

Cálculo dos Pilares – trecho 2

pav1 $f_{ck} = 250.00 \text{ kgf/cm}^2$ $E = 241500 \text{ kgf/cm}^2$ $\text{Peso Espec} = 2500.00 \text{ kgf/m}^3$
Lance 2 $\text{cobr} = 2.00 \text{ cm}$

Dados					Resultados			
Pilar	Seção (cm)	lib vínc esb B lih vínc esb H (cm)	Nd máx Nd mín (tf) ni Zr	MBd topo MBd base MHd topo MHd base (kgf.m)	MBsdtopo MBsdcentro MBsdbase MHsdtopo MHsdcentro MHsdbase (kgf.m)	Madtopo Madcentro Madbase MB2d MBcd MH2d MHcd (kgf.m)	Processo de Cálculo	As b(cm ²) As h % armad
P1	19.00 X 60.00	406.00 RR 73.93 406.00 RR 23.41	20.97 10.33 0.10 0.00 0.00	143 29 318 480	143 88 6 280 188 469	423 346 428 655 18 85 2	(*2) Msd(x) = 1107 kgf.m Msd(y) = 188 kgf.m Mrd(x) = 7991 kgf.m Mrd(y) = 1354 kgf.m Mrd/Msd=7.22	6.28 2 ø 20.0 12.57 4 ø 20.0 2.2
P2	19.00 X 60.00	506.00 RR 92.15 406.00 RR 23.41	29.13 13.63 0.14 0.00 0.00	26 16 2771 1103	26 20 10 2771 1221 1103	587 583 593 1963 39 400 11	(*2) Msd(x) = 2605 kgf.m Msd(y) = 1221 kgf.m Mrd(x) = 4520 kgf.m Mrd(y) = 2119 kgf.m Mrd/Msd=1.74	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9
P3	19.00 X 60.00	506.00 RR 92.15 406.00 RR 23.41	16.76 8.27 0.08 0.00 0.00	27 12 1356 682	27 12 12 1356 543 682	338 335 338 1129 14 230 3	(*2) Msd(x) = 1490 kgf.m Msd(y) = 543 kgf.m Mrd(x) = 8903 kgf.m Mrd(y) = 3241 kgf.m Mrd/Msd=5.97	6.28 2 ø 20.0 15.71 5 ø 20.0 2.8
P4	35.00 X 80.00	406.00 RR 40.14 406.00 RR 17.56	15.37 7.26 0.03 0.00 0.00	672 465 825 573	672 269 465 825 330 573	310 155 310 158 2 41 1	(*2) Msd(x) = 982 kgf.m Msd(y) = 825 kgf.m Mrd(x) = 24359 kgf.m Mrd(y) = 20479 kgf.m Mrd/Msd=24.81	9.42 3 ø 20.0 18.85 6 ø 20.0 1.6
P5	19.00 X 60.00	406.00 RR 73.93 506.00 RR 29.18	9.71 3.65 0.05 0.00 0.00	18 29 1844 955	18 12 29 1844 738 955	196 189 196 303 3 116 3	(*2) Msd(x) = 507 kgf.m Msd(y) = 738 kgf.m Mrd(x) = 3065 kgf.m Mrd(y) = 4463 kgf.m Mrd/Msd=6.05	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9
P6		406.00 RR	37.99	83	83	886	(*2)	9.42

