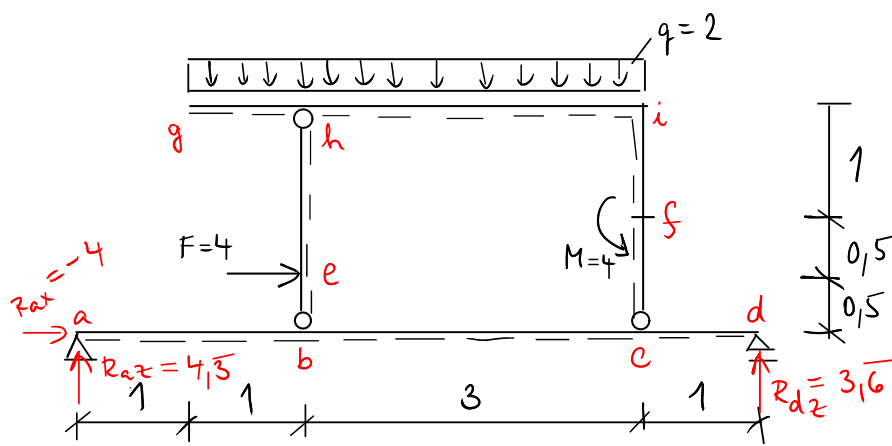




[m, kN, kNm, kN/m]

Reakce:

$$\sum F_{xi} = 0 \oplus \rightarrow R_{ax} + F = 0$$

$$R_{ax} = -F = -4 \text{ kN}$$

$$\sum M_{ai} = 0 \oplus \uparrow$$

$$R_{dz} \cdot 6 + M - F \cdot 0.5 - q \cdot 4 \cdot (1+2) = 0$$

$$R_{dz} = 3.6 \text{ kN}$$

$$\sum M_{di} = 0 \oplus \downarrow$$

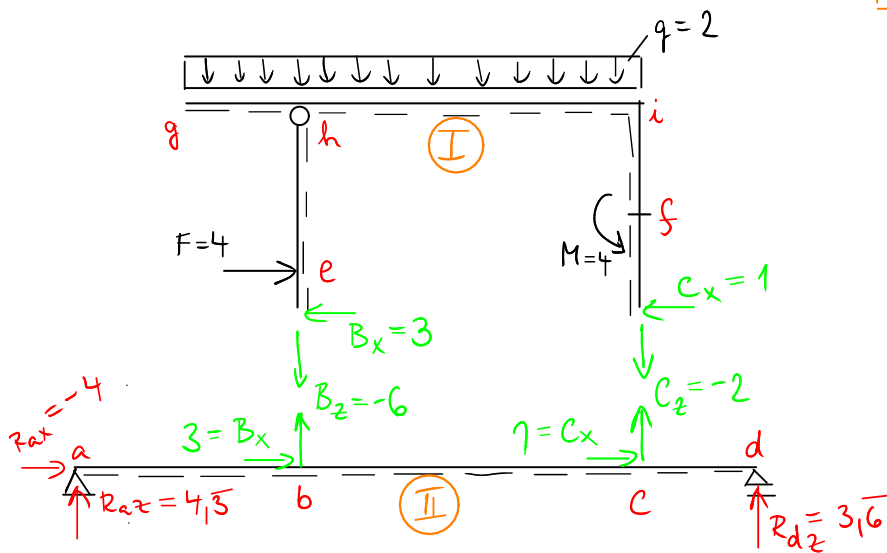
$$R_{az} \cdot 6 + F \cdot 0.5 - M - q \cdot 4 \cdot (2+1) = 0$$

$$R_{az} = 4.3 \text{ kN}$$

kontrola $\sum F_{zi} = 0 \oplus \uparrow$

$$R_{az} - q \cdot 4 + R_{dz} = 0 \checkmark$$

trojkloubový nosník_I + prostý nosník_{II}



Interakce:

