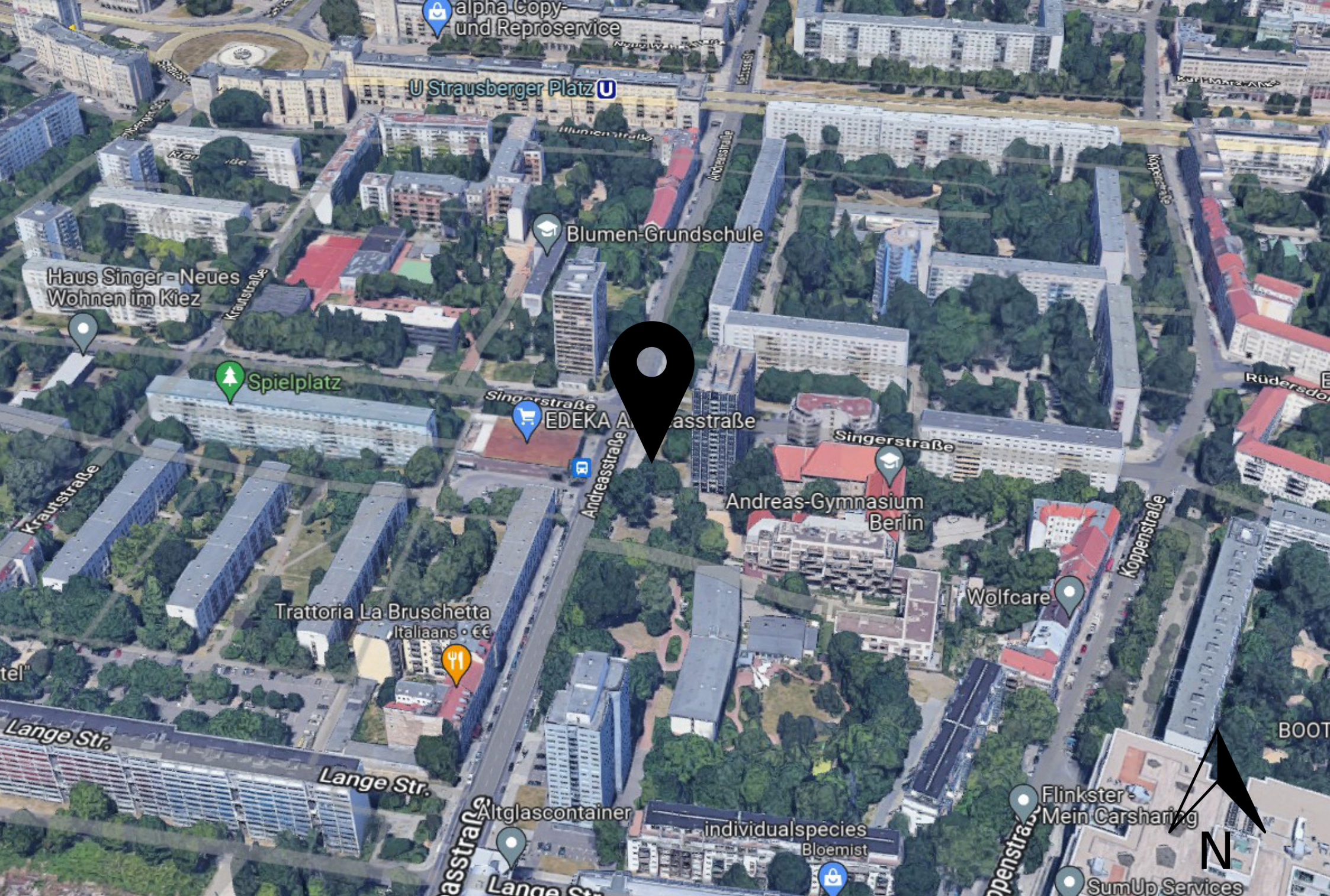


An architectural rendering of a large, multi-level indoor green space. The space is characterized by a curved walkway with a metal railing, overlooking a lush, green landscape. The landscape includes various plants, trees, and a central circular garden bed. The building's interior features large, arched windows and a high ceiling with circular skylights. The overall atmosphere is bright and airy, with a focus on integrating nature into the built environment.

Landscape inside

The indoor green condenser



Andreasviertel, Berlin



Original DDR plan

Public Green Condenser | P5 Finals | 03/11/2023 | Tjalling Schippers

Privatization problem

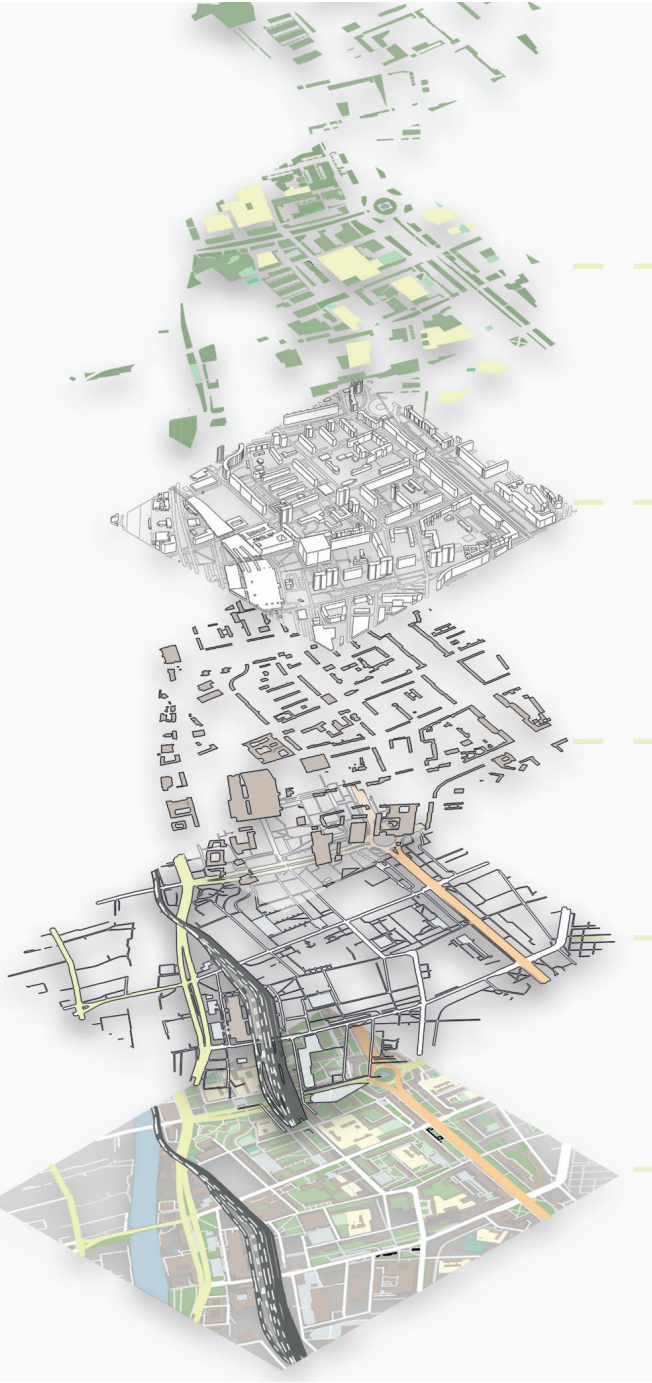


Greenspace claimed by (social) housing corporations



Greenspace sacrificed for building new homes

Available greenspace in Andreasviertel



— Greenspace total
x 54964 m²
x 5,7% of landuse

— Buildings
x Average height 18m
x Plattenbau most common

— Settlement area
x 60,1% of landuse
x 0,6 km²

— Infrastructure

— Andreasviertel
x Surface 1 km²
x 978.638 m²



— Accessible public green
x 0,13% of landuse
x <0,1 m² per inhabitant

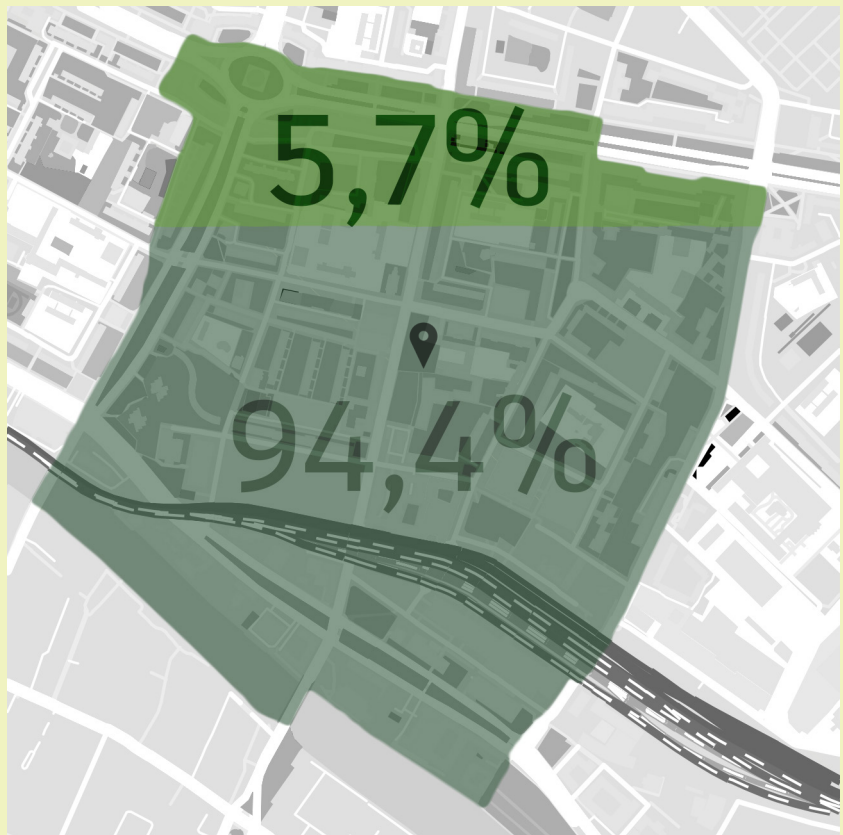
— Public green - total

— Private green

— Semi-private green

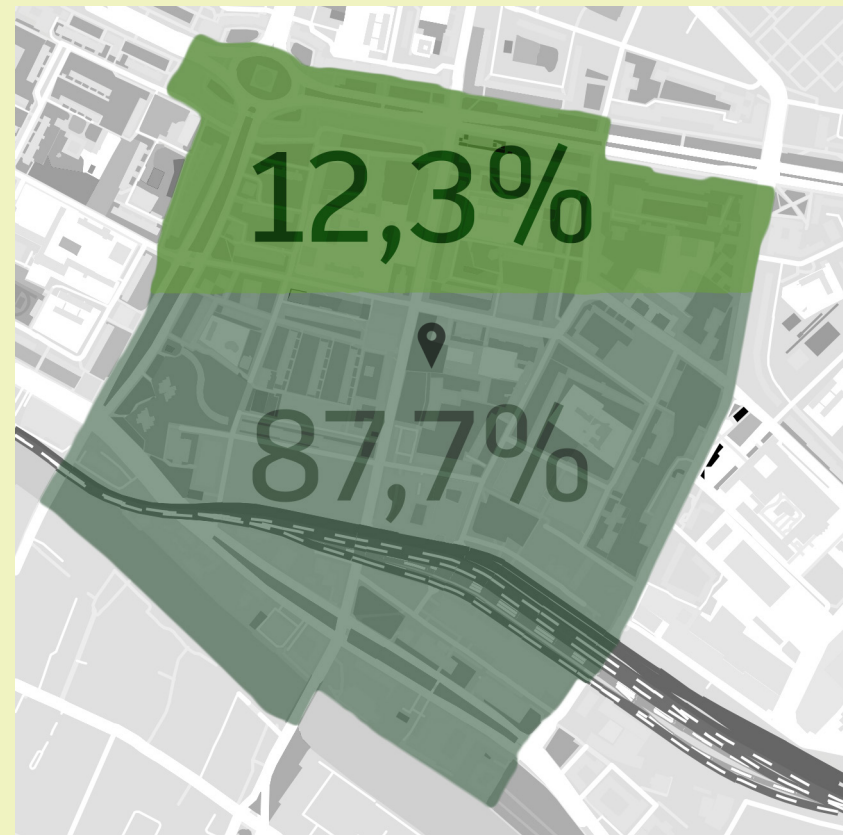
— Greenspace total
x 54964 m²
x 5,7% of landuse

How much extra green do we need?



Accessibility public green
Andreasviertel now

- x 13.406 inhabitants (2022)
- x 4,1 m² greenspace per inhabitant
- x 1.341 m² accessible public green
- x 5,7% of landuse is greenspace



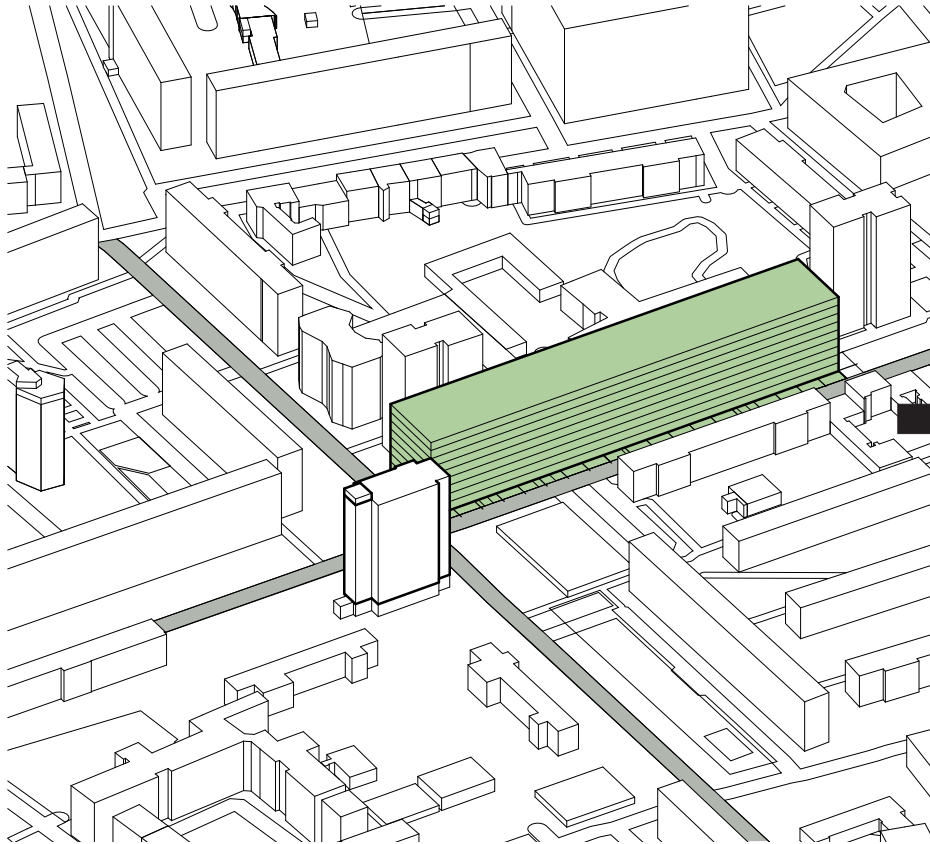
Accessibility public green
WHO Recommendation

- x 9 m² greenspace per inhabitant
- x 12,3% of landuse is greenspace
- x >65.690 m² greenspace lacking

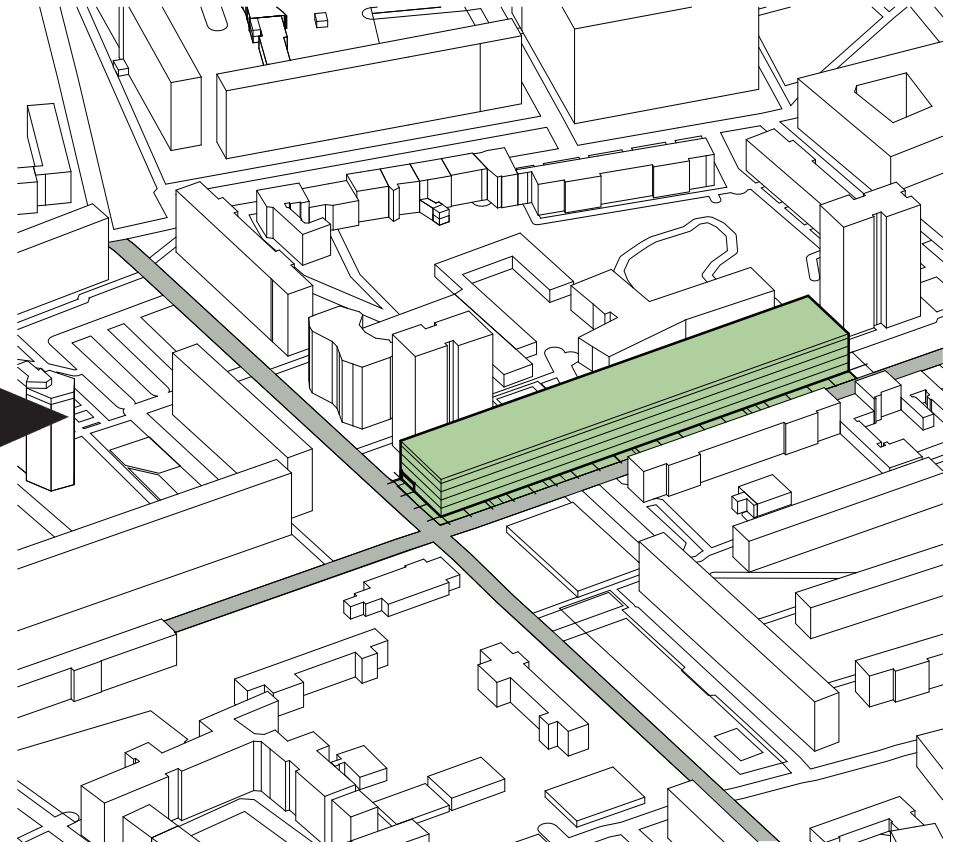


Site plan

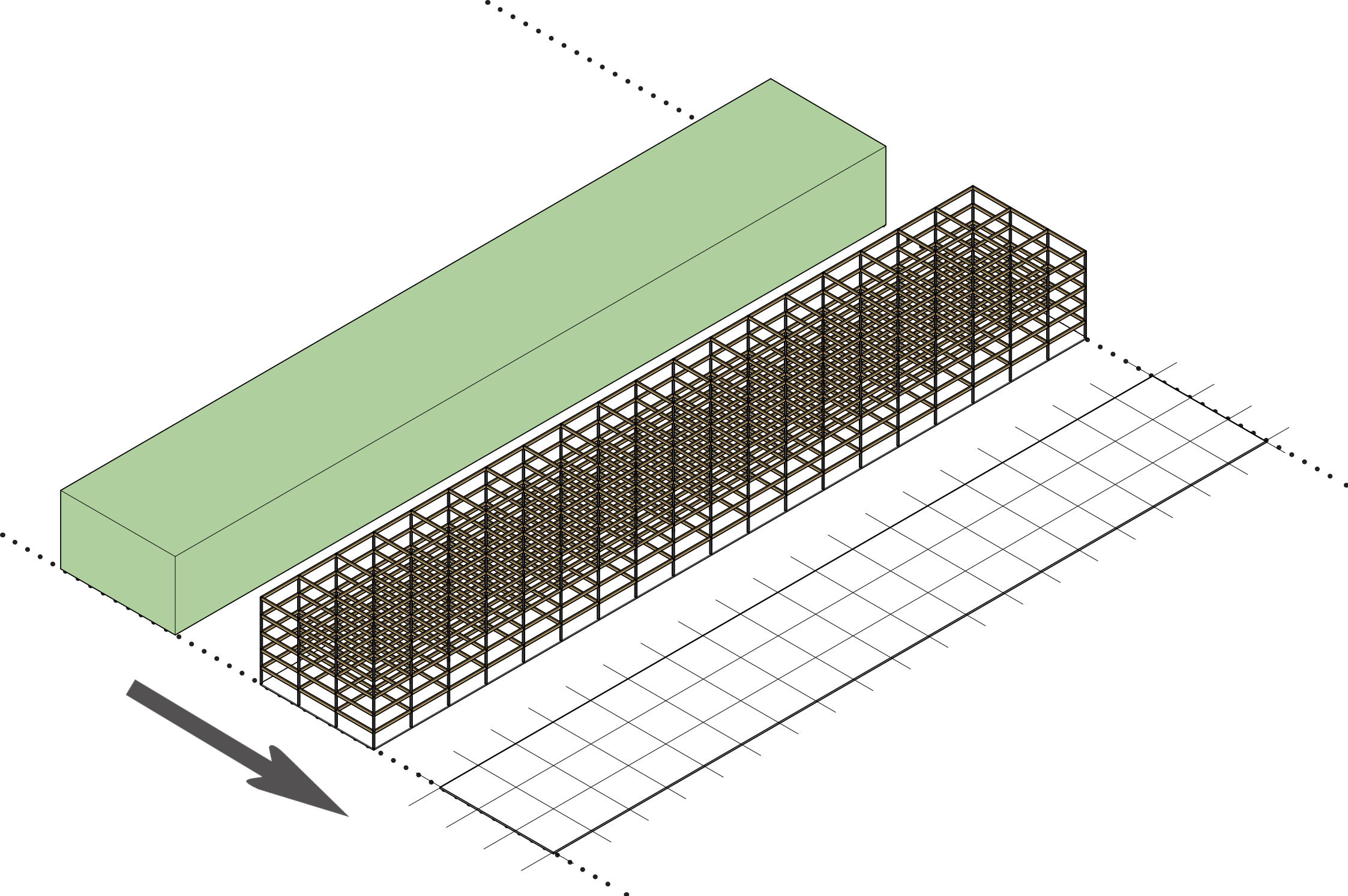
How to increase the public greenspace?



Required: 9 Layers of green - 65.000 m²



Condensed: 5 layers of green - 37.144 m²



Modular grid solutions

Indoor green references



Biodomes - Amazon head offices
Manhattan, New York City, USA



Green atrium - Hotel Jakarta
Amsterdam, Noord Holland, Netherlands

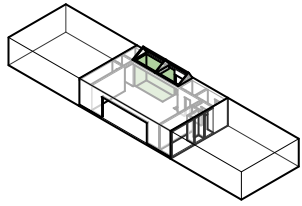


Semi-indoor green - Bosco verticale
Milano, Italy



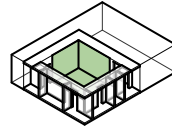
Floating green - Central park
Symphony of the seas

