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Estruturas de Concreto I

RUSSAS

2019

Laje	Base	Altura	Peso Próprio	Revestimento	Acidental	Carga Total(kN/m²)	POSIÇÃO DA VIGA EM RELAÇÃO A LAJE								Carregamento das lajes sobre as vigas							
							1		2		3		4		1		2		3		4	
							VIGA	M²	VIGA	M²	VIGA	M²	VIGA	M²	Viga	KN/m²	Viga	KN/m²	Viga	KN/m²	Viga	KN/m²
1	3,65	2,22	1,55	21	1,5	4,1	V5	2,819	V1	1,232	V4	2,819	V2	1,232	V5	11,560	V1	5,052	V4	11,560	V2	5,0516
2	4,55	2,22	1,55	21	1,5	4,1	V5	3,818	V2	1,232	V4	3,818	V3	1,232	V5	15,655	V2	5,052	V4	15,655	V3	5,0516
3	3,65	3,78	1,55	21	1,5	4,1	V6	3,568	V1	3,331	V5	3,568	V2	3,331	V6	14,628	V1	13,656	V5	14,628	V2	13,6556
4	3,65	2,1	1,55	21	1,5	4,1	V7	2,730	V1	1,103	V6	2,730	V2	1,103	V7	11,193	V1	4,520	V6	11,193	V2	4,5203
5	4,55	4,15	1,55	21	1,5	4,1	V8	5,136	V2	4,306	V6	5,136	V3	4,306	V8	21,056	V2	17,653	V6	21,056	V3	17,6531
6	3,65	2,05	1,55	21	1,5	4,1	V8	2,691	V1	1,051	V7	2,691	V2	1,051	V8	11,032	V1	4,308	V7	11,032	V2	4,3076
7	3,65	2,15	1,55	21	1,5	4,1	V9	2,768	V1	1,156	V8	2,768	V2	1,156	V9	11,349	V1	4,738	V8	11,349	V2	4,7381
8	3,65	2,07	1,55	21	1,5	4,1	V10	2,707	V1	1,071	V9	2,707	V2	1,071	V10	11,097	V1	4,392	V9	11,097	V2	4,3920
9	3,65	2,07	1,55	21	1,5	4,1	V11	2,707	V1	1,071	V10	2,707	V2	1,071	V11	11,097	V1	4,392	V10	11,097	V2	4,3920
10	4,55	4,13	1,55	21	1,5	4,1	V12	5,132	V2	4,264	V10	5,132	V3	4,264	V12	21,039	V2	17,483	V10	21,039	V3	17,4833
11	3,65	2,06	1,55	21	1,5	4,1	V12	2,699	V1	1,061	V11	2,699	V2	1,061	V12	11,064	V1	4,350	V11	11,064	V2	4,3497
12	4,55	4,23	1,55	21	1,5	4,1	V10	5,150	V2	4,473	V8	5,150	V3	4,473	V10	21,115	V2	18,340	V8	21,115	V3	18,3402
13	4,55	3,78	1,55	21	1,5	4,1	V6	5,027	V2	3,572	V5	5,027	V3	3,572	V6	20,612	V2	14,646	V5	20,612	V3	14,6456
14	4,55	3,78	1,1	21	1,5	3,65	V18	5,027	V14	3,572	V17	5,027	V15	3,572	V18	18,350	V14	13,038	V17	18,350	V15	13,0382
15	3,65	3,78	1,1	21	1,5	3,65	V18	3,568	V13	3,331	V17	3,568	V14	3,331	V18	13,023	V13	12,157	V17	13,023	V14	12,1568
16	3,65	2,1	1,1	21	1,5	3,65	V19	2,730	V13	1,103	V18	2,730	V14	1,103	V19	9,965	V13	4,024	V18	9,965	V14	4,0241
17	3,65	2,05	1,1	21	1,5	3,65	V20	2,691	V13	1,051	V19	2,691	V14	1,051	V20	9,821	V13	3,835	V19	9,821	V14	3,8348
18	3,65	2,15	1,1	21	1,5	3,65	V24	2,768	V13	1,156	V20	2,768	V14	1,156	V24	10,104	V13	4,218	V20	10,104	V14	4,2180
19	3,65	2,07	1,1	21	1,5	3,65	V21	2,707	V13	1,071	V24	2,707	V14	1,071	V21	9,879	V13	3,910	V24	9,879	V14	3,9100
20	3,65	2,07	1,1	21	1,5	3,65	V22	2,707	V13	1,071	V21	2,707	V14	1,071	V22	9,879	V13	3,910	V21	9,879	V14	3,9100
21	3,65	2,06	1,1	21	1,5	3,65	V23	2,699	V13	1,061	V22	2,699	V14	1,061	V23	9,850	V13	3,872	V22	9,850	V14	3,8723
22	4,55	4,13	1,1	21	1,5	3,65	V23	5,132	V14	4,264	V21	5,132	V15	4,264	V23	18,730	V14	15,564	V21	18,730	V15	15,5644
23	4,55	4,23	1,1	21	1,5	3,65	V21	5,150	V14	4,473	V20	5,150	V15	4,473	V21	18,798	V14	16,327	V20	18,798	V15	16,3273
24	4,55	4,15	1,1	21	1,5	3,65	V20	5,136	V14	4,306	V18	5,136	V15	4,306	V20	18,745	V14	15,716	V18	18,745	V15	15,7155

Gráfico do Carregamento – Viga 1

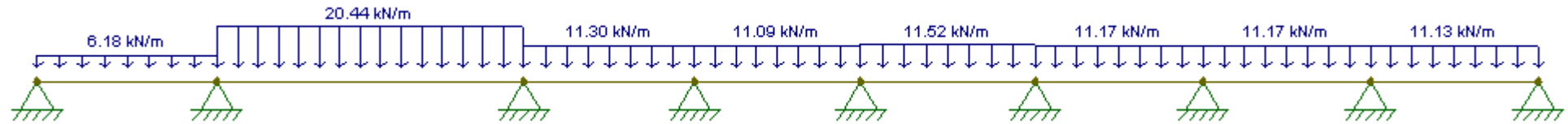
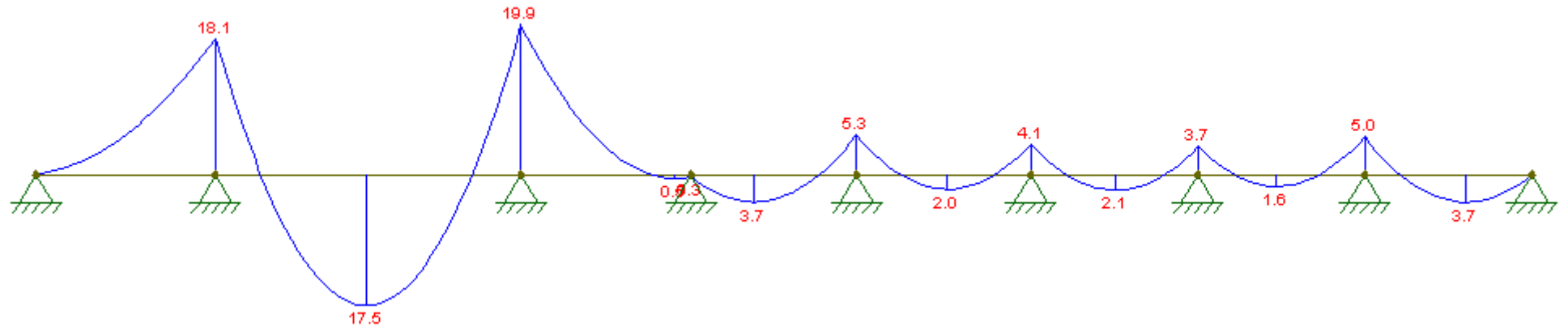


Gráfico do Momento – Viga 1



Vigas	Trecho 1 kN/m	Trecho 2 kN/m	Trecho 3 kN/m	Trecho 4 kN/m	Trecho 5 kN/m	Trecho 6 kN/m	Trecho 7 kN/m	Trecho 8 kN/m
1	6,18	20,44	11,30	11,09	11,52	11,17	11,17	11,13

Vigas	Md ₁	Md ₂	Md ₃	Md ₄	Md ₅	Md ₆	Md ₇	Md ₈	Md ₉	Md ₁₀	MD ₁₁	Md ₁₂	Md ₁₃
1	18.100 N.m	17.500 N.m	19.900 N.m	0.630 N.m	3.700 N.m	5.300 N.m	2.000 N.m	4.100 N.m	2.100 N.m	3.700 N.m	1.600 N.m	5.000 N.m	3.700 N.m

