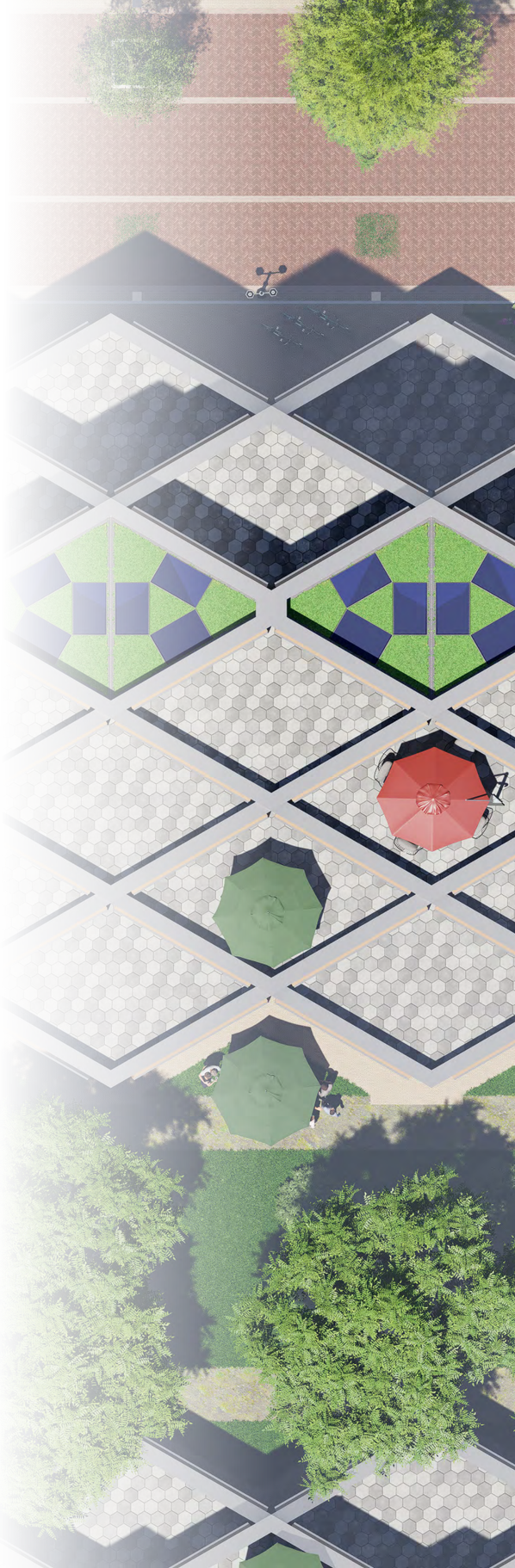
Architectural Engineering
A3



Max Heerschop
5542030

Current situation

National

Regional

Local

Current situation

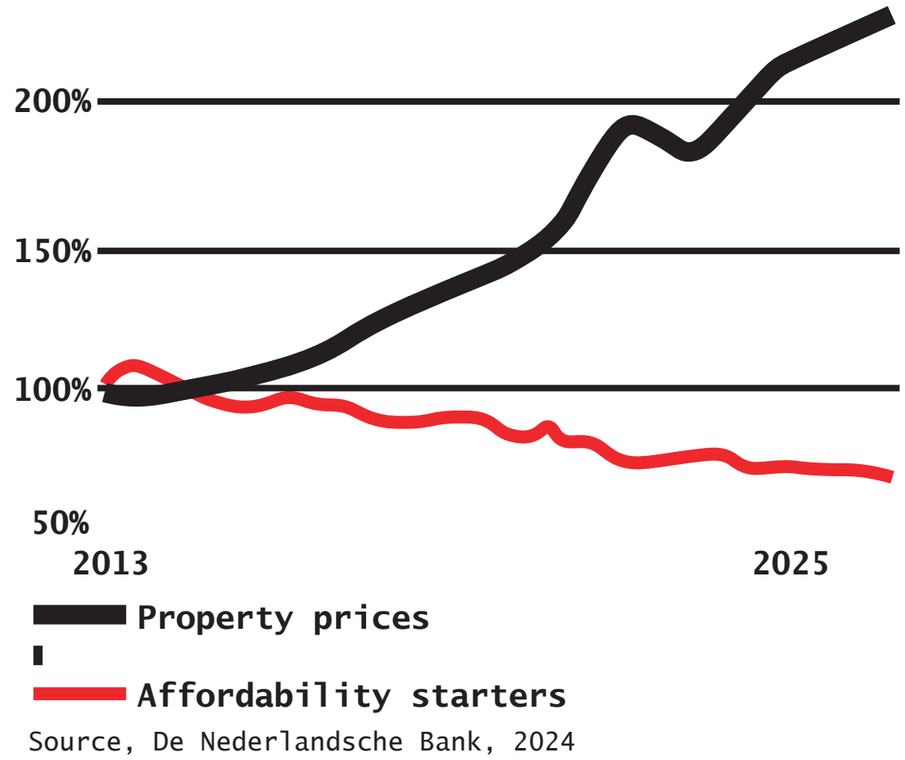
National

‘Everything’s just ... on hold’: the Netherlands’ next-level housing crisis



Regional

Local



Source, De Nederlandsche Bank, 2024

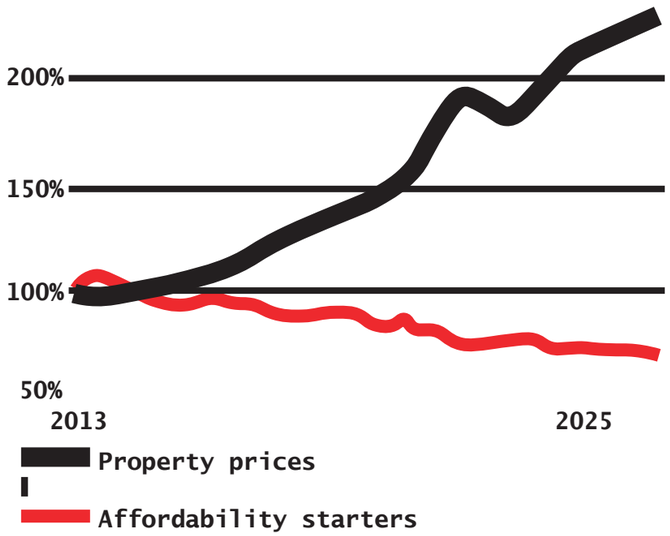
900.000 nieuwe woningen om aan groeiende vraag te voldoen

Er is in Nederland een groot tekort aan woningen. Dit komt onder andere door de groeiende bevolking, lange bouwprocedures en beperkte bouwgrond. Voor veel mensen is het hierdoor lastig een woning te vinden die aansluit bij hun wensen en mogelijkheden. Daarom wil de Rijksoverheid dat er 900.000 woningen gebouwd worden tot en met 2030.

Ministerie van Volkshuisvesting en Ruimtelijke Ordening

Current situation

National



Source, De Nederlandsche Bank, 2024

Soaring property prices

Shortage ~1 million homes

1.8 million people live in personal unpreffered typologies

Regional

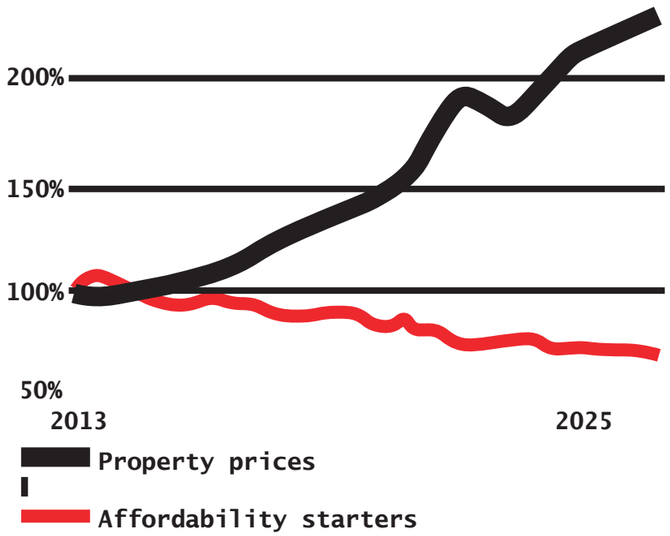
Local

Land use



Current situation

National



Source, De Nederlandsche Bank, 2024

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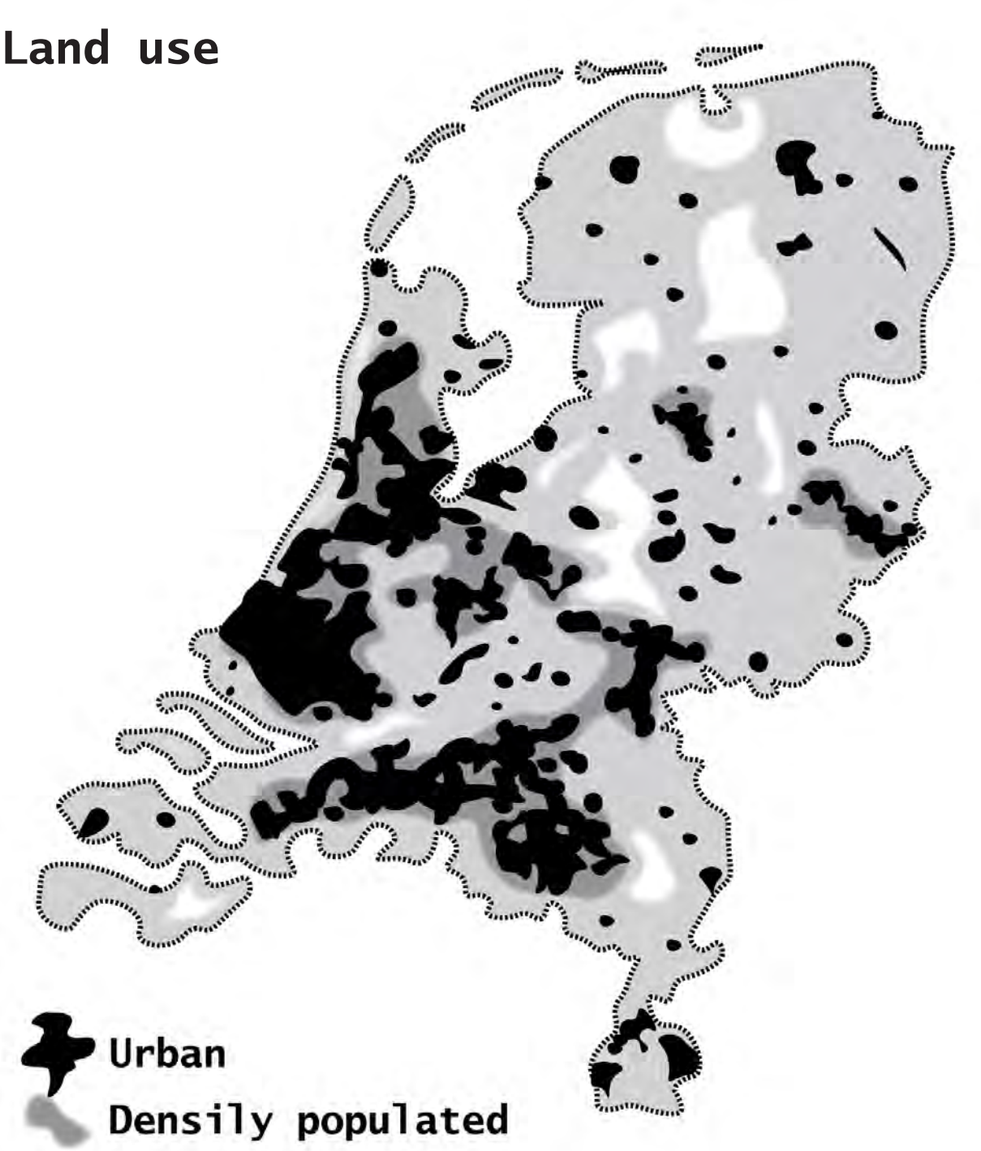
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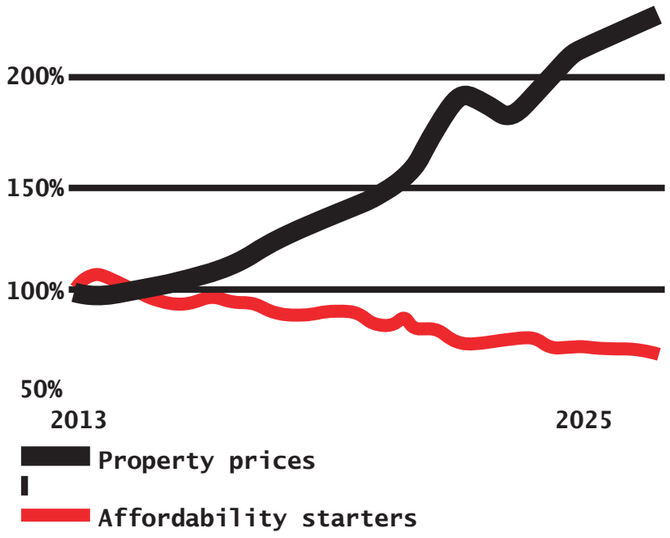
Land use

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Current situation

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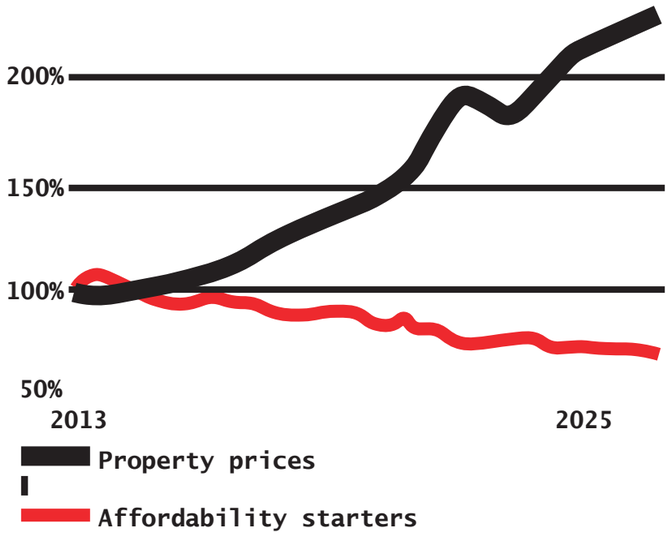
Local

Land use



Current situation

National



Source, De Nederlandsche Bank, 2024

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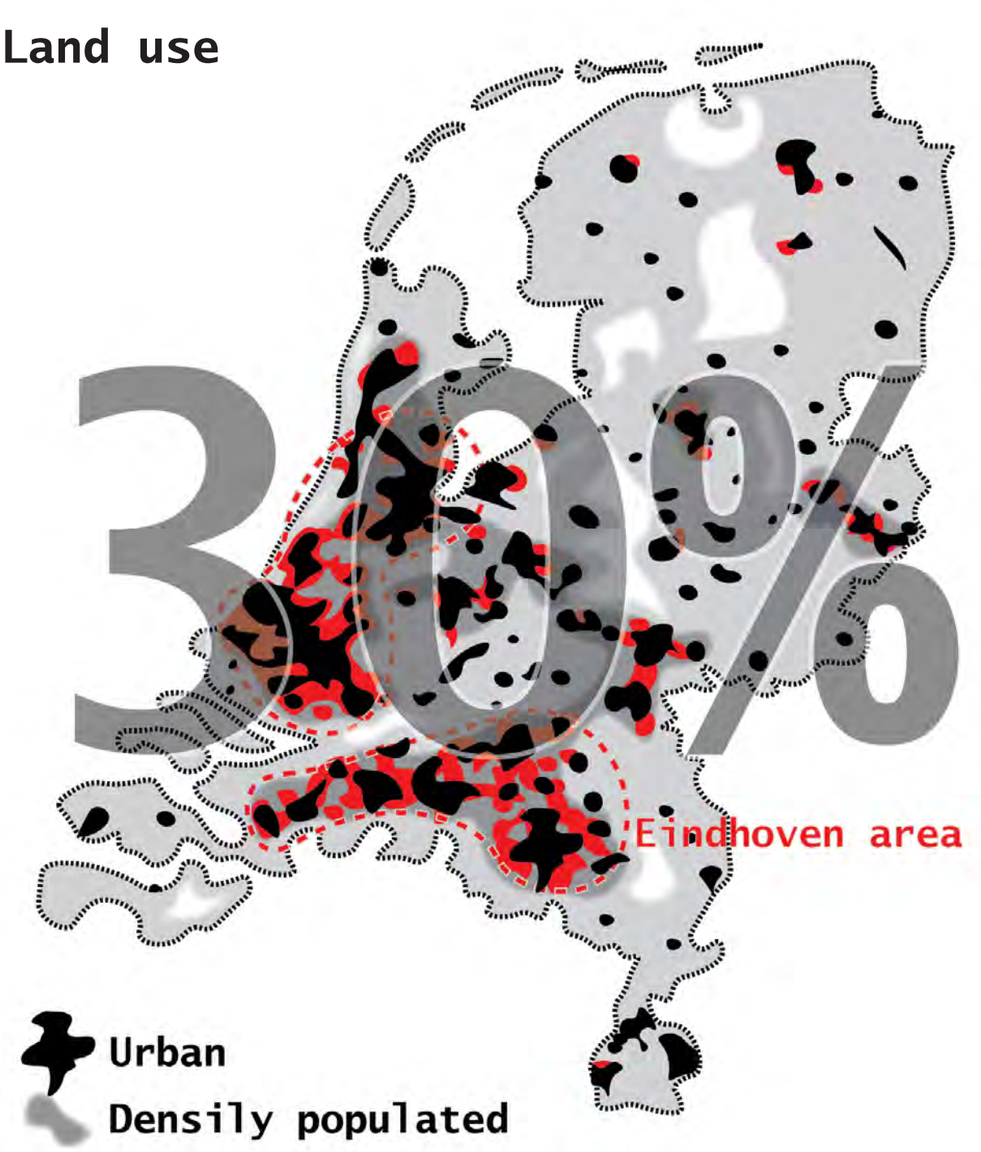
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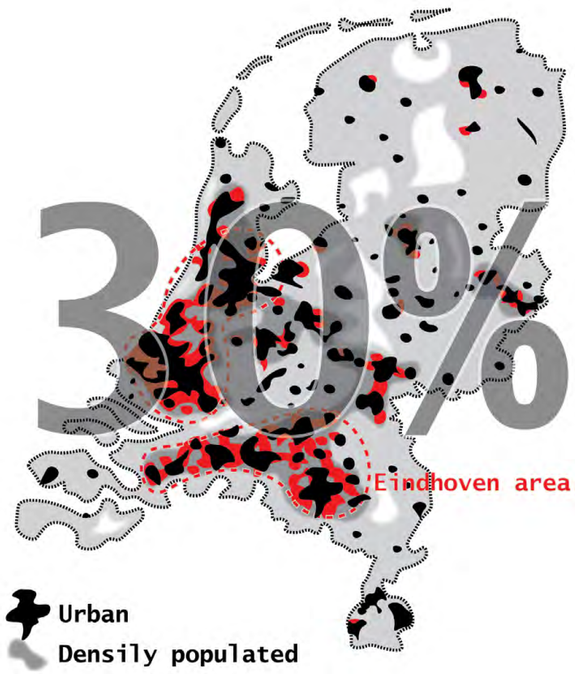
Local

Land use



Current situation

National



Heavy strain on land use

Soaring property prices

Shortage ~1 million homes

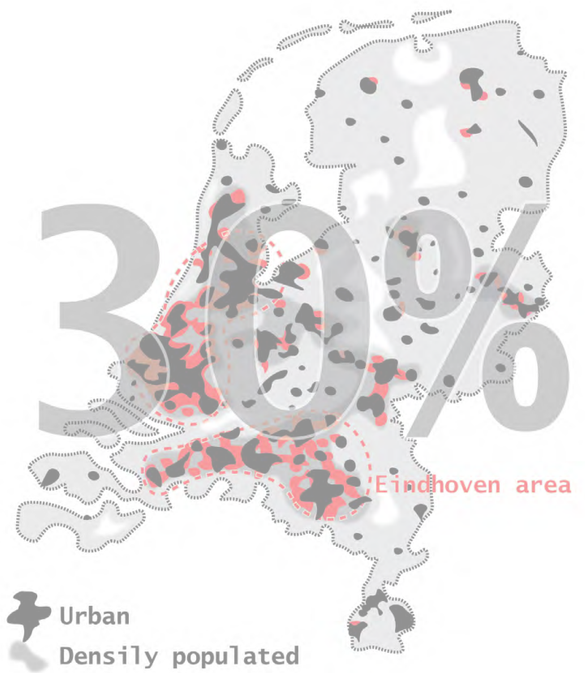
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Regional

Local

Current situation

National



Heavy strain on land use

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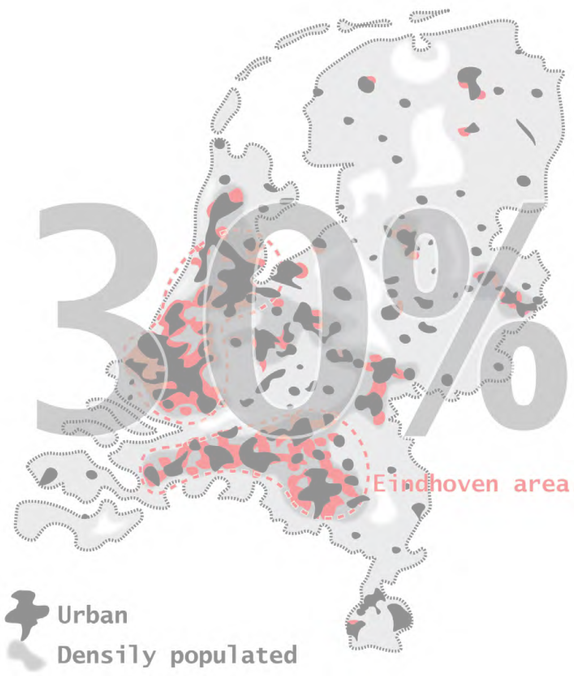
Regional



Local

Current situation

National



Heavy strain on land use

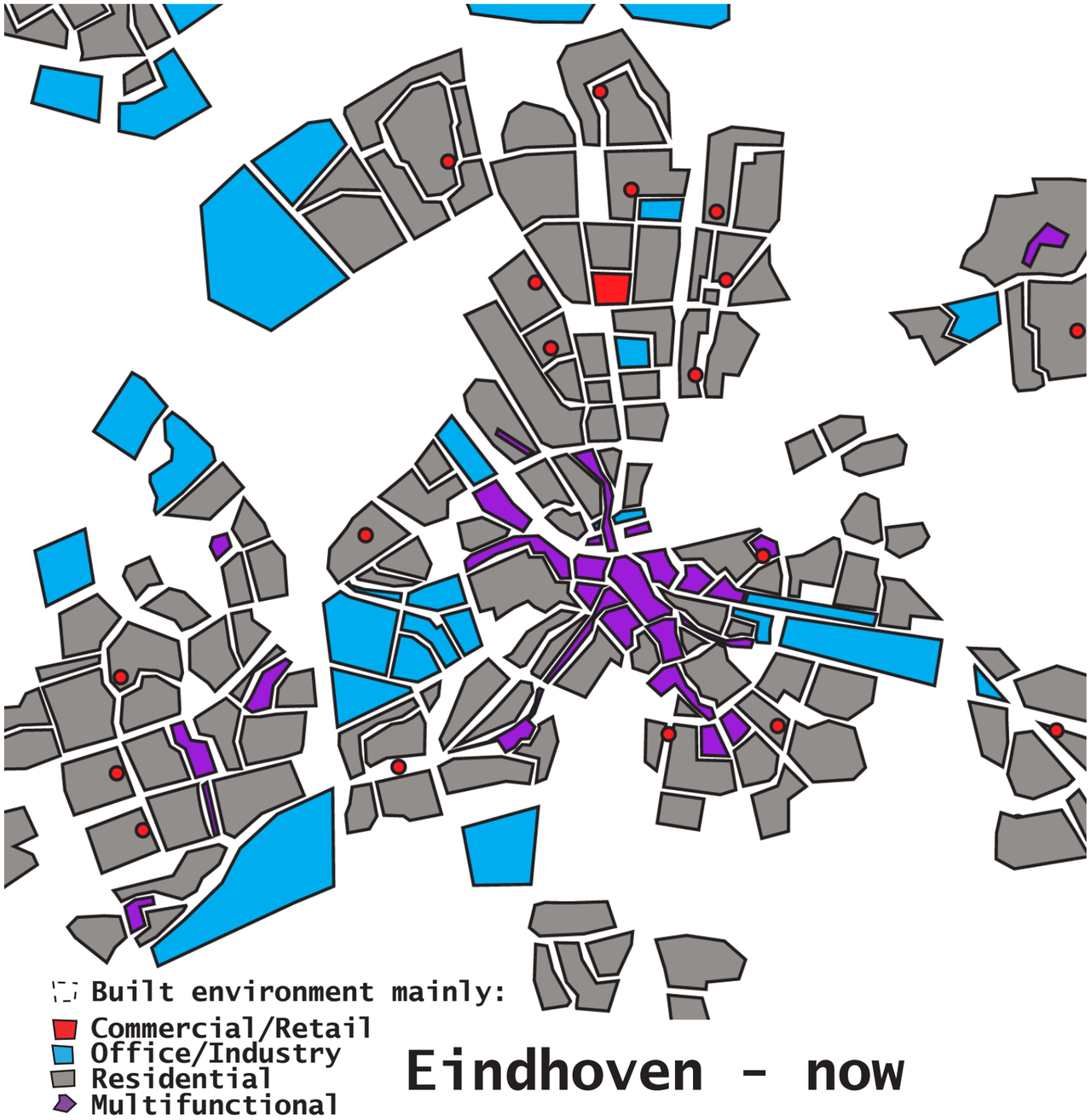
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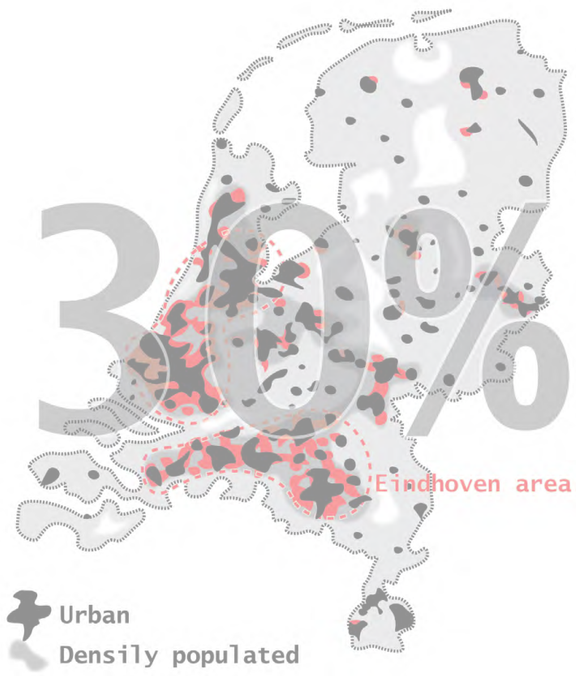
Regional

Local



Current situation

National



Heavy strain on land use

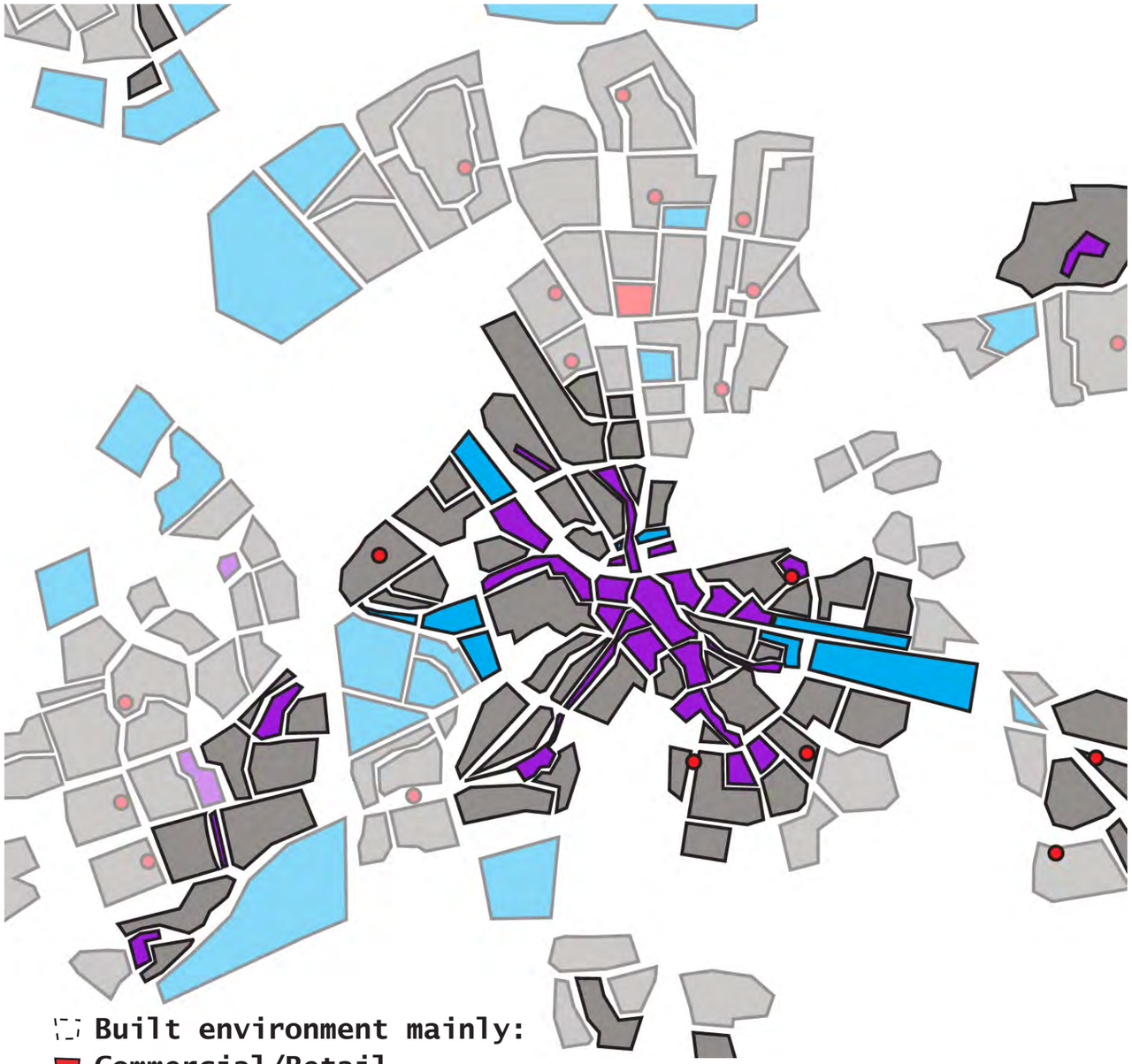
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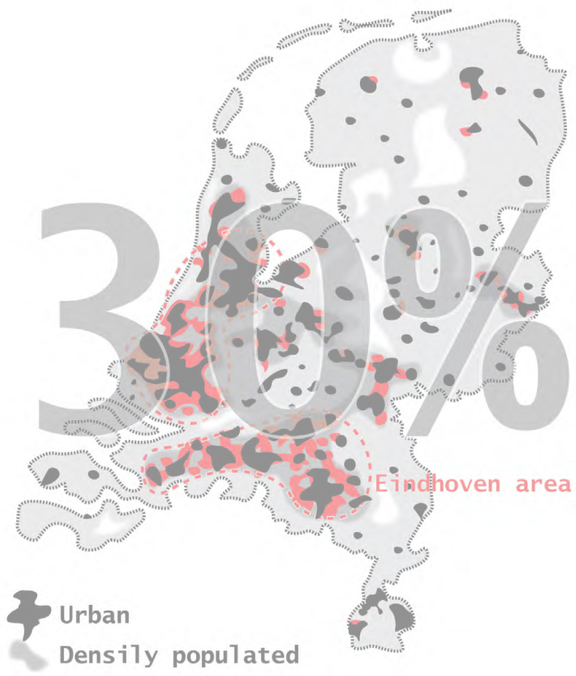
Local



Eindhoven - now

Current situation

National



Heavy strain on land use

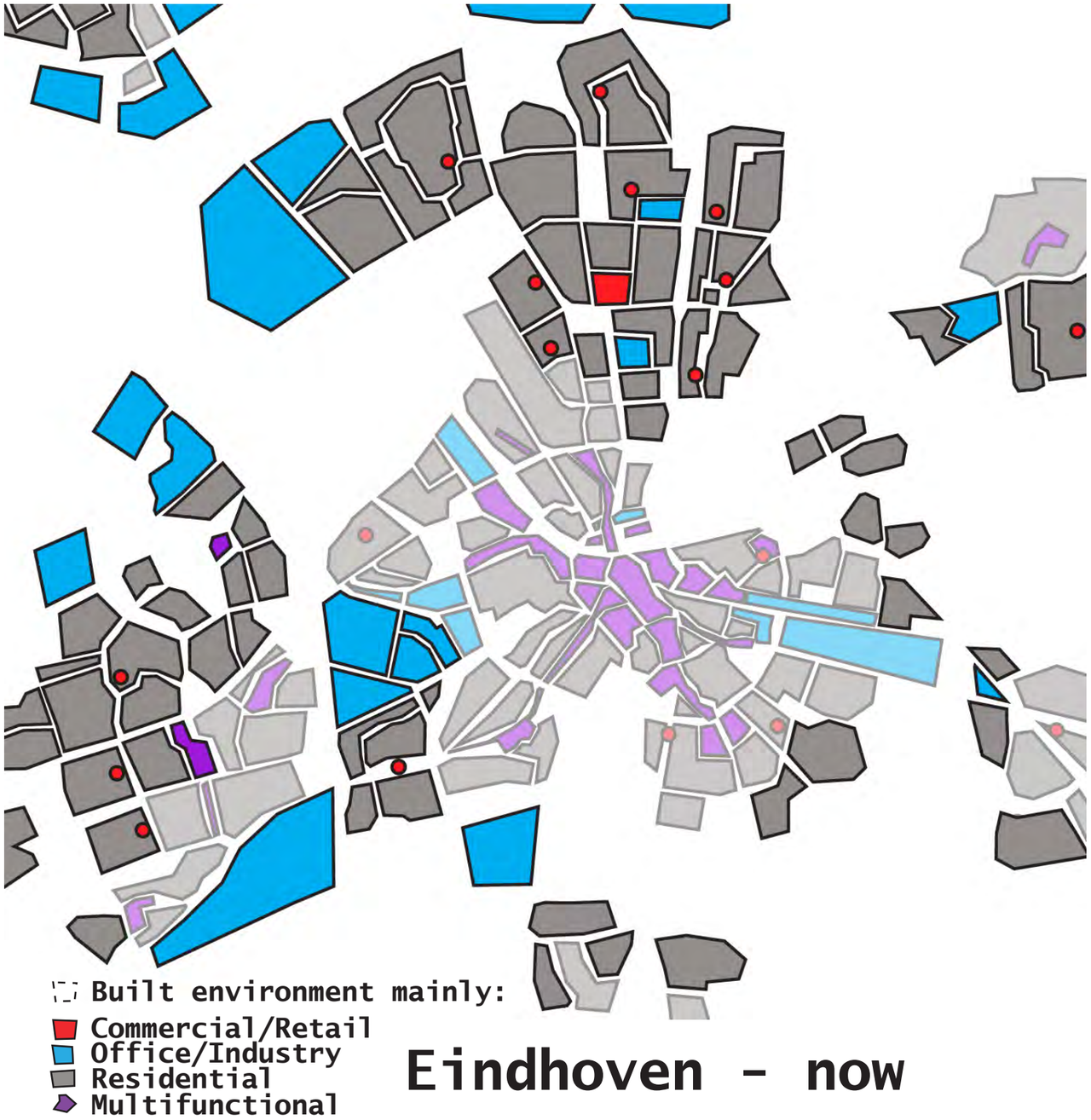
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Regional

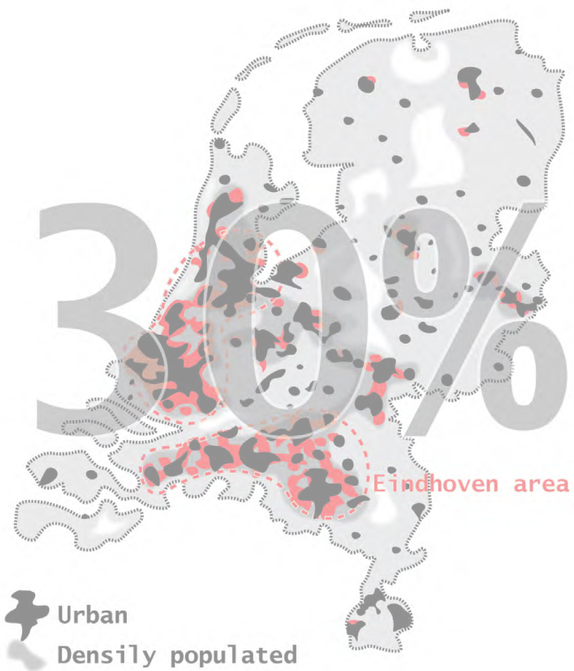
Local



Eindhoven - now

Current situation

National



Heavy strain on land use

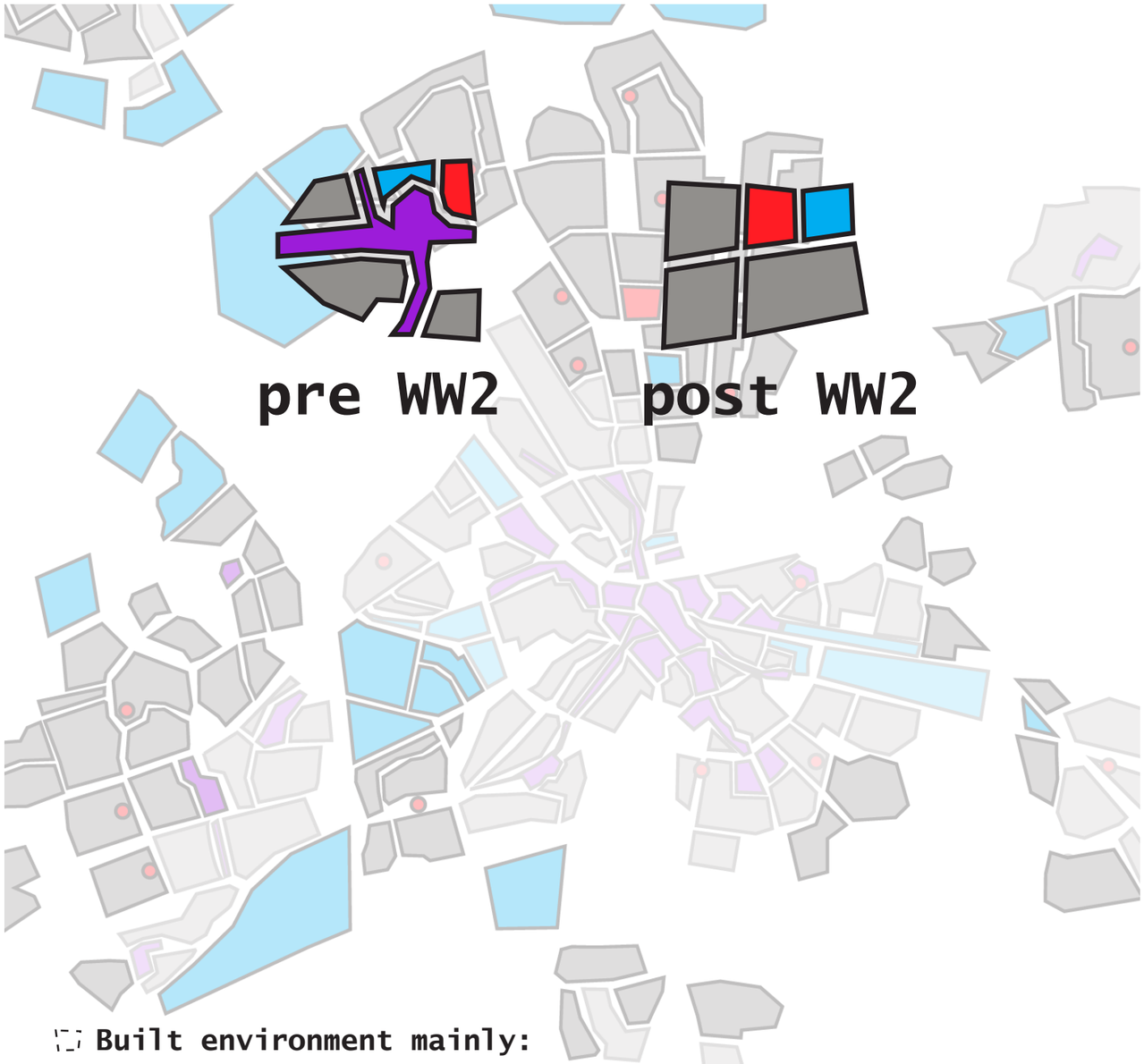
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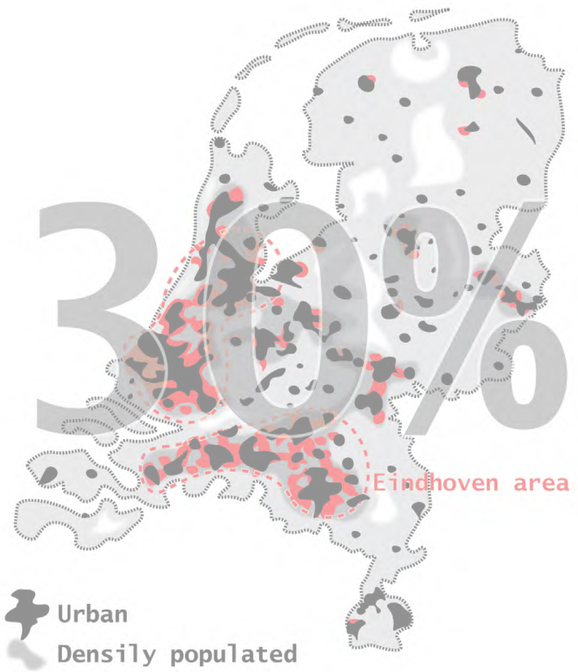
Regional

Local



Current situation

National



Heavy strain on land use

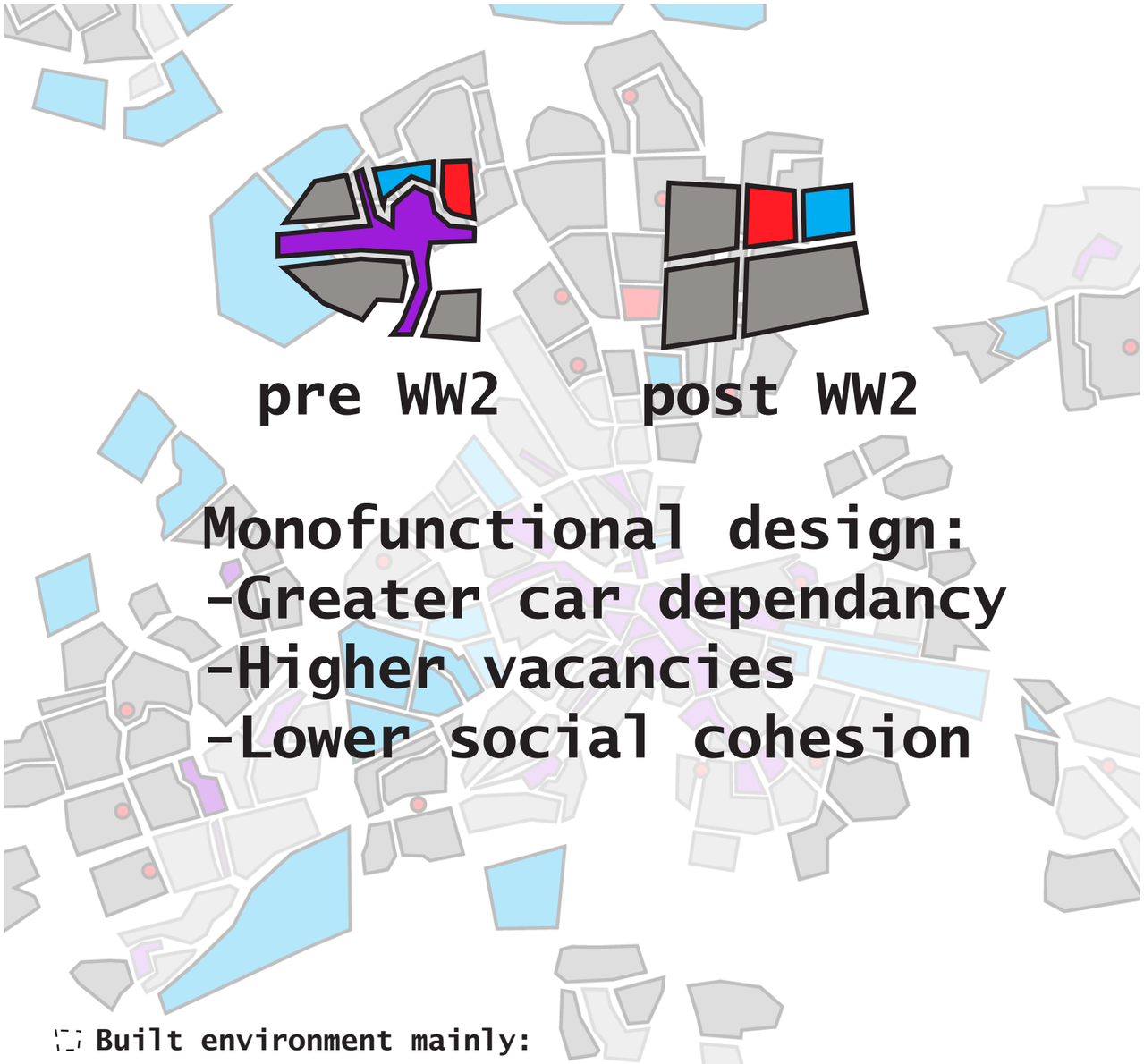
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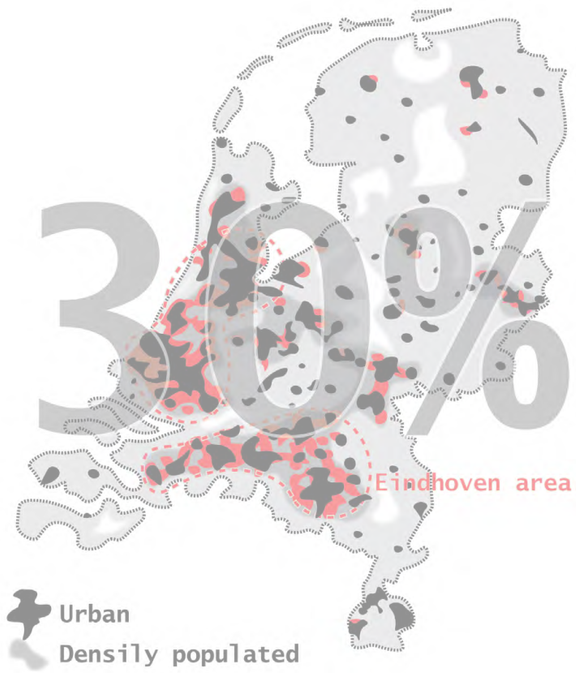
Regional

Local



Current situation

National



Heavy strain on land use

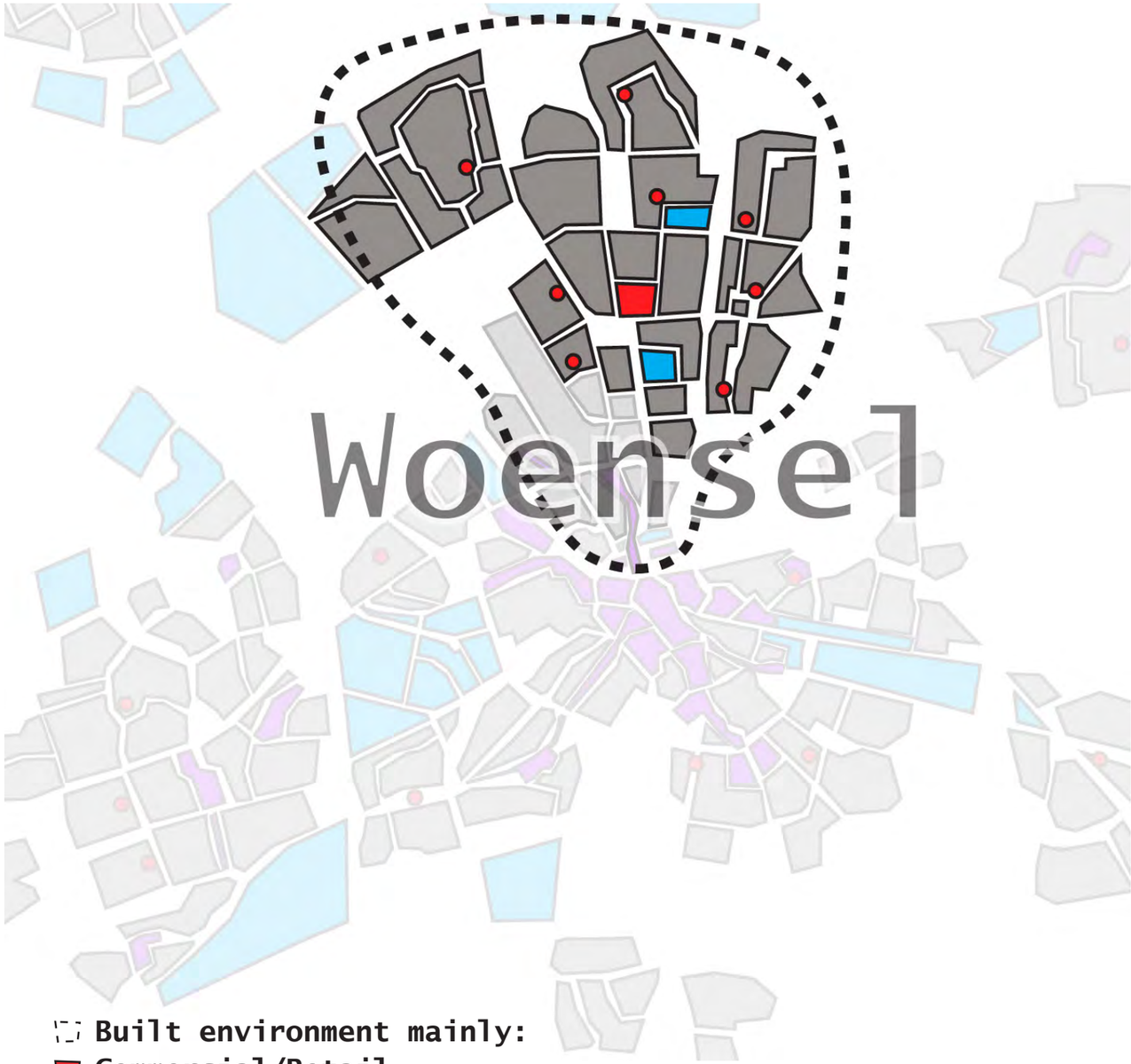
Soaring property prices

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Regional

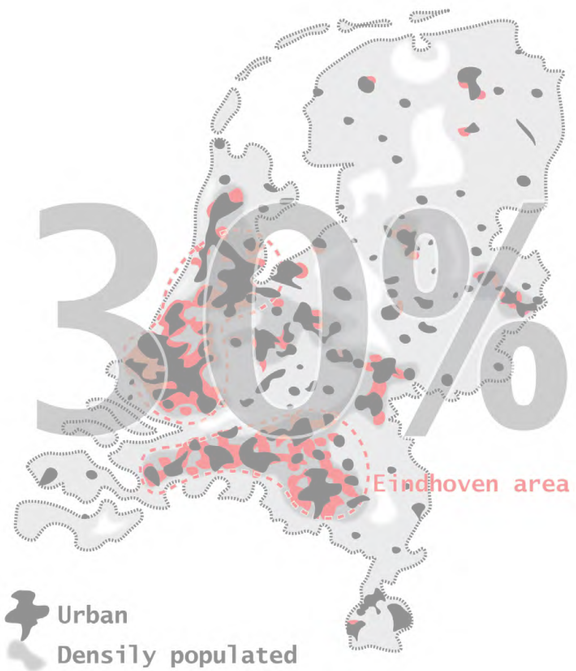
Local



Eindhoven - now

Current situation

National



Heavy strain on land use

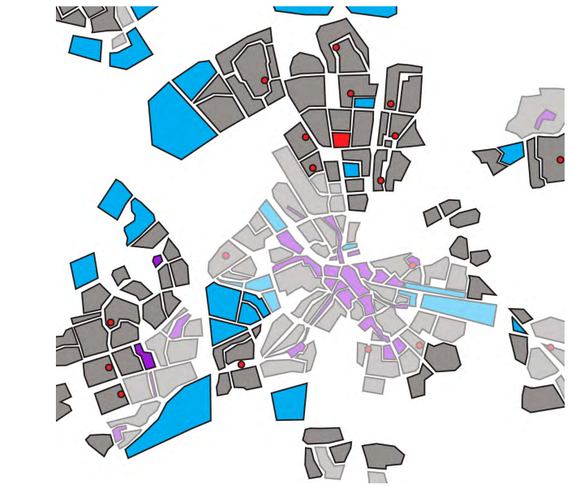
Soaring property prices

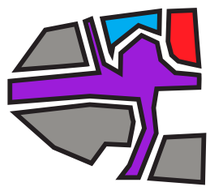
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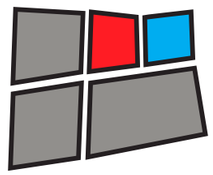
Regional

Heavy strain on land use
Shortage ~60.000 homes





pre WW2



post WW2

Monofunctional design:
-Greater car dependancy
-Higher vacancies
-Lower social cohesion

Local

Current situation

National **Regional** **Local**



Urban
Densily populated

Heavy strain on la

Soaring property p

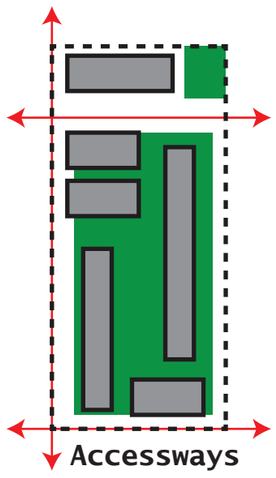
Shortage ~1 millio

1.8 million people
sonal unpreffered

Current situation

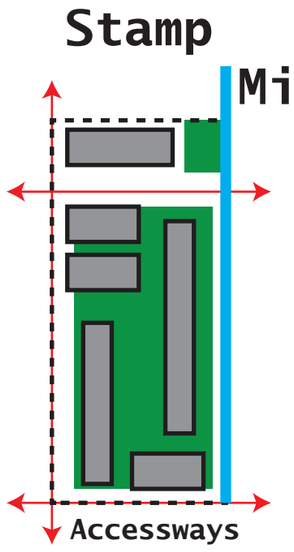
Local

Stamp



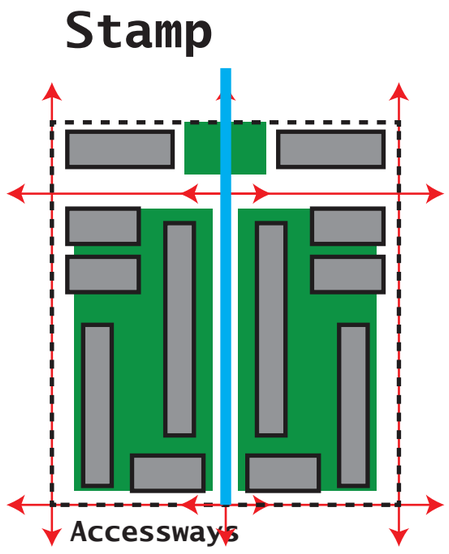
Current situation

Local



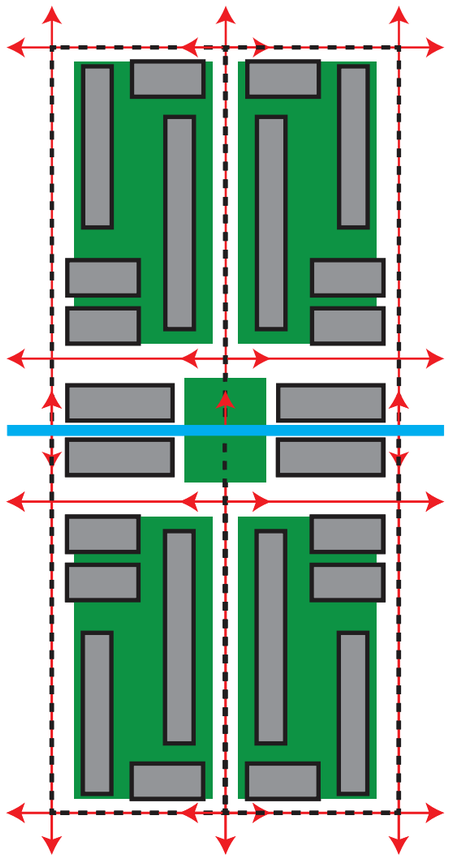
Current situation

Local



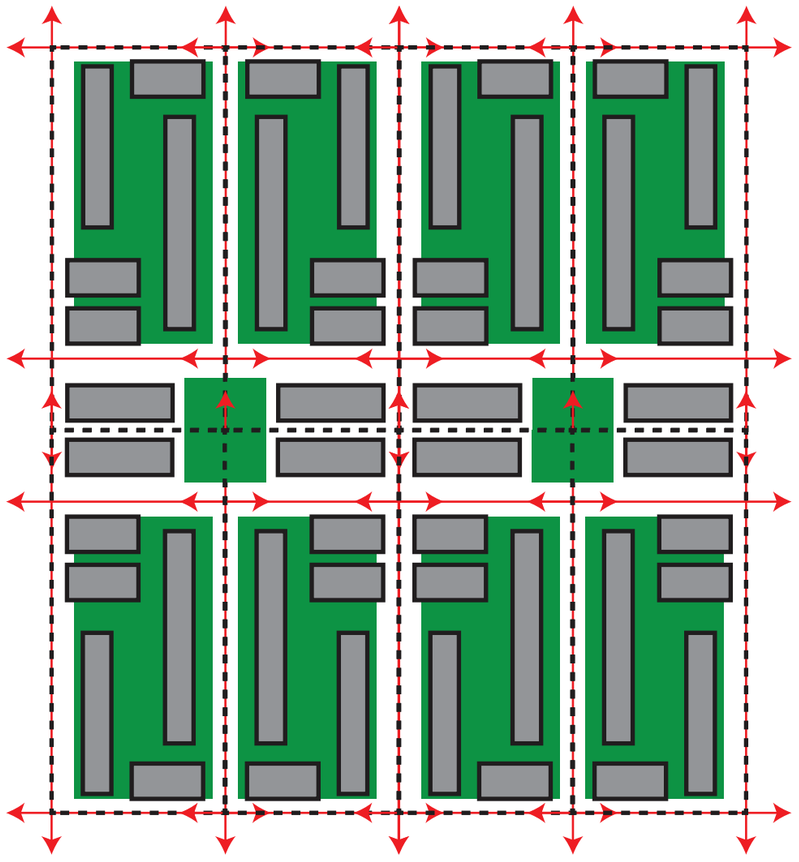
Current situation

Local



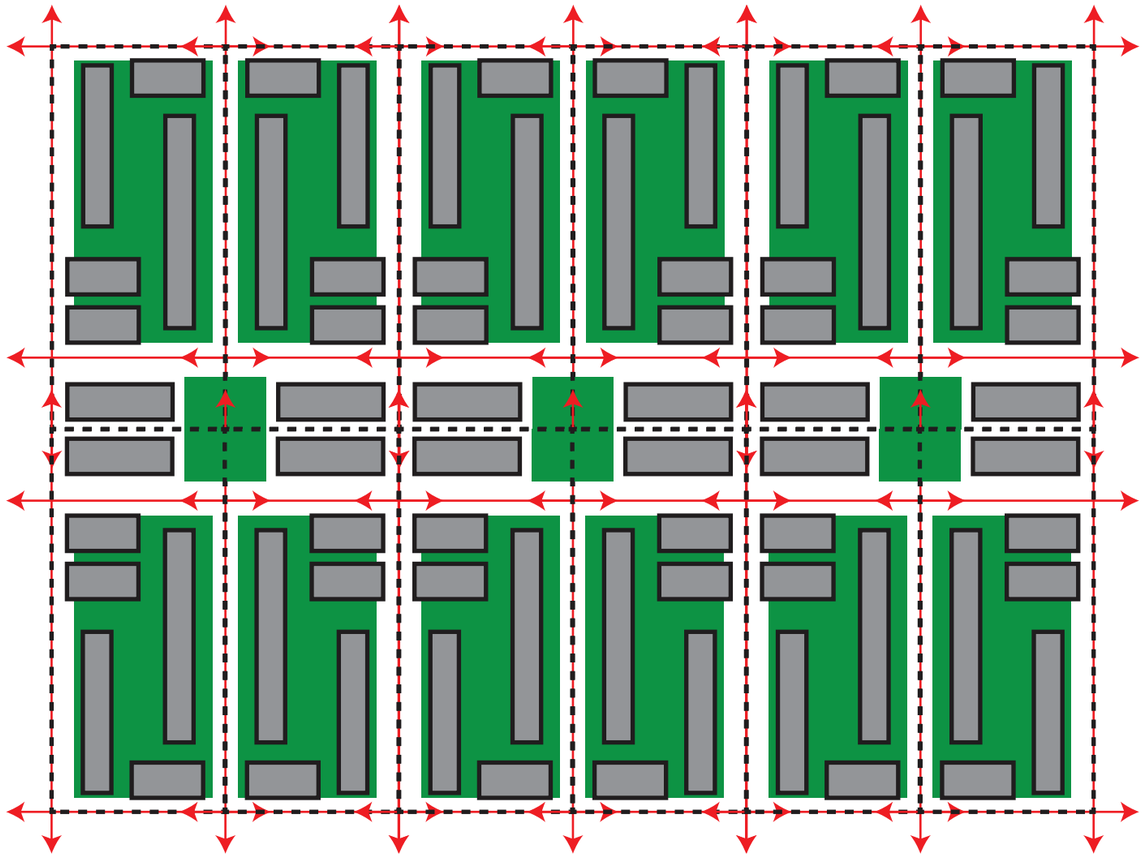
Current situation

Local

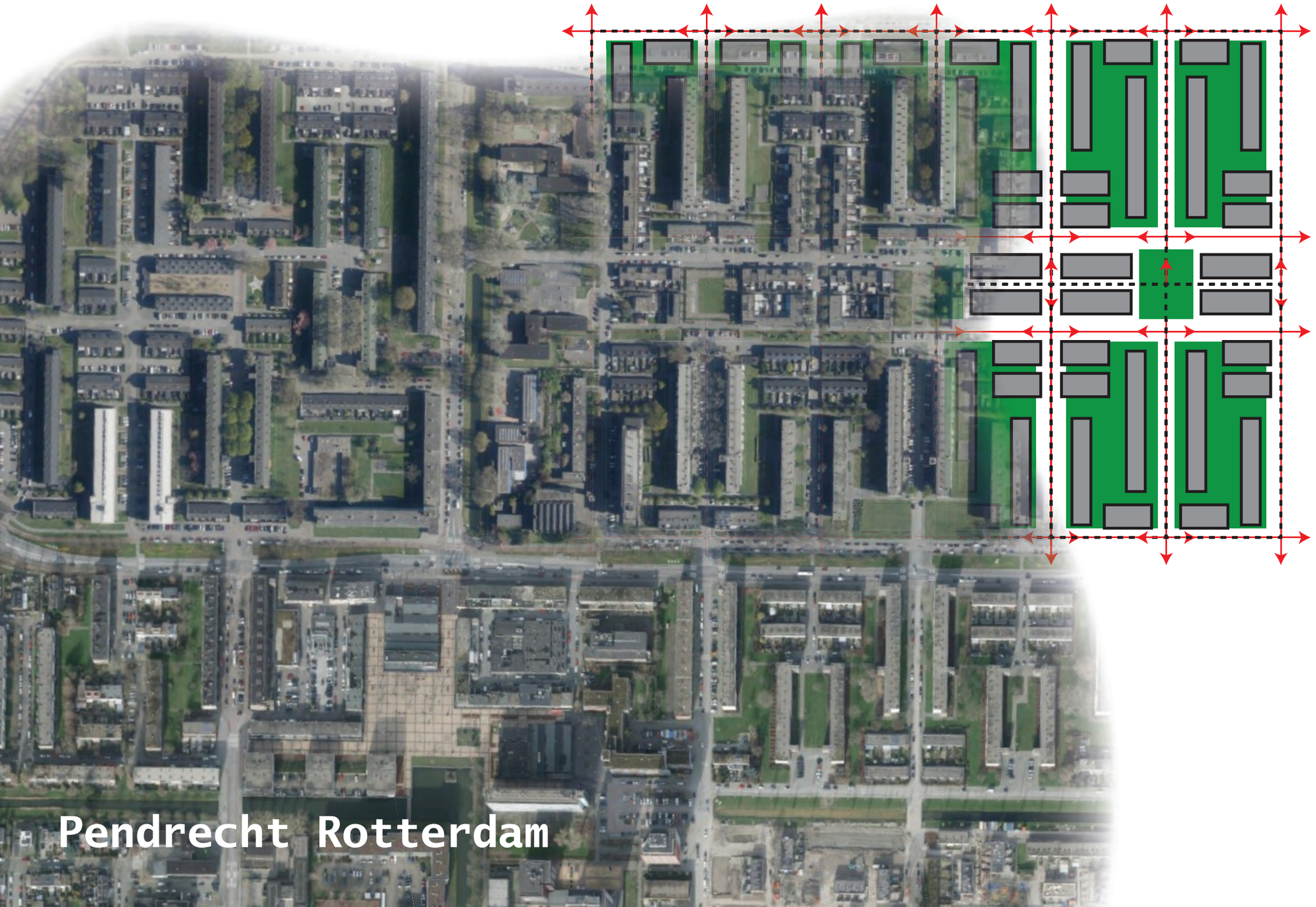


Current situation

Local



Current situation



Current situation

Local

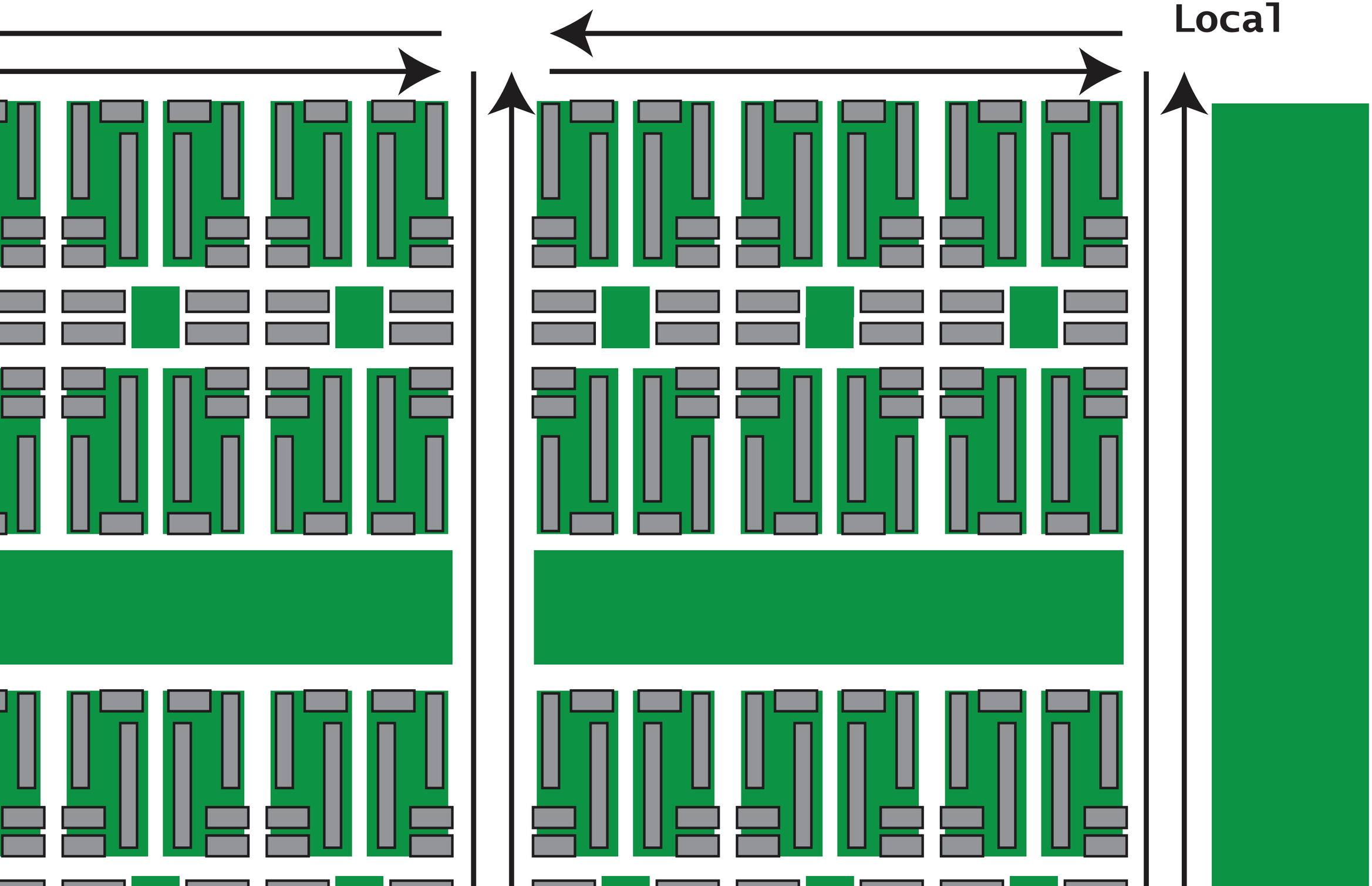


Pendrecht

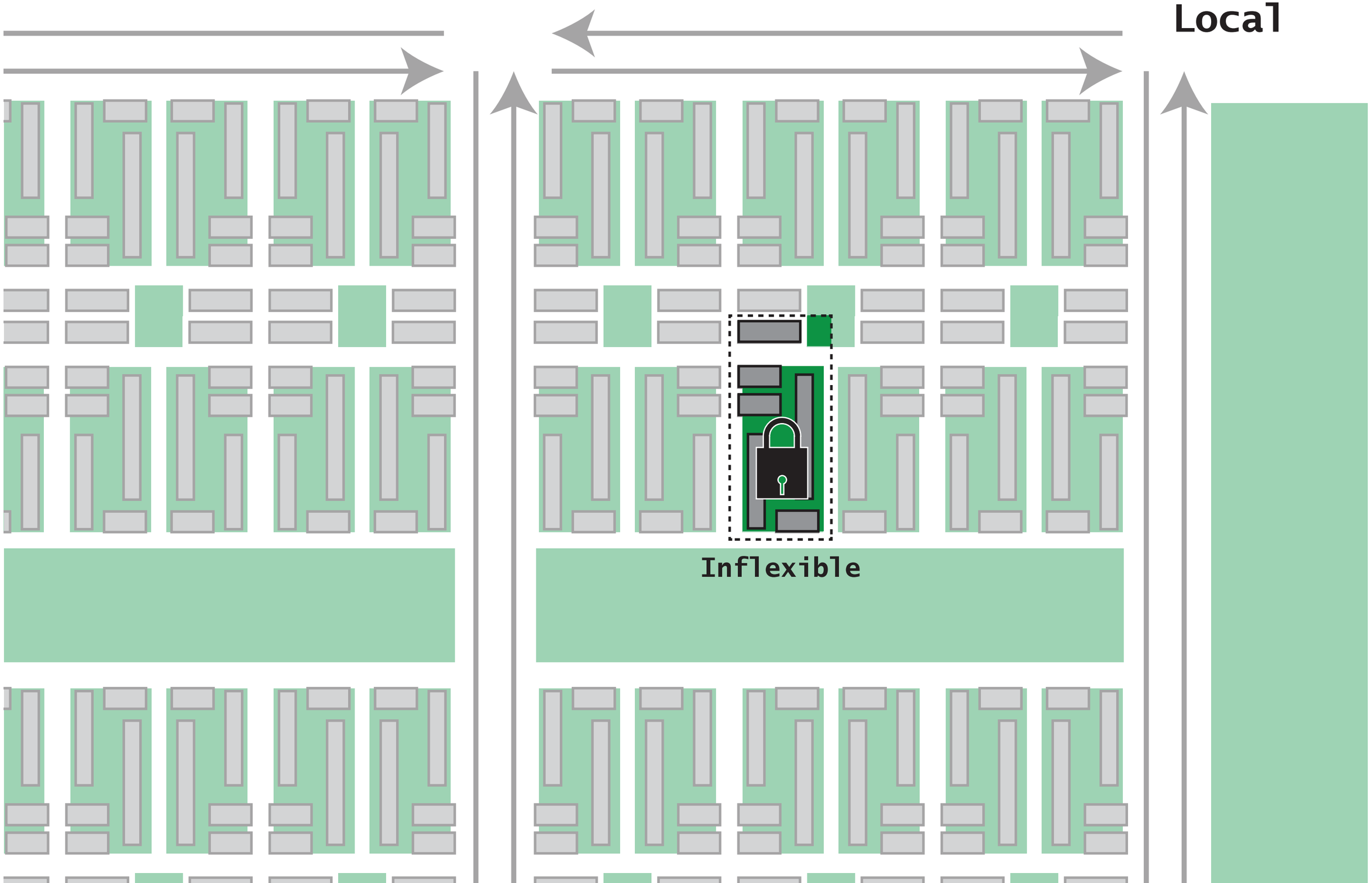


Bijlmer

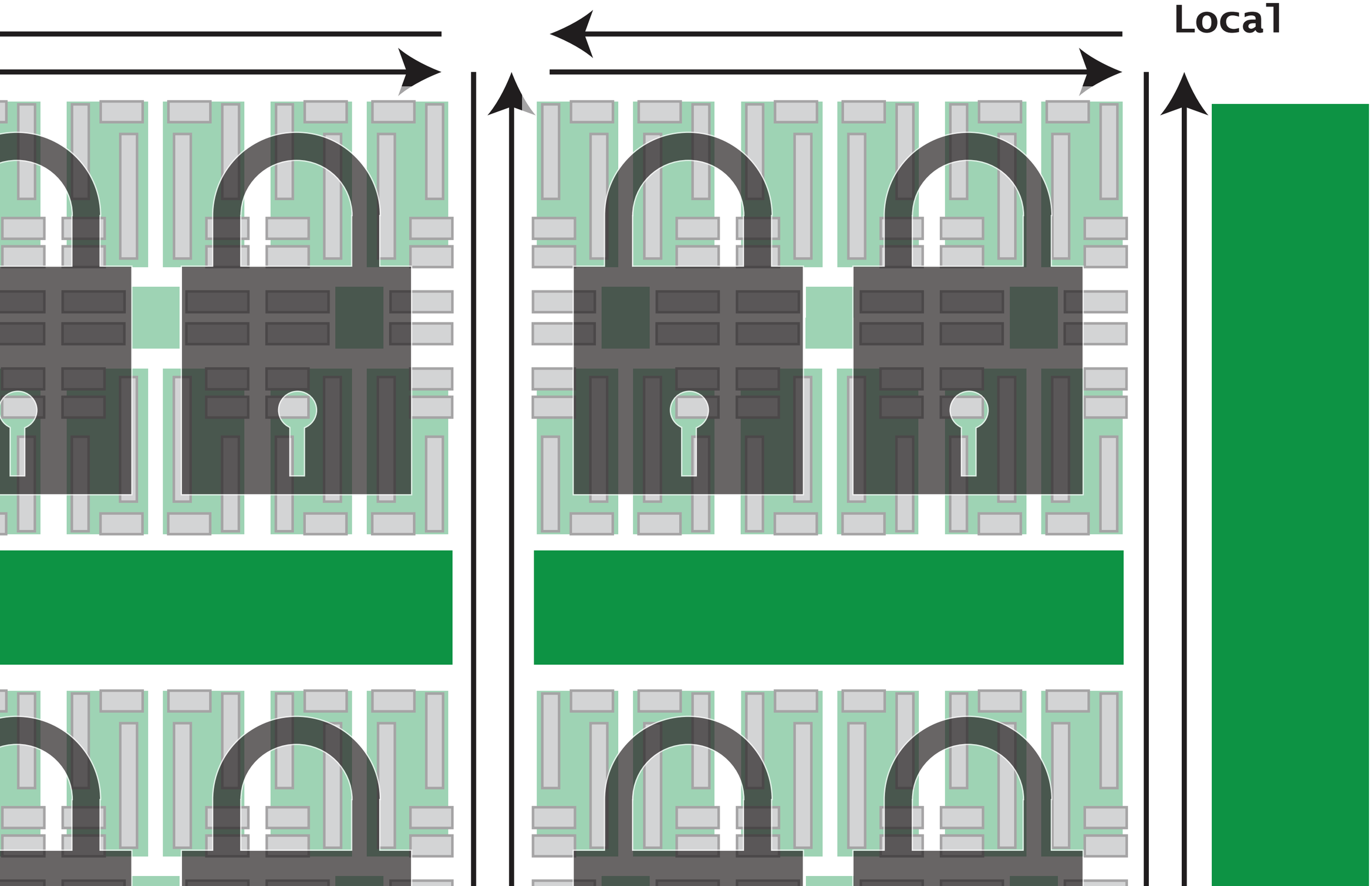
Current situation



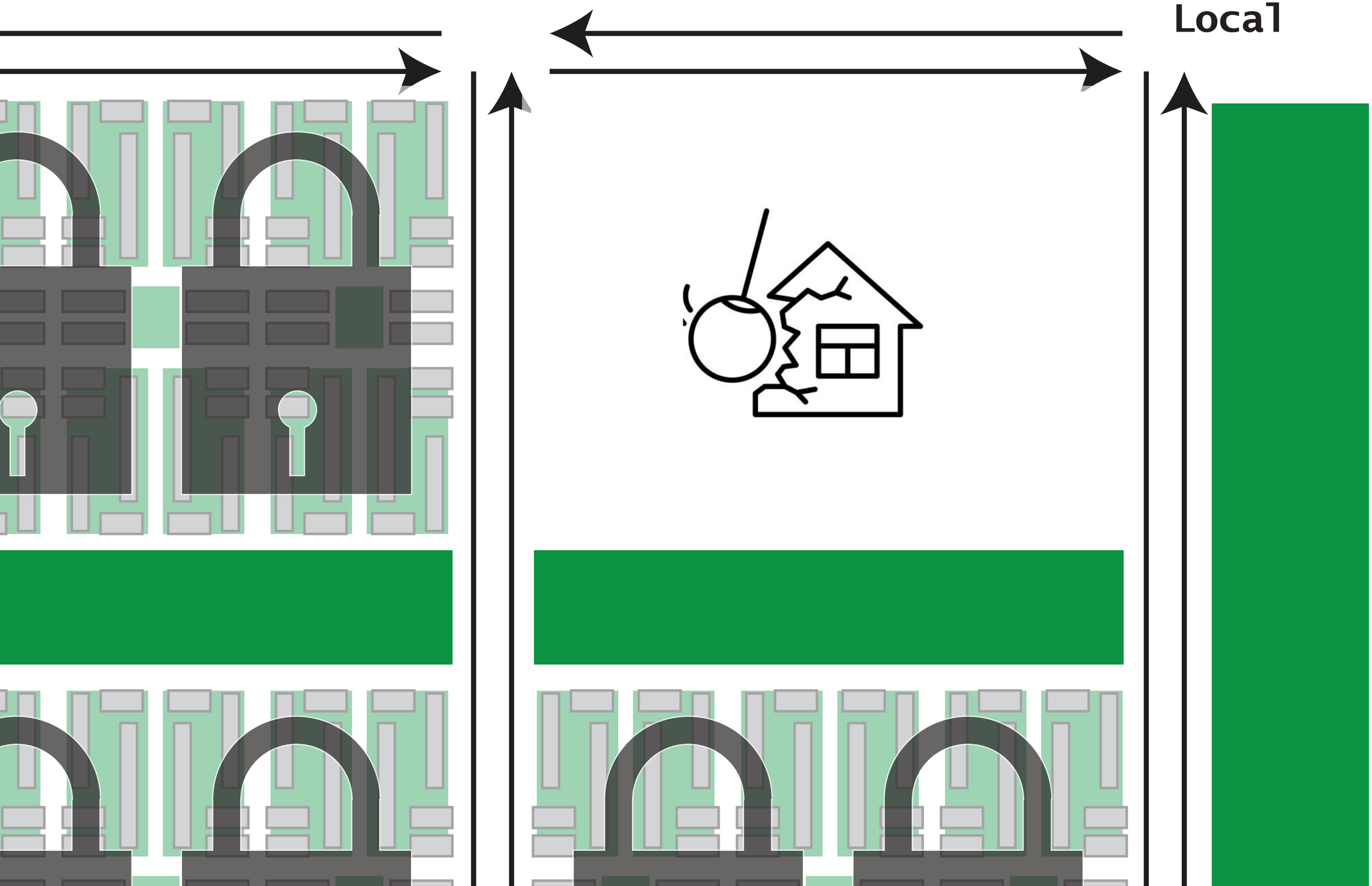
Current situation



Current situation



Current situation



Current situation

Local

Bijlmermeer

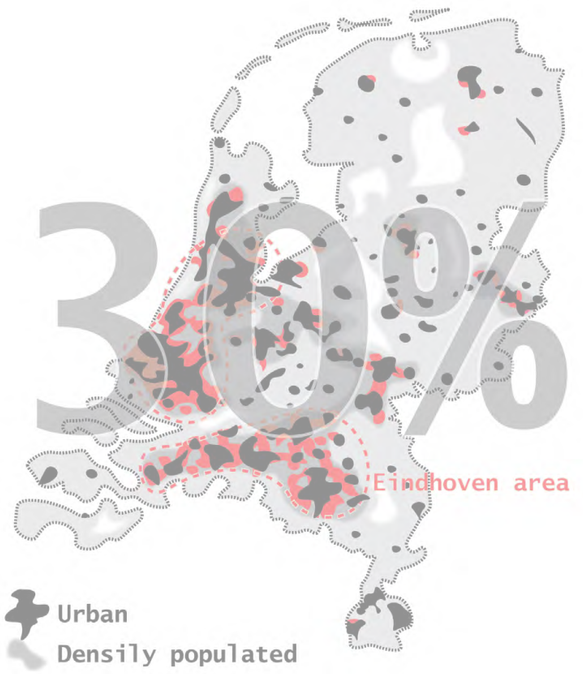


Demolished

Pushing away locals for change?

