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SUSTAINABLE, HIGH-PERFORMANCE BUILDING SOLUTIONS IN WOOD

PALS POLAND, LITUANIA, LATVIA, AUSTRIA/TEAM5

Florian Donner
Zuzanna Müller
Gabriela Lis
Patrycja Wasik
Ugis Selecovs
Rokas Ramoska





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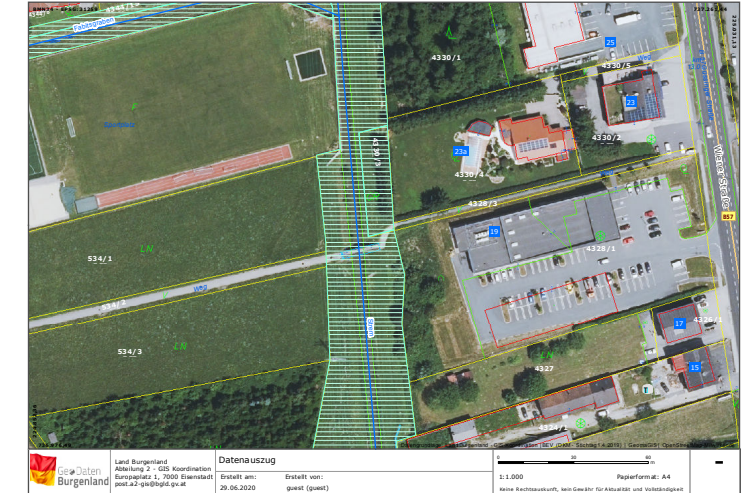
Basic Data

- 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



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





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Site Plan



Total area of the
site: 11.310 m²

Area of the
buildings: 2060 m²

Area of the
pavings: 2944 m²

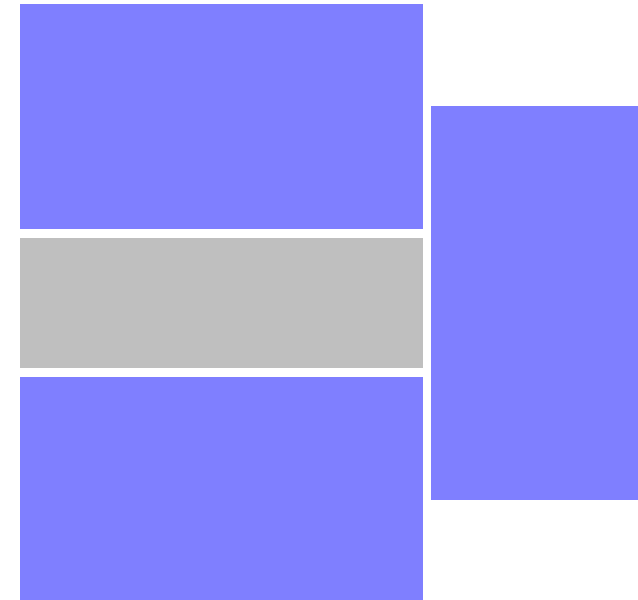
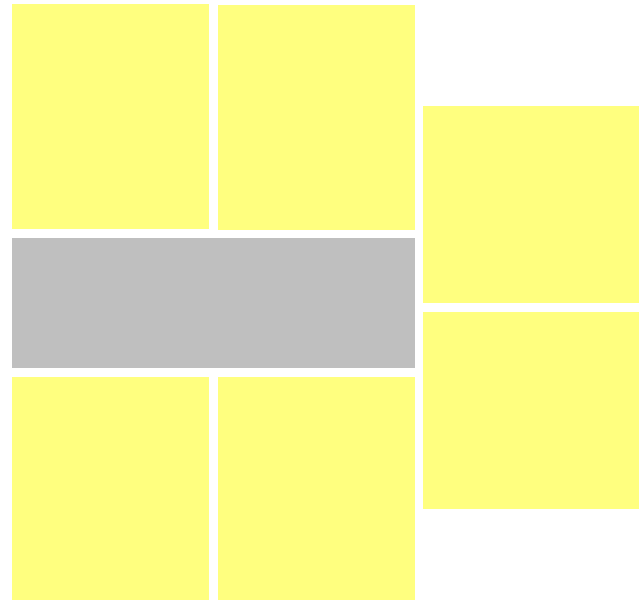
Area of the green
space: 6306 m²

Density: 0,55



Floor Plans

Assembly of the apartments



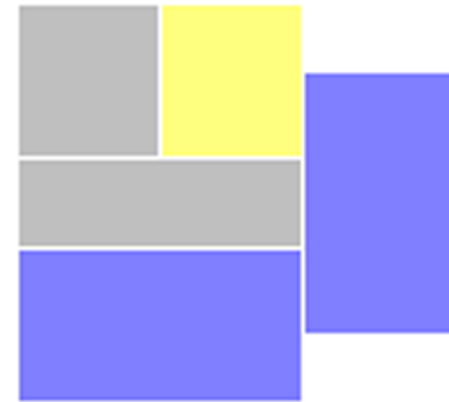
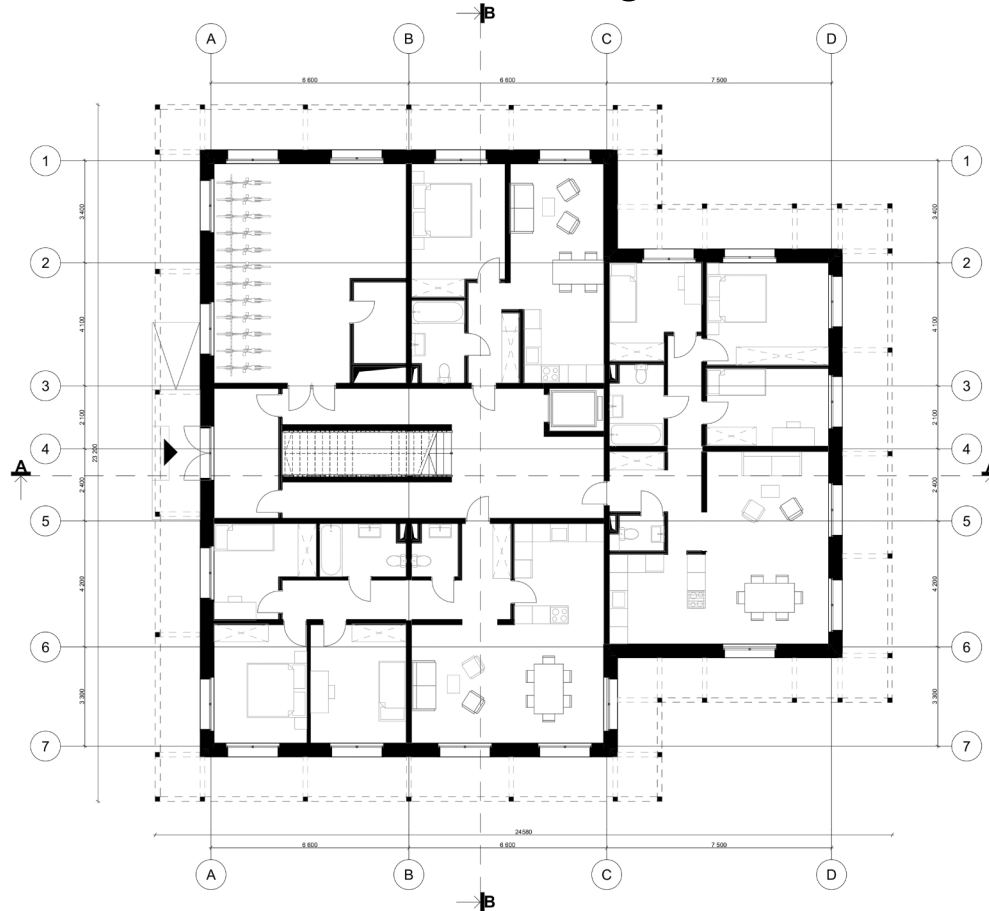