Indoor green type catalogue



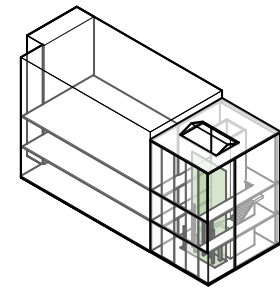
Green wall + skylight

1:200



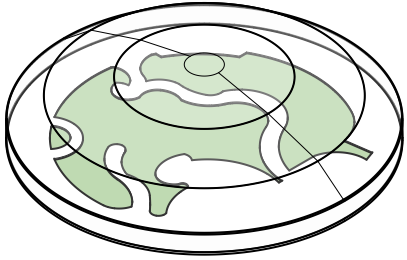
Patio

1:200



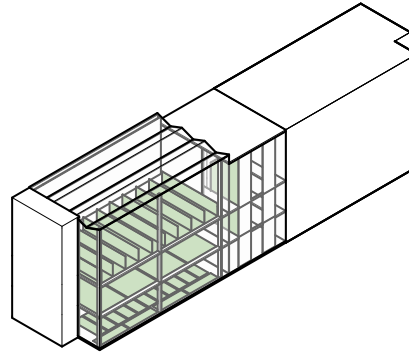
Stairwell garden

1:200



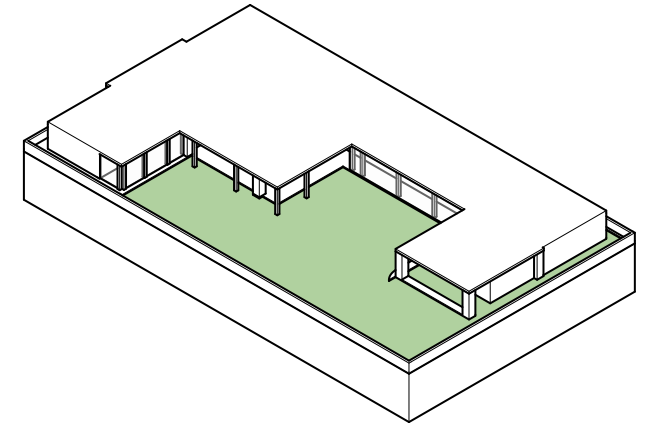
Biosphere/dome

1:200



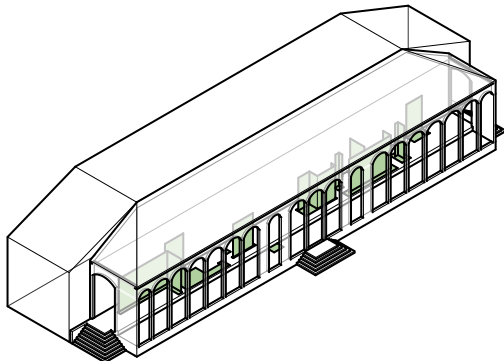
Vertical Farm

1:200



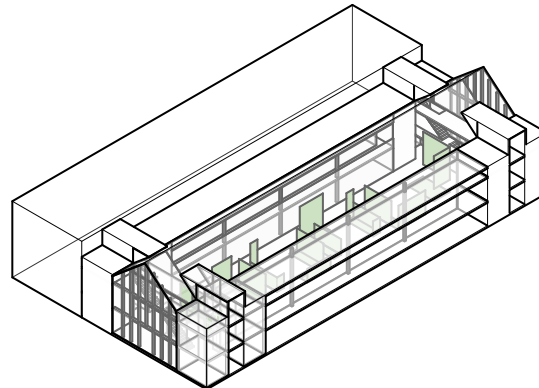
Rooftop garden

1:200



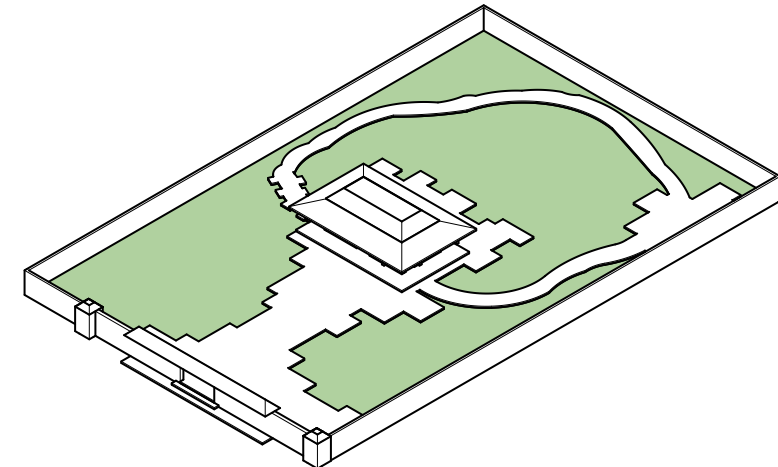
Orangery

1:200



Atrium

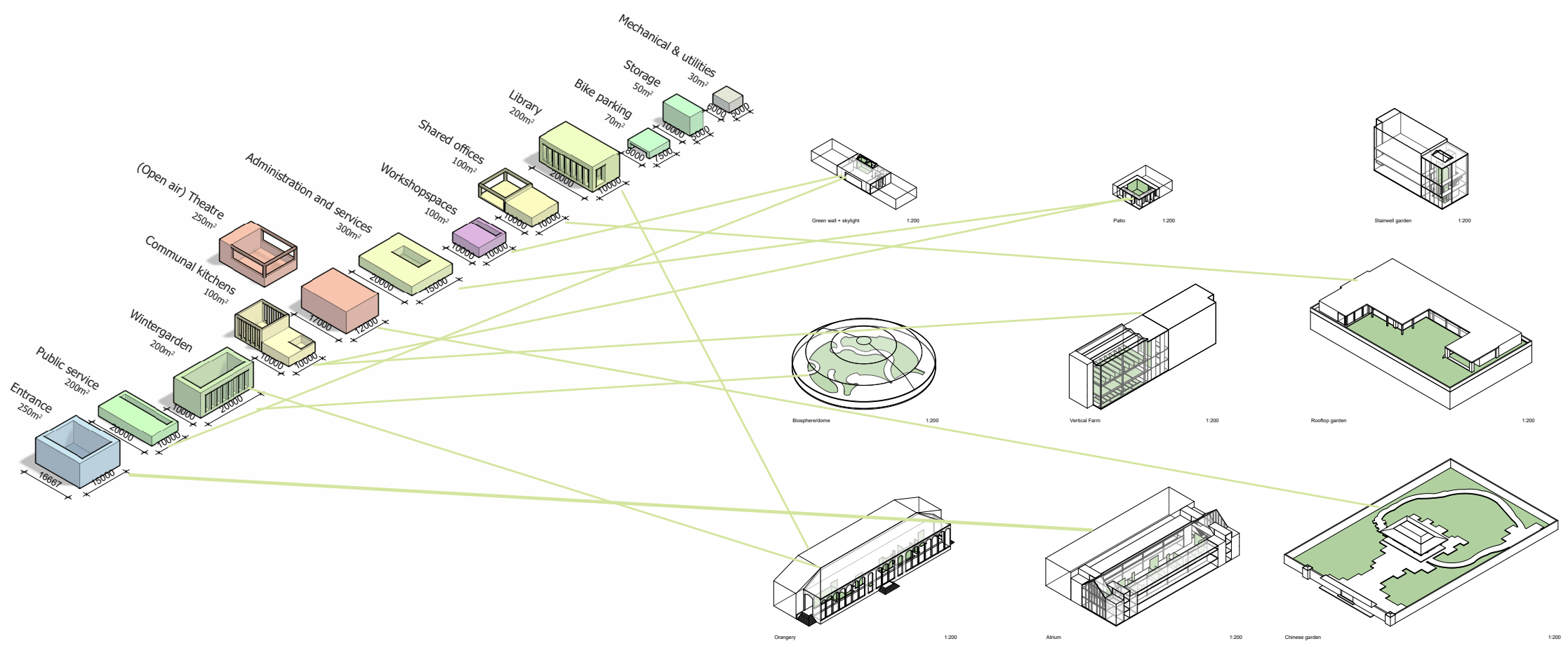
1:200



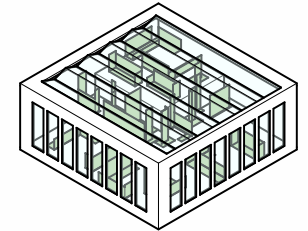
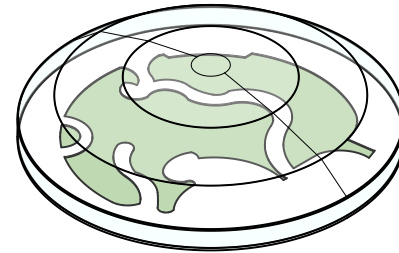
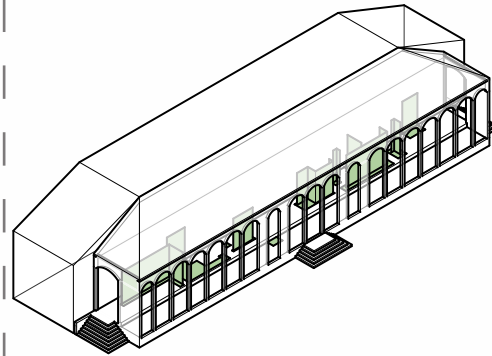
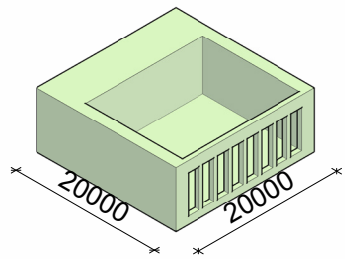
Chinese garden

1:200

Matching functions and indoor green typologies



Creating green condenser types



Wintergarden

- 400 m²
- 80% open roof
- Skylights
- Facades with tall windows
- South/west oriented
- Great variation of plants
- Regulated indoor climate

Orangery

- 300 m²
- Closed roof
- Possibility for skylights
- Facades with tall windows
- South/west oriented
- 'Library' of plants
- Climatization specified for special plants

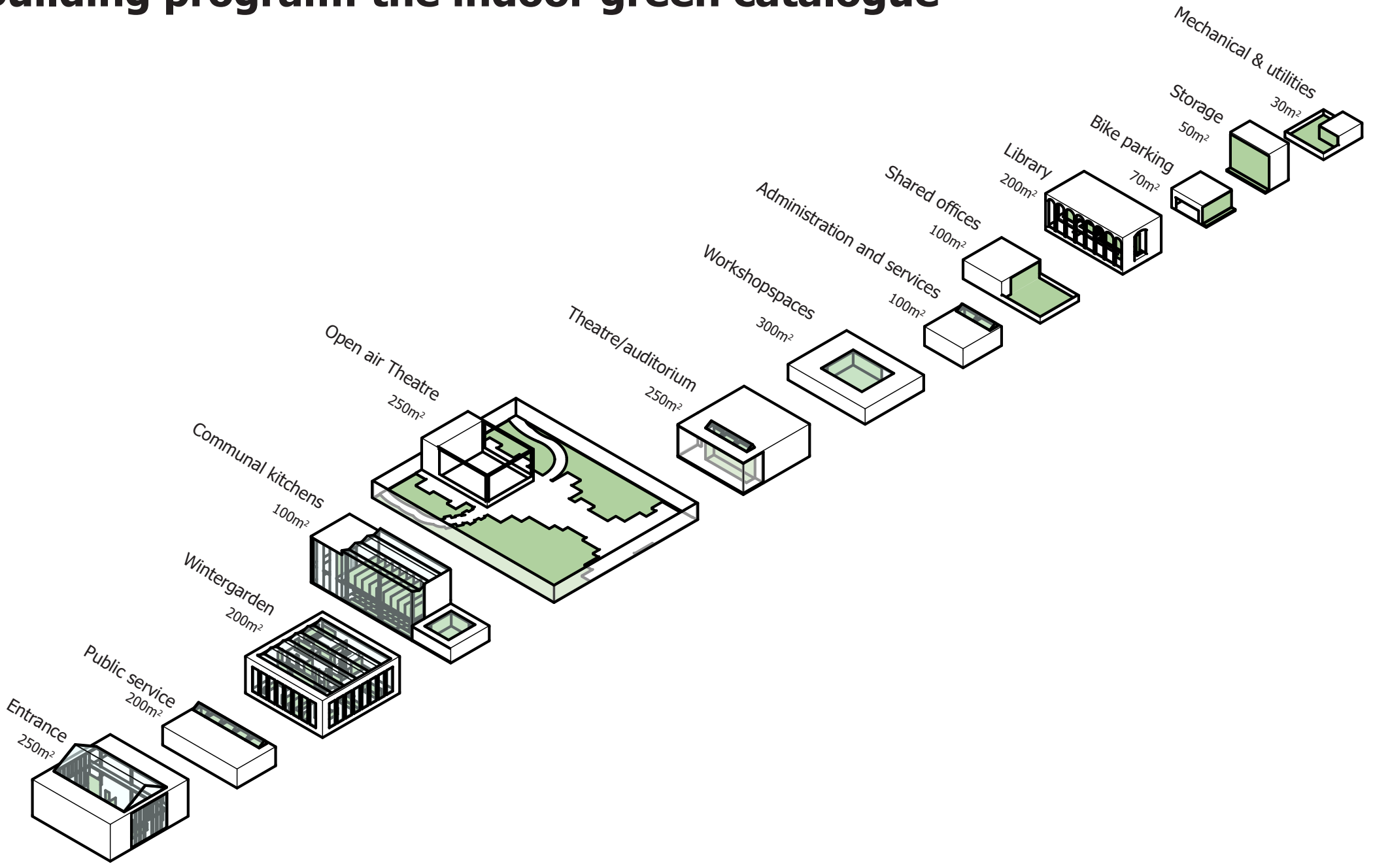
Biodome

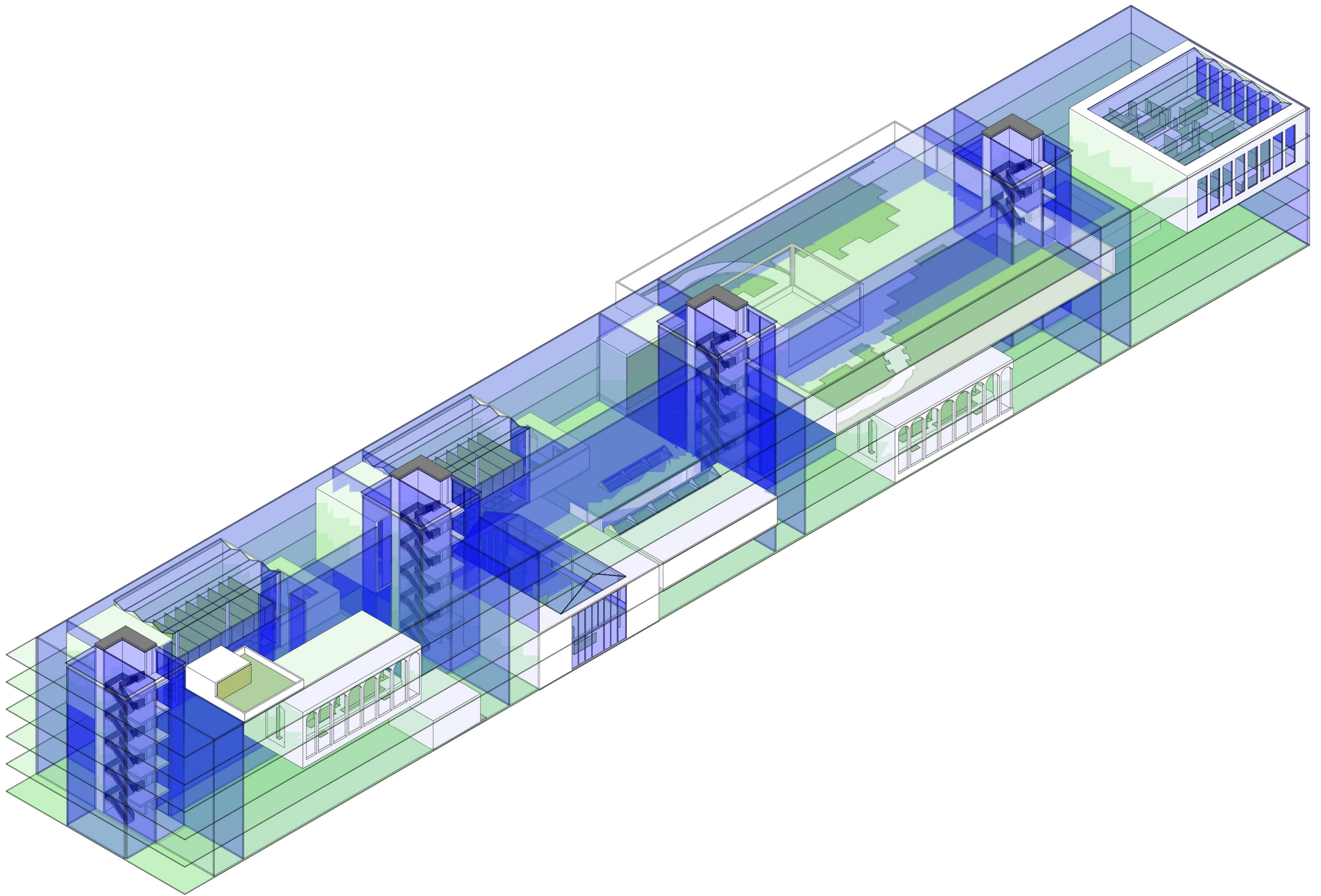
- 1200 m²
- 100% open roof
- Glass dome
- 90% glass facades
- 180° sun orientation
- Oriental plant species
- Biosphere-principle

Indoor Communal garden

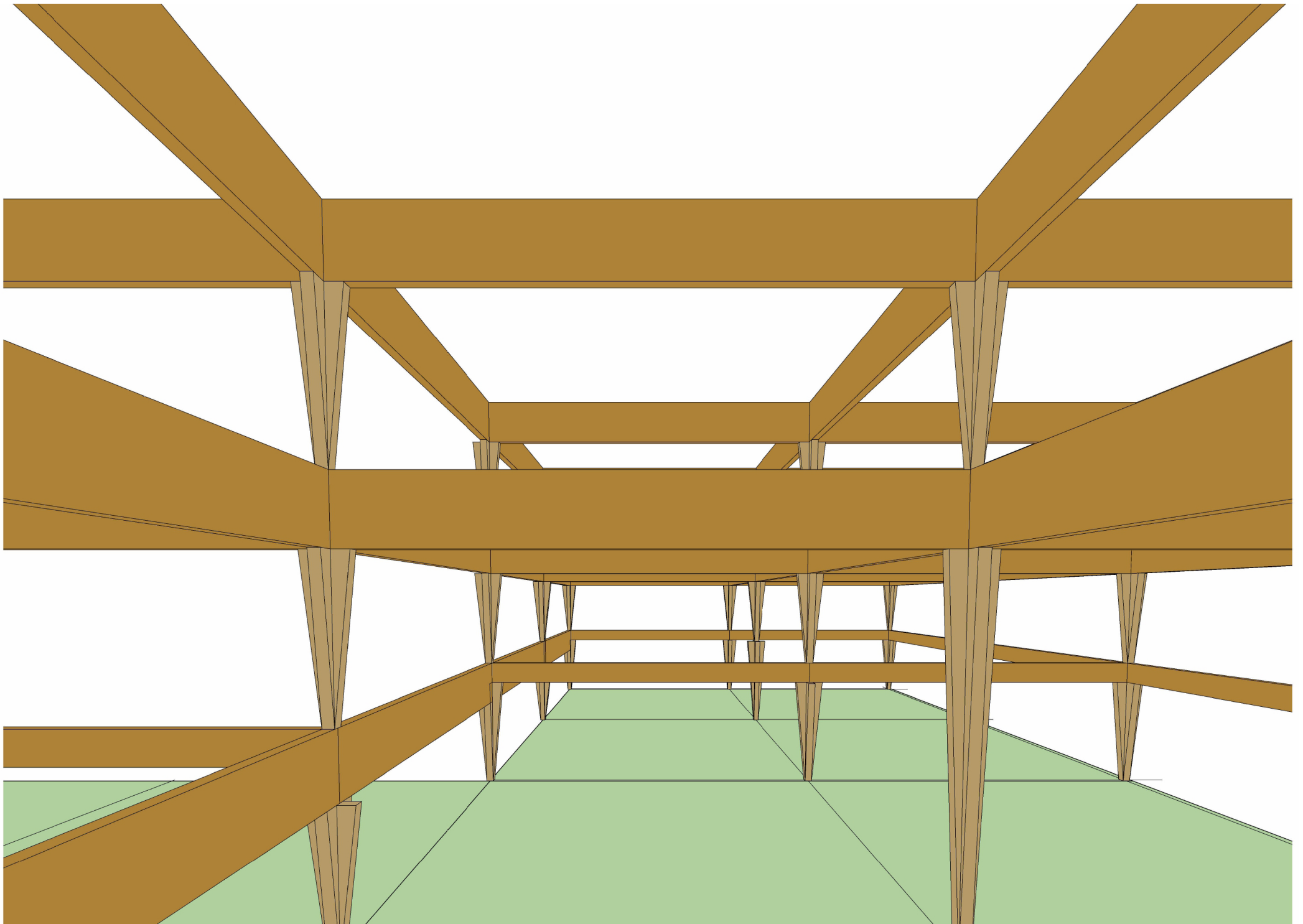
- 400 m²
- 90% open roof
- Skylights/greenhouse
- Facades with tall windows
- Windows on 2 or 3 sides
- Possibility for different garden styles
- Regulated indoor climate

Building program: the indoor green catalogue

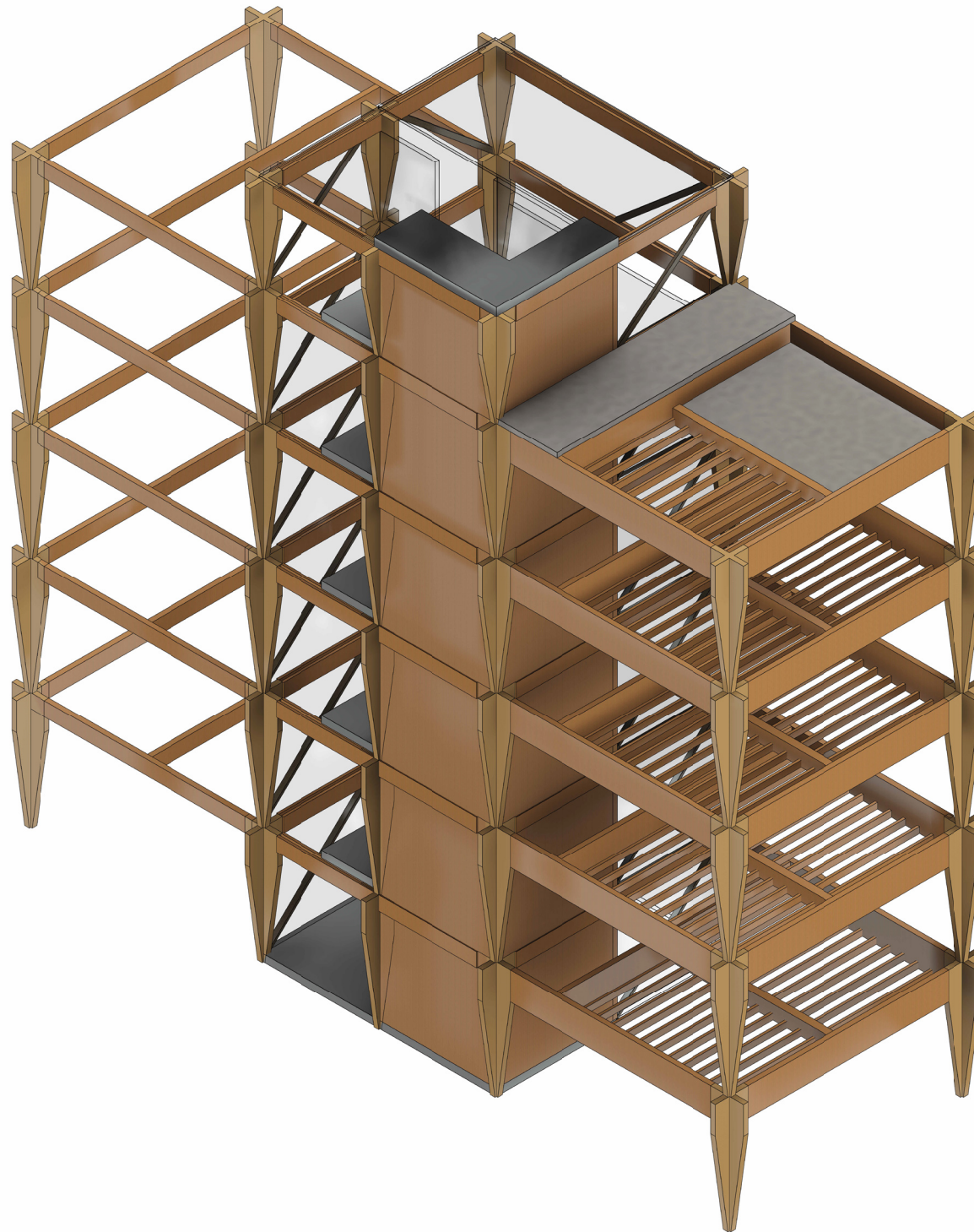




Functional arrangement

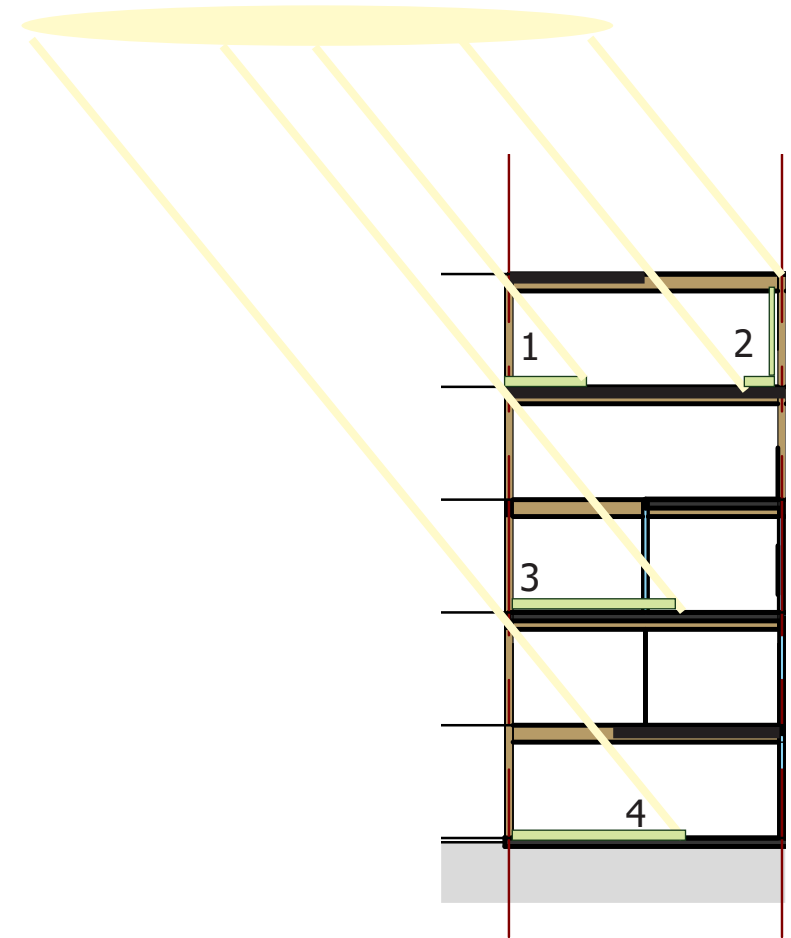
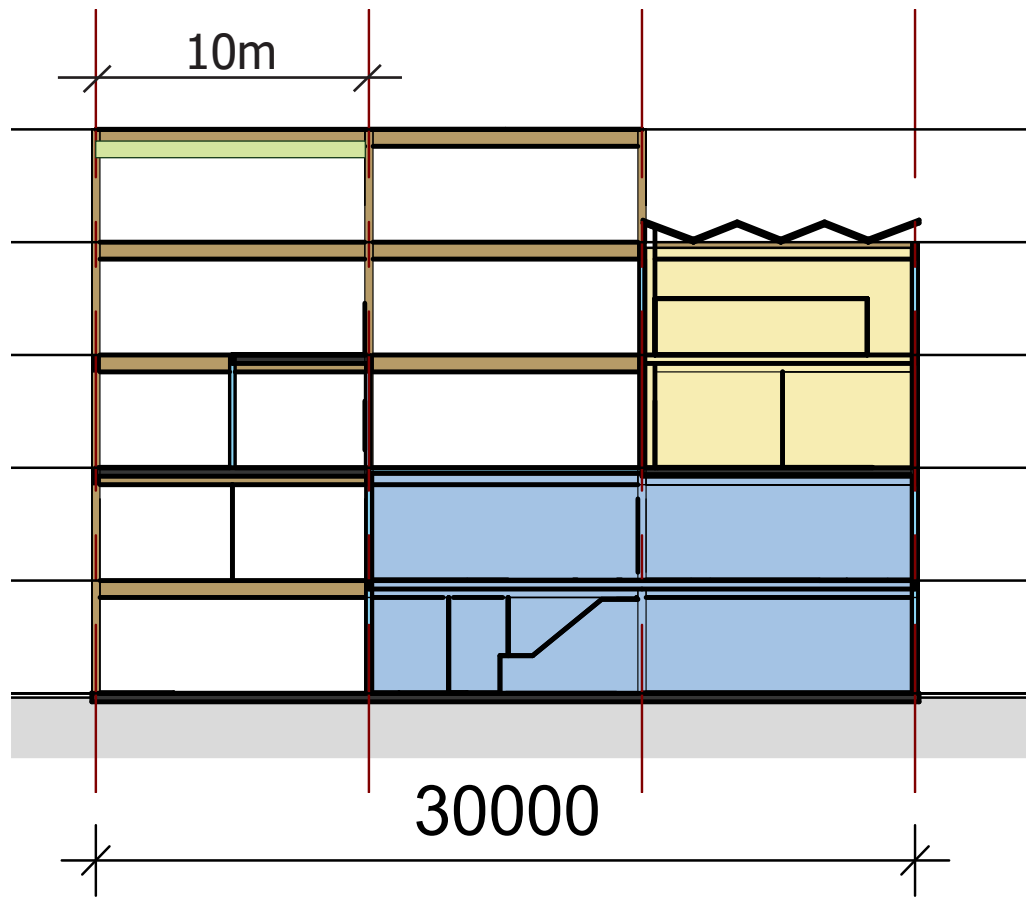


