NOTE DE CALCUL : FERRAILLAGE DES POTEAUX

Règlement : BAEL 91 révisé 99 **Méthode :** Compression centrée + Flambement	**Béton :** f_{c28} = 25.0 MPa (γ_b = 1.50) **Acier :** f_e = 500 MPa (γ_s = 1.15)	**Longueur de flambement :** $L_f = \beta \times L_0$ (β = 0.70) **Nombre de poteaux analysés :** 126

N° Poteau	Étage	L (m)	A (m)	B (m)	G (kN)	Q (kN)	Nu (kN)	Ns (kN)	As ret. (cm²)
5	Z=2.70m	2.70	0.25	0.50	82.01	26.87	151.02	108.88	**12.50**
6	Z=2.70m	2.70	0.25	0.50	103.51	34.19	191.01	137.69	**12.50**
7	Z=2.70m	2.70	0.25	0.50	153.19	69.95	311.73	223.14	**12.50**
8	Z=2.70m	2.70	0.25	0.50	142.67	60.70	283.65	203.37	**12.50**
9	Z=2.70m	2.70	0.25	0.50	866.90	403.08	1774.94	1269.99	**12.50**
10	Z=2.70m	2.70	0.25	0.50	886.91	422.96	1831.77	1309.87	**12.50**
11	Z=2.70m	2.70	0.35	0.50	241.61	110.79	492.36	352.40	**17.50**
12	Z=2.70m	2.70	0.35	0.50	251.96	115.45	513.32	367.41	**17.50**
14	Z=2.70m	2.70	0.35	0.50	271.22	143.27	581.05	414.49	**17.50**
15	Z=2.70m	2.70	0.20	0.40	582.83	270.84	1193.07	853.66	**8.80**
16	Z=2.70m	2.70	0.25	0.50	938.67	428.29	1909.65	1366.96	**12.50**
17	Z=2.70m	2.70	0.25	0.50	892.15	415.78	1828.07	1307.93	**12.50**
31	Z=2.70m	2.70	0.20	0.40	513.70	218.85	1021.78	732.56	**8.00**
32	Z=2.70m	2.70	0.20	0.40	593.99	296.86	1247.16	890.84	**10.52**
96	Z=5.30m	2.60	0.25	0.45	457.56	159.69	857.25	617.25	**11.25**
97	Z=5.30m	2.60	0.25	0.45	749.77	360.41	1552.81	1110.18	**11.25**
98	Z=5.30m	2.60	0.25	0.45	732.94	364.68	1536.49	1097.62	**11.25**
99	Z=5.30m	2.60	0.25	0.45	744.55	334.05	1506.21	1078.60	**11.25**
100	Z=5.30m	2.60	0.25	0.45	689.70	308.98	1394.56	998.68	**11.25**
101	Z=5.30m	2.60	0.25	0.45	718.21	344.64	1486.55	1062.86	**11.25**
102	Z=5.30m	2.60	0.20	0.40	445.10	208.74	914.00	653.85	**8.00**
103	Z=5.30m	2.60	0.25	0.45	760.35	345.89	1545.31	1106.24	**11.25**

