



FROM WATER TO STRUCTURE

Reconnecting floating architecture
and aquatic ecosystems
through regenerative design

Gaspard Marteau
6048382

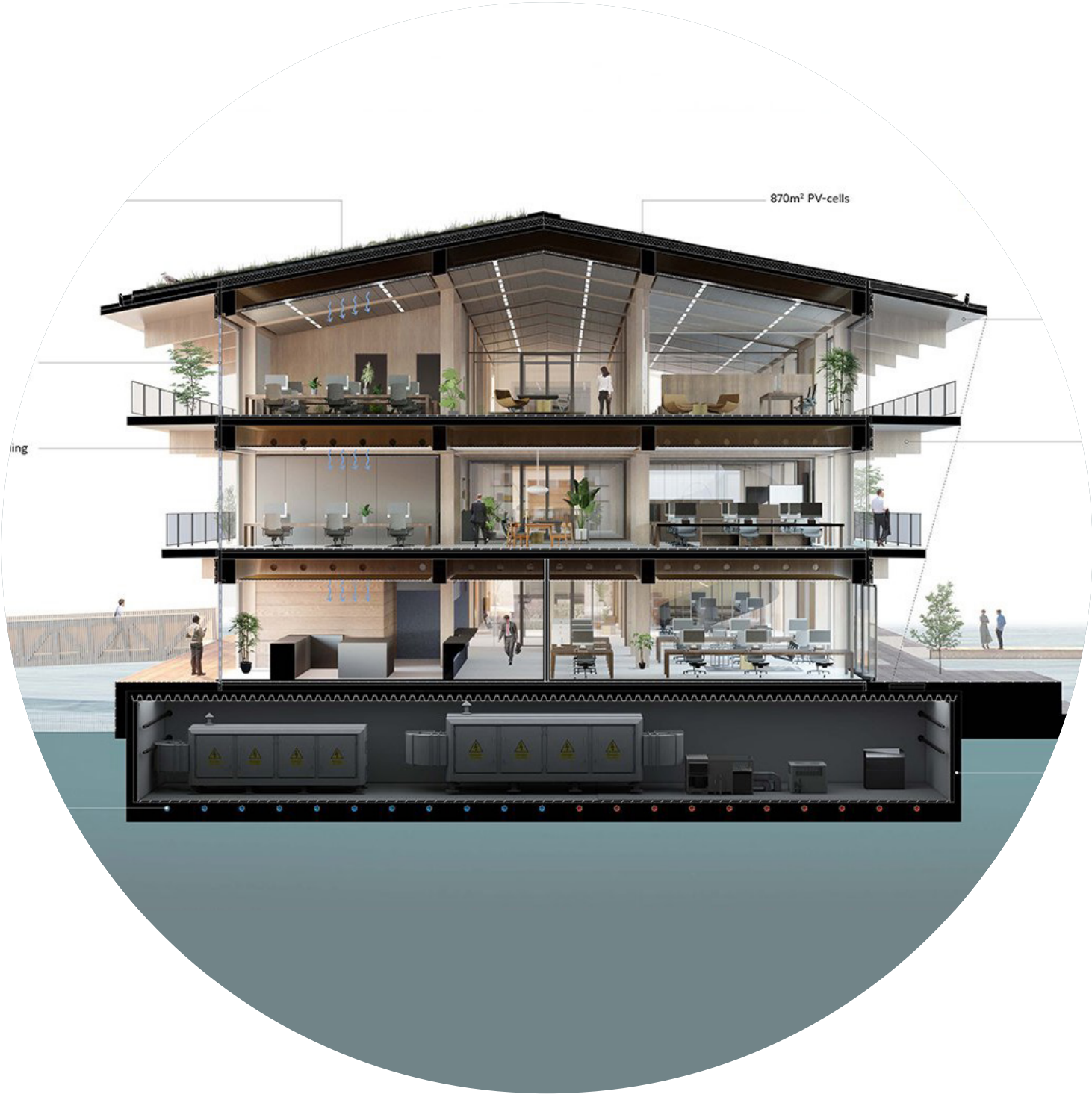
P5 Presentation
26-06-2025

Architectural Engineering Graduation Studio

Design Mentor: Dafne Swank
Research Mentor: Mo Smit
Building Technology Mentor: Paddy Tomesen



Source: <https://www.siebeswart.nl/image/I0000LQa6iS6DA90>



Floating Office Rotterdam (2021)

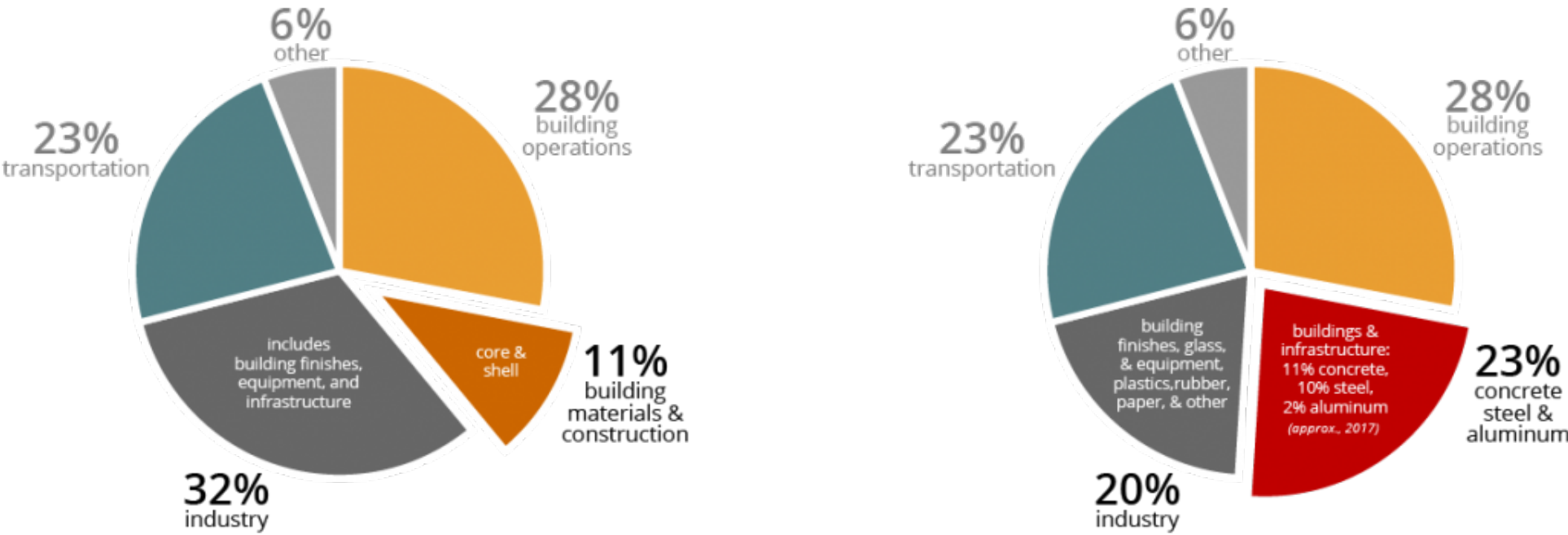


IBA Dock Hamburg (2010)

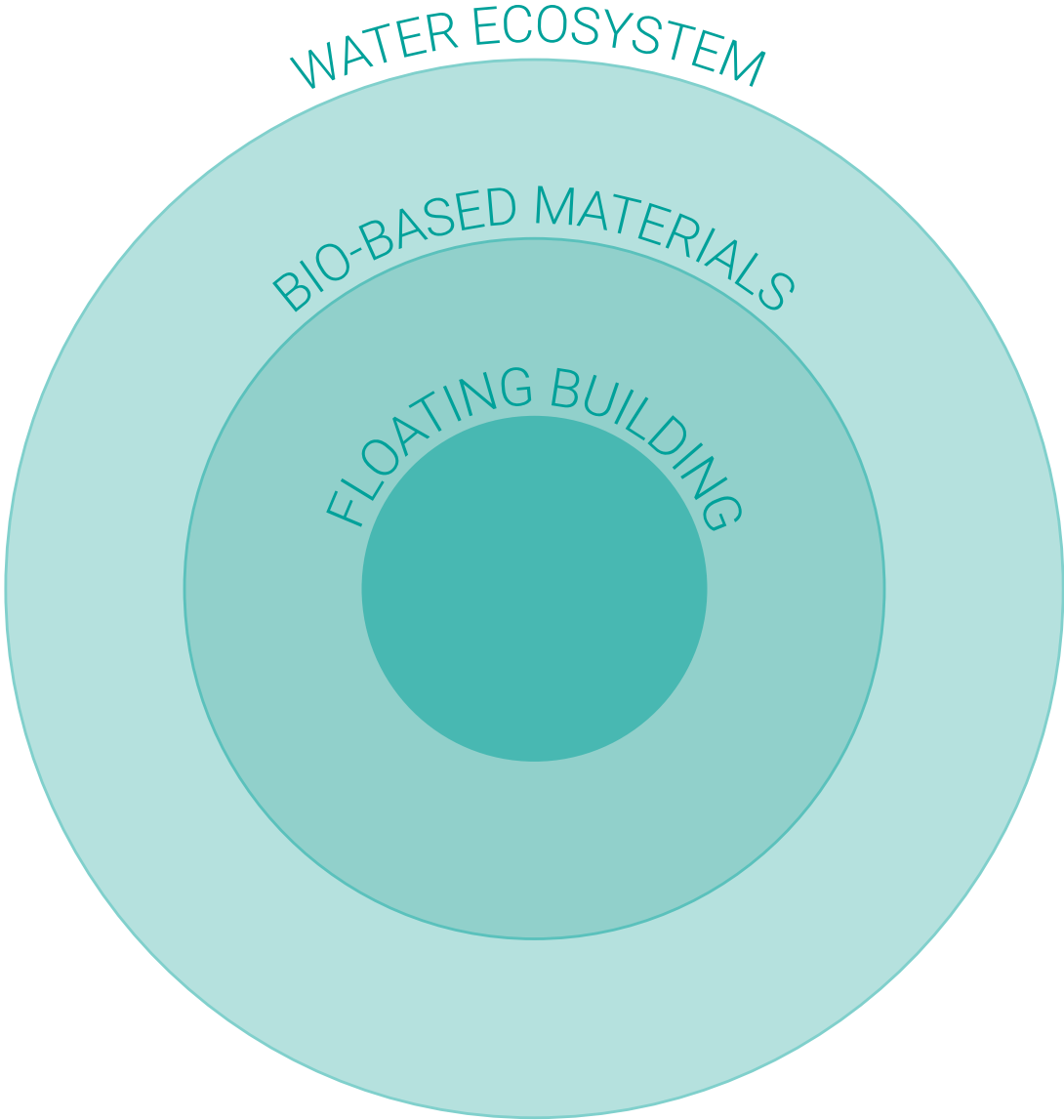


Pavilion of reflection, Zurich (2016)

Sources:
<https://www.dezeen.com/2016/07/29/pavilion-of-reflections-eth-zurich-students-studio-tom-emerson-wooden-floating-manifesta-art-biennale-switzerland/>
<https://www.archdaily.com/288198/iba-dock-architech>
<https://www.theplan.it/eng/award-2022-Mixed-Use/floating-office-rotterdam-the-biggest-and-most-sustainable-office-in-the-world-powerhouse-company>