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Floor Plans

ground floor



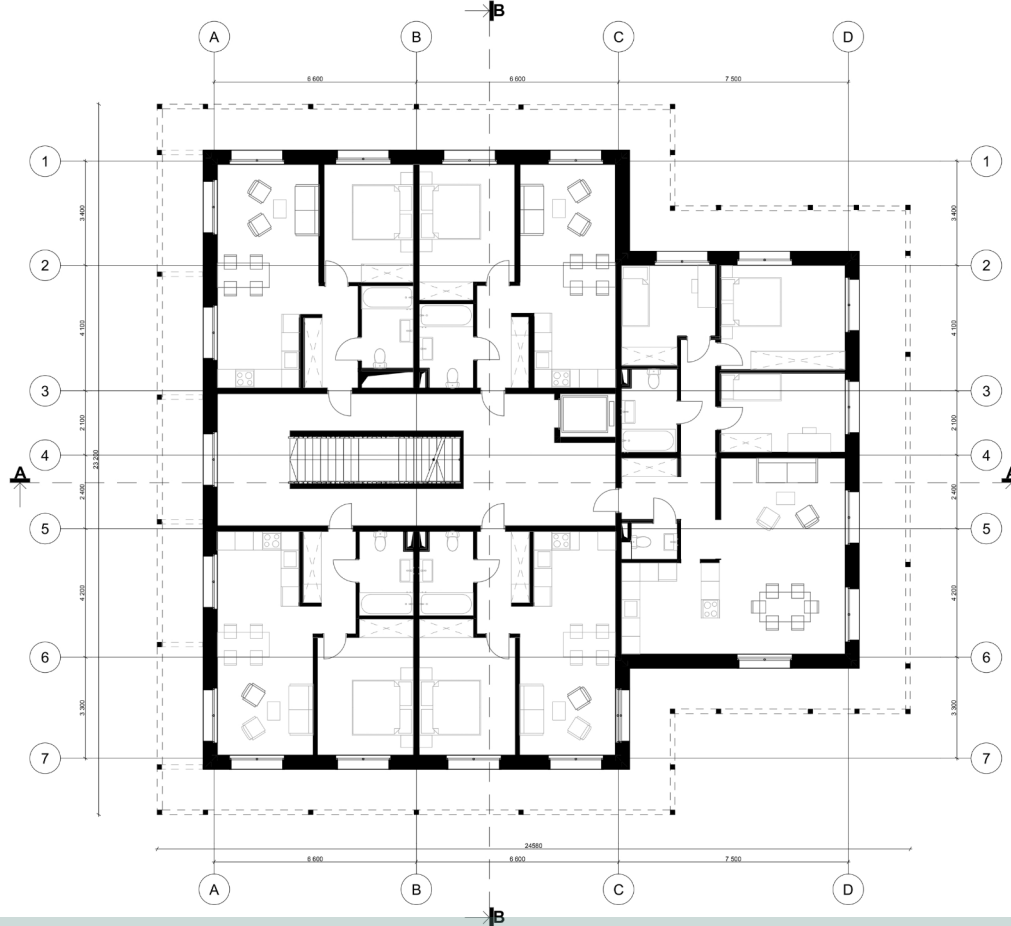


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Floor Plans

first floor





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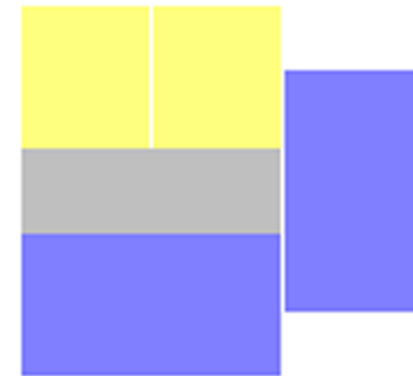
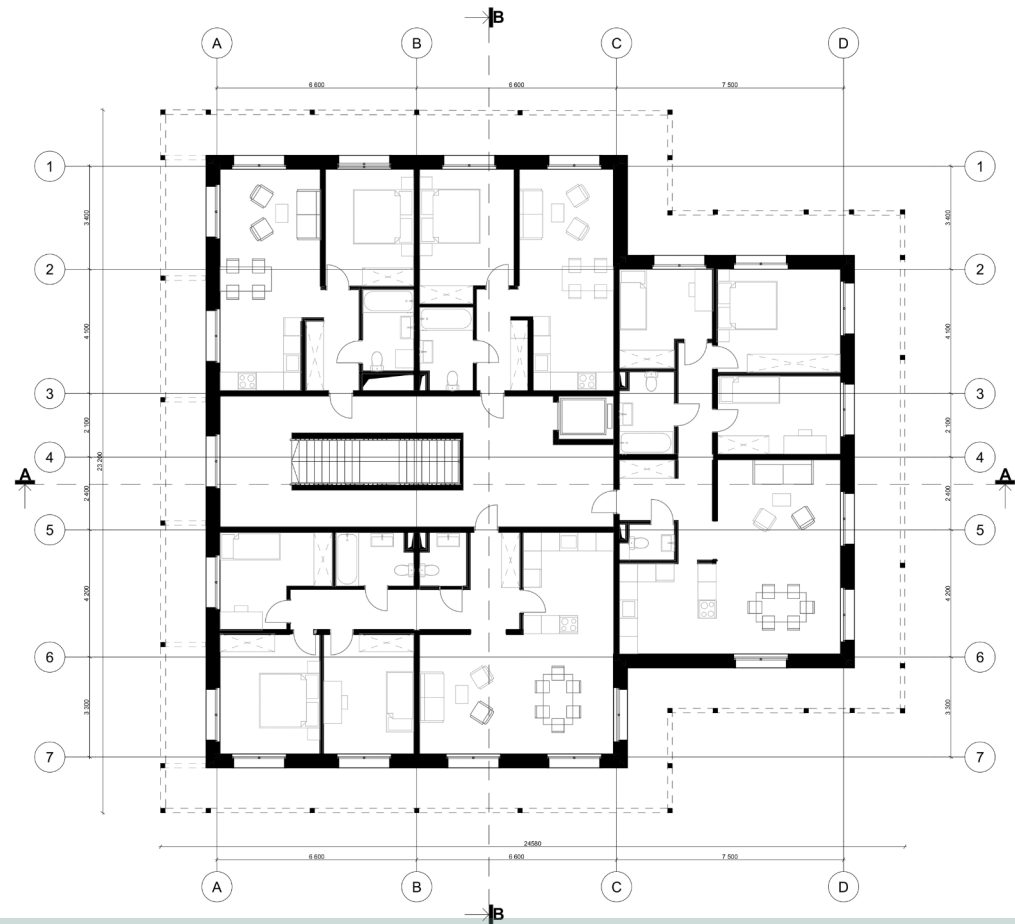


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Floor Plans

second floor



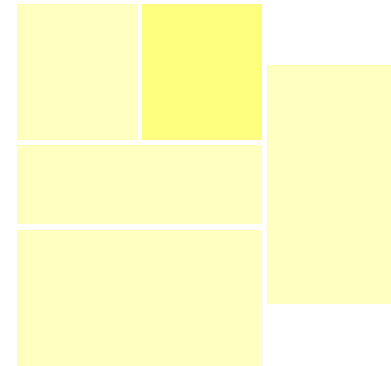
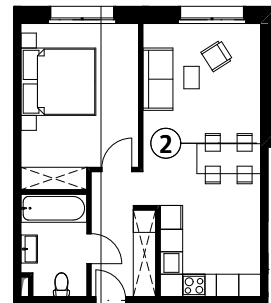
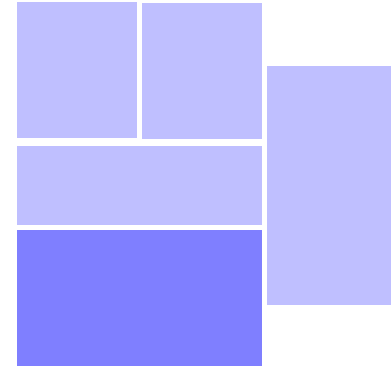
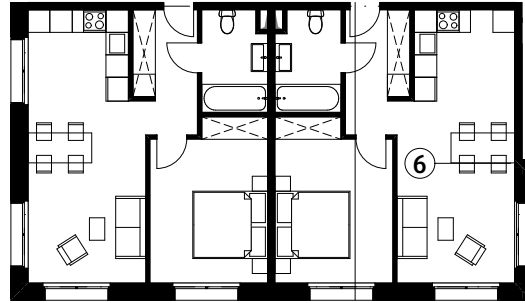


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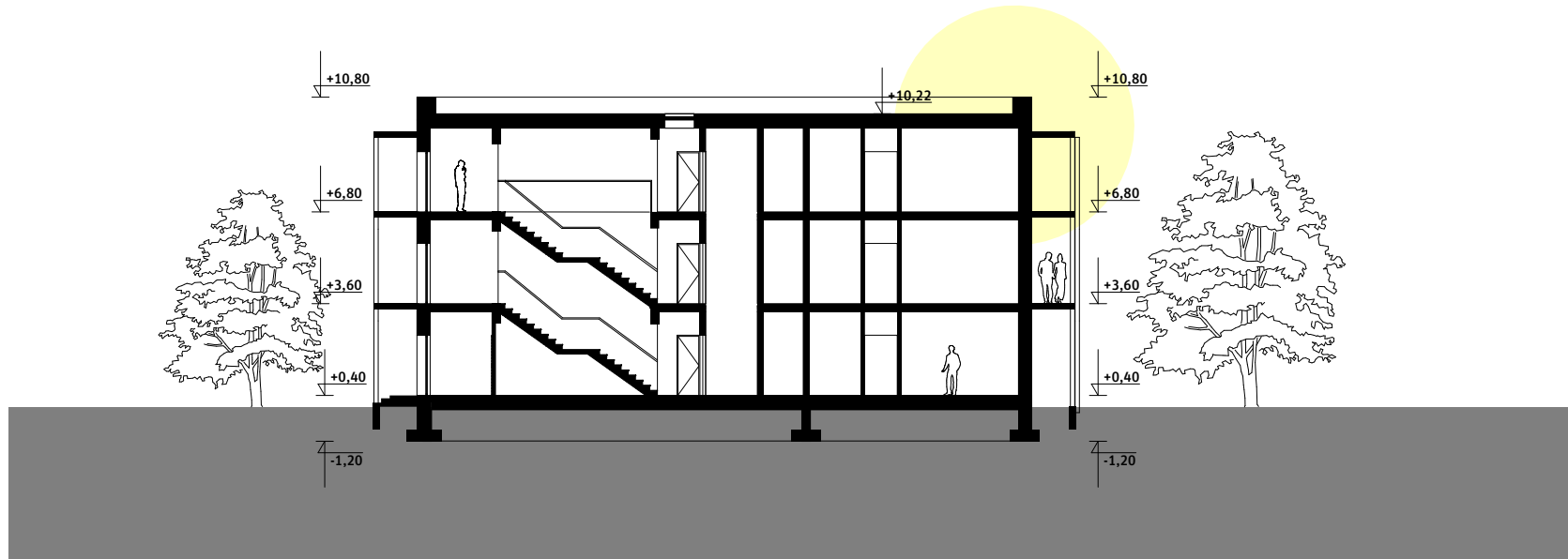


