAX-VY QUAD
2110	1.000	MIN-VY QUAD

Material (EN 1992-1-1:2004)

MAT	fck [N/mm2]	fc [N/mm2]	fctm [N/mm2]	fy [N/mm2]	ft [N/mm2]	N	minT	Type
1	30.0	25.5	2.9			6.1	0.20	
2				500.0	516.0			

MAT	material number	ft	tensile stress reinforcing steel
fck	nominal strength of the concrete	N	ratio Young's modules steel/concrete
fc	strength of the concrete	minT	minimum transverse reinforcement
fctm	tensile strength of the concrete	Type	character of the loading
fy	yield stress reinforcing steel		

Minimum reinforcement: 0.00 % of statically required section
Reduction of FC in case of transvers tension = 25.0 [o/o]

Material-safety-factors:

MAT	concr SC1	SC2	steel SS1	SS2
1	1.50	1.50		
2			1.15	1.15

MAT	material number
concr	material safety SC1/SC2 = bending/compression
steel	material safety steel bending/compression

At direct supports from the face of the support up to 1.0*d
the shear force is reduced.
The maximum shear capacity is checked at the face of the support without reduction.
For punching design, the longitudinal reinforcement will be increased up to 0.50%
to avoid shear reinforcement [input PUNC...RO_V].
Outside the punching area, the normal slab shear design may increase the,
longitudinal reinforcement up to 0.20% [input CTRL...RO_V].

Reinforcementparameter two layer reinforcement

Selection Grp elem no. no.	distance d1-u 2.lay d1-l 2.lay [mm]		bar-diameter ds-u 2.lay ds-l 2.lay [mm]		crackwidth wk-u 2.lay wk-l 2.lay [mm]		steelstress sigsu 2.lay sigsl 2.lay [MPa]		min.reinf. asu 2.lay asl 2.lay [cm2/m]	
default	35.0	45.0	10	10	0.20	0.20	-	-	-	-
	35.0	45.0	10	10	0.20	0.20	-	-	-	-

distance	upper / lower distance center of bar to surface
bar-diameter	upper / lower bar diameter
crackwidth	upper / lower required crack width
steelstress	upper / lower maximum steel stress in SLS check
min.reinf.	upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
With the input of a steel stress sigsu... the 'crack design according tables'
uses this given stress sigsu for the corresponding layer. With this input,
the check can be done for bar distances instead of bar diameters.
The reinforcement is saved in the data base as design case 1
+++++ warning no. 303 in program DU2V
An average element thickness has been computed for punching node 1
This warning can be switched off with CTRL WARN 303.
+++++ warning no. 304 in program DU2V
An average element thickness has been computed for punching node 3
+++++ warning no. 304 in program DU2V
An average element thickness has been computed for punching node 4
+++++ warning no. 304 in program DU2V
An average element thickness has been computed for punching node 5
+++++ warning no. 304 in program DU2V
An average element thickness has been computed for punching node 6

+++++ warning no. 304 in program DU2V
 An average element thickness has been computed for punching node 7
+++++ warning no. 304 in program DU2V
 An average element thickness has been computed for punching node 8
+++++ warning no. 304 in program DU2V
 An average element thickness has been computed for punching node 10

Punching Design (EN 1992-1-1:2004):