Modular grid structure



Technical solutions

Technical calculations



Dry soil = 1600 kg/m^3

Wet soil = 2000 kg/m^3

Soil volume (roof) = $10\text{m} \cdot 10\text{m} \cdot 0,4\text{m} = 40\text{m}^3$

=> Max soil weight = $2000 \cdot 40 = 80.000 \text{ kg}$

Floor thickness = $10000/25+15+10/2 = 420\text{mm}$

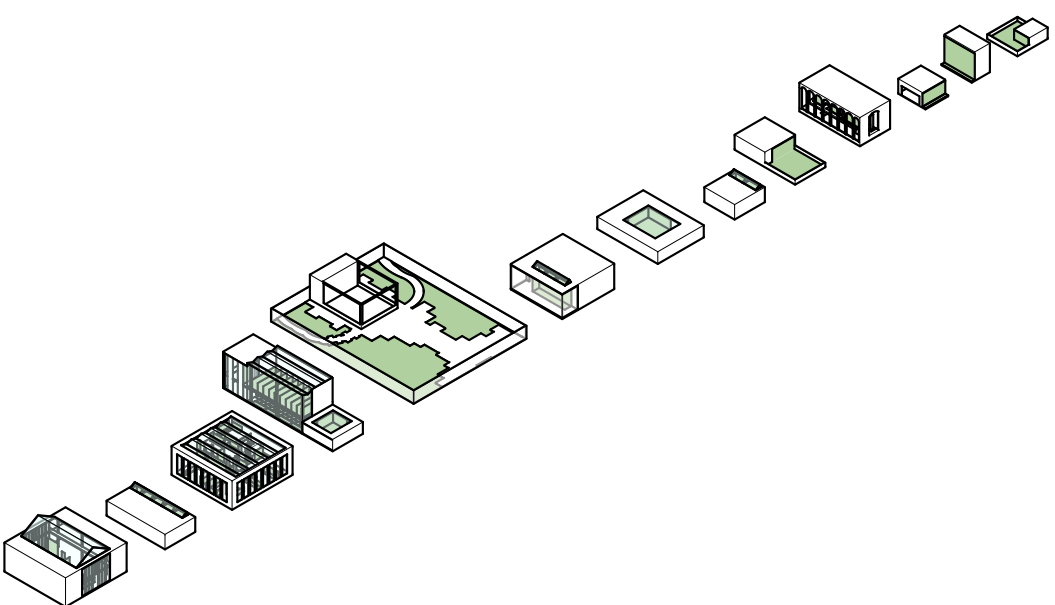
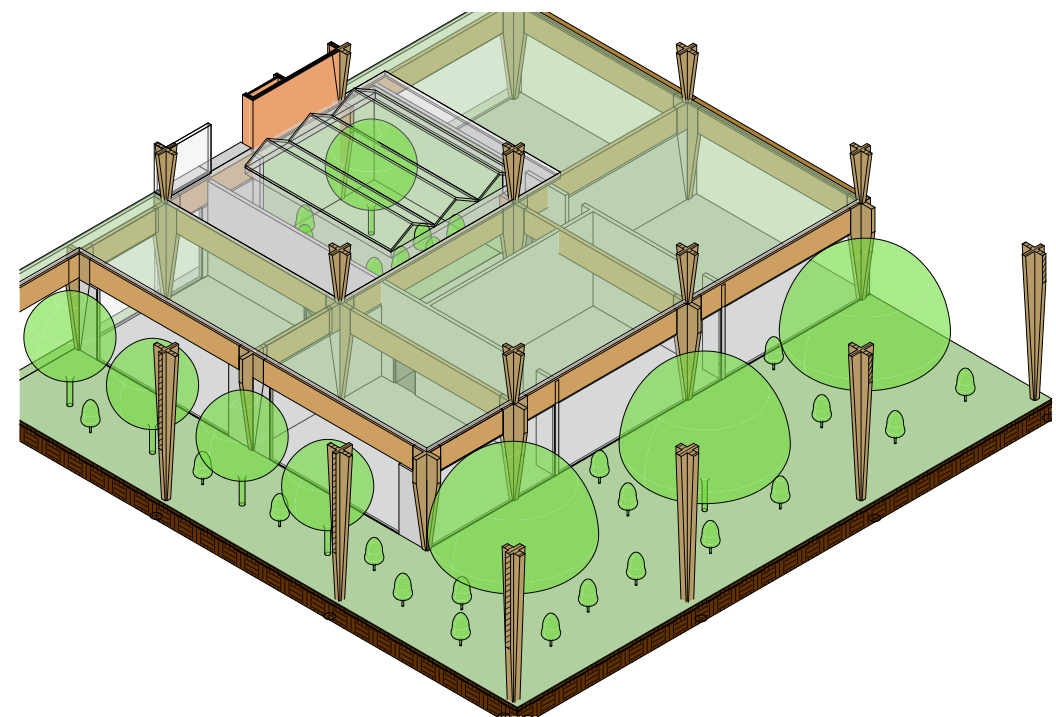
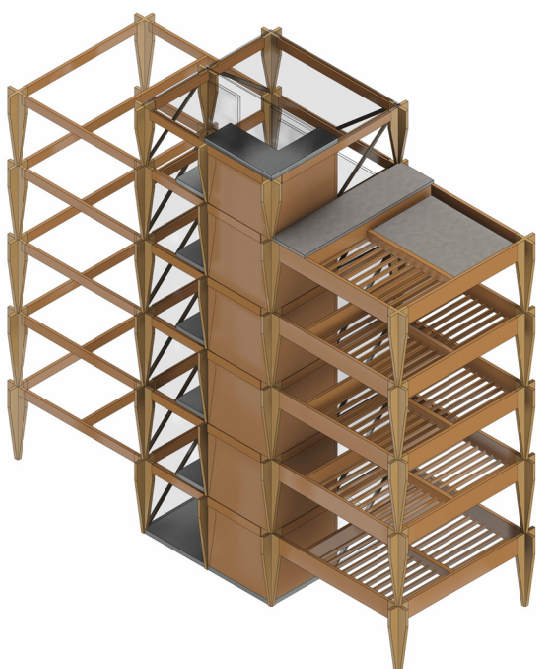
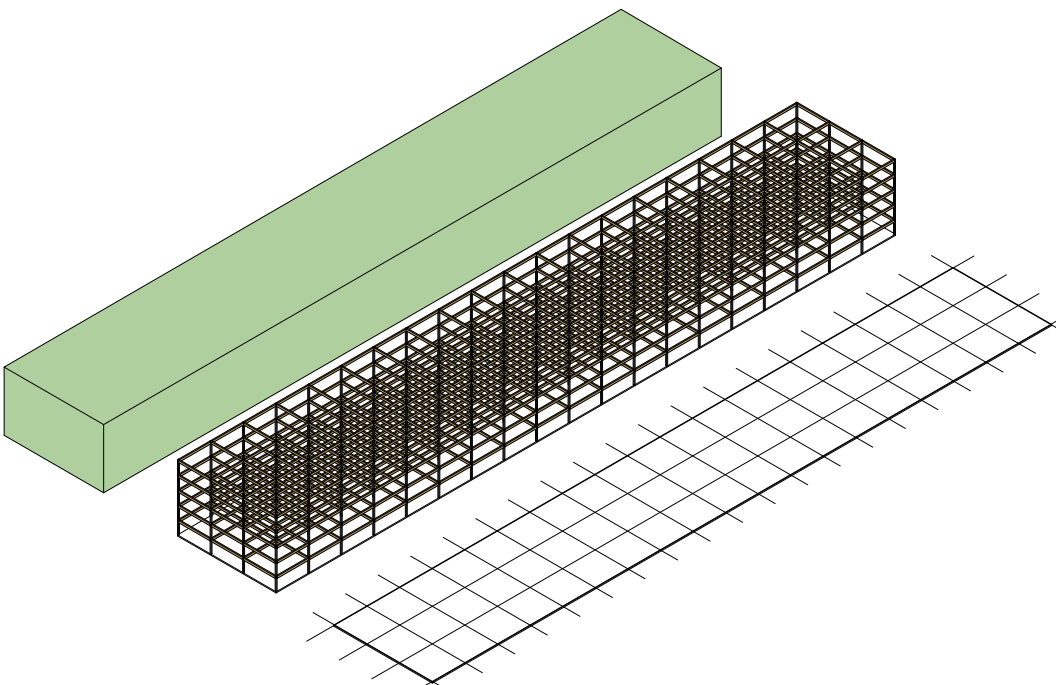
Floor weight = $2500 \text{ kg/m}^3 \cdot 42 \text{ m}^3 = 105.000\text{kg}$

Total weight = 185.000 kg

Beam thickness = $1/17 \cdot 10.000 = 588\text{mm}$

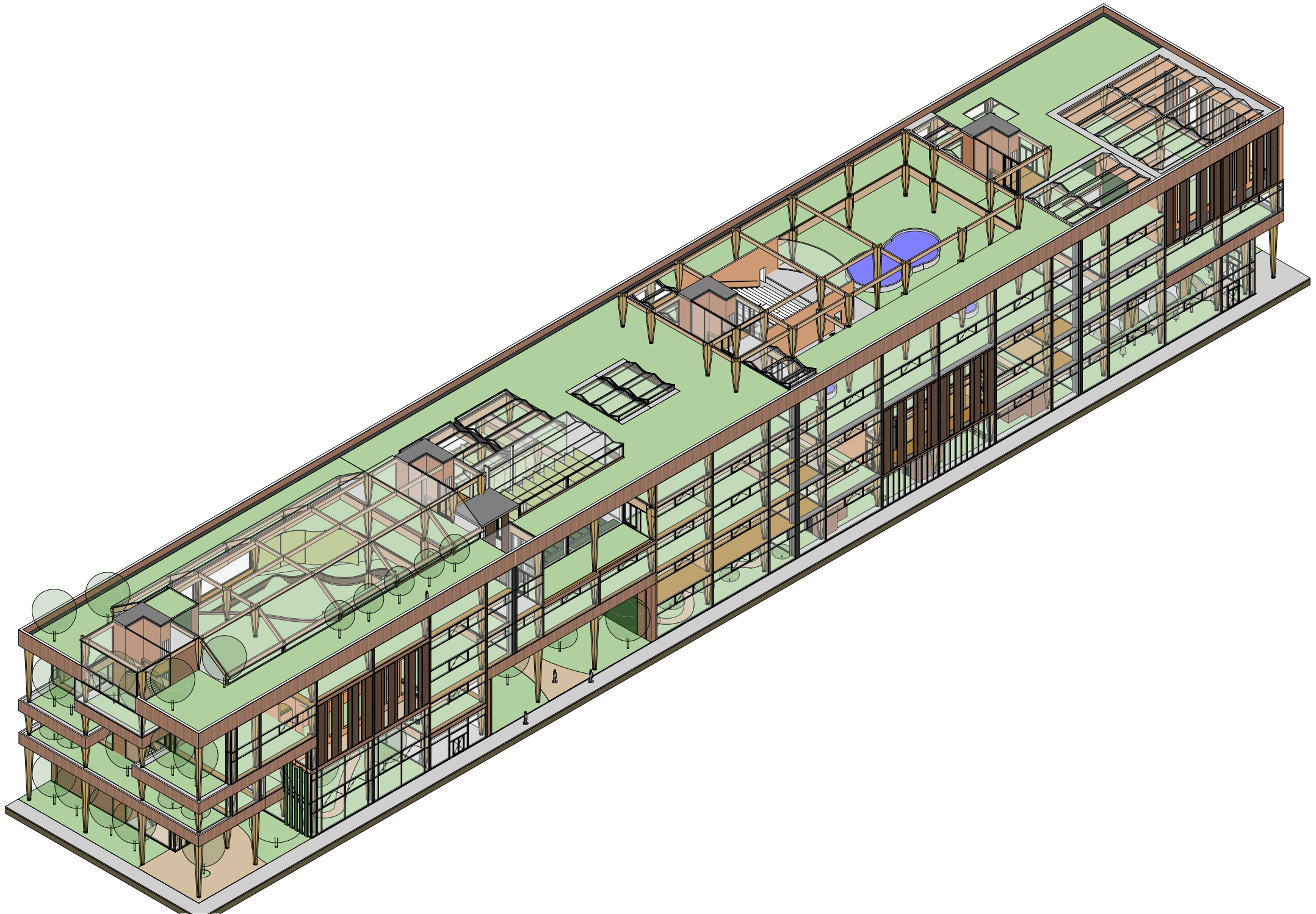
>> Sufficiënt?