Dados					Resultados			
Pilar	Seção (cm)	lib vínc esb B	Nd máx Nd mín (tf) ni	MBd topo MBd base	MBsdtopo MBsdcentro MBsdbase	Madtopo Madcentro Madbase	Processo de Cálculo	As b(cm²)
		lih vínc esb H (cm)	Zr	MHd topo MHd base (kgf.m)	MHsdtopo MHsdcentro MHsdbase (kgf.m)	MB2d MBcd		As h
						MH2d MHcd (kgf.m)		% armad
	35.00 X 80.00	40.14 506.00 RR 21.88	17.76 0.08 0.00 0.00	37 5370 2472	35 37 5370 2233 2472	934 932 374 5 242 9	Msd(x) = 83 kgf.m Msd(y) = 6136 kgf.m Mrd(x) = 927 kgf.m Mrd(y) = 68726 kgf.m Mrd/Msd=11.20	3 ø 20.0 18.85 6 ø 20.0 1.6
P7	19.00 X 60.00	406.00 RR 73.93 506.00 RR 29.18	11.53 4.49 0.06 0.00 0.00	106 72 2253 1124	106 42 72 2253 902 1124	232 196 232 360 5 140 4	(*2) Msd(x) = 339 kgf.m Msd(y) = 2253 kgf.m Mrd(x) = 1738 kgf.m Mrd(y) = 11570 kgf.m Mrd/Msd=5.13	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9
P8	19.00 X 60.00	406.00 RR 73.93 406.00 RR 23.41	39.15 18.31 0.19 0.00 0.00	38 13 456 264	38 17 13 456 182 264	789 793 797 1223 44 158 6	(*2) Msd(x) = 2077 kgf.m Msd(y) = 182 kgf.m Mrd(x) = 5396 kgf.m Mrd(y) = 473 kgf.m Mrd/Msd=2.60	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9
P9	25.00 X 60.00	506.00 RR 70.03 406.00 RR 23.41	63.49 26.76 0.24 0.00 0.00	7 3 7906 3323	7 3 3 7906 3414 3323	1421 1425 1425 2148 65 401 42	(*2) Msd(x) = 3641 kgf.m Msd(y) = 3414 kgf.m Mrd(x) = 13230 kgf.m Mrd(y) = 12406 kgf.m Mrd/Msd=3.63	6.28 2 ø 20.0 15.71 5 ø 20.0 2.1
P10	35.00 X 80.00	406.00 RR 40.14 506.00 RR 21.88	41.23 19.15 0.08 0.00 0.00	10 5 6687 3027	10 4 5 6687 2801 3027	1042 1047 1047 406 5 285 12	(*2) Msd(x) = 10 kgf.m Msd(y) = 7518 kgf.m Mrd(x) = 91 kgf.m Mrd(y) = 69727 kgf.m Mrd/Msd=9.28	9.42 3 ø 20.0 18.85 6 ø 20.0 1.6
P11	19.00 X 60.00	406.00 RR 73.93 506.00 RR 29.18	11.23 4.37 0.06 0.00 0.00	144 86 2187 1094	144 57 86 2187 875 1094	226 175 226 351 5 136 4	(*2) Msd(x) = 370 kgf.m Msd(y) = 2187 kgf.m Mrd(x) = 1907 kgf.m Mrd(y) = 11276 kgf.m Mrd/Msd=5.16	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9

Dados					Resultados			
Pilar	Seção (cm)	lib vínc esb B	Nd máx Nd mín (tf) ni	MBd topo MBd base	MBsdtopo MBsdcentro MBsdbase	Madtopo Madcentro Madbase	Processo de Cálculo	As b(cm²)
		lih vínc esb H (cm)	Zr	MHd topo MHd base (kgf.m)	MHsdtopo MHsdcentro MHsdbase (kgf.m)	MB2d MBcd		As h
						MH2d MHcd (kgf.m)		% armad
P12	35.00 X 80.00	406.00 RR 40.14	41.37 19.21	2 1	2 1 1	1053 1054 1054 408 5 285 12	(*2) Msd(x) = 2 kgf.m Msd(y) = 7473 kgf.m Mrd(x) = 21 kgf.m Mrd(y) = 69788 kgf.m Mrd/Msd=9.34	9.42 3 ø 20.0 18.85 6 ø 20.0 1.6
P13	19.00 X 60.00	406.00 RR 73.93	11.18 4.35	142 84	142 57 84	225 175 225 349 5 135 4	(*2) Msd(x) = 367 kgf.m Msd(y) = 2176 kgf.m Mrd(x) = 1902 kgf.m Mrd(y) = 11278 kgf.m Mrd/Msd=5.18	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9
P14	19.00 X 60.00	406.00 RR 73.93	38.56 18.11	38 13	38 17 13	777 781 785 1204 42 156 6	(*2) Msd(x) = 2045 kgf.m Msd(y) = 190 kgf.m Mrd(x) = 5361 kgf.m Mrd(y) = 499 kgf.m Mrd/Msd=2.62	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9
P15	25.00 X 60.00	506.00 RR 70.03	62.83 26.53	7 3	7 3 3	1406 1410 1410 2125 64 397 42	(*2) Msd(x) = 3603 kgf.m Msd(y) = 3370 kgf.m Mrd(x) = 13218 kgf.m Mrd(y) = 12363 kgf.m Mrd/Msd=3.67	6.28 2 ø 20.0 15.71 5 ø 20.0 2.1
P16	35.00 X 80.00	406.00 RR 40.14	40.75 18.95	4 2	4 2 2	1035 1038 1037 402 5 278 11	(*2) Msd(x) = 4 kgf.m Msd(y) = 7260 kgf.m Mrd(x) = 37 kgf.m Mrd(y) = 69679 kgf.m Mrd/Msd=9.60	9.42 3 ø 20.0 18.85 6 ø 20.0 1.6
P17	19.00 X 60.00	406.00 RR 73.93	11.48 4.48	104 71	104 42 71	231 196 231 359 4 139 4	(*2) Msd(x) = 335 kgf.m Msd(y) = 2243 kgf.m Mrd(x) = 1730 kgf.m Mrd(y) = 11576 kgf.m Mrd/Msd=5.16	2.45 2 ø 12.5 4.91 4 ø 12.5 0.9