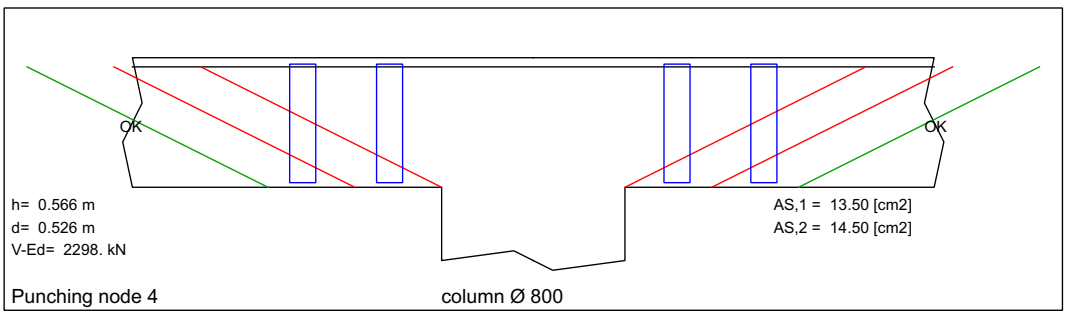
Node number	=	**1**	**X= 0.000 [m]**	**Y= -2.45 [m]**	
			Z= 0.000 [m]		
Max. shear force V-ULS= 921.9 [kN]			LC= 2104 via QUAD connecting forces		
reduced by 66.3 [kN] dead load *gamma over the column: V,red= 855.6 [kN]					
(live load part not available after superposition and not substracted)					
Circular column	dS= 0.800 [m]				
Plate thickness h-slab= 0.528 [m]			d= 0.488 [m]	(d=depth)	
1. perimeter at 2.0*d= 0.976 [m]			utot= 8.647 [m]	u1= 6.013 [m]	
(u= 64 % of utot + boundary spacing 2* 0.244 [m] -> edge column)					
Tension reinfor. as >= 14.51 [cm2/m] mue= 0.30 [o/o] vrdc= 0.41 [N/mm2]					
v-Ed = 1.40*V/u/d	=	0.41 [N/mm2]	<=	0.41 [N/mm2]=vrdc	
1.40=sweeping excentricity factor beta					
The value must be checked and input if necessary.					
No punching shear reinforcement necessary.					

Node number	=	**2**	**X= 0.000 [m]**	**Y= 0.000 [m]**	
			Z= 0.000 [m]		
Max. shear force V-ULS= 638.8 [kN]			LC= 2102 via QUAD connecting forces		
reduced by 96.1 [kN] dead load *gamma over the column: V,red= 542.6 [kN]					
(live load part not available after superposition and not substracted)					
Circular column	dS= 0.800 [m]				
Plate thickness h-slab= 0.635 [m]			d= 0.595 [m]	(d=depth)	
1. perimeter at 2.0*d= 1.190 [m]			utot= 9.990 [m]	u1= 6.348 [m]	
(u= 58 % of utot + boundary spacing 2* 0.260 [m] -> edge column)					
Tension reinfor. as >= 0.00 [cm2/m] mue= 0.00 [o/o] vrdc= 0.38 [N/mm2]					
The minimum punching shear resistance vmin + k1*sigmacp was controlling.					
v-Ed = 1.40*V/u/d	=	0.20 [N/mm2]	<=	0.38 [N/mm2]=vrdc	
1.40=sweeping excentricity factor beta					
The value must be checked and input if necessary.					
No punching shear reinforcement necessary.					

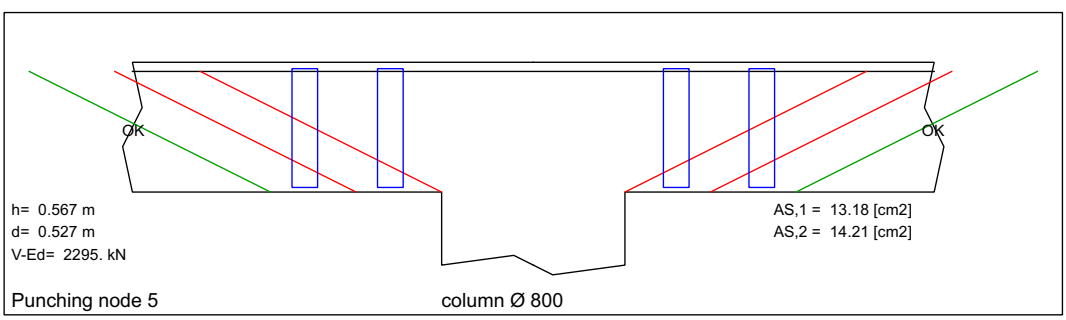
Node number	=	**3**	**X= 0.000 [m]**	**Y= 2.450 [m]**	
			Z= 0.000 [m]		
Max. shear force V-ULS= 935.7 [kN]			LC= 2104 via QUAD connecting forces		
reduced by 78.2 [kN] dead load *gamma over the column: V,red= 857.4 [kN]					
(live load part not available after superposition and not substracted)					
Circular column	dS= 0.800 [m]				
Plate thickness h-slab= 0.574 [m]			d= 0.534 [m]	(d=depth)	
1. perimeter at 2.0*d= 1.068 [m]			utot= 9.223 [m]	u1= 6.415 [m]	
(u= 67 % of utot + boundary spacing 2* 0.133 [m] -> edge column)					
Tension reinfor. as >= 0.00 [cm2/m] mue= 0.00 [o/o] vrdc= 0.39 [N/mm2]					
The minimum punching shear resistance vmin + k1*sigmacp was controlling.					
v-Ed = 1.40*V/u/d	=	0.35 [N/mm2]	<=	0.39 [N/mm2]=vrdc	
1.40=sweeping excentricity factor beta					
The value must be checked and input if necessary.					
No punching shear reinforcement necessary.					

