06-04-2022

P5

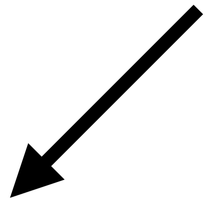
Luuk Goossen

Context

The SIMS
TM

202122

202122



Co-Design

202122

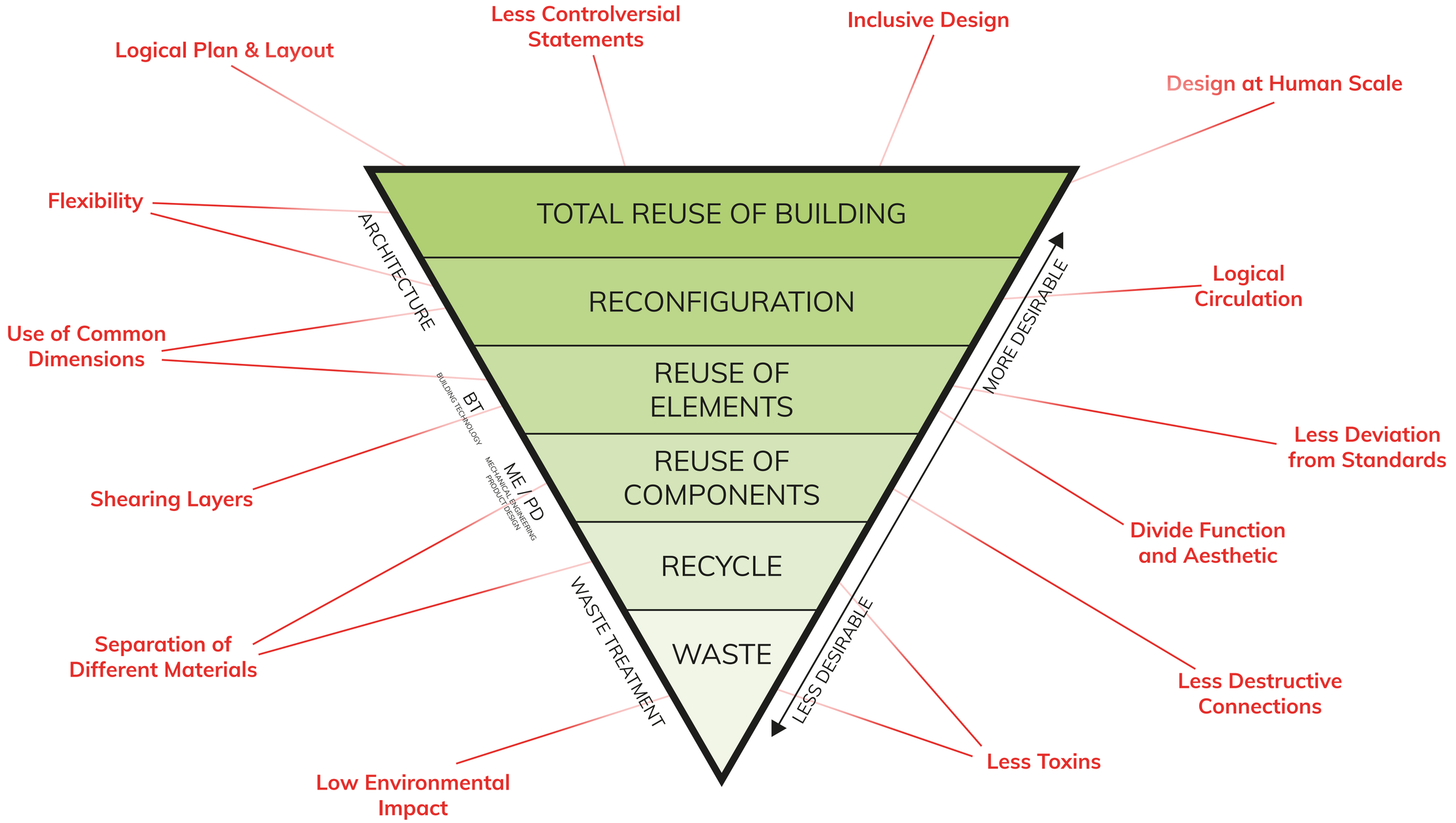
Co-Design

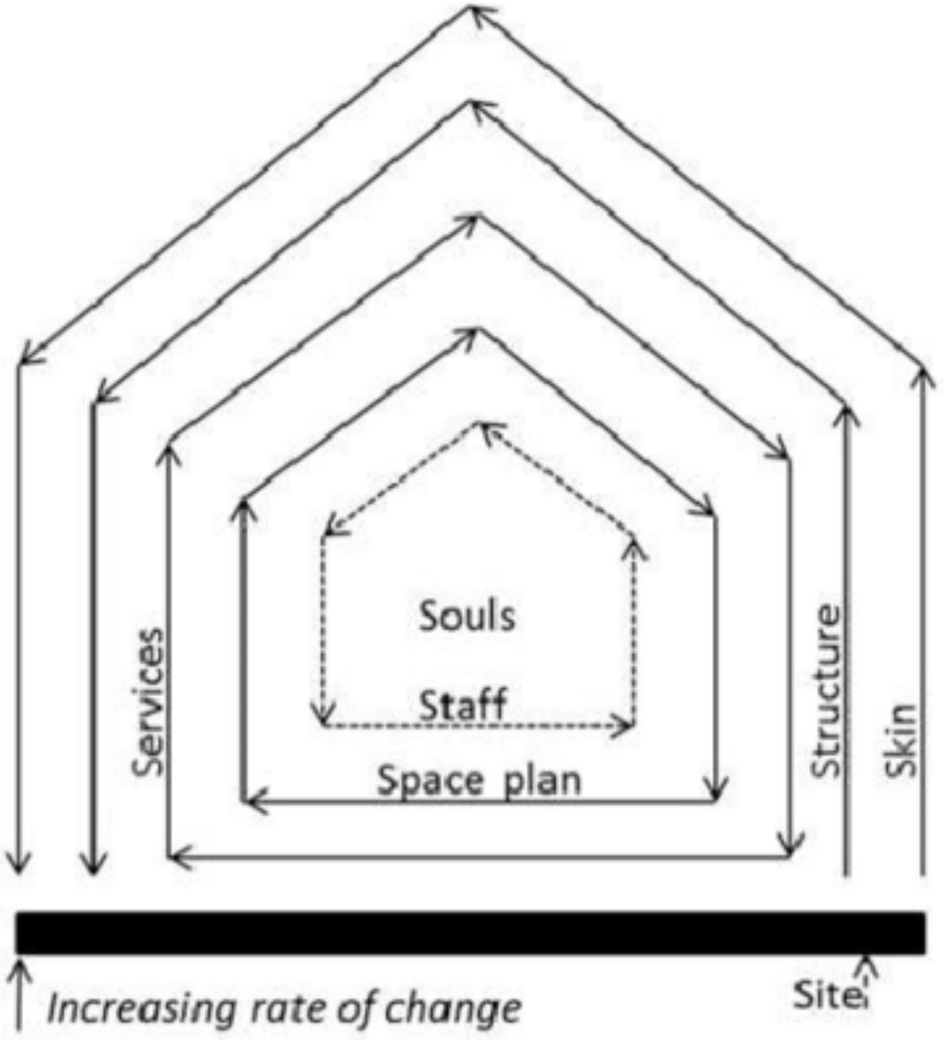
Building System

Digitally Supported Building System

Digitally Supported Building System

- Digital Detailing
- Mass Production
- Flexible
- Circular
- Open Specifications


Logical Plan & Layout
Less Controlversial Statements
Inclusive Design
Design at Human Scale
Flexibility
Use of Common Dimensions
Shearing Layers
Separation of Different Materials
Low Environmental Impact
Less Toxins
Less Destructive Connections
Divide Function and Aesthetic
Less Deviation from Standards
Logical Circulation
TOTAL REUSE OF BUILDING
RECONFIGURATION
REUSE OF ELEMENTS
REUSE OF COMPONENTS
RECYCLE
WASTE
ARCHITECTURE
BT
BUILDING TECHNOLOGY
ME / PD
MECHANICAL ENGINEERING
PRODUCT DESIGN
WASTE TREATMENT
MORE DESIRABLE
LESS DESIRABLE



Shearing layers	Description	Typical lifespan/activity
Site	Location and context	Permanent
Structure	Bones	30-300 years
Skin	Envelope	20+ years
Services	Lifeblood	7-20 years
Space plan	Interior layout	3 years
Stuff	Furniture and equipment	Under 3 years
Souls	People	Daily

Shearing Layers, Stewart Brand (1995)