Dados					Resultados			
Pilar	Seção (cm)	lib vínc esb B	Nd máx Nd mín (tf) ni	MBd topo MBd base	MBsdtopo MBsdcentro MBsdbase	Madtopo Madcentro Madbase	Processo de Cálculo	As b(cm²)
		lih vínc esb H (cm)	Zr	MHd topo MHd base (kgf.m)	MHsdtopo MHsdcentro MHsdbase (kgf.m)	MB2d MBcd		As h
						MH2d MHcd (kgf.m)		% armad
P18	35.00 X 80.00	406.00 RR 40.14	40.68 18.93	6 3	6 2 3	1032 1035 1035	(*2) Msd(x) = 6 kgf.m Msd(y) = 7230 kgf.m	9.42 3 ø 20.0 18.85 6 ø 20.0
		506.00 RR 21.88	0.08 0.00 0.00	6410 2911	6410 2682 2911	401 5 277 11	Mrd(x) = 56 kgf.m Mrd(y) = 69657 kgf.m Mrd/Msd=9.64	1.6
P19	19.00 X 60.00	406.00 RR 73.93	9.76 3.66	22 32	22 13 32	197 189 197	(*2) Msd(x) = 509 kgf.m Msd(y) = 742 kgf.m	2.45 2 ø 12.5 4.91 4 ø 12.5
		506.00 RR 29.18	0.05 0.00 0.00	1855 960	1855 742 960	305 3 117 3	Mrd(x) = 3067 kgf.m Mrd(y) = 4469 kgf.m Mrd/Msd=6.02	0.9
P20	19.00 X 60.00	406.00 RR 73.93	22.22 10.75	149 27	149 91 2	448 369 457	(*2) Msd(x) = 1174 kgf.m Msd(y) = 180 kgf.m	6.28 2 ø 20.0 12.57 4 ø 20.0
		406.00 RR 23.41	0.11 0.00 0.00	298 472	235 180 451	694 20 90 2	Mrd(x) = 8080 kgf.m Mrd(y) = 1242 kgf.m Mrd/Msd=6.89	2.2
P21	19.00 X 60.00	506.00 RR 92.15	30.65 14.14	26 16	26 19 10	618 615 624	(*2) Msd(x) = 2742 kgf.m Msd(y) = 1320 kgf.m	2.45 2 ø 12.5 4.91 4 ø 12.5
		406.00 RR 23.41	0.15 0.00 0.00	3002 1202	3002 1320 1202	2065 43 421 12	Mrd(x) = 4582 kgf.m Mrd(y) = 2207 kgf.m Mrd/Msd=1.67	0.9
P22	35.00 X 80.00	406.00 RR 40.14	41.05 19.10	3 1	3 1 1	1044 1046 1046	(*2) Msd(x) = 3 kgf.m Msd(y) = 7401 kgf.m	9.42 3 ø 20.0 18.85 6 ø 20.0
		506.00 RR 21.88	0.08 0.00 0.00	6574 2980	6574 2752 2980	405 5 282 12	Mrd(x) = 25 kgf.m Mrd(y) = 69730 kgf.m Mrd/Msd=9.42	1.6
P23	19.00 X 40.00	406.00 RR 73.93	42.40 13.40	226 177	226 90 177	854 787 854	(*2) Msd(x) = 2264 kgf.m Msd(y) = 139 kgf.m	4.02 2 ø 16.0 8.04 4 ø 16.0
		406.00 RR 35.12	0.31 0.00 0.00	348 259	348 139	1325 61 330	Mrd(x) = 6657 kgf.m Mrd(y) = 409 kgf.m	2.1

