



**ASSOCIAÇÃO BRASILEIRA DOS  
FABRICANTES DE TUBOS DE CONCRETO**

**RELATÓRIO DE DIMENSIONAMENTO DE  
ASSOCIAÇÃO DE TRÊS ADUELAS  
RETANGULARES MONOLÍTICAS DE CONCRETO**

**sexta-feira, 4 de outubro de 2019**



ASSOCIAÇÃO BRASILEIRA  
DOS FABRICANTES DE  
TUBOS DE CONCRETO

### DADOS DO FABRICANTE



NOME:  
CPF/CNPJ:  
ENDEREÇO: ,  
BAIRRO:  
CIDADE:  
ESTADO: Não Informado  
CEP:  
TEL.:  
CEL.:  
E-MAIL:  
SITE:

### DADOS DO CLIENTE



NOME: DEFESA CIVIL DO ESTADO DE SÃO PAULO  
CPF/CNPJ:  
ENDEREÇO: ,  
BAIRRO:  
CIDADE:  
ESTADO: Não Informado  
CEP:  
TEL.:  
CEL.:  
E-MAIL:  
SITE:

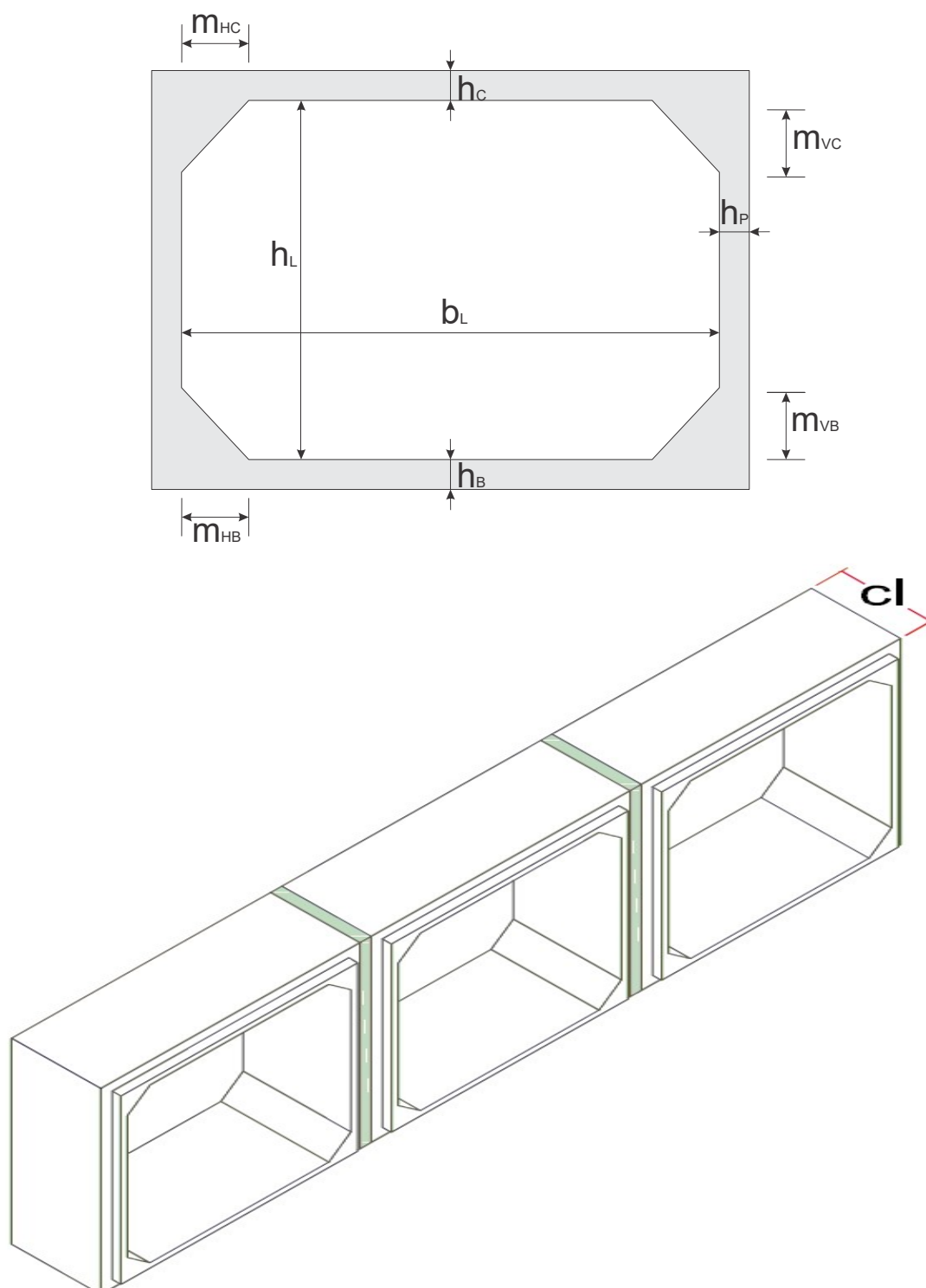
### DADOS DA OBRA



NOME: ADUELA 1,50 X 1,50 M PARA ATERRO DE 2,50 M - LINHA TRIPLA  
ENDEREÇO: ,  
BAIRRO:  
CIDADE:  
ESTADO: Não Informado  
CEP:  
TEL.:  
CEL.:  
E-MAIL:  
SITE:

**GEOMETRIA**

SEÇÃO CONSTANTE.....	: SIM
FINALIDADE.....	: ÁGUAS PLUVIAIS
COMPRIMENTO ( $c_l$ ).....	: 1.00 m
LARGURA LIVRE ( $b_l$ ).....	: 1.50 m
ALTURA LIVRE ( $h_l$ ).....	: 1.50 m
ALTURA DA LAJE DA COBERTURA ( $h_c$ ).....	: 0.15 m
ESPESSURA DAS PAREDES LATERAIS ( $h_p$ ).....	: 0.15 m
ALTURA DA LAJE DA BASE ( $h_b$ ).....	: 0.15 m
MÍSULA HOR. DA COBERTURA.....	: 0.20 m
MÍSULA VERT. DA COBERTURA.....	: 0.20 m
MÍSULA VERT. DA BASE.....	: 0.20 m
MÍSULA HOR. DA BASE.....	: 0.20 m



## INSTALAÇÃO E MANUSEIO

### ESPECIFICAÇÃO DO SOLO

PESO ESPECÍFICO.....	: 18.00 kN/m <sup>3</sup>
ÂNGULO DE ATRITO.....	: 30.00 graus
COEFICIENTE DE ATRITO ATIVO.....	: 0.33
COEFICIENTE DE ATRITO ESTÁTICO.....	: 0.50
COEFICIENTE DE ATRITO.....	: 0.58

---

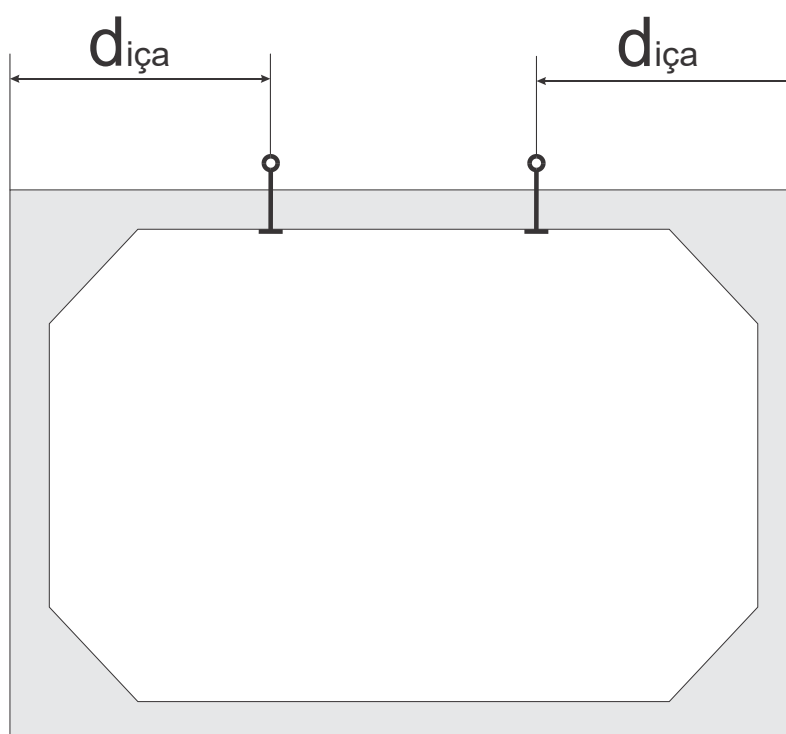
### DADOS DE INSTALAÇÃO

ALTURA DE TERRA.....	: 2.50 m
ESPESSURA DO PAVIMENTO.....	: 0.30 m
EFEITO DO ARQUEAMENTO.....	: NÃO CONSIDERADO
TIPO DE INSTALAÇÃO.....	: ---
LARGURA DA VALA.....	: ---
0.80 x Ka x COEFICIENTE DE ATRITO.....	: 0.15
RAZÃO DE RECALQUE.....	: ---

---

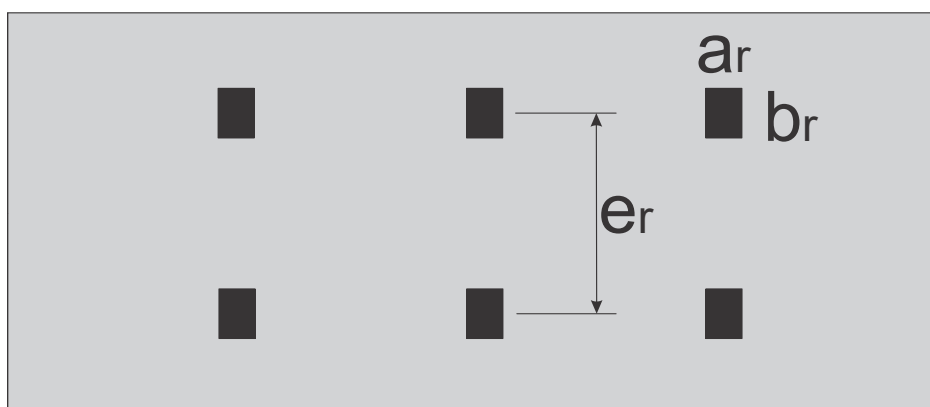
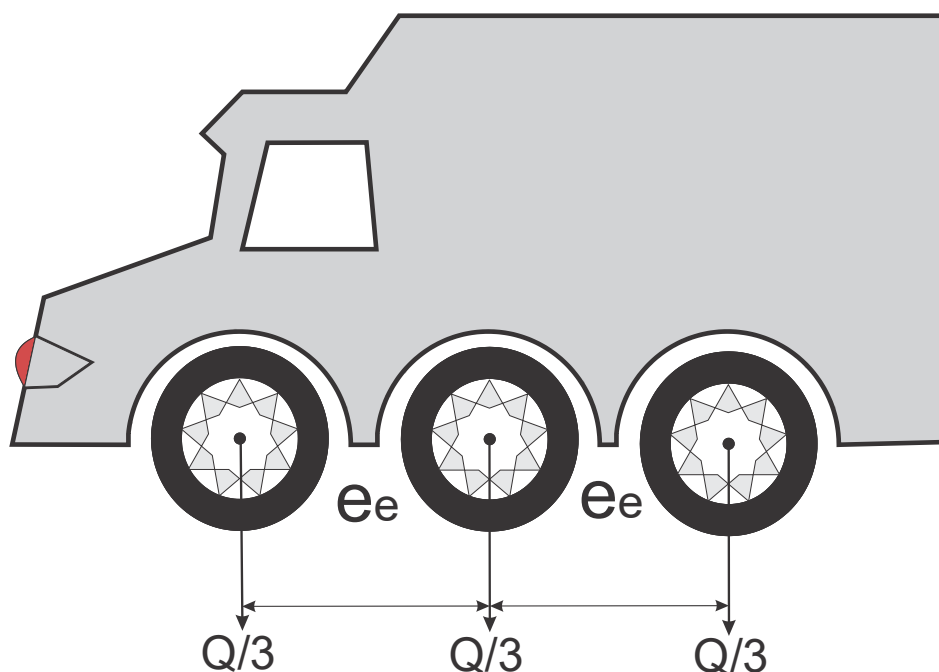
### INFORMAÇÕES DE MANUSEIO

RESISTÊNCIA DO CONCRETO (fcj).....	: 20.00 MPa
COEFICIENTE DE IMPACTO.....	: 1.20
DISTÂNCIA DE IÇAMENTO.....	: 50.00 cm



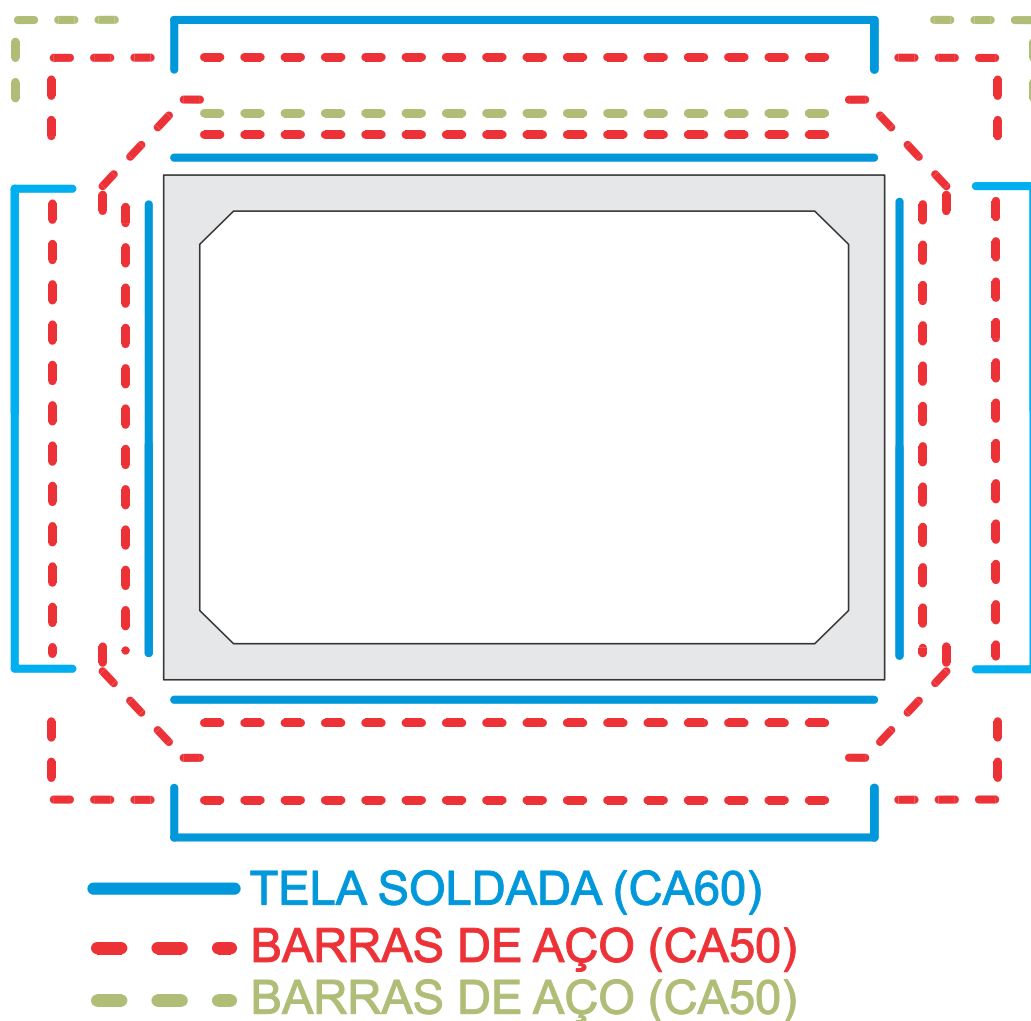
## SOBRECARGA

TIPO DE SOBRECARGA.....: RODOVIÁRIO  
TIPO DE TRÁFEGO.....: CLASSE 45  
PESO DO VEÍCULO (Q).....: 450.00 kN  
DISTÂNCIA ENTRE EIXOS ( $e_e$ ).....: 1.50 m  
DISTÂNCIA ENTRE RODAS ( $e_r$ ).....: 2.00 m  
ÁREA DE CONTATO DA RODA ( $a_r$ ).....: 0.20 m  
ÁREA DE CONTATO DA RODA ( $b_r$ ).....: 0.50 m  
COEF. DE IMPACTO ADICIONAL.....: 1.25  
COEF. DE IMPACTO EMPREGADO.....: 1.00



## PARÂMETROS DA ARMADURA

ABERTURA MÁX. DAS FISSURAS.....	: 0.20 mm
DIMINUIÇÃO DA RIGIDEZ.....	: 1.00
RESISTÊNCIA DA ARMADURA DO COROAMENTO.....	: 190.00 MPa
RESISTÊNCIA DA ARMADURA DA QUINA.....	: 105.00 MPa
COEF. DE PONDERAÇÃO DO CONCRETO.....	: 1.30
COEF. DE PONDERAÇÃO DO AÇO.....	: 1.15
ESPAÇAMENTO MÍN. ENTRE ARMADURAS.....	: 5.00 cm
ESPAÇAMENTO MÁX. ENTRE ARMADURAS.....	: 35.00 cm
COBRIMENTO DAS ARMADURAS.....	: 4.00 cm
TELA PADRÃO INTERNA.....	: L283
TELA PADRÃO EXTERNA.....	: L283
CONSIDERAR ANCOR. DA ARM. INT. P/ CORTANTE..	: SIM



## CRITÉRIOS E CONSTANTES

RESISTÊNCIA CARACTERÍSTICA DO CONCRETO...	30.00 MPa
PESO ESPECÍFICO DO CONCRETO.....	25.00 kN/m <sup>3</sup>
PESO ESPECÍFICO DO AÇO.....	78.00 kN/m <sup>3</sup>
MÓDULO DE DEFORMAÇÃO LONGITUDINAL.....	26071.59 MPa
MÓDULO DE REAÇÃO DO SOLO.....	25.00 MPa/m
COMPRIMENTO DO ELEMENTO FINITO.....	20.00 cm

# ELS:

COEFICIENTE DE PONDERAÇÃO PESO PRÓPRIO...	1.00
COEFICIENTE DE PONDERAÇÃO SOLO.....	1.00
COEFICIENTE DE PONDERAÇÃO FISSURAÇÃO.....	0.50
COEFICIENTE DE PONDERAÇÃO FADIGA.....	0.80

# ELU:

- VmaxHmin:

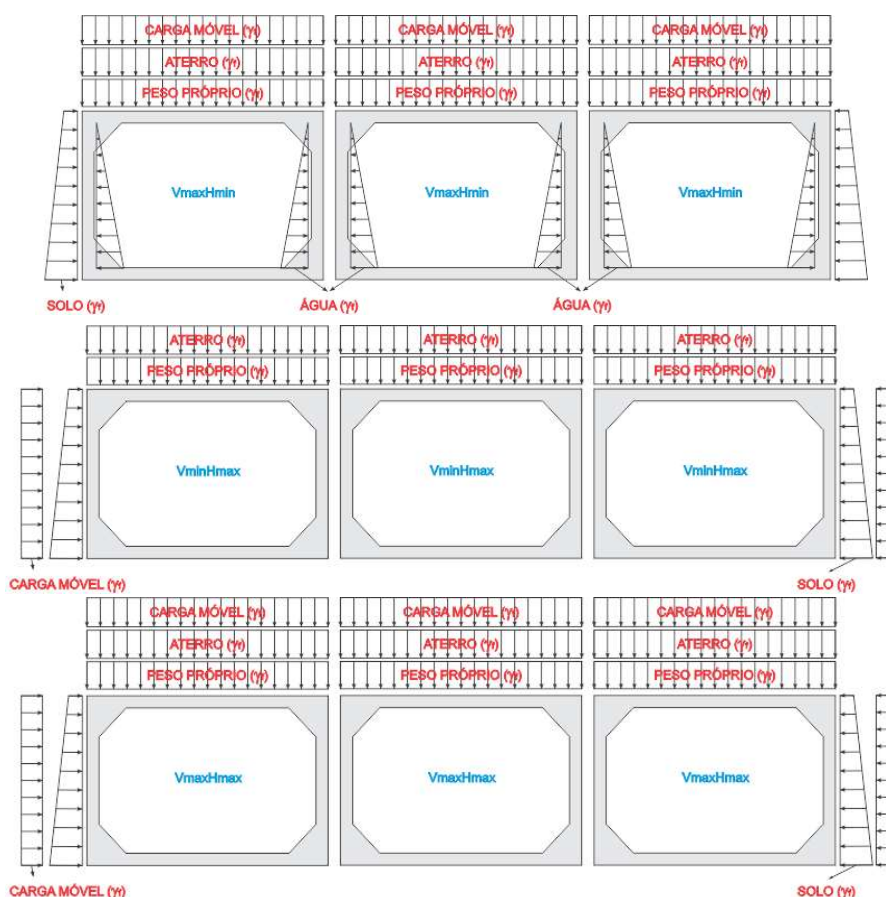
COEFICIENTE DE PONDERAÇÃO CARGA MÓVEL V.:	1.50
COEFICIENTE DE PONDERAÇÃO ATERRO.....	1.35
COEFICIENTE DE PONDERAÇÃO PESO PRÓPRIO...	1.30
COEFICIENTE DE PONDERAÇÃO SOLO.....	1.00
COEFICIENTE DE PONDERAÇÃO ÁGUA.....	1.20

- VminHmax:

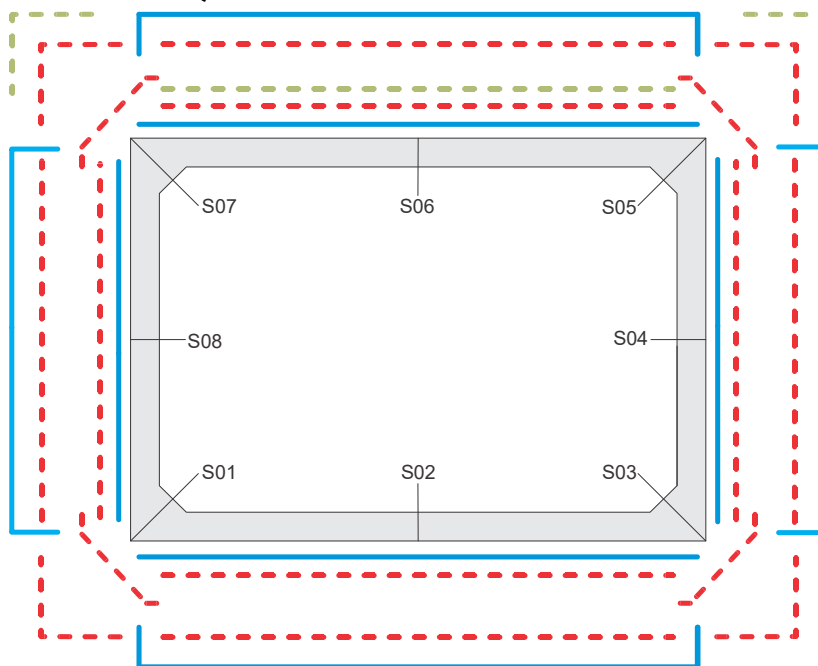
COEFICIENTE DE PONDERAÇÃO ATERRO.....	1.00
COEFICIENTE DE PONDERAÇÃO PESO PRÓPRIO...	1.00
COEFICIENTE DE PONDERAÇÃO SOLO.....	1.35
COEFICIENTE DE PONDERAÇÃO CARGA MÓVEL H.:	1.50

- VmaxHmax:

COEFICIENTE DE PONDERAÇÃO CARGA MÓVEL V.:	1.50
COEFICIENTE DE PONDERAÇÃO ATERRO.....	1.35
COEFICIENTE DE PONDERAÇÃO PESO PRÓPRIO...	1.30
COEFICIENTE DE PONDERAÇÃO SOLO.....	1.35
COEFICIENTE DE PONDERAÇÃO CARGA MÓVEL H.:	1.50



## ESQUEMA P/ DETALHAMENTO



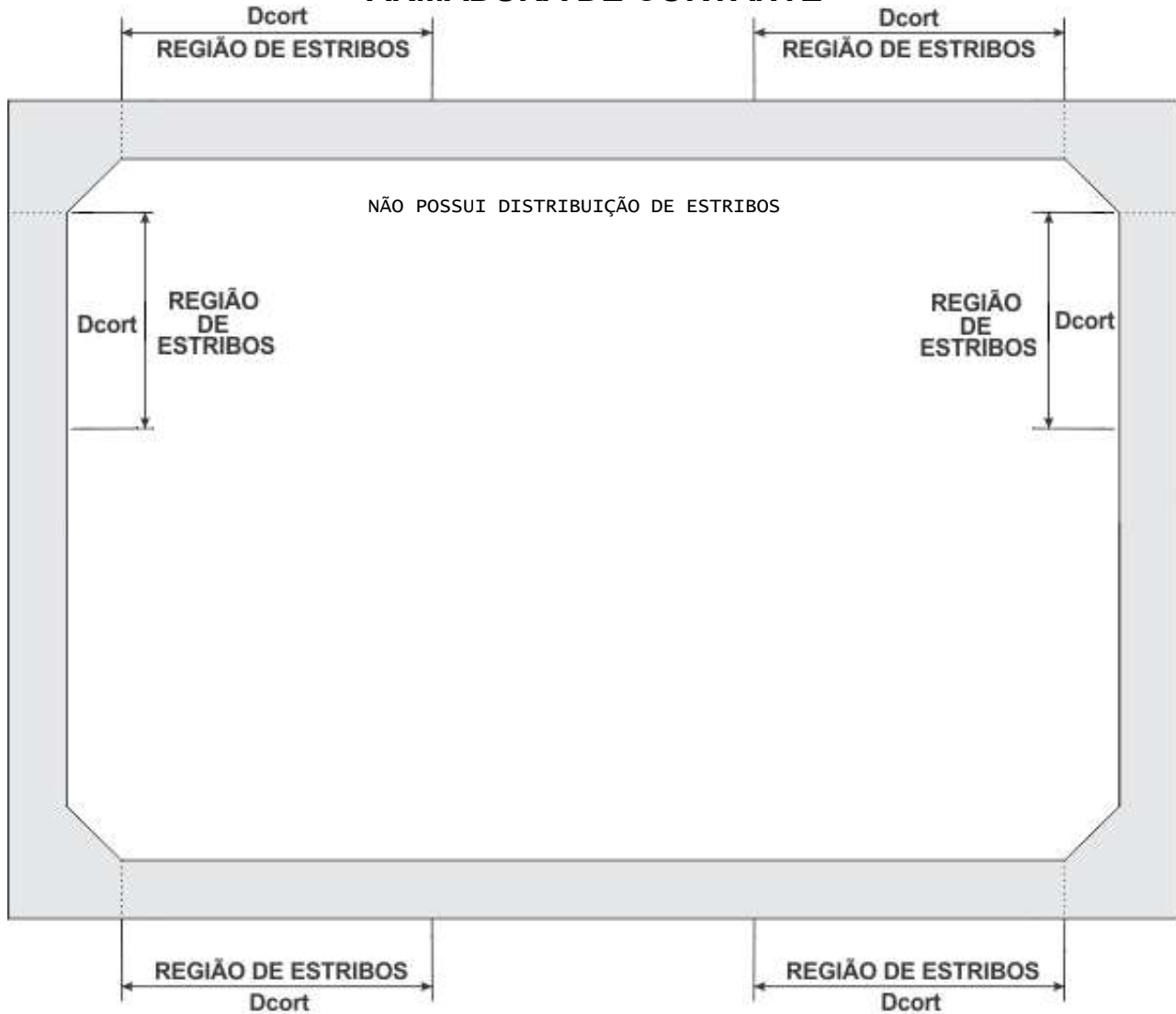
- TELA SOLDADA (CA60) ARMADURA BÁSICA  
 - - - BARRAS DE AÇO (CA50) ARMADURA COMPLEMENTAR  
 - - - BARRAS DE AÇO (CA50) ARMADURA DE FADIGA

OBS.: VALORES POR METRO DE ADUELA.

