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ERASMUS+ Strategic Partnerships For Higher Education

HiBi WOOD

SUSTAINABLE, HIGH-PERFORMANCE BUILDING SOLUTIONS IN WOOD

2020-1-LV01-KA203-077513

MARGK 45

POLAND, FINLAND, LATVIA, AUSTRIA /TEAM 5

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Basic Data

- Type: Living space for young people and families
- Flat sizes: 46 / 95 m2
- 48 Flats (Density: 0,55)
- Included: room for bicycles, community areas, garden or balconies, parking lots

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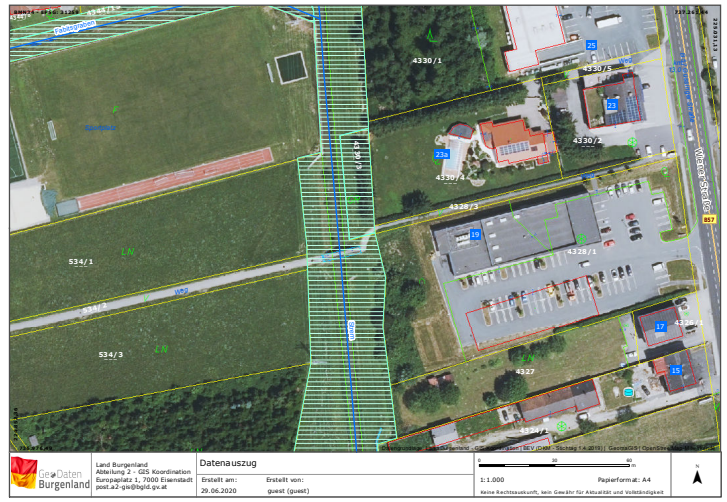
Location

- Stegersbach, a town in the Austrian state of Burgenland. Famous for golfing and its thermal bath.
- Population: 2,468
- Coordinates: 47.16317702532415, 16.161777468347303



Site Plan

Total area of the site: 11.310 m2

Area of the buildings: 2060 m2

Area of the pavings: 2944 m2

Area of the green space: 6306 m2

Density: 0,55

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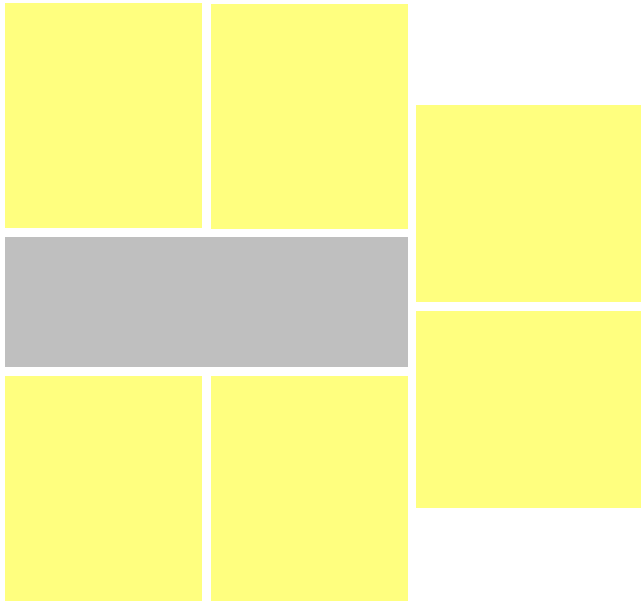
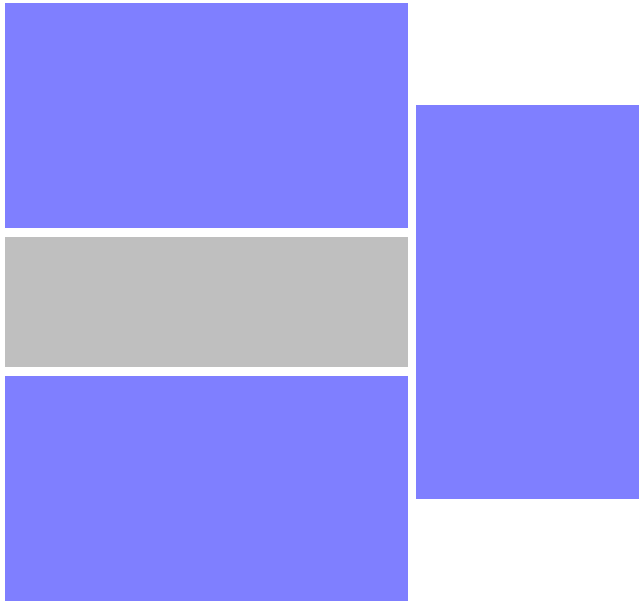
Floor Plans

Assembly of the apartments





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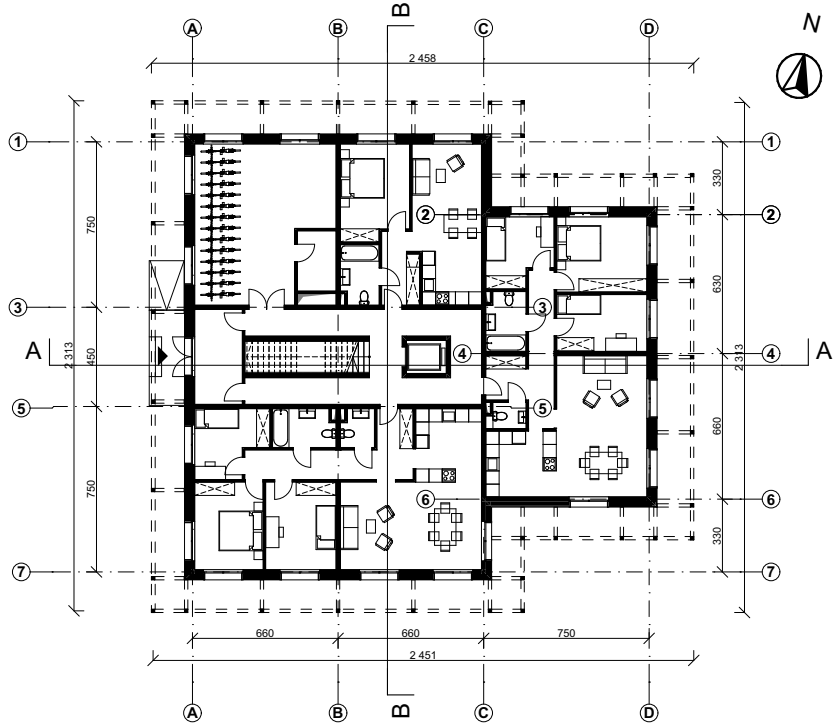
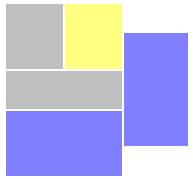
Floor Plans

