ASSOCIAÇÃO BRASILEIRA DOS FABRICANTES DE TUBOS DE CONCRETO

RELATÓRIO DE DIMENSIONAMENTO DE ASSOCIAÇÃO DE DUAS ADUELAS RETANGULARES MONOLÍTICAS DE CONCRETO

quinta-feira, 3 de outubro de 2019

ASSOCIAÇÃO BRASILEIRA
DOS FABRICANTES DE
TUBOS DE CONCRETO

DADOS DO FABRICANTE

LOGO

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:

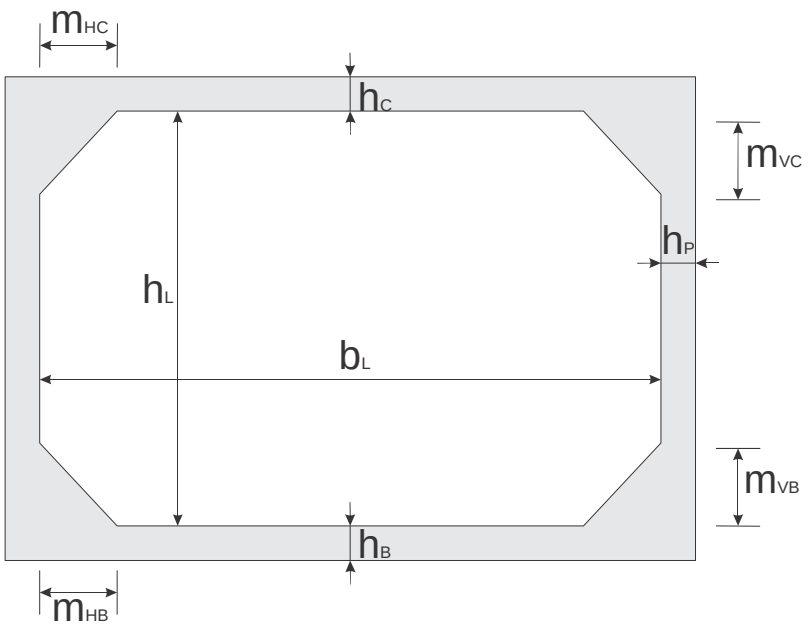
DADOS DA OBRA

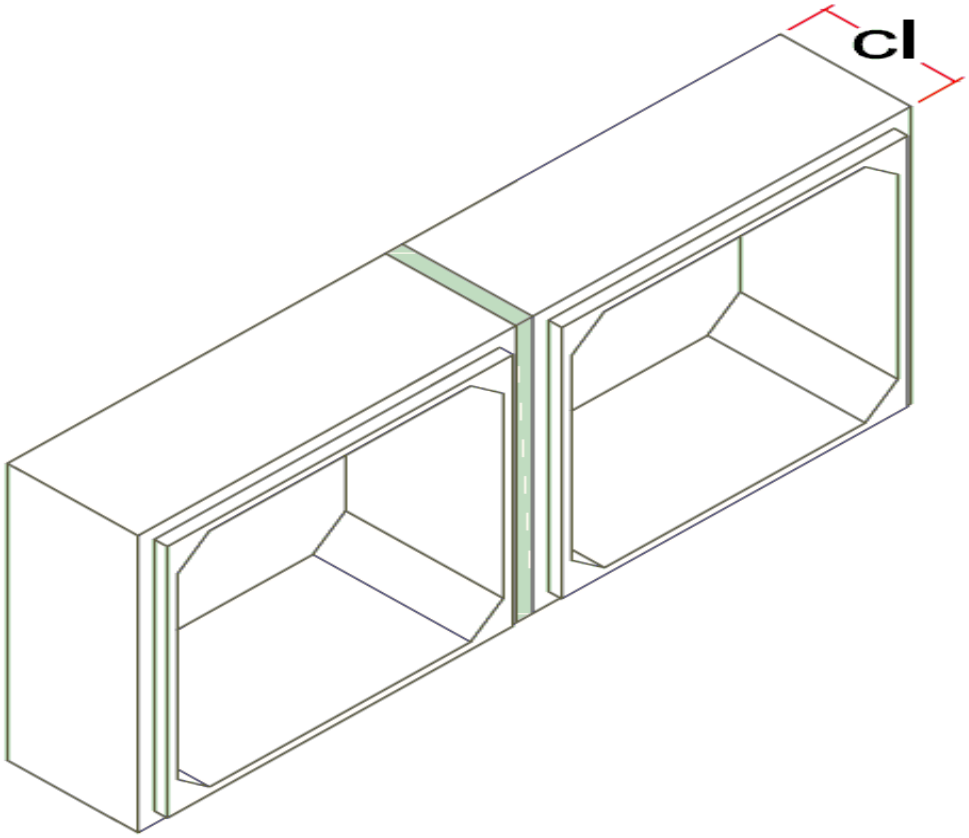
LOGO

NOME: ADUELA 2,00 X 2,00 M PARA ATERRO DE 5,00 M - LINHA DUPLA
ENDEREÇO: ,
BAIRRO:
CIDADE:
ESTADO: Não Informado
CEP:
TEL.:
CEL.:
E-MAIL:
SITE:

GEOMETRIA

SEÇÃO CONSTANTE	SIM
FINALIDADE	ÁGUAS PLUVIAIS
COMPRIMENTO (cl)	1.00 m
LARGURA LIVRE (bl)	2.00 m
ALTURA LIVRE (hl)	2.00 m
ALTURA DA LAJE DA COBERTURA (hc)	0.15 m
ESPESSURA DAS PAREDES LATERAIS (hp)	0.15 m
ALTURA DA LAJE DA BASE (hb)	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

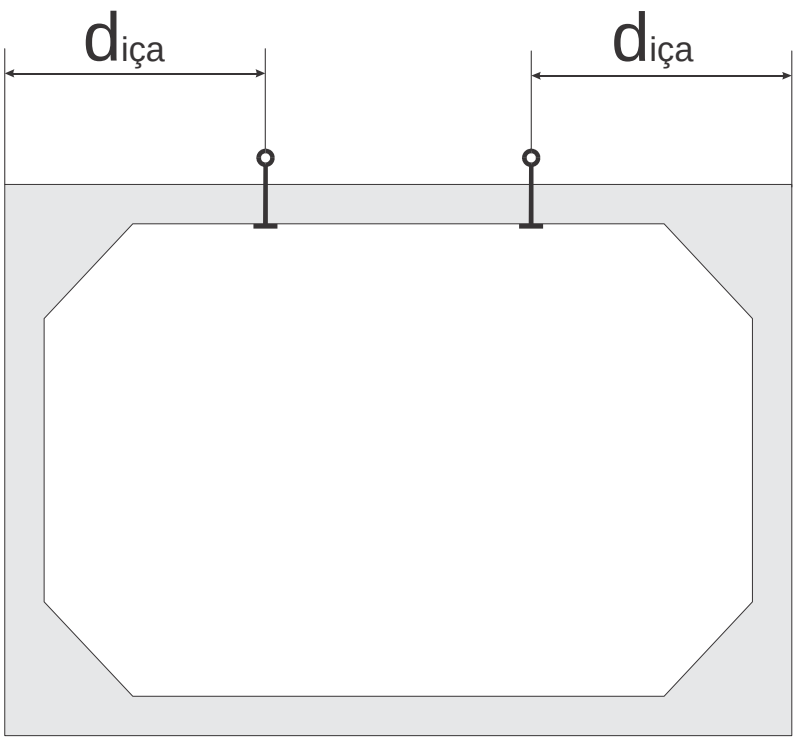
PESO ESPECÍFICO.....:	18.00 kN/m³
ÂNGULO DE ATRITO.....:	30.00 graus
COEFICIENTE DE ATRITO ATIVO.....:	0.33
COEFICIENTE DE ATRITO ESTÁTICO.....:	0.50
COEFICIENTE DE ATRITO.....:	0.58

DADOS DE INSTALAÇÃO

ALTURA DE TERRA.....:	5.00 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.....:	---

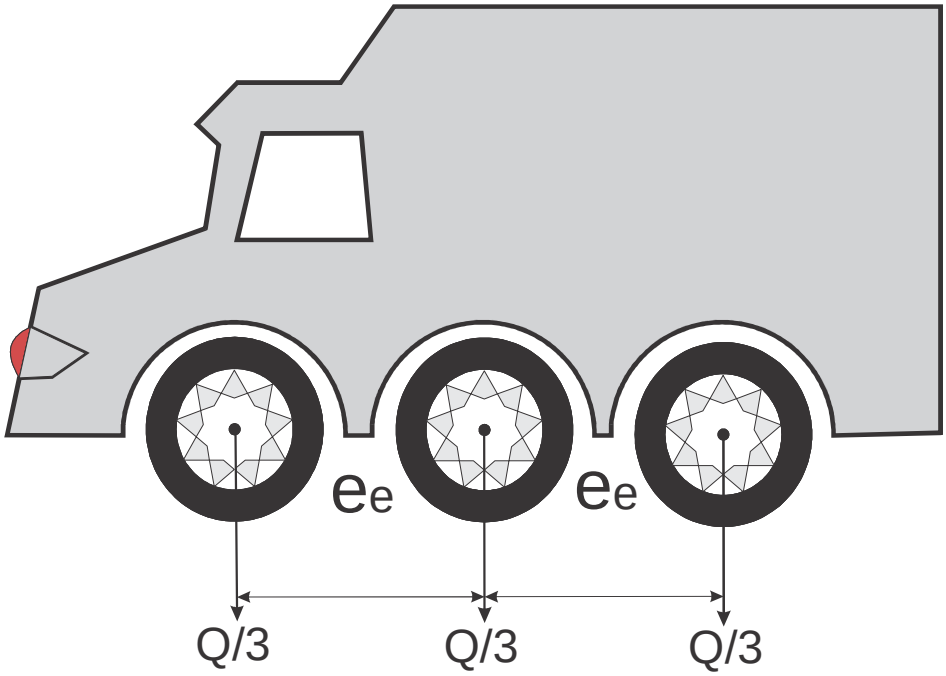
INFORMAÇÕES DE MANUSEIO

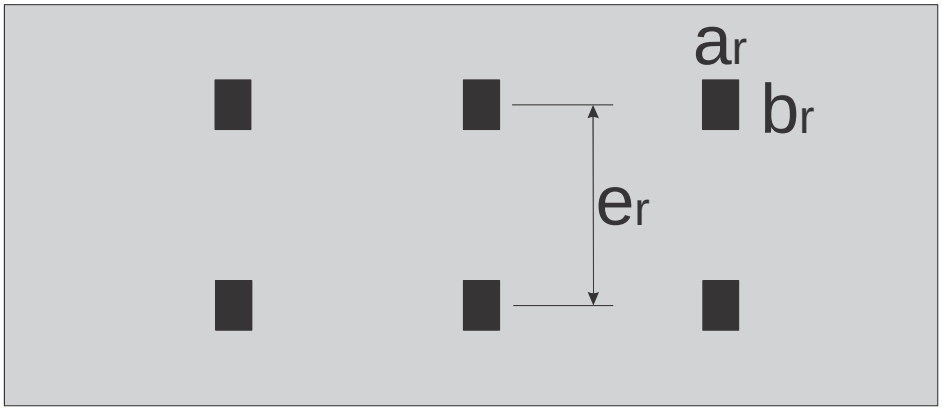
RESISTÊNCIA DO CONCRETO (fcj).....:	20.00 MPa
COEFICIENTE DE IMPACTO.....:	1.20
DISTÂNCIA DE IÇAMENTO.....:	50.00 cm



SOBRECARGA

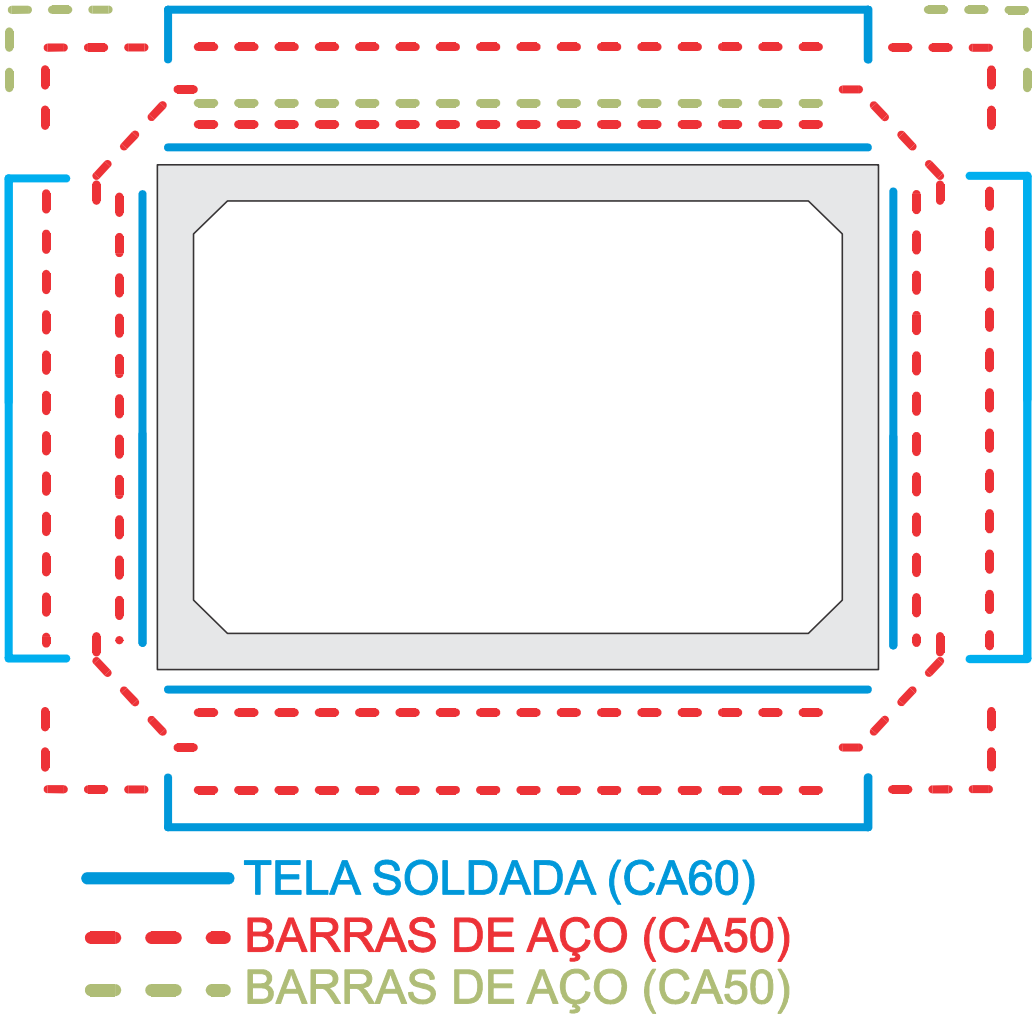
TIPO DE SOBRECARGA.....: RODOVIÁRIO
TIPO DE TRÁFEGO.....: CLASSE 45
PESO DO VEÍCULO (Q).....: 450.00 kN
DISTÂNCIA ENTRE EIXOS (ee).....: 1.50 m
DISTÂNCIA ENTRE RODAS (er).....: 2.00 m
ÁREA DE CONTATO DA RODA (ar).....: 0.20 m
ÁREA DE CONTATO DA RODA (br).....: 0.50 m
COEF. DE IMPACTO ADICIONAL.....: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





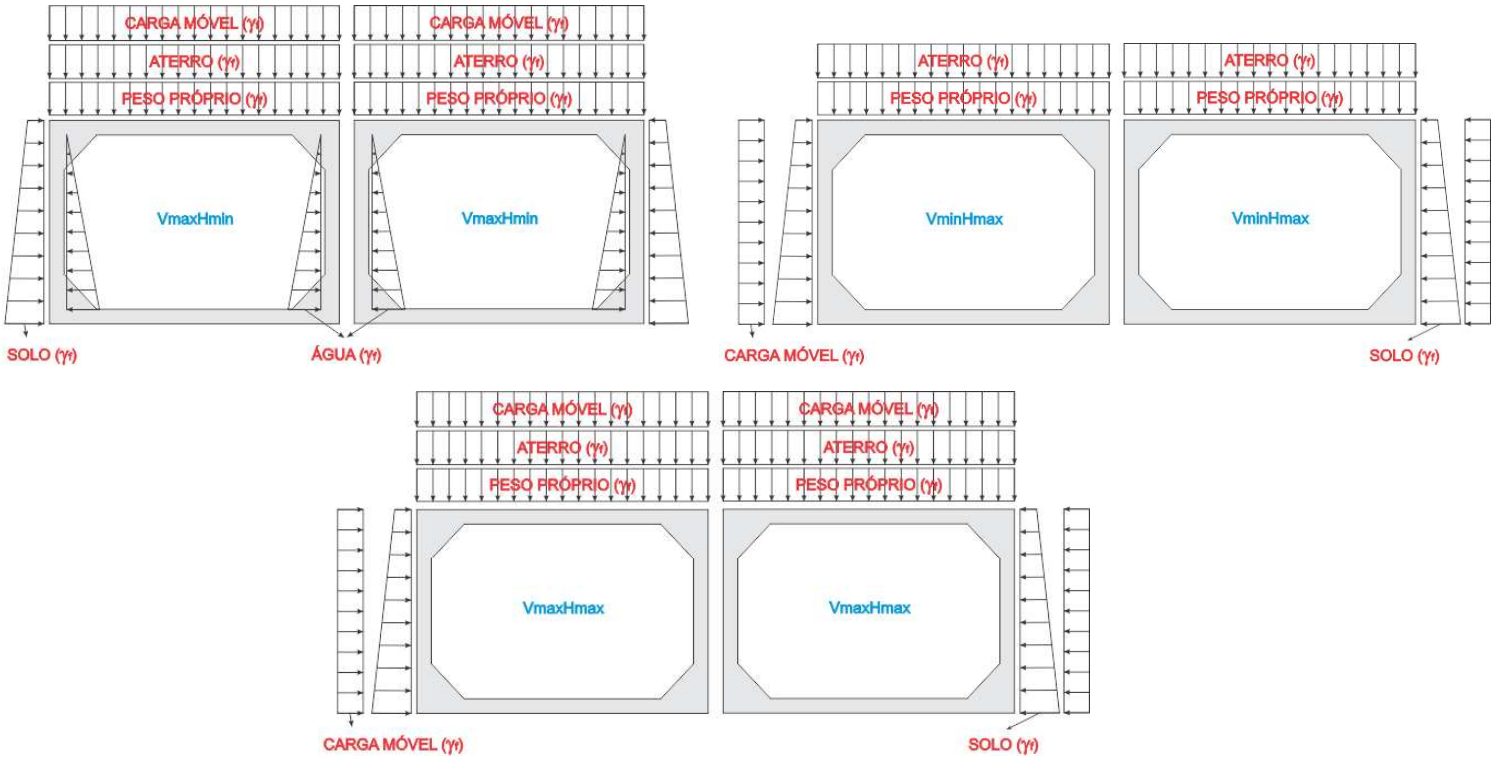
PARÂMETROS DA ARMADURA

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

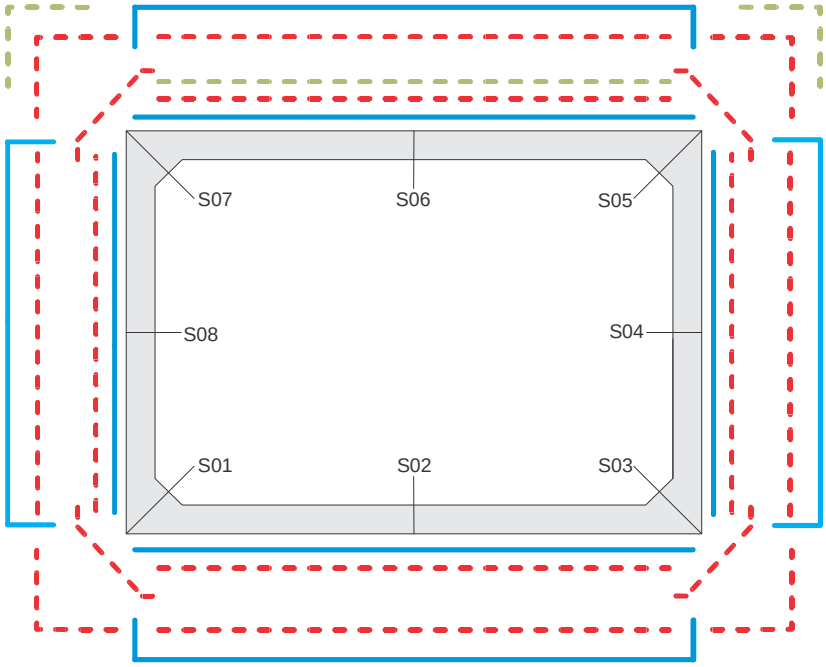


CRITÉRIOS E CONSTANTES

RESISTÊNCIA CARACTERÍSTICA DO CONCRETO..: 30.00 MPa
PESO ESPECÍFICO DO CONCRETO.....: 25.00 kN/m³
PESO ESPECÍFICO DO AÇO.....: 78.00 kN/m³
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

