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HAMK



SUSTAINABLE, HIGH-PERFORMANCE BUILDING SOLUTIONS IN WOOD

2020-1-LV01-KA203-077513

Architecture how to think in timber

Martin Aichholzer | FH Campus Wien

10.05.2022



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Cracow University
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KVKK
KLAIPĖDOS
VALSTYBINĖ
KOLEGIJA



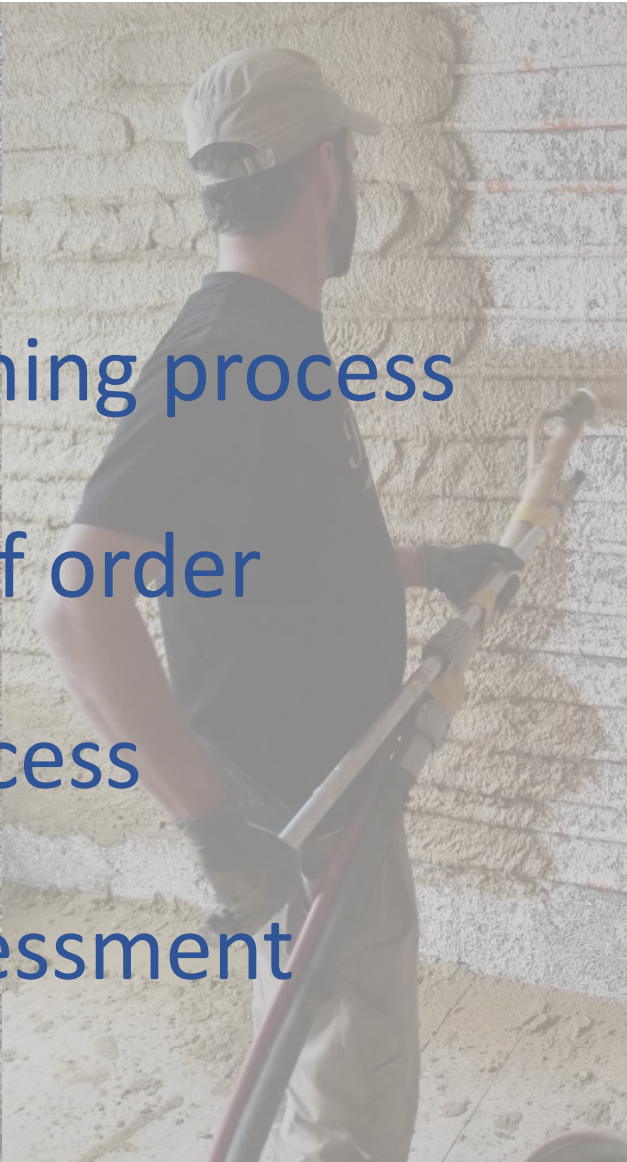
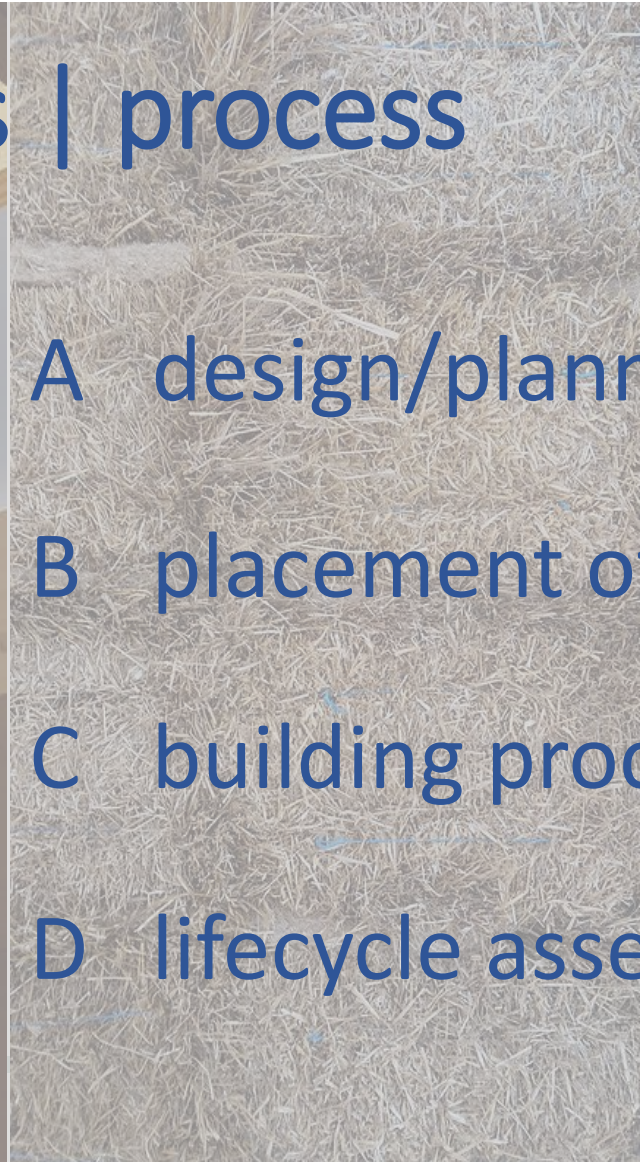
strategies | process

A design/planning process

B placement of order

C building process

D lifecycle assessment





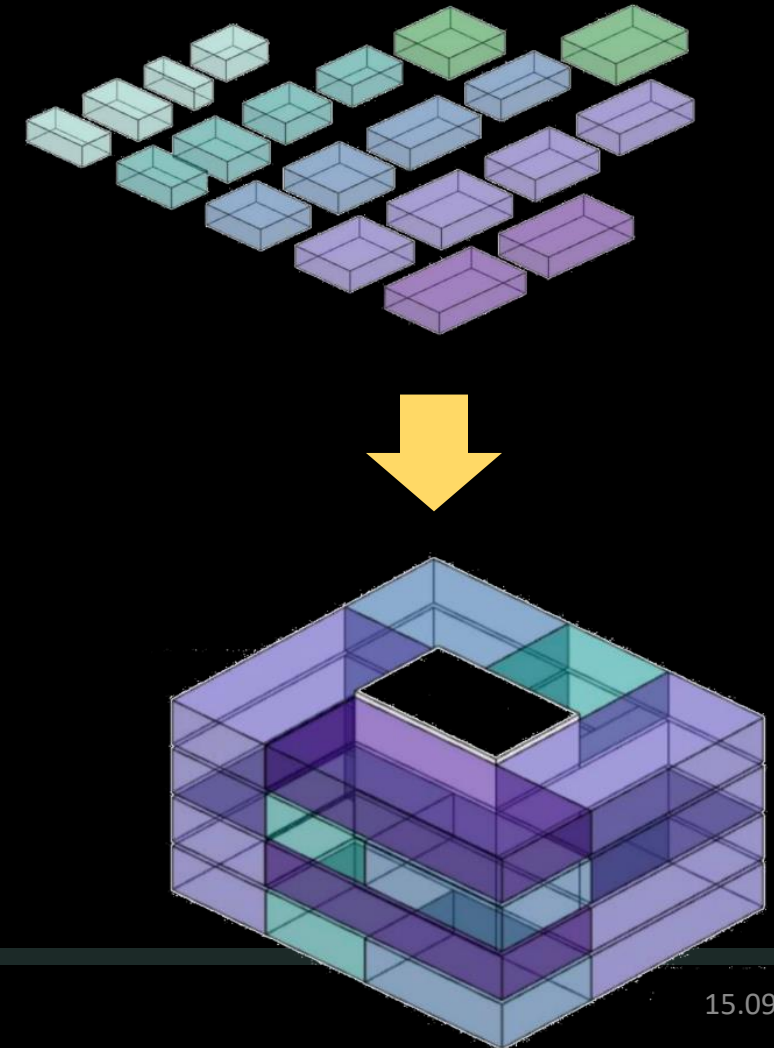
Low-Tech aspects

- “as low as we can go“
- Preferring non-complex, low-carbon, local, durable, reusable and renewable resources instead of „technical solutions“
- Priority: basic needs and demands of the users
- supports local companies
- respects local building cultures



Design Process

- construction units - pre-fabricated and standardized
- Modularity: approach is easily applicable
- Design/planning phase - shortened noticeably
- saves a considerable amount of time and thus money



Construction Process

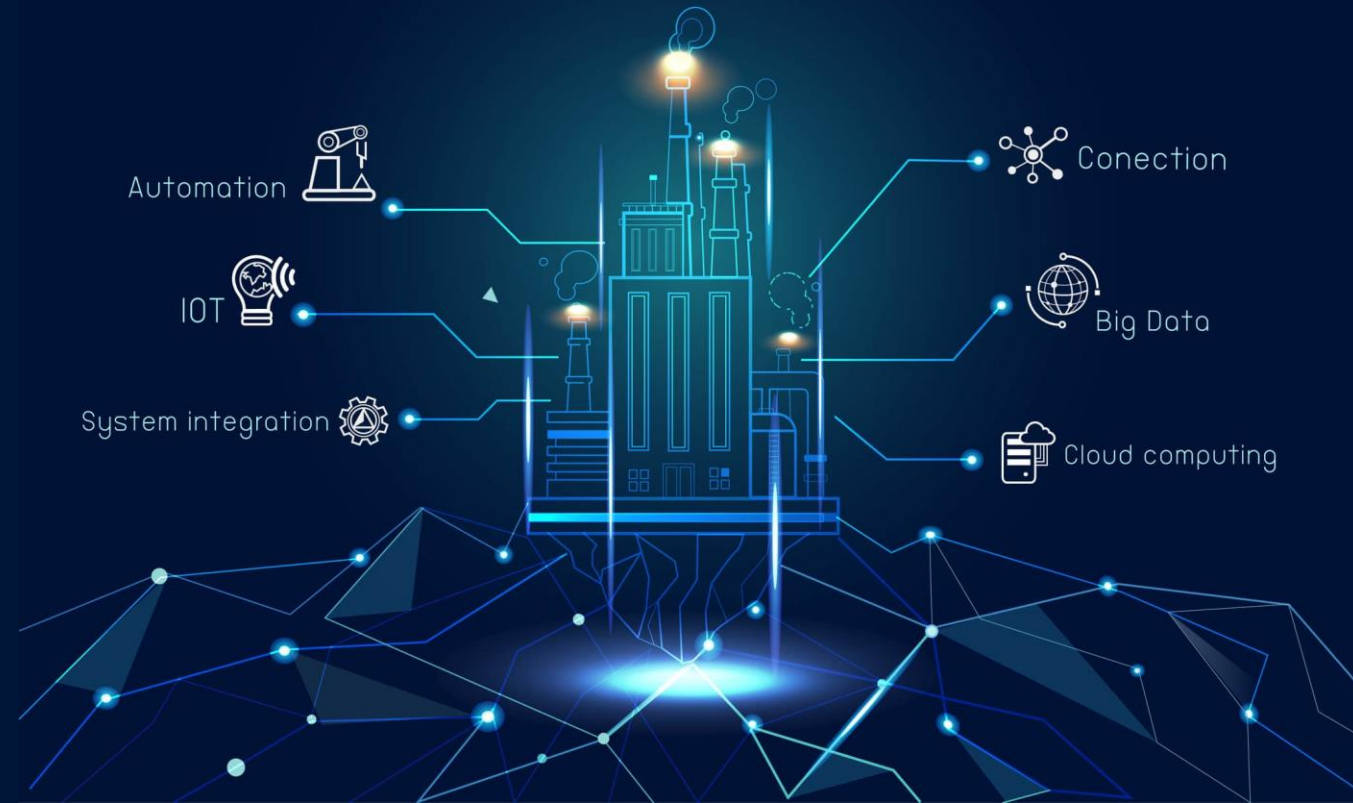
- Rethinking of the construction process:
 1. detailed planning stage
 2. Pre-production stage (clean production facility)
 3. logistics and transportation stage
 4. mounting stage on the dry construction site
- More controlled environment
- Increase in safety and quality standards



15.09.2023

BIM (Building Information Modelling)

INDUSTRY 4.0



digital copy of the building

all data needed for the producing, erecting and operating processes

Definition of "integrated design"

- Targeted creative process
- Group of experts
- Different disziplines
- Solution of a complex technical task

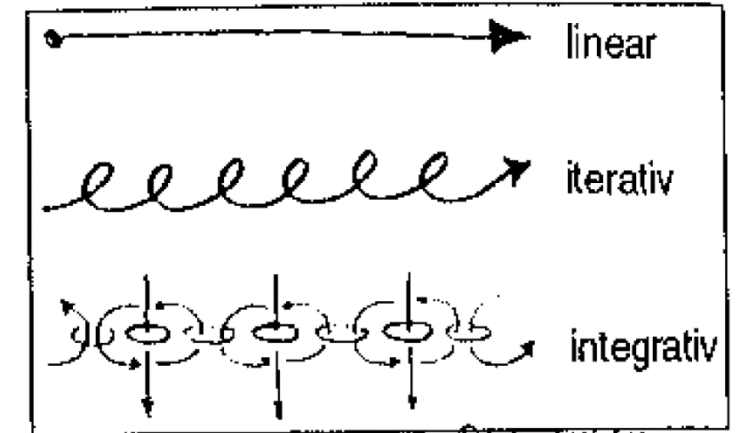


Abb. 2: Linearität – Iteration – Integration
© Löhner & Partner

Integrated design stands for

- Holistic approach to the planning of buildings
- Simultaneous participation of all disciplines and stakeholders involved in the planning process
- Early involvement of all necessary experts in the planning team
- Coordinated processing of the planning task
- involvement, already in the conceptual phase

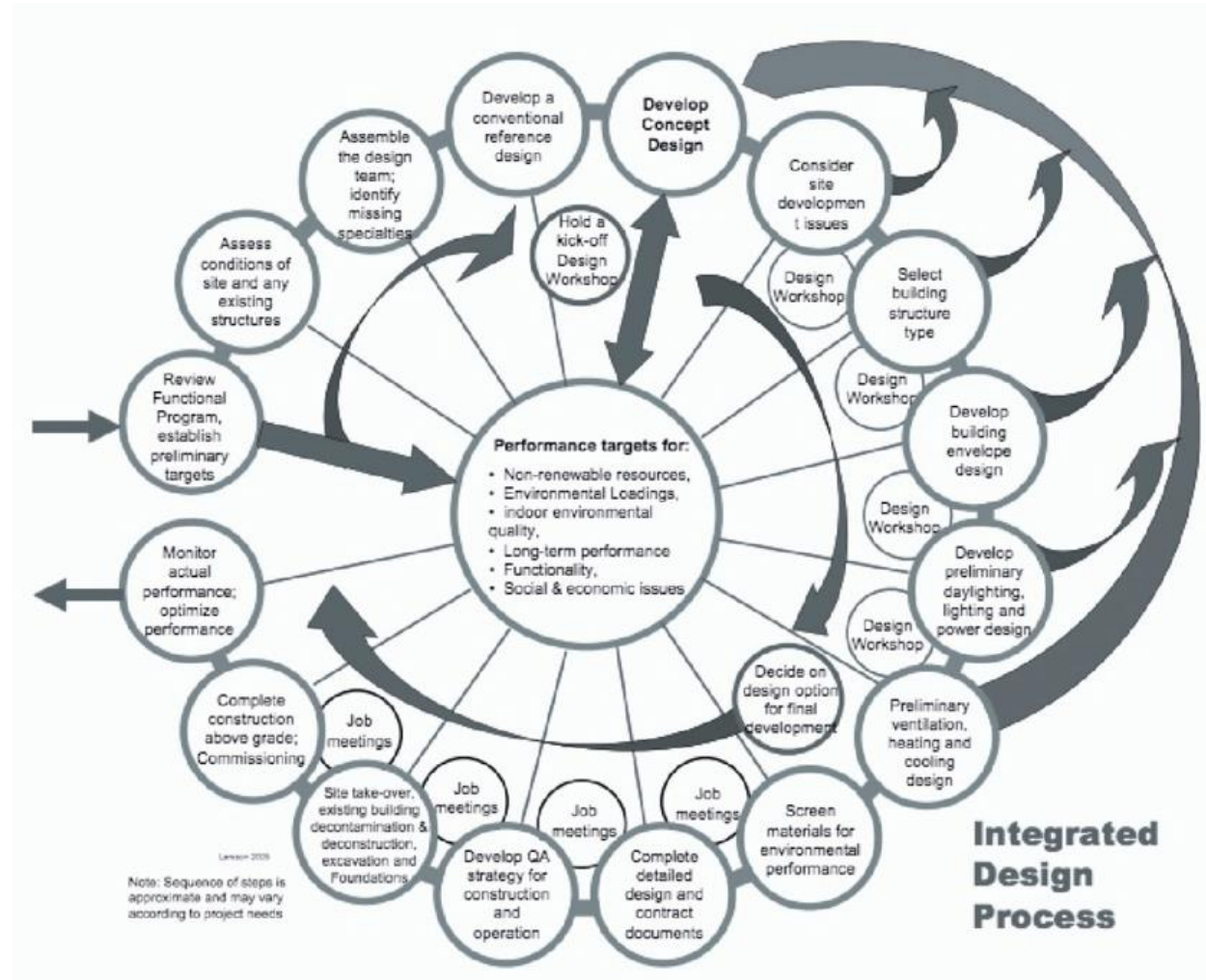
Expectations vs. planners

- Common goal definition
- Identification of conflicting goals
- Resolving conflicting goals
- prepare that they can be solved together.