Floor Plans

Flats



Section A





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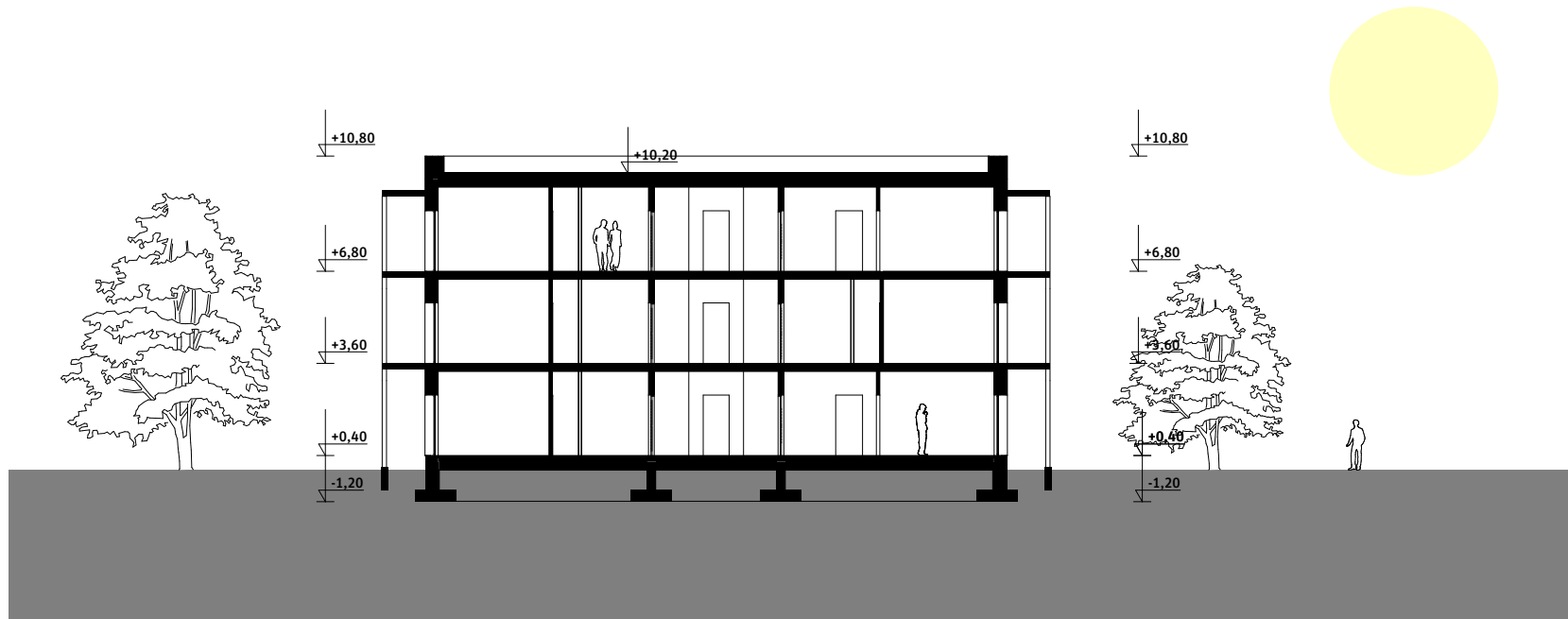
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WOOD

Section B



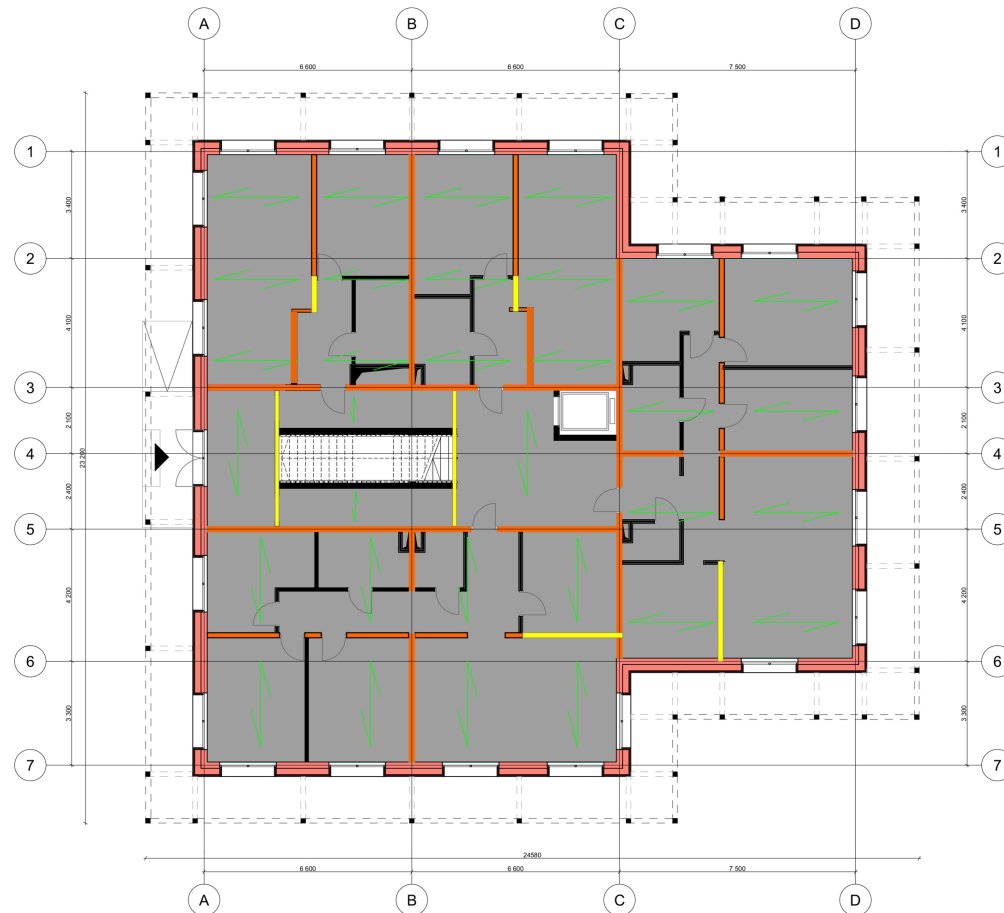
Vertical and horizontal load transfer

- **Live load (apartments):** $2,0 \text{ kN/m}^2$ (Category A)
- **Live load (roof):** $1,0 \text{ kN/m}^2$ (Category H)
- **Snow load:** $1,4 \text{ kN/m}^2$ □ **Wind load:** $0,8 \text{ kN/m}^2$
- **Dead load:** $\sim 8,5 \text{ kN/m}^2$ (per floor) – $25,5 \text{ kN/m}^2$ total
- **Staircase:** $2 - 4 \text{ kN/m}^2$

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



Load transfer



- **Outside load bearing walls**
- **Inside load bearing walls**
- **Support beams**
- Span of max 4 m for minimal CLT thickness
- 2 or 3 axle spanned floor slabs

Concept of sound management

•Between Apartments

- $D_{nT,w} = 55$ dB (Luftschallschutz)
- $L'_{nT,w} = 48$ dB (Trittschallschutz)

•Towards outside

- $R'_{res,w} = 33$ dB (resultierende Bauschalldämm-Maß)
- Windows and doors, $R_w = 28$ dB (Schalldämm-Maß)

•Technical room - $L_{AFmax,nT} = 25$ dB (30 dB to connecting rooms)

•Choose specific wall build-ups to ensure soundproofing

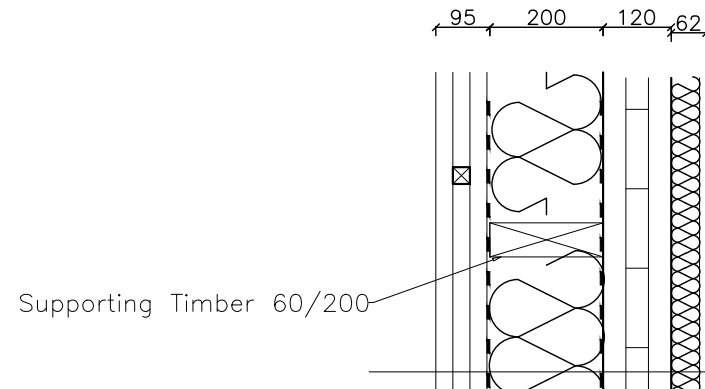
Concept of fire resistance

- building class 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)



Exterior wall



Timber cladding 30 mm
Counter-batten 30 mm
Batten 30 mm
Moisture protection
Straw 200 mm
Breathable layer
CLT 120 mm
Insulation material 50 mm
gypsum plaster board 12,5 mm