Dados					Resultados			
Pilar	Seção (cm)	lib vnc esb B	Nd máx Nd mín (tf) ni	MBd topo MBd base	MBsdtopo MBsdcentro MBsdbase	Madtopo Madcentro Madbase	Processo de Cálculo	As b(cm²)
		lih vnc esb H (cm)	Zr	MHd topo MHd base (kgf.m)	MHsdtopo MHsdcentro MHsdbase (kgf.m)	MB2d MBcd		As h
						MH2d MHcd (kgf.m)		% armad
					259	14	Mrd/Msd=2.94	
P24	19.00 X 40.00	406.00 RR 73.93	70.22 19.43	1 0	0 0 0	1453 1453 1453 2193	(*2) Msd(x) = 3772 kgf.m Msd(y) = 42 kgf.m	4.02 2 ø 16.0 8.04 4 ø 16.0
		406.00 RR 35.12	0.52 0.00 0.00	85 106	85 42 106	125 547 27	Mrd(x) = 6128 kgf.m Mrd(y) = 69 kgf.m Mrd/Msd=1.62	2.1
P25	19.00 X 40.00	406.00 RR 73.93	42.10 13.19	227 177	227 91 177	848 781 848 1315	(*2) Msd(x) = 2246 kgf.m Msd(y) = 98 kgf.m	4.02 2 ø 16.0 8.04 4 ø 16.0
		406.00 RR 35.12	0.31 0.00 0.00	258 210	246 98 204	60 328 13	Mrd(x) = 6701 kgf.m Mrd(y) = 293 kgf.m Mrd/Msd=2.98	2.1
P26	35.00 X 80.00	406.00 RR 40.14	41.17 19.10	12 6	12 5 6	1038 1045 1044	(*2) Msd(x) = 12 kgf.m Msd(y) = 7568 kgf.m	9.42 3 ø 20.0 18.85 6 ø 20.0
		506.00 RR 21.88	0.08 0.00 0.00	6739 3049	6739 2824 3049	406 5 286 12	Mrd(x) = 111 kgf.m Mrd(y) = 69705 kgf.m Mrd/Msd=9.21	1.6
P27	19.00 X 40.00	406.00 RR 73.93	59.93 23.47	193 46	98 63 9	1208 1178 1231	(*2) Msd(x) = 3258 kgf.m Msd(y) = 57 kgf.m	4.02 2 ø 16.0 8.04 4 ø 16.0
		406.00 RR 35.12	0.44 0.00 0.00	141 126	141 57 126	1872 145 467 28	Mrd(x) = 6480 kgf.m Mrd(y) = 112 kgf.m Mrd/Msd=1.99	2.1
P28	19.00 X 40.00	406.00 RR 73.93	63.89 14.01	39 22	39 16 22	1287 1307 1301	(*2) Msd(x) = 3400 kgf.m Msd(y) = 115 kgf.m	4.02 2 ø 16.0 8.04 4 ø 16.0
		406.00 RR 35.12	0.47 0.00 0.00	287 202	287 115 202	1996 82 498 20	Mrd(x) = 6303 kgf.m Mrd(y) = 213 kgf.m Mrd/Msd=1.85	2.1
P29	19.00 X 40.00	406.00 RR 73.93	50.66 19.21	227 58	117 72 6	1021 976 1043	(*2) Msd(x) = 2733 kgf.m Msd(y) = 49 kgf.m	4.02 2 ø 16.0 8.04 4 ø 16.0
		406.00 RR 35.12	0.37 0.00	60 58	60 37	1583 102	Mrd(x) = 6812 kgf.m	