As	As	As	As	As	As	As	As	As	As	As	As	As
1.72cm ²	1.6cm ²	1.89cm ²	0.060Cm ²	0.34cm ²	0.49cm ²	0.19cm ²	0.39cm ²	0.20cm ²	0.34cm ²	0.15cm ²	0.47cm ²	0.34cm ²

Gráfico do Carregamento – Viga 2

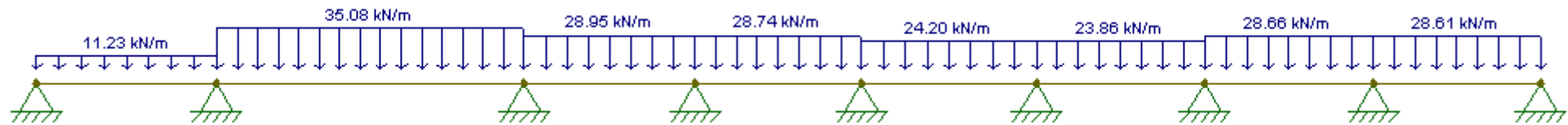
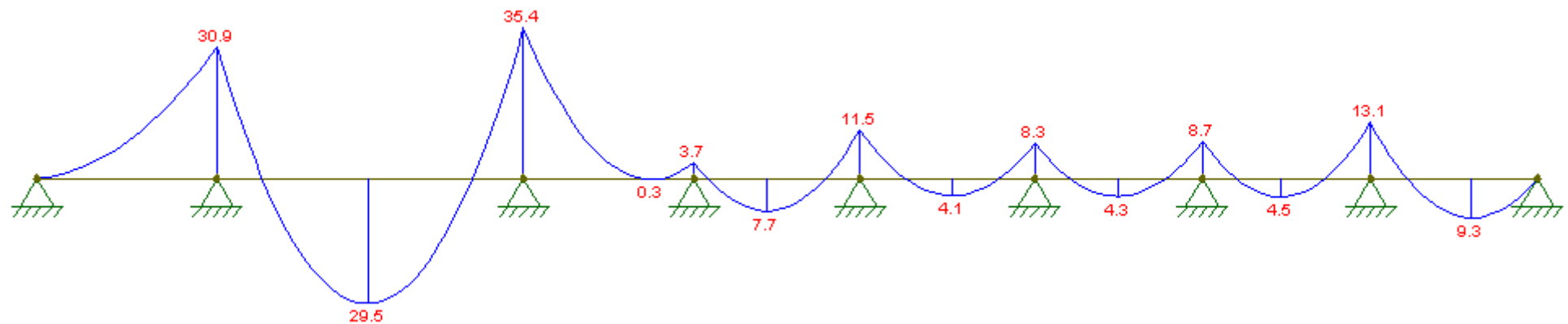


Gráfico do Momento – Viga 2



Viga	Trecho 1 kN/m	Trecho 2 kN/m	Trecho 3 kN/m	Trecho 4 kN/m	Trecho 5 kN/m	Trecho 6 kN/m	Trecho 7 kN/m	Trecho 8 kN/m
2	11,23	35,08	28,95	28,74	24,20	23,86	28,66	28,61

Viga	Md ₁	Md ₂	Md ₃	Md ₄	Md ₅	Md ₆	Md ₇	Md ₈	Md ₉	Md ₁₀	Md ₁₁	Md ₁₂	Md ₁₃	Md ₁₄
2	30.900 N.m	29.500 N.m	35.400 N.m	0.300 N.m	3.700 N.m	7.700 N.m	11.500 N.m	4100 N.m	8.300 N.m	4.300 N.m	8.700 N.m	4.500 N.m	13.100 N.m	9.300 N.m

[illegible]

3.23cm ²	2.96cm ²	2.60cm ²	0.030cm ²	0.34cm ²	0.73cm ²	0.14cm ²	0.39cm ²	0.78cm ²	0.40cm ²	0.82cm ²	0.42cm ²	1.24cm ²	0.88cm ²
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Gráfico do Carregamento – Viga 3

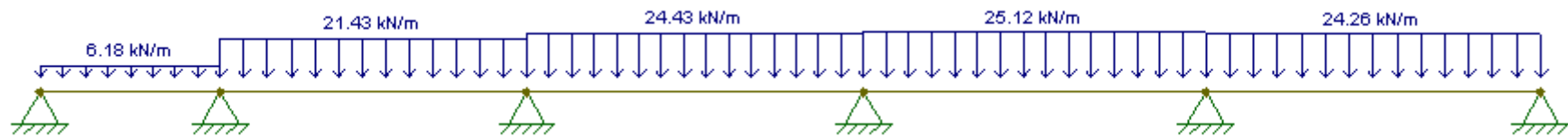
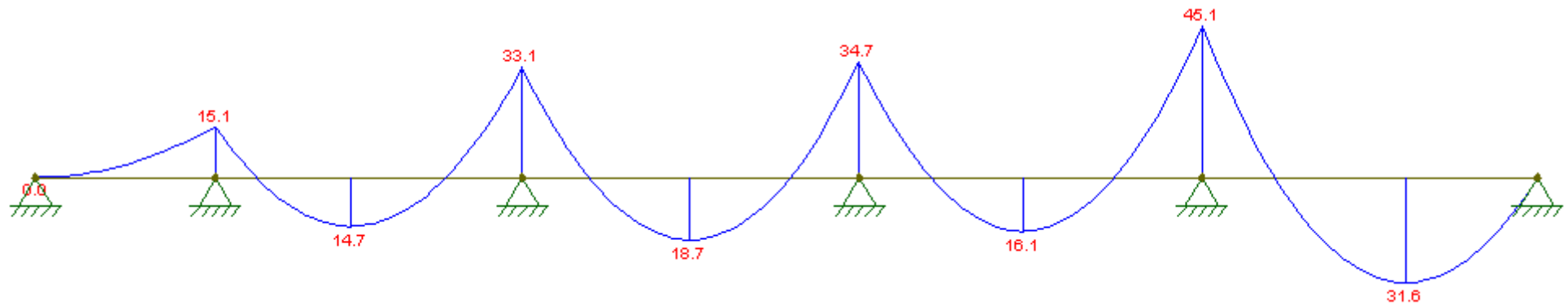


Gráfico do Momento – Viga 3



Viga	Trecho 1 kN/m	Trecho 2 kN/m	Trecho 3 kN/m	Trecho 4 kN/m	Trecho 5 kN/m
3	6,18	21,43	24,43	25,12	24,26

Viga	Md ₁	Md ₂	Md ₃	Md ₄	Md ₅	Md ₆	Md ₇	Md ₈
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3	15.100N.m	14.700N.m	33.1N.m	18.700N.m	34.700N.m	16.100N.m	45.100N.m	31.600N.m
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As	As	As	As	As	As	As	As
1.43cm ²	1.39cm ²	0	1.78cm ²	1.68cm ²	1.52cm ²	4.07cm ²	3.45cm ²

Gráfico do Carregamento – Viga 4

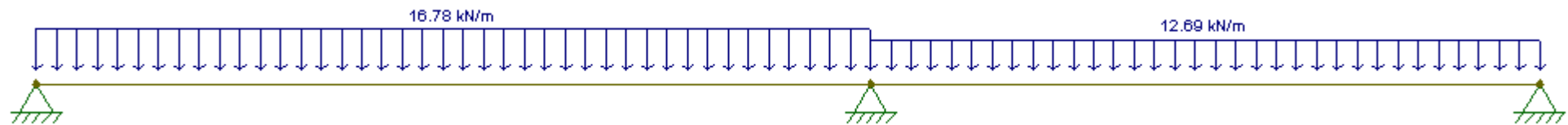
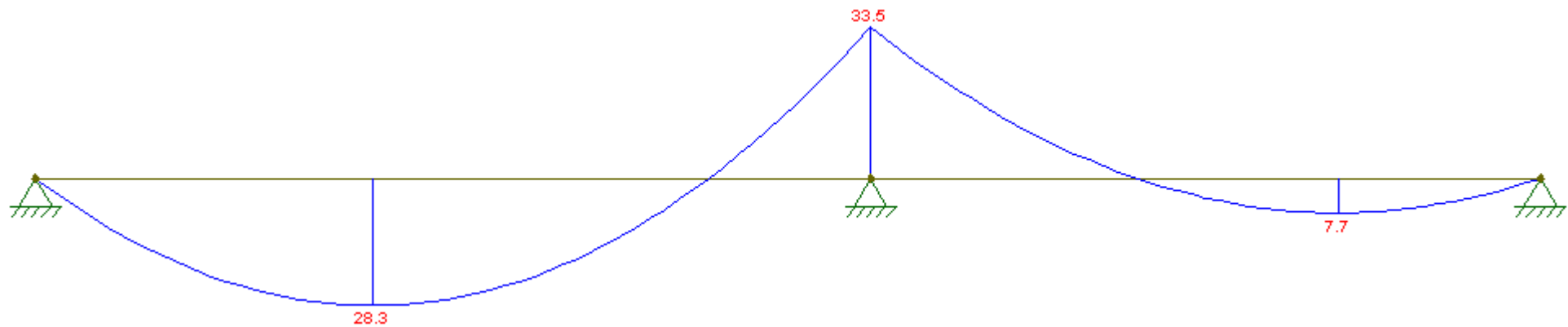


