

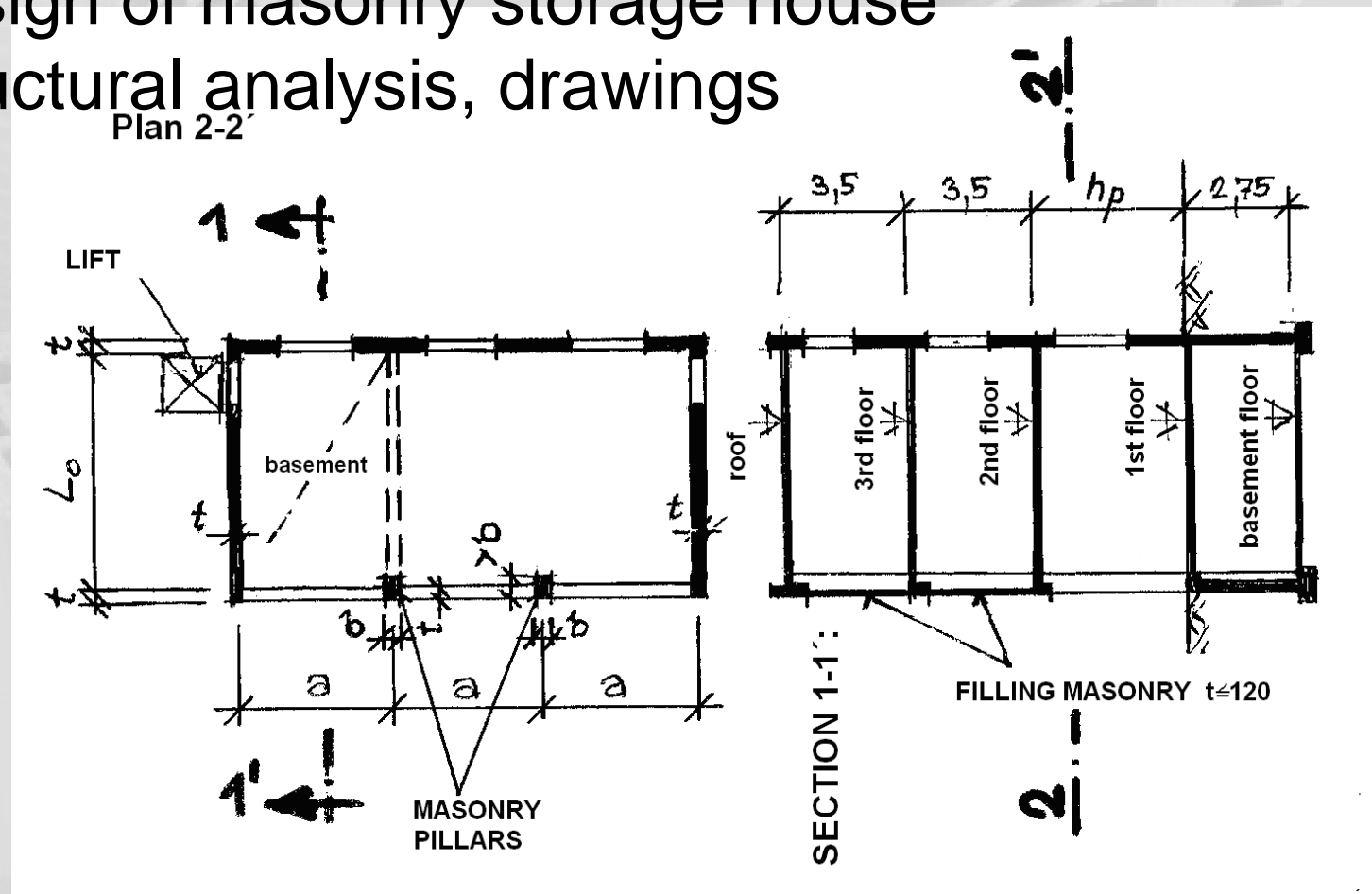


# Masonry Structures

## 9th Seminar

# Seminar task

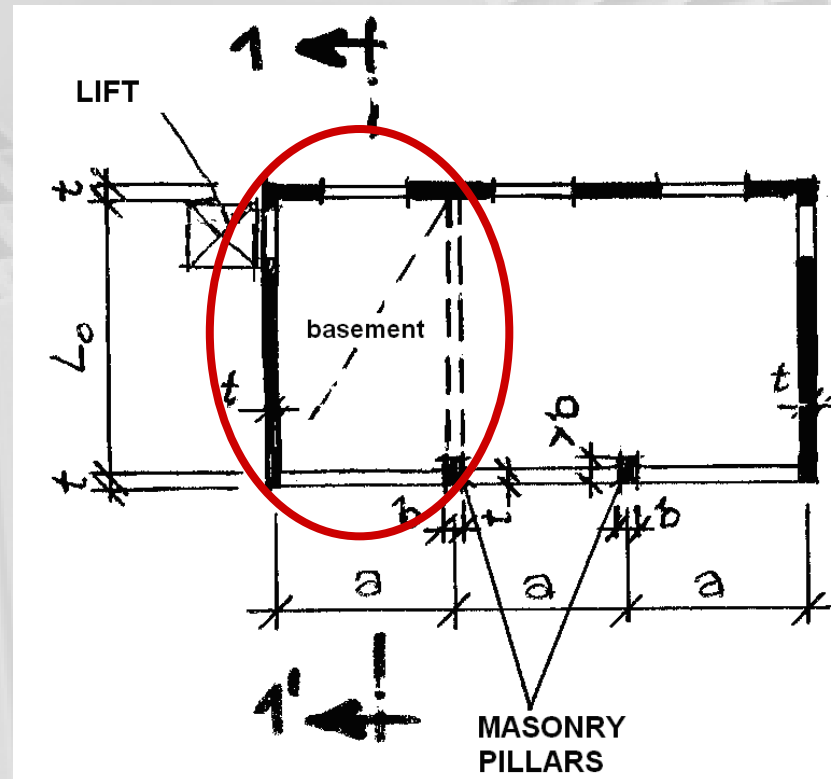
- ❑ Design of masonry storage house
- ❑ Structural analysis, drawings