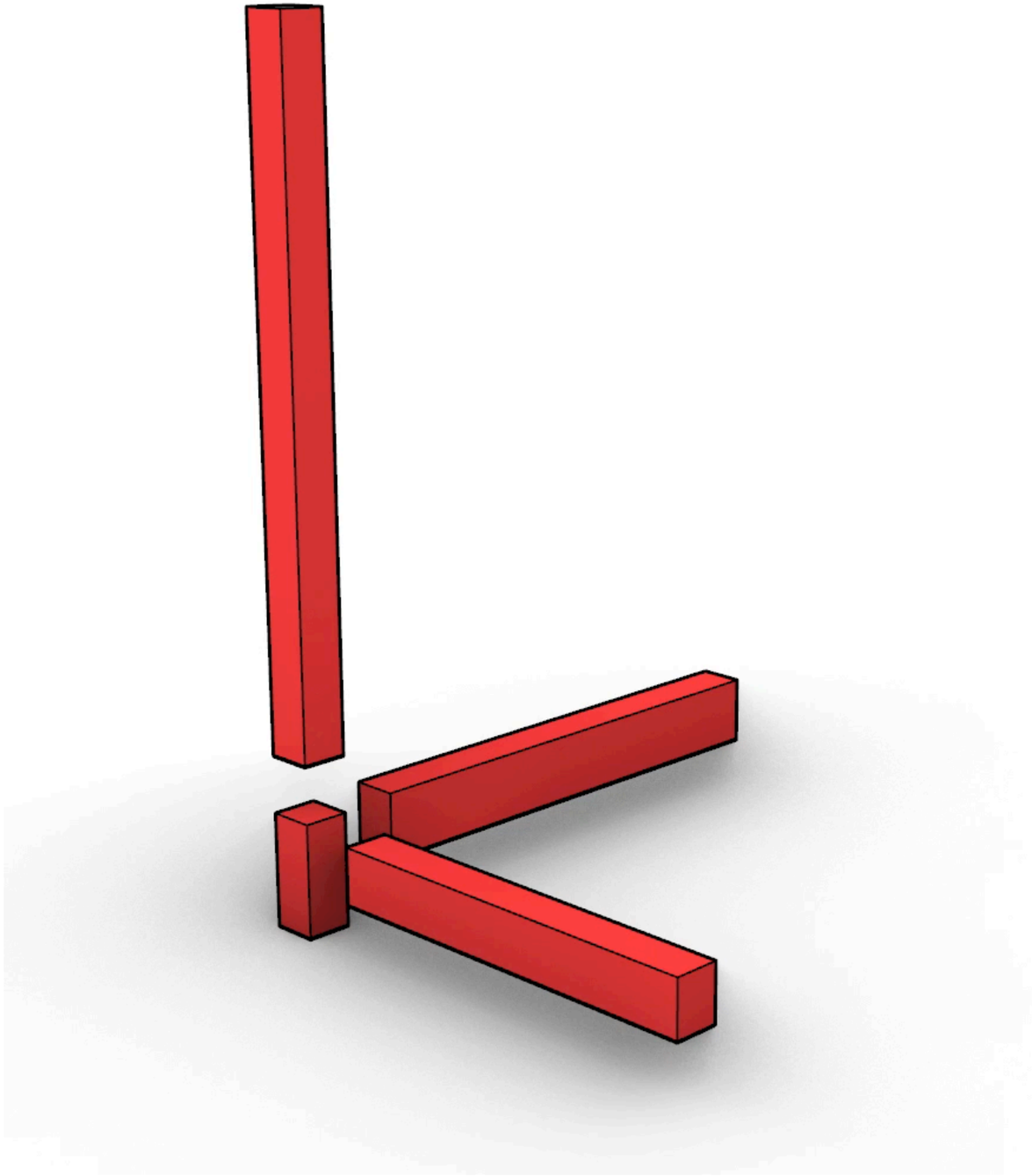
FINISH
PLASTERBOARD
INTERIOR FINISH
FACADE SYSTEMS
EXTERIOR FINISH

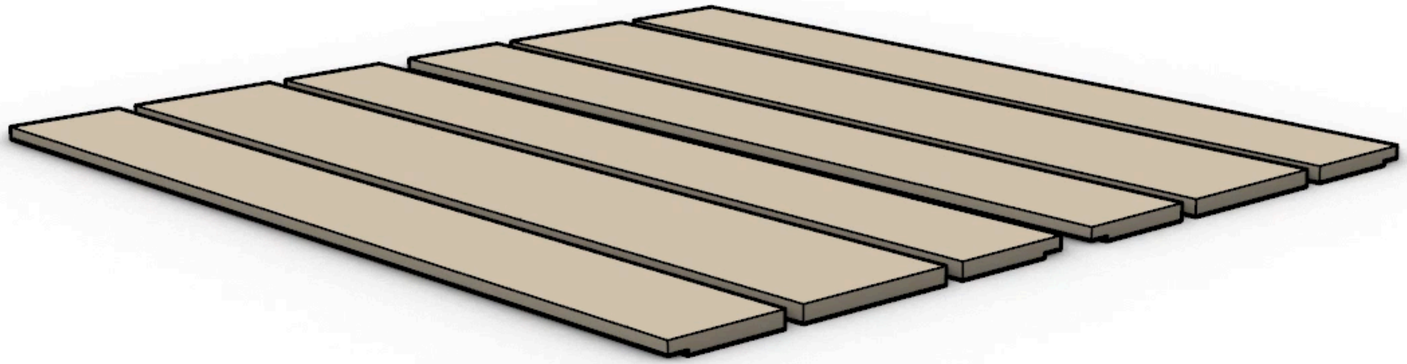
SERVICES
ELECTRICITY & DATA
WATER & WASTE
VENTILATION

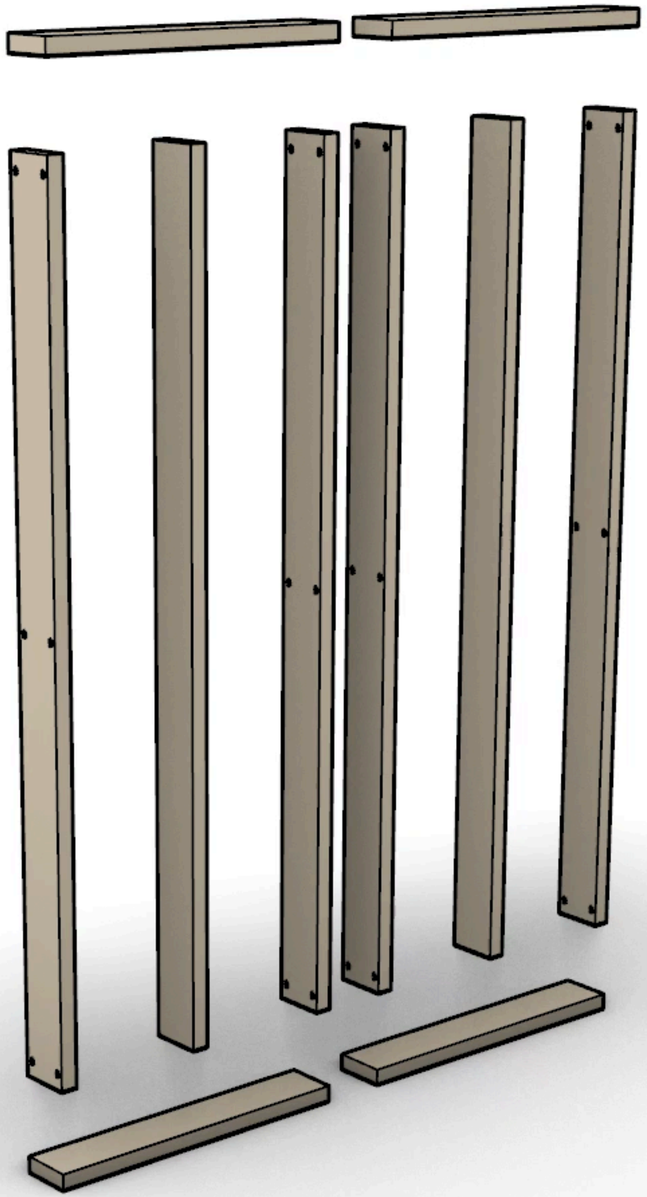
CORE
SPACE DIVIDERS
FLOORS
INSULATION
FIRE SAFERY

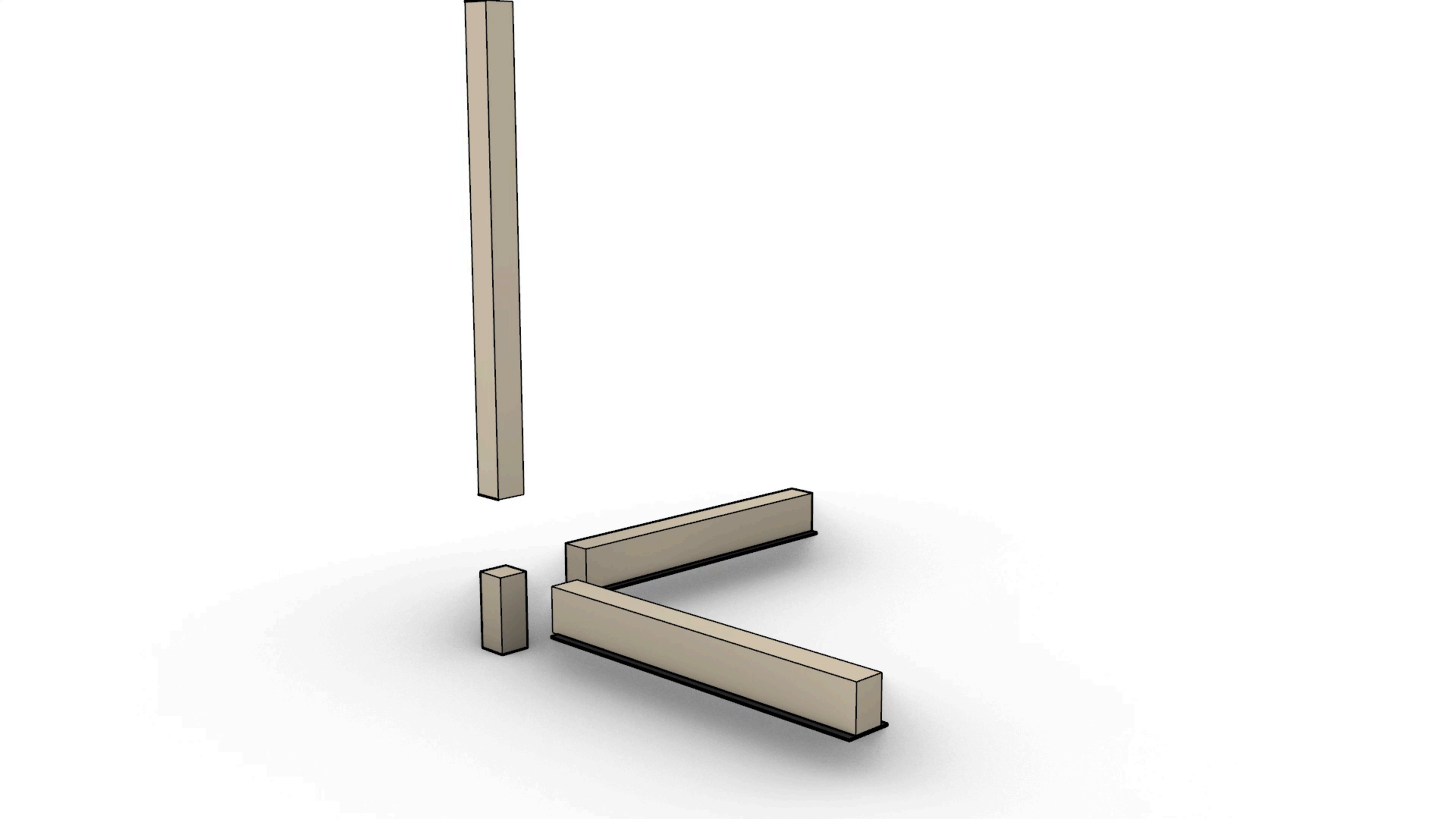
STRUCTURE
COLUMNS & BEAMS
LOAD BEARING WALLS
STAIRCASES
ELEVATORS

FOUNDATION
BUILDING FOUNDATIONS
MODULAR GRID SIZE









Disadvantages

- Critical Mass
- Monopoly
- High Initial Costs

Advantages

- Circular Production and Reduced Waste
- Automated Production
- Scalable
- Reduced Costs
- Customized Living

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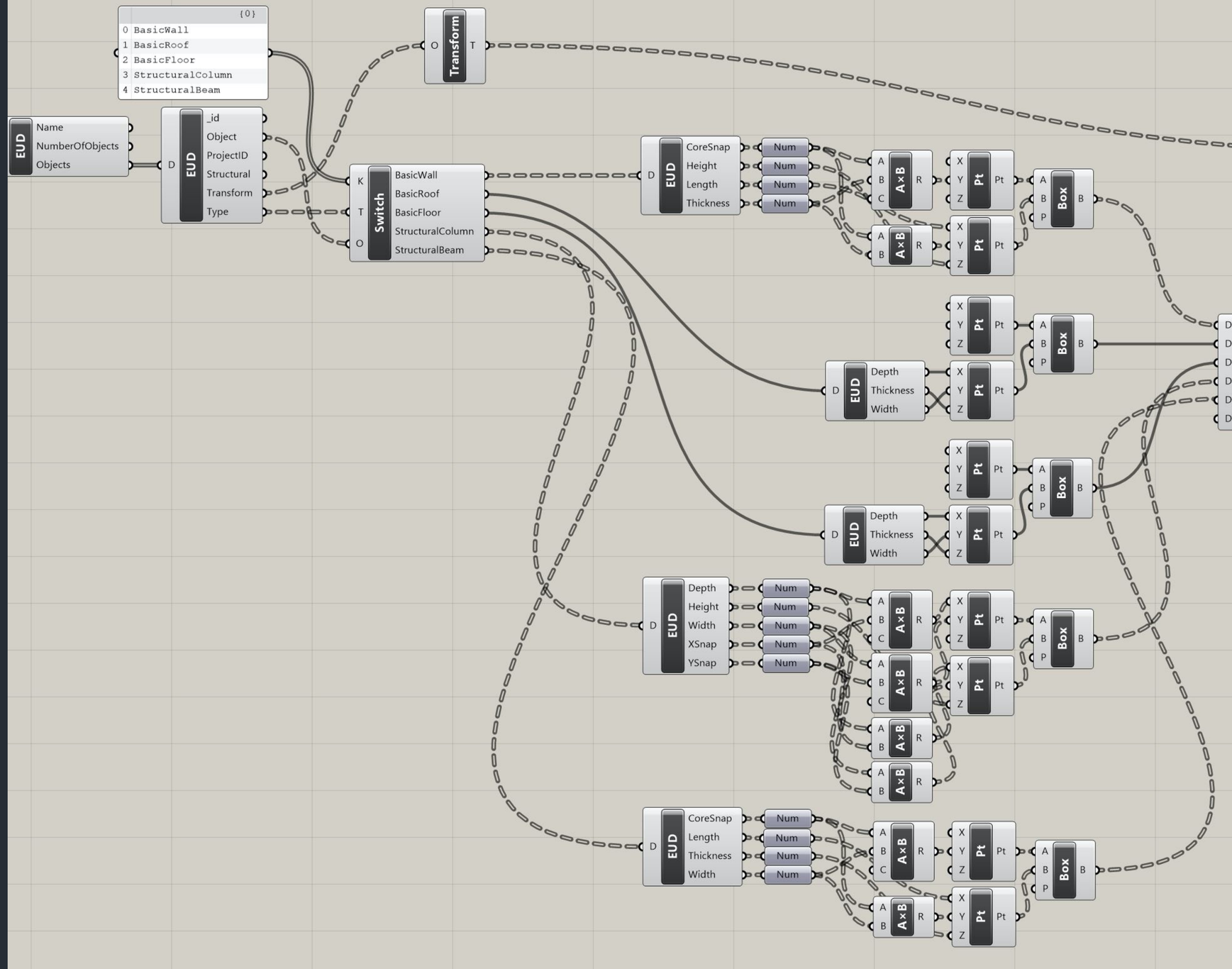


Co-Design Process

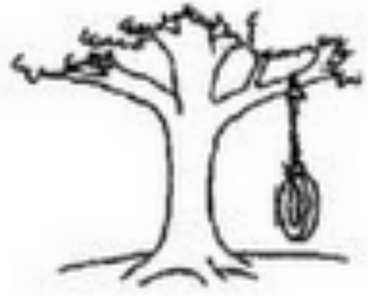
As proposed by the project sponsor.

As specified in the project request.

As designed by the senior architect.

As produced by the engineers.

As installed at the user's site.



What the customer really wanted.

Co-design process

- Phase 1: Raw Design Brief
- Phase 2: Design Brief and Frame of References
- Phase 3: Concept and Building Design
- Phase 4: Residence Design and Detailing
- Phase 5: Evaluation

Findings

General Impression

- Participants were satisfied with the results
- Participants felt involved in the process
- More co-design sessions preferred
- More feedback loops

VR as a Visual Language

- VR is a crucial tool in the co-design process
- Easier to understand than conventional tools
- Difference between VR and 3D on screen
- No need to be dynamic

Shared Frame of References

- Approach was successful
- Improved insight in 'unspoken' wishes and requirements
- Improved critical dialogue
- Supported further phases
- Helped me as a designer

Tensions and Priorities

- No important tensions experienced by participants
- Miscommunications were quickly resolved
- Tensions did not escalate to conflicts

Multiplayer VR

- Greatly improves communication
- Non-verbal communication is possible
- Essential part of VR for co-design

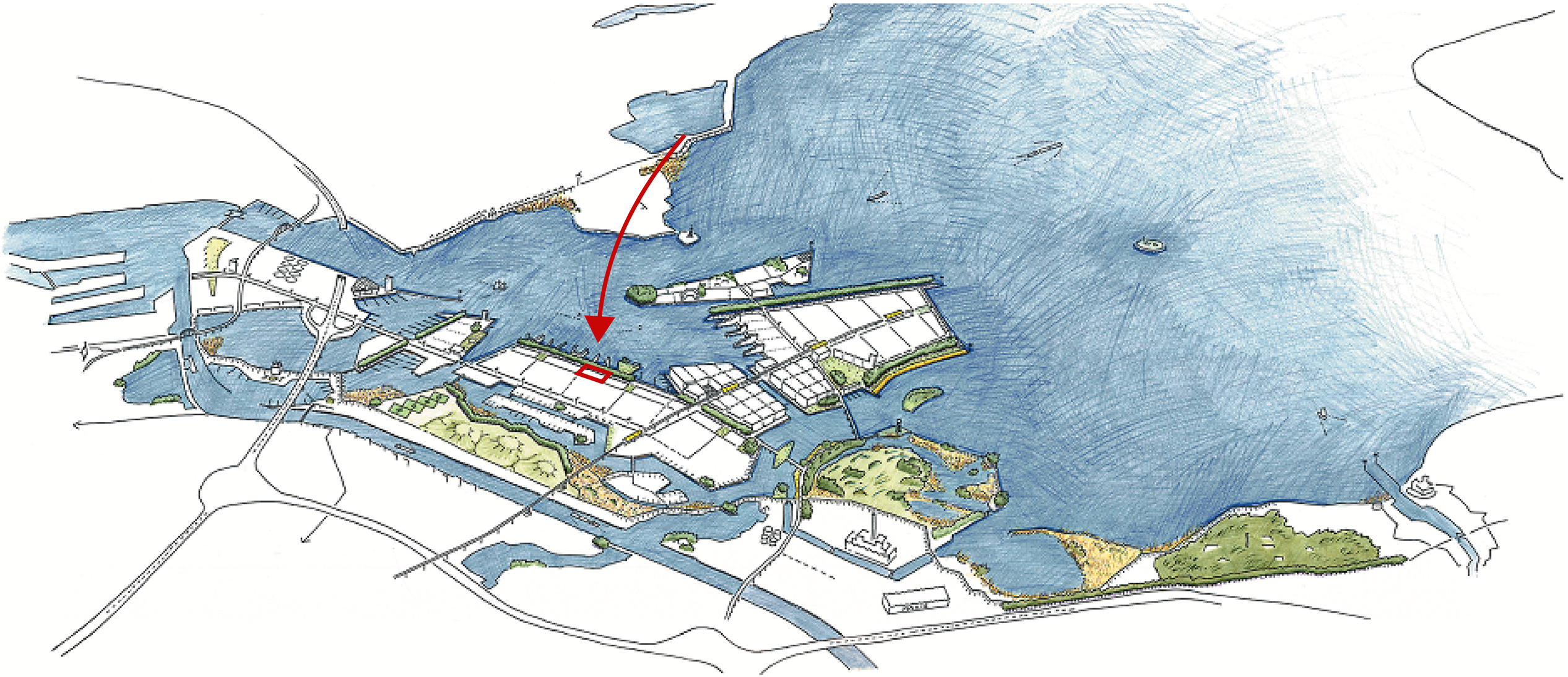
Role of Architect and User

- Clear distinction between architect and users
- Distinction is preferred by participants
- Changed setup could improve participant involvement in architectural themes