Gráfico do Momento – Viga 4



Viga	Trecho 1 kN/m	Trecho 2 kN/m
4	16,78	12,68

Viga	Md ₁	Md ₂	Md ₃
4	28.300N.m	33.500N.m	7.700N.m

As	As	As
2.80cm ²	0	0.72cm ²

Gráfico do Carregamento – Viga 5

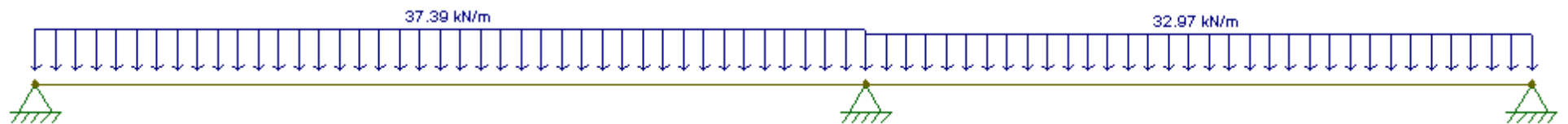
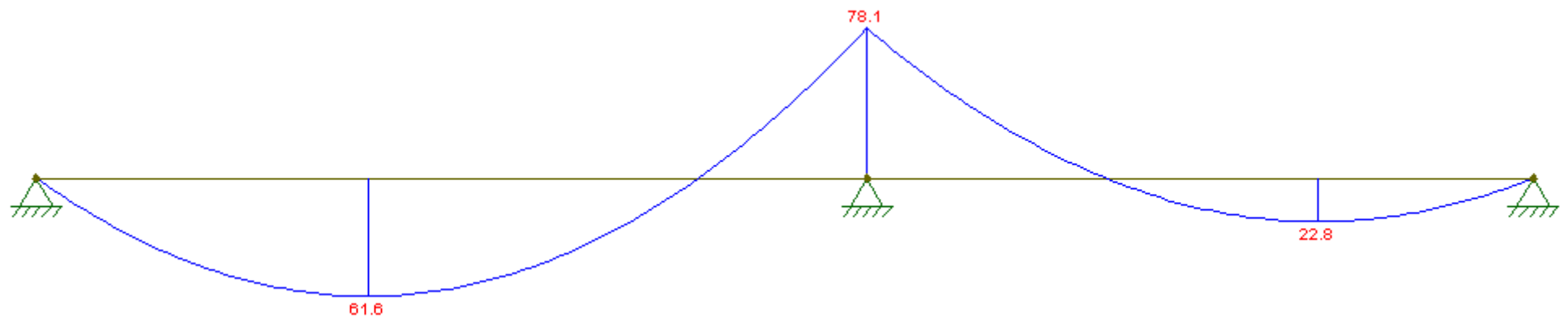


Gráfico do Momento – Viga 5



Viga	Trecho 1 kN/m	Trecho 2 kN/m
5	37,39	32,97

Viga	Md ₁	Md ₂	Md ₃
5	61.600N.m	78.100N.m	22.900N.m

As	As	As
5.65cm ² l 1.12cm ²	5.65cm ² l 2.78cm ²	2,19 cm ²

Gráfico do Carregamento – Viga 6

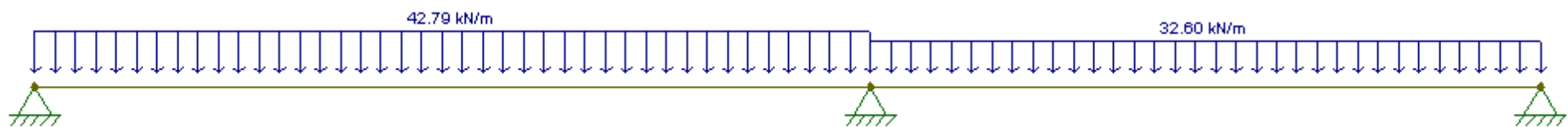
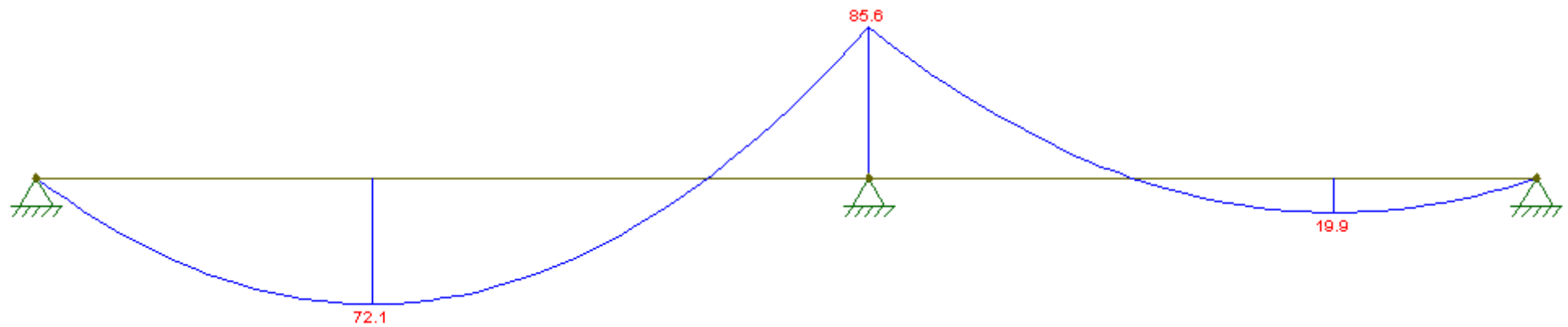


Gráfico do Momento – Viga 6



Viga	Trecho 1 kN/m	Trecho 2 kN/m
6	42,79	32,60

Viga	Md1	Md2	Md3
6	72.100N.m	85.600N.m	19.900N.m

As	As	As
5.65cm ² l 2.17cm ²	5.65cm ² l 3.52cm ²	1.90 cm ²

Gráfico do Carregamento – Viga 7

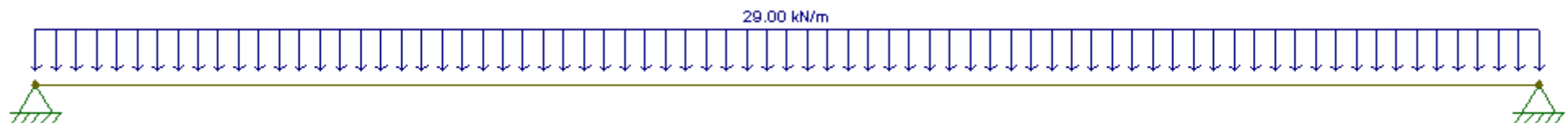
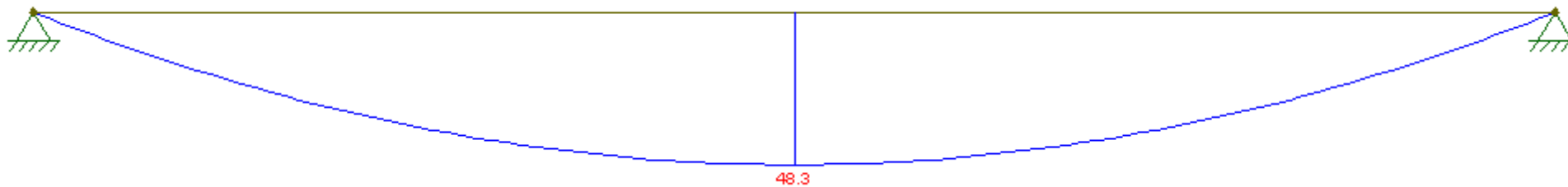


