

LOW-ENERGY HOUSE IN SISIMIUT

- A paper on
HOLISTIC DESIGN
- with focus on
**STRUCTURAL FUNCTIONS &
THERMAL BRIDGES**
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HOLISTIC DESIGN

- By Holistic Design means:
- to take into account all relevant functional requirements for the project in question,
- f.inst.
 - general requirements from building codes
 - special actions from use or climate
 - special demands from the client

DESIGN CO-OPERATION

- By design co-operation or integrated design means:
- dialogues between architects, engineers, contractors and the client, for the purpose of
 - avoiding re-designs in the design process
 - utilizing the present knowledge and experience
 - improving productivity and quality

NORMAL FUNCTIONAL REQUIREMENTS IN CODES

- House building design should as a minimum involve evaluation of all functional requirements from codes, i.e:
 - statical requirements: strength and stiffness
 - acoustical req.: sound reduction
 - thermal req.: heat loss and thermal bridges
 - moisture: condensation internal or on surfaces, rain and snow in combination with wind
 - fire: rating structures, components and joints

HOLISTIC DESIGN IN PRACTICE

- Holistic design is the art of compromising,- f.inst:
 - focus on load-bearing functions means risks of sound transportation and of thermal bridges
 - focus on fire protective structures right through the building envelope means risks of thermal bridges
 - focus on thermal bridges could lead to bad structural performance
 - etc

GENERAL DESIGN PROCEDURE

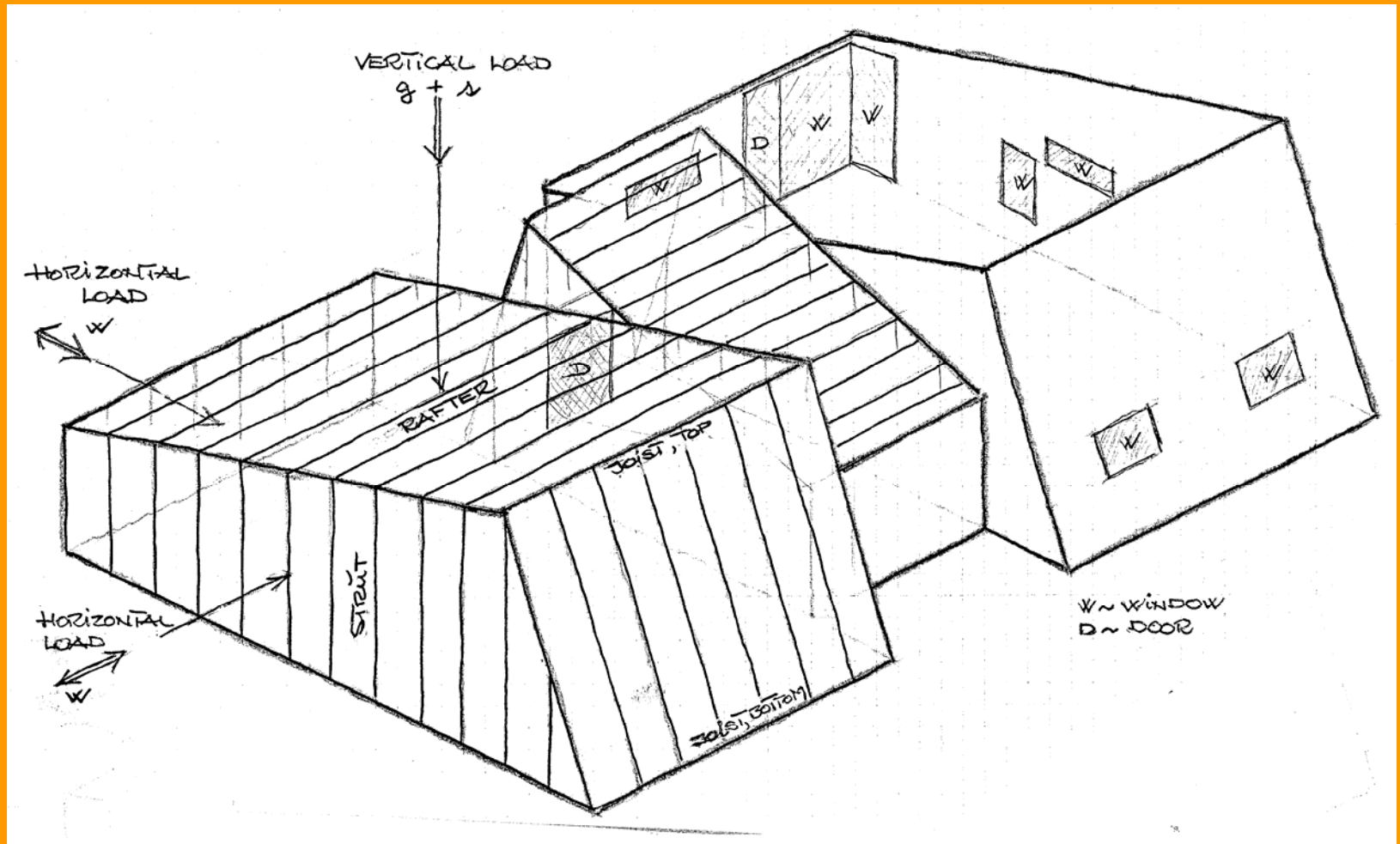
- 1. Load assessments
- 2. Defining the calculation model
- 3. Analyses

