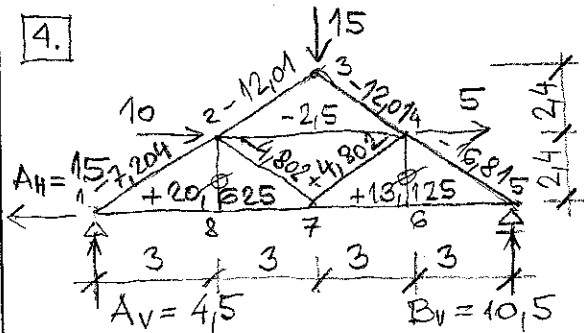
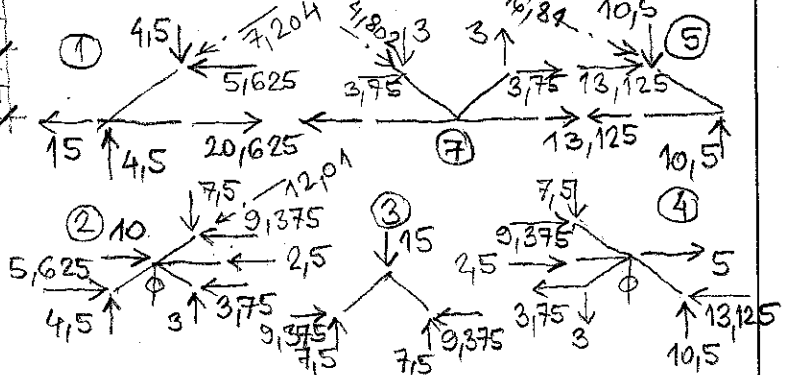


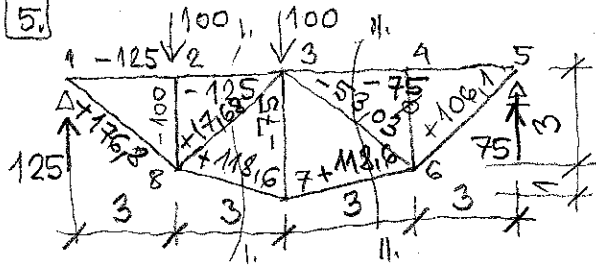
4.



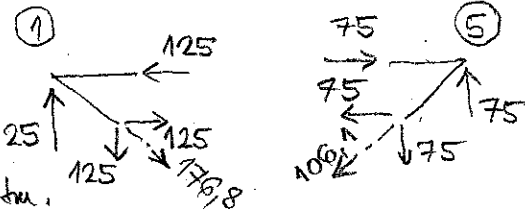
$$A_v = \frac{15 \cdot 6 - 15 \cdot 2,4}{12} = 4,5 \text{ kN} ; B_v = 10,5 \text{ kN}$$



5.

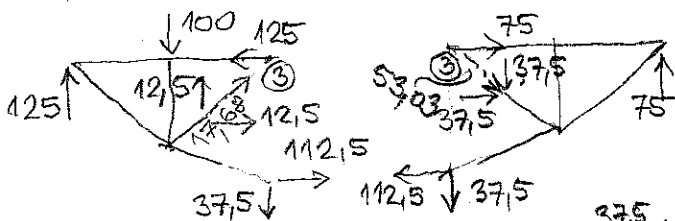


$$B = \frac{200 \cdot 4,5}{12} = 75 \text{ kN} ; A = 125 \text{ kN}$$



I.-I. átvetszés

II.-II. átv.



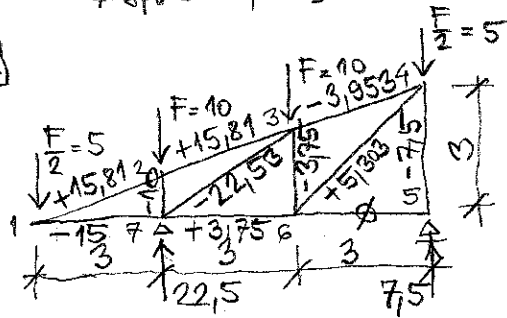
$$\sum M_{(3)} = 0 = -75 \cdot 6 + S_{6-7,H} \cdot 4$$

