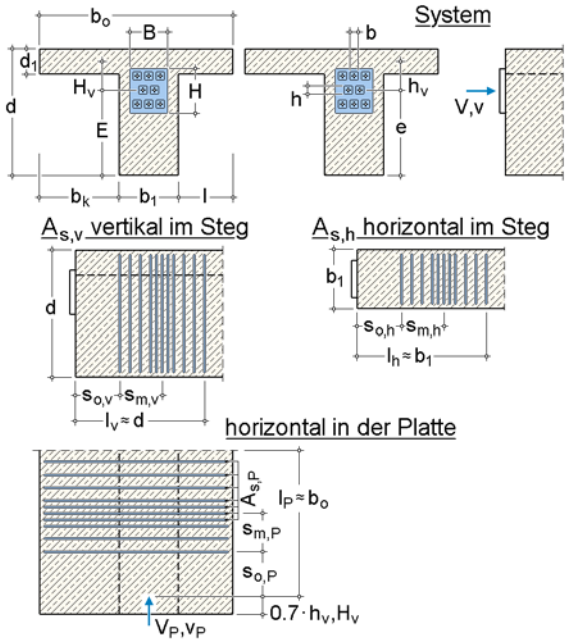
POS. 13: LOAD INTRODUCTION

load introduction

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



variant 1 (F.Leonhardt, T.2)

cross section

heights: d = 120.0 cm d_1 = 25.0 cm

widths : b_K = 65.0 cm b_1 = 170.0 cm l = 65.0 cm

loaded area and design value of point load

b = 25.0 cm h = 25.0 cm e = 55.0 cm v_{Ed} = 1271.0 kN

loaded area and design value of load group

B = 55.0 cm H = 55.0 cm E = 60.0 cm V_{Ed} = 4887.0 kN

design calculation of point load

vertical : tensile force Z_v = 257.8 kN ⇒ $A_{s,v}$ = 5.9 cm²
σ=0 at $s_{0,v}$ = 0.15 m σ_{max} at $s_{m,v}$ = 0.20 m

horizontal: tensile force Z_h = 299.8 kN ⇒ $A_{s,h}$ = 6.9 cm²
σ=0 at $s_{0,h}$ = 0.17 m σ_{max} at $s_{m,h}$ = 0.31 m

slab : tensile force Z_P = 104.1 kN ⇒ $A_{s,P}$ = 2.4 cm²
(h_v=0.52m) σ=0 at $s_{0,P}$ = 0.19 m σ_{max} at $s_{m,P}$ = 0.49 m

design calculation of load group

vertical : tensile force Z_v = 475.8 kN ⇒ $A_{s,v}$ = 10.9 cm²
σ=0 at $s_{0,v}$ = 0.22 m σ_{max} at $s_{m,v}$ = 0.20 m

horizontal: tensile force Z_h = 826.5 kN ⇒ $A_{s,h}$ = 19.0 cm²
σ=0 at $s_{0,h}$ = 0.30 m σ_{max} at $s_{m,h}$ = 0.33 m

slab : tensile force Z_P = 348.7 kN ⇒ $A_{s,P}$ = 8.0 cm²
(H_v=0.47m) σ=0 at $s_{0,P}$ = 0.36 m σ_{max} at $s_{m,P}$ = 0.56 m

minimum reinforcement

⇒ $A_{s,v}$ = 10.9 cm² $A_{s,h}$ = 19.0 cm² $A_{s,P}$ = 8.0 cm²

reinforcem.BSt 500 (B)
material safety γ_s = 1.15

selected:

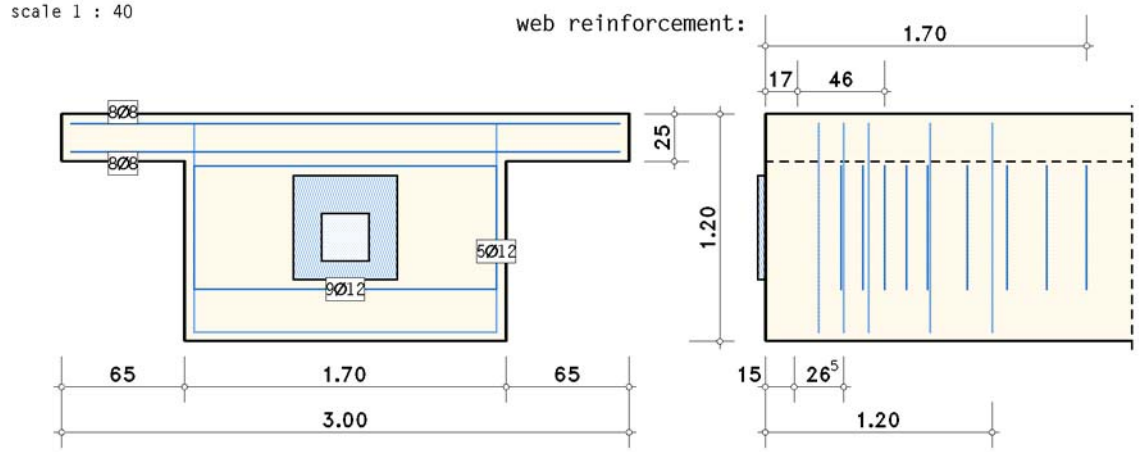
web : $A_{s,v}$: 5 Ø 12 = 2x5.7 = 11.3 cm² > 10.94 cm²
$A_{s,h}$: 9 Ø 12 = 2x10.2 = 20.4 cm² > 19.01 cm²

slab : $A_{s,P}$: 2x8 Ø 8 = 8.0 cm² > 8.02 cm²

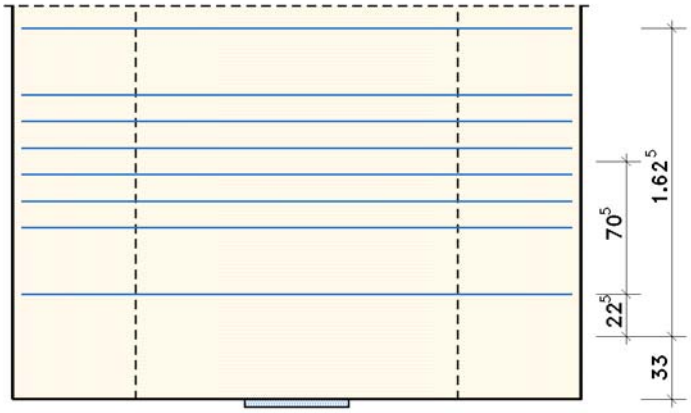
! reinforcement altogether 2-shear !

reinforcement drawing:

scale 1 : 40



slab reinforcement:



material properties

reinforcem.	f_{yk}	f_{tk}	ε_{su}	E_s
	MN/m²	MN/m²	‰	MN/m²
BSt 500 (B)	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