Thickness: 477 mm

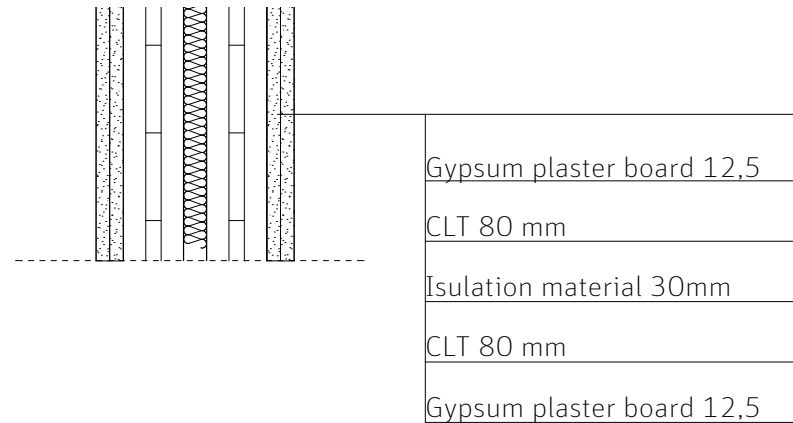
Fire: REI90

Sound: $R_w = 63$ dB

Heat protection: $U = 0,14$ W/(m²K)



Seperating wall between apartments



Thickness: 215 mm

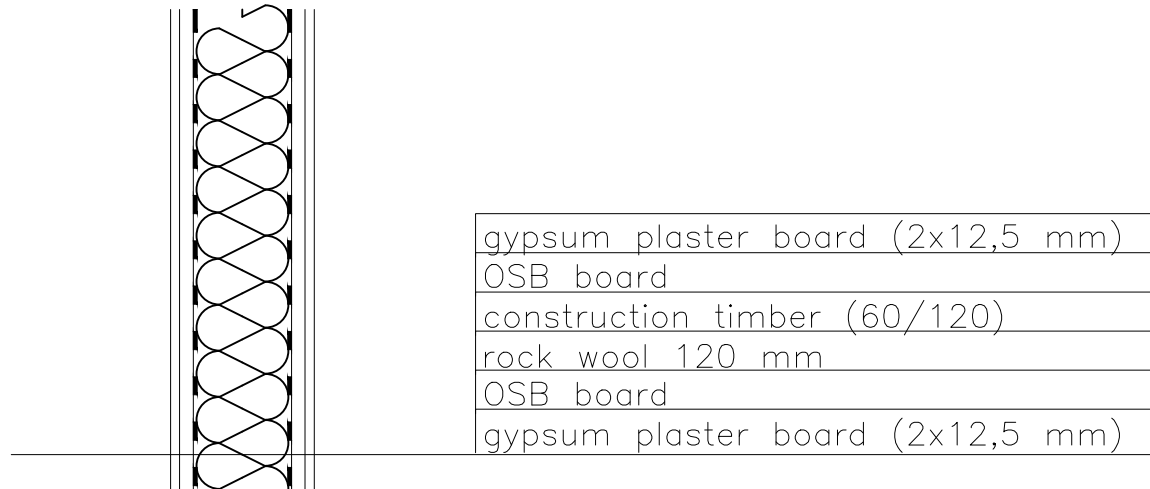
Fire: REI60

Sound: $R_w = 56$ dB

Heat protection: $U = 0,35$ W/(m²K)



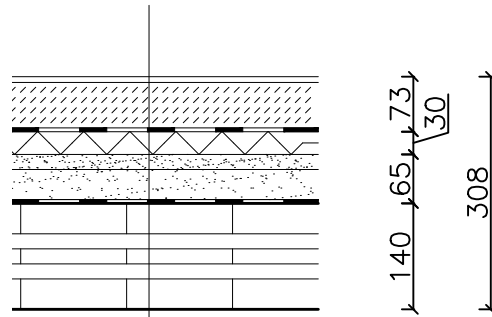
Internal wall



Thickness: 170 mm
Fire: REI60
Sound: $R_w = 45$ dB



Floor



Thickness: 308 mm

Fire: REI60

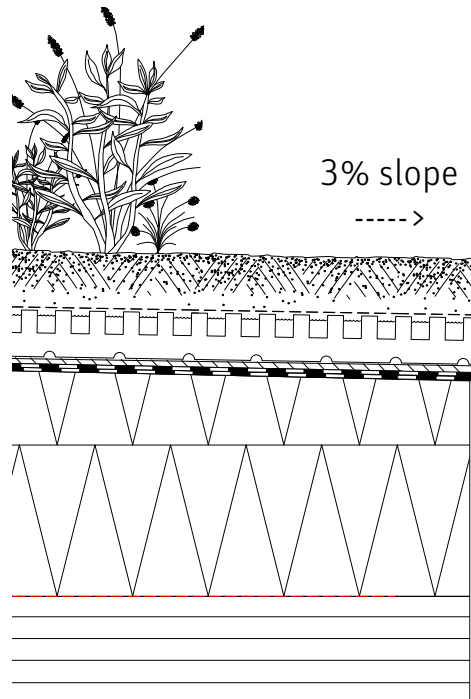
Sound: $R_w = 60$ dB

$L_{n,w} = 57$ dB

Timber Flooring	8 mm
Cement Screed	60 mm
Seperating layer	
sound insulation MW-T	30,0 mm
gravel	60,0 mm
Trickle protection	
CLT	140,0 mm



Roof



- 50mm roof seed
- 80mm green roof substrate
- filter layer
- 40mm drainage layer
- protection mat
- 12mm 3 layers of waterproof membrane
- 200mm sloped insulation 3%
- vapor control layer
- 140mm CLT

Fire: REI30

Sound: $R_w = 50$ dB

Heat protection: $U = 0,16$ W/(m²K)



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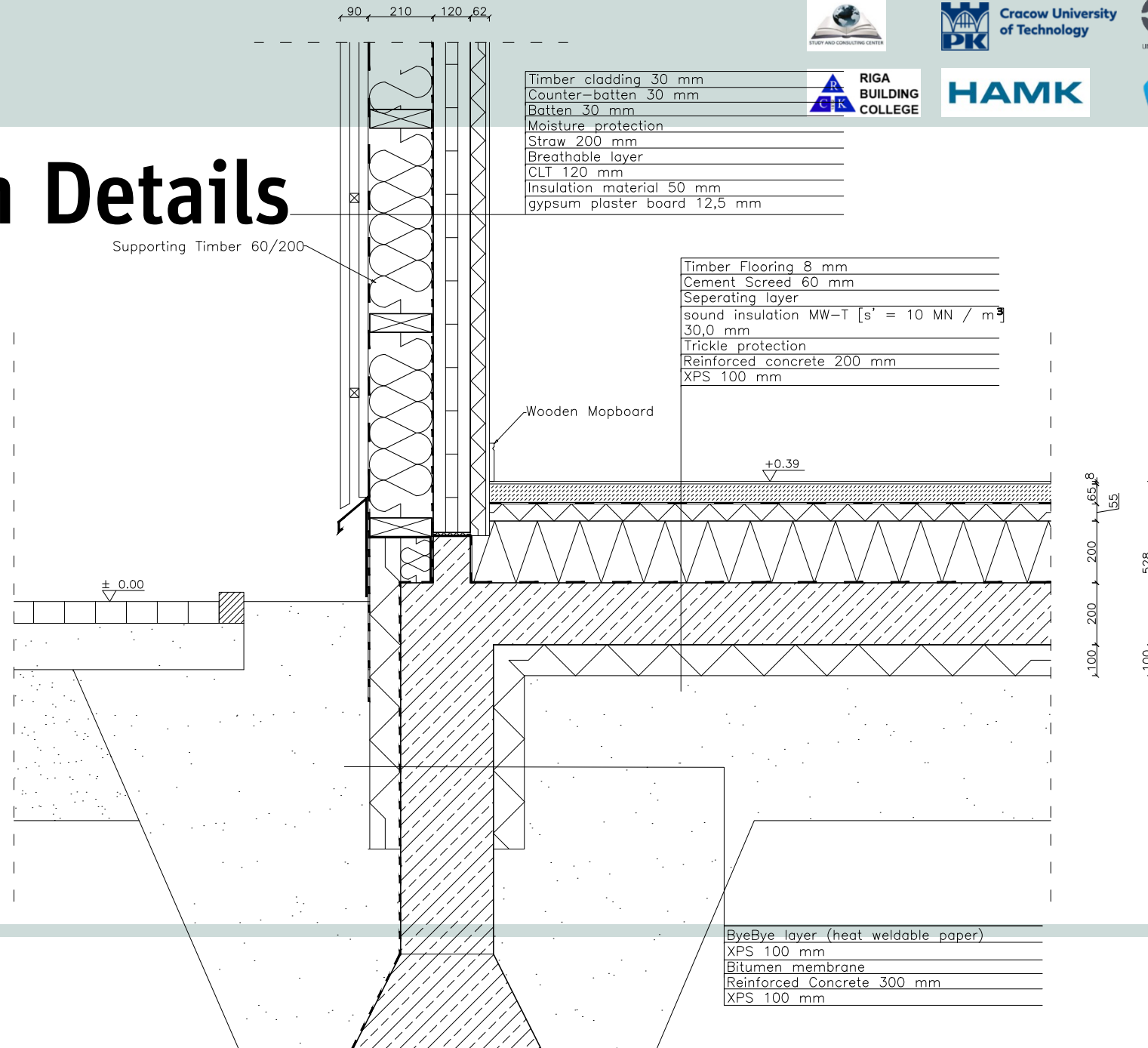