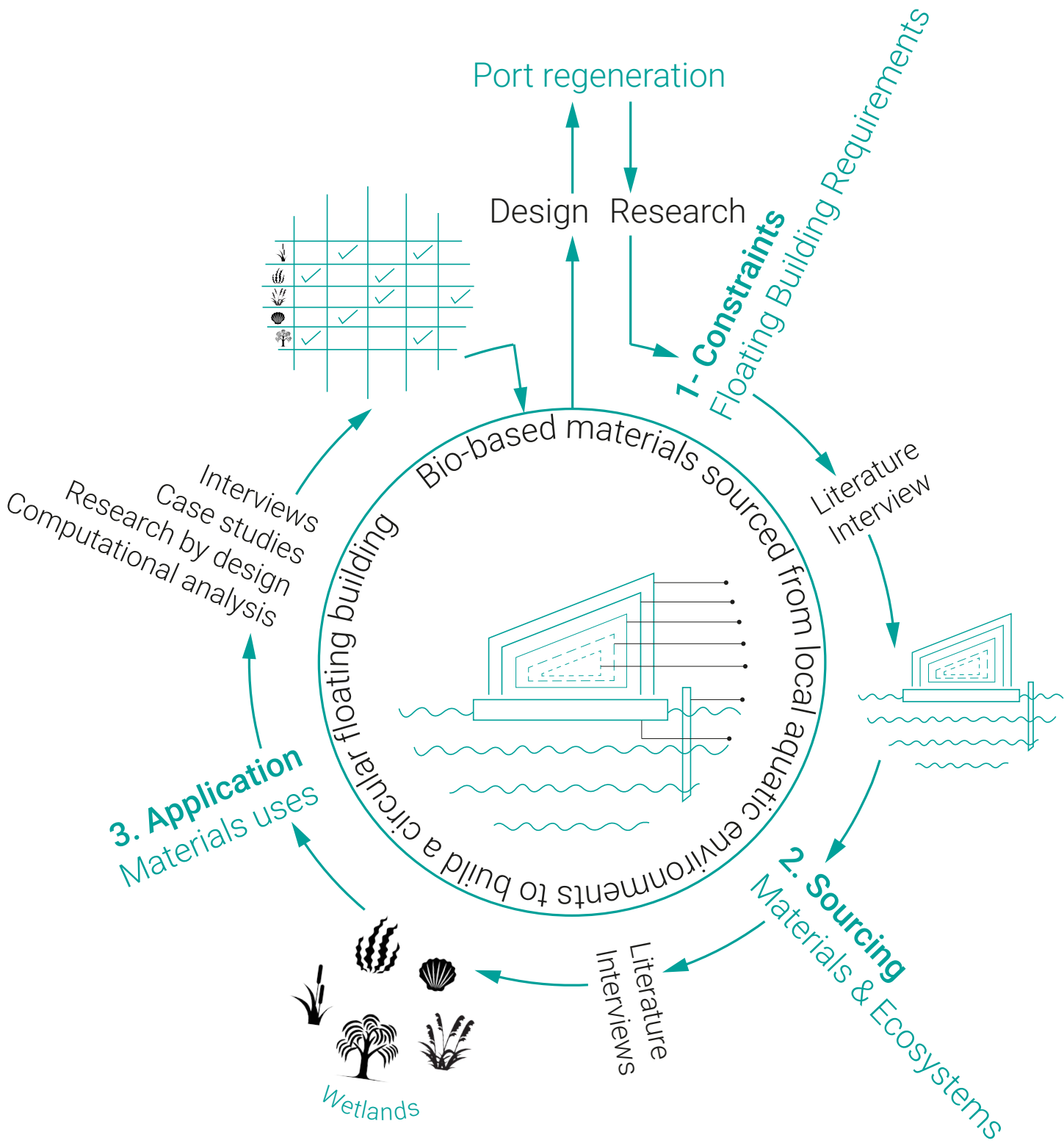


Source: Global alliance for buildings and construction 2018 global status report IEA

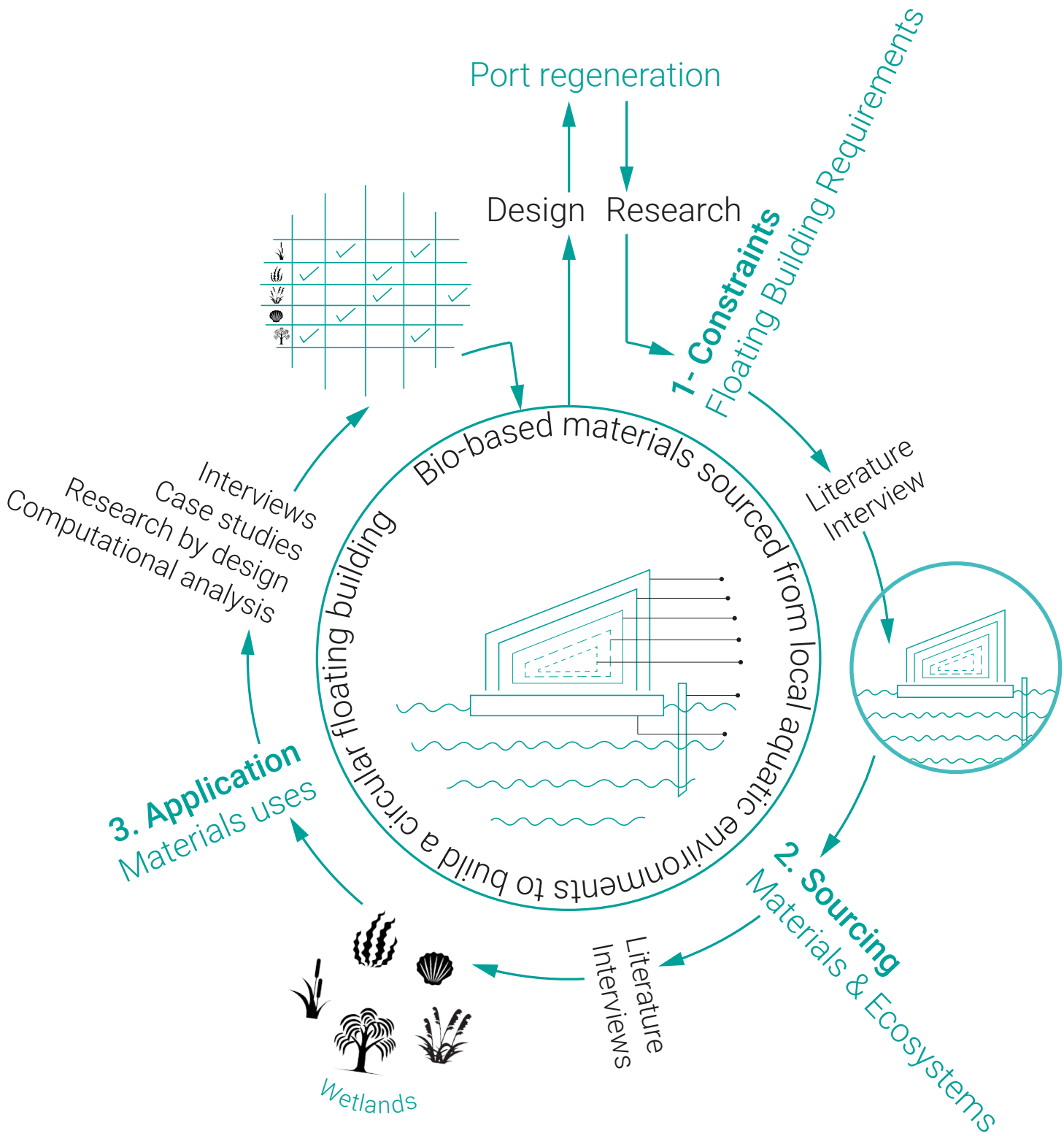


Conceptual Framework

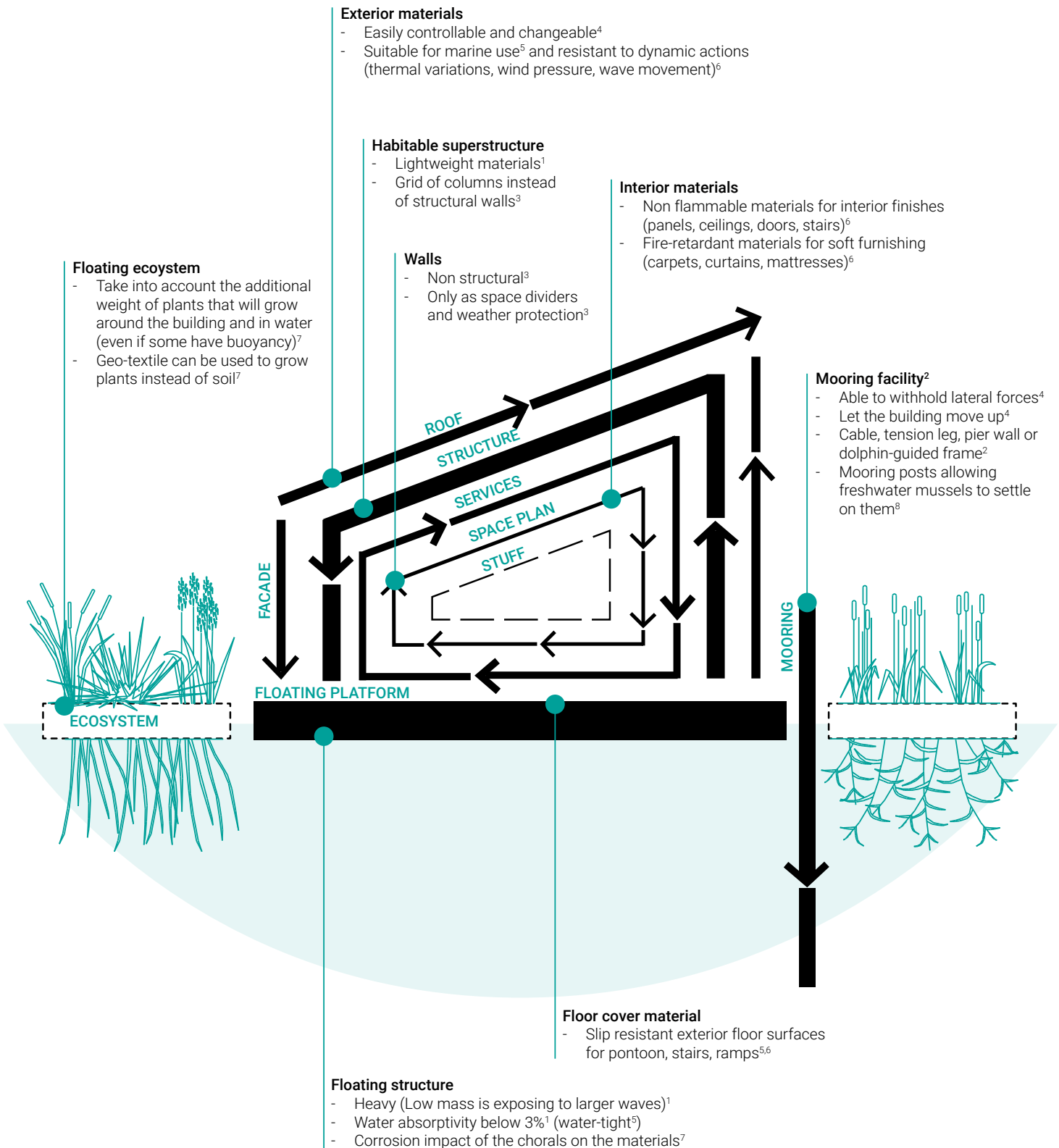
How can **bio-based materials** sourced from **local aquatic ecosystems** be used to build a **circular floating building**?