Gráfico do Momento – Viga 7



Viga	Trecho 1 kN/m
7	29,00

Viga	Md1
7	48.300N.m

As
4.39 cm ²

Gráfico do Carregamento – Viga 8

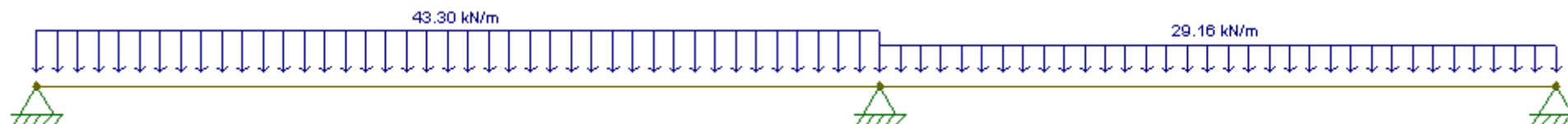
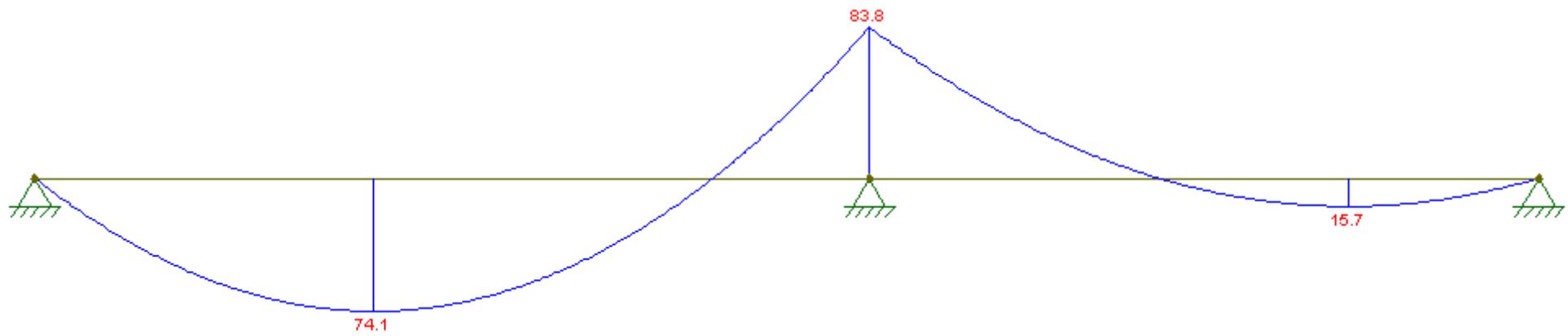


Gráfico do Momento – Viga 8



Vigas	Trecho 1 kN/m	Trecho 2 kN/m
8	43,30	29,16

Viga	Md ₁	Md ₂	Md ₃
8	74100N.m	83.800N.m	15.700N.m

As1l As2	As1lAs2	As
5.65cm ² l2.37cm ²	5.65cm ² l3.34cm ²	1.49cm ²

Gráfico do Carregamento – Viga 9

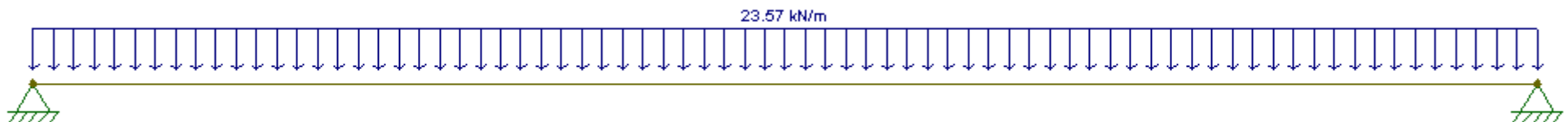
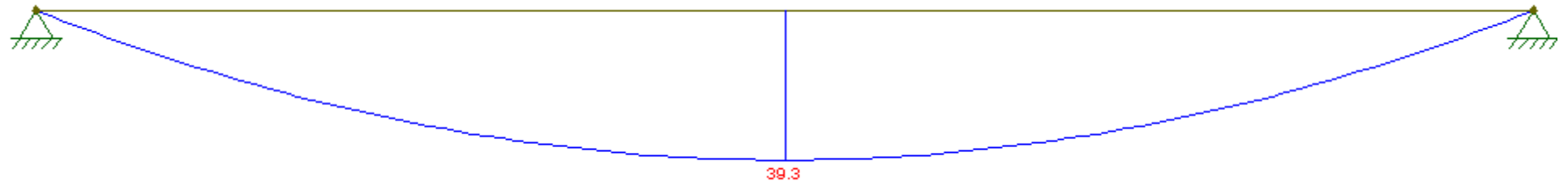


Gráfico do Momento – Viga 9



Viga	Trecho 1 kN/m
9	23,57

Viga	Md _l
9	39.300N.m

As
3.44 cm ²

Gráfico do Carregamento – Viga 10

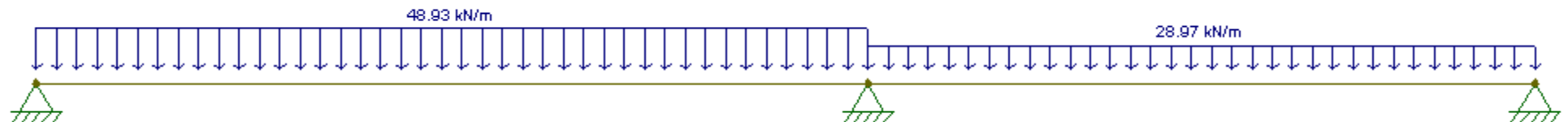
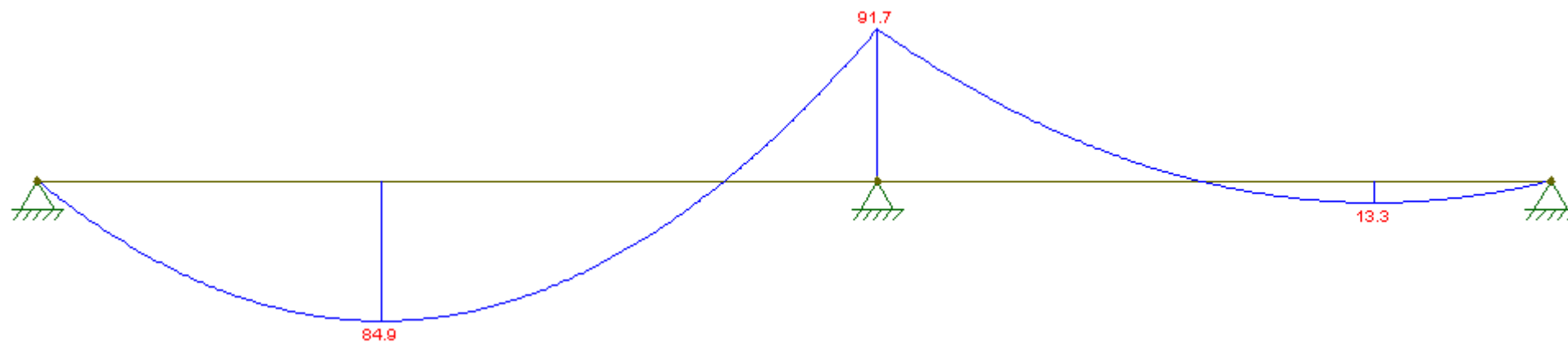