Node number	=	**4**	**X= 10.50 [m]**	**Y= 2.450 [m]**	
			Z= 0.000 [m]		
Max. shear force V-ULS= 2374. [kN]			LC= 2104 via QUAD connecting forces		
reduced by 76.0 [kN] dead load *gamma over the column: V,red= 2298. [kN]					
(live load part not available after superposition and not substracted)					
Circular column	dS= 0.800 [m]				
Plate thickness h-slab= 0.566 [m]			d= 0.526 [m]	(d=depth)	
1. perimeter at 2.0*d= 1.051 [m]			utot= 9.119 [m]	u1= 9.119 [m]	
Tension reinfor. as >= 20.04 [cm2/m] mue= 0.38 [o/o] vrdc= 0.44 [N/mm2]					
mue was increased to get less perimeters -> DUST RO_L.					
v-Ed = 1.15*V/u/d	=	0.55 [N/mm2]	>	0.44 [N/mm2]=vrdc	

Node number = 4 X= 10.50 [m] Y= 2.450 [m]
1.15=sweeping excentricity factor beta
The value must be checked and input if necessary.
1. shear reinforcement perimeter at a1=0.50*d
Optimum radial spacing reinforcement perimeters sr= 0.379 [m] =0.72*d
No further shear reinforcement is required from uout= 11.5 [m]
Shear reinforcem. Asw= (v-Ed-0.75*vrdc)*u*sr/1.5/fywd_ef (fywd_ef=381.)
1. perimeter Asi= 13.50 [cm2] ass= 8.55 [cm2/m2] a1= 0.263 [m]
2. perimeter Asi= 14.50 [cm2] ass= 5.84 [cm2/m2] a2= 0.642 [m]
Minimum reinforcement min-ro was relevant [EN 1992-1-1 9.4.3 (9.11)]

