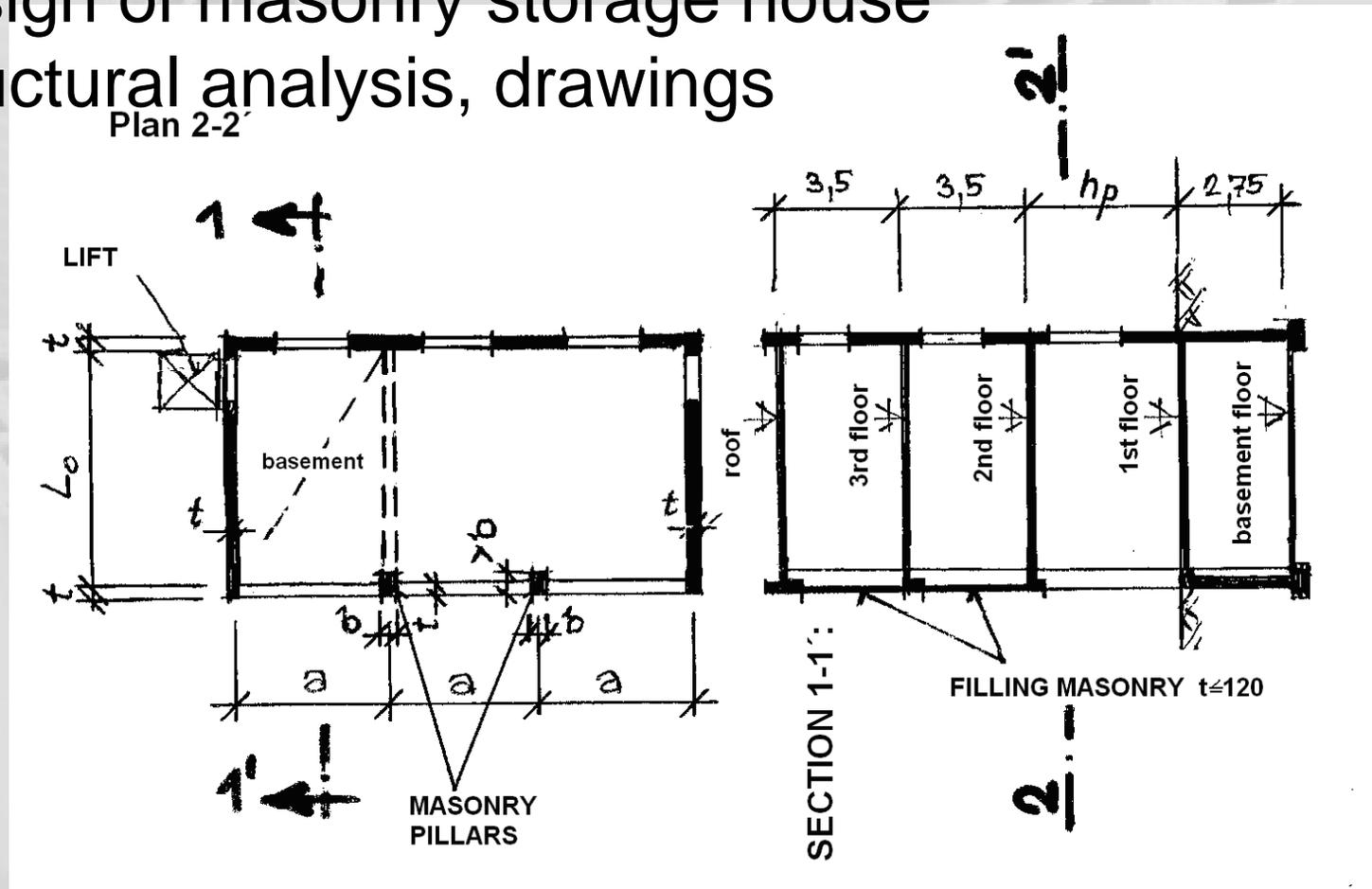




Masonry Structures
9th Seminar

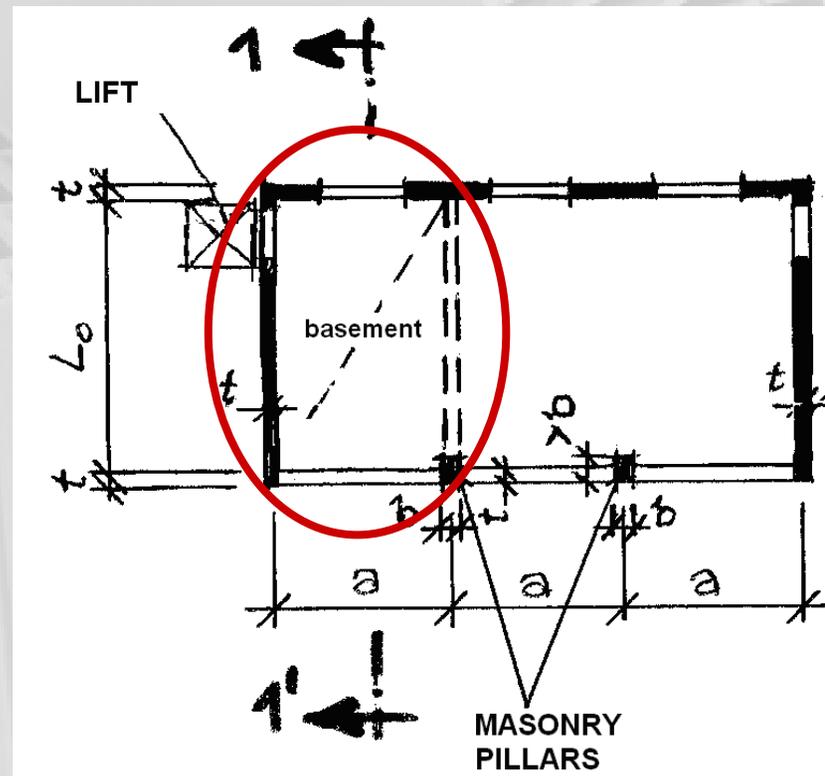
Seminar task

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



9th homework

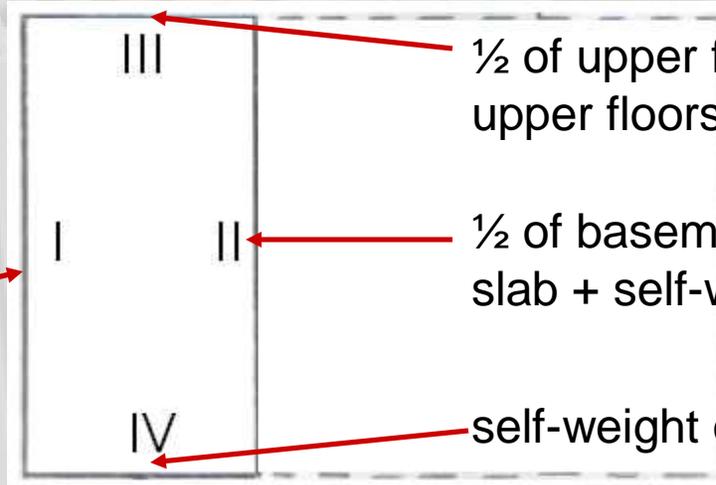
- Using simplified method according to Eurocode 6, check the load-bearing capacity of basement walls