$$\textcircled{I} \sum M_{bi} = 0 \oplus \downarrow$$

$$F \cdot 0.5 + q \cdot 4 \cdot 1 - M + C_z \cdot 3 = 0$$

$$C_z = -2 \text{ kN}$$

$$\sum M_{hi}^L = 0 \oplus \downarrow$$

$$B_x \cdot 2 - F \cdot 1.5 = 0 \Rightarrow B_x = 3 \text{ kN}$$

$$\sum M_{ci} = 0 \oplus \uparrow$$

$$B_z \cdot 3 - F \cdot 0.5 + q \cdot 4 \cdot 2 + M = 0$$

$$B_z = -6 \text{ kN}$$

$$\sum M_{hi}^P = 0 \oplus \downarrow$$

$$q \cdot 4 \cdot 1 - M + C_x \cdot 2 + C_z \cdot 3 = 0$$

$$C_x = 1 \text{ kN}$$

$\textcircled{II}$ kontrola

$$\sum F_{zi} = 0 \oplus \uparrow$$

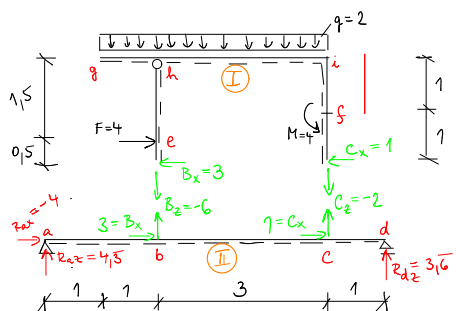
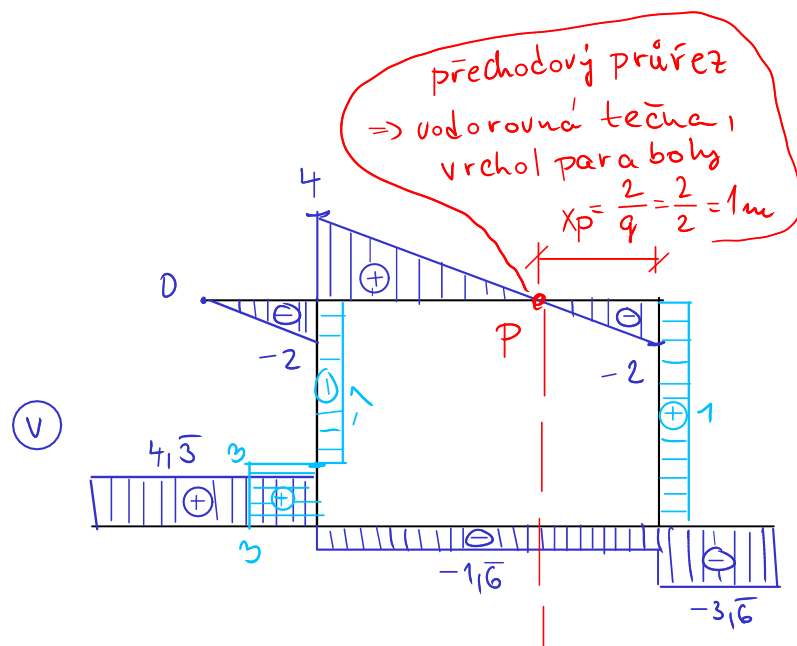
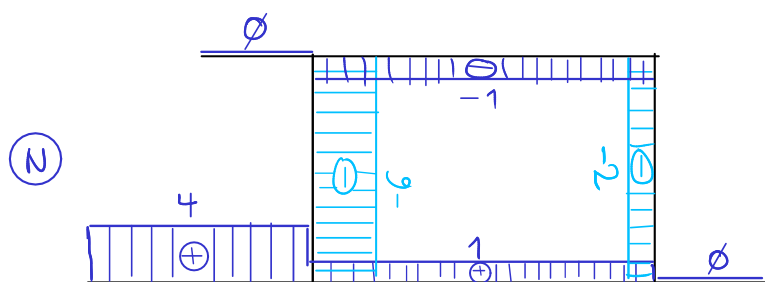
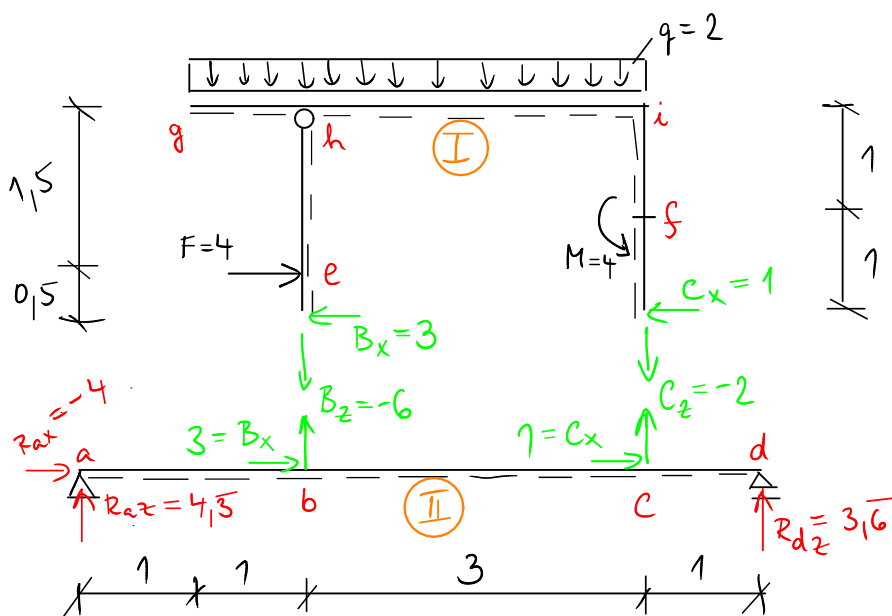
$$R_{az} + B_z + C_z + R_{dz} = 0$$