$$\left. \begin{aligned} S_{6-7,H} &= 112,5 \\ S_{6-7,V} &= 37,5 \end{aligned} \right\} S_{6-7} = 118,6$$

$$\sum M_{(3)} = 0 = 125 \cdot 6 - 100 \cdot 3 - S_{7-8,H} \cdot 4$$

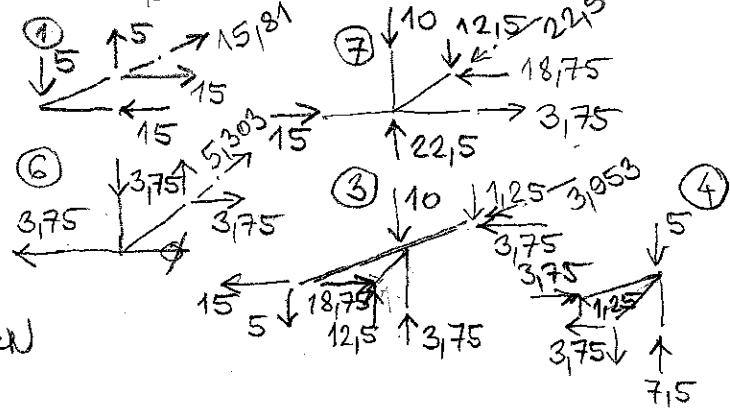
$$\left. \begin{aligned} S_{7-8,H} &= 112,5 \\ S_{7-8,V} &= 37,5 \end{aligned} \right\} S_{7-8} = 118,6$$

6.



F = 10 kN teherből keletkező rúderek:

$$A = \frac{30 \cdot 4,5}{6} = 22,5 \text{ kN} ; B = 7,5 \text{ kN}$$



$F = ?$ ha $|S_{max}| = 30 \text{ kN}$

$$|S_{max}| = 22,53 \text{ kN } 10 \text{ kN teherből}$$

$$F_{max} = \frac{30}{22,53} \cdot 10 = 13,32 \text{ kN}$$



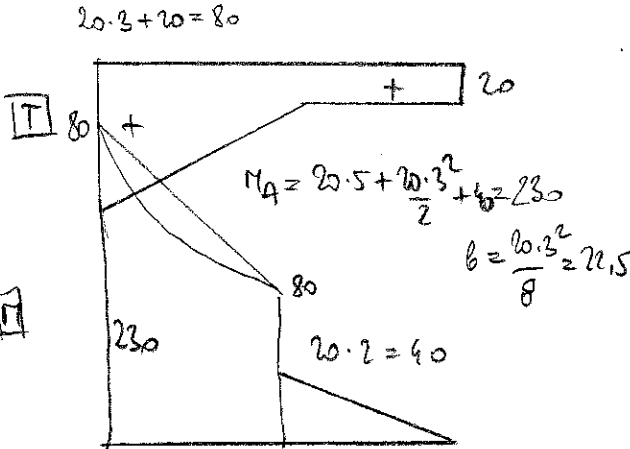
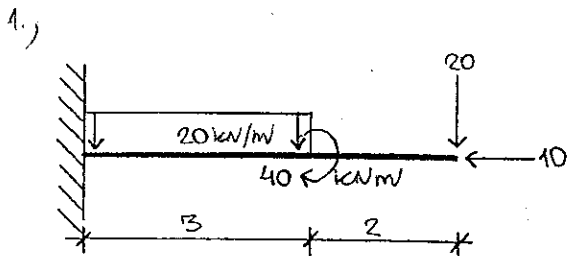
Egyenes és törtengelyű tartók belsőerő ábrái

ZH1/1 2000.11.03. 10¹⁵-12⁰⁰

„B” csoport

Az adatok kN, m, kNm, kN/m dimenzióban vannak megadva.

1.-4.) Rajzolja meg az alábbi tartók részletesen kótázott belsőerő ábráit. Ügyeljen az arányhelyes ábrázolásra, a törések, ugrások, szélsőértékek, belógások kiszámítására és az ábrákon való feltüntetésére. A szükséges rész számításokat dokumentálni kell, enélkül a jó eredmény sem fogadható el.



