

$$W = \frac{1}{6} \cdot 0,16 \cdot 0,30^2 = 2400 \cdot 10^{-6} \text{ m}^3$$

$$A = 0,16 \cdot 0,30 = 0,0480 \text{ m}^2$$

$$i_x = 300 \cdot \sqrt{\frac{1}{12}} = 86,60 \text{ mm}$$

Profil 300, TR10 - fiedler c 24

$$f_{\text{cod}} = 0,9 \cdot \frac{27,0}{1,3} = 14,54 \text{ MPa}$$

$$f_{\text{md}} = 0,9 \cdot \frac{24,0}{1,3} = 16,62 \text{ MPa}$$

$$\lambda_{\text{pin}} \lambda = \frac{9330}{86,6} = 107,7$$

$$\lambda_{\text{rel}} = \frac{107,7}{\pi} \cdot \sqrt{\frac{27,0}{7400}} = 1,826$$

$$\lambda = 0,5 \cdot (1 + 0,1 (1,826 - 0,3) + 1,826^2) = 2,243$$

$$\lambda_c = \frac{1}{2,243 + \sqrt{2,243^2 - 1,826^2}} = 0,282$$

Stäbe + smir:

$$\sigma_{\text{cod}} = \frac{14,202 \cdot 10^3}{0,0480} = 0,296 \text{ MPa}$$

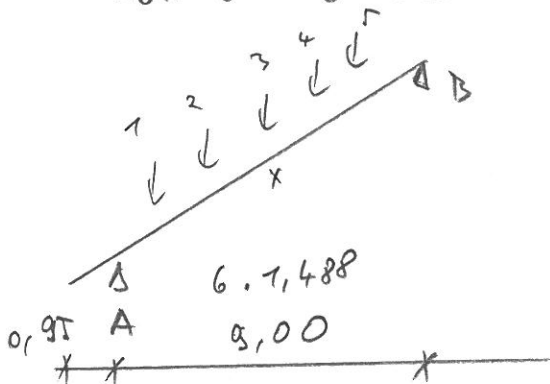
$$\sigma_{\text{md}} = \frac{17,27 \cdot 10^3}{2400 \cdot 10^{-6}} = 7,171 \text{ MPa}$$

$$\frac{0,296}{0,282 \cdot 14,54} + \frac{7,171}{16,62} = 0,072 + 0,429 = 0,501 < 1,0$$

Stäbe + smir + nitr:

$$\sigma_{\text{cod}} = \frac{9,028 \cdot 10^3}{0,0480} = 0,188 \text{ MPa}$$

Narvini! Moke

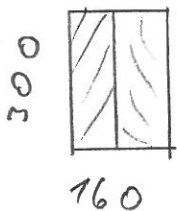


$$P_{1a} = 0,75 \cdot (1,35 \cdot 0,447 + 1,5 \cdot 1,0) = 1,57125 \text{ kN}$$

$$P_{4,2} = 2,25 \cdot 2,095 = 4,714 \text{ kN}$$

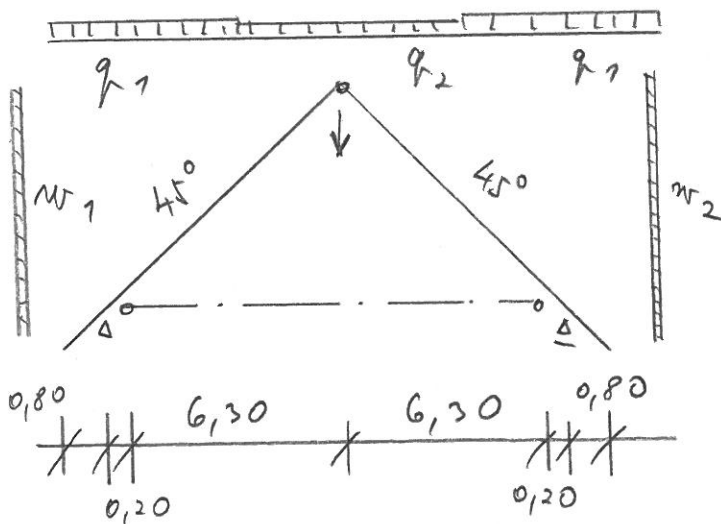
$$P_{\text{sa}} = 2,75 \cdot 2,095 = 5,767 \text{ kN}$$