Prototype for future indoor green condensers

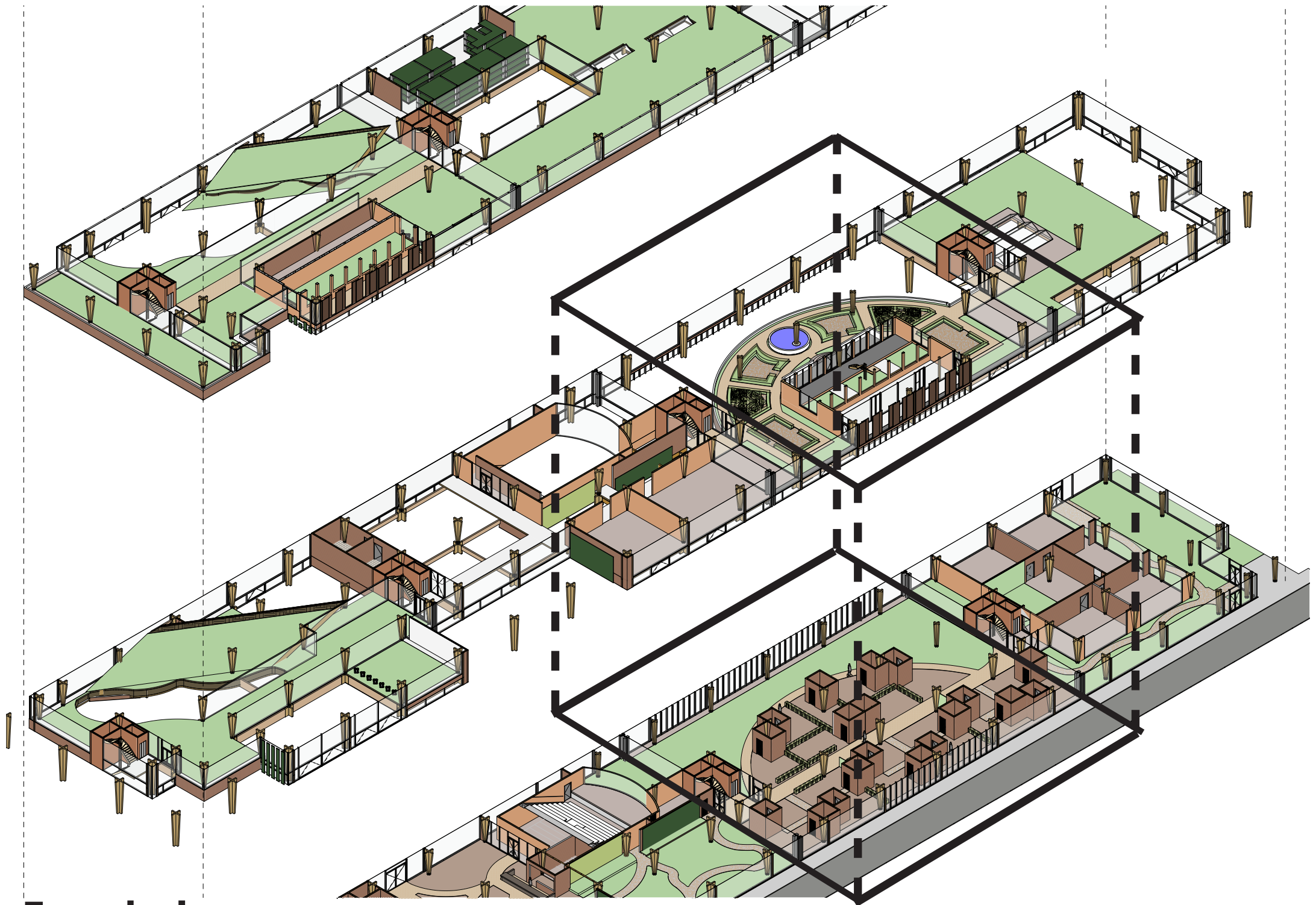




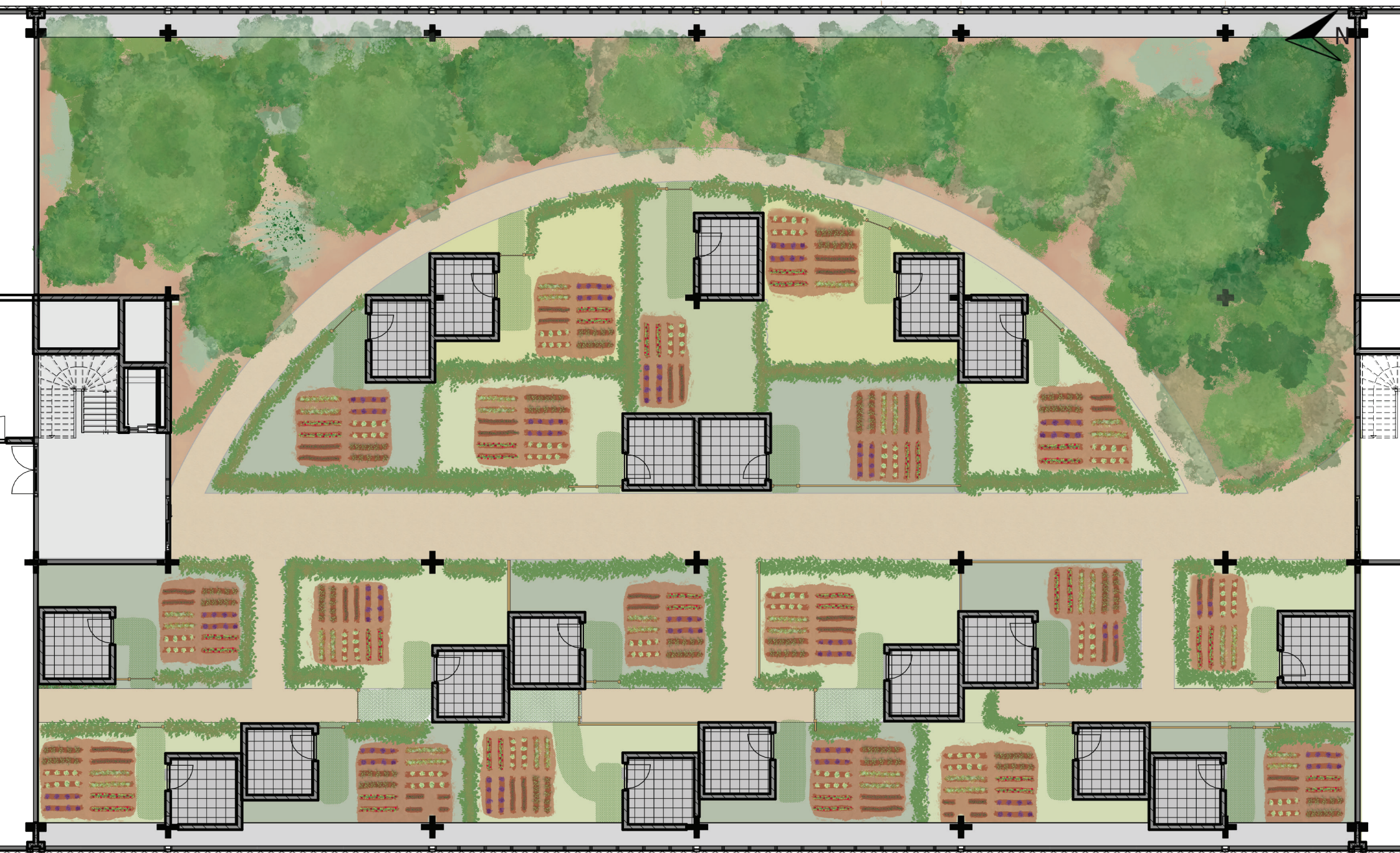
Prototype green condenser



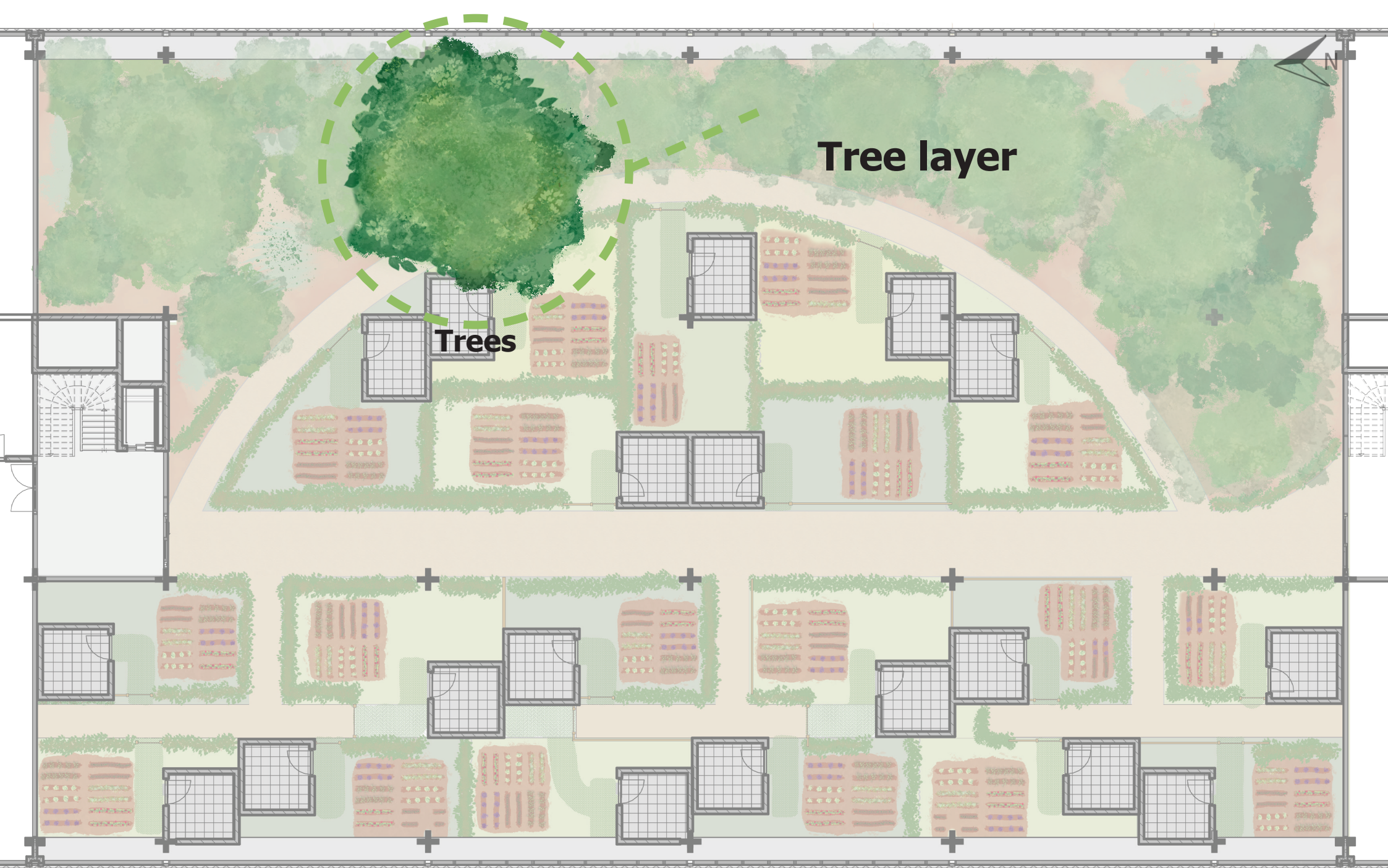
Total overview

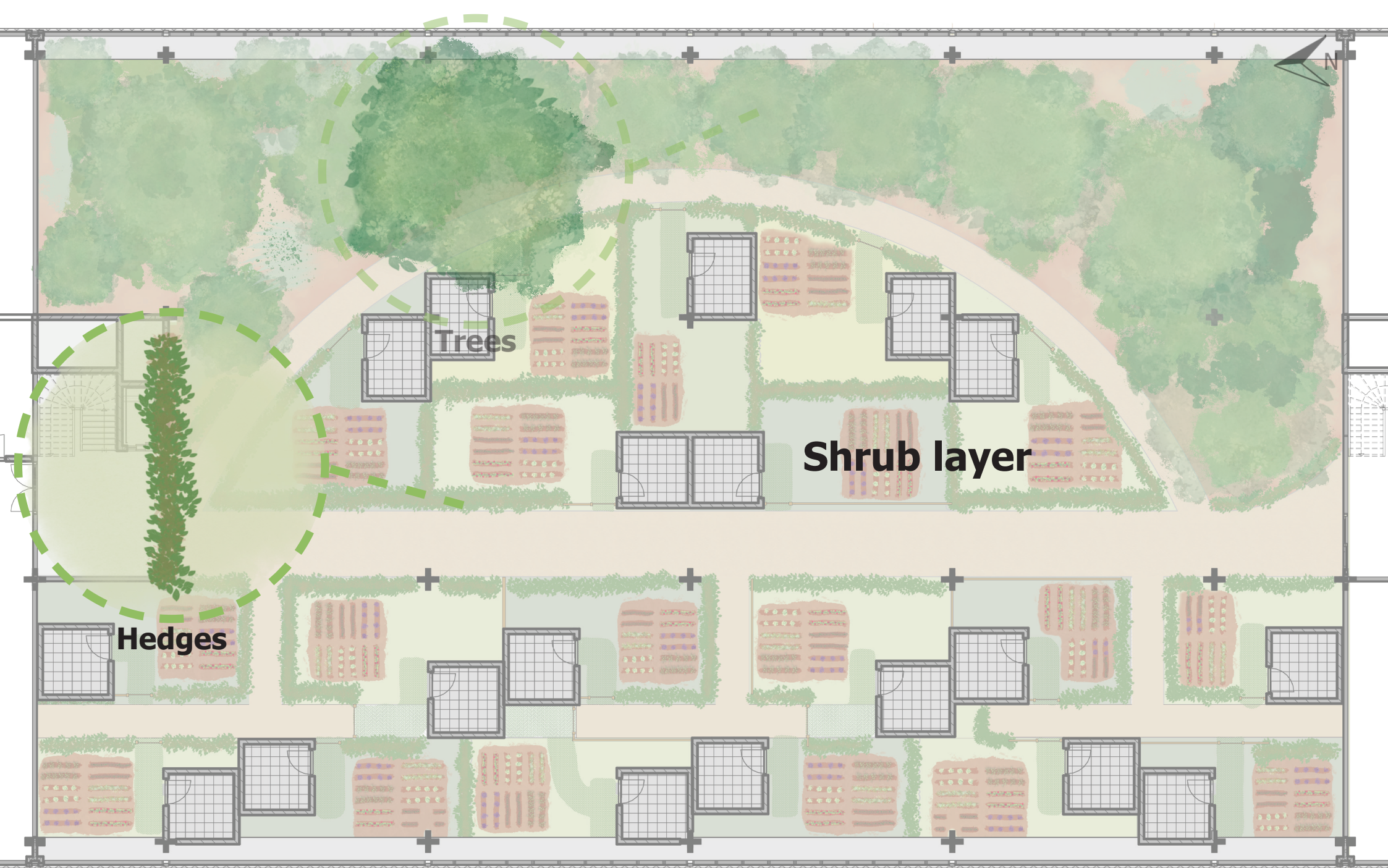


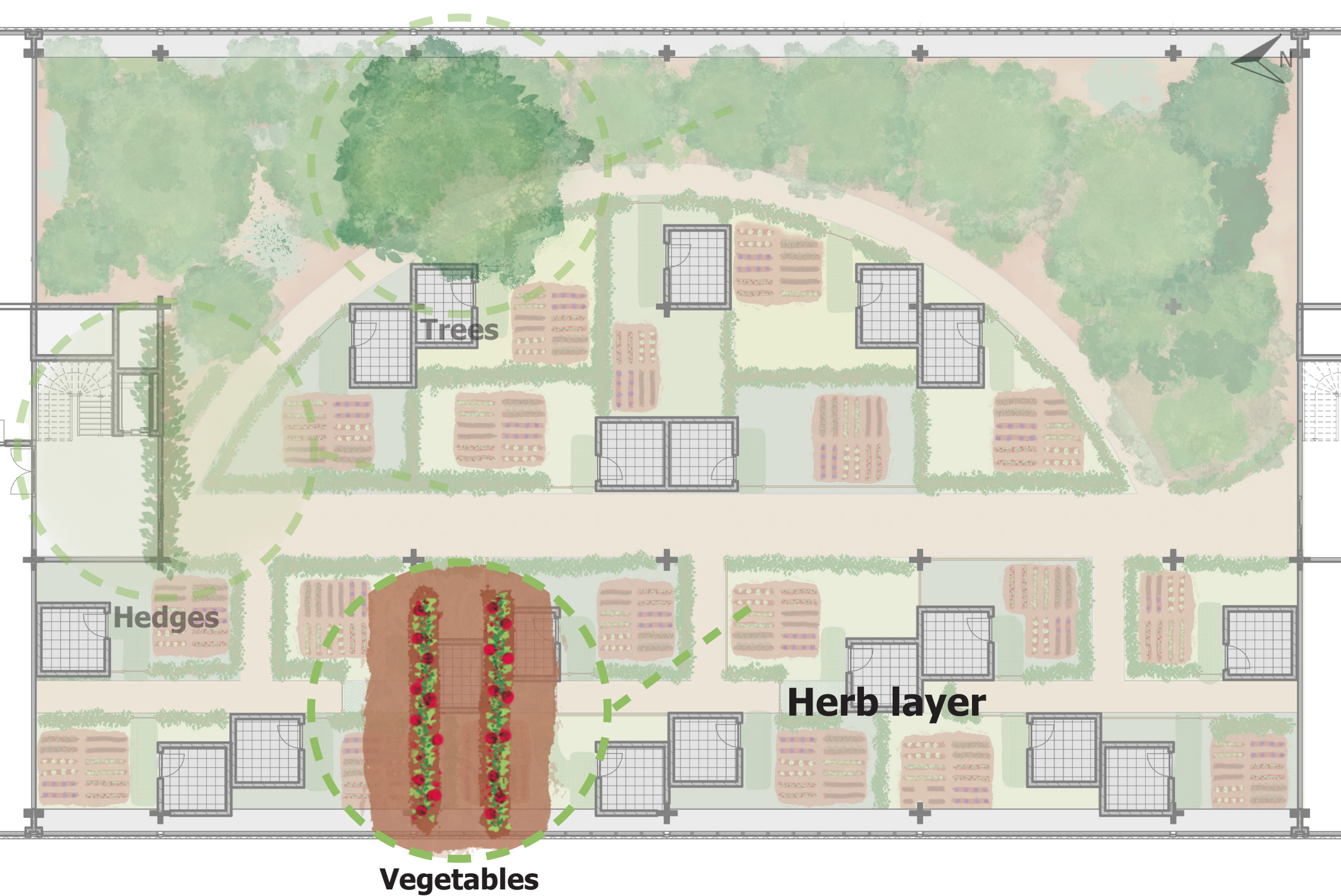
Free design spaces



Floorplan allotments + forest



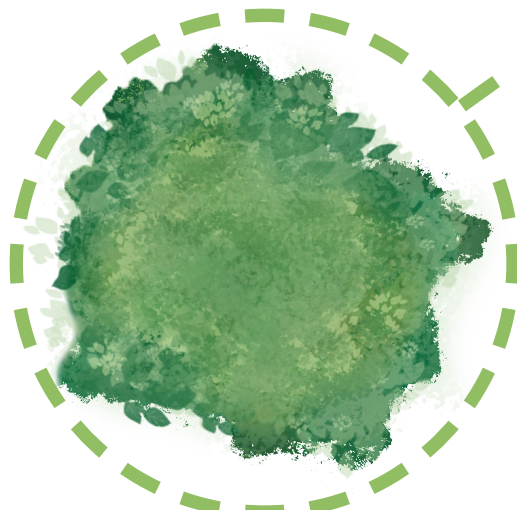




Layers

Plant selection

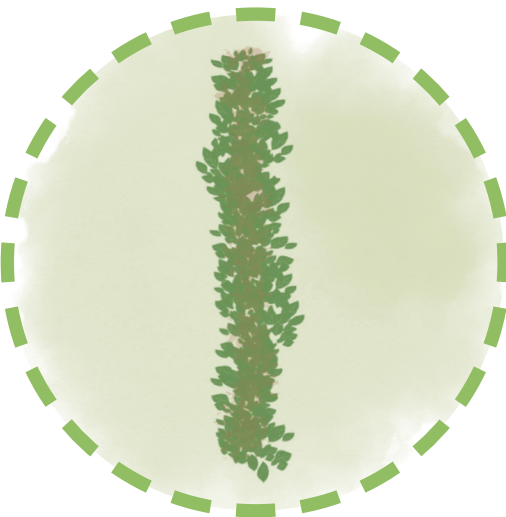
Alotment garden



Trees

Quercus ilex, Holm oak

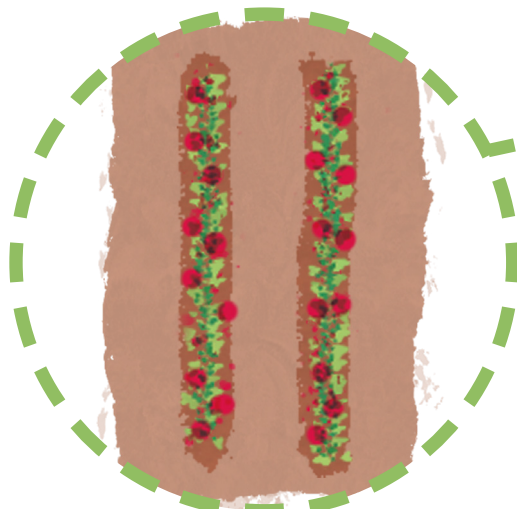
Sunlight: Full sun/half sun (east)
Temperature: -10-35°C
Humidity: ~55%
Height: 4,75-15m (width: 8-12m)



Hedges

Fagus Sylvatica, Beech hedge

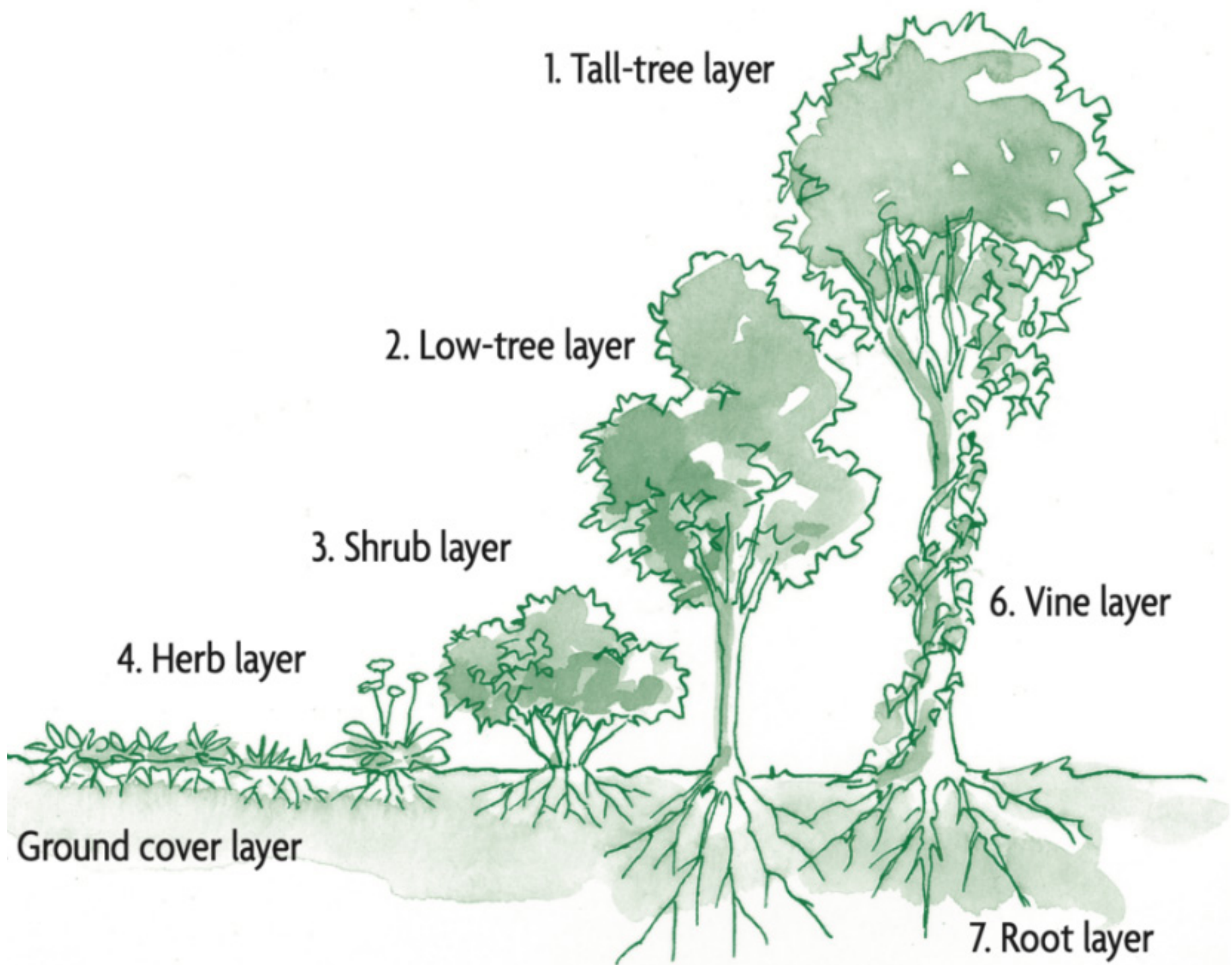
Sunlight: Sun/half shade
Temperature: 2-24°C (non-critical)
Humidity: ~75%
Height: 0,6-1,5m

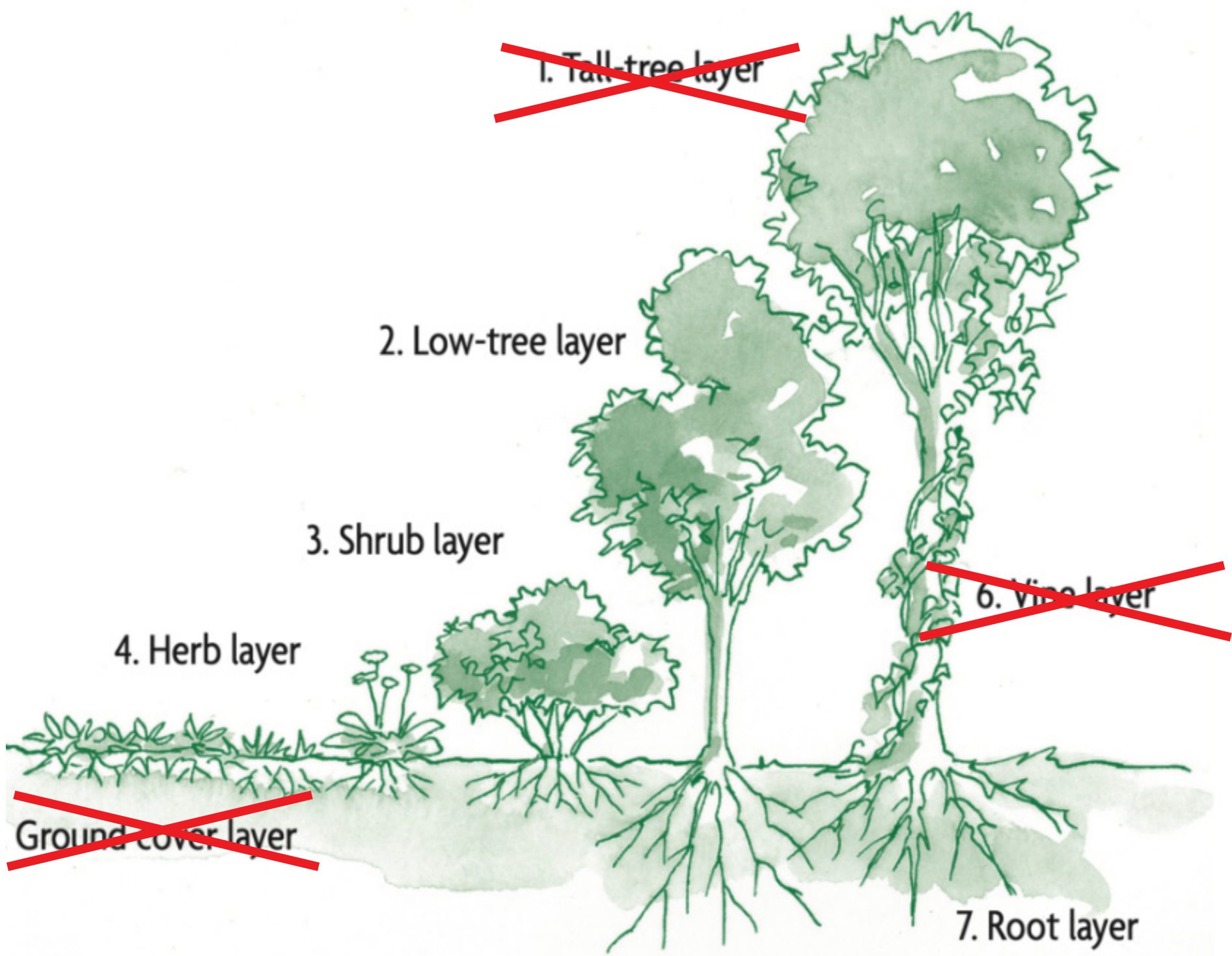


Vegetables

Solanum Lycopersicum, Tomato

Sunlight: Full sun
Temperature: 15-32°C (21-27°C (D), 16-18°C (N))
Humidity: 60-85% (80-85%(D), 65-75%(N))
Height: 0,2-2,0m







Chinese gardens

West

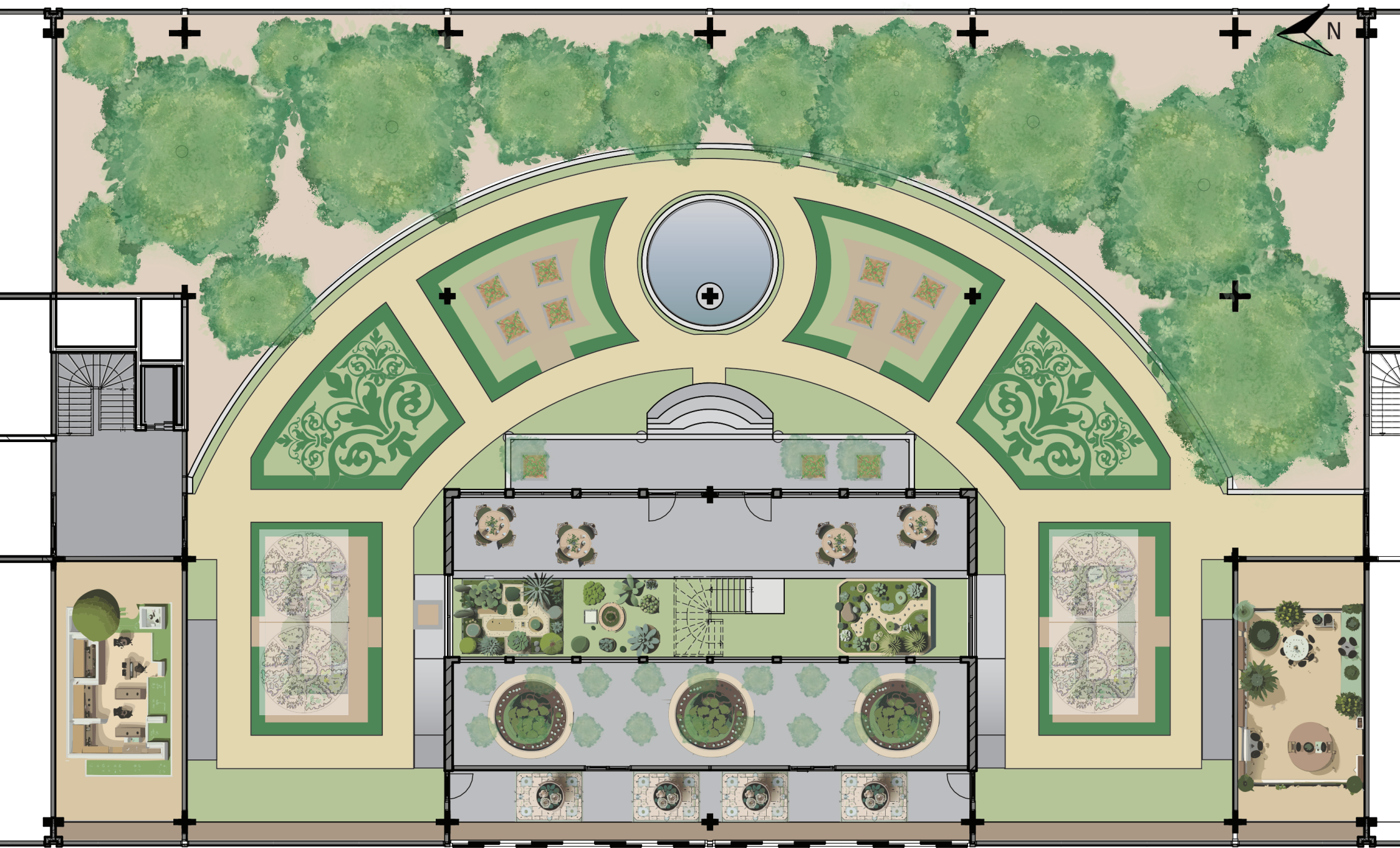
East

Orangery

French garden

Forest

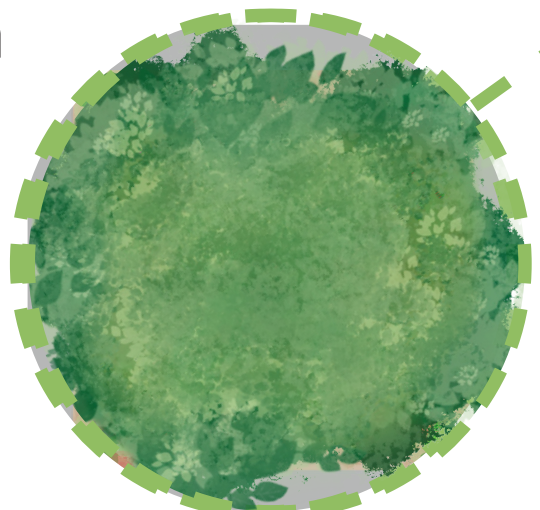
Allotments



Floorplan French garden

Plant selection

French garden



Trees

Ficus Carica, Fig tree

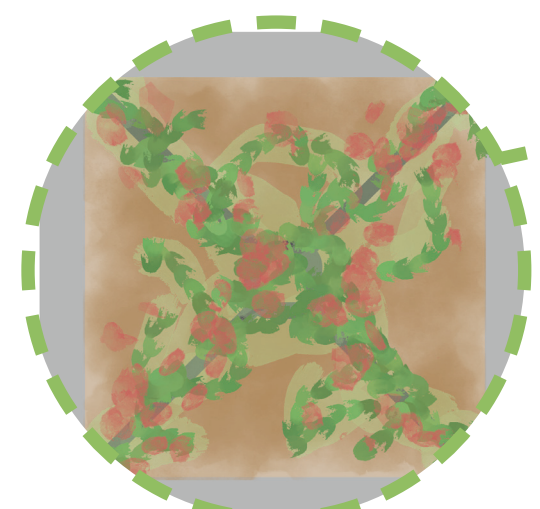
Sunlight: Full sun (sheltered from wind)
Temperature: 15-22°C (min -10°C max 35°C)
Humidity: ~60% (non-critical)
Height: 1,3-3,0m



Hedges

Buxus sempervirens, Buxus hedge

Sunlight: Shade/half shade/Sun
Temperature: 16-27°C (min. -23°C max 35°C)
Humidity: 50%-60% (non-critical)
Height: 0,2-1,0m (as hedge)

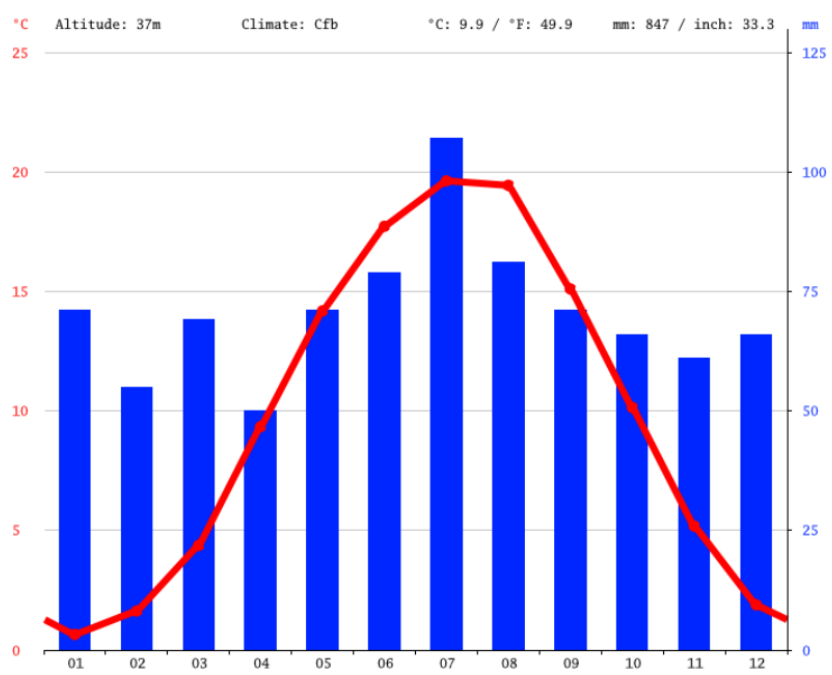


Flowers

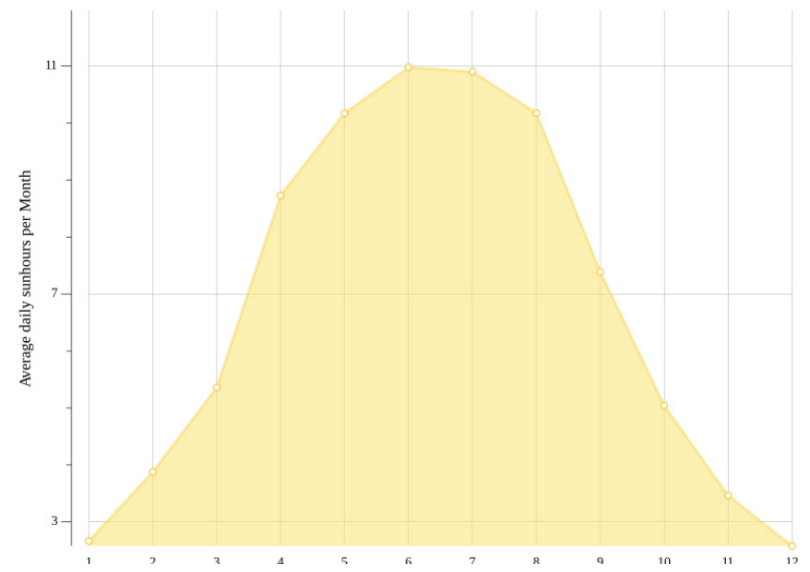
Rosa Amadeus, Climbing Roses

Sunlight: Full sun (south-east)
Temperature: -20-35°C
Humidity: ~60% (non-critical)
Height: 0,3-3,0m