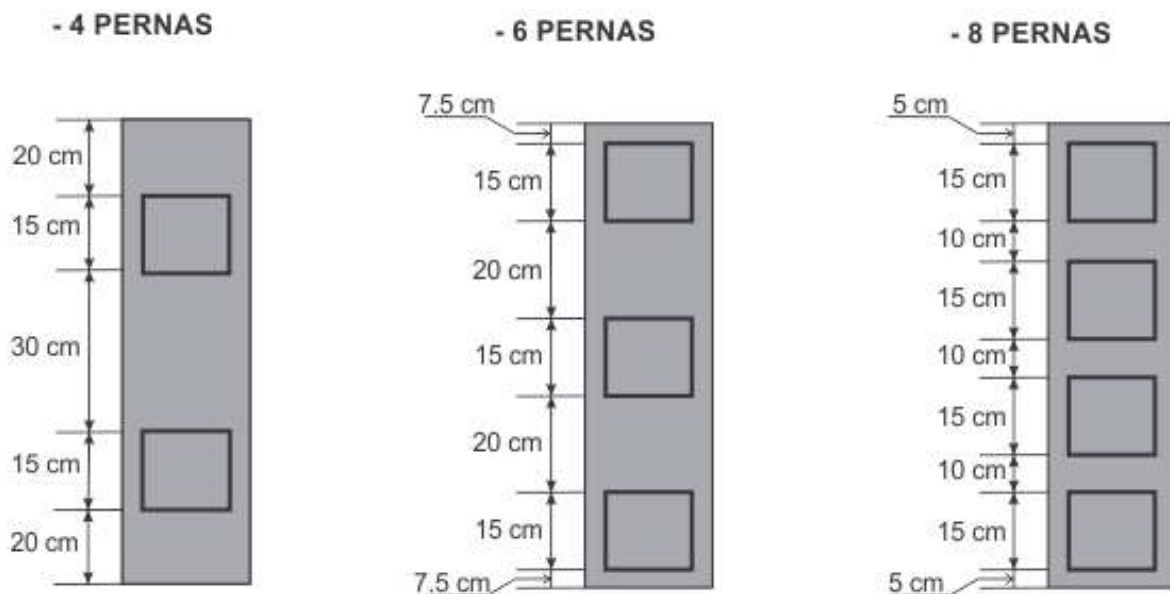
	TELA	ARMADURA COMPLEMENTAR	ARMADURA DE FADIGA
LADO EXTERNO	T-S02: L283	B-S01: 0.22 cm <sup>2</sup> de área acima	B-S05: 0.00 cm <sup>2</sup> de área acima
	T-S04: L283	B-S02: 0.61 cm <sup>2</sup> de área acima	B-S07: 0.00 cm <sup>2</sup> de área acima
	T-S06: L283	B-S03: 0.22 cm <sup>2</sup> de área acima	
	T-S08: L283	B-S04: 0.61 cm <sup>2</sup> de área acima B-S05: 0.22 cm <sup>2</sup> de área acima B-S06: 0.61 cm <sup>2</sup> de área acima B-S07: 0.22 cm <sup>2</sup> de área acima B-S08: 0.61 cm <sup>2</sup> de área acima	
LADO INTERNO	T-S02: L283	B-S01: 4 Ø6.30 c/ 31 cm ( 0.00%)	B-S06: 0.00 cm <sup>2</sup> de área acima
	T-S04: L283	B-S02: 0.20 cm <sup>2</sup> de área acima	
	T-S06: L283	B-S03: 4 Ø6.30 c/ 31 cm ( 0.00%)	
	T-S08: L283	B-S04: 0.61 cm <sup>2</sup> de área acima B-S05: 4 Ø6.30 c/ 31 cm ( 0.00%) B-S06: 0.61 cm <sup>2</sup> de área acima B-S07: 4 Ø6.30 c/ 31 cm ( 0.00%) B-S08: 0.61 cm <sup>2</sup> de área acima	

NOTA: Os valores entre parênteses representam a percentagem de área de aço que a seção apresenta acima (percentagem positiva) ou a menos (percentagem negativa) em relação ao necessário (calculado) para o tipo de armadura correspondente (armadura complementar ou armadura de fadiga) e não em relação a área total de aço na seção que é o resultado das áreas de tela, armadura complementar e armadura de fadiga. Assim sendo, se uma seção apresenta (X %) de área acima ou abaixo para armadura complementar, esta percentagem é calculada em função da área de armadura complementar necessária e não em relação a área total de aço.

## ARMADURA DE CORTANTE



DISTRIBUIÇÃO (POR METRO LONGITUDINAL) DOS ESTRIBOS AO LONGO DE UMA FIADA:

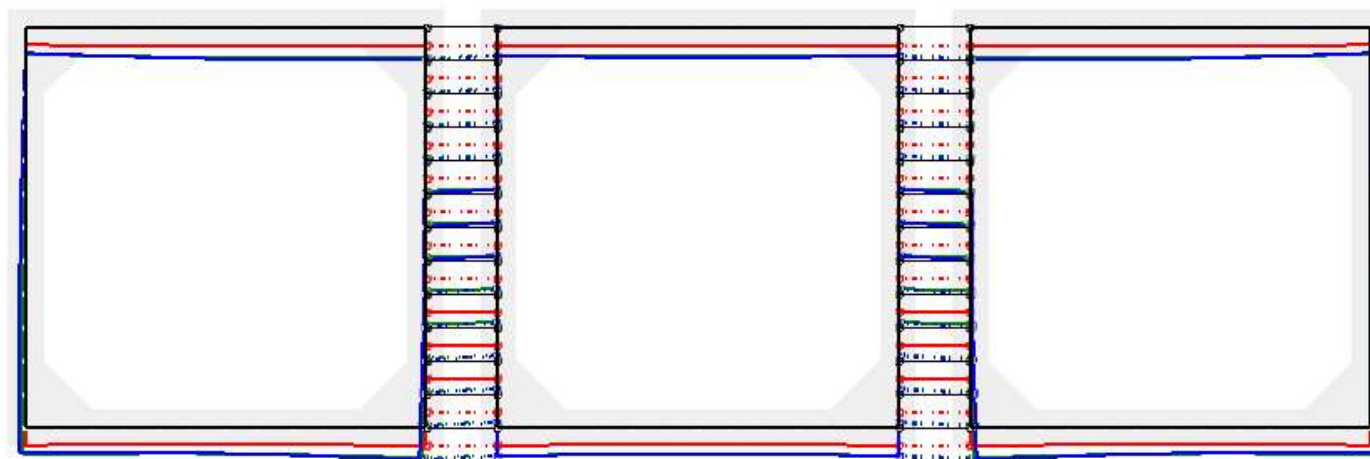
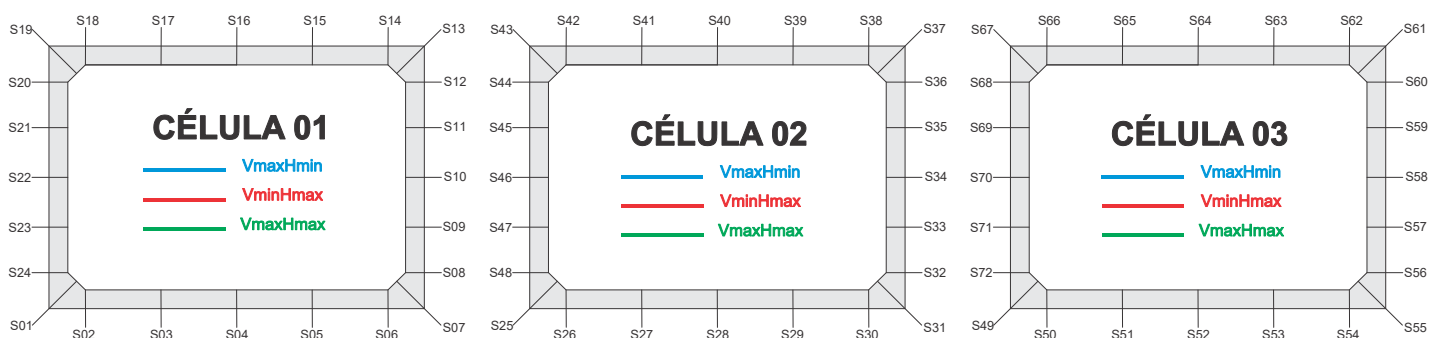


### OBSERVAÇÃO:

Quando houver necessidade de armadura transversal, esta deve necessariamente ser colocada na laje de cobertura e na laje de fundo nas regiões apontadas na figura esquemática acima (REGIÃO DE ESTRIBOS). É RECOMENDADO ainda a colocação de armadura transversal nas partes superiores das paredes, repedindo o arranjo da armadura transversal das lajes de cobertura, a partir das quinas, em função de possíveis concentrações de pressões mútuas entre as células.

## DESLOCAMENTOS

### NOMENCLATURA DAS SEÇÕES PARA VERSÃO COMPLETA DO RELATÓRIO



```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VmaxHmin #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-9.59E-004	-4.05E-003
2	-9.60E-004	-3.99E-003
3	-9.61E-004	-3.97E-003
4	-9.62E-004	-4.07E-003
5	-9.62E-004	-4.33E-003
6	-9.63E-004	-4.70E-003
7	-9.64E-004	-5.08E-003
8	-6.00E-004	-5.08E-003
9	-3.36E-004	-5.09E-003
10	-1.97E-004	-5.09E-003
11	-1.22E-004	-5.10E-003
12	-5.71E-005	-5.11E-003
13	-8.55E-006	-5.11E-003
14	-8.16E-006	-5.08E-003
15	-7.42E-006	-5.06E-003
16	-6.67E-006	-4.97E-003
17	-5.92E-006	-4.76E-003
18	-5.17E-006	-4.43E-003
19	-4.79E-006	-4.07E-003
20	-3.55E-004	-4.07E-003
21	-6.51E-004	-4.07E-003
22	-8.60E-004	-4.06E-003
23	-9.81E-004	-4.06E-003
24	-1.00E-003	-4.05E-003
25	2.26E-006	-4.51E-003
26	1.80E-006	-4.33E-003
27	8.98E-007	-4.17E-003
28	1.64E-010	-4.10E-003
29	-8.97E-007	-4.17E-003
30	-1.80E-006	-4.33E-003
31	-2.26E-006	-4.51E-003
32	1.60E-004	-4.52E-003
33	2.34E-004	-4.52E-003
34	2.02E-004	-4.53E-003
35	1.26E-004	-4.53E-003
36	6.32E-005	-4.54E-003
37	-1.77E-006	-4.54E-003
38	-1.41E-006	-4.62E-003
39	-7.03E-007	-4.72E-003
40	1.54E-010	-4.76E-003
41	7.04E-007	-4.72E-003
42	1.41E-006	-4.62E-003
43	1.77E-006	-4.54E-003
44	-6.32E-005	-4.54E-003
45	-1.26E-004	-4.53E-003
46	-2.02E-004	-4.53E-003
47	-2.34E-004	-4.52E-003
48	-1.60E-004	-4.52E-003
49	9.64E-004	-5.08E-003

50	9.63E-004	-4.70E-003
51	9.62E-004	-4.33E-003
52	9.62E-004	-4.07E-003
53	9.61E-004	-3.97E-003
54	9.60E-004	-3.99E-003
55	9.59E-004	-4.05E-003
56	1.00E-003	-4.05E-003
57	9.81E-004	-4.06E-003
58	8.60E-004	-4.06E-003
59	6.51E-004	-4.07E-003
60	3.55E-004	-4.07E-003
61	4.79E-006	-4.07E-003
62	5.17E-006	-4.43E-003
63	5.92E-006	-4.76E-003
64	6.67E-006	-4.97E-003
65	7.42E-006	-5.06E-003
66	8.16E-006	-5.08E-003
67	8.55E-006	-5.11E-003
68	5.71E-005	-5.11E-003
69	1.22E-004	-5.10E-003
70	1.97E-004	-5.09E-003
71	3.36E-004	-5.09E-003
72	6.00E-004	-5.08E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.90E-004
2	2.09E-004
3	-1.01E-004
4	-6.57E-004
5	-1.19E-003
6	-1.41E-003
7	-1.36E-003
8	-1.26E-003
9	-6.99E-004
10	-3.49E-004
11	-2.38E-004
12	-2.07E-004
13	-1.45E-004
14	-7.83E-005
15	-1.36E-004
16	-5.32E-004
17	-1.01E-003
18	-1.31E-003
19	-1.30E-003
20	-1.24E-003
21	-9.14E-004
22	-6.05E-004
23	-2.72E-004
24	1.20E-004
25	6.29E-004
26	6.71E-004
27	4.75E-004
28	1.12E-011
29	-4.75E-004

30	-6.71E-004
31	-6.29E-004
32	-5.33E-004
33	-3.95E-005
34	2.38E-004
35	2.69E-004
36	2.14E-004
37	2.63E-004
38	3.22E-004
39	2.90E-004
40	1.61E-011
41	-2.90E-004
42	-3.22E-004
43	-2.63E-004
44	-2.14E-004
45	-2.69E-004
46	-2.38E-004
47	3.95E-005
48	5.33E-004
49	1.36E-003
50	1.41E-003
51	1.19E-003
52	6.57E-004
53	1.01E-004
54	-2.09E-004
55	-1.90E-004
56	-1.20E-004
57	2.72E-004
58	6.05E-004
59	9.14E-004
60	1.24E-003
61	1.30E-003
62	1.31E-003
63	1.01E-003
64	5.32E-004
65	1.36E-004
66	7.83E-005
67	1.45E-004
68	2.07E-004
69	2.38E-004
70	3.49E-004
71	6.99E-004
72	1.26E-003

---

```
#####
#          SOLICITAÇÕES NORMAIS (ELU)          #
#          VminHmax                             #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-1.84E-007	-2.77E-003
2	-1.91E-006	-2.75E-003
3	-5.28E-006	-2.71E-003
4	-8.64E-006	-2.69E-003
5	-1.20E-005	-2.72E-003
6	-1.54E-005	-2.77E-003
7	-1.71E-005	-2.80E-003
8	1.49E-007	-2.80E-003
9	1.42E-006	-2.80E-003
10	1.73E-006	-2.81E-003
11	3.87E-006	-2.81E-003
12	7.22E-006	-2.82E-003
13	3.98E-006	-2.82E-003
14	5.41E-006	-2.83E-003
15	8.21E-006	-2.86E-003
16	1.10E-005	-2.88E-003
17	1.38E-005	-2.86E-003
18	1.66E-005	-2.81E-003
19	1.80E-005	-2.79E-003
20	3.64E-006	-2.79E-003
21	1.24E-005	-2.78E-003
22	2.00E-005	-2.78E-003
23	5.71E-006	-2.78E-003
24	-9.76E-006	-2.77E-003
25	8.45E-006	-2.78E-003
26	6.72E-006	-2.76E-003
27	3.36E-006	-2.72E-003
28	4.70E-011	-2.69E-003
29	-3.36E-006	-2.72E-003
30	-6.72E-006	-2.76E-003
31	-8.45E-006	-2.78E-003
32	2.83E-006	-2.78E-003
33	-9.78E-007	-2.79E-003
34	-4.14E-006	-2.79E-003
35	-4.54E-006	-2.79E-003
36	-3.01E-006	-2.80E-003
37	-7.05E-006	-2.80E-003
38	-5.61E-006	-2.81E-003
39	-2.81E-006	-2.85E-003
40	-1.08E-008	-2.87E-003
41	2.79E-006	-2.85E-003
42	5.59E-006	-2.81E-003
43	7.03E-006	-2.80E-003
44	3.01E-006	-2.80E-003
45	4.93E-006	-2.79E-003
46	4.51E-006	-2.79E-003
47	1.02E-006	-2.79E-003
48	-2.84E-006	-2.78E-003
49	1.71E-005	-2.80E-003

50	1.54E-005	-2.77E-003
51	1.20E-005	-2.72E-003
52	8.63E-006	-2.69E-003
53	5.27E-006	-2.71E-003
54	1.91E-006	-2.75E-003
55	1.75E-007	-2.77E-003
56	9.75E-006	-2.77E-003
57	-5.72E-006	-2.78E-003
58	-2.00E-005	-2.78E-003
59	-1.24E-005	-2.78E-003
60	-3.64E-006	-2.79E-003
61	-1.80E-005	-2.79E-003
62	-1.66E-005	-2.81E-003
63	-1.38E-005	-2.86E-003
64	-1.10E-005	-2.88E-003
65	-8.21E-006	-2.86E-003
66	-5.41E-006	-2.83E-003
67	-3.97E-006	-2.82E-003
68	-7.23E-006	-2.82E-003
69	-4.28E-006	-2.81E-003
70	-2.11E-006	-2.81E-003
71	-1.47E-006	-2.80E-003
72	-1.43E-007	-2.80E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	5.92E-005
2	1.08E-004
3	1.33E-004
4	-2.03E-005
5	-1.71E-004
6	-1.38E-004
7	-8.69E-005
8	-3.72E-005
9	2.17E-006
10	-4.44E-006
11	-1.12E-005
12	-3.46E-006
13	2.97E-005
14	7.58E-005
15	1.13E-004
16	-1.23E-005
17	-1.42E-004
18	-1.17E-004
19	-7.42E-005
20	-2.65E-005
21	5.44E-005
22	-1.19E-005
23	-7.98E-005
24	6.38E-006
25	6.49E-005
26	1.16E-004
27	1.48E-004
28	9.78E-009
29	-1.48E-004

30	-1.16E-004
31	-6.49E-005
32	-1.59E-005
33	1.76E-005
34	5.92E-006
35	-2.43E-006
36	-7.71E-008
37	3.24E-005
38	7.83E-005
39	1.19E-004
40	2.12E-008
41	-1.18E-004
42	-7.83E-005
43	-3.24E-005
44	2.89E-007
45	3.98E-006
46	-7.09E-006
47	-1.84E-005
48	1.60E-005
49	8.68E-005
50	1.38E-004
51	1.71E-004
52	2.03E-005
53	-1.33E-004
54	-1.08E-004
55	-5.92E-005
56	-6.38E-006
57	7.98E-005
58	1.19E-005
59	-5.44E-005
60	2.65E-005
61	7.42E-005
62	1.17E-004
63	1.42E-004
64	1.23E-005
65	-1.13E-004
66	-7.58E-005
67	-2.98E-005
68	3.27E-006
69	9.63E-006
70	5.61E-006
71	-1.42E-006
72	3.71E-005