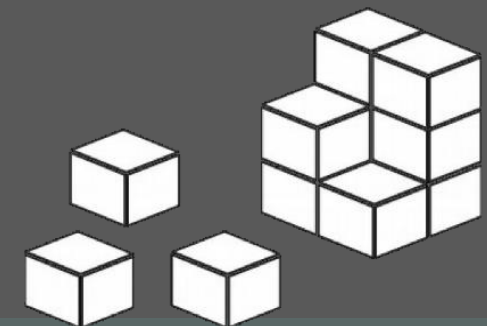
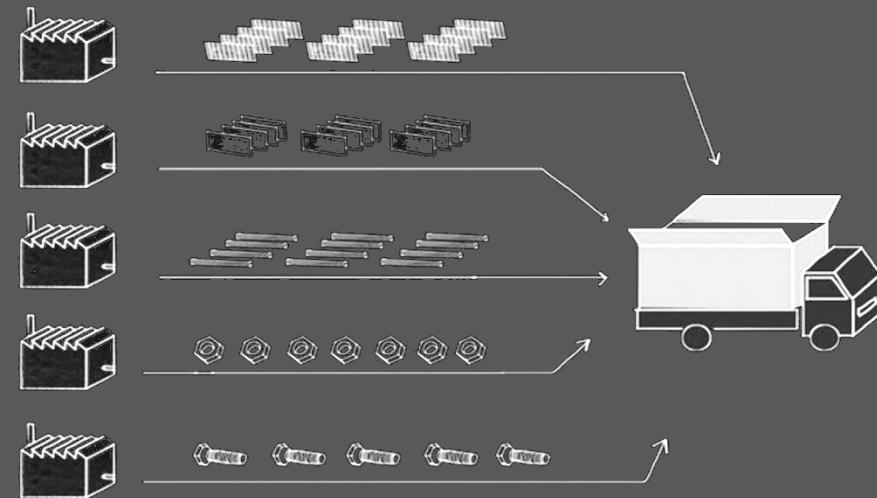
General task:

the best possible design for
the life cycle of a building



Lean Management

- serial production / specialization of pre-fabricated, standardized and dismantlable building parts
- Efficient building process – no overproduction
- Reduction of production costs
- supports the local economy and the utilization of low-tech and low-carbon building materials





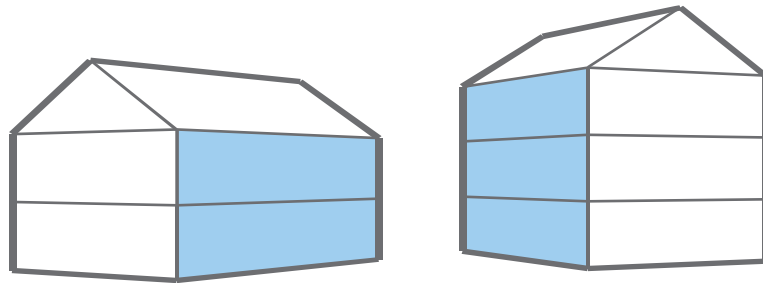
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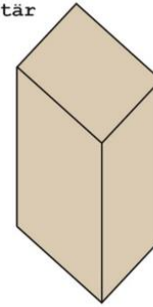
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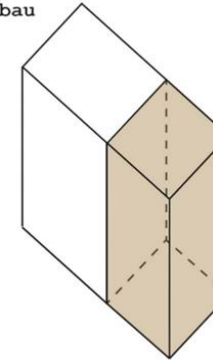
What is the task?



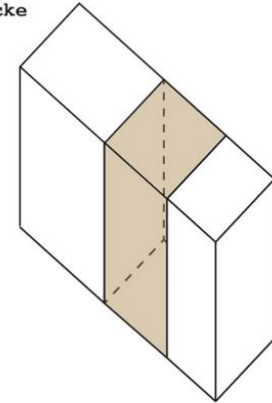
Solitär



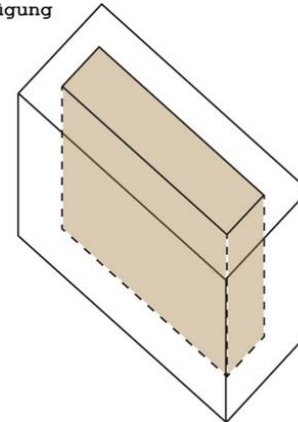
Anbau



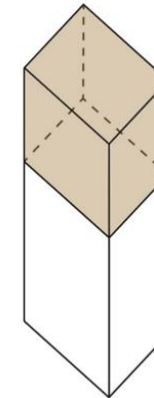
Baulücke



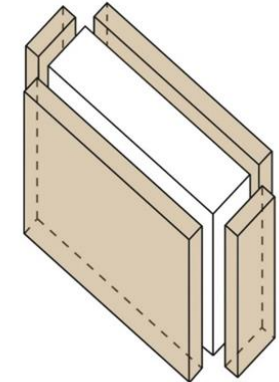
Einfügung



Aufstockung



Hülle





ca. 28 m

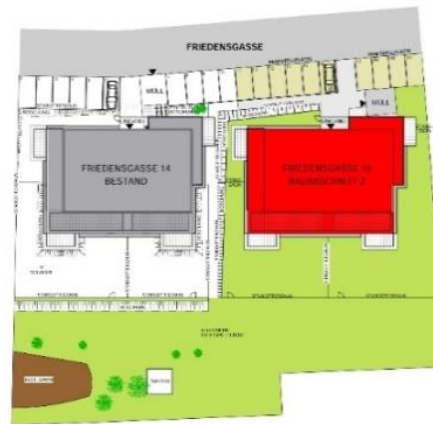
ca. 37 m



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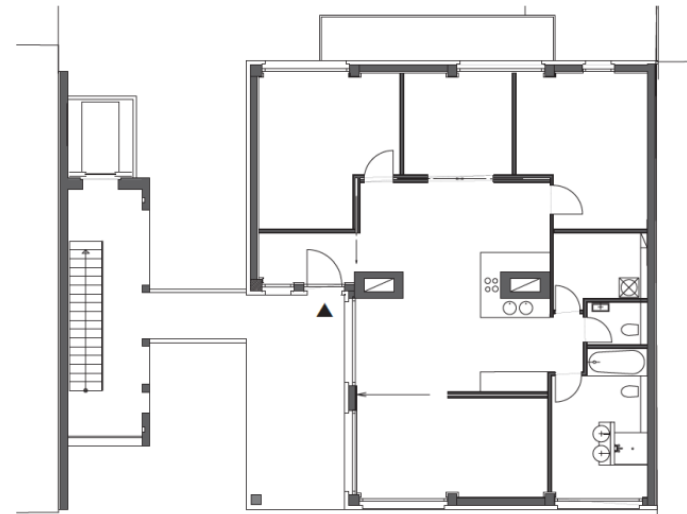
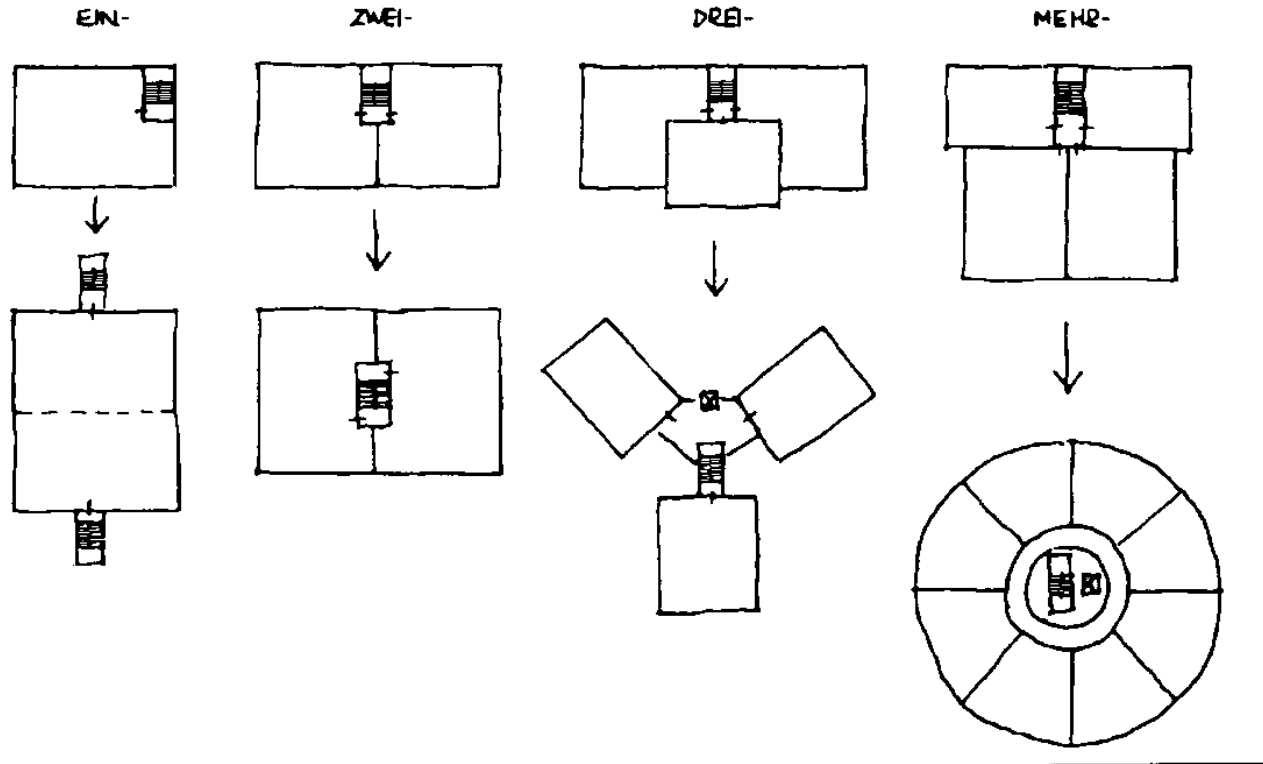
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Typologies of residential buildings

Spännertyp

TYPLOGIE DER SPANNER





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Typologies of residential buildings

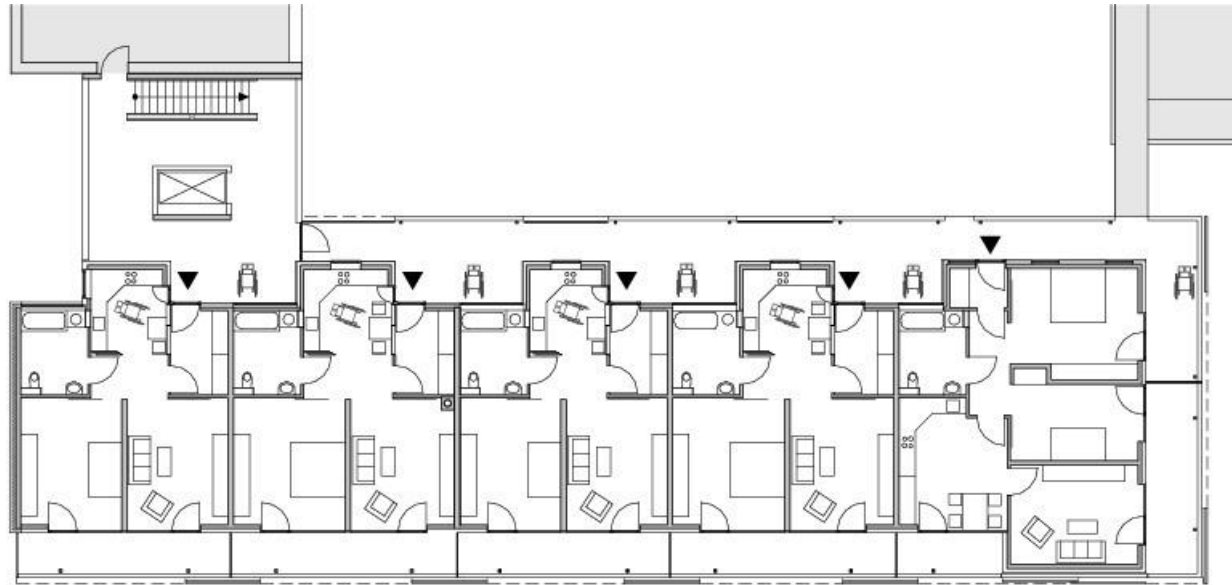
arcade type





Typologies of residential buildings

„arcade type“



Grundriss 1.-4. Obergeschoss, M 1 : 333 1/3



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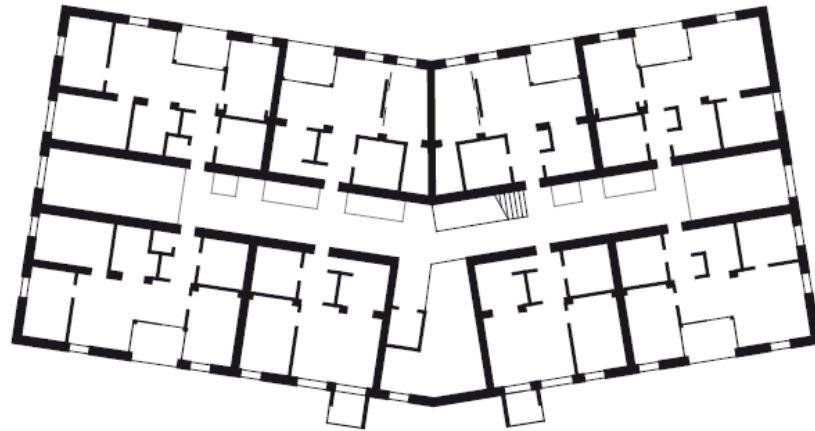


