



RENATO IOITI TERAMOTO

LINHAS DE INFLUÊNCIA PARA VIGAS FINITAS SOBRE APOIO
ELÁSTICO, COM DIVERSAS CONDIÇÕES DE EXTREMIDADE

Dissertação apresentada à Escola
Politécnica da U.S.P. para a
obtenção do Título de Mestre em
Engenharia.


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Eng. Civil, Escola Politécnica da USP, 1966

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RESUMO

O objetivo do presente trabalho é apresentar tabelas para soluções numéricas de vigas finitas sobre apoio elástico, com diversas condições de extremidade.

O modelo de Winkler é utilizado, admitindo-se constante o coeficiente de recalque do solo.

As tabelas fornecem os coeficientes de influência para rotações das secções transversais, para reação do apoio elástico, para momento fletor e força cortante.

Os coeficientes de influência referem-se a esforços externos, força concentrada ou momento, que se deslocam ao longo da viga.

O valor característico SL do conjunto viga-solo varia de 1,5 a 8,0, atendendo portanto as vigas curtas, as médias e as longas.

Com referência às vigas sobre apoio elástico, acredita-se que estas são as tabelas numéricas mais completas, disponíveis, no momento.

ABSTRACT

The purpose of the paper is to present tables for the numerical solutions of finite beams on elastic foundation; several end conditions are included for the beams.

Winkler's model is assumed, with a constant subgrade reaction.

The users are supplied with influence coefficients for slope, elastic foundation reaction, bending moments and shear forces.

The influence coefficients refer either to an external concentrated force or to an external moment travelling along the beam.

The characteristic value SL , for beam-soil interaction, varies from 1,5 to 8,0, allowing therefore to consider short, intermediate and long beams.

Regarding to beams on elastic foundation, we believe the tables to be the most complete numerical ones available at the moment.

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NOTAÇÕES

Adotam-se nesse trabalho, as notações abaixo indicadas:

- E - módulo de elasticidade do material da viga.
- E_s - módulo de elasticidade do solo.
- I - momento de inércia da secção transversal da viga em relação ao eixo central de inércia horizontal
- L - comprimento da viga sobre apoio elástico
- M - momento fletor ou momento externo
- P - força concentrada
- S - comprimento característico , $S = \sqrt[4]{\frac{kb}{4EI}}$
- a - distância do esforço externo à extremidade da esquerda da viga
- b - largura da viga em contato com o apoio elástico
- k - coeficiente de recalque do apoio elástico, $k = \frac{P}{y}$
- p - reação do apoio elástico (pressão de contato)
- q - carga, por unidade de comprimento, aplicada sobre a viga
- x - abscissa da secção transversal ao longo da viga
- y - ordenada da linha elástica da viga (deslocamento)
- ν_s - coeficiente de Poisson do solo
- n_ϕ - coeficiente de influência para rotação da secção transversal
- n_p - coeficiente de influência para reação do apoio elástico
- n_M - coeficiente de influência para momento fletor
- n_V - coeficiente de influência para força cortante
- φ - rotação, deslocamento angular, da secção transversal da viga $\varphi = dy/dx = y'$.
- z - abscissa da secção onde se aplica o esforço externo

1. INTRODUÇÃO

Encontram-se frequentemente, nos projetos de estruturas, elementos sobre apoio elástico, a saber, vigas de fundação, estacas e tubulões sob esforços horizontais, trilhos de ferrovia, dormentes e peças embutidas em meios deformáveis (chumbadores).

Contudo, para o cálculo prático desses elementos estruturais, os trabalhos publicados fornecem soluções numéricas para casos particulares de vigas e de apoio elástico. As vigas geralmente são prismáticas com as suas extremidades livres e o apoio elástico é representado pelo modelo de Winkler, admitindo constante o coeficiente de recalque do apoio deformável.

Os trabalhos de Wölfer [47] e de Hahn [46] apresentam soluções numéricas para vigas infinitas, semi-infinitas e finitas sobre apoio elástico, com suas extremidades livres. Sherif [43] e Werner [45] dedicam seus trabalhos à solução de estacas, admitindo o modelo de Winkler para apoio elástico, porém com o coeficiente de recalque do solo variando com a profundidade.

No entanto, se as vigas sobre apoio elástico não têm suas extremidades livres, não se encontram, até o presente, quaisquer soluções numéricas que tenham o mesmo aspecto prático apresentado pelos trabalhos de Hahn e de Wölfer.

A constatação deste fato, conduziu-nos ao objetivo dessa dissertação, isto é, à preparação de tabelas numéricas, na forma mais adequada, para a solução de vigas finitas sobre apoio elástico, modelo de Winkler, com diversas condições de extremidade, a saber,

- extremidades livres;
- extremidade à esquerda, articulada e extremidade à direita, livre;
- extremidade à esquerda, livre e extremidade à direita, engastada;
- extremidade à esquerda, articulada e extremidade à direita, engastada;
- extremidades articuladas;
- extremidades engastadas.

Esse trabalho foi desenvolvido com base na publicação de Orlov e Saxenhofer [24] que adotam solução na forma de função circular e hiperbólica para a equação diferencial da viga prismática sobre apoio elástico, modelo de Winkler, e utilizam o processo dos parâmetros iniciais. O coeficiente de recalque do apoio elástico é admitido constante.

São, assim, obtidos os coeficientes para momentos fletores, forças cortantes, reações do apoio elástico e rotações das secções transversais das vigas finitas sob força concentrada unitária e momento unitário. Esses coeficientes que permitem traçar linhas de influência ou linhas de estado, estão dispostos em tabelas, na forma daquelas publicadas por Hahn.

Para controle dos valores obtidos, utilizaram-se expressões tabeladas por Roark e Young [44] e as tabelas numéricas apresentadas por Hampe [27], na solução de cascas cilíndricas.

Além das diferentes condições de extremidade, destaca-se no presente trabalho o fornecimento dos coeficientes para cálculo das rotações das secções transversais das vigas finitas sobre apoio elástico.

2. TRABALHOS PUBLICADOS. RESUMO

Sem a pretensão de apresentar uma relação completa de trabalhos publicados referentes às estruturas sobre apoio elástico, citam-se as obras e os comentários abaixo.

O modelo que admite a reação de cada apoio elástico proporcional ao seu deslocamento, independente dos outros apoios, foi utilizado por Winkler, em trabalho publicado em 1867.

Hayashi [1], em 1921, apresenta o desenvolvimento da teoria de Winkler abrangendo diversos problemas de vigas sobre apoio elástico; aborda os seguintes exemplos: dormentes de ferrovia, base de eclusa, estaca prancha sob esforço horizontal, viga de fundação com trecho central rígido, sapata, viga curva sobre apoio elástico, viga com engastamento elástico nas extremidades e pórtico enterrado.

Adotando a teoria do semi-espaço elástico, pela primeira vez, em 1937, Biot [2] resolve a viga infinita sobre apoio elástico, sob força concentrada e compara a solução obtida com o modelo de Winkler.

O problema de estruturas sobre apoio elástico foi amplamente abordado por Hetényi [3], que, em 1946, publicou um dos textos mais importantes sobre o assunto.

Hetényi comenta o processo dos parâmetros iniciais, largamente utilizado pelos autores soviéticos. Como exemplos de aplicação de vigas sobre apoio elástico cita trilhos sobre dormentes, tubos ou cascas cilíndricas e grelhas.

Em relação às vigas de comprimento finito usa o processo da superposição com base na viga infinita, apresentando soluções para casos de esforços externos simétricos e assimétricos. Aborda, ainda, casos particulares de vigas

com secção transversal variável sobre apoio elástico, a influência da força normal com o exame de vigas finitas com diversas condições de extremidade, o problema de flambagem de barras sobre apoio elástico e o efeito de torção em barras sobre apoio elástico. Finalizando, Hetényi apresenta comentários sobre o modelo de Winkler e do semi-espaço elástico.

Em 1947, Langendonck [4] usando método das diferenças finitas apresenta a resolução da viga de secção transversal variável sobre apoio elástico, modelo de Winkler.

Posteriormente, o método das diferenças finitas é empregado por Malter [13] em 1958 e Bowles [33] em 1968.

Malter utiliza também o método de Newmark, integração passo a passo, e nas aplicações numéricas faz comparações com o método das diferenças finitas, com o método das aproximações sucessivas utilizado por Popov [7] e com as soluções de Hetényi.

Estrutura sobre apoio elástico passa a ser capítulo das obras de Timoshenko [9] em 1951, Belluzzi [11] em 1953, Seely e Smith [10] em 1952 e Volterra e Gaines [36] em 1971. Esses apresentam, igualmente, o problema clássico das vigas infinitas e das vigas finitas, sobre apoio elástico, modelo de Winkler. Timoshenko, Seely e Smith publicam tabelas dos coeficientes utilizados na determinação dos deslocamentos e esforços solicitantes. Seely e Smith, ainda, apresentam os gráficos de momentos fletores e deslocamentos para cargas unitárias em vigas finitas sobre apoio elástico e abordam o caso de apoios elásticos discretos, igualmente espaçados.

Swida [8] em 1951 e Müllersdorf [23] em 1963, utilizando também o processo dos parâmetros iniciais, apresentam linhas de influência de esforços solicitantes e deslocamentos para as vigas finitas sobre apoio elástico, com extremidades livres, adotando para o apoio elástico o modelo de

Winkler. Para Swida o valor característico SL varia de 1,5 a 5,0 e para Müllersdorf, de 0,8 a 4,8.

Teng [20], em 1962, e Bowles [33,41], em 1968 e 1974, dedicam parte de seus trabalhos aos problemas de estruturas sobre apoio elástico, apresentando os métodos usuais de cálculo. Bowles aborda a solução pelo método dos elementos finitos e faz comentários sobre o modelo de Winkler em relação ao dô semi-espaço elástico.

Orlov e Saxenhofer [24] em 1963 tratam das vigas finita, semi-infinita e infinita sobre apoio elástico. Para vigas finitas apresentam solução sob forma fechada. Suas tabelas referem-se a coeficientes de influência para momento fletor, força cortante e deslocamento para vigas finitas com extremidades livres. O valor característico SL varia de $\pi/2$ a 4,71.

Dodge [28], em 1964, fornece os coeficientes de influência para vigas sobre apoio elástico com características elásticas e coeficientes de recalque do apoio, constantes. São tabelados os coeficientes de influência para deslocamentos, rotações, momento fletor e força cortante para as vigas finitas com extremidades livres. Para as vigas semi-infinitas, os coeficientes de influência correspondentes são apresentados por meio de gráficos.

Iyengar e Anantharamu [29], em 1965, propõem solução em forma de série de funções características. Para vigas finitas com extremidades livres, fornecem gráficos dos coeficientes de influência para deslocamentos, momento fletor e força cortante; os valores característicos SL das vigas variam de 2,1 a 7,5. Consideram vigas curtas quando $SL < 2,0$ e infinitas, quando $SL > 8,0$.

Para as estruturas enterradas, Langendonck [12], em 1954, publica trabalho sobre flambagem de postes e estacas parcialmente enterrados, na forma de âbacos, adotando-se

o modelo de Winkler para a reação horizontal do terreno.

De Beer [5], em 1948, e Langendonck [21], em 1962, procuram modelos mais reais para o apoio elástico contínuo, adotando soluções que permitem considerar a influência recíproca entre os apoios.

Vesic [16,18], em 1961, com base na solução de Biot, apresenta o seu trabalho para viga infinita sobre semi-espaço elástico. Avalia o coeficiente de recalque do terreno em função das características de deformabilidade do conjunto, isto é, solo e estrutura, com a expressão abaixo:

$$k_{\infty} b = 0,65 \cdot \sqrt{\frac{E_S b^4}{E I}} \frac{E_S}{1-\nu_S^2} \quad \text{para } SL > 2,25$$

Classifica as vigas sobre apoio elástico da seguinte forma:

SL < 0,80	vigas curtas
0,80 < SL < 2,25	vigas moderadamente curtas
2,25 < SL < 5,0	vigas moderadamente longas
SL > 5,0	vigas longas.

Recomenda os processos de análise de vigas sobre apoio elástico em função do valor característico SL . .

Em 1963, Vesic e Johnson [22] publicam os resultados de ensaios de modelos e comparam suas conclusões com os obtidos pelo uso do modelo de Winkler e o do semi-espaço elástico (método de Ohde).

As estruturas sobre semi-espaço elástico foram abordadas, ainda, por Gorbunov-Possadov [17] em 1961, por Cheung e Nag [32] em 1968 e Kany [40] em 1974.

Em 1962, Barden [19] publica extenso trabalho sobre vigas sobre semi-espaco elástico, considerando casos de solo homogêneo anisótropo e isotropo, compressibilidade decrescente com a profundidade e certos casos de camadas estratificadas. Apresenta coeficientes de influência para reação do terreno em função do valor característico da viga e solo, para vigas finitas com extremidades livres. Comenta Winkler e mostra a sua validade para as vigas não rígidas e recomenda a de terminação do coeficiente de recalque a partir das constantes elásticas do solo.

Em 1963, adotando o modelo de Winkler para o apoio elástico, Barden [25] apresenta coeficientes de influência para reação do terreno para vigas finitas com extremidades livres.

Ainda, no mesmo ano, Barden [26] mostra as suas conclusões quanto ao modelo de Winkler e o do semi-espaco elástico. Para o coeficiente de recalque do terreno sugere a seguinte expressão, em função das características do solo:

$$b_k = 0,65 \frac{E_s}{1 - \nu_s^2} \quad \text{para } SL > 2,75$$

e classifica as vigas da seguinte forma:

0 < SL < 3	viga rígida
3 < SL < 7	viga finita
7 < SL < 10	viga infinita

Griffel [34], em 1970, destaca em seu livro as vigas finita, infinita e semi-infinita sobre apoio elástico. Para quatorze casos de carregamentos usuais, forças e momen-

tos, fornece linhas de estado de deslocamentos, rotações, momentos fletores e forças cortantes para as vigas finitas com diversas condições de extremidade. Também na forma de linhas de estado, fornece os mesmos esforços solicitantes e deslocamentos para as vigas infinitas e semi-infinita, considerando cinco casos de carregamentos. Adota o modelo de Winkler para o apoio elástico.

Roark e Young [44], em 1975, representando o formulário mais completo de vigas sobre apoio elástico, apresentam as expressões para deslocamento, para rotação e esforços solicitantes de vários casos de carregamento, particularmente aqueles de força e momento, isolados. Aborda vigas finitas, semi-infinitas e infinitas. Usa o modelo de Winkler para o apoio elástico e recomenda que as vigas finitas devem ser utilizadas quando o valor característico viga-solo (SL) não for maior que 6,0.

Para as estruturas enterradas sob esforços aplicados nas extremidades, por exemplo, para o caso de estacas, têm-se os trabalhos de Titze [35], em 1970, Werner [45], em 1977 e Sherif [43], em 1974. Titze e Werner apresentam soluções numéricas na forma de ábacos; consideram coeficiente de recalque do solo variável ou constante com a profundidade. Sherif publica tabelas numéricas dos coeficientes de influência para pressões de contato, deslocamentos horizontais, forças cortantes, momentos fletores e rotações para 3 casos de variação do coeficiente de recalque horizontal do solo e 4 casos de carregamento.

Os trabalhos mais completos quanto às tabelas são os de Hahn [46], em 1977, e Wölfer [47], em 1978. Hahn fornece a solução de vigas finitas, com exemplos para tubo, casca cilíndrica e chumbador. Utiliza o modelo de Winkler e sob a forma de tabela apresenta os coeficientes de influência para pressões de contato, momento fletor e força cor-

tante para viga infinita, semi-infinita e finita com extremidades livres, sob força concentrada unitária. O valor característico SL varia de 0 a 8, para as vigas finitas.

Com momento unitário aplicado na extremidade apresenta as linhas de estado de pressão de contato, de força cortante e momento fletor, em forma de tabela. Wölfer, também, fornece os coeficientes de influência para momento fletor, força cortante e pressão de contato para vigas finitas com extremidades livres sob esforços externos: força concentrada e momento.

Recentemente, em 1978, Grasshof [48] publica o seu trabalho, utilizando apoio elástico, modelo de Winkler em forma de tabelas e diagramas, fornece as linhas de influência de pressão de contato, momento fletor e força cortante para vigas finitas com extremidades livres sob força concentrada e momento. O valor característico SL varia de 2,0 a 5,5.

Após o resumo acima, enfatiza-se, mais uma vez, que a finalidade da presente dissertação é apresentar tabelas práticas e mais completas que aquelas publicadas até o momento.

3. Equações Gerais

3.1 - Equação diferencial para a viga sobre apoio elástico

Para a viga de secção transversal constante de largura b , sobre apoio elástico de característica constante, com os esforços aplicados no seu plano de simetria, tem-se de acordo com a Resistência dos Materiais:

$$EI \frac{d^4 y}{dx^4} = q - bp.$$

Adotando-se o modelo de Winkler para o apoio elástico:

$$y = \frac{p}{k}$$

isto é, deformação do apoio proporcional à pressão correspondente, e fazendo-se:

$$s = \sqrt[4]{\frac{kb}{4EI}}$$

tem-se a equação diferencial de 4^a ordem:

$$\frac{d^4 y}{dx^4} + 4s^4 y = \frac{1}{EI} q \quad (3.1)$$

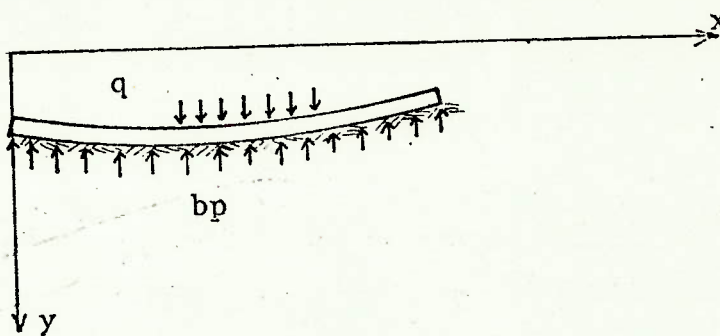


Figura 3.1

Nas expressões acima, as notações representam as seguintes características:

- b = largura da viga em contato com o apoio elástico;
- I = momento de inércia da secção transversal da viga em relação ao eixo central de inércia horizontal;
- E = módulo de elasticidade do material da viga;
- k = coeficiente de recalque do apoio elástico, isto é, pressão que nele causa um recalque unitário;
- y = ordenada da linha elástica da viga (o deslocamento angular, rotação, será representado por $\psi = y' = dy/dx$);
- q = carga, por unidade de comprimento, aplicada sobre a viga.

Utilizando a equação diferencial da linha elástica da viga:

$$\frac{d^2 y}{dx^2} = - \frac{M}{EI}$$

a equação (3.1) passa a ter o momento fletor como variável dependente, isto é,

$$\frac{d^4 M}{dx^4} + 4 S^4 M = - q'' \quad (3.2)$$

3.2 - Solução da equação diferencial em função dos parâmetros iniciais.

Admitindo-se que q é função linear, particularmente constante ou nula, a equação diferencial (3.2) passa a ser homogênea e tem solução na forma de função circular e hipérbolica, como se segue:

$$M(x) = C_1 \cosh Sx \cos Sx + C_2 \cosh Sx \sen Sx + \\ + C_3 \sinh Sx \cos Sx + C_4 \sinh Sx \sen Sx \quad (3.3)$$

As constantes de integração C_1 , C_2 , C_3 e C_4 são substituídas pelos valores $y'(0)$, $y(0)$, $q'(0)$, $q(0)$, $M(0)$ e $-V(0)$ existentes na extremidade $x = 0$ (condições iniciais) da viga, pelo processo dos parâmetros iniciais. Resultam, assim, as expressões para momento fletor, força cortante, reação do apoio elástico e deslocamento angular (rotação) na secção da viga sobre apoio elástico:

Momento fletor

$$M(x) = M(0)A_{Sx} + \frac{V(0)}{S} B_{Sx} + \frac{kb y(0) - q(0)}{S^2} C_{Sx} + \\ + \frac{kb y'(0) - q'(0)}{S^3} D_{Sx} \quad (3.4)$$

Força cortante

$$V(x) = -4S M(0)D_{Sx} + V(0)A_{Sx} + \frac{kb y(0) - q(0)}{S} B_{Sx} + \\ + \frac{kb y'(0) - q'(0)}{S^2} C_{Sx} \quad (3.5)$$

Reação do apoio elástico

$$kb y(x) - q(x) = - 4S^2 M(o) C_{Sx} - 4SV(o) D_{Sx} + [kb y(o) - q(o)] A_{Sx} +$$

$$+ \frac{kb y'(o) - q'(o)}{S} B_{Sx} \quad (3.6)$$

Rotação

$$kb y'(x) - q'(x) = - 4S^3 M(o) B_{Sx} - 4S^2 V(o) C_{Sx} - 4S [kb y(o) - q(o)] D_{Sx} +$$

$$+ [kb y'(o) - q'(o)] A_{Sx} \quad (3.7)$$

A_{Sx} , B_{Sx} , C_{Sx} e D_{Sx} nas equações (3.4) a (3.7) valem:

$$A_{Sx} = \cosh Sx \cos Sx$$

$$B_{Sx} = \frac{1}{2} (\cosh Sx \sen Sx + \sinh Sx \cos Sx)$$

$$C_{Sx} = \frac{1}{2} \sinh Sx \sen Sx$$

$$D_{Sx} = \frac{1}{4} (\cosh Sx \sen Sx - \sinh Sx \cos Sx)$$

e as condições iniciais $y(o)$, $y'(o)$, $q(o)$, $q'(o)$, $V(o)$ e M_o definem-se abaixo:

$y(o)$ = ordenada da linha elástica da viga na secção de ex tremidade $x = 0$;

$y'(o)$ = rotação da linha elástica da viga, na secção de ex tremidade $x = 0$;

$q(o)$ = carga distribuída aplicada sobre a viga, esforço para $x = 0$;

$q'(0)$ = derivada da função q , em $x = 0$;

$V(0)$ = força cortante na secção de extremidade $x = 0$;

$M(0)$ = momento fletor na secção de extremidade $x = 0$.

3.3 - Expressões dos esforços solicitantes e deslocamentos para esforços externos: força concentrada e momento.

Para o caso de esforços externos descontínuos, força concentrada e momento aplicados na secção de abscissa $x=a$, e a carga distribuída $q = 0$, ao longo da viga (fig.3.2), as equações (3.4) a (3.7) passam a ter as seguintes formas:

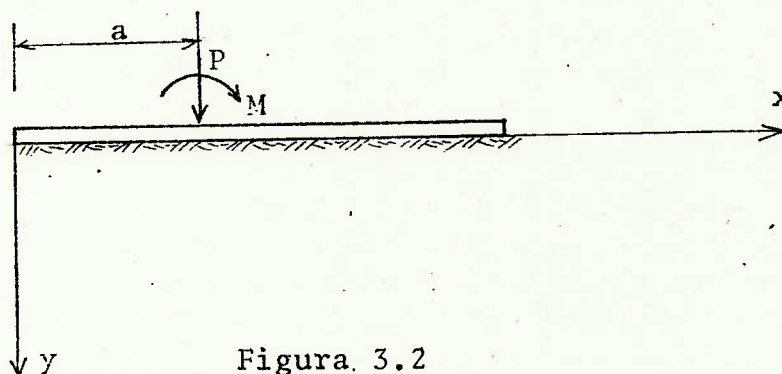


Figura. 3.2

$$M(x) = M(0)A_{Sx} + \frac{V(0)}{S} B_{Sx} + \frac{kb y(0)}{S^2} C_{Sx} + \frac{kb y'(0)}{S^3} D_{Sx} - \frac{P}{S} B_{S\langle x-a \rangle} + MA_{S\langle x-a \rangle} \quad (3.8)$$

$$V(x) = -4S M(0)D_{Sx} + V(0)A_{Sx} + \frac{kb y(0)}{S} B_{Sx} + \frac{kb y'(0)}{S^2} C_{Sx} - PA_{S\langle x-a \rangle} - 4SMD_{S\langle x-a \rangle} \quad (3.9)$$

$$\begin{aligned}
 kb \ y(x) = & -4S^2 M(o)C_{Sx} - 4SV(o)D_{Sx} + kb \ y(o)A_{Sx} + \\
 & + \frac{kb \ y'(o)}{S} B_{Sx} + 4SPD_{S<x-a>} - 4S^2M C_{S<x-a>} \quad (3.10)
 \end{aligned}$$

$$\begin{aligned}
 kb \ y'(x) = & -4S^3M(o)B_{Sx} - 4S^2V(o)C_{Sx} - 4S \ kby(o)D_{Sx} + \\
 & + kby'(o)A_{Sx} + 4S^2P C_{S<x-a>} - 4S^3MB_{S<x-a>} \quad (3.11)
 \end{aligned}$$

Nas expressões (3.8) a (3.11) acima, o índice $\langle x-a \rangle$ identifica função ressalto de argumento a , caracterizando o efeito dos esforços externos descontínuos de forma que os valores correspondentes são nulos para $x < a$.

Os parâmetros iniciais $y(o)$, $y'(o)$, $M(o)$, $V(o)$ são determinados pelas condições de extremidade das vigas e em função dos esforços externos aplicados.

4. Vigas finitas sobre apoio elástico, com diversas condições de extremidade - Coeficientes das linhas de influência.

4.1 - Introdução

As vigas finitas de comprimentos iguais a L apresentam as condições de vínculos nas duas extremidades, isto é, na extremidade à esquerda, com $x = 0$, e na extremidade à direita, com $x = L$.

No presente trabalho, consideram-se vigas finitas com seis casos de condições de extremidade, que são identificadas a seguir:

- ESTRUTURA 1 - Viga de comprimento L , sobre apoio elástico, com as extremidades livres;
- ESTRUTURA 2 - Viga de comprimento L , sobre apoio elástico, com extremidade à esquerda, articulada e extremidade à direita, livre;
- ESTRUTURA 3 - Viga de comprimento L , sobre apoio elástico, com extremidade à esquerda, livre e extremidade à direita, engastada;
- ESTRUTURA 4 - Viga de comprimento L , sobre apoio elástico, com as extremidades articuladas;
- ESTRUTURA 5 - Viga de comprimento L , sobre apoio elástico, com extremidade à esquerda, articulada e extremidade à direita, engastada;
- ESTRUTURA 6 - Viga de comprimento L , sobre apoio elástico - com as extremidades engastadas.

Para cada estrutura, determinam-se os parâmetros iniciais em função das condições de vínculos nas duas extremidades e do esforço externo aplicado, força concentrada unitária e momento unitário.

Obtêm-se, assim, os coeficientes de influência correspondentes ao deslocamento angular (rotação), reação do apoio elástico, momento fletor e força cortante para cada um dos esforços unitários aplicados. Esses coeficientes são representados por η_ϕ , η_p , η_M e η_V , respectivamente, e definem-se da seguinte forma:

para força concentrada unitária

$$\eta_\phi = \frac{kb}{S^2} y'(x)$$

$$\eta_p = kbL y(x) = bL p(x)$$

$$\eta_M = \frac{M(x)}{L}$$

$$\eta_V = V(x)$$

para momento unitário

$$\eta_\phi = \frac{kb}{S^3} y'(x)$$

$$\eta_p = kbL^2 y(x) = bL^2 p(x)$$

$$\eta_M = M(x)$$

$$\eta_V = L V(x)$$

Apresentam-se, a seguir, as expressões dos parâmetros iniciais e dos coeficientes acima definidos para cada um dos seis casos de condições de extremidade das vigas finitas sobre apoio elástico.

4.2 - ESTRUTURA 1

Viga de comprimento L , sobre apoio elástico, com extremidades livres (fig. 4.2.1 e 4.2.2).

Condições de extremidade:

$$\begin{aligned} \text{a) Para } x = 0, \quad V(0) &= 0 & (4.2a) \\ & M(0) = 0 \end{aligned}$$

$$\begin{aligned} \text{b) Para } x = L, \quad V(L) &= 0 & (4.2b) \\ & M(L) = 0 \end{aligned}$$

4.2.1 - Esforço externo: força concentrada unitária

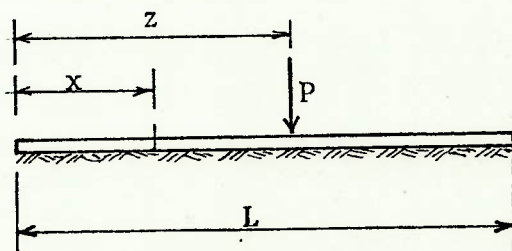


Figura 4.2.1

Fazendo-se $a = z, P = 1, M = 0$ e com as condições de extremidade acima nas expressões (3.8) e (3.9), obtêm-se os parâmetros iniciais seguintes:

$$\frac{kb}{S} \cdot y(0) = \frac{C_{SL} B_S(L-z) - D_{SL} A_S(L-z)}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.2.1)$$

$$\frac{kb}{S^2} y'(0) = \frac{C_{SL} A_{S(L-z)} - B_{SL} B_{S(L-z)}}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.2.2)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^2} y'(x) = -4 \frac{kb}{S} y(0) D_{Sx} + \frac{kb}{S^2} y'(0) A_{Sx} + 4 C_{S<x-z>} \quad (4.2.3)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \frac{1}{SL} = \frac{kb}{S} y(x) = \frac{kb}{S} y(0) A_{Sx} + \frac{kb}{S^2} y'(0) B_{Sx} + 4 D_{S<x-z>} \quad (4.2.4)$$

Momento fletor nas secções transversais da viga:

$$\eta_M \cdot SL = SM(x) = \frac{kb}{S} y(0) C_{Sx} + \frac{kb}{S^2} y'(0) D_{Sx} - B_{S<x-z>} \quad (4.2.5)$$

Força cortante nas secções transversais da viga:

$$\eta_V = V(x) = \frac{kb}{S} y(0) B_{Sx} + \frac{kb}{S^2} y'(0) C_{Sx} - A_{S<x-z>} \quad (4.2.6)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 1.01 a 1.14 do Anexo.

4.2.2 - Esforço externo: momento unitário

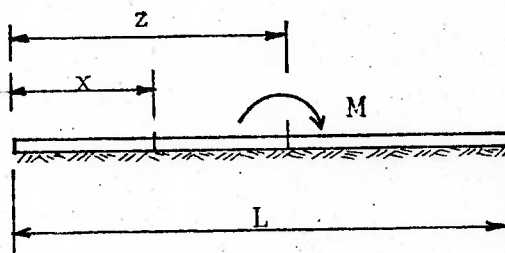


Figura 4.2.2

Fazendo-se $a = z$, $p = 0$, $M = 1$ e com as condições de extremidade (4.2a) e (4.2b) nas expressões (3.8) e (3.9), - obtêm-se os parâmetros iniciais seguintes:

$$\frac{kb}{S^2} y(0) = - \frac{C_{SL} A_S(L-z) - 4D_{SL} D_S(L-z)}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.2.7)$$

$$\frac{kb}{S^3} y'(0) = \frac{4C_{SL} D_S(L-z) + B_{SL} A_S(L-z)}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.2.8)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_\phi = \frac{kb}{S^3} y'(x) = - 4 \frac{kb}{S^2} y(0) D_{Sx} + \frac{kb}{S^3} y'(0) A_{Sx} - 4B_{S(x-z)} \quad (4.2.9)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{(SL)^2} = \frac{kb}{S^2} y(x) = \frac{kb}{S^2} y(o)A_{Sx} + \frac{kb}{S^3} y'(o)B_{Sx} - 4C_{S<x-z>} \quad (4.2.10)$$

Momento fletor nas secções transversais da viga:

$$\eta_M = M(x) = \frac{kb}{S^2} y(o)C_{Sx} + \frac{kb}{S^3} y'(o)D_{Sx} + A_{S<x-z>} \quad (4.2.11)$$

Força cortante nas secções transversais da viga:

$$\eta_V \cdot \frac{1}{SL} = \frac{V(x)}{S} = \frac{kb}{S^2} y(o)B_{Sx} + \frac{kb}{S^3} y'(o)C_{Sx} - 4D_{S<x-z>} \quad (4.2.12)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 1.15 a 1.28 do Anexo.

4.3 - ESTRUTURA 2

Viga de comprimento L, sobre apoio elástico, com extremidade à esquerda, articulada e extremidade à direita, livre, (fig.4.3.1 e 4.3.2).

Condições de extremidade

$$\text{a) Para } x = 0, \quad y(o) = 0 \quad (4.3a)$$

$$M(o) = 0$$

$$\text{b) Para } x = L, \quad V(L) = 0 \quad (4.3b)$$

$$M(L) = 0$$

4.3.1 - Esforço externo: força concentrada unitária

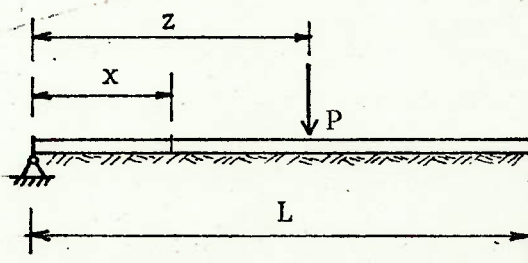


Figura 4.3.1

Fazendo-se $a = z$, $P = 1$, $M = 0$ e com as condições de extremidade acima nas expressões (3.8) e (3.9), obtêm-se os parâmetros iniciais seguintes:

$$V(o) = \frac{D_{SL} A_{S(L-z)} - C_{SL} B_{S(L-z)}}{A_{SL} D_{SL} - B_{SL} C_{SL}} \quad (4.3.1)$$

$$\frac{kb}{S^2} y'(o) = \frac{A_{SL} B_{S(L-z)} - B_{SL} A_{S(L-z)}}{A_{SL} D_{SL} - B_{SL} C_{SL}} \quad (4.3.2)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^2} y'(x) = -4V(o)D_{Sx} + \frac{kb}{S^2} y'(o)A_{Sx} + 4C_{S\langle x-z \rangle} \quad (4.3.3)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \frac{1}{SL} = \frac{kb}{S} y(x) = - 4V(o)D_{Sx} + \frac{kb}{S^2} y'(o)B_{Sx} + 4D_{S<x-z>} \quad (4.3.4)$$

Momento fletor nas secções transversais da viga:

$$\eta_M \cdot SL = SM(x) = V(o)B_{Sx} + \frac{kb}{S^2} y'(o)D_{Sx} - B_{S<x-z>} \quad (4.3.5)$$

Força cortante nas secções transversais da viga:

$$\eta_V = V(x) = V(o)A_{Sx} + \frac{kb}{S^2} y'(o)C_{Sx} - A_{S<x-z>} \quad (4.3.6)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 2.01 a 2.14 do Anexo.

4.3.2 - Esforço externo: momento unitário

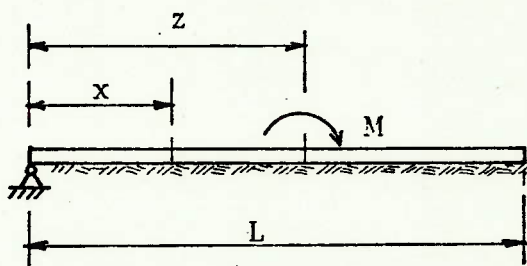


Figura 4.3.2

Fazendo-se $a = z$, $P = 0$, $M = 1$ e com as condições de extremidade (4.3a) e (4.3b) nas expressões (3.8) e (3.9) obtêm-se os parâmetros iniciais seguintes:

$$\frac{V(o)}{S} = \frac{4D_{SL} D_{S(L-z)} + C_{SL} A_{S(L-z)}}{A_{SL} D_{SL} - B_{SL} C_{SL}} \quad (4.3.7)$$

$$\frac{kb}{S^3} y'(o) = - \frac{A_{SL} A_{S(L-z)} + 4B_{SL} D_{S(L-z)}}{A_{SL} D_{SL} - B_{SL} C_{SL}} \quad (4.3.8)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = -\frac{kb}{S^3} y'(x) = -4 \frac{V(o)}{S} C_{Sx} + \frac{kb}{S^3} y'(o) A_{Sx} - 4B_{S<x-z>} \quad (4.3.9)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{(SL)^2} = \frac{kb}{S^2} y(x) = -4 \frac{V(o)}{S} D_{Sx} + \frac{kb}{S^3} y'(o) B_{Sx} - 4C_{S<x-z>} \quad (4.3.10)$$

Momento fletor nas secções transversais da viga:

$$\eta_M = M(x) = \frac{V(o)}{S} B_{Sx} + \frac{kb}{S^3} y'(o) D_{Sx} + A_{S<x-z>} \quad (4.3.11)$$

Força cortante nas secções transversais da viga:

$$\eta_V \cdot \frac{1}{SL} = \frac{V(x)}{S} = \frac{V(o)}{S} A_{Sx} + \frac{kb}{S^3} y'(o) C_{Sx} - 4D_{S<x-z>} \quad (4.3.12)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 3.15 a 3.28 do Anexo.

4.4 - ESTRUTURA 3

Viga de comprimento L, sobre apoio elástico, com extremidade à esquerda, livre e extremidade à direita, engastada (fig.4.4.1 e 4.4.2).

Condições de extremidade:

$$\begin{aligned} \text{a) Para } x = 0, \quad V(o) &= 0 \\ &M(o) = 0 \end{aligned} \quad (4.4a)$$

$$\begin{aligned} \text{b) Para } x = L, \quad y'(L) &= 0 \\ &y(L) = 0 \end{aligned} \quad (4.4b)$$

4.4.1 - Esforço externo: força concentrada unitária

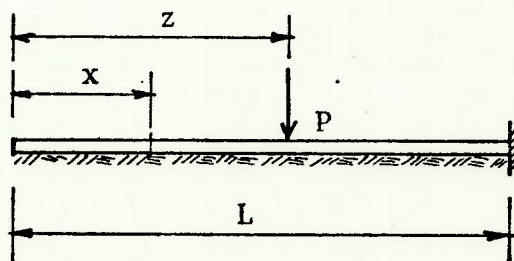


Figura 4.4.1

Fazendo-se $a = z$, $P = 1$, $M = 0$ e com as condições de extremidade acima nas expressões (3.10) e (3.11), obtem-se os parâmetros iniciais seguintes:

$$\frac{kb}{S^2} y'(0) = -4 \frac{A_{SL} C_{S(L-z)} + 4D_{SL} D_{S(L-z)}}{A_{SL}^2 + 4B_{SL} D_{SL}} \quad (4.4.1)$$

$$\frac{kb}{S} y(0) = 4 \frac{B_{SL} C_{S(L-z)} - A_{SL} D_{S(L-z)}}{A_{SL}^2 + 4B_{SL} D_{SL}} \quad (4.4.2)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^2} y'(x) = \frac{kb}{S^2} y'(0) A_{Sx} - 4 \frac{kb}{S} y(0) D_{Sx} + 4C_{S<x-z>} \quad (4.4.3)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{SL} = \frac{kb}{S} y(x) = \frac{kb}{S^2} y'(0) B_{Sx} + \frac{kb}{S} y(0) A_{Sx} + 4D_{S<x-z>} \quad (4.4.4)$$

Momento fletor nas secções transversais da viga:

$$\eta_M \cdot SL = SM(x) = \frac{kb}{S^2} y'(0) D_{Sx} + \frac{kb}{S} y(0) C_{Sx} - B_{S<x-z>} \quad (4.4.5)$$

Força cortante nas secções transversais da viga:

$$\eta_V = V(x) = \frac{kb}{S^2} y'(0) C_{Sx} + \frac{kb}{S} y(0) B_{Sx} - A_{S\langle x-z \rangle} \quad (4.4.6)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 3.01 a 3.14 do Anexo.

4.4.2 - Esforço externo: momento unitário

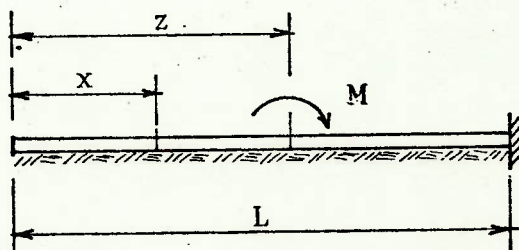


Figura 4.4.2

Fazendo-se $a = z$, $P = 0$, $M = 1$ e com as condições de extremidade (4.4a) e (4.4b) nas expressões (3.10) e (3.11), obtêm-se os parâmetros iniciais seguintes:

$$\frac{kb}{S^3} y'(0) = 4 \frac{A_{SL} B_{S(L-z)} + 4D_{SL} C_{S(L-z)}}{A_{SL}^2 + 4B_{SL} D_{SL}} \quad (4.4.7)$$

$$\frac{kb}{S^2} y(0) = 4 \frac{A_{SL} C_{S(L-z)} - B_{SL} B_{S(L-z)}}{A_{SL}^2 + 4B_{SL} D_{SL}} \quad (4.4.8)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^3} y'(x) = \frac{kb}{S^3} y'(o) A_{Sx} - 4 \frac{kb}{S^2} y(o) D_{Sx} - 4 B_{S<x-z>} \quad (4.4.9)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{(SL)^2} = \frac{kb}{S^2} y(x) = \frac{kb}{S^3} y'(o) B_{Sx} + \frac{kb}{S^2} y(o) A_{Sx} - 4 C_{S<x-z>} \quad (4.4.10)$$

Momento fletor nas secções transversais da viga:

$$\eta_M = M(x) = \frac{kb}{S^3} y'(o) D_{Sx} + \frac{kb}{S^2} y(o) C_{Sx} + A_{S<x-z>} \quad (4.4.11)$$

Força cortante nas secções transversais da viga:

$$\eta_V \cdot \frac{1}{SL} = \frac{V(x)}{S} = \frac{kb}{S^3} y'(o) C_{Sx} + \frac{kb}{S^2} y(o) B_{Sx} - 4 D_{S<x-z>} \quad (4.4.12)$$

Os coeficientes η_{ϕ} , η_p , η_M e η_V encontram-se nas tabelas 3.15 a 3.28 do Anexo.

4.5 - ESTRUTURA 4

Viga de comprimento L, sobre apoio elástico, com as extremidades articuladas (fig.4.5.1 e 4.5.2).

Condições de extremidade:

$$\begin{aligned} \text{a) Para } x = 0, \quad y(0) &= 0 \\ &M(0) = 0 \end{aligned} \quad (4.5a)$$

$$\begin{aligned} \text{b) Para } x = L, \quad y(L) &= 0 \\ &M(L) = 0 \end{aligned} \quad (4.5b)$$

4.5.1 - Esforço externo: força concentrada unitária:

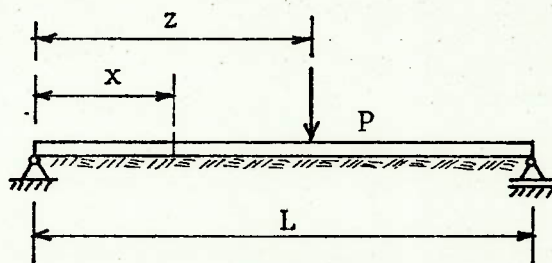


Figura 4.5.1

Fazendo-se $a = z$, $P = 1$, $M = 0$ e com as condições de extremidade acima nas expressões (3.8) e (3.10), obtêm-se os parâmetros iniciais seguintes:

$$V(0) = \frac{B_{SL} B_{S(L-z)} + 4D_{SL} D_{S(L-z)}}{B_{SL}^2 + 4D_{SL}^2} \quad (4.5.1)$$

$$\frac{kb}{S^2} y'(0) = -4 \frac{B_{SL} D_{S(L-z)} - D_{SL} B_{S(L-z)}}{B_{SL}^2 + 4D_{SL}^2} \quad (4.5.2)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^2} y'(x) = -4V(o)C_{Sx} + \frac{kb}{S^2} y'(o)A_{Sx} + 4C_{S<x-z>} \quad (4.5.3)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{SL} = \frac{kb}{S} y(x) = -4V(o)D_{Sx} + \frac{kb}{S^2} y'(o)B_{Sx} + 4D_{S<x-z>} \quad (4.5.4)$$

Momento fletor nas secções transversais da viga:

$$\eta_M \cdot SL = SM(x) = V(o)B_{Sx} + \frac{kb}{S^2} y'(o)D_{Sx} - B_{S<x-z>} \quad (4.5.5)$$

Força cortante nas secções transversais da viga:

$$\eta_V = V(x) = V(o)A_{Sx} + \frac{kb}{S^2} y'(o)C_{Sx} - A_{S<x-z>} \quad (4.5.6)$$

Os coeficientes η_{ϕ} , η_p , η_M e η_V encontram-se nas tabelas 4.01 a 4.14 do Anexo.

4.5.2 - Esforço externo: momento unitário

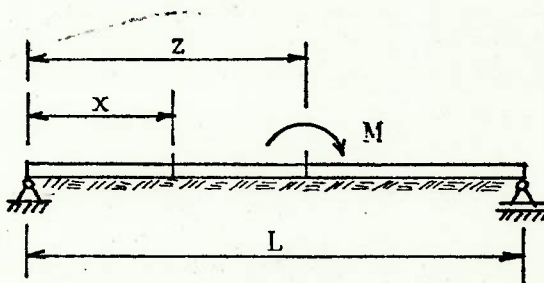


Figura 4.5.2

Fazendo-se $a = z$, $P = 0$, $M = 1$ e com as condições de extremidade (4.5a) e (4.5b) nas expressões (3.8) e (3.10), obtêm-se os parâmetros seguintes:

$$\frac{V(o)}{S} = - \frac{B_{SL} A_{S(L-z)} + 4D_{SL} C_{S(L-z)}}{B_{SL}^2 + 4D_{SL}^2} \quad (4.5.7)$$

$$\frac{kb}{S^3} y'(o) = 4 \frac{B_{SL} C_{S(L-z)} - D_{SL} A_{S(L-z)}}{B_{SL}^2 + 4D_{SL}^2} \quad (4.5.8)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_\phi = \frac{kb}{S^3} y'(x) = -4 \frac{V(o)}{S} C_{Sx} + \frac{kb}{S^3} y'(o) A_{Sx} - 4B_{S(x-z)} \quad (4.5.9)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{(SL)^2} = \frac{kb}{S^2} y(x) = -4 \frac{V(o)}{S} D_{Sx} + \frac{kb}{S^3} y'(o) B_{Sx} - 4C_{S<x-z>} \quad (4.5.10)$$

Momento fletor nas secções transversais da viga:

$$\eta_M = M(x) = \frac{V(o)}{S} B_{Sx} + \frac{kb}{S^3} y'(o) D_{Sx} + A_{S<x-z>} \quad (4.5.11)$$

Força cortante nas secções transversais da viga:

$$\eta_V \cdot \frac{1}{SL} = \frac{V(x)}{S} = \frac{V(o)}{S} A_{Sx} + \frac{kb}{S^3} y'(o) C_{Sx} - 4D_{S<x-z>} \quad (4.5.12)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 4.15 a 4.28 do Anexo.

4.6 - ESTRUTURA 5

Viga de comprimento L, sobre apoio elástico, com extremidade ã esquerda, articulada e extremidade ã direita, en-
gastada (fig. 4.6.1 e 4.6.2)

Condições de extremidade:

$$\begin{aligned} \text{a) Para } x = 0, \quad y(0) &= 0 \\ &M(0) = 0 \end{aligned} \quad (4.6a)$$

$$\begin{aligned} \text{b) Para } x = L, \quad y(L) &= 0 \\ &y'(L) = 0 \end{aligned} \quad (4.6b)$$

4.6.1 - Esforço externo: força concentrada unitária

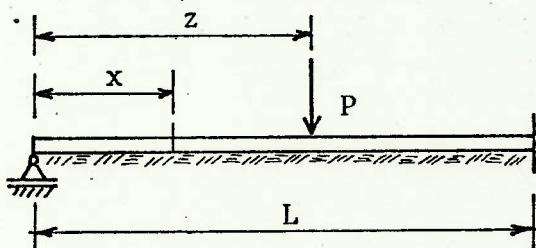


Figura 4.6.1

Fazendo-se $a = z$, $P = 1$, $M = 0$ e com as condições de extremidade acima nas expressões (3.10) e (3.11), obtem-se os parâmetros iniciais seguintes:

$$\frac{kb}{s^2} y'(0) = 4 \frac{D_{SL} C_{S(L-z)} - C_{SL} D_{S(L-z)}}{B_{SL} C_{SL} - A_{SL} D_{SL}} \quad (4.6.1)$$

$$V(0) = \frac{B_{SL} C_{S(L-z)} - A_{SL} D_{S(L-z)}}{B_{SL} C_{SL} - A_{SL} D_{SL}} \quad (4.6.2)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^2} y'(x) = \frac{kb}{S^2} y'(o) A_{Sx} - 4V(o) C_{Sx} + 4C_{S<x-z>} \quad (4.6.3)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{SL} = \frac{kb}{S} y(x) = \frac{kb}{S^2} y'(o) B_{Sx} - 4V(o) D_{Sx} + 4D_{S<x-z>} \quad (4.6.4)$$

Momento fletor nas secções transversais da viga:

$$\eta_M \cdot SL = SM(x) = \frac{kb}{S^2} y'(o) D_{Sx} + V(o) B_{Sx} - B_{S<x-z>} \quad (4.6.5)$$

Força cortante nas secções transversais da viga:

$$\eta_V = V(x) = \frac{kb}{S^2} y'(o) C_{Sx} + V(o) A_{Sx} - A_{S<x-z>} \quad (4.6.6)$$

Os coeficientes η_{ϕ} , η_p , η_M e η_V encontram-se nas tabelas 5.01 a 5.14 do Anexo.

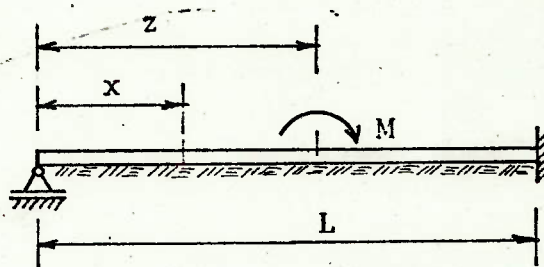
4.6.2 - Esforço externo: momento unitário

Figura 4.6.2

Fazendo-se $a = z$, $P = 0$, $M = 1$ e com as condições de extremidade (4.6a) e (4.6b) nas expressões (3.10) e (3.11), obtêm-se os parâmetros iniciais seguintes:

$$\frac{kb}{S^3} y'(0) = 4 \frac{C_{SL} C_{S(L-z)} - D_{SL} B_{S(L-z)}}{B_{SL} C_{SL} - A_{SL} D_{SL}} \quad (4.6.7)$$

$$\frac{V(0)}{S} = \frac{A_{SL} C_{S(L-z)} - B_{SL} B_{S(L-z)}}{B_{SL} C_{SL} - A_{SL} D_{SL}} \quad (4.6.8)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga :

$$\eta_\phi = \frac{kb}{S^3} y'(x) = \frac{kb}{S^3} y'(0) A_{Sx} - 4 \frac{V(0)}{S} C_{Sx} - 4 B_{S(x-z)}$$

(4.6.9)

Reação do apoio elástico nas secções da viga :

$$\eta_p \cdot \frac{1}{(SL)^2} = \frac{kb}{s^2} y(x) = \frac{kb}{s^3} y'(o) B_{Sx} - 4 \frac{V(o)}{s} D_{Sx} - 4C_{S<x-z>} \quad (4.6.10)$$

Momento fletor nas secções transversais da viga:

$$\eta_M = M(x) = \frac{kb}{s^3} y'(o) D_{Sx} + \frac{V(o)}{s} B_{Sx} + A_{S<x-z>} \quad (4.6.11)$$

Força cortante nas secções transversais da viga:

$$\eta_V \cdot \frac{1}{SL} = \frac{V(x)}{s} = \frac{kb}{s^3} y'(o) C_{Sx} + \frac{V(o)}{s} A_{Sx} - 4D_{S<x-z>} \quad (4.6.12)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 5.15 a 5.28 do Anexo.

4.7 - ESTRUTURA 6

Viga de comprimento L , sobre apoio elástico, com extremidades engastadas (fig.4.7.1 e 4.7.2).

Condições de extremidade:

$$\begin{aligned} \text{a) Para } x = 0, \quad y'(o) &= 0 & (4.7a) \\ & y(o) = 0 \end{aligned}$$

$$\begin{aligned} \text{b) Para } x = L, \quad y'(L) &= 0 \\ y(L) &= 0 \end{aligned} \quad (4.7b)$$

4.7.1 - Esforço externo: força concentrada unitária

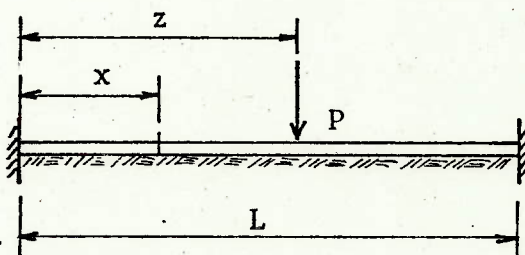


Figura 4.7.1

Fazendo-se $a = z$, $P = 1$, $M = 0$ e com as condições de extremidade acima nas expressões (3.10) e (3.11), obtêm-se os parâmetros iniciais seguintes:

$$SM(o) = \frac{C_{SL} D_{S(L-z)} - D_{SL} C_{S(L-z)}}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.7.1)$$

$$V(o) = \frac{C_{SL} C_{S(L-z)} - B_{SL} D_{S(L-z)}}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.7.2)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^2} y'(x) = -4SM(o)B_{Sx} - 4V(o)C_{Sx} + 4C_{S<x-z>} \quad (4.7.3)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{SL} = \frac{kb}{S} y(x) = -4SM(o)C_{Sx} - 4V(o)D_{Sx} + 4D_{S<x-z>} \quad (4.7.4)$$

Momento fletor nas secções transversais da viga:

$$\eta_M \cdot SL = SM(x) = SM(o)A_{Sx} + V(o)B_{Sx} - B_{S<x-z>} \quad (4.7.5)$$

Força cortante nas secções transversais da viga:

$$\eta_V = V(x) = -4SM(o)D_{Sx} + V(o)A_{Sx} - A_{S<x-z>} \quad (4.7.6)$$

Os coeficientes η_{ϕ} , η_p , η_M e η_V encontram-se nas tabelas 6.01 a 6.14 do Anexo.

4.7.2 - Esforço externo: momento unitário

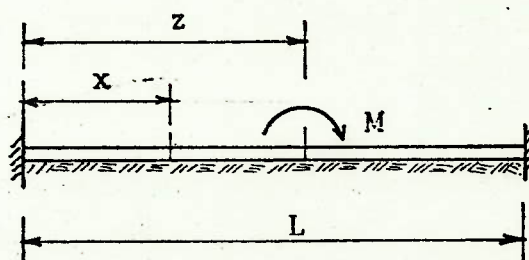


Figura 4.7.2

Fazendo-se $a = z$, $P = 0$, $M = 1$ e com as condições de extremidade (4.7a) e (4.7b) nas expressões (3.10) e (3.11), obtêm-se os parâmetros iniciais seguintes:

$$M(o) = \frac{D_{SL} B_{S(L-z)} - C_{SL} C_{S(L-z)}}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.7.7)$$

$$\frac{V(o)}{S} = \frac{B_{SL} C_{S(L-z)} - C_{SL} B_{S(L-z)}}{C_{SL}^2 - B_{SL} D_{SL}} \quad (4.7.8)$$

Conhecidos os parâmetros iniciais, têm-se os coeficientes abaixo:

Rotação das secções da viga:

$$\eta_{\phi} = \frac{kb}{S^3} y'(x) = -4M(o)B_{Sx} - 4 \frac{V(o)}{S} C_{Sx} - 4B_{S(x-z)} \quad (4.7.9)$$

Reação do apoio elástico nas secções da viga:

$$\eta_p \cdot \frac{1}{(SL)^2} = \frac{kb}{S^2} y(x) = -4M(o)C_{Sx} - 4 \frac{V(o)}{S} D_{Sx} - 4C_{S(x-z)} \quad (4.7.10)$$

Momento fletor nas secções transversais da viga:

$$\eta_M = M(x) = M(o)A_{Sx} + \frac{V(o)}{S} B_{Sx} + A_{S<x-z>} \quad (4.7.11)$$

Força cortante nas secções transversais da viga:

$$\eta_V \cdot \frac{L}{SL} = \frac{V(x)}{S} = - 4M(o)D_{Sx} + \frac{V(o)}{S} A_{Sx} - 4D_{S<x-z>} \quad (4.7.12)$$

Os coeficientes η_ϕ , η_p , η_M e η_V encontram-se nas tabelas 6.15 a 6.28 do Anexo.

5. TABELAS

5.1 - Características das tabelas

Variando-se o parâmetro característico SL de 0,5 em 0,5, desde 1,5 a 8,0, obtêm-se uma série de 28 tabelas para cada estrutura; as primeiras quatorze tabelas correspondem à estrutura sob força concentrada unitária e as últimas, sob momento unitário.

As tabelas apresentam os coeficientes de influência η_ϕ , η_p , η_M e η_V , definidos no capítulo anterior, em onze secções transversais, igualmente espaçadas ao longo de cada estrutura. Os coeficientes η_ϕ e η_M estão multiplicados por 100 para proporcionar maior precisão.

Para cada secção transversal definida pela abscissa x/L , os coeficientes de influência apresentam-se na horizontal correspondente. Os coeficientes na vertical de z/L representam as ordenadas da linha de estado para o esforço externo unitário, aplicado nessa abscissa.

Os sinais dos esforços solicitantes são aqueles convencionalmente adotados, isto é, forças cortantes positivas quando tendem a fazer girar o elemento em que se aplicam no sentido horário e momentos fletores positivos quando tendem a encurvar a barra com a concavidade para cima. Quanto à reação do solo, o sinal positivo corresponde à força atuando de baixo para cima. Os deslocamentos angulares (rotações) são positivos quando giram a secção no sentido horário.

Os coeficientes junto às descontinuidades de linhas de influência têm o módulo e o sinal do esforço imediatamente à esquerda da secção x/L correspondente. Quan

to às descontinuidades de linhas de estado, os coeficientes têm o módulo e o sinal do esforço imediatamente à direita da secção z/L , na qual se aplica o esforço externo.

5.2 - Utilização das tabelas

5.2.1 - Traçado da linha de influência

A título de exemplo, traçar a linha de influência de momentos fletores para a secção $x/L = 0,4$ da estrutura sobre apoio elástico da figura (5.2.1a). O valor característico SL é igual a 5,5.

Da tabela 2.09, da estrutura 2, obtêm-se para $x/L = 0,40$, a linha de influência para momentos fletores conforme figura (5.2.1b).

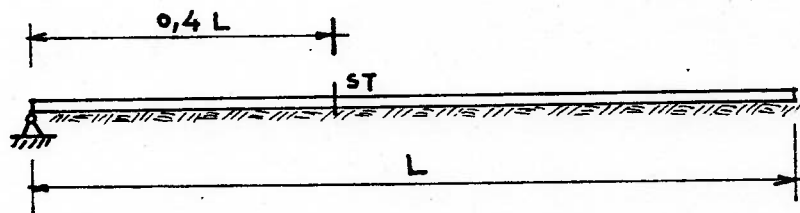


Figura 5.2.1a

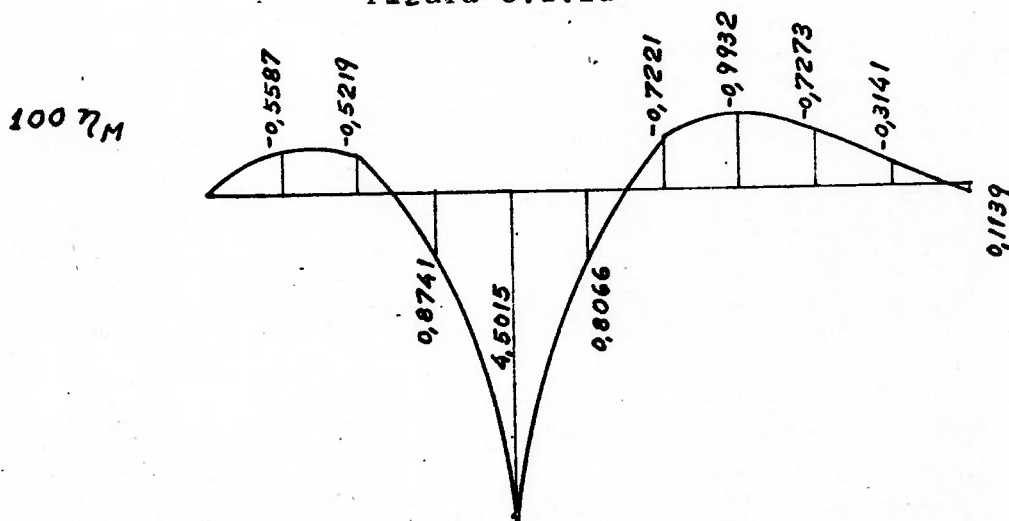


Figura 5.2.1b

5.2.2 - Traçado da linha de estado

Como exemplo, traçar a linha de estado de forças cortantes para a estrutura da figura (5.2.2a), sob ação de força concentrada em $z/L = 0,5$. O valor característico SL é igual a 7,5.

Da tabela 5.13, da estrutura 5, obtém-se para $z/L = 0,5$, a linha de estado para forças cortantes, conforme a figura (5.2.2b).

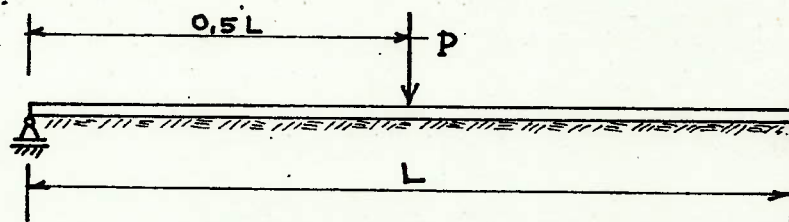


Figura 5.2.2a

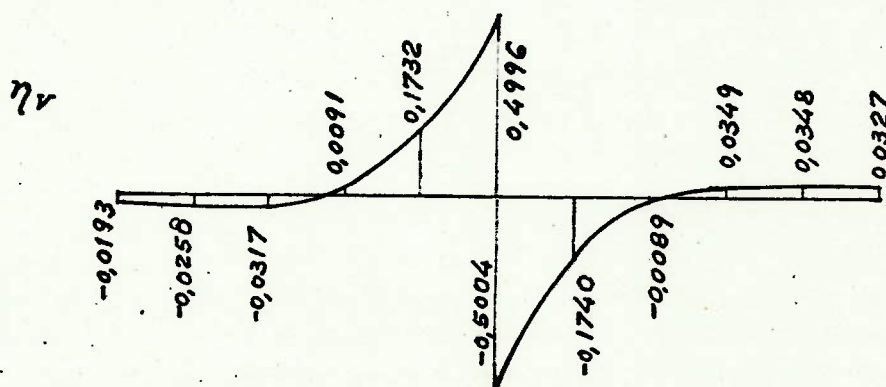


Figura 5.2.2b

ANEXO

Tabelas dos coeficientes de influência η_{ϕ} , η_p , η_M e η_V .

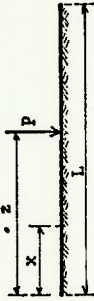
As tabelas estão numeradas conforme quadro abaixo:

ESTRUTURA	CONDIÇÕES DE EXTREMIDADE	ESFORÇO EXTERNO	TABELAS
1	Ambas livres	Força concentrada unitária	1.01 a 1.14
		Momento unitário	1.15 a 1.28
2	Esquerda, articulada Direita, livre	Força concentrada unitária	2.01 a 2.14
		Momento unitário	2.15 a 2.28
3	Esquerda, livre Direita, engastada	Força concentrada unitária	3.01 a 3.14
		Momento unitário	3.15 a 3.28
4	Ambas articuladas	Força concentrada unitária	4.01 a 4.14
		Momento unitário	4.15 a 4.28
5	Esquerda, articulada Direita engastada	Força concentrada unitária	5.01 a 5.14
		Momento unitário	5.15 a 5.28
6	Ambas engastadas	Força concentrada unitária	6.01 a 6.14
		Momento unitário	6.15 a 6.28

TABELA 1.01

ESTRUTURA 1

Esforço externo: Força Concentrada



x/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)										
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100η	-312.4660	-230.8195	-157.8460	-92.8008	-34.6169	17.9627	66.2673	111.5911	155.0951	197.7151	240.0729
100η _p	4.1864	3.4864	2.8021	2.1427	1.5119	0.9089	0.3300	-0.2305	-0.7790	-1.3212	-1.8615
100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100η _V	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	-308.5676	-231.3230	-158.2530	-93.1143	-34.8408	17.8248	66.2122	111.6162	155.1989	197.8966	240.3318
0.1	3.4864	2.9668	2.4467	1.9337	1.4338	0.9492	0.4790	-0.0206	-0.4300	-0.8763	-1.3212
0.2	-8.0238	-1.6566	1.3418	1.0365	0.7429	0.4612	0.1898	-0.0734	-0.3313	-0.5865	-0.8407
0.3	-0.6164	-0.6773	0.2624	0.2038	0.1473	0.0929	0.0405	-0.0105	-0.0604	-0.1099	-0.1591
0.4	-299.0693	-230.1915	-160.9953	-95.2466	-36.3844	16.8478	65.7819	111.7171	155.8205	199.0336	241.9825
0.5	2.8021	2.4467	2.0882	1.7223	1.3541	0.9885	0.6277	0.2718	-0.0802	-0.4300	-0.7790
0.6	-12.5598	-3.7200	5.1301	4.0066	2.9196	1.8715	0.8587	-0.1263	-1.0926	-2.0491	-3.0026
0.7	-0.3022	-0.4067	-0.5108	0.3867	0.2867	0.1898	0.0958	0.0041	-0.0860	-0.1752	-0.2642
0.8	-286.8009	-225.0361	-163.6135	-100.8428	-40.5022	14.1596	64.4783	111.7620	157.1895	201.7139	245.9701
0.9	2.1427	1.9337	1.7223	1.5025	1.2682	1.0238	0.7744	0.5232	0.2718	0.0206	-0.2305
1.0	-14.2917	-6.6494	1.0059	8.6982	6.4499	4.2700	2.1550	0.927	-1.9338	-3.9414	-5.9429
	-0.0552	-0.1877	-0.3202	-0.4520	0.4179	0.2905	0.1659	0.0439	-0.0764	-0.1957	-0.3147
	273.9875	218.8029	163.3225	106.8540	48.3744	8.8548	61.6705	111.3933	159.2198	206.1217	252.7487
	1.5119	1.4338	1.3541	1.2682	1.1690	1.0502	0.9167	0.7744	0.6277	0.4790	0.3300
	-13.8785	-7.6440	-1.3963	4.8911	11.2472	7.6915	4.2570	0.8348	-2.5030	-5.8124	-9.1127
	0.1273	0.0195	-0.1664	-0.3133	-0.4601	0.3943	0.2505	0.1088	-0.0315	-0.1708	-0.3099
	262.2737	212.0323	161.5065	110.0270	56.5976	0.0000	56.5976	110.0270	161.5065	212.0323	262.2737
	0.9089	0.9492	0.9885	1.0238	1.0502	1.0810	1.0502	1.0238	0.9885	0.9492	0.9089
	-11.9510	-7.2034	-2.4441	2.3513	7.2118	12.1620	7.2118	2.3513	-2.4441	-7.2034	-11.9510
	0.2481	0.0995	-0.0493	-0.1987	-0.3490	-0.5000	0.3490	0.1987	0.0493	-0.0995	-0.2481
	252.7487	206.1217	159.2198	111.3933	61.6705	8.8548	48.3744	106.8540	163.3225	218.8029	273.9875
	0.3300	0.4790	0.6277	0.7744	0.9167	1.0502	1.1690	1.2682	1.3541	1.4338	1.5119
	-9.1127	-5.8124	-2.5030	0.8348	4.2255	7.6915	11.2472	4.8911	-1.3963	-7.6440	-13.8785
	0.3099	0.1708	0.0315	-0.1088	-0.2505	-0.3943	-0.5399	0.3133	0.1664	0.0195	-0.1273
	-245.9701	-201.7139	-157.1895	-111.7620	-64.4783	-14.1596	40.5022	100.8428	163.6135	225.3611	286.8009
	0.2305	0.0206	0.2718	0.5232	0.7744	1.0238	1.2682	1.5025	1.7223	1.9337	2.1427
	-5.9429	-3.9414	-1.9338	0.0927	2.1550	4.2700	6.4499	8.6982	1.0059	-6.6494	-14.2917
	0.3147	0.1957	0.0764	-0.0439	-0.1659	-0.2905	-0.4179	-0.5480	0.3202	0.1677	0.0552
	-241.9825	-199.0336	-155.8205	-111.7171	-65.7819	-16.8478	36.3844	95.2466	160.9953	230.1915	299.0693
	0.7790	0.4300	-0.0802	0.2718	0.6277	0.9885	1.3541	1.7223	2.0882	2.4467	2.8021
	-3.0026	-2.0491	-1.0926	-0.1263	0.8587	1.8715	2.9196	4.0066	5.1301	6.4499	7.9429
	0.2642	0.1752	0.0860	-0.0041	-0.0958	-0.1898	-0.2867	-0.3867	-0.4867	-0.5867	-0.6867
	-240.3318	-197.8966	-155.1989	-111.6162	-66.2122	-17.8248	34.8408	93.1143	158.2530	231.3230	308.5676
	-1.3212	-0.8763	-0.4300	0.0206	0.4790	0.9492	1.4338	1.9337	2.4467	2.9668	3.4864
	-0.8407	-0.5865	-0.3313	-0.0734	0.1898	0.4612	0.7429	1.0365	1.3418	1.6566	1.9666
	0.1591	0.1099	0.0604	0.0105	-0.0405	-0.0929	-0.1473	-0.2038	-0.2624	-0.3227	-0.3827
	-240.0729	-197.7151	-155.0951	-111.5911	-66.2673	-17.9627	34.6169	92.8008	157.8460	230.8195	312.4660
	-1.8615	-1.3212	-0.7790	-0.2305	0.3300	0.9089	1.5119	2.1427	2.8021	3.4864	4.1864
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \frac{S^2}{kb}$$

$$p = \eta \frac{P}{bL}$$

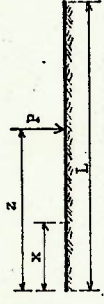
$$M = \eta M$$

$$V = \eta V$$

TABELA 1.03

ESTRUTURA 1

SL=2.50 Esforço externo: Força Concentrada.



