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UBS INDÍGENA TIPO II

MEMORIAL DE CÁLCULO ESTRUTURA DE CONCRETO

CLIENTE	VOLUME	REVISÃO	DATA
SESAB	01/01	00	ABR/25

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1. OBJETIVO

O objetivo do presente documento é apresentar as especificações técnicas de materiais e serviços a serem utilizados na obra de implementação da Unidade Básica de Saúde Indígena Tipo II.

O documento aqui colocado trata das questões referentes a instalações de **estrutura de concreto**.

2. DESCRIÇÃO DO EMPREENDIMENTO

Endereço: -

Proprietário: SECRETARIA DA SAÚDE DA BAHIA – SESAB

Projeto: UNIDADE BÁSICA DE SAÚDE INDÍGENA – UBS INDÍGENA - TIPO II

3. CRITÉRIOS PARA DURABILIDADE

Classe de agressividade ambiental adotada:

Pavimento	Classe de agressividade ambiental	Agressividade	Risco de deterioração da estrutura
Todos	III	forte	grande

Cobrimentos das armaduras:

Elemento	Cobrimento (m)		
	Peças externas	Peças internas	Peças em contato com o solo
Vigas	0.04	0.03	0.04
Pilares	0.04	0.03	0.05
Lajes	0.04	-	0.04
Sapatas	-	-	0.05

4. PROPRIEDADES DO CONCRETO

Características do concreto:

fck (MPa)	Ecs (MPa)	fct (MPa)	Abatimento (cm)	Coefficiente de dilatação térmica (/°C)
30	26838	3	5.00	0.00001

5. PROPRIEDADES DO AÇO

Características do aço:

Categoria	Massa específica (kN/m³)	Módulo de elasticidade (MPa)	f_{yk} (MPa)
CA50	79	210000	500
CA60	79	210000	600

6. AÇÕES DE CARREGAMENTO

Coefficientes de ponderação das ações:

Ação	Coefficientes de ponderação						Fatores de combinação		
	Normais (desfavorável)	Normais (favorável)	Excepcionais (desfavorável)	Excepcionais (favorável)	Fundações	Construção	Psi0	Psi1	Psi2
Peso próprio (G1)	1.40	1.00	1.20	1.00	1.00	1.30	-	-	-
Adicional (G2)	1.40	1.00	1.30	1.00	1.00	1.40	-	-	-
Solo (S)	1.40	1.00	1.20	1.00	1.00	1.30	-	-	-
Protensão (P)	1.20	0.90	1.20	0.90	1.00	1.20	-	-	-
Retração (R)	1.20	0.00	0.00	0.00	1.00	1.20	-	-	-
Acidental (Q)	1.40	-	1.00	-	1.00	1.20	0.70	0.60	0.40
Água (A)	1.20	-	1.00	-	1.00	1.20	1.00	1.00	1.00
Subpressão (AS)	1.20	-	1.00	-	1.00	1.20	1.00	1.00	1.00
Temperatura 1 (T1)	1.20	-	0.00	-	1.00	1.20	0.60	0.50	0.30
Temperatura 2 (T2)	1.20	-	0.00	-	1.00	1.20	0.60	0.50	0.30
Vento X+ (V1)	1.40	-	0.00	-	1.00	0.00	0.60	0.30	0.00
Vento X- (V2)	1.40	-	0.00	-	1.00	0.00	0.60	0.30	0.00
Vento Y+ (V3)	1.40	-	0.00	-	1.00	0.00	0.60	0.30	0.00
Vento Y- (V4)	1.40	-	0.00	-	1.00	0.00	0.60	0.30	0.00
Desaprumo X+ (D1)	1.40	1.00	1.20	1.00	1.00	0.00	-	-	-

Desaprumo X- (D2)	1.40	1.00	1.20	1.00	1.00	0.00	-	-	-
Desaprumo Y+ (D3)	1.40	1.00	1.20	1.00	1.00	0.00	-	-	-
Desaprumo Y- (D4)	1.40	1.00	1.20	1.00	1.00	0.00	-	-	-

7. COMBINAÇÕES DE AÇÕES

Combinações:

Tipo	Combinações
ELU-Concreto	1.4G1+1.4G2+0.98Q+0.84V1+1.4D1
	1.4G1+1.4G2+0.98Q+0.84V2+1.4D2
	1.4G1+1.4G2+0.98Q+0.84V3+1.4D3
	1.4G1+1.4G2+0.98Q+0.84V4+1.4D4
	1.4G1+1.4G2+0.98Q+1.4V1+0.84D1
	1.4G1+1.4G2+0.98Q+1.4V2+0.84D2
	1.4G1+1.4G2+0.98Q+1.4V3+0.84D3
	1.4G1+1.4G2+0.98Q+1.4V4+0.84D4
	1.4G1+1.4G2+1.4D1
	1.4G1+1.4G2+1.4D2
	1.4G1+1.4G2+1.4D3
	1.4G1+1.4G2+1.4D4
	1.4G1+1.4G2+1.4Q+0.84V1+0.84D1
	1.4G1+1.4G2+1.4Q+0.84V2+0.84D2
	1.4G1+1.4G2+1.4Q+0.84V3+0.84D3
	1.4G1+1.4G2+1.4Q+0.84V4+0.84D4
	1.4G1+1.4G2+1.4Q+1.4D1
	1.4G1+1.4G2+1.4Q+1.4D2
	1.4G1+1.4G2+1.4Q+1.4D3
	1.4G1+1.4G2+1.4Q+1.4D4
	1.4G1+1.4G2+1.4Q+D1
	1.4G1+1.4G2+1.4Q+D2

	$1.4G1+1.4G2+1.4Q+D3$ $1.4G1+1.4G2+1.4Q+D4$ $1.4G1+1.4G2+D1$ $1.4G1+1.4G2+D2$ $1.4G1+1.4G2+D3$ $1.4G1+1.4G2+D4$ $G1+G2+0.98Q+0.84V1+1.4D1$ $G1+G2+0.98Q+0.84V2+1.4D2$ $G1+G2+0.98Q+0.84V3+1.4D3$ $G1+G2+0.98Q+0.84V4+1.4D4$ $G1+G2+0.98Q+1.4V1+0.84D1$ $G1+G2+0.98Q+1.4V2+0.84D2$ $G1+G2+0.98Q+1.4V3+0.84D3$ $G1+G2+0.98Q+1.4V4+0.84D4$ $G1+G2+1.4D1$ $G1+G2+1.4D2$ $G1+G2+1.4D3$ $G1+G2+1.4D4$ $G1+G2+1.4Q+0.84V1+0.84D1$ $G1+G2+1.4Q+0.84V2+0.84D2$ $G1+G2+1.4Q+0.84V3+0.84D3$ $G1+G2+1.4Q+0.84V4+0.84D4$ $G1+G2+1.4Q+1.4D1$ $G1+G2+1.4Q+1.4D2$ $G1+G2+1.4Q+1.4D3$ $G1+G2+1.4Q+1.4D4$
ELU-Aço	$1.4G1+1.4G2+1.05Q+0.84V1+1.4D1$ $1.4G1+1.4G2+1.05Q+0.84V2+1.4D2$ $1.4G1+1.4G2+1.05Q+0.84V3+1.4D3$ $1.4G1+1.4G2+1.05Q+0.84V4+1.4D4$ $1.4G1+1.4G2+1.05Q+1.4V1+0.84D1$ $1.4G1+1.4G2+1.05Q+1.4V2+0.84D2$

1.4G1+1.4G2+1.05Q+1.4V3+0.84D3
1.4G1+1.4G2+1.05Q+1.4V4+0.84D4
1.4G1+1.4G2+1.4D1
1.4G1+1.4G2+1.4D2
1.4G1+1.4G2+1.4D3
1.4G1+1.4G2+1.4D4
1.4G1+1.4G2+1.5Q+0.84V1+0.84D1
1.4G1+1.4G2+1.5Q+0.84V2+0.84D2
1.4G1+1.4G2+1.5Q+0.84V3+0.84D3
1.4G1+1.4G2+1.5Q+0.84V4+0.84D4
1.4G1+1.4G2+1.5Q+1.4D1
1.4G1+1.4G2+1.5Q+1.4D2
1.4G1+1.4G2+1.5Q+1.4D3
1.4G1+1.4G2+1.5Q+1.4D4
1.4G1+1.4G2+1.5Q+D1
1.4G1+1.4G2+1.5Q+D2
1.4G1+1.4G2+1.5Q+D3
1.4G1+1.4G2+1.5Q+D4
1.4G1+1.4G2+D1
1.4G1+1.4G2+D2
1.4G1+1.4G2+D3
1.4G1+1.4G2+D4
G1+G2+1.05Q+0.84V1+1.4D1
G1+G2+1.05Q+0.84V2+1.4D2
G1+G2+1.05Q+0.84V3+1.4D3
G1+G2+1.05Q+0.84V4+1.4D4
G1+G2+1.05Q+1.4V1+0.84D1
G1+G2+1.05Q+1.4V2+0.84D2
G1+G2+1.05Q+1.4V3+0.84D3
G1+G2+1.05Q+1.4V4+0.84D4
G1+G2+1.4D1
G1+G2+1.4D2

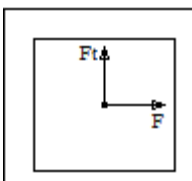
	$G1+G2+1.4D3$ $G1+G2+1.4D4$ $G1+G2+1.5Q+0.84V1+0.84D1$ $G1+G2+1.5Q+0.84V2+0.84D2$ $G1+G2+1.5Q+0.84V3+0.84D3$ $G1+G2+1.5Q+0.84V4+0.84D4$ $G1+G2+1.5Q+1.4D1$ $G1+G2+1.5Q+1.4D2$ $G1+G2+1.5Q+1.4D3$ $G1+G2+1.5Q+1.4D4$
ELU-Construção	$1.3G1+1.4G2$ $1.3G1+1.4G2+0.84Q$ $1.3G1+1.4G2+1.2Q$
Fundações	$G1+G2+0.7Q+0.6V1+D1$ $G1+G2+0.7Q+0.6V2+D2$ $G1+G2+0.7Q+0.6V3+D3$ $G1+G2+0.7Q+0.6V4+D4$ $G1+G2+0.7Q+V1+0.6D1$ $G1+G2+0.7Q+V2+0.6D2$ $G1+G2+0.7Q+V3+0.6D3$ $G1+G2+0.7Q+V4+0.6D4$ $G1+G2+D1$ $G1+G2+D2$ $G1+G2+D3$ $G1+G2+D4$ $G1+G2+Q+0.6V1+0.6D1$ $G1+G2+Q+0.6V2+0.6D2$ $G1+G2+Q+0.6V3+0.6D3$ $G1+G2+Q+0.6V4+0.6D4$ $G1+G2+Q+D1$ $G1+G2+Q+D2$ $G1+G2+Q+D3$

	G1+G2+Q+D4
ELS-Frequentes	G1+G2 G1+G2+0.4Q+0.3V1 G1+G2+0.4Q+0.3V2 G1+G2+0.4Q+0.3V3 G1+G2+0.4Q+0.3V4 G1+G2+0.6Q
ELS-Quase perm.	G1+G2 G1+G2+0.4Q
ELS-Raras	G1+G2 G1+G2+0.6Q+0.3V1 G1+G2+0.6Q+0.3V2 G1+G2+0.6Q+0.3V3 G1+G2+0.6Q+0.3V4 G1+G2+0.6Q+V1 G1+G2+0.6Q+V2 G1+G2+0.6Q+V3 G1+G2+0.6Q+V4 G1+G2+Q G1+G2+Q+0.3V1 G1+G2+Q+0.3V2 G1+G2+Q+0.3V3 G1+G2+Q+0.3V4

8. AÇÃO DO VENTO

Parâmetros adotados para consideração do vento:

Parâmetros	Valor adotado	Observações
Velocidade	42.00m/s	-
Nível do solo (S2)	0.00m	-

Maior dimensão horizontal ou vertical (S2)	Menor que 20 m	-
Rugosidade do terreno (S2)	Categoria II	Terrenos abertos em nível ou aproximadamente em nível, com poucos obstáculos isolados, tais como árvores e edificações baixas.
Fator topográfico (S1)	1.0	Demais casos.
Fator estatístico (S3)	1.00	Edificações para residências, hotéis, comércio, e indústrias. Estruturas ou elementos estruturais desmontáveis com vistas á reutilização.
Ângulo do vento em relação à horizontal	0°	
Direções de aplicação do vento	Vento X+ (V1) Vento X- (V2) Vento Y+ (V3) Vento Y- (V4)	Ver combinações de ações.

Forças aplicadas nos pavimentos da estrutura devido ao vento estático

Vento X+

Pavimento	Fachada (m)	Fachada transv.(m)	Nível (m)	Altura relativa (m)	Área de influência (m²)	S2	Coefficiente de arrasto	Forças (kN)	Forças transversais (kN)	Torção (kN.m)	Momento tombamento (kN.m)
Nv 664,00	0.15	9.35	6.64	7.64	0.10	0.96	1.00	0.10	0.00	0.00	0.77
Nv 531,00	0.30	28.65	5.31	6.31	0.40	0.94	0.91	0.36	0.00	0.00	2.25
Nv 332,00	9.80	28.80	3.32	4.32	3.19	0.92	0.71	2.09	0.00	0.00	9.03
Nv 273,00	13.15	28.80	2.73	3.73	9.01	0.89	0.74	5.89	0.00	0.00	21.96
Nv 180,00	14.38	28.80	1.80	2.80	19.05	0.85	0.77	11.63	0.00	0.00	32.55
Baldrame	14.38	28.80	0.00	1.00	12.94	0.41	0.77	1.82	0.00	0.00	1.82

Momento de tombamento total na base (kN.m) = 68.37

Força cortante total na base (kN) = 21.88

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Vento X-

Pavimento	Fachada (m)	Fachada transv.(m)	Nível (m)	Altura relativa (m)	Área de influência (m²)	S2	Coefficiente de arrasto	Forças (kN)	Forças transversais (kN)	Torção (kN.m)	Momento tombamento (kN.m)
Nv 664,00	0.15	9.35	6.64	7.64	0.10	0.96	1.00	0.10	0.00	0.00	0.77
Nv 531,00	0.30	28.65	5.31	6.31	0.40	0.94	0.91	0.36	0.00	0.00	2.25
Nv 332,00	9.80	28.80	3.32	4.32	3.19	0.92	0.71	2.09	0.00	0.00	9.03
Nv 273,00	13.15	28.80	2.73	3.73	9.01	0.89	0.74	5.89	0.00	0.00	21.96
Nv 180,00	14.38	28.80	1.80	2.80	19.05	0.85	0.77	11.63	0.00	0.00	32.55
Baldrame	14.38	28.80	0.00	1.00	12.94	0.41	0.77	1.82	0.00	0.00	1.82

Momento de tombamento total na base (kN.m) = 68.37

Força cortante total na base (kN) = 21.88

Vento Y+

Pavimento	Fachada (m)	Fachada transv.(m)	Nível (m)	Altura relativa (m)	Área de influência (m²)	S2	Coefficiente de arrasto	Forças (kN)	Forças transversais (kN)	Torção (kN.m)	Momento tombamento (kN.m)
Nv 664,00	9.35	0.15	6.64	7.64	6.22	0.96	1.28	8.12	0.00	0.00	62.01
Nv 531,00	28.65	0.30	5.31	6.31	34.72	0.94	1.24	42.18	0.00	0.00	266.17
Nv 332,00	28.80	9.80	3.32	4.32	37.00	0.92	1.20	41.29	0.00	0.00	178.38
Nv 273,00	28.80	13.15	2.73	3.73	21.89	0.89	1.18	22.63	0.00	0.00	84.41
Nv 180,00	28.80	14.38	1.80	2.80	39.31	0.85	1.17	36.33	0.00	0.00	101.71
Baldrame	28.80	14.38	0.00	1.00	25.92	0.41	1.17	5.53	0.00	0.00	5.53

Momento de tombamento total na base (kN.m) = 698.21

Força cortante total na base (kN) = 156.07

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Vento Y-

Pavimento	Fachada (m)	Fachada transv.(m)	Nível (m)	Altura relativa (m)	Área de influência (m²)	S2	Coefficiente de arrasto	Forças (kN)	Forças transversais (kN)	Torção (kN.m)	Momento tombamento (kN.m)
Nv 664,00	9.35	0.15	6.64	7.64	6.22	0.96	1.28	8.12	0.00	0.00	62.01
Nv 531,00	28.65	0.30	5.31	6.31	34.72	0.94	1.24	42.18	0.00	0.00	266.17
Nv 332,00	28.80	9.80	3.32	4.32	37.00	0.92	1.20	41.29	0.00	0.00	178.38
Nv 273,00	28.80	13.15	2.73	3.73	21.89	0.89	1.18	22.63	0.00	0.00	84.41
Nv 180,00	28.80	14.38	1.80	2.80	39.31	0.85	1.17	36.33	0.00	0.00	101.71
Baldrame	28.80	14.38	0.00	1.00	25.92	0.41	1.17	5.53	0.00	0.00	5.53

Momento de tombamento total na base (kN.m) = 698.21

Força cortante total na base (kN) = 156.07

Imperfeições globais

Parâmetros adotados para consideração das imperfeições globais:

Parâmetros	Valor adotado	Observações
Direções de aplicação	Direção X Direção Y	Ver combinações de ações.

Não linearidade física

Valores adotados para consideração da não-linearidade física:

Rigidez das vigas: 0.40 Ec.Ic

Rigidez dos pilares: 0.80 Ec.Ic

Rigidez das lajes: 0.30 Ec.Ic

Análise de 2ª ordem

Processo adotado: P-Delta

9. RELATÓRIOS

Relatório de Resultados das Sapatas

Baldrame	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 1		cobr = 4.50 cm	

Nome	Dimensões		Armaduras inferiores		Armaduras superiores	
	B (cm)	H0 (m)	Dir. B	Dir. H	Dir. B	Dir. H
	H (cm)	H1 (m)				
S1	85.00	0.30	6 Ø 10.0 c/13	6 Ø 10.0 c/13		
	85.00	0.45	(4.71 cm²)	(4.71 cm²)		
S3	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S4	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S5	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S6	85.00	0.30	6 Ø 10.0 c/13	6 Ø 10.0 c/13		
	85.00	0.45	(4.71 cm²)	(4.71 cm²)		
S7	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		

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13/
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S8	110.00	0.25	8 Ø 10.0 c/14	8 Ø 10.0 c/14		
	110.00	0.45	(6.28 cm²)	(6.28 cm²)		
S9	140.00	0.20	9 Ø 10.0 c/15	9 Ø 10.0 c/15		
	140.00	0.45	(7.07 cm²)	(7.07 cm²)		
S10	140.00	0.20	9 Ø 10.0 c/15	9 Ø 10.0 c/15		
	140.00	0.45	(7.07 cm²)	(7.07 cm²)		
S11	135.00	0.20	9 Ø 10.0 c/15	9 Ø 10.0 c/15		
	135.00	0.45	(7.07 cm²)	(7.07 cm²)		
S12	135.00	0.20	9 Ø 10.0 c/15	9 Ø 10.0 c/15		
	135.00	0.45	(7.07 cm²)	(7.07 cm²)		
S13	135.00	0.20	9 Ø 10.0 c/15	9 Ø 10.0 c/15		
	135.00	0.45	(7.07 cm²)	(7.07 cm²)		
S14	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S15	85.00	0.40	10 Ø 10.0 c/8	10 Ø 10.0 c/8		
	85.00	0.55	(7.85 cm²)	(7.85 cm²)		
S16	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S17	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S18	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S19	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S20	105.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	105.00	0.45	(5.50 cm²)	(5.50 cm²)		
S21	85.00	0.40	10 Ø 10.0 c/8	10 Ø 10.0 c/8		
	85.00	0.55	(7.85 cm²)	(7.85 cm²)		
S22	85.00	0.20	6 Ø 10.0 c/15	6 Ø 10.0 c/15		
	85.00	0.35	(4.71 cm²)	(4.71 cm²)		
S23	90.00	0.20	6 Ø 10.0 c/16	6 Ø 10.0 c/16		
	90.00	0.35	(4.71 cm²)	(4.71 cm²)		

S24	85.00	0.20	6 Ø 10.0 c/15	6 Ø 10.0 c/15		
	85.00	0.35	(4.71 cm²)	(4.71 cm²)		
S25	95.00	0.20	6 Ø 10.0 c/17	6 Ø 10.0 c/17		
	95.00	0.35	(4.71 cm²)	(4.71 cm²)		
S26	60.00	0.25	6 Ø 10.0 c/10	6 Ø 10.0 c/10		
	60.00	0.35	(4.71 cm²)	(4.71 cm²)		
S28	60.00	0.25	6 Ø 10.0 c/10	6 Ø 10.0 c/10		
	60.00	0.35	(4.71 cm²)	(4.71 cm²)		

Resultados dos Pilares

Baldrame	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 1		cobr = 4.00 cm	

Dados					Resultados					
Pilar	Seção (cm)	Nível Altura (m)	leb leh (m)	vínc vínc (m)	Nd máx Nd mín (kN)	MBd topo MBd base (kN.m)	MHd topo MHd base (kN.m)	As b Armaduras As h % armad total	Estribo Topo Base cota	Esb b Esb h
P1 1:20	30.00	0.00	1.00	RR	87.81	10.78	6.37	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53
	X	1.00	1.00	RR	39.35	0.00	0.00	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53
	30.00							1.1 8 Ø 12.5	30	
P2 1:20	30.00	0.00	1.00	RR	139.01	15.92	2.71	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53
	X	1.00	1.00	RR	75.74	15.90	24.29	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53
	30.00							1.1 8 Ø 12.5	30	
P3 1:20	30.00	0.00	1.00	RR	139.55	10.74	5.11	3.68 3 Ø 12.5	Ø 5.0 c/15	11.53
	X	1.00	1.00	RR	76.40	0.00	0.00	3.68 3 Ø 12.5	Ø 5.0 c/15	11.53
	30.00							1.1 8 Ø 12.5	30	
P4	30.00	0.00	1.00	RR	138.45	5.22	15.55	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53

FORTALEZA

1:20	X 30.00	1.00	1.00 RR	76.90	0.00	0.00	3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/11 30	11.53
P5	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	136.71 75.69	5.63 0.00	15.12 0.00	3.68 3 Ø 12.5 3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/11 Ø 5.0 c/11 30	11.53 11.53
P6	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	84.53 36.70	1.21 0.00	10.58 0.00	3.68 3 Ø 12.5 3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/15 Ø 5.0 c/15 30	11.53 11.53
P7	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	141.94 78.09	3.82 0.00	10.65 0.00	3.68 3 Ø 12.5 3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/15 Ø 5.0 c/15 30	11.53 11.53
P8	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	151.43 93.37	5.31 0.00	16.08 0.00	2.45 2 Ø 12.5 2.45 2 Ø 12.5 0.5 4 Ø 12.5	Ø 5.0 c/11 Ø 5.0 c/11 30	11.53 11.53
P9	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	252.90 154.36	3.82 0.00	13.31 0.00	3.68 3 Ø 12.5 3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/15 Ø 5.0 c/15 30	11.53 11.53
P10	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	253.69 155.24	14.49 0.00	2.07 0.00	3.68 3 Ø 12.5 3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/15 Ø 5.0 c/15 30	11.53 11.53
P11	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	249.76 152.41	13.26 0.00	2.06 0.00	3.68 3 Ø 12.5 3.68 3 Ø 12.5 1.1 8 Ø 12.5	Ø 5.0 c/15 Ø 5.0 c/15 30	11.53 11.53
P12	30.00	0.00	1.00 RR	248.97	16.02	2.57	2.45 2 Ø 12.5	Ø 5.0 c/15	11.53