---

```
#####
#          SOLICITAÇÕES NORMAIS (ELU)          #
#          VmaxHmax                             #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-4.64E-004	-4.21E-003
2	-4.65E-004	-4.14E-003
3	-4.67E-004	-4.08E-003
4	-4.69E-004	-4.11E-003
5	-4.72E-004	-4.28E-003
6	-4.74E-004	-4.52E-003
7	-4.75E-004	-4.76E-003
8	-2.59E-004	-4.76E-003
9	-1.24E-004	-4.77E-003
10	-6.60E-005	-4.77E-003
11	-4.19E-005	-4.78E-003
12	-2.10E-005	-4.78E-003
13	-9.71E-006	-4.79E-003
14	-8.78E-006	-4.79E-003
15	-6.95E-006	-4.82E-003
16	-5.13E-006	-4.80E-003
17	-3.30E-006	-4.67E-003
18	-1.48E-006	-4.47E-003
19	-5.41E-007	-4.24E-003
20	-2.13E-004	-4.24E-003
21	-3.76E-004	-4.23E-003
22	-4.78E-004	-4.23E-003
23	-5.34E-004	-4.22E-003
24	-5.26E-004	-4.22E-003
25	5.75E-006	-4.44E-003
26	4.58E-006	-4.32E-003
27	2.29E-006	-4.20E-003
28	1.13E-010	-4.14E-003
29	-2.29E-006	-4.19E-003
30	-4.57E-006	-4.32E-003
31	-5.75E-006	-4.44E-003
32	9.27E-005	-4.44E-003
33	1.19E-004	-4.44E-003
34	8.58E-005	-4.45E-003
35	4.21E-005	-4.46E-003
36	1.82E-005	-4.46E-003
37	-9.49E-006	-4.46E-003
38	-8.55E-006	-4.51E-003
39	-6.73E-006	-4.58E-003
40	-4.91E-006	-4.61E-003
41	-3.09E-006	-4.58E-003
42	-1.27E-006	-4.51E-003
43	-3.35E-007	-4.47E-003
44	-2.73E-005	-4.47E-003
45	-5.56E-005	-4.46E-003
46	-9.91E-005	-4.46E-003
47	-1.27E-004	-4.45E-003
48	-9.58E-005	-4.44E-003
49	4.60E-004	-4.75E-003

50	4.59E-004	-4.52E-003
51	4.57E-004	-4.28E-003
52	4.54E-004	-4.12E-003
53	4.52E-004	-4.08E-003
54	4.50E-004	-4.14E-003
55	4.49E-004	-4.22E-003
56	5.11E-004	-4.22E-003
57	5.19E-004	-4.22E-003
58	4.64E-004	-4.23E-003
59	3.62E-004	-4.23E-003
60	2.01E-004	-4.24E-003
61	-9.48E-006	-4.24E-003
62	-8.55E-006	-4.46E-003
63	-6.72E-006	-4.67E-003
64	-4.90E-006	-4.79E-003
65	-3.07E-006	-4.82E-003
66	-1.25E-006	-4.79E-003
67	-3.13E-007	-4.78E-003
68	1.20E-005	-4.78E-003
69	3.89E-005	-4.77E-003
70	6.39E-005	-4.77E-003
71	1.17E-004	-4.76E-003
72	2.47E-004	-4.75E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	2.57E-004
2	2.92E-004
3	8.30E-005
4	-3.69E-004
5	-7.89E-004
6	-8.92E-004
7	-8.29E-004
8	-7.25E-004
9	-3.13E-004
10	-1.29E-004
11	-6.61E-005
12	-6.93E-005
13	-9.66E-006
14	6.31E-005
15	6.28E-005
16	-2.57E-004
17	-6.40E-004
18	-8.29E-004
19	-8.00E-004
20	-7.37E-004
21	-4.67E-004
22	-2.88E-004
23	-1.05E-004
24	1.87E-004
25	4.09E-004
26	4.67E-004
27	3.74E-004
28	1.67E-006
29	-3.69E-004

30	-4.57E-004
31	-3.98E-004
32	-3.02E-004
33	5.33E-005
34	1.66E-004
35	1.27E-004
36	7.66E-005
37	1.29E-004
38	1.99E-004
39	2.31E-004
40	5.05E-006
41	-2.22E-004
42	-1.94E-004
43	-1.26E-004
44	-7.59E-005
45	-1.46E-004
46	-1.50E-004
47	-3.21E-005
48	3.14E-004
49	8.18E-004
50	8.81E-004
51	7.84E-004
52	3.68E-004
53	-8.27E-005
54	-2.91E-004
55	-2.57E-004
56	-1.86E-004
57	1.04E-004
58	2.85E-004
59	4.62E-004
60	7.31E-004
61	7.93E-004
62	8.22E-004
63	6.33E-004
64	2.52E-004
65	-6.50E-005
66	-6.11E-005
67	1.25E-005
68	7.50E-005
69	9.03E-005
70	1.16E-004
71	2.93E-004
72	7.13E-004

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmin                                #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-9.73E-004	-4.07E-003
2	-9.73E-004	-3.99E-003
3	-9.74E-004	-3.95E-003
4	-9.75E-004	-4.04E-003
5	-9.76E-004	-4.31E-003
6	-9.76E-004	-4.72E-003
7	-9.77E-004	-5.16E-003
8	-5.56E-004	-5.17E-003
9	-2.84E-004	-5.18E-003
10	-1.92E-004	-5.19E-003
11	-1.76E-004	-5.21E-003
12	-1.34E-004	-5.22E-003
13	-7.99E-005	-5.22E-003
14	-7.95E-005	-5.19E-003
15	-7.87E-005	-5.16E-003
16	-7.78E-005	-5.05E-003
17	-7.70E-005	-4.82E-003
18	-7.62E-005	-4.47E-003
19	-7.58E-005	-4.10E-003
20	-4.39E-004	-4.10E-003
21	-7.38E-004	-4.09E-003
22	-9.39E-004	-4.09E-003
23	-1.04E-003	-4.08E-003
24	-1.04E-003	-4.08E-003
25	2.11E-006	-4.54E-003
26	1.68E-006	-4.34E-003
27	8.38E-007	-4.15E-003
28	-8.12E-011	-4.07E-003
29	-8.38E-007	-4.15E-003
30	-1.68E-006	-4.35E-003
31	-2.11E-006	-4.58E-003
32	2.03E-004	-4.59E-003
33	2.67E-004	-4.60E-003
34	1.74E-004	-4.61E-003
35	4.57E-005	-4.62E-003
36	-1.84E-005	-4.63E-003
37	-7.27E-005	-4.63E-003
38	-7.23E-005	-4.71E-003
39	-7.16E-005	-4.79E-003
40	-7.08E-005	-4.82E-003
41	-7.01E-005	-4.76E-003
42	-6.93E-005	-4.66E-003
43	-6.89E-005	-4.57E-003
44	-1.40E-004	-4.57E-003
45	-2.09E-004	-4.56E-003
46	-2.75E-004	-4.55E-003
47	-2.85E-004	-4.55E-003
48	-1.85E-004	-4.54E-003
49	9.74E-004	-5.15E-003

50	9.73E-004	-4.73E-003
51	9.72E-004	-4.33E-003
52	9.72E-004	-4.05E-003
53	9.71E-004	-3.94E-003
54	9.70E-004	-3.97E-003
55	9.69E-004	-4.06E-003
56	1.04E-003	-4.06E-003
57	1.03E-003	-4.07E-003
58	8.89E-004	-4.08E-003
59	6.56E-004	-4.09E-003
60	3.27E-004	-4.10E-003
61	-6.58E-005	-4.11E-003
62	-6.54E-005	-4.51E-003
63	-6.47E-005	-4.86E-003
64	-6.39E-005	-5.08E-003
65	-6.32E-005	-5.15E-003
66	-6.24E-005	-5.16E-003
67	-6.20E-005	-5.18E-003
68	-2.44E-005	-5.18E-003
69	4.01E-005	-5.17E-003
70	1.27E-004	-5.16E-003
71	2.85E-004	-5.16E-003
72	5.78E-004	-5.15E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	2.83E-004
2	3.00E-004
3	-4.54E-005
4	-6.62E-004
5	-1.28E-003
6	-1.62E-003
7	-1.60E-003
8	-1.43E-003
9	-6.02E-004
10	-1.33E-004
11	-4.53E-005
12	-2.37E-004
13	-1.47E-004
14	-9.09E-005
15	-1.98E-004
16	-6.17E-004
17	-1.09E-003
18	-1.36E-003
19	-1.35E-003
20	-1.28E-003
21	-9.05E-004
22	-5.57E-004
23	-1.97E-004
24	2.12E-004
25	7.20E-004
26	7.59E-004
27	5.25E-004
28	-3.22E-006
29	-5.50E-004

30	-8.37E-004
31	-8.10E-004
32	-6.51E-004
33	1.23E-004
34	4.82E-004
35	3.67E-004
36	1.63E-004
37	2.44E-004
38	2.98E-004
39	2.39E-004
40	-5.99E-005
41	-3.42E-004
42	-3.51E-004
43	-2.86E-004
44	-2.34E-004
45	-2.77E-004
46	-1.72E-004
47	1.32E-004
48	6.25E-004
49	1.48E-003
50	1.53E-003
51	1.30E-003
52	7.25E-004
53	1.03E-004
54	-3.03E-004
55	-3.02E-004
56	-2.04E-004
57	2.98E-004
58	6.79E-004
59	1.02E-003
60	1.39E-003
61	1.46E-003
62	1.45E-003
63	1.06E-003
64	5.18E-004
65	9.10E-005
66	3.24E-005
67	1.03E-004
68	1.72E-004
69	2.66E-004
70	4.06E-004
71	7.85E-004
72	1.37E-003

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VminHmax                                #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-9.67E-006	-2.77E-003
2	-1.14E-005	-2.75E-003
3	-1.48E-005	-2.71E-003
4	-1.81E-005	-2.69E-003
5	-2.15E-005	-2.72E-003
6	-2.48E-005	-2.77E-003
7	-2.66E-005	-2.81E-003
8	-5.35E-006	-2.82E-003
9	-9.75E-006	-2.82E-003
10	-1.19E-005	-2.83E-003
11	-7.82E-006	-2.84E-003
12	2.40E-006	-2.85E-003
13	4.85E-006	-2.85E-003
14	6.29E-006	-2.86E-003
15	9.09E-006	-2.89E-003
16	1.19E-005	-2.90E-003
17	1.47E-005	-2.87E-003
18	1.75E-005	-2.82E-003
19	1.89E-005	-2.79E-003
20	-1.34E-006	-2.79E-003
21	2.95E-006	-2.78E-003
22	8.13E-006	-2.78E-003
23	-6.73E-006	-2.78E-003
24	-2.11E-005	-2.77E-003
25	8.44E-006	-2.79E-003
26	6.71E-006	-2.76E-003
27	3.36E-006	-2.71E-003
28	-3.87E-011	-2.69E-003
29	-3.36E-006	-2.71E-003
30	-6.71E-006	-2.76E-003
31	-8.44E-006	-2.79E-003
32	6.05E-006	-2.80E-003
33	-4.03E-006	-2.80E-003
34	-1.04E-005	-2.81E-003
35	-1.07E-005	-2.82E-003
36	-5.02E-006	-2.83E-003
37	-5.74E-006	-2.83E-003
38	-4.30E-006	-2.84E-003
39	-1.49E-006	-2.88E-003
40	1.31E-006	-2.89E-003
41	4.12E-006	-2.87E-003
42	6.92E-006	-2.83E-003
43	8.36E-006	-2.81E-003
44	-2.05E-006	-2.80E-003
45	-6.00E-006	-2.80E-003
46	-8.69E-006	-2.80E-003
47	-1.02E-005	-2.79E-003
48	-8.53E-006	-2.79E-003
49	2.68E-005	-2.81E-003

50	2.51E-005	-2.77E-003
51	2.17E-005	-2.72E-003
52	1.84E-005	-2.69E-003
53	1.50E-005	-2.70E-003
54	1.16E-005	-2.74E-003
55	9.89E-006	-2.77E-003
56	1.61E-005	-2.77E-003
57	-2.35E-005	-2.78E-003
58	-5.39E-005	-2.79E-003
59	-3.35E-005	-2.79E-003
60	-3.70E-006	-2.80E-003
61	-1.63E-005	-2.80E-003
62	-1.48E-005	-2.83E-003
63	-1.20E-005	-2.88E-003
64	-9.25E-006	-2.90E-003
65	-6.45E-006	-2.88E-003
66	-3.65E-006	-2.85E-003
67	-2.21E-006	-2.83E-003
68	-9.44E-006	-2.83E-003
69	-1.04E-005	-2.82E-003
70	-9.05E-006	-2.82E-003
71	-5.07E-006	-2.82E-003
72	2.93E-006	-2.81E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	6.63E-005
2	1.16E-004
3	1.38E-004
4	-2.30E-005
5	-1.86E-004
6	-1.71E-004
7	-1.23E-004
8	-3.04E-005
9	1.79E-005
10	-2.95E-006
11	-2.71E-005
12	-3.41E-005
13	2.39E-005
14	6.79E-005
15	9.49E-005
16	-3.66E-005
17	-1.68E-004
18	-1.40E-004
19	-9.61E-005
20	-4.71E-005
21	4.20E-005
22	-1.71E-005
23	-7.87E-005
24	1.28E-005
25	8.53E-005
26	1.35E-004
27	1.60E-004
28	6.73E-007
29	-1.61E-004

30	-1.46E-004
31	-9.79E-005
32	-6.39E-006
33	3.50E-005
34	1.17E-005
35	-8.59E-006
36	-2.22E-005
37	3.52E-005
38	7.93E-005
39	1.09E-004
40	-1.67E-005
41	-1.40E-004
42	-1.01E-004
43	-5.52E-005
44	-2.38E-005
45	-1.15E-005
46	-7.85E-006
47	-2.70E-006
48	3.69E-005
49	1.11E-004
50	1.61E-004
51	1.88E-004
52	2.99E-005
53	-1.32E-004
54	-1.17E-004
55	-7.00E-005
56	3.18E-005
57	1.79E-004
58	1.74E-005
59	-1.40E-004
60	-3.70E-006
61	8.80E-005
62	1.29E-004
63	1.45E-004
64	7.60E-006
65	-1.23E-004
66	-8.94E-005
67	-4.36E-005
68	-1.22E-005
69	-3.07E-008
70	9.80E-006
71	1.90E-005
72	6.16E-005

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmax                                #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-5.11E-004	-4.22E-003
2	-5.13E-004	-4.13E-003
3	-5.15E-004	-4.05E-003
4	-5.17E-004	-4.09E-003
5	-5.19E-004	-4.27E-003
6	-5.22E-004	-4.55E-003
7	-5.23E-004	-4.85E-003
8	-2.55E-004	-4.85E-003
9	-1.09E-004	-4.86E-003
10	-8.49E-005	-4.88E-003
11	-1.01E-004	-4.89E-003
12	-8.43E-005	-4.90E-003
13	-6.10E-005	-4.90E-003
14	-6.00E-005	-4.90E-003
15	-5.82E-005	-4.92E-003
16	-5.63E-005	-4.87E-003
17	-5.44E-005	-4.72E-003
18	-5.25E-005	-4.49E-003
19	-5.16E-005	-4.24E-003
20	-2.82E-004	-4.24E-003
21	-4.56E-004	-4.24E-003
22	-5.60E-004	-4.23E-003
23	-6.09E-004	-4.22E-003
24	-5.89E-004	-4.22E-003
25	5.65E-006	-4.47E-003
26	4.50E-006	-4.32E-003
27	2.25E-006	-4.18E-003
28	-7.24E-011	-4.12E-003
29	-2.25E-006	-4.18E-003
30	-4.50E-006	-4.33E-003
31	-5.65E-006	-4.50E-003
32	1.30E-004	-4.50E-003
33	1.49E-004	-4.51E-003
34	6.85E-005	-4.52E-003
35	-1.59E-005	-4.53E-003
36	-3.96E-005	-4.55E-003
37	-6.06E-005	-4.55E-003
38	-5.96E-005	-4.59E-003
39	-5.78E-005	-4.66E-003
40	-5.59E-005	-4.68E-003
41	-5.41E-005	-4.63E-003
42	-5.22E-005	-4.55E-003
43	-5.12E-005	-4.50E-003
44	-9.00E-005	-4.49E-003
45	-1.27E-004	-4.49E-003
46	-1.70E-004	-4.48E-003
47	-1.82E-004	-4.48E-003
48	-1.22E-004	-4.47E-003
49	5.04E-004	-4.83E-003

50	5.03E-004	-4.56E-003
51	5.01E-004	-4.29E-003
52	4.98E-004	-4.10E-003
53	4.96E-004	-4.05E-003
54	4.94E-004	-4.11E-003
55	4.93E-004	-4.20E-003
56	5.66E-004	-4.21E-003
57	5.62E-004	-4.22E-003
58	4.85E-004	-4.23E-003
59	3.69E-004	-4.24E-003
60	1.88E-004	-4.25E-003
61	-6.01E-005	-4.25E-003
62	-5.92E-005	-4.52E-003
63	-5.73E-005	-4.75E-003
64	-5.55E-005	-4.89E-003
65	-5.37E-005	-4.91E-003
66	-5.19E-005	-4.87E-003
67	-5.09E-005	-4.86E-003
68	-4.59E-005	-4.86E-003
69	-2.04E-005	-4.85E-003
70	1.29E-005	-4.84E-003
71	8.79E-005	-4.84E-003
72	2.54E-004	-4.83E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	3.12E-004
2	3.45E-004
3	1.09E-004
4	-3.93E-004
5	-8.87E-004
6	-1.09E-003
7	-1.05E-003
8	-8.77E-004
9	-2.57E-004
10	3.16E-005
11	3.65E-005
12	-1.26E-004
13	-3.11E-005
14	3.26E-005
15	-1.03E-005
16	-3.52E-004
17	-7.35E-004
18	-9.03E-004
19	-8.69E-004
20	-7.99E-004
21	-4.88E-004
22	-2.77E-004
23	-6.91E-005
24	2.40E-004
25	5.04E-004
26	5.57E-004
27	4.22E-004
28	-3.45E-006
29	-4.40E-004

30	-6.07E-004
31	-5.62E-004
32	-3.98E-004
33	1.72E-004
34	3.58E-004
35	1.99E-004
36	3.71E-005
37	1.27E-004
38	1.91E-004
39	1.97E-004
40	-4.44E-005
41	-2.76E-004
42	-2.40E-004
43	-1.69E-004
44	-1.17E-004
45	-1.64E-004
46	-1.24E-004
47	5.99E-005
48	4.12E-004
49	9.52E-004
50	1.01E-003
51	8.92E-004
52	4.39E-004
53	-6.31E-005
54	-3.39E-004
55	-3.17E-004
56	-2.04E-004
57	1.83E-004
58	3.52E-004
59	5.09E-004
60	8.49E-004
61	9.45E-004
62	9.61E-004
63	7.01E-004
64	2.69E-004
65	-8.01E-005
66	-8.87E-005
67	-1.44E-005
68	4.99E-005
69	1.05E-004
70	1.67E-004
71	4.08E-004
72	8.46E-004

---

```
#####
#                VERIFICAÇÃO DA FADIGA (ELS)                #
#                VmaxHmin                                    #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-3.68E-004	-3.01E-003
2	-3.69E-004	-2.96E-003
3	-3.71E-004	-2.92E-003
4	-3.72E-004	-2.95E-003
5	-3.74E-004	-3.07E-003
6	-3.75E-004	-3.25E-003
7	-3.76E-004	-3.44E-003
8	-2.08E-004	-3.44E-003
9	-1.01E-004	-3.44E-003
10	-5.40E-005	-3.45E-003
11	-3.52E-005	-3.45E-003
12	-1.86E-005	-3.46E-003
13	-8.10E-006	-3.46E-003
14	-7.51E-006	-3.46E-003
15	-6.37E-006	-3.48E-003
16	-5.23E-006	-3.46E-003
17	-4.09E-006	-3.36E-003
18	-2.94E-006	-3.20E-003
19	-2.36E-006	-3.03E-003
20	-1.66E-004	-3.03E-003
21	-2.93E-004	-3.02E-003
22	-3.75E-004	-3.02E-003
23	-4.18E-004	-3.02E-003
24	-4.13E-004	-3.01E-003
25	3.79E-006	-3.19E-003
26	3.01E-006	-3.10E-003
27	1.51E-006	-3.01E-003
28	8.46E-011	-2.97E-003
29	-1.51E-006	-3.00E-003
30	-3.01E-006	-3.10E-003
31	-3.79E-006	-3.19E-003
32	7.28E-005	-3.19E-003
33	9.59E-005	-3.19E-003
34	7.05E-005	-3.20E-003
35	3.53E-005	-3.20E-003
36	1.54E-005	-3.21E-003
37	-6.97E-006	-3.21E-003
38	-6.38E-006	-3.24E-003
39	-5.25E-006	-3.29E-003
40	-4.11E-006	-3.32E-003
41	-2.97E-006	-3.29E-003
42	-1.83E-006	-3.25E-003
43	-1.25E-006	-3.21E-003
44	-2.29E-005	-3.21E-003
45	-4.66E-005	-3.21E-003
46	-8.17E-005	-3.20E-003
47	-1.02E-004	-3.20E-003
48	-7.54E-005	-3.19E-003
49	3.63E-004	-3.43E-003

50	3.63E-004	-3.25E-003
51	3.61E-004	-3.07E-003
52	3.60E-004	-2.95E-003
53	3.58E-004	-2.92E-003
54	3.57E-004	-2.96E-003
55	3.56E-004	-3.01E-003
56	4.01E-004	-3.01E-003
57	4.06E-004	-3.02E-003
58	3.63E-004	-3.02E-003
59	2.82E-004	-3.02E-003
60	1.56E-004	-3.03E-003
61	-6.03E-006	-3.03E-003
62	-5.44E-006	-3.20E-003
63	-4.30E-006	-3.36E-003
64	-3.16E-006	-3.45E-003
65	-2.02E-006	-3.47E-003
66	-8.73E-007	-3.46E-003
67	-2.86E-007	-3.45E-003
68	1.10E-005	-3.45E-003
69	3.26E-005	-3.45E-003
70	5.22E-005	-3.44E-003
71	9.46E-005	-3.44E-003
72	1.98E-004	-3.43E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.85E-004
2	2.08E-004
3	4.72E-005
4	-2.87E-004
5	-5.98E-004
6	-6.83E-004
7	-6.40E-004
8	-5.66E-004
9	-2.54E-004
10	-1.02E-004
11	-5.11E-005
12	-5.80E-005
13	-1.58E-005
14	3.51E-005
15	2.92E-005
16	-2.05E-004
17	-4.86E-004
18	-6.32E-004
19	-6.13E-004
20	-5.69E-004
21	-3.70E-004
22	-2.28E-004
23	-8.21E-005
24	1.35E-004
25	3.16E-004
26	3.56E-004
27	2.78E-004
28	1.40E-006
29	-2.74E-004

30	-3.48E-004
31	-3.07E-004
32	-2.38E-004
33	3.31E-005
34	1.31E-004
35	1.04E-004
36	6.41E-005
37	1.01E-004
38	1.50E-004
39	1.68E-004
40	4.23E-006
41	-1.61E-004
42	-1.46E-004
43	-9.82E-005
44	-6.34E-005
45	-1.20E-004
46	-1.18E-004
47	-1.54E-005
48	2.48E-004
49	6.31E-004
50	6.74E-004
51	5.94E-004
52	2.86E-004
53	-4.70E-005
54	-2.07E-004
55	-1.84E-004
56	-1.34E-004
57	8.11E-005
58	2.25E-004
59	3.66E-004
60	5.64E-004
61	6.08E-004
62	6.26E-004
63	4.80E-004
64	2.01E-004
65	-3.10E-005
66	-3.34E-005
67	1.83E-005
68	6.27E-005
69	7.14E-005
70	9.18E-005
71	2.37E-004
72	5.55E-004

---

```
#####
#                VERIFICAÇÃO DA FADIGA (ELS)                #
#                VminHmax                                    #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-7.20E-005	-2.77E-003
2	-7.33E-005	-2.72E-003
3	-7.57E-005	-2.68E-003
4	-7.81E-005	-2.67E-003
5	-8.05E-005	-2.72E-003
6	-8.30E-005	-2.81E-003
7	-8.42E-005	-2.87E-003
8	-3.04E-005	-2.88E-003
9	-9.99E-006	-2.88E-003
10	-2.63E-006	-2.88E-003
11	2.47E-006	-2.89E-003
12	5.87E-006	-2.89E-003
13	4.06E-007	-2.89E-003
14	1.42E-006	-2.91E-003
15	3.39E-006	-2.94E-003
16	5.36E-006	-2.96E-003
17	7.33E-006	-2.92E-003
18	9.30E-006	-2.85E-003
19	1.03E-005	-2.78E-003
20	-4.76E-005	-2.78E-003
21	-7.93E-005	-2.78E-003
22	-9.48E-005	-2.78E-003
23	-1.08E-004	-2.77E-003
24	-1.05E-004	-2.77E-003
25	6.10E-006	-2.80E-003
26	4.85E-006	-2.76E-003
27	2.42E-006	-2.71E-003
28	5.28E-011	-2.68E-003
29	-2.42E-006	-2.71E-003
30	-4.85E-006	-2.76E-003
31	-6.10E-006	-2.80E-003
32	1.77E-005	-2.80E-003
33	1.26E-005	-2.80E-003
34	2.32E-006	-2.81E-003
35	-2.55E-006	-2.81E-003
36	-1.57E-006	-2.81E-003
37	-4.95E-006	-2.82E-003
38	-3.93E-006	-2.83E-003
39	-1.96E-006	-2.86E-003
40	1.04E-008	-2.88E-003
41	1.98E-006	-2.86E-003
42	3.96E-006	-2.83E-003
43	4.97E-006	-2.82E-003
44	1.59E-006	-2.81E-003
45	2.62E-006	-2.81E-003
46	-2.25E-006	-2.81E-003
47	-1.26E-005	-2.80E-003
48	-1.77E-005	-2.80E-003
49	8.42E-005	-2.87E-003

50	8.30E-005	-2.81E-003
51	8.06E-005	-2.72E-003
52	7.81E-005	-2.67E-003
53	7.57E-005	-2.68E-003
54	7.33E-005	-2.72E-003
55	7.20E-005	-2.77E-003
56	1.05E-004	-2.77E-003
57	1.08E-004	-2.77E-003
58	9.48E-005	-2.78E-003
59	7.93E-005	-2.78E-003
60	4.76E-005	-2.78E-003
61	-1.03E-005	-2.78E-003
62	-9.28E-006	-2.85E-003
63	-7.31E-006	-2.92E-003
64	-5.34E-006	-2.96E-003
65	-3.37E-006	-2.94E-003
66	-1.40E-006	-2.91E-003
67	-3.83E-007	-2.89E-003
68	-5.85E-006	-2.89E-003
69	-2.51E-006	-2.89E-003
70	2.60E-006	-2.88E-003
71	1.00E-005	-2.88E-003
72	3.04E-005	-2.88E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.40E-004
2	1.75E-004
3	1.24E-004
4	-8.71E-005
5	-2.80E-004
6	-2.73E-004
7	-2.23E-004
8	-1.61E-004
9	-3.25E-005
10	-2.18E-005
11	-1.61E-005
12	2.41E-006
13	3.94E-005
14	8.71E-005
15	1.18E-004
16	-3.59E-005
17	-2.14E-004
18	-2.60E-004
19	-2.29E-004
20	-1.87E-004
21	-6.86E-005
22	-5.31E-005
23	-3.66E-005
24	9.22E-005
25	1.12E-004
26	1.60E-004
27	1.70E-004
28	-3.67E-009
29	-1.70E-004

30	-1.60E-004
31	-1.12E-004
32	-5.43E-005
33	4.58E-005
34	2.82E-005
35	6.48E-006
36	-2.68E-006
37	3.03E-005
38	7.63E-005
39	1.17E-004
40	-1.30E-008
41	-1.18E-004
42	-7.63E-005
43	-3.03E-005
44	2.70E-006
45	-6.26E-006
46	-2.84E-005
47	-4.59E-005
48	5.43E-005
49	2.23E-004
50	2.73E-004
51	2.80E-004
52	8.71E-005
53	-1.24E-004
54	-1.75E-004
55	-1.40E-004
56	-9.22E-005
57	3.66E-005
58	5.32E-005
59	6.86E-005
60	1.87E-004
61	2.29E-004
62	2.60E-004
63	2.14E-004
64	3.59E-005
65	-1.18E-004
66	-8.71E-005
67	-3.94E-005
68	-2.45E-006
69	1.59E-005
70	2.20E-005
71	3.26E-005
72	1.61E-004

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VmaxHmax                             #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-3.28E-004	-3.02E-003
2	-3.29E-004	-2.97E-003
3	-3.31E-004	-2.93E-003
4	-3.32E-004	-2.95E-003
5	-3.34E-004	-3.07E-003
6	-3.36E-004	-3.24E-003
7	-3.36E-004	-3.41E-003
8	-1.83E-004	-3.41E-003
9	-8.76E-005	-3.41E-003
10	-4.66E-005	-3.42E-003
11	-2.96E-005	-3.42E-003
12	-1.48E-005	-3.43E-003
13	-6.87E-006	-3.43E-003
14	-6.20E-006	-3.43E-003
15	-4.91E-006	-3.45E-003
16	-3.62E-006	-3.44E-003
17	-2.33E-006	-3.35E-003
18	-1.04E-006	-3.20E-003
19	-3.78E-007	-3.04E-003
20	-1.51E-004	-3.04E-003
21	-2.66E-004	-3.04E-003
22	-3.39E-004	-3.03E-003
23	-3.78E-004	-3.03E-003
24	-3.73E-004	-3.03E-003
25	4.13E-006	-3.18E-003
26	3.29E-006	-3.10E-003
27	1.64E-006	-3.01E-003
28	8.10E-011	-2.97E-003
29	-1.64E-006	-3.01E-003
30	-3.29E-006	-3.10E-003
31	-4.13E-006	-3.18E-003
32	6.58E-005	-3.18E-003
33	8.44E-005	-3.19E-003
34	6.06E-005	-3.19E-003
35	2.97E-005	-3.19E-003
36	1.29E-005	-3.20E-003
37	-6.70E-006	-3.20E-003
38	-6.03E-006	-3.23E-003
39	-4.75E-006	-3.28E-003
40	-3.46E-006	-3.30E-003
41	-2.17E-006	-3.28E-003
42	-8.85E-007	-3.23E-003
43	-2.23E-007	-3.20E-003
44	-1.92E-005	-3.20E-003
45	-3.92E-005	-3.20E-003
46	-7.00E-005	-3.19E-003
47	-8.98E-005	-3.19E-003
48	-6.79E-005	-3.19E-003
49	3.26E-004	-3.40E-003

50	3.25E-004	-3.24E-003
51	3.23E-004	-3.07E-003
52	3.22E-004	-2.95E-003
53	3.20E-004	-2.93E-003
54	3.18E-004	-2.97E-003
55	3.18E-004	-3.02E-003
56	3.62E-004	-3.03E-003
57	3.68E-004	-3.03E-003
58	3.29E-004	-3.03E-003
59	2.57E-004	-3.04E-003
60	1.43E-004	-3.04E-003
61	-6.68E-006	-3.04E-003
62	-6.02E-006	-3.20E-003
63	-4.73E-006	-3.35E-003
64	-3.44E-006	-3.43E-003
65	-2.15E-006	-3.45E-003
66	-8.60E-007	-3.43E-003
67	-1.97E-007	-3.42E-003
68	8.48E-006	-3.42E-003
69	2.75E-005	-3.42E-003
70	4.52E-005	-3.41E-003
71	8.25E-005	-3.41E-003
72	1.75E-004	-3.41E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.84E-004
2	2.09E-004
3	6.09E-005
4	-2.61E-004
5	-5.60E-004
6	-6.33E-004
7	-5.88E-004
8	-5.14E-004
9	-2.21E-004
10	-9.13E-005
11	-4.69E-005
12	-4.89E-005
13	-6.63E-006
14	4.49E-005
15	4.48E-005
16	-1.81E-004
17	-4.52E-004
18	-5.87E-004
19	-5.66E-004
20	-5.22E-004
21	-3.31E-004
22	-2.05E-004
23	-7.47E-005
24	1.34E-004
25	2.90E-004
26	3.32E-004
27	2.67E-004
28	1.18E-006
29	-2.63E-004

30	-3.25E-004
31	-2.83E-004
32	-2.14E-004
33	3.84E-005
34	1.17E-004
35	8.96E-005
36	5.41E-005
37	9.14E-005
38	1.41E-004
39	1.63E-004
40	3.56E-006
41	-1.57E-004
42	-1.37E-004
43	-8.87E-005
44	-5.35E-005
45	-1.03E-004
46	-1.06E-004
47	-2.35E-005
48	2.23E-004
49	5.80E-004
50	6.25E-004
51	5.57E-004
52	2.60E-004
53	-6.07E-005
54	-2.08E-004
55	-1.84E-004
56	-1.33E-004
57	7.39E-005
58	2.03E-004
59	3.28E-004
60	5.17E-004
61	5.62E-004
62	5.82E-004
63	4.48E-004
64	1.78E-004
65	-4.63E-005
66	-4.35E-005
67	8.66E-006
68	5.29E-005
69	6.39E-005
70	8.24E-005
71	2.07E-004
72	5.05E-004

---