Ground Floor





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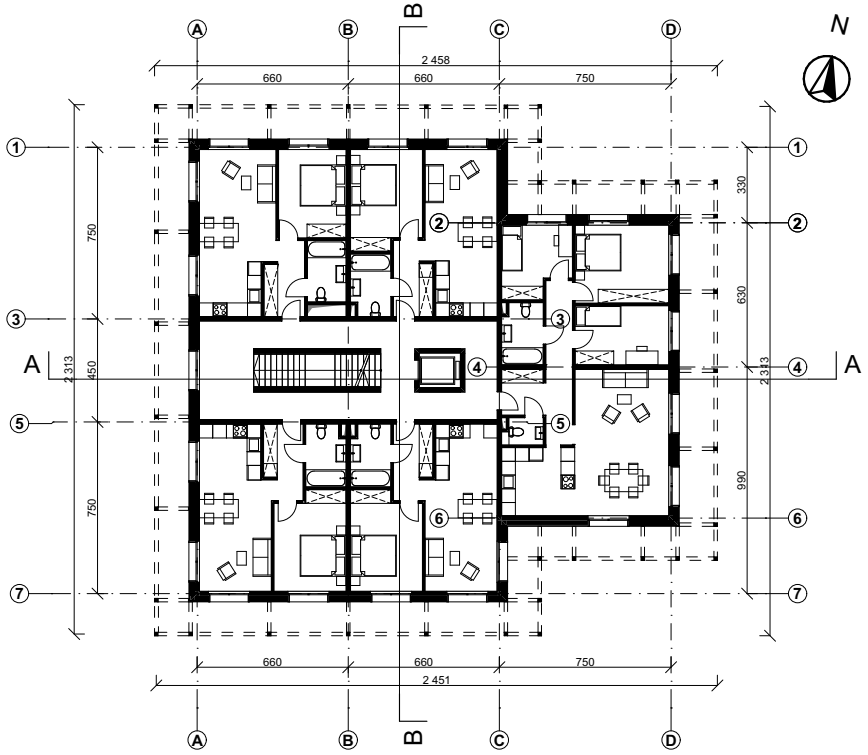
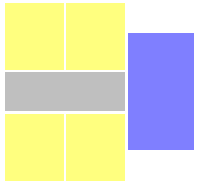
Floor Plans

First Floor





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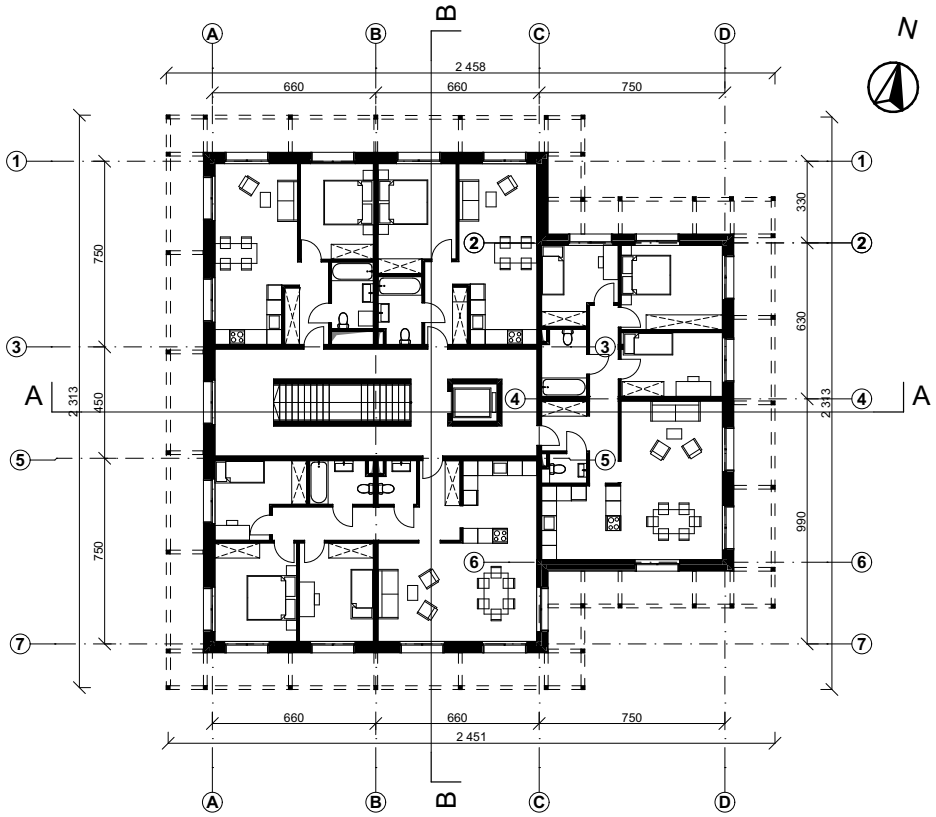
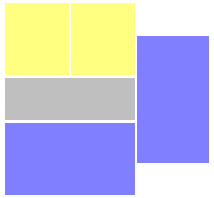
Floor Plans

Second Floor

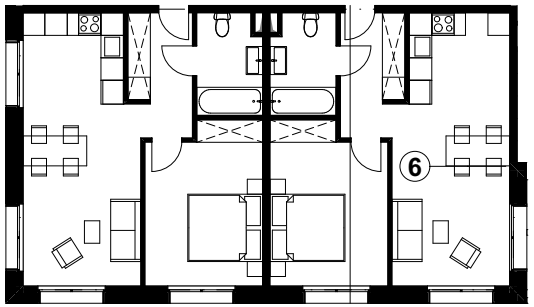


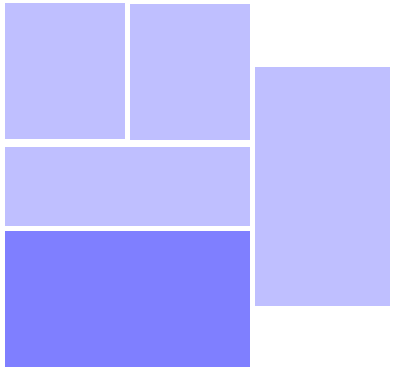


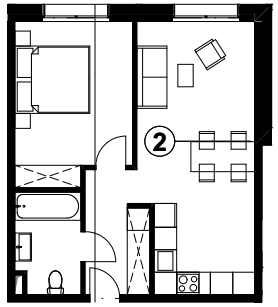
Sources:

