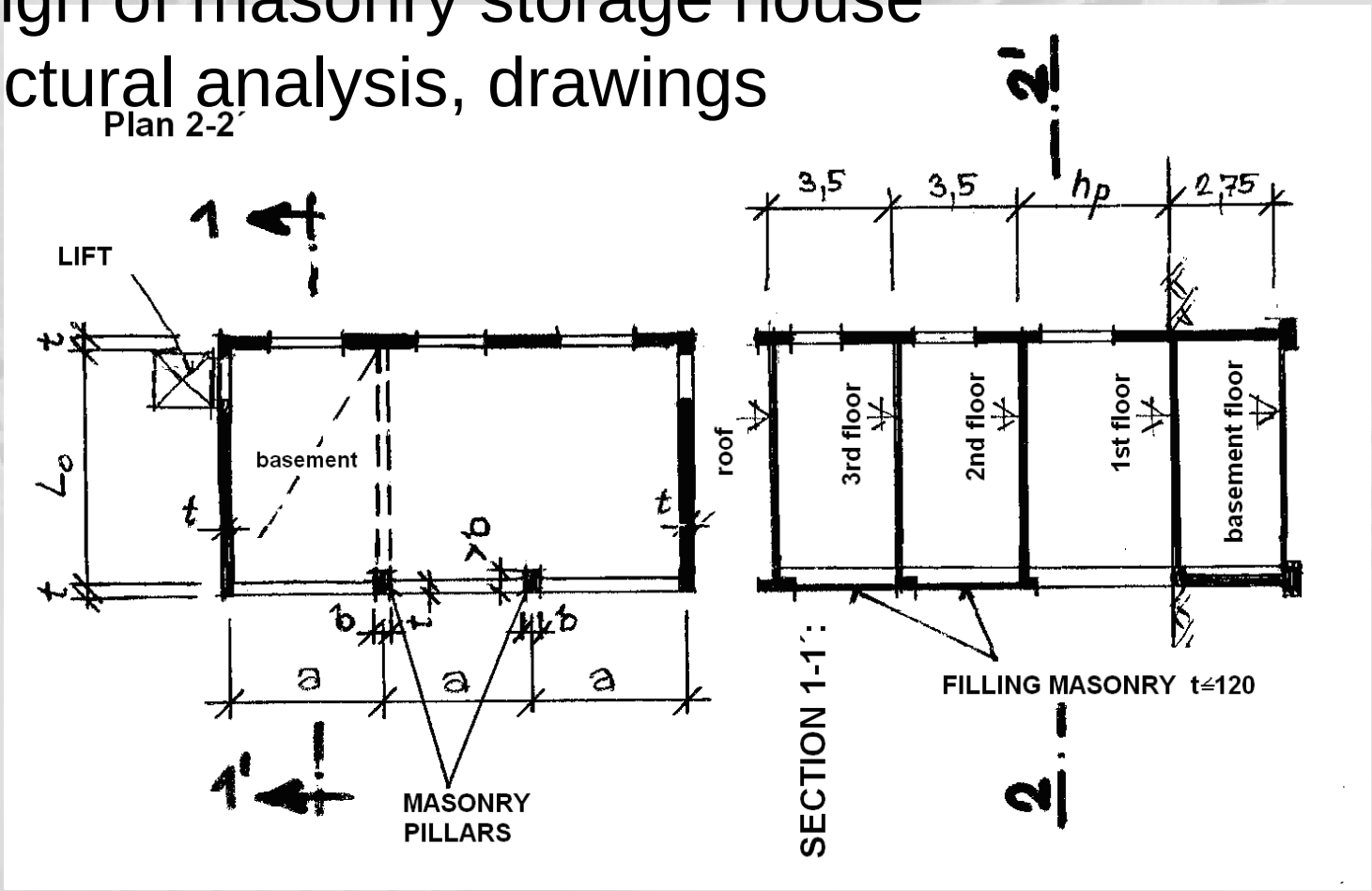
# Masonry Structures

## 8th Seminar

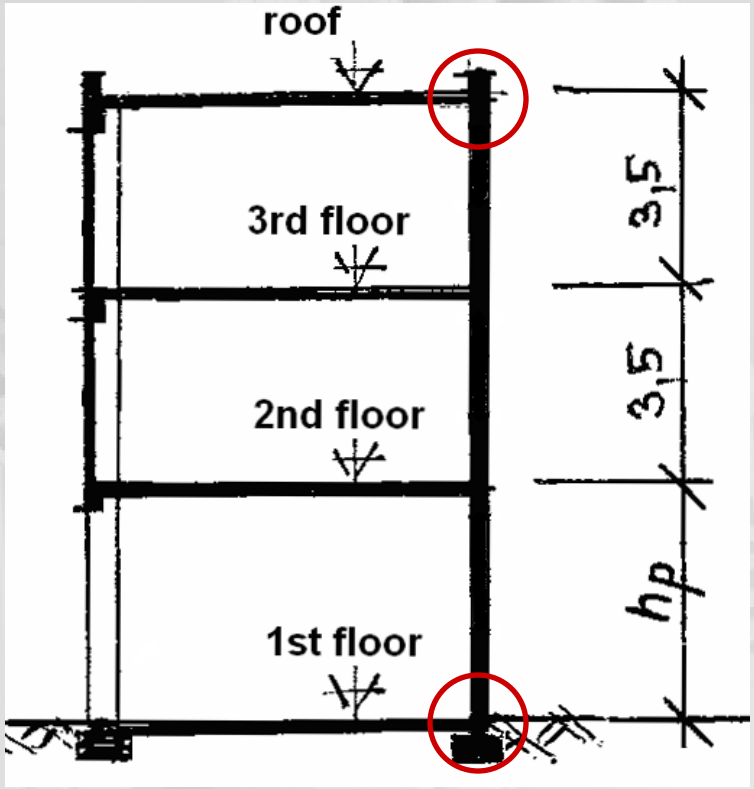
# Seminar task

- Design of masonry storage house
- Structural analysis, drawings



# 8th homework

- Calculate the shear resistance at the section below the roof and at the bottom of the wall in the 1st floor
- Compare the effect of normal stress on the shear resistance of the load-bearing wall



# Shear strength of masonry

- Design shear strength:

$$f_{vd} = \frac{f_{vk}}{\gamma_M}$$

- $\gamma_M$ = 2,0 (designed mortar)
- In case that the perpend joints are not filled with mortar, the characteristic shear strength is:

$$f_{vk} = \min \begin{cases} 0,5\, f_{vko} + 0,4\sigma_d \\ 0,045\, f_b \end{cases}$$

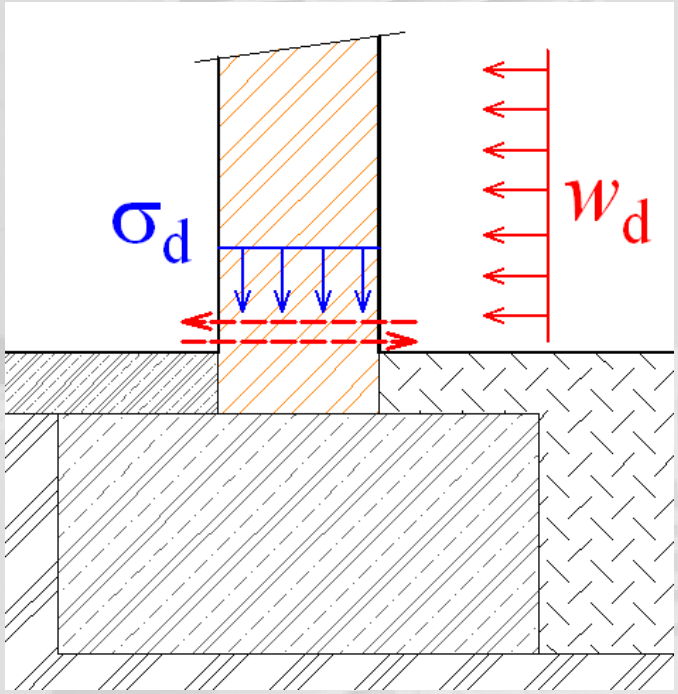
# Shear strength of masonry

- $f_{vko}$ – characteristic initial shear strength under zero compressive stress, see table

| Masonry units | $f_{vko}$ [MPa] | | | |
|---|---|---|---|---|
| | General purpose mortar of the Strength Class given | | Thin layer mortar (bed joint ≥ 0,5 mm and ≤ 3 mm) | Lightweight mortar |