N° Poteau	Étage	L (m)	A (m)	B (m)	G (kN)	Q (kN)	Nu (kN)	Ns (kN)	As ret. (cm²)
104	Z=5.30m	2.60	0.20	0.40	588.07	296.82	1239.12	884.89	**9.84**
105	Z=5.30m	2.60	0.20	0.40	484.77	199.02	952.97	683.79	**8.00**
126	Z=5.30m	2.60	0.25	0.45	369.12	131.65	695.78	500.77	**11.25**
1	Z=7.90m	2.60	0.20	0.45	389.93	149.75	751.03	539.68	**9.00**
2	Z=7.90m	2.60	0.25	0.45	633.76	335.99	1359.57	969.76	**11.25**
3	Z=7.90m	2.60	0.25	0.45	605.15	320.66	1297.94	925.81	**11.25**
4	Z=7.90m	2.60	0.25	0.45	649.26	301.61	1328.92	950.87	**11.25**
13	Z=7.90m	2.60	0.25	0.45	582.08	286.04	1214.87	868.12	**11.25**
18	Z=7.90m	2.60	0.25	0.45	602.95	304.85	1271.25	907.80	**11.25**
19	Z=7.90m	2.60	0.20	0.40	408.24	193.51	841.39	601.75	**8.00**
20	Z=7.90m	2.60	0.25	0.45	679.46	301.66	1369.76	981.12	**11.25**
21	Z=7.90m	2.60	0.20	0.40	577.37	304.76	1236.60	882.14	**9.76**
22	Z=7.90m	2.60	0.20	0.40	403.13	183.51	819.49	586.64	**8.00**
127	Z=7.90m	2.60	0.20	0.45	355.86	133.07	680.02	488.93	**9.00**
251	Z=7.90m	5.20	0.40	0.40	461.84	188.12	905.66	649.96	**16.00**
252	Z=7.90m	5.20	0.40	0.40	662.29	341.47	1406.30	1003.76	**16.00**
253	Z=7.90m	5.20	0.40	0.40	551.11	297.53	1190.29	848.64	**16.00**
254	Z=7.90m	5.20	0.40	0.40	788.88	415.37	1688.04	1204.25	**16.00**
255	Z=7.90m	5.20	0.40	0.40	1020.46	559.89	2217.46	1580.35	**16.00**
256	Z=7.90m	5.20	0.40	0.40	451.95	181.17	881.88	633.12	**16.00**
751	Z=7.90m	5.20	0.35	0.50	915.30	429.86	1880.44	1345.16	**17.50**
752	Z=7.90m	5.20	0.35	0.50	946.34	449.31	1951.52	1395.65	**17.50**
753	Z=7.90m	5.20	0.35	0.50	1027.39	567.21	2237.79	1594.60	**17.50**
257	Z=11.10m	3.20	0.20	0.40	283.24	103.01	536.89	386.25	**8.00**
258	Z=11.10m	3.20	0.20	0.40	346.81	144.19	684.48	491.00	**8.00**
259	Z=11.10m	3.20	0.25	0.40	808.28	447.12	1761.86	1255.40	**17.95**
260	Z=11.10m	3.20	0.25	0.40	623.40	333.14	1341.31	956.55	**10.00**

N° Poteau	Étage	L (m)	A (m)	B (m)	G (kN)	Q (kN)	Nu (kN)	Ns (kN)	As ret. (cm²)
261	Z=11.10m	3.20	0.25	0.40	433.41	240.27	945.51	673.68	**10.00**
262	Z=11.10m	3.20	0.25	0.40	531.60	274.37	1129.21	805.96	**10.00**
263	Z=11.10m	3.20	0.20	0.40	354.47	149.18	702.31	503.65	**8.00**
264	Z=11.10m	3.20	0.25	0.50	715.18	324.06	1451.60	1039.25	**12.50**
265	Z=11.10m	3.20	0.25	0.50	740.61	339.59	1509.20	1080.20	**12.50**
266	Z=11.10m	3.20	0.25	0.50	807.68	449.44	1764.54	1257.12	**12.50**
267	Z=11.10m	3.20	0.20	0.40	466.80	224.13	966.37	690.92	**8.00**
268	Z=11.10m	3.20	0.20	0.40	497.28	257.42	1057.47	754.71	**8.00**
269	Z=11.10m	3.20	0.20	0.40	310.86	118.30	597.12	429.17	**8.00**
270	Z=11.10m	3.20	0.25	0.40	491.88	256.44	1048.69	748.32	**10.00**
271	Z=11.10m	3.20	0.25	0.40	493.31	257.91	1052.84	751.22	**10.00**
272	Z=11.10m	3.20	0.25	0.40	541.43	233.24	1080.80	774.67	**10.00**
273	Z=11.10m	3.20	0.25	0.40	521.53	223.28	1038.98	744.81	**10.00**
274	Z=11.10m	3.20	0.20	0.40	300.53	147.12	626.39	447.64	**8.00**
275	Z=11.10m	3.20	0.20	0.40	439.10	230.38	938.36	669.48	**8.00**
276	Z=11.10m	3.20	0.20	0.40	325.74	150.73	665.84	476.47	**8.00**
24	Z=14.30m	3.20	0.20	0.40	210.06	73.52	393.86	283.58	**8.00**
25	Z=14.30m	3.20	0.20	0.40	258.47	107.91	510.80	366.38	**8.00**
26	Z=14.30m	3.20	0.25	0.40	606.78	333.90	1320.02	940.69	**10.00**
28	Z=14.30m	3.20	0.25	0.40	468.77	250.31	1008.30	719.08	**10.00**
29	Z=14.30m	3.20	0.25	0.40	326.31	179.40	709.62	505.71	**10.00**
30	Z=14.30m	3.20	0.25	0.40	397.40	205.01	844.00	602.40	**10.00**
107	Z=14.30m	3.20	0.25	0.40	264.65	111.32	524.26	375.97	**10.00**
108	Z=14.30m	3.20	0.20	0.50	533.41	249.30	1094.05	782.71	**10.00**
109	Z=14.30m	3.20	0.20	0.50	554.10	262.25	1141.41	816.35	**10.00**
111	Z=14.30m	3.20	0.20	0.50	601.94	333.91	1313.49	935.86	**10.00**
112	Z=14.30m	3.20	0.20	0.40	348.29	163.14	714.90	511.43	**8.00**

