POS. 11: BEARING BRACKET

half joint

variant 1
beam section
width b = 30.0 cm  height d = 60.0 cm
corbel section
length l_k = 30.0 cm  height d_k = 30.0 cm
bearing plate
length l_1 = 10.0 cm  width b_1 = 20.0 cm
lateral concrete cover (for anchorage length) c_v = 3.0 cm
reinforcement edge distances
d^* = 6.0 cm  d^*_k = 4.0 cm (z = 48.6 cm ⇒ z_k = 23.4 cm)
load (design calculation values - design loads)
A_d = 150.0 kN at Δa = 15.0 cm  H_2 = 40.0 kN at Δh = 3.0 cm
with e^* = 8.0 cm ⇒ e = Δa + e^* = 23.0 cm
design calculation acc. to Heft 430, DAFStb
bearing stress: \( \sigma_a = 7.50 \text{ MN/m}^2 \) < \( \sigma_{rd,max} = 11.90 \text{ MN/m}^2 \)
tens. reinf. hor.: \( Z_{A,h} = 199.4 \text{ kN} \Rightarrow \min A_{s,h} = 4.59 \text{ cm}^2 \)
vertical: \( Z_v = 253.4 \text{ kN} \Rightarrow \min A_{s,v} = 5.83 \text{ cm}^2 \)
anchoring of \( A_{s,h} \): \( Z_{v,1} = 66.4 \text{ kN} \Rightarrow \min A_{s,v,1} = 1.53 \text{ cm}^2 \)
at \( z_3 = 36.4 \text{ cm} \)
verification of compression strut in Auflagerknoten:
\( \sigma_a = 7.56 \text{ MN/m}^2 \) (\( \theta_a = 59.5^\circ \)) < zum \( \sigma_a = 11.90 \text{ MN/m}^2 \)
tensile splitting reinforcement: vertical stirrups bew. (A_{sd,h} non-struct.)
\( Z' = 144.7 \text{ kN} \) (\( \theta_a = 59.5^\circ \)) ⇒ \( \min A_{sd,v} = 3.33 \text{ cm}^2 \)
tension anchoring for \( Z_{A,h} = 199.4 \text{ kN} \Rightarrow \min A_{s,h,1} = 4.59 \text{ cm}^2 \)

selected:
horiz. tensile reinf. \( A_{s,h} : 4 \bigcirc 10 = 2x3.1 = 6.3 \text{ cm}^2 > 4.59 \text{ cm}^2 \)
vertical \( A_{s,v} : 4 \bigcirc 10 = 2x3.1 = 6.3 \text{ cm}^2 > 5.83 \text{ cm}^2 \)
anchoring of \( A_{s,h} \): \( A_{s,v,1} : 3 \bigcirc 8 = 2x1.5 = 3.1 \text{ cm}^2 > 1.53 \text{ cm}^2 \)
anchorage length from \( A_{s,h} \): \( \min b_0 = 13.4 \text{ cm} < 17.0 \text{ cm} \)
from beam-sided bearing plate edge towards corbel edge (lateral concrete cover 3.0 cm)
tensile split. reinf. \( As_{d,h} : 3 \bigcirc 8 = 2x1.5 = 3.0 \text{ cm}^2 \)
tension anchoring \( A_{s,h,1} : 5 \bigcirc 8 = 2x2.5 = 5.0 \text{ cm}^2 > 4.59 \text{ cm}^2 \)

reinforcement drawing:
scale 1 : 20

plan view: \( \min d_{br} = 4.0 \text{ cm} \)
<table>
<thead>
<tr>
<th>Material Properties</th>
<th>Concrete</th>
<th>Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f_{ck}$</td>
<td>28.0 MN/m²</td>
<td>500.0 MN/m²</td>
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<tr>
<td>$\alpha$</td>
<td>0.850</td>
<td>-</td>
</tr>
<tr>
<td>$e_{c2}$</td>
<td>-2.00</td>
<td>-</td>
</tr>
<tr>
<td>$e_{c2u}$</td>
<td>-3.50</td>
<td>-</td>
</tr>
<tr>
<td>$n_C$</td>
<td>2.00</td>
<td>500.0</td>
</tr>
<tr>
<td>$E_{cm}$</td>
<td>34000.0 MN/m²</td>
<td>5.00</td>
</tr>
<tr>
<td>$f_{ctn}$</td>
<td>2.766</td>
<td>210000.0</td>
</tr>
</tbody>
</table>

- Design value of compression strength $f_{cd} = \frac{f_{ck}}{\gamma_c}$
- Strain at reaching the maximum strength $e_{c2}$, ult. compr. strain $e_{c2u}$
- Conc. comp. stress $e_C = f_{cd} \left(1-(1-e_{c2}/e_{c2u})^{1/2}\right)$ for $0 \leq e_{c2} \leq e_{c2}$ and $e_c = f_{cd}$ for $e_{c2} > e_{c2} > e_{c2u}$
- Modulus of elasticity $E_{cm}$, mean value of axial tensile strength $f_{ctn}$

- Design yield strength $f_{yd} = \frac{f_{yk}}{\gamma_y}$
- Design tensile strength $f_{td} = \frac{f_{tk}}{\gamma_y}$

- Ult. tensile strain $e_{su}$, modulus of elasticity $E_s$