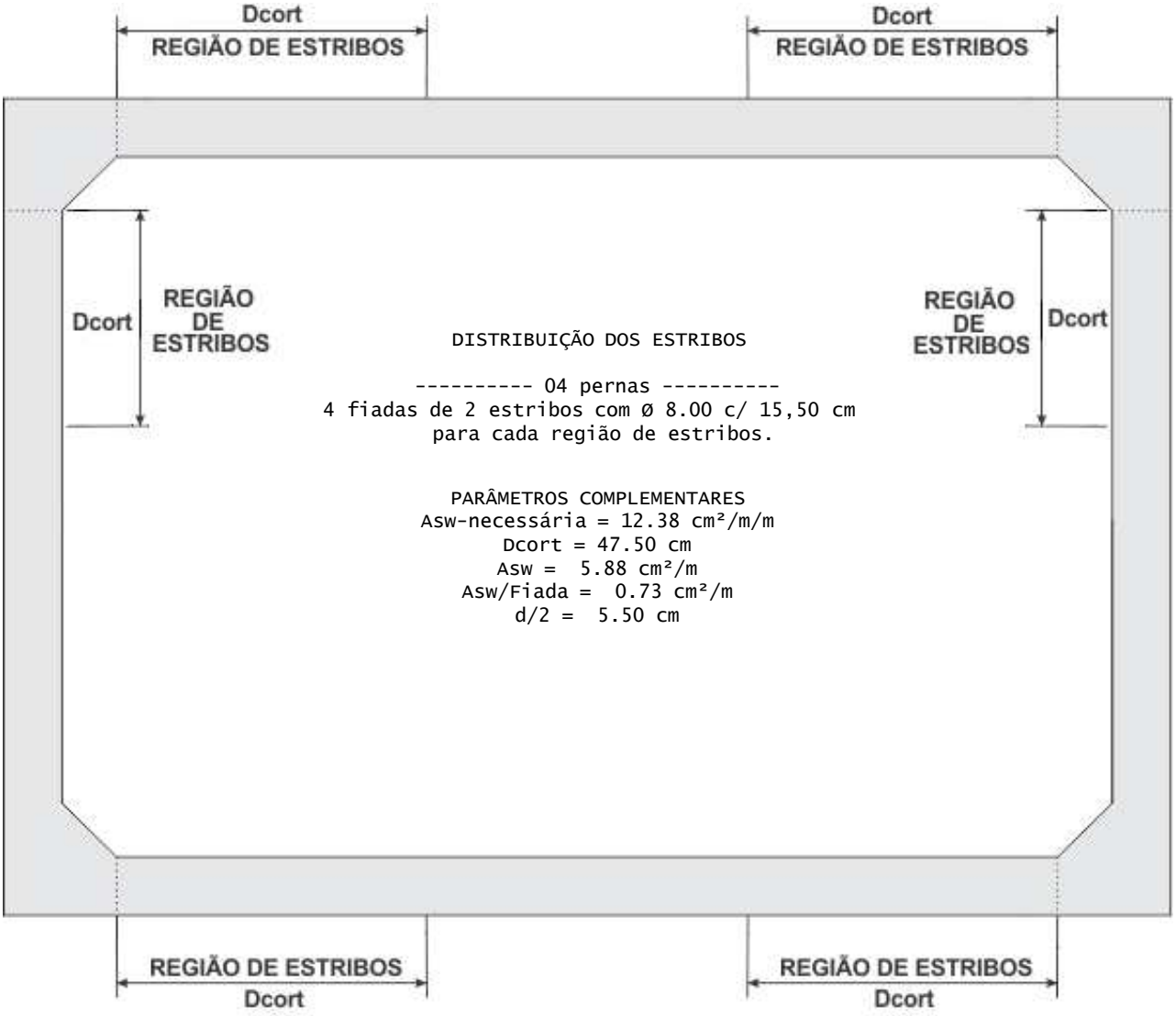


OBS.: VALORES POR METRO DE ADUELA.

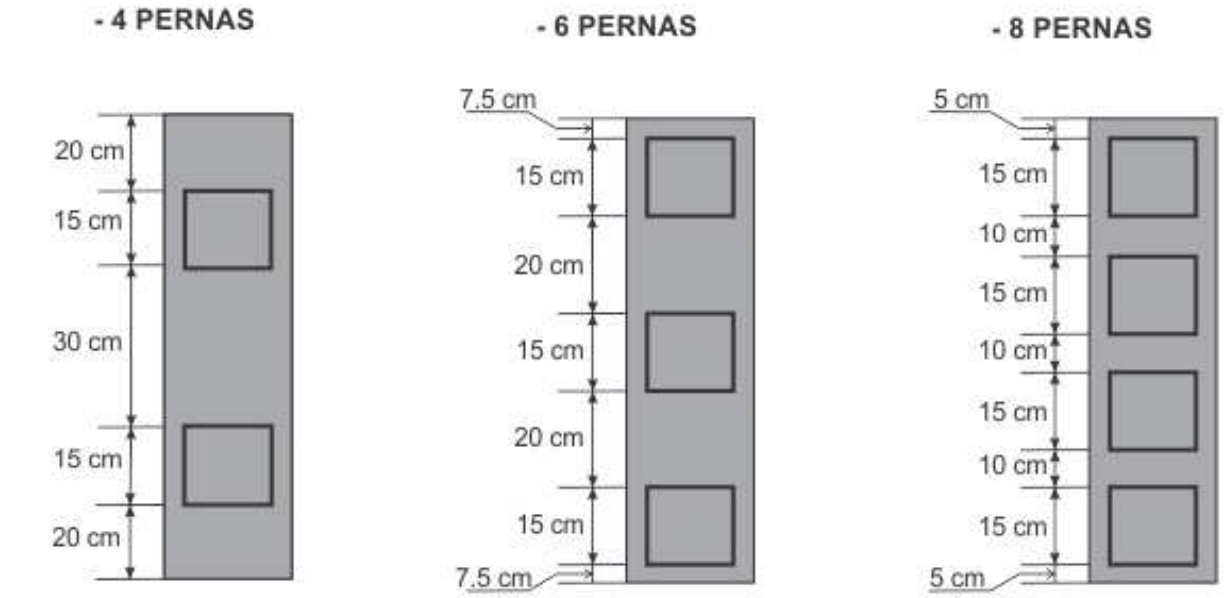
	TELA	ARMADURA COMPLEMENTAR	ARMADURA DE FADIGA
LADO EXTERNO	T-S02: L283 T-S04: L283 T-S06: L283 T-S08: L283	B-S01: 5 Ø6.30 c/ 23 cm (0.68%) B-S02: 0.61 cm² de área acima B-S03: 5 Ø6.30 c/ 23 cm (0.68%) B-S04: 4 Ø6.30 c/ 31 cm (19.21%) B-S05: 0.22 cm² de área acima B-S06: 0.61 cm² de área acima B-S07: 0.22 cm² de área acima B-S08: 4 Ø6.30 c/ 31 cm (19.21%)	B-S05: 0.00 cm² de área acima B-S07: 0.00 cm² de área acima
LADO INTERNO	T-S02: L283 T-S04: L283 T-S06: L283 T-S08: L283	B-S01: 4 Ø6.30 c/ 31 cm (0.00%) B-S02: 7 Ø10.00 c/ 15 cm (6.13%) B-S03: 4 Ø6.30 c/ 31 cm (0.00%) B-S04: 0.61 cm² de área acima B-S05: 4 Ø6.30 c/ 31 cm (0.00%) B-S06: 4 Ø10.00 c/ 31 cm (0.62%) B-S07: 4 Ø6.30 c/ 31 cm (0.00%) B-S08: 0.61 cm² de área acima	B-S06: 0.00 cm² de área acima

NOTA: Os valores entre parênteses representam a percentagem de área de aço que a seção apresenta acima (porcentagem positiva) ou a menos (porcentagem 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 porcentagem é calculada em função da área de armadura complementar necessária e não em relação a área total de aço.

ARMADURA DE CORTANTE



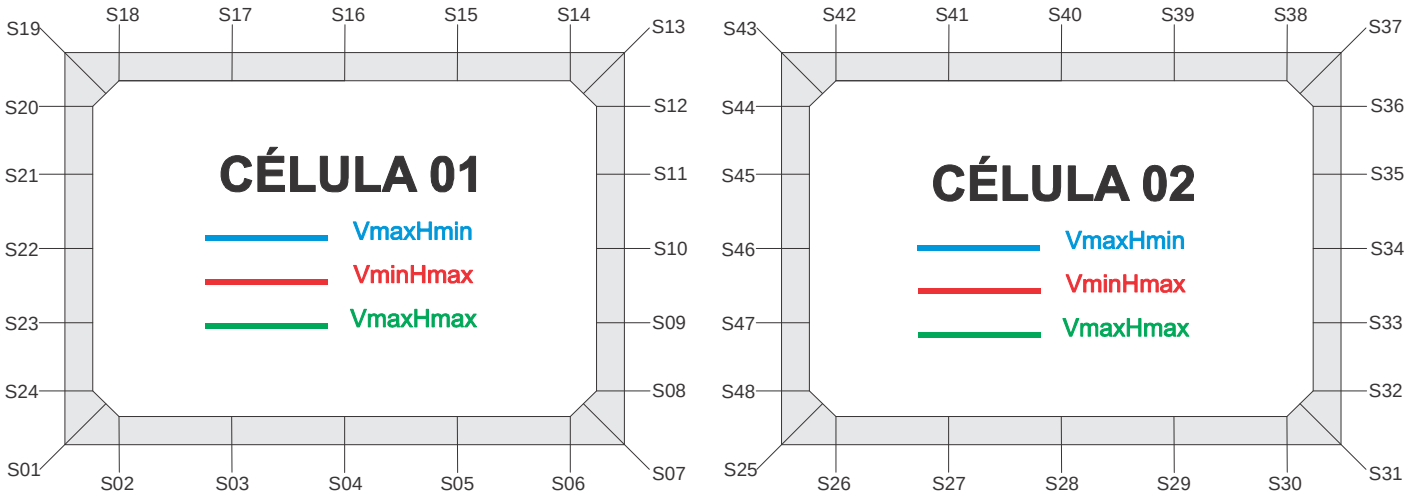
DISTRIBUIÇÃO (POR METRO LONGITUDINAL) DOS ESTRIBOS AO LONGO DE UMA FIADA:

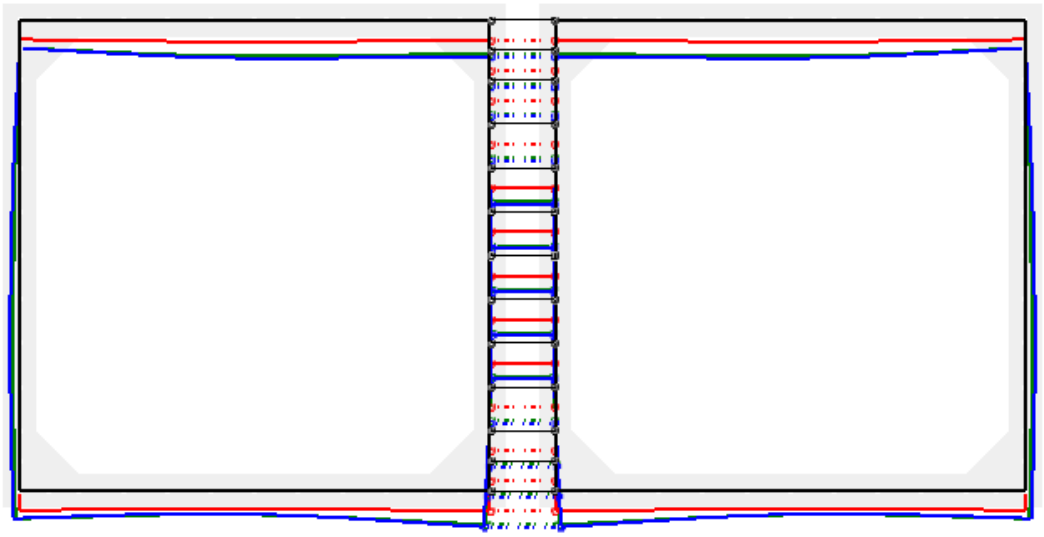


OBSERVAÇÃO:
Quando houver necessidade de armadura transversal, esta deve necessariamente ser colocada na laje de cobertura e na laje de fundo nas regiões apontadas na figura esquemática acima (REGIÃO DE ESTRIBOS). É RECOMENDADO ainda a colocação de armadura transversal nas partes superiores das paredes, 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





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#########################################################
#            SOLICITAÇÕES NORMAIS (ELU)                 #
#                     VmaxHmin                          #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -1.47E-003|             -6.80E-003|
|     2|             -1.48E-003|             -6.29E-003|
|     3|             -1.48E-003|             -5.67E-003|
|     4|             -1.48E-003|             -5.68E-003|
|     5|             -1.48E-003|             -6.52E-003|
|     6|             -1.49E-003|             -7.89E-003|
|     7|             -1.49E-003|             -8.84E-003|
|     8|             -5.95E-004|             -8.85E-003|
|     9|              1.77E-004|             -8.86E-003|
|    10|              2.70E-004|             -8.88E-003|
|    11|              7.73E-005|             -8.90E-003|
|    12|              6.12E-006|             -8.92E-003|
|    13|             -1.35E-005|             -8.93E-003|
|    14|             -1.24E-005|             -9.00E-003|
|    15|             -9.38E-006|             -9.33E-003|
|    16|             -6.33E-006|             -9.42E-003|
|    17|             -3.27E-006|             -8.85E-003|
|    18|             -2.11E-007|             -7.72E-003|
|    19|              8.70E-007|             -6.87E-003|
|    20|             -8.29E-004|             -6.86E-003|
|    21|             -1.75E-003|             -6.85E-003|
|    22|             -2.24E-003|             -6.83E-003|
|    23|             -2.33E-003|             -6.82E-003|
|    24|             -1.95E-003|             -6.80E-003|
|    25|              1.49E-003|             -8.84E-003|
|    26|              1.49E-003|             -7.89E-003|
|    27|              1.48E-003|             -6.52E-003|
|    28|              1.48E-003|             -5.68E-003|
|    29|              1.48E-003|             -5.67E-003|
|    30|              1.48E-003|             -6.29E-003|
|    31|              1.47E-003|             -6.80E-003|
|    32|              1.95E-003|             -6.80E-003|
|    33|              2.33E-003|             -6.82E-003|
|    34|              2.24E-003|             -6.83E-003|
|    35|              1.75E-003|             -6.85E-003|
|    36|              8.29E-004|             -6.86E-003|
|    37|             -8.70E-007|             -6.87E-003|
|    38|              2.11E-007|             -7.72E-003|
|    39|              3.27E-006|             -8.85E-003|
|    40|              6.33E-006|             -9.42E-003|
|    41|              9.38E-006|             -9.33E-003|
|    42|              1.24E-005|             -9.00E-003|
|    43|              1.35E-005|             -8.93E-003|
|    44|             -6.12E-006|             -8.92E-003|
|    45|             -7.73E-005|             -8.90E-003|
|    46|             -2.70E-004|             -8.88E-003|
|    47|             -1.77E-004|             -8.86E-003|
|    48|              5.95E-004|             -8.85E-003|
---------------------------------------------------------
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DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.80E-003
2	1.87E-003
3	9.38E-004
4	-1.08E-003
5	-3.00E-003
6	-3.51E-003
7	-3.36E-003
8	-3.08E-003
9	-9.28E-004
10	3.00E-004
11	4.80E-004
12	-6.77E-006
13	1.62E-004
14	4.18E-004
15	8.04E-004
16	-5.19E-004
17	-2.26E-003
18	-3.14E-003
19	-3.08E-003
20	-2.93E-003
21	-1.73E-003
22	-7.31E-004
23	3.13E-004
24	1.63E-003
25	3.36E-003
26	3.51E-003
27	3.00E-003
28	1.08E-003
29	-9.38E-004
30	-1.87E-003
31	-1.80E-003
32	-1.63E-003
33	-3.13E-004
34	7.31E-004
35	1.73E-003
36	2.93E-003
37	3.08E-003
38	3.14E-003
39	2.26E-003
40	5.19E-004
41	-8.04E-004
42	-4.18E-004
43	-1.62E-004
44	6.77E-006
45	-4.80E-004
46	-3.00E-004
47	9.28E-004
48	3.08E-003

```
#########################################################
#            SOLICITAÇÕES NORMAIS (ELU)                 #
#                     VminHmax                          #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|         DIREÇÃO X (m)|         DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|            -7.20E-005|            -4.73E-003|
|     2|            -7.56E-005|            -4.62E-003|
|     3|            -8.55E-005|            -4.36E-003|
|     4|            -9.55E-005|            -4.25E-003|
|     5|            -1.05E-004|            -4.46E-003|
|     6|            -1.15E-004|            -4.80E-003|
|     7|            -1.19E-004|            -4.94E-003|
|     8|            -1.47E-005|            -4.95E-003|
|     9|             4.86E-006|            -4.96E-003|
|    10|            -5.58E-007|            -4.97E-003|
|    11|            -2.53E-006|            -4.98E-003|
|    12|             6.04E-006|            -4.99E-003|
|    13|            -5.93E-006|            -5.00E-003|
|    14|            -2.85E-006|            -5.05E-003|
|    15|             5.87E-006|            -5.26E-003|
|    16|             1.46E-005|            -5.38E-003|
|    17|             2.33E-005|            -5.22E-003|
|    18|             3.20E-005|            -4.92E-003|
|    19|             3.51E-005|            -4.78E-003|
|    20|            -6.74E-005|            -4.78E-003|
|    21|            -4.59E-005|            -4.77E-003|
|    22|             2.95E-006|            -4.76E-003|
|    23|            -7.60E-005|            -4.74E-003|
|    24|            -1.42E-004|            -4.73E-003|
|    25|             1.19E-004|            -4.94E-003|
|    26|             1.15E-004|            -4.80E-003|
|    27|             1.05E-004|            -4.46E-003|
|    28|             9.55E-005|            -4.25E-003|
|    29|             8.55E-005|            -4.36E-003|
|    30|             7.56E-005|            -4.62E-003|
|    31|             7.20E-005|            -4.73E-003|
|    32|             1.42E-004|            -4.73E-003|
|    33|             7.60E-005|            -4.74E-003|
|    34|            -2.95E-006|            -4.76E-003|
|    35|             4.59E-005|            -4.77E-003|
|    36|             6.74E-005|            -4.78E-003|
|    37|            -3.51E-005|            -4.78E-003|
|    38|            -3.20E-005|            -4.92E-003|
|    39|            -2.33E-005|            -5.22E-003|
|    40|            -1.46E-005|            -5.38E-003|
|    41|            -5.87E-006|            -5.26E-003|
|    42|             2.85E-006|            -5.05E-003|
|    43|             5.93E-006|            -5.00E-003|
|    44|            -6.04E-006|            -4.99E-003|
|    45|             2.53E-006|            -4.98E-003|
|    46|             5.58E-007|            -4.97E-003|
|    47|            -4.86E-006|            -4.96E-003|
|    48|             1.47E-005|            -4.95E-003|
---------------------------------------------------------
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DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	3.22E-004
2	4.66E-004
3	6.10E-004
4	-1.27E-004
5	-8.41E-004
6	-6.12E-004
7	-4.54E-004
8	-2.86E-004
9	8.71E-006
10	1.38E-005
11	-8.51E-006
12	-2.03E-007
13	9.72E-005
14	2.60E-004
15	5.81E-004
16	-3.93E-005
17	-7.18E-004
18	-5.75E-004
19	-4.39E-004
20	-2.86E-004
21	2.12E-004
22	-3.33E-005
23	-3.04E-004
24	1.65E-004
25	4.54E-004
26	6.12E-004
27	8.41E-004
28	1.27E-004
29	-6.10E-004
30	-4.66E-004
31	-3.22E-004
32	-1.65E-004
33	3.04E-004
34	3.33E-005
35	-2.12E-004
36	2.86E-004
37	4.39E-004
38	5.75E-004
39	7.18E-004
40	3.93E-005
41	-5.81E-004
42	-2.60E-004
43	-9.72E-005
44	2.03E-007
45	8.51E-006
46	-1.38E-005
47	-8.71E-006
48	2.86E-004