$$M_{Ed} = M_x = 26,420 \text{ RNm}$$



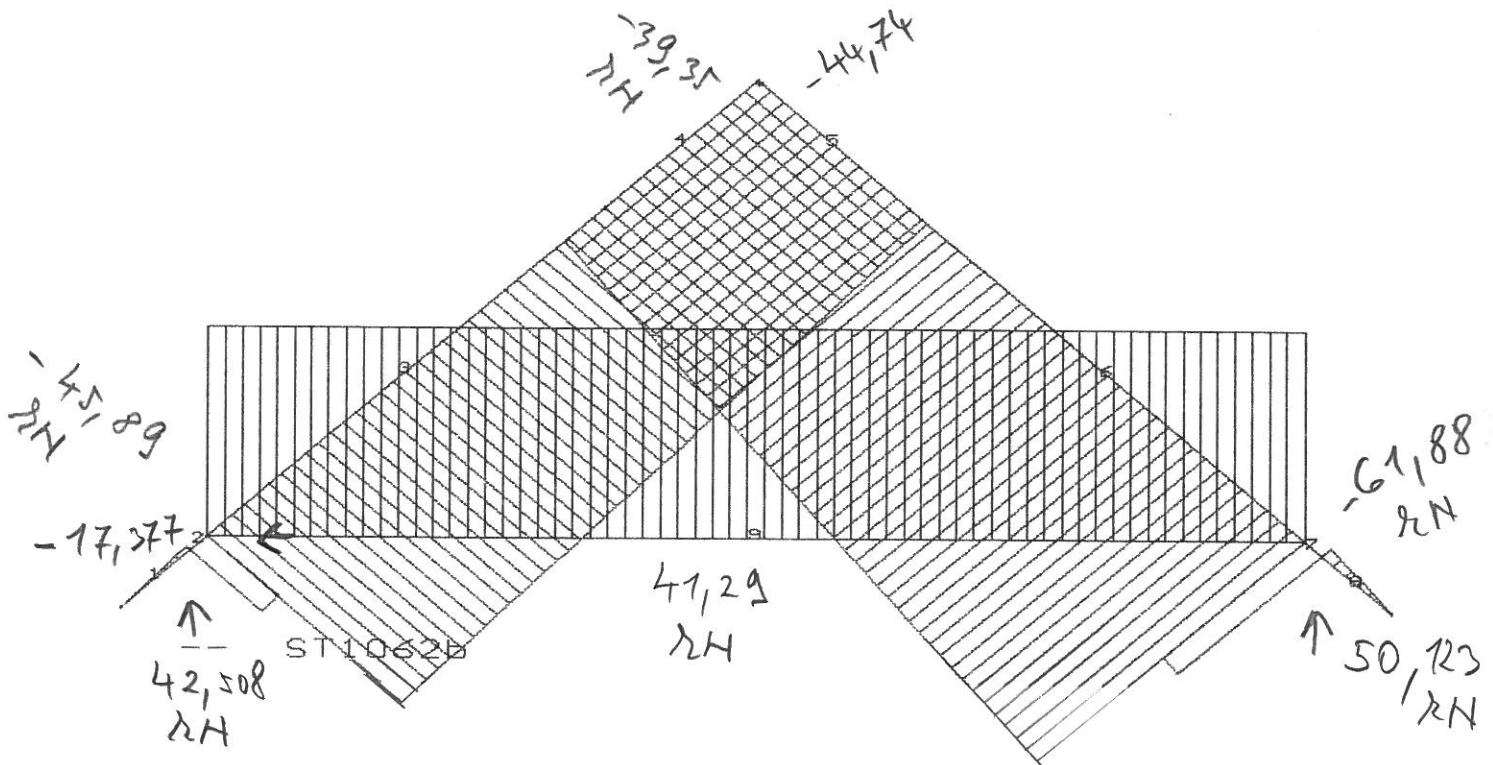
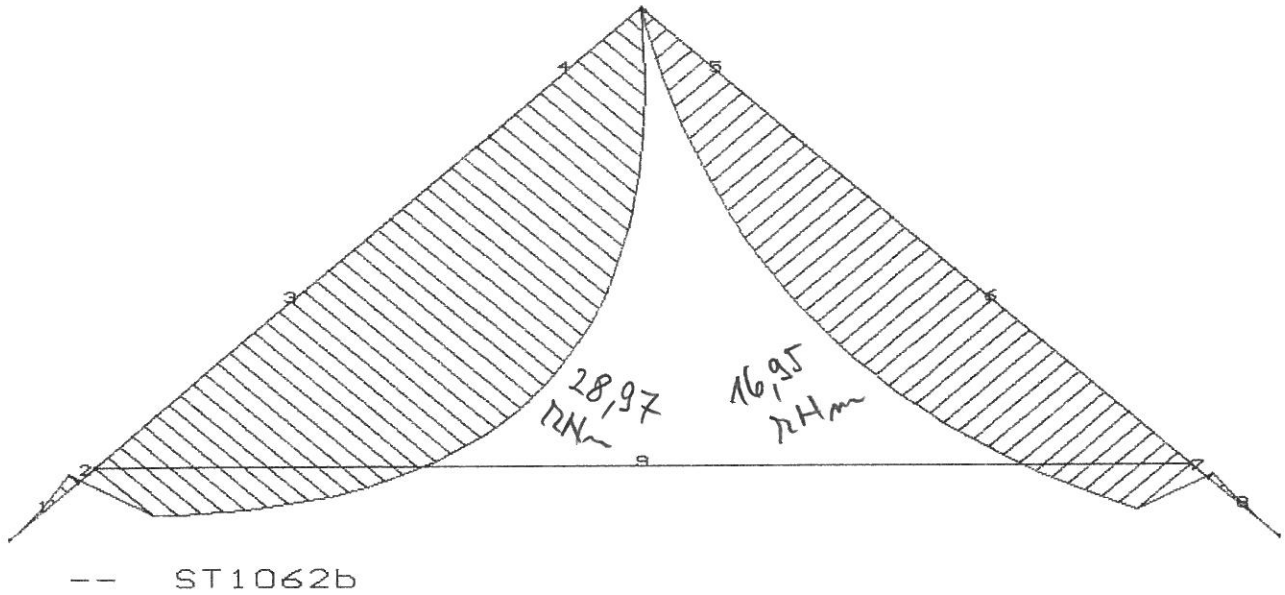
$$\sigma_{md} = \frac{26,420 \cdot 10^3}{2400 \cdot 10^{-6}} = 11,01 \text{ MPa} < f_{md} = 76,62 \text{ MPa}$$