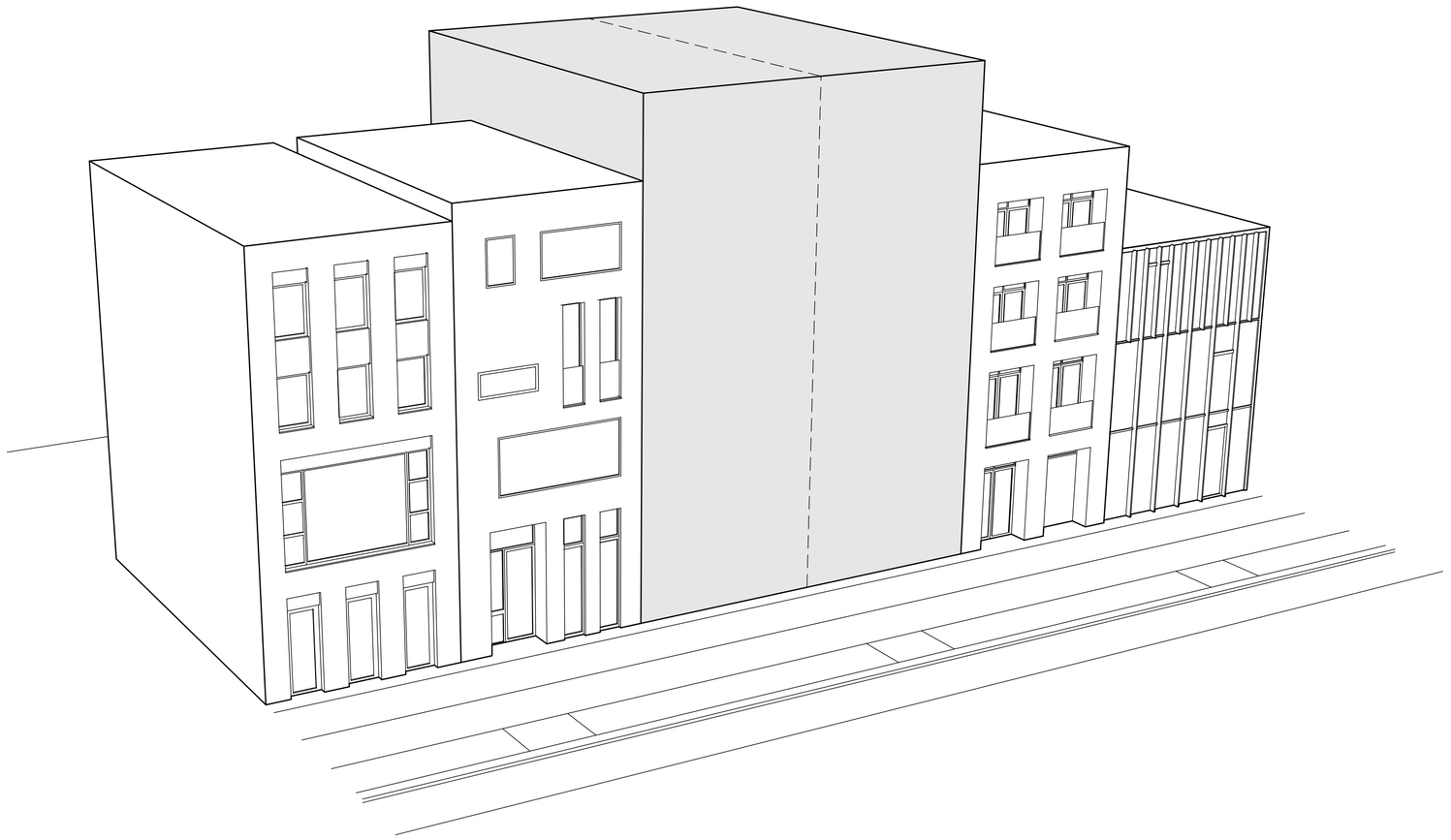
Discussion

- Simulation and Budget
- Number of Participants
- Education Setting
- Impact
- Further Research

Case Study



Masterplan IJburg, Gemeente Amsterdam



Plot:

Size:	320m²
Width:	2x6m
Depth:	26.8m
Front Elevation:	1.95+NAP
Back Elevation:	1.41+NAP

Maximum Building Size:

Height:	16m
Depth:	14m
Width	6m
Basement:	3m

Minimum Building Size:

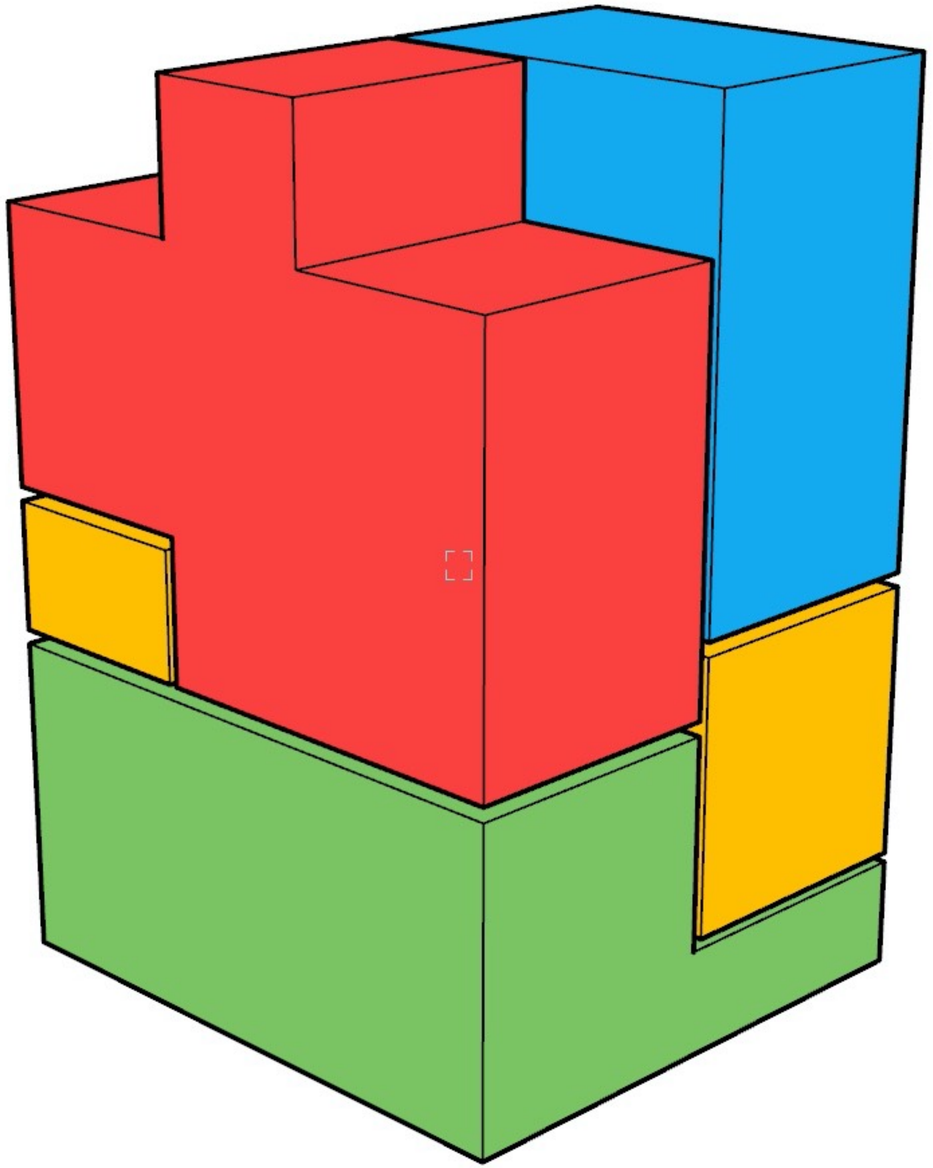
Height:	9.4m
Depth:	11m
Width	6m
Basement:	3m

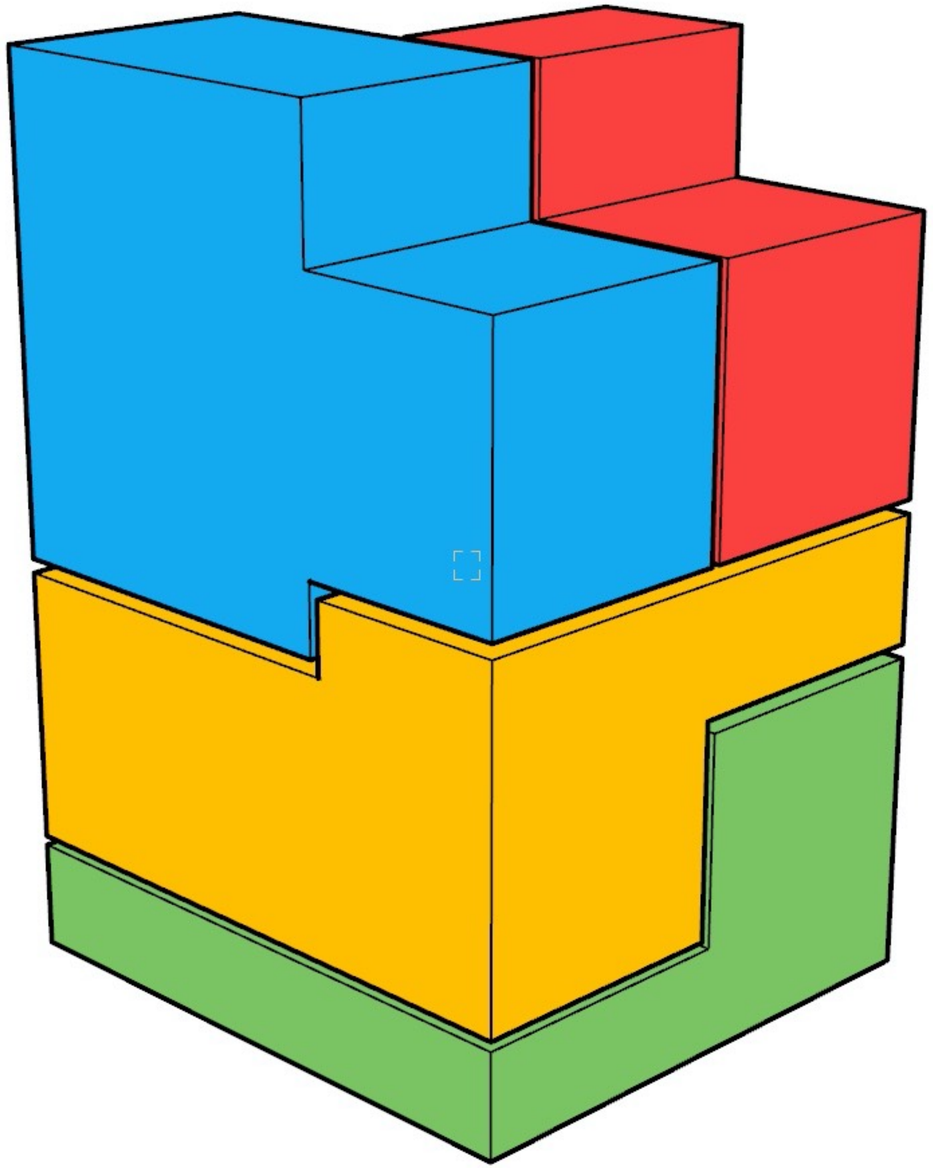
Garden:

