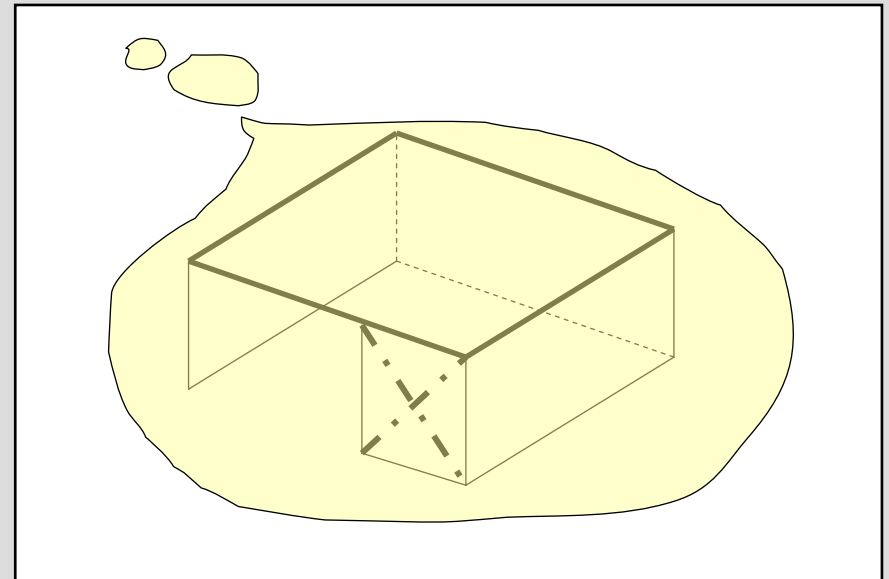
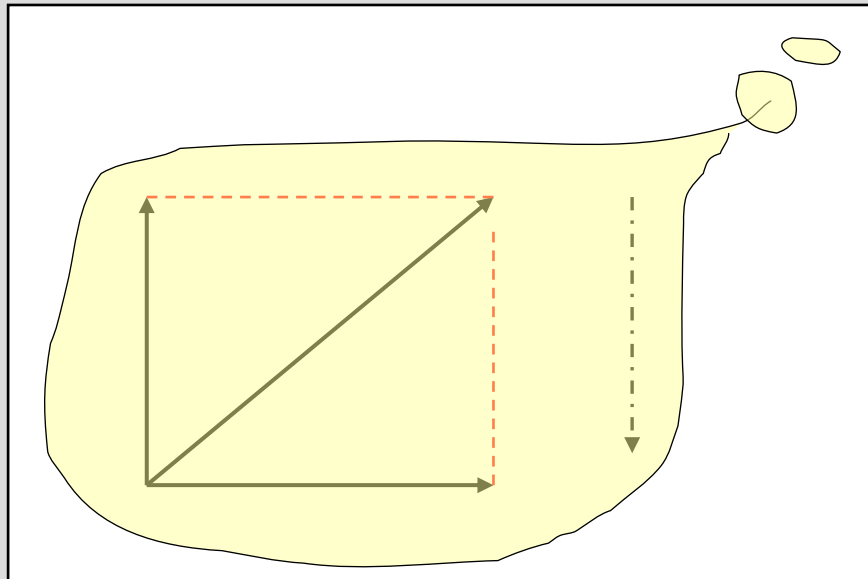
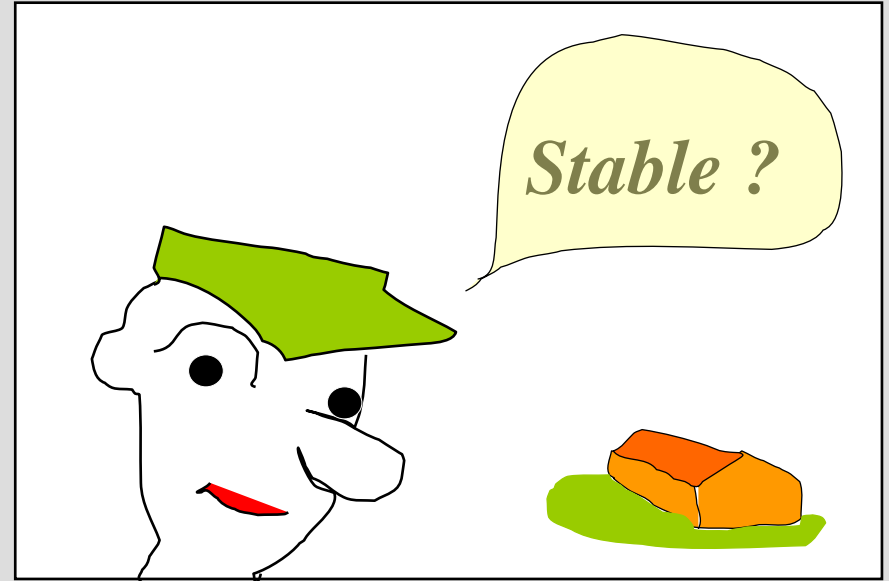
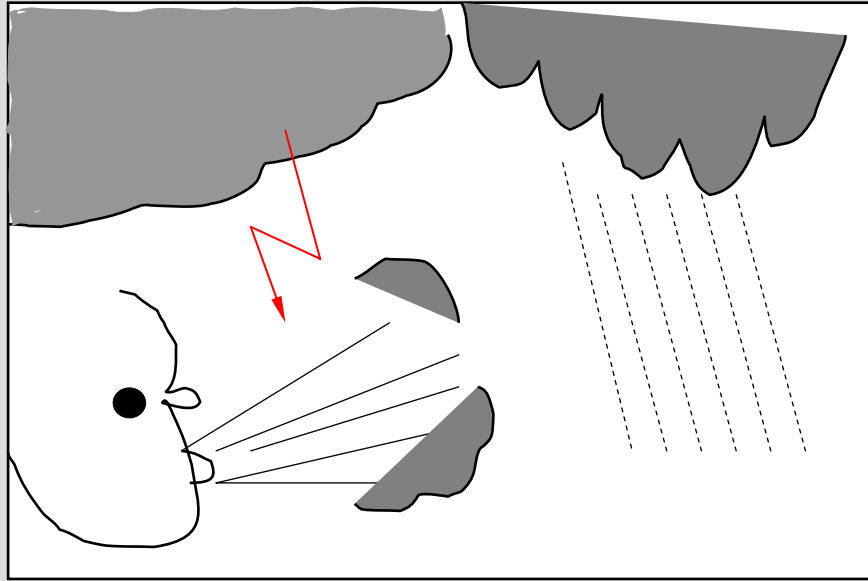
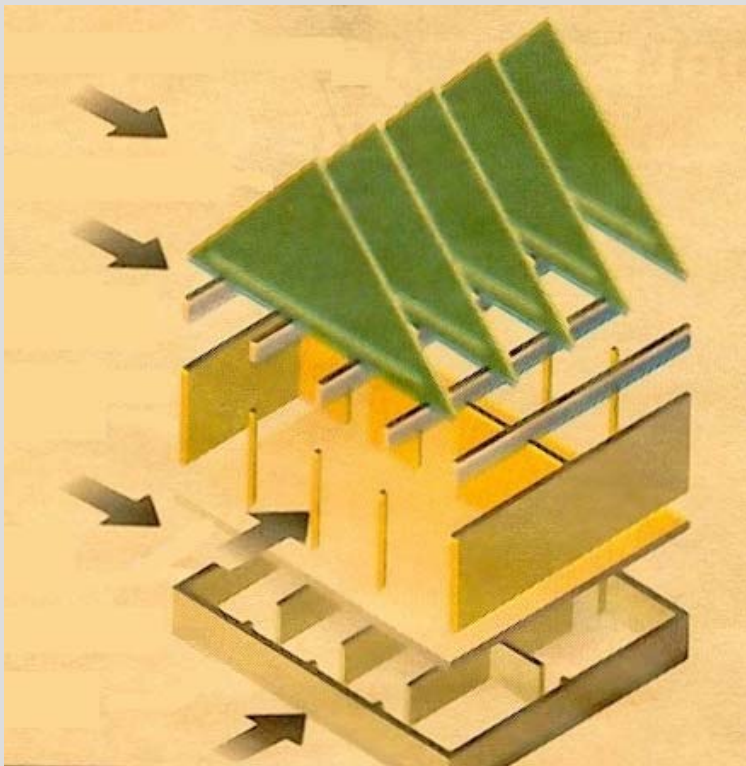


