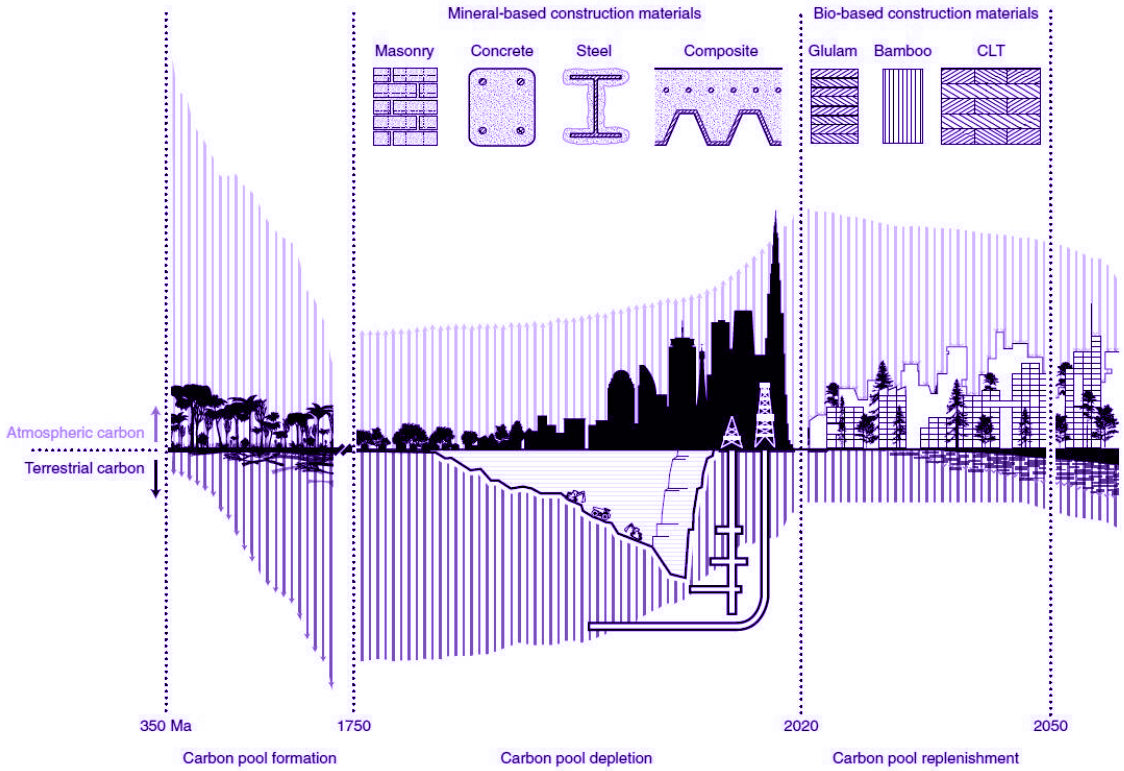
PATTERN AND SYSTEM

An automated approach to housing in the Minervahaven

Merel van Casteren

Architectural wood graduation studio

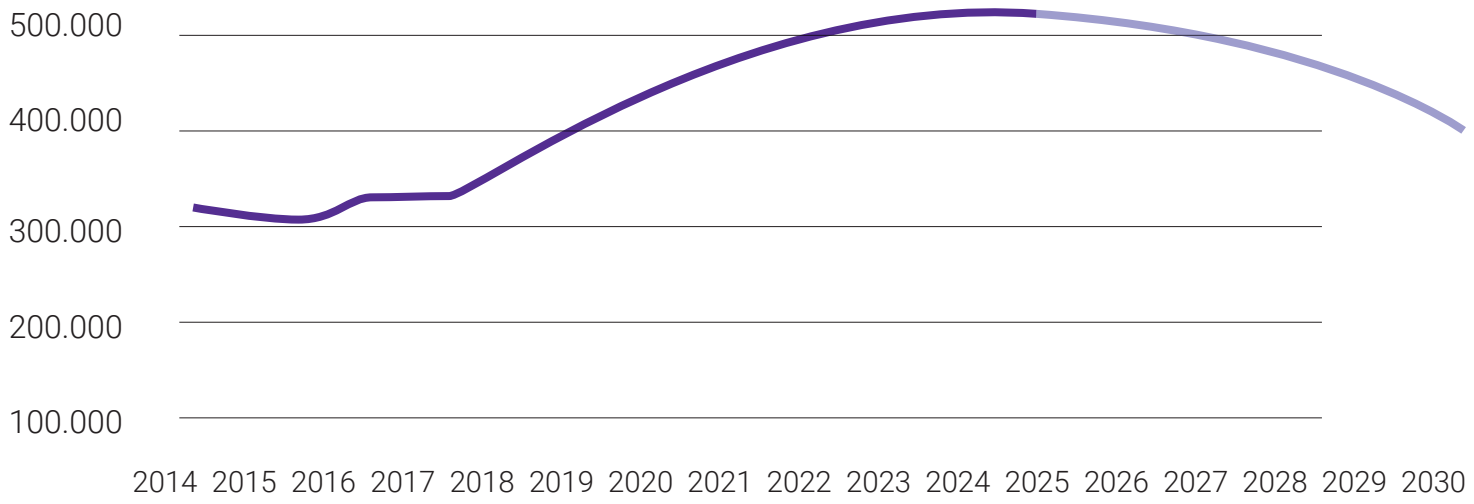
Introduction



“Timber for Urban Density

source: Churkina, G. et al. (2020). Decarbonizing construction. Buildings as a global carbon sink.

Housing shortage Netherlands



source: CBS

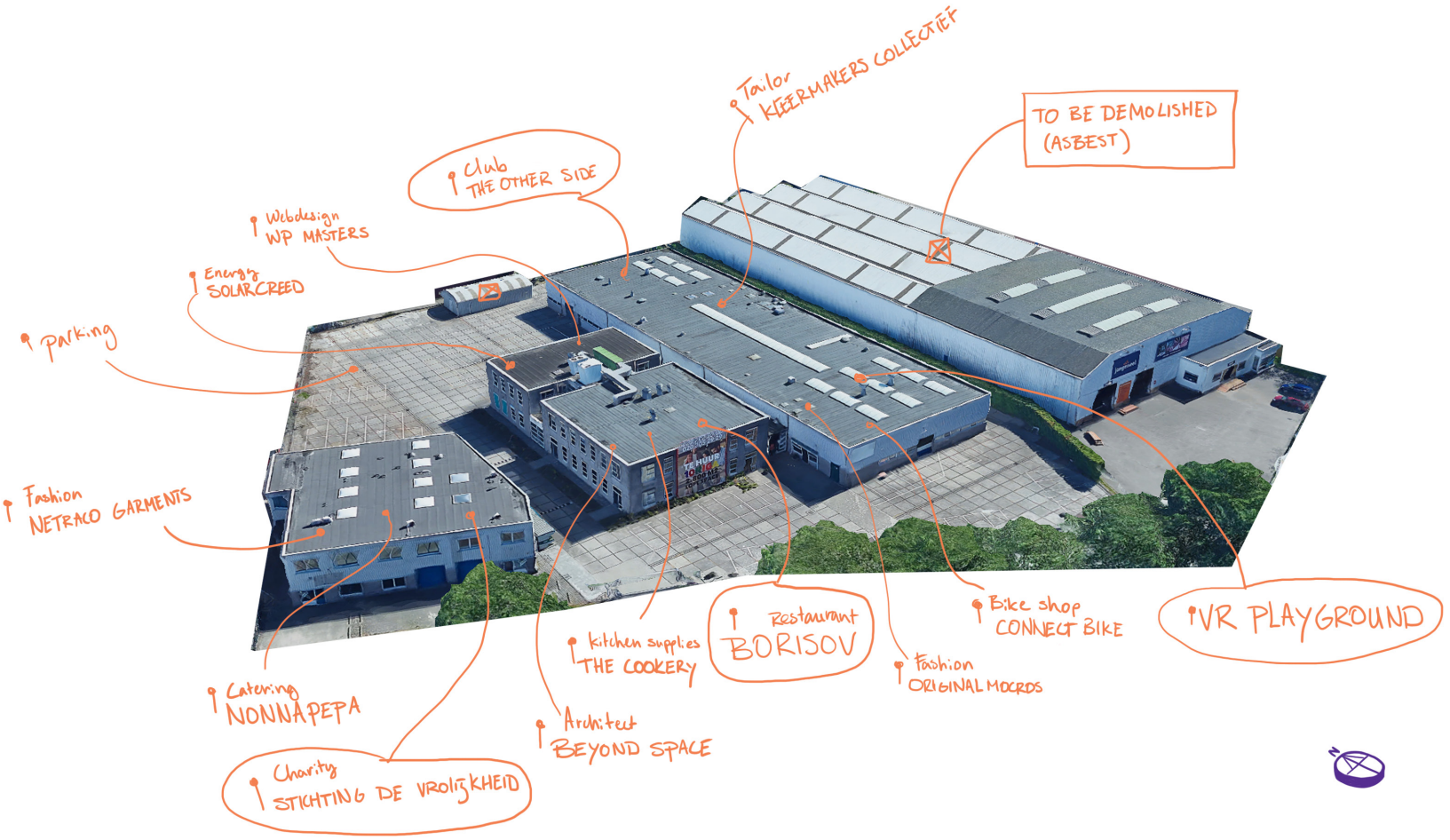
Location

Minervahaven

Typical structures

Site

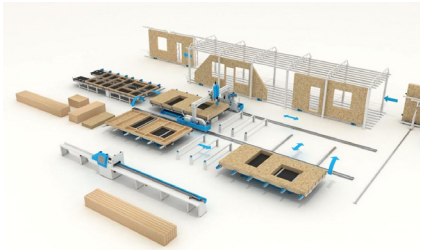
Occupation


Tailor
KLEERMAKERS COLLECTIEF
TO BE DEMOLISHED
(ASBEST)
Club
THE OTHER SIDE
Webdesign
WP MASTERS
Energy
SOLARCREED
parking
Fashion
NETRACO GARMENTS
Catering
NONNAPEPA
Charity
STICHTING DE VROLIJKHEID
Architect
BEYOND SPACE
kitchen supplies
THE COOKERY
Restaurant
BORISOV
Fashion
ORIGINAL MOCKOS
Bike shop
CONNECT BIKE
VR PLAYGROUND

Approach

Modular construction

Modern machinery



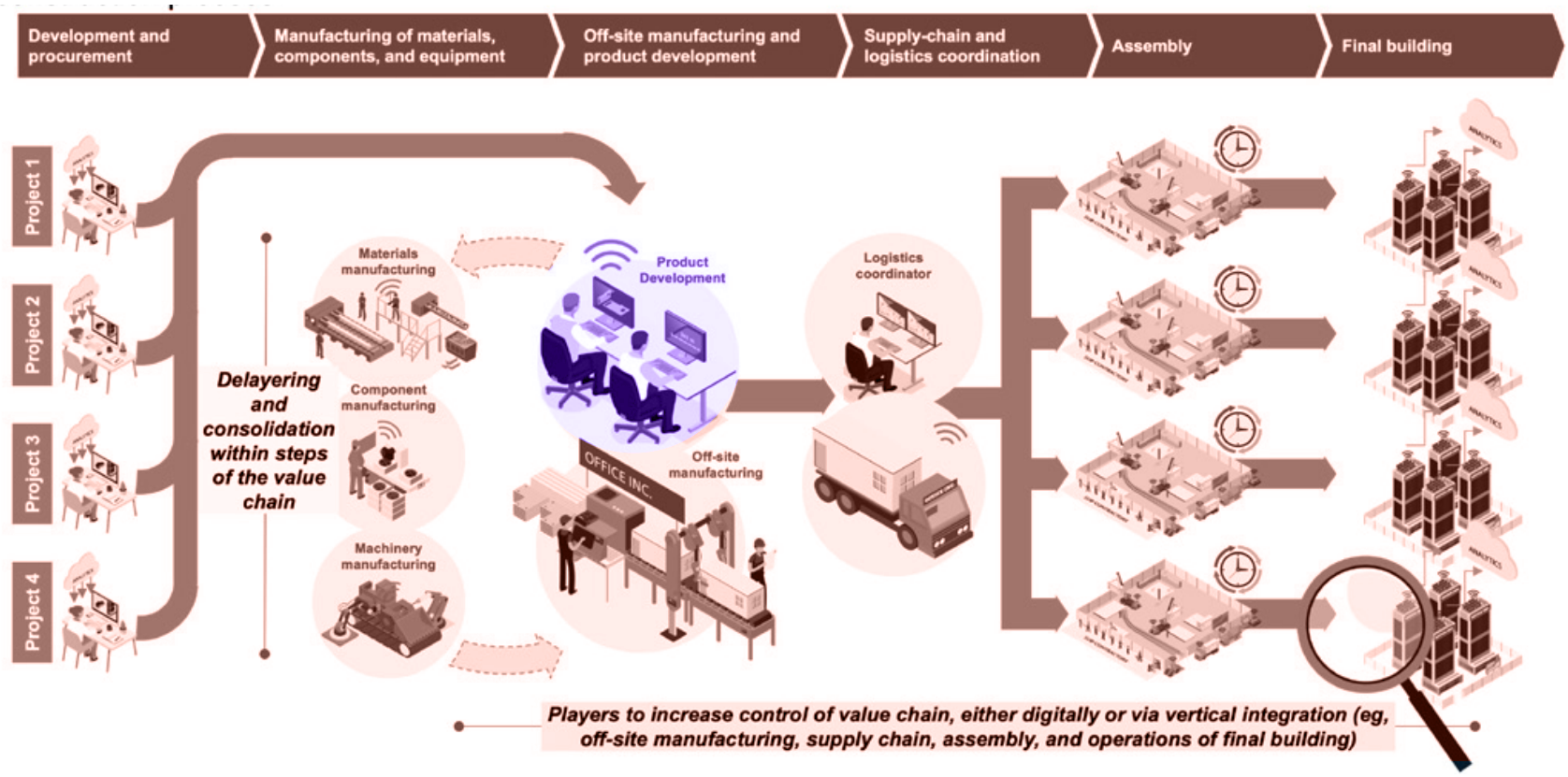
& engineered timber

images top-bottom, left-right: PONTEC, XLAM, SeARCH.

Commercial systems

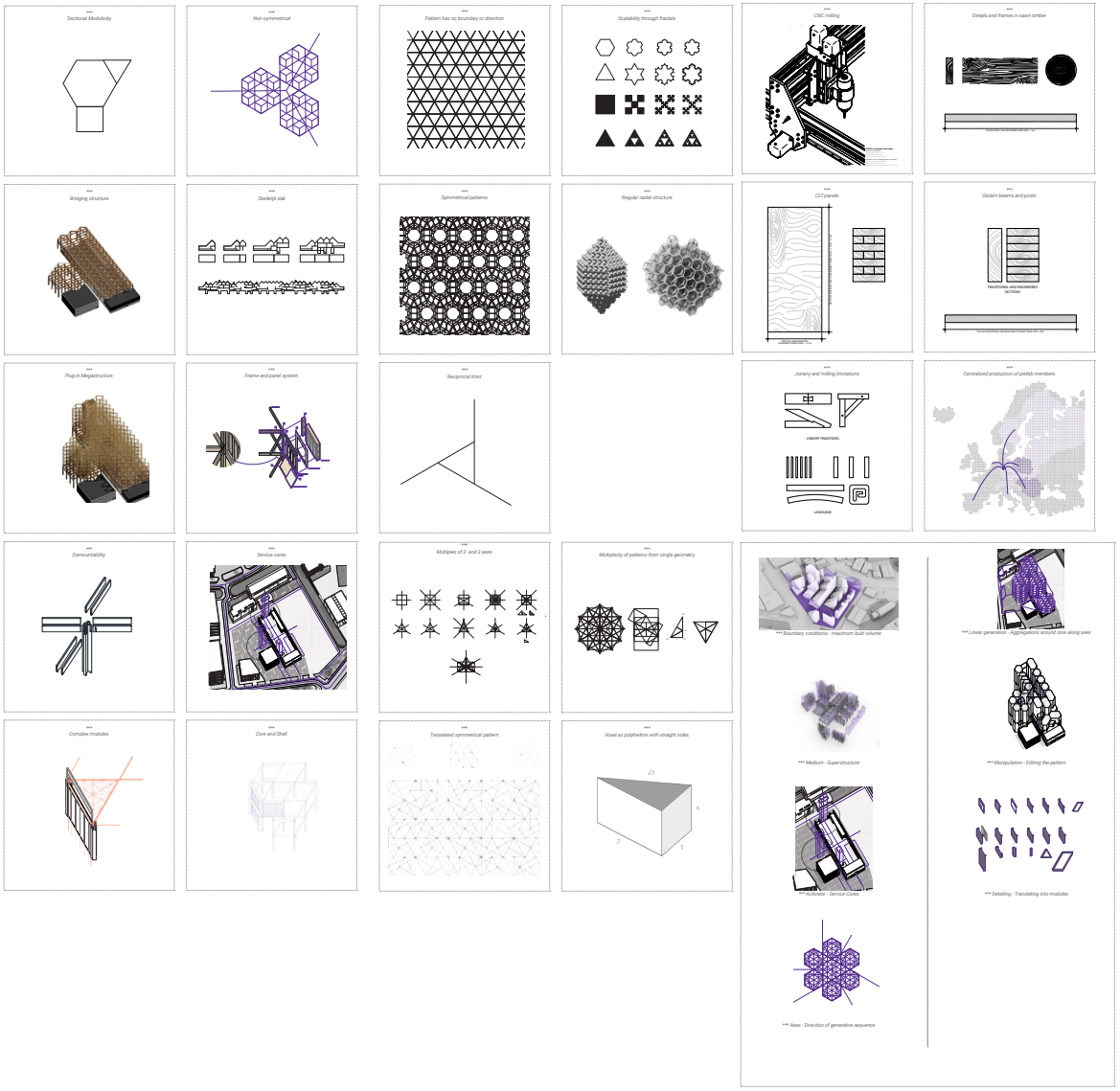
image: Dura Vermeer

Speculative future

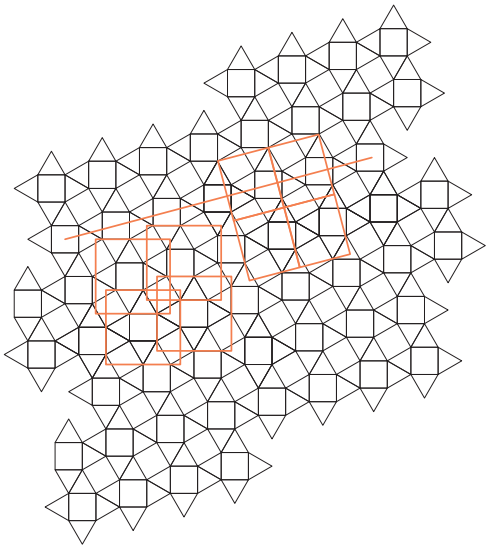


source: McKinsey & Company

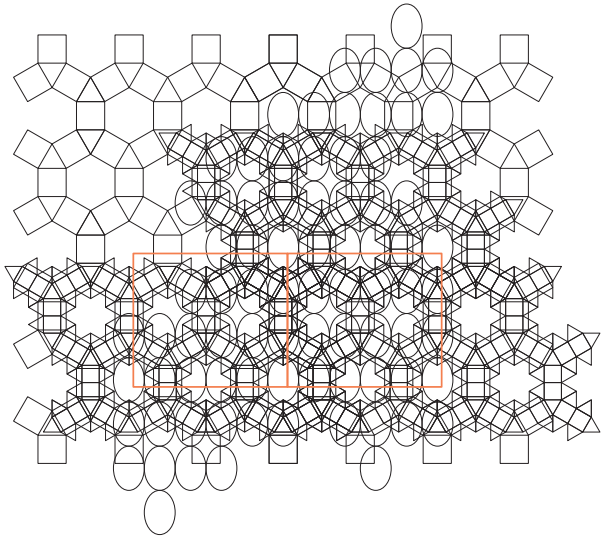
Design Patterns



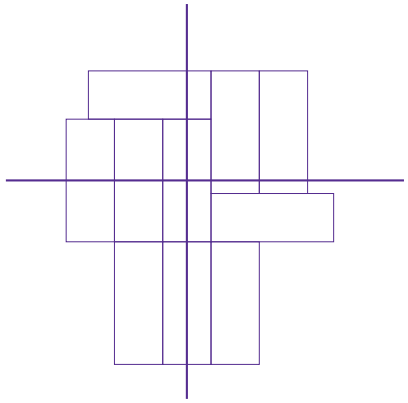
Pattern geometry

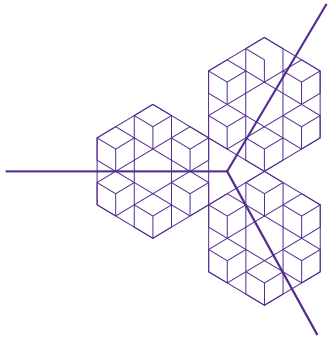


Linear pattern

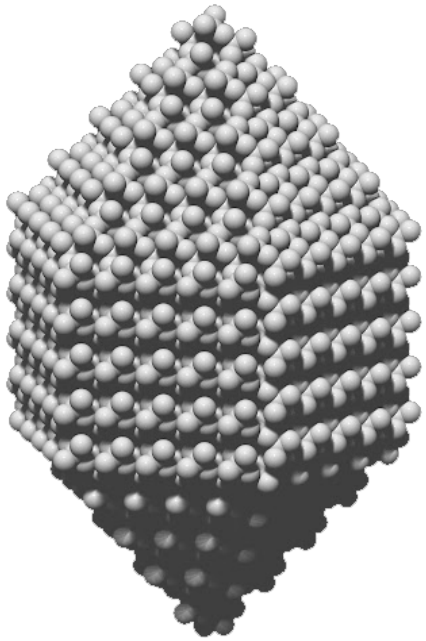


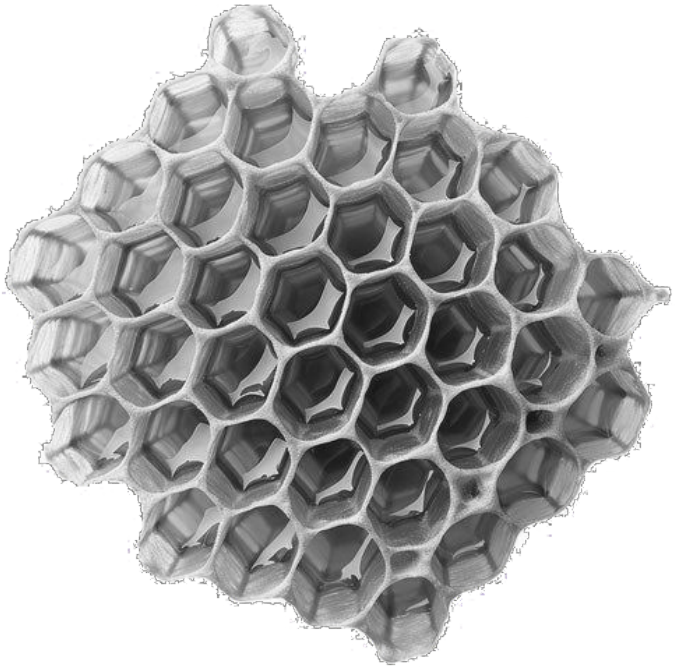
Radial pattern





Radial patterns in nature





Geometric basis

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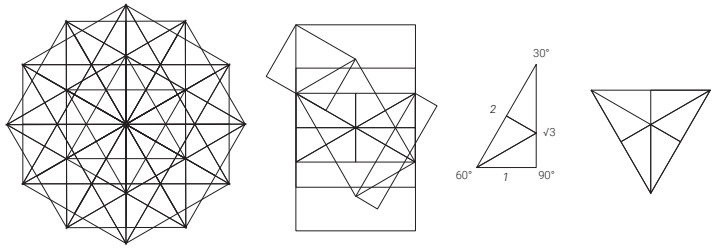
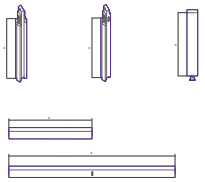
Multiplicity of patterns from single geometry