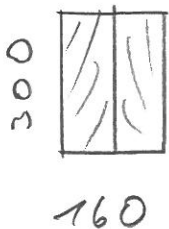
1. raba mo rambu



$$P_d = 4.17,682 = 46,768 \text{ N}$$

Krokov pro valbu → stáčí + smič + nřta x +
valba stáčí a smič





$$1.) \quad \sigma_{c, \sigma, \alpha} = \frac{42,62 \cdot 10^3}{0,0480} = 0,888 \text{ MPa}$$

$$\sigma_{md} = \frac{28,97 \cdot 10^3}{2400 \cdot 10^{-6}} = 12,071 \text{ MPa}$$

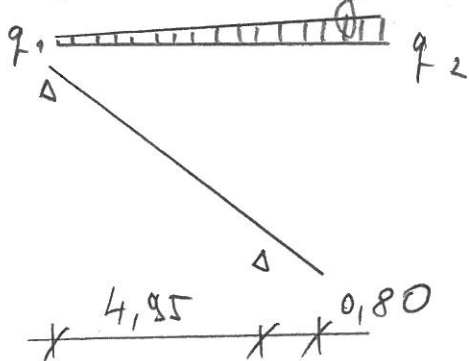
$$\frac{0,888}{0,282 \cdot 14,54} + \frac{12,071}{16,62} = 0,217 + 0,727 = 0,944 < 1,00$$

$$2.) \quad \sigma_{c \sigma \alpha} = \frac{53,37 \cdot 10^3}{0,0480} = 1,111 \text{ MPa}$$

$$\sigma_{md} = \frac{16,95 \cdot 10^3}{2400 \cdot 10^{-6}} = 7,063 \text{ MPa}$$

$$\frac{1,111}{0,282 \cdot 14,54} + \frac{7,063}{16,62} = 0,271 + 0,425 = 0,696 < 1,00$$