What happened ?



Argument

The components giving the stability.



Argument:

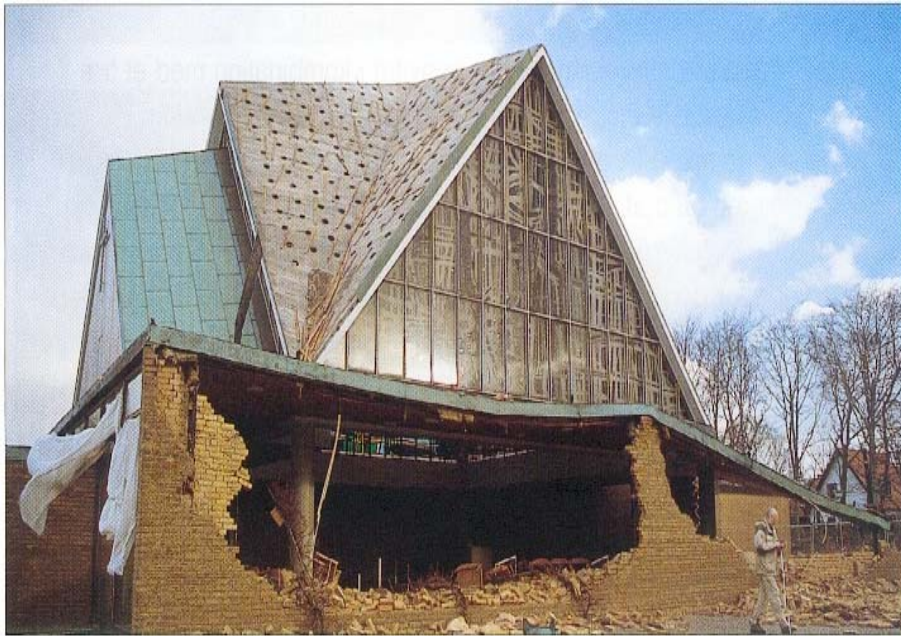
Houses are build up by components, and often one lose track of how the components have to be connected, to give a stable construction.

Stability



A building is stable if it is in equilibrium with all the external actions.

On an early time



On an early stage in the projecting sequence, the stability of the building have to be estimated.

Typically actions

- **Vertical actions :**

- Snow



- Wind



- Imposed action



- Dead load



- **Horizontal actions :**

- Wind 

- Horizontal mass action 

Problems and organizing



- **Vertical actions downward:**
A strength and stiffness *problem*
- **Vertical actions upward :**
An anchor *problem*
- **Horizontal actions:**
An overturning and sliding *problem*

These problems have to be solved temporary, by making an outline of how to lead the loads to the ground.

How to make an outline

Early in the scheme design, the is made from the statically Principe.

These is connected to a stable whole, and in this way they will make up the total statically system for e.g. a building.

Principis



Principis can be one or more of the following

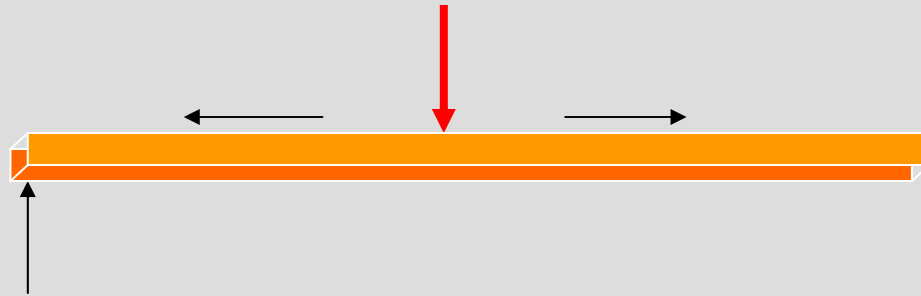
- Make demands for the **function** for alle the copponents in the building.
- Make demands for the **function** for all the supports.
- Impose **self strengthening** main constructions.
- Impose stable **triangles** (e.g. ties)
- Explain **load transferring** from one building component to another.

Typical statical functions:

- Beam function
- Slab function
- Shear function
- Column function

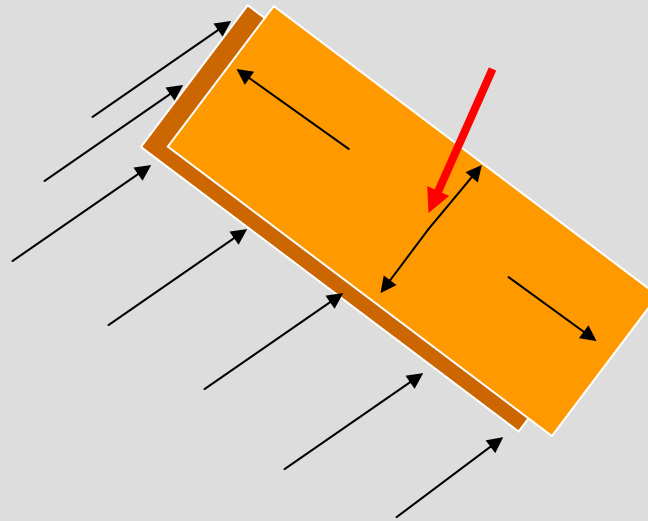
Beam function

Ability to transferee loads perpendicular to the center line of the building component.