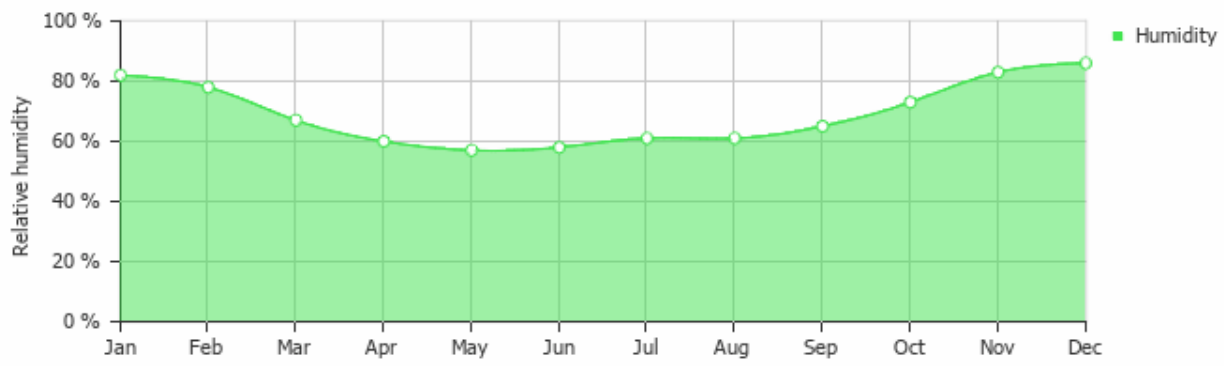
Berlin climate diagrams



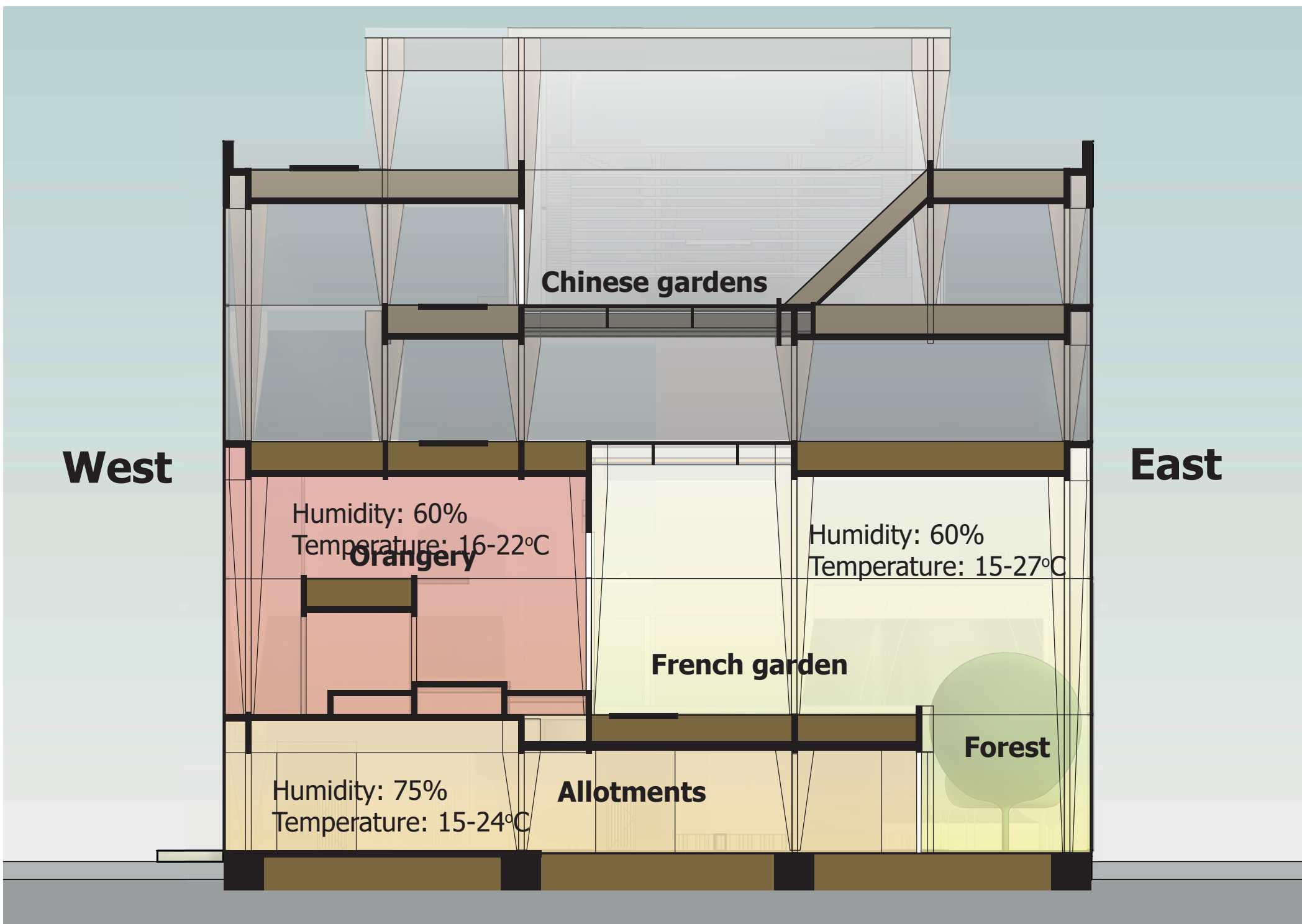
Weather graph Berlin



Average daily sunhours Berlin



Average relative humidity Berlin



Section D - Subclimates

Technical solutions & products: open facade systems



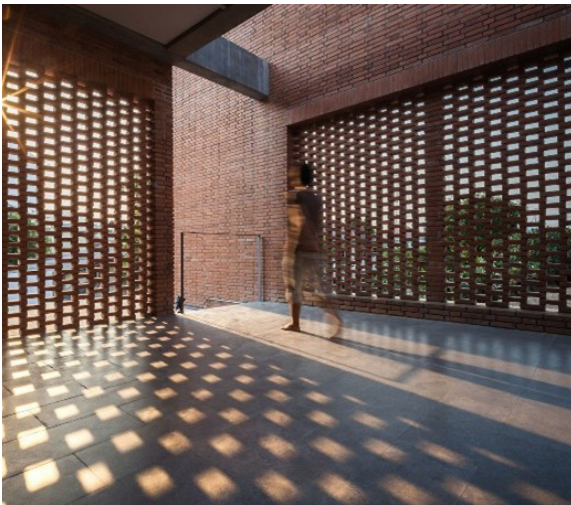
Turning panels



Plant guiding cables



Shutters



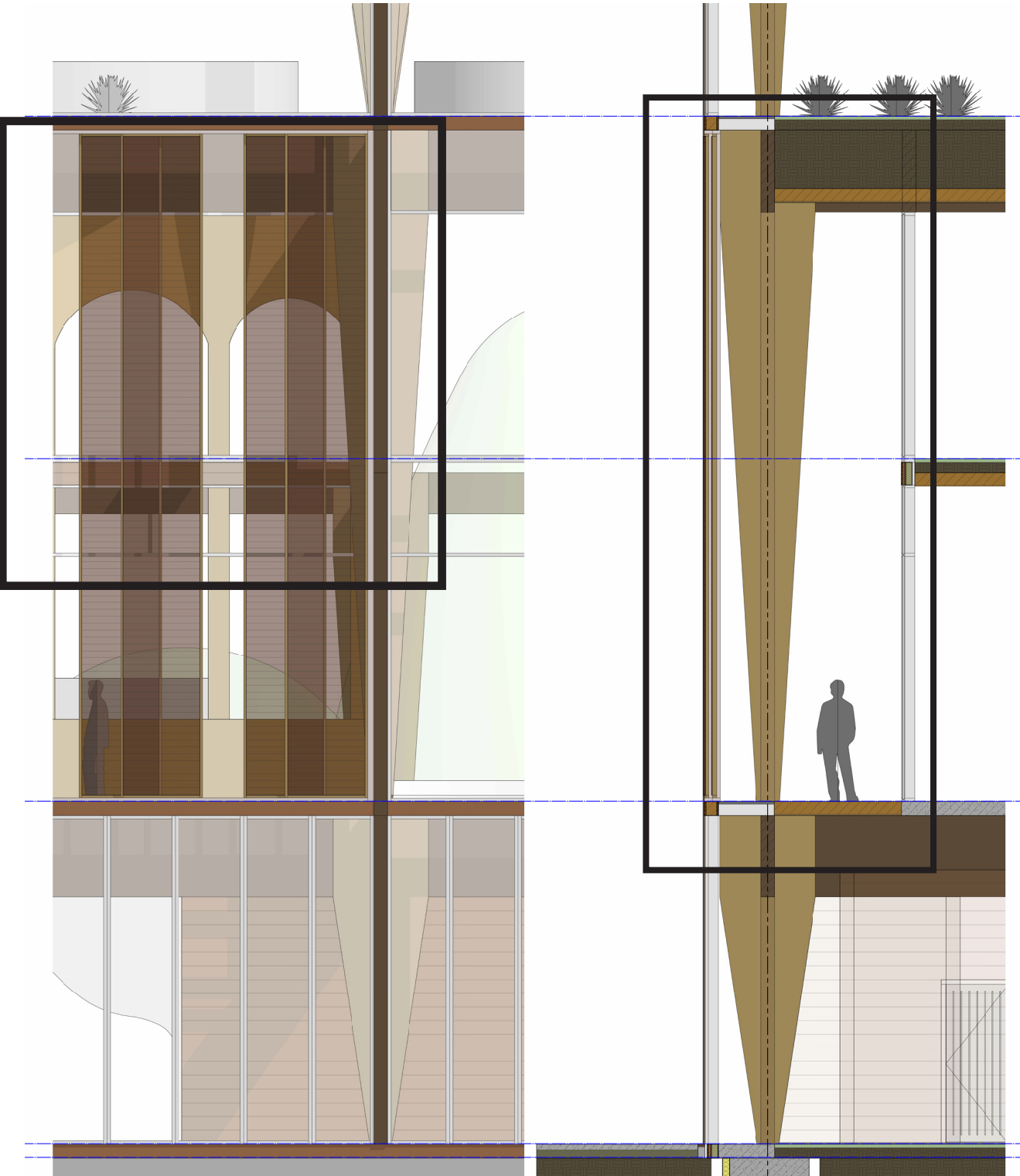
Perforated brickwork



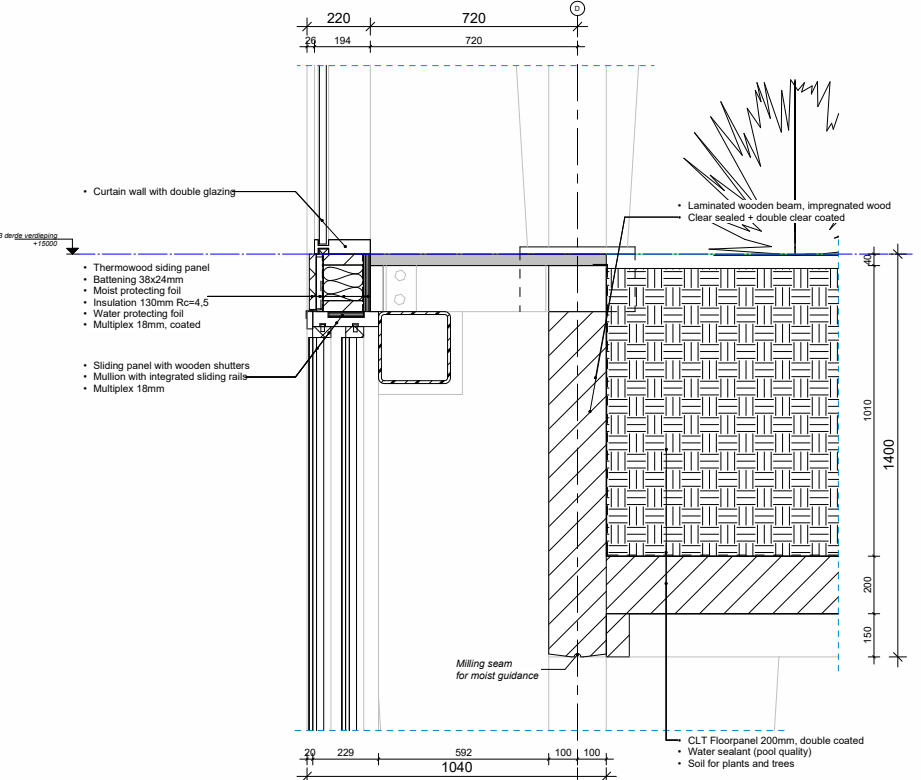
Folding walls



(Glass) sliding panels



Facade & section

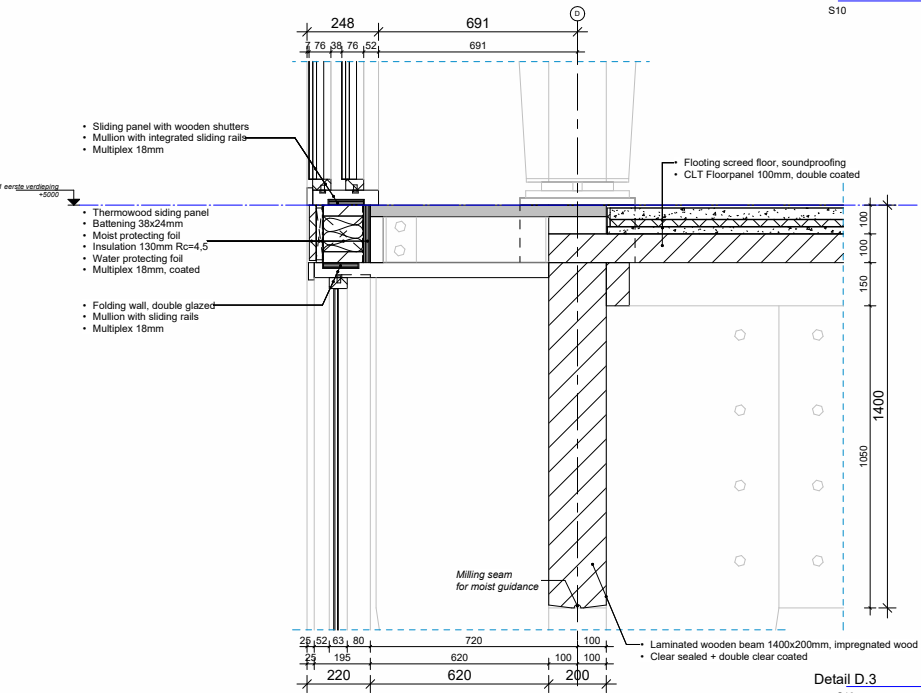


- Curtain wall with double glazing
- Thermowood siding panel
- Battening 38x24mm
- Moist protecting foil
- Insulation 130mm R_c=4,5
- Water protecting foil
- Multiplex 18mm, coated
- Sliding panel with wooden shutters
- Mullion with integrated sliding rails
- Multiplex 18mm

• Laminated wooden beam, impregnated wood
Clear sealed + double clear coated

• CLT Floorpanel 200mm, double coated
• Water sealant (pool quality)
• Soil for plants and trees

Detail D.2
S10

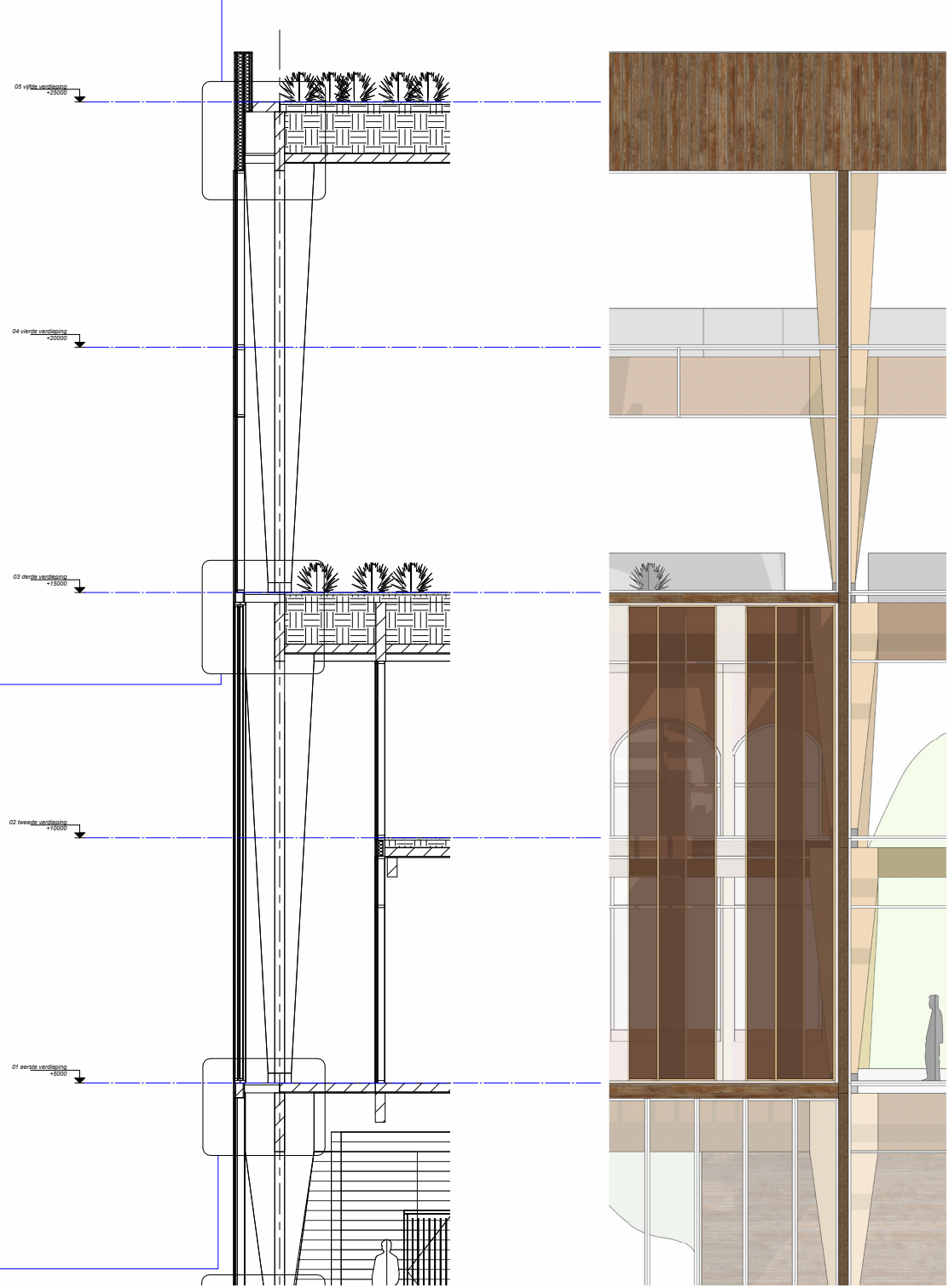


- Sliding panel with wooden shutters
- Mullion with integrated sliding rails
- Multiplex 18mm
- Thermowood siding panel
- Battening 38x24mm
- Moist protecting foil
- Insulation 130mm R_c=4,5
- Water protecting foil
- Multiplex 18mm, coated
- Folding wall, double glazed
- Mullion with sliding rails
- Multiplex 18mm

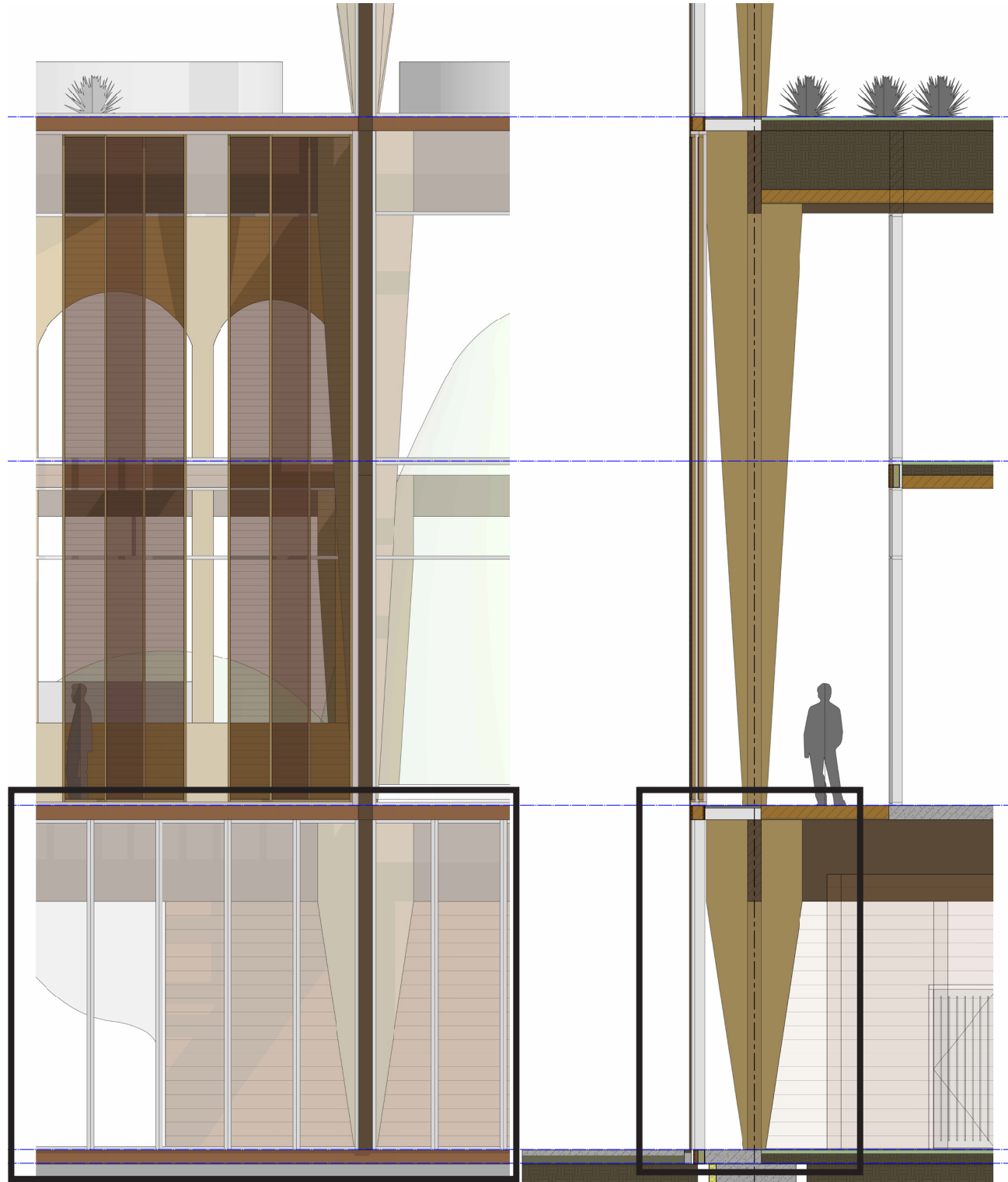
• Floating screed floor, soundproofing
• CLT Floorpanel 100mm, double coated

• Laminated wooden beam 1400x200mm, impregnated wood
• Clear sealed + double clear coated

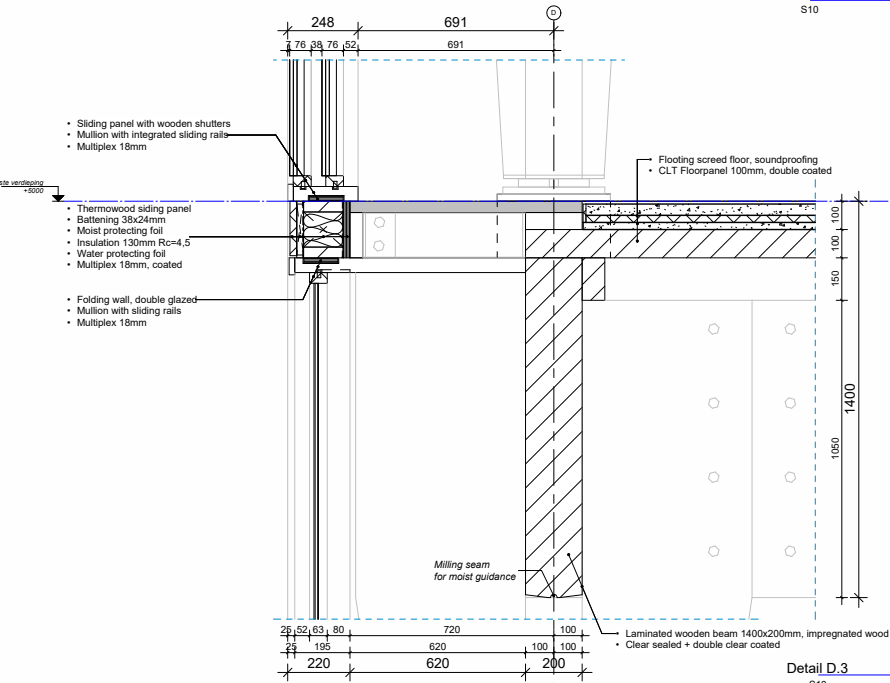
Detail D.3
S10



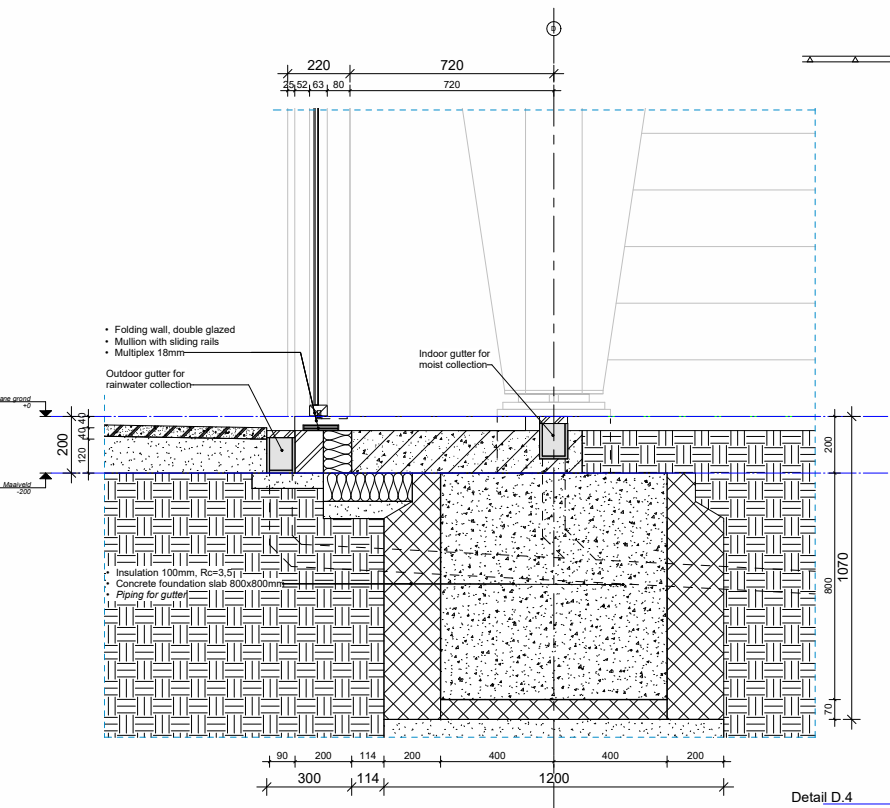
Section & details



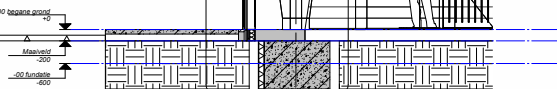
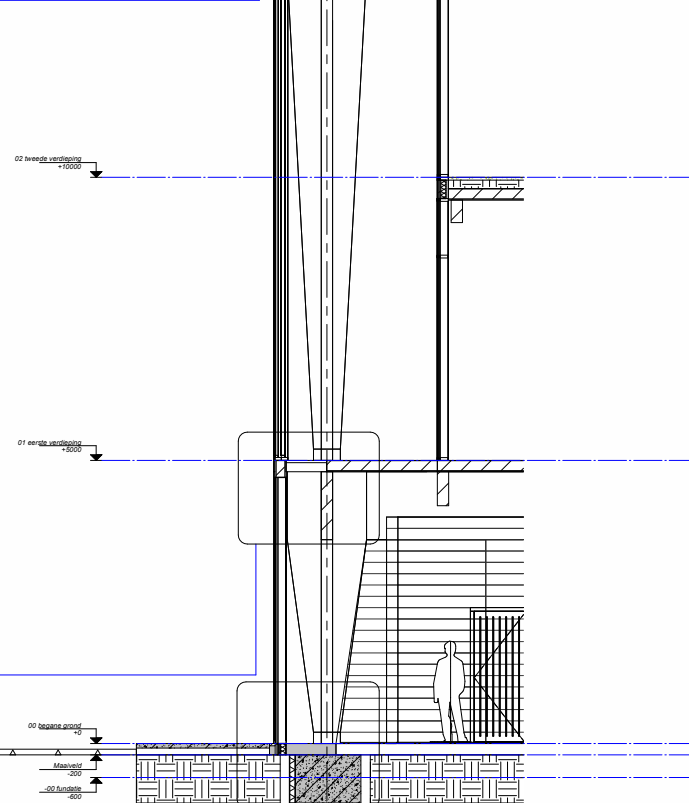
Facade & section