Current situation

National



Heavy strain on land use

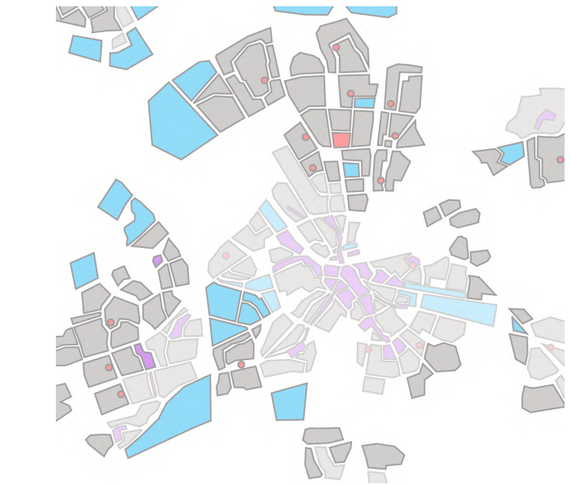
Soaring property prices

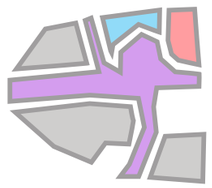
Shortage ~1 million homes

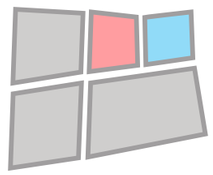
1.8 million people live in personal unpreffered typologies

Regional

Heavy strain on land use
Shortage ~60.000 homes





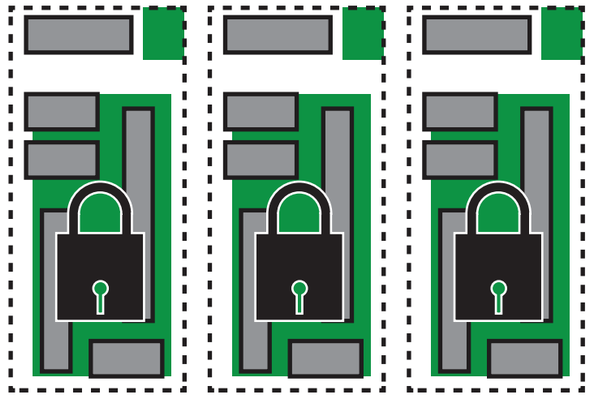


pre WW2

post WW2

Monofunctional design:
-Greater car dependancy
-Higher vacancies
-Lower social cohesion

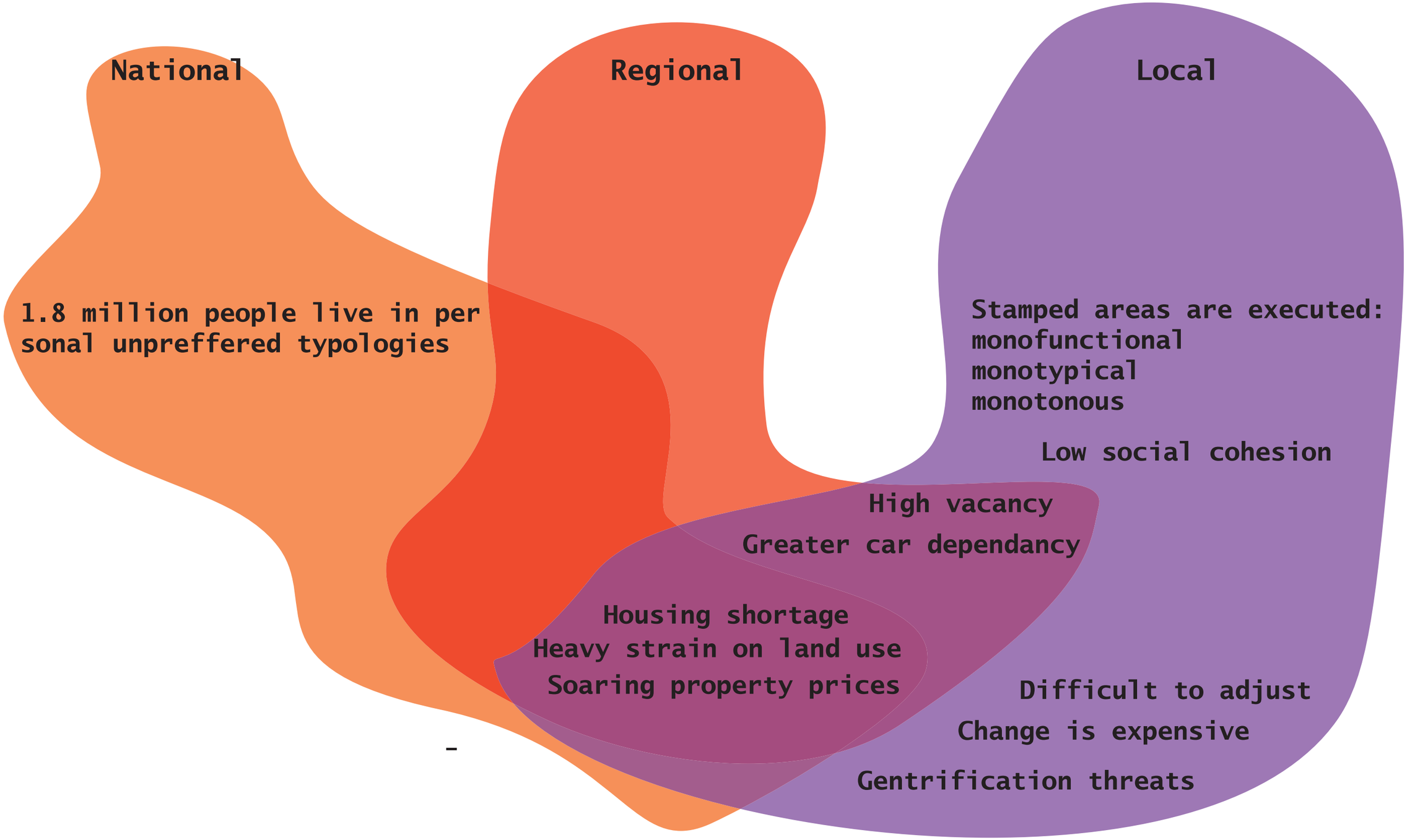
Local



Stamped areas are executed:
monofunctional
monotypical
monotonous

-Low social cohesion
-Difficult to adjust
-Change is expensive
-Gentrification threats
-High vacancy commercial and office areas

Current situation



-

Current situation

National

1.8 million people live in per
sonal unpreffered typologies

Regional

Local

Stamped areas are executed:
monofunctional
monotypical
monotonous

Low adaptability

Low social cohesion

High vacancy

Greater car dependancy

Housing shortage
Heavy strain on land use
Soaring property prices

Difficult to adjust

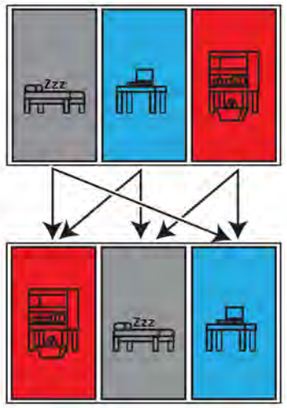
Change is expensive

Gentrification threats

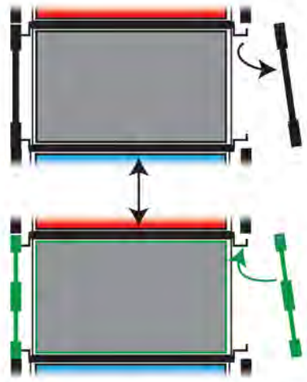
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Adaptability

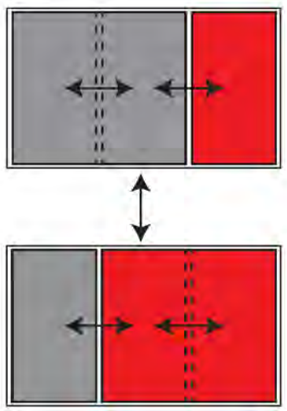
“the capacity for a building to accommodate effectively the evolving demands of its context, thus maximizing its value through life” Schmidt & Austin (2016)



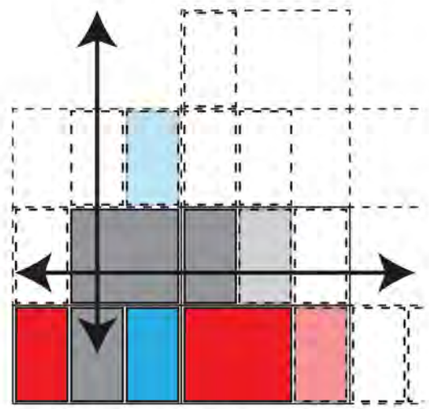
Convertible adaptability



Refitable adaptability



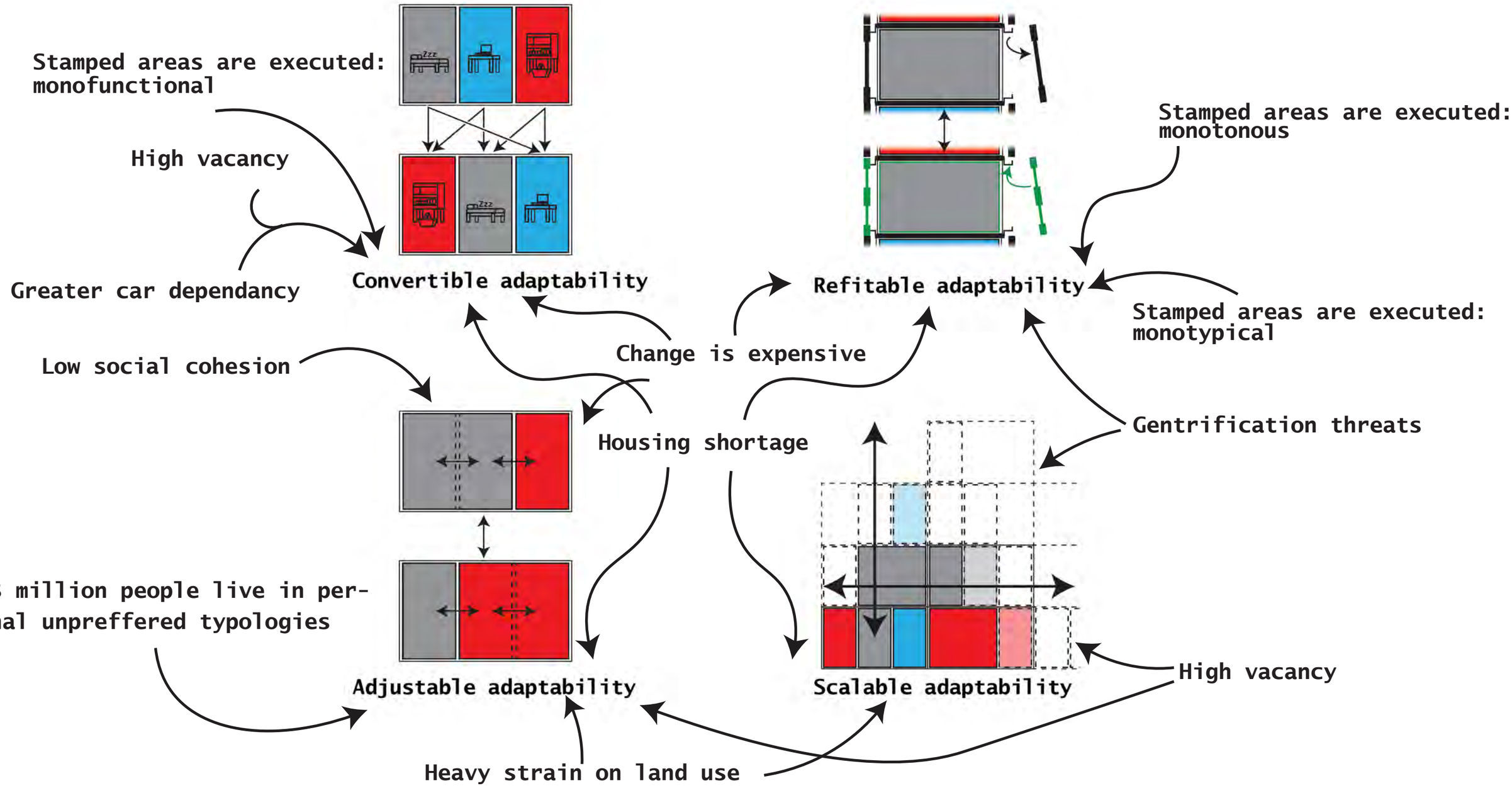
Adjustable adaptability



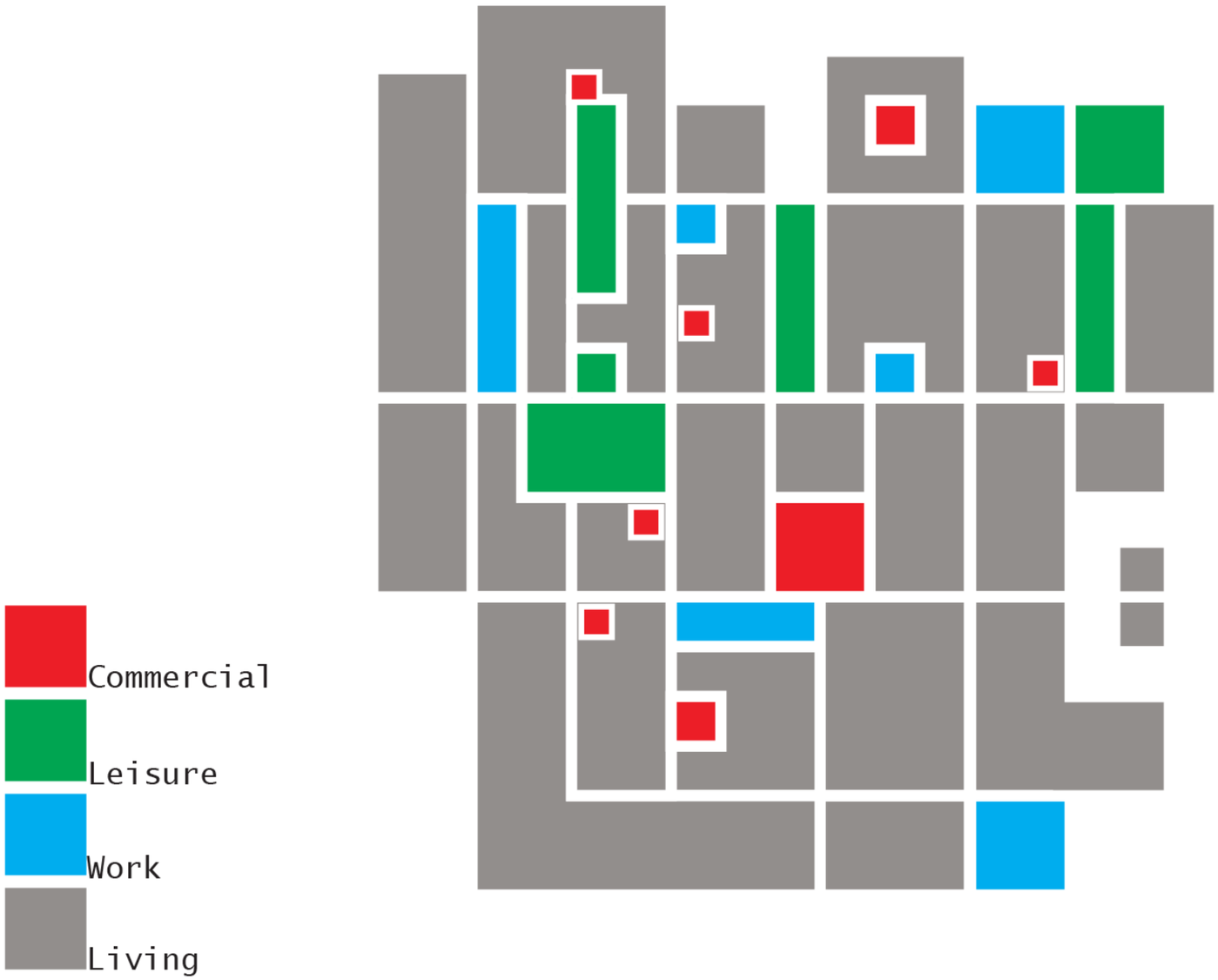
Scalable adaptability

Adaptability

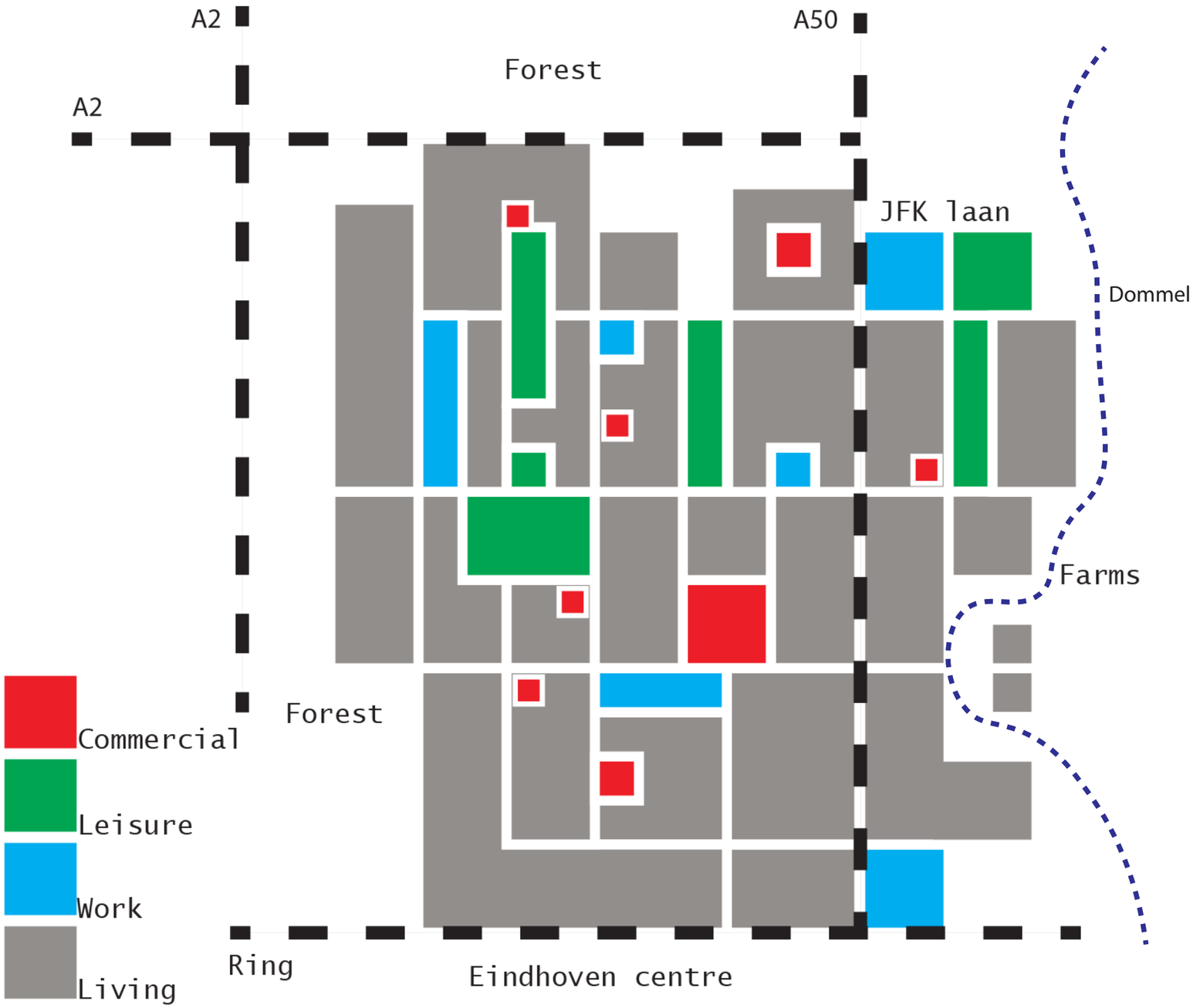
“the capacity for a building to accommodate effectively the evolving demands of its context, thus maximizing its value through life” Schmidt & Austin (2016)



Woensel



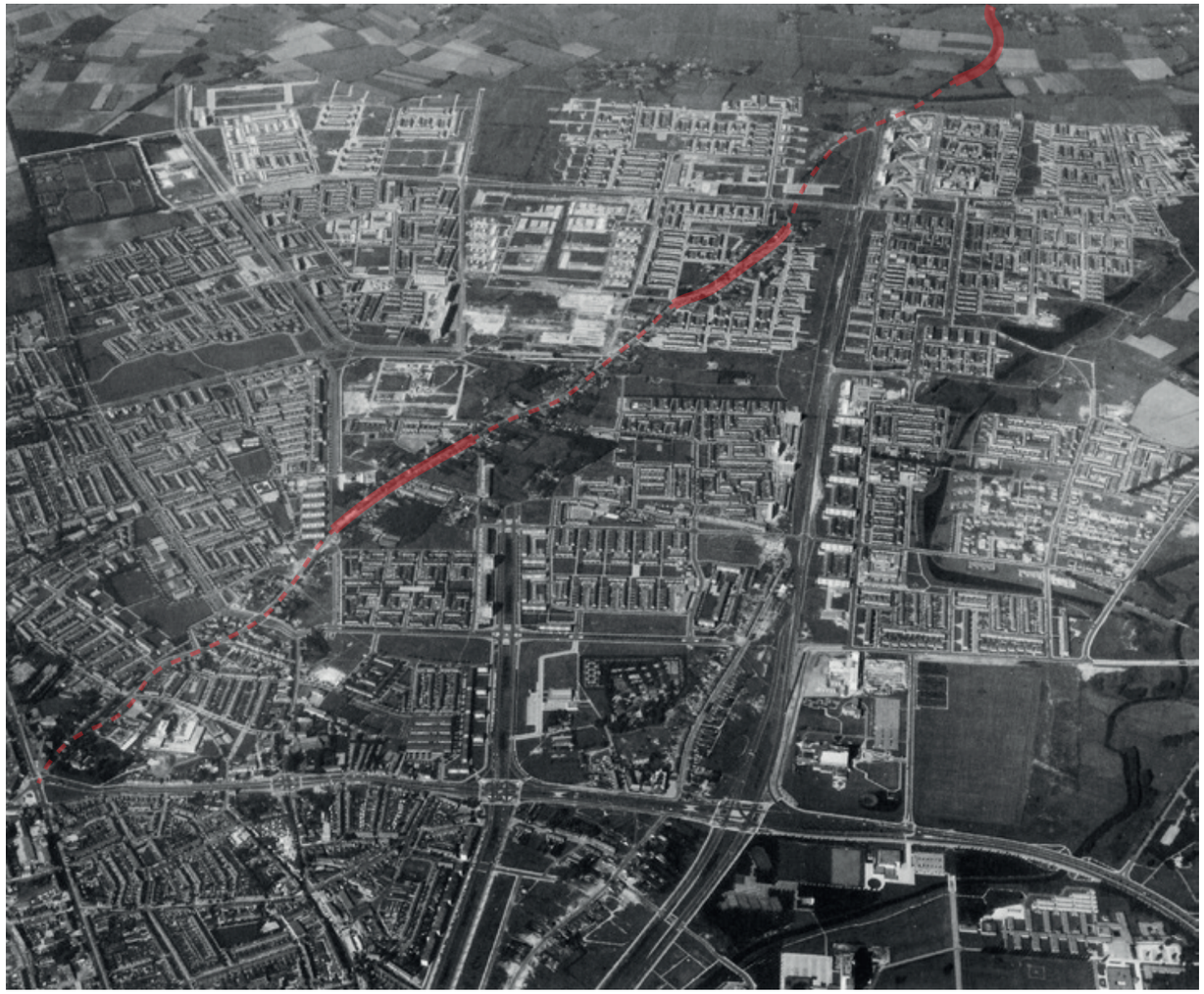
Woensel


A2
A50
A2
Forest
JFK laan
Dommel
Farms
Forest
Commercial
Leisure
Work
Living
Ring
Eindhoven centre

Woensel



Structuurplan Woensel, 1957 (Eindhoven. Stadsontwikkeling 1900-1960)



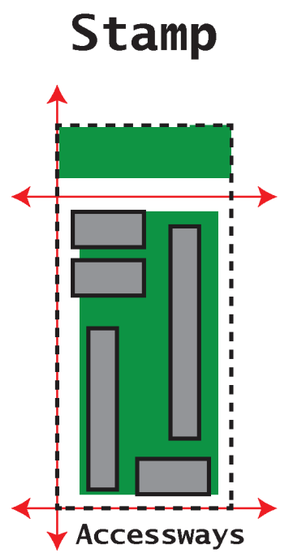
Woensel vanuit de lucht in 1969 (Historische Atlas van Eindhoven)

Woensel





Woensel, jaren 70, topotijdreis

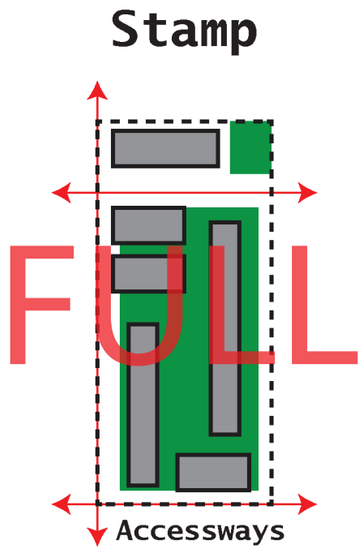


Woensel

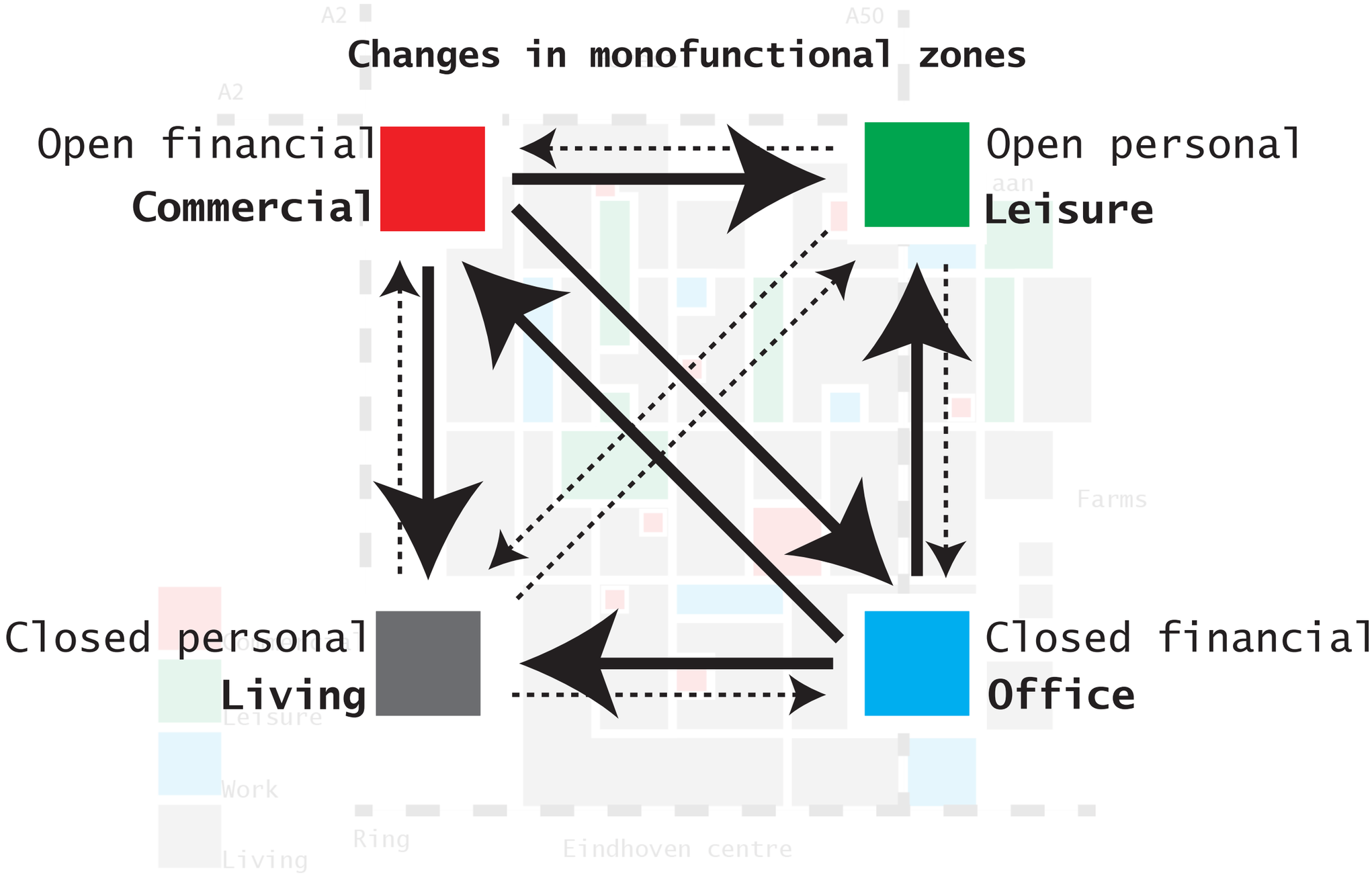




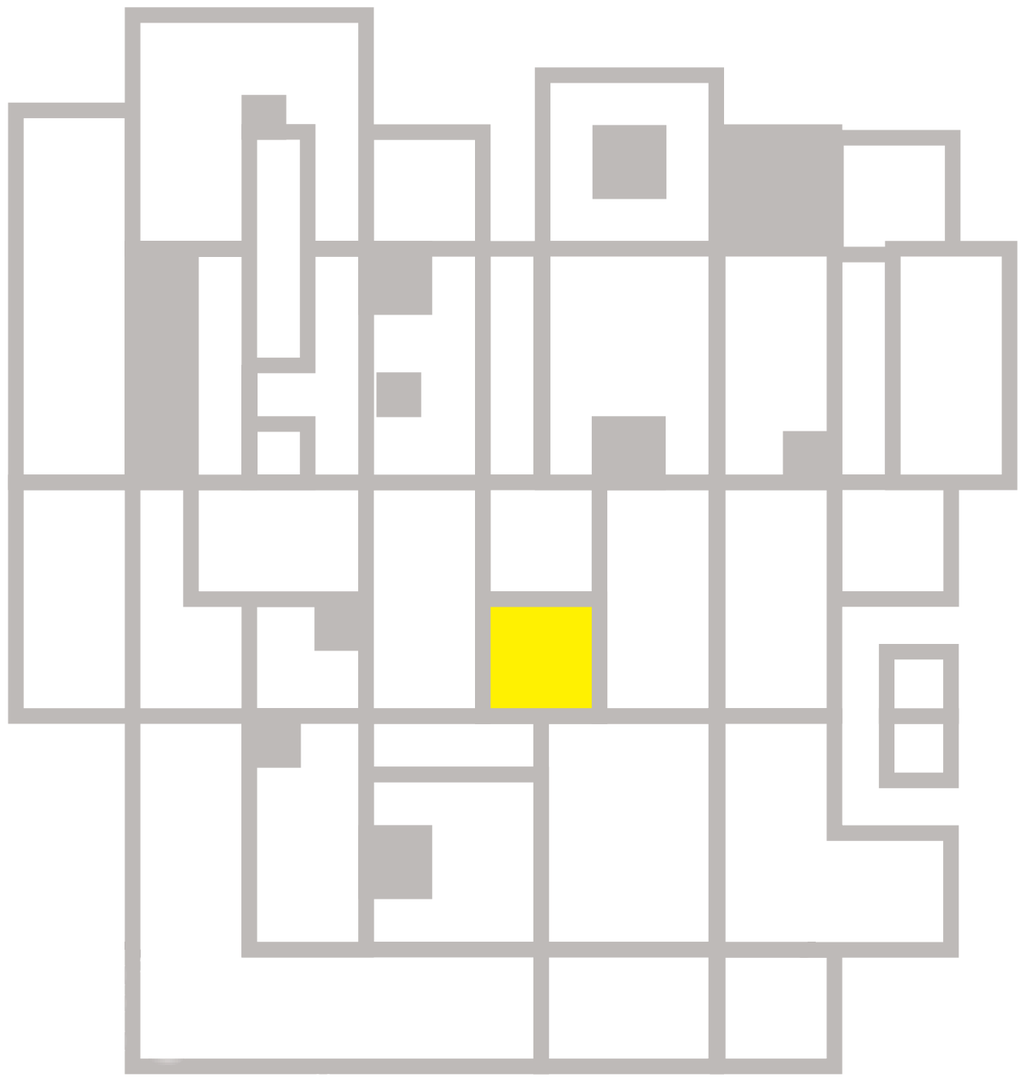
Woensel, jaren 80, topotijdreis



Woensel


Changes in monofunctional zones
Open financial
Commercial
Open personal
Leisure
Closed personal
Living
Closed financial
Office
A2
A50
A2
aan
Farms
Leisure
Work
Living
Ring
Eindhoven centre

Opportunities

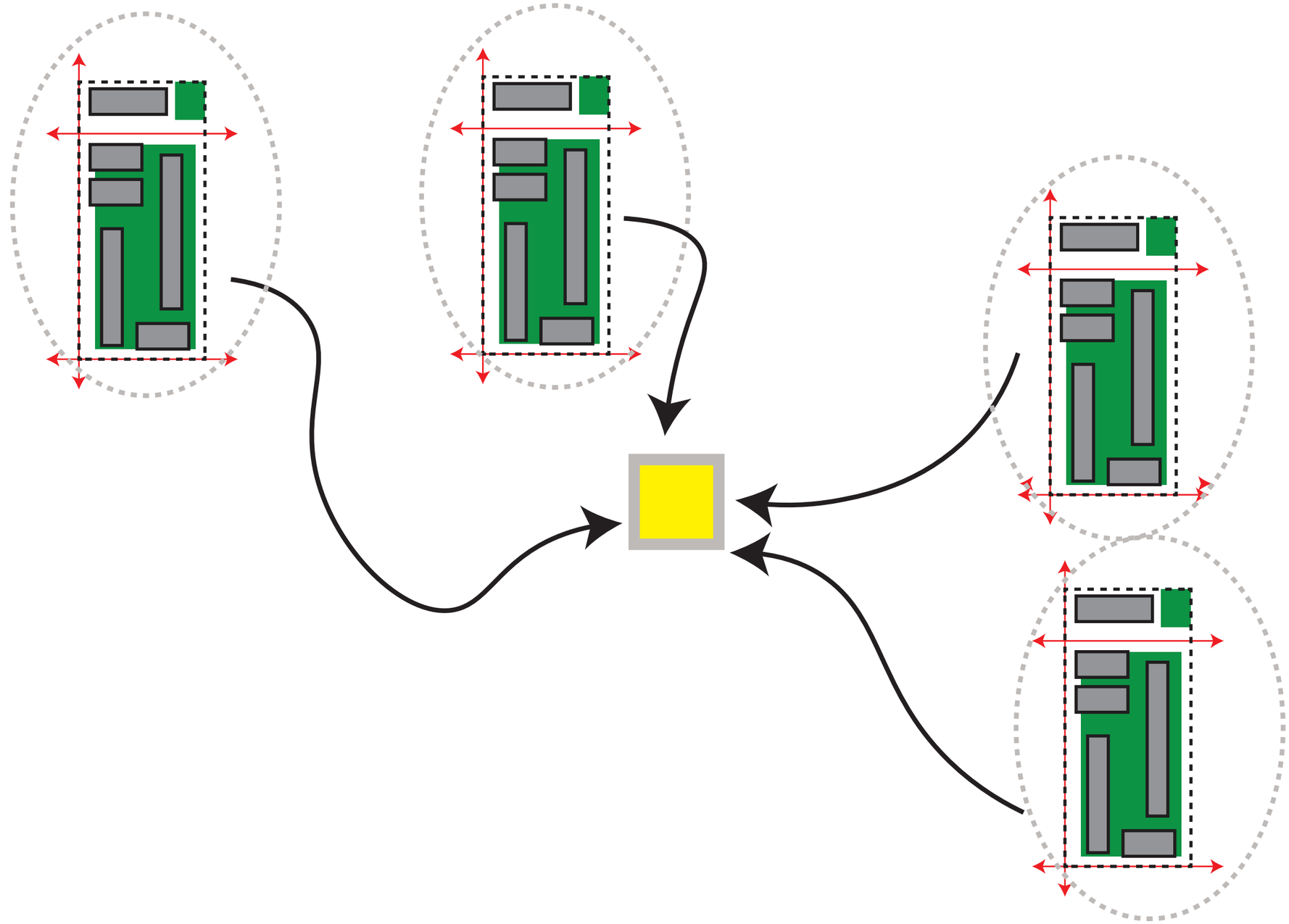


Less accessible to change

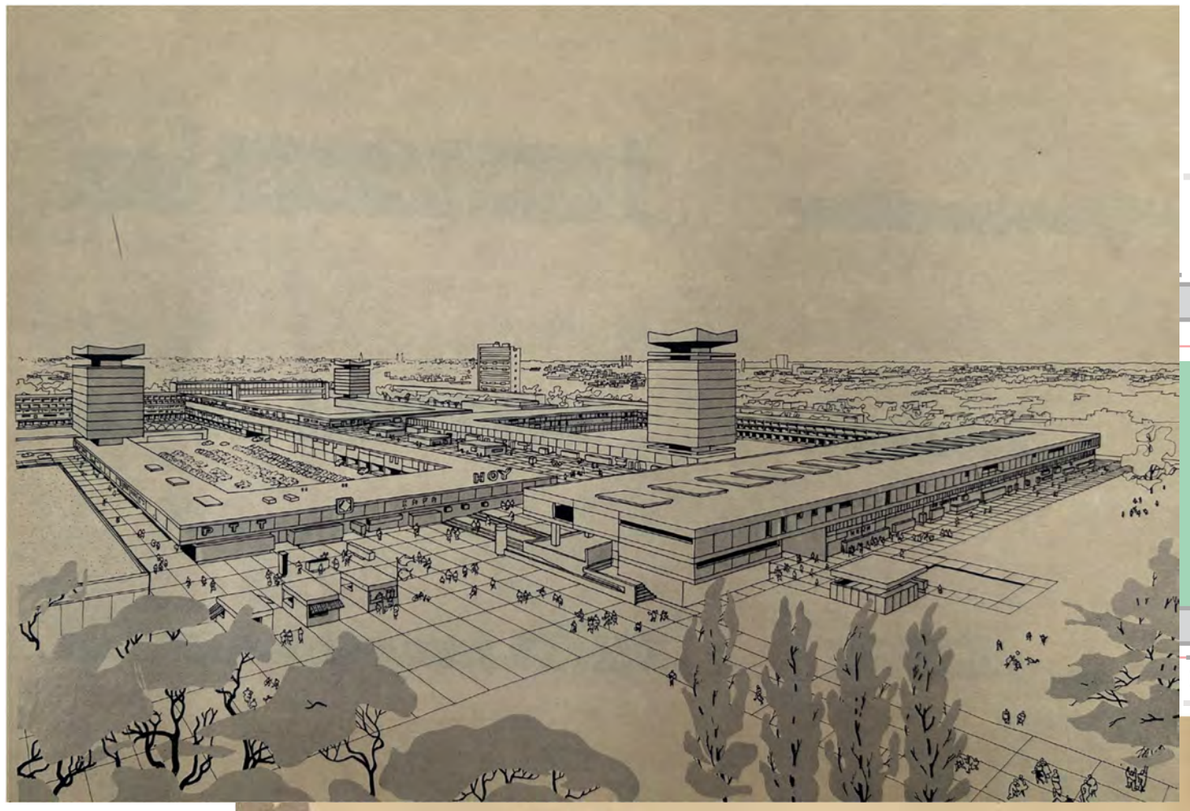
More accessible to change

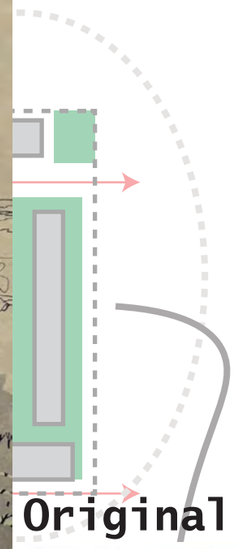
Centre

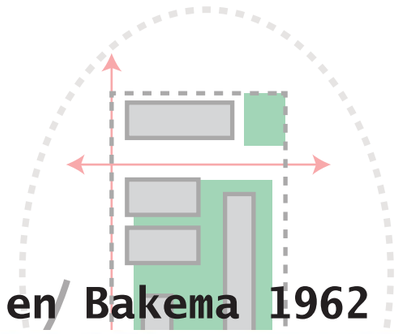
Opportunities



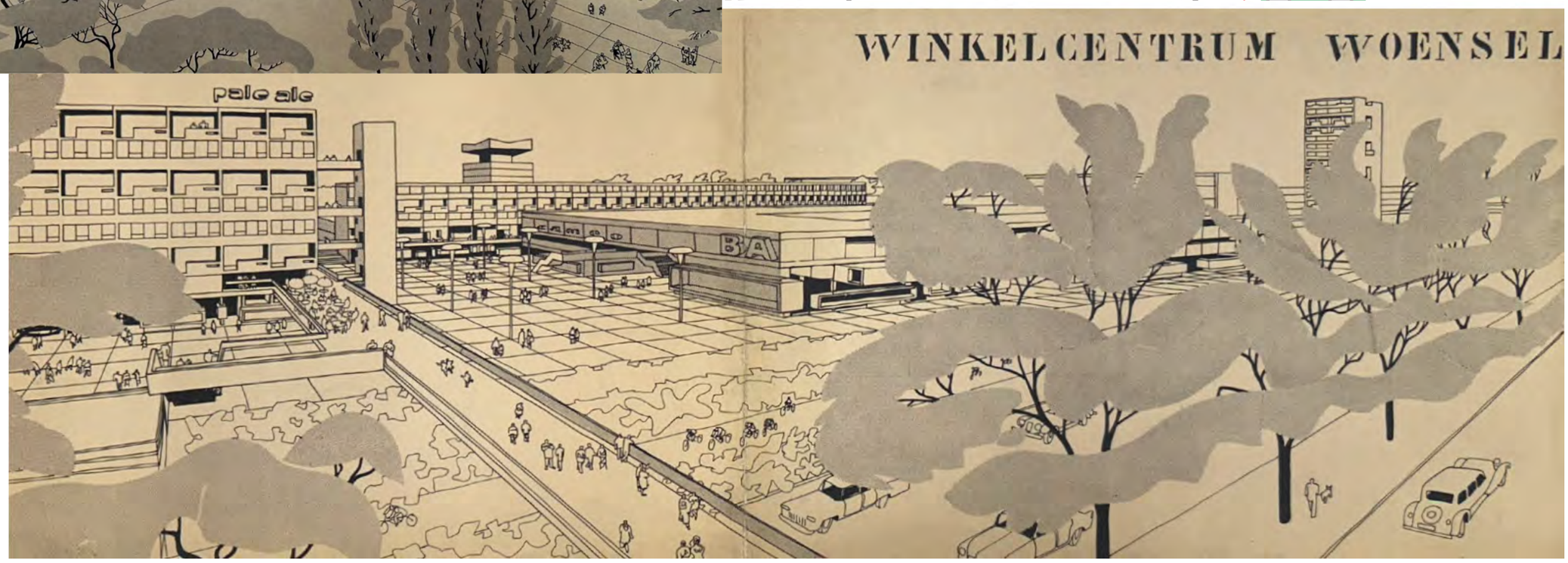
Opportunities





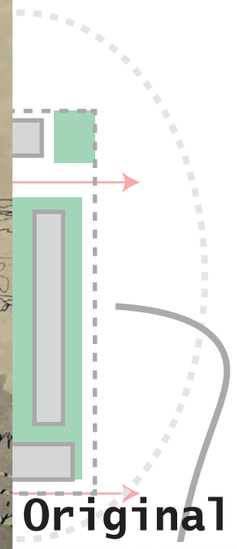


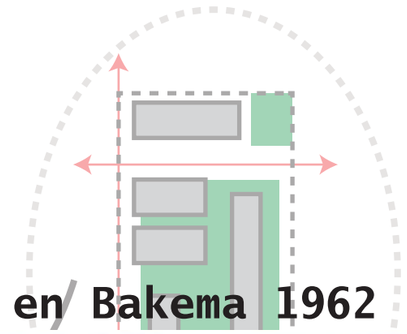
Original design Broek en Bakema 1962



Opportunities

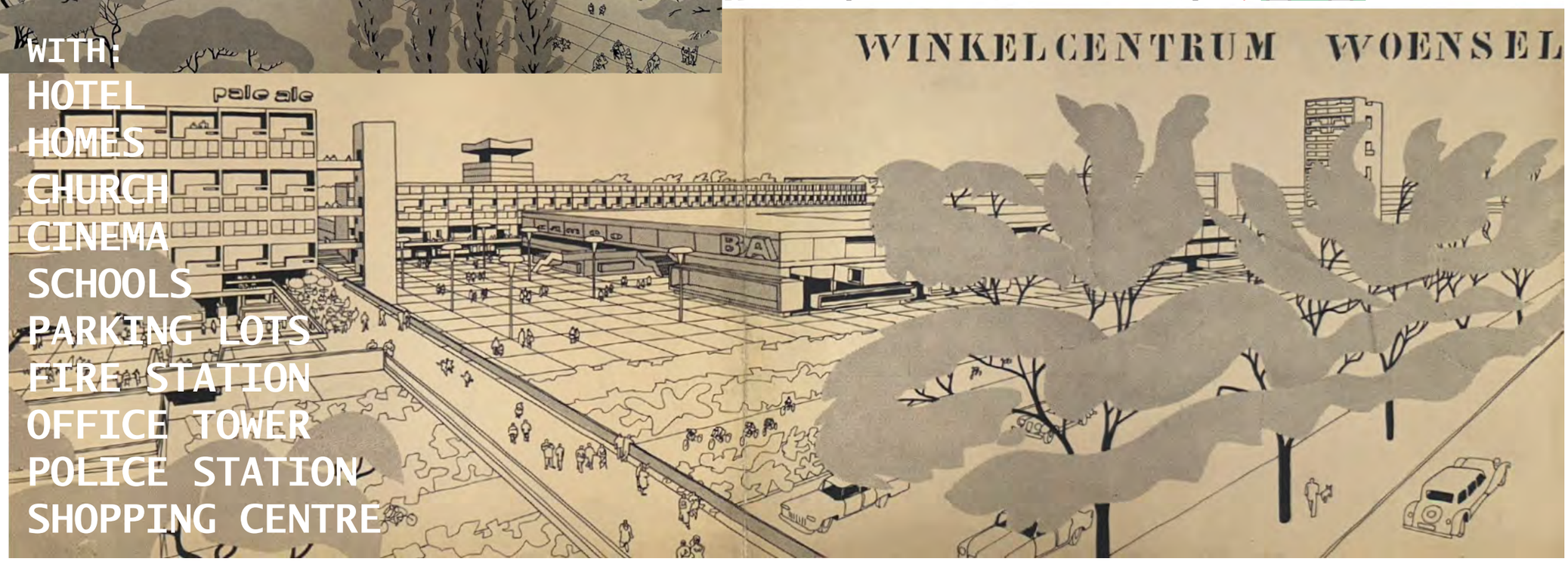






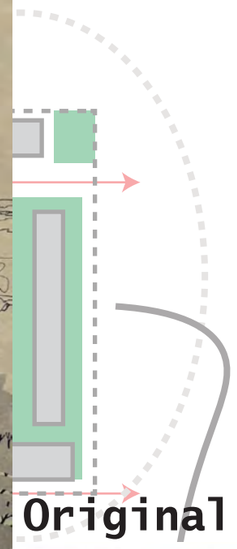
Original design Broek en Bakema 1962

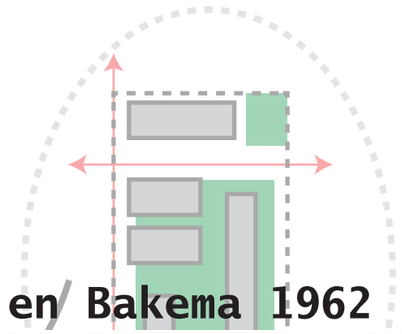
WITH:
HOTEL
HOMES
CHURCH
CINEMA
SCHOOLS
PARKING LOTS
FIRE STATION
OFFICE TOWER
POLICE STATION
SHOPPING CENTRE



Opportunities



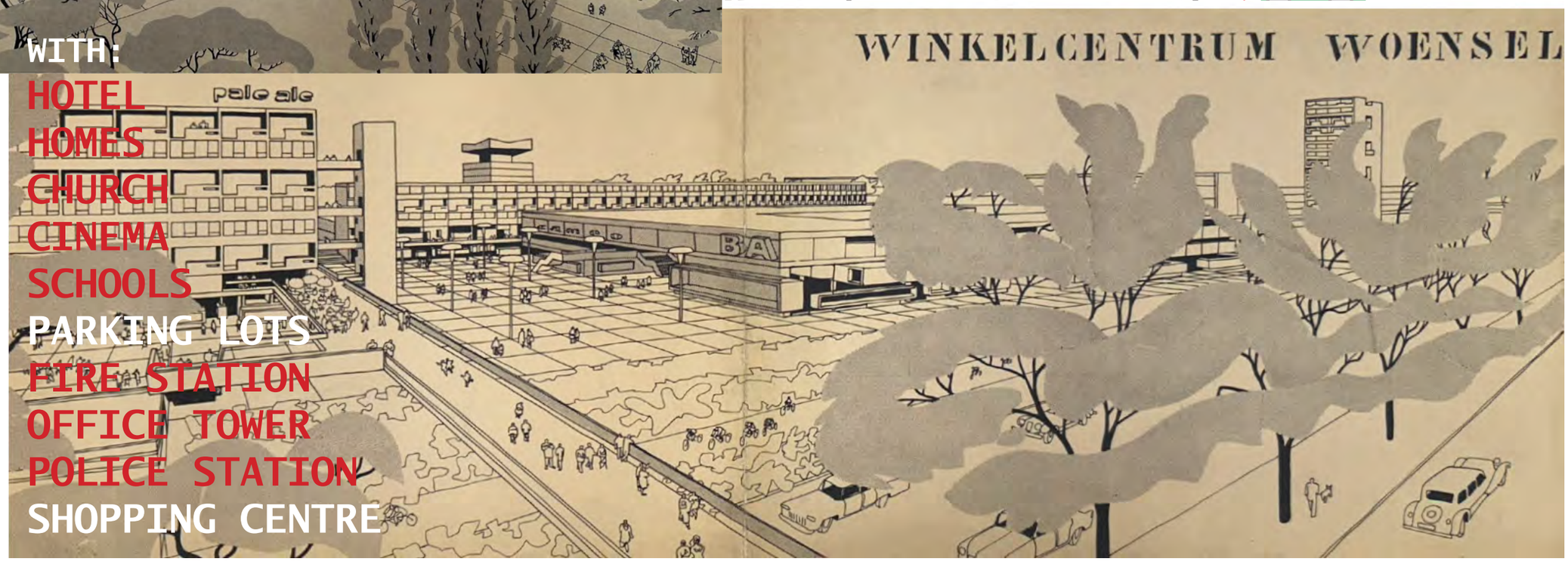




Original design Broek en Bakema 1962

WITH:

HOTEL
HOMES
CHURCH
CINEMA
SCHOOLS
PARKING LOTS
FIRE STATION
OFFICE TOWER
POLICE STATION
SHOPPING CENTRE



Opportunities



Realised shopping centre



Monofunctional
Monogenous
Monotypical

Opportunities



Still mainly

Monofunctional
Monogenous
Monotypical

Renovation 2003-2006



Opportunities

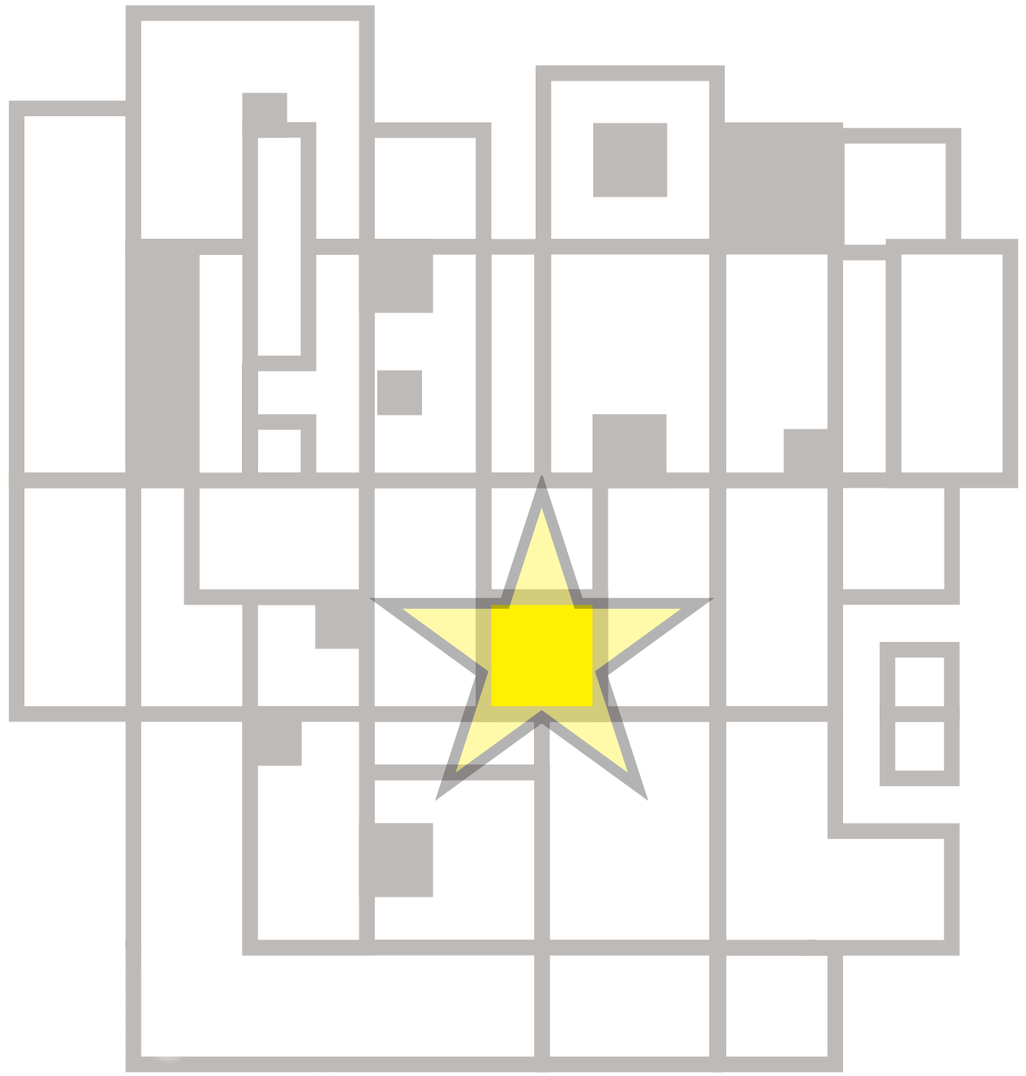


Removing retail space
Removing parking space
Adding 3500 homes
Add cultural venues

Current proposal



Opportunities



Less accessible to change

More accessible to change

Centre

Opportunities



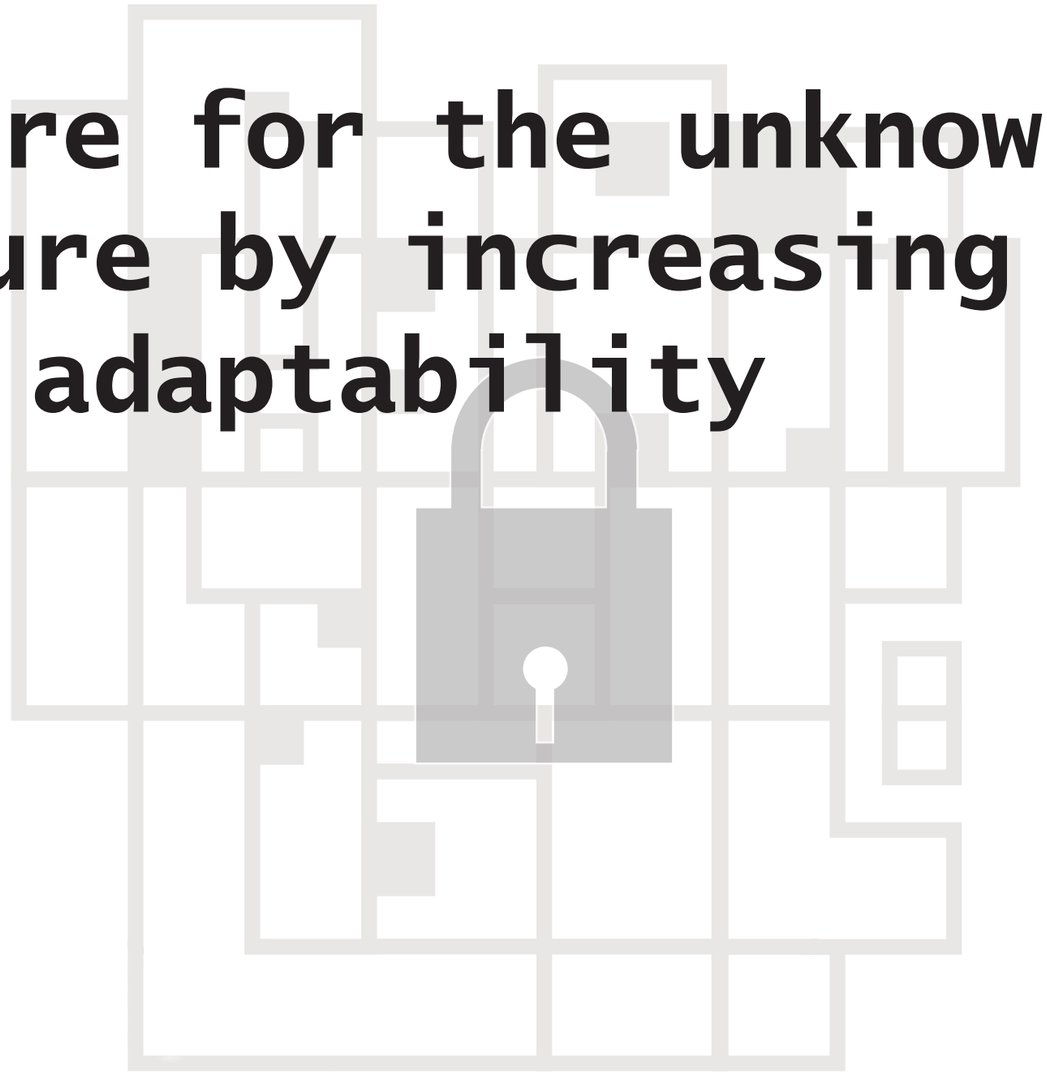
Less accessible to change

More accessible to change

Centre

Opportunities

Prepare for the unknown future by increasing adaptability



Less accessible to change

More accessible to change

Centre

Opportunities

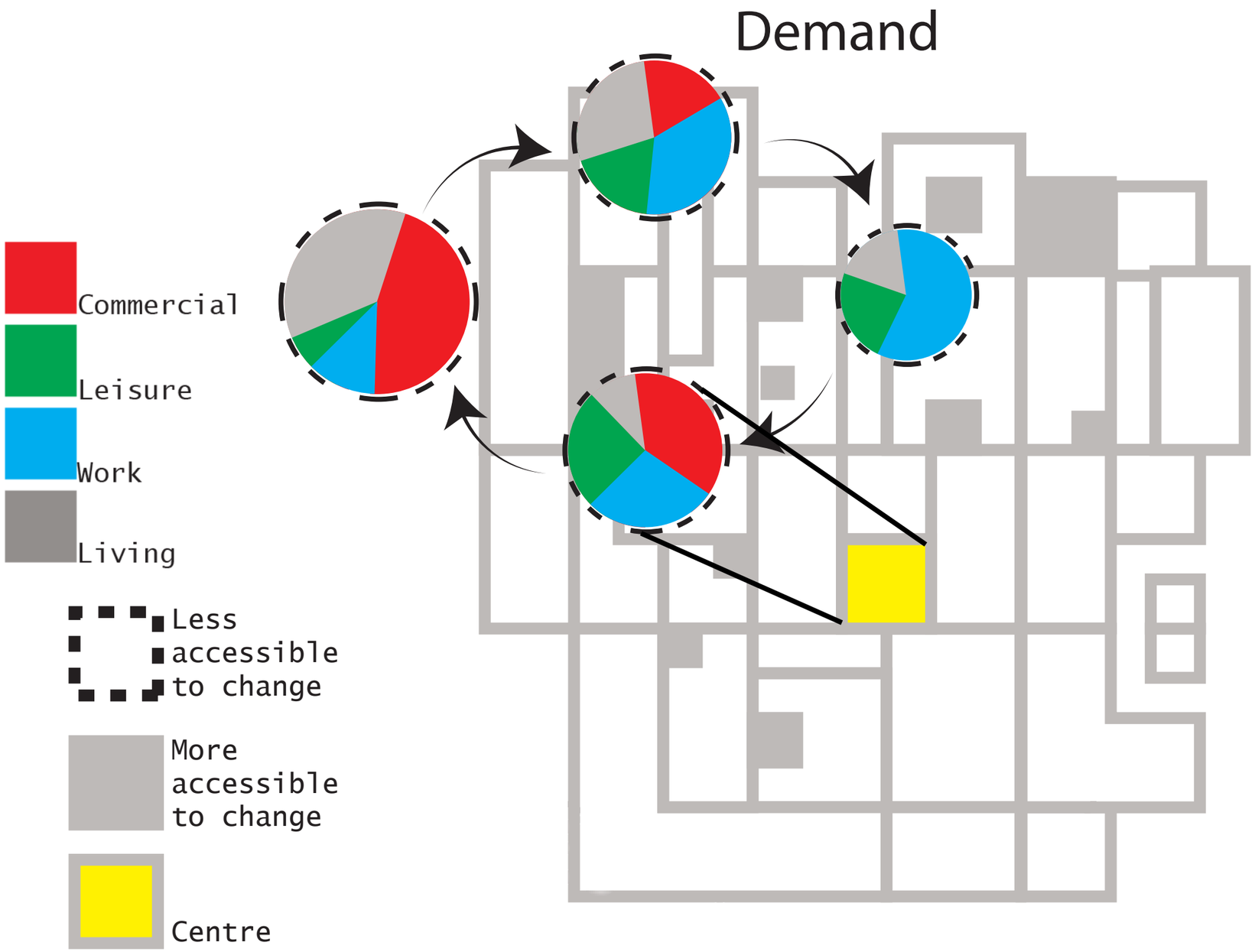


Less accessible to change

More accessible to change

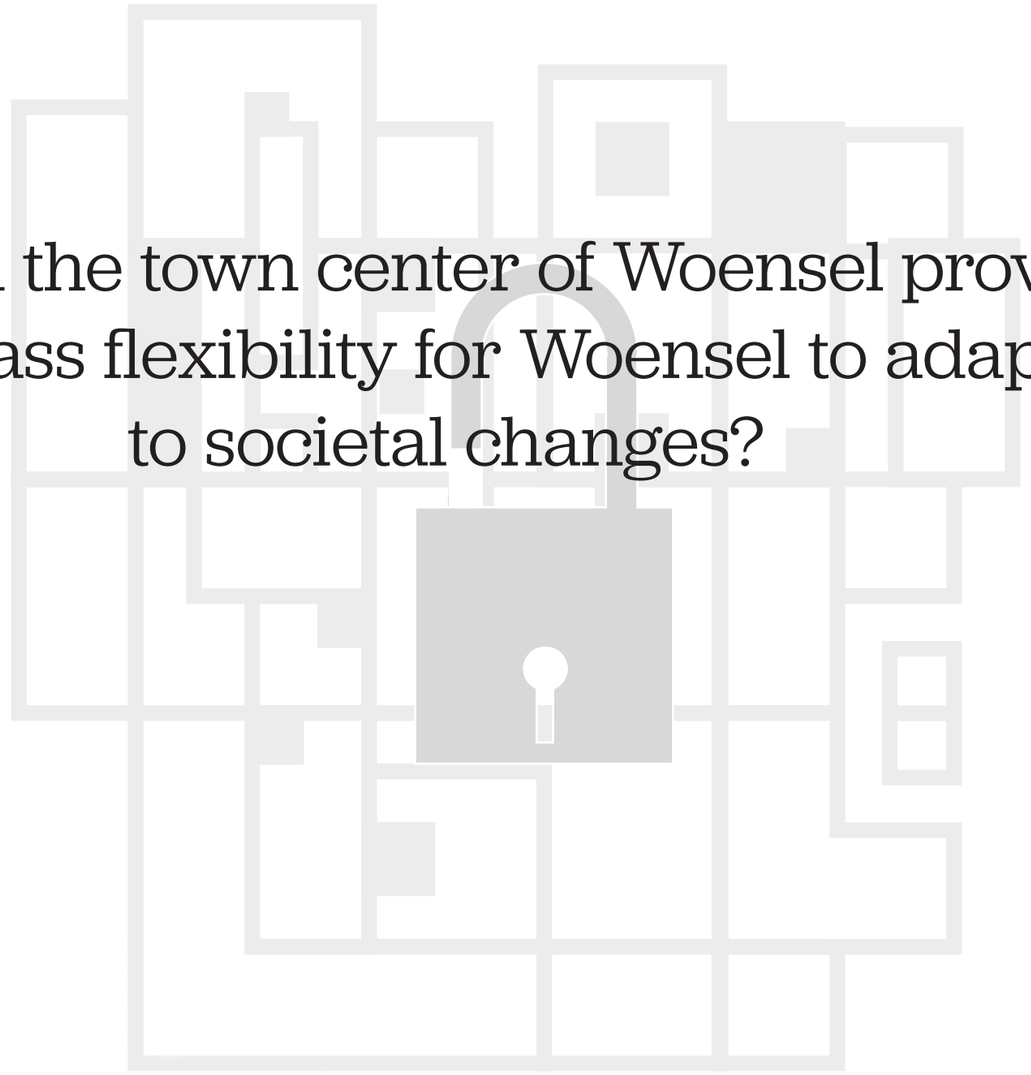
Centre

Opportunities



Research structure

How can the town center of Woensel provide the mass flexibility for Woensel to adapt to societal changes?

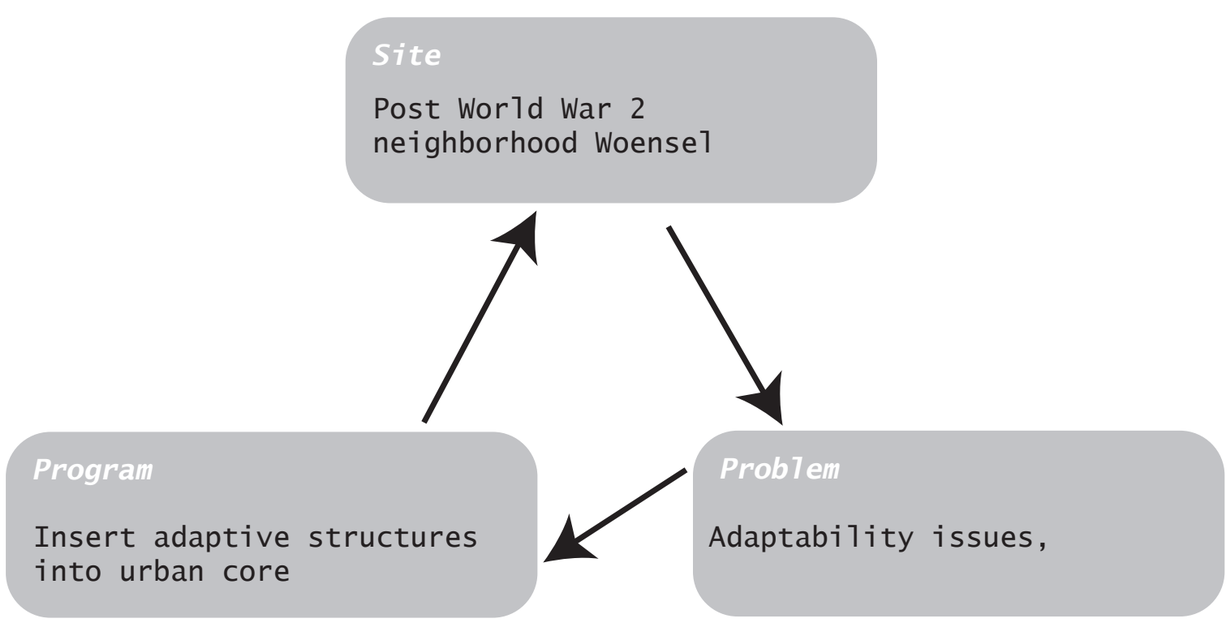


Less accessible to change

More accessible to change

Centre

Research structure



Research structure

Metabolism



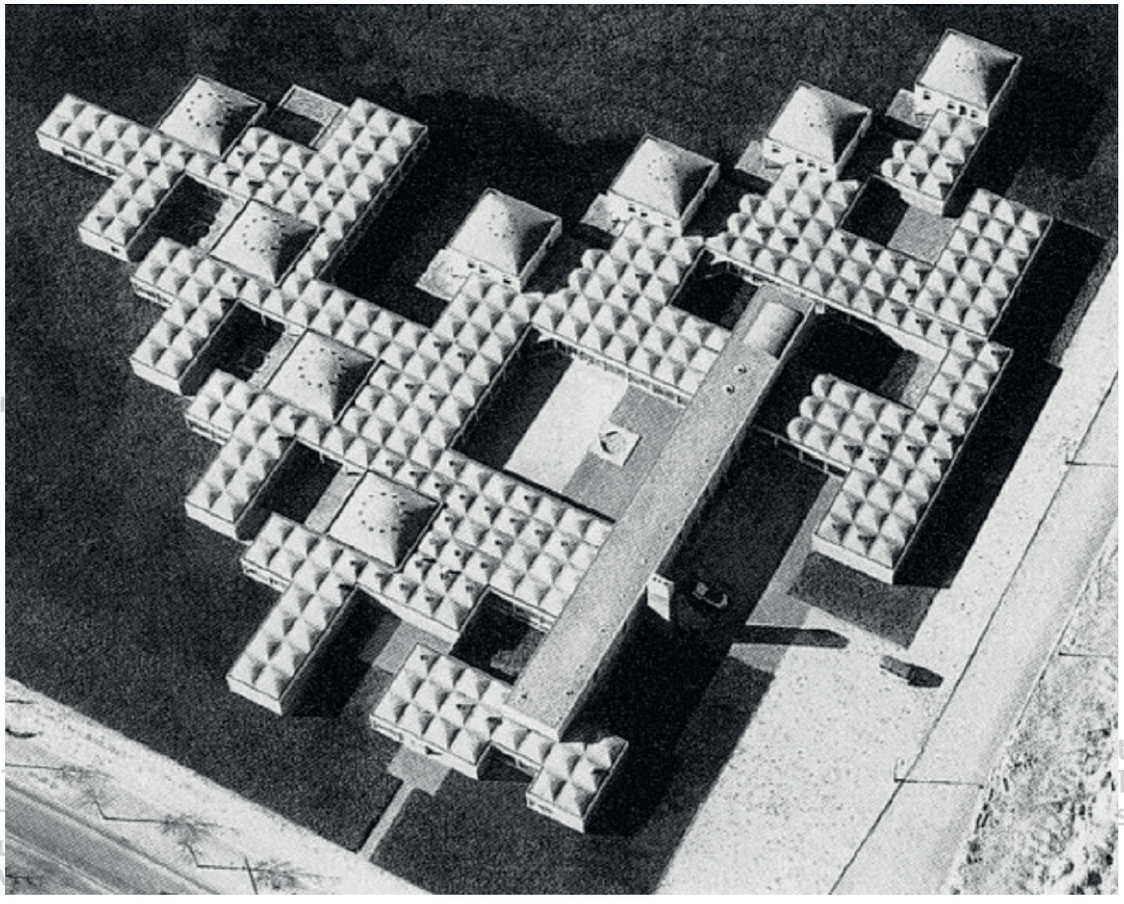
Kisho Kurokawa, 1972



Kisho Kurokawa, 1970

Research structure

Structuralism



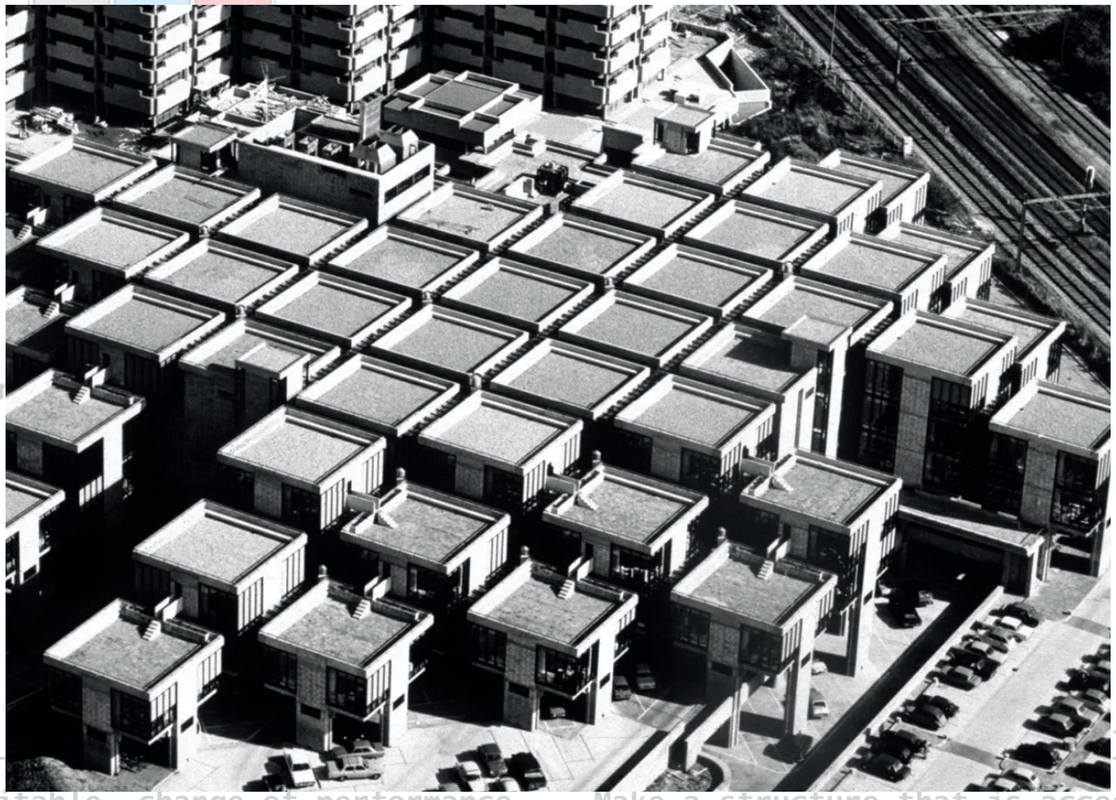
Burgerweeshuis, Aldo van Eyck, 1960,
24 February 1960, Aviodrome Lelystad - Luchtfoto archief



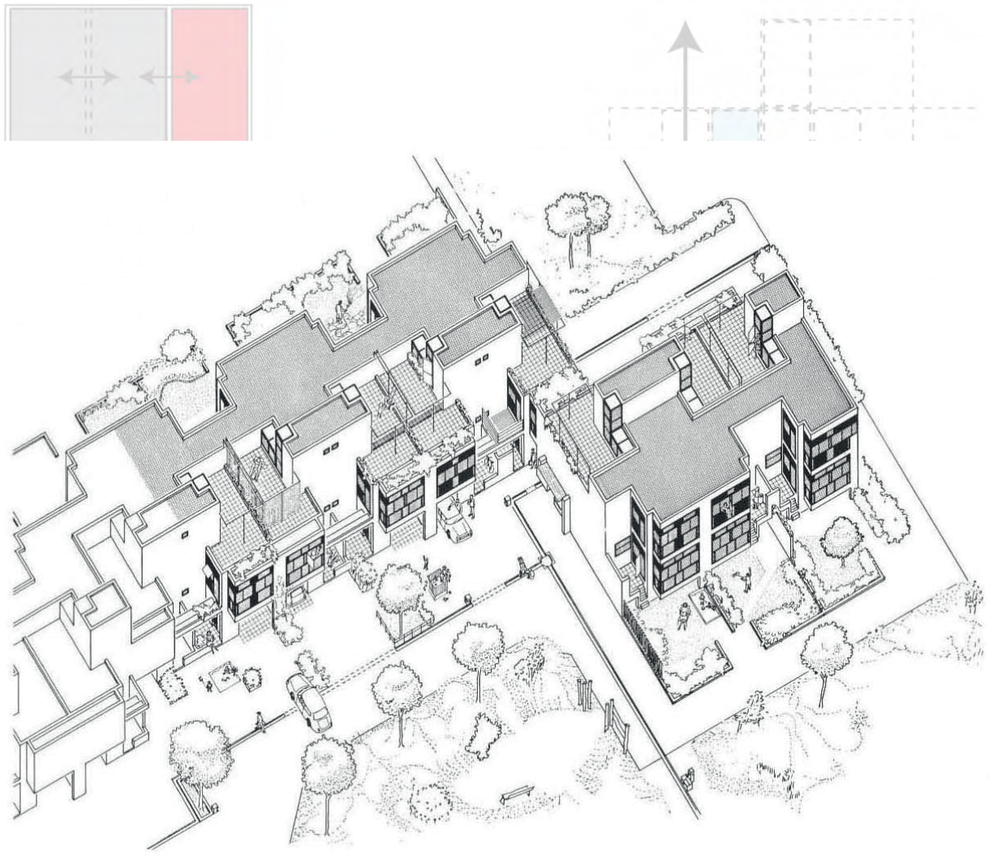
Kasbah, Piet Blom, 1973, 20 september 2005

Research structure

Structuralism



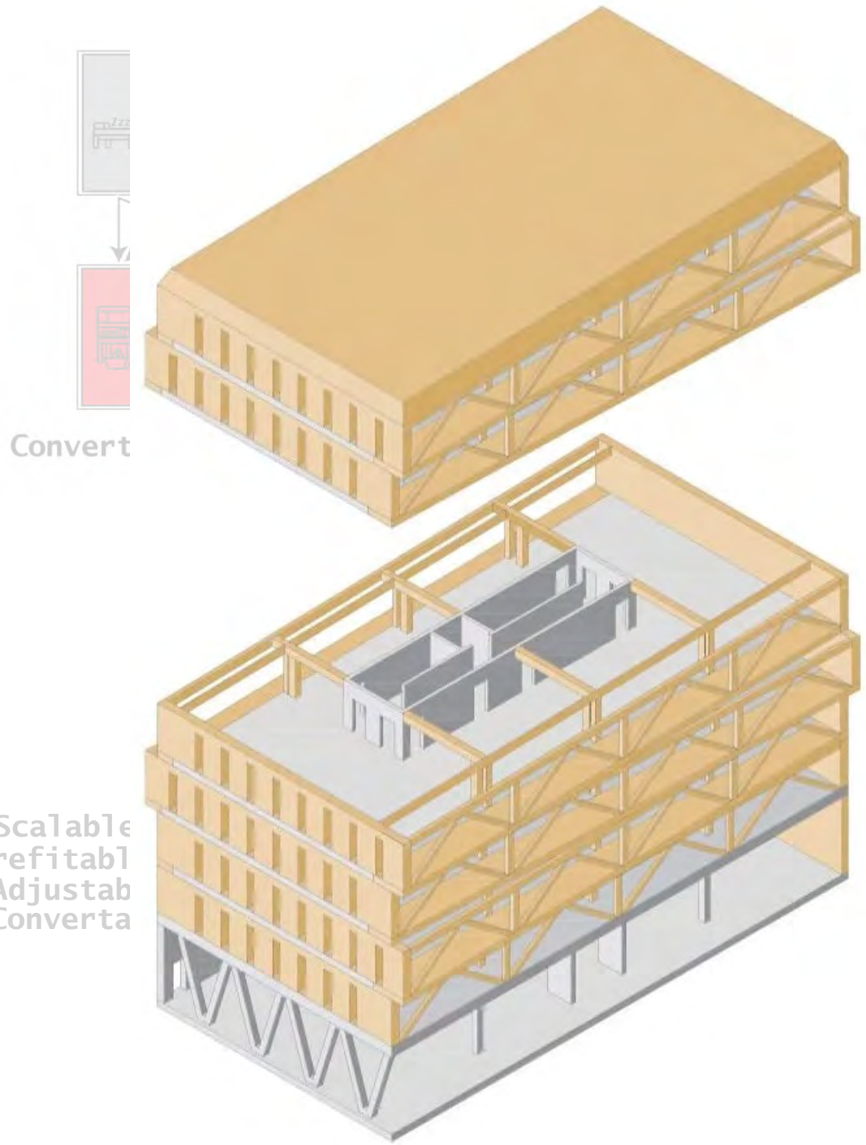
Herman Hertzberger, Centraal beheer Apeldoorn, 1972, aviodrome n.d.



