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UBS INDÍGENA TIPO I

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 I.

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 I

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
Radier	-	-	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	fyk (MPa)
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		(MPa)	
CA50	79	210000	500
CA60	79	210000	600

6. AÇÕES DE CARREGAMENTO

Coefficientes de ponderação das ações:

Ação	Coeficientes 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

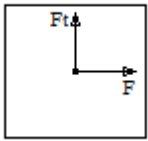
	$G1+G2+1.5Q+0.84V2+0.84D2$ $G1+G2+1.5Q+0.84V3+0.84D3$ $G1+G2+1.5Q+0.84V4+0.84D4$ $G1+G2+1.5Q+1.4D1$ $G1+G2+1.5Q+1.4D2$ $G1+G2+1.5Q+1.4D3$ $G1+G2+1.5Q+1.4D4$
ELU-Construção	$1.3G1+1.4G2$ $1.3G1+1.4G2+0.84Q$ $1.3G1+1.4G2+1.2Q$
Fundações	$G1+G2+0.7Q+0.6V1+D1$ $G1+G2+0.7Q+0.6V2+D2$ $G1+G2+0.7Q+0.6V3+D3$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

9. 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 531,00	0.00	19.30	5.31	6.31	0.00	0.94	1.00	0.00	0.00	0.00	0.00
Nv 332,00	9.80	19.30	3.32	4.32	3.14	0.92	0.79	2.29	0.00	0.00	9.87
Nv 268,00	19.70	32.50	2.68	3.68	11.80	0.89	0.83	8.59	0.00	0.00	31.62
Nv 180,00	19.70	32.50	1.80	2.80	26.40	0.85	0.83	17.37	0.00	0.00	48.64
Baldrame	19.70	32.50	0.00	1.00	17.73	0.41	0.83	2.70	0.00	0.00	2.70

Momento de tombamento total na base (kN.m) = 92.82

Força cortante total na base (kN) = 30.94

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 531,00	0.00	19.30	5.31	6.31	0.00	0.94	1.00	0.00	0.00	0.00	0.00

Nv 332,00	9.80	19.30	3.32	4.32	3.14	0.9 2	0.79	2.29	0.00	0.00	9.87
Nv 268,00	19.70	32.50	2.68	3.68	11.80	0.8 9	0.83	8.59	0.00	0.00	31.62
Nv 180,00	19.70	32.50	1.80	2.80	26.40	0.8 5	0.83	17.37	0.00	0.00	48.64
Baldrame	19.70	32.50	0.00	1.00	17.73	0.4 1	0.83	2.70	0.00	0.00	2.70

Momento de tombamento total na base (kN.m) = 92.82

Força cortante total na base (kN) = 30.94

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 531,00	19.30	0.00	5.31	6.31	19.20	0.9 4	1.00	18.68	0.00	0.00	117.88
Nv 332,00	19.30	9.80	3.32	4.32	25.38	0.9 2	1.16	27.35	0.00	0.00	118.15
Nv 268,00	32.50	19.70	2.68	3.68	20.48	0.8 9	1.13	20.33	0.00	0.00	74.80
Nv 180,00	32.50	19.70	1.80	2.80	43.55	0.8 5	1.13	39.08	0.00	0.00	109.42
Baldrame	32.50	19.70	0.00	1.00	29.25	0.4 1	1.13	6.06	0.00	0.00	6.06

Momento de tombamento total na base (kN.m) = 426.30

Força cortante total na base (kN) = 111.50

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 531,00	19.30	0.00	5.31	6.31	19.20	0.9 4	1.00	18.68	0.00	0.00	117.88
Nv 332,00	19.30	9.80	3.32	4.32	25.38	0.9 2	1.16	27.35	0.00	0.00	118.15

Nv 268,00	32.50	19.70	2.68	3.68	20.48	0.8 9	1.13	20.33	0.00	0.00	74.80
Nv 180,00	32.50	19.70	1.80	2.80	43.55	0.8 5	1.13	39.08	0.00	0.00	109.42
Baldrame	32.50	19.70	0.00	1.00	29.25	0.4 1	1.13	6.06	0.00	0.00	6.06

Momento de tombamento total na base (kN.m) = 426.30

Força cortante total na base (kN) = 111.50

10. IMPERFEIÇÕES GLOBAIS

Parâmetros adotados para consideração das imperfeições globais:

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

Modelo de análise

Verificação de estabilidade global

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

11. 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)				
S5	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)		
S6	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)		
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)		
S8	120.00	0.20	8 Ø 10.0 c/14	8 Ø 10.0 c/14		
	120.00	0.45	(6.28 cm²)	(6.28 cm²)		
S13	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)		
S20	115.00	0.20	8 Ø 10.0 c/14	8 Ø 10.0 c/14		
	115.00	0.45	(6.28 cm²)	(6.28 cm²)		
S21	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)		
S22	150.00	0.20	10 Ø 10.0 c/15	10 Ø 10.0 c/15		
	150.00	0.45	(7.85 cm²)	(7.85 cm²)		
S23	145.00	0.20	10 Ø 10.0 c/15	10 Ø 10.0 c/15		
	145.00	0.45	(7.85 cm²)	(7.85 cm²)		
S24	125.00	0.20	9 Ø 10.0 c/14	9 Ø 10.0 c/14		
	125.00	0.45	(7.07 cm²)	(7.07 cm²)		
S25	100.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	100.00	0.45	(5.50 cm²)	(5.50 cm²)		
S26	100.00	0.25	7 Ø 10.0 c/14	7 Ø 10.0 c/14		
	100.00	0.45	(5.50 cm²)	(5.50 cm²)		
S27	120.00	0.20	8 Ø 10.0 c/14	8 Ø 10.0 c/14		
	120.00	0.45	(6.28 cm²)	(6.28 cm²)		
S28	115.00	0.20	8 Ø 10.0 c/14	8 Ø 10.0 c/14		
	115.00	0.45	(6.28 cm²)	(6.28 cm²)		
S29	105.00	0.45	9 Ø 10.0 c/11	9 Ø 10.0 c/11	8 Ø 10.0 c/12	8 Ø 10.0 c/12

	105.00	0.45	(7.07 cm ²)	(7.07 cm ²)	(6.28 cm ²)	(6.28 cm ²)
S30	110.00	0.45	10 Ø 10.0 c/11	10 Ø 10.0 c/11	9 Ø 10.0 c/12	9 Ø 10.0 c/12
	110.00	0.45	(7.85 cm ²)	(7.85 cm ²)	(7.07 cm ²)	(7.07 cm ²)
S31	115.00	0.45	10 Ø 10.0 c/11	10 Ø 10.0 c/11	9 Ø 10.0 c/12	9 Ø 10.0 c/12
	115.00	0.45	(7.85 cm ²)	(7.85 cm ²)	(7.07 cm ²)	(7.07 cm ²)
S9-10	185.00	0.65	11 Ø 12.5 c/12	15 Ø 12.5 c/12	10 Ø 12.5 c/13	14 Ø 12.5 c/13
	130.00	0.65	(13.50 cm ²)	(18.41 cm ²)	(12.27 cm ²)	(17.18 cm ²)
S12-11	185.00	0.65	11 Ø 12.5 c/12	15 Ø 12.5 c/12	10 Ø 12.5 c/13	14 Ø 12.5 c/13
	130.00	0.65	(13.50 cm ²)	(18.41 cm ²)	(12.27 cm ²)	(17.18 cm ²)

Resultados dos Pilares

Baldrame	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m ³
Lance 1		cofr = 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
P5 1:20	20.00	0.00	1.00	RR	25.02	1.07	2.98	1.57 2 Ø 10.0	Ø 5.0 c/12	17.30
	X	1.00	1.00	RR	1.14	0.00	0.00	1.57 2 Ø 10.0	Ø 5.0 c/12	17.30
	20.00							0.8 4 Ø 10.0	30	
P6 1:20	20.00	0.00	1.00	RR	24.66	0.65	0.80	1.57 2 Ø 10.0	Ø 5.0 c/12	17.30
	X	1.00	1.00	RR	2.91	0.00	0.00	1.57 2 Ø 10.0	Ø 5.0 c/12	17.30
	20.00							0.8 4 Ø 10.0	30	
P7 1:20	30.00	0.00	1.00	RR	69.59	1.47	12.02	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53
	X	1.00	1.00	RR	39.50	7.22	13.11	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53
	30.00							1.1 8 Ø 12.5	30	
P8	30.00	0.00	1.00	RR	117.49	3.30	16.85	3.68 3 Ø 12.5	Ø 5.0 c/11	11.53

1:20	X 30.00	1.00	1.00 RR	68.04	8.69	13.25	3.68 3 ø 12.5 1.1 8 ø 12.5	ø 5.0 c/11 30	11.53
P9	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	113.71 65.79	4.76 18.59	14.87 8.21	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
P10	20.00 X 1:20 20.00	0.00 1.00	1.00 RR 1.00 RR	26.71 2.44	1.64 0.71	0.72 3.77	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
P11	20.00 X 1:20 20.00	0.00 1.00	1.00 RR 1.00 RR	24.04 2.41	1.55 2.49	1.52 3.33	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
P12	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	116.43 67.33	1.41 6.68	16.10 15.09	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
P13	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	68.47 38.47	3.69 5.73	11.85 14.97	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 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	112.95 72.08	2.10 4.54	11.92 14.72	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
P21	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	205.11 126.20	1.89 4.02	12.06 15.50	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
P22	30.00	0.00	1.00 RR	243.84	1.79	4.04	2.45 2 ø 12.5	ø 5.0 c/11	11.53

1:20	X 30.00	1.00	1.00 RR	148.16	3.16	22.42	2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/11 30	11.53
P23	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	245.80 149.28	2.54 4.64	5.16 15.93	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
P24	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	152.75 94.63	5.27 16.20	5.15 3.76	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
P25	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	58.15 33.93	6.15 12.69	5.52 4.30	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
P26	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	71.71 42.50	4.30 4.56	10.68 12.53	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
P27	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	116.17 67.24	14.11 18.99	1.58 3.43	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
P28	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	116.06 67.10	16.28 14.78	1.74 4.27	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
P29	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	68.61 38.56	3.06 3.94	11.70 14.87	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
P30	30.00	0.00	1.00 RR	48.21	4.84	3.78	2.45 2 ø 12.5	ø 5.0 c/11	11.53

1:20	X 30.00	1.00	1.00 RR	28.29	4.47	14.07	2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/11 30	11.53
P31	30.00 X 1:20 30.00	0.00 1.00	1.00 RR 1.00 RR	48.51 28.46	4.83 4.47	4.12 15.37	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

Quadro de Cargas e Taxa de Compressão Permanente nos Pilares

Baldrame						
Pilares	Seção (cm)	N _{máx} (kN)	N _{min} (kN)	N _{perm} (kN)	Taxa de compressão (bruta)	Taxa de compressão (homogeneizada)
P5	20x20	17.87	0.00	14.87	0.02	0.02
P6	20x20	17.62	0.00	15.57	0.02	0.02
P7	30x30	49.71	0.00	58.80	0.03	0.03
P8	30x30	83.92	0.00	98.74	0.05	0.04
P9	30x30	81.22	0.00	95.62	0.05	0.04
P10	20x20	19.08	0.00	16.37	0.02	0.02
P11	20x20	17.17	0.00	15.01	0.02	0.02
P12	30x30	83.17	0.00	97.80	0.05	0.04
P13	30x30	48.90	0.00	57.81	0.03	0.03
P20	30x30	80.68	0.00	104.45	0.05	0.05
P21	30x30	146.50	0.00	179.88	0.09	0.08
P22	30x30	174.17	0.00	210.58	0.11	0.10
P23	30x30	175.57	0.00	212.20	0.11	0.10
P24	30x30	109.11	0.00	136.03	0.07	0.06
P25	30x30	41.54	0.00	55.22	0.03	0.03
P26	30x30	51.22	0.00	62.91	0.03	0.03
P27	30x30	82.98	0.00	97.64	0.05	0.04
P28	30x30	82.90	0.00	97.48	0.05	0.04
P29	30x30	49.01	0.00	57.92	0.03	0.03

P30	30x30	34.43	0.00	45.92	0.02	0.02
P31	30x30	34.65	0.00	46.15	0.02	0.02

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)
P5	0.20		2 Ø 10.0 0.08	2 Ø 10.0 0.68					0.00
1	3.05	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.08		Ø 5.0 c/ 15			0.00
P6	0.20		2 Ø 10.0 0.08	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)
P7	0.30		2 Ø 10.0 0.06	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 0.06		Ø 5.0 c/ 15			0.00
P8	0.30		2 Ø 10.0 0.06	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
P9	0.30		2 Ø 10.0 0.42	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 0.42		Ø 5.0 c/ 15			0.01
P12	0.30		2 Ø 10.0 0.42	2 Ø 10.0 0.68					0.02
4	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.31		Ø 5.0 c/ 15			0.00
P13	0.30		2 Ø 10.0 0.31	2 Ø 10.0 0.68					0.01

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)
P10	0.20		2 Ø 10.0 0.19	2 Ø 10.0 0.68					0.00
1	3.05	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.19		Ø 5.0 c/ 15			0.00
P11	0.20		2 Ø 10.0 0.19	2 Ø 10.0 0.68					0.00

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)
P20	0.30		2 Ø 10.0 0.11	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 0.11		Ø 5.0 c/ 15			0.00
P21	0.30		2 Ø 10.0 0.16	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 0.16		Ø 5.0 c/ 15			0.00
P22	0.30		2 Ø 10.0 0.21	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 0.21		Ø 5.0 c/ 15			0.00
P23	0.30		2 Ø 10.0 0.33	2 Ø 10.0 0.68					0.01
4	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.33		Ø 5.0 c/ 15			0.00
P24	0.30		2 Ø 10.0 0.33	2 Ø 10.0 0.68					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)
P25	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
P26	0.30		2 Ø 10.0 0.15	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 0.15		Ø 5.0 c/ 15			0.00
P27	0.30		2 Ø 10.0 0.15	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 0.12		Ø 5.0 c/ 15			0.00
P28	0.30		2 Ø 10.0 0.18	2 Ø 10.0 0.68					0.01
4	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.18		Ø 5.0 c/ 15			0.00
P29	0.30		2 Ø 10.0 0.18	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/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)
P30	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
P31	0.30			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)
P30	0.30		2 Ø 10.0 0.15	2 Ø 10.0 0.68					0.00
1	3.20	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.15		Ø 5.0 c/ 15			0.00
P25	0.30		2 Ø 10.0 0.15	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 0.09		Ø 5.0 c/ 15			0.00
P20	0.30		2 Ø 10.0 0.44	2 Ø 10.0 0.85					0.02
3	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.44		Ø 5.0 c/ 15			0.01
P7	0.30		2 Ø 10.0 0.44	2 Ø 10.0 0.84					0.02

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)
P31	0.30		2 Ø 10.0 0.13	2 Ø 10.0 0.68					0.01
1	3.20	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.13		Ø 5.0 c/ 15			0.00
P26	0.30		2 Ø 10.0 0.35	2 Ø 10.0 0.83					0.02
2	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
P21	0.30		2 Ø 10.0 0.73	2 Ø 10.0 1.00					0.03
3	4.45	15.00 x 30.00	2 Ø 10.0 0.73	2 Ø 10.0 0.73		Ø 5.0 c/ 15			0.01
P8	0.30		2 Ø 10.0 0.73	2 Ø 10.0 1.07					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)
P27	0.30		2 Ø 10.0 0.60	2 Ø 10.0 1.09					0.03
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.60		Ø 5.0 c/ 15			0.01
P22	0.30		2 Ø 10.0 0.74	2 Ø 10.0 1.02					0.02
2	4.45	15.00 x 30.00	2 Ø 10.0 0.74	2 Ø 10.0 0.74		Ø 5.0 c/ 15			0.01
P9	0.30		2 Ø 10.0 0.74	2 Ø 10.0 1.12					0.03

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)
P10	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
P5	0.20			2 ø 10.0 0.68					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)
	0.15			2 Ø 10.0 0.68					0.00
1	1.00	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
V1	0.15			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)
P11	0.20		2 Ø 10.0 0.05	2 Ø 10.0 0.68					0.00
1	0.90	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.05		Ø 5.0 c/ 15			0.00
P6	0.20		2 Ø 10.0 0.05	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)
P28	0.30		2 Ø 10.0 0.66	2 Ø 10.0 1.08					0.04
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.66		Ø 5.0 c/ 15			0.01
P23	0.30		2 Ø 10.0 0.66	2 Ø 10.0 0.95					0.02
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.66		Ø 5.0 c/ 15			0.01
P12	0.30		2 Ø 10.0 0.66	2 Ø 10.0 1.08					0.03

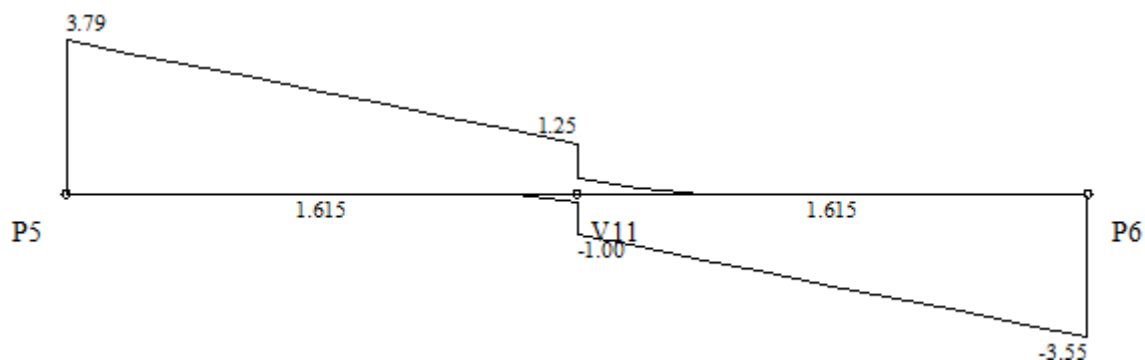
Resultados da Viga V14

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

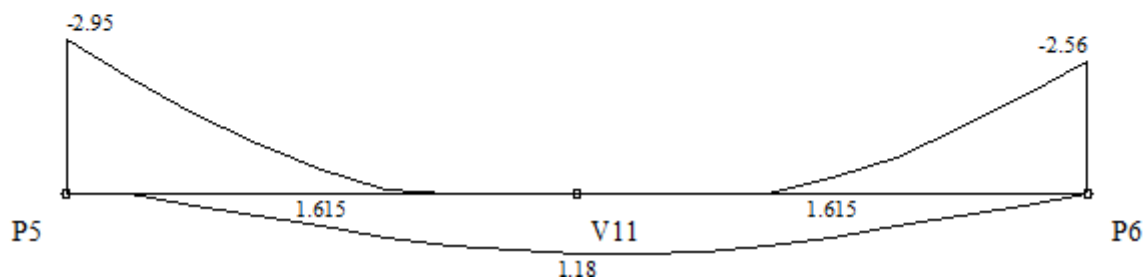
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P29	0.30		2 Ø 10.0 0.34	2 Ø 10.0 0.85					0.02
1	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.34		Ø 5.0 c/ 15			0.00
P24	0.30		2 Ø 10.0 0.34	2 Ø 10.0 0.79					0.02
2	4.45	15.00 x 30.00	2 Ø 10.0 0.68	2 Ø 10.0 0.34		Ø 5.0 c/ 15			0.00
P13	0.30		2 Ø 10.0 0.34	2 Ø 10.0 0.86					0.02

Diagramas: VIGA V1 - Baldrame

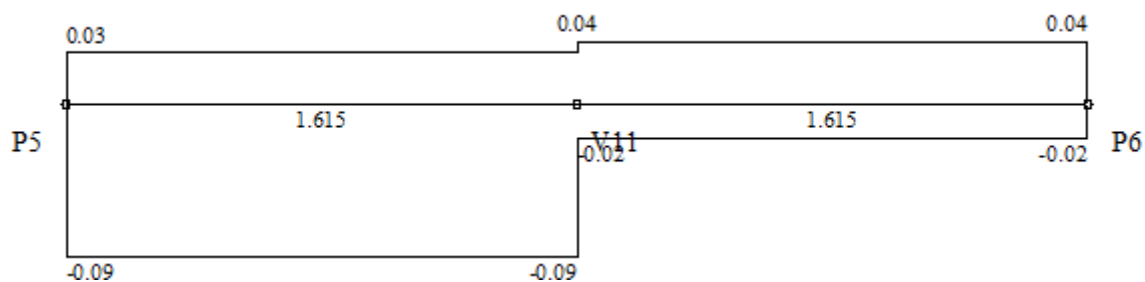
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