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Connection Details

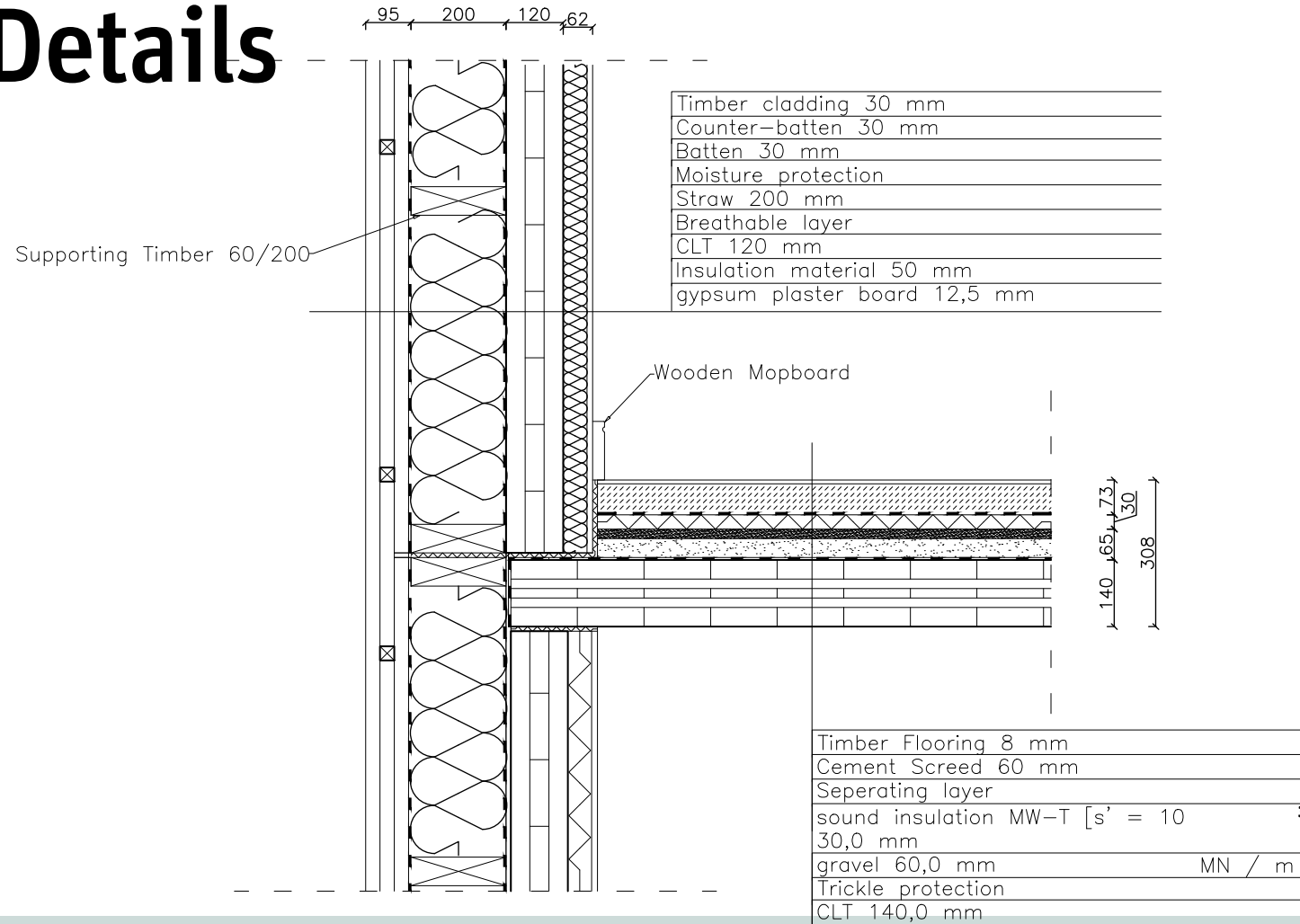
Foundation





Connection Details

Outside wall/flooring





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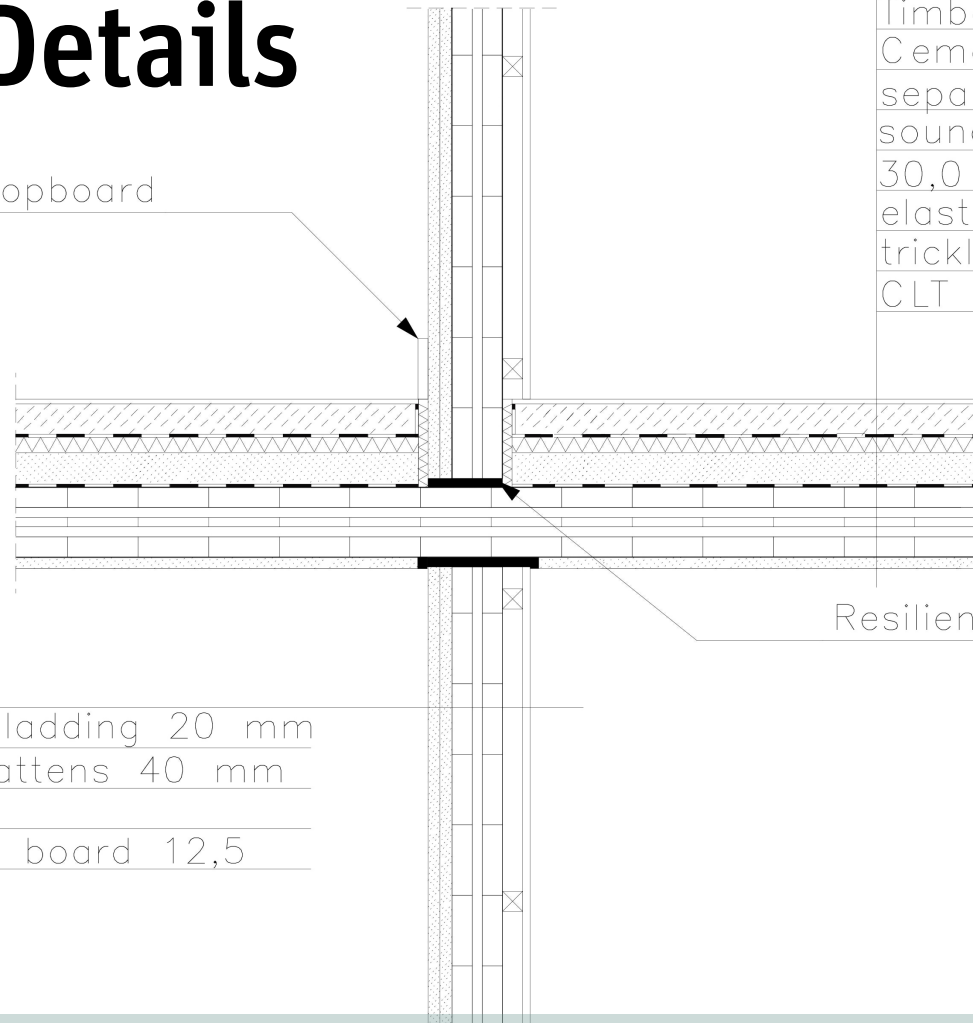
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Connection Details

Interior walls (load bearing)

wooden mopboard



Timber flooring 8 mm
Cement Screed 60 mm
separating layer
sound insulation MW-T [$s' = 10 \text{ MN} / \text{m}^2$]
30,0 mm
elastic bound 60 mm
trickle protection
CLT 140,0 mm

Resilient material

vertical wood cladding 20 mm
spruce wood battens 40 mm
CLT 120 mm
Gypsum plaster board 12,5