Floor Plans

Flats







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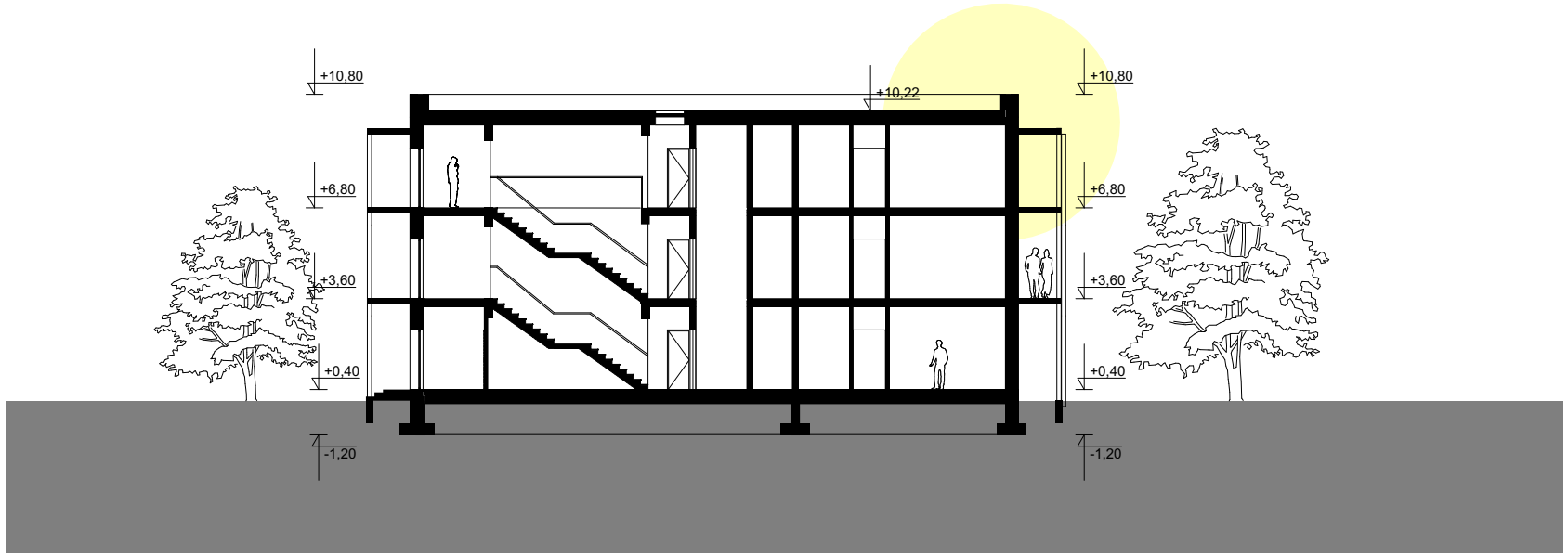
Section A



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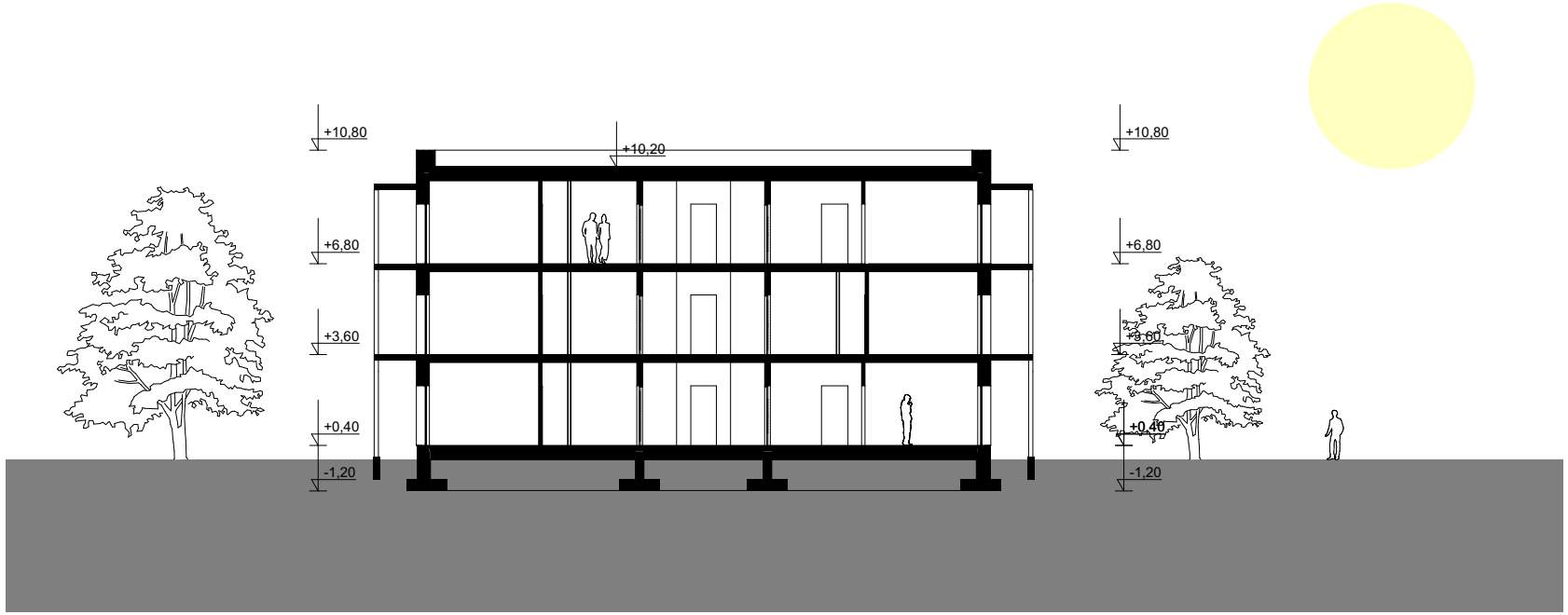
Section B



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Vertical and horizontal load transfer

- **Live load (apartments):** 2,0 kN/m² (Category A)
- **Live load (roof):** 1,0 kN/m² (Category H)
- **Snow load:** 1,4 kN/m² ‖ **Wind load:** 0,8 kN/m²
- **Dead load:** ~ 8,5 kN/m² (per floor) – 25,5 kN/m² total
- **Staircase:** 2 - 4 kN/m²

