Betongegnekaper:

$f_{ck} := 30$ $\gamma_c := 1.5$ $f_{cd} := 17\ \boldsymbol{MPa}$

Stålegnekaper:

$f_{yk} := 500\ \boldsymbol{MPa}$ $\gamma_s := 1.15$ $f_{yd} := 434\ \boldsymbol{MPa}$

$ø := 16\ \boldsymbol{mm}$

Geometri:

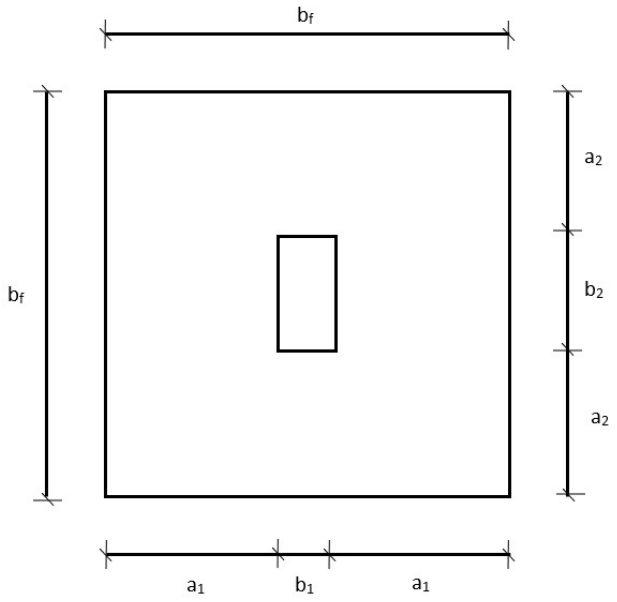
$b_f := 3300\ \boldsymbol{mm}$ $b_1 := 300\ \boldsymbol{mm}$ $b_2 := 800\ \boldsymbol{mm}$

$a_1 := 1500\ \boldsymbol{mm}$ $a_2 := 1250\ \boldsymbol{mm}$ $h := 600\ \boldsymbol{mm}$

$c_{min.dev} := 35\ \boldsymbol{mm}$ $\Delta c_{dev} := 10\ \boldsymbol{mm}$

$c_{nom} := c_{min.dev} + \Delta c_{dev} = 45\ \boldsymbol{mm}$ (EC2, 4.4.1.1)

$d := h - c_{nom} - \frac{ø}{2} = 547\ \boldsymbol{mm}$



Laster:

$L := 7.2\ m \qquad \gamma_g := 1.2 \qquad \gamma_q := 1.5$

$g_{k.dekke} := 6.25\ \frac{kN}{m^2}$

$g_{d.dekke} := g_{k.dekke} \cdot \gamma_g \cdot 4 = 30\ \frac{kN}{m^2}$

$q_{k.dekke} := 2\ \frac{kN}{m^2}$

$q_{d.dekke} := q_{k.dekke} \cdot \gamma_q \cdot 3 = 9\ \frac{kN}{m^2}$

$S_k := 3.16\ \frac{kN}{m^2}$

$S_d := S_k \cdot \gamma_q = 4.74\ \frac{kN}{m^2}$

$q_d := \frac{\left(g_{d.dekke} + q_{d.dekke} + S_d\right) \cdot L}{2} = 157.5\ \frac{kN}{m}$

$G_{k.vegg} := 13.75\ \frac{kN}{m}$

$G_{d.vegg} := G_{k.vegg} \cdot \gamma_g \cdot 3 = 49.5\ \frac{kN}{m}$

$G_{k.søyle} := 15.99\ kN$

$G_{d.søyle} := G_{k.søyle} \cdot \gamma_g = 19.2\ kN$

Opplagerkrefter:

$L_1 := 2\ m \qquad L_2 := 7.4\ m \qquad L_3 := 4.6\ m$

$A := \left(q_d + G_{d.vegg}\right) \cdot L_1 + \frac{\left(q_d + G_{d.vegg}\right) \cdot L_2}{2} = 1180\ kN$

$B := \frac{\left(q_d + G_{d.vegg}\right) \cdot L_2}{2} + \frac{5}{8} \cdot \left(q_d + G_{d.vegg}\right) \cdot L_3 = 1361\ kN$

$C := \frac{3}{8} \cdot \left(q_d + G_{d.vegg}\right) \cdot L_3 = 357\ kN$

$N_{Ed} := B + G_{d.søyle} = 1380\ kN$

Eksentrisk belastet søylefundament:

$\sigma_{gd} := 400 \ \frac{kN}{m^2}$

$b_0 := \sqrt{\frac{N_{Ed}}{\sigma_{gd}}} = 1.857 \ m$ (Sørensen, (4.2.7))