Gráfico do Momento – Viga 10



Viga	Trecho 1 kN/m	Trecho 2 kN/m
10	48,93	28,97

Viga	Md ₁	Md ₂	Md ₃
10	84.900N.m	91.700N.m	13.300N.m

As1	As2	As1As2	As
5.65cm ²	13.45cm ²	5.65cm ² 14.13cm ²	1.26cm ²

Gráfico do Carregamento – Viga 11

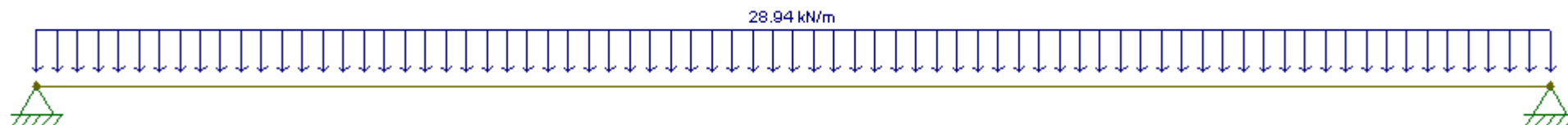
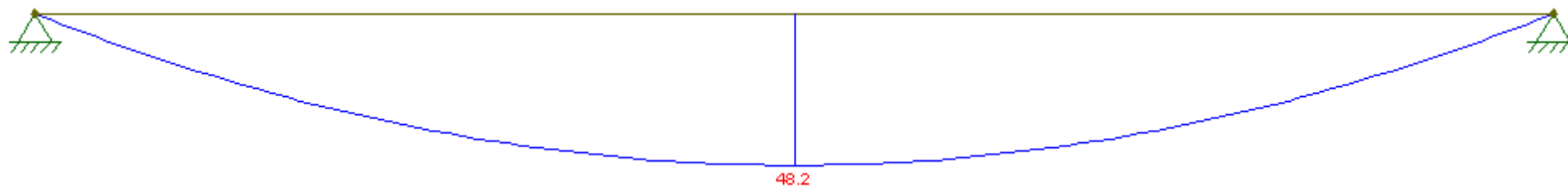


Gráfico do Momento – Viga 11



Viga	Trecho 1 kN/m
11	28,94

Viga	Md ₁
11	48.200N.m

As
4.39cm ²

Gráfico do Carregamento – Viga 12

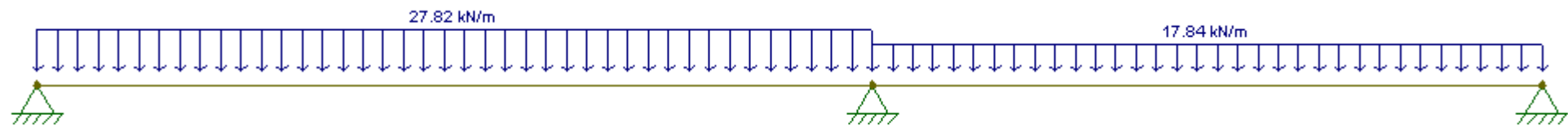
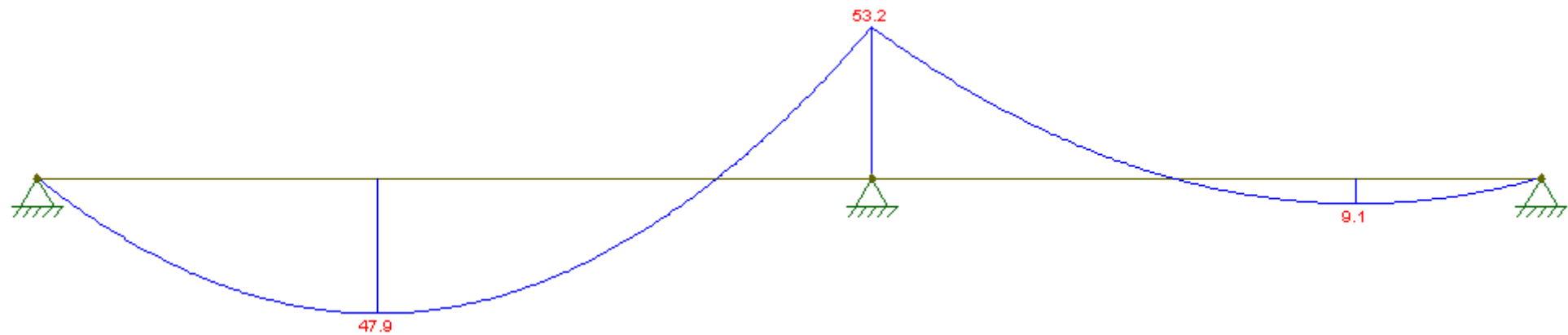


Gráfico do Momento – Viga 12



Viga	Trecho 1 kN/m	Trecho 2 kN/m
12	27,82	17,84

Viga	Md ₁	Md ₂	Md ₃
12	47.900N.m	53.200N.m	9.1N.m

As	As	As
4.35cm ²	5.65cm ² 10.28cm ²	0.86cm ²

Gráfico Do Carregamento - Viga 13

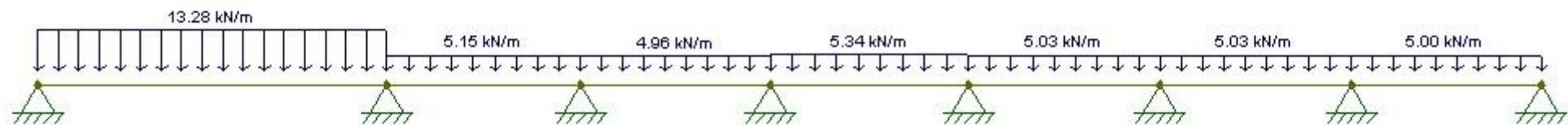
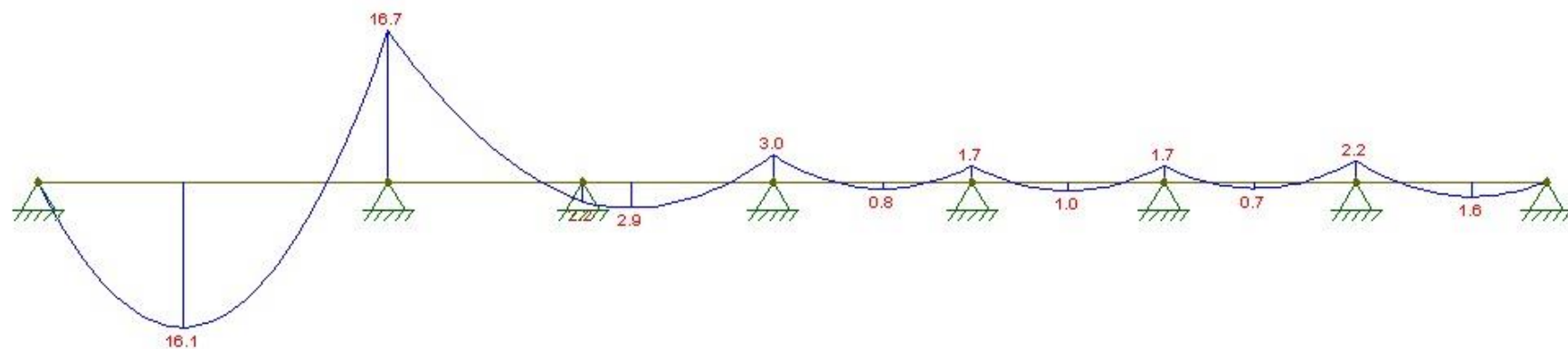


Gráfico do Momento – Viga 13



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m	Trecho 3 Kn/m	Trecho 4 Kn/m	Trecho 5 Kn/m	Trecho 6 Kn/m	Trecho 7 Kn/m
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13	13,28	5,15	4,96	5,34	5,03	5,03	5,00
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Viga	Md ₁	Md ₂	Md ₃	Md ₄	Md ₅	Md ₆	Md ₇	Md ₈	Md ₉	Md ₁₀	Md ₁₁	Md ₁₂
13	16.100N.m	15.700N.m	2.200N.m	2.900N.m	3000N.m	0.800N.m	1.700N.m	1000N.m	1.700N.m	0.700N.m	2.200N.m	1.600N.m

As	As	As	As	As	As	As	As	As	As	As	As
1.52cm²	1.49cm²	0.21cm²	0.27cm²	0.28cm²	0.075cm²	0.16cm²	0.094cm²	0.16cm²	0.066cm²	0.21cm²	0.15cm²