- **Thickness of CLT**
  - Walls: 12 cm
  - Ceiling: 24 cm

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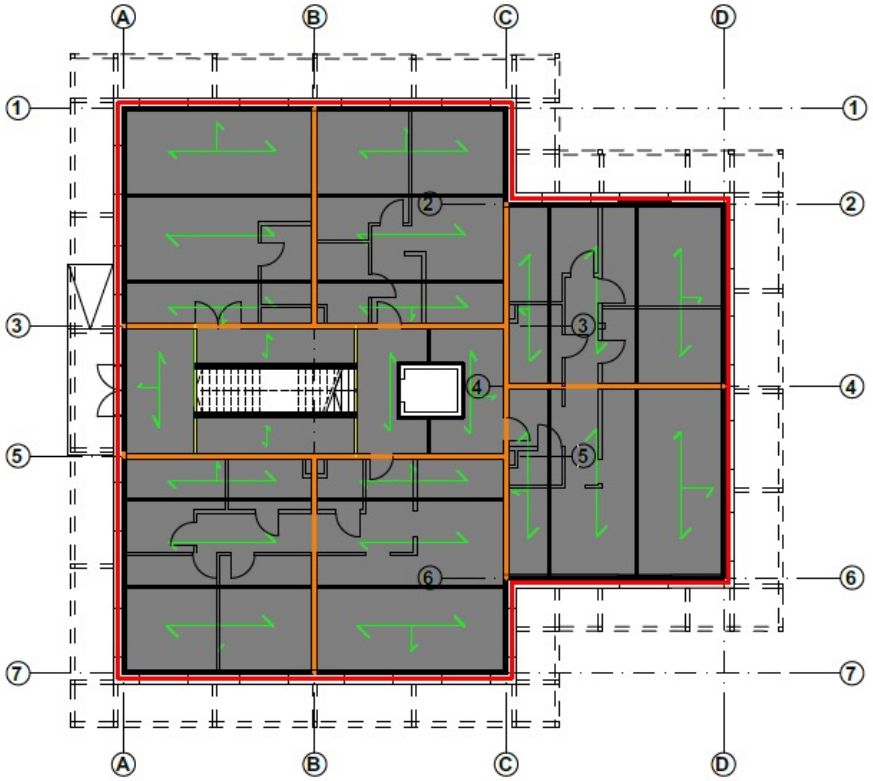
Load transfer



- Outside load bearing walls
- Inside load bearing walls
- Staircase support beams

Sources:

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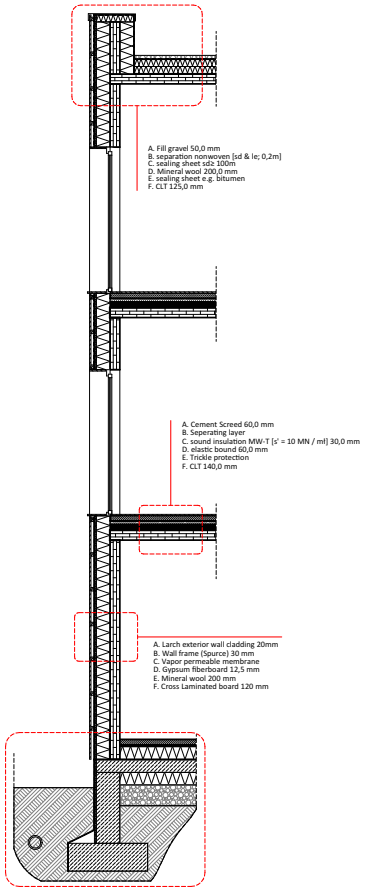
Section through the facade



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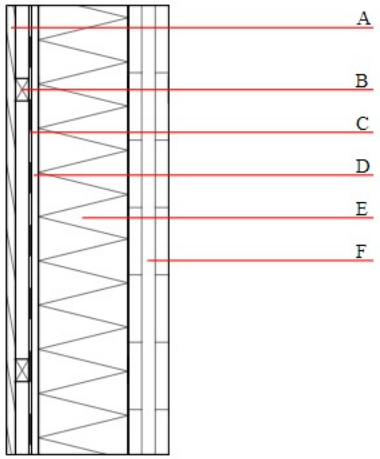
Exterior wall



A. Larch exterior wall cladding 20mm
B. Wall frame (Spurce) 30 mm
C. Vapor permeable membrane
D. Gypsum fiberboard 12,5 mm
E. Mineral wool 200 mm
F. Cross Laminated board 120 mm

Thickness: 359 mm
Fire: REI60
Sound: Rw = 43 dB

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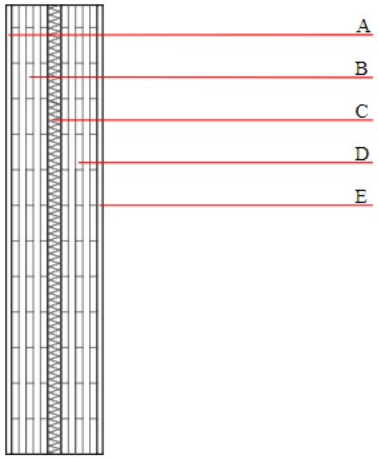
Seperating wall between apartments



A. Gypsum plaster board 12,5 mm
B. Glued solid wood 78,0 mm
C. Sound insulation 60,0 mm
D. Glued solid wood 78,0 mm
E. Gypsum plaster board 12,5 mm

Thickness: 241 mm
Fire: REI60
Sound: Rw = 60 dB
Heat protection: U = 0,29 W/(m2K)

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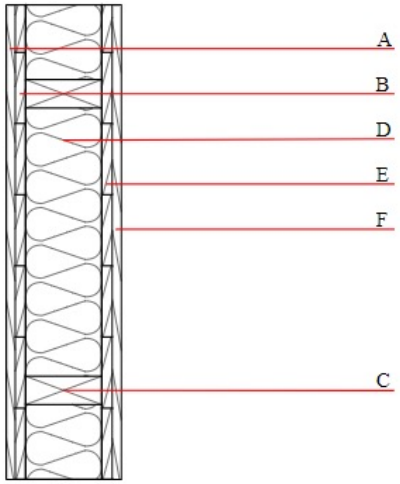
Internal wall