# 9th homework

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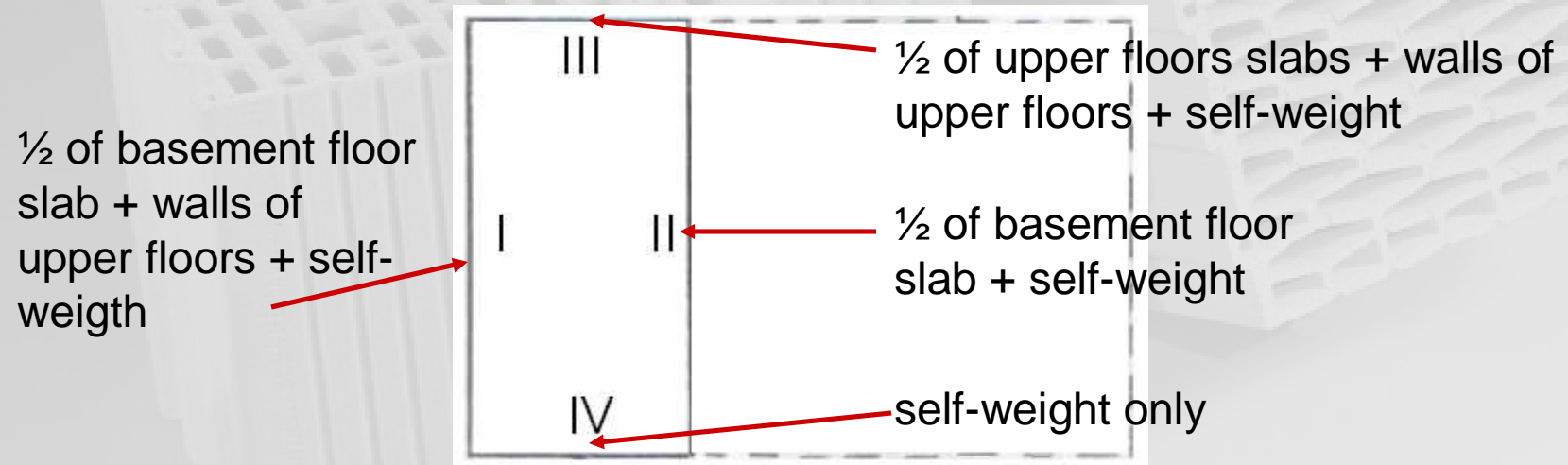
- ❑ Using simplified method according to Eurocode 6, check the load-bearing capacity of basement walls