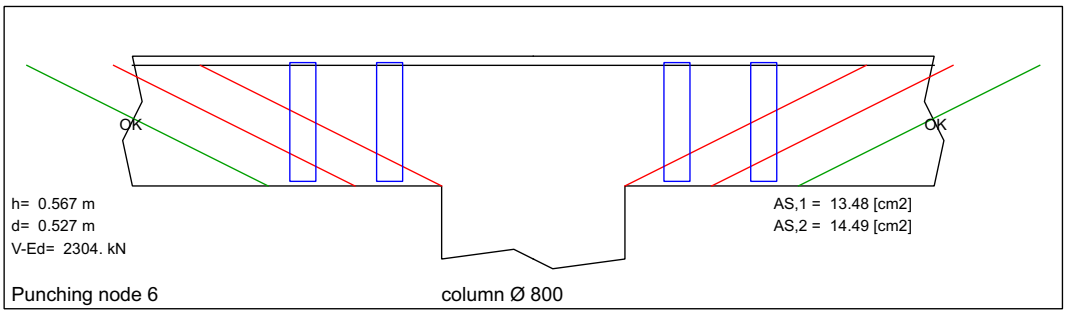


Node number = 5 X= 10.50 [m] Y= -2.45 [m]
Z= 0.000 [m]
Max. shear force V-ULS= 2371. [kN] LC= 2104 via QUAD connecting forces
reduced by 76.3 [kN] dead load *gamma over the column: V,red= 2295. [kN]
(live load part not available after superposition and not substracted)
Circular column dS= 0.800 [m]
Plate thickness h-slab= 0.567 [m] d= 0.527 [m] (d=depth)
1. perimeter at 2.0*d= 1.053 [m] utot= 9.132 [m] u1= 9.132 [m]
Tension reinfor. as >= 20.03 [cm2/m] mue= 0.38 [o/o] vrdc= 0.44 [N/mm2]
mue was increased to get less perimeters -> DUST RO_L.
v-Ed = 1.15*V/u/d = 0.55 [N/mm2] > 0.44 [N/mm2]=vrdc
1.15=sweeping excentricity factor beta
The value must be checked and input if necessary.
1. shear reinforcement perimeter at a1=0.50*d
Optimum radial spacing reinforcement perimeters sr= 0.373 [m] =0.71*d
No further shear reinforcement is required from uout= 11.5 [m]
Shear reinforcem. Asw= (v-Ed-0.75*vrdc)*u*sr/1.5/fywd_ef (fywd_ef=382.)
1. perimeter Asi= 13.18 [cm2] ass= 8.47 [cm2/m2] a1= 0.263 [m]
2. perimeter Asi= 14.21 [cm2] ass= 5.84 [cm2/m2] a2= 0.637 [m]
Minimum reinforcement min-ro was relevant [EN 1992-1-1 9.4.3 (9.11)]

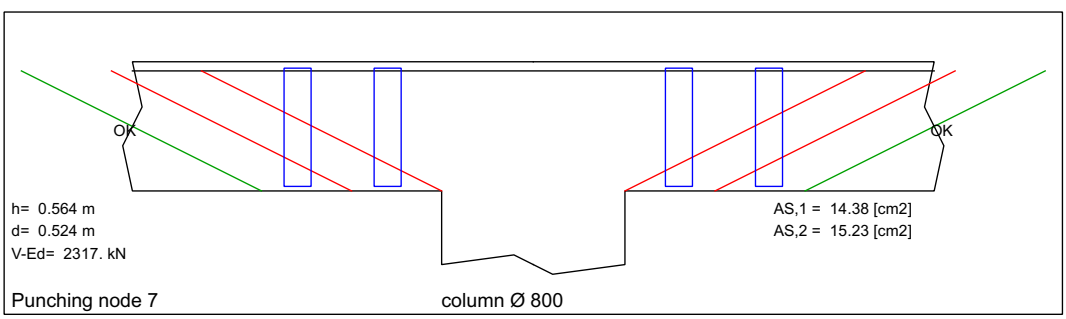


Node number = 6 X= 23.50 [m] Y= -2.45 [m]
Z= 0.000 [m]
Max. shear force V-ULS= 2380. [kN] LC= 2104 via QUAD connecting forces
reduced by 76.3 [kN] dead load *gamma over the column: V,red= 2304. [kN]
(live load part not available after superposition and not substracted)
Circular column dS= 0.800 [m]
Plate thickness h-slab= 0.567 [m] d= 0.527 [m] (d=depth)
1. perimeter at 2.0*d= 1.053 [m] utot= 9.132 [m] u1= 9.132 [m]
Tension reinfor. as >= 20.07 [cm2/m] mue= 0.38 [o/o] vrdc= 0.44 [N/mm2]
mue was increased to get less perimeters -> DUST RO_L.
v-Ed = 1.15*V/u/d = 0.55 [N/mm2] > 0.44 [N/mm2]=vrdc
1.15=sweeping excentricity factor beta
The value must be checked and input if necessary.