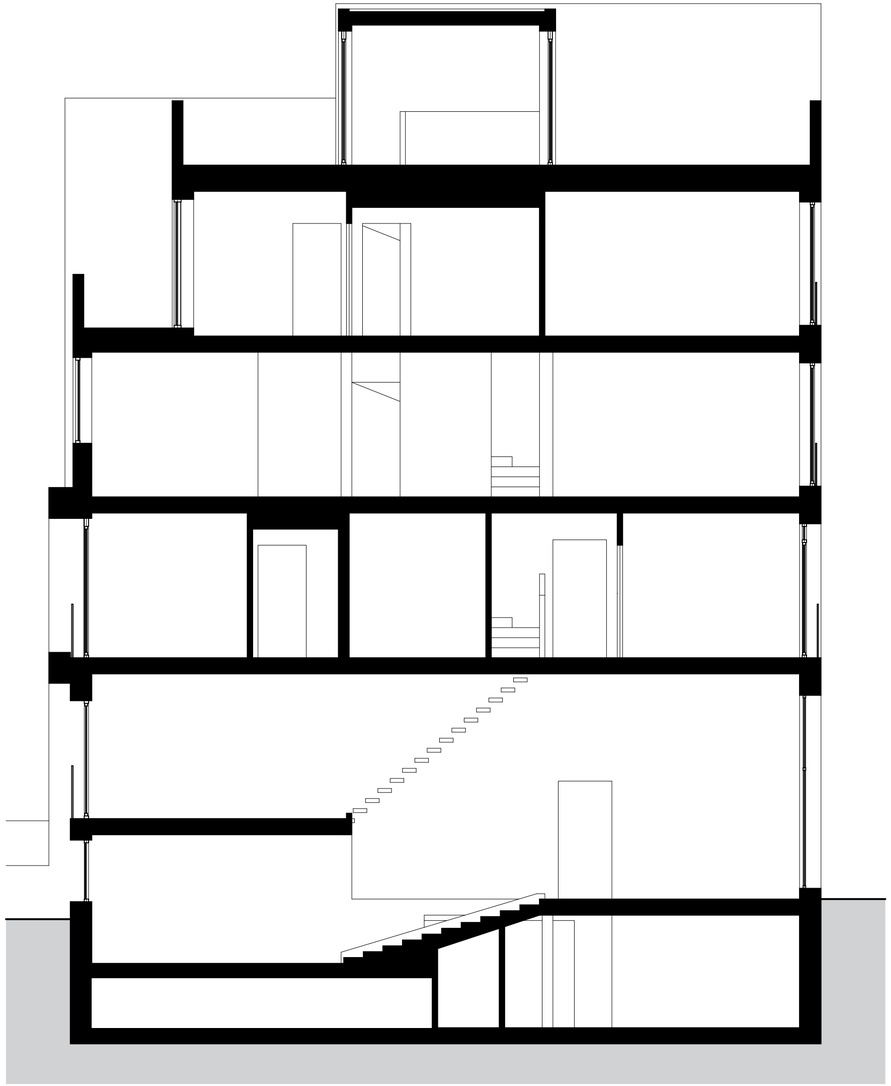
Depth:	11.6m
Patio Height:	3m

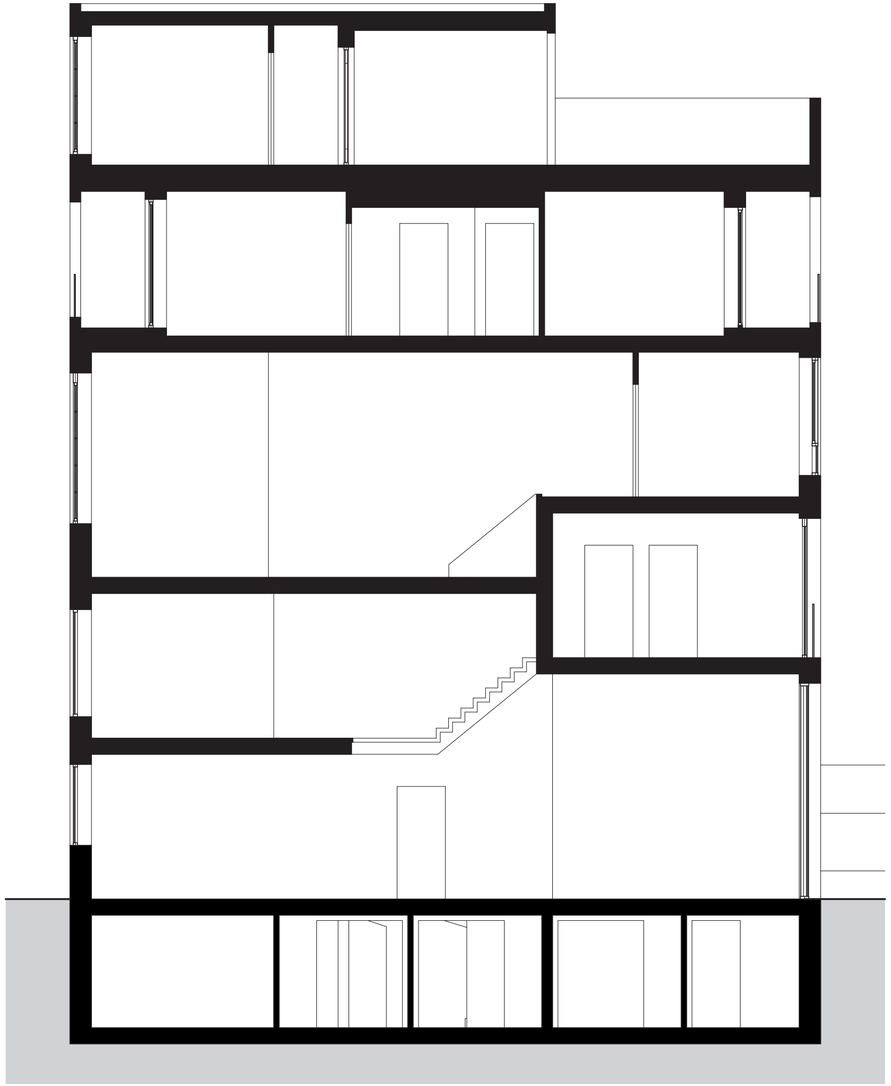
Street Access:

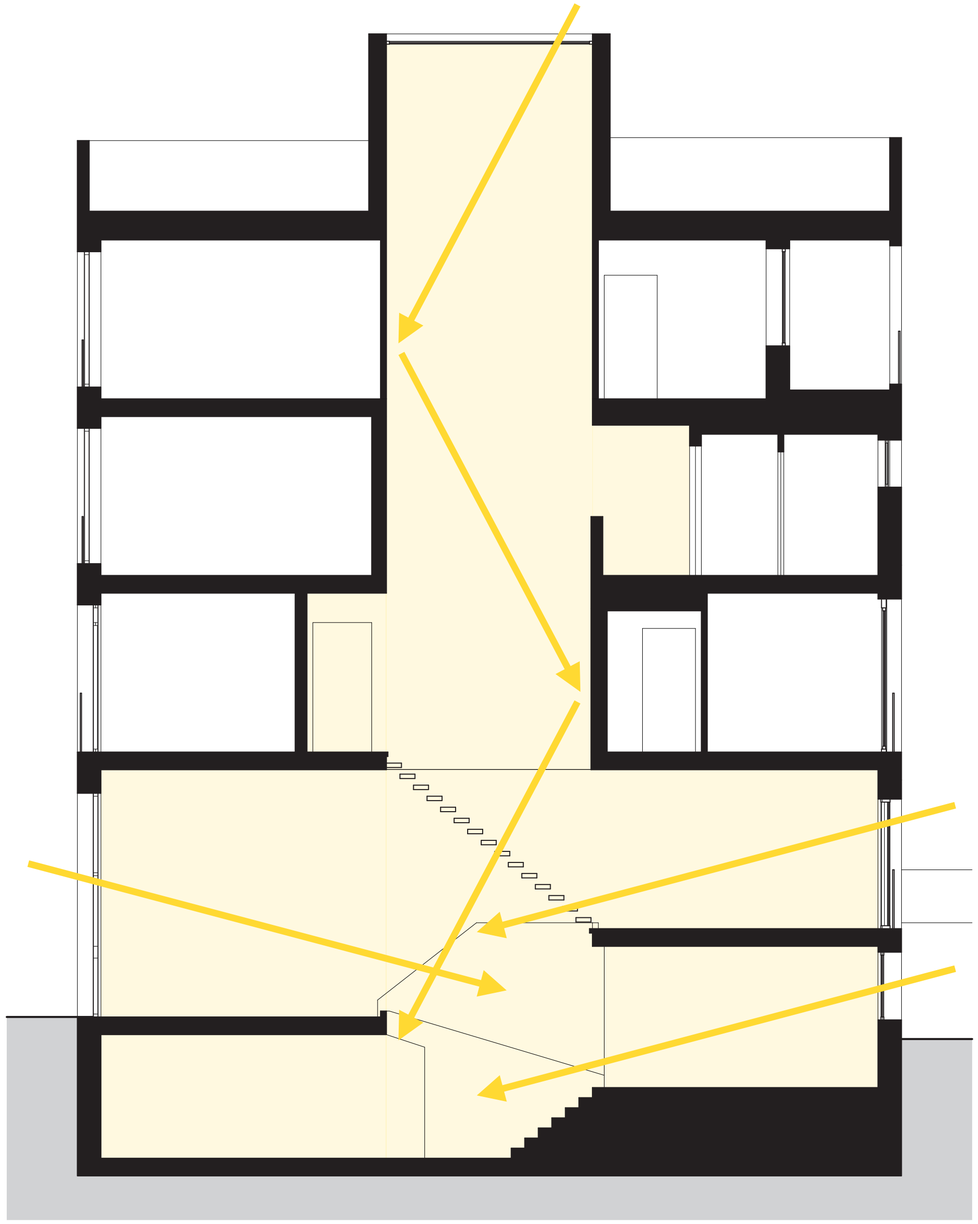
2 Parking Spots at the Back
Bike Parking at the Front
Home Office at the Front