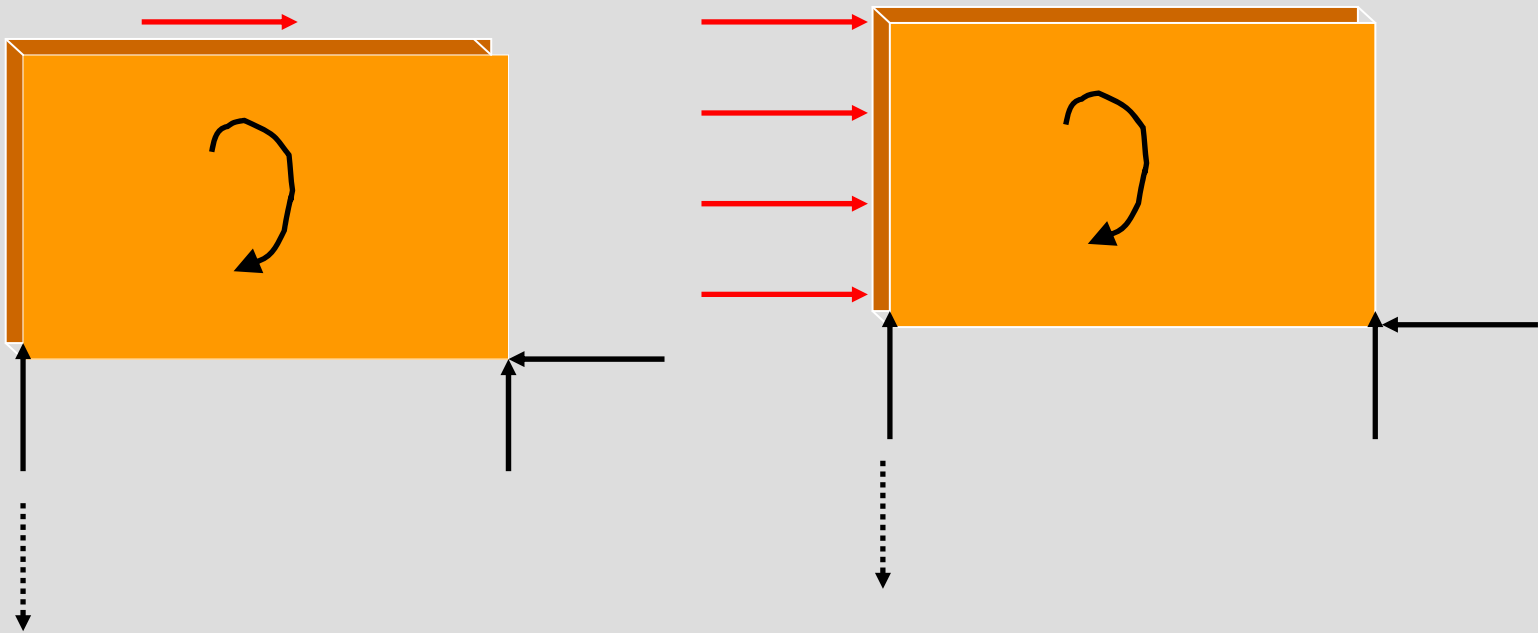
Slab function

Ability to transfer loads perpendicular to the center line of the plane building component.



Shear function

The ability to transfer loads in a longitudinal axis of the building component.



Column function

The ability to transfer loads parallel to or exactly in a longitudinal axis of the building component.



Supports

Symbols:

Functions:

	<p>Rolling support (Movable simple support)</p>
	<p>Pinned support (simple support)</p>
	<p>Fixed support</p>

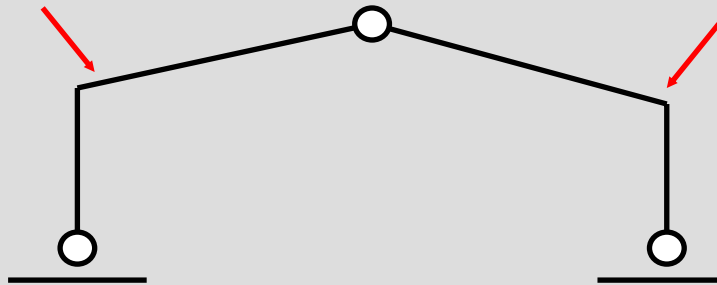
Self strengthening construction

Symbol:

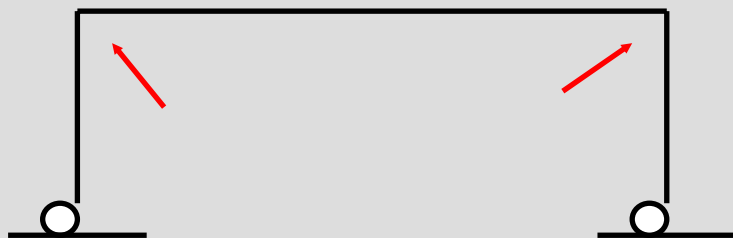
Function:



Beam column system, with fixed columns and simply supported beams.

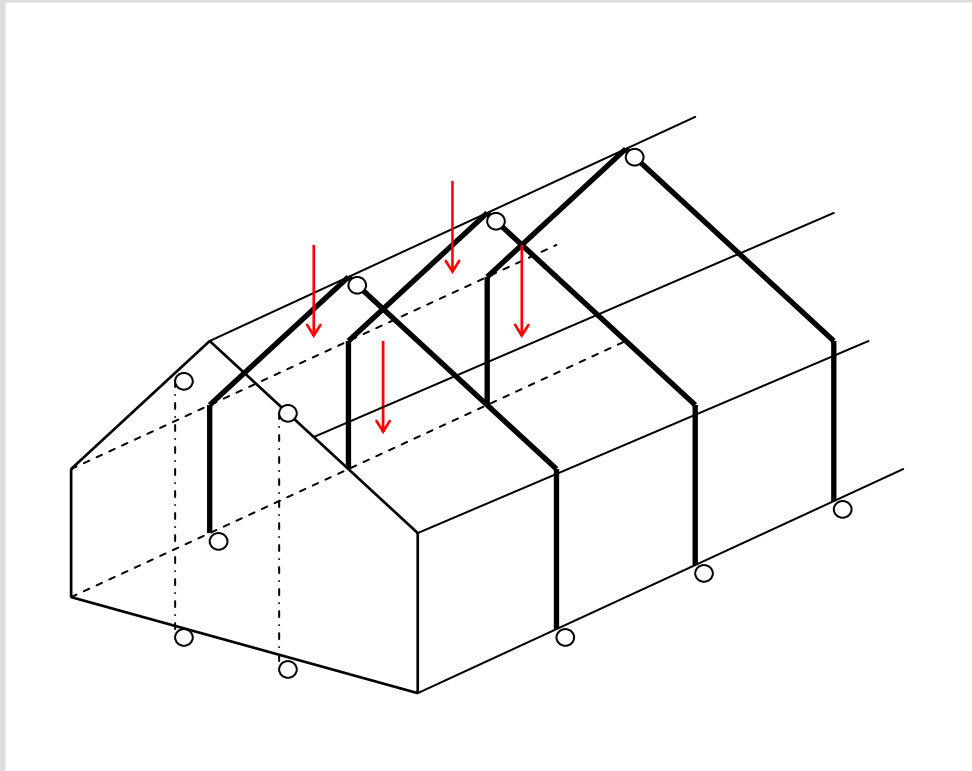


3-Charnier portal frames, with moment rigid corners.