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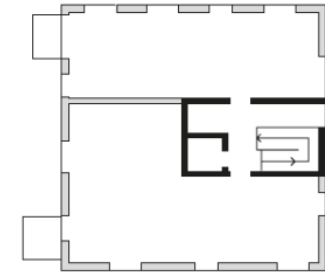
Typologies of residential buildings

medium aisle type



Regelgeschoss  10 m

5 m





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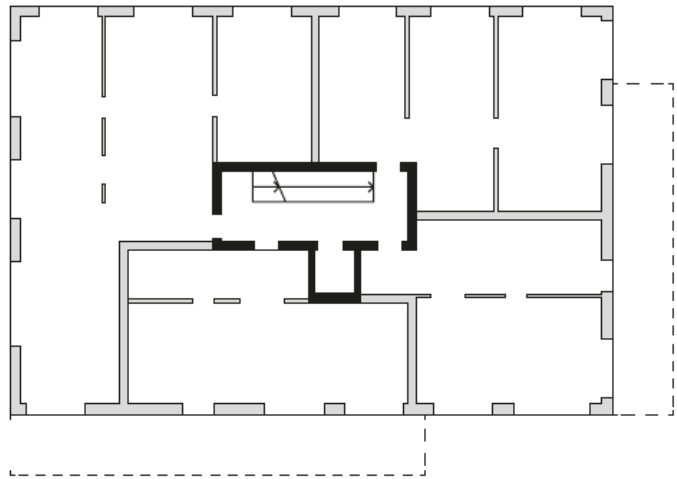
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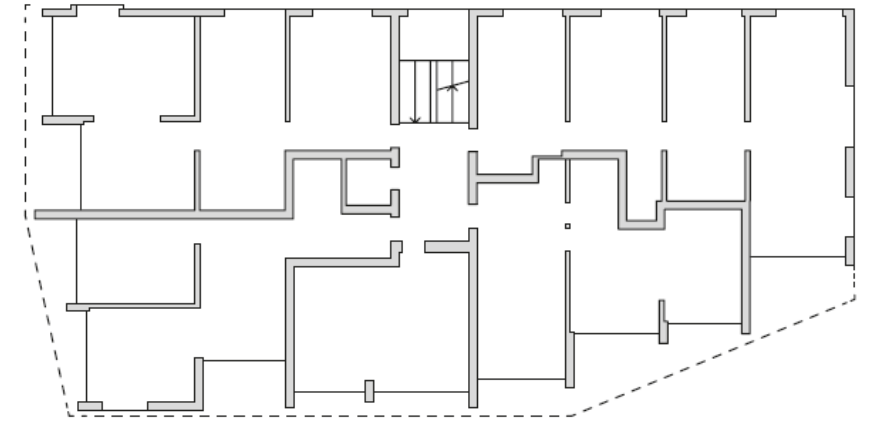
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Typologies of residential buildings central type



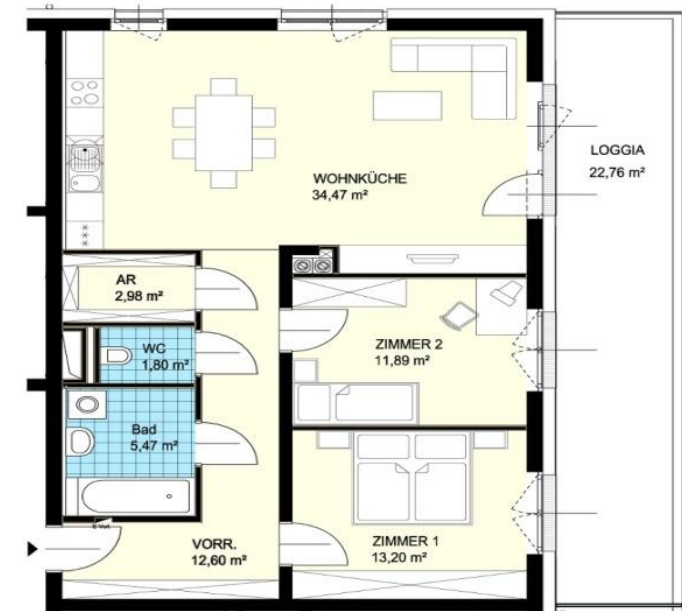
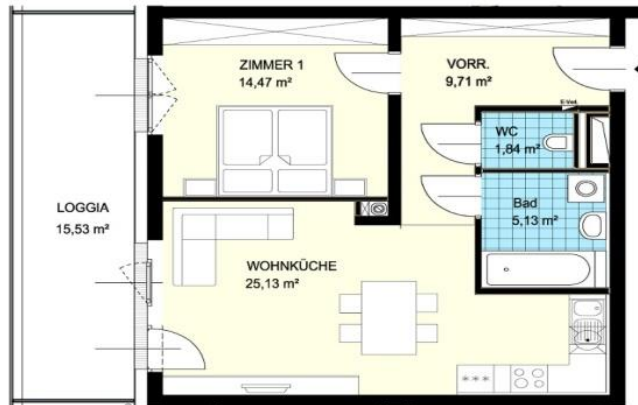
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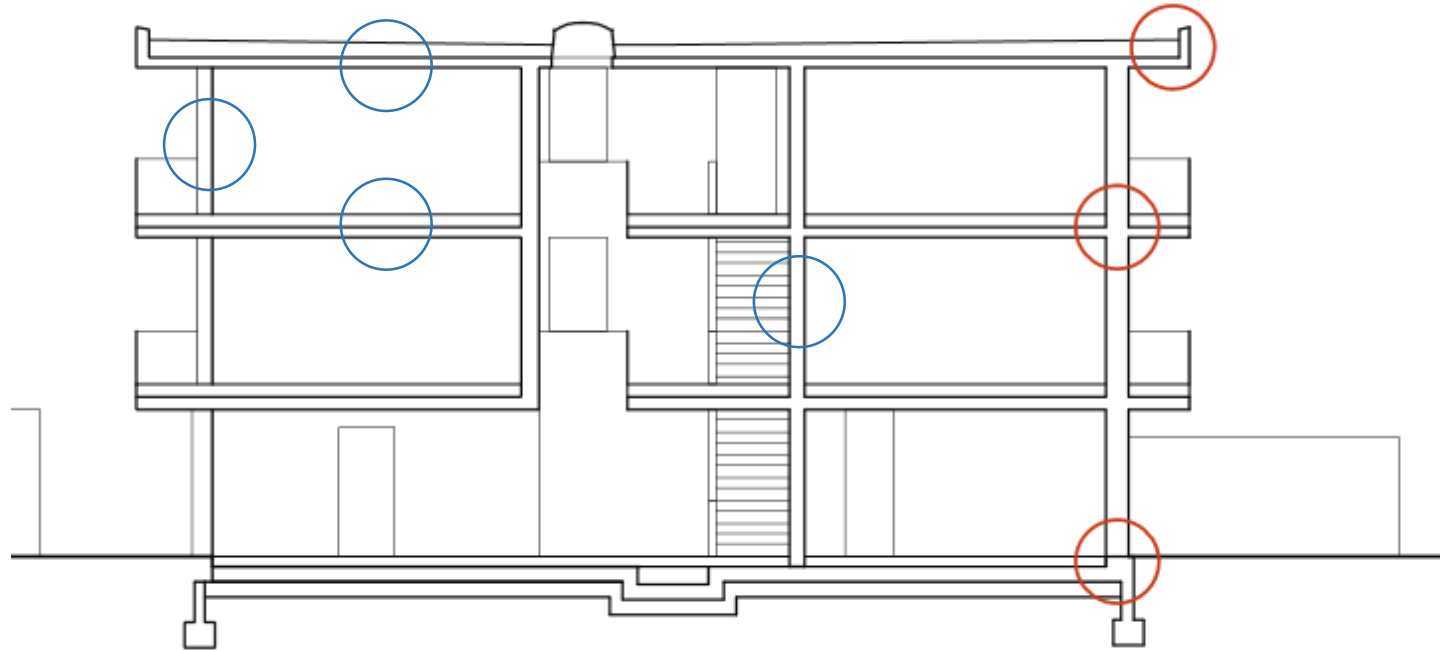


- 2 rooms
- 3 rooms
- 4 rooms (seldom)
- 5 Zimmer (seldom)

Living space : 50m² bis 85m² avg.



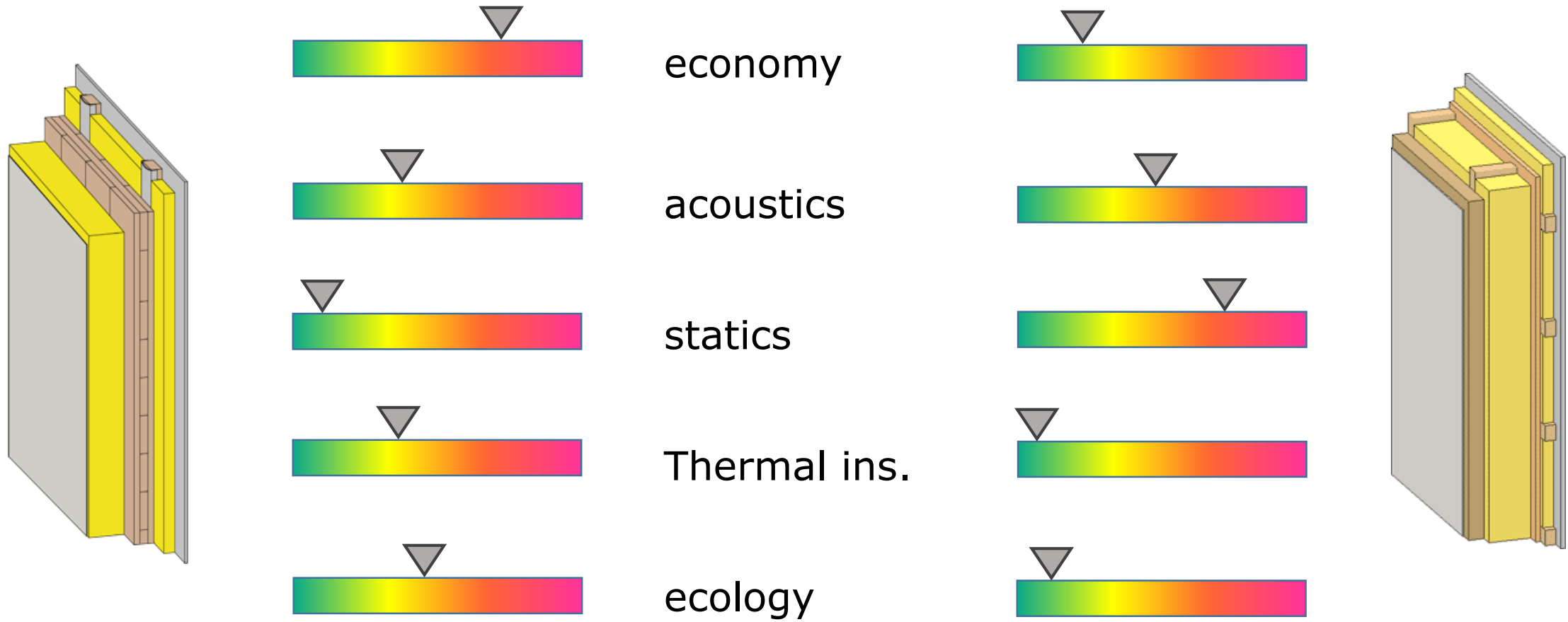
Elements of wood constructions | layers | building skin



walls

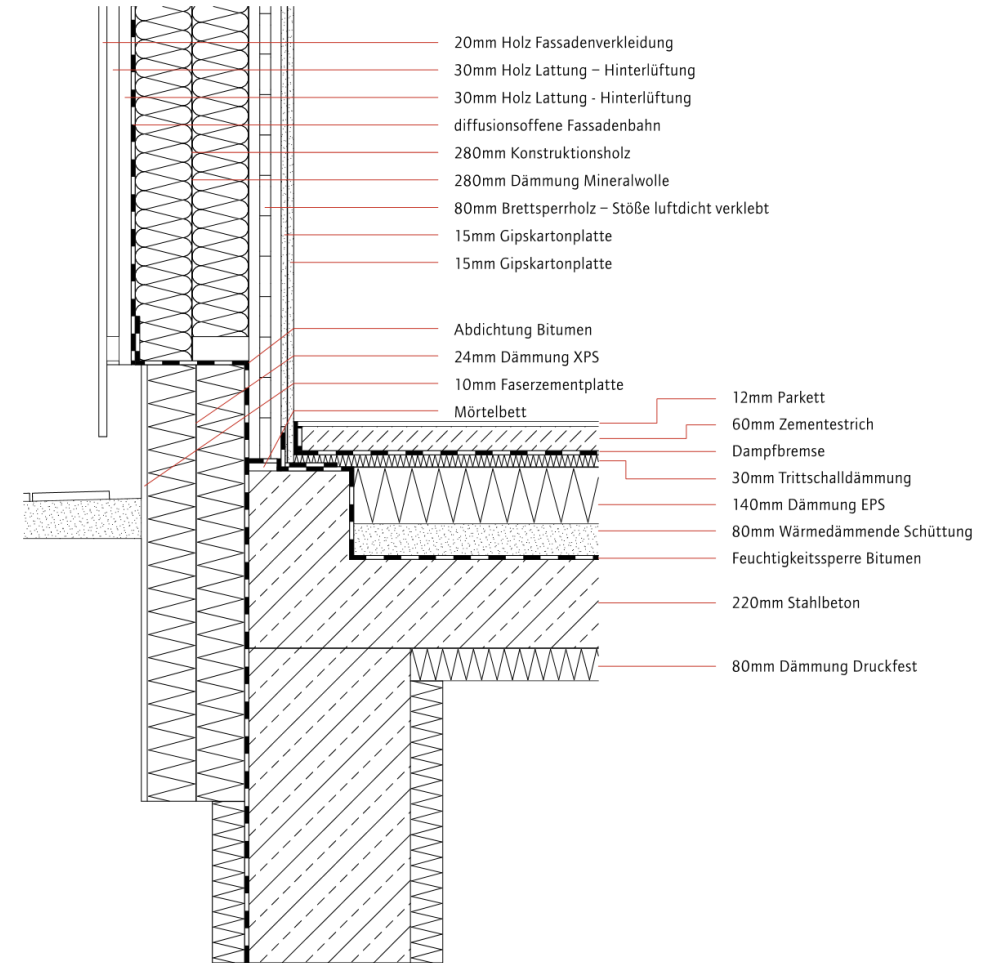
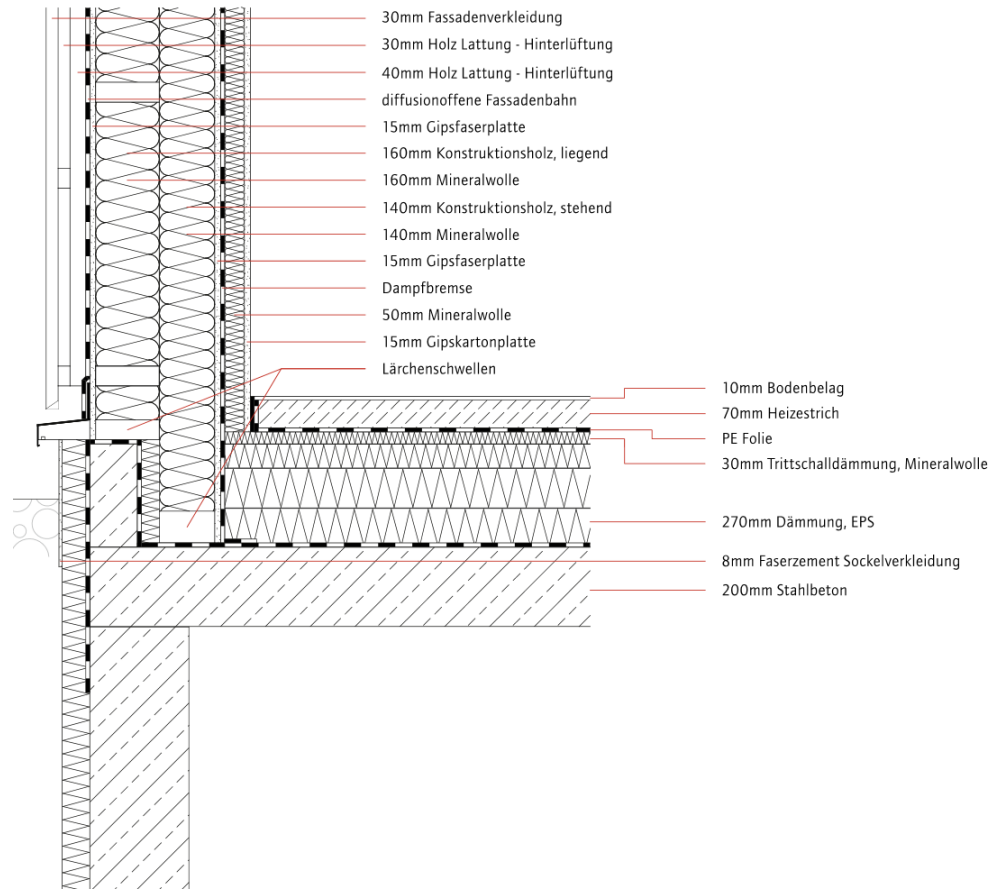
- Exterior wall with static stress
- Exterior wall without static stress (curtain)
- interior wall with static stress
- Interior wall as an apartment partition load-bearing/non-load-bearing
- interior wall without static stress or claims in building physics