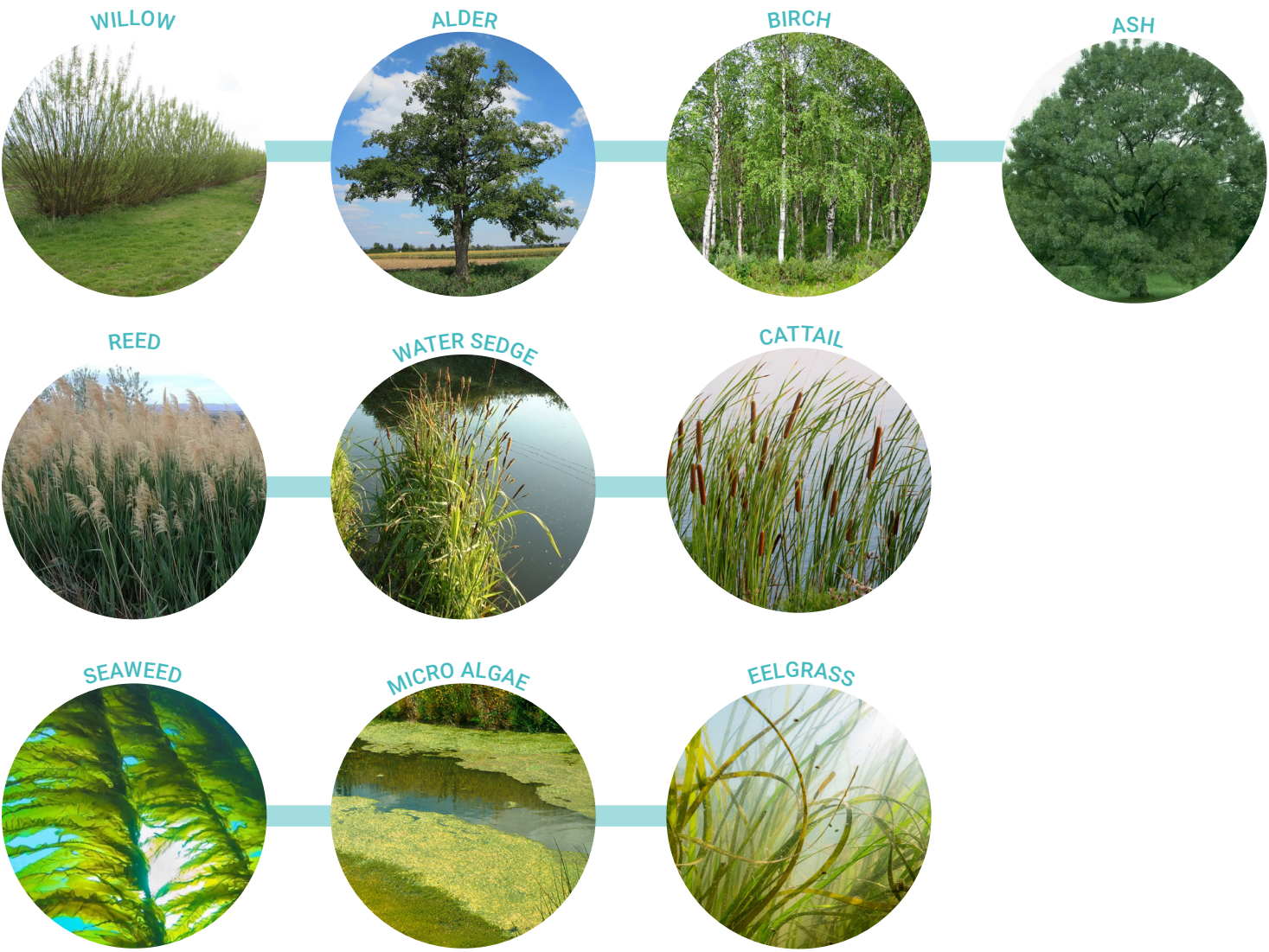
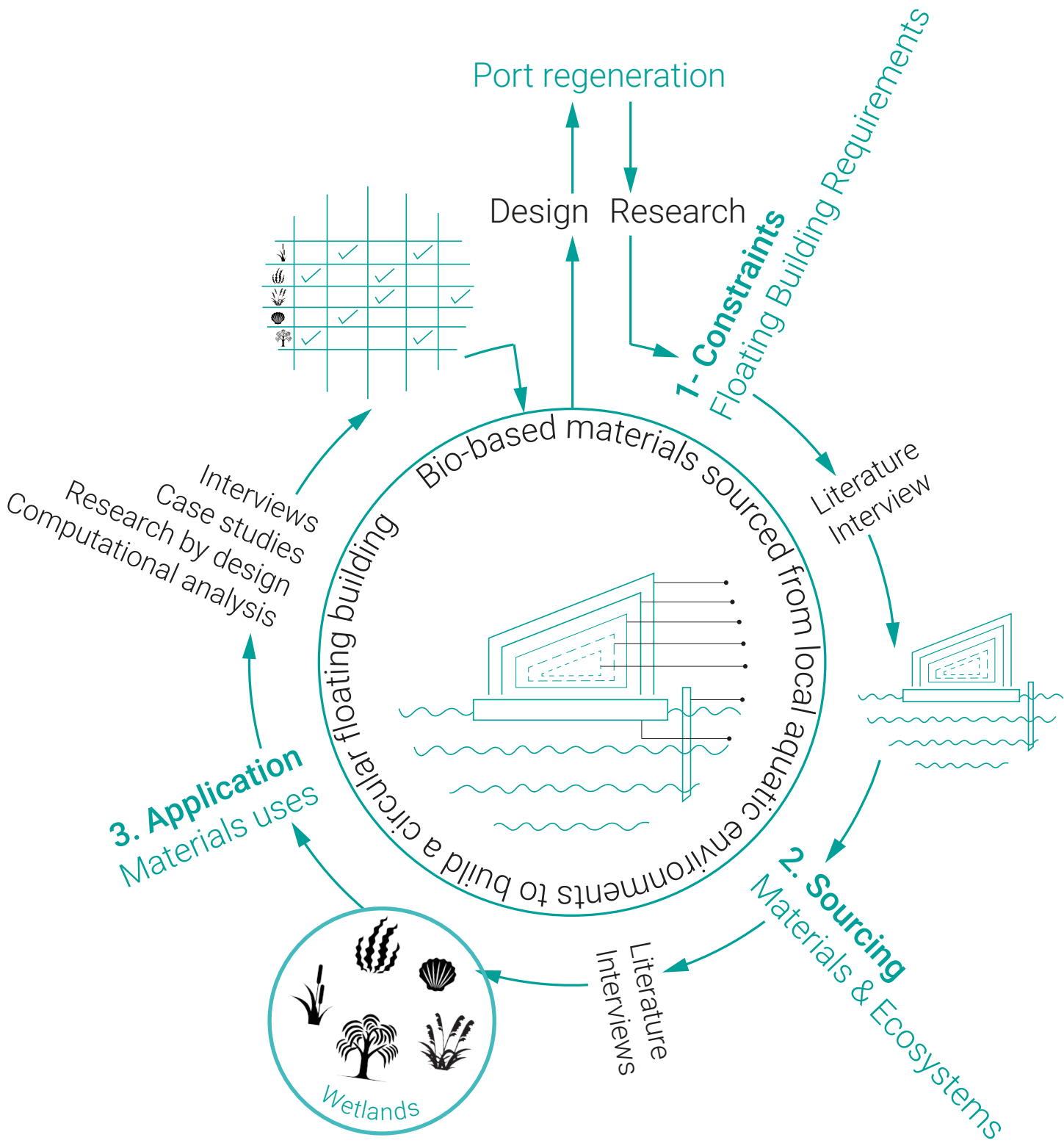
Research plan diagram