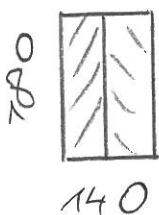
Kontroler abridy:



$$q_{1d} = 1,35 \cdot 0,12 = 0,162 \text{ kN/m}$$

$$q_{2d} = 0,162 + 1,70 \cdot (1,35 \cdot 0,485 + 1,50 \cdot 0,667) = 2,976 \text{ kN/m}$$

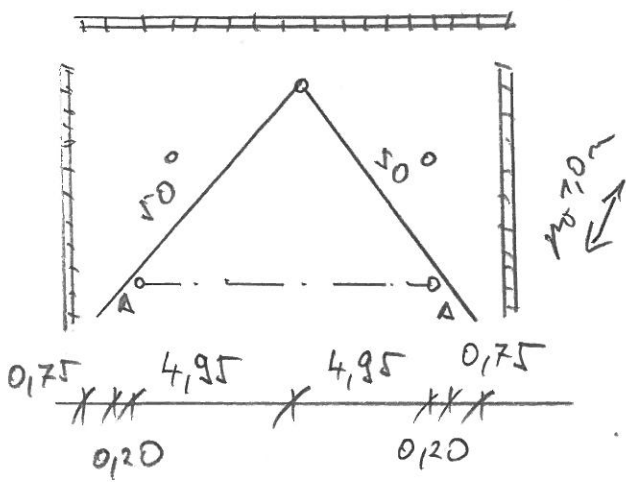
$$M_{Ed} = \frac{1}{15} \cdot 2,976 \cdot 4,95^2 = 4,861 \text{ kNm}$$



$$W = \frac{1}{6} \cdot 0,14 \cdot 0,18^2 = 756 \cdot 10^{-6} \text{ m}^3$$

$$\sigma_{md} = \frac{4,861 \cdot 10^3}{756 \cdot 10^{-6}} = 6,430 \text{ MPa} < f_{md} = 16,62 \text{ MPa}$$

Krovin praveho trojuholníka



stĺček

$$q_d = 1,35 \cdot (1,0 \cdot 0,485 + 0,162) = 0,874 \text{ kN/m'}$$

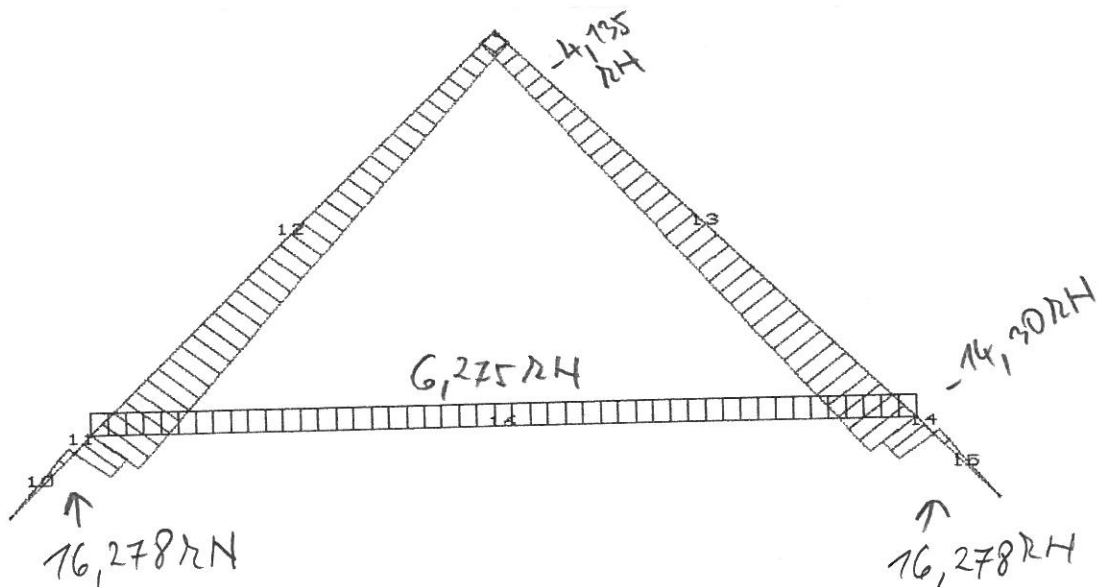
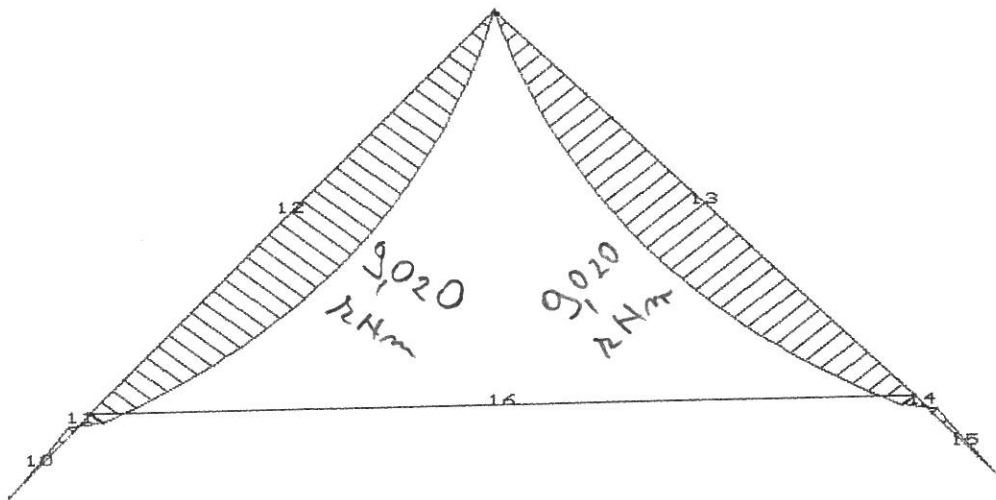
smič