```
#########################################################
#            SOLICITAÇÕES NORMAIS (ELU)                 #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -9.56E-004|             -6.82E-003|
|     2|             -9.59E-004|             -6.42E-003|
|     3|             -9.65E-004|             -5.87E-003|
|     4|             -9.72E-004|             -5.83E-003|
|     5|             -9.79E-004|             -6.49E-003|
|     6|             -9.85E-004|             -7.58E-003|
|     7|             -9.88E-004|             -8.28E-003|
|     8|             -3.37E-004|             -8.29E-003|
|     9|              1.77E-004|             -8.31E-003|
|    10|              2.04E-004|             -8.33E-003|
|    11|              5.38E-005|             -8.35E-003|
|    12|              6.90E-006|             -8.36E-003|
|    13|             -1.22E-005|             -8.37E-003|
|    14|             -1.02E-005|             -8.44E-003|
|    15|             -4.39E-006|             -8.77E-003|
|    16|              1.37E-006|             -8.90E-003|
|    17|              7.13E-006|             -8.45E-003|
|    18|              1.29E-005|             -7.54E-003|
|    19|              1.49E-005|             -6.89E-003|
|    20|             -5.97E-004|             -6.89E-003|
|    21|             -1.21E-003|             -6.87E-003|
|    22|             -1.50E-003|             -6.86E-003|
|    23|             -1.57E-003|             -6.84E-003|
|    24|             -1.32E-003|             -6.83E-003|
|    25|              9.88E-004|             -8.28E-003|
|    26|              9.85E-004|             -7.58E-003|
|    27|              9.79E-004|             -6.49E-003|
|    28|              9.72E-004|             -5.83E-003|
|    29|              9.65E-004|             -5.87E-003|
|    30|              9.59E-004|             -6.42E-003|
|    31|              9.56E-004|             -6.82E-003|
|    32|              1.32E-003|             -6.83E-003|
|    33|              1.57E-003|             -6.84E-003|
|    34|              1.50E-003|             -6.86E-003|
|    35|              1.21E-003|             -6.87E-003|
|    36|              5.97E-004|             -6.89E-003|
|    37|             -1.49E-005|             -6.89E-003|
|    38|             -1.29E-005|             -7.54E-003|
|    39|             -7.13E-006|             -8.45E-003|
|    40|             -1.37E-006|             -8.90E-003|
|    41|              4.39E-006|             -8.77E-003|
|    42|              1.02E-005|             -8.44E-003|
|    43|              1.22E-005|             -8.37E-003|
|    44|             -6.90E-006|             -8.36E-003|
|    45|             -5.38E-005|             -8.35E-003|
|    46|             -2.04E-004|             -8.33E-003|
|    47|             -1.77E-004|             -8.31E-003|
|    48|              3.37E-004|             -8.29E-003|
---------------------------------------------------------
```

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.41E-003
2	1.52E-003
3	9.30E-004
4	-7.95E-004
5	-2.42E-003
6	-2.66E-003
7	-2.48E-003
8	-2.21E-003
9	-5.42E-004
10	2.80E-004
11	3.44E-004
12	-5.06E-006
13	1.57E-004
14	4.09E-004
15	8.34E-004
16	-3.50E-004
17	-1.86E-003
18	-2.40E-003
19	-2.30E-003
20	-2.12E-003
21	-1.04E-003
22	-4.52E-004
23	1.35E-004
24	1.22E-003
25	2.48E-003
26	2.66E-003
27	2.42E-003
28	7.95E-004
29	-9.30E-004
30	-1.52E-003
31	-1.41E-003
32	-1.22E-003
33	-1.35E-004
34	4.52E-004
35	1.04E-003
36	2.12E-003
37	2.30E-003
38	2.40E-003
39	1.86E-003
40	3.50E-004
41	-8.34E-004
42	-4.09E-004
43	-1.57E-004
44	5.06E-006
45	-3.44E-004
46	-2.80E-004
47	5.42E-004
48	2.21E-003

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                      VmaxHmin                         #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -1.64E-003|             -6.83E-003|
|     2|             -1.64E-003|             -6.25E-003|
|     3|             -1.65E-003|             -5.56E-003|
|     4|             -1.65E-003|             -5.56E-003|
|     5|             -1.65E-003|             -6.48E-003|
|     6|             -1.65E-003|             -8.10E-003|
|     7|             -1.66E-003|             -9.29E-003|
|     8|             -5.27E-004|             -9.30E-003|
|     9|              3.18E-004|             -9.34E-003|
|    10|              1.84E-004|             -9.38E-003|
|    11|             -2.74E-004|             -9.41E-003|
|    12|             -3.77E-004|             -9.45E-003|
|    13|             -3.48E-004|             -9.46E-003|
|    14|             -3.47E-004|             -9.51E-003|
|    15|             -3.44E-004|             -9.75E-003|
|    16|             -3.40E-004|             -9.72E-003|
|    17|             -3.37E-004|             -9.03E-003|
|    18|             -3.34E-004|             -7.80E-003|
|    19|             -3.33E-004|             -6.90E-003|
|    20|             -1.21E-003|             -6.89E-003|
|    21|             -2.16E-003|             -6.88E-003|
|    22|             -2.62E-003|             -6.86E-003|
|    23|             -2.65E-003|             -6.85E-003|
|    24|             -2.18E-003|             -6.83E-003|
|    25|              1.66E-003|             -9.15E-003|
|    26|              1.65E-003|             -8.08E-003|
|    27|              1.65E-003|             -6.55E-003|
|    28|              1.65E-003|             -5.60E-003|
|    29|              1.64E-003|             -5.54E-003|
|    30|              1.64E-003|             -6.22E-003|
|    31|              1.64E-003|             -6.82E-003|
|    32|              2.20E-003|             -6.83E-003|
|    33|              2.59E-003|             -6.86E-003|
|    34|              2.39E-003|             -6.89E-003|
|    35|              1.77E-003|             -6.92E-003|
|    36|              6.69E-004|             -6.95E-003|
|    37|             -3.34E-004|             -6.96E-003|
|    38|             -3.33E-004|             -7.99E-003|
|    39|             -3.30E-004|             -9.28E-003|
|    40|             -3.27E-004|             -9.89E-003|
|    41|             -3.24E-004|             -9.76E-003|
|    42|             -3.21E-004|             -9.36E-003|
|    43|             -3.20E-004|             -9.24E-003|
|    44|             -3.89E-004|             -9.23E-003|
|    45|             -4.75E-004|             -9.21E-003|
|    46|             -5.71E-004|             -9.19E-003|
|    47|             -3.16E-004|             -9.17E-003|
|    48|              6.39E-004|             -9.15E-003|
---------------------------------------------------------
```

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	2.04E-003
2	2.11E-003
3	1.07E-003
4	-1.15E-003
5	-3.39E-003
6	-4.37E-003
7	-4.27E-003
8	-3.84E-003
9	-6.36E-004
10	1.03E-003
11	9.53E-004
12	-2.29E-004
13	5.47E-005
14	2.90E-004
15	5.41E-004
16	-8.37E-004
17	-2.56E-003
18	-3.33E-003
19	-3.25E-003
20	-3.08E-003
21	-1.73E-003
22	-6.14E-004
23	5.08E-004
24	1.87E-003
25	3.81E-003
26	3.95E-003
27	3.34E-003
28	1.28E-003
29	-9.51E-004
30	-2.18E-003
31	-2.15E-003
32	-1.90E-003
33	-1.41E-004
34	1.04E-003
35	2.09E-003
36	3.52E-003
37	3.73E-003
38	3.75E-003
39	2.50E-003
40	5.04E-004
41	-9.60E-004
42	-6.05E-004
43	-3.44E-004
44	-1.66E-004
45	-3.63E-004
46	4.45E-005
47	1.38E-003
48	3.53E-003

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                     VminHmax                          #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|         DIREÇÃO X (m)|         DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|            -8.26E-005|            -4.74E-003|
|     2|            -8.61E-005|            -4.62E-003|
|     3|            -9.60E-005|            -4.35E-003|
|     4|            -1.06E-004|            -4.23E-003|
|     5|            -1.16E-004|            -4.45E-003|
|     6|            -1.26E-004|            -4.83E-003|
|     7|            -1.29E-004|            -5.01E-003|
|     8|            -4.92E-006|            -5.02E-003|
|     9|            -4.50E-005|            -5.04E-003|
|    10|            -7.39E-005|            -5.06E-003|
|    11|            -6.39E-005|            -5.09E-003|
|    12|            -2.55E-005|            -5.11E-003|
|    13|            -2.07E-005|            -5.12E-003|
|    14|            -1.76E-005|            -5.16E-003|
|    15|            -8.90E-006|            -5.36E-003|
|    16|            -1.49E-007|            -5.46E-003|
|    17|             8.60E-006|            -5.27E-003|
|    18|             1.73E-005|            -4.94E-003|
|    19|             2.04E-005|            -4.79E-003|
|    20|            -9.50E-005|            -4.79E-003|
|    21|            -8.55E-005|            -4.78E-003|
|    22|            -3.81E-005|            -4.77E-003|
|    23|            -1.10E-004|            -4.75E-003|
|    24|            -1.63E-004|            -4.74E-003|
|    25|             1.29E-004|            -4.98E-003|
|    26|             1.26E-004|            -4.82E-003|
|    27|             1.16E-004|            -4.46E-003|
|    28|             1.06E-004|            -4.24E-003|
|    29|             9.59E-005|            -4.34E-003|
|    30|             8.59E-005|            -4.62E-003|
|    31|             8.24E-005|            -4.74E-003|
|    32|             1.51E-004|            -4.75E-003|
|    33|            -5.26E-005|            -4.77E-003|
|    34|            -2.26E-004|            -4.79E-003|
|    35|            -8.55E-005|            -4.81E-003|
|    36|             6.11E-005|            -4.84E-003|
|    37|            -4.85E-005|            -4.84E-003|
|    38|            -4.54E-005|            -5.00E-003|
|    39|            -3.67E-005|            -5.32E-003|
|    40|            -2.80E-005|            -5.49E-003|
|    41|            -1.93E-005|            -5.34E-003|
|    42|            -1.06E-005|            -5.11E-003|
|    43|            -7.48E-006|            -5.04E-003|
|    44|            -3.81E-005|            -5.04E-003|
|    45|            -5.19E-005|            -5.02E-003|
|    46|            -5.06E-005|            -5.01E-003|
|    47|            -3.64E-005|            -5.00E-003|
|    48|             8.06E-006|            -4.99E-003|
---------------------------------------------------------
```

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	3.61E-004
2	5.05E-004
3	6.37E-004
4	-1.31E-004
5	-8.96E-004
6	-7.43E-004
7	-5.94E-004
8	-2.79E-004
9	1.27E-004
10	2.04E-005
11	-6.77E-005
12	-8.95E-005
13	8.16E-005
14	2.40E-004
15	5.28E-004
16	-1.07E-004
17	-7.86E-004
18	-6.26E-004
19	-4.87E-004
20	-3.31E-004
21	1.96E-004
22	-2.56E-005
23	-2.78E-004
24	2.03E-004
25	5.16E-004
26	6.74E-004
27	8.89E-004
28	1.53E-004
29	-6.17E-004
30	-5.19E-004
31	-3.81E-004
32	-8.04E-005
33	7.18E-004
34	3.33E-005
35	-6.07E-004
36	2.36E-004
37	5.25E-004
38	6.54E-004
39	7.36E-004
40	1.26E-005
41	-6.35E-004
42	-3.26E-004
43	-1.63E-004
44	-7.14E-005
45	-1.34E-005
46	1.96E-005
47	5.14E-005
48	3.48E-004

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -1.17E-003|             -6.82E-003|
|     2|             -1.17E-003|             -6.37E-003|
|     3|             -1.18E-003|             -5.78E-003|
|     4|             -1.18E-003|             -5.73E-003|
|     5|             -1.19E-003|             -6.47E-003|
|     6|             -1.20E-003|             -7.76E-003|
|     7|             -1.20E-003|             -8.66E-003|
|     8|             -3.65E-004|             -8.67E-003|
|     9|              1.92E-004|             -8.71E-003|
|    10|              7.80E-005|             -8.75E-003|
|    11|             -2.20E-004|             -8.78E-003|
|    12|             -2.63E-004|             -8.82E-003|
|    13|             -2.41E-004|             -8.83E-003|
|    14|             -2.39E-004|             -8.88E-003|
|    15|             -2.33E-004|             -9.13E-003|
|    16|             -2.27E-004|             -9.16E-003|
|    17|             -2.21E-004|             -8.59E-003|
|    18|             -2.15E-004|             -7.59E-003|
|    19|             -2.13E-004|             -6.89E-003|
|    20|             -8.76E-004|             -6.89E-003|
|    21|             -1.53E-003|             -6.87E-003|
|    22|             -1.83E-003|             -6.85E-003|
|    23|             -1.87E-003|             -6.84E-003|
|    24|             -1.58E-003|             -6.82E-003|
|    25|              1.20E-003|             -8.55E-003|
|    26|              1.20E-003|             -7.74E-003|
|    27|              1.19E-003|             -6.52E-003|
|    28|              1.18E-003|             -5.76E-003|
|    29|              1.18E-003|             -5.76E-003|
|    30|              1.17E-003|             -6.35E-003|
|    31|              1.17E-003|             -6.81E-003|
|    32|              1.58E-003|             -6.82E-003|
|    33|              1.76E-003|             -6.85E-003|
|    34|              1.56E-003|             -6.88E-003|
|    35|              1.21E-003|             -6.91E-003|
|    36|              5.09E-004|             -6.94E-003|
|    37|             -2.42E-004|             -6.95E-003|
|    38|             -2.40E-004|             -7.75E-003|
|    39|             -2.34E-004|             -8.79E-003|
|    40|             -2.28E-004|             -9.29E-003|
|    41|             -2.23E-004|             -9.14E-003|
|    42|             -2.17E-004|             -8.75E-003|
|    43|             -2.15E-004|             -8.63E-003|
|    44|             -2.78E-004|             -8.63E-003|
|    45|             -3.41E-004|             -8.61E-003|
|    46|             -4.03E-004|             -8.59E-003|
|    47|             -2.28E-004|             -8.57E-003|
|    48|              4.45E-004|             -8.55E-003|
---------------------------------------------------------
```

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.56E-003
2	1.67E-003
3	1.01E-003
4	-8.64E-004
5	-2.75E-003
6	-3.35E-003
7	-3.22E-003
8	-2.78E-003
9	-3.39E-004
10	7.12E-004
11	5.79E-004
12	-2.00E-004
13	7.28E-005
14	3.08E-004
15	6.10E-004
16	-6.32E-004
17	-2.13E-003
18	-2.61E-003
19	-2.49E-003
20	-2.30E-003
21	-1.10E-003
22	-4.19E-004
23	2.36E-004
24	1.37E-003
25	2.86E-003
26	3.03E-003
27	2.71E-003
28	9.65E-004
29	-9.18E-004
30	-1.72E-003
31	-1.64E-003
32	-1.33E-003
33	1.97E-004
34	6.89E-004
35	1.16E-003
36	2.57E-003
37	2.85E-003
38	2.91E-003
39	2.08E-003
40	3.59E-004
41	-9.52E-004
42	-5.70E-004
43	-3.16E-004
44	-1.52E-004
45	-2.40E-004
46	3.66E-005
47	9.46E-004
48	2.59E-003

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

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-7.19E-004	-4.98E-003
2	-7.21E-004	-4.68E-003
3	-7.25E-004	-4.27E-003
4	-7.30E-004	-4.25E-003
5	-7.35E-004	-4.74E-003
6	-7.39E-004	-5.55E-003
7	-7.41E-004	-6.08E-003
8	-2.54E-004	-6.08E-003
9	1.33E-004	-6.09E-003
10	1.54E-004	-6.11E-003
11	4.07E-005	-6.12E-003
12	4.95E-006	-6.13E-003
13	-8.97E-006	-6.14E-003
14	-7.56E-006	-6.19E-003
15	-3.60E-006	-6.43E-003
16	3.72E-007	-6.52E-003
17	4.34E-006	-6.19E-003
18	8.31E-006	-5.51E-003
19	9.71E-006	-5.03E-003
20	-4.48E-004	-5.03E-003
21	-9.09E-004	-5.02E-003
22	-1.13E-003	-5.01E-003
23	-1.18E-003	-5.00E-003
24	-9.93E-004	-4.98E-003
25	7.41E-004	-6.08E-003
26	7.39E-004	-5.55E-003
27	7.35E-004	-4.74E-003
28	7.30E-004	-4.25E-003
29	7.25E-004	-4.27E-003
30	7.21E-004	-4.68E-003
31	7.19E-004	-4.98E-003
32	9.93E-004	-4.98E-003
33	1.18E-003	-5.00E-003
34	1.13E-003	-5.01E-003
35	9.09E-004	-5.02E-003
36	4.48E-004	-5.03E-003
37	-9.71E-006	-5.03E-003
38	-8.31E-006	-5.51E-003
39	-4.34E-006	-6.19E-003
40	-3.72E-007	-6.52E-003
41	3.60E-006	-6.43E-003
42	7.56E-006	-6.19E-003
43	8.97E-006	-6.14E-003
44	-4.95E-006	-6.13E-003
45	-4.07E-005	-6.12E-003
46	-1.54E-004	-6.11E-003
47	-1.33E-004	-6.09E-003
48	2.54E-004	-6.08E-003

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.05E-003
2	1.13E-003
3	6.80E-004
4	-5.95E-004
5	-1.80E-003
6	-1.98E-003
7	-1.85E-003
8	-1.65E-003
9	-4.10E-004
10	2.11E-004
11	2.60E-004
12	-3.79E-006
13	1.14E-004
14	2.98E-004
15	6.05E-004
16	-2.62E-004
17	-1.37E-003
18	-1.79E-003
19	-1.72E-003
20	-1.59E-003
21	-7.97E-004
22	-3.40E-004
23	1.14E-004
24	9.19E-004
25	1.85E-003
26	1.98E-003
27	1.80E-003
28	5.95E-004
29	-6.80E-004
30	-1.13E-003
31	-1.05E-003
32	-9.19E-004
33	-1.14E-004
34	3.40E-004
35	7.97E-004
36	1.59E-003
37	1.72E-003
38	1.79E-003
39	1.37E-003
40	2.62E-004
41	-6.05E-004
42	-2.98E-004
43	-1.14E-004
44	3.79E-006
45	-2.60E-004
46	-2.11E-004
47	4.10E-004
48	1.65E-003

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

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-3.67E-004	-4.73E-003
2	-3.70E-004	-4.54E-003
3	-3.77E-004	-4.22E-003
4	-3.84E-004	-4.15E-003
5	-3.91E-004	-4.48E-003
6	-3.99E-004	-5.03E-003
7	-4.01E-004	-5.34E-003
8	-1.24E-004	-5.35E-003
9	6.36E-005	-5.36E-003
10	7.03E-005	-5.37E-003
11	1.74E-005	-5.38E-003
12	5.37E-006	-5.39E-003
13	-7.16E-006	-5.40E-003
14	-4.92E-006	-5.45E-003
15	1.39E-006	-5.67E-003
16	7.70E-006	-5.77E-003
17	1.40E-005	-5.53E-003
18	2.03E-005	-5.07E-003
19	2.26E-005	-4.78E-003
20	-2.40E-004	-4.78E-003
21	-4.40E-004	-4.77E-003
22	-5.17E-004	-4.76E-003
23	-5.81E-004	-4.74E-003
24	-5.29E-004	-4.73E-003
25	4.01E-004	-5.34E-003
26	3.99E-004	-5.03E-003
27	3.91E-004	-4.48E-003
28	3.84E-004	-4.15E-003
29	3.77E-004	-4.22E-003
30	3.70E-004	-4.54E-003
31	3.67E-004	-4.73E-003
32	5.29E-004	-4.73E-003
33	5.81E-004	-4.74E-003
34	5.17E-004	-4.76E-003
35	4.40E-004	-4.77E-003
36	2.40E-004	-4.78E-003
37	-2.26E-005	-4.78E-003
38	-2.03E-005	-5.07E-003
39	-1.40E-005	-5.53E-003
40	-7.70E-006	-5.77E-003
41	-1.39E-006	-5.67E-003
42	4.92E-006	-5.45E-003
43	7.16E-006	-5.40E-003
44	-5.37E-006	-5.39E-003
45	-1.74E-005	-5.38E-003
46	-7.03E-005	-5.37E-003
47	-6.36E-005	-5.36E-003
48	1.24E-004	-5.35E-003

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	6.49E-004
2	7.59E-004
3	6.27E-004
4	-3.38E-004
5	-1.26E-003
6	-1.23E-003
7	-1.08E-003
8	-9.07E-004
9	-1.84E-004
10	1.04E-004
11	1.15E-004
12	-1.85E-006
13	1.02E-004
14	2.70E-004
15	5.76E-004
16	-1.41E-004
17	-9.98E-004
18	-1.12E-003
19	-1.01E-003
20	-8.76E-004
21	-2.57E-004
22	-1.74E-004
23	-1.05E-004
24	5.07E-004
25	1.08E-003
26	1.23E-003
27	1.26E-003
28	3.38E-004
29	-6.27E-004
30	-7.59E-004
31	-6.49E-004
32	-5.07E-004
33	1.05E-004
34	1.74E-004
35	2.57E-004
36	8.76E-004
37	1.01E-003
38	1.12E-003
39	9.98E-004
40	1.41E-004
41	-5.76E-004
42	-2.70E-004
43	-1.02E-004
44	1.85E-006
45	-1.15E-004
46	-1.04E-004
47	1.84E-004
48	9.07E-004