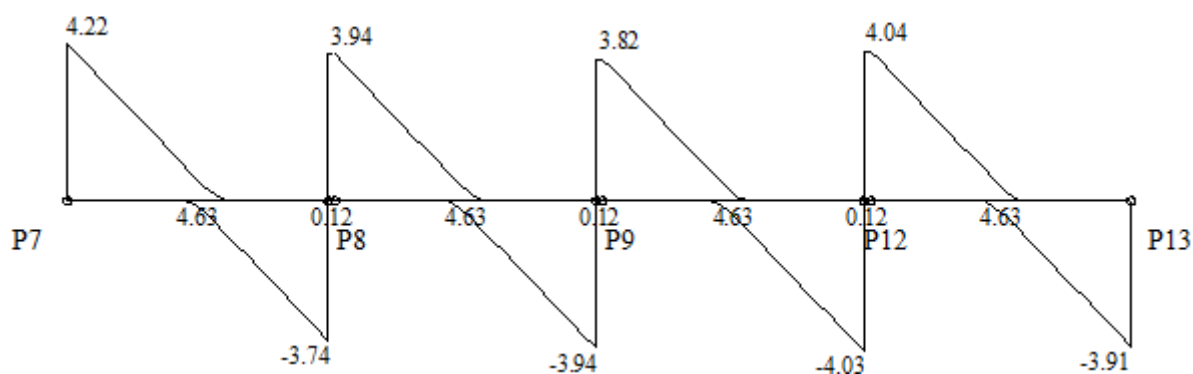


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

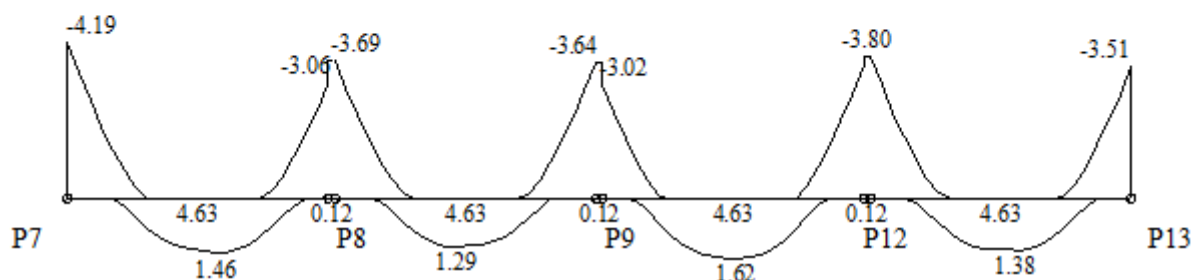


Diagramas: VIGA V2 - Baldrame

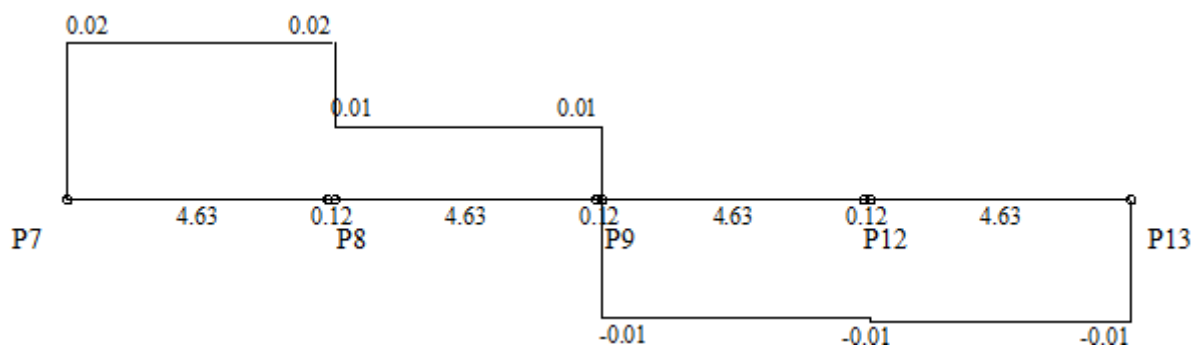
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

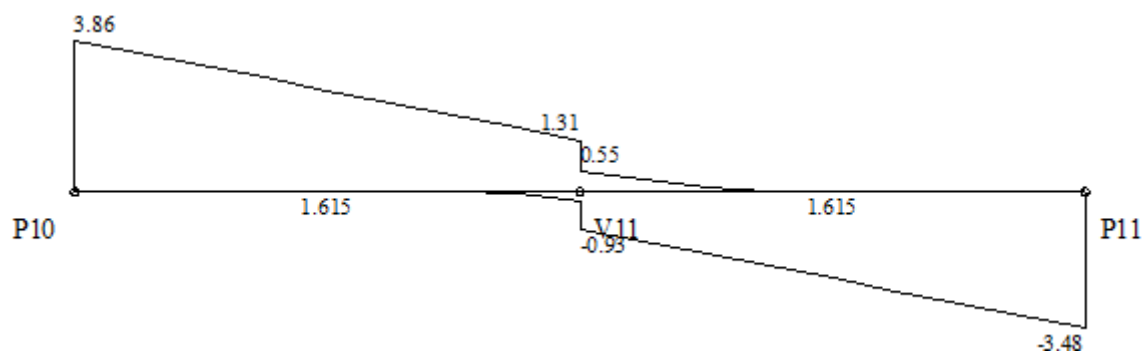


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

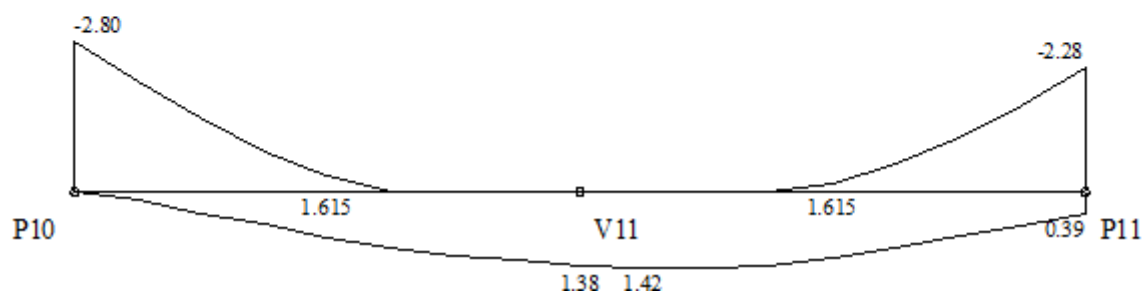


Diagramas: VIGA V3 - Baldrame

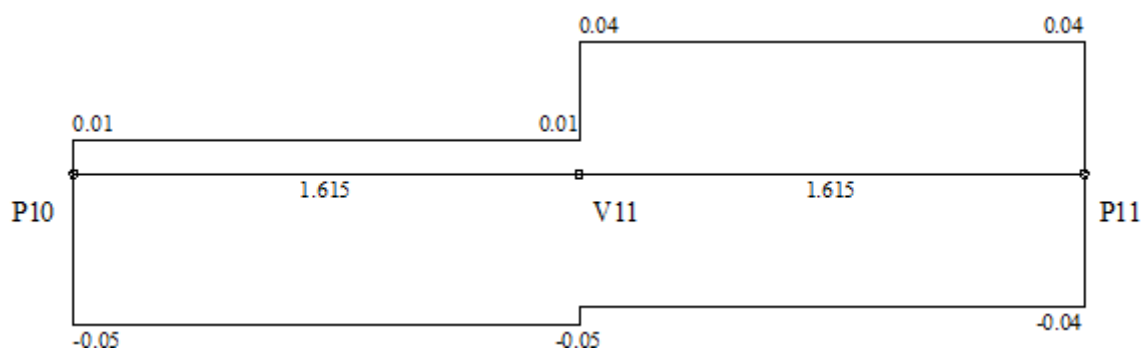
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

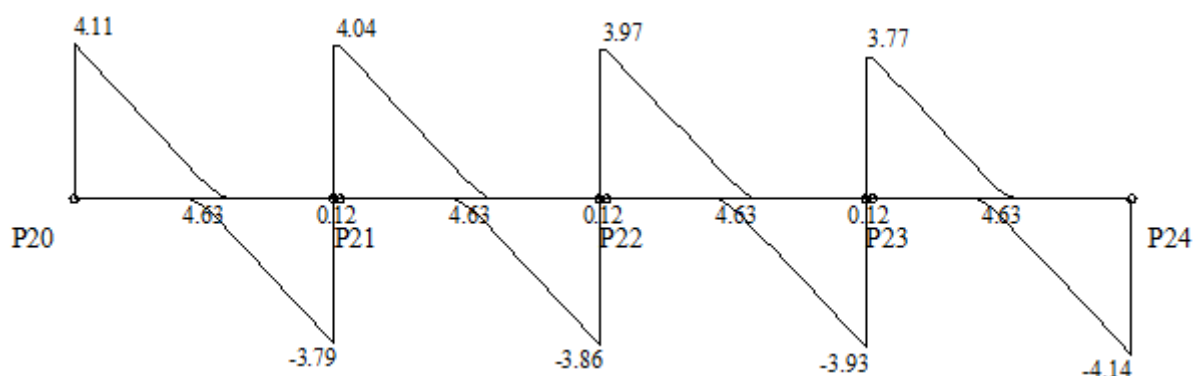


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

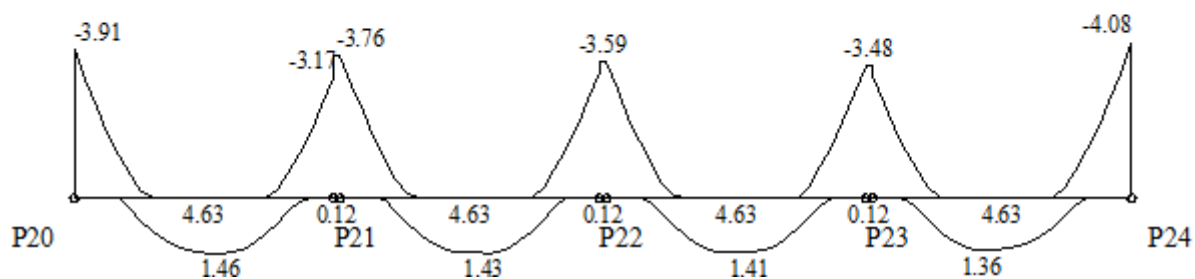


Diagramas: VIGA V4 - Baldrame

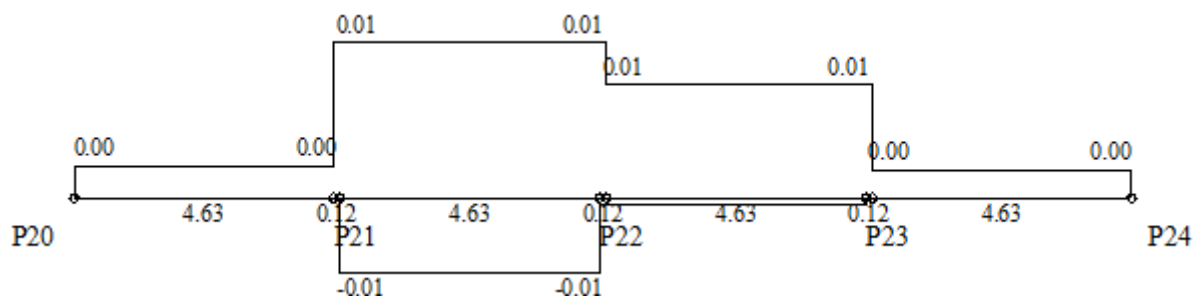
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

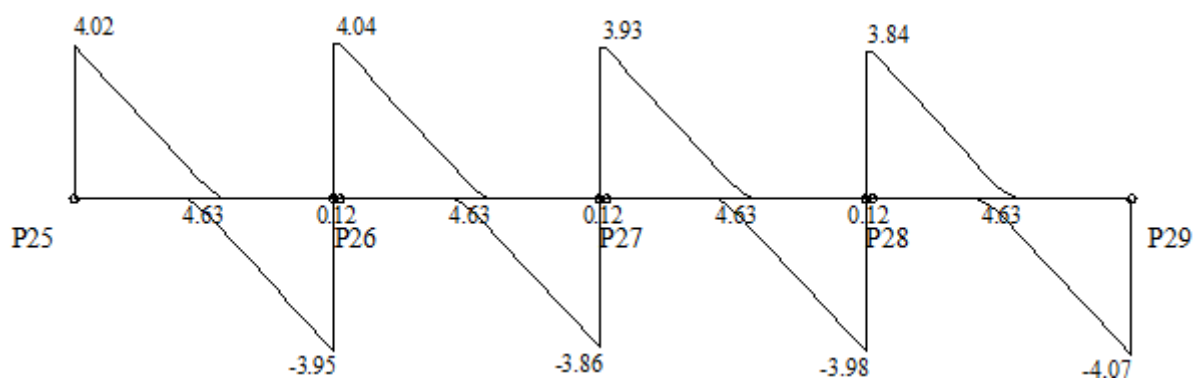


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

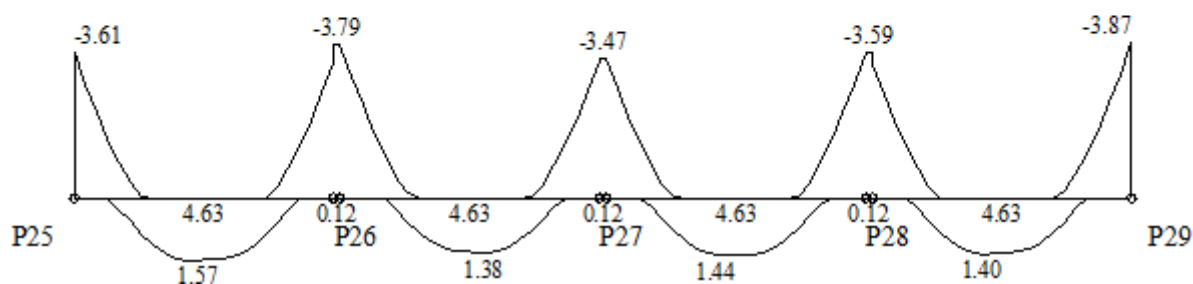


Diagramas: VIGA V5 - Baldrame

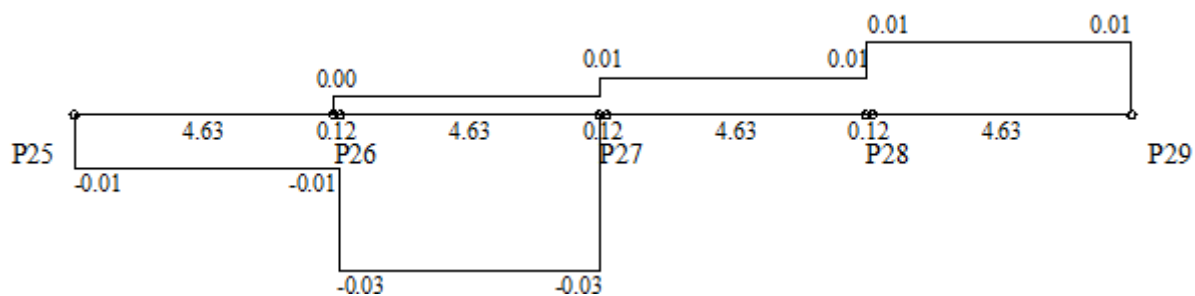
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

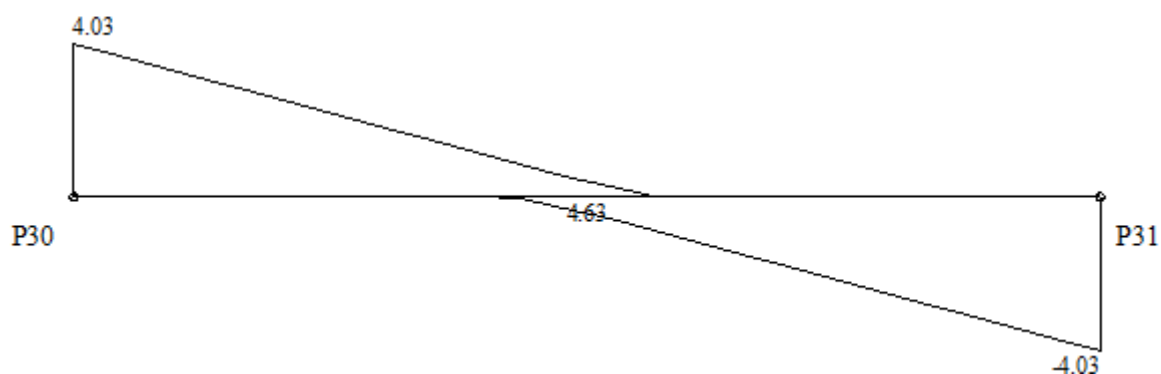


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

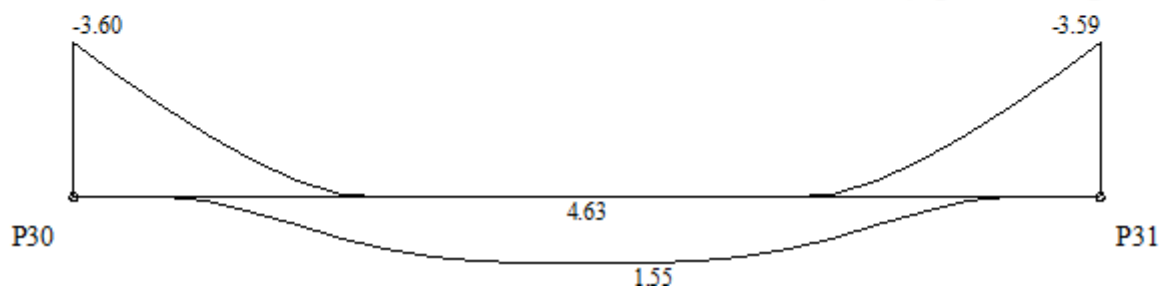


Diagramas: VIGA V6 - Baldrame

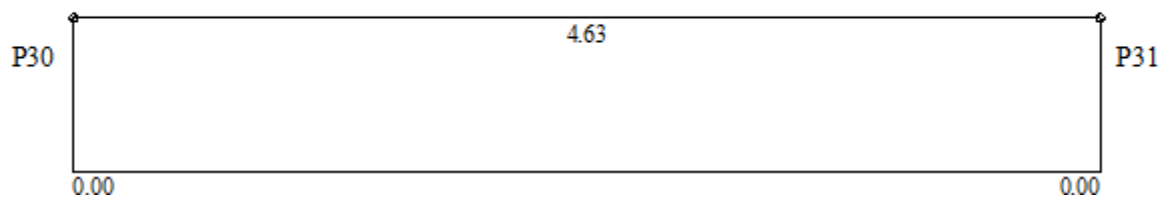
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

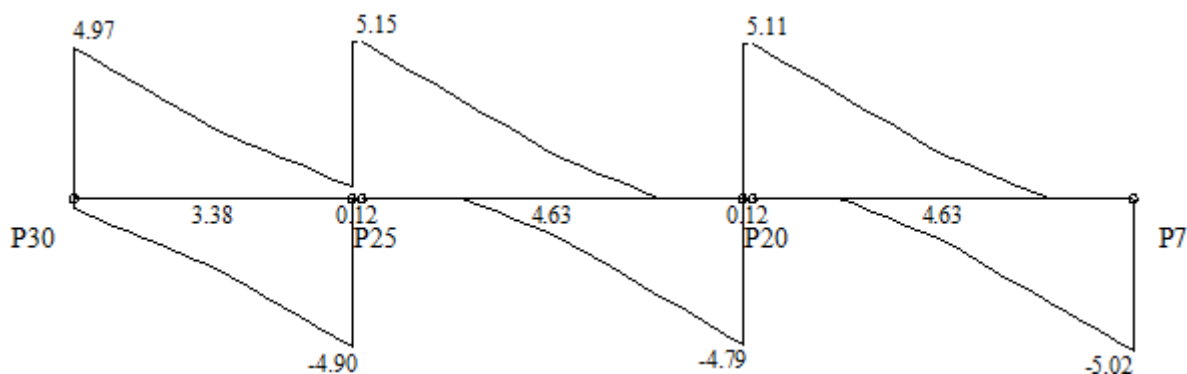


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

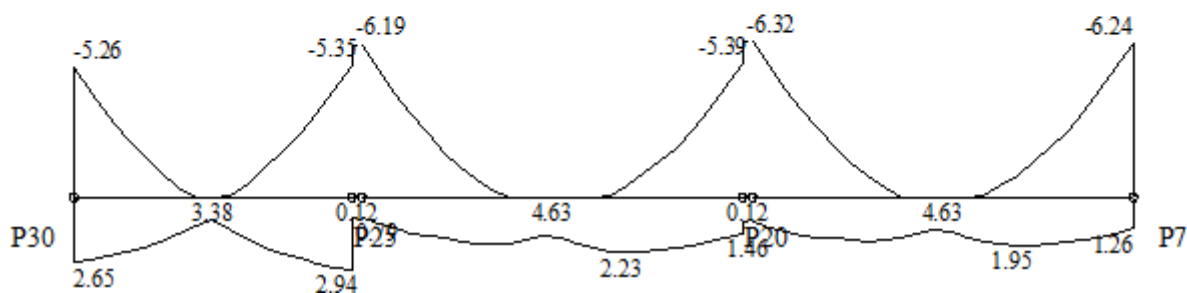


Diagramas: VIGA V7 - Baldrame

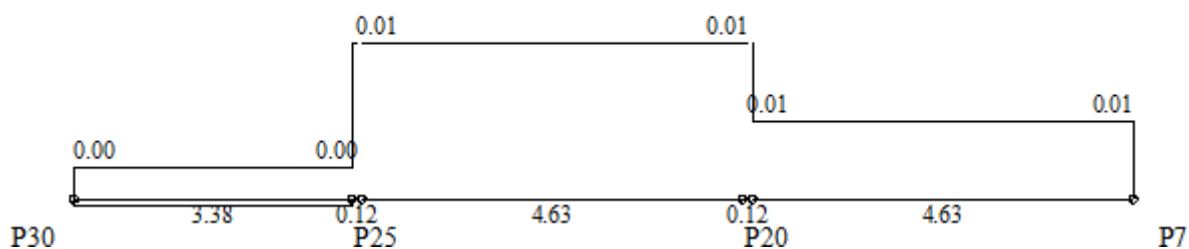
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