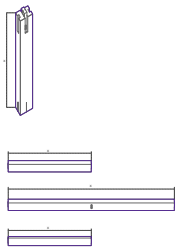
Kit of Parts

1D MODULES

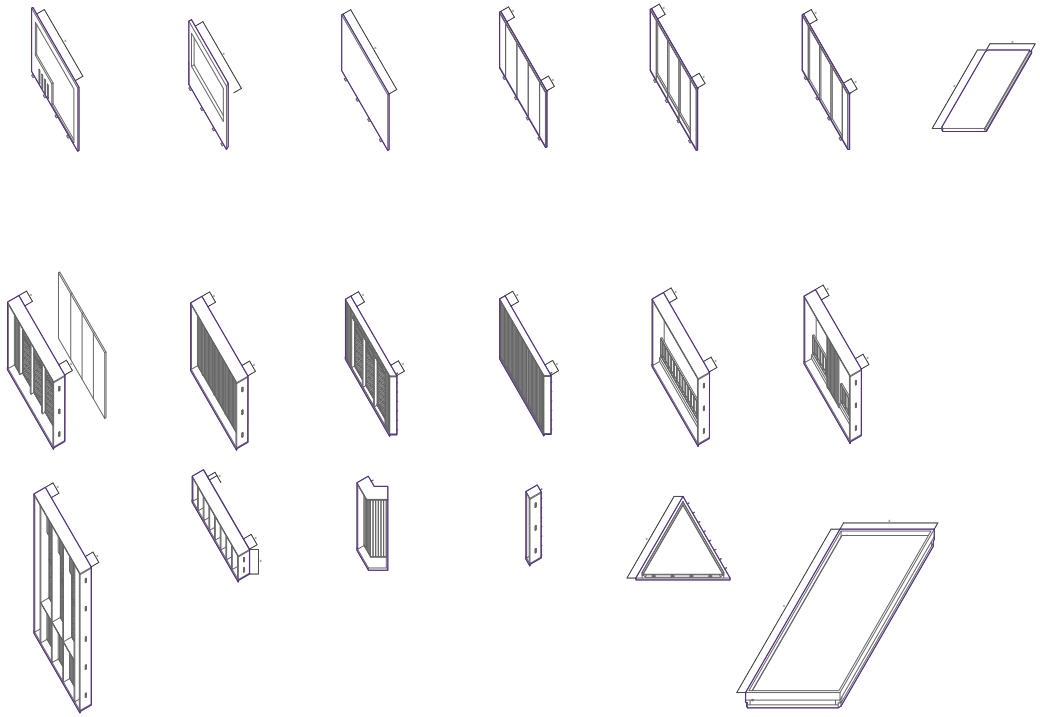
COVERED



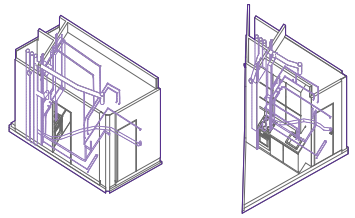
EXPOSED



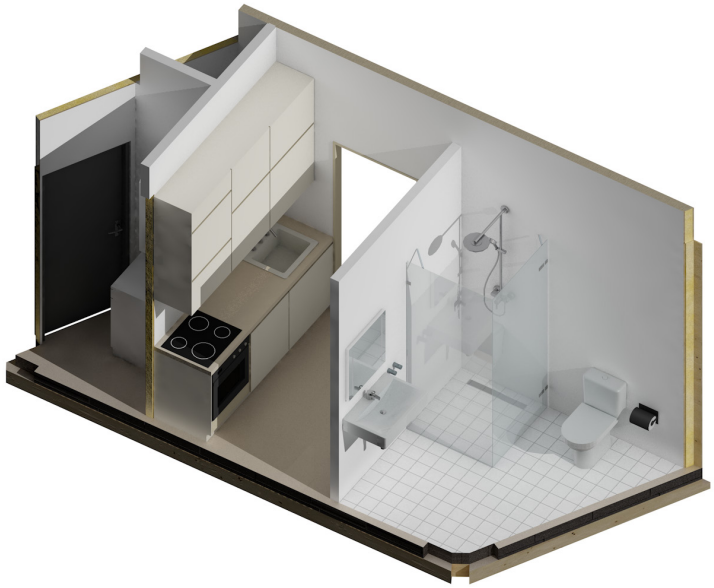
2D MODULES



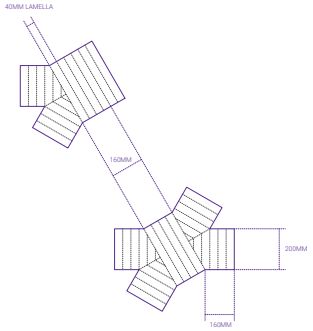
3D MODULES



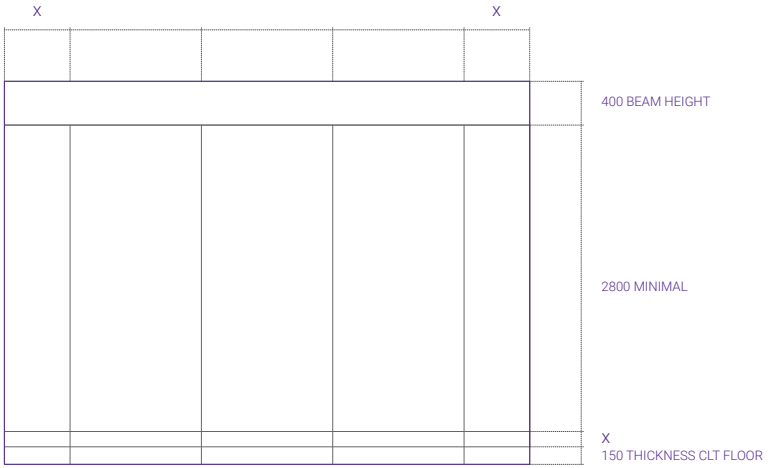
Kit of Parts



Dimensioning principles



Section main columns



Wall frames

Main materials

Robinia - All exposed members, cladding

Mycelium composite - Insulation

Spruce - wall frames

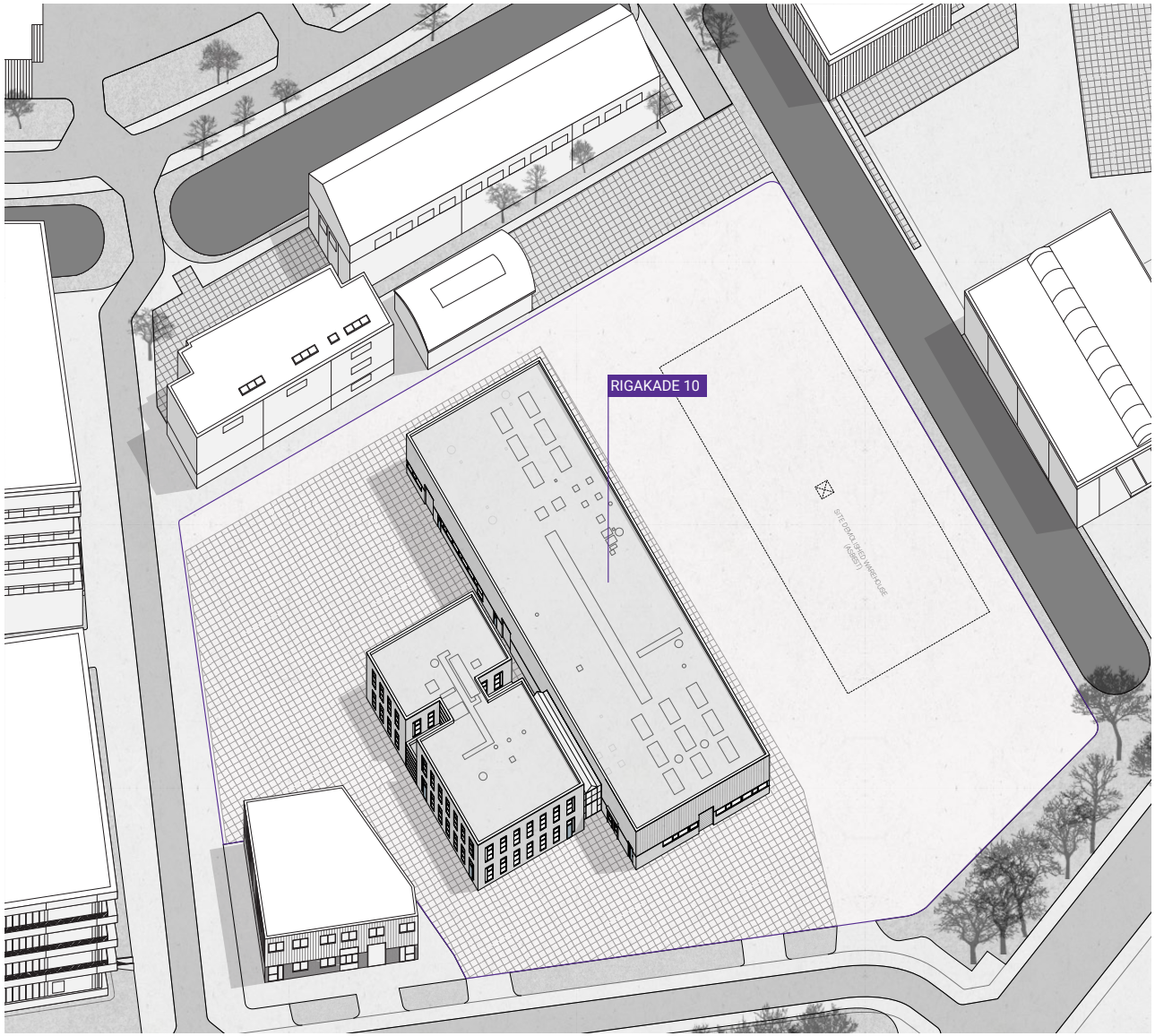
Spruce GLT - Beams and columns interior

Spruce CLT - Solid panels

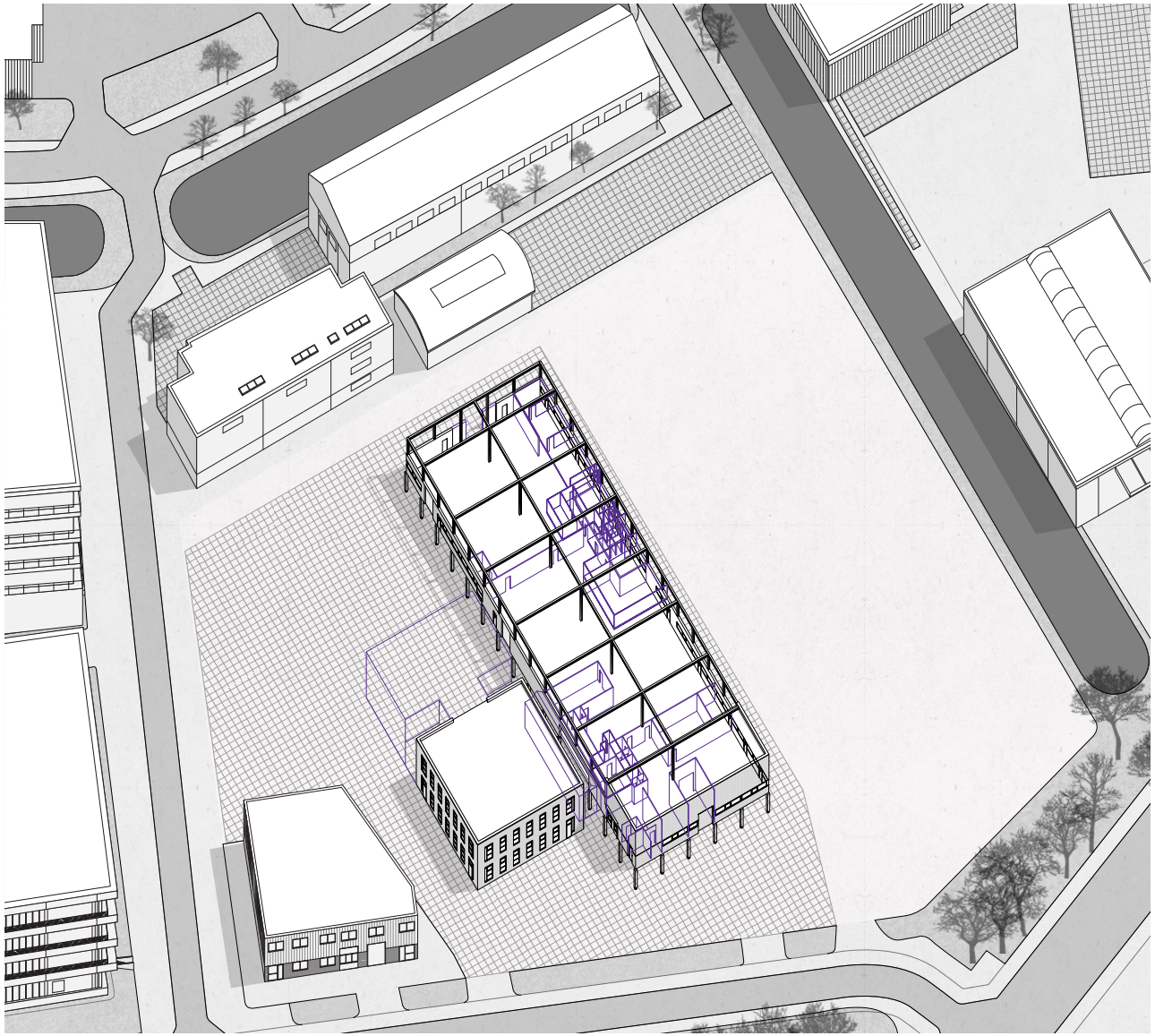
Material sourcing

Generation of space

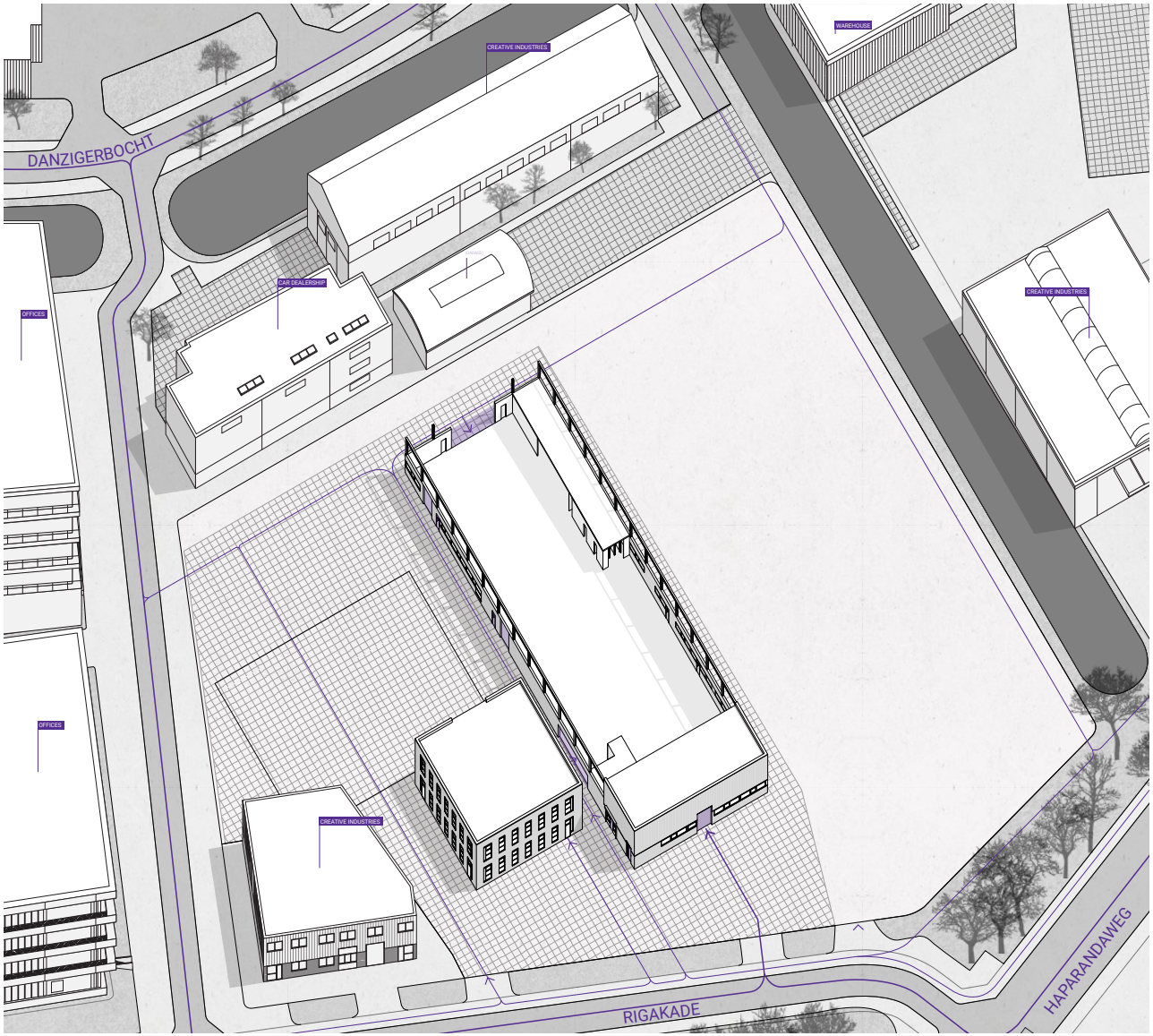
Existing building



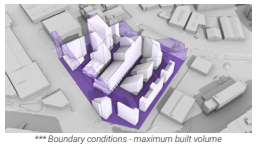
Interior existing building



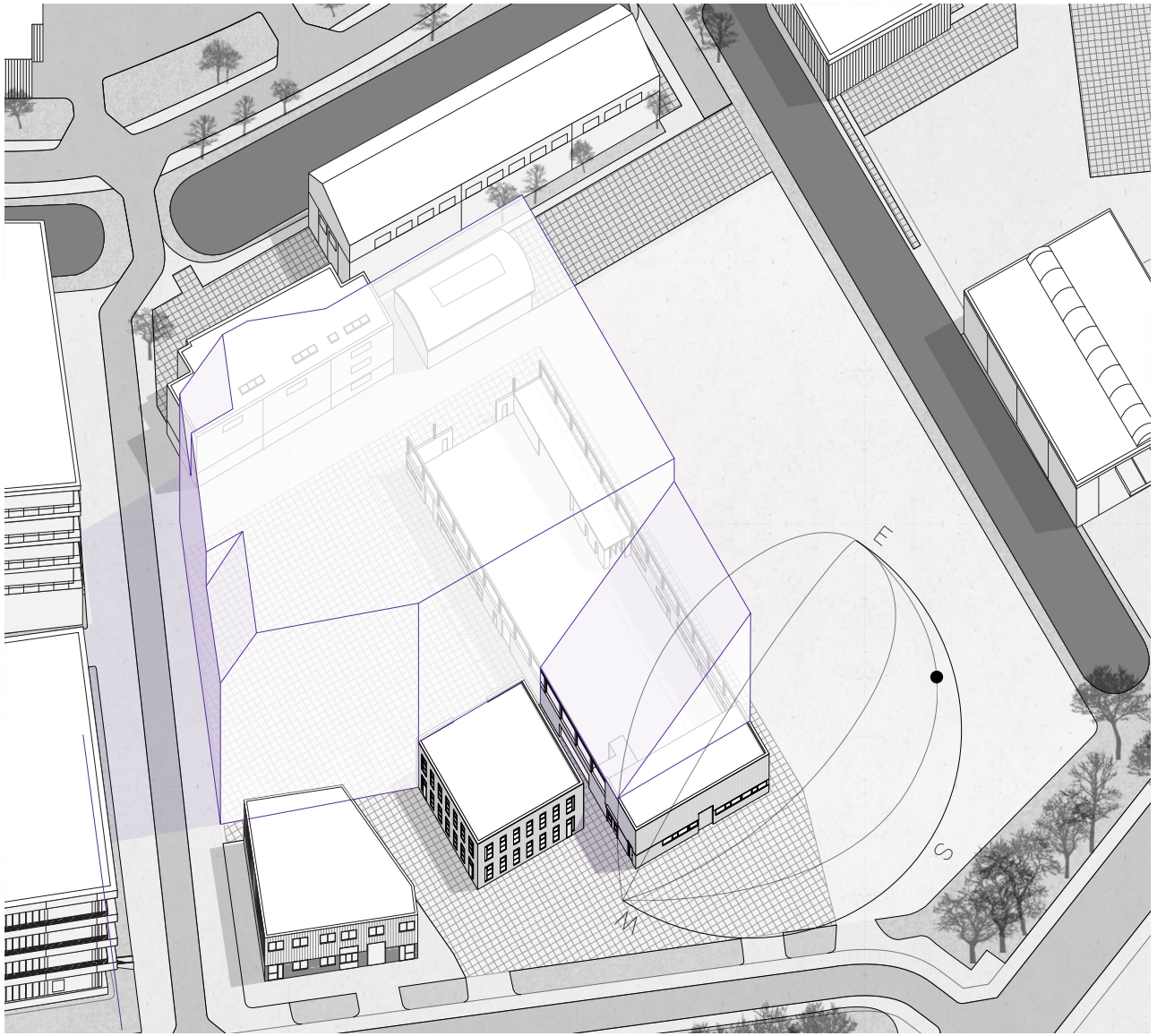
Creating opportunities



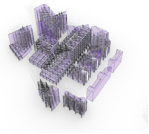
Maximum built volume



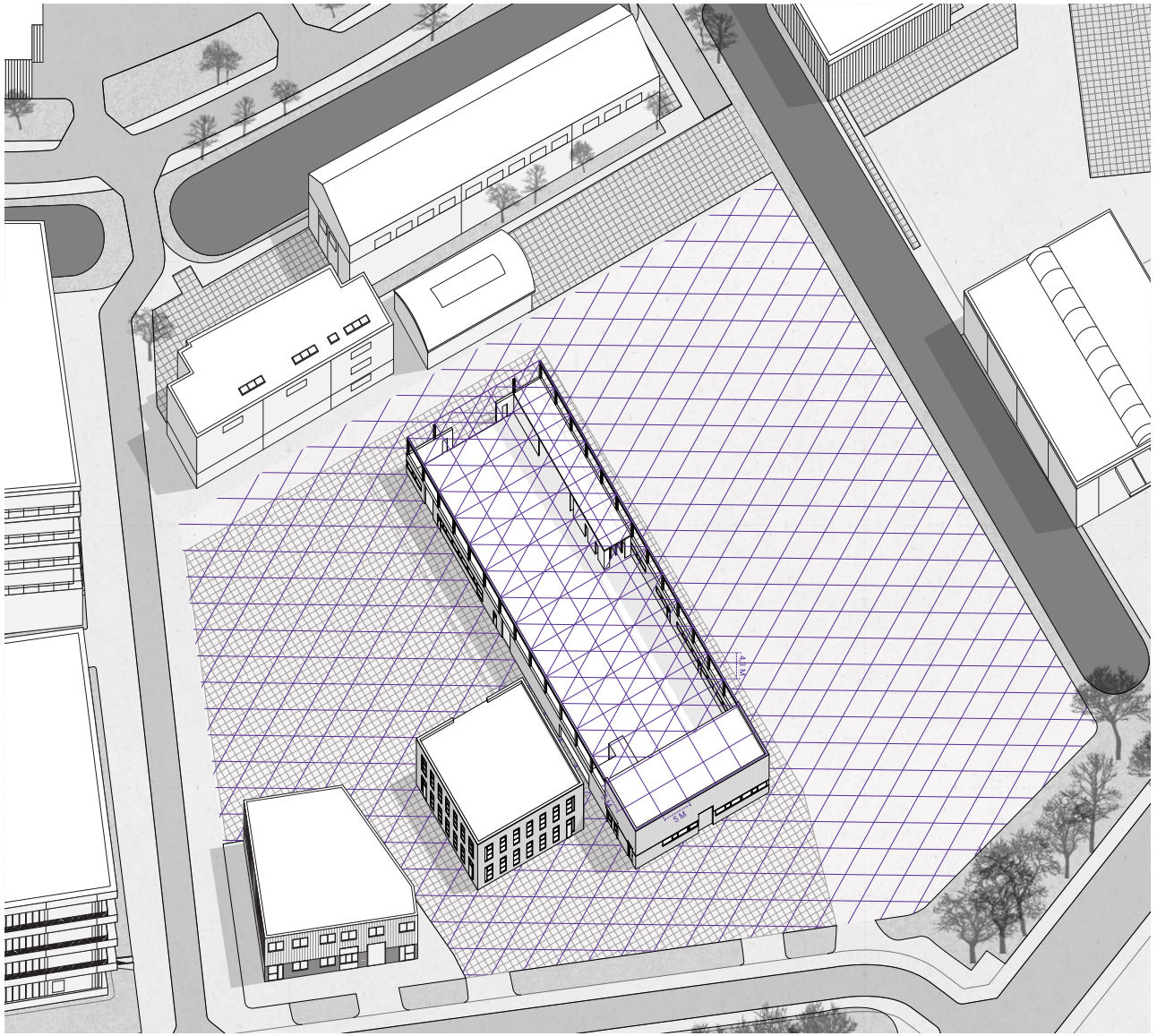
*** Boundary conditions - maximum built volume