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

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-6.96E-004	-4.98E-003
2	-6.97E-004	-4.69E-003
3	-7.02E-004	-4.29E-003
4	-7.07E-004	-4.25E-003
5	-7.12E-004	-4.74E-003
6	-7.17E-004	-5.53E-003
7	-7.19E-004	-6.04E-003
8	-2.45E-004	-6.05E-003
9	1.29E-004	-6.06E-003
10	1.48E-004	-6.08E-003
11	3.92E-005	-6.09E-003
12	5.00E-006	-6.10E-003
13	-8.85E-006	-6.11E-003
14	-7.38E-006	-6.16E-003
15	-3.20E-006	-6.40E-003
16	9.83E-007	-6.49E-003
17	5.16E-006	-6.16E-003
18	9.34E-006	-5.50E-003
19	1.08E-005	-5.03E-003
20	-4.34E-004	-5.03E-003
21	-8.77E-004	-5.02E-003
22	-1.09E-003	-5.01E-003
23	-1.14E-003	-5.00E-003
24	-9.63E-004	-4.98E-003
25	7.19E-004	-6.04E-003
26	7.17E-004	-5.53E-003
27	7.12E-004	-4.74E-003
28	7.07E-004	-4.25E-003
29	7.02E-004	-4.29E-003
30	6.98E-004	-4.69E-003
31	6.96E-004	-4.98E-003
32	9.63E-004	-4.98E-003
33	1.14E-003	-5.00E-003
34	1.09E-003	-5.01E-003
35	8.77E-004	-5.02E-003
36	4.34E-004	-5.03E-003
37	-1.08E-005	-5.03E-003
38	-9.34E-006	-5.50E-003
39	-5.16E-006	-6.16E-003
40	-9.83E-007	-6.49E-003
41	3.20E-006	-6.40E-003
42	7.38E-006	-6.16E-003
43	8.85E-006	-6.11E-003
44	-5.00E-006	-6.10E-003
45	-3.92E-005	-6.09E-003
46	-1.48E-004	-6.08E-003
47	-1.29E-004	-6.06E-003
48	2.45E-004	-6.05E-003

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.03E-003
2	1.11E-003
3	6.79E-004
4	-5.78E-004
5	-1.76E-003
6	-1.93E-003
7	-1.80E-003
8	-1.61E-003
9	-3.95E-004
10	2.04E-004
11	2.50E-004
12	-3.69E-006
13	1.14E-004
14	2.97E-004
15	6.05E-004
16	-2.55E-004
17	-1.35E-003
18	-1.75E-003
19	-1.67E-003
20	-1.54E-003
21	-7.60E-004
22	-3.30E-004
23	9.69E-005
24	8.91E-004
25	1.80E-003
26	1.93E-003
27	1.76E-003
28	5.78E-004
29	-6.79E-004
30	-1.11E-003
31	-1.03E-003
32	-8.91E-004
33	-9.69E-005
34	3.30E-004
35	7.60E-004
36	1.54E-003
37	1.67E-003
38	1.75E-003
39	1.35E-003
40	2.55E-004
41	-6.05E-004
42	-2.97E-004
43	-1.14E-004
44	3.69E-006
45	-2.50E-004
46	-2.04E-004
47	3.95E-004
48	1.61E-003

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

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y

SEÇÃO	DIREÇÃO X (m)	DIREÇÃO Y (m)
1	-1.55E-003	-5.46E-003
2	-1.55E-003	-4.96E-003
3	-1.56E-003	-4.27E-003
4	-1.56E-003	-3.97E-003
5	-1.57E-003	-4.21E-003
6	-1.57E-003	-4.83E-003
7	-1.57E-003	-5.27E-003
8	-1.16E-003	-5.28E-003
9	-8.04E-004	-5.29E-003
10	-7.44E-004	-5.30E-003
11	-9.22E-004	-5.31E-003
12	-1.41E-003	-5.32E-003
13	-1.87E-003	-5.33E-003
14	-1.87E-003	-5.81E-003
15	-1.86E-003	-6.49E-003
16	-1.86E-003	-6.80E-003
17	-1.85E-003	-6.55E-003
18	-1.85E-003	-5.94E-003
19	-1.85E-003	-5.51E-003
20	-2.25E-003	-5.51E-003
21	-2.60E-003	-5.50E-003
22	-2.65E-003	-5.49E-003
23	-2.47E-003	-5.47E-003
24	-2.02E-003	-5.46E-003
25	1.57E-003	-1.07E-003
26	1.57E-003	-6.02E-004
27	1.57E-003	6.93E-005
28	1.57E-003	7.27E-004
29	1.57E-003	1.37E-003
30	1.57E-003	2.01E-003
31	1.57E-003	2.45E-003
32	1.14E-003	2.45E-003
33	5.02E-004	2.45E-003
34	-1.33E-004	2.45E-003
35	-7.72E-004	2.45E-003
36	-1.42E-003	2.45E-003
37	-1.86E-003	2.45E-003
38	-1.86E-003	2.00E-003
39	-1.86E-003	1.35E-003
40	-1.86E-003	6.95E-004
41	-1.86E-003	3.72E-005
42	-1.86E-003	-6.19E-004
43	-1.86E-003	-1.07E-003
44	-1.41E-003	-1.07E-003
45	-8.15E-004	-1.07E-003
46	-1.98E-004	-1.07E-003
47	4.44E-004	-1.07E-003
48	1.11E-003	-1.07E-003

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.76E-003
2	1.84E-003
3	1.38E-003
4	7.13E-005
5	-1.22E-003
6	-1.64E-003
7	-1.55E-003
8	-1.41E-003
9	-4.70E-004
10	1.43E-004
11	7.81E-004
12	1.62E-003
13	1.72E-003
14	1.80E-003
15	1.38E-003
16	7.78E-005
17	-1.21E-003
18	-1.61E-003
19	-1.53E-003
20	-1.38E-003
21	-4.32E-004
22	1.61E-004
23	7.26E-004
24	1.62E-003
25	1.69E-003
26	1.69E-003
27	1.66E-003
28	1.63E-003
29	1.61E-003
30	1.59E-003
31	1.59E-003
32	1.59E-003
33	1.59E-003
34	1.59E-003
35	1.60E-003
36	1.62E-003
37	1.62E-003
38	1.62E-003
39	1.64E-003
40	1.64E-003
41	1.64E-003
42	1.64E-003
43	1.64E-003
44	1.59E-003
45	1.51E-003
46	1.57E-003
47	1.63E-003
48	1.69E-003

```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmin                         #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -6.94E-004|             -4.89E-003|
|     2|             -6.96E-004|             -4.59E-003|
|     3|             -7.01E-004|             -4.20E-003|
|     4|             -7.05E-004|             -4.17E-003|
|     5|             -7.10E-004|             -4.65E-003|
|     6|             -7.15E-004|             -5.44E-003|
|     7|             -7.16E-004|             -5.95E-003|
|     8|             -2.45E-004|             -5.95E-003|
|     9|              1.28E-004|             -5.96E-003|
|    10|              1.48E-004|             -5.98E-003|
|    11|              3.92E-005|             -5.99E-003|
|    12|              4.87E-006|             -6.00E-003|
|    13|             -8.73E-006|             -6.01E-003|
|    14|             -7.33E-006|             -6.06E-003|
|    15|             -3.37E-006|             -6.29E-003|
|    16|              6.00E-007|             -6.38E-003|
|    17|              4.57E-006|             -6.06E-003|
|    18|              8.53E-006|             -5.40E-003|
|    19|              9.93E-006|             -4.94E-003|
|    20|             -4.33E-004|             -4.93E-003|
|    21|             -8.77E-004|             -4.92E-003|
|    22|             -1.09E-003|             -4.91E-003|
|    23|             -1.14E-003|             -4.90E-003|
|    24|             -9.60E-004|             -4.89E-003|
|    25|              7.16E-004|             -5.95E-003|
|    26|              7.15E-004|             -5.44E-003|
|    27|              7.10E-004|             -4.65E-003|
|    28|              7.05E-004|             -4.17E-003|
|    29|              7.01E-004|             -4.20E-003|
|    30|              6.96E-004|             -4.59E-003|
|    31|              6.94E-004|             -4.89E-003|
|    32|              9.60E-004|             -4.89E-003|
|    33|              1.14E-003|             -4.90E-003|
|    34|              1.09E-003|             -4.91E-003|
|    35|              8.77E-004|             -4.92E-003|
|    36|              4.33E-004|             -4.93E-003|
|    37|             -9.93E-006|             -4.94E-003|
|    38|             -8.53E-006|             -5.40E-003|
|    39|             -4.57E-006|             -6.06E-003|
|    40|             -6.00E-007|             -6.38E-003|
|    41|              3.37E-006|             -6.29E-003|
|    42|              7.33E-006|             -6.06E-003|
|    43|              8.73E-006|             -6.01E-003|
|    44|             -4.87E-006|             -6.00E-003|
|    45|             -3.92E-005|             -5.99E-003|
|    46|             -1.48E-004|             -5.98E-003|
|    47|             -1.28E-004|             -5.96E-003|
|    48|              2.45E-004|             -5.95E-003|
---------------------------------------------------------
```

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.02E-003
2	1.10E-003
3	6.66E-004
4	-5.76E-004
5	-1.75E-003
6	-1.92E-003
7	-1.79E-003
8	-1.60E-003
9	-3.95E-004
10	2.03E-004
11	2.50E-004
12	-3.66E-006
13	1.12E-004
14	2.91E-004
15	5.93E-004
16	-2.54E-004
17	-1.33E-003
18	-1.73E-003
19	-1.66E-003
20	-1.54E-003
21	-7.66E-004
22	-3.29E-004
23	1.04E-004
24	8.89E-004
25	1.79E-003
26	1.92E-003
27	1.75E-003
28	5.76E-004
29	-6.66E-004
30	-1.10E-003
31	-1.02E-003
32	-8.89E-004
33	-1.04E-004
34	3.29E-004
35	7.66E-004
36	1.54E-003
37	1.66E-003
38	1.73E-003
39	1.33E-003
40	2.54E-004
41	-5.93E-004
42	-2.91E-004
43	-1.12E-004
44	3.66E-006
45	-2.50E-004
46	-2.03E-004
47	3.95E-004
48	1.60E-003

```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VminHmax                         #
#########################################################
---------------------------------------------------------
  DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -3.80E-004|             -4.73E-003|
|     2|             -3.83E-004|             -4.53E-003|
|     3|             -3.90E-004|             -4.21E-003|
|     4|             -3.97E-004|             -4.14E-003|
|     5|             -4.04E-004|             -4.48E-003|
|     6|             -4.11E-004|             -5.04E-003|
|     7|             -4.14E-004|             -5.36E-003|
|     8|             -1.29E-004|             -5.36E-003|
|     9|              6.62E-005|             -5.38E-003|
|    10|              7.35E-005|             -5.39E-003|
|    11|              1.83E-005|             -5.40E-003|
|    12|              5.35E-006|             -5.41E-003|
|    13|             -7.22E-006|             -5.42E-003|
|    14|             -5.03E-006|             -5.47E-003|
|    15|              1.16E-006|             -5.68E-003|
|    16|              7.35E-006|             -5.79E-003|
|    17|              1.35E-005|             -5.55E-003|
|    18|              1.97E-005|             -5.08E-003|
|    19|              2.19E-005|             -4.78E-003|
|    20|             -2.48E-004|             -4.78E-003|
|    21|             -4.58E-004|             -4.77E-003|
|    22|             -5.41E-004|             -4.76E-003|
|    23|             -6.04E-004|             -4.74E-003|
|    24|             -5.46E-004|             -4.73E-003|
|    25|              4.14E-004|             -5.36E-003|
|    26|              4.11E-004|             -5.04E-003|
|    27|              4.04E-004|             -4.48E-003|
|    28|              3.97E-004|             -4.14E-003|
|    29|              3.90E-004|             -4.21E-003|
|    30|              3.83E-004|             -4.53E-003|
|    31|              3.80E-004|             -4.73E-003|
|    32|              5.46E-004|             -4.73E-003|
|    33|              6.04E-004|             -4.74E-003|
|    34|              5.41E-004|             -4.76E-003|
|    35|              4.58E-004|             -4.77E-003|
|    36|              2.48E-004|             -4.78E-003|
|    37|             -2.19E-005|             -4.78E-003|
|    38|             -1.97E-005|             -5.08E-003|
|    39|             -1.35E-005|             -5.55E-003|
|    40|             -7.35E-006|             -5.79E-003|
|    41|             -1.16E-006|             -5.68E-003|
|    42|              5.03E-006|             -5.47E-003|
|    43|              7.22E-006|             -5.42E-003|
|    44|             -5.35E-006|             -5.41E-003|
|    45|             -1.83E-005|             -5.40E-003|
|    46|             -7.35E-005|             -5.39E-003|
|    47|             -6.62E-005|             -5.38E-003|
|    48|              1.29E-004|             -5.36E-003|
---------------------------------------------------------
```

DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	6.64E-004
2	7.72E-004
3	6.28E-004
4	-3.48E-004
5	-1.28E-003
6	-1.25E-003
7	-1.11E-003
8	-9.34E-004
9	-1.92E-004
10	1.08E-004
11	1.20E-004
12	-1.91E-006
13	1.03E-004
14	2.71E-004
15	5.76E-004
16	-1.45E-004
17	-1.01E-003
18	-1.14E-003
19	-1.04E-003
20	-9.03E-004
21	-2.78E-004
22	-1.80E-004
23	-9.53E-005
24	5.22E-004
25	1.11E-003
26	1.25E-003
27	1.28E-003
28	3.48E-004
29	-6.28E-004
30	-7.72E-004
31	-6.64E-004
32	-5.22E-004
33	9.53E-005
34	1.80E-004
35	2.78E-004
36	9.03E-004
37	1.04E-003
38	1.14E-003
39	1.01E-003
40	1.45E-004
41	-5.76E-004
42	-2.71E-004
43	-1.03E-004
44	1.91E-006
45	-1.20E-004
46	-1.08E-004
47	1.92E-004
48	9.34E-004

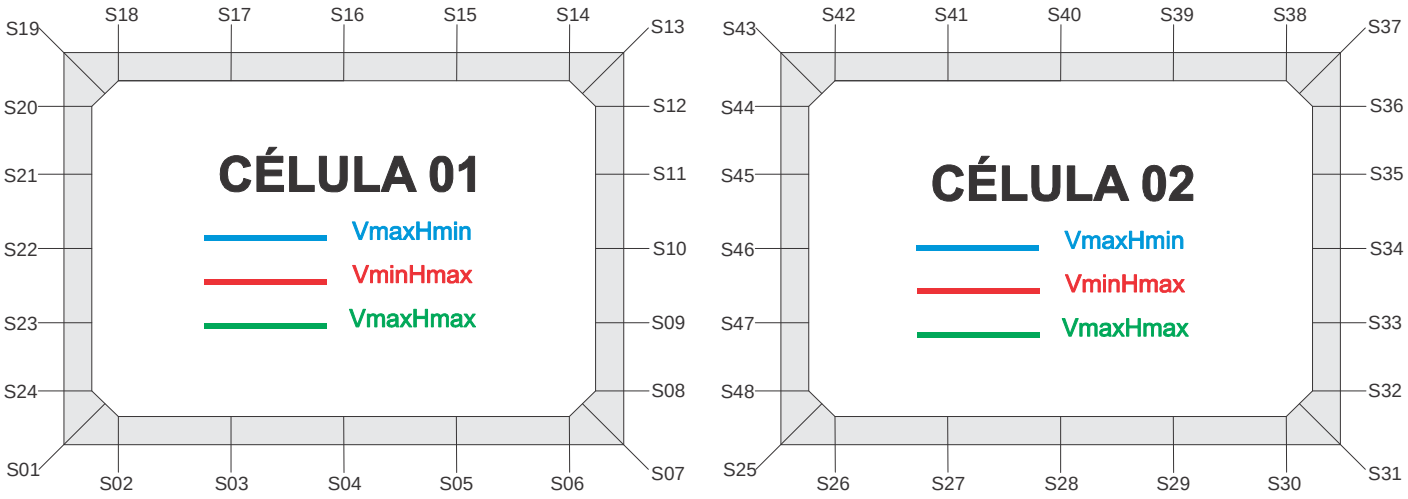
```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
 DESLOCAMENTOS NAS SEÇÕES DE INTERESSE NAS DIR. X E Y
---------------------------------------------------------
| SEÇÃO|          DIREÇÃO X (m)|          DIREÇÃO Y (m)|
---------------------------------------------------------
|     1|             -6.80E-004|             -4.89E-003|
|     2|             -6.82E-004|             -4.60E-003|
|     3|             -6.87E-004|             -4.21E-003|
|     4|             -6.91E-004|             -4.17E-003|
|     5|             -6.96E-004|             -4.65E-003|
|     6|             -7.01E-004|             -5.42E-003|
|     7|             -7.03E-004|             -5.93E-003|
|     8|             -2.39E-004|             -5.93E-003|
|     9|              1.26E-004|             -5.94E-003|
|    10|              1.45E-004|             -5.96E-003|
|    11|              3.83E-005|             -5.97E-003|
|    12|              4.90E-006|             -5.98E-003|
|    13|             -8.67E-006|             -5.99E-003|
|    14|             -7.22E-006|             -6.04E-003|
|    15|             -3.12E-006|             -6.27E-003|
|    16|              9.82E-007|             -6.36E-003|
|    17|              5.08E-006|             -6.04E-003|
|    18|              9.18E-006|             -5.40E-003|
|    19|              1.06E-005|             -4.94E-003|
|    20|             -4.24E-004|             -4.93E-003|
|    21|             -8.57E-004|             -4.92E-003|
|    22|             -1.06E-003|             -4.91E-003|
|    23|             -1.12E-003|             -4.90E-003|
|    24|             -9.41E-004|             -4.89E-003|
|    25|              7.03E-004|             -5.93E-003|
|    26|              7.01E-004|             -5.42E-003|
|    27|              6.96E-004|             -4.65E-003|
|    28|              6.91E-004|             -4.17E-003|
|    29|              6.87E-004|             -4.21E-003|
|    30|              6.82E-004|             -4.60E-003|
|    31|              6.80E-004|             -4.89E-003|
|    32|              9.41E-004|             -4.89E-003|
|    33|              1.12E-003|             -4.90E-003|
|    34|              1.06E-003|             -4.91E-003|
|    35|              8.57E-004|             -4.92E-003|
|    36|              4.24E-004|             -4.93E-003|
|    37|             -1.06E-005|             -4.94E-003|
|    38|             -9.18E-006|             -5.40E-003|
|    39|             -5.08E-006|             -6.04E-003|
|    40|             -9.82E-007|             -6.36E-003|
|    41|              3.12E-006|             -6.27E-003|
|    42|              7.22E-006|             -6.04E-003|
|    43|              8.67E-006|             -5.99E-003|
|    44|             -4.90E-006|             -5.98E-003|
|    45|             -3.83E-005|             -5.97E-003|
|    46|             -1.45E-004|             -5.96E-003|
|    47|             -1.26E-004|             -5.94E-003|
|    48|              2.39E-004|             -5.93E-003|
---------------------------------------------------------
```

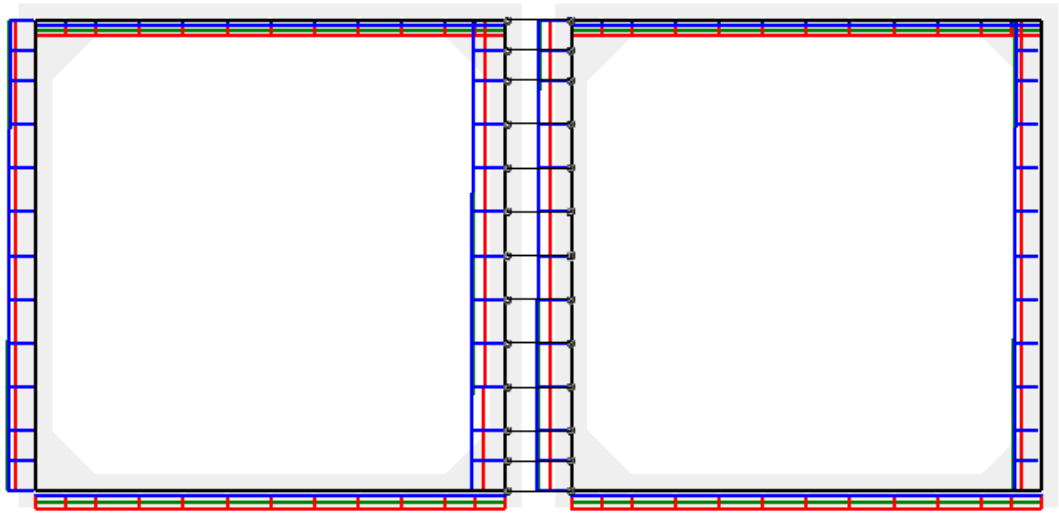
DESLOCAMENTOS NAS SEÇÕES DE INTERESSE (ROTAÇÃO)