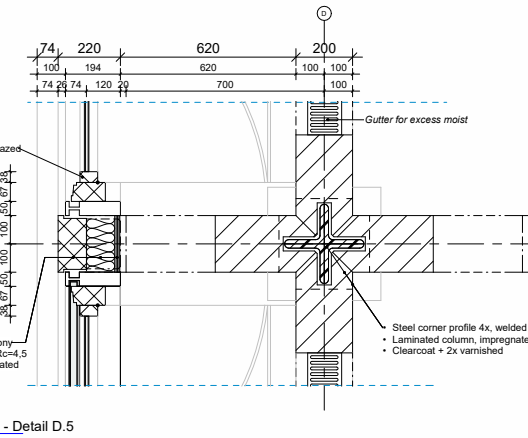
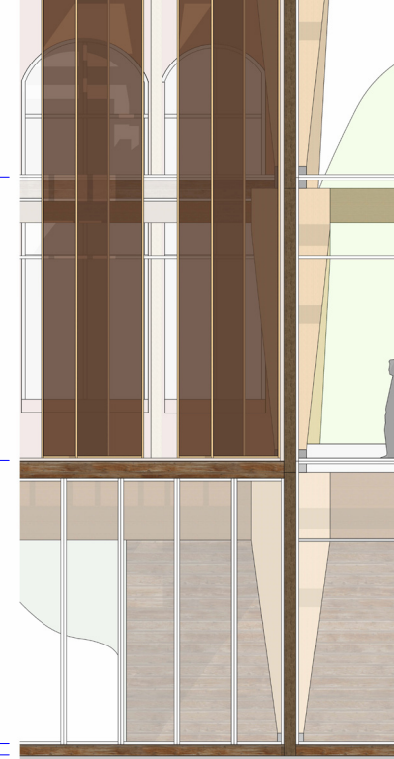
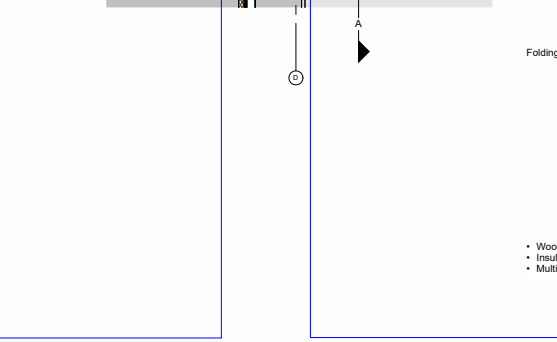
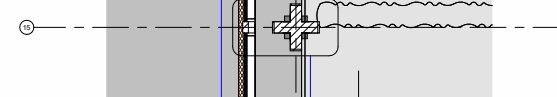
Detail D.3
S10



Detail D.4
S10



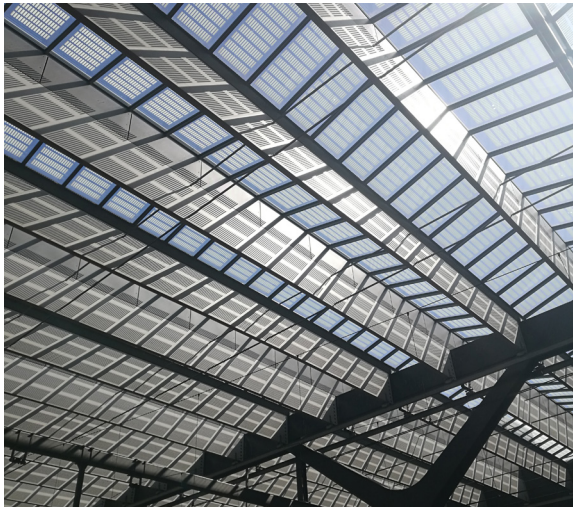
E Copy 1



1 10 - Detail D.5
S10

Sections & details

Technical solutions & products: climate systems



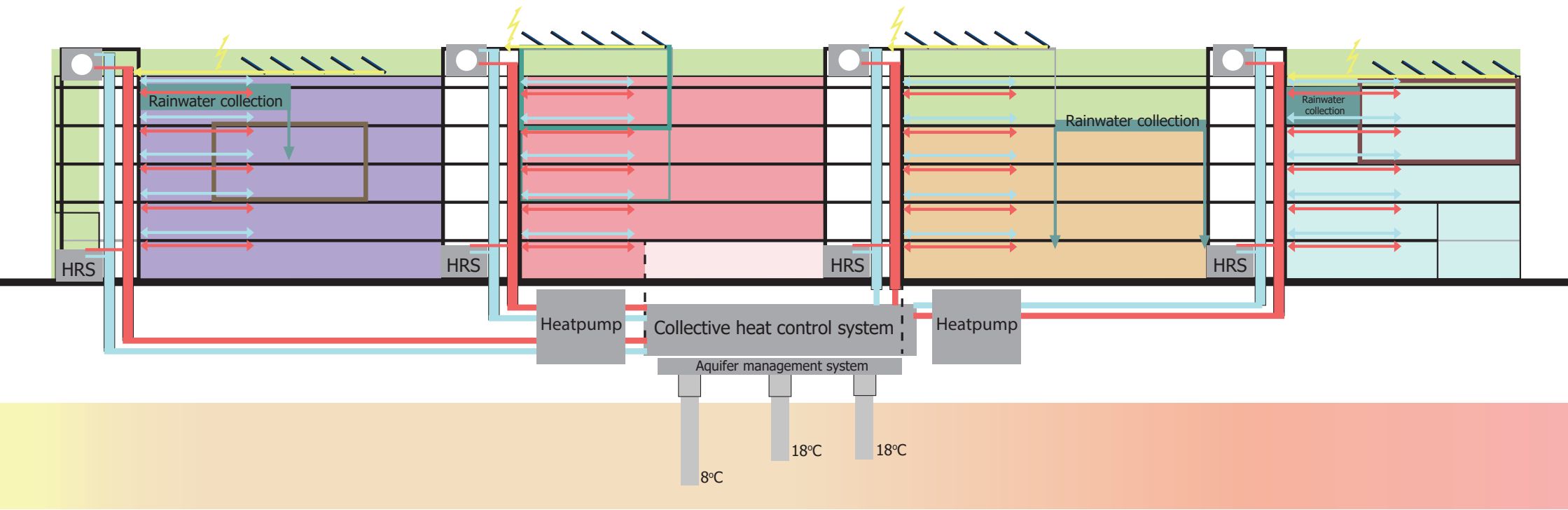
Integrated solar panels



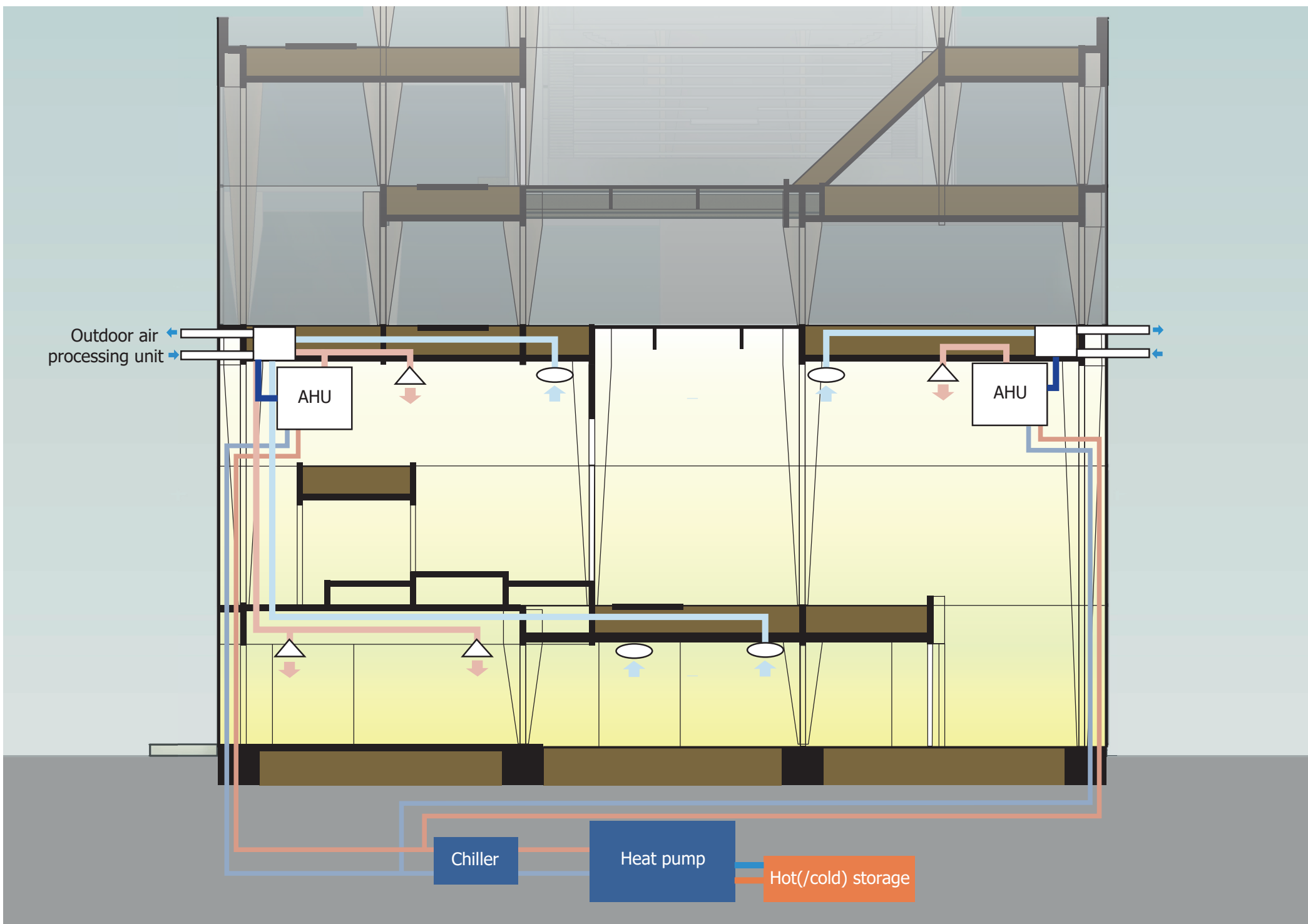
Evaporative cooling



Misting airconditioning

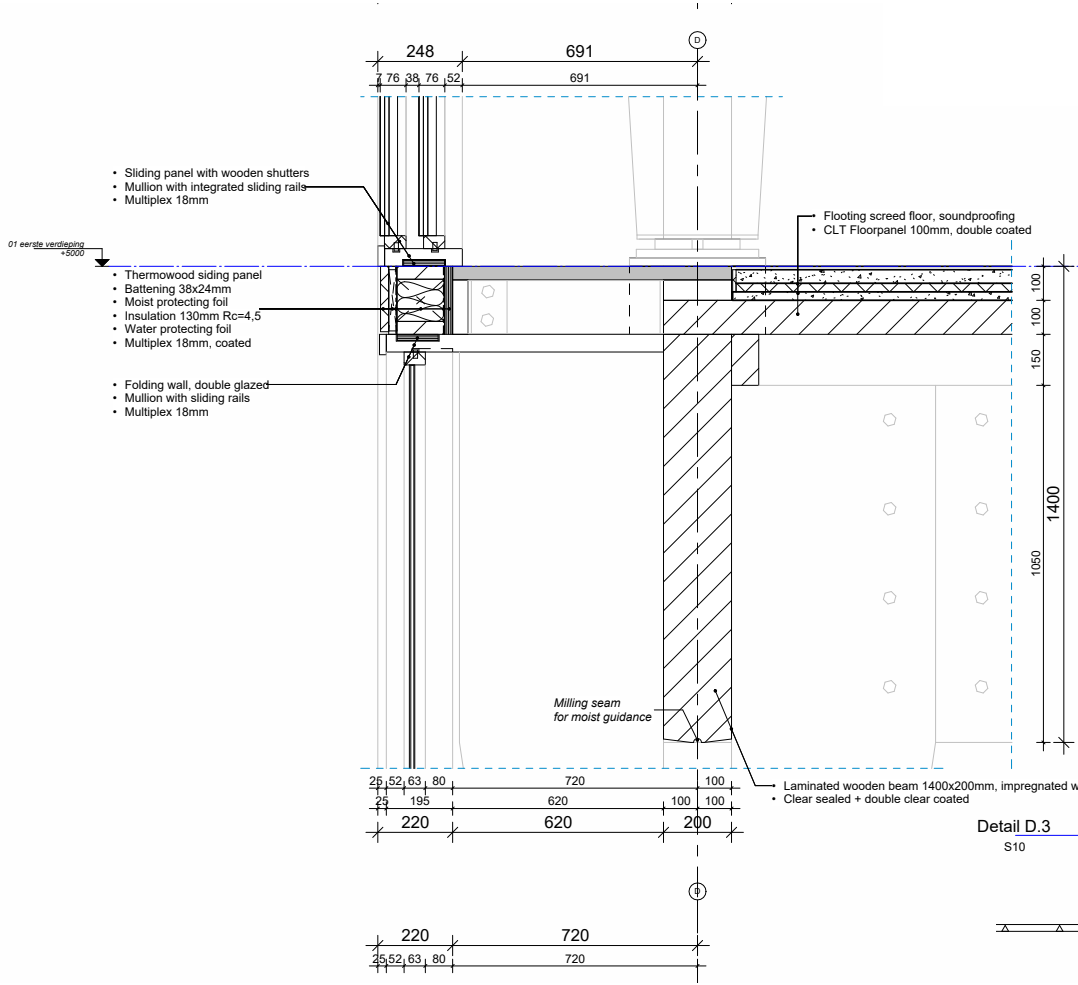
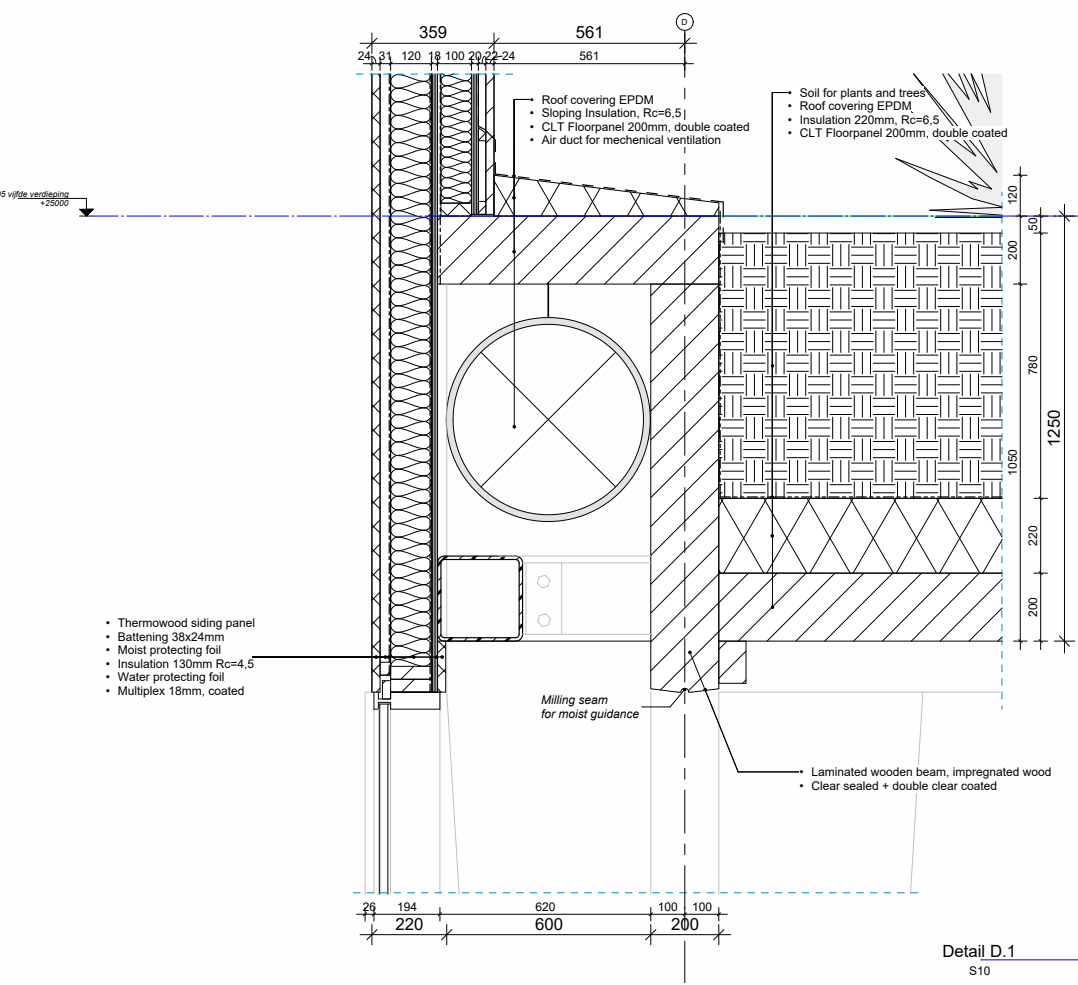


Section A - Climate diagram



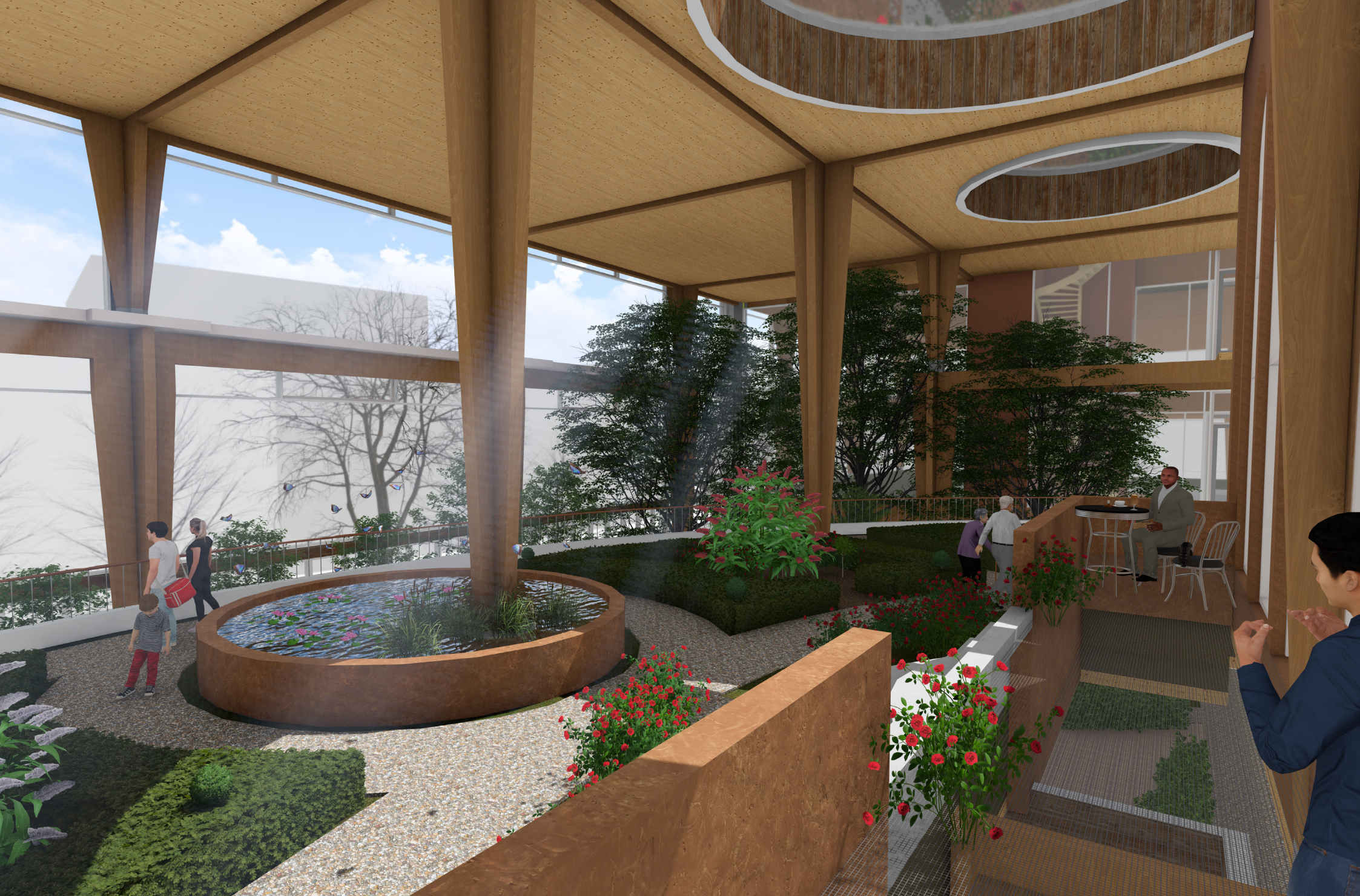
Climate systems diagram

Technical Details





Landscape Inside



Landscape Inside

Thank you!