1:20	X 30.00	1.00	1.00 RR	151.96	0.00	0.00	2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15 30	11.53
P13	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	243.67 147.70	16.14 0.00	3.80 0.00	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15 ø 5.0 c/15 30	11.53 11.53
P14	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	144.10 88.02	16.21 0.00	4.25 0.00	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/11 ø 5.0 c/11 30	11.53 11.53
P15	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	87.56 38.94	3.24 0.00	11.06 0.00	4.02 2 ø 16.0 4.02 2 ø 16.0 0.9 4 ø 16.0	ø 5.0 c/11 ø 5.0 c/11 30	11.53 11.53
P16	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	136.78 82.70	23.07 0.00	3.12 0.00	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11 ø 5.0 c/11 30	11.53 11.53
P17	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	134.03 81.05	21.79 0.00	1.89 0.00	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11 ø 5.0 c/11 30	11.53 11.53
P18	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	134.78 81.44	22.99 0.00	1.88 0.00	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11 ø 5.0 c/11 30	11.53 11.53
P19	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	138.63 77.04	15.50 0.00	2.27 0.00	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11 ø 5.0 c/11 30	11.53 11.53
P20	30.00	0.00	1.00 RR	136.97	14.97	3.12	3.68 3 ø 12.5	ø 5.0 c/11	11.53

1:20	X 30.00	1.00	1.00 RR	75.86	0.00	0.00	3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11 30	11.53
P21	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	84.70 37.11	2.64 0.00	10.33 0.00	4.02 2 ø 16.0 4.02 2 ø 16.0 0.9 4 ø 16.0	ø 5.0 c/19 ø 5.0 c/19 ø 5.0 c/19 30	11.53 11.53
P22	Circ 0.00 1:20 30.00	0.00 1.00	1.00 RR	95.43 49.98	10.89 0.00	2.99 0.00	4.71 6 ø 10.0 0.7	ø 5.0 c/11	13.33
P23	Circ 0.00 1:20 30.00	0.00 1.00	1.00 RR	99.84 52.96	11.68 0.00	2.83 0.00	4.71 6 ø 10.0 0.7	ø 5.0 c/11	13.33
P24	Circ 0.00 1:20 30.00	0.00 1.00	1.00 RR	95.55 50.03	11.11 0.00	2.99 0.00	4.71 6 ø 10.0 0.7	ø 5.0 c/11	13.33
P25	20.00 X 1:20 20.00	0.00 1.00	1.00 RR 1.00 RR	43.00 4.05	1.55 0.00	8.40 0.00	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 30	17.30 17.30
P26	20.00 X 1:20 20.00	0.00 1.00	1.00 RR 1.00 RR	42.13 10.50	2.47 0.00	2.43 0.00	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 ø 5.0 c/12 30	17.30 17.30
P27	20.00 X 1:20 20.00	0.00 1.00	1.00 RR 2.80 RR	39.94 1.53	3.20 7.34	0.65 2.72	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 30	17.30 48.44
P28	20.00	0.00	1.00 RR	33.50	2.52	0.15	1.57 2 ø 10.0	ø 5.0 c/12	17.30

1:20	X	1.00	2.80 RR	4.58	0.00	0.00	1.57	2 ø 10.0	ø 5.0 c/12	48.44
	20.00						0.8	4 ø 10.0	30	

Resultados da Viga V1

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P1	0.30		2 Ø 10.0 0.37	2 Ø 10.0 0.68					0.01
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.37		Ø 5.0 c/ 15			0.01
P7	0.30		2 Ø 10.0 0.46	2 Ø 10.0 0.74					0.02
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.46		Ø 5.0 c/ 15			0.01
P2	0.30		2 Ø 10.0 0.46	2 Ø 10.0 0.68					0.02
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P3	0.30			2 Ø 10.0 0.68					0.01

Resultados da Viga V2

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P3	0.30			2 Ø 10.0 0.68					0.00
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P4	0.30		2 Ø 10.0 0.07	2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.07		Ø 5.0 c/ 15			0.00
P5	0.30		2 Ø 10.0 0.17	2 Ø 10.0 0.68					0.01
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.17		Ø 5.0 c/ 15			0.00
P6	0.30		2 Ø 10.0 0.17	2 Ø 10.0 0.68					0.02

Resultados da Viga V3

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar	Apoio	Seção	As Inf	As Sup	As esq	Asw min	As dir	Asw Pele	Fissura
Trecho	1 e 1o	(cm)	(cm ²)	(cm ²)	trecho	(cm ²)	trecho	(cm ²)	(mm)
	(m)				(cm ²)		(cm ²)		
P8	0.30		2 Ø 10.0 0.39	2 Ø 10.0 0.68					0.02
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.39		Ø 5.0 c/ 15			0.01
P9	0.30		2 Ø 10.0 0.39	2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.28		Ø 5.0 c/ 15			0.00
P10	0.30		2 Ø 10.0 0.28	2 Ø 10.0 0.68					0.01
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.25		Ø 5.0 c/ 15			0.00
P11	0.30		2 Ø 10.0 0.25	2 Ø 10.0 0.68					0.01

Resultados da Viga V4

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P11	0.30		2 Ø 10.0 0.25	2 Ø 10.0 0.68					0.01
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.25		Ø 5.0 c/ 15			0.00
P12	0.30		2 Ø 10.0 0.27	2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.27		Ø 5.0 c/ 15			0.00
P13	0.30		2 Ø 10.0 0.35	2 Ø 10.0 0.68					0.02
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.35		Ø 5.0 c/ 15			0.00
P14	0.30		2 Ø 10.0 0.35	2 Ø 10.0 0.71					0.02

Resultados da Viga V5

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P15	0.30		2 Ø 10.0 0.25	2 Ø 10.0 0.68					0.01
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.25		Ø 5.0 c/ 15			0.00
P16	0.30		2 Ø 10.0 0.25	2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.17		Ø 5.0 c/ 15			0.00
P17	0.30		2 Ø 10.0 0.17	2 Ø 10.0 0.68					0.01
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.16		Ø 5.0 c/ 15			0.00
P18	0.30		2 Ø 10.0 0.16	2 Ø 10.0 0.68					0.01

Resultados da Viga V6

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P18	0.30		2 Ø 10.0 0.16	2 Ø 10.0 0.68					0.01
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.16		Ø 5.0 c/ 15			0.00
P19	0.30		2 Ø 10.0 0.17	2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.17		Ø 5.0 c/ 15			0.00
P20	0.30		2 Ø 10.0 0.22	2 Ø 10.0 0.68					0.01
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.22		Ø 5.0 c/ 15			0.00
P21	0.30		2 Ø 10.0 0.22	2 Ø 10.0 0.68					0.01

Resultados da Viga V7

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P22	0.30			2 Ø 10.0 0.68					0.01
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P23	0.30			2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P24	0.30			2 Ø 10.0 0.68					0.01

Resultados da Viga V8

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P15	0.30		2 Ø 10.0 0.45	3 Ø 10.0 1.96					0.03
1	4.45	15.00 x 30.00	2 Ø 10.0 1.34	2 Ø 10.0 0.45		Ø 5.0 c/ 15			0.01
P8	0.30		2 Ø 10.0 0.45	3 Ø 10.0 1.88					0.02
2	4.45	15.00 x 30.00	2 Ø 10.0 1.36	2 Ø 10.0 0.45		Ø 5.0 c/ 15			0.01
P1	0.30		2 Ø 10.0 0.45	3 Ø 10.0 2.01					0.03

Resultados da Viga V9

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P22	0.30		2 Ø 10.0 0.10	3 Ø 10.0 1.89					0.01
1	3.20	15.00 x 30.00	2 Ø 10.0 1.60	2 Ø 10.0 0.10		Ø 5.0 c/ 15			0.01
P16	0.30		2 Ø 10.0 0.78	3 Ø 10.0 2.15					0.03
2	4.45	15.00 x 30.00	2 Ø 10.0 1.42	2 Ø 10.0 0.78		Ø 5.0 c/ 15			0.02
P9	0.30		2 Ø 10.0 0.89	3 Ø 10.0 1.99					0.03
3	4.45	15.00 x 30.00	2 Ø 10.0 1.56	2 Ø 10.0 0.89		Ø 5.0 c/ 15			0.02
P7	0.30		2 Ø 10.0 0.89	3 Ø 10.0 2.24					0.04

Resultados da Viga V10

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P27	0.20		2 Ø 10.0 0.21	2 Ø 10.0 0.68					0.00
1	0.90	15.00 x 30.00	2 Ø 10.0 0.89	2 Ø 10.0 0.21		Ø 5.0 c/ 15			0.01
P25	0.20		2 Ø 10.0 0.21	2 Ø 10.0 0.84					0.00

Resultados da Viga V11

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P25	0.20			2 Ø 10.0 0.68					0.00
1	3.05	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P26	0.20			2 Ø 10.0 0.68					0.00

Resultados da Viga V12

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P28	0.20			2 Ø 10.0 0.68					0.00
1	0.90	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P26	0.20			2 Ø 10.0 0.68					0.00

Resultados da Viga V13

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P23	0.30		2 Ø 10.0 0.09	3 Ø 10.0 1.97					0.02
1	3.20	15.00 x 30.00	3 Ø 10.0 1.73	2 Ø 10.0 0.09		Ø 5.0 c/ 14			0.01
P17	0.30		2 Ø 10.0 0.72	3 Ø 10.0 2.08					0.03
2	4.45	15.00 x 30.00	2 Ø 10.0 1.43	2 Ø 10.0 0.72		Ø 5.0 c/ 15			0.01
P10	0.30		2 Ø 10.0 0.77	3 Ø 10.0 1.89					0.02
3	4.45	15.00 x 30.00	2 Ø 10.0 1.40	2 Ø 10.0 0.77		Ø 5.0 c/ 15			0.01
P2	0.30		2 Ø 10.0 0.77	3 Ø 10.0 1.99					0.03

Resultados da Viga V14

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P24	0.30		2 Ø 10.0 0.10	3 Ø 10.0 1.92					0.02
1	3.20	15.00 x 30.00	2 Ø 10.0 1.62	2 Ø 10.0 0.10		Ø 5.0 c/ 15			0.01
P18	0.30		2 Ø 10.0 0.78	3 Ø 10.0 2.14					0.03
2	4.45	15.00 x 30.00	2 Ø 10.0 1.43	2 Ø 10.0 0.78		Ø 5.0 c/ 15			0.02
P11	0.30		2 Ø 10.0 0.89	3 Ø 10.0 2.01					0.03
3	4.45	15.00 x 30.00	2 Ø 10.0 1.55	2 Ø 10.0 0.89		Ø 5.0 c/ 15			0.02
P3	0.30		2 Ø 10.0 0.89	3 Ø 10.0 2.23					0.04

Resultados da Viga V15

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P19	0.30		2 Ø 10.0 0.74	3 Ø 10.0 2.22					0.04
1	4.45	15.00 x 30.00	2 Ø 10.0 1.55	2 Ø 10.0 0.74		Ø 5.0 c/ 15			0.02
P12	0.30		2 Ø 10.0 0.74	3 Ø 10.0 2.02					0.03
2	4.45	15.00 x 30.00	2 Ø 10.0 1.54	2 Ø 10.0 0.74		Ø 5.0 c/ 15			0.02
P4	0.30		2 Ø 10.0 0.74	3 Ø 10.0 2.20					0.04

Resultados da Viga V16

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P20	0.30		2 Ø 10.0 0.71	3 Ø 10.0 2.21					0.04
1	4.45	15.00 x 30.00	2 Ø 10.0 1.53	2 Ø 10.0 0.71		Ø 5.0 c/ 15			0.02
P13	0.30		2 Ø 10.0 0.71	3 Ø 10.0 2.01					0.03
2	4.45	15.00 x 30.00	2 Ø 10.0 1.51	2 Ø 10.0 0.71		Ø 5.0 c/ 15			0.02
P5	0.30		2 Ø 10.0 0.71	3 Ø 10.0 2.18					0.03

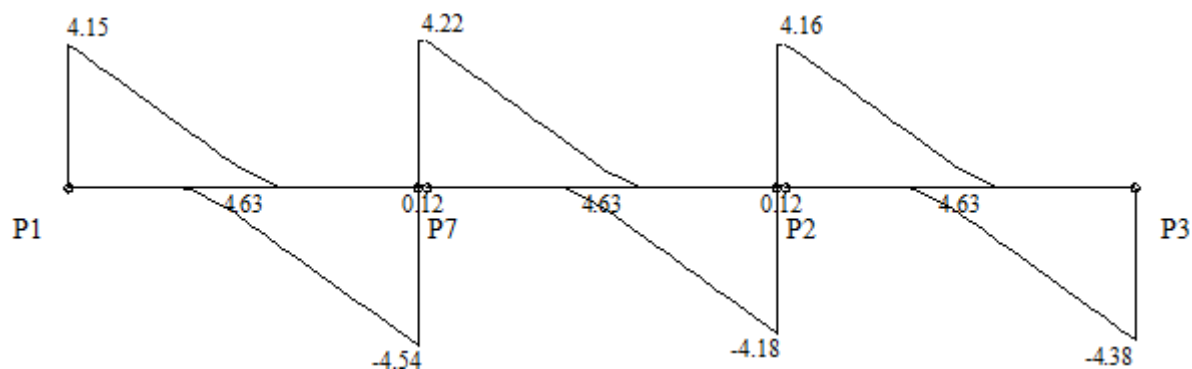
Resultados da Viga V17

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

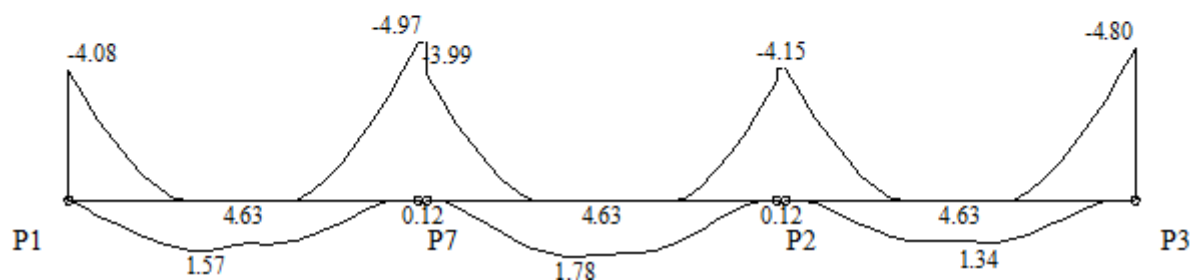
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P21	0.30		2 Ø 10.0 0.41	3 Ø 10.0 1.99					0.03
1	4.45	15.00 x 30.00	2 Ø 10.0 1.35	2 Ø 10.0 0.41		Ø 5.0 c/ 15			0.01
P14	0.30		2 Ø 10.0 0.41	3 Ø 10.0 1.87					0.02
2	4.45	15.00 x 30.00	2 Ø 10.0 1.33	2 Ø 10.0 0.41		Ø 5.0 c/ 15			0.01
P6	0.30		2 Ø 10.0 0.41	3 Ø 10.0 1.95					0.02

Diagramas: VIGA V1 - Baldrame

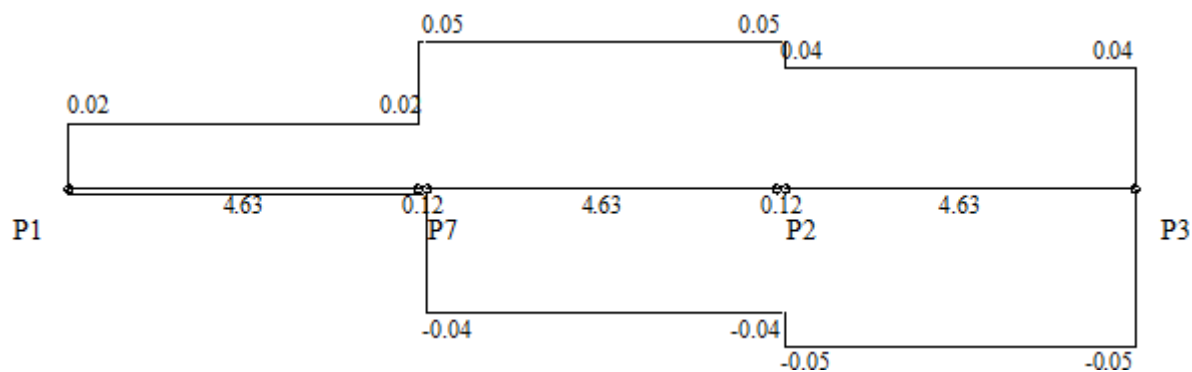
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

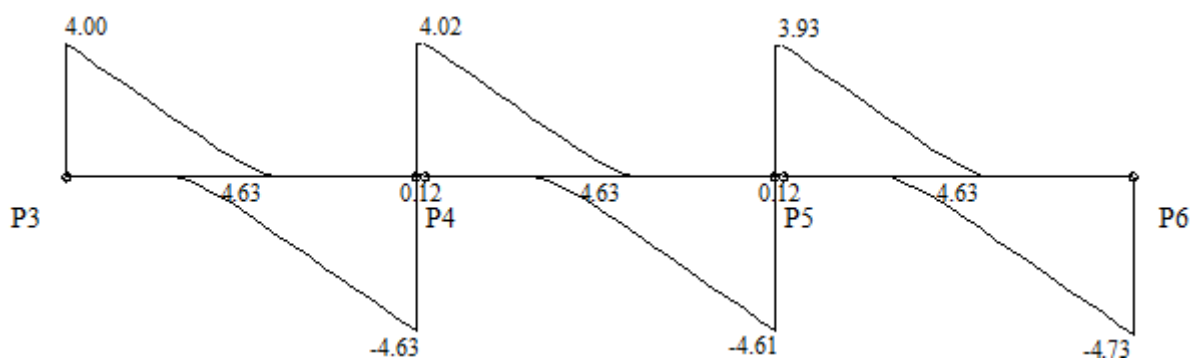


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

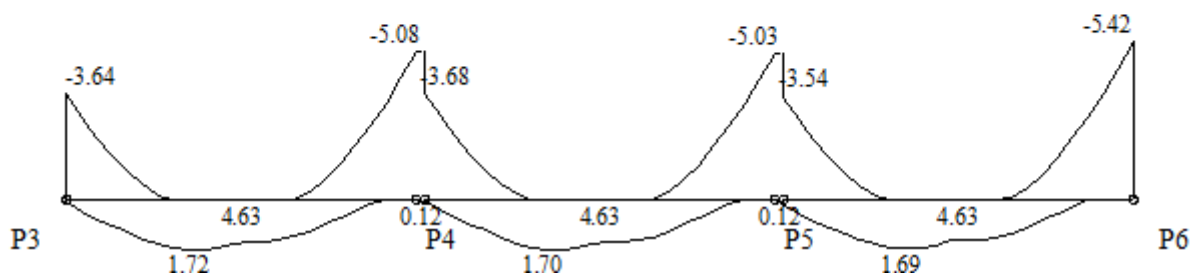


Diagramas: VIGA V2 - Baldrame

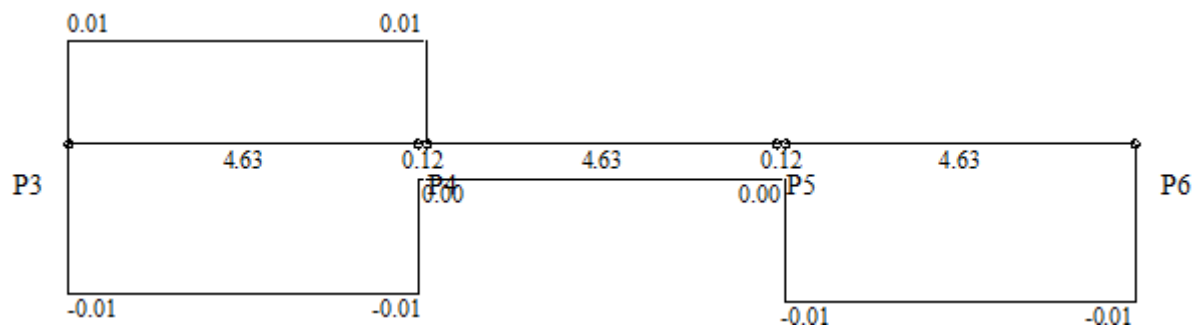
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

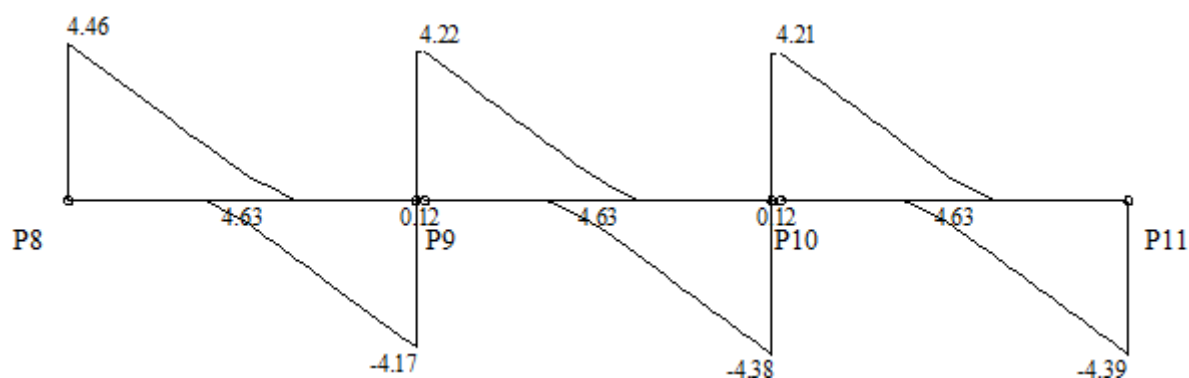


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

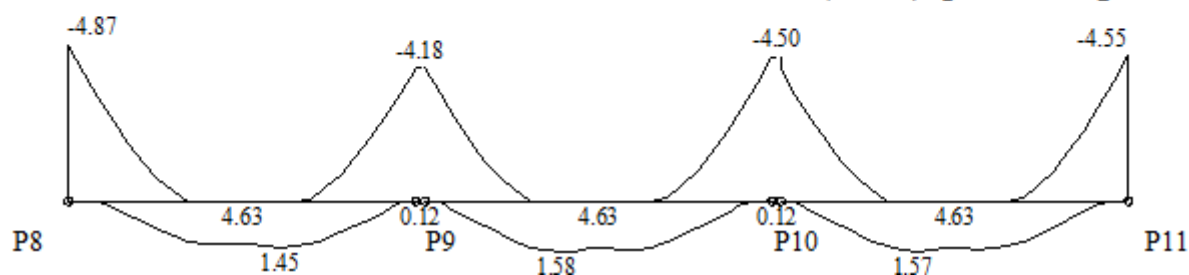


Diagramas: VIGA V3 - Baldrame

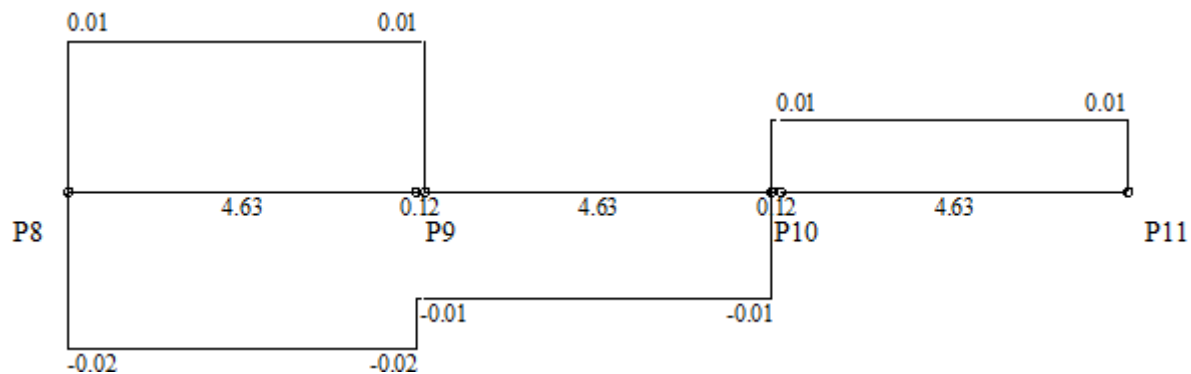
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