- For structural performances:
 - load tables and load estimates
 - structural system with **load path description**
 - internal forces, reactions, stresses, deformations

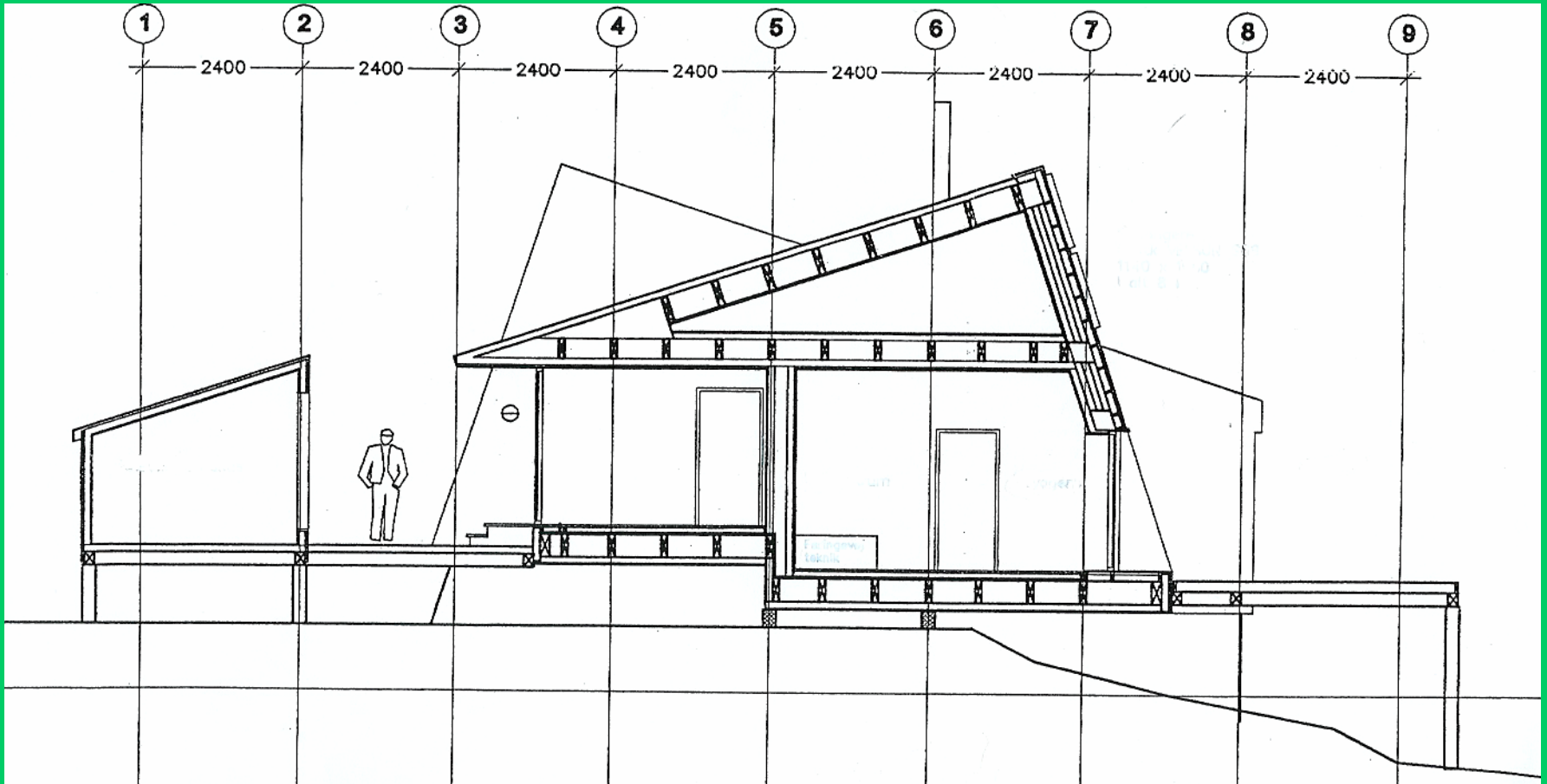
DESIGN PROCEDURE, cont.