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →										(LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.8	0.9	1.0	0.8	0.9	1.0				
100n _p	203.9526	-115.2969	-50.1436	-5.3989	22.8675	38.7134	45.8714	47.4920	46.0231	43.1790	39.9580	46.0231	43.1790	39.9580	46.0231	43.1790	39.9580				
n _p	5.1841	3.9322	2.7942	1.8292	1.0518	0.4478	-0.00138	-0.3716	-0.6642	-0.9244	-1.1749	-0.6642	-0.9244	-1.1749	-0.6642	-0.9244	-1.1749				
100n _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
n	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
v	-193.4803	-116.8602	-51.2752	-6.1575	22.4144	38.5016	45.8473	47.6159	46.2699	43.5361	40.4216	46.2699	43.5361	40.4216	46.2699	43.5361	40.4216				
L 0.1	3.9322	3.2091	2.4791	1.7942	1.1940	0.6894	0.2728	-0.0746	-0.3762	-0.6540	-0.9244	-0.3762	-0.6540	-0.9244	-0.3762	-0.6540	-0.9244				
N 0.1	7.6192	1.8459	1.3448	0.9089	0.5497	0.2642	0.0409	-0.1363	-0.2841	-0.4172	-0.5458	-0.2841	-0.4172	-0.5458	-0.2841	-0.4172	-0.5458				
I 0.1	-0.5447	-0.6429	0.2637	0.1812	0.1123	0.0569	0.0130	-0.0223	-0.0520	-0.0789	-0.1050	-0.0520	-0.0789	-0.1050	-0.0520	-0.0789	-0.1050				
H 0.1	169.1381	-114.7000	-58.9327	-11.4380	19.1245	36.8180	45.4397	48.2358	47.7572	45.8097	43.4570	47.7572	45.8097	43.4570	47.7572	45.8097	43.4570				
A 0.2	2.7942	2.4791	1.7428	1.3261	0.9261	0.5585	0.2246	-0.0832	-0.3762	-0.6540	-0.9244	-0.3762	-0.6540	-0.9244	-0.3762	-0.6540	-0.9244				
D 0.2	11.2965	-3.1003	5.1669	3.6108	2.2926	1.2175	0.3545	-0.3471	-0.9441	-1.4878	-2.0152	-0.9441	-1.4878	-2.0152	-0.9441	-1.4878	-2.0152				
E 0.2	-0.2097	-0.3586	-0.5050	0.3583	0.2385	0.1377	0.0545	-0.0149	-0.0751	-0.1306	-0.1846	-0.0751	-0.1306	-0.1846	-0.0751	-0.1306	-0.1846				
I 0.3	139.3335	-103.4265	-66.3896	-25.6614	9.8481	31.6432	43.6096	49.1641	51.0590	51.2876	51.0499	51.0590	51.2876	51.0499	51.0590	51.2876	51.0499				
N 0.3	1.8292	1.7942	1.7428	1.6326	1.4206	1.1424	0.8379	0.5290	0.2246	-0.0746	-0.3716	0.2246	-0.0746	-0.3716	0.2246	-0.0746	-0.3716				
F 0.3	-12.1650	-5.5636	1.1230	8.0506	5.3584	3.0952	1.2262	-0.3328	-1.6860	-2.9326	-4.1462	-1.6860	-2.9326	-4.1462	-1.6860	-2.9326	-4.1462				
L 0.3	0.0199	-0.1455	-0.3104	-0.4722	0.3763	0.2414	0.1245	0.0228	-0.0682	-0.1534	-0.2368	-0.0682	-0.1534	-0.2368	-0.0682	-0.1534	-0.2368				
U 0.4	109.8453	-88.3810	-65.9922	-40.5470	-8.8480	20.3919	38.6114	49.4590	55.9986	60.5331	64.4951	55.9986	60.5331	64.4951	55.9986	60.5331	64.4951				
E 0.4	1.0518	1.1940	1.3261	1.4206	1.4295	1.3090	1.0971	0.8379	0.5585	0.2728	-0.0138	0.5585	0.2728	-0.0138	0.5585	0.2728	-0.0138				
N 0.4	-11.1886	-6.2254	-1.1796	4.1138	9.8379	6.1113	2.9341	0.2109	-2.2010	-4.4482	-6.6435	-2.2010	-4.4482	-6.6435	-2.2010	-4.4482	-6.6435				
I 0.4	0.1624	0.0031	-0.1570	-0.3187	-0.4802	0.3646	0.2215	0.0911	-0.0293	-0.1440	-0.2567	-0.0293	-0.1440	-0.2567	-0.0293	-0.1440	-0.2567				
A 0.5	84.2744	-73.2985	-61.5973	-47.4117	-28.0267	0.0000	28.0267	47.4417	61.5973	73.2985	84.2744	61.5973	73.2985	84.2744	61.5973	73.2985	84.2744				
P 0.5	0.4478	0.6894	0.9261	1.1424	1.3090	1.3783	1.3090	1.1424	0.9261	0.6894	0.4478	0.9261	0.6894	0.4478	0.9261	0.6894	0.4478				
A 0.5	-9.1459	-5.6852	-2.1547	1.5922	5.7353	10.4283	5.7353	1.5922	-2.1547	-5.6852	-9.1459	-2.1547	-5.6852	-9.1459	-2.1547	-5.6852	-9.1459				
R 0.5	0.2361	0.0965	-0.0447	-0.1902	-0.3423	-0.5000	0.3423	0.1902	0.0447	-0.0965	-0.2361	0.0447	-0.0965	-0.2361	0.0447	-0.0965	-0.2361				
A 0.6	64.4951	-60.5331	-55.9986	-49.4590	-38.6114	-20.3919	8.8480	40.5470	65.9992	88.3810	109.8453	65.9992	88.3810	109.8453	65.9992	88.3810	109.8453				
A 0.6	-0.0138	0.2728	0.5585	0.8379	1.0971	1.3090	1.4295	1.4206	1.3261	1.1940	1.0518	1.3261	1.1940	1.0518	1.3261	1.1940	1.0518				
S 0.6	-6.6435	-4.4482	-2.2010	0.2109	6.1113	9.8379	4.1138	1.4206	-1.1796	-6.2254	-11.1886	-1.1796	-6.2254	-11.1886	-1.1796	-6.2254	-11.1886				
A 0.6	0.2567	0.1440	0.0293	-0.0911	-0.3646	-0.5000	0.3646	0.0911	-0.0293	-0.1440	-0.2567	-0.0293	-0.1440	-0.2567	-0.0293	-0.1440	-0.2567				
S 0.7	51.0499	-51.2876	-51.0590	-49.1641	-43.6096	-31.6432	-9.8481	25.6614	66.3896	103.4265	139.3335	66.3896	103.4265	139.3335	66.3896	103.4265	139.3335				
E 0.7	-0.3716	-0.0746	0.2246	0.5290	0.8379	1.1424	1.4206	1.6326	1.7428	1.7942	1.8292	1.7428	1.7942	1.8292	1.7428	1.7942	1.8292				
C 0.7	-4.1462	-2.9326	-1.6860	-0.3328	1.2262	3.0952	5.3584	8.0506	1.1230	-5.5636	-12.1650	1.1230	-5.5636	-12.1650	1.1230	-5.5636	-12.1650				
D 0.7	0.2368	0.1534	0.0682	-0.0228	-0.1245	-0.2414	-0.3763	-0.5278	0.3104	0.1455	-0.0199	0.3104	0.1455	-0.0199	0.3104	0.1455	-0.0199				
A 0.7	-43.4570	-45.8097	-47.7572	-48.2358	-45.4397	-36.8180	-19.1245	11.4380	58.9327	114.7000	169.1381	58.9327	114.7000	169.1381	58.9327	114.7000	169.1381				
A 0.7	-0.6642	-0.3762	-0.0832	0.2246	0.5585	0.9261	1.3261	1.7428	2.1396	2.4791	2.7942	2.1396	2.4791	2.7942	2.1396	2.4791	2.7942				
A 0.7	-2.0152	-1.4878	-0.9441	-0.3471	0.3545	1.2175	2.2926	3.6108	5.1669	7.6192	10.1650	5.1669	7.6192	10.1650	5.1669	7.6192	10.1650				
A 0.7	0.1846	0.1306	0.0751	0.0149	-0.0545	-0.1377	-0.2365	-0.3583	-0.4950	-0.6540	-0.9244	-0.4950	-0.6540	-0.9244	-0.4950	-0.6540	-0.9244				
A 0.8	-43.4216	-43.5361	-46.2699	-47.6159	-45.8473	-38.5016	-22.4144	6.1575	51.2752	116.8602	193.4803	51.2752	116.8602	193.4803	51.2752	116.8602	193.4803				
A 0.8	-0.9244	-0.6540	-0.3762	-0.0746	0.2728	0.6894	1.1940	1.7428	2.4791	3.2091	3.9322	2.4791	3.2091	3.9322	2.4791	3.2091	3.9322				
A 0.8	-0.5458	-0.4172	-0.2841	-0.1363	0.0409	0.2642	0.9089	1.3448	1.8459	2.4791	3.2091	1.3448	1.8459	2.4791	1.3448	1.8459	2.4791				
A 0.8	0.1050	0.0789	0.0520	0.0223	-0.0130	-0.0569	-0.1123	-0.1612	-0.2637	-0.3571	-0.5447	-0.2637	-0.3571	-0.5447	-0.2637	-0.3571	-0.5447				
A 0.9	-39.9580	-43.1790	-46.0231	-47.4920	-45.8714	-38.7134	-22.8675	5.3989	50.1436	115.2969	203.9526	50.1436	115.2969	203.9526	50.1436	115.2969	203.9526				
A 0.9	-1.1749	-0.9244	-0.6642	-0.3716	-0.0746	0.4478	1.0518	1.8292	2.7942	3.9322	5.1841	2.7942	3.9322	5.1841	2.7942	3.9322	5.1841				
A 0.9	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
A 1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = n \cdot \frac{P}{kb}$$

$$P = n \cdot \frac{P}{bL}$$

$$M = n \cdot PL$$

$$V = n \cdot P$$

TABELA 1.05

ESTRUTURA 1

Esforço externo: Força Concentrada

SL=3.50

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100n _p	100n _p											
0.0	0.0	-200.1799	-83.7587	-11.1870	27.1427	41.8524	42.1706	34.9577	24.6177	13.4876	2.4342	-8.4857
		7.0075	4.6391	2.6615	1.2185	0.2885	0.02284	0.4534	-0.4969	-0.4440	-0.3509	0.2477
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-180.9058	-87.3375	-13.3325	26.0798	41.5122	42.2517	35.2405	24.9619	13.8164	2.7147	-8.2623
		4.6391	3.6019	2.5179	1.5478	0.8002	0.2885	-0.0242	-0.1942	-0.2777	-0.3203	0.3509
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.4197	2.1481	1.3077	0.6646	-0.2296	-0.0281	-0.1553	-0.1981	-0.1944	-0.1705	-0.1411
		-140.1655	-86.1868	-28.1083	18.1055	38.2961	41.9747	36.5182	26.8757	15.8456	4.6271	-6.5301
		2.6615	2.5179	1.2832	1.8294	1.2941	0.8056	0.4144	0.1213	-0.0984	-0.2777	0.4440
		-9.1282	-2.1081	5.1263	2.8733	1.2582	0.2324	-0.3340	-0.5895	-0.6656	-0.6603	0.6325
		-0.0586	-0.2818	-0.4993	0.3081	0.1595	0.0577	-0.0045	-0.0384	-0.0551	-0.0637	-0.0699
		-95.8412	-70.8005	-42.7784	-5.0524	27.0747	38.6597	37.8353	30.5377	20.4967	9.6361	-1.3422
		1.2185	1.5478	1.8294	1.7060	1.8949	1.7196	1.3290	0.8709	0.4716	-0.1942	0.4969
		-8.6491	-3.8364	1.2071	6.8968	3.5743	3.6601	1.0118	-0.6479	-1.6706	-2.3758	-2.9856
		0.1306	-0.0801	-0.2922	-0.5016	0.3106	0.3160	0.1698	0.0576	-0.0284	-0.0997	-0.1174
		-57.4364	-51.1369	-42.9200	-28.1050	0.4993	27.1374	36.0434	34.4957	27.7135	18.8978	9.0662
		0.2885	0.8002	1.2941	1.7060	1.8949	1.7196	1.3290	0.8709	0.4716	-0.1942	0.4969
		-6.9085	-3.9979	-0.8890	2.8200	7.5783	3.6601	1.0118	-0.6479	-1.6706	-2.3758	-2.9856
		0.2020	-0.0353	-0.1360	-0.3175	0.3160	0.3160	0.1698	0.0576	-0.0284	-0.0997	-0.1174
		-28.6424	-32.9472	-36.1840	-35.4612	-25.7542	-0.9000	25.7542	35.4612	36.1840	32.9472	28.6424
		0.2885	0.8002	1.2941	1.7060	1.8949	1.7196	1.3290	0.8709	0.4716	-0.1942	0.4969
		-4.8450	-3.3395	-1.6868	0.4349	3.4440	7.7240	3.4440	1.3048	0.8056	0.2885	0.2477
		0.2021	0.0879	-0.0317	-0.1662	-0.3232	-0.5000	0.3232	0.1662	0.0317	-0.0679	-0.2021
		-9.0662	-18.8978	-27.7135	-34.4957	-38.0434	-27.1374	-0.4993	28.1050	42.9200	51.1369	57.4364
		0.4534	0.0242	0.4144	0.8709	1.3290	1.7196	1.8949	1.7060	1.5941	0.8002	0.2885
		-2.9856	-2.3758	-1.6706	-0.6479	1.0118	3.6601	7.5783	2.8200	-0.8890	-3.9979	-6.9085
		0.1661	0.0997	0.0284	-0.0576	-0.1698	-0.3160	-0.4934	0.3175	0.1360	-0.0353	-0.2020
		1.3422	9.16361	20.4967	30.5377	37.8353	38.6597	38.6597	38.6597	42.7784	70.8005	95.8412
		-0.4969	-0.1942	0.1213	0.4716	0.8709	1.3048	1.7060	1.9295	1.8294	1.5478	1.2185
		-1.5645	-1.4245	-1.2318	-0.8566	-0.0967	1.2972	3.5743	6.8568	1.2071	-3.8364	-8.6491
		0.1174	0.0878	0.0595	0.0092	-0.0596	-0.1636	-0.3106	-0.4984	0.2922	0.0801	-0.1306
		6.5301	4.6271	-15.8456	-26.8757	-36.5182	-41.9747	-38.2961	-18.1055	28.1083	66.1868	140.1655
		-0.4440	-0.2777	-0.0984	0.1213	0.4144	0.8056	1.2941	1.8294	2.2832	2.5179	2.6615
		-0.6325	-0.6603	-0.6656	-0.5695	-0.3340	0.2324	1.2582	2.2733	5.1263	-2.1081	-9.1282
		0.0699	0.0637	0.0551	0.0384	0.0045	-0.0577	-0.1595	-0.3081	-0.5007	-0.2818	0.0588
		8.2623	2.7147	-13.8164	-24.9619	-35.2405	-42.2517	-41.5122	-26.0798	13.3325	87.3375	180.9058
		-0.3509	-0.3203	-0.2777	-0.1942	-0.0242	0.2885	0.8002	1.5478	2.5179	3.6019	4.6391
		-0.1411	-0.1705	-0.1981	-0.1944	-0.1553	-0.0281	0.2324	0.6646	1.3077	2.1481	-6.9005
		0.0300	0.0336	0.0361	0.0346	0.0239	-0.0030	-0.0545	-0.1384	-0.2592	-0.4124	0.4197
		8.4857	-2.4342	-13.4876	-24.6177	-34.9577	-42.1706	-41.8524	-27.1427	11.1870	83.7587	200.1799
		-0.2477	-0.3509	-0.4440	-0.4969	-0.4534	-0.2885	0.2885	1.2185	2.6615	4.6391	7.0075
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{KB} P$$

$$P = \eta \frac{P}{BL}$$

$$M = \eta N PL$$

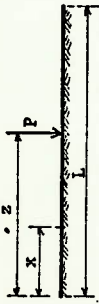
$$V = \eta V P$$

TABELA 1.06

ESTRUTURA 1

SL=4.00 Esforço externo: Força Concentrada

x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)										
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
0.0	0.0	-203.3079	-71.2440	2.2336	35.0562	42.6203	37.1631	26.7790	15.8406	5.9874	-2.7823	-11.1013
0.0	100 η_x	0.0062	4.9405	2.5005	0.8634	-0.0631	-0.4721	0.5589	-0.4762	-0.3221	-0.1472	0.0304
0.0	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0	-176.0013	-76.2093	-0.4428	33.9857	42.5057	37.5080	27.2609	16.2809	6.3053	-2.6134	-11.0864
0.1	100 η_x	4.9405	3.7805	2.5255	1.4202	0.6185	0.1241	-0.1284	-0.2209	-0.1110	-0.2250	-0.3271
0.1	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.0	-127.4157	-76.4711	-19.2146	25.3117	40.2507	38.6489	29.7127	18.8158	8.3219	-1.3390	-10.6032
0.2	100 η_x	2.5005	2.5255	2.4004	1.9110	1.2865	0.7331	0.3244	0.0563	-0.1111	-0.2250	-0.3271
0.2	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.0	-78.3521	-60.2091	-37.8470	29.7618	37.8439	33.5077	23.9718	13.1120	2.3717	-0.2209	-0.4762
0.3	100 η_x	0.8634	1.4202	1.9110	2.1332	1.8634	1.3512	0.8301	0.3955	0.0563	-0.2209	-0.4762
0.3	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0	-39.5708	-40.0442	-38.1401	-27.7591	0.9638	28.4261	34.9527	30.3038	20.8512	9.9448	1.1761
0.4	100 η_x	0.0631	0.6185	1.2865	1.8634	2.1417	1.8989	1.3848	0.8301	0.3244	0.0563	-0.2209
0.4	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5	0.0	-13.6319	-22.4976	-30.3215	-33.8916	-26.9632	-0.0000	26.9632	33.8916	30.3215	22.4976	13.6319
0.5	100 η_x	0.4762	0.1241	0.7331	1.3512	1.8989	2.1599	1.8989	1.3512	0.7331	0.1241	-0.4762
0.5	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6	0.0	1.1761	9.9448	20.8512	30.3038	34.9527	28.4261	0.9638	27.7591	38.1401	40.0442	39.5708
0.6	100 η_x	0.5589	0.1284	0.3244	0.8301	1.3848	1.8989	2.1417	1.8634	1.2865	0.6185	-0.0631
0.6	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7	0.0	8.1509	2.3717	-13.1120	-23.9718	-33.5077	-37.8439	-29.7127	-18.8158	-8.3219	-2.6134	-11.0864
0.7	100 η_x	0.4762	0.2209	0.0563	0.3955	0.8301	1.3512	1.8634	2.1332	1.9110	1.4202	0.8634
0.7	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8	0.0	11.0864	2.6134	6.3053	16.2809	27.2609	37.5080	42.5057	42.5057	33.9857	25.3117	19.2146
0.8	100 η_x	0.1472	0.1910	0.2250	0.2209	0.1284	0.1241	0.6185	1.4202	2.5255	3.7805	4.9405
0.8	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	0.0	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304	0.0304
0.9	100 η_x	0.0058	0.0169	0.0274	0.0349	0.0349	0.0174	-0.0278	-0.1143	-0.2516	-0.4367	-0.5236
0.9	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100 η_x	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100 η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100 η_z	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000



$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\phi = \eta \phi \frac{S^2}{kb}$$

$$p = \eta \frac{P}{bL}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 1.07

ESTRUTURA 1

Esforço externo: Força Concentrada

SL=4.50

x/L	z/L	LINHA DE ESTADO PARA		ESFORÇO APLICADO EM		(LER NA VERTICAL)		0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5	0.6			
0.0	100ηφ	-200.1888	13.2707	39.5435	40.2268	30.3413	18.5971	1.5609	-3.8836	-8.6927
0.0	100ηP	9.0056	2.2720	0.5033	-0.3519	-0.6160	-0.5695	-0.2077	-0.0234	0.1535
0.0	100ηM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100ηV	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-170.4944	10.1134	38.5940	40.4269	30.9653	19.2366	1.8305	-3.8255	-8.8404
0.1		5.1691	2.5249	1.2995	0.4639	0.0018	-0.1895	-0.1747	-0.1018	-0.0234
0.1		-6.1611	1.1803	0.3850	-0.0402	-0.2055	-0.2219	-0.0985	-0.0248	0.0474
0.1		-0.2964	0.2403	0.0903	0.0056	-0.0308	-0.0360	-0.0192	-0.0063	0.0065
0.2		-114.4690	12.6394	29.8078	39.6240	33.6602	22.6979	3.6262	-3.2079	-9.3958
0.2		2.2720	2.5497	1.2801	0.2801	0.6533	0.2594	-0.1232	-0.1747	-0.2077
0.2		-7.0713	4.8681	2.0636	0.3840	-0.4063	-0.6301	-0.3703	-0.1509	0.0707
0.2		0.0061	-0.5022	0.2574	0.0929	0.0015	-0.0366	-0.0343	-0.0202	-0.0049
0.3		-62.2288	35.0436	-0.2290	30.7596	35.7745	28.8132	8.1533	-0.9120	-9.4238
0.3		0.5033	2.0148	2.0157	1.3624	0.5214	0.7485	-0.0092	-0.2205	-0.4007
0.3		-5.6139	1.0516	5.7279	2.0823	0.0514	-0.8004	-0.7601	-0.4496	-0.1145
0.3		0.1960	-0.0324	-0.2702	-0.5186	0.1019	0.0112	-0.0417	-0.0403	-0.0353
0.4		-25.0067	35.0912	-28.7581	0.4949	29.1506	33.6268	15.9475	4.66613	-6.4622
0.4		0.3519	2.8011	2.0157	2.3825	2.0445	1.3866	0.2294	-0.1895	-0.5695
0.4		-3.5767	-0.7653	1.6909	5.7671	1.6702	-0.2117	-1.1487	-0.9625	-0.6986
0.4		0.1973	0.0524	-0.1055	-0.2948	0.2733	0.1172	-0.0320	-0.0618	-0.0843
0.5		-3.4154	26.1176	33.0249	-28.4889	-0.0000	28.4889	26.1176	15.1712	3.4154
0.5		0.6160	0.6533	1.3624	2.0445	2.3920	2.0445	0.6533	0.0018	-0.6160
0.5		-1.8424	-1.6317	-0.3545	1.7680	5.7069	1.7680	-1.2923	-1.6517	-1.8424
0.5		0.1453	0.0729	-0.0104	-0.1252	-0.5000	0.2897	0.0104	-0.0729	-0.1453
0.6		6.4622	-4.6613	-15.9475	-33.6268	-29.1506	-0.4949	35.0912	31.3774	25.0067
0.6		-0.5695	0.1895	0.2394	0.7485	2.0445	2.3825	1.2601	0.4639	-0.3519
0.6		-0.6986	0.9625	-1.1487	-0.2117	1.9702	5.7671	-0.7653	-2.3165	-3.5767
0.6		0.0843	0.0618	0.0320	-0.1172	-0.2733	-0.4841	0.1055	-0.0524	-0.1973
0.7		9.4238	0.9120	-8.1533	-28.8132	-35.7745	-30.7596	35.0436	51.3945	62.2288
0.7		-0.4007	-0.2205	0.0092	0.7485	1.3624	2.0157	2.0148	1.2995	0.5033
0.7		-0.1145	-0.4496	-0.7601	-0.8004	-0.0514	2.0823	1.0316	-2.4659	-5.6139
0.7		0.0353	0.0403	0.0417	-0.0299	-0.1019	-0.2591	0.0270	0.0324	-0.1960
0.8		9.3958	3.2079	-3.6262	-22.6979	-33.6602	-39.6240	12.6394	68.0853	114.4690
0.8		-0.2077	-0.1747	0.0092	0.2801	0.6533	1.2801	2.5497	2.5249	2.2720
0.8		0.0707	-0.1509	-0.3703	-0.6301	-0.4063	0.3840	4.8681	-1.3224	-7.0713
0.8		0.0049	0.0202	0.0343	0.0366	-0.0015	-0.0929	-0.4378	0.2208	-0.0661
0.9		8.8404	3.8255	-1.8305	-19.2366	-30.9653	-40.4269	-10.1134	65.9717	170.4944
0.9		-0.0234	-0.1018	-0.1747	0.1895	0.0018	0.4639	2.5249	3.9325	5.1691
0.9		0.0474	-0.0248	-0.0985	-0.1706	-0.2055	-0.4042	1.803	2.3629	-6.1611
0.9		-0.0065	0.0063	0.0192	0.0380	0.0308	-0.0056	-0.2403	-0.4561	0.2964
1.0		8.6927	3.8836	-1.5609	-18.5971	-30.3413	-40.2268	-13.2707	59.4008	200.1888
1.0		0.1535	-0.0234	-0.2077	-0.5695	-0.6160	-0.3519	2.2720	5.1691	9.0056
1.0		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \frac{S^2}{kb} \tau$$

$$P = \eta_p \frac{P}{bL}$$

$$M = \eta_M \tau L$$

$$V = \eta_V P$$

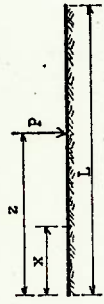
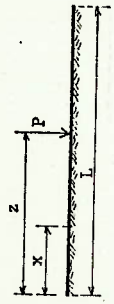


TABELA 1.08

ESTRUTURA 1

Esforço externo: Força Concentrada

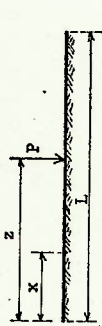


x/L	z/L	ESFORÇO EXTERNO: FORÇA CONCENTRADA									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100n _p	-200.0666	22.1837	41.4505	36.0602	23.2567	11.5746	3.6859	-0.7905	-3.2994	-5.1700
0.0	100n _M	10.0000	1.9870	0.1542	-0.5712	-0.6707	-0.5093	0.2949	-0.1102	0.0368	0.1675
0.0	100n _V	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-164.6846	18.6419	40.7619	36.6363	24.1320	12.3027	4.1389	-0.5986	-3.3263	-5.3953
0.1		5.3242	2.5197	1.1667	0.3344	-0.0836	-0.2153	-0.1959	-0.1288	-0.0459	0.0368
0.1		-5.8145	2.4590	1.0852	0.2497	-0.1352	-0.2063	-0.1320	-0.0584	0.0046	0.0622
0.1		-0.2413	0.2560	0.0672	-0.0120	-0.0379	-0.0364	-0.0248	-0.0120	0.0005	0.0103
0.2		-60.9746	7.8720	32.5126	37.6442	28.2905	16.4087	6.9861	-0.8039	-3.2388	-6.5331
0.2		1.9870	2.7289	2.1321	1.2668	0.5649	0.1348	-0.0677	-0.1301	0.1288	-0.1102
0.2		-6.1873	4.6658	1.6800	0.0666	-0.5551	-0.6233	-0.4609	-0.2443	-0.0367	0.1598
0.2		0.1111	-0.5061	0.2348	0.0679	-0.0147	-0.0412	-0.0388	-0.0252	-0.0092	0.0068
0.3		-47.8170	33.6080	0.1264	31.0863	33.3278	24.2944	13.5641	4.7104	-2.1639	-8.2164
0.3		0.1542	2.1321	2.6133	2.1561	1.3403	0.6378	0.1810	-0.0677	-0.1999	-0.2949
0.3		-4.4457	0.8970	5.2060	1.5328	-0.2958	-0.8927	-0.5551	-0.2061	0.1439	-0.1439
0.3		0.2068	-0.0174	-0.5213	0.2403	0.0795	-0.0043	-0.0345	-0.0359	-0.0259	-0.0131
0.4		-13.5465	32.8797	-30.1333	-0.1337	29.7280	32.1001	23.3065	12.1088	1.5399	-8.4217
0.4		0.5712	0.3344	2.1561	2.6176	2.1616	1.3506	0.6378	0.1348	-0.2153	-0.5093
0.4		-2.8574	1.7665	1.2558	5.1218	1.3090	-0.5061	-1.0364	-0.9220	-0.5708	-0.1697
0.4		0.1769	0.0546	-0.2766	-0.5146	0.2553	0.0935	0.0044	-0.0341	-0.0474	-0.0532
0.5		3.1321	-9.9459	-22.6636	-29.8940	0.0000	29.8940	0.0000	22.6636	9.9459	-3.1321
0.5		-0.6707	0.0836	0.5649	1.3403	2.6109	2.1616	1.3403	0.5649	-0.0636	0.6707
0.5		-0.9867	1.1388	-1.1350	0.5658	1.2407	5.0466	1.2407	-0.5658	-1.1388	0.9867
0.5		0.1133	0.0641	0.0013	-0.1014	-0.5000	0.2695	0.1014	-0.0013	-0.0641	-0.1133
0.6		8.4217	-1.5399	-12.1088	-23.3065	-29.7280	30.1333	32.8797	24.5466	13.5465	-8.4217
0.6		-0.5093	0.2153	0.1348	0.6378	1.3506	2.1616	2.1616	1.2668	0.3344	-0.5712
0.6		-0.1697	-0.5708	-0.0474	0.0341	-0.5061	1.3090	5.1218	1.2558	-1.7665	-2.4574
0.6		0.0532	0.0474	0.0013	-0.1014	-0.2553	-0.4854	0.2766	0.0881	-0.0546	-0.1789
0.7		8.2164	2.1639	-4.7104	-13.5641	-24.2944	-33.3278	-31.0863	-0.1264	44.0887	47.8170
0.7		-0.2949	-0.1999	-0.0677	0.1348	0.6378	1.3403	2.1616	2.1616	1.1867	0.1542
0.7		0.1439	-0.2061	-0.5551	-0.8479	-0.2958	-1.5328	-0.8479	-2.0233	-4.4457	-6.1873
0.7		0.0131	0.0259	0.0359	0.0345	-0.0795	-0.2348	-0.2348	-0.4787	0.0174	-0.2068
0.8		6.5331	3.2388	-0.8039	-16.4087	-28.2905	-37.6442	-32.5126	7.8720	60.9746	101.7617
0.8		-0.1102	0.1288	-0.1301	0.0577	0.1348	1.2668	2.1321	2.7289	2.5197	1.9870
0.8		0.1598	-0.0367	0.2443	-0.4609	-0.5551	0.0666	1.6800	4.6658	-1.0521	-6.1873
0.8		-0.0068	0.0092	0.0005	0.0120	0.0005	-0.0679	-0.2348	-0.4939	0.1991	-0.1111
0.9		5.3953	3.3263	0.5986	-4.1389	-12.3027	-24.1320	-36.6363	-40.7619	-18.6419	164.6846
0.9		0.0368	-0.0459	-0.1288	-0.1999	-0.2153	-0.0636	0.3344	1.1867	2.5197	4.0632
0.9		0.0622	0.0046	0.0584	-0.1320	-0.2063	-0.1352	1.0852	1.0852	2.4590	5.3242
0.9		-0.0103	0.0005	0.0120	0.0248	0.0379	0.0120	-0.0672	-0.2360	-0.4709	0.2413
1.0		5.1700	3.2994	0.7905	-11.5746	-23.2567	-36.0602	-41.4505	-22.1837	48.3234	200.0668
1.0		0.1675	0.0368	-0.1102	-0.2949	-0.5093	-0.6707	0.1542	1.9870	5.3242	10.0031
1.0		0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
1.0		0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4H}} \quad \phi = \eta \phi \frac{S^2}{kb} P \quad P = \eta \frac{P}{BL} \quad M = \eta M \quad V = \eta V$$

TABELA 1.09

ESTRUTURA 1
 Esforço externo: Força Concentrada
 LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)



x/L	z/L	Esforço externo: Força Concentrada																		
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0									
0.0	0.0	200.0133	29.1375	41.3480	31.0012	16.7661	6.1958	0.4801	-1.7565	-2.2772	-2.3068	0.4097	0.0557	0.1272	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.1	11.0011	1.6609	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.2	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.3	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.4	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.5	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.6	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.7	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.8	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.9	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	1.0	11.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0	158.7010	48.3931	25.3451	41.0568	31.9812	17.8337	6.9272	0.8462	-1.6561	-2.3547	-2.5280	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000
0.1	0.1	5.4112	2.5143	1.0812	0.2253	0.1408	0.0468	0.0465	-0.1126	-0.1287	-0.0689	-0.0365	0.0889	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000
0.1	0.2	5.4825	0.9765	0.1243	-0.2037	-0.2434	-0.0901	-0.0315	-0.0271	-0.0163	0.0519	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.3	0.1902	0.2096	0.0457	-0.0250	-0.0401	-0.0177	-0.0063	-0.0021	0.0092	0.0092	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.4	89.5569	4.5577	33.9898	35.0080	23.2057	11.2532	3.3318	-0.7442	-2.6151	-3.7831	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.5	1.6609	2.5143	2.9340	2.2523	1.2368	0.4681	0.0465	-0.1126	-0.1287	-0.0689	0.0889	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.6	5.3921	0.8476	4.4349	1.3250	-0.1762	-0.5580	-0.3453	-0.1422	0.0183	0.1578	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.7	0.1456	-0.1818	-0.5106	0.2141	0.0474	-0.0251	-0.0411	-0.0324	-0.0174	-0.0105	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.8	35.3055	38.0804	0.0099	31.2374	30.9047	20.2013	9.6316	-2.4373	-2.2941	-6.1876	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.9	0.1683	1.0612	2.8703	2.2790	1.2695	0.5122	0.0725	-0.1126	-0.1287	-0.0689	0.0889	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	1.0	3.4781	1.6686	0.7197	4.7353	-0.5101	-0.7025	-0.3816	-0.0692	0.2224	0.0000	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.0	0.2067	0.0064	-0.2442	0.5214	0.2242	0.0608	-0.0154	-0.0302	-0.0158	-0.0000	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.1	4.9659	19.1657	31.0017	31.3874	0.5809	30.3126	19.9678	8.9166	0.2693	8.4015	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.2	0.7206	0.2253	1.2388	2.2790	2.8495	2.2580	1.2837	0.4681	0.2166	0.4097	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.3	1.6261	0.3585	0.7674	0.8990	4.6081	0.9036	-0.9658	-0.7219	-0.3223	0.0951	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.4	0.1547	0.0542	-0.0703	-0.2561	-0.5115	0.2382	0.0718	-0.0094	-0.0352	-0.0292	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.5	6.8305	6.2121	19.5222	30.8678	30.9873	0.0000	30.9873	30.8678	19.5222	6.8305	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.6	0.6564	0.1408	0.4681	1.2837	2.2580	2.2580	1.2837	0.4681	0.2166	0.4097	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.7	0.4444	0.7820	0.9936	0.6880	0.8585	4.5455	0.8585	-0.6880	-0.9936	-0.4444	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.8	0.0829	0.0551	0.0122	-0.0779	-0.2486	-0.5000	0.2486	0.0779	-0.0122	-0.0829	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.9	8.4015	0.2693	19.9878	30.3958	30.3126	0.5809	31.3874	31.0017	19.9878	8.4015	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	1.0	0.4097	0.2166	0.4681	1.2837	2.2580	2.2580	1.2837	0.4681	0.2166	0.4097	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.0	0.0951	0.3223	0.7219	0.9658	0.6616	0.9036	4.6081	0.8990	2.2790	0.2206	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.1	0.0292	0.0356	0.0094	0.0094	0.0718	-0.2382	-0.4885	0.2561	-0.0703	-0.1547	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.2	6.1876	2.4373	19.5222	30.8678	30.9873	0.0000	30.9873	30.8678	19.5222	6.1876	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.3	0.1680	0.1680	0.0692	0.0692	0.0692	0.0692	0.0692	0.0692	0.0692	0.1680	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.4	0.2224	0.0692	0.0692	0.0692	0.0692	0.0692	0.0692	0.0692	0.0692	0.2224	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.5	0.0000	0.0158	0.0302	0.0360	0.0154	-0.0608	-0.2424	-0.4786	-0.0703	-0.1547	0.0829	0.0444	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.6	3.7831	2.6151	0.7442	3.3318	11.2532	23.2057	35.0080	33.9898	4.5577	3.7831	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.7	0.0365	0.0689	0.1287	0.1126	0.0465	0.4681	1.2368	2.2523	2.9340	0.0365	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.8	0.1578	0.0183	-0.1422	-0.3453	-0.5580	-0.6200	-0.1762	1.3250	4.4349	0.1578	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.9	0.0105	0.0030	0.0174	0.0324	0.0411	0.0251	-0.0474	-0.2141	-0.4894	0.0105	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	1.0	2.5280	2.3547	1.6561	0.8462	-1.6561	-2.3547	-2.5280	2.3547	1.6561	2.5280	0.4097	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0	0.0557	0.0139	0.0519	0.0519	0.0519	0.0519	0.0519	0.0519	0.0519	0.0557	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.1	0.0519	0.0163	0.0271	0.0901	-0.1734	-0.2434	-0.2037	0.2253	0.1408	0.0519	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.2	0.0092	0.0021	0.0063	0.0177	0.0063	0.0063	0.0063	0.0063	0.0063	0.0092	0.0557	0.0519	0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.3	2.3068	2.2772	1.																

TABELA 1.10

ESTRUTURA 1



SL=6.00 Esforço externo: Força Concentrada

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)							0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5	0.6	0.7			
L	100n _φ	-20.0000	34.3198	39.7106	25.6370	11.2577	2.4576	-1.2002	-1.8716	-1.3486	-0.5541
		12.0002	1.3098	-0.4509	-0.8038	-0.5938	-0.2976	-0.0913	0.0112	0.0523	0.0737
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	100n _y	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-152.5686	41.0329	30.4372	39.9346	27.0113	12.4387	3.1182	-0.9554	-1.8583	-1.4449
		3.4357	4.2927	2.5117	0.9622	0.1325	-0.1774	-0.2031	-0.1323	-0.0561	0.0028
H	0.1	-5.1646	2.5423	0.8597	0.0130	-0.2289	-0.1338	-0.0528	-0.0056	0.0180	0.0335
		-0.1430	-0.5102	0.1921	0.0265	-0.0339	-0.0389	-0.0252	-0.0112	-0.0022	0.0028
		-77.9762	-50.2122	-2.3825	34.6263	32.1004	18.6739	7.2694	0.9474	-1.4418	-1.8789
A	0.2	1.3098	2.5117	3.1601	2.3662	1.1913	0.3651	-0.0305	-0.1181	-0.0561	0.0112
		-4.6783	0.6954	4.1904	1.0062	-0.3521	-0.6252	-0.4646	-0.2354	-0.0670	0.0381
		0.1716	-0.1675	-0.5147	0.1954	0.0307	-0.0314	-0.0361	-0.0254	-0.0111	0.0003
E	0.3	-24.6988	-33.1396	-2.9886	0.2708	31.3932	28.6142	16.5885	6.4668	0.6294	-2.2678
		-0.4509	0.9822	2.3662	3.1272	2.3808	1.2155	-0.3839	-0.0205	-0.1323	-0.0913
		-2.6821	1.3951	0.5369	4.3189	0.7482	-0.2155	0.8058	-0.5479	-0.2434	0.0005
I	0.4	0.1986	0.0020	-0.2294	-0.5197	0.2094	0.0446	-0.0233	-0.0351	-0.0246	0.0066
		1.0944	-14.9185	-29.1854	-32.3244	-0.7743	30.9029	28.5355	16.7575	6.2118	-1.2580
		-0.8038	0.1325	1.1913	2.3808	3.0803	2.3394	1.1969	0.3639	-0.0305	-0.2031
N	0.5	-1.0202	-1.0537	-0.7328	0.6108	4.1935	0.6065	-0.7289	-0.8573	-0.5495	-0.1985
		0.1262	0.0522	-0.0522	-0.2349	-0.5081	0.2215	0.0522	-0.0200	-0.0348	-0.0261
		8.4131	3.5598	-16.5322	-29.2074	-31.7378	-0.0000	31.7378	29.2074	16.5322	3.5598
U	0.6	-0.5938	0.1774	0.3651	1.2155	2.3394	3.0803	2.3394	1.2155	0.3651	-0.1774
		-0.1170	-0.5344	-0.8622	-0.7462	0.5768	4.1526	0.5768	-0.7462	-0.8622	-0.5344
		0.0561	0.0466	0.0212	-0.0561	-0.2281	-0.5000	0.2281	0.0561	-0.0212	-0.0466
A	0.7	7.2969	1.2580	-6.2118	-16.7575	-28.5355	-30.9029	-31.7378	-29.2074	-16.7575	-8.4131
		-0.2976	-0.2031	-0.0305	0.3839	1.1989	2.3394	3.0803	2.3394	1.1913	0.3651
		0.1985	-0.1693	-0.5495	-0.8573	-0.7289	0.6065	4.1935	0.6108	-0.7732	-1.0537
S	0.8	0.0119	0.0261	0.0348	0.0200	-0.0522	-0.2215	-0.4919	0.2349	0.0522	-0.1282
		4.1496	2.2678	-0.6294	-6.4668	-16.5885	-28.6142	-31.3932	-29.2074	32.3244	14.9185
		-0.0913	-0.1323	-0.1403	0.0205	0.3839	1.2155	2.3808	3.1272	2.3662	0.9622
C	0.9	0.2062	0.0090	-0.2434	-0.5479	-0.8058	-0.6298	-0.7462	4.3189	0.5389	-1.0951
		-0.0066	0.0090	0.0246	0.0351	-0.0233	-0.0446	-0.2094	-0.4803	0.2294	-0.1986
		1.7655	1.8789	1.4418	-0.9474	-18.6739	-32.1004	-34.6263	-30.4372	41.0329	152.5686
O	1.0	0.0112	0.0561	-0.1181	0.1403	0.3651	1.1913	2.3662	3.1601	2.5117	1.3098
		0.1178	0.0381	-0.0670	-0.2354	-0.6252	-0.4646	-0.3521	1.0062	4.1904	-0.6954
		-0.0096	-0.0003	0.0111	0.0254	0.0381	0.0314	-0.0307	-0.1954	-0.4653	0.1675
I	0.9	0.7190	1.4449	1.8583	0.9554	-3.1182	-12.4387	-27.0113	-39.9346	-30.4372	41.0329
		0.0523	0.0028	-0.0561	0.1323	-0.2031	-0.1774	0.1325	0.9622	2.5117	4.2927
		0.0335	0.0180	-0.0528	-0.0528	-0.1338	-0.2289	-0.1338	0.0130	0.8597	2.5423
E	1.0	-0.0063	-0.0028	0.0022	0.0112	0.0252	0.0389	0.0339	-0.0265	-0.1921	-0.4898
		0.5541	1.3486	1.8718	1.2002	-2.44576	-11.2577	-25.6370	-39.7106	-34.3198	28.6132
		0.0737	0.0523	0.0112	-0.0913	-0.2976	-0.5938	-0.8038	-0.4509	1.3098	5.4357
A	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta_\phi \frac{S^2}{KB} P$$

$$P = \eta_P \frac{P}{bL}$$

$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 1.12

ESTRUTURA 1

Esforço externo: Força Concentrada

SL=7.00

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LFR NA VERTICAL)

0.5

0.4

0.3

0.2

0.1

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

0.0

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	0.1	-20.0000	-11.9793	40.2212	33.5061	15.5332	3.5259	-1.1773	-1.7589	-1.0622	-0.2546	0.4793
I	0.1	14.0000	0.5867	-0.5867	-0.8656	-0.8022	-0.3958	0.1023	0.6206	0.0419	0.0257	0.0025
N	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.1	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.1	-139.9443	-28.8503	36.6981	34.9923	17.5295	4.6743	-0.7963	-1.7947	-1.1756	-0.3282	0.4520
N	0.1	5.3173	4.5224	2.5184	0.7978	-0.0151	-0.2086	-0.1555	-0.0675	-0.0124	0.0123	0.0257
A	0.1	-4.5701	2.5539	0.6207	-0.1583	-0.2733	-0.1686	-0.0656	-0.0643	0.0121	0.0107	0.0051
D	0.1	-0.0599	-0.15018	0.1565	-0.0040	-0.0416	-0.0306	-0.0130	-0.0023	0.0015	0.0019	0.0014
E	0.1	-56.9852	-43.0631	0.3495	34.4574	26.2603	11.4434	2.1953	-1.1906	-1.4703	-0.7517	0.1117
A	0.2	0.5867	2.5184	3.6540	2.5490	1.0350	0.1566	-0.1361	-0.1462	-0.0772	-0.0124	0.0419
A	0.2	-3.4716	-0.45063	3.7034	0.4917	-0.5398	-0.5317	-0.2715	-0.0756	0.0106	0.0326	0.0355
D	0.2	0.2011	-0.1444	-0.5202	0.1633	0.0057	-0.0360	-0.0269	-0.0133	-0.0028	0.0021	0.0049
E	0.2	-8.7772	-25.5983	-33.4491	-0.7641	31.7674	24.3303	10.6622	2.0995	-1.0917	-1.5240	-1.2010
I	0.3	-0.8656	0.7978	2.5490	3.6253	2.5195	1.0190	-0.1504	-0.1409	-0.1462	-0.0075	0.0208
N	0.3	-1.5101	0.2141	0.2141	3.6446	0.2691	-0.6959	-0.5484	-0.2567	-0.0683	0.0400	0.1048
F	0.3	0.1675	0.0140	-0.1970	-0.5140	0.1810	0.0175	-0.0317	-0.0269	-0.0142	-0.0016	0.0086
L	0.4	7.3666	-8.8296	-25.3085	-33.1888	-0.6460	31.8562	24.4817	10.8770	2.1414	-1.8649	-1.0974
U	0.4	-0.8022	-0.0151	1.0350	2.5195	3.5446	2.4662	1.0000	0.1504	-0.1381	-0.1555	-0.1023
E	0.4	-0.2912	-0.6454	-0.7501	-0.2016	3.5693	0.2116	-0.7274	-0.6153	-0.0234	0.1864	0.1864
C	0.4	0.0777	0.0463	-0.0213	-0.1939	-0.5030	0.1684	-0.0201	-0.0320	-0.0297	-0.0126	0.0057
I	0.5	7.7804	-0.4020	-11.0033	-25.0462	-32.4215	0.0000	32.4215	25.0462	11.0033	0.4020	7.7804
A	0.5	-0.3956	-0.2086	0.1566	1.0190	2.4662	3.5134	2.4662	1.0190	0.1566	-0.2086	-0.3956
P	0.5	0.1510	-0.2400	-0.6221	-0.7448	0.1991	3.5623	0.1991	-0.7448	-0.6221	-0.2400	0.1510
A	0.5	0.0177	0.0317	0.0323	-0.0206	-0.1899	-0.5000	0.1899	0.0206	-0.0323	-0.0317	-0.0177
R	0.5	4.0974	1.8649	-2.1414	-10.6770	-24.4817	-31.8562	-0.6460	33.1686	25.3085	6.8296	7.3666
A	0.6	-0.1023	-0.1555	-0.1361	-0.1504	1.0000	2.4662	3.5446	2.5195	-1.0350	-0.0151	-0.8022
A	0.6	0.1864	-0.0234	-0.2879	-0.6153	-0.7274	0.2116	3.5693	0.2016	-0.7501	-0.6454	-0.2912
S	0.6	-0.0057	0.0126	0.0297	0.0320	-0.0201	-0.1684	-0.0490	0.1939	0.0213	-0.0463	-0.0777
E	0.7	1.2010	1.5240	1.0917	-2.0995	-10.6622	-24.3303	-31.7674	0.7641	33.4491	25.5983	8.7772
C	0.7	0.0208	-0.0675	-0.1462	-0.1409	0.1504	1.0190	2.5195	3.6253	2.5490	0.7978	0.6656
C	0.7	0.1048	0.0400	-0.0683	-0.2867	-0.5984	-0.6959	0.2691	3.6446	0.2141	-1.0142	-1.5101
A	0.7	-0.0086	0.0016	0.0142	0.0289	0.0317	-0.0175	-0.1810	-0.0456	0.1970	-0.0140	-0.2011
D	0.7	-0.1117	0.7517	1.4703	1.1906	-2.1953	-11.4434	-26.2603	-34.4574	0.3495	43.0631	56.9852
E	0.7	0.0419	-0.0124	-0.0772	-0.1462	-0.1361	0.1566	1.0350	2.5490	3.6540	2.5184	0.5867
C	0.7	0.0355	0.0328	0.0108	-0.0756	-0.2715	-0.5317	-0.5398	0.4917	3.7034	-0.5063	-3.4716
A	0.8	-0.0049	-0.0021	0.0028	0.0133	0.0289	0.0360	-0.0057	-0.1633	0.1444	-0.1444	-0.2011
D	0.8	-0.4520	0.3262	1.1756	1.7947	0.7963	-4.6743	-17.5295	-34.9923	-26.2603	-28.8503	-139.9443
E	0.8	0.0257	0.0123	-0.0124	-0.0675	-0.1566	-0.2086	-0.0151	0.7978	2.5184	4.5224	5.3173
A	0.9	0.0051	0.0107	0.0121	-0.0043	-0.0606	-0.1686	-0.2733	0.1686	-0.6207	2.5539	-4.5701
D	0.9	-0.0014	-0.0019	-0.0015	0.0023	0.0130	0.0306	0.0416	0.0040	-0.1565	-0.4982	0.0599
E	0.9	-0.4793	0.2546	1.0822	1.7989	1.1773	-3.5259	-15.5332	-33.5061	-40.2212	-11.9793	200.0000
C	0.9	0.0025	0.0257	0.0419	0.0208	-0.1023	-0.3958	-0.8022	-0.6206	0.5867	5.3173	14.0000
C	0.9	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	1.0	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{kb} P$$

$$P = \eta \frac{P}{SL}$$

$$M = \eta \frac{M}{PL}$$

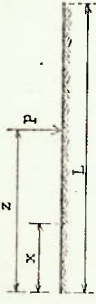
$$V = \eta \frac{V}{P}$$

TABELA 1.13

ESTRUTURA 1

SL=7.50 Esforço externo: Força Concentrada

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)



x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
L	0.0	100n _p	200.0000	4.7282	41.3585	29.6451	11.2637	1.1663	-1.4737	-0.6406	-0.0266	0.4150
I	0.0	100n _M	15.0000	5.1844	0.2367	-0.7394	-0.0344	-0.0416	0.0372	0.0136	-0.0098	0.0000
N	0.0	100n _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.1	100n _p	-133.5222	-23.6912	38.2928	31.8019	13.4367	2.1882	-1.5021	-0.7463	-0.0788	0.4259
A	0.1	100n _M	5.1844	4.6480	2.5261	0.7091	-0.6735	-0.1285	-0.0004	-0.0004	0.0115	0.0136
I	0.1	100n _v	-4.2931	2.5388	0.5051	-0.2174	-0.2630	-0.0333	0.0070	0.0126	0.0066	-0.0010
N	0.1	100n _v	-0.0230	-0.5003	0.1393	-0.0152	-0.0254	-0.0082	0.0000	0.0019	0.0061	-0.0002
H	0.2	100n _p	-47.6716	40.4736	0.0466	34.0127	23.5226	8.6651	0.7220	-1.4687	-0.4089	0.3564
A	0.2	100n _M	2.5261	3.9123	2.6108	0.9317	0.0611	-0.1670	0.1310	-0.0336	-0.0004	0.0372
I	0.2	100n _v	-2.9676	0.4528	3.4742	0.2948	-0.5715	-0.1911	-0.0290	0.0234	0.0240	0.0119
D	0.2	100n _v	0.2068	-0.1344	-0.5214	0.1495	-0.0358	-0.0240	-0.0087	-0.0006	0.0020	0.0028
E	0.3	100n _p	-3.1603	-22.6468	33.5920	0.8753	31.9061	22.2509	8.2553	-1.3853	-1.1430	-0.3767
I	0.3	100n _M	0.9932	0.7091	2.6108	3.8655	2.5595	0.9041	0.0531	-0.1310	-0.0424	0.0418
N	0.3	100n _v	-1.0935	-0.8795	0.0812	3.3775	0.1087	-0.6791	-0.1925	-0.0216	0.0384	0.0606
F	0.3	100n _v	0.1462	0.0187	-0.1801	-0.5110	0.1669	0.0061	-0.0332	-0.0097	0.0002	0.0071
L	0.4	100n _p	8.4539	6.6246	23.2137	4.4849	32.1149	22.3661	8.3710	0.7565	-1.6014	-0.6532
U	0.4	100n _M	-0.7336	-0.0735	0.9317	3.7804	2.5120	0.8919	0.0531	-0.1670	-0.1285	-0.0341
E	0.4	100n _v	0.0563	0.0429	-0.0061	0.0616	0.0772	-0.5045	-0.1953	0.0065	-0.0080	0.0085
A	0.5	100n _p	0.5541	0.4713	-8.5625	-22.7633	-32.4775	-0.0000	32.4775	8.5625	-0.4713	-6.5541
C	0.5	100n _M	-0.2893	-0.2092	0.0611	0.9061	2.5120	3.7558	2.5120	0.9061	-0.2092	-0.2393
N	0.5	100n _v	0.1789	0.1541	-0.5146	0.7103	0.0690	3.3286	0.0690	-0.7103	-6.1541	-0.1789
C	0.5	100n _v	0.0056	0.0255	0.0346	-0.0070	0.1725	0.0070	0.0070	-0.0346	-0.0255	-0.0056
A	0.6	100n _p	2.6532	1.8014	0.7565	-8.3710	-22.3661	-32.1149	0.4849	23.2137	6.6248	-8.4539
C	0.6	100n _M	-0.0344	-0.1245	-0.1670	0.0531	0.8919	2.5120	3.7804	2.5595	0.9317	-0.0735
A	0.6	100n _v	0.1445	0.0065	-0.1953	-0.5045	0.0772	3.3279	0.0616	-0.7168	-0.5068	-0.0938
S	0.6	100n _v	-0.0085	0.0080	0.0256	0.0341	-0.0073	-0.01721	-0.4965	0.1751	-0.0081	-0.0563
E	0.7	100n _p	0.3767	1.1430	1.3853	-0.7192	-9.2553	-22.2509	-31.9061	0.6753	33.5920	3.1603
C	0.7	100n _M	0.0416	0.0424	-0.1310	0.1693	0.2061	0.0061	3.8655	2.6108	0.7091	-0.9932
A	0.7	100n _v	0.0600	0.0384	-0.0218	-0.0925	-0.6791	0.1067	3.3775	0.0812	-0.6795	-1.0935
A	0.7	100n _v	-0.0071	-0.0002	0.0097	0.0247	0.0332	-0.0061	-0.1669	-0.4890	-0.0187	-0.1482
O	0.8	100n _p	-0.3564	0.4039	1.1967	1.4687	-0.7220	-8.6651	-23.5226	-34.0127	0.0466	40.4736
C	0.8	100n _M	0.0372	-0.0004	-0.0538	-0.1310	0.0611	0.9317	2.6108	3.9123	2.5261	0.2367
A	0.8	100n _v	0.0119	0.0240	0.0234	-0.0230	-0.1911	-0.4609	0.2948	3.4742	-0.4528	-2.9676
O	0.8	100n _v	-0.0028	-0.0023	0.0006	0.0087	0.0240	0.0358	-0.0035	-0.1344	-0.4786	-0.2068
O	0.9	100n _p	-0.4299	0.0788	0.7463	1.5525	-1.5021	-2.1882	-13.4367	-31.8019	-38.2928	23.6912
C	0.9	100n _M	0.0138	0.0115	-0.0004	0.0424	-0.1285	-0.2092	0.7091	2.5261	4.6480	5.1844
A	0.9	100n _v	-0.0010	0.0066	0.0126	0.0070	-0.0333	-0.1332	-0.2630	0.5051	2.5388	-4.2931
O	0.9	100n _v	-0.0002	-0.0013	-0.0019	0.0000	0.0082	0.0254	0.0416	-0.0152	-0.1393	0.0236
O	1.0	100n _p	-0.4150	0.0286	0.6406	1.4737	-1.1663	-11.2637	-29.6451	-41.3585	4.7282	200.0000
C	1.0	100n _M	0.0098	0.0134	0.0372	0.0418	-0.0344	-0.07394	-0.0932	0.2367	5.1844	15.0000
A	1.0	100n _v	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O	1.0	100n _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\phi = \eta \frac{S^2}{kb} \quad P = \eta \frac{P}{bL} \quad M = \eta_N PL \quad V = \eta_V P$$

TABELA 1.14

ESTRUTURA 1

Esforço externo: Força Concentrada

SL=6.00

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100n _p	-200.0002	1.8557	41.5415	25.6350	7.6633	-0.3794	-1.7912	-1.0566	-0.3039	0.0687	0.2655
n _p	16.0000	-0.0943	-1.0704	-0.6511	-0.1915	0.0120	0.0470	0.0054	0.0275	0.0054	-0.0122
100n _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _V	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-19.6001	39.1101	28.4447	9.9134	0.4619	-1.7201	-1.1546	-0.4004	0.0410	0.2993
L 0.1		4.7844	2.5345	0.6209	-0.1230	-0.2024	-0.1019	0.0065	0.0094	0.0054	0.0054
I 0.1		2.5128	0.3953	-0.2598	-0.2425	-0.0993	-0.0131	0.0121	0.0034	0.0034	-0.0032
N 0.1		0.0093	0.1230	-0.0239	-0.0398	-0.0201	-0.0045	0.0013	0.0017	0.0006	-0.0004
H 0.1		-39.1834	-0.0064	33.4694	20.9574	6.3614	-0.2612	-1.4740	-0.8860	-0.1041	0.3829
A 0.2		0.0943	2.5345	4.1729	0.8175	-0.0236	-0.1805	-0.1095	-0.0325	0.0065	0.0275
D 0.2		-2.5226	-0.4142	3.2596	0.1338	-0.3866	-0.1259	-0.0002	0.0260	0.0157	-0.0006
E 0.2		0.2077	-0.1230	-0.5216	-0.1366	-0.0345	-0.0194	-0.0052	0.0007	0.0017	0.0012
I 0.3		1.1232	-20.0673	-33.6251	0.8933	31.9563	6.1748	-0.2413	-1.4349	-0.8079	0.0974
N 0.3		-1.0704	0.6209	2.6512	4.1017	2.5831	-0.0292	-0.1808	-0.1695	0.0229	0.0470
F 0.3		-0.7660	-0.7691	-0.6304	3.1484	-0.0141	-0.4012	-0.1215	0.0055	0.0323	0.0294
L 0.3		0.1282	0.0227	-0.1633	-0.5082	0.1528	-0.0037	-0.0203	-0.0661	0.0012	0.0051
U 0.3		0.6149	-4.8173	-21.0526	-33.6444	-0.3311	20.2464	6.2026	-0.2349	-1.6208	-1.5043
E 0.3		-0.6511	-0.1230	0.8175	2.5831	4.0194	-0.4541	-0.0292	-0.1605	-0.1049	0.6120
N 0.4		-0.0297	-0.3971	-0.6470	-0.0470	3.1195	-0.6508	-0.4062	0.0217	0.0217	0.1023
C 0.4		0.0383	0.0395	0.0031	-0.1576	-0.5007	-0.1562	-0.0342	-0.0212	-0.0046	0.0089
I 0.5		5.1702	1.0351	-6.3978	-20.5212	-32.3965	0.0000	20.5212	6.3978	-1.0351	-5.1702
A 0.5		-0.1915	-0.2024	-0.0236	0.7889	2.5451	4.0023	0.7889	-0.0236	-0.2024	-0.1915
P 0.5		-0.1731	-0.0934	-0.4175	-0.6645	-0.0348	-0.0348	-0.6645	-0.4175	-0.0934	-0.1731
R 0.5		-0.0019	0.0201	0.0349	0.0039	-0.1562	0.1562	-0.0039	-0.0349	-0.0201	0.0019
A 0.6		1.5043	1.6208	0.2349	-6.2026	-20.2464	-32.3965	0.3311	33.0444	21.0526	-8.6149
C 0.6		0.0120	-0.1019	0.1805	-0.0292	0.7804	2.5451	4.0194	0.6175	-0.1230	-0.6511
A 0.6		0.1023	0.0217	-0.1247	-0.4062	-0.6508	-0.0295	-0.0470	-0.6770	-0.3971	0.0297
S 0.6		-0.0089	0.0046	0.0212	0.0342	0.0033	-0.1562	0.1576	-0.0031	-0.0395	-0.0383
E 0.6		-0.0974	0.8079	1.4349	0.2413	-6.1748	-31.9563	0.8933	33.6251	20.0673	-1.1232
C 0.6		0.0470	-0.0229	-0.1095	-0.1808	-0.0292	-0.7889	2.5831	4.1017	2.6512	0.6209
A 0.6		0.0294	0.0323	0.0055	-0.1215	0.4012	-0.6446	-0.0141	-0.0304	-0.7691	-0.7660
D 0.6		-0.0051	-0.0012	0.0061	0.0203	0.0333	0.0037	-0.1528	0.1633	-0.0227	-0.1282
0.6		-0.3829	0.1841	0.6880	1.4740	0.2612	-6.3614	-20.9574	0.0064	38.3715	39.1834
0.6		0.0275	0.0065	-0.0325	-0.1095	-0.1805	-0.0236	0.8175	2.6512	4.1729	2.5345
0.6		-0.0006	0.0157	0.0260	-0.0002	-0.1259	-0.3866	-0.5743	3.2596	-0.4182	-2.5226
0.6		-0.0012	-0.0017	-0.0007	0.0052	0.0194	0.0345	0.0110	-0.1366	0.1250	-0.2077
0.9		-0.2993	-0.0410	0.4804	1.1846	1.7201	-0.4619	-6.9134	-39.1101	19.6001	127.8761
0.9		0.0054	0.0094	0.0065	-0.0229	-0.1019	-0.2024	-0.1230	2.5345	4.7844	5.0088
0.9		-0.0032	0.0034	0.0105	0.0121	-0.0131	-0.0993	-0.2425	0.3953	2.5128	-4.0291
0.9		0.0004	-0.0003	-0.0017	-0.0013	0.0045	0.0201	0.0398	-0.1230	-0.5000	-0.0093
0.9		-0.2655	-0.0687	0.3039	1.0566	1.7912	-0.3794	-7.6633	-41.5415	-1.8557	200.0002
1.0		0.0122	0.0054	0.0275	0.0470	0.1019	-0.1915	-0.6511	-1.0704	5.0088	16.0000
1.0		0.0000	-0.0003	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000
1.0		0.0000	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000



$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = n_0 \frac{S^2}{kb} P$$

$$p = n_p \frac{P}{bL}$$

$$M = n_M PL$$

$$V = n_V P$$

TABELA 1.15

ESTRUTURA 1



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM V					ESFORÇO externo: Momento					(LER NA VERTICAL)				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.6	0.7	0.8	0.9	1.0
100ηφ	574.1435	459.0250	409.4446	367.7498	334.8006	310.7095	294.9079	286.1953	282.7715	282.2552						
100ηP	-7.0305	-6.7291	-6.4530	-6.1647	-5.9012	-5.6868	-5.5343	-5.4446	-5.4075	-5.4015						
100ηM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
L 0.1	514.7991	459.6592	410.0554	368.3352	335.3625	311.2520	295.4365	286.7156	283.2684	282.7715						
I 0.1	-3.1934	-5.1793	-5.0706	-4.9231	-4.7707	-4.6377	-4.5386	-4.4783	-4.4527	-4.4486						
N 0.1	96.7993	86.8182	76.6947	66.6056	56.5339	46.4745	36.4339	26.4151	16.4151	6.4339						
H 0.1	-0.6095	-0.6074	-0.5954	-0.5836	-0.5722	-0.5616	-0.5516	-0.5422	-0.5333	-0.5250						
A 0.2	459.6592	463.7864	414.0541	372.1849	339.0694	314.8394	298.9371	290.1644	286.7156	286.1953						
E 0.2	-3.5515	-3.5607	-3.6224	-3.6913	-3.7648	-3.8439	-3.9284	-4.0186	-4.1146	-4.2166						
D 0.2	83.3886	88.4238	88.6056	88.6947	88.6947	88.6056	88.4238	83.3886	76.6947	66.6056						
E 0.2	-1.0452	-1.0441	-1.0356	-1.0286	-1.0226	-1.0174	-1.0131	-1.0094	-1.0062	-1.0034						
I 0.3	409.4446	414.0554	424.0563	438.4427	459.6592	487.4339	521.7095	562.2552	609.1435	662.2552						
N 0.3	-2.0860	-2.0951	-2.1130	-2.1396	-2.1747	-2.2182	-2.2693	-2.3270	-2.3914	-2.4616						
L 0.3	76.4120	76.4538	76.6947	77.1919	77.9347	78.9124	80.1245	81.5715	83.2547	85.0745						
F 0.3	-1.3255	-1.3225	-1.3225	-1.3225	-1.3225	-1.3225	-1.3225	-1.3225	-1.3225	-1.3225						
L 0.4	367.7498	368.3352	372.1849	399.2387	438.4427	487.4339	547.2552	607.1435	667.0339	726.9245						
E 0.4	-0.7789	-0.7839	-0.8186	-0.8684	-0.9339	-1.0152	-1.1124	-1.2256	-1.3548	-1.5000						
N 0.4	67.3342	62.3758	62.6247	63.1726	63.9841	65.0459	66.3584	67.9124	69.6079	71.4476						
C 0.4	-1.4686	-1.4683	-1.4694	-1.4726	-1.4774	-1.4836	-1.4904	-1.4978	-1.5058	-1.5144						
I 0.4	334.8006	335.3625	339.0694	348.4427	365.3153	390.8115	424.0563	467.2552	519.4446	580.6340						
A 0.4	0.4042	0.4011	0.3791	0.3186	0.1992	-0.0000	-0.1992	-0.4042	-0.7182	-1.0910						
P 0.5	47.4670	47.5033	47.7250	48.2315	49.0219	50.0000	51.1674	52.5247	54.0745	55.8182						
A 0.5	-1.4858	-1.4865	-1.4905	-1.4982	-1.5072	-1.5172	-1.5282	-1.5396	-1.5516	-1.5642						
R 0.5	319.7095	311.2520	314.8394	323.9377	340.3736	365.3153	399.2387	438.4427	487.4339	547.2552						
A 0.6	1.4910	1.4898	1.4801	1.3876	1.2734	1.1476	1.0094	0.8684	0.7347	0.6182						
A 0.6	32.9960	33.0240	33.1975	33.6007	34.2506	35.0459	36.0159	37.1674	38.5000	40.0159						
S 0.6	-1.3903	-1.3913	-1.3966	-1.4091	-1.4272	-1.4476	-1.4694	-1.4926	-1.5174	-1.5438						
E 0.6	294.9079	295.4365	296.9371	307.8324	323.9377	348.4427	381.8782	424.0563	472.2552	529.4446						
C 0.7	2.5106	2.5114	2.5146	2.5146	2.5063	2.4756	2.4042	2.2690	2.1430	2.0251						
A 0.7	20.0104	20.0288	20.1336	20.4151	20.8612	21.4593	22.1445	22.8081	23.5247	24.2939						
A 0.7	-1.1898	-1.1908	-1.1967	-1.2103	-1.2297	-1.2552	-1.2866	-1.3231	-1.3656	-1.4141						
D 0.8	286.1953	286.7156	290.1644	298.9371	314.8394	339.0694	372.1849	414.0563	463.7864	519.4446						
E 0.8	3.4896	3.4929	3.5060	3.5368	3.5824	3.6339	3.6748	3.6813	3.6507	3.5515						
C 0.8	9.5322	9.5415	9.6004	9.7406	9.9745	10.2947	10.6735	11.0924	11.5415	12.0159						
A 0.8	-0.8895	-0.8903	-0.8955	-0.9075	-0.9274	-0.9539	-0.9844	-1.0139	-1.0415	-1.0674						
D 0.9	282.7715	283.2834	286.7156	295.4365	311.2520	335.3625	368.3352	414.0563	467.2552	529.4446						
E 0.9	4.4466	4.4527	4.4783	4.5386	4.6377	4.7707	4.9231	5.0706	5.1793	5.2488						
C 0.9	2.5420	2.5447	2.5613	2.6013	2.6686	2.7622	2.8755	3.0000	3.1318	3.2707						
A 0.9	-0.4925	-0.4930	-0.4962	-0.5037	-0.5162	-0.5336	-0.5544	-0.5782	-0.6054	-0.6366						
D 1.0	282.2552	282.7715	286.1953	294.9079	310.7095	334.8006	367.7498	409.1435	459.6592	519.4446						
E 1.0	5.4016	5.4075	5.4446	5.5343	5.6688	5.8486	6.0745	6.3486	6.6726	7.0466						
C 1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
A 1.0	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000						

$$S = \sqrt{\frac{kb}{ZEI}}$$

$$\varphi = \eta_0 \frac{3}{kb} M$$

$$P = \eta_1 \frac{M}{bL^2}$$

$$M = \eta_2 M$$

$$V = \eta_3 \frac{M}{L}$$

TABELA 1.16

ESTRUTURA 1

SL=2.00

Esforço externo: Momento

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →					(LER NA VERTICAL)				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	430.4775	278.4543	214.8619	162.7569	122.7173	94.2546	76.0904	66.3304	62.5840	62.0298	
100ηM	-9.0732	-6.1431	-7.3111	-6.4580	-5.6916	-5.0765	-4.6485	-4.3987	-4.2364	-4.2334	
100ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
L 0.1	351.5767	279.4658	215.7794	163.5766	123.4435	94.9066	76.6699	66.8992	63.1401	62.5840	
I	-9.9471	-5.9845	-5.1334	-5.5903	-4.7084	-4.3232	-4.0365	-3.8669	-3.7946	-3.7831	
N	96.0106	96.0692	93.3690	91.0119	88.6821	86.4135	84.2227	82.1109	80.0647	78.0575	
H	-0.7457	-0.7393	-0.7029	-0.6451	-0.5807	-0.4701	-0.4344	-0.4133	-0.4046	-0.4032	
A	278.4543	265.9512	221.7427	162.9522	128.2641	99.2669	80.7236	70.7387	66.8992	66.3304	
D	-3.4323	-3.4613	-3.4569	-3.4285	-3.3705	-3.3051	-3.2375	-3.1695	-3.1022	-3.0375	
E	86.0234	86.1295	86.6883	86.8883	87.1764	87.4489	87.6988	87.9228	88.1109	88.2647	
I	-1.2098	-1.2067	-1.1173	-1.0302	-0.9411	-0.8641	-0.8072	-0.7729	-0.7584	-0.7561	
N	214.8619	215.7794	221.7427	236.5259	262.4787	301.5447	348.8219	401.1716	456.6899	512.7236	
H	-1.4663	-1.4875	-1.6332	-2.0188	-2.4292	-2.8636	-3.3155	-3.7881	-4.2707	-4.7589	
A	72.5579	72.6826	73.8005	74.8776	75.9104	76.9004	77.8489	78.7574	79.6264	80.4574	
D	-1.4505	-1.4499	-1.4420	-1.4115	-1.3439	-1.2590	-1.1761	-1.0755	-0.9584	-0.8226	
I	162.7589	163.5766	168.9522	182.4787	206.6593	252.8219	311.0785	382.4787	466.6899	562.7589	
N	0.0362	0.0219	-0.0764	-0.3507	-0.8803	-1.4301	-2.0872	-2.8459	-3.7022	-4.6584	
H	57.5874	57.7094	58.4403	60.0499	62.4329	64.5875	66.4944	68.1574	69.5774	70.7589	
A	-1.5186	-1.5197	-1.5241	-1.5263	-1.5110	-1.4638	-1.3875	-1.2826	-1.1470	-0.9874	
I	122.7173	123.4435	128.2641	140.5447	162.8219	196.7222	248.8219	322.4787	418.6899	536.7589	
N	1.1701	1.1620	1.1024	0.9333	0.5894	0.0000	-0.5894	-1.1620	-1.7017	-2.1701	
H	42.8224	42.7273	43.3706	44.6394	47.1423	50.9000	55.0499	59.5874	64.5264	69.8699	
A	-1.4556	-1.4578	-1.4470	-1.4194	-1.3526	-1.2575	-1.1326	-0.9874	-0.8226	-0.6374	
I	94.2546	94.9066	99.2689	110.4907	131.0785	162.8219	206.6593	262.4787	332.4787	418.6899	
N	2.0307	2.0280	2.0051	1.9298	1.7572	1.4301	0.8503	0.0784	-0.0219	-0.0362	
H	28.8049	28.8845	29.3802	30.5382	32.4159	34.8745	37.5671	40.4999	43.7094	47.2589	
A	-1.2936	-1.2964	-1.3129	-1.3493	-1.4032	-1.4638	-1.5110	-1.5263	-1.5241	-1.5186	
I	76.0904	76.6899	80.7236	91.1716	110.4907	140.5447	182.4787	236.5259	299.4658	378.4543	
N	2.7057	2.7081	2.7166	2.7298	2.7165	2.6362	2.4292	2.0168	1.4675	0.8663	
H	17.0026	17.0542	17.3791	18.1504	19.4293	21.1604	23.1633	25.1222	27.0499	28.8224	
A	-1.0556	-1.0584	-1.0755	-1.1150	-1.1781	-1.2590	-1.3439	-1.4115	-1.4499	-1.4505	
I	66.3304	66.8992	70.7387	80.7236	99.2689	128.2641	168.9522	221.7427	279.4658	351.5767	
N	3.2706	3.2775	3.3195	3.4122	3.5501	3.7655	3.8285	3.6450	3.2669	2.7589	
H	7.8969	7.9228	8.0874	8.4828	9.1489	10.0712	11.1764	12.3264	13.5317	14.7993	
A	-0.7561	-0.7584	-0.7729	-0.8072	-0.8641	-0.9411	-1.0302	-1.1173	-1.1918	-1.2598	
I	62.5840	63.1401	66.8992	76.6899	94.9066	123.4435	163.5766	215.7794	279.4658	351.5767	
N	3.7831	3.7946	3.8669	4.0385	4.3232	4.7064	5.1543	5.5903	5.9134	6.1264	
H	2.0575	2.0647	2.1109	2.2227	2.4135	2.6821	3.0119	3.3690	3.7002	4.0000	
A	-0.4032	-0.4046	-0.4133	-0.4344	-0.4701	-0.5200	-0.5807	-0.6451	-0.7029	-0.7589	
I	62.0298	62.5840	66.3304	76.0904	94.2546	122.7173	162.7589	214.8619	278.4543	351.5767	
N	4.2804	4.2964	4.3987	4.6485	5.0785	5.6916	6.4580	7.3111	8.2589	9.2732	
H	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	
A	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	

$$s = \sqrt{\frac{I_b}{4EI}}$$

$$\varphi = \eta \phi \frac{M}{kb} \quad p = \eta p \frac{M}{bl^2} \quad N = \eta N \quad V = \eta V \quad \dot{M}$$

TABELA 1.17

ESTRUTURA 1

SL=2.50 Esforço externo: Momento



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →					(LÍNEA NA VERTICAL)				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L 0.1	100n _φ	404.1420	217.3405	143.2839	85.5823	43.6898	15.6821	-1.0636	-9.5255	-12.5049	-12.9896
	n _p	-12.7470	-10.5711	-8.7083	-6.8653	-5.2671	-4.0309	-3.1906	-2.7161	-2.5263	-2.4974
	100n _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	n _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		306.0164	218.9606	144.6420	86.6708	44.5392	16.3437	-0.5514	-9.0666	-12.1357	-12.5649
I 0.1		-7.2051	-7.1687	-6.4642	-5.5238	-4.5812	-3.7833	-3.2655	-2.8631	-2.7210	-2.6987
		94.6141	4.7194	-3.9809	-3.2096	-2.5197	-1.9745	-1.5981	-1.3828	-1.2958	-1.2825
		-0.9849	-0.9730	-0.8672	-0.7588	-0.64925	-0.5398	-0.4311	-0.3299	-0.2624	-0.2599
		217.3405	229.1675	153.3992	93.8420	50.2555	20.8918	3.1603	-5.6059	-9.0466	-9.5255
		-3.1340	-3.2047	-3.6833	-4.1494	-4.1250	-3.8498	-3.1912	-2.9848	-2.8919	-2.8764
A 0.2		81.8992	82.1401	63.9990	-14.4204	-11.9387	-9.6170	-6.3994	-5.6267	-5.3109	-5.2618
		-1.4903	-1.4839	-1.4311	-1.2906	-1.1029	-0.9148	-0.7555	-0.6402	-0.5718	-0.5390
		143.2839	144.6420	174.8621	111.9200	65.0540	32.9677	13.3094	3.1803	-2.0514	-1.0838
		-0.3374	-0.3848	-0.7149	-1.6038	-2.5342	-3.0912	-3.0728	-3.0147	-2.9760	-2.9682
		65.9439	66.2178	67.7907	71.0097	-24.7770	-20.5515	-16.9745	-14.3634	-12.8481	-12.1107
N 0.3		-1.6542	-1.6537	-1.6411	-1.5810	-1.4363	-1.2574	-1.0867	-0.9547	-0.8730	-0.8323
		85.5823	86.6708	93.8420	144.2341	144.2341	92.3410	55.8667	32.9277	20.8918	16.3437
		1.4292	1.4009	1.1953	-0.6155	-0.5530	-1.7517	-2.4132	-2.7256	-2.8400	-2.8670
		49.5653	49.8244	51.3793	54.8086	59.8830	-34.4224	-29.2853	-23.0673	-22.0706	-21.9118
		-1.5921	-1.5953	-1.6094	-1.6223	-1.6094	-1.5897	-1.5540	-1.4855	-1.4289	-1.3995
U 0.4		43.6898	44.5392	50.2555	65.0540	92.3410	134.4737	92.3410	65.0540	50.2555	44.5392
		2.4196	2.4064	2.3011	1.9777	1.2745	0.0000	-1.2745	-1.9777	-2.3011	-2.4064
		34.5513	34.7670	36.0963	39.1517	43.9770	50.0000	-43.9770	-39.1517	-36.0963	-34.7670
		-1.3942	-1.3995	-1.4289	-1.4665	-1.5540	-1.5897	-1.5540	-1.4855	-1.4289	-1.3995
		15.6821	16.3437	20.8918	32.9677	55.8667	92.3410	144.2341	144.2341	93.8420	66.6708
A 0.6		2.8670	2.8555	2.8400	2.7256	2.4432	1.7517	0.6155	-1.1953	-1.4009	-1.4292
		21.9118	22.0706	23.0573	25.4213	29.2883	34.4224	40.1170	-34.8086	-49.8244	-49.5653
		-1.1263	-1.1322	-1.1680	-1.2472	-1.3649	-1.4967	-1.5968	-1.6223	-1.6094	-1.5921
		-1.0836	-0.5514	3.1803	13.3094	32.9677	65.0540	111.9200	174.8621	153.3992	144.6420
		2.9682	2.9760	3.0147	3.0728	3.0912	2.9632	2.5342	1.6038	0.7149	0.3374
C 0.7		12.1107	12.2107	12.8461	14.3834	16.9745	20.5515	24.7770	28.9903	33.2047	33.1340
		-0.8323	-0.8380	-0.8730	-0.9547	-1.0867	-1.2574	-1.4363	-1.5610	-1.6411	-1.6542
		-9.5255	-9.0666	-5.8059	-3.1803	20.8918	50.2555	93.8420	153.3992	229.1675	218.9606
		2.8764	2.8919	2.9846	3.1912	3.4999	3.8498	4.1250	4.1494	3.8833	3.2047
		5.2618	5.3109	5.6267	6.3994	7.7297	9.6170	11.9387	14.4204	16.6010	18.1401
A 0.8		-0.5390	-0.5435	-0.5718	-0.6402	-0.7555	-0.9148	-1.1029	-1.2906	-1.4311	-1.4639
		-12.5649	-12.1357	-9.0666	-6.4642	-4.5392	-3.1912	-2.1867	-1.4462	-0.8872	-0.5770
		2.6987	2.7210	2.8631	3.2055	3.7833	4.45392	5.2338	6.4642	7.1687	7.3038
		1.2825	1.2958	1.3828	1.5981	1.9745	2.5197	3.2096	3.9809	4.7194	5.2491
		-0.2599	-0.2624	-0.2790	-0.3199	-0.3908	-0.4925	-0.6196	-0.7588	-0.8872	-0.9649
0.9		-12.9896	-12.5649	-9.5255	-6.4642	-4.5392	-3.1912	-2.1867	-1.4462	-0.8872	-0.5770
		2.4974	2.5263	2.7161	3.1906	4.0309	5.2671	6.8653	8.7083	10.5711	12.6925
		-0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		306.0164	218.9606	144.6420	86.6708	44.5392	16.3437	-0.5514	-9.0666	-12.1357	-12.5649
1.0		-7.2051	-7.1687	-6.4642	-5.5238	-4.5812	-3.7833	-3.2655	-2.8631	-2.7210	-2.6987
		94.6141	4.7194	-3.9809	-3.2096	-2.5197	-1.9745	-1.5981	-1.3828	-1.2958	-1.2825
		-0.9849	-0.9730	-0.8672	-0.7588	-0.64925	-0.5398	-0.4311	-0.3299	-0.2624	-0.2599
		217.3405	229.1675	153.3992	93.8420	50.2555	20.8918	3.1603	-5.6059	-9.0466	-9.5255
		-3.1340	-3.2047	-3.6833	-4.1494	-4.1250	-3.8498	-3.1912	-2.9848	-2.8919	-2.8764

$$S = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb} M$$

$$P = \eta P \frac{M}{bL^2}$$

$$M = \eta M M$$

$$V = \eta V \frac{M}{L}$$

TABELA 1.18

ESTRUTURA 1

Esforço externo: Momento

SL=3.00



(LER NA VERTICAL)