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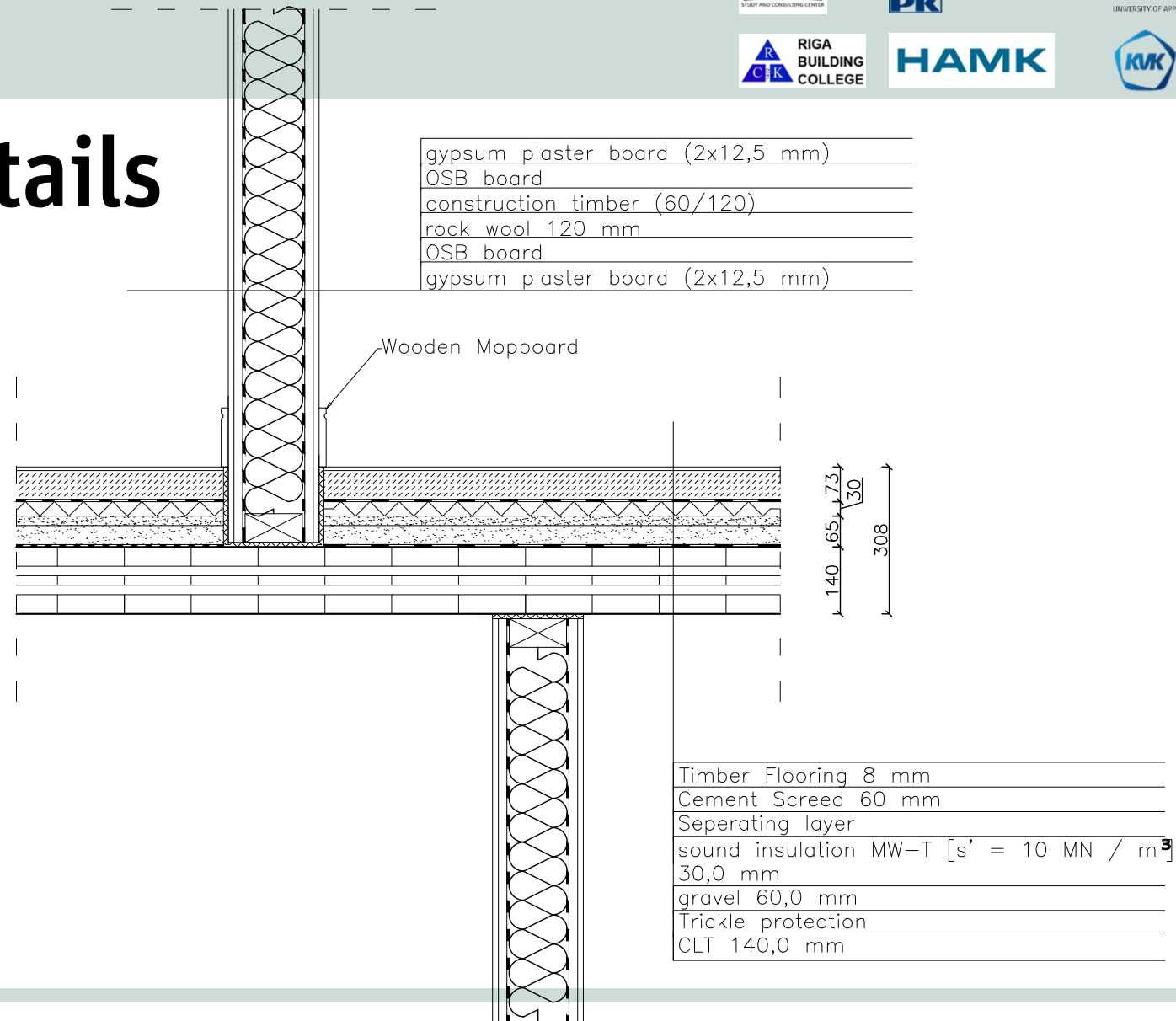


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Connection Details

Interior walls (non load bearing)



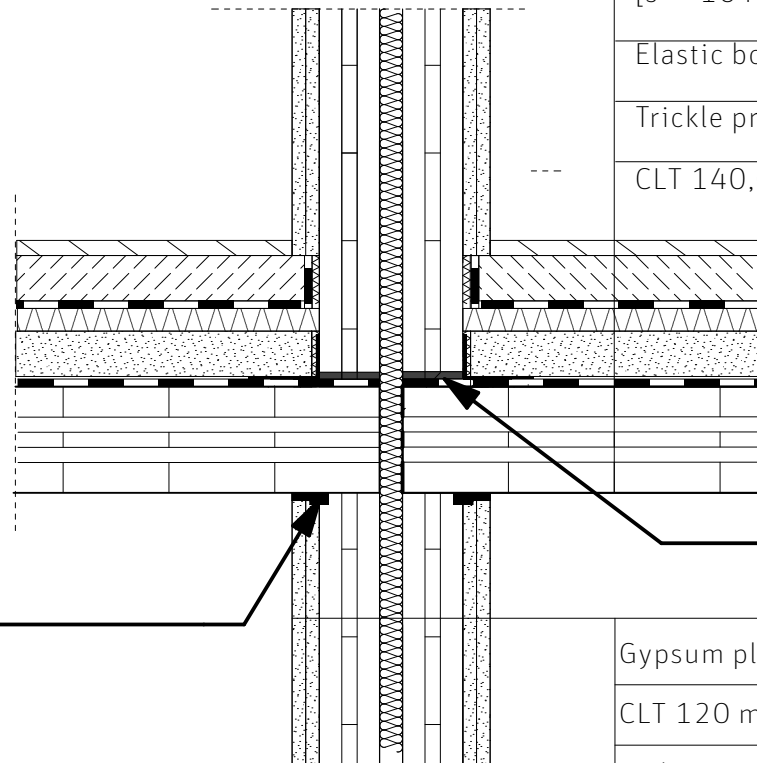


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Connection Details

Load bearing wall/floor



Timber Flooring 8 mm
Cement Screed 60 mm
Seperating layer
sound insulation MW-T [s' = 10 MN / m ³] 30,0 mm
Elastic bound 60,0 mm
Trickle protection
CLT 140,0 mm
Flexible bearings, in accordance with the requirements of soundproofing
Gypsum plaster board 12,5
CLT 120 mm
Isulation material 30mm
CLT 120 mm
Gypsum plaster board 12,5

Sealing tape



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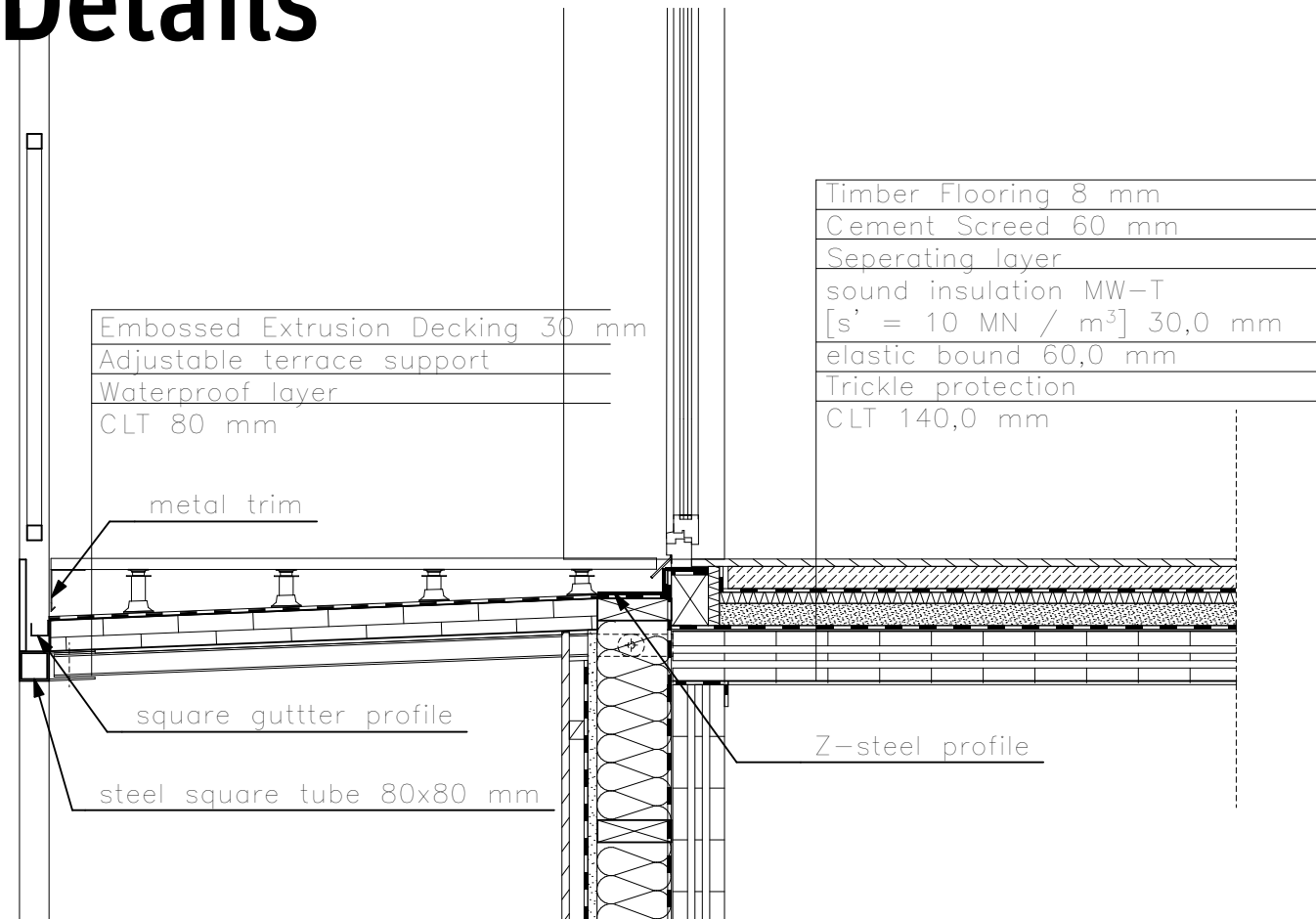