Research plan diagram

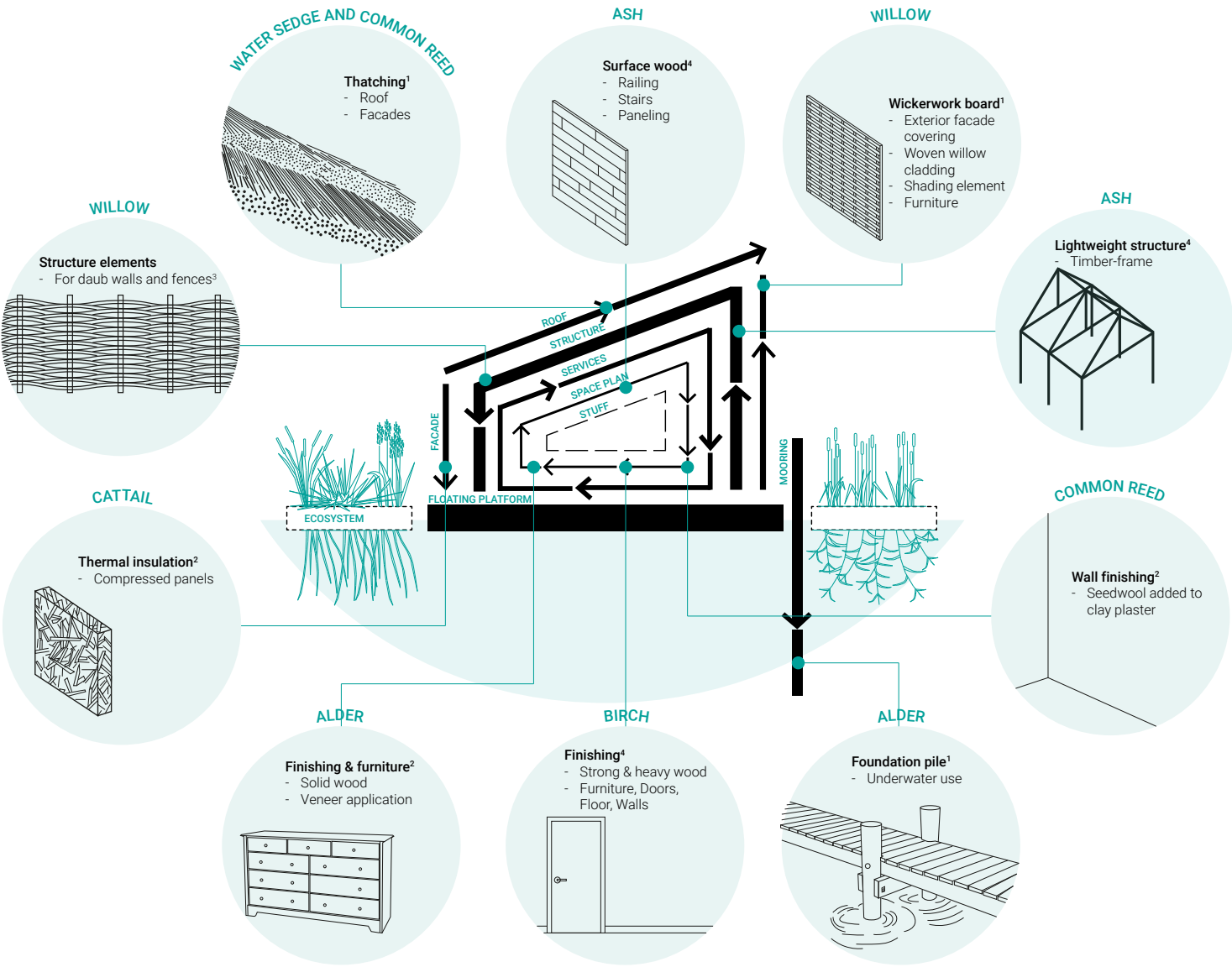
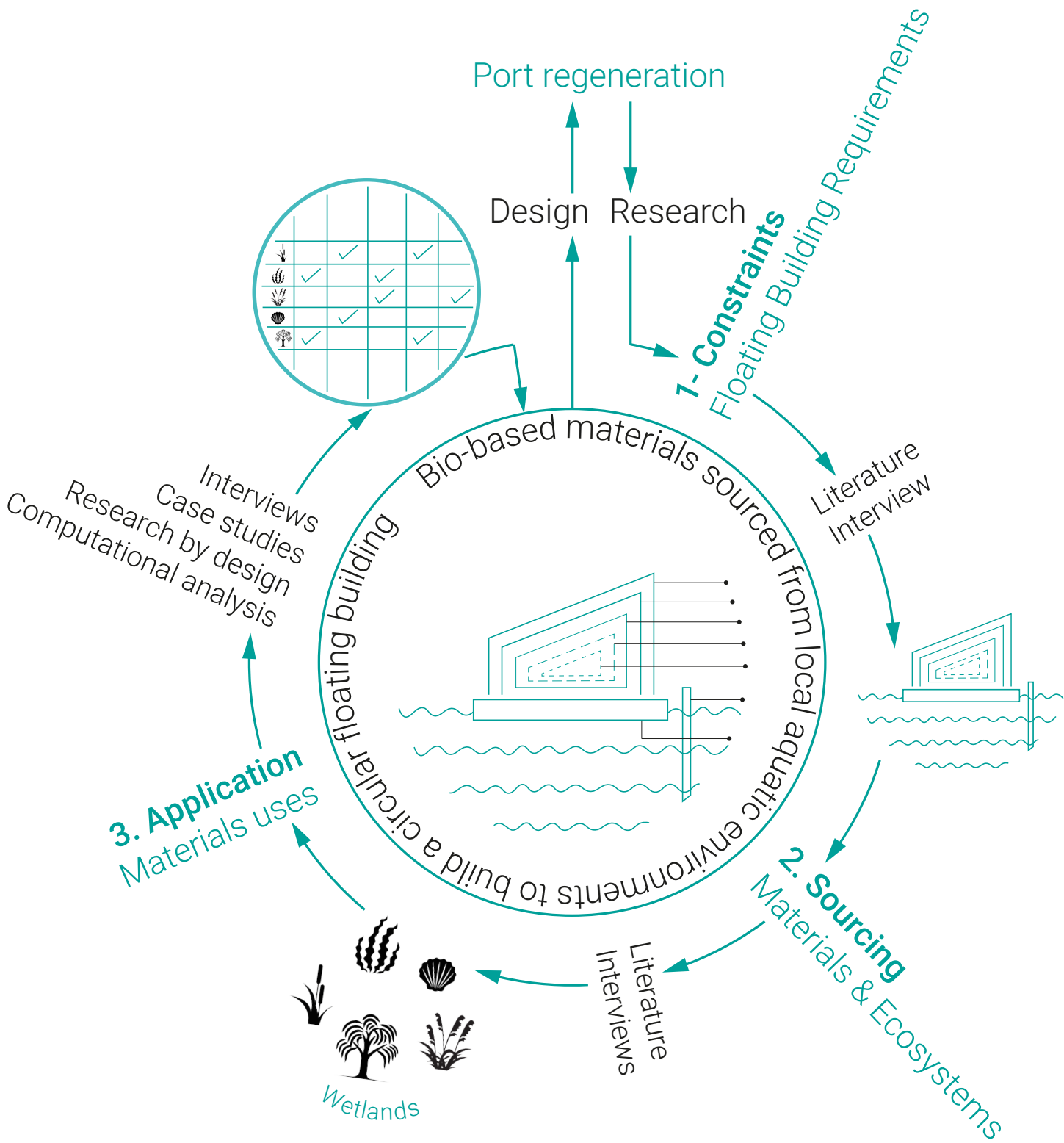


Material requirements for a floating building



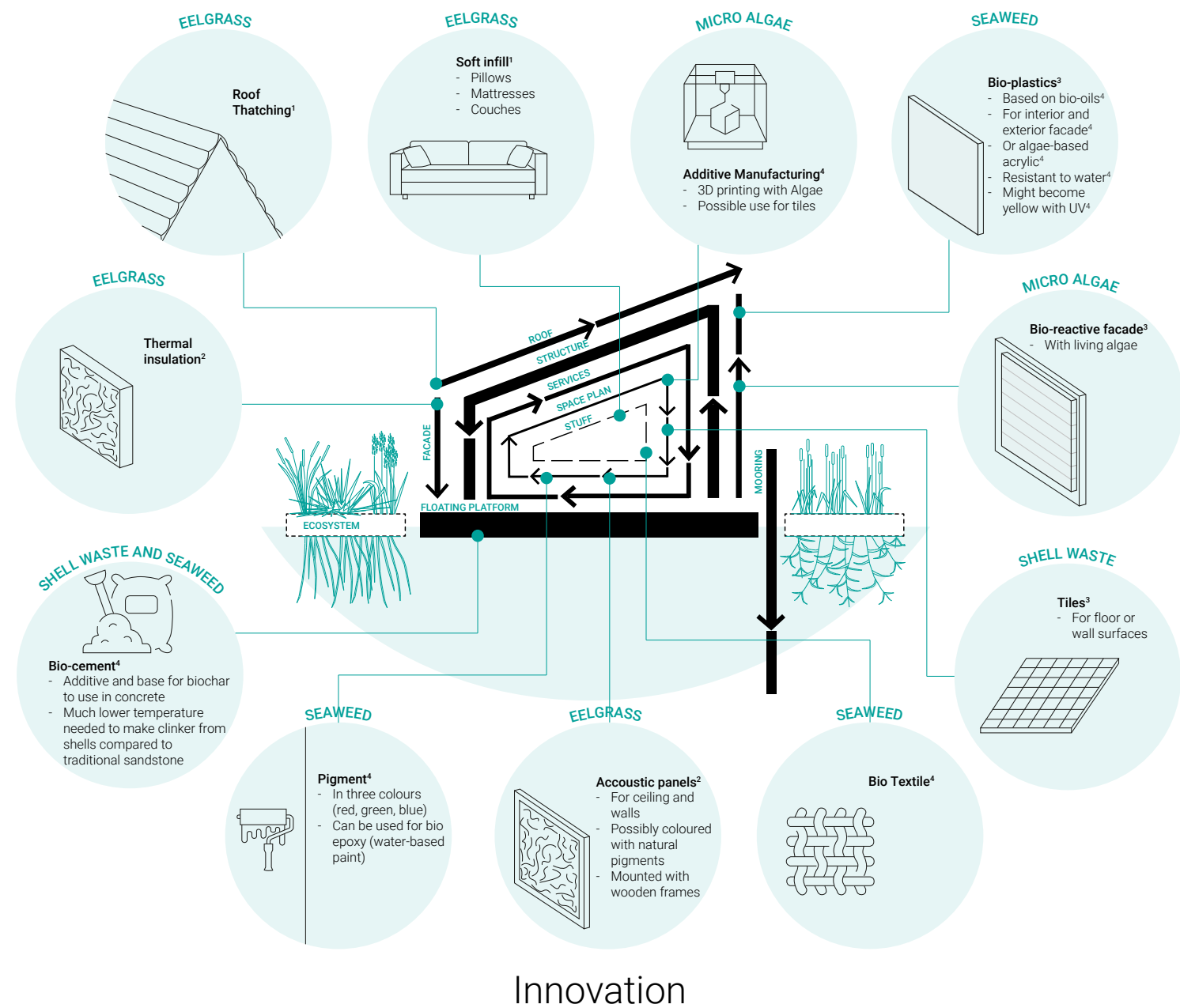
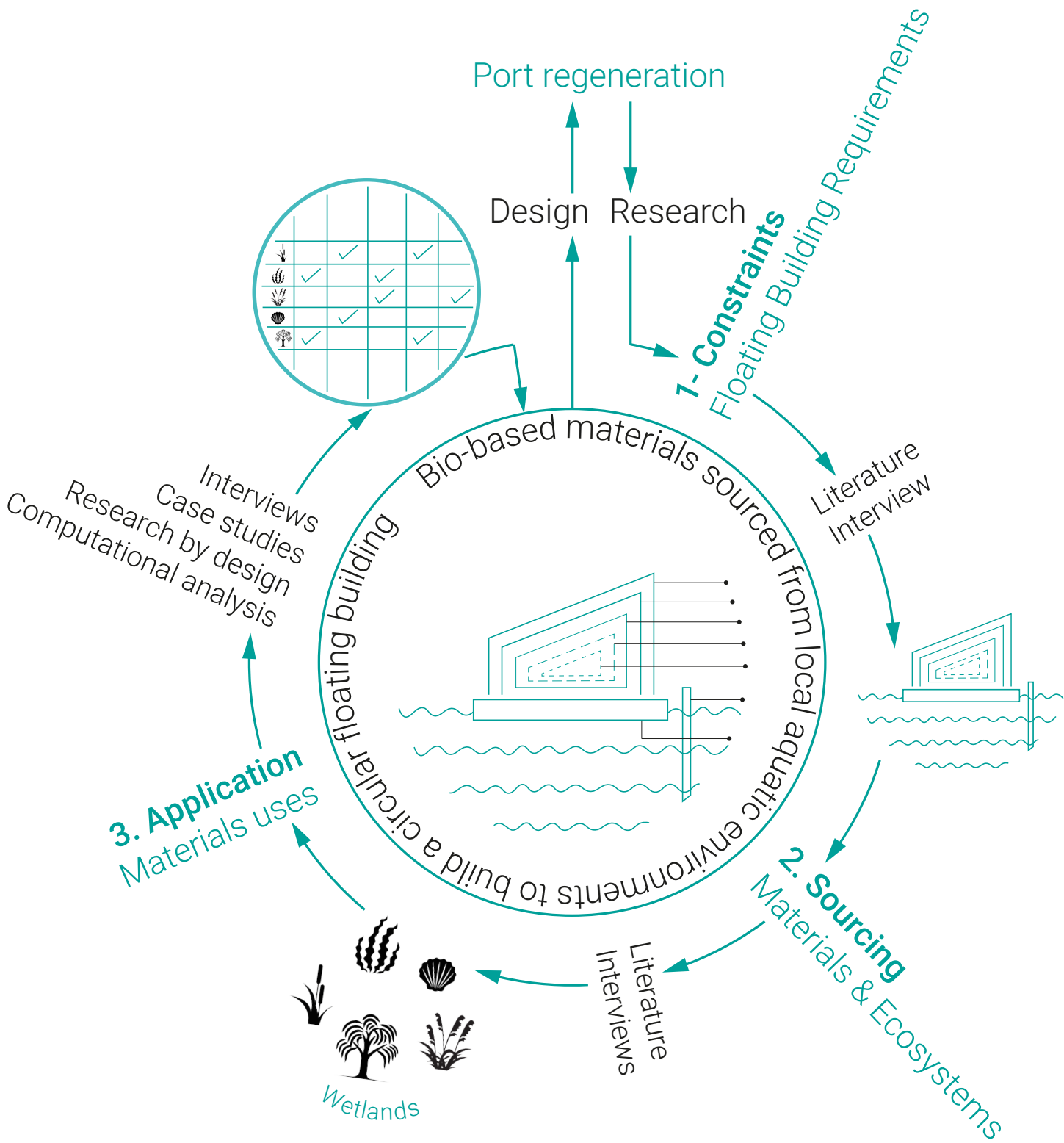
Research plan diagram