Node number = 6 X= 23.50 [m] Y= -2.45 [m]
1. shear reinforcement perimeter at a1=0.50*d
Optimum radial spacing reinforcement perimeters sr= 0.379 [m] =0.72*d
No further shear reinforcement is required from uout= 11.5 [m]
Shear reinforcem. Asw= (v-Ed-0.75*vrdc)*u*sr/1.5/fywd_ef (fywd_ef=382.)
1. perimeter Asi= 13.48 [cm2] ass= 8.54 [cm2/m2] a1= 0.263 [m]
2. perimeter Asi= 14.49 [cm2] ass= 5.84 [cm2/m2] a2= 0.642 [m]
Minimum reinforcement min-ro was relevant [EN 1992-1-1 9.4.3 (9.11)]



Node number = 7 X= 23.50 [m] Y= 2.450 [m]
Z= 0.000 [m]
Max. shear force V-ULS= 2393. [kN] LC= 2104 via QUAD connecting forces
reduced by 75.6 [kN] dead load *gamma over the column: V,red= 2317. [kN]
(live load part not available after superposition and not substracted)
Circular column dS= 0.800 [m]
Plate thickness h-slab= 0.564 [m] d= 0.524 [m] (d=depth)
1. perimeter at 2.0*d= 1.048 [m] utot= 9.101 [m] u1= 9.101 [m]
Tension reinfor. as >= 20.15 [cm2/m] mue= 0.38 [o/o] vrdc= 0.44 [N/mm2]
mue was increased to get less perimeters -> DUST RO_L.
v-Ed = 1.15*V/u/d = 0.56 [N/mm2] > 0.44 [N/mm2]=vrdc
1.15=sweeping excentricity factor beta
The value must be checked and input if necessary.
1. shear reinforcement perimeter at a1=0.50*d
Optimum radial spacing reinforcement perimeters sr= 0.393 [m] =0.75*d
No further shear reinforcement is required from uout= 11.6 [m]
Shear reinforcem. Asw= (v-Ed-0.75*vrdc)*u*sr/1.5/fywd_ef (fywd_ef=381.)
1. perimeter Asi= 14.38 [cm2] ass= 8.79 [cm2/m2] a1= 0.262 [m]
2. perimeter Asi= 15.23 [cm2] ass= 5.84 [cm2/m2] a2= 0.655 [m]
Minimum reinforcement min-ro was relevant [EN 1992-1-1 9.4.3 (9.11)]



Node number = 8 X= 34.00 [m] Y= 2.450 [m]
Z= 0.000 [m]
Max. shear force V-ULS= 933.3 [kN] LC= 2104 via QUAD connecting forces
reduced by 69.0 [kN] dead load *gamma over the column: V,red= 864.3 [kN]
(live load part not available after superposition and not substracted)
Circular column dS= 0.800 [m]
Plate thickness h-slab= 0.539 [m] d= 0.499 [m] (d=depth)
1. perimeter at 2.0*d= 0.998 [m] utot= 8.785 [m] u1= 6.123 [m]
(u= 67 % of utot + boundary spacing 2* 0.133 [m] -> edge column)
Tension reinfor. as >= 0.00 [cm2/m] mue= 0.00 [o/o] vrdc= 0.40 [N/mm2]
The minimum punching shear resistance vmin + k1*sigmacp was controlling.
v-Ed = 1.40*V/u/d = 0.40 [N/mm2] <= 0.40 [N/mm2]=vrdc
1.40=sweeping excentricity factor beta
The value must be checked and input if necessary.
No punching shear reinforcement necessary.