$$s_d = 1,50 \cdot (1,0 \cdot 0,667) = 1,00 \text{ kN/m'}$$

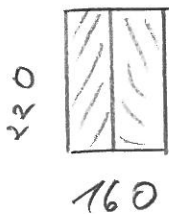
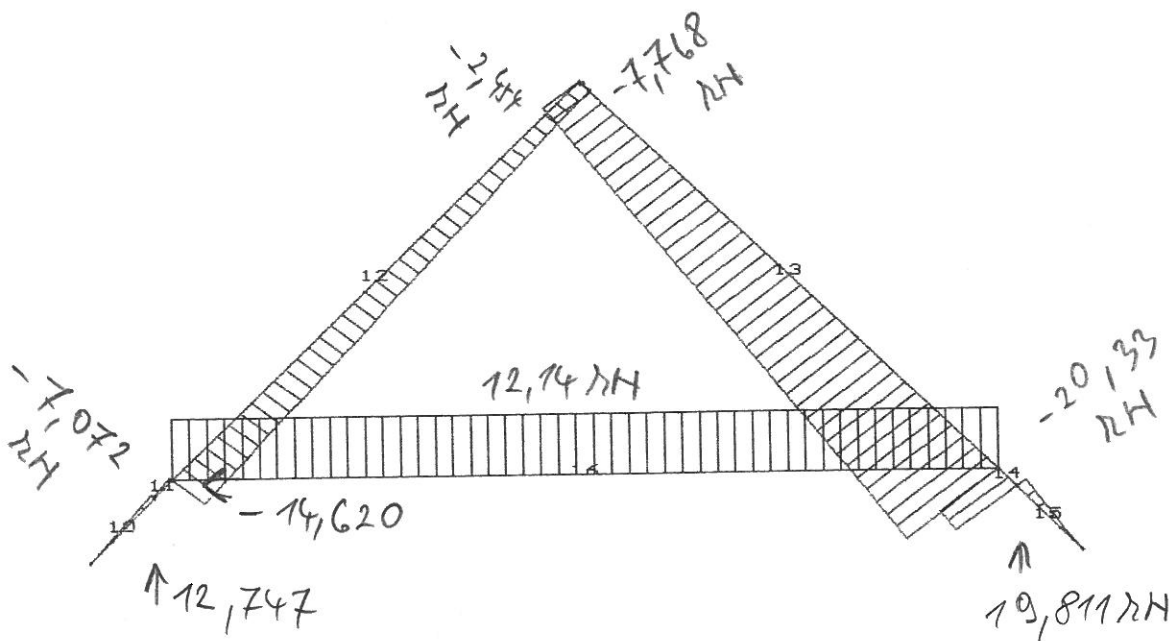
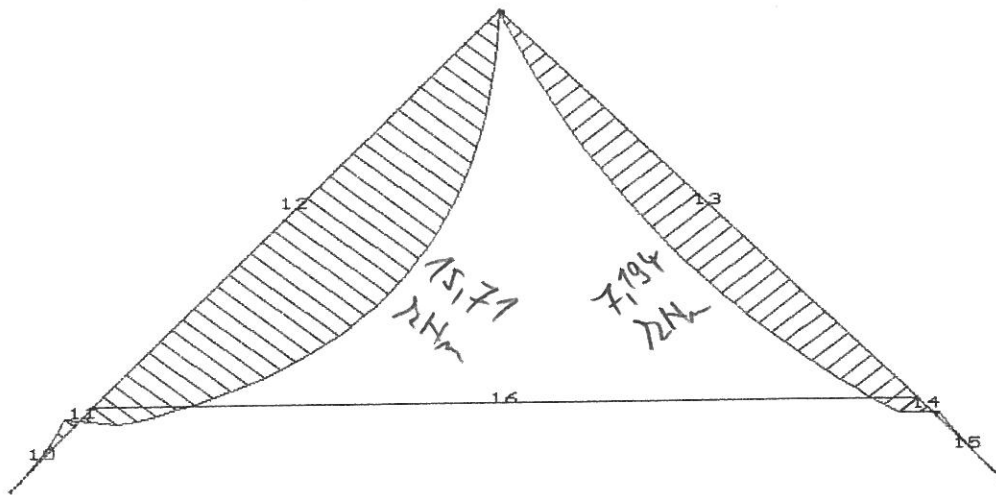
vľavá - tála $w_{1d} = 1,178 \text{ kN/m'}$