Gráfico Do Carregamento - Viga 14

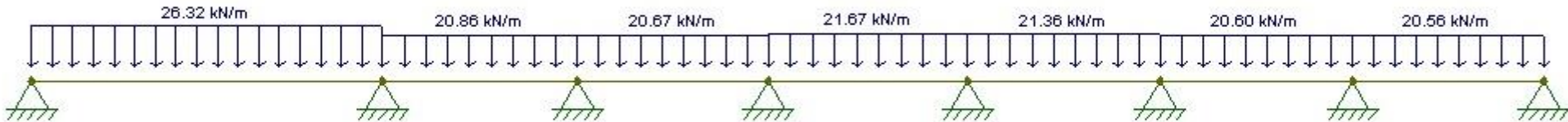
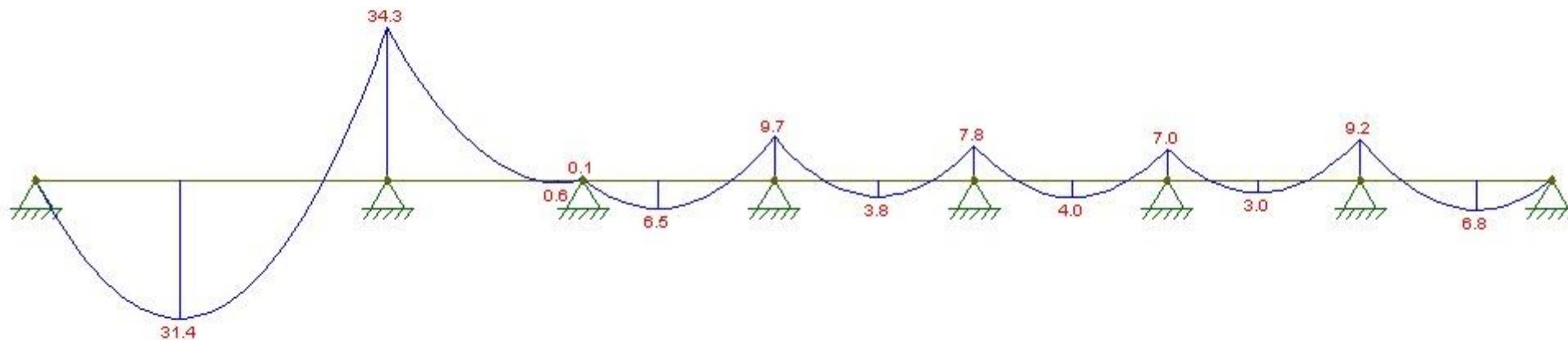


Gráfico do Momento – Viga 14



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m	Trecho 3 Kn/m	Trecho 4 Kn/m	Trecho 5 Kn/m	Trecho 6 Kn/m	Trecho 7 Kn/m
14	26,32	20,86	20,68	21,67	21,36	20,60	20,56

Vig a	Md ₁	Md ₂	Md ₃	Md ₄	Md ₅	Md ₆	Md ₇	Md ₈	Md ₉	Md ₁₀	Md ₁₁	Md ₁₂	Md ₁₃
14	31.400N. m	34.300N. m	0.600N. m	0.100N. m	6.500N. m	9.700N. m	3.800N. m	7.800N. m	4000N. m	7000N. m	3000N. m	9200N. m	6.800N. m

As	As	As	As	As	As	As	As	As	As	As	As	As
3.38cm²	3.78cm²	0.056cm²	0.009cm²	0.61cm²	0.91cm²	0.36cm²	0.74cm²	0.38cm²	0.66cm²	0.28cm²	0.87cm²	0.64cm²

Gráfico Do Carregamento - Viga 15

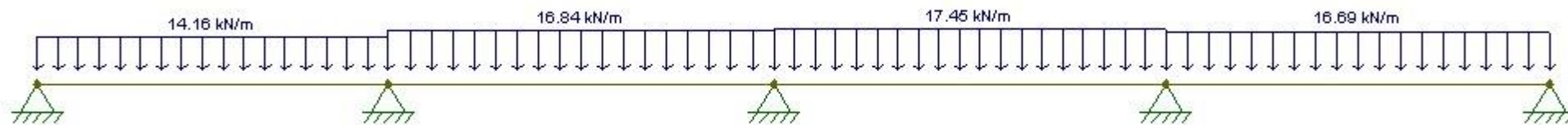
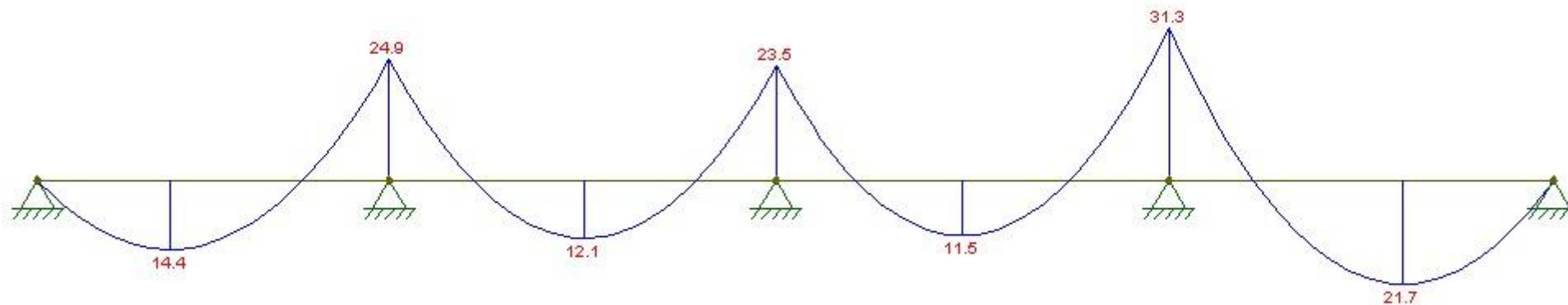


Gráfico do Momento – Viga 15



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m	Trecho 3 Kn/m	Trecho 4 Kn/m
15	14,16	16,84	17,45	16,69

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Viga	Md ₁	Md ₂	Md ₃	Md ₄	Md ₅	Md ₆	Md ₇
15	14.400N.m	24.900N.m	12.100N.m	23.500N.m	11.500N.m	31.300N.m	1.700N.m

As	As	As	As	As	As	As
1.36cm²	2.40cm²	1.14cm²	2.25cm²	1.09cm²	3.34cm²	2.08cm²

Gráfico Do Carregamento - Viga 17

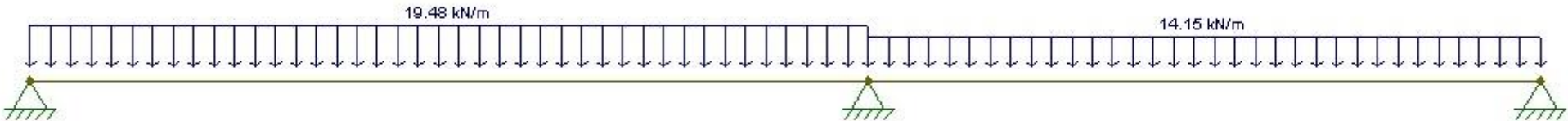
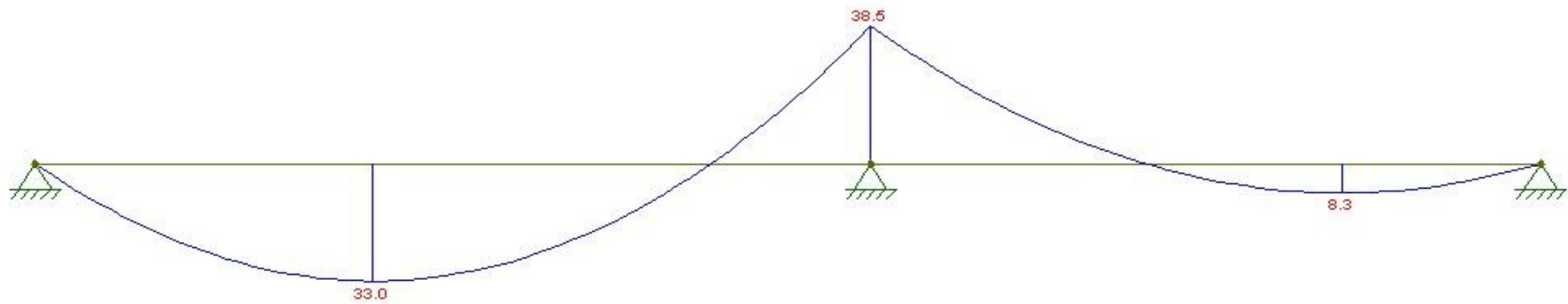