Dados					Resultados			
Pilar	Seção (cm)	lib vínc esb B lih vínc esb H (cm)	Nd máx Nd mín (tf) ni Zr	MBd topo MBd base MHd topo MHd base (kgf.m)	MBsdtopo MBsdcentro MBsdbase MHsdtopo MHsdcentro MHsdbase (kgf.m)	Madtopo Madcentro Madbase MB2d MBcd MH2d MHcd (kgf.m)	Processo de Cálculo	As b(cm ²) As h % armad
			0.00		49 58	394 20	Mrd(y) = 123 kgf.m Mrd/Msd=2.49	2.1
P30	Circ 0.00 X 40.00 0.00	406.00 RR 40.60	95.01 54.89 0.42 0.00 0.00	1928 841 17 13	1928 820 841 16 15 13	1914 1745 1914 1958 141 1958 77	Msd(x) = 820 kgf.m Msd(y) = 4600 kgf.m Mrd(x) = 14986 kgf.m Mrd(y) = 0 kgf.m Mrd/Msd=3.21	18.85 6 ø 20.0 1.5
P31	Circ 0.00 X 40.00 0.00	406.00 RR 40.60	101.62 60.03 0.45 0.00 0.00	1533 678 61 39	1533 649 678 61 24 39	2048 2095 2065 2094 146 2094 91	Msd(x) = 4984 kgf.m Msd(y) = 24 kgf.m Mrd(x) = 14835 kgf.m Mrd(y) = 0 kgf.m Mrd/Msd=2.98	18.85 6 ø 20.0 1.5
P32	35.00 X 80.00	406.00 RR 40.14 506.00 RR 21.88	41.20 19.25 0.08 0.00 0.00	186 134 5754 2651	186 75 134 5754 2392 2651	864 976 917 406 6 261 10	(*2) Msd(x) = 186 kgf.m Msd(y) = 6584 kgf.m Mrd(x) = 1943 kgf.m Mrd(y) = 68682 kgf.m Mrd/Msd=10.43	9.42 3 ø 20.0 18.85 6 ø 20.0 1.6
P33	14.00 X 30.00	506.00 RR 125.05 406.00 RR 46.83	5.31 3.02 0.07 0.00 0.00	43 26 410 259	43 17 26 410 164 259	86 65 86 389 7 117 3	(*2) Msd(x) = 597 kgf.m Msd(y) = 205 kgf.m Mrd(x) = 1535 kgf.m Mrd(y) = 527 kgf.m Mrd/Msd=2.57	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P34	14.00 X 30.00	506.00 RR 125.05 406.00 RR 46.83	10.95 6.65 0.15 0.00 0.00	15 10 914 502	15 6 10 914 366 502	177 162 177 801 26 241 15	(*2) Msd(x) = 1244 kgf.m Msd(y) = 457 kgf.m Mrd(x) = 1686 kgf.m Mrd(y) = 619 kgf.m Mrd/Msd=1.36	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P35	14.00 X 30.00	506.00 RR 125.05 406.00 RR	4.70 2.63 0.06	9 4 409	9 4 4	76 68 76 344	(*2) Msd(x) = 526 kgf.m Msd(y) = 204 kgf.m	2.45 2 ø 12.5 3.68 3 ø 12.5