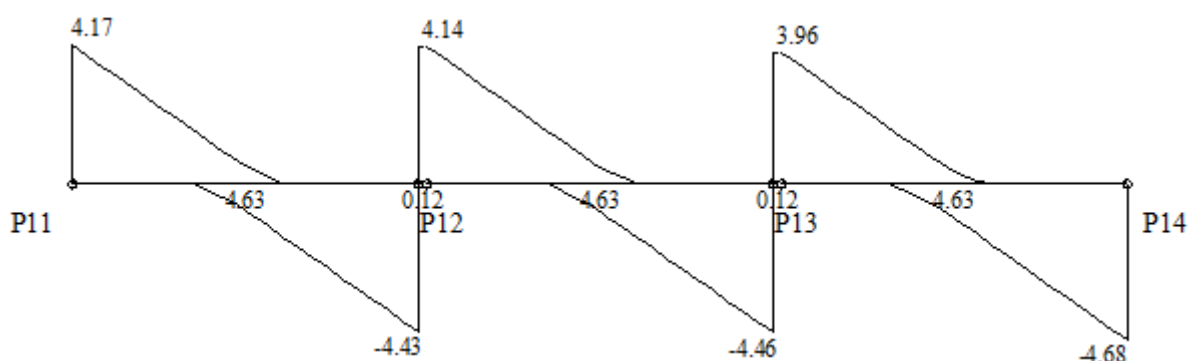


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

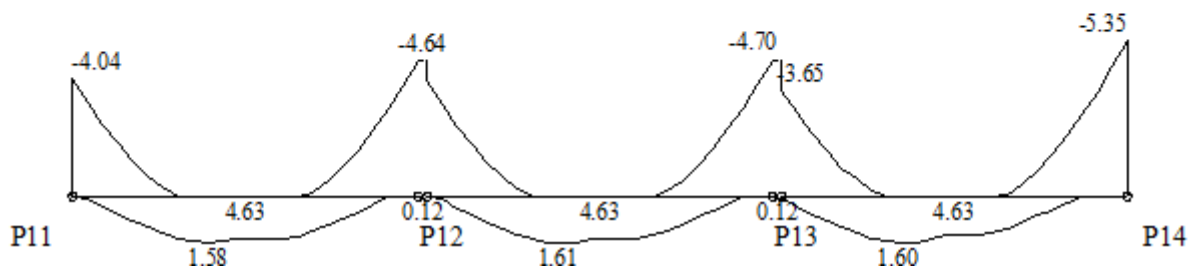


Diagramas: VIGA V4 - Baldrame

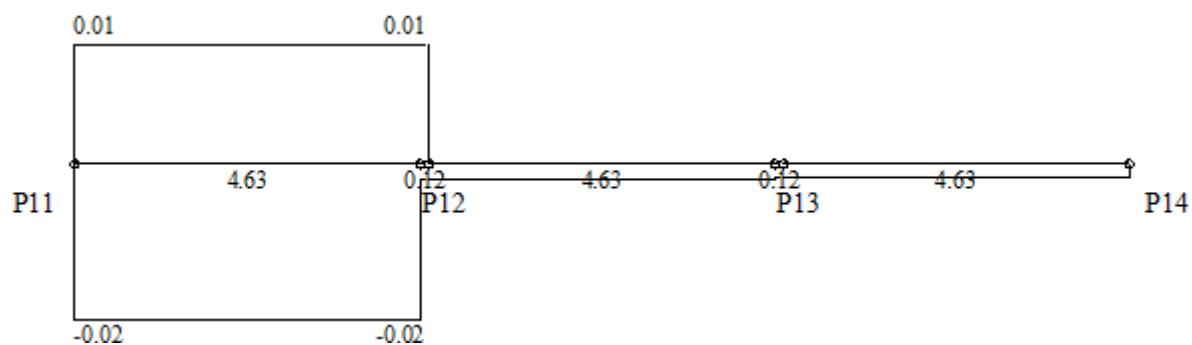
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

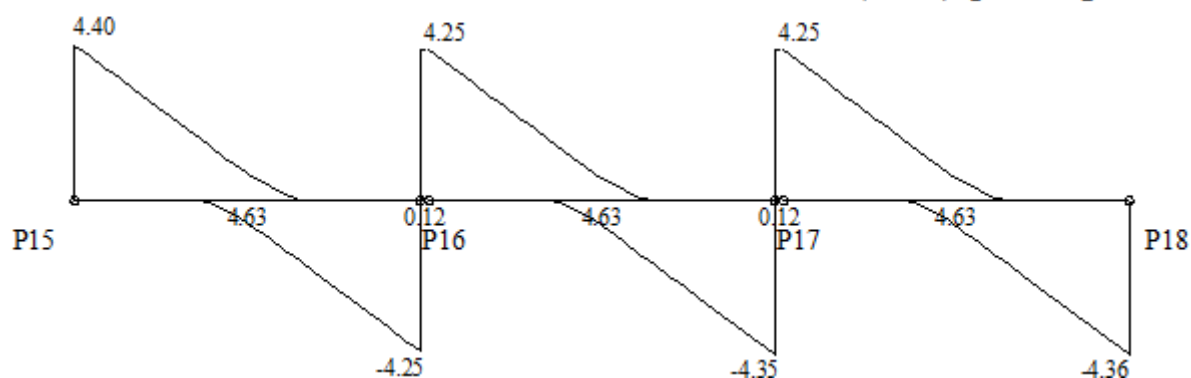


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

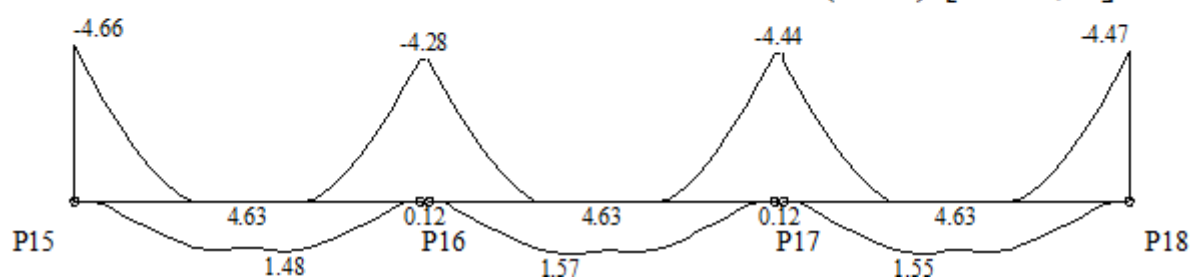


Diagramas: VIGA V5 - Baldrame

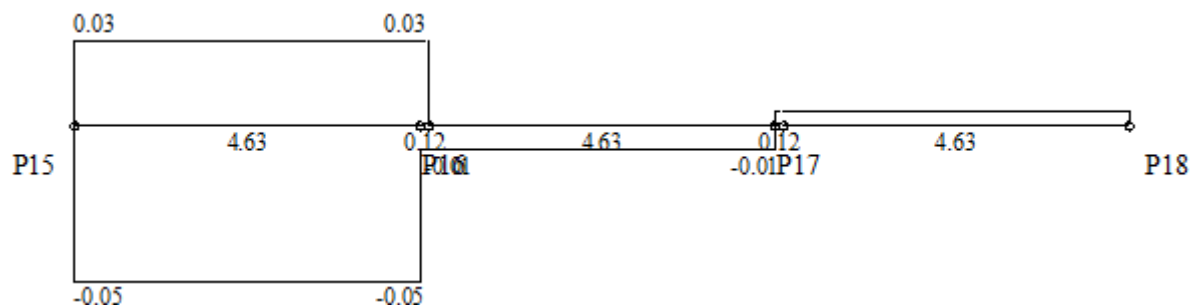
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

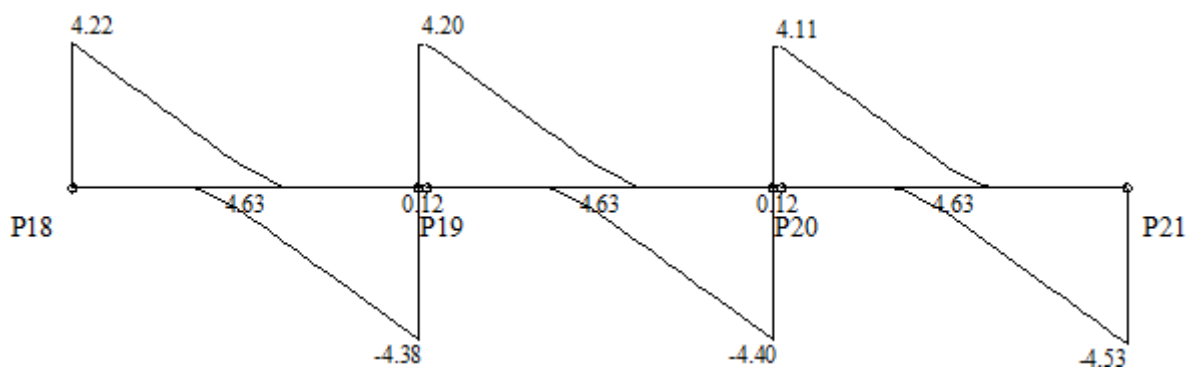


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

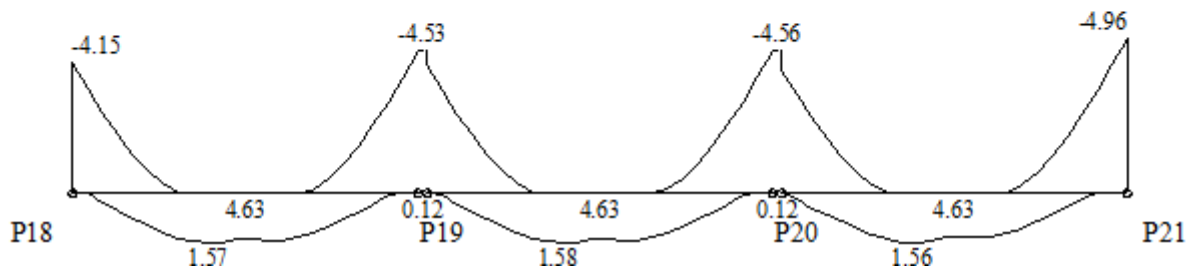


Diagramas: VIGA V6 - Baldrame

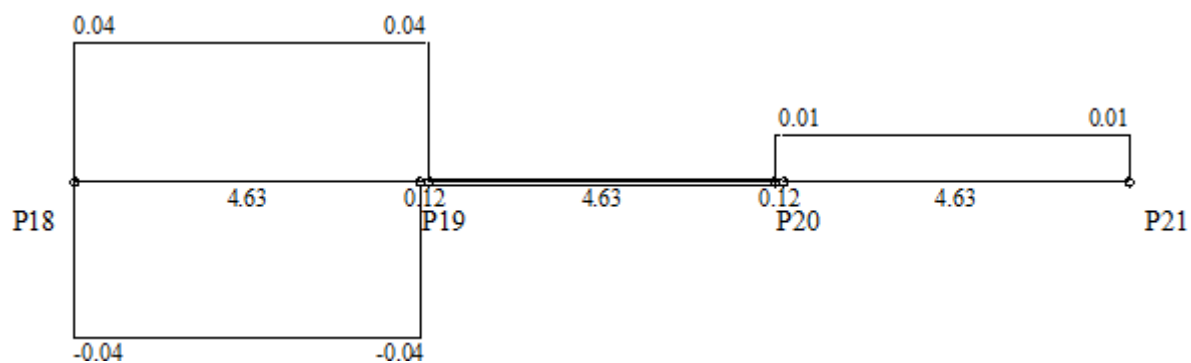
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

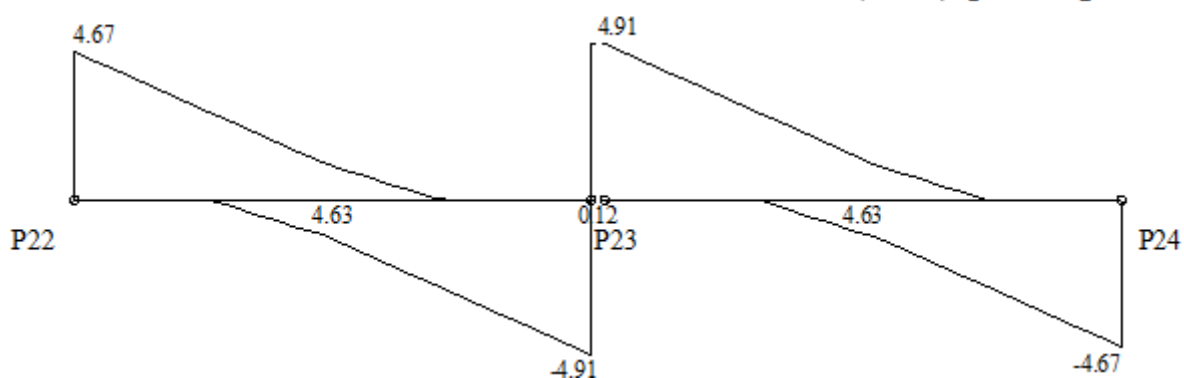


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

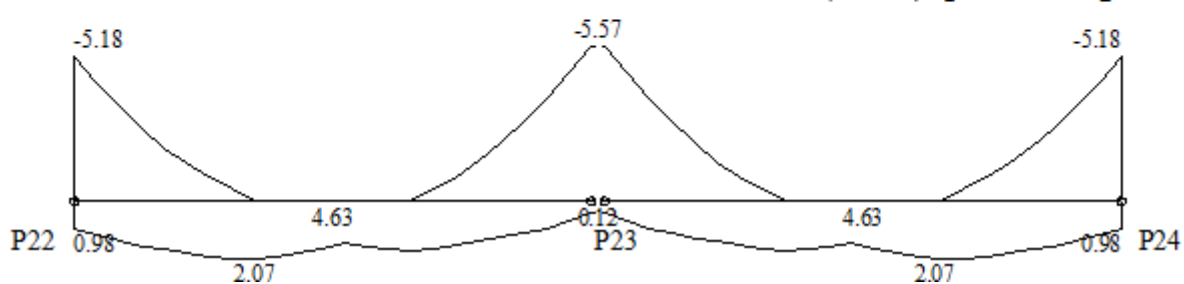


Diagramas: VIGA V7 - Baldrame

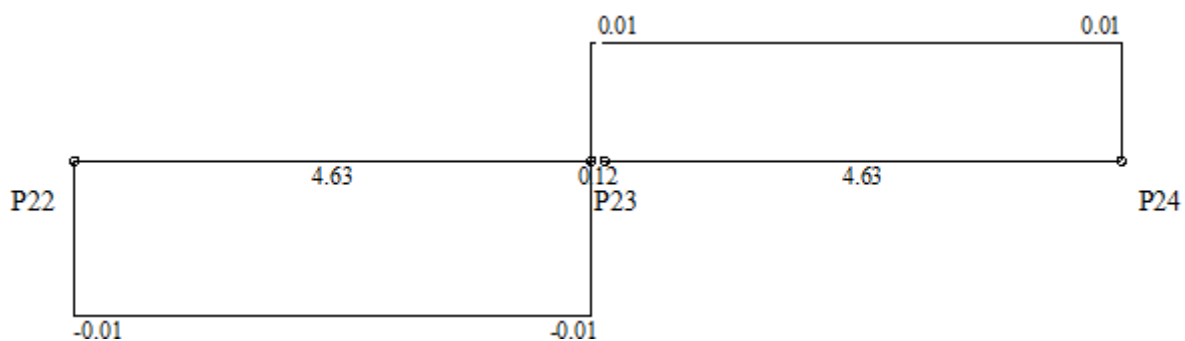
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

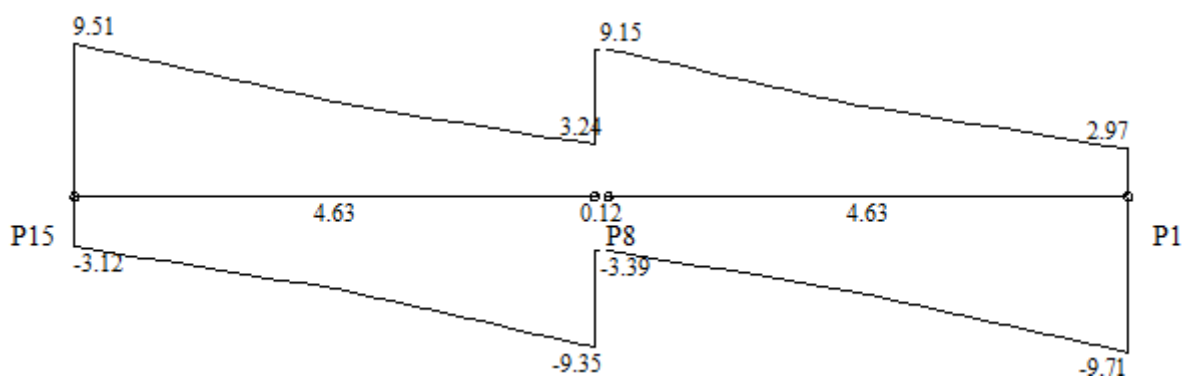


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

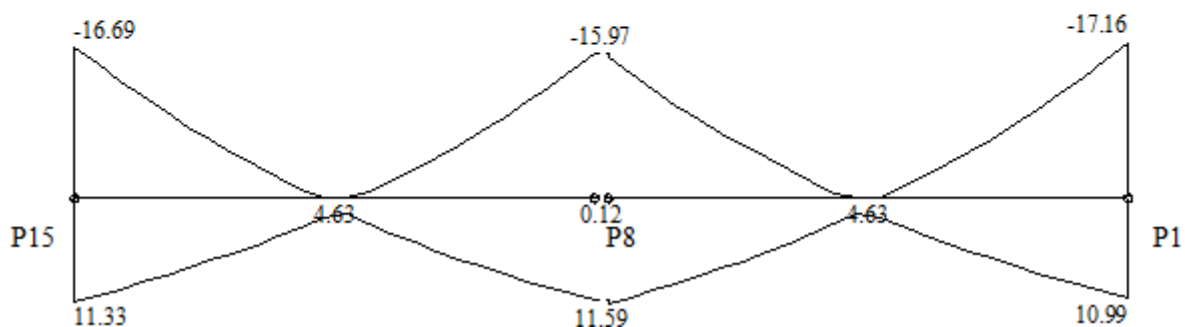


Diagramas: VIGA V8 - Baldrame

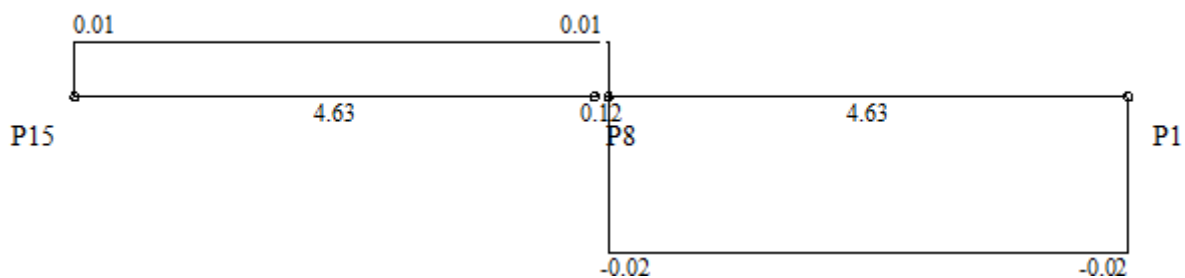
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

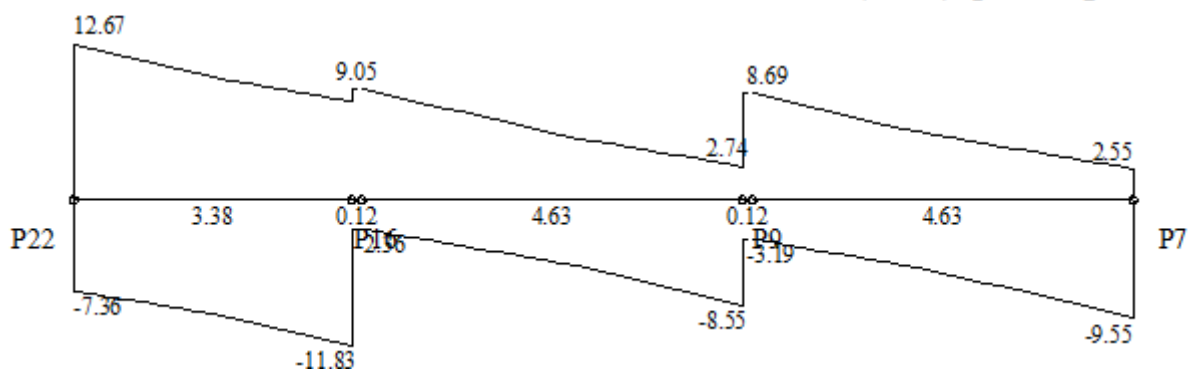


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

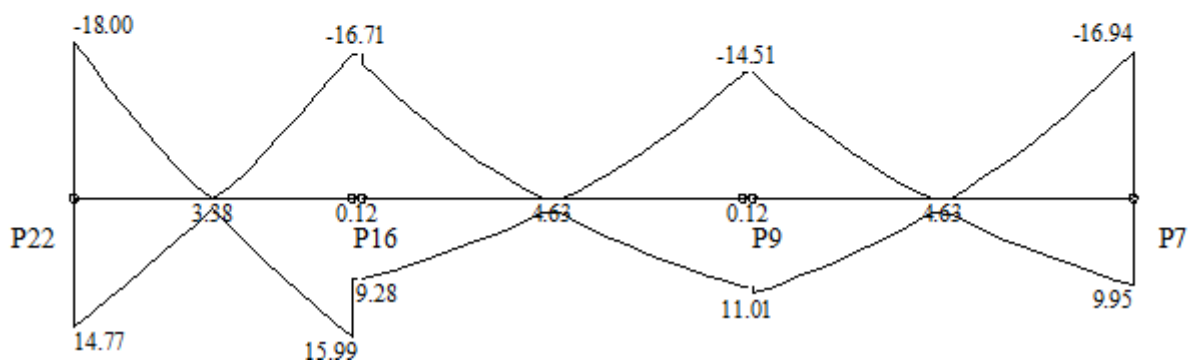


Diagramas: VIGA V9 - Baldrame

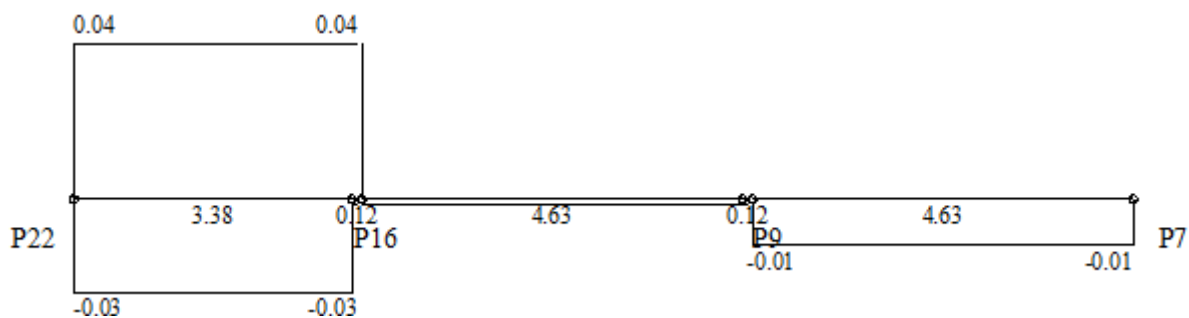
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