Gráfico do Momento – Viga 17



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m
17	14.15	19.48

Viga	Md ₁	Md ₂	Md ₃
17	33.000N.m	38.500N.m	8.300N.m

As	As	As
3.12cm ²	3.34cm ²	0.78cm ²

Gráfico Do Carregamento - Viga 18

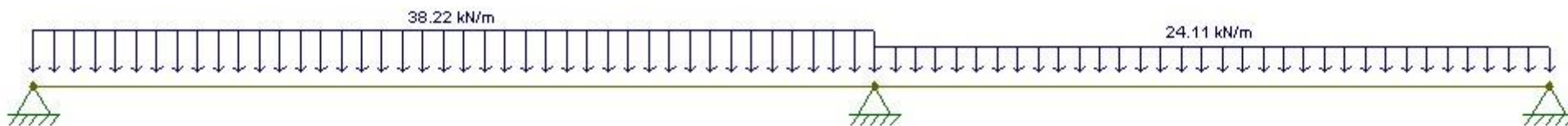
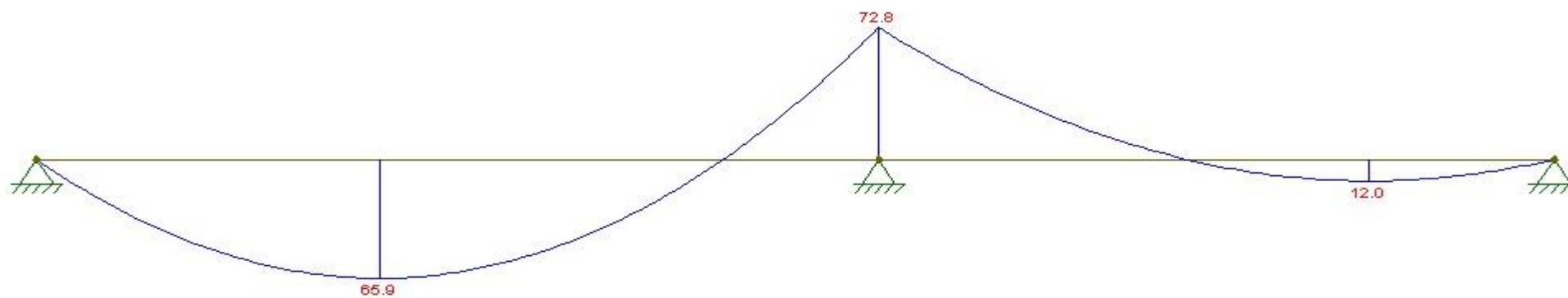


Gráfico do Momento – Viga 18



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m
18	24,11	38,22

Viga	Md ₁	Md ₂	Md ₃
18	65.900N.m	72.800N.m	12.000N.m

As	As	As
5.65cm ² 11.55cm ²	5.65cm ² 12.24cm ²	1.13cm ²

Gráfico Do Carregamento - Viga 19

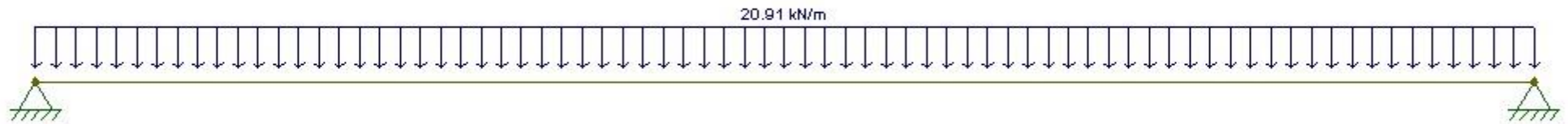
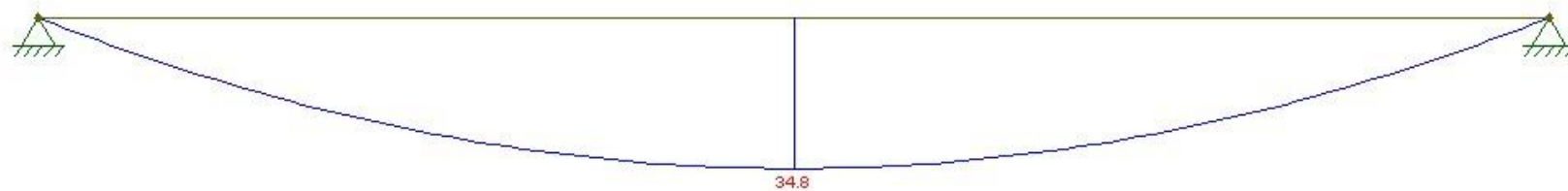


Gráfico do Momento – Viga 19



Viga	Trecho 1 Kn/m
19	20,91

Viga	Md ₁
19	34.800N.m

As
1.97cm ²

Gráfico Do Carregamento - Viga 20

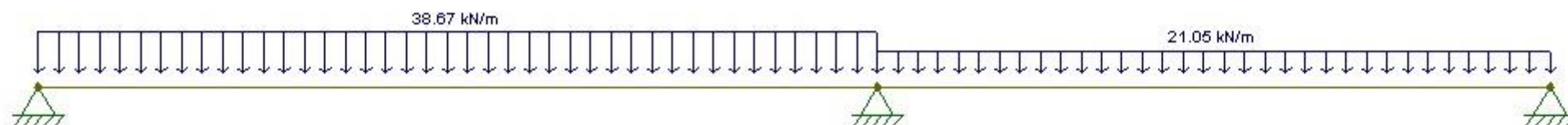
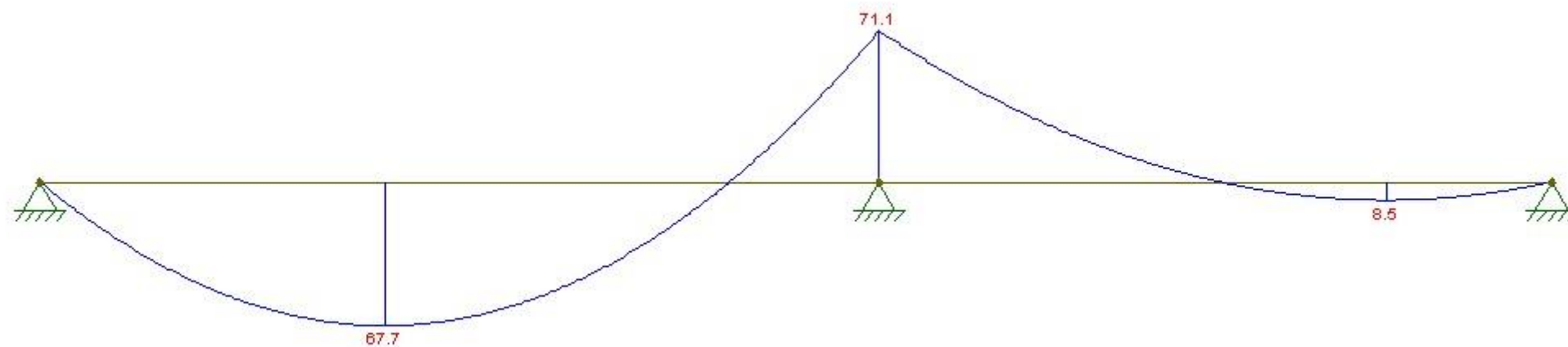