Herman Hertzberger, Diagoonwoningen, 1969

Research structure

Open Building

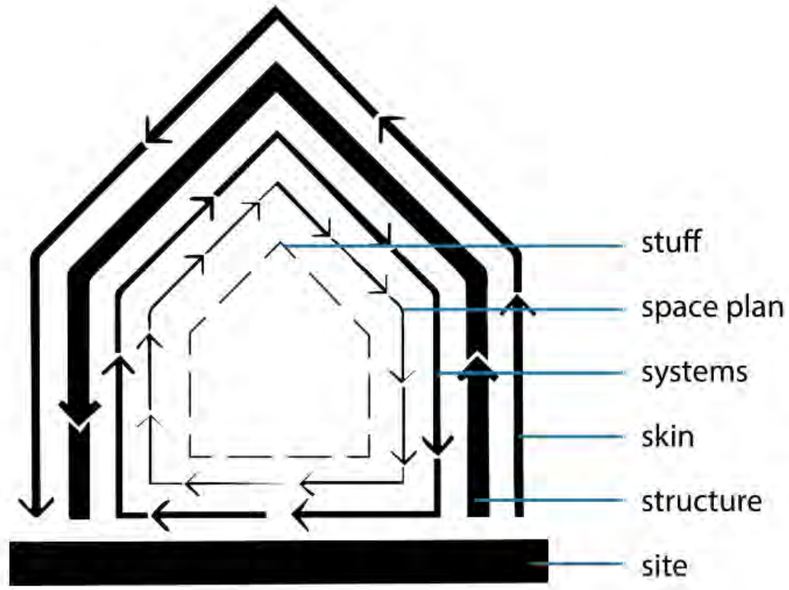


Tom Frantzen, 2016

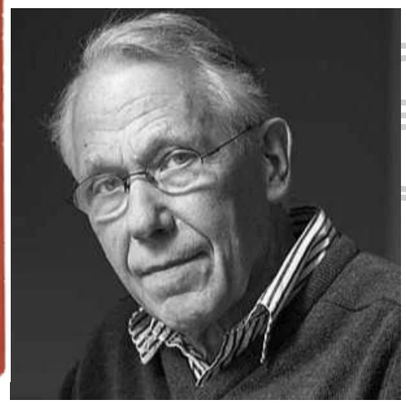
Shearing Layers



John Habraken, 1962



Stewart Brand 1994

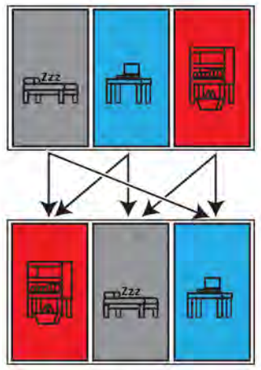


Metabolism

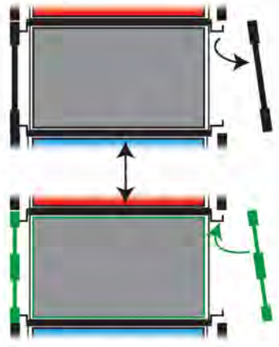
Shearing layers

Open building

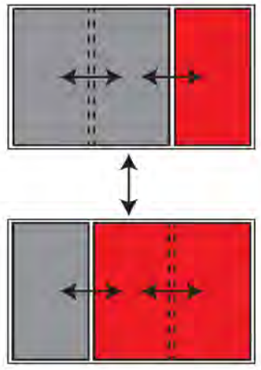
Research structure



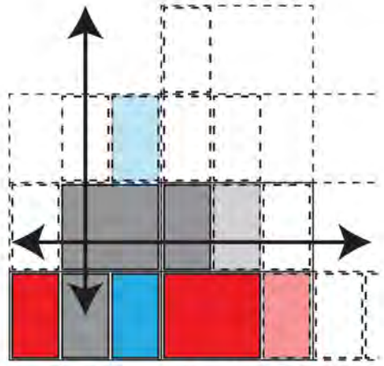
Convertible adaptability



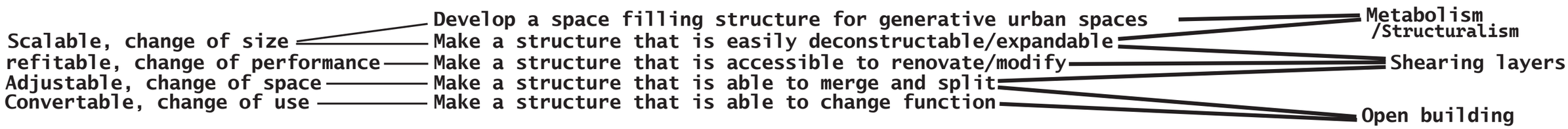
Refitable adaptability



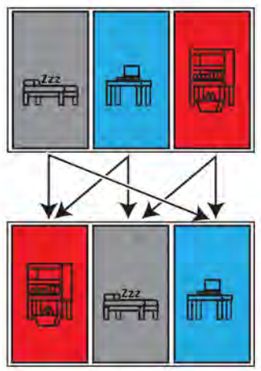
Adjustable adaptability



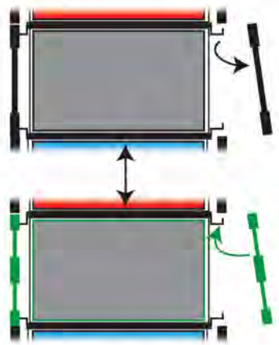
Scalable adaptability



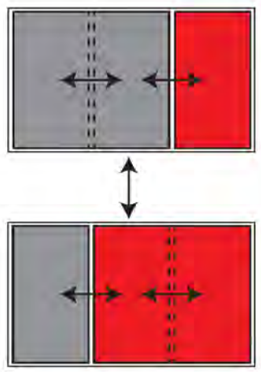
Research structure



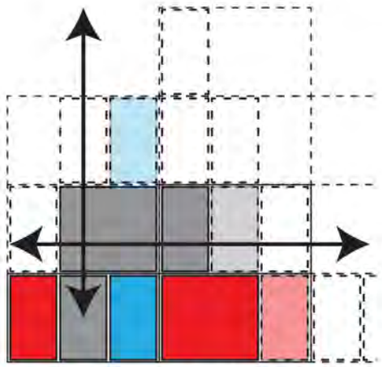
Convertible adaptability



Refitable adaptability



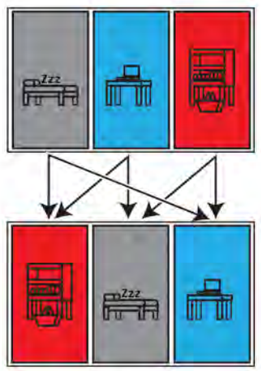
Adjustable adaptability



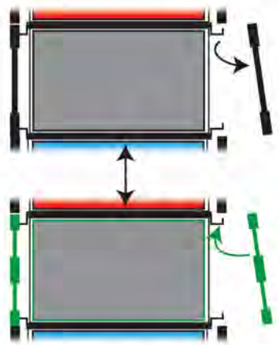
Scalable adaptability

Project goal:
Create a space filling structure, providing a multifunctional role as the town center of Woensel, that responds to changes in society, through future adjustments in: size, division, function and appearance.

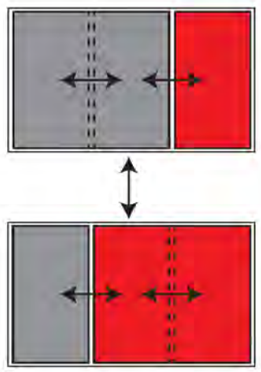
Research structure



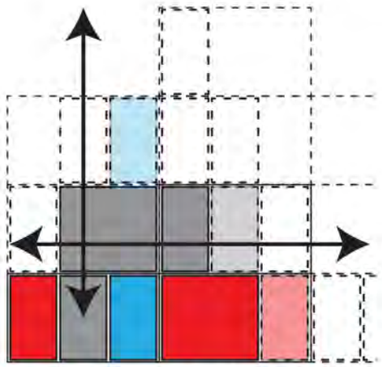
Convertible adaptability



Refitable adaptability



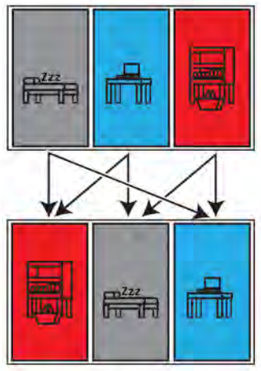
Adjustable adaptability



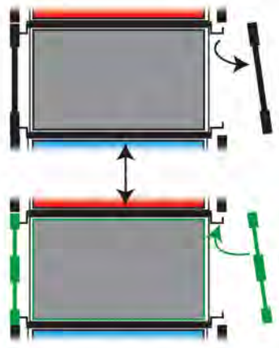
Scalable adaptability

Possible research value:
Embedding mass flexibility in future design could lengthen the lifespan and use of urban districts, buildings, and materials.

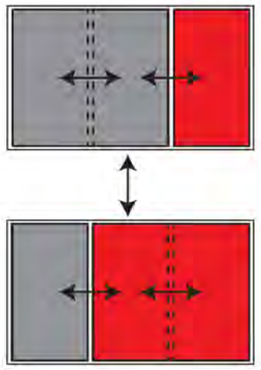
Research structure



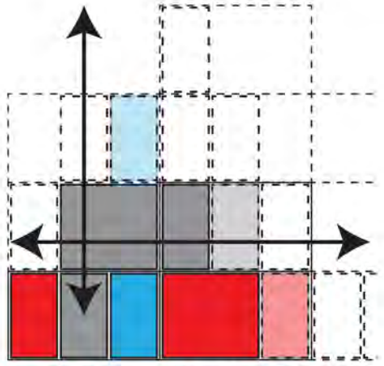
Convertible adaptability



Refitable adaptability



Adjustable adaptability



Scalable adaptability

Research on flexible design tool

How can a building system provide for future adjustments in division, function and appearance to accomodate changes in society?

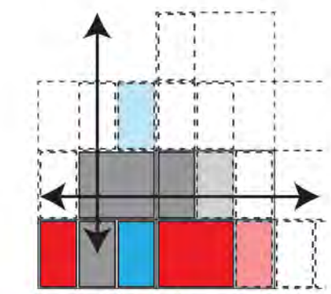
Generative design

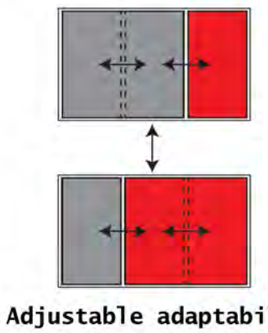
What generative approach to a space filling structure encourages adjustments in size,to accommodate changes in society?

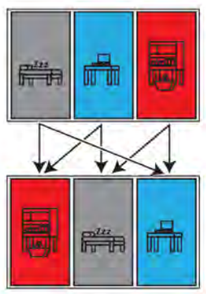
Site context and philosphy

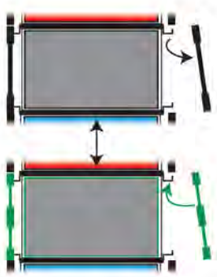
How have philosophy and design methodology, applied in Woensel, effected flexibility?

Research structure









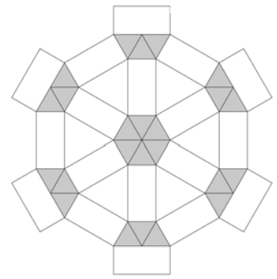
Prototype 2
Spatial - Conceptual
Space filling structure

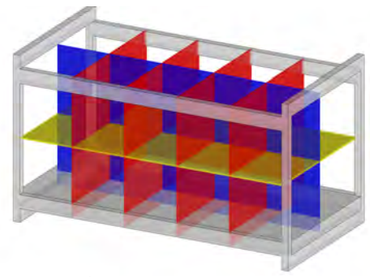
Prototype 1
Spatial - Conceptual
'Open' Modular unit

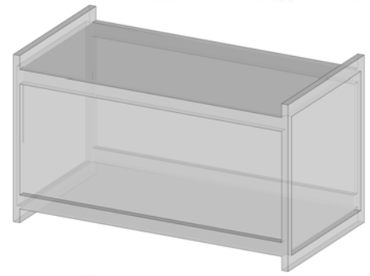
Prototype 3
Technical - Structural
Load bearing structure

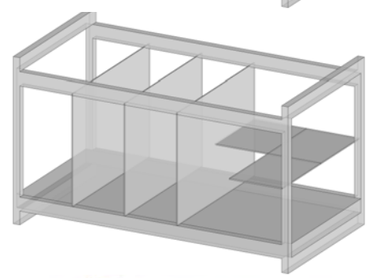
Prototype 5
Open Building
Interior structure

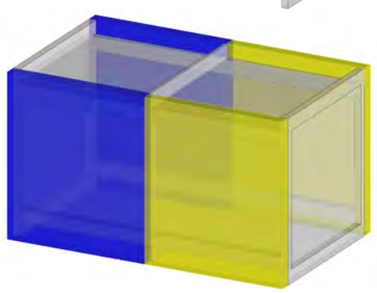
Prototype 4
Technical - Structural
Exterior structure



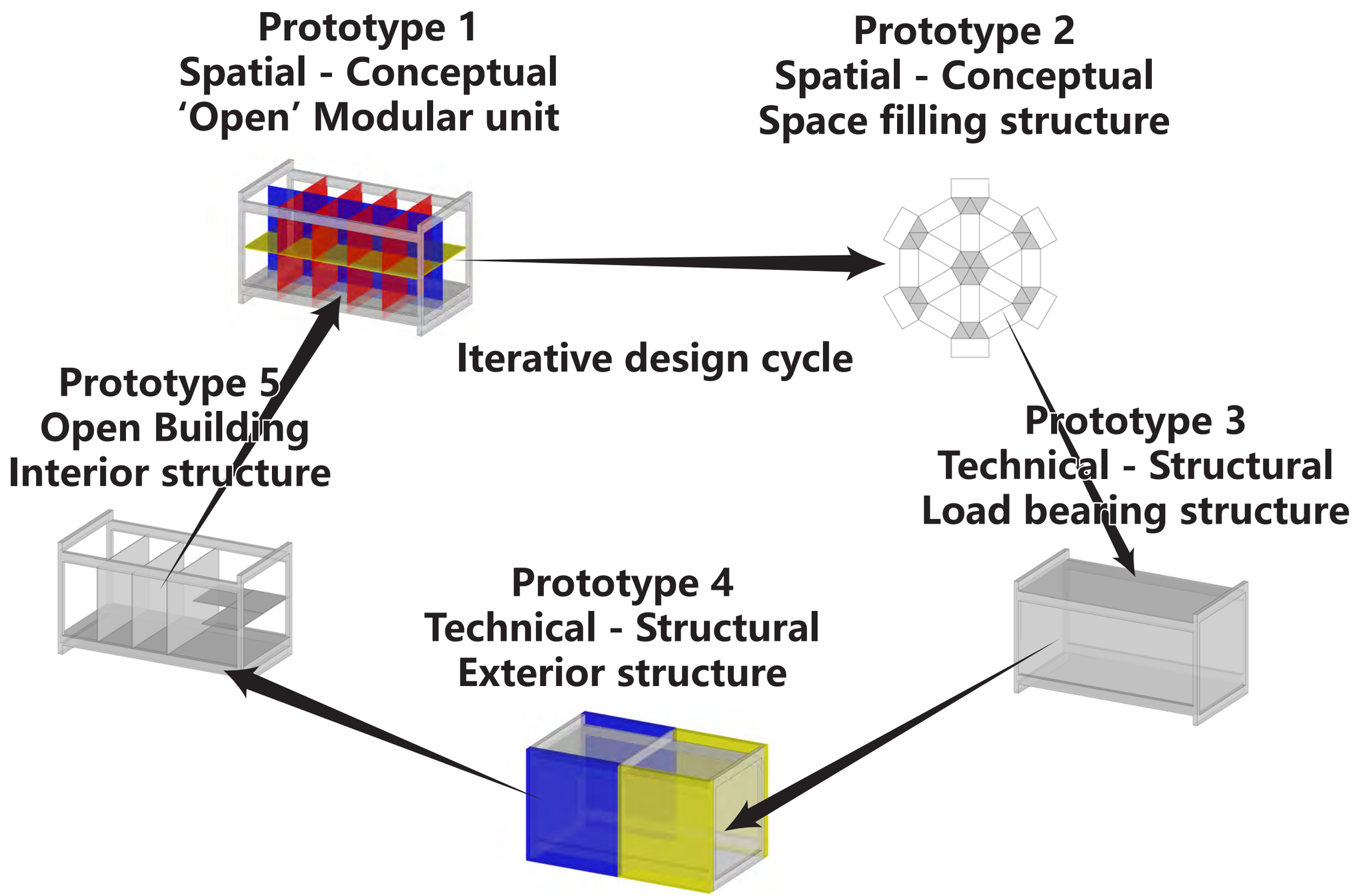








Research structure



Space filling structure

perhaps it is not the principle of the stamp but rather the
shape and filling that have resulted in undesired outcomes. Rethinking stamp
philosophy could improve devolopment, construction and cost.

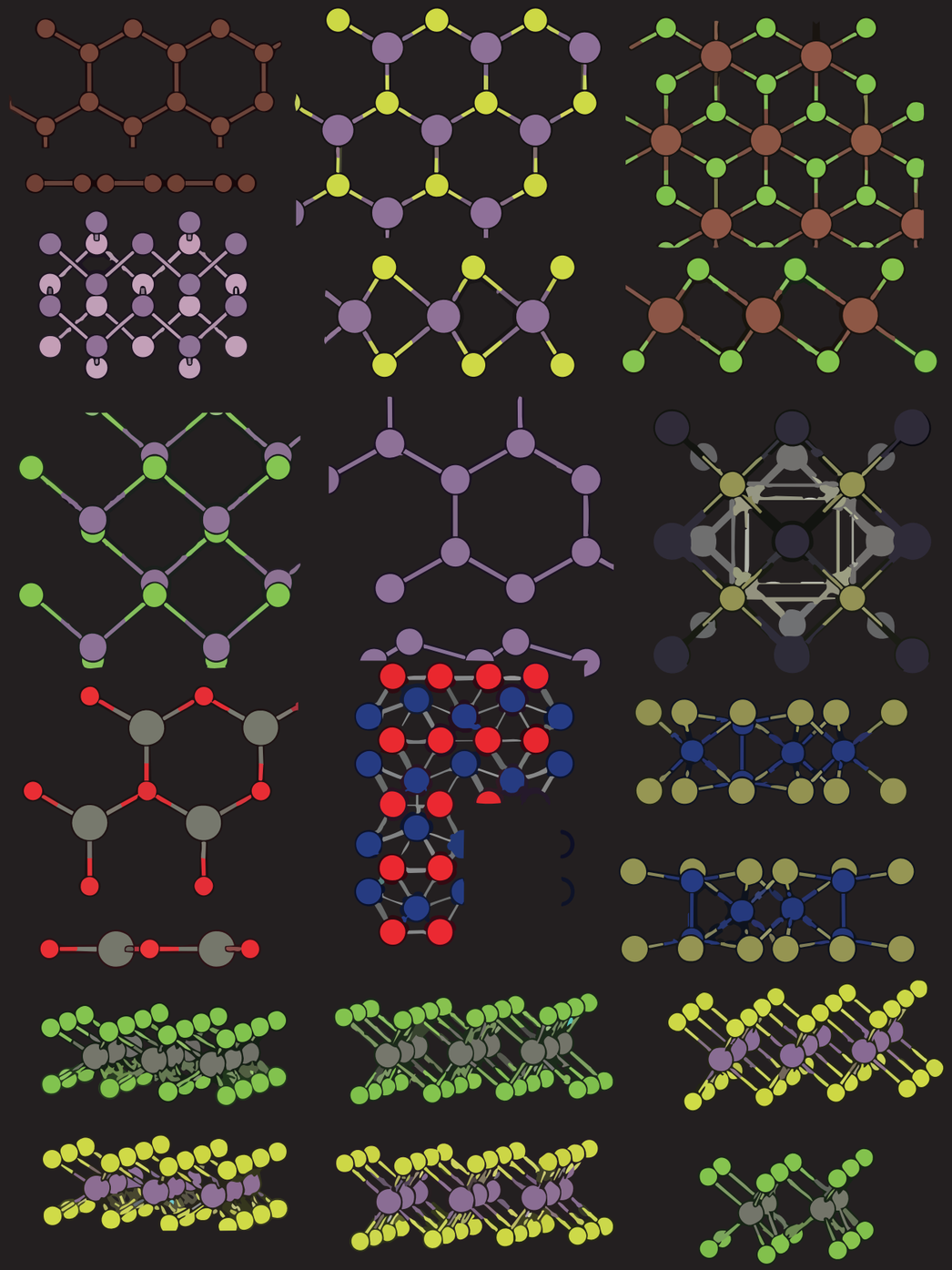
Space filling structure



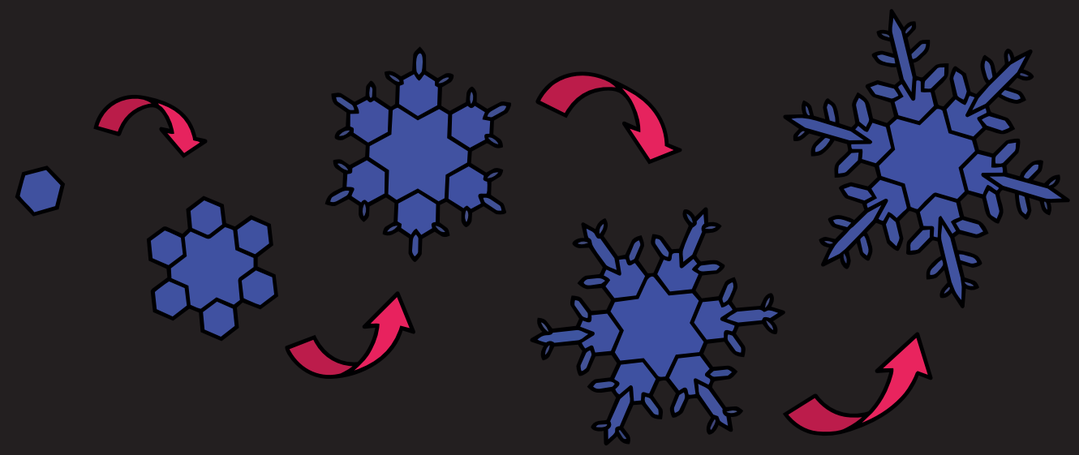




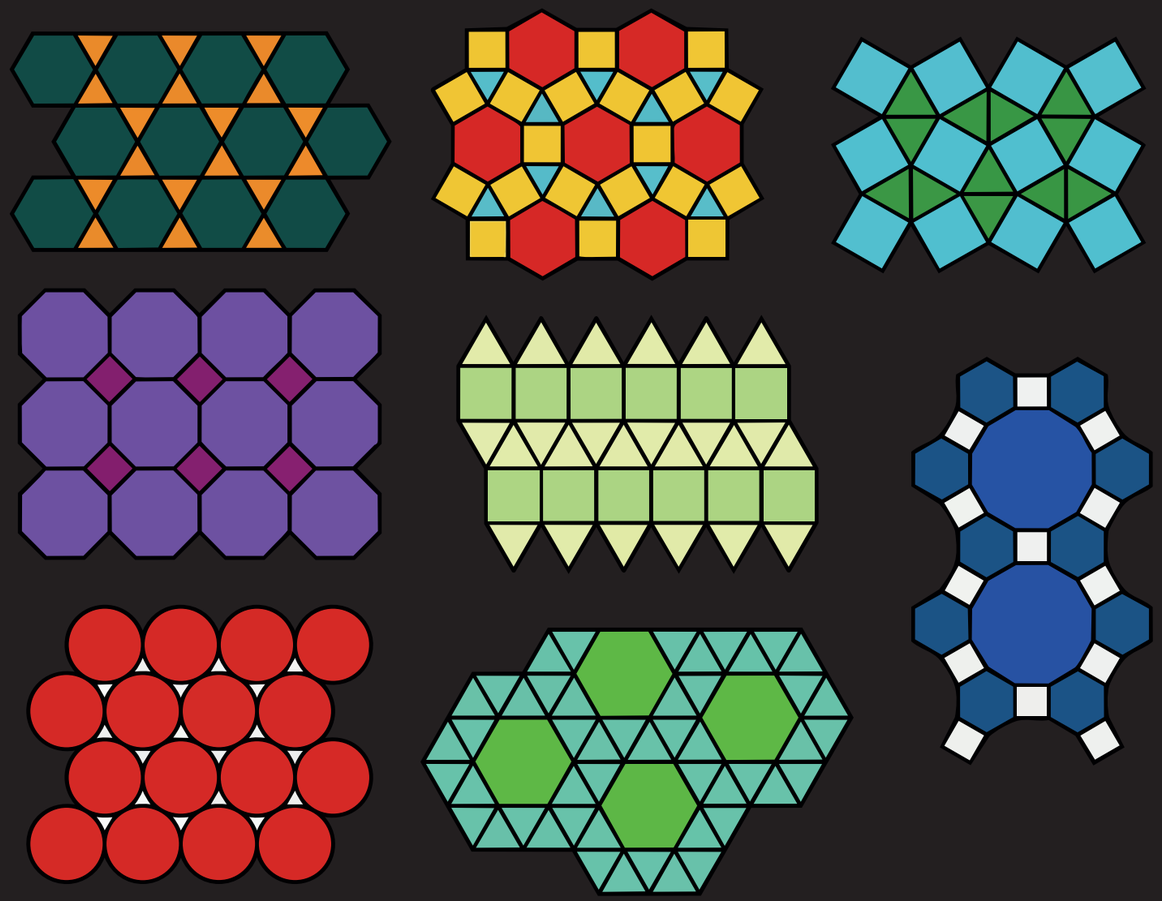
Space filling structure



Visualizations of various crystal growths, Srihari Kastuar et al. 2022



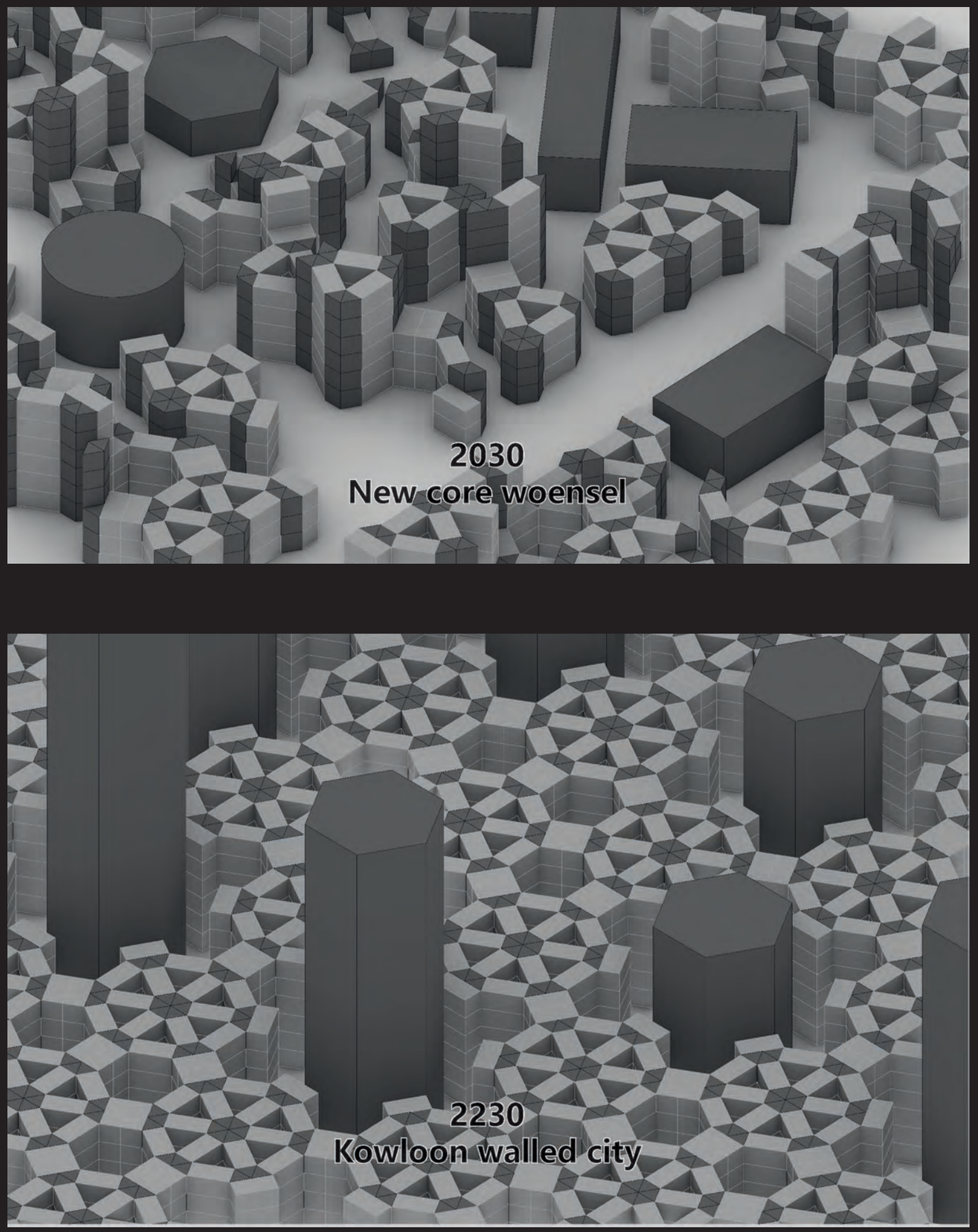
Snowflake development, Kenneth Libbrecht. 2015

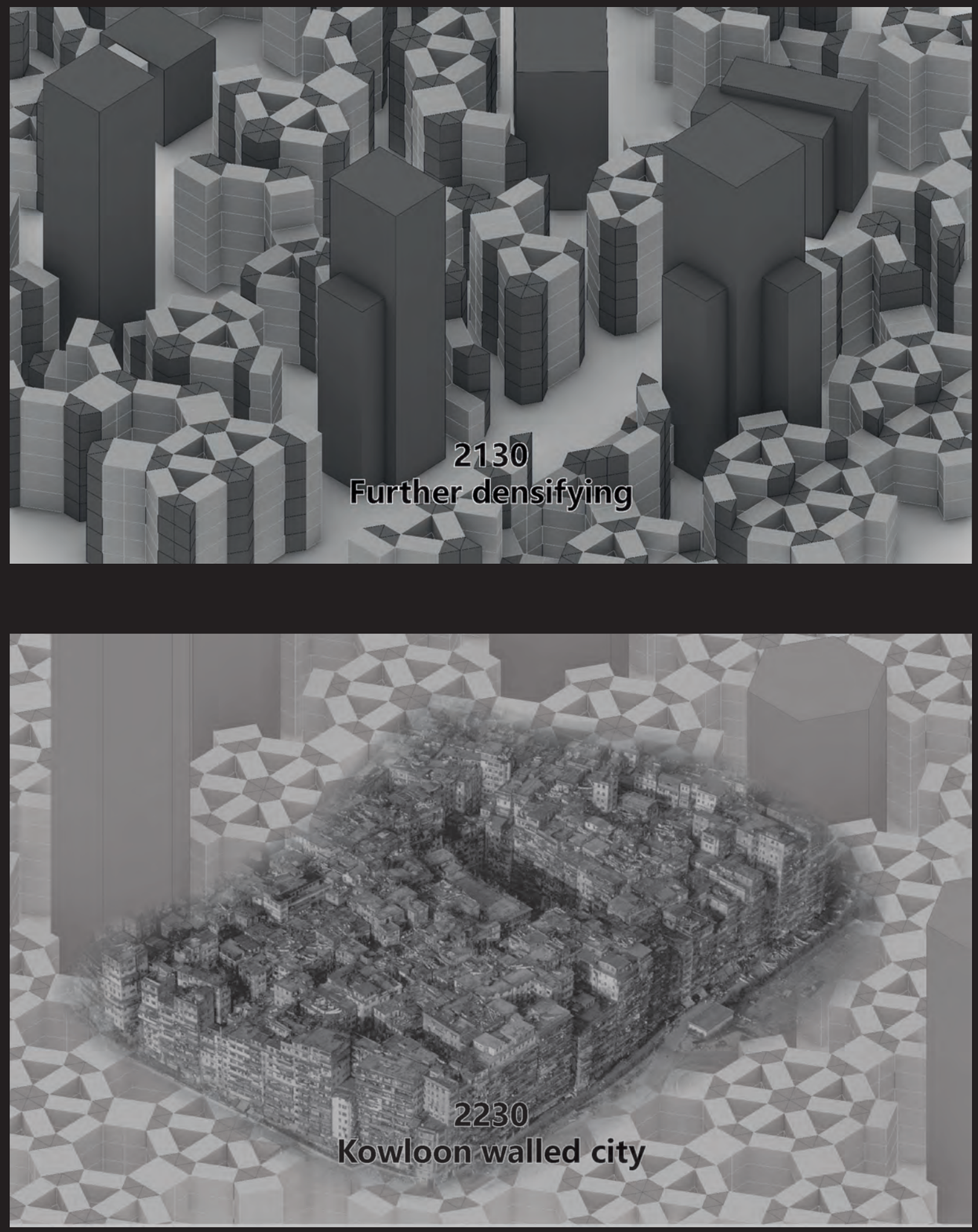


Tessalations, Max Scout, 2015

Fractal structures

Space filling structure





Space filling structure

Benefits

- Consistent construction
- Less planning
- Fewer specifics to be designed
- Economy of scale

Space filling structure

Benefits

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Downsides

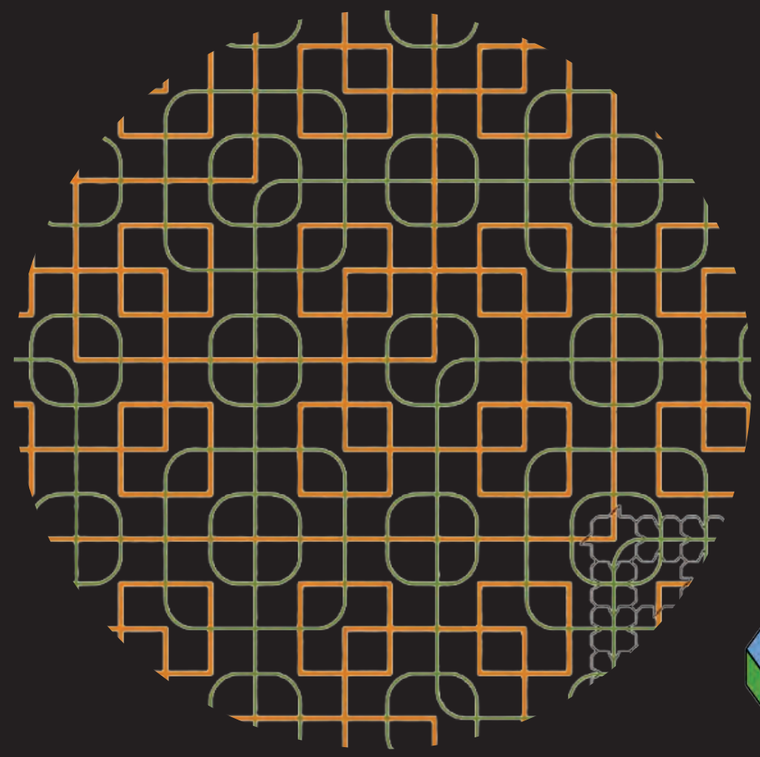
- Predictable
- Low sense of place
- Anonimity through repetition
- Little mixed use incorporated
- Buildings often uneconomical to alter
- Remaining space often filled with similar use

Space filling structure

repeated units, that tile the plane,
while remaining unpredictable and varied throughout,
are needed.

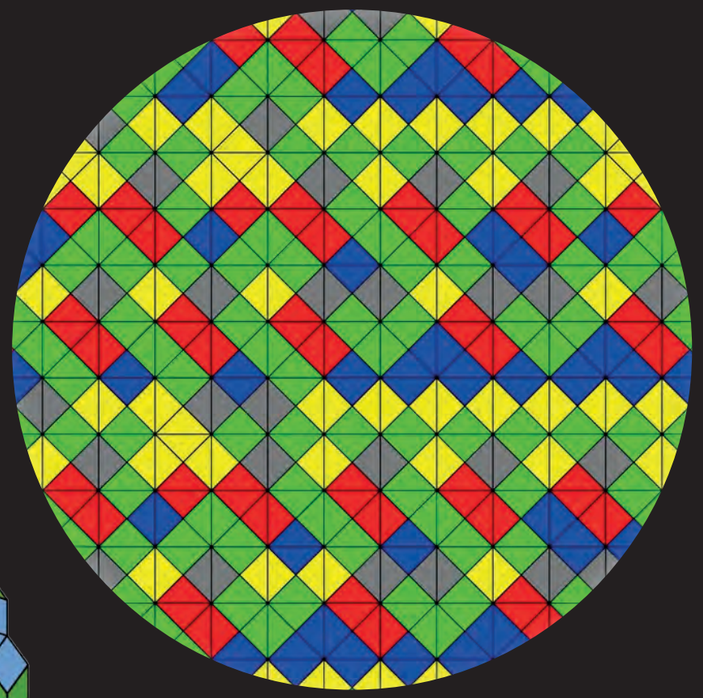
Space filling structure



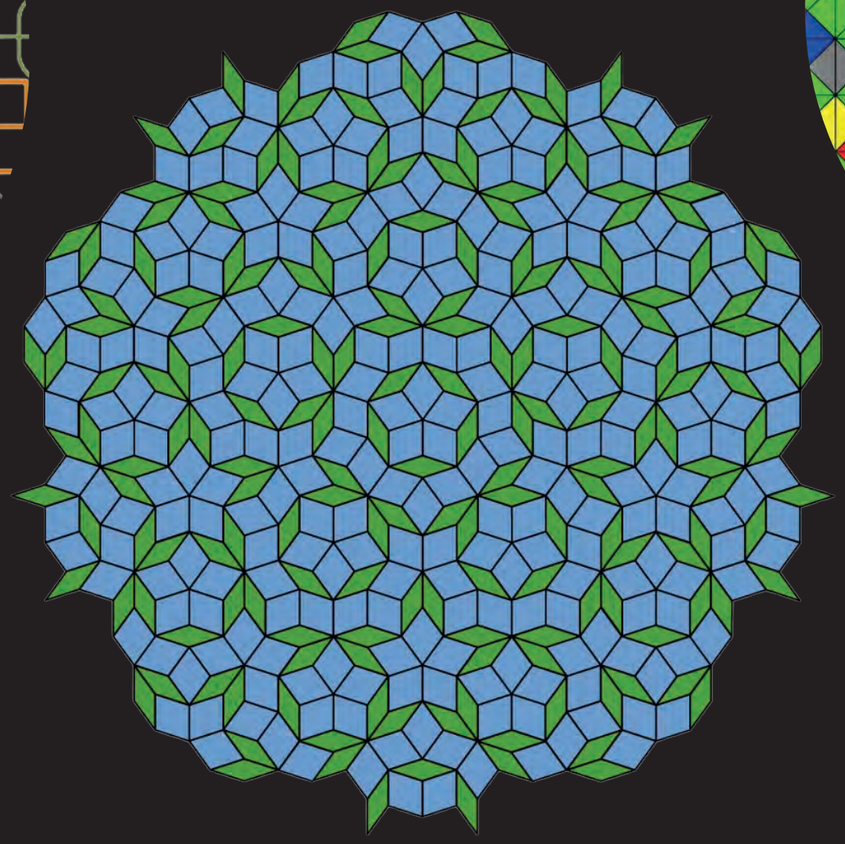


Robinson tiling, visualized by C. Straus





Aperiodic Mosaic, visualized by Claudio Rochchini

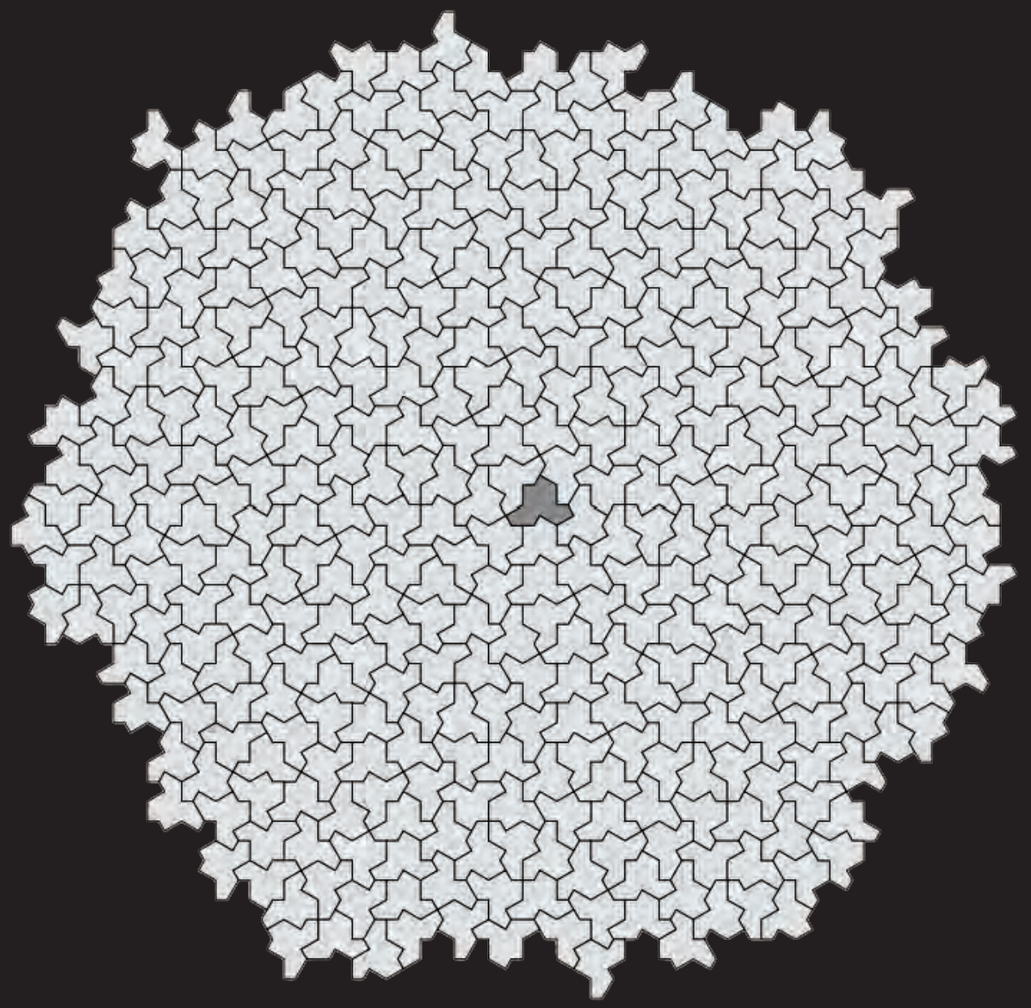


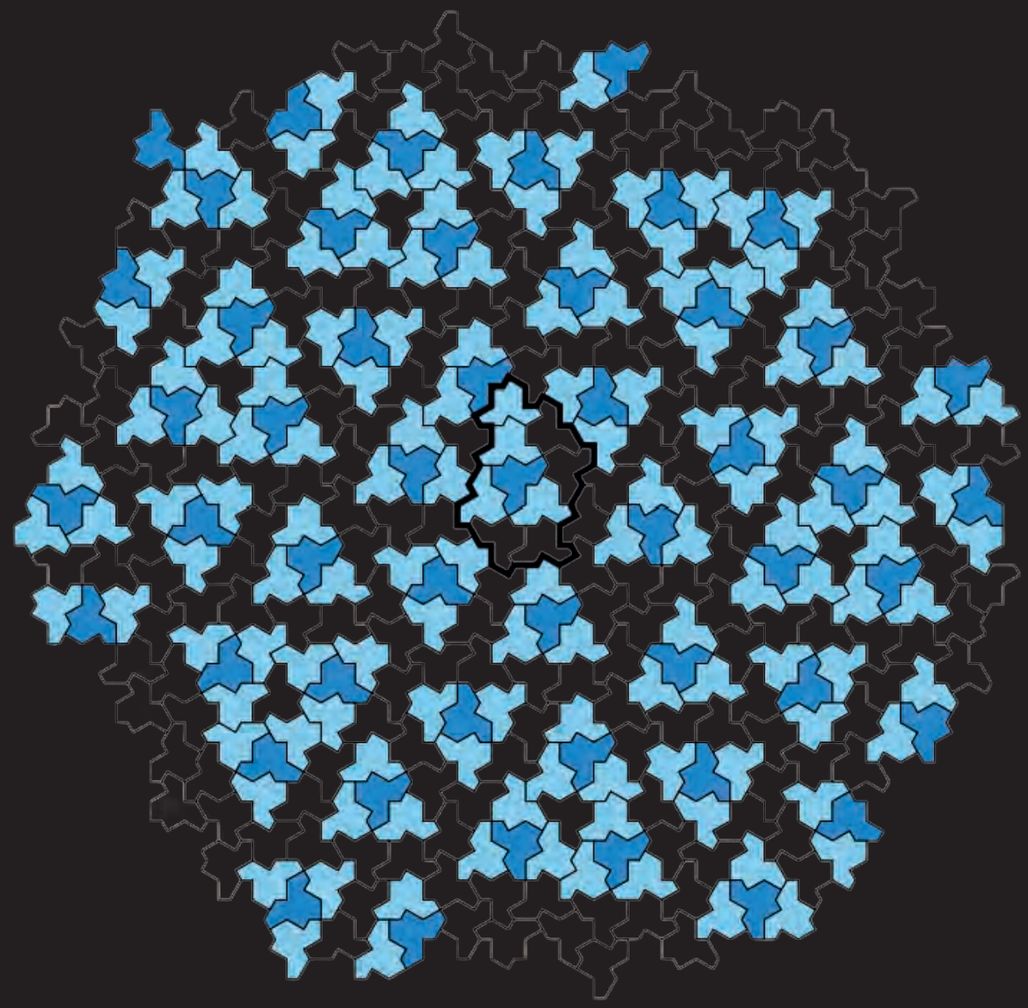
Penrose tiling, visualized by C. Straus

Space filling structure



Einstein tile

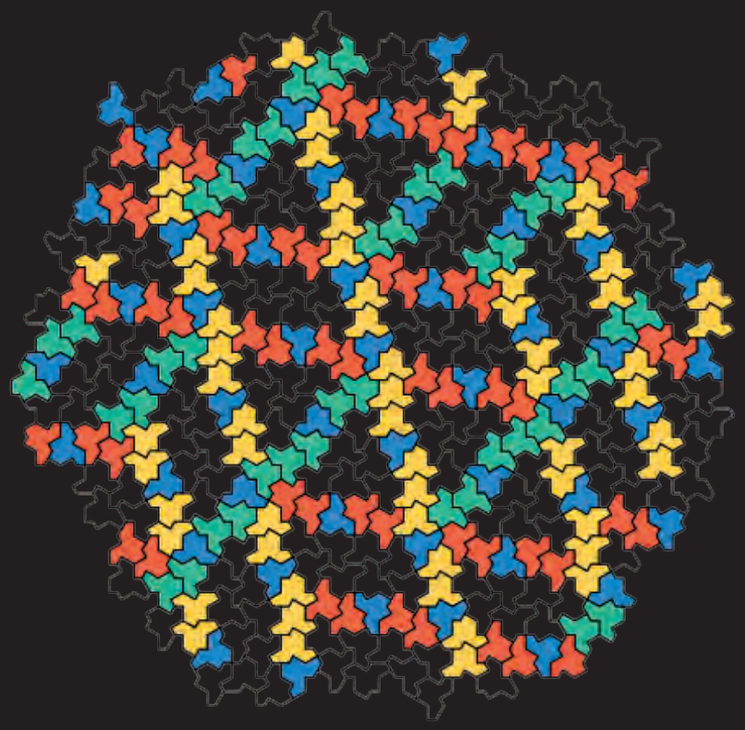


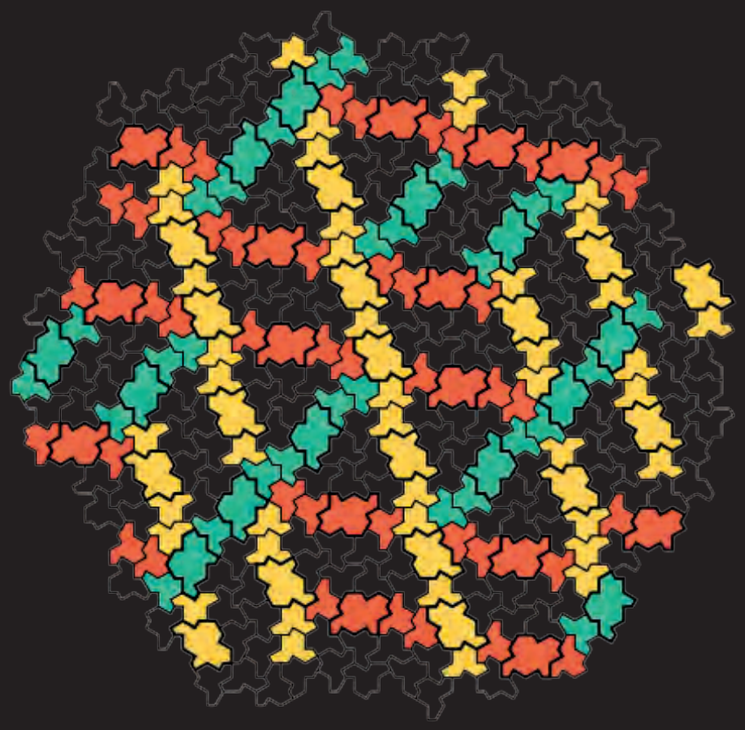


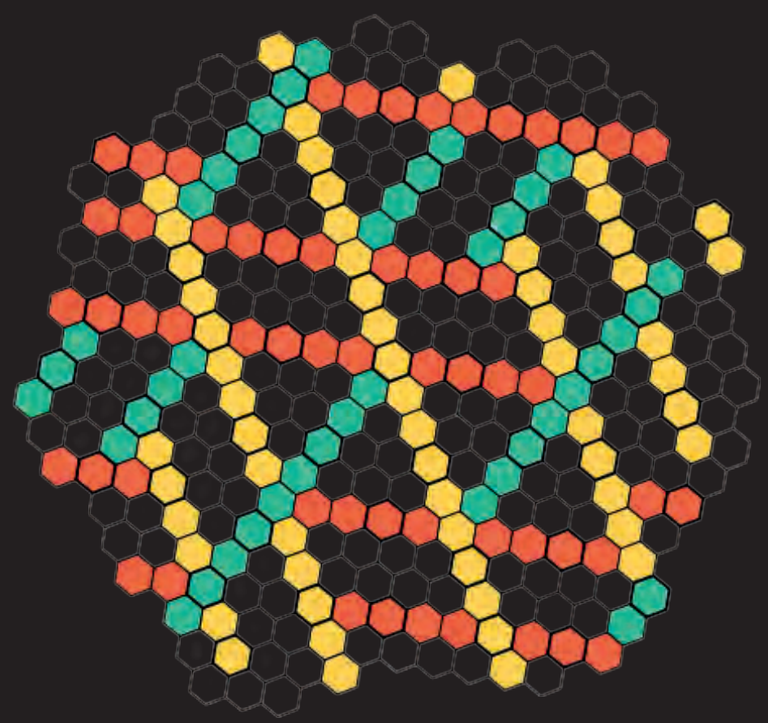
Einstein tiling visualization, edited from David Smith et al., 2024

Space filling structure









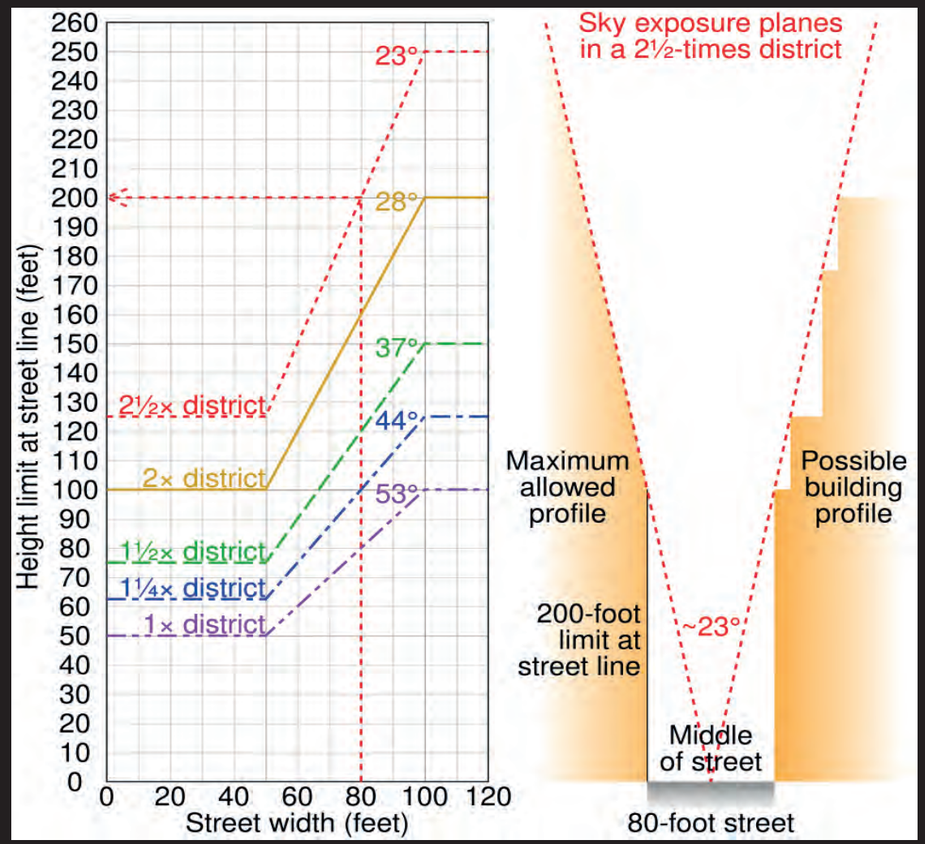
David Smith et al., 2024

Generative structure

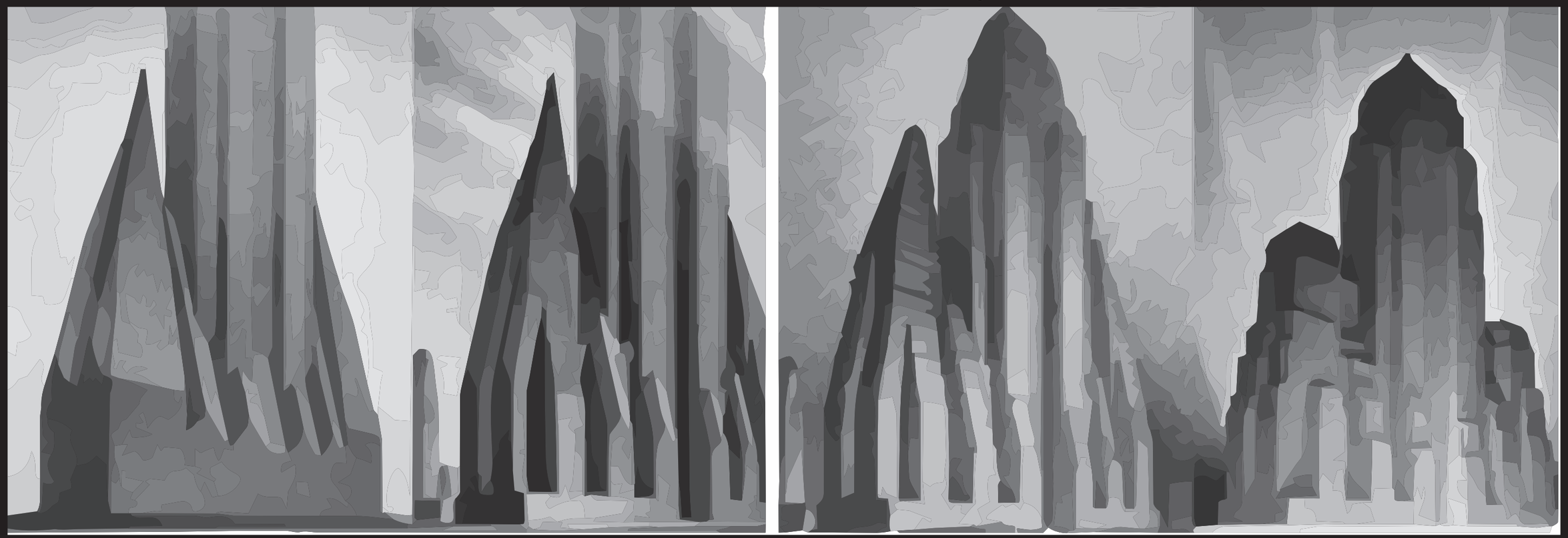


Kowloon Walled City. 1989 Aerial - Wikipedia - CC BY-SA 4.0

Generative structure

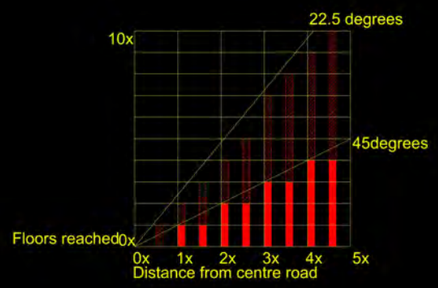


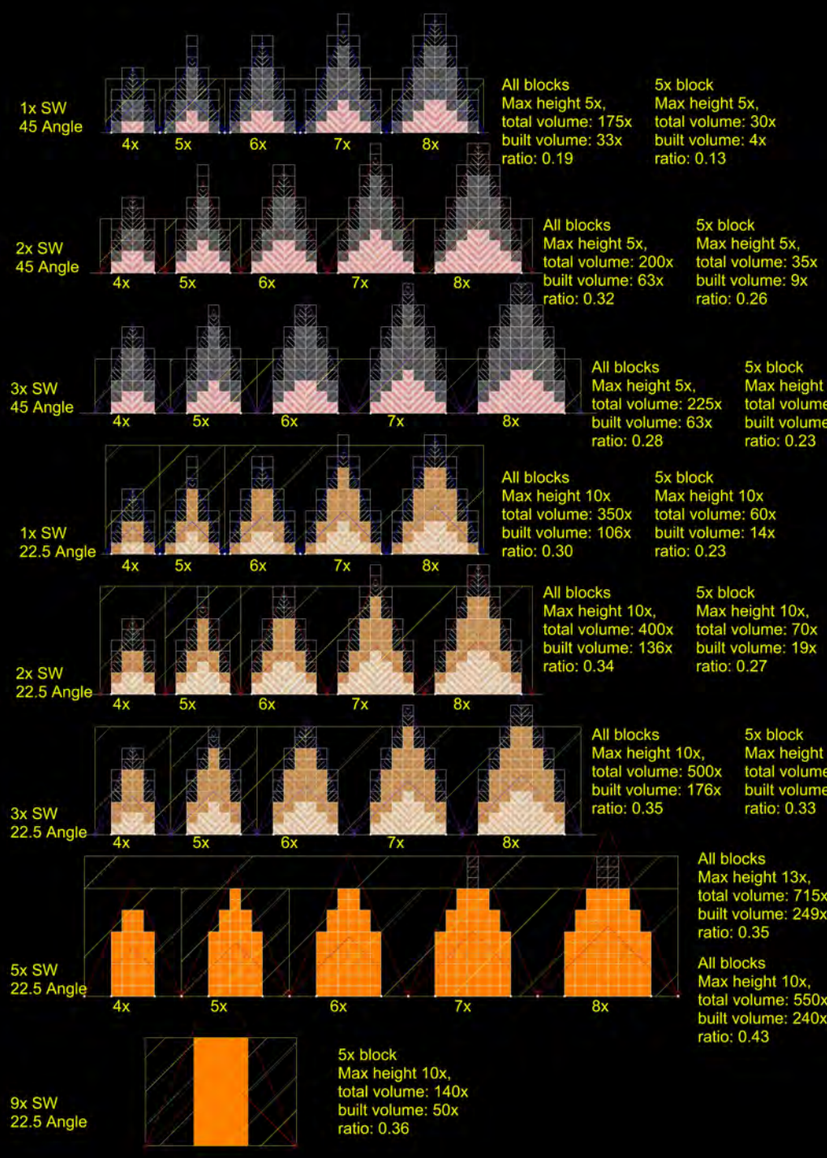
Cmglee. (2019). NYC 1916 setback principle

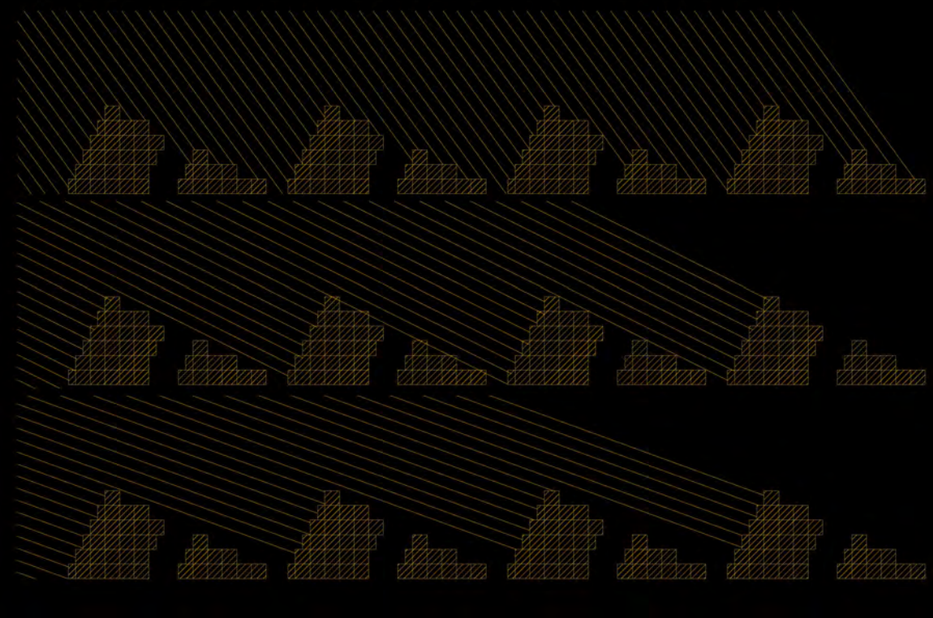


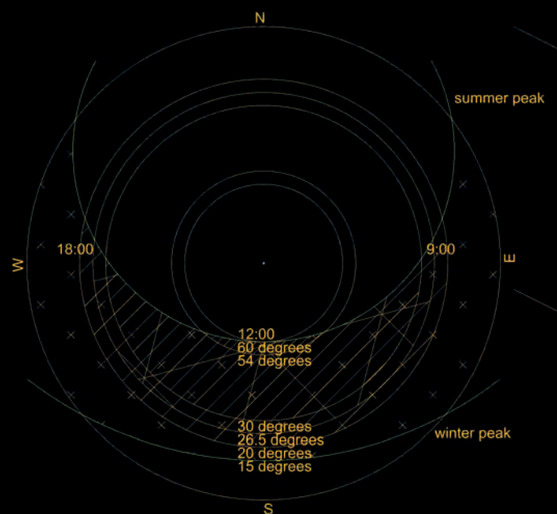
Hugh Ferriss, New York Times, 1922, edited

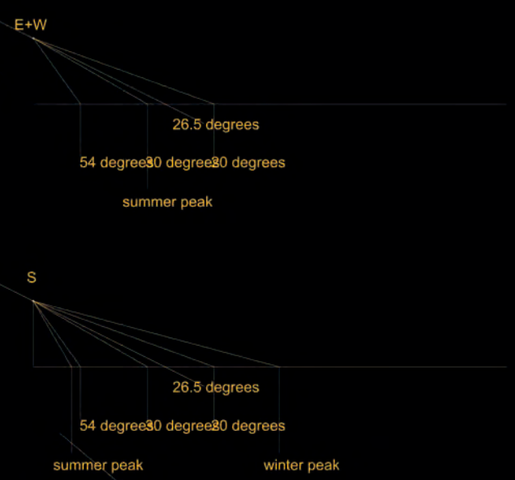
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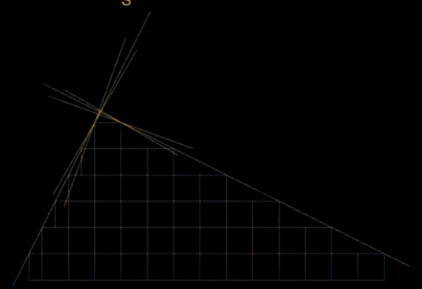


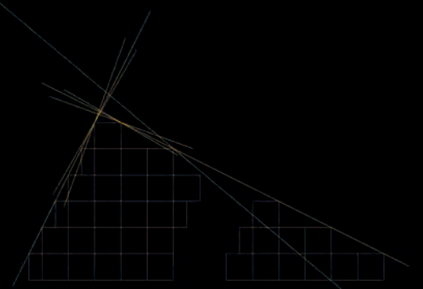




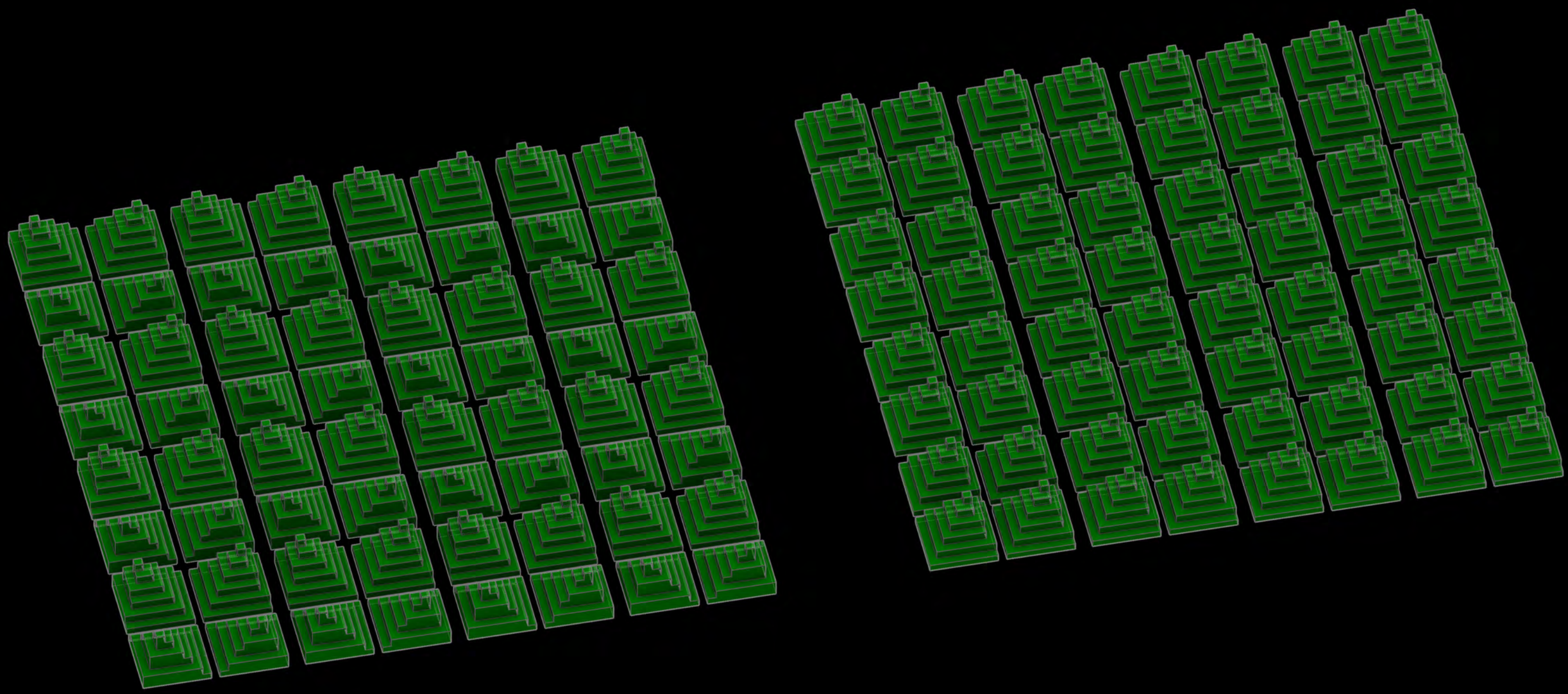


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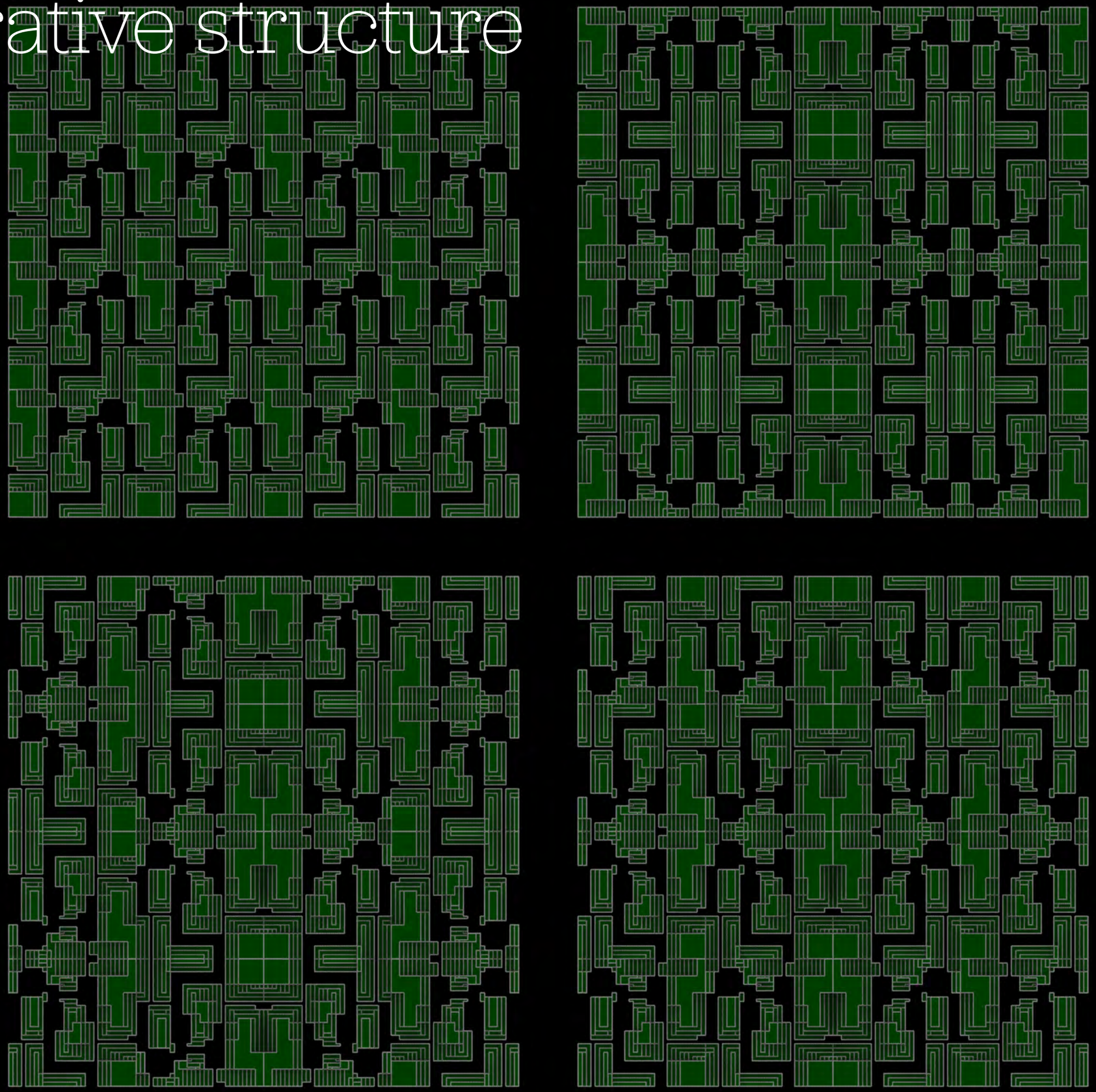