N° Poteau	Étage	L (m)	A (m)	B (m)	G (kN)	Q (kN)	Nu (kN)	Ns (kN)	As ret. (cm²)
113	Z=14.30m	3.20	0.20	0.40	377.06	185.90	787.88	562.96	**8.00**
250	Z=14.30m	3.20	0.20	0.40	232.18	85.58	441.81	317.76	**8.00**
366	Z=14.30m	3.20	0.25	0.40	368.22	189.78	781.76	557.99	**10.00**
367	Z=14.30m	3.20	0.25	0.40	368.85	190.05	783.02	558.90	**10.00**
368	Z=14.30m	3.20	0.25	0.40	408.65	185.51	829.95	594.17	**10.00**
369	Z=14.30m	3.20	0.25	0.40	392.21	177.17	795.25	569.39	**10.00**
370	Z=14.30m	3.20	0.20	0.40	217.40	102.11	446.65	319.51	**8.00**
371	Z=14.30m	3.20	0.20	0.40	320.28	168.18	684.65	488.46	**8.00**
372	Z=14.30m	3.20	0.20	0.40	245.83	116.36	506.41	362.19	**8.00**
462	Z=17.50m	3.20	0.20	0.40	139.72	45.07	256.23	184.79	**8.00**
463	Z=17.50m	3.20	0.20	0.40	171.25	71.84	338.95	243.09	**8.00**
464	Z=17.50m	3.20	0.20	0.40	407.22	222.01	882.75	629.22	**8.00**
465	Z=17.50m	3.20	0.20	0.40	312.98	166.60	672.43	479.58	**8.00**
466	Z=17.50m	3.20	0.20	0.40	217.62	118.10	470.94	335.72	**8.00**
467	Z=17.50m	3.20	0.20	0.40	263.35	135.98	559.49	399.33	**8.00**
468	Z=17.50m	3.20	0.20	0.40	174.52	73.84	346.36	248.36	**8.00**
469	Z=17.50m	3.20	0.20	0.45	356.54	175.85	745.10	532.39	**9.00**
470	Z=17.50m	3.20	0.20	0.45	371.03	185.21	778.70	556.24	**9.00**
471	Z=17.50m	3.20	0.20	0.45	402.65	221.40	875.68	624.05	**9.00**
472	Z=17.50m	3.20	0.20	0.40	230.74	101.96	464.45	332.71	**8.00**
473	Z=17.50m	3.20	0.20	0.40	257.04	114.07	518.10	371.11	**8.00**
474	Z=17.50m	3.20	0.20	0.40	154.78	52.99	288.45	207.78	**8.00**
475	Z=17.50m	3.20	0.20	0.40	245.58	126.17	520.80	371.76	**8.00**
476	Z=17.50m	3.20	0.20	0.40	245.39	125.70	519.82	371.09	**8.00**
477	Z=17.50m	3.20	0.20	0.40	273.89	134.47	571.46	408.36	**8.00**
478	Z=17.50m	3.20	0.20	0.40	261.90	128.21	545.88	390.11	**8.00**
479	Z=17.50m	3.20	0.20	0.40	139.42	59.71	277.78	199.13	**8.00**