SEÇÃO	ROTAÇÃO (rad)
1	1.00E-003
2	1.08E-003
3	6.66E-004
4	-5.65E-004
5	-1.73E-003
6	-1.89E-003
7	-1.76E-003
8	-1.57E-003
9	-3.86E-004
10	1.99E-004
11	2.44E-004
12	-3.60E-006
13	1.11E-004
14	2.91E-004
15	5.93E-004
16	-2.49E-004
17	-1.32E-003
18	-1.71E-003
19	-1.63E-003
20	-1.51E-003
21	-7.42E-004
22	-3.23E-004
23	9.38E-005
24	8.72E-004
25	1.76E-003
26	1.89E-003
27	1.73E-003
28	5.65E-004
29	-6.66E-004
30	-1.08E-003
31	-1.00E-003
32	-8.72E-004
33	-9.38E-005
34	3.23E-004
35	7.42E-004
36	1.51E-003
37	1.63E-003
38	1.71E-003
39	1.32E-003
40	2.49E-004
41	-5.93E-004
42	-2.91E-004
43	-1.11E-004
44	3.60E-006
45	-2.44E-004
46	-1.99E-004
47	3.86E-004
48	1.57E-003

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	-150.54	-28.81
2	-28.81	-28.81
3	-28.81	-28.81
4	-28.81	-28.81
5	-28.81	-28.81
6	-28.81	-28.81
7	-28.81	-189.21
8	-187.54	-187.54
9	-185.59	-185.59
10	-183.64	-183.64
11	-181.69	-181.69
12	-179.74	-179.74
13	-178.08	-29.89
14	-29.89	-29.89
15	-29.89	-29.89
16	-29.89	-29.89
17	-29.89	-29.89
18	-29.89	-29.89
19	-29.89	-139.41
20	-141.08	-141.08
21	-143.03	-143.03
22	-144.98	-144.98
23	-146.93	-146.93
24	-148.88	-148.88
25	-150.54	-28.81
26	-28.81	-28.81
27	-28.81	-28.81
28	-28.81	-28.81
29	-28.81	-28.81
30	-28.81	-28.81
31	-28.81	-150.54
32	-148.88	-148.88
33	-146.93	-146.93
34	-144.98	-144.98
35	-143.03	-143.03
36	-141.08	-141.08
37	-139.41	-29.89
38	-29.89	-29.89
39	-29.89	-29.89
40	-29.89	-29.89
41	-29.89	-29.89
42	-29.89	-29.89
43	-29.89	-178.08
44	-179.74	-179.74
45	-181.69	-181.69
46	-183.64	-183.64
47	-185.59	-185.59
48	-187.54	-187.54

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-114.63	-97.36
2	-97.36	-97.36
3	-97.36	-97.36
4	-97.36	-97.36
5	-97.36	-97.36
6	-97.36	-97.36
7	-97.36	-120.04
8	-118.76	-118.76
9	-117.26	-117.26
10	-115.76	-115.76
11	-114.26	-114.26
12	-112.76	-112.76
13	-111.48	-85.26
14	-85.26	-85.26
15	-85.26	-85.26
16	-85.26	-85.26
17	-85.26	-85.26
18	-85.26	-85.26
19	-85.26	-106.06
20	-107.35	-107.35
21	-108.85	-108.85
22	-110.35	-110.35
23	-111.85	-111.85
24	-113.35	-113.35
25	-114.63	-97.36
26	-97.36	-97.36
27	-97.36	-97.36
28	-97.36	-97.36
29	-97.36	-97.36
30	-97.36	-97.36
31	-97.36	-114.63
32	-113.35	-113.35
33	-111.85	-111.85
34	-110.35	-110.35
35	-108.85	-108.85
36	-107.35	-107.35
37	-106.06	-85.26
38	-85.26	-85.26
39	-85.26	-85.26
40	-85.26	-85.26
41	-85.26	-85.26
42	-85.26	-85.26
43	-85.26	-111.48
44	-112.76	-112.76
45	-114.26	-114.26
46	-115.76	-115.76
47	-117.26	-117.26
48	-118.76	-118.76

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-155.06	-65.39
2	-65.39	-65.39
3	-65.39	-65.39
4	-65.39	-65.39
5	-65.39	-65.39
6	-65.39	-65.39
7	-65.39	-184.69
8	-183.02	-183.02
9	-181.07	-181.07
10	-179.12	-179.12
11	-177.17	-177.17
12	-175.22	-175.22
13	-173.55	-56.35
14	-56.35	-56.35
15	-56.35	-56.35
16	-56.35	-56.35
17	-56.35	-56.35
18	-56.35	-56.35
19	-56.35	-143.93
20	-145.60	-145.60
21	-147.55	-147.55
22	-149.50	-149.50
23	-151.45	-151.45
24	-153.40	-153.40
25	-155.06	-65.39
26	-65.39	-65.39
27	-65.39	-65.39
28	-65.39	-65.39
29	-65.39	-65.39
30	-65.39	-65.39
31	-65.39	-155.06
32	-153.40	-153.40
33	-151.45	-151.45
34	-149.50	-149.50
35	-147.55	-147.55
36	-145.60	-145.60
37	-143.93	-56.35
38	-56.35	-56.35
39	-56.35	-56.35
40	-56.35	-56.35
41	-56.35	-56.35
42	-56.35	-56.35
43	-56.35	-173.55
44	-175.22	-175.22
45	-177.17	-177.17
46	-179.12	-179.12
47	-181.07	-181.07
48	-183.02	-183.02

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-154.21	-27.06
2	-27.06	-27.06
3	-27.06	-27.06
4	-27.06	-27.06
5	-27.06	-27.06
6	-27.06	-27.06
7	-27.06	-185.54
8	-183.87	-183.87
9	-181.92	-181.92
10	-179.97	-179.97
11	-178.02	-178.02
12	-176.07	-176.07
13	-174.40	-31.64
14	-31.64	-31.64
15	-31.64	-31.64
16	-31.64	-31.64
17	-31.64	-31.64
18	-31.64	-31.64
19	-31.64	-143.08
20	-144.75	-144.75
21	-146.70	-146.70
22	-148.65	-148.65
23	-150.60	-150.60
24	-152.55	-152.55
25	-154.21	-29.43
26	-29.43	-29.43
27	-29.43	-29.43
28	-29.43	-29.43
29	-29.43	-29.43
30	-29.43	-29.43
31	-29.43	-145.42
32	-143.75	-143.75
33	-141.80	-141.80
34	-139.85	-139.85
35	-137.90	-137.90
36	-135.95	-135.95
37	-134.29	-29.26
38	-29.26	-29.26
39	-29.26	-29.26
40	-29.26	-29.26
41	-29.26	-29.26
42	-29.26	-29.26
43	-29.26	-183.20
44	-184.87	-184.87
45	-186.82	-186.82
46	-188.77	-188.77
47	-190.72	-190.72
48	-192.67	-192.67

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-115.37	-97.10
2	-97.10	-97.10
3	-97.10	-97.10
4	-97.10	-97.10
5	-97.10	-97.10
6	-97.10	-97.10
7	-97.10	-119.30
8	-118.02	-118.02
9	-116.52	-116.52
10	-115.02	-115.02
11	-113.52	-113.52
12	-112.02	-112.02
13	-110.74	-85.51
14	-85.51	-85.51
15	-85.51	-85.51
16	-85.51	-85.51
17	-85.51	-85.51
18	-85.51	-85.51
19	-85.51	-106.80
20	-108.09	-108.09
21	-109.59	-109.59
22	-111.09	-111.09
23	-112.59	-112.59
24	-114.09	-114.09
25	-115.37	-97.48
26	-97.48	-97.48
27	-97.48	-97.48
28	-97.48	-97.48
29	-97.48	-97.48
30	-97.48	-97.48
31	-97.48	-113.87
32	-112.59	-112.59
33	-111.09	-111.09
34	-109.59	-109.59
35	-108.09	-108.09
36	-106.59	-106.59
37	-105.31	-85.14
38	-85.14	-85.14
39	-85.14	-85.14
40	-85.14	-85.14
41	-85.14	-85.14
42	-85.14	-85.14
43	-85.14	-112.23
44	-113.51	-113.51
45	-115.01	-115.01
46	-116.51	-116.51
47	-118.01	-118.01
48	-119.51	-119.51

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-158.01	-64.26
2	-64.26	-64.26
3	-64.26	-64.26
4	-64.26	-64.26
5	-64.26	-64.26
6	-64.26	-64.26
7	-64.26	-181.74
8	-180.07	-180.07
9	-178.12	-178.12
10	-176.17	-176.17
11	-174.22	-174.22
12	-172.27	-172.27
13	-170.61	-57.48
14	-57.48	-57.48
15	-57.48	-57.48
16	-57.48	-57.48
17	-57.48	-57.48
18	-57.48	-57.48
19	-57.48	-146.88
20	-148.55	-148.55
21	-150.50	-150.50
22	-152.45	-152.45
23	-154.40	-154.40
24	-156.35	-156.35
25	-158.01	-66.12
26	-66.12	-66.12
27	-66.12	-66.12
28	-66.12	-66.12
29	-66.12	-66.12
30	-66.12	-66.12
31	-66.12	-151.25
32	-149.59	-149.59
33	-147.64	-147.64
34	-145.69	-145.69
35	-143.74	-143.74
36	-141.79	-141.79
37	-140.12	-55.62
38	-55.62	-55.62
39	-55.62	-55.62
40	-55.62	-55.62
41	-55.62	-55.62
42	-55.62	-55.62
43	-55.62	-177.36
44	-179.03	-179.03
45	-180.98	-180.98
46	-182.93	-182.93
47	-184.88	-184.88
48	-186.83	-186.83

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-112.72	-45.71
2	-45.71	-45.71
3	-45.71	-45.71
4	-45.71	-45.71
5	-45.71	-45.71
6	-45.71	-45.71
7	-45.71	-134.88
8	-133.60	-133.60
9	-132.10	-132.10
10	-130.60	-130.60
11	-129.10	-129.10
12	-127.60	-127.60
13	-126.31	-38.79
14	-38.79	-38.79
15	-38.79	-38.79
16	-38.79	-38.79
17	-38.79	-38.79
18	-38.79	-38.79
19	-38.79	-104.15
20	-105.43	-105.43
21	-106.93	-106.93
22	-108.43	-108.43
23	-109.93	-109.93
24	-111.43	-111.43
25	-112.72	-45.71
26	-45.71	-45.71
27	-45.71	-45.71
28	-45.71	-45.71
29	-45.71	-45.71
30	-45.71	-45.71
31	-45.71	-112.72
32	-111.43	-111.43
33	-109.93	-109.93
34	-108.43	-108.43
35	-106.93	-106.93
36	-105.43	-105.43
37	-104.15	-38.79
38	-38.79	-38.79
39	-38.79	-38.79
40	-38.79	-38.79
41	-38.79	-38.79
42	-38.79	-38.79
43	-38.79	-126.31
44	-127.60	-127.60
45	-129.10	-129.10
46	-130.60	-130.60
47	-132.10	-132.10
48	-133.60	-133.60

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-110.87	-71.18
2	-71.18	-71.18
3	-71.18	-71.18
4	-71.18	-71.18
5	-71.18	-71.18
6	-71.18	-71.18
7	-71.18	-123.80
8	-122.52	-122.52
9	-121.02	-121.02
10	-119.52	-119.52
11	-118.02	-118.02
12	-116.52	-116.52
13	-115.24	-61.71
14	-61.71	-61.71
15	-61.71	-61.71
16	-61.71	-61.71
17	-61.71	-61.71
18	-61.71	-61.71
19	-61.71	-102.31
20	-103.59	-103.59
21	-105.09	-105.09
22	-106.59	-106.59
23	-108.09	-108.09
24	-109.59	-109.59
25	-110.87	-71.18
26	-71.18	-71.18
27	-71.18	-71.18
28	-71.18	-71.18
29	-71.18	-71.18
30	-71.18	-71.18
31	-71.18	-110.87
32	-109.59	-109.59
33	-108.09	-108.09
34	-106.59	-106.59
35	-105.09	-105.09
36	-103.59	-103.59
37	-102.31	-61.71
38	-61.71	-61.71
39	-61.71	-61.71
40	-61.71	-61.71
41	-61.71	-61.71
42	-61.71	-61.71
43	-61.71	-115.24
44	-116.52	-116.52
45	-118.02	-118.02
46	-119.52	-119.52
47	-121.02	-121.02
48	-122.52	-122.52

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-113.03	-47.72
2	-47.72	-47.72
3	-47.72	-47.72
4	-47.72	-47.72
5	-47.72	-47.72
6	-47.72	-47.72
7	-47.72	-134.56
8	-133.28	-133.28
9	-131.78	-131.78
10	-130.28	-130.28
11	-128.78	-128.78
12	-127.28	-127.28
13	-125.99	-40.87
14	-40.87	-40.87
15	-40.87	-40.87
16	-40.87	-40.87
17	-40.87	-40.87
18	-40.87	-40.87
19	-40.87	-104.47
20	-105.75	-105.75
21	-107.25	-107.25
22	-108.75	-108.75
23	-110.25	-110.25
24	-111.75	-111.75
25	-113.03	-47.72
26	-47.72	-47.72
27	-47.72	-47.72
28	-47.72	-47.72
29	-47.72	-47.72
30	-47.72	-47.72
31	-47.72	-113.03
32	-111.75	-111.75
33	-110.25	-110.25
34	-108.75	-108.75
35	-107.25	-107.25
36	-105.75	-105.75
37	-104.47	-40.87
38	-40.87	-40.87
39	-40.87	-40.87
40	-40.87	-40.87
41	-40.87	-40.87
42	-40.87	-40.87
43	-40.87	-125.99
44	-127.28	-127.28
45	-128.78	-128.78
46	-130.28	-130.28
47	-131.78	-131.78
48	-133.28	-133.28

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

ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	-117.74	-44.64
2	-44.64	-44.64
3	-44.64	-44.64
4	-44.64	-44.64
5	-44.64	-44.64
6	-44.64	-44.64
7	-44.64	-116.93
8	-115.65	-115.65
9	-114.15	-114.15
10	-112.65	-112.65
11	-111.15	-111.15
12	-109.65	-109.65
13	-108.37	-39.85
14	-39.85	-39.85
15	-39.85	-39.85
16	-39.85	-39.85
17	-39.85	-39.85
18	-39.85	-39.85
19	-39.85	-109.17
20	-110.45	-110.45
21	-111.95	-111.95
22	-113.45	-113.45
23	-114.95	-114.95
24	-116.45	-116.45
25	-117.74	0.26
26	0.26	0.26
27	0.26	0.26
28	0.26	0.26
29	0.26	0.26
30	0.26	0.26
31	0.26	-0.33
32	-0.33	-0.33
33	-0.33	-0.33
34	-0.33	-0.33
35	-0.33	-0.33
36	-0.33	-0.33
37	-0.33	-0.26
38	-0.26	-0.26
39	-0.26	-0.26
40	-0.26	-0.26
41	-0.26	-0.26
42	-0.26	-0.26
43	-0.26	0.33
44	-0.95	-0.95
45	-2.45	-2.45
46	-3.95	-3.95
47	-5.45	-5.45
48	-6.95	-6.95

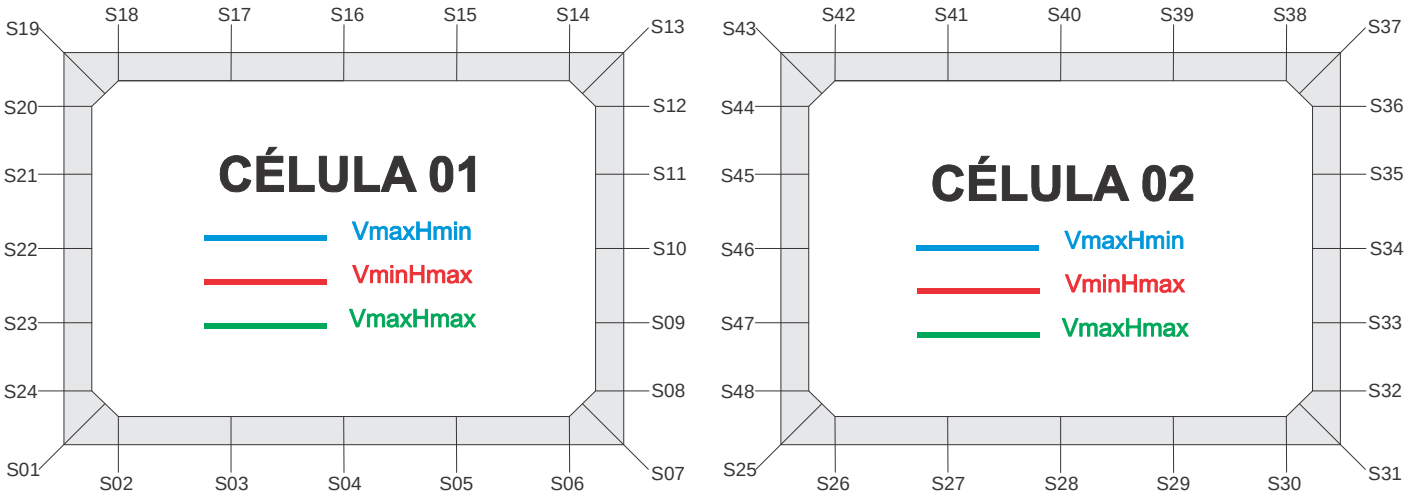
```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmin                         #
#########################################################
---------------------------------------------------------
           ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|          ESQUERDA (kN)|          DIREITA (kN)|
---------------------------------------------------------
|      1|                -110.65|                -45.72|
|      2|                 -45.72|                -45.72|
|      3|                 -45.72|                -45.72|
|      4|                 -45.72|                -45.72|
|      5|                 -45.72|                -45.72|
|      6|                 -45.72|                -45.72|
|      7|                 -45.72|               -132.09|
|      8|                -130.81|               -130.81|
|      9|                -129.31|               -129.31|
|     10|                -127.81|               -127.81|
|     11|                -126.31|               -126.31|
|     12|                -124.81|               -124.81|
|     13|                -123.53|                -38.77|
|     14|                 -38.77|                -38.77|
|     15|                 -38.77|                -38.77|
|     16|                 -38.77|                -38.77|
|     17|                 -38.77|                -38.77|
|     18|                 -38.77|                -38.77|
|     19|                 -38.77|               -102.09|
|     20|                -103.37|               -103.37|
|     21|                -104.87|               -104.87|
|     22|                -106.37|               -106.37|
|     23|                -107.87|               -107.87|
|     24|                -109.37|               -109.37|
|     25|                -110.65|                -45.72|
|     26|                 -45.72|                -45.72|
|     27|                 -45.72|                -45.72|
|     28|                 -45.72|                -45.72|
|     29|                 -45.72|                -45.72|
|     30|                 -45.72|                -45.72|
|     31|                 -45.72|               -110.65|
|     32|                -109.37|               -109.37|
|     33|                -107.87|               -107.87|
|     34|                -106.37|               -106.37|
|     35|                -104.87|               -104.87|
|     36|                -103.37|               -103.37|
|     37|                -102.09|                -38.77|
|     38|                 -38.77|                -38.77|
|     39|                 -38.77|                -38.77|
|     40|                 -38.77|                -38.77|
|     41|                 -38.77|                -38.77|
|     42|                 -38.77|                -38.77|
|     43|                 -38.77|               -123.53|
|     44|                -124.81|               -124.81|
|     45|                -126.31|               -126.31|
|     46|                -127.81|               -127.81|
|     47|                -129.31|               -129.31|
|     48|                -130.81|               -130.81|
---------------------------------------------------------
```