LINHA DE ESTADO PARA ESFORÇO APLICADO EM

z/L → 0.0

x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	401.5108	284.6024	185.1754	104.4060	46.1087	7.6402	-15.2439	-27.1198	-32.1291	-33.5717	-33.7259
I	-18.0071	-16.6891	-13.7550	-10.3453	-7.1570	-4.5509	-2.6529	-1.4373	-0.7890	-0.5432	-0.45072
N	103.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	284.6024	267.5559	185.1754	104.4060	46.1087	7.6402	-15.2439	-27.1198	-32.1291	-33.5717	-33.7259
A	-3.7648	-8.9844	-8.8057	-7.5652	-5.9397	-4.3629	-3.0757	-2.1762	-1.6606	-1.4528	-1.4209
N	92.6690	92.9369	6.0549	-4.7110	-3.3769	-2.2449	-1.3974	-0.8421	-0.5399	-0.4233	-0.4060
N	-1.3122	-1.2643	-1.1285	-0.8459	-0.6551	-0.4459	-0.2865	-0.1607	-0.1225	-0.0998	-0.0964
H	182.6711	185.1754	200.7211	116.6048	55.2159	13.8706	-11.2127	-24.5535	-30.3708	-32.1291	-32.3305
A	-2.5010	-2.6484	-3.6384	-4.6121	-4.5970	-4.0903	-3.4449	-2.8519	-2.5103	-2.3448	-2.3175
D	76.3237	76.7742	79.1016	-16.9739	-8.9463	-5.8664	-3.8578	-3.8578	-2.7389	-2.2981	-2.2317
E	-1.8526	-1.8428	-1.7541	-1.5075	-1.1840	-0.8699	-0.6135	-0.4342	-0.3315	-0.2900	-0.2837
I	102.4754	104.4060	116.6048	146.9772	78.3803	30.5017	0.2096	-16.7108	-24.5535	-27.1198	-27.4443
N	1.2968	1.2114	0.5999	-1.0967	-2.8310	-3.5210	-3.6148	-3.4548	-3.2644	-3.1560	-3.1356
O	57.2715	57.7581	60.5435	66.1973	-20.5531	-19.5137	-13.7642	-9.7448	-7.4405	-6.5113	-6.3686
F	-1.8947	-1.8963	-1.8871	-1.7998	-1.5606	-1.2542	-0.9650	-0.7528	-0.6215	-0.5662	-0.5574
L	44.7376	46.1087	55.2159	78.3803	120.0584	62.0990	23.2583	0.2096	-11.2127	-15.2439	-15.7958
U	3.2358	3.1948	2.8732	1.8970	-0.1971	-2.3082	-3.3269	-3.7027	-3.7687	-3.7477	-3.7389
E	39.3614	39.7974	42.4219	48.2283	56.8186	-33.6493	-25.2392	-19.0599	-15.3861	-13.8625	-13.6237
C	-1.6551	-1.6629	-1.6996	-1.7443	-1.7213	-1.5527	-1.3214	-1.1145	-0.9761	-0.9140	-0.9037
I	6.7392	7.0402	13.8706	30.5017	62.0990	112.1590	62.0990	30.5017	13.8706	7.6402	6.7392
A	3.8908	3.5602	3.7643	3.3231	2.2164	0.0000	-2.2164	-3.3231	-3.7643	-3.8802	-3.8908
P	24.5805	24.9237	27.0585	32.0259	39.9748	50.0000	-39.9748	-32.0259	-27.0585	-24.9237	-24.5805
A	-1.2903	-1.3005	-1.3584	-1.4725	-1.6073	-1.6793	-1.6073	-1.4725	-1.3584	-1.3005	-1.2903
R	-15.7958	-15.2439	-11.2127	0.2096	23.2583	62.0990	120.0584	78.3803	55.2159	46.1087	44.7376
A	3.7389	3.7477	3.7687	3.7027	3.3289	2.3082	0.1971	-1.8970	-2.8732	-3.1948	-3.2358
A	13.6237	13.8625	15.3861	19.0599	25.2392	33.6483	43.1914	-48.2283	-42.4219	-39.7974	-39.3614
S	-0.9037	-0.9140	-0.9761	-1.1145	-1.3214	-1.5527	-1.7213	-1.7443	-1.6996	-1.6629	-1.6551
E	-27.4443	-27.1198	-24.5535	-16.7108	0.2096	23.2583	62.0990	146.9772	116.6048	104.4060	102.4754
C	3.1356	3.1560	3.2644	3.4548	3.6148	3.5201	2.8310	1.0967	-0.5999	-1.2114	-1.2968
C	6.3686	6.5113	7.4405	9.7448	13.7642	19.5137	26.5531	33.6027	60.5435	57.7581	57.2715
A	-0.5574	-0.5662	-0.6215	-0.7528	-0.9690	-1.2542	-1.5606	-1.7998	-1.8871	-1.8963	-1.8947
D	-32.3305	-32.1291	-30.3708	-24.5535	-11.2127	13.8706	55.2159	116.6048	200.7211	185.1754	182.6711
A	2.3175	2.3348	2.5103	2.6619	3.4449	4.0903	4.5970	4.6121	3.6384	2.6484	2.5010
C	2.2317	2.2981	2.7389	3.8578	5.8664	8.8463	12.6638	16.9739	20.6984	-76.7742	-76.3237
A	0.2537	-0.2900	-0.3315	-0.4342	-0.6135	-0.8699	-1.1840	-1.5075	-1.7541	-1.8428	-1.8526
D	-33.7259	-33.5717	-32.1291	-27.1198	-15.2439	7.6402	46.1087	104.4060	165.1754	287.5559	284.6024
A	1.4209	1.4528	1.6606	2.1762	3.0757	4.3629	5.9397	7.5652	8.8057	8.9844	8.7648
O	0.4060	0.4233	0.5399	0.8421	1.3974	2.2449	3.3769	4.7110	6.0549	7.0631	-92.6690
A	-0.0964	-0.0998	-0.1225	-0.1607	-0.2865	-0.4459	-0.6551	-0.8959	-1.1285	-1.2843	-1.3122
I	-33.8730	-33.7259	-32.3305	-27.4443	-15.7958	6.7392	44.7376	102.4754	182.6711	284.6024	401.5108
A	0.5072	0.5432	0.7890	1.4373	2.6529	4.5509	7.1570	10.3453	13.7550	16.6891	18.0071
O	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta_0 \frac{3}{kb} M$$

$$P = \eta_p \frac{M}{bL^2}$$

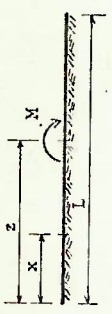
$$M = \eta_M M$$

$$V = \eta_V V$$

TABELA 1.19

ESTRUTURA 1

Esforço externo: Momento



LINHA DE ESTADO PARA ESFORÇO APLICADO EM $\frac{x}{L}$ (LEVA NA VERTICAL)

SL=3.50

x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	0.0	286.1794	153.3000	70.8955	17.5970	-12.5103	-26.6295	-31.3726	-31.8471	-31.3195	-31.1549
I	0.0	-24.5220	-17.1703	-11.7405	-7.0360	-3.5087	-1.1768	0.1644	0.7999	1.0121	1.0395
N	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.1	206.1784	156.9226	73.4574	19.1946	-11.6604	-26.2863	-31.3325	-31.9541	-31.4773	-31.3195
A	0.1	-10.2604	-10.6958	-8.6731	-6.2643	-4.0360	-2.3150	-1.1604	-0.5668	-0.3326	-0.2982
A	0.2	90.3590	90.8233	-7.4863	-5.3627	-3.3917	-1.8434	-0.7766	-0.1723	0.2822	0.2971
E	0.2	-1.6907	-1.6445	-1.3876	-1.0215	-0.6655	-0.3775	-0.1747	0.0117	0.0340	0.0371
D	0.2	153.3000	179.1835	89.9507	30.0120	-5.4679	-23.3704	-30.4245	-32.0649	-31.9541	-31.8471
I	0.2	-1.3704	-3.4433	-5.2403	-5.2577	-4.4325	-3.3949	-2.5108	-1.9411	-1.6925	-1.6522
N	0.3	70.0073	70.7453	74.5047	-19.3702	-13.0296	-7.7130	-3.6678	-0.2229	0.2305	0.2945
E	0.3	-2.2318	-2.2204	-2.0955	-1.7230	-0.8031	-0.4612	-0.2357	-0.1137	-0.0670	-0.0602
I	0.3	70.8955	73.4574	69.9507	130.1123	58.1126	11.9937	-13.8797	-26.0652	-31.3325	-31.3726
N	0.3	3.3250	3.1948	2.2179	-0.6189	-3.4429	-4.3440	-4.2257	-3.7409	-3.2923	-3.0578
F	0.3	47.9352	48.6806	52.9324	61.4797	-27.8592	-17.9758	-10.3321	-5.2481	-2.5576	-1.5146
C	0.3	-2.1047	-2.1125	-2.1249	-2.0303	-1.6905	-1.2461	-0.8456	-0.5498	-0.3759	-0.3048
I	0.4	17.5970	19.1946	20.0120	58.1126	109.5852	46.8663	7.5168	-13.8797	-23.3704	-26.2863
E	0.4	5.1269	5.0652	4.6913	3.3167	0.0612	-3.1549	-4.4153	-4.6348	-4.3170	-4.2623
N	0.4	28.9478	29.5665	33.3129	41.6533	51.0063	-22.4920	-20.9897	-12.8626	-8.1716	-6.3095
C	0.4	-1.6631	-1.6791	-1.7561	-1.6897	-1.8779	-1.6355	-1.2853	-0.9729	-0.7667	-0.6753
I	0.5	-12.5103	-11.6604	-5.4679	11.9937	46.8663	104.3979	46.8663	11.9937	-5.4679	-11.6604
A	0.5	5.1659	5.1758	4.7358	3.3243	0.0000	-3.3243	-4.7358	-5.1758	-5.1659	-5.1269
P	0.5	14.9417	15.3890	18.2173	24.9347	35.9169	50.0000	-35.9169	-24.9347	-18.2173	-15.3890
A	0.5	-1.1377	-1.1551	-1.2538	-1.4506	-1.6863	-1.8138	-1.6863	-1.4506	-1.2538	-1.1551
R	0.5	-26.6295	-26.2883	-23.3704	-13.8797	7.5168	46.8663	109.5852	58.1126	30.0120	19.1946
A	0.6	4.2823	4.3170	4.4735	4.6348	4.4153	3.1549	0.0612	-3.3167	-4.6913	-5.0852
A	0.6	6.0259	6.3095	8.1716	12.8265	20.9697	32.4920	45.9917	-41.6533	-33.3129	-29.5665
S	0.6	-0.6603	-0.6753	-0.7667	-0.9729	-1.2853	-1.6355	-1.8779	-1.6997	-1.7581	-1.6791
E	0.6	-31.3726	-31.3325	-30.4245	-26.0652	-13.8797	11.9937	58.1126	130.1123	89.9507	73.4574
C	0.6	3.0157	3.0378	3.2923	3.7409	4.2257	4.3440	3.4429	0.6189	-2.2179	-3.1948
C	0.7	1.3615	1.5146	2.5576	5.2681	10.3321	17.9758	27.8592	38.5203	52.9324	48.6806
A	0.7	-0.2937	-0.3048	-0.3759	-0.5498	-0.8456	-1.2461	-1.6905	-2.6303	-2.4124	-2.1125
D	0.7	-31.8471	-31.9541	-32.0649	-30.4245	-23.3704	-13.8797	11.9937	58.1126	109.5852	156.9226
L	0.7	1.6522	1.6925	1.9411	2.5108	3.3949	4.4325	5.2577	5.2577	4.4325	3.3949
L	0.8	-0.2945	-0.2305	0.2229	1.0635	3.8678	7.7130	13.0296	19.3702	25.4953	30.4245
L	0.8	-0.0602	-0.0671	-0.1137	-0.2357	-0.4612	-0.8031	-1.2461	-1.6905	-2.6303	-2.4124
L	0.9	-31.3195	-31.4773	-31.9541	-31.3325	-26.2863	-11.6604	19.1946	73.4574	156.9226	270.6632
L	0.9	0.2982	0.3326	0.5668	1.1604	2.3150	4.0360	6.2643	8.6731	10.5579	10.6988
L	0.9	0.2971	0.2822	-0.1723	0.1420	0.7766	1.8434	3.3917	5.3527	7.4883	9.1767
L	0.9	0.0371	0.0340	0.0117	-0.0508	-0.1747	-0.3775	-0.6655	-1.0215	-1.3876	-1.6445
L	1.0	-31.1549	-31.3195	-31.8471	-31.3726	-26.6295	-12.5103	17.5970	70.8955	153.3000	266.1784
L	1.0	-1.0395	-1.0121	-0.7999	-0.1644	1.1768	3.5087	7.0360	11.7405	17.1703	24.5220
L	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt[4]{\frac{kb}{4EI}}$$

$$P = \eta_p \frac{M}{bL^2}$$

$$\varphi = \eta_\phi \frac{S^3}{k_b} M$$

$$M = \eta_M M$$

$$V = \eta_V \frac{M}{L}$$

TABELA 1.20



ESTRUTURA I
Esforço externo: Momento

SL=4.00

x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM $\frac{y}{0.5}$ (LER NA VERTICAL)										
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
0.0	0.0	403.8424	247.8142	126.1101	44.5599	-1.6070	-22.3288	-27.8134	-26.2419	-23.0672	-21.0622	-20.6969
0.0	100n _p	-32.0493	-28.1602	-20.3865	-12.5313	-6.3313	-2.1611	0.1862	1.3041	1.6965	1.7738	1.7762
0.0	100n _M	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	n _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0	254.2654	131.0078	47.7124	0.0880	-21.6520	-27.7449	-26.4777	-23.4211	-21.4552	-21.0622	-20.6969
0.1	0.1	-11.3990	-12.1935	-9.6335	-6.4071	-3.8599	-1.5912	0.3750	0.2142	0.4181	0.4452	0.4580
0.1	0.2	67.8284	68.5669	-8.8453	-5.7911	-3.1819	-1.3284	0.0202	0.6020	0.6181	0.6671	0.6671
0.1	0.3	-2.0905	-2.0208	-1.6335	-1.1100	-0.6377	-0.2694	0.0464	0.0957	0.1098	0.1113	0.1113
0.1	0.4	129.1101	131.0078	68.2129	11.9831	-16.1621	-26.3172	-27.2289	-25.1062	-23.4211	-23.0672	-23.0672
0.1	0.5	0.3574	0.3709	-6.0555	-6.1024	-4.8514	-3.3362	-2.0979	-1.3315	-1.0068	-0.9580	-0.9580
0.1	0.6	63.5116	64.6148	-21.1636	-12.7419	-6.2440	-1.9941	0.3615	1.4130	1.7360	1.7360	1.7360
0.1	0.7	-2.5770	-2.5682	-2.4148	-1.2695	-0.7148	-0.3173	0.0771	0.0408	0.0313	0.0667	0.0667
0.1	0.8	44.5599	47.7124	118.6073	44.0815	0.8990	-19.5901	-26.5146	-27.2289	-26.4777	-26.2419	-26.2419
0.1	0.9	5.6090	5.4377	4.0499	-4.4413	-5.4227	-4.8486	-3.6355	-3.0105	-2.6049	-2.5345	-2.5345
0.1	1.0	39.0101	40.0404	45.9057	57.5908	-28.2939	-7.1039	-1.7495	0.8609	1.7868	1.9072	1.9072
0.2	0.0	-2.2359	-2.2555	-2.3166	-1.8137	-1.2375	-0.7300	0.0374	-0.1752	-0.0977	-0.0862	-0.0862
0.2	0.1	-1.6070	0.0880	11.9831	104.8146	37.7468	-1.0185	-19.5901	-26.3172	-27.7449	-27.8134	-27.8134
0.2	0.2	6.8192	6.8039	6.4401	0.1542	-4.3141	-5.5924	-5.3612	-4.7540	-4.3617	-4.2846	-4.2846
0.2	0.3	19.7832	20.5606	25.3156	51.9556	-30.9538	-17.0003	-7.6799	-2.6684	-0.7181	-0.5092	-0.5092
0.2	0.4	-1.5899	-1.6113	-1.7622	-2.0604	-1.7439	-1.2619	-0.8376	-0.5638	-0.4453	-0.4263	-0.4263
0.2	0.5	-22.3288	-21.6520	-16.1621	0.8990	102.1673	37.7468	0.8990	-16.1621	-21.6520	-22.3288	-22.3288
0.2	0.6	5.9461	6.0013	6.1838	4.5482	0.0000	-4.5482	-6.0550	-6.1838	-6.0013	-5.9461	-5.9461
0.2	0.7	7.2048	7.7043	10.9477	18.9045	32.3425	-18.9045	-10.9477	-7.7043	-7.2048	-7.2048	-7.2048
0.2	0.8	-0.9407	-0.9667	-1.1161	-1.7895	-1.9939	-1.7695	-1.4192	-1.1161	-0.9667	-0.9407	-0.9407
0.2	0.9	-27.8134	-27.7449	-26.3172	-19.5901	37.7468	104.8146	44.0615	11.9831	0.8680	-1.6070	-1.6070
0.2	1.0	4.2846	4.3617	4.7540	5.5924	4.3141	-0.1542	-4.7540	-6.4401	-6.8039	-6.8192	-6.8192
0.3	0.0	0.5092	0.7618	2.6684	7.6799	17.0003	30.9538	48.0444	-36.0210	-25.3156	-20.5066	-19.7832
0.3	0.1	-0.4263	-0.4453	-0.5638	-0.8376	-1.2619	-1.7439	-2.0604	-1.9830	-1.7622	-1.6183	-1.5899
0.3	0.2	-26.2419	-26.4777	-27.2289	-26.5146	-19.5901	0.8990	44.0615	118.6073	68.2129	47.7124	44.5599
0.3	0.3	2.5345	2.6049	3.0105	3.8355	4.8486	5.4227	4.4413	0.2594	-4.0499	-5.4377	-5.6090
0.3	0.4	-1.9072	-1.7868	-0.8609	1.7495	15.9565	28.2939	42.4092	45.9057	40.0404	39.0101	39.0101
0.3	0.5	-0.0862	-0.0977	-0.1752	-0.3741	-0.7300	-1.2375	-1.6137	-2.2479	-2.3166	-2.2555	-2.2359
0.3	0.6	-23.0672	-23.4211	-25.1062	-27.2289	-26.3172	-16.1621	11.9831	68.2129	160.9157	131.0078	126.1101
0.3	0.7	0.9550	1.0088	1.3315	2.0979	3.3362	4.8514	6.1024	6.0555	3.0743	0.0709	-0.3574
0.3	0.8	-1.7736	-1.7360	-1.4130	-0.3615	1.9941	6.2440	12.7419	21.1636	29.8471	64.6148	63.5116
0.3	0.9	0.0867	0.0813	0.0408	-0.0771	-0.3173	-0.7148	-1.2695	-1.9053	-2.4148	-2.5682	-2.5776
0.3	1.0	-21.0622	-21.4652	-23.4211	-26.4777	-27.7449	-21.6520	-27.7449	-26.4777	-23.4211	-21.4652	-21.0622
0.4	0.0	-0.4452	-0.4181	-0.2142	0.3750	1.5912	6.4071	9.6335	12.2354	12.1935	11.3990	11.3990
0.4	0.1	-0.6671	-0.6618	-0.6620	-0.3720	0.2026	1.3284	3.1619	5.7911	8.8453	11.4331	87.8284
0.4	0.2	0.1113	0.1095	0.0957	0.0464	-0.0702	-0.2694	-0.0637	-1.1100	-1.6335	-2.0208	-2.0905
0.4	0.3	-20.6969	-21.0822	-23.0672	-26.2419	-27.8134	-22.3288	-1.6070	44.5599	126.1101	247.8142	400.8424
0.4	0.4	-1.7762	-1.7738	-1.6965	-1.3041	-0.1862	2.1611	6.3313	12.5313	20.3865	28.1602	32.0493
0.4	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{4u}{4EI}}$$

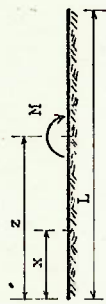
$$\varphi = \eta \phi \frac{3}{KB} M$$

$$P = \eta P \frac{N}{BL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 1.21



ESTRUTURA 1
Esforço externo: Momento

SL=4.50

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)										
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
I	100%	400.3283	229.9977	101.4751	23.1630	-14.5567	-26.2118	-24.6544	-18.7976	-13.6268	-11.0251	-10.5693
	η_x	-40.5382	-34.5251	-23.1800	-12.6013	-5.0639	-0.6916	1.3063	1.9083	1.9026	1.7902	1.7603
	0.0	100%	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L	η_y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.1	229.9977	238.7815	107.7342	26.7843	-12.9383	-25.8252	-24.6784	-19.2415	-14.1044	-11.4867	-11.0251
	0.2	-12.0287	-13.3593	-13.7873	-10.4074	-6.3539	-3.0722	-0.9439	0.1647	0.6496	0.7747	0.7864
H	0.0	85.1355	86.2377	-10.0438	-5.9461	-2.7518	-0.7437	0.2796	0.6683	0.7440	0.7273	0.7192
	0.1	-2.4984	-2.4003	-1.8527	-1.1529	-0.5720	-0.1684	0.0164	0.1050	0.1279	0.1286	0.1277
	0.2	101.4751	107.7342	145.8542	50.7828	-0.8521	-21.6953	-25.0935	-21.3109	-16.6911	-14.1044	-13.6268
A	0.0	2.6873	2.0480	-2.5595	-7.0963	-7.1060	-5.2868	-3.2294	-1.6510	-0.7343	-0.3707	-0.3161
	0.1	57.0843	58.6273	66.2666	-22.2135	-11.8170	-4.5479	-0.3860	1.5120	2.1271	2.2189	2.2147
	0.2	-2.8678	-2.8563	-2.6988	-2.0461	-1.2540	-0.6095	-0.1901	0.0332	0.1257	0.1507	0.1531
E	0.0	23.1630	26.7843	50.7828	110.9007	33.8076	6.3023	-21.5462	-23.6870	-21.3109	-19.2415	-18.7976
	0.1	8.0676	7.8153	6.0361	-0.0464	-5.8235	-3.6675	-5.4071	-3.7121	-2.4569	-1.8748	-1.7774
	0.2	30.9390	32.2820	39.8003	54.7295	-27.8235	-13.5765	-4.2783	0.6618	2.7471	3.3097	3.43640
U	0.0	-2.2738	-2.3118	-2.4528	-2.4488	-1.9266	-1.2199	-0.6245	-0.2331	-0.0303	0.0424	0.0524
	0.1	-14.5567	-12.9383	0.8521	33.8076	102.6690	31.1250	-6.4691	-21.5462	-25.0935	-24.6784	-24.6544
	0.2	8.1459	8.1865	8.0239	6.2288	0.1002	-5.7690	-6.8094	-5.8347	-4.5963	-3.6958	-3.7659
E	0.0	12.3747	13.2677	18.8215	31.5616	50.7295	-29.1039	-13.5147	-3.8621	0.8739	2.4814	2.6907
	0.1	-1.4376	-1.4817	-1.7108	-2.0812	-2.2650	-1.8710	-1.2466	-0.7119	-0.3801	-0.2418	-0.2202
	0.2	-26.2118	-25.8252	-21.6953	-23.6870	101.7894	31.1250	-6.3023	-21.5462	-25.0935	-24.6784	-24.6544
A	0.0	6.1441	6.2705	6.8162	7.2443	5.9030	0.0000	-5.9030	-7.2443	-6.8162	-6.2705	-6.1441
	0.1	1.7835	2.2749	5.6056	14.1883	29.3726	50.0000	-29.3726	-14.1883	-5.6056	-2.2749	-1.7835
	0.2	-0.7144	-0.7493	-0.9531	-1.3773	-1.9106	-2.2130	-1.9106	-1.3773	-0.9531	-0.7493	-0.7144
A	0.0	-24.6544	-24.8784	-25.0935	-21.5462	-6.4691	31.1250	102.6690	33.8076	110.9007	26.7843	23.1630
	0.1	3.7659	3.8958	4.5963	5.8347	6.8094	5.7690	-0.1002	-6.2288	-8.0239	-8.1459	-8.1865
	0.2	-2.6907	-2.4814	-0.8739	3.8621	13.5147	29.1039	49.2705	-31.5616	-18.8215	-13.2677	-12.3747
S	0.0	-0.2202	-0.2418	-0.3801	-0.7119	-1.2466	-1.8710	-2.2650	-2.0812	-1.7108	-1.4817	-1.4376
	0.1	-18.7976	-19.2415	-21.3109	-23.6870	-21.5462	-6.3023	33.8076	110.9007	50.7828	26.7843	23.1630
	0.2	-1.7774	-1.8748	-2.4569	-3.7121	-5.4071	-6.6875	-5.8235	-4.2783	-3.8621	-3.3097	-3.3640
C	0.0	-3.3640	-3.3097	-2.7471	-0.6848	4.2783	13.5765	27.8235	45.2705	-39.8003	-32.2820	-30.9390
	0.1	0.0524	0.0424	-0.0303	-0.2331	-0.6245	-1.2199	-1.9266	-2.4488	-2.4528	-2.3118	-2.2738
	0.2	-13.6268	-14.1044	-16.6911	-21.3109	-25.0935	-21.6953	-0.8521	50.7828	145.8542	107.7342	101.4751
C	0.0	0.3161	0.3707	0.7343	1.6510	3.2294	5.2868	7.1060	7.0963	2.5595	-2.0480	-2.6873
	0.1	-2.2147	-2.2189	-2.1571	-1.5120	0.3880	4.5479	11.8170	22.2135	33.7314	58.6270	57.0843
	0.2	0.1531	0.1507	0.1257	0.0332	-0.1901	-0.6095	-1.2540	-2.0461	-2.6988	-2.8663	-2.8678
C	0.0	-11.0251	-11.4867	-14.1044	-19.2415	-24.8784	-25.8252	-24.6784	-19.2415	-14.1044	-11.4867	-11.0251
	0.1	-0.7864	-0.7747	-0.6496	-0.1847	0.9439	3.0722	6.3539	10.4074	13.7873	13.3593	12.0287
	0.2	-0.7192	-0.7273	-0.7440	-0.7437	-0.2796	0.1684	0.6683	0.7440	0.7440	0.7273	0.7192
C	0.0	0.1277	0.1296	0.1279	0.1050	0.0184	-0.1864	-0.5720	-1.1529	-1.8527	-2.4003	-2.4984
	0.1	-10.5693	-11.0251	-13.6268	-18.7976	-24.6544	-26.2118	-24.6544	-18.7976	-13.6268	-11.0251	-10.5693
	0.2	-1.7603	-1.7902	-1.9026	-1.9083	-1.3063	-0.6916	0.6095	1.6510	2.1271	2.2147	2.2147
C	0.0	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta_4 \frac{s^3}{kb} M$$

$$p = \eta_p \frac{M}{bL^2}$$

$$M = \eta_M M$$

$$V = \eta_V \frac{M}{L}$$

TABELA 1.23

ESTRUTURA 1

SL=5.50

Esforço externo: Momento

LINHA DE ESTADO PARA ESFORÇO APLICADO EM V (LER NA VERTICAL)



x/L	z/L →	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	400.0133	196.7601	60.4174	-6.0425	-26.0348	-23.9939	-14.5975	-6.6676	-2.0250	-0.2458	0.0102	0.0102
ηP	-60.5040	-48.0070	-27.0910	-10.6799	-1.5022	2.0662	2.5415	1.8718	1.1444	0.7647	0.6978	0.6978
100ηM	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ηV	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
196.7601	211.3549	69.4252	-2.0361	-25.0873	-23.9939	-15.3064	-7.2519	-4.8660	-2.4135	-0.5223	0.2458	0.2458
-11.5149	-14.6389	-16.6566	-11.5193	-5.7976	-1.8792	0.0815	0.7373	0.7911	0.7123	0.6889	0.6889	0.6889
79.3412	81.4745	-11.8571	-5.5020	-1.4719	0.3780	0.8648	0.7501	0.5155	0.3752	0.3488	0.3488	0.3488
-3.3175	-3.1509	-2.1987	-1.1149	-0.3661	0.0099	0.1321	0.1312	0.0973	0.0742	0.0697	0.0697	0.0697
60.4174	69.4252	124.6392	26.5364	15.3284	-23.8772	-18.4509	-10.4985	-4.8660	-2.4135	-0.5223	0.2458	0.2458
8.8141	7.6669	-1.3787	-9.9956	-9.3780	-5.9055	-2.6973	-0.6940	-0.2251	0.5010	0.5313	0.5313	0.5313
44.7596	47.3651	60.0077	-22.3438	-8.6907	-1.1327	1.7847	2.2139	1.8055	1.4504	1.3752	1.3752	1.3752
-3.2636	-3.3027	-3.1766	-2.2297	-1.1380	-0.3793	0.0057	0.1379	0.1514	0.1374	0.1331	0.1331	0.1331
-6.0425	-2.0361	26.5364	103.3040	19.9094	-14.6964	-21.1579	-16.4547	-10.4985	-7.2519	-6.6676	-6.6676	-6.6676
12.5078	12.4197	10.2819	0.0030	-9.4947	-9.3375	-6.0463	-2.9136	-1.0079	-0.2560	-0.1452	-0.1452	-0.1452
17.6183	19.4705	30.1900	51.5102	-25.0129	-8.5084	-0.0444	3.2653	2.9619	2.8944	2.8944	2.8944	2.8944
-2.1059	-2.1999	-2.5957	-2.8355	-2.1300	-1.1538	-0.4275	-0.0342	0.1201	0.1564	0.1588	0.1588	0.1588
-26.0348	-25.0873	-15.3284	19.9094	101.3526	20.2900	13.8240	-21.1579	-18.4509	-15.3064	-14.5975	-14.5975	-14.5975
9.3779	9.6743	10.5899	9.4493	-0.1757	-9.3737	-9.1947	-6.1109	-3.4041	-2.0955	-1.8742	-1.8742	-1.8742
2.4347	3.3691	9.7231	25.3213	49.9426	-24.9526	-7.9123	-7.9123	3.6188	4.1724	4.1724	4.1724	4.1724
-0.9845	-1.0638	-1.4946	-2.2476	-2.7261	-2.1373	-1.1993	-1.1993	-0.4787	0.0500	0.0689	0.0689	0.0689
-23.5964	-23.9939	-23.8772	-14.6964	20.2900	101.6312	20.2900	20.2900	14.5964	23.8772	23.9939	23.9939	23.9939
5.0717	5.3947	7.0197	9.3487	9.1696	0.0000	-9.1696	-9.3487	-9.3487	-5.3947	-5.0717	-5.0717	-5.0717
-3.4549	-3.1312	-0.4612	7.7998	24.7243	50.0000	-24.7243	-7.7998	-0.4612	3.1312	3.4549	3.4549	3.4549
-0.2656	-0.3122	-0.6027	-1.2602	-2.1644	-2.7185	-2.1644	-2.1644	-1.2602	-0.6027	-0.3122	-0.2658	-0.2658
-14.5975	-15.3064	-18.4509	-21.1579	-13.8240	20.2900	101.3526	19.9094	15.3284	25.0873	26.0348	26.0348	26.0348
1.8742	2.0955	3.4041	6.1109	9.1947	9.3737	0.1757	-9.4493	-9.6743	-9.3779	-9.3779	-9.3779	-9.3779
-4.1724	-4.1668	-3.6188	-0.6203	7.9123	24.9526	50.0574	-25.3213	-9.7231	-3.3891	-2.4347	-2.4347	-2.4347
0.0689	0.0500	-0.0893	-0.4787	-1.1993	-2.1373	-2.7261	-2.2476	-1.4946	-1.0638	-0.9845	-0.9845	-0.9845
-6.6676	-7.2519	-10.4985	-16.4547	-21.1579	-14.6964	-21.1579	-14.6964	-10.4985	-6.6676	-6.0425	-6.0425	-6.0425
0.1452	0.2560	1.0079	2.9136	6.0463	9.3375	5.9055	9.4947	9.9956	10.2819	12.5078	12.5078	12.5078
-2.8904	-2.9819	-3.2653	-2.9169	3.0444	8.5084	25.0129	48.4698	30.1900	-17.6183	-17.6183	-17.6183	-17.6183
0.1588	0.1564	0.1201	-0.0342	-0.4275	-1.1538	-2.1300	-2.8355	-2.5957	-2.1999	-2.1059	-2.1059	-2.1059
-2.0250	-2.4135	-4.8660	-10.4985	-18.4509	-23.8772	-15.3254	26.5364	124.6392	69.4252	60.4174	60.4174	60.4174
-0.5313	-0.5010	-0.2251	0.6940	2.6973	5.9055	9.3780	9.9956	11.5193	16.6566	17.6183	17.6183	17.6183
-1.3752	-1.4504	-1.8055	-2.2139	-1.7847	1.1327	8.6907	22.3438	39.9923	47.3651	44.7596	44.7596	44.7596
0.1331	0.1374	0.1514	0.1379	0.0057	-0.3793	-1.1380	-2.2297	-3.1766	-3.3027	-3.3175	-3.3175	-3.3175
-0.2458	-0.5223	-2.4135	-7.2519	-15.3064	-23.9939	-25.0873	-23.9939	-15.3064	-7.2519	-6.6676	-6.6676	-6.6676
-0.6889	-0.7123	-0.7911	-0.7373	-0.0815	1.8792	5.7976	11.5193	16.6566	21.13549	21.13549	21.13549	21.13549
-0.3488	-0.3752	-0.5155	-0.7501	-0.8648	-0.3780	1.4719	5.5020	11.8571	18.5255	17.6183	17.6183	17.6183
0.0697	0.0742	0.0973	0.1312	0.0099	-0.0099	-0.3661	-1.1149	-2.1987	-3.1509	-3.3175	-3.3175	-3.3175
0.0102	0.2458	0.7647	1.4504	2.4347	3.3691	4.1724	4.1724	4.1724	4.1724	4.1724	4.1724	4.1724
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb} M$$

$$P = \eta p \frac{M}{bL^2}$$

$$M = \eta M M$$

$$V = \eta v \frac{M}{L}$$

TABELA 1.24



ESTRUTURA 1
Esforço externo: Momento

SL=6.00

x/L	z/L →	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)												
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0			
100φ	400.0030	181.1846	43.6589	-15.0218	-26.7644	-19.7372	-9.8448	-3.0003	0.2537	1.2411	1.3499	0.2537	1.2411	1.3499
100p	-72.0003	-54.9247	-28.0722	-8.8916	0.3940	3.0287	2.6269	1.4939	0.6356	0.2588	0.1995	0.6356	0.2588	0.1995
100M	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ny	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.1	181.1846	199.2285	53.9381	-11.1430	-26.3440	-20.5217	-10.6823	-3.5327	-0.0059	1.1108	1.2411	-0.0059	1.1108	1.2411
I 0.1	-10.3008	-14.7718	-18.0764	-11.9303	-5.3707	-1.2815	0.4529	0.6164	0.6764	0.5202	0.4855	0.6764	0.5202	0.4855
N 0.1	76.2836	79.0958	-12.4451	-4.9798	-0.7662	0.8021	0.9574	0.6379	0.3265	0.1739	0.1482	0.3265	0.1739	0.1482
I 0.2	-3.7186	-3.5148	-2.3243	-1.0473	-0.2494	0.0687	0.1554	0.1164	0.0660	0.0392	0.0344	0.0660	0.0392	0.0344
H 0.2	43.6589	53.9381	117.5896	18.3164	-18.8086	-22.5459	-14.7823	-6.7019	-1.8473	-0.0659	0.2537	-1.8473	-0.0659	0.2537
A 0.2	12.3551	10.9574	-0.8577	-11.8759	-10.5068	-5.9516	-2.2363	-0.2266	0.5190	0.6290	0.6739	0.5190	0.6290	0.6739
D 0.2	38.9868	42.1845	57.5969	-21.6577	-6.8623	0.2698	2.0636	2.0636	1.3142	0.8597	0.7747	1.3142	0.8597	0.7747
E 0.2	-3.3686	-3.4441	-3.3847	-2.2697	-1.0563	-0.2690	0.0737	0.1516	0.1291	0.1006	0.0941	0.1291	0.1006	0.0941
I 0.3	-15.0218	-11.1430	18.3164	101.8529	14.8529	-17.1486	-20.0091	-13.2139	-6.7019	-3.5327	-3.0003	-6.7019	-3.5327	-3.0003
N 0.3	14.2958	14.3765	12.4655	0.0975	-11.6368	-10.5147	-6.0327	-2.3280	-0.3411	0.3439	0.4321	-0.3411	0.3439	0.4321
F 0.3	12.3437	14.3930	26.4543	50.7410	-23.1536	-6.1779	1.3604	3.1738	2.7635	2.1764	2.0407	2.7635	2.1764	2.0407
L 0.4	-1.9315	-2.0613	-2.6262	-3.0382	-2.2232	-1.1015	-0.3301	0.0356	0.1467	0.1575	0.1552	0.1467	0.1575	0.1552
U 0.4	-26.7644	-26.3440	-18.8086	14.8529	101.1524	15.3867	-16.4608	-20.0091	-14.7823	-10.6823	-9.8448	-14.7823	-10.6823	-9.8448
E 0.4	9.2724	11.5562	11.3015	0.2787	-0.2787	-11.8256	-10.3278	-5.9719	-2.6170	-1.1226	-0.8847	-2.6170	-1.1226	-0.8847
N 0.4	-0.5573	0.3357	6.6167	23.0103	49.9349	-22.8764	-5.6876	1.8223	3.7529	3.7425	3.6500	3.7529	3.7425	3.6500
I 0.5	-0.7350	-0.8298	-1.3593	-2.3220	-2.9737	-2.2562	-1.1512	-0.3668	0.0134	0.1315	0.1449	0.0134	0.1315	0.1449
A 0.5	-19.7372	-20.5217	-22.5459	-17.1486	15.3867	101.3284	15.3867	-17.1486	-22.5459	-20.5217	-19.7372	-22.5459	-20.5217	-19.7372
P 0.5	4.0528	4.4779	6.7226	10.3011	11.1250	-0.0000	-0.0000	-11.1250	-10.3011	-6.7226	-4.0528	-10.3011	-6.7226	-4.0528
A 0.6	-4.2182	-4.0261	-1.9670	5.5712	22.7480	50.0000	-22.7480	-5.5712	1.9670	4.0261	4.2182	1.9670	4.0261	4.2182
R 0.6	-0.0840	-0.1306	-0.4393	-1.1851	-2.2776	-2.9816	-2.2776	-1.1851	-0.4393	-0.1306	-0.0840	-0.4393	-0.1306	-0.0840
A 0.7	-9.8448	-10.6823	-14.7823	-20.0091	-16.4608	15.3867	101.1524	14.8529	-18.8086	-26.3440	-26.7644	-18.8086	-26.3440	-26.7644
A 0.8	0.8847	1.1226	2.6170	5.9719	10.2728	11.8256	10.2728	5.9719	2.6170	1.1226	0.8847	2.6170	1.1226	0.8847
A 0.9	-3.6500	-3.7425	-3.7529	-1.8223	5.6876	22.8764	50.0651	-23.0103	-6.6167	-0.3357	-0.5573	-6.6167	-0.3357	-0.5573
S 0.9	0.1449	0.1315	0.0134	-0.3668	-1.1512	-2.2562	-2.2562	-0.3668	-1.1512	-0.3301	-0.7350	-1.1512	-0.3301	-0.7350
E 0.9	-3.0003	-3.5327	-6.7019	-13.2139	-20.0091	-17.1486	-14.8529	-11.1430	-3.5327	-0.0059	1.1108	-3.5327	-0.0059	1.1108
C 0.9	-0.4321	-0.3439	0.3411	2.3280	6.0327	-10.5147	11.6368	0.0975	11.6368	18.3164	18.3164	11.6368	0.0975	11.6368
A 1.0	-2.0407	-2.1764	-2.7635	-3.1738	-1.3604	6.1779	23.1536	49.2590	-26.4543	-14.3930	-12.3437	-26.4543	-14.3930	-12.3437
O 1.0	0.1552	0.1575	0.1467	0.0356	-0.3301	-1.1015	-2.2232	-3.0382	-2.2232	-2.0613	-1.9315	-2.2232	-2.0613	-1.9315
A 1.1	0.2537	0.0059	-1.8473	-6.7019	-14.7823	-22.5459	-18.8086	18.3164	117.5896	53.9381	43.6589	18.3164	117.5896	53.9381
E 1.1	-0.6739	-0.6690	-0.5190	0.2266	2.2363	5.9516	10.5068	10.5068	5.9516	2.2363	0.6739	10.5068	5.9516	2.2363
C 1.1	-0.7747	-0.8597	-1.3142	-2.0636	-0.2698	-0.2698	-0.2698	-0.2698	-0.2698	-0.2698	-0.2698	-0.2698	-0.2698	-0.2698
O 1.1	0.0941	0.1006	0.1291	0.1516	0.0737	-0.2690	-1.0563	-2.2697	-3.3847	-3.4441	-3.3686	-3.3847	-3.4441	-3.3686
A 1.2	1.2411	1.1108	-0.0059	-3.5327	-10.6823	-20.5217	-26.3440	-11.1430	-3.5327	-0.0059	1.1108	-3.5327	-0.0059	1.1108
E 1.2	-0.4855	-0.5202	-0.6764	-0.8164	-0.4529	-1.2815	-0.9574	-0.6379	-0.3265	-0.1739	-0.1482	-0.3265	-0.1739	-0.1482
C 1.2	-0.1739	-0.1739	-0.3265	-0.6379	-0.9574	-0.9574	-0.9574	-0.9574	-0.9574	-0.9574	-0.9574	-0.9574	-0.9574	-0.9574
O 1.2	0.0344	0.0392	0.0660	0.1164	0.1554	0.0687	-0.2494	-1.0473	-0.2494	-1.0473	-0.2494	-0.2494	-1.0473	-0.2494
A 1.3	1.3499	1.2411	0.2537	-3.0003	-9.8448	-19.7372	-26.7644	-15.0218	-9.8448	-19.7372	-18.8086	-9.8448	-19.7372	-18.8086
E 1.3	-0.1995	-0.2588	-0.6356	-1.4939	-2.6269	-3.0287	-0.3940	3.0287	-0.3940	3.0287	-0.3940	-0.3940	3.0287	-0.3940
C 1.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O 1.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 1.4	1.3499	1.2411	0.2537	-3.0003	-9.8448	-19.7372	-26.7644	-15.0218	-9.8448	-19.7372	-18.8086	-9.8448	-19.7372	-18.8086
E 1.4	-0.1995	-0.2588	-0.6356	-1.4939	-2.6269	-3.0287	-0.3940	3.0287	-0.3940	3.0287	-0.3940	-0.3940	3.0287	-0.3940
C 1.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
O 1.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = n_p \frac{S^3}{kb}$$

$$p = n_p \frac{M}{bL^2}$$

$$M = n_M M$$

$$V = n_V \frac{M}{L}$$

TABELA 1.25



ESTRUTURA 1
Esforço externo: Momento

SL=6.50

(LER NA VERTICAL)

z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM		Esforço externo: Momento		0.5		0.6		0.7		0.8		0.9		1.0	
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.8	0.9	1.0	0.8	0.9	1.0
100ηφ	400.0027	166.2396	-21.0697	-25.4720	-15.4518	-5.9266	-0.7108	1.1295	1.4380	1.4333	1.1295	1.4380	1.4333	1.1295	1.4380	1.4333
nP	-84.5001	-61.8142	-6.7188	2.1406	3.6097	2.4191	1.0361	0.2219	-0.0707	-0.1093	0.2219	-0.0707	-0.1093	0.2219	-0.0707	-0.1093
100ηM	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	166.2396	188.0592	-17.5341	-25.6413	-16.5552	-6.7977	-1.1383	0.9998	1.4259	1.4380	0.9998	1.4259	1.4380	0.9998	1.4259	1.4380
0.1	-8.4204	-14.5940	-12.2709	-4.8767	-0.7159	0.7292	0.8112	0.5236	0.3240	0.2852	0.5236	0.3240	0.2852	0.5236	0.3240	0.2852
0.2	73.1528	76.7567	-4.3163	-0.0967	1.0946	0.9361	0.8845	0.1624	0.6305	0.1110	0.1624	0.6305	0.1110	0.1624	0.6305	0.1110
0.3	-4.1071	-3.8665	-2.4185	-0.9566	0.1471	0.1593	0.0933	0.0375	0.0127	0.0088	0.0375	0.0127	0.0088	0.0375	0.0127	0.0088
0.4	29.1625	40.5699	11.8673	-20.7493	-20.4900	-11.3969	-3.9179	-0.1633	0.9998	1.1295	-0.1633	0.9998	1.1295	-0.1633	0.9998	1.1295
0.5	16.0306	14.4272	0.4485	-14.0172	-11.5350	-5.7789	-1.6711	0.6785	0.6777	0.6550	0.6785	0.6777	0.6550	0.6785	0.6777	0.6550
0.6	33.5511	37.3569	55.6279	-20.6224	-5.0546	2.5443	1.7499	0.8377	0.3825	0.3060	0.8377	0.3825	0.3060	0.8377	0.3825	0.3060
0.7	-3.4137	-3.5577	-3.5813	-2.3369	-0.9672	-0.1684	0.1227	0.1002	0.0637	0.0564	0.1002	0.0637	0.0564	0.1002	0.0637	0.0564
0.8	-21.0697	-17.5341	11.8673	10.4749	10.8015	-18.8375	-18.5024	-3.9179	-1.1383	-0.7108	-3.9179	-1.1383	-0.7108	-3.9179	-1.1383	-0.7108
0.9	15.6196	15.9694	14.6654	-0.2342	-13.9053	-11.5027	-5.7851	0.1961	0.7184	0.7677	0.1961	0.7184	0.7677	0.1961	0.7184	0.7677
1.0	7.9529	10.1339	23.2869	50.3086	-21.2241	-4.1267	2.3334	2.1404	1.3882	1.2365	2.1404	1.3882	1.2365	2.1404	1.3882	1.2365
	-1.7179	-1.8866	-2.6415	-2.3094	-1.0354	-0.2335	0.0900	0.1525	0.1383	0.1317	0.1525	0.1383	0.1317	0.1525	0.1383	0.1317
	-25.4720	25.6413	20.7493	10.4749	10.8015	-18.8375	-18.5024	-11.3969	-6.7977	-5.9266	-11.3969	-6.7977	-5.9266	-11.3969	-6.7977	-5.9266
	8.6124	9.3403	12.3125	13.3429	-0.3241	-13.6017	-5.6723	-1.8232	-0.2727	-0.0464	-1.8232	-0.2727	-0.0464	-1.8232	-0.2727	-0.0464
	-2.5296	-1.7541	4.1972	20.9875	49.9911	-20.8974	-3.7346	2.5211	3.0262	2.8595	2.5211	3.0262	2.8595	2.5211	3.0262	2.8595
	-0.4374	-0.6038	-1.2194	-2.3908	-3.2270	-2.3571	-1.0829	-0.2588	0.1735	0.1797	-0.2588	0.1735	0.1797	-0.2588	0.1735	0.1797
	-15.4516	-16.5552	-20.4900	-18.8375	10.8015	100.9608	10.8015	18.8375	18.8375	15.4516	18.8375	18.8375	15.4516	18.8375	18.8375	15.4516
	2.8954	3.4056	6.2364	11.1705	13.2827	0.0000	-13.2827	-11.1705	-3.4056	-2.8954	-3.4056	-11.1705	-2.8954	-3.4056	-11.1705	-2.8954
	-4.2663	-4.2160	-2.8541	3.7346	20.8833	50.0000	-20.8833	3.7346	2.8541	4.2663	3.7346	2.8541	4.2663	3.7346	2.8541	4.2663
	0.0545	0.0121	-0.2935	-1.0994	-2.3736	-3.2426	-2.3736	-1.0994	0.0121	0.0545	-1.0994	0.0121	0.0545	-1.0994	0.0121	0.0545
	-5.9266	-6.7977	-11.3969	-18.5024	-18.4490	10.8015	10.8015	101.0003	18.4490	20.4900	10.8015	18.4490	20.4900	10.8015	18.4490	20.4900
	0.0464	0.2727	1.8232	5.6723	11.2178	13.6017	0.3241	13.3429	12.3125	8.6124	12.3125	13.3429	8.6124	12.3125	13.3429	8.6124
	-2.8595	-3.0282	-3.5115	-2.5921	-3.7899	20.8974	20.8974	50.0089	-20.9875	-4.1972	-20.9875	-4.1972	-20.9875	-4.1972	-20.9875	-4.1972
	0.1797	0.1735	0.0863	-0.2588	-1.0829	-2.3571	-2.3571	-3.2270	-3.2270	-2.3908	-3.2270	-2.3908	-2.3571	-3.2270	-2.3908	-2.3571
	-0.7108	-1.1383	-10.3505	-18.5024	-18.4490	10.8015	10.8015	101.0003	10.4749	10.4749	10.8015	10.4749	10.4749	10.8015	10.4749	10.4749
	-0.7677	-0.7184	0.2727	1.8232	5.6723	11.2178	13.6017	0.3241	13.3429	12.3125	13.3429	12.3125	12.3125	13.3429	12.3125	12.3125
	-1.2365	-1.3882	-2.1404	-3.7346	-2.3334	4.1267	21.2241	49.6944	20.6224	14.6654	20.6224	14.6654	14.6654	20.6224	14.6654	14.6654
	0.1317	0.1383	0.1525	0.0900	-0.2335	-1.0354	-0.9672	-2.3369	-2.3369	-3.5813	-2.3369	-3.5813	-2.3369	-3.5813	-2.3369	-3.5813
	1.1295	0.9998	-0.1633	-3.9179	-11.3969	-20.4900	-20.4900	-11.3969	-6.7977	-5.9266	-11.3969	-6.7977	-5.9266	-11.3969	-6.7977	-5.9266
	-0.6550	-0.6777	-0.6785	-0.1929	-1.6711	5.7789	14.0172	14.0172	4.8767	0.7159	14.0172	4.8767	0.7159	14.0172	4.8767	0.7159
	-0.3060	-0.3825	-0.8377	-1.7499	-2.5443	-1.4096	-0.9672	-2.3369	-2.3369	-3.5813	-2.3369	-3.5813	-2.3369	-3.5813	-2.3369	-3.5813
	0.0664	0.0637	0.1002	0.1498	0.1227	-0.1684	-0.9672	-2.3369	-2.3369	-3.5813	-2.3369	-3.5813	-2.3369	-3.5813	-2.3369	-3.5813
	1.4380	1.4259	0.9998	0.9998	-6.7977	-16.5552	-25.6413	-17.5341	-17.5341	-17.5341	-17.5341	-17.5341	-17.5341	-17.5341	-17.5341	-17.5341
	-0.2852	-0.3240	-0.5236	-0.8112	-0.7292	0.7159	4.8767	12.2709	4.8767	12.2709	4.8767	12.2709	4.8767	12.2709	4.8767	12.2709
	-0.0110	-0.0305	-0.1624	-0.4845	-0.9361	-1.0946	-0.0967	4.3163	0.0967	4.3163	0.0967	4.3163	0.0967	4.3163	0.0967	4.3163
	0.0088	0.0127	0.0375	0.0933	0.1471	0.1471	-0.1363	-0.9566	-0.9566	-0.9566	-0.9566	-0.9566	-0.9566	-0.9566	-0.9566	-0.9566
	1.4333	1.4380	1.1295	0.9998	-5.9266	-15.4516	-25.4720	-21.0697	-21.0697	-21.0697	-21.0697	-21.0697	-21.0697	-21.0697	-21.0697	-21.0697
	-0.1093	-0.0707	-0.2219	-1.0361	-2.4191	-3.6097	-2.1406	6.7188	-2.1406	6.7188	-2.1406	6.7188	-2.1406	6.7188	-2.1406	6.7188
	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{4 \cdot K \cdot b}{4 \cdot E \cdot I}}$$

$$\varphi = \eta \cdot \phi \cdot \frac{M}{K \cdot b \cdot L^2}$$

$$p = \eta \cdot p \cdot \frac{M}{b \cdot L^2}$$

$$M = \eta \cdot M$$

$$V = \eta \cdot V$$

TABELA 1.26

ESTRUTURA 1

Esforço externo: Momento

SL=7.00

LÍNEA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100η	φ	400.0019	151.9257	16.7671	-24.7294	-22.9274	-11.3353	-2.9790	0.5343	1.2370	1.0976	1.0293
nP	φ	-98.0003	-68.5727	-27.9227	-4.3008	3.6194	3.8124	2.0077	0.5685	-0.0547	-0.2215	-0.2348
100ηM	φ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ηV	φ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.1	I	151.9257	177.8136	29.1122	-21.7356	-23.6976	-12.6591	-3.7958	0.2386	1.2131	1.1569	1.0976
I	N	-5.8699	-14.1366	-21.1009	-12.5431	-4.3265	-0.1970	0.9138	0.3683	0.3683	0.1008	0.1248
I	N	69.9718	74.4803	-12.9667	3.5568	0.4957	1.2538	0.8311	0.3240	0.0433	-0.0478	-0.0583
I	N	-4.4787	-4.2038	-2.4831	-0.8496	-0.0331	0.1843	0.1482	0.0675	0.0157	-0.0032	-0.0057
H	A	16.7671	29.1122	108.4714	6.7226	-21.6477	-18.1170	-8.4477	-1.9616	0.6529	1.2131	1.2370
A	E	19.7084	17.9821	-0.1713	-16.3754	-12.4012	-5.3916	-1.0493	0.5349	0.7205	0.5760	0.5303
A	E	28.4925	32.9035	54.0591	-19.3387	-3.3632	2.2109	2.5070	1.3668	0.4506	0.0686	0.0124
D	E	-3.4020	-3.5675	-3.7718	-2.3748	-0.8742	-0.0792	0.1547	0.1376	0.0717	0.0334	0.0266
I	N	-24.7294	-21.7356	6.7226	100.9609	6.5467	-19.9147	-16.7446	-7.8528	-1.9616	0.2386	0.5343
N	O	16.4190	17.1462	16.8641	-0.3744	-16.2625	-12.2726	-5.3297	-1.0288	0.5834	0.6794	0.8815
N	O	4.3901	6.6289	20.5895	50.0945	-19.3211	-2.3861	2.9360	2.8338	1.5403	0.7541	0.6110
N	O	-1.4797	-1.6883	-2.6469	-3.4801	-2.3860	-0.9561	-0.1401	0.1299	0.1443	0.1089	0.0991
U	E	-22.9274	-23.6976	-21.6477	6.5467	100.8460	6.5795	-19.7889	-16.7446	-8.4477	-3.7958	-2.9790
E	C	7.6113	8.5895	12.8676	15.5660	-0.3165	-15.8865	-5.3297	-1.0288	0.5834	0.6794	0.8815
N	O	-3.6884	-3.0754	2.3120	19.1468	50.0472	-19.0321	-2.1854	3.0481	3.0887	2.2562	2.0398
N	O	-0.2849	-0.3977	-1.0804	-2.4521	-3.4829	-2.4378	-0.9966	-0.1569	0.1382	0.1638	0.1820
A	P	-11.3353	-12.6591	-18.1170	-19.9147	6.5795	100.6230	6.5795	-19.9147	-18.1170	-12.6591	-11.3353
P	O	1.7277	2.2914	5.6073	11.9218	15.86095	0.0000	-15.6095	-1.9218	-5.6073	-2.2914	-1.7277
P	O	-3.8809	-3.9671	-3.3172	2.1920	19.0321	50.0000	-19.0961	-2.1920	3.3172	3.9671	3.8809
A	R	0.1483	0.1142	-0.1679	-1.0041	-2.4503	-3.4994	-2.4503	-1.0041	-0.1679	0.1142	0.1483
A	R	-2.9790	-3.7958	-8.4477	-16.7446	-19.7889	-19.7889	100.8460	6.5467	-16.7446	-8.4477	-3.7958
A	R	-0.5769	-0.3902	1.0757	5.2245	11.9961	15.8865	0.3165	-15.5660	-12.8676	-8.5895	-7.6113
A	R	-2.0398	-2.2562	-3.0887	-3.0481	2.1854	19.0321	49.9528	-19.1468	-2.3120	3.0754	3.6884
S	A	0.1820	0.1838	0.1382	-0.1569	-0.9966	-2.4378	-3.4829	-2.4521	-1.0804	-0.3977	-0.2849
E	C	0.5343	0.2386	-1.9616	-7.8528	-16.7446	-19.9147	100.9609	6.5467	100.9609	6.5467	100.9609
C	O	-0.8815	-0.8794	1.0288	1.0288	5.3297	12.2726	16.2625	0.3744	-16.8841	-17.1462	-16.4190
C	O	-0.6110	-0.7541	-1.5403	-2.8338	-2.9360	2.3861	19.3211	49.9055	-20.5895	-6.6289	-4.3901
A	A	0.0991	0.1089	0.1443	0.1299	-0.1401	-0.9561	-2.3860	-3.4801	-2.6469	-1.6883	-1.4797
O	0	1.2370	1.2131	0.6529	-1.9616	-8.4477	-18.1170	-21.6477	6.7226	108.4714	29.1122	16.7671
O	0	-0.5303	-0.5760	-0.7205	-0.5349	1.0493	5.3916	12.4012	0.3744	0.1713	-17.9821	-19.7084
O	0	-0.0124	-0.0686	-0.4506	-4.3368	-5.070	-2.2109	3.3632	19.3387	45.9409	-32.9035	-28.4925
O	0	0.0266	0.0334	0.0717	0.1378	0.1547	-0.0792	-0.3748	-2.3748	-3.7718	-3.5675	-3.4020
O	0	1.0976	1.1569	1.2131	0.2386	-3.7958	-12.6591	-23.6976	21.7356	29.1122	177.8136	151.9257
O	0	-0.1248	-0.1608	-0.3683	-0.7467	-0.9138	0.1970	4.3265	12.5431	21.1009	14.1366	5.8699
O	0	0.0583	0.0478	-0.0433	-0.3240	-0.8311	-1.2538	-0.4957	3.5568	12.9667	25.5197	-69.9718
O	0	-0.0057	-0.0032	0.0157	0.0675	0.1482	0.1843	-0.0331	-0.8496	-2.4831	-4.2038	-4.4787
O	0	1.0293	1.0976	1.2370	0.5343	-2.9790	-11.3353	-22.9274	24.7294	16.7671	151.9257	400.0019
O	0	0.2346	0.2215	0.0547	-0.5885	-2.0077	-3.8124	-3.6194	4.3008	27.9227	68.5727	98.0003
O	0	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb^3} M$$

$$P = \eta P \frac{M}{bl^2}$$

$$M = \eta M M$$

$$V = \eta V L$$

TABELA 1.28

ESTRUTURA 1

Esforço externo: Momento

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (CLER NA VERTICAL)

Esforço externo: Momento

SL=8.00

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	400.0002	-2.3577	-16.2780	-4.7935	0.2777	1.1389	0.6854	0.3015	0.2265			
100ηP	-128.0001	-25.0774	0.7189	3.3089	0.9628	-0.0623	-0.2451	-0.1915	-0.1699			
100ηM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
100ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
L 0.1	125.2205	159.9712	11.1516	-18.1027	-6.2279	1.0944	0.7691	0.3829	0.3015			
I 0.1	1.1676	-12.5441	-24.5578	-3.0831	0.6625	1.0373	0.5170	-0.0262	-0.0440			
N 0.1	63.5379	70.1853	-1.9211	1.3579	1.2387	0.5028	-0.0636	-0.0697	-0.0653			
A 0.2	-5.1573	-4.8308	-2.5336	0.1290	0.2042	0.1020	-0.0067	-0.0112	-0.0110			
D 0.2	26.5865	25.0304	-0.0041	-13.4738	-4.0946	0.1503	0.5683	0.2563	0.1945			
E 0.2	19.5915	25.1303	51.9190	-0.5385	2.9679	1.9697	0.6376	-0.0013	-0.1559			
I 0.3	-3.2290	-3.5748	-4.1532	-0.6822	0.0632	0.1772	0.0984	-0.0014	-0.0051			
N 0.3	-26.7576	25.3153	-0.9580	103.8462	-21.5676	-13.3182	-4.0009	0.9615	0.7691			
A 0.3	16.4064	18.2046	21.4204	-0.5717	-21.1084	-13.1336	-3.9697	0.1544	0.7581			
D 0.3	-0.5617	1.5641	16.2546	50.0016	-15.7740	3.3176	2.0365	0.6270	0.0342			
F 0.3	-0.9804	-1.2628	-2.6390	-3.9643	-2.4996	-0.7653	0.0243	0.1055	0.0478			
U 0.3	-16.2780	18.1027	-21.5676	-0.3592	100.5225	-0.7014	-20.7175	-12.8479	-4.0009			
E 0.4	4.9045	6.3446	13.4127	20.4520	-0.2119	-20.7338	-12.9590	-3.9519	0.1671			
N 0.4	-4.3065	-4.0936	-0.3040	50.0899	-15.6387	0.2613	3.3112	2.1088	0.9743			
C 0.4	0.0382	-0.0688	-0.8136	-2.5417	-3.9944	-2.5395	-0.7867	0.0179	0.1463			
I 0.5	-4.7935	-6.2279	-13.3182	-0.7014	100.1910	-0.7014	-20.6040	-13.3182	-0.2537			
A 0.5	-0.2428	0.2956	4.0713	12.9196	20.6068	0.0000	-20.6068	-12.9196	-4.0713			
P 0.5	-2.5817	-2.8773	-3.4694	-0.2005	15.7306	50.0000	-15.7306	3.4694	2.8773			
A 0.6	0.2219	0.2119	0.0235	-0.7908	-2.5463	-4.0030	-2.5463	-0.7908	0.2119			
R 0.6	0.2777	-0.2537	-4.0009	12.8479	-20.7175	-0.7014	100.5225	-0.3592	-16.2780			
A 0.6	-1.1464	-1.1008	-0.1671	3.9519	12.9590	20.7338	0.2119	-20.4520	-13.4127			
S 0.6	0.7464	-0.9743	2.1088	-3.3112	-0.2813	15.6387	49.9101	-15.7985	0.3040			
A 0.6	0.1310	0.1463	0.1786	0.0179	-0.7867	-2.5395	-3.9944	-2.5417	-0.8136			
E 0.7	1.1389	1.0944	0.1720	-12.8479	-20.6040	-0.3592	100.8998	-0.9580	-25.3153			
C 0.7	-0.6762	-0.7581	-0.9434	3.9697	13.1336	21.1484	0.5717	-21.4204	-18.2046			
C 0.7	0.0495	-0.0342	-0.6270	-0.2005	-3.3176	-0.2162	15.7740	49.9984	-16.2546			
A 0.7	0.0364	0.0478	0.1055	0.1693	0.0243	-0.7653	-2.4996	-3.9643	-1.2628			
D 0.7	0.6854	0.7691	0.9615	-0.1720	-4.0009	-13.3182	-21.5676	-0.9580	103.8462			
A 0.8	-0.1945	-0.2563	-0.5683	10.9183	-0.1503	4.0946	13.4738	21.5201	0.0041			
A 0.8	0.1654	0.1559	0.0013	-0.6376	-1.9697	-2.9679	0.5385	16.3647	48.0010			
A 0.8	-0.0051	-0.0014	0.0267	0.0984	0.1772	0.0632	-0.6822	-2.4289	-4.1532			
L 0.8	0.3015	0.3829	0.7691	1.0944	-0.2537	-6.2279	-18.1027	-25.3153	11.1516			
I 0.8	0.0440	0.0262	-0.1178	-0.5170	-1.0373	3.0831	12.8479	24.5578	12.5441			
N 0.8	0.0653	0.0697	0.0636	-0.0660	-0.5028	-1.2387	-1.3579	1.9211	-2.6828			
A 0.8	-0.0110	-0.0112	-0.0067	0.0229	0.1020	-0.0660	0.0660	-0.0660	0.0660			
L 0.9	0.2265	0.3015	0.6854	1.1389	0.2777	-4.7935	-16.2780	-26.7576	23.577			
I 0.9	0.1699	0.1915	0.2451	0.3015	0.3829	0.478	0.5617	0.653	0.7464			
N 0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
A 0.9	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000			
L 1.0	0.2265	0.3015	0.6854	1.1389	0.2777	-4.7935	-16.2780	-26.7576	23.577			
I 1.0	0.1699	0.1915	0.2451	0.3015	0.3829	0.478	0.5617	0.653	0.7464			
N 1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			
A 1.0	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000			

$$s = \sqrt{\frac{I_b}{4EI}}$$

$$\varphi = \eta \cdot \frac{3}{4} \cdot \frac{M}{KB}$$

$$p = \eta \cdot \frac{M}{p \cdot BL^2}$$

$$M = \eta \cdot M$$

$$V = \eta \cdot V$$

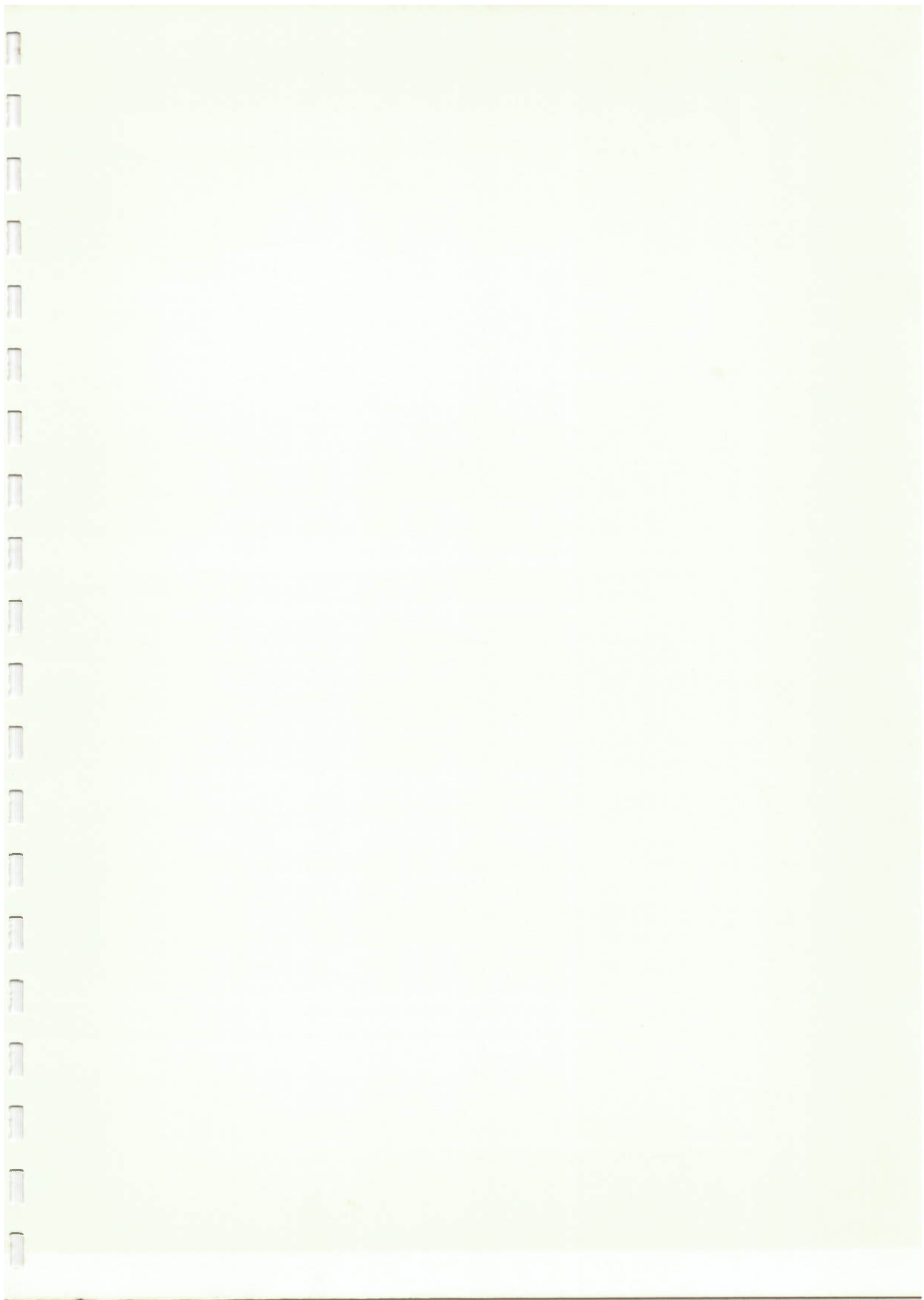
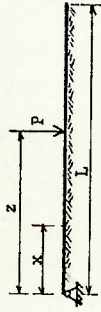


TABELA 2.01

ESTRUTURA 2

SL=1.50 Esforço externo: Força Concentrada



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →					(LER NA VERTICAL)				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100n _φ 100n _M n _V	29.3991	51.2940	67.1236	78.2249	85.8005	90.8960	94.3538	96.9529	99.1016	101.1318
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.8328	0.6693	0.5118	0.3611	0.2171	0.0768	-0.0551	-0.1861	-0.3156	-0.4447
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		25.6490	48.2777	64.8148	76.5932	84.8163	90.5336	94.6236	97.7821	100.5134	103.1243
		0.0000	0.1132	0.1493	0.1748	0.1923	0.2042	0.2125	0.2188	0.2240	0.2290
		0.0000	6.7123	5.1432	3.6406	2.2032	0.8223	-0.5153	-1.8244	-3.1188	-4.4086
		-0.1640	0.6750	0.5193	0.3699	0.2267	0.0850	-0.0444	-0.1752	-0.3044	-0.4332
		0.0000	18.8705	17.6212	16.6195	15.7772	14.9856	14.2475	13.5611	12.9281	12.3485
		0.0000	0.1127	0.2682	0.3422	0.3801	0.4068	0.4261	0.4412	0.4544	0.4670
		0.0000	6.7397	10.4349	7.4554	4.5983	1.8487	-0.8179	-3.4297	-6.0130	-8.5874
		-0.1550	-0.3085	0.4513	0.3958	0.2554	0.1196	-0.0125	-0.1422	-0.2706	-0.3986
		0.0000	13.4839	45.9459	63.0711	76.4255	87.0841	95.9681	103.8230	111.2602	118.4413
		0.0000	0.1493	0.4058	0.4944	0.5586	0.6055	0.6412	0.6705	0.6968	0.7222
		0.0000	5.2526	16.0129	11.6111	7.3728	3.2815	-0.8944	-4.5932	-8.4518	-12.2978
		-0.1418	-0.2833	0.4378	0.3025	0.1703	0.0406	-0.0867	-0.2131	-0.3393	
		0.0000	9.3712	33.3766	50.5716	68.3388	83.2663	96.3050	108.2330	119.6520	130.9175
		0.0000	0.1743	0.4944	0.7220	0.8775	0.9577	0.9577	0.9090	0.8562	0.7222
		0.0000	3.9139	11.9943	16.2592	10.7046	5.3194	0.706	-5.0854	-10.1924	-15.2839
		-0.1255	-0.2516	-0.3785	-0.5001	0.3666	0.2405	0.1158	-0.0078	-0.1307	-0.2533
		0.0000	6.3866	24.2083	38.1181	56.9409	77.8701	95.5638	112.7039	129.2594	145.6511
		0.0000	0.1923	0.5586	0.7220	0.8036	0.8786	0.9378	0.9738	1.0022	1.0222
		0.0000	2.7493	8.4680	11.5277	14.7566	18.1538	21.6931	25.3679	29.1751	33.1130
		-0.1071	-0.2154	-0.3257	-0.4386	-0.5539	0.3294	0.2124	0.0955	-0.0212	-0.1378
		0.0000	4.3649	17.9669	29.6054	46.0182	68.9962	92.9353	116.2922	139.0360	161.6004
		0.0000	0.2042	0.6055	0.7975	0.9786	1.1430	1.2864	1.4155	1.5380	1.6586
		0.0000	1.7766	5.4988	7.5164	9.6700	11.8655	14.1919	17.7519	21.6931	26.6000
		-0.0872	-0.1759	-0.2674	-0.3624	-0.4616	-0.5643	-0.6706	-0.7806	-0.8944	-10.1199
		0.0000	3.1276	14.1289	24.3497	39.2417	59.8897	87.2974	117.8446	147.7335	177.8479
		0.0000	0.2125	0.6412	0.8577	1.0738	1.2864	1.4698	1.6794	1.8609	2.0402
		0.0000	1.0078	3.1343	4.3012	5.5402	6.8163	8.1310	9.4842	10.8742	12.2978
		-0.0664	-0.1342	-0.2050	-0.2796	-0.3568	-0.4427	-0.5307	-0.6206	-0.7124	-0.8062
		0.0000	2.4871	12.1329	21.6061	35.8678	55.4576	81.9208	115.9663	153.8224	191.4694
		0.0000	0.4412	0.6705	0.9090	1.1576	1.4155	1.6794	1.9432	2.2068	2.4557
		0.0000	0.44514	1.4105	1.9430	2.5234	3.1563	3.8412	4.5714	5.3466	6.1718
		-0.0443	-0.0909	-0.1393	-0.1912	-0.2472	-0.3075	-0.3721	-0.4401	-0.5111	-0.5853
		0.0000	2.2474	11.3589	20.5796	34.3524	53.7839	79.8794	113.5332	155.4749	201.7017
		0.0000	0.2240	0.6544	0.9562	1.2361	1.5300	1.8409	2.2068	2.5498	2.8989
		0.0000	0.1137	0.3314	0.5069	0.6437	0.8092	0.9902	1.1854	1.3913	1.6072
		-0.0227	-0.0461	-0.0710	-0.0979	-0.1275	-0.1598	-0.1951	-0.2328	-0.2724	-0.3132
		0.0000	2.2153	11.2415	20.4310	34.1583	53.5396	79.5601	113.1744	155.0531	205.7152
		0.0000	0.2290	0.7222	1.0022	1.3130	1.6586	2.0402	2.4557	2.8989	3.3587
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \frac{S^2}{kb} P$$

$$p = \eta_p \frac{P}{bL}$$

$$M = \eta_M PL$$

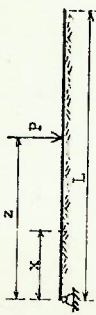
$$V = \eta_V P$$

TABELA 2.02

ESTRUTURA 2

SL=2.00 Esforço externo: Força Concentrada

LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LEN NA VERTICAL)



x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
I	$100\eta_\phi$	33.3966	53.9265	64.5225	67.7832	65.9017	60.6430	53.3539	44.9953	36.1676	27.2638
	$100\eta_P$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	$100\eta_V$	0.0000	0.0000	0.4000	0.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	$100\eta_\phi$	0.8027	0.6516	0.4461	0.2948	0.1616	0.0435	-0.0000	-0.1621	-0.42574	-0.3516
	$100\eta_P$	26.9653	48.9839	60.9369	65.4064	64.5916	60.2745	53.8436	46.2600	38.2372	30.0691
	$100\eta_V$	0.1250	0.2091	0.2533	0.2680	0.2619	0.2421	0.2141	0.1617	0.1475	0.1128
I	$100\eta_\phi$	8.0488	6.1960	4.5034	2.9934	1.6595	0.4758	-0.5444	-1.5909	-2.5499	-3.4974
	$100\eta_P$	-0.1908	0.6267	0.4588	0.3083	0.1747	0.0557	-0.0523	-0.1531	-0.2501	-0.3460
	$100\eta_V$	15.5751	33.9889	49.9774	58.0619	60.4518	58.9913	55.1416	49.9890	44.2682	38.3946
I	$100\eta_\phi$	0.2091	0.3785	0.4777	0.5166	0.5130	0.4810	0.4316	0.3735	0.3112	0.2479
	$100\eta_P$	6.2188	12.5978	9.2576	6.2532	3.5800	1.1935	-0.9743	-2.4993	-4.9510	-6.8801
	$100\eta_V$	-0.1738	-0.3435	0.4958	0.3478	0.2136	0.0919	-0.0201	-0.1254	-0.2274	-0.3283
I	$100\eta_\phi$	6.9557	16.4712	31.0593	45.1218	52.9625	56.2030	56.7310	55.6779	53.9185	51.9520
	$100\eta_P$	0.2533	0.4777	0.6425	0.7250	0.7409	0.7120	0.6556	0.5843	0.5065	0.4269
	$100\eta_V$	4.5946	9.3718	14.4846	10.0262	6.0116	2.3915	-0.9219	-4.0325	-7.0382	-10.0112
I	$100\eta_\phi$	-0.1503	-0.3001	-0.4476	-0.4103	0.2765	0.1516	0.0343	-0.0777	-0.1668	-0.2950
	$100\eta_P$	0.7380	3.7459	11.2799	25.5930	40.8207	50.9591	57.7420	62.5808	66.5191	70.2012
	$100\eta_V$	0.2690	0.5166	0.7250	0.8688	0.9300	0.9274	0.8494	0.8205	0.7465	0.6658
I	$100\eta_\phi$	3.2213	6.6186	10.3470	14.5190	18.1808	4.3003	-0.2135	-4.4794	-8.6152	-12.7101
	$100\eta_P$	-0.1241	-0.2499	-0.3786	-0.5094	0.3605	0.2337	0.1113	-0.0077	-0.1246	-0.2408
	$100\eta_V$	-3.4949	-4.9856	-2.4359	6.2001	22.9695	41.9461	56.9421	69.5736	81.0826	92.2649
I	$100\eta_\phi$	0.2619	0.5130	0.7250	0.8688	0.9300	0.9274	0.8494	0.8205	0.7465	0.6658
	$100\eta_P$	2.1142	4.3784	6.9288	9.8733	13.2751	7.1342	1.1152	1.0851	1.0412	0.9937
	$100\eta_V$	-0.0974	-0.1962	-0.3048	-0.4188	-0.5394	0.3362	0.2113	-4.1033	-9.4411	-14.7324
I	$100\eta_\phi$	-6.1669	-10.5379	-11.2799	-6.4959	5.7773	27.5364	52.7314	75.1321	96.1738	116.8124
	$100\eta_P$	0.2421	0.4810	0.7120	0.9274	1.1147	1.2558	1.3359	1.3752	1.3959	1.4113
	$100\eta_V$	1.2679	2.6469	4.2478	6.1524	8.4226	11.0789	4.0879	-2.6401	-9.2206	-15.7532
I	$100\eta_\phi$	-0.0722	-0.1483	-0.2319	-0.3255	-0.4302	-0.5448	0.3340	0.2102	0.0657	-0.0389
	$100\eta_P$	-7.6811	-13.7153	-16.4081	-13.9810	-4.5556	13.6276	43.1489	77.2880	109.8431	141.9198
	$100\eta_V$	0.2141	0.4318	0.6556	0.8849	1.1152	1.3359	1.5299	1.6816	1.8086	1.9289
I	$100\eta_\phi$	0.6630	1.3590	2.2766	3.3555	4.6602	6.2740	8.1296	10.1998	12.5997	15.3543
	$100\eta_P$	-0.0493	-0.1025	-0.1633	-0.2346	-0.3163	-0.4148	-0.5224	0.3629	0.2454	0.1273
	$100\eta_V$	-8.4026	-15.2448	-18.9145	-17.7048	-9.7935	6.7461	33.0621	73.5954	119.5269	164.9149
I	$100\eta_\phi$	0.1817	0.3735	0.5643	0.8205	1.0851	1.3752	1.6816	1.9458	2.2293	2.5438
	$100\eta_P$	0.2718	0.5802	0.9598	1.4417	2.0506	2.8073	3.6773	4.7212	-4.4158	-13.0184
	$100\eta_V$	-0.0295	-0.0622	-0.1012	-0.1492	-0.2081	-0.2790	-0.3615	-0.4536	0.4490	0.3502
I	$100\eta_\phi$	-8.6478	-15.7709	-19.7909	-19.0318	-11.6959	4.1291	30.4215	69.1218	121.9628	182.2197
	$100\eta_P$	0.1475	0.3112	0.5065	0.7465	1.0412	1.3959	1.8086	2.2693	2.7554	3.2407
	$100\eta_V$	0.0622	0.1345	0.2267	0.3477	0.5048	0.7031	0.9445	1.2263	1.5596	1.9437
I	$100\eta_\phi$	-0.0130	-0.0280	-0.0467	-0.0708	-0.1016	-0.1404	-0.1869	-0.2407	-0.2998	-0.3688
	$100\eta_P$	-8.6802	-15.8413	-19.9101	-19.2155	-11.9641	3.7536	29.9151	68.4617	121.1309	189.2065
	$100\eta_V$	0.1129	0.2479	0.4269	0.6698	0.9937	1.4113	1.9289	2.5438	3.2407	3.9879
I	$100\eta_\phi$	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
	$100\eta_P$	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	$100\eta_V$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\phi = \eta_\phi \frac{S^2}{kb} P$$

$$P = \eta_P \frac{P}{bL}$$

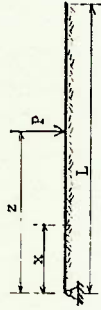
$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 2.06