N° Poteau	Étage	L (m)	A (m)	B (m)	G (kN)	Q (kN)	Nu (kN)	Ns (kN)	As ret. (cm²)
480	Z=17.50m	3.20	0.20	0.40	211.20	111.88	452.94	323.08	**8.00**
481	Z=17.50m	3.20	0.20	0.40	162.71	79.29	338.60	242.00	**8.00**
571	Z=20.70m	3.20	0.20	0.40	70.69	17.16	121.17	87.85	**8.00**
572	Z=20.70m	3.20	0.20	0.40	83.39	35.44	165.74	118.84	**8.00**
573	Z=20.70m	3.20	0.20	0.40	210.82	111.06	451.19	321.88	**8.00**
574	Z=20.70m	3.20	0.20	0.40	157.51	82.00	335.64	239.51	**8.00**
575	Z=20.70m	3.20	0.20	0.40	109.55	56.03	231.94	165.58	**8.00**
576	Z=20.70m	3.20	0.20	0.40	130.45	66.21	275.43	196.66	**8.00**
577	Z=20.70m	3.20	0.20	0.40	86.73	36.95	172.51	123.68	**8.00**
578	Z=20.70m	3.20	0.20	0.40	183.03	103.78	402.77	286.81	**8.00**
579	Z=20.70m	3.20	0.20	0.40	189.95	108.91	419.79	298.86	**8.00**
580	Z=20.70m	3.20	0.20	0.40	208.35	111.54	448.59	319.89	**8.00**
581	Z=20.70m	3.20	0.20	0.40	113.44	40.52	213.92	153.96	**8.00**
582	Z=20.70m	3.20	0.20	0.40	137.78	41.63	248.45	179.41	**8.00**
583	Z=20.70m	3.20	0.20	0.40	77.68	20.36	135.42	98.05	**8.00**
584	Z=20.70m	3.20	0.20	0.40	124.66	63.01	262.80	187.67	**8.00**
585	Z=20.70m	3.20	0.20	0.40	123.86	61.61	259.62	185.47	**8.00**
586	Z=20.70m	3.20	0.20	0.40	139.64	83.65	313.98	223.29	**8.00**
587	Z=20.70m	3.20	0.20	0.40	133.56	80.00	300.31	213.56	**8.00**
588	Z=20.70m	3.20	0.20	0.40	61.98	17.30	109.61	79.27	**8.00**
589	Z=20.70m	3.20	0.20	0.40	110.16	60.26	239.10	170.42	**8.00**
590	Z=20.70m	3.20	0.20	0.40	77.52	40.66	165.64	118.18	**8.00**
743	Z=22.45m	1.75	0.20	0.40	-21.34	-21.09	-60.44	-42.43	**8.00**

Rappels réglementaires et formules de calcul (BAEL 91 révisé 99) :

- **Combinaisons d'actions :** $N_u = 1.35 \times G + 1.50 \times Q$ (ELU) | $N_{ser} = G + Q$ (ELS)
- **Élancement et Flambement :** $L_f = 0.70 \times L_0$ | $\lambda = L_f \sqrt{12} / a \leq 70$ | $\alpha = 0.85 / [1 + 0.2(\lambda/35)^2]$ si $\lambda \leq 50$
- **Section d'acier théorique :** $A_{calc} = [(N_{u,maj} / \alpha) - (B_r \times f_{c28} / 0.9\gamma_b)] / (f_e / \gamma_s)$ avec $B_r = (a - 0.02) \times (b - 0.02)$
- **Dispositions constructives :** $A_{min,1} = 4 \times u$ (cm²), $A_{min,2} = 0.2\% \times B$, $A_{min,3} = 1\% \times B$, $A_{max} = 4\% \times B_r$ | $A_{ret} = \min[\max(A_{calc}, A_{min}), A_{max}]$