Materials sourced from aquatic ecosystems in The Netherlands

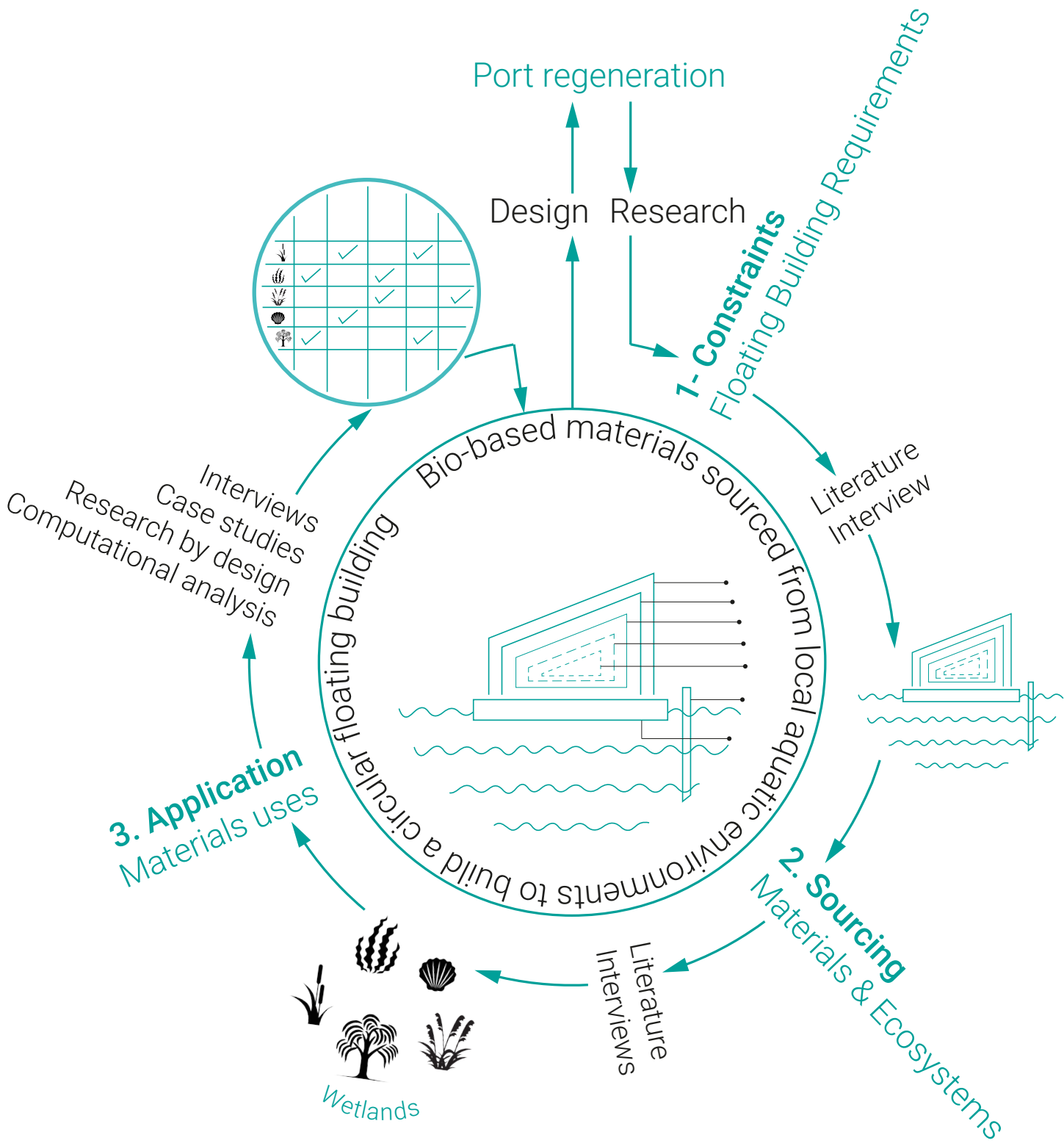


Common uses

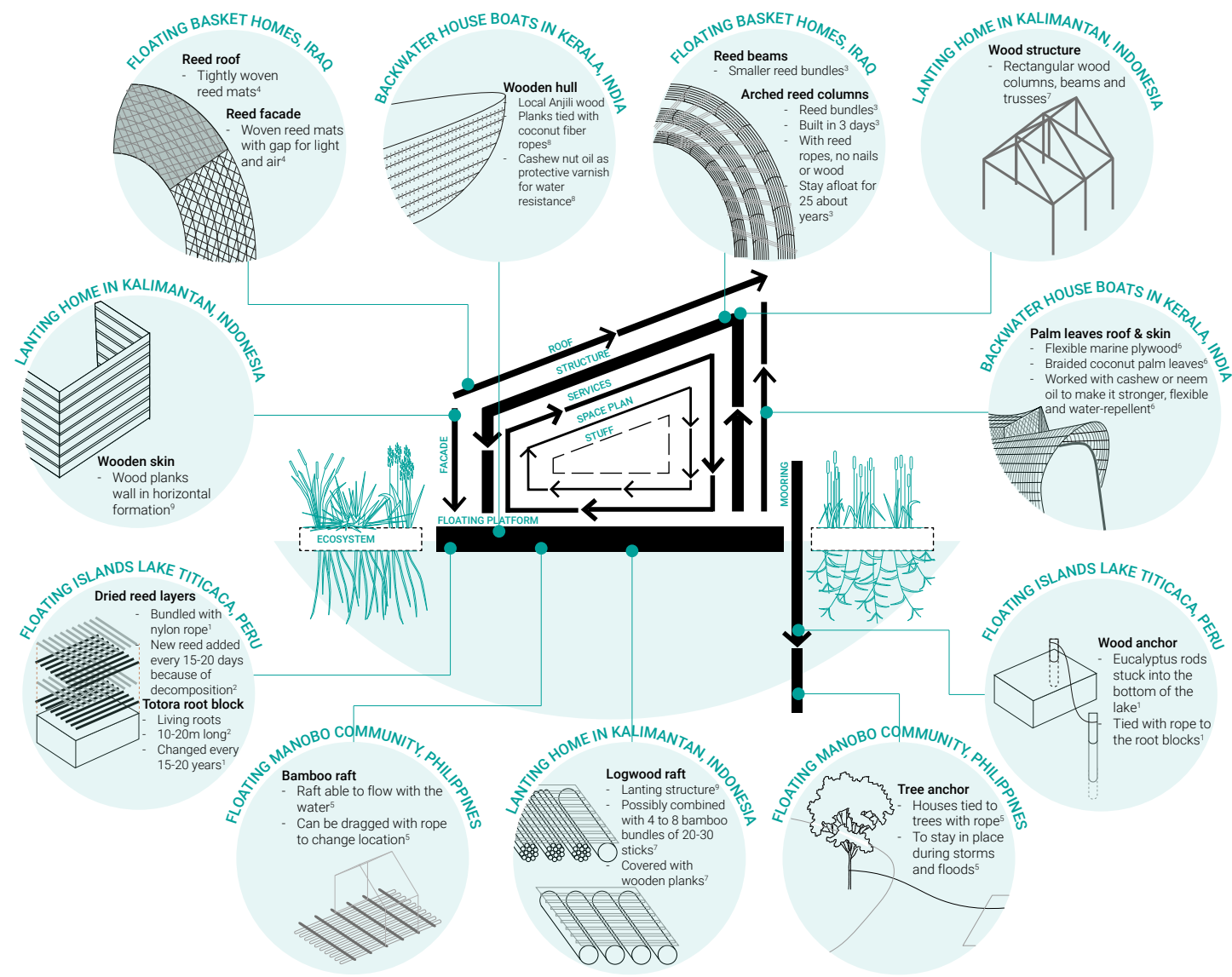
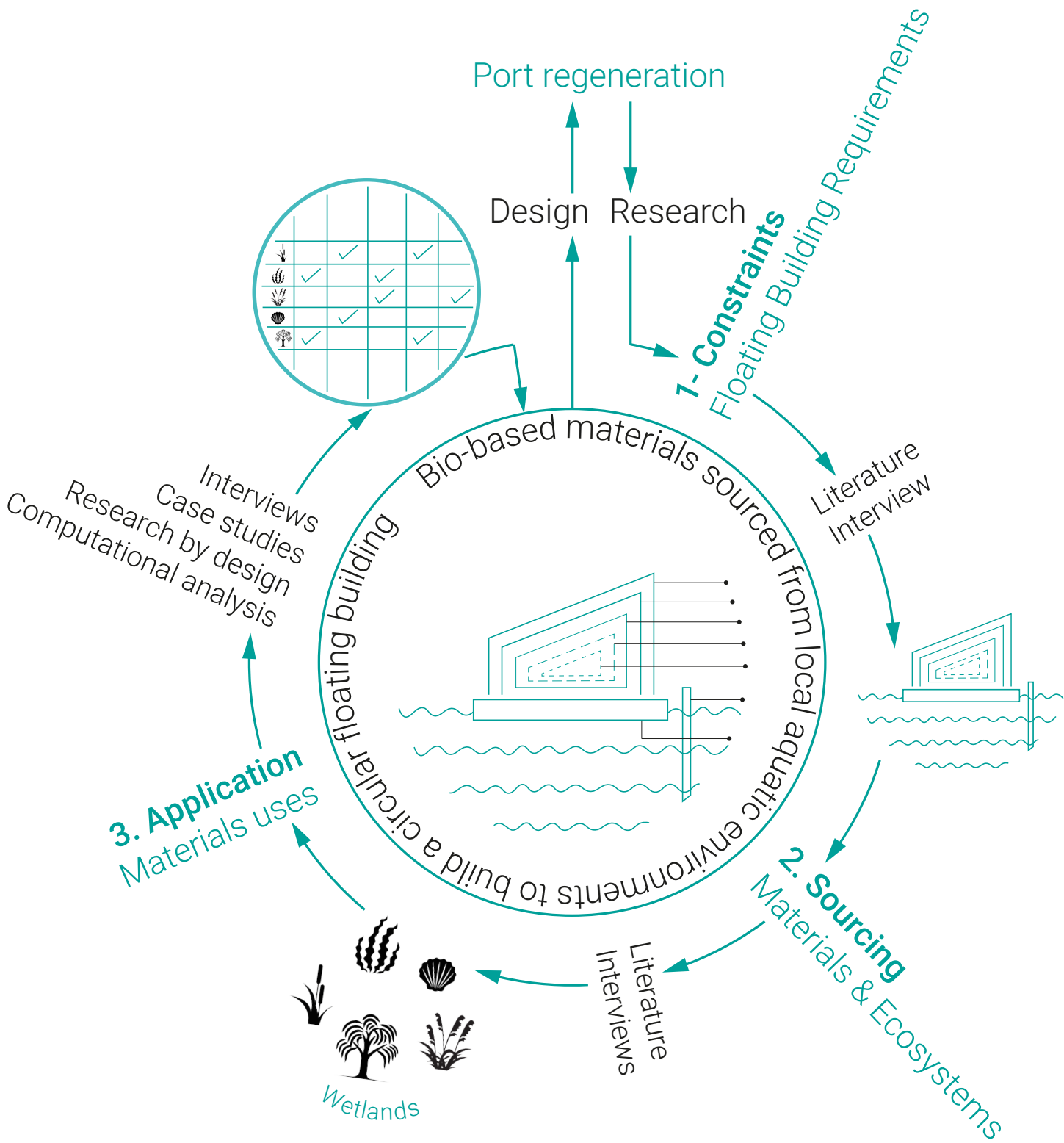
Research plan diagram