A. Wooden formwork N&F 19,0 mm

B. Wood formwork Spruce Diagonal formwork 22,0 mm

C. Construction wood 160,0 mm

D. Mineral wool 160,0 mm

E. Vapour barrier 22,0 mm

F. Spruce 19,0 mm

Thickness: 402 mm
Fire: REI60
Sound: Rw = 39 dB

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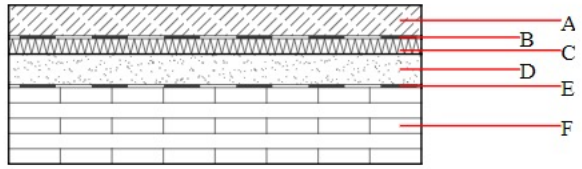
Floor



A. Cement Screed 60,0 mm
B. Seperating layer
C. sound insulation MW-T [s' = 10 MN / m³] 30,0 mm
D. elastic bound 60,0 mm
E. Trickle protection
F. CLT 140,0 mm

Thickness: 290 mm
Fire: REI60
Sound: Rw = 73 dB

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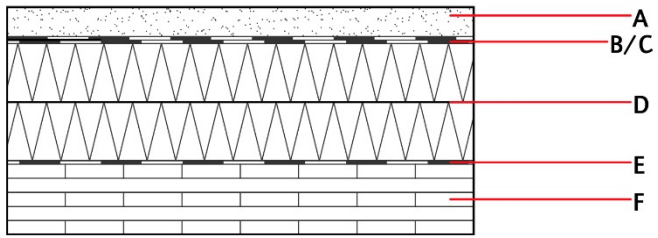
Roof



A. Fill gravel 50,0 mm

B. separation nonwoven [sd & le; 0,2m]

C. sealing sheet sd≥ 100m

D. Mineral wool 200,0 mm

E. sealing sheet e.g. bitumen

F. CLT 125,0 mm

Fire: REI30
Sound: Rw = 50 dB
Heat protection: U = 0,21 W/(m2K)

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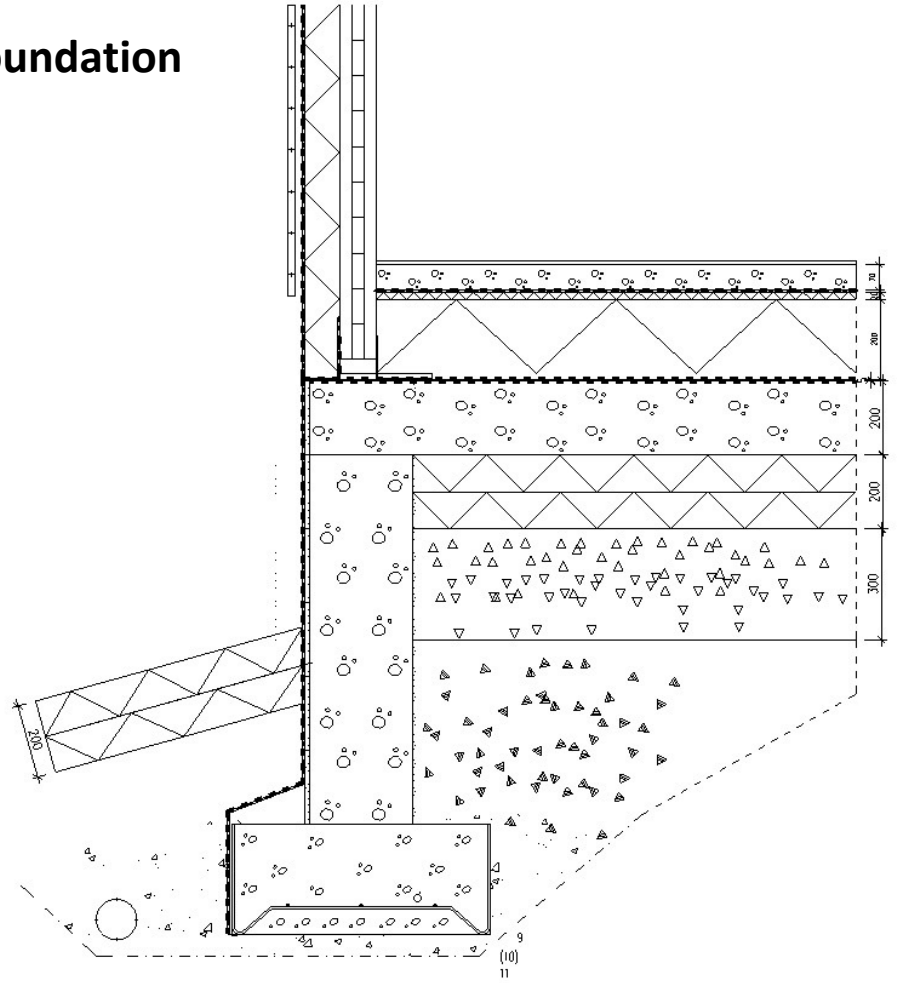
Foundation



Connection Details

- Leveling agent if necessary + Surface material and treatment according to room description 10 mm
- Heating screed 70 mm
- Vapour Barrier 5 mm
- Mineral wool 20 mm
- Mineral wool 180 mm
- Vapour berrier 5 mm
- Concrete slab 200 mm
- XPS polystyrene 200 mm
- Capillary rise breaking layer (Crushed stone) 300 mm
- Filter cloth