2-Charnier portal frames, with moment rigid corners.

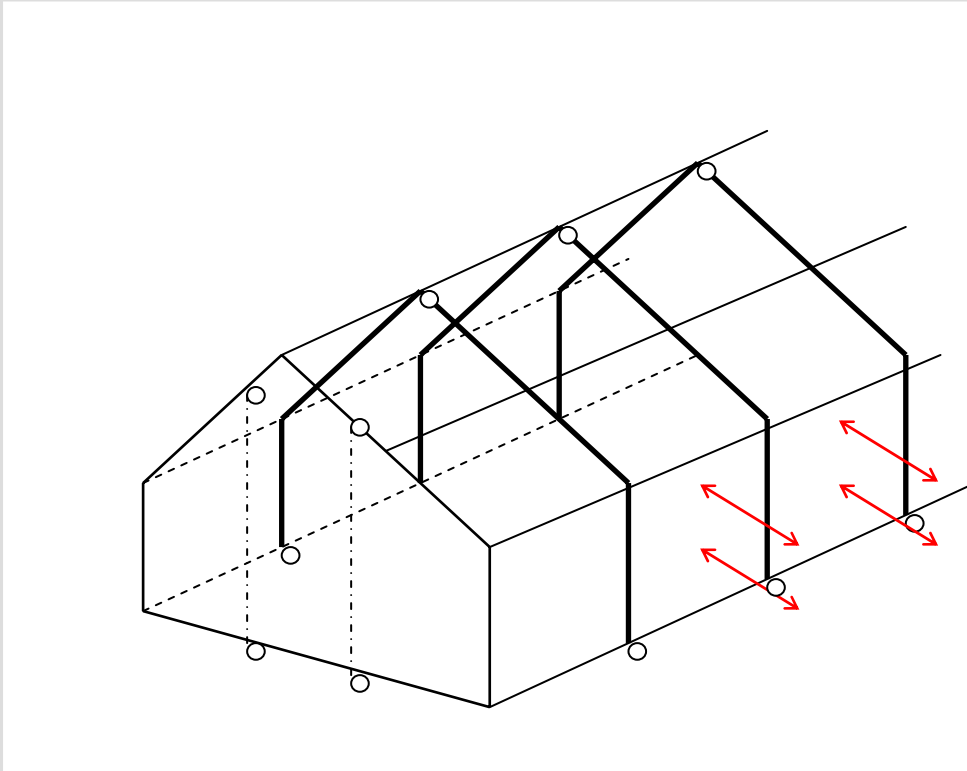
Outline. Ex.1A



Vertical actions :

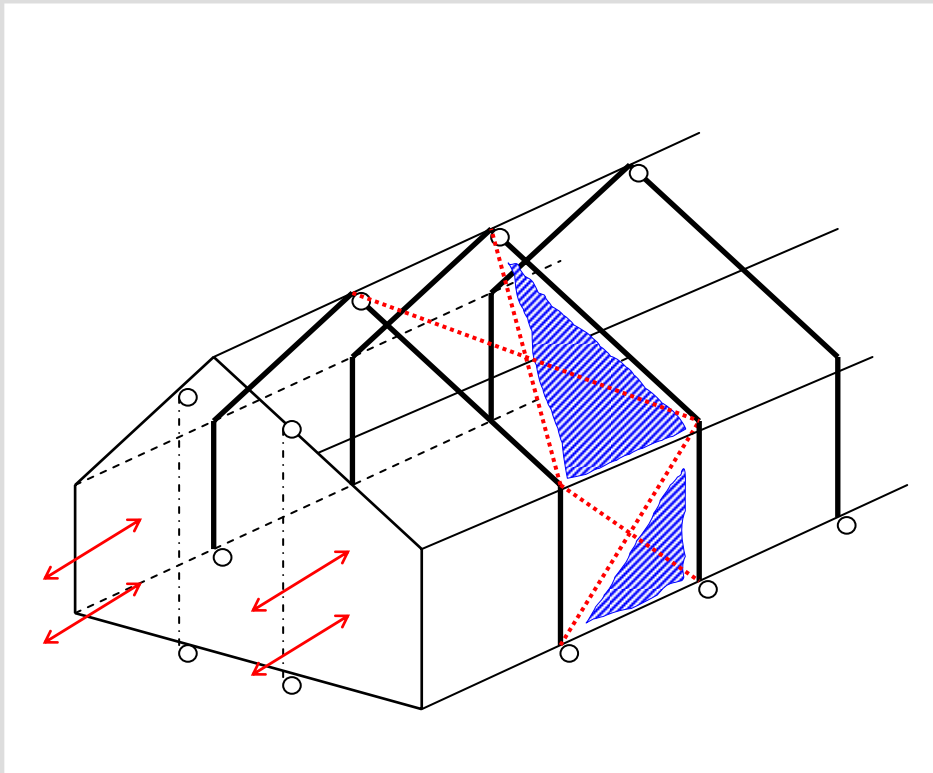
The load is transferred by the **beam-function** in the roof construction to the portal frames. Then the loads is transferred to the foundation with **portal frame function**.

Outline. Ex.1A



Vertical loads on the facade:
The load is transferred by **slab function** in the facade to the portal frames. Then the loads is transferred to the foundation with **portal frame function**.