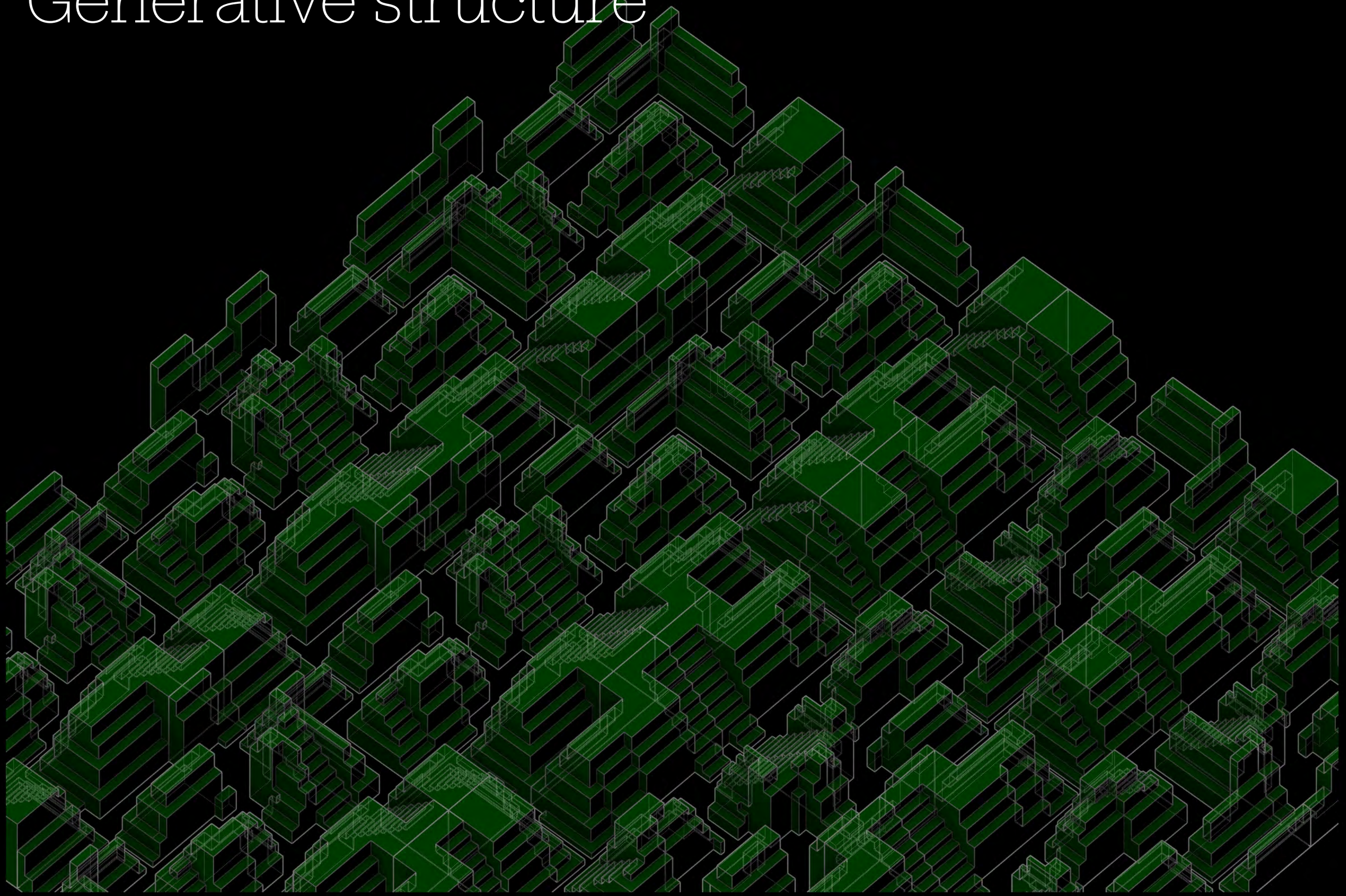
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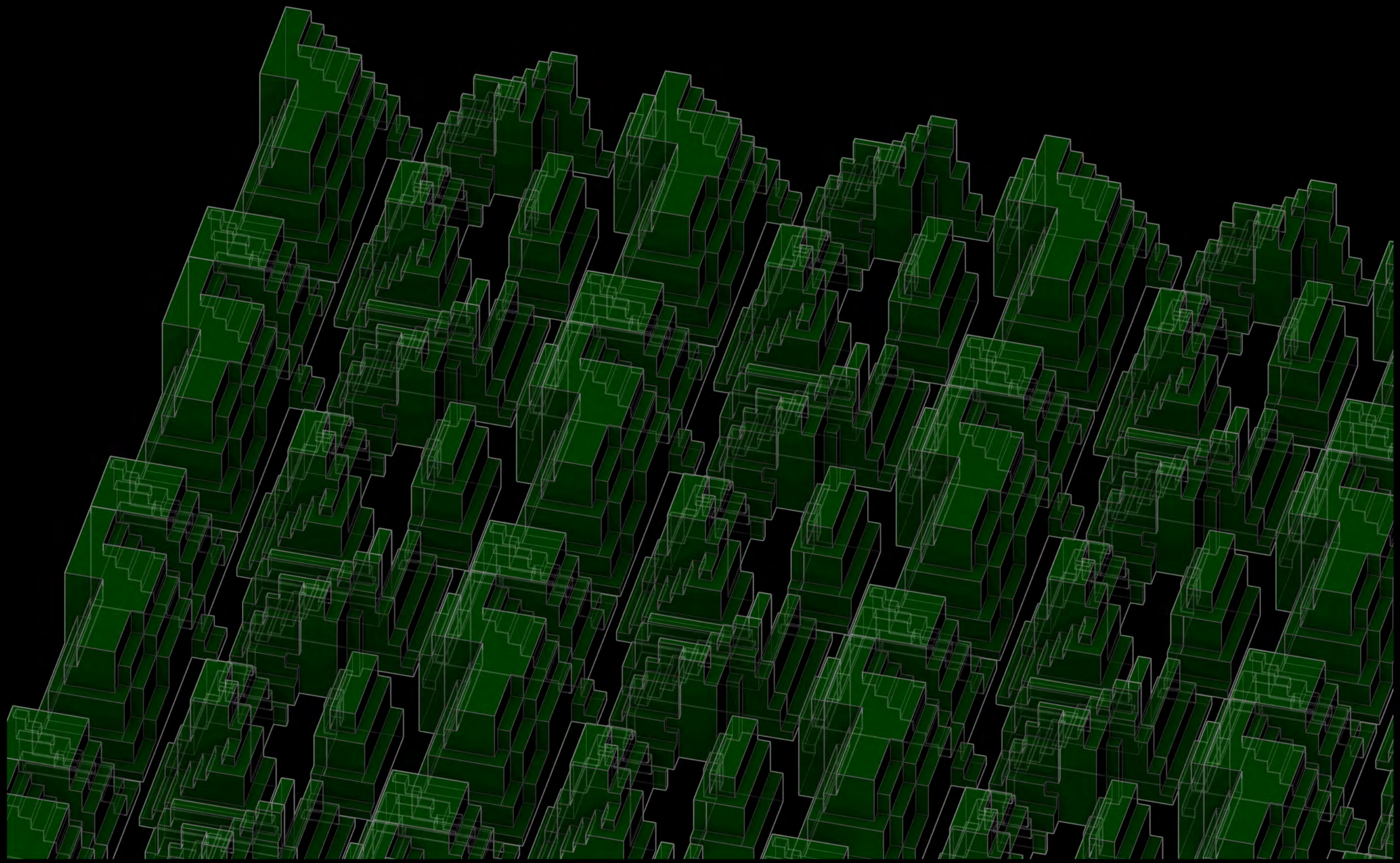
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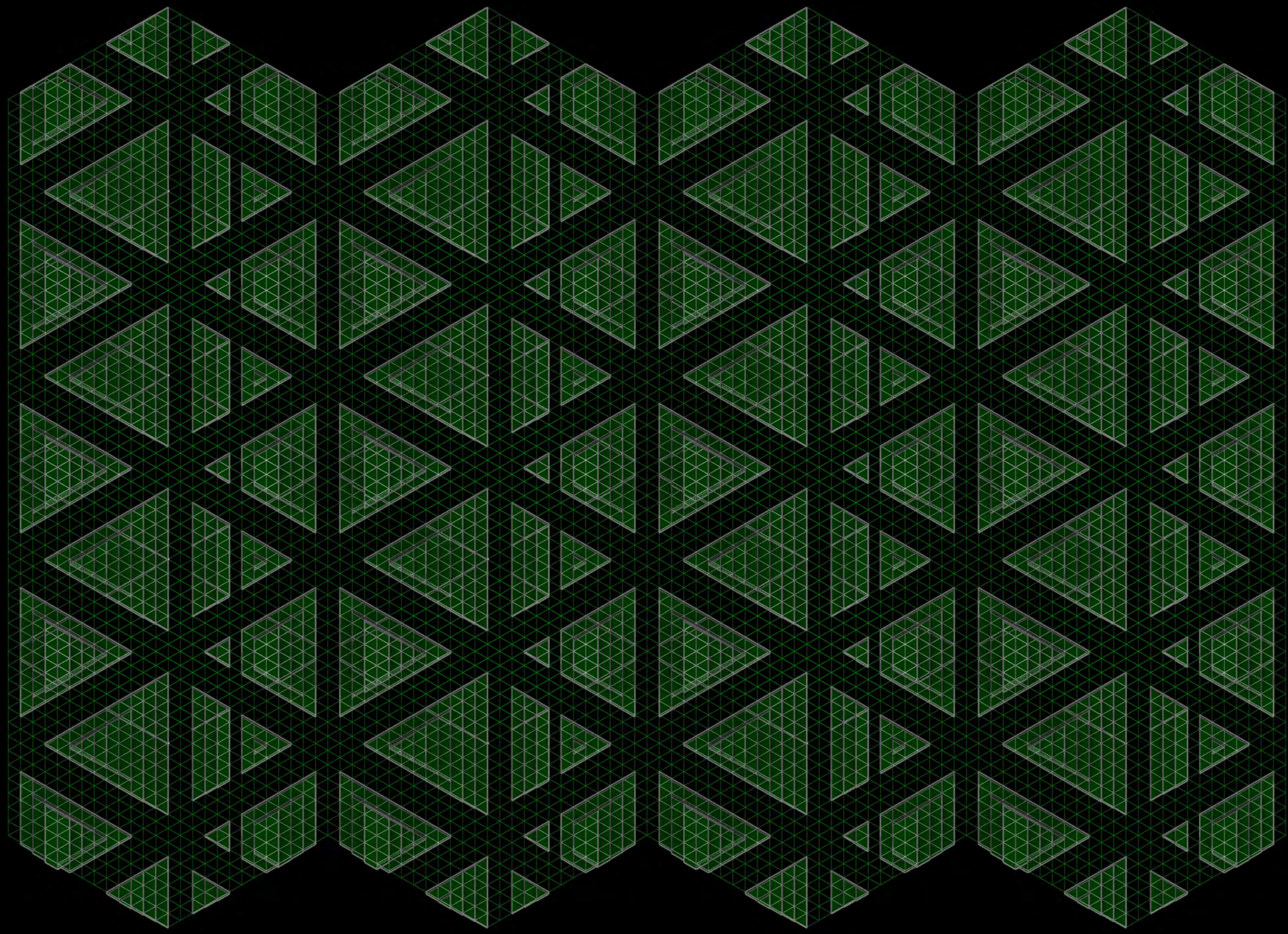
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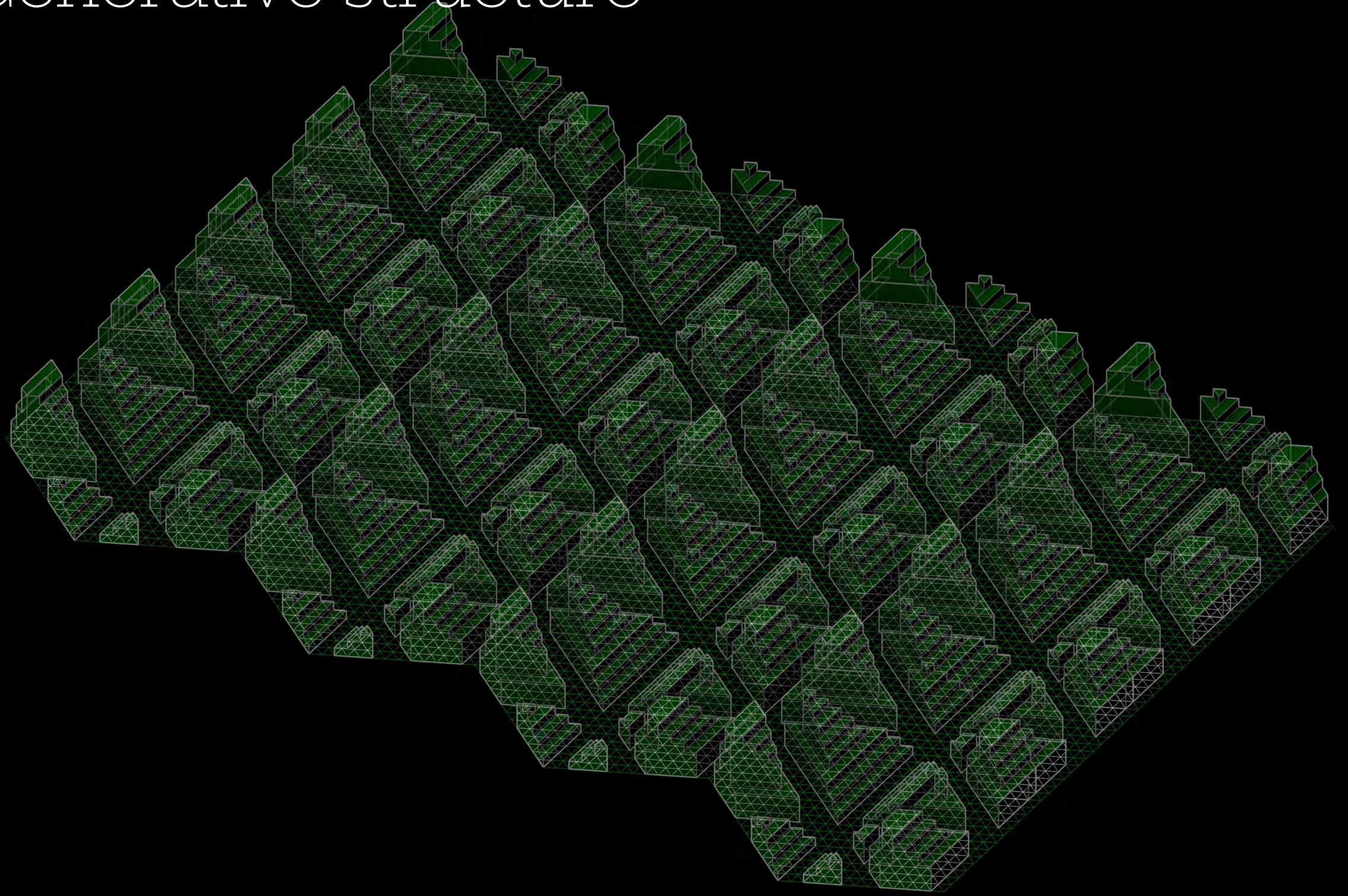
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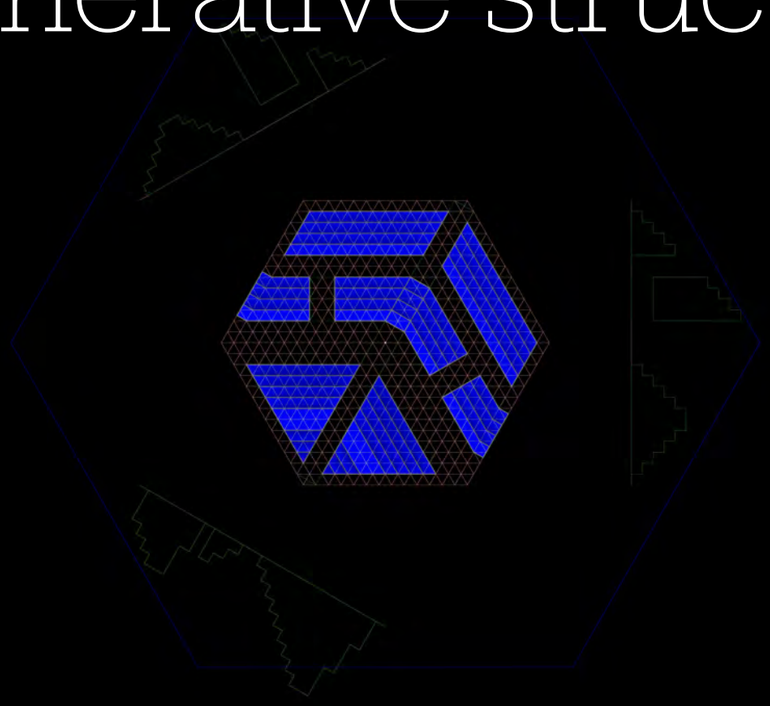
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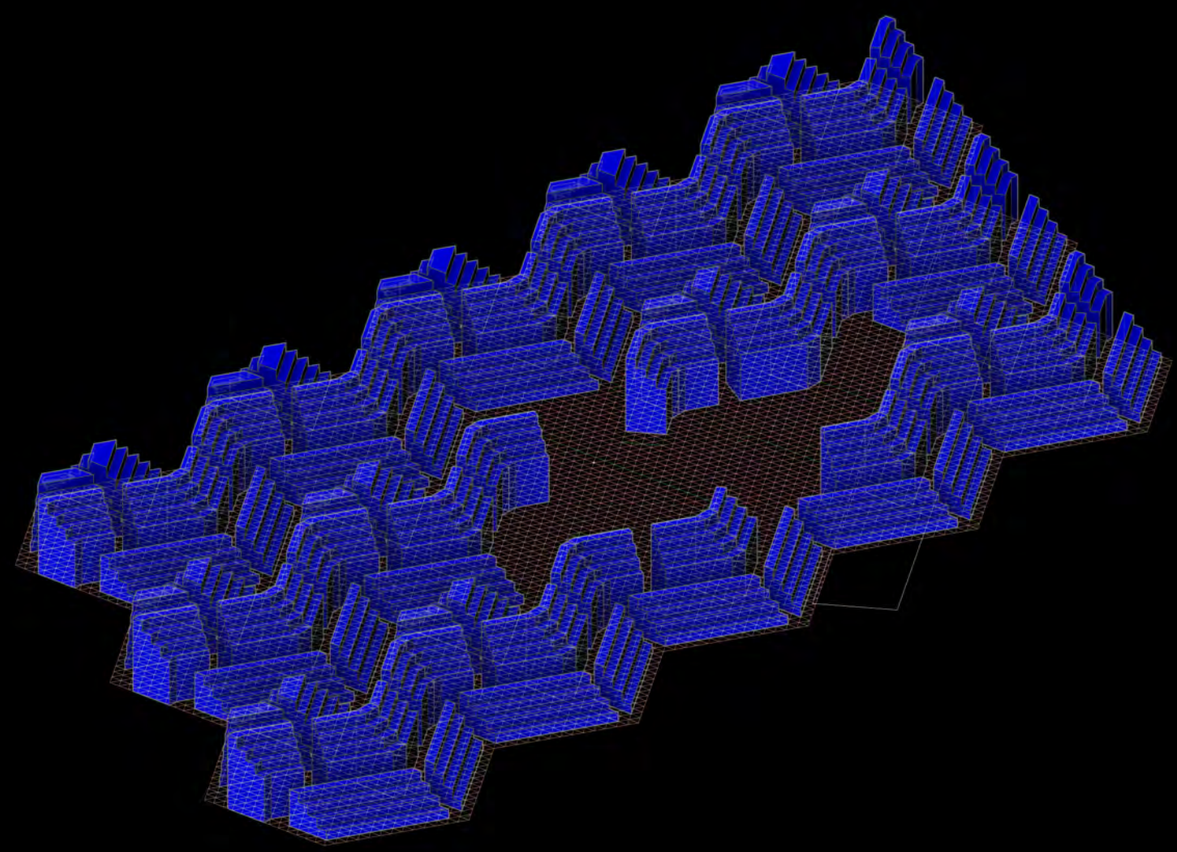


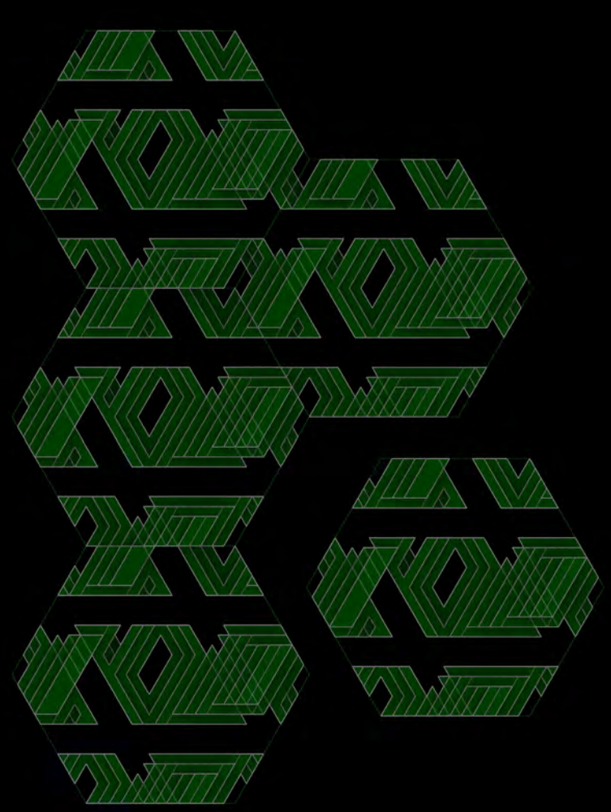
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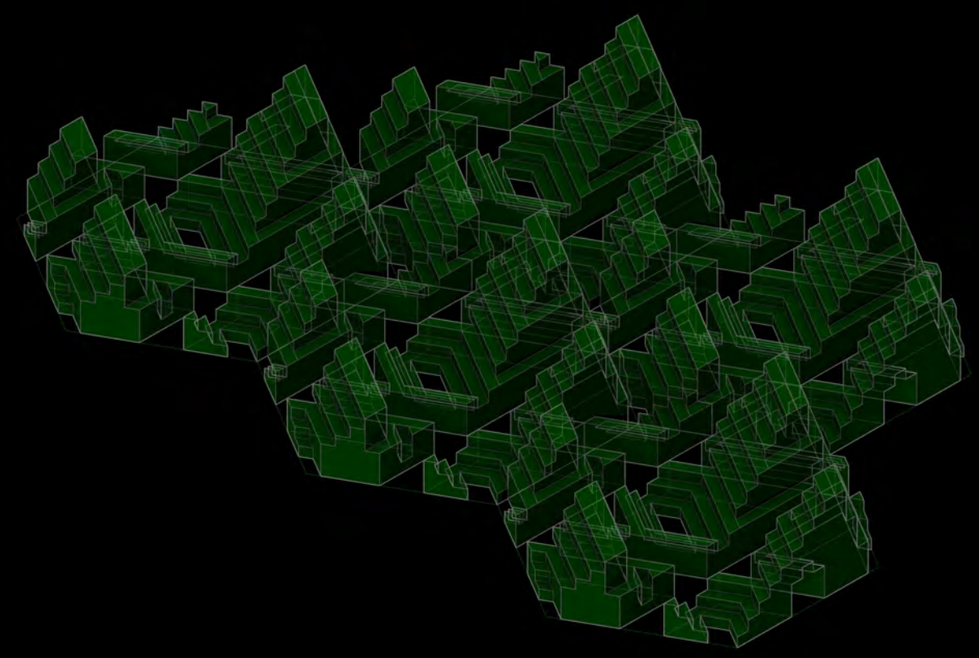


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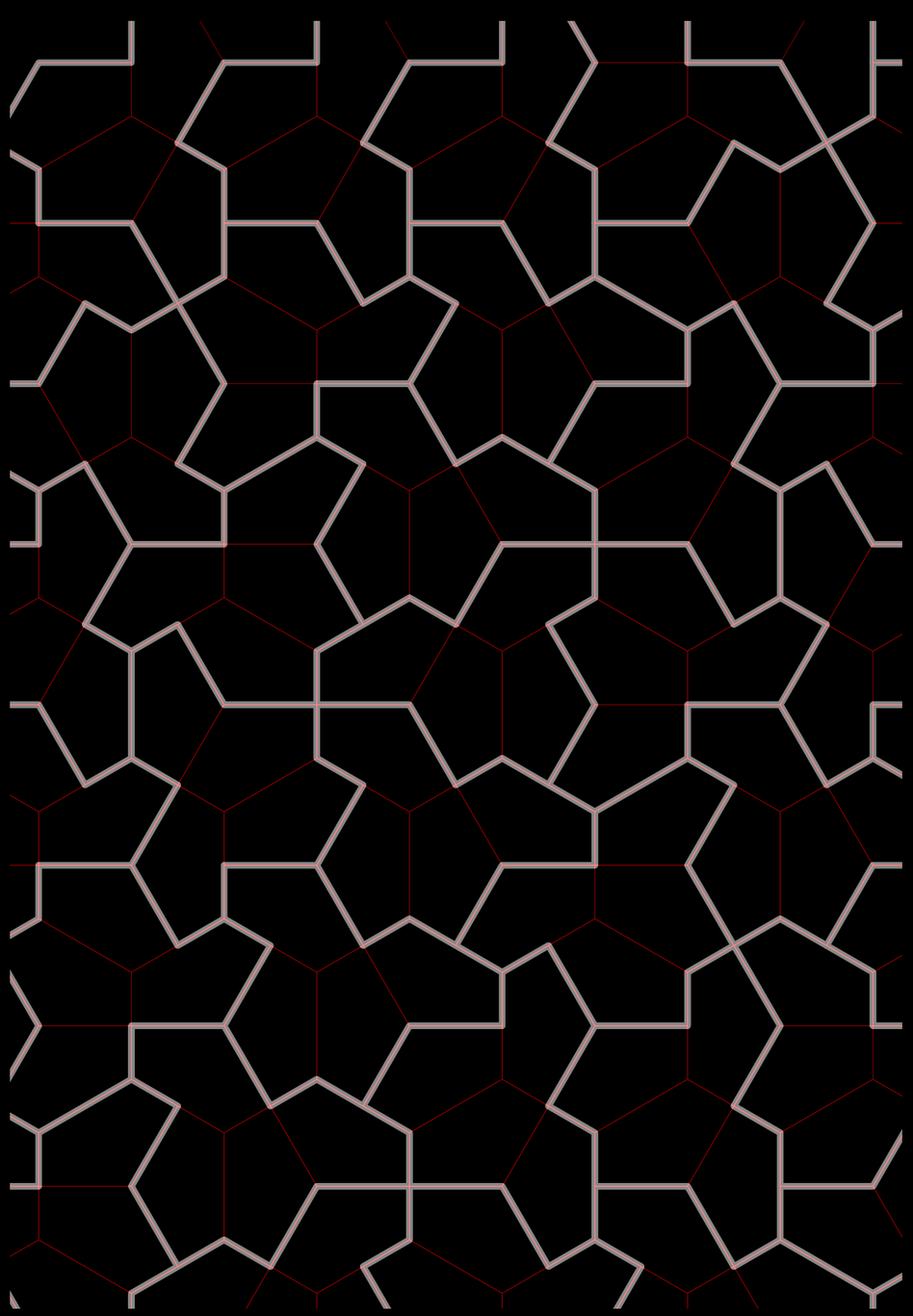


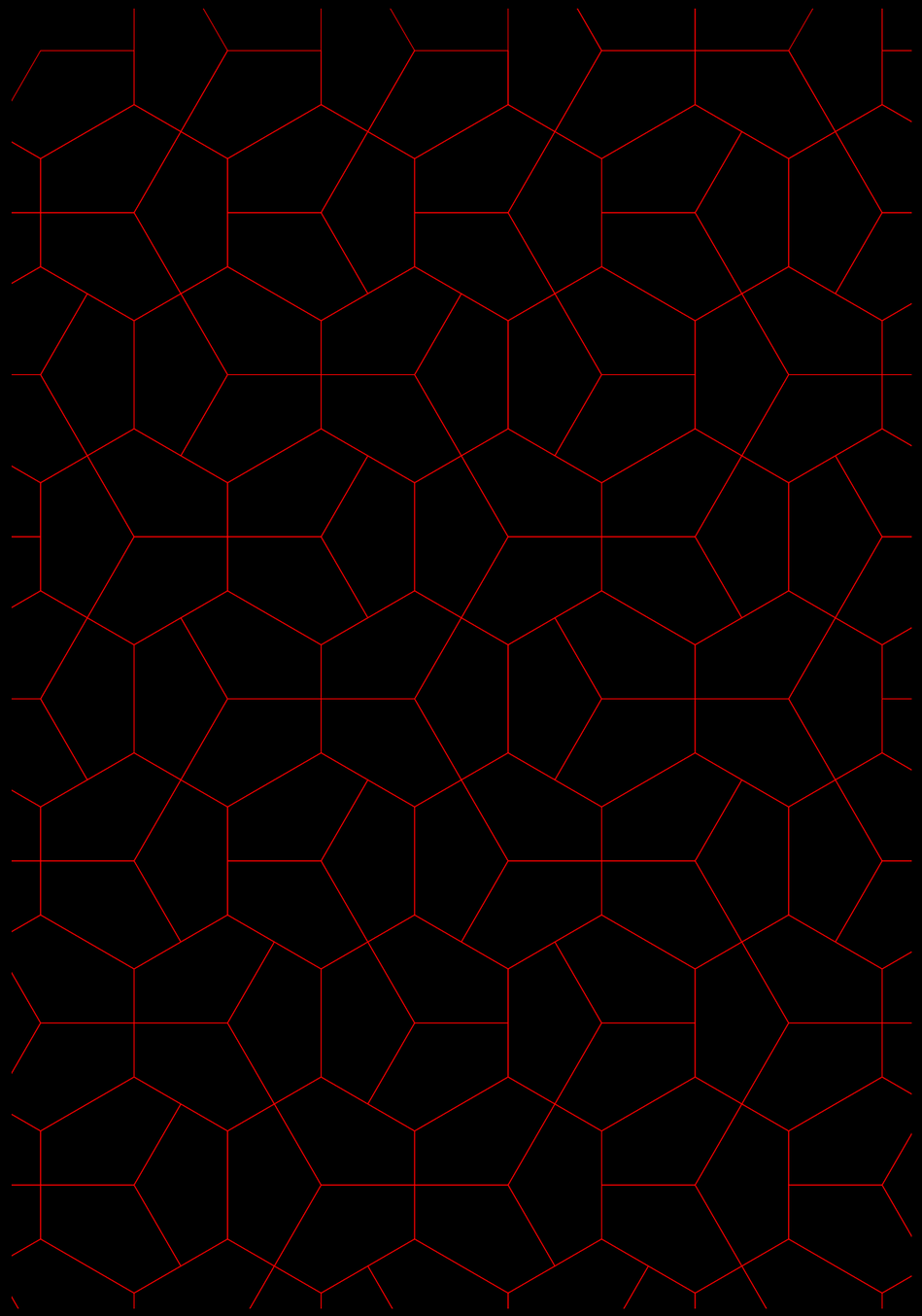




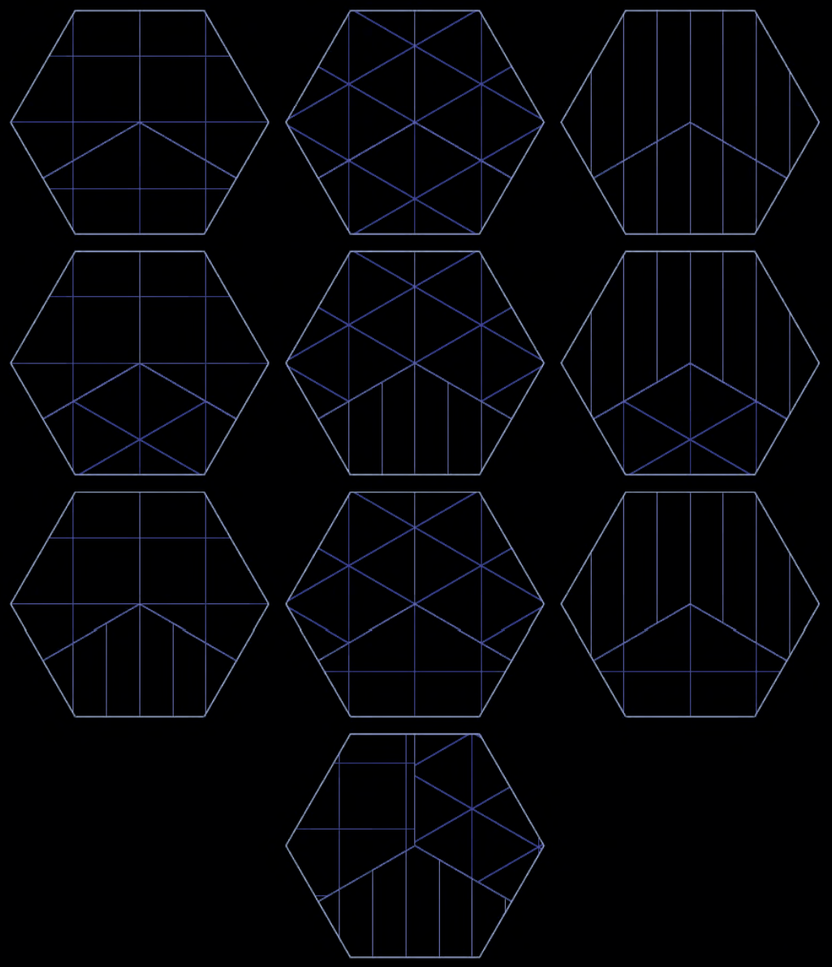


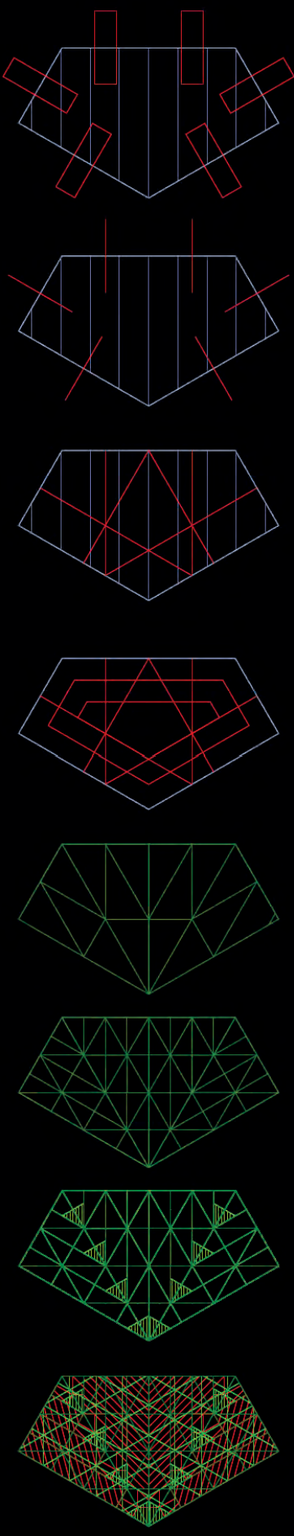
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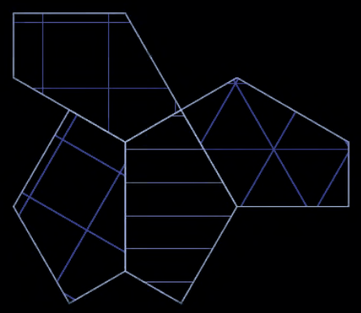




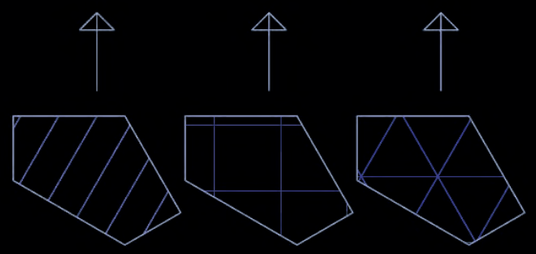
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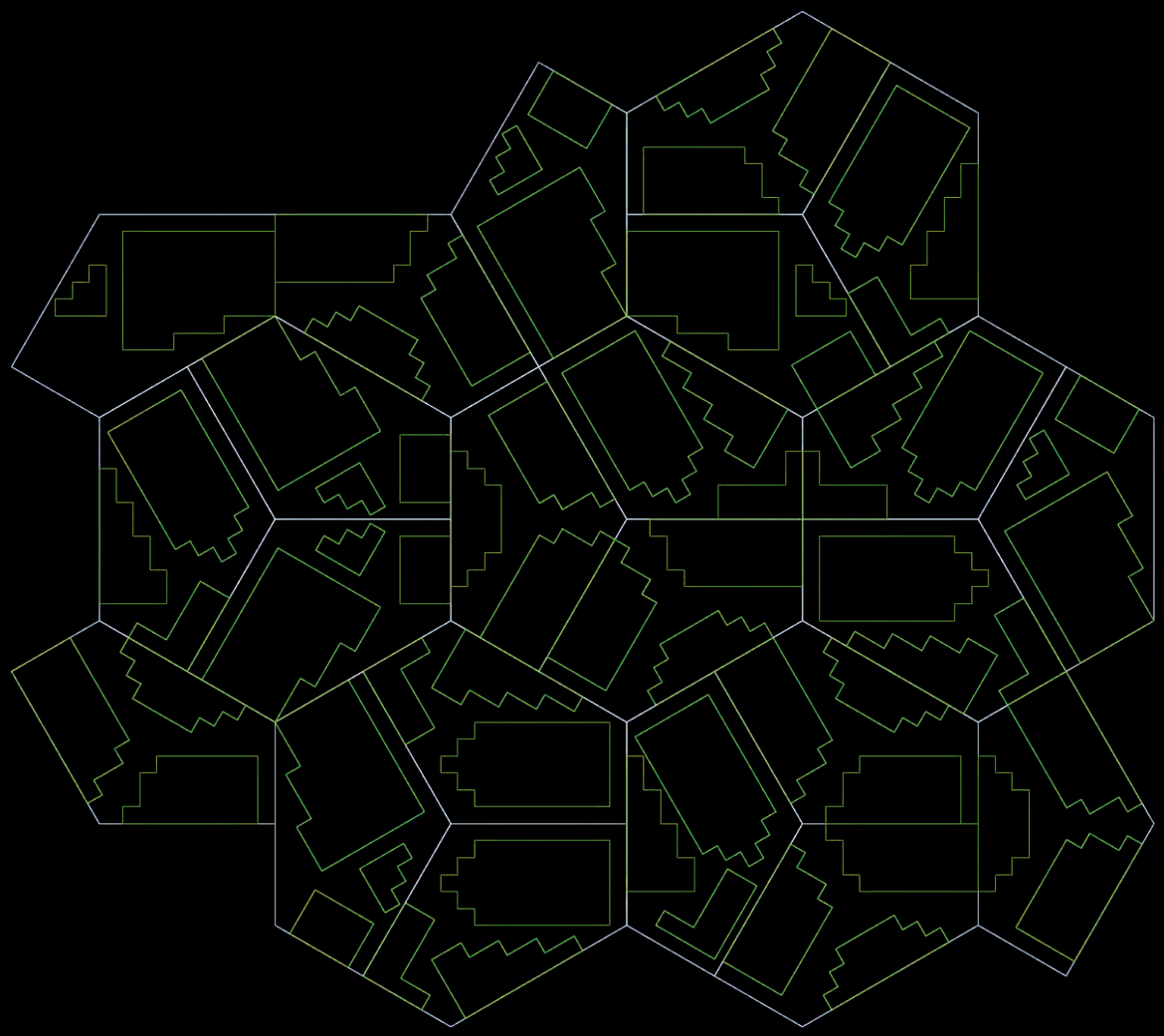


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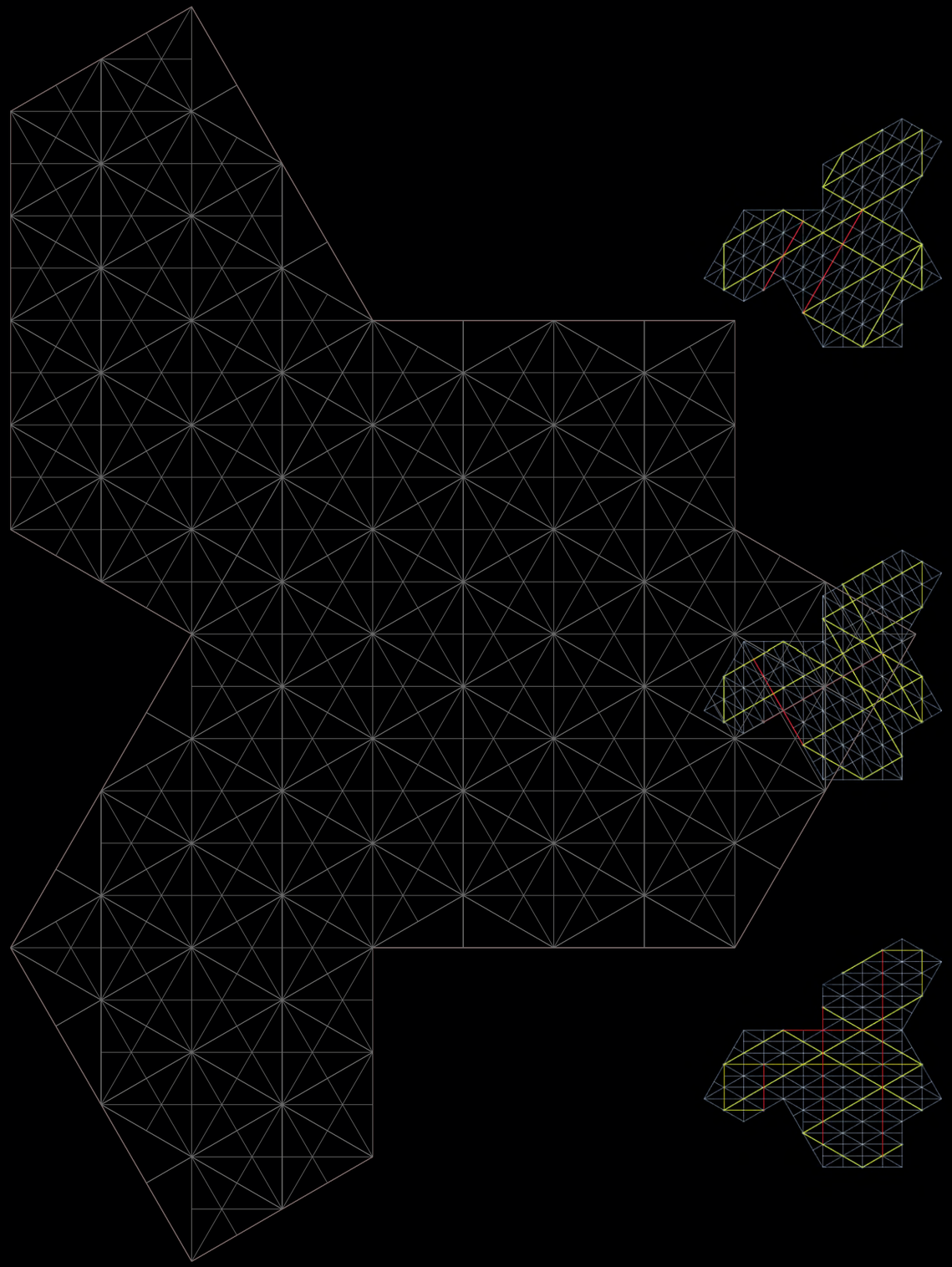
10 options

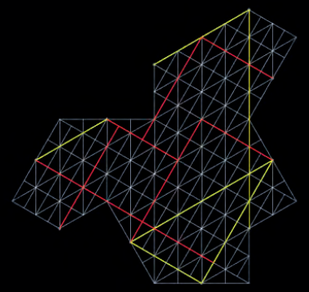
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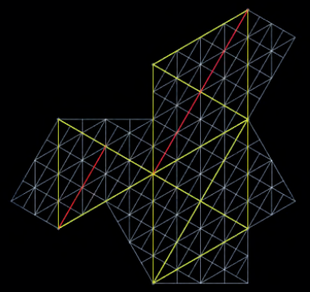


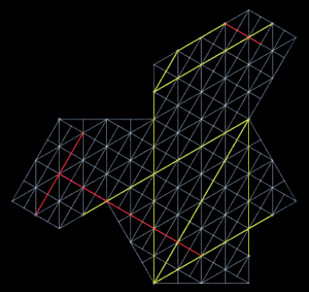


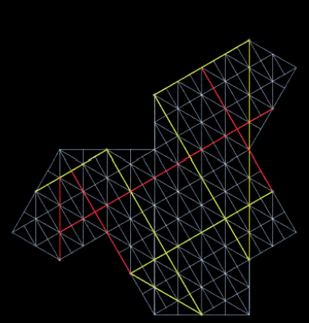
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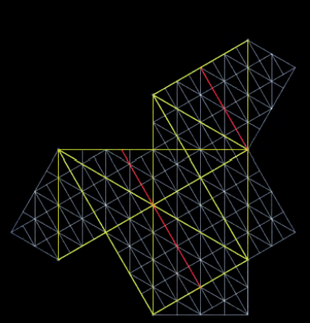


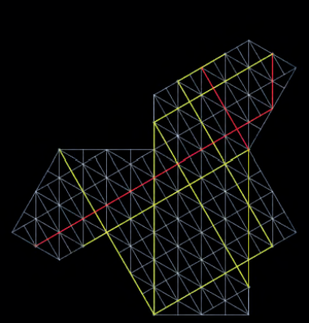


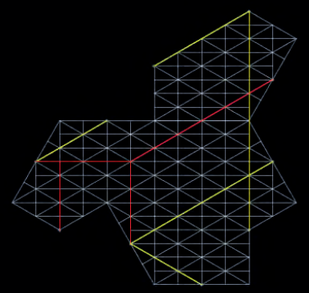


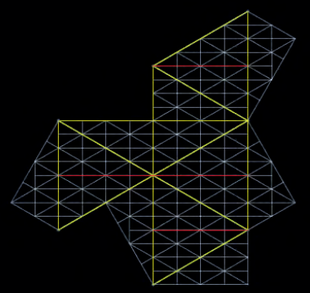


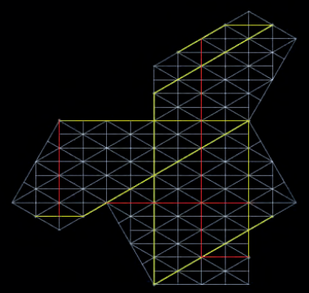




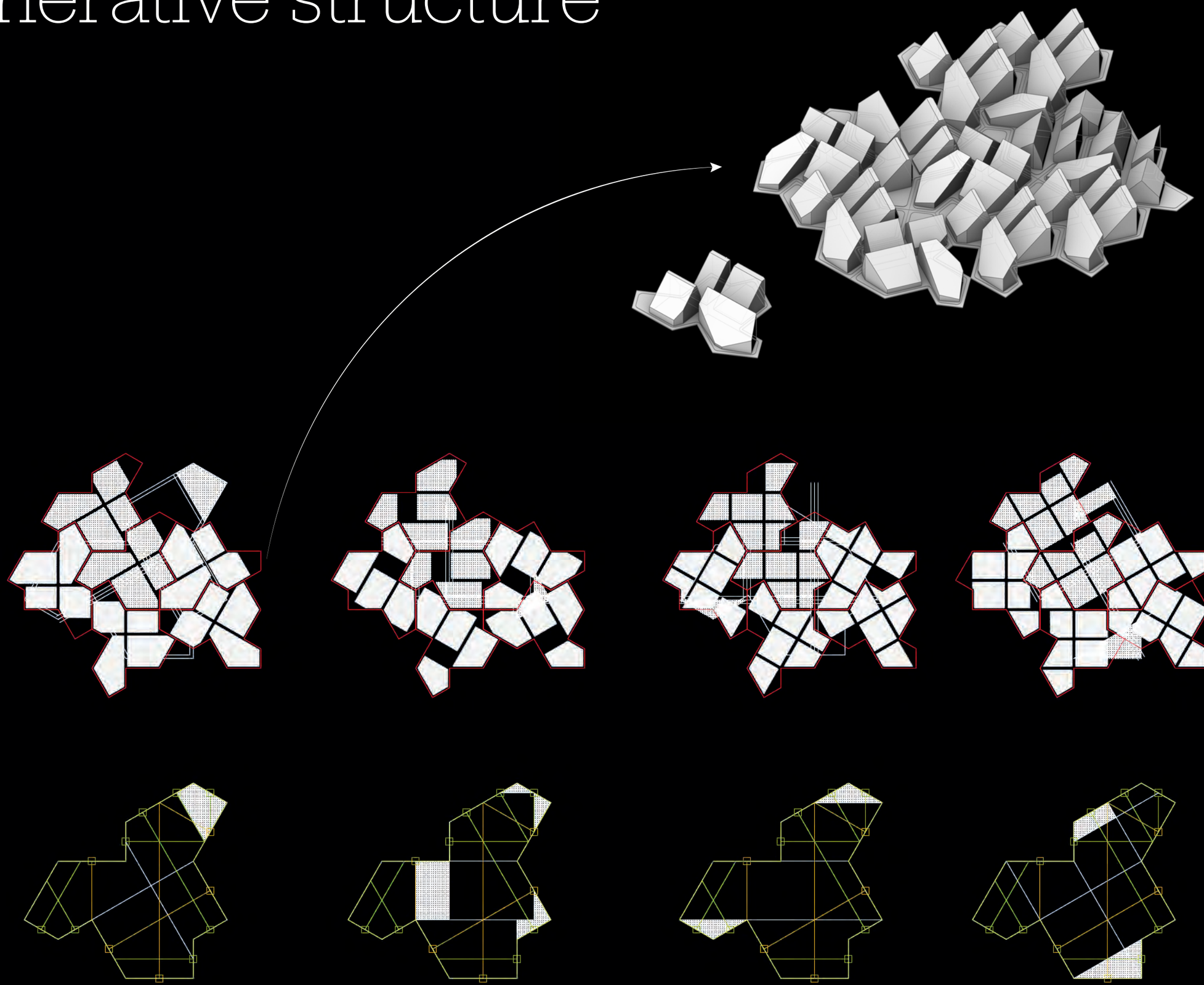




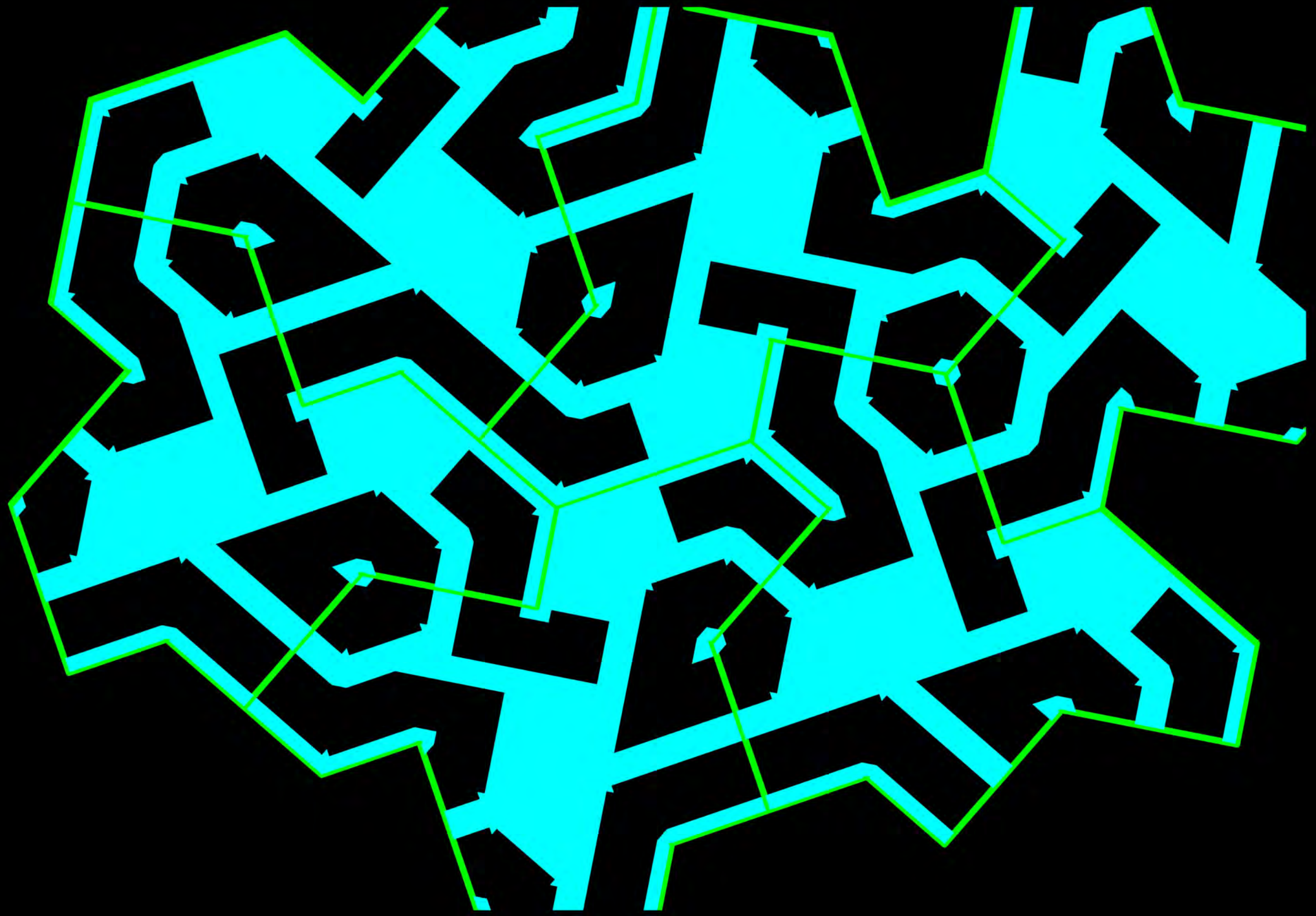




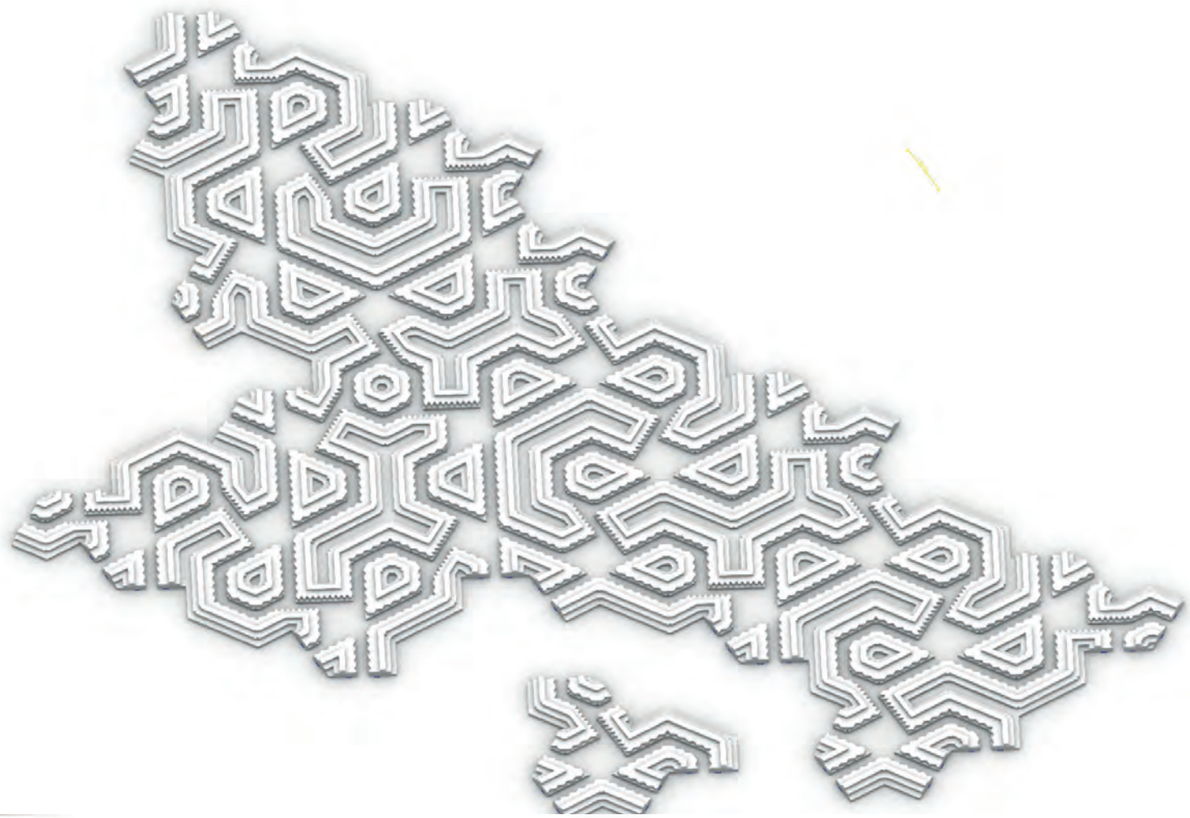
Generative structure

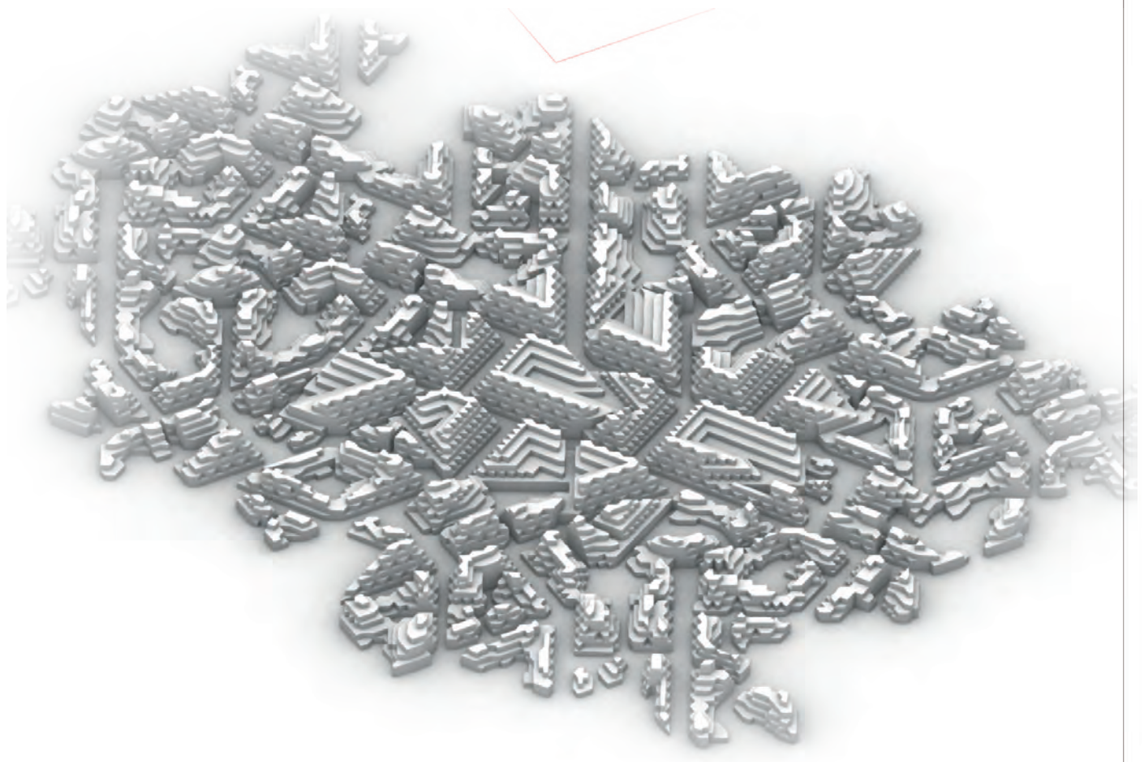


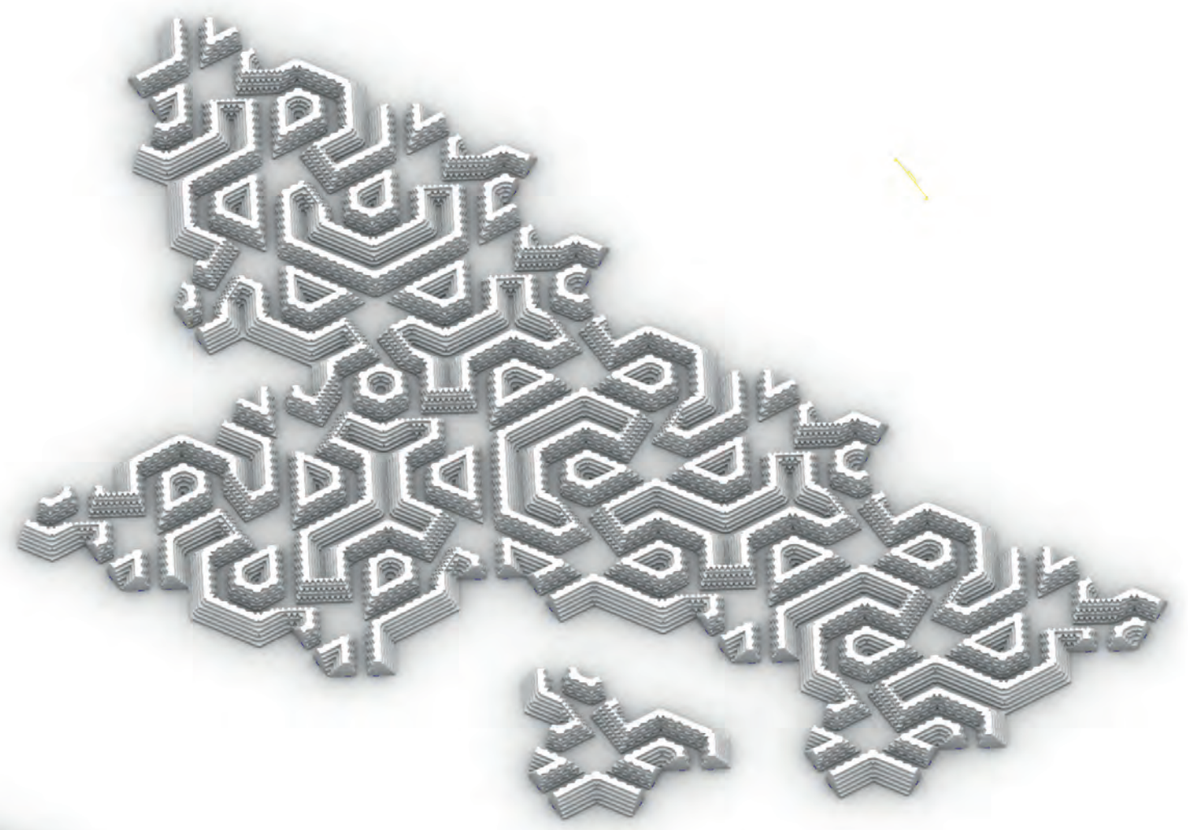
Generative structure











Generative structure

Generative structure

Generative structure

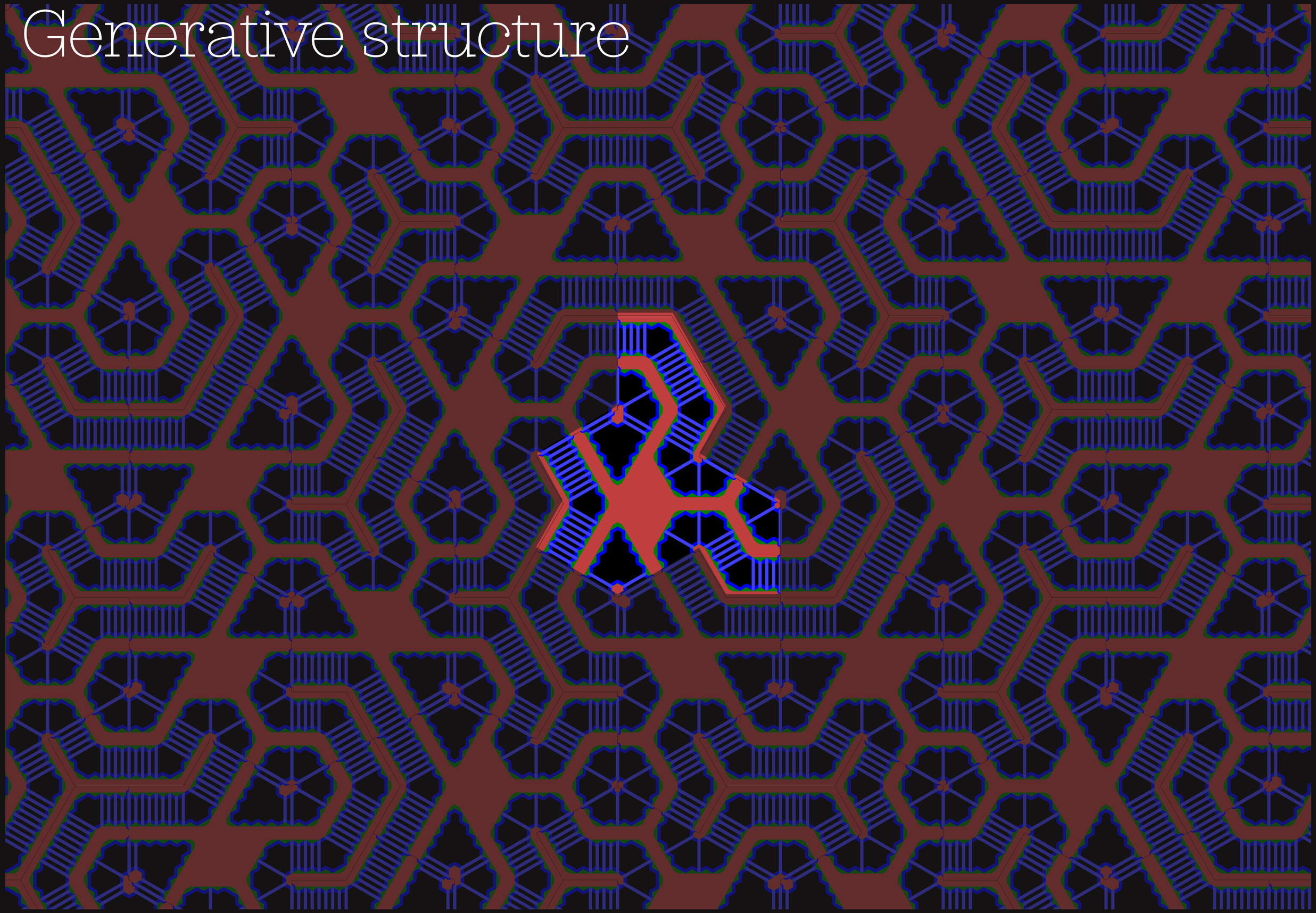
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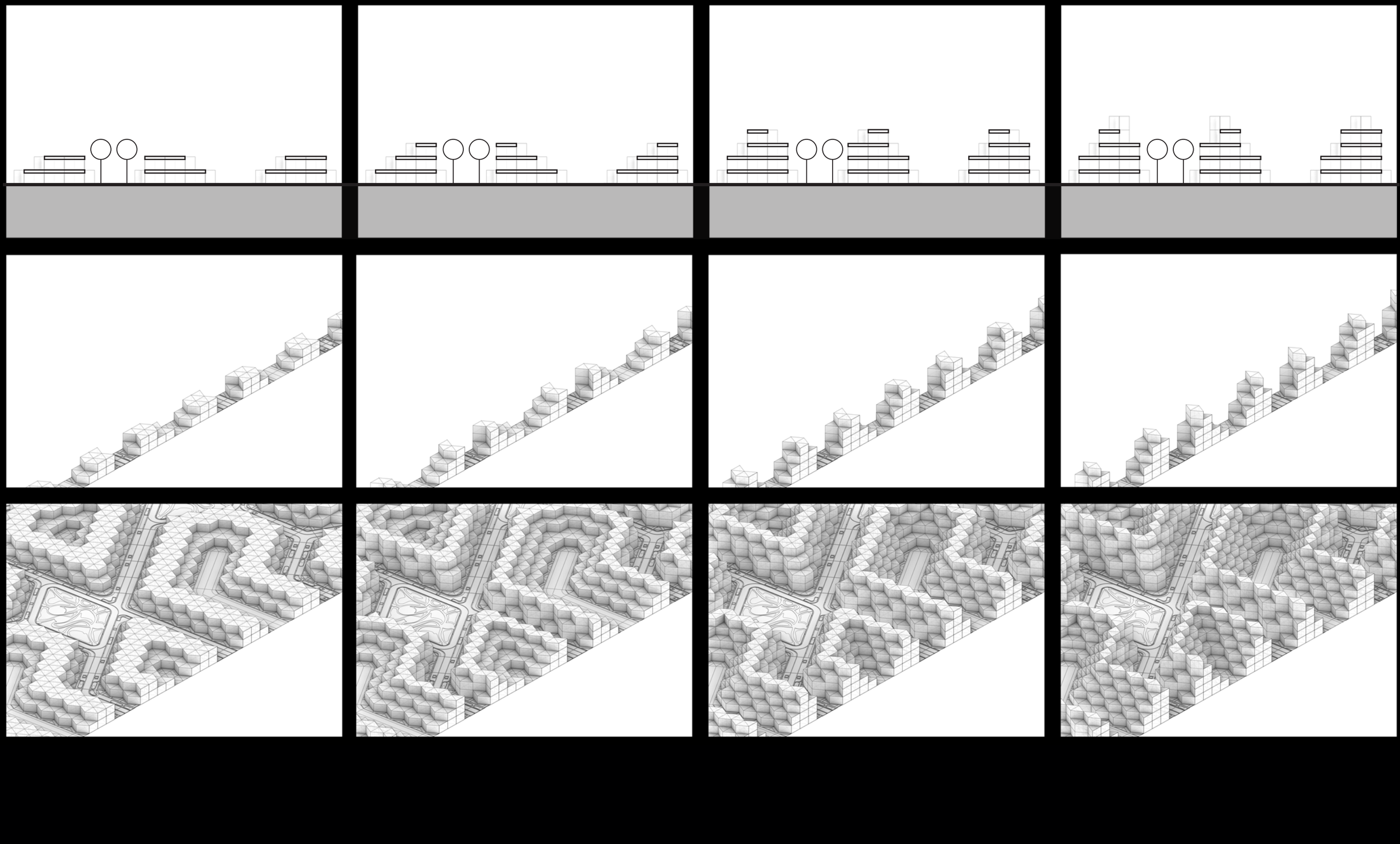
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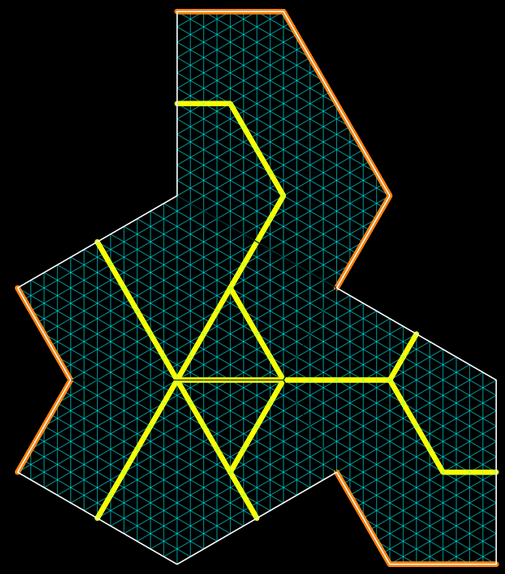


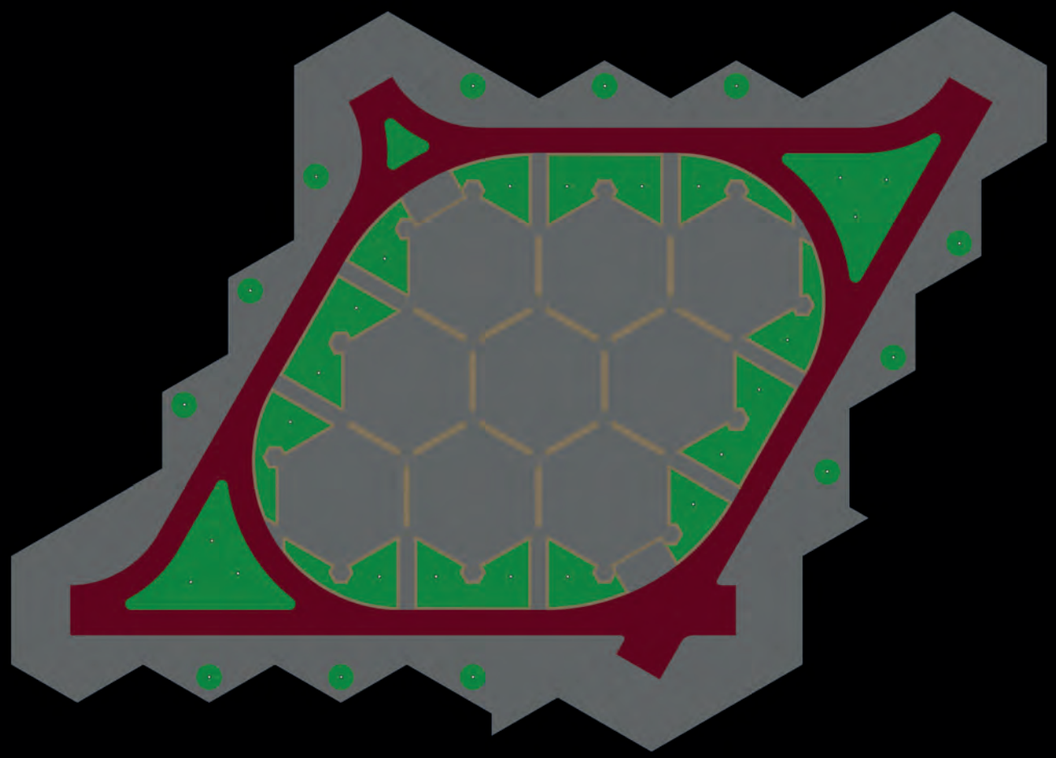
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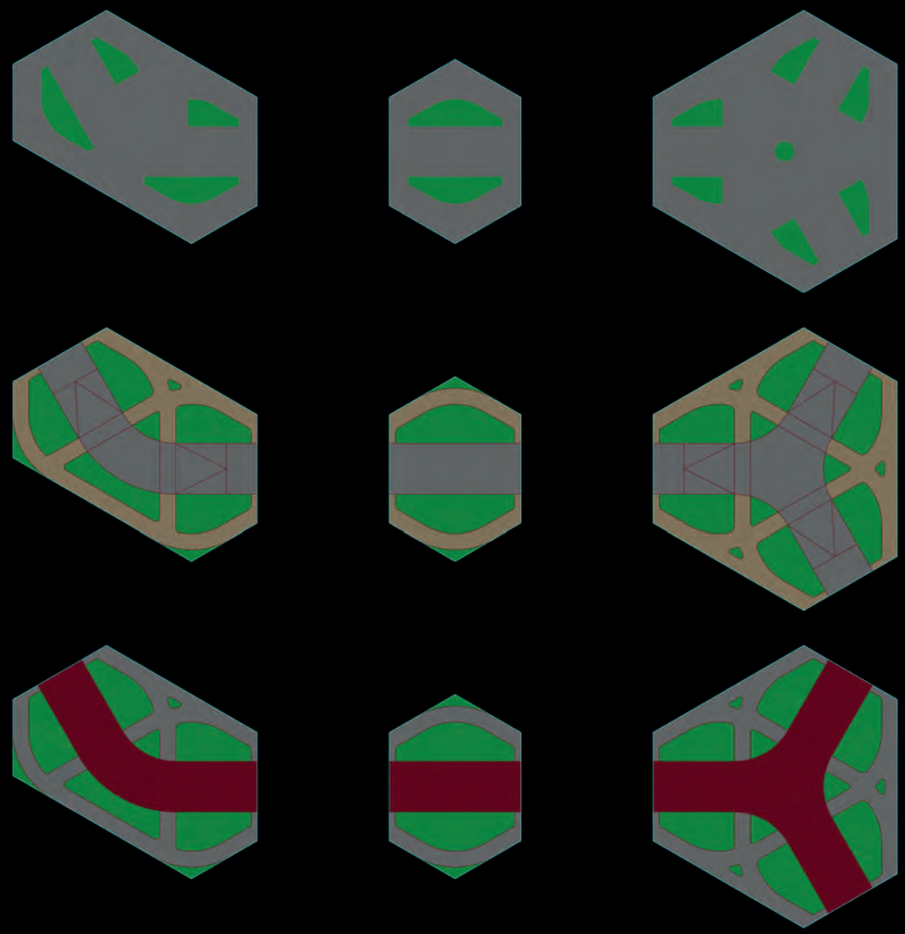
Generative structure

Generative structure





Interhangeable square

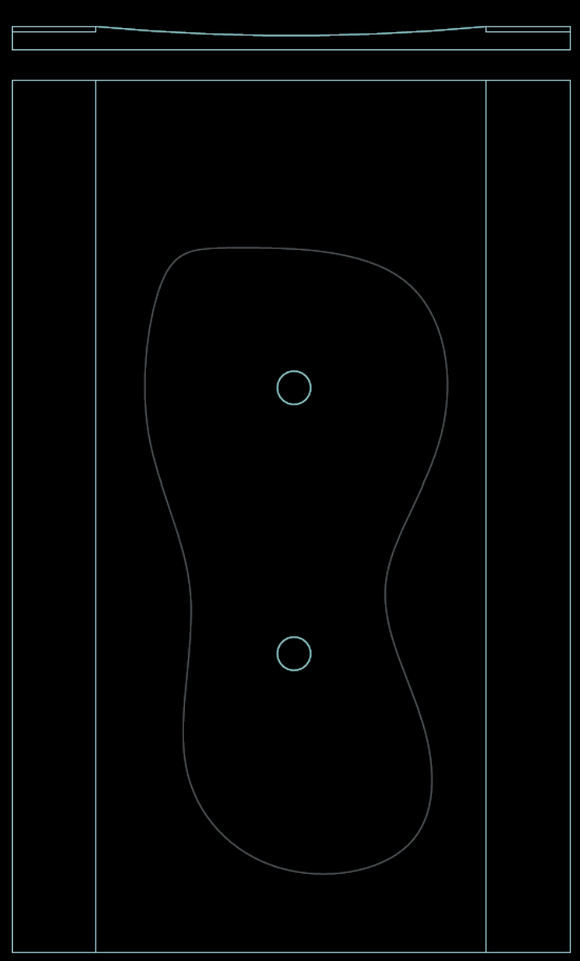


Busy-being

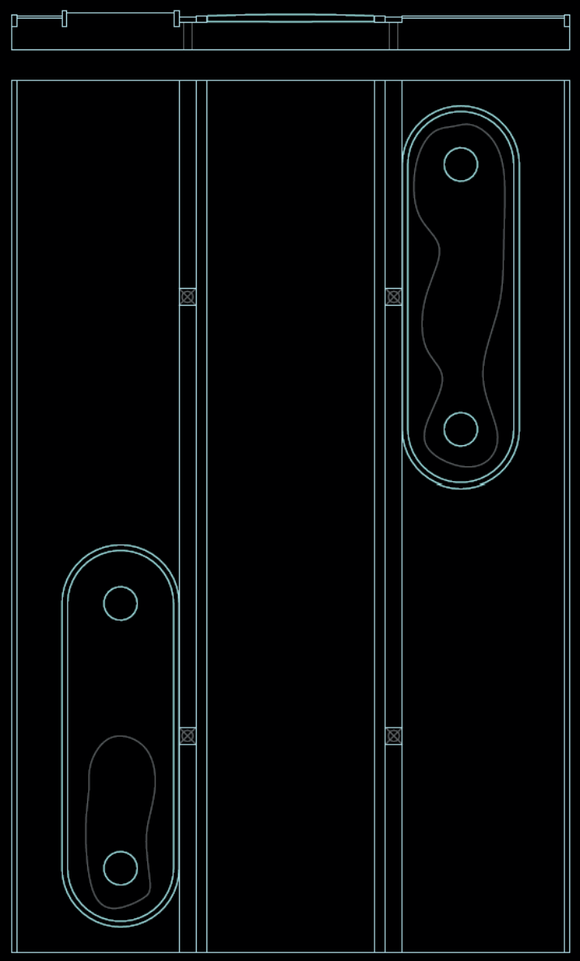
Quiet-staying

Busy-going

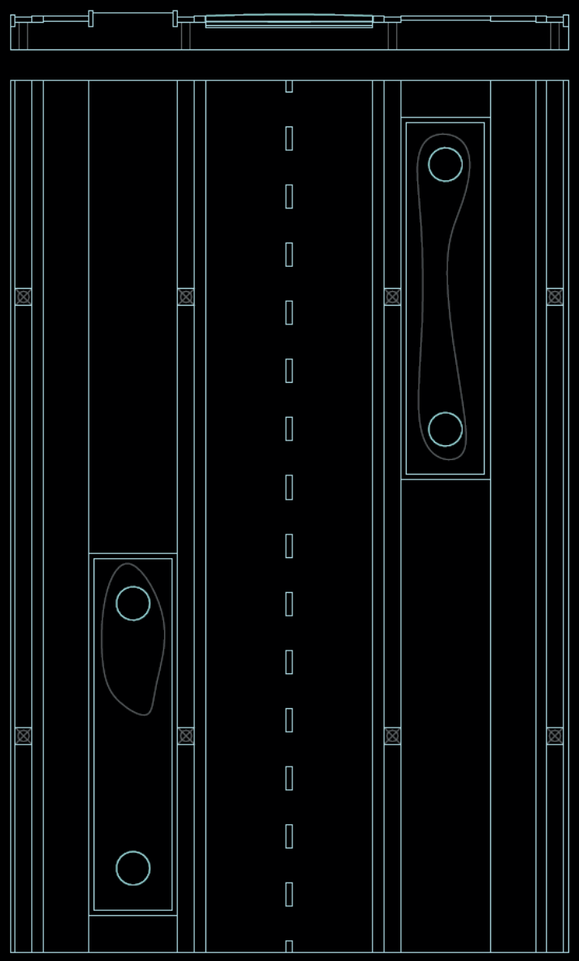
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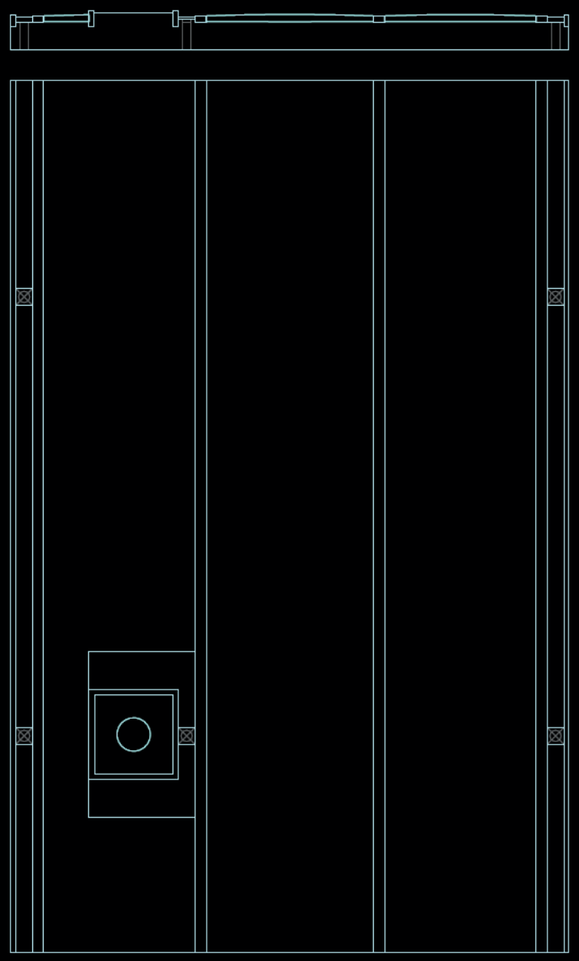
Courtyard