Introduction

- ❑ 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

1/2 of basement floor slab + walls of upper floors + self-weight

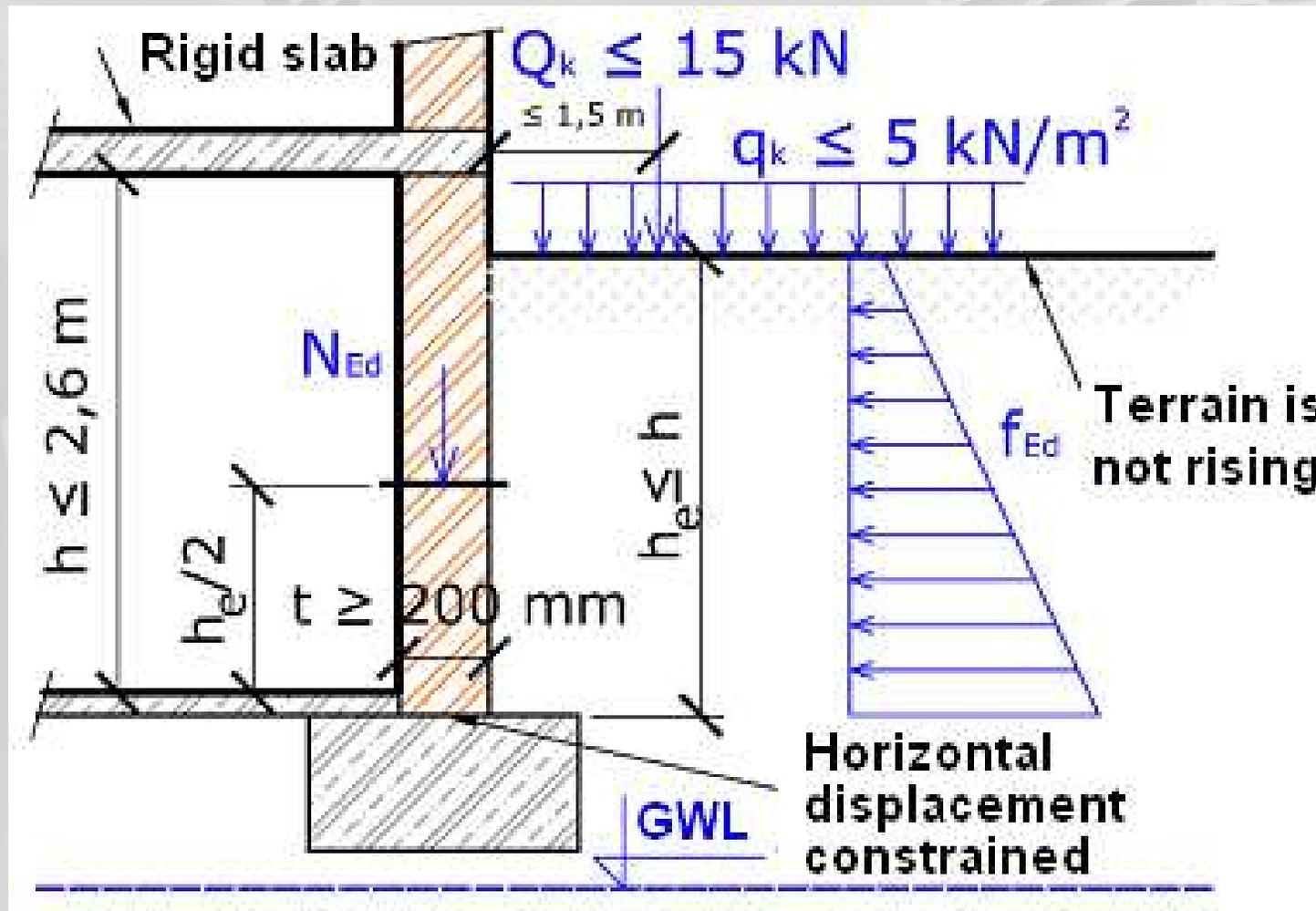


1/2 of upper floors slabs + walls of upper floors + self-weight

1/2 of basement floor slab + self-weight

self-weight only

Simplified Method: Conditions



Simplified Method: Equations

□ 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_{Ed} = lateral force effect of the backfill

□ N_{Rd} = vertical load-bearing capacity of the wall

Simplified Method: Equations

- ❑ γ – 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)
-

Simplified Method: Equations

- β_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:

- ❑ 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 The diagram shows a cross-section of a stepped pillar. It consists of a base layer, followed by three rectangular blocks of increasing height, and a top layer. The blocks are separated by recessed joints, creating a stepped profile.
 - ❑ Design reinforced concrete basement
- ⇒ Choose one of the measures if any of your walls doesn't meet the criteria!
-



Thank you for your attention

Any questions?