Outline. Ex.1A

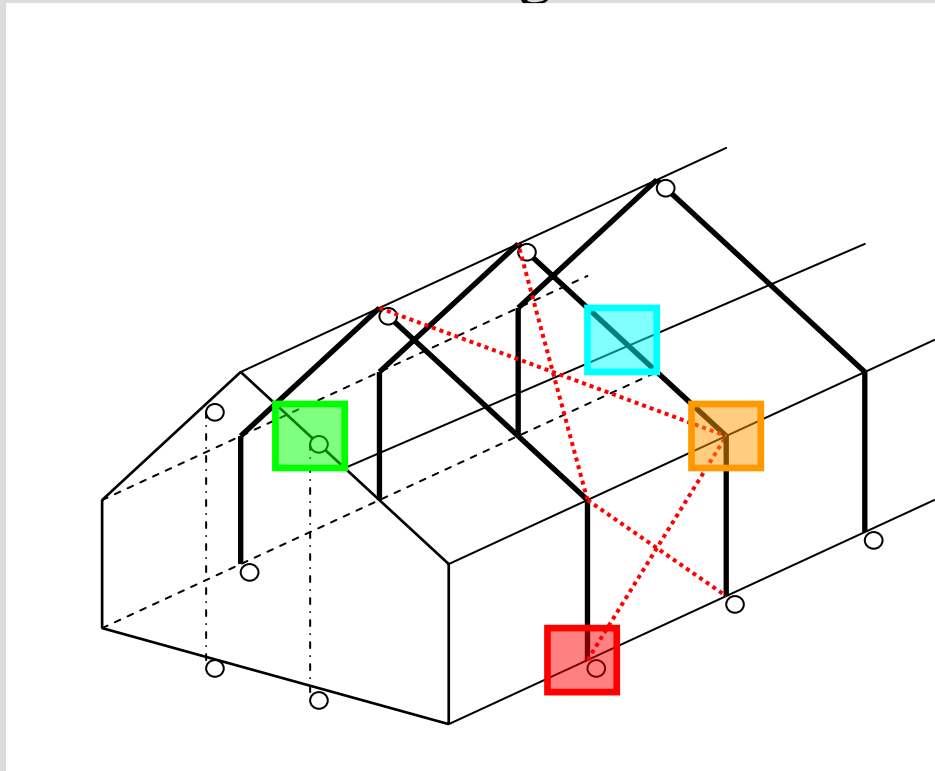


Horizontal load on the gable:

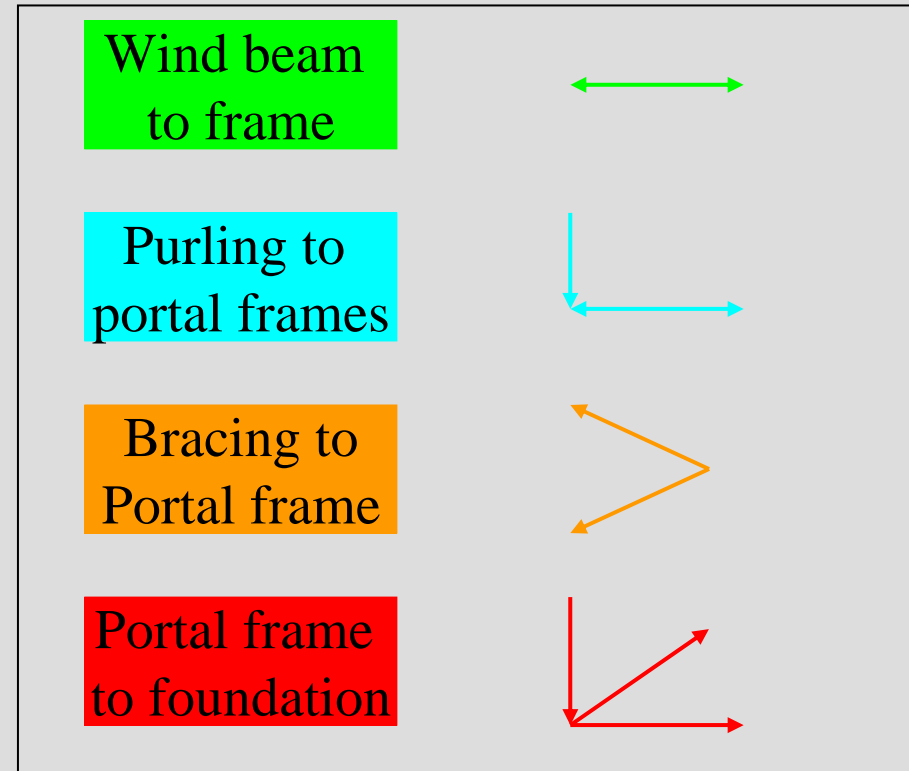
The load is transferred by **slab function** in the facade to the wind beams in the gable. From there the load is transferred with **beam function** to the foundations and to the roof construction. The purling (compression bar) transfer the load to the bracing. With **tie rod function** in the bracing the load is transferred to the foundation under the facade.

Outline. Find load transferring connections.

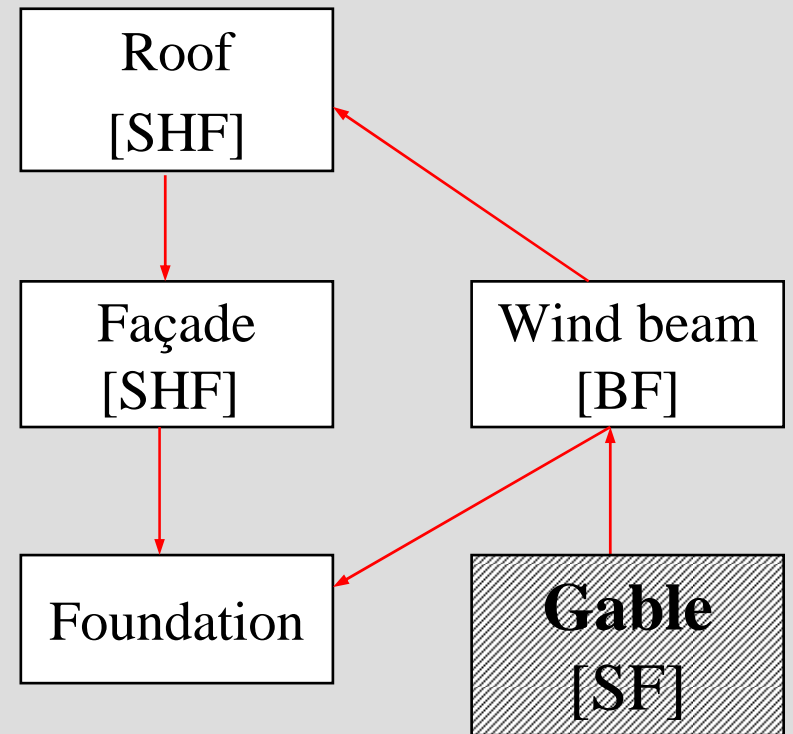
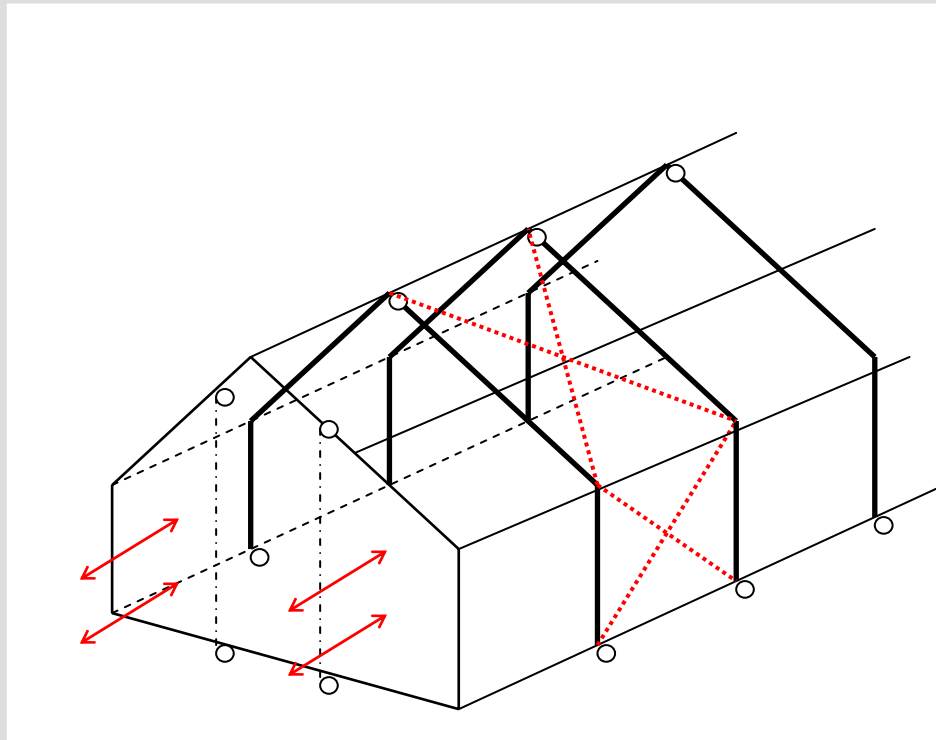
Load transferring details.