ESTRUTURA 2

Esforço externo: Força Concentrada



LINHA DE ESTADO PARA ESFORÇO APLICADO EM \downarrow (LER NA VERTICAL)

SL=4.00

x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
L	$100n_\phi$	0.0000	52.3629	64.7931	56.6586	41.0424	25.3528	12.7957	3.9271	-2.0702	-6.4647	-10.3404
	n_p	0.0000	0.0000	0.0000	0.0000	0.0000	0.7000	0.0000	0.0000	0.0000	0.0000	0.0000
	$100n_M$	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	n_v	0.0000	0.6171	0.3123	0.1078	-0.0079	-0.0590	-0.0698	-0.0595	-0.0402	-0.0184	0.0038
	n	0.0000	32.3984	54.5254	52.9668	41.1193	27.1308	14.9743	5.8131	-0.7745	-5.8490	-10.4178
	n	0.0000	0.7318	0.9825	0.8874	0.6575	0.4154	0.2165	0.0729	-0.0262	-0.1302	-0.1660
A	n	0.0000	6.3052	3.2933	1.2286	0.0307	-0.5215	-0.6634	-0.5638	-0.4074	-0.2009	0.0104
	n	0.0000	-0.3437	0.3628	0.1527	0.0250	-0.0384	-0.0593	-0.0561	-0.0417	-0.0235	-0.0045
	n	0.0000	2.1552	20.5795	39.0530	39.2470	31.1364	20.8179	11.2376	3.1965	-3.6814	-10.1192
D	n	0.0000	0.9825	1.6195	1.6414	1.3062	0.8606	0.4990	0.2050	-0.0105	-0.1790	-0.3316
	n	0.0000	3.2967	7.5407	3.3338	0.7185	-0.6233	-1.1047	-1.0497	-0.8376	-0.5003	-0.1452
	n	0.0000	-0.2539	-0.5026	0.2810	0.1234	0.0258	-0.0243	-0.0429	-0.0441	-0.0377	-0.0294
F	n	0.0000	-11.6592	-13.3763	6.8288	29.1446	33.2242	28.0379	19.3117	9.9603	0.9313	-7.8533
	n	0.0000	0.8874	1.6414	2.0401	1.8702	1.4021	0.8904	0.4469	0.0910	-0.2050	-0.4795
	n	0.0000	1.2423	3.3513	7.0515	2.7039	0.1605	-1.0377	-1.3813	-1.2712	-0.8744	-0.6311
U	n	0.0000	-0.1586	-0.3350	-0.5307	0.2835	0.1397	0.0442	-0.0114	-0.0410	-0.0575	-0.0702
	n	0.0000	-15.6257	-25.7815	-23.4905	0.6521	26.0902	32.1902	27.9503	19.2594	9.2173	-1.0258
	n	0.0000	0.6575	1.3062	1.8702	2.1412	1.8952	1.3804	0.8263	0.3219	-0.1296	-0.5587
E	n	0.0000	0.0544	0.7742	2.7571	6.5399	2.3446	-0.0718	-1.2145	-1.6029	-1.8451	-1.5908
	n	0.0000	-0.0809	-0.1660	-0.3312	-0.5121	0.3054	0.1572	0.0511	-0.0216	-0.0754	-0.1231
	n	0.0000	-14.0856	-26.0640	-32.4214	-27.0706	-0.8037	26.0116	33.0808	29.7731	22.2470	13.6837
P	n	0.0000	0.4154	0.8806	1.4021	1.8952	2.1412	1.8659	1.3231	0.7141	-0.1154	-0.4703
	n	0.0000	0.4567	0.5037	0.3088	2.4672	6.4033	2.2747	-0.2111	-1.5991	-2.4313	-3.0955
	n	0.0000	-0.0274	-0.0767	-0.1664	-0.3066	-0.4896	0.3203	0.1579	0.0288	-0.0778	-0.1765
R	n	0.0000	-10.6705	-21.2185	-30.4307	-34.9434	-28.3568	-0.8817	27.8280	38.1874	40.0658	39.5663
	n	0.0000	0.2165	0.4990	0.8904	1.3804	1.8659	2.1027	1.8301	1.2640	0.6083	-0.0609
	n	0.0000	-0.5587	-0.8969	-0.7405	0.2681	2.5474	6.4672	2.1167	-0.8678	-3.0815	-5.0440
S	n	0.0000	0.0037	-0.0084	-0.0520	-0.1418	-0.2861	-0.4777	0.3162	0.1266	-0.0440	-0.2065
	n	0.0000	7.4015	15.6577	24.8508	-33.4434	-37.3633	-29.1928	2.1060	38.1749	60.3589	78.3212
	n	0.0000	0.0729	0.2050	0.4469	0.8263	1.3231	1.8301	2.1049	1.8919	1.4114	0.8652
C	n	0.0000	-0.4396	-0.7837	-0.8933	-0.5533	0.5352	2.7152	6.2561	1.1346	-3.0972	-7.0103
	n	0.0000	0.0177	0.0261	0.0141	-0.0317	-0.1235	-0.2773	-0.4836	0.2844	0.0542	-0.1714
	n	0.0000	-5.2041	-11.6334	-19.9593	-29.6292	-38.0237	-39.5105	-24.6511	19.6411	76.6060	127.3754
A	n	0.0000	-0.0262	-0.0105	0.0910	0.3219	0.7141	1.2640	1.8919	2.3875	2.5196	2.5017
	n	0.0000	0.2438	-0.4588	-0.5918	-0.5439	-0.1589	0.7656	2.4550	5.0187	-1.8755	-8.0517
	n	0.0000	0.0198	0.0353	0.0403	0.0252	-0.0235	-0.1213	-0.2803	-0.4992	0.2486	-0.0096
O	n	0.0000	4.2278	-9.7478	-17.4765	-27.1735	-36.8543	-41.7318	-33.3264	0.8888	76.4131	175.9592
	n	0.0000	0.1002	-0.1790	-0.2050	-0.1296	0.1154	0.6063	1.4114	2.5196	3.7778	4.9411
	n	0.0000	-0.0721	-0.1405	-0.1942	-0.1377	0.0811	0.0811	0.5242	1.2553	2.2793	-6.5235
1.0	n	0.0000	0.0133	0.0256	0.0343	0.0345	0.0178	-0.0274	-0.1140	-0.2514	-0.44365	0.3560
	n	0.0000	4.0682	-9.4545	-17.0379	-26.6916	-36.5085	-41.8453	-34.3954	-1.7870	71.4481	200.2657
	n	0.0000	-0.1660	-0.3316	-0.4795	-0.5587	-0.4703	-0.0609	0.4652	2.5017	4.9411	8.0061
1.0	n	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	n	0.0000	-0.0000	0.0000	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	n	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\phi = n_p \frac{s^2}{kb} P$$

$$M = n_M PL$$

$$V = n_V P$$

TABELA 2.09

ESTRUTURA 2

SL=5.50 Esforço externo: Força Concentrada



x/L	z/L	100n _φ	100n _p	100n _v	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	0.1	0.0000	0.0000	0.0000	60.3162	59.3355	38.2682	17.8992	4.8314	-1.2533	-2.8687	-2.4206	-1.2654	0.0051
I	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
F	0.1	0.0000	0.0000	0.0000	0.4919	0.1510	-0.0153	-0.0655	-0.0957	-0.0372	-0.0168	-0.0033	0.0051	0.0116
L	0.1	0.0000	0.0000	0.0000	29.6982	49.3058	38.6290	21.5853	8.3641	1.0167	-1.8267	-2.1830	-1.5519	-0.6936
U	0.1	0.0000	0.0000	0.0000	1.5191	1.6974	1.1640	0.5797	-0.1821	-0.0710	-0.0768	-0.0710	-0.0412	-0.0069
E	0.1	0.0000	0.0000	0.0000	5.2077	1.8042	0.0404	-0.5629	-0.0376	-0.0376	-0.1425	-0.0453	0.0441	0.1153
N	0.1	0.0000	0.0000	0.0000	-0.4245	0.2383	0.0428	-0.0375	-0.0515	-0.0386	-0.0210	-0.0069	0.0031	0.0114
C	0.1	0.0000	0.0000	0.0000	11.0122	8.9636	32.6198	29.1415	17.8619	7.9178	1.8234	-1.0415	-2.1620	-2.7479
I	0.1	0.0000	0.0000	0.0000	2.6832	2.2777	1.3476	0.5672	0.1064	0.0446	-0.0446	-0.1232	-0.0973	-0.0557
A	0.1	0.0000	0.0000	0.0000	1.8047	5.2490	1.2425	-0.5294	-0.0941	-0.7568	-0.4361	0.0456	0.0456	0.2201
E	0.1	0.0000	0.0000	0.0000	-0.2335	-0.5326	0.2163	-0.0570	-0.0164	-0.0356	-0.0299	-0.0169	-0.0037	0.0088
I	0.3	0.0000	0.0000	0.0000	20.7145	27.7129	0.5302	28.9247	28.7980	18.8864	9.0370	2.1769	-2.2587	-5.7795
N	0.3	0.0000	0.0000	0.0000	1.1640	2.2777	2.8677	2.2680	1.2794	0.5060	0.0696	-0.1132	-0.1671	-0.1833
F	0.3	0.0000	0.0000	0.0000	0.0422	1.2448	4.6821	0.8665	-0.7176	-1.0086	-0.7611	-0.3932	-0.0516	0.2626
L	0.3	0.0000	0.0000	0.0000	-0.1081	-0.2754	-0.5182	0.2377	0.0731	-0.0077	-0.0325	-0.0295	-0.0169	-0.0024
U	0.3	0.0000	0.0000	0.0000	16.7231	30.2520	31.4633	0.9062	30.0163	30.2108	19.9642	8.9001	-0.2442	-8.3441
E	0.3	0.0000	0.0000	0.0000	0.5797	1.3476	2.2680	2.8023	2.2150	1.2569	0.5001	0.2130	-0.4014	-0.4014
N	0.3	0.0000	0.0000	0.0000	0.5587	0.5219	0.8741	4.5015	0.8066	-0.7821	-0.6932	-0.7273	-0.3141	-0.1139
C	0.3	0.0000	0.0000	0.0000	-0.0219	-0.0936	-0.2538	-0.5014	0.2475	0.0775	-0.0068	-0.0347	-0.0364	-0.0310
I	0.3	0.0000	0.0000	0.0000	9.5719	20.5535	30.7633	30.5399	0.4076	31.2417	30.8628	19.5449	6.1776	-6.9094
A	0.3	0.0000	0.0000	0.0000	0.1821	0.5672	1.2794	2.150	2.7881	2.2336	1.2784	0.4660	-0.1375	-0.6488
P	0.3	0.0000	0.0000	0.0000	0.5635	0.9265	0.6948	0.8294	4.5170	0.8419	-0.6955	-0.9951	-0.7798	-0.4392
A	0.3	0.0000	0.0000	0.0000	0.0143	-0.0004	-0.0767	-0.2432	-0.4951	0.2517	0.0793	-0.0119	-0.0555	-0.0838
R	0.3	0.0000	0.0000	0.0000	3.8632	10.1850	19.8593	29.8454	0.8938	31.5269	31.0296	19.1232	4.8688	4.8688
A	0.3	0.0000	0.0000	0.0000	-0.0151	0.1084	0.5060	1.2569	2.2336	2.8343	2.2721	1.2375	-0.2274	-0.7159
A	0.3	0.0000	0.0000	0.0000	0.3691	0.7362	0.9644	-0.6554	0.9093	4.6116	0.9006	-0.7671	-1.3590	-1.6272
S	0.3	0.0000	0.0000	0.0000	0.0213	0.0308	0.0098	-0.0699	-0.2365	-0.4874	0.2566	-0.0704	-0.0543	-0.1550
E	0.3	0.0000	0.0000	0.0000	0.6063	3.2283	9.5370	19.7959	30.5354	31.0069	0.0943	33.0639	38.0491	35.2340
C	0.3	0.0000	0.0000	0.0000	0.0768	0.0846	0.0696	0.5001	1.2784	2.2721	2.8672	2.2517	1.0822	-0.1662
C	0.3	0.0000	0.0000	0.0000	0.1785	0.4152	-0.8645	-0.4868	1.1026	4.7390	4.7390	0.7204	-1.6697	-3.4806
A	0.3	0.0000	0.0000	0.0000	0.0159	0.0302	0.0360	0.0154	-0.0608	-0.2242	-0.4786	0.2442	0.0064	-0.2067
D	0.3	0.0000	0.0000	0.0000	0.7542	0.1730	-3.2739	-11.0054	-22.9800	-34.8671	-33.9261	4.5703	55.0440	89.5132
L	0.3	0.0000	0.0000	0.0000	0.0710	0.1232	-0.1132	0.0441	0.4660	1.2375	2.2517	2.9339	2.5145	1.6614
L	0.3	0.0000	0.0000	0.0000	0.0593	0.1660	0.3429	-0.5476	-0.6106	-0.1703	1.3276	4.4355	-0.8484	-5.3940
L	0.3	0.0000	0.0000	0.0000	0.0081	0.0190	0.0322	0.0404	0.0245	-0.0476	-0.2142	-0.4895	-0.1818	-0.1457
L	0.3	0.0000	0.0000	0.0000	1.1112	1.2744	0.8076	6.7616	17.6828	31.8870	41.0142	25.3367	48.3803	158.6717
L	0.3	0.0000	0.0000	0.0000	0.412	0.0973	-0.1671	-0.2130	-0.1375	0.2274	1.0822	2.5145	4.1804	5.4105
L	0.3	0.0000	0.0000	0.0000	0.0092	0.0349	-0.0893	-0.1700	-0.2603	-0.2018	0.1252	0.9766	2.5107	-5.4831
L	0.3	0.0000	0.0000	0.0000	0.0024	0.0077	0.0176	0.0309	0.0396	0.0247	-0.0459	-0.2096	-0.4819	0.1903
L	0.3	0.0000	0.0000	0.0000	1.1425	1.4082	0.4448	6.0447	16.4285	30.9153	41.3042	29.1296	38.0540	199.9866
L	0.3	0.0000	0.0000	0.0000	0.0069	0.0557	-0.1833	-0.4014	-0.5488	-0.7159	-0.1662	1.6614	5.4105	10.9996
L	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L	0.3	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000

$$S = \sqrt{\frac{4kD}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{kb} P$$

$$p = \eta_p \frac{P}{bL}$$

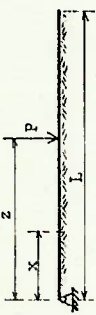
$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 2.11

ESTRUTURA 2

SL=6.50 Esforço externo: Força Concentrada



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L 0.1	0.0000	63.1889	52.5233	26.4355	7.6522	0.9629	-2.8371	-2.1586	-1.0043	-0.0636	0.7167
I 0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
F 0.1	0.0000	0.4156	0.0729	-0.0527	-0.0637	-0.0386	-0.0147	-0.0017	0.0027	0.0031	0.0023
L 0.2	0.0000	26.2618	44.8133	30.0913	12.7933	2.4163	-1.5101	-1.8205	-1.2046	-0.3195	0.5023
I 0.2	0.0000	2.1597	1.1729	0.3971	0.0098	0.0000	-0.1016	-0.6886	-0.0454	-0.0063	0.0274
N 0.2	0.0000	4.5758	1.0942	-0.3376	-0.5790	-0.3698	-0.1644	-0.0322	0.0201	0.0299	0.0278
F 0.2	0.0000	-0.4635	0.1815	0.0046	-0.0456	-0.0393	-0.0203	-0.0062	0.0005	0.0028	0.0037
L 0.3	0.0000	18.3762	3.8304	31.1766	24.8704	12.1721	3.3267	-0.5788	-1.4228	-1.0342	-0.3716
I 0.3	0.0000	2.1192	3.3326	2.5166	1.1831	0.2963	-0.0786	-0.1491	-0.1024	-0.0336	0.0333
N 0.3	0.0000	1.0943	4.2384	0.5154	-0.7272	-0.7464	-0.4244	-0.1509	-0.0064	0.0518	0.0813
F 0.3	0.0000	-0.2341	-0.5318	0.1685	0.0291	-0.0274	-0.0310	-0.0186	-0.0066	0.0011	0.0071
L 0.4	0.0000	22.4345	32.0175	1.3919	30.5684	25.8254	13.1913	3.9586	-0.4131	-1.8715	-2.4159
I 0.4	0.0000	1.1729	2.5166	3.3433	2.4170	1.0972	0.2515	-0.0931	-0.1488	-0.0958	-0.0206
N 0.4	0.0000	-0.3372	0.5160	3.8494	0.3485	-0.7630	-0.7356	-0.4094	-0.1347	0.0371	0.1632
F 0.4	0.0000	-0.0692	-0.2270	-0.5073	0.2089	0.0374	-0.0258	-0.0323	-0.0197	-0.0051	0.0084
L 0.5	0.0000	13.6480	-27.6712	-32.6451	-0.4446	31.6338	26.6258	13.7012	-1.7415	-1.7415	-5.7372
I 0.5	0.0000	0.3971	1.1831	2.4170	3.2588	2.3766	1.0908	0.2602	-0.0903	-0.1787	-0.1896
N 0.5	0.0000	-0.5781	-0.7255	0.3506	3.8158	0.3607	-0.7520	-0.7365	-0.4036	-0.0754	0.2147
F 0.5	0.0000	0.0071	-0.2086	-0.2086	-0.4987	0.2089	0.0365	-0.0273	-0.0332	-0.0188	-0.0009
L 0.6	0.0000	5.2451	-14.3008	-26.7754	-31.6495	0.3296	32.3193	27.2400	13.6546	1.6683	-8.5631
I 0.6	0.0000	0.0096	0.2963	1.0972	2.3766	3.2576	2.4012	1.1228	0.2611	-0.1973	-0.5004
N 0.6	0.0000	-0.3884	-0.7431	0.3680	3.8349	0.3649	-0.7385	-0.7601	-0.7385	-0.3618	0.0643
F 0.6	0.0000	0.0244	0.0255	-0.2082	-0.4987	0.2089	0.0370	0.0370	-0.0280	-0.0388	-0.0344
L 0.7	0.0000	0.6536	-4.3726	-13.3909	-26.1866	-31.2175	0.8515	32.9218	27.2862	11.5249	-5.0797
I 0.7	0.0000	0.1016	-0.0786	0.2515	1.0908	2.4012	3.3067	2.4603	1.1233	0.0537	-0.8272
N 0.7	0.0000	-0.1659	-0.4207	-0.7243	-0.7298	0.3916	3.8565	0.3820	-0.7690	-0.8235	-0.5894
F 0.7	0.0000	0.0182	0.0328	0.0275	-0.0350	-0.2049	-0.4948	0.2140	0.0363	-0.0494	-0.1019
L 0.8	0.0000	0.9009	0.2777	-3.8566	-13.2695	-26.3443	-31.5447	0.5585	33.1702	29.0360	15.8969
I 0.8	0.0000	-0.0686	-0.1491	0.0931	0.2602	1.1228	2.4603	3.3793	2.4667	0.8684	-0.6847
N 0.8	0.0000	-0.0350	-0.1518	-0.3976	-0.6955	-0.6785	0.4803	3.9568	-0.3673	-1.1627	-2.0336
F 0.8	0.0000	0.0082	0.0198	0.0321	0.0260	-0.0306	-0.1952	-0.4630	0.42136	-0.0065	-0.1848
L 0.9	0.0000	1.0211	1.5677	0.4918	-4.2819	-14.7406	-29.1344	-34.7101	1.0600	46.2615	67.1002
I 0.9	0.0000	-0.0454	-0.1024	-0.1488	-0.0903	0.2611	1.1233	2.4667	3.4016	2.5130	0.9477
N 0.9	0.0000	-0.0095	-0.0227	-0.1402	-0.3603	-0.5777	-0.4690	0.7284	3.9437	-0.5849	-4.0401
F 0.9	0.0000	0.0014	0.0068	0.0185	0.0333	0.0344	-0.0171	-0.1786	-0.4820	0.1553	-0.1897
L 1.0	0.0000	0.8364	1.6161	1.6916	-0.6562	-8.0671	-22.1097	-37.7977	-34.1468	34.5424	146.3061
I 1.0	0.0000	-0.0063	-0.0336	-0.0958	-0.1787	-0.1573	0.0537	0.6884	2.5130	4.4049	5.4026
N 1.0	0.0000	0.0042	0.0056	-0.0230	-0.0937	-0.2014	-0.2693	-0.0818	0.7398	2.5557	-4.8606
F 1.0	0.0000	-0.0011	-0.0000	0.0059	0.0186	0.0353	0.0392	-0.0099	-0.1742	-0.4950	0.0997
L 1.0	0.0000	0.7826	1.5691	1.8034	-0.1262	-6.8030	-20.3862	-36.9703	-37.9421	19.9306	200.0008
I 1.0	0.0000	-0.0274	0.0333	-0.0206	-0.1896	-0.5004	0.0047	0.9477	5.4026	13.0000	-0.0000
N 1.0	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000
F 1.0	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \frac{S^2}{kD} P$$

$$P = \eta \frac{P}{BL}$$

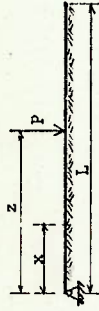
$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 2.12

ESTRUTURA 2

Esforço externo: Força Concentrada



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)					0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5			
0.0	100φ	0.0000	48.6033	21.1427	4.0730	-2.1293	-1.5021	0.1121	0.5146
0.0	100M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100N	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100V	0.0000	0.3798	-0.0618	-0.0573	-0.0283	0.0015	0.0030	0.0002
0.1	0.0000	24.3017	42.5632	26.3400	9.5106	0.7200	-1.5871	-0.7566	0.4768
0.1	0.0000	2.5028	2.2955	1.1266	0.2896	-0.0583	-0.0754	0.0025	0.0247
0.1	0.0000	4.2896	0.8122	-0.4409	-0.5352	-0.2976	0.0025	0.0191	0.0060
0.1	0.0000	0.4790	0.1590	-0.0077	-0.0451	0.0323	-0.0022	0.0017	0.0014
0.2	0.0000	-21.4196	2.0388	30.9342	22.9951	9.8324	1.7768	-1.2996	-0.6472
0.2	0.0000	2.2955	3.6294	2.5853	1.0687	0.1734	-0.1338	-0.0790	0.0418
0.2	0.0000	0.8123	3.8489	0.2771	-0.7388	-0.6299	-0.0705	0.0212	0.0361
0.2	0.0000	-0.2208	-0.5286	0.1758	-0.0173	-0.0303	-0.0274	-0.0034	0.0049
0.3	0.0000	-22.2646	-33.0513	1.3067	31.2644	24.0521	10.5980	-1.0655	-1.1994
0.3	0.0000	1.1266	2.5853	3.5716	2.4699	0.9945	0.1441	-0.1436	0.0209
0.3	0.0000	0.4407	0.2774	3.5513	0.1826	0.7386	-0.6094	0.0427	0.1050
0.3	0.0000	-0.0496	-0.2040	-0.5036	0.1906	0.0222	-0.0305	-0.0147	0.0086
0.4	0.0000	-11.6351	-25.6181	-32.7331	-0.2227	32.0650	24.5357	2.1193	-1.6784
0.4	0.0000	0.2896	1.0687	2.4699	3.4886	2.4436	0.9941	-0.1357	-0.1540
0.4	0.0000	-0.5348	-0.7379	0.1836	3.5226	0.2036	-0.7295	-0.6149	-0.0229
0.4	0.0000	0.0168	-0.0246	-0.1891	-0.4985	0.1906	0.0206	-0.0321	-0.0127
0.5	0.0000	-3.3571	-11.3294	-24.5652	-31.9757	0.2500	32.4784	25.0347	10.9800
0.5	0.0000	0.0583	0.1734	0.9945	2.4436	3.5022	2.4634	1.0196	-0.2078
0.5	0.0000	-0.2974	-0.6284	-0.7354	0.2077	3.5665	-0.2002	-0.7450	-0.2403
0.5	0.0000	0.0250	0.0316	-0.0195	-0.1889	-0.4995	0.1900	0.0206	-0.0317
0.6	0.0000	0.3086	-2.3131	-10.6237	-24.2470	-31.7404	0.6759	33.1627	8.8221
0.6	0.0000	-0.1166	-0.1338	0.1441	0.9941	2.4634	3.5438	2.5196	-0.0149
0.6	0.0000	-0.0942	-0.2957	-0.6038	-0.7167	0.2171	3.5706	0.2013	-0.8022
0.6	0.0000	0.0147	0.0299	0.0317	-0.0204	-0.1886	-0.4970	0.1940	-0.6458
0.7	0.0000	1.0678	1.0414	-2.0253	-10.5934	-24.2963	-31.7586	0.7623	-7.3873
0.7	0.0000	-0.0754	-0.1471	-0.1396	0.1516	1.0196	2.5196	3.6252	8.8221
0.7	0.0000	0.0002	-0.0727	-0.2802	-0.5924	0.2036	-0.6930	0.2138	-0.0149
0.7	0.0000	0.0048	0.0145	0.0284	0.0313	-0.0177	-0.1811	-0.4860	-1.0144
0.8	0.0000	-0.7942	1.4750	1.1837	-2.2017	-11.4465	-26.2612	-34.4572	-0.1970
0.8	0.0000	0.0283	-0.0790	-0.1436	-0.1357	0.1580	1.0353	2.5489	0.1970
0.8	0.0000	0.0194	0.0093	-0.0734	-0.2695	0.5307	-0.5396	0.4917	3.7033
0.8	0.0000	-0.0002	0.0030	0.0129	0.0286	0.0359	-0.0058	-0.1633	-0.4798
0.9	0.0000	0.4999	1.1945	1.7668	0.7704	-4.6690	-17.5328	-34.9916	43.0633
0.9	0.0000	0.0025	-0.0135	-0.0659	-0.1540	0.2078	0.2138	2.5183	2.5489
0.9	0.0000	0.0088	0.0118	-0.0088	-0.0603	0.1685	-0.2733	-0.1583	3.6539
0.9	0.0000	-0.0014	-0.0015	0.0022	0.0129	0.0306	0.0416	0.0040	0.6207
1.0	0.0000	0.4366	1.1022	1.7693	1.1499	-3.5394	-15.5367	-33.5074	-40.2198
1.0	0.0000	0.0247	0.0418	0.0209	-0.1022	-0.3957	-0.8022	-0.6656	0.5667
1.0	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \frac{S}{kb} P$$

$$p = \eta \frac{P}{bL}$$

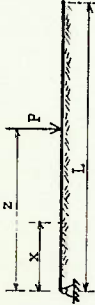
$$M = \eta_N PL$$

$$V = \eta_V P$$

TABELA 2.14

ESTRUTURA 2

SL=6.00 Esforço externo: Força Concentrada



x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100φ	0.0000	40.3622	12.2554	-0.4759	-2.7730	-1.6416	-0.4694	0.0404	0.1363	0.1132
0.0	100η _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _v	0.0000	-0.0059	-0.0669	-0.0407	-0.0120	0.0067	0.0029	0.0017	0.0003	-0.0008
0.1	100φ	0.0000	38.3608	19.9436	4.7419	-1.0589	-1.6250	-0.8115	-0.1817	0.6639	0.2025
0.1	100η _p	0.0000	2.5640	0.9560	-0.0809	-0.1424	-0.1057	-0.0376	-0.0021	0.0077	0.0092
0.1	100η _M	0.0000	3.7741	0.3715	-0.5294	-0.1476	-0.1010	0.0240	0.0174	0.0048	0.0063
0.1	100η _v	0.0000	-0.5029	0.1231	-0.0233	-0.0200	-0.0045	0.0012	0.0017	0.0007	-0.0003
0.2	100φ	0.0000	-26.1051	30.8481	19.3628	5.8924	-0.2318	-1.3590	-0.6206	-0.1708	0.3531
0.2	100η _p	0.0000	2.5640	0.9560	-0.0809	-0.1424	-0.1057	-0.0376	-0.0021	0.0077	0.0092
0.2	100η _M	0.0000	3.7741	0.3715	-0.5294	-0.1476	-0.1010	0.0240	0.0174	0.0048	0.0063
0.2	100η _v	0.0000	-0.5029	0.1231	-0.0233	-0.0200	-0.0045	0.0012	0.0017	0.0007	-0.0003
0.3	100φ	0.0000	-33.6185	32.4681	0.0195	32.3012	6.1740	-0.2446	-1.4368	-0.8083	0.0983
0.3	100η _p	0.0000	2.6449	0.8136	-0.0248	-0.1805	-0.1092	-0.0324	0.0065	0.0275	0.0462
0.3	100η _M	0.0000	3.0972	-0.0349	-0.4168	0.0072	0.0303	0.0166	-0.0026	-0.0026	0.0289
0.3	100η _v	0.0000	-0.1625	-0.4996	0.1580	-0.0022	-0.0033	0.0011	-0.0063	0.0011	0.0052
0.4	100φ	0.0000	-21.0020	20.1753	-32.1861	0.0619	32.3927	20.5060	-1.6236	-1.4977	0.0089
0.4	100η _p	0.0000	0.8136	2.5396	3.9929	2.5373	4.0000	2.5453	0.1794	0.0115	0.0115
0.4	100η _M	0.0000	0.6768	-0.0450	3.1207	-0.0291	-0.6509	-0.4063	-0.1247	0.0217	0.1023
0.4	100η _v	0.0000	0.0275	0.0033	-0.1551	0.1567	-0.0033	-0.0343	-0.0213	-0.0046	0.0089
0.5	100φ	0.0000	-6.3673	20.1753	-32.1861	0.0619	32.3927	20.5060	6.3889	-1.0368	5.1663
0.5	100η _p	0.0000	0.0248	0.7760	2.5373	4.0000	2.5453	0.7694	-0.0233	-0.0233	-0.1916
0.5	100η _M	0.0000	0.1475	-0.6530	-0.0278	3.1253	-0.0350	-0.6651	-0.4178	-0.0934	0.1732
0.5	100η _v	0.0000	0.0349	0.0038	-0.1562	-0.5000	0.1562	-0.0039	-0.0349	-0.0201	0.0019
0.6	100φ	0.0000	0.2438	-6.1020	20.1872	-32.1861	0.0619	32.3927	21.0502	4.8168	-8.6138
0.6	100η _p	0.0000	0.1805	0.0284	0.7809	2.5453	4.0194	2.5631	0.8175	-0.1230	-0.8511
0.6	100η _M	0.0000	0.1241	-0.3994	-0.6467	-0.0283	3.1194	-0.0473	-0.6772	-0.3972	0.0298
0.6	100η _v	0.0000	0.0211	0.0336	0.0029	-0.1564	-0.4993	0.1576	-0.0031	-0.0395	-0.0383
0.7	100φ	0.0000	1.0343	0.2348	-6.1788	-20.1861	-31.9562	0.8936	33.6253	20.0673	-1.1233
0.7	100η _p	0.0000	0.1092	-0.1776	-0.0273	0.7894	2.5831	4.1016	2.6512	0.6209	-1.0703
0.7	100η _M	0.0000	0.0057	0.1196	-0.4000	-0.6443	-0.0141	3.1483	-0.0304	-0.7691	0.7659
0.7	100η _v	0.0000	0.0061	0.0200	0.0331	0.0036	-0.1528	-0.4916	0.1633	-0.0227	-0.1282
0.8	100φ	0.0000	0.3039	0.8858	1.4484	0.2456	-20.9571	-33.4682	0.0070	38.3716	39.1831
0.8	100η _p	0.0000	0.0021	-0.0324	-0.1076	-0.0233	0.8175	2.6512	4.1728	2.5345	-0.0943
0.8	100η _M	0.0000	0.0159	0.0260	-0.0003	-0.1259	-0.5743	0.1336	3.2596	-0.4182	-2.5226
0.8	100η _v	0.0000	-0.0013	-0.0051	0.0051	0.0345	0.0110	-0.1366	-0.4784	0.1250	-0.2077
0.9	100φ	0.0000	0.0527	0.3987	1.1645	1.7079	-0.4655	-9.9132	-39.1096	19.6602	127.0759
0.9	100η _p	0.0000	0.0077	0.0065	-0.0226	-0.1017	0.6209	0.6209	2.5345	4.7843	5.0088
0.9	100η _M	0.0000	0.0044	0.0105	0.0119	-0.0132	-0.2925	-0.2596	0.3953	2.5128	-4.0291
0.9	100η _v	0.0000	-0.0009	-0.0017	-0.0012	0.0045	0.0201	0.0398	-0.1230	-0.4500	-0.0093
1.0	100φ	0.0000	0.0144	0.3023	1.0388	1.7804	-0.3762	-7.6631	-25.6442	-41.5410	1.6556
1.0	100η _p	0.0000	0.0092	0.0275	0.0462	0.0115	-0.1916	-0.6511	-1.0703	5.0088	16.0000
1.0	100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100η _v	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000

$$S = \sqrt{\frac{4k\delta}{4EI}}$$

$$\phi = \eta \phi \frac{s^2}{kb}$$

$$p = \eta p \frac{p}{bL}$$

$$M = \eta M \frac{pL}{bL}$$

$$V = \eta V \frac{pL}{bL}$$

TABELA 2.15

ESTRUTURA 2

Esforço externo: Momento

SL=1.50

x/L	z/L →	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100φ 100M nV	224.3180 0.0000 0.0000 -1.6793	169.3381 0.0000 0.0000 -1.6584	124.1979 0.0000 0.0000 -1.6073	88.3528 0.0000 0.0000 -1.5414	61.0034 0.0000 0.0000 -1.4725	41.1686 0.0000 0.0000 -1.4096	27.7413 0.0000 0.0000 -1.3520	19.5288 0.0000 0.0000 -1.3220	15.2805 0.0000 0.0000 -1.3005	13.7048 0.0000 0.0000 -1.2917	13.4783 0.0000 0.0000 -1.2903
L 0.1		169.3381 0.6615 83.3246 -1.6447	129.0094 0.5771 16.0033 -1.6297	92.49695 0.4246 -0.3034 -1.5863	65.4158 0.3034 -1.46909 -1.5264	45.3939 0.1437 -1.46909 -1.4025	31.8141 0.0982 -1.4025 -1.3536	23.4930 0.0704 -13.2084 -1.3186	19.1807 0.0560 -12.9987 -1.2978	17.5786 0.0506 -12.9087 -1.2879	17.3480 0.0498 -12.8949 -1.2879	17.3480 0.0498 -12.8949 -1.2879
N 0.2		124.1979 1.1541 67.2866 -1.5527	129.0094 0.8815 68.4206 -1.5452	143.3166 0.6378 30.4223 -1.5213	106.7287 0.4514 -29.1684 -1.4797	78.5899 0.3159 -27.9989 -1.4294	58.0265 0.2239 -27.0357 -1.3799	44.0031 0.1675 -26.3443 -1.3378	35.3646 0.1382 -25.7646 -1.2885	30.8648 0.1274 -25.7378 -1.2807	29.1648 0.1274 -25.7378 -1.2794	28.9420 0.12538 -25.7378 -1.2794
H 0.3		88.3528 1.5103 52.4113 -1.4184	129.0094 1.4583 52.7525 -1.4170	106.7287 1.0338 53.7230 -1.3966	78.5899 0.7510 55.1625 -1.3699	58.0265 0.5447 -41.6047 -1.3375	44.0031 0.3179 -39.3082 -1.3070	35.3646 0.2239 -39.3082 -1.2833	27.7413 0.1675 -39.3082 -1.2684	20.1171 0.1274 -38.4588 -1.2620	18.4701 0.1274 -38.4588 -1.2620	18.4701 0.1274 -38.4588 -1.2620
I 0.4		41.1686 1.7601 39.0275 -1.2542	129.0094 1.8114 40.3173 -1.2571	106.7287 1.4191 41.7803 -1.2733	78.5899 1.0338 43.5474 -1.2763	58.0265 0.8577 -54.6588 -1.2682	44.0031 0.6661 -53.1031 -1.2542	35.3646 0.4861 -51.2469 -1.2408	27.7413 0.3179 -51.2469 -1.2266	20.1171 0.2563 -50.9029 -1.2266	18.4701 0.2563 -50.9029 -1.2266	18.4701 0.2563 -50.9029 -1.2266
N 0.5		16.9339 1.9305 27.3971 -1.0691	129.0094 1.9084 27.6338 -1.0750	106.7287 1.7196 28.5162 -1.0916	78.5899 1.5376 29.8100 -1.1158	58.0265 1.2812 33.1540 -1.1622	44.0031 1.0354 -64.0303 -1.1702	35.3646 0.8030 -63.2683 -1.1702	27.7413 0.6030 -62.9400 -1.1678	20.1171 0.4861 -62.9400 -1.1678	18.4701 0.4861 -62.9400 -1.1678	18.4701 0.4861 -62.9400 -1.1678
L 0.6		27.7413 2.0452 17.6926 -0.8699	129.0094 2.0370 17.9115 -0.8773	106.7287 1.8735 18.5502 -0.8987	78.5899 1.8735 20.8318 -0.9314	58.0265 1.7386 22.2507 -1.0108	44.0031 1.5387 23.6373 -1.0428	35.3646 1.0354 -75.2193 -1.0599	27.7413 0.8030 -74.4761 -1.0664	20.1171 0.6030 -74.4761 -1.0664	18.4701 0.6030 -74.4761 -1.0664	18.4701 0.6030 -74.4761 -1.0664
A 0.7		19.5288 2.1236 10.0303 -0.6612	129.0094 2.1431 10.1732 -0.6688	106.7287 2.0105 10.5916 -0.6908	78.5899 2.0105 10.5916 -0.7686	58.0265 1.8735 13.0823 -0.8160	44.0031 1.5387 14.0717 -0.8611	35.3646 1.0354 14.9519 -0.8956	27.7413 0.8030 14.9519 -0.8956	20.1171 0.6030 14.9519 -0.8956	18.4701 0.6030 14.9519 -0.8956	18.4701 0.6030 14.9519 -0.8956
S 0.8		15.2805 2.1814 4.4899 -0.4459	129.0094 2.2001 4.5621 -0.4522	106.7287 2.0105 4.7743 -0.4708	78.5899 2.0105 5.5531 -0.5383	58.0265 1.8735 6.0623 -0.5816	44.0031 1.5387 7.0932 -0.6255	35.3646 1.0354 7.0932 -0.6255	27.7413 0.8030 7.0932 -0.6255	20.1171 0.6030 7.0932 -0.6255	18.4701 0.6030 7.0932 -0.6255	18.4701 0.6030 7.0932 -0.6255
E 0.9		13.7048 2.2298 1.1301 -0.2253	129.0094 2.2616 1.1504 -0.2291	106.7287 2.0105 1.4306 -0.2404	78.5899 2.0105 1.4306 -0.3093	58.0265 1.8735 1.9471 -0.3819	44.0031 1.5387 1.9471 -0.4616	35.3646 1.0354 1.9471 -0.5167	27.7413 0.8030 1.9471 -0.5816	20.1171 0.6030 1.9471 -0.6255	18.4701 0.6030 1.9471 -0.6255	18.4701 0.6030 1.9471 -0.6255
I 1.0		13.4783 2.2755 0.0000 -0.0000	129.0094 2.3203 0.0000 -0.0000	106.7287 2.0105 0.0000 -0.0000	78.5899 2.0105 0.0000 -0.0000	58.0265 1.8735 0.0000 -0.0000	44.0031 1.5387 0.0000 -0.0000	35.3646 1.0354 0.0000 -0.0000	27.7413 0.8030 0.0000 -0.0000	20.1171 0.6030 0.0000 -0.0000	18.4701 0.6030 0.0000 -0.0000	18.4701 0.6030 0.0000 -0.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\phi = \eta \phi \frac{S^3}{KB} M$$

$$p = \eta p \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$




TABELA 2.17

ESTRUTURA 2

Esforço externo: Momento (LER NA VERTICAL)

SL=2.50

LINHA DE ESTADO PARA ESFORÇO APLICADO EM →



x/L	z/L →	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100%	203.5429	115.7174	50.9834	6.2414	22.4569	39.1989	-39.1989	-47.7525	-51.2944	-52.2679	-52.3218	-52.2906
n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100%	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _y	-2.4589	-2.3326	-2.0392	-1.6798	-1.3243	-1.0160	-0.7776	-0.6155	-0.5239	-0.4873	-0.4817	-0.4817
L	115.7174	127.3047	61.1456	14.6361	15.8210	34.0935	-43.8338	-48.1638	-49.6143	-49.6512	-49.6480	-49.6480
I	2.4626	1.8686	0.8496	0.1413	-0.3144	-0.5859	-0.7858	-0.7853	-0.8029	-0.8047	-0.8044	-0.8044
N	75.8792	76.9780	-20.2562	-16.7799	-13.2999	-10.2610	-7.8590	-6.2875	-5.3747	-5.0089	-4.9530	-4.9530
A	-2.3243	-2.4207	-1.9980	-1.6739	-1.3410	-1.0460	-0.8144	-0.6551	-0.5644	-0.5279	-0.5223	-0.5223
H	50.9834	61.1456	91.2073	39.7497	4.2450	-18.4842	-31.7147	-38.4593	-41.2523	-42.0371	-42.1179	-42.1179
A	3.7366	3.3132	2.0146	0.5445	-0.4245	-1.0108	-1.3272	-1.4714	-1.5208	-1.5302	-1.5303	-1.5303
O	54.1223	55.7894	60.3635	-33.3967	-26.8989	-21.0946	-16.5135	-13.3520	-11.5453	-10.8160	-10.7038	-10.7038
D	-2.0059	-1.9730	-1.8587	-1.6428	-1.3807	-1.1279	-0.9186	-0.7692	-0.6817	-0.6456	-0.6400	-0.6400
E	6.2414	14.6361	39.7497	81.2393	38.1113	8.4273	-10.3687	-20.9927	-26.0198	-27.7120	-27.9330	-27.9330
I	4.1603	3.8819	3.0151	1.4688	-0.1118	-2.1048	-1.6689	-1.9470	-2.0564	-2.0871	-2.0871	-2.0871
N	36.0315	37.8412	42.9843	50.5745	-43.8873	-32.9115	-26.4336	-21.8706	-19.2216	-18.1391	-17.9711	-17.9711
F	-1.6053	-1.6072	-1.6005	-1.5476	-1.4119	-1.2371	-1.0712	-0.9424	-0.8625	-0.8282	-0.8227	-0.8227
L	-22.4569	-15.8210	4.2450	38.1113	86.0462	47.6986	21.7019	5.9252	-2.1286	-5.0687	-5.4848	-5.4848
E	4.0154	3.8543	3.3400	2.3823	0.8399	-0.6831	-1.5954	-2.0783	-2.2889	-2.3529	-2.3603	-2.3603
N	22.0536	23.7255	28.5640	36.0137	45.0657	-45.7903	-37.9881	-32.3076	-28.9292	-27.5231	-27.3018	-27.3018
U	-1.1927	-1.2164	-1.2782	-1.3494	-1.3817	-1.3316	-1.2366	-1.1472	-1.0829	-1.0531	-1.0480	-1.0480
C	-39.1989	-34.0935	-18.4842	8.4273	47.6986	100.2236	66.1294	44.3067	32.4594	28.1114	27.4504	27.4504
N	3.5207	3.4509	3.2143	2.7299	1.8675	0.8550	-0.9263	-1.7021	-2.0665	-2.1681	-2.2039	-2.2039
A	12.0626	13.4330	17.4464	23.7881	31.8050	40.7075	-51.0685	-44.7606	-40.8880	-39.2241	-38.9573	-38.9573
R	-0.8138	-0.8488	-0.9475	-1.0899	-1.2414	-1.3499	-1.3704	-1.3412	-1.3052	-1.2844	-1.2805	-1.2805
A	-47.7525	-43.8338	-31.7147	-10.3687	21.7019	66.1294	124.1745	96.0421	80.3257	74.0986	73.1543	73.1543
E	2.8330	2.8332	2.8118	2.7024	2.3949	1.7376	0.5422	-0.6240	-1.2025	-1.4076	-1.4359	-1.4359
A	5.5763	6.5738	9.5202	14.2615	20.4202	27.6724	34.9513	58.8974	54.8600	53.0620	52.7657	52.7657
S	-0.4950	-0.5334	-0.6445	-0.8159	-1.0249	-1.2358	-1.3972	-1.4642	-1.4749	-1.4702	-1.4684	-1.4684
E	-51.2944	-48.1638	-38.4593	-20.9927	5.9252	44.3067	96.0421	162.2943	142.7007	134.6907	133.4467	133.4467
C	2.0544	2.1091	2.2569	2.4484	2.5856	2.5856	2.2452	1.3751	0.5202	0.2037	0.1584	0.1584
O	1.9155	2.5391	4.3992	7.4184	11.4836	16.3389	21.5530	26.4385	-69.9630	-68.2384	-67.9413	-67.9413
A	-0.2502	-0.2857	-0.3902	-0.5570	-0.7731	-1.0168	-1.2542	-1.4353	-1.5171	-1.5383	-1.5402	-1.5402
D	-52.2679	-49.6143	-41.2523	-26.0198	2.1286	32.5941	80.3257	142.7007	220.0602	210.4696	208.9664	208.9664
U	1.2432	1.3425	1.6304	2.0754	2.6203	3.1706	3.6085	3.7406	3.3353	2.8810	2.8140	2.8140
C	0.3066	0.6101	1.5173	3.0141	5.0609	7.5695	10.3717	13.1601	15.5452	18.3122	21.4014	21.4014
O	-0.0852	-0.1129	-0.1955	-0.3301	-0.5111	-0.7273	-0.9594	-1.1770	-1.3344	-1.3939	-1.4014	-1.4014
S	-52.3218	-49.6512	-42.0371	-27.7120	5.0687	28.1114	74.0986	134.6907	210.4896	299.9531	298.2273	298.2273
E	0.4257	0.5647	0.9781	1.6526	2.5391	3.6419	4.8050	5.8952	6.6844	6.8533	6.7607	6.7607
C	-0.0596	0.0227	0.2698	0.6812	1.2517	1.9651	2.7853	3.6449	4.4334	4.9831	4.9831	4.9831
O	-0.0017	-0.0175	-0.0649	-0.1435	-0.2518	-0.3858	-0.5360	-0.6942	-0.8322	-0.9189	-0.9343	-0.9343
S	-52.2906	-49.6480	-42.1179	-27.9330	5.4848	27.4504	73.1543	133.4467	208.9664	298.2273	298.2273	298.2273
E	-0.3915	-0.2142	0.3203	1.2170	2.4750	4.0734	5.9518	7.9452	9.9556	11.5200	12.1810	12.1810
N	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = n \cdot \phi \cdot \frac{S^3}{KB} \cdot M$$

$$p = n \cdot P \cdot \frac{M}{bLZ}$$

$$M = n \cdot M$$

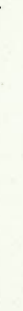
$$V = n \cdot V$$

TABELA 2.18

ESTRUTURA 2

Esforço externo: Momento

SL=3.00



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)					0.8	0.9	1.0	
		0.1	0.2	0.3	0.4	0.5				
100ηφ	202.6568	100.3037	30.7734	-11.7681	-34.2971	-43.5171	-45.0918	-43.3165	-39.7239	-39.4744
100ηM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100ηP	103.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100ηV	-2.9816	-2.7634	-2.2776	-1.7130	-1.1851	-0.7535	-0.4393	-0.2380	-0.1306	-0.0899
I	108.3037	116.7471	44.3960	-1.4753	27.1411	-36.9375	-42.3956	-41.8303	-40.2043	-39.1307
N	4.0114	2.8567	0.9536	-0.2252	-1.8134	-1.1934	-1.1564	-1.0779	-1.1008	-1.0610
H	70.9687	72.8250	-22.6310	-17.1780	-7.7292	-4.5944	-2.6542	-1.4908	-1.0173	-1.0173
A	-2.7580	-2.6243	-2.2329	-1.7265	-1.2298	-0.8113	-0.4995	-0.2961	-0.1859	-0.1372
N	30.7734	44.3960	64.6916	29.5382	-5.1562	-24.5184	-33.5909	-36.6777	-37.0263	-36.7108
A	5.7128	4.9682	2.6379	0.1068	-1.3324	-2.0144	-2.2348	-2.2262	-2.1504	-2.0970
0.2	45.7568	48.4448	55.7527	-34.5349	-24.8326	-16.5714	-10.3697	-6.2976	-4.0782	-3.2201
D	-2.2562	-2.2169	-2.0624	-1.7394	-1.3444	-0.9719	-0.6729	-0.4664	-0.3491	-0.3022
E	-11.7681	-1.4753	29.5382	81.3433	32.9740	1.6290	-16.6212	-25.8295	-29.5591	-30.5658
I	5.9164	4.9228	4.1286	1.5573	-0.9950	-2.3526	-2.9342	-3.0861	-3.0166	-3.0055
N	28.1337	28.8995	36.7584	48.3084	-38.9288	-27.3832	-18.3516	-12.2302	-8.8048	-7.4505
0.3	-1.6652	-1.6836	-1.7117	-1.6679	-1.4693	-1.1962	-0.9352	-0.7345	-0.6114	-0.5592
F	-38.2971	-27.1411	5.1562	32.9740	88.6458	42.1245	11.6145	6.0988	14.6757	17.6279
L	5.2573	5.0684	4.4174	3.0584	3.0311	-3.5413	-3.6867	-3.6801	-3.6801	-3.6820
U	12.3559	14.7685	21.7932	32.7134	46.0852	-40.4734	-29.2178	-21.2155	-16.5694	-14.3844
E	-1.1015	-1.1498	-1.2766	-1.4262	-1.5013	-1.4128	-1.2398	-1.0703	-0.9519	-0.8973
N	-43.5171	-38.9375	-24.5184	1.6290	42.1245	99.4578	54.6950	26.4903	11.6686	6.1243
0.4	4.1838	4.1518	3.9881	3.4915	2.3329	0.0741	-2.1733	-3.2997	-3.7515	-3.8714
A	3.8015	5.6656	11.1852	20.0882	31.7161	44.8748	-43.0360	-33.6845	-27.9690	-25.5504
P	-0.6274	-0.6862	-0.8520	-1.0917	-1.3439	-1.5118	-1.5097	-1.4196	-1.3293	-1.2805
R	-45.0918	-42.3956	-33.5909	-16.6212	11.6145	54.6950	115.7423	76.0420	53.9322	45.2251
A	2.9756	3.0404	3.1858	3.0256	2.1154	0.0847	-1.9579	-2.9066	-3.2178	-3.2572
0.5	-0.5797	-0.6988	-0.8537	-1.0900	-1.3439	-1.5118	-1.5097	-1.4196	-1.3293	-1.2805
P	-0.2690	-0.3258	-0.4913	-0.7498	-1.0691	-1.3923	-1.6278	-1.6937	-1.6717	-1.6438
A	-43.3165	-41.8303	-36.6777	-25.8295	-16.6212	11.6145	54.6950	115.7423	76.0420	53.9322
S	1.7785	1.8982	2.2278	2.6751	3.0754	3.1771	2.6311	0.9883	-0.6594	-1.2523
E	-1.9838	-1.2297	-1.0604	-0.4963	10.4445	17.4026	25.3226	33.1360	-60.9095	-58.0101
C	-0.0317	-0.0790	-0.2199	-0.4508	-0.7601	-1.1213	-1.4831	-1.7578	-1.8640	-1.8805
A	-41.0434	-40.2043	-37.0263	-29.5591	-14.6757	11.6686	53.9322	116.1094	200.3393	184.9126
0.6	0.6408	0.7907	1.2294	1.9185	2.7785	3.6666	4.3500	4.4783	3.5629	2.5958
0.7	-1.6041	-1.2569	-0.1911	1.6541	4.3419	7.8769	12.1187	16.6677	20.7303	-76.8899
0.8	0.0887	0.0551	-0.0470	-0.2203	-0.4655	-0.7758	-1.1291	-1.4778	-1.7378	-1.8421
0.9	-39.7239	-39.1307	-36.7108	-30.5658	-17.6279	6.1243	45.2251	103.9273	184.9126	287.3750
1.0	-0.4468	-0.2782	0.2340	1.1032	2.3334	3.8909	5.6646	7.4161	8.7239	8.9280
0.9	-0.5795	-0.4900	-0.2128	0.2759	1.0057	1.9959	3.2317	4.6324	6.0117	7.0334
0.8	0.0981	0.0605	0.0261	-0.0690	-0.2092	-0.3967	-0.6265	-0.8604	-1.1200	-1.2784
0.7	-39.4744	-38.9172	-36.6092	-30.6623	-18.0221	5.3236	43.9126	102.0283	182.4257	284.4335
0.6	-1.5143	-1.3305	-0.7552	0.2759	1.8494	4.0400	6.8591	10.1639	13.6665	16.6281
0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt[4]{\frac{I_b}{4EI}}$$

$$\varphi = \eta \frac{S^3}{kb} \quad M$$

$$P = \eta \frac{M}{P \cdot b l^2} \quad M$$

$$N = \eta \frac{M}{M} \quad M$$

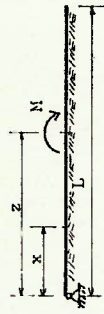
$$V = \eta \frac{M}{V} \quad L$$

TABELA 2.19

ESTRUTURA 2

Esforço externo: Momento

SL=3.50



x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100φ 100M 100N	201.2460 0.0000 0.0000 -3.4994	13.1591 0.0000 0.0000 -2.4503	-24.9289 0.0000 0.0000 -1.6754	-39.8294 0.0000 0.0000 -1.0091	-41.1477 0.0000 0.0000 -0.5007	-36.2340 0.0000 0.0000 -0.1679	-30.0307 0.0000 0.0000 0.0000	-25.3181 0.0000 0.0000 0.1142	-23.0587 0.0000 0.0000 0.1444	-22.6706 0.0000 0.0000 0.1483
0.1	85.3043 5.9734 65.2115 -3.1593	107.2244 3.9719 69.0008 -2.9717	30.2751 0.8090 -2.4396 -2.4159	-13.1406 -0.9007 -1.6064 -1.7247	-32.7026 -1.7132 -5.2985 -0.5076	-37.5404 -1.7132 -5.2985 -0.5076	-34.9661 -1.5360 -1.9373 -0.2452	-30.1198 -1.2693 -0.9601 -0.0410	-26.0537 -1.0964 0.9601 -0.0596	-24.0119 -1.0026 1.2789 0.0946	-23.6522 -0.9864 1.3207 0.0994
0.2	13.1591 7.9433 38.0643 -2.4376	81.0571 6.7837 41.8779 -2.4065	22.8547 3.0781 52.1382 -1.8049	10.1978 -0.7812 -34.6638 -1.8216	25.5197 -2.5054 -12.2835 -1.3045	25.5197 -2.5054 -12.2835 -1.3045	30.0954 -2.9480 -5.4007 -0.4711	29.4449 -2.5733 -1.2493 -0.2343	27.4933 -2.2449 -0.8191 -0.1069	26.1699 -2.0769 1.5489 -0.0585	25.9064 -2.0470 1.6486 -0.0515
0.3	7.5890 17.6626 -1.6476	7.0482 21.3281 -1.6994	5.2035 31.7397 -1.8049	1.4226 46.9867 -1.8115	3.7339 -36.5434 -1.5593	3.7339 -36.5434 -1.5593	4.0211 -11.7845 -0.8237	3.7695 -5.0851 -0.5529	3.44314 -1.5705 -0.3908	3.2338 -0.2654 -0.3236	3.1964 -0.0785 -0.3131
0.4	39.8294 6.1363 4.7722 -0.9561	32.7026 5.9975 7.7186 -0.9561	10.1978 3.7999 16.3852 -1.2630	30.6182 3.3508 30.0786 -1.5312	93.1081 0.3508 47.0717 -1.6751	93.1081 0.3508 47.0717 -1.6751	4.7610 -4.3669 -22.1298 -1.2513	13.44947 -4.6416 -12.6644 -0.9776	21.4971 -4.5064 -7.3830 -0.7897	23.9181 -4.3586 -5.3117 -0.7045	24.1952 -4.3251 5.0011 -0.6903
0.5	41.1477 4.3666 -2.0128 -0.4305	37.5404 4.4535 0.0670 -0.5160	25.5197 4.5822 6.3458 -0.7586	1.7172 4.3531 16.8173 -1.1120	38.6496 3.0950 31.0523 -1.4833	100.3004 -0.1144 47.5741 -1.7126	45.4921 -3.3627 -36.7305 -1.6523	12.1657 -4.7305 -24.8211 -1.4554	10.4784 -5.1158 -17.6642 -1.2769	10.4784 -5.1158 -14.6892 -1.1843	11.2864 -5.1320 -14.2230 -1.1677
0.6	36.2340 2.8658 4.4218 -0.0792	34.9681 2.8832 3.1323 -0.1501	30.0954 3.3626 0.8562 -0.3598	1.84781 3.8752 7.8244 -0.6947	4.7610 3.9601 17.9720 -1.1185	45.4921 2.9279 30.9971 -1.5524	109.1243 -0.1373 45.4903 -1.8500	58.1770 -3.3066 -41.5633 -1.8736	30.3253 -4.6395 -32.9721 -1.7770	19.5910 -5.0198 -29.1353 -1.7031	18.0041 -5.0597 -28.5050 -1.6877
0.7	30.0307 1.2769 4.1134 0.1172	30.1198 1.2769 3.4331 0.0666	29.4449 0.8522 1.2757 -0.0881	13.44947 2.9084 2.6668 -0.3530	12.1857 3.7268 8.7612 -0.7277	12.1857 4.0952 17.1925 -1.1893	58.1770 3.3594 27.5964 -1.8933	130.1033 0.6306 38.5570 -2.0333	69.9070 -2.1612 -52.7536 -2.1383	73.4021 -3.1230 -48.4546 -2.1294	70.8386 -3.2513 -47.7032 -2.1221
0.8	25.9064 0.0985 -2.5077 0.1843	26.0537 0.2884 -2.2306 0.1539	27.4933 0.8522 -1.3268 0.0576	27.2986 1.7670 0.4038 -0.1186	21.4971 2.9491 3.3288 -0.3911	4.5337 4.2102 7.3964 -0.7681	30.3253 5.1831 12.9234 -1.2337	69.9070 3.4940 19.3251 -1.7247	178.9706 3.4940 25.5675 -2.1035	156.6533 1.6974 -70.6540 -2.2305	153.0233 1.4363 -69.9135 -2.2422
0.9	23.0587 3.9299 -0.7285 0.1419	24.0119 -0.7773 -0.7285 0.1288	26.1699 0.2931 -0.5182 0.0851	27.3775 0.5924 -0.0945 -0.0006	10.4784 3.8603 1.7728 -0.3625	10.4784 3.8603 1.7728 -0.3625	19.5910 6.2053 3.3680 -0.6605	73.4021 6.6813 5.3660 -1.0222	156.6533 10.5979 7.5044 -1.3910	270.3422 10.7495 9.1971 -1.6488	265.8282 20.3125 -90.3381 -1.6951
1.0	22.6706 1.9062 3.0000 0.0000	23.6522 -1.7954 0.0000 0.0000	25.9064 -1.4068 0.0000 0.0000	24.1952 0.5794 0.0000 0.0000	18.0041 3.3647 -0.0000 0.0000	18.0041 3.3647 -0.0000 0.0000	18.0041 6.9944 -0.0000 0.0000	70.8386 11.7464 -0.0000 0.0000	153.0233 17.1986 -0.0000 0.0000	265.8282 22.1967 -0.0000 -0.0000	401.0312 24.5588 0.0000 0.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = -\eta \phi \quad \frac{S^3}{kb} M \quad P = -\eta P \quad \frac{N}{kL} Z$$

$$M = -\eta_1 M \quad V = -\eta_2 V$$

TABELA 2.20

ESTRUTURA 2

Esforço externo: Momento

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

SL=4.00

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100n _φ	200.3819	-1.4027	-33.8519	41.2079	-35.9711	-26.6364	-18.0646	-12.4559	-9.9273	-9.9273	-9.9273	-9.5871
n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _M	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _v	-4.0030	-2.5463	-1.5658	-0.7908	-0.4224	0.0235	0.1629	0.2119	0.2216	0.2216	0.2216	0.2219
L 0.1	71.6788	18.9682	21.1845	34.7075	33.6388	26.7107	-19.3104	-14.0975	-11.7167	-11.3205	-11.3205	-0.6509
A 0.1	8.3781	0.3448	1.8975	-2.5001	-2.2937	-1.7073	-1.1642	-0.8327	-0.6765	-0.6765	-0.6765	-0.6509
I 0.1	61.7142	-25.4566	-16.0059	-8.3468	-3.1056	-0.0492	1.4346	1.9843	2.1071	2.1071	2.1071	2.1144
N 0.1	-3.5156	-2.5400	-1.6674	-0.9193	-0.3863	-0.0618	0.1043	0.1711	0.1887	0.1887	0.1887	0.1902
H 0.1	-1.4027	18.9682	79.8050	13.2070	-24.8399	25.5685	-22.0402	-18.3564	-16.3637	-16.3637	-16.3637	-16.0003
A 0.2	10.3669	8.7241	3.2927	-4.1250	-4.1702	-3.3950	-2.5052	-1.8613	-1.5628	-1.5628	-1.5628	-1.5127
I 0.2	31.2774	36.2921	49.6488	19.1098	-8.4377	-1.8049	1.6731	3.1193	3.5201	3.5201	3.5201	3.5600
D 0.2	-2.5395	-2.5347	-1.8904	-1.2619	-0.7122	-0.3175	-0.0787	0.0387	0.0792	0.0792	0.0792	0.0846
E 0.2	-33.8519	21.1845	87.9358	28.5913	-4.4373	19.1297	-23.3239	-23.0782	-22.1378	-22.1378	-22.1378	-21.8962
I 0.3	9.0654	8.4747	1.0926	-3.7585	-5.1874	-4.8669	-3.9761	-3.1935	-2.7962	-2.7962	-2.7962	-2.7261
N 0.3	10.9378	15.3745	28.0489	33.8396	-17.8669	-6.9391	-0.6072	2.3669	3.3405	3.3405	3.3405	3.4630
F 0.3	-1.5507	-1.6535	-1.8808	-1.9799	-1.6783	-1.1909	-0.4020	-0.2114	-0.1357	-0.1357	-0.1357	-0.1242
L 0.3	-41.2079	34.7075	13.2070	96.9914	35.0518	101.2389	37.8269	17.9786	-24.2210	-25.5532	-25.5532	-25.6187
E 0.4	6.5668	6.5791	6.2795	4.6631	0.1043	-4.3313	-5.9509	-5.3510	-4.7407	-4.3478	-4.2707	-4.2707
N 0.4	-0.4325	2.7980	12.4564	28.1135	47.9620	32.3296	-16.8816	-6.8573	-1.5983	0.3371	0.6111	0.6111
C 0.4	-0.7653	-0.8937	-1.2376	-1.6605	-1.8975	-1.6878	-1.2668	-0.8711	-0.6075	-0.4910	-0.4910	-0.4720
I 0.4	-35.9711	33.6388	24.8399	4.4373	35.0518	101.2389	37.8269	104.8077	44.0336	11.9208	0.0229	-1.6722
A 0.5	4.0564	4.3400	4.9818	5.3159	4.1749	0.1286	-4.5371	-4.6708	-6.3217	-6.6771	-6.6771	-6.6953
P 0.5	-5.2341	3.2251	3.0354	14.0389	29.8852	49.1535	32.2695	-18.3983	-10.2892	-7.0158	-6.5154	-6.5154
A 0.6	-0.2370	-0.3484	-0.6685	-1.1440	-1.6505	-1.9461	-1.7937	-1.4479	-1.1533	-1.0056	-1.0056	-0.9797
R 0.6	-26.6364	26.7107	25.5685	19.1297	-0.7860	37.8269	104.8077	44.0336	11.9208	0.0229	-1.6722	-1.6722
A 0.7	2.0473	2.3959	3.3309	4.4661	5.1504	4.1619	-0.1411	-4.6708	-6.3217	-6.6771	-6.6771	-6.6953
P 0.7	-5.9357	4.8811	1.4312	5.1589	15.1271	30.5152	48.0823	-35.7586	-24.9744	-20.2039	-19.4260	-19.4260
A 0.8	0.0632	-0.0153	-0.2525	-0.6461	-1.1652	-1.7106	-2.0029	-1.7681	-1.6454	-1.6454	-1.6454	-1.6170
S 0.8	-18.0846	19.3104	-22.0402	23.3239	-17.9786	17.9786	11.9208	67.7812	67.7812	130.4205	130.4205	125.5220
E 0.9	0.6283	0.9301	1.7980	3.0899	4.7720	5.2929	4.4525	0.3370	-3.9490	-5.3322	-5.3322	-5.5033
C 0.7	-4.5400	-4.1001	-2.5556	0.7196	6.5838	15.7773	28.3093	42.5164	-45.7664	-39.8947	-38.8642	-38.8642
A 0.9	3.1924	0.1471	0.0020	-0.2651	-0.6750	-1.2185	-2.2592	-2.3313	-2.2709	-2.2709	-2.2709	-2.2513
O 0.9	-12.4559	-14.0975	-18.3564	-23.0782	-24.2210	-15.4399	11.9208	67.7812	130.4205	130.4205	130.4205	125.5220
L 0.8	-0.3312	-0.1239	0.5114	4.5936	3.0815	4.7637	6.1100	6.1680	0.1422	0.2859	0.2859	0.2859
C 0.8	-2.4774	-2.3544	-1.8607	0.6368	1.8551	6.1961	12.7460	21.1922	29.8844	-64.5758	-63.4726	-63.4726
O 0.8	3.2042	0.1846	0.1155	-0.0311	-0.2940	-0.7068	-1.2702	-1.9101	-2.4210	-2.5747	-2.5747	-2.5841
E 0.9	-0.9873	-1.7167	-16.3637	-22.1378	-25.5532	-20.8970	0.0229	47.2609	253.6514	253.6514	247.1993	247.1993
A 0.9	-1.0344	-0.9358	-0.5890	0.1490	1.4748	3.5595	6.4105	9.6574	12.2666	12.2666	12.2666	11.4317
I 0.9	-0.7247	-0.7125	-0.6387	-0.3946	0.1912	1.3245	3.1822	5.7935	8.6884	11.4363	-87.8252	-87.8252
N 0.9	0.1346	0.1303	0.1106	0.0555	-0.0656	-0.2787	-0.6379	-1.1110	-1.6347	-2.0221	-2.0221	-2.0918
H 0.9	-9.5871	-11.3205	-16.0003	-21.8962	-25.6187	-21.5728	44.1078	125.5220	400.2267	400.2267	400.2267	400.2267
A 1.0	-1.6545	-1.6669	-1.6191	-1.2565	-0.1641	2.1694	6.3306	12.5314	20.3601	26.1535	32.0425	32.0425
I 1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 1.0	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

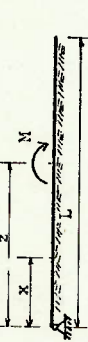
$$\varphi = n \phi \frac{S^3}{kD} M$$

$$p = n_p \frac{M}{bL^2}$$

$$M = n_M M$$

$$V = n_v \frac{M}{L}$$

TABELA 2.21



ESTRUTURA 2

SL=4.50

Esforço externo: Momento

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LEK NA VERTICAL)

x/L	z/L →	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100η _φ	200.0741	59.4477	13.0313	39.0862	39.5716	29.6283	18.1901	9.3707	4.2280	2.1618	1.8738	
100η _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100η _M	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
η _V	4.5015	3.8338	2.5740	1.3993	0.5623	0.0768	0.1453	0.2119	0.2113	0.1988	0.1955	
	59.4477	9.35295	10.2129	26.2313	34.2427	28.7349	19.3730	11.2129	6.0997	3.9551	3.6194	
L 0.1	11.2397	6.4576	0.4853	3.1744	3.4473	2.6752	1.6950	0.9107	0.4425	0.2529	0.2239	
I	52.4015	25.9023	14.5672	6.2162	1.2168	1.1749	1.9734	1.9734	2.0457	1.9520	1.9235	
N	3.8329	3.5368	2.6157	1.5677	0.7387	0.2212	0.0615	0.1678	0.1906	0.1875	0.1856	
H	13.0313	10.2129	60.3790	15.1684	15.1557	23.6489	21.3972	15.9206	11.3168	9.0477	8.8547	
A	12.9147	10.7583	3.2886	3.9171	5.8284	5.1143	3.5595	2.1325	1.2143	0.8223	0.7602	
A 0.2	25.2530	31.5173	48.0673	32.1083	15.7933	5.0910	0.6395	3.0105	3.6211	3.6246	3.5969	
D	2.5704	2.6130	2.5287	1.9537	1.2168	0.6045	0.1997	0.0192	0.1117	0.1376	0.1402	
E	39.0862	26.2313	15.1884	91.5505	26.0317	7.3643	19.5367	20.7566	18.3893	16.4925	16.0945	
I	10.2730	9.7447	7.3315	0.6579	5.5405	6.6489	5.4802	3.8187	2.5632	1.9748	1.8758	
N	5.6682	10.7396	25.3504	46.8741	30.9802	14.0076	3.4625	1.8745	3.9332	4.4257	4.4613	
F	1.3915	1.5604	1.9483	2.1746	1.8164	1.2048	0.6529	0.2746	0.0718	0.0034	0.0141	
L	39.5716	34.2427	15.1557	26.0317	99.5443	30.6982	5.6616	20.3666	23.9194	23.7738	23.5682	
U	6.5617	6.8372	7.1180	0.0977	5.0796	6.7583	5.7401	3.8259	4.5220	3.8259	3.6971	
E	3.7257	0.4444	9.6152	26.5568	48.7183	29.3786	12.9949	3.1042	1.6295	3.1924	3.3898	
N	0.5496	0.7254	1.2030	1.8052	2.1541	1.8558	1.2753	0.7537	0.4217	0.2810	0.2588	
I	29.6283	28.7349	23.6489	7.3643	30.6982	10.1731	31.2353	6.1415	21.5349	25.6743	26.0634	
A	3.3714	3.9091	5.2307	6.3824	5.5566	0.0473	5.8135	7.1138	6.6861	6.1480	6.0237	
U	0.5100	4.7884	0.8633	11.6102	28.3367	49.8585	29.1049	13.7979	5.2163	1.9087	1.4234	
P	0.0606	0.1924	0.5792	1.1740	1.8289	2.2019	1.9317	1.4081	0.9838	0.7781	0.7428	
A	18.1901	19.3730	21.3972	19.5367	5.6616	31.2353	102.4603	33.5033	1.1555	13.2238	14.8374	
A	1.2024	1.7126	3.1305	5.0378	6.4892	5.7253	7.0175	6.1081	7.9035	8.0732	8.0346	
A	5.8354	5.1596	2.6720	2.8846	13.1218	28.0503	49.3720	31.4136	18.6739	13.1289	12.2382	
S	0.1594	0.0815	0.1630	0.5939	1.1992	1.8645	2.2773	2.0991	1.7286	1.4985	1.4541	
E	9.3707	11.2129	15.9206	20.7566	20.3666	6.1415	33.5033	110.4570	50.3404	26.3680	22.7536	
C	0.0263	0.3386	1.4255	3.1514	5.1817	6.6568	5.8817	0.1313	5.9514	7.7356	7.9292	
C	3.8793	3.7486	0.8418	0.8450	4.2139	13.5677	27.8401	45.2947	39.7762	32.2392	30.9166	
A	0.2115	0.1779	0.0606	0.1836	0.6046	1.2172	1.9318	2.4563	2.4603	2.3188	2.2807	
A	4.2280	6.0997	11.3168	18.3893	23.9194	21.5349	1.1555	50.3404	145.4131	107.3192	101.0669	
0	0.6187	0.4254	0.1998	1.3605	3.1126	5.2729	7.1362	7.1403	2.6033	2.0067	2.6467	
0	1.8964	1.9478	1.9451	1.4431	0.4278	4.5534	11.8068	22.1985	33.7165	58.6410	57.0981	
0	1.753	0.1696	0.1384	0.0401	0.1873	0.6092	1.2547	2.0472	2.6998	2.8673	2.8688	
0	2.1818	3.9551	9.0477	16.4925	21.7738	25.6743	13.2238	26.3680	107.3192	238.3910	229.6137	
0	0.8917	0.8643	0.7098	0.2174	0.9308	3.0704	10.4123	13.7922	13.3639	12.0332	12.0332	
0	0.5060	0.5457	0.6221	0.6020	0.2530	0.7473	2.7449	5.9360	10.0338	13.7529	85.1448	
0	0.0983	0.1035	0.1111	0.0958	0.0147	0.1689	0.5710	1.1515	1.8513	2.3990	2.4972	
1	1.8738	3.6194	8.6547	16.0945	23.5682	26.0634	14.8374	22.7536	101.0669	229.6137	399.9507	
1	1.0695	1.2019	1.5077	1.6936	1.2223	0.7034	5.0416	12.5688	23.1475	34.4946	40.5082	
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

$$s = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{3}{kb} M$$

$$p = \eta p \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 2.22

ESTRUTURA 2

Esforço externo: Momento

(LER NA VERTICAL)