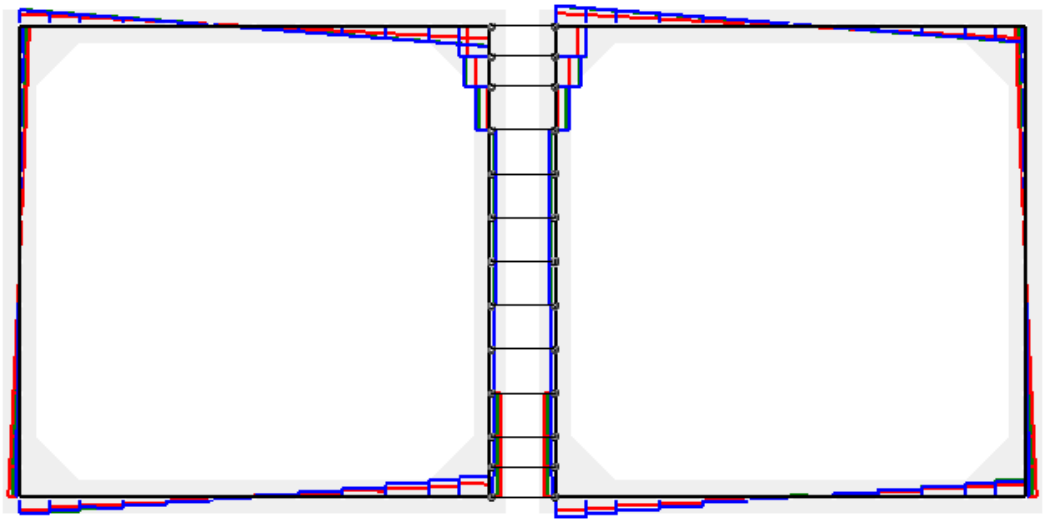
```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VminHmax                         #
#########################################################
---------------------------------------------------------
           ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|          ESQUERDA (kN)|          DIREITA (kN)|
---------------------------------------------------------
|      1|                -110.69|                -70.05|
|      2|                 -70.05|                -70.05|
|      3|                 -70.05|                -70.05|
|      4|                 -70.05|                -70.05|
|      5|                 -70.05|                -70.05|
|      6|                 -70.05|                -70.05|
|      7|                 -70.05|               -123.98|
|      8|                -122.70|               -122.70|
|      9|                -121.20|               -121.20|
|     10|                -119.70|               -119.70|
|     11|                -118.20|               -118.20|
|     12|                -116.70|               -116.70|
|     13|                -115.42|                -60.53|
|     14|                 -60.53|                -60.53|
|     15|                 -60.53|                -60.53|
|     16|                 -60.53|                -60.53|
|     17|                 -60.53|                -60.53|
|     18|                 -60.53|                -60.53|
|     19|                 -60.53|               -102.13|
|     20|                -103.41|               -103.41|
|     21|                -104.91|               -104.91|
|     22|                -106.41|               -106.41|
|     23|                -107.91|               -107.91|
|     24|                -109.41|               -109.41|
|     25|                -110.69|                -70.05|
|     26|                 -70.05|                -70.05|
|     27|                 -70.05|                -70.05|
|     28|                 -70.05|                -70.05|
|     29|                 -70.05|                -70.05|
|     30|                 -70.05|                -70.05|
|     31|                 -70.05|               -110.69|
|     32|                -109.41|               -109.41|
|     33|                -107.91|               -107.91|
|     34|                -106.41|               -106.41|
|     35|                -104.91|               -104.91|
|     36|                -103.41|               -103.41|
|     37|                -102.13|                -60.53|
|     38|                 -60.53|                -60.53|
|     39|                 -60.53|                -60.53|
|     40|                 -60.53|                -60.53|
|     41|                 -60.53|                -60.53|
|     42|                 -60.53|                -60.53|
|     43|                 -60.53|               -115.42|
|     44|                -116.70|               -116.70|
|     45|                -118.20|               -118.20|
|     46|                -119.70|               -119.70|
|     47|                -121.20|               -121.20|
|     48|                -122.70|               -122.70|
---------------------------------------------------------
```

```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
            ESFORÇO NORMAL NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|          ESQUERDA (kN)|          DIREITA (kN)|
---------------------------------------------------------
|      1|                -110.85|                -46.98|
|      2|                 -46.98|                -46.98|
|      3|                 -46.98|                -46.98|
|      4|                 -46.98|                -46.98|
|      5|                 -46.98|                -46.98|
|      6|                 -46.98|                -46.98|
|      7|                 -46.98|               -131.89|
|      8|                -130.61|               -130.61|
|      9|                -129.11|               -129.11|
|     10|                -127.61|               -127.61|
|     11|                -126.11|               -126.11|
|     12|                -124.61|               -124.61|
|     13|                -123.33|                -40.07|
|     14|                 -40.07|                -40.07|
|     15|                 -40.07|                -40.07|
|     16|                 -40.07|                -40.07|
|     17|                 -40.07|                -40.07|
|     18|                 -40.07|                -40.07|
|     19|                 -40.07|               -102.29|
|     20|                -103.57|               -103.57|
|     21|                -105.07|               -105.07|
|     22|                -106.57|               -106.57|
|     23|                -108.07|               -108.07|
|     24|                -109.57|               -109.57|
|     25|                -110.85|                -46.98|
|     26|                 -46.98|                -46.98|
|     27|                 -46.98|                -46.98|
|     28|                 -46.98|                -46.98|
|     29|                 -46.98|                -46.98|
|     30|                 -46.98|                -46.98|
|     31|                 -46.98|               -110.85|
|     32|                -109.57|               -109.57|
|     33|                -108.07|               -108.07|
|     34|                -106.57|               -106.57|
|     35|                -105.07|               -105.07|
|     36|                -103.57|               -103.57|
|     37|                -102.29|                -40.07|
|     38|                 -40.07|                -40.07|
|     39|                 -40.07|                -40.07|
|     40|                 -40.07|                -40.07|
|     41|                 -40.07|                -40.07|
|     42|                 -40.07|                -40.07|
|     43|                 -40.07|               -123.33|
|     44|                -124.61|               -124.61|
|     45|                -126.11|               -126.11|
|     46|                -127.61|               -127.61|
|     47|                -129.11|               -129.11|
|     48|                -130.61|               -130.61|
---------------------------------------------------------
```

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	28.81	-138.86
2	-118.02	-91.49
3	-63.77	-35.42
4	-9.49	18.93
5	47.02	79.63
6	113.59	146.90
7	174.02	-28.81
8	-34.99	-34.99
9	-42.47	-42.47
10	-48.16	-48.16
11	-52.07	-52.07
12	116.81	225.14
13	269.10	-178.08
14	-137.23	-137.23
15	-78.28	-78.28
16	-19.33	-19.33
17	39.61	39.61
18	98.56	98.56
19	139.41	-29.89
20	-21.16	-21.16
21	-9.10	-9.10
22	2.20	2.20
23	12.74	12.74
24	22.52	22.52
25	28.81	-174.02
26	-146.90	-113.59
27	-79.63	-47.02
28	-18.93	9.49
29	35.42	63.77
30	91.49	118.02
31	138.86	-28.81
32	-22.52	-22.52
33	-12.74	-12.74
34	-2.20	-2.20
35	9.10	9.10
36	21.16	21.16
37	29.89	-139.41
38	-98.56	-98.56
39	-39.61	-39.61
40	19.33	19.33
41	78.28	78.28
42	137.23	137.23
43	178.08	-269.10
44	-225.14	-116.81
45	52.07	52.07
46	48.16	48.16
47	42.47	42.47
48	34.99	34.99

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	97.36	-106.50
2	-91.69	-72.19
3	-51.20	-29.39
4	-9.54	11.72
5	31.81	54.12
6	75.82	96.06
7	111.55	-97.36
8	-97.36	-97.36
9	-1.26	-1.26
10	-1.26	-1.26
11	-1.26	-1.26
12	20.01	126.79
13	190.20	-111.48
14	-83.47	-83.47
15	-43.09	-43.09
16	-2.71	-2.71
17	37.67	37.67
18	78.05	78.05
19	106.06	-85.26
20	-65.18	-65.18
21	-34.27	-34.27
22	-1.31	-1.31
23	33.68	33.68
24	70.72	70.72
25	97.36	-111.55
26	-96.06	-75.82
27	-54.12	-31.81
28	-11.72	9.54
29	29.39	51.20
30	72.19	91.69
31	106.50	-97.36
32	-70.72	-70.72
33	-33.68	-33.68
34	1.31	1.31
35	34.27	34.27
36	65.18	65.18
37	85.26	-106.06
38	-78.05	-78.05
39	-37.67	-37.67
40	2.71	2.71
41	43.09	43.09
42	83.47	83.47
43	111.48	-190.20
44	-126.79	-20.01
45	1.26	1.26
46	1.26	1.26
47	1.26	1.26
48	97.36	97.36

```
#########################################################
#             SOLICITAÇÕES NORMAIS (ELU)                #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
          ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|          ESQUERDA (kN)|          DIREITA (kN)|
---------------------------------------------------------
|      1|                 65.39|               -143.34|
|      2|                -122.24|                -95.16|
|      3|                 -66.54|                -37.19|
|      4|                 -10.34|                 18.78|
|      5|                  47.21|                 79.68|
|      6|                 112.85|                144.82|
|      7|                 170.45|                -65.39|
|      8|                 -65.39|                -65.39|
|      9|                 -34.76|                -34.76|
|     10|                 -34.76|                -34.76|
|     11|                 -34.76|                -34.76|
|     12|                  91.98|                214.03|
|     13|                 272.15|               -173.55|
|     14|                -132.70|               -132.70|
|     15|                 -73.76|                -73.76|
|     16|                 -14.81|                -14.81|
|     17|                  44.14|                 44.14|
|     18|                 103.08|                103.08|
|     19|                 143.93|                -56.35|
|     20|                 -42.97|                -42.97|
|     21|                 -22.36|                -22.36|
|     22|                  -0.39|                 -0.39|
|     23|                  22.94|                 22.94|
|     24|                  47.63|                 47.63|
|     25|                  65.39|               -170.45|
|     26|                -144.82|               -112.85|
|     27|                 -79.68|                -47.21|
|     28|                 -18.78|                 10.34|
|     29|                  37.19|                 66.54|
|     30|                  95.16|                122.24|
|     31|                 143.34|                -65.39|
|     32|                 -47.63|                -47.63|
|     33|                 -22.94|                -22.94|
|     34|                   0.39|                  0.39|
|     35|                  22.36|                 22.36|
|     36|                  42.97|                 42.97|
|     37|                  56.35|               -143.93|
|     38|                -103.08|               -103.08|
|     39|                 -44.14|                -44.14|
|     40|                  14.81|                 14.81|
|     41|                  73.76|                 73.76|
|     42|                 132.70|                132.70|
|     43|                 173.55|               -272.15|
|     44|                -214.03|                -91.98|
|     45|                  34.76|                 34.76|
|     46|                  34.76|                 34.76|
|     47|                  34.76|                 34.76|
|     48|                  65.39|                 65.39|
---------------------------------------------------------
```

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	27.06	-142.48
2	-121.66	-95.28
3	-67.96	-40.16
4	-14.88	12.90
5	40.48	72.90
6	107.16	141.33
7	169.57	-27.06
8	-33.24	-33.24
9	-34.49	-34.49
10	-40.18	-40.18
11	-44.09	-44.08
12	103.04	207.13
13	282.36	-174.40
14	-133.55	-133.55
15	-74.61	-74.61
16	-15.66	-15.66
17	43.29	43.29
18	102.23	102.23
19	143.08	-31.64
20	-22.90	-22.90
21	-10.85	-10.85
22	0.45	0.45
23	10.99	10.99
24	20.78	20.78
25	27.06	-178.61
26	-150.66	-116.57
27	-82.12	-49.38
28	-21.50	6.48
29	31.81	59.53
30	86.68	112.93
31	133.69	-29.43
32	-23.15	-23.15
33	-13.37	-13.37
34	-2.83	-2.83
35	8.47	8.47
36	20.53	20.53
37	29.26	-134.29
38	-93.44	-93.44
39	-34.49	-34.49
40	24.46	24.46
41	83.40	83.40
42	142.35	142.35
43	183.20	-279.98
44	-204.75	-100.67
45	46.46	46.46
46	42.55	42.55
47	36.86	36.86
48	35.62	35.62

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                      VminHmax                         #
#########################################################
---------------------------------------------------------
          ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|          ESQUERDA (kN)|          DIREITA (kN)|
---------------------------------------------------------
|      1|                 97.10|               -107.22|
|      2|                -92.40|                -72.90|
|      3|                -51.95|                -30.22|
|      4|                -10.47|                 10.69|
|      5|                 30.71|                 52.97|
|      6|                 74.69|                 95.05|
|      7|                110.69|                -97.10|
|      8|                -97.10|                -97.10|
|      9|                  0.43|                  0.43|
|     10|                  0.43|                  0.43|
|     11|                  0.43|                  0.43|
|     12|                  9.12|                121.28|
|     13|                202.72|               -110.74|
|     14|                -82.73|                -82.73|
|     15|                -42.35|                -42.35|
|     16|                 -1.97|                 -1.97|
|     17|                 38.41|                 38.41|
|     18|                 78.79|                 78.79|
|     19|                106.80|                -85.51|
|     20|                -65.44|                -65.44|
|     21|                -34.52|                -34.52|
|     22|                 -1.56|                 -1.56|
|     23|                 33.43|                 33.43|
|     24|                 70.46|                 70.46|
|     25|                 97.10|               -112.23|
|     26|                -96.64|                -76.29|
|     27|                -54.53|                -32.22|
|     28|                -12.15|                  9.04|
|     29|                 28.80|                 50.52|
|     30|                 71.44|                 90.91|
|     31|                105.73|                -97.48|
|     32|                -70.84|                -70.84|
|     33|                -33.81|                -33.81|
|     34|                  1.19|                  1.19|
|     35|                 34.14|                 34.14|
|     36|                 65.06|                 65.06|
|     37|                 85.14|               -105.31|
|     38|                -77.30|                -77.30|
|     39|                -36.92|                -36.92|
|     40|                  3.46|                  3.46|
|     41|                 43.84|                 43.84|
|     42|                 84.22|                 84.22|
|     43|                112.23|               -202.35|
|     44|               -120.90|                 -8.75|
|     45|                 -0.06|                 -0.06|
|     46|                 -0.06|                 -0.06|
|     47|                 -0.06|                 -0.06|
|     48|                 97.48|                 97.48|
---------------------------------------------------------
```

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
          ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|          ESQUERDA (kN)|          DIREITA (kN)|
---------------------------------------------------------
|      1|                 64.26|               -146.30|
|      2|                -125.28|                -98.39|
|      3|                 -70.14|                -41.25|
|      4|                 -14.92|                 13.71|
|      5|                  41.77|                 74.12|
|      6|                 107.57|                140.29|
|      7|                 166.85|                -64.27|
|      8|                 -64.27|                -64.27|
|      9|                 -27.13|                -27.13|
|     10|                 -27.13|                -27.13|
|     11|                 -27.13|                -27.13|
|     12|                  71.37|                197.82|
|     13|                 287.04|               -170.61|
|     14|                -129.76|               -129.76|
|     15|                 -70.81|                -70.81|
|     16|                 -11.86|                -11.86|
|     17|                  47.08|                 47.08|
|     18|                 106.03|                106.03|
|     19|                 146.88|                -57.48|
|     20|                 -44.10|                -44.10|
|     21|                 -23.48|                -23.48|
|     22|                  -1.51|                 -1.51|
|     23|                  21.82|                 21.82|
|     24|                  46.50|                 46.50|
|     25|                  64.26|               -173.81|
|     26|                -147.46|               -114.81|
|     27|                 -81.21|                -48.62|
|     28|                 -20.32|                  8.47|
|     29|                  34.85|                 63.67|
|     30|                  91.80|                118.58|
|     31|                 139.55|                -66.12|
|     32|                 -48.36|                -48.36|
|     33|                 -23.68|                -23.68|
|     34|                  -0.35|                 -0.35|
|     35|                  21.62|                 21.62|
|     36|                  42.24|                 42.24|
|     37|                  55.62|               -140.12|
|     38|                 -99.27|                -99.27|
|     39|                 -40.33|                -40.33|
|     40|                  18.62|                 18.62|
|     41|                  77.57|                 77.57|
|     42|                 136.51|                136.51|
|     43|                 177.36|               -285.18|
|     44|                -195.96|                -69.50|
|     45|                  28.99|                 28.99|
|     46|                  28.99|                 28.99|
|     47|                  28.99|                 28.99|
|     48|                  66.13|                 66.13|
---------------------------------------------------------
```

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	45.71	-104.16
2	-88.82	-69.08
3	-48.31	-26.94
4	-7.46	13.77
5	34.43	58.14
6	82.31	105.72
7	124.43	-45.71
8	-45.71	-45.71
9	-26.18	-26.18
10	-26.18	-26.18
11	-26.18	-26.18
12	68.60	156.25
13	197.40	-126.31
14	-96.65	-96.65
15	-53.87	-53.87
16	-11.08	-11.08
17	31.70	31.70
18	74.49	74.49
19	104.15	-38.79
20	-29.63	-29.63
21	-15.45	-15.45
22	-0.25	-0.25
23	15.99	15.99
24	33.25	33.25
25	45.71	-124.43
26	-105.72	-82.31
27	-58.14	-34.43
28	-13.77	7.46
29	26.94	48.31
30	69.08	88.82
31	104.16	-45.71
32	-33.25	-33.25
33	-15.99	-15.99
34	0.25	0.25
35	15.45	15.45
36	29.63	29.63
37	38.79	-104.15
38	-74.49	-74.49
39	-31.70	-31.70
40	11.08	11.08
41	53.87	53.87
42	96.65	96.65
43	126.31	-197.40
44	-156.25	-68.60
45	26.18	26.18
46	26.18	26.18
47	26.18	26.18
48	45.71	45.71

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	71.18	-102.74
2	-88.08	-68.95
3	-48.60	-27.52
4	-8.36	12.36
5	32.19	54.60
6	76.86	98.07
7	114.62	-71.18
8	-71.18	-71.18
9	-12.66	-12.66
10	-12.66	-12.66
11	-12.66	-12.66
12	41.75	136.82
13	188.31	-115.24
14	-87.23	-87.23
15	-46.85	-46.85
16	-6.47	-6.47
17	33.91	33.91
18	74.29	74.29
19	102.31	-61.71
20	-47.15	-47.15
21	-24.71	-24.71
22	-0.75	-0.75
23	24.73	24.73
24	51.73	51.73
25	71.18	-114.62
26	-98.07	-76.86
27	-54.60	-32.19
28	-12.36	8.36
29	27.52	48.60
30	68.95	88.08
31	102.74	-71.18
32	-51.73	-51.73
33	-24.73	-24.73
34	0.75	0.75
35	24.71	24.71
36	47.15	47.15
37	61.71	-102.31
38	-74.29	-74.29
39	-33.91	-33.91
40	6.47	6.47
41	46.85	46.85
42	87.23	87.23
43	115.24	-188.31
44	-136.82	-41.75
45	12.66	12.66
46	12.66	12.66
47	12.66	12.66
48	71.18	71.18

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	47.72	-104.48
2	-89.13	-69.36
3	-48.54	-27.10
4	-7.57	13.70
5	34.38	58.08
6	82.21	105.54
7	124.17	-47.72
8	-47.72	-47.72
9	-25.29	-25.29
10	-25.29	-25.29
11	-25.29	-25.29
12	66.87	155.39
13	197.53	-125.99
14	-96.33	-96.33
15	-53.55	-53.55
16	-10.76	-10.76
17	32.02	32.02
18	74.81	74.81
19	104.47	-40.87
20	-31.17	-31.17
21	-16.20	-16.20
22	-0.23	-0.23
23	16.76	16.76
24	34.76	34.76
25	47.72	-124.17
26	-105.54	-82.21
27	-58.08	-34.38
28	-13.70	7.57
29	27.10	48.54
30	69.36	89.13
31	104.48	-47.72
32	-34.76	-34.76
33	-16.76	-16.76
34	0.23	0.23
35	16.20	16.20
36	31.17	31.17
37	40.87	-104.47
38	-74.81	-74.81
39	-32.02	-32.02
40	10.76	10.76
41	53.55	53.55
42	96.33	96.33
43	125.99	-197.53
44	-155.39	-66.87
45	25.29	25.29
46	25.29	25.29
47	25.29	25.29
48	47.72	47.72

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	44.64	-108.36
2	-91.72	-70.78
3	-49.31	-27.95
4	-9.17	10.68
5	29.32	50.39
6	71.40	91.78
7	107.87	-44.64
8	-32.18	-32.18
9	-14.93	-14.93
10	1.31	1.31
11	16.51	16.51
12	-26.76	50.49
13	91.23	-108.37
14	-80.36	-80.36
15	-39.98	-39.98
16	0.40	0.40
17	40.78	40.78
18	81.16	81.16
19	109.17	-39.85
20	-30.70	-30.70
21	-16.52	-16.52
22	-1.32	-1.32
23	14.92	14.92
24	32.18	32.18
25	44.64	-6.40
26	-3.53	-1.00
27	0.33	0.33
28	0.33	0.33
29	0.33	0.33
30	0.33	0.33
31	0.33	0.26
32	0.26	0.26
33	0.26	0.26
34	0.26	0.26
35	0.26	0.26
36	0.26	0.26
37	0.26	-0.33
38	-0.33	-0.33
39	-0.33	-0.33
40	-0.33	-0.33
41	-0.33	-0.33
42	-0.33	-0.33
43	-0.33	-51.64
44	-20.05	57.20
45	-0.25	-0.25
46	-0.25	-0.25
47	-0.25	-0.25
48	-0.25	-0.25