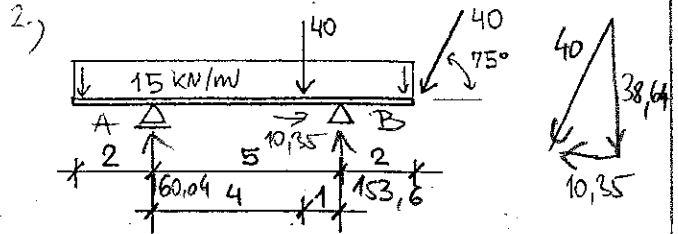
$$M_A = \frac{15 \cdot 2^2}{2} = 30 \quad b = \frac{30}{4} = 7,5$$

$$M_B = 38,64 \cdot 2 + 30 = 107,28$$

$$+M_{max} = \frac{30,04^2}{2 \cdot 15} - 30 = 0,08$$

$$x_0 = \frac{30,04}{15} \approx 2,0 \quad b_2 = \frac{15 \cdot 4^2}{8} = 30$$

$$+M_{max} = 60,04 \cdot 2 - \frac{15 \cdot 4^2}{2} = 0,08 \approx 0!$$

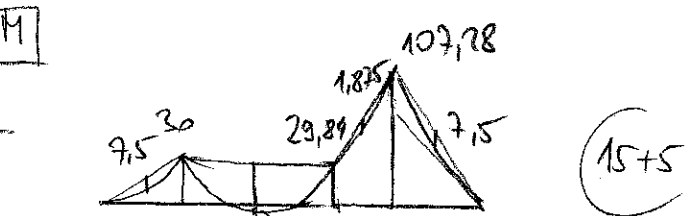
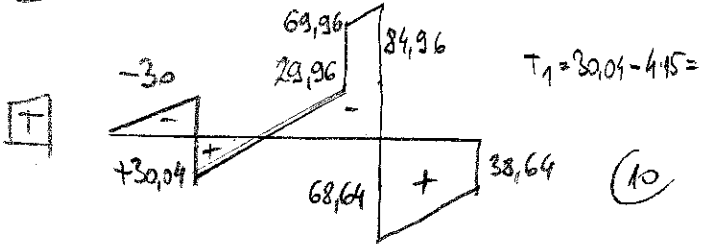


$$B_H = 10,35 \rightarrow$$

$$\sum M_A = 0 \quad (15 \cdot 9 \cdot 2,5 + 40 \cdot 4 + 38,64 \cdot 7) / 5 = B_V = 153,6$$

$$\sum M_B = 0 \quad (15 \cdot 9 \cdot 2,5 + 40 - 38,64 \cdot 2) / 5 = A_V = 60,04$$

$$\sum V = 0 \quad 9 \cdot 15 + 40 + 38,64 - 153,6 - 60,04 = 0 \checkmark$$



$$M_1 = 60,04 \cdot 4 - \frac{15 \cdot 6^2}{2} = -29,84 \quad b_3 = \frac{15}{8} = 1,875$$

35

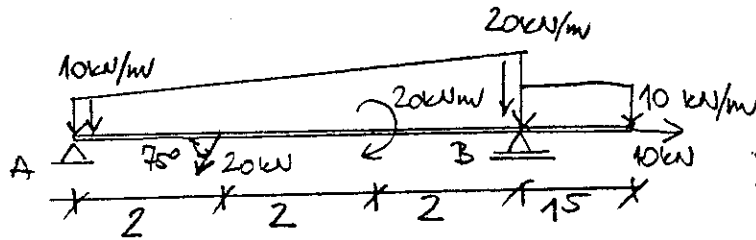
(5 bonus pont, mert nehezebb mint az „A” így helyes 125 érték el!)