Exterior wall with static stress

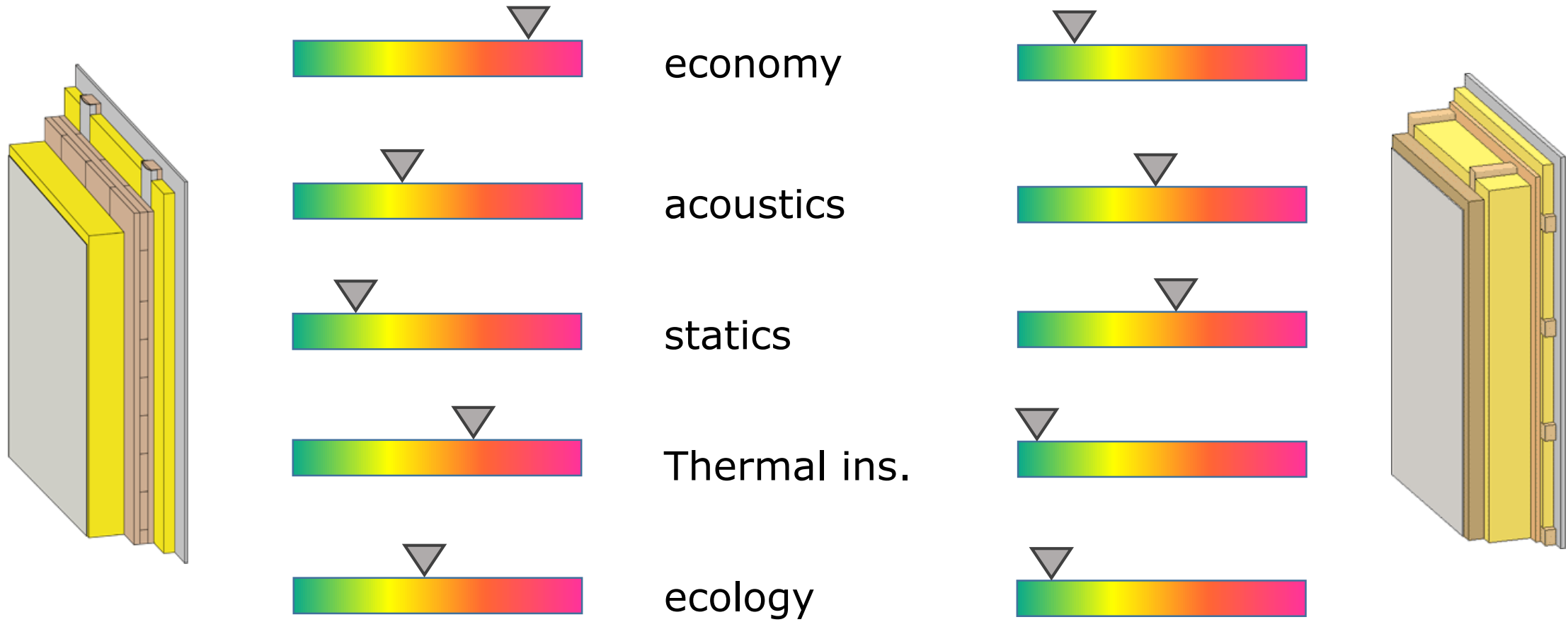




Exterior wall with static stress



Exterior wall without static stress





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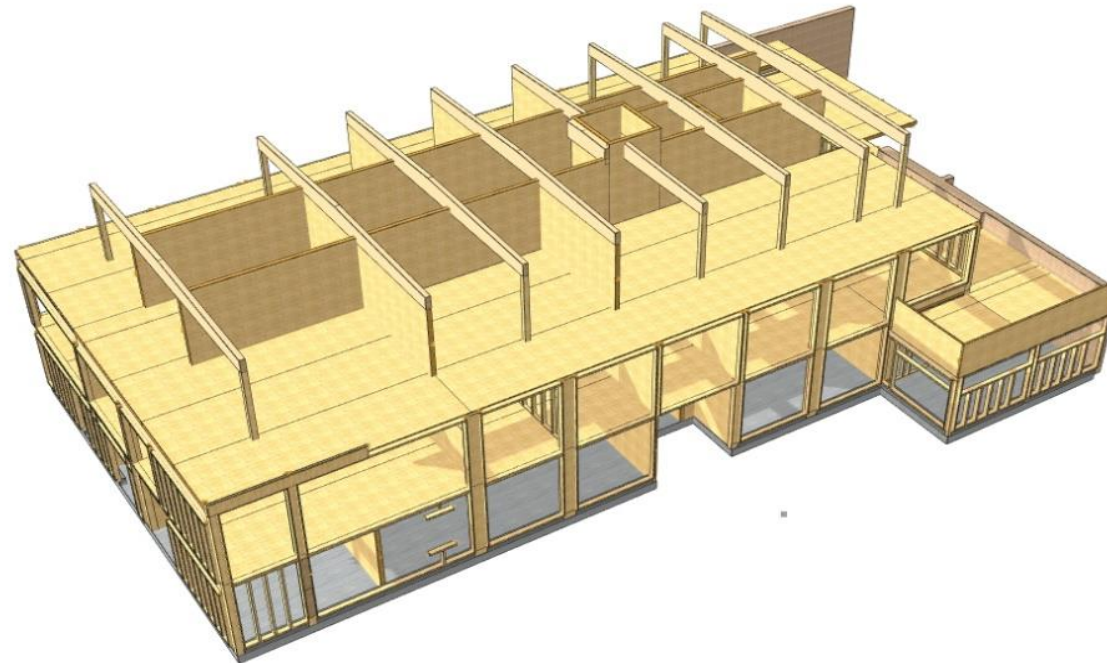




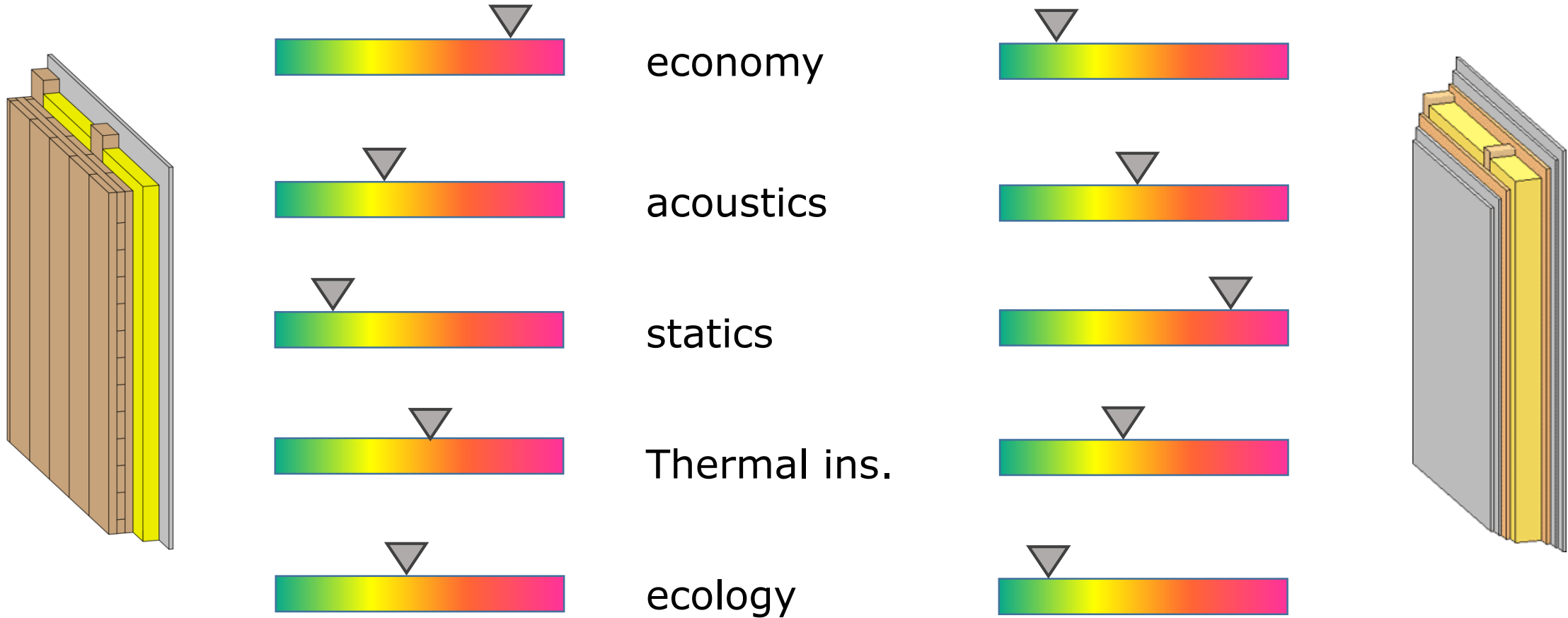
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interior wall with static stress (vertical-horiz)





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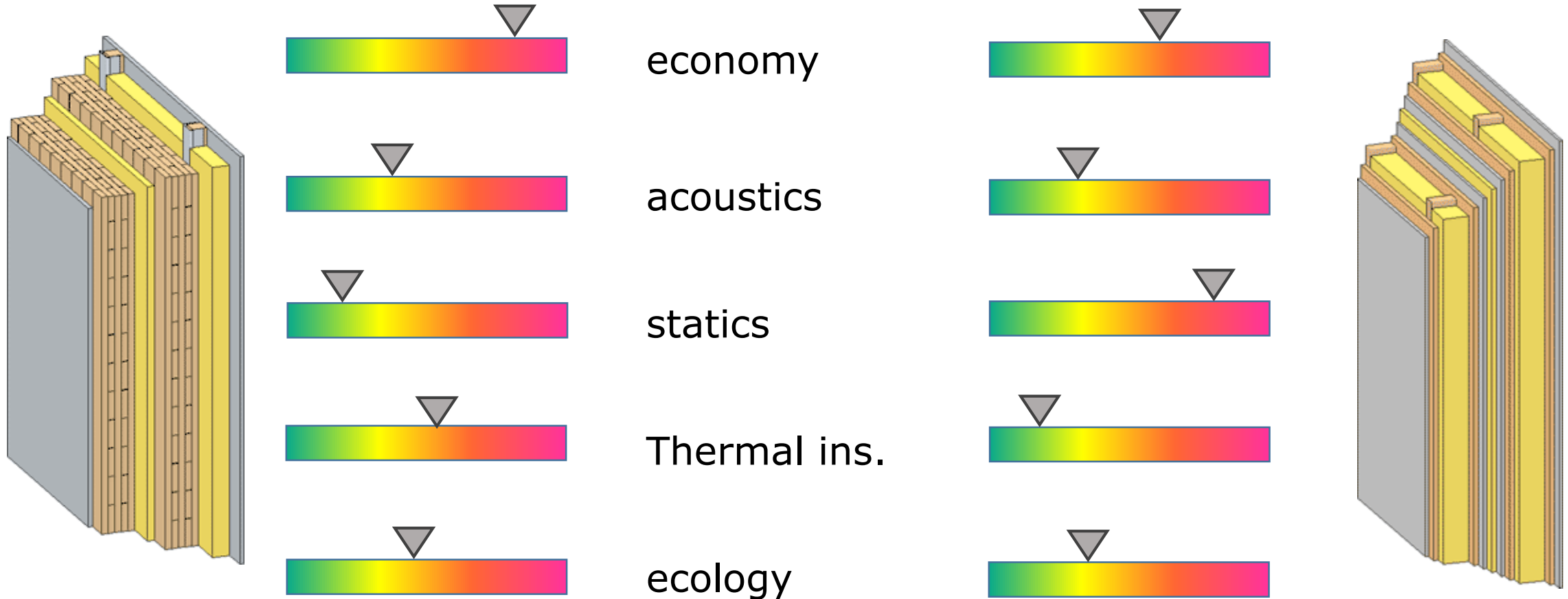
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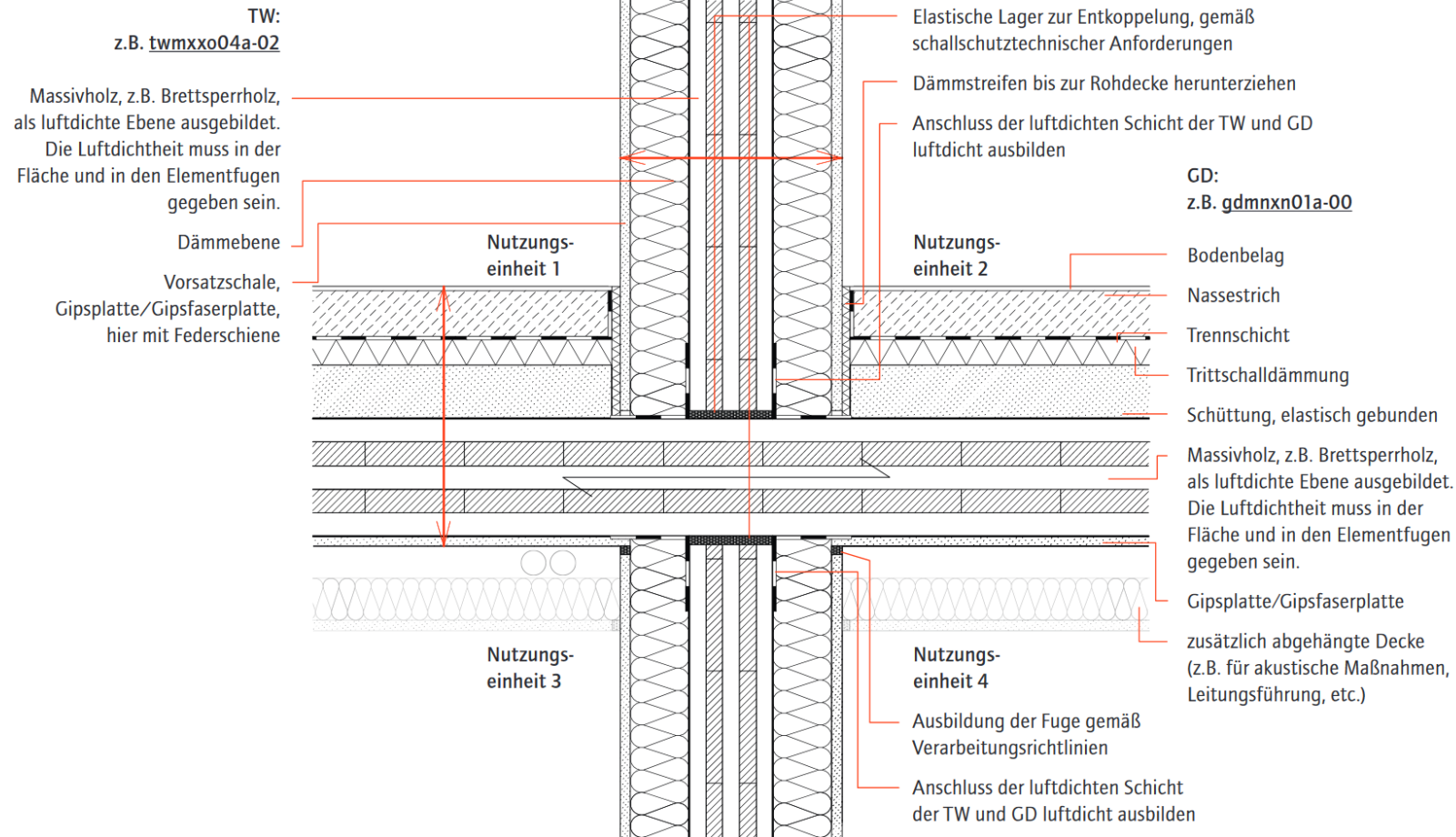
interior wall without static stress or claims in building physics