- Strip foundation
- Splash protection and 30 cm distance from ground

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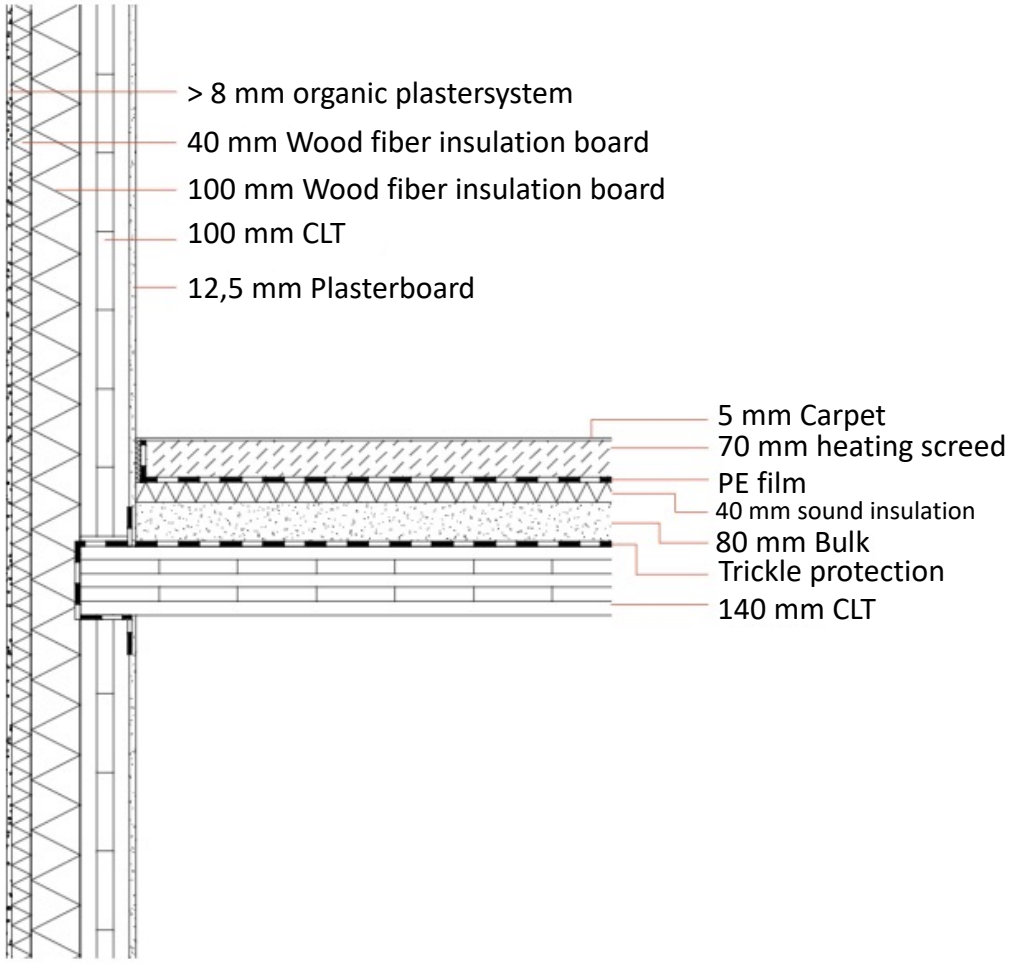
Connection Details

- Outside wall - flooring



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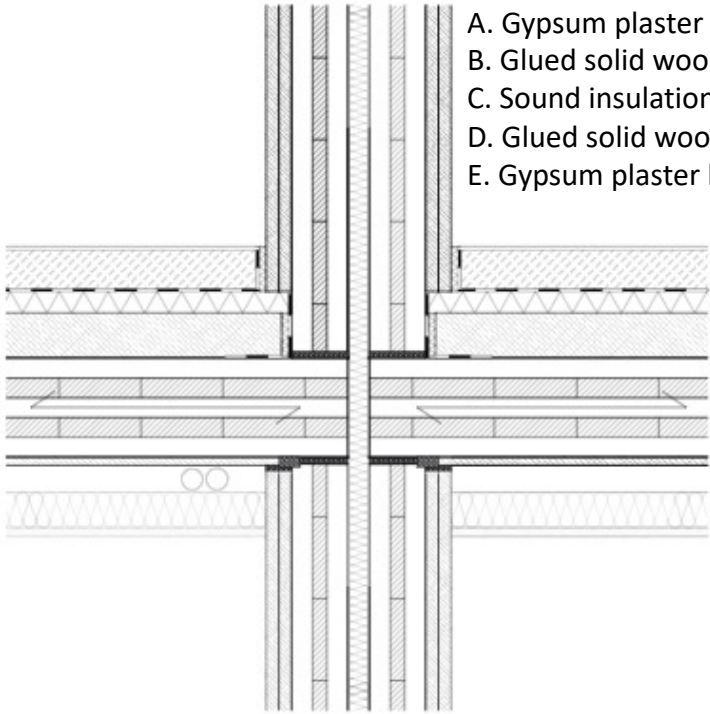
Connection Details

- Load bearing wall indoor

Floor:
A. Cement Screed 60,0 mm
B. Seperating layer
C. sound insulation MW-T [s' = 10 MN / m³] 30,0 mm
D. elastic bound 60,0 mm
E. Trickle protection
F. CLT 140,0 mm



Wall:
A. Gypsum plaster board 12,5 mm
B. Glued solid wood 78,0 mm
C. Sound insulation 60,0 mm
D. Glued solid wood 78,0 mm
E. Gypsum plaster board 12,5 mm

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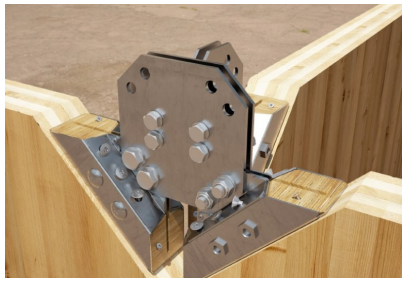
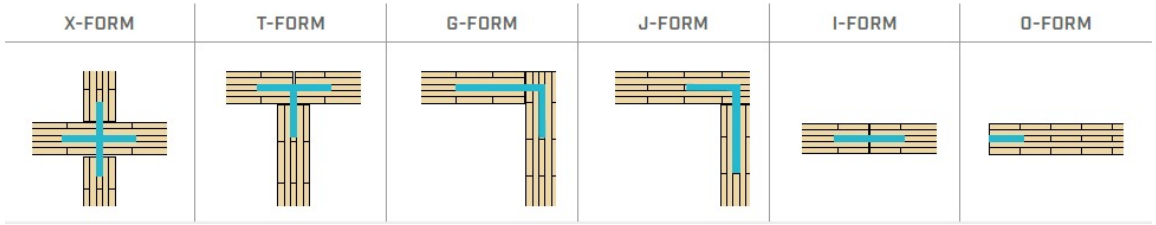
Jointing technology



- Screws are used – no glue
- X-RAD connection to join the CLT elements
  - Saves time
  - X-RAD installed off-site
  - Connection on-site



- Non-CLT elements
  - Angle brackets, etc.