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Connection Details

Balcony





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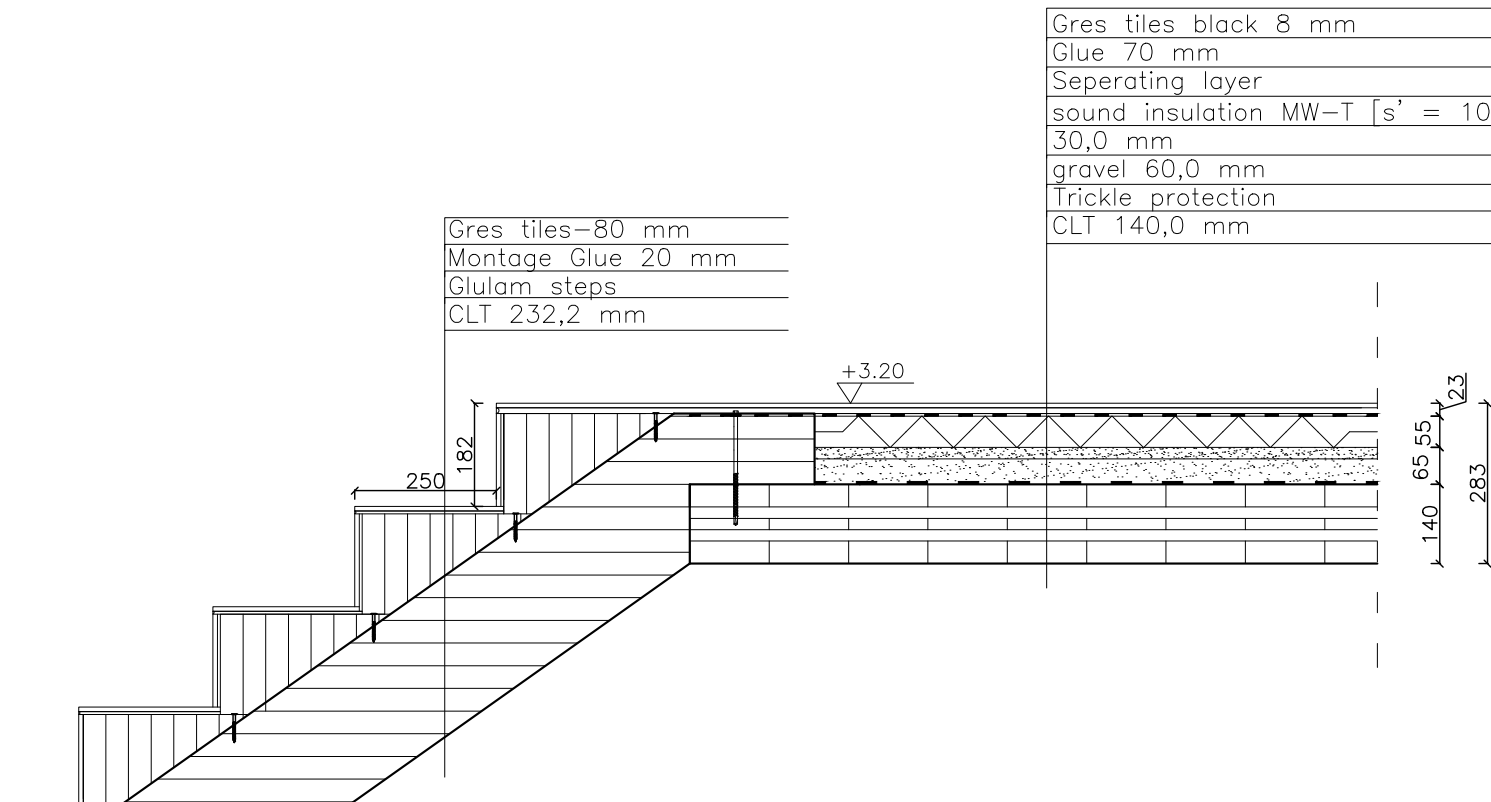


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Connection Details

stairs





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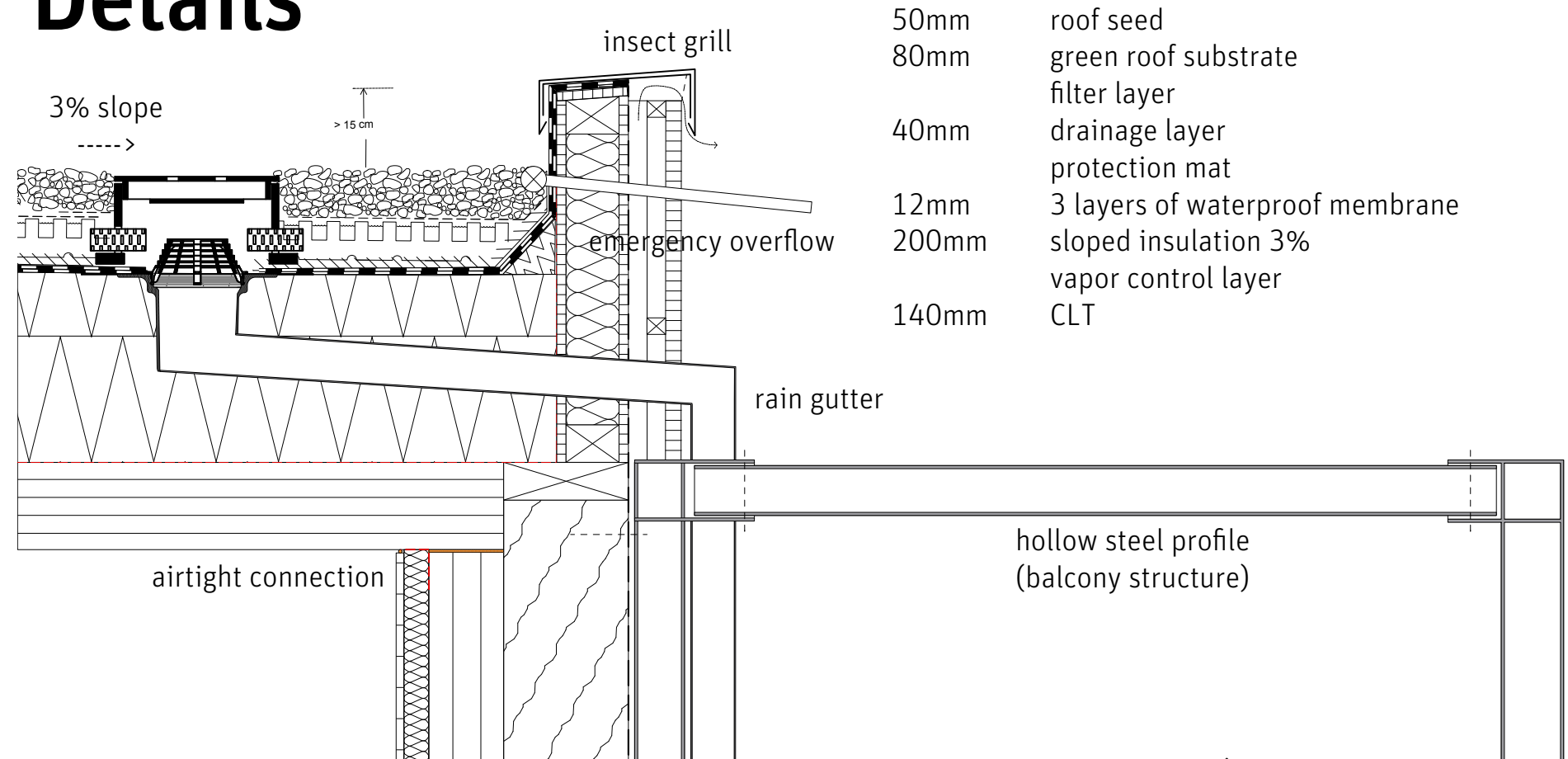
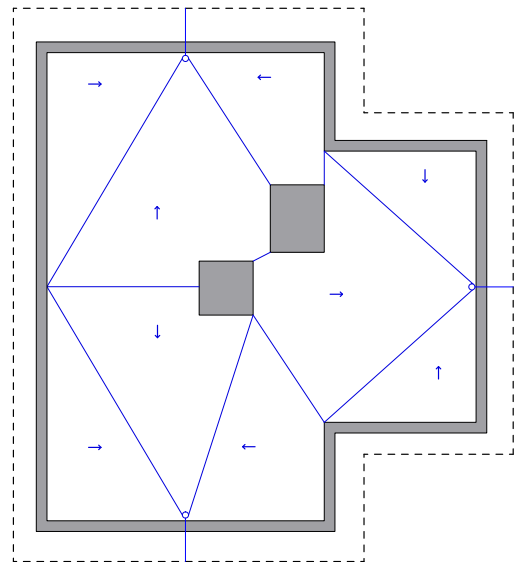