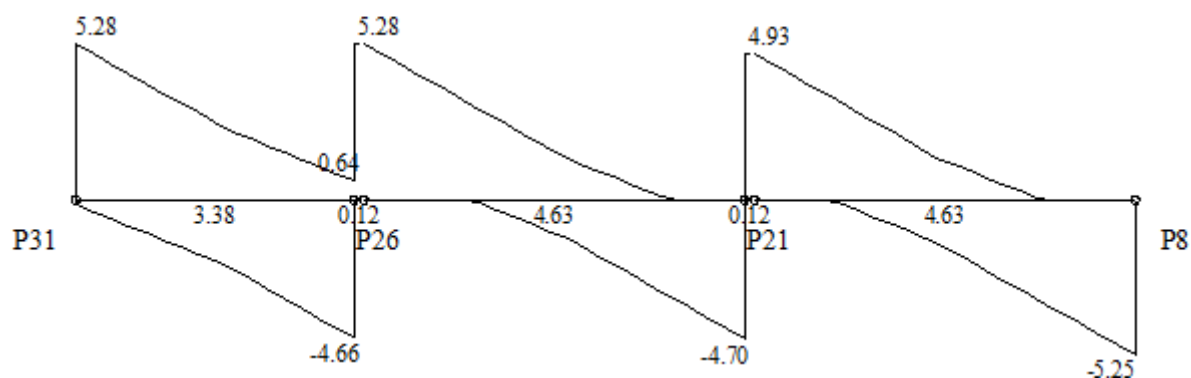


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

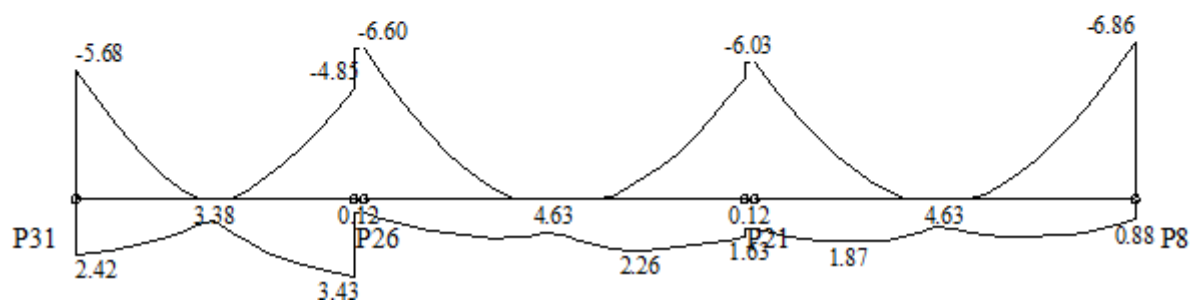


Diagramas: VIGA V8 - Baldrame

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



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

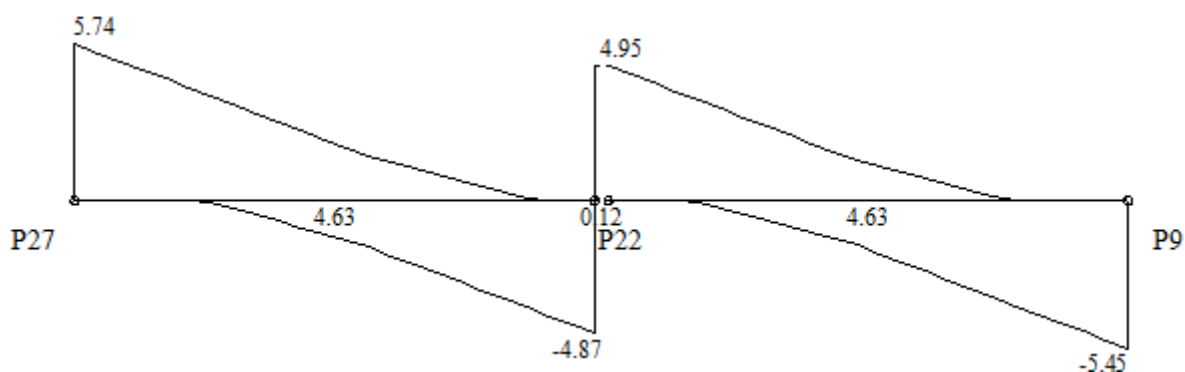


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

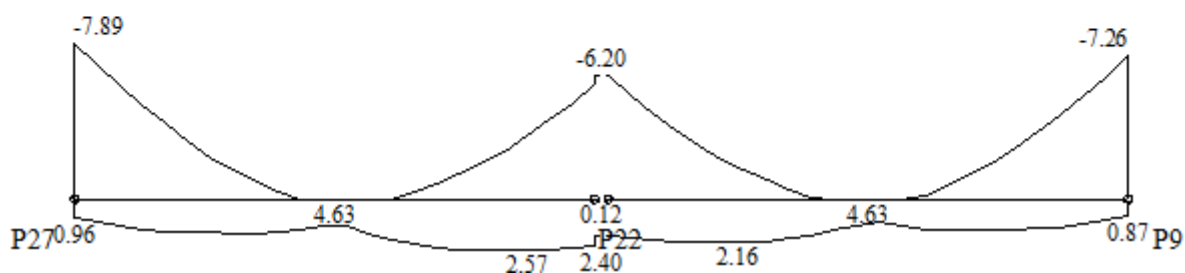


Diagramas: VIGA V9 - Baldrame

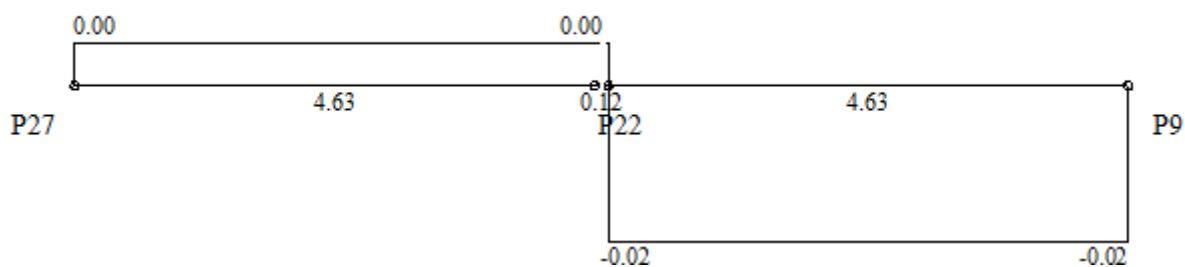
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

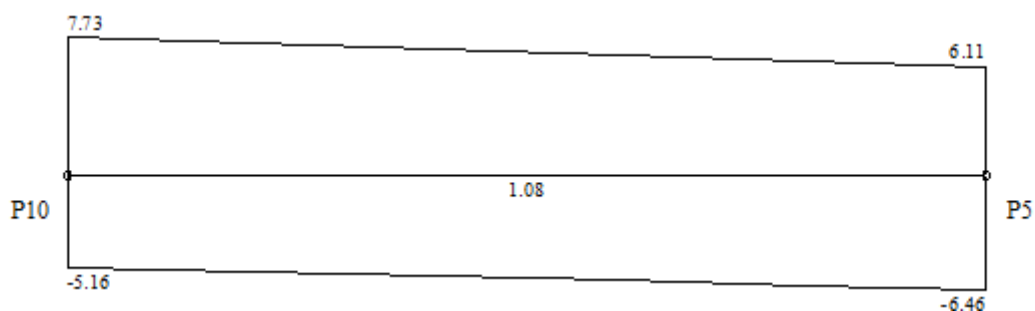


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

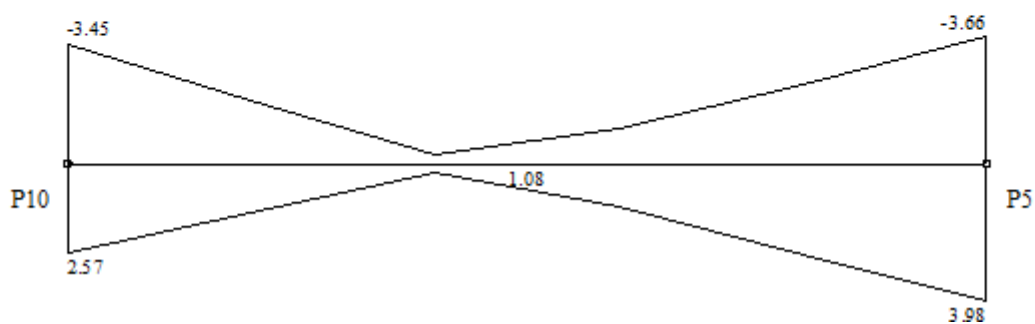


Diagramas: VIGA V10 - Baldrame

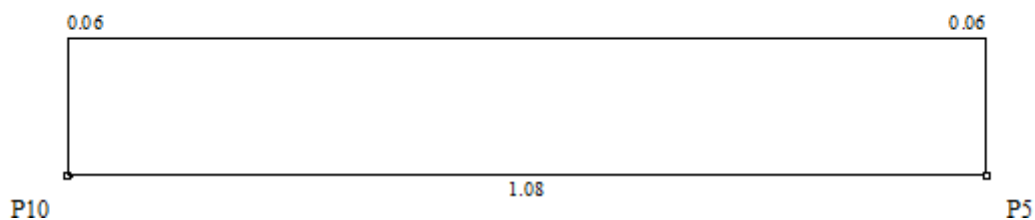
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

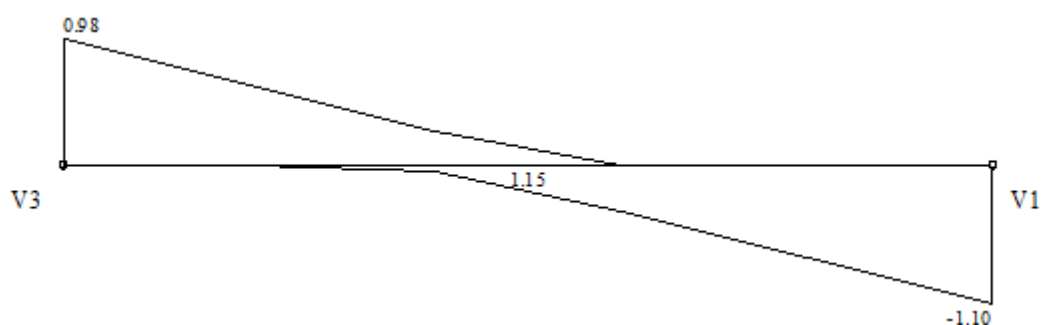


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

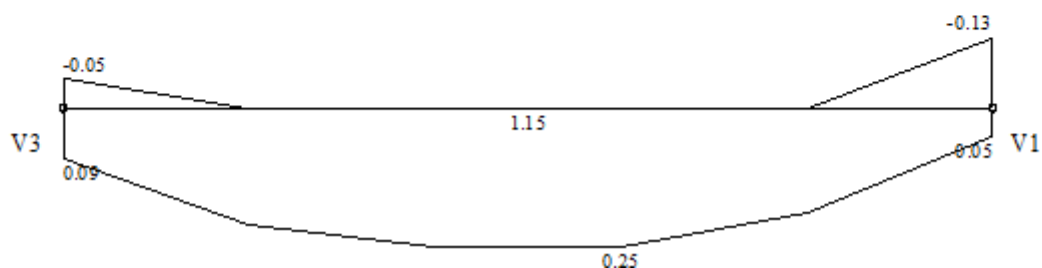


Diagramas: VIGA V11 - Baldrame

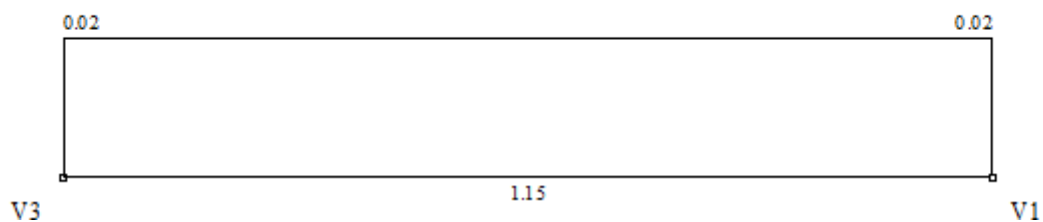
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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



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

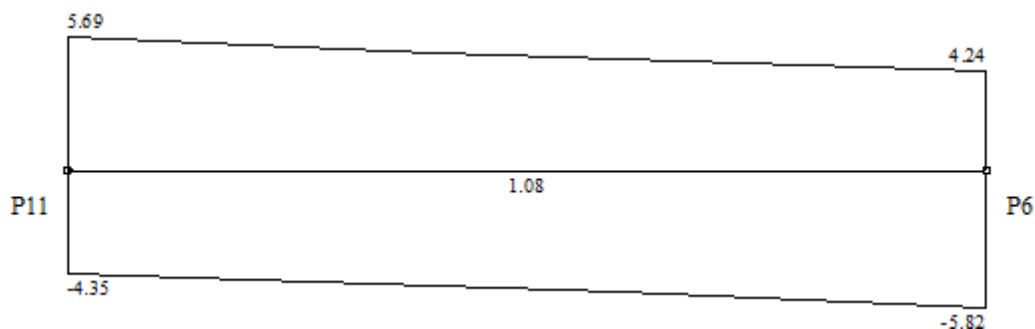


FORTALEZA

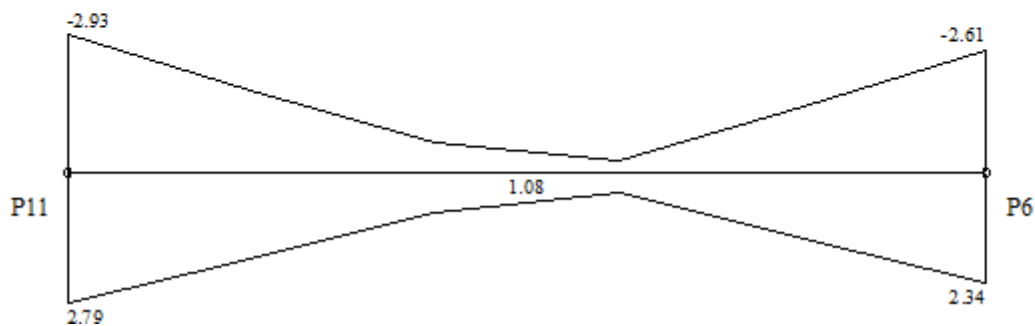
Av. Santos Dumont, 3060 – Sala 608
Edf. Emilio Ary – Aldeota – Fortaleza / CE
CEP: 60.150-161 - Tel. / Fax (85) 3077-9999
fortaleza@jcaengenharia.com.br

Diagramas: VIGA V12 - Baldrame

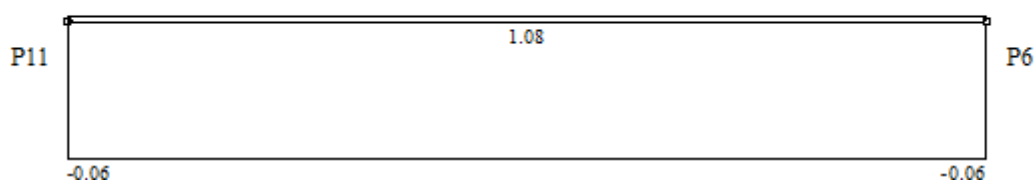
ESFORÇOS CORTANTES DE CÁLCULO (Vdx) [kN;m]



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

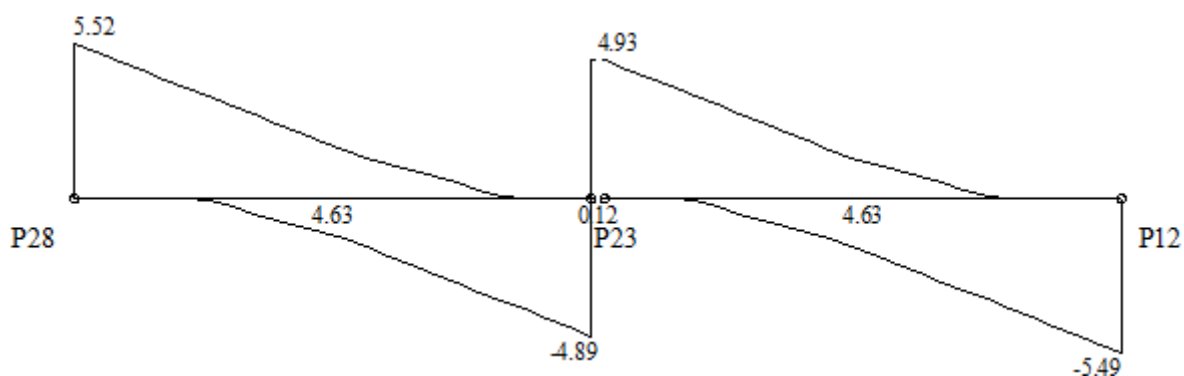


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

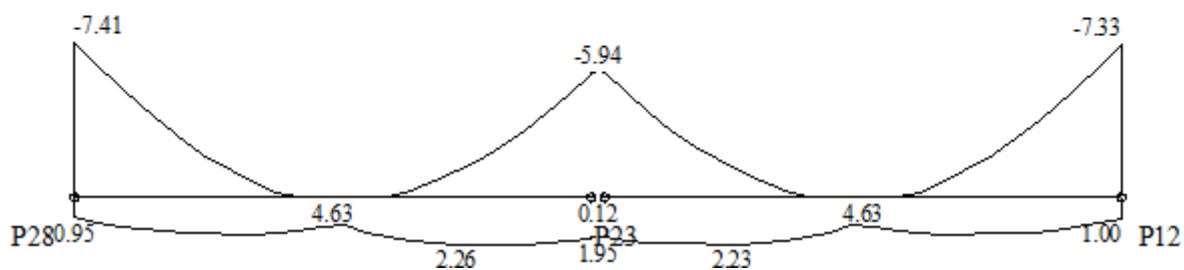


Diagramas: VIGA V13 - Baldrame

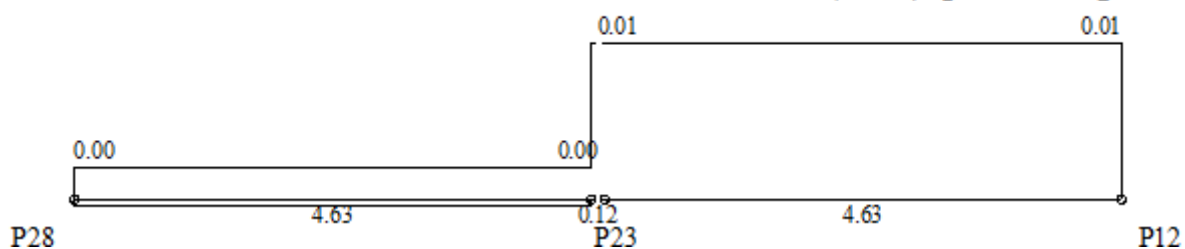
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

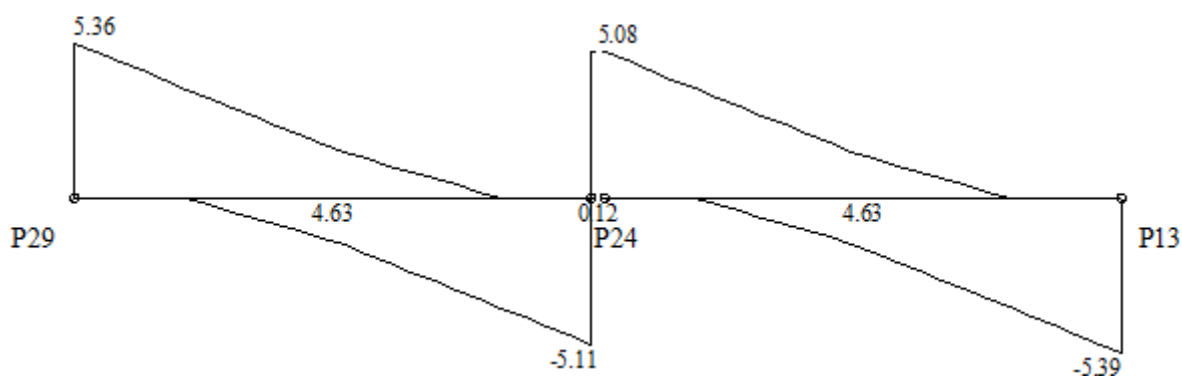


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

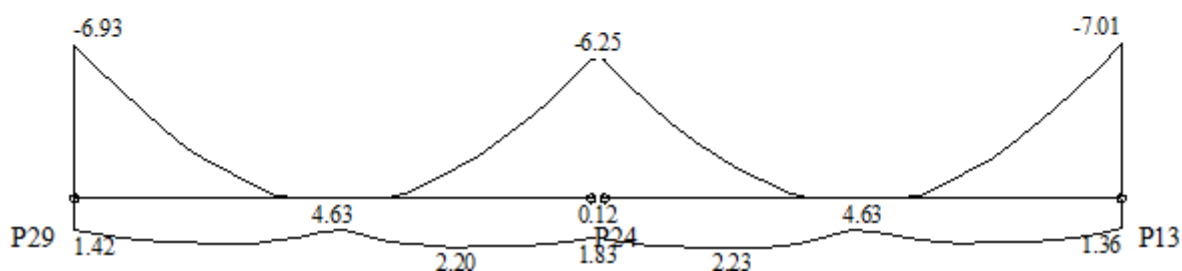


Diagramas: VIGA V14 - Baldrame

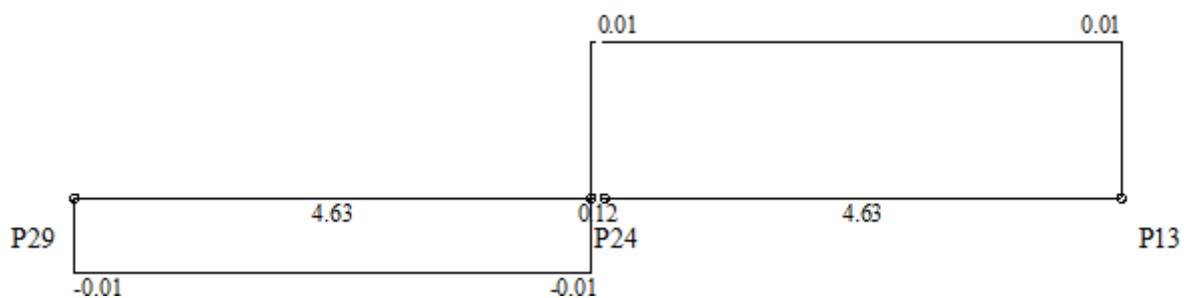
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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