Dados					Resultados			
Pilar	Seção (cm)	lib	Nd máx Nd mín (tf) ni	MBd	MBsdtopo MBsdcentro MBsdbase	Madtopo	Processo de Cálculo	As b(cm ²) As h % armad
		vínc esb B		MHd		Madcentro		
		lih	Zr	topo	MHsdtopo	Madbase		
		vínc		base	MHsdcentro			
		esb H		(kgf.m)	(kgf.m)			
		(cm)						
		46.83	0.00 0.00	263	409 164 263	4 103 3	Mrd(x) = 1502 kgf.m Mrd(y) = 584 kgf.m Mrd/Msd=2.86	1.8
P36	14.00 X 30.00	506.00 RR 125.05 406.00 RR 46.83	8.41 5.05 0.11 0.00 0.00	29 12 325 230	29 13 12 325 130 230	136 117 136 615 16 185 5	(*2) Msd(x) = 951 kgf.m Msd(y) = 162 kgf.m Mrd(x) = 1698 kgf.m Mrd(y) = 290 kgf.m Mrd/Msd=1.79	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P37	14.00 X 30.00	406.00 RR 100.34 406.00 RR 46.83	0.60 -0.10 0.01 0.00 0.00	295 343 7 7	295 137 343 7 6 4	9 5 9 32 1 13 0	(*2) Msd(x) = 440 kgf.m Msd(y) = 6 kgf.m Mrd(x) = 1472 kgf.m Mrd(y) = 19 kgf.m Mrd/Msd=3.34	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P38	14.00 X 30.00	406.00 RR 100.34 406.00 RR 46.83	0.85 0.10 0.01 0.00 0.00	98 134 10 28	98 54 134 10 10 23	14 7 14 42 1 19 0	(*2) Msd(x) = 185 kgf.m Msd(y) = 29 kgf.m Mrd(x) = 1443 kgf.m Mrd(y) = 224 kgf.m Mrd/Msd=7.80	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P39	14.00 X 30.00	406.00 RR 100.34 406.00 RR 46.83	0.00 -2.05 -0.01 0.00 0.00	75 40 87 36	75 30 40 87 37 36	22 21 22 0 0 0 0	(*2) Msd(x) = 121 kgf.m Msd(y) = 108 kgf.m Mrd(x) = 1193 kgf.m Mrd(y) = 1068 kgf.m Mrd/Msd=9.87	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P40	14.00 X 30.00	406.00 RR 100.34 406.00 RR 46.83	3.72 2.03 0.05 0.00 0.00	244 110 57 43	244 103 110 57 23 43	60 30 60 175 7 82 1	(*2) Msd(x) = 394 kgf.m Msd(y) = 29 kgf.m Mrd(x) = 1575 kgf.m Mrd(y) = 115 kgf.m Mrd/Msd=4.00	2.45 2 ø 12.5 3.68 3 ø 12.5 1.8
P41	19.00 X	506.00 RR 92.15	17.23 8.35	30 13	30 13 13	347 344 347	(*2) Msd(x) = 1532 kgf.m Msd(y) = 553 kgf.m	6.28 2 ø 20.0 15.71

Dados					Resultados			
Pilar	Seção (cm)	lib vínc esb B lih vínc esb H (cm)	Nd máx Nd mín (tf) ni Zr	MBd topo MBd base MHd topo MHd base (kgf.m)	MBsdtopo MBsdcentro MBsdbase MHsdtopo MHsdcentro MHsdbase (kgf.m)	Madtopo Madcentro Madbase MB2d MBcd MH2d MHcd (kgf.m)	Processo de Cálculo	As b(cm²) As h % armad
	60.00	406.00 RR 23.41	0.08 0.00 0.00	1382 721	1382 553 721	1161 14 237 3	Mrd(x) = 8931 kgf.m Mrd(y) = 3223 kgf.m Mrd/Msd=5.83	5 ø 20.0 2.8
P42	19.00 X 60.00	406.00 RR 73.93 406.00 RR 23.41	10.22 5.13 0.05 0.00 0.00	325 286 19 11	325 130 286 19 9 7	206 103 206 326 7 41 0	(*2) Msd(x) = 567 kgf.m Msd(y) = 9 kgf.m Mrd(x) = 9273 kgf.m Mrd(y) = 146 kgf.m Mrd/Msd=16.36	6.28 2 ø 20.0 15.71 5 ø 20.0 2.8

(*) Quantidade de barras alterada pelo usuário (para mais)