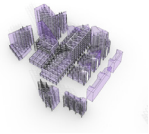
Matching pattern grid



*** Medium - Superstructure



Matching pattern grid



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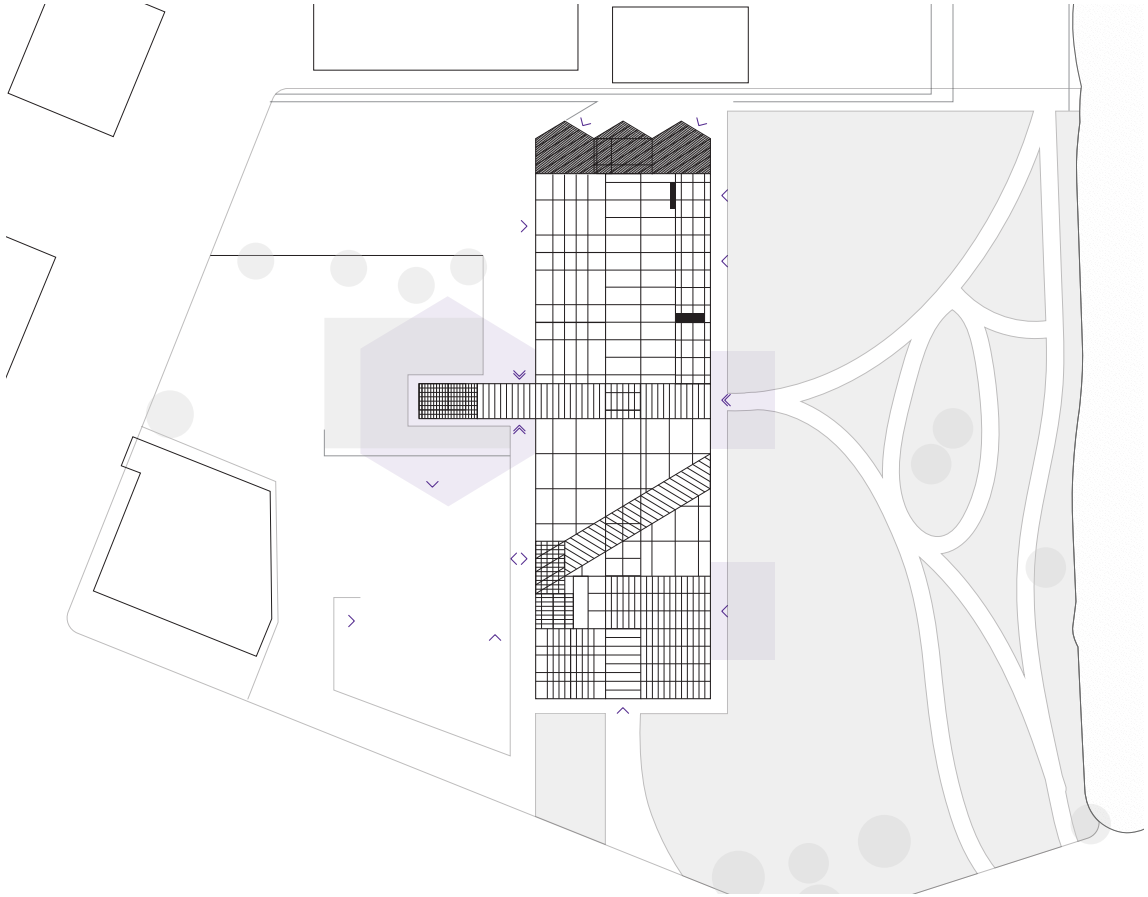
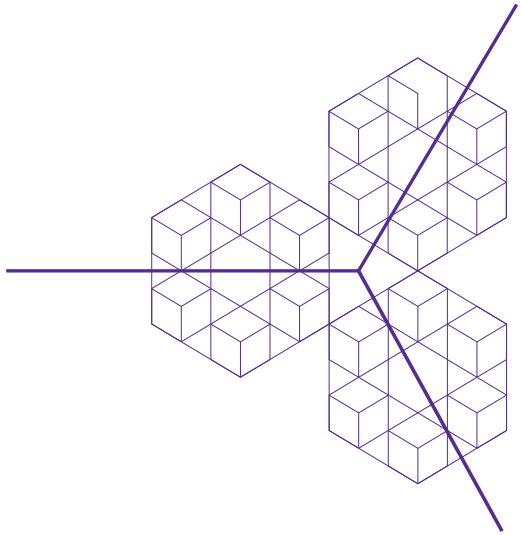
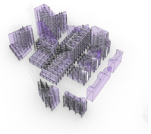




Matching pattern grid



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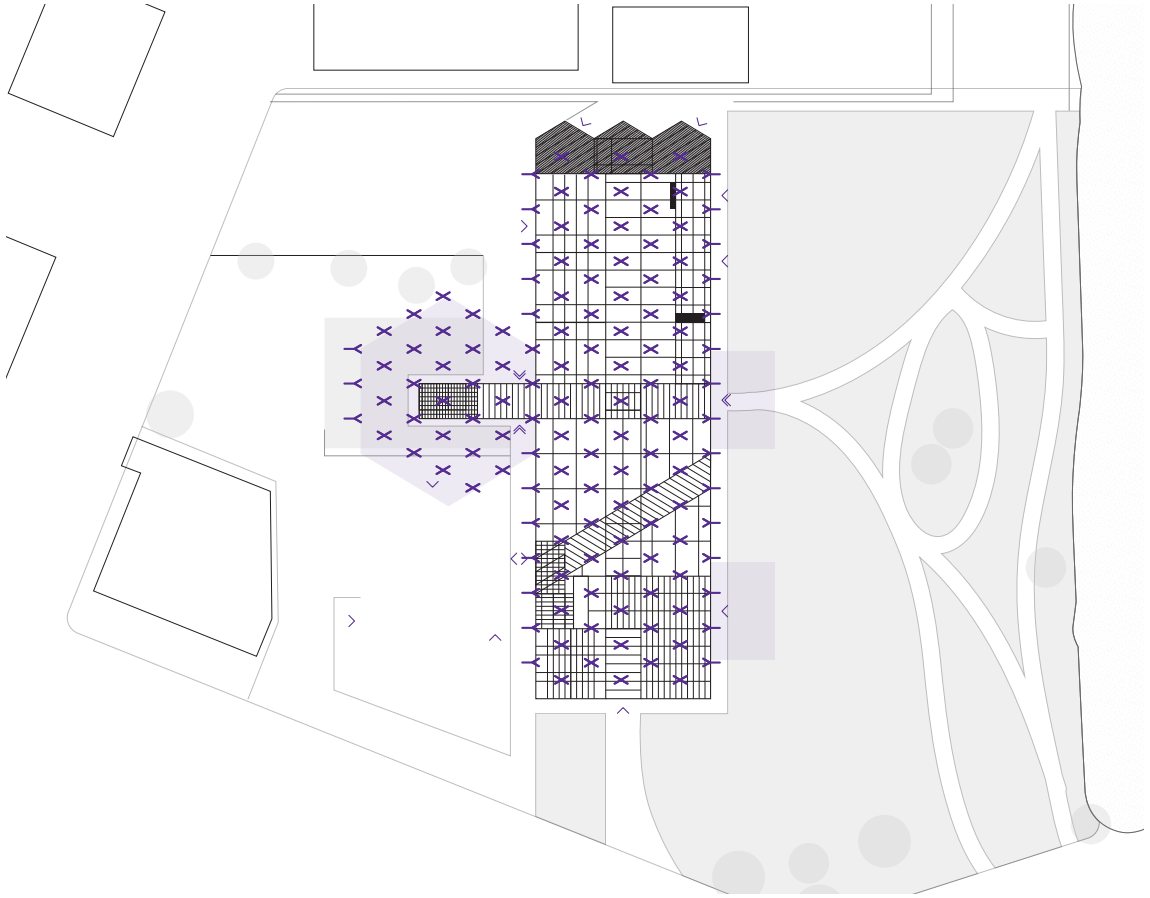
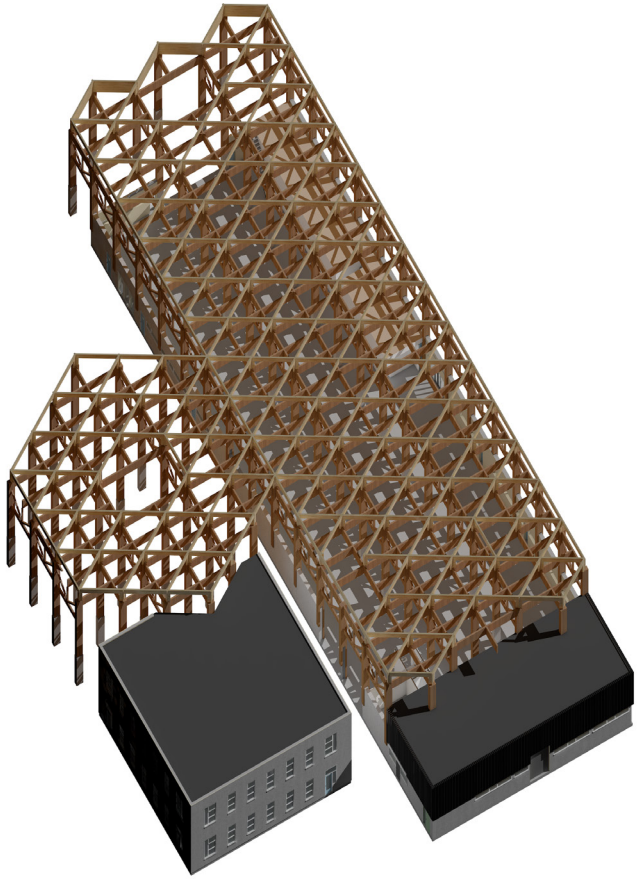
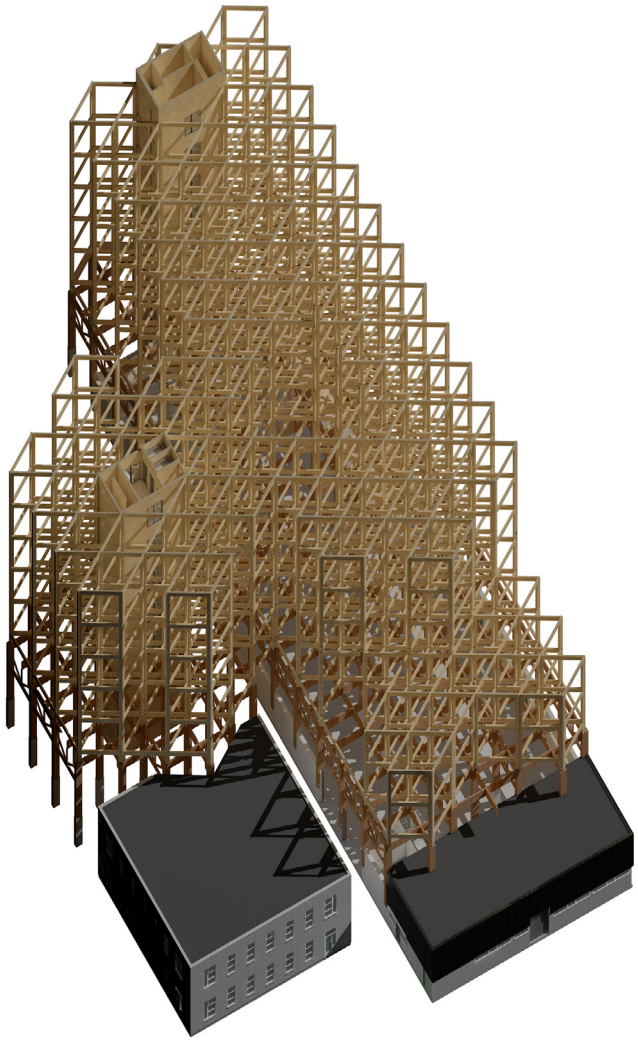


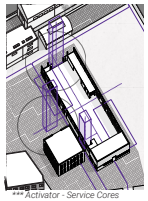
Glulam Table structure



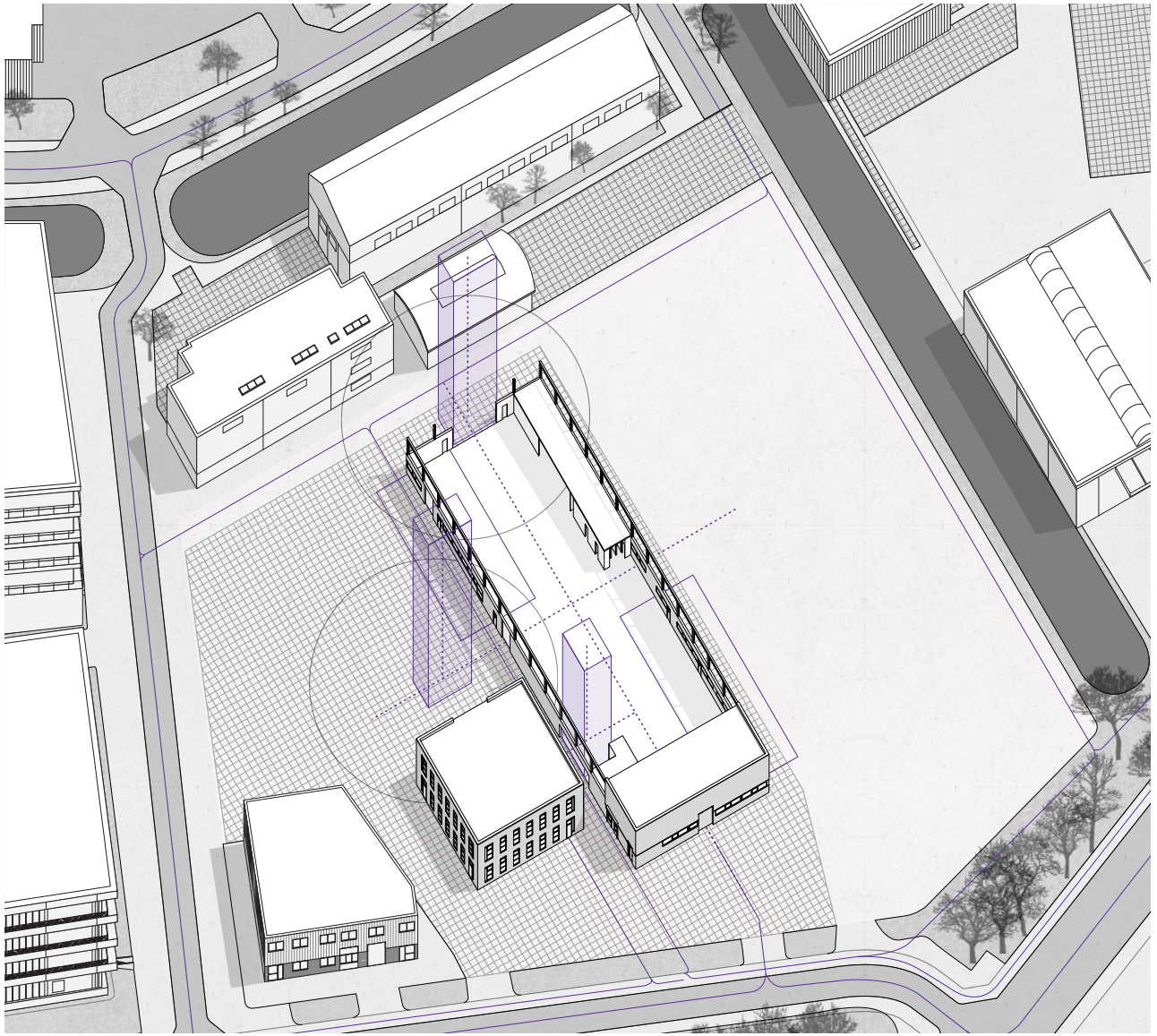
Glulam frame



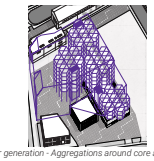
Cores and Axes



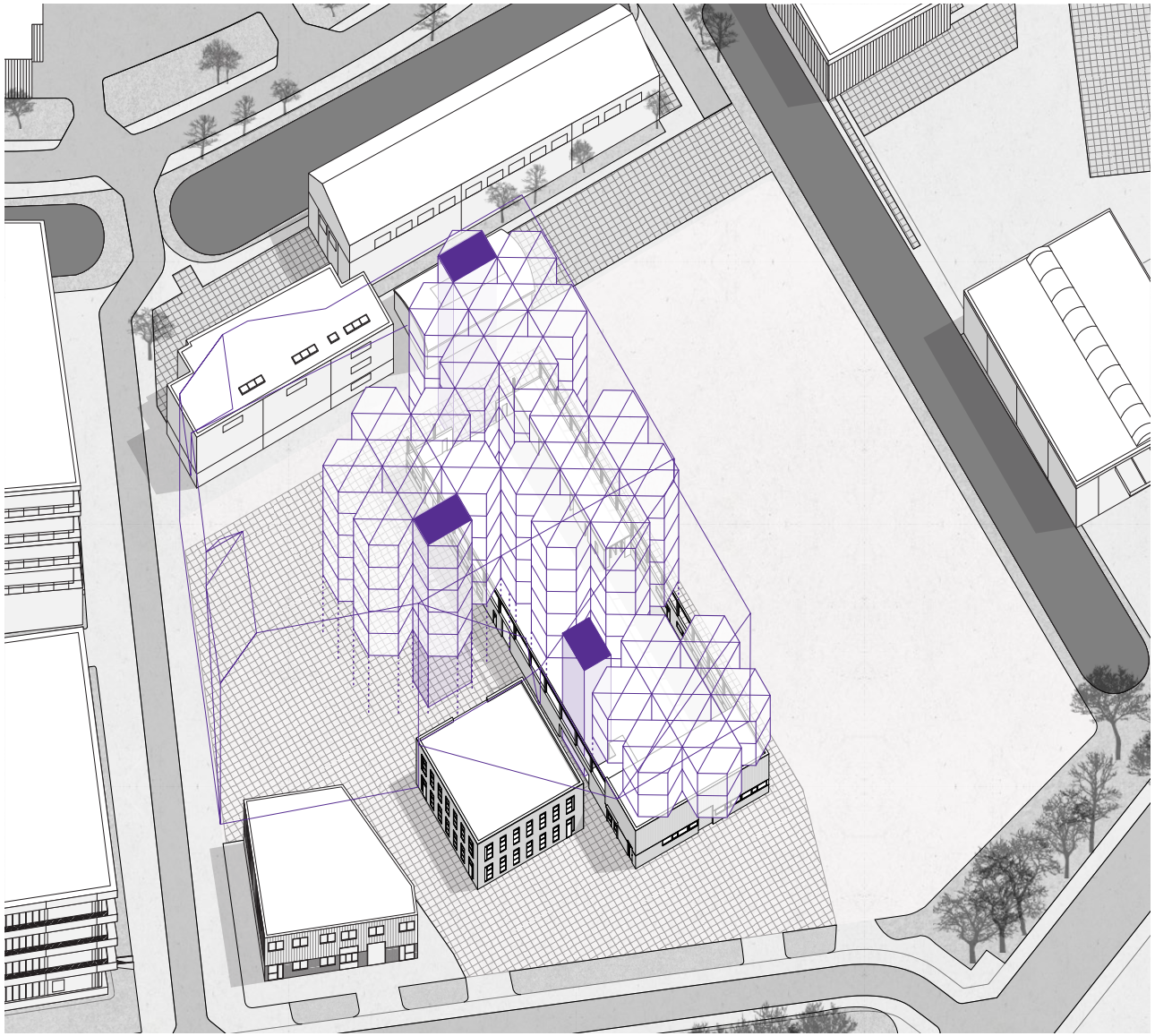
*** Activator - Service Cores



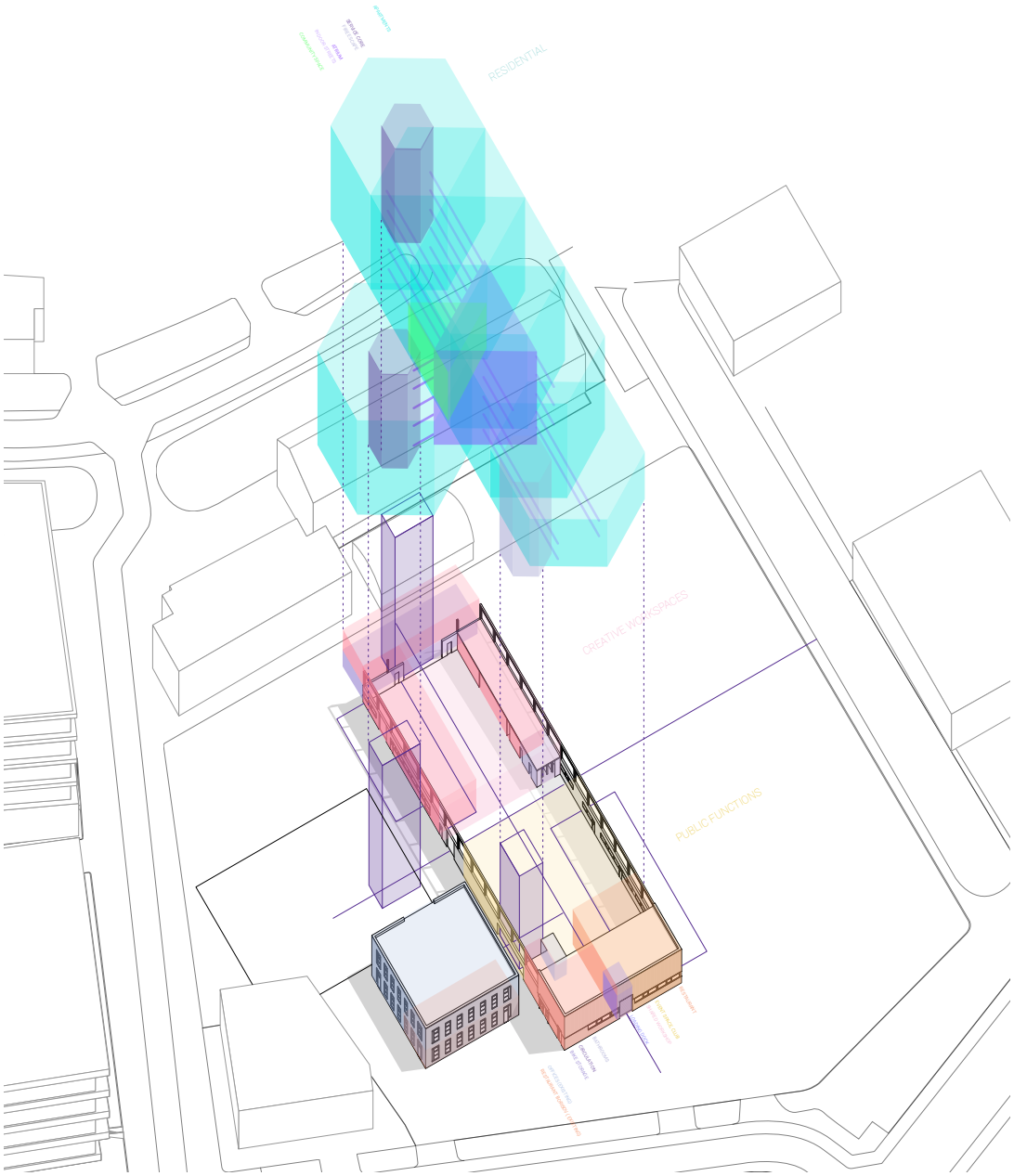
Basic pattern



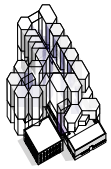
**** Linear generation - Aggregations around core along axes*