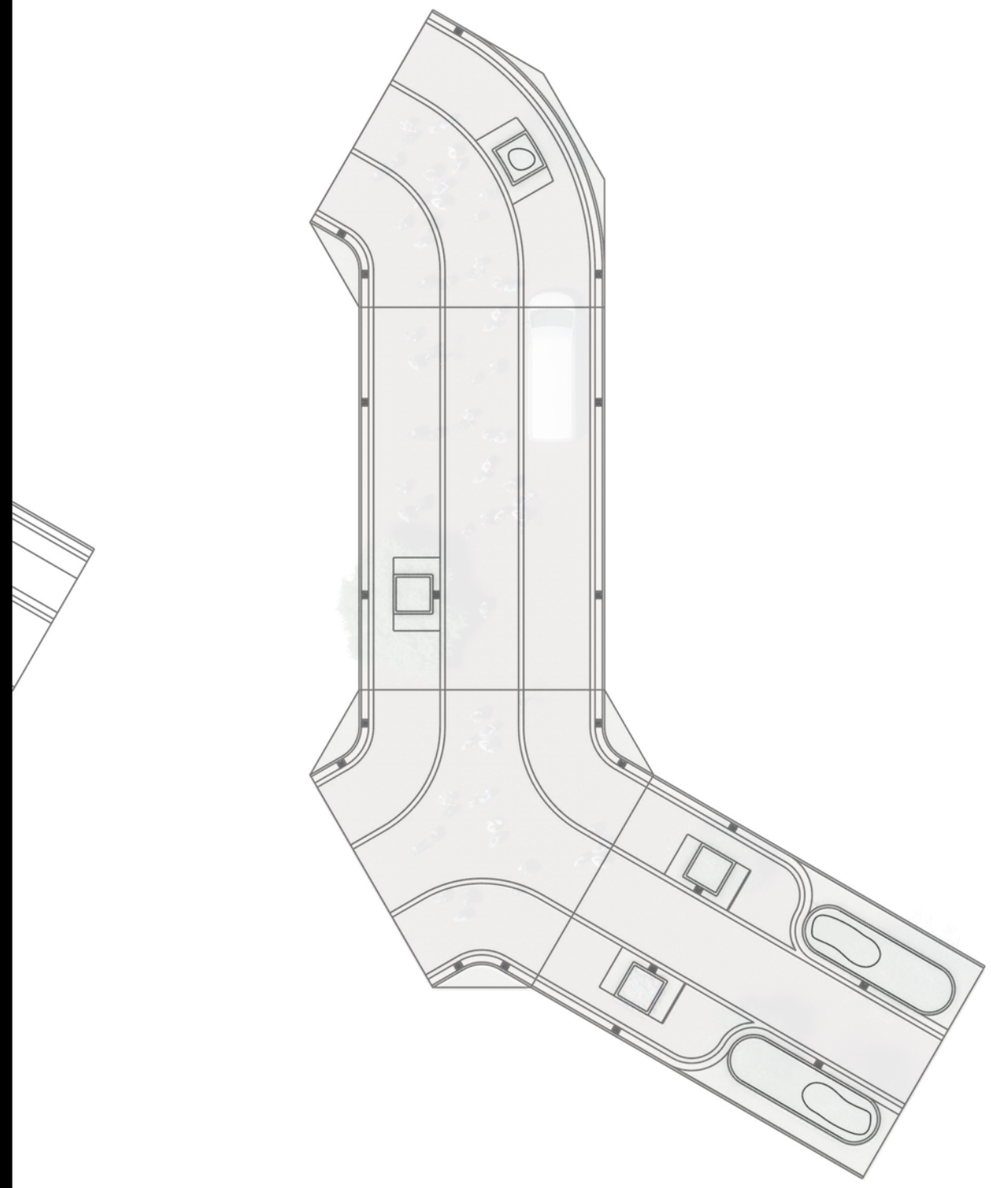
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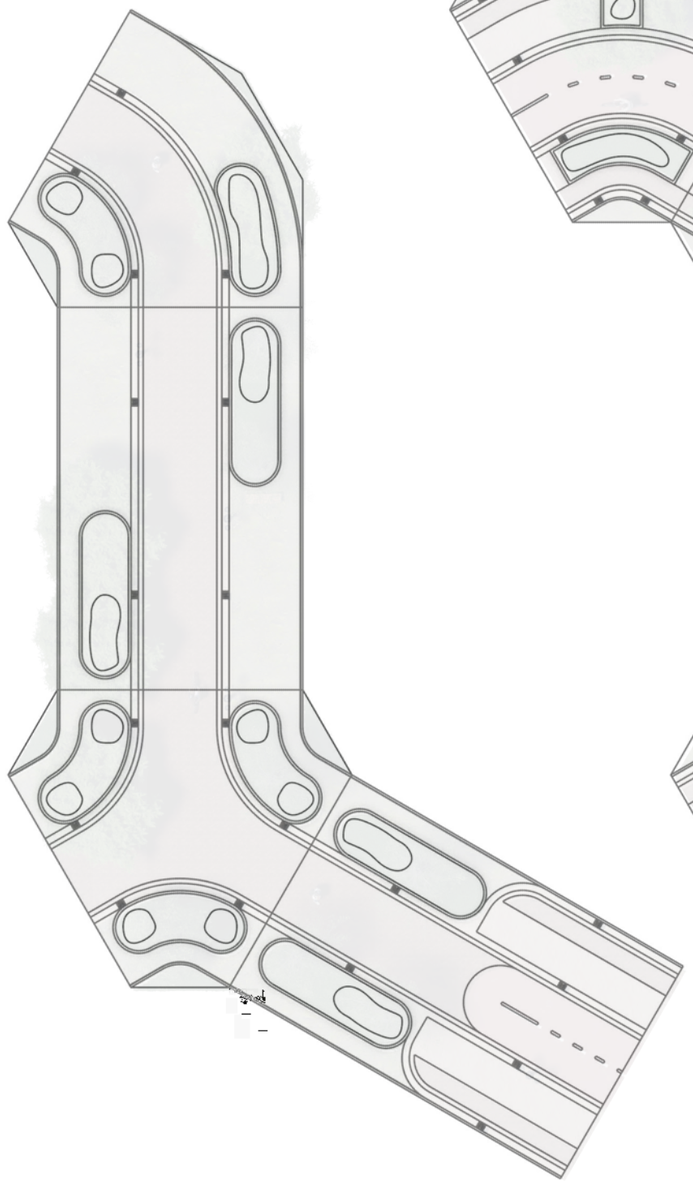


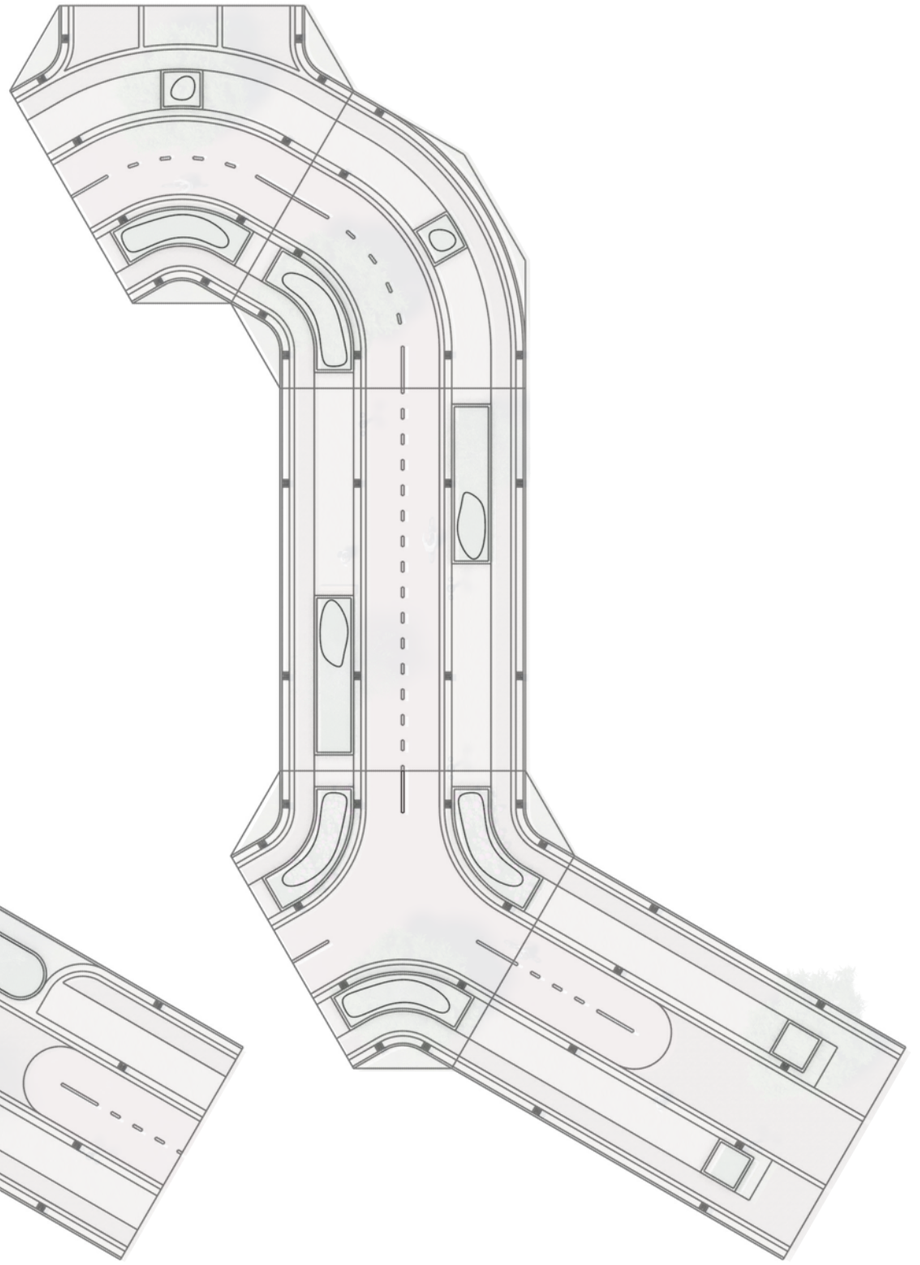
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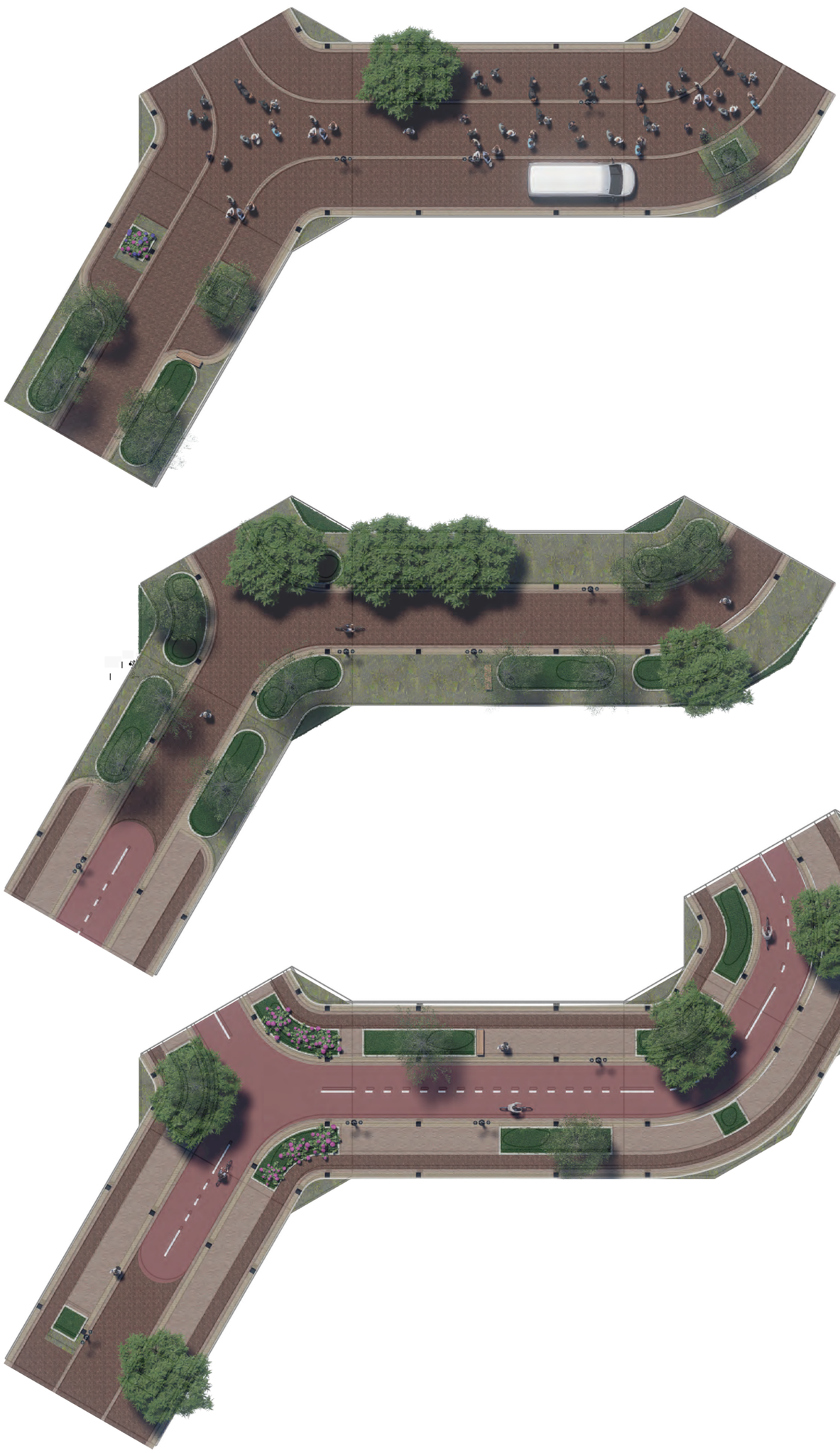


Third space

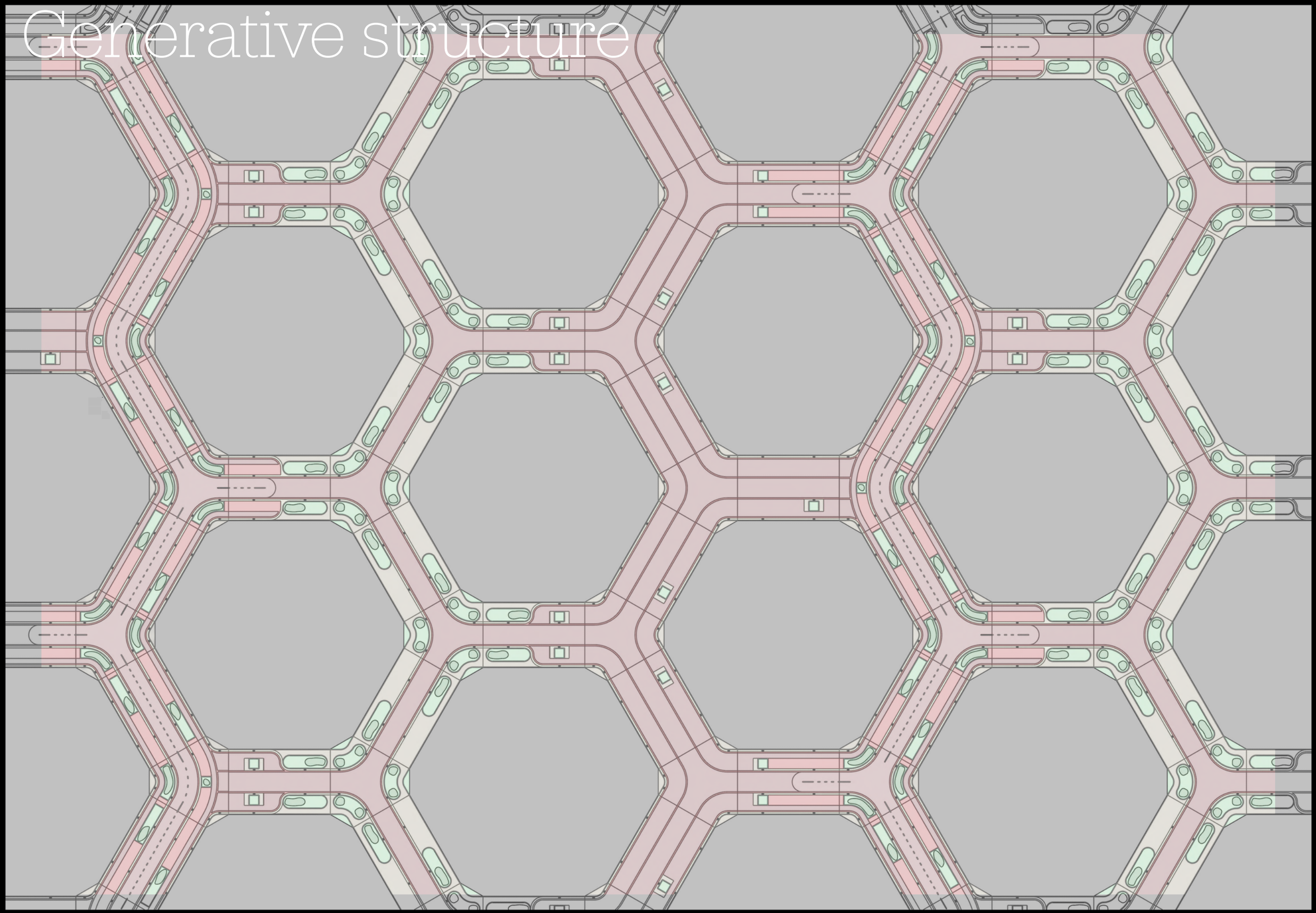


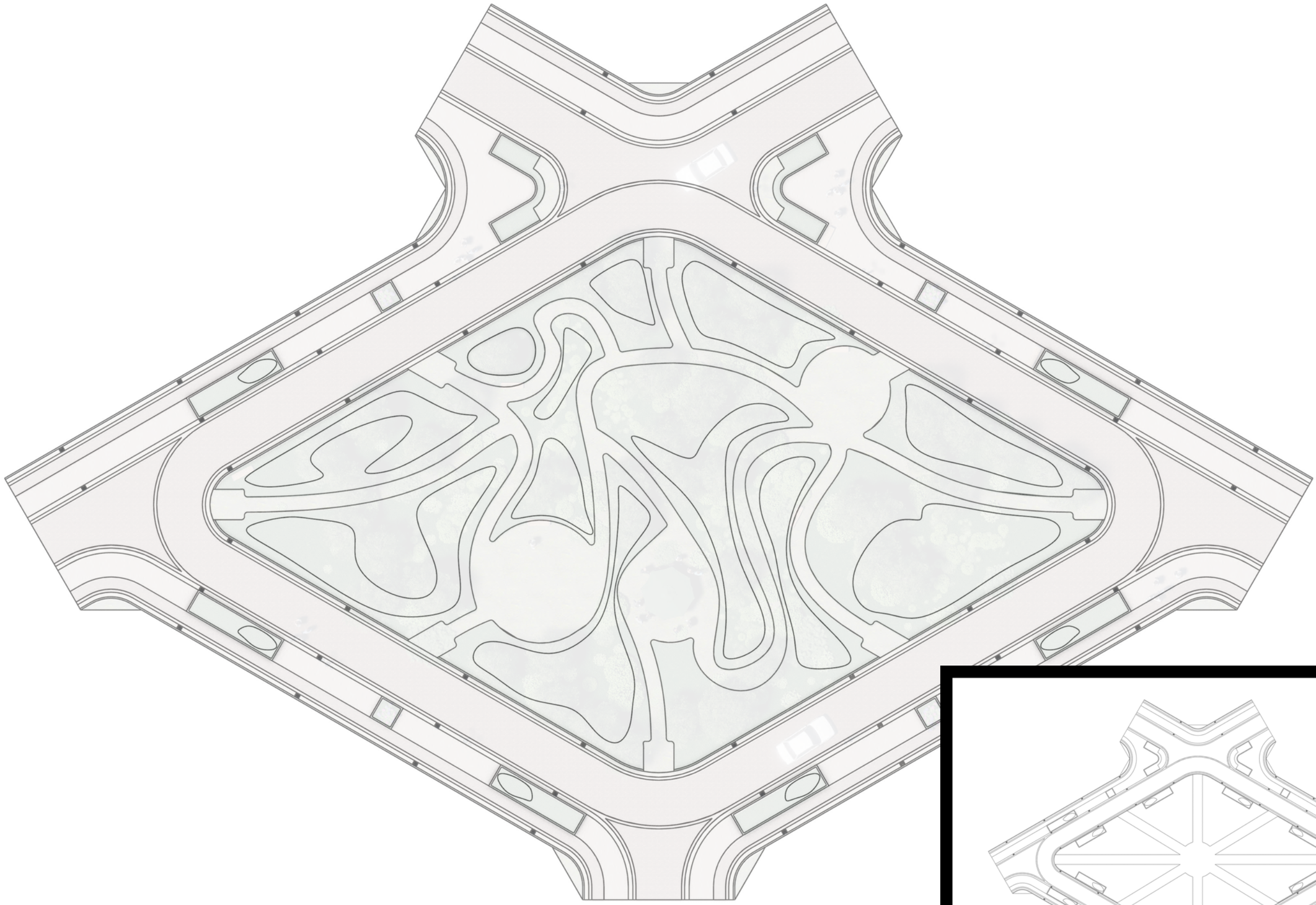






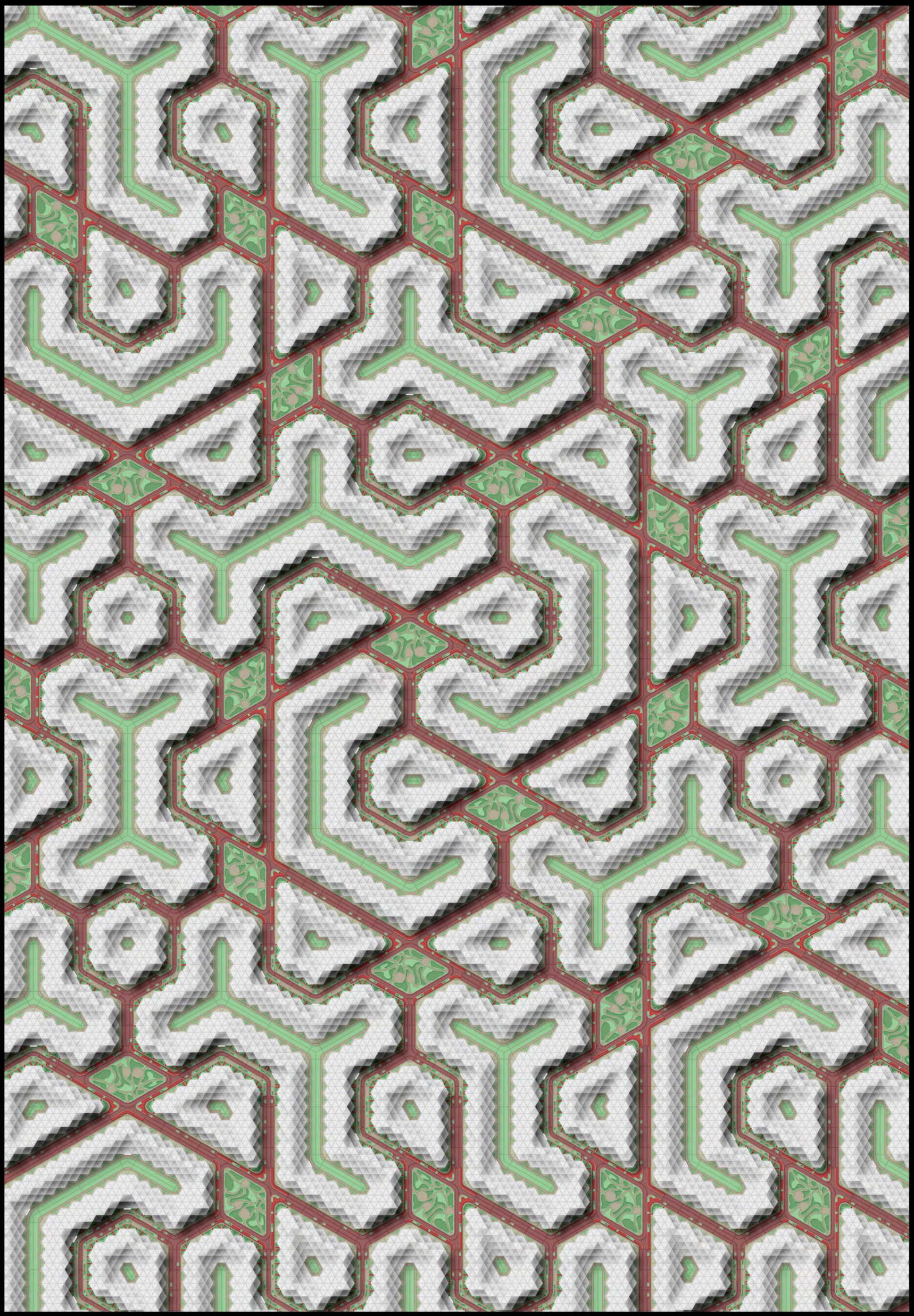
Generative structure



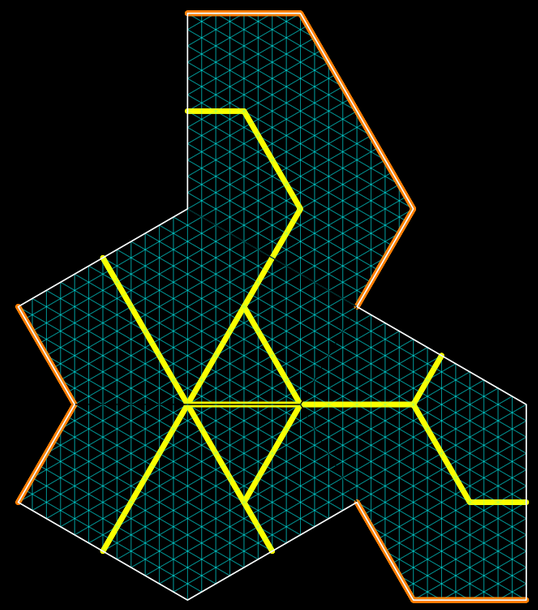


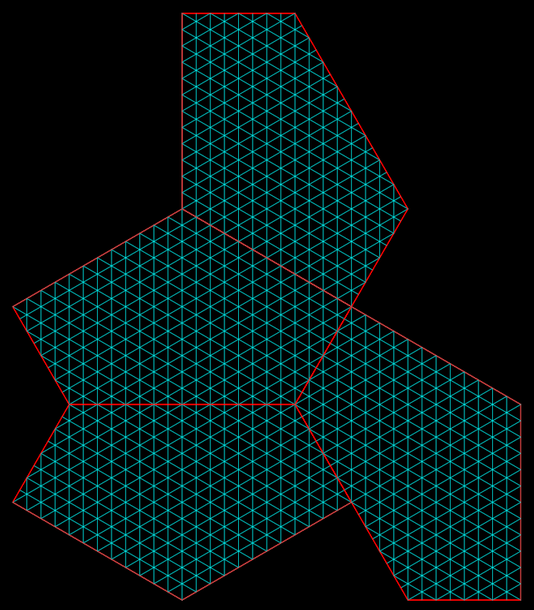


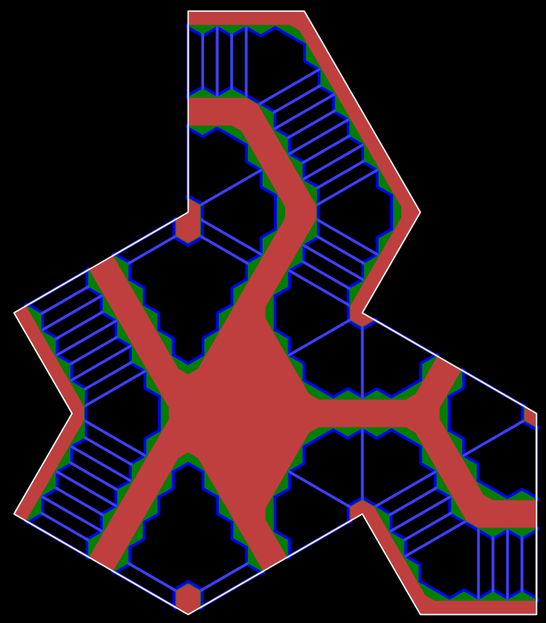
Generative structure



Generative urban structure

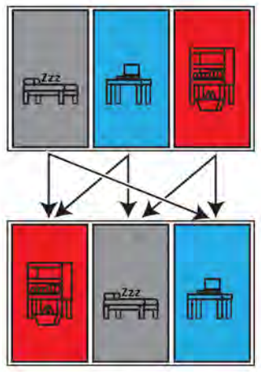




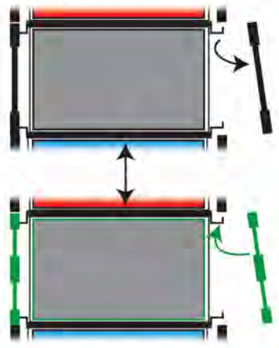




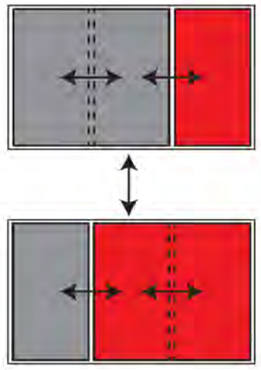
Building structure



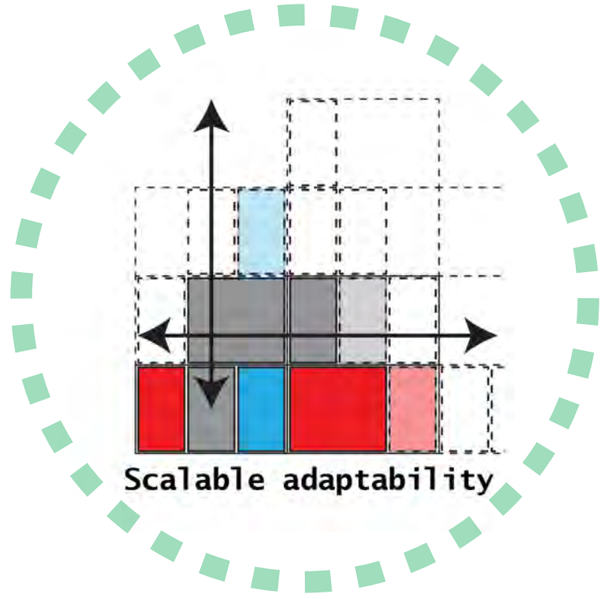
Convertible adaptability



Refitable adaptability



Adjustable adaptability

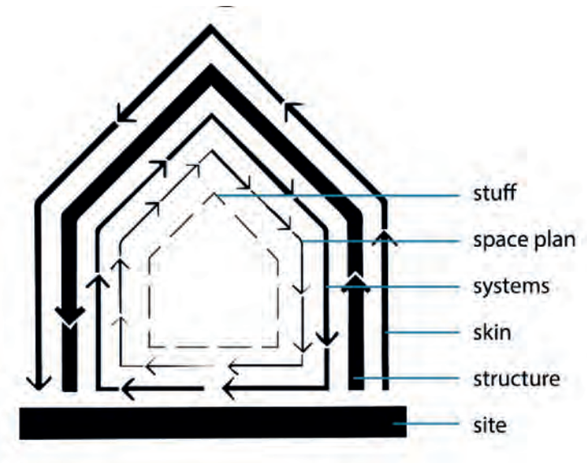


Scalable adaptability

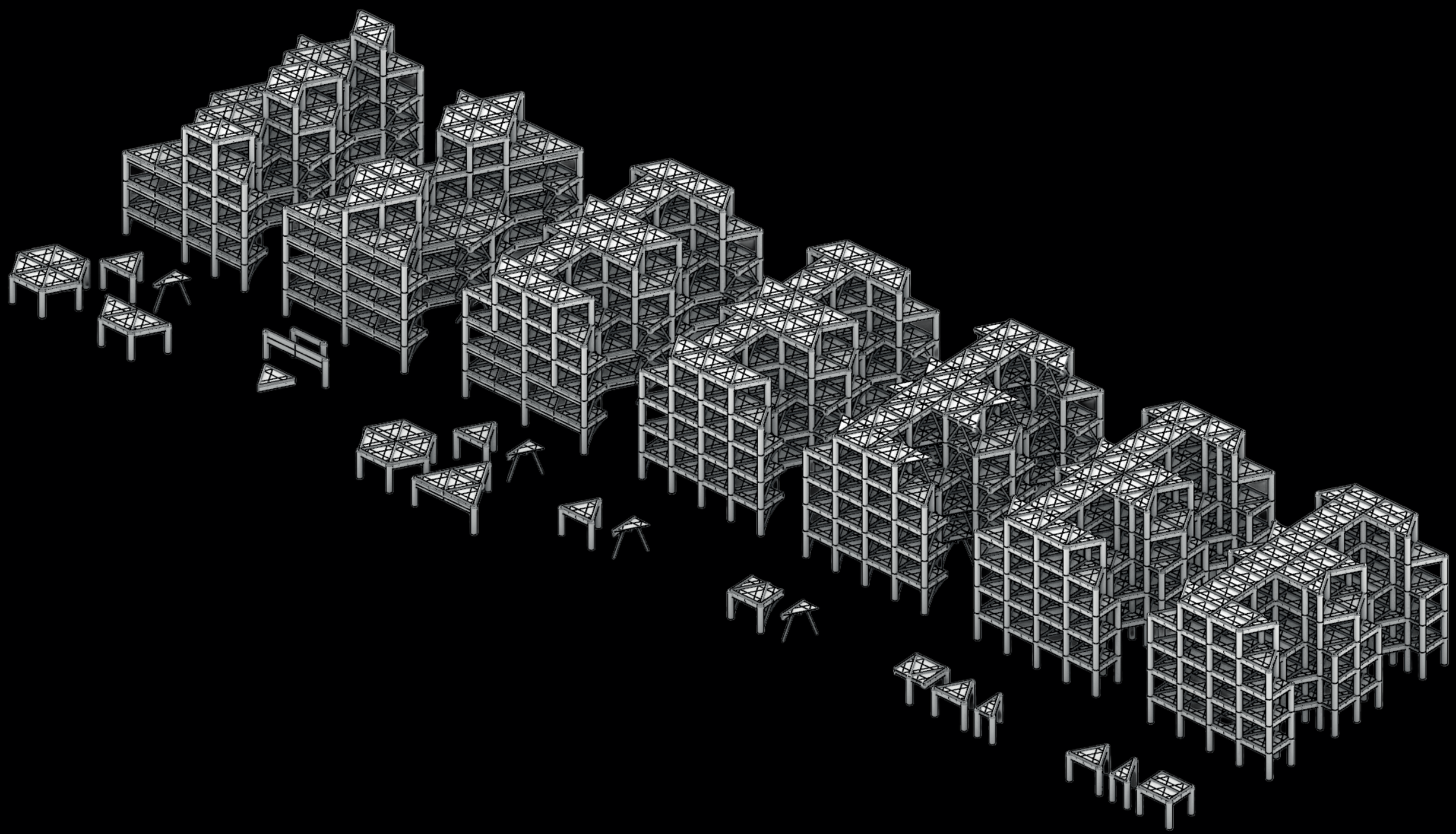
Scalable, change of size
refitable, change of performance
Adjustable, change of space
Convertable, change of use

Develop a space filling structure for generative urban spaces
Make a structure that is easily deconstructable/expandable
Make a structure that is accessible to renovate/modify
Make a structure that is able to merge and split
Make a structure that is able to change function

Metabolism
Shearing layers
Open building

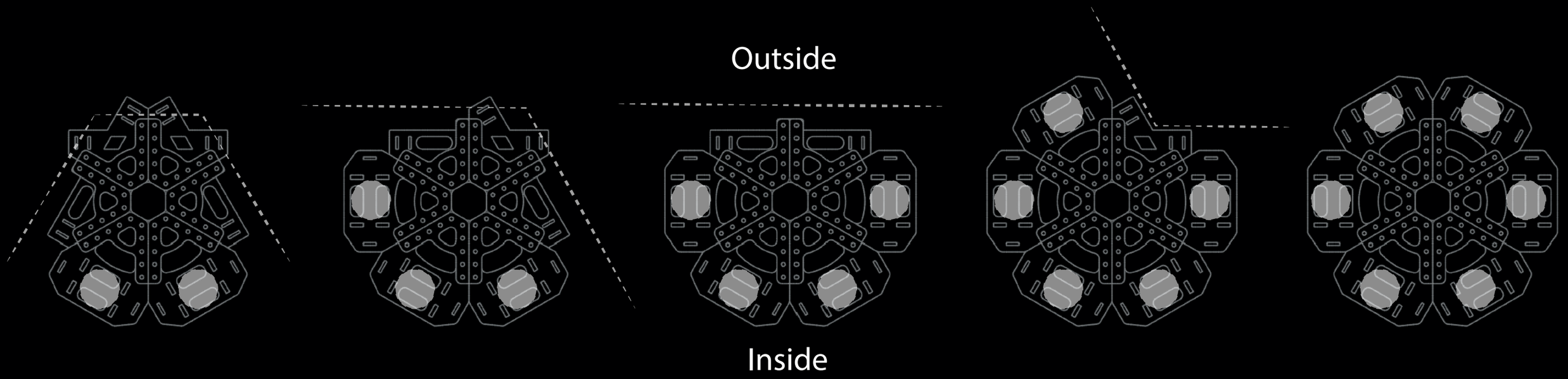


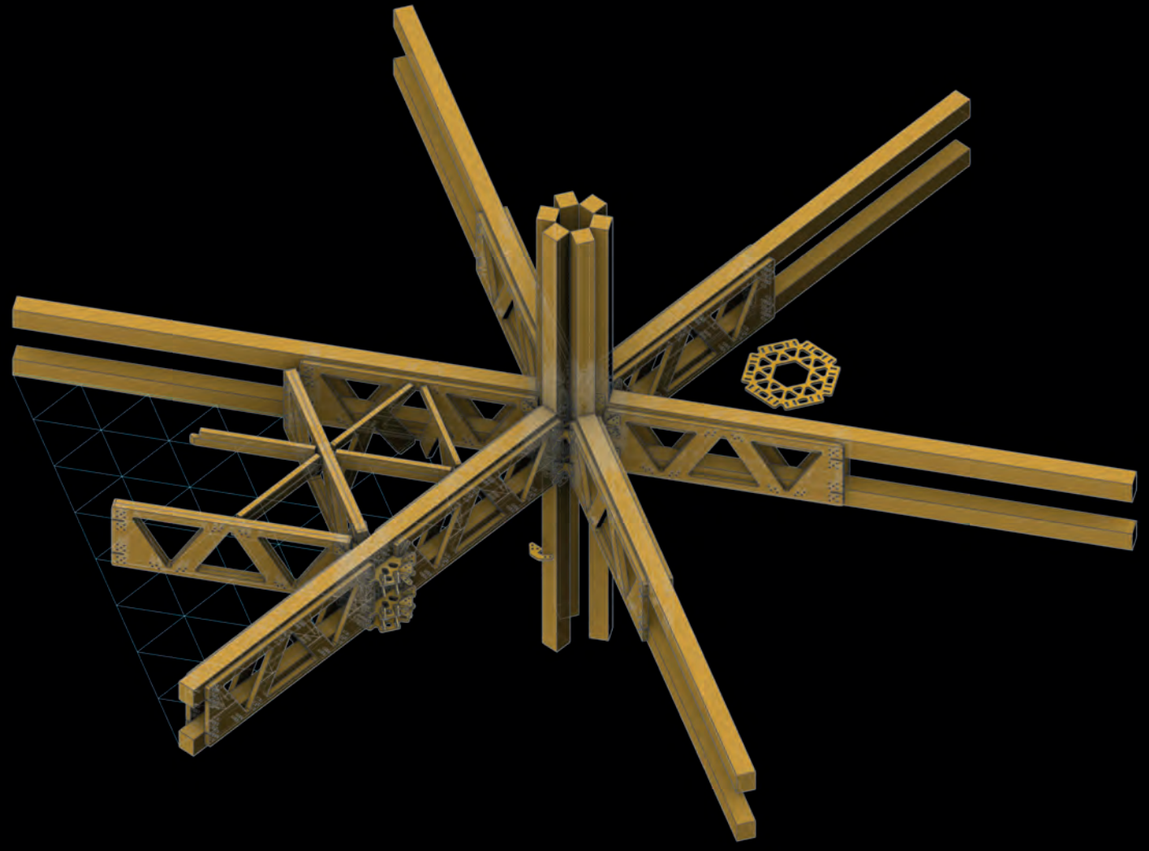
Building structure

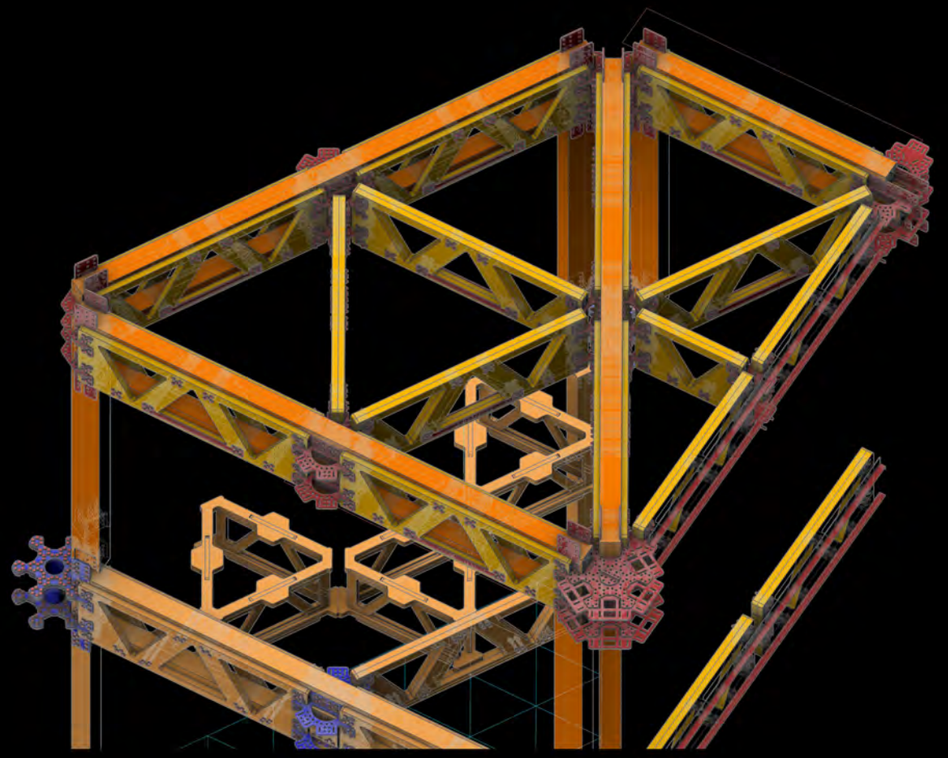


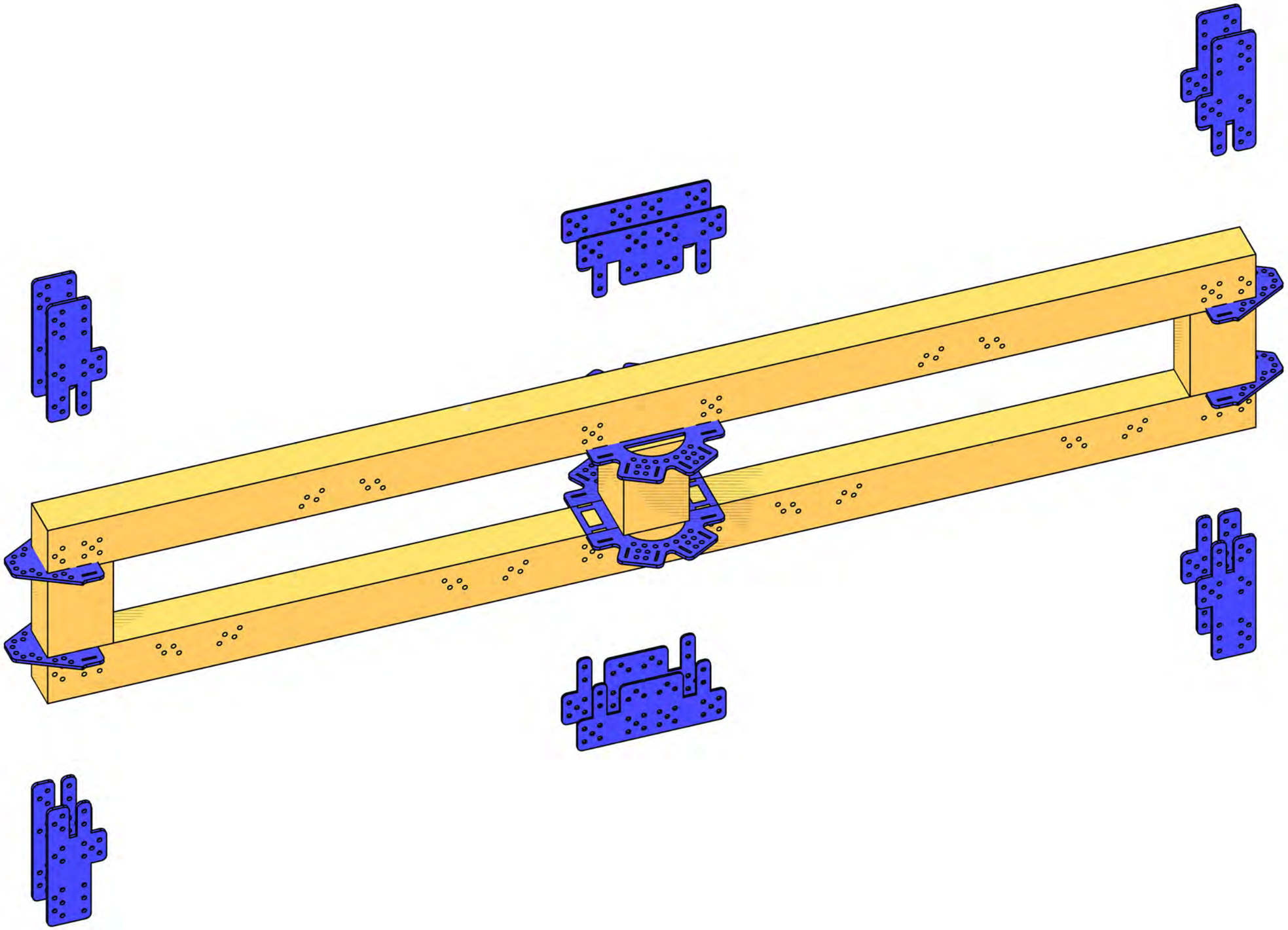
Building structure

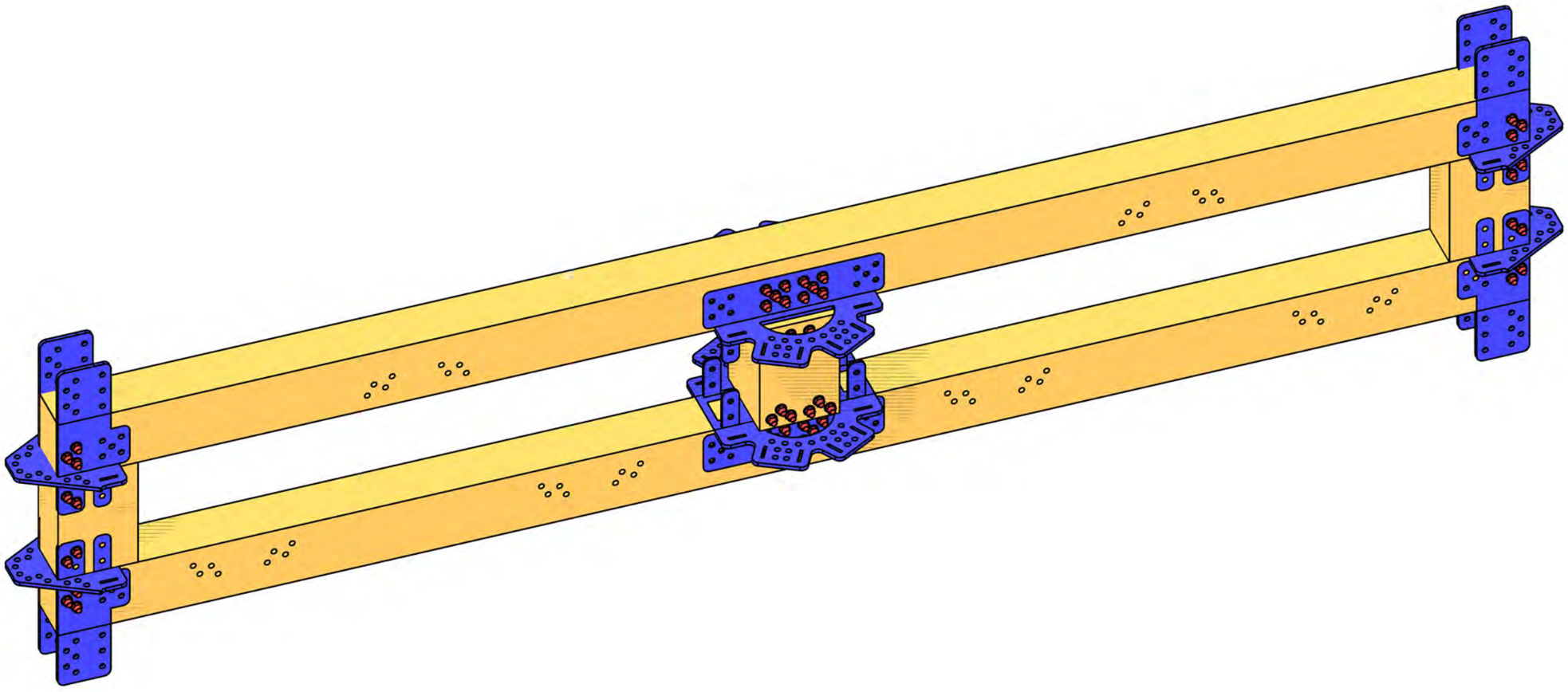
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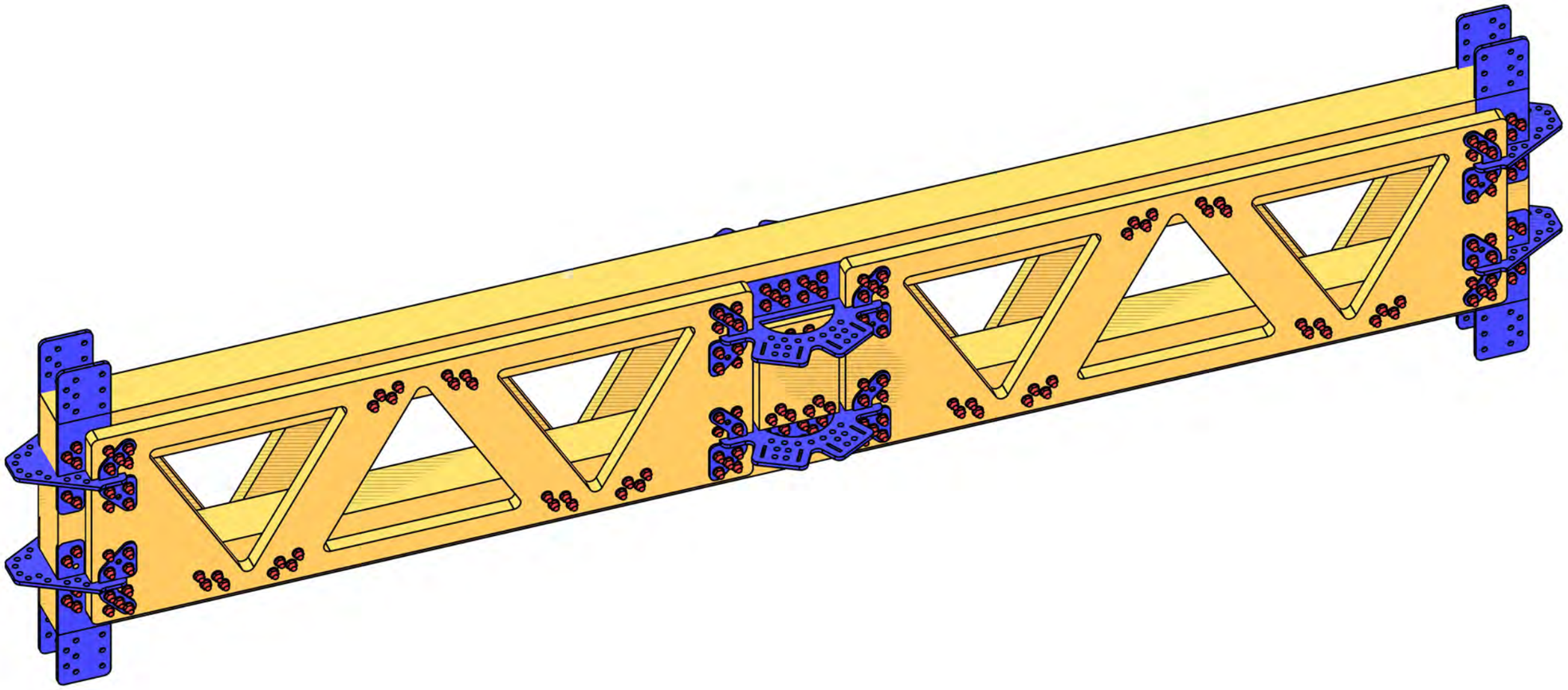