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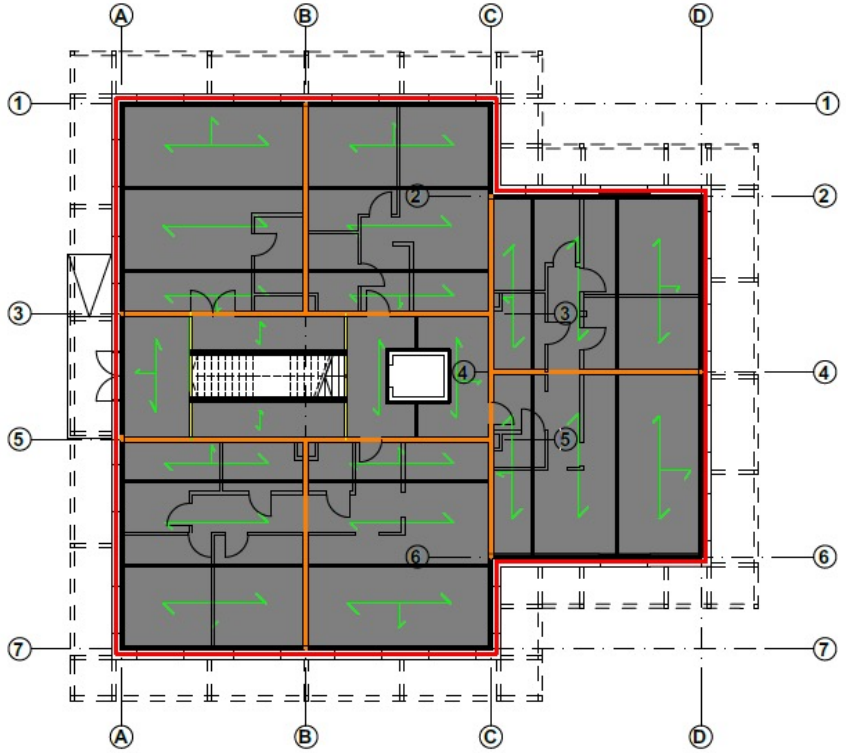
Degree of prefabrication

~ 85%



3 CLT slab elements per flat:

- 2 elements: 3,0x6,6 m
- 1 element: 1,5x6,6 m
- Easy assembly
- Span of 7 m possible according to KLH
- 2 or 3 axle spanned floor slab

Outside/interior loadbearing walls

- Prefabricated with installations
- 1-2 elements possible per wall

Elevator shaft prefabricated

all buildings have the same shape/system - buying the same materials and same amounts for everything makes the planning easier

Concept of sound management

- Between Apartments
  - DnT,w = 55 dB (Luftschallschutz)
  - L'nT,w = 48 dB (Trittschallschutz)
- Towards outside
  - R'res,w = 33 dB (resultierende Bauschalldämm-Maß)
  - Windows and doors, Rw = 28 dB (Schalldämm-Maß)
- Technical room - $L_{AFmax,nT}$ = 25 dB (30 dB to connecting rooms)
- Choose specific wall build-ups to ensure soundproofing

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Concept of heat management

- Wind energy - Burgenland known for wind turbines
  - No mountains – flat area
- Electric heating
  - water circulating Underfloor Heating System
- Solar panels
  - Solar panels are one of the lowest emission ways to generate electricity
  - Solar panel systems are long lasting and require little maintenance.

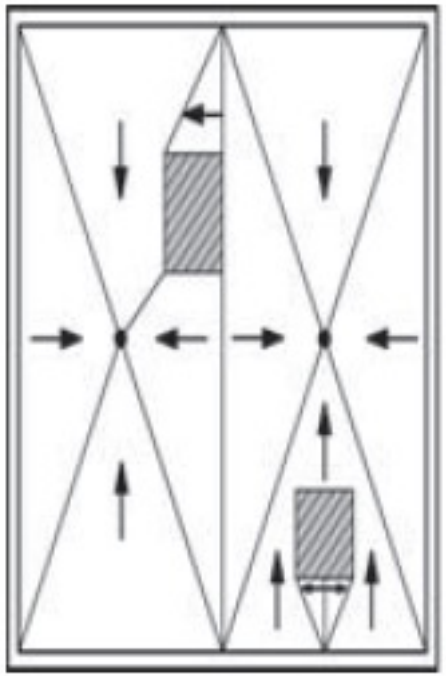
Concept of fire resistance

- Gebäudeklasse 3 (Height 6,4m < 7,0m)
- proper material classification chosen according to OIB guidelines

Loadbearing parts	**Seperating walls**	**Staircases**
R 30 (highest floor)	REI 30 (highest floor)	REI 60 (walls)
R 60 (floors overground)	REI 60 (floors overground)	EI2 30-C (apartment doors)
		E 30-C (doors to hallways)

Concept of moisture management

- Underdrain system
  - Keeping out water coming foundation
- 4 inclined fields on roof (tot. 518 m²) - internal drainage system
- Ventilation system
  - Keep the structures of the apartment in good condition



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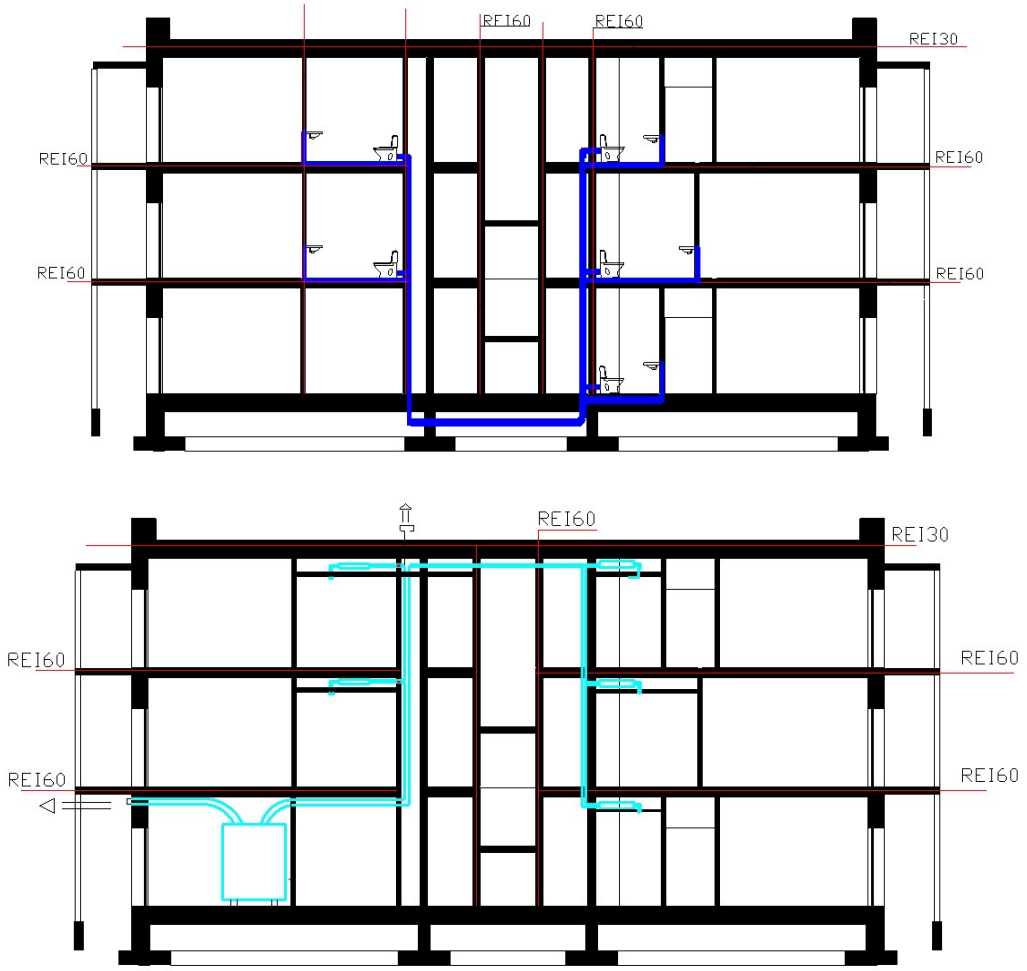
Technical systems