Research plan diagram

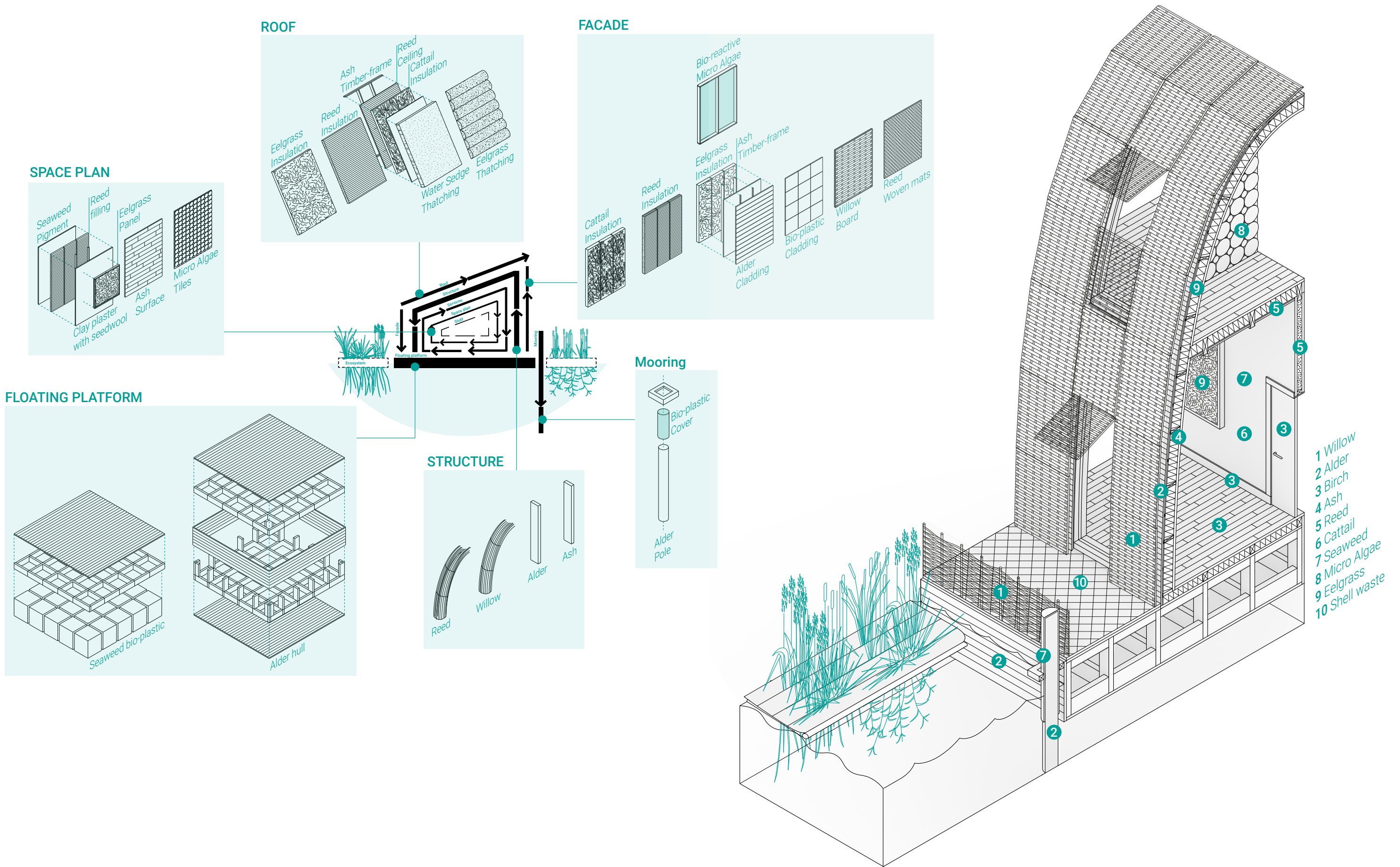


Research plan diagram



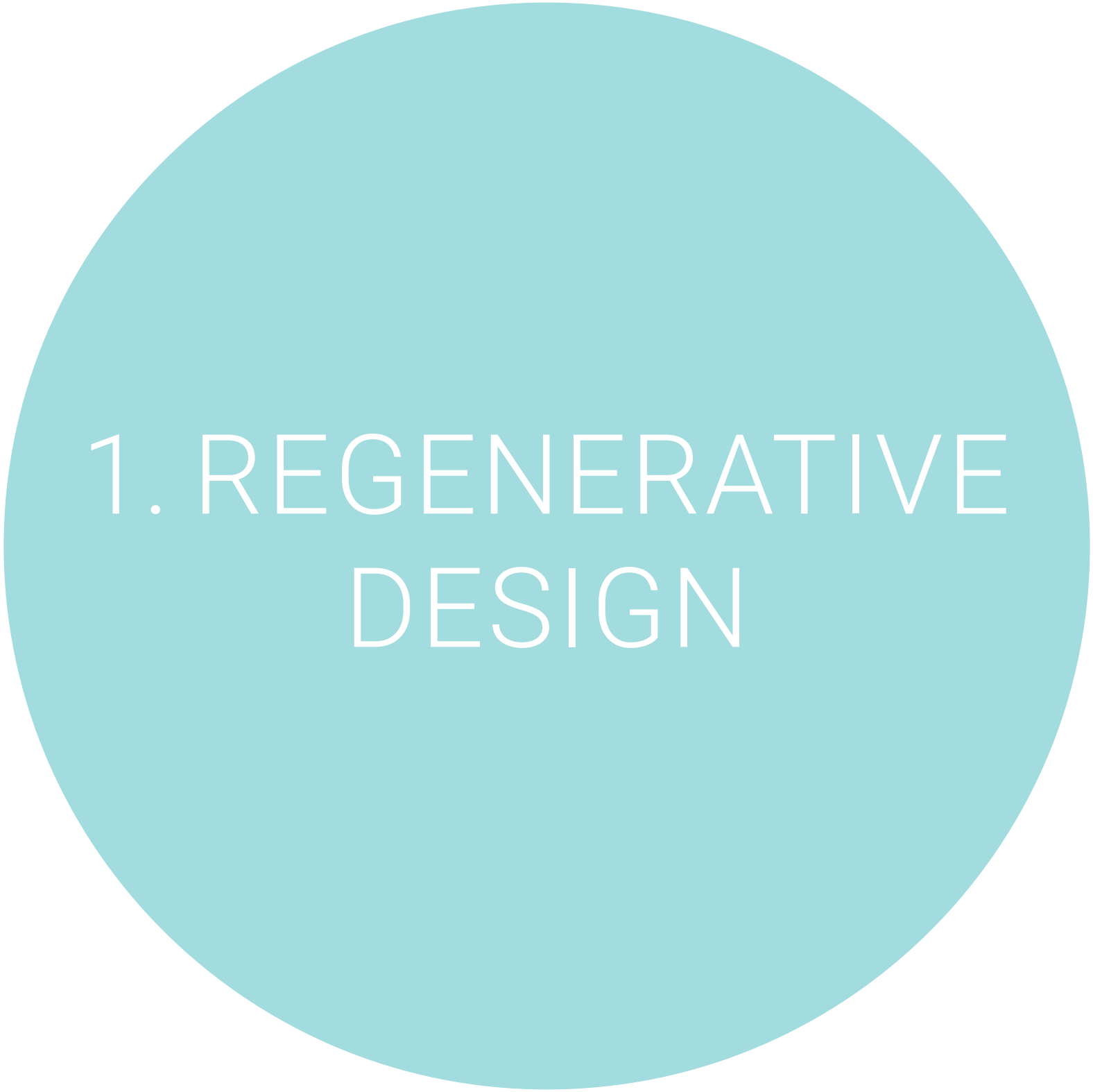
Case studies

Research plan diagram

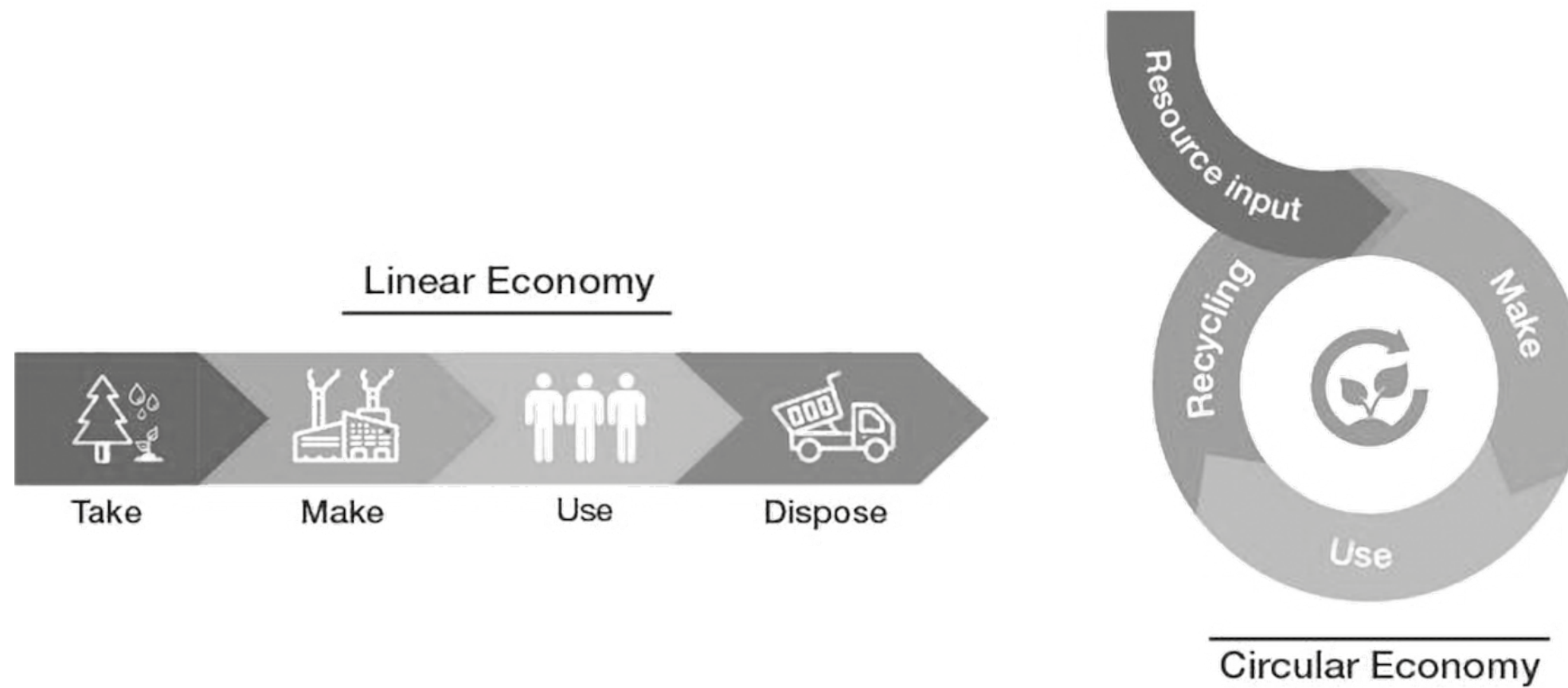


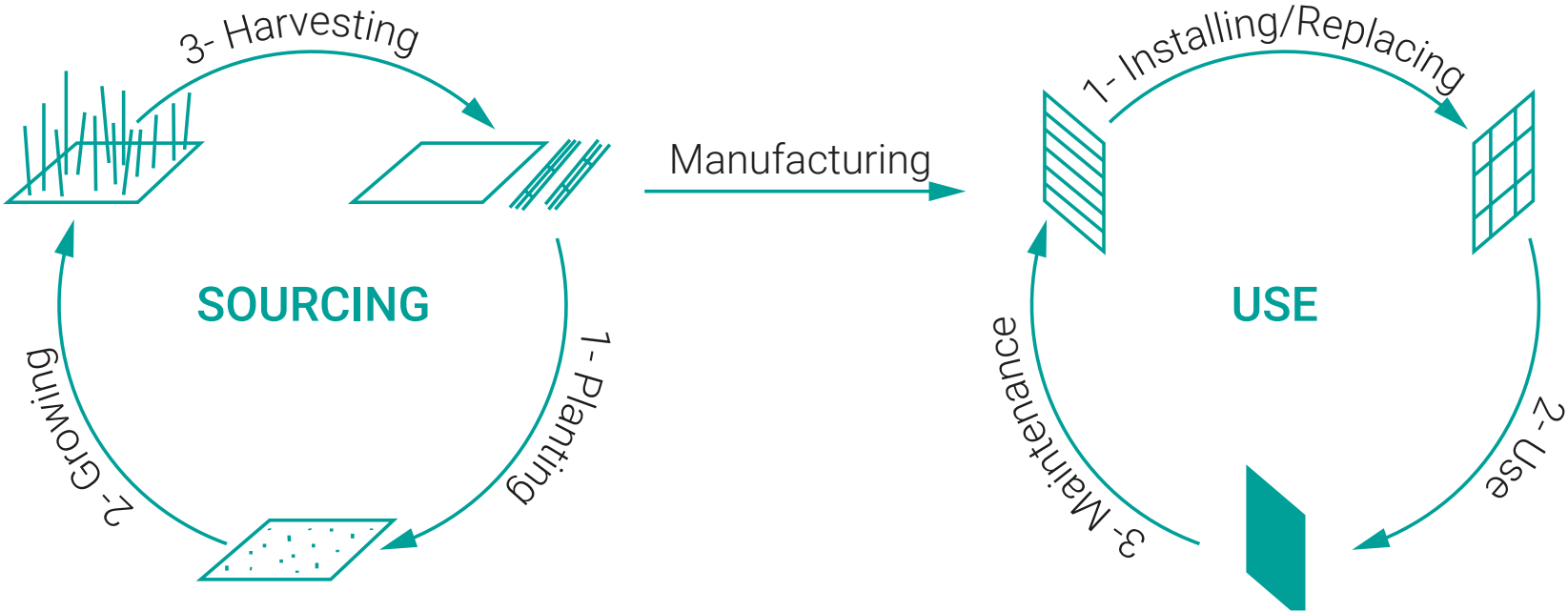
Material combinations

Research-by-design application



1. REGENERATIVE DESIGN





Life-cycle loops of bio-based materials