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



FORTALEZA

Av. Santos Dumont, 3060 – Sala 608
Edf. Emilio Ary – Aldeota – Fortaleza / CE
CEP: 60.150-161 - Tel. / Fax (85) 3077-9999
fortaleza@jcaengenharia.com.br

Resultados do Radier

Baldrame	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m ³
Lance 1		cobr = 4.50 cm	

Nome	Espessura (cm)	Carga (kN/m ²)	Mdx (kN.m/m)	Mdy (kN.m/m)	Asx	Asy
RADIER1	16	15.37	7.37	11.56	As = 1.82 cm ² /m (ø8.0 c/20 - 2.51 cm ² /m)	As = 2.97 cm ² /m (ø8.0 c/16 - 3.14 cm ² /m)

FORTALEZA

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	20.00	1.80	2.68	RR	17.93	1.21	4.00	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	1.80	2.68	RR	8.89	3.06	3.29	1.57 2 ø 10.0		46.36
	20.00							0.8 4 ø 10.0		
P2 1:20	20.00	1.80	2.68	RR	17.93	4.00	1.21	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	1.80	2.68	RR	8.89	3.29	3.06	1.57 2 ø 10.0		46.36
	20.00							0.8 4 ø 10.0		
P3 1:20	20.00	1.80	2.68	RR	40.53	1.17	3.34	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	1.80	2.68	RR	22.15	4.23	5.77	1.57 2 ø 10.0		46.36
	20.00							0.8 4 ø 10.0		
P4 1:20	20.00	1.80	2.68	RR	40.53	1.17	3.34	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	1.80	2.68	RR	22.15	4.23	5.77	1.57 2 ø 10.0		46.36
	20.00							0.8 4 ø 10.0		
P5 1:20	20.00	1.80	1.80	RR	13.99	3.63	1.67	1.57 2 ø 10.0	ø 5.0 c/12 30	31.14
	X	1.80	1.80	RR	3.23	1.98	1.15	1.57 2 ø 10.0		31.14
	20.00							0.8 4 ø 10.0		
P6	20.00	1.80	1.80	RR	14.43	3.70	1.82	1.57 2 ø 10.0	ø 5.0 c/12	31.14

1:20	X 20.00	1.80	1.80 RR	3.38	2.26	1.83	1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 30	31.14
P7	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	58.04 30.19	5.10 5.92	8.44 18.55	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/15 0	38.29 38.29
P8	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	102.62 56.30	0.93 4.12	14.08 24.03	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/15 0	38.29 38.29
P9	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	98.51 53.92	0.86 5.45	13.62 22.46	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/15 0	38.29 38.29
P10	20.00 X 1:20 20.00	1.80 1.80	1.80 RR 1.80 RR	14.40 3.55	1.84 1.82	4.09 3.05	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
P11	20.00 X 1:20 20.00	1.80 1.80	1.80 RR 1.80 RR	14.06 3.10	1.74 1.47	3.80 2.75	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
P12	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	100.90 55.26	1.61 2.74	13.26 23.77	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/15 0	38.29 38.29
P13	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	56.95 29.54	4.56 7.42	7.84 19.17	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/15 0	38.29 38.29
P14	20.00	1.80	2.68 RR	22.65	1.11	4.91	1.57 2 ø 10.0	ø 5.0 c/12	46.36

1:20	X 20.00	1.80	2.68 RR	11.62	3.12	4.78	1.57 2 ø 10.0 0.8 4 ø 10.0		46.36
P15	20.00 X 1:20 20.00	1.80 1.80	2.68 RR 2.68 RR	22.65 11.62	4.91 4.78	1.11 3.12	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12	46.36 46.36
P16	20.00 X 1:20 20.00	1.80 1.80	2.68 RR 2.68 RR	16.62 5.95	1.93 2.69	1.86 5.64	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12	46.36 46.36
P17	20.00 X 1:20 20.00	1.80 1.80	2.68 RR 2.68 RR	16.62 5.95	1.93 2.69	1.86 5.64	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12	46.36 46.36
P18	20.00 X 1:20 20.00	1.80 1.80	2.68 RR 2.68 RR	16.72 6.02	1.96 2.53	2.30 3.61	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12	46.36 46.36
P19	20.00 X 1:20 20.00	1.80 1.80	2.68 RR 2.68 RR	16.72 6.02	1.96 2.53	2.30 3.61	1.57 2 ø 10.0 1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12	46.36 46.36
P20	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	98.64 60.28	4.50 6.27	5.64 19.20	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
P21	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	187.92 112.04	2.62 3.94	5.56 19.24	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
P22	30.00	1.80	3.32 RR	226.88	1.81	1.64	2.45 2 ø 12.5	ø 5.0 c/15	38.29

1:20	X 30.00	1.80	3.32 RR	134.14	3.53	11.14	2.45 2 ø 12.5 0.5 4 ø 12.5		38.29
P23	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	228.92 135.29	1.40 3.70	1.01 12.55	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
P24	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	138.57 82.90	1.04 12.80	7.90 9.49	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
P25	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 6.64 EL	45.80 21.69	0.96 15.11	0.75 3.36	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 76.58
P26	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	55.52 28.70	4.86 6.28	6.40 20.72	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
P27	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	100.72 55.26	13.68 22.38	0.86 2.98	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/15 0	38.29 38.29
P28	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	100.77 55.18	13.26 24.02	1.24 2.93	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/15 0	38.29 38.29
P29	30.00 X 1:20 30.00	1.80 1.80	3.32 RR 3.32 RR	56.93 29.53	4.79 7.16	7.84 18.93	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/15 0	38.29 38.29
P30	30.00	1.80	5.36 EL	36.44	0.45	1.00	2.45 2 ø 12.5	ø 5.0 c/15	61.82

1:20	X 30.00	1.80	5.36 EL	21.98	2.81	6.25	2.45 2 ø 12.5 0.5 4 ø 12.5		61.82
P31	30.00 X 1:20 30.00	1.80 1.80	5.36 EL 5.36 EL	36.44 21.98	0.45 2.81	1.00 6.25	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15	61.82 61.82

Quadro de Cargas e Taxa de Compressão Permanente nos Pilares

Nv 180,00						
Pilares	Seção (cm)	N _{máx} (kN)	N _{min} (kN)	N _{perm} (kN)	Taxa de compressão (bruta)	Taxa de compressão (homogeneizada)
P1	20x20	12.81	0.00	15.09	0.02	0.02
P2	20x20	12.81	0.00	15.09	0.02	0.02
P3	20x20	28.95	0.00	33.69	0.04	0.03
P4	20x20	28.95	0.00	33.69	0.04	0.03
P5	20x20	9.99	0.00	10.05	0.01	0.01
P6	20x20	10.30	0.00	10.35	0.01	0.01
P7	30x30	41.46	0.00	48.19	0.02	0.02
P8	30x30	73.30	0.00	84.74	0.04	0.04
P9	30x30	70.37	0.00	81.41	0.04	0.04
P10	20x20	10.29	0.00	10.42	0.01	0.01
P11	20x20	10.04	0.00	10.02	0.01	0.01
P12	30x30	72.07	0.00	83.31	0.04	0.04
P13	30x30	40.68	0.00	47.30	0.02	0.02
P14	20x20	16.18	0.00	18.92	0.02	0.02
P15	20x20	16.18	0.00	18.92	0.02	0.02
P16	20x20	11.87	0.00	12.88	0.02	0.01
P17	20x20	11.87	0.00	12.88	0.02	0.01
P18	20x20	11.94	0.00	12.98	0.02	0.01
P19	20x20	11.94	0.00	12.98	0.02	0.01
P20	30x30	70.45	0.00	90.34	0.05	0.04
P21	30x30	134.23	0.00	162.57	0.08	0.08
P22	30x30	162.06	0.00	193.47	0.10	0.09
P23	30x30	163.51	0.00	195.13	0.10	0.09
P24	30x30	98.98	0.00	122.02	0.06	0.06

P25	30x30	32.71	0.00	41.96	0.02	0.02
P26	30x30	39.66	0.00	46.11	0.02	0.02
P27	30x30	71.95	0.00	83.29	0.04	0.04
P28	30x30	71.98	0.00	83.20	0.04	0.04
P29	30x30	40.67	0.00	47.28	0.02	0.02
P30	30x30	26.03	0.00	36.44	0.02	0.02
P31	30x30	26.03	0.00	36.44	0.02	0.02

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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)
P5	0.20			2 Ø 10.0 0.68					0.01
1	3.05	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.01
P6	0.20			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/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)
P10	0.20			2 Ø 10.0 0.68					0.01
1	3.05	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.01
P11	0.20			2 Ø 10.0 0.68					0.01

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 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)
P10	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
P5	0.20			2 Ø 10.0 0.68					0.00

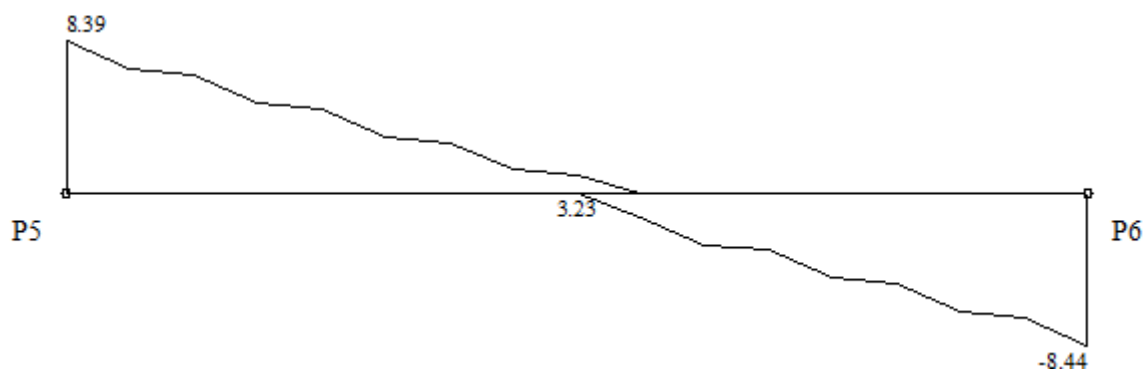
Resultados da Viga V4

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

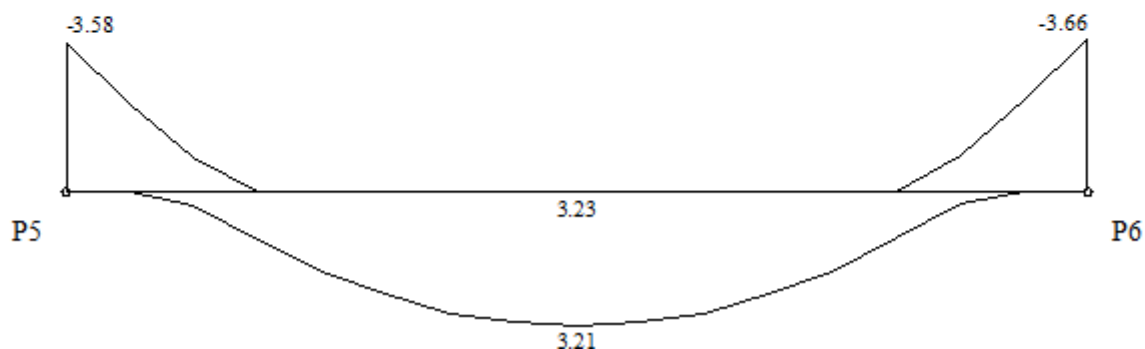
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm ²)	As Sup (cm ²)	As esq trecho (cm ²)	Asw min (cm ²)	As dir trecho (cm ²)	Asw Pele (cm ²)	Fissura (mm)
P11	0.20			2 Ø 10.0 0.68					0.00
1	0.90	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P6	0.20			2 Ø 10.0 0.68					0.00

Diagramas: VIGA V1 - Nv 180,00

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



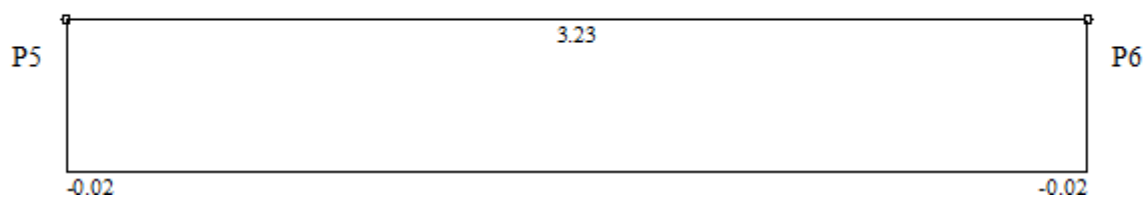
MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



FORTALEZA

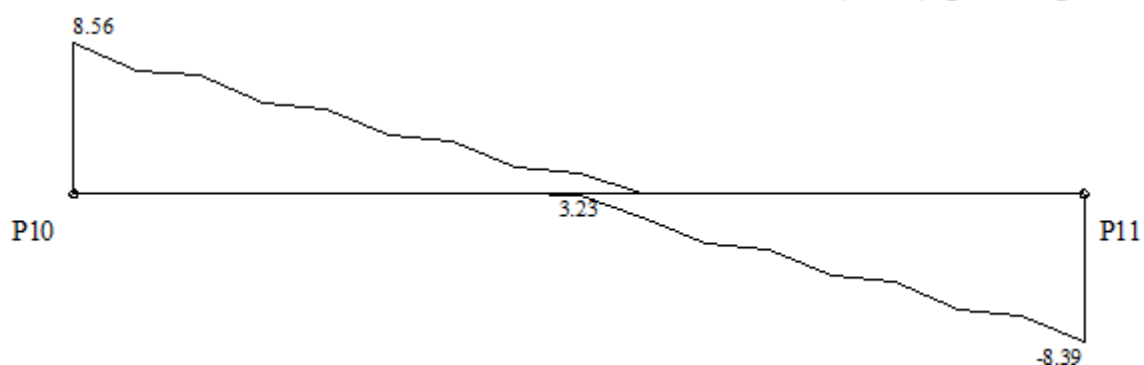
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

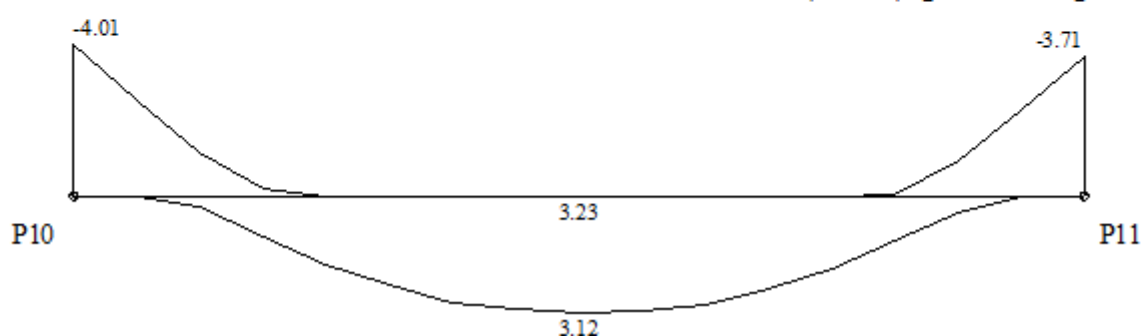


Diagramas: VIGA V2 - Nv 180,00

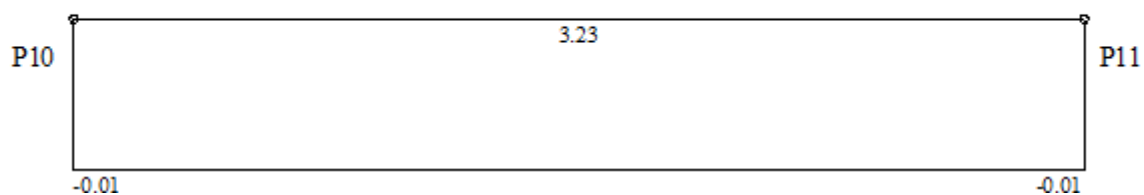
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



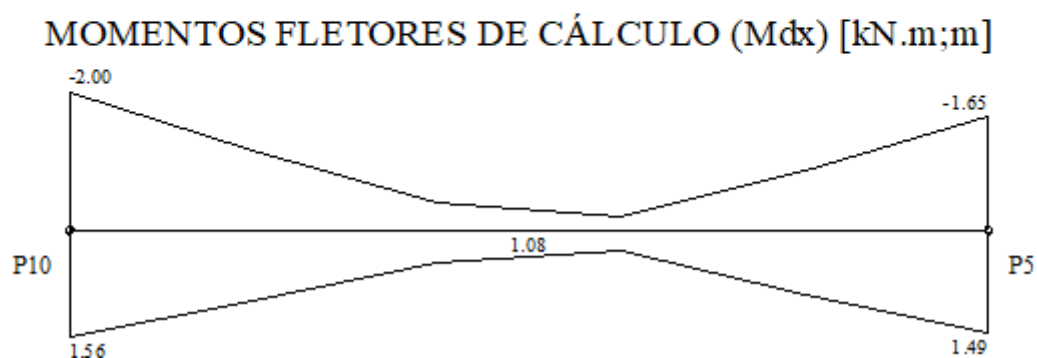
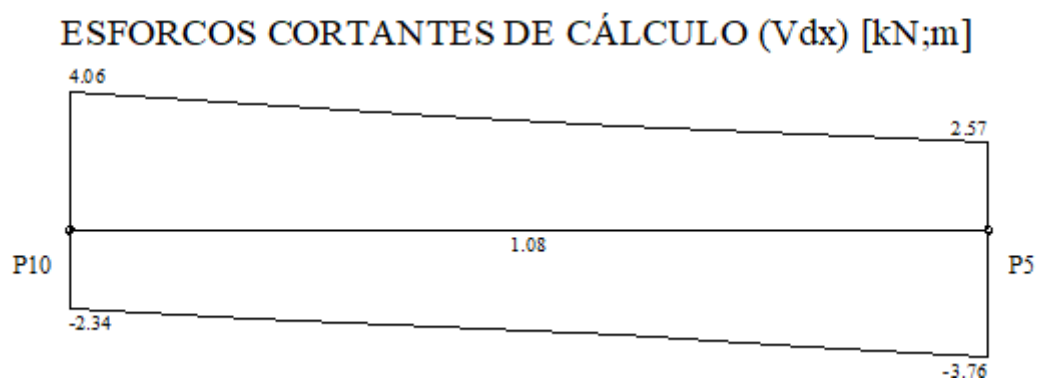
MOMENTOS FLETORES DE CÁLCULO (M_{dx}) [kN.m;m]



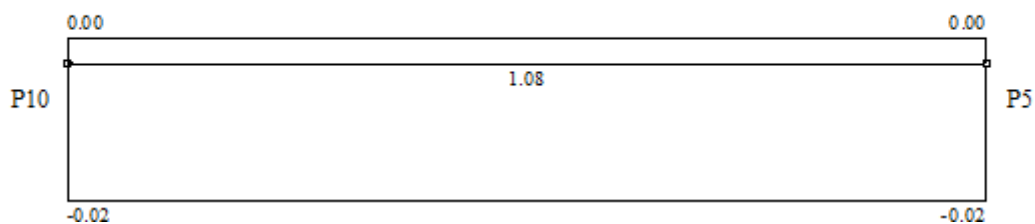
MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Diagramas: VIGA V3 - Nv 180,00

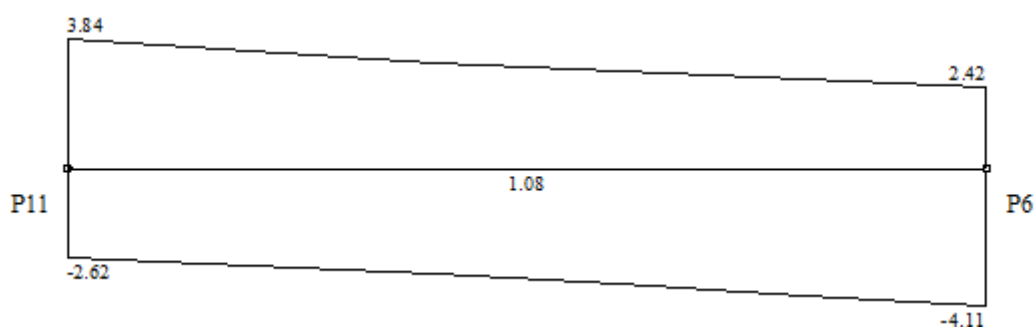


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

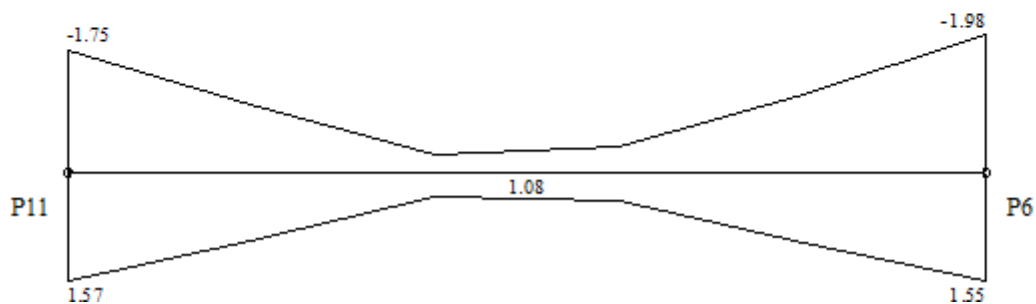


Diagramas: VIGA V4 - Nv 180,00

ESFORÇOS CORTANTES DE CÁLCULO (Vdx) [kN;m]