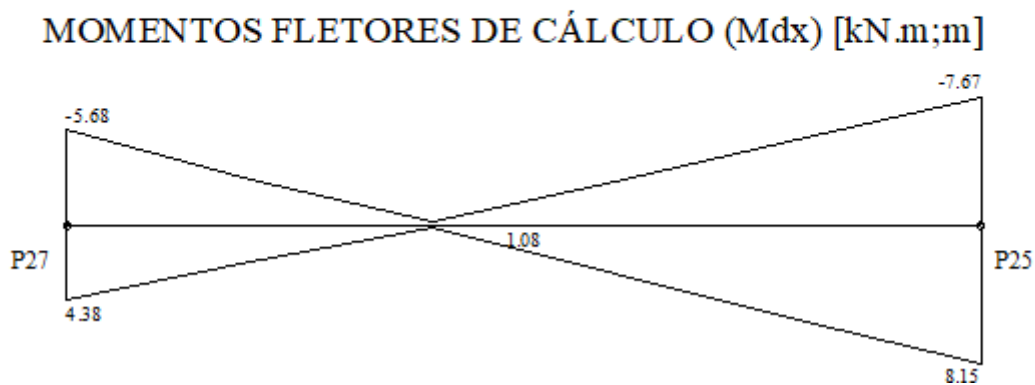
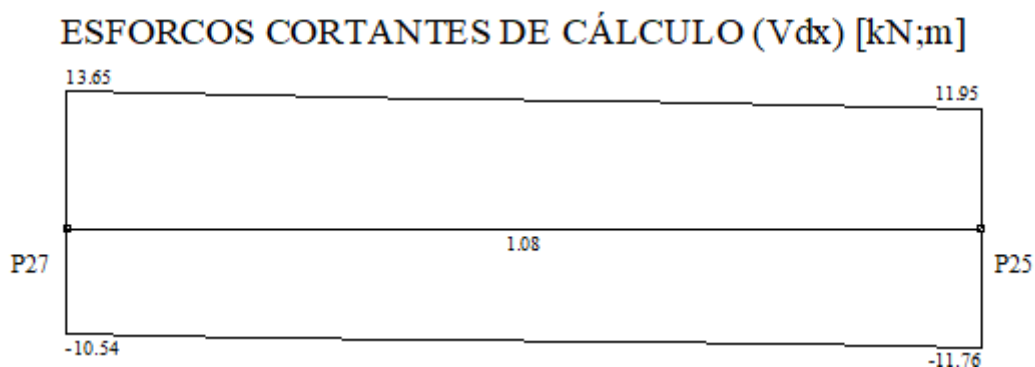
MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



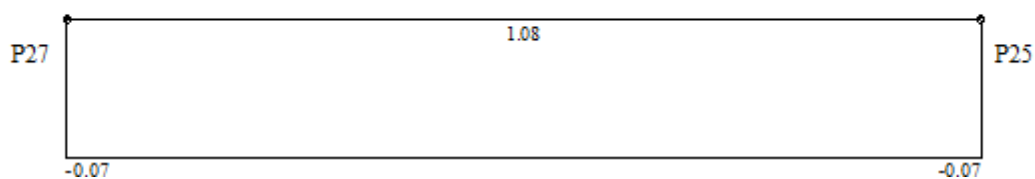
MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Diagramas: VIGA V10 - Baldrame

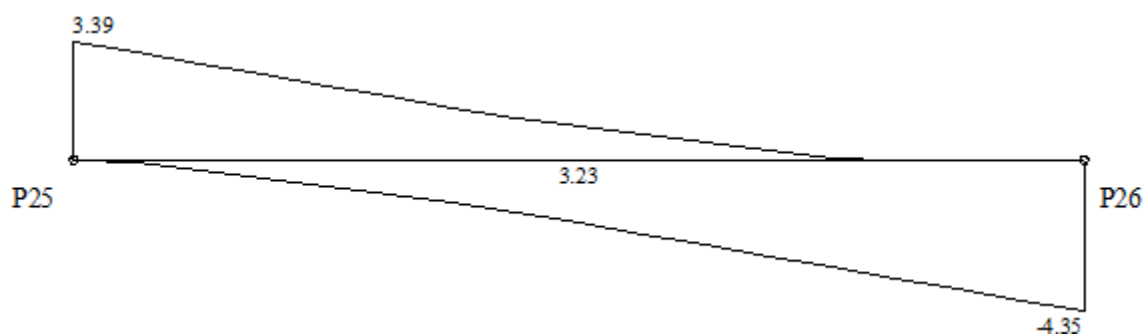


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

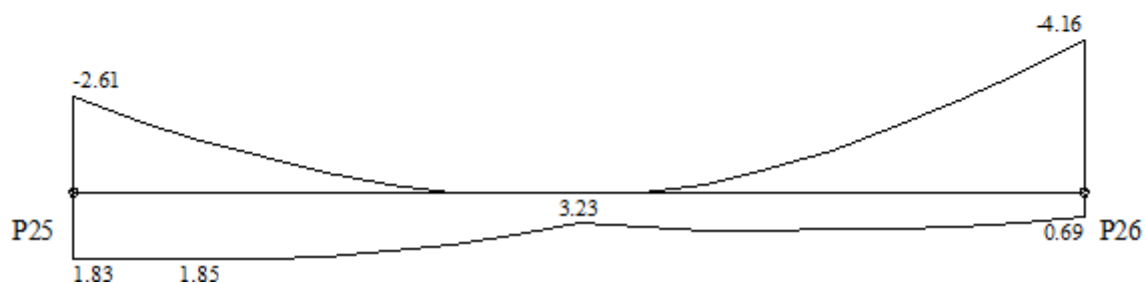


Diagramas: VIGA V11 - Baldrame

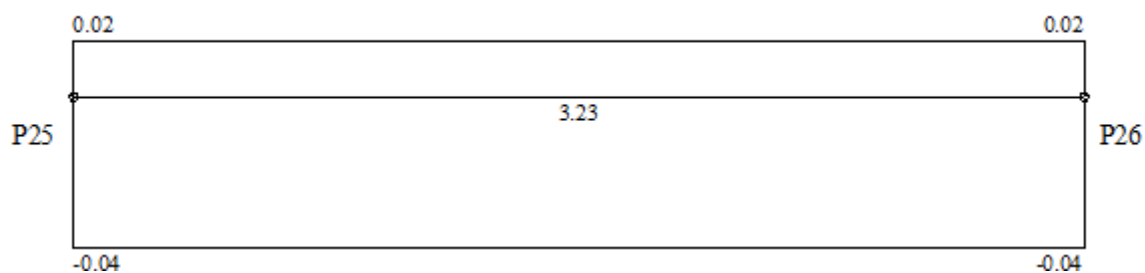
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

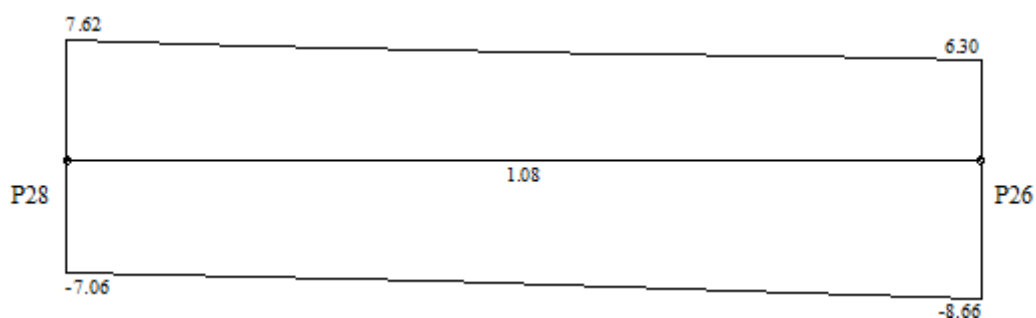


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

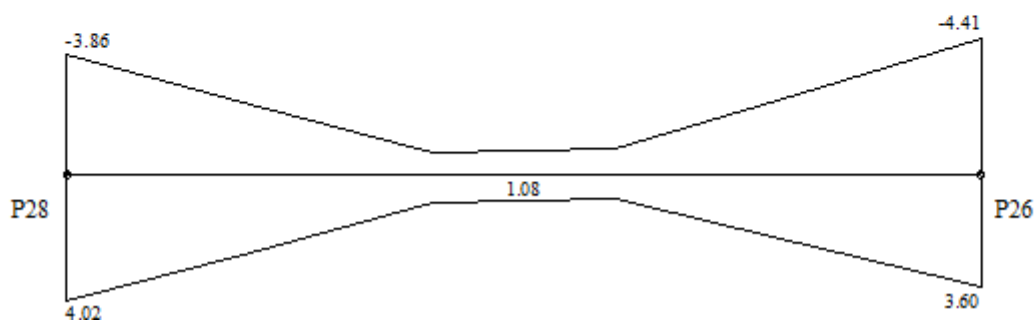


Diagramas: VIGA V12 - Baldrame

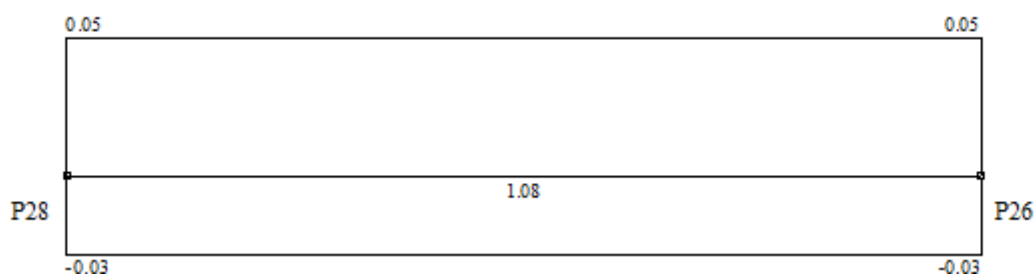
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

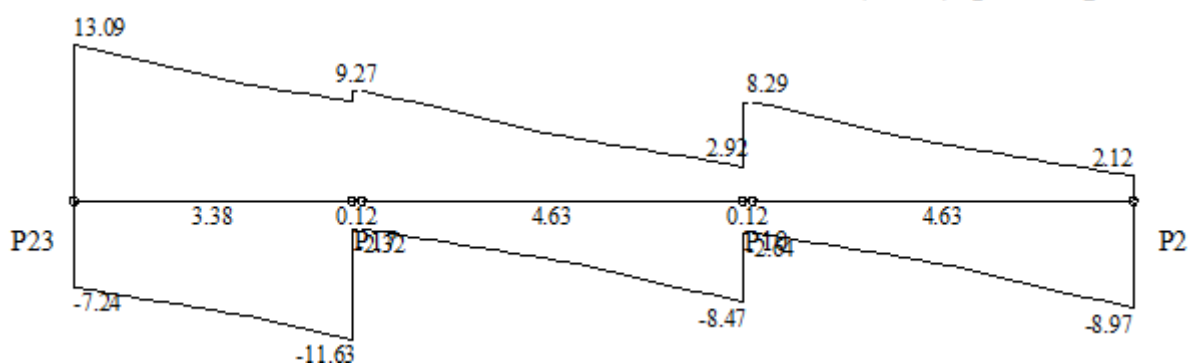


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

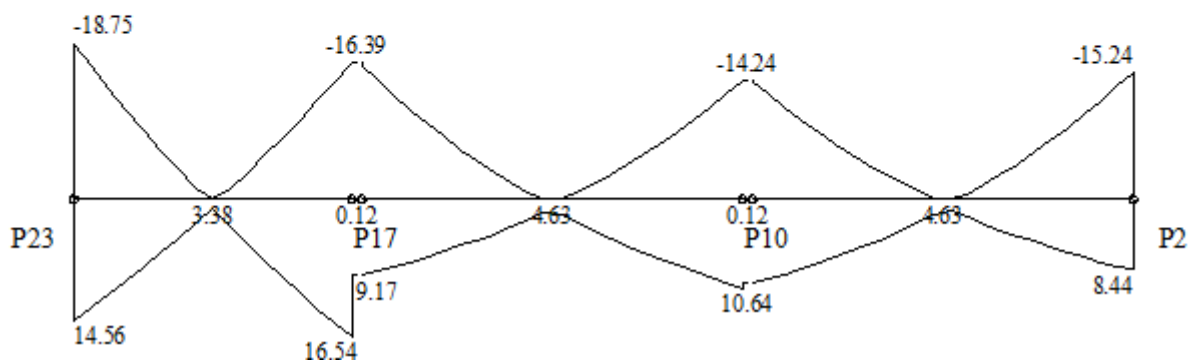


Diagramas: VIGA V13 - Baldrame

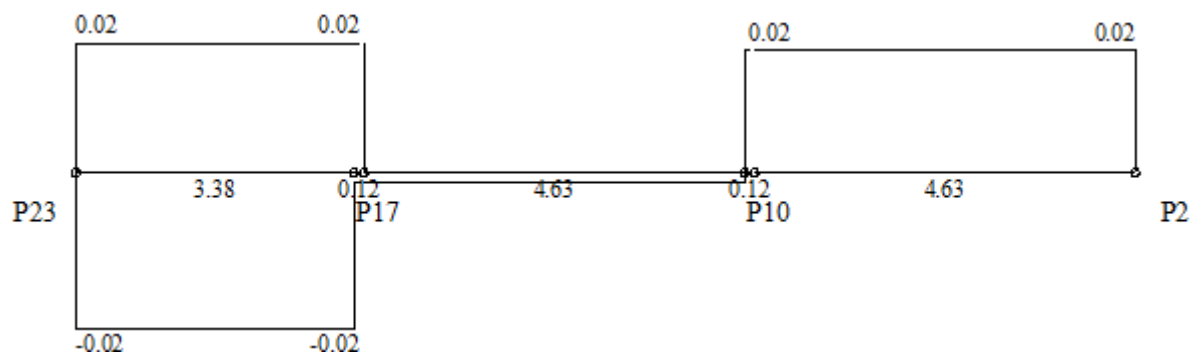
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

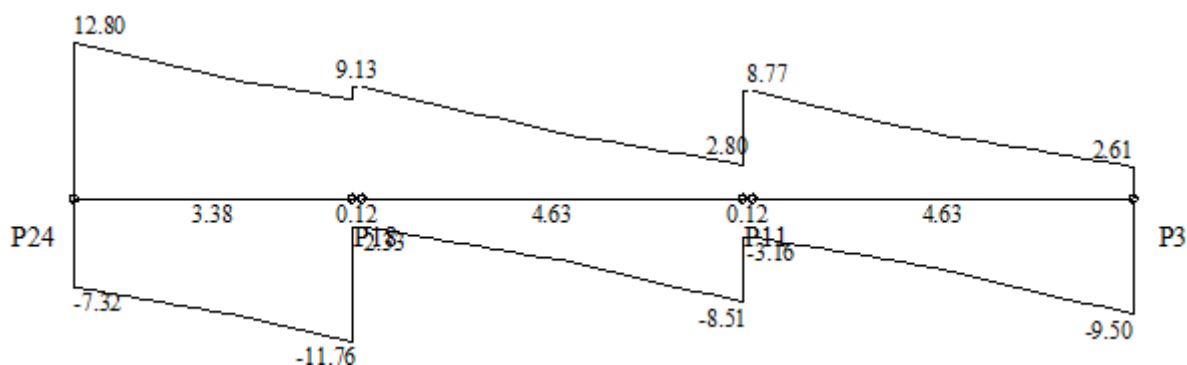


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

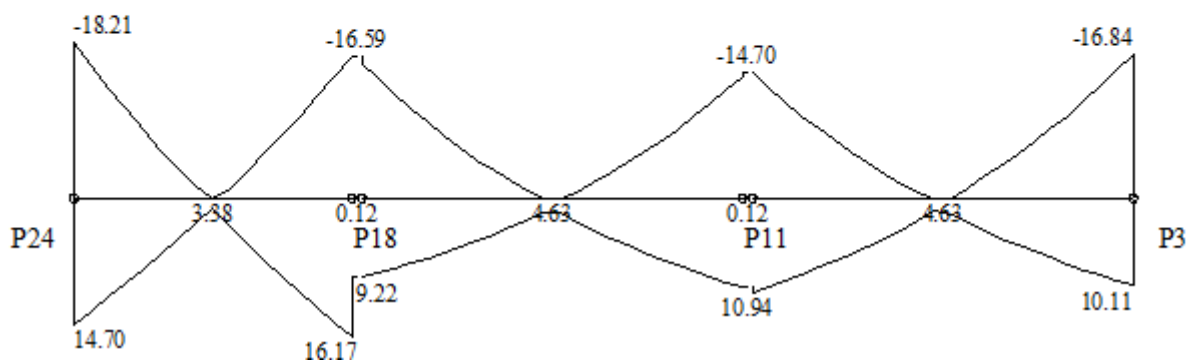


Diagramas: VIGA V14 - Baldrame

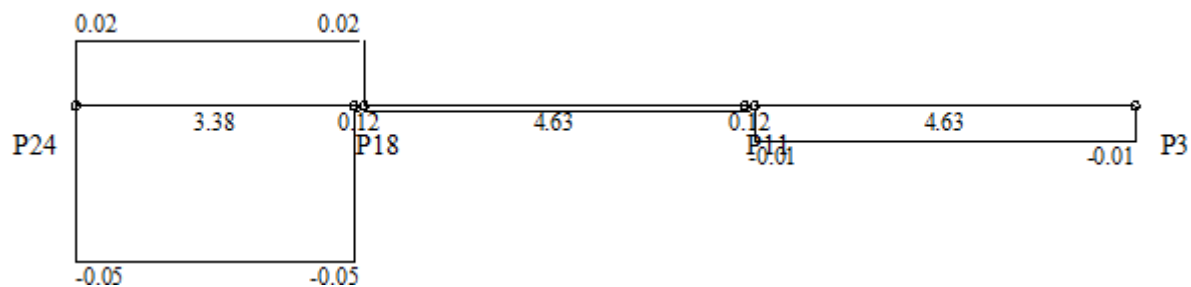
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

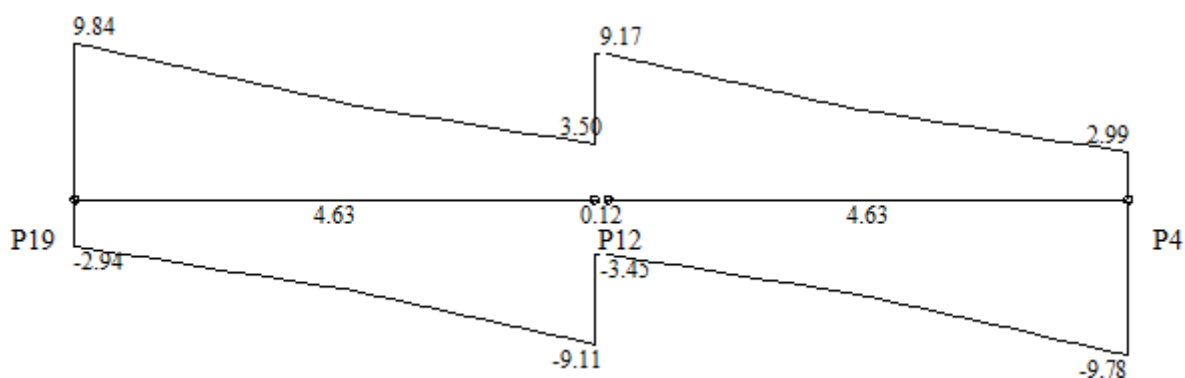


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

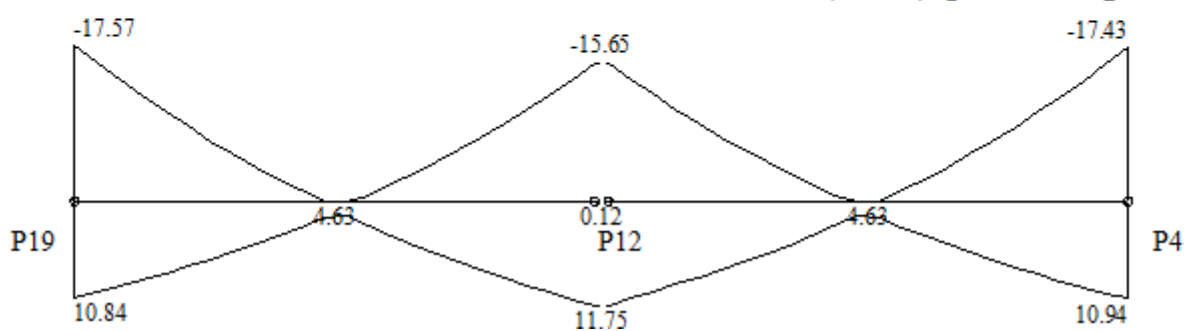


Diagramas: VIGA V15 - Baldrame

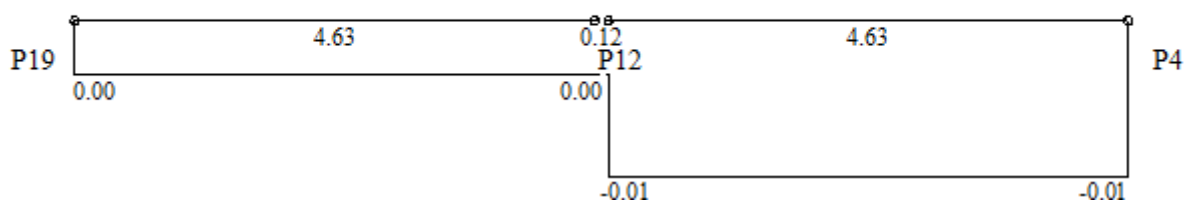
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

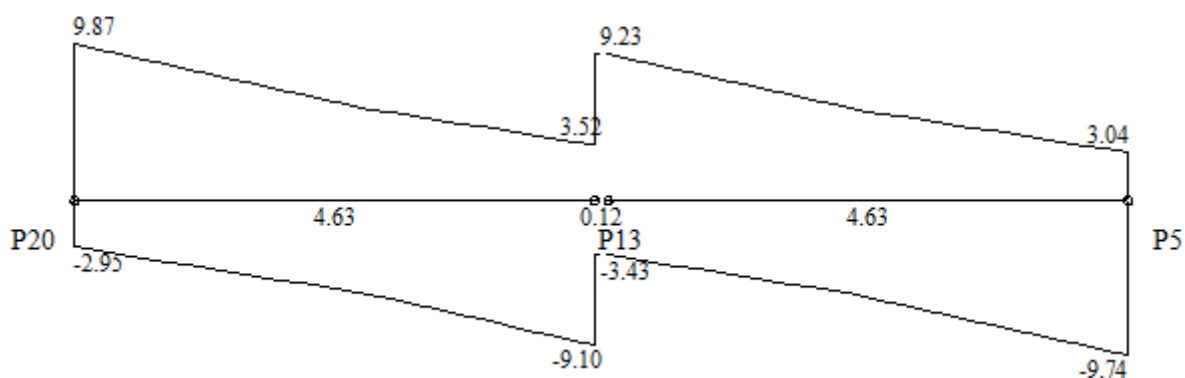


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

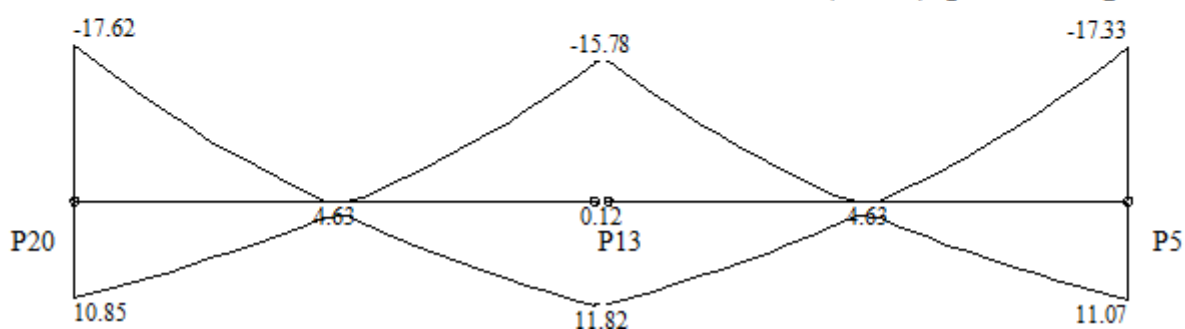


Diagramas: VIGA V16 - Baldrame

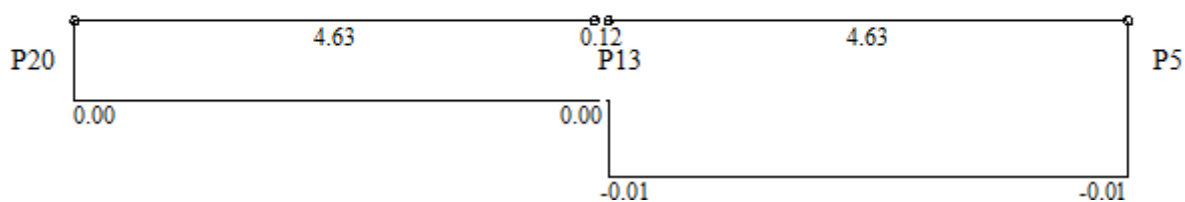
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