```
#####
#                VERIFICAÇÃO DA FADIGA (ELS)                #
#                VminHmin                                    #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-2.79E-004	-2.71E-003
2	-2.79E-004	-2.66E-003
3	-2.81E-004	-2.62E-003
4	-2.82E-004	-2.64E-003
5	-2.84E-004	-2.74E-003
6	-2.85E-004	-2.89E-003
7	-2.86E-004	-3.04E-003
8	-1.55E-004	-3.04E-003
9	-7.37E-005	-3.04E-003
10	-3.91E-005	-3.05E-003
11	-2.45E-005	-3.05E-003
12	-1.21E-005	-3.05E-003
13	-5.80E-006	-3.05E-003
14	-5.21E-006	-3.06E-003
15	-4.07E-006	-3.08E-003
16	-2.93E-006	-3.07E-003
17	-1.79E-006	-2.99E-003
18	-6.51E-007	-2.86E-003
19	-6.41E-008	-2.73E-003
20	-1.29E-004	-2.72E-003
21	-2.28E-004	-2.72E-003
22	-2.90E-004	-2.72E-003
23	-3.24E-004	-2.71E-003
24	-3.18E-004	-2.71E-003
25	3.79E-006	-2.84E-003
26	3.01E-006	-2.77E-003
27	1.51E-006	-2.69E-003
28	7.11E-011	-2.66E-003
29	-1.51E-006	-2.69E-003
30	-3.01E-006	-2.77E-003
31	-3.79E-006	-2.84E-003
32	5.62E-005	-2.84E-003
33	7.13E-005	-2.85E-003
34	5.07E-005	-2.85E-003
35	2.46E-005	-2.85E-003
36	1.07E-005	-2.86E-003
37	-5.73E-006	-2.86E-003
38	-5.14E-006	-2.89E-003
39	-4.00E-006	-2.93E-003
40	-2.87E-006	-2.95E-003
41	-1.73E-006	-2.93E-003
42	-5.89E-007	-2.89E-003
43	-3.31E-009	-2.86E-003
44	-1.59E-005	-2.86E-003
45	-3.25E-005	-2.86E-003
46	-5.85E-005	-2.85E-003
47	-7.58E-005	-2.85E-003
48	-5.80E-005	-2.85E-003
49	2.77E-004	-3.03E-003

50	2.77E-004	-2.89E-003
51	2.75E-004	-2.74E-003
52	2.74E-004	-2.64E-003
53	2.72E-004	-2.62E-003
54	2.71E-004	-2.66E-003
55	2.70E-004	-2.71E-003
56	3.10E-004	-2.71E-003
57	3.15E-004	-2.72E-003
58	2.82E-004	-2.72E-003
59	2.20E-004	-2.72E-003
60	1.23E-004	-2.72E-003
61	-5.79E-006	-2.73E-003
62	-5.20E-006	-2.86E-003
63	-4.06E-006	-2.99E-003
64	-2.92E-006	-3.06E-003
65	-1.78E-006	-3.07E-003
66	-6.35E-007	-3.06E-003
67	-4.86E-008	-3.05E-003
68	6.81E-006	-3.05E-003
69	2.28E-005	-3.05E-003
70	3.79E-005	-3.04E-003
71	6.94E-005	-3.04E-003
72	1.48E-004	-3.03E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.64E-004
2	1.87E-004
3	5.92E-005
4	-2.24E-004
5	-4.85E-004
6	-5.46E-004
7	-5.06E-004
8	-4.40E-004
9	-1.86E-004
10	-7.75E-005
11	-4.01E-005
12	-4.03E-005
13	-3.21E-006
14	4.21E-005
15	4.33E-005
16	-1.53E-004
17	-3.89E-004
18	-5.05E-004
19	-4.87E-004
20	-4.48E-004
21	-2.82E-004
22	-1.75E-004
23	-6.34E-005
24	1.19E-004
25	2.50E-004
26	2.87E-004
27	2.33E-004
28	9.75E-007
29	-2.30E-004

30	-2.82E-004
31	-2.44E-004
32	-1.83E-004
33	3.58E-005
34	9.96E-005
35	7.50E-005
36	4.47E-005
37	7.74E-005
38	1.21E-004
39	1.41E-004
40	2.95E-006
41	-1.36E-004
42	-1.18E-004
43	-7.52E-005
44	-4.43E-005
45	-8.64E-005
46	-9.05E-005
47	-2.34E-005
48	1.90E-004
49	4.99E-004
50	5.40E-004
51	4.82E-004
52	2.23E-004
53	-5.91E-005
54	-1.87E-004
55	-1.64E-004
56	-1.19E-004
57	6.27E-005
58	1.73E-004
59	2.80E-004
60	4.44E-004
61	4.83E-004
62	5.01E-004
63	3.85E-004
64	1.50E-004
65	-4.46E-005
66	-4.08E-005
67	4.89E-006
68	4.36E-005
69	5.42E-005
70	7.02E-005
71	1.74E-004
72	4.32E-004

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmin          #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-3.35E-004	-2.90E-003
2	-3.35E-004	-2.85E-003
3	-3.37E-004	-2.80E-003
4	-3.38E-004	-2.83E-003
5	-3.40E-004	-2.95E-003
6	-3.41E-004	-3.12E-003
7	-3.42E-004	-3.29E-003
8	-1.88E-004	-3.29E-003
9	-9.05E-005	-3.29E-003
10	-4.84E-005	-3.30E-003
11	-3.12E-005	-3.30E-003
12	-1.61E-005	-3.30E-003
13	-7.24E-006	-3.31E-003
14	-6.65E-006	-3.31E-003
15	-5.51E-006	-3.33E-003
16	-4.37E-006	-3.31E-003
17	-3.23E-006	-3.22E-003
18	-2.08E-006	-3.07E-003
19	-1.50E-006	-2.92E-003
20	-1.52E-004	-2.91E-003
21	-2.69E-004	-2.91E-003
22	-3.43E-004	-2.91E-003
23	-3.83E-004	-2.90E-003
24	-3.78E-004	-2.90E-003
25	3.79E-006	-3.06E-003
26	3.01E-006	-2.98E-003
27	1.51E-006	-2.89E-003
28	7.96E-011	-2.85E-003
29	-1.51E-006	-2.89E-003
30	-3.01E-006	-2.97E-003
31	-3.79E-006	-3.06E-003
32	6.65E-005	-3.06E-003
33	8.67E-005	-3.06E-003
34	6.30E-005	-3.07E-003
35	3.13E-005	-3.07E-003
36	1.36E-005	-3.07E-003
37	-6.50E-006	-3.08E-003
38	-5.92E-006	-3.11E-003
39	-4.78E-006	-3.16E-003
40	-3.64E-006	-3.18E-003
41	-2.50E-006	-3.16E-003
42	-1.37E-006	-3.11E-003
43	-7.80E-007	-3.08E-003
44	-2.03E-005	-3.08E-003
45	-4.13E-005	-3.08E-003
46	-7.30E-005	-3.07E-003
47	-9.24E-005	-3.07E-003
48	-6.88E-005	-3.06E-003
49	3.31E-004	-3.28E-003

50	3.30E-004	-3.12E-003
51	3.29E-004	-2.95E-003
52	3.27E-004	-2.83E-003
53	3.26E-004	-2.81E-003
54	3.24E-004	-2.85E-003
55	3.24E-004	-2.90E-003
56	3.67E-004	-2.90E-003
57	3.72E-004	-2.90E-003
58	3.32E-004	-2.91E-003
59	2.59E-004	-2.91E-003
60	1.44E-004	-2.91E-003
61	-5.94E-006	-2.92E-003
62	-5.35E-006	-3.07E-003
63	-4.21E-006	-3.22E-003
64	-3.07E-006	-3.31E-003
65	-1.93E-006	-3.32E-003
66	-7.84E-007	-3.31E-003
67	-1.97E-007	-3.30E-003
68	9.45E-006	-3.30E-003
69	2.89E-005	-3.30E-003
70	4.68E-005	-3.29E-003
71	8.52E-005	-3.29E-003
72	1.79E-004	-3.28E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.77E-004
2	2.00E-004
3	5.17E-005
4	-2.63E-004
5	-5.56E-004
6	-6.32E-004
7	-5.90E-004
8	-5.18E-004
9	-2.28E-004
10	-9.30E-005
11	-4.70E-005
12	-5.14E-005
13	-1.11E-005
14	3.77E-005
15	3.45E-005
16	-1.85E-004
17	-4.49E-004
18	-5.84E-004
19	-5.66E-004
20	-5.24E-004
21	-3.37E-004
22	-2.08E-004
23	-7.51E-005
24	1.29E-004
25	2.91E-004
26	3.30E-004
27	2.61E-004
28	1.24E-006
29	-2.58E-004

30	-3.23E-004
31	-2.83E-004
32	-2.17E-004
33	3.41E-005
34	1.19E-004
35	9.30E-005
36	5.68E-005
37	9.23E-005
38	1.39E-004
39	1.58E-004
40	3.75E-006
41	-1.52E-004
42	-1.35E-004
43	-8.95E-005
44	-5.62E-005
45	-1.07E-004
46	-1.08E-004
47	-1.84E-005
48	2.26E-004
49	5.81E-004
50	6.24E-004
51	5.52E-004
52	2.62E-004
53	-5.15E-005
54	-1.99E-004
55	-1.77E-004
56	-1.29E-004
57	7.42E-005
58	2.06E-004
59	3.33E-004
60	5.19E-004
61	5.61E-004
62	5.79E-004
63	4.44E-004
64	1.82E-004
65	-3.61E-005
66	-3.62E-005
67	1.32E-005
68	5.56E-005
69	6.50E-005
70	8.37E-005
71	2.14E-004
72	5.09E-004

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VminHmax          #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-8.21E-005	-2.77E-003
2	-8.33E-005	-2.72E-003
3	-8.57E-005	-2.67E-003
4	-8.80E-005	-2.67E-003
5	-9.04E-005	-2.72E-003
6	-9.27E-005	-2.81E-003
7	-9.39E-005	-2.88E-003
8	-3.55E-005	-2.89E-003
9	-1.23E-005	-2.89E-003
10	-3.97E-006	-2.89E-003
11	1.61E-006	-2.90E-003
12	5.32E-006	-2.90E-003
13	4.57E-008	-2.90E-003
14	1.02E-006	-2.92E-003
15	2.90E-006	-2.95E-003
16	4.79E-006	-2.97E-003
17	6.68E-006	-2.93E-003
18	8.57E-006	-2.85E-003
19	9.54E-006	-2.78E-003
20	-5.32E-005	-2.78E-003
21	-8.93E-005	-2.78E-003
22	-1.07E-004	-2.77E-003
23	-1.21E-004	-2.77E-003
24	-1.16E-004	-2.77E-003
25	5.90E-006	-2.80E-003
26	4.69E-006	-2.76E-003
27	2.35E-006	-2.71E-003
28	5.37E-011	-2.68E-003
29	-2.35E-006	-2.71E-003
30	-4.69E-006	-2.76E-003
31	-5.90E-006	-2.80E-003
32	1.99E-005	-2.80E-003
33	1.52E-005	-2.81E-003
34	4.11E-006	-2.81E-003
35	-1.58E-006	-2.81E-003
36	-1.04E-006	-2.82E-003
37	-4.76E-006	-2.82E-003
38	-3.78E-006	-2.83E-003
39	-1.89E-006	-2.87E-003
40	-4.08E-009	-2.88E-003
41	1.89E-006	-2.87E-003
42	3.78E-006	-2.83E-003
43	4.75E-006	-2.82E-003
44	1.03E-006	-2.82E-003
45	1.56E-006	-2.81E-003
46	-4.14E-006	-2.81E-003
47	-1.52E-005	-2.81E-003
48	-1.99E-005	-2.80E-003
49	9.39E-005	-2.88E-003

50	9.27E-005	-2.81E-003
51	9.04E-005	-2.72E-003
52	8.80E-005	-2.67E-003
53	8.57E-005	-2.67E-003
54	8.33E-005	-2.72E-003
55	8.21E-005	-2.77E-003
56	1.16E-004	-2.77E-003
57	1.21E-004	-2.77E-003
58	1.07E-004	-2.77E-003
59	8.93E-005	-2.78E-003
60	5.32E-005	-2.78E-003
61	-9.55E-006	-2.78E-003
62	-8.58E-006	-2.85E-003
63	-6.69E-006	-2.93E-003
64	-4.80E-006	-2.97E-003
65	-2.91E-006	-2.95E-003
66	-1.03E-006	-2.92E-003
67	-5.50E-008	-2.90E-003
68	-5.33E-006	-2.90E-003
69	-1.60E-006	-2.90E-003
70	3.99E-006	-2.89E-003
71	1.23E-005	-2.89E-003
72	3.55E-005	-2.89E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

SEÇÃO	ROTAÇÃO (rad)
1	1.46E-004
2	1.80E-004
3	1.22E-004
4	-9.53E-005
5	-2.93E-004
6	-2.89E-004
7	-2.40E-004
8	-1.77E-004
9	-3.76E-005
10	-2.43E-005
11	-1.74E-005
12	1.55E-006
13	3.88E-005
14	8.65E-005
15	1.16E-004
16	-4.09E-005
17	-2.24E-004
18	-2.76E-004
19	-2.47E-004
20	-2.05E-004
21	-8.21E-005
22	-5.86E-005
23	-3.42E-005
24	9.83E-005
25	1.20E-004
26	1.66E-004
27	1.73E-004
28	1.48E-009
29	-1.73E-004

30	-1.66E-004
31	-1.20E-004
32	-6.11E-005
33	4.83E-005
34	3.16E-005
35	8.79E-006
36	-1.49E-006
37	3.15E-005
38	7.75E-005
39	1.18E-004
40	5.21E-009
41	-1.18E-004
42	-7.74E-005
43	-3.15E-005
44	1.49E-006
45	-8.88E-006
46	-3.15E-005
47	-4.82E-005
48	6.11E-005
49	2.40E-004
50	2.89E-004
51	2.93E-004
52	9.53E-005
53	-1.22E-004
54	-1.80E-004
55	-1.46E-004
56	-9.83E-005
57	3.42E-005
58	5.86E-005
59	8.21E-005
60	2.05E-004
61	2.47E-004
62	2.76E-004
63	2.24E-004
64	4.09E-005
65	-1.16E-004
66	-8.65E-005
67	-3.88E-005
68	-1.53E-006
69	1.74E-005
70	2.43E-005
71	3.75E-005
72	1.77E-004

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmax          #
#####
```

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

-----

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-3.10E-004	-2.91E-003
2	-3.10E-004	-2.85E-003
3	-3.12E-004	-2.81E-003
4	-3.14E-004	-2.84E-003
5	-3.15E-004	-2.95E-003
6	-3.17E-004	-3.11E-003
7	-3.18E-004	-3.27E-003
8	-1.72E-004	-3.27E-003
9	-8.24E-005	-3.27E-003
10	-4.38E-005	-3.28E-003
11	-2.77E-005	-3.28E-003
12	-1.38E-005	-3.29E-003
13	-6.47E-006	-3.29E-003
14	-5.83E-006	-3.29E-003
15	-4.60E-006	-3.31E-003
16	-3.36E-006	-3.30E-003
17	-2.13E-006	-3.21E-003
18	-8.95E-007	-3.07E-003
19	-2.60E-007	-2.92E-003
20	-1.43E-004	-2.92E-003
21	-2.52E-004	-2.92E-003
22	-3.21E-004	-2.91E-003
23	-3.58E-004	-2.91E-003
24	-3.52E-004	-2.91E-003
25	4.01E-006	-3.06E-003
26	3.19E-006	-2.98E-003
27	1.59E-006	-2.89E-003
28	7.73E-011	-2.85E-003
29	-1.59E-006	-2.89E-003
30	-3.19E-006	-2.97E-003
31	-4.00E-006	-3.05E-003
32	6.22E-005	-3.05E-003
33	7.95E-005	-3.06E-003
34	5.69E-005	-3.06E-003
35	2.78E-005	-3.07E-003
36	1.21E-005	-3.07E-003
37	-6.33E-006	-3.07E-003
38	-5.70E-006	-3.10E-003
39	-4.47E-006	-3.15E-003
40	-3.24E-006	-3.17E-003
41	-2.01E-006	-3.15E-003
42	-7.74E-007	-3.10E-003
43	-1.41E-007	-3.08E-003
44	-1.80E-005	-3.07E-003
45	-3.67E-005	-3.07E-003
46	-6.57E-005	-3.07E-003
47	-8.45E-005	-3.06E-003
48	-6.42E-005	-3.06E-003
49	3.08E-004	-3.26E-003

50	3.07E-004	-3.11E-003
51	3.05E-004	-2.95E-003
52	3.04E-004	-2.84E-003
53	3.02E-004	-2.81E-003
54	3.00E-004	-2.85E-003
55	3.00E-004	-2.91E-003
56	3.43E-004	-2.91E-003
57	3.48E-004	-2.91E-003
58	3.11E-004	-2.92E-003
59	2.43E-004	-2.92E-003
60	1.35E-004	-2.92E-003
61	-6.35E-006	-2.92E-003
62	-5.71E-006	-3.07E-003
63	-4.48E-006	-3.21E-003
64	-3.24E-006	-3.29E-003
65	-2.01E-006	-3.31E-003
66	-7.76E-007	-3.29E-003
67	-1.41E-007	-3.28E-003
68	7.85E-006	-3.28E-003
69	2.57E-005	-3.28E-003
70	4.24E-005	-3.27E-003
71	7.76E-005	-3.27E-003
72	1.65E-004	-3.27E-003

-----

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

-----

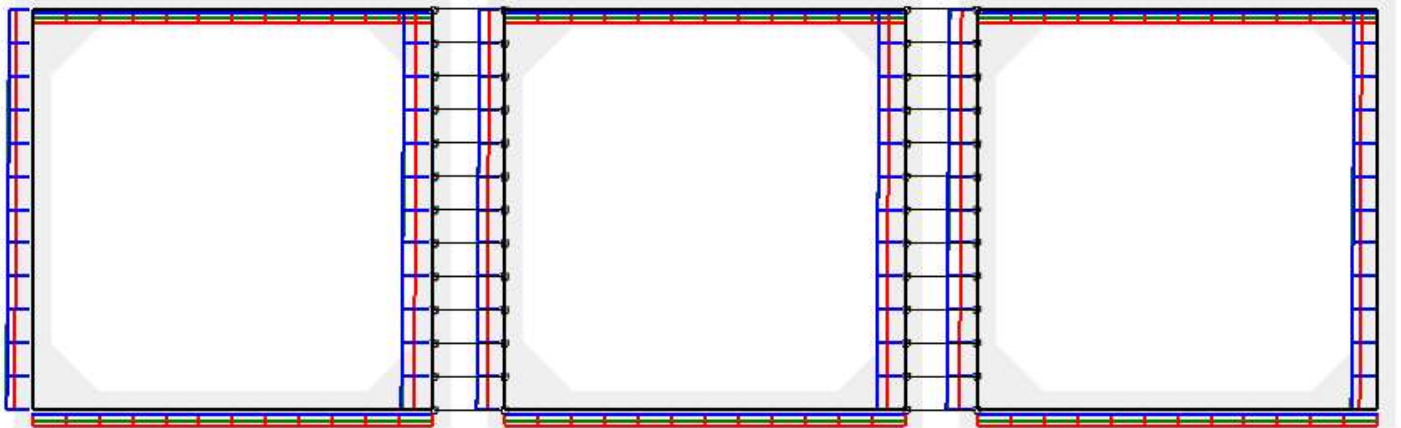
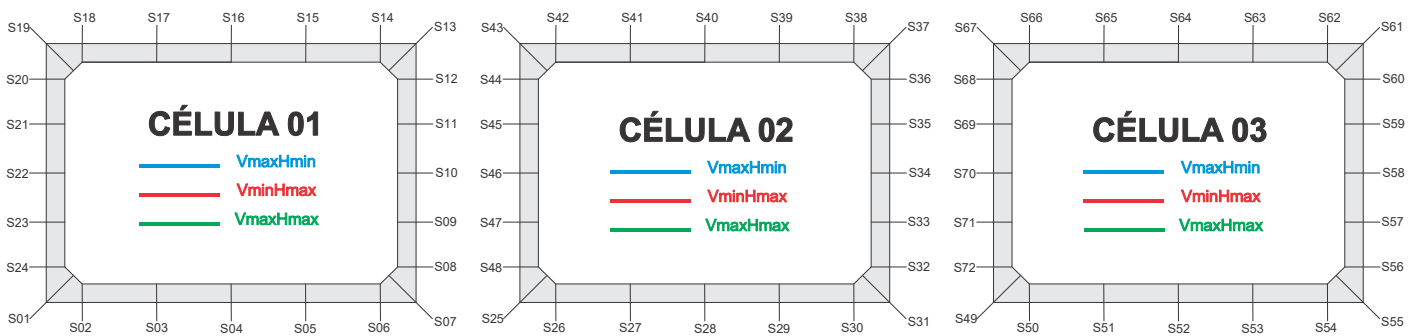
SEÇÃO	ROTAÇÃO (rad)
1	1.77E-004
2	2.01E-004
3	6.03E-005
4	-2.47E-004
5	-5.32E-004
6	-6.00E-004
7	-5.57E-004
8	-4.86E-004
9	-2.08E-004
10	-8.61E-005
11	-4.43E-005
12	-4.57E-005
13	-5.35E-006
14	4.38E-005
15	4.43E-005
16	-1.71E-004
17	-4.29E-004
18	-5.56E-004
19	-5.37E-004
20	-4.94E-004
21	-3.13E-004
22	-1.94E-004
23	-7.05E-005
24	1.28E-004
25	2.75E-004
26	3.15E-004
27	2.54E-004
28	1.10E-006
29	-2.51E-004

30	-3.09E-004
31	-2.68E-004
32	-2.02E-004
33	3.74E-005
34	1.11E-004
35	8.41E-005
36	5.06E-005
37	8.61E-005
38	1.33E-004
39	1.55E-004
40	3.33E-006
41	-1.49E-004
42	-1.30E-004
43	-8.36E-005
44	-5.01E-005
45	-9.70E-005
46	-1.00E-004
47	-2.35E-005
48	2.10E-004
49	5.50E-004
50	5.93E-004
51	5.29E-004
52	2.46E-004
53	-6.01E-005
54	-2.00E-004
55	-1.76E-004
56	-1.28E-004
57	6.97E-005
58	1.92E-004
59	3.10E-004
60	4.90E-004
61	5.32E-004
62	5.51E-004
63	4.24E-004
64	1.68E-004
65	-4.57E-005
66	-4.25E-005
67	7.25E-006
68	4.94E-005
69	6.03E-005
70	7.78E-005
71	1.95E-004
72	4.78E-004

---

## ESFORÇO NORMAL

### NOMENCLATURA DAS SEÇÕES PARA VERSÃO COMPLETA DO RELATÓRIO