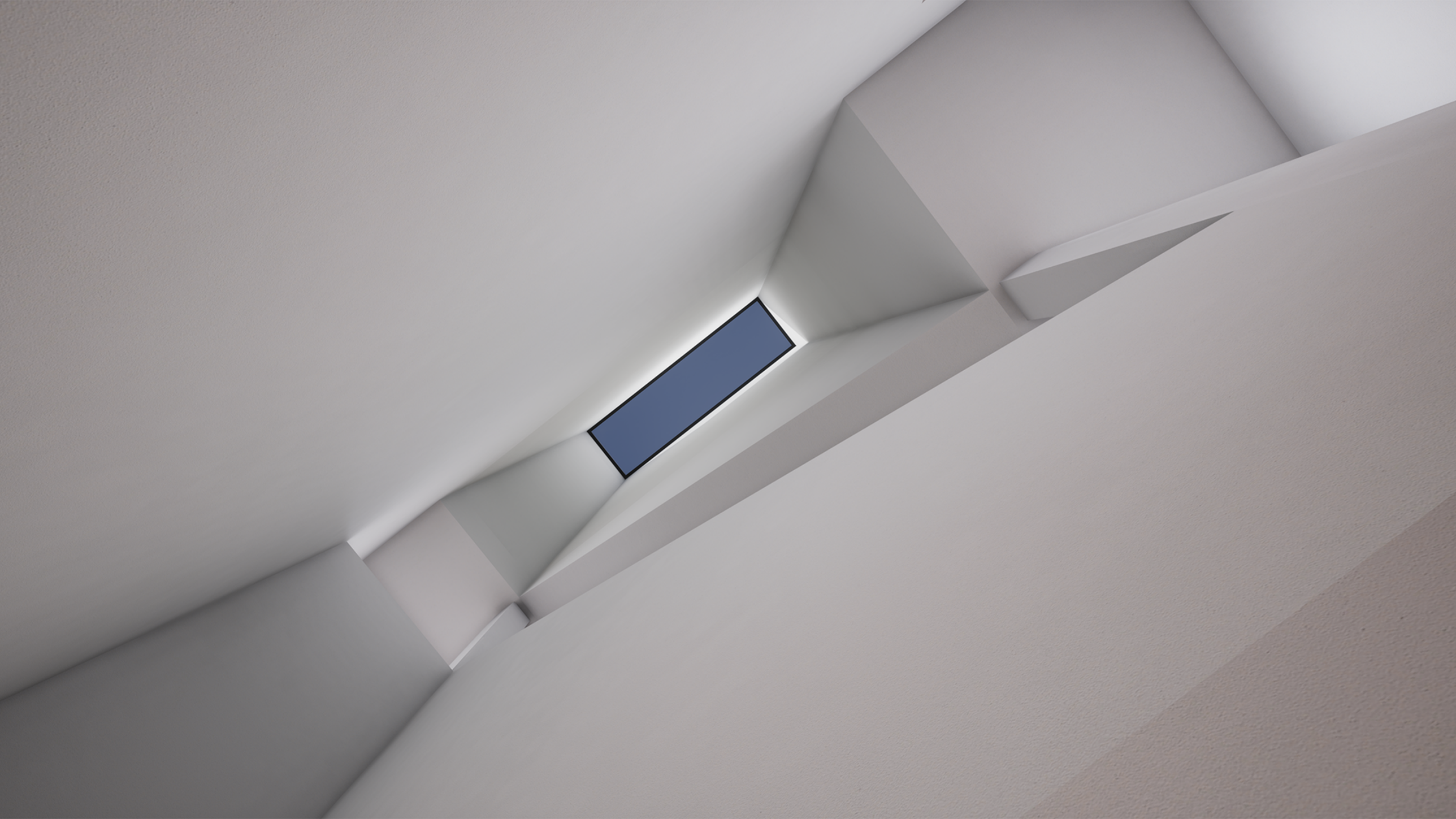


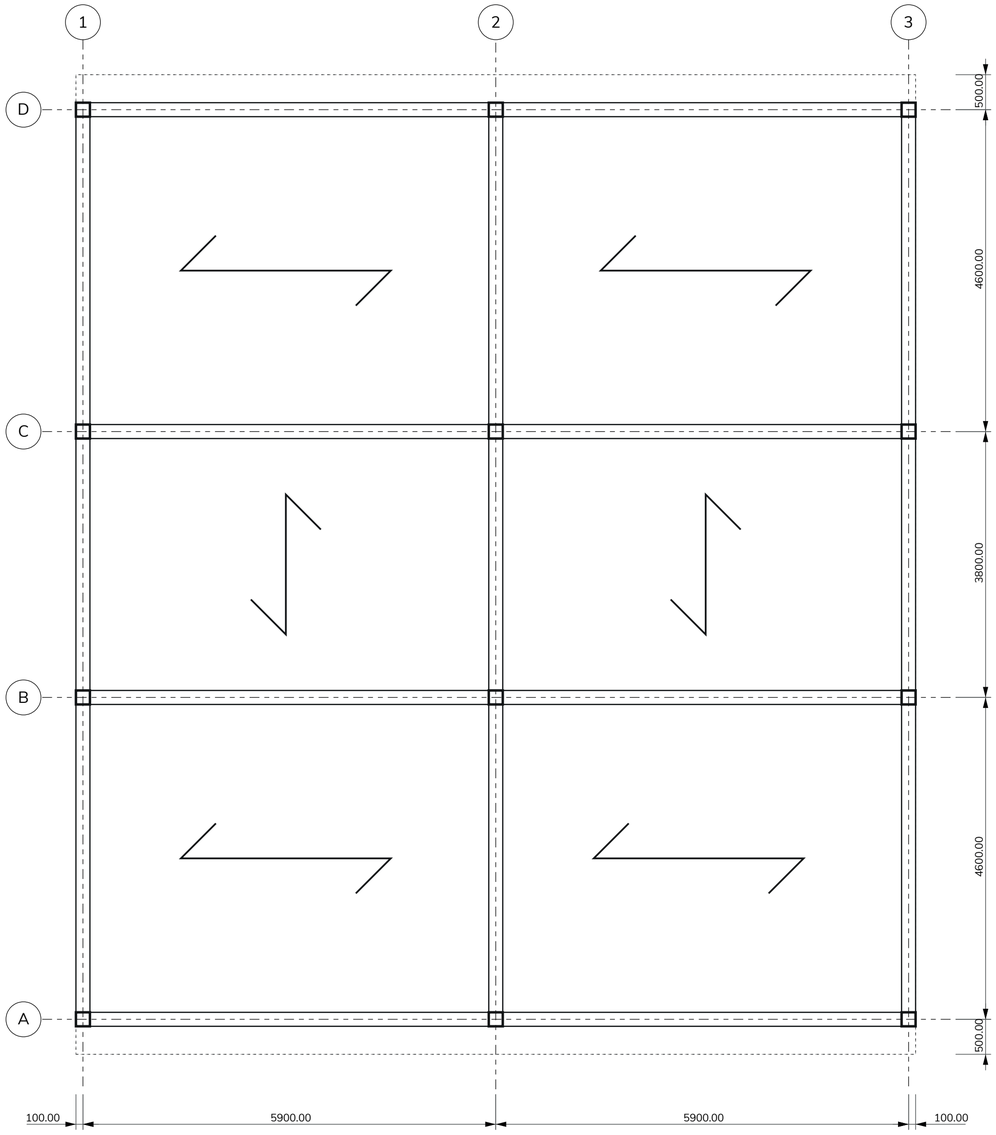








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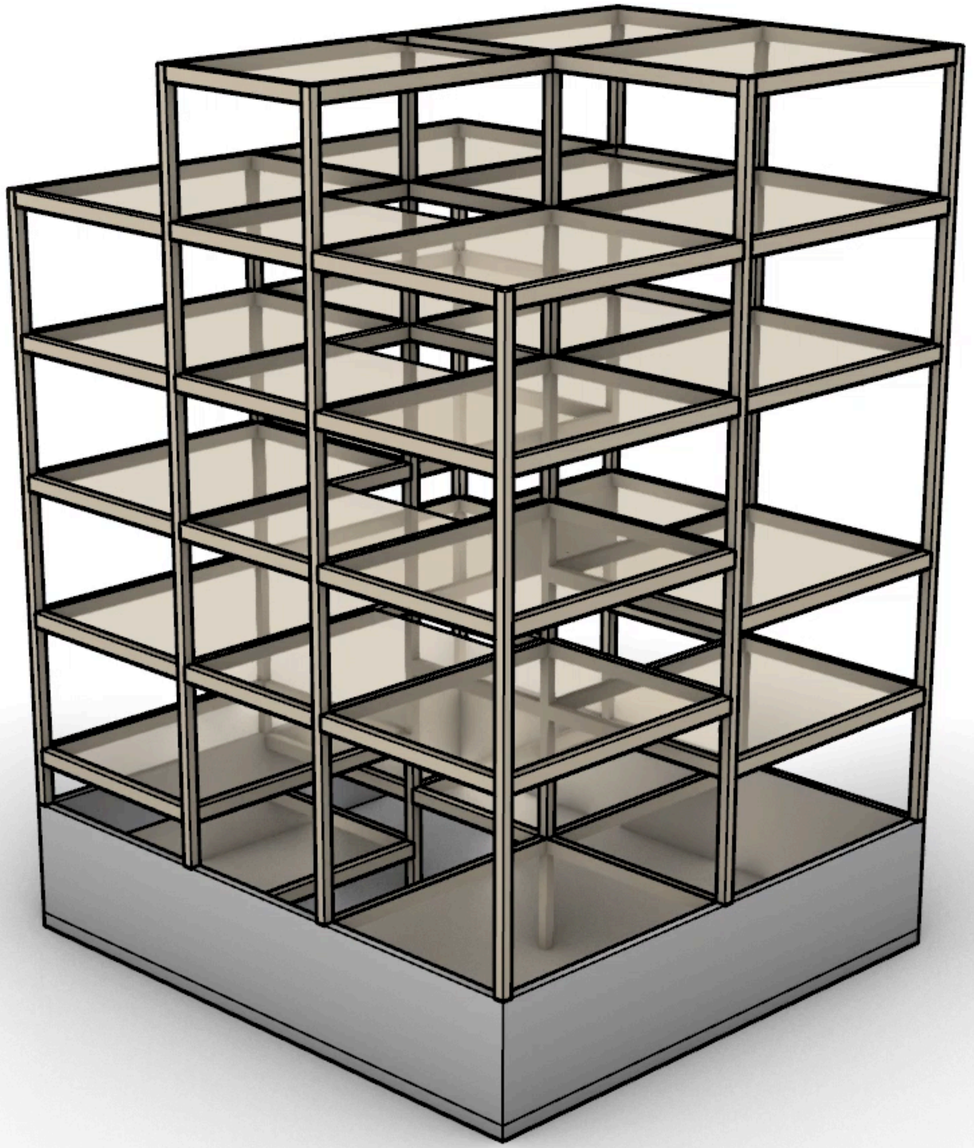

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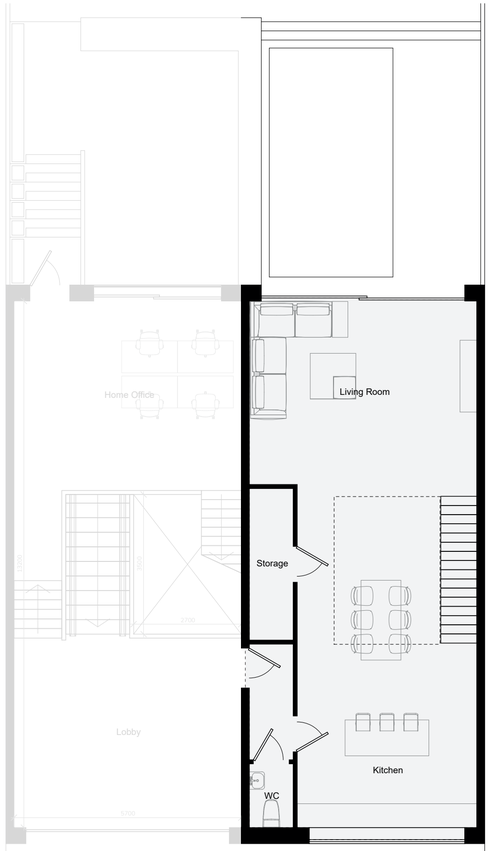
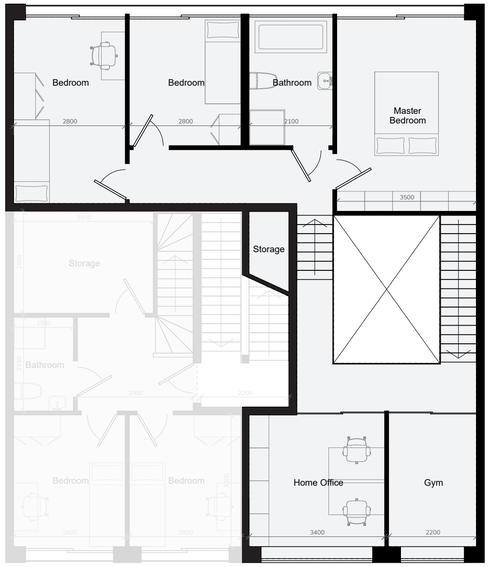
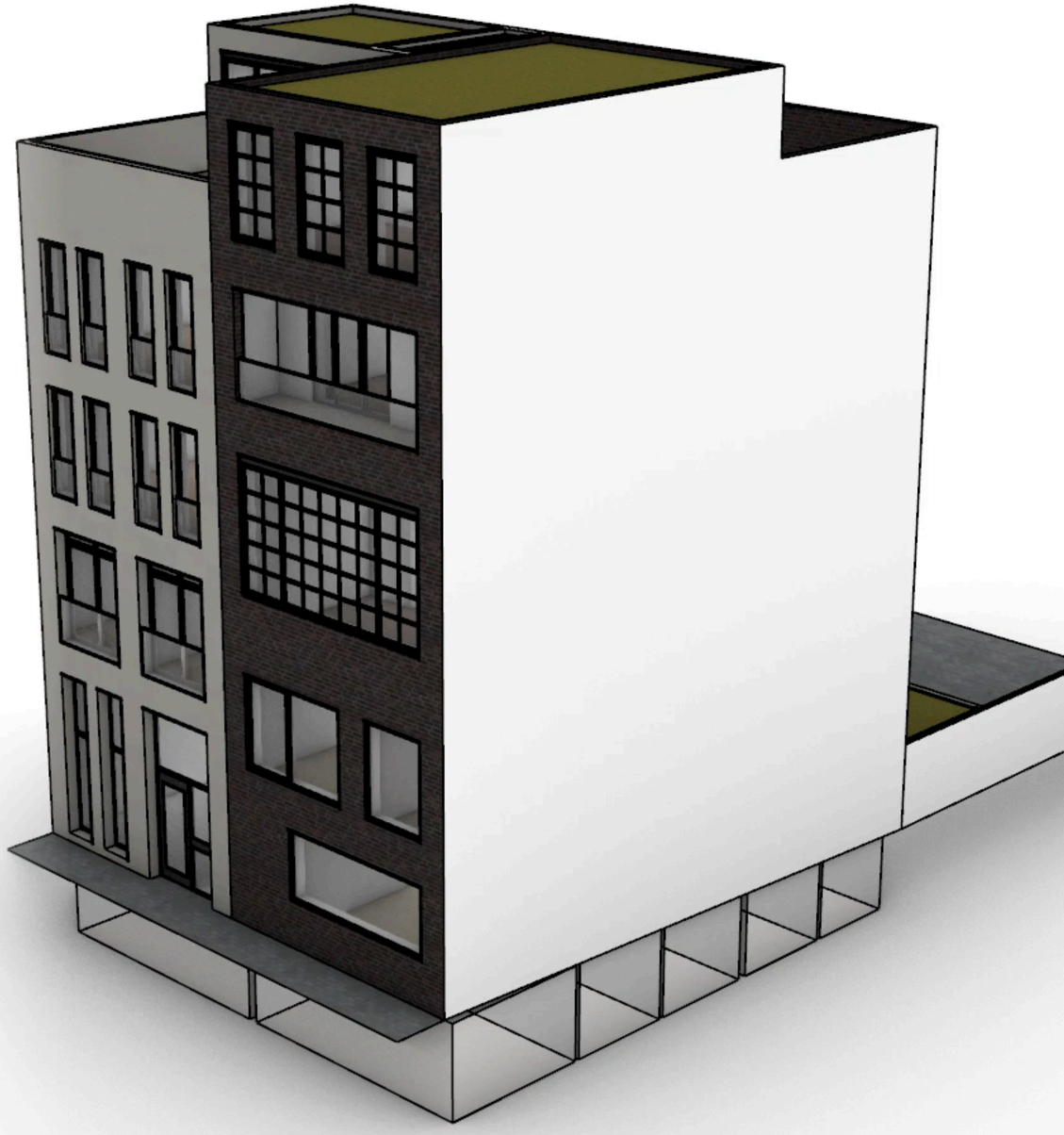
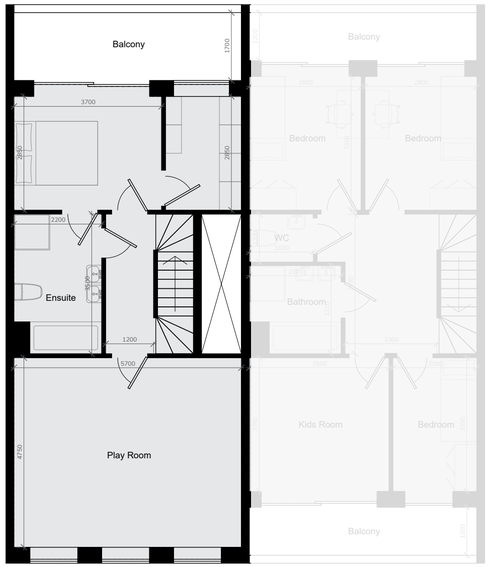