- For thermal resistance requirements:
 - design temperatures, inside/outside plus
 - formulars for energy transportation
 - evaluation of heat loss and thermal bridges
- all results have to be presented as calculations, specifications and *drawings, from which houses are built.*

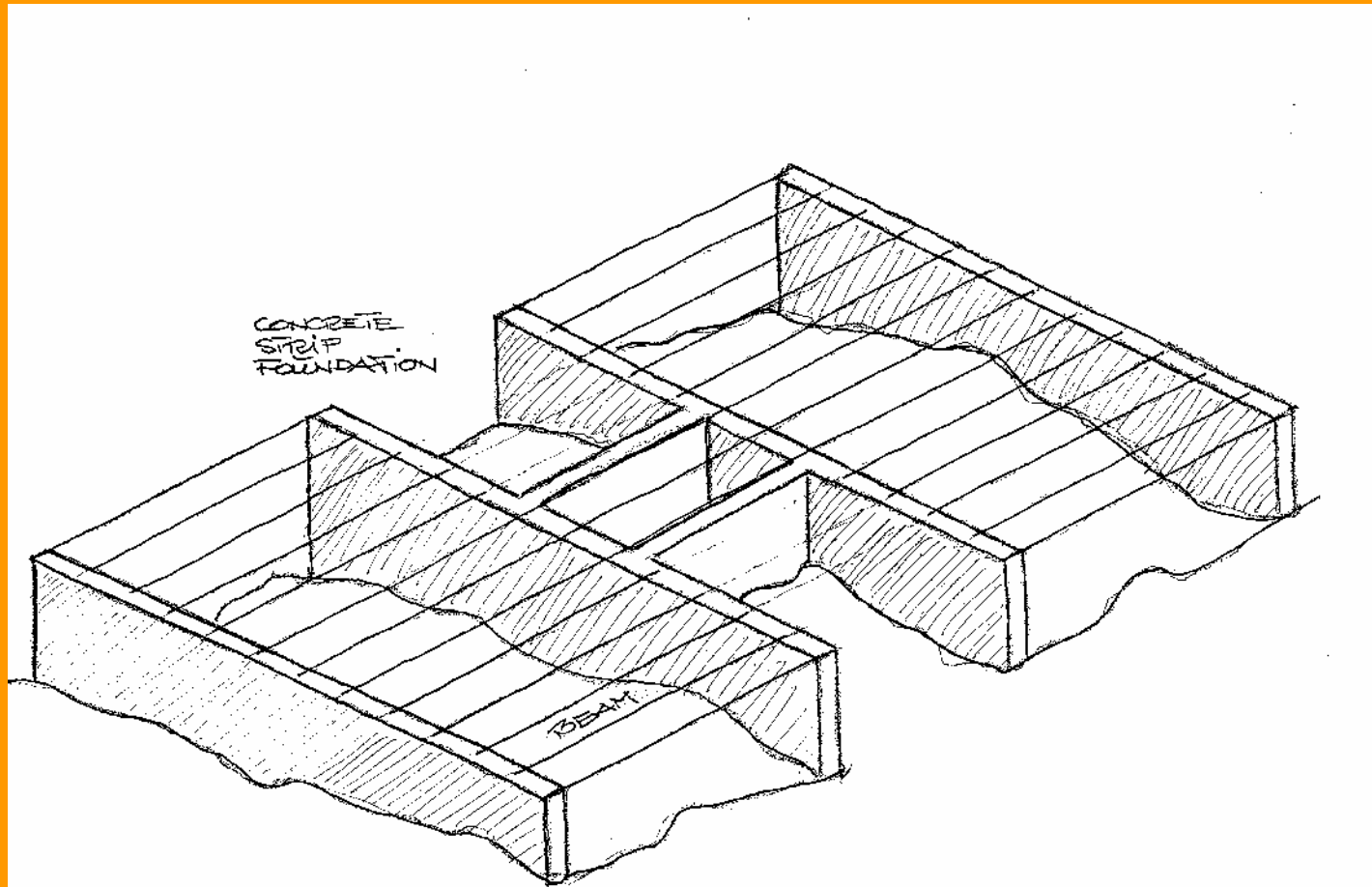