```
#####
#          SOLICITAÇÕES NORMAIS (ELU)          #
#          VmaxHmin                             #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-75.83	-12.14
2	-12.14	-12.14
3	-12.14	-12.14
4	-12.14	-12.14
5	-12.14	-12.14
6	-12.14	-12.14
7	-12.14	-91.44
8	-89.78	-89.78
9	-88.44	-88.44
10	-87.10	-87.10
11	-85.76	-85.76
12	-84.41	-84.41
13	-82.75	-10.63
14	-10.63	-10.63
15	-10.63	-10.63
16	-10.63	-10.63
17	-10.63	-10.63
18	-10.63	-10.63
19	-10.63	-67.14
20	-68.81	-68.81
21	-70.15	-70.15
22	-71.49	-71.49
23	-72.83	-72.83
24	-74.17	-74.17
25	-75.83	-12.77
26	-12.77	-12.77
27	-12.77	-12.77
28	-12.77	-12.77
29	-12.77	-12.77
30	-12.77	-12.77
31	-12.77	-83.64
32	-81.97	-81.97
33	-80.63	-80.63
34	-79.29	-79.29
35	-77.95	-77.95
36	-76.61	-76.61
37	-74.94	-10.00
38	-10.00	-10.00
39	-10.00	-10.00
40	-10.00	-10.00
41	-10.00	-10.00
42	-10.00	-10.00
43	-10.00	-74.94
44	-76.61	-76.61
45	-77.95	-77.95
46	-79.29	-79.29
47	-80.63	-80.63
48	-81.97	-81.97
49	-83.64	-12.14

	50	-12.14	-12.14
	51	-12.14	-12.14
	52	-12.14	-12.14
	53	-12.14	-12.14
	54	-12.14	-12.14
	55	-12.14	-75.83
	56	-74.17	-74.17
	57	-72.83	-72.83
	58	-71.49	-71.49
	59	-70.15	-70.15
	60	-68.81	-68.81
	61	-67.14	-10.63
	62	-10.63	-10.63
	63	-10.63	-10.63
	64	-10.63	-10.63
	65	-10.63	-10.63
	66	-10.63	-10.63
	67	-10.63	-82.75
	68	-84.41	-84.41
	69	-85.76	-85.76
	70	-87.10	-87.10
	71	-88.44	-88.44
	72	-89.78	-89.78

---

```
#####
#          SOLICITAÇÕES NORMAIS (ELU)          #
#          VminHmax                             #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-52.69	-47.84
2	-47.84	-47.84
3	-47.84	-47.84
4	-47.84	-47.84
5	-47.84	-47.84
6	-47.84	-47.84
7	-47.84	-53.50
8	-52.22	-52.22
9	-51.19	-51.19
10	-50.16	-50.16
11	-49.13	-49.13
12	-48.10	-48.10
13	-46.82	-39.78
14	-39.78	-39.78
15	-39.78	-39.78
16	-39.78	-39.78
17	-39.78	-39.78
18	-39.78	-39.78
19	-39.78	-46.00
20	-47.28	-47.28
21	-48.31	-48.31
22	-49.34	-49.34
23	-50.38	-50.38
24	-51.41	-51.41
25	-52.69	-47.81
26	-47.81	-47.81
27	-47.81	-47.81
28	-47.81	-47.81
29	-47.81	-47.81
30	-47.81	-47.81
31	-47.81	-53.10
32	-51.82	-51.82
33	-50.78	-50.78
34	-49.75	-49.75
35	-48.72	-48.72
36	-47.69	-47.69
37	-46.41	-39.81
38	-39.81	-39.81
39	-39.81	-39.81
40	-39.81	-39.81
41	-39.81	-39.81
42	-39.81	-39.81
43	-39.81	-46.41
44	-47.69	-47.69
45	-48.72	-48.72
46	-49.75	-49.75
47	-50.78	-50.78
48	-51.81	-51.81
49	-53.10	-47.84

	50	-47.84	-47.84
	51	-47.84	-47.84
	52	-47.84	-47.84
	53	-47.84	-47.84
	54	-47.84	-47.84
	55	-47.84	-52.69
	56	-51.41	-51.41
	57	-50.37	-50.37
	58	-49.34	-49.34
	59	-48.31	-48.31
	60	-47.28	-47.28
	61	-46.00	-39.78
	62	-39.78	-39.78
	63	-39.78	-39.78
	64	-39.78	-39.78
	65	-39.78	-39.78
	66	-39.78	-39.78
	67	-39.78	-46.82
	68	-48.10	-48.10
	69	-49.13	-49.13
	70	-50.16	-50.16
	71	-51.19	-51.19
	72	-52.22	-52.22

---

```
#####
#          SOLICITAÇÕES NORMAIS (ELU)          #
#          VmaxHmax                             #
#####
```

-----

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-77.54	-32.47
2	-32.47	-32.47
3	-32.47	-32.47
4	-32.47	-32.47
5	-32.47	-32.47
6	-32.47	-32.47
7	-32.47	-89.74
8	-88.07	-88.07
9	-86.73	-86.73
10	-85.39	-85.39
11	-84.05	-84.05
12	-82.71	-82.71
13	-81.04	-25.94
14	-25.94	-25.94
15	-25.94	-25.94
16	-25.94	-25.94
17	-25.94	-25.94
18	-25.94	-25.94
19	-25.94	-68.84
20	-70.51	-70.51
21	-71.85	-71.85
22	-73.19	-73.19
23	-74.53	-74.53
24	-75.87	-75.87
25	-77.54	-32.53
26	-32.53	-32.53
27	-32.53	-32.53
28	-32.53	-32.53
29	-32.53	-32.53
30	-32.53	-32.53
31	-32.53	-83.77
32	-82.10	-82.10
33	-80.76	-80.76
34	-79.42	-79.42
35	-78.08	-78.08
36	-76.74	-76.74
37	-75.07	-25.89
38	-25.89	-25.89
39	-25.89	-25.89
40	-25.89	-25.89
41	-25.89	-25.89
42	-25.89	-25.89
43	-25.89	-74.81
44	-76.48	-76.48
45	-77.82	-77.82
46	-79.16	-79.16
47	-80.50	-80.50
48	-81.84	-81.84
49	-83.51	-32.48

	50	-32.48	-32.48
	51	-32.48	-32.48
	52	-32.48	-32.48
	53	-32.48	-32.48
	54	-32.48	-32.48
	55	-32.48	-77.41
	56	-75.74	-75.74
	57	-74.40	-74.40
	58	-73.06	-73.06
	59	-71.72	-71.72
	60	-70.38	-70.38
	61	-68.71	-25.94
	62	-25.94	-25.94
	63	-25.94	-25.94
	64	-25.94	-25.94
	65	-25.94	-25.94
	66	-25.94	-25.94
	67	-25.94	-81.17
	68	-82.84	-82.84
	69	-84.18	-84.18
	70	-85.52	-85.52
	71	-86.86	-86.86
	72	-88.20	-88.20

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmin                                #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-78.29	-11.11
2	-11.11	-11.11
3	-11.11	-11.11
4	-11.11	-11.11
5	-11.11	-11.11
6	-11.11	-11.11
7	-11.11	-88.99
8	-87.32	-87.32
9	-85.98	-85.98
10	-84.64	-84.64
11	-83.30	-83.30
12	-81.96	-81.96
13	-80.30	-11.66
14	-11.66	-11.66
15	-11.66	-11.66
16	-11.66	-11.66
17	-11.66	-11.66
18	-11.66	-11.66
19	-11.66	-69.59
20	-71.26	-71.26
21	-72.60	-72.60
22	-73.94	-73.94
23	-75.28	-75.28
24	-76.62	-76.62
25	-78.29	-11.92
26	-11.92	-11.92
27	-11.92	-11.92
28	-11.92	-11.92
29	-11.92	-11.92
30	-11.92	-11.92
31	-11.92	-82.03
32	-80.37	-80.37
33	-79.03	-79.03
34	-77.68	-77.68
35	-76.34	-76.34
36	-75.00	-75.00
37	-73.34	-10.85
38	-10.85	-10.85
39	-10.85	-10.85
40	-10.85	-10.85
41	-10.85	-10.85
42	-10.85	-10.85
43	-10.85	-76.55
44	-78.22	-78.22
45	-79.56	-79.56
46	-80.90	-80.90
47	-82.24	-82.24
48	-83.58	-83.58
49	-85.25	-12.12

	50	-12.12	-12.12
	51	-12.12	-12.12
	52	-12.12	-12.12
	53	-12.12	-12.12
	54	-12.12	-12.12
	55	-12.12	-72.81
	56	-71.14	-71.14
	57	-69.80	-69.80
	58	-68.46	-68.46
	59	-67.12	-67.12
	60	-65.78	-65.78
	61	-64.11	-10.65
	62	-10.65	-10.65
	63	-10.65	-10.65
	64	-10.65	-10.65
	65	-10.65	-10.65
	66	-10.65	-10.65
	67	-10.65	-85.77
	68	-87.44	-87.44
	69	-88.78	-88.78
	70	-90.12	-90.12
	71	-91.46	-91.46
	72	-92.80	-92.80

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VminHmax                                #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-53.12	-47.75
2	-47.75	-47.75
3	-47.75	-47.75
4	-47.75	-47.75
5	-47.75	-47.75
6	-47.75	-47.75
7	-47.75	-53.08
8	-51.80	-51.80
9	-50.76	-50.76
10	-49.73	-49.73
11	-48.70	-48.70
12	-47.67	-47.67
13	-46.39	-39.87
14	-39.87	-39.87
15	-39.87	-39.87
16	-39.87	-39.87
17	-39.87	-39.87
18	-39.87	-39.87
19	-39.87	-46.43
20	-47.71	-47.71
21	-48.74	-48.74
22	-49.77	-49.77
23	-50.80	-50.80
24	-51.83	-51.83
25	-53.12	-47.74
26	-47.74	-47.74
27	-47.74	-47.74
28	-47.74	-47.74
29	-47.74	-47.74
30	-47.74	-47.74
31	-47.74	-52.82
32	-51.54	-51.54
33	-50.51	-50.51
34	-49.48	-49.48
35	-48.45	-48.45
36	-47.41	-47.41
37	-46.13	-39.88
38	-39.88	-39.88
39	-39.88	-39.88
40	-39.88	-39.88
41	-39.88	-39.88
42	-39.88	-39.88
43	-39.88	-46.68
44	-47.97	-47.97
45	-49.00	-49.00
46	-50.03	-50.03
47	-51.06	-51.06
48	-52.09	-52.09
49	-53.37	-47.84

	50	-47.84	-47.84
	51	-47.84	-47.84
	52	-47.84	-47.84
	53	-47.84	-47.84
	54	-47.84	-47.84
	55	-47.84	-52.49
	56	-51.21	-51.21
	57	-50.18	-50.18
	58	-49.15	-49.15
	59	-48.12	-48.12
	60	-47.09	-47.09
	61	-45.81	-39.79
	62	-39.79	-39.79
	63	-39.79	-39.79
	64	-39.79	-39.79
	65	-39.79	-39.79
	66	-39.79	-39.79
	67	-39.79	-47.01
	68	-48.29	-48.29
	69	-49.32	-49.32
	70	-50.35	-50.35
	71	-51.39	-51.39
	72	-52.42	-52.42

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmax                                #
#####
-----
                ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE
-----
| SEÇÃO |          ESQUERDA (kN) |          DIREITA (kN) |
-----
|  1 |          -79.58 |          -31.71 |
|  2 |          -31.71 |          -31.71 |
|  3 |          -31.71 |          -31.71 |
|  4 |          -31.71 |          -31.71 |
|  5 |          -31.71 |          -31.71 |
|  6 |          -31.71 |          -31.71 |
|  7 |          -31.71 |          -87.69 |
|  8 |          -86.03 |          -86.03 |
|  9 |          -84.69 |          -84.69 |
| 10 |          -83.35 |          -83.35 |
| 11 |          -82.01 |          -82.01 |
| 12 |          -80.66 |          -80.66 |
| 13 |          -79.00 |          -26.70 |
| 14 |          -26.70 |          -26.70 |
| 15 |          -26.70 |          -26.70 |
| 16 |          -26.70 |          -26.70 |
| 17 |          -26.70 |          -26.70 |
| 18 |          -26.70 |          -26.70 |
| 19 |          -26.70 |          -70.89 |
| 20 |          -72.56 |          -72.56 |
| 21 |          -73.90 |          -73.90 |
| 22 |          -75.24 |          -75.24 |
| 23 |          -76.58 |          -76.58 |
| 24 |          -77.92 |          -77.92 |
| 25 |          -79.58 |          -31.97 |
| 26 |          -31.97 |          -31.97 |
| 27 |          -31.97 |          -31.97 |
| 28 |          -31.97 |          -31.97 |
| 29 |          -31.97 |          -31.97 |
| 30 |          -31.97 |          -31.97 |
| 31 |          -31.97 |          -82.67 |
| 32 |          -81.01 |          -81.01 |
| 33 |          -79.67 |          -79.67 |
| 34 |          -78.33 |          -78.33 |
| 35 |          -76.99 |          -76.99 |
| 36 |          -75.65 |          -75.65 |
| 37 |          -73.98 |          -26.44 |
| 38 |          -26.44 |          -26.44 |
| 39 |          -26.44 |          -26.44 |
| 40 |          -26.44 |          -26.44 |
| 41 |          -26.44 |          -26.44 |
| 42 |          -26.44 |          -26.44 |
| 43 |          -26.44 |          -75.91 |
| 44 |          -77.58 |          -77.58 |
| 45 |          -78.92 |          -78.92 |
| 46 |          -80.26 |          -80.26 |
| 47 |          -81.60 |          -81.60 |
| 48 |          -82.94 |          -82.94 |
| 49 |          -84.60 |          -32.56 |
```

	50	-32.56	-32.56
	51	-32.56	-32.56
	52	-32.56	-32.56
	53	-32.56	-32.56
	54	-32.56	-32.56
	55	-32.56	-75.52
	56	-73.85	-73.85
	57	-72.51	-72.51
	58	-71.17	-71.17
	59	-69.83	-69.83
	60	-68.49	-68.49
	61	-66.83	-25.86
	62	-25.86	-25.86
	63	-25.86	-25.86
	64	-25.86	-25.86
	65	-25.86	-25.86
	66	-25.86	-25.86
	67	-25.86	-83.06
	68	-84.73	-84.73
	69	-86.07	-86.07
	70	-87.41	-87.41
	71	-88.75	-88.75
	72	-90.09	-90.09

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VmaxHmin                             #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-55.22	-21.38
2	-21.38	-21.38
3	-21.38	-21.38
4	-21.38	-21.38
5	-21.38	-21.38
6	-21.38	-21.38
7	-21.38	-64.27
8	-62.99	-62.99
9	-61.96	-61.96
10	-60.92	-60.92
11	-59.89	-59.89
12	-58.86	-58.86
13	-57.58	-16.24
14	-16.24	-16.24
15	-16.24	-16.24
16	-16.24	-16.24
17	-16.24	-16.24
18	-16.24	-16.24
19	-16.24	-48.53
20	-49.81	-49.81
21	-50.84	-50.84
22	-51.87	-51.87
23	-52.90	-52.90
24	-53.93	-53.93
25	-55.22	-21.44
26	-21.44	-21.44
27	-21.44	-21.44
28	-21.44	-21.44
29	-21.44	-21.44
30	-21.44	-21.44
31	-21.44	-59.85
32	-58.57	-58.57
33	-57.54	-57.54
34	-56.51	-56.51
35	-55.48	-55.48
36	-54.44	-54.44
37	-53.16	-16.18
38	-16.18	-16.18
39	-16.18	-16.18
40	-16.18	-16.18
41	-16.18	-16.18
42	-16.18	-16.18
43	-16.18	-52.95
44	-54.23	-54.23
45	-55.26	-55.26
46	-56.29	-56.29
47	-57.32	-57.32
48	-58.35	-58.35
49	-59.63	-21.38

	50	-21.38	-21.38
	51	-21.38	-21.38
	52	-21.38	-21.38
	53	-21.38	-21.38
	54	-21.38	-21.38
	55	-21.38	-55.11
	56	-53.83	-53.83
	57	-52.79	-52.79
	58	-51.76	-51.76
	59	-50.73	-50.73
	60	-49.70	-49.70
	61	-48.42	-16.24
	62	-16.24	-16.24
	63	-16.24	-16.24
	64	-16.24	-16.24
	65	-16.24	-16.24
	66	-16.24	-16.24
	67	-16.24	-57.69
	68	-58.97	-58.97
	69	-60.00	-60.00
	70	-61.03	-61.03
	71	-62.06	-62.06
	72	-63.10	-63.10

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VminHmax                             #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-50.66	-34.52
2	-34.52	-34.52
3	-34.52	-34.52
4	-34.52	-34.52
5	-34.52	-34.52
6	-34.52	-34.52
7	-34.52	-55.54
8	-54.26	-54.26
9	-53.22	-53.22
10	-52.19	-52.19
11	-51.16	-51.16
12	-50.13	-50.13
13	-48.85	-28.02
14	-28.02	-28.02
15	-28.02	-28.02
16	-28.02	-28.02
17	-28.02	-28.02
18	-28.02	-28.02
19	-28.02	-43.97
20	-45.25	-45.25
21	-46.28	-46.28
22	-47.31	-47.31
23	-48.34	-48.34
24	-49.37	-49.37
25	-50.66	-34.48
26	-34.48	-34.48
27	-34.48	-34.48
28	-34.48	-34.48
29	-34.48	-34.48
30	-34.48	-34.48
31	-34.48	-53.10
32	-51.81	-51.81
33	-50.78	-50.78
34	-49.75	-49.75
35	-48.72	-48.72
36	-47.69	-47.69
37	-46.41	-28.05
38	-28.05	-28.05
39	-28.05	-28.05
40	-28.05	-28.05
41	-28.05	-28.05
42	-28.05	-28.05
43	-28.05	-46.41
44	-47.69	-47.69
45	-48.72	-48.72
46	-49.75	-49.75
47	-50.78	-50.78
48	-51.82	-51.82
49	-53.10	-34.52

	50	-34.52	-34.52
	51	-34.52	-34.52
	52	-34.52	-34.52
	53	-34.52	-34.52
	54	-34.52	-34.52
	55	-34.52	-50.66
	56	-49.37	-49.37
	57	-48.34	-48.34
	58	-47.31	-47.31
	59	-46.28	-46.28
	60	-45.25	-45.25
	61	-43.97	-28.02
	62	-28.02	-28.02
	63	-28.02	-28.02
	64	-28.02	-28.02
	65	-28.02	-28.02
	66	-28.02	-28.02
	67	-28.02	-48.85
	68	-50.13	-50.13
	69	-51.16	-51.16
	70	-52.19	-52.19
	71	-53.22	-53.22
	72	-54.26	-54.26

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VmaxHmax                             #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-55.41	-23.34
2	-23.34	-23.34
3	-23.34	-23.34
4	-23.34	-23.34
5	-23.34	-23.34
6	-23.34	-23.34
7	-23.34	-64.07
8	-62.79	-62.79
9	-61.76	-61.76
10	-60.73	-60.73
11	-59.70	-59.70
12	-58.67	-58.67
13	-57.38	-18.35
14	-18.35	-18.35
15	-18.35	-18.35
16	-18.35	-18.35
17	-18.35	-18.35
18	-18.35	-18.35
19	-18.35	-48.72
20	-50.01	-50.01
21	-51.04	-51.04
22	-52.07	-52.07
23	-53.10	-53.10
24	-54.13	-54.13
25	-55.41	-23.39
26	-23.39	-23.39
27	-23.39	-23.39
28	-23.39	-23.39
29	-23.39	-23.39
30	-23.39	-23.39
31	-23.39	-59.83
32	-58.55	-58.55
33	-57.52	-57.52
34	-56.49	-56.49
35	-55.46	-55.46
36	-54.43	-54.43
37	-53.15	-18.30
38	-18.30	-18.30
39	-18.30	-18.30
40	-18.30	-18.30
41	-18.30	-18.30
42	-18.30	-18.30
43	-18.30	-52.96
44	-54.24	-54.24
45	-55.28	-55.28
46	-56.31	-56.31
47	-57.34	-57.34
48	-58.37	-58.37
49	-59.65	-23.35

	50	-23.35	-23.35
	51	-23.35	-23.35
	52	-23.35	-23.35
	53	-23.35	-23.35
	54	-23.35	-23.35
	55	-23.35	-55.32
	56	-54.04	-54.04
	57	-53.01	-53.01
	58	-51.98	-51.98
	59	-50.94	-50.94
	60	-49.91	-49.91
	61	-48.63	-18.34
	62	-18.34	-18.34
	63	-18.34	-18.34
	64	-18.34	-18.34
	65	-18.34	-18.34
	66	-18.34	-18.34
	67	-18.34	-57.48
	68	-58.76	-58.76
	69	-59.79	-59.79
	70	-60.82	-60.82
	71	-61.85	-61.85
	72	-62.88	-62.88

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VminHmin                             #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-49.31	-21.39
2	-21.39	-21.39
3	-21.39	-21.39
4	-21.39	-21.39
5	-21.39	-21.39
6	-21.39	-21.39
7	-21.39	-56.88
8	-55.60	-55.60
9	-54.57	-54.57
10	-53.54	-53.54
11	-52.51	-52.51
12	-51.48	-51.48
13	-50.20	-16.23
14	-16.23	-16.23
15	-16.23	-16.23
16	-16.23	-16.23
17	-16.23	-16.23
18	-16.23	-16.23
19	-16.23	-42.62
20	-43.90	-43.90
21	-44.93	-44.93
22	-45.96	-45.96
23	-47.00	-47.00
24	-48.03	-48.03
25	-49.31	-21.43
26	-21.43	-21.43
27	-21.43	-21.43
28	-21.43	-21.43
29	-21.43	-21.43
30	-21.43	-21.43
31	-21.43	-53.17
32	-51.89	-51.89
33	-50.86	-50.86
34	-49.83	-49.83
35	-48.80	-48.80
36	-47.77	-47.77
37	-46.48	-16.19
38	-16.19	-16.19
39	-16.19	-16.19
40	-16.19	-16.19
41	-16.19	-16.19
42	-16.19	-16.19
43	-16.19	-46.33
44	-47.61	-47.61
45	-48.65	-48.65
46	-49.68	-49.68
47	-50.71	-50.71
48	-51.74	-51.74
49	-53.02	-21.40

	50	-21.40	-21.40
	51	-21.40	-21.40
	52	-21.40	-21.40
	53	-21.40	-21.40
	54	-21.40	-21.40
	55	-21.40	-49.23
	56	-47.95	-47.95
	57	-46.92	-46.92
	58	-45.89	-45.89
	59	-44.86	-44.86
	60	-43.83	-43.83
	61	-42.55	-16.22
	62	-16.22	-16.22
	63	-16.22	-16.22
	64	-16.22	-16.22
	65	-16.22	-16.22
	66	-16.22	-16.22
	67	-16.22	-50.27
	68	-51.55	-51.55
	69	-52.58	-52.58
	70	-53.62	-53.62
	71	-54.65	-54.65
	72	-55.68	-55.68

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmin                                   #
#####
```

---

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

---

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-53.00	-21.38
2	-21.38	-21.38
3	-21.38	-21.38
4	-21.38	-21.38
5	-21.38	-21.38
6	-21.38	-21.38
7	-21.38	-61.50
8	-60.22	-60.22
9	-59.19	-59.19
10	-58.16	-58.16
11	-57.12	-57.12
12	-56.09	-56.09
13	-54.81	-16.24
14	-16.24	-16.24
15	-16.24	-16.24
16	-16.24	-16.24
17	-16.24	-16.24
18	-16.24	-16.24
19	-16.24	-46.31
20	-47.59	-47.59
21	-48.63	-48.63
22	-49.66	-49.66
23	-50.69	-50.69
24	-51.72	-51.72
25	-53.00	-21.43
26	-21.43	-21.43
27	-21.43	-21.43
28	-21.43	-21.43
29	-21.43	-21.43
30	-21.43	-21.43
31	-21.43	-57.35
32	-56.06	-56.06
33	-55.03	-55.03
34	-54.00	-54.00
35	-52.97	-52.97
36	-51.94	-51.94
37	-50.66	-16.19
38	-16.19	-16.19
39	-16.19	-16.19
40	-16.19	-16.19
41	-16.19	-16.19
42	-16.19	-16.19
43	-16.19	-50.47
44	-51.75	-51.75
45	-52.78	-52.78
46	-53.81	-53.81
47	-54.84	-54.84
48	-55.87	-55.87
49	-57.15	-21.39

	50	-21.39	-21.39
	51	-21.39	-21.39
	52	-21.39	-21.39
	53	-21.39	-21.39
	54	-21.39	-21.39
	55	-21.39	-52.90
	56	-51.62	-51.62
	57	-50.59	-50.59
	58	-49.56	-49.56
	59	-48.53	-48.53
	60	-47.50	-47.50
	61	-46.22	-16.23
	62	-16.23	-16.23
	63	-16.23	-16.23
	64	-16.23	-16.23
	65	-16.23	-16.23
	66	-16.23	-16.23
	67	-16.23	-54.91
	68	-56.19	-56.19
	69	-57.22	-57.22
	70	-58.25	-58.25
	71	-59.28	-59.28
	72	-60.31	-60.31

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VminHmax                                   #
#####
-----
                ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE
-----
| SEÇÃO |          ESQUERDA (kN) |          DIREITA (kN) |
-----
|  1 |          -50.49 |          -33.40 |
|  2 |          -33.40 |          -33.40 |
|  3 |          -33.40 |          -33.40 |
|  4 |          -33.40 |          -33.40 |
|  5 |          -33.40 |          -33.40 |
|  6 |          -33.40 |          -33.40 |
|  7 |          -33.40 |          -55.70 |
|  8 |          -54.42 |          -54.42 |
|  9 |          -53.39 |          -53.39 |
| 10 |          -52.36 |          -52.36 |
| 11 |          -51.33 |          -51.33 |
| 12 |          -50.29 |          -50.29 |
| 13 |          -49.01 |          -26.84 |
| 14 |          -26.84 |          -26.84 |
| 15 |          -26.84 |          -26.84 |
| 16 |          -26.84 |          -26.84 |
| 17 |          -26.84 |          -26.84 |
| 18 |          -26.84 |          -26.84 |
| 19 |          -26.84 |          -43.80 |
| 20 |          -45.09 |          -45.09 |
| 21 |          -46.12 |          -46.12 |
| 22 |          -47.15 |          -47.15 |
| 23 |          -48.18 |          -48.18 |
| 24 |          -49.21 |          -49.21 |
| 25 |          -50.49 |          -33.37 |
| 26 |          -33.37 |          -33.37 |
| 27 |          -33.37 |          -33.37 |
| 28 |          -33.37 |          -33.37 |
| 29 |          -33.37 |          -33.37 |
| 30 |          -33.37 |          -33.37 |
| 31 |          -33.37 |          -53.10 |
| 32 |          -51.82 |          -51.82 |
| 33 |          -50.78 |          -50.78 |
| 34 |          -49.75 |          -49.75 |
| 35 |          -48.72 |          -48.72 |
| 36 |          -47.69 |          -47.69 |
| 37 |          -46.41 |          -26.88 |
| 38 |          -26.88 |          -26.88 |
| 39 |          -26.88 |          -26.88 |
| 40 |          -26.88 |          -26.88 |
| 41 |          -26.88 |          -26.88 |
| 42 |          -26.88 |          -26.88 |
| 43 |          -26.88 |          -46.41 |
| 44 |          -47.69 |          -47.69 |
| 45 |          -48.72 |          -48.72 |
| 46 |          -49.75 |          -49.75 |
| 47 |          -50.78 |          -50.78 |
| 48 |          -51.81 |          -51.81 |
| 49 |          -53.10 |          -33.40 |
```