sprava - tála $w_{2d} = 0,505 \text{ kN/m'}$

Kombinácia stĺček + smič



Kombinace střeš + směr + vln x (přilíný)



$$W = \frac{1}{6} \cdot 0,16 \cdot 0,22^2 = 1290,7 \cdot 10^{-6} \text{ m}^3$$

$$A = 0,16 \cdot 0,22 = 0,0352 \text{ m}^2$$

$$i_x = 220 \cdot \sqrt{\frac{1}{12}} = 63,51 \text{ mm}$$

$$\lambda_{\text{přilín}} : \lambda = \frac{7750}{63,51} = 122,0$$

$$\lambda_{\text{rel}} = \frac{122,0}{\pi} \cdot \sqrt{\frac{27,0}{7400}} = 2,069$$

$$\lambda = 0,5 \cdot (1 + 0,7 \cdot (2,069 - 0,3) + 2,069^2) = 2,729$$

$$\lambda_c = \frac{1}{2,729 + \sqrt{2,729^2 - 2,069^2}} = 0,222$$

stabil + smir:

$$\sigma_{cod} = \frac{9,218 \cdot 10^3}{0,0352} = 0,262 \text{ MPa}$$

$$\sigma_{md} = \frac{9,020 \cdot 10^3}{1290,7 \cdot 10^{-6}} = 6,988 \text{ MPa}$$

$$\frac{0,262}{0,222 \cdot 14,54} + \frac{6,988}{16,62} = 0,081 + 0,421 = 0,502 < 1,00$$

stabil + smir + nitr

$$1.) \sigma_{cod} = \frac{4,763 \cdot 10^3}{0,0352} = 0,135 \text{ MPa}$$

$$\sigma_{md} = \frac{15,71 \cdot 10^3}{1290,7 \cdot 10^{-6}} = 12,172 \text{ MPa}$$

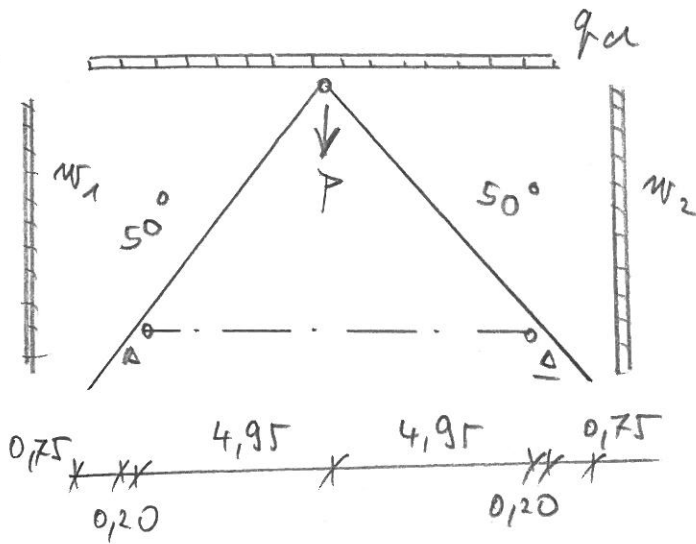
$$\frac{0,135}{0,222 \cdot 14,54} + \frac{12,172}{16,62} = 0,042 + 0,732 = 0,774 < 1,00$$