$e := \frac{b_f - b_0}{2} = 0.721 \ m$ (Sørensen, (4.2.6))

$M_{Ed} := N_{Ed} \cdot e = 995 \ kN \cdot m$

$M_{Rd} := 0.275 \cdot f_{cd} \cdot b_f \cdot d^2 = 4616 \ kN \cdot m$

$M_{Rd} > M_{Ed}$ Gir tilstrekkelig kapasitet

Armering:

$z := \left(1 - 0.17 \cdot \left(\frac{M_{Ed}}{M_{Rd}}\right)\right) \cdot d = 526.9 \ mm$ (Sørensen, (4.3.5))

$A_s := \frac{M_{Ed}}{f_{yd} \cdot z} = 4352.4 \ mm^2$ (Sørensen, (4.3.6))

$b_f < 5 \ b_2$ Gir jevnt fordelt armering i y-retning (Sørensen, Figur 4.3.8)

$b_f > b_1$ Gir ikke jevnt fordelt armering i x-retning (Sørensen, Figur 4.3.8)

Armering y-retning:

$n := \frac{A_s}{\pi \cdot \left(\frac{\phi}{2}\right)^2} = 21.6$ $s := \frac{b_f}{n} = 152.445 \ mm$ Velger ø16c150

Armering x-retning:

$A_{s.midtre} := \frac{2}{3} A_s = 2901.6 \ mm^2$ (Sørensen, Figur 4.3.8)

$n := \frac{A_{s.midtre}}{\pi \cdot \left(\frac{\phi}{2}\right)^2} = 14.4$ $s := \frac{\frac{b_f}{2}}{n} = 114.334 \ mm$ Velger ø16c110

$A_{s.ytre} := \frac{A_s}{6} = 725.4 \ mm^2$ (Sørensen, Figur 4.3.8)

$n := \frac{A_{s.ytre}}{\pi \cdot \left(\frac{\phi}{2}\right)^2} = 3.6$ $s := \frac{\frac{b_f}{4}}{n} = 228.7 \ mm$ Velger ø16c225

Gjennomlokking:

$V_{Ed} := N_{Ed} = 1380\ kN$ $M_{Ed} = 995\ kN \cdot m$

$d_{eff} := h - c_{nom} - \phi = 539\ mm$ $g_{fundament} := 15\ \frac{kN}{m^2}$

$\sigma_d := \sigma_{gd} - g_{fundament} = 385\ \frac{kN}{m^2}$

$c_1 := b_1 = 300\ mm$ $c_2 := b_2 = 800\ mm$

$$k := 1 + \sqrt{\frac{200}{539}} = 1.609$$

$\rho_l := 0.0035$

$$V_{Rd.c} := \frac{0.18}{\gamma_c} \cdot k \cdot \left(100\ \rho_l \cdot f_{ck}\right)^{\frac{1}{3}} = 0.423$$

0.5d:

$a := 0.5 \cdot d_{eff} = 269.5\ mm$

$u_{0.5d} := 2\ \left(c_1 + c_2\right) + 2\ \pi \cdot a = 3893.318\ mm$

$A_{0.5d} := c_1 \cdot c_2 + 2 \cdot c_1 \cdot a + 2 \cdot c_2 \cdot a + \pi \cdot a^2 = 1061074.66\ mm^2$

$$W_{0.5d} := \frac{{c_1}^2}{2} + c_1 \cdot c_2 + 2 \cdot c_2 \cdot a + 4 \cdot a^2 + a \cdot \pi \cdot c_1 = 1.261\ m^2$$

$k := 0.45$

$$\beta := 1 + k \cdot \frac{M_{Ed}}{V_{Ed}} \cdot \frac{u_{0.5d}}{W_{0.5d}} = 2.002$$

$$V_{Ed.c.u0.5d} := \beta \cdot \frac{V_{Ed}}{u_{0.5d} \cdot d_{eff}} = 1.317\ \frac{N}{mm^2}$$

$$V_{Rd.c.u0.5d} := V_{Rd.c} \cdot \frac{2 \cdot d_{eff}}{a} \cdot \frac{N}{mm^2} = 1.691\ \frac{N}{mm^2}$$

$V_{Rd} > V_{Ed}$ Gir tilstrekkelig kapasitet

Avstand fra søyle [d]	Ui [mm]	Ai [mm^2]	Ved [kN]	Wi [m^2]	β	Ved.ui [N/mm^2]	Vrd,c [N/mm^2]	Vrd,c/Ved
2	8973	6,26	1380	7,7	1,38	0,394	0,423	1,07
1,5	7280	4,07	1380	5,0	1,48	0,519	0,564	1,09
1	5587	2,34	1380	2,8	1,64	0,753	0,846	1,12
0,5	3893	1,06	1380	1,3	2,00	1,317	1,691	1,28