	50	-33.40	-33.40
	51	-33.40	-33.40
	52	-33.40	-33.40
	53	-33.40	-33.40
	54	-33.40	-33.40
	55	-33.40	-50.49
	56	-49.21	-49.21
	57	-48.18	-48.18
	58	-47.15	-47.15
	59	-46.12	-46.12
	60	-45.09	-45.09
	61	-43.80	-26.84
	62	-26.84	-26.84
	63	-26.84	-26.84
	64	-26.84	-26.84
	65	-26.84	-26.84
	66	-26.84	-26.84
	67	-26.84	-49.01
	68	-50.29	-50.29
	69	-51.33	-51.33
	70	-52.36	-52.36
	71	-53.39	-53.39
	72	-54.42	-54.42

---

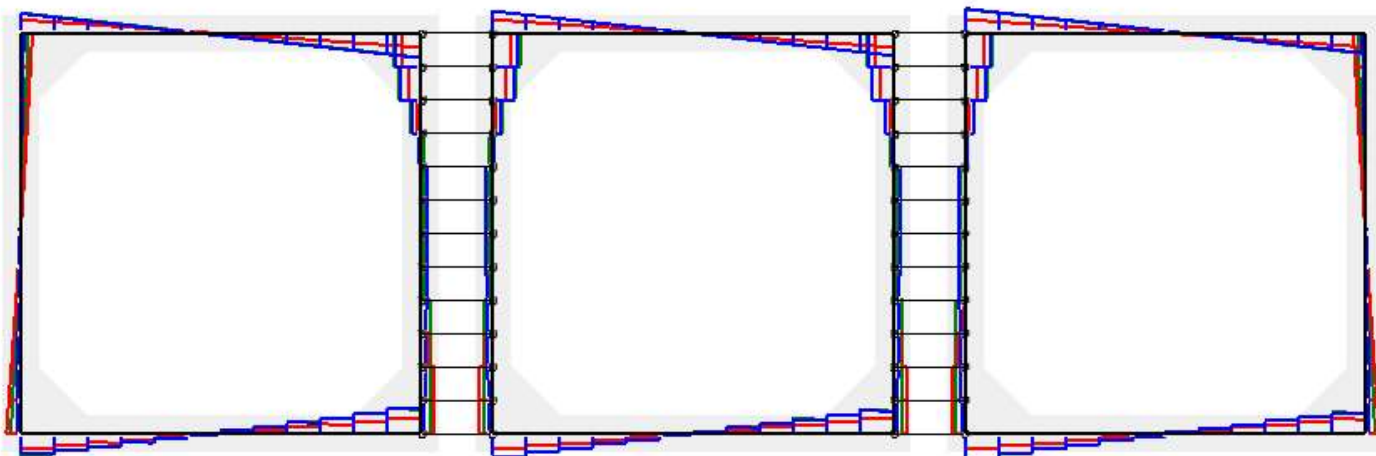
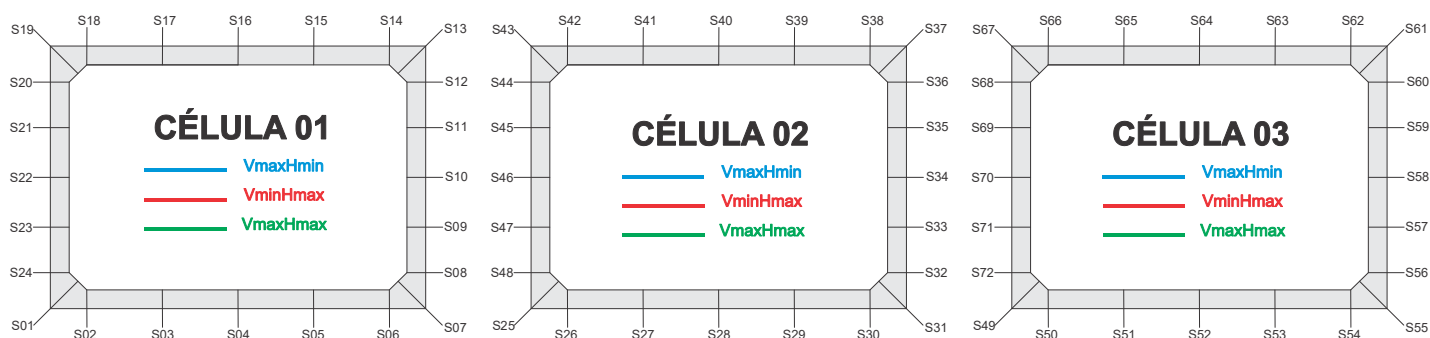
```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmax                                  #
#####
-----
                ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE
-----
| SEÇÃO |          ESQUERDA (kN) |          DIREITA (kN) |
-----
|  1 |          -53.12 |          -22.61 |
|  2 |          -22.61 |          -22.61 |
|  3 |          -22.61 |          -22.61 |
|  4 |          -22.61 |          -22.61 |
|  5 |          -22.61 |          -22.61 |
|  6 |          -22.61 |          -22.61 |
|  7 |          -22.61 |          -61.38 |
|  8 |          -60.10 |          -60.10 |
|  9 |          -59.06 |          -59.06 |
| 10 |          -58.03 |          -58.03 |
| 11 |          -57.00 |          -57.00 |
| 12 |          -55.97 |          -55.97 |
| 13 |          -54.69 |          -17.55 |
| 14 |          -17.55 |          -17.55 |
| 15 |          -17.55 |          -17.55 |
| 16 |          -17.55 |          -17.55 |
| 17 |          -17.55 |          -17.55 |
| 18 |          -17.55 |          -17.55 |
| 19 |          -17.55 |          -46.44 |
| 20 |          -47.72 |          -47.72 |
| 21 |          -48.75 |          -48.75 |
| 22 |          -49.78 |          -49.78 |
| 23 |          -50.81 |          -50.81 |
| 24 |          -51.84 |          -51.84 |
| 25 |          -53.12 |          -22.65 |
| 26 |          -22.65 |          -22.65 |
| 27 |          -22.65 |          -22.65 |
| 28 |          -22.65 |          -22.65 |
| 29 |          -22.65 |          -22.65 |
| 30 |          -22.65 |          -22.65 |
| 31 |          -22.65 |          -57.34 |
| 32 |          -56.05 |          -56.05 |
| 33 |          -55.02 |          -55.02 |
| 34 |          -53.99 |          -53.99 |
| 35 |          -52.96 |          -52.96 |
| 36 |          -51.93 |          -51.93 |
| 37 |          -50.65 |          -17.51 |
| 38 |          -17.51 |          -17.51 |
| 39 |          -17.51 |          -17.51 |
| 40 |          -17.51 |          -17.51 |
| 41 |          -17.51 |          -17.51 |
| 42 |          -17.51 |          -17.51 |
| 43 |          -17.51 |          -50.48 |
| 44 |          -51.76 |          -51.76 |
| 45 |          -52.79 |          -52.79 |
| 46 |          -53.82 |          -53.82 |
| 47 |          -54.85 |          -54.85 |
| 48 |          -55.88 |          -55.88 |
| 49 |          -57.16 |          -22.61 |
```

	50	-22.61	-22.61
	51	-22.61	-22.61
	52	-22.61	-22.61
	53	-22.61	-22.61
	54	-22.61	-22.61
	55	-22.61	-53.04
	56	-51.76	-51.76
	57	-50.72	-50.72
	58	-49.69	-49.69
	59	-48.66	-48.66
	60	-47.63	-47.63
	61	-46.35	-17.55
	62	-17.55	-17.55
	63	-17.55	-17.55
	64	-17.55	-17.55
	65	-17.55	-17.55
	66	-17.55	-17.55
	67	-17.55	-54.77
	68	-56.06	-56.06
	69	-57.09	-57.09
	70	-58.12	-58.12
	71	-59.15	-59.15
	72	-60.18	-60.18

---

## ESFORÇO CORTANTE

### NOMENCLATURA DAS SEÇÕES PARA VERSÃO COMPLETA DO RELATÓRIO



```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VmaxHmin #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	12.14	-68.87
2	-56.71	-42.99
3	-30.68	-17.03
4	-4.62	9.38
5	22.41	37.29
6	51.43	67.58
7	82.72	-12.14
8	-16.68	-16.68
9	-20.39	-20.39
10	-23.28	-23.28
11	-25.34	3.56
12	27.12	69.08
13	82.06	-82.75
14	-57.55	-57.55
15	-32.68	-32.68
16	-7.80	-7.80
17	17.07	17.07
18	41.94	41.94
19	67.14	-10.63
20	-6.01	-6.01
21	-1.72	-1.72
22	2.24	2.24
23	5.87	5.87
24	9.17	9.17
25	12.14	-75.88
26	-62.33	-47.43
27	-34.18	-19.86
28	-7.05	7.05
29	19.86	34.18
30	47.43	62.33
31	75.88	-12.77
32	-17.30	-17.30
33	-21.02	-21.02
34	-23.90	-23.90
35	-25.97	2.93
36	26.49	68.45
37	81.43	-74.94
38	-49.75	-49.75
39	-24.87	-24.87
40	0.00	0.00
41	24.87	24.87
42	49.75	49.75
43	74.94	-81.43
44	-68.45	-26.49
45	-2.93	25.97
46	23.90	23.90
47	21.02	21.02
48	17.30	17.30
49	12.77	-82.72

	50	-67.58	-51.43
	51	-37.29	-22.41
	52	-9.38	4.62
	53	17.03	30.68
	54	42.99	56.71
	55	68.87	-12.14
	56	-9.17	-9.17
	57	-5.87	-5.87
	58	-2.24	-2.24
	59	1.72	1.72
	60	6.01	6.01
	61	10.63	-67.14
	62	-41.94	-41.94
	63	-17.07	-17.07
	64	7.80	7.80
	65	32.68	32.68
	66	57.55	57.55
	67	82.75	-82.06
	68	-69.08	-27.12
	69	-3.56	25.34
	70	23.28	23.28
	71	20.39	20.39
	72	16.68	16.68

---

```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VminHmax #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	47.84	-47.93
2	-39.71	-30.27
3	-21.92	-12.61
4	-4.37	4.88
5	13.13	22.48
6	30.88	40.40
7	48.69	-47.84
8	-47.84	-27.14
9	-2.82	-0.01
10	-0.01	-0.01
11	-0.01	-0.01
12	11.29	40.43
13	60.92	-46.82
14	-31.18	-31.18
15	-15.79	-15.79
16	-0.41	-0.41
17	14.98	14.98
18	30.36	30.36
19	46.00	-39.78
20	-27.54	-27.54
21	-14.36	-14.36
22	-0.23	-0.23
23	14.85	14.85
24	30.87	30.87
25	47.84	-48.31
26	-40.07	-30.59
27	-22.21	-12.87
28	-4.63	4.63
29	12.87	22.21
30	30.59	40.07
31	48.31	-47.81
32	-47.81	-27.23
33	-3.05	0.32
34	0.32	0.32
35	0.32	-1.52
36	11.56	40.76
37	61.11	-46.41
38	-30.77	-30.77
39	-15.39	-15.39
40	0.00	0.00
41	15.39	15.39
42	30.77	30.77
43	46.41	-60.95
44	-40.46	-11.32
45	-0.02	-0.02
46	-0.02	-0.02
47	-0.02	2.79
48	27.11	47.81
49	47.81	-48.69

	50	-40.40	-30.88
	51	-22.48	-13.13
	52	-4.88	4.37
	53	12.61	21.92
	54	30.27	39.71
	55	47.92	-47.84
	56	-30.87	-30.87
	57	-14.85	-14.85
	58	0.23	0.23
	59	14.36	14.36
	60	27.54	27.54
	61	39.78	-46.00
	62	-30.36	-30.36
	63	-14.98	-14.98
	64	0.41	0.41
	65	15.80	15.80
	66	31.18	31.18
	67	46.82	-61.08
	68	-40.73	-11.53
	69	1.55	-0.29
	70	-0.29	-0.29
	71	-0.29	3.08
	72	27.27	47.84

---

```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VmaxHmax #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	32.47	-70.29
2	-57.60	-43.37
3	-30.62	-16.60
4	-3.91	10.23
5	23.27	37.97
6	51.74	67.28
7	81.56	-32.47
8	-32.47	-32.47
9	-32.48	-11.74
10	-11.74	-11.74
11	-11.74	-11.74
12	30.84	73.95
13	90.87	-81.04
14	-55.85	-55.85
15	-30.97	-30.97
16	-6.10	-6.10
17	18.77	18.77
18	43.65	43.65
19	68.84	-25.94
20	-17.78	-17.78
21	-8.99	-8.99
22	0.43	0.43
23	10.48	10.48
24	21.16	21.16
25	32.47	-75.87
26	-62.47	-47.62
27	-34.33	-19.91
28	-6.96	7.27
29	20.21	34.63
30	47.91	62.76
31	76.14	-32.53
32	-32.53	-32.53
33	-32.53	-14.65
34	-14.65	-14.65
35	-14.65	7.41
36	27.54	70.56
37	89.41	-75.07
38	-49.88	-49.88
39	-25.00	-25.00
40	-0.13	-0.13
41	24.74	24.74
42	49.62	49.62
43	74.81	-90.82
44	-73.89	-30.79
45	11.80	11.80
46	11.80	11.80
47	11.80	32.53
48	32.53	32.53
49	32.53	-81.70

	50	-67.43	-51.90
	51	-38.13	-23.42
	52	-10.39	3.76
	53	16.45	30.48
	54	43.24	57.46
	55	70.16	-32.48
	56	-21.16	-21.16
	57	-10.48	-10.48
	58	-0.43	-0.43
	59	8.99	8.99
	60	17.78	17.78
	61	25.94	-68.71
	62	-43.52	-43.52
	63	-18.64	-18.64
	64	6.23	6.23
	65	31.10	31.10
	66	55.98	55.98
	67	81.17	-89.46
	68	-70.61	-27.59
	69	-7.47	14.60
	70	14.60	14.60
	71	14.60	32.48
	72	32.48	32.48

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmin                                 #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	11.11	-71.29
2	-59.09	-45.37
3	-33.11	-19.54
4	-7.23	6.66
5	19.60	34.42
6	48.56	64.79
7	80.11	-11.11
8	-15.65	-15.65
9	-19.36	-15.71
10	-18.60	-18.60
11	-20.66	-20.66
12	34.61	71.53
13	87.81	-80.30
14	-55.10	-55.10
15	-30.22	-30.22
16	-5.35	-5.35
17	19.52	19.52
18	44.39	44.39
19	69.59	-11.66
20	-7.04	-7.04
21	-2.75	-2.75
22	1.21	1.21
23	4.84	4.84
24	8.14	8.14
25	11.11	-77.44
26	-63.85	-48.95
27	-35.73	-21.47
28	-8.74	5.26
29	17.99	32.27
30	45.51	60.47
31	74.16	-11.92
32	-16.46	-16.46
33	-20.17	-20.17
34	-23.06	-23.06
35	-25.12	13.74
36	23.21	64.08
37	84.84	-73.34
38	-48.14	-48.14
39	-23.27	-23.27
40	1.61	1.61
41	26.48	26.48
42	51.35	51.35
43	76.55	-87.00
44	-70.72	-33.80
45	21.47	21.47
46	19.41	19.41
47	16.52	20.17
48	16.46	16.46
49	11.92	-85.62

	50	-70.31	-54.04
	51	-39.83	-24.94
	52	-11.94	1.98
	53	14.29	27.83
	54	40.04	53.69
	55	65.83	-12.12
	56	-9.15	-9.15
	57	-5.85	-5.85
	58	-2.22	-2.22
	59	1.74	1.74
	60	6.03	6.03
	61	10.65	-64.11
	62	-38.92	-38.92
	63	-14.04	-14.04
	64	10.83	10.83
	65	35.70	35.70
	66	60.58	60.58
	67	85.77	-84.64
	68	-63.88	-23.01
	69	-13.54	25.32
	70	23.26	23.26
	71	20.37	20.37
	72	16.66	16.66

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VminHmax                                #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	47.75	-48.35
2	-40.15	-30.71
3	-22.36	-13.07
4	-4.85	4.39
5	12.63	21.97
6	30.38	39.91
7	48.24	-47.75
8	-47.75	-25.74
9	-0.16	-0.16
10	-0.16	-0.16
11	-0.16	-0.16
12	7.79	38.66
13	64.22	-46.39
14	-30.75	-30.75
15	-15.37	-15.37
16	0.02	0.02
17	15.41	15.41
18	30.79	30.79
19	46.43	-39.87
20	-27.63	-27.63
21	-14.45	-14.45
22	-0.31	-0.31
23	14.76	14.76
24	30.79	30.79
25	47.75	-48.58
26	-40.32	-30.83
27	-22.46	-13.14
28	-4.91	4.33
29	12.56	21.88
30	30.26	39.75
31	48.02	-47.74
32	-47.74	-26.15
33	0.15	0.15
34	0.15	0.15
35	0.15	-2.15
36	8.43	39.04
37	64.30	-46.13
38	-30.50	-30.50
39	-15.11	-15.11
40	0.28	0.28
41	15.66	15.66
42	31.05	31.05
43	46.68	-64.23
44	-38.67	-7.80
45	0.15	0.15
46	0.15	0.15
47	0.15	0.15
48	25.73	47.74
49	47.74	-48.87

	50	-40.54	-31.00
	51	-22.59	-13.24
	52	-4.99	4.25
	53	12.47	21.76
	54	30.10	39.53
	55	47.73	-47.84
	56	-30.87	-30.87
	57	-14.84	-14.84
	58	0.23	0.23
	59	14.36	14.36
	60	27.55	27.55
	61	39.79	-45.81
	62	-30.17	-30.17
	63	-14.78	-14.78
	64	0.60	0.60
	65	15.99	15.99
	66	31.37	31.37
	67	47.01	-64.21
	68	-38.95	-8.34
	69	2.24	-0.06
	70	-0.06	-0.06
	71	-0.06	-0.06
	72	26.25	47.84

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmax                                #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	31.71	-72.34
2	-59.66	-45.48
3	-32.79	-18.86
4	-6.26	7.79
5	20.76	35.44
6	49.23	64.87
7	79.36	-31.71
8	-31.71	-31.71
9	-13.78	-13.78
10	-13.78	-13.78
11	-13.78	-13.78
12	31.67	71.09
13	94.30	-79.00
14	-53.80	-53.80
15	-28.93	-28.93
16	-4.05	-4.05
17	20.82	20.82
18	45.69	45.69
19	70.89	-26.70
20	-18.55	-18.55
21	-9.75	-9.75
22	-0.33	-0.33
23	9.72	9.72
24	20.40	20.40
25	31.71	-76.92
26	-63.47	-48.61
27	-35.36	-21.00
28	-8.13	6.02
29	18.89	33.26
30	46.53	61.43
31	74.95	-31.97
32	-31.97	-31.97
33	-16.69	-16.69
34	-16.69	-16.69
35	-16.69	14.15
36	22.92	66.09
37	93.18	-73.98
38	-48.78	-48.78
39	-23.91	-23.91
40	0.96	0.96
41	25.84	25.84
42	50.71	50.71
43	75.91	-94.04
44	-70.83	-31.41
45	14.04	14.04
46	14.04	14.04
47	14.04	14.04
48	31.97	31.97
49	31.97	-83.46

	50	-68.98	-53.31
	51	-39.47	-24.74
	52	-11.72	2.36
	53	14.97	28.88
	54	41.53	55.67
	55	68.30	-32.56
	56	-21.25	-21.25
	57	-10.56	-10.56
	58	-0.51	-0.51
	59	8.91	8.91
	60	17.70	17.70
	61	25.86	-66.83
	62	-41.63	-41.63
	63	-16.76	-16.76
	64	8.12	8.12
	65	32.99	32.99
	66	57.86	57.86
	67	83.06	-92.60
	68	-65.50	-22.34
	69	-13.57	17.28
	70	17.28	17.28
	71	17.28	17.28
	72	32.56	32.56

---

```
#####
# VERIFICAÇÃO DA FADIGA (ELS) #
# VmaxHmin #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	21.38	-50.04
2	-41.06	-30.90
3	-21.86	-11.84
4	-2.84	7.29
5	16.56	27.12
6	36.95	48.14
7	58.36	-21.38
8	-21.38	-21.38
9	-21.38	-9.72
10	-9.72	-9.72
11	-9.72	-9.72
12	22.97	52.87
13	63.69	-57.58
14	-39.73	-39.73
15	-22.13	-22.13
16	-4.53	-4.53
17	13.07	13.07
18	30.68	30.68
19	48.53	-16.24
20	-11.21	-11.21
21	-5.68	-5.68
22	0.34	0.34
23	6.86	6.86
24	13.87	13.87
25	21.38	-54.15
26	-44.61	-33.95
27	-24.50	-14.17
28	-4.97	5.22
29	14.42	24.75
30	34.20	44.85
31	54.37	-21.44
32	-21.44	-21.44
33	-21.44	-12.16
34	-12.16	-12.16
35	-12.16	6.29
36	20.20	50.02
37	62.46	-53.16
38	-35.31	-35.31
39	-17.71	-17.71
40	-0.11	-0.11
41	17.49	17.49
42	35.09	35.09
43	52.95	-63.63
44	-52.81	-22.92
45	9.77	9.77
46	9.77	9.77
47	9.77	21.44
48	21.44	21.44
49	21.44	-58.48

	50	-48.26	-37.08
	51	-27.25	-16.70
	52	-7.42	2.71
	53	11.72	21.74
	54	30.78	40.95
	55	49.93	-21.38
	56	-13.87	-13.87
	57	-6.86	-6.86
	58	-0.34	-0.34
	59	5.68	5.68
	60	11.21	11.21
	61	16.24	-48.42
	62	-30.57	-30.57
	63	-12.97	-12.97
	64	4.64	4.64
	65	22.24	22.24
	66	39.84	39.84
	67	57.69	-62.51
	68	-50.08	-20.25
	69	-6.35	12.11
	70	12.11	12.11
	71	12.11	21.38
	72	21.38	21.38