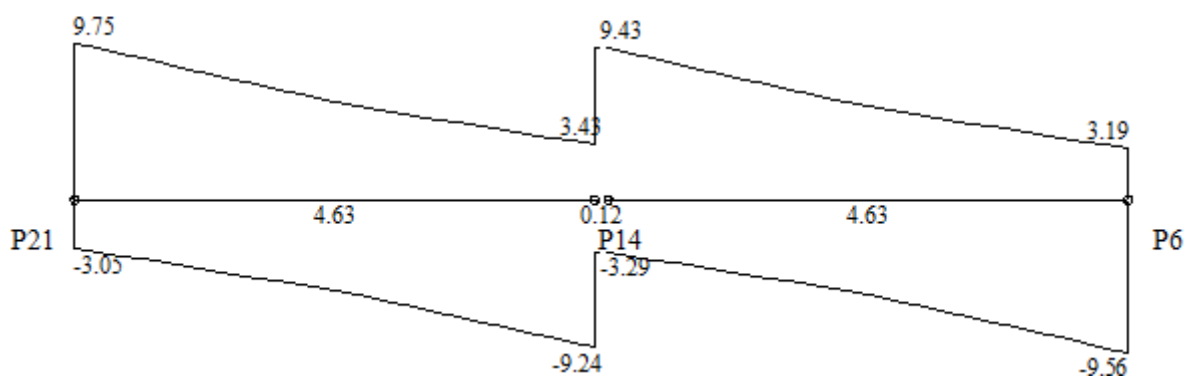


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

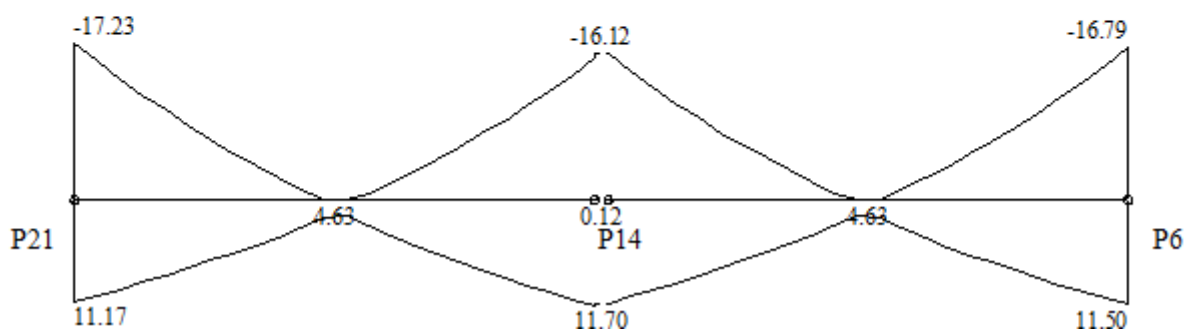


Diagramas: VIGA V17 - Baldrame

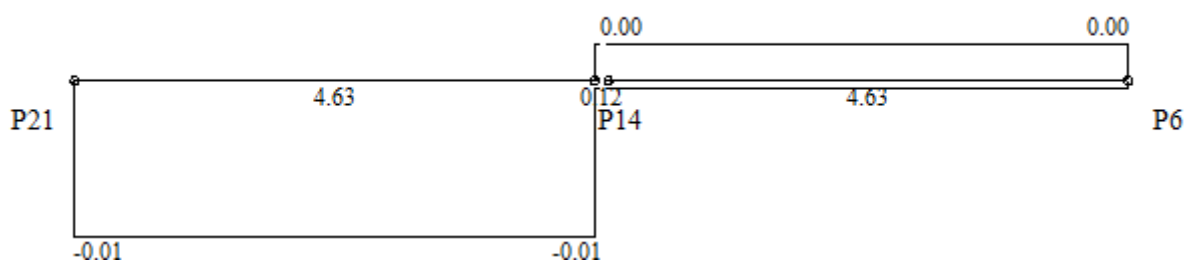
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Pavimento Nv 180,00

Resultados dos Pilares

Nv 180,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 2		cobr = 4.00 cm	

Dados					Resultados					
Pilar	Seção (cm)	Nível Altura (m)	leb leh (m)	vínc vínc	Nd máx Nd mín (kN)	MBd topo MBd base (kN.m)	MHd topo MHd base (kN.m)	As b Armaduras As h % armad total	Estribo Topo Base cota	Esb b Esb h
P1 1:20	30.00	1.80	3.32	RR	71.60	15.67	5.98	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	1.80	3.32	RR	35.71	16.06	8.54	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P2 1:20	30.00	1.80	3.32	RR	120.53	17.99	1.53	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	1.80	3.32	RR	67.23	31.62	4.09	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P3 1:20	30.00	1.80	3.32	RR	121.00	20.55	2.32	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	1.80	3.32	RR	67.74	24.37	3.16	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P4 1:20	30.00	1.80	3.32	RR	119.73	2.08	20.97	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	1.80	3.32	RR	67.42	3.01	20.98	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P5 1:20	30.00	1.80	3.32	RR	118.26	1.80	20.36	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	1.80	3.32	RR	66.14	3.42	20.37	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P6	30.00	1.80	3.32	RR	67.71	6.97	14.88	3.68 3 ø 12.5	ø 5.0 c/11	38.29

1:20	X 30.00	1.80	3.32 RR	33.01	4.49	15.27	3.68 3 ø 12.5 1.1 8 ø 12.5		38.29
P7	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	122.85 68.94	2.71 2.26	20.59 24.47	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11	38.29 38.29
P8	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	137.11 81.85	9.44 8.67	6.98 11.53	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/11	38.29 38.29
P9	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	236.29 140.45	2.39 3.58	3.99 12.48	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/15	38.29 38.29
P10	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	236.81 141.24	4.42 12.99	1.58 2.16	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/15	38.29 38.29
P11	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	232.89 138.38	3.92 12.72	1.56 1.55	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/15	38.29 38.29
P12	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	231.98 137.92	6.96 11.44	1.80 1.53	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15	38.29 38.29
P13	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	226.81 133.74	7.04 11.52	1.57 2.41	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15	38.29 38.29
P14	30.00	1.80	3.32 RR	129.52	7.07	9.21	2.45 2 ø 12.5	ø 5.0 c/11	38.29

1:20	X 30.00	1.80	3.32 RR	76.33	11.64	8.11	2.45 2 ø 12.5 0.5 4 ø 12.5		38.29
P15	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	71.13 35.39	6.62 6.22	15.45 15.84	4.02 2 ø 16.0 4.02 2 ø 16.0 0.9 4 ø 16.0	ø 5.0 c/11	38.29 38.29
P16	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	123.06 68.90	18.66 29.57	2.07 2.82	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11	38.29 38.29
P17	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	120.38 67.28	19.13 27.80	1.40 1.76	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11	38.29 38.29
P18	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	121.00 67.60	18.71 29.75	1.54 1.54	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11	38.29 38.29
P19	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	119.91 67.53	21.02 21.06	1.62 1.47	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11	38.29 38.29
P20	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	118.41 66.22	20.49 20.52	1.39 2.15	3.68 3 ø 12.5 3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11	38.29 38.29
P21	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	68.00 33.29	6.48 5.94	15.08 15.49	4.02 2 ø 16.0 4.02 2 ø 16.0 0.9 4 ø 16.0	ø 5.0 c/11	38.29 38.29
P22	Circ	1.80	5.46 EL	76.75	1.57	0.49	4.71 6 ø 10.0	ø 5.0 c/11	72.80

1:20	0.00 30.00	1.80		51.64	7.86	2.49	0.7		
P23 1:20	Circ 0.00 30.00	1.80 1.80	5.46 EL	76.75 51.64	1.57 7.87	0.49 2.47	4.71 6 ø 10.0 0.7	ø 5.0 c/11	72.80
P24 1:20	Circ 0.00 30.00	1.80 1.80	5.46 EL	76.75 51.64	1.57 7.86	0.49 2.49	4.71 6 ø 10.0 0.7	ø 5.0 c/11	72.80
P25 1:20	20.00 X 20.00	1.80 1.80	1.80 RR 1.80 RR	27.94 12.59	1.92 1.62	1.84 0.22	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 30	31.14 31.14
P26 1:20	20.00 X 20.00	1.80 1.80	1.80 RR 1.80 RR	28.89 12.99	2.43 1.63	2.49 1.94	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 30	31.14 31.14
P27 1:20	20.00 X 20.00	1.80 1.80	1.80 RR 2.80 RR	24.89 10.28	2.80 2.62	0.15 0.97	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 30	31.14 48.44
P28 1:20	20.00 X 20.00	1.80 1.80	1.80 RR 2.80 RR	24.48 9.85	2.28 1.76	0.13 0.25	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 ø 5.0 c/12 30	31.14 48.44

Resultados da Viga V1

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P25	0.20			2 Ø 10.0 0.68					0.00
1	3.05	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P26	0.20			2 Ø 10.0 0.68					0.00

Resultados da Viga V2

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P28	0.20			2 Ø 10.0 0.68					0.00
1	0.90	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P26	0.20			2 Ø 10.0 0.68					0.00

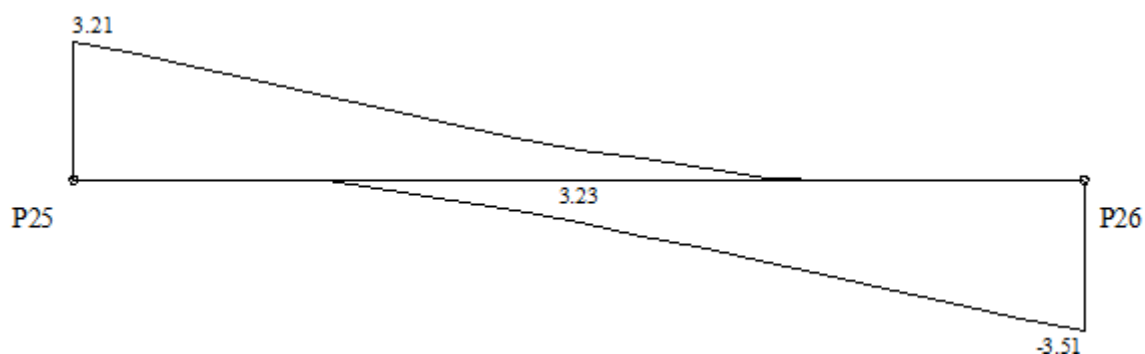
Resultados da Viga V3

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

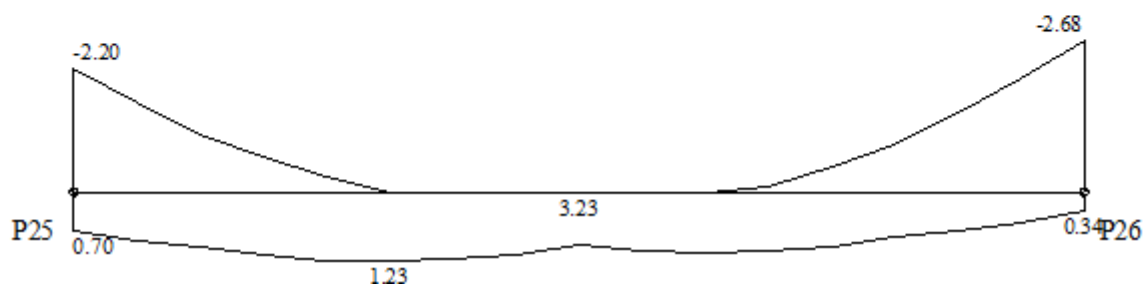
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P27	0.20			2 Ø 10.0 0.68					0.00
1	0.90	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P25	0.20			2 Ø 10.0 0.68					0.00

Diagramas: VIGA V1 - Nv 180,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

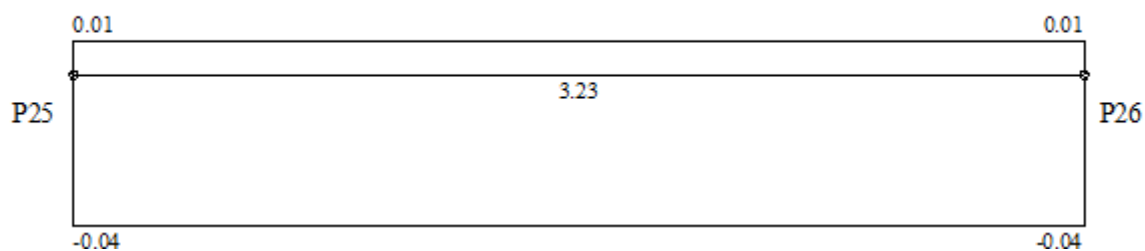


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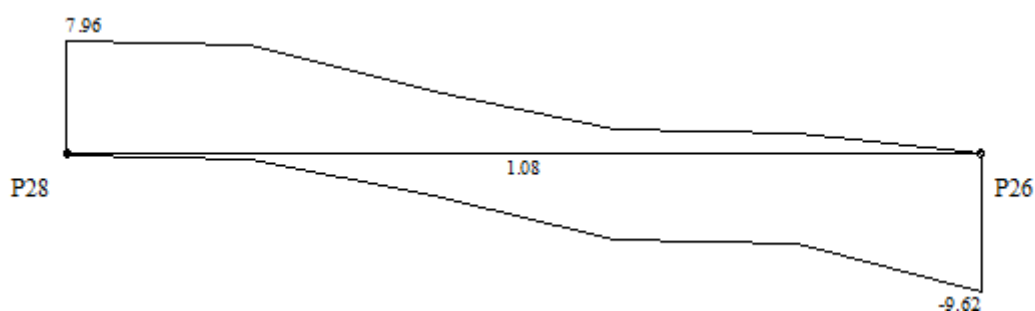
79/
139

MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

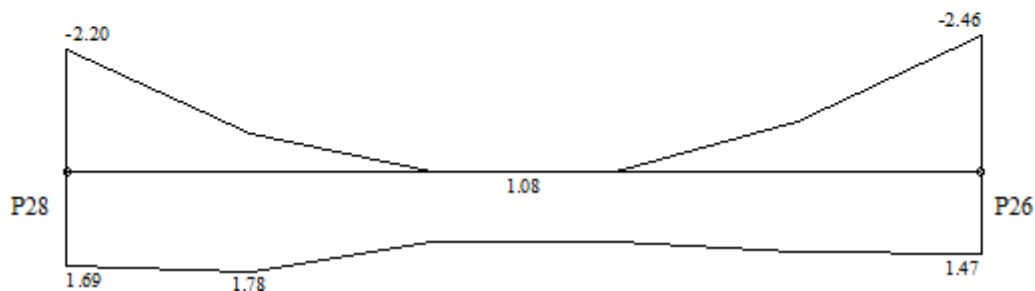


Diagramas: VIGA V2 - Nv 180,00

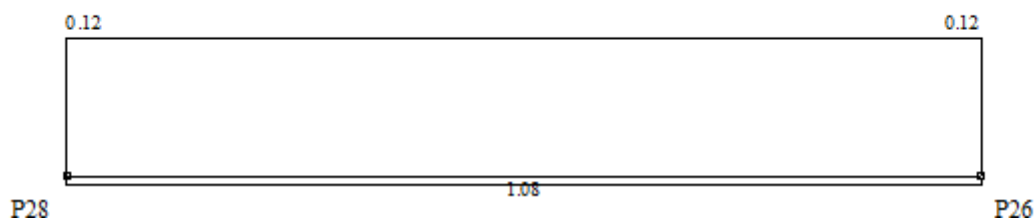
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

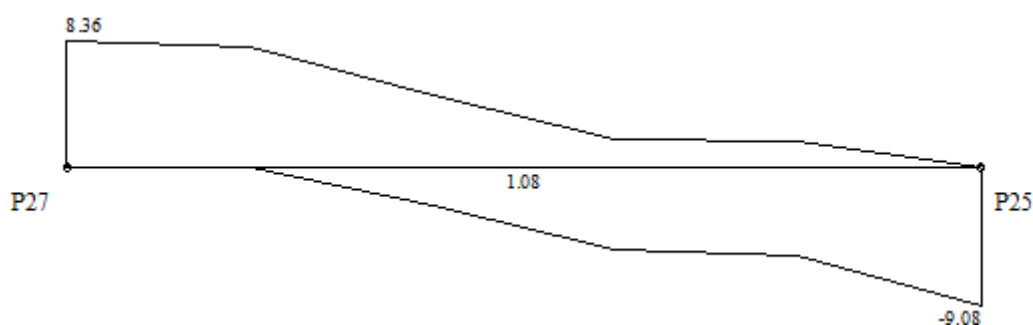


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

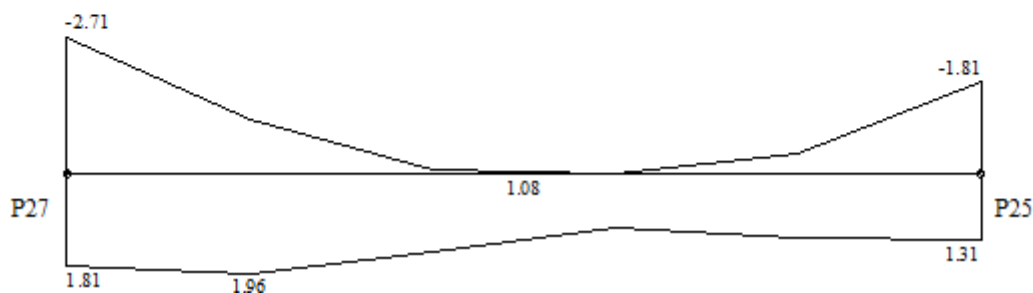


Diagramas: VIGA V3 - Nv 180,00

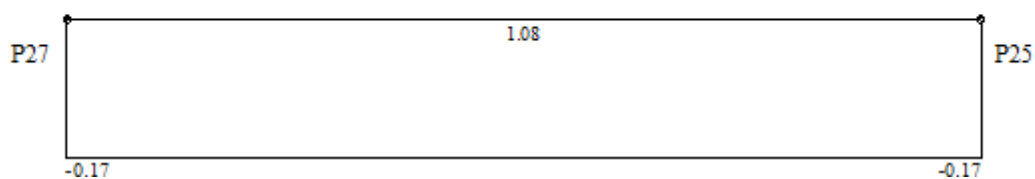
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Resultados da Laje

Nv 180,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m ³
Lance 2		cobr = 3.50 cm	

Nome	Espessura (cm)	Carga (kN/m ²)	Mdx (kN.m/m)	Mdy (kN.m/m)	Asx	Asy
L1	12	4.07	6.70		As = 0.57 cm ² /N (TR 08646 - 0.57 cm ² /N)	

Resultados dos Pilares

Nv 273,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 3		cobr = 4.00 cm	

Dados					Resultados					
Pilar	Seção (cm)	Nível Altura (m)	leb leh (m)	vínc vínc	Nd máx Nd mín (kN)	MBd topo MBd base (kN.m)	MHd topo MHd base (kN.m)	As b Armaduras As h % armad total	Estribo Topo Base cota	Esb b Esb h
P1 1:20	30.00	2.73	3.32	RR	65.93	30.32	12.76	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.93	3.32	RR	33.62	15.67	5.98	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P2 1:20	30.00	2.73	3.32	RR	114.86	41.89	2.19	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.93	3.32	RR	65.14	17.99	1.53	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P3 1:20	30.00	2.73	3.32	RR	115.33	42.00	2.59	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.93	3.32	RR	65.64	20.55	2.32	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P4 1:20	30.00	2.73	3.32	RR	114.06	2.29	40.87	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.93	3.32	RR	65.33	2.08	20.97	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P5 1:20	30.00	2.73	3.32	RR	112.59	2.69	39.63	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.93	3.32	RR	64.04	1.80	20.36	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P6 1:20	30.00	2.73	3.32	RR	62.04	12.34	28.72	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.93	3.32	RR	30.92	6.97	14.88	3.68 3 ø 12.5		38.29

	30.00						1.1	8 Ø 12.5		
P7	30.00	2.73	3.32 RR	117.18	3.53	42.11	3.68	3 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	66.85	2.71	20.59	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P8	30.00	2.73	3.32 RR	131.44	18.44	14.78	2.45	2 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	79.76	9.44	6.98	2.45	2 Ø 12.5		38.29
	30.00						0.5	4 Ø 12.5		
P9	30.00	2.73	3.32 RR	230.62	4.91	10.59	3.68	3 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.93	3.32 RR	138.35	2.39	3.99	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P10	30.00	2.73	3.32 RR	231.14	10.88	2.94	3.68	3 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.93	3.32 RR	139.15	4.42	1.58	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P11	30.00	2.73	3.32 RR	227.22	10.61	2.61	3.68	3 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.93	3.32 RR	136.28	3.92	1.56	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P12	30.00	2.73	3.32 RR	226.31	14.68	2.79	2.45	2 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.93	3.32 RR	135.83	6.96	1.80	2.45	2 Ø 12.5		38.29
	30.00						0.5	4 Ø 12.5		
P13	30.00	2.73	3.32 RR	221.14	14.84	2.34	2.45	2 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.93	3.32 RR	131.65	7.04	1.57	2.45	2 Ø 12.5		38.29
	30.00						0.5	4 Ø 12.5		
P14	30.00	2.73	3.32 RR	123.85	14.98	17.80	2.45	2 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	74.24	7.07	9.21	2.45	2 Ø 12.5		38.29

	30.00						0.5	4 ø 12.5		
P15	30.00	2.73	3.32 RR	65.46	12.69	29.88	4.02	2 ø 16.0	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	33.30	6.62	15.45	4.02	2 ø 16.0		38.29
	30.00						0.9	4 ø 16.0		
P16	30.00	2.73	3.32 RR	117.39	41.83	4.04	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	66.81	18.66	2.07	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P17	30.00	2.73	3.32 RR	114.71	41.63	2.47	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	65.18	19.13	1.40	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P18	30.00	2.73	3.32 RR	115.33	42.01	2.57	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	65.51	18.71	1.54	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P19	30.00	2.73	3.32 RR	114.24	40.99	2.57	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	65.43	21.02	1.62	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P20	30.00	2.73	3.32 RR	112.74	39.90	2.57	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	64.13	20.49	1.39	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P21	30.00	2.73	3.32 RR	62.33	12.35	29.13	4.02	2 ø 16.0	ø 5.0 c/11	38.29
1:20	X	0.93	3.32 RR	31.20	6.48	15.08	4.02	2 ø 16.0		38.29
	30.00						0.9	4 ø 16.0		
P22	Circ	2.73		72.30	0.00	0.00	4.71	6 ø 10.0	ø 5.0 c/12	72.80
1:20	0.00	0.93	5.46 EL	50.00	1.57	0.49				