4.) 2. PZH/1

-3-

24.01.05.

$$\begin{aligned} X &= 20 \cdot \cos 75^\circ = 5,18 \\ Y &= 20 \cdot \sin 75^\circ = 19,32 \end{aligned}$$



$$\sum M_A = 0$$

$$B_V = \left(\frac{10 \cdot 7,5^2}{2} + 20 + \frac{10 \cdot 6}{2} + 19,32 \right) / 6$$

$$B_V = 76,648 \text{ kN} \uparrow$$

$$\begin{aligned} A_V &= 6 \left(\frac{10+20}{2} \right) + 19,32 + 15 - 76,64 = \\ &= 47,64 \text{ kN} \uparrow \end{aligned}$$

$$A_H = 10 - 5,18 = 4,82 \leftarrow$$

$$T_1 = 47,64 - 2 \left(\frac{10+13,33}{2} \right) = 24,3$$

$$T_2 = 24,3 - 19,32 = 4,98$$

$$T_3 = 76,648 - 15 = 61,648$$

$$0 = 4,98 - 13,33 \cdot x - \frac{x \cdot 3,33 \cdot x}{2}$$

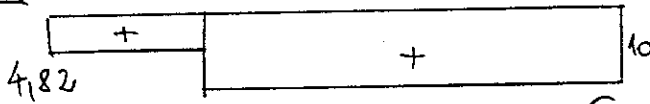
$$x_{1,2} = \frac{13,33 \pm \sqrt{13,33^2 + 4 \cdot 3,33 \cdot 4,98}}{2 \cdot 3,33} = 0,365 \text{ m}$$

$$M_1 = 47,64 \cdot 2 - \frac{10 \cdot 2^2}{2} - \frac{3,33 \cdot 2 \cdot 2}{3} = 73,05$$

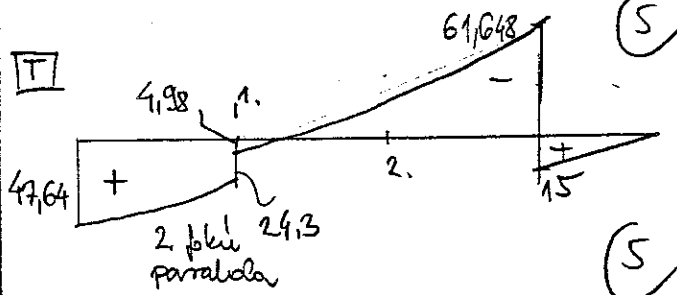
$$\begin{aligned} M_{\max} &= 47,64 \cdot 2,365 - \frac{10 \cdot 2,365^2}{2} - \frac{3,33 \cdot 2,365^2}{3} \\ &\quad - 19,32 \cdot 0,365 = 73,96 \end{aligned}$$

$$M_2 = 47,64 \cdot 4 - \frac{10 \cdot 4^2}{2} - \frac{6,66 \cdot 4^2}{3} - 19,32 \cdot 2 = 54,14$$

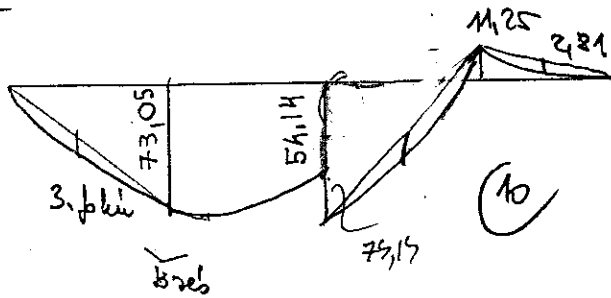
N



T



M

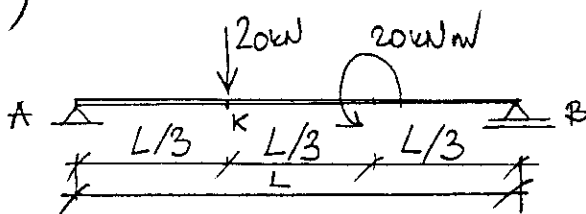


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sidužes (10)

$$M_k = \frac{10 \cdot 1,5^2}{2} = 11,25 \quad b = 2,8125$$

5.)



$$A_V = \frac{2}{3} \cdot 20 + \frac{20}{L}$$

$$M_k = \left(\frac{40}{3} + \frac{20}{L} \right) \frac{L}{3} = 40$$

$$\frac{40L}{9} + \frac{20}{3} = 40 \quad L = 7,5 \text{ m}$$

proba $A_V = 13,33 + \frac{20}{7,5} = 16,0 \text{ kN}$

$$M_k = 16 \cdot 2,5 = 40 \checkmark$$