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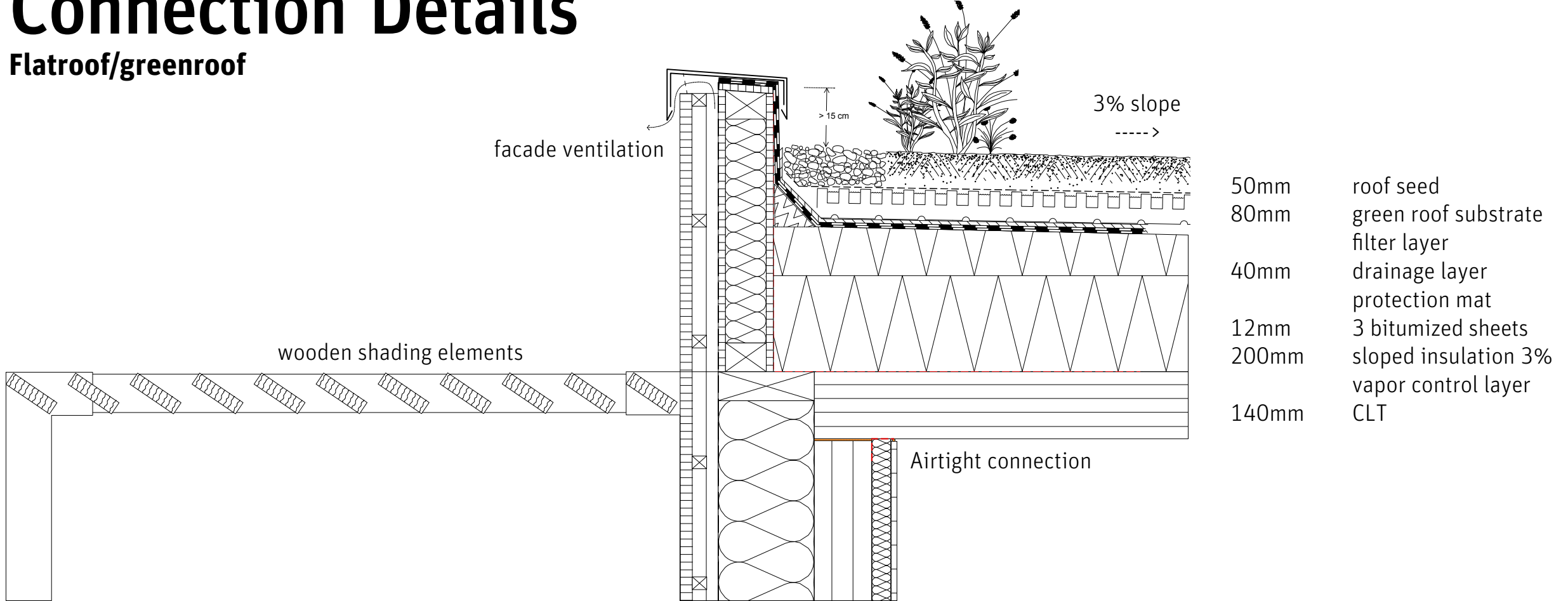
Flatroof/gutter





Connection Details

Flatroof/greenroof

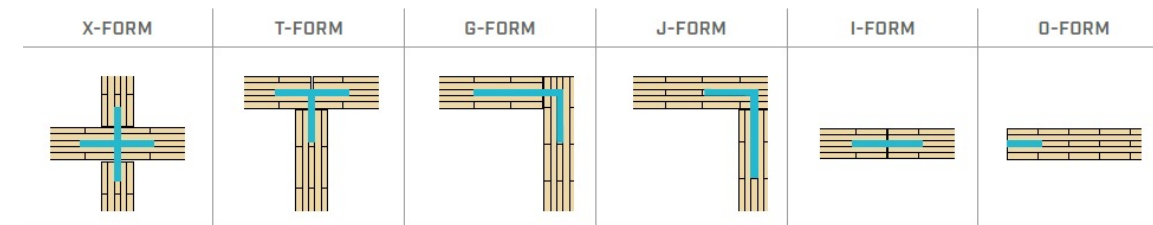
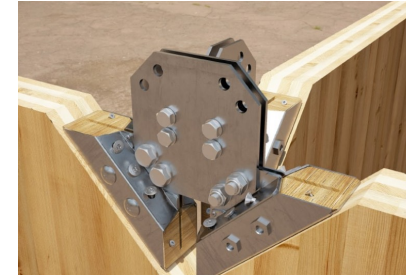


- 50mm roof seed
- 80mm green roof substrate
- filter layer
- 40mm drainage layer
- protection mat
- 12mm 3 bitumized sheets
- 200mm sloped insulation 3%
- vapor control layer
- 140mm CLT

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.



Degree of prefabrication ~ 85%

Elements per floor:

- 37 floor slabs
- 29 wall elements
- 21 window beams
- 30 interior wall elements
- 6 internal wall beams

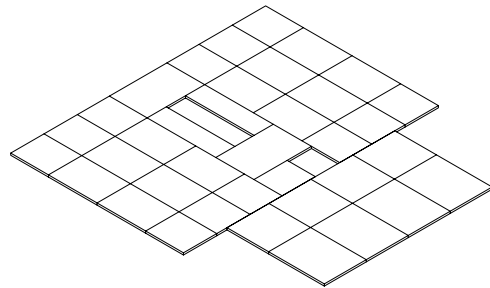
Outside/interior loadbearing walls

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

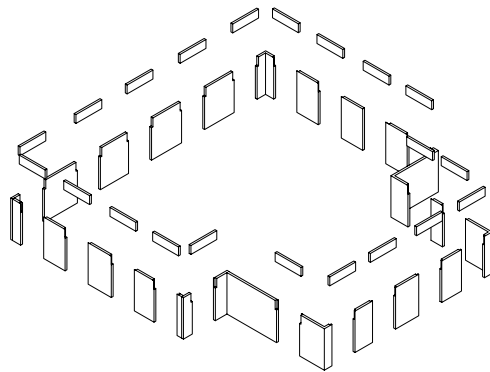
Elevator shaft prefabricated

all buildings have the same shape/system

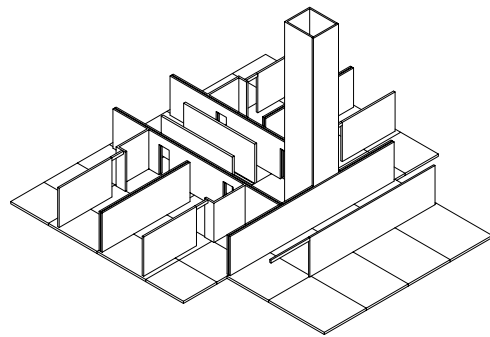
- buying the same materials and same amounts for everything makes the planning easier



3. step: ceiling/floor



2. step: external walls+
beams



1. step: floor + internal walls+
elevator shaft





Technical systems

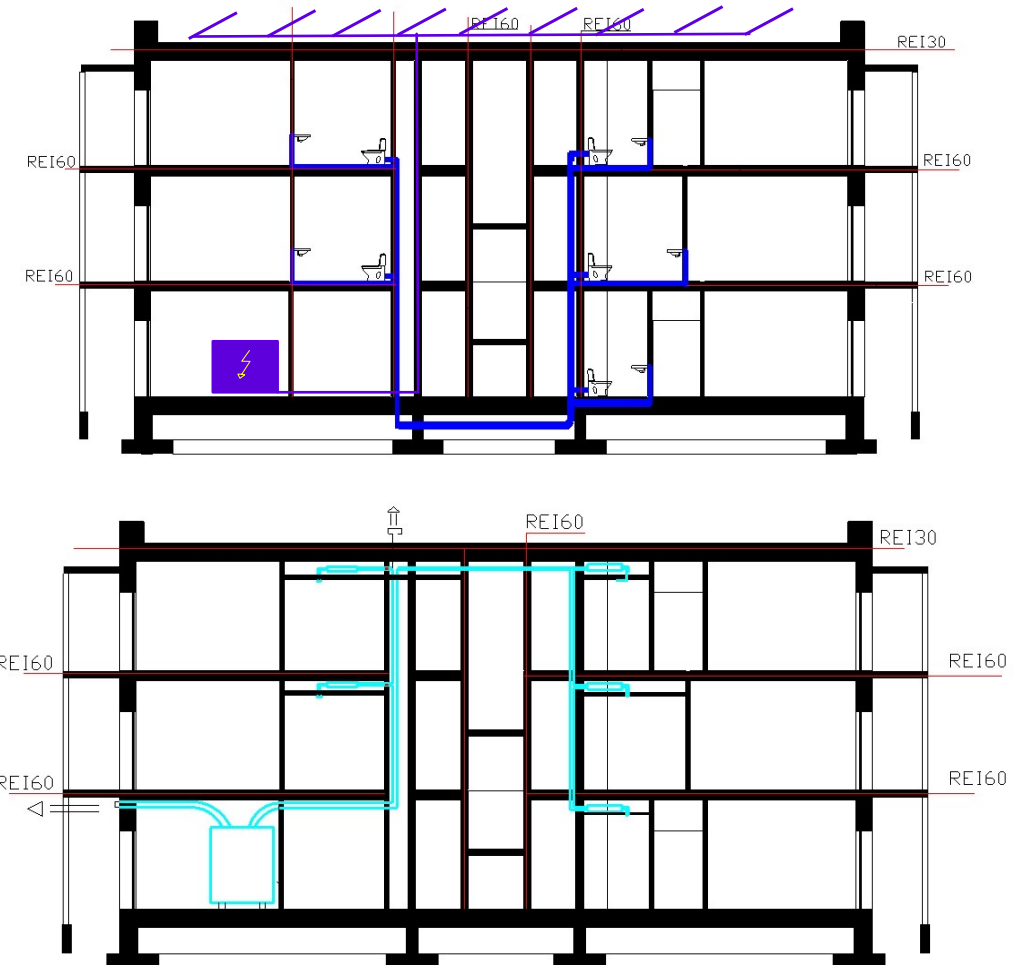
•Ventilation system

- System location is ground floor
- Exhaust air is led out from two places

•Water system

•Central water pipe locations

•Solar panels + battery



Dismantling and flexibility concept

Dismantling:

- Ventilation 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
- balconys can easily be changed if the CLT panels would start to decay

Flexibility Concept:

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

Cost efficiency

- compact design and simple shape - more efficient
- getting materials from only few suppliers so its easier and more efficient
- durable materials so after some time it will be profitable
- small apartments are costworthy and space is used efficiently
- a lot of the energy is self generated (solar panels)
- no expensive materials
- Self supporting balconies



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