Ground Floor

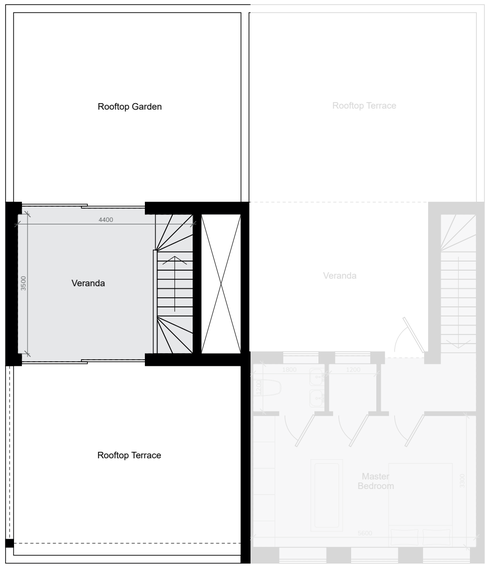


1st Floor

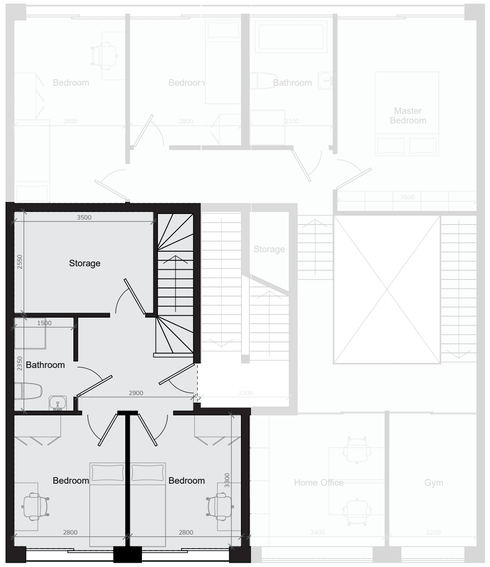




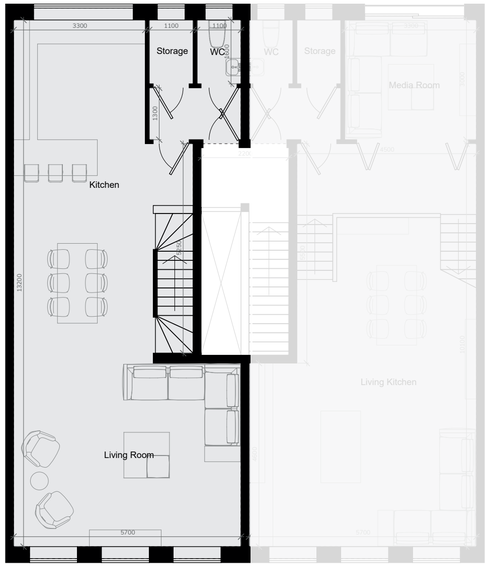
3rd Floor



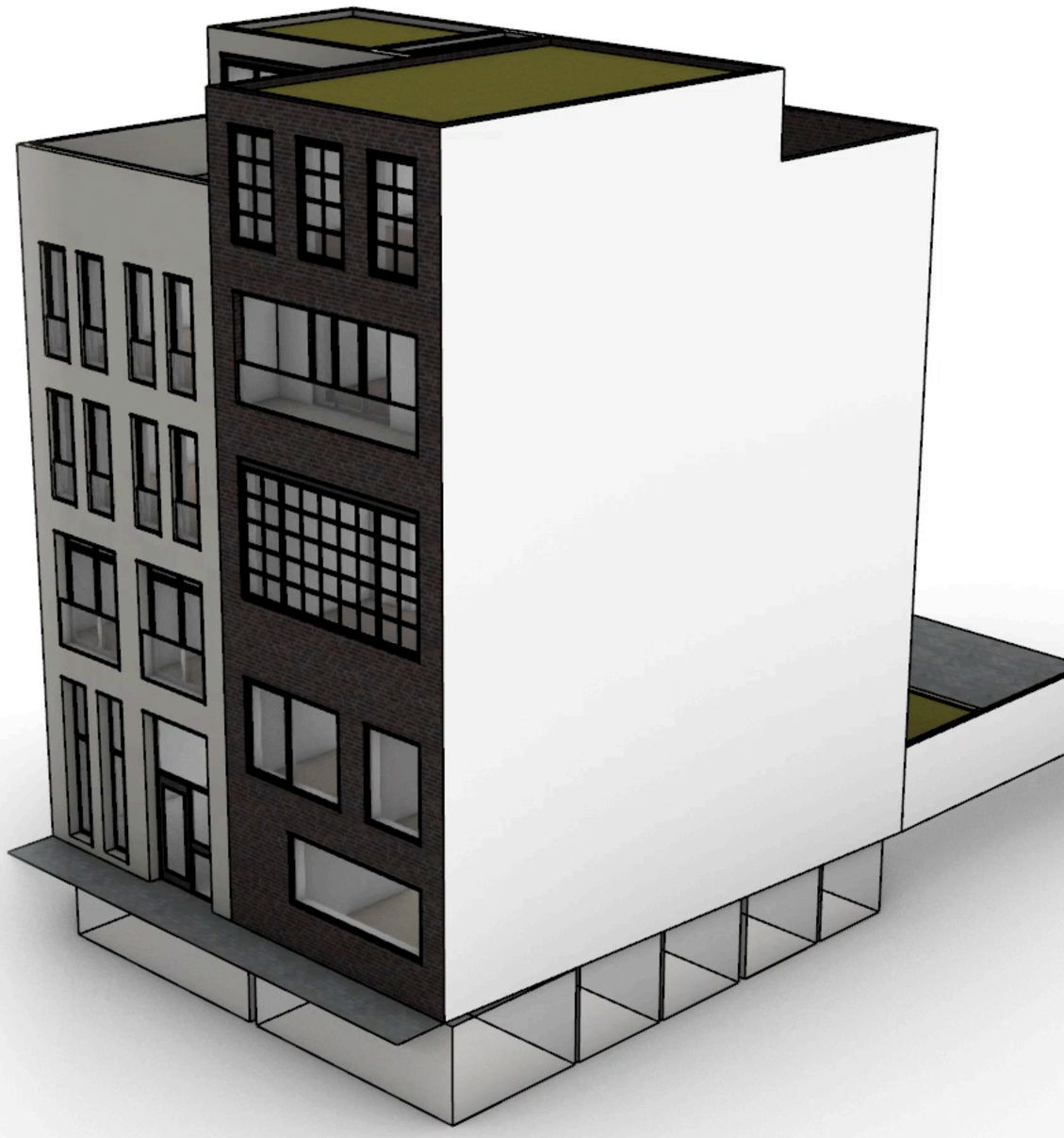
Roof

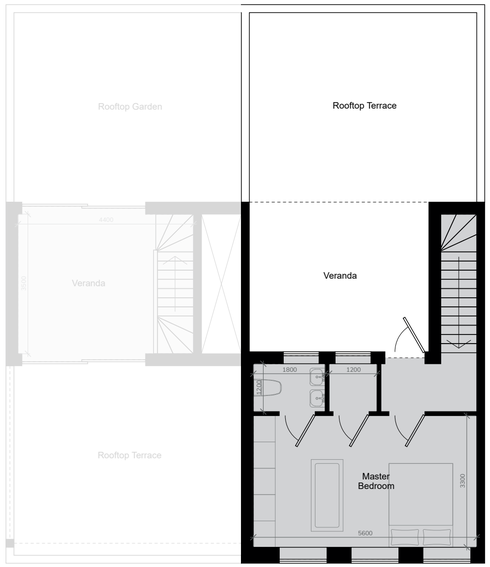


1st Floor

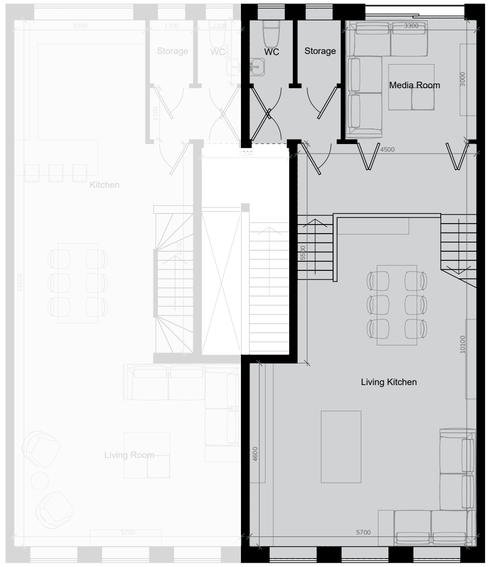


2nd Floor



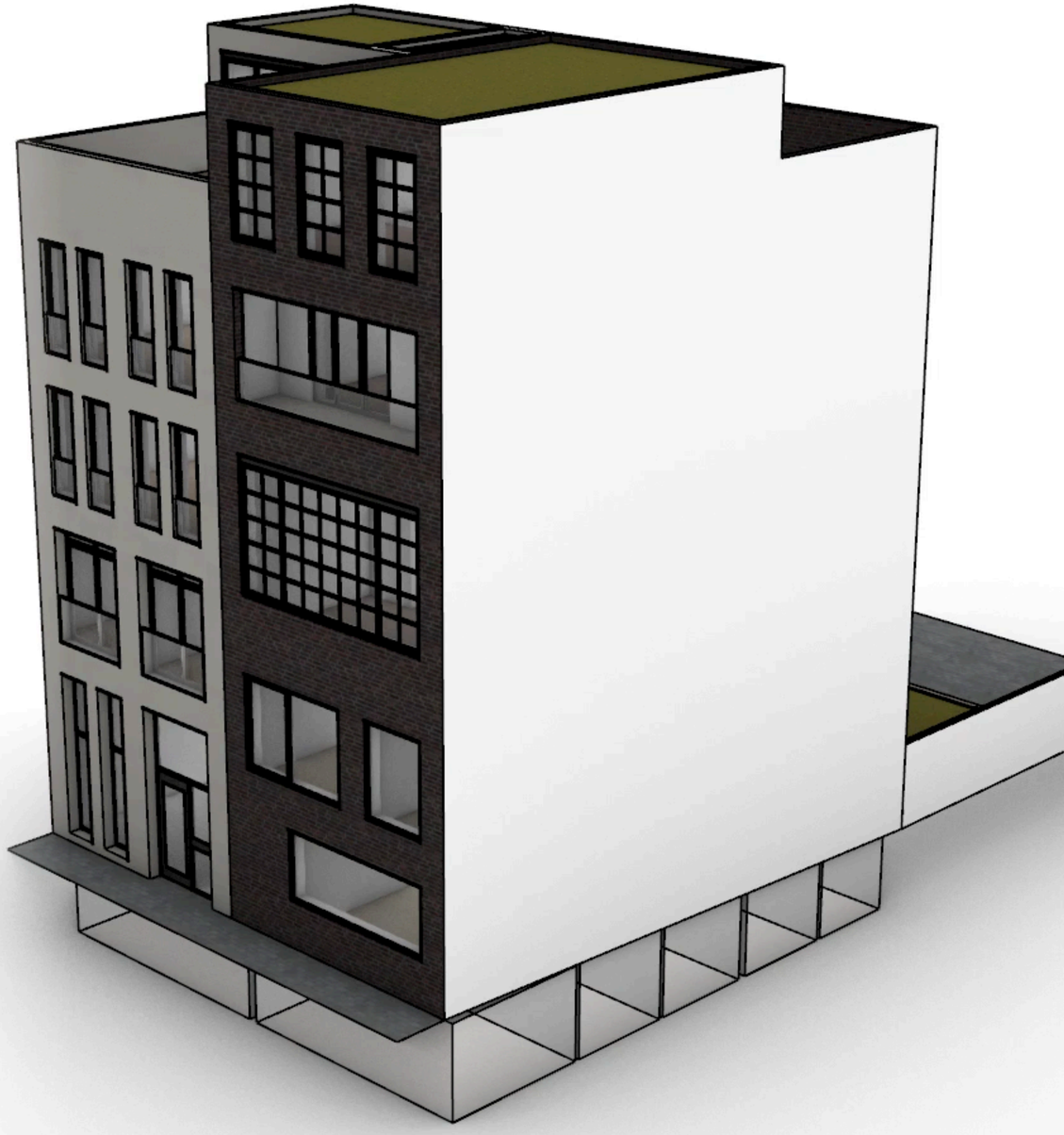


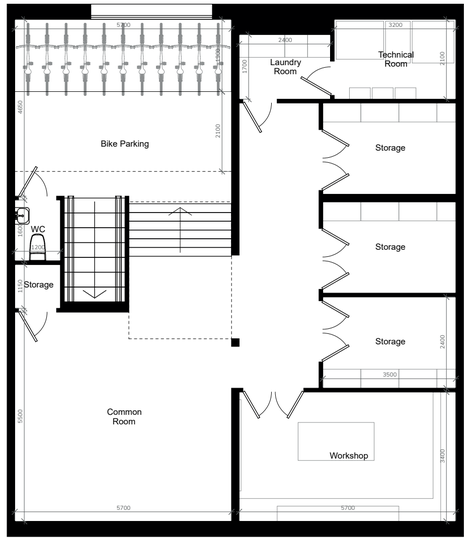
Roof



2nd Floor

3rd Floor





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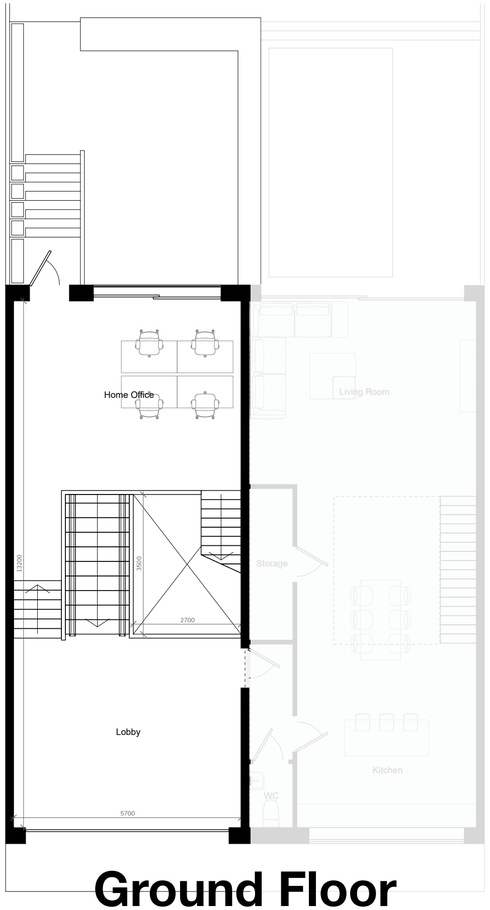
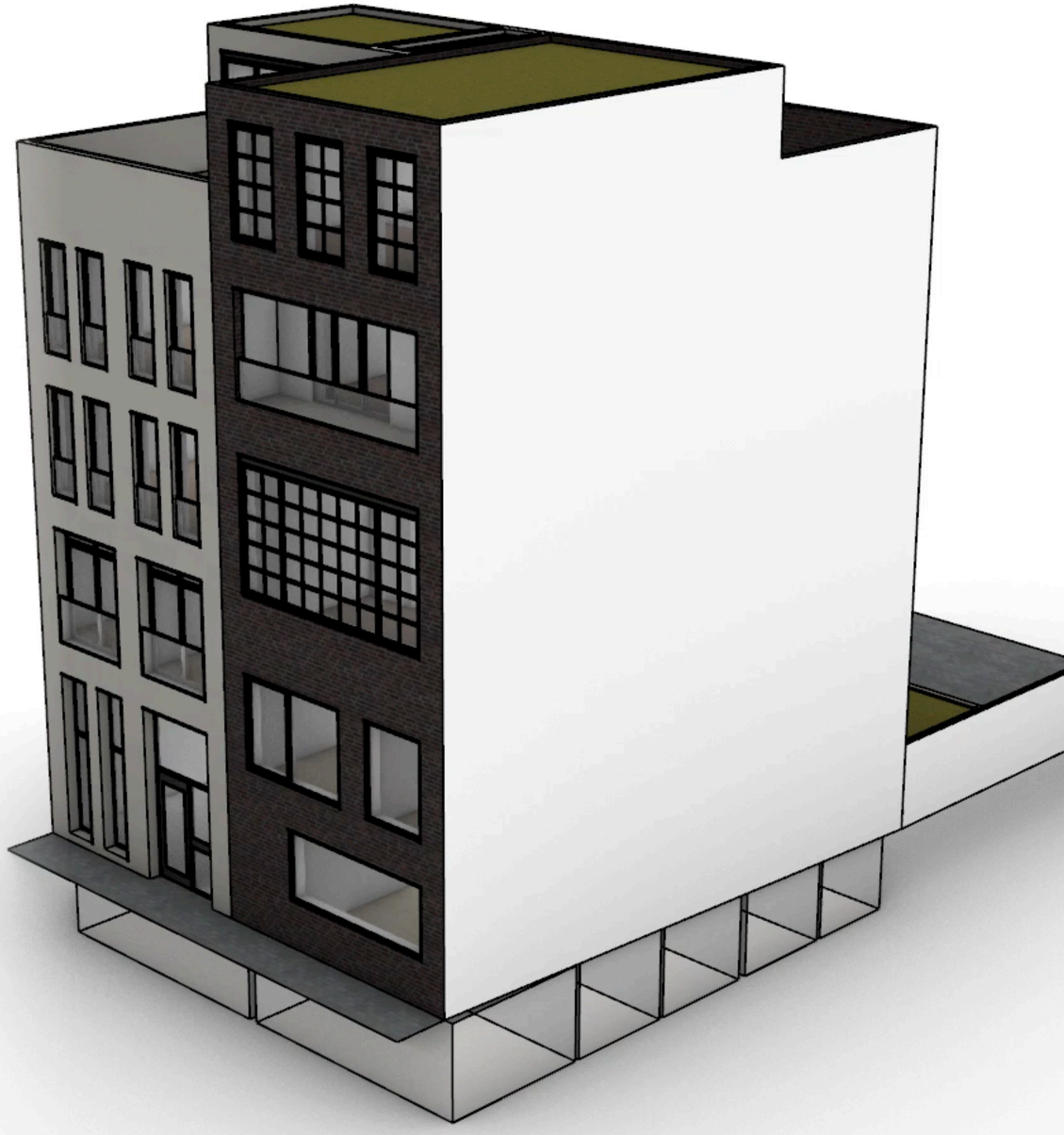
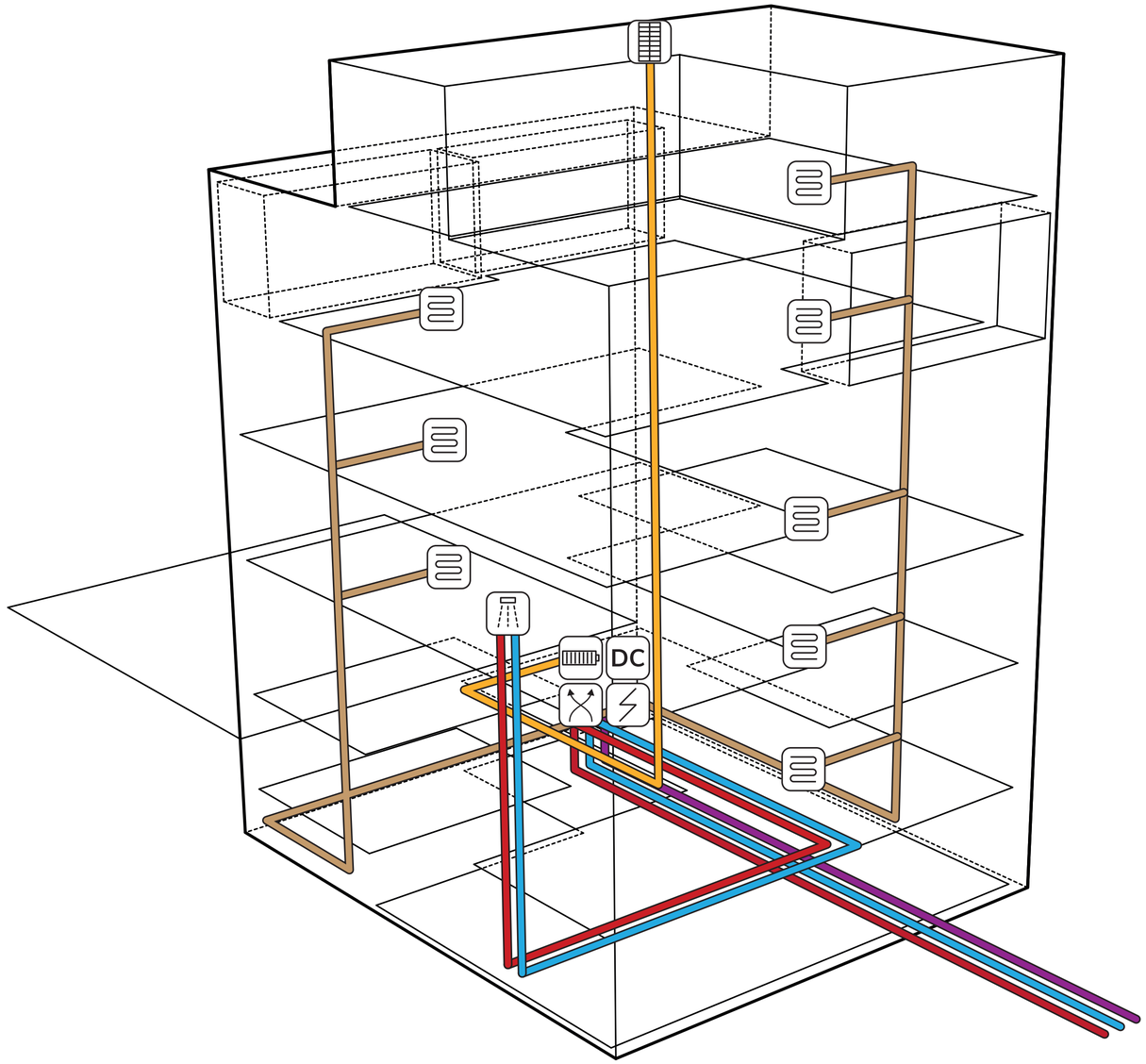