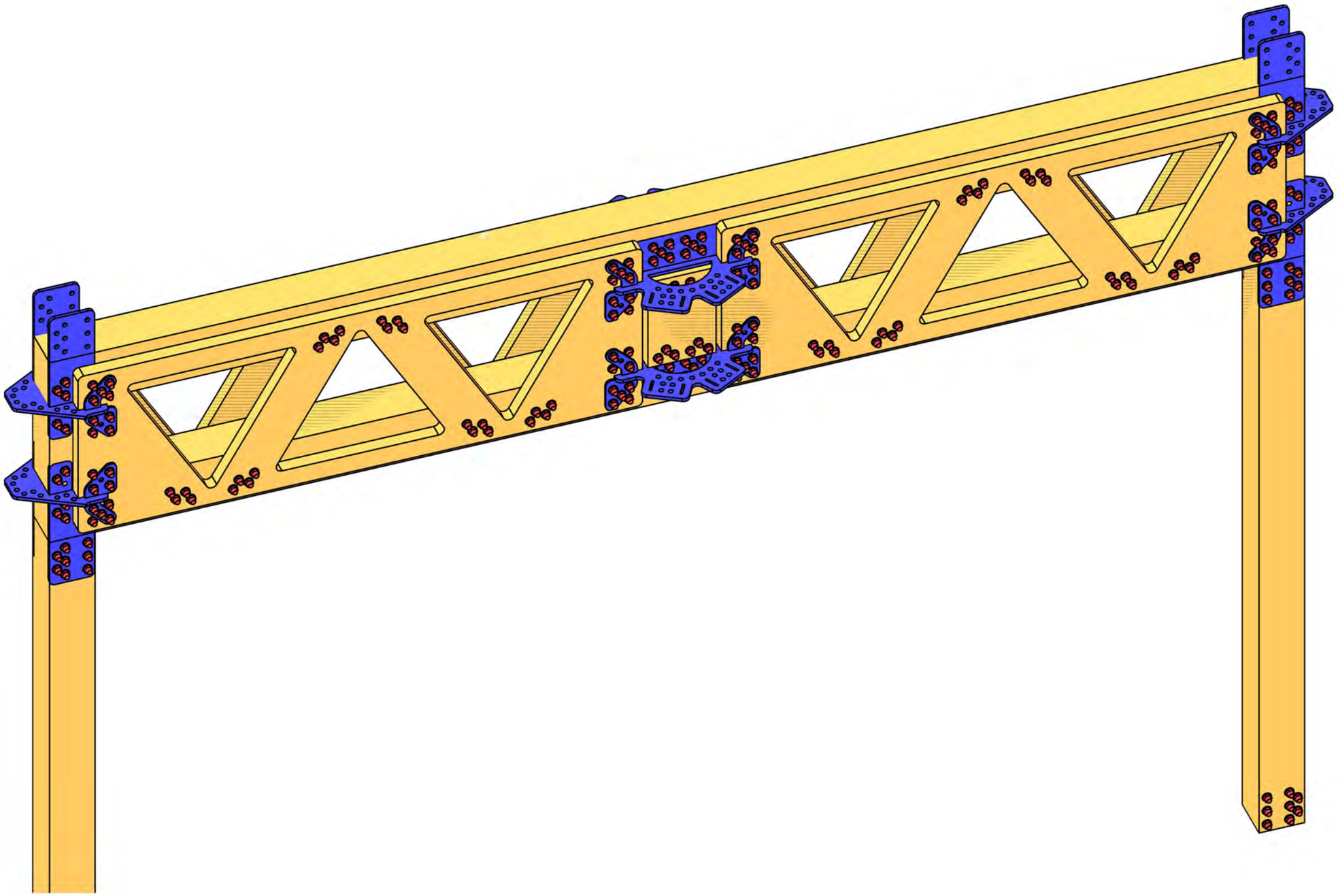


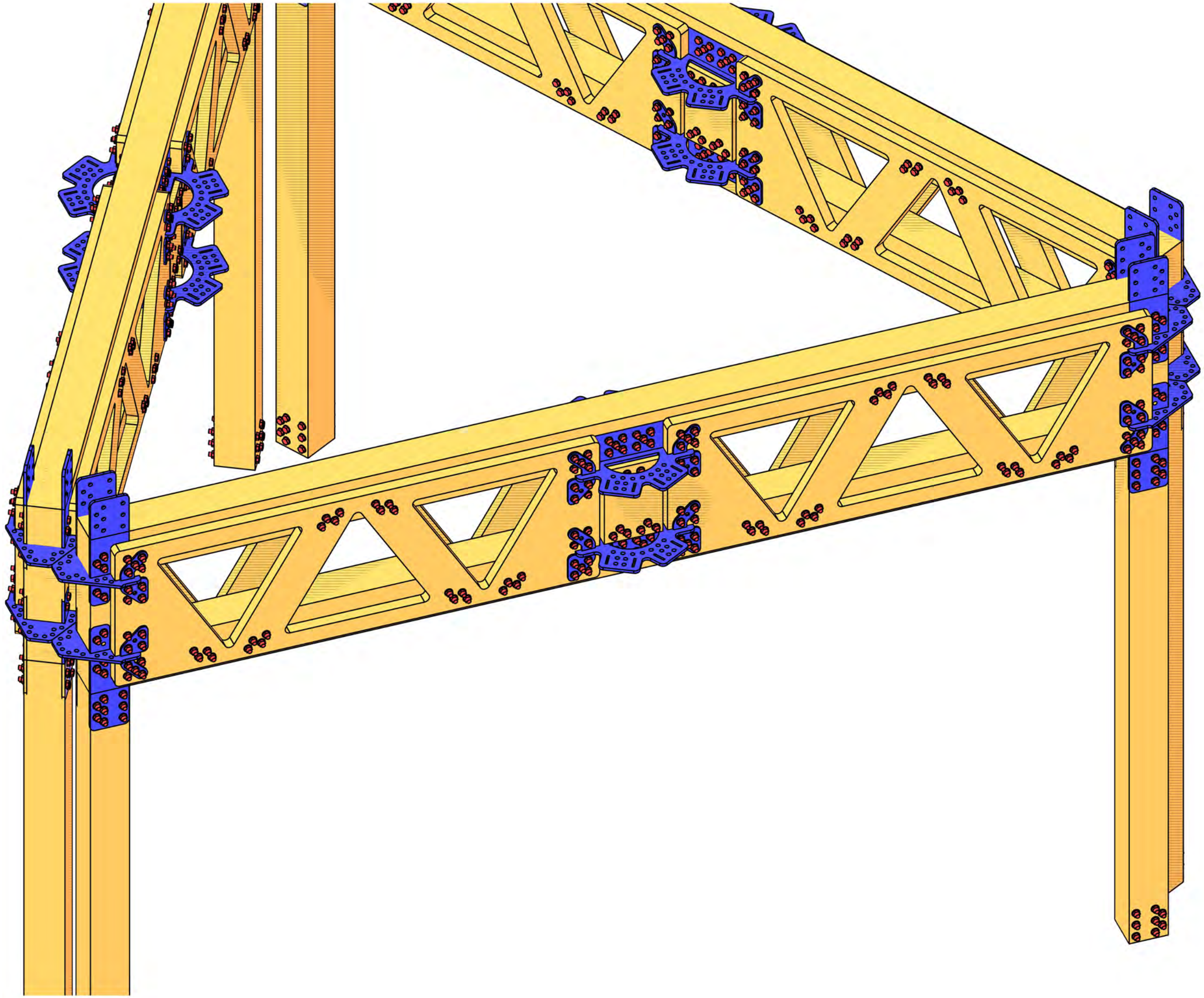


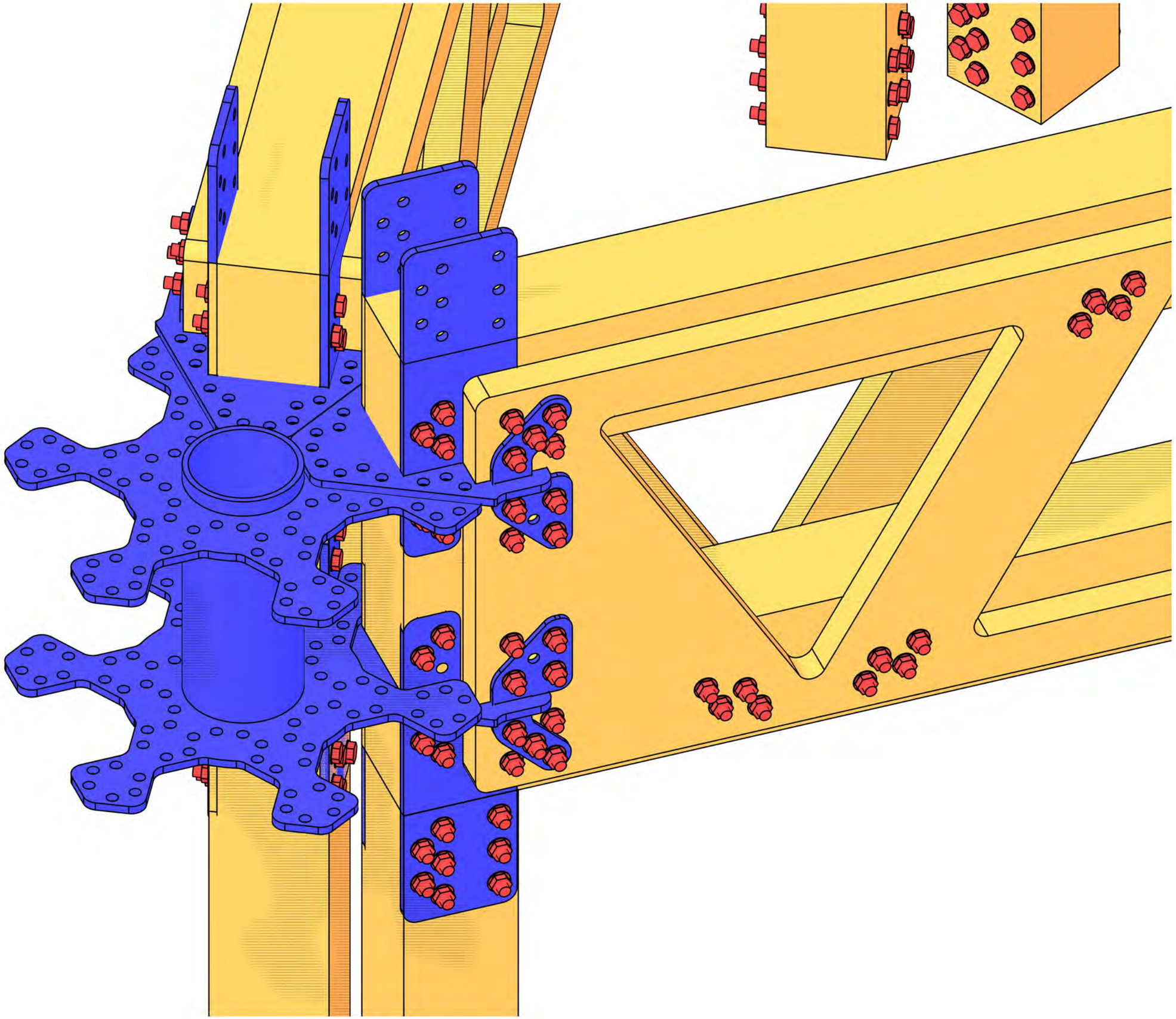


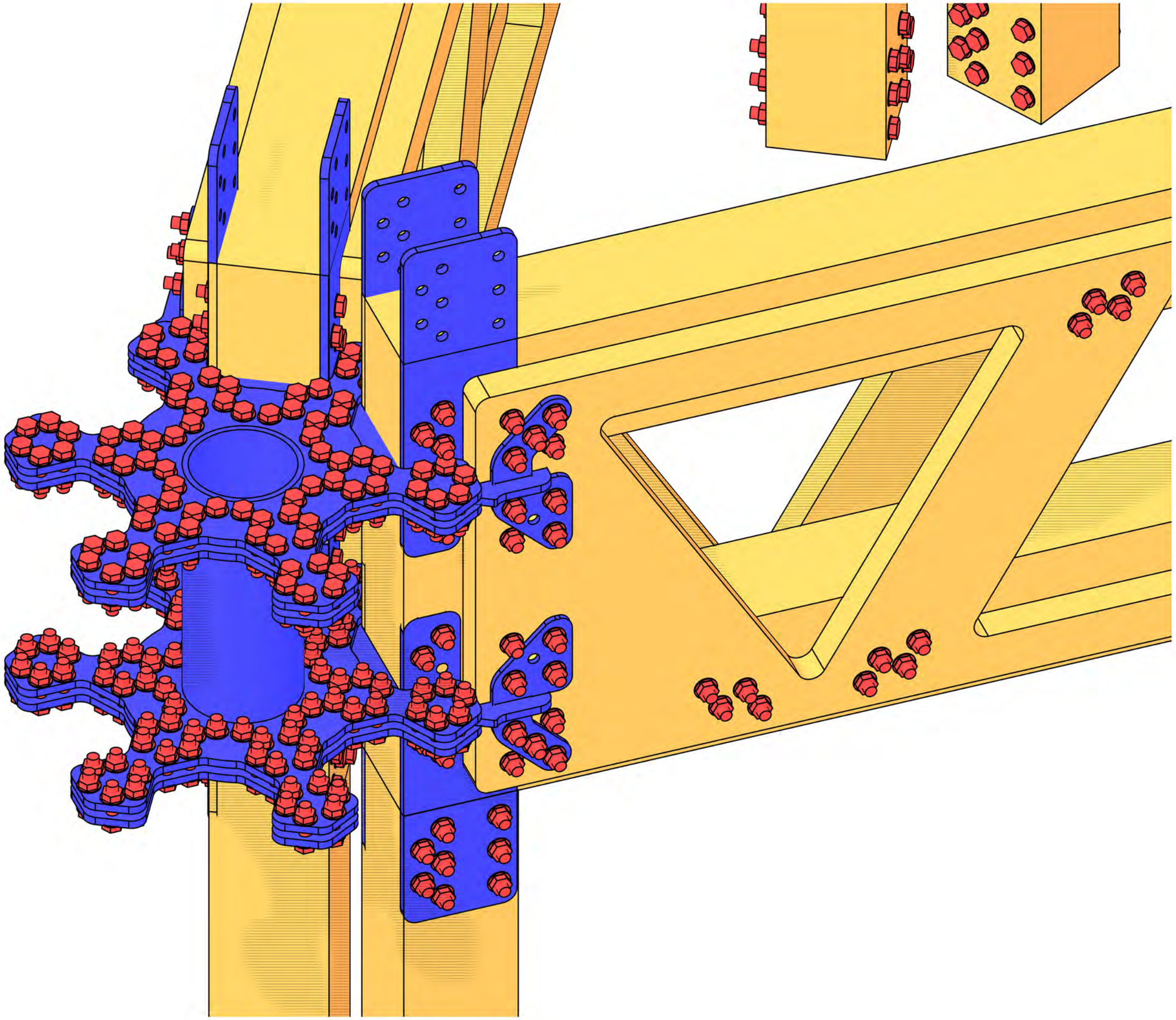


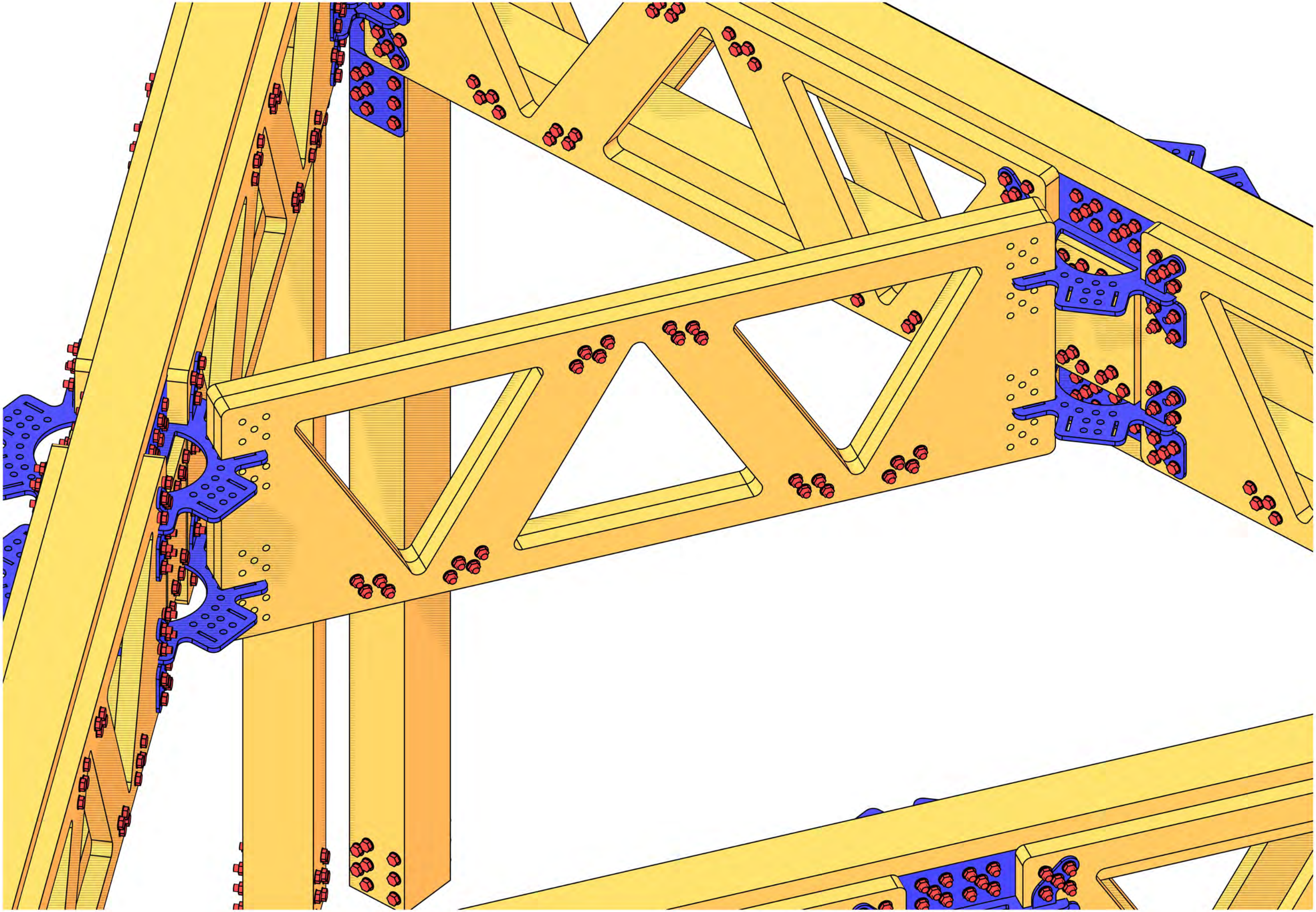


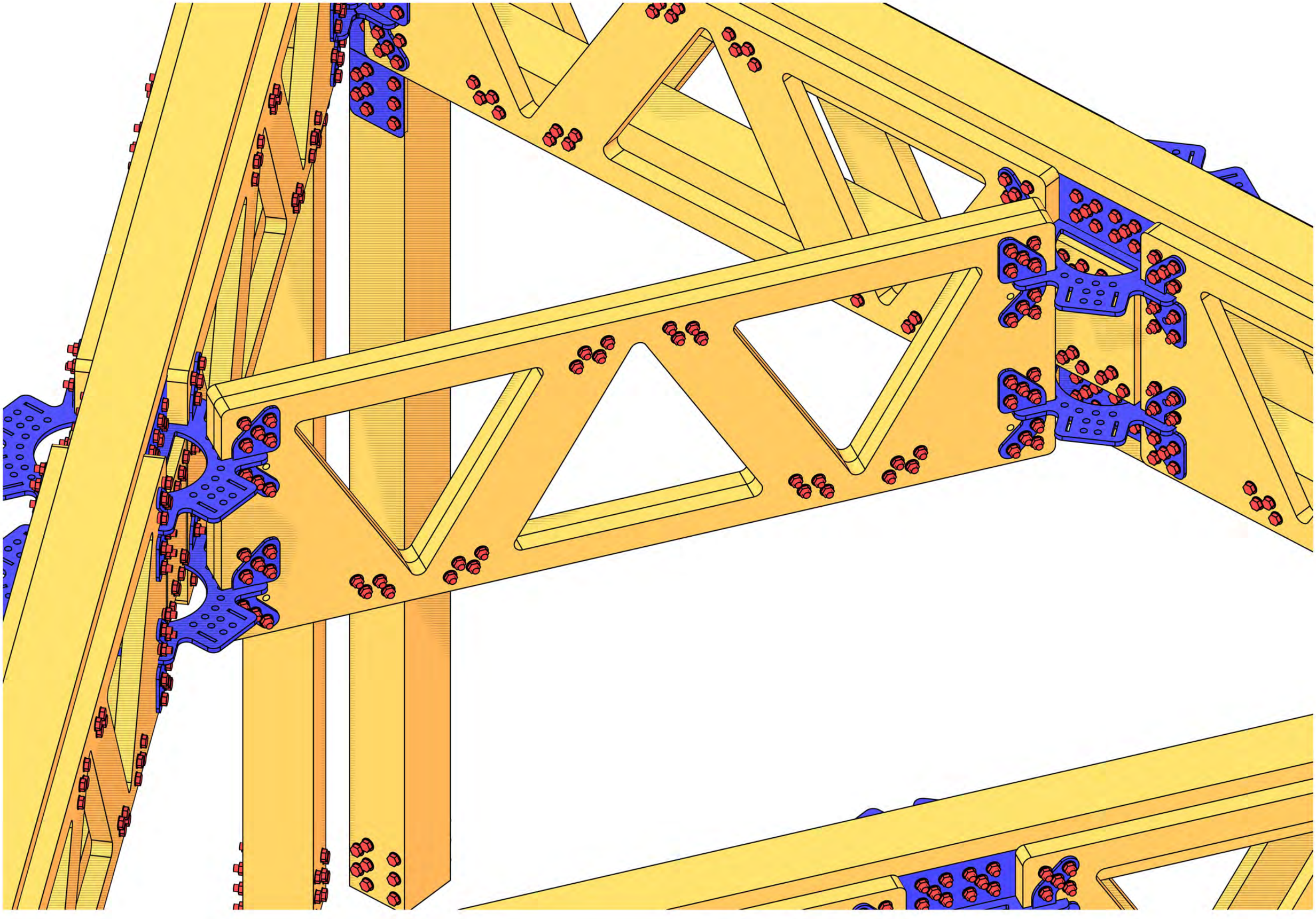


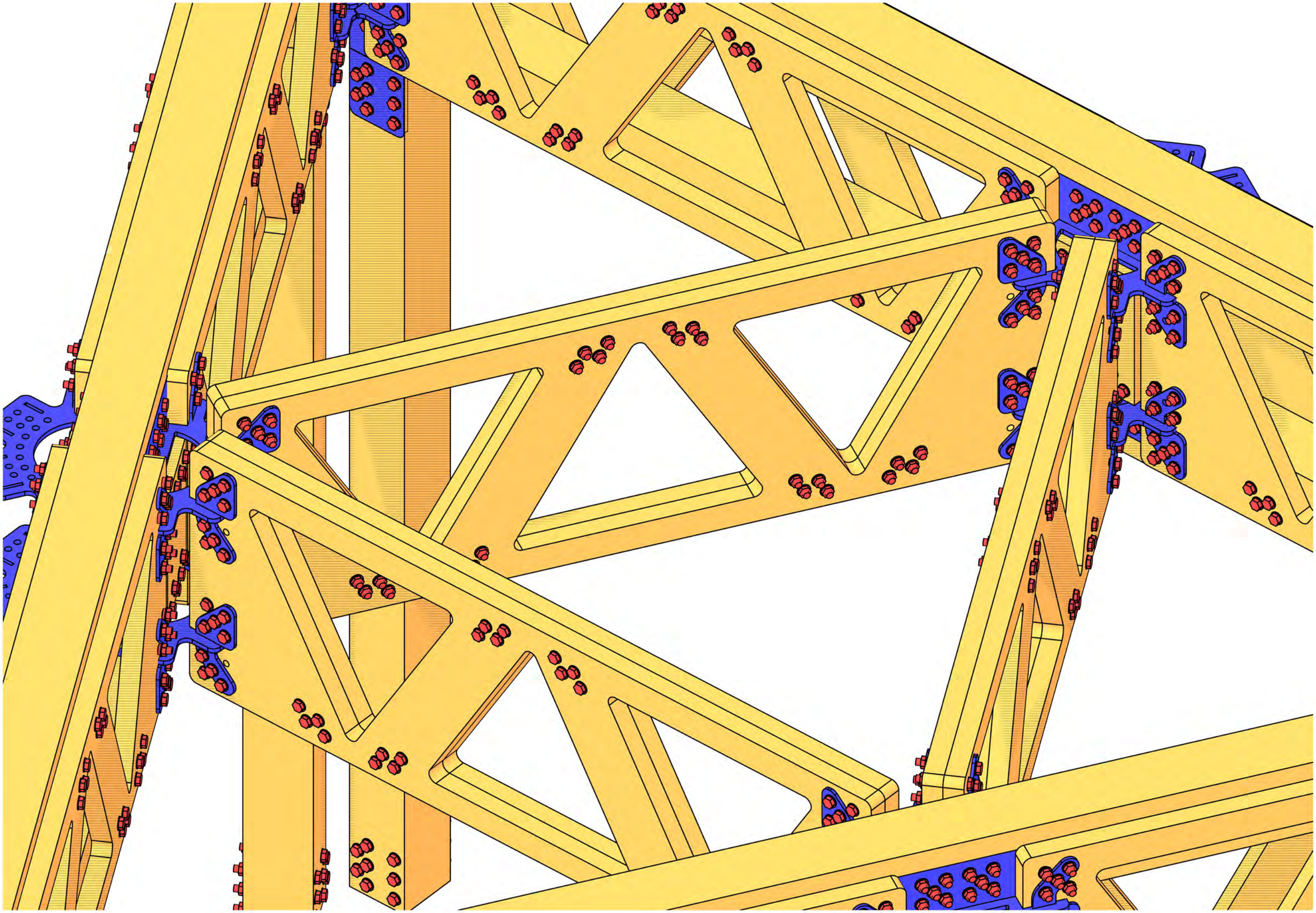


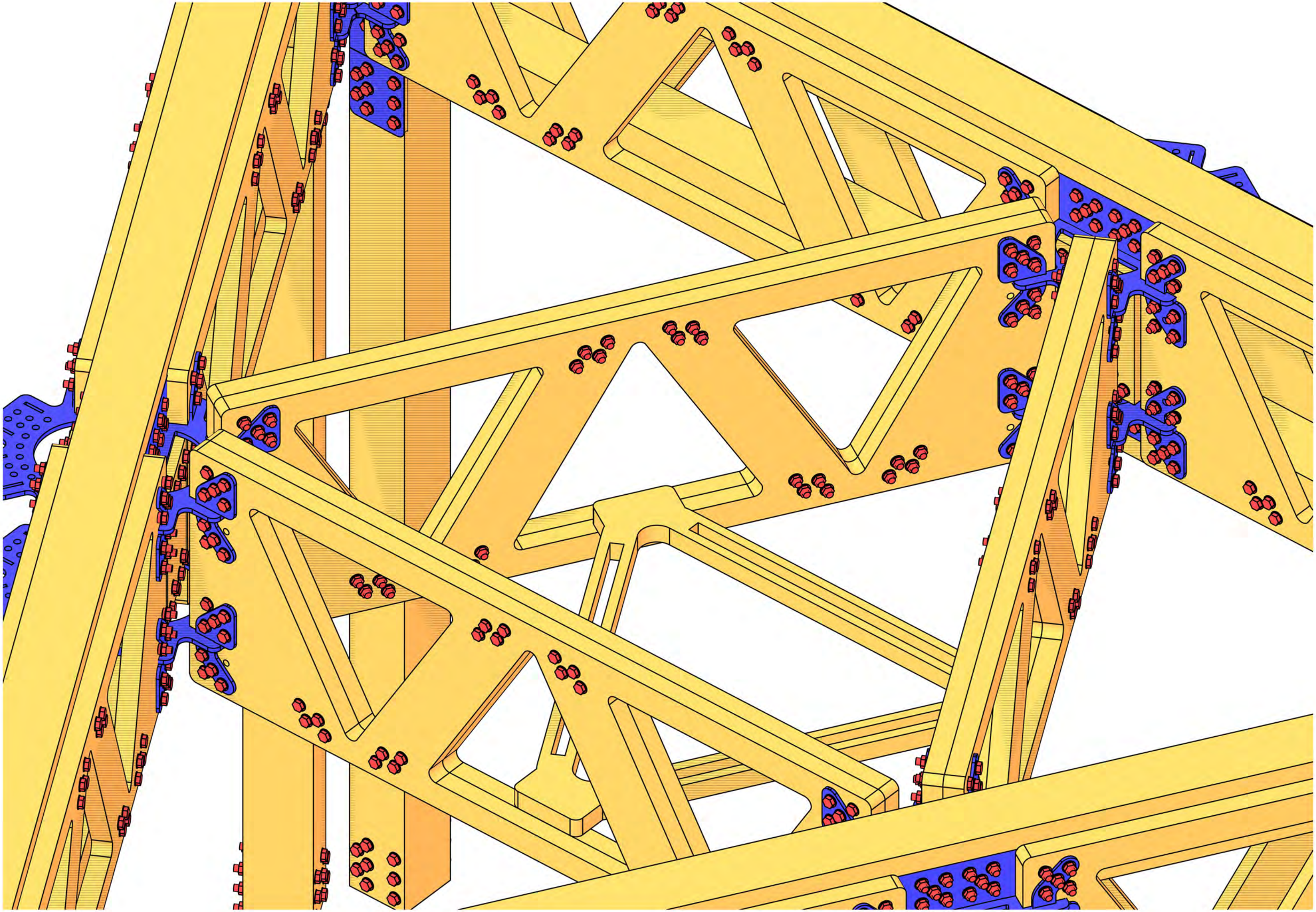


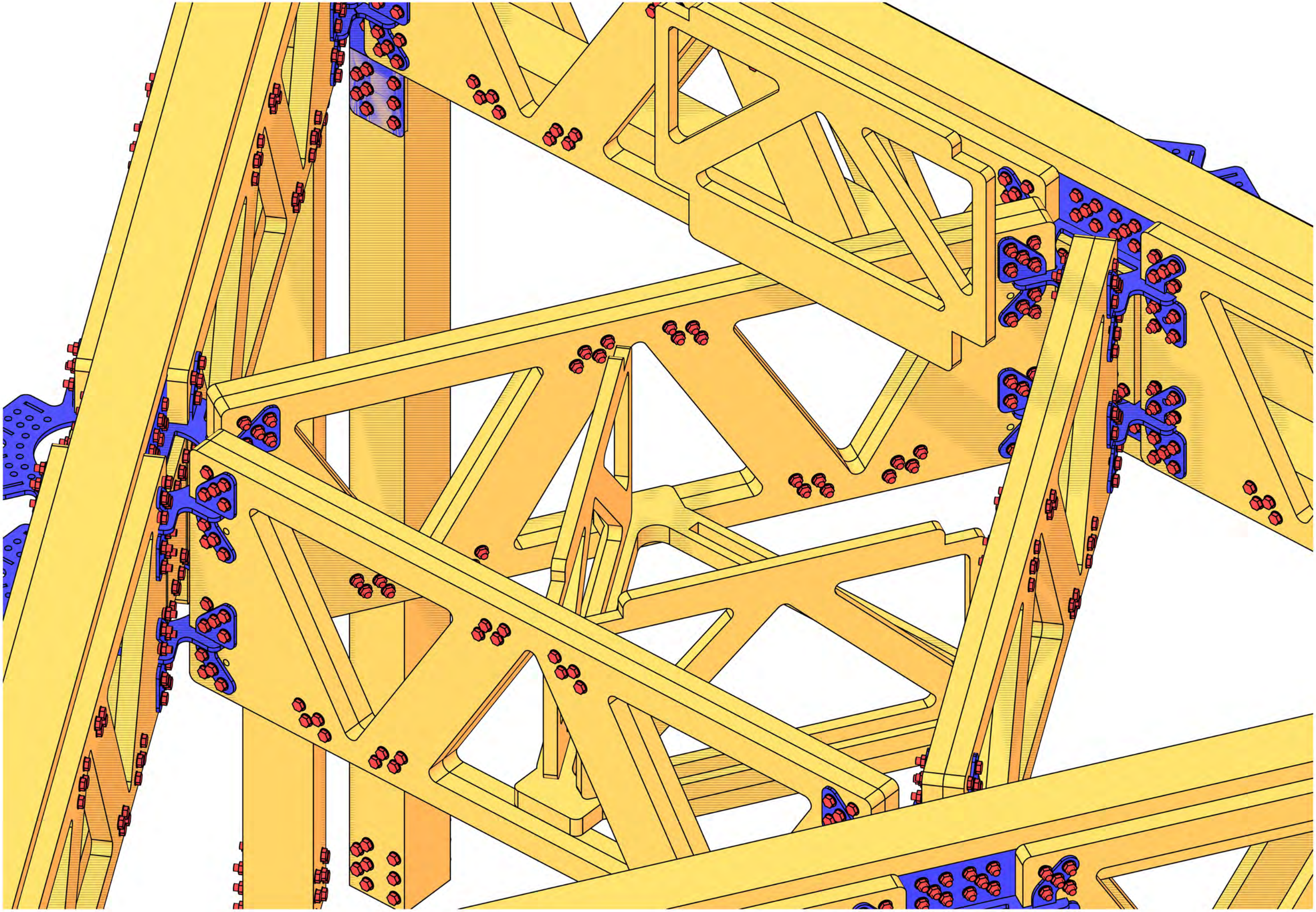


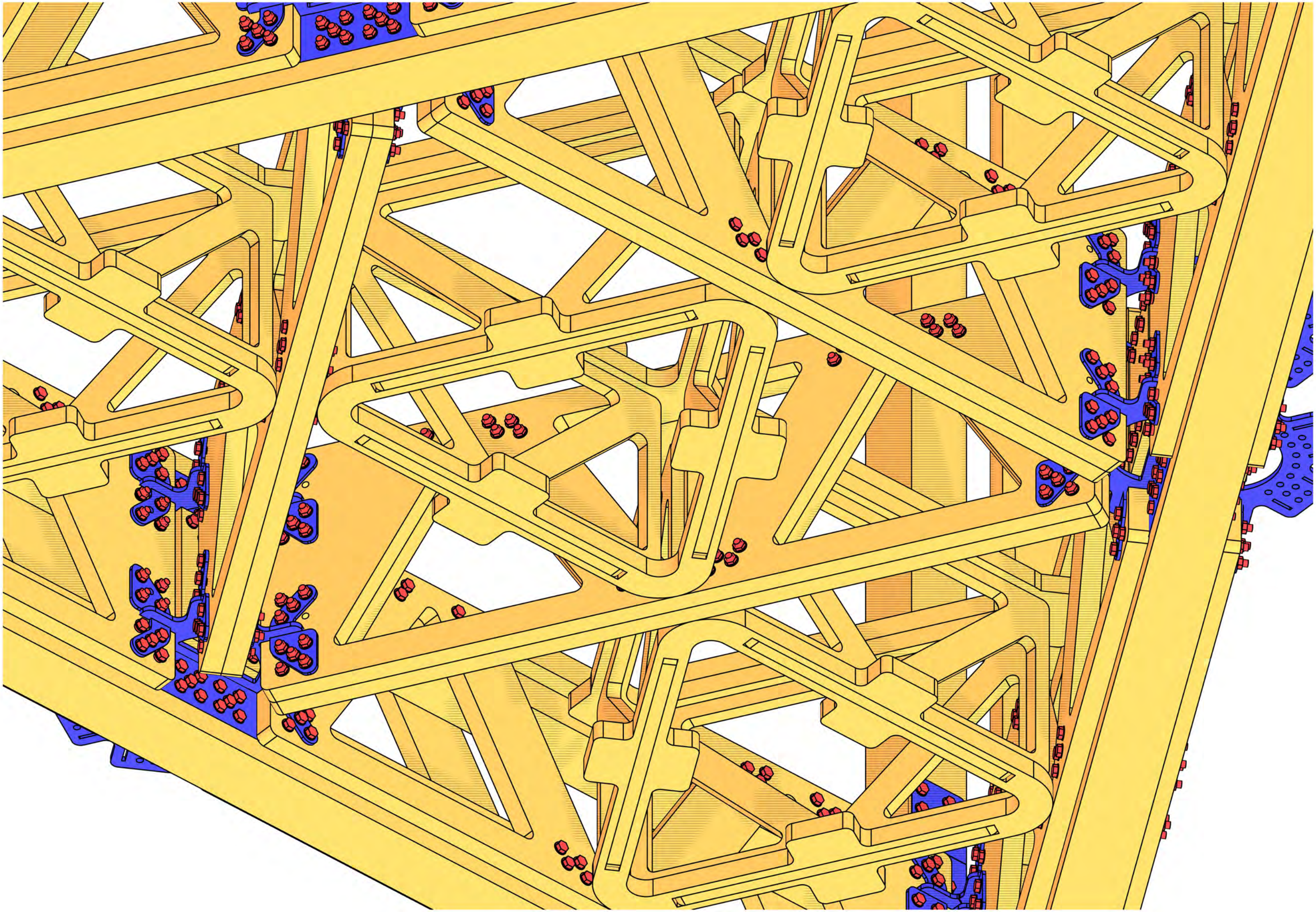


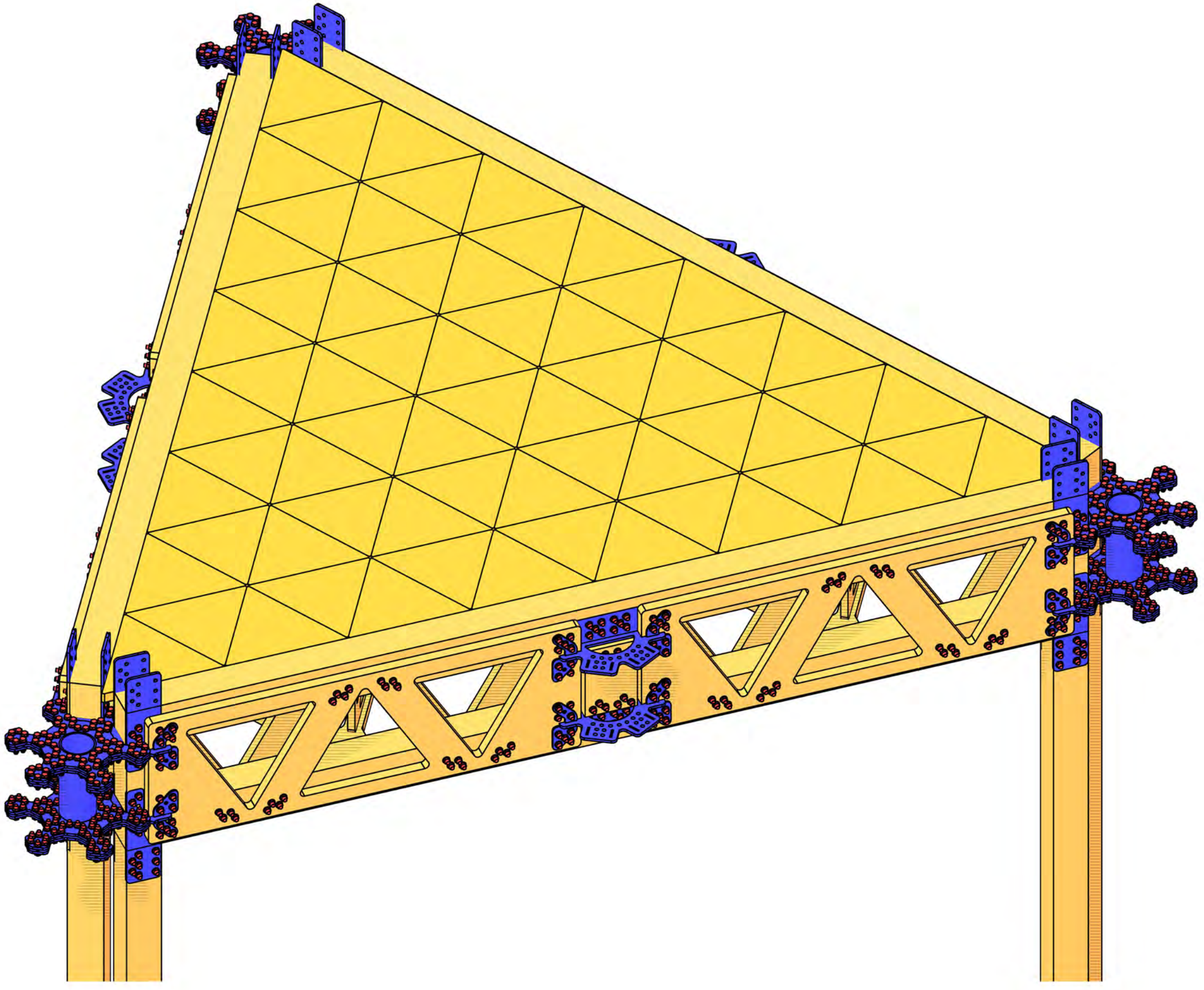


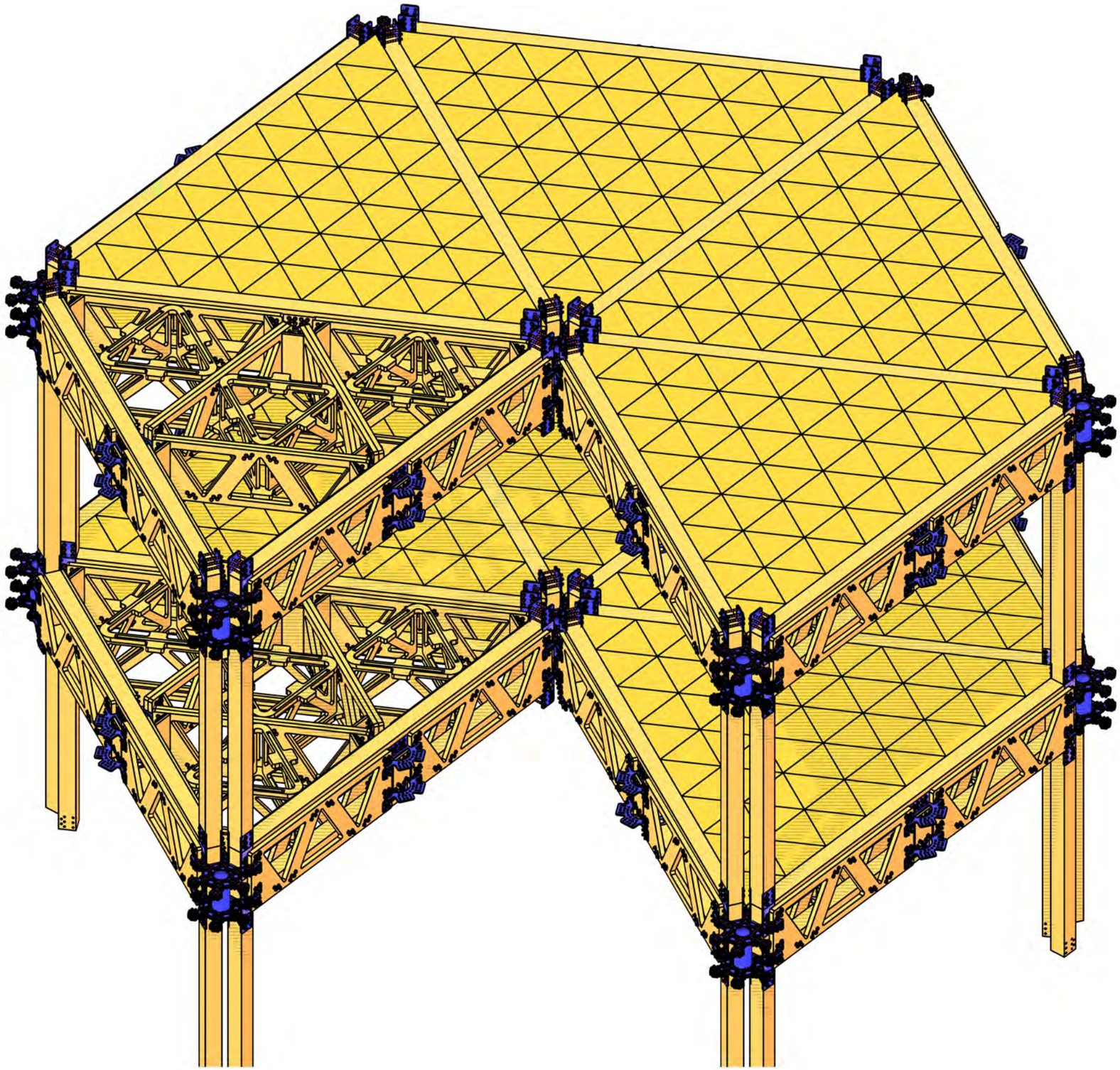




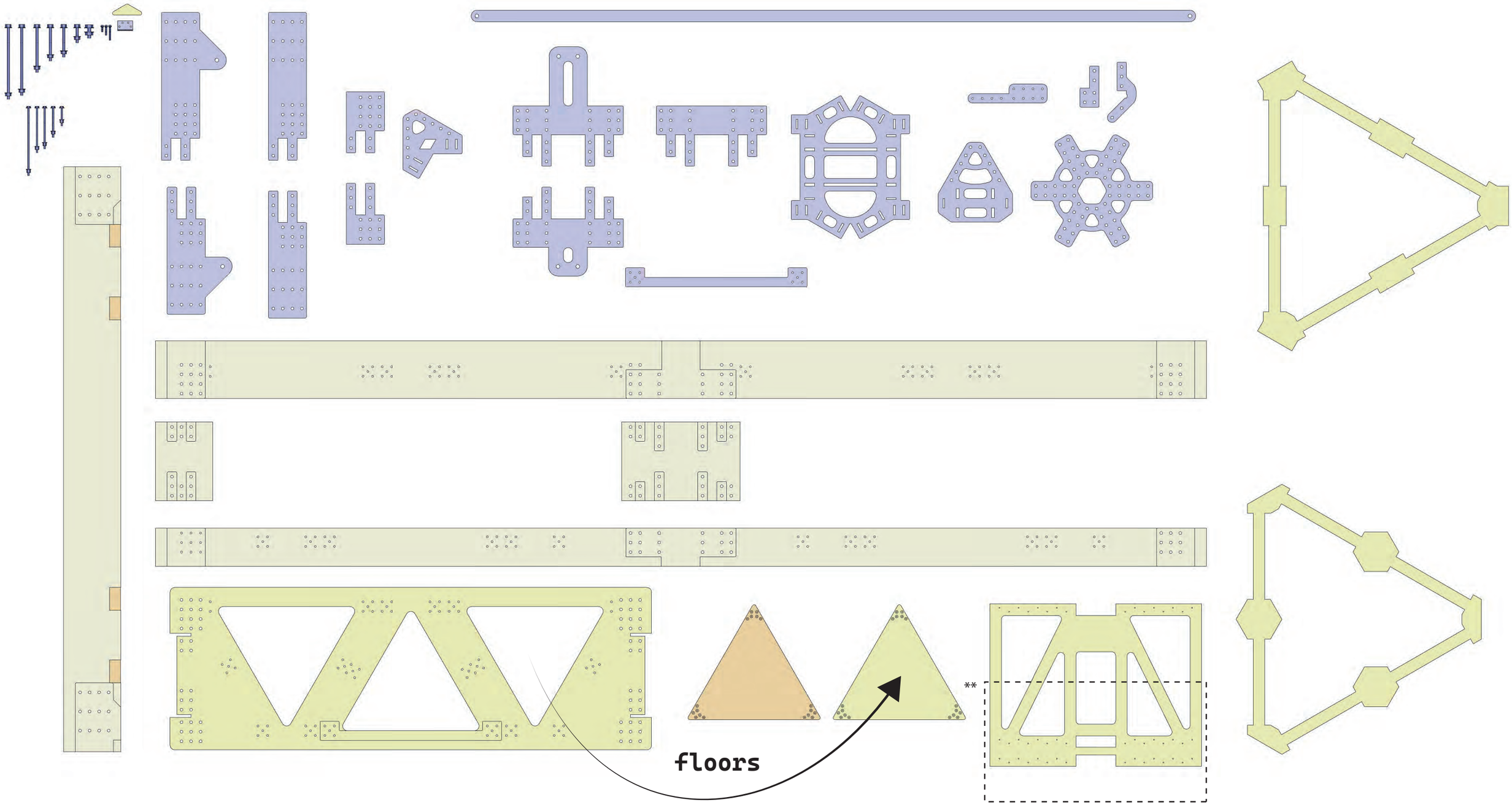




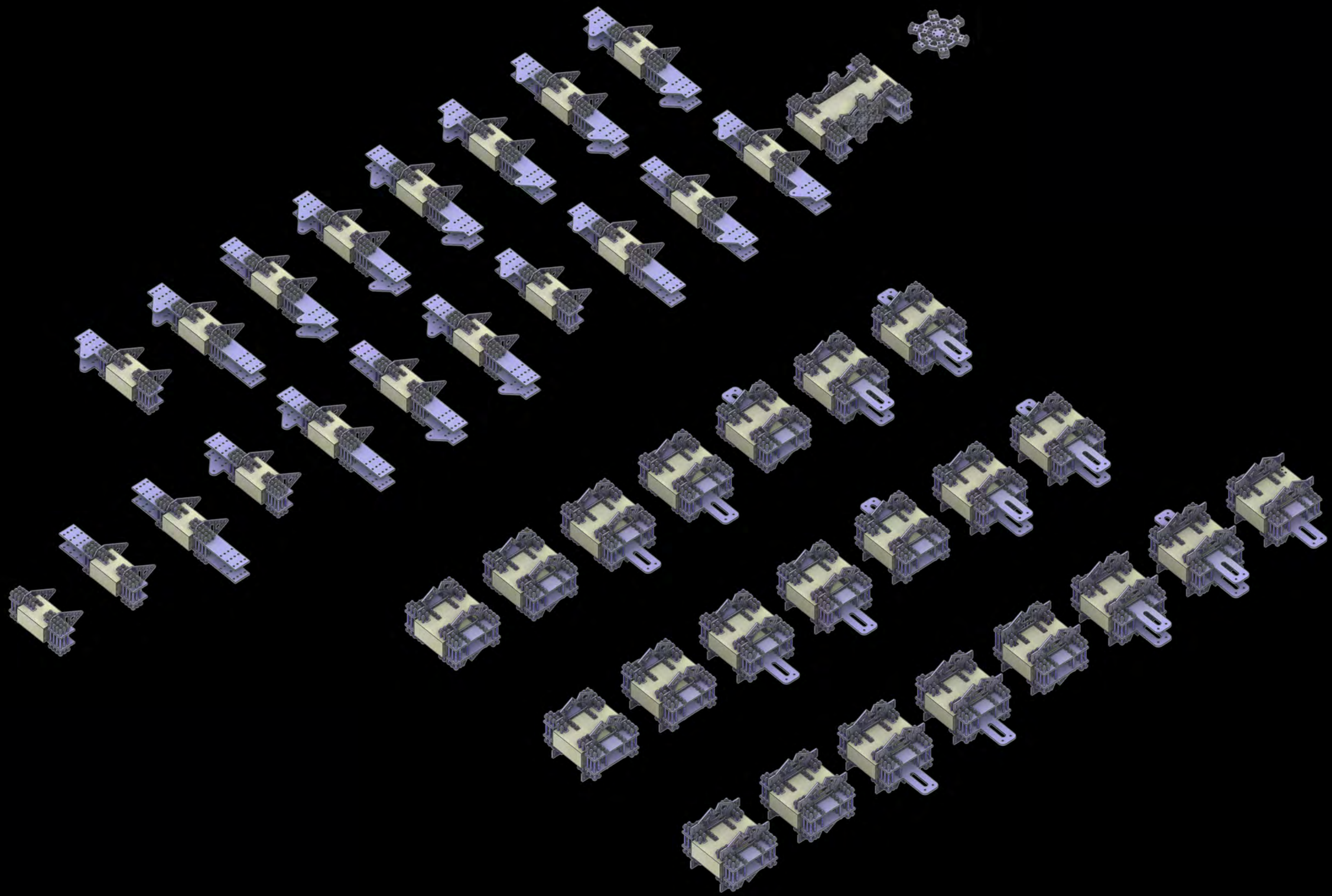




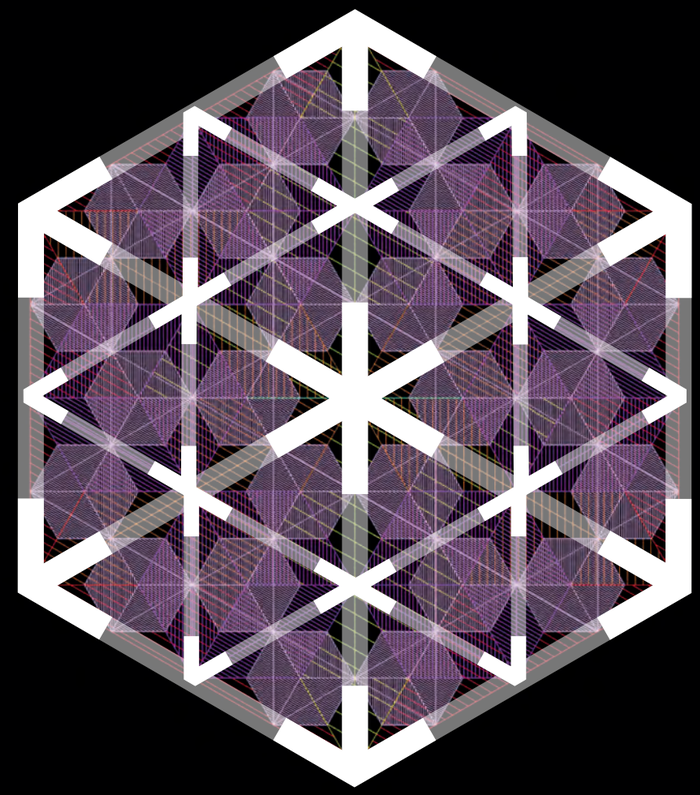
Building structure

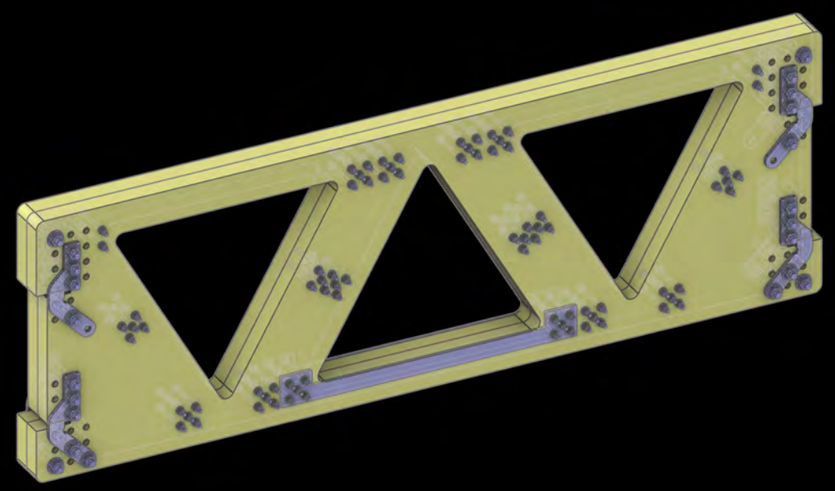


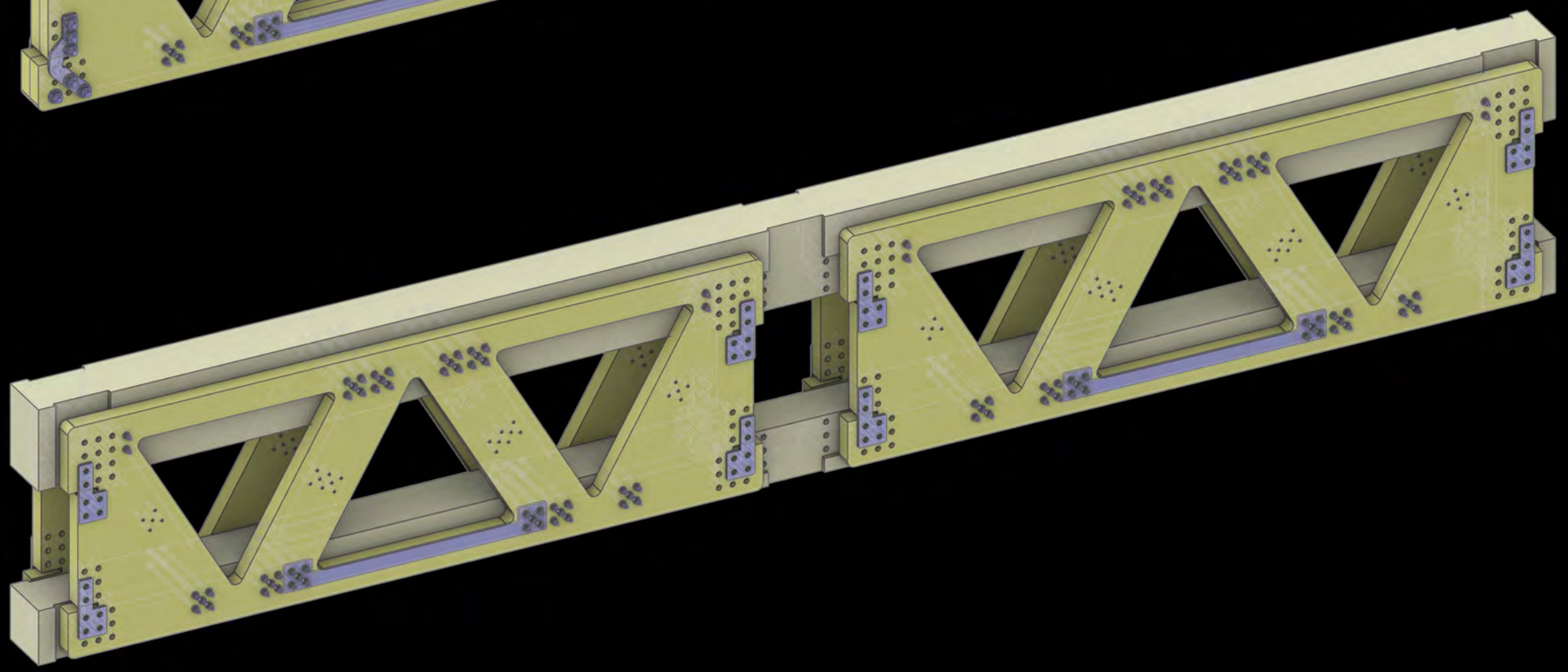
Building structure



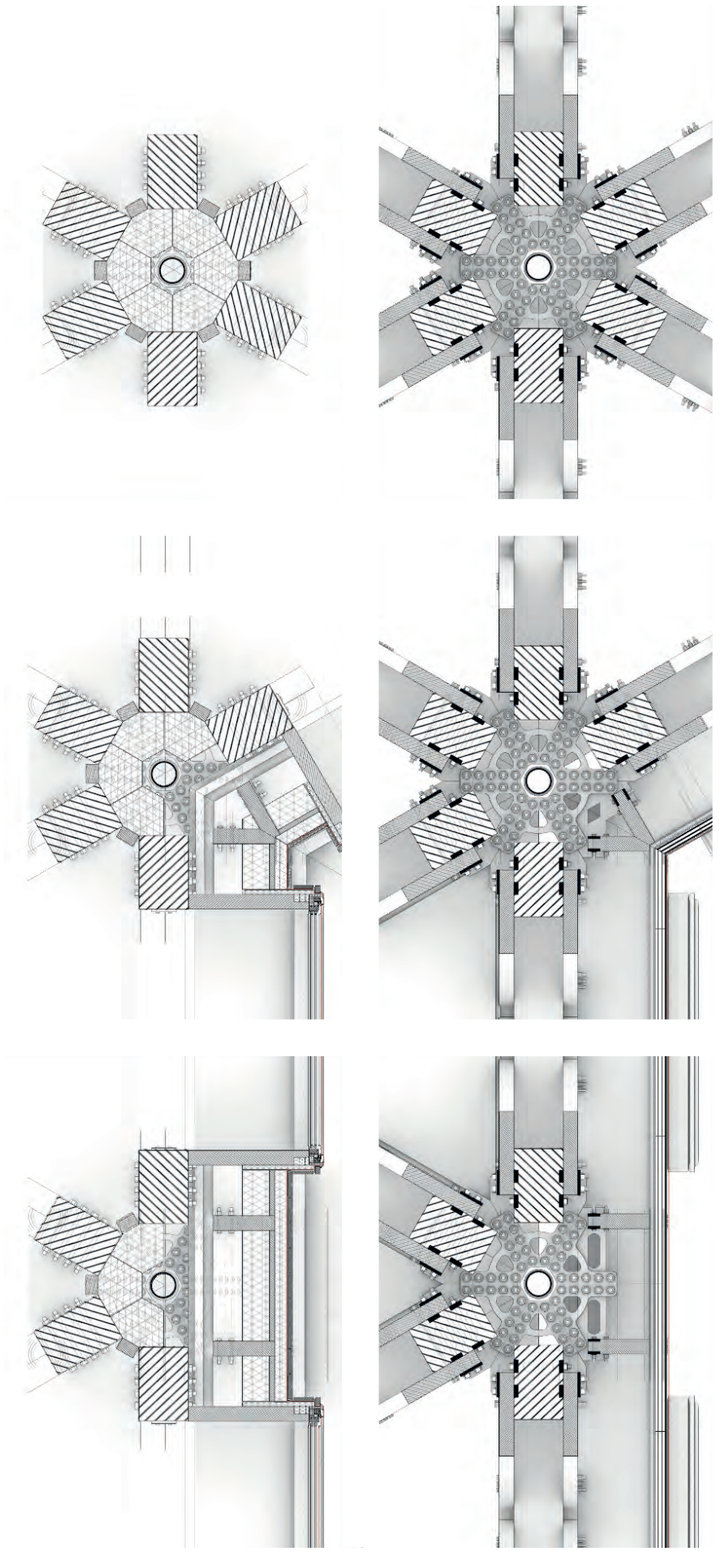
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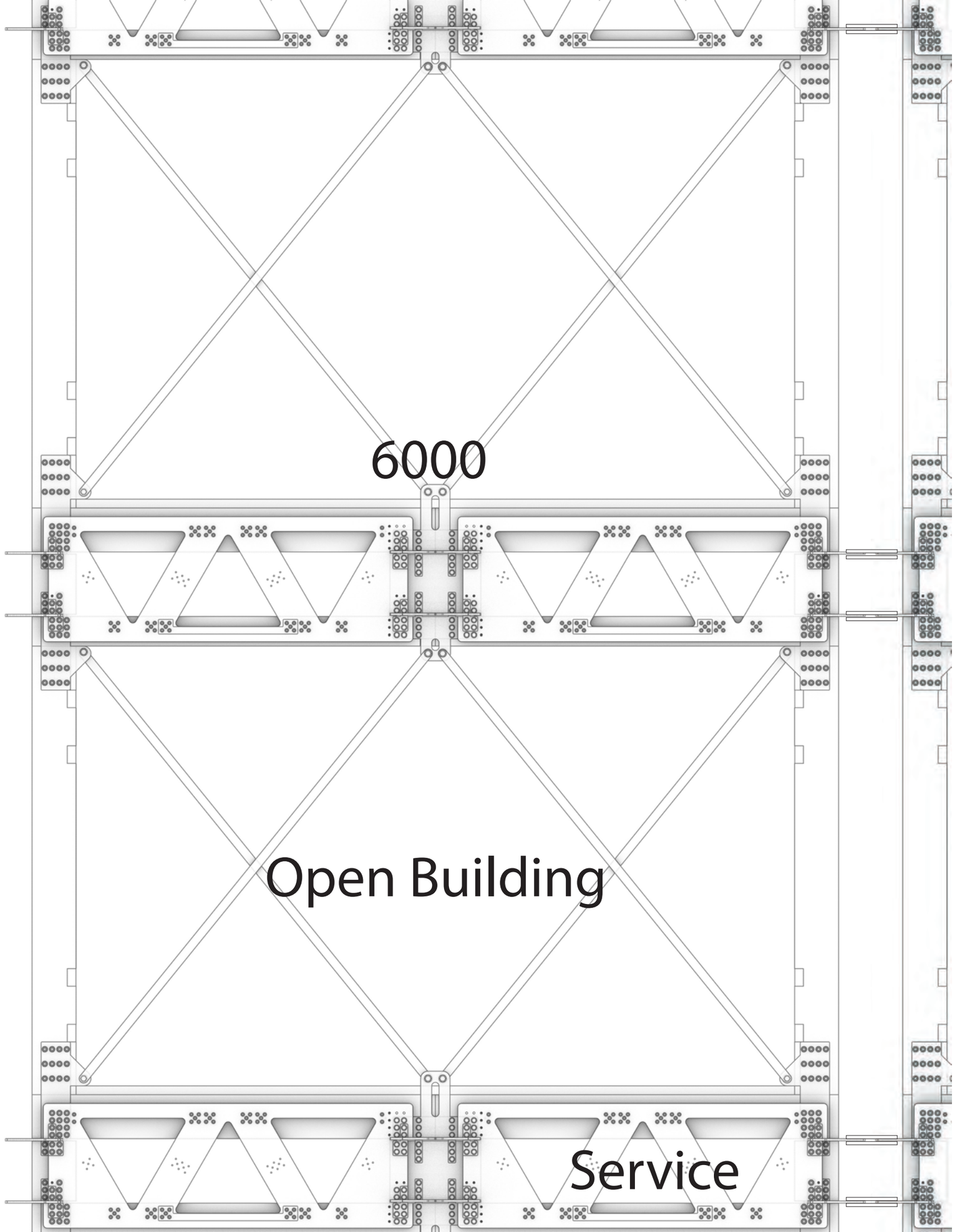




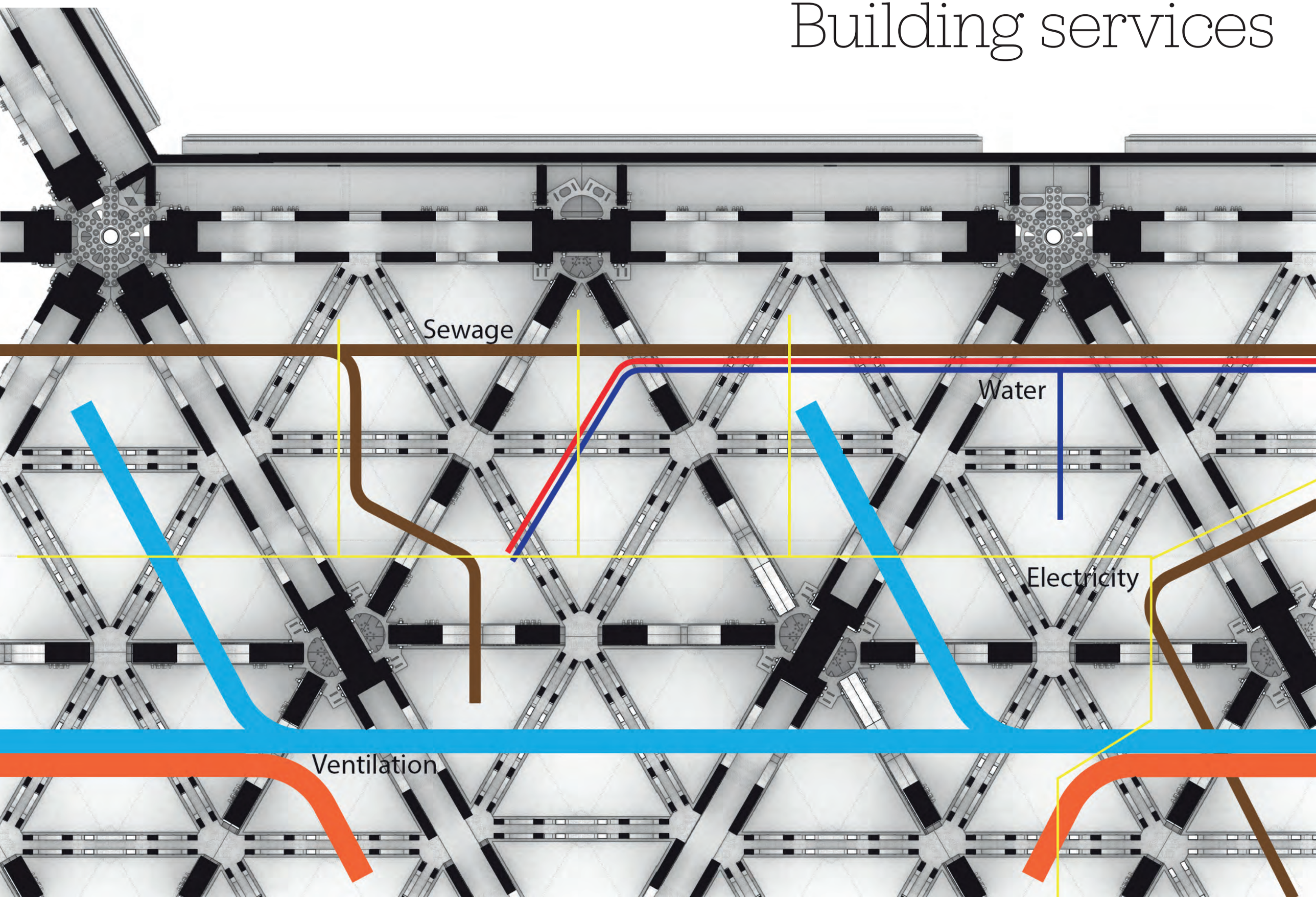


Building structure

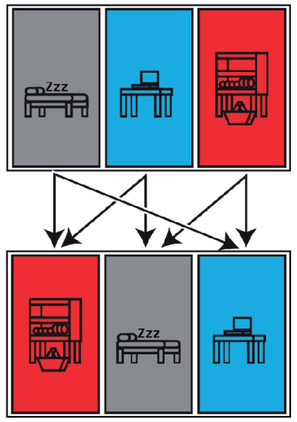




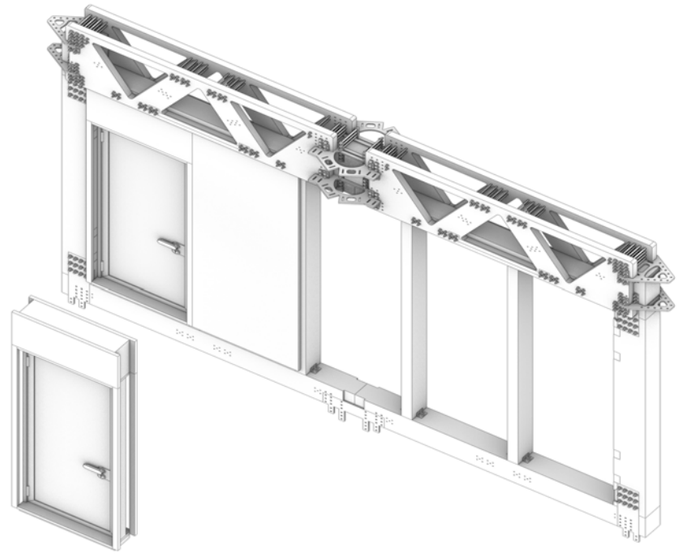
Building services

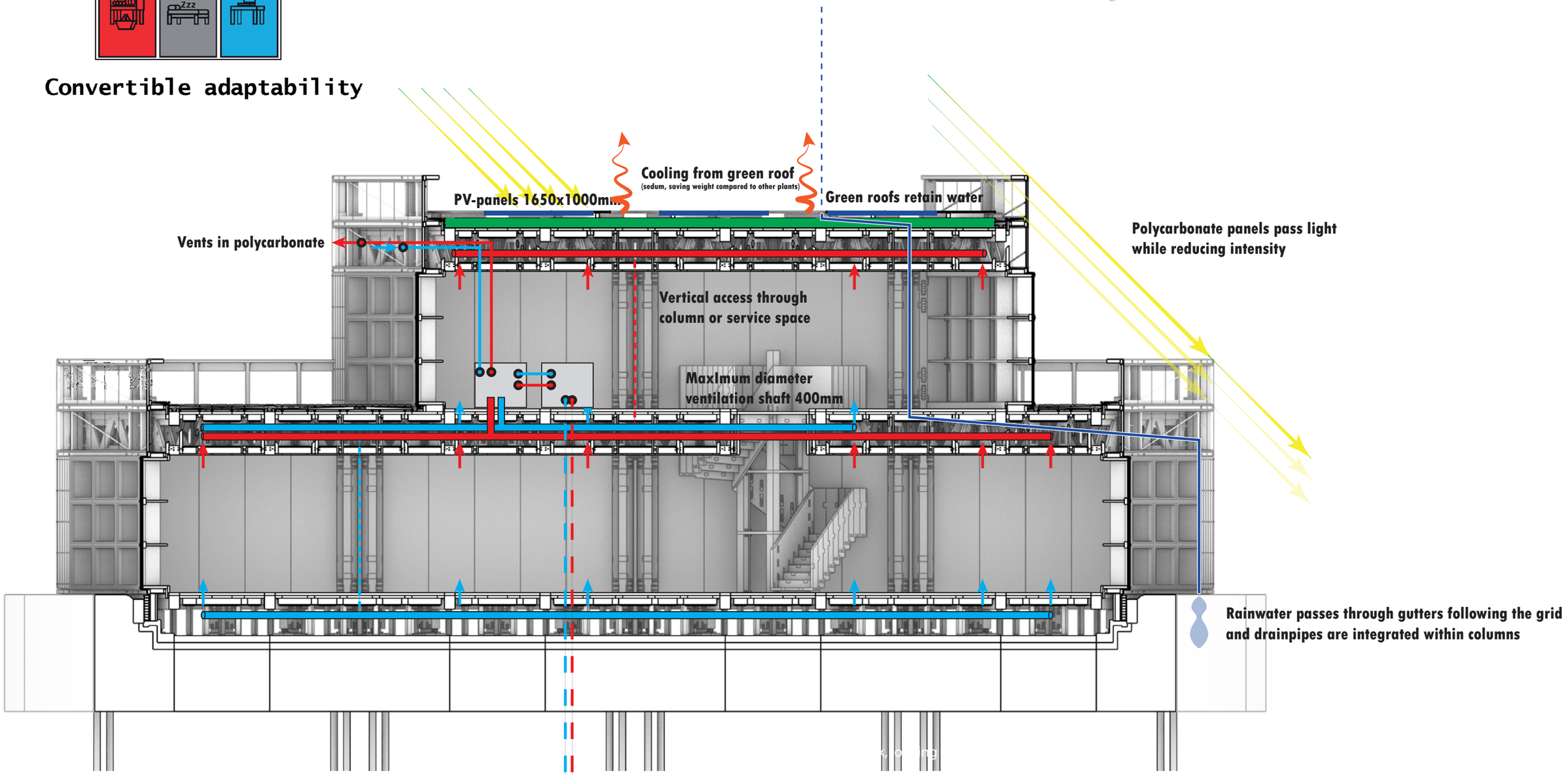


Building services

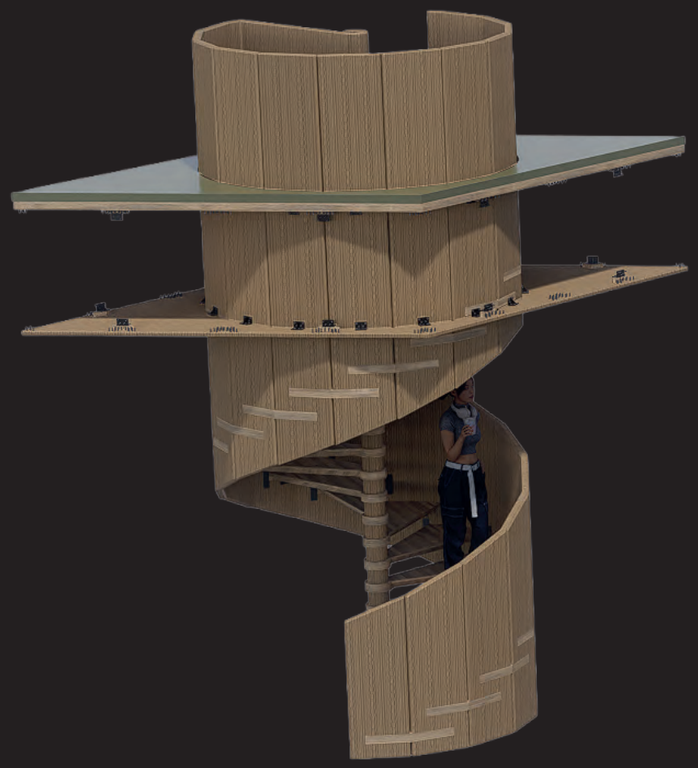


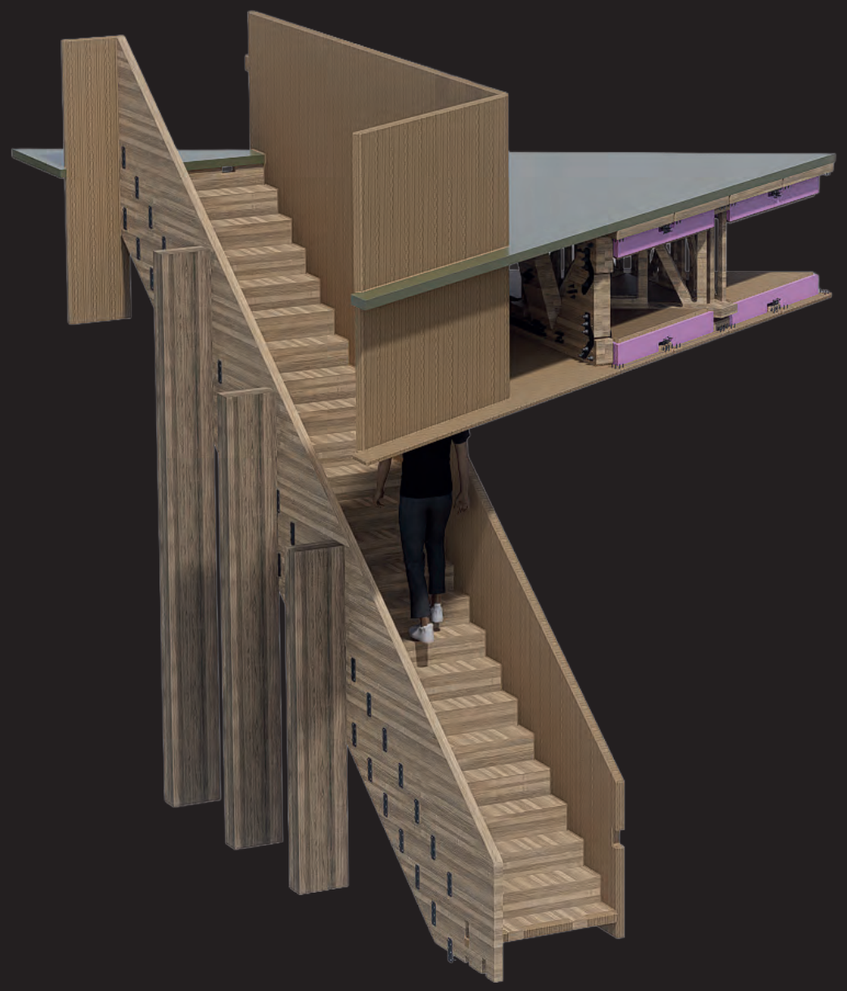
Convertible adaptability





Vertical translation



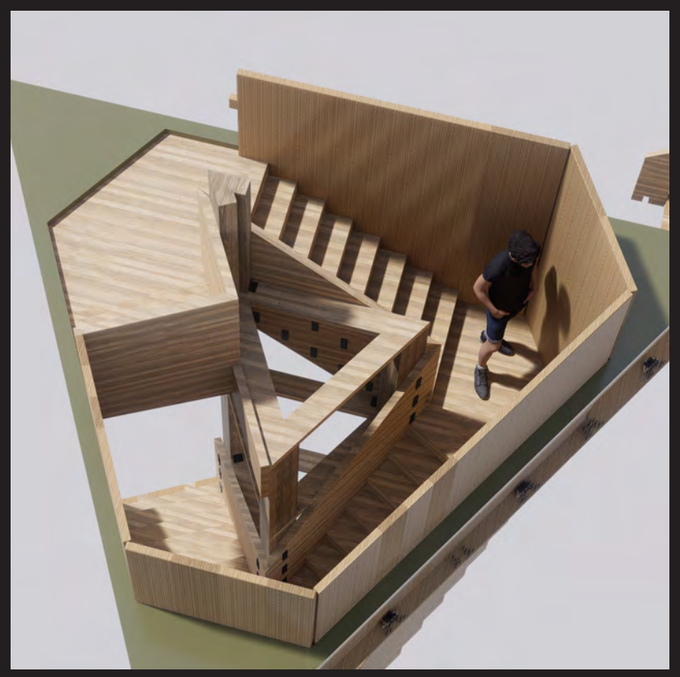


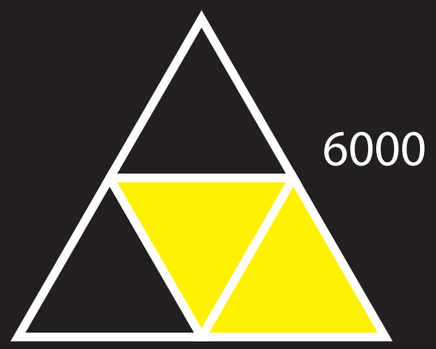


Vertical translation

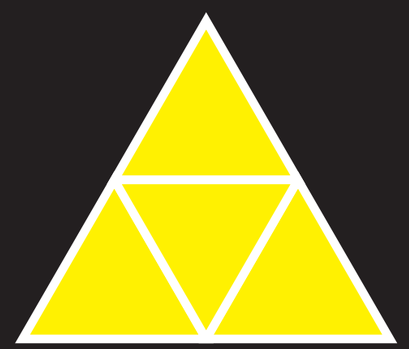






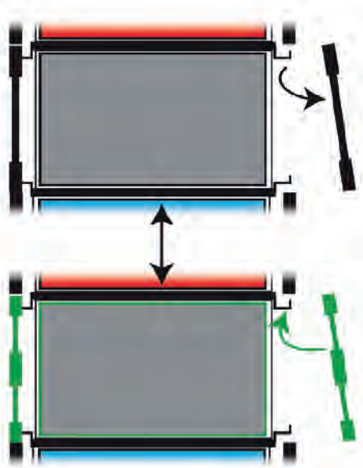






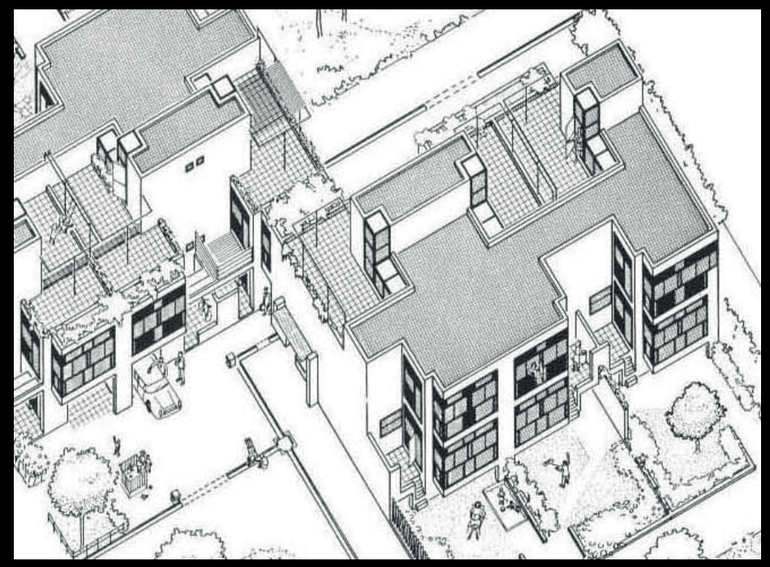
Building skin

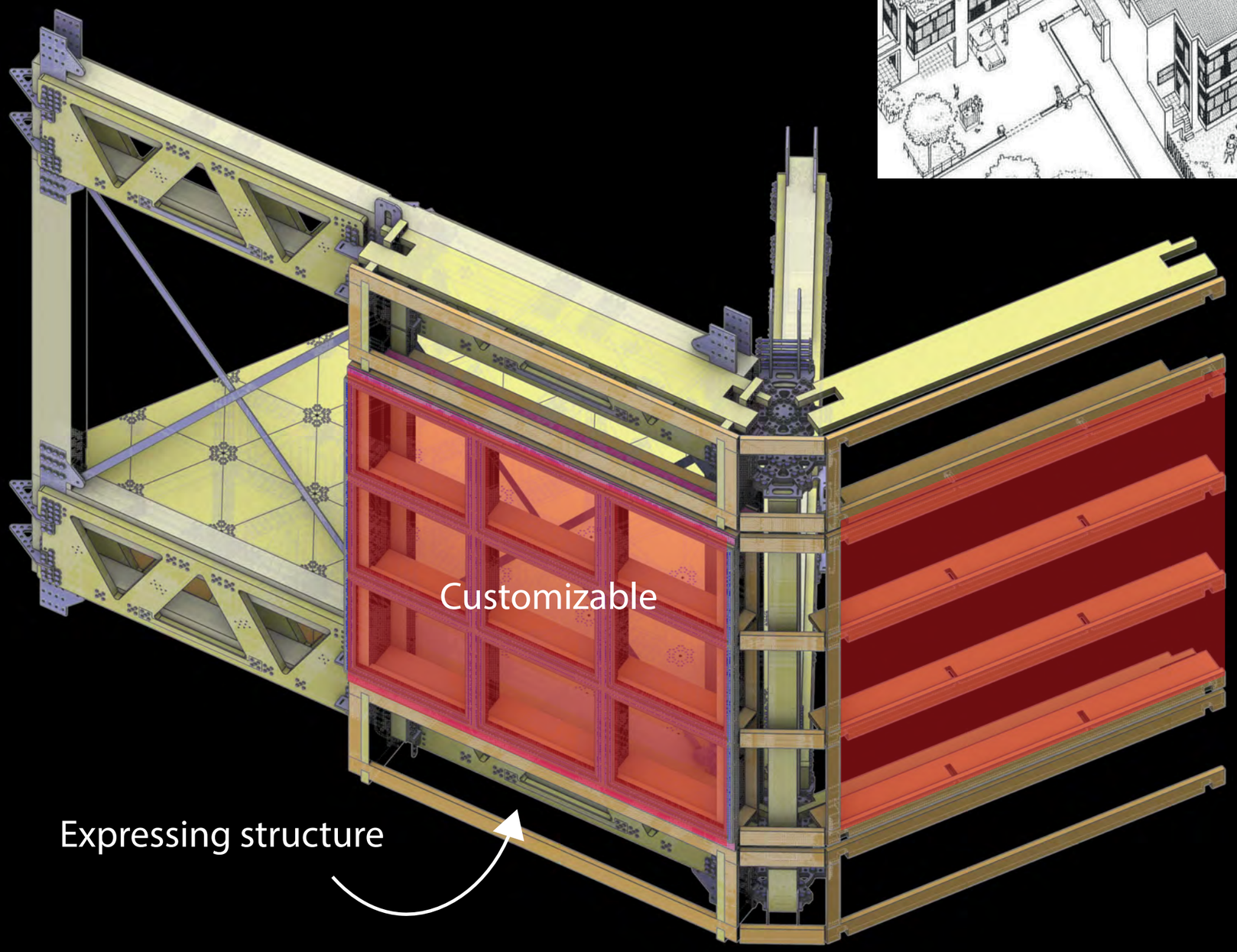




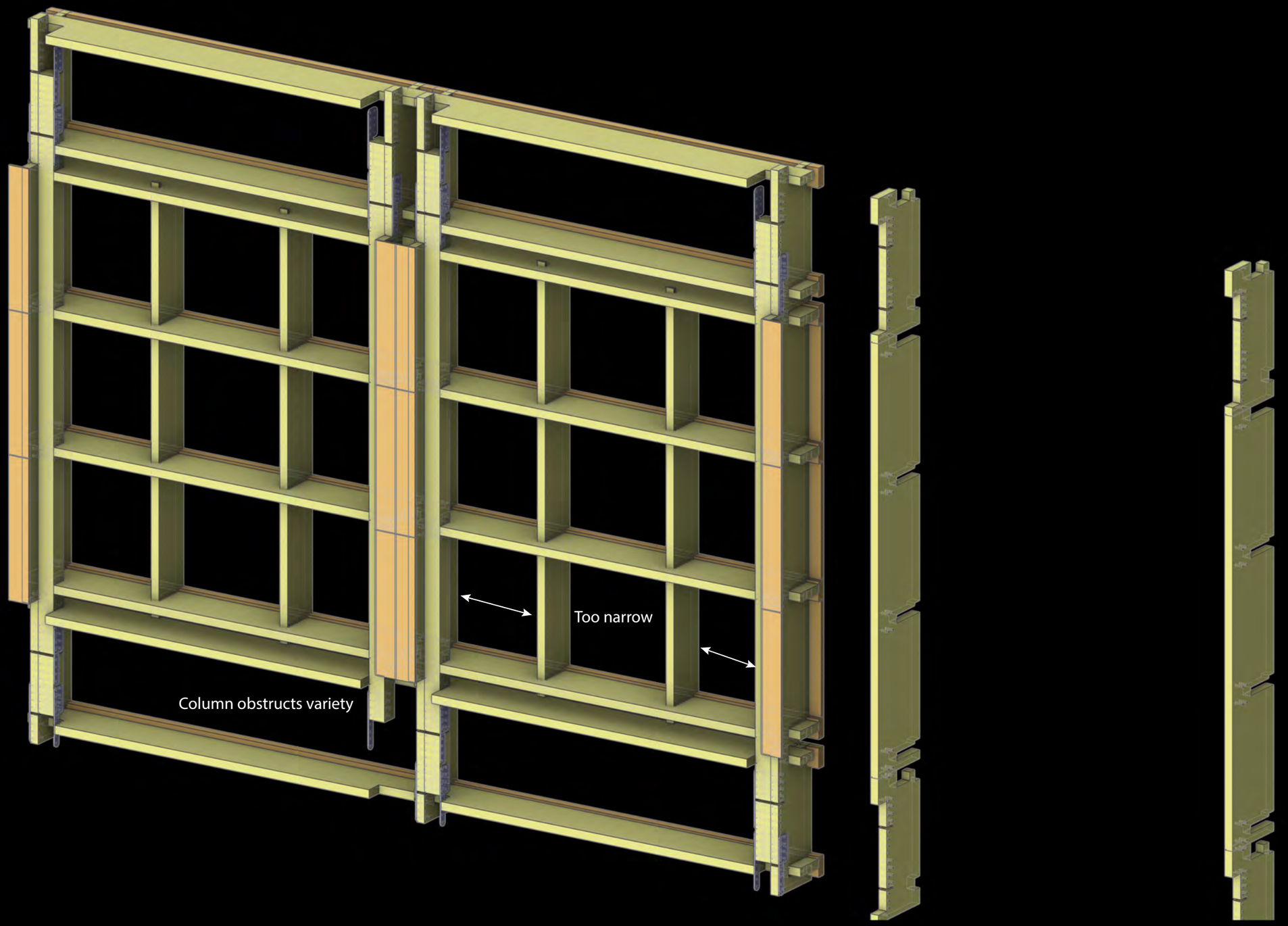
Refitable adaptability

Building skin

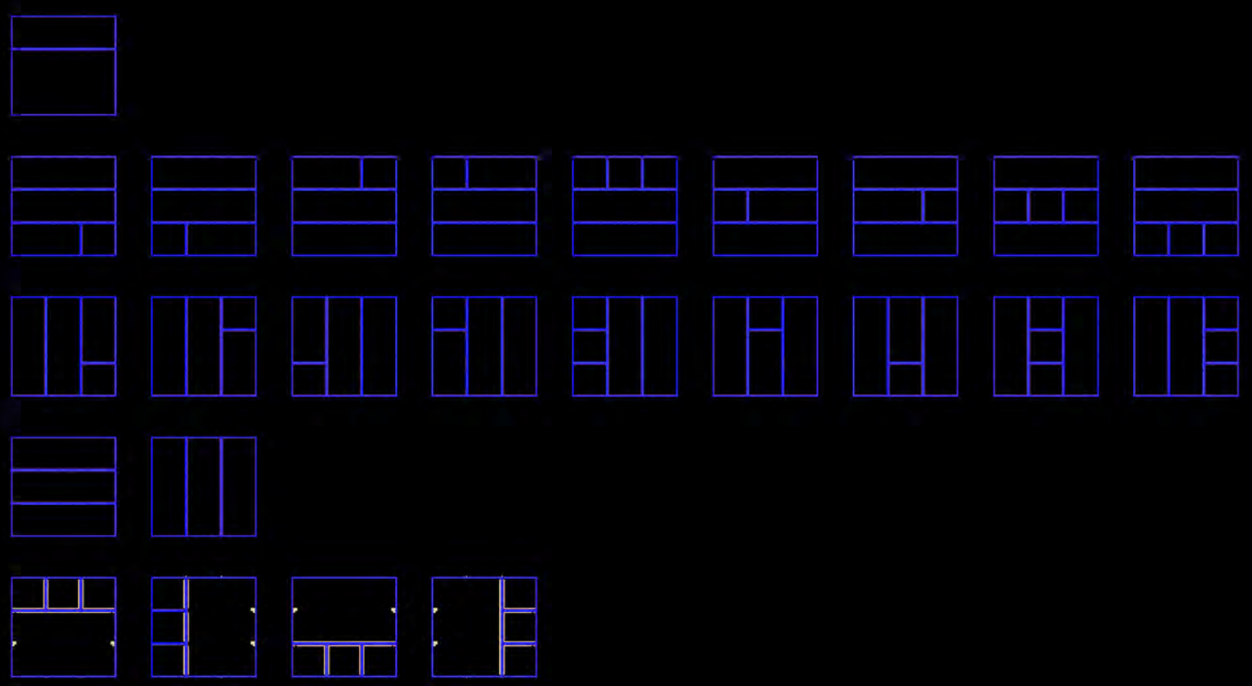


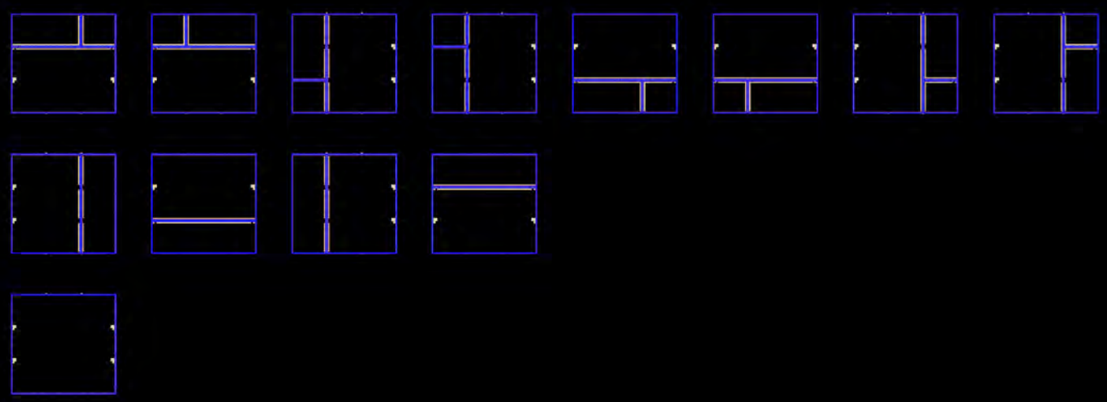


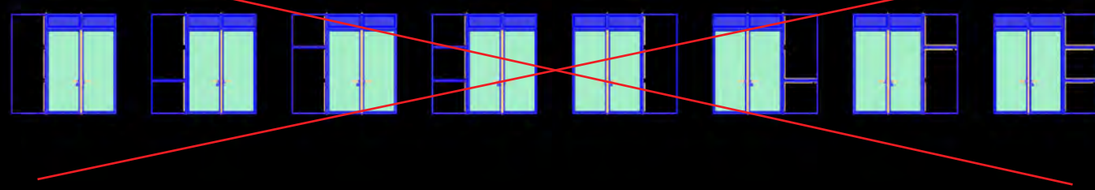
Building skin

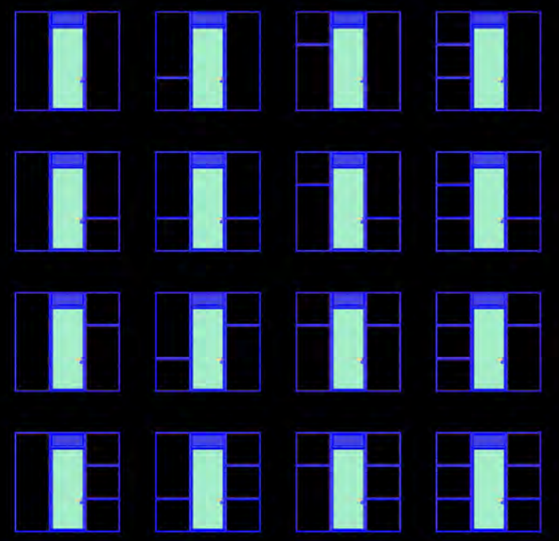


Building skin



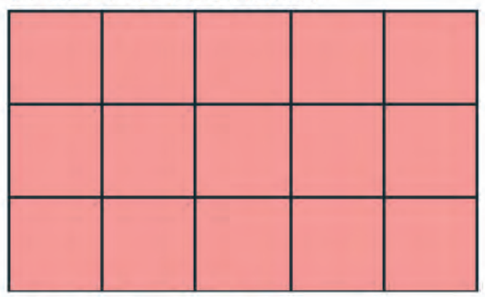






Building skin

1 Choose frame geometry



#00001

2 Choose materiality

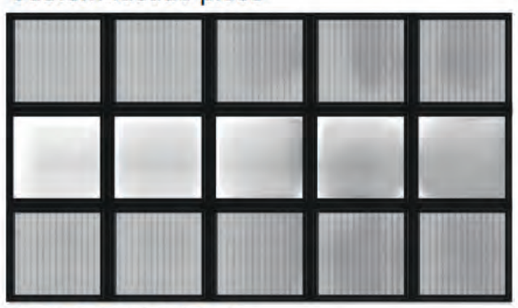
Polycarbonate

Glass

Polycarbonate

#00001

Custom facade piece

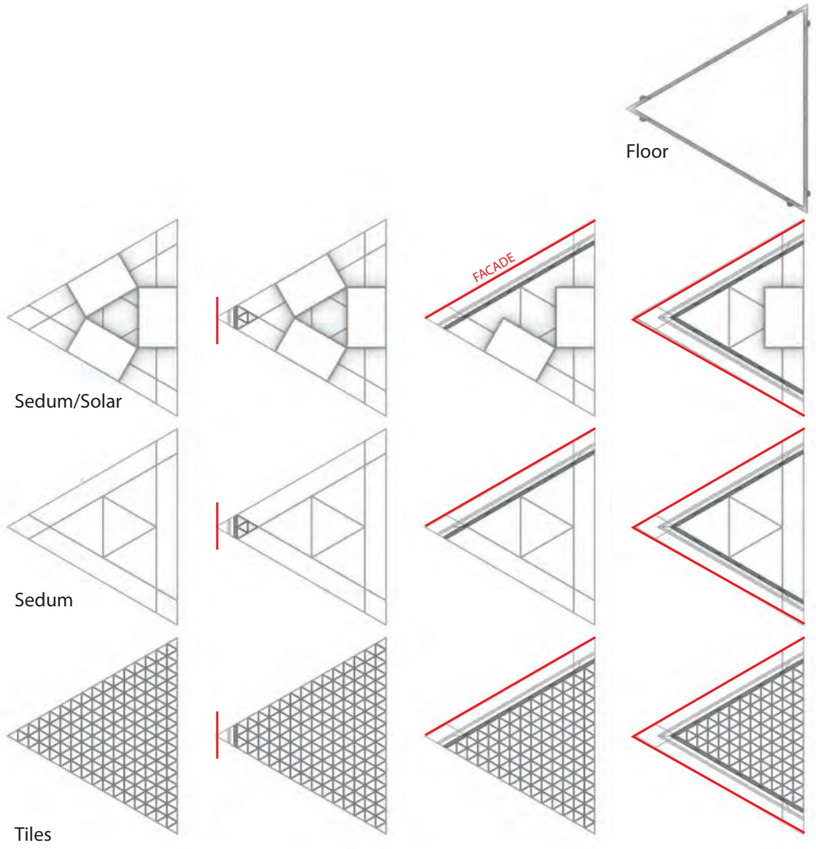


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Installation



#00001





#12682



#20471



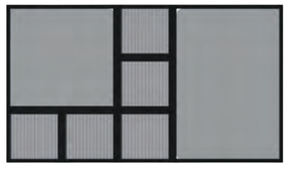
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#00001



#22491



#23578



#25086



#11835



#05784

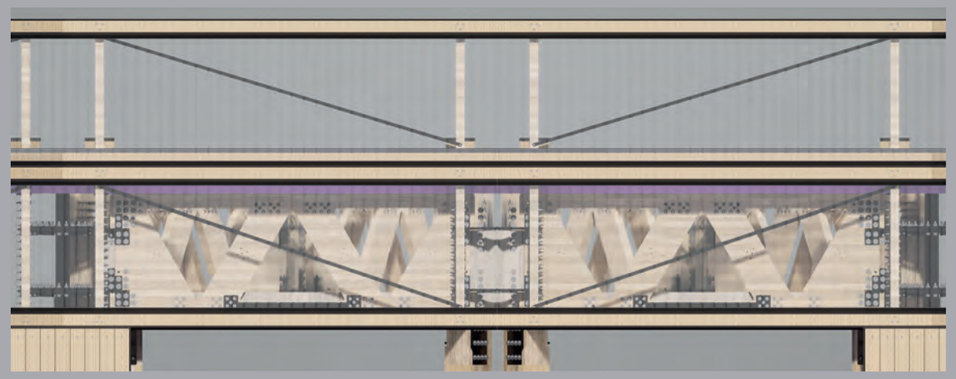


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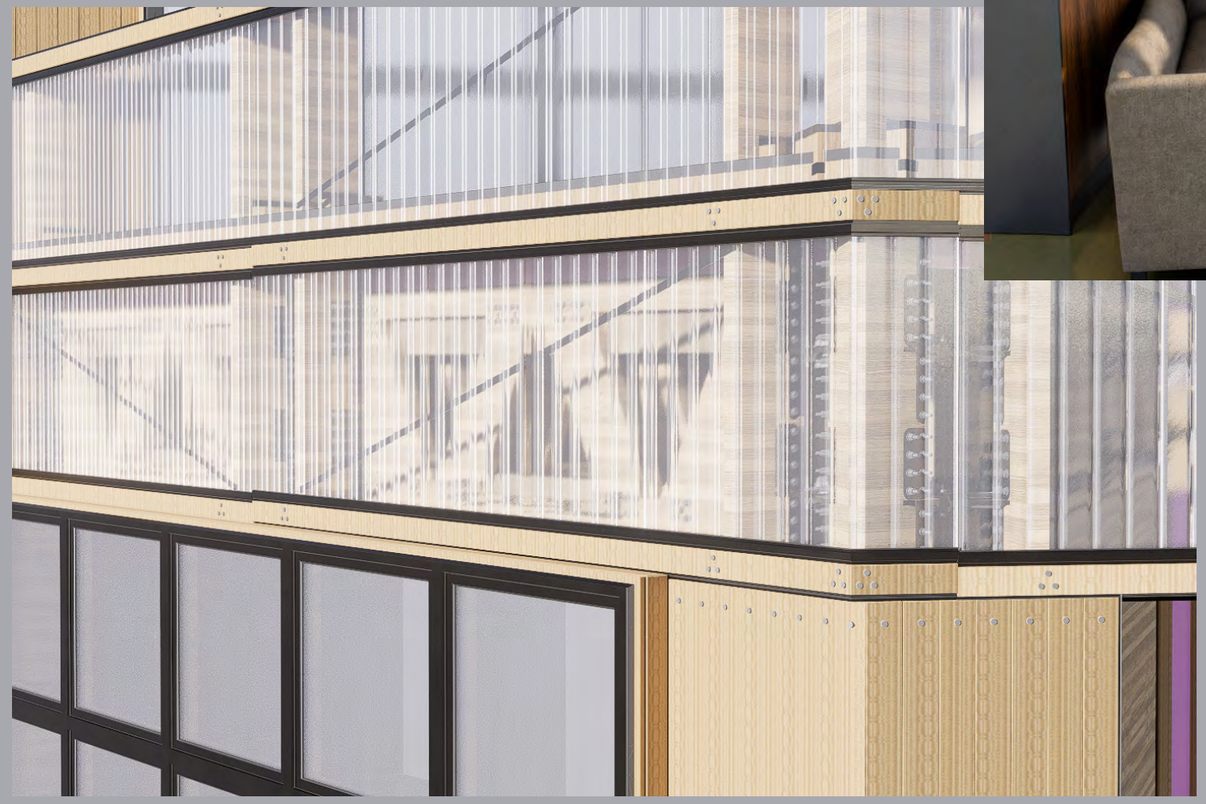