- Ventilation system
  - System location is ground floor
  - Exhaust air is led out from two places
    - Through a wall and roof
  - „Easier to be and breathe“
- Water system
- Central water pipe locations
- Solar panels



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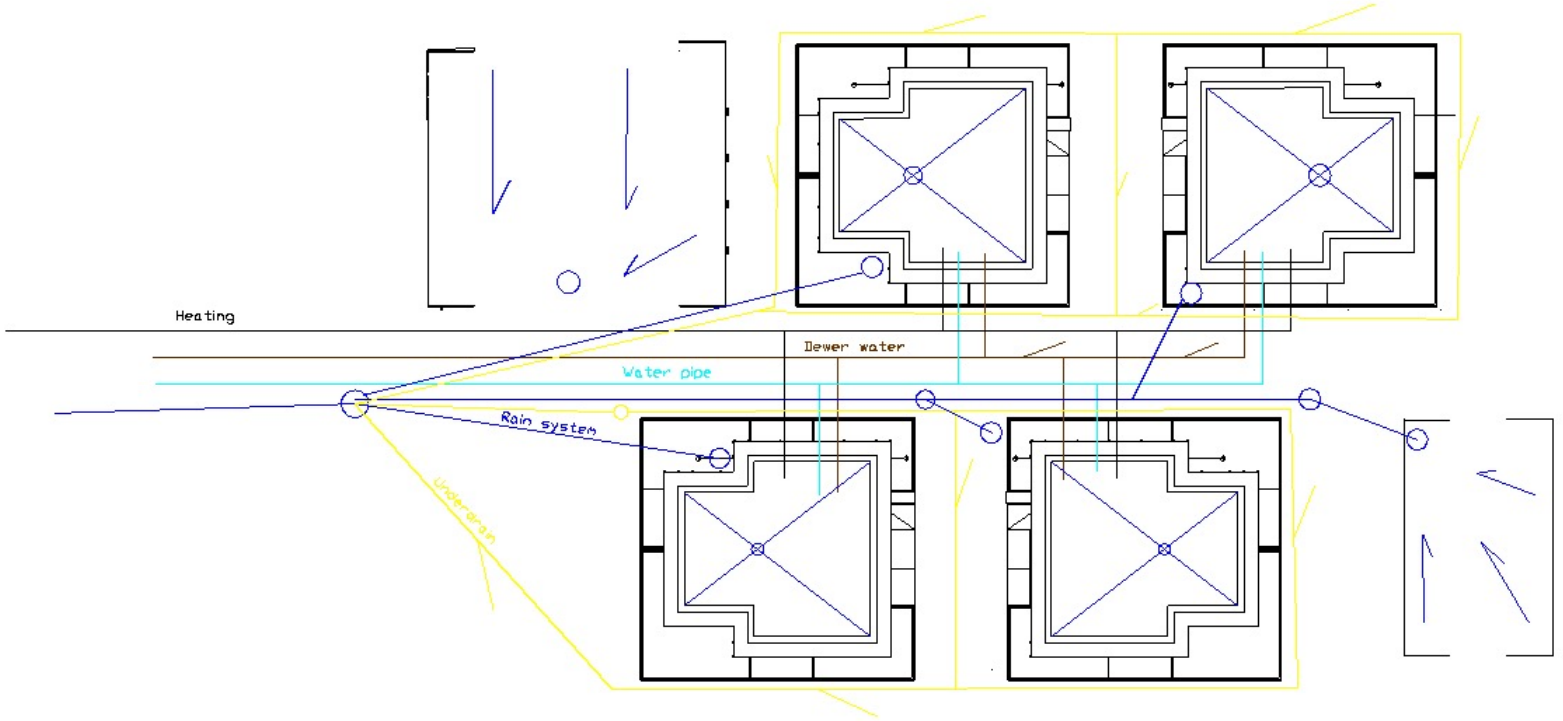
HVAC system

- Drain Water (Blue)
  - Parking lot
  - Roof
- Sewer water (Brown)
- Underdrain (Yellow)
- Water pipe (Light blue)
- Heating (Black)

Rainwater well

Underdrain well



Dismantling and flexibility concept

Dismantling:

- Heat system can be reused
- Screws instead of glue - CLT panels can be changed / reused easily
- solar panels can be reused
- CLT is easy to recycle
- space between the buildings - if more living space is needed it can be added later on

Flexibility Concept:

- simple apartments - can be adapted
- different sizes of apartments
- all apartments have the same system

Sustainability concept

- CLT - sustainable material - wood is local
- low CO2 footprint
- good fire resistance, air quality and soundproofing
- Wind turbines
- Reusable floor heating matts
- two different apartment types - if you want to move in a bigger apartment you can stay in the same building
- social aspect (community rooms)
- big outside area- it’s possible to grow some of your own food
- compact design and simple shape
- durable
- orientation – using the sunlight to create a compfortable way of living
- Parking lots for electric cars

Cost efficiency

- compact design and simple shape - more efficient
- getting materials from only few suppliers so its easier and more efficient
- durable so after some time it will be profitable
- small apartments are less costworthy and space is used efficient
- some of the energy is self generated (solar panels, wind turbines)
- no details or ornaments
- entertainment can be in the community areas so people can share their equipment
- Self supporting balconies

Renderings

Renderings

Renderings

Sources:

Thank you for your attention!