	30.00						0.7		
P23	Circ	2.73	5.46 EL	72.30	0.00	0.00	4.71 6 Ø 10.0	Ø 5.0 c/12	72.80
1:20	0.00	0.93		50.00	1.57	0.49			
	30.00						0.7		
P24	Circ	2.73	5.46 EL	72.30	0.00	0.00	4.71 6 Ø 10.0	Ø 5.0 c/12	72.80
1:20	0.00	0.93		50.00	1.57	0.49			
	30.00						0.7		

Resultados dos Pilares

Nv 332,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 4		cobr = 4.00 cm	

Dados					Resultados					
Pilar	Seção (cm)	Nível Altura (m)	leb leh (m)	vínc vínc	Nd máx Nd mín (kN)	MBd topo MBd base (kN.m)	MHd topo MHd base (kN.m)	As b Armaduras As h % armad total	Estribo Topo Base cota	Esb b Esb h
P1 1:20	30.00	3.32	3.32	RR	63.00	38.80	17.00	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.59	3.32	RR	32.29	30.32	12.76	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P2 1:20	30.00	3.32	3.32	RR	111.93	56.21	3.11	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.59	3.32	RR	63.81	41.89	2.19	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P3 1:20	30.00	3.32	3.32	RR	112.40	54.76	2.54	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.59	3.32	RR	64.32	42.00	2.59	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P4 1:20	30.00	3.32	3.32	RR	111.13	2.56	52.66	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.59	3.32	RR	64.00	2.29	40.87	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P5 1:20	30.00	3.32	3.32	RR	109.66	3.56	51.01	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.59	3.32	RR	62.72	2.69	39.63	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P6 1:20	30.00	3.32	3.32	RR	59.11	15.66	36.69	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.59	3.32	RR	29.59	12.34	28.72	3.68 3 ø 12.5		38.29

	30.00						1.1	8 Ø 12.5		
P7	30.00	3.32	3.32 RR	114.25	3.83	54.91	3.68	3 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	65.52	3.53	42.11	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P8	30.00	3.32	3.32 RR	128.51	24.01	18.90	2.45	2 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	78.43	18.44	14.78	2.45	2 Ø 12.5		38.29
	30.00						0.5	4 Ø 12.5		
P9	30.00	3.32	3.32 RR	227.69	6.28	13.92	3.68	3 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.59	3.32 RR	137.03	4.91	10.59	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P10	30.00	3.32	3.32 RR	228.21	14.45	3.58	3.68	3 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.59	3.32 RR	137.82	10.88	2.94	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P11	30.00	3.32	3.32 RR	224.29	14.07	3.05	3.68	3 Ø 12.5	Ø 5.0 c/15	38.29
1:20	X	0.59	3.32 RR	134.96	10.61	2.61	3.68	3 Ø 12.5		38.29
	30.00						1.1	8 Ø 12.5		
P12	30.00	3.32	3.32 RR	223.38	18.70	3.20	2.45	2 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	134.50	14.68	2.79	2.45	2 Ø 12.5		38.29
	30.00						0.5	4 Ø 12.5		
P13	30.00	3.32	3.32 RR	218.21	18.91	2.91	2.45	2 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	130.32	14.84	2.34	2.45	2 Ø 12.5		38.29
	30.00						0.5	4 Ø 12.5		
P14	30.00	3.32	3.32 RR	120.92	19.17	23.11	2.45	2 Ø 12.5	Ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	72.91	14.98	17.80	2.45	2 Ø 12.5		38.29

	30.00						0.5	4 ø 12.5		
P15	30.00	3.32	3.32 RR	62.53	16.43	38.22	4.02	2 ø 16.0	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	31.97	12.69	29.88	4.02	2 ø 16.0		38.29
	30.00						0.9	4 ø 16.0		
P16	30.00	3.32	3.32 RR	114.46	55.69	5.08	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	65.48	41.83	4.04	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P17	30.00	3.32	3.32 RR	111.78	55.07	2.94	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	63.86	41.63	2.47	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P18	30.00	3.32	3.32 RR	112.40	55.95	3.01	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	64.18	42.01	2.57	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P19	30.00	3.32	3.32 RR	111.31	52.82	2.95	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	64.11	40.99	2.57	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P20	30.00	3.32	3.32 RR	109.81	51.37	3.15	3.68	3 ø 12.5	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	62.80	39.90	2.57	3.68	3 ø 12.5		38.29
	30.00						1.1	8 ø 12.5		
P21	30.00	3.32	3.32 RR	59.40	15.98	37.23	4.02	2 ø 16.0	ø 5.0 c/11	38.29
1:20	X	0.59	3.32 RR	29.87	12.35	29.13	4.02	2 ø 16.0		38.29
	30.00						0.9	4 ø 16.0		

Resultados da Viga V1

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P1	0.30			2 Ø 10.0 1.10					0.07
1	4.45	15.00 x 40.00	2 Ø 10.0 1.27			Ø 5.0 c/ 21			0.10
P7	0.30			3 Ø 10.0 1.79					0.09
2	4.45	15.00 x 40.00	2 Ø 10.0 1.14			Ø 5.0 c/ 21			0.08
P2	0.30			2 Ø 10.0 1.54					0.14
3	4.45	15.00 x 40.00	2 Ø 10.0 1.17			Ø 5.0 c/ 21			0.09
P3	0.30			2 Ø 10.0 1.59					0.15

Resultados da Viga V2

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P3	0.30			2 Ø 10.0 1.58					0.15
1	4.45	15.00 x 40.00	2 Ø 10.0 1.16			Ø 5.0 c/ 21			0.09
P4	0.30			2 Ø 10.0 1.55					0.15
2	4.45	15.00 x 40.00	2 Ø 10.0 1.15			Ø 5.0 c/ 21			0.09
P5	0.30			3 Ø 10.0 1.72					0.08
3	4.45	15.00 x 40.00	2 Ø 10.0 1.19			Ø 5.0 c/ 21			0.09
P6	0.30			2 Ø 10.0 1.01					0.06

Resultados da Viga V3

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P8	0.30			2 Ø 10.0 1.60					0.15
1	4.45	15.00 x 40.00	3 Ø 10.0 2.18			Ø 5.0 c/ 20			0.13
P9	0.30			3 Ø 12.5 2.85					0.10
2	4.45	15.00 x 40.00	3 Ø 10.0 1.99			Ø 5.0 c/ 20			0.11
P10	0.30			2 Ø 12.5 2.41					0.18
3	4.45	15.00 x 40.00	3 Ø 10.0 2.01			Ø 5.0 c/ 20			0.11
P11	0.30			2 Ø 12.5 2.45					0.19

Resultados da Viga V4

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P11	0.30			2 Ø 12.5 2.37					0.17
1	4.45	15.00 x 40.00	3 Ø 10.0 2.02			Ø 5.0 c/ 20			0.11
P12	0.30			2 Ø 12.5 2.44					0.18
2	4.45	15.00 x 40.00	3 Ø 10.0 2.00			Ø 5.0 c/ 20			0.11
P13	0.30			2 Ø 12.5 2.50					0.19
3	4.45	15.00 x 40.00	3 Ø 10.0 2.02			Ø 5.0 c/ 20			0.11
P14	0.30			2 Ø 10.0 1.53					0.13

Resultados da Viga V5

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P15	0.30			2 Ø 10.0 1.06					0.07
1	4.45	15.00 x 40.00	2 Ø 10.0 1.27			Ø 5.0 c/ 21			0.10
P16	0.30			3 Ø 10.0 1.83					0.09
2	4.45	15.00 x 40.00	2 Ø 10.0 1.14			Ø 5.0 c/ 21			0.09
P17	0.30			2 Ø 10.0 1.56					0.15
3	4.45	15.00 x 40.00	2 Ø 10.0 1.16			Ø 5.0 c/ 21			0.09
P18	0.30			2 Ø 10.0 1.58					0.15

Resultados da Viga V6

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P18	0.30			2 Ø 10.0 1.55					0.15
1	4.45	15.00 x 40.00	2 Ø 10.0 1.16			Ø 5.0 c/ 21			0.09
P19	0.30			2 Ø 10.0 1.57					0.15
2	4.45	15.00 x 40.00	2 Ø 10.0 1.15			Ø 5.0 c/ 21			0.09
P20	0.30			3 Ø 10.0 1.70					0.08
3	4.45	15.00 x 40.00	2 Ø 10.0 1.19			Ø 5.0 c/ 21			0.09
P21	0.30			2 Ø 10.0 1.03					0.06

Resultados da Viga V7

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P15	0.30			3 Ø 12.5 2.68					0.05
1	4.45	15.00 x 40.00	2 Ø 10.0 1.41			Ø 5.0 c/ 21			0.11
P8	0.30			4 Ø 12.5 3.96					0.08
2	4.45	15.00 x 40.00	2 Ø 10.0 1.40			Ø 5.0 c/ 21			0.11
P1	0.30			3 Ø 12.5 2.72					0.05

Resultados da Viga V8

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P16	0.30			4 ø 12.5 4.13					0.07
1	4.45	15.00 x 40.00	3 ø 10.0 2.39			ø 5.0 c/ 20	ø 5.0 c/ 16 20.00		0.14
P9	0.30			6 ø 12.5 7.01					0.10
2	4.45	15.00 x 40.00	3 ø 10.0 2.37		ø 5.0 c/ 16 20.00	ø 5.0 c/ 20			0.14
P7	0.30			6 ø 10.0 4.27					0.07

Resultados da Viga V9

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P17	0.30			6 ø 10.0 4.27					0.07
1	4.45	15.00 x 40.00	3 ø 10.0 2.39			ø 5.0 c/ 20	ø 5.0 c/ 16 20.00		0.14
P10	0.30			6 ø 12.5 7.00					0.10
2	4.45	15.00 x 40.00	3 ø 10.0 2.39		ø 5.0 c/ 16 20.00	ø 5.0 c/ 20			0.14
P2	0.30			6 ø 10.0 4.37					0.07

Resultados da Viga V10

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P3	0.30			6 Ø 10.0 4.24					0.07
1	4.45	15.00 x 40.00	3 Ø 10.0 2.37			Ø 5.0 c/ 20	Ø 5.0 c/ 16 20.00		0.14
P11	0.30			6 Ø 12.5 6.98					0.10
2	4.45	15.00 x 40.00	3 Ø 10.0 2.38		Ø 5.0 c/ 16 20.00	Ø 5.0 c/ 20			0.14
P18	0.30			6 Ø 10.0 4.35					0.07

Resultados da Viga V11

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P19	0.30			3 ø 12.5 3.81					0.10
1	4.45	15.00 x 40.00	3 ø 10.0 2.39			ø 5.0 c/ 20	ø 5.0 c/ 17 20.00		0.14
P12	0.30			5 ø 12.5 6.35					0.11
2	4.45	15.00 x 40.00	3 ø 10.0 2.39		ø 5.0 c/ 17 20.00	ø 5.0 c/ 20			0.14
P4	0.30			3 ø 12.5 3.79					0.10

Resultados da Viga V12

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m ³

Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P20	0.30			3 ø 12.5 3.70					0.10
1	4.45	15.00 x 40.00	3 ø 10.0 2.28			ø 5.0 c/ 20	ø 5.0 c/ 19 20.00		0.13
P13	0.30			5 ø 12.5 6.10					0.10
2	4.45	15.00 x 40.00	3 ø 10.0 2.29		ø 5.0 c/ 18 20.00	ø 5.0 c/ 20			0.13
P5	0.30			3 ø 12.5 3.67					0.10

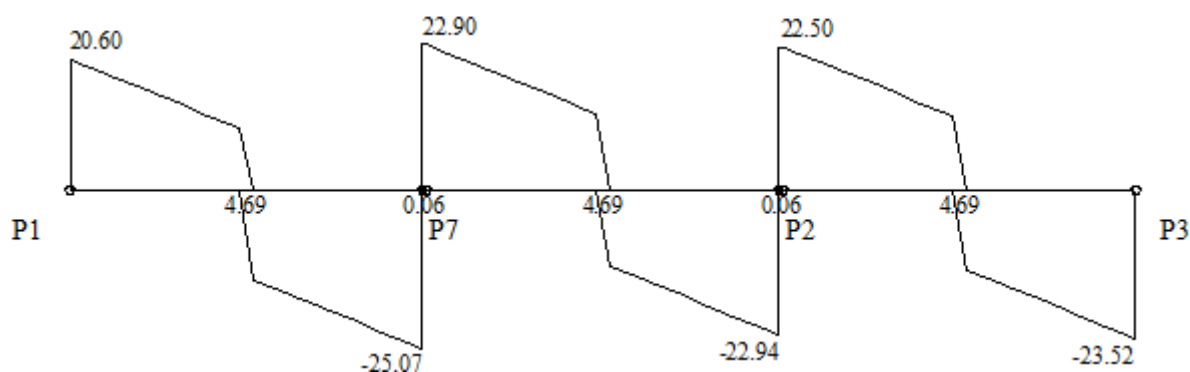
Resultados da Viga V13

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

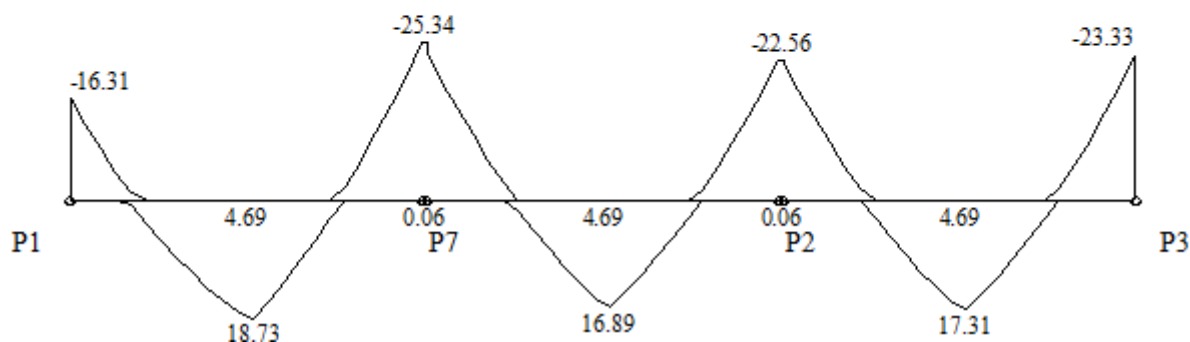
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P21	0.30			2 Ø 12.5 2.52					0.09
1	4.45	15.00 x 40.00	2 Ø 10.0 1.31			Ø 5.0 c/ 21			0.09
P14	0.30			3 Ø 12.5 3.66					0.10
2	4.45	15.00 x 40.00	2 Ø 10.0 1.32			Ø 5.0 c/ 21			0.09
P6	0.30			2 Ø 12.5 2.48					0.09

Diagramas: VIGA V1 - Nv 332,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



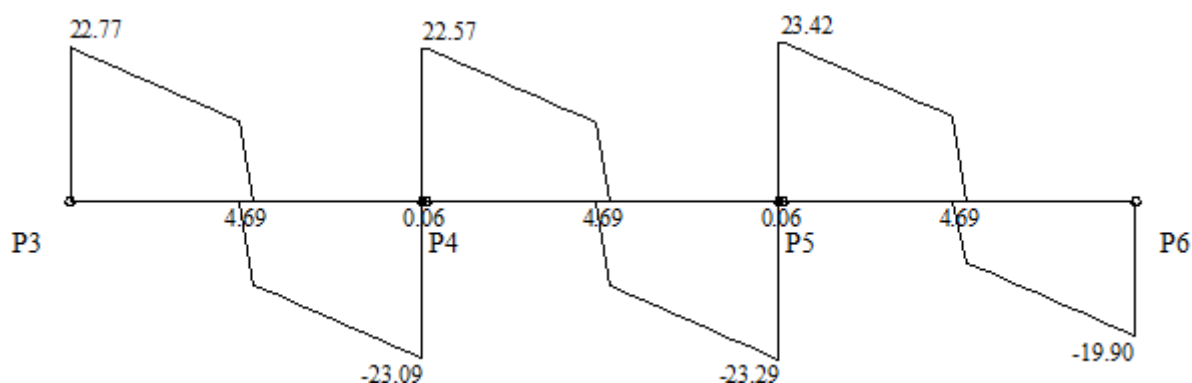
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 fortaleza@jcaengenharia.com.br

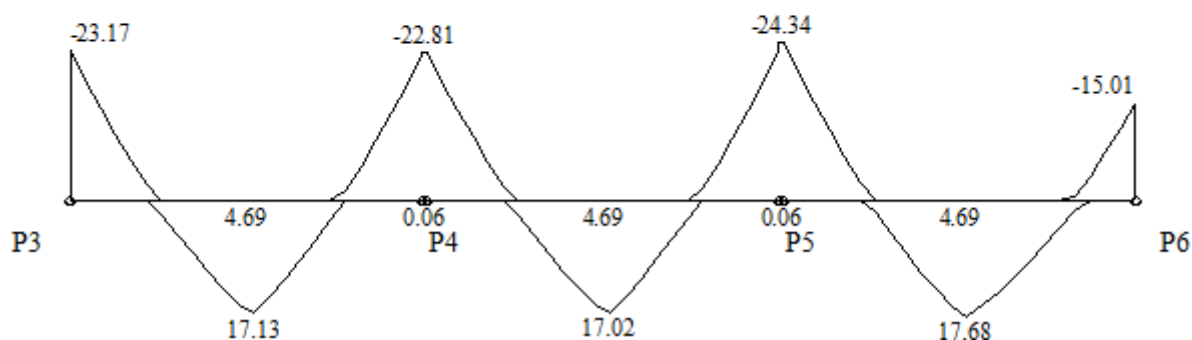
106/
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Diagramas: VIGA V2 - Nv 332,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

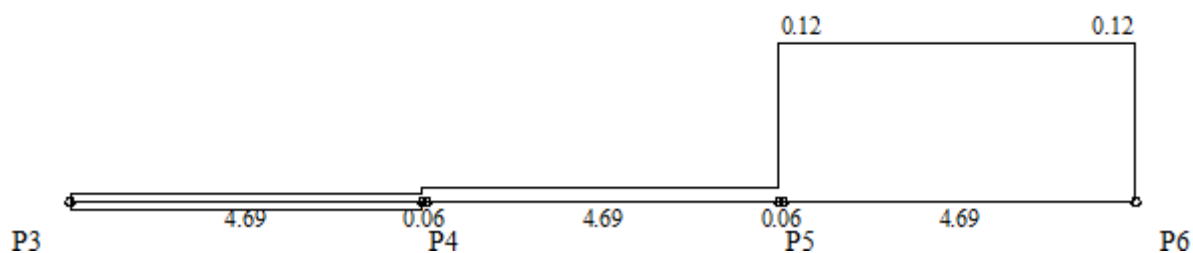


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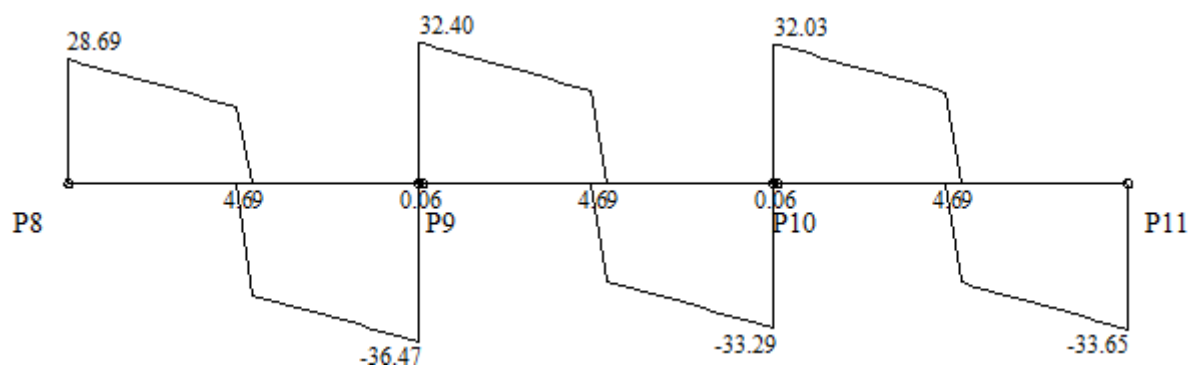
108/
 139

MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

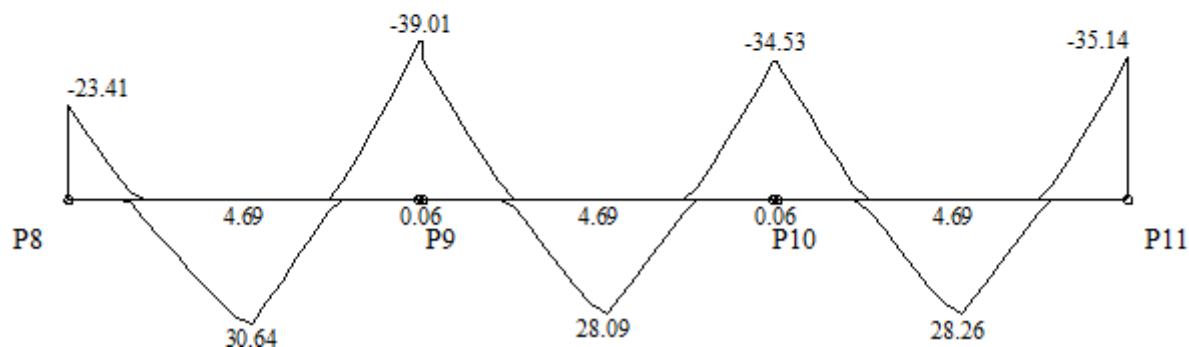


Diagramas: VIGA V3 - Nv 332,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

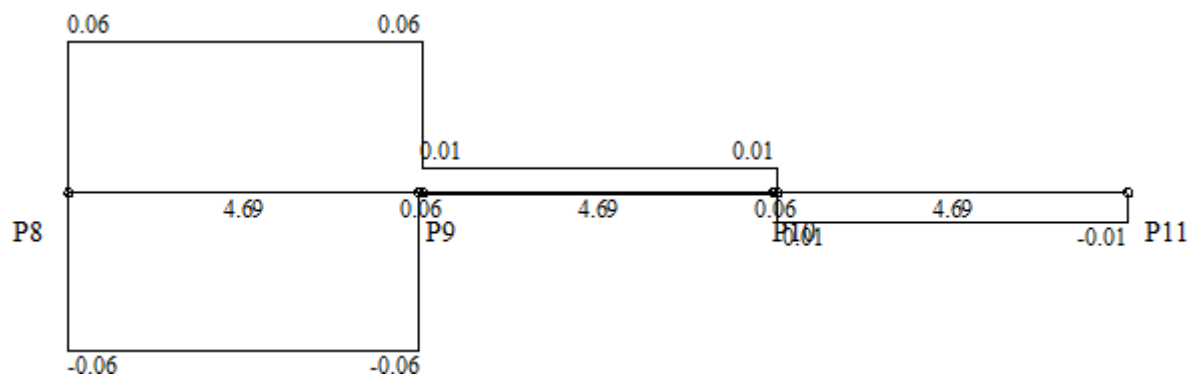


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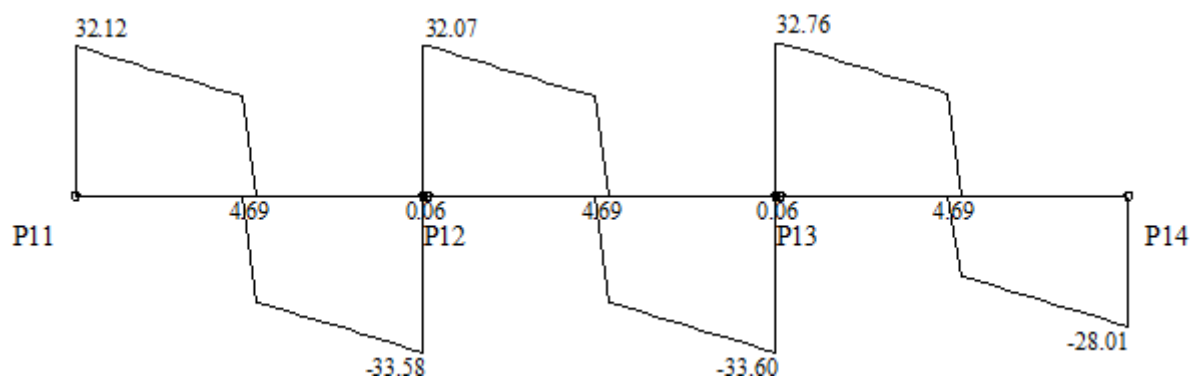
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