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

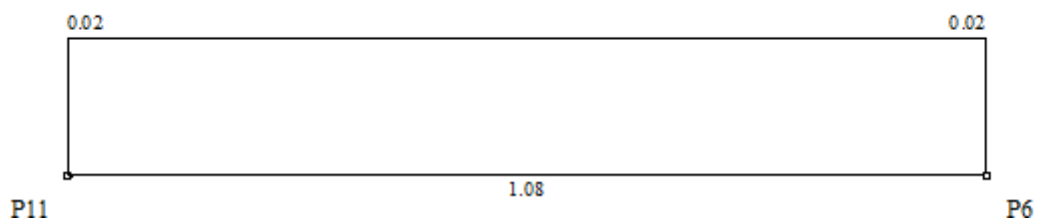


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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Resultados da Laje

Nv 180,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m ³
Lance 2		cobr = 4.00 cm	

Nome	Espessura (cm)	Carga (kN/m ²)	Mdx (kN.m/m)	Mdy (kN.m/m)	Asx	Asy
L1	12	4.29	0.92		As = 0.57 cm ² /N (TR 08646 - 0.57 cm ² /N)	

Cálculos das Lajes

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

ARMADURAS POSITIVAS (LAJE)												
Laje	Direção	Momento positivo				Momento negativo				Armadura inferior	Armadura superior	Cisalhamento
		Seção	Flexão	Verificação axial (compressão)	Verificação axial (tração)	Seção	Flexão	Verificação axial (compressão)	Verificação axial (tração)			
L1	X	bw = 9.0 cm h = 12.0 cm bf = 39.0 cm hf = 4.0 cm	Md = 0.88 kN.m /N As = 0.16 cm²/N A's = 0.00 cm²/N			bw = 9.0 cm h = 12.0 cm				As = 0.57 cm²/N (TR 08646 - 0.57 cm²/N) M = 0.23 kN.m/N F = 0.00 kN/N fiss = 0.00 mm		vsd = 1.25 kN/N vrd1 = 6.56 kN/N Modelo I vrd2 = 45.82 kN/N vsw = 0.00 kN/N asw = 0.00 cm²/m

Pavimento Nv 268,00

Resultados dos Pilares

Nv 268,00	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	20.00	2.68	2.68	RR	15.41	1.46	4.97	1.57 2 ø 10.0	ø 5.0 c/12	
	X	0.88	2.68	RR	8.01	1.21	4.00	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	20.00							0.8 4 ø 10.0	30	46.36
P2 1:20	20.00	2.68	2.68	RR	15.41	4.97	1.46	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	0.88	2.68	RR	8.01	4.00	1.21	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	20.00							0.8 4 ø 10.0	30	
P3 1:20	20.00	2.68	2.68	RR	38.01	2.15	6.21	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	0.88	2.68	RR	21.27	1.17	3.34	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	20.00							0.8 4 ø 10.0	30	
P4 1:20	20.00	2.68	2.68	RR	38.01	2.15	6.21	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	X	0.88	2.68	RR	21.27	1.17	3.34	1.57 2 ø 10.0	ø 5.0 c/12	46.36
	20.00							0.8 4 ø 10.0	30	
P7 1:20	30.00	2.68	3.32	RR	52.37	9.82	20.07	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.88	3.32	RR	28.21	5.10	8.44	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P8	30.00	2.68	3.32	RR	96.95	2.60	30.82	2.45 2 ø 12.5	ø 5.0 c/11	38.29

1:20	X 30.00	0.88	3.32 RR	54.32	0.93	14.08	2.45 2 ø 12.5 0.5 4 ø 12.5		38.29
P9	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	92.84 51.94	2.63 0.86	29.41 13.62	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
P12	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	95.23 53.28	2.61 1.61	29.65 13.26	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
P13	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	51.28 27.56	9.74 4.56	19.48 7.84	2.36 3 ø 10.0 2.36 3 ø 10.0 0.7 8 ø 10.0	ø 5.0 c/11	38.29 38.29
P14	20.00 X 1:20 20.00	2.68 0.88	2.68 RR 2.68 RR	20.13 10.74	1.49 1.11	8.08 4.91	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	46.36 46.36
P15	20.00 X 1:20 20.00	2.68 0.88	2.68 RR 2.68 RR	20.13 10.74	8.08 4.91	1.49 1.11	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	46.36 46.36
P16	20.00 X 1:20 20.00	2.68 0.88	2.68 RR 2.68 RR	14.10 5.07	2.44 1.93	3.21 1.86	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	46.36 46.36
P17	20.00 X 1:20 20.00	2.68 0.88	2.68 RR 2.68 RR	14.10 5.07	2.44 1.93	3.21 1.86	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	46.36 46.36
P18	20.00	2.68	2.68 RR	14.20	2.23	2.54	1.57 2 ø 10.0	ø 5.0 c/12	46.36

1:20	X 20.00	0.88	2.68 RR	5.14	1.96	2.30	1.57 2 ø 10.0 0.8 4 ø 10.0	ø 5.0 c/12 30	46.36
P19	20.00 X 1:20 20.00	2.68 0.88	2.68 RR 2.68 RR	14.20 5.14	2.23 1.96	2.54 2.30	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	46.36 46.36
P20	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	92.97 58.30	9.06 4.50	16.17 5.64	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
P21	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	182.25 110.06	5.13 2.62	16.11 5.56	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
P22	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	221.21 132.16	3.72 1.81	5.92 1.64	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
P23	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	223.25 133.31	3.19 1.40	6.10 1.01	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
P24	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	132.90 80.92	6.26 1.04	15.80 7.90	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
P25	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 6.64 EL	40.13 19.71	7.25 0.96	0.17 0.75	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 76.58
P26	30.00	2.68	3.32 RR	49.85	9.61	18.10	2.45 2 ø 12.5	ø 5.0 c/11	38.29

1:20	X 30.00	0.88	3.32 RR	26.72	4.86	6.40	2.45 2 ø 12.5 0.5 4 ø 12.5		38.29
P27	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	95.05 53.28	29.73 13.68	2.04 0.86	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
P28	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	95.10 53.20	29.77 13.26	2.57 1.24	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
P29	30.00 X 1:20 30.00	2.68 0.88	3.32 RR 3.32 RR	51.26 27.55	9.97 4.79	19.36 7.84	2.36 3 ø 10.0 2.36 3 ø 10.0 0.7 8 ø 10.0	ø 5.0 c/11	38.29 38.29
P30	30.00 X 1:20 30.00	2.68 0.88	5.36 EL 5.36 EL	30.77 20.00	0.00 0.45	0.00 1.00	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15	61.82 61.82
P31	30.00 X 1:20 30.00	2.68 0.88	5.36 EL 5.36 EL	30.77 20.00	0.00 0.45	0.00 1.00	2.45 2 ø 12.5 2.45 2 ø 12.5 0.5 4 ø 12.5	ø 5.0 c/15	61.82 61.82

Quadro de Cargas e Taxa de Compressão Permanente nos Pilares

Nv 268,00						
Pilares	Seção (cm)	Nmáx (kN)	Nmin (kN)	Nperm (kN)	Taxa de compressão (bruta)	Taxa de compressão (homogeneizada)
P1	20x20	11.01	0.00	12.57	0.01	0.01
P2	20x20	11.01	0.00	12.57	0.01	0.01
P3	20x20	27.15	0.00	31.17	0.04	0.03
P4	20x20	27.15	0.00	31.17	0.04	0.03
P7	30x30	37.41	0.00	42.52	0.02	0.02
P8	30x30	69.25	0.00	79.07	0.04	0.04
P9	30x30	66.32	0.00	75.74	0.04	0.03
P12	30x30	68.02	0.00	77.64	0.04	0.03
P13	30x30	36.63	0.00	41.63	0.02	0.02
P14	20x20	14.38	0.00	16.40	0.02	0.02
P15	20x20	14.38	0.00	16.40	0.02	0.02
P16	20x20	10.07	0.00	10.36	0.01	0.01
P17	20x20	10.07	0.00	10.36	0.01	0.01
P18	20x20	10.14	0.00	10.46	0.01	0.01
P19	20x20	10.14	0.00	10.46	0.01	0.01
P20	30x30	66.40	0.00	84.67	0.04	0.04
P21	30x30	130.18	0.00	156.90	0.08	0.07
P22	30x30	158.01	0.00	187.80	0.10	0.09
P23	30x30	159.46	0.00	189.46	0.10	0.09
P24	30x30	94.93	0.00	116.35	0.06	0.05
P25	30x30	28.66	0.00	36.29	0.02	0.02
P26	30x30	35.61	0.00	40.44	0.02	0.02
P27	30x30	67.90	0.00	77.62	0.04	0.03
P28	30x30	67.93	0.00	77.53	0.04	0.03

P29	30x30	36.62	0.00	41.61	0.02	0.02
P30	30x30	21.98	0.00	30.77	0.02	0.01
P31	30x30	21.98	0.00	30.77	0.02	0.01

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	0.20			2 Ø 10.0 0.68					0.00
1	1.95	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P2	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/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	0.20			2 Ø 10.0 0.68					0.00
1	1.95	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P4	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/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)
P14	0.20			2 Ø 10.0 0.68					0.00
1	1.95	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P15	0.20			2 Ø 10.0 0.68					0.00

Resultados da Viga V4

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	0.20			2 Ø 10.0 0.68					0.00
1	1.95	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.01
P17	0.20			2 Ø 10.0 0.68					0.00

Resultados da Viga V5

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)
P18	0.20			2 Ø 10.0 0.68					0.00
1	1.95	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.01
P19	0.20			2 Ø 10.0 0.68					0.00

Resultados da Viga V6

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)
P18	0.20			2 Ø 10.0 0.68					0.00
1	1.90	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P16	0.20			2 Ø 10.0 0.68					0.00

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)
P14	0.20			2 Ø 10.0 0.75					0.02
1	3.85	15.00 x 30.00	2 Ø 10.0 0.79			Ø 5.0 c/ 15			0.04
P3	0.20			2 Ø 10.0 1.43					0.11
2	3.00	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.01
P1	0.20			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/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	0.20			2 Ø 10.0 0.68					0.00
1	1.90	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.00
P17	0.20			2 Ø 10.0 0.68					0.00

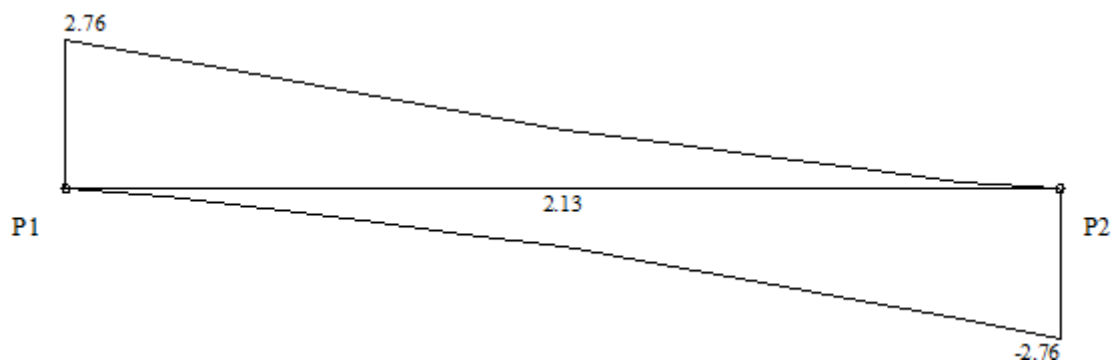
Resultados da Viga V9

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

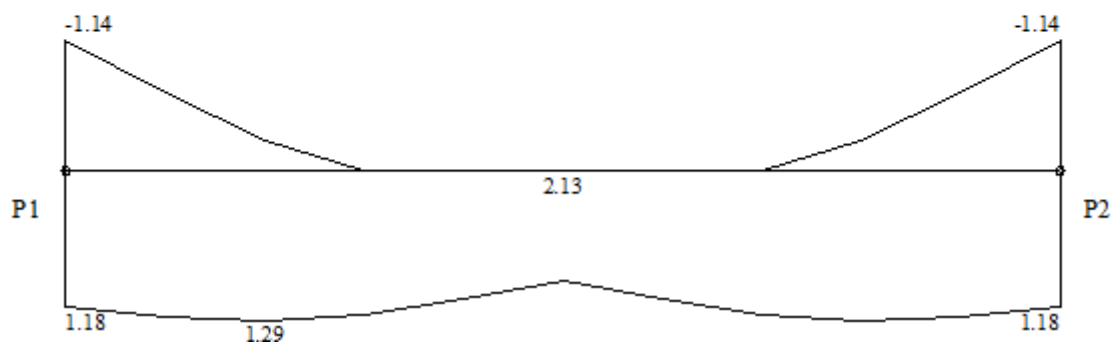
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P15	0.20			2 Ø 10.0 0.75					0.02
1	3.85	15.00 x 30.00	2 Ø 10.0 0.79			Ø 5.0 c/ 15			0.04
P4	0.20			2 Ø 10.0 1.43					0.11
2	3.00	15.00 x 30.00	2 Ø 10.0 0.68			Ø 5.0 c/ 15			0.01
P2	0.20			2 Ø 10.0 0.68					0.01

Diagramas: VIGA V1 - Nv 268,00

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



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

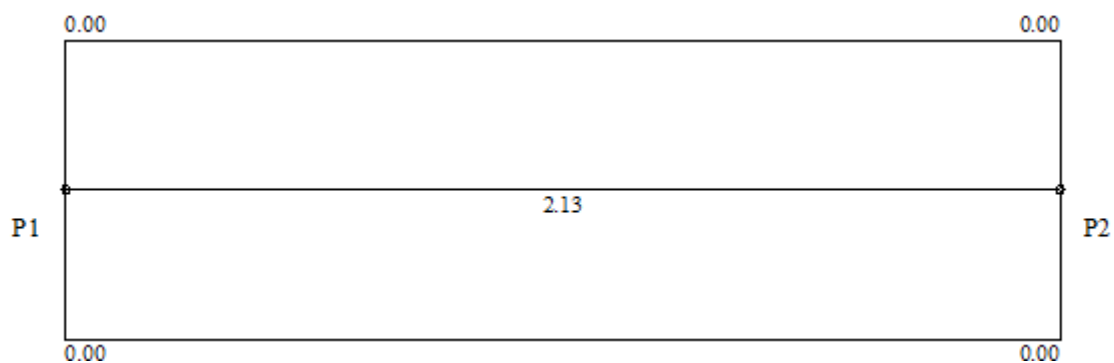


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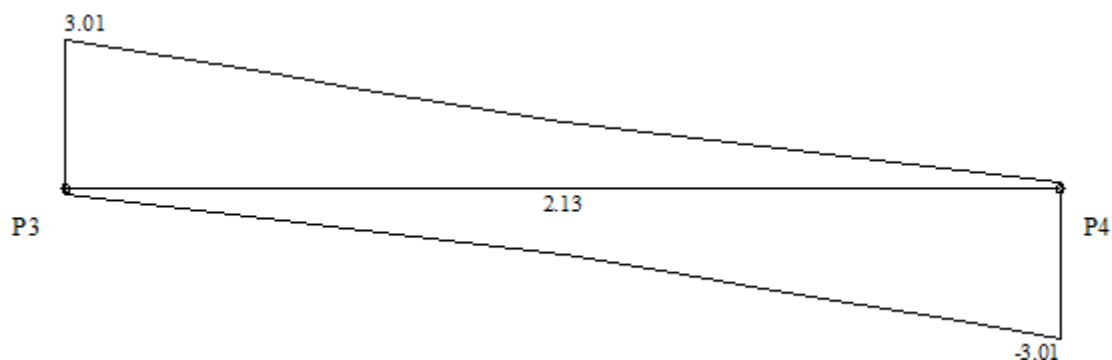
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

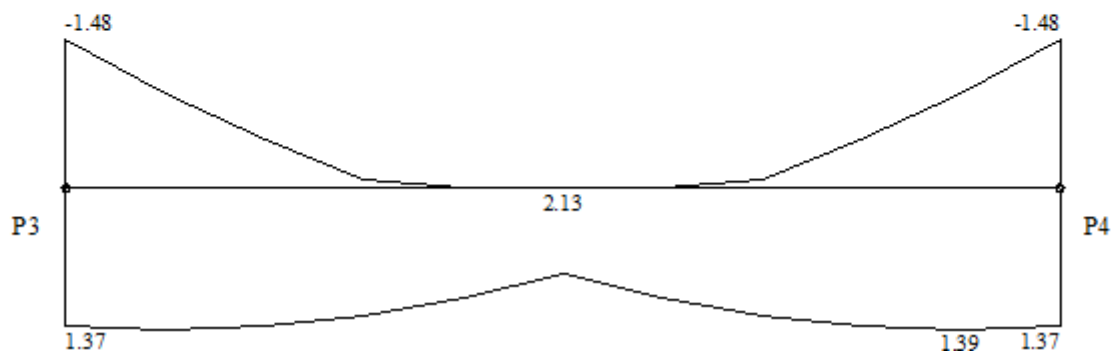


Diagramas: VIGA V2 - Nv 268,00

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



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

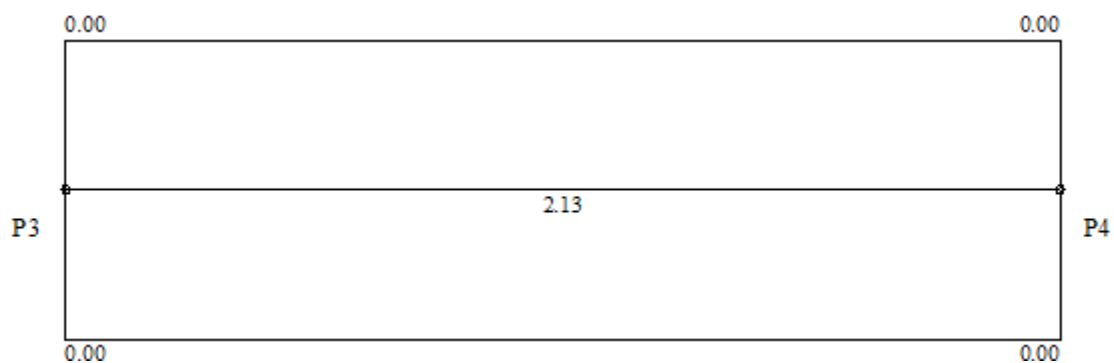


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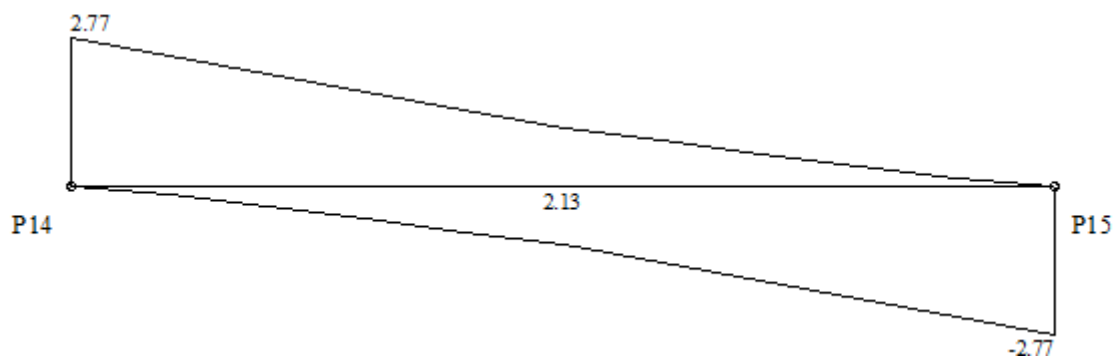
100/
148

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

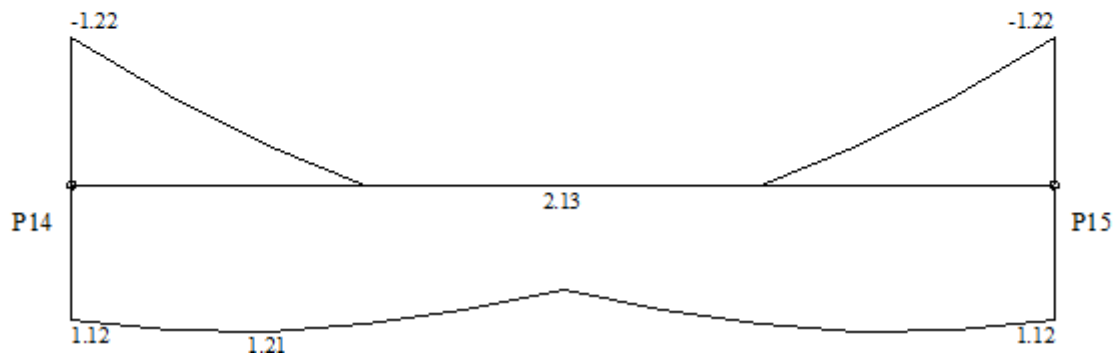


Diagramas: VIGA V3 - Nv 268,00

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



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

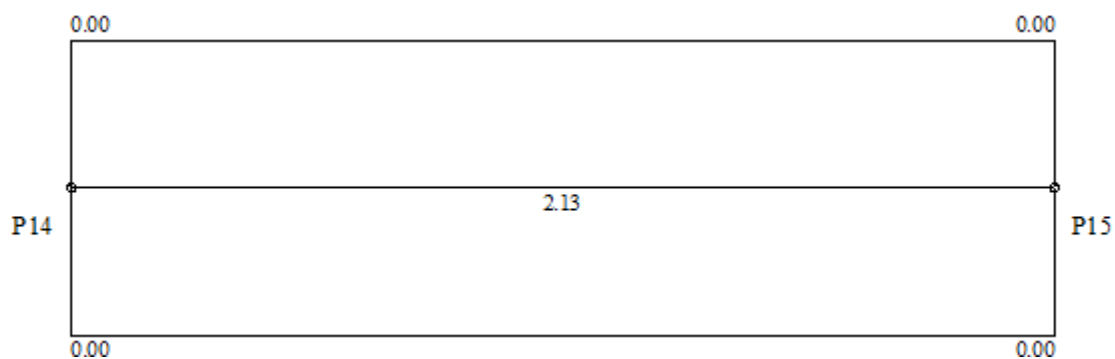


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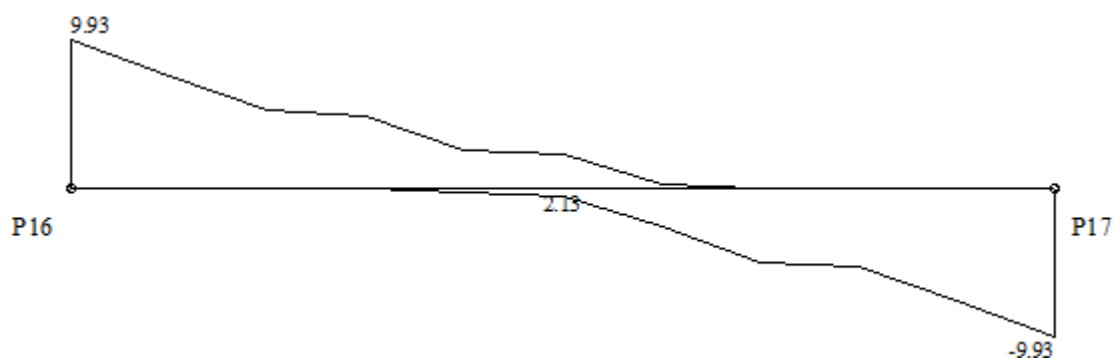
102/
 148