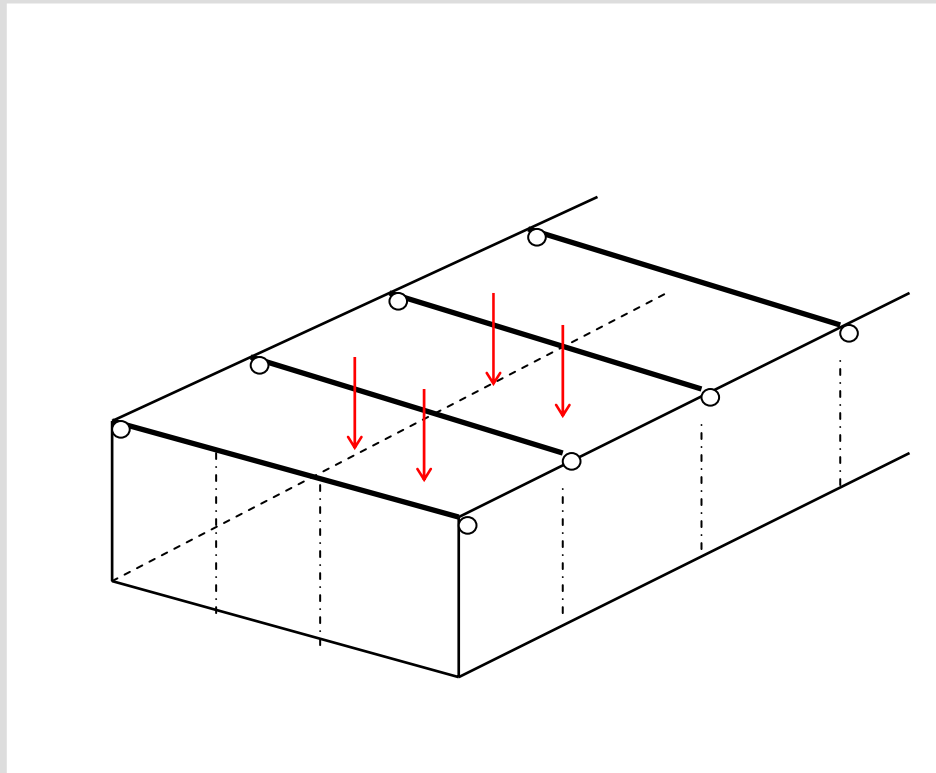
Load directions



Outline. Ex. 1B



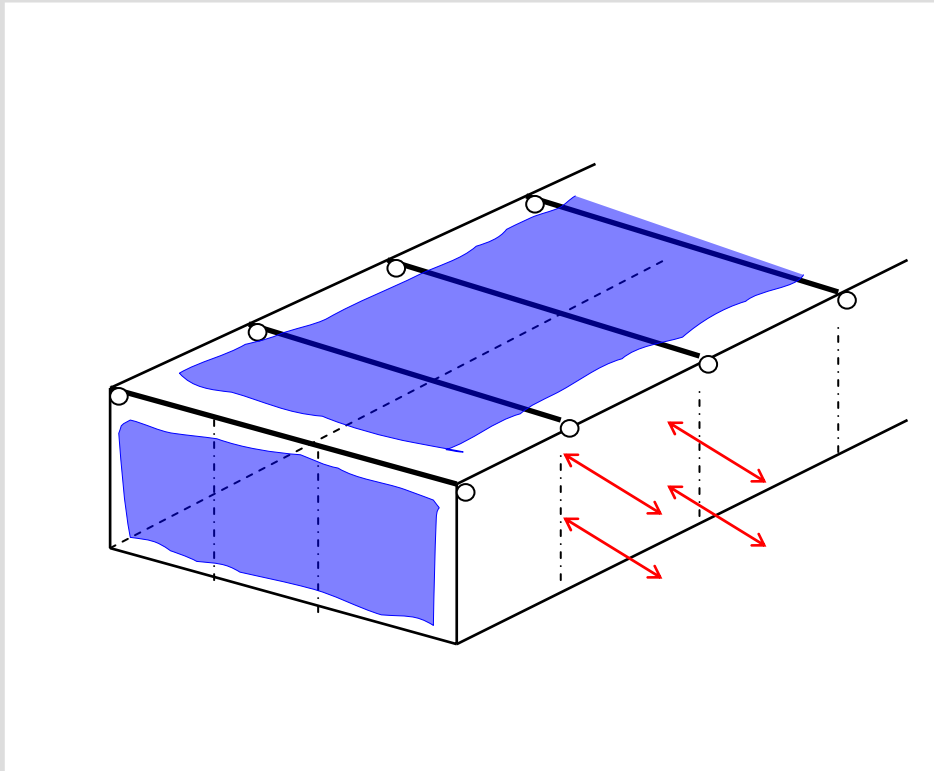
Outline. Ex. 2A



Vertical load :

The load is transferred by **slab-beam function** in the roof to the main beam. The main beam transfer the load to the facade by **beam function** The facade transfer the load to the foundations with **column function**.