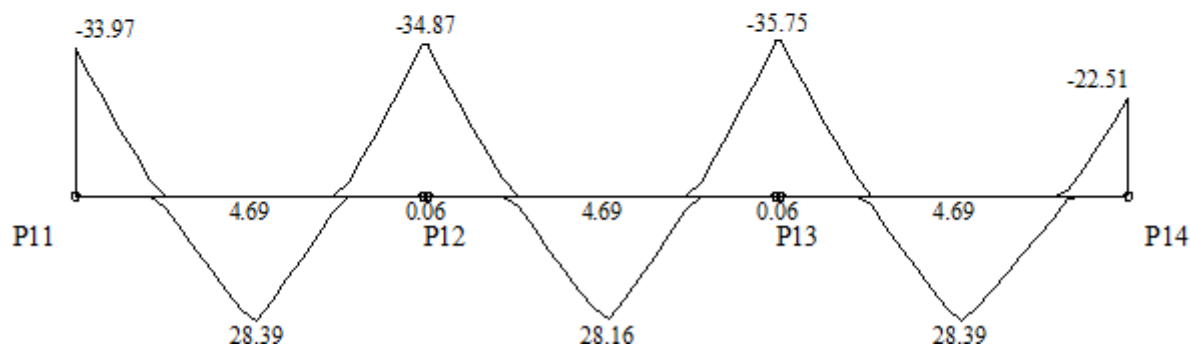


Diagramas: VIGA V4 - Nv 332,00

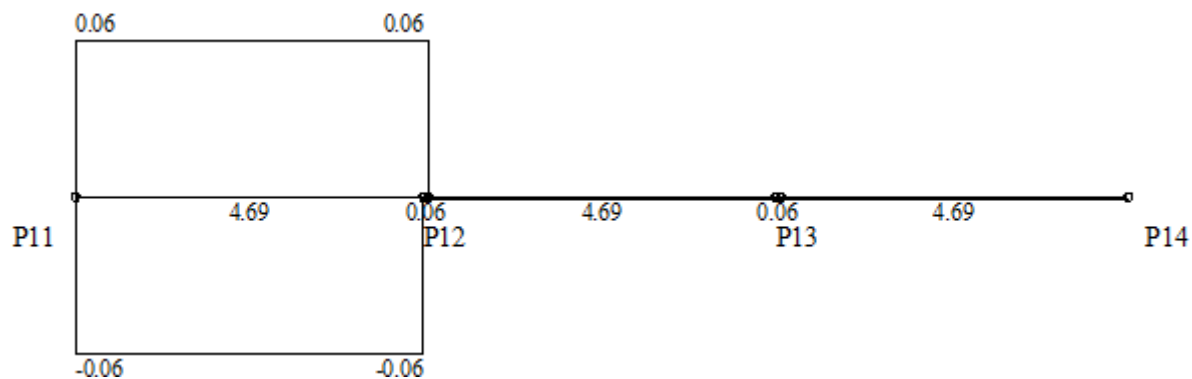
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



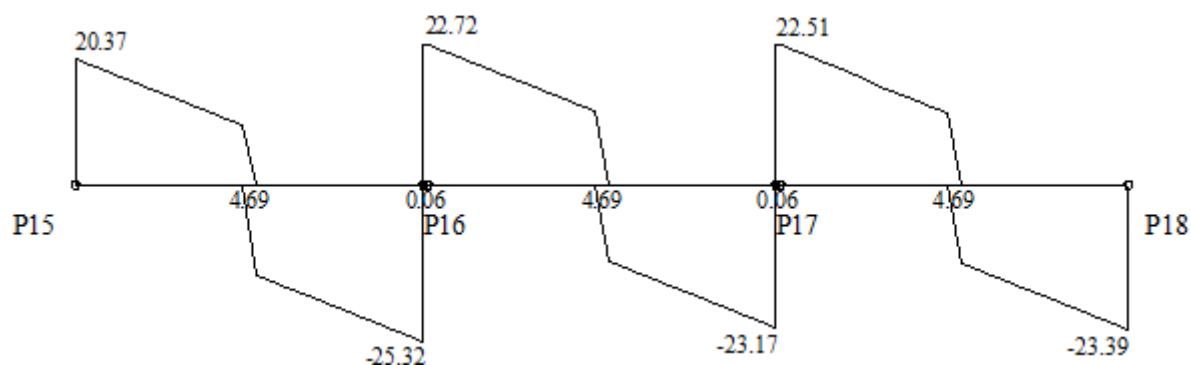
MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



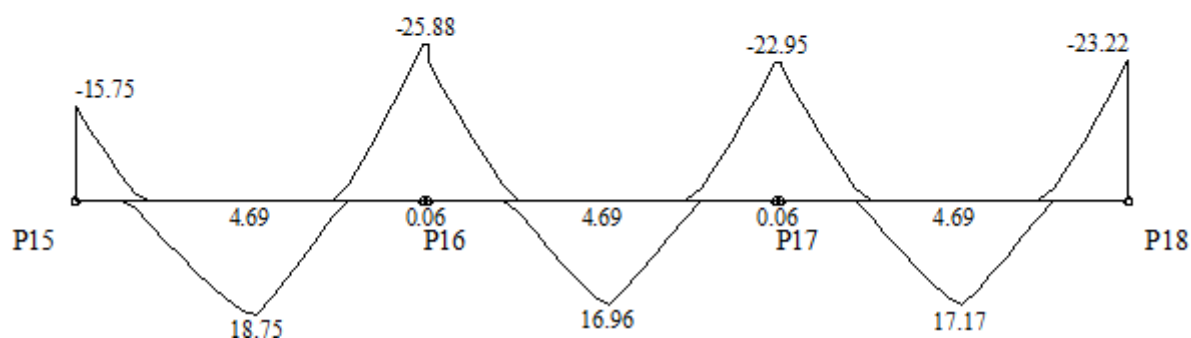
MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



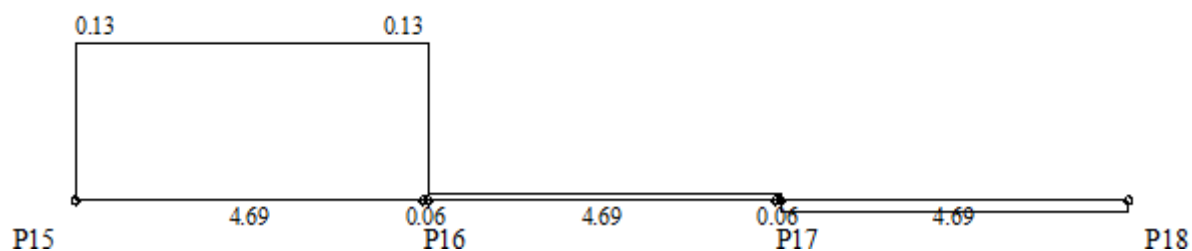
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (Mdx) [kN.m;m]

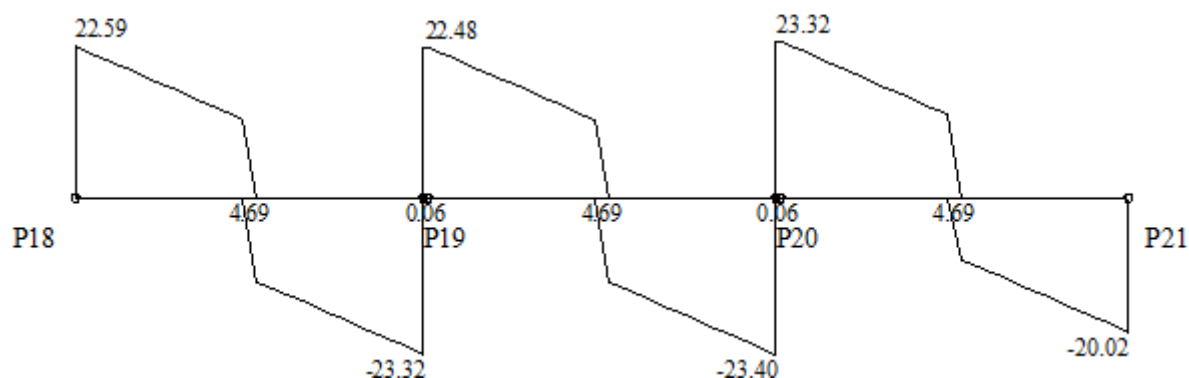


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

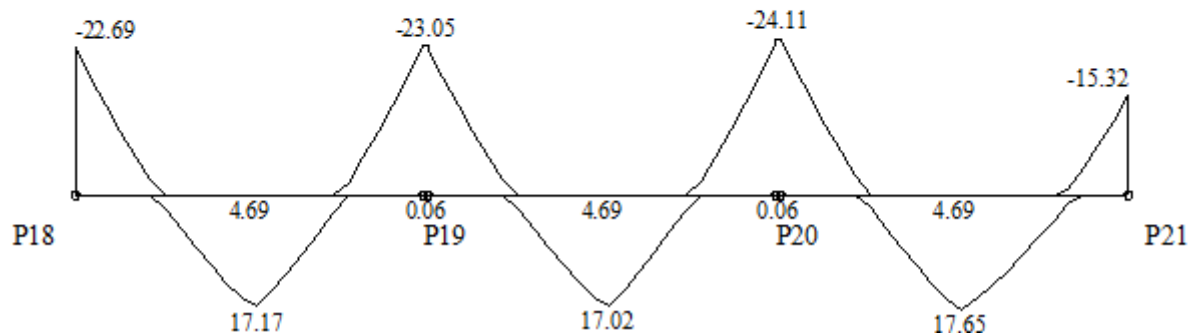


Diagramas: VIGA V6 - Nv 332,00

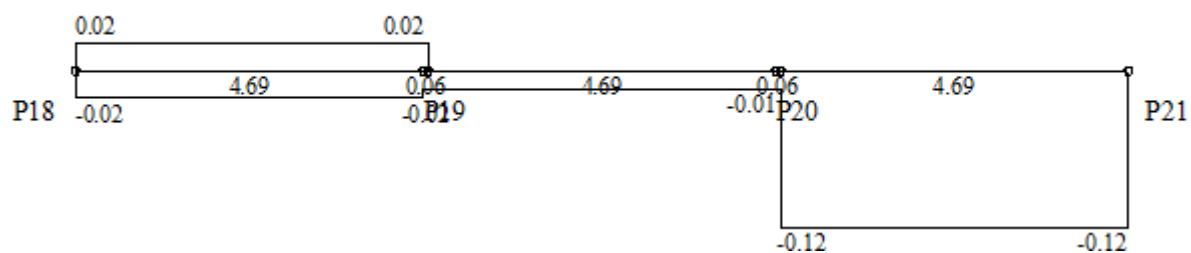
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

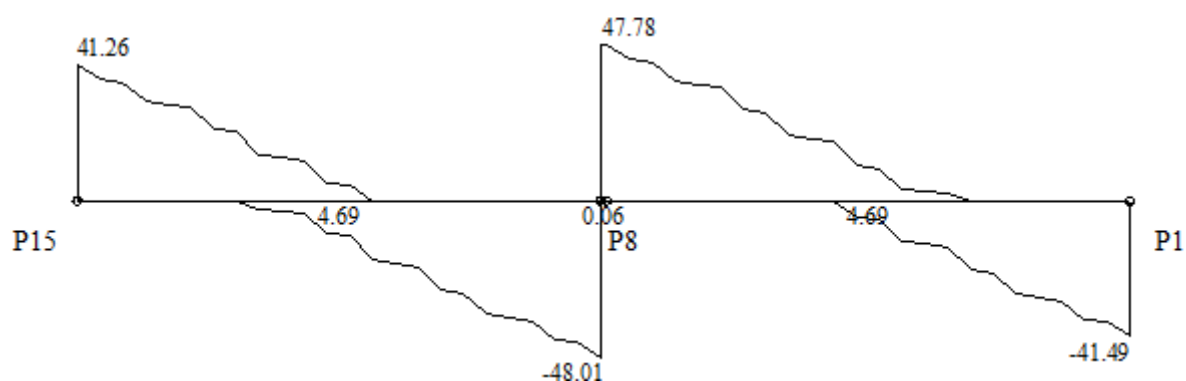


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

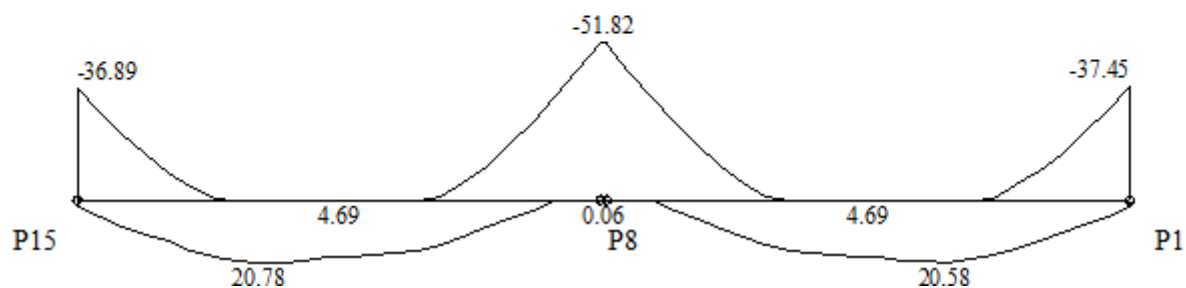


Diagramas: VIGA V7 - Nv 332,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

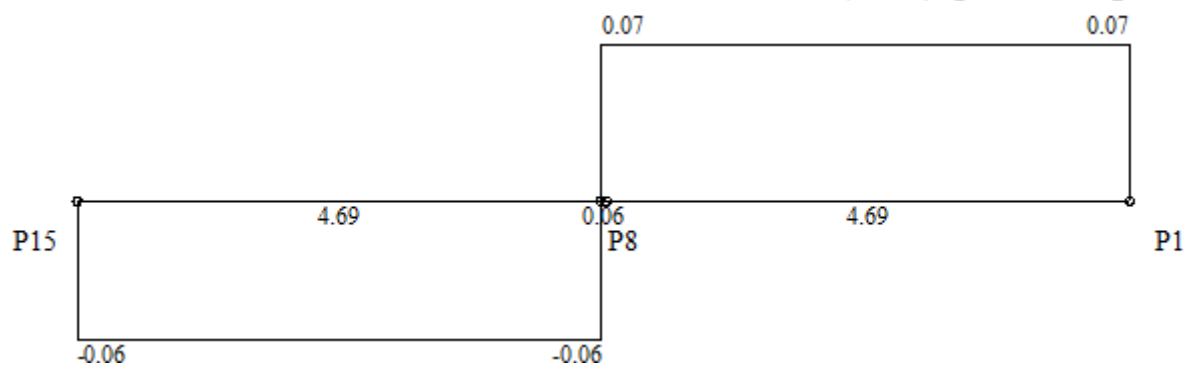


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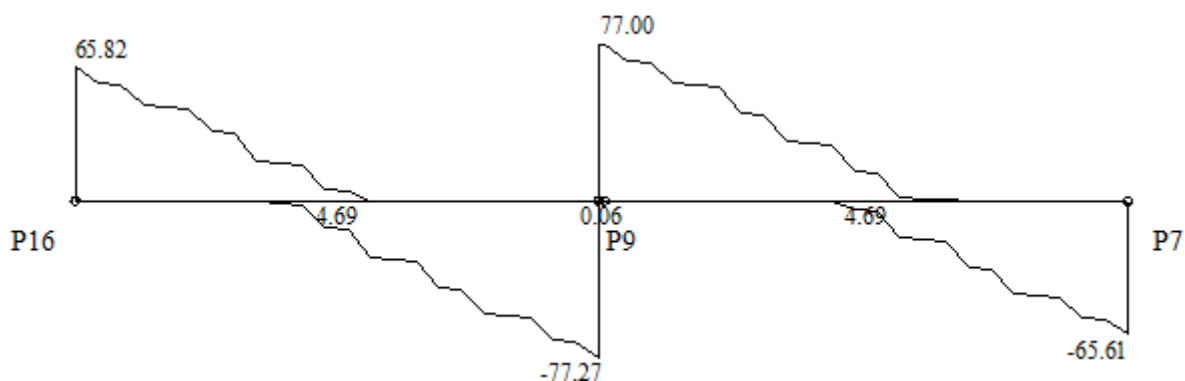
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

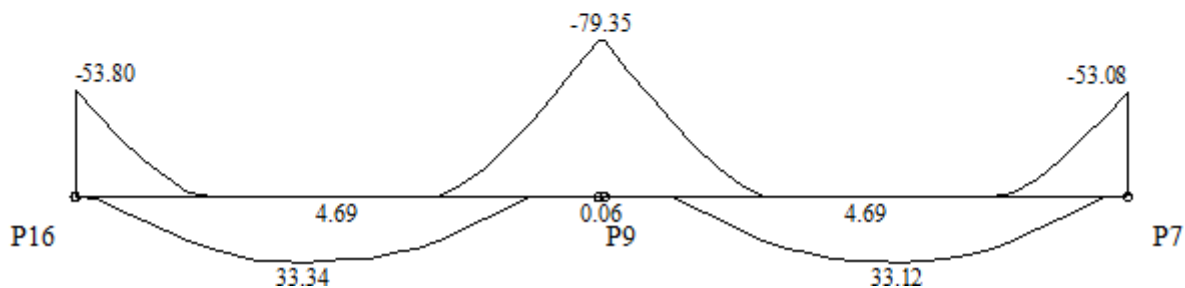


Diagramas: VIGA V8 - Nv 332,00

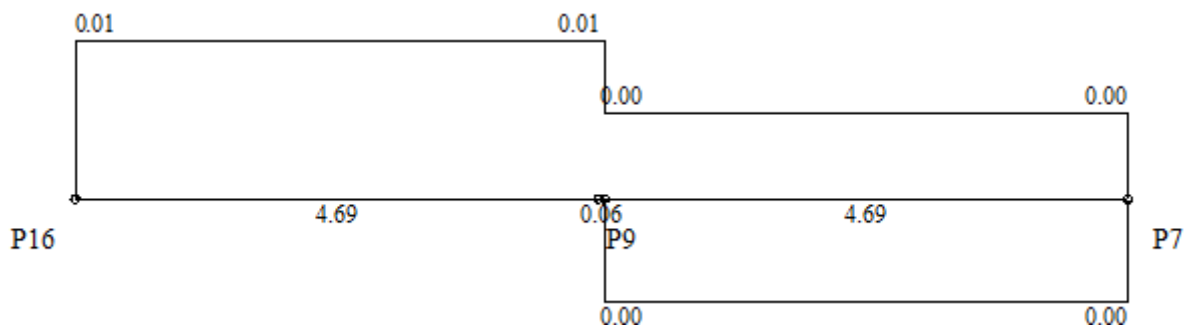
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

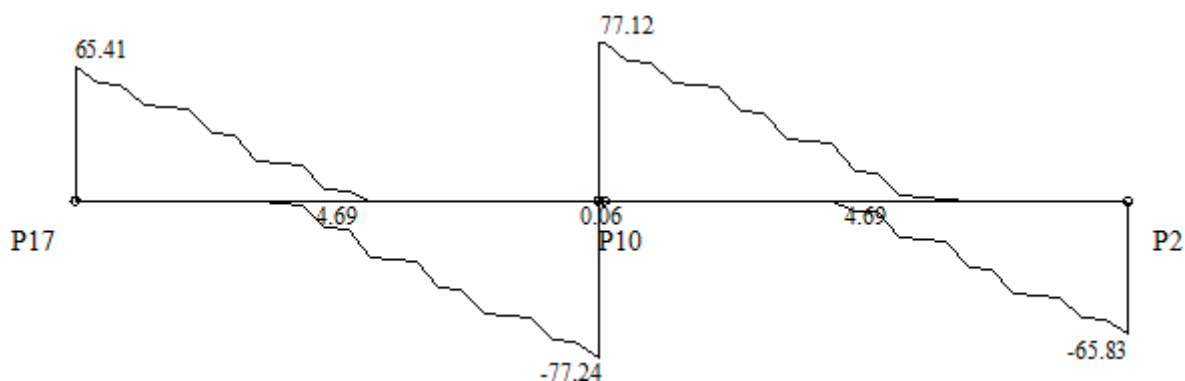


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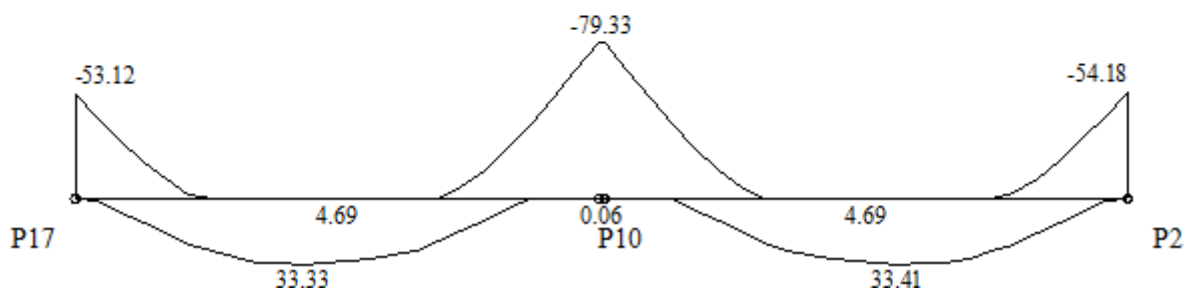
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Diagramas: VIGA V9 - Nv 332,00

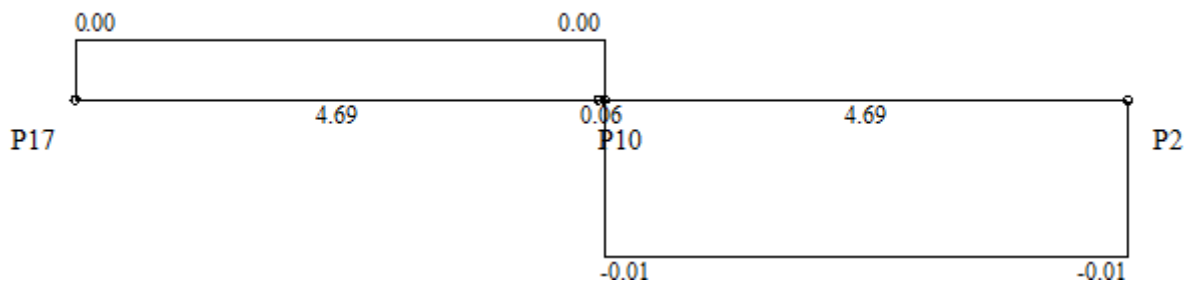
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