$$2.) \sigma_{cod} = \frac{14,049 \cdot 10^3}{0,0352} = 0,399 \text{ MPa}$$

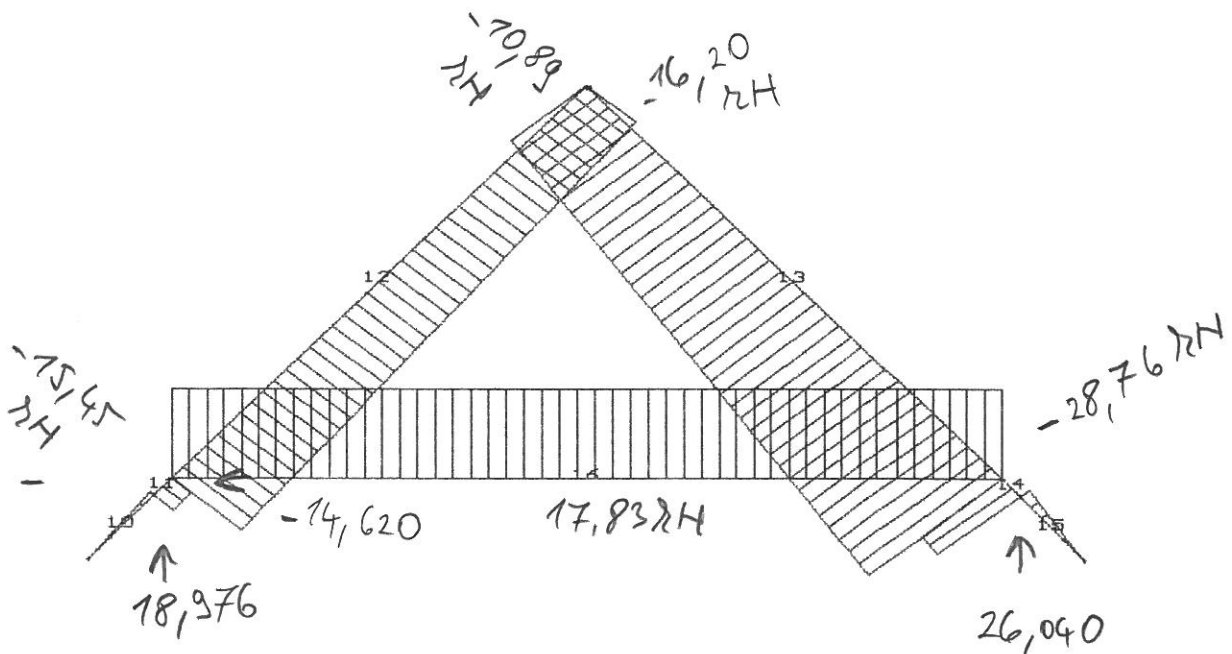
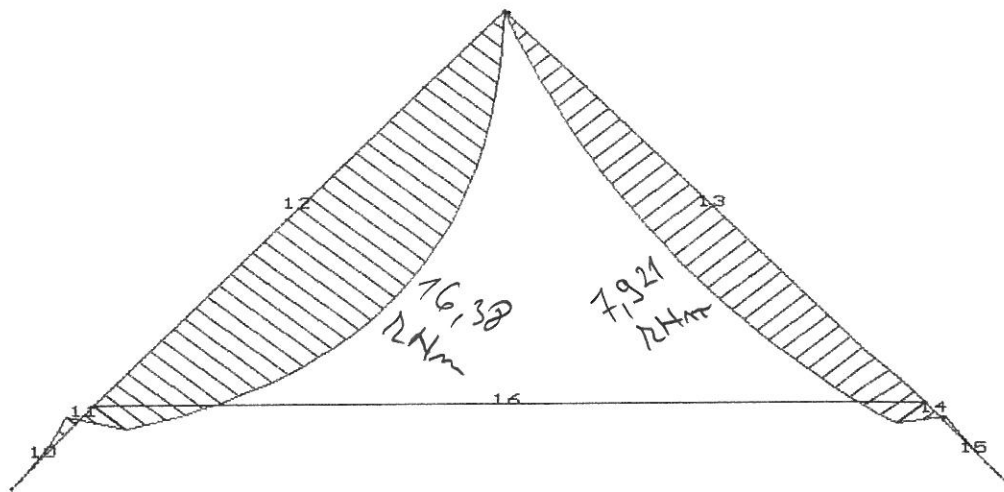
$$\sigma_{md} = \frac{7,194 \cdot 10^3}{1290,7 \cdot 10^{-6}} = 5,574 \text{ MPa}$$