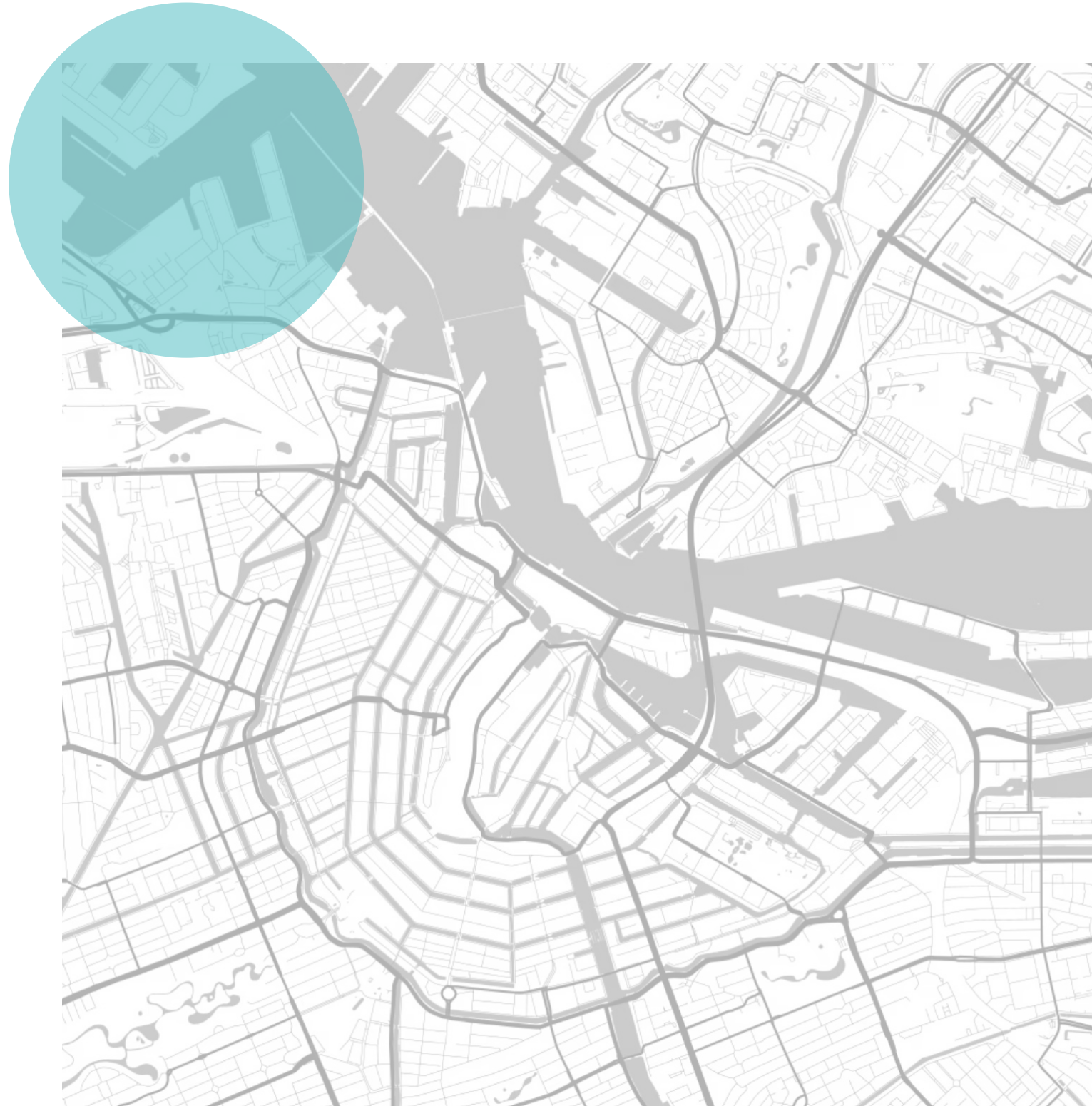


Source: <https://www.floatingislandinternational.com>





2. LOCAL APPLICATION



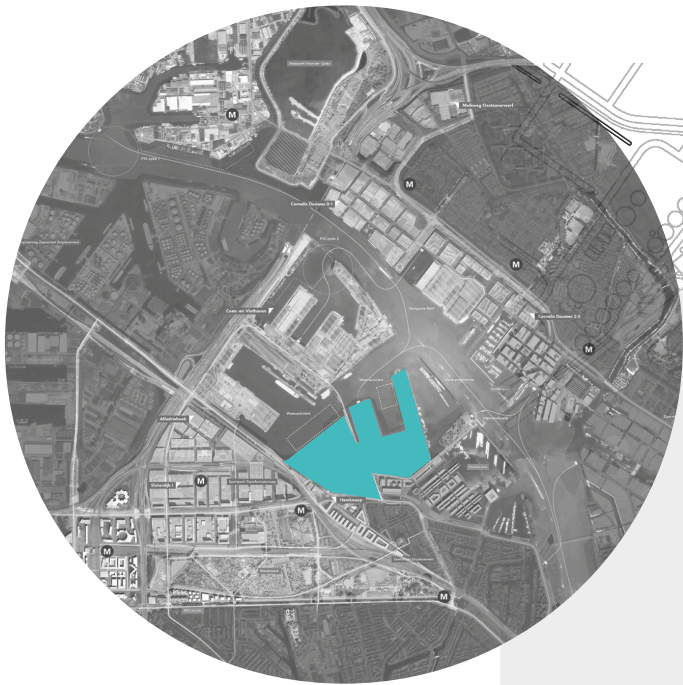
Haven Stad in Amsterdam

72 650 HOMES



58 000 JOBS

Source: <https://openresearch.amsterdam/en/page/70618/programmaplan-maatschappelijke-voorzieningen-haven-stad>



11 620 HOMES
(16% of Haven Stad)

7 747 JOBS
(13% of Haven Stad)