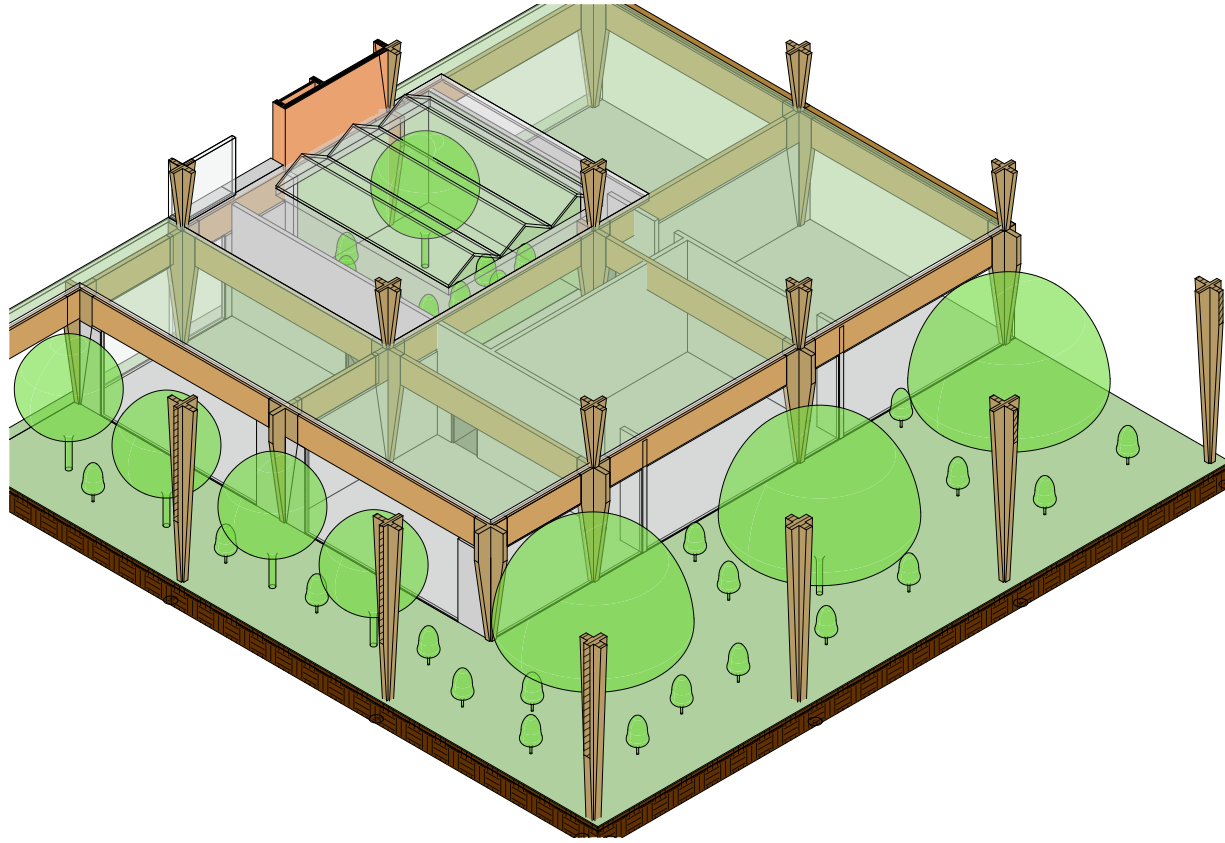


Q & A

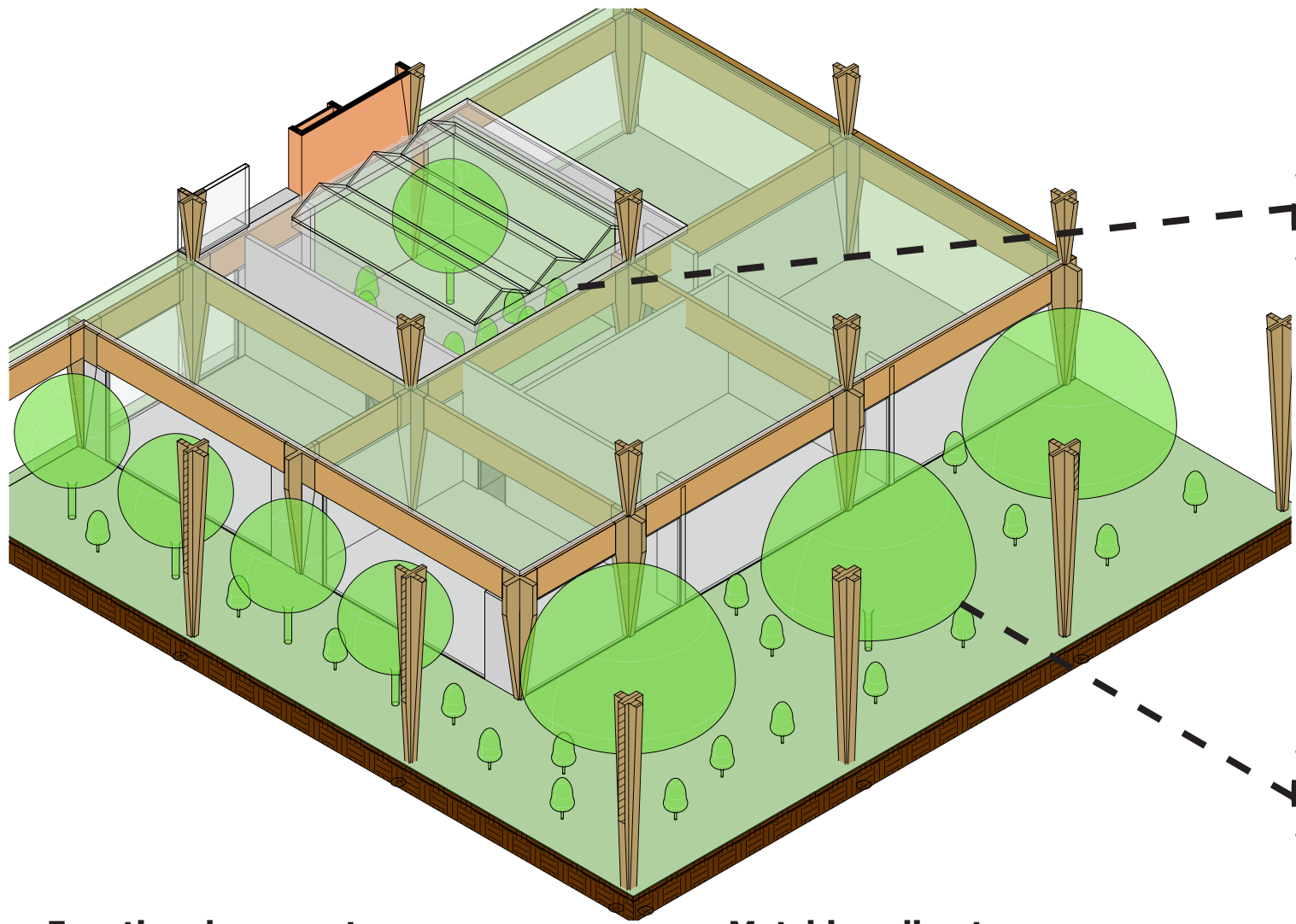
Functional parameters

Function	Area (m ²)	Amount	Length (m)	Width (m)	Height (m)	Type of green	Outdoor plant types	Indoor plant types	Furniture	Spatial parameters	Openness	Daylight factor (1-3)	Orientation	Soil thickness (m)	Stories (0-4)	Indoor green typology
Outdoor Neighbourhood Garden -Terrace -Planting borders -Vegetable garden -Different gardening styles -Space for artworks	300	2			∞	-Functional* -Decorative**	-Hedges -Trees -Herbs -Vegetables -Flowers -Grass -Bushes -Wine ranks	-None	-Park benches -Low fences -Picnic-benches -Stools -Bar -Artworks	-Could be divided into different areas	-Semi-closed from surroundings -Minimal shadows from buildings		South Or East/west	4		Chinese garden
Entrance Hall -Entrance -Reception information -Ticket Counter -Café with small kitchen -Shop -Toilets	300	1	16,7	15	≥8	-Decorative	-Bushes -Seasonal flowers -Pendant plants -Climbers	-Bushes -Pendant plants -Small trees (On ground floor) -Ground-covering plants -Roses/flowers	-Front desk -Waiting area/benches -Bar -Coffee tables -Chairs -Bistro tables -Showcases	-Near main circulation on streets -Enter through neighbourhood garden or pathway next to busy street				0	Atrium	
Public Service -Information counter -Waiting area -Private meeting rooms -Back office -Auditorium	200	2			>3	-Decorative	-Pendant plants -Climbers	-Climbers -Roses/flowers -Small bushes	-Counter -Benches -Conference desk -Desks/tables -Chairs -Tribune -Stage	-Next to entrance hall -In natural circulation flow						Green wall + Skylight
Wintergarden -Neighbourhood garden -Terrace/sitting area -Work tables -Indoor green -Storage -Greenhouses -Vegetable garden -Different gardening styles	400	1			≥8	-Functional -Decorative	-Pendant plants -Climbers	-Herbs -Vegetables -Flowers -Ground covering plants -Pendant plants -Climbers -Bushes -Shrubs -Exotics		-Could be divided into different areas	-Greenhouse-structure -Tall windows	3	South			Biodome/ <u>combination atrium + orangerie</u>
Communal Kitchens -Multiple kitchens -Dining areas -Front desk -Pantry -Freezer room -Toilets	200	2			>7	-Functional -Decorative	-Ground covering plants -Grasses -Pendant plants	-Herbs -Vegetables -Flowers -Shrubs		-Connection to herb garden -Connection to vegetable garden -Connection to vertical farming						Patio + Vertical farm

Interactions



Mediterranean gardens with workshopspaces



Flowers
Temperature: 18-25°C
Humidity: 55%

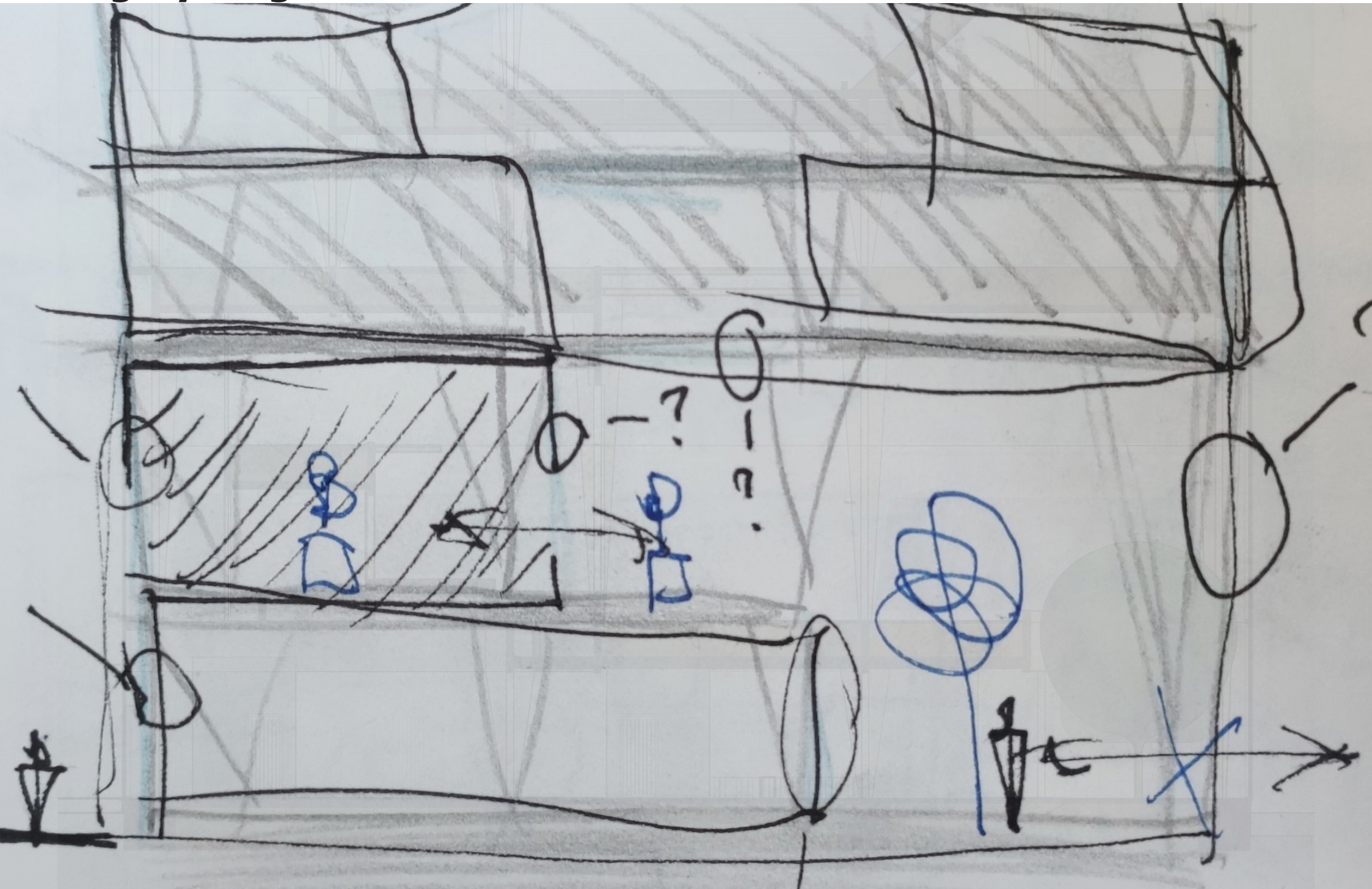


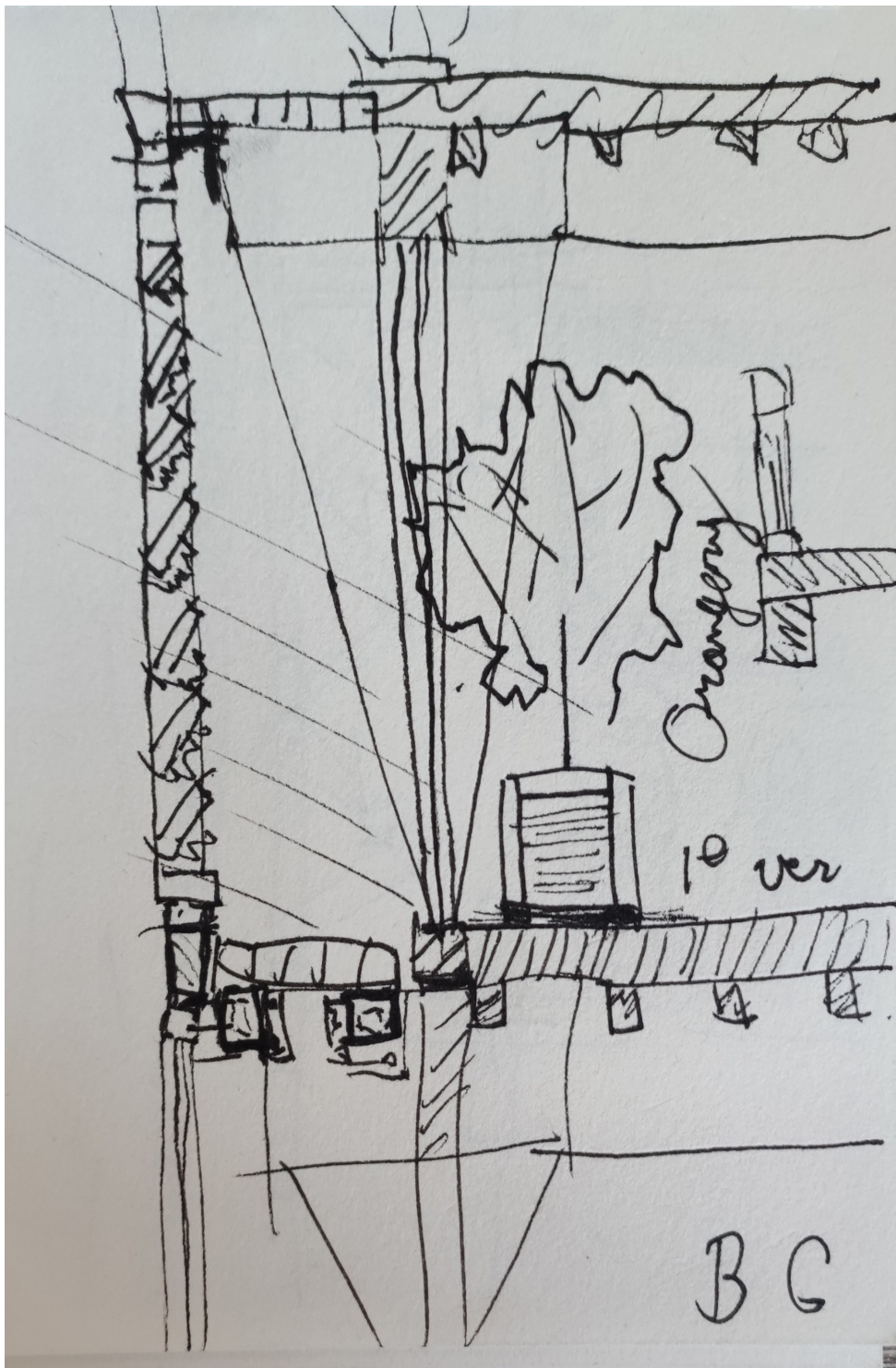
Olive trees
Temperature: 7-37°C
Humidity: 45%

Functional parameters
Temperature: 15-27°C
Daylight: All day (in)direct
Height:
General: embedded in gardens and visual relation to street life

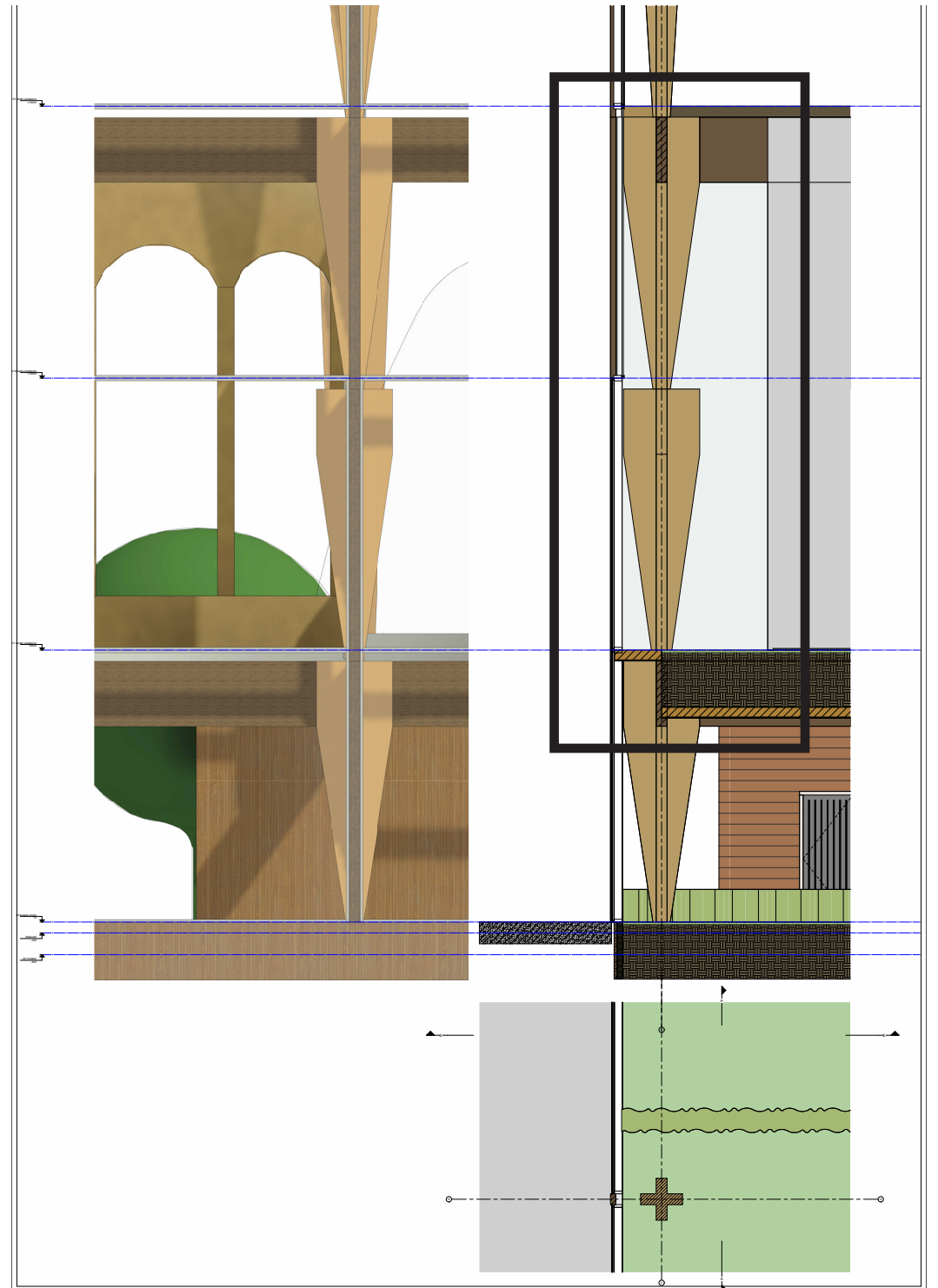
Matching climate: Mediterranean
South facing
Temperature: 10-40°C
Height: 10m

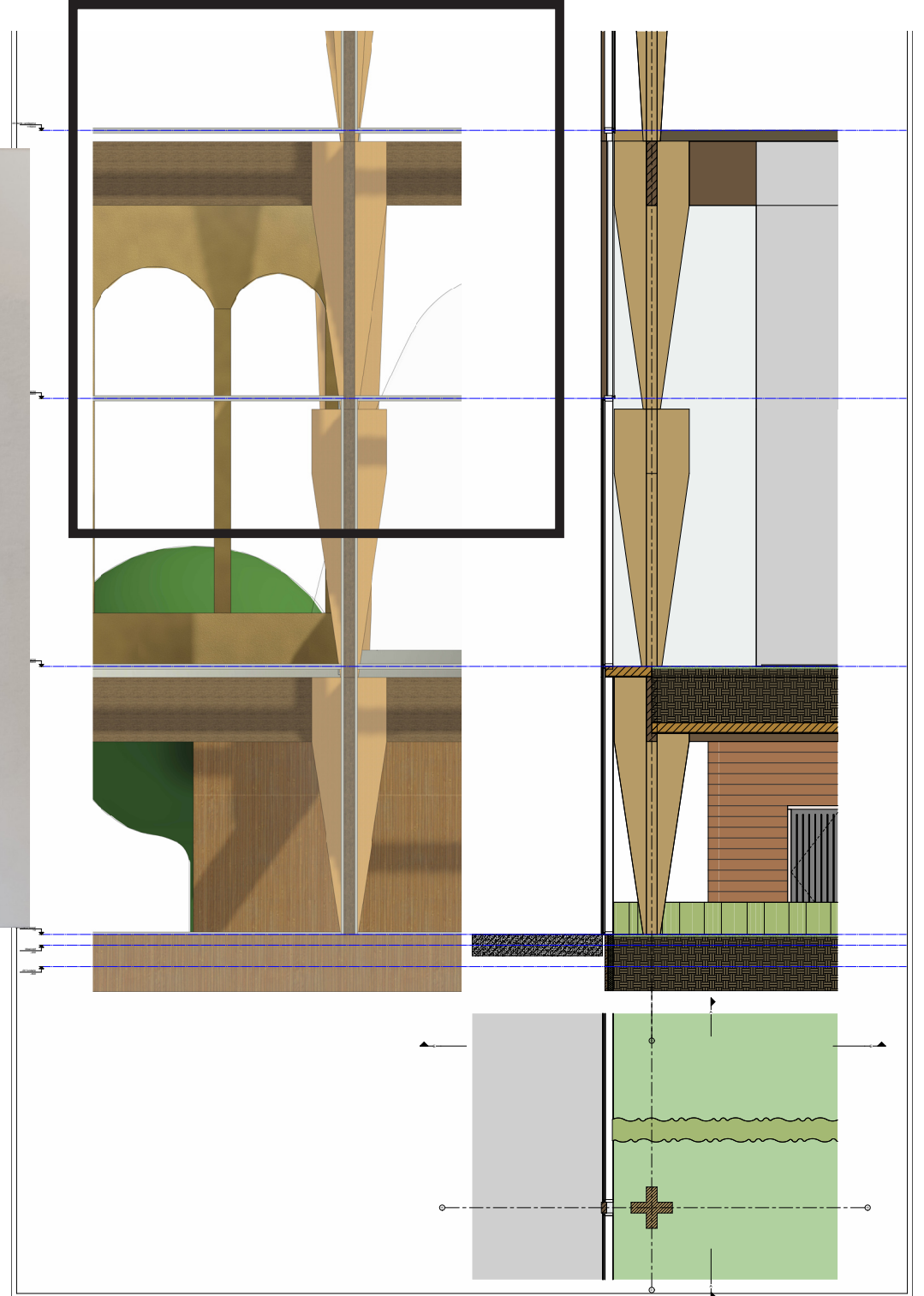
Orangery diagram



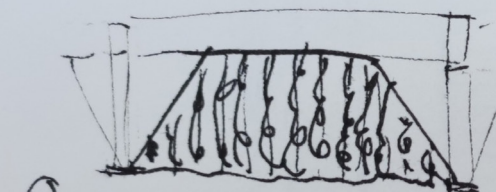
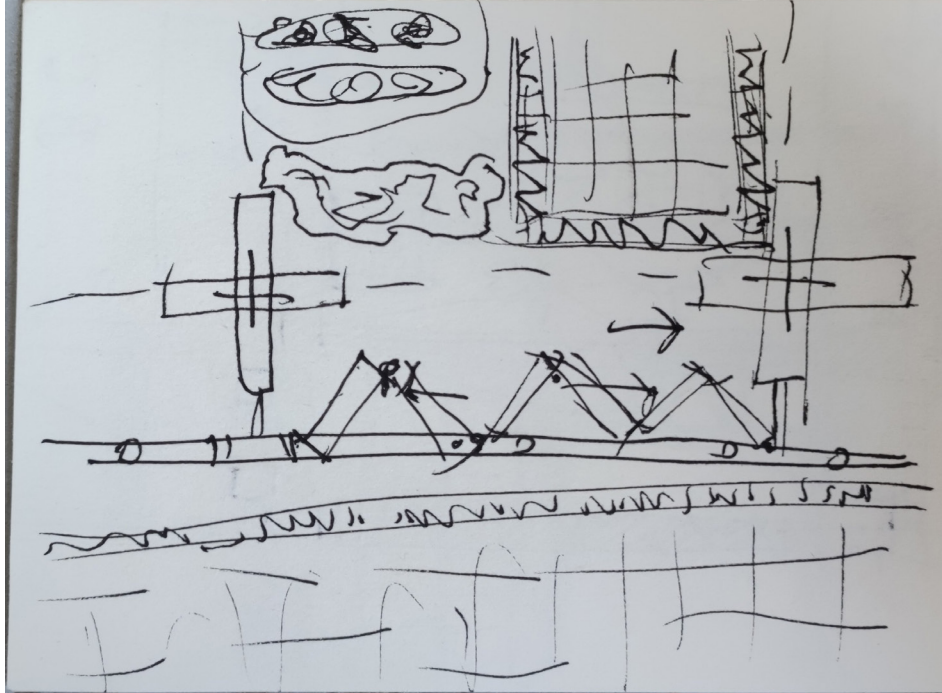


Section & details

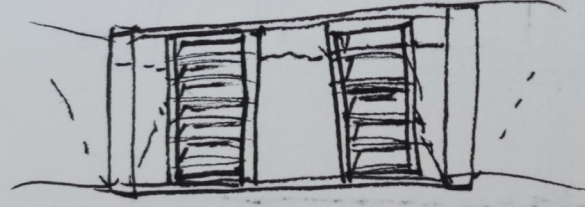




Sections & details



① Climbers

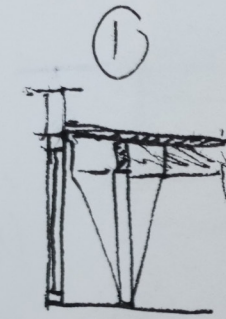


② Shutters (Fixed)

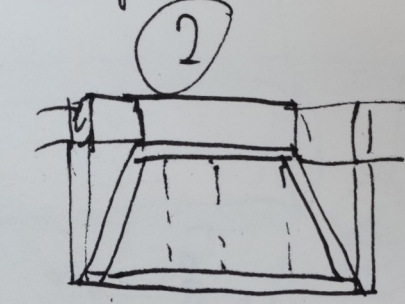
(Semi) Open Facades

- Provide shade
- Enclose the space
- Privacy screens
- Backdrop for plants (just like a hedge)
- Both dependant and independent possible

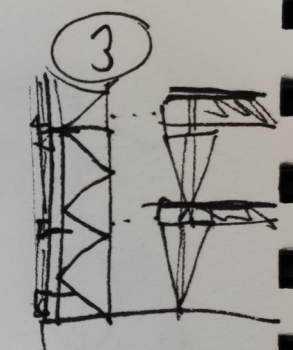
Curtain Wall placement



In front of construction
(dependant)