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	45.72	-102.25
2	-87.23	-67.85
3	-47.47	-26.48
4	-7.37	13.48
5	33.73	56.99
6	80.65	103.58
7	121.88	-45.72
8	-45.72	-45.72
9	-25.27	-25.27
10	-25.27	-25.27
11	-25.27	-25.27
12	66.45	152.62
13	193.30	-123.53
14	-94.49	-94.49
15	-52.60	-52.60
16	-10.72	-10.72
17	31.16	31.16
18	73.04	73.04
19	102.09	-38.77
20	-29.62	-29.62
21	-15.44	-15.44
22	-0.23	-0.23
23	16.00	16.00
24	33.26	33.26
25	45.72	-121.88
26	-103.58	-80.65
27	-56.99	-33.73
28	-13.48	7.37
29	26.48	47.47
30	67.85	87.23
31	102.25	-45.72
32	-33.26	-33.26
33	-16.00	-16.00
34	0.23	0.23
35	15.44	15.44
36	29.62	29.62
37	38.77	-102.09
38	-73.04	-73.04
39	-31.16	-31.16
40	10.72	10.72
41	52.60	52.60
42	94.49	94.49
43	123.53	-193.30
44	-152.62	-66.45
45	25.27	25.27
46	25.27	25.27
47	25.27	25.27
48	45.72	45.72

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

ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	70.05	-102.56
2	-87.91	-68.79
3	-48.48	-27.43
4	-8.30	12.40
5	32.22	54.63
6	76.92	98.17
7	114.77	-70.05
8	-70.05	-70.05
9	-13.16	-13.16
10	-13.16	-13.16
11	-13.16	-13.16
12	42.72	137.30
13	188.23	-115.42
14	-87.41	-87.41
15	-47.03	-47.03
16	-6.65	-6.65
17	33.73	33.73
18	74.11	74.11
19	102.13	-60.53
20	-46.29	-46.29
21	-24.29	-24.29
22	-0.76	-0.76
23	24.30	24.30
24	50.88	50.88
25	70.05	-114.77
26	-98.17	-76.92
27	-54.63	-32.22
28	-12.40	8.30
29	27.43	48.48
30	68.79	87.91
31	102.56	-70.05
32	-50.88	-50.88
33	-24.30	-24.30
34	0.76	0.76
35	24.29	24.29
36	46.29	46.29
37	60.53	-102.13
38	-74.11	-74.11
39	-33.73	-33.73
40	6.65	6.65
41	47.03	47.03
42	87.41	87.41
43	115.42	-188.23
44	-137.30	-42.72
45	13.16	13.16
46	13.16	13.16
47	13.16	13.16
48	70.05	70.05

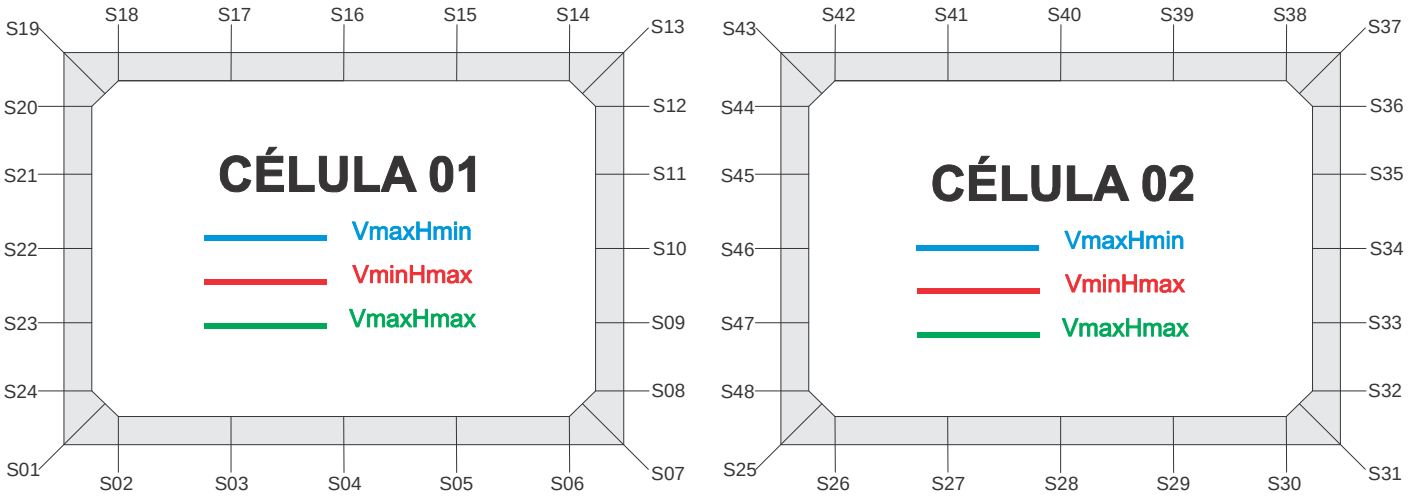
```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmax                         #
#########################################################
```

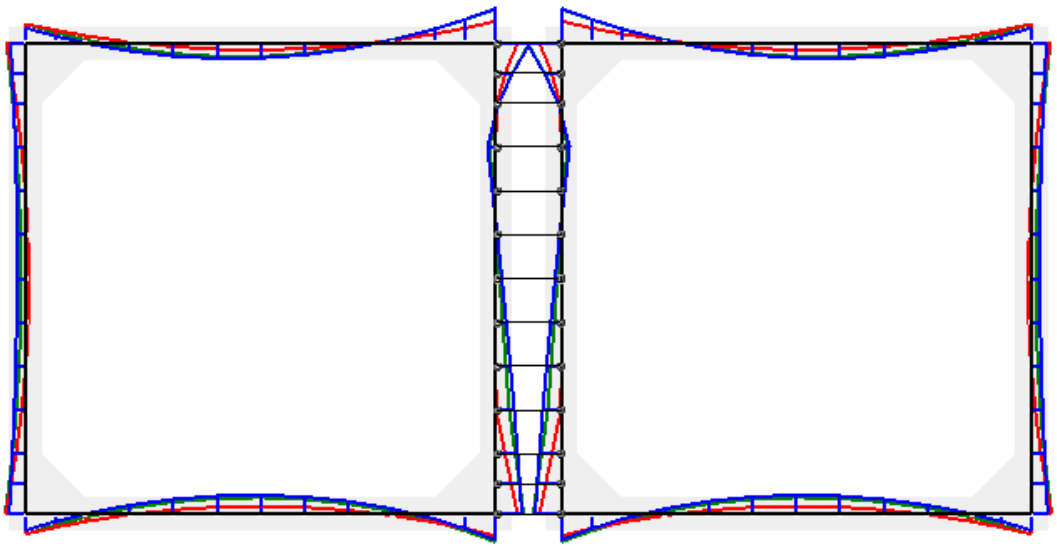
ESFORÇOS CORTANTE NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN)	DIREITA (kN)
1	46.98	-102.45
2	-87.42	-68.02
3	-47.61	-26.58
4	-7.44	13.43
5	33.70	56.95
6	80.59	103.47
7	121.71	-46.98
8	-46.98	-46.98
9	-24.71	-24.71
10	-24.71	-24.71
11	-24.71	-24.71
12	65.37	152.08
13	193.38	-123.33
14	-94.29	-94.29
15	-52.41	-52.41
16	-10.52	-10.52
17	31.36	31.36
18	73.24	73.24
19	102.29	-40.07
20	-30.58	-30.58
21	-15.91	-15.91
22	-0.22	-0.22
23	16.48	16.48
24	34.20	34.20
25	46.98	-121.71
26	-103.47	-80.59
27	-56.95	-33.70
28	-13.43	7.44
29	26.58	47.61
30	68.02	87.42
31	102.45	-46.98
32	-34.20	-34.20
33	-16.48	-16.48
34	0.22	0.22
35	15.91	15.91
36	30.58	30.58
37	40.07	-102.29
38	-73.24	-73.24
39	-31.36	-31.36
40	10.52	10.52
41	52.41	52.41
42	94.29	94.29
43	123.33	-193.38
44	-152.08	-65.37
45	24.71	24.71
46	24.71	24.71
47	24.71	24.71
48	46.98	46.98

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|               -35.14|                35.14|
|      2|                -0.18|                -0.18|
|      3|               -31.23|               -31.23|
|      4|               -40.21|               -40.21|
|      5|               -27.02|               -27.02|
|      6|                11.62|                11.62|
|      7|                55.75|                55.75|
|      8|                46.96|                46.96|
|      9|                31.40|                31.40|
|     10|                13.22|                13.22|
|     11|                -6.89|                -6.89|
|     12|                 6.00|                 6.00|
|     13|                73.94|               -73.94|
|     14|               -30.59|               -30.59|
|     15|                12.51|                12.51|
|     16|                32.04|                32.04|
|     17|                27.98|                27.98|
|     18|                 0.34|                 0.34|
|     19|               -32.38|               -32.38|
|     20|               -25.37|               -25.37|
|     21|               -19.34|               -19.34|
|     22|               -17.98|               -17.98|
|     23|               -21.00|               -21.00|
|     24|               -28.07|               -28.07|
|     25|               -35.14|                55.75|
|     26|                11.62|                11.62|
|     27|               -27.02|               -27.02|
|     28|               -40.21|               -40.21|
|     29|               -31.23|               -31.23|
|     30|                -0.18|                -0.18|
|     31|                35.14|                35.14|
|     32|                28.07|                28.07|
|     33|                21.00|                21.00|
|     34|                17.98|                17.98|
|     35|                19.34|                19.34|
|     36|                25.37|                25.37|
|     37|                32.38|               -32.38|
|     38|                 0.34|                 0.34|
|     39|                27.98|                27.98|
|     40|                32.04|                32.04|
|     41|                12.51|                12.51|
|     42|               -30.59|               -30.59|
|     43|               -73.94|               -73.94|
|     44|                -6.00|                -6.00|
|     45|                 6.89|                 6.89|
|     46|               -13.22|               -13.22|
|     47|               -31.40|               -31.40|
|     48|               -46.96|               -46.96|
---------------------------------------------------------
```

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

MOMENTO FLETOR NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-43.31	43.31
2	16.06	16.06
3	-8.61	-8.61
4	-16.40	-16.40
5	-7.69	-7.69
6	18.29	18.29
7	46.84	46.84
8	20.07	20.07
9	0.34	0.34
10	-0.16	-0.16
11	-0.66	-0.66
12	3.09	3.09
13	46.68	-46.68
14	-19.87	-19.87
15	5.44	5.44
16	14.60	14.60
17	7.60	7.60
18	-15.54	-15.54
19	-40.86	-40.86
20	-20.15	-20.15
21	-0.19	-0.19
22	6.99	6.99
23	0.59	0.59
24	-20.23	-20.23
25	-43.31	46.84
26	18.29	18.29
27	-7.69	-7.69
28	-16.40	-16.40
29	-8.61	-8.61
30	16.06	16.06
31	43.31	43.31
32	20.23	20.23
33	-0.59	-0.59
34	-6.99	-6.99
35	0.19	0.19
36	20.15	20.15
37	40.86	-40.86
38	-15.54	-15.54
39	7.60	7.60
40	14.60	14.60
41	5.44	5.44
42	-19.87	-19.87
43	-46.68	-46.68
44	-3.09	-3.09
45	0.66	0.66
46	0.16	0.16
47	-0.34	-0.34
48	-20.07	-20.07

```
#########################################################
#             SOLICITAÇÕES NORMAIS (ELU)                #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|                -43.35|                43.35|
|      2|                  6.83|                 6.83|
|      3|                -25.51|              -25.51|
|      4|                -35.01|              -35.01|
|      5|                -21.81|              -21.81|
|      6|                 16.69|               16.69|
|      7|                 60.04|               60.04|
|      8|                 42.06|               42.06|
|      9|                 22.03|               22.03|
|     10|                  8.12|                8.12|
|     11|                 -5.78|               -5.78|
|     12|                  5.66|                5.66|
|     13|                 72.51|              -72.51|
|     14|                -30.40|              -30.40|
|     15|                 10.89|               10.89|
|     16|                 28.60|               28.60|
|     17|                 22.74|               22.74|
|     18|                 -6.71|               -6.71|
|     19|                -40.67|              -40.67|
|     20|                -27.00|              -27.00|
|     21|                -13.89|              -13.89|
|     22|                 -9.29|               -9.29|
|     23|                -13.76|              -13.76|
|     24|                -27.83|              -27.83|
|     25|                -43.35|               60.04|
|     26|                 16.69|               16.69|
|     27|                -21.81|              -21.81|
|     28|                -35.01|              -35.01|
|     29|                -25.51|              -25.51|
|     30|                  6.83|                6.83|
|     31|                 43.35|               43.35|
|     32|                 27.83|               27.83|
|     33|                 13.76|               13.76|
|     34|                  9.29|                9.29|
|     35|                 13.89|               13.89|
|     36|                 27.00|               27.00|
|     37|                 40.67|              -40.67|
|     38|                 -6.71|               -6.71|
|     39|                 22.74|               22.74|
|     40|                 28.60|               28.60|
|     41|                 10.89|               10.89|
|     42|                -30.40|              -30.40|
|     43|                -72.51|              -72.51|
|     44|                 -5.66|               -5.66|
|     45|                  5.78|                5.78|
|     46|                 -8.12|               -8.12|
|     47|                -22.03|              -22.03|
|     48|                -42.06|              -42.06|
---------------------------------------------------------
```

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

MOMENTO FLETOR NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-35.05	35.05
2	-1.27	-1.27
3	-33.92	-33.92
4	-44.92	-44.92
5	-34.25	-34.25
6	1.77	1.77
7	44.51	44.51
8	36.20	36.20
9	22.60	22.60
10	7.60	7.60
11	-9.31	-9.31
12	2.42	2.42
13	69.71	-69.71
14	-27.37	-27.37
15	14.27	14.27
16	32.32	32.32
17	26.80	26.80
18	-2.31	-2.31
19	-36.04	-36.04
20	-28.55	-28.55
21	-21.82	-21.82
22	-19.77	-19.77
23	-22.09	-22.09
24	-28.46	-28.46
25	-35.05	55.73
26	10.45	10.45
27	-29.29	-29.29
28	-43.46	-43.46
29	-35.81	-35.81
30	-6.56	-6.56
31	27.35	27.35
32	20.11	20.11
33	12.78	12.78
34	9.51	9.51
35	10.62	10.62
36	16.39	16.39
37	23.23	-23.23
38	8.08	8.08
39	33.67	33.67
40	35.67	35.67
41	14.10	14.10
42	-31.05	-31.05
43	-75.81	-75.81
44	-9.18	-9.18
45	1.60	1.60
46	-16.26	-16.26
47	-32.21	-32.21
48	-46.76	-46.76

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                      VminHmax                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|               -43.42|                43.42|
|      2|                15.98|                15.98|
|      3|                -9.00|                -9.00|
|      4|               -17.13|               -17.13|
|      5|                -8.85|                -8.85|
|      6|                16.68|                16.68|
|      7|                44.97|                44.97|
|      8|                18.27|                18.27|
|      9|                -1.07|                -1.07|
|     10|                -0.89|                -0.89|
|     11|                -0.72|                -0.72|
|     12|                 1.19|                 1.19|
|     13|                45.74|               -45.74|
|     14|               -19.14|               -19.14|
|     15|                 5.88|                 5.88|
|     16|                14.74|                14.74|
|     17|                 7.45|                 7.45|
|     18|               -15.99|               -15.99|
|     19|               -41.51|               -41.51|
|     20|               -20.73|               -20.73|
|     21|                -0.67|                -0.67|
|     22|                 6.61|                 6.61|
|     23|                 0.31|                 0.31|
|     24|               -20.41|               -20.41|
|     25|               -43.42|                46.86|
|     26|                18.14|                18.14|
|     27|                -8.02|                -8.02|
|     28|               -16.89|               -16.89|
|     29|                -9.33|                -9.33|
|     30|                15.06|                15.06|
|     31|                42.10|                42.10|
|     32|                18.98|                18.98|
|     33|                -1.88|                -1.88|
|     34|                -8.34|                -8.34|
|     35|                -1.20|                -1.20|
|     36|                18.71|                18.71|
|     37|                39.38|               -39.38|
|     38|               -14.27|               -14.27|
|     39|                 8.57|                 8.57|
|     40|                15.26|                15.26|
|     41|                 5.80|                 5.80|
|     42|               -19.81|               -19.81|
|     43|               -46.83|               -46.83|
|     44|                -2.38|                -2.38|
|     45|                -0.62|                -0.62|
|     46|                -0.59|                -0.59|
|     47|                -0.57|                -0.57|
|     48|               -20.05|               -20.05|
---------------------------------------------------------
```

```
#########################################################
#          SOLICITAÇÕES TANGENCIAIS (ELU)               #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|               -43.63|                43.63|
|      2|                 6.29|                 6.29|
|      3|               -27.42|               -27.42|
|      4|               -38.65|               -38.65|
|      5|               -27.56|               -27.56|
|      6|                 8.78|                 8.78|
|      7|                51.01|                51.01|
|      8|                33.34|                33.34|
|      9|                15.06|                15.06|
|     10|                 4.21|                 4.21|
|     11|                -6.64|                -6.64|
|     12|                 2.20|                 2.20|
|     13|                68.87|               -68.87|
|     14|               -27.57|               -27.57|
|     15|                12.54|                12.54|
|     16|                29.07|                29.07|
|     17|                22.03|                22.03|
|     18|                -8.59|                -8.59|
|     19|               -43.37|               -43.37|
|     20|               -29.39|               -29.39|
|     21|               -15.83|               -15.83|
|     22|               -10.78|               -10.78|
|     23|               -14.80|               -14.80|
|     24|               -28.41|               -28.41|
|     25|               -43.63|                59.67|
|     26|                15.50|                15.50|
|     27|               -23.71|               -23.71|
|     28|               -37.50|               -37.50|
|     29|               -28.83|               -28.83|
|     30|                 2.26|                 2.26|
|     31|                37.75|                37.75|
|     32|                22.03|                22.03|
|     33|                 7.66|                 7.66|
|     34|                 2.90|                 2.90|
|     35|                 7.20|                 7.20|
|     36|                20.02|                20.02|
|     37|                33.49|               -33.49|
|     38|                -0.57|                -0.57|
|     39|                27.34|                27.34|
|     40|                31.69|                31.69|
|     41|                12.45|                12.45|
|     42|               -30.37|               -30.37|
|     43|               -73.53|               -73.53|
|     44|                -7.37|                -7.37|
|     45|                 0.73|                 0.73|
|     46|               -10.86|               -10.86|
|     47|               -22.46|               -22.46|
|     48|               -41.48|               -41.48|
---------------------------------------------------------
```

```
#########################################################
#              VERIFICAÇÃO DA FADIGA (ELS)              #
#                       VmaxHmin                        #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|               -31.08|                31.08|
|      2|                 4.54|                 4.54|
|      3|               -18.94|               -18.94|
|      4|               -25.82|               -25.82|
|      5|               -16.18|               -16.18|
|      6|                11.91|                11.91|
|      7|                43.56|                43.56|
|      8|                30.99|                30.99|
|      9|                16.61|                16.61|
|     10|                 6.14|                 6.14|
|     11|                -4.34|                -4.34|
|     12|                 4.15|                 4.15|
|     13|                52.77|               -52.77|
|     14|               -22.12|               -22.12|
|     15|                 7.99|                 7.99|
|     16|                20.98|                20.98|
|     17|                16.85|                16.85|
|     18|                -4.39|                -4.39|
|     19|               -28.95|               -28.95|
|     20|               -19.53|               -19.53|
|     21|               -10.48|               -10.48|
|     22|                -7.31|                -7.31|
|     23|               -10.42|               -10.42|
|     24|               -20.23|               -20.23|
|     25|               -31.08|                43.56|
|     26|                11.91|                11.91|
|     27|               -16.18|               -16.18|
|     28|               -25.82|               -25.82|
|     29|               -18.94|               -18.94|
|     30|                 4.54|                 4.54|
|     31|                31.08|                31.08|
|     32|                20.23|                20.23|
|     33|                10.42|                10.42|
|     34|                 7.31|                 7.31|
|     35|                10.48|                10.48|
|     36|                19.53|                19.53|
|     37|                28.95|               -28.95|
|     38|                -4.39|                -4.39|
|     39|                16.85|                16.85|
|     40|                20.98|                20.98|
|     41|                 7.99|                 7.99|
|     42|               -22.12|               -22.12|
|     43|               -52.77|               -52.77|
|     44|                -4.15|                -4.15|
|     45|                 4.34|                 4.34|
|     46|                -6.14|                -6.14|
|     47|               -16.61|               -16.61|
|     48|               -30.99|               -30.99|
---------------------------------------------------------
```

```
#########################################################
#              VERIFICAÇÃO DA FADIGA (ELS)              #
#                       VminHmax                        #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|                -36.62|                36.62|
|      2|                 10.38|                10.38|
|      3|                -13.13|               -13.13|
|      4|                -20.31|               -20.31|
|      5|                -11.40|               -11.40|
|      6|                 14.90|                14.90|
|      7|                 44.14|                44.14|
|      8|                 24.57|                24.57|
|      9|                  7.80|                 7.80|
|     10|                  2.74|                 2.74|
|     11|                 -2.33|                -2.33|
|     12|                  3.49|                 3.49|
|     13|                 48.19|               -48.19|
|     14|                -20.36|               -20.36|
|     15|                  6.46|                 6.46|
|     16|                 17.12|                17.12|
|     17|                 11.63|                11.63|
|     18|                -10.01|               -10.01|
|     19|                -34.29|               -34.29|
|     20|                -19.31|               -19.31|
|     21|                 -4.89|                -4.89|
|     22|                  0.26|                 0.26|
|     23|                 -4.49|                -4.49|
|     24|                -19.73|               -19.73|
|     25|                -36.62|                44.14|
|     26|                 14.90|                14.90|
|     27|                -11.40|               -11.40|
|     28|                -20.31|               -20.31|
|     29|                -13.13|               -13.13|
|     30|                 10.38|                10.38|
|     31|                 36.62|                36.62|
|     32|                 19.73|                19.73|
|     33|                  4.49|                 4.49|
|     34|                 -0.26|                -0.26|
|     35|                  4.89|                 4.89|
|     36|                 19.31|                19.31|
|     37|                 34.29|               -34.29|
|     38|                -10.01|               -10.01|
|     39|                 11.63|                11.63|
|     40|                 17.12|                17.12|
|     41|                  6.46|                 6.46|
|     42|                -20.36|               -20.36|
|     43|                -48.19|               -48.19|
|     44|                 -3.49|                -3.49|
|     45|                  2.33|                 2.33|
|     46|                 -2.74|                -2.74|
|     47|                 -7.80|                -7.80|
|     48|                -24.57|               -24.57|
---------------------------------------------------------
```