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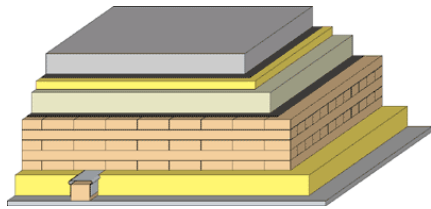
Horizontal panels (ceiling, roof)

- Ceiling in between apartments
- Ceiling within one apartment
- Platform roof
- Steep roof
- Balkony/Terraces

Ceiling in between apartments



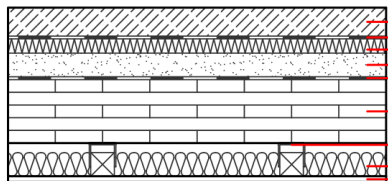
economy



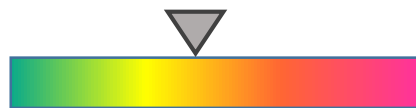
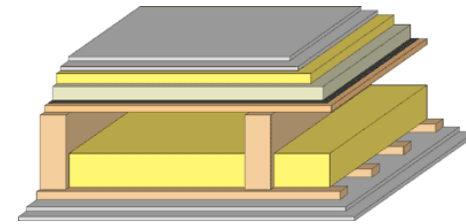
acoustics



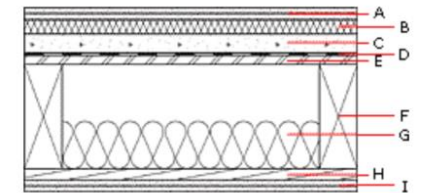
statics



Thermal ins.



ecology





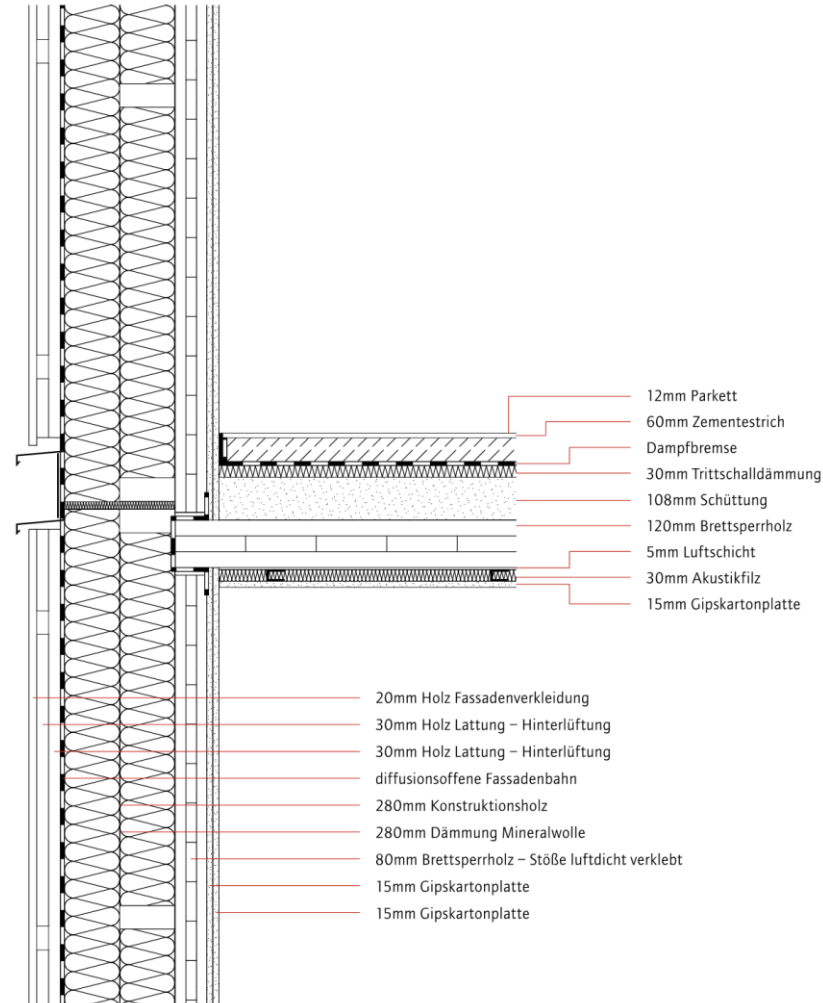
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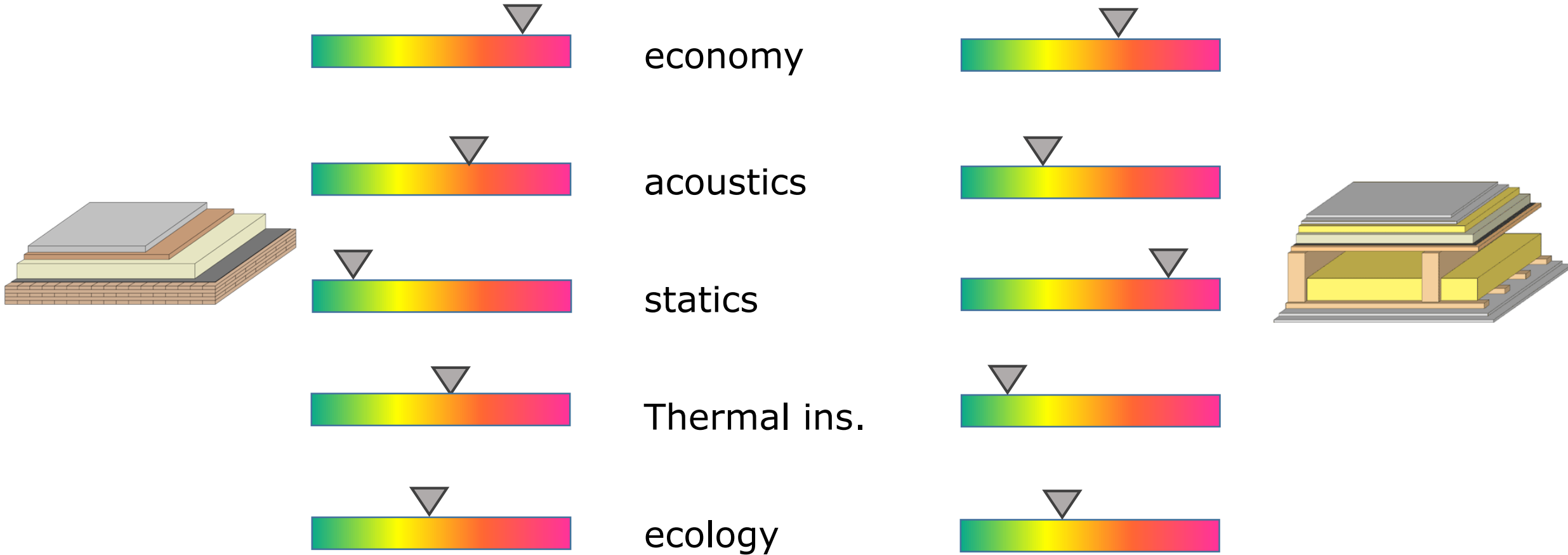
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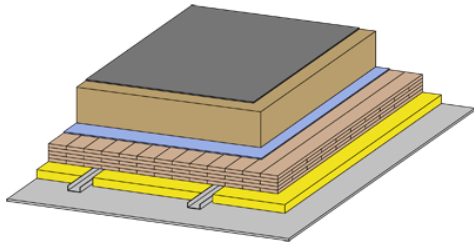
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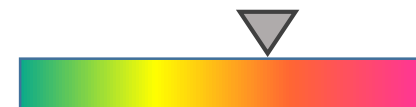
Ceiling within one apartment



Flat roof



economy



acoustics



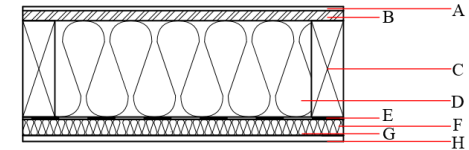
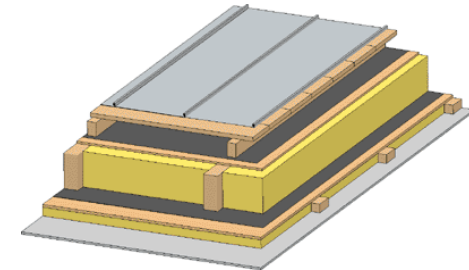
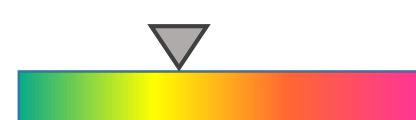
statics



Thermal ins.



ecology

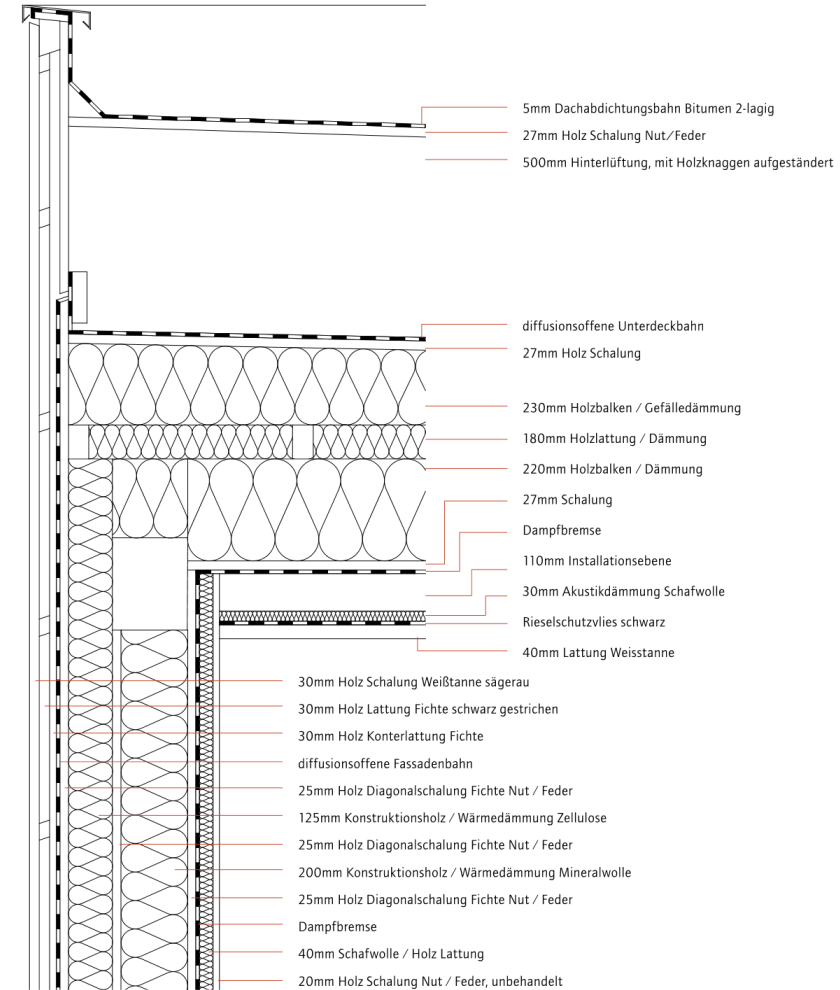
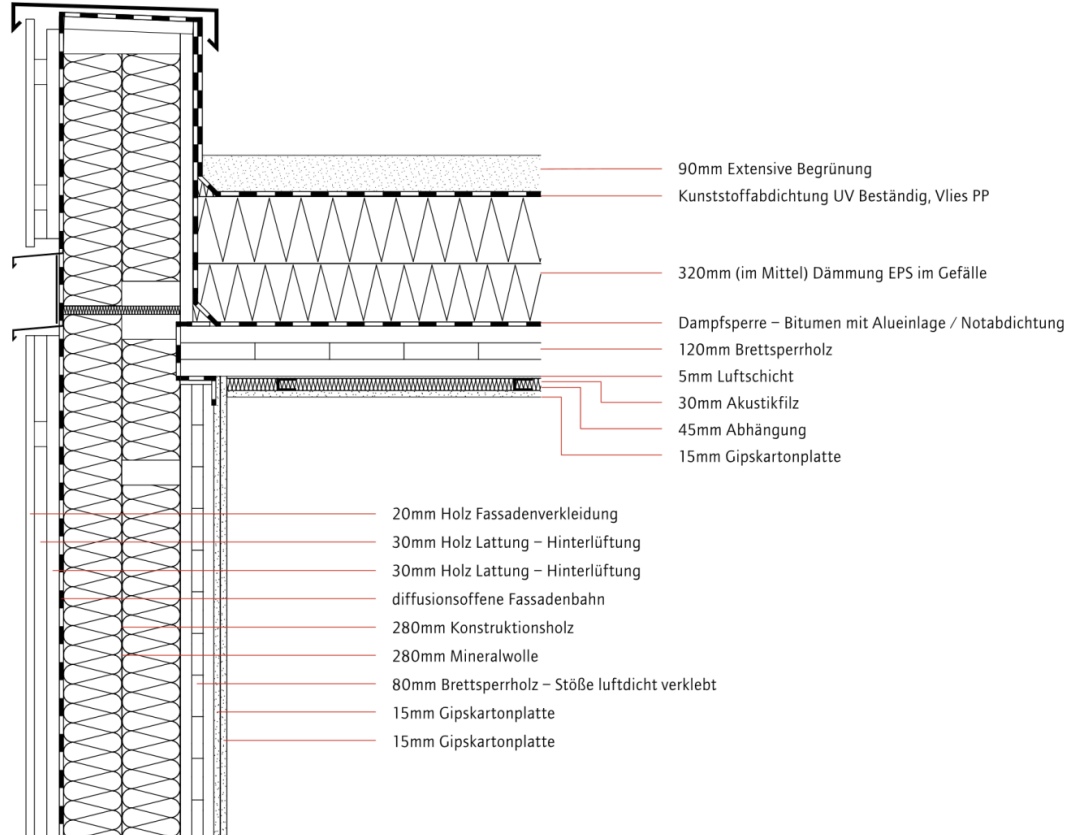


Bemerkung

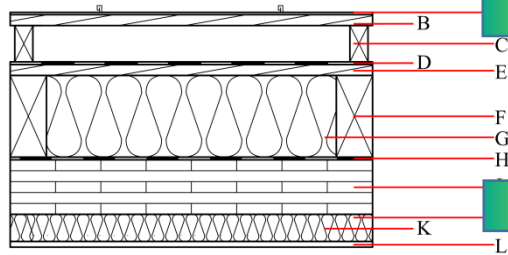
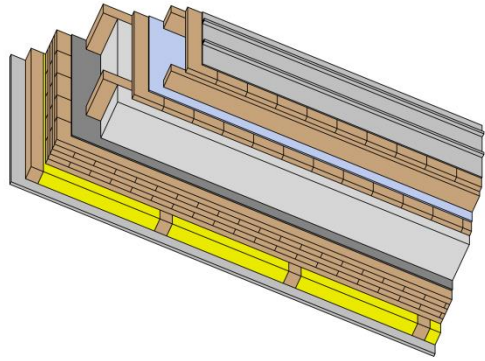
ACHTUNG: Der Aufbau ist nur unter bestimmten Randbedingungen diffusionstechnisch geeignet. Sollten diese nicht zutreffen, wird hinsichtlich des Feuchteschutzes einen objektbezogenen Nachweis mittels hydrothermischer Simulation benötigt.