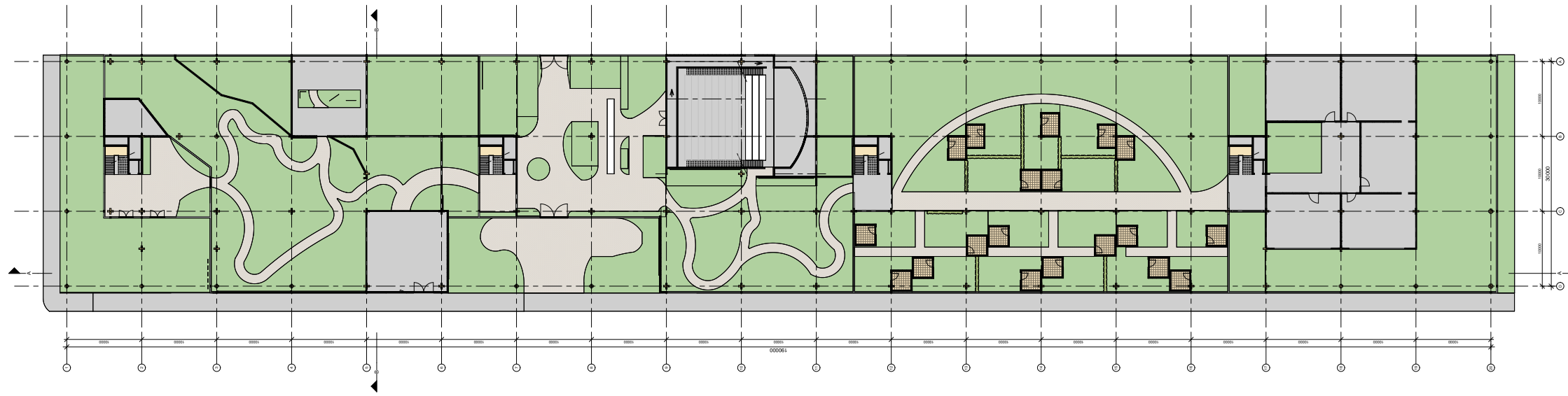


In between construction

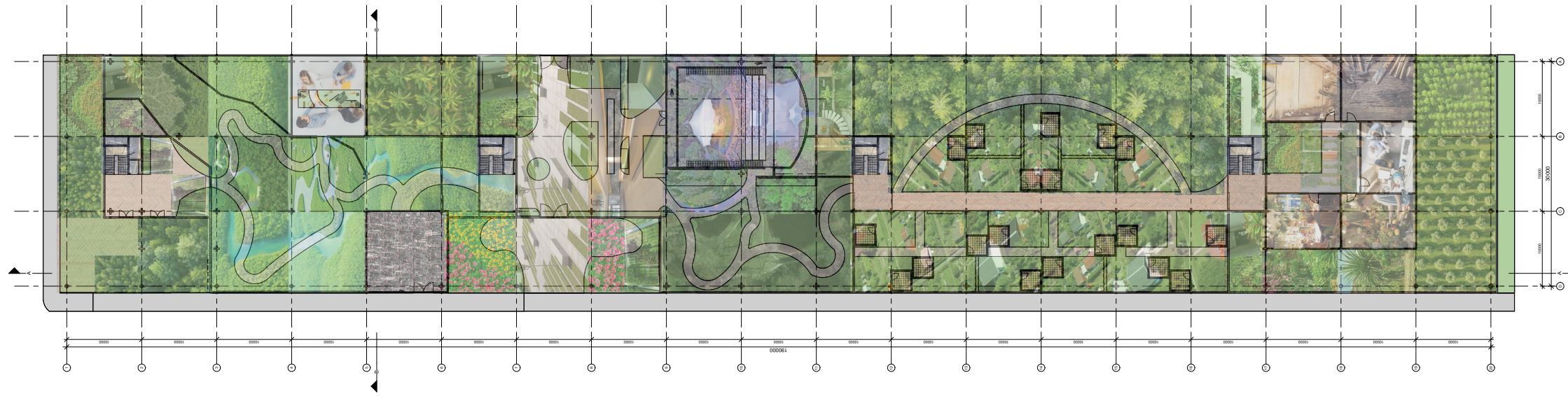


Own construction
(Independent)

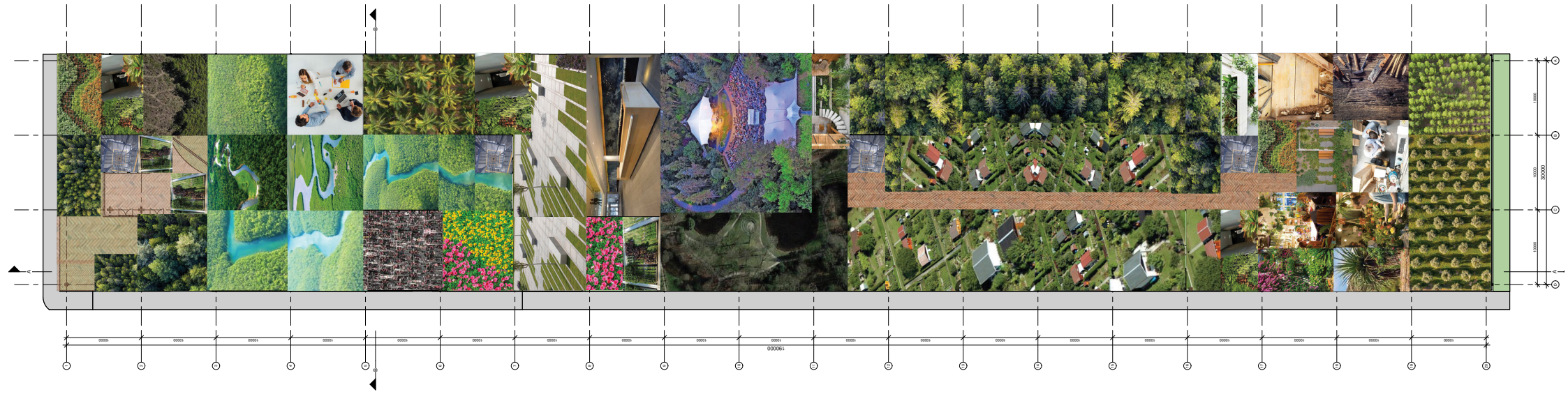
Landscape design



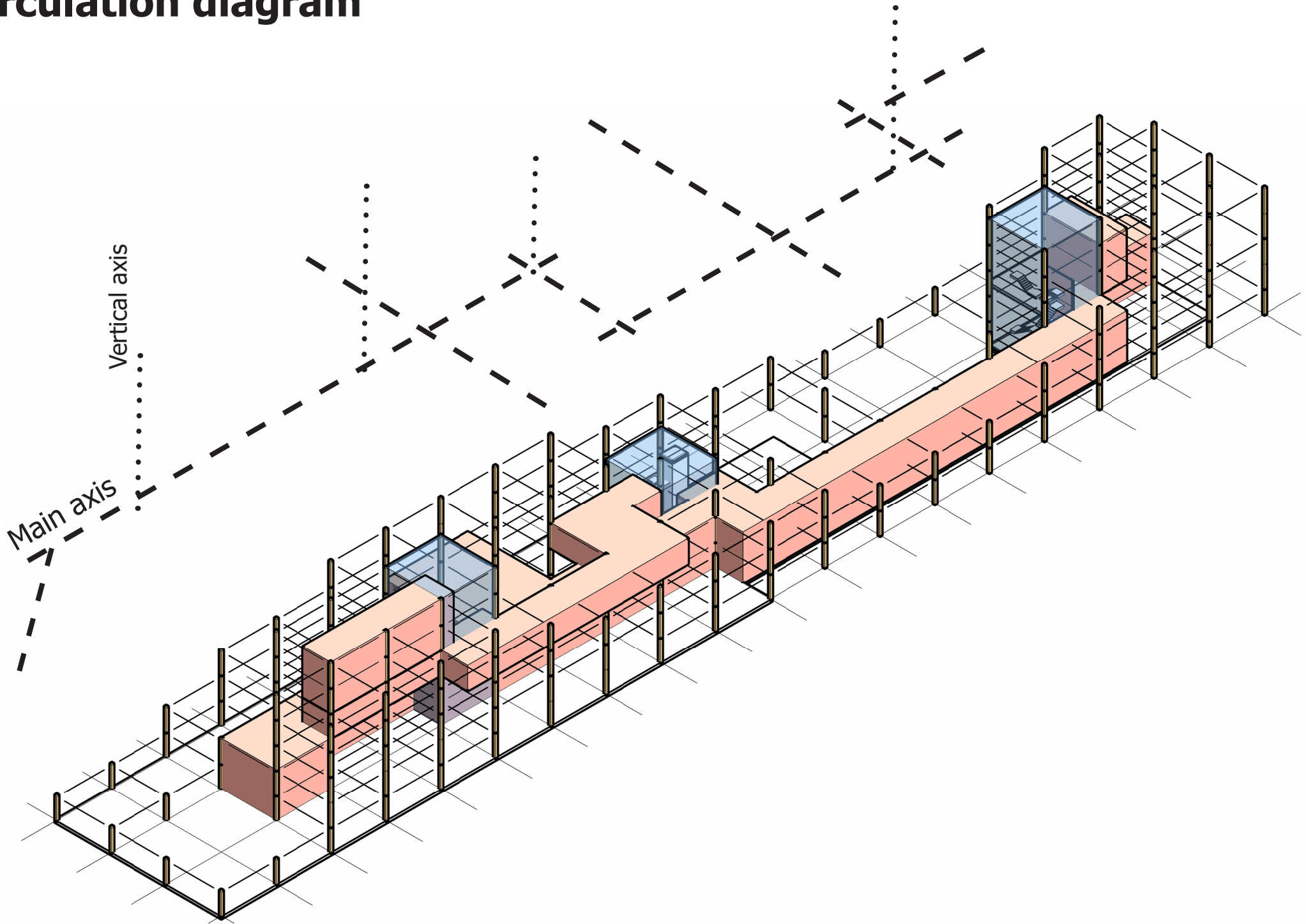
Landscape design



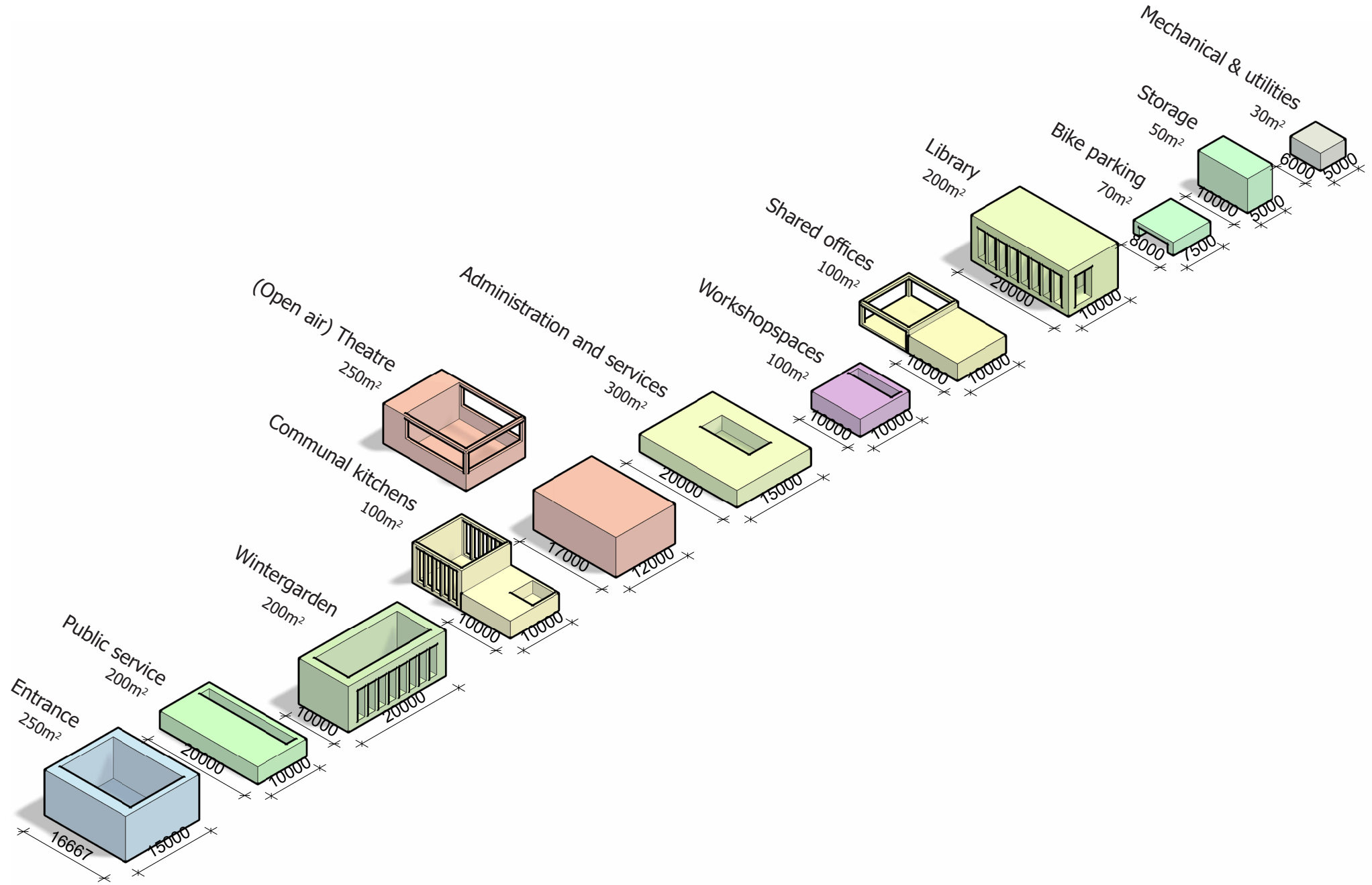
Landscape design



Circulation diagram

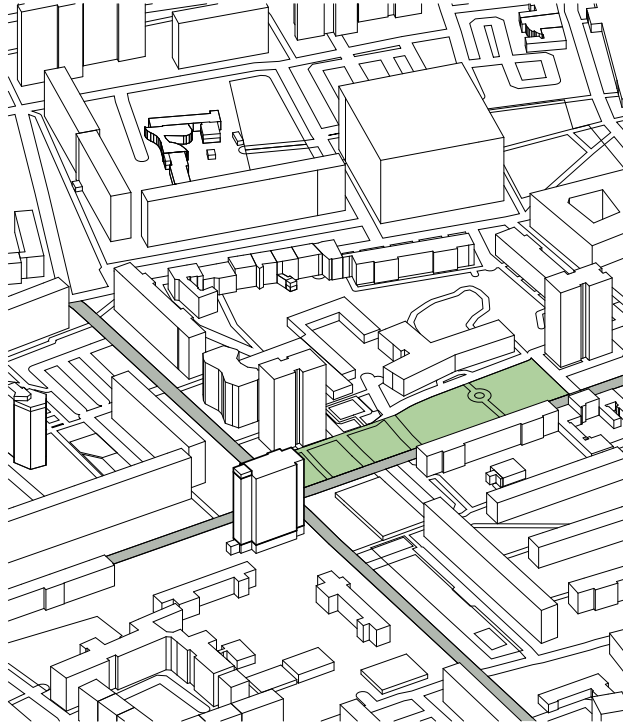


3D Building program

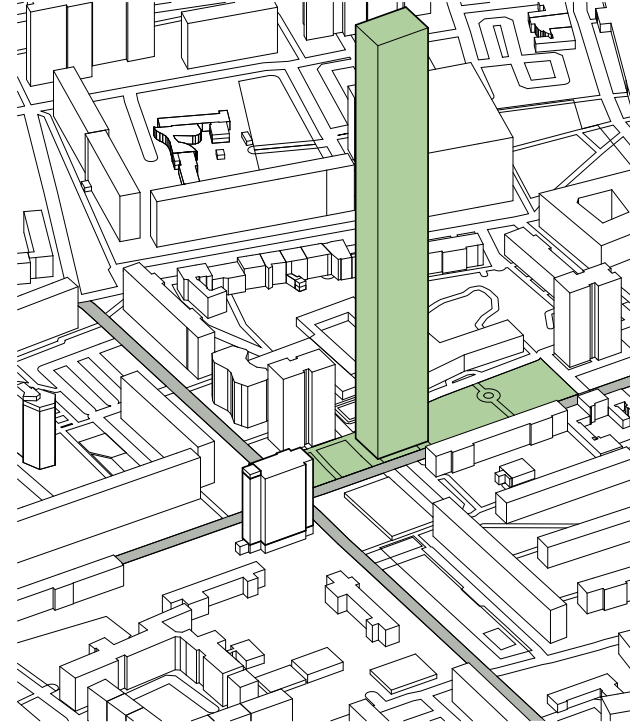


How to increase the urban green area?

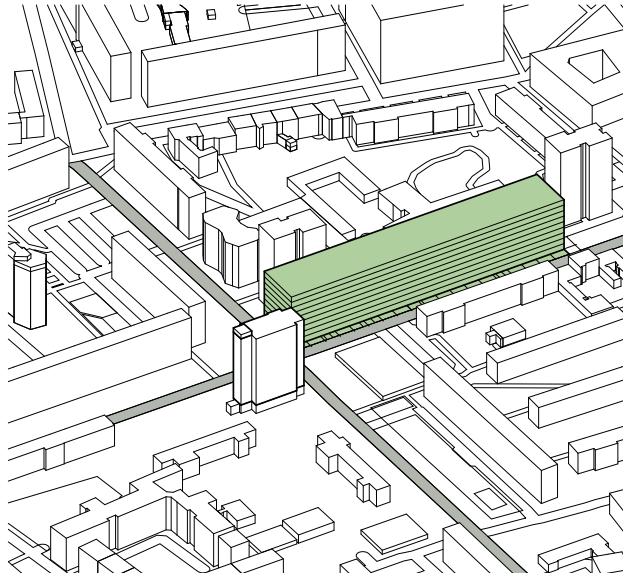
Site area - 9.286 m²



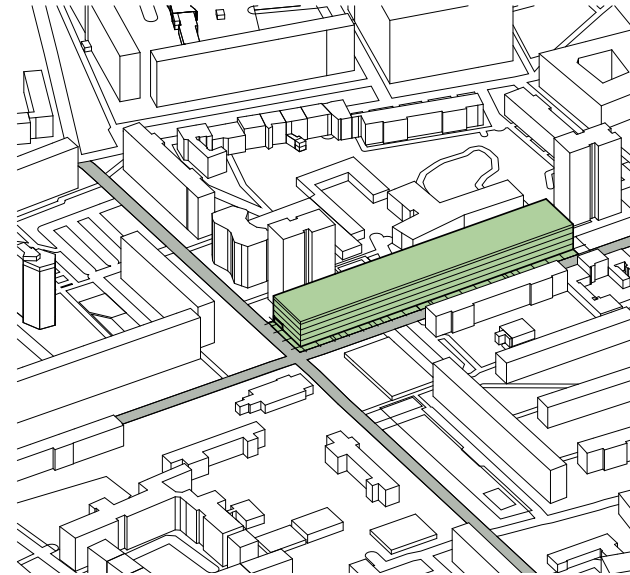
Vertical stacked - 65.000 m²



Horizontal stacked - 65.000 m²



Condensed volume - 37.144 m²



What is a green condenser?

XL



Central park - 3,41 km² - 1.620.867 C
Manhattan, New York City, USA

M



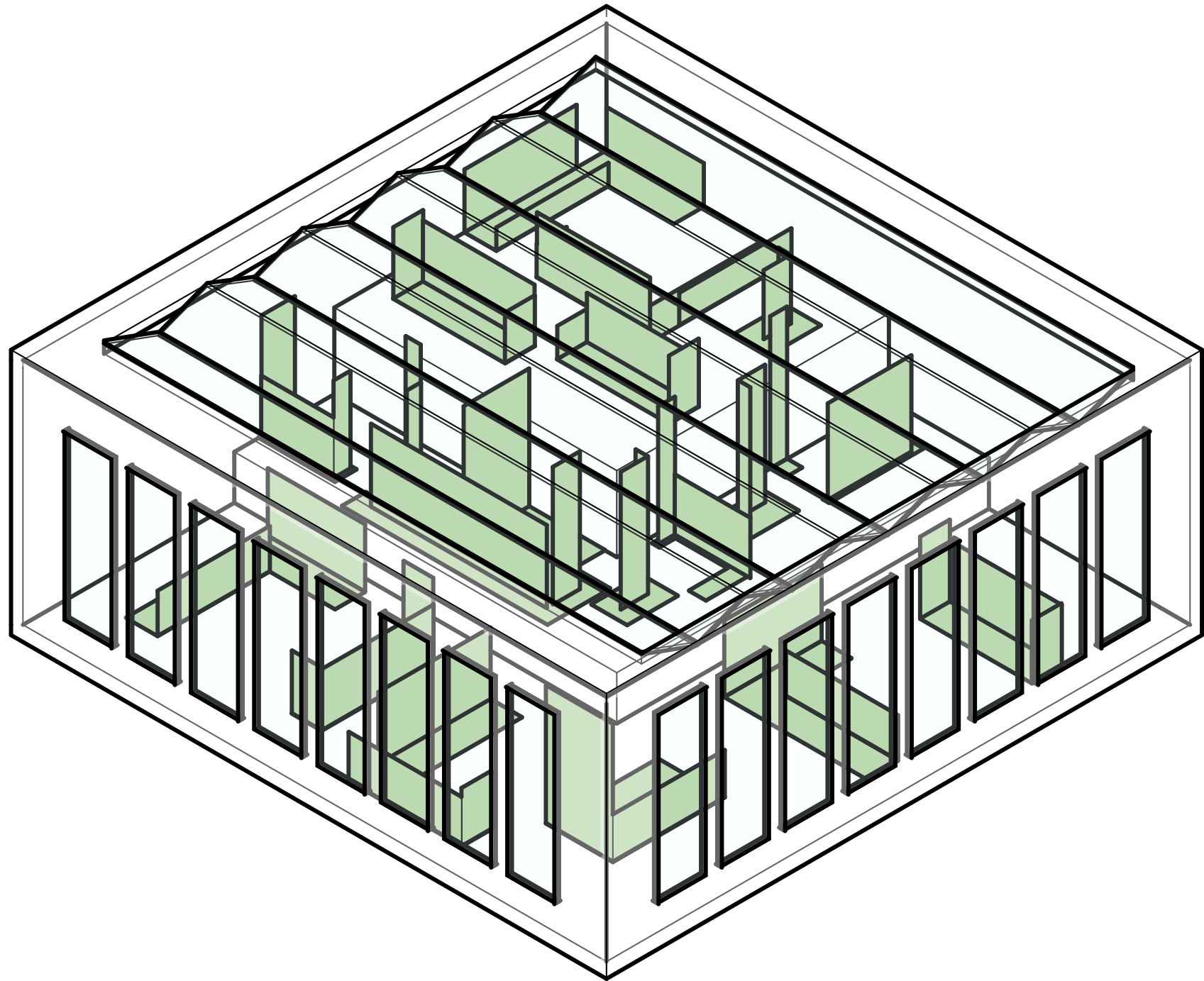
Floriade - 0,60 km² - 217.828 C
Almere, Flevoland, Netherlands

S

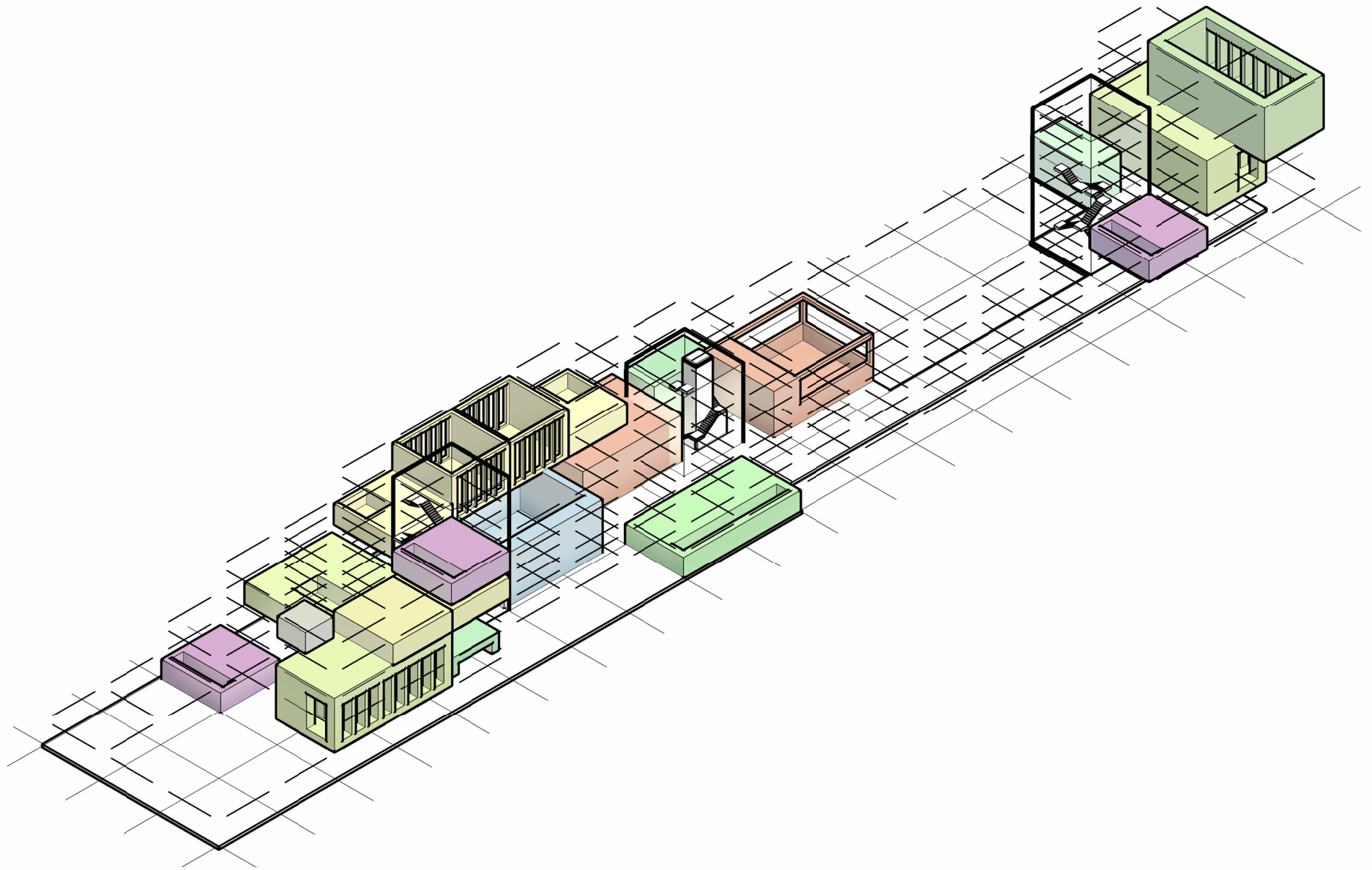


Hortus Botanicus-0,025 km²-104.574 C
Delft, Zuid Holland, Netherlands

Indoor communal garden



Functional diagram



Vision: Condensed communal green