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

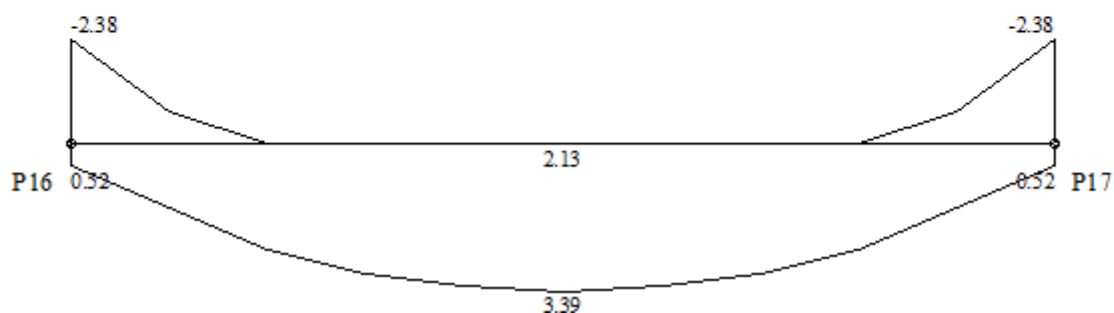


Diagramas: VIGA V4 - Nv 268,00

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



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

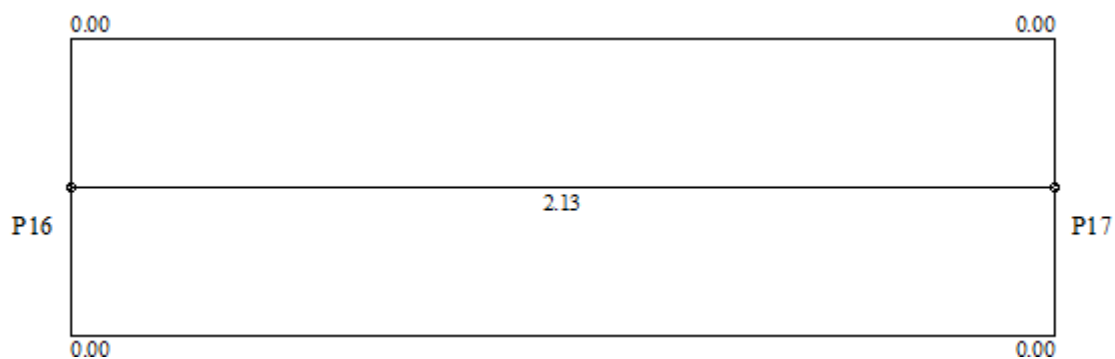


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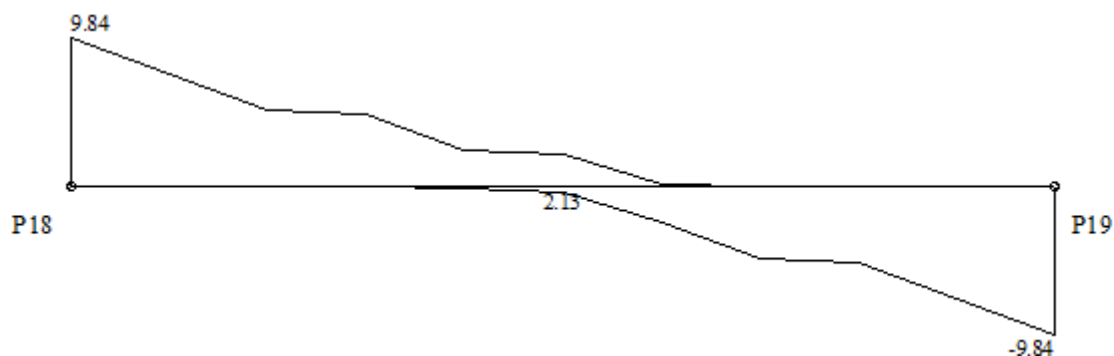
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

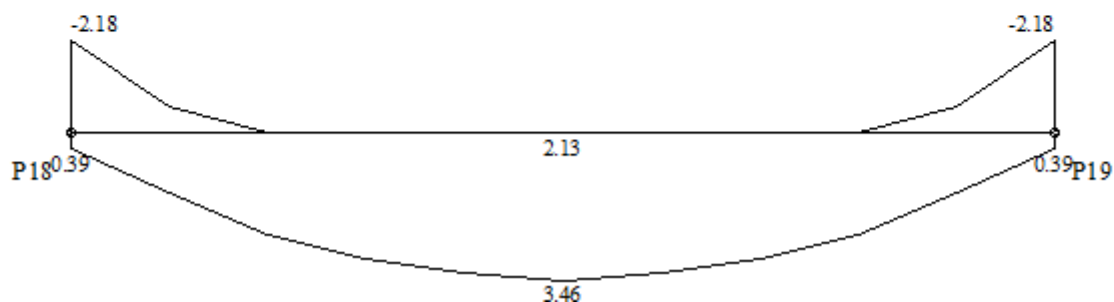


Diagramas: VIGA V5 - Nv 268,00

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



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

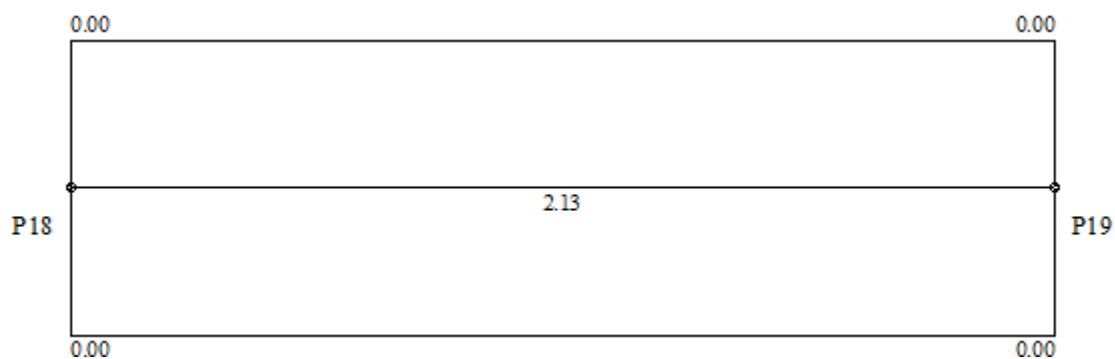


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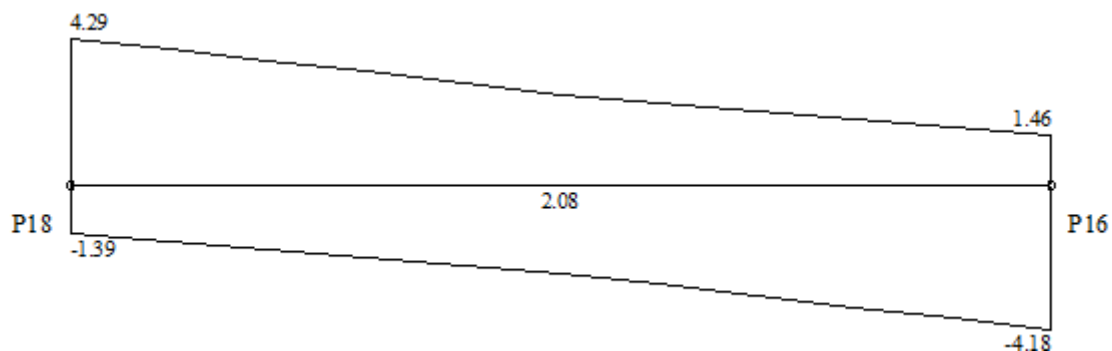
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

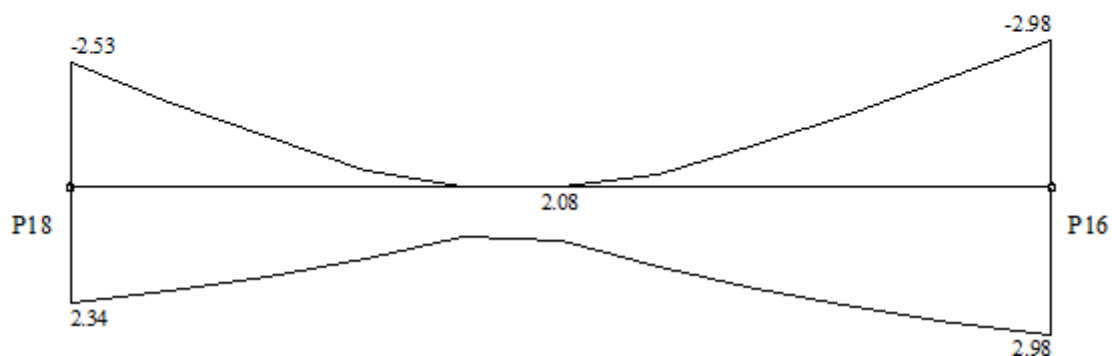


Diagramas: VIGA V6 - Nv 268,00

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



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

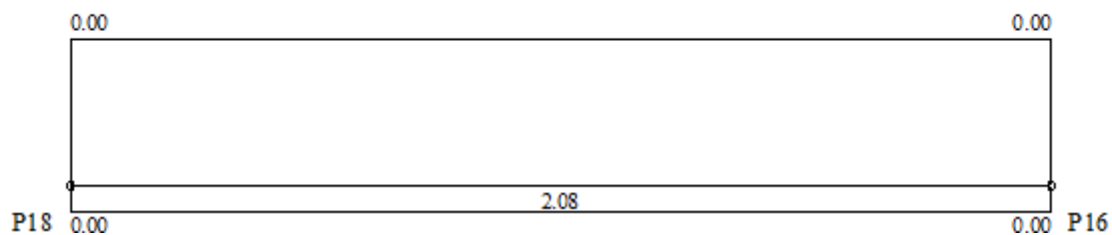


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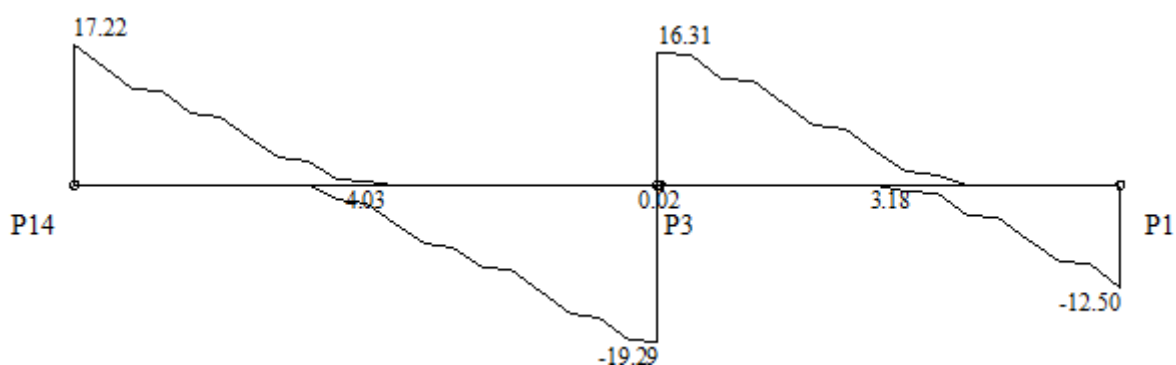
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

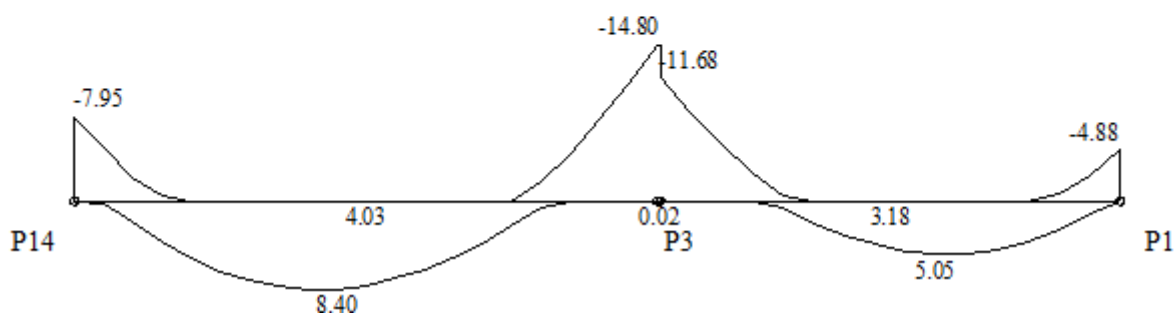


Diagramas: VIGA V7 - Nv 268,00

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



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

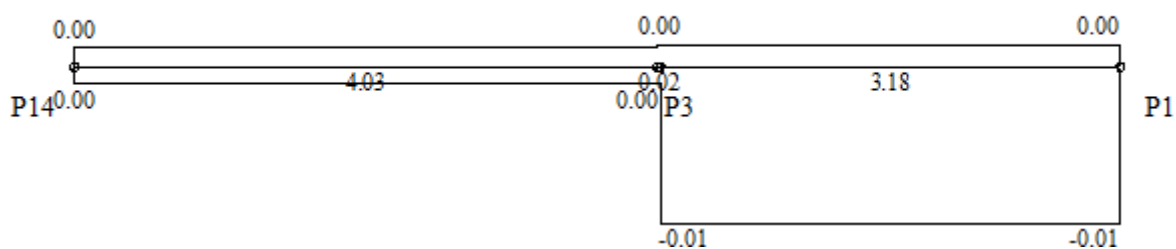


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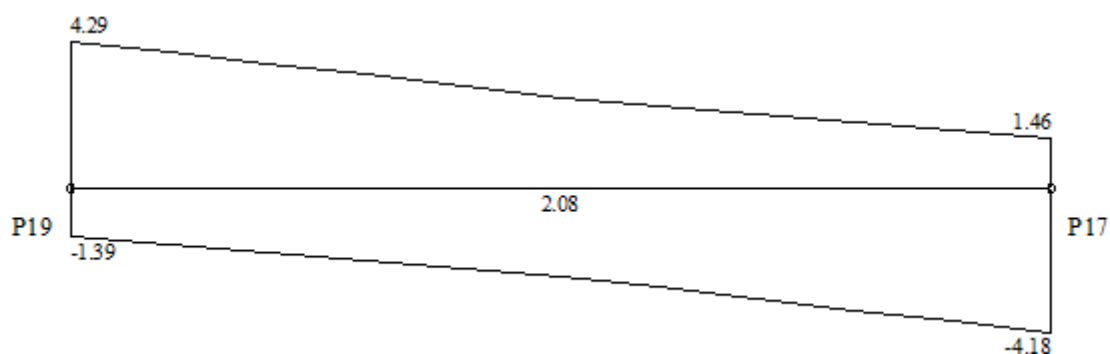
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

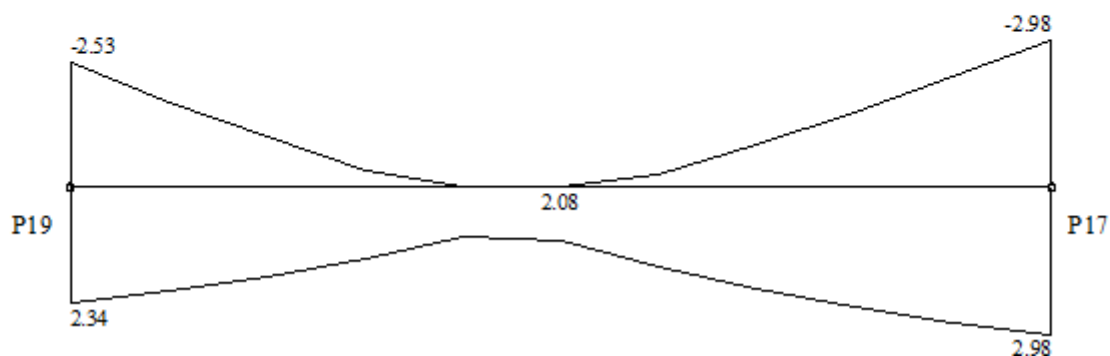


Diagramas: VIGA V8 - Nv 268,00

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



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

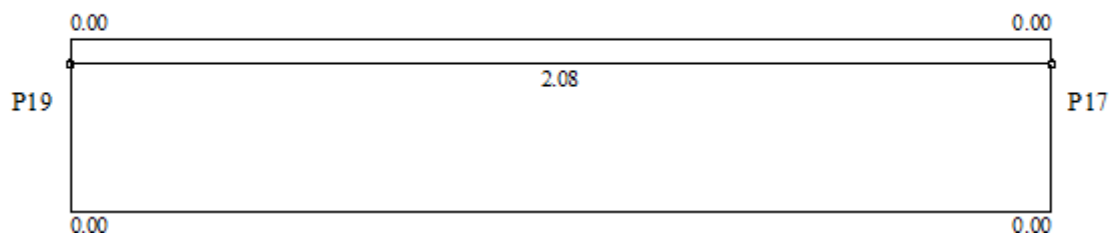


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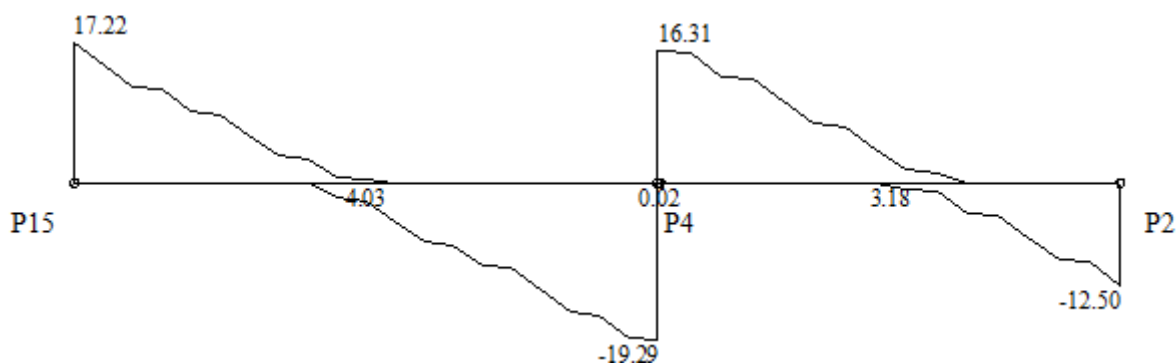
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

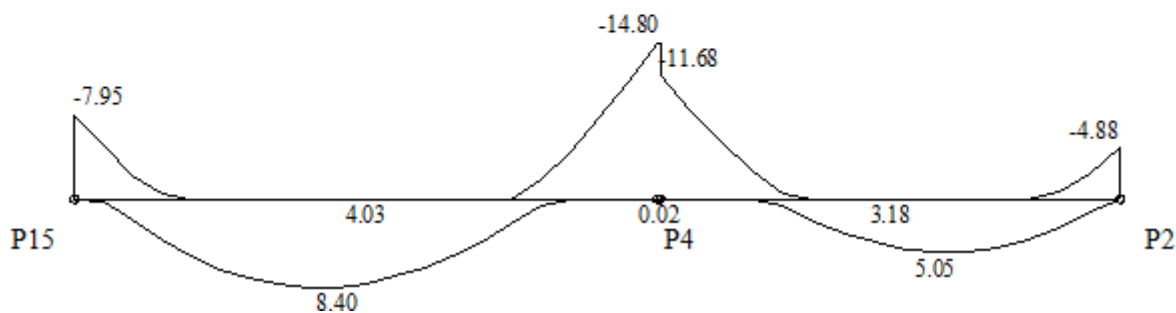


Diagramas: VIGA V9 - Nv 268,00

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



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

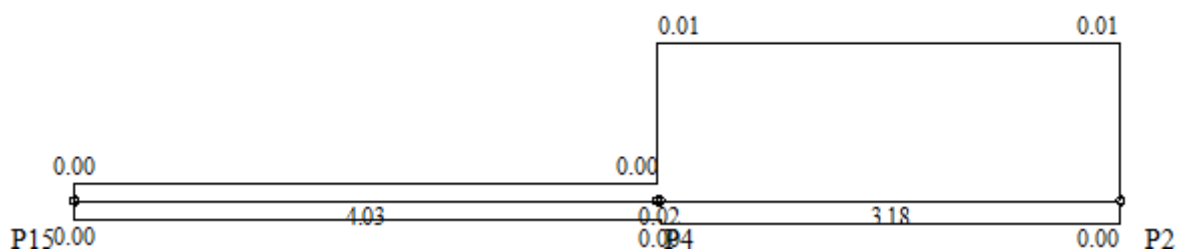


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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]



Resultados da Laje

Nv 268,00	fck = 30.00 MPa	E = 26838 MPa	Peso Espec = 25.00 kN/m ³
Lance 3		cobr = 3.50 cm	