THE LOW-ENERGY HOUSE



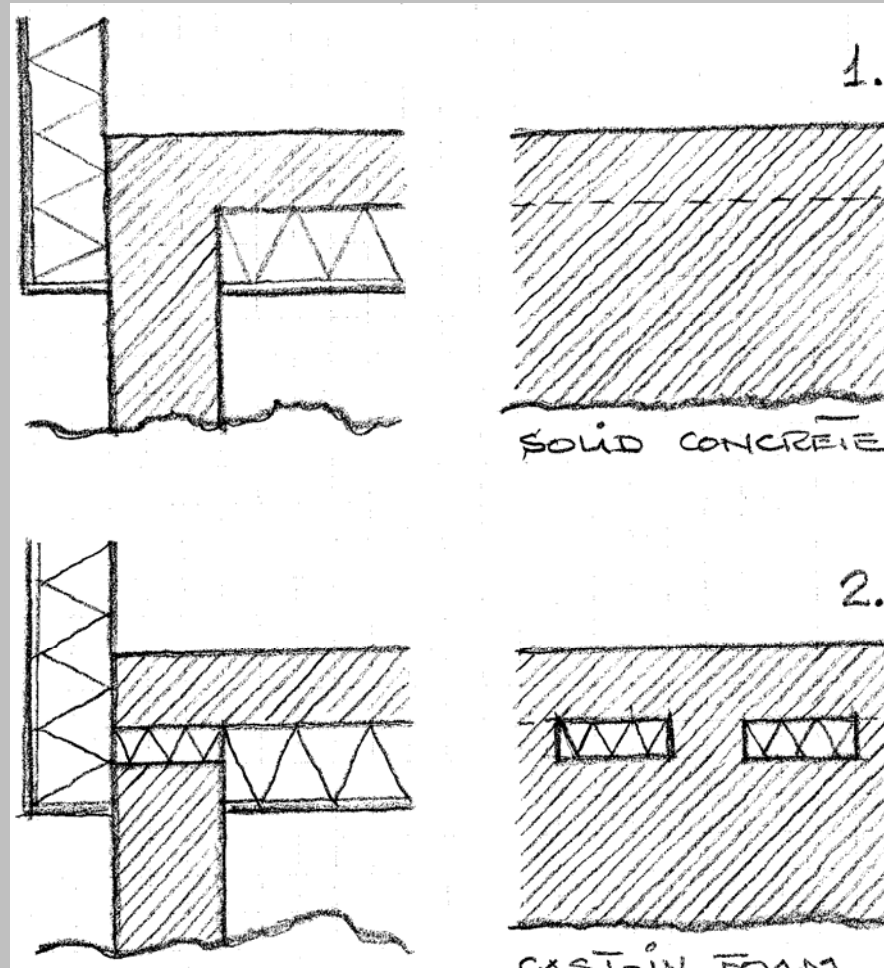
CROSS-SECTION



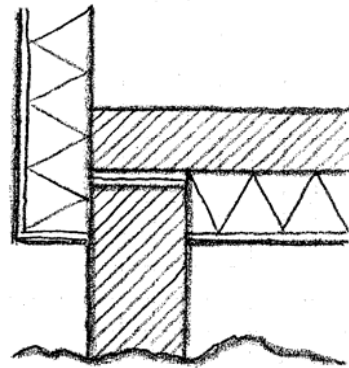
THE FOUNDATION SYSTEM



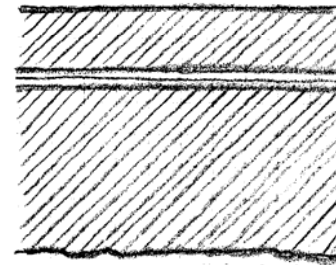
FOUNDATION-SLAB-WALL 1



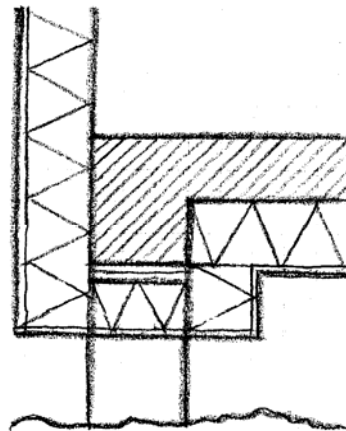
FOUNDATION-SLAB-WALL 2



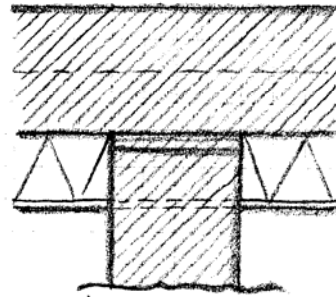
3.