Ground Floor



Climate



PV Panels

Battery

AC/DC Converter

Power Grid Connection

Heat Exchanger

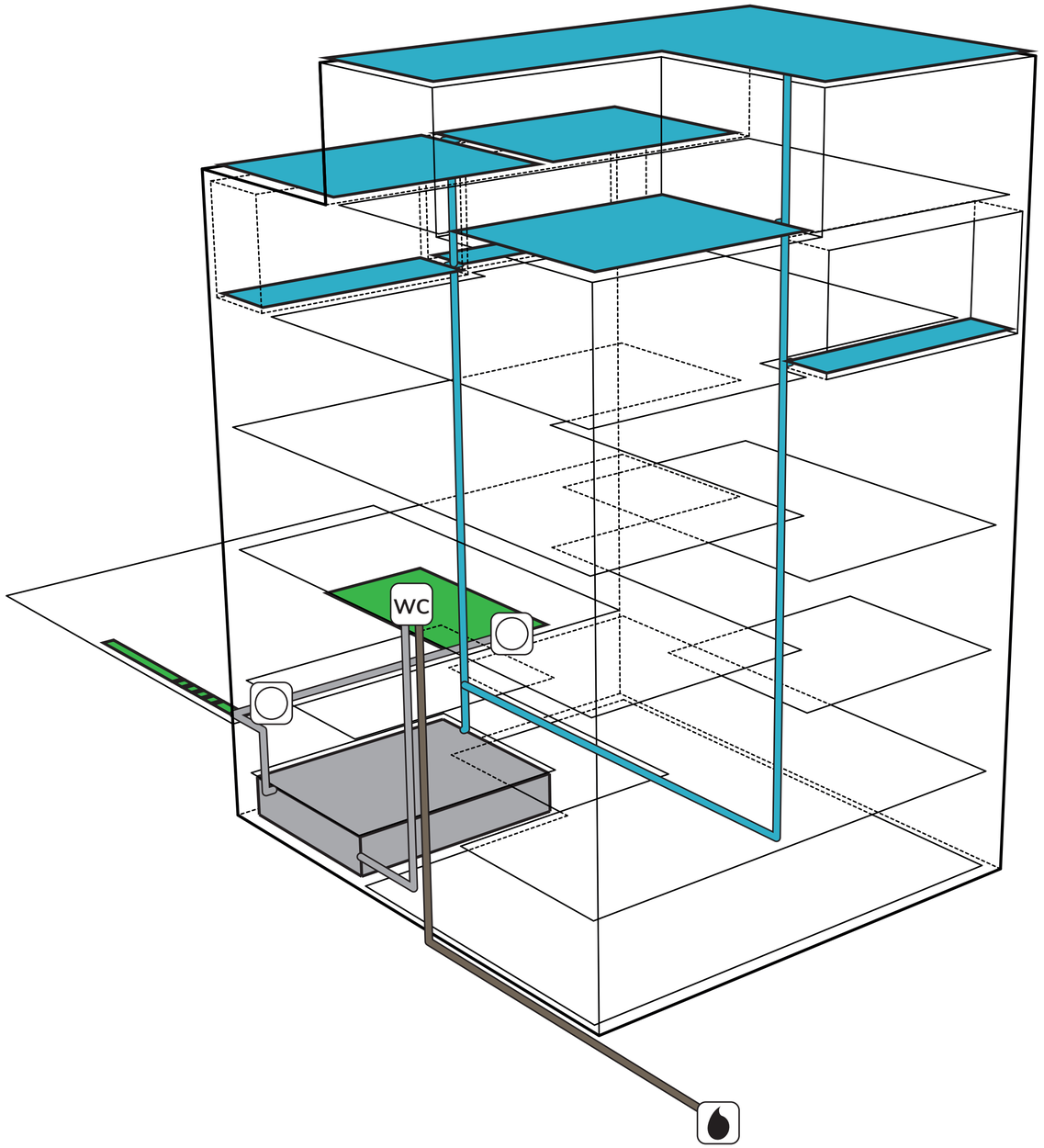
Underfloor Heating

Cold Water

Warm Water

District Heating Retour

Underfloor Heating Loop



Sewage

WC Toilets

Rain Water Tap

Rain Water Source

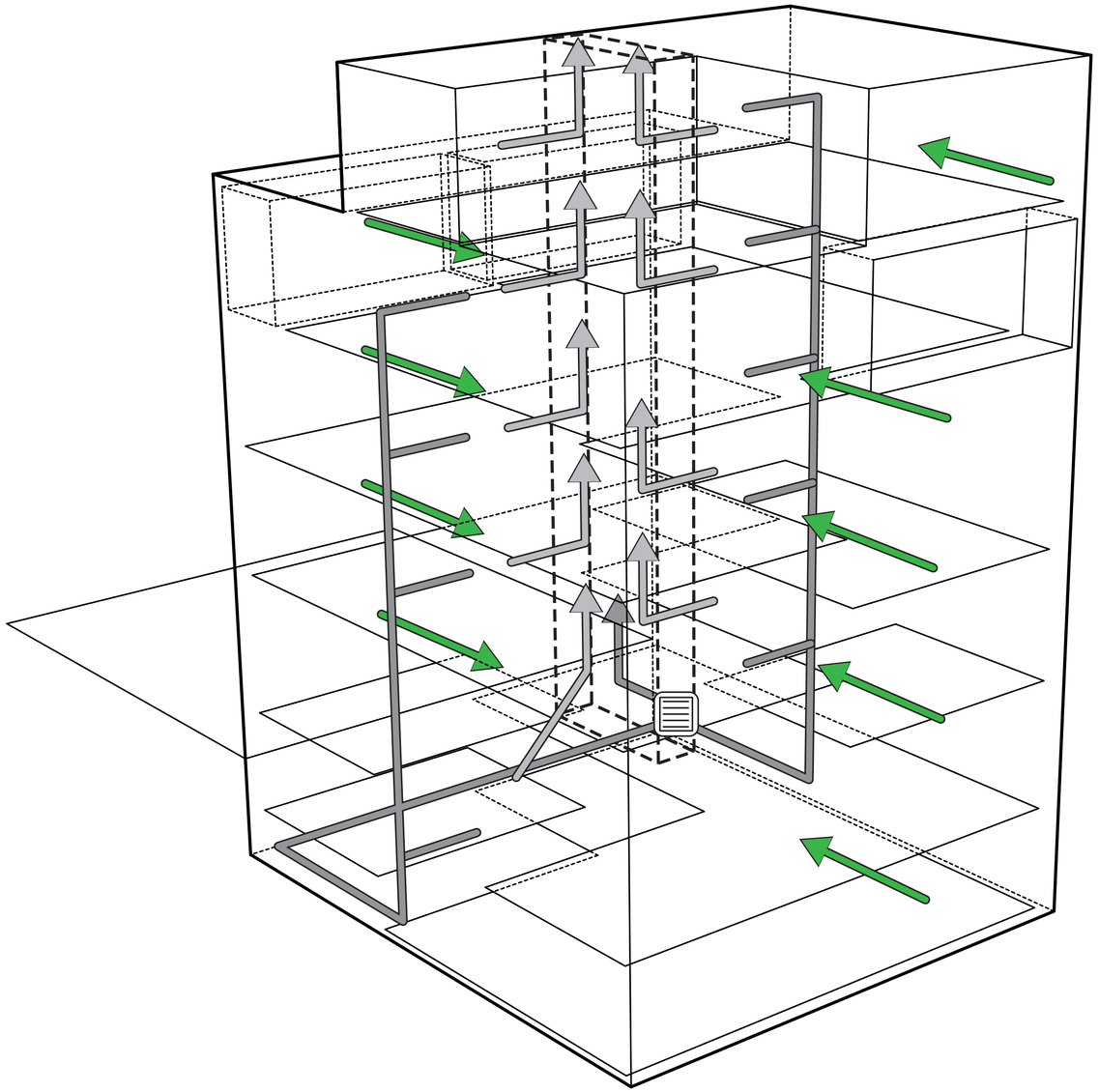
Grey Water Target

Grey Water Storage

Drainage Pipe

Grey Water Pipe

Sewage Pipe



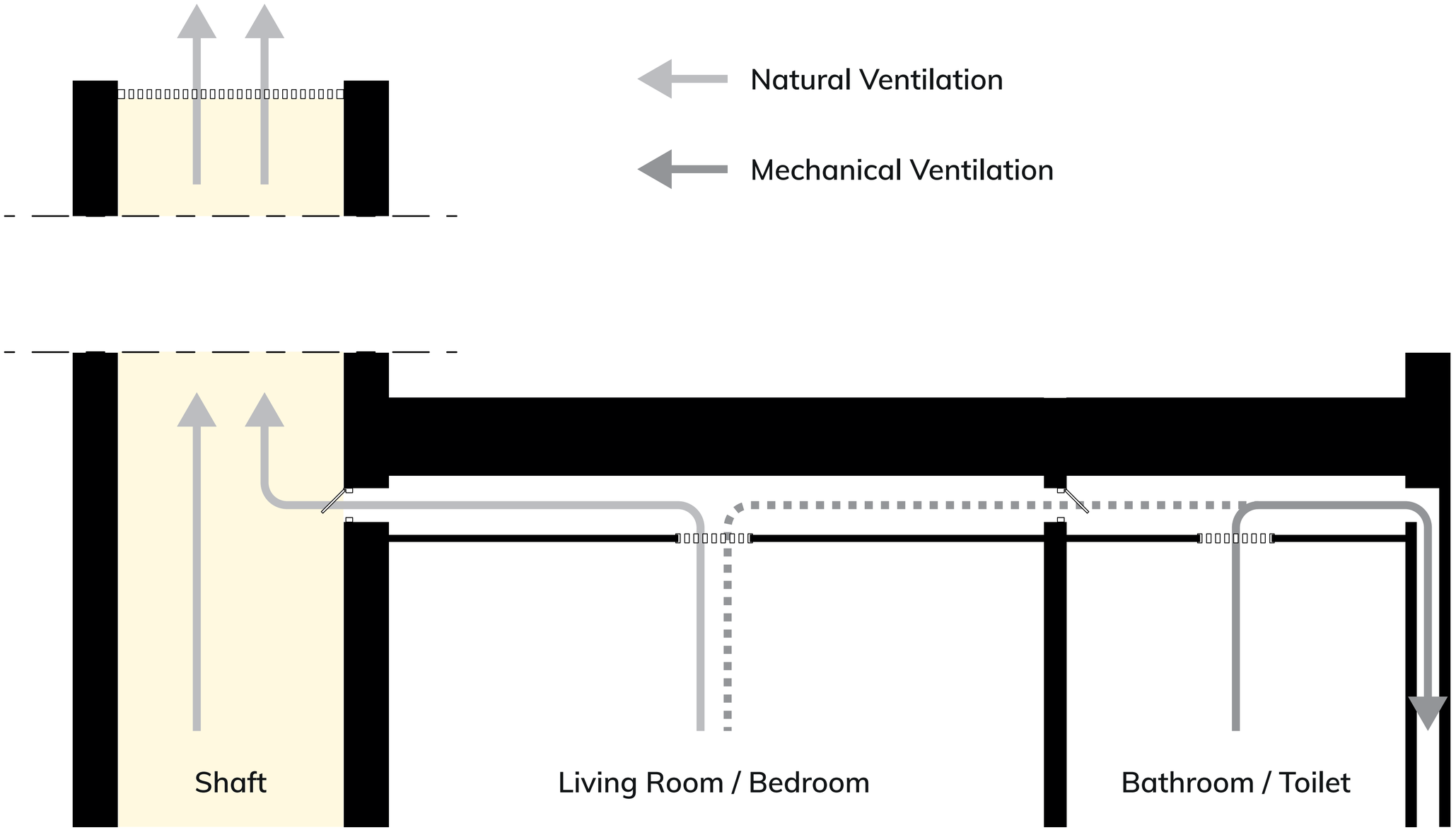
Mechanical Ventilation

Passive Ventilation Shaft

Natural Ventilation Intake

Natural Ventilation Exhaust

Mechanical Ventilation Exhaust


Natural Ventilation
Mechanical Ventilation
Shaft
Living Room / Bedroom
Bathroom / Toilet