Nome	Espessura (cm)	Carga (kN/m ²)	Mdx (kN.m/m)	Mdy (kN.m/m)	Asx	Asy
L1	12	4.59	4.03		As = 0.57 cm ² /N (TR 08646 - 0.57 cm ² /N)	
L2	12	4.59	3.87		As = 0.57 cm ² /N (TR 08646 - 0.57 cm ² /N)	
L3	12	4.59	3.39		As = 0.57 cm ² /N (TR 08646 - 0.57 cm ² /N)	

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
P7 1:20	30.00	3.32	3.32	RR	49.60	13.08	27.83	2.45 2 ø 12.5	ø 5.0 c/11	38.29
	X	0.64	3.32	RR	26.77	9.82	20.07	2.45 2 ø 12.5		38.29
	30.00							0.5 4 ø 12.5		
P8 1:20	30.00	3.32	3.32	RR	94.18	3.57	42.44	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.64	3.32	RR	52.88	2.60	30.82	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P9 1:20	30.00	3.32	3.32	RR	90.07	3.92	40.32	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.64	3.32	RR	50.50	2.63	29.41	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P12 1:20	30.00	3.32	3.32	RR	92.46	3.05	40.94	3.68 3 ø 12.5	ø 5.0 c/11	38.29
	X	0.64	3.32	RR	51.84	2.61	29.65	3.68 3 ø 12.5		38.29
	30.00							1.1 8 ø 12.5		
P13 1:20	30.00	3.32	3.32	RR	48.51	13.36	27.25	2.45 2 ø 12.5	ø 5.0 c/11	38.29
	X	0.64	3.32	RR	26.12	9.74	19.48	2.45 2 ø 12.5		38.29
	30.00							0.5 4 ø 12.5		
P20	30.00	3.32	3.32	RR	90.19	12.19	23.16	2.45 2 ø 12.5	ø 5.0 c/11	38.29

1:20	X 30.00	0.64	3.32	RR	56.86	9.06	16.17	2.45 2 ø 12.5 0.5 4 ø 12.5		38.29
P21	30.00 X 1:20 30.00	3.32 0.64	3.32 3.32	RR RR	179.48 108.62	6.64 5.13	23.07 16.11	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
P22	30.00 X 1:20 30.00	3.32 0.64	3.32 3.32	RR RR	218.44 130.72	4.80 3.72	8.31 5.92	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
P23	30.00 X 1:20 30.00	3.32 0.64	3.32 3.32	RR RR	220.48 131.87	4.20 3.19	9.08 6.10	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
P24	30.00 X 1:20 30.00	3.32 0.64	3.32 3.32	RR RR	130.12 79.48	9.35 6.26	21.36 15.80	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
P25	30.00 X 1:20 30.00	3.32 0.64	3.32 6.64	RR EL	37.35 18.27	11.13 7.25	0.11 0.17	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 76.58
P26	30.00 X 1:20 30.00	3.32 0.64	3.32 3.32	RR RR	47.08 25.28	12.89 9.61	25.92 18.10	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
P27	30.00 X 1:20 30.00	3.32 0.64	3.32 3.32	RR RR	92.28 51.84	40.70 29.73	2.60 2.04	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
P28	30.00	3.32	3.32	RR	92.33	41.14	3.25	3.68 3 ø 12.5	ø 5.0 c/11	38.29

1:20	X 30.00	0.64	3.32 RR	51.76	29.77	2.57	3.68 3 ø 12.5 1.1 8 ø 12.5		38.29
P29	30.00 X 1:20 30.00	3.32 0.64	3.32 RR 3.32 RR	48.49 26.11	13.56 9.97	27.05 19.36	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

Quadro de Cargas e Taxa de Compressão Permanente nos Pilares

Nv 332,00						
Pilares	Seção (cm)	N _{máx} (kN)	N _{min} (kN)	N _{perm} (kN)	Taxa de compressão (bruta)	Taxa de compressão (homogeneizada)
P7	30x30	35.43	0.00	39.75	0.02	0.02
P8	30x30	67.27	0.00	76.29	0.04	0.03
P9	30x30	64.34	0.00	72.97	0.04	0.03
P12	30x30	66.04	0.00	74.87	0.04	0.03
P13	30x30	34.65	0.00	38.86	0.02	0.02
P20	30x30	64.42	0.00	81.90	0.04	0.04
P21	30x30	128.20	0.00	154.13	0.08	0.07
P22	30x30	156.03	0.00	185.03	0.10	0.09
P23	30x30	157.48	0.00	186.69	0.10	0.09
P24	30x30	92.95	0.00	113.58	0.06	0.05
P25	30x30	26.68	0.00	33.52	0.02	0.02
P26	30x30	33.63	0.00	37.67	0.02	0.02
P27	30x30	65.92	0.00	74.85	0.04	0.03
P28	30x30	65.95	0.00	74.76	0.04	0.03
P29	30x30	34.64	0.00	38.84	0.02	0.02

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)
P7	0.30			2 Ø 10.0 0.90					0.04
1	4.45	15.00 x 40.00	2 Ø 10.0 1.06			Ø 5.0 c/ 21			0.07
P8	0.30			2 Ø 10.0 1.37					0.11
2	4.45	15.00 x 40.00	2 Ø 10.0 1.00			Ø 5.0 c/ 21			0.06
P9	0.30			2 Ø 10.0 1.25					0.09
3	4.45	15.00 x 40.00	2 Ø 10.0 0.95			Ø 5.0 c/ 21			0.06
P12	0.30			2 Ø 10.0 1.35					0.11
4	4.45	15.00 x 40.00	2 Ø 10.0 1.06			Ø 5.0 c/ 21			0.07
P13	0.30			2 Ø 10.0 0.90					0.04

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)
P20	0.30			2 Ø 10.0 0.90					0.04
1	4.45	15.00 x 40.00	2 Ø 12.5 1.02			Ø 5.0 c/ 20			0.04
P21	0.30			2 Ø 12.5 1.87					0.11
2	4.45	15.00 x 40.00	2 Ø 12.5 1.83			Ø 5.0 c/ 20			0.11
P22	0.30			2 Ø 12.5 2.32					0.16
3	4.45	15.00 x 40.00	2 Ø 12.5 1.71			Ø 5.0 c/ 20			0.10
P23	0.30			2 Ø 12.5 2.30					0.16
4	4.45	15.00 x 40.00	2 Ø 12.5 1.90			Ø 5.0 c/ 20			0.12
P24	0.30			2 Ø 10.0 1.42					0.12

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)
P26	0.30			2 Ø 10.0 0.90					0.04
1	4.45	15.00 x 40.00	2 Ø 12.5 1.09			Ø 5.0 c/ 20			0.04
P27	0.30			2 Ø 10.0 1.45					0.13
2	4.45	15.00 x 40.00	2 Ø 12.5 0.95			Ø 5.0 c/ 20			0.03
P28	0.30			2 Ø 10.0 1.34					0.11
3	4.45	15.00 x 40.00	2 Ø 12.5 1.07			Ø 5.0 c/ 20			0.04
P29	0.30			2 Ø 10.0 0.90					0.04

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)
P25	0.30			2 Ø 10.0 0.90					0.01
1	4.45	15.00 x 40.00	2 Ø 12.5 0.90			Ø 5.0 c/ 20			0.00
P20	0.30			2 Ø 12.5 2.25					0.11
2	4.45	15.00 x 40.00	2 Ø 12.5 1.20			Ø 5.0 c/ 20			0.05
P7	0.30			2 Ø 12.5 1.84					0.07

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)
P26	0.30			2 Ø 12.5 1.71					0.05
1	4.45	15.00 x 40.00	2 Ø 12.5 1.02			Ø 5.0 c/ 20			0.03
P21	0.30			4 Ø 12.5 4.33					0.10
2	4.45	15.00 x 40.00	2 Ø 12.5 2.16			Ø 5.0 c/ 20			0.14
P8	0.30			3 Ø 12.5 2.99					0.09

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)
P27	0.30			4 ø 10.0 2.89					0.09
1	4.45	15.00 x 40.00	3 ø 10.0 2.11			ø 5.0 c/ 20			0.12
P22	0.30			4 ø 12.5 4.76					0.11
2	4.45	15.00 x 40.00	3 ø 10.0 2.12			ø 5.0 c/ 20			0.12
P9	0.30			4 ø 10.0 2.85					0.09

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)
P28	0.30			4 Ø 10.0 2.92					0.09
1	4.45	15.00 x 40.00	3 Ø 10.0 2.11			Ø 5.0 c/ 20			0.12
P23	0.30			4 Ø 12.5 4.77					0.11
2	4.45	15.00 x 40.00	3 Ø 10.0 2.11			Ø 5.0 c/ 20			0.12
P12	0.30			4 Ø 10.0 2.91					0.09

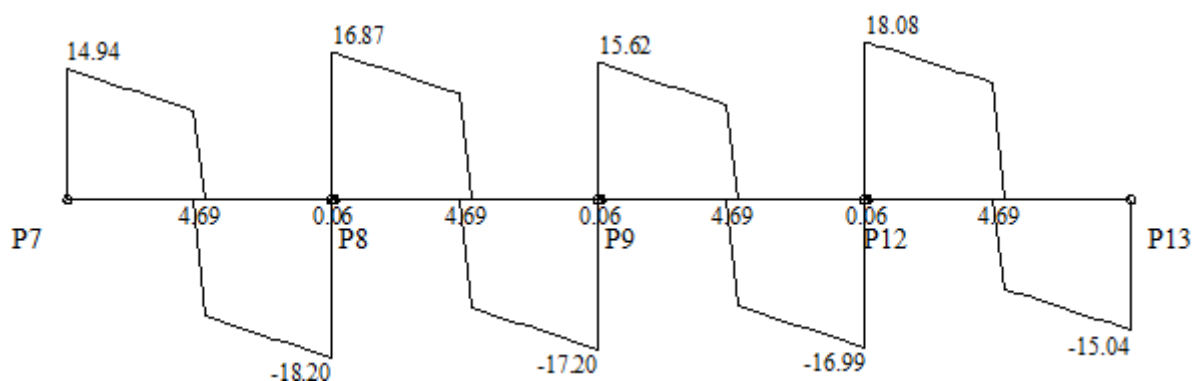
Resultados da Viga V8

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

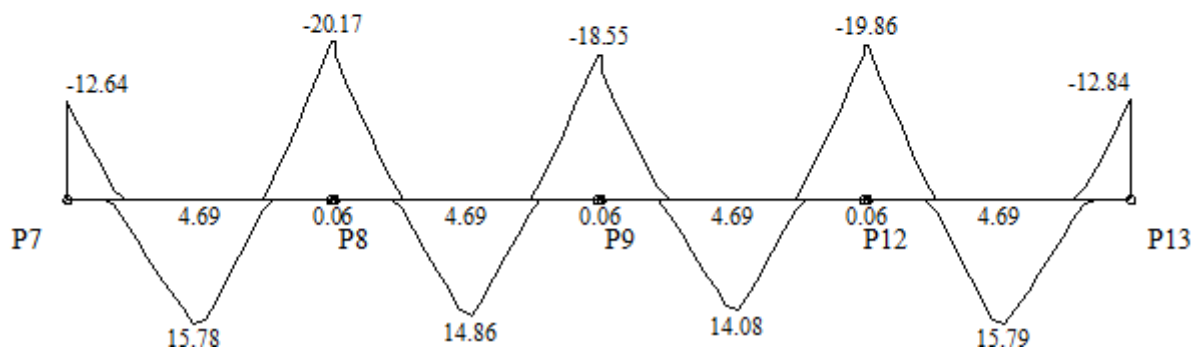
Dados			Resultados						
Pilar Trecho	Apoio 1 e 1o (m)	Seção (cm)	As Inf (cm²)	As Sup (cm²)	As esq trecho (cm²)	Asw min (cm²)	As dir trecho (cm²)	Asw Pele (cm²)	Fissura (mm)
P29	0.30			2 Ø 12.5 1.79					0.06
1	4.45	15.00 x 40.00	2 Ø 10.0 1.11			Ø 5.0 c/ 21			0.07
P24	0.30			3 Ø 12.5 2.76					0.08
2	4.45	15.00 x 40.00	2 Ø 10.0 1.10			Ø 5.0 c/ 21			0.07
P13	0.30			2 Ø 12.5 1.80					0.06

Diagramas: VIGA V1 - Nv 332,00

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



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

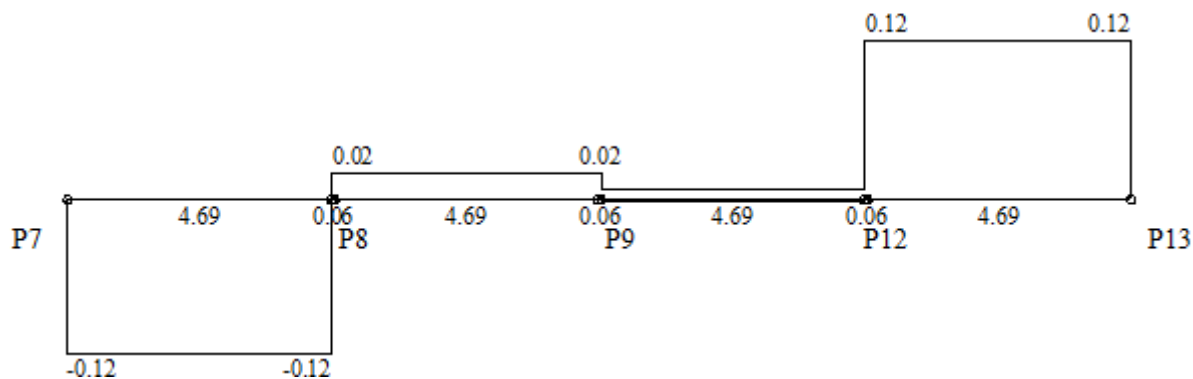


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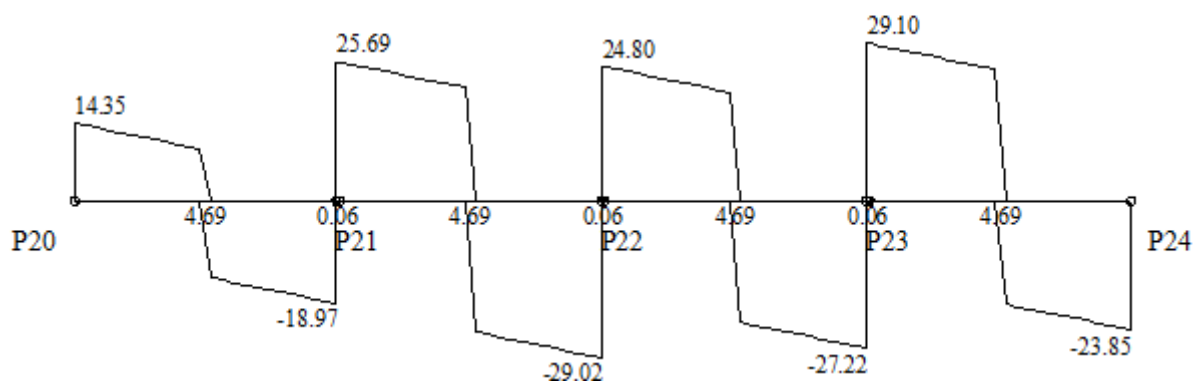
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

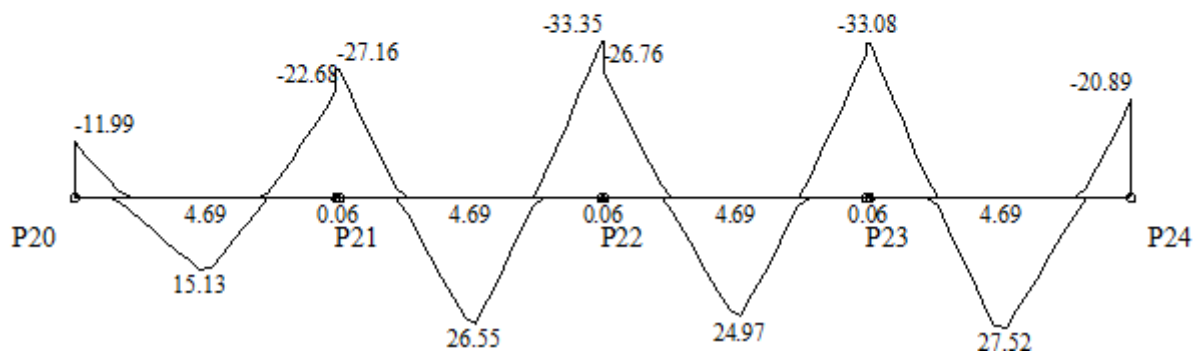


Diagramas: VIGA V2 - Nv 332,00

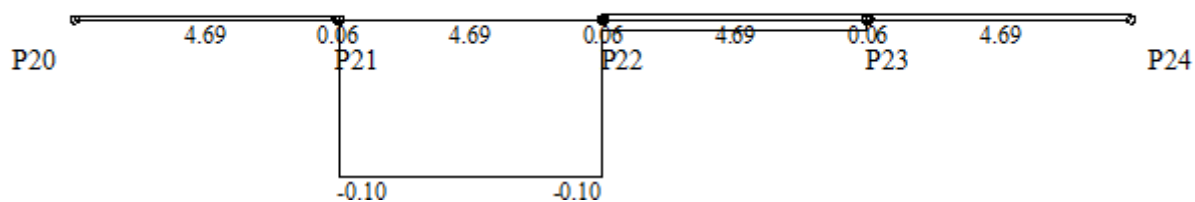
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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

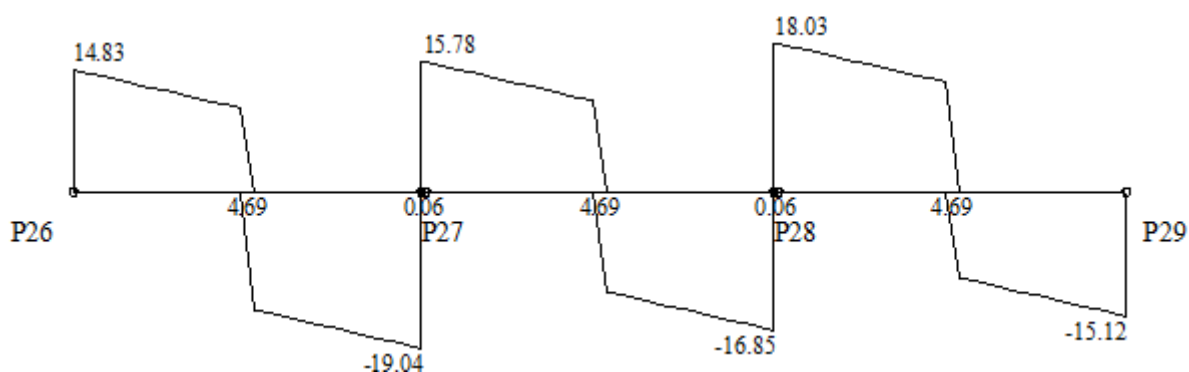


MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

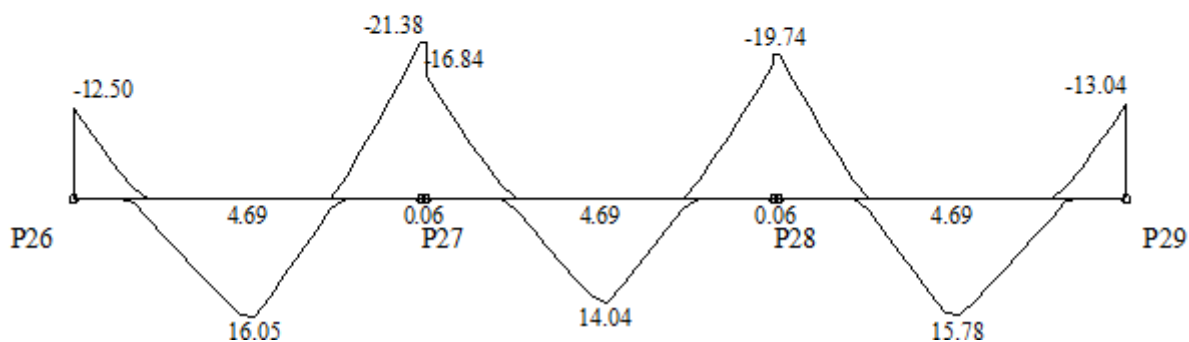


Diagramas: VIGA V3 - Nv 332,00

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



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

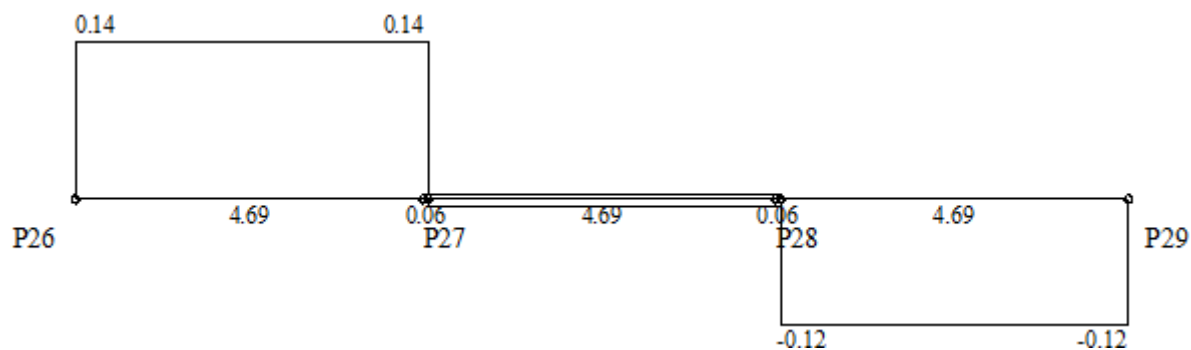


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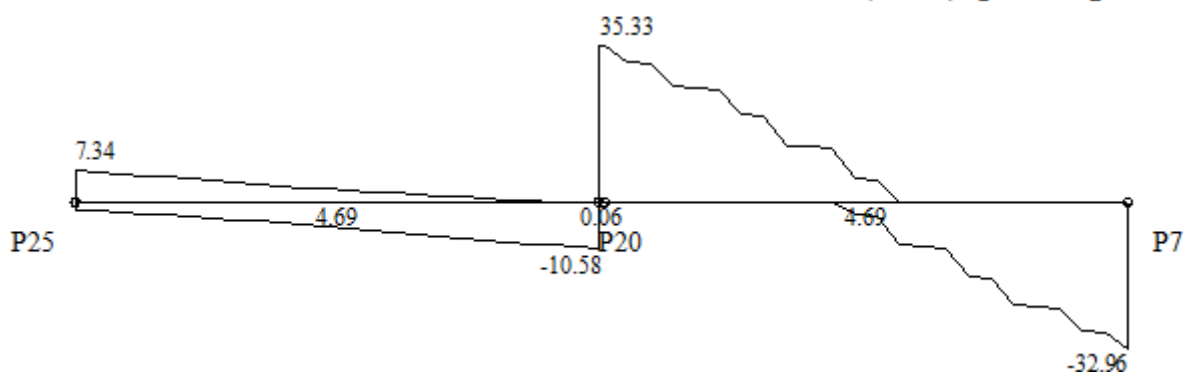
133/
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