Flat roof



Steep roof



economy



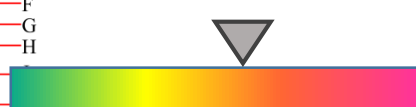
acoustics



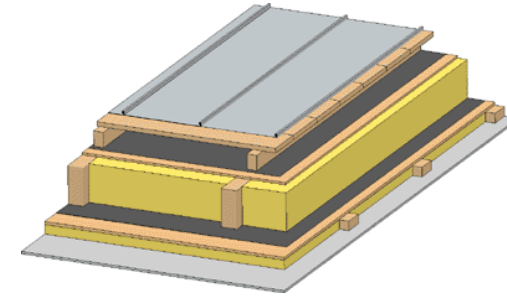
statics



Thermal ins.



ecology





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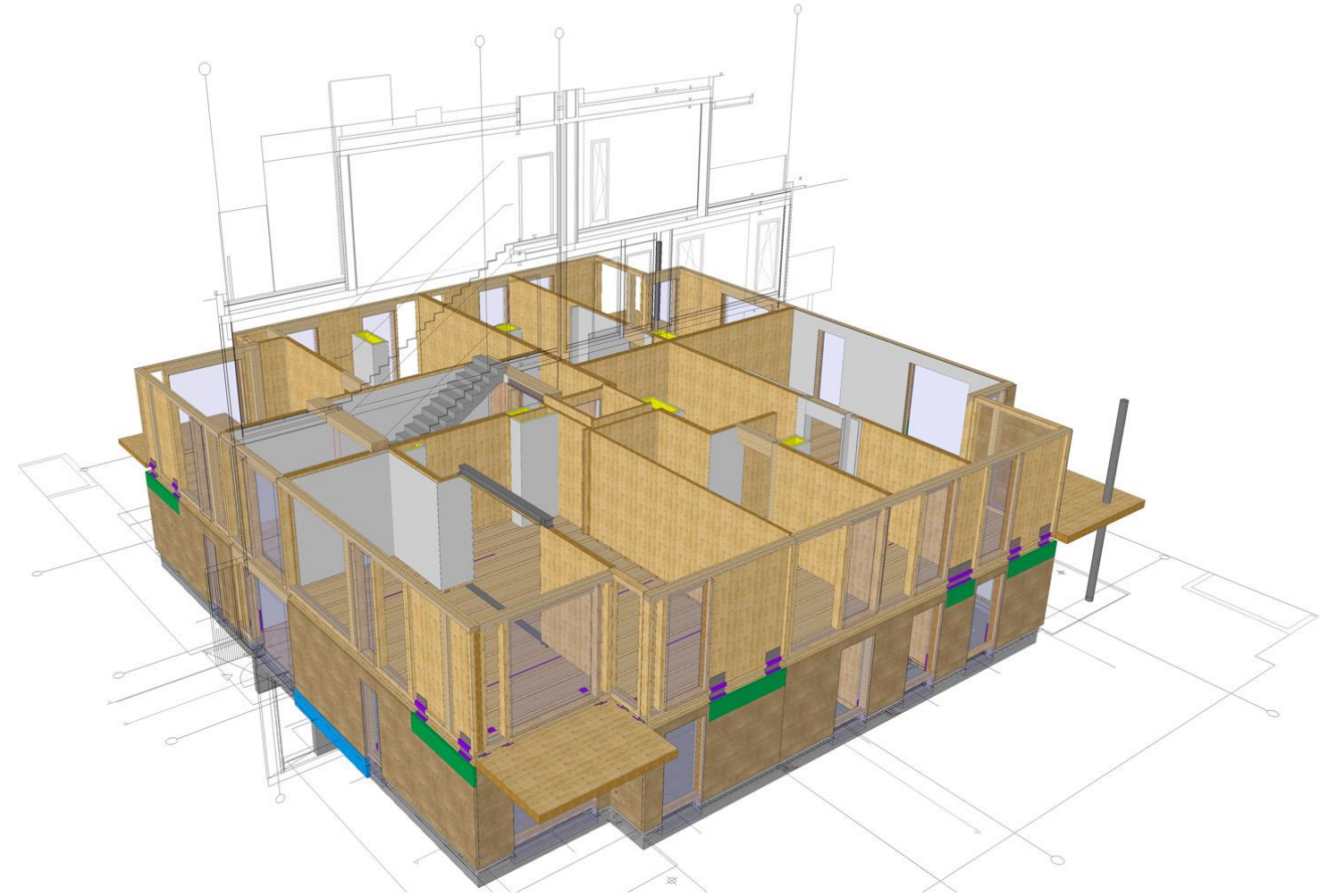


KLAIPĖDOS
VALSTYBINĖ
KOLEGIJA



Hi Bi
WOOD

balkony | loggia

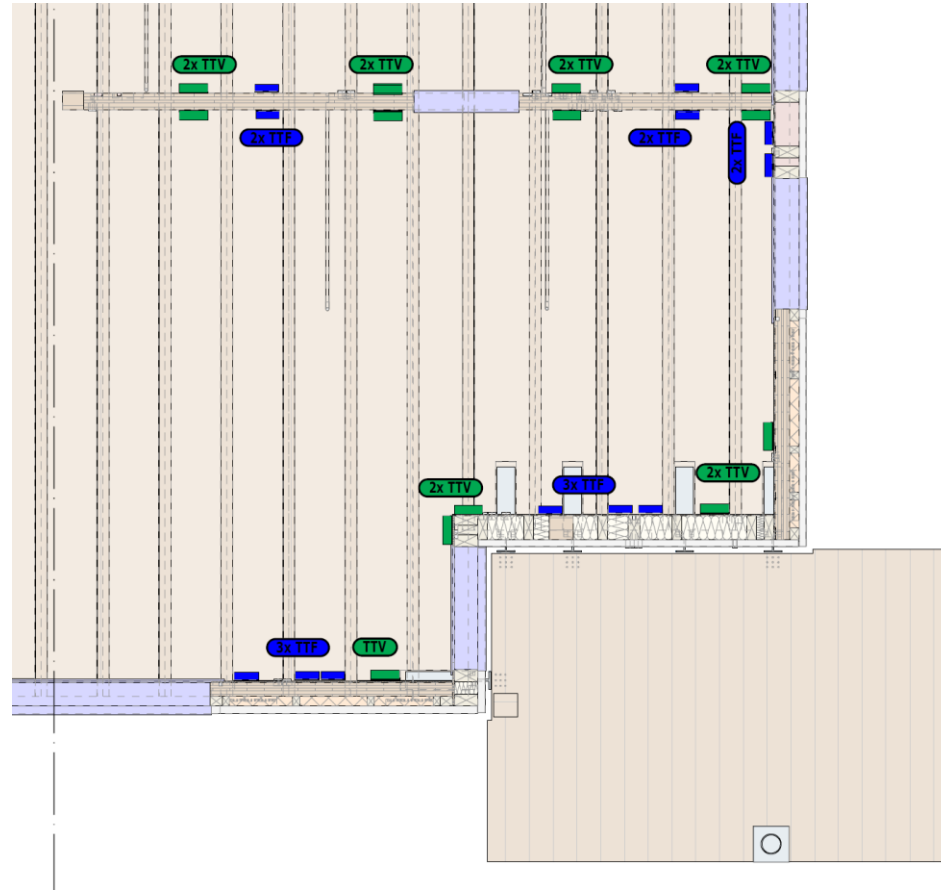




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Balkony/Terraces



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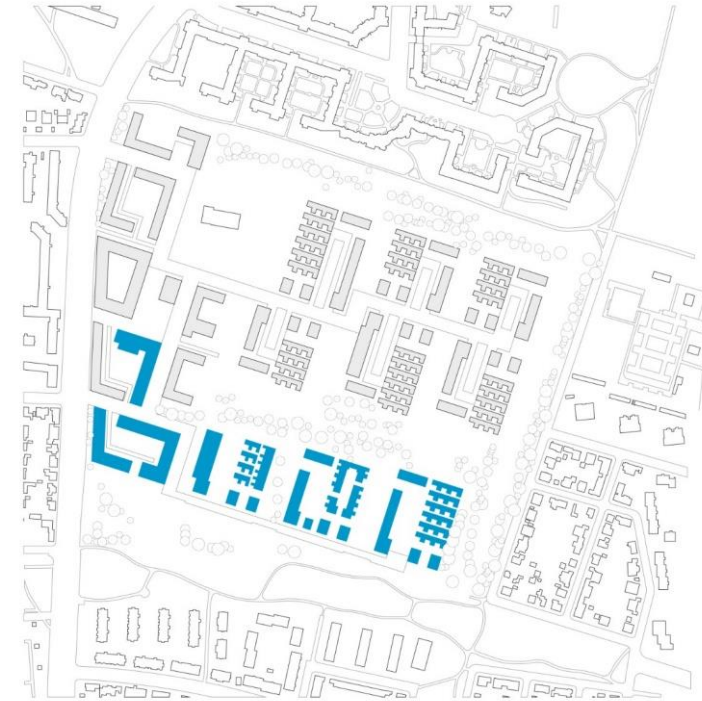
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München / Mustersiedlung im Prinz-Eugen-Park



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2015- Reininghausgründe (Graz,Stmk) Arch. Nussmüller



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2017- Dragonerhöfe (Wels,OÖ) Arch. Luger Maul



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2021 Wohnen 600 (System,V) Arch. Johannes Kaufmann



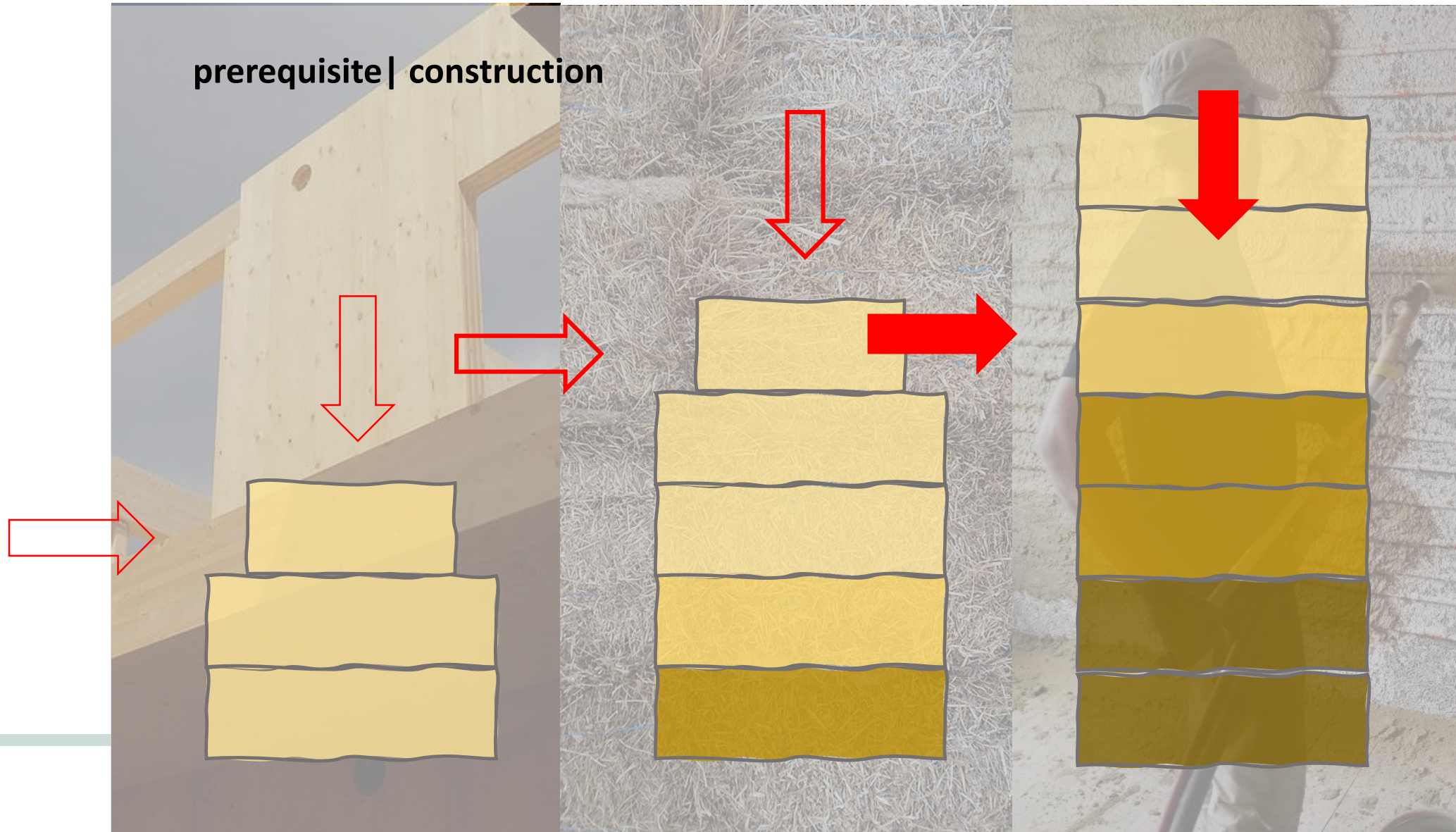
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prerequisite | construction



Wohnbau Baranygasse (W, 2020)