NEOPRENE IN SUPPORT

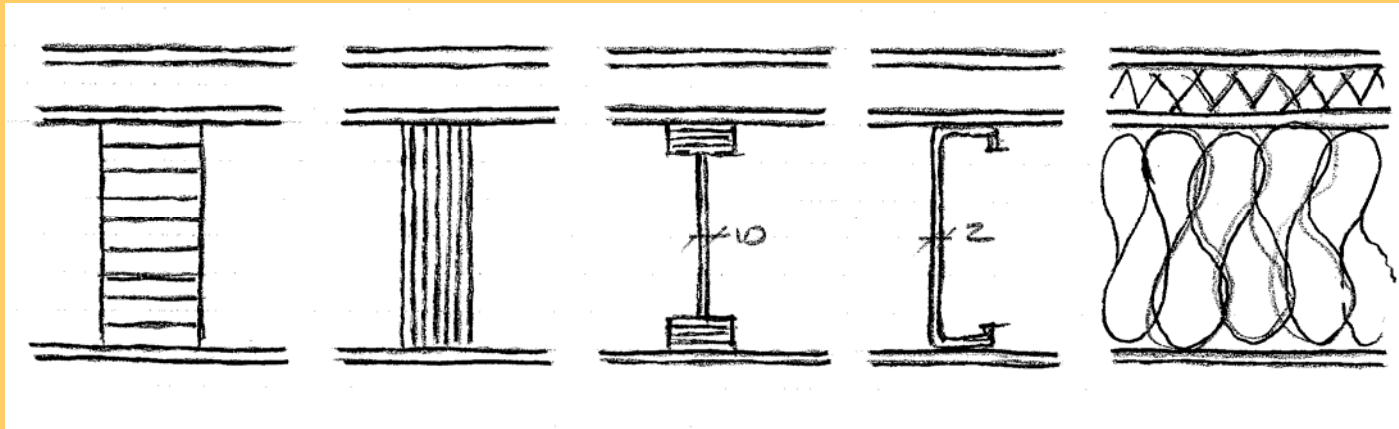


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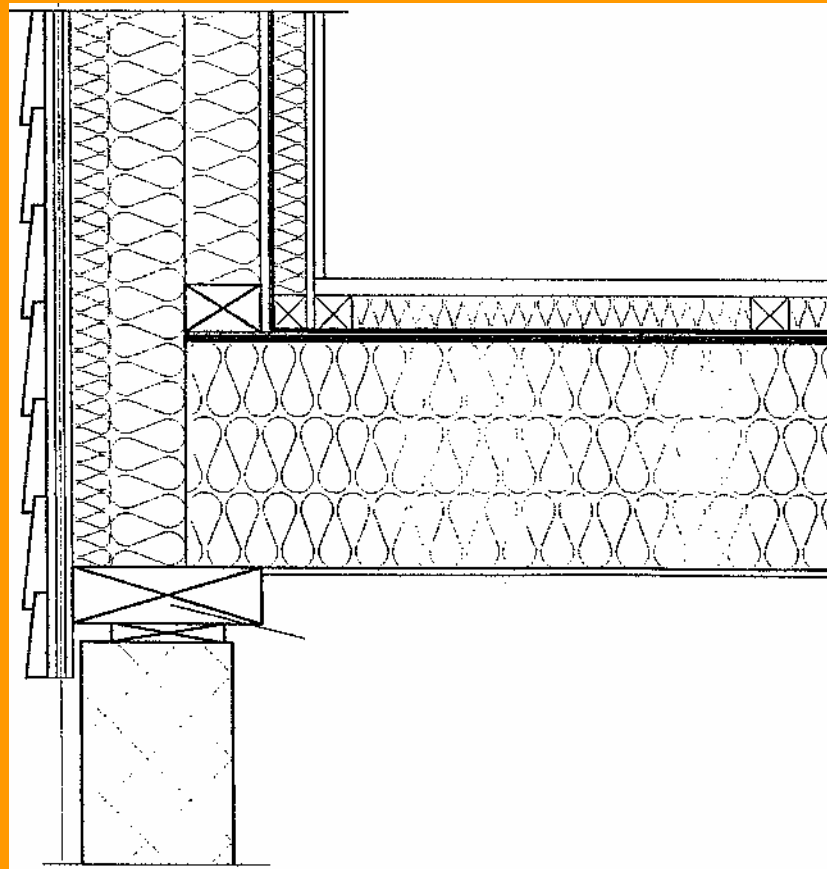


COLUMN-BEAM
NEOPRENE

LIGHT-WEIGHT SLAB STRUCTURES



ASSEMBLY DETAIL: FOUNDATION-SLAB-WALL



CONCLUSION

- the SISIMIUT Low-Energy-House is equipped with many monitoring systems:
 - measuring temperature and moisture content in the building envelope
 - measuring energy consumption
 - and only the future will show, if a proper holistic design has been carried out!
 - THANK YOU