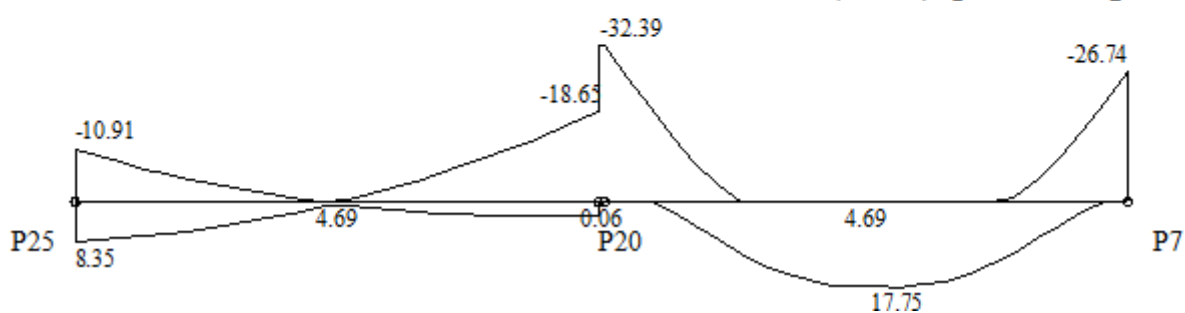


Diagramas: VIGA V4 - Nv 332,00

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



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

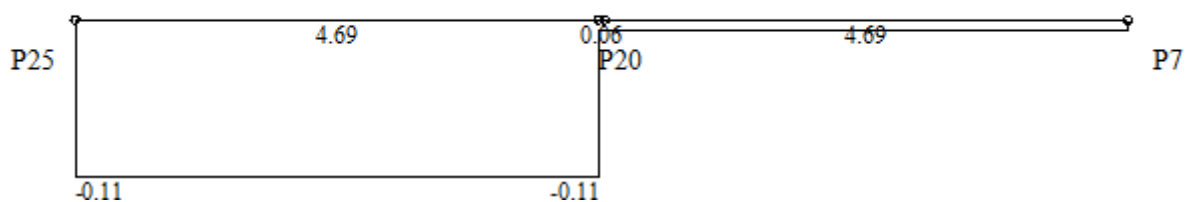


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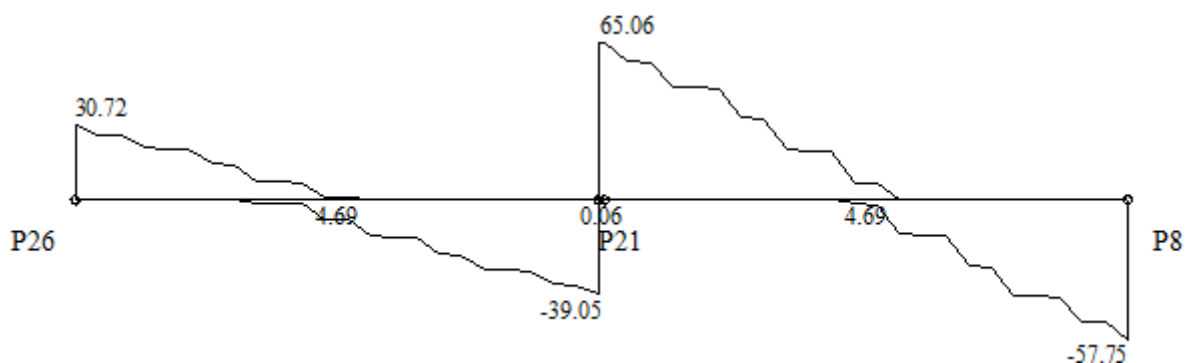
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

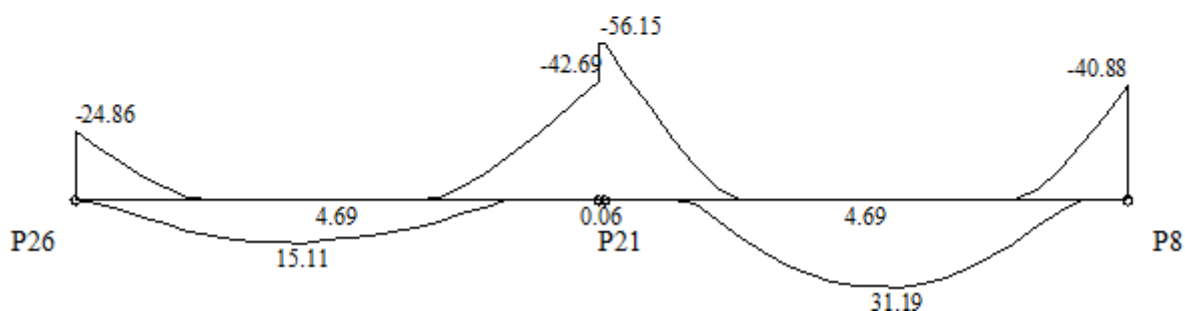


Diagramas: VIGA V5 - Nv 332,00

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



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

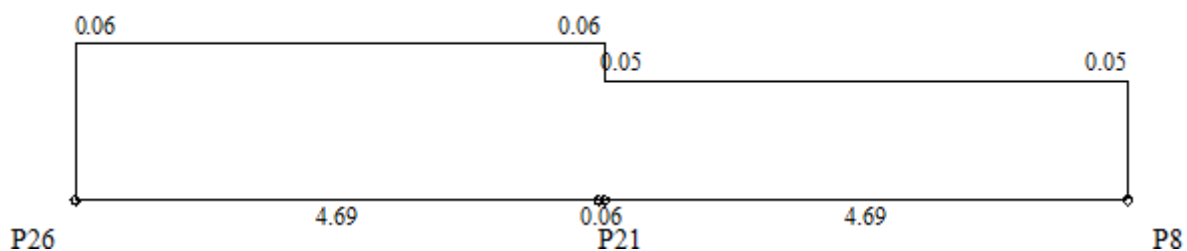


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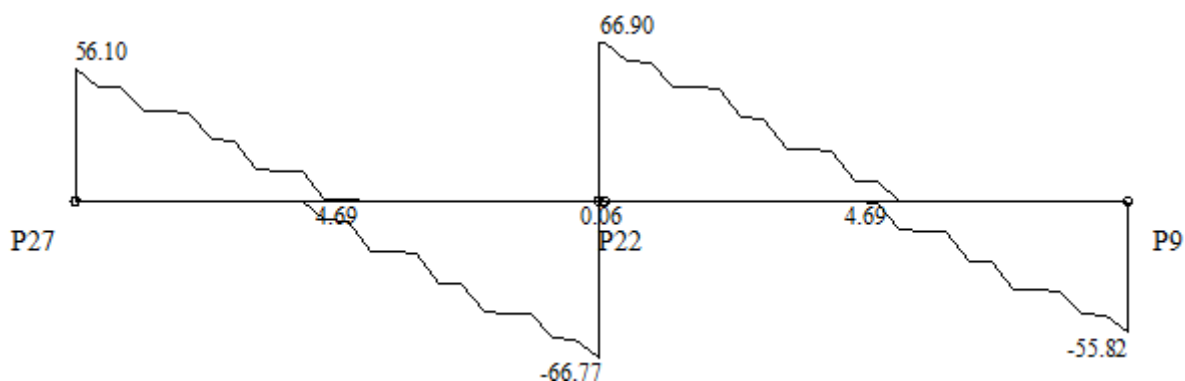
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MOMENTOS TORSORES DE CÁLCULO (Mtd) [kN.m;m]

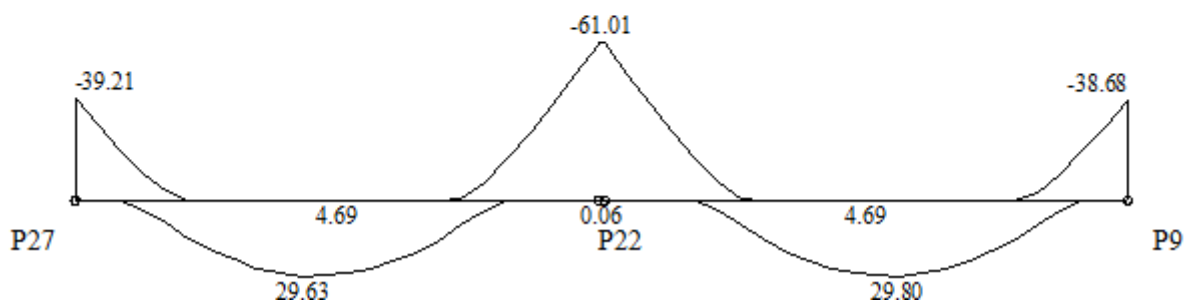


Diagramas: VIGA V6 - Nv 332,00

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



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

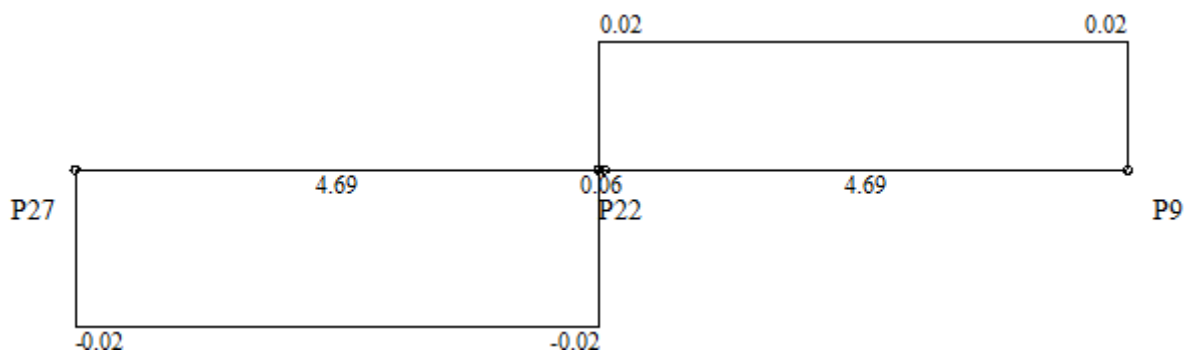


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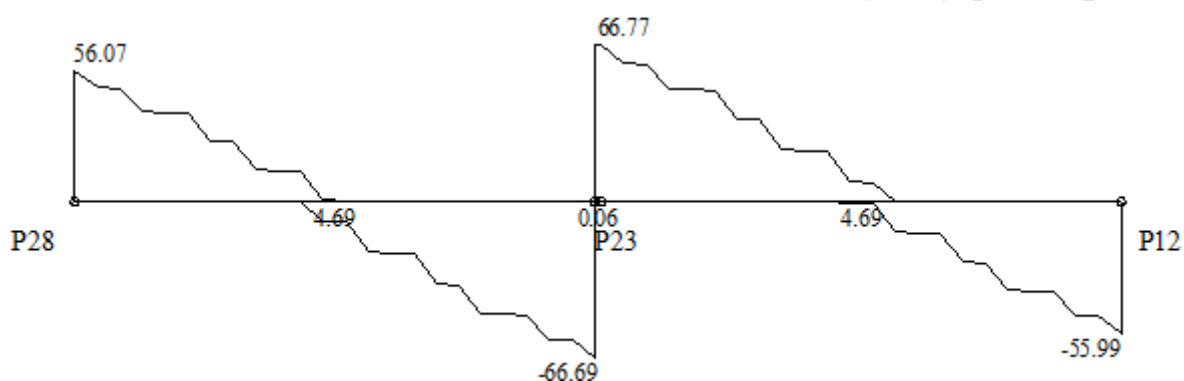
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 148

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

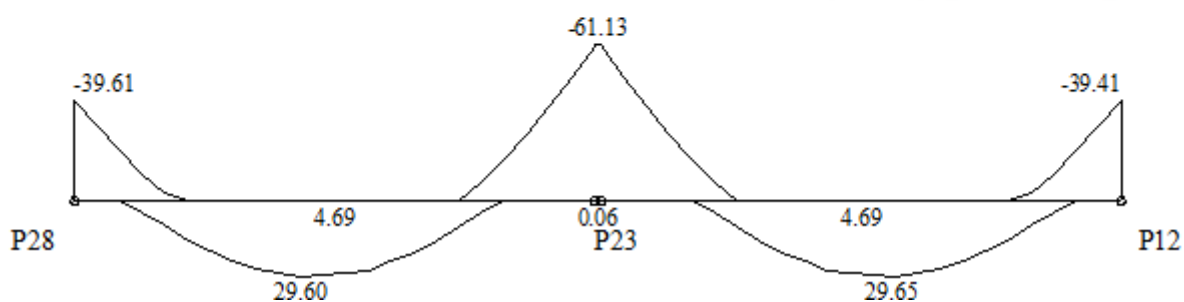


Diagramas: VIGA V7 - Nv 332,00

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



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

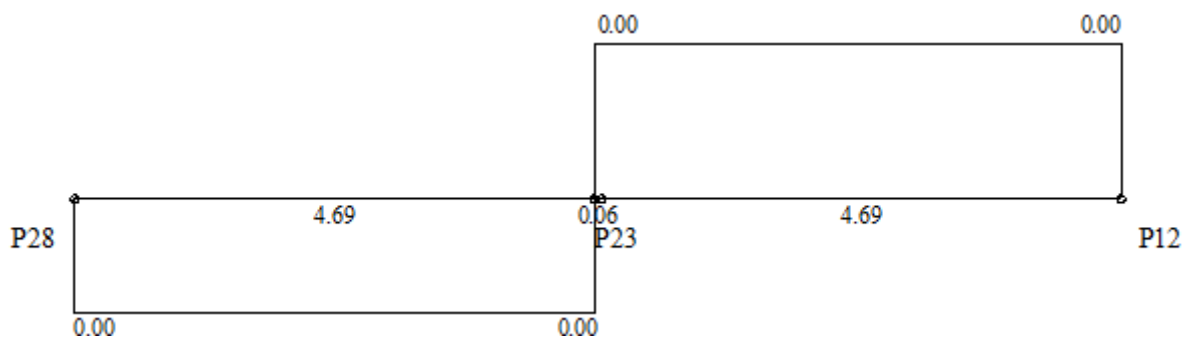


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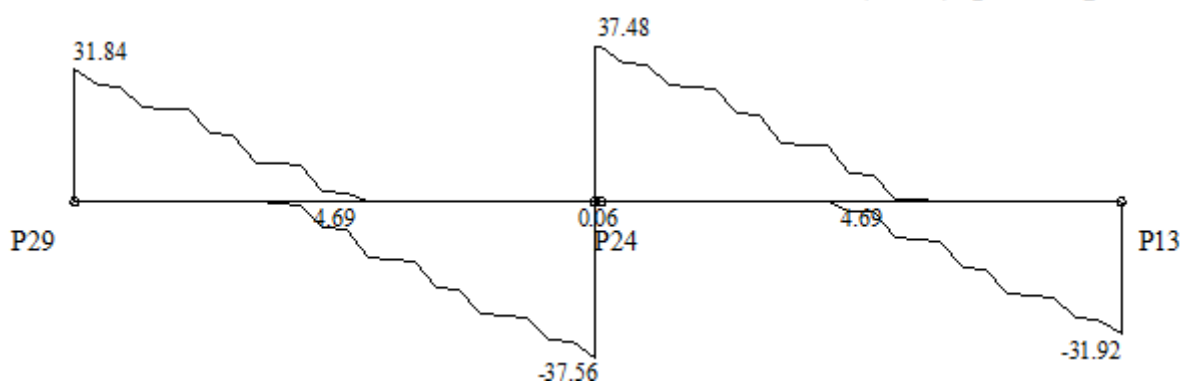
141/
 148

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

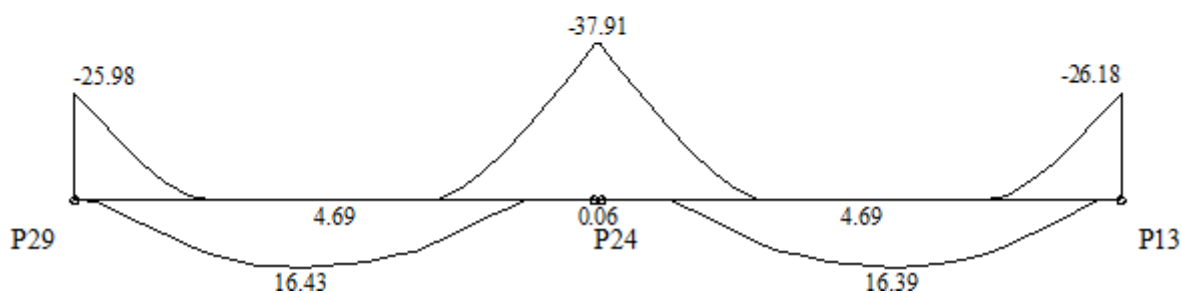


Diagramas: VIGA V8 - Nv 332,00

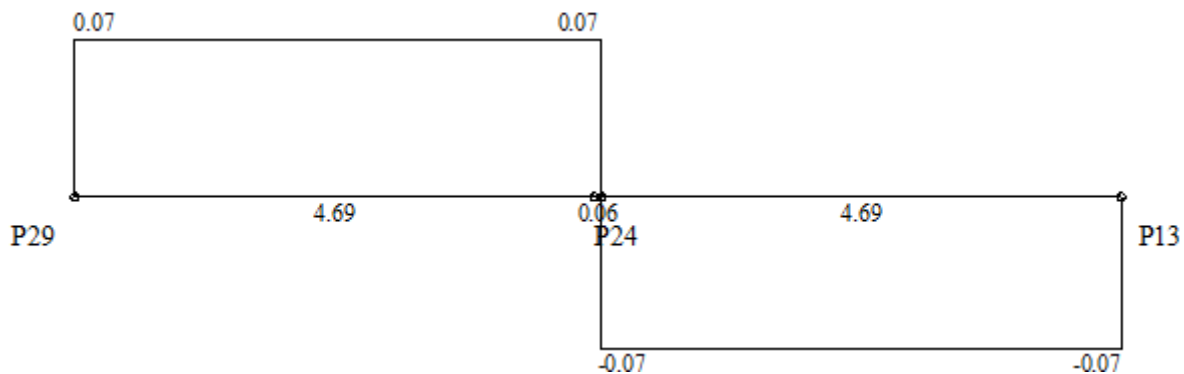
ESFORÇOS CORTANTES DE CÁLCULO (V_{dx}) [kN;m]



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



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



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	14.09	1.11	As = 1.25 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.93 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L2	15	4.85	14.32	1.22	As = 1.27 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 1.02 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L3	15	4.85	13.86	1.11	As = 1.23 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.93 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L4	15	4.85	14.30	1.08	As = 1.27 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.90 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L5	15	4.85	14.52	1.13	As = 1.29 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.95 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L6	15	4.85	13.86	1.11	As = 1.23 cm²/N (2x TR 12645 - 0.39 cm²/N) (1ø8.0 c/N - 0.50 cm²/N)	As = 0.93 cm²/N (1ø12.5 c/N - 1.23 cm²/N)
L7	15	4.85	14.31	1.08	As = 1.27 cm²/N (2x TR 12645 - 0.39 cm²/N)	As = 0.90 cm²/N (1ø12.5 c/N - 1.23 cm²/N)

					(1ø8.0 c/N - 0.50 cm ² /N)	
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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
P20 1:20	30.00	5.31	3.98	EL	34.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	20.00	0.22	10.64	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		
P21 1:20	30.00	5.31	3.98	EL	34.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	20.00	0.22	10.64	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		
P22 1:20	30.00	5.31	3.98	EL	34.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	20.00	0.22	10.63	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		
P23 1:20	30.00	5.31	3.98	EL	34.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	20.00	0.22	10.63	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		
P24 1:20	30.00	5.31	3.98	EL	34.27	0.00	0.00	2.45 2 ø 12.5	ø 5.0 c/11	45.90
	X	1.99	3.98	EL	20.00	10.63	0.23	2.45 2 ø 12.5		45.90
	30.00							0.5 4 ø 12.5		

Quadro de Cargas e Taxa de Compressão Permanente nos Pilares

Nv 531,00						
Pilares	Seção (cm)	N _{máx} (kN)	N _{min} (kN)	N _{perm} (kN)	Taxa de compressão (bruta)	Taxa de compressão (homogeneizada)
P20	30x30	24.48	0.00	34.27	0.02	0.02
P21	30x30	24.48	0.00	34.27	0.02	0.02
P22	30x30	24.48	0.00	34.27	0.02	0.02
P23	30x30	24.48	0.00	34.27	0.02	0.02
P24	30x30	24.48	0.00	34.27	0.02	0.02

FORTALEZA