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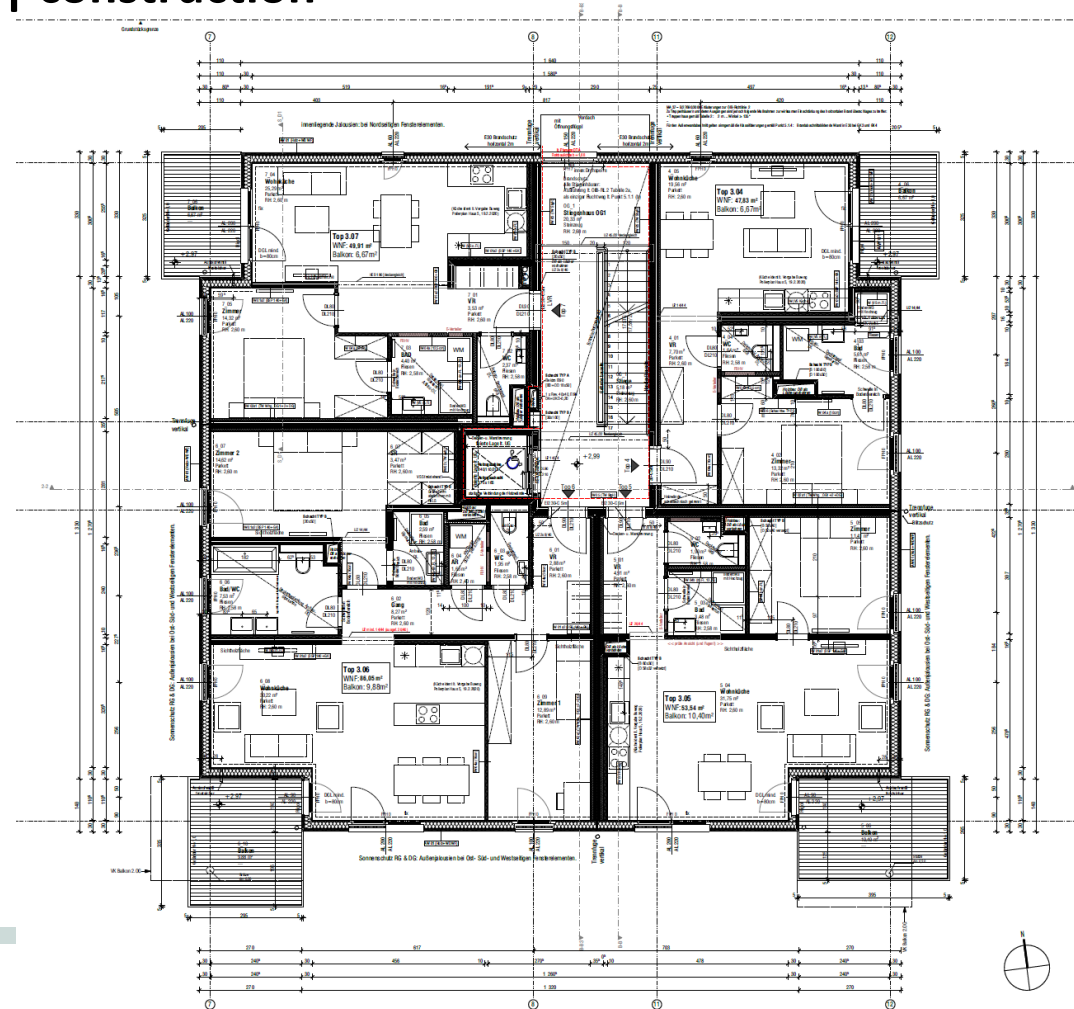
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prerequisites | construction





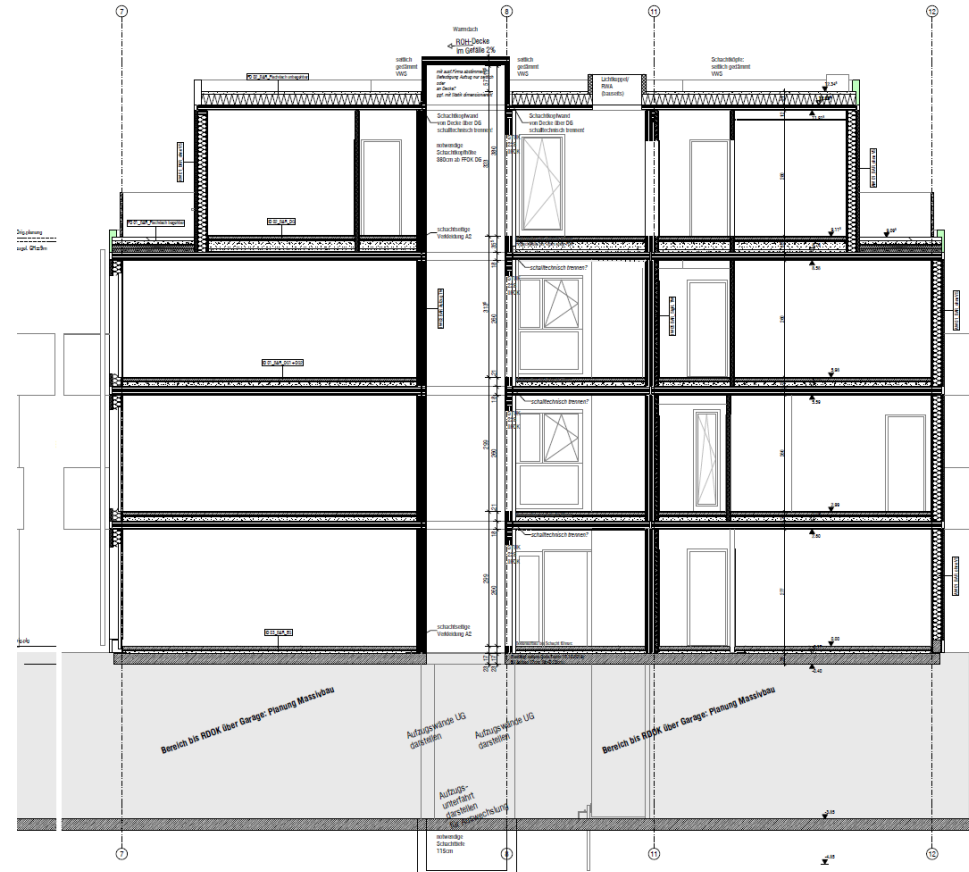
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prerequisites | construction





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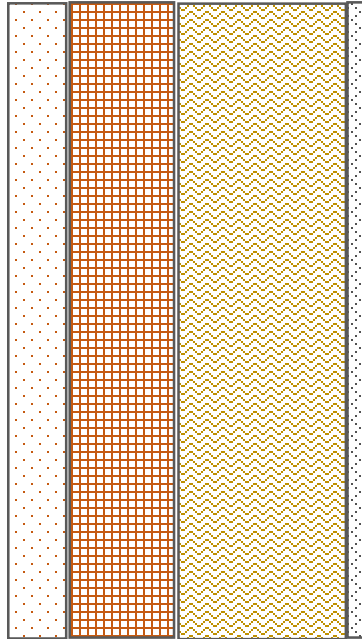
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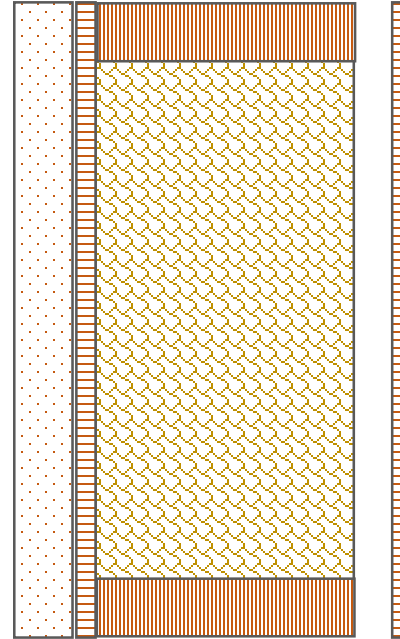
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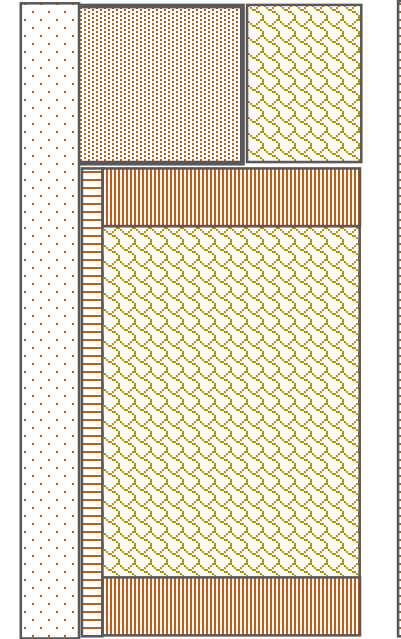
prerequisites | timber elements



Massive



Frame



Skeleton



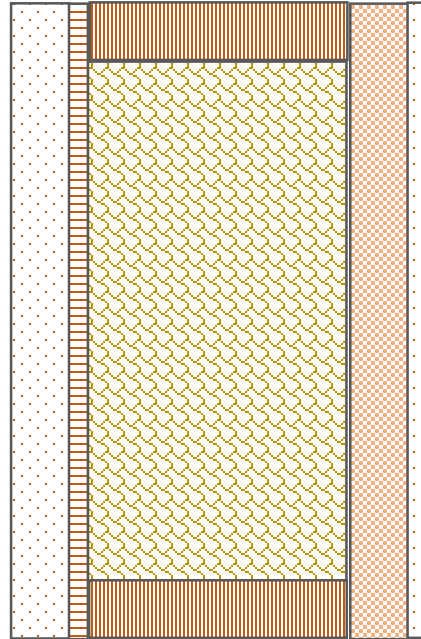
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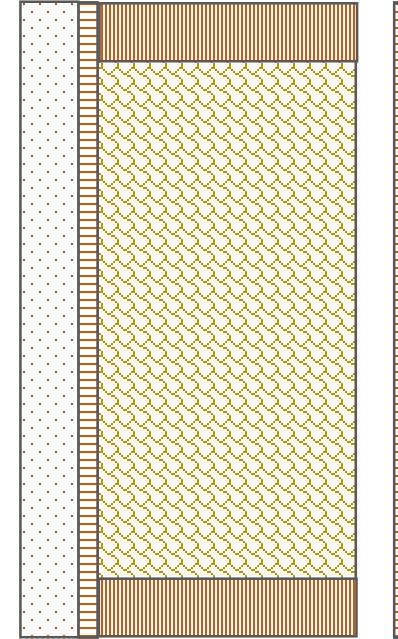
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prerequisites | timber elements



Frame non ventilated



Frame ventilated



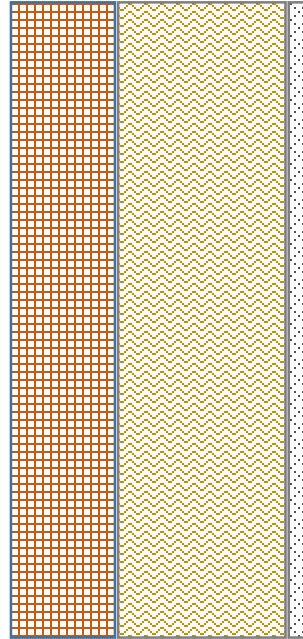
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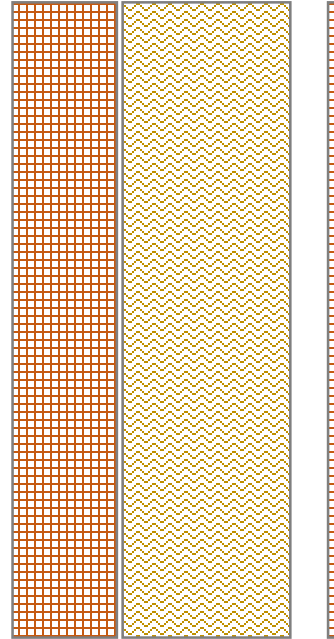
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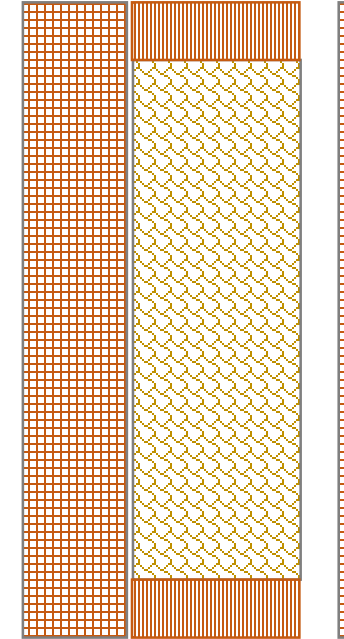
prerequisites | massive timber elements



non ventilated



ventilated1



ventilated 2



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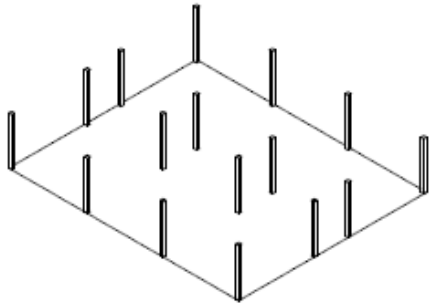
Architecture how to think in timber?

Martin Aichholzer | FH Campus Wien

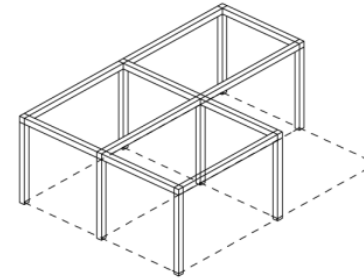
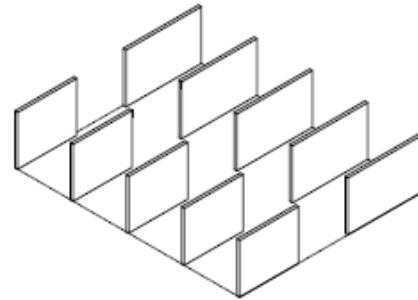


Tragstrukturen

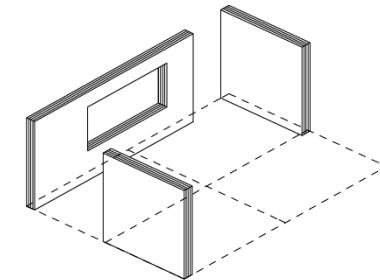
Skelettbau



Tafelbau

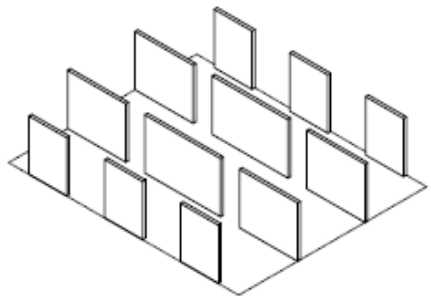


Holzskelettbau

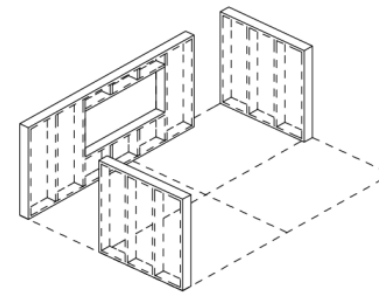
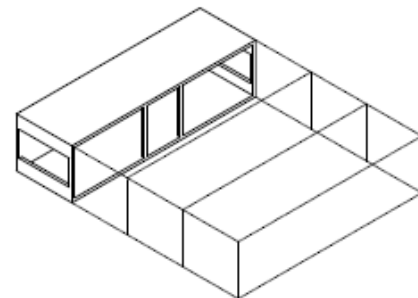


Holzmassivbau

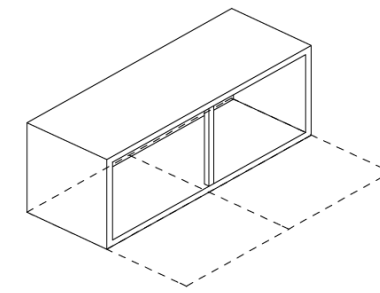
Tafelbau



Raumzelle



Holzrahmenbau



Fertigungsabhängige Systeme / Raumzelle

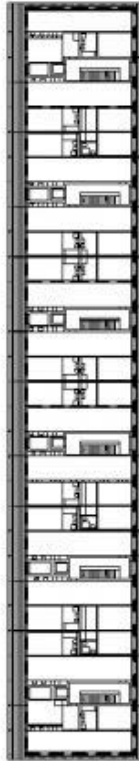
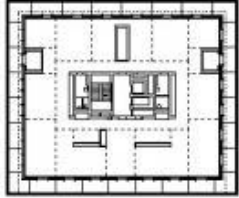
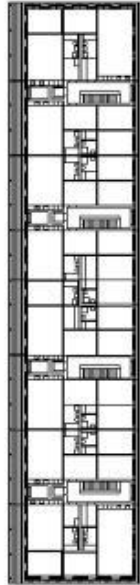
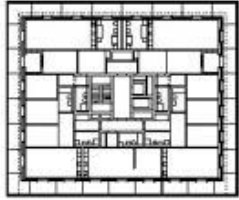
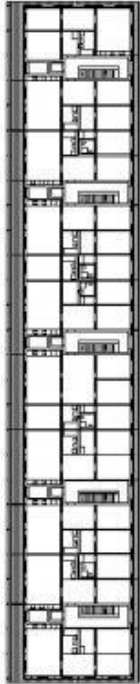
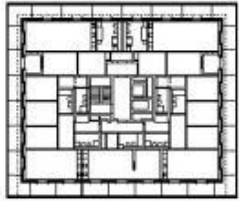
**Wohnbau Zollfreilager
Zürich (Ch)**