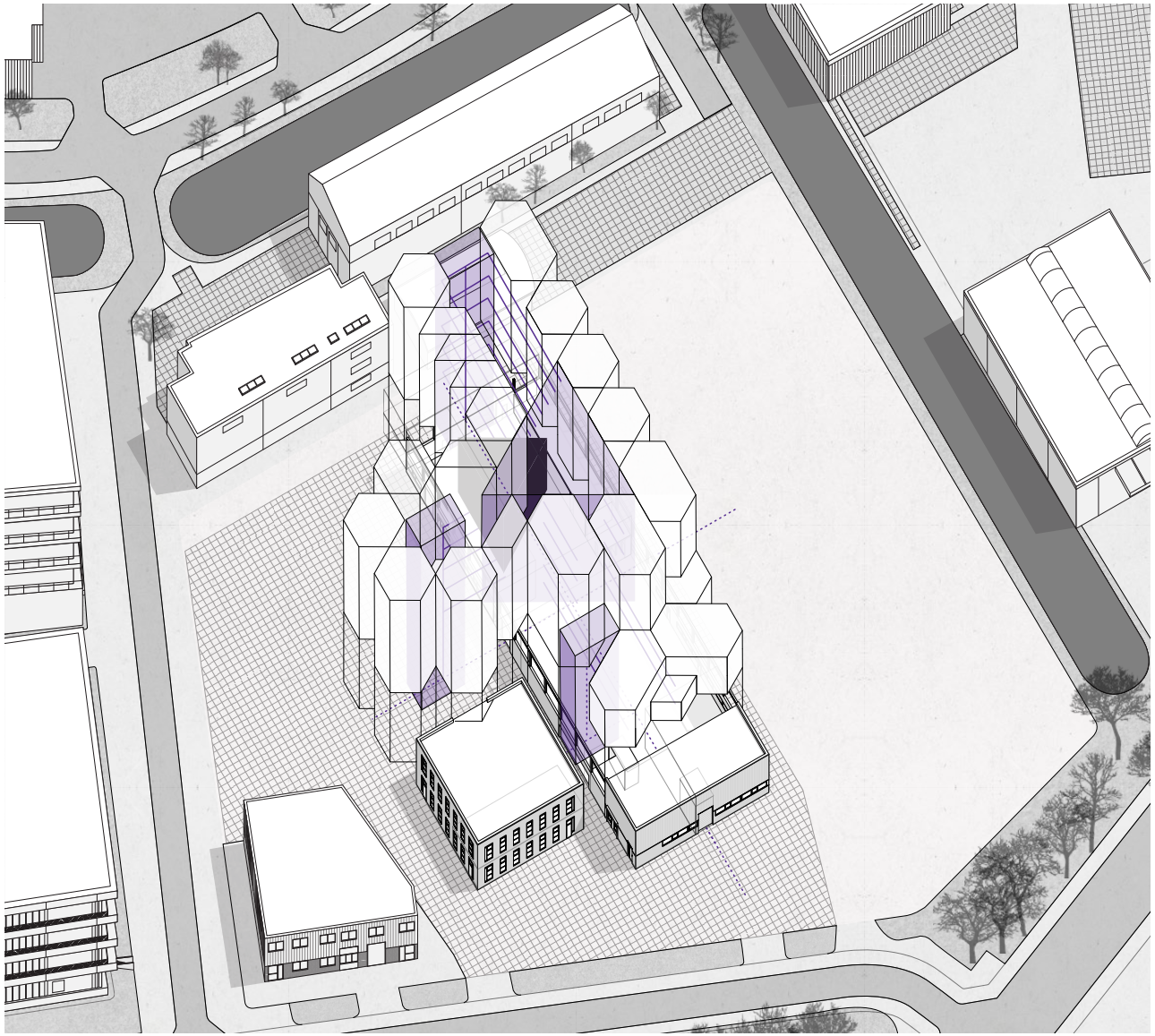
Function diagram



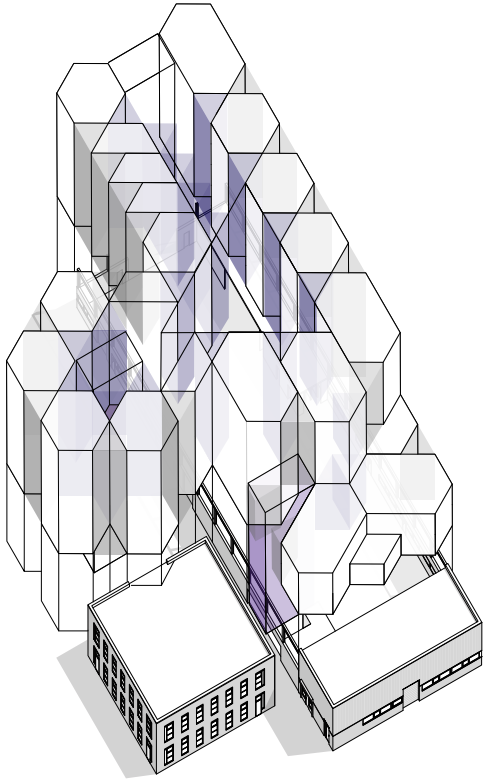
Manipulation



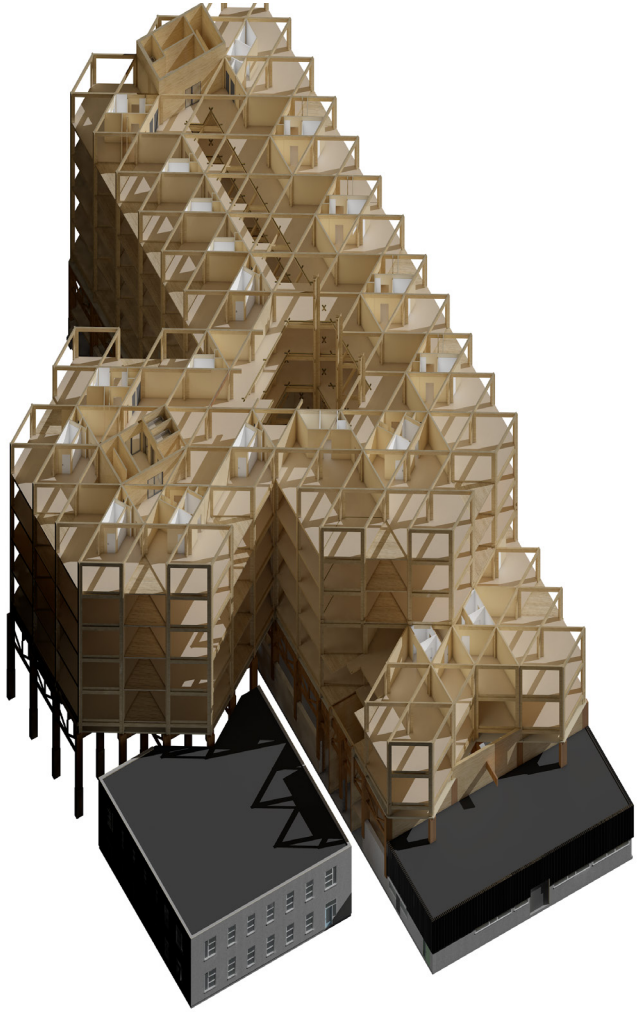
*** Manipulation - Editing the pattern



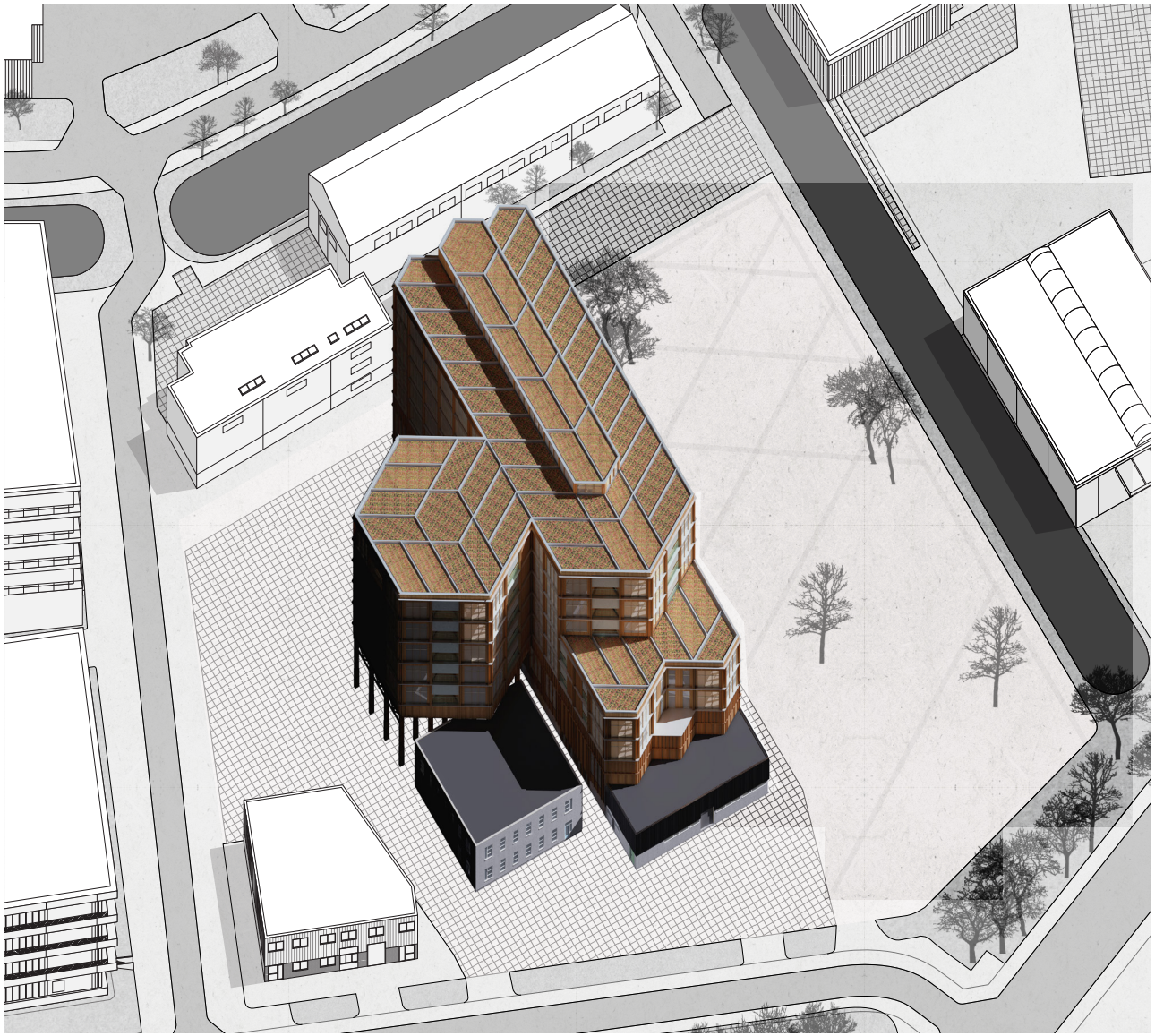
Final volumes



Interior modular fill

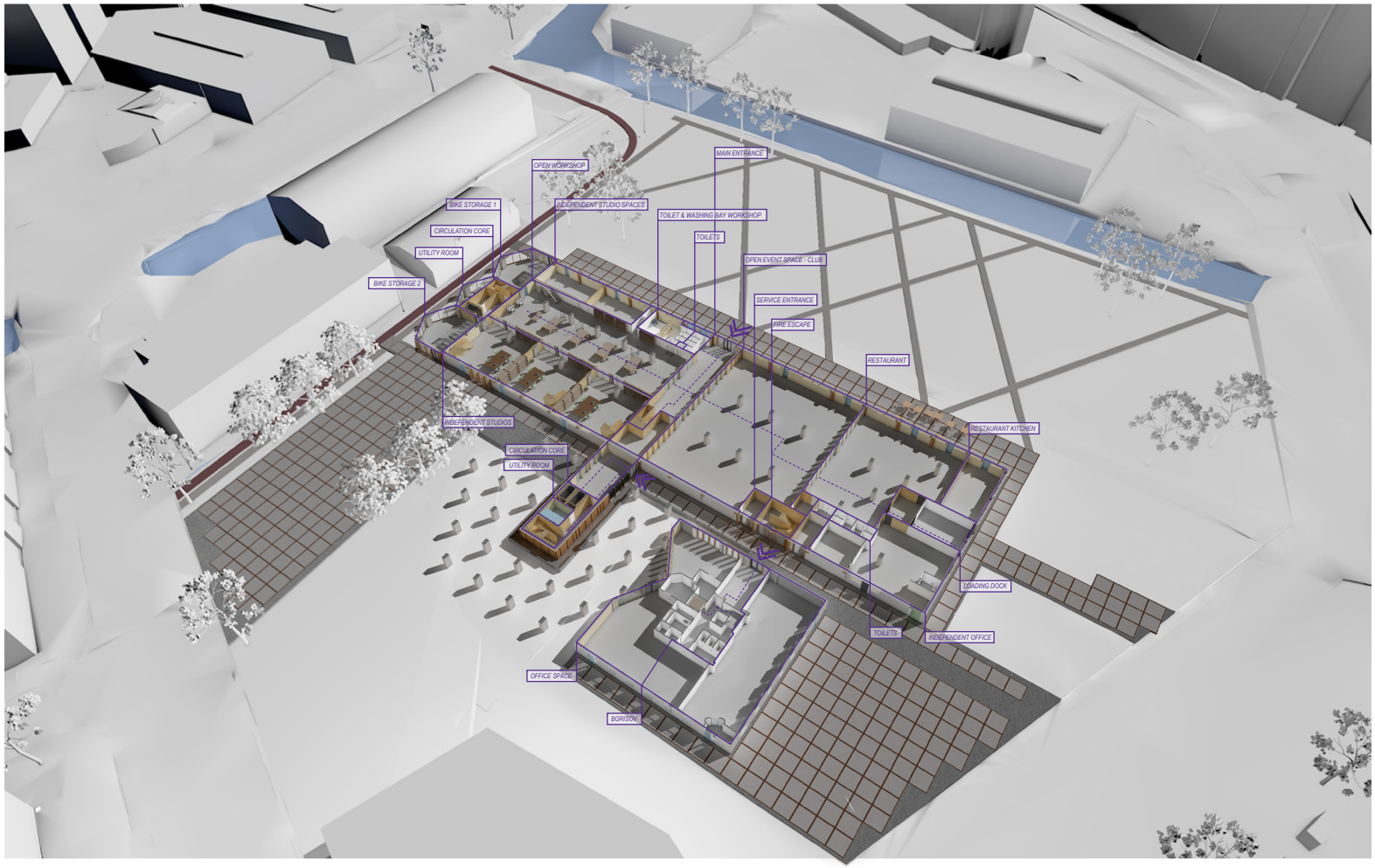


Final volume



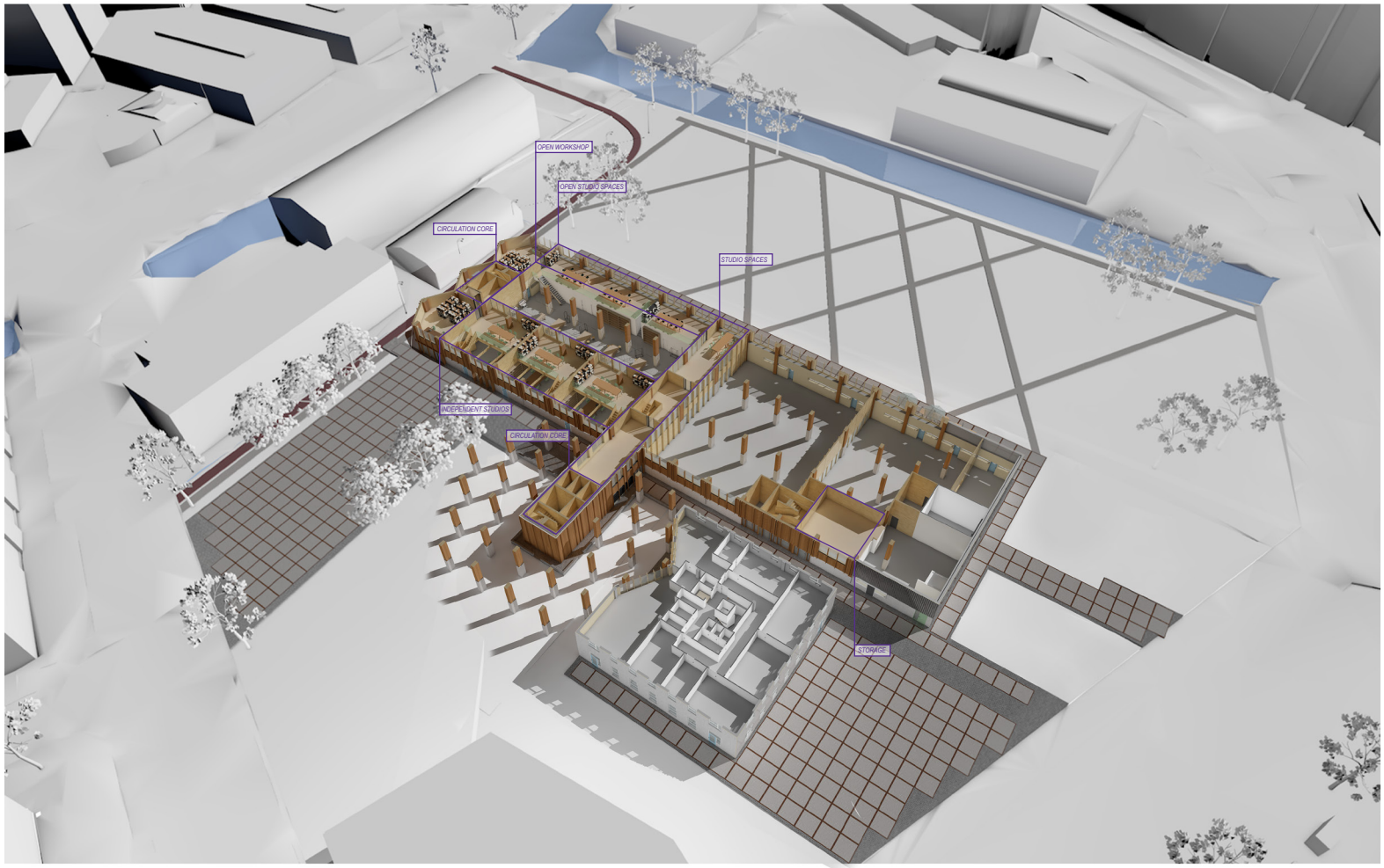
Proposal

Ground floor



Main entrance

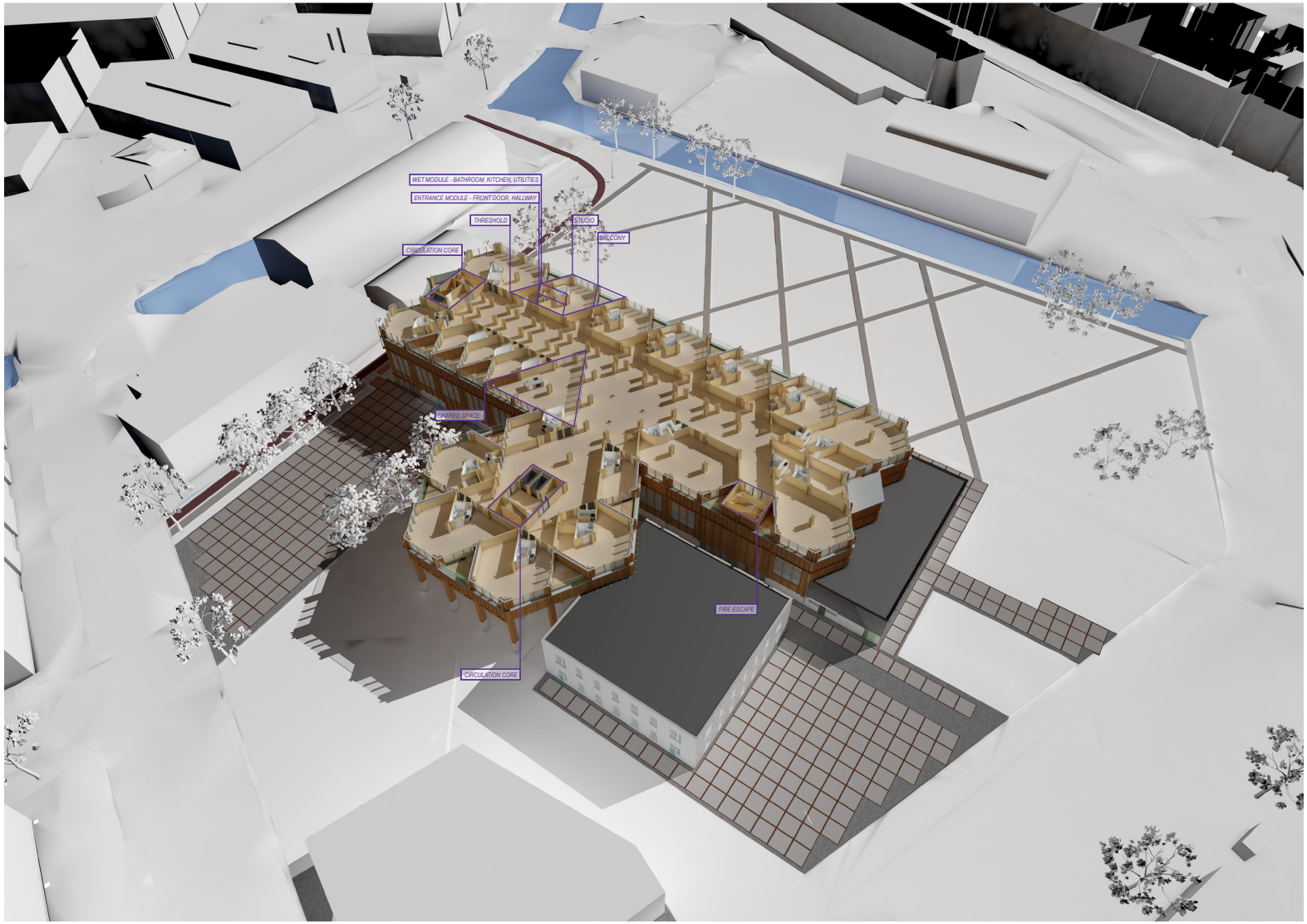
First floor


OPEN WORKSHOP
OPEN STUDIO SPACES
CIRCULATION CORE
STUDIO SPACES
INDEPENDENT STUDIOS
CIRCULATION CORE
STORAGE

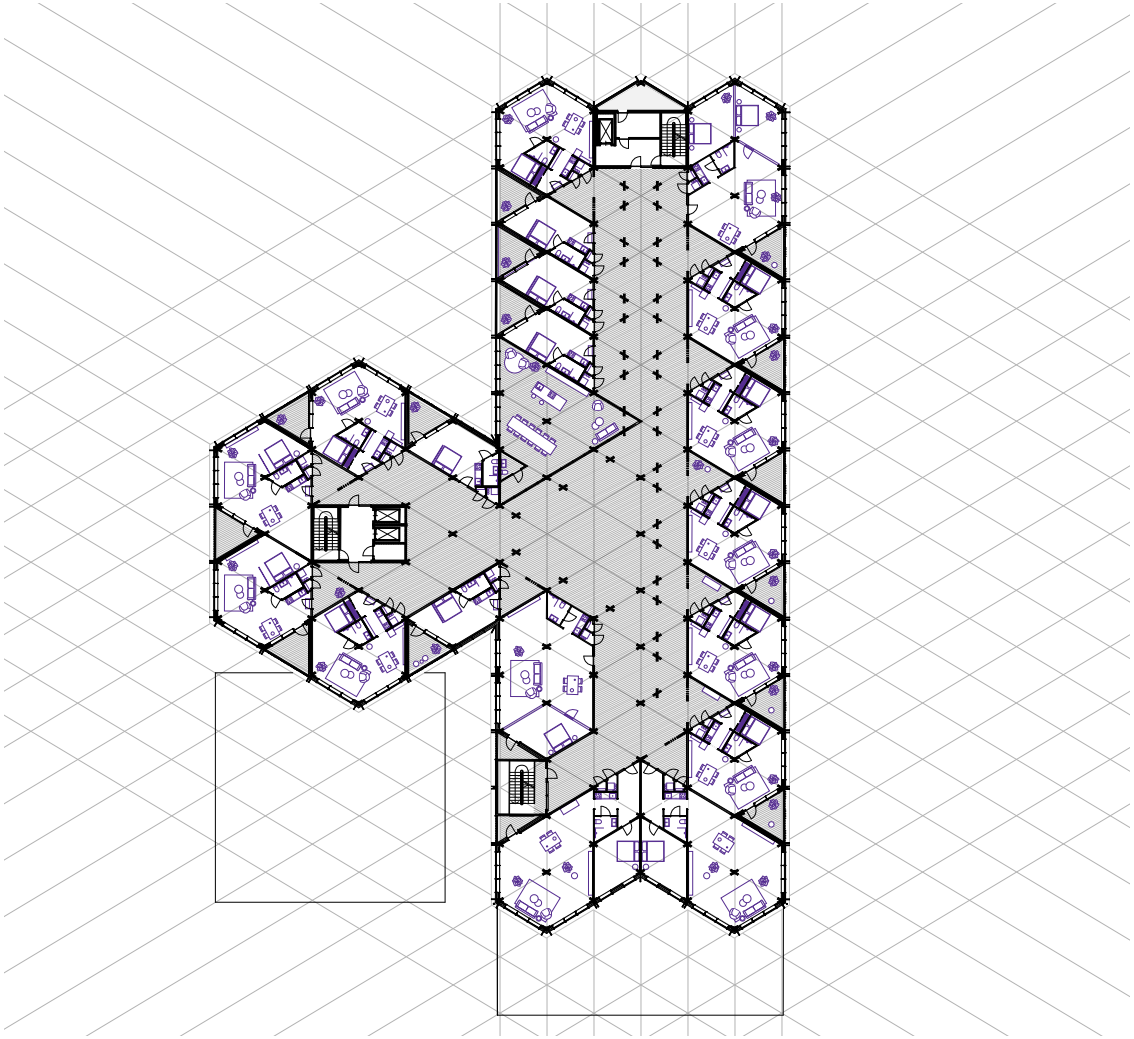
Open workshop

Open workshop

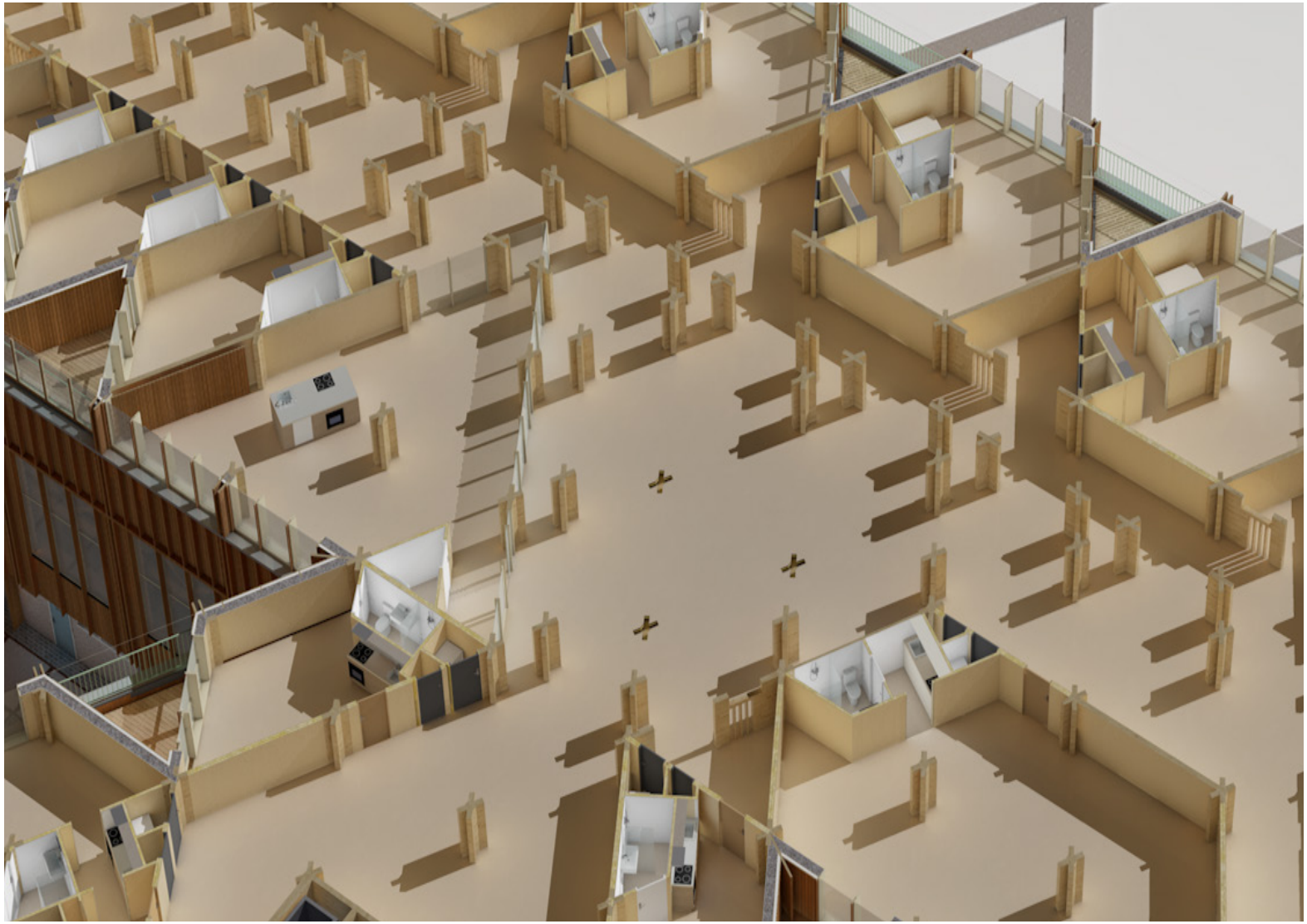