$$4.3 - 6 - 2 + 3.6 = 0 \checkmark$$

$$\sum F_{xi} = 0 \oplus \rightarrow$$

$$R_{ax} + B_x + C_x = 0$$

$$-4 + 3 + 1 = 0 \checkmark$$



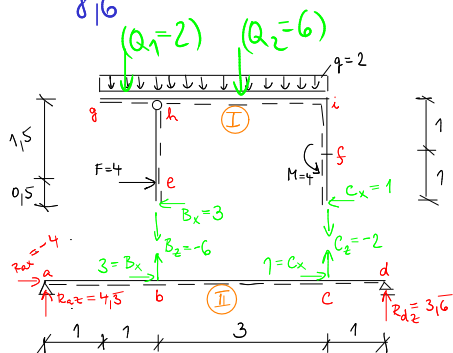
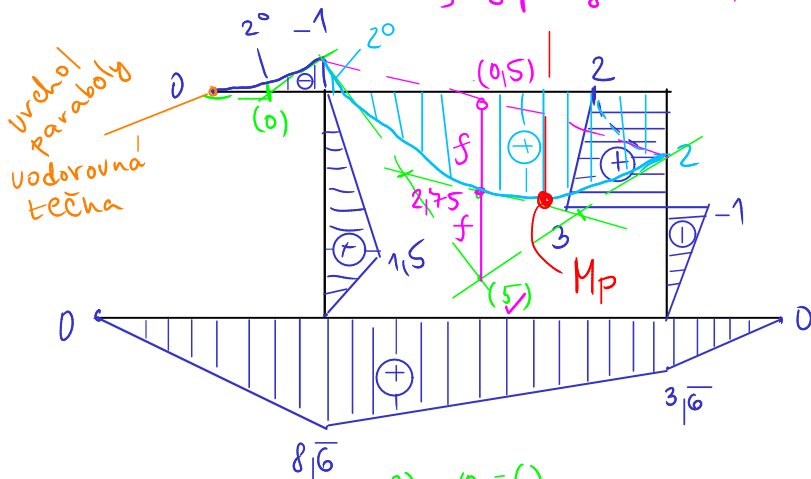
Normálové síly

$$\begin{aligned}
 N_{ab}^L &= -R_{ax} = 4\text{ kN} = N_{ba} \\
 N_{bc}^L &= -R_{ax} - B_x = 1\text{ kN} = N_{cb} \\
 N_{dc}^P &= 0 = N_{cd} \\
 N_{cd}^L &= -R_{ax} - B_x - C_x = 0 \\
 N_{gh}^L &= 0 = N_{hg} \\
 N_{bh}^L &= B_z = -6\text{ kN} = N_{hb}^L \\
 N_{ci}^P &= C_z = -2\text{ kN} = N_{ic}^P \\
 N_{ih}^P &= -C_x = -1\text{ kN} = N_{hi}^P \\
 N_{hi}^L &= -F + B_x = -1\text{ kN}
 \end{aligned}$$