Project: Residential Buildings Zollfreilager in Zürich
Architect: Rolf Mühletaler
Site: Zürich (CH)
Date: 2016





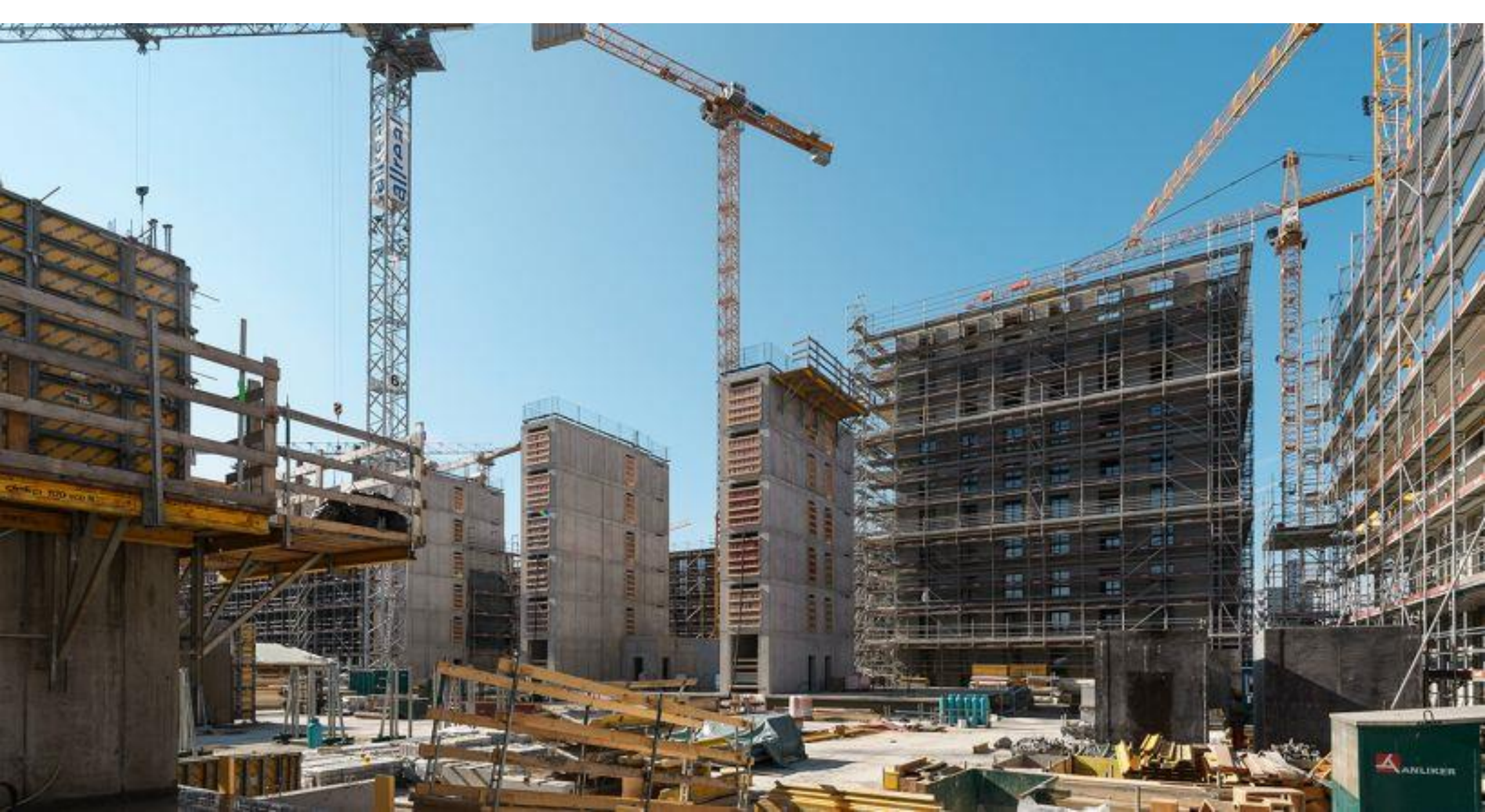




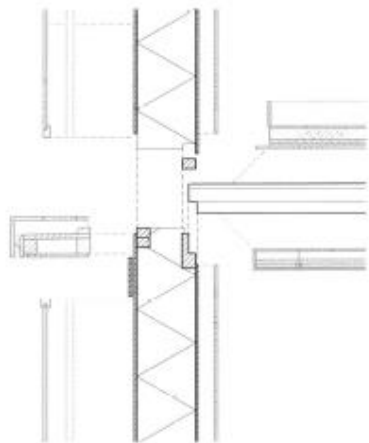
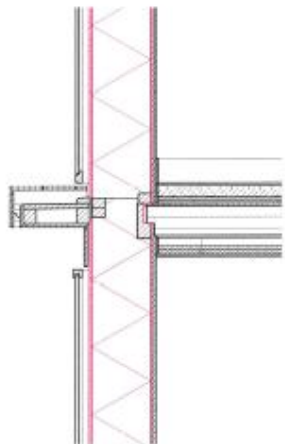
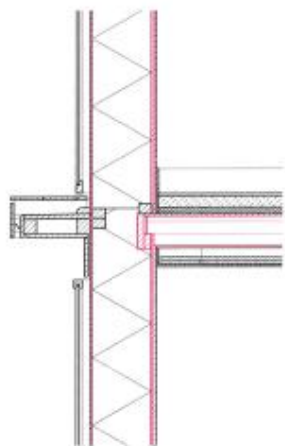
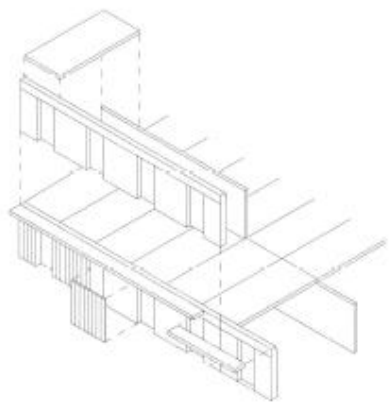
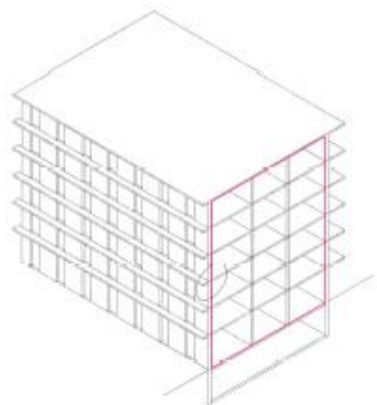
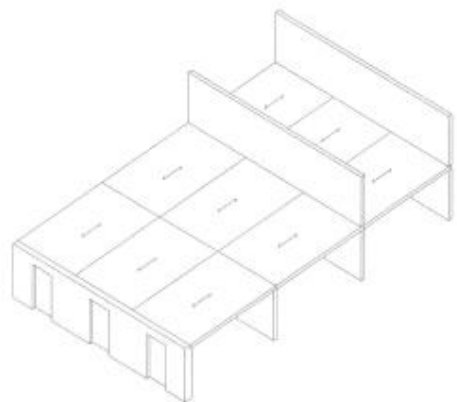


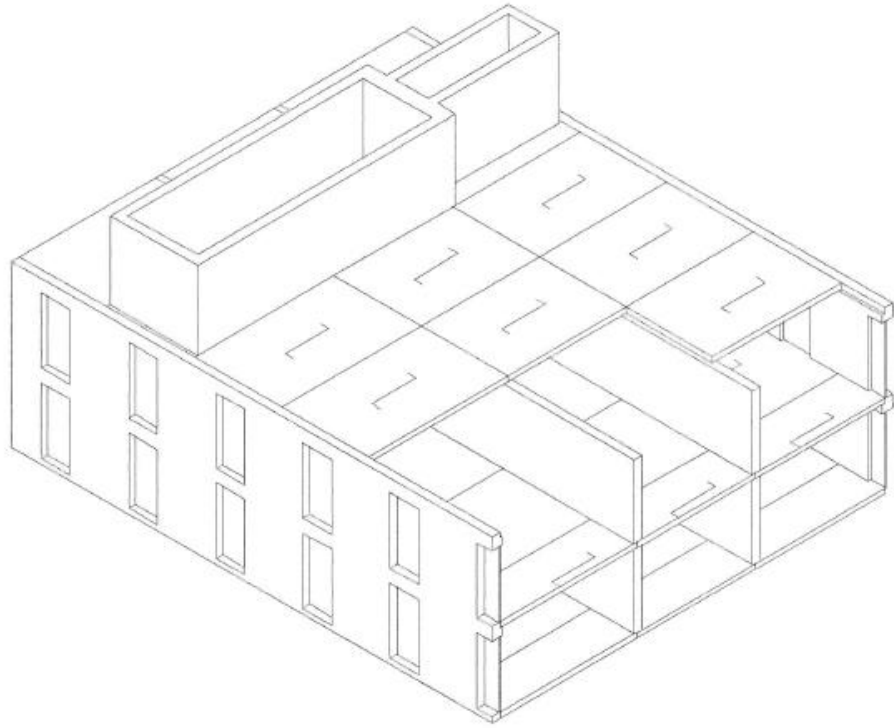




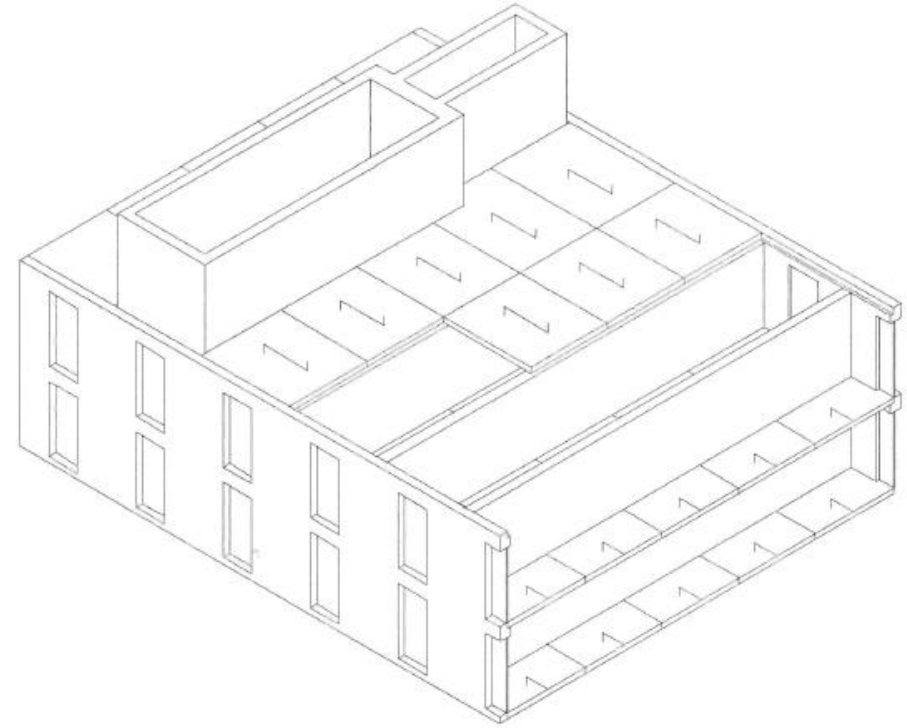




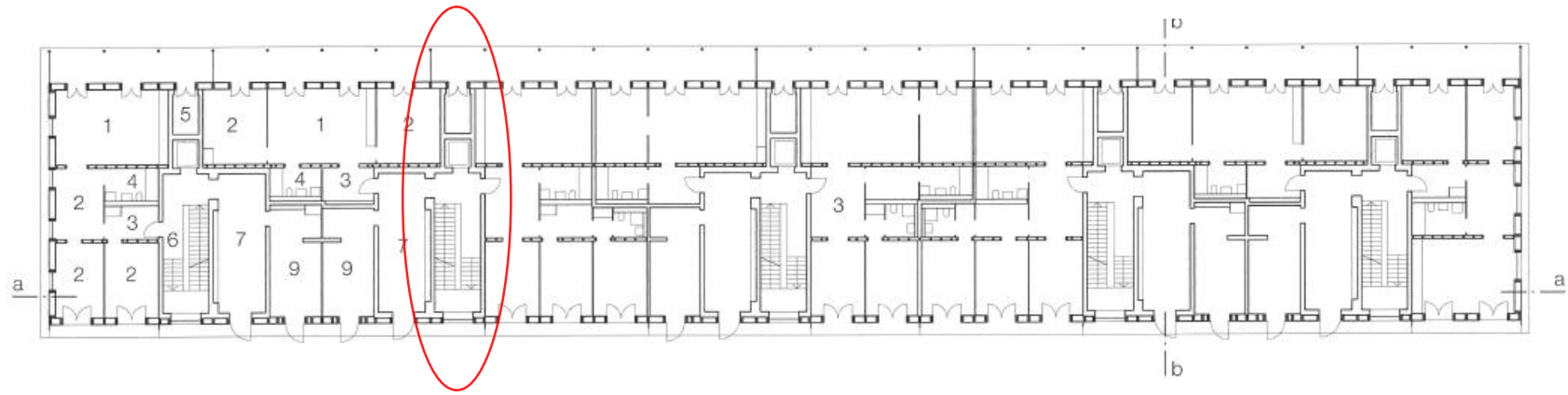




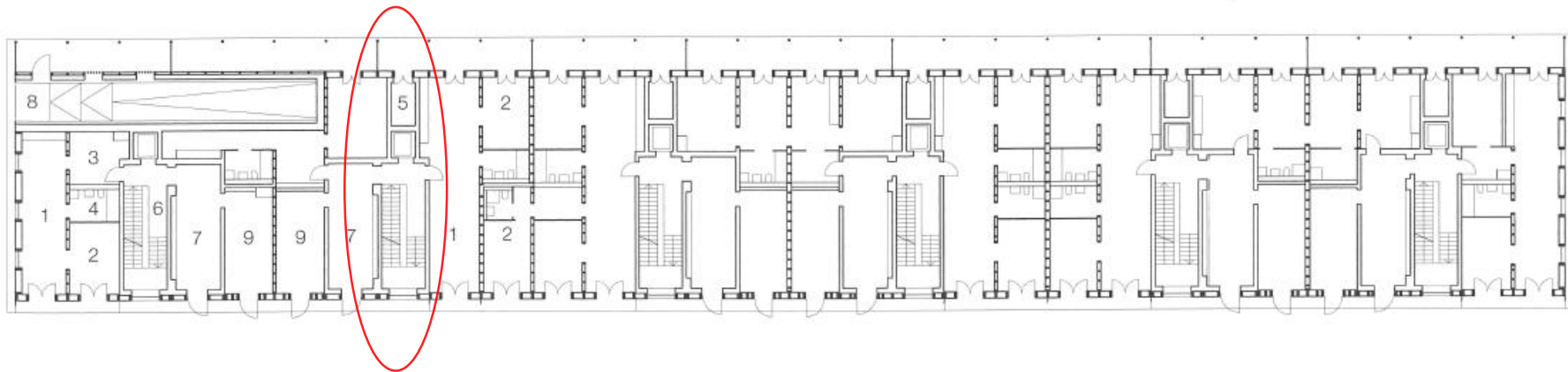
Haus A + B



Haus C



EG Haus A



EG Haus C