Second floor



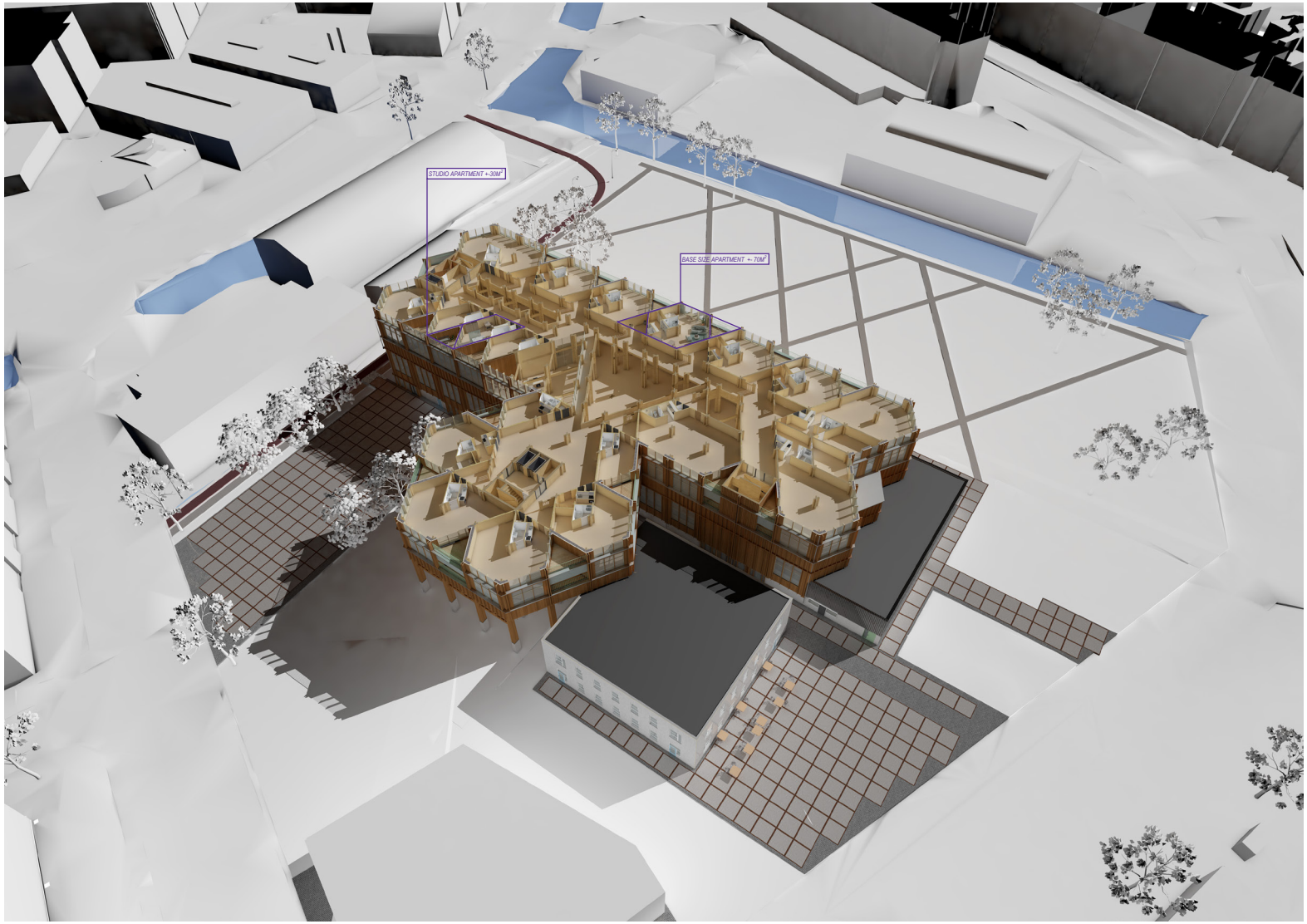
Second floor plan



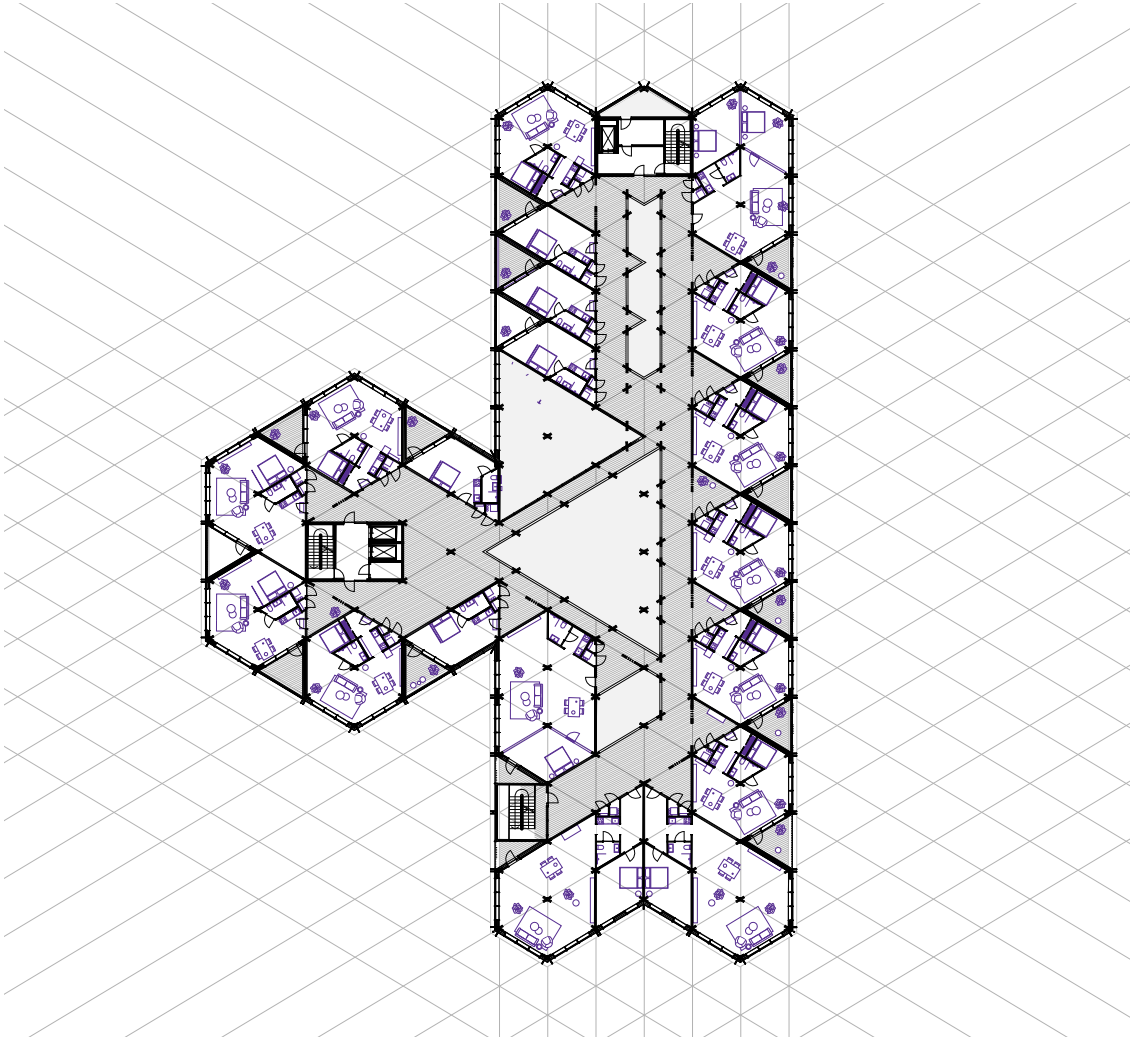
Common space



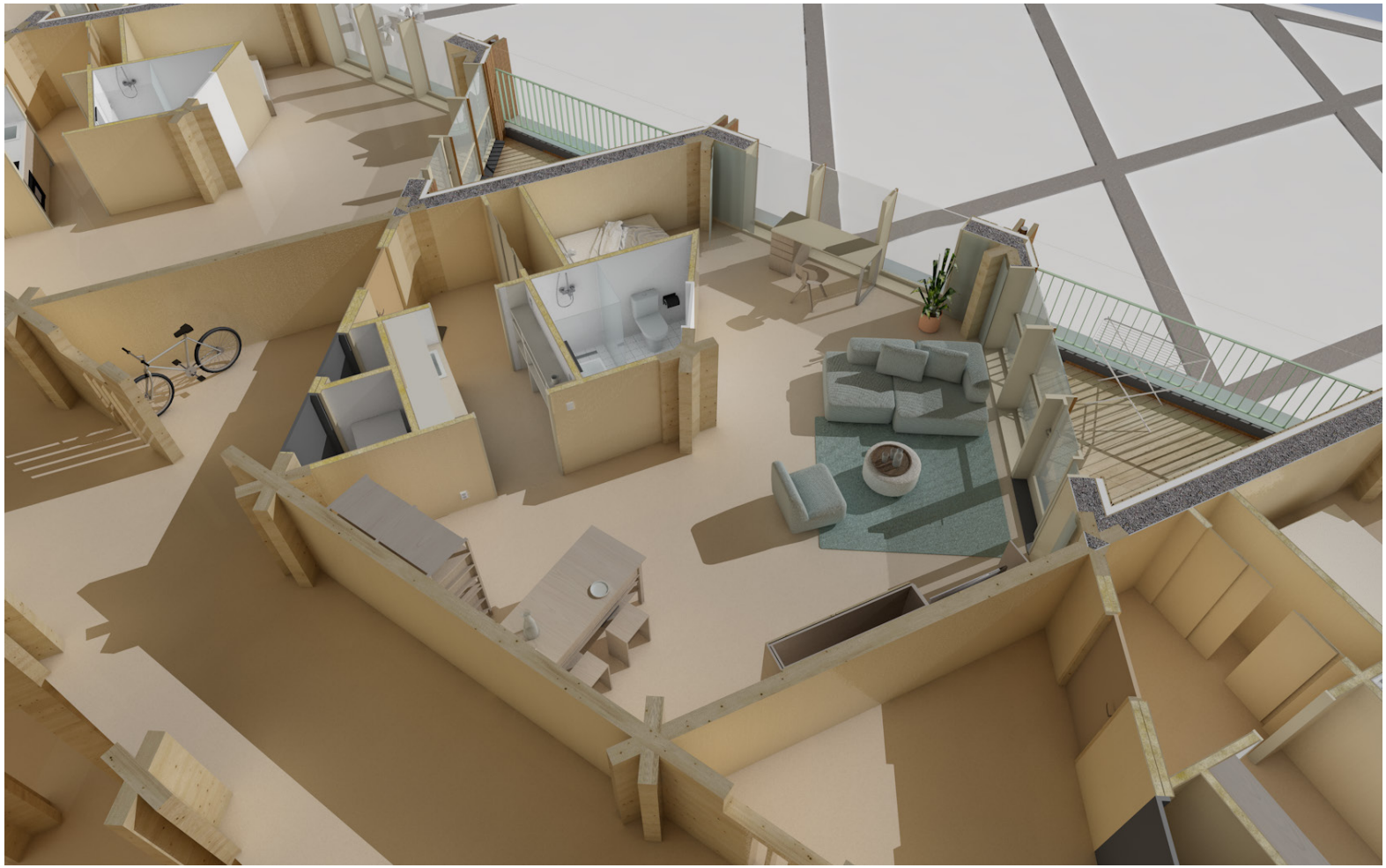
Third floor



Third floor plan



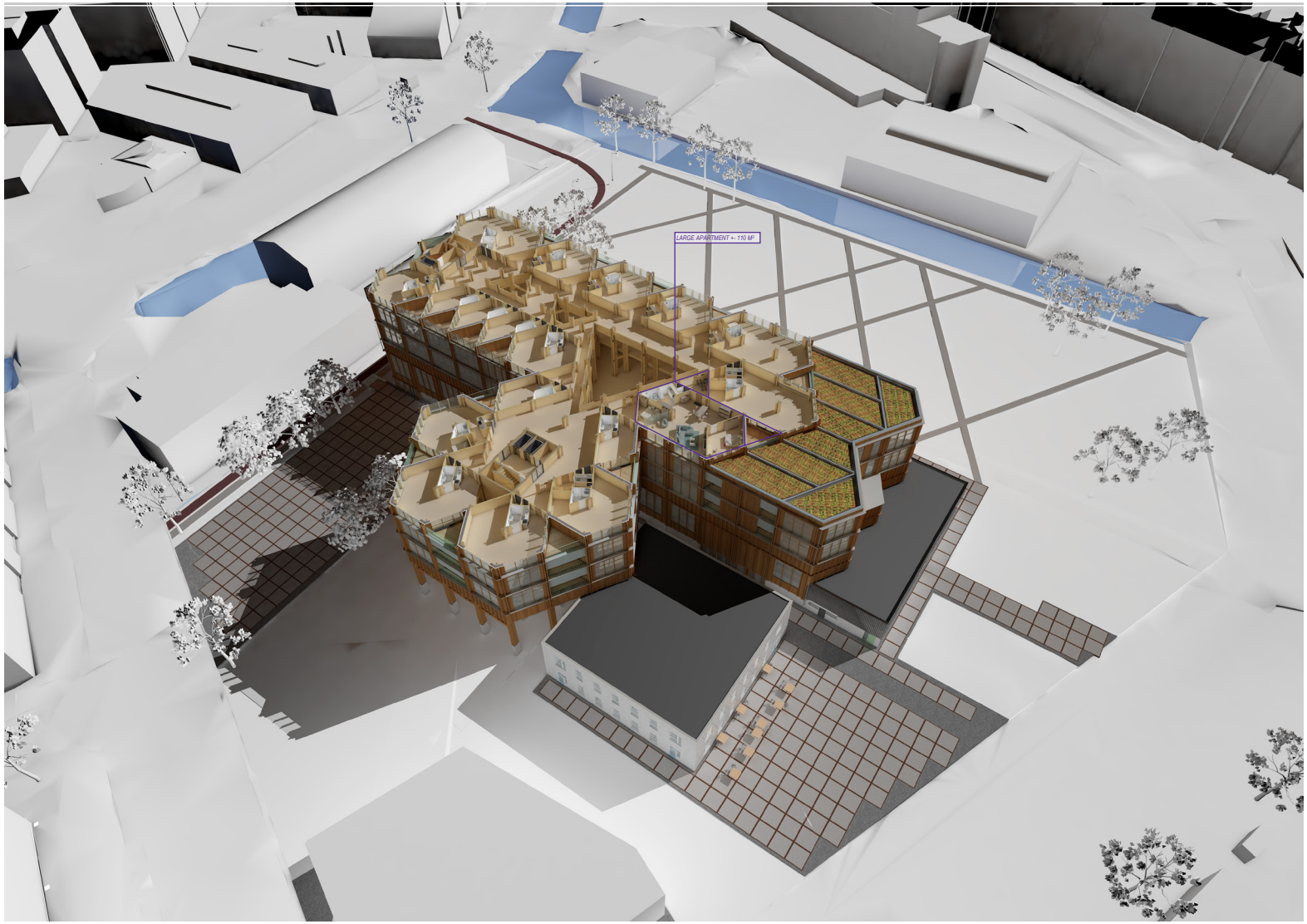
Average apartment



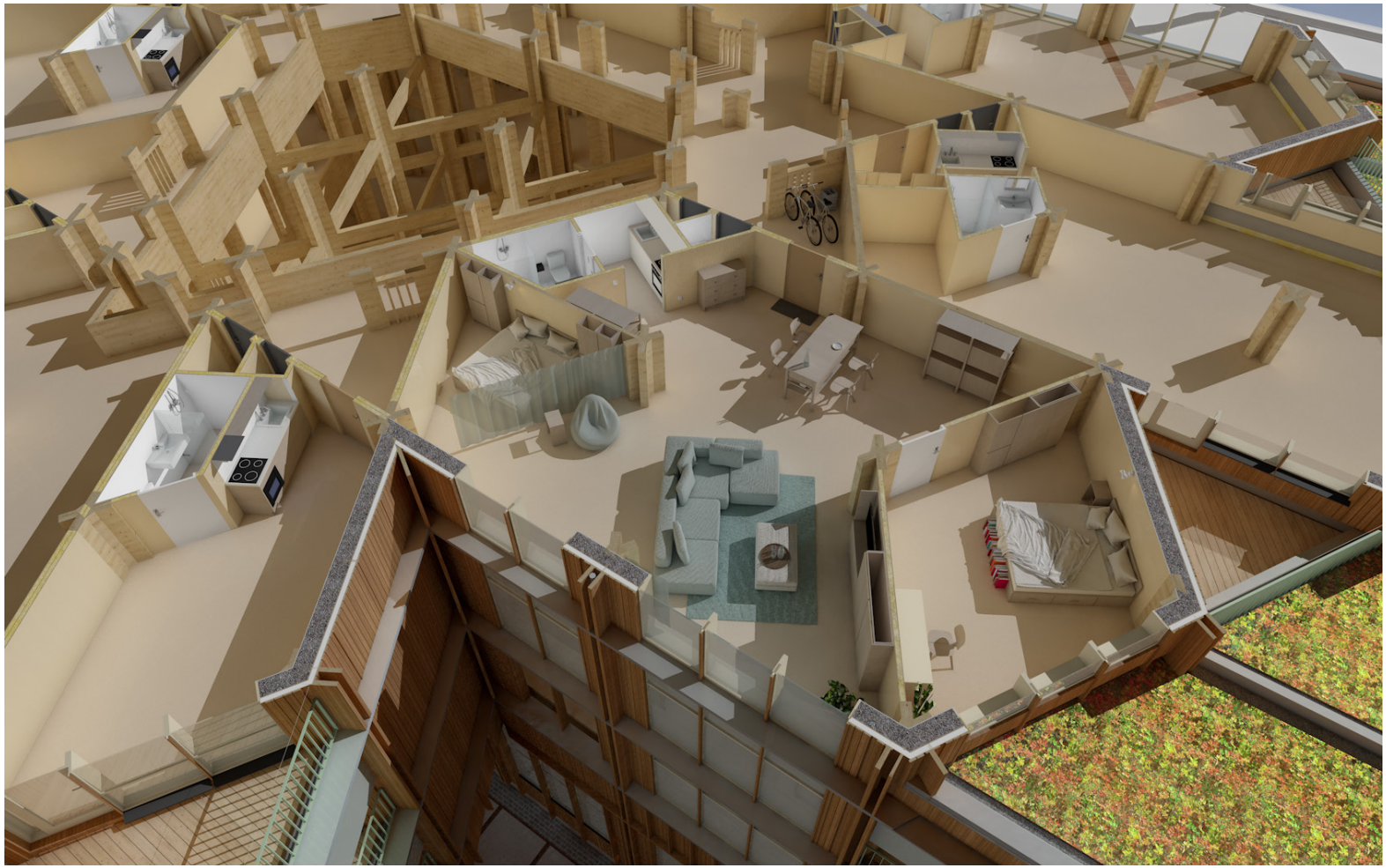
Average apartment

Studio Apartment

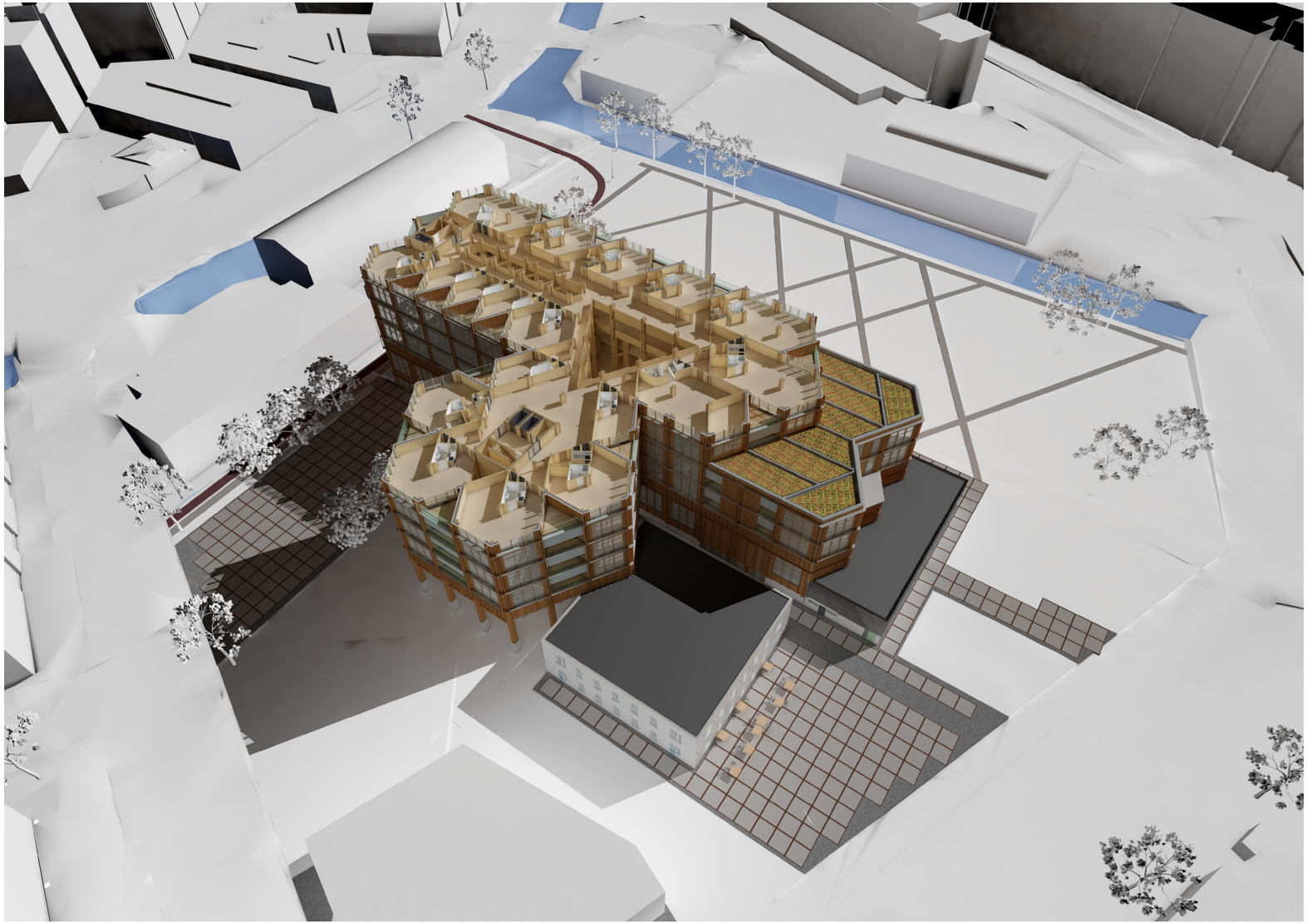
Fourth floor



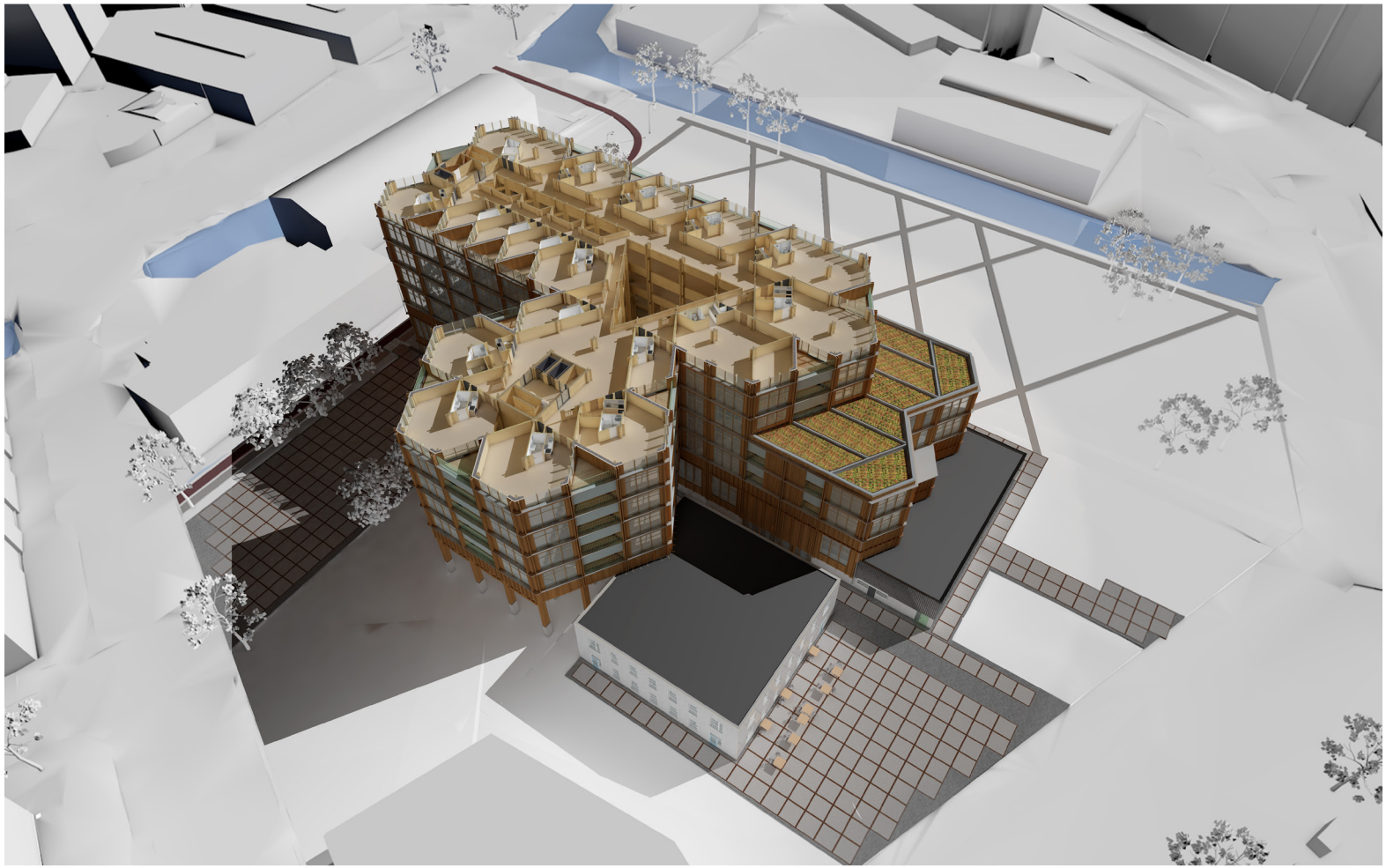
Large apartment



Fifth floor

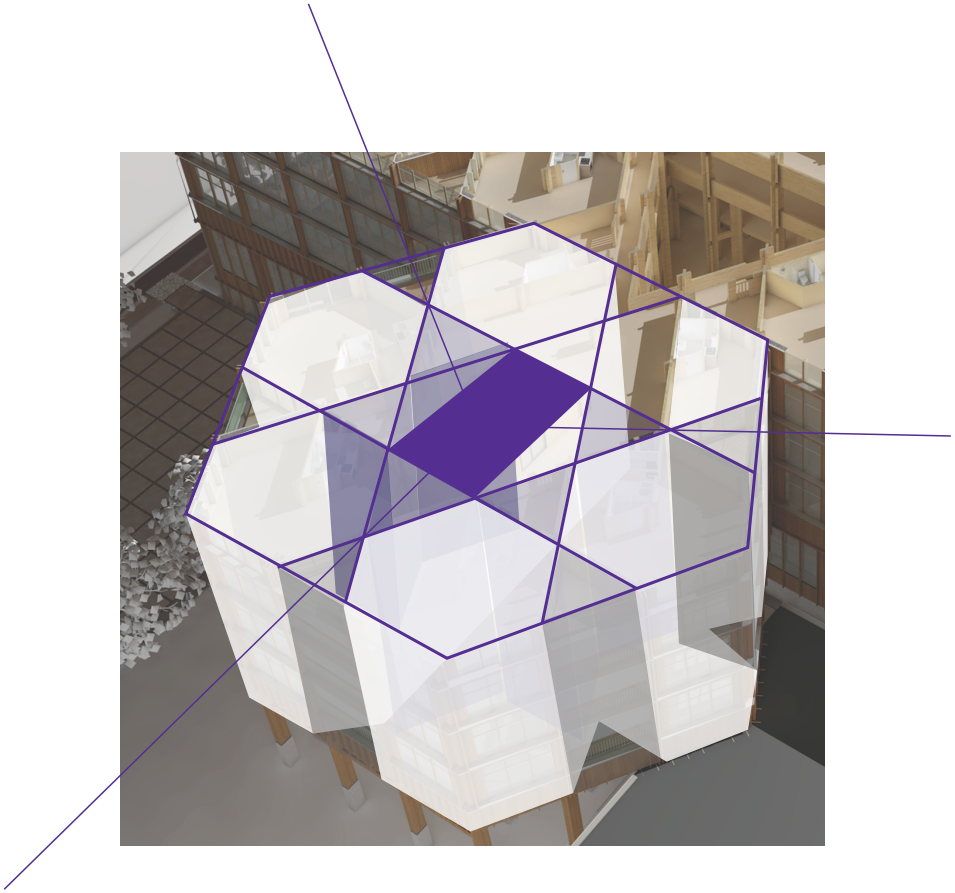


Sixth floor

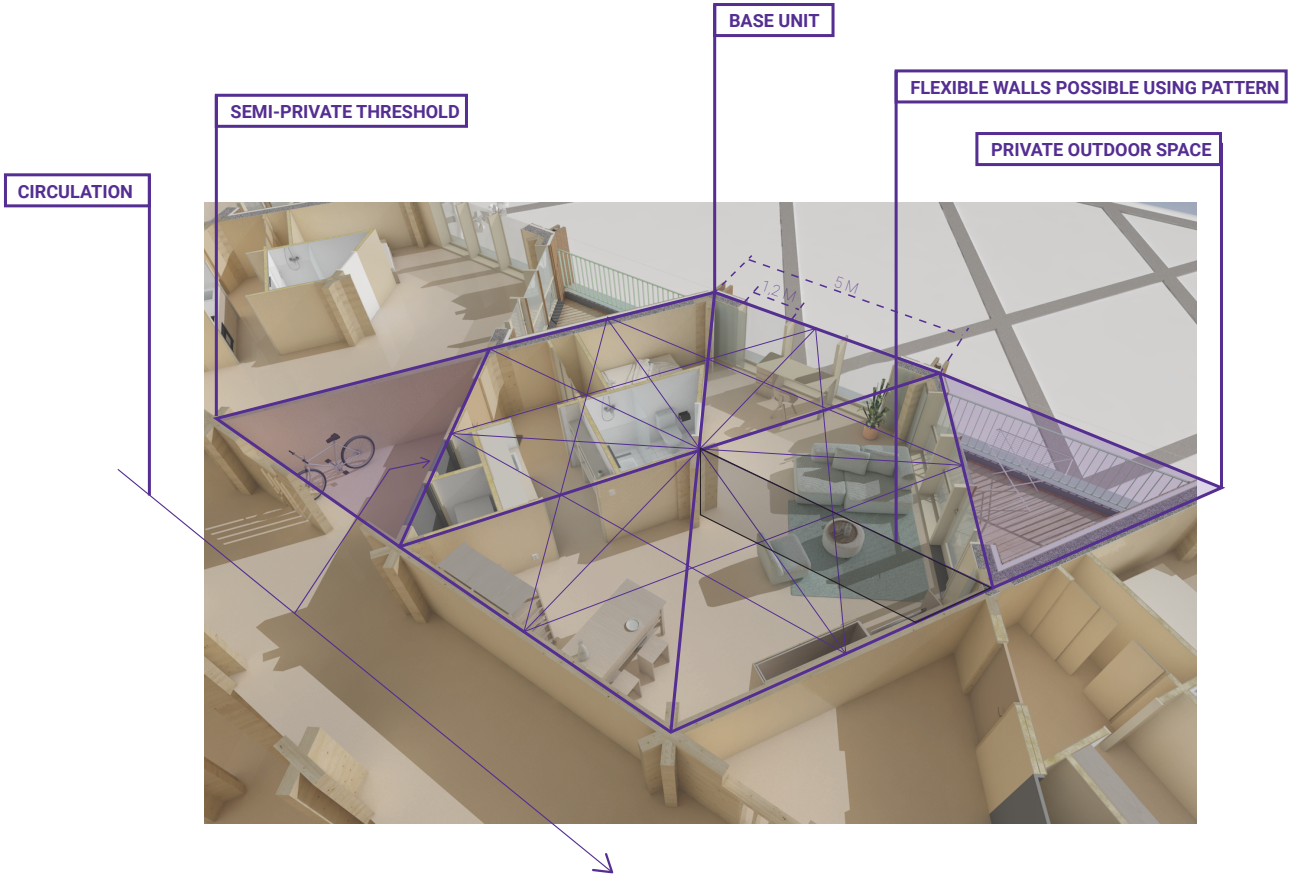


Pattern in Detail

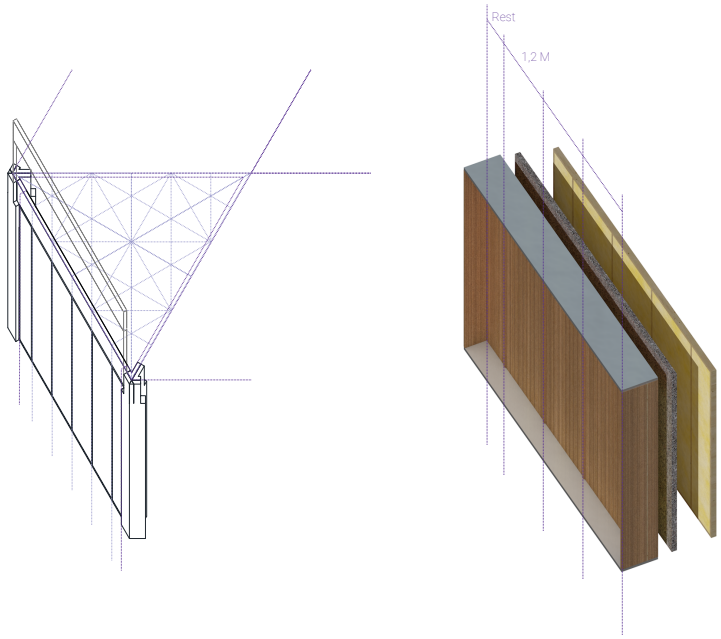
Block