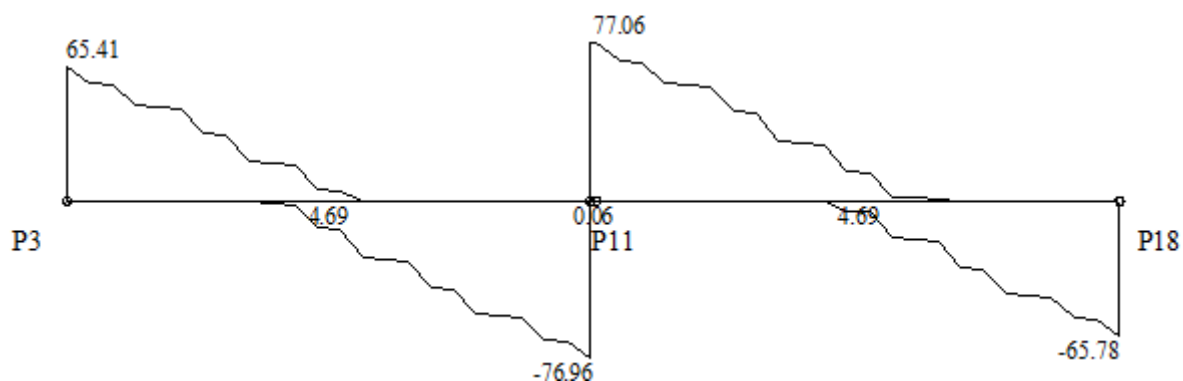


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

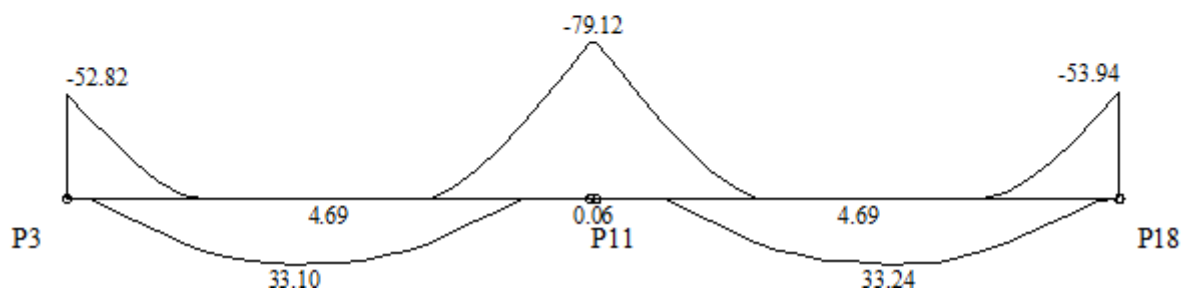


Diagramas: VIGA V10 - Nv 332,00

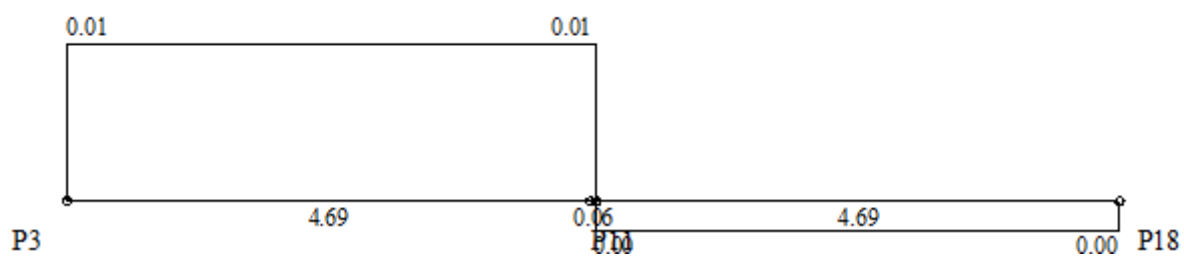
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

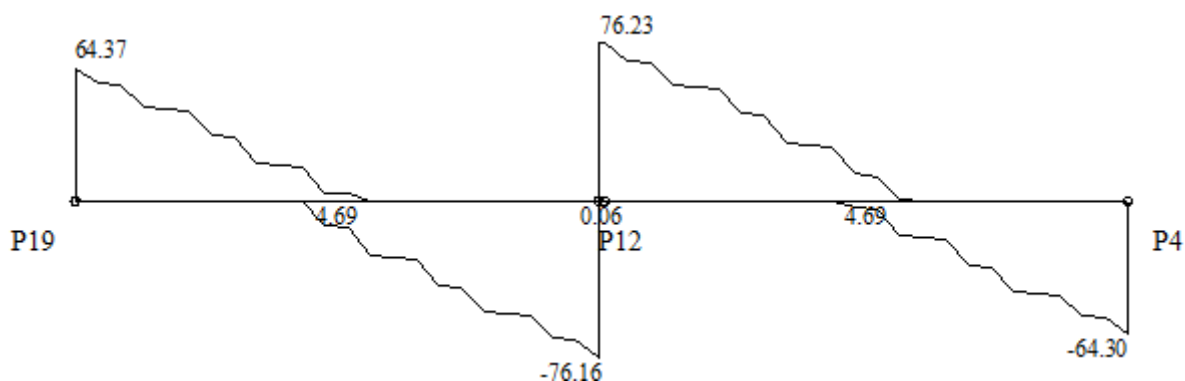


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

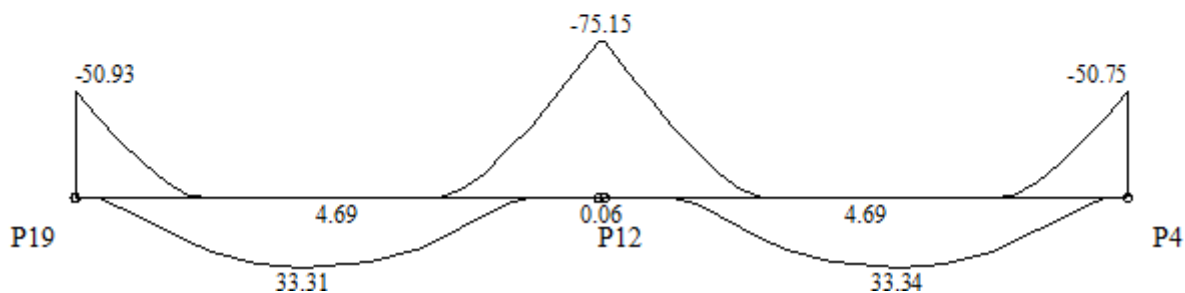


Diagramas: VIGA V11 - Nv 332,00

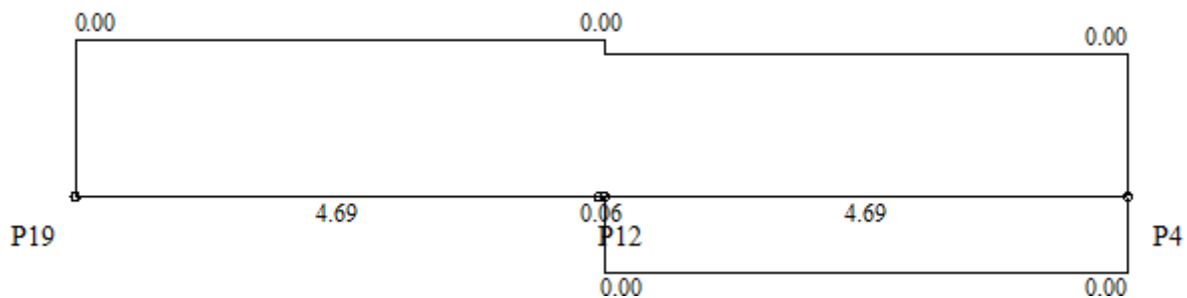
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

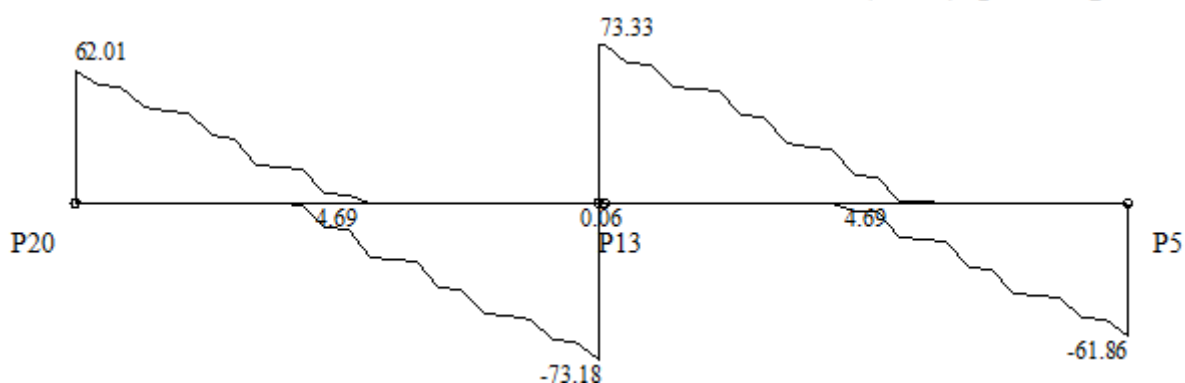


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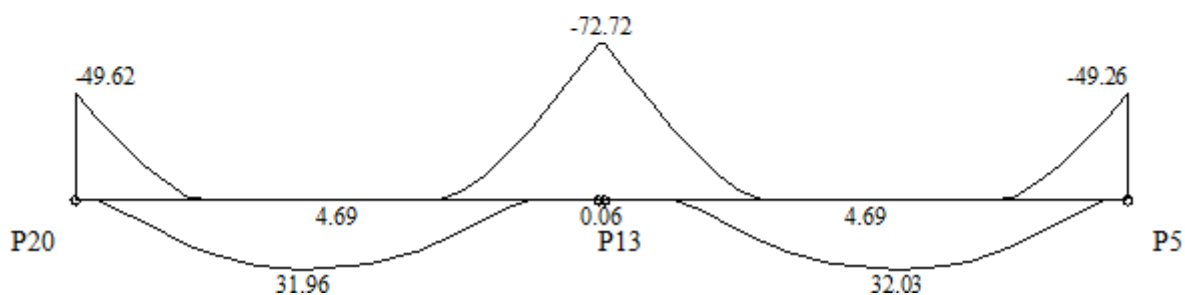
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Diagramas: VIGA V12 - Nv 332,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]

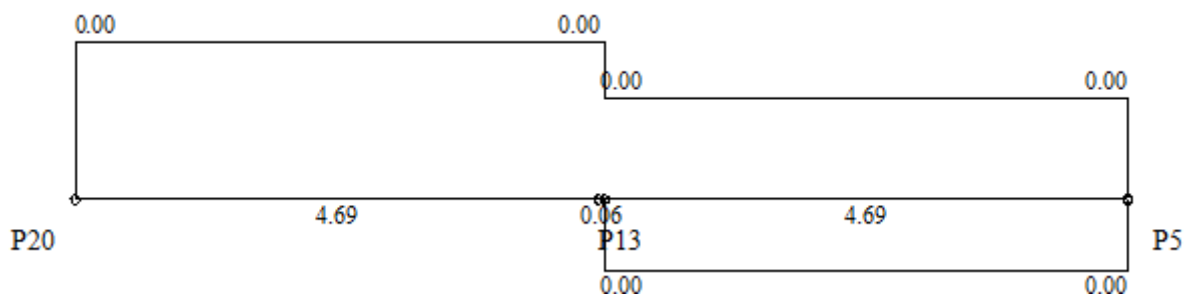


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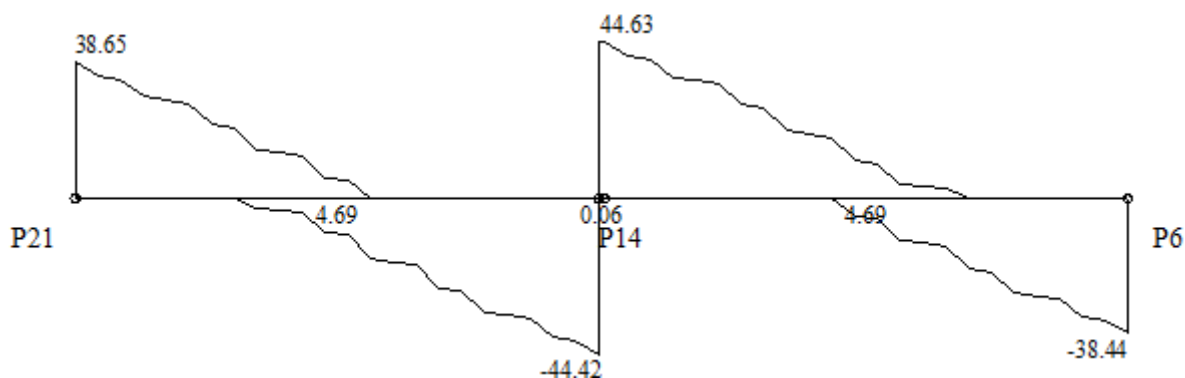
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

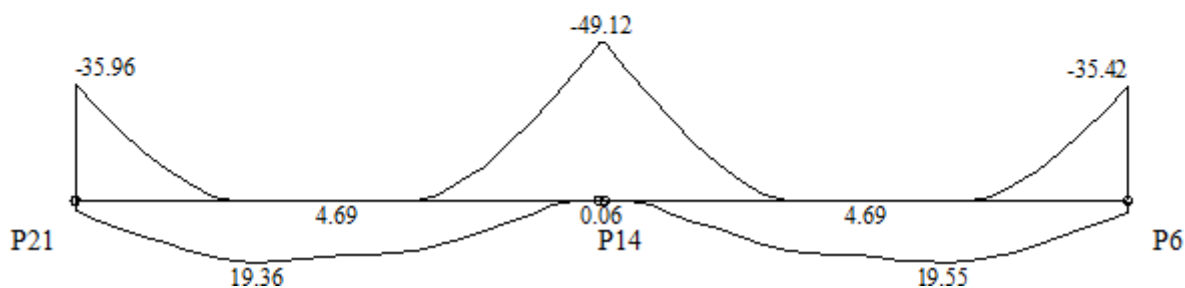


Diagramas: VIGA V13 - Nv 332,00

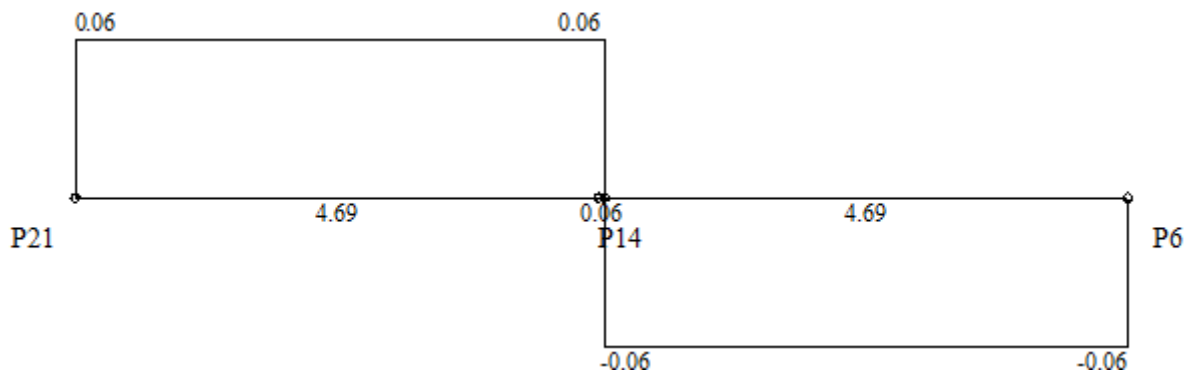
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Resultados da Laje

Nv 332,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 4		cobr = 3.50 cm	

Nome	Espessura (cm)	Carga (kN/m²)	Mdx (kN.m/m)	Mdy (kN.m/m)	Asx	Asy
L1	15	4.85	14.30	1.09	As = 1.27 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.91 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L2	15	4.85	14.09	1.17	As = 1.25 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.98 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L3	15	4.85	14.09	1.17	As = 1.25 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.98 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L4	15	4.85	14.09	1.17	As = 1.25 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.98 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L5	15	4.85	14.11	1.16	As = 1.25 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.97 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L6	15	4.35	12.82	0.99	As = 0.95 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø5.0 c/N - 0.20 cm²/N)	As = 0.81 cm²/N (1ø10.0 c/N - 0.79 cm²/N)
L7	15	4.35	12.82	0.99	As = 0.95 cm²/N (2x TR 12645 - 0.39 cm²/N)	As = 0.81 cm²/N (1ø10.0 c/N - 0.79 cm²/N)

					(1ø5.0 c/N - 0.20 cm ² /N)	
L8	15	4.85	14.11	1.16	As = 1.25 cm ² /N (2x TR 12645 - 0.39 cm ² /N) (1ø8.0 c/N - 0.50 cm ² /N)	As = 0.97 cm ² /N (1ø12.5 c/N - 1.23 cm ² /N)
L9	15	4.85	14.09	1.17	As = 1.25 cm ² /N (2x TR 12645 - 0.39 cm ² /N) (1ø8.0 c/N - 0.50 cm ² /N)	As = 0.98 cm ² /N (1ø12.5 c/N - 1.23 cm ² /N)
L10	15	4.85	14.09	1.17	As = 1.25 cm ² /N (2x TR 12645 - 0.39 cm ² /N) (1ø8.0 c/N - 0.50 cm ² /N)	As = 0.98 cm ² /N (1ø12.5 c/N - 1.23 cm ² /N)
L11	15	4.85	14.09	1.17	As = 1.25 cm ² /N (2x TR 12645 - 0.39 cm ² /N) (1ø8.0 c/N - 0.50 cm ² /N)	As = 0.98 cm ² /N (1ø12.5 c/N - 1.23 cm ² /N)
L12	15	4.85	14.30	1.09	As = 1.27 cm ² /N (2x TR 12645 - 0.39 cm ² /N) (1ø8.0 c/N - 0.50 cm ² /N)	As = 0.91 cm ² /N (1ø12.5 c/N - 1.23 cm ² /N)

Resultados dos Pilares

Nv 531,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 5		cobr = 4.00 cm	

Dados					Resultados					
Pilar	Seção (cm)	Nível Altura (m)	leb leh (m)	vínc vínc (m)	Nd máx Nd mín (kN)	MBd topo MBd base (kN.m)	MHd topo MHd base (kN.m)	As b Armaduras As h % armad total	Estribo Topo Base cota	Esb b Esb h
P8 1:20	30.00	5.31	3.98	EL	13.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	5.00	0.19	16.89	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		
P9 1:20	30.00	5.31	3.32	RR	14.08	1.82	5.10	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	1.99	6.64	EL	5.38	0.22	29.58	3.68 3 ø 12.5		76.58
	30.00							1.1 8 ø 12.5		
P10 1:20	30.00	5.31	6.64	EL	18.12	5.19	0.42	3.68 3 ø 12.5	ø 5.0 c/11	76.58
	X	1.99	3.32	RR	8.46	29.78	0.48	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P11 1:20	30.00	5.31	6.64	EL	14.00	5.11	1.41	3.68 3 ø 12.5	ø 5.0 c/11	76.58
	X	1.99	3.32	RR	5.32	29.59	0.73	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P12 1:20	30.00	5.31	3.98	EL	13.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	5.00	16.89	0.19	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		
P13	30.00	5.31	3.98	EL	13.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90

1:20	X 30.00	1.99	3.98 EL	5.00	16.89	0.19	2.45 2 ø 12.5 0.5 4 ø 12.5		45.90
P14	30.00 X	5.31	3.98 EL	13.27	0.00	0.00	2.45 2 ø 12.5 2.45 2 ø 12.5	ø 5.0 c/11	45.90
1:20	30.00	1.99	3.98 EL	5.00	16.89	0.19	0.5 4 ø 12.5		45.90

Resultados dos Pilares

Nv 664,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m³
Lance 6		cobr = 4.00 cm	

Dados					Resultados					
Pilar	Seção (cm)	Nível Altura (m)	leb leh (m)	vínc vínc (m)	Nd máx Nd mín (kN)	MBd topo MBd base (kN.m)	MHd topo MHd base (kN.m)	As b Armaduras As h % armad total	Estribo Topo Base cota	Esb b Esb h
P9 1:20	30.00	6.64	3.32	RR	7.81	2.83	0.00	3.68 3 ø 12.5	ø 5.0 c/15	38.29
	X	1.33	6.64	EL	2.39	1.82	5.10	3.68 3 ø 12.5	ø 5.0 c/15	76.58
	30.00							1.1 8 ø 12.5	30	
P10 1:20	30.00	6.64	6.64	EL	11.85	0.01	0.76	3.68 3 ø 12.5	ø 5.0 c/15	76.58
	X	1.33	3.32	RR	5.46	5.19	0.42	3.68 3 ø 12.5	ø 5.0 c/15	38.29
	30.00							1.1 8 ø 12.5	30	
P11 1:20	30.00	6.64	6.64	EL	7.73	0.00	2.67	3.68 3 ø 12.5	ø 5.0 c/15	76.58
	X	1.33	3.32	RR	2.33	5.11	1.41	3.68 3 ø 12.5	ø 5.0 c/15	38.29
	30.00							1.1 8 ø 12.5	30	

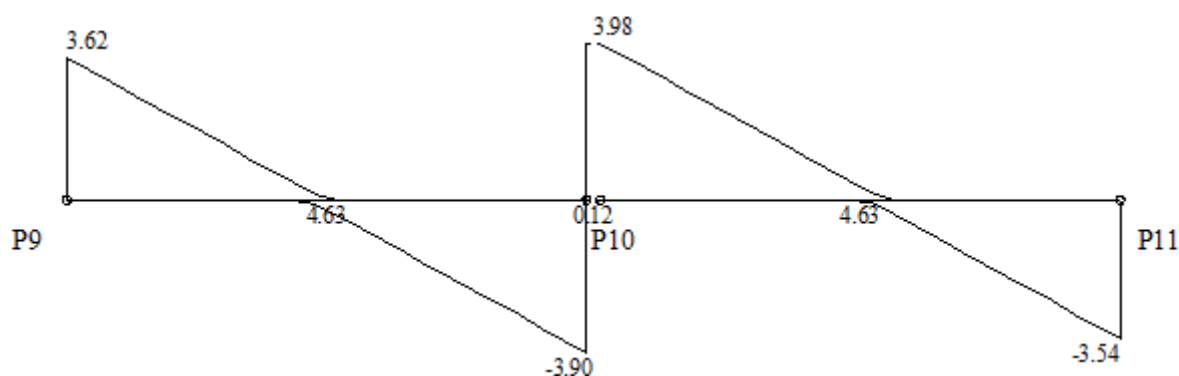
Resultados da Viga V1

fck = 30.00 MPa	Ecs = 26838 MPa
Cobrimento = 4.00 cm	Peso específico = 25.00 kN/m³

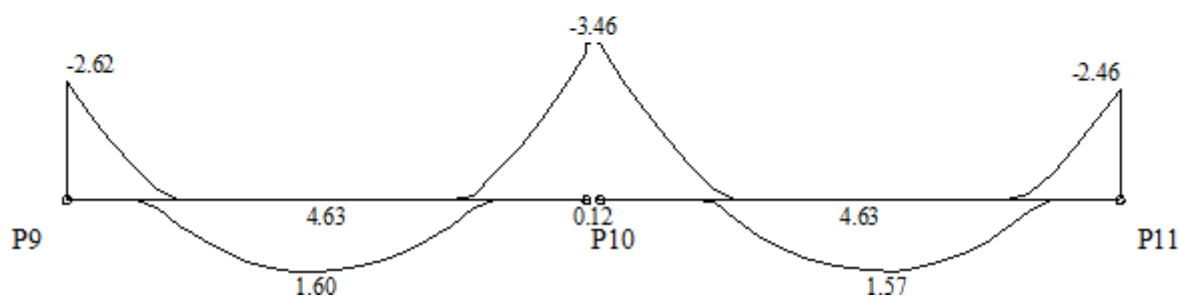
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P9	0.30			2 Ø 10.0 0.68					0.00
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P10	0.30			2 Ø 10.0 0.68					0.01
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P11	0.30			2 Ø 10.0 0.68					0.00

Diagramas: VIGA V1 - Nv 664,00

ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