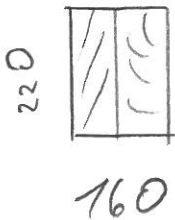
$$\frac{0,399}{0,222 \cdot 14,54} + \frac{5,574}{16,62} = 0,124 + 0,335 = 0,459 < 1,00$$

Knoten pro Rollen



$$P_{d1} = (0,5 \cdot \pi \cdot 2,4^2 - 0,5 \cdot 2 \cdot 2,4) \cdot 1,874 = 12,458 \text{ kN}$$





$$1.) \quad \sigma_{\text{cod}} = \frac{13,17 \cdot 10^3}{0,0352} = 0,374 \text{ MPa}$$

$$\sigma_{\text{mat}} = \frac{16,38 \cdot 10^3}{1290,7 \cdot 10^{-6}} = 12,697 \text{ MPa}$$

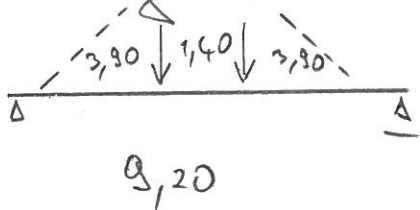
$$\frac{0,374}{0,222 \cdot 14,54} + \frac{12,697}{16,62} = 0,116 + 0,764 = 0,880 < 1,0$$

$$2.) \quad \sigma_{\text{cod}} = \frac{22,48 \cdot 10^3}{0,0352} = 0,639 \text{ MPa}$$

$$\sigma_{\text{mat}} = \frac{7,927 \cdot 10^3}{1290,7 \cdot 10^{-6}} = 6,137 \text{ MPa}$$

$$\frac{0,639}{0,222 \cdot 14,54} + \frac{6,137}{16,62} = 0,198 + 0,369 = 0,567 < 1,0$$

Normierung pro Lastmeteron rechteck



$$g_d = 0,25 \cdot 1,35 = 0,3375 \text{ kN/m}$$

$$P_d (\text{Gulbung/ocklast}) = 9,12 \text{ kN}$$

$$M_{\text{Ed}} = 0,125 \cdot 0,3375 \cdot 9,20^2 + 3,90 \cdot 9,12 = 39,139 \text{ kNm}$$

I 220 $W = 278 \cdot 10^{-6} \text{ m}^3$

$$M_{\text{Gpd}} = 278 \cdot 10^{-6} \cdot 273,6 \cdot 10^6 = 59,380 \text{ kNm} > M_{\text{Ed}}$$

Tabla normi

Ø 20 mm

$$A = 374,2 \text{ mm}^2$$

$$N_{t, \text{red}} = 374,2 \cdot 10^{-6} \cdot 273,6 \cdot 10^6 = 67,113 \text{ kN}$$

$$> 10,21 \text{ kN}$$

$$17,16 \text{ kN}$$

$$41,29 \text{ kN}$$

$$6,275 \text{ kN}$$

$$12,14 \text{ kN}$$

$$17,83 \text{ kN}$$

Stávající konstrukce → nová střešní je lehká
než přivádí s tažkovou kytinou, nad hlavní
loží nebude obrovský dřevný trámový skelet.
Stávající konstrukce vyhovuje pro vybudování
nové střechy.

Varianty tažky 7 lara 1 x 19 Ø 3,15

$$N_{t, \text{red}} = 19 \cdot 7,79 \cdot 10^{-6} \cdot 969,2 \cdot 10^6 = 143,457 \text{ kN}$$