| Clay | M10 - M20 | 0,30 | 0,30 | 0,15 |
| | M2,5 - M9 | 0,20 | | |
| | M1 - M2 | 0,10 | | |
| Calcium silicate | M10 - M20 | 0,20 | 0,40 | 0,15 |
| | M2,5 - M9 | 0,15 | | |
| | M1 - M2 | 0,10 | | |
| Aggregate concrete | M10 - M20 | 0,20 | 0,30 | 0,15 |
| Autoclaved Aerated Concrete | M2,5 - M9 | 0,15 | | |
| Manufactured stone and Dimensioned natural stone | M1 - M2 | 0,10 | | |

# Shear strength of masonry

- $\sigma_d$ – design compressive stress perpendicular to the shear plane
- The effect of $\sigma_d$ is favorable for the resistance of the structure => partial factors are:
  - $\gamma_F$ = 1,00 for dead load
  - $\gamma_F$ = 0 for live load




- $f_b$ – take the value from 5th homework

# Shear resistance of the wall

- Resistance per 1 meter of the wall (*t* is thickess of the wall):

$$V_{\mathrm{Rd}} = t \cdot f_{\mathrm{vd}} \ \left[\mathrm{kN/m}\right]$$

- Compare the resistances of the two cross-sections to understand the effect of normal stress!

# Thank you for your attention

## Any questions?