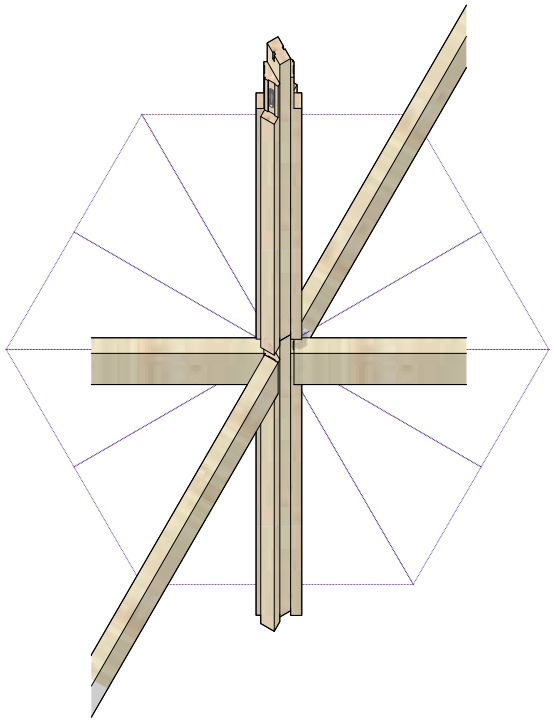
Unit


BASE UNIT
FLEXIBLE WALLS POSSIBLE USING PATTERN
PRIVATE OUTDOOR SPACE
SEMI-PRIVATE THRESHOLD
CIRCULATION
5M
1.2M

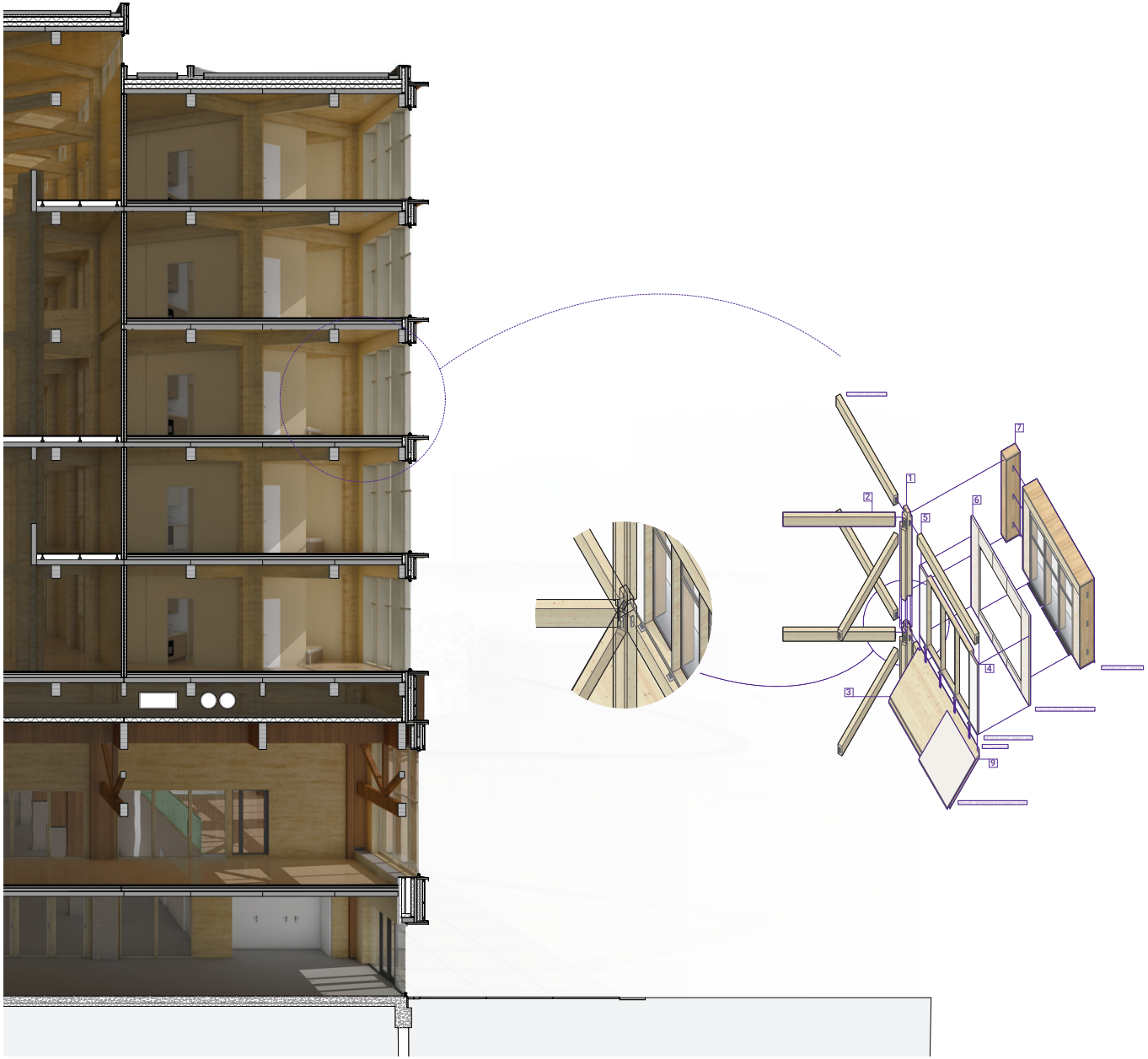
Element



Detail

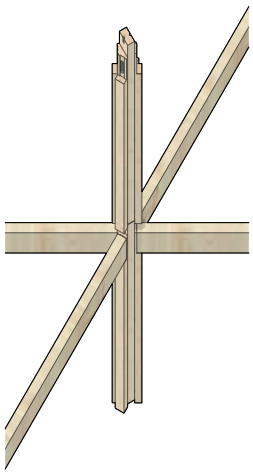


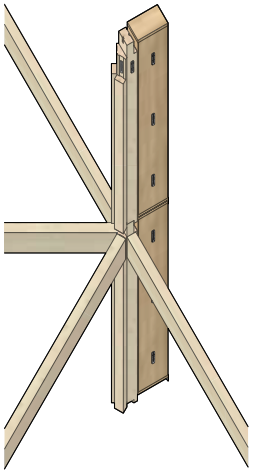
Façade construction

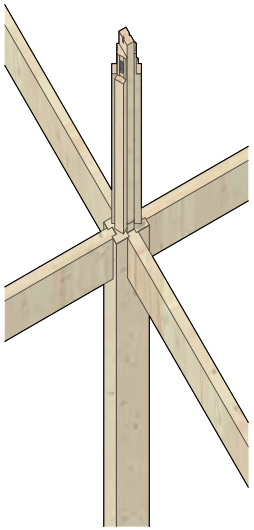


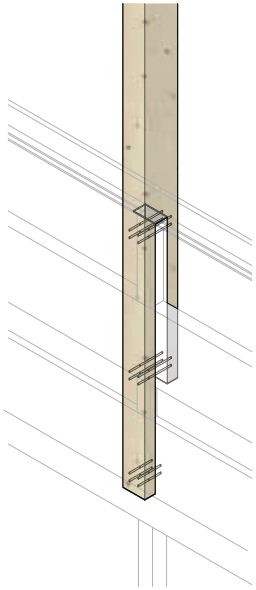
Façade

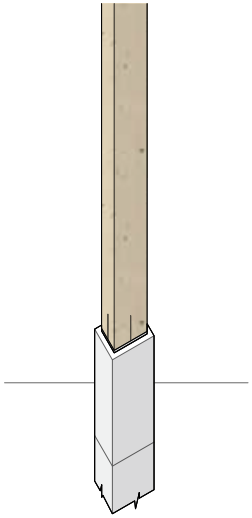
Joints

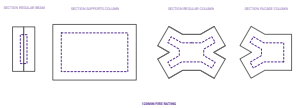






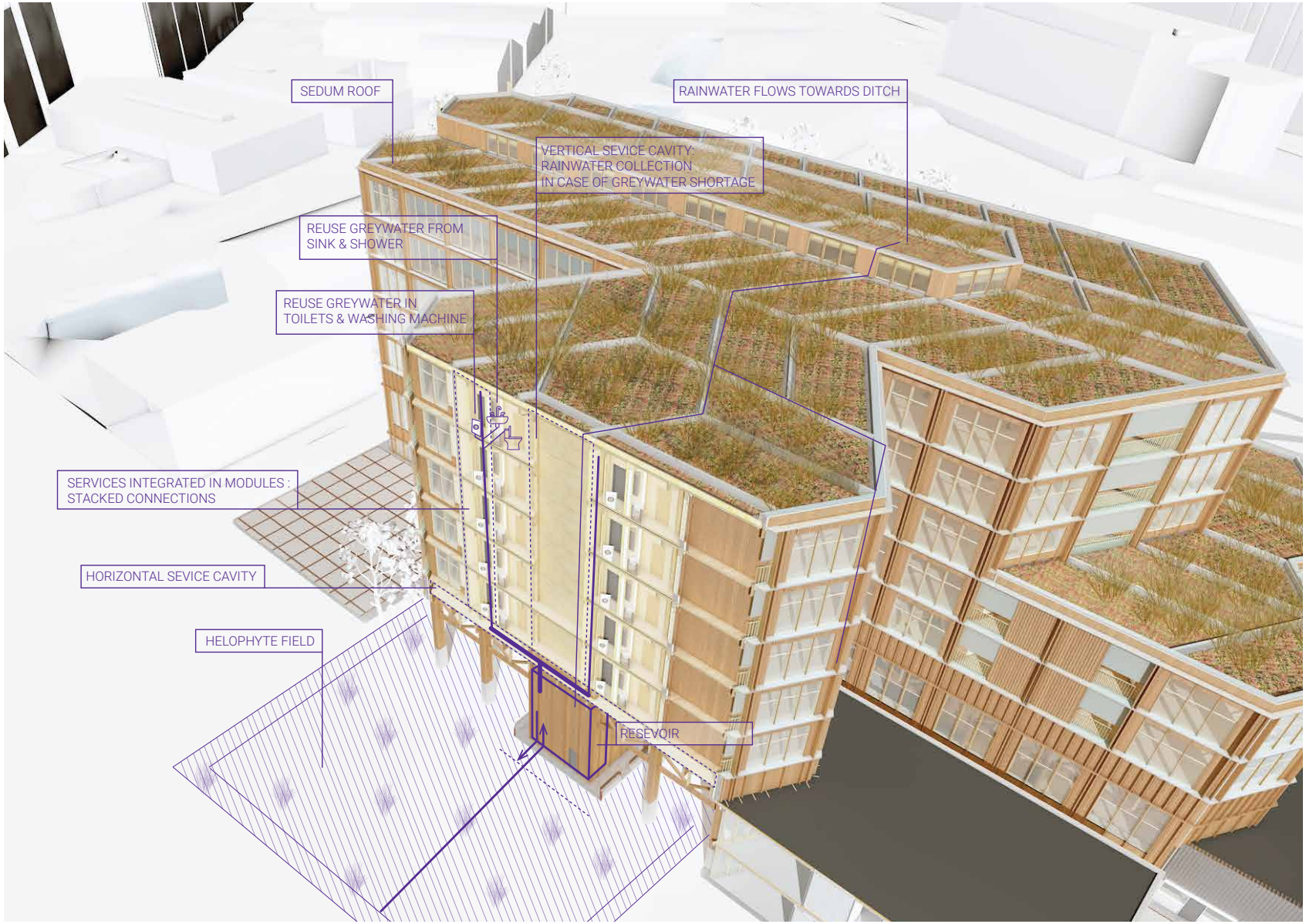






Transverse section

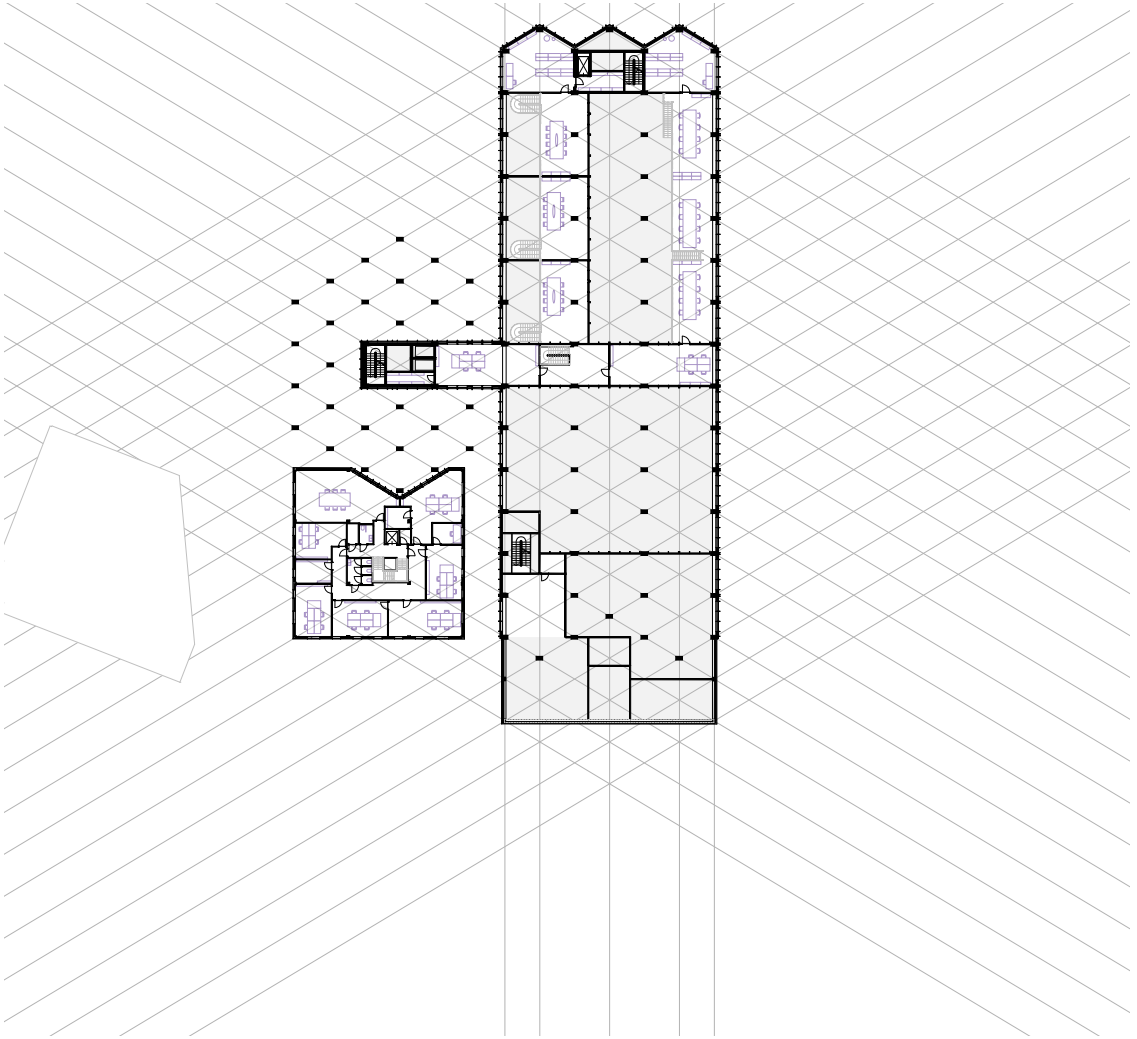
Building services



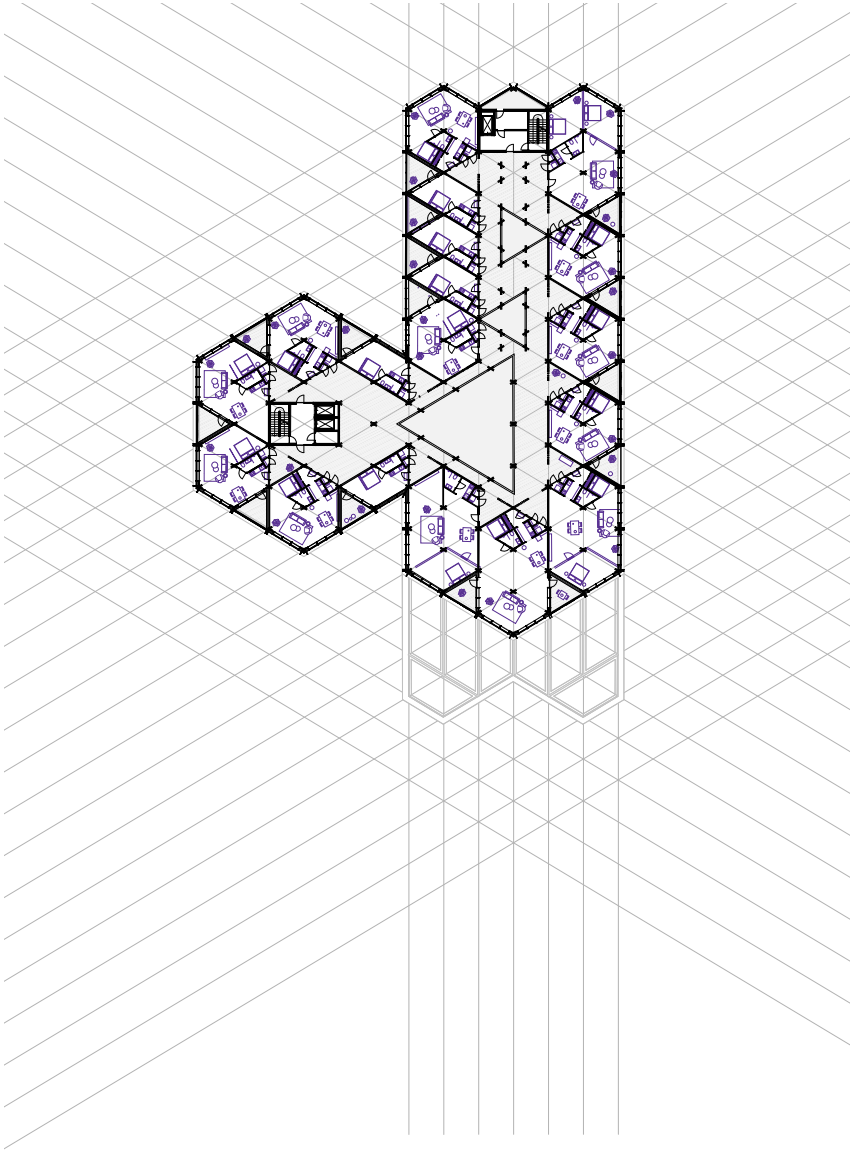

Thank you.