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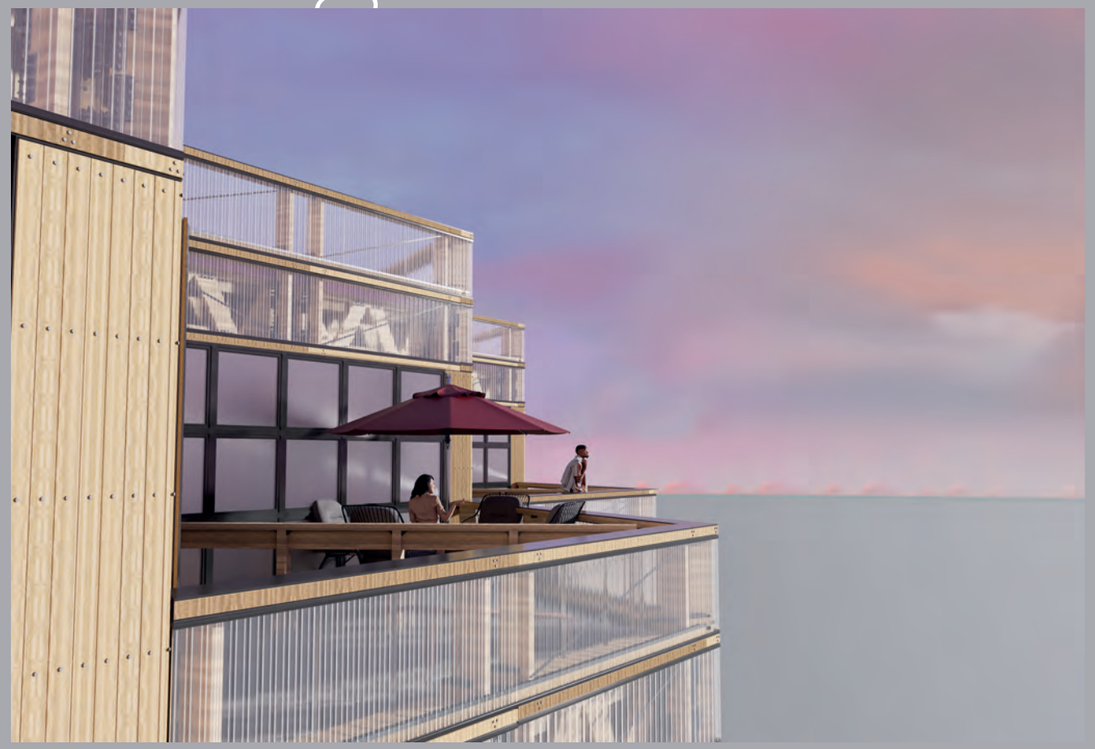
Building skin

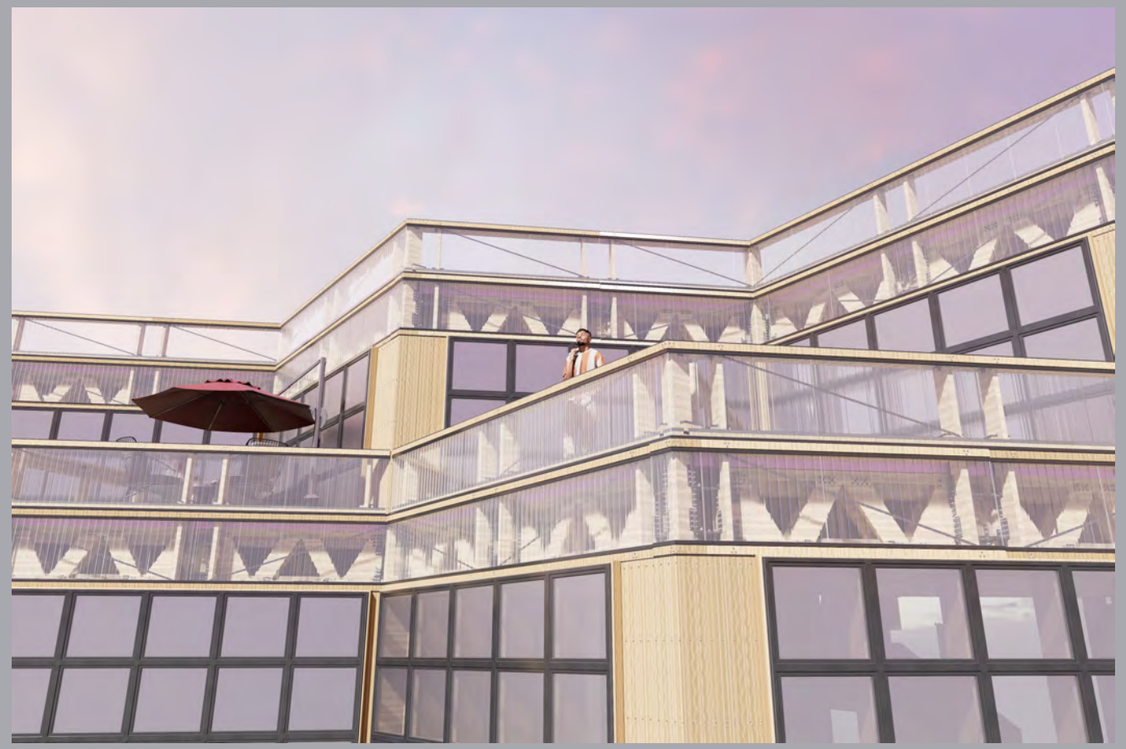


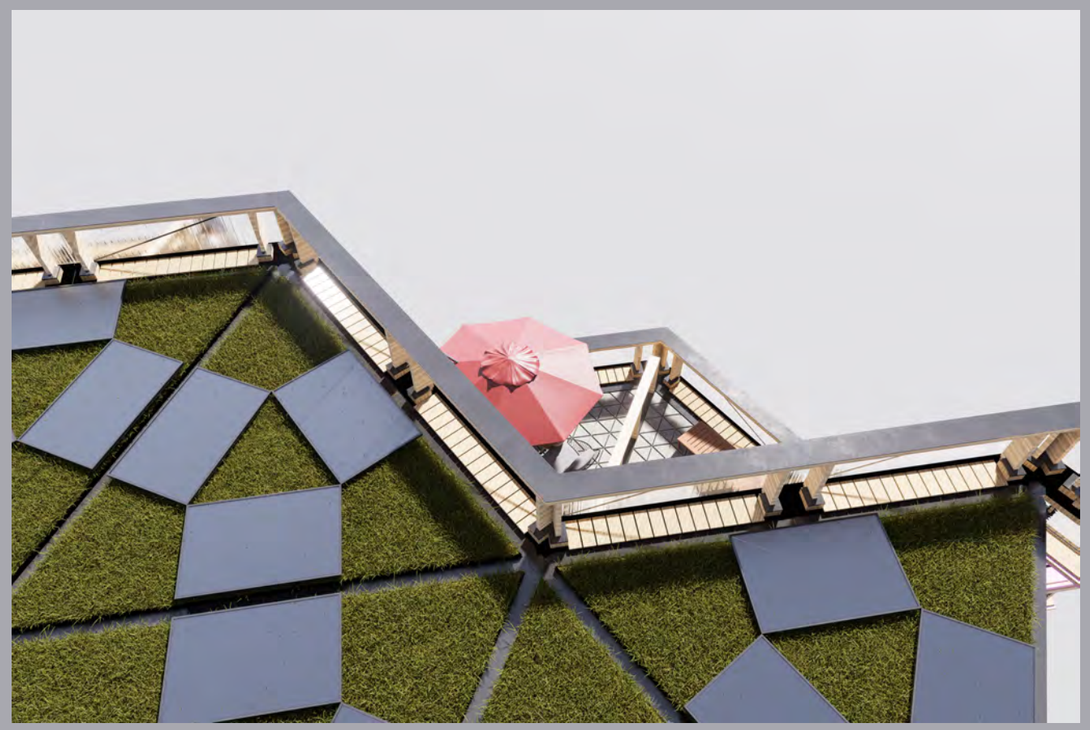




Building skin

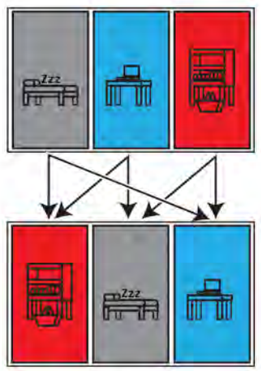




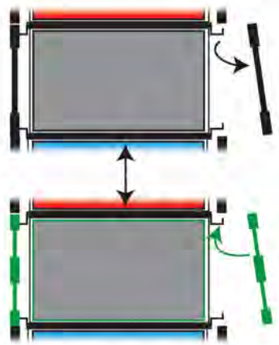




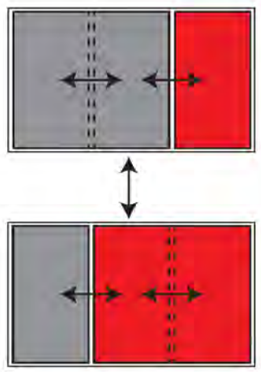
Developed Tool



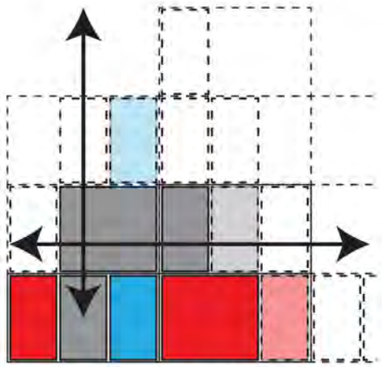
Convertible adaptability



Refitable adaptability



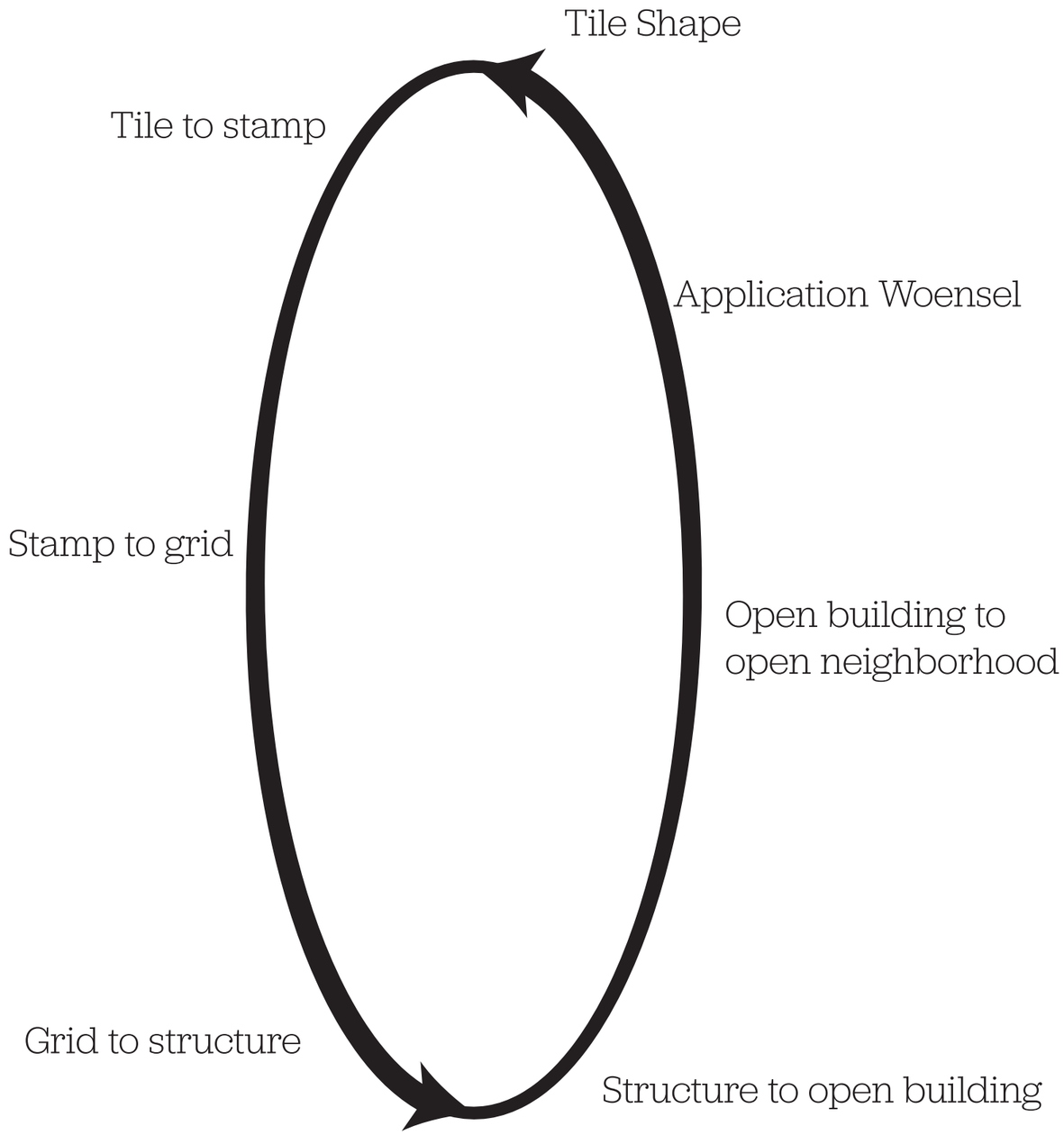
Adjustable adaptability



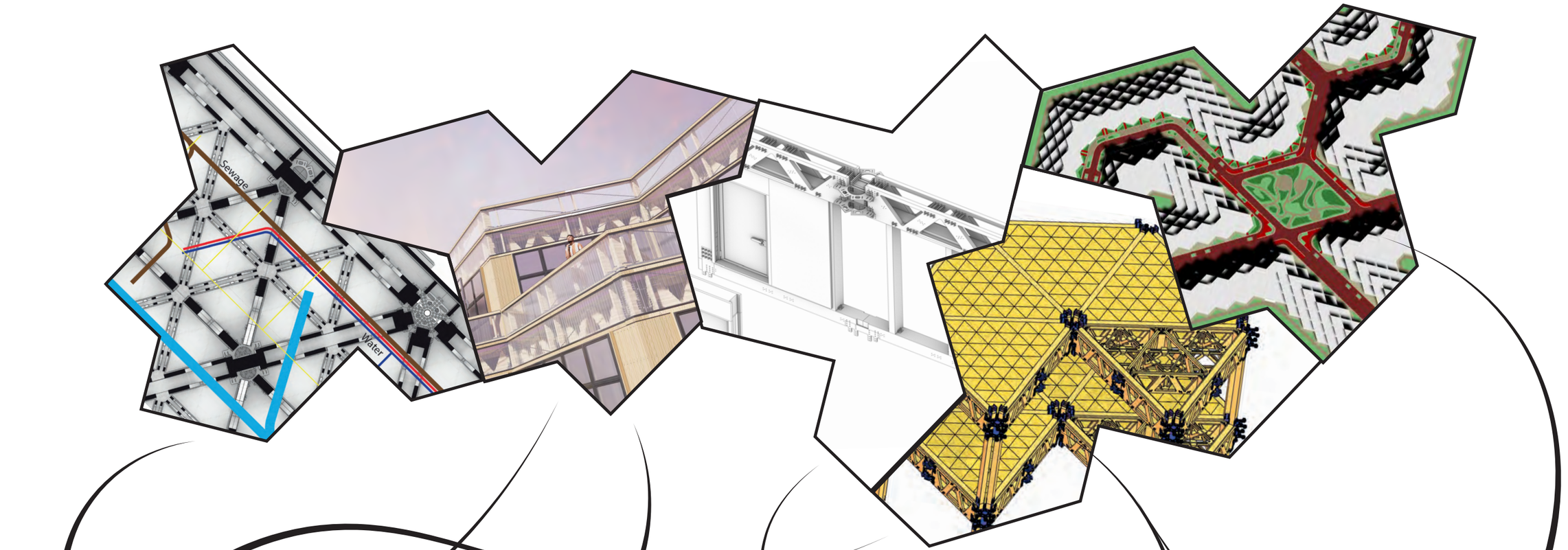
Scalable adaptability

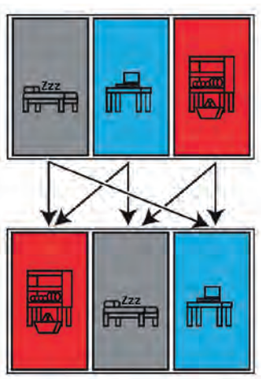
Project goal:
Create a space filling structure, providing a multifunctional role as the town center of Woensel, that responds to changes in society, through future adjustments in: size, division, function and appearance.

Developed tool

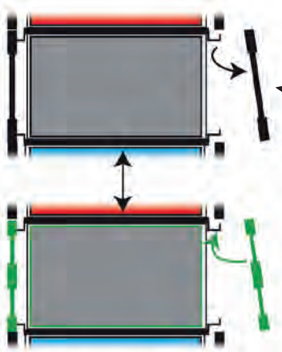


Developed tool

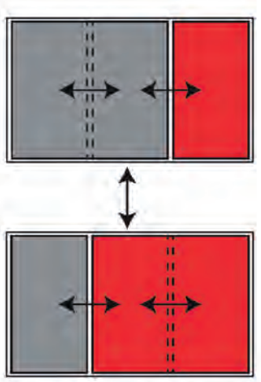




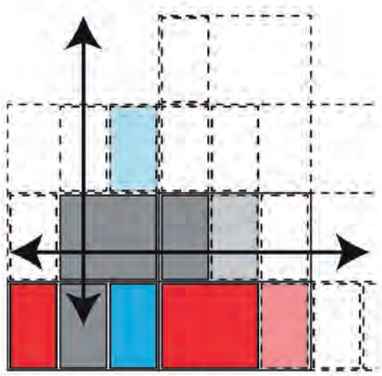
Convertible adaptability



Refitable adaptability



Adjustable adaptability

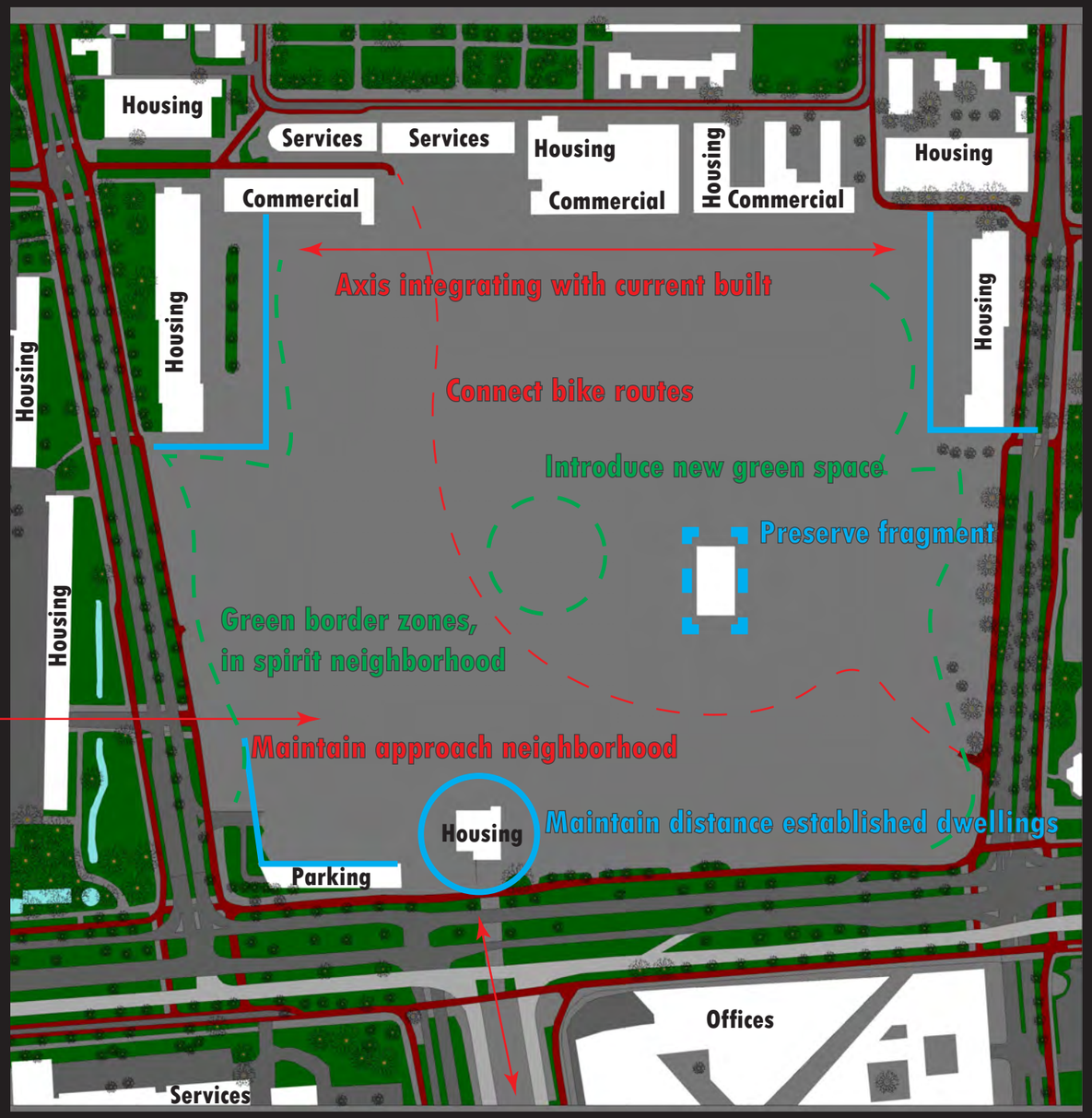


Scalable adaptability

Application Woensel



Establishing site boundary.



Add points of integration and care.

Application Woensel



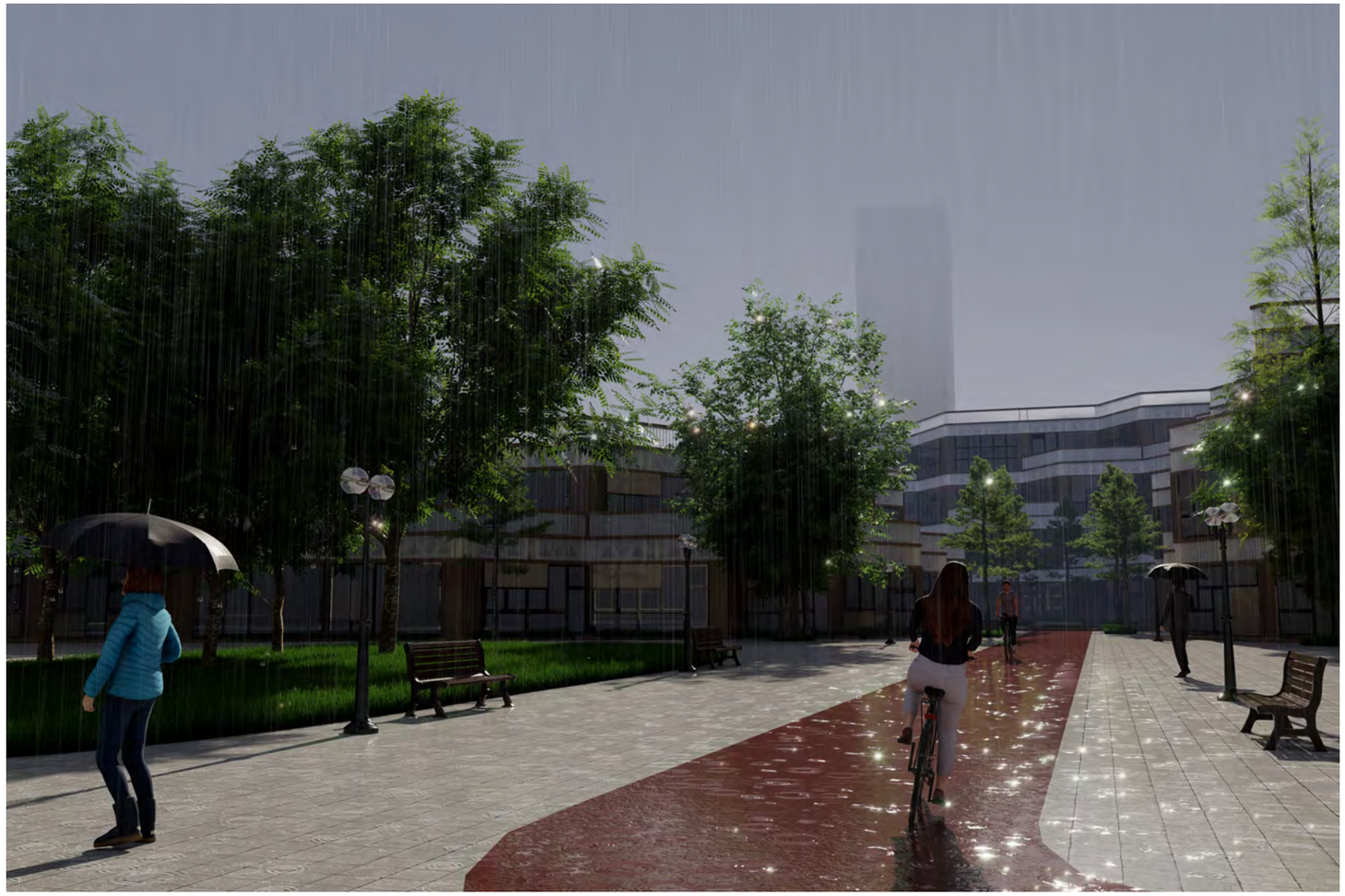
Generate structure, and include function fitting street profiles.



Generate urban volumes and create green boundary park.



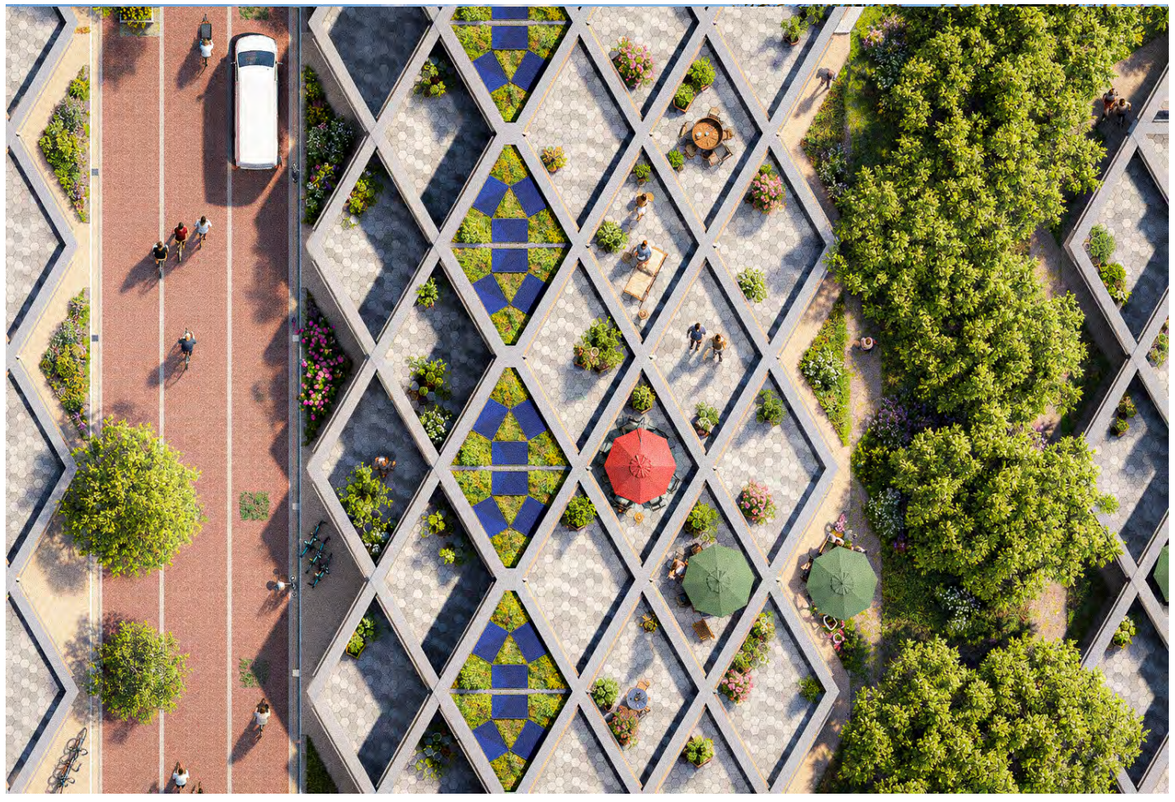
130.000 m2



















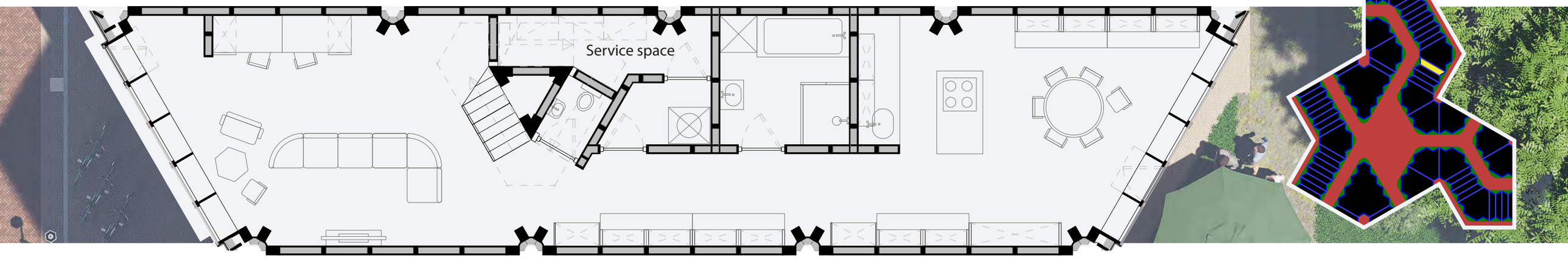


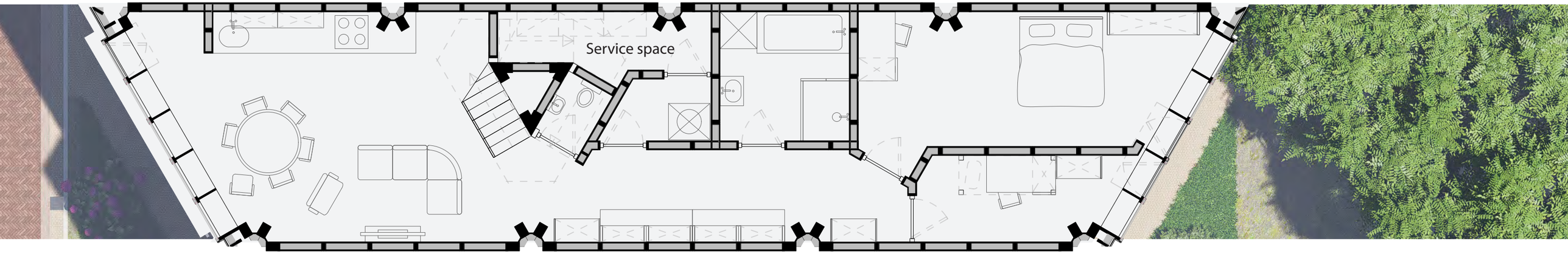


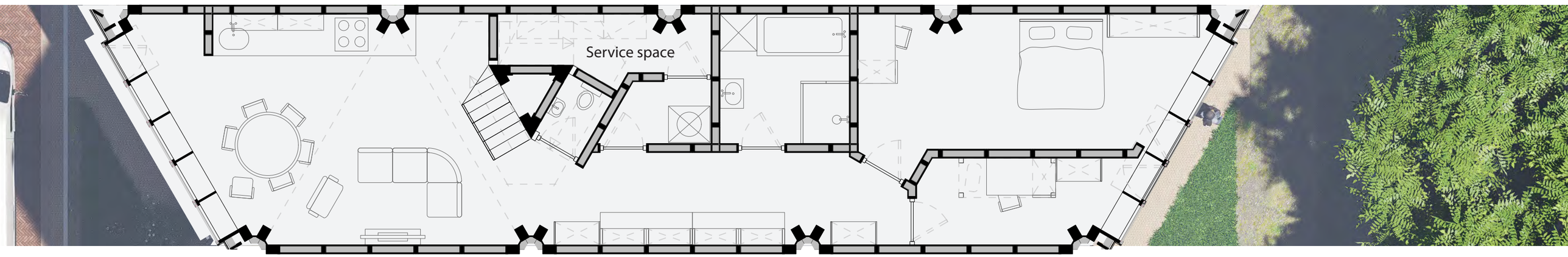






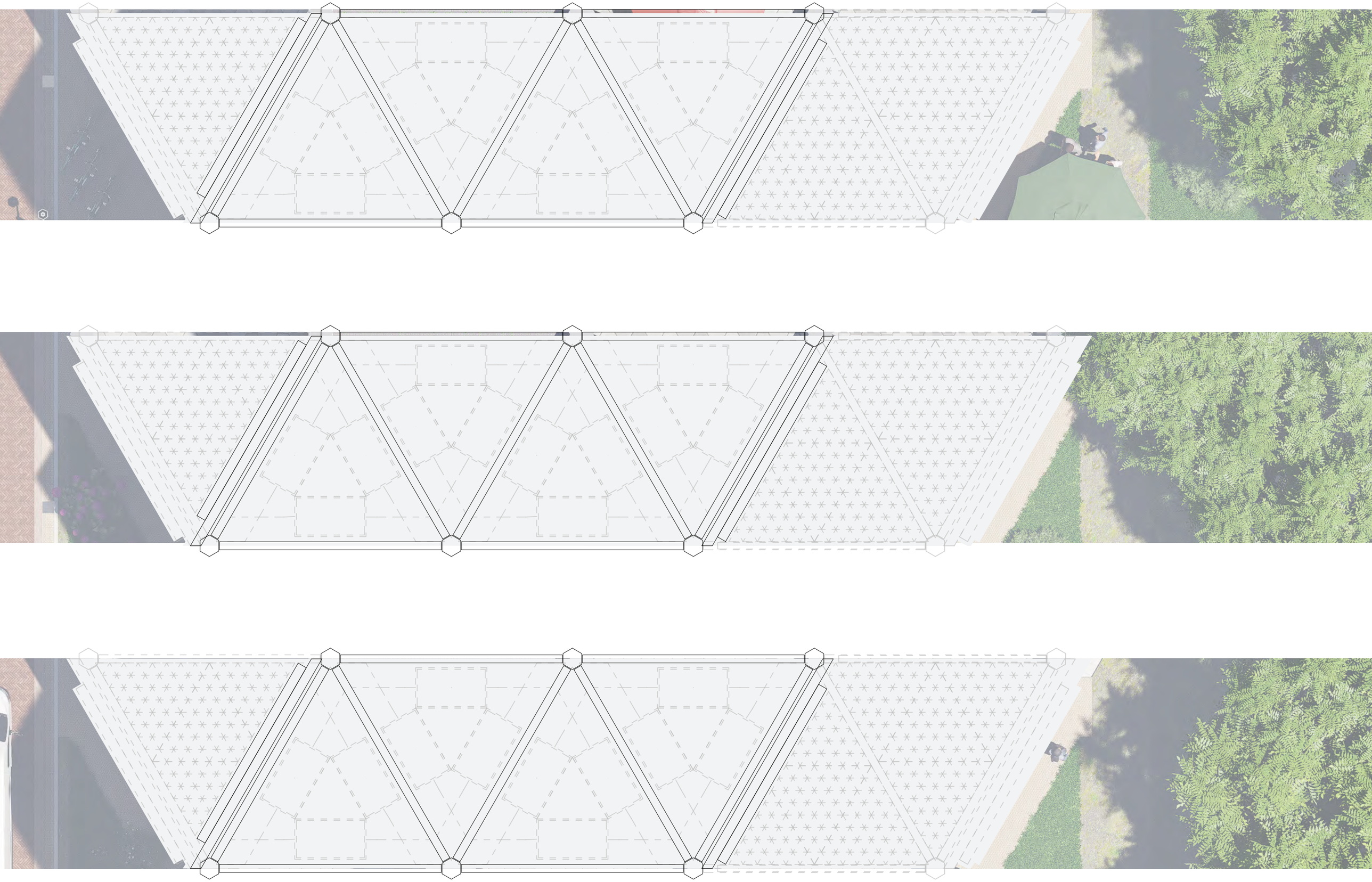




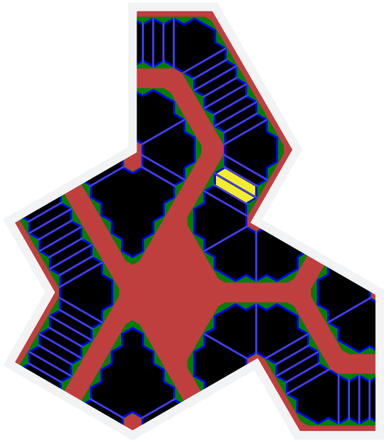


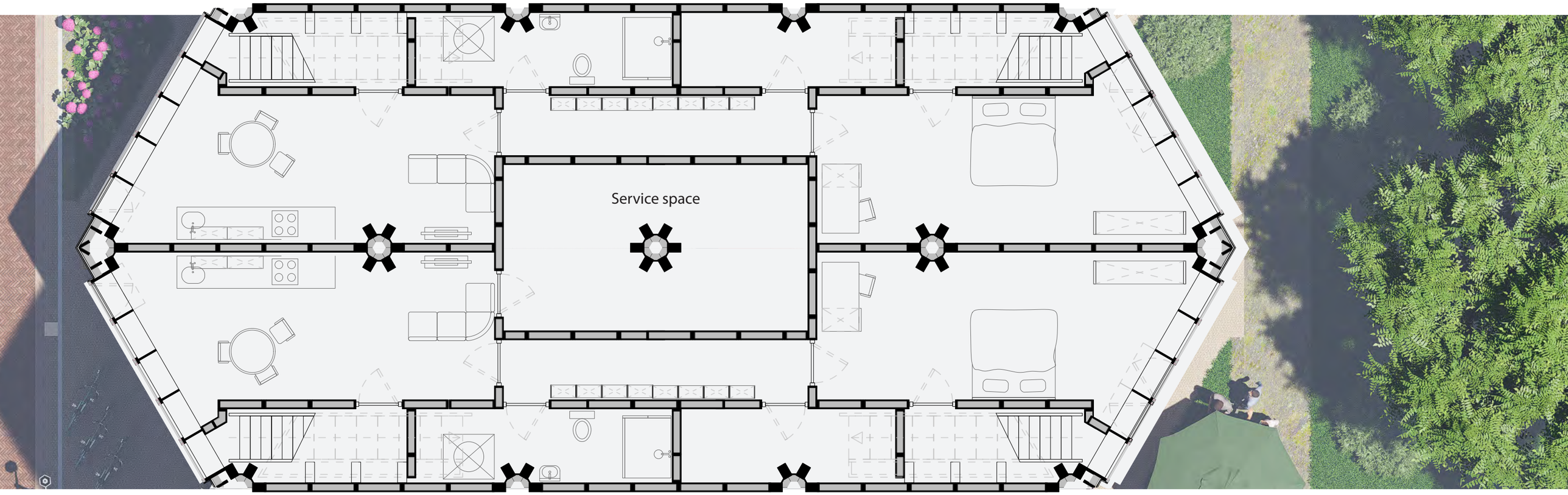
Floorplan: strip, terraced house, version 1,2,3 ground floor, 1:100

Floorplan: strip, terraced house, version 1,2,3 first floor, 1:100

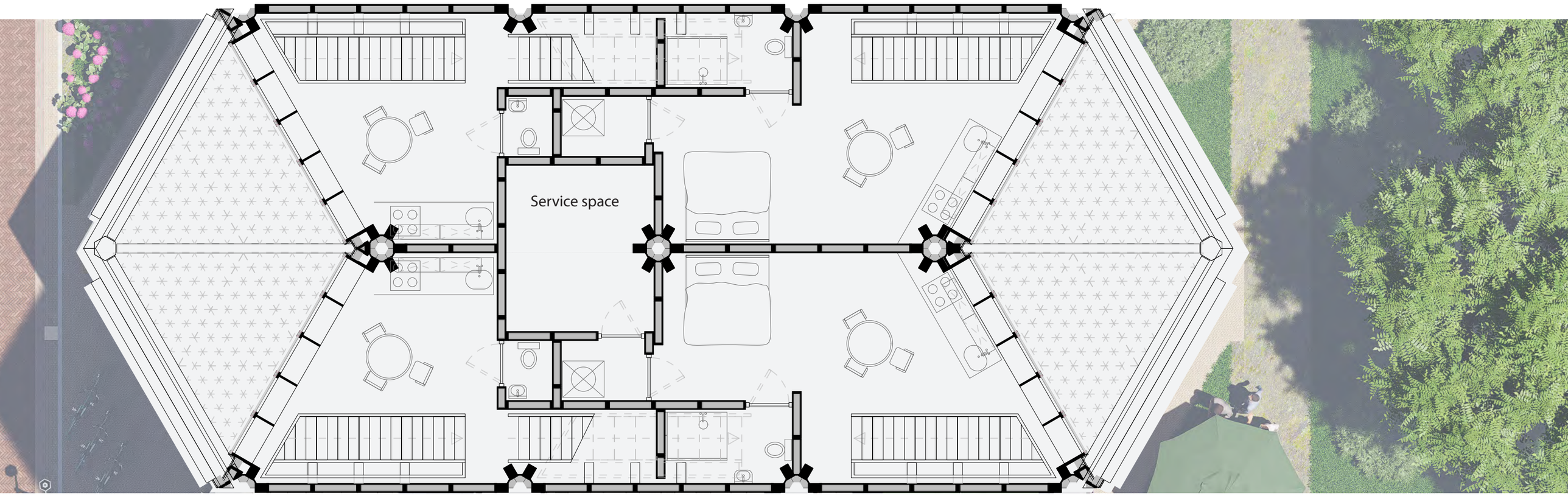


Floorplan: strip, terraced house, version 1,2,3 roof, 1:100

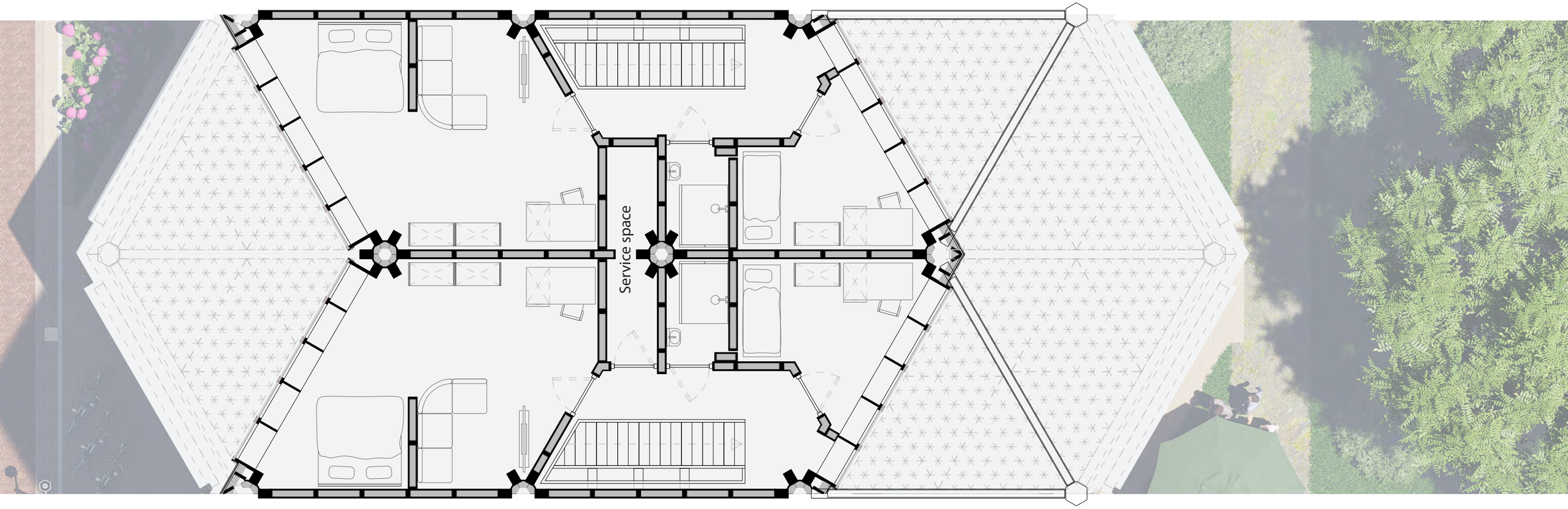




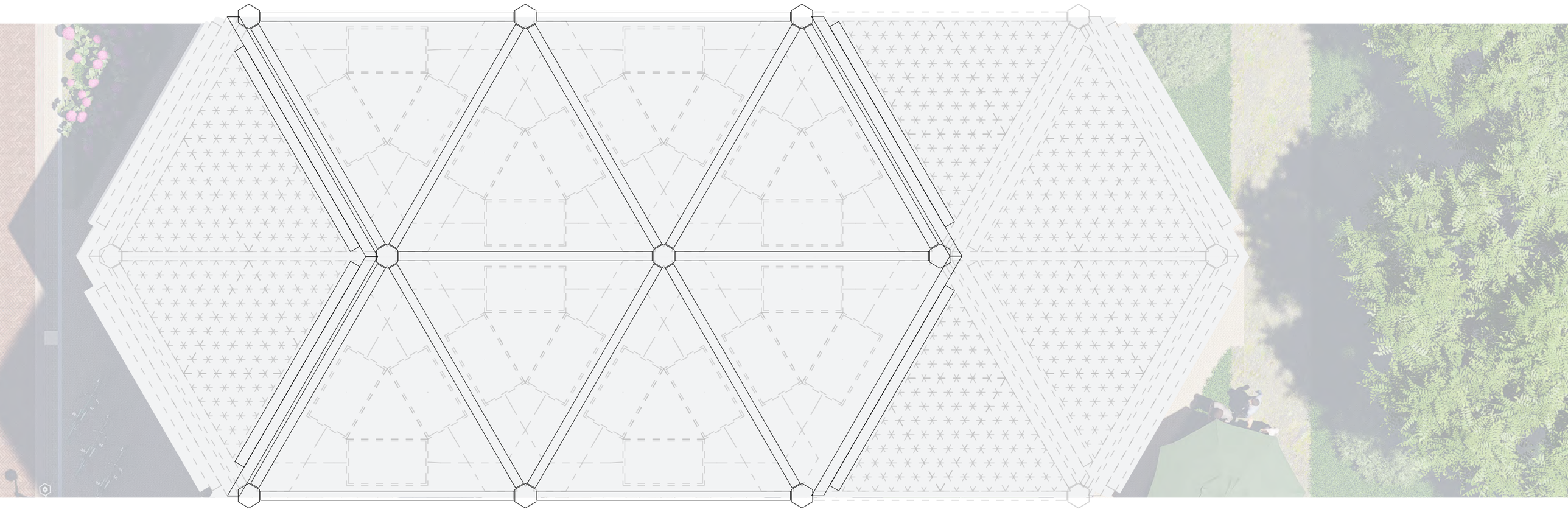
Floorplan: strip, porch house (6 units), ground floor 1:100



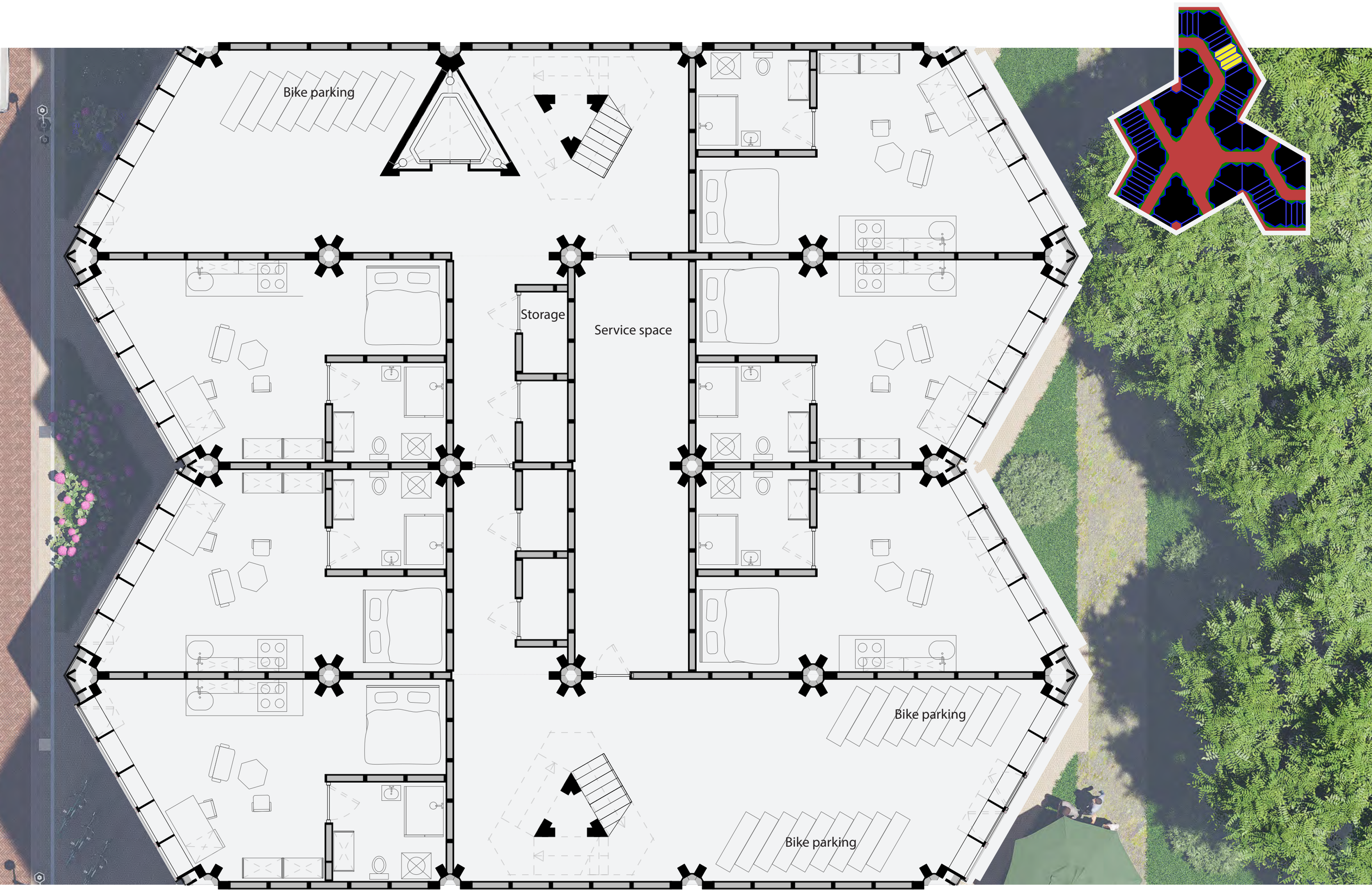
Floorplan: strip, porch house (6 units), first floor 1:100



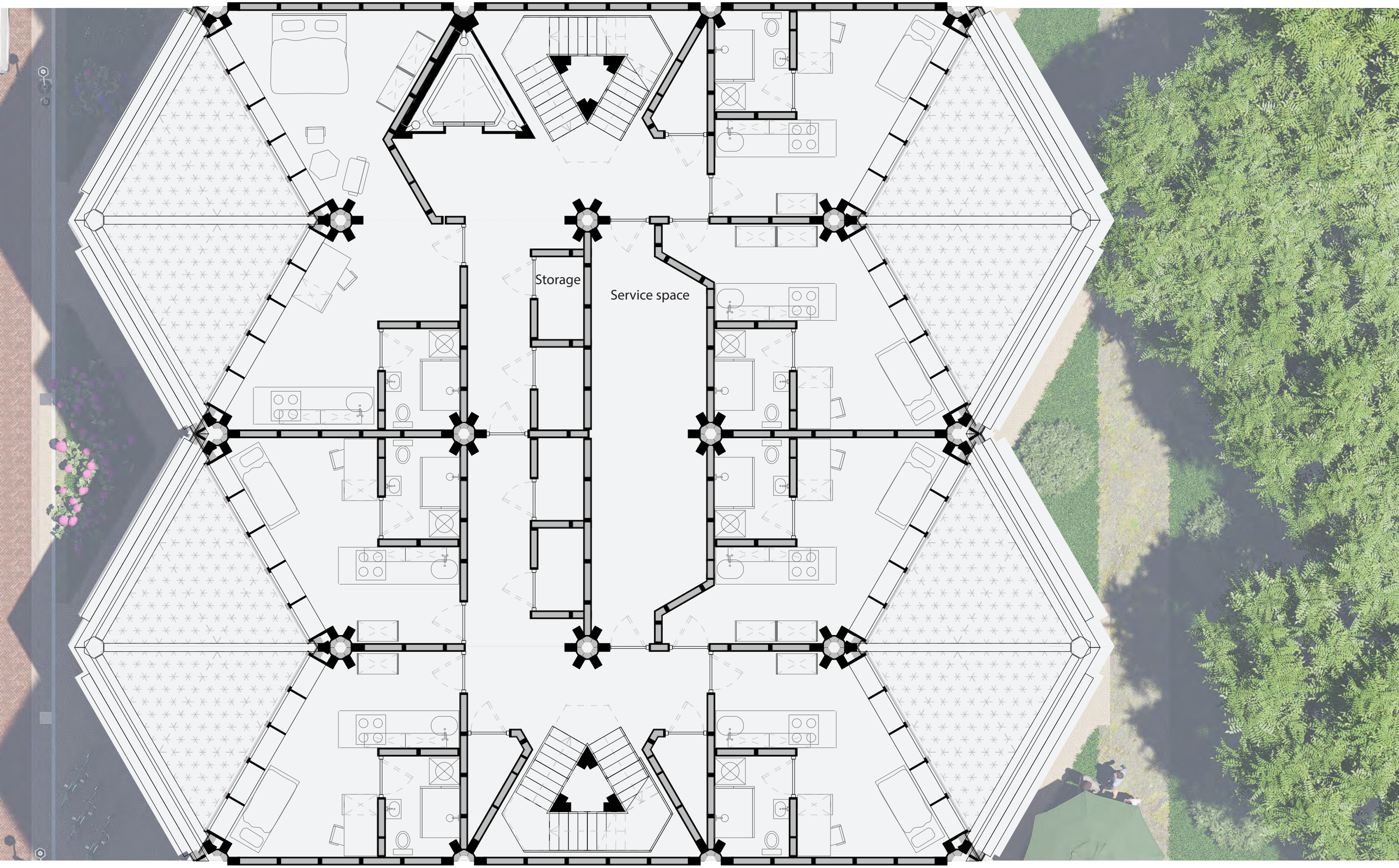
Floorplan: strip, porch house (6 units), second floor 1:100



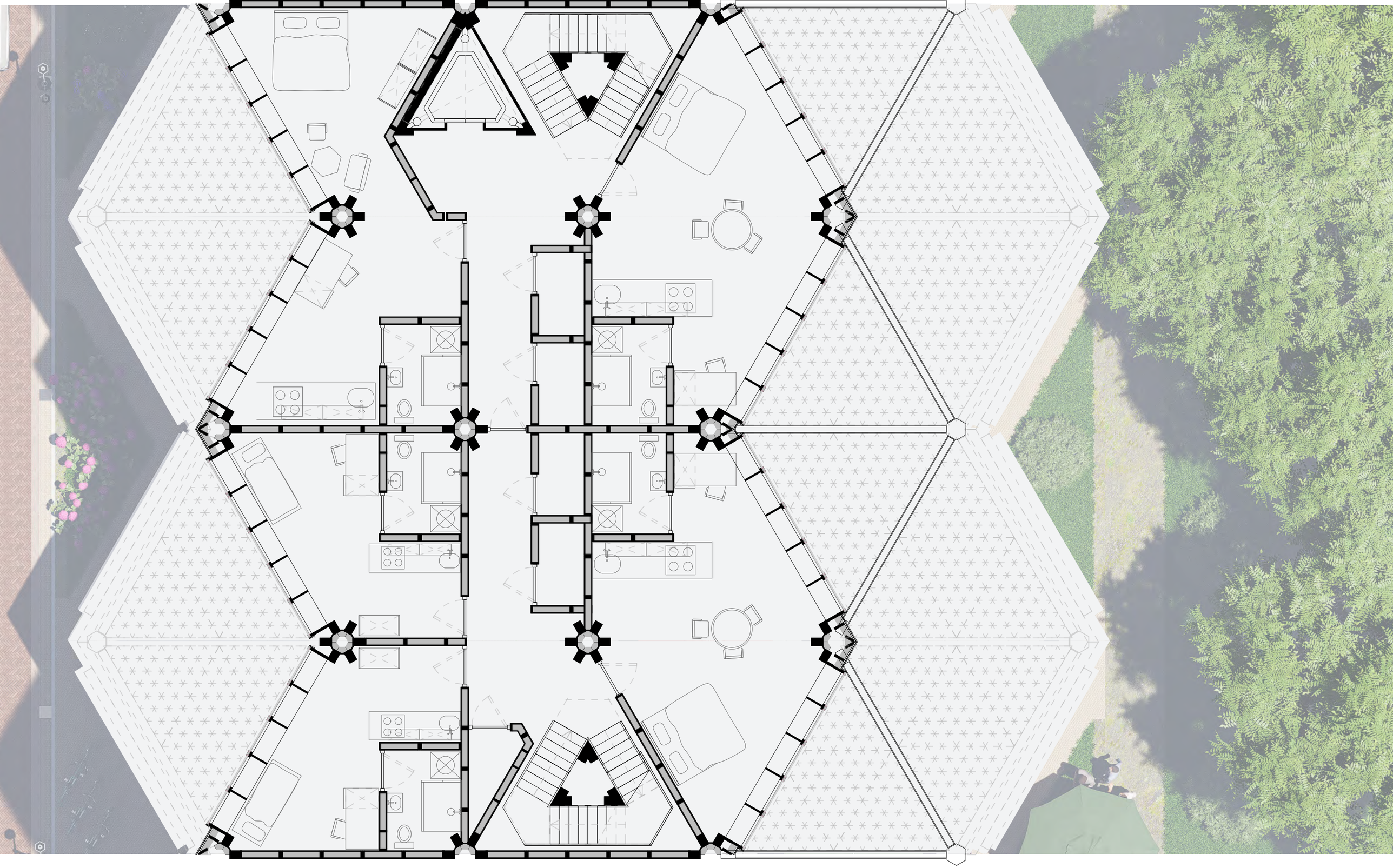
Floorplan: strip, porch house, roof, 1:100



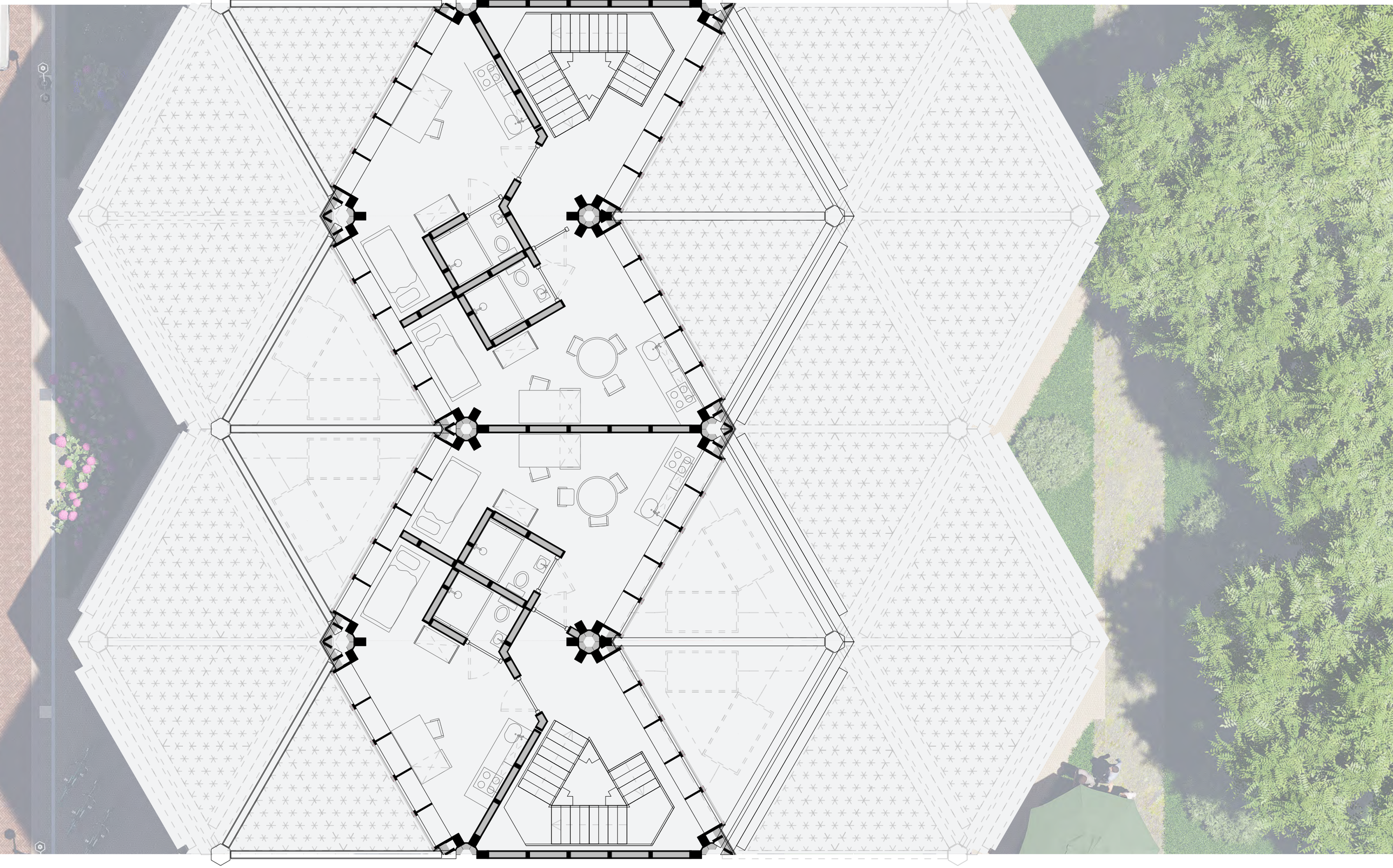
Floorplan: strip, studios (18 units) , ground floor 1:100



Floorplan: strip, studios (18 units), first floor 1:100



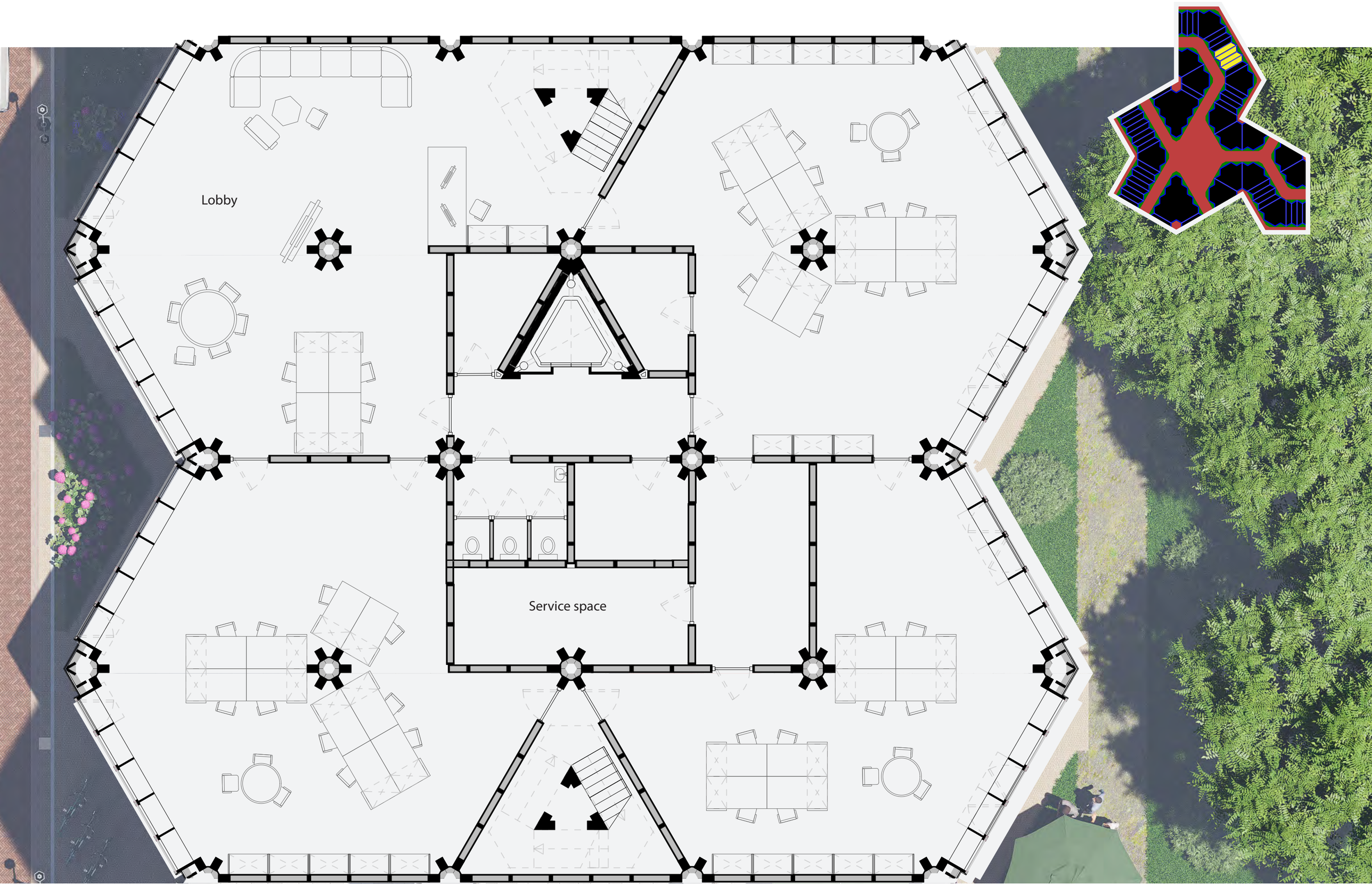
Floorplan: strip, studios (18 units), second floor 1:100



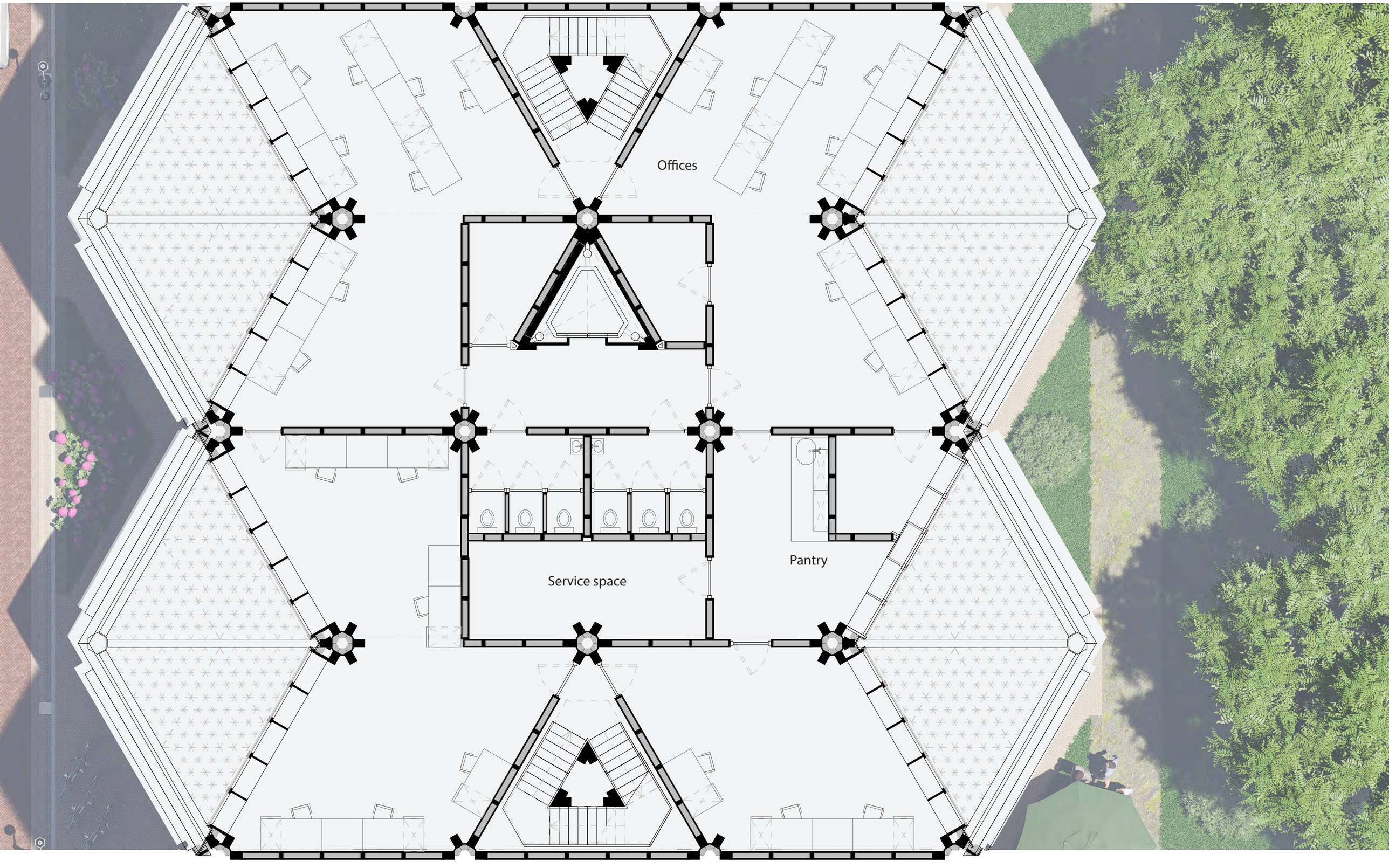
Floorplan: strip, studios (18 units), third floor 1:100



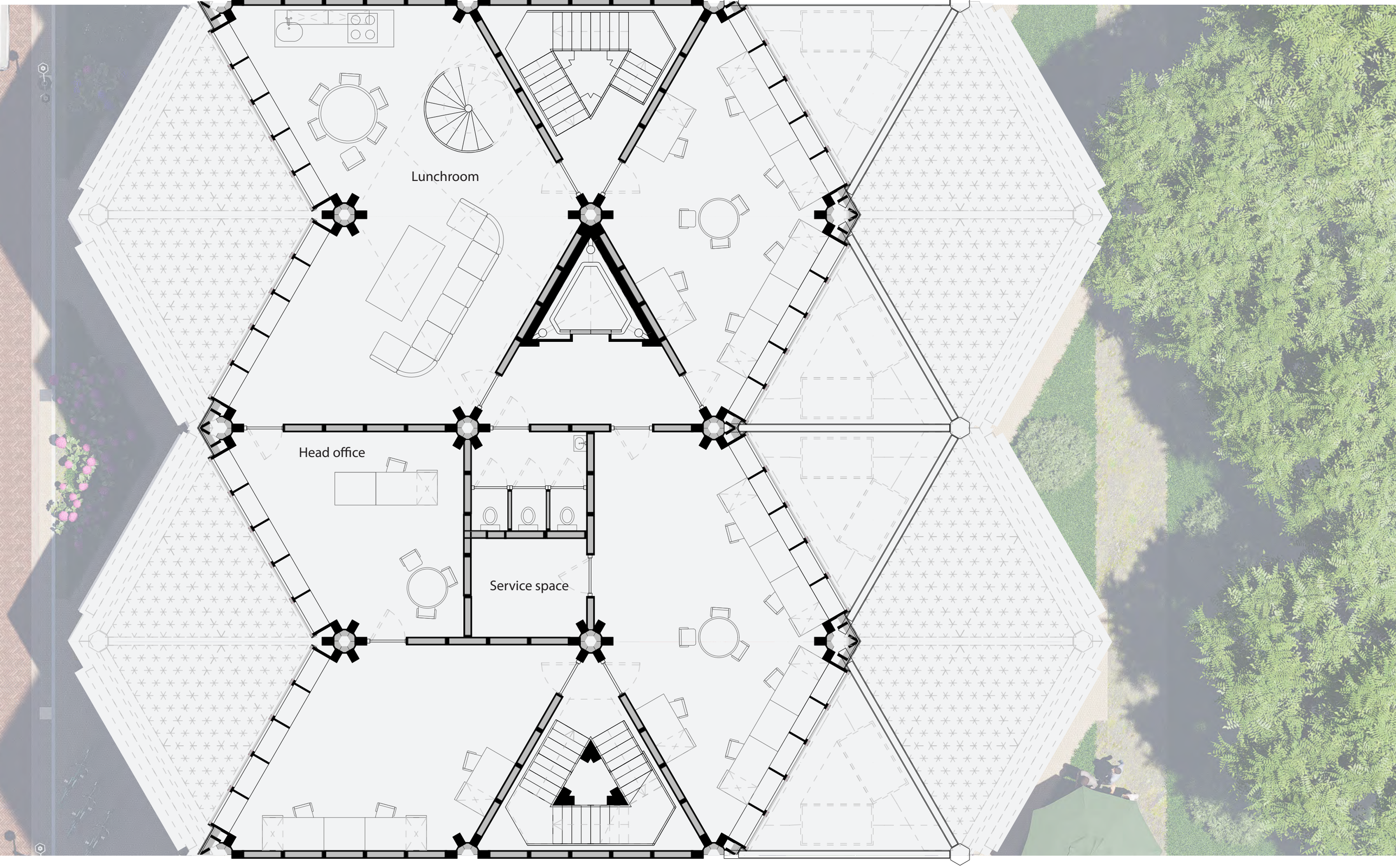
Floorplan: strip, studios (18 units), roof, 1:100



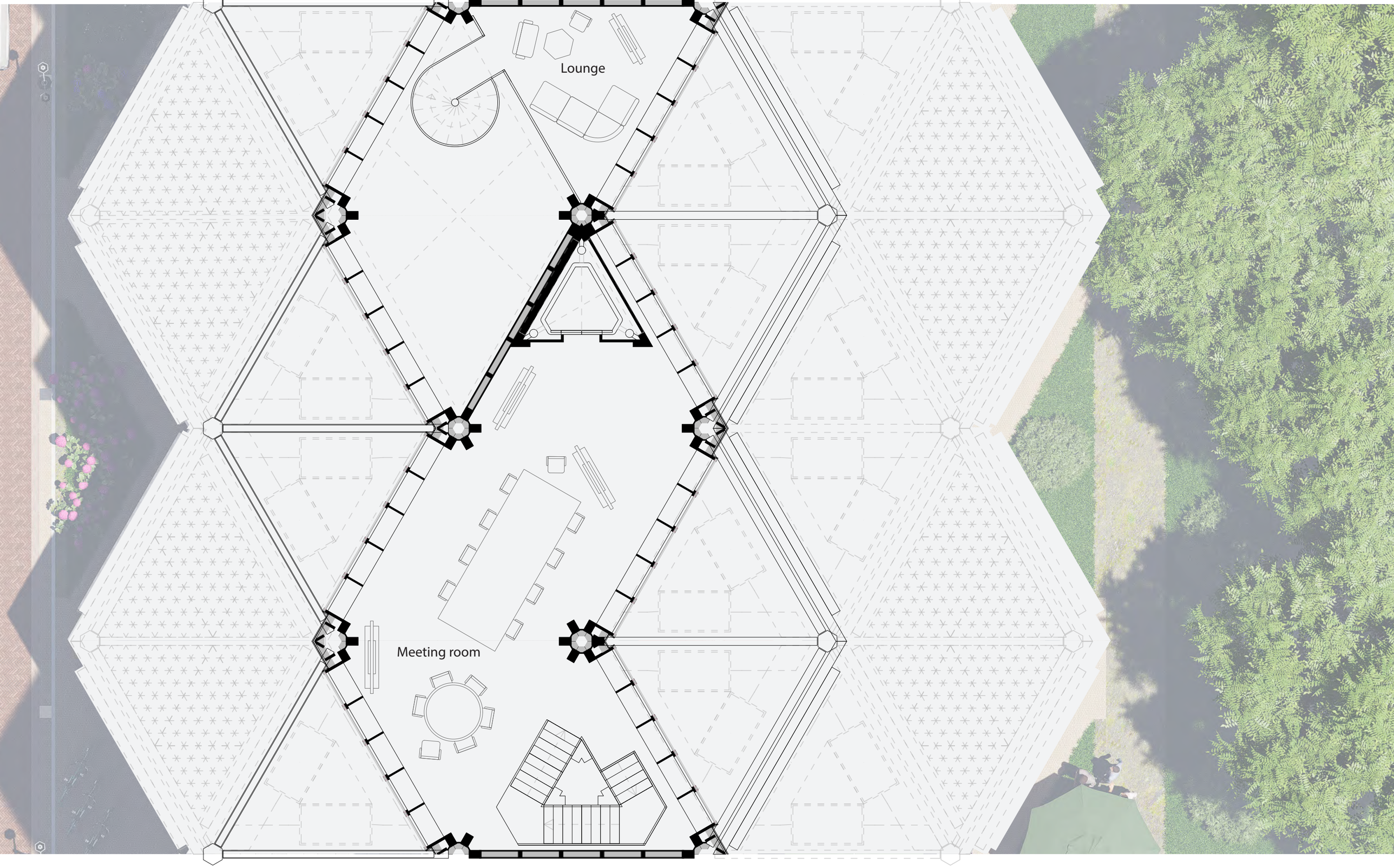
Floorplan: strip, office, ground floor 1:100



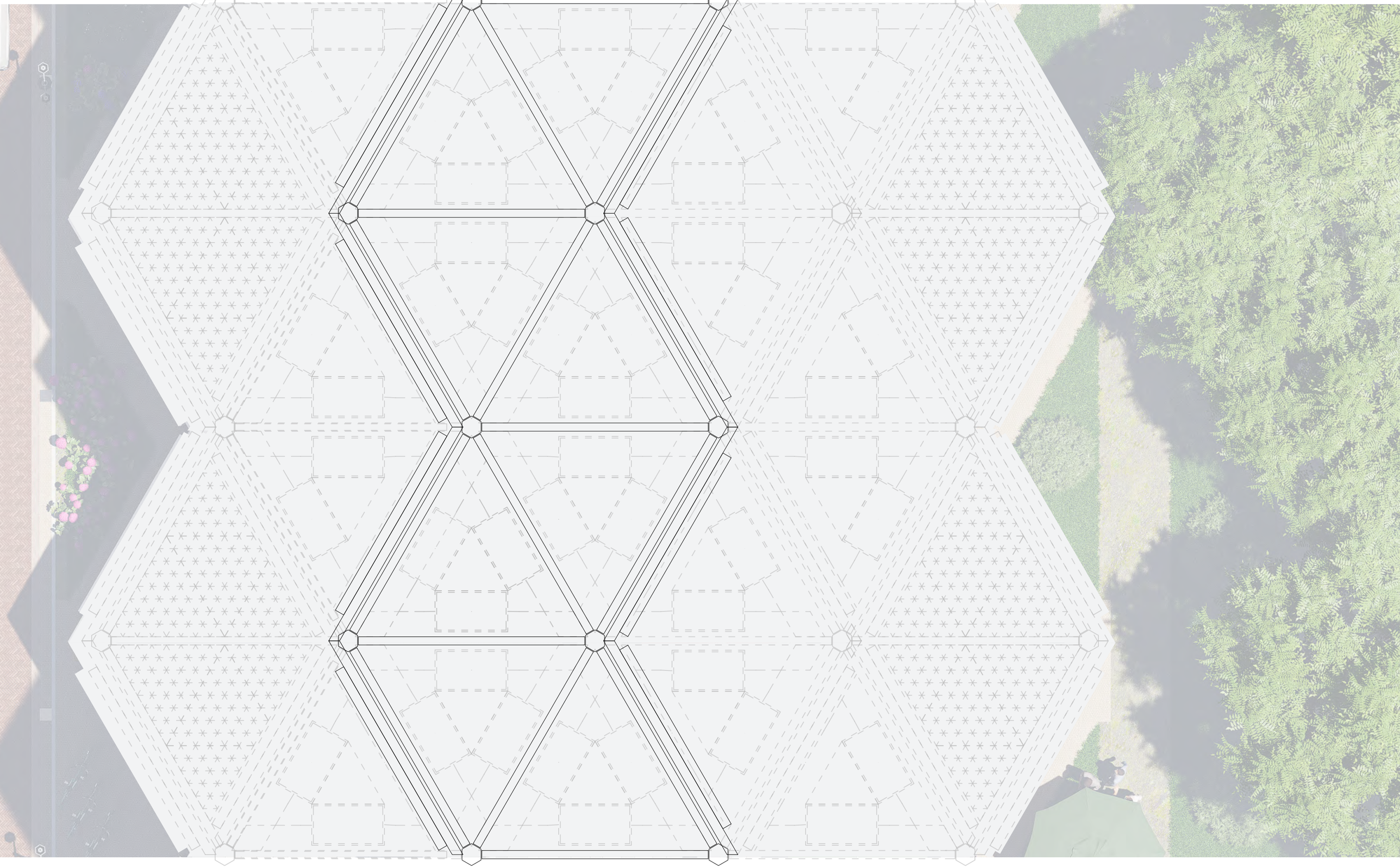
Floorplan: strip, office, first floor 1:100