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VminHmax                             #
#####
```

-----  
 ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE  
 -----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	34.52	-45.90
2	-37.73	-28.37
3	-20.12	-10.92
4	-2.78	6.40
5	14.62	23.98
6	32.46	42.11
7	50.60	-34.52
8	-34.52	-34.52
9	-18.37	-0.48
10	-0.48	-0.48
11	-0.48	-0.48
12	13.31	42.99
13	59.61	-48.85
14	-33.21	-33.21
15	-17.83	-17.83
16	-2.44	-2.44
17	12.95	12.95
18	28.33	28.33
19	43.97	-28.02
20	-19.38	-19.38
21	-10.02	-10.02
22	0.04	0.04
23	10.82	10.82
24	22.31	22.31
25	34.52	-48.29
26	-40.01	-30.52
27	-22.15	-12.83
28	-4.61	4.61
29	12.83	22.14
30	30.52	40.01
31	48.29	-34.48
32	-34.48	-34.48
33	-18.38	-0.41
34	-0.41	-0.41
35	-0.41	-0.66
36	13.37	43.06
37	59.66	-46.41
38	-30.77	-30.77
39	-15.39	-15.39
40	0.00	0.00
41	15.39	15.39
42	30.77	30.77
43	46.41	-59.64
44	-43.02	-13.34
45	0.45	0.45
46	0.45	0.45
47	0.45	18.34
48	34.48	34.48
49	34.48	-50.60

	50	-42.11	-32.46
	51	-23.98	-14.62
	52	-6.40	2.78
	53	10.92	20.12
	54	28.37	37.73
	55	45.90	-34.52
	56	-22.31	-22.31
	57	-10.82	-10.82
	58	-0.04	-0.04
	59	10.02	10.02
	60	19.38	19.38
	61	28.02	-43.97
	62	-28.33	-28.33
	63	-12.95	-12.95
	64	2.44	2.44
	65	17.83	17.83
	66	33.21	33.21
	67	48.85	-59.63
	68	-43.03	-13.34
	69	0.69	0.44
	70	0.44	0.44
	71	0.44	18.41
	72	34.52	34.52

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VmaxHmax                             #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	23.34	-50.22
2	-41.19	-30.99
3	-21.91	-11.85
4	-2.82	7.32
5	16.60	27.14
6	36.94	48.07
7	58.22	-23.34
8	-23.34	-23.34
9	-23.34	-8.27
10	-8.27	-8.27
11	-8.27	-8.27
12	21.81	52.34
13	64.33	-57.38
14	-39.53	-39.53
15	-21.93	-21.93
16	-4.33	-4.33
17	13.27	13.27
18	30.87	30.87
19	48.72	-18.35
20	-12.58	-12.58
21	-6.35	-6.35
22	0.36	0.36
23	7.55	7.55
24	15.21	15.21
25	23.34	-54.18
26	-44.66	-34.01
27	-24.55	-14.21
28	-5.00	5.21
29	14.42	24.76
30	34.22	44.86
31	54.37	-23.39
32	-23.39	-23.39
33	-23.39	-10.32
34	-10.32	-10.32
35	-10.32	5.22
36	19.48	49.95
37	63.29	-53.15
38	-35.29	-35.29
39	-17.69	-17.69
40	-0.09	-0.09
41	17.51	17.51
42	35.11	35.11
43	52.96	-64.29
44	-52.30	-21.77
45	8.31	8.31
46	8.31	8.31
47	8.31	23.39
48	23.39	23.39
49	23.39	-58.31

	50	-48.18	-37.05
	51	-27.25	-16.71
	52	-7.43	2.72
	53	11.75	21.81
	54	30.89	41.10
	55	50.12	-23.35
	56	-15.21	-15.21
	57	-7.55	-7.55
	58	-0.36	-0.36
	59	6.35	6.35
	60	12.58	12.58
	61	18.34	-48.63
	62	-30.78	-30.78
	63	-13.18	-13.18
	64	4.42	4.42
	65	22.02	22.02
	66	39.62	39.62
	67	57.48	-63.33
	68	-49.99	-19.52
	69	-5.26	10.28
	70	10.28	10.28
	71	10.28	23.35
	72	23.35	23.35

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VminHmin                             #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	21.39	-44.65
2	-36.70	-27.55
3	-19.52	-10.51
4	-2.53	6.56
5	14.75	24.17
6	32.82	42.76
7	51.67	-21.39
8	-21.39	-21.39
9	-21.39	-6.86
10	-6.86	-6.86
11	-6.86	-6.86
12	18.83	45.70
13	56.37	-50.20
14	-34.56	-34.56
15	-19.17	-19.17
16	-3.79	-3.79
17	11.60	11.60
18	26.98	26.98
19	42.62	-16.23
20	-11.19	-11.19
21	-5.67	-5.67
22	0.36	0.36
23	6.87	6.87
24	13.89	13.89
25	21.39	-48.13
26	-39.76	-30.23
27	-21.88	-12.62
28	-4.48	4.66
29	12.80	22.05
30	30.40	39.92
31	48.29	-21.43
32	-21.43	-21.43
33	-21.43	-8.57
34	-8.57	-8.57
35	-8.57	4.31
36	16.90	43.72
37	55.51	-46.48
38	-30.85	-30.85
39	-15.46	-15.46
40	-0.08	-0.08
41	15.31	15.31
42	30.70	30.70
43	46.33	-56.33
44	-45.67	-18.79
45	6.90	6.90
46	6.90	6.90
47	6.90	21.43
48	21.43	21.43
49	21.43	-51.75

	50	-42.84	-32.91
	51	-24.27	-14.84
	52	-6.65	2.44
	53	10.42	19.44
	54	27.47	36.62
	55	44.57	-21.40
	56	-13.89	-13.89
	57	-6.88	-6.88
	58	-0.36	-0.36
	59	5.66	5.66
	60	11.19	11.19
	61	16.22	-42.55
	62	-26.91	-26.91
	63	-11.52	-11.52
	64	3.86	3.86
	65	19.25	19.25
	66	34.64	34.64
	67	50.27	-55.54
	68	-43.76	-16.93
	69	-4.34	8.53
	70	8.53	8.53
	71	8.53	21.40
	72	21.40	21.40

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmin                                   #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	21.38	-48.02
2	-39.43	-29.65
3	-20.98	-11.34
4	-2.72	7.02
5	15.88	26.02
6	35.40	46.12
7	55.85	-21.38
8	-21.38	-21.38
9	-21.38	-8.65
10	-8.65	-8.65
11	-8.65	-8.65
12	21.42	50.18
13	60.95	-54.81
14	-37.79	-37.79
15	-21.02	-21.02
16	-4.25	-4.25
17	12.52	12.52
18	29.29	29.29
19	46.31	-16.24
20	-11.20	-11.20
21	-5.68	-5.68
22	0.35	0.35
23	6.86	6.86
24	13.88	13.88
25	21.38	-51.89
26	-42.79	-32.56
27	-23.52	-13.59
28	-4.79	5.01
29	13.81	23.74
30	32.78	43.00
31	52.09	-21.43
32	-21.43	-21.43
33	-21.43	-10.81
34	-10.81	-10.81
35	-10.81	5.55
36	18.96	47.66
37	59.85	-50.66
38	-33.64	-33.64
39	-16.87	-16.87
40	-0.10	-0.10
41	16.67	16.67
42	33.44	33.44
43	50.47	-60.90
44	-50.13	-21.37
45	8.70	8.70
46	8.70	8.70
47	8.70	21.43
48	21.43	21.43
49	21.43	-55.95

	50	-46.23	-35.52
	51	-26.13	-16.00
	52	-7.13	2.61
	53	11.23	20.88
	54	29.54	39.33
	55	47.92	-21.39
	56	-13.88	-13.88
	57	-6.87	-6.87
	58	-0.35	-0.35
	59	5.67	5.67
	60	11.20	11.20
	61	16.23	-46.22
	62	-29.20	-29.20
	63	-12.42	-12.42
	64	4.35	4.35
	65	21.12	21.12
	66	37.89	37.89
	67	54.91	-59.90
	68	-47.71	-19.01
	69	-5.60	10.77
	70	10.77	10.77
	71	10.77	21.39
	72	21.39	21.39

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VminHmax                                  #
#####
```

-----  
 ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE  
 -----

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	33.40	-45.74
2	-37.58	-28.23
3	-19.99	-10.80
4	-2.67	6.50
5	14.71	24.08
6	32.57	42.23
7	50.74	-33.40
8	-33.40	-33.40
9	-20.74	-0.61
10	-0.61	-0.61
11	-0.61	-0.61
12	13.55	43.20
13	59.40	-49.01
14	-33.38	-33.38
15	-17.99	-17.99
16	-2.60	-2.60
17	12.78	12.78
18	28.17	28.17
19	43.80	-26.84
20	-18.61	-18.61
21	-9.66	-9.66
22	0.02	0.02
23	10.42	10.42
24	21.55	21.55
25	33.40	-48.28
26	-40.00	-30.51
27	-22.13	-12.82
28	-4.61	4.61
29	12.82	22.14
30	30.51	40.00
31	48.28	-33.37
32	-33.37	-33.37
33	-20.68	-0.59
34	-0.59	-0.59
35	-0.59	-0.49
36	13.57	43.22
37	59.42	-46.41
38	-30.77	-30.77
39	-15.39	-15.39
40	0.00	0.00
41	15.39	15.39
42	30.77	30.77
43	46.41	-59.43
44	-43.23	-13.59
45	0.58	0.58
46	0.58	0.58
47	0.58	20.70
48	33.37	33.37
49	33.37	-50.74

	50	-42.23	-32.57
	51	-24.08	-14.72
	52	-6.50	2.67
	53	10.80	19.99
	54	28.23	37.58
	55	45.74	-33.40
	56	-21.55	-21.55
	57	-10.42	-10.42
	58	-0.02	-0.02
	59	9.66	9.66
	60	18.61	18.61
	61	26.84	-43.80
	62	-28.17	-28.17
	63	-12.78	-12.78
	64	2.60	2.60
	65	17.99	17.99
	66	33.38	33.38
	67	49.01	-59.39
	68	-43.18	-13.54
	69	0.53	0.63
	70	0.63	0.63
	71	0.63	20.72
	72	33.40	33.40

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmax                                   #
#####
```

-----

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

-----

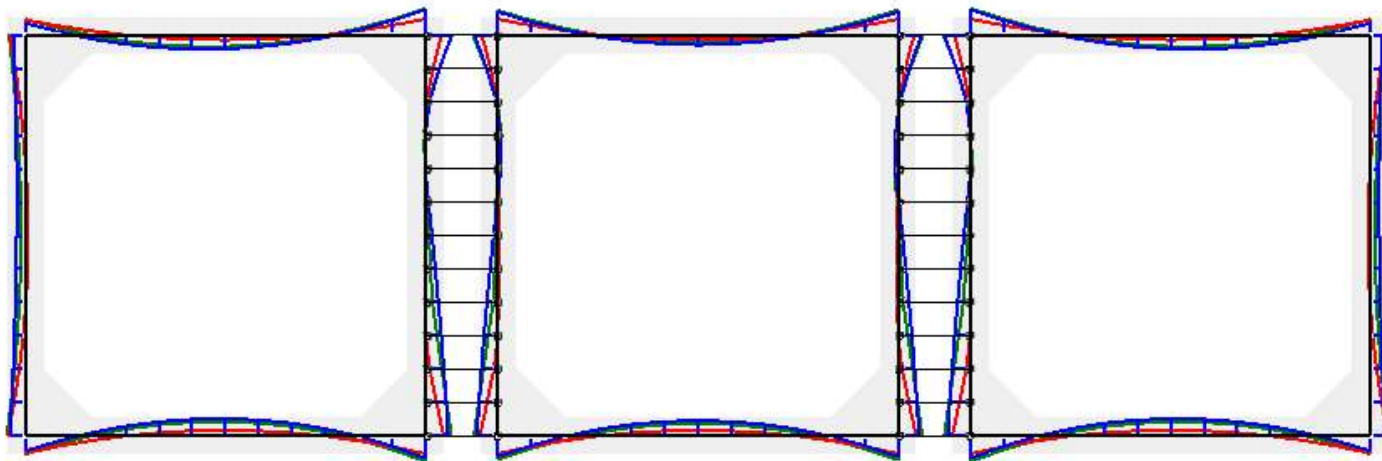
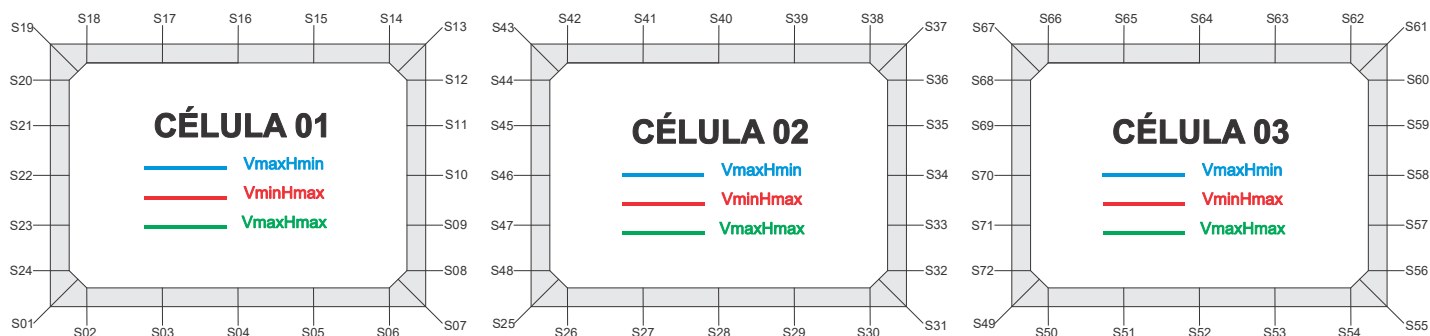
SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	22.61	-48.13
2	-39.51	-29.70
3	-21.01	-11.35
4	-2.71	7.03
5	15.90	26.03
6	35.39	46.08
7	55.76	-22.61
8	-22.61	-22.61
9	-22.61	-7.74
10	-7.74	-7.74
11	-7.74	-7.74
12	20.69	49.85
13	61.34	-54.69
14	-37.67	-37.67
15	-20.90	-20.90
16	-4.13	-4.13
17	12.64	12.64
18	29.41	29.41
19	46.44	-17.55
20	-12.06	-12.06
21	-6.09	-6.09
22	0.36	0.36
23	7.29	7.29
24	14.71	14.71
25	22.61	-51.91
26	-42.82	-32.59
27	-23.55	-13.61
28	-4.80	5.01
29	13.81	23.75
30	32.79	43.01
31	52.09	-22.65
32	-22.65	-22.65
33	-22.65	-9.66
34	-9.66	-9.66
35	-9.66	4.88
36	18.51	47.62
37	60.37	-50.65
38	-33.63	-33.63
39	-16.86	-16.86
40	-0.09	-0.09
41	16.69	16.69
42	33.46	33.46
43	50.48	-61.30
44	-49.81	-20.65
45	7.78	7.78
46	7.78	7.78
47	7.78	22.65
48	22.65	22.65
49	22.65	-55.85

	50	-46.18	-35.50
	51	-26.13	-16.01
	52	-7.14	2.61
	53	11.25	20.92
	54	29.61	39.42
	55	48.04	-22.61
	56	-14.71	-14.71
	57	-7.30	-7.30
	58	-0.36	-0.36
	59	6.09	6.09
	60	12.06	12.06
	61	17.55	-46.35
	62	-29.33	-29.33
	63	-12.56	-12.56
	64	4.21	4.21
	65	20.98	20.98
	66	37.75	37.75
	67	54.77	-60.41
	68	-47.65	-18.55
	69	-4.92	9.62
	70	9.62	9.62
	71	9.62	22.61
	72	22.61	22.61

---

## MOMENTO FLETOR

### NOMENCLATURA DAS SEÇÕES PARA VERSÃO COMPLETA DO RELATÓRIO



```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VmaxHmin #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-14.51	14.51
2	-2.76	-2.76
3	-12.89	-12.89
4	-15.86	-15.86
5	-11.49	-11.49
6	0.71	0.71
7	21.37	21.37
8	17.39	17.39
9	12.28	12.28
10	6.25	6.25
11	-0.45	-0.45
12	3.75	3.75
13	24.51	-24.51
14	-5.22	-5.22
15	7.19	7.19
16	12.75	12.75
17	11.48	11.48
18	3.36	3.36
19	-11.63	-11.63
20	-9.35	-9.35
21	-8.30	-8.30
22	-8.38	-8.38
23	-9.50	-9.50
24	-11.57	-11.57
25	-14.51	19.86
26	0.86	0.86
27	-10.37	-10.37
28	-14.06	-14.06
29	-10.37	-10.37
30	0.86	0.86
31	19.86	19.86
32	15.71	15.71
33	10.42	10.42
34	4.22	4.22
35	-2.65	-2.65
36	1.37	1.37
37	21.97	-21.97
38	-4.82	-4.82
39	5.44	5.44
40	8.86	8.86
41	5.44	5.44
42	-4.82	-4.82
43	-21.97	-21.97
44	-1.37	-1.37
45	2.65	2.65
46	-4.22	-4.22
47	-10.42	-10.42
48	-15.71	-15.71
49	-19.86	21.37

	50	0.71	0.71
	51	-11.49	-11.49
	52	-15.86	-15.86
	53	-12.89	-12.89
	54	-2.76	-2.76
	55	14.51	14.51
	56	11.57	11.57
	57	9.50	9.50
	58	8.38	8.38
	59	8.30	8.30
	60	9.35	9.35
	61	11.63	-11.63
	62	3.36	3.36
	63	11.48	11.48
	64	12.75	12.75
	65	7.19	7.19
	66	-5.22	-5.22
	67	-24.51	-24.51
	68	-3.75	-3.75
	69	0.45	0.45
	70	-6.25	-6.25
	71	-12.28	-12.28
	72	-17.39	-17.39

---

```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VminHmax #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-16.60	16.60
2	4.55	4.55
3	-2.63	-2.63
4	-4.96	-4.96
5	-2.49	-2.49
6	4.85	4.85
7	17.10	17.10
8	3.94	3.94
9	-0.17	-0.17
10	-0.18	-0.18
11	-0.18	-0.18
12	1.37	1.37
13	15.30	-15.30
14	-4.58	-4.58
15	1.88	1.88
16	4.11	4.11
17	2.10	2.10
18	-4.13	-4.13
19	-14.63	-14.63
20	-5.35	-5.35
21	0.43	0.43
22	2.46	2.46
23	0.47	0.47
24	-5.80	-5.80
25	-16.60	16.96
26	4.80	4.80
27	-2.46	-2.46
28	-4.86	-4.86
29	-2.46	-2.46
30	4.80	4.80
31	16.96	16.96
32	3.81	3.81
33	-0.36	-0.36
34	-0.27	-0.27
35	-0.18	-0.18
36	1.20	1.20
37	15.21	-15.21
38	-4.60	-4.60
39	1.75	1.75
40	3.86	3.86
41	1.75	1.75
42	-4.60	-4.60
43	-15.21	-15.21
44	-1.27	-1.27
45	0.29	0.29
46	0.30	0.30
47	0.30	0.30
48	-3.81	-3.81
49	-16.96	17.10

	50	4.85	4.85
	51	-2.49	-2.49
	52	-4.96	-4.96
	53	-2.63	-2.63
	54	4.55	4.55
	55	16.60	16.60
	56	5.80	5.80
	57	-0.47	-0.47
	58	-2.46	-2.46
	59	-0.43	-0.43
	60	5.35	5.35
	61	14.63	-14.63
	62	-4.13	-4.13
	63	2.10	2.10
	64	4.11	4.11
	65	1.88	1.88
	66	-4.58	-4.58
	67	-15.30	-15.30
	68	-1.31	-1.31
	69	0.07	0.07
	70	0.15	0.15
	71	0.23	0.23
	72	-3.95	-3.95

---

```
#####
# SOLICITAÇÕES NORMAIS (ELU) #
# VmaxHmax #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-17.56	17.56
2	-0.03	-0.03
3	-10.20	-10.20
4	-13.02	-13.02
5	-8.42	-8.42
6	3.92	3.92
7	24.38	24.38
8	15.45	15.45
9	6.52	6.52
10	3.29	3.29
11	0.06	0.06
12	2.69	2.69
13	25.35	-25.35
14	-6.53	-6.53
15	5.41	5.41
16	10.50	10.50
17	8.76	8.76
18	0.18	0.18
19	-15.29	-15.29
20	-9.26	-9.26
21	-5.57	-5.57
22	-4.37	-4.37
23	-5.86	-5.86
24	-10.20	-10.20
25	-17.56	22.66
26	3.64	3.64
27	-7.63	-7.63
28	-11.33	-11.33
29	-7.55	-7.55
30	3.80	3.80
31	22.90	22.90
32	13.96	13.96
33	5.01	5.01
34	0.98	0.98
35	-3.05	-3.05
36	1.76	1.76
37	23.75	-23.75
38	-6.57	-6.57
39	3.72	3.72
40	7.18	7.18
41	3.80	3.80
42	-6.43	-6.43
43	-23.54	-23.54
44	-0.89	-0.89
45	1.72	1.72
46	-1.52	-1.52
47	-4.77	-4.77
48	-13.71	-13.71
49	-22.66	24.58

	50	4.08	4.08
	51	-8.30	-8.30
	52	-12.95	-12.95
	53	-10.17	-10.17
	54	-0.04	-0.04
	55	17.51	17.51
	56	10.15	10.15
	57	5.81	5.81
	58	4.33	4.33
	59	5.52	5.52
	60	9.21	9.21
	61	15.24	-15.24
	62	0.19	0.19
	63	8.74	8.74
	64	10.45	10.45
	65	5.31	5.31
	66	-6.66	-6.66
	67	-25.52	-25.52
	68	-3.51	-3.51
	69	1.31	1.31
	70	-2.70	-2.70
	71	-6.72	-6.72
	72	-15.65	-15.65

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmin                                 #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-14.55	14.55
2	-3.38	-3.38
3	-14.17	-14.17
4	-17.85	-17.85
5	-14.24	-14.24
6	-2.83	-2.83
7	17.09	17.09
8	13.39	13.39
9	8.56	8.56
10	3.83	3.83
11	-1.59	-1.59
12	0.31	0.31
13	22.20	-22.20
14	-3.58	-3.58
15	8.15	8.15
16	13.04	13.04
17	11.09	11.09
18	2.30	2.30
19	-13.37	-13.37
20	-10.80	-10.80
21	-9.47	-9.47
22	-9.26	-9.26
23	-10.10	-10.10
24	-11.89	-11.89
25	-14.55	19.50
26	0.08	0.08
27	-11.57	-11.57
28	-15.72	-15.72
29	-12.52	-12.52
30	-1.83	-1.83
31	16.68	16.68
32	12.76	12.76
33	7.70	7.70
34	1.74	1.74
35	-4.90	-4.90
36	0.16	0.16
37	20.62	-20.62
38	-3.91	-3.91
39	5.91	5.91
40	8.88	8.88
41	5.02	5.02
42	-5.68	-5.68
43	-23.27	-23.27
44	-1.60	-1.60
45	0.08	0.08
46	-5.57	-5.57
47	-10.53	-10.53
48	-15.58	-15.58
49	-19.50	22.14

	50	0.70	0.70
	51	-12.20	-12.20
	52	-17.27	-17.27
	53	-15.04	-15.04
	54	-5.71	-5.71
	55	10.73	10.73
	56	7.80	7.80
	57	5.73	5.73
	58	4.61	4.61
	59	4.53	4.53
	60	5.59	5.59
	61	7.88	-7.88
	62	6.29	6.29
	63	13.57	13.57
	64	14.01	14.01
	65	7.61	7.61
	66	-5.63	-5.63
	67	-25.75	-25.75
	68	-5.35	-5.35
	69	-0.34	-0.34
	70	-7.04	-7.04
	71	-13.06	-13.06
	72	-18.17	-18.17

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VminHmax                                #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-16.71	16.71
2	4.54	4.54
3	-2.76	-2.76
4	-5.22	-5.22
5	-2.88	-2.88
6	4.32	4.32
7	16.44	16.44
8	3.30	3.30
9	-0.26	-0.26
10	-0.30	-0.30
11	-0.34	-0.34
12	0.70	0.70
13	14.85	-14.85
14	-4.24	-4.24
15	2.10	2.10
16	4.21	4.21
17	2.09	2.09
18	-4.27	-4.27
19	-14.88	-14.88
20	-5.58	-5.58
21	0.23	0.23
22	2.28	2.28
23	0.31	0.31
24	-5.93	-5.93
25	-16.71	16.84
26	4.62	4.62
27	-2.71	-2.71
28	-5.19	-5.19
29	-2.86	-2.86
30	4.30	4.30
31	16.37	16.37
32	3.24	3.24
33	-0.33	-0.33
34	-0.29	-0.29
35	-0.25	-0.25
36	0.61	0.61
37	14.82	-14.82
38	-4.29	-4.29
39	1.98	1.98
40	4.02	4.02
41	1.83	1.83
42	-4.59	-4.59
43	-15.28	-15.28
44	-1.13	-1.13
45	-0.08	-0.08
46	-0.12	-0.12
47	-0.16	-0.16
48	-3.72	-3.72
49	-16.84	16.99

	50	4.70	4.70
	51	-2.67	-2.67
	52	-5.17	-5.17
	53	-2.87	-2.87
	54	4.26	4.26
	55	16.25	16.25
	56	5.46	5.46
	57	-0.81	-0.81
	58	-2.80	-2.80
	59	-0.77	-0.77
	60	5.02	5.02
	61	14.30	-14.30
	62	-3.85	-3.85
	63	2.33	2.33
	64	4.28	4.28
	65	2.00	2.00
	66	-4.51	-4.51
	67	-15.29	-15.29
	68	-1.11	-1.11
	69	-0.27	-0.27
	70	-0.25	-0.25
	71	-0.24	-0.24
	72	-3.84	-3.84

