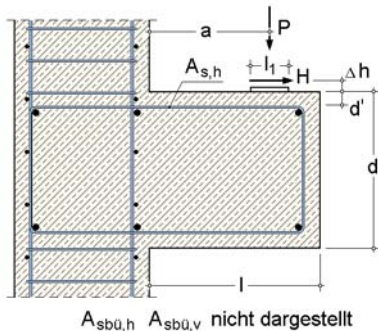


POS. 9: BANDKONSOLE

corbel

design calculation acc. to DIN EN 1992-1-1 (EC 2) / NA: Deutschland (4H-BETON version: 11/2007-4)



Bandkonsole (direct load introduction)

corbel section

length $l = 35.0$ cm height $d = 35.0$ cm

bearing plate: length $l_1 = 16.0$ cm

lateral concrete edge cover (for anchorage length) $c_v = 2.0$ cm

reinforcement edge distance

$d' = 5.0$ cm $\Rightarrow h = 30.0$ cm ($z_0 = 27.0$ cm, $z_{P+H} = 28.5$ cm)

load (design calculation values - design loads)

$P_d = 187.0$ kN/m at $a = 20.0$ cm $H_d = 41.0$ kN/m at $\Delta h = 2.0$ cm

method acc. to Heft 525, DAfStb

bearing stress: $\sigma_a = 1.17$ MN/m² $< \sigma_{Rd,max} = 14.45$ MN/m²

verification of shear force: $V_{Ed} = 187.0$ kN/m $< V_{Rd,max} = 1485.0$ kN/m

tensile chord reinf.: $Z = Z_{P+H} = 182.4$ kN/m $\Rightarrow \min A_{s,h} = 4.19$ cm²/m

tensile splitting reinforcement: vertical

$a > 0.5d$ and $V_{Ed} > V_{Rd,ct} = 89.2$ kN/m $\Rightarrow \min A_{sb,u,v} = 3.01$ cm²/m

reinforcem. BSt 500 (A)

concrete C30/37

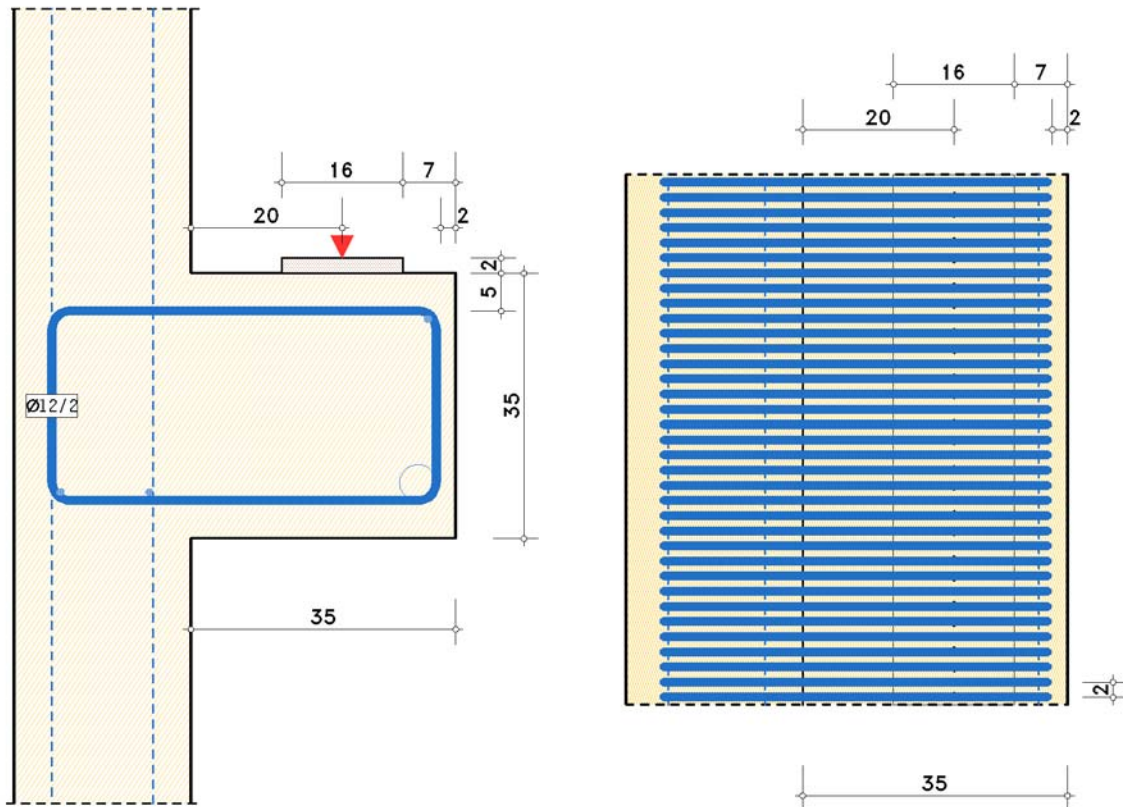
material safety $\gamma_s = 1.15$, $\gamma_c = 1.50$

selected: tensile chord reinf. $A_{s,h} : \varnothing 12 / 2 = 56.5$ cm²/m > 4.19 cm²/m
 anchorage length from $A_{s,h}$: $\min l_b = 8.5$ cm < 21.0 cm
 from column-sided bearing plate edge towards corbel edge (lateral concrete cover 2.0 cm)
 tensile splitting reinforcement $A_{sb,u,h} : \varnothing 8 / 3 = 16.8$ cm²/m

reinforcement drawing:

scale 1 : 10

plan view:



min dbr = 4.8 cm, tensile splitting reinforcement not sketched

material properties

concrete	f_{ck}	α	ϵ_{c2}	ϵ_{c2u}	n_c	E_{cm}	f_{ctm}
	MN/m ²	-	‰	‰	-	MN/m ²	MN/m ²
C30/37	30.0	0.850	-2.00	-3.50	2.00	32836.6	2.896

design value of compression strength $f_{cd} = \alpha_c f_{ck} / \gamma_c$
 strain at reaching the maximum strength ϵ_{c2} , ult. compr. strain ϵ_{c2u}
 concr. comp. stress $\sigma_c = f_{cd} (1 - (\epsilon_c / \epsilon_{c2})^n)$ for $0 \leq \epsilon_c < \epsilon_{c2}$ and $\sigma_c = f_{cd}$ for $\epsilon_c \geq \epsilon_{c2}$
 modulus of elasticity E_{cm} , mean value of axial tensile strength f_{ctm}

reinforcem.	f_{yk}	f_{tk}	ϵ_{su}	E_s
	MN/m ²	MN/m ²	‰	MN/m ²
BSt 500 (A)	500.0	525.0	25.00	200000.0

design yield strength $f_{yd} = f_{yk} / \gamma_s$
 design tensile strength $f_{td} = f_{tk} / \gamma_s$
 ult. tensile strain ϵ_{su} , modulus of elasticity E_s