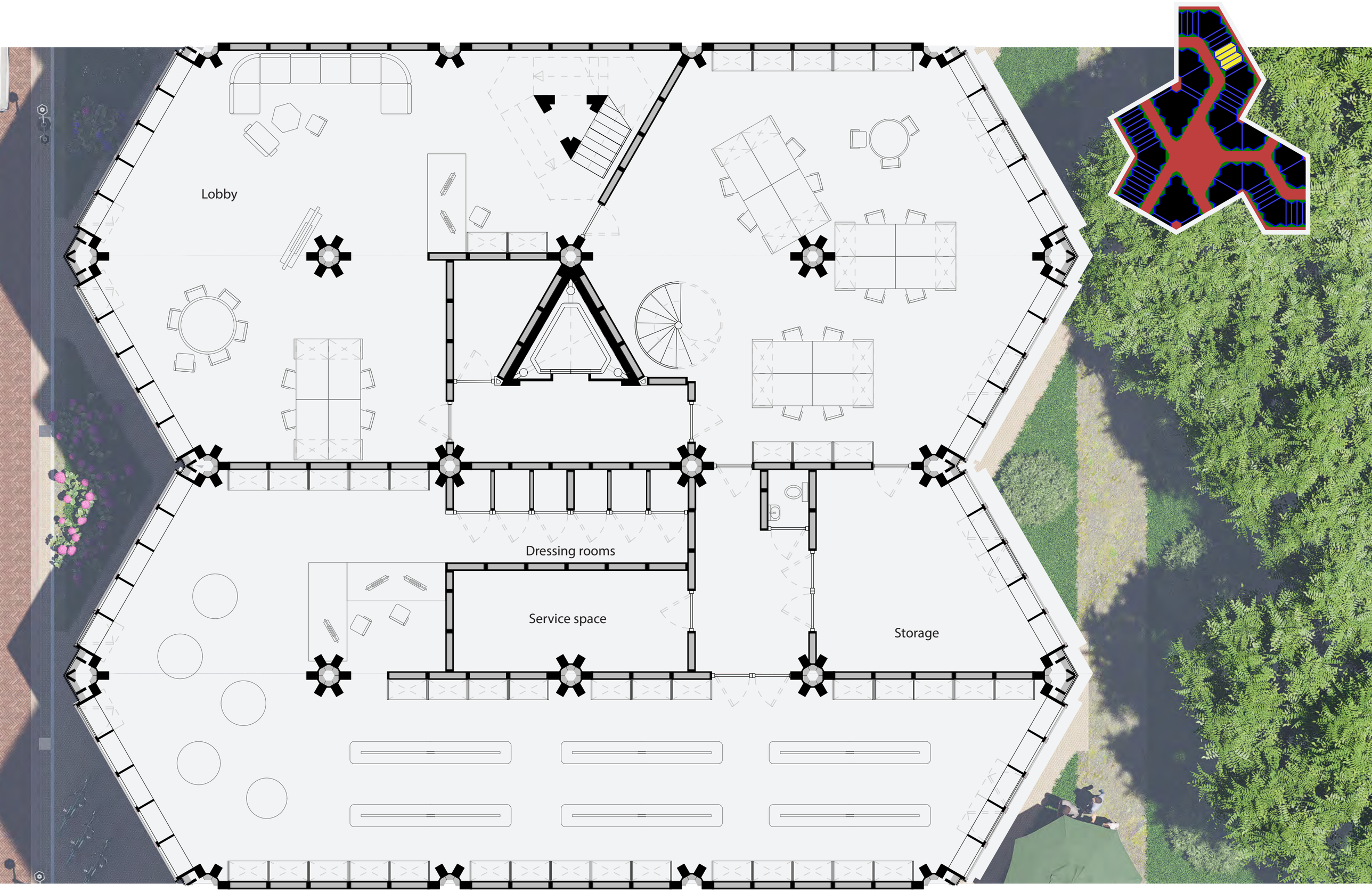
Floorplan: strip, office, second floor 1:100



Floorplan: strip, office, third floor 1:100

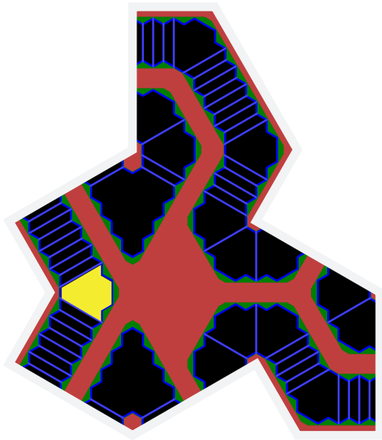


Floorplan: strip, office, roof, 1:100



Floorplan: strip, variation: office + shop, ground floor 1:100

Floorplan: bent, shops + starter homes (15 units) ground floor
1:125



Counter

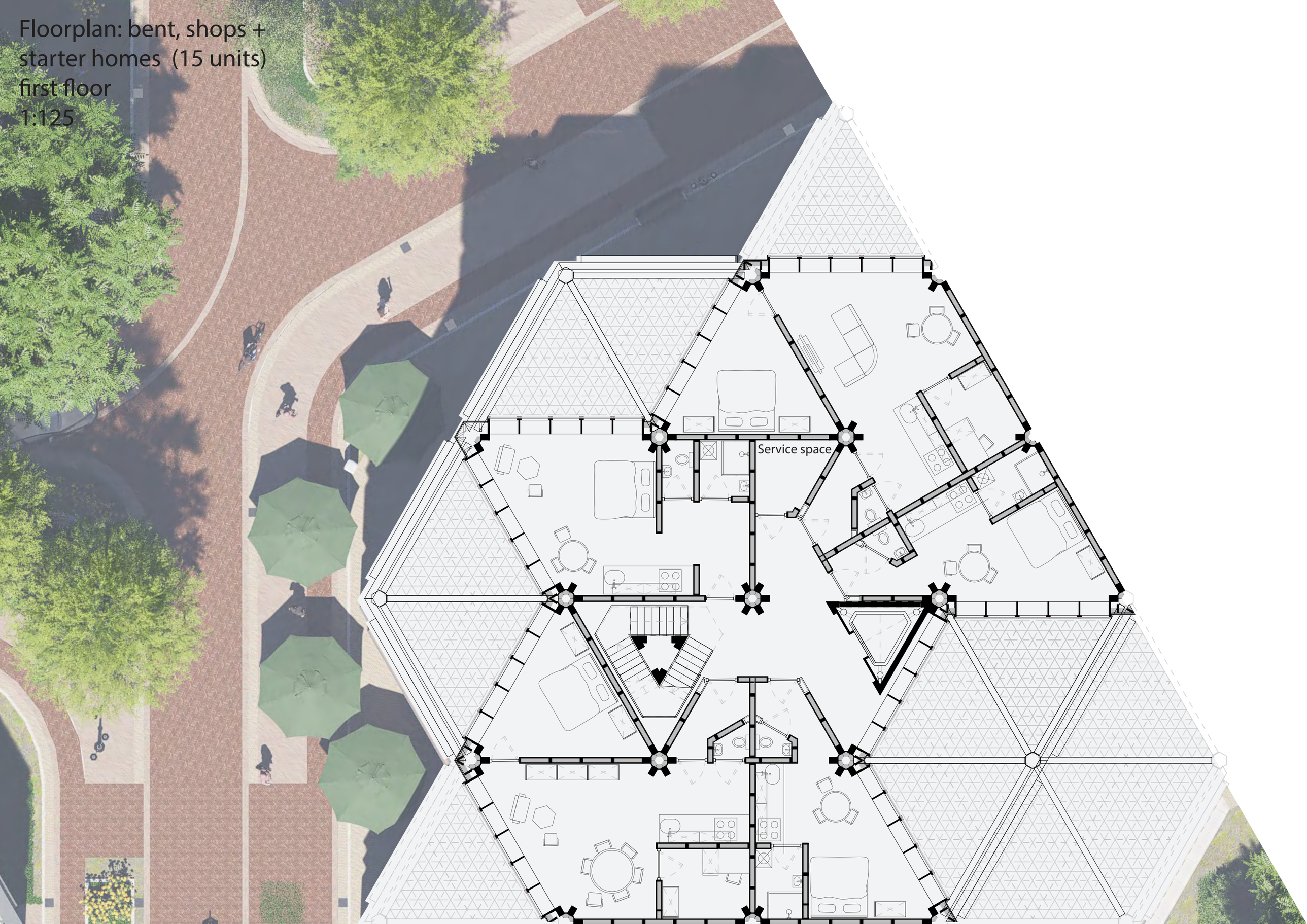
Service space

Goods storage

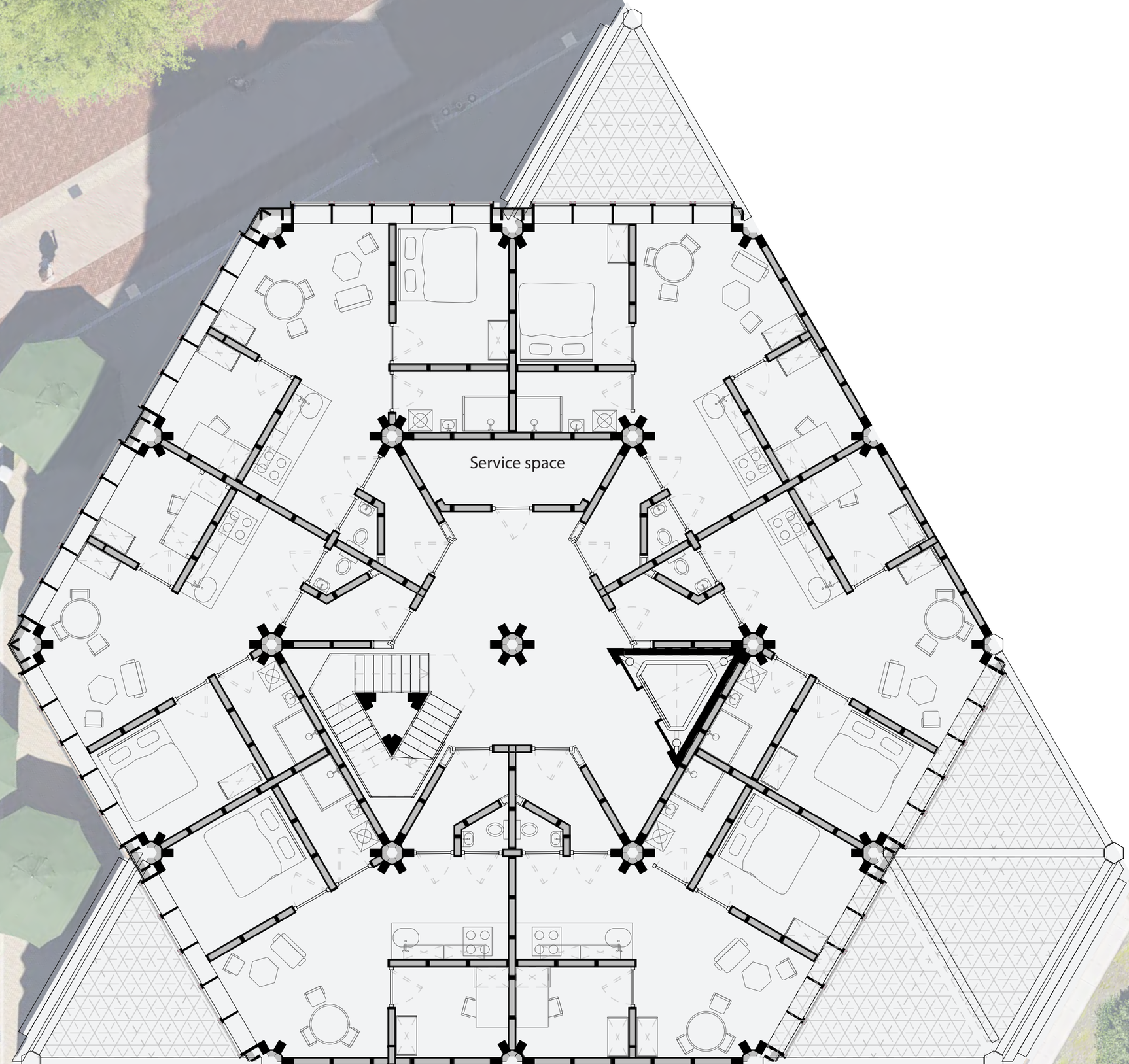
Counter

Bike storage

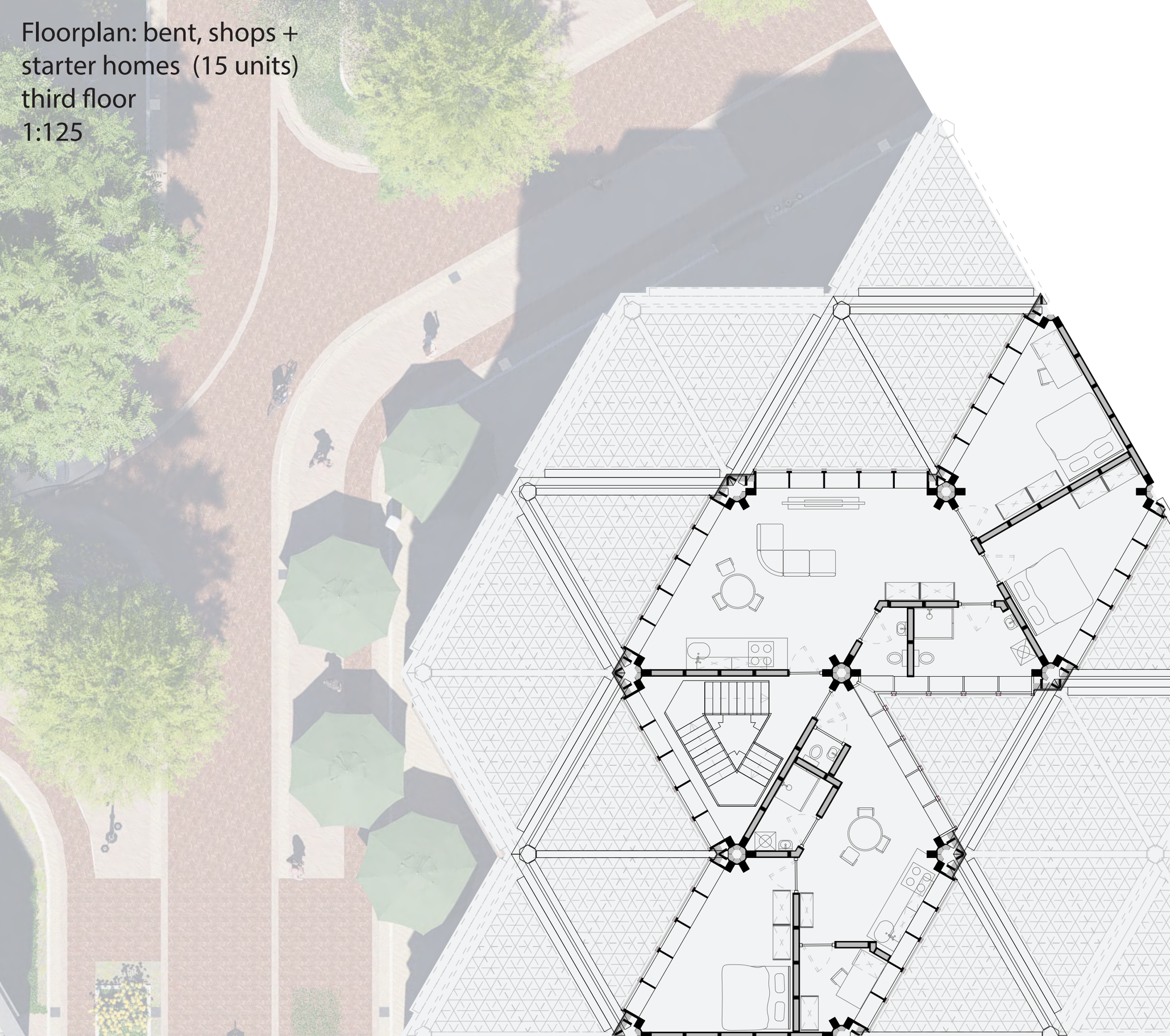
Floorplan: bent, shops +
starter homes (15 units)
first floor
1:125



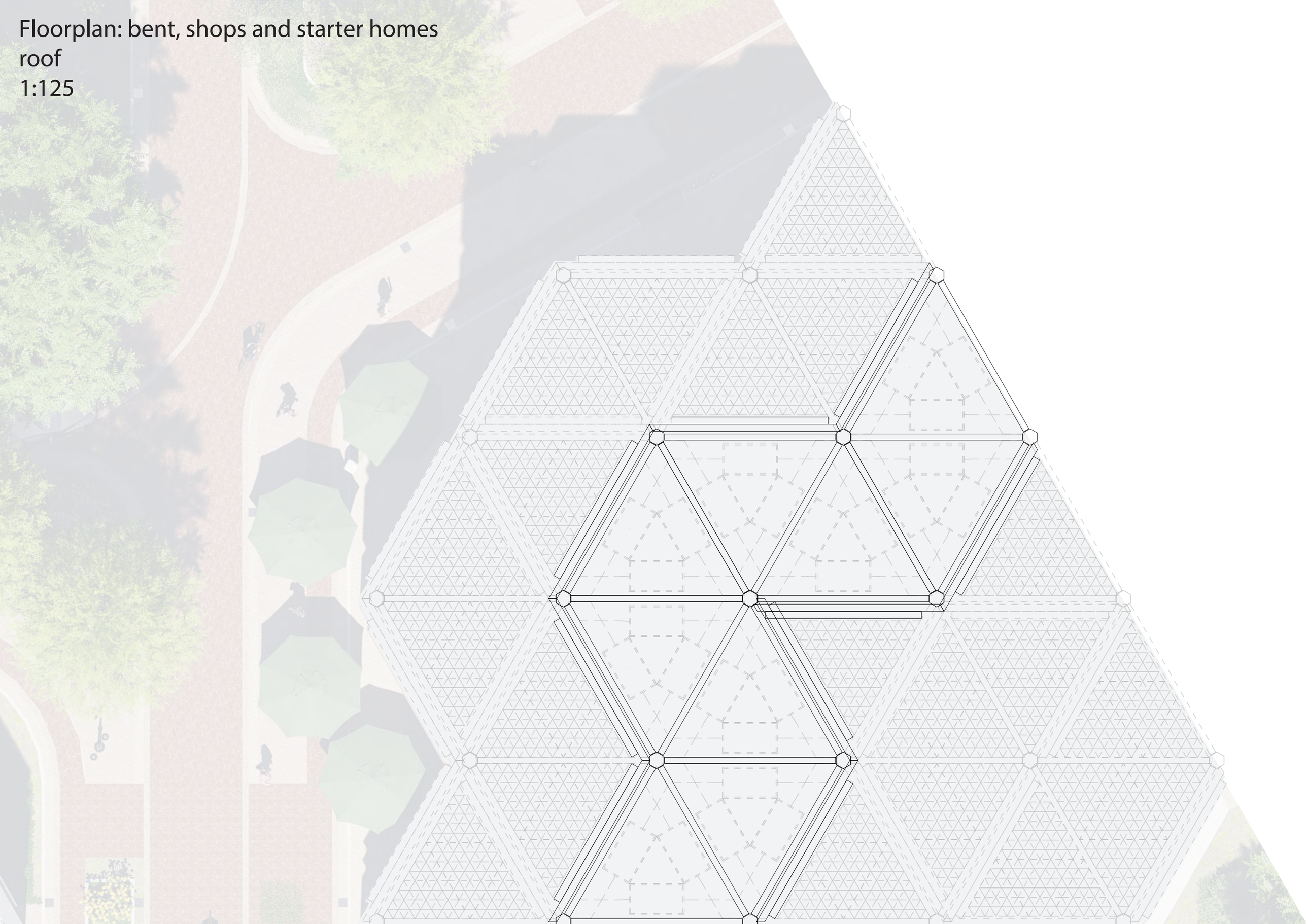
Floorplan: bent, shops +
starter homes (15 units)
second floor
1:125



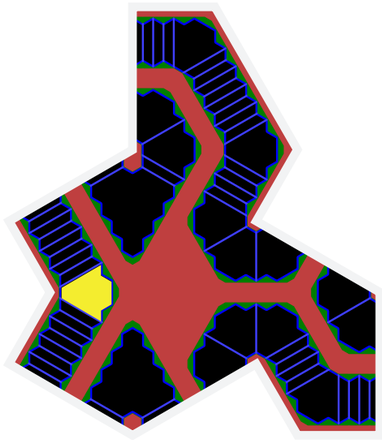
Floorplan: bent, shops +
starter homes (15 units)
third floor
1:125



Floorplan: bent, shops and starter homes
roof
1:125



Floorplan: bent, studios (5 units)
+ coliving (20 units)
ground floor
1:125



Comunal laundry

Service space

Storage

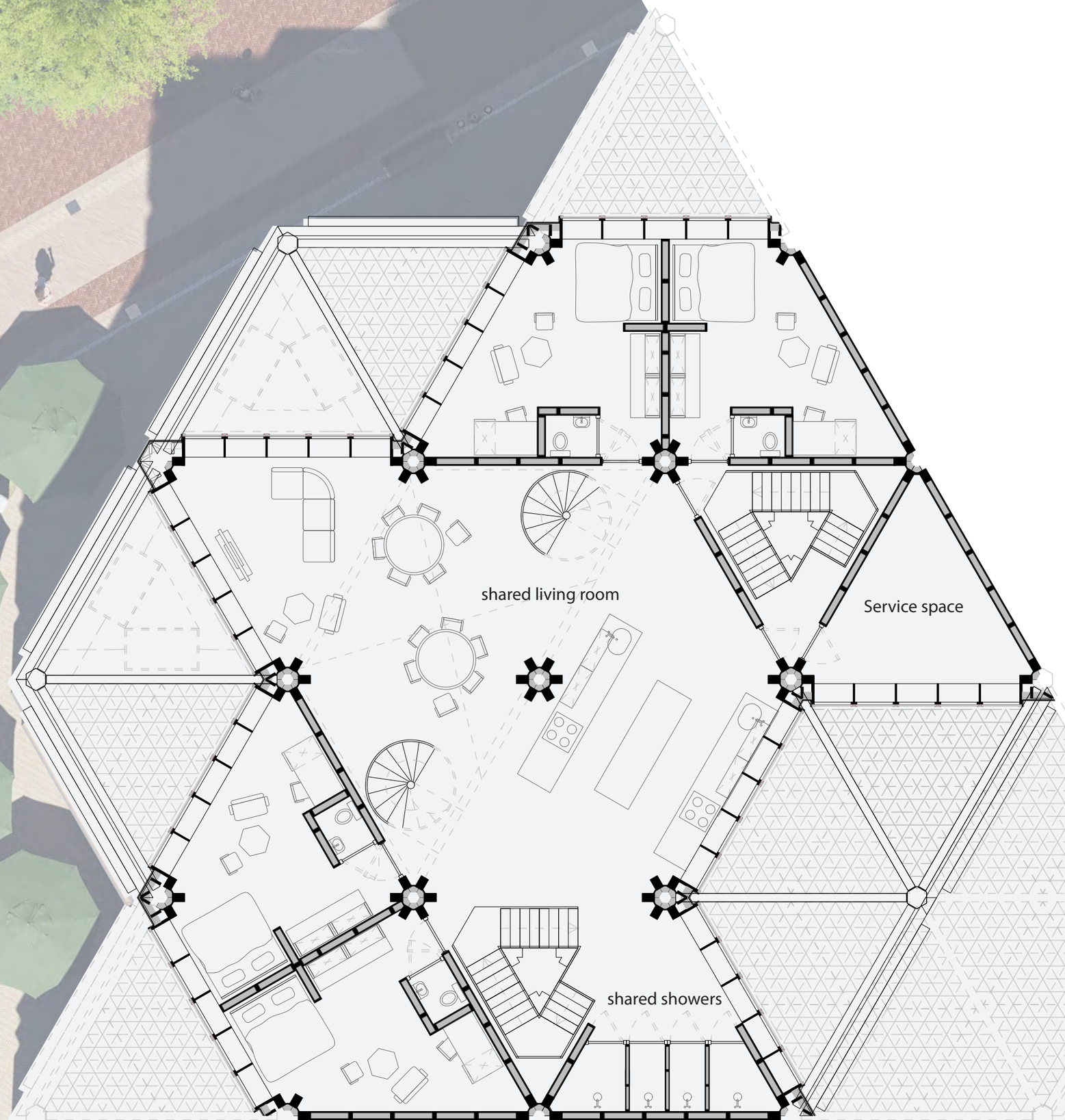
Bike storage

Floorplan: bent, studios (5 units)
+ coliving (20 units)
first floor
1:125

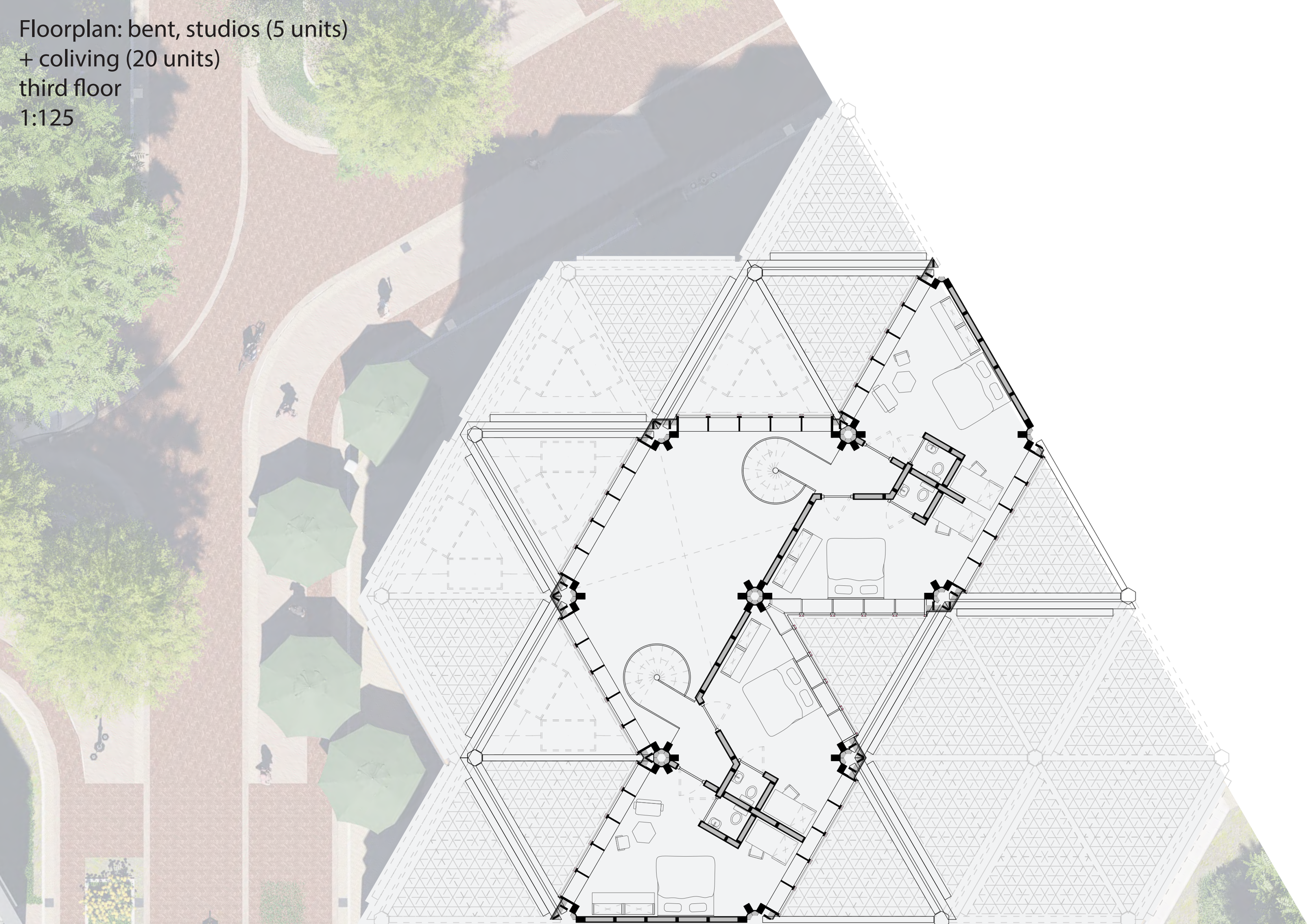
shared showers

Service space

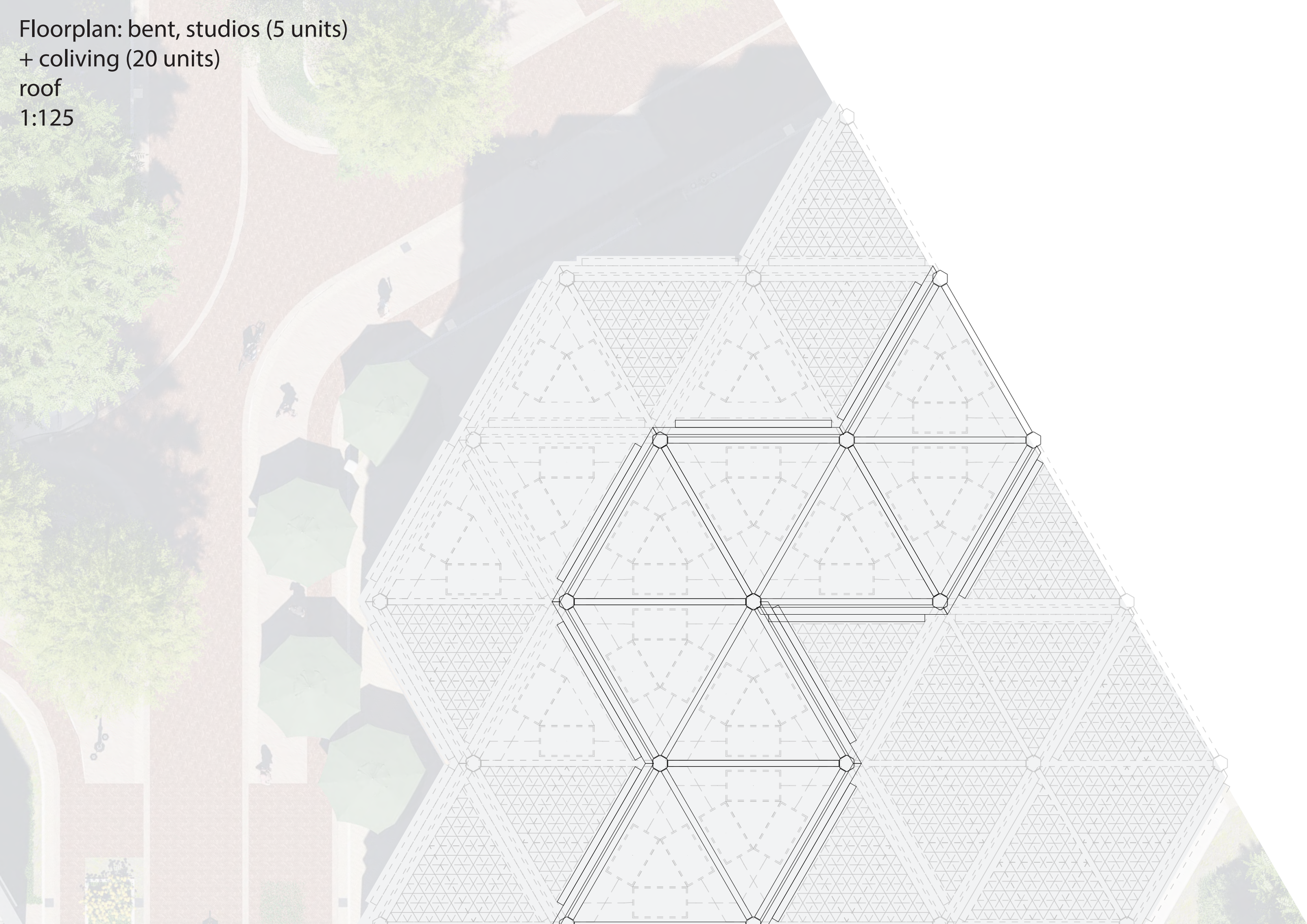
Floorplan: bent, studios (5 units)
+ coliving (20 units)
second floor
1:125



Floorplan: bent, studios (5 units)
+ coliving (20 units)
third floor
1:125



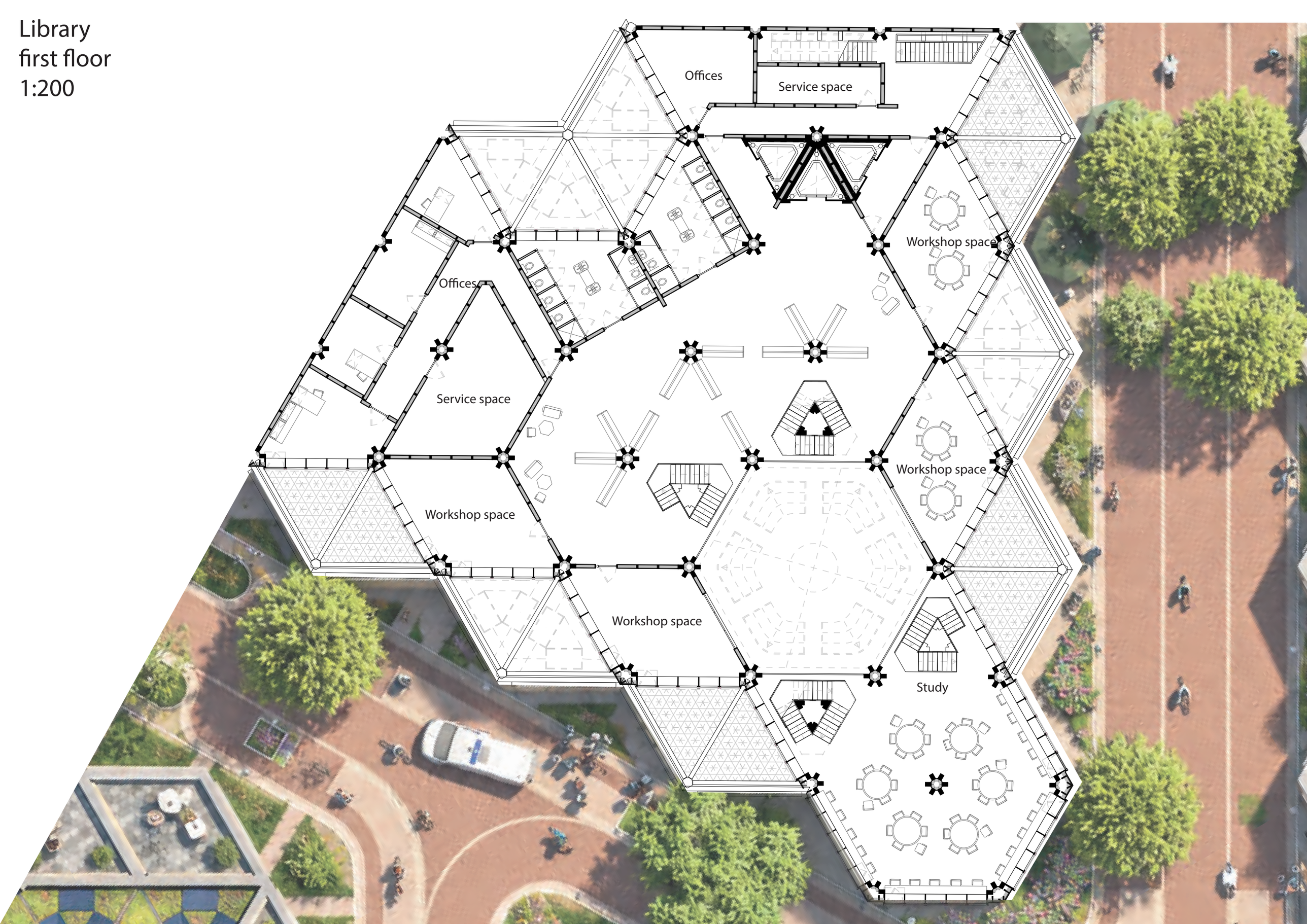
Floorplan: bent, studios (5 units)
+ coliving (20 units)
roof
1:125



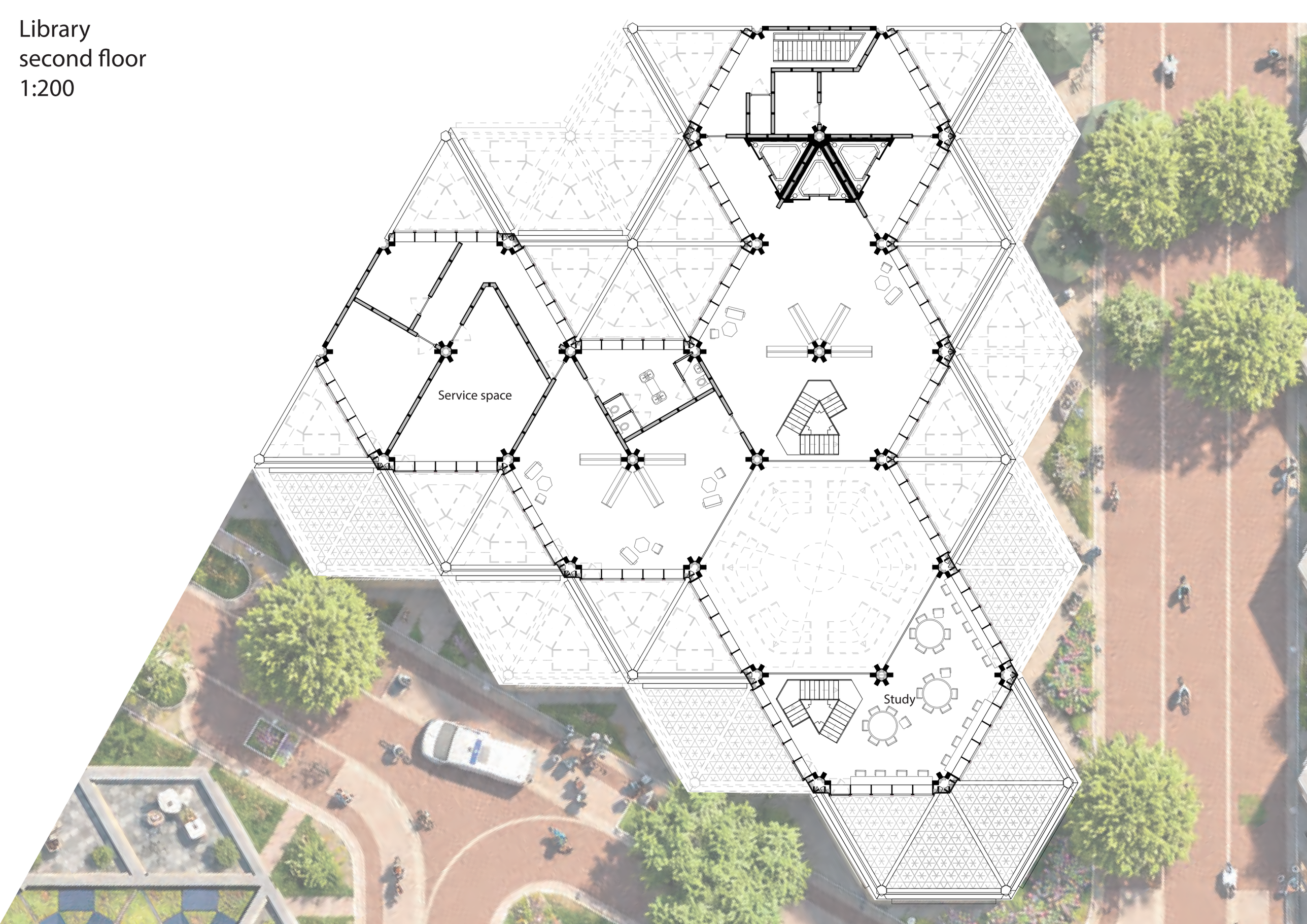
Library
ground floor
1:200



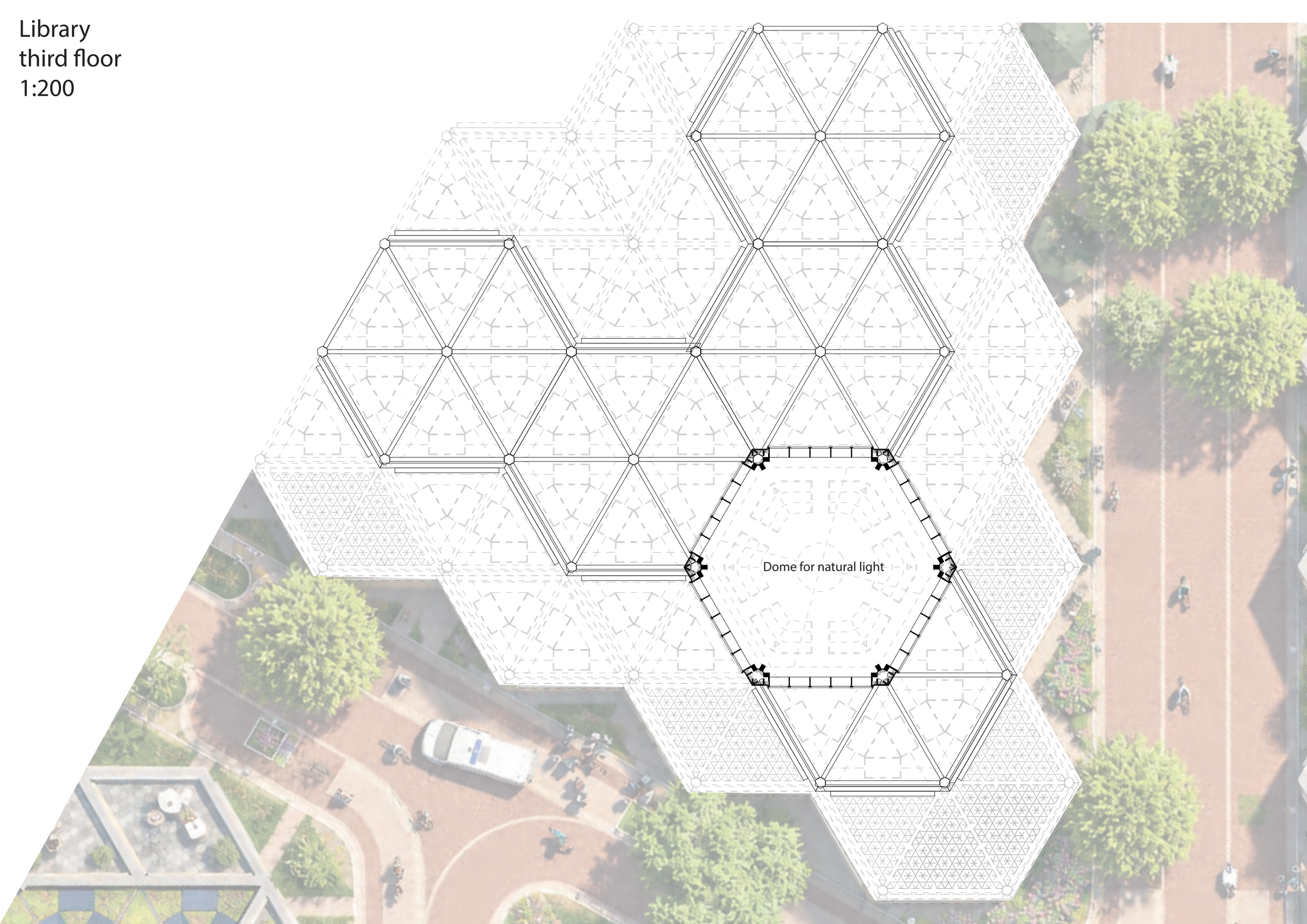
Library
first floor
1:200



Library
second floor
1:200



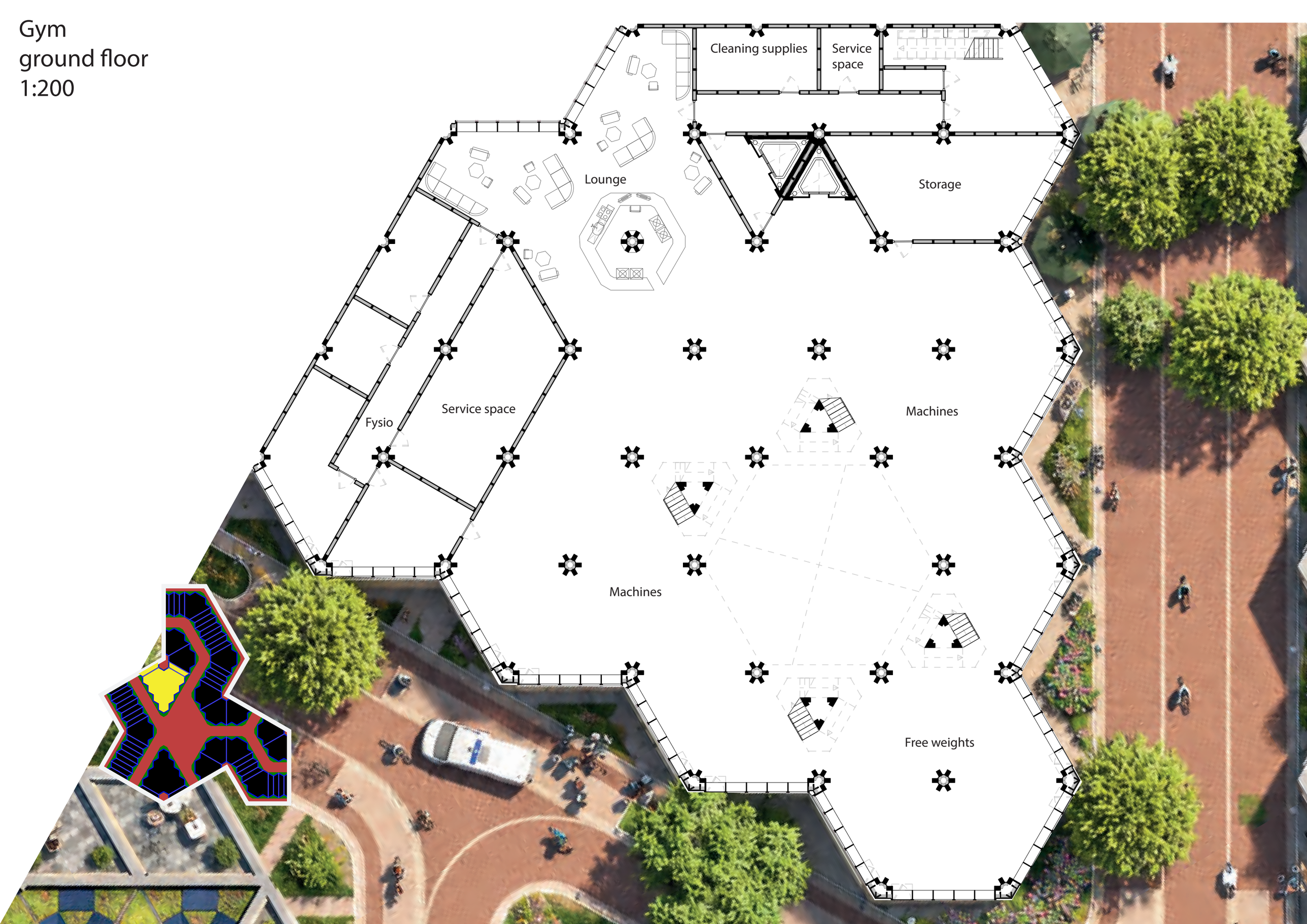
Library
third floor
1:200



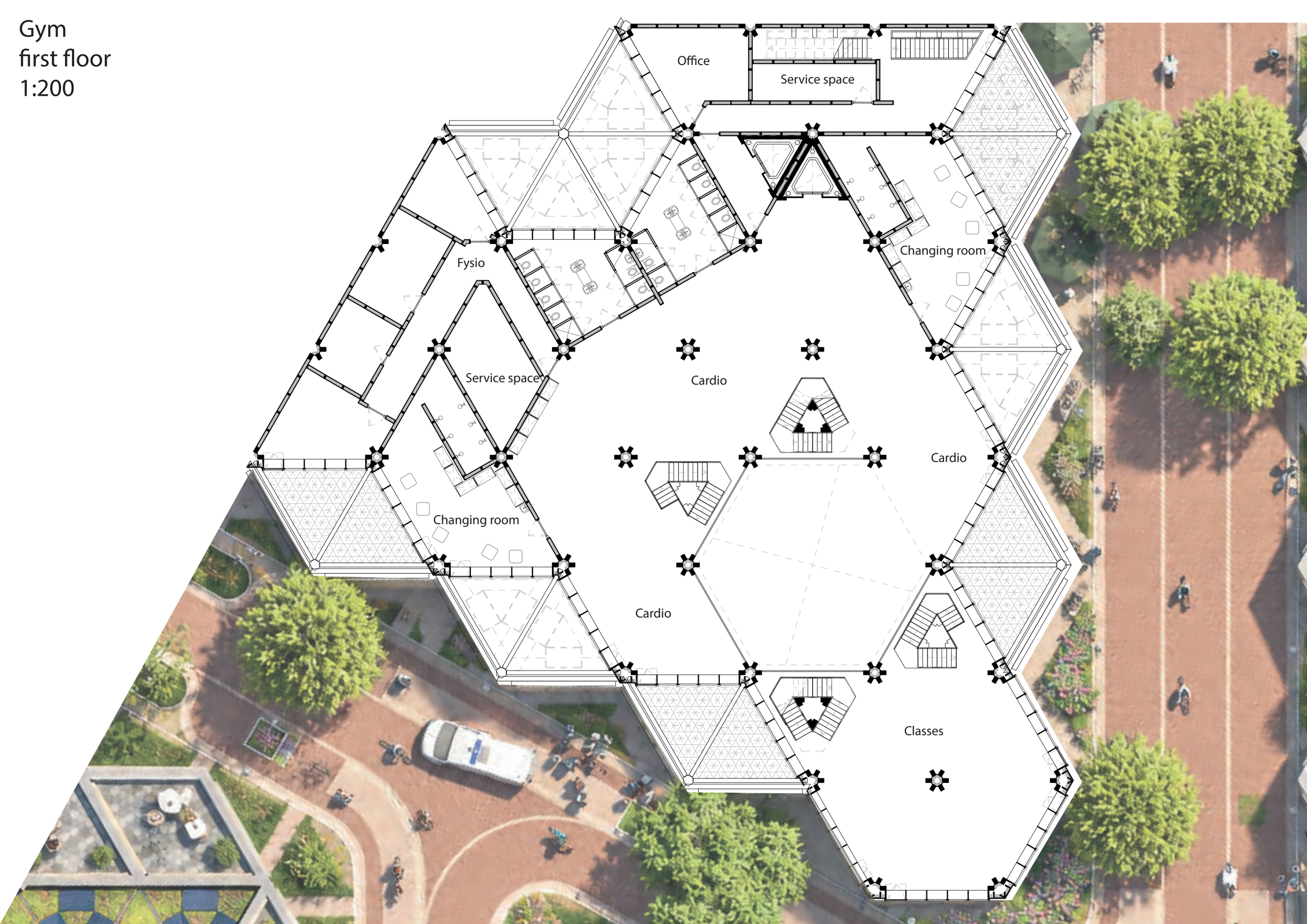
Library
roof
1:200



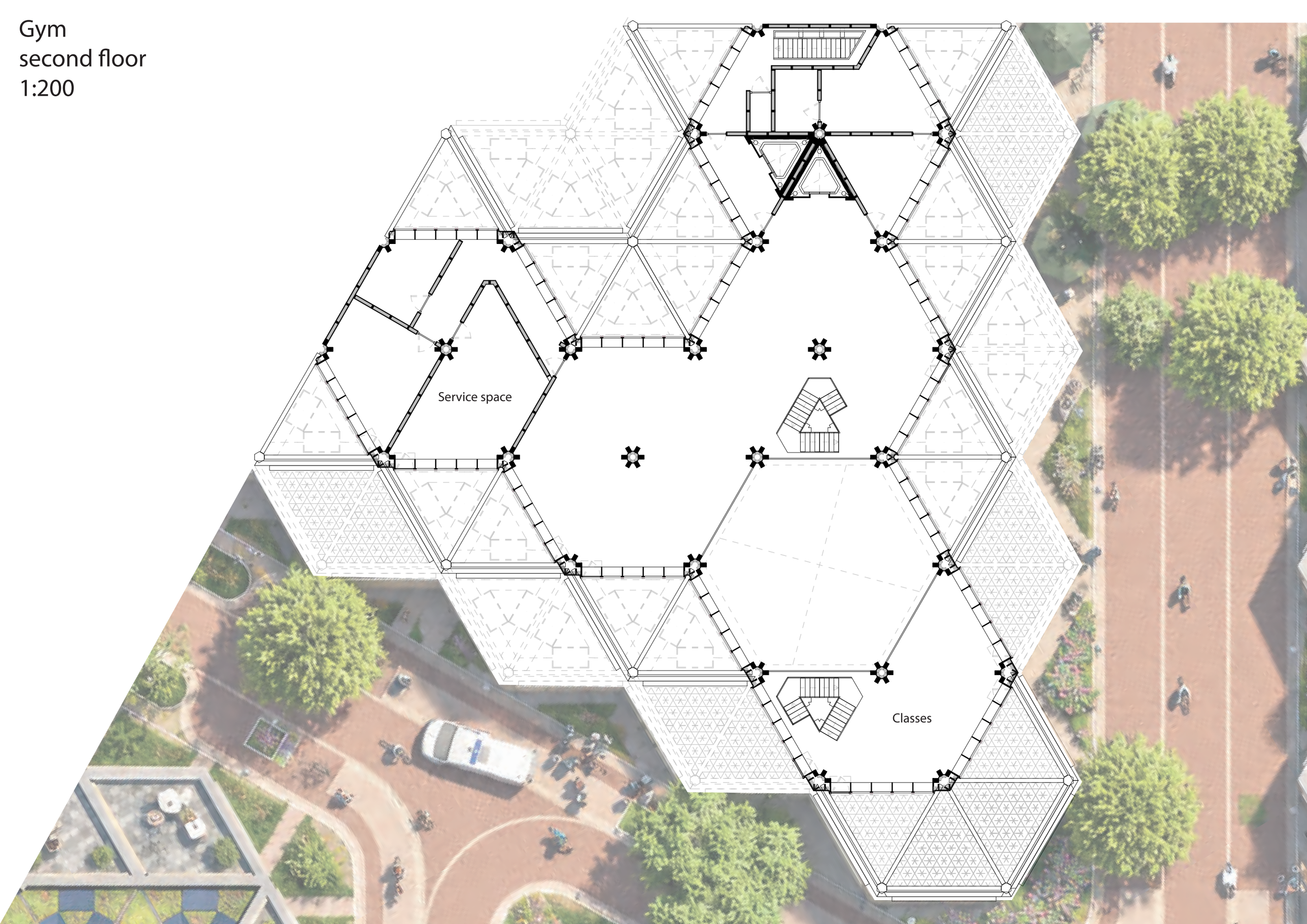
Gym
ground floor
1:200



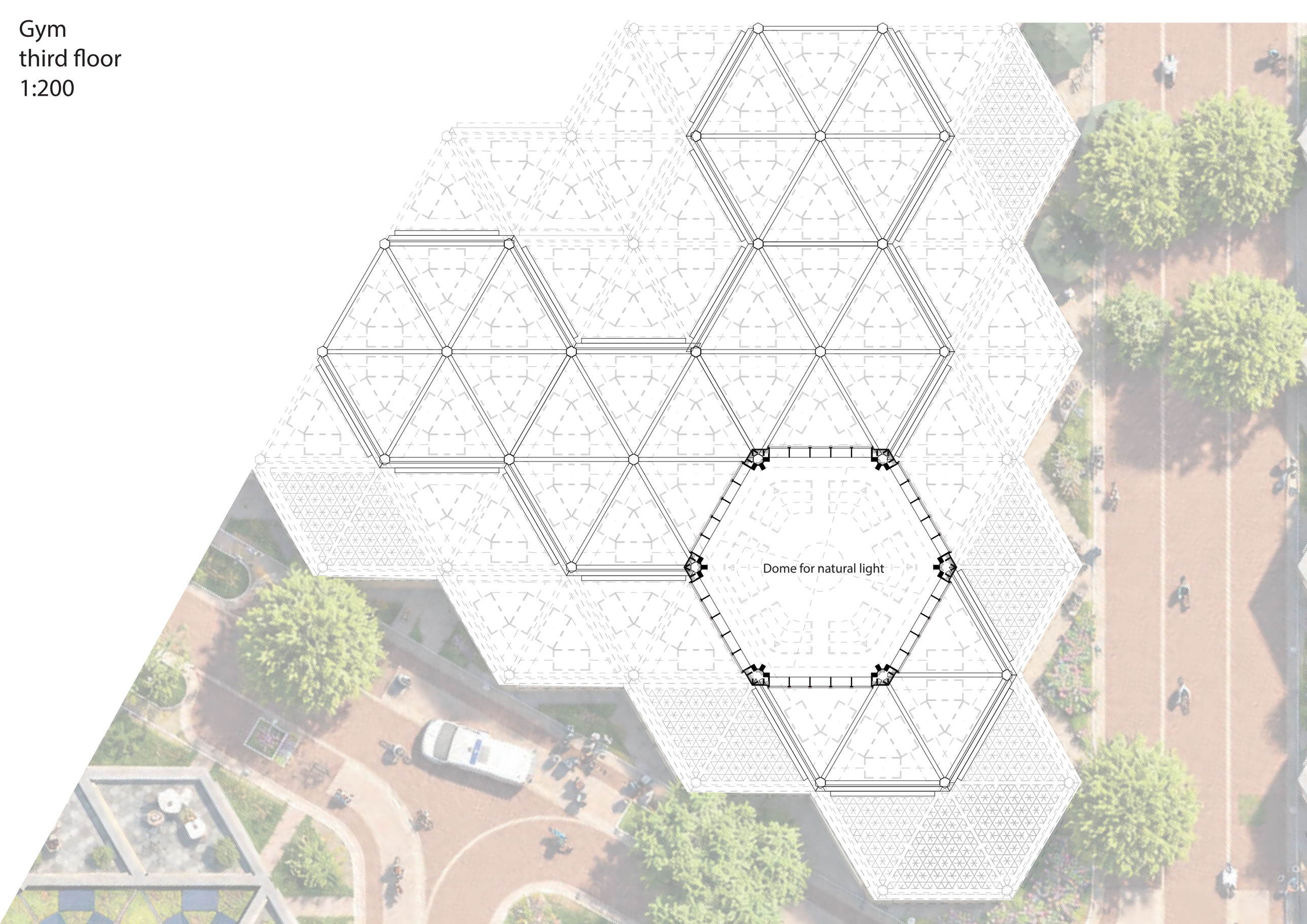
Gym
first floor
1:200



Gym
second floor
1:200



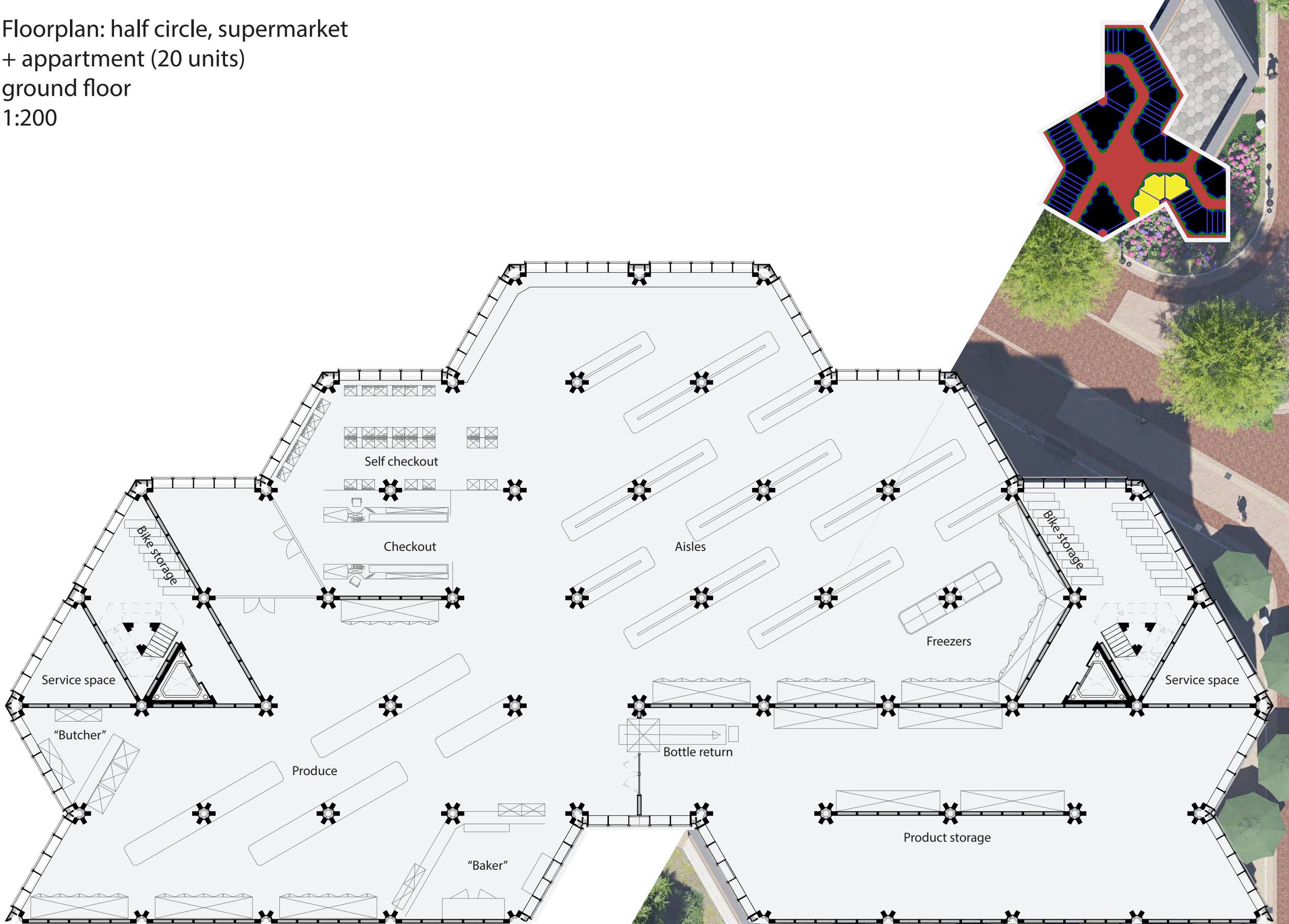
Gym
third floor
1:200



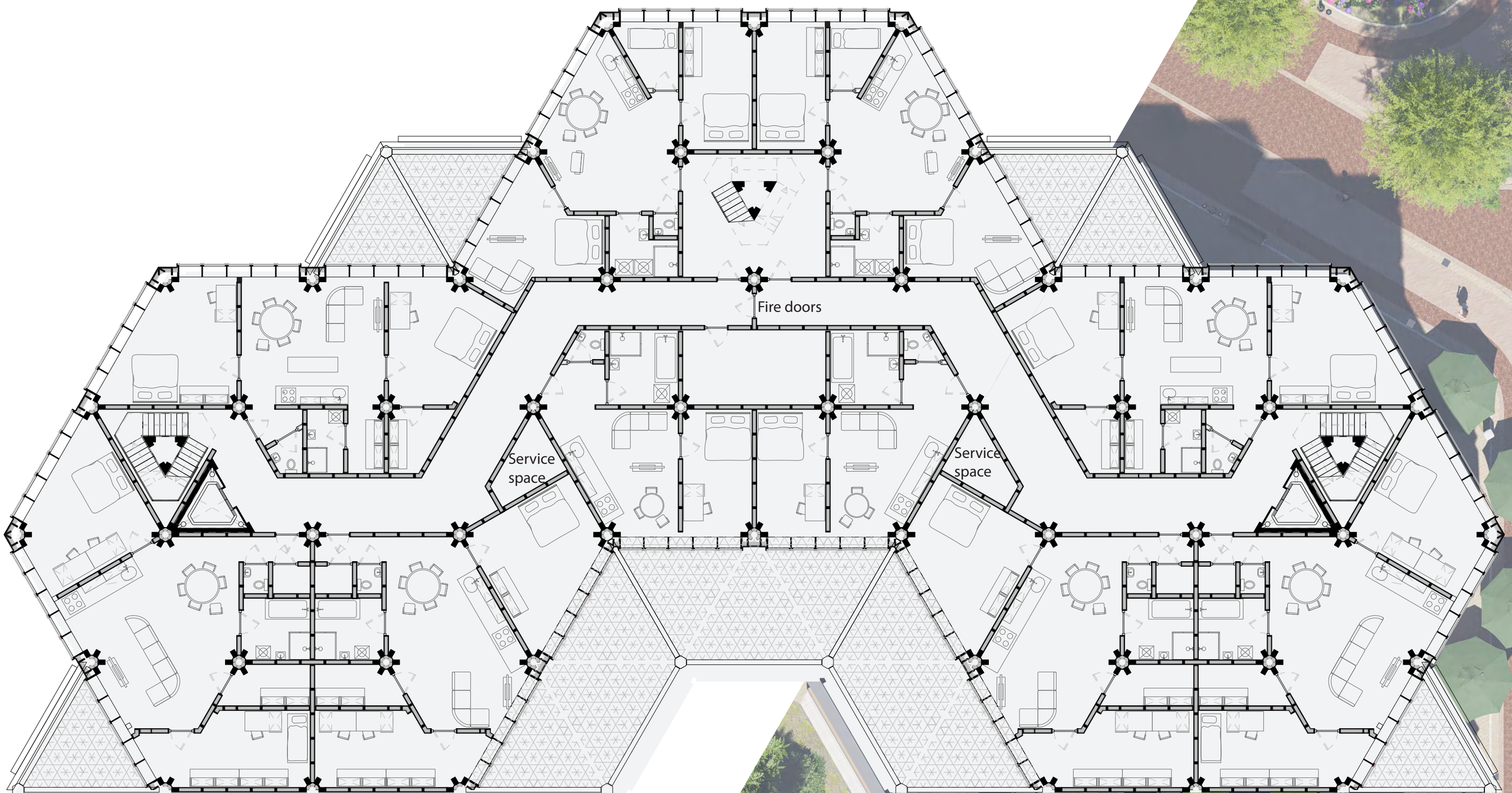
Gym
roof
1:200



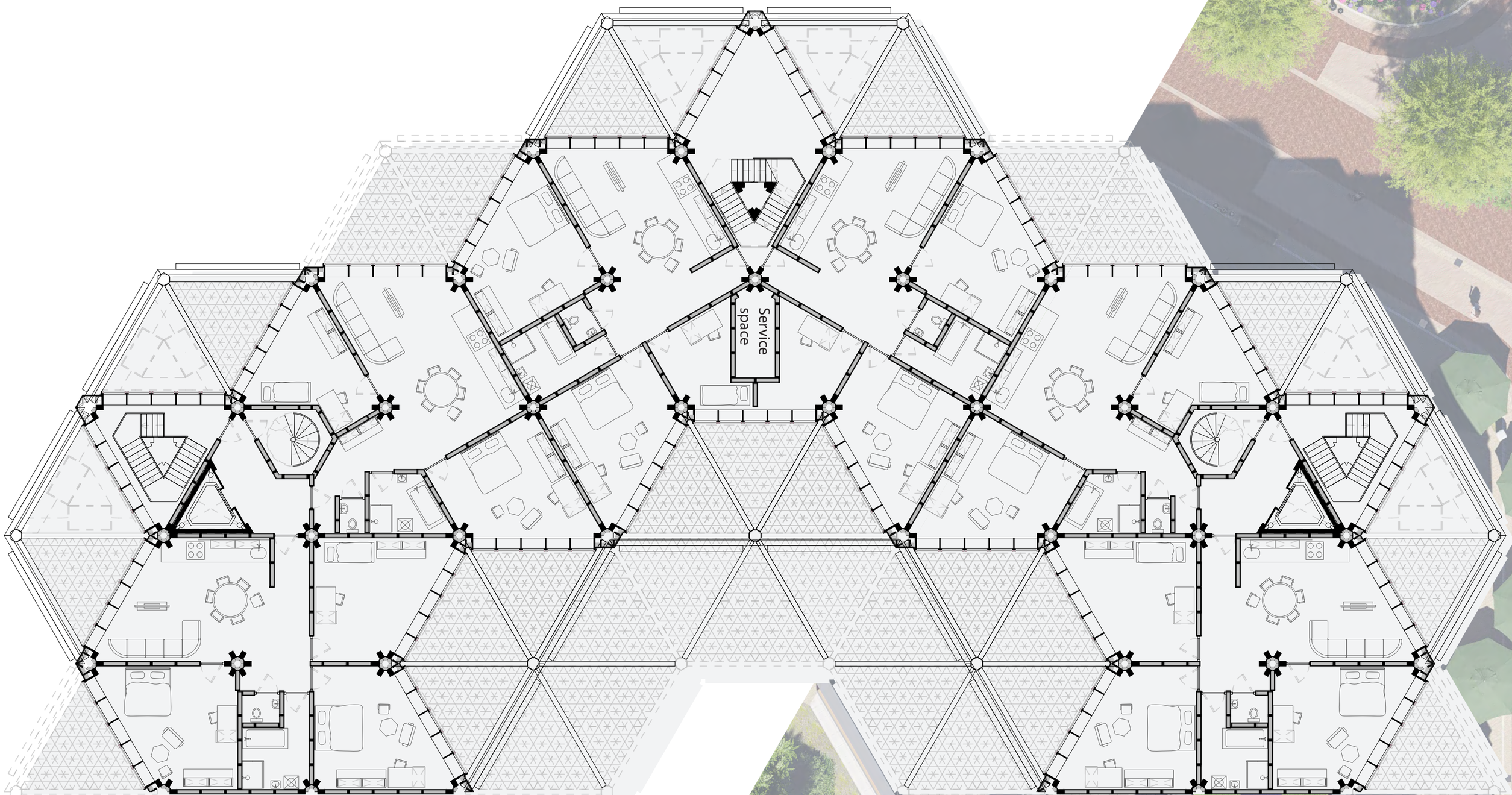
Floorplan: half circle, supermarket
+ appartment (20 units)
ground floor
1:200



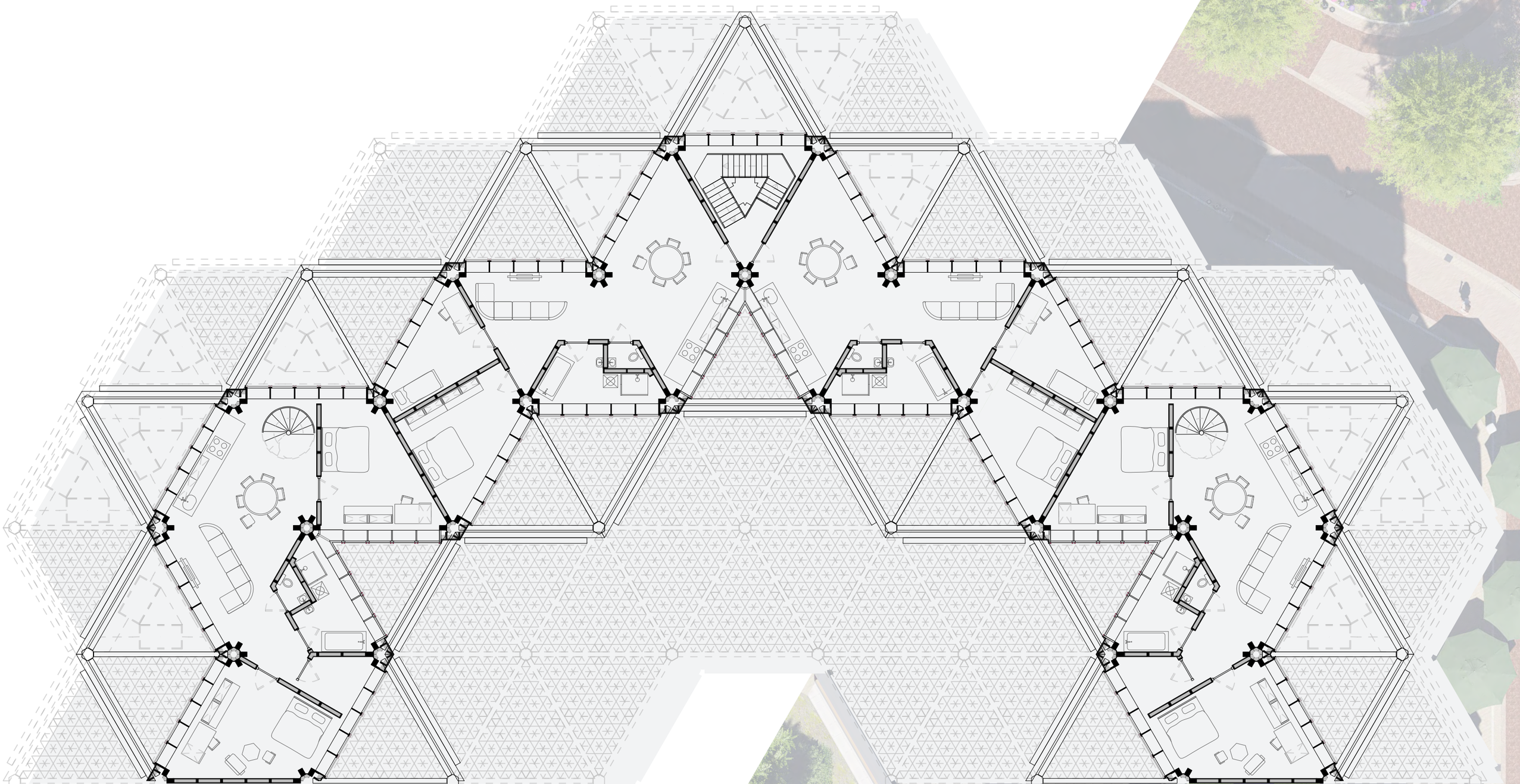
Floorplan: half circle, supermarket
+ appartment (20 units)
first floor
1:200



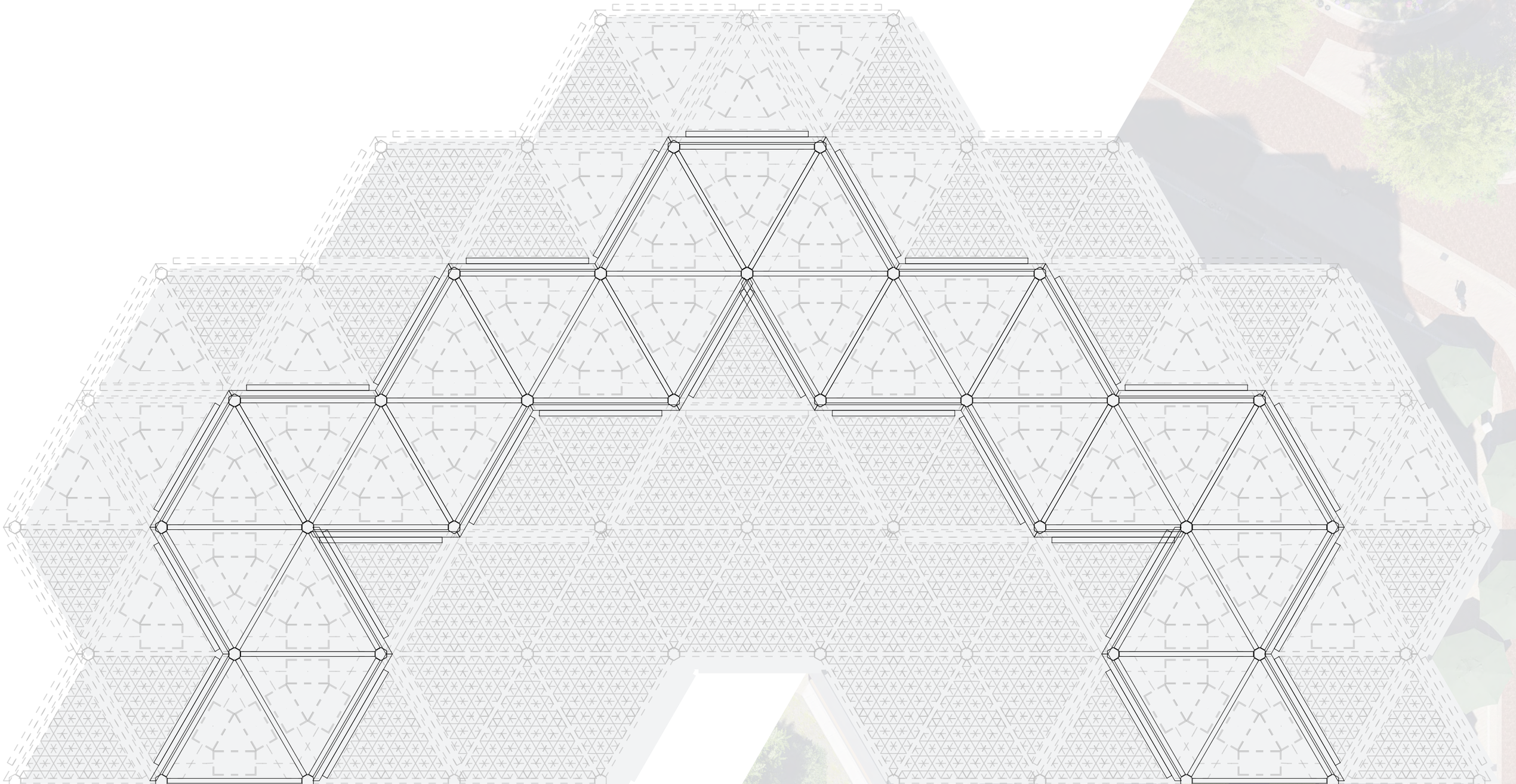
Floorplan: half circle, supermarket
+ appartment (20 units)
second floor
1:200



Floorplan: half circle, supermarket
+ appartment (20 units)
third floor
1:200



Floorplan: half circle, supermarket
+ appartment (20 units)
roof
1:200



Architectural Engineering
A3

Max Heerschop
5542030