Ground floor plan

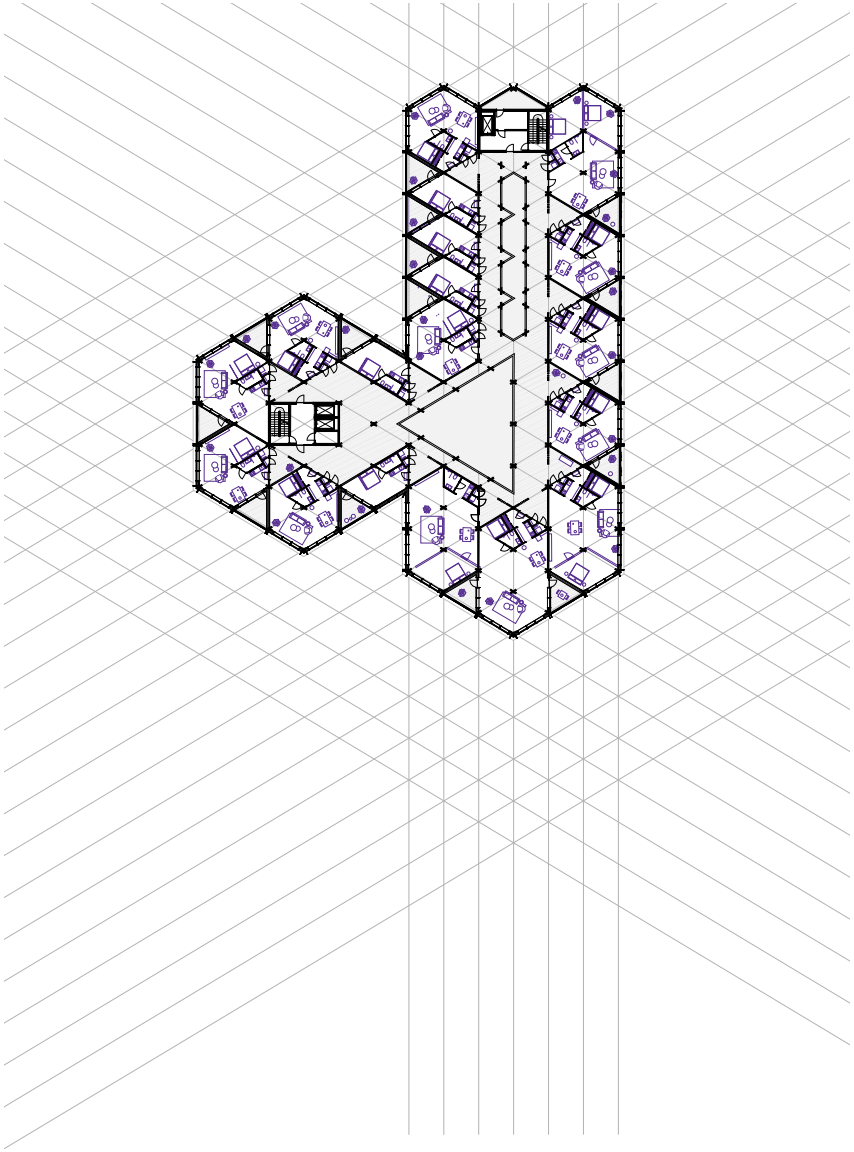
First floor plan



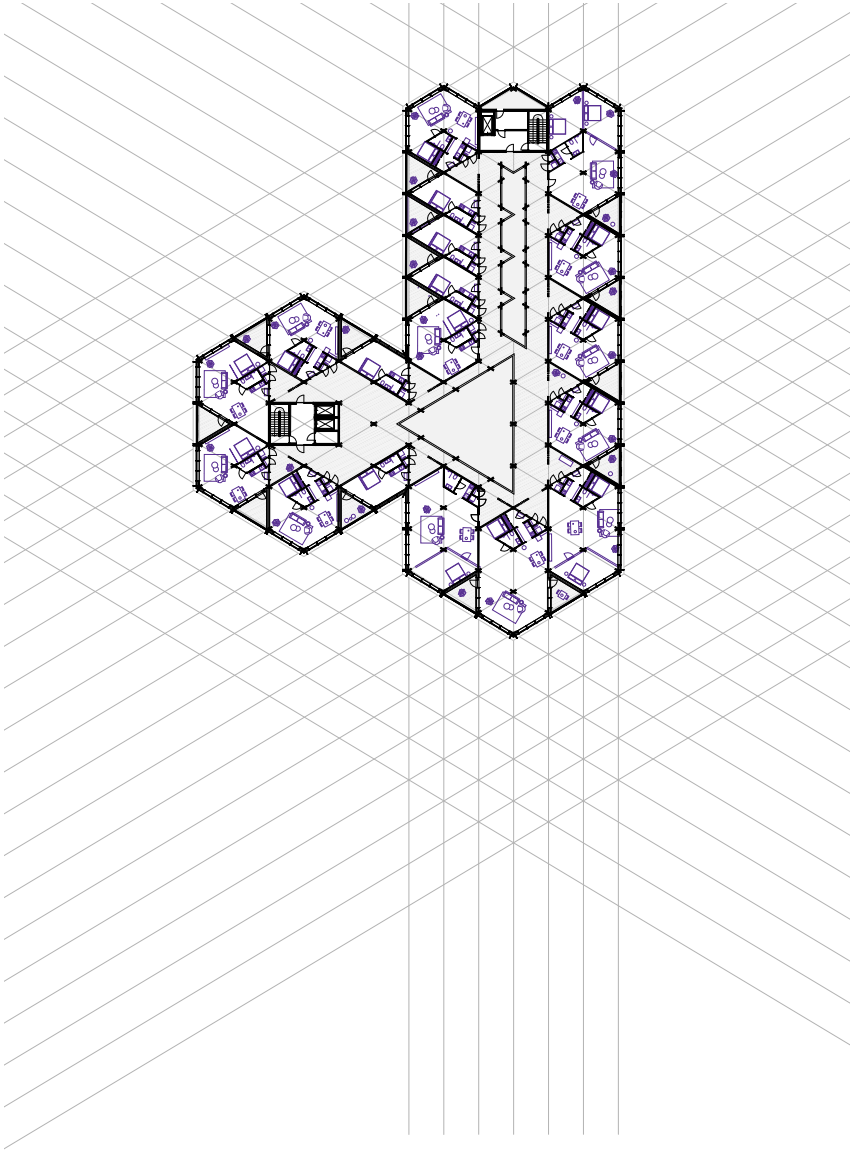
Fourth floor plan



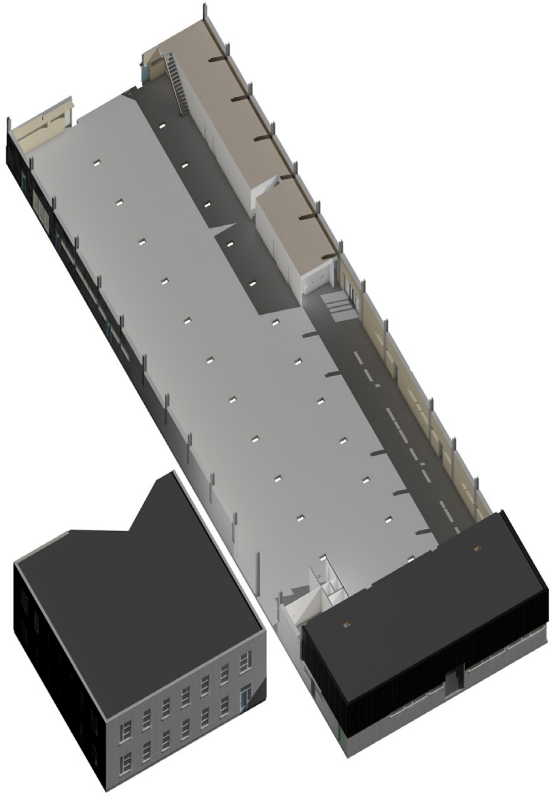
Fifth floor plan



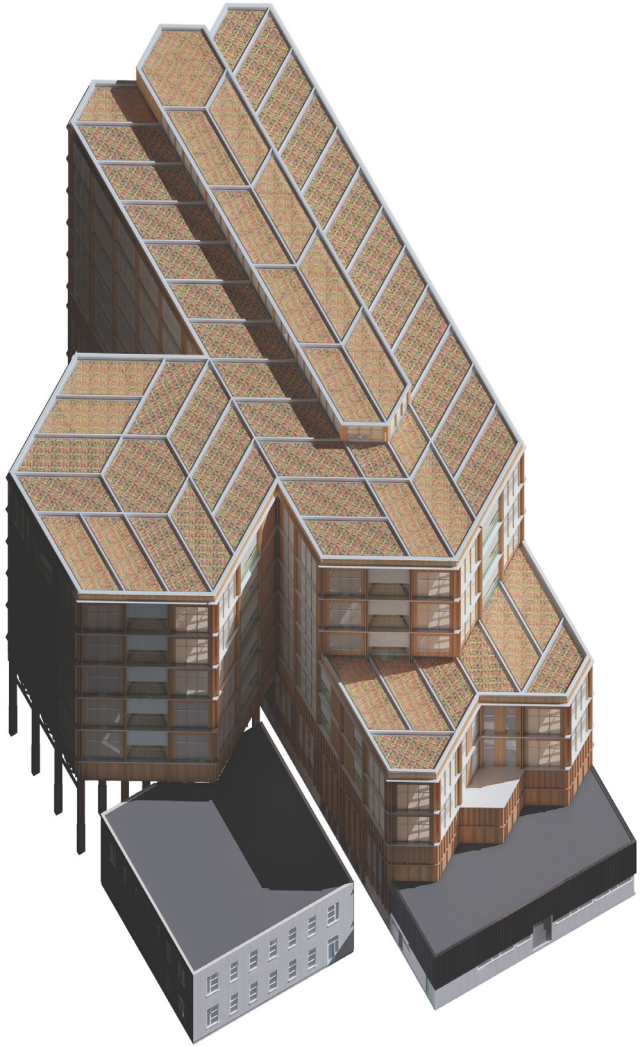
Sixth floor plan



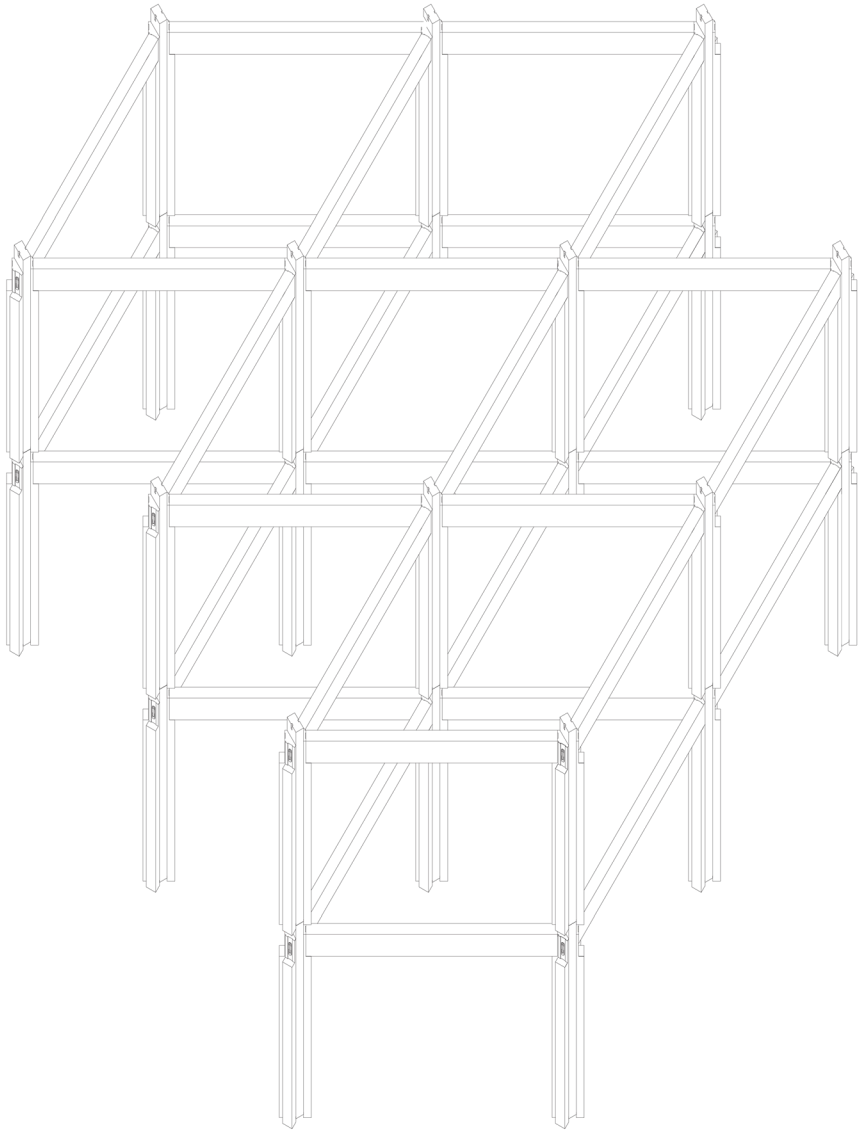
Existing building as foundation



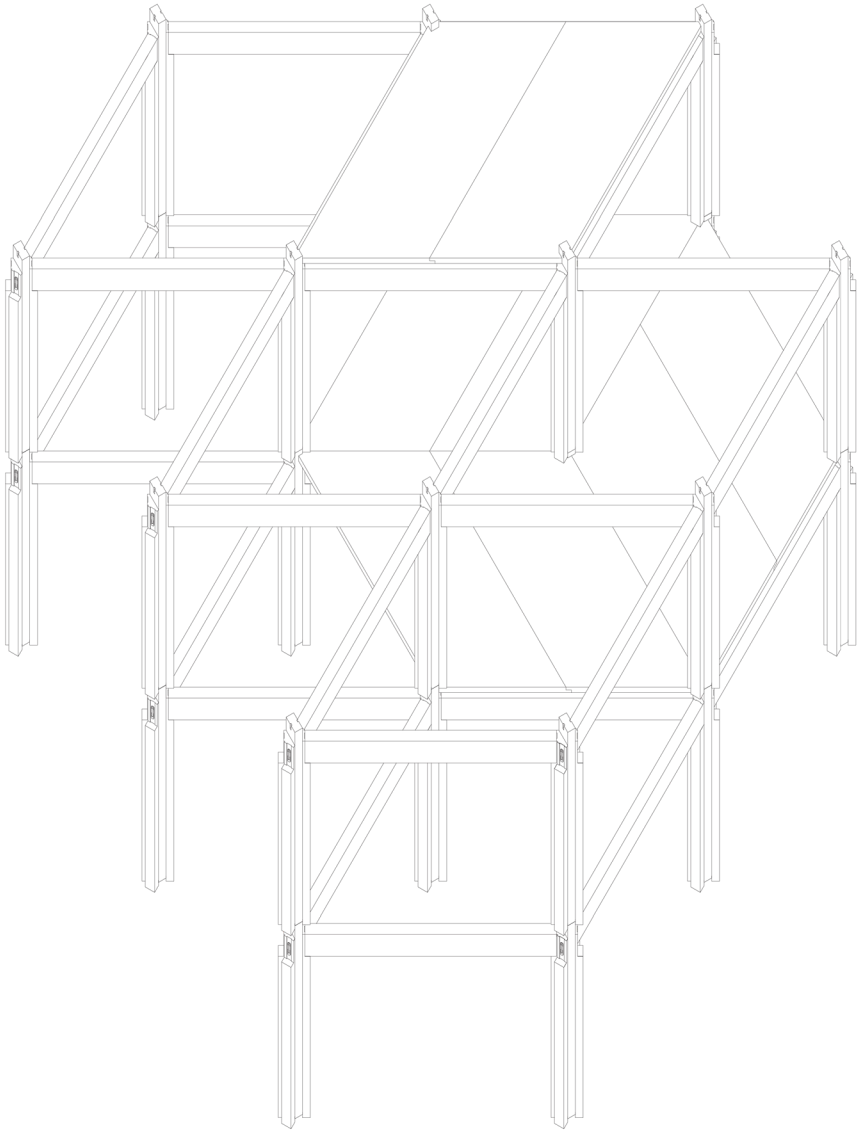
Exterior Modular skin



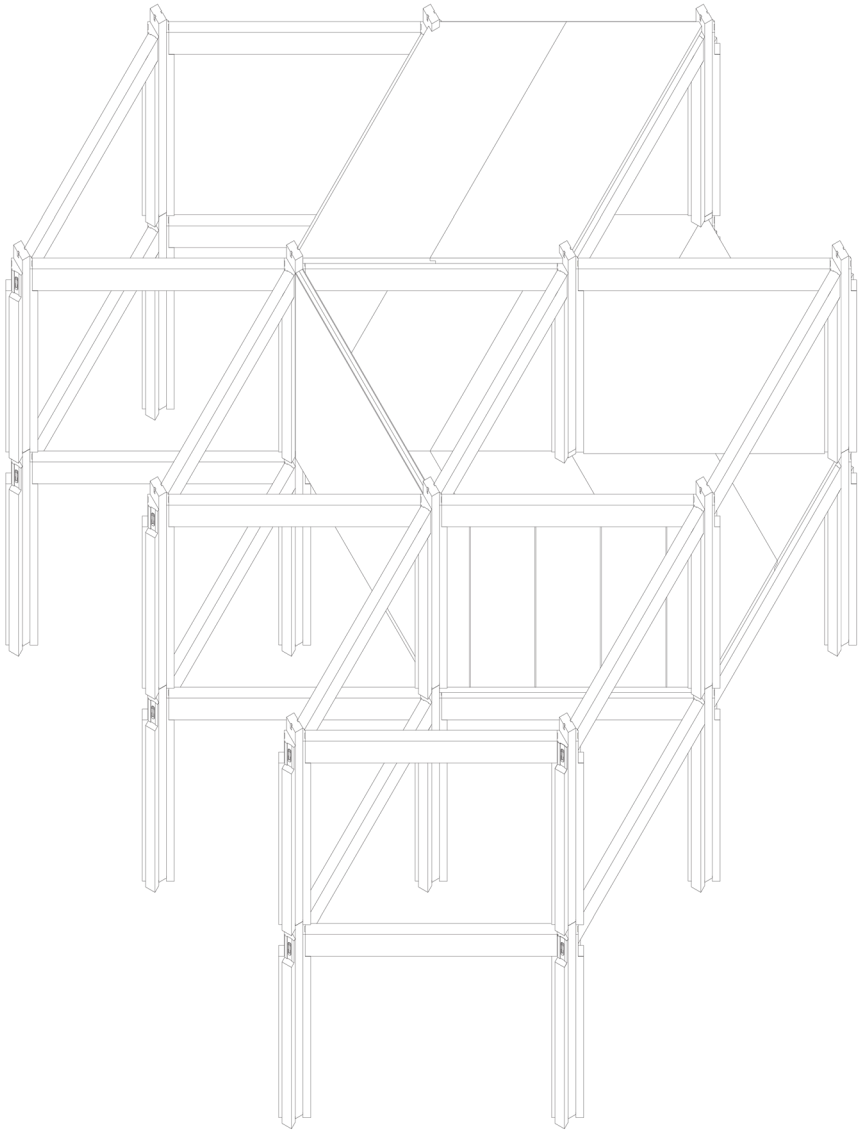
Frame and panel system



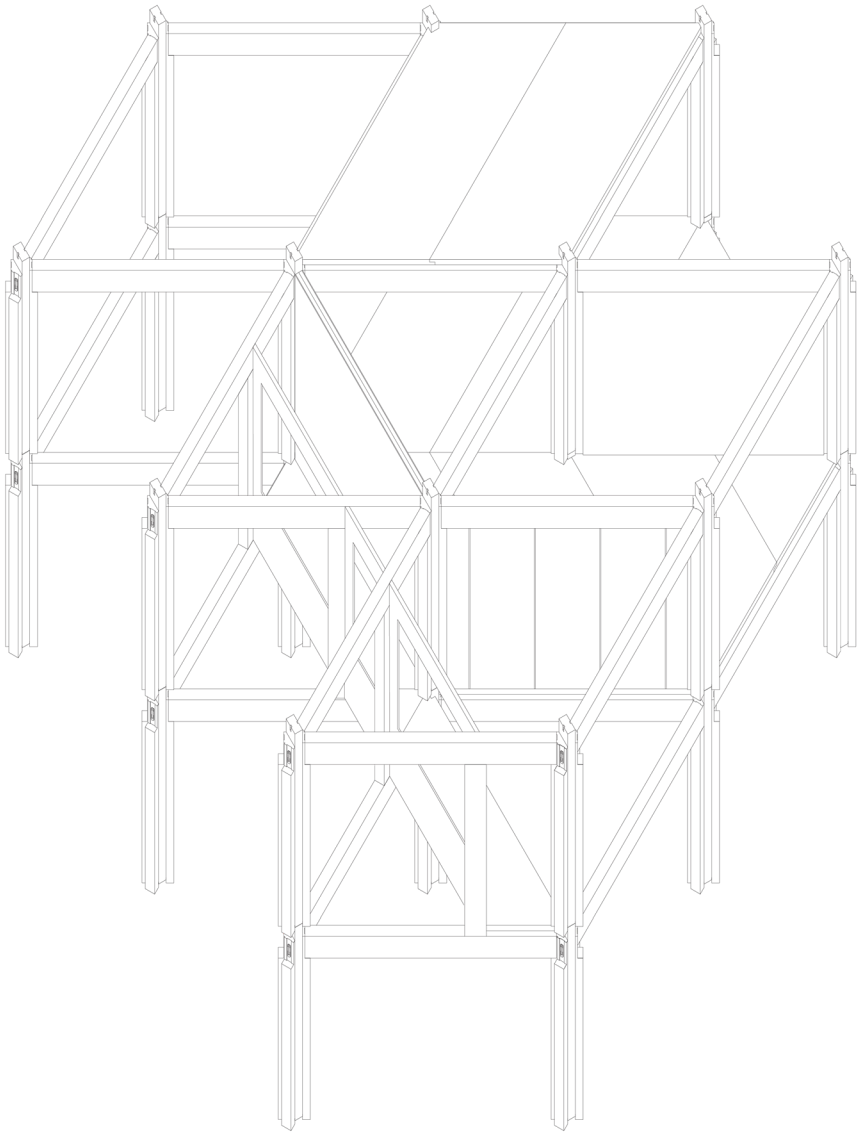
Frame and panel system



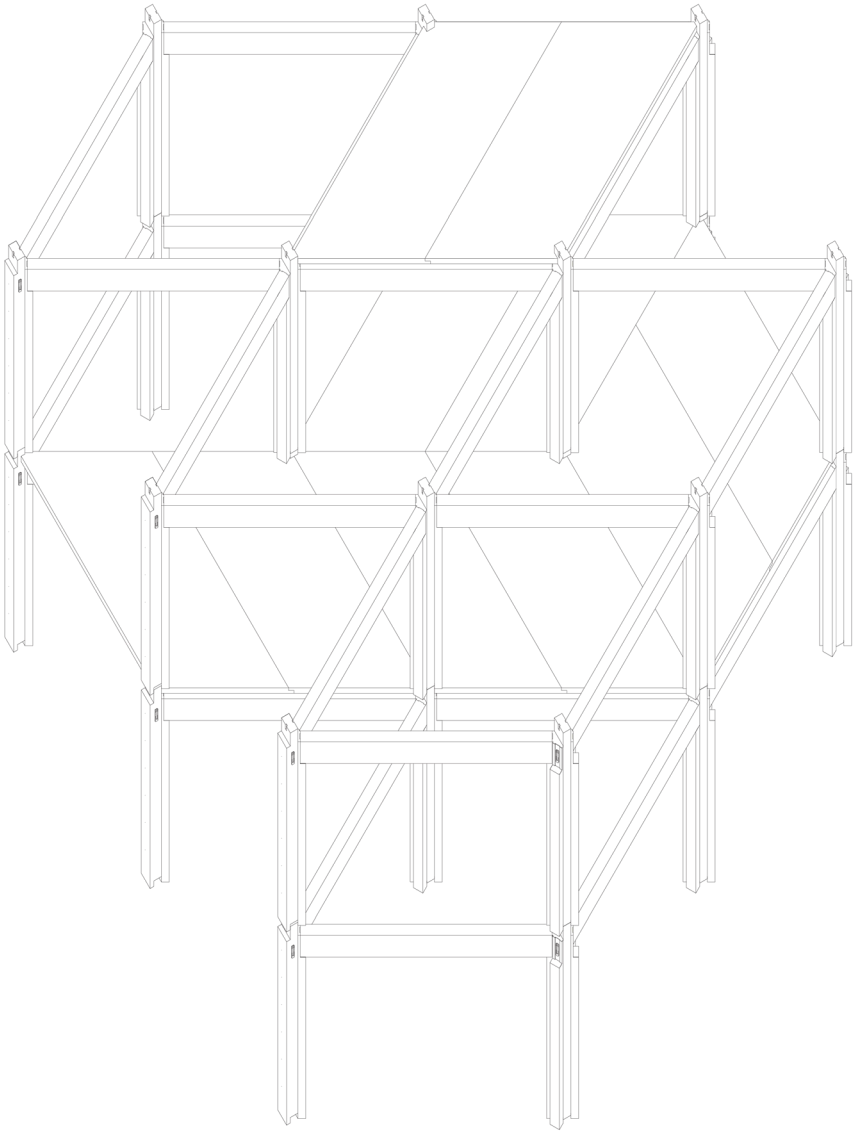
Frame and panel system



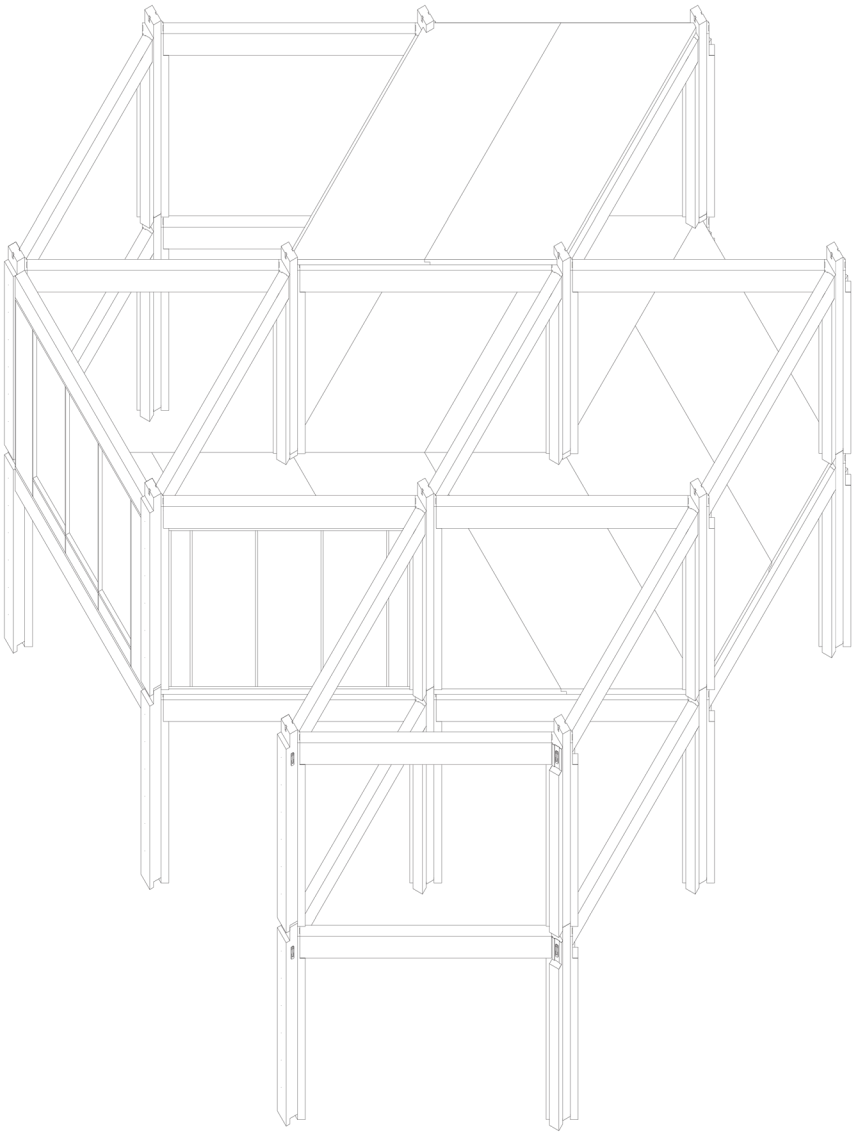
Frame and panel system



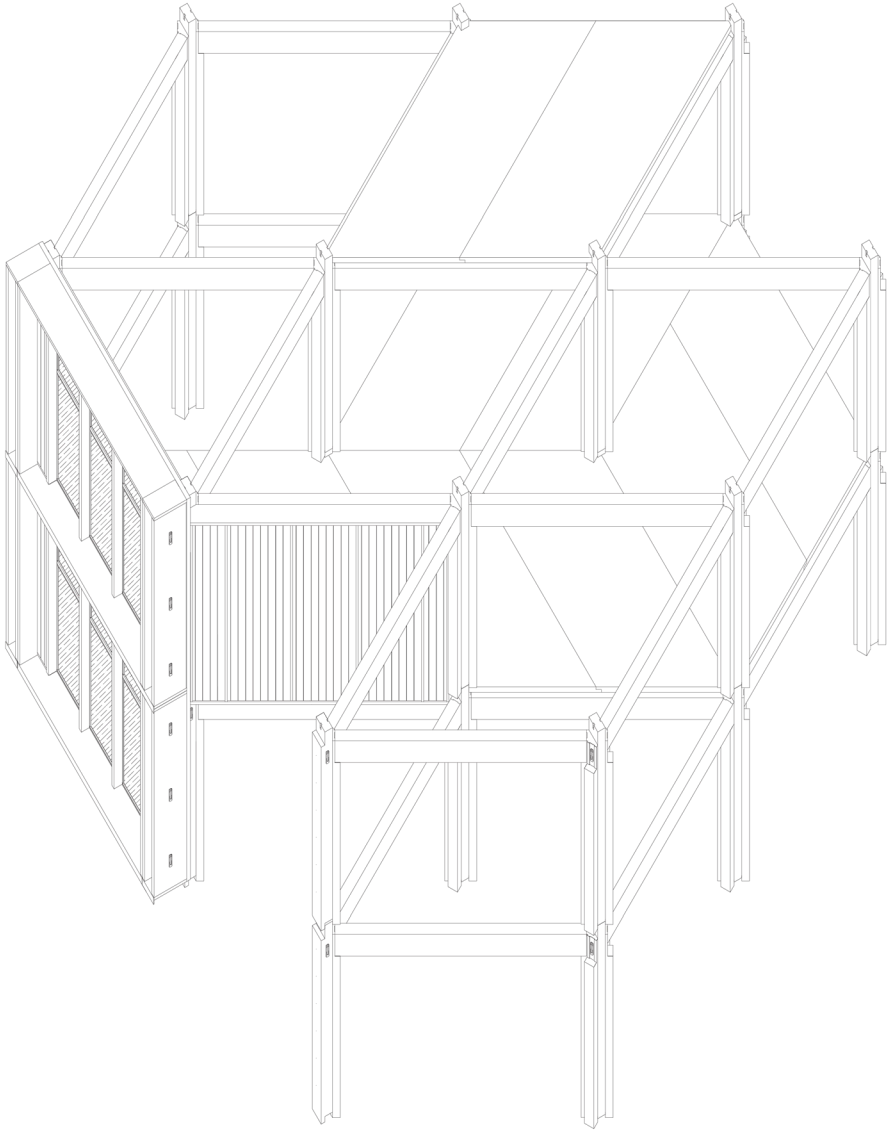
Frame and panel system