SL=5.00

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100φ	200.0112	48.3113	-22.1441	-41.3443	35.8757	-23.0131	-11.3670	-3.7421	0.0672	1.3615	0.0000	1.5290
100p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _p	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _v	-5.0001	-4.1159	-2.5433	-1.1951	-0.3386	0.0783	0.2105	0.2053	0.1633	0.1348	0.1348	0.1292
L 0.1	48.3113	3.5015	-28.9714	-4.6595	-12.7868	-4.1257	-0.5591	-0.1373	0.1798	0.1620	0.1419	0.1374
I 0.1	14.5408	-1.7029	-4.3341	-2.9033	-1.5056	-0.5523	0.1137	0.1369	1.6308	1.3740	1.3213	1.2619
N 0.1	53.2270	25.9334	-4.1257	-0.5591	-0.1373	0.1798	0.1620	0.1419	0.1348	0.1348	0.1348	0.1348
H 0.1	-4.1154	-2.8551	-1.4408	-0.5591	-0.1373	0.1798	0.1620	0.1419	0.1348	0.1348	0.1348	0.1348
A 0.1	-22.1441	3.5015	-28.9714	-4.6595	-12.7868	-4.1257	-0.5591	-0.1373	0.1798	0.1620	0.1419	0.1374
I 0.1	15.4811	12.8387	3.0854	-6.0274	-7.5472	-5.8214	-3.4454	-1.5056	-0.5523	0.1137	0.1369	1.2619
N 0.1	19.8759	27.3953	47.1549	29.9634	-2.3038	-0.9843	3.3495	3.1680	2.8329	2.7518	2.7518	2.7518
D 0.1	-2.5415	-2.6537	-2.6678	-2.0185	-1.1692	-0.5037	-0.1045	0.0787	0.1378	0.1461	0.1461	0.1455
E 0.1	-41.3443	12.8017	16.5187	-17.8027	-11.2426	-11.2426	-11.2426	-11.2426	-11.2426	-11.2426	-11.2426	-11.2426
I 0.1	11.1335	10.8250	8.5203	0.2158	-7.4811	-8.0428	-5.8591	3.4227	3.4227	3.4227	3.4227	3.4227
N 0.1	1.5012	7.1163	23.2933	47.4608	-28.1491	-10.6789	-0.9843	3.0735	4.1142	4.1142	4.1142	4.0660
F 0.1	-1.1912	-1.4371	-2.0156	-2.3942	-1.9613	-1.2089	-0.5686	-0.1045	0.0307	0.0947	0.1027	0.1027
L 0.1	-35.8757	32.1189	16.5187	22.7934	10.4798	-19.7733	-18.0686	-13.8605	-11.2292	-10.7231	-10.7231	-10.7231
U 0.1	6.1590	6.8081	7.9583	7.0890	-0.2268	25.7038	-9.9689	-21.2298	-21.6441	-19.9192	-19.4389	-19.4389
E 0.1	5.6207	2.4935	7.4607	25.1537	49.3088	-26.8688	-9.9870	0.6869	3.2042	4.2558	4.3547	4.3547
N 0.1	-0.3326	-0.5525	-1.1614	-1.9543	-2.4278	-2.0199	-1.2667	-0.6300	-0.2501	-0.0989	-0.0762	-0.0762
C 0.1	-23.0131	23.5557	22.2831	10.4798	25.7038	10.4798	25.7038	10.4798	25.7038	10.4798	25.7038	10.4798
I 0.1	2.4603	3.2723	5.3667	7.5304	7.2049	0.0525	-7.2908	-8.1942	-6.9631	-5.9426	-5.7275	-5.7275
P 0.1	-6.5508	-5.2479	-0.5744	9.4066	26.5544	50.0774	-26.6010	-10.3851	-1.7787	1.3118	1.7346	1.7346
A 0.1	0.0849	-0.0575	-0.4894	-1.1889	-2.0008	-2.4678	-2.0630	-1.3476	-0.7961	-0.5392	-0.4964	-0.4964
A 0.1	-11.3670	13.3520	-17.8027	-19.7733	-9.9689	25.3598	10.3920	25.6853	-9.9032	-21.1949	-22.5465	-22.5465
A 0.1	0.3470	0.9794	2.8069	5.4649	7.8526	7.5134	0.1406	-7.6670	-9.3279	-9.0904	-8.9492	-8.9492
A 0.1	-4.8857	-4.6229	-3.2345	0.9887	10.4468	27.0744	49.8950	-28.0555	-13.6828	-7.5980	-6.6447	-6.6447
A 0.1	0.2130	0.1444	-0.0855	-0.5297	-1.2110	-2.0101	-2.4996	-2.1789	-1.6250	-1.2958	-1.2338	-1.2338
S 0.1	-3.7421	-5.7552	-11.2426	-18.0686	-21.2298	-11.3571	25.6853	105.7411	36.8556	10.1686	6.2617	6.2617
E 0.1	-0.5530	-0.1790	0.9966	3.0386	5.7268	8.0538	7.5954	0.0290	-8.0800	-10.1507	-10.3245	-10.3245
C 0.1	-2.7722	-2.9230	-3.0224	-1.9886	1.9687	11.0156	26.6137	47.1968	-34.6233	-25.4335	-23.8289	-23.8289
A 0.1	0.1948	0.1164	0.0978	-0.1064	-0.5206	-1.1938	-2.0341	-2.6441	-2.5438	-2.2902	-2.2271	-2.2271
D 0.1	0.0672	1.5651	-6.4025	-13.8605	-21.6441	-23.9785	-9.9032	36.8556	133.6867	87.0925	79.4515	79.4515
C 0.1	-0.7489	-0.6034	-0.0794	1.0458	2.9899	5.6745	8.2431	8.4246	-4.6456	-4.6456	-5.5317	-5.5317
C 0.1	-1.1535	-1.3410	-1.7514	-1.8880	-0.8276	2.7756	10.3682	22.5364	37.0630	-52.8830	-50.8340	-50.8340
A 0.1	0.1258	0.1330	0.1386	0.0933	-0.0845	-0.4945	-1.2054	-2.1498	-2.9492	-3.1099	-3.0959	-3.0959
D 0.1	1.2615	-0.3002	-4.1986	-11.2292	-19.9192	-26.2184	-21.1949	10.1686	87.0925	224.3561	212.8609	212.8609
C 0.1	-0.6802	-0.7162	-0.4970	0.3974	2.4836	11.0146	15.2376	14.1678	12.0761	12.0761	12.0761	12.0761
C 0.1	-3.2592	-0.3341	-0.5233	-0.7030	-0.6188	2.1441	5.8254	11.0430	16.1267	-82.3081	-82.3081	-82.3081
A 0.1	0.0550	0.0672	0.0965	0.1180	0.0830	-0.0844	-0.4753	-1.1504	-2.0398	-2.7768	-2.9077	-2.9077
I 0.1	1.5290	0.2219	-3.8363	-10.7231	-19.4389	-26.2263	-22.5465	6.2617	79.4515	212.8609	399.9498	399.9498
C 0.1	-0.4550	-0.6594	-1.2073	-1.8539	-2.0487	-0.7661	3.3514	11.9199	25.4131	41.1486	49.9951	49.9951
C 0.1	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.1	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\phi = \eta \frac{s^3}{kb} M$$

$$p = \eta p \frac{M}{bL^2}$$

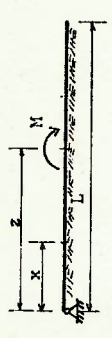
$$M = \eta M$$

$$V = \eta V$$

TABELA 2.24

ESTRUTURA 2

Esforço externo: Momento



LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100η	200.0057	28.6186	-34.3180	-39.7202	-25.6701	-11.3243	-2.5480	1.1495	2.0191	1.9600	1.9040
100η _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100η _M	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100η _v	-5.9999	-4.5770	-2.3393	-0.7409	0.0328	0.2524	0.2189	0.1245	0.0530	0.0216	0.0166
L 0.1	28.6186	82.8451	-5.5458	-29.9839	-25.5092	-14.1040	-5.1160	-0.3671	1.3409	1.6593	1.6637
I 0.1	0.0000	10.1070	-7.9027	-5.5491	-0.7370	0.6534	0.1397	0.4039	0.3885	0.4039	0.3951
N 0.1	100.0000	59.4577	-24.5256	-8.8065	-0.5967	2.1855	2.0879	1.2809	0.8686	0.8686	0.8686
H 0.1	-4.5770	-4.1695	-2.6559	-1.1533	-0.2447	0.1248	0.1867	0.1332	0.0736	0.0422	0.0368
A 0.2	-34.3180	5.5458	8.6868	-18.3819	-10.5498	-6.2822	-2.5230	-0.3897	0.4497	0.6408	0.6697
A 0.2	0.0000	16.9523	2.2053	-10.9054	-6.7087	1.4706	3.3497	2.6460	1.5620	0.9606	0.8525
D 0.2	10.9175	20.7721	46.6529	-25.1240	-6.7087	1.4706	3.3497	2.6460	1.5620	0.9606	0.8525
E 0.2	-2.3389	-2.6585	-2.9833	-2.1626	-1.0619	-0.3124	0.0361	0.1302	0.1200	0.0969	0.0913
I 0.3	-39.7202	-29.9839	8.6868	14.9880	10.5498	-16.1096	-19.1080	-12.7014	-6.4639	-3.4439	-2.9318
I 0.3	11.5904	12.3127	11.4107	-0.4316	-11.6220	-10.4008	-5.9340	-2.2719	-0.3172	0.3537	0.4396
N 0.3	-3.7484	2.1173	20.1801	48.7537	-23.0656	-5.5010	1.9475	3.5077	2.9056	2.2342	2.0853
L 0.3	-0.7401	-1.1524	-2.1617	-2.8911	-2.2297	-1.1516	-0.3736	0.0109	0.1362	0.1533	0.1519
U 0.3	-25.5092	-18.3819	10.5498	101.1464	15.3406	-16.5007	-18.5007	-20.0318	-14.7920	-10.6662	-9.8478
E 0.3	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.8714
N 0.4	-6.6787	4.3340	4.2301	22.2544	49.9684	-22.6209	-5.4643	1.9493	3.8070	3.7645	3.6669
C 0.4	0.0339	-0.2432	-1.0595	-2.2270	-2.9779	-2.2885	-1.1792	-0.3828	0.0066	0.1287	0.1428
I 0.4	-11.3243	-14.1040	-19.2658	-16.1096	15.3406	100.9745	15.0797	-17.3231	-22.6202	-20.5520	-19.7605
U 0.4	4.4059	6.0453	9.6759	10.7060	-0.2523	-11.2227	-10.0969	-5.8718	-2.5744	-1.1052	-0.87

TABELA 2.27

ESTRUTURA 2

SL=7.50 Esforço externo: Momento



x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100n _p	0.0	203.0002	-41.3571	-29.6435	-11.2650	-1.1173	1.6937	1.4361	0.6496	0.2251	0.1534
n _p	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _M	0.0	109.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _M	0.0	-7.5000	-1.7877	-0.1185	0.3170	0.2458	0.0995	0.0141	-0.0134	-0.0161	-0.0156
	0.1	4.7287	12.4568	26.3101	15.4100	-4.7890	0.1173	1.1492	0.8151	0.4542	0.3779
L	0.1	36.2232	-13.4984	-12.1244	-5.3700	-1.0091	0.4975	0.5697	0.2993	0.1279	0.0968
I	0.1	34.5625	50.7891	-3.2538	2.3459	2.3492	1.1034	0.2406	-0.0866	-0.1437	-0.1432
N	0.1	-5.0071	-4.6438	-0.7354	0.40635	0.2081	0.1299	0.0436	0.0010	-0.0105	-0.0115
H	0.2	-41.3571	94.3698	1.7795	19.8302	-14.1164	-5.3334	-0.5612	0.8650	0.9506	0.9070
A	0.2	25.0395	0.3959	-18.8675	-13.1328	-4.8746	-0.4491	0.7759	0.6763	0.4236	0.3640
D	0.2	1.5784	47.5354	-18.2465	-0.9066	3.4453	2.5862	1.0235	0.1382	0.1448	0.1749
E	0.2	-1.7876	-3.5915	-2.3808	-0.8445	-0.0529	0.1515	0.1167	0.0495	0.0152	0.0096
	0.3	-29.6435	100.8535	3.0849	20.3755	-14.7878	-5.7020	-0.6566	0.8909	0.8909	1.0528
I	0.3	9.2263	17.3566	-0.6101	-18.3681	-12.5715	-4.6099	-0.3905	0.8129	0.8573	0.8135
N	0.3	-6.6205	16.3169	49.8827	-17.1501	-0.6792	3.3489	2.4718	1.0147	0.2915	0.1746
F	0.3	-0.1184	-2.3806	-3.7005	-2.4971	-0.9017	-0.0680	0.1540	0.1292	0.0794	0.0679
L	0.3	-11.2650	19.8302	3.0849	10.3259	2.4685	-20.6323	-5.9708	-1.6358	-0.9419	-0.9419
U	0.3	0.7904	11.9097	17.8595	-0.0384	-18.0869	-12.5085	-0.4160	0.8530	0.8530	0.9570
E	0.3	-4.9279	0.8745	17.4163	50.1103	-17.2594	-0.8349	3.2704	2.5983	1.5513	1.3164
N	0.4	0.3170	-0.8441	-2.4966	-3.7569	-2.15121	-0.9019	-0.0647	0.1676	0.1726	0.1633
I	0.4	-1.1773	4.7890	20.3755	2.4685	100.1490	2.6586	20.4914	-15.6669	-9.1504	-7.7178
A	0.4	1.5139	4.3569	12.4819	18.1564	0.0711	-18.0358	-12.5121	-4.8780	-1.2355	-0.6606
P	0.4	-1.9282	3.1713	0.9112	17.3208	49.9560	-17.3953	-0.8925	3.4936	3.4777	3.2730
C	0.4	0.2456	-0.0522	-0.8999	-2.5094	-3.7539	-2.5081	-0.9006	-0.0626	0.1789	0.2018
A	0.5	1.6937	5.3534	14.7878	20.6323	2.6586	100.6480	2.9463	-21.8006	-21.0483	-19.7135
A	0.5	-1.2268	1.0174	4.6395	12.5930	18.2771	0.2762	17.9467	-13.2319	-7.5598	-6.3364
A	0.6	0.2339	0.8291	-3.2519	0.7984	17.2470	49.9051	-17.4295	-0.8403	3.8064	4.2265
S	0.6	0.0987	0.1517	-0.0649	-0.8936	-2.4961	-3.7382	-2.5031	-0.9449	-0.2184	-0.1053
A	0.7	1.4361	1.1492	5.7020	14.8457	-20.4914	2.9463	100.9027	2.5334	-24.1994	-26.4825
E	0.7	-0.5156	0.6641	0.4095	4.6955	12.8053	18.6768	0.4918	-19.1316	-17.8879	-16.6747
C	0.7	0.2626	0.0059	-2.4492	-3.2593	0.9331	17.4907	49.9868	-18.2709	-3.7994	-1.5796
A	0.7	0.0126	0.0416	0.1553	-0.0510	-0.8635	-2.4495	-3.7179	-2.6457	-1.4775	-1.2301
O	0.7	0.6496	0.8151	-0.6566	-5.9708	15.6669	-21.8406	2.5334	105.7321	19.3685	6.3138
	0.8	-0.0811	0.2334	-0.7748	0.4137	4.8073	13.0340	18.8950	-21.85391	-23.2636	-23.8353
	0.8	0.2176	-0.1563	-0.9802	-2.42947	-2.7188	1.8482	17.6946	47.1596	-28.8297	-31.8353
	0.8	-0.0144	-0.0020	0.1193	0.1729	-0.0014	-0.7787	-2.4052	-3.9612	-3.5982	-3.3386
	0.9	0.2251	0.4542	0.8909	-1.6358	-9.1504	-21.0483	-24.1994	19.3685	168.4616	138.2502
	0.9	0.0874	0.0248	-0.6413	-1.0177	-0.2685	3.7251	12.7386	22.7666	13.4390	2.6598
	0.9	0.0689	0.0695	-0.0275	-0.1801	0.6759	-0.9848	2.7450	12.9172	27.7150	-66.7608
	0.9	-0.0126	-0.0111	0.0010	0.0432	0.2023	-0.7326	-2.5205	-2.5205	-4.5255	-4.8298
	1.0	0.1534	0.3779	0.9070	1.0528	-0.9419	-19.7135	-26.4625	6.3138	138.2502	400.0000
	1.0	0.1599	0.1927	0.1829	-0.2131	-1.4893	-4.7544	1.7778	26.8151	75.1061	112.5000
	1.0	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000
	1.0	0.0000	-0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = n \phi \frac{S}{kL} M$$

$$p = n \rho \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

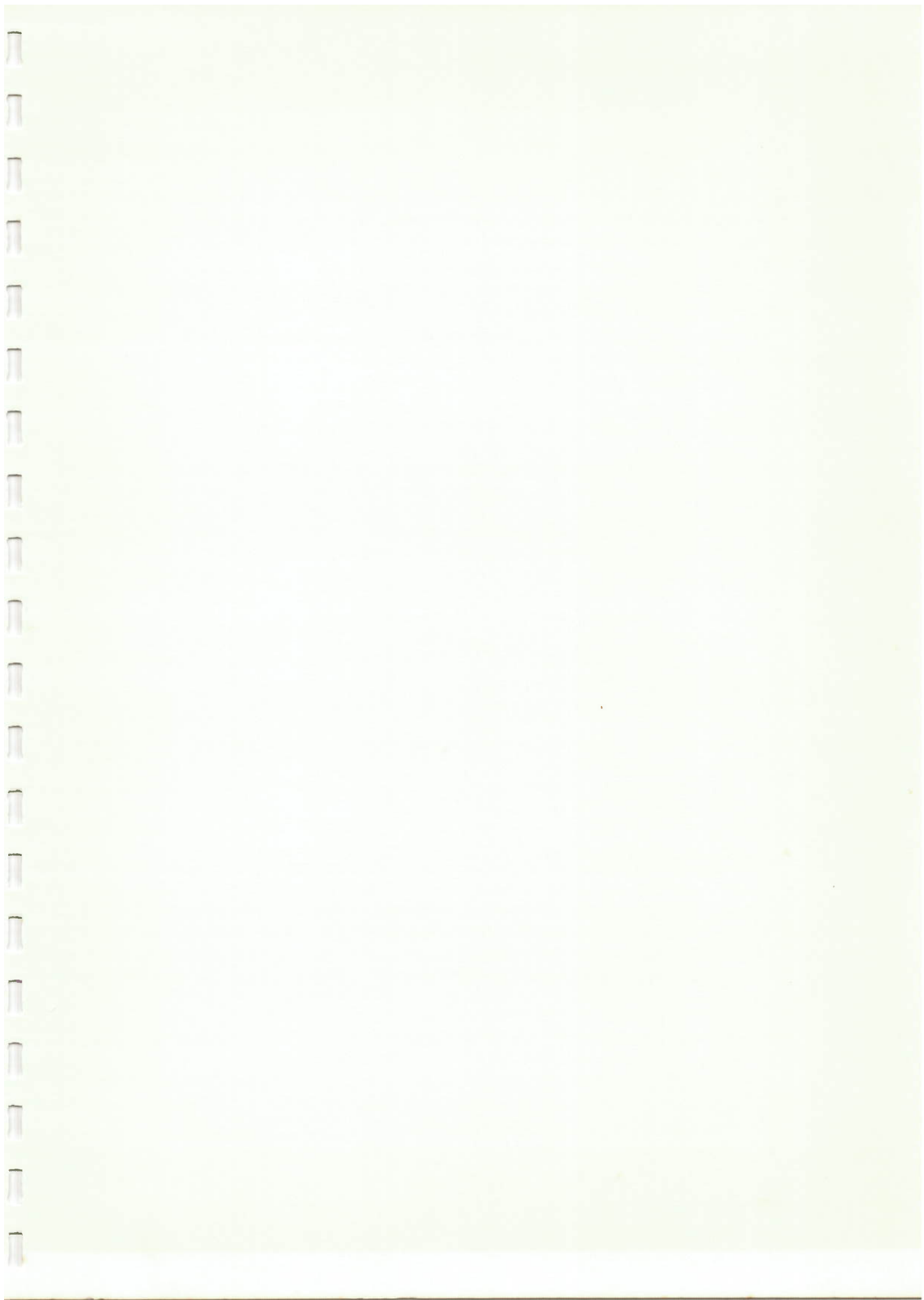
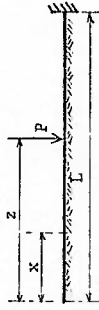


TABELA 3.01

ESTRUTURA 3

Esforço externo: Força Concentrada



SL=1.50

x/L	z/L	100n _p	100n _v	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
LINHA DE ESTAÇÃO PARA ESFORÇO APLICADO EM (LFR NA VERTICAL)													
L	0.1	199.6366	149.3389	73.9090	43.0780	29.0629	15.7308	7.2464	-2.5086	-0.4468	0.0000	0.0000	0.0000
A	0.2	2.6748	1.8000	1.4019	1.0439	0.7328	0.4732	0.2683	0.1201	0.0302	0.0000	0.0000	0.0000
I	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.4	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.5	195.5230	149.4203	74.1130	43.2306	29.1104	15.8065	7.2680	-2.5264	-0.4533	0.0000	0.0000	0.0000
A	0.6	2.2287	1.8931	1.5583	1.2355	0.9356	0.6075	0.4378	0.1144	0.0292	0.0000	0.0000	0.0000
I	0.7	8.7373	1.0585	0.8598	0.6732	0.5039	0.3555	0.2307	0.1314	0.0591	0.0000	0.0000	0.0000
N	0.8	-0.7549	-0.7939	0.1679	0.1319	0.0990	0.0700	0.0456	0.0117	0.0030	0.0000	0.0000	0.0000
H	0.9	184.5804	147.0717	75.4914	43.2658	29.8431	16.2774	7.5005	-2.4694	-0.4645	0.0000	0.0000	0.0000
A	1.0	1.8000	1.5583	1.3147	1.0075	0.8242	0.6013	0.4018	0.1066	0.0282	0.0000	0.0000	0.0000
I	0.1	15.2444	5.9900	3.2777	2.5018	1.9434	1.3785	0.8992	0.5148	0.2326	0.0591	0.0000	0.0000
D	0.2	-0.4537	-0.6214	-0.6864	0.2470	0.1871	0.1335	0.0875	0.0229	0.0058	0.0000	0.0000	0.0000
E	0.3	168.6235	139.1059	79.4040	51.9764	31.7720	17.5395	8.2052	-2.9778	-0.5661	0.0000	0.0000	0.0000
I	0.4	1.4019	1.2355	1.0675	0.8941	0.7127	0.5323	0.3640	0.1024	0.0270	0.0000	0.0000	0.0000
N	0.5	19.9489	11.4791	2.9901	5.5574	4.2087	3.0825	1.9694	1.1334	0.5148	0.1314	0.0000	0.0000
F	0.6	-0.3939	-0.4818	-0.5693	-0.6548	0.2641	0.1902	0.1259	0.0730	0.0334	0.0086	0.0000	0.0000
L	0.7	149.0934	126.7802	78.2617	51.9764	31.7720	17.5395	8.2052	-2.9778	-0.5661	0.0000	0.0000	0.0000
U	0.8	1.0439	0.9356	0.8262	0.7127	0.5905	0.4571	0.3221	0.1975	0.0950	0.0256	0.0000	0.0000
E	0.9	23.2482	15.7309	8.1899	5.5736	7.1860	3.4031	1.5694	0.8992	0.2307	0.0591	0.0000	0.0000
N	1.0	-0.2720	-0.3735	-0.4747	-0.5744	-0.6707	0.2397	0.1602	0.0938	0.0433	0.0112	0.0000	0.0000
I	0.1	127.0906	111.0715	94.9103	78.2617	60.5862	41.1941	23.7617	11.6692	4.6244	0.9911	0.0000	0.0000
A	0.2	0.7328	0.6675	0.6013	0.5323	0.4571	0.3714	0.2732	0.1735	0.0858	0.0236	0.0000	0.0000
P	0.3	25.4997	19.0443	12.5621	5.9919	0.7527	7.7705	5.1564	3.0625	1.8785	0.3555	0.0000	0.0000
A	0.4	-0.1835	-0.2936	-0.4035	-0.5122	-0.6182	-0.7187	0.1900	0.1124	0.0524	0.0137	0.0000	0.0000
R	0.5	103.4146	92.7012	81.8711	70.6373	58.5471	45.0053	29.2983	15.1223	6.1136	1.3761	0.0000	0.0000
A	0.6	0.4732	0.4378	0.4018	0.3640	0.3221	0.2732	0.2138	0.1433	0.0739	0.0210	0.0000	0.0000
A	0.7	27.0140	21.6870	16.3308	10.8769	5.2235	0.7527	7.1860	4.2087	1.9434	0.5039	0.0000	0.0000
S	0.8	-0.1237	-0.2387	-0.3536	-0.4676	-0.5793	-0.6864	-0.7855	0.1283	0.0604	0.0159	0.0000	0.0000
E	0.9	78.6062	72.1668	65.6359	58.7929	51.2826	42.6310	32.2604	19.5077	8.1450	1.9044	0.0000	0.0000
C	1.0	0.2663	0.2520	0.2353	0.2176	0.1975	0.1735	0.1433	0.1046	0.0579	0.0173	0.0000	0.0000
C	0.7	28.0506	23.8883	19.6950	13.3960	10.8769	5.9919	-0.5736	5.5574	2.5818	0.6732	0.0000	0.0000
A	0.8	-0.0871	-0.2046	-0.3220	-0.4387	-0.5535	-0.6642	-0.7676	-0.8692	0.0670	0.0179	0.0000	0.0000
D	0.9	53.0049	49.7786	46.4913	42.9902	39.0284	34.2721	28.3068	20.8569	10.7782	2.5931	0.0000	0.0000
I	1.0	0.1201	0.1144	0.1086	0.1024	0.0950	0.0858	0.0739	0.0659	0.0368	0.0123	0.0000	0.0000
0.6	0.1	25.8141	22.8206	19.6950	16.3308	12.5621	8.1899	2.9901	3.2777	0.8592	0.0000	0.0000	0.0000
0.7	0.2	-0.0681	-0.1667	-0.2606	-0.3531	-0.4430	-0.5333	-0.6214	-0.7068	-0.7855	0.0194	0.0000	0.0000
0.8	0.3	26.7796	25.7014	24.5921	23.3731	21.9161	20.0453	17.5411	14.1431	9.5556	3.4556	0.0000	0.0000
0.9	0.4	0.0302	0.0292	0.0282	0.0270	0.0256	0.0236	0.0210	0.0173	0.0123	0.0055	0.0000	0.0000
1.0	0.5	27.44527	27.6601	25.8141	23.8883	21.6870	19.0443	15.7309	11.4791	5.9900	1.0585	0.0000	0.0000
1.1	0.6	-0.0611	-0.1600	-0.2592	-0.3533	-0.4461	-0.5333	-0.6214	-0.7068	-0.7855	0.0194	0.0000	0.0000
1.2	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.3	0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.4	0.9	30.0561	29.44527	28.8141	28.0506	27.0140	25.4997	23.2482	19.9489	15.2444	8.7373	0.0000	0.0000
1.5	1.0	-0.0601	-0.1790	-0.2972	-0.4160	-0.5325	-0.6453	-0.7516	-0.8466	-0.9253	-0.9795	-1.0000	-1.0000

$$S = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = n_t \frac{S^2}{kb}$$

$$P = n_p \frac{P}{bL}$$

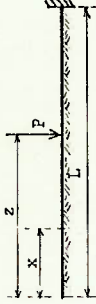
$$M = n_m \frac{PL}{bL}$$

$$V = n_v \frac{P}{bL}$$

TABELA 3.02

ESTRUTURA 3

SL=2.00 Esforço externo: Força Concentrada



x/L	z/L	LÍNEA DE ESTADO PARA ESFORÇO APLICADO EM → (LEF. NA VERTICAL)					0.6	0.7	0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5					
100%	100%	-195.1651	-129.0397	-41.5757	-17.0074	-2.4388	4.4014	5.6686	4.0556	1.3613	0.0000
100%	100%	3.9151	2.4238	1.7866	1.2494	0.8176	0.4859	0.2548	0.1040	0.0237	0.0000
0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.1	-188.1572	-129.8438	-42.0410	-17.3361	-2.6563	4.2699	5.7391	4.0267	1.3746	0.0000
0.1	0.2	3.1441	2.6272	1.8198	1.1811	0.8078	0.5064	0.2779	0.1202	0.0292	0.0000
0.1	0.3	-9.1720	1.4860	0.8655	0.6134	0.4073	0.2474	0.1313	0.0547	0.0128	0.0000
0.1	0.4	-0.6473	0.2267	0.1703	0.1215	0.0813	0.0498	0.0266	0.0112	0.0026	0.0000
0.1	0.5	-170.6928	-127.1960	-45.2092	-19.6000	-4.1729	3.3397	5.2404	3.8164	1.3249	0.0000
0.1	0.6	2.4238	2.1100	1.4466	1.1082	0.7946	0.5250	0.3091	0.1360	0.0346	0.0000
0.1	0.7	-13.1956	4.4011	4.4286	3.3504	2.4075	1.6221	1.0010	0.5404	0.2296	0.0000
0.1	0.8	-0.3695	-0.4746	-0.5763	-0.6238	-0.6165	0.1012	0.0356	0.0240	0.0058	0.0000
0.1	0.9	-147.2261	-116.8863	-66.0454	-53.5332	-8.2707	0.7883	3.8500	3.2195	1.1611	0.0000
0.1	1.0	1.7866	1.6193	1.2512	1.0193	0.7710	0.5310	0.3187	0.1502	0.0397	0.0000
0.2	0.1	-15.7884	8.1759	7.2000	5.3084	3.6309	2.2762	1.2493	0.5404	0.1313	0.0000
0.2	0.2	-0.1597	-0.2685	-0.4165	-0.5441	-0.7399	0.1540	0.0665	0.0384	0.0096	0.0000
0.2	0.3	-121.1253	-101.8984	-82.2500	-61.1716	-37.1297	-16.2024	-4.2268	1.0730	0.8836	0.0000
0.2	0.4	1.2494	1.1011	1.082	1.0193	0.8958	0.7235	0.5250	0.3291	0.1609	0.0000
0.2	0.5	-16.5863	-10.3266	-4.0150	-2.4576	-9.2258	6.4088	4.0810	2.2762	1.0010	0.0000
0.2	0.6	-0.0088	-0.1490	-0.2889	-0.4273	-0.5612	0.3149	0.2069	0.1190	0.0540	0.0000
0.2	0.7	-94.8192	-64.4728	-73.7890	-61.9406	-47.6294	-29.1635	-12.5504	-3.6088	-0.0695	0.0000
0.2	0.8	0.8178	0.8078	0.7710	0.7235	0.6347	0.5346	0.4927	0.3247	0.1651	0.0000
0.2	0.9	-16.1259	-11.2908	-6.4032	-1.3470	-4.0346	9.9607	6.4088	3.6309	1.6221	0.0000
0.2	1.0	0.0937	-0.0501	-0.1940	-0.3378	-0.4799	-0.6168	0.2581	0.1519	0.0703	0.0000
0.3	0.1	-69.9613	-66.2007	-62.1849	-57.2726	-50.4255	-40.2408	-24.9966	-10.7185	-3.2714	0.0000
0.3	0.2	0.4889	0.5064	0.5220	0.5310	0.5250	0.4927	0.4191	0.2969	0.1569	0.0000
0.3	0.3	-14.8391	-11.4411	-7.9931	-4.3799	-0.4353	4.0346	9.2258	5.3084	2.4075	0.0000
0.3	0.4	0.1582	0.0150	-0.1285	-0.2728	-0.4474	-0.5600	-0.6959	0.1832	0.0866	0.0000
0.3	0.5	-47.5972	-48.1334	-48.4910	-48.2089	-46.5166	-42.3362	-34.2950	-20.7533	-7.8577	0.0000
0.3	0.6	0.2548	0.2779	0.3001	0.3187	0.3291	0.3247	0.2969	0.2551	0.1371	0.0000
0.3	0.7	-13.0555	-11.0789	-9.0567	-6.8795	-4.3799	-1.3470	2.4576	7.2800	3.3504	0.0000
0.3	0.8	0.1946	0.0536	-0.0879	-0.2306	-0.3748	-0.5191	-0.6598	0.1016	0.0274	0.0000
0.3	0.9	-28.3218	-30.8983	-33.3650	-35.4294	-36.1586	-33.0187	-26.1389	-14.0652	-3.2364	0.0000
0.3	1.0	0.1040	0.1202	0.1360	0.1502	0.1609	0.1651	0.1597	0.1597	0.1597	0.0000
0.4	0.1	-11.0102	-10.4329	-9.8154	-9.0567	-7.9931	-6.4032	-4.0150	4.4286	1.1597	0.0000
0.4	0.2	0.2119	0.0730	-0.0666	-0.2076	-0.3506	-0.4948	-0.6370	-0.7711	-0.8667	0.0000
0.4	0.3	-12.4220	-14.8140	-17.1559	-19.3092	-21.0260	-21.9353	-21.5323	-19.1733	-14.0788	0.0000
0.4	0.4	0.0237	0.0292	0.0346	0.0397	0.0439	0.0464	0.0464	0.0424	0.0328	0.0000
0.4	0.5	-9.8550	-9.6611	-9.4329	-9.10789	-8.74411	-8.2906	-7.759	-7.159	-6.4611	0.0000
0.4	0.6	0.2176	0.0399	-0.0586	-0.1987	-0.3409	-0.4847	-0.6272	-0.7624	-0.8803	0.0000
0.4	0.7	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.8	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.9	-6.6714	-4.8950	-11.0102	-13.0555	-14.8391	-16.1259	-16.5863	-15.7664	-13.1956	0.0000
0.4	1.0	0.2186	0.0839	-0.0574	-0.1973	-0.3394	-0.4831	-0.6256	-0.7699	-0.8791	-1.0000

$$S = \sqrt{\frac{4kP}{4EI}}$$

$$\varphi = \eta \frac{S^2}{kP}$$

$$p = \eta \frac{P}{bL}$$

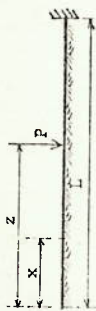
$$M = \eta N \cdot PL$$

$$V = \eta \cdot V$$

TABELA 3.03

ESTRUTURA 3

Esforço externo: Força Concentrada

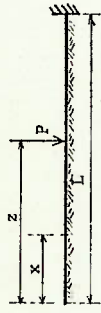


x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LEF. NA VERTICAL)								0.7	0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7				
100ηφ	-193.2875	-109.9214	-50.1343	-10.9788	11.3295	20.7902	21.2596	16.2926	9.1256	2.7472	0.0000	0.0000	0.0000
100ηP	4.9130	3.7279	2.6590	1.7702	1.0835	0.5926	0.2740	0.0941	0.0151	-0.0029	0.0000	0.0000	0.0000
100ηV	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-182.7092	-111.4031	-51.2095	-11.7092	10.8706	20.5297	21.1317	16.2428	9.1136	2.7466	0.0000	0.0000	0.0000
L 0.1	3.7279	3.0386	2.3440	1.7005	1.1536	0.7222	0.4066	0.1959	0.0721	0.0142	0.0000	0.0000	0.0000
I	-7.7437	1.7494	1.2772	0.8736	0.5535	0.3180	0.1591	0.0640	0.0170	0.0014	0.0000	0.0000	0.0000
N	-0.5685	-0.6616	0.2502	0.1736	0.1119	0.0658	0.0340	0.0145	0.0044	0.0006	0.0000	0.0000	0.0000
H	-157.6808	-108.6998	-58.4728	-16.7634	7.6009	18.5988	20.1253	15.8093	8.9809	2.7284	0.0000	0.0000	0.0000
A	2.6590	2.3440	2.0059	1.6148	1.2135	0.8456	0.5363	0.2964	0.1287	0.0314	0.0000	0.0000	0.0000
D	-11.7495	-3.4638	4.8967	3.4465	2.2599	1.3576	0.7247	0.3236	0.1061	0.0173	0.0000	0.0000	0.0000
E	-3.2505	-0.3926	-0.5319	0.3396	0.2304	0.1442	0.0812	0.0391	0.0144	0.0028	0.0000	0.0000	0.0000
I	-126.1853	-96.0398	-64.8618	-30.2851	14.4385	13.0376	17.0620	14.3769	8.4755	2.6353	0.0000	0.0000	0.0000
N	1.7702	1.7005	1.6148	1.4733	1.2366	0.9471	0.6539	0.3914	0.1836	0.0482	0.0000	0.0000	0.0000
0.3	-13.0811	-6.3285	0.5169	7.6297	5.1768	3.2413	1.8255	0.8795	0.3238	0.0640	0.0000	0.0000	0.0000
F	-0.0307	-0.1911	-0.3506	-0.5053	0.2342	0.1409	0.0736	0.0391	0.0300	0.0068	0.0000	0.0000	0.0000
L	-93.7590	-78.4783	-62.4026	-43.6349	-19.3100	1.6051	10.4539	11.0860	7.2087	2.3681	0.0000	0.0000	0.0000
U	1.0835	1.1536	1.2135	1.2366	1.1772	0.9965	0.7422	0.4722	0.2331	0.0640	0.0000	0.0000	0.0000
N	-12.6255	-7.4807	-2.2488	3.2774	9.3234	6.0678	3.5779	1.8255	0.7247	0.1591	0.0000	0.0000	0.0000
E	3.1103	0.0493	-0.2073	-0.3691	-0.5250	0.3320	0.2111	0.1169	0.0509	0.0125	0.0000	0.0000	0.0000
I	-63.9687	-59.5826	-54.6305	-47.7002	-36.5311	-18.1281	-1.4438	4.8570	4.6567	1.7865	0.0000	0.0000	0.0000
A	0.5926	0.7222	0.8456	0.9471	0.9965	0.9499	0.7736	0.5239	0.2710	0.0771	0.0000	0.0000	0.0000
P	-11.0701	-7.4775	-3.7961	0.1573	4.6364	9.8830	6.0678	3.2413	1.3576	0.3160	0.0000	0.0000	0.0000
0.5	0.1926	0.0435	-0.1067	-0.2597	-0.4154	-0.5697	0.2875	0.1071	0.0763	0.0195	0.0000	0.0000	0.0000
A	-38.9095	-41.6973	-44.1195	-45.2106	-43.3193	-36.0955	-20.5260	-5.5550	0.1956	0.7142	0.0000	0.0000	0.0000
A	0.2740	0.4066	0.5363	0.6539	0.7736	0.7736	0.7092	0.5242	0.2874	0.0653	0.0000	0.0000	0.0000
A	-8.9077	-6.7385	-4.4967	-2.0158	0.9398	4.6364	9.3234	5.1768	2.2599	0.5535	0.0000	0.0000	0.0000
S	0.2346	0.0990	-0.0382	-0.1798	-0.3281	-0.4826	-0.6374	0.2200	0.1044	0.0277	0.0000	0.0000	0.0000
E	-19.6645	-26.2332	-32.5970	-38.1673	-41.8479	-41.9517	-36.1465	-21.4602	-6.8786	-1.0518	0.0000	0.0000	0.0000
C	0.0941	0.1959	0.2964	0.3914	0.4722	0.5239	0.5242	0.4430	0.2680	0.0846	0.0000	0.0000	0.0000
C	-6.4596	-5.5841	-4.6531	-3.5325	-2.0158	0.1573	3.2774	7.6297	3.4465	0.8736	0.0000	0.0000	0.0000
A	0.2520	0.1283	0.0029	-0.1279	-0.2675	-0.4174	-0.5749	-0.7308	0.1326	0.0363	0.0000	0.0000	0.0000
D	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
0.6	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
A	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
0.7	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
0.8	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
0.9	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000
1.0	-3.9091	-4.2266	-4.5071	-4.6531	-4.4967	-3.7481	-2.2468	0.5169	4.8967	1.2772	0.0000	0.0000	0.0000
1.0	0.2560	0.1411	0.0235	-0.0997	-0.2327	-0.3779	-0.5343	-0.6947	-0.8438	0.0442	0.0000	0.0000	0.0000
1.0	-6.6938	-13.9436	-21.1040	-27.8767	-33.6349	-37.3145	-37.3475	-31.5060	-17.2581	-3.7239	0.0000	0.0000	0.0000
1.0	0.0151	0.0721	0.1287	0.1836	0.2331	0.2710	0.2874	0.2680	0.1945	0.0670	0.0000	0.0000	0.0000

TABELA 3.04

ESTRUTURA 3

Esforço externo: Força Concentrada



SL=3.00

x/L	z/L → J.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	-196.1692	-95.8355	-28.6514	10.9846	29.7512	34.0540	29.5325	20.5697	10.8154	3.1070	0.0000
100ηP	59213	42023	27094	15475	0.7316	0.2251	-0.0343	-0.1175	-0.0950	-0.0343	0.0000
100ηM	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100ηy	-181.4587	-96.2274	-30.2363	10.0413	29.2721	33.9030	29.5132	20.6323	10.8576	3.1234	0.0000
L 0.1	4.2023	3.3343	2.4460	1.6442	0.9963	0.5315	0.2314	0.0079	0.0025	-0.0063	0.0000
I 0.1	-7.3311	-1.9572	1.3116	0.7901	0.4104	0.1637	0.0271	-0.0278	-0.0313	-0.0125	0.0000
N 0.1	-3.4949	-0.6230	0.2580	0.1596	0.0665	0.0378	0.0099	-0.0025	-0.0046	-0.0020	0.0000
H 0.1	-148.4418	-95.9263	-41.0299	3.3241	25.5991	32.2682	29.0594	20.7085	11.0375	3.2045	0.0000
A 0.1	2.7094	2.4480	2.1374	1.7109	1.2490	0.8311	0.4957	0.2541	0.1009	0.0221	0.0000
D 0.1	-10.4406	-2.7541	5.0674	3.2222	1.8160	0.4583	0.2856	0.0123	-0.0600	-0.0313	0.0000
E 0.1	-0.1518	-0.3341	-0.5120	0.1992	0.1061	0.0031	0.0462	0.0136	0.0005	-0.0012	0.0000
I 0.2	-109.5581	-81.3405	-51.2604	15.2054	14.6876	26.7275	26.8625	20.2387	11.1686	3.3219	0.0000
N 0.2	1.5475	1.6442	1.7109	1.6686	1.4375	1.1007	0.7494	0.4391	0.2010	0.0515	0.0000
F 0.2	-10.8126	-5.0103	0.9495	7.3564	4.4695	2.3817	1.0390	0.3065	0.0123	-0.0278	0.0000
L 0.2	0.0581	-0.1306	-0.3188	-0.5017	0.3343	0.2031	0.1087	0.0483	0.0156	0.0024	0.0000
U 0.2	-72.4669	-61.8351	-49.9174	-33.6312	-9.2977	13.8040	20.6814	17.9752	10.7075	3.3431	0.0000
E 0.2	0.7316	0.9983	1.2490	1.4375	1.4772	1.2901	0.9674	0.6131	0.3002	0.0815	0.0000
N 0.2	-9.6082	-5.6088	-1.4602	3.1418	8.5444	4.9992	2.5369	1.0390	0.2856	0.0271	0.0000
C 0.2	0.1692	0.0001	-0.1709	-0.3451	-0.5182	0.3236	0.1950	0.1011	0.0407	0.0091	0.0000
I 0.3	-41.2760	-42.1659	-42.2683	-39.5451	-33.6041	-10.8050	7.4266	12.0243	8.7524	3.0286	0.0000
N 0.3	0.2251	0.5315	0.8311	1.1007	1.2901	1.3141	1.1005	0.7517	0.3893	0.1107	0.0000
P 0.3	-7.6462	-5.1940	-2.6171	0.3561	4.0800	8.8932	4.9992	2.3817	0.8583	0.1637	0.0000
A 0.3	0.2147	0.0751	-0.0675	-0.2177	-0.3782	-0.5444	0.2993	0.1698	0.0753	0.0187	0.0000
S 0.3	-17.7014	-25.0863	-32.0767	-37.5153	-39.2138	-33.7895	-16.6235	-0.0702	4.0622	2.0322	0.0000
E 0.3	0.0343	0.0679	0.2314	0.4957	0.7494	0.9674	1.1005	0.6667	0.8111	0.4496	0.0000
C 0.3	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 0.4	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 0.4	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 0.4	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 0.4	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 0.5	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 0.5	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 0.5	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 0.5	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 0.6	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 0.6	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 0.6	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 0.6	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 0.7	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 0.7	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 0.7	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 0.7	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 0.8	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 0.8	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 0.8	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 0.8	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 0.9	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 0.9	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 0.9	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 0.9	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 1.0	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 1.0	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 1.0	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 1.0	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 1.0	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 1.0	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000
E 1.0	0.1175	0.0679	0.2541	0.4391	0.6131	0.7517	0.8111	0.7235	0.4497	0.1439	0.0000
C 1.0	-3.2504	-3.0306	-2.7510	-2.2631	-1.3299	0.7517	3.1418	7.3564	3.2222	0.7901	0.0000
A 1.0	0.2137	0.1259	0.0348	-0.0664	-0.1857	-0.3287	-0.4949	-0.6729	0.1632	0.0451	0.0000
S 1.0	-2.0883	-11.9692	-21.7306	-30.8714	-38.1898	-41.4935	-37.3747	-21.1209	-4.8728	-0.0665	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{kb} P$$

$$P = \eta P \frac{P}{bL}$$

$$M = \eta M \quad PL$$

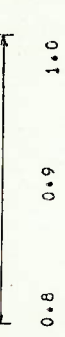
$$V = \eta V$$

TABELA 3.05

ESTRUTURA 3

Esforço externo: Força Concentrada

SL=3.50



LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
I	0.1	198.7269	-63.3295	-11.9153	25.3668	35.8243	37.8785	29.6640	19.1144	9.4659	2.5587	0.0000
I	0.1	6.9567	4.6061	2.6480	1.2291	0.3320	-0.1400	-0.3076	-0.2862	-0.1745	-0.0550	0.0000
I	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.1	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.1	-179.4149	-66.8815	-13.9461	24.2996	38.4561	37.8981	29.8410	19.3003	9.5248	2.5973	0.0000
H	0.1	4.6061	3.5743	2.4967	1.5367	0.8055	0.3241	-0.0564	-0.0514	-0.0589	-0.0236	0.0000
H	0.1	-6.9230	2.1326	1.2997	0.6663	0.2452	0.0673	-0.0932	-0.1040	-0.0680	-0.0223	0.0000
H	0.1	-0.4239	-0.5906	0.2574	0.1384	0.0570	0.0692	-0.0126	-0.0169	-0.0117	-0.0039	0.0000
A	0.2	-138.4387	-85.5589	-28.6232	16.3311	35.1051	37.2774	30.4851	20.2174	10.1681	2.8155	0.0000
A	0.2	2.6480	2.4967	1.7965	1.0223	0.7862	0.4256	-0.0611	-0.0094	-0.0094	0.0000	0.0000
A	0.2	-9.2059	-2.1668	5.0891	2.8656	1.2956	0.3387	-0.1296	-0.2589	-0.1945	-0.0680	0.0000
A	0.2	-0.0654	-0.2873	-0.5035	0.3058	0.1607	0.0648	0.0115	-0.0101	-0.0116	-0.0047	0.0000
E	0.3	-93.5666	-69.7349	-42.9834	6.7031	23.7040	33.2967	30.4155	21.5266	11.3303	3.2481	0.0000
E	0.3	1.2291	1.5367	1.7965	1.8754	1.6340	1.2240	0.8006	0.4457	0.1925	0.0463	0.0000
E	0.3	-8.7953	-3.9591	1.1127	6.8468	3.6016	1.4544	0.2602	-0.2227	-0.1040	-0.0000	0.0000
E	0.3	0.1239	-0.0872	-0.2995	-0.5082	0.3067	0.1657	0.0728	0.0216	0.0000	-0.0019	0.0000
U	0.4	-54.2952	-49.2891	-42.4561	-29.3006	-2.8414	21.0326	26.6269	21.6712	12.3901	3.7588	0.0000
U	0.4	0.3320	0.8065	1.2623	1.6340	1.7814	1.5884	1.1559	0.7127	0.3384	0.0693	0.0000
U	0.4	-7.1118	-4.1951	-1.0731	2.6738	7.5233	3.7866	1.4492	-0.2602	-0.1296	-0.0932	0.0000
U	0.4	0.1979	0.0276	-0.1466	-0.3305	-0.5198	0.3065	0.1710	0.0795	0.0274	0.0048	0.0000
N	0.5	-24.4485	-29.9606	-34.5337	-35.5615	-28.4007	-6.3546	14.3331	17.8140	12.0473	4.0154	0.0000
N	0.5	0.1400	0.3241	0.7882	1.2240	1.5684	1.8777	1.4185	0.9605	0.4904	0.1374	0.0000
N	0.5	-5.0607	-3.6038	-1.9915	0.1211	3.1934	7.6680	3.7866	1.4544	0.3387	0.0073	0.0000
N	0.5	0.2045	0.0624	-0.0450	-0.1669	-0.3498	-0.5284	0.3009	0.1635	0.0668	0.0161	0.0000
A	0.6	-4.4965	-14.5190	-24.2935	-32.4861	-36.6828	-32.3200	-12.7776	5.8568	8.2718	3.4626	0.0000
A	0.6	0.3076	0.0564	0.4256	0.8006	1.1559	1.4485	1.4467	1.1162	0.6196	0.1644	0.0000
A	0.6	-3.1243	-2.6704	-2.1138	-1.2083	0.4157	3.1934	7.5233	3.6016	1.2956	0.2452	0.0000
A	0.6	0.1800	0.0998	0.0145	-0.0860	-0.2127	-0.3709	-0.5531	0.2686	0.1247	0.0323	0.0000
S	0.7	-6.6570	-3.8960	-14.5237	-25.0332	-34.3606	-39.9512	-37.2249	-19.2868	-1.6552	1.3122	0.0000
S	0.7	0.2862	0.0514	0.1898	0.4457	0.7127	0.9605	1.1162	1.0502	0.6880	0.2157	0.0000
S	0.7	-1.4799	-1.6673	-1.8000	-1.7313	-1.2083	0.1211	2.6738	6.8468	2.8656	0.6663	0.0000
S	0.7	0.1492	0.0990	0.0443	-0.0245	-0.1195	-0.2512	-0.4224	-0.6206	0.1901	0.0525	0.0000
E	0.8	10.4665	1.8962	6.9121	-16.2555	-26.0109	-35.0751	-40.7904	-38.4271	-20.8676	-3.4158	0.0000
E	0.8	-0.1745	-0.0589	0.0611	0.1925	0.3384	0.4904	0.6196	0.5411	0.2060	0.0000	0.0000
E	0.8	-0.1142	-0.7072	-1.2874	-1.8000	-2.1138	-1.9915	-1.0731	1.1127	5.0891	1.2997	0.0000
E	0.8	0.1258	0.0929	0.0561	-0.0065	-0.0678	-0.1792	-0.3353	-0.5327	-0.7475	0.0740	0.0000
C	0.9	8.0801	3.1276	-2.0133	-7.7162	-14.2082	-21.2766	-27.7256	-31.2766	-27.8914	-11.7545	0.0000
C	0.9	-0.0550	-0.0236	0.0094	0.0463	0.0893	0.1374	0.1844	0.2157	0.2060	0.1173	0.0000
C	0.9	1.0777	0.1975	-0.7072	-1.6673	-2.6704	-3.6038	-4.1951	-3.9591	-2.1326	-2.1326	0.0000
C	0.9	0.1146	0.0887	0.0591	-0.0176	-0.10476	-0.1492	-0.2964	-0.4693	-0.7094	-0.9089	0.0000
I	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	1.0	2.2092	1.0777	-0.1142	-1.4799	-3.1243	-5.0891	-7.1118	-8.7953	-9.2059	-6.9230	0.0000
I	1.0	0.1127	0.0675	0.0594	0.0191	-0.0446	-0.1445	-0.2900	-0.4617	-0.7020	-0.9043	-1.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{kb} P$$

$$p = \eta_p \frac{P}{bL}$$

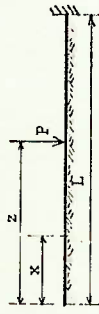
$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 3.06

ESTRUTURA 3

Esforço externo: Força Concentrada



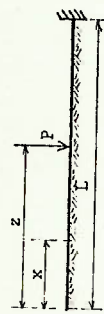
x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100η	199.7710	-71.1388	1.8860	34.2080	41.2331	35.2956	24.7279	14.3271	6.3545	1.5629	0.0000
100η _p	7.9848	4.9277	2.4974	0.8734	-0.0345	-0.4179	-0.4740	-0.3625	-0.1978	-0.0579	0.0000
100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100η _v	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-175.4438	-76.0909	-0.7856	33.1306	41.0940	35.5907	25.1279	14.6526	6.5384	1.6180	0.0000
	4.9277	3.7695	2.5169	1.4165	0.6248	-0.1481	-0.0766	-0.1319	-0.0954	-0.0326	0.0000
	-6.5329	2.2735	-2.2735	0.5278	0.0927	-0.1148	-0.1710	-0.1430	-0.0919	-0.0248	0.0000
	-0.3577	-0.5645	0.2510	0.1146	0.0295	-0.0135	-0.0276	-0.0248	-0.0147	-0.0045	0.0000
	-126.7326	-76.2641	-19.5124	24.4370	38.7151	36.4478	27.0760	16.4373	7.6056	1.9492	0.0000
	2.4974	2.5169	2.3866	1.8935	1.2693	0.7246	0.3389	0.1144	0.0162	-0.0046	0.0000
	-8.0837	-1.8955	5.0123	2.4671	0.8092	-0.0865	-0.4171	-0.4167	-0.2585	-0.0819	0.0000
	0.0070	-0.2502	-0.5013	0.2813	0.1245	0.0300	-0.0147	-0.0259	-0.0188	-0.0064	0.0000
	-77.3879	-59.7755	-37.9881	-2.4604	28.0379	35.0752	29.7393	19.7373	9.8100	2.6756	0.0000
	0.8734	1.4165	1.8935	2.1018	1.8201	1.3032	0.7942	0.4025	0.1542	-0.0319	0.0000
	-7.0588	-3.1339	1.1229	6.2784	2.7877	0.6788	-0.3209	-0.5724	-0.4167	-0.1430	0.0000
	0.1689	-0.0558	-0.2849	-0.5154	0.2804	0.1315	0.0416	-0.0005	-0.0106	-0.0052	0.0000
	-38.1918	-39.2055	-37.9122	-28.3500	-0.8193	24.9867	29.4877	22.8991	12.6057	3.7100	0.0000
	0.0345	0.6244	1.2693	1.8201	2.0700	1.8012	1.2755	0.7456	0.3335	0.0027	0.0000
	-5.1205	-3.1294	-0.8831	2.1458	6.5620	2.7352	0.5720	-0.3209	-0.4171	-0.1710	0.0000
	0.2056	0.0435	-0.1268	-0.3159	-0.5213	0.2881	0.1451	0.0565	0.0135	0.0004	0.0000
	-11.8274	-21.0865	-29.4015	-33.7858	-28.3086	-3.7474	19.7030	22.2505	14.4328	4.6658	0.0000
	0.4179	0.1481	0.7246	1.3032	1.8012	2.0038	1.6875	1.1153	0.5527	0.1504	0.0000
	-3.1631	-2.4736	-1.6126	-0.1855	2.3583	6.5659	2.7352	0.6788	-0.0805	-0.1148	0.0000
	0.1795	-0.0797	-0.0282	-0.1590	-0.3241	-0.5179	0.2945	0.1496	0.0575	0.0119	0.0000
	3.1523	7.8878	-18.8337	-28.7579	-34.8216	-31.3067	-9.0923	11.8388	12.4570	4.8874	0.0000
	-0.4740	-0.0766	0.3389	0.7942	1.2755	1.6875	1.8050	1.4060	0.7753	0.2285	0.0000
	-1.5964	-1.6486	-1.6040	-1.2123	-0.0649	2.3583	6.5620	2.7877	0.6092	-0.0927	0.0000
	0.1329	0.0815	0.0235	-0.0549	-0.1694	-0.3297	-0.5271	0.2771	0.1242	0.0309	0.0000
	9.6001	0.1609	-9.6105	-19.9751	-30.1996	-37.5072	-36.0782	-16.4005	2.4304	3.0132	0.0000
	-0.3625	-0.1319	0.1144	0.4025	0.7456	1.1153	1.4060	1.3993	0.9066	0.2951	0.0000
	-0.4900	-0.8862	-1.2429	-1.4349	-1.2123	-0.1555	2.1458	6.2784	2.4671	0.5278	0.0000
	0.0903	0.0700	0.0450	0.0038	-0.0690	-0.1687	-0.3629	-0.5789	0.2097	0.0573	0.0000
	10.1916	3.7266	-3.1820	-11.2651	-20.9075	-31.3138	-39.5343	-39.4496	-21.0331	-2.5217	0.0000
	-0.1978	-0.0954	0.0162	0.1542	0.3335	0.5527	0.7753	0.9066	0.7615	0.3053	0.0000
	0.2583	-0.2480	-0.7568	-1.2429	-1.6040	-1.6126	-0.6831	1.1229	5.0123	1.2534	0.0000
	0.0622	0.0582	0.0506	0.0305	-0.0163	-0.1061	-0.2534	-0.4605	-0.7027	0.0880	0.0000
	6.7189	3.5365	0.0340	-4.4083	-10.3972	-18.0619	-26.4380	-32.6594	-31.3482	-13.6676	0.0000
	-0.0579	-0.0326	-0.0046	0.0319	0.0827	0.1504	0.2285	0.2951	0.3053	0.1845	0.0000
	0.8066	0.2966	-0.2460	-0.8862	-1.6486	-2.4736	-3.1294	-3.1339	-1.6955	2.2735	0.0000
	0.0498	0.0518	0.0504	0.0389	0.0032	-0.0728	-0.2050	-0.4012	-0.6470	-0.8860	0.0000
	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
	1.2901	0.8066	0.2583	-0.4900	-1.5964	-3.1631	-5.1205	-7.0688	-8.0637	-6.5329	0.0000
	0.0476	0.0507	0.0506	0.0399	0.0059	-0.0677	-0.1971	-0.3908	-0.6359	-0.8786	-1.0000

$S = \sqrt{\frac{4kb}{4EI}}$
 $\varphi = \eta \phi \frac{S^2}{kD} P$
 $p = \eta_p \frac{P}{DL}$
 $M = \eta_M PL$
 $V = \eta_V P$

TABELA 3.09

ESTRUTURA 3

SL=5.50 Esforço externo: Força Concentrada



x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →										0.7	0.8	0.9	1.0		
		0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.6	0.6	0.6						
0.0	100 π_ϕ	-38.0687	29.11018	41.2757	30.9008	16.6844	6.2520	0.6883	-0.7209	-0.4438	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100 π_p	5.4105	1.6614	-0.1661	-0.7159	-0.6488	-0.4014	-0.1834	-0.0558	-0.0070	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100 π_v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-159.6717	48.3948	25.3091	40.9613	31.8727	17.7380	6.9659	-0.5974	-0.4230	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		5.4105	4.1800	2.5137	1.0812	0.2289	-0.1358	-0.2067	-0.0767	-0.0203	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-5.4831	2.5107	0.9765	0.1250	-0.2019	-0.1690	-0.0671	-0.0315	-0.0057	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.1903	-0.5131	0.2096	0.0458	-0.0247	-0.0395	-0.0169	-0.0067	-0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		-89.5132	4.5915	33.9007	34.8561	23.0225	11.1627	3.6105	-0.3485	-0.2241	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		1.6614	2.9323	2.2498	1.2366	0.4692	0.0560	-0.0877	-0.0837	-0.0308	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-5.3940	4.4343	1.3263	-0.1709	-0.6084	-0.5394	-0.3253	-0.1387	-0.0315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.1457	-0.5107	0.2140	0.0477	-0.0241	-0.0392	-0.0296	-0.0149	-0.0040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		-35.2340	-33.0581	-0.0873	31.0100	30.5238	19.7530	9.4450	3.0859	0.4215	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.1661	1.0812	2.2498	2.2711	1.2823	0.5143	0.1001	-0.0375	-0.0289	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-3.4806	-1.6716	0.7168	4.7346	0.4895	-0.8373	-0.6410	-0.0671	-0.0315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.2067	-0.0066	-0.2446	-0.5218	0.0615	-0.0128	-0.0305	-0.0217	-0.0071	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		-4.8689	-19.0840	-30.9546	-31.4394	-0.8550	29.6616	29.2909	18.6731	8.3468	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.7159	0.2269	1.2366	2.2711	2.8339	2.2352	1.2631	0.5191	0.1288	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.6271	-1.3632	-0.7752	4.6074	0.9253	-0.5960	-0.8373	-0.5394	-0.1690	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.1550	0.0543	-0.0709	-0.2572	0.2375	0.0736	-0.0016	-0.0184	-0.0087	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		6.9090	-6.0715	-19.3420	-30.7407	-31.1367	-0.8126	29.0395	27.5537	15.5795	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.6488	-0.1358	0.4692	1.2823	2.2711	2.8339	2.2352	1.2631	0.5191	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.4392	-0.7866	-1.0081	-0.7110	0.8352	4.5449	0.9253	-0.4895	-0.2400	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0836	0.0553	-0.0115	-0.0798	-0.2519	-0.5041	0.2463	0.0533	0.0106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		8.3434	0.4403	-8.5249	-19.4564	-39.0166	-30.7652	-1.8681	25.5287	21.0551	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.4014	-0.2067	0.0560	0.5143	1.2631	2.2711	2.8339	2.2352	1.2631	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.1139	-0.3216	-0.7416	-1.0103	-0.7296	0.8352	4.6074	1.1007	-0.1709	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0310	0.0366	0.0350	0.0071	-0.0774	-0.2420	-0.5008	0.0491	0.0664	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		5.7785	-2.5203	-1.6765	-8.4398	-18.6273	-29.7968	-32.6249	-7.3850	15.4467	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.1834	-0.1538	-0.0877	0.1001	0.5191	1.2286	2.0795	2.4646	1.6530	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.2626	-0.0533	-0.3965	-0.7650	-1.0103	-0.7110	0.8352	4.7346	1.3263	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0024	0.0180	0.0317	0.0351	0.0088	-0.0774	-0.2535	-0.5155	0.2232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		2.7472	-2.3464	-1.3942	-1.4026	-7.7353	-18.5658	-31.7490	-38.1975	-17.6075	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0558	-0.0767	-0.0837	-0.0375	0.4884	0.4884	1.0556	1.7151	0.7132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.2200	0.0629	-0.1269	-0.3965	-0.7416	-1.0681	-0.7752	0.7168	4.4343	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0088	0.0065	0.0223	0.0364	0.0385	0.0056	-0.0970	-0.3020	-0.6002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		0.6946	-1.3110	1.7223	1.2769	-1.2552	-7.4446	-18.1768	-31.3421	-38.0133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0070	-0.0203	-0.0308	-0.0289	0.0057	0.1020	0.2829	0.5290	0.7132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.1150	0.1006	0.0629	-0.0333	-0.3216	-0.7666	-1.3632	-1.6716	-0.8490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0114	0.0020	0.0165	0.0324	0.0435	0.0323	-0.0335	-0.1947	-0.4737	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0005	0.1150	0.2200	0.2626	0.1139	-0.4392	-1.6271	-3.4806	-5.3940	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0116	0.0013	0.0154	0.0313	0.0435	0.0352	-0.0435	-0.1761	-0.4476	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{4kb}{4EI}}$$

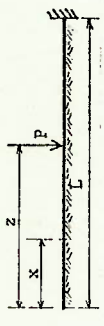
$$\varphi = n_\phi \frac{S^2}{KB} P$$

$$P = n_p \frac{P}{BL}$$

$$M = n_M PL$$

$$V = n_V P$$

TABELA 3.11



ESTRUTURA 3
Esforço externo: Força Concentrada

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM 0.5 (LER NA VERTICAL)										0.8	0.9	1.0		
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0					
0.0	100η _p	199.9966	37.9362	36.9576	20.3715	6.8579	0.1712	-1.6481	-1.2606	-0.4115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _M	5.4027	0.9479	-0.6882	-0.8265	-0.5002	-0.1914	-0.0268	0.0211	0.0127	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _V	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-146.3015	34.1404	37.7840	22.0917	8.0616	0.7048	-1.5237	-1.2624	-0.4349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		5.4027	4.4049	0.8683	0.0537	-0.1973	-0.1786	-0.0952	-0.0325	-0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-4.8666	0.7399	-0.0614	-0.2691	-0.2013	-0.0943	-0.0250	0.0016	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.0997	0.1742	0.0099	-0.0392	-0.0353	-0.0187	-0.0061	-0.0006	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		-67.0943	-1.0683	34.6922	29.1109	14.7334	4.3453	-0.2731	-1.1331	-0.4983	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		0.9479	3.4013	2.4660	1.1224	0.2608	-0.0878	-0.1402	-0.0653	-0.0248	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		-4.0402	3.9436	0.7286	-0.4686	-0.5876	-0.3612	-0.1435	-0.0292	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		0.1897	-0.5180	0.1785	-0.0171	-0.0344	-0.0333	-0.0183	-0.0065	-0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		-15.8907	-29.0365	-0.5773	31.5199	26.3366	13.3361	4.0668	0.1797	-0.3507	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		-0.6842	0.8683	3.3778	2.4583	1.1222	0.2655	-0.0746	-0.1122	-0.0443	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		-2.0335	-1.1827	3.9564	0.4799	-0.6786	-0.6943	-0.3934	-0.1435	-0.0250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		0.1849	0.0085	-0.5172	0.1951	0.0306	-0.0275	-0.0306	-0.0168	-0.0046	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		5.0790	-11.5248	-27.9196	31.2183	26.1789	13.3644	4.3198	0.5901	-0.3507	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		-0.8265	0.0537	1.1224	2.4583	3.3061	2.4004	1.0979	-0.0434	-0.0302	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		-0.5886	-0.8236	-0.7702	0.3795	3.8533	0.3907	-0.7211	-0.3612	-0.0943	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		0.1020	0.0494	-0.0365	-0.0214	-0.0506	-0.0248	0.0360	-0.0254	-0.0093	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		8.5384	-13.6199	-27.1654	32.2213	26.3363	13.5458	4.3124	0.5901	-0.3507	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		-0.5002	0.1973	0.2608	1.1222	2.4004	3.2574	2.3398	1.0525	0.2399	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		0.0664	0.3620	-0.7415	0.7665	3.8323	0.3907	-0.6786	-0.3612	-0.0943	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		0.0345	0.0388	0.0276	-0.0374	-0.0205	-0.0515	0.2079	0.0406	-0.0110	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		5.6641	-3.8389	-13.4809	-26.3363	31.5458	13.3361	29.9480	22.3124	7.2011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		-0.1914	-0.0878	0.2855	1.0979	2.3788	3.2398	2.3513	1.0525	0.2399	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		0.2182	-0.0757	-0.4095	-0.7471	0.7659	3.8533	0.4799	-0.4686	-0.2691	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		0.0010	0.0188	0.0330	0.0271	-0.0369	-0.0209	0.2119	0.0504	0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		2.2835	-1.8633	-3.5595	-12.6668	-25.6659	-31.9830	-3.4494	22.3062	10.7535	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		-0.0268	0.0952	-0.1402	0.0746	0.2759	1.1046	2.3513	2.0653	0.6300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		0.1661	0.0368	-0.1388	-0.4182	0.7471	-0.7665	3.9564	0.7286	-0.0614	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		-0.0087	0.0051	0.0201	0.0331	0.0269	-0.0371	-0.2099	0.2062	0.0431	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		0.2356	1.0463	1.6133	-2.7885	-12.0084	-26.3220	-36.1912	-13.7936	6.3898	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		-0.0211	-0.0325	-0.0853	-0.1122	0.3110	1.0525	2.0653	2.4361	1.0406	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		0.0773	0.0522	-0.0388	0.1388	0.4085	-0.3672	0.3672	3.9438	0.7399	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		-0.0083	-0.0010	0.0085	0.0222	0.0357	-0.0419	-0.2329	-0.5563	0.1281	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		-0.4308	0.3132	1.1045	1.7353	1.2374	-12.0306	-27.4564	-35.5783	-19.9638	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		0.0127	-0.0050	-0.0248	-0.0443	0.0274	0.2399	0.6300	1.0406	0.8620	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		0.0049	0.0320	0.0522	0.0368	-0.0757	-0.8236	-1.1827	-0.5849	2.5537	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		-0.0064	-0.0026	0.0031	0.0141	0.0307	0.0424	-0.0176	-0.3736	-0.7676	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		-0.0551	0.0049	0.0773	0.1661	0.2182	0.0664	-2.0335	-4.0402	-4.6606	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		-0.0059	-0.0027	0.0023	0.0125	0.0289	0.0429	-0.0254	-0.3355	-0.7315	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{kb} P$$

$$p = \eta \frac{P}{bL}$$

$$M = \eta_M PL$$

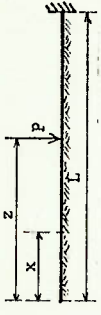
$$V = \eta_V P$$

TABELA 3.12

ESTRUTURA 3

SL=7.00 Esforço externo: Força Concentrada

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →					(LER NA VERTICAL)				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100η _φ	199.9992	-11.9799	40.2185	33.5033	15.5295	3.5335	-1.1367	-1.7111	-0.9686	-0.2607	0.0000
100η _P	13.9999	5.3173	0.5868	-0.8653	-0.8017	-0.3953	-0.1029	0.0171	0.0330	0.0132	0.0000
100η _V	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-139.9427	-28.8507	36.6952	34.9868	17.5243	4.6822	-0.7572	-1.6985	-1.0376	-0.2934	0.0000
	5.3173	4.5223	2.5183	0.7978	-0.0148	-0.2078	-0.1542	-0.0667	-0.0154	0.0000	0.0000
	4.5702	2.5538	0.6207	-0.1582	-0.2731	-0.1683	-0.0606	-0.0054	0.0086	0.0045	0.0000
	-0.0599	-0.5018	0.1565	-0.0040	-0.0416	-0.0306	-0.0130	-0.0025	0.0009	0.0007	0.0000
	-56.9823	43.0627	-0.3526	34.4488	26.2463	11.4346	2.2247	-1.0647	-1.2016	-0.4342	0.0000
	0.5868	2.5183	3.6538	2.5487	1.0349	0.1576	-0.1350	-0.1401	-0.0708	0.0175	0.0000
	-3.4716	-0.5063	3.7033	0.4919	-0.5304	-0.5304	-0.2701	-0.0770	0.0011	0.0086	0.0000
	0.2011	-0.0144	-0.5202	0.1633	0.0058	-0.0358	-0.0286	-0.0131	-0.0033	-0.0001	0.0000
	-8.7725	-25.5951	-33.4197	-0.7753	31.7357	24.2779	10.6267	2.2087	-0.6197	-0.5127	0.0000
	-0.8653	0.7978	2.5487	3.6245	2.5182	1.0185	0.1537	-0.1285	-0.1216	-0.0417	0.0000
	-1.5102	-1.0144	0.2138	3.6446	0.2701	-0.6928	-0.5927	-0.2821	-0.0770	-0.0054	0.0000
	0.1675	0.0140	-0.0170	-0.5140	0.1810	0.0177	-0.0311	-0.0278	-0.0132	-0.0031	0.0000
	7.3902	-8.8214	-25.2989	-33.4191	-0.6907	31.7285	24.2697	10.7419	2.5849	0.0491	0.0000
	-0.8017	-0.0148	1.0349	2.5182	3.5414	2.4614	0.9979	-0.1636	-0.0889	-0.0575	0.0000
	-0.2909	-0.6457	-0.7510	0.2006	3.5692	0.2159	-0.7146	-0.5927	-0.2701	-0.0606	0.0000
	0.0777	0.0463	-0.0214	-0.1941	-0.5032	0.1884	0.0208	-0.0295	-0.0250	-0.0063	0.0000
	7.7726	-0.3958	-10.9714	-25.0080	-32.4315	-0.1521	31.9033	24.1694	10.4654	2.2198	0.0000
	-0.3953	-0.2078	0.1576	1.0185	2.4614	3.5006	2.4466	1.0103	0.2096	-0.0106	0.0000
	0.1520	-0.2401	-0.6235	-0.7480	0.1949	3.5622	0.2159	-0.6928	-0.5304	-0.1683	0.0000
	0.0178	0.0317	0.0323	-0.0208	-0.1905	-0.5009	0.1897	0.0236	-0.0222	-0.0125	0.0000
	4.0587	1.8697	-2.0817	-10.7493	-24.3306	-31.8996	-0.0938	31.0692	21.8414	6.6634	0.0000
	-0.1029	-0.1542	-0.1350	0.1537	0.9979	2.4466	3.4928	2.4397	0.9994	0.1984	0.0000
	0.1885	0.0224	-0.2890	-0.6210	-0.7403	0.1549	3.5692	0.2701	-0.5391	-0.2731	0.0000
	-0.0056	0.0127	0.0298	0.0319	-0.0211	-0.1910	-0.5007	0.1931	0.0336	-0.0050	0.0000
	1.1132	1.4091	1.1465	-1.8609	-10.1559	-23.7256	-31.9468	-2.2353	24.9086	11.5455	0.0000
	0.0171	-0.0667	-0.1401	-0.1285	0.1636	1.0103	2.4397	3.4153	2.2256	0.6531	0.0000
	0.1073	0.0432	-0.0660	-0.2911	-0.6210	-0.7480	0.2006	3.6446	0.4919	-0.1582	0.0000
	-0.0087	0.0019	0.0148	0.0295	0.0311	-0.0217	-0.1915	-0.5010	0.1934	0.0356	0.0000
	-0.2253	0.6247	1.3971	1.4081	-1.2480	-9.4044	-23.8141	-35.1657	-11.8124	8.5534	0.0000
	0.0330	-0.0154	-0.0708	-0.1216	-0.0889	0.2096	0.9994	2.2256	2.8026	1.2071	0.0000
	0.0346	0.0389	-0.0226	-0.0660	-0.2890	-0.6235	-0.7510	0.2138	3.7033	0.6207	0.0000
	-0.0056	-0.0019	0.0041	0.0157	0.0312	-0.0333	-0.0231	-0.2059	-0.5406	0.1297	0.0000
	-0.4459	0.0783	0.7279	1.4971	1.6612	-0.8475	-9.2666	-25.0734	-39.6516	-20.4688	0.0000
	0.0132	0.0000	-0.0175	-0.0417	-0.0515	-0.0106	0.1984	0.6531	1.2071	1.0700	0.0000
	-0.0080	0.0161	0.0389	0.0432	-0.0224	-0.2801	-0.6457	-1.0144	-0.5063	2.5538	0.0000
	-0.0032	-0.0024	0.0000	0.0075	0.0227	0.0398	0.0308	-0.6663	-0.3290	-0.7448	0.0000
	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000
	-0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000
	-0.0368	-0.0030	0.0346	0.1073	0.1885	0.1520	-0.2909	-1.5102	-3.4716	-4.5702	0.0000
	-0.0027	-0.0024	-0.0006	0.0060	0.0205	0.0389	0.0369	-0.0439	-0.2849	-0.6997	-1.0000



$$S = \sqrt{\frac{kb}{4EI}}$$

$$\phi = \eta \sqrt{\frac{S^2}{kb}} P$$

$$p = \eta \frac{P}{bL}$$

$$M = \eta_N PL$$

$$V = \eta_V P$$

TABELA 3.13

ESTRUTURA 3

SL=7.50 Esforço externo: Força Concentrada



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →					(LER NA VERTICAL)				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100nφ	199.9999	41.3574	29.6432	11.2630	1.1723	1.7002	1.4336	0.6130	-0.1227	0.0000	
nP	15.0000	0.2368	0.9931	-0.7392	-0.2692	-0.0351	0.0394	0.0326	0.0103	0.0000	
100nM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
nV	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
L 0.1	133.5216	38.2915	31.7996	13.4372	2.1935	1.4793	-1.45056	-0.1549	0.0000	0.0000	
I 0.1	5.1844	2.5261	0.7091	-0.0734	-0.2067	-0.1279	0.0425	0.0030	0.0000	0.0000	
N 0.1	4.2931	2.5388	0.5051	-0.2173	-0.1331	-0.0334	0.0062	0.0105	0.0040	0.0000	
I 0.2	0.0236	0.1393	-0.0152	-0.0416	-0.0253	-0.0062	-0.0001	0.0015	0.0007	0.0000	
H 0.2	47.6704	0.0499	34.0088	23.5163	8.6633	0.7442	-1.3918	-1.0577	-0.3229	0.0000	
A 0.2	0.2368	3.9122	2.6106	0.9317	0.0616	-0.1651	-0.1277	-0.0520	-0.0098	0.0000	
D 0.2	2.9676	3.4742	0.2949	-0.5711	-0.4602	-0.1907	-0.0306	0.0168	0.0105	0.0000	
E 0.2	0.2068	-0.1344	0.1495	-0.0034	-0.0357	-0.0239	-0.0087	-0.0011	0.0004	0.0000	
I 0.3	3.1585	33.5921	0.8808	31.8895	22.2243	8.2468	0.6120	-1.0598	-0.5504	0.0000	
N 0.3	0.9931	0.7091	3.8651	2.5588	0.9060	0.0556	-0.1609	-0.1164	-0.0347	0.0000	
F 0.3	1.0935	0.8810	3.3775	0.1092	-0.6774	-0.4923	-0.1914	-0.0306	0.0662	0.0000	
L 0.3	0.1482	-0.1801	-0.5110	0.1669	-0.0063	-0.0329	-0.0241	-0.0095	-0.0017	0.0000	
U 0.3	8.4546	23.2083	33.2145	0.15095	32.2049	22.2492	8.3343	1.1753	-0.3390	0.0000	
E 0.3	0.7392	0.0734	2.5588	3.7786	2.5092	0.6914	-0.0642	-0.1300	-0.0039	0.0000	
N 0.4	0.0937	0.5070	0.7192	0.0610	0.0796	-0.6867	-0.4923	-0.1907	-0.0334	0.0000	
C 0.4	0.0563	0.0429	-0.0082	-0.1752	0.1721	0.0079	-0.0324	-0.0228	-0.0067	0.0000	
L 0.4	6.5481	0.4764	22.7596	32.4797	0.1106	32.1462	22.2528	8.4039	1.4149	0.0000	
E 0.4	0.2892	0.2087	0.9060	2.5092	3.7475	2.4992	0.9035	0.1106	-0.0442	0.0000	
N 0.5	0.1794	0.1540	0.5153	0.7120	0.3285	0.0796	-0.6774	-0.4602	-0.1331	0.0000	
C 0.5	0.0059	0.0255	-0.0072	-0.1729	-0.5006	0.1725	-0.0093	-0.0272	-0.0129	0.0000	
L 0.5	2.6317	1.8004	8.2959	22.2647	-32.1264	-0.0110	31.7305	20.8398	5.9196	0.0000	
E 0.5	0.0351	0.1279	0.1651	0.0556	2.4492	3.7432	2.5019	0.9199	0.1481	0.0000	
N 0.6	0.1454	0.0071	0.5072	-0.7014	-0.0666	3.3279	0.1092	-0.5711	-0.2029	0.0000	
A 0.6	-0.0085	0.0081	0.0341	-0.0079	-0.1738	-0.5009	0.1749	0.0184	-0.0099	0.0000	
S 0.6	0.3367	1.1171	1.3989	0.5922	-21.7911	-31.9586	-1.3466	26.9443	12.0098	0.0000	
E 0.6	0.0394	0.0425	-0.1277	0.1609	0.0642	2.5019	3.6989	2.3526	0.6563	0.0000	
C 0.7	0.0611	0.0401	-0.0197	-0.1935	-0.5072	0.0610	3.3775	0.2949	-0.2173	0.0000	
A 0.7	-0.0072	-0.0001	0.0101	0.0252	0.0331	-0.0088	-0.1743	0.1789	0.0274	0.0000	
O 0.7	0.3839	0.3329	1.1082	1.5254	-0.1615	-21.4633	-34.2480	10.6608	0.0000	0.0000	
0.8	0.0326	0.0032	-0.0520	0.1164	-0.1300	0.9199	2.3526	3.1655	1.3011	0.0000	
0.9	0.0096	0.0265	0.0309	-0.0197	-0.1956	-0.7192	0.0510	3.4742	0.5051	0.0000	
1.0	-0.0032	-0.0020	0.0013	0.0104	0.0261	-0.0064	-0.1827	-0.5284	0.1292	0.0000	
0.0000	0.0000	0.0404	0.4115	1.1589	1.7571	-6.8238	-22.5731	-39.3474	-20.7348	0.0000	
0.0103	0.0030	0.0030	-0.0098	-0.0347	-0.0639	0.1461	0.6563	1.3011	0.0000	0.0000	
0.0104	0.0070	0.0265	0.0401	0.0071	-0.1540	-0.5070	-0.8796	-0.4528	-2.5388	0.0000	
0.0011	-0.0018	-0.0015	0.0030	0.0030	0.0156	0.0348	0.0361	-0.2683	-0.7229	0.0000	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	
0.0189	-0.0194	0.0096	0.0611	0.1454	0.1794	-0.0937	-1.6935	-2.9676	-4.2931	0.0000	
0.0008	-0.0017	-0.0018	0.0018	0.0132	0.0327	0.0423	-0.0158	-0.2384	-0.6676	-1.0000	