Gráfico do Momento – Viga 20



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m
20	21,04	38,66

Viga	Md ₁	Md ₂	Md ₃
20	67.700N.m	71.100N.m	8.500N.m

As	As	As
5.65cm ² 11.73cm ²	5.65cm ² 12.07cm ²	0.80cm ²

Gráfico Do Carregamento - Viga 21

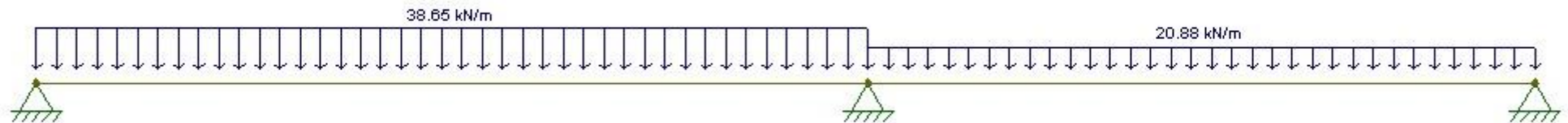
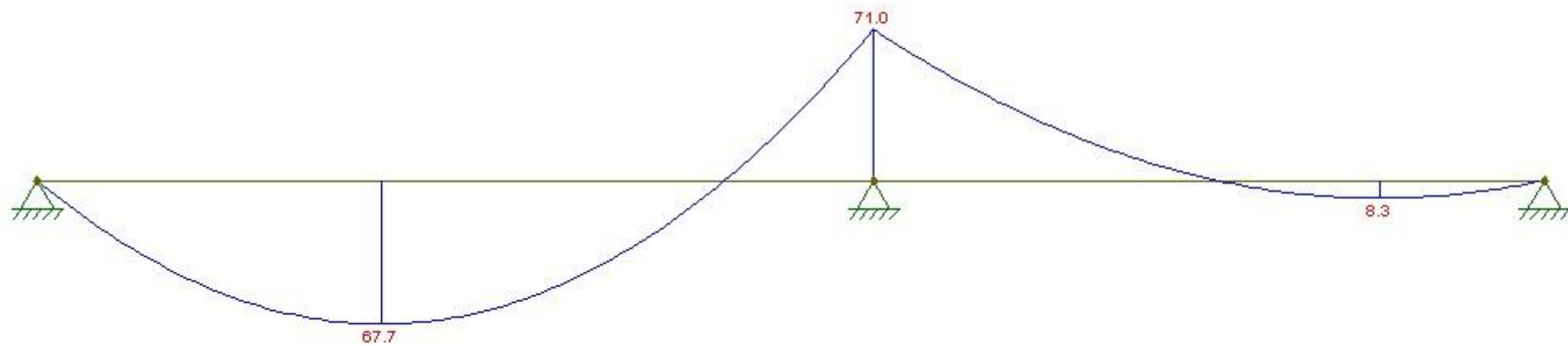


Gráfico do Momento – Viga 21



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m
21	20,88	38,65

Viga	Md ₁	Md ₂	Md ₃
21	67.700N.m	71.000N.m	8.300N.m

As	As	As
5.65cm ² 11.73cm ²	5.65cm ² 12.06cm ²	0.78cm ²

Gráfico Do Carregamento - Viga 22

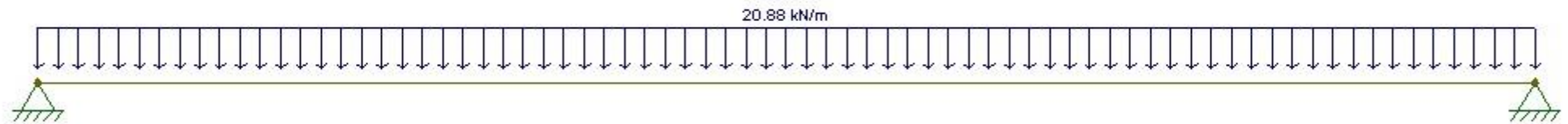
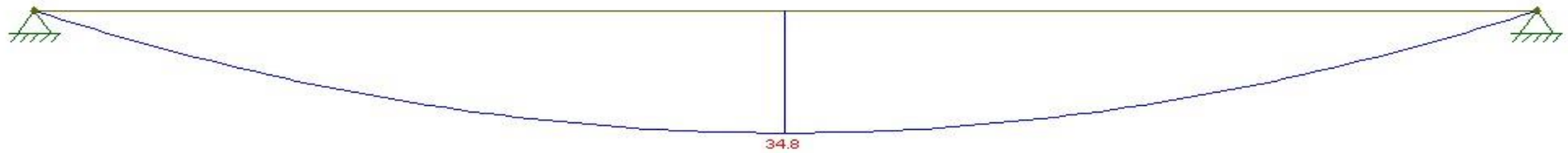


Gráfico do Momento – Viga 22



Viga	Trecho 1 Kn/m
22	20,85

Viga	Md _l
22	34.800N.m

As
1.97cm ²

Gráfico Do Carregamento - Viga 23

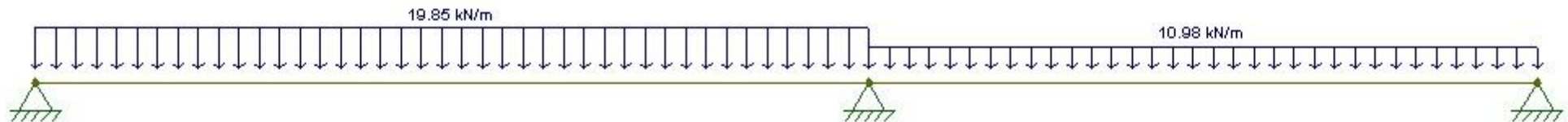
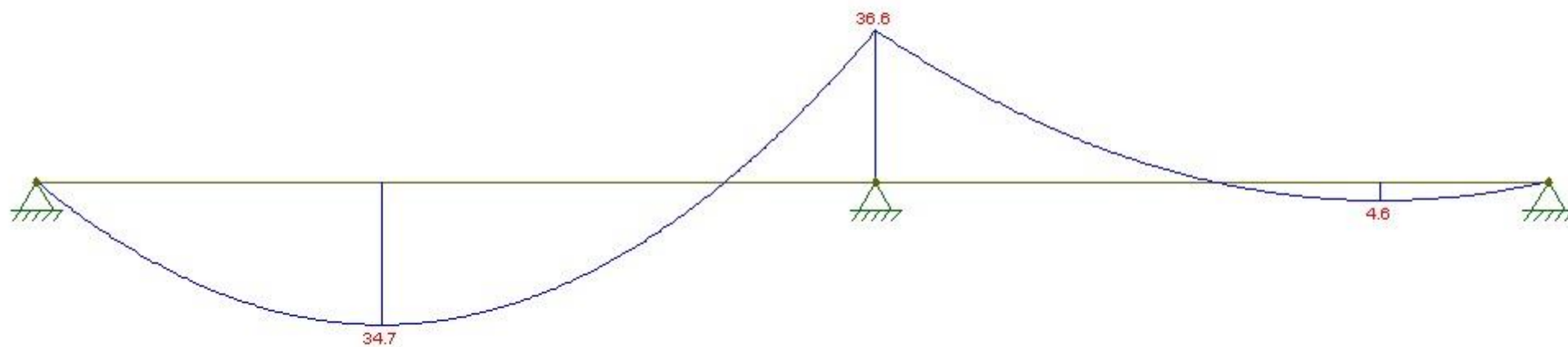


Gráfico do Momento – Viga 23



Viga	Trecho 1 Kn/m	Trecho 2 Kn/m
23	10,98	19,86

Viga	Md ₁	Md ₂	Md ₃
23	34.700N.m	36.600N.m	4.600N.m

As	As	As
1.68cm ²	3.01cm ²	0.43cm ²

Gráfico Do Carregamento - Viga 24

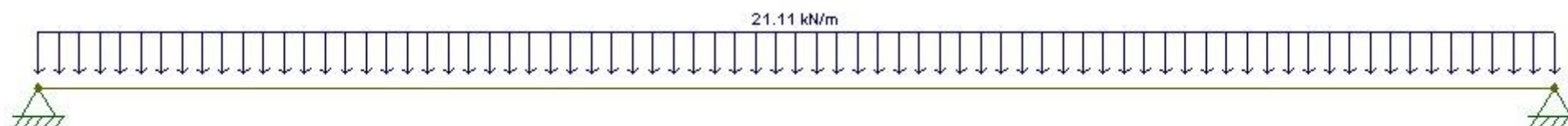
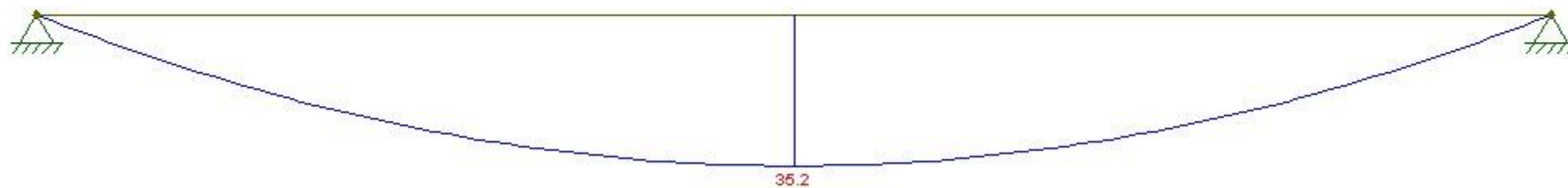


Gráfico do Momento – Viga 24



Viga	Trecho 1 Kn/m
24	21,10

Viga	Md ₁
24	35.200N.m

As
2.48cm ²