Node number	=	**9**	**X= 34.00 [m]**		**Y= 0.000 [m]**
			Z= 0.000 [m]		
Max. shear force V-ULS= 623.4 [kN]			LC= 2102	via QUAD connecting forces	
reduced by 96.1 [kN]	dead load *gamma over the column: V,red= 527.3 [kN]				
(live load part not available after superposition and not substracted)					
Circular column	dS= 0.800 [m]				
Plate thickness h-slab= 0.635 [m]		d= 0.595 [m]	(d=depth)		
1. perimeter at 2.0*d= 1.190 [m]		utot= 9.990 [m]	u1= 6.348 [m]		
(u= 58 % of utot + boundary spacing 2* 0.260 [m] -> edge column)					
Tension reinfor. as >= 0.00 [cm2/m]	mue= 0.00 [o/o]	vrdc= 0.38 [N/mm2]			
The minimum punching shear resistance vmin + k1*sigmacp was controlling.					
v-Ed = 1.40*V/u/d = 0.20 [N/mm2]	<= 0.38 [N/mm2]=vrdc				
1.40=sweeping excentricity factor beta					
The value must be checked and input if necessary.					
No punching shear reinforcement necessary.					

Node number	=	**10**	**X= 34.00 [m]**		**Y= -2.45 [m]**
			Z= 0.000 [m]		
Max. shear force V-ULS= 949.3 [kN]			LC= 2104	via QUAD connecting forces	
reduced by 66.3 [kN]	dead load *gamma over the column: V,red= 883.0 [kN]				
(live load part not available after superposition and not substracted)					
Circular column	dS= 0.800 [m]				
Plate thickness h-slab= 0.528 [m]		d= 0.488 [m]	(d=depth)		
1. perimeter at 2.0*d= 0.976 [m]		utot= 8.647 [m]	u1= 6.013 [m]		
(u= 64 % of utot + boundary spacing 2* 0.244 [m] -> edge column)					
Tension reinfor. as >= 15.95 [cm2/m]	mue= 0.33 [o/o]	vrdc= 0.42 [N/mm2]			
v-Ed = 1.40*V/u/d = 0.42 [N/mm2]	<= 0.42 [N/mm2]=vrdc				
1.40=sweeping excentricity factor beta					
The value must be checked and input if necessary.					
No punching shear reinforcement necessary.					

Summary Punching Design (EN 1992-1-1:2004)

Node No	Typ	X [m]	Y [m]	V-ULS [kN]	column [mm]	ucrit [m]	%u0 [o/o]	beta [-]	v-max [MPa]	AssSum [cm2]	ast [cm2/m]	nperi
1	E	0.000	-2.450	855.6	Ø 800	6.013	64	1.40	0.41	-	14.51	-
2	E	0.000	0.000	542.6	Ø 800	6.348	58	1.40	0.20	-	0.00	-
3	E	0.000	2.450	857.4	Ø 800	6.415	67	1.40	0.35	-	0.00	-
4	I	10.500	2.450	2298.4	Ø 800	9.119	100	1.15	0.55	28.00	20.04	2
5	I	10.500	-2.450	2295.1	Ø 800	9.132	100	1.15	0.55	27.39	20.03	2
6	I	23.500	-2.450	2303.7	Ø 800	9.132	100	1.15	0.55	27.97	20.07	2
7	I	23.500	2.450	2317.1	Ø 800	9.101	100	1.15	0.56	29.60	20.15	2
8	E	34.000	2.450	864.3	Ø 800	6.123	67	1.40	0.40	-	0.00	-
9	E	34.000	0.000	527.3	Ø 800	6.348	58	1.40	0.20	-	0.00	-
10	E	34.000	-2.450	883.0	Ø 800	6.013	64	1.40	0.42	-	15.95	-

Typ	I=inner column, E=edge column, C=corner column, F=foundation, W=end of wall, L=wall corner, G=end_of_girder
V-ULS	design shear force (reduced by bedding pressure)
column	dimension of column (or compression area at wall ends)
ucrit	effective length of 1. perimeter, reduced due to openings and edges
%u0	ucrit = ... % of a full circle (ucrit/u0-tot)
beta	excentricity factor
v-max	shear stress at reduced critical 1. perimeter
AssSum	shear reinforcemend - total sum of all nperi perimeters
ast	min. required tension reinforcement in the punching zone
nperi	up to this perimeter, shear reinforcement is required

The excentricity factors beta must be checked and input if necessary.