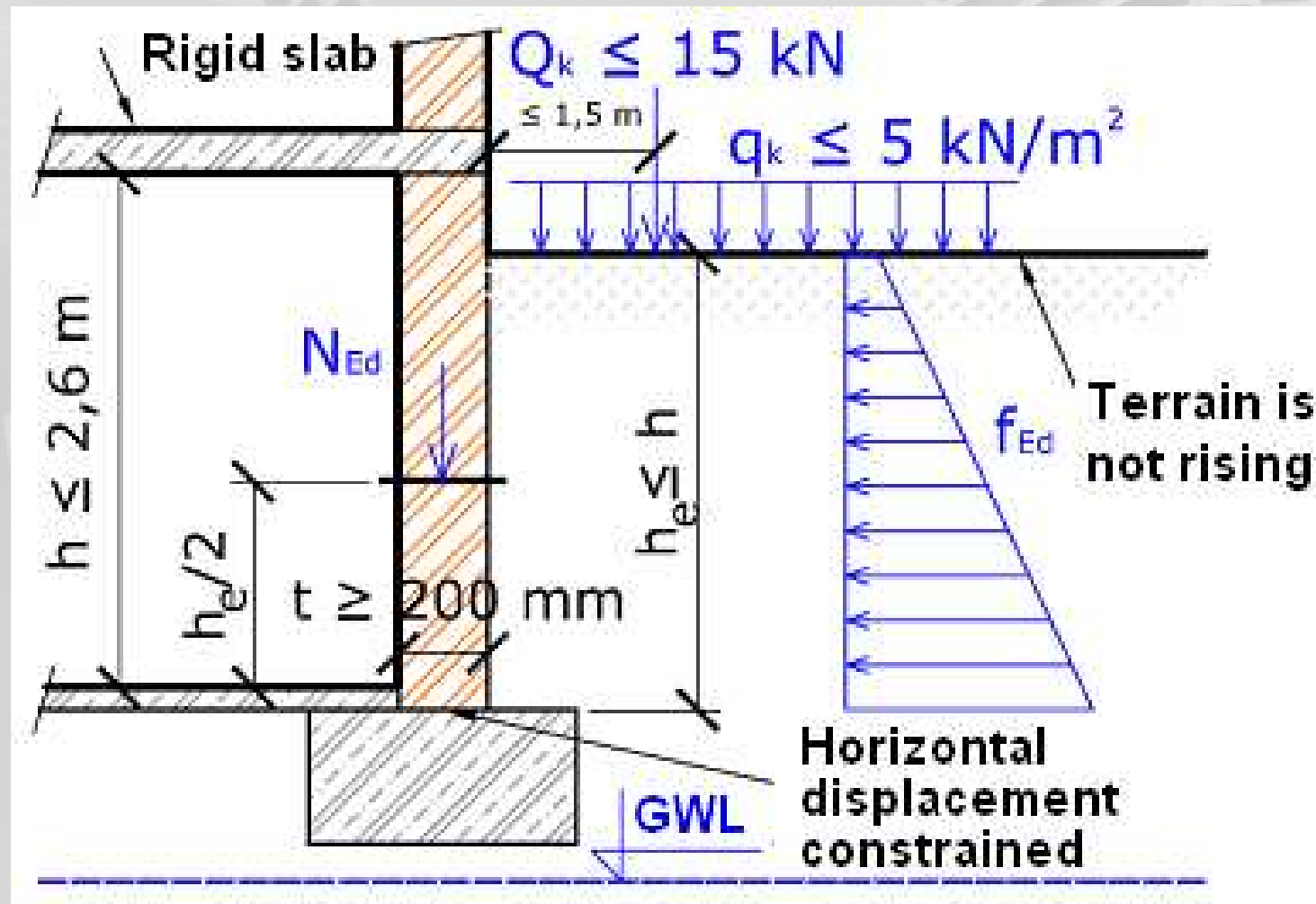
# Introduction

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- ❑ BW is laterally loaded by earth pressure
- ❑ Vertical loading is favorable as it decreases total eccentricity due to loads
- ❑ We have 4 different walls => check all of them



# Simplified Method: Conditions



# Simplified Method: Equations

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❑ Lateral:

$$N_{\text{Ed,min}} \geq F_{\text{Ed}} = \frac{\gamma b h h_e^2}{\beta_e t}$$

❑ Vertical:

$$N_{\text{Ed,max}} \leq N_{\text{Rd}} = \frac{b t f_d}{3}$$

❑  $N_{\text{Ed,min}}$   $\equiv$  characteristic value of vertical dead loads in the section of the wall in the middle of backfill height

❑  $N_{\text{Ed,max}}$   $\equiv$  design value of vertical dead+live loads in the section of the wall in the middle of backfill height

❑  $F_{\text{Ed}}$  = lateral force effect of the backfill

❑  $N_{\text{Rd}}$  = vertical load-bearing capacity of the wall

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# Simplified Method: Equations

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- ❑  $\gamma$  – density of soil (backfill), see assignment
  - ❑  $b$  – width of the wall, take  $b = 1$  m and calculate the forces per 1 m
  - ❑  $h$  – clear height of the wall
  - ❑  $h_e$  – height of the backfill,  $h_e = 2$  m
  - ❑  $t$  – thickness of basement wall, 290 mm for HELUZ, 365 mm for POROTHERM
  - ❑  $f_d$  – design strength of masonry, see 6th homework (the same masonry is used)
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# Simplified Method: Equations

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- $\beta_e$  – coefficient to involve horizontal spanning (L) of the wall

$$L \geq 2h \rightarrow \beta_e = 20$$


$$L \leq h \rightarrow \beta_e = 40$$

$$h < L < 2h \rightarrow \beta_e = 60 - 20 \frac{L}{h}$$



# If the capacity is not enough:

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- ❑ Increase thickness of the wall
  - ❑ Use masonry of higher strength (applicable only if vertical condition is not met)
  - ❑ Use reinforced masonry (ditto)
  - ❑ Design strengthening pillars 
  - ❑ Design reinforced concrete basement
- => Choose one of the measures if any of your walls doesn't meet the criteria!
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The background of the slide features a collection of white plastic components. In the foreground, there is a large, rectangular sheet with a grid-like mesh pattern. Behind it, several other sheets are visible, some with a corrugated or ribbed texture. The items are arranged in a way that suggests they are part of a product line or a set of materials.

**Thank you for your attention**

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**Any questions?**