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

MOMENTO FLETOR NAS SEÇÕES DE INTERESSE

SEÇÃO	ESQUERDA (kN.m)	DIREITA (kN.m)
1	-31.63	31.63
2	5.01	5.01
3	-18.57	-18.57
4	-25.51	-25.51
5	-15.89	-15.89
6	12.17	12.17
7	43.75	43.75
8	30.63	30.63
9	16.03	16.03
10	5.91	5.91
11	-4.20	-4.20
12	4.11	4.11
13	52.64	-52.64
14	-22.07	-22.07
15	7.91	7.91
16	20.77	20.77
17	16.52	16.52
18	-4.85	-4.85
19	-29.50	-29.50
20	-19.59	-19.59
21	-10.08	-10.08
22	-6.76	-6.76
23	-10.03	-10.03
24	-20.30	-20.30
25	-31.63	43.75
26	12.17	12.17
27	-15.89	-15.89
28	-25.51	-25.51
29	-18.57	-18.57
30	5.01	5.01
31	31.63	31.63
32	20.30	20.30
33	10.03	10.03
34	6.76	6.76
35	10.08	10.08
36	19.59	19.59
37	29.50	-29.50
38	-4.85	-4.85
39	16.52	16.52
40	20.77	20.77
41	7.91	7.91
42	-22.07	-22.07
43	-52.64	-52.64
44	-4.11	-4.11
45	4.20	4.20
46	-5.91	-5.91
47	-16.03	-16.03
48	-30.63	-30.63

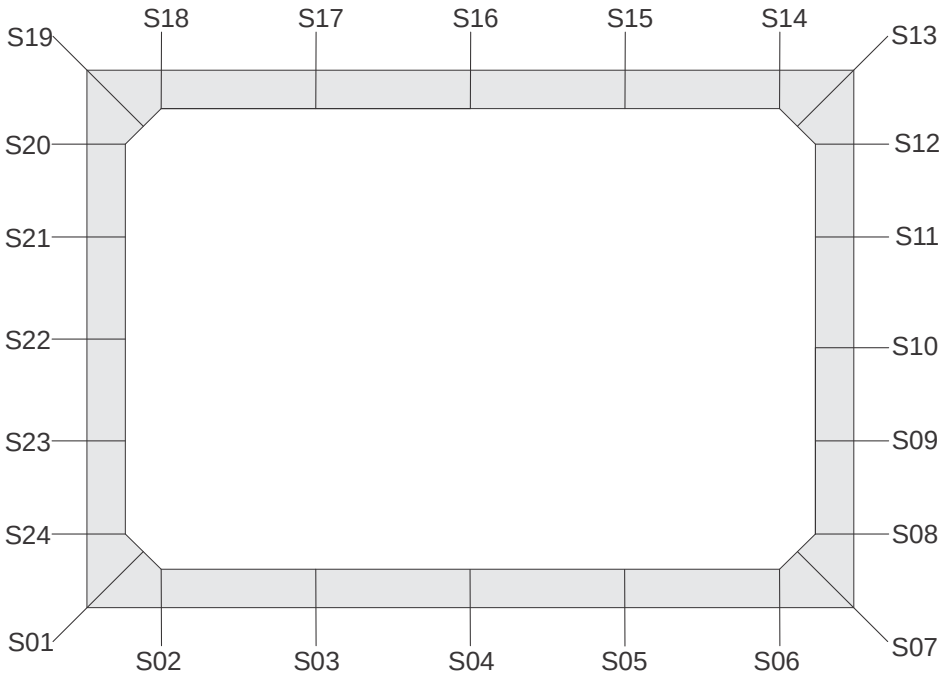
```
#########################################################
#             VERIFICAÇÃO DA FADIGA (ELS)               #
#                      VminHmin                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|               -32.19|                32.19|
|      2|                 4.68|                 4.68|
|      3|               -19.34|               -19.34|
|      4|               -26.76|               -26.76|
|      5|               -18.76|               -18.76|
|      6|                 5.60|                 5.60|
|      7|                33.05|                33.05|
|      8|                22.49|                22.49|
|      9|                13.11|                13.11|
|     10|                10.42|                10.42|
|     11|                14.02|                14.02|
|     12|                12.00|                12.00|
|     13|                31.50|               -31.50|
|     14|                -5.55|                -5.55|
|     15|                18.52|                18.52|
|     16|                26.43|                26.43|
|     17|                18.20|                18.20|
|     18|                -6.19|                -6.19|
|     19|               -32.36|               -32.36|
|     20|               -22.65|               -22.65|
|     21|               -13.17|               -13.17|
|     22|                -9.57|                -9.57|
|     23|               -12.26|               -12.26|
|     24|               -21.64|               -21.64|
|     25|               -32.19|                 0.88|
|     26|                -0.49|                -0.49|
|     27|                -0.62|                -0.62|
|     28|                -0.49|                -0.49|
|     29|                -0.36|                -0.36|
|     30|                -0.23|                -0.23|
|     31|                -0.14|                -0.14|
|     32|                -0.07|                -0.07|
|     33|                 0.03|                 0.03|
|     34|                 0.14|                 0.14|
|     35|                 0.24|                 0.24|
|     36|                 0.35|                 0.35|
|     37|                 0.42|                -0.42|
|     38|                -0.33|                -0.33|
|     39|                -0.20|                -0.20|
|     40|                -0.07|                -0.07|
|     41|                 0.06|                 0.06|
|     42|                 0.19|                 0.19|
|     43|                 0.28|                 0.28|
|     44|                10.14|                10.14|
|     45|                -1.25|                -1.25|
|     46|                -1.15|                -1.15|
|     47|                -1.05|                -1.05|
|     48|                -0.95|                -0.95|
---------------------------------------------------------
```

```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmin                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|               -30.71|                30.71|
|      2|                 4.66|                 4.66|
|      3|               -18.41|               -18.41|
|      4|               -25.17|               -25.17|
|      5|               -15.73|               -15.73|
|      6|                11.79|                11.79|
|      7|                42.80|                42.80|
|      8|                30.22|                30.22|
|      9|                16.02|                16.02|
|     10|                 5.92|                 5.92|
|     11|                -4.19|                -4.19|
|     12|                 4.05|                 4.05|
|     13|                51.61|               -51.61|
|     14|               -21.63|               -21.63|
|     15|                 7.79|                 7.79|
|     16|                20.45|                20.45|
|     17|                16.36|                16.36|
|     18|                -4.48|                -4.48|
|     19|               -28.56|               -28.56|
|     20|               -19.14|               -19.14|
|     21|               -10.10|               -10.10|
|     22|                -6.93|                -6.93|
|     23|               -10.05|               -10.05|
|     24|               -19.86|               -19.86|
|     25|               -30.71|                42.80|
|     26|                11.79|                11.79|
|     27|               -15.73|               -15.73|
|     28|               -25.17|               -25.17|
|     29|               -18.41|               -18.41|
|     30|                 4.66|                 4.66|
|     31|                30.71|                30.71|
|     32|                19.86|                19.86|
|     33|                10.05|                10.05|
|     34|                 6.93|                 6.93|
|     35|                10.10|                10.10|
|     36|                19.14|                19.14|
|     37|                28.56|               -28.56|
|     38|                -4.48|                -4.48|
|     39|                16.36|                16.36|
|     40|                20.45|                20.45|
|     41|                 7.79|                 7.79|
|     42|               -21.63|               -21.63|
|     43|               -51.61|               -51.61|
|     44|                -4.05|                -4.05|
|     45|                 4.19|                 4.19|
|     46|                -5.92|                -5.92|
|     47|               -16.02|               -16.02|
|     48|               -30.22|               -30.22|
---------------------------------------------------------
```

```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VminHmax                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|                -36.31|                36.31|
|      2|                 10.12|                10.12|
|      3|                -13.33|               -13.33|
|      4|                -20.48|               -20.48|
|      5|                -11.56|               -11.56|
|      6|                 14.75|                14.75|
|      7|                 44.03|                44.03|
|      8|                 24.77|                24.77|
|      9|                  8.13|                 8.13|
|     10|                  2.86|                 2.86|
|     11|                 -2.40|                -2.40|
|     12|                  3.51|                 3.51|
|     13|                 48.27|               -48.27|
|     14|                -20.38|               -20.38|
|     15|                  6.50|                 6.50|
|     16|                 17.24|                17.24|
|     17|                 11.82|                11.82|
|     18|                 -9.75|                -9.75|
|     19|                -33.98|               -33.98|
|     20|                -19.28|               -19.28|
|     21|                 -5.11|                -5.11|
|     22|                 -0.05|                -0.05|
|     23|                 -4.71|                -4.71|
|     24|                -19.70|               -19.70|
|     25|                -36.31|                44.03|
|     26|                 14.75|                14.75|
|     27|                -11.56|               -11.56|
|     28|                -20.48|               -20.48|
|     29|                -13.33|               -13.33|
|     30|                 10.12|                10.12|
|     31|                 36.31|                36.31|
|     32|                 19.70|                19.70|
|     33|                  4.71|                 4.71|
|     34|                  0.05|                 0.05|
|     35|                  5.11|                 5.11|
|     36|                 19.28|                19.28|
|     37|                 33.98|               -33.98|
|     38|                 -9.75|                -9.75|
|     39|                 11.82|                11.82|
|     40|                 17.24|                17.24|
|     41|                  6.50|                 6.50|
|     42|                -20.38|               -20.38|
|     43|                -48.27|               -48.27|
|     44|                 -3.51|                -3.51|
|     45|                  2.40|                 2.40|
|     46|                 -2.86|                -2.86|
|     47|                 -8.13|                -8.13|
|     48|                -24.77|               -24.77|
---------------------------------------------------------
```

```
#########################################################
#           VERIFICAÇÃO DA FISSURAÇÃO (ELS)             #
#                      VmaxHmax                         #
#########################################################
---------------------------------------------------------
            MOMENTO FLETOR NAS SEÇÕES DE INTERESSE
---------------------------------------------------------
|  SEÇÃO|       ESQUERDA (kN.m)|       DIREITA (kN.m)|
---------------------------------------------------------
|      1|               -31.06|                31.06|
|      2|                 4.95|                 4.95|
|      3|               -18.18|               -18.18|
|      4|               -24.98|               -24.98|
|      5|               -15.55|               -15.55|
|      6|                11.95|                11.95|
|      7|                42.92|                42.92|
|      8|                30.00|                30.00|
|      9|                15.66|                15.66|
|     10|                 5.77|                 5.77|
|     11|                -4.11|                -4.11|
|     12|                 4.02|                 4.02|
|     13|                51.53|               -51.53|
|     14|               -21.60|               -21.60|
|     15|                 7.74|                 7.74|
|     16|                20.32|                20.32|
|     17|                16.15|                16.15|
|     18|                -4.77|                -4.77|
|     19|               -28.90|               -28.90|
|     20|               -19.18|               -19.18|
|     21|                -9.84|                -9.84|
|     22|                -6.58|                -6.58|
|     23|                -9.80|                -9.80|
|     24|               -19.90|               -19.90|
|     25|               -31.06|                42.92|
|     26|                11.95|                11.95|
|     27|               -15.55|               -15.55|
|     28|               -24.98|               -24.98|
|     29|               -18.18|               -18.18|
|     30|                 4.95|                 4.95|
|     31|                31.06|                31.06|
|     32|                19.90|                19.90|
|     33|                 9.80|                 9.80|
|     34|                 6.58|                 6.58|
|     35|                 9.84|                 9.84|
|     36|                19.18|                19.18|
|     37|                28.90|               -28.90|
|     38|                -4.77|                -4.77|
|     39|                16.15|                16.15|
|     40|                20.32|                20.32|
|     41|                 7.74|                 7.74|
|     42|               -21.60|               -21.60|
|     43|               -51.53|               -51.53|
|     44|                -4.02|                -4.02|
|     45|                 4.11|                 4.11|
|     46|                -5.77|                -5.77|
|     47|               -15.66|               -15.66|
|     48|               -30.00|               -30.00|
---------------------------------------------------------
```

ARMADURAS P/ SOLICITAÇÕES NORMAIS



Seção	As-CA60ext(cm²/m)	As-CA50ext(cm²/m)	As-CA60int(cm²/m)	As-CA50int(cm²/m)
1	5.47	6.57	1.26	1.26
2	2.38	2.86	2.32	2.79
3	2.32	2.79	5.34	6.41
4	2.32	2.79	7.21	8.65
5	2.32	2.79	4.50	5.40
6	2.80	3.36	2.32	2.79
7	5.47	6.57	1.26	1.26
8	6.96	8.36	2.32	2.79
9	3.68	4.41	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	5.19	6.23	2.32	2.79
15	2.32	2.79	2.32	2.79
16	2.32	2.79	5.48	6.58
17	2.32	2.79	4.67	5.60
18	2.32	2.79	2.32	2.79
19	5.47	6.57	1.26	1.26
20	2.99	3.59	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	3.09	3.70	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(cm²/m)
12	-127.28	4.11	-109.65	12.00	-130.71	0.00
13	-125.99	52.64	-39.85	31.50	80.22	0.00
14	-40.87	22.07	-39.85	5.55	253.52	0.00
16	-38.79	20.98	-61.71	17.12	71.41	0.00
18	-40.87	4.85	-39.85	6.19	-21.17	0.00
19	-104.47	29.50	-39.85	32.36	-51.51	0.00
20	-105.75	19.59	-110.45	22.65	-44.63	0.00

NOTA:
* A armadura adicional referente à fadiga necessariamente é nula quando a altura de aterro supera 1.5 m.

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(cm²/m)	ro	Vsd(kN)	Vrd1(kN)	Vrd2(kN)	Asw(cm²/m/m)
1	6.57	2.12E-003	130.01	187.42	0.00	0.00
2	2.86	2.60E-003	119.50	72.65	571.15	6.69
6	3.36	3.06E-003	133.57	73.83	571.15	12.38
7	6.57	2.12E-003	147.68	175.67	0.00	0.00
13	6.57	2.12E-003	168.09	177.15	0.00	0.00
14	6.23	5.66E-003	91.34	81.75	571.15	0.00
18	2.79	2.53E-003	94.80	73.76	571.15	0.00
19	6.57	2.12E-003	115.22	180.81	0.00	0.00

OBSERVAÇÃO 1: A verificação da resistência à força cortante é feita a uma distância d/2 das seções das mísulas.
OBSERVAÇÃO 2: Recomenda-se 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.

VERIFICAÇÃO DA FISSURAÇÃO

VmaxHmin

Seção	As(cm²/m)	Nsd(kN)	Msd(kN.m)	Ø(mm)	w(mm)
1	6.57	-22.86	30.71	6.30	0.032
2	2.86	-45.72	4.66	6.30	0.013
3	6.41	-45.72	18.41	6.30	0.078
4	8.65	-45.72	25.17	6.30	0.084
5	5.40	-45.72	15.73	6.30	0.077
6	3.36	-45.72	11.79	6.30	0.104
7	6.57	-88.91	42.80	6.30	0.048
8	8.36	-130.81	30.22	6.30	0.107
9	4.41	-129.31	16.02	6.30	0.077
10	2.79	-127.81	5.92	6.30	0.003
11	2.79	-126.31	4.19	6.30	0.000
12	2.79	-124.81	4.05	6.30	0.000
13	6.57	-81.15	51.61	6.30	0.077
14	6.23	-38.77	21.63	6.30	0.120
15	2.79	-38.77	7.79	10.00	0.096
16	6.58	-38.77	20.45	10.00	0.151
17	5.60	-38.77	16.36	10.00	0.129
18	2.79	-38.77	4.48	6.30	0.014
19	6.57	-70.43	28.56	6.30	0.019
20	3.69*	-103.37	19.14	6.30	0.200
21	2.79	-104.87	10.10	6.30	0.061
22	2.79	-106.37	6.93	6.30	0.015
23	2.79	-107.87	10.05	6.30	0.058
24	3.82*	-109.37	19.86	6.30	0.200

VminHmax

Seção	As(cm²/m)	Nsd(kN)	Msd(kN.m)	Ø(mm)	w(mm)
1	6.57	-35.02	36.31	6.30	0.043
2	2.86	-70.05	10.12	6.30	0.082
3	6.41	-70.05	13.33	6.30	0.033
4	8.65	-70.05	20.48	6.30	0.049
5	5.40	-70.05	11.56	6.30	0.032
6	3.36	-70.05	14.75	6.30	0.151
7	6.57	-97.01	44.03	6.30	0.049
8	8.36	-122.70	24.77	6.30	0.068
9	4.41	-121.20	8.13	6.30	0.009
10	2.79	-119.70	2.86	6.30	0.000
11	2.79	-118.20	2.40	6.30	0.000
12	2.79	-116.70	3.51	6.30	0.000
13	6.57	-87.97	48.27	6.30	0.064
14	6.23	-60.53	20.38	6.30	0.097
15	2.79	-60.53	6.50	10.00	0.045
16	6.58	-60.53	17.24	10.00	0.095
17	5.60	-60.53	11.82	10.00	0.054
18	2.79	-60.53	9.75	6.30	0.085
19	6.57	-81.33	33.98	6.30	0.028
20	3.73*	-103.41	19.28	6.30	0.200
21	2.79	-104.91	5.11	6.30	0.003
22	2.79	-106.41	0.05	6.30	0.000
23	2.79	-107.91	4.71	6.30	0.001
24	3.82*	-109.41	19.70	6.30	0.196

VERIFICAÇÃO DA FISSURAÇÃO (CONT.)

VmaxHmax

Seção	As(cm²/m)	Nsd(kN)	Msd(kN.m)	Ø(mm)	w(mm)
1	6.57	-23.49	31.06	6.30	0.033
2	2.86	-46.98	4.95	6.30	0.015
3	6.41	-46.98	18.18	6.30	0.075
4	8.65	-46.98	24.98	6.30	0.082
5	5.40	-46.98	15.55	6.30	0.075
6	3.36	-46.98	11.95	6.30	0.106
7	6.57	-89.44	42.92	6.30	0.048
8	8.36	-130.61	30.00	6.30	0.105
9	4.41	-129.11	15.66	6.30	0.072
10	2.79	-127.61	5.77	6.30	0.003
11	2.79	-126.11	4.11	6.30	0.000
12	2.79	-124.61	4.02	6.30	0.000
13	6.57	-81.70	51.53	6.30	0.077
14	6.23	-40.07	21.60	6.30	0.119
15	2.79	-40.07	7.74	10.00	0.093
16	6.58	-40.07	20.32	10.00	0.148
17	5.60	-40.07	16.15	10.00	0.124
18	2.79	-40.07	4.77	6.30	0.017
19	6.57	-71.18	28.90	6.30	0.020
20	3.73*	-103.57	19.18	6.30	0.197
21	2.79	-105.07	9.84	6.30	0.056
22	2.79	-106.57	6.58	6.30	0.012
23	2.79	-108.07	9.80	6.30	0.053
24	3.82*	-109.57	19.90	6.30	0.200

NOTA:
* Seção com aumento na armadura devido à fissuração.