Posouvající síly

$$\begin{aligned}
 V_{ab}^L &= R_{az} = 4.33\text{ kN} = V_{ba}^L \\
 V_{bc}^L &= R_{az} + B_z = 4.33 - 6 = -1.67\text{ kN} = V_{cb}^L \\
 V_{dc}^P &= -R_{dz} = -3.67\text{ kN} = V_{cd}^P \\
 V_{cd}^L &= R_{az} + B_z + C_z = 4.33 - 6 - 2 = -3.67\text{ kN} \\
 V_{gh}^L &= 0 \\
 V_{hg}^L &= -q \cdot 1 = -2\text{ kN} \\
 V_{be}^L &= B_x = 3\text{ kN} = V_{eb}^L \\
 V_{eh}^L &= B_x - F = -1\text{ kN} = V_{he}^L \\
 V_{ci}^P &= C_x = 1\text{ kN} = V_{ic}^P \\
 V_{ih}^P &= C_z = -2\text{ kN} \\
 V_{hi}^L &= -q \cdot 1 - B_z = -2 - (-6) = 4\text{ kN} = V_{hi}^P = C_z + q \cdot 3 = -2 + 6 = 4\text{ kN}
 \end{aligned}$$

$$f = \frac{1}{8} q l^2 = \frac{1}{8} 2 \cdot 3^2 = 2,25$$



$$M^P(\text{pod } Q_2 \text{ bez } q_2) = -C_2 \cdot 1,5 - C_x \cdot 2 + 11 = 5$$

$$M_p^P = M_{p\text{red}} - \int_{x_p} v dx = 2 - \frac{1}{2}(-2) \cdot x_p = \underline{\underline{3 \text{ kNm}}}$$

$$M_p^P = -C_2 \cdot x_p - C_x \cdot 2 + 11 - q \cdot \frac{x_p^2}{2} = \underline{\underline{3 \text{ kNm}}}$$

Momenty

$$M_a^L = 0$$

$$M_{ba}^L = R_{az} \cdot 2 = 4,3 \cdot 2 = 8,6 \text{ kNm} = M_{bc}^L$$

$$M_a^P = 0$$

$$M_{cd}^P = R_{dz} \cdot 1 = 3,6 \text{ kNm} = M_{cb}^P$$

$$M_{cd}^L = R_{az} \cdot 5 + B_z \cdot 3 = 3,6 \text{ kNm}$$

$$M_g^L = 0$$

$$M_{hg}^L = -q \cdot 1 \cdot \frac{1}{2} = -1 \text{ kNm}$$

$$M^L(\text{pod } Q_1 \text{ bez } q_1) = 0 \quad (\text{vrchol tečnoveho polygonu})$$

$$M_{be}^L = 0 \quad (\text{kloub } \checkmark)$$

$$M_e^L = B_x \cdot 0,5 = 1,5 \text{ kNm}$$

$$M_{he}^L = B_x \cdot 2 - 4 \cdot 1,5 = 0 \quad (\text{kloub } \checkmark)$$

$$M_{cf}^P = 0 \quad (\text{kloub } \checkmark)$$

$$M_{fc}^P = -C_x \cdot 1 = -1 \text{ kNm}$$

$$M_{fi}^P = -C_x \cdot 1 + 11 = 3 \text{ kNm}$$

$$M_{if}^P = -C_x \cdot 2 + 11 = 2 \text{ kNm} = M_{ic}^P = M_{ih}^P$$

$$M_i^L = -q \cdot 4 \cdot 2 - F \cdot 1,5 + B_x \cdot 2 - B_z \cdot 3 = 2 \text{ kNm}$$