Building System

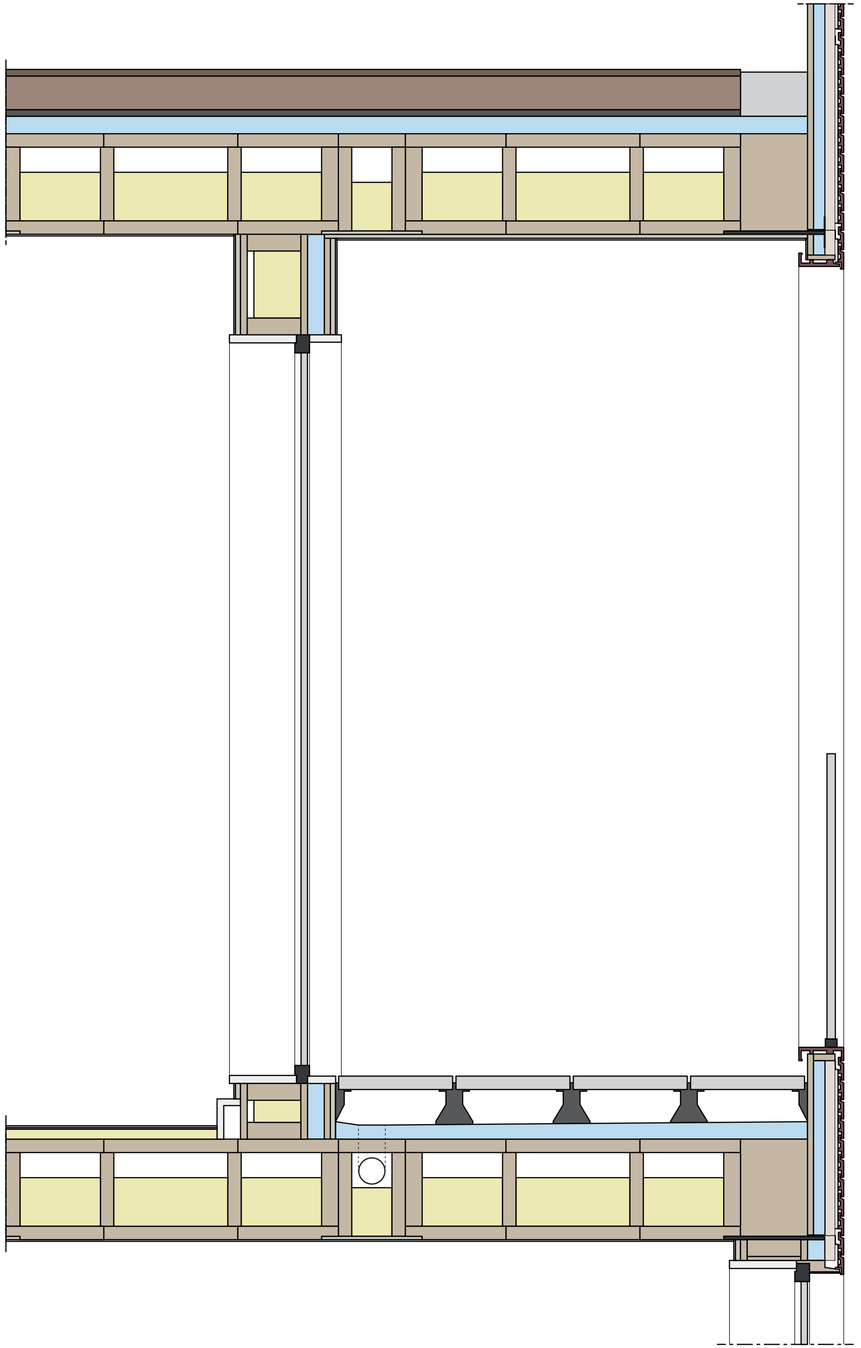
FINISH
PLASTERBOARD
INTERIOR FINISH
FACADE SYSTEMS
EXTERIOR FINISH

SERVICES
ELECTRICITY & DATA
WATER & WASTE
VENTILATION

CORE
SPACE DIVIDERS
FLOORS
INSULATION
FIRE SAFERY

STRUCTURE
COLUMNS & BEAMS
LOAD BEARING WALLS
STAIRCASES
ELEVATORS

FOUNDATION
BUILDING FOUNDATIONS
MODULAR GRID SIZE



FINISH
PLASTERBOARD
INTERIOR FINISH
FACADE SYSTEMS
EXTERIOR FINISH

SERVICES
ELECTRICITY & DATA
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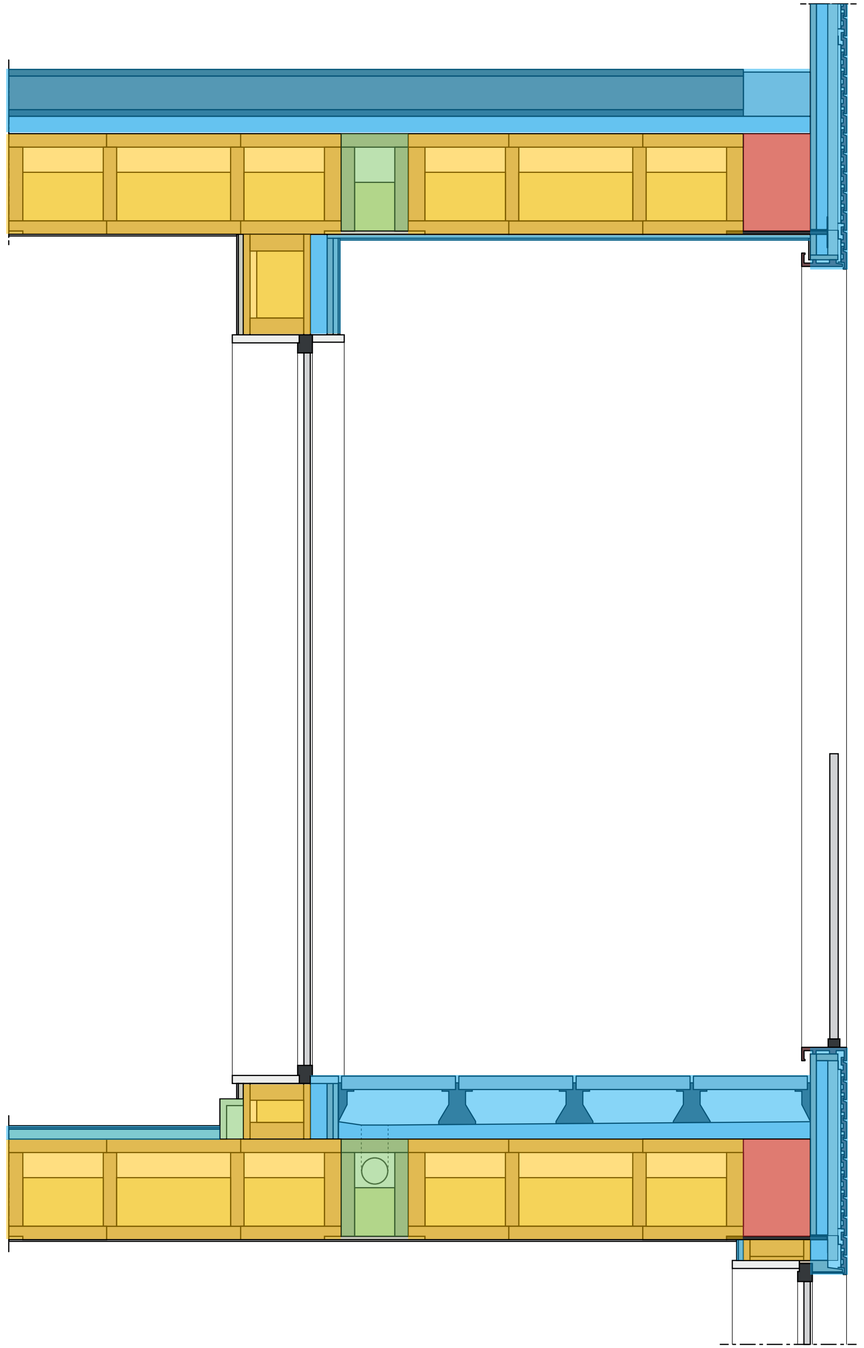
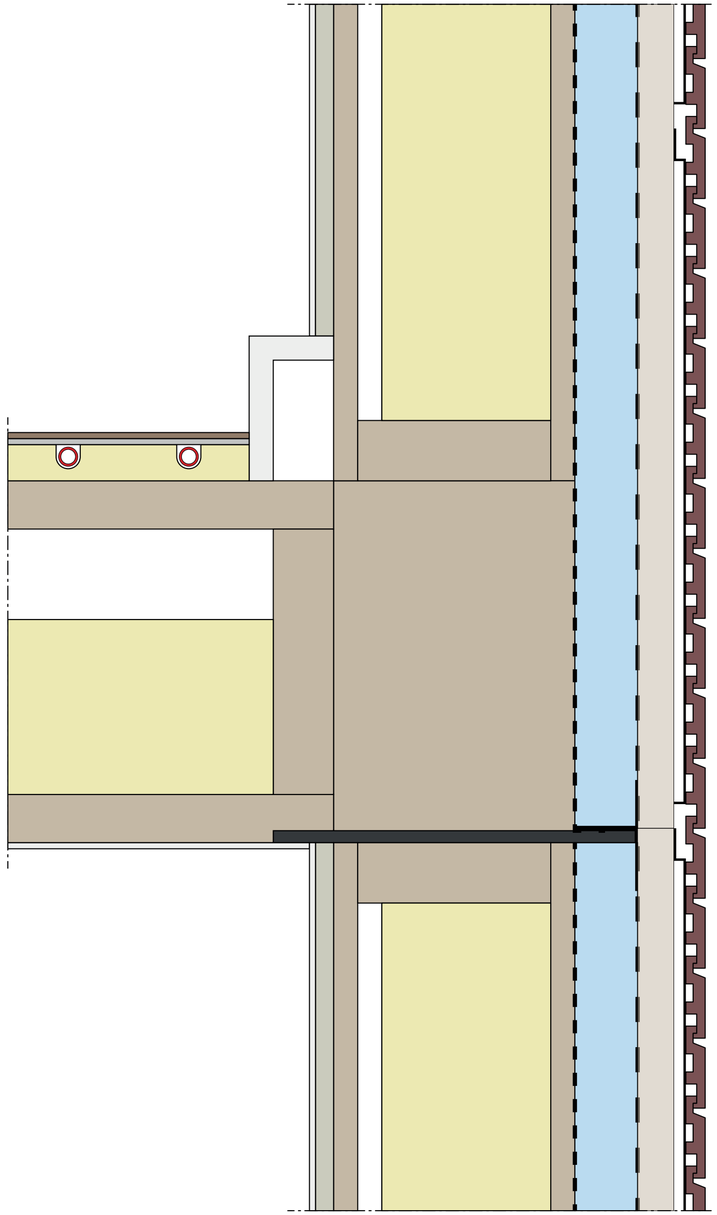
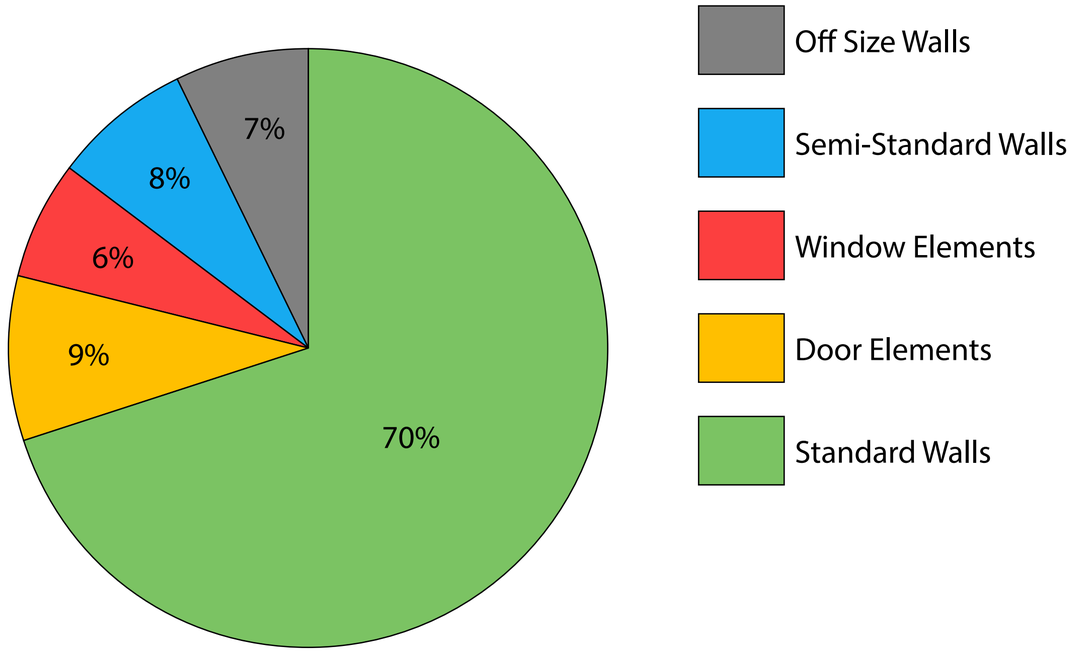
MODULAR GRID SIZE

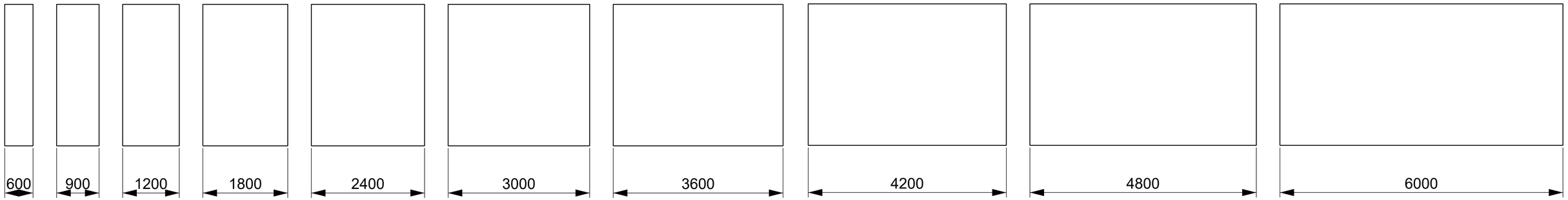




STANDARD WALLS:	273
DOOR ELEMENTS:	35
WINDOW ELEMENTS:	25
SEMI-STANDARD WALLS:	29
OFF SIZE WALLS:	28

60CM:	10
90CM:	18
120CM:	306
180CM:	4
240CM:	3
300CM:	12
360CM:	1
420CM:	4
480CM:	1
600CM:	3
OFF SIZE:	28





Materialization

Participant 3

Participant 2

Participant 1

Common

VR Tool

06-04-2022

P5

Luuk Goossen