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\phi = n \phi \frac{S^2}{P}$$

$$P = n_p \frac{P}{bL}$$

$$M = n_M P L$$

$$V = n_V P$$

TABELA 3.14

ESTRUTURA 3

SL=6.00 Esforço externo: Força Concentrada

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM y										(LER NA VERTICAL)		0.8	0.9	1.0	
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0						
L 0.1	100η _φ	1.8556	41.5410	25.6343	7.6634	-0.3756	-1.7803	-1.0412	-0.3102	-0.0270	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.1	100η _M	5.0088	-0.0943	-1.0703	-0.6511	-0.1915	0.0115	0.0456	0.0256	0.0063	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.1	100η _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.1	100η _φ	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.1	100η _M	-127.0759	39.1096	28.4438	9.9131	0.4655	-1.7079	-1.1644	-0.3982	-0.0520	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.1	100η _v	4.7843	-2.5345	-0.6209	-0.1229	-0.2032	0.1017	0.0232	0.0043	0.0042	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.1	100η _φ	2.5128	0.3953	-0.2598	-0.2425	-0.0993	-0.0132	0.0116	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D 0.1	100η _M	0.0093	-0.1230	-0.0239	-0.0398	-0.0201	0.0045	0.0015	0.0005	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.1	100η _v	39.1829	-38.3714	-0.0070	33.4675	6.3617	-0.2463	-1.4299	-0.8247	-0.2064	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.2	100η _φ	-0.0943	4.1728	2.6512	0.8175	-0.0233	-0.1794	-0.1078	-0.0330	-0.0032	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.2	100η _M	-2.5226	-0.4182	3.2596	0.1339	-0.5742	-0.3663	-0.0219	0.0095	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.2	100η _v	0.2077	-0.1250	-0.5216	-0.1366	-0.0110	-0.0345	-0.0052	0.0003	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.2	100η _φ	1.1239	-20.0666	-33.6251	-0.8961	31.9477	20.1736	6.1763	-1.2241	-0.5027	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.3	100η _M	-1.0703	0.6209	2.6512	4.1015	-0.7689	0.0274	-0.1753	-0.1016	-0.0255	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.3	100η _v	-0.7660	-0.7692	-0.0304	3.1484	-0.0138	-0.6438	-0.3999	-0.0015	0.0116	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.3	100η _φ	0.1282	0.0227	-0.1633	-0.5082	0.1528	-0.0036	-0.0331	-0.0062	-0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.3	100η _M	8.6148	-4.8156	-21.0499	-33.0442	-0.3446	32.1554	6.2112	0.1159	-0.5755	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.4	100η _v	-3.6511	-0.1229	0.8175	2.5828	4.0164	2.5434	-0.7806	-0.1540	-0.0633	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.4	100η _φ	0.0297	-0.3972	-0.0472	-0.0472	3.1195	0.0281	-0.6467	-0.1259	-0.0132	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.4	100η _M	0.0363	0.0395	0.0031	-0.1577	-0.5008	-0.5003	-0.0029	-0.0196	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.4	100η _v	5.1665	1.0371	-6.3889	-20.5069	-32.3958	0.0671	32.1852	20.1984	6.4434	0.7049	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.5	100η _φ	-0.2022	-0.0233	0.7889	2.5434	3.9970	0.7696	0.0200	0.0200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.5	100η _M	-0.0933	-0.4178	-0.6654	-0.0362	3.1232	-0.0281	-0.6438	-0.3863	-0.0993	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.5	100η _v	0.0201	0.0349	0.0039	-0.1564	-0.5003	0.1562	-0.0022	-0.0297	-0.0124	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.5	100η _φ	1.4934	1.6185	0.2482	-6.1593	-20.1790	-32.1950	31.9985	19.4455	5.0442	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.6	100η _M	0.0115	-0.1017	-0.1794	0.0274	0.7806	2.5368	2.5419	0.8213	0.0931	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.6	100η _v	0.1026	0.0220	-0.1246	-0.4075	-0.6550	0.0362	3.1195	-0.0138	-0.2425	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.6	100η _φ	-0.0089	0.0047	0.0213	0.0342	0.0030	-0.1573	-0.5010	0.1577	-0.0136	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.6	100η _M	-0.1128	0.7908	1.4316	0.3047	-5.9636	-19.8449	-31.9410	-0.7526	26.4452	12.1563	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.7	100η _v	0.0456	-0.0232	0.1078	-0.1753	0.0203	0.7896	2.5419	0.4471	0.6399	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.7	100η _φ	0.0293	0.0331	0.0070	-0.1212	-0.4075	-0.6654	-0.0472	3.1484	0.1339	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.7	100η _M	-0.0052	-0.0011	0.0063	0.0207	0.0333	0.0021	-0.1560	-0.5000	0.1636	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.7	100η _v	-0.3766	0.1425	0.8122	1.4565	0.5728	-5.3165	-19.2639	-33.3936	-8.1460	12.7152	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.8	100η _φ	-0.0256	0.0043	-0.0330	-0.1046	0.0200	0.0200	0.8213	2.4471	3.5207	1.5232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.8	100η _M	-0.0025	0.0166	0.0303	-0.0070	-0.1246	-0.4178	-0.6772	-0.0304	3.2596	0.3553	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.8	100η _v	-0.0015	-0.0017	-0.0063	0.0212	0.0063	0.0347	0.0031	-0.1625	-0.5192	0.1268	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.8	100η _φ	-0.2036	-0.0852	0.1813	0.8158	1.6402	1.6646	-4.7375	-38.7353	-20.7792	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.9	100η _M	0.0063	0.0042	-0.0032	-0.0255	-0.0633	-0.0709	0.0931	0.6399	1.5232	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.9	100η _v	-0.0085	0.0021	0.0166	0.0331	0.0220	-0.0933	-0.3972	-0.7692	-0.4162	2.5128	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.9	100η _φ	-0.0000	-0.0012	-0.0019	0.0003	0.0097	0.0286	0.0409	-0.0156	-0.2513	-0.7019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.9	100η _M	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0600	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 1.0	100η _v	-0.0000	0.0030	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 1.0	100η _φ	-0.0071	-0.0095	-0.0025	0.0293	0.1026	0.1733	0.0247	-0.7660	-2.5226	-4.0291	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 1.0	100η _M	0.0002	-0.0010	-0.0019	-0.0006	0.0075	0.0256	0.0431	-0.0056	-0.1959	-0.6354	-1.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \frac{S^2}{kb} P$$

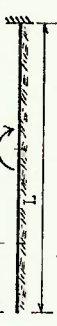
$$P = \eta \frac{P}{bL}$$

$$M = \eta_N PL$$

$$V = \eta_V P$$

TABELA 3.15

ESTRUTURA 3



Esforço externo: Momento

z/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)										0.7	0.8	0.9	1.0		
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0						
0.0	100n _p	307.2471	249.9584	196.6928	148.6737	106.7245	71.3656	42.8969	21.4794	7.1732	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100n _v	-4.3993	-4.1531	-3.7940	-3.3546	-2.8595	-2.3268	-1.7687	-1.1926	-0.6025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		307.2471	249.9584	196.6928	148.6737	106.7245	71.3656	42.8969	21.4794	7.1732	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-3.3547	-3.3091	-3.1299	-2.8526	-2.4991	-2.0858	-1.6238	-1.1200	-0.5783	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		97.9520	-1.9359	-1.7864	-1.5937	-1.3697	-1.1233	-0.8602	-0.5842	-0.2972	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.3907	-0.3731	-0.3462	-0.3104	-0.2679	-0.2206	-0.1696	-0.1156	-0.0590	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		249.9584	250.3526	197.0556	148.9966	107.0015	71.5923	43.0721	21.5969	7.2328	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-2.4153	-2.4212	-2.4607	-2.4616	-2.4355	-2.3755	-2.2858	-2.1681	-2.0259	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		92.5327	92.5764	87.8194	82.7023	78.5508	74.3321	70.0602	65.7340	61.5553	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.6775	-0.6617	-0.6258	-0.5704	-0.4997	-0.4171	-0.3247	-0.2240	-0.1156	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		196.6928	199.4624	205.5905	156.7134	122.7097	84.7071	47.3002	24.5521	8.7507	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.6630	-1.6675	-1.6986	-1.7793	-1.8284	-1.8485	-1.8328	-1.7871	-1.7173	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		84.6825	84.7427	85.1068	85.9213	87.1445	88.7699	90.3023	91.7344	93.0666	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.8800	-0.8786	-0.8681	-0.8381	-0.7793	-0.6947	-0.5851	-0.4511	-0.3044	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		148.6737	148.9966	151.1566	156.7134	166.9195	172.7097	178.5923	184.4711	190.3455	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.0818	-1.0852	-1.1085	-1.1695	-1.2637	-1.3932	-1.5553	-1.7485	-1.9644	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		75.1551	75.2272	75.6813	76.7596	78.5508	80.1445	81.5553	82.7871	83.8444	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.0158	-1.0148	-1.0071	-0.9841	-0.9352	-0.8511	-0.7343	-0.5886	-0.4171	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		106.7245	107.0015	108.8680	113.7145	122.7097	136.7911	151.0666	166.4444	182.9222	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.6526	-0.6515	-0.6715	-0.7149	-0.7967	-0.9269	-1.1026	-1.3271	-1.6011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		64.5332	64.6139	65.1346	66.4154	68.6443	71.8742	76.1111	81.3472	87.5833	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.1014	-1.1007	-1.0949	-1.0771	-1.0380	-0.9660	-0.8511	-0.6947	-0.4997	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		71.33656	71.5923	73.1307	77.1591	84.7071	96.6466	113.6765	133.7095	158.8443	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.3539	-0.3555	-0.3662	-0.3946	-0.4485	-0.5346	-0.6592	-0.8229	-1.0347	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		53.2479	53.3346	55.9054	57.9296	61.214	67.0661	76.4084	88.394	103.04	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.1507	-1.1502	-1.1458	-1.1316	-1.0992	-1.0380	-0.9352	-0.7793	-0.5704	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		42.8969	43.0721	44.2559	47.3802	53.2851	62.7136	76.2995	94.5483	118.8443	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.1631	-0.1640	-0.1701	-0.1864	-0.2175	-0.2675	-0.3403	-0.4389	-0.5648	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		41.5997	41.6908	42.3009	43.8710	46.7566	51.2236	57.4429	65.4808	76.4443	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.1758	-1.1754	-1.1718	-1.1598	-1.1316	-1.0771	-0.9841	-0.8381	-0.6258	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		21.4794	21.5969	22.4045	24.5521	28.6436	35.2328	44.8143	57.8105	74.5521	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0564	-0.0568	-0.0596	-0.0670	-0.0811	-0.1041	-0.1376	-0.1833	-0.2425	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		29.7813	29.8761	30.5191	32.2030	35.3583	40.3497	47.4697	56.9286	68.8394	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.1861	-1.1858	-1.1827	-1.1718	-1.1458	-1.0949	-1.0071	-0.8681	-0.6617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		7.1732	7.2328	7.6455	8.7507	10.8722	14.3156	19.3643	26.2718	35.2522	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.0101	-0.0109	-0.0128	-0.0164	-0.0223	-0.0310	-0.0426	-0.0583	-0.0778	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		17.9015	17.9994	18.6725	20.4625	23.8728	29.3649	37.3510	48.1534	62.1375	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.1891	-1.1888	-1.1858	-1.1754	-1.1502	-1.1007	-1.0148	-0.8786	-0.6756	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		6.0086	6.0120	6.0759	6.3120	6.6370	7.1528	7.9150	8.9873	10.4158	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-1.1894	-1.1891	-1.1861	-1.1758	-1.1507	-1.1014	-1.0158	-0.8800	-0.6775	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb} M$$

$$P = \eta P \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 3.19

ESTRUTURA 3

Esforço externo: Momento

SL=3.50

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)										0.8	0.9	1.0		
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0					
0.0	100nφ	398.4773	263.2306	150.1711	67.4356	15.9317	-28.5620	-30.1189	-24.4240	-14.0425	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	nP	-24.3440	-21.9783	-16.9587	-11.4619	-6.6512	-2.9849	-0.5508	0.8155	1.2821	0.9674	0.0000	0.0000	0.0000	0.0000	0.0000
	100nM	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	nV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.1		263.2306	267.7002	153.7523	69.9611	15.4393	-15.1931	-28.4817	-30.2338	-24.6621	-14.2378	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.1		-10.2077	-10.6430	-10.4810	-8.5425	-6.0379	-3.6702	-1.7786	-0.4773	0.2323	0.3831	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.1		90.4272	90.8935	-7.4049	5.2480	3.2255	-1.6111	-0.4803	0.1925	0.4684	0.3933	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.1		-1.6791	-1.6325	-1.3731	-1.0010	-0.6349	-0.3335	-0.1165	0.0170	0.0758	0.0686	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.2		153.7523	175.7054	86.1289	25.7668	-9.7104	-26.5079	-30.4348	-25.8378	-15.3219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D 0.2		-1.4474	-1.7086	-3.5093	-5.2655	-4.2304	-2.9686	-1.7792	-0.8467	-0.2466	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.2		70.1960	70.9413	74.7480	-19.0109	-12.4719	-6.8836	-2.7365	-0.0932	1.1628	1.1676	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.3		-2.2214	-2.2093	-2.0803	-1.6972	-1.2005	-0.7304	-0.3546	-0.0958	0.0455	0.0758	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.3		67.4556	69.9611	86.1289	125.6220	52.7700	102.6004	38.0635	-2.4102	-22.9665	-19.6092	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.3		3.1074	2.9767	2.0006	-0.8211	-3.5893	-4.3563	-3.9795	-3.0666	-1.9913	-0.9452	0.0000	0.0000	0.0000	0.0000	0.0000
F 0.3		48.1665	48.9259	53.2713	62.0568	-26.8558	-16.3514	-7.9471	-2.1573	1.0068	1.6696	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.4		-2.1089	-2.1160	-2.1236	-2.0156	-1.6496	-1.1654	-0.7045	-0.3385	-0.0958	0.0170	0.0000	0.0000	0.0000	0.0000	0.0000
U 0.4		13.9223	15.4393	25.7668	52.7700	102.6004	38.0635	-2.4102	-22.9665	-19.6092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.4		4.6401	4.6425	4.5655	4.0789	2.5765	-0.7784	-3.9592	-4.8940	-4.2967	-2.6026	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.4		14.4497	14.9199	17.9175	25.1214	37.0929	52.8375	-30.6539	-16.5680	-6.4774	-0.9201	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.4		-1.2162	-1.2336	-1.3310	-1.5196	-1.7298	-1.8006	-1.5686	-1.1654	-0.7304	-0.3335	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.5		-15.9317	-15.1931	-9.7104	6.0454	38.0835	91.8871	30.5058	6.8143	-22.6292	-20.0987	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.5		4.6401	4.6425	4.5655	4.0789	2.5765	-0.7784	-3.9592	-4.8940	-4.2967	-2.6026	0.0000	0.0000	0.0000	0.0000	0.0000
P 0.5		14.4497	14.9199	17.9175	25.1214	37.0929	52.8375	-30.6539	-16.5680	-6.4774	-0.9201	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.6		-1.2162	-1.2336	-1.3310	-1.5196	-1.7298	-1.8006	-1.5686	-1.1654	-0.7304	-0.3335	0.0000	0.0000	0.0000	0.0000	0.0000
R 0.6		-28.6820	-28.4817	-26.5079	-19.4382	-12.4102	30.5058	85.2254	25.6845	-7.5935	-15.8196	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.6		3.6338	3.6555	3.7344	3.7259	3.2620	1.7558	1.5653	4.5601	-4.9688	-3.3564	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.6		4.4635	4.7649	6.7826	11.9522	21.2706	34.9754	51.9838	-30.6698	-16.0731	-5.6958	0.0000	0.0000	0.0000	0.0000	0.0000
S 0.6		-0.7980	-0.8140	-0.9100	-1.1203	-1.4235	-1.7298	-1.8643	-1.6496	-1.2005	-0.6349	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.7		-30.1189	-30.2338	-30.4348	-29.1428	-22.9665	-16.5680	-6.4774	-0.9201	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.7		2.3415	2.3643	2.4766	2.6547	2.6547	2.1622	0.7175	-2.3026	-4.7073	-3.8314	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.7		-1.9119	-1.7591	-0.6524	2.4486	8.6033	18.6939	33.0465	50.8226	-30.5844	-13.8387	0.0000	0.0000	0.0000	0.0000	0.0000
O 0.7		-0.4987	-0.5124	-0.5981	-0.7987	-1.1203	-1.5196	-1.8854	-2.0156	-1.6972	-1.0010	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.8		-24.4240	-24.6621	-25.8378	-27.5212	-27.7262	-22.8292	-15.8196	80.1967	24.6973	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.8		1.1522	1.1668	1.2456	1.3880	1.5178	1.4758	1.0133	-0.2028	-2.5588	-3.4167	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.8		-5.9366	-5.9103	-5.6079	-4.4308	-1.4527	4.5007	14.6614	29.9486	50.3507	-25.7432	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.8		-0.3261	-0.3379	-0.4136	-0.5981	-0.9100	-1.3310	-1.7870	-2.1236	-2.0803	-1.3731	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.9		-14.0425	-14.2378	-15.3219	-17.3904	-19.4382	-22.8292	-22.8292	-15.8196	24.6973	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.9		0.3134	0.3182	0.3449	0.3979	0.4605	0.4919	0.4242	0.1607	-0.4184	-1.4399	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.9		-8.7795	-8.8654	-9.2899	-9.9003	-9.9839	-8.2394	-2.7840	8.7221	26.7258	59.0650	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.9		-0.2565	-0.2673	-0.3379	-0.5124	-0.8140	-1.2336	-1.7122	-2.1160	-2.2093	-1.6325	0.0000	0.0000	0.0000	0.0000	0.0000
A 1.0		-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 1.0		-11.2651	-11.4590	-12.5807	-14.9224	-18.0048	-20.4465	-19.7914	-12.3873	6.5388	42.3881	100.0000	0.0000	0.0000	0.0000	0.0000
N 1.0		-0.2459	-0.2565	-0.3261	-0.4987	-0.7980	-1.2162	-1.6966	-2.1089	-2.2214	-1.6791	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = n \cdot \frac{S^3}{kD} \cdot M$$

$$P = n \cdot P \cdot \frac{M}{bL^2}$$

$$M = n \cdot M$$

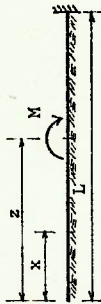
$$V = n \cdot V \cdot \frac{M}{L}$$

TABELA 3.21

ESTRUTURA 3

SL=4.50

Esforço externo: Momento



x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	399.9332	229.5933	101.0273	22.6659	-15.0077	-26.3409	-23.9388	-16.4606	-8.7767	-3.0626	0.0000	0.0000
ηP	-40.4982	-38.4629	-23.1249	-12.5197	-4.9443	0.0000	0.0000	0.0000	1.5773	0.8841	0.0000	0.0000
100ηM	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
229.5933	238.3672	107.2731	26.2659	-13.4222	-25.9974	-24.2053	-16.9188	-9.1898	-3.3069	0.0000	0.0000	0.0000
-12.0249	-13.3542	-10.3706	-6.2762	-2.9383	0.7544	0.3916	0.7678	0.5993	0.0000	0.0000	0.0000	0.0000
85.1495	86.2527	-13.0231	-5.9123	-2.6989	0.6724	0.3531	0.7009	0.6550	0.3953	0.0000	0.0000	0.0000
-2.4962	-2.3980	-1.8492	-1.1469	-0.5621	0.1744	0.0342	0.1150	0.1175	0.0743	0.0000	0.0000	0.0000
101.0273	107.2731	145.3238	50.1423	-1.5399	-22.1610	-24.7556	-19.2152	-11.5922	-4.8434	0.0000	0.0000	0.0000
2.6525	2.0134	-2.5903	-7.1114	-7.0799	-5.1813	-2.9902	-1.2396	-0.1595	0.2416	0.0000	0.0000	0.0000
57.1159	58.6617	66.3236	-22.1097	-11.6343	-4.2725	-0.0527	1.7836	2.0686	1.3843	0.0000	0.0000	0.0000
-2.8672	-2.8654	-2.6961	-2.0390	-1.2388	-0.5932	-0.1526	0.0744	0.1498	0.1175	0.0000	0.0000	0.0000
26.2659	26.2659	50.1423	110.0181	32.6513	-7.5291	-22.2220	-22.5673	-16.5309	-8.4286	0.0000	0.0000	0.0000
7.9295	7.7359	5.9520	-0.1300	-5.8793	-6.6529	-5.1765	-3.1463	-1.4238	-0.3464	0.0000	0.0000	0.0000
30.9529	32.2815	39.8581	54.8870	-27.4874	-12.9932	-3.4467	1.6029	3.2945	2.5959	0.0000	0.0000	0.0000
-2.2787	-2.3165	-2.4558	-2.4464	-1.9126	-1.1859	-0.5628	-0.1423	0.0744	0.1150	0.0000	0.0000	0.0000
-15.0077	-13.4222	-1.5399	32.6513	100.8065	28.5416	-9.2593	-23.0903	-13.9682	0.0000	0.0000	0.0000	0.0000
8.0234	8.0601	7.8781	6.0518	-0.0918	-5.9033	-6.7270	-5.2727	-3.2088	-1.3553	0.0000	0.0000	0.0000
12.2928	13.1925	18.7972	31.6869	51.1585	-28.1861	-11.9677	-1.7446	3.0521	3.4258	0.0000	0.0000	0.0000
-1.4526	-1.4988	-1.7252	-2.0916	-2.2628	-1.8409	-1.1677	-0.5626	0.0342	0.0000	0.0000	0.0000	0.0000
-26.3409	-25.9974	-22.1610	-7.5291	28.5416	97.3436	24.8362	13.1525	-25.5786	-19.9315	0.0000	0.0000	0.0000
5.9921	6.1113	6.6148	6.9559	5.5070	0.4520	6.2234	-7.0411	-5.4503	-2.9073	0.0000	0.0000	0.0000
1.4844	1.9797	5.3539	14.1028	29.6968	51.1055	-27.0491	-10.3385	-0.4393	2.8541	0.0000	0.0000	0.0000
-0.7434	-0.7788	-0.9851	-1.4109	-1.9372	-2.2108	-1.8409	-1.1859	-0.5832	-0.1744	0.0000	0.0000	0.0000
-23.9388	-24.2053	-24.7556	-22.2220	-9.2593	24.8362	91.7176	18.3011	-17.7331	-22.4849	0.0000	0.0000	0.0000
3.6357	3.7543	4.3833	5.4528	6.1617	4.8243	-1.2001	-7.0182	-7.5453	-4.6875	0.0000	0.0000	0.0000
-3.3549	-3.1517	-1.5508	3.2787	13.3337	29.9304	52.0186	-25.8289	-9.3725	-0.6626	0.0000	0.0000	0.0000
-0.2639	-0.2870	-0.4333	-0.7795	-1.3252	-1.9372	-2.2628	-1.9126	-1.2388	-0.5621	0.0000	0.0000	0.0000
-16.4606	-16.9188	-19.2152	-22.5873	-23.0903	-13.1525	18.3011	83.9147	12.6427	-14.6177	0.0000	0.0000	0.0000
1.7795	1.8628	2.3461	3.3376	4.5462	5.1276	3.5087	-2.6648	-8.0006	-6.6923	0.0000	0.0000	0.0000
-4.5144	-4.4875	-4.0530	-2.1399	2.9472	13.1682	29.8591	52.0186	-25.7196	-9.0555	0.0000	0.0000	0.0000
0.0011	0.0017	0.0102	-0.3398	-0.7795	-1.4109	-2.0916	-2.4464	-2.0390	-1.1469	0.0000	0.0000	0.0000
-8.7767	-9.1898	-11.5922	-16.5309	-22.5819	-25.5786	-17.7331	12.6427	79.45302	14.0848	0.0000	0.0000	0.0000
0.6392	0.6815	0.9414	1.5276	2.3853	3.2018	3.2741	1.3941	-4.1298	-6.9210	0.0000	0.0000	0.0000
-3.8334	-3.9000	-4.1547	-4.1932	-2.9354	1.3514	10.7966	27.1749	50.2880	-24.0139	0.0000	0.0000	0.0000
0.1161	0.1096	0.0574	-0.1012	-0.4333	-0.9851	-1.7252	-2.4456	-1.8492	-1.8492	0.0000	0.0000	0.0000
-3.0626	-3.3069	-4.8434	-8.4286	-13.9682	-19.9315	-22.4849	-14.6177	14.0848	75.8659	0.0000	0.0000	0.0000
0.1187	0.1303	0.2050	0.3842	0.6731	1.0108	1.2243	0.9786	-0.2497	-3.1180	0.0000	0.0000	0.0000
-2.4611	-2.5780	-3.2587	-4.6623	-6.3937	-7.2836	-5.1369	3.3534	22.1636	54.4381	0.0000	0.0000	0.0000
0.1497	0.1457	0.1096	-0.0117	-0.2870	-0.7788	-1.4968	-2.3165	-2.8654	-2.3980	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
-0.9366	-1.0905	-2.1132	-4.6836	-9.0917	-14.8087	-19.7785	-19.45359	-6.5132	29.7128	100.0000	0.0000	0.0000
0.1533	0.1497	0.1161	0.0011	-0.2639	-0.7434	-1.4526	-2.2787	-2.8672	-2.4962	0.0000	0.0000	0.0000

$$S = \sqrt[4]{\frac{Kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb}$$

$$P = \eta p \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta v$$

TABELA 3.22

ESTRUTURA 3

Esforço externo: Momento

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

x/L	Esforço externo: Momento									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	399.9381	79.4509	6.2903	-22.4596	-26.0503	-19.1647	-10.4070	-3.6670	-0.1474	0.0000
0.1	-49.9985	-25.4132	-11.9113	-3.3255	0.8485	2.1303	1.9480	1.2577	0.5495	0.0000
0.2	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	212.8505	87.0920	10.1941	-21.1175	-26.0618	-19.6750	-10.9478	-4.0479	-0.3290	0.0000
0.4	-12.0810	-15.2379	-11.0026	-6.0925	-2.4099	-0.2824	0.6295	0.7871	0.5254	0.0000
0.5	82.3061	-11.0431	-5.8205	-2.1294	-0.1186	0.6653	0.7566	0.5520	0.2715	0.0000
0.6	-2.9081	-2.0398	-1.1494	-0.4721	-0.0780	0.0929	0.1294	0.1026	0.0539	0.0000
0.7	79.4509	133.6867	36.8568	-9.8994	-23.9708	-21.6320	-13.8466	-6.3951	-1.5813	0.0000
0.8	5.5259	4.6405	-8.4106	-8.2006	-5.5884	-2.8555	-0.8910	0.1623	0.4225	0.0000
0.9	50.8252	62.9166	-22.5148	-10.3026	-2.6429	1.0345	2.1265	1.8791	1.0624	0.0000
1.0	-3.0968	-2.9492	-2.1475	-1.1982	-0.4800	-0.0619	0.1193	0.1525	0.1026	0.0000
0.1	6.2903	36.8568	105.6711	25.4726	11.7876	-21.9011	-18.8421	-11.6569	-4.8513	0.0000
0.2	10.3203	10.1470	8.0798	-0.0186	-7.9902	-5.6276	-2.9243	-0.9353	0.0454	0.0000
0.3	23.8077	25.4147	34.6224	52.8551	-26.4562	-1.4715	2.5617	3.3293	2.2534	0.0000
0.4	-2.2286	-2.2915	-2.5438	-2.0230	-1.1714	-0.4856	-0.0662	0.1193	0.1294	0.0000
0.5	-22.4596	-21.1175	-9.8994	25.4726	100.7459	24.0520	-12.0078	-19.0612	-10.6063	0.0000
0.6	8.9519	9.0928	9.3280	7.6605	-0.1604	-7.9533	-7.9148	-2.8453	-0.6956	0.0000
0.7	6.6074	7.5647	13.6812	28.1470	50.3827	-26.5123	-9.5704	3.7754	3.4428	0.0000
0.8	-1.2354	-1.2973	-1.6251	-2.1750	-2.44875	-1.9856	-1.1728	-0.4656	0.0929	0.0000
0.9	-26.0503	-26.0618	-23.9708	-11.7876	24.0520	99.0746	21.5759	-24.8310	-17.9970	0.0000
1.0	5.7463	5.9593	6.9639	8.1482	7.1510	-0.3356	-7.6462	-5.6390	-2.6780	0.0000
0.1	-1.7849	-1.3564	1.7765	10.5077	27.0533	50.6763	-25.3794	-8.0525	3.6656	0.0000
0.2	-0.4970	-0.5398	-0.7961	-1.3460	-2.40582	-2.4580	-1.9856	-1.1714	-0.4800	0.0000
0.3	19.1647	19.6750	21.6320	21.9011	12.0078	33.2159	94.3942	15.3775	-23.4533	0.0000
0.4	2.8669	3.0406	4.0110	5.8411	6.7201	-0.8779	-8.3621	-8.6402	-5.3205	0.0000
0.5	-4.3977	-4.2941	-3.2060	0.7921	10.3065	27.5155	51.6994	-23.9918	-6.8384	0.0000
0.6	-0.0737	-0.0966	-0.2500	-0.6362	-1.2856	-2.0582	-2.4875	-2.0230	-1.1982	0.0000
0.7	-10.4070	-10.9478	-13.8466	-18.8421	-22.1230	-15.42369	15.3775	8.2243	-18.9850	0.0000
0.8	1.0265	1.1313	1.7755	3.2144	5.2263	6.7618	5.4841	-2.5173	-9.7529	0.0000
0.9	-4.0539	-4.1038	-4.1136	-3.1031	0.8944	10.4970	27.8655	52.2123	-23.4683	0.0000
1.0	0.1118	0.1028	0.0311	-0.1868	-0.6362	-1.3460	-2.1750	-2.6404	-2.1475	0.0000
0.1	3.6670	4.0479	6.3951	11.6569	19.0612	24.8310	20.4907	18.9850	17.9970	0.0000
0.2	0.1775	0.2237	0.3306	1.2960	2.5656	4.4020	6.2243	8.2243	9.0993	0.0000
0.3	-2.5999	-2.6976	-3.1613	-3.7214	-3.3135	0.0169	8.9315	25.8549	-22.5944	0.0000
0.4	0.1650	0.1634	0.1386	0.0311	-0.2500	-0.7961	-1.6251	-2.5438	-2.9492	0.0000
0.5	-0.1474	-0.3290	-4.8513	-10.6063	-17.9970	-23.4533	-18.9850	8.8502	77.2688	0.0000
0.6	-0.0257	0.0147	0.0645	0.2803	1.2302	1.6202	1.6538	0.0930	-4.2285	0.0000
0.7	-0.9144	-1.0116	-1.6129	-2.9671	-4.8887	-6.4215	1.7842	19.9478	52.9232	0.0000
0.8	0.1689	0.1700	0.1634	0.1028	-0.0966	-0.5398	-1.2973	-2.215	-3.1107	0.0000
0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.7645	0.6807	0.0336	-1.8710	-5.6832	-11.5059	-17.9369	-20.6710	-11.0714	100.0000
0.2	0.1674	0.1669	0.1650	0.1118	-0.0737	-0.4970	-1.2354	-2.2866	-3.0968	-2.9081

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb} M$$

$$P = \eta P \frac{M}{bL^2}$$

$$N = \eta N M$$

$$V = \eta V \frac{M}{L}$$

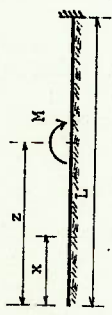
TABELA 3.24

ESTRUTURA 3

SL=6.00

Esforço externo: Momento

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM $\frac{v}{0.5}$ (LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	399.9834	181.1640	43.6348	-15.0443	-26.7604	-19.6527	-9.6034	-2.5537	0.7964	1.3913	0.0000
100ηP	-71.9967	-54.9207	-28.0658	-8.8010	0.4070	3.0336	2.5981	1.3910	0.4214	-0.0439	0.0000
100ηM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.1	181.1640	199.2068	53.9120	-11.1692	-26.3453	-20.4410	-10.4347	-3.0546	0.6108	1.3788	0.0000
I 0.1	-10.3015	-14.7724	-18.0754	-11.9247	-5.3570	-1.2586	0.4766	0.1118	0.5835	0.2563	0.0000
N 0.1	76.2846	79.0971	-12.4428	-4.9754	-0.7596	0.8075	0.9517	0.6026	0.2390	0.0281	0.0000
H 0.1	-3.7184	-3.5146	-2.3239	-1.0465	-0.2481	0.0901	0.1551	0.1110	0.0505	0.0106	0.0000
A 0.2	43.6348	117.5537	18.2682	-18.8473	-22.5050	-14.5328	-6.0629	-0.8125	0.5968	0.5308	0.0000
D 0.2	12.3496	10.9517	0.8632	-11.8780	-10.4966	-5.9144	-2.1581	-0.1145	0.5304	0.3109	0.0000
A 0.3	38.9881	42.1064	57.6024	-21.6434	-6.8356	0.3234	2.3382	1.9899	1.0504	0.3109	0.0000
E 0.3	-3.3688	-3.4442	-3.3846	-2.2887	-1.0537	-0.2646	0.0785	0.1512	0.1121	0.0505	0.0000
I 0.4	-15.0443	11.1692	18.2682	101.7669	14.7161	-17.2580	-19.8843	-12.4731	-4.8867	-0.5316	0.0000
N 0.4	14.2850	14.3649	12.4507	-0.1145	-11.6443	-10.4822	-5.9100	-2.0959	0.0405	0.6215	0.0000
F 0.4	12.3396	14.3897	26.4573	50.7624	-23.0980	-6.0806	1.4668	3.1768	2.4124	1.1103	0.0000
L 0.4	-1.9325	-2.0622	-2.6271	-3.0381	-2.2203	-1.0933	-0.3150	0.0538	0.1512	0.1110	0.0000
U 0.4	-26.7604	-26.3453	-18.8473	14.7161	100.8537	14.9355	-16.8277	-19.6140	-12.3746	-4.7514	0.0000
E 0.4	9.2158	9.7088	11.5313	11.2593	-0.3324	-11.4497	-10.1670	-5.5725	-1.7663	0.1105	0.0000
N 0.4	-0.5774	0.3159	6.6024	23.0209	50.0097	-22.6891	-5.3654	2.1637	3.7107	2.4823	0.0000
C 0.4	-0.7372	-0.8321	-1.3621	-2.3247	-2.9736	-2.2470	-1.1238	-0.3150	0.0785	0.1551	0.0000
I 0.5	-19.6527	-20.4410	-22.5058	-17.2580	14.9355	100.3333	13.8872	-18.3586	-21.2089	-12.4836	0.0000
A 0.5	4.0476	4.4699	6.6921	10.2300	10.9888	-0.1776	-11.2075	-9.9585	-5.4178	-1.6902	0.0000
P 0.5	-4.2670	-4.0768	-2.0229	5.5283	22.7850	50.2490	-22.1203	4.5074	3.0849	3.8575	0.0000
A 0.6	-0.0873	-0.1343	-0.4448	-1.1935	-2.2866	-2.9815	-2.2470	-1.0933	-0.2646	0.0901	0.0000
A 0.6	-9.6034	-10.4347	-14.5328	-19.8843	-16.8277	13.8872	97.8517	9.8901	-22.7865	-21.8361	0.0000
S 0.6	0.9133	1.1484	2.6189	5.8971	10.0407	10.9732	-0.3133	-11.5612	-10.4321	-5.4147	0.0000
E 0.6	-3.7305	-3.8300	-3.8744	-1.9877	5.5494	22.9991	50.8887	-20.9280	-3.0841	3.3783	0.0000
C 0.6	0.1425	0.1284	0.0063	-0.0063	-1.1788	-2.2866	-2.9736	-2.2203	-1.0537	-0.2481	0.0000
E 0.7	-2.5537	-3.0546	-0.0829	-12.4731	-19.6140	-18.3586	9.8901	90.9213	1.8714	24.3004	0.0000
C 0.7	-0.3292	-0.2401	0.4342	2.3385	5.7863	9.7446	10.1344	-1.8702	-13.3994	-10.6542	0.0000
A 0.7	-2.1210	-2.2710	-2.9434	-3.5292	-1.8997	5.7133	23.5467	51.9907	-19.5370	-2.6537	0.0000
D 0.7	0.1590	0.1605	0.1436	0.0152	-0.3830	-1.1935	-2.3247	-3.0381	-2.2987	-1.0465	0.0000
I 0.8	0.7964	0.6108	-0.8125	4.8867	-12.3746	-21.2089	-22.7865	1.8714	81.2988	-0.6353	0.0000
E 0.8	-0.4596	-0.4427	-0.2456	0.5058	2.2655	5.1377	7.9554	6.6911	-5.6747	-4.0599	0.0000
N 0.8	-0.7485	-0.8536	-1.4518	72.5832	-3.4888	-2.0687	5.3075	22.9559	51.4738	-19.2100	0.0000
H 0.8	0.1135	0.1198	0.1436	0.1436	0.0063	-0.4448	-1.3621	-2.0622	-3.3846	-2.3239	0.0000
A 0.9	1.3913	1.3788	1.0520	-0.5316	-4.7514	-12.4836	-21.8361	-24.3004	-0.6353	78.7501	0.0000
I 0.9	-0.1827	-0.1843	-0.1633	-0.0115	0.9527	1.3901	2.6854	3.4715	1.5322	-6.9143	0.0000
N 0.9	0.1972	0.1586	-0.1427	-1.0206	-2.6650	-4.6702	-5.2170	-0.1692	16.7544	51.0237	0.0000
H 0.9	0.0804	0.0871	0.1198	0.1605	0.1284	-0.1343	-0.8321	-2.0622	-3.4442	-3.5146	0.0000
A 1.0	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 1.0	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N 1.0	0.9520	0.9809	1.0095	0.5747	-1.2739	-5.6620	-12.8347	-19.8595	-17.1585	14.3089	100.0000
H 1.0	0.0737	0.0804	0.1135	0.1590	0.1425	-0.0873	-0.7372	-1.0325	-3.3688	-3.7184	0.0000



$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb} M$$

$$p = \eta_p \frac{M}{bL^2}$$

$$M = \eta_M M$$

$$V = \eta_V \frac{M}{L}$$

TABELA 3.25

ESTRUTURA 3

SL=6.50

Esforço externo: Momento

z/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100ηφ	399.9955	29.1534	-21.0768	-17.5431	-25.6353	-16.5042	-6.6639	-0.9167	1.1848	1.1769	0.0000
100ηP	-84.4985	-28.3473	6.7138	-12.2679	-4.8692	-0.7039	0.7365	0.7957	0.4421	0.1323	0.0000
100ηM	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100ηV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.1	166.2319	40.5598	-17.5431	-17.5431	-25.6353	-16.5042	-6.6639	-0.9167	1.1848	1.1769	0.0000
I	-84.4985	-19.5457	-12.2679	-12.2679	-4.8692	-0.7039	0.7365	0.7957	0.4421	0.1323	0.0000
N	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.2	166.2319	40.5598	11.8464	11.8464	-20.7627	-20.4453	-11.2413	-3.5702	0.3268	1.2191	0.0000
I	10.0280	14.4243	-0.4514	-14.0181	-11.5280	-5.7544	-1.6219	0.2530	0.6816	0.4667	0.0000
N	33.5514	37.3576	55.6305	-20.6153	-5.0414	1.4240	2.5396	1.6827	0.6499	0.0562	0.0000
D	-3.4138	-3.5378	-3.5812	-2.3364	-0.9658	-0.1660	0.1247	0.1473	0.0853	0.0272	0.0000
E	-21.0768	-17.5431	101.1572	101.1572	10.4064	18.8821	-18.3869	-9.8336	-2.7647	0.4821	0.0000
I	15.6146	15.9637	14.6575	0.2439	-13.9085	-11.4774	-5.6957	-1.5039	0.4176	0.7332	0.0000
N	7.9503	10.1317	23.2879	50.3194	-21.1944	-4.0755	2.3806	3.0598	1.8338	0.6139	0.0000
F	-1.7184	-1.8871	-2.6420	-3.2529	-2.3076	-1.0303	-0.2245	0.0991	0.1473	0.0889	0.0000
L 0.3	-25.4634	-25.6353	-20.7627	10.4064	100.8362	10.5500	18.6146	-18.0843	-9.5140	-2.5893	0.0000
I	8.6070	9.3337	12.2994	13.3172	-0.3585	-13.6135	-11.1271	-5.3517	-1.1782	0.5186	0.0000
N	-2.5400	-1.7646	4.1886	20.9917	50.0323	-20.7873	-3.6045	2.7541	3.3255	1.8668	0.0000
C	-0.4985	-0.6050	-1.2209	-2.3925	-3.2270	-2.3509	-1.0642	-0.2245	0.1247	0.1584	0.0000
I 0.4	-15.4002	-16.5042	-20.4553	18.8821	10.5500	100.3572	9.8803	-19.4352	18.9340	-9.6168	0.0000
E	2.8975	3.4060	6.2249	11.1273	13.1897	-0.1267	-13.3281	-10.8438	-5.0735	-1.0572	0.0000
N	-4.2894	-4.2408	-2.8848	3.7062	20.8992	50.1508	-20.4802	3.0566	3.4435	3.5262	0.0000
C	0.0531	0.0105	-0.2964	-1.1045	-2.3797	-3.2425	-2.3509	-1.0303	-0.1660	0.1476	0.0000
I 0.5	-5.8002	-6.6639	-11.2413	18.8821	10.5500	100.3572	9.8803	-19.4352	18.9340	-9.6168	0.0000
E	0.0723	0.2978	1.8359	5.6345	13.2602	30.2953	50.5606	-19.5079	-1.7068	3.9208	0.0000
N	-2.8919	3.0654	-3.5741	-2.6944	3.6867	20.9535	50.5606	-19.5079	-1.7068	3.9208	0.0000
C	0.1796	0.1730	0.0852	-0.2684	-1.1017	-2.3797	-3.2270	-2.3076	-0.1660	0.1476	0.0000
I 0.6	-0.5143	-0.9167	-3.5702	-9.8336	-18.0843	-19.4352	7.1056	7.1056	22.9202	-19.9012	0.0000
E	0.6963	-0.6437	-0.1154	1.7267	5.6464	10.9268	12.6530	-1.4766	-15.2908	-11.6003	0.0000
N	-1.2503	-1.4105	-2.2186	-3.3115	-2.7065	3.7439	21.4262	51.7151	-17.8545	-0.9907	0.0000
C	0.1363	0.1426	0.1536	0.0797	-0.2684	-1.1045	-2.3925	-3.2529	-2.3364	-0.9562	0.0000
I 0.7	1.2655	1.1848	0.3268	-2.7647	-9.5140	-18.0843	-22.9202	0.4814	82.6118	-4.7352	0.0000
E	-0.5326	-0.5418	-0.4788	0.0759	1.8251	5.2756	9.4270	9.4252	-5.8278	-16.7218	0.0000
N	0.2292	-0.3142	-0.8463	-2.0084	-3.3034	-2.7832	3.6455	21.3625	51.7992	-17.4206	0.0000
C	0.0708	0.0786	0.1150	0.1536	0.0852	-0.2964	-1.2209	-2.6420	-3.5812	-2.4184	0.0000
I 0.8	1.1317	1.1769	1.2191	0.4821	2.5893	9.6168	-19.9012	-4.7352	79.0459	0.0000	0.0000
E	-0.1739	-0.1837	-0.2105	-0.1482	0.2893	0.2893	3.0425	4.5433	2.6997	-8.4347	0.0000
N	0.2739	0.2600	0.0985	-0.5100	-1.8823	-3.8797	-4.9438	0.6542	15.5297	50.4969	0.0000
C	0.0359	0.0424	0.0786	0.1426	0.1730	0.0105	-0.6050	-1.8871	-3.5378	-3.8664	0.0000
I 1.0	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000	0.0000
E	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	-0.0000	0.0000
N	0.5873	0.6354	0.8273	0.8707	-0.1005	-3.4541	-10.2026	-18.4856	-18.9691	9.9669	100.0000
C	0.0298	0.0359	0.0708	0.1363	0.1796	0.0531	-0.4985	-1.7184	-3.4138	-4.1071	0.0000

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^3}{kb} M$$

$$p = \eta \frac{M}{bL^2}$$

$$M = \eta_M M$$

$$V = \eta_V V$$

$$V = \eta_V \frac{M}{L}$$

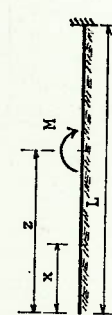


TABELA 3.26

ESTRUTURA 3

SL=7.00

Esforço externo: Momento

z/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →										(LER NA VERTICAL)			0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0						
100n _φ	399.9929	151.9229	16.7637	-24.7313	22.9206	-11.3069	-2.9166	0.6054	1.2111	0.7293	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _p	-97.9996	-68.5719	-27.9213	4.2985	3.6212	3.8086	1.9888	0.5455	-0.1104	-0.2185	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _y	103.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	151.9229	177.8105	29.1083	-21.7385	-23.6919	-12.6300	-3.7289	0.3269	1.2141	0.8019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	5.8701	-14.1369	-21.1007	-12.5416	-4.3225	-0.1910	0.9162	0.7296	0.3061	0.0384	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	69.9720	74.4805	-2.9662	3.5557	0.4970	1.2536	0.8251	0.3066	0.0141	-0.0673	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	-4.4787	-4.2038	-2.4831	-0.8494	-0.0328	0.1844	0.1474	0.0645	0.0098	-0.0092	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	16.7637	29.1083	108.4650	6.7136	-21.6517	-18.0927	-8.3562	-1.7780	0.8473	1.0675	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	19.7070	17.9806	-0.1728	-16.3757	-12.3965	-5.3760	0.5918	0.6846	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	28.4926	32.9037	54.0603	-19.3352	-3.3568	2.2164	2.4779	1.3163	0.3324	-0.0910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	-3.4021	-3.5876	-3.7718	-2.3745	-0.8735	-0.0780	0.1554	0.1350	0.0603	0.0098	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	-24.7313	21.7385	6.7136	100.9387	6.5124	-19.9306	-16.6541	-7.5094	-1.2705	0.9750	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	16.4166	17.1435	16.8799	-0.3799	-16.2636	-12.2539	-0.9118	0.6900	0.7336	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	4.3886	6.6277	20.5898	50.1000	-1.9.3054	-2.3597	2.9535	2.7811	1.3068	0.2483	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
F	-1.4799	-1.6886	-2.6472	-3.4801	-2.3849	-0.9531	-0.1349	0.1338	0.3650	0.0645	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L	-22.9206	-23.6919	-21.6517	6.5124	100.7558	6.4400	-19.8533	-16.3774	-7.0554	-0.9957	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U	7.6094	8.5869	12.8607	15.5505	-0.3384	-15.8914	-11.9220	-4.9764	-0.6115	0.8140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	-3.6936	-3.0807	-2.3071	19.1482	50.0698	-18.9683	-2.0801	3.1140	2.8648	1.2993	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	-0.2854	-0.3982	-1.0812	-2.4531	-3.4829	-2.4337	-0.9841	-0.1349	0.1554	0.1474	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C	-11.3069	-12.6300	-18.0927	19.9306	6.4400	100.2571	6.0159	20.1686	-16.6150	-7.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	1.7314	2.2943	5.6029	11.8961	15.5469	-0.0892	-15.6308	-11.6255	4.6082	-0.4193	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
U	-3.8912	-3.9786	-3.3336	2.1738	19.1020	50.0913	-18.8376	-1.7653	3.5838	3.0583	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.1479	0.1136	-0.1694	-1.0072	-2.4543	-3.4994	-2.4437	-0.9531	-0.0780	0.1844	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	-2.9186	3.7289	-8.3562	-16.6541	-19.8533	6.0159	99.3656	4.2673	-22.6682	-17.5980	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	-0.5579	-0.3711	1.0901	5.2081	11.8922	15.6326	-0.0459	-15.6539	-11.6689	4.5407	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C	-2.0507	-2.2701	-3.1198	3.1100	2.1117	19.0546	50.3225	-18.0979	-0.5797	4.1585	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.1826	0.1842	0.1370	-0.1624	-1.0092	-2.4543	-3.4829	-2.3849	-0.8735	-0.0328	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S	0.6054	0.3269	-1.7780	7.5094	-16.3774	-20.1686	4.2673	94.9623	-2.5160	-25.8700	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	-0.8384	-0.8323	-0.5217	1.0823	5.2635	11.8528	15.2337	-1.0953	17.2410	-12.2860	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C	-0.6027	-0.7501	-1.5692	-2.9509	-3.1871	-2.0847	19.4110	51.4049	-16.3347	-0.3975	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.1026	0.1125	0.1466	0.1256	-0.1624	-1.0072	-2.4531	-3.4801	-2.3745	-0.8494	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	1.2111	1.2141	0.8473	-1.2705	-7.0554	-16.6150	-22.6682	-2.6472	-3.7718	-2.4631	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 0.6	-0.4746	-0.5084	-0.5888	-0.3037	1.2666	5.1281	10.7023	12.2052	84.1474	-8.3522	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 0.7	0.0573	-0.0002	-0.4134	1.4763	-2.9814	-3.2308	2.1400	19.7030	52.0219	-15.6485	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 0.8	0.0355	0.0431	0.0637	0.1466	-0.1370	-0.1694	-1.0812	-2.6472	-3.7718	-2.4631	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 0.9	0.7293	0.8019	1.0675	-0.9957	-7.0020	-17.5980	-25.8700	-8.3522	79.1740	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	-0.1277	-0.1437	-0.2127	-0.2512	0.0241	1.0877	3.2651	5.6573	4.1912	-10.0297	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	0.2394	0.2427	0.1862	-0.1865	-1.2741	-3.1734	4.6285	1.4023	14.4441	50.1797	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	0.0068	0.0117	0.0431	0.1125	0.1842	0.1136	-0.3982	-1.6886	-3.5876	-4.2038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	0.2750	0.3228	0.5626	0.8676	0.5592	-1.7775	-7.7703	-16.7532	-20.1090	-5.9906	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
→ 1.0	0.0025	0.0068	0.0355	0.1028	0.1826	0.1479	-0.2854	-1.4799	-3.4021	-4.4787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt[4]{\frac{E I}{k B}}$$

$$\varphi = \eta \phi \frac{S}{k B} M$$

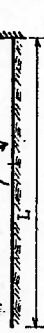
$$P = \eta P \frac{M}{b L} Z$$

$$M = \eta M M$$

$$V = \eta V \frac{M}{L}$$

TABELA 3.27

ESTRUTURA 3



Esforço externo: Momento

z/L	Linha de Estado para Esforço Aplicado em (LER NA VERTICAL)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	399.9999	6.3133	-26.4836	19.7148	-7.7169	-0.9333	1.0755	0.9387	0.3743	0.0000
0.0	112.5000	-26.8146	-1.7767	4.7557	3.6833	1.4803	0.1894	-0.2160	-0.1889	0.0000
0.0	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	138.2500	19.3677	-24.2010	-21.0502	-9.1491	-1.6232	0.9243	0.9971	0.4489	0.0000
0.1	-2.6598	-13.4389	-12.7380	-3.7244	0.2680	1.0127	0.6283	0.1873	-0.0227	0.0000
0.1	66.7609	72.2851	-2.7445	0.9854	1.2934	0.6720	0.1699	-0.0417	-0.0678	0.0000
0.1	-4.8298	-4.5255	-0.7325	-0.0562	0.1269	0.1269	0.0413	-0.0016	-0.0108	0.0000
0.2	6.3133	105.7300	2.5288	-21.8461	-15.6631	-5.9342	-0.5603	0.9993	0.7998	0.0000
0.2	23.2635	21.5390	-0.0281	-18.8956	-4.8068	-0.4091	0.7869	0.6234	0.2314	0.0000
0.2	23.8355	28.8299	52.8411	-17.8930	2.7175	2.2824	0.9480	0.1076	-0.1512	0.0000
0.2	-3.3386	3.5982	-3.9611	-0.7785	-0.0015	0.1721	0.1172	0.0388	-0.0016	0.0000
0.3	-26.4836	17.8873	100.8924	2.9342	-20.4829	-14.7648	-5.4892	0.2842	1.1153	0.0000
0.3	16.6743	17.8873	0.4955	-18.6882	-12.8023	-4.6664	-0.3331	0.8580	0.6519	0.0000
0.3	1.5798	3.7996	18.2718	-17.4885	-0.9346	3.2446	2.4102	0.8668	0.0121	0.0000
0.3	-1.2301	-1.4775	-2.6457	-2.4496	-0.8635	-0.0503	0.1571	0.1172	0.0413	0.0000
0.4	-19.7148	-21.0502	2.9342	100.6337	2.6686	-20.5369	-14.5368	-5.0032	0.0773	0.0000
0.4	6.3354	7.5584	13.2379	-0.2866	-18.2698	-12.5239	-4.4577	0.0909	0.9884	0.0000
0.4	-4.2267	3.8066	0.8395	50.0929	-17.2456	-0.7853	3.2666	2.3896	0.8236	0.0000
0.4	0.1054	-0.2185	-2.5038	-3.7391	-2.4955	-0.8880	-0.0503	0.1721	0.1269	0.0000
0.5	7.7169	9.1491	20.4829	2.6686	100.1421	2.4022	-20.5500	-14.3598	-4.7611	0.0000
0.5	0.6594	1.2338	4.8731	-0.0622	-18.0711	-12.2575	-4.0439	0.1820	0.0000	0.0000
0.5	-3.2745	3.4799	0.8787	17.3790	50.0553	-1.7212	-0.6254	3.5700	2.5332	0.0000
0.5	0.2016	0.1786	-0.0634	-2.5102	-3.7524	-2.4955	-0.8635	-0.0015	0.2022	0.0000
0.6	-0.9333	-1.6232	5.9342	20.5369	2.4022	99.6914	1.4152	-22.1597	-15.1437	0.0000
0.6	-0.9584	0.8321	4.6388	12.5152	18.0822	-0.0062	-17.9767	-12.0731	3.8384	0.0000
0.6	-1.3202	-1.5568	-2.6143	0.7932	17.2884	50.1673	-16.6859	0.3445	4.1573	0.0000
0.6	0.1630	0.1723	0.1666	-0.9046	-2.5102	-3.7391	-2.4496	-0.7785	0.0562	0.0000
0.7	1.0755	0.9243	-5.4892	-14.5368	-20.5500	1.4152	96.4598	-4.3503	-25.6092	0.0000
0.7	-0.8064	-0.8469	0.4568	4.6880	12.5172	17.8484	-0.7574	-19.2645	-12.6973	0.0000
0.7	-0.1797	-0.2989	-2.5193	3.4050	0.7182	17.5230	51.0986	-14.9479	1.5183	0.0000
0.7	0.0660	0.0795	0.1296	-0.1548	-0.9024	-2.5038	-3.7180	-0.7325	0.0000	0.0000
0.8	0.9387	0.9971	-0.2642	-5.0032	-14.3598	-22.1597	-4.3503	85.8178	-11.4790	0.0000
0.8	-0.3448	-0.3954	-0.5961	0.6611	4.7272	11.7224	15.1562	-5.5737	-22.1329	0.0000
0.8	0.1761	0.1466	-1.0122	-2.5728	-3.4546	0.8177	18.0125	52.1382	-13.9335	0.0000
0.8	0.0110	0.0173	0.0553	0.1666	-0.0634	-0.9452	-2.6457	-3.9811	-2.5205	0.0000
0.9	0.3743	0.4489	0.7998	1.1153	-15.1437	-25.6092	-11.4790	79.2099	-11.6633	0.0000
0.9	-0.0690	-0.0872	-0.1817	-0.3096	-0.1907	3.3298	6.7555	6.0079	-11.6633	0.0000
0.9	0.1657	0.1826	0.1989	0.0076	-0.8107	-4.2927	-1.8690	13.4449	50.0281	0.0000
0.9	-0.0077	-0.0049	0.0173	0.0795	0.1723	0.1786	-0.2185	-3.5982	-4.5255	0.0000
1.0	-0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000
1.0	0.0767	0.1126	0.3248	0.7180	0.8469	-5.6325	-14.8217	-20.6785	2.3644	100.0000
1.0	-0.0098	-0.0077	0.0110	0.0680	0.1630	-0.1054	-1.2301	-3.3386	-4.8298	0.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{s^3}{kb} M$$

$$p = \eta P \frac{M}{bL^2}$$

$$M = \eta M$$

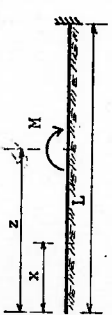
$$V = \eta V$$

$$M = \eta M$$

TABELA 3.28

ESTRUTURA 3

Esforço externo: Momento



LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)

SL=6.00

x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100ηφ 100ηM 100ηV	125.2201 -61.3286 0.0000 0.0000	-2.3581 -25.0771 0.0000 0.0000	-26.7575 5.5135 0.0000 0.0000	-16.2757 3.3065 0.0000 0.0000	-4.7866 0.9558 0.0000 0.0000	0.2877 -0.9722 0.0000 0.0000	1.1353 -0.0722 0.0000 0.0000	0.6253 -0.2410 0.0000 0.0000	0.1324 -0.1303 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000
0.1	125.2201 1.1876 63.5379 -5.1573	159.9707 -12.5441 70.1853 -4.8308	11.1511 -24.5577 -12.6823 -2.5336	-25.3155 -12.8426 -1.9208 -0.6109	-18.1004 -3.0620 1.3580 0.1291	-6.2202 0.6637 1.2381 0.2042	-0.2407 1.0359 0.5002 0.1016	1.0963 0.5061 0.0606 0.0218	0.7110 0.0912 -0.0667 -0.0678	0.1927 -0.0545 -0.0536 -0.0095	0.0000 0.0000 0.0000 0.0000
0.2	-2.3581 26.5862 19.5914 -3.2290	11.1511 -0.0045 25.1303 -3.5748	103.6450 -0.0045 51.9192 -4.1532	-0.9597 -21.5201 -16.3639 -2.4288	-13.3089 -0.5371 2.9680 0.0635	-3.9728 0.1588 1.9633 0.1771	0.2129 0.6162 -0.6171 0.0965	0.9493 0.5198 -0.0335 0.0216	0.9493 0.1160 -0.1541 -0.0078	0.5286 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000
0.3	-26.7575 10.4060 -0.5620 -0.9804	-25.3155 18.2040 1.5638 -1.2629	100.8943 -0.5735 21.4192 -2.6391	100.8943 -0.5735 21.4192 -2.6391	-0.3677 -13.1244 -0.2229 -0.7642	-12.6038 -3.9420 3.3168 0.0259	0.3692 0.9321 -0.5216 0.0965	0.3692 0.9321 -0.5216 0.0965	0.3692 0.9321 -0.5216 0.0965	1.0421 0.5621 -0.1182 0.0218	0.0000 0.0000 0.0000 0.0000
0.4	-4.7866 -0.2404 -2.5833 0.2219	-18.1004 6.3444 -4.0949 -0.0659	-21.5675 13.4109 4.0715 -0.8138	-0.3677 -0.2206 15.7985 -2.5421	-0.7436 -20.7333 50.0967 -3.9944	-20.7140 -12.9146 0.2938 -0.7813	-12.6279 -3.8167 3.3066 0.0259	-3.3660 0.3666 1.9336 0.1771	-3.3660 0.3666 1.9336 0.1771	0.7186 1.0497 0.4537 0.1016	0.0000 0.0000 0.0000 0.0000
0.5	-0.2877 -1.1394 -0.7460 0.1315	-18.1004 6.3444 -4.0949 -0.0659	-13.3089 4.0715 -3.4738 0.0232	-0.3677 -0.2206 15.7985 -2.5421	-0.7436 -20.7333 50.0967 -3.9944	-20.7140 -12.9146 0.2938 -0.7813	-12.6279 -3.8167 3.3066 0.0259	-3.3660 0.3666 1.9336 0.1771	-3.3660 0.3666 1.9336 0.1771	-2.9394 3.4025 2.0086 0.2042	0.0000 0.0000 0.0000 0.0000
0.6	0.2877 -1.1394 -0.7460 0.1315	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-12.6038 -3.9420 3.3168 0.0259	-21.4715 -12.3289 -1.1026 0.6820	0.0000 0.0000 0.0000 0.0000
0.7	1.1353 -0.6664 0.0589 0.0378	1.0963 -0.7452 0.0251 0.0494	0.9493 -0.5278 0.0390 0.0323	-3.7743 -0.1094 -2.0683 0.1695	-20.5847 12.9270 -0.3872 -0.7919	-1.3898 -0.0008 50.0762 -2.5421	97.6079 -0.4817 50.8214 -3.9043	-6.0623 -21.3719 -13.6647 -2.4288	-6.0623 -21.3719 -13.6647 -2.4288	-24.8395 -12.8367 2.3914 -0.6109	0.0000 0.0000 0.0000 0.0000
0.8	0.6253 -0.2410 0.0000 0.0000	0.7110 0.0912 -0.0667 -0.0678	0.9493 0.5198 -0.0335 0.0216	-12.6279 -3.8167 3.3066 0.0259	-20.7140 -12.9146 0.2938 -0.7813	-12.6279 -3.8167 3.3066 0.0259	-12.6279 -3.8167 3.3066 0.0259	-12.6279 -3.8167 3.3066 0.0259	-12.6279 -3.8167 3.3066 0.0259	-14.1301 -5.2135 12.4952 -4.1532	0.0000 0.0000 0.0000 0.0000
0.9	0.1324 -0.1303 0.0000 0.0000	0.1927 -0.0545 -0.0536 -0.0095	0.9493 0.5198 -0.0335 0.0216	-12.6279 -3.8167 3.3066 0.0259	-20.7140 -12.9146 0.2938 -0.7813	-12.6279 -3.8167 3.3066 0.0259	-12.6279 -3.8167 3.3066 0.0259	-12.6279 -3.8167 3.3066 0.0259	-12.6279 -3.8167 3.3066 0.0259	-14.1301 -5.2135 12.4952 -4.1532	0.0000 0.0000 0.0000 0.0000
1.0	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000	-0.0000 -0.0000 0.8910 0.1315	-0.0000 0.0000 0.8910 0.1315	-0.0000 0.0000 0.8910 0.1315	-0.0000 0.0000 0.8910 0.1315	-0.0000 0.0000 0.8910 0.1315	-0.0000 0.0000 0.8910 0.1315	-10.0000 -0.0000 -0.0000 -0.0000	0.0000 0.0000 100.0000 0.0000

$$s = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = \eta \phi \frac{s}{kb} M$$

$$p = \eta \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

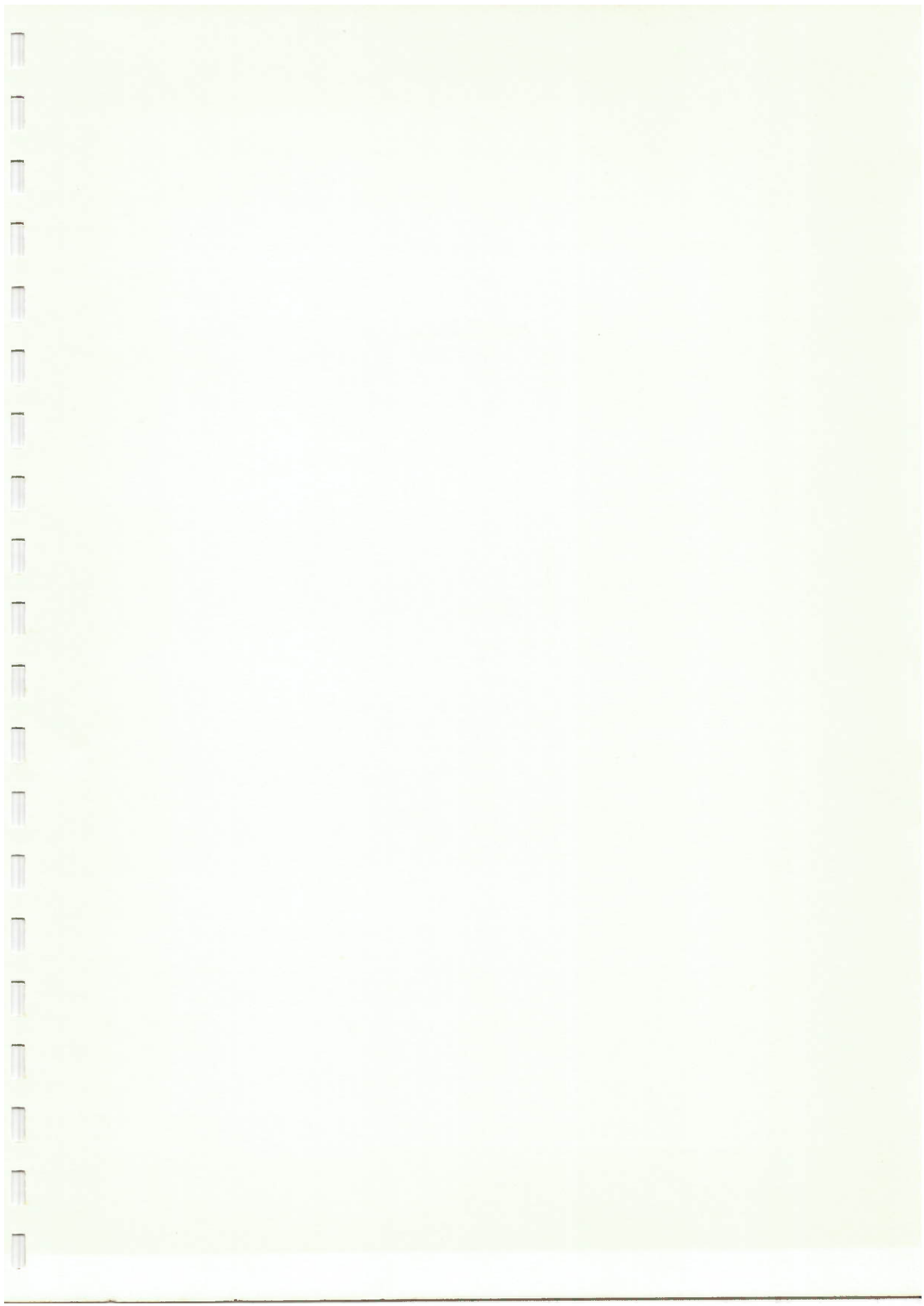


TABELA 4.01

ESTRUTURA 4



Esforço externo: Força Concentrada

SL=1.50

LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LFR NA VERTICAL)

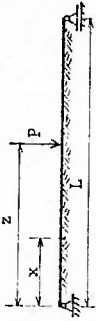
x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
I	0.1	0.0000	22.5024	37.2331	45.3772	48.0469	46.2641	40.9550	32.5534	23.0110	11.6133	0.0000
N	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.3	0.0000	11.4374	24.0234	34.3332	39.0940	39.1653	35.5289	29.0387	20.4775	10.5700	0.0000
N	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.5	0.0000	5.4669	11.8806	20.4775	27.7279	30.1220	28.5953	24.0234	17.2254	8.6720	0.0000
N	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.7	0.0000	3.5460	7.1111	11.8806	15.5055	17.1111	16.6166	16.7519	12.5160	6.8553	0.0000
N	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.9	0.0000	1.5055	3.0110	4.5165	5.0220	5.0220	4.5165	3.0110	1.5055	0.0000	0.0000
N	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$S = \sqrt{\frac{kb}{k}}$
 $\varphi = n \cdot \frac{S^2}{L}$
 $P = n \cdot \frac{RT}{L}$
 $N = n \cdot PL$
 $V = \frac{P}{L}$