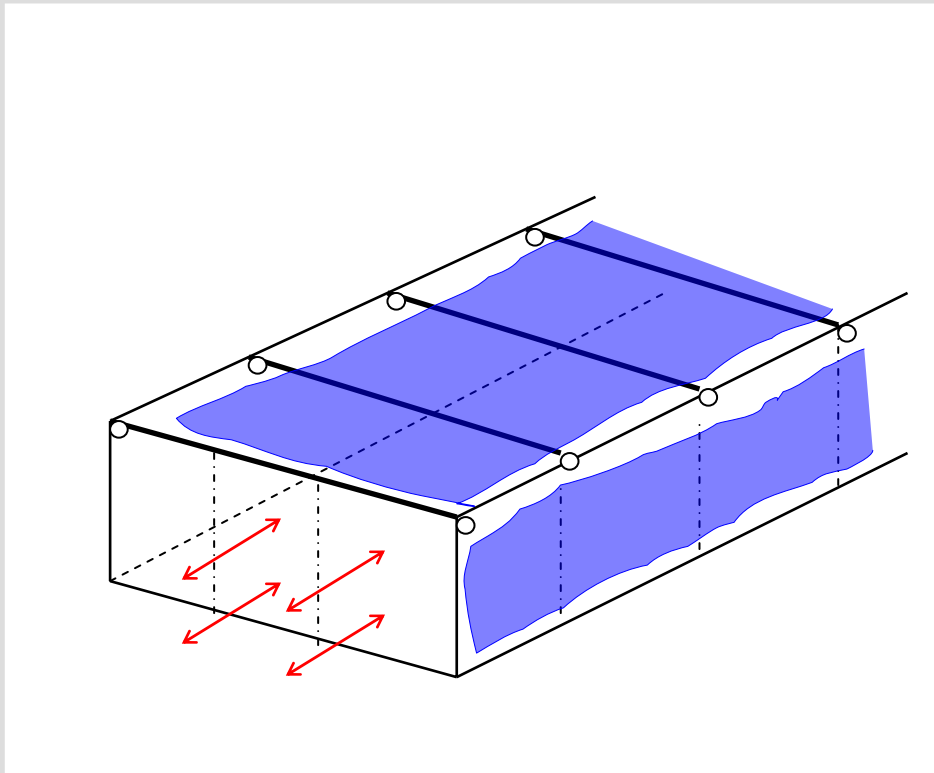
Outline. Ex. 2A



Horizontal load on the facade

The load is transferred by **slab function** in the facade to the roof and to the foundation. The **shear function** in the roof transfer the load to the gable and from there by **shear function** to the foundation.

Outline. Ex. 2A



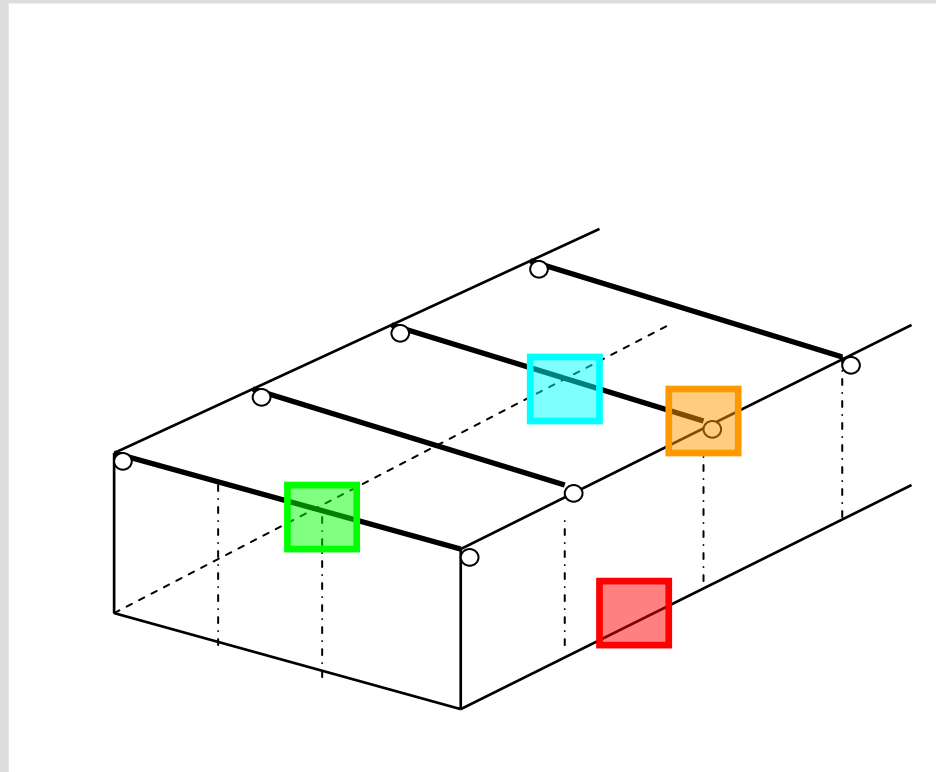
Vertical load on the gable.

The load is transferred by **slab function** in the gable to the roof and the foundation.

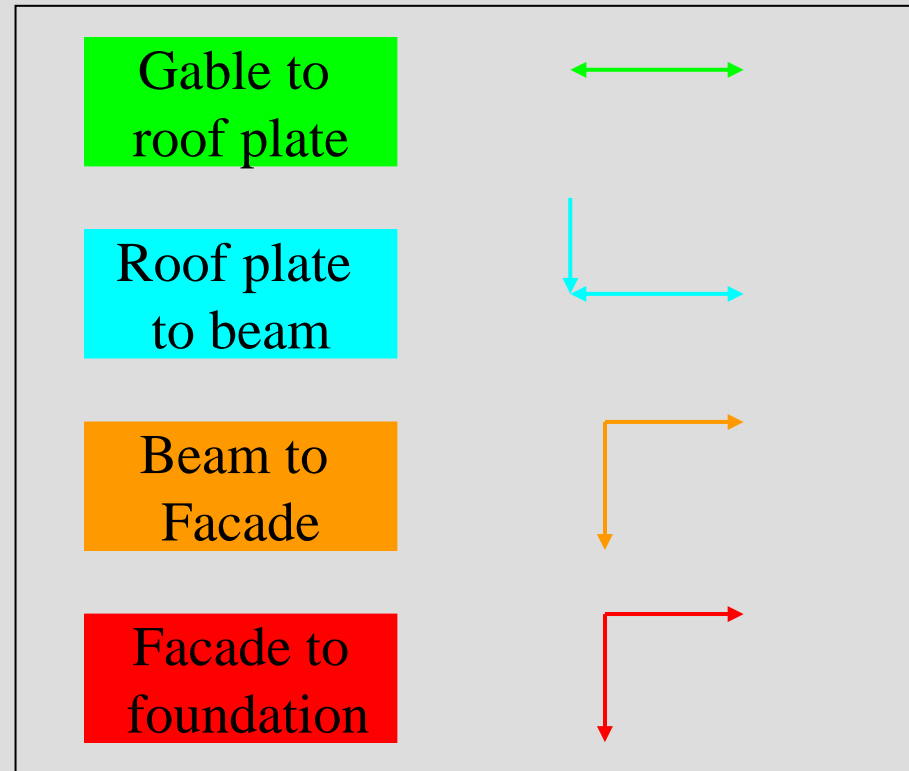
The **shear function** in the roof transfer the load to the facade and from there with **shear function** to the foundation.