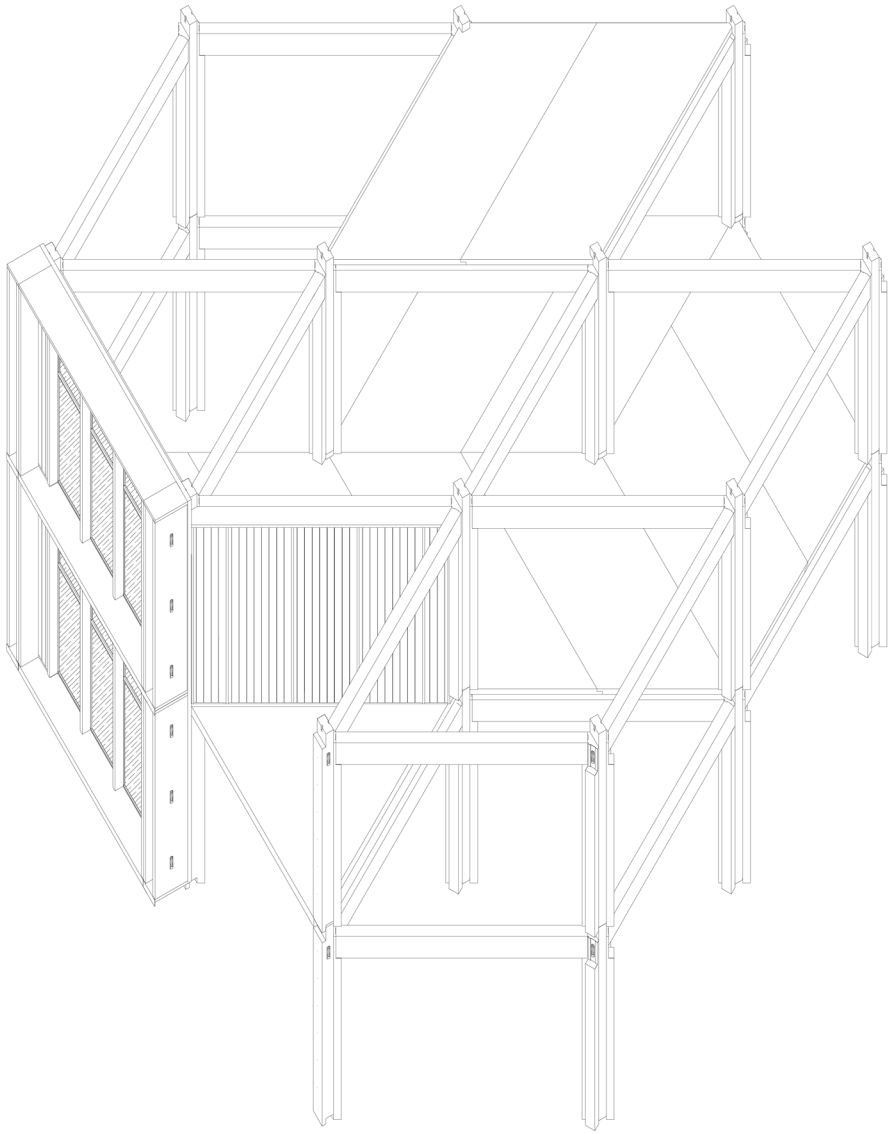
Frame and panel system



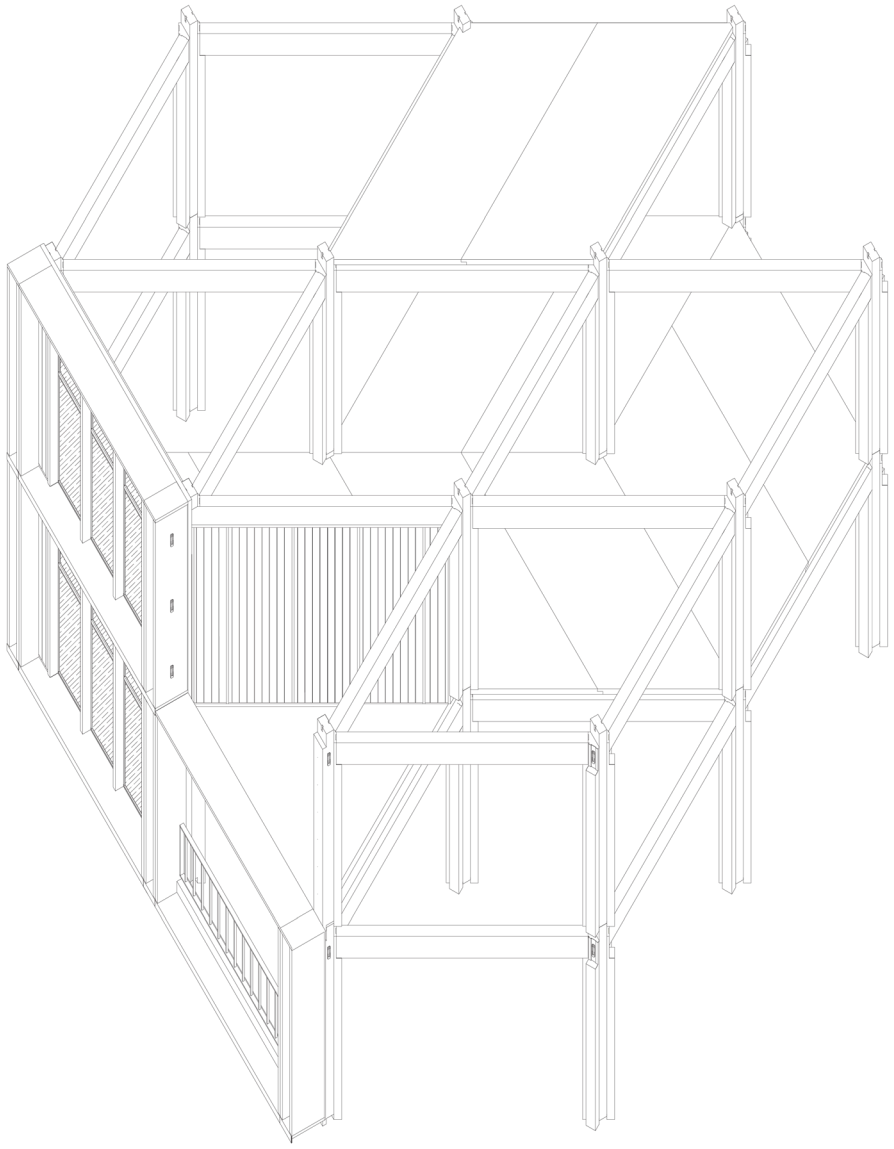
Frame and panel system



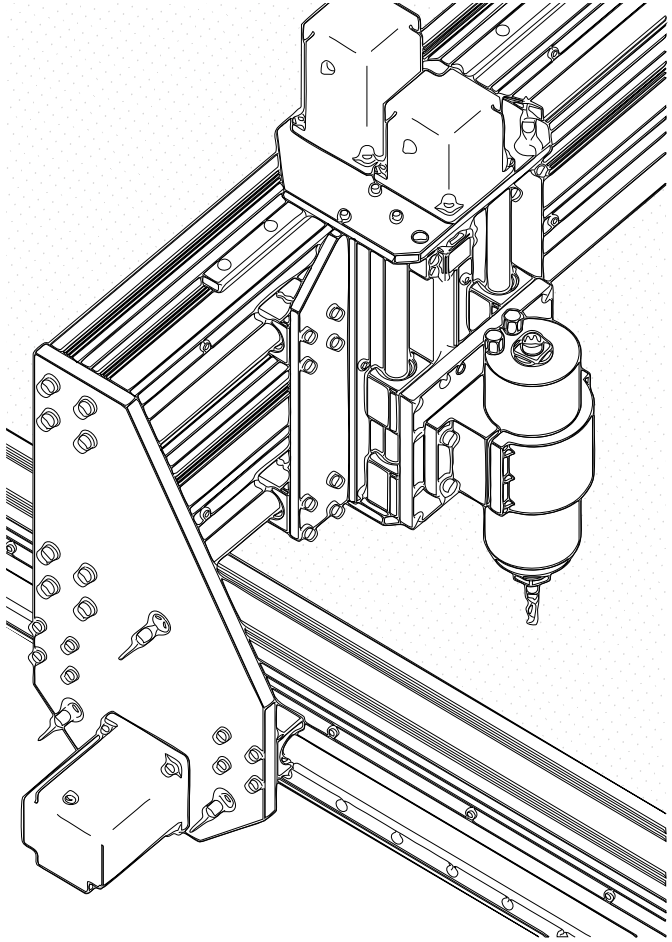
Frame and panel system



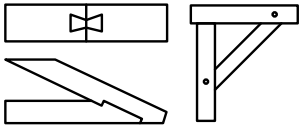
Frame and panel system



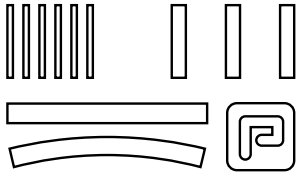
Prefabrication



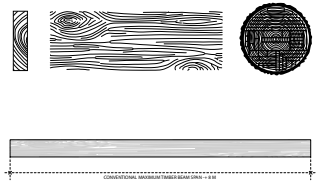
PONTEC assemblyline style bridge;
Element constraints
Travel length max.12.8 m
Panel width 3000 mm
Panel thickness 50 - 400 mm
8 positions for tools&aggregates possible
Basic spiral tool ø 16 mm
Basic saw unit ø 250 mm
Basic stapler unit staple length 26 - 65 mm

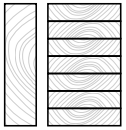


JOINERY TRADITIONS



LANGUAGE





TRADITIONAL AND ENGINEERED SECTIONS