TABELA 4.06

ESTRUTURA 4

Esforço externo: Força Concentrada



x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100φ	52.1495	64.3649	56.0393	40.3209	24.7454	12.7169	5.0446	1.1609	-0.0630	0.0000
0.0	100ηP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100ηM	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100ηV	0.6172	0.3125	0.1081	-0.0076	-0.0587	-0.0698	-0.0599	-0.0414	-0.0207	0.0000
0.1	0.0000	32.1824	54.0939	52.3429	40.3924	26.5189	14.8950	6.9389	2.4608	0.5605	0.0000
0.1	0.0000	0.7283	0.9756	0.8774	0.6459	0.4056	0.2152	0.0909	0.0256	0.0022	0.0000
0.1	0.0000	6.3054	3.2937	1.2292	0.0315	-0.0209	-0.6633	-0.5049	-0.4107	-0.2073	0.0000
0.1	0.0000	-0.3438	0.3626	0.1524	0.0247	-0.0367	-0.0593	-0.0556	-0.0403	-0.0207	0.0000
0.2	0.0000	1.9454	20.1604	38.4470	33.5409	30.5420	20.7409	12.3312	6.3525	2.5635	0.0000
0.2	0.0000	0.9756	1.6058	1.6215	1.2830	0.8611	0.4965	0.2408	0.0931	0.0256	0.0000
0.2	0.0000	3.2937	7.5346	3.3251	0.7083	-0.6318	-1.1058	-1.0740	-0.7922	-0.4107	0.0000
0.2	0.0000	-0.2545	-0.5038	0.2792	0.1213	0.0241	-0.0245	-0.0397	-0.0349	-0.0196	0.0000
0.3	0.0000	-12.0220	-13.7016	6.3585	28.5966	32.7629	27.9782	20.1004	12.4142	5.7780	0.0000
0.3	0.0000	0.8774	1.6215	2.0114	1.8367	1.3739	0.6867	0.4987	0.2408	0.0909	0.0000
0.3	0.0000	1.2292	3.3251	7.0137	2.6618	0.1234	-1.0425	-1.3131	-1.0740	-0.5849	0.0000
0.3	0.0000	-0.1603	-0.3380	-0.5349	0.2786	0.1355	0.0437	-0.0036	-0.0190	-0.0142	0.0000
0.4	0.0000	-15.6470	-25.8240	-23.5519	0.5805	26.0328	32.1824	28.0612	19.5800	9.8504	0.0000
0.4	0.0000	0.6459	1.2830	1.8367	2.1022	1.8624	1.3761	0.8667	0.4987	0.2152	0.0000
0.4	0.0000	0.3115	0.7083	2.6618	6.4288	2.2512	-0.0839	-1.0425	-1.1058	-0.6433	0.0000
0.4	0.0000	-0.0834	-0.1911	-0.3385	-0.5207	0.2482	0.1562	0.0644	0.0169	0.0006	0.0000
0.5	0.0000	-13.8020	-25.4973	-31.6020	-26.1158	-0.0000	26.1158	31.6020	25.4973	13.8020	0.0000
0.5	0.0000	0.4056	0.8611	1.3739	1.8624	2.1045	1.8624	1.3739	0.8611	0.4056	0.0000
0.5	0.0000	-0.5209	-0.6318	-0.1234	2.2512	6.2215	2.2512	0.1234	-0.6318	-0.5209	0.0000
0.5	0.0000	-0.0311	-0.0840	-0.1769	-0.3189	-0.4500	0.3189	0.1769	0.0840	0.0311	0.0000
0.6	0.0000	-9.8504	-19.5800	-28.0612	-32.1824	-26.0328	-0.5805	23.5519	25.8240	15.6470	0.0000
0.6	0.0000	0.2152	0.4965	0.6867	0.8624	1.0425	1.0425	0.6867	0.4965	0.2152	0.0000
0.6	0.0000	-0.6033	-1.1058	-1.0425	-0.0839	2.2512	6.4288	2.6618	0.7083	0.3115	0.0000
0.6	0.0000	-0.0036	-0.0169	-0.0644	-0.1562	-0.2982	-0.4773	0.3385	0.1911	0.0834	0.0000
0.7	0.0000	-5.7780	-12.4142	-20.1604	-27.9782	-32.7629	-28.5966	-6.3585	13.7016	12.0220	0.0000
0.7	0.0000	0.0909	0.2408	0.4987	0.6867	0.8624	1.0425	1.0425	0.6867	0.4987	0.0000
0.7	0.0000	-0.5849	-1.0740	-1.3131	-0.0425	0.1234	2.6618	7.0137	3.3251	1.2292	0.0000
0.7	0.0000	0.0142	0.0190	0.0038	-0.0437	-0.1355	-0.2786	-0.4651	0.3360	0.1600	0.0000
0.8	0.0000	-2.5635	-6.3585	-12.3312	-20.7409	-30.5420	-36.5409	-36.5470	-20.1604	-1.9454	0.0000
0.8	0.0000	0.0256	0.0931	0.2408	0.4965	0.8611	1.2830	1.6215	1.6215	0.9756	0.0000
0.8	0.0000	-0.4107	-0.7922	-1.0740	-1.1058	-0.6318	0.7083	3.3251	7.5346	3.2937	0.0000
0.8	0.0000	0.0196	0.0349	0.0397	0.0241	-0.0241	-0.1213	-0.2792	-0.4962	0.2545	0.0000
0.9	0.0000	-0.5805	-2.4608	-6.9389	-14.8950	-26.5189	-40.3924	-52.3429	-54.0939	-32.1824	0.0000
0.9	0.0000	0.0022	0.0256	0.0909	0.2152	0.4056	0.6459	0.8667	0.8667	0.4975	0.0000
0.9	0.0000	-0.2073	-0.4107	-0.5849	-0.6683	-0.5209	0.0315	1.2492	3.2937	6.3054	0.0000
0.9	0.0000	0.0207	0.0403	0.0556	0.0593	0.0367	-0.0247	-0.1524	-0.3326	0.3054	0.0000
1.0	0.0000	0.0000	-1.1609	-5.0446	-12.7169	-24.7454	-40.3209	-56.0393	-64.3649	-52.3429	0.0000
1.0	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{Kb}{4LI}}$$

$$\varphi = \eta_1 \frac{S^2}{Kb} R$$

$$P = \eta_1 \frac{P}{R}$$

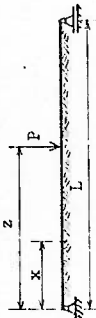
$$M = \eta_1 \frac{PL}{R}$$

$$V = \eta_1 \frac{P}{R}$$

TABELA 4.07

ESTRUTURA 4

SL=4.50 Esforço externo: Força Concentrada



Linha de Estado	Esforço Aplicado em (LER NA VERTICAL)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	55.4392	63.6319	50.4910	32.0727	16.2938	5.7370	0.1692	-1.7203	-1.3707	0.0000
0.1	31.6160	52.9651	47.8523	33.3924	18.9048	6.2315	2.6084	-0.6007	-0.8601	0.0000
0.2	0.9642	1.2177	1.0056	0.6590	0.3479	0.1331	0.0156	-0.0273	-0.0243	0.0000
0.3	5.9212	2.7388	0.7362	-0.2714	-0.6166	-0.6057	-0.4534	-0.2791	-0.1283	0.0000
0.4	-0.3736	0.3154	0.1074	-0.0053	-0.0503	-0.0564	-0.0450	-0.0289	-0.0137	0.0000
0.5	-2.4741	16.0393	35.8665	34.6845	25.3301	15.1762	7.4615	2.8685	0.7700	0.0000
0.6	1.2177	1.9697	1.8767	1.3534	0.7421	0.3637	0.1056	-0.0085	-0.0273	0.0000
0.7	2.7388	6.6574	2.4674	0.1196	-0.8771	-1.0700	-0.8846	-0.5817	-0.2791	0.0000
0.8	-0.2588	-0.1196	0.2535	0.0951	0.0056	-0.0327	-0.0398	-0.0313	-0.0165	0.0000
0.9	-15.7796	-1.5727	2.8685	27.8042	30.9558	24.5602	16.0363	8.8322	3.7286	0.0000
1.0	1.0056	1.8767	2.3176	2.0098	1.3693	0.7648	0.3394	0.1056	0.0158	0.0000
0.1	0.7362	2.4674	6.0408	1.8618	-0.3336	-1.1562	-1.1983	-0.8848	-0.4534	0.0000
0.2	-0.1196	-0.3207	-0.5313	0.2844	0.1127	0.0221	-0.0190	-0.0274	-0.0176	0.0000
0.3	-17.0986	-28.9475	-27.6350	-0.8601	27.0342	31.8160	25.9309	16.8965	8.0623	0.0000
0.4	0.6590	1.3534	2.0098	2.3335	1.9825	1.3450	0.7648	0.3637	0.1331	0.0000
0.5	0.2714	0.1196	1.8618	5.5874	1.5827	-0.4621	-1.1562	-1.0700	-0.6057	0.0000
0.6	-0.0503	-0.0517	-0.3098	-0.5137	0.2609	0.1264	0.0345	-0.0053	-0.0109	0.0000
0.7	-13.1678	-25.1609	-32.6761	-28.4049	-0.0000	28.4049	32.6761	25.1609	13.1678	0.0000
0.8	0.3479	0.7921	1.3693	1.9825	2.3091	1.5827	1.3693	0.7921	0.3479	0.0000
0.9	-0.6166	-0.8771	-0.3338	1.5827	5.4591	1.5827	0.3338	-0.8771	-0.6166	0.0000
1.0	-0.0123	-0.0511	-0.1401	-0.2933	-0.5000	0.2933	0.1401	-0.0511	-0.0123	0.0000
0.1	8.0623	16.8965	25.9309	31.8160	27.0342	0.8601	27.6350	28.9475	17.0986	0.0000
0.2	0.1331	0.3637	0.7648	1.3450	1.9825	2.3335	2.0098	1.3450	0.6590	0.0000
0.3	-0.6057	-1.0700	-1.1562	-0.4621	1.5827	5.5874	1.618	0.1196	-0.2714	0.0000
0.4	0.0109	0.0053	-0.0345	-0.1264	-0.2609	-0.4863	0.3098	0.1577	0.0620	0.0000
0.5	3.7286	8.0623	16.8965	27.0342	30.9558	24.5602	16.0363	8.8322	3.7286	0.0000
0.6	0.0158	0.1056	0.3637	0.7648	1.3450	1.9825	2.3335	2.0098	1.3450	0.0000
0.7	-0.2791	-0.8601	-1.1562	-0.4621	1.5827	5.5874	1.618	0.1196	-0.2714	0.0000
0.8	0.0176	0.0274	0.0190	-0.0221	-0.1127	-0.2644	-0.4687	0.3207	0.1454	0.0000
0.9	-0.7700	-2.8685	-7.4615	-15.1762	-25.3301	-34.6845	-35.8665	-16.0363	-2.4741	0.0000
1.0	0.0273	0.0158	0.1058	0.3637	0.7421	1.3534	1.8767	1.9697	1.2177	0.0000
0.1	0.2791	0.8601	1.1562	0.4621	-0.8771	1.0700	0.8848	0.5817	0.2791	0.0000
0.2	0.0165	0.0313	0.0398	0.0327	-0.0056	-0.0503	-0.0450	-0.0289	-0.0137	0.0000
0.3	0.0000	0.6007	2.0084	8.2315	18.9048	33.3924	47.8523	52.9651	31.6160	0.0000
0.4	0.0000	-0.0273	0.0158	0.1331	0.3479	0.6590	1.056	1.2177	0.9642	0.0000
0.5	0.0000	-0.1283	-0.2791	-0.6057	-0.6166	-0.2714	0.7362	2.7388	5.9212	0.0000
0.6	0.0000	0.0137	0.0289	0.0564	0.0503	0.0053	-0.1674	-0.3154	-0.6264	0.0000
0.7	0.0000	1.3707	1.7203	0.7370	-16.2938	-32.0727	-50.4910	-63.6319	-55.4392	0.0000
0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = n_0 \frac{S^2}{kb} P$$

$$P = n_p \frac{P}{bL}$$

$$M = n_M P L$$

$$V = n_V P$$

TABELA 4.11



ESTRUTURA 4

Esforço externo: Força Concentrada

SL=6.50

x/L	z/L	100φ n _p	100n _p n _v	LIMHA DE ESTADO PARA ESFORÇO APLICADO EM				(LFR NA VERTICAL)					
				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	0.0	0.0000	0.0000	63.1874	52.5214	26.4366	7.6627	-0.8353	-2.7915	-2.1210	-1.0566	-0.3614	0.0000
0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0	0.0000	0.0000	0.4156	0.0729	-0.0527	-0.0636	-0.0365	0.00146	-0.00016	0.0026	0.0021	0.0000
0.0	0.0	0.0000	0.0000	26.2607	44.8120	30.0921	12.8006	2.4356	-1.4762	-1.9240	-1.2412	-0.5283	0.0000
0.0	0.0	0.0000	0.0000	2.1596	2.1192	1.1729	0.3975	0.0107	-0.0999	-0.0672	-0.0474	-0.0177	0.0000
0.0	0.0	0.0000	0.0000	4.5757	1.0942	-0.3375	-0.5786	-0.3685	-0.1647	-0.0307	0.0160	0.0184	0.0000
0.0	0.0	0.0000	0.0000	-0.4636	0.1615	0.0046	-0.0456	-0.0391	-0.0200	-0.0060	0.0003	0.0013	0.0000
0.0	0.0	0.0000	0.0000	18.3754	3.8313	31.1760	24.8650	12.1570	3.3031	-0.5964	-1.3957	-0.8798	0.0000
0.0	0.0	0.0000	0.0000	2.1192	3.3326	2.5166	1.1836	0.2976	-0.0765	-0.1473	-0.1049	-0.0474	0.0000
0.0	0.0	0.0000	0.0000	1.0942	4.2362	0.5156	-0.7261	-0.7432	-0.4192	-0.1466	-0.0123	0.0180	0.0000
0.0	0.0	0.0000	0.0000	-0.2341	-0.5318	0.1885	0.0292	-0.0271	-0.0305	-0.0182	-0.0073	-0.0018	0.0000
0.0	0.0	0.0000	0.0000	22.4294	-32.0114	-1.3957	30.5332	25.7324	13.0376	3.8313	-0.2369	-0.8075	0.0000
0.0	0.0	0.0000	0.0000	1.1729	2.5166	3.3432	2.4167	1.0964	0.2502	-0.0942	-0.1473	-0.0672	0.0000
0.0	0.0	0.0000	0.0000	-0.3375	0.5156	3.8497	-0.3509	-0.7568	-0.4008	-0.1466	-0.0307	-0.0307	0.0000
0.0	0.0	0.0000	0.0000	-0.0693	-0.2270	-0.5073	0.2070	0.0377	-0.0253	-0.0318	-0.0203	-0.0018	0.0000
0.0	0.0	0.0000	0.0000	13.6360	-27.6505	-32.6542	-0.5283	31.4130	26.2607	13.3990	4.3596	0.6429	0.0000
0.0	0.0	0.0000	0.0000	0.3975	1.1836	2.4167	3.2561	2.3693	1.0767	0.2502	-0.0765	-0.0474	0.0000
0.0	0.0	0.0000	0.0000	-0.5786	-0.7261	0.3509	3.8190	0.3690	-0.7364	-0.7252	-0.4192	-0.1647	0.0000
0.0	0.0	0.0000	0.0000	0.0071	-0.0437	-0.2086	-0.4987	0.2088	0.0364	-0.0274	-0.0331	-0.0105	0.0000
0.0	0.0	0.0000	0.0000	5.2271	-14.2788	-26.7890	-31.7744	0.0000	31.7744	26.7890	14.2788	5.2271	0.0000
0.0	0.0	0.0000	0.0000	0.0107	0.2976	1.0964	2.3693	3.2384	2.3693	1.0964	0.2976	0.0107	0.0000
0.0	0.0	0.0000	0.0000	-0.3885	-0.7432	-0.7568	0.3690	3.8374	0.3690	-0.7432	-0.7432	-0.3885	0.0000
0.0	0.0	0.0000	0.0000	0.0245	0.0255	-0.0352	-0.2067	-0.5000	0.2067	0.0352	-0.0255	-0.0245	0.0000
0.0	0.0	0.0000	0.0000	-0.6429	-4.3596	-13.3990	-26.2607	-31.4130	0.5283	32.6542	27.6565	13.6360	0.0000
0.0	0.0	0.0000	0.0000	-0.0999	-0.0765	0.2502	1.0767	2.3693	3.2561	2.4167	1.1836	0.3975	0.0000
0.0	0.0	0.0000	0.0000	-0.1647	-0.4192	-0.7384	-0.7384	0.3690	3.8190	0.3309	-0.7261	-0.5786	0.0000
0.0	0.0	0.0000	0.0000	0.0185	0.0331	0.0274	-0.0364	-0.2088	-0.5013	0.2086	0.0437	-0.0071	0.0000
0.0	0.0	0.0000	0.0000	0.8675	0.2369	-3.8313	-13.0376	-25.7324	-30.5332	1.3957	32.0114	22.4294	0.0000
0.0	0.0	0.0000	0.0000	-0.0872	-0.1473	-0.0942	0.2502	1.0964	2.4167	3.2384	2.5166	1.1729	0.0000
0.0	0.0	0.0000	0.0000	-0.0307	-0.1466	-0.4008	-0.7252	-0.7568	0.3509	3.8497	0.5156	-0.3375	0.0000
0.0	0.0	0.0000	0.0000	0.0086	0.0203	0.0318	0.0253	-0.0377	-0.0207	-0.0492	0.2270	0.0086	0.0000
0.0	0.0	0.0000	0.0000	-0.8798	1.3957	0.5984	-3.3031	-12.1570	-24.8650	-31.1760	-3.8313	16.3754	0.0000
0.0	0.0	0.0000	0.0000	-0.0474	-0.1049	-0.1473	0.2976	1.1836	1.1836	2.5166	3.3260	2.1192	0.0000
0.0	0.0	0.0000	0.0000	0.0180	-0.0123	-0.1466	-0.7432	0.7432	0.4192	0.1466	4.2362	1.0942	0.0000
0.0	0.0	0.0000	0.0000	0.0018	0.0073	0.0182	0.0182	0.0271	-0.0292	-0.1825	-0.4682	0.2341	0.0000
0.0	0.0	0.0000	0.0000	0.5283	1.2412	1.9240	1.4762	-2.4356	-12.8006	-30.0921	-44.8120	-26.2607	0.0000
0.0	0.0	0.0000	0.0000	-0.0177	-0.0474	-0.0872	-0.0999	0.0107	-0.3975	1.1729	2.1192	2.1596	0.0000
0.0	0.0	0.0000	0.0000	0.0184	0.0160	-0.0307	-0.1647	-0.3685	-0.5786	-0.3375	1.0942	4.5757	0.0000
0.0	0.0	0.0000	0.0000	-0.0013	-0.0003	0.0060	0.0060	0.0391	0.0456	-0.0046	-0.0046	-0.0013	0.0000
0.0	0.0	0.0000	0.0000	0.3614	1.0566	2.1210	2.7915	0.8353	-7.6627	-28.4366	-52.5214	-31.1760	0.0000
0.0	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000
0.0	0.0	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0	0.0000	0.0000	-0.0021	-0.0026	0.0016	0.0146	0.0385	0.0636	0.0577	-0.0729	-0.4156	-1.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = n_4 \frac{s^2}{kb} P$$

$$P = n_4 \frac{P}{bL}$$

$$M = n_4 PL$$

$$V = n_4 P$$

TABELA 4.12

ESTRUTURA 4

Esforço externo: Força Concentrada



SL=7.00

x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)							0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5	0.6	0.7			
100n _φ	0.0000	63.9817	48.6018	21.1419	4.0768	-2.1137	-2.6099	-1.4703	-0.5053	-0.6833	0.0000
100n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _v	0.0000	0.3798	0.0419	-0.0618	-0.0573	-0.0263	-0.0073	0.0015	0.0030	0.0018	0.0000
	0.0000	24.3009	42.5618	26.3393	9.5141	0.7335	-1.7920	-1.5576	-0.7768	-0.2527	0.0000
	0.0000	2.5028	1.1265	-0.2954	-0.2896	-0.0576	-0.1152	-0.0739	-0.0293	-0.0069	0.0000
	0.0000	4.2896	0.8122	-0.4409	-0.4532	-0.0297	-0.0937	0.0028	0.0255	0.0166	0.0000
	0.0000	-0.4790	0.1590	-0.0077	-0.0450	-0.0323	-0.0134	-0.0022	0.0016	0.0015	0.0000
	0.0000	-21.4199	2.0364	30.9340	22.9959	9.8358	1.7857	-1.0985	-1.3049	-0.6935	0.0000
	0.0000	2.2954	3.8293	2.5852	1.0690	0.1746	-0.1314	-0.1445	-0.0807	-0.0293	0.0000
	0.0000	0.8122	3.8487	0.2771	-0.7385	-0.6289	-0.2948	-0.0682	0.0197	0.0255	0.0000
	0.0000	-0.2208	-0.5286	0.1758	-0.0173	-0.0302	-0.0272	-0.0132	-0.0037	-0.0001	0.0000
	0.0000	-22.2825	-33.0477	-1.3049	31.2557	24.0482	10.5293	2.0384	-1.0152	-1.0523	0.0000
	0.0000	1.1265	2.5852	3.5717	2.4700	0.9951	0.1453	-0.1383	-0.1445	-0.0739	0.0000
	0.0000	0.4409	0.2771	3.5511	0.1833	-0.7357	-0.6034	-0.2780	-0.0682	0.0028	0.0000
	0.0000	-0.0496	-0.2040	-0.5037	0.1907	0.0224	-0.0300	-0.0286	-0.0150	-0.0051	0.0000
	0.0000	-11.6278	-25.6058	-32.7260	-0.2577	31.9492	24.3009	10.6126	2.2911	-0.3217	0.0000
	0.0000	0.2898	1.0690	2.4700	3.4979	2.4407	0.9882	0.1453	-0.1314	-0.1152	0.0000
	0.0000	0.5352	-0.7385	0.1833	3.5539	0.2088	-0.7188	-0.6034	-0.2948	-0.0937	0.0000
	0.0000	0.0168	-0.0246	-0.1892	-0.4985	0.1908	0.0210	-0.0318	-0.0301	-0.0149	0.0000
	0.0000	-3.3433	-11.3061	-24.5535	-32.0325	0.0000	32.0325	24.5535	11.3061	3.3433	0.0000
	0.0000	-0.0576	0.1746	0.9951	2.4407	3.4910	2.4407	0.9951	0.1746	-0.0576	0.0000
	0.0000	-0.2976	-0.6289	-0.7357	-0.2088	3.5708	0.2068	-0.7357	-0.6289	-0.2976	0.0000
	0.0000	0.0250	0.0317	-0.0195	-0.1890	-0.1500	0.1890	-0.0195	-0.0317	-0.0250	0.0000
	0.0000	0.3217	-2.2911	-10.6126	-24.3009	-31.9492	0.2527	32.7260	25.6058	11.6278	0.0000
	0.0000	-0.1152	-0.1314	0.1453	0.9882	2.4407	3.4979	2.4700	1.0690	0.2898	0.0000
	0.0000	-0.0937	-0.2948	-0.6034	-0.7188	0.2088	3.5539	0.1833	-0.7385	-0.5352	0.0000
	0.0000	0.0149	0.0301	0.0318	-0.0210	-0.1908	-0.5015	0.1892	0.0246	-0.0166	0.0000
	0.0000	1.0523	1.0152	-2.0384	-10.5293	-24.0482	-31.2557	1.3049	33.0477	22.2825	0.0000
	0.0000	-0.0739	-0.1445	-0.1383	0.1453	0.9951	2.4700	3.5717	2.5852	1.1265	0.0000
	0.0000	0.0028	-0.0682	-0.2780	-0.6034	-0.7357	0.1833	3.5511	0.2771	-0.4409	0.0000
	0.0000	0.0051	0.0150	0.0286	0.0300	-0.0224	-0.1907	-0.4963	0.2040	0.0496	0.0000
	0.0000	0.6935	1.3049	-1.0985	-1.7857	-9.8358	-22.9959	-31.9340	-2.0384	21.4199	0.0000
	0.0000	-0.0293	-0.0690	-0.1445	-0.1314	0.1746	1.0690	2.5852	3.6293	2.2954	0.0000
	0.0000	0.0255	0.0197	-0.0682	-0.2948	-0.6289	-0.7385	0.2771	3.8487	0.6122	0.0000
	0.0000	0.0001	0.0037	0.0032	0.0272	0.0302	-0.0173	-0.0175	-0.4714	0.2208	0.0000
	0.0000	0.2527	0.7768	1.5576	1.7920	-0.7335	-9.5141	-26.3393	-42.5618	-24.3009	0.0000
	0.0000	-0.0069	-0.0293	-0.0739	-0.1152	-0.0576	0.2898	1.1265	2.2954	2.5028	0.0000
	0.0000	0.0168	0.0255	0.0028	-0.0937	-0.2976	-0.5352	-0.4409	0.8122	4.2896	0.0000
	0.0000	-0.0015	-0.0016	0.0022	0.0134	0.0323	0.0450	0.0077	-0.1590	-0.5210	0.0000
	0.0000	0.0833	0.5053	1.4703	2.6099	2.1137	-4.0768	-21.1419	-48.6018	-63.9817	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000
	0.0000	-0.0018	-0.0030	-0.0015	0.0073	0.0283	0.0573	0.0018	-0.0419	-0.3798	-1.0000

$S = \sqrt{\frac{4 E I}{L^3}}$
 $\varphi = n \cdot \frac{P}{E I}$
 $P = n \cdot \frac{P}{B L}$
 $M = n \cdot P L$
 $V = n \cdot P$

TABELA 4.15

ESTRUTURA 4



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →							ESFORÇO externo: Momento									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.8	0.9	1.0				
100n _φ	178.6410	74.9679	34.8579	1.8735	24.6158	-45.2467	-60.6079	-71.1981	-77.3953	-79.4345								
100n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
100n _M	10.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
n _y	-1.3781	-1.2827	-1.1886	-1.0826	-0.9757	-0.8770	-0.7934	-0.7302	-0.6908	-0.6775								
	122.7612	78.8096	38.4207	5.1210	-21.6866	-42.6118	-56.2224	-69.0016	-75.3163	-77.3953								
	0.5063	0.4199	0.2573	0.0100	-0.0798	-0.1497	-0.2019	-0.2378	-0.2589	-0.2658								
	86.3113	-12.7842	-11.8662	-10.8244	-9.7709	-8.7955	-7.9664	-7.3418	-6.9518	-6.8194								
	-1.3512	-1.2699	-1.1626	-1.0822	-0.9798	-0.8846	-0.8036	-0.7421	-0.7038	-0.6908								
	74.9679	34.8579	14.8606	12.8750	11.8750	11.0056	10.0564	9.0056	8.0056	7.11981								
	0.8377	0.5405	0.2673	0.0419	-0.1398	-0.2817	-0.3876	-0.4607	-0.5036	-0.5177								
	73.1144	74.8910	-23.6087	-21.6371	-19.6200	-17.7393	-16.1373	-14.9201	-14.1012	-13.9035								
	-1.2627	-1.2303	-1.1635	-1.0798	-0.9910	-0.9064	-0.8333	-0.7773	-0.7421	-0.7302								
	34.8579	38.4207	66.6972	31.0767	1.8849	-21.2667	-38.7605	-51.0056	-58.2224	-60.6079								
	1.0210	0.9594	0.4607	0.1176	-0.1600	-0.3776	-0.5405	-0.6534	-0.7415	-0.7934								
	60.7429	61.2482	62.7027	64.9201	67.4042	69.9617	72.6910	75.5673	78.4919	81.3621								
	-1.1886	-1.1826	-1.1276	-1.0723	-1.0064	-0.9397	-0.8600	-0.8333	-0.8036	-0.7934								
	1.8735	5.1210	14.8606	31.0767	53.7215	72.6910	88.49	100.564	112.8750	122.7612								
	1.0811	1.0310	0.8796	0.6239	0.2589	-0.1203	-0.4189	-0.6434	-0.7994	-0.9215								
	49.3821	49.9184	51.4773	53.9072	56.9518	59.7460	62.3072	64.6228	66.6972	68.4033								
	-1.0826	-1.0922	-1.0798	-1.0723	-1.0541	-1.0210	-0.9801	-0.9397	-0.8910	-0.8775								
	-24.6158	-21.6866	-12.8750	1.8849	22.6830	49.6033	72.6910	90.0564	106.6079	122.7612								
	1.0409	1.0013	0.8812	0.6777	0.3861	0.0000	-0.3861	-0.6777	-0.8812	-1.0409								
	39.0940	39.6112	41.1229	43.5090	46.5654	50.0000	53.9072	58.1229	62.6910	67.4033								
	-0.9757	-0.9798	-0.9910	-1.0064	-1.0210	-1.0278	-1.0210	-1.0064	-0.9910	-0.9757								
	-45.2467	-42.6118	-34.8623	-21.2687	-2.2333	22.6830	53.7215	88.49	122.7612	148.600								
	0.9215	0.8912	0.7994	0.6434	0.4189	0.1203	-0.2589	-0.6239	-0.8796	-1.0811								
	29.8403	30.2985	31.6428	33.7812	36.5572	39.7460	43.0462	46.4773	49.9184	53.3821								
	-0.8770	-0.8846	-0.9064	-0.9397	-0.9801	-1.0210	-1.0541	-1.0723	-1.0798	-1.0826								
	-60.6079	-58.2224	-45.2467	-24.6158	1.8849	22.6830	49.6033	72.6910	90.0564	106.6079								
	0.7415	0.7196	0.6534	0.5405	0.3776	0.1600	-0.1176	-0.4189	-0.6434	-0.7994								
	21.5030	21.8719	22.9567	24.6910	26.9617	29.6055	32.4042	35.0799	37.7027	40.2729								
	-0.7934	-0.8036	-0.8333	-0.8800	-0.9397	-1.0064	-1.0278	-1.0210	-1.0064	-0.9757								
	-71.1981	-69.0016	-62.3406	-34.8623	-12.8750	14.8606	31.0767	49.6033	66.6972	81.3621								
	0.5177	0.5036	0.4607	0.3876	0.2817	0.1398	-0.0419	-0.2673	-0.5036	-0.8377								
	13.9035	14.1612	14.9201	16.1373	17.7393	19.6200	21.6371	23.6087	25.3090	27.1144								
	-0.7302	-0.7421	-0.7773	-0.8333	-0.9064	-0.9910	-1.0798	-1.1635	-1.2303	-1.2827								
	-77.3953	-75.3163	-69.0016	-42.6118	-21.6866	5.1210	38.4207	66.6972	90.0564	112.8750								
	0.2658	0.2599	0.2378	0.2019	0.1497	0.0798	-0.0100	-0.1217	-0.2378	-0.4189								
	6.8194	6.9518	7.3418	7.9664	8.7955	9.7709	10.8244	11.9662	12.7842	13.4428								
	-0.6908	-0.7038	-0.7421	-0.8036	-0.8846	-0.9798	-1.0822	-1.1826	-1.2699	-1.3304								
	-79.4345	-77.3953	-71.1981	-45.2467	-24.6158	1.8849	22.6830	49.6033	72.6910	90.0564								
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000								
	-0.6775	-0.6908	-0.7302	-0.7934	-0.8770	-0.9757	-1.0826	-1.1826	-1.2699	-1.3512								

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{s^3}{kb} M$$

$$p = \eta p \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 4.16

ESTRUTURA 4

Esforço externo: Momento

SL=2.00



x/L	z/L → 0.0	LINHA DE ESTADO PAPA ESFORÇO APLICADO EM →					(LFR NA VERTICAL)					
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
0.0	100η _P	203.6066	128.1487	70.2438	25.5344	-7.6008	-31.7587	-48.2962	-59.1748	-65.8532	-69.4157	-70.5283
	100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100η _V	-1.8978	-1.8277	-1.6542	-1.4235	-1.1717	-0.9254	-0.7041	-0.5211	-0.3651	-0.23016	-0.2735
0.1		128.1487	135.4253	76.8415	31.2215	3.1122	-28.0455	-45.4668	-57.0747	-64.2953	-68.1908	-69.4157
		1.3050	1.0446	0.5796	0.2194	-0.0499	-0.2442	-0.3768	-0.4678	-0.5227	-0.5521	-0.5613
		61.2638	61.8946	-16.4470	-14.2002	-11.7255	-9.2963	-7.1054	-5.2696	-3.9387	-3.1084	-2.8255
		-1.8277	-1.7760	-1.6256	-1.4129	-1.1745	-0.9379	-0.7233	-0.5446	-0.4113	-0.3293	-0.3016
0.2		70.2438	76.8415	48.1950	10.9738	16.9202	-16.9202	-36.8270	-50.5672	-59.4122	-64.2953	-65.8532
		2.0693	1.8646	1.2641	0.5297	-0.0287	-0.4287	-0.7120	-0.9015	-1.0199	-1.0640	-1.1042
		63.7892	64.8168	67.6943	-28.1735	-23.4966	-18.8319	-14.5859	-11.0442	-8.3980	-6.7673	-6.2168
		-1.6542	-1.6256	-1.5347	-1.3766	-1.1791	-0.9723	-0.7784	-0.6135	-0.4688	-0.34113	-0.3851
0.3		25.5344	31.2215	48.1950	76.8415	10.9738	34.4869	29.3665	21.9407	-21.9407	-50.5672	-59.4122
		2.4641	2.3087	1.8347	1.0199	0.1508	-0.4286	-0.9514	-1.2641	-1.4628	-1.5720	-1.6067
		48.3696	49.5889	53.0903	58.3980	-35.2789	-28.7862	-22.7706	-17.6943	-13.8727	-11.5064	-10.7060
		-1.4235	-1.4129	-1.3766	-1.3010	-1.1744	-1.0196	-0.8626	-0.7226	-0.6135	-0.5446	-0.5211
0.4		7.8008	3.1122	10.9738	34.4869	67.3768	29.3665	29.3665	21.9407	-21.9407	-50.5672	-59.4122
		2.5282	2.4142	2.0644	1.5967	0.9331	0.3719	-0.3719	-1.0446	-1.45127	-1.8162	-2.0398
		35.9387	36.6433	40.2926	45.9849	53.1084	39.2176	-31.8946	-25.5992	-20.8028	-17.8114	-16.7960
		-1.1717	-1.1745	-1.1791	-1.1744	-1.1415	-1.0647	-0.9638	-0.8626	-0.7784	-0.7233	-0.7041
0.5		31.7587	28.0485	-16.8202	2.1953	29.3665	65.0393	29.3665	29.3665	16.8202	-28.0485	-31.7587
		2.3643	2.2840	2.0354	1.5967	0.9331	0.0000	-0.9331	-1.5967	-2.0354	-2.2840	-2.3643
		24.9169	26.0924	29.5379	35.0030	42.0461	50.0000	-42.0461	-35.0030	-29.5379	-24.9169	-24.9169
		-0.9254	-0.9379	-0.9273	-1.0196	-1.0647	-1.0647	-1.0647	-1.0196	-0.9723	-0.9379	-0.9254
0.6		48.2962	45.4668	-36.8270	-21.9407	-0.1423	29.3665	67.3768	34.4869	10.9738	-3.1122	-7.8009
		2.0398	1.9855	1.8162	1.5127	1.0446	0.3719	-0.3719	-1.0446	-1.45127	-1.8162	-2.0398
		16.7960	17.8114	20.8028	25.5992	31.8946	39.2176	46.8916	45.9849	40.2926	36.6433	35.9387
		-0.7041	-0.7233	-0.7784	-0.8626	-0.9638	-1.0647	-1.1415	-1.1744	-1.1791	-1.1745	-1.1717
0.7		59.4157	57.0747	-50.5672	-39.1646	21.9407	-39.1646	-21.9407	21.9407	16.8202	-28.0485	-31.7587
		1.6067	1.5720	1.4628	1.2641	0.9514	0.4926	0.2442	0.1508	-0.1508	-0.3087	-2.4641
		10.7060	11.5064	13.8727	17.6943	22.7706	28.7862	35.2789	41.6020	53.0903	49.5889	48.3696
		-0.5211	-0.5446	-0.6135	-0.7226	-0.8626	-1.0196	-1.1744	-1.3010	-1.4129	-1.4235	-1.4235
0.8		65.8532	64.2953	-59.4122	-50.5672	-36.8270	-16.8202	10.9738	48.1950	96.4030	76.8415	70.2438
		1.1042	1.0840	1.0199	0.9015	0.7120	0.4287	0.2442	0.1508	-0.1508	-0.3087	-2.0398
		6.2168	6.7673	8.3980	11.0442	14.5859	18.8319	23.4966	28.1735	32.3057	36.6433	40.2926
		-0.3651	-0.4113	-0.4688	-0.6135	-0.7784	-0.9723	-1.1791	-1.3766	-1.5347	-1.6256	-1.6542
0.9		69.4157	68.1908	-64.2953	-57.0747	-45.4668	-31.122	31.122	31.122	16.8415	135.4253	128.1487
		0.5613	0.5521	0.5227	0.4678	0.3788	0.2442	0.1508	0.0499	-0.1508	-0.3087	-0.5613
		2.8265	3.1084	3.9387	5.2896	7.1054	9.2963	11.7265	14.2002	18.4470	22.7706	26.0924
		-0.3016	-0.3293	-0.4113	-0.5446	-0.7233	-0.9379	-1.1745	-1.4129	-1.6256	-1.7760	-1.8277
1.0		70.5283	69.4157	-65.8532	-59.4157	-48.2962	-31.7587	31.7587	25.5344	18.4470	12.8148	10.7060
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-0.2735	-0.3016	-0.3851	-0.5211	-0.7041	-0.9254	-1.1717	-1.4235	-1.6542	-1.8277	-1.8978

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta_c \frac{3}{kb} M$$

$$P = \eta_p \frac{M}{bL^2}$$

$$M = \eta_M M$$

$$V = \eta_V \frac{M}{L}$$

TABELA 4.17

ESTRUTURA 4

SL=2,50

Esforço externo: Momento

LINHA DE ESTADO PARA ESFORÇO APLICADO EM $\frac{z}{L}$ (LER NA VERTICAL)

x/L	$z/L \rightarrow 0.0$	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100 η	203.3435	115.6082	51.1466	6.8615	-21.1958	-37.1234	-44.7200	-47.2258	-47.1954	-46.4523	-46.0842
η_p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100 η_M	103.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
η_V	-2.4769	-2.3425	-2.0244	-1.6237	-1.2103	-0.8283	-0.5033	-0.2475	-0.0651	0.0436	0.0796
	115.6082	127.2450	61.2349	14.9754	-15.1310	-32.9579	-42.1746	-45.9577	-46.8390	-46.6398	-46.4523
L 0.1	2.4660	1.8671	0.8518	0.1495	-0.2996	-0.5584	-0.6856	-0.7314	-0.7356	-0.7269	-0.7220
I 0.1	75.6983	76.8790	-20.1082	-16.2175	-12.1562	-8.3787	-5.1486	-2.5574	-0.7741	0.3146	0.6750
H 0.1	-2.3425	-2.2507	-1.9831	-1.6173	-1.2260	-0.8568	-0.5379	-0.2842	-0.1020	0.0072	0.0436
A 0.2	51.1466	61.2349	91.0738	39.2424	3.2133	-20.1821	-34.1956	-41.7678	-45.4021	-46.6390	-47.1954
A 0.2	3.7343	3.3119	2.0166	0.5522	-0.4089	-1.2898	-1.4212	-1.4582	-1.4577	-1.4537	-1.4537
D 0.2	53.7580	55.5901	60.6615	-32.2644	-24.5962	-17.3048	-10.9761	-5.9226	-2.2828	-0.0981	0.6291
E 0.2	-2.4024	-1.9831	-1.5854	-1.2038	-0.9356	-0.6377	-0.3924	-0.2118	-0.0651	-0.1020	-0.0651
I 0.3	6.8615	14.9754	39.2424	79.3117	34.1912	1.9756	-19.7954	-33.6400	-41.7678	-45.9577	-47.2258
N 0.3	4.1637	3.8638	3.0123	1.4582	-0.1334	-1.1403	-1.7208	-2.0166	-2.1432	-2.1851	-2.1933
F 0.3	35.4819	37.5405	43.4339	52.2828	-37.4130	-27.1936	-18.0789	-10.6615	-5.2467	-1.9663	-0.8722
L 0.3	-1.6237	-1.6173	-1.5854	-1.4901	-1.2950	-1.0448	-0.7901	-0.5653	-0.3924	-0.2842	-0.2475
U 0.3	-21.1958	-15.1310	3.2133	78.0740	34.1912	34.5780	2.5312	-19.7954	-34.1956	-42.1746	-44.7200
N 0.4	4.0333	3.8640	3.2326	2.3267	0.7269	-0.8690	-1.8671	-2.4429	-2.7435	-2.8789	-2.9164
E 0.4	21.3230	23.3257	29.1619	38.2653	49.6854	-38.1871	-26.8790	-17.4029	-10.3470	-6.0209	-4.5657
C 0.4	-1.2103	-1.2260	-1.2638	-1.2950	-1.2710	-1.1495	-0.9724	-0.7901	-0.6377	-0.5379	-0.5033
I 0.4	-37.1234	-32.9579	-20.1821	1.9756	34.5780	78.6296	34.5780	1.9756	-20.1821	-32.9579	-37.1234
A 0.4	3.5644	3.4748	3.1785	2.5940	1.5911	0.0000	1.5911	2.5940	3.1785	3.4748	3.5644
U 0.4	11.1695	12.9444	18.1771	26.5645	37.5111	50.0000	-37.5111	-26.5645	-18.1771	-12.9444	-11.1695
N 0.5	-0.8283	-0.8568	-0.9356	-1.0448	-1.1495	-1.1987	-1.1495	-1.0448	-0.9356	-0.8568	-0.8283
A 0.5	-44.7200	-42.1746	-34.1956	-19.7954	2.5312	34.5780	78.0740	34.1912	3.2133	15.1310	21.1958
U 0.5	2.9164	2.8789	2.7435	2.4429	1.8671	0.8690	-0.7269	-2.3267	-3.3254	-3.8640	-4.0333
E 0.5	4.5657	6.0209	10.3470	17.4029	28.8790	38.1871	50.3146	38.2653	29.1619	23.3257	21.3230
N 0.6	-0.5033	-0.5379	-0.6377	-0.7901	-1.1495	-1.1495	-1.2710	-1.2950	-1.2638	-1.2260	-1.2103
A 0.6	-47.2258	-45.9577	-41.7878	-33.6400	-19.7954	1.9756	34.5780	79.3117	39.2424	14.9754	6.8615
U 0.6	2.1933	2.1851	2.1432	2.0166	1.7208	1.4033	0.1334	-1.4582	-3.0123	-3.8638	-4.1637
E 0.6	3.8722	1.9683	5.2467	10.6615	18.0789	27.1936	37.4130	47.7172	43.4339	37.5405	35.4819
A 0.7	-0.2475	-0.2842	-0.3924	-0.5653	-0.7901	-1.0448	-1.2950	-1.4901	-1.5854	-1.6173	-1.6237
S 0.7	-47.1954	-46.8390	-45.4021	-41.7878	-34.1956	-20.1821	3.2133	39.2424	61.2349	81.0738	91.0738
E 0.7	1.4537	1.4577	1.4582	1.4212	1.2898	0.9852	0.4089	-0.5522	-2.0166	-3.3119	-3.7343
C 0.7	0.6291	0.0981	2.2828	5.9228	10.9761	17.3048	24.5962	32.2644	39.3385	55.5901	75.6983
A 0.8	-0.0651	-0.1020	-0.2118	-0.3924	-0.6377	-0.9356	-1.2638	-1.5854	-1.8631	-2.0244	-2.2507
O 0.8	-46.4523	-46.6398	-46.8390	-45.9577	-42.1746	-32.9579	-15.1310	14.9754	61.2349	127.2450	115.6082
E 0.8	0.7220	0.7289	0.7356	0.7314	0.6856	0.5584	0.2996	-0.1495	-0.8518	-1.6671	-2.4601
C 0.9	-0.6760	-0.3146	0.7741	2.5974	5.1486	8.3787	12.1562	16.2175	20.1082	23.1210	25.6983
A 0.9	0.0436	0.0072	-0.1020	-0.2842	-0.5379	-0.8568	-1.2260	-1.6173	-1.9831	-2.2507	-2.3425
E 0.9	-46.0842	-46.4523	-47.1954	-47.2258	-44.7200	-37.1234	-21.1958	6.8615	51.1466	115.6082	203.3435
N 0.9	-0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.9	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
A 1.0	0.0796	0.0436	-0.0651	-0.2475	-0.5033	-0.8283	-1.2103	-1.6237	-2.0244	-2.3425	-2.4769

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \frac{S}{kb} M$$

$$p = \eta p \frac{M}{bL^2}$$

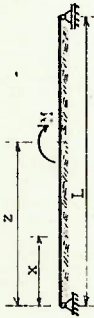
$$M = \eta M$$

$$V = \eta V$$



TABELA 4.18

ESTRUTURA 4



Esforço externo: Momento

SL=3.00

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

x/L	z/L → 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100φ	201.2325	99.0524	30.0630	-11.5086	-32.5577	-39.7172	-36.6405	-33.7301	-28.1695	-24.0645	-22.5914
np	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100ηM	103.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ny	-3.0101	-2.7884	-2.2918	-1.7078	-1.1502	-0.6775	-0.3101	-0.0463	0.1266	0.2231	0.2539
	99.0524	115.6477	43.7719	-1.2473	25.6129	35.5991	-36.7277	-33.4150	-28.9113	-25.3905	-24.0845
L 0.1	3.9745	2.8243	0.9352	-0.2184	-0.8167	-1.0355	-1.0263	-0.9082	-0.7678	-0.6622	-0.6235
I	70.6773	72.5689	-22.7763	-17.1250	-11.6458	-6.9516	-3.2744	-0.6143	1.1393	2.1221	2.4371
N	-2.7884	-2.6510	-2.2461	-1.7210	-1.1926	-0.7302	-0.3619	-0.0917	0.0684	0.1903	0.2231
H	30.0630	43.7719	64.3374	29.6676	-4.2887	-22.6234	-30.3736	-31.9008	-28.9113	-28.9113	-28.1895
A	5.6465	4.9097	2.6058	0.1185	-1.2539	-1.8430	-1.9437	-1.7940	-1.5703	-1.3913	-1.3243
0.2	45.1379	47.9010	55.4440	-34.4221	-24.0767	-14.9201	-7.5661	-2.1351	1.5078	3.5764	4.2442
D	-2.2918	-2.2481	-2.0802	-1.7330	-1.3010	-0.8770	-0.5118	-0.2272	-0.0281	0.0684	0.1266
E	-11.5086	-1.2473	29.6676	81.2960	32.6571	0.9368	-17.7965	-27.5745	-31.9008	-33.4150	-33.7381
I	5.6450	5.4301	4.0930	1.5703	-0.9077	-2.1621	-2.6107	-2.6058	-2.4175	-2.2325	-2.1590
N	25.1246	28.0129	36.2552	48.4922	37.6965	-24.6910	-13.7809	-5.4440	0.3020	3.6299	4.7157
F	-1.7078	-1.7210	-1.7330	-1.6601	-1.4473	-1.0826	-0.7423	-0.4481	-0.2272	-0.0617	-0.0463
L	-32.5577	-25.6129	-4.2887	32.6571	86.5215	37.4840	3.7358	-17.7965	-30.3736	-36.7277	-38.6405
U	5.2117	5.0283	4.3946	3.0668	0.6622	-1.6755	-2.8243	-3.2342	-3.2680	-3.1853	-3.1407
E	10.6880	13.4789	21.0612	32.9808	47.8779	-36.5572	-22.5689	-11.3437	-3.3219	1.4413	3.0155
N	-1.1502	-1.1926	-1.3010	-1.4173	-1.4447	-1.2827	-1.0189	-0.7423	-0.5118	-0.3619	-0.3101
I	-39.7172	-35.5991	-22.6234	0.9368	37.4840	89.3205	37.4840	0.9368	-22.6234	-35.5991	-39.7172
A	4.2115	4.1762	4.0020	3.4864	2.2990	-0.0000	-2.2990	-3.4864	-4.0020	-4.1762	-4.2115
P	1.8331	3.9362	10.2045	20.4468	34.1201	50.9000	34.1201	-10.2045	-10.2045	-3.9362	-1.8331
0.5	-0.6775	-0.7302	-0.8770	-1.0826	-1.2827	-1.3781	-1.2827	-1.0826	-0.8770	-0.7302	-0.6775
A	-39.6405	-36.7277	-30.3736	-17.7965	37.358	37.4640	86.5215	32.6571	-4.2887	-25.6129	-32.5577
R	3.1407	3.1853	3.2680	3.2342	2.8243	1.6755	-0.6622	-3.0668	-4.3946	-5.0283	-5.2117
A	-3.0155	-1.4413	3.3219	11.3437	22.5689	36.5572	52.1221	-32.9808	-21.0612	-13.4789	-10.6880
A	-0.3101	-0.3619	-0.5118	-0.7423	-1.0189	-1.2827	-1.4417	-1.4173	-1.3010	-1.1926	-1.1502
S	-33.7381	-33.4150	-31.9008	-27.5745	-17.7965	0.9368	32.6571	81.2960	29.6676	1.2473	11.5086
E	2.1590	2.2325	2.4175	2.6058	2.6107	2.1621	0.9077	-1.5703	-4.0930	-5.4301	-5.6450
C	-4.7157	-3.6299	-0.3020	5.4440	13.7809	24.6910	37.6965	51.5078	-36.2552	-28.0129	-25.1246
C	-0.0463	-0.0917	-0.2272	-0.4481	-0.7423	-1.0826	-1.4173	-1.6601	-1.7330	-1.7210	-1.7078
A	-28.1895	-28.9113	-30.6159	-31.9008	-30.3736	-22.6234	-4.2887	29.6676	64.3374	43.7719	30.0630
S	1.3243	1.3913	1.5703	1.7940	1.9437	1.8430	1.2539	-0.1185	-2.6058	-4.9097	-5.6465
C	4.2442	3.5764	-1.5076	2.1351	7.5661	14.9201	24.0767	34.4221	44.5560	47.9010	45.1379
0.6	0.1266	0.0884	-0.0281	-0.2272	-0.5118	-0.8770	-1.3010	-1.7330	-2.0602	-2.2481	-2.2918
0.7	-24.0845	-25.3905	-28.9113	-33.4150	-36.7277	-35.5991	-25.6129	-1.2473	43.7719	115.6477	99.0524
C	0.6235	0.6622	0.7678	0.9082	1.0263	1.0355	0.8167	0.2184	-0.9352	-2.8243	-3.9745
C	2.4371	2.1221	-1.1393	0.6143	3.2744	6.9516	11.6458	17.1250	22.7763	27.4311	20.6773
0.9	0.2231	0.1903	0.0884	-0.0917	-0.3619	-0.7302	-1.1926	-1.7210	-2.2481	-2.6510	-2.7884
1.0	-22.5914	-24.0845	-28.1895	-33.7381	-39.6405	-39.7172	-32.5577	-11.5086	30.0630	99.0524	201.2325
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2539	0.2231	0.1266	-0.0463	-0.3101	-0.6775	-1.1502	-1.7078	-2.2918	-2.2918	-2.7884	-3.0101

$$\varphi = \eta_4 \frac{S_j}{t b} M \quad p = \eta_4 \frac{N}{bL} Z \quad M = \eta_4 M \quad V = \eta_4 V$$

TABELA 4.19

ESTRUTURA 4

SL=3.50

Esforço externo: Momento

LINHA DE ESTAJO PARA ESFORÇO APLICADO EM (LEF NA VERTICAL)

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100φ	100η _p	200.0351	84.1638	12.2654	-25.2969	-39.2398	-38.9976	-31.7909	-22.5689	-14.3929	-6.9584	-7.0699
0.0	100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	η _y	103.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-3.5090	-3.1715	-2.4574	-1.6783	-0.9994	-0.4636	-0.1326	0.0828	0.2010	0.2565	0.2724
		84.1638	106.1502	29.4334	-13.4872	-32.1473	-35.5154	-30.7833	-23.0919	-15.7637	-10.7314	-8.9584
		5.9225	3.9240	0.7714	-0.9162	-1.5816	-1.4228	-1.3491	-0.9754	-0.6369	-0.4696	-0.3302
		68.1066	68.9021	-24.4737	-16.9558	-10.2691	-5.1123	-1.5526	0.6661	1.9052	2.5000	2.6717
		-3.1715	-2.9632	-2.4249	-1.7284	-1.0810	-0.5660	-0.2004	0.0342	0.1697	0.2367	0.2565
		12.2654	29.4334	80.3876	22.5831	-9.7627	-23.9329	-26.8163	-23.9780	-19.4304	-15.7637	-14.3929
		7.8460	6.6939	3.0078	-0.8102	-2.5390	-2.9307	-1.9582	-1.0960	-1.3650	-0.9671	-0.8191
		37.8041	41.6329	51.9463	-34.7428	-22.0682	-11.8217	-4.4462	0.3536	3.1661	4.5779	4.9999
		-2.4574	-2.4249	-2.2592	-1.8276	-1.2950	-0.7978	-0.3992	-0.1135	0.0699	0.1697	0.2010
		-85.2969	-13.4872	22.5831	84.1221	30.7974	-1.0637	-17.1277	-23.1548	-23.9780	-23.0919	-22.5689
		7.4654	6.9316	5.1123	1.3850	-2.1592	-3.5144	-3.5676	-3.0078	-2.3162	-1.7946	-1.6040
		17.1592	20.8483	31.3638	46.8339	-36.2954	-21.4020	-9.9155	-1.9463	3.0254	5.6661	6.4841
		-1.6783	-1.7284	-1.8276	-1.8208	-1.5444	-1.1282	-0.7109	-0.3635	-0.1135	0.0342	0.0828
		-39.2398	-32.1473	-9.7627	30.7974	92.8211	37.6027	2.5978	-17.1277	-26.8163	-30.7833	-31.7909
		6.0156	5.8838	5.3070	0.4096	-2.7961	-3.9240	-3.9240	-3.8978	-3.4174	-2.9531	-2.7700
		3.8925	6.8901	15.7360	29.8113	47.5000	-34.3892	-18.9021	-7.2437	0.5537	4.9316	6.3322
		-0.9994	-1.0810	-1.2950	-1.5444	-1.6540	-1.4575	-1.0925	-0.7109	-0.3992	-0.2004	-0.1326
		-38.9976	-35.5154	-23.9329	-1.0637	37.6027	96.4826	37.6027	-1.0637	-23.9329	-35.5154	-38.9976
		4.3022	4.3928	4.5337	4.3335	3.1264	0.0000	0.0000	0.0000	4.5337	4.3928	4.3022
		3.3790	1.2198	5.3375	16.4021	31.7175	50.0000	-31.7175	-16.4021	-5.3375	-1.2198	-3.3790
		-0.4836	-0.5660	-0.7978	-1.1282	-1.4575	-1.6183	-1.4575	-1.1282	-0.7978	-0.5660	-0.4836
		-31.7909	-30.7833	-26.8163	-17.1277	2.5978	37.6027	92.8211	30.7974	-9.7627	-32.1473	-39.2398
		2.7700	2.9531	3.4174	3.8978	3.9240	2.7961	-0.4096	-3.7632	-5.3090	-6.0156	-6.4841
		-6.3322	-4.9316	-0.5537	7.2437	18.9021	34.3892	52.5000	-29.8113	-15.7360	-6.8901	-3.8925
		-0.1326	-0.2004	-0.3992	-0.7109	-1.0925	-1.4575	-1.6540	-1.5444	-1.2950	-1.0810	-0.9994
		-22.5689	-23.0919	-23.9780	-23.1548	-17.1277	1.0637	17.1277	23.1548	23.9780	23.0919	22.5689
		1.6040	1.7946	2.3162	3.0078	3.5676	3.5144	2.1592	-1.3650	-5.1123	-6.9316	-7.4654
		-6.4841	-5.6661	-3.0254	1.9463	9.9155	21.4020	36.2954	53.1661	-31.3638	-20.6483	-17.1592
		0.0828	0.0342	-0.1135	-0.3635	-0.7109	-1.1282	-1.4544	-1.8206	-1.8276	-1.7284	-1.6783
		-14.3929	-15.7637	-19.4304	-23.9780	-26.8163	-23.9329	-9.7627	22.5831	80.3876	29.4334	12.2654
		0.8191	0.9671	1.3850	1.9660	2.5982	2.9307	2.5390	0.8102	-3.0078	-6.6939	-7.8460
		-4.9999	-4.5779	-3.1661	-0.3536	4.4462	11.8217	22.0682	34.7428	48.0537	41.6329	37.8041
		0.2010	0.1697	0.0699	-0.1135	-0.3992	-0.7978	-1.2950	-1.8276	-2.2542	-2.4249	-2.4574
		-8.9584	-10.7314	-15.7637	-23.0919	-30.7833	-35.5154	-32.1473	-13.4872	29.4334	106.1502	84.1638
		0.3302	0.4096	0.6369	0.9754	1.3491	1.6228	1.5816	0.9162	-0.7714	-3.9240	-5.9225
		-2.6717	-2.4500	-1.9062	-0.6661	1.5526	5.1123	10.2691	16.9558	24.4737	31.0979	36.1066
		0.2565	0.2367	0.1697	0.0342	-0.2004	-0.5660	-1.0810	-1.8276	-2.4249	-2.9832	-3.1715
		-7.0699	-8.9584	-14.3929	-22.5689	-31.7909	-38.9976	-39.2398	-25.2969	-12.2654	-6.9584	-7.0699
		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
		-3.0000	0.3020	0.0000	0.0000	-3.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
		0.2724	0.2565	0.2010	0.0828	-0.1326	-0.4836	-0.9994	-1.6783	-2.4574	-3.1715	-3.5090

$$z = \sqrt{\frac{z_b}{12EI}}$$

$$\phi = \eta \phi \frac{S^3}{k^2} M$$

$$p = \eta \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 4.22

ESTRUTURA 4

Esforço externo: Momento

SL=5.00

LINHA DE ESTAUO PARA ESFORÇO APLICADO EM (CLER NA VERTICAL)

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	0.1	199.9946	48.2873	-22.1861	-41.4118	-35.9503	-23.0421	-11.2451	-3.3063	0.9223	2.6593	3.3488
I	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.0	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.0	-4.9994	-4.1147	-2.5412	-1.1920	-0.3351	0.0796	0.2049	0.1554	0.1207	0.0659	0.0455
A	0.1	48.2873	88.9033	3.4378	29.0692	-32.2269	-23.5977	-13.1752	-5.1264	-0.2245	2.1705	2.8593
A	0.2	14.5384	7.7373	-1.7092	-4.6692	-7.3448	-2.9074	-1.4860	-0.4392	0.3292	0.3988	0.3988
D	0.2	53.2342	59.9439	-25.8216	-12.7572	-4.0930	0.3146	1.8102	1.7411	1.2254	0.7176	0.5238
E	0.2	-4.1147	-3.7703	-2.6534	-1.4382	-0.5562	-0.0651	0.1325	0.1028	0.1257	0.0831	0.0659
I	0.3	-22.1861	3.4378	82.0222	12.6226	-16.7166	-22.3600	-17.4790	-10.0914	-3.9481	-0.2245	0.9923
N	0.3	15.4746	12.8292	3.0661	-8.0540	-7.5766	-5.8329	-3.3973	-1.4146	-0.1607	0.4723	0.6584
A	0.3	19.8879	27.4127	47.1867	-29.9146	-12.4426	-2.2828	2.0957	3.0356	2.4987	1.7492	1.4352
D	0.3	-2.5412	-2.6534	-2.6673	-2.0176	-1.1682	-0.5033	-0.1072	0.0728	0.1252	0.1257	0.1207
E	0.3	-41.4118	29.0692	12.6226	94.3748	22.4895	-10.5979	-19.2762	-16.3007	-10.0914	-5.1264	-3.3083
I	0.3	11.1200	10.8054	8.4844	0.1607	-7.5421	-8.0665	-5.7594	-3.0681	-1.0158	0.1665	0.5458
N	0.3	1.5911	7.1307	23.3196	47.5013	-28.1044	-1.06615	-1.0574	2.6133	3.5594	3.2163	2.9746
A	0.3	-1.1920	-1.4382	-2.0176	-2.3973	-1.9647	-1.2103	-0.5630	-0.1446	0.0728	0.1628	0.1854
L	0.4	-35.9503	32.2269	16.7166	22.4895	100.4934	25.5733	-9.4196	-19.2762	-17.4790	-13.1752	-11.2451
U	0.4	6.1362	6.7752	7.8980	6.9963	-0.3292	-7.4686	-7.7373	-5.3606	-2.7389	-0.9423	-0.3214
E	0.4	-5.6265	-2.5019	7.4452	25.1298	49.2824	-26.8790	-9.9439	-0.5337	3.5309	4.7848	4.9974
N	0.4	-0.3351	-0.5562	-1.1682	-1.9647	-2.4393	-2.0244	-1.2479	-0.5630	-0.1072	0.1325	0.2049
I	0.4	-23.0421	23.5977	22.3600	22.4895	25.5733	101.6717	25.5733	-10.5979	-22.3600	-23.5977	-23.0421
A	0.4	2.4303	3.2288	5.2671	7.4081	7.0698	0.0000	27.0698	-7.4081	-5.2671	-3.2288	-2.4303
P	0.5	-6.5950	-5.3120	-0.6917	9.2263	24.3552	50.0000	-26.3552	-9.2263	-0.6917	5.3120	6.5950
A	0.5	0.0796	-0.0651	-0.5033	-1.2103	-2.0244	-2.4769	-2.0244	-1.2103	-0.5033	-0.0651	0.0796
R	0.5	-11.2451	13.1752	-17.4790	-19.2762	-9.4196	25.5733	100.4934	22.4895	-16.7166	-32.2269	-35.9503
A	0.5	0.3214	0.9423	2.7389	5.3606	7.7373	7.4686	0.3292	6.9963	6.7752	6.1362	5.6265
A	0.6	-4.9974	-4.7848	-3.5309	0.5337	9.9439	26.8790	50.0176	-25.1298	-7.4452	-2.5019	5.6265
S	0.6	0.2049	0.1325	-0.1072	-0.5630	-1.2479	-2.0244	-2.4393	-1.9647	-1.1682	-0.5562	-0.3351
E	0.6	3.3063	5.1264	10.0914	16.3007	-19.2762	-10.5979	22.4895	94.3748	12.6226	-29.0692	-41.4118
C	0.6	-0.5458	-0.1685	1.0158	3.0681	5.7594	8.0665	7.5421	-0.1607	-8.4844	-10.8054	-11.1200
C	0.7	-2.9746	-3.2163	-3.5594	-2.8133	1.0574	10.6615	28.1044	52.4987	-23.3196	-7.1307	-1.5911
A	0.7	0.1854	0.1628	0.0728	-0.1446	-0.5630	-1.2103	-1.9647	-2.3973	-2.0176	-1.4382	-1.1920
D	0.7	0.9923	0.2245	-3.9481	-10.0914	-17.4790	-22.3600	-16.7166	12.6226	62.0222	3.4378	2.8593
L	0.8	-0.6584	-0.4723	0.1607	1.4146	3.3973	5.8329	7.5766	6.0540	-3.0681	-12.6226	-15.4746
L	0.8	-1.4352	-1.7492	-2.4987	-3.0356	-2.2828	2.2828	12.4426	29.9146	52.4813	-27.4127	-19.8879
L	0.8	0.1207	0.1257	0.1252	0.0728	-0.1072	-0.5033	-1.1682	-2.0176	-2.6534	-2.6534	-2.5412
H	0.8	2.8593	2.1705	-0.2245	-5.1264	-13.1752	-23.5977	-32.2269	-29.0692	-29.0692	88.9033	48.2873
A	0.8	-0.3988	-0.3292	-0.0735	0.4899	1.4880	2.9074	4.3448	4.6692	1.7092	-7.7373	-14.5384
A	0.9	-0.5238	-0.7176	-1.2254	-1.7811	-1.8102	-0.3146	4.0930	12.7572	25.8216	40.0561	-53.2342
A	0.9	0.0659	0.0631	0.1257	0.1628	0.1325	-0.0651	-0.1325	-0.14382	-2.6534	-3.7703	-4.1147
H	0.9	3.3488	2.8593	0.9923	3.3083	-11.2451	-23.0421	-35.9503	-41.4118	-22.1681	48.2873	199.9946
A	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000
A	1.0	0.0000	-0.3000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000
A	1.0	0.0455	0.0659	0.1207	0.1854	0.2049	0.0796	-0.3351	-1.1920	-2.5412	-4.1147	-4.9994

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = n\phi \frac{S^3}{kD} \quad M$$

$$p = n_p \frac{M}{bL^2} \quad M$$

$$M = n_M M \quad M$$

$$V = n_V \frac{M}{L} \quad V$$

TABELA 4.24

ESTRUTURA 4

Esforço externo: Momento

SL=6.00



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM $\frac{z}{L}$ (CLER NA VERTICAL)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	100n _φ	200.0034	-34.3137	-39.7067	-25.6454	-11.2557	-2.5441	1.0662	1.7560	1.4452	1.2291
	100n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100n _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	100n _φ	-6.0000	-2.3391	-0.7402	0.0342	0.2539	0.2191	0.1199	0.0386	-0.0066	-0.0202
	100n _p	28.6179	5.5444	29.9795	-25.5012	-14.0948	-5.1148	-0.3941	1.2557	1.4925	1.4452
	100n _M	22.3123	10.1069	-7.9004	-5.5450	-2.6486	0.1257	0.3443	0.3443	0.3165	0.2818
0.2	100n _φ	45.2953	-24.5241	-8.7987	0.5824	2.1221	2.0901	1.2326	0.4474	-0.0133	-0.1574
	100n _p	-4.5770	-2.6586	-1.1524	-0.2431	0.1266	0.1869	0.1289	0.0567	0.0092	-0.0066
	100n _M	-34.3137	8.6611	18.4289	-11.9447	-4.9253	-0.6575	-0.3941	1.2557	1.4925	1.4452
0.3	100n _φ	20.2137	2.2064	-10.9050	-6.2813	-2.5229	-0.3920	0.4422	0.4422	0.4222	0.6329
	100n _p	10.9146	46.6586	-25.1065	6.6766	1.5078	3.3547	2.5375	1.2193	0.2900	-0.0266
	100n _M	-2.3391	-2.6586	-2.1615	-1.0600	-0.3101	0.0364	0.1237	0.0567	0.0567	0.0386
0.4	100n _φ	-39.7067	8.6611	14.8420	-16.2788	-19.1308	-12.2082	-4.9253	-0.3941	1.2557	1.4925
	100n _p	11.5922	12.3133	11.4073	-10.4422	-5.9370	-2.2064	-0.1102	0.7587	0.6261	0.6329
	100n _M	20.7712	46.6586	48.7807	-23.0163	-5.4440	1.9552	3.3414	2.3801	1.2660	0.7374
0.5	100n _φ	-3.7529	2.1159	20.1888	-2.2285	-1.1502	0.0070	0.1237	0.1237	0.1289	0.1199
	100n _p	-0.0342	-0.2431	-1.0600	-2.2285	-1.1502	-0.3734	0.0070	0.1237	0.1289	0.1199
	100n _M	-34.3137	8.6611	14.8420	-16.2788	-19.1308	-12.2082	-4.9253	-0.3941	1.2557	1.4925
0.6	100n _φ	25.5012	18.4289	14.8420	100.8797	15.0315	-16.5423	-19.1308	-11.9447	-5.1148	-2.5441
	100n _p	6.0472	9.6646	10.6709	-0.3165	-11.2970	-10.1069	-5.6552	-1.8899	0.2341	0.8844
	100n _M	-6.8288	-4.3353	4.2300	50.0133	-22.5689	-5.4573	1.7978	3.3281	2.8275	2.8386
0.7	100n _φ	0.0342	-0.2431	-1.0600	-2.2285	-1.1502	-0.3734	0.0070	0.1237	0.1289	0.1199
	100n _p	-0.0342	-0.2431	-1.0600	-2.2285	-1.1502	-0.3734	0.0070	0.1237	0.1289	0.1199
	100n _M	-34.3137	8.6611	14.8420	-16.2788	-19.1308	-12.2082	-4.9253	-0.3941	1.2557	1.4925
0.8	100n _φ	-11.2957	-14.0948	-16.2788	15.0315	100.8797	15.0315	-16.5423	-19.1308	-11.9447	-5.1148
	100n _p	0.5022	1.7642	5.3109	11.0152	0.0000	-11.0152	-9.7904	-5.3109	-1.7642	-0.5022
	100n _M	-4.9177	-4.5607	-2.2452	5.4706	22.7263	50.0000	-22.7263	-5.4706	2.2452	4.9177
0.9	100n _φ	0.2539	0.1266	-0.3101	-1.1502	-2.2918	-3.0101	-2.2918	-1.1502	-0.3101	0.1266
	100n _p	-2.5441	-5.1148	-11.9447	-19.1308	-16.2788	-12.2082	-8.6611	-6.6611	-4.4289	-25.5012
	100n _M	-0.8844	-0.2341	1.8899	5.6552	10.6709	0.3165	-10.6709	-0.6646	-6.0472	-4.4128
1.0	100n _φ	-2.4386	-2.8275	-3.3281	-4.3353	-5.4573	-6.8288	-8.6611	-10.6709	-12.2082	-14.0948
	100n _p	0.2191	0.1869	0.0364	-0.3734	-1.1797	-2.2918	-2.2918	-1.1502	-0.3101	0.1266
	100n _M	1.0662	1.0662	1.0662	1.0662	1.0662	1.0662	1.0662	1.0662	1.0662	1.0662

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \frac{s^3}{kb} M$$

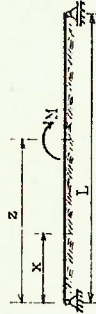
$$P = \eta p \frac{M}{bL^2}$$

$$M = \eta_1 M$$

$$V = \eta_2 V$$

TABELA 4.25

ESTRUTURA 4



x/L	z/L →	100η _φ ↓	100η _ψ ↓	100η _M ↓	100η _N ↓	Esforço externo: Momento																
						LINHA DE ESTADO	PARA	ESFORÇO	APLICADO	EM	0.4	0.5	(L/4 NA VERTICAL)	0.6	0.7	0.8	0.9	1.0				
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	
L 0.1		19.9324	-37.9375	-36.9635	-20.3849	-6.8776	-0.1828	-0.16045	1.4142	0.7465	0.4579											
I 0.1		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000											
N 0.1		4.7550	-2.1806	-0.5167	0.1651	0.2783	0.1825	0.0785	0.0121	-0.0163	-0.0233											
H 0.1		19.9324	-8.5156	-29.1612	-21.9206	-10.2638	-2.5965	-0.6157	1.2155	0.9361	0.7465											
A 0.1		26.6967	-7.7636	-9.4764	-5.7612	-2.2084	-0.2716	-0.3665	0.3717	0.2232	0.1527											
N 0.2		41.5589	-23.4128	-6.6262	2.4519	1.8452	1.8452	0.8575	0.1847	-0.1281	-0.2106											
D 0.2		4.7550	-2.6358	-1.0078	0.1192	0.1758	0.1758	0.0593	0.0311	-0.0056	-0.0163											
E 0.2		-37.9375	69.8078	6.5274	-19.0601	-17.6395	-9.4853	-3.0056	0.1376	1.2155	1.4142											
I 0.3		22.1903	1.6187	-13.5248	-11.6849	-6.9328	-1.8419	-0.1001	0.5697	0.5244	0.4464											
C 0.3		7.2896	46.8186	-22.7040	4.3742	2.5540	3.3095	2.0299	0.7294	-0.0259	-0.2563											
F 0.3		-2.1806	-3.1675	-2.2383	-0.9972	-0.2191	-0.0686	0.1310	0.0816	0.0311	0.0121											
L 0.4		36.9635	29.1612	6.5274	10.8084	10.8084	18.2616	-18.1085	-3.0656	0.6157	1.6645											
I 0.4		11.1695	12.7139	13.1719	-0.5897	-13.7964	-11.3184	-5.6611	0.2528	0.6129	0.8961											
N 0.4		5.2668	0.4635	18.8549	49.2706	3.1568	2.7382	0.0709	1.8193	0.6013	0.1588											
F 0.4		0.5167	-1.0078	-2.2383	-2.3382	-1.0643	-1.0643	0.0709	0.1310	0.0993	0.0785											
L 0.5		20.3849	-19.0601	10.8084	100.7073	10.3394	18.7398	-18.1085	-0.4853	-2.5965	-0.1528											
E 0.5		3.2375	5.4083	10.5055	0.2232	-13.4247	-11.0952	-5.5084	0.6245	0.6245	1.1794											
C 0.5		6.3627	4.5580	2.9134	20.7000	50.1281	-20.6741	-3.6448	3.0532	2.0040	1.4588											
N 0.5		0.1651	-0.1192	-0.9972	-2.3382	-3.2440	-2.3656	-1.1020	0.0886	0.0886	0.1784											
F 0.5		6.8776	10.2835	17.6395	18.2616	10.3394	10.3394	18.2616	-17.6395	-10.2638	-6.8776											
L 0.6		0.3529	1.0299	5.1367	10.6720	13.2720	0.0000	0.2232	5.1367	1.0299	0.3529											
C 0.6		3.8491	3.9103	2.7128	20.8847	50.0000	-20.8847	-3.7729	3.9106	3.9106	3.8491											
F 0.6		0.2763	0.1758	-0.2191	-1.0643	-2.3656	-3.2617	-2.3656	-0.2191	0.1758	0.2763											
L 0.7		0.1828	2.5965	-9.4853	-18.1085	-18.1085	-18.1085	-18.1085	-19.0601	-21.9206	-20.3849											
I 0.7		-1.1794	-0.6245	1.3955	5.5084	11.0952	13.4247	0.2232	-12.9003	-10.5055	-5.4083											
N 0.7		-1.4588	-2.0040	-3.0532	-2.5281	3.6448	20.6741	49.8719	-20.7000	-2.9154	4.5560											
F 0.7		0.1865	0.1784	0.0886	-0.2665	-1.1020	-2.3656	-3.2440	-2.3382	-0.9972	-0.1192											
L 0.8		1.6845	0.6157	-3.0656	-9.4853	-17.6395	-18.2616	10.8084	99.9086	6.5274	-36.9635											
E 0.8		-0.8961	-0.8129	0.2528	1.6187	5.6611	11.3184	13.7964	0.5597	-13.1719	-11.1695											
C 0.8		-3.1588	-0.6013	-1.8193	-3.1614	-2.7387	3.5167	20.8588	50.7294	-18.8549	-26.6967											
A 0.8		0.0785	0.0993	0.1310	0.0709	-0.2665	-1.0843	-2.3382	-3.1568	-2.2383	-1.0078											
S 0.8		1.4142	1.2155	0.1376	-3.0656	-9.4853	-17.6395	-18.2616	10.8084	99.9086	6.5274											
E 0.9		-0.4464	-0.5244	-0.5897	-0.1001	1.8419	6.0328	11.6849	13.5248	-1.6187	-18.9331											
C 0.9		0.2563	0.0259	-0.7294	-2.0299	-3.3095	-2.5540	4.3742	22.7040	53.1814	-7.2896											
A 0.9		0.0121	0.0311	0.0816	-0.2191	-0.0686	-0.2191	-0.0686	-2.2383	-3.1675	-2.1806											
S 0.9		0.7465	0.9361	1.2155	0.6157	-2.5965	-10.2638	-21.9206	-29.1612	-29.1612	-36.9635											
E 1.0		-0.1527	-0.2232	-0.3717	-0.3665	0.2716	0.2716	0.2716	0.2716	0.2716	0.2716											
C 1.0		0.2106	0.1291	-0.1847	-0.8575	1.8452	-2.4519	-0.7018	6.6262	23.4128	-41.5589											
A 1.0		-0.0163	-0.0056	0.0311	0.0393	0.1784	0.1758	-0.1192	-1.0078	-2.6358	-4.7550											
S 1.0		0.4579	0.7465	1.4142	1.6645	-3.0656	-9.4853	-17.6395	-20.3849	-36.9635	-64.9324											
E 1.0		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000											
C 1.0		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000											
A 1.0		-0.0233	-0.0163	0.0121	0.0785	0.1865	0.2763	0.1651	-0.5167	-2.1806	-6.5000											

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta_c \frac{S^3}{KB} M$$

$$P = \eta_c \frac{M}{L^2}$$

$$M = \eta_c M$$

$$V = \eta_c V$$

$$\eta = \eta_c \eta$$

TABELA 4.28

ESTRUTURA 4



Esforço externo: Momento

SL=6.00

LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100n _φ	200.0000	-1.8557	-41.5413	-7.6622	0.3796	1.7869	1.0421	0.2603	0.0698	0.2603	0.0698	-0.1523
100n _p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100n _φ	-5.0830	-1.5673	0.0449	0.3466	0.2067	-0.0039	-0.0141	-0.0045	-0.0141	-0.0045	-0.0045
0.1	100n _p	79.2293	13.7451	-24.6018	-12.6274	-2.9377	0.7108	1.0336	0.0640	0.4862	0.0640	-0.0698
0.2	100n _v	41.2561	16.7074	-13.0882	-4.8085	-0.3715	0.7391	0.5370	0.0646	0.1801	-0.0646	-0.0576
0.3	100n _φ	31.3051	49.7052	-18.9973	-1.7400	2.0706	0.7431	0.0500	0.0576	-0.1154	-0.0576	-0.0576
0.4	100n _p	-5.0830	-1.5673	0.0449	0.3466	0.2067	-0.0039	-0.0141	-0.0045	-0.0141	-0.0045	-0.0045
0.5	100n _v	79.2293	13.7451	-24.6018	-12.6274	-2.9377	0.7108	1.0336	0.0640	0.4862	0.0640	-0.0698
0.6	100n _φ	41.2561	16.7074	-13.0882	-4.8085	-0.3715	0.7391	0.5370	0.0646	0.1801	-0.0646	-0.0576
0.7	100n _p	31.3051	49.7052	-18.9973	-1.7400	2.0706	0.7431	0.0500	0.0576	-0.1154	-0.0576	-0.0576
0.8	100n _v	-5.0830	-1.5673	0.0449	0.3466	0.2067	-0.0039	-0.0141	-0.0045	-0.0141	-0.0045	-0.0045
0.9	100n _φ	79.2293	13.7451	-24.6018	-12.6274	-2.9377	0.7108	1.0336	0.0640	0.4862	0.0640	-0.0698
1.0	100n _p	41.2561	16.7074	-13.0882	-4.8085	-0.3715	0.7391	0.5370	0.0646	0.1801	-0.0646	-0.0576
1.0	100n _v	-5.0830	-1.5673	0.0449	0.3466	0.2067	-0.0039	-0.0141	-0.0045	-0.0141	-0.0045	-0.0045

$$S = \sqrt{\frac{kb}{4LI}}$$

$$\varphi = n \cdot \frac{S^3}{kb} M$$

$$p = n \cdot p \cdot \frac{M}{bL^2}$$

$$M = n \cdot M \cdot N$$

$$V = n \cdot v \cdot \frac{N}{L}$$

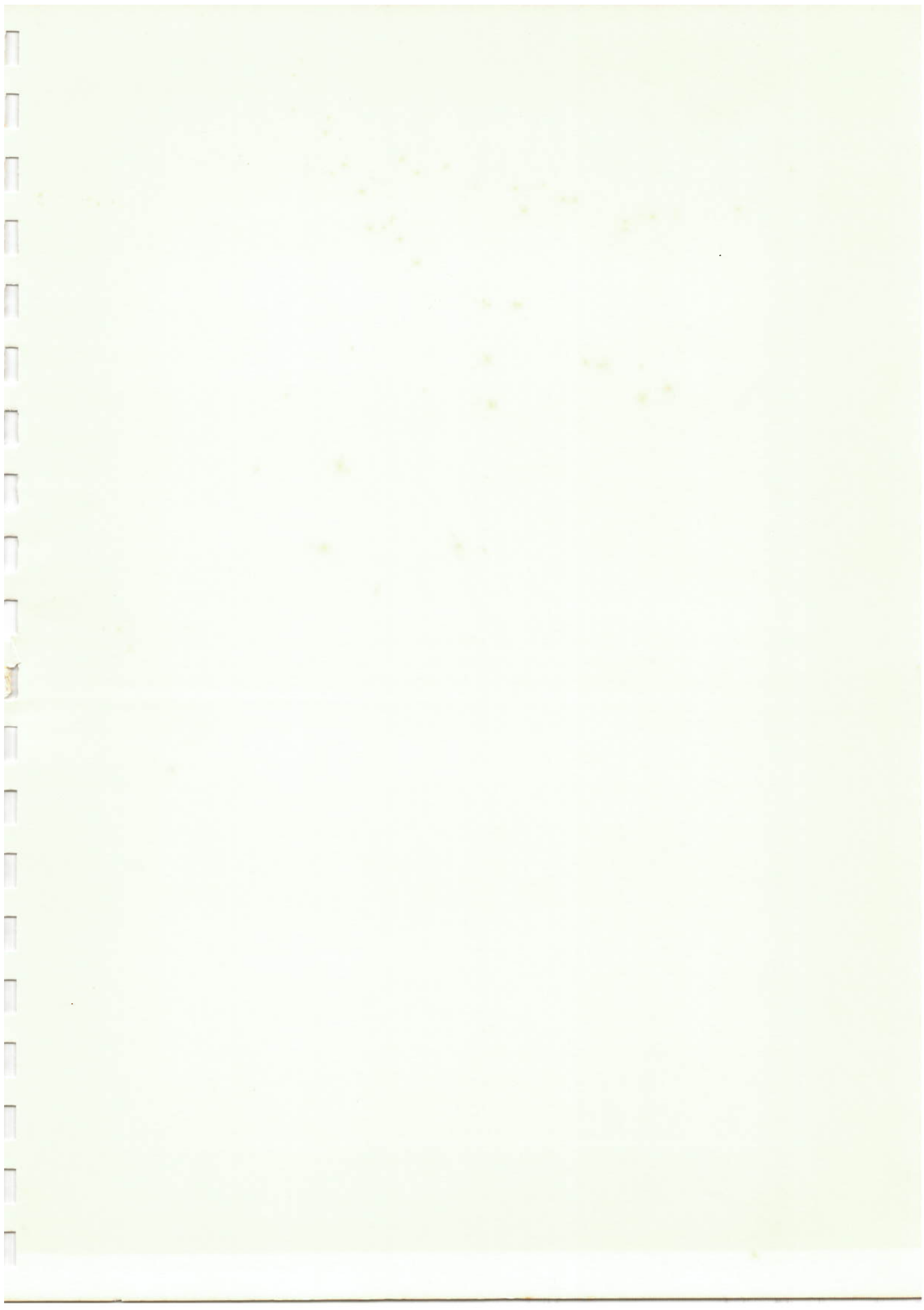


TABELA 5.02

ESTRUTURA 5

Esforço externo: Força Concentrada



x/L	z/L	J.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	0.1	0.0000	27.6922	42.5267	47.4821	45.2755	35.3274	26.7736	18.5682	9.2466	2.5417	0.0000
I	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.3	0.0000	1.3471	5.0989	13.6491	21.3536	22.4820	19.1740	13.4302	7.1310	2.0716	0.0000
N	0.3	0.0000	0.1651	0.3406	0.4360	0.4491	0.3978	0.3079	0.2524	0.1928	0.1289	0.0000
F	0.3	0.0000	4.5034	9.2576	14.4846	19.3470	6.9288	4.2478	2.5766	0.9598	0.2267	0.0000
L	0.3	0.0000	-0.1602	-0.3376	-0.4423	0.3540	0.2366	0.1474	0.0796	0.0338	0.0081	0.0000
U	0.3	0.0000	4.6258	7.2641	5.8996	1.5250	9.0984	10.8944	8.8547	5.2252	1.6164	0.0000
E	0.3	0.0000	0.1777	0.3347	0.4491	0.4626	0.3650	0.2476	0.1277	0.0426	0.0135	0.0000
N	0.4	0.0000	2.9934	6.2532	10.0262	14.5190	9.8733	6.1524	3.3555	1.4417	0.3477	0.0000
C	0.4	0.0000	-0.1419	-0.2834	-0.4262	-0.5584	0.1167	0.2080	0.1196	0.0542	0.0136	0.0000
I	0.4	0.0000	8.3261	15.0867	18.6727	17.3699	9.3576	-0.7093	2.5611	2.4497	0.9396	0.0000
A	0.4	0.0000	0.1511	0.2885	0.3978	0.4626	0.4638	0.3906	0.2715	0.1434	0.0415	0.0000
P	0.5	0.0000	1.6595	3.5800	6.0115	9.1808	13.2751	8.4226	4.6402	2.0506	0.5048	0.0000
R	0.5	0.0000	-0.1253	-0.2520	-0.3805	-0.5098	-0.6363	0.2464	0.1458	0.0678	0.0177	0.0000
A	0.6	0.0000	10.0166	18.8734	25.3478	28.0988	25.6272	16.2597	6.1661	-1.4127	-0.0210	0.0000
A	0.6	0.0000	0.1138	0.2193	0.3079	0.3690	0.3906	0.3561	0.2651	0.1459	0.0434	0.0000
A	0.6	0.0000	0.4758	1.1935	2.3915	4.3003	7.1342	11.0789	6.2740	2.8017	0.7031	0.0000
S	0.6	0.0000	-0.1120	-0.2265	-0.3450	-0.4679	-0.5931	-0.7157	0.1729	0.0824	0.0220	0.0000
E	0.7	0.0000	9.9093	19.0246	26.4893	31.3269	32.3941	28.3510	17.0561	-0.5931	-1.3334	0.0000
C	0.7	0.0000	0.0733	0.1424	0.2024	0.2478	0.2715	0.2651	0.2165	0.1303	0.0409	0.0000
A	0.7	0.0000	0.5944	0.9743	1.3219	1.6000	1.8000	1.9298	1.9298	1.8000	1.6000	0.0000
O	0.7	0.0000	-0.1027	-0.2064	-0.3195	-0.4369	-0.5597	-0.6841	-0.8025	-0.9664	-0.0262	0.0000
A	0.8	0.0000	8.1539	15.8316	22.5056	27.5478	30.1879	29.4819	24.2960	-13.3128	-3.0651	0.0000
A	0.8	0.0000	0.0367	0.0716	0.1028	0.1277	0.1434	0.1459	0.1303	0.0911	0.0322	0.0000
A	0.8	0.0000	-1.5909	-2.9993	-4.0325	-4.4724	-4.1033	-2.6401	0.1968	4.7212	1.2263	0.0000
A	0.8	0.0000	-0.0972	-0.1978	-0.3043	-0.4183	-0.5391	-0.6635	-0.7749	-0.8923	0.0300	0.0000
A	0.9	0.0000	4.6383	8.4657	13.6408	17.0618	19.3406	19.9810	14.3050	-13.7488	-5.2745	0.0000
A	0.9	0.0000	0.0102	0.0200	0.0289	0.0363	0.0415	0.0434	0.0409	0.0322	0.0157	0.0000
A	0.9	0.0000	-2.5494	-4.9510	-7.0382	-8.4411	-9.4411	-9.2208	-7.5947	-4.1658	1.5396	0.0000
A	0.9	0.0000	-0.0950	-0.1934	-0.2980	-0.4104	-0.5302	-0.6544	-0.7765	-0.8861	-0.9676	0.0000
A	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	1.0	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	1.0	0.0000	-3.4974	-6.8801	-10.0112	-12.7101	-14.7324	-15.7532	-15.2542	-13.0164	-8.1317	0.0000
A	1.0	0.0000	-0.0347	-0.1927	-0.2971	-0.4092	-0.5286	-0.6529	-0.7751	-0.8850	-0.9670	-1.0000

$$S = \sqrt{\frac{z \cdot b}{4EI}}$$

$$\varphi = \frac{S^2}{n} \cdot \frac{P}{4EI}$$

$$p = \frac{P}{4EI}$$

$$M = \frac{P \cdot L}{4}$$

$$V = \frac{P}{4}$$

TABELA 5.03

ESTRUTURA 5

Esforço externo: Força Concentrada



x/L	z/L	100η _φ n _p	100η _x n _y	LINHA DE ESTAÇÃO PARA ESFORÇO APLICADO EM						(LEI NA VERTICAL)					
				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
0.0000	0.0000	0.0000	0.0000	36.7436	54.4773	58.6655	53.9567	44.1057	32.0379	19.0951	9.7184	2.6321	0.0000		
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
0.0000	0.0000	0.0000	0.0000	0.7508	0.5412	0.3603	0.2205	0.1206	0.0556	0.0142	0.0031	-0.0006	0.0000		
0.0000	0.0000	0.0000	0.0000	27.2352	47.6769	54.1236	51.1650	42.5693	31.3201	19.7426	9.6736	2.6378	0.0000		
0.0000	0.0000	0.0000	0.0000	0.2094	0.3263	0.3572	0.3314	0.2725	0.1968	0.1245	0.0667	0.0165	0.0000		
0.0000	0.0000	0.0000	0.0000	7.6252	5.4683	3.6638	2.2613	1.2520	0.5909	0.2124	0.0408	-0.0032	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.2302	0.5579	0.3784	0.2373	0.1343	0.0657	0.0254	0.0061	0.0002	0.0000		
0.0000	0.0000	0.0000	0.0000	10.9471	26.8676	40.0513	42.3755	37.6193	26.9160	16.6297	9.4240	2.6344	0.0000		
0.0000	0.0000	0.0000	0.0000	0.3293	0.5868	0.6567	0.6271	0.5251	0.3680	0.2454	0.1206	0.0330	0.0000		
0.0000	0.0000	0.0000	0.0000	5.4516	11.2557	7.6400	4.8511	2.7749	1.3798	0.5469	0.1422	0.0100	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.2026	-0.3964	0.4298	0.2856	0.1745	0.0952	0.0439	0.0152	0.0027	0.0000		
0.0000	0.0000	0.0000	0.0000	0.2914	3.4326	15.1013	26.3901	28.2588	24.0984	16.7941	6.8626	2.5602	0.0000		
0.0000	0.0000	0.0000	0.0000	0.3572	0.6567	0.8354	0.8462	0.7336	0.5552	0.3575	0.1781	0.0492	0.0000		
0.0000	0.0000	0.0000	0.0000	3.5973	7.5967	12.3430	8.0616	4.2192	2.5550	1.1301	0.3630	0.0502	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.1678	-0.3340	-0.4943	0.3601	0.2379	0.1426	0.0742	0.0301	0.0066	0.0000		
0.0000	0.0000	0.0000	0.0000	-7.3347	-11.6551	-9.8522	1.3674	12.8919	15.6622	12.6820	7.4962	2.3123	0.0000		
0.0000	0.0000	0.0000	0.0000	0.3314	0.6271	0.8462	0.8567	0.7336	0.5552	0.3575	0.1781	0.0492	0.0000		
0.0000	0.0000	0.0000	0.0000	2.0955	4.5844	7.8265	12.1079	7.5908	4.2820	2.0674	0.7634	0.1516	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.1330	-0.2650	-0.4089	-0.5493	0.3167	0.2049	0.1142	0.0566	0.0125	0.0000		
0.0000	0.0000	0.0000	0.0000	-11.0437	-20.0092	-24.6514	-22.4236	-10.4416	2.1232	6.0624	4.5548	1.7484	0.0000		
0.0000	0.0000	0.0000	0.0000	0.2725	0.5251	0.7336	0.8462	0.7336	0.5552	0.3575	0.1781	0.0492	0.0000		
0.0000	0.0000	0.0000	0.0000	0.9224	2.1933	4.1460	7.0776	11.2183	6.4651	3.4534	1.3516	0.3114	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.1026	-0.2109	-0.3291	-0.4579	-0.5929	0.2767	0.1634	0.0757	0.0197	0.0000		
0.0000	0.0000	0.0000	0.0000	-12.1731	-23.0608	-31.1910	-34.7363	-31.4020	-18.3563	-4.8097	0.3166	0.6911	0.0000		
0.0000	0.0000	0.0000	0.0000	0.1988	0.3680	0.5552	0.6818	0.7406	0.6939	0.5190	0.2865	0.0654	0.0000		
0.0000	0.0000	0.0000	0.0000	0.0205	0.3244	1.1937	2.9043	5.7109	9.6202	5.3474	2.2872	0.5482	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.0790	-0.1651	-0.2643	-0.3799	-0.5109	-0.6505	0.2155	0.1037	0.0279	0.0000		
0.0000	0.0000	0.0000	0.0000	-11.3120	-21.9542	-31.0019	-37.5112	-39.85796	-35.0499	-21.0036	-6.8184	-1.0635	0.0000		
0.0000	0.0000	0.0000	0.0000	0.1245	0.2454	0.3575	0.4515	0.5125	0.5190	0.4412	0.2677	0.0647	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.6826	-1.1570	-1.2050	-0.9312	-0.9365	3.6376	7.7534	3.4663	0.8698	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.0629	-0.1335	-0.2187	-0.3231	-0.4478	-0.5890	-0.7356	0.1318	0.0364	0.0000		
0.0000	0.0000	0.0000	0.0000	3.8643	-17.4811	-25.4649	-32.1587	-36.5111	-36.9742	-31.4398	-17.2376	-3.7279	0.0000		
0.0000	0.0000	0.0000	0.0000	0.0607	0.1206	0.1781	0.2298	0.2692	0.2865	0.2677	0.1944	0.0702	0.0000		
0.0000	0.0000	0.0000	0.0000	-1.2604	-2.3914	-3.2446	-3.6345	-3.3265	-2.0308	0.5918	4.9087	1.2749	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.9537	-0.1155	-0.1922	-0.2893	-0.4089	-0.5486	-0.6996	-0.8445	0.0443	0.0000		
0.0000	0.0000	0.0000	0.0000	5.0616	-10.0991	-15.0095	-19.5323	-23.1734	-25.1359	-24.2651	-19.0210	-7.4957	0.0000		
0.0000	0.0000	0.0000	0.0000	0.0185	0.0330	0.0492	0.0646	0.0775	0.0854	0.0647	0.0762	0.0358	0.0000		
0.0000	0.0000	0.0000	0.0000	-1.7754	-3.5022	-5.1018	-6.4433	-7.3161	-7.4100	-6.3029	-3.4657	1.7486	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.0501	-0.1062	-0.1514	-0.2752	-0.3922	-0.5306	-0.6824	-0.8312	-0.9502	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000		
0.0000	0.0000	0.0000	0.0000	-2.2726	-4.5754	-6.9032	-9.1791	-11.2166	-12.6942	-13.1047	-11.7532	-7.7429	0.0000		
0.0000	0.0000	0.0000	0.0000	-0.0445	-0.1070	-0.1797	-0.2730	-0.3896	-0.5277	-0.6794	-0.8267	-0.9488	-1.0000		

$$S = \sqrt{\frac{Ib}{4EI}}$$

$$\varphi = \eta_c \frac{S^2}{RE} P$$

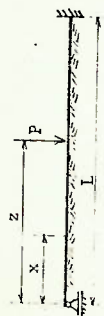
$$P = \eta_p \frac{P}{BL}$$

$$N = \eta_N PL$$

$$V = \eta_V P$$

TABELA 5.09

ESTRUTURA 5
Esforço externo: Força Concentrada



SL=5.50

LIQUA DE ESTADO PARA ESFORÇO APLICADO EM \rightarrow (L.F. NA VERTICAL)