---

```
#####
#          SOLICITAÇÕES TANGENCIAIS (ELU)          #
#          VmaxHmax                                #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-17.69	17.69
2	-0.46	-0.46
3	-11.22	-11.22
4	-14.68	-14.68
5	-10.75	-10.75
6	0.89	0.89
7	20.72	20.72
8	12.00	12.00
9	5.75	5.75
10	1.96	1.96
11	-1.83	-1.83
12	0.63	0.63
13	23.37	-23.37
14	-5.11	-5.11
15	6.26	6.26
16	10.80	10.80
17	8.49	8.49
18	-0.65	-0.65
19	-16.68	-16.68
20	-10.45	-10.45
21	-6.54	-6.54
22	-5.14	-5.14
23	-6.41	-6.41
24	-10.54	-10.54
25	-17.69	21.96
26	2.66	2.66
27	-8.89	-8.89
28	-12.89	-12.89
29	-9.47	-9.47
30	1.50	1.50
31	20.25	20.25
32	11.46	11.46
33	4.77	4.77
34	0.18	0.18
35	-4.41	-4.41
36	0.69	0.69
37	22.59	-22.59
38	-5.71	-5.71
39	4.28	4.28
40	7.44	7.44
41	3.75	3.75
42	-6.77	-6.77
43	-24.18	-24.18
44	-1.51	-1.51
45	0.88	0.88
46	-2.98	-2.98
47	-6.85	-6.85
48	-13.17	-13.17
49	-21.96	24.60

	50	3.64	3.64
	51	-9.12	-9.12
	52	-14.13	-14.13
	53	-11.75	-11.75
	54	-2.07	-2.07
	55	14.98	14.98
	56	7.60	7.60
	57	3.24	3.24
	58	1.73	1.73
	59	2.90	2.90
	60	6.57	6.57
	61	12.57	-12.57
	62	2.34	2.34
	63	10.37	10.37
	64	11.56	11.56
	65	5.90	5.90
	66	-6.59	-6.59
	67	-25.97	-25.97
	68	-4.23	-4.23
	69	0.71	0.71
	70	-4.04	-4.04
	71	-8.79	-8.79
	72	-15.65	-15.65

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VmaxHmin                             #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-12.20	12.20
2	-0.33	-0.33
3	-7.58	-7.58
4	-9.60	-9.60
5	-6.32	-6.32
6	2.49	2.49
7	17.13	17.13
8	11.25	11.25
9	5.37	5.37
10	2.70	2.70
11	0.03	0.03
12	1.85	1.85
13	17.88	-17.88
14	-4.50	-4.50
15	4.01	4.01
16	7.67	7.67
17	6.50	6.50
18	0.48	0.48
19	-10.41	-10.41
20	-6.62	-6.62
21	-4.29	-4.29
22	-3.54	-3.54
23	-4.52	-4.52
24	-7.36	-7.36
25	-12.20	15.87
26	2.30	2.30
27	-5.74	-5.74
28	-8.37	-8.37
29	-5.67	-5.67
30	2.43	2.43
31	16.08	16.08
32	10.18	10.18
33	4.29	4.29
34	0.94	0.94
35	-2.40	-2.40
36	1.24	1.24
37	16.71	-16.71
38	-4.54	-4.54
39	2.75	2.75
40	5.20	5.20
41	2.81	2.81
42	-4.42	-4.42
43	-16.53	-16.53
44	-0.52	-0.52
45	1.29	1.29
46	-1.40	-1.40
47	-4.08	-4.08
48	-9.98	-9.98
49	-15.87	17.30

	50	2.62	2.62
	51	-6.22	-6.22
	52	-9.54	-9.54
	53	-7.56	-7.56
	54	-0.33	-0.33
	55	12.16	12.16
	56	7.33	7.33
	57	4.49	4.49
	58	3.51	3.51
	59	4.25	4.25
	60	6.58	6.58
	61	10.37	-10.37
	62	0.49	0.49
	63	6.48	6.48
	64	7.62	7.62
	65	3.93	3.93
	66	-4.61	-4.61
	67	-18.02	-18.02
	68	-2.54	-2.54
	69	1.12	1.12
	70	-2.21	-2.21
	71	-5.54	-5.54
	72	-11.42	-11.42

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VminHmax                             #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-13.76	13.76
2	2.26	2.26
3	-4.40	-4.40
4	-6.29	-6.29
5	-3.39	-3.39
6	4.37	4.37
7	17.11	17.11
8	7.62	7.62
9	0.35	0.35
10	0.22	0.22
11	0.09	0.09
12	1.85	1.85
13	15.96	-15.96
14	-4.67	-4.67
15	2.34	2.34
16	5.13	5.13
17	3.69	3.69
18	-1.99	-1.99
19	-11.93	-11.93
20	-5.40	-5.40
21	-1.34	-1.34
22	0.05	0.05
23	-1.43	-1.43
24	-5.97	-5.97
25	-13.76	16.34
26	4.20	4.20
27	-3.04	-3.04
28	-5.44	-5.44
29	-3.04	-3.04
30	4.20	4.20
31	16.34	16.34
32	6.86	6.86
33	-0.41	-0.41
34	-0.52	-0.52
35	-0.64	-0.64
36	1.11	1.11
37	15.24	-15.24
38	-4.62	-4.62
39	1.72	1.72
40	3.84	3.84
41	1.72	1.72
42	-4.62	-4.62
43	-15.24	-15.24
44	-1.12	-1.12
45	0.65	0.65
46	0.53	0.53
47	0.41	0.41
48	-6.86	-6.86
49	-16.34	17.11

	50	4.37	4.37
	51	-3.39	-3.39
	52	-6.29	-6.29
	53	-4.40	-4.40
	54	2.26	2.26
	55	13.76	13.76
	56	5.97	5.97
	57	1.43	1.43
	58	-0.05	-0.05
	59	1.34	1.34
	60	5.40	5.40
	61	11.93	-11.93
	62	-1.99	-1.99
	63	3.69	3.69
	64	5.13	5.13
	65	2.35	2.35
	66	-4.67	-4.67
	67	-15.96	-15.96
	68	-1.84	-1.84
	69	-0.10	-0.10
	70	-0.22	-0.22
	71	-0.34	-0.34
	72	-7.62	-7.62

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VmaxHmax                             #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-12.58	12.58
2	0.01	0.01
3	-7.26	-7.26
4	-9.28	-9.28
5	-5.99	-5.99
6	2.82	2.82
7	17.43	17.43
8	11.01	11.01
9	4.60	4.60
10	2.32	2.32
11	0.05	0.05
12	1.91	1.91
13	17.95	-17.95
14	-4.63	-4.63
15	3.83	3.83
16	7.44	7.44
17	6.21	6.21
18	0.14	0.14
19	-10.81	-10.81
20	-6.54	-6.54
21	-3.93	-3.93
22	-3.10	-3.10
23	-4.17	-4.17
24	-7.29	-7.29
25	-12.58	16.21
26	2.62	2.62
27	-5.43	-5.43
28	-8.07	-8.07
29	-5.37	-5.37
30	2.74	2.74
31	16.38	16.38
32	9.95	9.95
33	3.52	3.52
34	0.68	0.68
35	-2.16	-2.16
36	1.24	1.24
37	16.81	-16.81
38	-4.65	-4.65
39	2.63	2.63
40	5.08	5.08
41	2.68	2.68
42	-4.55	-4.55
43	-16.66	-16.66
44	-0.63	-0.63
45	1.22	1.22
46	-1.07	-1.07
47	-3.35	-3.35
48	-9.78	-9.78
49	-16.21	17.57

	50	2.93	2.93
	51	-5.91	-5.91
	52	-9.23	-9.23
	53	-7.24	-7.24
	54	0.01	0.01
	55	12.55	12.55
	56	7.26	7.26
	57	4.14	4.14
	58	3.06	3.06
	59	3.90	3.90
	60	6.51	6.51
	61	10.77	-10.77
	62	0.15	0.15
	63	6.19	6.19
	64	7.39	7.39
	65	3.76	3.76
	66	-4.72	-4.72
	67	-18.07	-18.07
	68	-2.49	-2.49
	69	0.92	0.92
	70	-1.91	-1.91
	71	-4.73	-4.73
	72	-11.15	-11.15

---

```
#####
#          VERIFICAÇÃO DA FADIGA (ELS)          #
#          VminHmin                             #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-11.30	11.30
2	0.11	0.11
3	-6.36	-6.36
4	-8.15	-8.15
5	-5.22	-5.22
6	2.61	2.61
7	15.60	15.60
8	9.71	9.71
9	3.83	3.83
10	1.94	1.94
11	0.05	0.05
12	1.70	1.70
13	15.73	-15.73
14	-4.08	-4.08
15	3.31	3.31
16	6.47	6.47
17	5.39	5.39
18	0.09	0.09
19	-9.48	-9.48
20	-5.70	-5.70
21	-3.37	-3.37
22	-2.63	-2.63
23	-3.62	-3.62
24	-6.46	-6.46
25	-11.30	14.52
26	2.44	2.44
27	-4.73	-4.73
28	-7.08	-7.08
29	-4.68	-4.68
30	2.54	2.54
31	14.67	14.67
32	8.77	8.77
33	2.88	2.88
34	0.52	0.52
35	-1.83	-1.83
36	1.08	1.08
37	14.73	-14.73
38	-4.09	-4.09
39	2.27	2.27
40	4.41	4.41
41	2.31	2.31
42	-4.01	-4.01
43	-14.60	-14.60
44	-0.58	-0.58
45	1.06	1.06
46	-0.84	-0.84
47	-2.74	-2.74
48	-8.63	-8.63
49	-14.52	15.71

	50	2.71	2.71
	51	-5.16	-5.16
	52	-8.11	-8.11
	53	-6.34	-6.34
	54	0.11	0.11
	55	11.27	11.27
	56	6.43	6.43
	57	3.59	3.59
	58	2.61	2.61
	59	3.35	3.35
	60	5.68	5.68
	61	9.46	-9.46
	62	0.09	0.09
	63	5.38	5.38
	64	6.43	6.43
	65	3.25	3.25
	66	-4.16	-4.16
	67	-15.83	-15.83
	68	-2.18	-2.18
	69	0.75	0.75
	70	-1.60	-1.60
	71	-3.94	-3.94
	72	-9.83	-9.83

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmin                                  #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-11.86	11.86
2	-0.16	-0.16
3	-7.12	-7.12
4	-9.06	-9.06
5	-5.91	-5.91
6	2.54	2.54
7	16.56	16.56
8	10.68	10.68
9	4.79	4.79
10	2.42	2.42
11	0.04	0.04
12	1.80	1.80
13	17.07	-17.07
14	-4.34	-4.34
15	3.74	3.74
16	7.22	7.22
17	6.08	6.08
18	0.33	0.33
19	-10.06	-10.06
20	-6.28	-6.28
21	-3.95	-3.95
22	-3.20	-3.20
23	-4.18	-4.18
24	-7.02	-7.02
25	-11.86	15.37
26	2.35	2.35
27	-5.36	-5.36
28	-7.89	-7.89
29	-5.30	-5.30
30	2.47	2.47
31	15.55	15.55
32	9.65	9.65
33	3.76	3.76
34	0.79	0.79
35	-2.19	-2.19
36	1.18	1.18
37	15.96	-15.96
38	-4.37	-4.37
39	2.57	2.57
40	4.90	4.90
41	2.62	2.62
42	-4.27	-4.27
43	-15.81	-15.81
44	-0.54	-0.54
45	1.20	1.20
46	-1.19	-1.19
47	-3.58	-3.58
48	-9.47	-9.47
49	-15.37	16.70

	50	2.65	2.65
	51	-5.82	-5.82
	52	-9.00	-9.00
	53	-7.10	-7.10
	54	-0.17	-0.17
	55	11.83	11.83
	56	6.99	6.99
	57	4.15	4.15
	58	3.17	3.17
	59	3.91	3.91
	60	6.24	6.24
	61	10.03	-10.03
	62	0.34	0.34
	63	6.06	6.06
	64	7.18	7.18
	65	3.67	3.67
	66	-4.44	-4.44
	67	-17.20	-17.20
	68	-2.40	-2.40
	69	0.98	0.98
	70	-1.98	-1.98
	71	-4.94	-4.94
	72	-10.82	-10.82

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VminHmax                                  #
#####
```

-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-13.52	13.52
2	2.06	2.06
3	-4.57	-4.57
4	-6.42	-6.42
5	-3.51	-3.51
6	4.28	4.28
7	17.07	17.07
8	7.88	7.88
9	0.44	0.44
10	0.27	0.27
11	0.10	0.10
12	1.88	1.88
13	15.99	-15.99
14	-4.66	-4.66
15	2.40	2.40
16	5.24	5.24
17	3.84	3.84
18	-1.79	-1.79
19	-11.69	-11.69
20	-5.42	-5.42
21	-1.52	-1.52
22	-0.18	-0.18
23	-1.60	-1.60
24	-5.98	-5.98
25	-13.52	16.24
26	4.11	4.11
27	-3.13	-3.13
28	-5.53	-5.53
29	-3.13	-3.13
30	4.11	4.11
31	16.24	16.24
32	7.07	7.07
33	-0.36	-0.36
34	-0.53	-0.53
35	-0.69	-0.69
36	1.11	1.11
37	15.22	-15.22
38	-4.61	-4.61
39	1.74	1.74
40	3.85	3.85
41	1.74	1.74
42	-4.61	-4.61
43	-15.22	-15.22
44	-1.10	-1.10
45	0.68	0.68
46	0.52	0.52
47	0.37	0.37
48	-7.07	-7.07
49	-16.24	17.07

	50	4.28	4.28
	51	-3.51	-3.51
	52	-6.42	-6.42
	53	-4.57	-4.57
	54	2.06	2.06
	55	13.52	13.52
	56	5.98	5.98
	57	1.60	1.60
	58	0.18	0.18
	59	1.52	1.52
	60	5.42	5.42
	61	11.69	-11.69
	62	-1.79	-1.79
	63	3.84	3.84
	64	5.24	5.24
	65	2.40	2.40
	66	-4.66	-4.66
	67	-15.99	-15.99
	68	-1.88	-1.88
	69	-0.10	-0.10
	70	-0.27	-0.27
	71	-0.44	-0.44
	72	-7.88	-7.88

---

```
#####
#          VERIFICAÇÃO DA FISSURAÇÃO (ELS)          #
#          VmaxHmax                                  #
#####
```

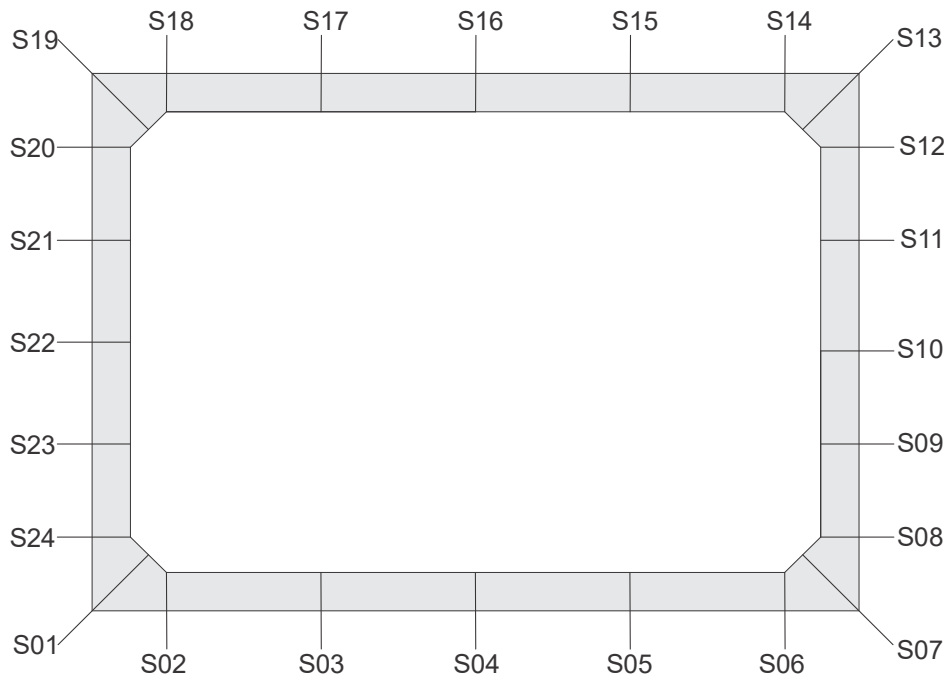
-----  
MOMENTO FLETOR NAS SEÇÕES DE INTERESSE  
-----

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-12.10	12.10
2	0.05	0.05
3	-6.92	-6.92
4	-8.86	-8.86
5	-5.70	-5.70
6	2.74	2.74
7	16.74	16.74
8	10.53	10.53
9	4.31	4.31
10	2.18	2.18
11	0.05	0.05
12	1.83	1.83
13	17.12	-17.12
14	-4.42	-4.42
15	3.63	3.63
16	7.07	7.07
17	5.90	5.90
18	0.12	0.12
19	-10.31	-10.31
20	-6.23	-6.23
21	-3.72	-3.72
22	-2.92	-2.92
23	-3.96	-3.96
24	-6.98	-6.98
25	-12.10	15.58
26	2.55	2.55
27	-5.17	-5.17
28	-7.70	-7.70
29	-5.11	-5.11
30	2.66	2.66
31	15.74	15.74
32	9.51	9.51
33	3.28	3.28
34	0.62	0.62
35	-2.03	-2.03
36	1.18	1.18
37	16.03	-16.03
38	-4.44	-4.44
39	2.50	2.50
40	4.83	4.83
41	2.55	2.55
42	-4.35	-4.35
43	-15.89	-15.89
44	-0.61	-0.61
45	1.16	1.16
46	-0.98	-0.98
47	-3.12	-3.12
48	-9.35	-9.35
49	-15.58	16.88

	50	2.85	2.85
	51	-5.63	-5.63
	52	-8.81	-8.81
	53	-6.90	-6.90
	54	0.04	0.04
	55	12.07	12.07
	56	6.95	6.95
	57	3.93	3.93
	58	2.89	2.89
	59	3.69	3.69
	60	6.20	6.20
	61	10.28	-10.28
	62	0.13	0.13
	63	5.89	5.89
	64	7.03	7.03
	65	3.57	3.57
	66	-4.51	-4.51
	67	-17.23	-17.23
	68	-2.37	-2.37
	69	0.86	0.86
	70	-1.79	-1.79
	71	-4.44	-4.44
	72	-10.66	-10.66

---

## ARMADURAS P/ SOLICITAÇÕES NORMAIS



Seção	As-CA60ext(cm <sup>2</sup> /m)	As-CA50ext(cm <sup>2</sup> /m)	As-CA60int(cm <sup>2</sup> /m)	As-CA50int(cm <sup>2</sup> /m)
1	5.47	6.57	1.26	1.26
2	2.32	2.79	2.32	2.79
3	2.32	2.79	2.32	2.79
4	2.32	2.79	2.66	3.20
5	2.32	2.79	2.32	2.79
6	2.32	2.79	2.32	2.79
7	5.47	6.57	1.26	1.26
8	2.32	2.79	2.32	2.79
9	2.32	2.79	2.32	2.79
10	2.32	2.79	2.32	2.79
11	2.32	2.79	2.32	2.79
12	2.32	2.79	2.32	2.79
13	5.47	6.57	1.26	1.26
14	2.32	2.79	2.32	2.79
15	2.32	2.79	2.32	2.79
16	2.32	2.79	2.32	2.79
17	2.32	2.79	2.32	2.79
18	2.32	2.79	2.32	2.79
19	5.47	6.57	1.26	1.26
20	2.32	2.79	2.32	2.79
21	2.32	2.79	2.32	2.79
22	2.32	2.79	2.32	2.79
23	2.32	2.79	2.32	2.79
24	2.32	2.79	2.32	2.79

NOTA: A tabela acima mostra as áreas de aço calculadas para parte interna e externa das seções de interesse. Estas áreas são mostradas para o caso de se utilizar apenas aço do tipo CA60 (As-CA60ext e As-CA60int) e os correspondentes valores para o caso de se utilizar apenas aço do tipo CA50 (As-CA50ext e As-CA50int). Possibilitando os cálculos para o uso combinado dos tipos de aço: CA60 contido nas telas soldadas e o CA50 presentes nas barras.

**VERIFICAÇÃO DA FADIGA**

---

Seção	Nsdmax(kN)	Msdmax(kN.m)	Nsdmin(kN)	Msdmin(kN.m)	DSs(MPa)	Asad(cm <sup>2</sup> /m)
12	-58.67	1.91	-51.48	1.70	-0.59	0.00
13	-57.38	17.95	-16.23	15.73	-8.70	0.00
14	-18.35	4.63	-16.23	4.08	7.27	0.00
16	-16.24	7.67	-28.02	5.13	106.86	0.00
18	-18.35	0.14	-16.23	0.09	-0.01	0.00
19	-48.72	10.81	-16.23	9.48	-9.43	0.00
20	-50.01	6.54	-43.90	5.70	9.68	0.00

---

## VERIFICAÇÃO DA CORTANTE

Seção	fck(MPa)	fcd(MPa)	fctm(MPa)	fctk,inf(MPa)	fctd(MPa)	Trd(MPa)
1	30.00	23.08	2.90	2.03	1.56	0.39
2	30.00	23.08	2.90	2.03	1.56	0.39
6	30.00	23.08	2.90	2.03	1.56	0.39
7	30.00	23.08	2.90	2.03	1.56	0.39
13	30.00	23.08	2.90	2.03	1.56	0.39
14	30.00	23.08	2.90	2.03	1.56	0.39
18	30.00	23.08	2.90	2.03	1.56	0.39
19	30.00	23.08	2.90	2.03	1.56	0.39

Seção	As(cm <sup>2</sup> /m)	ro	vsd(kN)	vrd1(kN)	vrd2(kN)	Asw(cm <sup>2</sup> /m/m)
1	6.57	2.12E-003	62.51	193.98	0.00	0.00
2	2.79	2.53E-003	56.18	77.91	0.00	0.00
6	2.79	2.53E-003	60.68	77.91	0.00	0.00
7	6.57	2.12E-003	68.30	188.50	0.00	0.00
13	6.57	2.12E-003	63.92	189.66	0.00	0.00
14	2.79	2.53E-003	44.32	78.78	0.00	0.00
18	2.79	2.53E-003	38.76	78.78	0.00	0.00
19	6.57	2.12E-003	51.36	190.91	0.00	0.00

**OBSERVAÇÃO:** A verificação da resistência à força cortante é feita a uma distância  $d/2$  das seções das mísulas.

**VERIFICAÇÃO DA FISSURAÇÃO**

VmaxHmin

Seção	As (cm <sup>2</sup> /m)	Nsd (kN)	Msd (kN.m)	Ø (mm)	w (mm)
1	6.57	-18.87	11.86	6.30	0.004
2	2.79	-21.38	0.16	6.30	0.000
3	2.79	-21.38	7.12	6.30	0.059
4	3.20	-21.38	9.06	6.30	0.076
5	2.79	-21.38	5.91	6.30	0.039
6	2.79	-21.38	2.54	6.30	0.005
7	6.57	-41.44	16.56	6.30	0.006
8	2.79	-60.22	10.68	6.30	0.107
9	2.79	-59.19	4.79	6.30	0.011
10	2.79	-58.16	2.42	6.30	0.000
11	2.79	-57.12	0.04	6.30	0.000
12	2.79	-56.09	1.80	6.30	0.000
13	6.57	-35.52	17.07	6.30	0.008
14	2.79	-16.24	4.34	6.30	0.021
15	2.79	-16.24	3.74	6.30	0.015
16	2.79	-16.24	7.22	6.30	0.064
17	2.79	-16.24	6.08	6.30	0.044
18	2.79	-16.24	0.33	6.30	0.000
19	6.57	-31.27	10.06	6.30	0.002
20	2.79	-47.59	6.28	6.30	0.031
21	2.79	-48.63	3.95	6.30	0.007
22	2.79	-49.66	3.20	6.30	0.003
23	2.79	-50.69	4.18	6.30	0.009
24	2.79	-51.72	7.02	6.30	0.040

VminHmax

Seção	As (cm <sup>2</sup> /m)	Nsd (kN)	Msd (kN.m)	Ø (mm)	w (mm)
1	6.57	-16.75	13.52	6.30	0.006
2	2.79	-33.40	2.06	6.30	0.001
3	2.79	-33.40	4.57	6.30	0.017
4	3.20	-33.40	6.42	6.30	0.031
5	2.79	-33.40	3.51	6.30	0.008
6	2.79	-33.40	4.28	6.30	0.014
7	6.57	-44.55	17.07	6.30	0.007
8	2.79	-54.42	7.88	6.30	0.052
9	2.79	-53.39	0.44	6.30	0.000
10	2.79	-52.36	0.27	6.30	0.000
11	2.79	-51.33	0.10	6.30	0.000
12	2.79	-50.29	1.88	6.30	0.000
13	6.57	-37.93	15.99	6.30	0.006
14	2.79	-26.84	4.66	6.30	0.020
15	2.79	-26.84	2.40	6.30	0.003
16	2.79	-26.84	5.24	6.30	0.027
17	2.79	-26.84	3.84	6.30	0.012
18	2.79	-26.84	1.79	6.30	0.001
19	6.57	-35.32	11.69	6.30	0.003
20	2.79	-45.09	5.42	6.30	0.022
21	2.79	-46.12	1.52	6.30	0.000
22	2.79	-47.15	0.18	6.30	0.000
23	2.79	-48.18	1.60	6.30	0.000
24	2.79	-49.21	5.98	6.30	0.027

## VERIFICAÇÃO DA FISSURAÇÃO (CONT.)

VmaxHmax

Seção	As(cm <sup>2</sup> /m)	Nsd(kN)	Msd(kN.m)	Ø(mm)	w(mm)
1	6.57	-18.58	12.10	6.30	0.004
2	2.79	-22.61	0.05	6.30	0.000
3	2.79	-22.61	6.92	6.30	0.055
4	3.20	-22.61	8.86	6.30	0.072
5	2.79	-22.61	5.70	6.30	0.035
6	2.79	-22.61	2.74	6.30	0.006
7	6.57	-41.99	16.74	6.30	0.007
8	2.79	-60.10	10.53	6.30	0.104
9	2.79	-59.06	4.31	6.30	0.007
10	2.79	-58.03	2.18	6.30	0.000
11	2.79	-57.00	0.05	6.30	0.000
12	2.79	-55.97	1.83	6.30	0.000
13	6.57	-36.12	17.12	6.30	0.008
14	2.79	-17.55	4.42	6.30	0.021
15	2.79	-17.55	3.63	6.30	0.013
16	2.79	-17.55	7.07	6.30	0.061
17	2.79	-17.55	5.90	6.30	0.041
18	2.79	-17.55	0.12	6.30	0.000
19	6.57	-31.99	10.31	6.30	0.002
20	2.79	-47.72	6.23	6.30	0.030
21	2.79	-48.75	3.72	6.30	0.006
22	2.79	-49.78	2.92	6.30	0.002
23	2.79	-50.81	3.96	6.30	0.007
24	2.79	-51.84	6.98	6.30	0.039

NOTA:

\* Seção com aumento na armadura devido à fissuração.