Outline. Find load transferring connections.

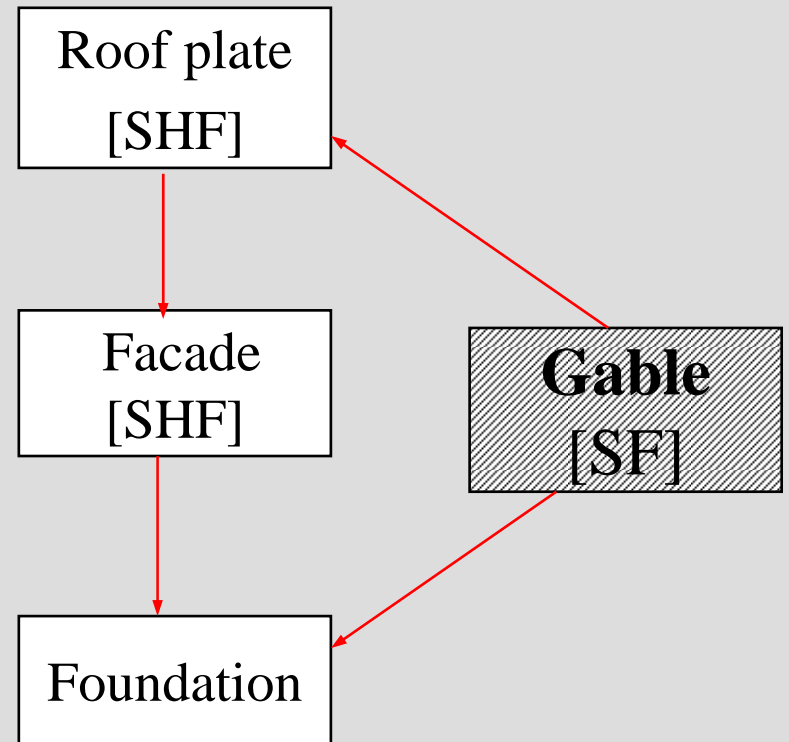
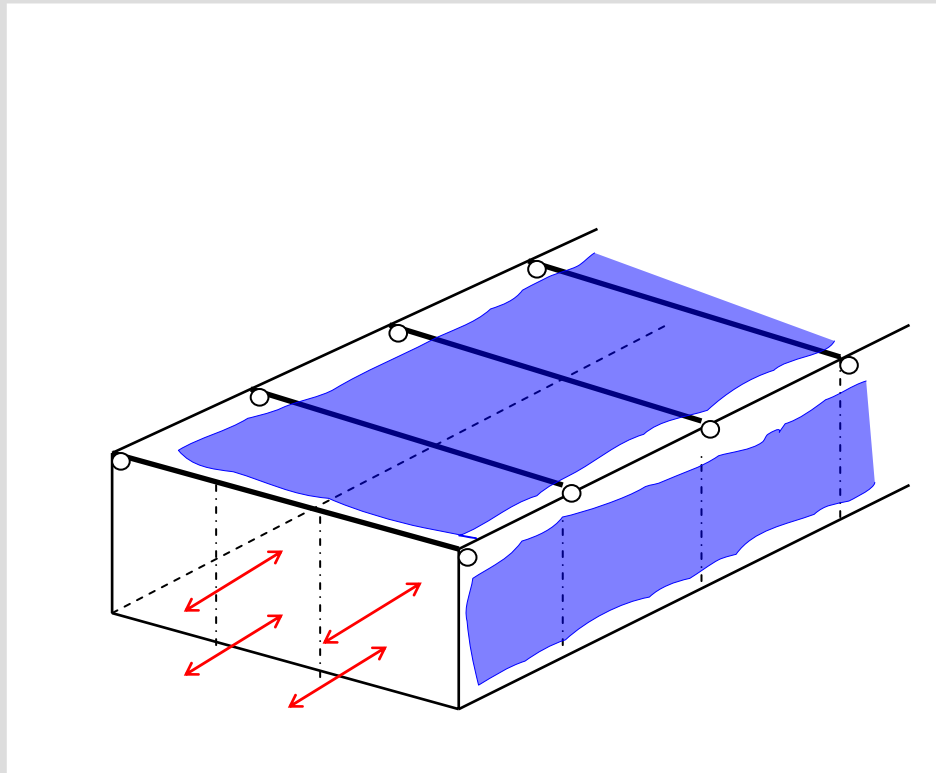
Chosen details.



Load direction

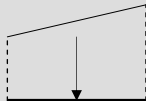
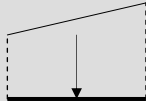






Outline. Ex. 2B




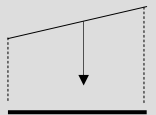

An early stage estimate

Design dead load [kN/m²]

Load type	Construction	Dwellings max 3 storey	Hall	The area used for calculation	Load direktion
Dead load	Light roof	0,4	0,5	Vertical projection of the surface.	
	Heavy roof	0,7	3,0	Horizontal projection of the surface.	
	Light storey partition	0,7		Floor area	
	Heavy storey partition	3,5		Floor area	
	Light wall	1,0	1,0	Wall surface	
	Heavy wall	4,0	4,0	Wall surface	

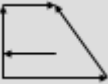
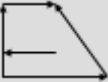

An early stage estimate

Variable load [kN/m²]

Load type	Construction	Dwellings max 3 storey's	Hall	The area used for calculation	Load direction
Imposed load		2,5	3,0	Floor area	
Snow load		0,8	0,8	Horizontal projection of the surface.	
1,5% mass load		1,5	0,8	Floor area	

An early stage estimate

Variable load [kN/m²]

Load type	Construction	Dwellings max 3 storey's	Hall	The area used for calculation	Load direction
Wind pres. And suc.	Roof surface $\leq 40^\circ$	0,5 - 0,2	0,5- 0,2	Vertical projection of the surface.	
	Wall surface	1,0	1,0	Vertical projection of the surface.	
Wind suction	Roof surface 0°	2,0	2,0	Horizontal projection of the surface.	
	Roof surface $\leq 40^\circ$	1,0 - 0,5	1,0- 0,5	Horizontal projection of the surface.	