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
L	0.1	0.0000	60.3015	59.3075	38.2549	17.8849	4.8676	-1.0401	-2.4461	-1.7355	-0.5707	0.0000
A	0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.4	0.0000	0.4919	0.1510	-0.0151	-1.0651	-0.0590	-0.0385	-0.0167	-0.0051	-0.0006	0.0000
F	0.5	0.0000	29.6533	49.2747	38.5845	21.5458	8.3782	1.1754	-1.4611	-1.4024	-0.5237	0.0000
C	0.6	0.0000	1.5186	1.6965	1.1629	0.5791	0.1534	-0.0053	-0.0636	-0.0492	-0.0168	0.0000
I	0.7	0.0000	5.2077	1.8047	0.0422	-3.5587	-0.5625	-0.3691	-0.1785	-0.0593	-0.0092	0.0000
N	0.8	0.0000	-0.4245	0.2383	0.0429	-0.0371	-0.0507	-0.0375	-0.0201	-0.0076	-0.0015	0.0000
F	0.9	0.0000	-11.9251	8.9284	32.5486	29.0303	17.7423	7.8961	2.1180	-0.1056	-0.2809	0.0000
C	1.0	0.0000	1.6965	2.6813	2.2749	1.3447	0.5672	0.1167	-0.0600	-0.0753	-0.0295	0.0000
I	0.1	0.0000	1.5042	5.2490	1.2448	-0.5219	-0.9285	-0.7362	-0.4152	-0.1660	-0.0349	0.0000
N	0.2	0.0000	-0.2536	-0.5327	0.2162	0.0572	-0.0156	-0.0338	-0.0272	-0.0142	-0.0039	0.0000
F	0.3	0.0000	20.7150	-27.7364	-0.6196	28.7168	28.4855	18.4672	8.6576	2.9071	0.4391	0.0000
C	0.4	0.0000	1.1629	2.2749	2.8623	2.2603	1.2725	0.5062	0.0573	-0.0383	-0.0293	0.0000
I	0.5	0.0000	0.0404	1.2425	4.6621	0.8741	-0.6948	-0.5644	-0.6991	-0.3429	-0.0693	0.0000
N	0.6	0.0000	-0.1082	-0.2758	-0.5187	0.2374	0.0737	-0.0053	-0.0270	-0.0206	-0.0070	0.0000
F	0.7	0.0000	-16.6990	-30.2192	-31.5129	-1.1719	29.3744	29.1152	18.5919	8.3221	1.9915	0.0000
C	0.8	0.0000	0.5791	1.3447	2.2603	2.7873	2.1930	1.2369	0.5072	0.1252	0.0000	0.0000
I	0.9	0.0000	-0.5629	-0.5294	0.8665	4.5015	0.8294	-0.0554	-0.8645	-0.5476	-0.1700	0.0000
N	1.0	0.0000	-0.0222	-0.0943	-0.2549	0.2466	0.2466	0.0793	0.0607	-0.0176	-0.0086	0.0000
F	0.1	0.0000	-9.4699	-20.3655	-30.6363	-30.6870	-0.4650	29.2916	27.6669	15.6146	4.5201	0.0000
C	0.2	0.0000	0.1834	0.5672	1.2725	2.1930	2.7434	2.1676	1.2176	0.4651	0.1615	0.0000
I	0.3	0.0000	-0.5705	-0.9417	-0.7176	0.8066	4.5190	0.9093	-0.4966	-0.6106	-0.2403	0.0000
N	0.4	0.0000	0.0141	-0.0012	-0.0786	-0.2465	-0.4992	0.2493	0.0647	0.0110	-0.0039	0.0000
F	0.5	0.0000	3.6637	-9.7851	-19.3304	-29.4736	-30.2730	-1.5637	25.6676	21.0975	7.3795	0.0000
C	0.6	0.0000	-0.0093	0.1147	0.5082	1.2369	2.1676	2.6996	2.0726	-1.0535	0.2826	0.0000
I	0.7	0.0000	0.3776	-0.7568	-1.0086	-0.7221	0.8419	4.6116	1.1026	-0.1703	-0.2018	0.0000
N	0.8	0.0000	0.0213	0.0303	0.0076	-0.0754	-0.2462	-0.4996	0.2496	0.0865	0.0146	0.0000
F	0.9	0.0000	-0.3221	-2.5493	-8.3525	-18.2512	-29.4559	-32.4140	-7.2087	15.4760	6.2491	0.0000
C	1.0	0.0000	0.0636	-0.0600	0.0973	0.5072	1.2176	2.0728	2.4615	1.6521	0.5268	0.0000
I	0.1	0.0000	-0.1625	-0.4361	-0.7611	-0.9932	-0.6955	0.9006	4.7399	1.3276	0.1252	0.0000
N	0.2	0.0000	0.0168	0.0313	0.0351	0.0050	-0.0772	-0.2534	-0.5155	0.2232	0.0549	0.0000
F	0.3	0.0000	0.7951	0.9792	1.3611	7.5595	18.44037	-31.6488	-38.1517	-17.5935	2.2272	0.0000
C	0.4	0.0000	-0.0492	-0.0753	-0.0383	0.1252	0.4851	1.0535	1.6521	1.7146	0.7132	0.0000
I	0.5	0.0000	-0.0453	-0.1601	-0.3932	-0.7273	-0.9951	-0.7671	0.7204	4.4355	0.9766	0.0000
N	0.6	0.0000	0.0109	0.0237	0.0363	0.0379	0.0051	-0.0973	-0.3021	-0.6002	0.1185	0.0000
F	0.7	0.0000	0.9694	1.6174	1.2874	-1.2100	-7.4036	-18.1535	-31.3306	-38.0697	-18.1686	0.0000
C	0.8	0.0000	-0.0168	-0.0298	-0.0290	0.0052	0.1615	0.2826	0.5268	0.7132	0.5106	0.0000
I	0.9	0.0000	0.0441	0.0456	-0.0516	-0.3141	-0.7792	-1.3590	-1.6597	-0.8464	-2.5107	0.0000
N	1.0	0.0000	0.0076	0.0183	0.0322	0.0426	0.0316	-0.0340	-0.1949	-0.4735	-0.6146	0.0000
F	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000
C	0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.3	0.0000	0.1153	0.2201	0.2626	0.1139	-0.4392	-1.6272	-3.4806	-5.3940	-5.4631	0.0000
N	0.4	0.0000	0.0070	0.0172	0.0311	0.0426	0.0348	-0.0244	-0.1763	-0.4477	-0.7934	-1.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta_4 \frac{s^2}{kb} P$$

$$P = \eta_P \frac{P}{bl}$$

$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 5.10

ESTRUTURA 5

SL=6.00 Esforço externo: Força Concentrada

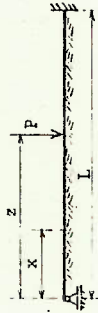


x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (CLER NA VERTICAL)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
0.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	100n _z	61.9737	56.1384	32.1840	12.2427	1.4036	-2.3814	-2.4979
0.1	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	100n _z	28.0689	47.0769	34.1840	16.7801	4.9106	-0.5618	-1.8748
0.2	100n _y	1.8333	1.9180	1.1860	0.4965	0.0928	-0.0641	-0.0427
0.3	100n _z	4.8317	1.4237	-0.1802	-0.5913	-0.4615	-0.2591	-0.0738
0.3	100n _y	-0.4454	0.2077	0.0212	-0.0433	-0.0456	-0.0283	-0.0122
0.4	100n _z	-14.8959	6.1135	31.6631	26.8247	14.7646	5.3574	0.5886
0.4	100n _y	1.9180	3.0162	2.4141	1.2778	0.4308	0.0067	-0.1133
0.5	100n _z	1.4234	4.7011	0.8316	-3.6618	-0.8495	-0.5711	-0.2661
0.5	100n _y	-0.2453	-0.5335	0.2018	0.0423	-0.0224	-0.0329	-0.0226
0.6	100n _z	-21.9499	-30.3011	-1.2427	29.6203	27.2029	15.7742	6.3066
0.6	100n _y	1.1860	2.4141	3.1074	2.3465	1.1900	0.3767	-0.0012
0.7	100n _z	0.1811	0.8305	4.2181	0.5725	-0.7503	-0.8498	-0.5401
0.7	100n _y	-0.3981	-0.2512	-0.45125	0.2225	0.0548	-0.0168	-0.0302
0.8	100n _z	-15.3228	-29.2806	-32.3029	-0.8478	30.5801	27.9187	16.0621
0.8	100n _y	0.4955	1.2778	2.3465	3.0175	2.2863	1.1664	0.3767
0.9	100n _z	-0.5935	-0.6654	0.5685	4.1252	0.5689	-0.7156	-0.7919
0.9	100n _y	-0.3063	-0.0671	-0.2307	-0.5000	0.2275	0.0369	-0.0437
1.0	100n _z	-7.3130	-17.3489	-28.8014	-31.2419	-0.0786	30.6884	27.1351
1.0	100n _y	0.4308	0.4308	1.1900	2.2863	2.9893	2.2801	1.1753
1.0	100n _z	-0.4845	-0.8566	-0.7625	0.5560	4.1468	0.6163	-0.6195
1.0	100n _y	0.0211	0.0147	-0.0550	-0.2202	-0.4997	0.2283	0.0613
1.0	100n _z	-1.9450	-6.7825	-16.1460	-27.7596	-30.7767	28.2083	22.1032
1.0	100n _y	-0.0041	0.0041	0.3767	1.1684	2.2501	2.8742	2.2301
1.0	100n _z	-0.2619	-0.5807	-0.6723	-0.7582	4.1984	0.7533	-0.3492
1.0	100n _y	0.0209	0.0335	0.0195	-0.0546	-0.2272	-0.4998	0.2311
1.0	100n _z	-0.5047	-0.7399	-5.5937	-15.2212	-27.4725	-32.0749	-5.1644
1.0	100n _y	-0.0827	-0.1133	-0.0612	0.3906	1.1753	2.2301	2.7965
1.0	100n _z	-0.0923	-0.2769	-0.5685	-0.7471	0.6123	4.3204	1.0071
1.0	100n _y	-0.0128	0.0265	0.0351	0.0195	-0.0556	-0.2304	-0.4507
1.0	100n _z	-1.0908	1.5300	0.1564	-4.8283	-14.9917	-26.5463	-37.2113
1.0	100n _y	-0.3501	-0.0901	-0.0668	0.0436	0.4666	1.6726	1.6731
1.0	100n _z	-0.3008	-0.0626	-0.2409	-0.5485	-0.8421	-0.7734	4.1903
1.0	100n _y	0.0060	0.0156	0.0291	0.0381	0.0197	-0.0663	-0.2647
1.0	100n _z	0.7671	1.4877	1.7217	0.2988	-4.7009	-15.0439	-29.2590
1.0	100n _y	-0.0149	-0.0306	-0.0401	-0.0213	0.0665	0.2692	0.5179
1.0	100n _z	0.0405	0.0585	0.0122	-0.1648	-0.5339	-1.0546	-1.3960
1.0	100n _y	0.0029	0.0096	0.0223	0.0376	0.0403	-0.0034	-0.1440
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	100n _y	0.0000	0.0000	0.0000				

TABELA 5.12

ESTRUTURA 5

Esforço externo: Força Concentrada



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →					(LEVA NA VERTICAL)					0.8	0.9	1.0		
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0					
L	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\phi = \eta \phi \frac{P}{kb}$$

$$P = \eta_P \frac{P}{BL}$$

$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 5.16

ESTRUTURA 5

Esforço externo: Momento

SL=2.00

x/L	z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
I	0.0	175.8109	103.7439	47.0914	4.7300	-24.7606	-42.9243	-51.0387	-50.1976	-41.1573	-24.3618	0.0000
N	0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.0	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.0	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.1	103.7439	111.7055	54.0544	10.7453	-19.8240	-39.0379	-48.1661	-48.2391	-39.9889	-23.6477	0.0000
N	0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.1	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.1	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.2	47.0914	54.0544	74.7854	28.7697	-4.8804	-27.2457	-39.3878	-42.2050	-36.3533	-22.2479	0.0000
N	0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.2	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.2	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.3	4.7300	10.7453	26.7697	58.7000	20.2406	-7.1729	-24.2417	-31.6325	-29.8667	-19.2735	0.0000
N	0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.3	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.3	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.4	-24.7606	-19.8240	-4.8804	20.2406	55.7495	21.7206	-2.0203	-15.7933	-19.6915	-4.6149	0.0000
N	0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.4	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.4	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.5	-42.9243	-39.0379	-27.2457	-7.1729	20.2406	60.0114	26.1315	6.2377	-5.6597	-7.7609	0.0000
N	0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.5	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.5	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.6	-51.0387	-48.1661	-39.3878	-24.2417	-2.0203	28.1315	67.0735	35.4799	13.7053	1.6710	0.0000
N	0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.6	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.6	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.7	-50.1976	-48.2391	-39.9889	-29.8667	-19.6915	-5.6597	-35.4799	72.0052	39.2540	14.9100	0.0000
N	0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.7	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.7	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.8	-41.1573	-39.9889	-36.3533	-31.6325	-26.1315	-2.0203	28.1315	67.0735	35.4799	13.7053	0.0000
N	0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.8	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.8	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	0.9	-24.3618	-23.3477	-22.2479	-19.2735	-14.6149	-7.7609	-1.6710	14.9100	31.9694	53.5632	0.0000
N	0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	0.9	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	0.9	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000
I	1.0	-41.1573	-39.9889	-36.3533	-31.6325	-26.1315	-2.0203	28.1315	67.0735	35.4799	13.7053	0.0000
N	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H	1.0	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A	1.0	-1.9939	-1.9224	-1.7439	-1.5042	-0.9687	-0.7148	-0.4663	-0.2894	-0.2894	-0.1269	0.0000

$$S = \sqrt{\frac{4}{48EI}}$$

$$\varphi = n_0 \frac{S}{kb}$$

$$p = n_0 p \frac{M}{bL^2}$$

$$M = n_0 M$$

$$V = n_0 V$$

TABELA 5.19

ESTRUTURA 5

Esforço externo: Momento



SL=3.50

x/L	z/L	100n _φ	100n _p	100n _v	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	0.0	199.7852	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	0.0	-3.4994	-3.1593	-2.4378	-1.6476	-0.9561	-0.4305	-0.0792	0.1172	0.1843	0.1419	0.0000	0.0000	0.0000
0.1	0.1	83.6472	105.7490	28.7689	14.4979	33.5710	37.2618	32.5406	24.2246	-15.2144	-6.9622	0.0000	0.0000	0.0000
0.1	0.1	5.9108	3.9092	0.7477	-0.9534	-1.6341	-1.6472	-1.0172	1.0040	1.7424	1.3758	0.0000	0.0000	0.0000
0.1	0.1	66.2011	69.0217	24.2815	-16.8544	-9.8445	-4.5915	1.0040	0.0000	0.1539	0.1286	0.0000	0.0000	0.0000
0.1	0.1	-3.1625	-2.9717	-2.4065	-1.6994	-1.0402	-0.5160	-0.1501	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.2	11.7567	28.7689	79.3620	20.9592	-12.0501	-26.7369	-29.6397	-25.7981	-18.5478	-9.7079	0.0000	0.0000	0.0000
0.2	0.2	7.8190	6.6572	2.9489	-0.9026	-2.6692	-3.0904	-2.7589	-2.0698	-1.3348	-0.6225	0.0000	0.0000	0.0000
0.2	0.2	37.9802	41.8568	52.3050	34.1787	-21.2735	-10.8469	-3.4654	0.9059	2.8598	2.4782	0.0000	0.0000	0.0000
0.2	0.2	-2.4503	-2.4159	-2.2597	-1.6049	-1.2630	-0.7586	-0.3598	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.3	-26.0946	-14.4979	20.9592	81.5758	27.2106	-5.4636	-21.5549	-26.0090	-22.5941	-13.5961	0.0000	0.0000	0.0000
0.3	0.3	7.4067	6.8600	4.9969	1.2040	-2.4142	-3.8271	-3.8822	-3.2107	-2.2178	-1.1197	0.0000	0.0000	0.0000
0.3	0.3	17.3883	21.1387	31.8304	47.5655	-35.2649	-20.1379	-8.6435	-1.1263	2.0278	2.9379	0.0000	0.0000	0.0000
0.3	0.3	-1.6754	-1.7247	-1.8216	-1.8115	-1.5312	-1.1120	-0.6947	-0.3530	-0.1186	-0.0000	0.0000	0.0000	0.0000
0.4	0.4	-40.3634	-33.5710	12.0501	27.2106	87.7687	31.4050	-3.6365	-21.1480	-24.8674	-17.4674	0.0000	0.0000	0.0000
0.4	0.4	5.9177	5.7597	5.1097	3.4507	-0.0307	-3.3362	-4.4674	-4.2481	-3.2475	-1.7674	0.0000	0.0000	0.0000
0.4	0.4	4.1163	7.1737	16.1916	30.5257	48.5064	-33.1547	-17.6599	-6.4429	0.1654	2.2273	0.0000	0.0000	0.0000
0.4	0.4	-1.0041	-1.0669	-1.3045	-1.5593	-1.6751	-1.4633	-1.1185	-0.7277	-0.3911	-0.1446	0.0000	0.0000	0.0000
0.5	0.5	-40.3759	-37.2618	26.7369	-5.4636	31.4050	68.8799	29.9528	-5.9955	-21.5418	-19.1073	0.0000	0.0000	0.0000
0.5	0.5	4.1501	4.2001	4.2251	3.8481	2.4426	-0.8387	-3.9703	-4.8270	-2.5827	-0.0000	0.0000	0.0000	0.0000
0.5	0.5	-3.2596	-1.0685	5.5806	16.7833	32.2545	50.0588	-31.0546	-15.9746	-5.1547	-0.2019	0.0000	0.0000	0.0000
0.5	0.5	-0.5007	-0.5876	-0.8326	-1.1827	-1.5344	-1.7126	-1.5524	-1.1893	-0.7681	-0.3025	0.0000	0.0000	0.0000
0.6	0.6	-33.1777	-32.5406	29.6397	-21.5549	3.6385	29.9528	85.1236	25.8351	7.73567	15.6373	0.0000	0.0000	0.0000
0.6	0.6	2.5574	2.6037	2.9847	3.2191	2.9679	1.6234	-1.5846	-4.5240	-4.89401	-3.3527	0.0000	0.0000	0.0000
0.6	0.6	-8.4698	-5.1059	-0.8336	6.8046	18.2834	33.6303	51.7364	-30.3035	-15.4973	-5.2523	0.0000	0.0000	0.0000
0.6	0.6	-0.1674	-0.2452	-0.4711	-0.8237	-1.2513	-1.8523	-1.8500	-1.6708	-1.2337	-0.6605	0.0000	0.0000	0.0000
0.7	0.7	-23.4630	-24.2248	25.7981	-26.0090	-21.1480	-5.9955	25.8351	60.9230	24.1342	-2.8436	0.0000	0.0000	0.0000
0.7	0.7	1.3401	1.4602	1.7790	2.1655	2.3611	2.0390	0.8948	-2.3291	-4.6546	-3.7908	0.0000	0.0000	0.0000
0.7	0.7	-7.0906	-6.4345	-4.2600	0.0103	7.1884	18.0508	32.9294	50.5961	-30.3117	-13.6287	0.0000	0.0000	0.0000
0.7	0.7	0.0235	0.0410	-0.2343	-0.5529	-0.9776	-1.4554	-1.8736	-2.0331	-1.7247	-1.0222	0.0000	0.0000	0.0000
0.8	0.8	-13.9594	-15.2144	18.5478	-22.5941	-24.8670	-21.5418	-7.3567	24.1342	79.6455	24.2728	0.0000	0.0000	0.0000
0.8	0.8	0.5417	0.6156	0.8203	1.1005	1.3510	1.4007	0.9955	-0.1823	-2.45266	-3.3919	0.0000	0.0000	0.0000
0.8	0.8	-6.3360	-6.2710	-5.8862	-4.6189	-4.5316	4.4516	14.0523	29.9220	50.3718	-25.7270	0.0000	0.0000	0.0000
0.8	0.8	0.1142	0.0596	-0.1069	-0.3908	-0.7787	-1.2769	-1.7770	-2.1383	-2.1035	-1.3910	0.0000	0.0000	0.0000
0.9	0.9	-5.8836	-6.9622	-9.7079	-13.5961	-17.4074	-19.1073	-15.6373	-2.8436	24.2728	70.7387	0.0000	0.0000	0.0000
0.9	0.9	0.1209	0.1443	0.2108	0.3072	0.4078	0.4602	0.4198	0.1672	-0.4083	-1.4321	0.0000	0.0000	0.0000
0.9	0.9	-5.0081	-5.4605	-6.6627	-8.1246	-9.9535	-7.7754	-2.6947	8.5958	28.45272	58.5120	0.0000	0.0000	0.0000
0.9	0.9	0.1444	0.0946	-0.0585	-0.3236	-0.7045	-1.1443	-1.7031	-2.1294	-2.2305	-1.6486	0.0000	0.0000	0.0000
1.0	1.0	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	1.0	-3.5343	-4.4794	-7.1952	-11.2625	-15.8927	-19.4954	-19.6145	-12.8483	8.1318	42.0745	100.0000	0.0000	0.0000
1.0	1.0	0.1483	0.0994	-0.0515	-0.3131	-0.6903	-1.1677	-1.6877	-2.1221	-2.2422	-1.6951	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4EI}{KB}}$$

$$\varphi = n \frac{S^3}{L^3} M$$

$$P = n \frac{M}{L^2}$$

$$M = n M$$

$$V = n \frac{M}{L}$$

TABELA 5.21

ESTRUTURA 5



x/L	z/L	100n _φ	100n _p	100n _M	LINHA DE ESTADO PARA	ESFORÇO APLICADO EM			ESFORÇO externo: Momento			(LEK NA VERTICAL)	0.8	0.9	1.0	
						0.1	0.2	0.3	0.4	0.5	0.6					0.7
L 0.1	0.0	199.8766	0.0000	0.0000	39.1752	39.4321	29.0333	-16.8558	7.6624	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.1	0.0	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D 0.1	0.0	4.5015	-3.8329	-2.5704	-1.3915	-0.5496	-0.0606	0.1594	0.2115	0.1753	0.0983	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.1	0.1	59.2515	93.3266	10.0050	-26.3896	34.2188	-28.2699	-18.1744	-8.69165	-2.5554	0.4118	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.1	0.1	11.2217	6.4395	-0.4993	3.1846	3.4381	-2.6255	-1.5774	-0.7005	-0.1376	0.0919	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.1	0.1	57.3985	62.6235	-25.8693	-14.4907	-1.0458	-0.0000	1.3356	2.0046	1.7359	1.0012	0.0000	0.0000	0.0000	0.0000	0.0000
D 0.2	0.1	3.8336	-3.5368	-2.6130	-1.5604	-0.7254	-0.1924	0.0815	0.1779	0.1696	0.1035	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.2	0.1	13.2072	10.0060	60.0946	14.8304	-15.4865	-23.6984	-20.7112	-13.8486	-7.1430	-2.3497	0.0000	0.0000	0.0000	0.0000	0.0000
H 0.2	0.1	12.6795	10.7214	3.2495	-3.9500	-5.8313	-5.0436	-3.3523	-1.7200	-0.5576	0.0183	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.2	0.1	23.2291	31.5111	48.1159	-31.9665	-15.5273	-4.7017	1.0762	3.2816	3.3105	2.0604	0.0000	0.0000	0.0000	0.0000	0.0000
D 0.3	0.1	2.5740	-2.6157	-2.5287	-1.9483	-1.8052	-1.1740	-0.5792	0.0606	0.1384	0.1111	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.3	0.1	39.1752	26.3898	14.8304	90.9019	25.1013	-8.3614	-20.0325	-19.6821	-14.1224	-7.0786	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.3	0.1	10.2250	9.6905	7.2627	0.5795	-0.2761	-5.9236	-5.2578	-3.2541	-1.5132	-0.3965	0.0000	0.0000	0.0000	0.0000	0.0000
F 0.3	0.1	5.5885	10.6845	25.3748	47.0464	-30.5941	-13.3346	-2.5486	3.7944	4.2823	3.1496	0.0000	0.0000	0.0000	0.0000	0.0000
L 0.3	0.1	1.3993	-1.5677	-1.9537	-2.1746	-1.8052	-1.1740	-0.5792	0.0606	0.0401	0.0956	0.0000	0.0000	0.0000	0.0000	0.0000
U 0.3	0.1	39.4321	34.2188	15.4865	25.1013	97.8246	28.2128	-8.3946	-21.8429	-21.6306	-13.4350	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.4	0.1	6.5145	6.7754	7.0166	5.5654	-0.2761	-5.9236	-6.6736	-5.2018	-3.1500	-1.3224	0.0000	0.0000	0.0000	0.0000	0.0000
N 0.4	0.1	3.9081	-0.6020	9.5463	26.6789	49.1806	-28.4042	-11.3941	-0.8635	3.6831	3.7794	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.4	0.1	3.5623	-0.7387	-1.2168	-1.8164	-2.1541	-1.8289	-1.1992	-0.6046	-0.1873	0.0117	0.0000	0.0000	0.0000	0.0000	0.0000
I 0.4	0.1	29.0333	-28.2699	-23.6984	-8.3614	28.2128	97.3073	24.9335	-13.0260	-25.4738	19.8728	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.4	0.1	3.3557	3.8664	5.1094	6.1409	5.1951	-0.4874	-6.1301	-6.89172	-5.3476	-2.8498	0.0000	0.0000	0.0000	0.0000	0.0000
P 0.5	0.1	6.8397	-5.1080	0.6007	11.5296	26.6805	50.9935	-26.7544	-9.0474	-0.1151	3.0358	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.5	0.1	0.0768	-0.2112	-0.6045	-1.2048	-1.8558	-2.2019	-1.8645	-1.2172	-0.6092	-0.1889	0.0000	0.0000	0.0000	0.0000	0.0000
S 0.5	0.1	16.8558	-8.1744	-20.7112	-20.0325	8.3946	24.9335	91.4668	17.8683	-18.0090	-22.6395	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.6	0.1	1.2724	1.7421	3.0339	4.7223	4.7425	-0.4925	-1.1164	-6.9072	-7.4533	-4.8359	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.6	0.1	6.3237	-5.6795	-3.2460	2.3610	12.9712	29.8904	52.1237	-25.6895	-9.2569	-0.5977	0.0000	0.0000	0.0000	0.0000	0.0000
S 0.6	0.1	0.1453	0.0615	-0.1997	-0.6529	-1.2753	-1.9317	-2.2773	-1.9316	-1.2547	-0.5710	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.7	0.1	7.0624	-8.9165	-13.8486	-19.6821	-21.9429	-13.0260	17.8683	83.4732	12.2766	-14.8228	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.7	0.1	3.2085	0.5251	1.4491	2.8519	4.3544	5.1064	3.5643	-2.5910	-7.9394	-6.6580	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.7	0.1	4.4494	-4.4321	-4.0159	-2.1186	2.9551	13.1691	29.8568	52.0155	-25.7221	-9.0569	0.0000	0.0000	0.0000	0.0000	0.0000
D 0.7	0.1	3.2119	0.1678	0.0192	-0.2746	-0.7537	-1.4081	-2.0991	-2.44563	-2.0472	-1.1515	0.0000	0.0000	0.0000	0.0000	0.0000
S 0.7	0.1	3.2850	-2.5554	-7.1430	-14.1224	-21.6306	-25.4738	-18.0090	12.2766	79.2267	13.9147	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.8	0.1	3.1288	0.0276	0.5029	1.4202	2.2916	3.1915	3.3013	1.4302	-4.0999	-6.9042	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.8	0.1	2.3059	-2.5993	-3.2825	-3.7210	-2.7489	1.3719	10.7445	27.1032	50.2285	-24.0472	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.8	0.1	3.2113	0.1906	0.1117	-0.0718	-0.4217	-0.9038	-1.7266	-2.4603	-2.6998	-1.8513	0.0000	0.0000	0.0000	0.0000	0.0000
S 0.8	0.1	1.3047	0.4114	-2.3497	-7.0786	-13.4350	-19.8728	-22.6395	-14.8228	13.9147	75.7706	0.0000	0.0000	0.0000	0.0000	0.0000
E 0.9	0.1	3.0863	-0.3442	0.0880	0.3209	3.6481	1.0680	1.2316	0.9283	-0.2418	-3.1135	0.0000	0.0000	0.0000	0.0000	0.0000
C 0.9	0.1	3.2594	-0.7034	-2.0016	-3.9818	-6.1249	-7.2539	-5.2148	3.2499	22.0779	54.3900	0.0000	0.0000	0.0000	0.0000	0.0000
A 0.9	0.1	3.1988	0.1875	0.1376	0.0034	-0.2810	-0.7781	-1.4985	-2.3188	-2.8673	-2.3990	0.0000	0.0000	0.0000	0.0000	0.0000
S 0.9	0.1	3.0000	0.3000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E 1.0	0.1	0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C 1.0	0.1	1.7040	1.1579	-0.6054	-3.8674	-3.7693	-14.7731	-19.8719	-19.6595	-6.6161	29.2552	100.0000	0.0000	0.0000	0.0000	0.0000
A 1.0	0.1	3.1955	0.1856	0.1402	0.0141	-0.2588	-0.7472	-1.4541	-2.2607	-2.8688	-2.44972	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\phi = \eta \phi \frac{S^3}{kb} M$$

$$P = \eta p \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 5.22

ESTRUTURA 5



Esforço externo: Momento

SL=5.00

x/L	z/L → 0.0	Linha de estado para esforço aplicado em → (LER NA VERTICAL)					0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5			
100n _φ	199.9366	-22.2047	-41.3564	-35.7620	-22.6563	-10.6431	1.3636	2.6507	0.6000
n _P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100n _M	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n _V	-5.0001	-2.5415	-1.1912	-3.3326	0.9849	0.2130	0.1258	0.0550	0.0000
	48.2394	3.4236	-29.0219	-32.0662	-23.2683	-12.6612	-4.5343	1.4802	0.0000
	14.5317	-1.7112	-4.6626	-4.3224	-2.8615	-1.4164	-0.4073	0.2329	0.0000
	53.2255	-25.8242	-12.7485	-4.0636	0.3749	1.9044	1.4696	0.5911	0.0000
	-4.1159	-2.6537	-1.4371	-0.5525	-0.0575	0.1444	0.1764	0.0672	0.0000
	-22.2047	62.0172	12.6390	-16.6608	-22.2457	-17.3007	-9.8660	-0.4641	0.0000
	15.4636	3.0649	-6.0431	-7.5306	-5.7570	-3.2750	-1.2782	0.3133	0.0000
	14.8636	27.3921	47.1796	-29.8909	-12.3619	-2.1175	3.3326	1.4627	0.0000
	-2.5433	-2.6551	-2.0156	-2.0156	-2.0156	-0.0855	0.0978	0.0965	0.0000
	-41.3564	-29.0219	94.3201	22.3035	-10.9791	-19.8709	-16.9856	-4.3276	0.0000
	11.1109	10.7976	8.4816	0.1697	-7.5114	-8.0036	-5.6613	-2.6551	0.0000
	1.5413	7.0891	23.3049	47.5505	-27.9372	-10.3168	0.5227	3.8894	0.0000
	-1.1951	-1.4408	-2.0185	-2.3942	-1.1954	-0.5297	-0.1064	0.0933	0.0000
	-35.7620	-16.6608	22.3035	99.8612	24.2777	-11.4410	-21.6047	-10.4601	0.0000
	6.1416	7.8798	6.9910	0.3473	7.5056	-7.7951	5.4272	-0.8447	0.0000
	-5.7102	-2.5734	7.4204	25.2125	49.45634	-26.3032	0.5011	4.0853	0.0000
	-0.3386	-0.5591	-1.1092	-1.9613	-2.4278	-2.0008	-0.5206	-0.0845	0.0000
	-22.6563	-23.2683	-10.9791	24.2777	99.8612	21.4313	-15.3691	-18.0343	0.0000
	-2.4710	3.2635	5.2992	6.9332	-0.2600	-7.9113	-5.5568	-2.6420	0.0000
	-6.7054	-0.7245	9.3354	25.7266	50.7596	-25.1697	7.4606	3.7197	0.0000
	-0.0783	-0.0663	-0.5037	-1.2089	-2.0199	-2.0199	-1.1938	-0.0644	0.0000
	-10.6431	-12.6612	-17.3007	-19.8709	-11.4410	21.4313	94.0311	-20.7050	0.0000
	0.4241	1.0300	2.7694	5.2591	7.3923	6.7616	-0.7738	-8.5788	0.0000
	-5.0910	-4.8652	-3.5588	0.6267	10.2603	27.5273	51.7290	-23.9648	0.0000
	0.2105	0.1373	-0.1055	-0.5686	-1.2667	-2.00630	-2.4996	-2.0341	0.0000
	-2.6146	-4.5343	-16.9856	-16.9856	-21.6047	-15.0455	85.7999	6.0262	0.0000
	-0.3596	-0.0095	1.0709	-2.8942	5.1341	6.7653	5.5432	-2.4633	0.0000
	-2.9479	3.1935	-3.5515	-2.8396	0.9680	10.4782	27.8184	52.1693	0.0000
	0.2053	0.1798	0.0787	-0.1645	-0.6300	-1.3476	-2.1719	-2.6441	0.0000
	1.3636	0.0927	-3.8360	-10.4584	-18.7266	-24.9164	-20.7050	8.7949	0.0000
	-0.3993	-0.2510	0.2375	-1.1586	4.0500	4.7950	2.8498	-4.7849	0.0000
	-1.1022	1.4649	-2.4000	-3.3646	-2.3139	0.0085	6.8677	25.7965	0.0000
	0.1633	0.1629	0.1378	0.0307	-0.2501	-0.7961	-1.6250	-2.9492	0.0000
	2.0507	1.4602	-0.4641	-4.3276	-10.4601	-18.0343	-23.2683	-19.0706	0.0000
	-3.1553	-0.1213	-0.0614	0.2494	0.6706	1.2324	1.7315	1.6586	0.0000
	0.3676	0.0433	-0.9613	-2.6017	-4.8034	-8.4479	-5.4761	1.7343	0.0000
	0.1348	0.1419	0.1461	0.0947	-0.0989	-0.5392	-1.2958	-2.2942	0.0000
	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000
	1.6745	1.4247	0.4861	-1.6542	-5.6227	-11.5214	-17.9756	-20.7050	100.0000
	0.1292	0.1374	0.1455	0.1027	-0.0762	-0.4964	-1.2338	-2.2271	0.0000

$$s = \sqrt[4]{\frac{kb}{4EI}}$$

$$\varphi = \eta_{\phi} \frac{s^3}{kb} M$$

$$p = \eta_{\rho} \frac{M}{bL^2}$$

$$M = \eta_M M$$

$$V = \eta_V \frac{M}{L}$$

TABELA 5.25

LSTRUURA 5

SL=6.50

Esforço externo: Momento

x/L	z/L →	100ηφ	100ηP	100ηM	100ηV	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LEFR NA VERTICAL)										0.8	0.9	1.0
						0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0			
L 0.1		199.9994	-37.9407	-36.9674	-23.3845	-6.8619	-0.1361	1.7692	1.5011	0.7009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		-6.5000	-2.1806	-0.5165	0.1651	0.2775	0.1841	0.0742	0.0077	-0.0140	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		19.9307	61.0287	29.1675	-21.9199	-10.2582	-2.5205	0.7537	1.3571	0.8617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		26.6963	11.0945	-7.8767	-5.7611	-2.2032	-0.2560	0.3547	0.4007	0.2080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		41.5593	53.6456	-6.8244	3.7086	2.4447	1.6237	0.8166	0.1446	-0.1071	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		-4.7549	-4.3403	-2.6357	-0.1192	0.1752	0.0963	0.0280	-0.0040	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		-37.9407	69.7978	6.5155	-19.0598	-17.5909	-9.3412	-2.8042	0.6056	1.0746	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		22.1893	18.9314	1.6156	-11.6844	-6.3175	-1.7864	0.1626	0.6744	0.4799	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		7.2902	19.1470	46.8204	-4.3745	2.5452	3.2834	1.9825	0.6808	-0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		-2.1808	-2.6358	-3.1676	-0.9971	-0.2187	0.0598	0.1332	0.0639	0.0299	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		-36.9674	29.1675	99.8946	10.8100	-18.2037	-17.9368	-9.6521	-2.7460	0.4476	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		11.1674	12.7105	13.1655	-0.5972	-11.2875	-5.5697	-1.8531	0.4226	0.7236	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		-5.2672	0.4629	18.9537	49.2692	-3.5112	2.7549	3.2107	1.8494	0.5855	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		-0.5168	-1.0081	-2.2389	-3.1575	-2.3381	-1.0816	-0.2565	0.0654	0.0914	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		-20.3645	-21.9199	-19.0588	10.7072	10.3331	-18.7584	-18.1423	-9.5200	-2.5783	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		3.2348	5.4039	10.4971	-0.2221	-13.3841	-10.9749	-5.2904	-1.1718	0.5070	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		-6.3661	-4.5634	-2.9051	20.6677	59.1295	-3.4861	2.7977	3.3300	1.8566	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		0.1647	-0.1199	-0.9985	-2.3398	-3.2438	-2.3792	-1.0630	0.1240	0.1598	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		-6.8619	10.2592	-17.5909	-18.2037	10.3331	99.9927	9.6384	-19.5327	-18.9441	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		0.3537	-1.0277	5.1342	10.8690	13.2773	0.0121	-13.2360	-10.6067	-5.0697	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		3.8580	-3.9252	-2.7460	3.7405	20.8882	50.1324	-20.4924	-3.0616	3.4430	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		0.2777	0.1747	-0.2210	-1.0867	-2.3854	-3.2521	-2.9573	-1.0329	0.1480	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		-0.1361	-2.5205	-9.3412	-17.9368	9.6384	98.6259	7.0410	-22.9269	-19.8890	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		1.1720	-0.6124	1.4184	5.5356	11.0922	13.3134	-0.1068	-13.4496	-11.1196	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		-1.4734	-2.0277	-3.0982	-2.5817	3.6506	20.8929	50.5204	-19.5241	-1.7085	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		0.1861	0.1778	0.0874	-0.2679	-1.1019	-2.3800	-3.2272	-2.3077	-0.1356	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		-1.7692	0.7537	-2.8042	-9.6521	-18.1423	-19.5327	7.0410	93.0773	-0.4841	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		0.8706	0.7712	-0.1735	1.7128	5.6509	10.9343	12.6580	-1.4746	-15.2906	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		-0.1709	-0.6210	-1.8565	-3.2257	-2.7339	3.6578	21.3957	51.7026	-17.6558	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		0.0797	0.1012	0.1346	0.0753	-0.2670	-1.1021	-2.3909	-3.2523	-0.9563	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		1.5011	1.3571	0.4058	-2.7460	-9.5200	-18.9441	-22.9269	-0.4841	2.6115	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		0.3956	-0.4416	-0.4328	0.0868	1.8217	5.2697	9.4231	9.4236	-5.8279	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		0.2729	0.0531	-0.6779	-3.3162	-3.3162	-0.2941	3.6313	21.3567	51.7986	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		0.0171	0.0392	0.0970	0.1494	0.0866	-0.2941	-1.2194	-2.6414	-3.5811	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		0.7009	0.6617	1.0746	0.4478	-2.5783	-9.5984	-19.8890	-25.4773	-4.7347	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		-0.0916	-0.1236	-0.1829	-0.1416	0.2472	1.2504	3.0402	4.5424	2.6996	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		0.3057	0.2032	0.1092	-0.5075	-1.8831	-3.8811	-4.9447	-0.8546	15.5297	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		-0.0054	0.0121	0.0647	0.1393	0.1741	0.0123	-0.6038	-1.8666	-3.5376	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
A 0.1		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
I 0.1		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
N 0.1		0.2290	0.3732	0.7071	0.8423	-0.0914	-3.4368	-10.1924	-18.4417	-18.9287	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
H 0.1		-0.0084	0.0079	0.0580	0.1333	0.1805	0.0548	-0.4974	-1.7180	-3.4137	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

$$S = \sqrt{\frac{4I_b}{4EI}}$$

$$\varphi = \eta_c \frac{3}{kb} M$$

$$P = \eta_p \frac{M}{bL^2}$$

$$M = \eta_M M$$

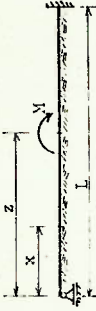
$$V = \eta_V \frac{M}{L}$$

TABELA 5.27

ESTRUTURA 5

SL=7.50

Esforço externo: Momento



x/L	z/L →	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)					0.8	0.9	1.0										
		0.1	0.2	0.3	0.4	0.5													
0.0	100η _p	199.9997	4.7283	-41.3572	-29.6421	-11.2601	-1.1688	1.6984	1.4122	0.5546	0.0385	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _M	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _y	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0	100η _x	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		4.7283	79.3211	-12.4575	-26.3097	-15.4058	-4.7775	0.1338	1.1491	0.7408	0.2247	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		36.2230	12.5196	-13.4985	-12.1239	-5.3681	-1.0051	0.5011	0.5629	0.2619	0.0426	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		34.5625	50.7892	-20.5915	-3.2530	2.3476	1.0957	0.2241	-0.1035	-0.1035	-0.1219	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-5.0071	-4.6438	-2.5628	-0.7353	0.0637	0.2080	0.1292	0.0416	-0.0020	-0.0111	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-41.3572	12.4575	9.43676	1.7759	-19.8309	-14.1623	-5.3069	-0.4801	0.9078	0.7197	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		25.0392	22.7244	0.3952	-18.6675	-13.1298	-4.8649	-0.8325	-0.7539	0.6268	0.2344	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		1.5781	13.9707	4.5360	-18.2445	-0.9034	3.4463	2.5753	0.9854	0.0649	-0.1885	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-1.7877	-2.5628	-3.5915	-2.3806	-0.8441	-0.0522	0.1517	0.1146	0.0418	0.0010	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-29.6421	-26.3097	1.7759	100.8425	3.0677	-20.3795	-14.7232	-5.4839	-0.2703	1.1100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		9.2262	12.9149	17.3547	-0.6131	-19.3683	-12.5584	-4.5684	-0.3205	0.8437	0.6394	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		6.6214	-1.6755	16.3170	49.8855	-17.1418	-0.6861	3.3525	2.4241	0.8510	-0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.1185	-0.7354	-2.3806	-3.7005	-2.4986	-0.8999	-0.0649	0.1553	0.1193	0.0432	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-11.2601	-15.4058	-19.8309	3.0677	100.2733	2.3918	-20.6482	-14.5510	-4.9870	0.0915	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.7916	3.8573	11.9065	17.8503	-0.0522	-18.0883	-12.4509	-4.4484	-0.1015	0.9791	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-4.9292	-4.2757	0.6720	17.4167	50.1226	-17.2226	-0.7760	3.2882	2.3882	0.6224	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.3170	0.0635	-0.8445	-2.4971	-3.7569	-2.5094	-0.8936	-0.6510	0.1729	0.1276	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-4.7775	-4.7775	-14.1023	-20.3795	2.3918	99.9277	2.3160	-20.5610	-14.3472	-4.7501	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-1.5096	-0.2143	4.3561	12.4669	19.1147	0.0088	-18.0425	-12.2536	-4.0480	0.1764	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-1.9288	-2.5815	-3.1791	0.8999	17.3221	50.0113	-17.2299	-0.6277	3.5726	2.5355	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.2458	0.2081	-0.0529	-0.9017	-2.5121	-3.7539	-2.4961	-0.8635	-0.0014	0.2023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		1.6964	0.1339	-5.3069	-14.7232	-23.6482	2.3160	99.9568	1.4108	-22.1546	-15.1393	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-1.2195	-1.0077	0.3559	4.6347	12.5263	18.0908	-0.0027	-17.9762	-12.0736	-3.8388	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.2296	0.8288	-2.3544	-3.2886	0.7471	17.2527	50.1529	-16.8878	0.3466	4.1591	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0995	0.1299	0.1515	-0.0680	-0.9019	-2.5081	-3.7382	-2.4495	-0.7787	0.0561	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		1.4122	1.1491	-0.4801	-5.4839	-14.5510	-20.5610	1.4108	96.4593	-4.3497	-25.6086	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.5110	-0.6497	-0.7125	0.4614	4.6755	12.5075	17.8445	-0.7579	-19.2639	-12.6969	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.2786	0.3070	-0.9270	-2.5121	-3.4244	0.7032	17.5170	51.0778	-14.9470	1.5190	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0141	0.0436	0.1167	0.1540	-0.0647	-0.9006	-2.5031	-3.7179	-2.4052	-0.7326	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.5548	0.7408	0.9078	-0.2703	-4.9870	-14.3472	-4.3497	85.8170	-11.4796	-11.4796	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.1000	-0.2320	-0.5366	-0.5923	0.6508	4.7192	11.7192	15.1557	-5.8732	-22.1325	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.2482	0.1947	-0.1118	-1.0111	-2.5759	-3.4569	0.8167	18.0124	52.1383	-13.5334	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.0134	0.0010	0.0495	0.1292	0.1676	-0.0626	-0.9449	-2.7457	-3.98612	-2.5205	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0365	0.2247	0.7197	1.1100	0.0915	-4.7501	-15.1393	-25.6086	-11.4796	79.82093	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0065	-0.0354	-0.1632	-0.3084	-0.1940	0.7933	3.3287	6.7554	-6.0081	-11.6632	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0920	0.1307	0.1804	0.0063	-0.8074	-2.5501	-4.2916	13.4447	50.6280	-13.5334	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.0161	-0.0105	0.0152	0.0794	0.1726	0.1789	-0.2184	-1.4775	-3.5982	-4.5255	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0654	0.0177	0.2909	0.7158	0.8529	-0.5840	-5.6306	-1.4215	-20.6788	2.3041	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		-0.0156	-0.0115	0.0046	0.0674	0.1633	0.2018	-0.1053	-1.2301	-3.3385	-4.8296	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4KB}{4EI}}$$

$$\varphi = \eta \phi \frac{S}{kb} X$$

$$p = \eta p \frac{M}{bL^2}$$

$$X = \eta X$$

$$V = \eta V$$

$$M = \eta M$$

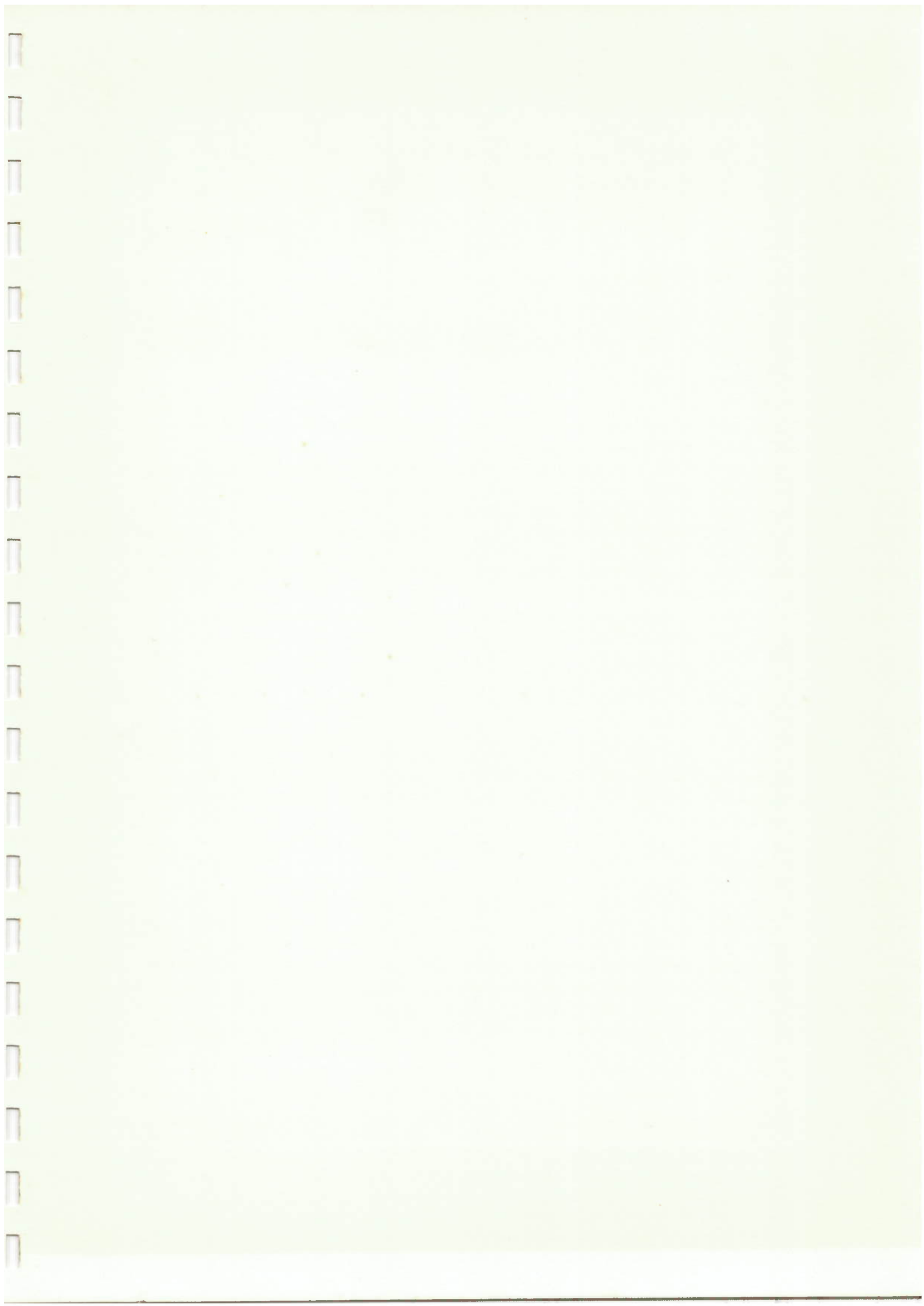


TABELA 6.03



ESTRUTURA 6

Esforço externo: Força Concentrada

SL=2,50

x/L	z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM							0.7	0.8	0.9	1.0
		0.1	0.2	0.3	0.4	0.5	0.6	0.7				
	100	η_ϕ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100	η_P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0	η_M	-7.6192	-11.2965	-12.1650	-11.1886	-9.1459	-6.6435	-4.1462	-2.0152	-0.5458	0.0000
	0.0	η_V	0.9461	0.8190	0.6594	0.4957	0.3455	0.2207	0.1211	0.0526	0.0128	0.0000
L 0.1			7.2193	18.0007	22.1659	21.7724	18.5429	13.8676	8.6504	4.3797	1.2640	0.0000
I 0.1			0.0349	0.0669	0.0779	0.0745	0.0625	0.0462	0.0292	0.0144	0.0039	0.0000
N 0.1			1.8459	-3.1003	-5.5036	-6.2254	-5.6852	-4.4482	-2.9326	-1.4878	-0.4172	0.0000
H 0.1			-0.0525	0.8214	0.6622	0.4982	0.3477	0.2207	0.1221	0.0531	0.0130	0.0000
A 0.2			3.2421	15.4438	27.7493	31.0609	28.3704	22.1998	14.6368	7.4261	2.0825	0.0000
A 0.2			0.0669	0.1822	0.2426	0.2462	0.2136	0.1618	0.1003	0.0520	0.0144	0.0000
D 0.2			1.3448	5.1669	1.1230	-1.1796	-2.1547	-2.2010	-1.6660	-0.9441	-0.2641	0.0000
E 0.2			-0.0472	-0.1660	0.6779	0.5138	0.3610	0.2307	0.1285	0.0563	0.0138	0.0000
I 0.3			0.0000	0.4403	16.3495	27.4646	29.1372	24.7364	17.1922	9.0562	2.6126	0.0000
N 0.3			0.0000	0.0779	0.2426	0.3894	0.4360	0.3982	0.3116	0.1043	0.0292	0.0000
F 0.3			0.0000	0.9089	3.6108	8.0506	4.1138	1.5922	0.2109	-0.3471	-0.1363	0.0000
L 0.3			0.0000	-0.0398	-0.1442	-0.2899	0.15481	0.4398	0.2929	0.0773	0.0197	0.0000
U 0.3			1.3668	2.8099	10.1311	20.0785	20.8858	16.1296	9.0747	2.7398	0.0000	0.0000
E 0.4			0.0745	0.2462	0.4360	0.5574	0.4578	0.3116	0.1618	0.0462	0.0000	0.0000
N 0.4			0.5497	2.2926	5.3584	9.8379	5.7353	2.9341	1.2262	0.3545	0.0409	0.0000
C 0.4			-0.0321	-0.1194	-0.2478	-0.4012	0.4398	0.2929	0.1697	0.0773	0.0197	0.0000
I 0.5			2.3698	7.1490	10.8025	-9.6863	0.0000	9.6863	10.6025	7.1490	2.3698	0.0000
A 0.5			0.0625	0.2136	0.3982	0.5574	0.6263	0.5574	0.3982	0.2136	0.0625	0.0000
P 0.5			0.2642	1.2175	3.0952	6.1113	10.4283	6.1113	3.0952	1.2175	0.2642	0.0000
A 0.6			-0.0252	-0.0962	-0.2055	-0.3442	-0.5000	0.3442	0.2055	0.0962	0.0252	0.0000
S 0.6			2.7398	9.0747	16.1296	-20.8858	-20.0785	-10.1311	0.3237	2.8099	1.3668	0.0000
E 0.6			0.0462	0.1618	0.3116	0.4578	0.5609	0.4360	0.2462	0.0745	0.0000	0.0000
C 0.6			0.0409	0.3545	1.2262	2.9341	5.7353	9.8379	5.3584	2.2926	0.5497	0.0000
A 0.7			-0.0197	-0.0773	-0.1697	-0.2929	-0.4398	-0.5988	0.2478	0.1194	0.0321	0.0000
S 0.7			2.6126	9.0562	17.1922	24.7364	29.1372	27.4646	16.3495	4.5174	-0.4403	0.0000
E 0.7			0.0292	0.1043	0.2055	0.3116	0.3982	0.4360	0.3694	0.2426	0.0779	0.0000
C 0.7			0.1363	0.3471	0.6328	0.2109	1.5922	4.1138	6.0506	3.6108	0.9089	0.0000
A 0.8			-0.0160	-0.0640	-0.1438	-0.2542	-0.3915	-0.5461	-0.7101	0.1442	0.0398	0.0000
S 0.8			2.0825	7.4261	14.6368	-22.1998	-28.3704	-31.0609	-27.7493	-15.4438	-3.2421	0.0000
E 0.8			0.0144	0.0520	0.1043	0.1618	0.2136	0.2462	0.2426	0.1822	0.0669	0.0000
C 0.8			0.2841	0.9441	1.6860	2.2010	2.1547	1.1796	1.1230	5.1669	1.3448	0.0000
A 0.9			-0.0138	-0.0563	-0.1285	-0.2307	-0.3610	-0.5138	-0.6779	-0.8340	-0.0472	0.0000
S 0.9			1.2040	4.3797	8.6504	13.8676	18.5429	21.7724	22.1659	18.0007	-7.2193	0.0000
E 0.9			0.0039	0.0144	0.0292	0.0462	0.0625	0.0745	0.0779	0.0669	0.0349	0.0000
C 0.9			0.4172	1.4878	2.9326	4.4482	5.6852	6.2254	5.5036	3.1003	1.8459	0.0000
A 1.0			-0.0130	-0.0531	-0.1221	-0.2207	-0.3477	-0.4982	-0.6622	-0.8214	-0.9475	0.0000
S 1.0			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000
E 1.0			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
C 1.0			0.5458	-2.0152	-4.1462	-6.6435	-9.1459	-11.1886	-12.1650	-11.2965	-7.6192	0.0000
A 1.0			-0.0128	-0.0526	-0.1211	-0.2191	-0.3455	-0.4957	-0.6594	-0.8190	-0.9461	0.0000

$$S = \sqrt{\frac{4EI}{k\phi}}$$

$$\phi = \eta_\phi \frac{S^2}{k\phi}$$

$$P = \eta_P \frac{P}{BL}$$

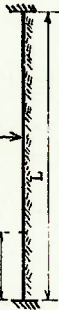
$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 6.05

ESTRUTURA 6

Esforço externo: Força Concentrada



z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM → (LER NA VERTICAL)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{KB}{4EI}}$$

$$\varphi = \eta \frac{S^2}{KB} P$$

$$P = \eta P \frac{P}{BL}$$

$$M = \eta M PL$$

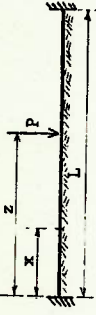
$$V = \eta V P$$

TABELA 6.08

ESTRUTURA 6

Esforço externo: Força Concentrada

SL=5.00



LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LER NA VERTICAL)

z/L	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100 η_{ϕ}	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
η_P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100 η_M	0.0000	-5.8145	-6.1873	-4.4457	-2.4574	-0.9887	-0.1697	0.1439	0.1598	0.0000	0.0000
η_V	0.0000	0.8230	0.5061	0.2381	0.0667	-0.0161	-0.0404	-0.0349	-0.0195	-0.0057	0.0000
	0.0000	16.9021	36.3554	32.4676	21.1918	10.6695	3.7107	0.3089	-0.6188	-0.3355	0.0000
L 0.1	0.0000	0.3835	0.5612	0.4561	0.2792	0.1302	-0.0034	-0.0034	-0.0118	-0.0054	0.0000
A 0.2	0.0000	2.4590	-1.0521	-2.0233	-1.7665	-1.1388	-0.5708	-0.2061	-0.0367	0.0046	0.0000
D 0.3	0.0000	-0.1614	0.5286	0.2541	0.0762	-0.0118	-0.0392	-0.0352	-0.0200	-0.0059	0.0000
E 0.4	0.0000	-0.3893	19.1288	38.8624	34.3267	22.2944	11.2659	4.1241	0.7725	-0.0744	0.0000
I 0.5	0.0000	0.5612	1.3736	1.4083	0.9939	0.5422	0.2178	0.0447	-0.0142	0.0418	0.0000
N 0.6	0.0000	1.0852	4.6658	0.8970	-0.7599	-1.1350	-0.9220	-0.5551	-0.2443	-0.0584	0.0000
F 0.7	0.0000	-0.1105	-0.3711	0.3460	0.1371	0.0194	-0.0280	-0.0339	-0.0216	-0.0068	0.0000
L 0.8	0.0000	-6.6271	-11.3783	9.8718	33.0455	31.5161	21.3873	11.2392	4.3040	0.8691	0.0000
I 0.9	0.0000	0.4561	1.4083	2.1070	1.8777	-1.2264	0.6235	0.2306	0.0447	-0.0132	0.0000
N 1.0	0.0000	0.2497	1.6800	5.2060	1.2558	-1.0364	-0.8479	-0.4609	-0.0409	-0.1320	0.0000
F 0.1	0.0000	-0.0584	-0.2257	-0.4723	0.2809	0.1059	0.0119	-0.0216	-0.0208	-0.0078	0.0000
L 0.2	0.0000	-6.8928	-19.0948	-22.0962	3.0050	29.5005	29.8726	20.2793	9.8233	2.5712	0.0000
I 0.3	0.0000	0.2792	0.9939	1.8777	2.4087	2.0265	1.2751	0.6235	0.2178	0.0380	0.0000
N 0.4	0.0000	-0.1352	0.0656	1.5328	5.1218	1.2407	-0.5061	-0.2958	-0.6233	-0.2063	0.0000
F 0.5	0.0000	-0.0216	-0.1040	-0.2864	-0.4986	0.2689	0.1050	0.0192	-0.0088	-0.0064	0.0000
L 0.6	0.0000	-4.8592	-16.0190	-26.9783	-27.2387	0.0000	27.2387	26.9783	16.0190	4.8592	0.0000
I 0.7	0.0000	0.1302	0.5822	1.2264	2.0265	2.4744	2.0265	1.2264	0.5422	0.1302	0.0000
N 0.8	0.0000	-0.2383	-0.5551	-0.2958	1.3090	5.0466	1.3090	-0.2958	-0.5551	-0.2383	0.0000
F 0.9	0.0000	-0.0015	-0.0279	-0.1103	-0.2706	-0.5000	0.2706	0.1103	0.0279	0.0015	0.0000
L 1.0	0.0000	-2.5712	-9.8233	-20.2793	-29.8726	-29.5005	3.0050	22.0962	19.0948	6.8928	0.0000
I 0.1	0.0000	0.0380	0.2178	0.6235	1.2751	2.0265	2.4087	1.8777	0.9939	0.2792	0.0000
N 0.2	0.0000	-0.2093	-0.6233	-0.8927	-0.5061	1.2407	5.1218	1.5328	0.0666	-0.1352	0.0000
F 0.3	0.0000	0.3064	0.0088	-0.0192	-0.1050	-0.2689	-0.5014	0.2664	0.1040	0.0216	0.0000
L 0.4	0.0000	-0.8691	-4.3040	-11.2392	-21.3873	-31.5161	-33.0455	-9.8718	11.3783	6.6271	0.0000
I 0.5	0.0000	0.0447	0.2306	0.6235	1.2264	1.2264	1.8777	2.1070	1.4083	0.4561	0.0000
N 0.6	0.0000	-0.1320	-0.4609	-0.8479	-1.0364	-1.2407	1.2558	0.8970	4.6658	1.0852	0.0000
F 0.7	0.0000	0.0078	0.0208	0.0216	-0.0119	-0.1059	-0.0280	-0.0349	-0.0257	0.0584	0.0000
L 0.8	0.0000	0.0744	-0.7725	4.1241	-11.2659	-22.2944	-34.3267	-38.8624	-19.1288	0.3893	0.0000
I 0.9	0.0000	-0.0118	-0.0142	0.0447	0.2178	0.5422	0.9939	1.4083	1.3736	0.5612	0.0000
N 1.0	0.0000	-0.0584	-0.2443	-0.5551	-0.9220	-1.1350	-0.7599	0.8970	4.6658	1.0852	0.0000
F 0.1	0.0000	0.0068	0.0216	0.0339	0.0280	-0.0194	-0.1371	-0.3460	-0.6289	0.1105	0.0000
L 0.2	0.0000	0.3355	0.6188	-0.3089	-3.7107	-10.6695	-21.1918	-32.4676	-36.3554	-16.9021	0.0000
I 0.3	0.0000	-0.0054	-0.0118	0.0034	0.0380	0.1302	0.2792	0.4561	0.5612	0.3835	0.0000
N 0.4	0.0000	0.0046	-0.0367	-0.2061	-0.5708	-1.1388	-1.7665	-2.0233	-1.0521	2.4590	0.0000
F 0.5	0.0000	0.0059	0.0200	0.0352	0.0392	0.0118	-0.0762	-0.2541	-0.5286	-0.8386	0.0000
L 0.6	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000
I 0.7	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000
N 0.8	0.0000	0.0622	0.1598	0.1439	-0.1697	-0.9887	-2.4574	-4.4457	-6.1873	-5.8145	0.0000
F 0.9	0.0000	0.0057	0.0195	0.0349	0.0404	0.0161	-0.0404	-0.0349	-0.0195	-0.0057	0.0000
L 1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	-0.8230	-1.0000

$$S = \sqrt{\frac{4KB}{4EI}}$$

$$y = \eta_{\phi} \frac{S^2}{KB} P$$

$$P = \eta_P \frac{P}{BL}$$

$$M = \eta_M PL$$

$$V = \eta_V P$$

TABELA 6.12

ESTRUTURA 6

SL=7.60 Esforço externo: Força Concentrada



x/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LFP NA VERTICAL)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
0.0	100φ 100η _p 100η _M 100η _v	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \phi \frac{S^2}{KB} P$$

$$P = \eta_p \frac{P}{BL}$$

$$M = \eta_M PL$$

$$V = \eta_v P$$

TABELA 6.14

ESTRUTURA 6

SL=f.00 Esforço externo: Força Concentrada



x/L	z/L → 0.0	Linha de Estando para Esforço Aplicado em (LER NA VERTICAL)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
0.0	100nφ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100nP	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	100nV	-4.0291	-2.5226	-0.7660	0.0297	0.1731	0.1023	0.0294
0.1	100nφ	0.6354	0.1959	-0.0056	-0.0431	-0.0258	0.0075	0.0000
	100nP	36.7349	20.0569	4.7379	-1.0812	-1.6317	-0.8066	0.0000
	100nV	1.5540	1.5232	0.6399	-0.0932	-0.0708	-0.0254	0.0000
0.2	100nφ	2.5128	-0.4182	-0.7691	-0.3971	-0.0934	0.0217	0.0000
	100nP	-0.2981	0.2513	0.0156	-0.0409	-0.0288	-0.0097	0.0000
	100nV	12.7153	8.1454	33.3919	19.2616	5.3175	-0.5561	0.0000
0.3	100nφ	1.5232	3.5206	2.4470	0.8213	0.0203	-0.1529	0.0000
	100nP	0.3953	3.2596	-0.0304	-0.6770	-0.4175	0.0260	0.0000
	100nV	-0.1268	-0.4808	0.1625	-0.0030	-0.0347	-0.0663	0.0000
0.4	100nφ	-12.1560	-28.4453	0.7499	31.9326	19.8321	5.9658	0.0000
	100nP	0.6399	2.4470	3.9698	2.5416	0.7897	-0.0186	0.0000
	100nV	0.2598	0.1338	3.1484	-0.0470	-0.6645	-0.4062	0.0000
0.5	100nφ	-0.0192	-0.1636	-0.5000	0.1580	-0.0020	-0.0331	0.0000
	100nP	-19.4531	-31.9985	-31.9985	-0.0123	32.1525	20.1140	6.1686
	100nV	0.0932	0.8213	2.5416	3.9918	2.5351	0.7808	-0.0186
0.6	100nφ	-0.2425	-0.5743	-0.0141	3.1195	-0.0348	-0.4012	0.0000
	100nP	0.0136	-0.0054	-0.1577	-0.4991	0.1573	-0.0026	-0.0332
	100nV	-0.7027	-6.4351	-20.1846	-32.1846	0.0000	32.1846	20.1846
0.7	100nφ	-0.0708	-0.0203	0.7897	2.5351	3.9916	2.5351	0.7897
	100nP	-0.0993	-0.3866	-0.6446	-0.0295	3.1232	0.0295	-0.6446
	100nV	0.0124	0.0297	0.0022	-0.1564	-0.5000	0.1564	-0.0022
0.8	100nφ	0.5769	0.1025	-0.1686	-20.1140	-32.1525	0.0123	31.9985
	100nP	-0.0631	-0.1529	-0.0186	0.7808	2.5351	3.9918	2.5416
	100nV	-0.0131	-0.1259	-0.4012	-0.6508	-0.0346	3.1195	-0.0141
0.9	100nφ	0.0050	0.0197	0.0332	0.0026	-0.1573	-0.5009	0.1577
	100nP	0.4965	1.2246	0.2345	-5.9658	-19.8321	-31.9326	-0.7499
	100nV	-0.0254	-0.1000	-0.1700	0.0186	0.7897	2.5416	3.9298
1.0	100nφ	0.0121	-0.0002	-0.1215	-0.0462	-0.6645	-0.0470	3.1484
	100nP	0.0007	0.0064	0.0204	0.0331	0.0020	-0.1560	-0.5000
	100nV	0.1802	0.7598	1.4160	3.5581	-5.3175	-19.2616	-33.3919
0.8	100nφ	-0.0040	-0.0331	-0.1000	-0.0186	0.7897	2.5416	3.9298
	100nP	0.0105	0.0260	0.0055	-0.1247	0.4175	-0.6770	-0.0304
	100nV	-0.0006	-0.0000	0.0063	0.0211	-0.0347	-0.1625	0.0030
0.9	100nφ	0.0015	0.1945	0.8066	1.6317	1.0612	-4.7379	-20.0569
	100nP	0.0039	-0.0040	-0.0254	-0.0631	-0.0708	0.0932	0.0639
	100nV	0.0034	0.0157	0.0323	0.0217	-0.0934	-0.3971	-0.7691
1.0	100nφ	-0.0007	-0.0016	0.0003	0.0097	0.0288	0.0409	-0.0156
	100nP	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000
	100nV	-0.0032	-0.0006	0.0294	0.1023	0.0297	-0.7660	-2.5226
1.0	100nφ	-0.0007	-0.0017	-0.0005	0.0075	0.0256	0.0431	0.0056
	100nP	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	-0.0000
	100nV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$S = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = n \phi \frac{S^2}{kb} P$$

$$P = n \frac{P}{bL}$$

$$M = n_M PL$$

$$V = n_V P$$

TABELA 6.17



ESTRUTURA 6

SL=2.50

z/L	LINHA DE ESTADO PARA ESFORÇO APLICADO EM (LEK NA VERTICAL)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{kb}{4EI}}$$

$$\varphi = \eta \frac{s^3}{kb} M$$

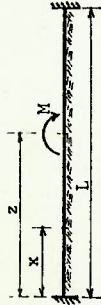
$$p = \eta p \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

TABELA 6.23

ESTRUTURA 6



z/L	z/L → 0.0	LINHA DE ESTADO PARA ESFORÇO APLICADO EM →										Esforço externo: Momento		0.8	0.9	1.0	
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0						
0.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$$s = \sqrt{\frac{4kb}{4EI}}$$

$$\varphi = \eta \frac{s^3}{kb} M$$

$$p = \eta P \frac{M}{bL^2}$$

$$M = \eta M$$

$$V = \eta V$$

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