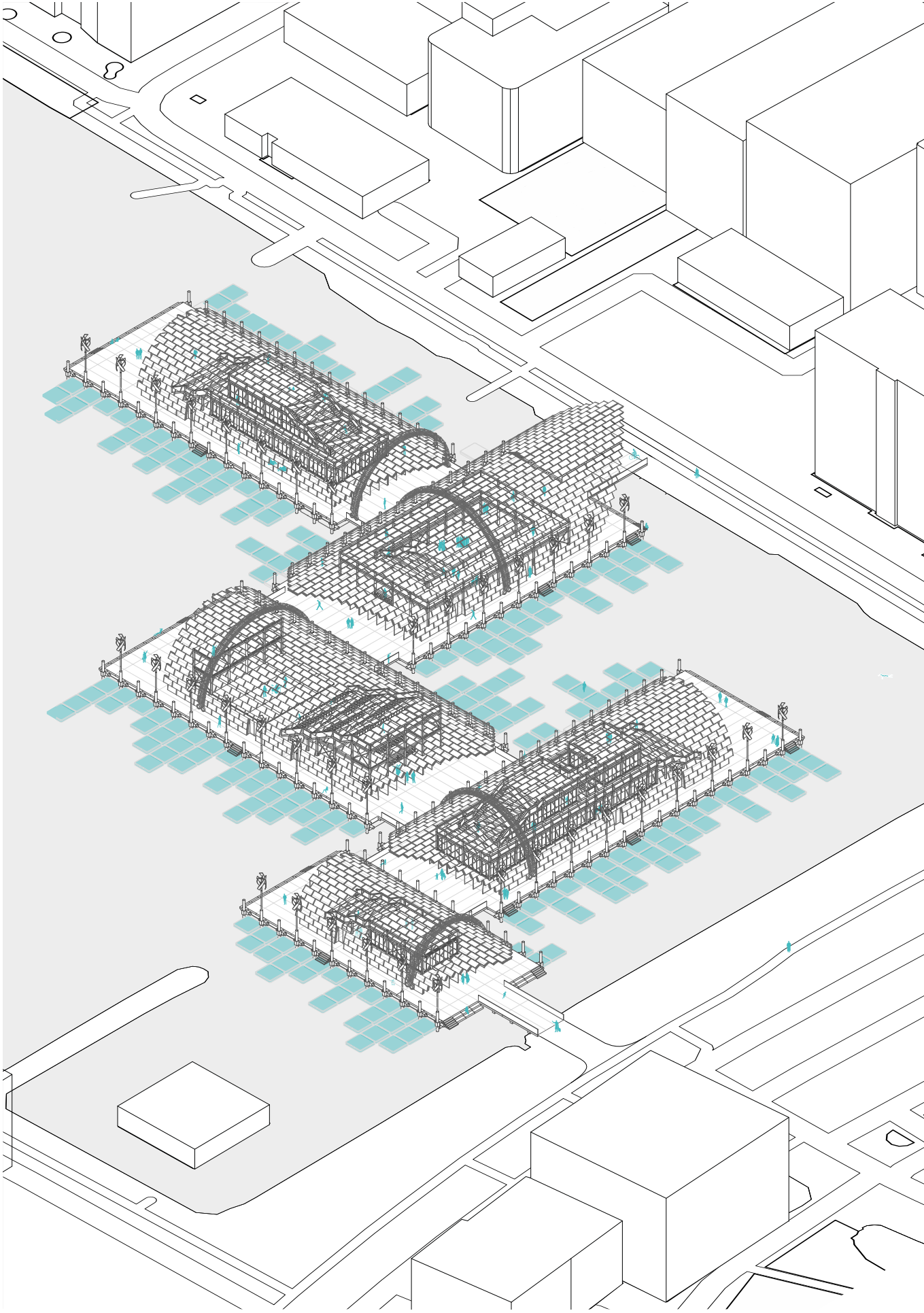
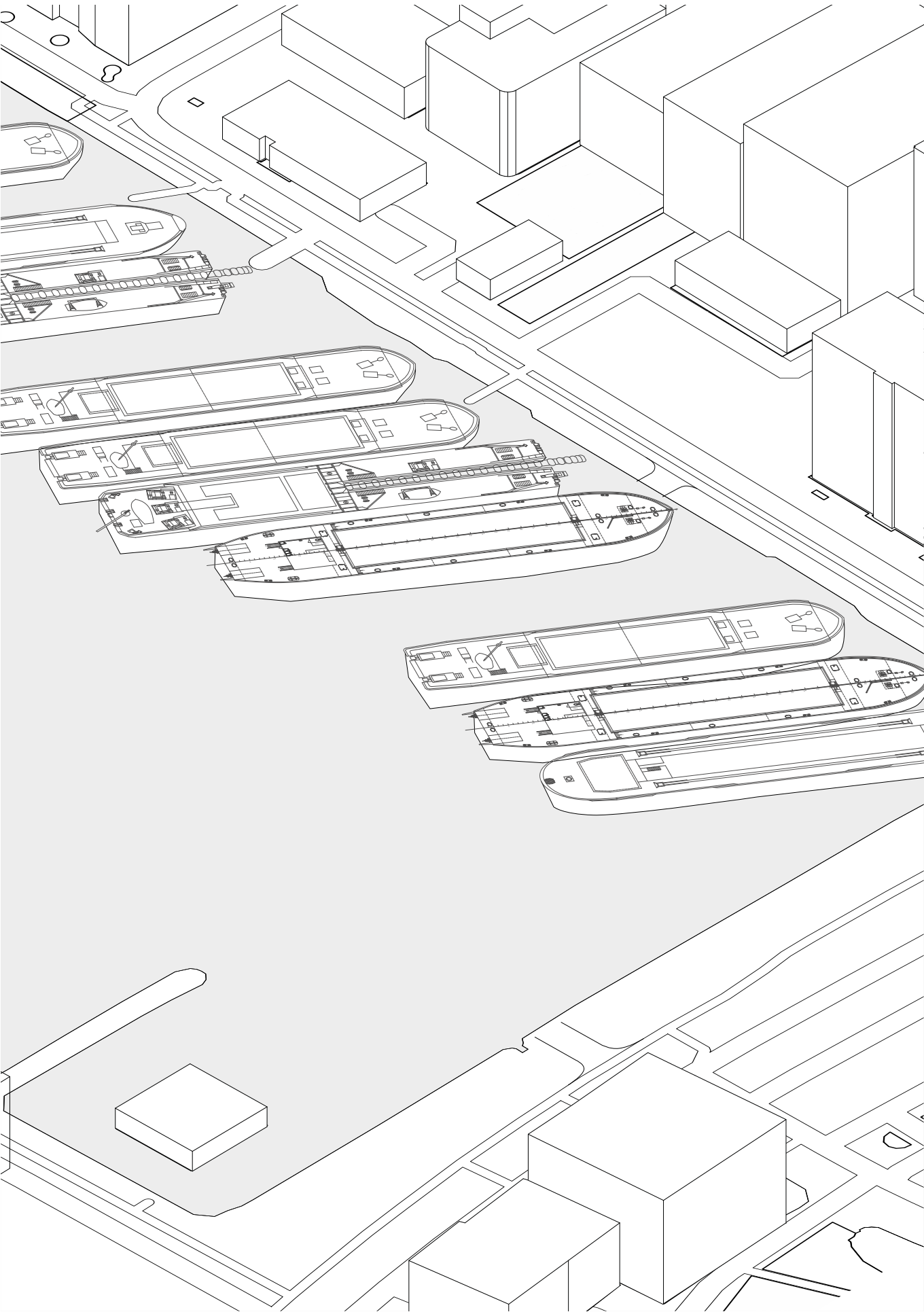
50m 100m 200m

Minervahaven district - 1:5000



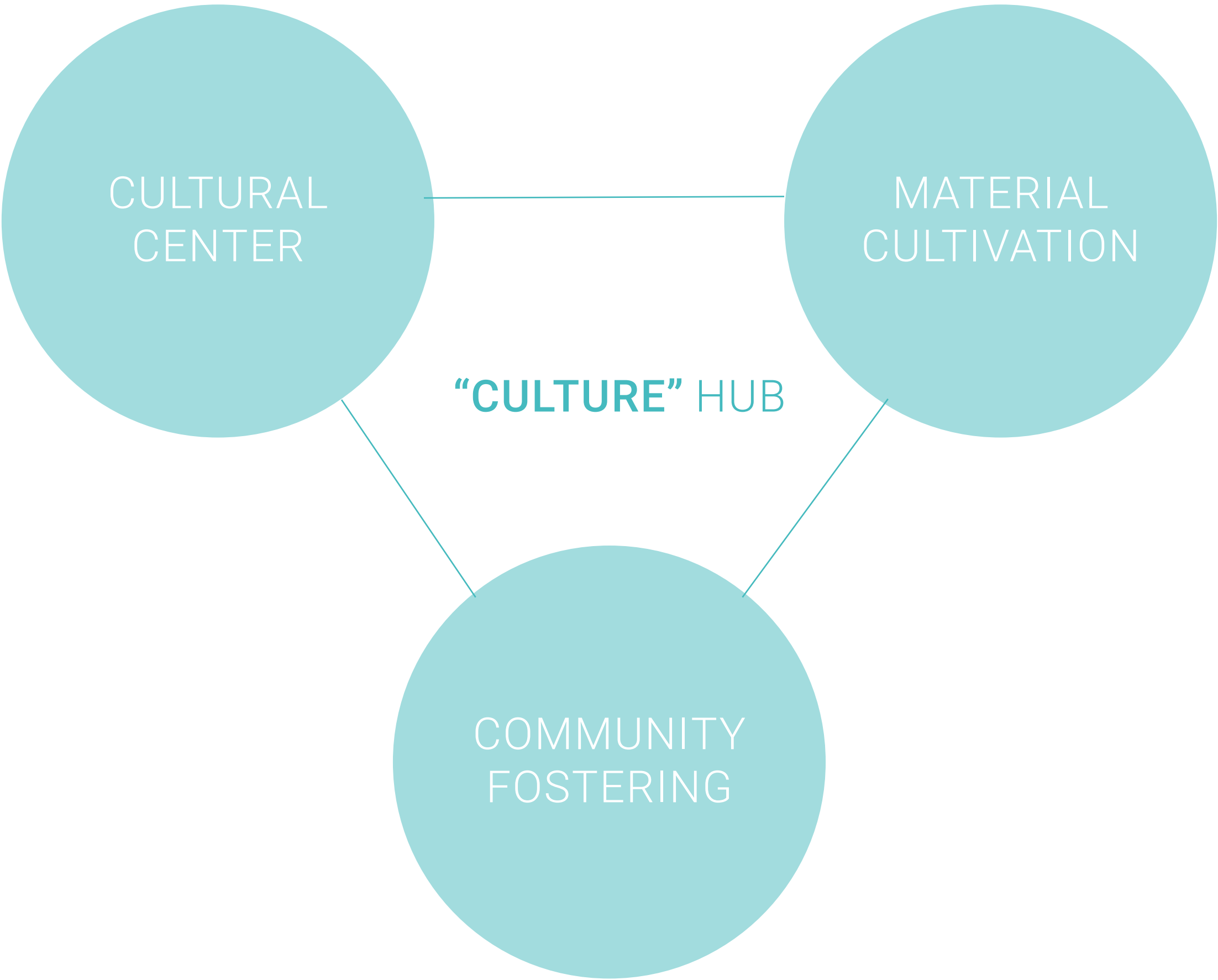


Current situation



Before/after

How can bio-based materials sourced from local aquatic ecosystems be **integrated in the design** of a floating **public building** that **positively impacts** the environment and the future **communities** of Amsterdam's **Haven Stad**?



Regenerative public building concept

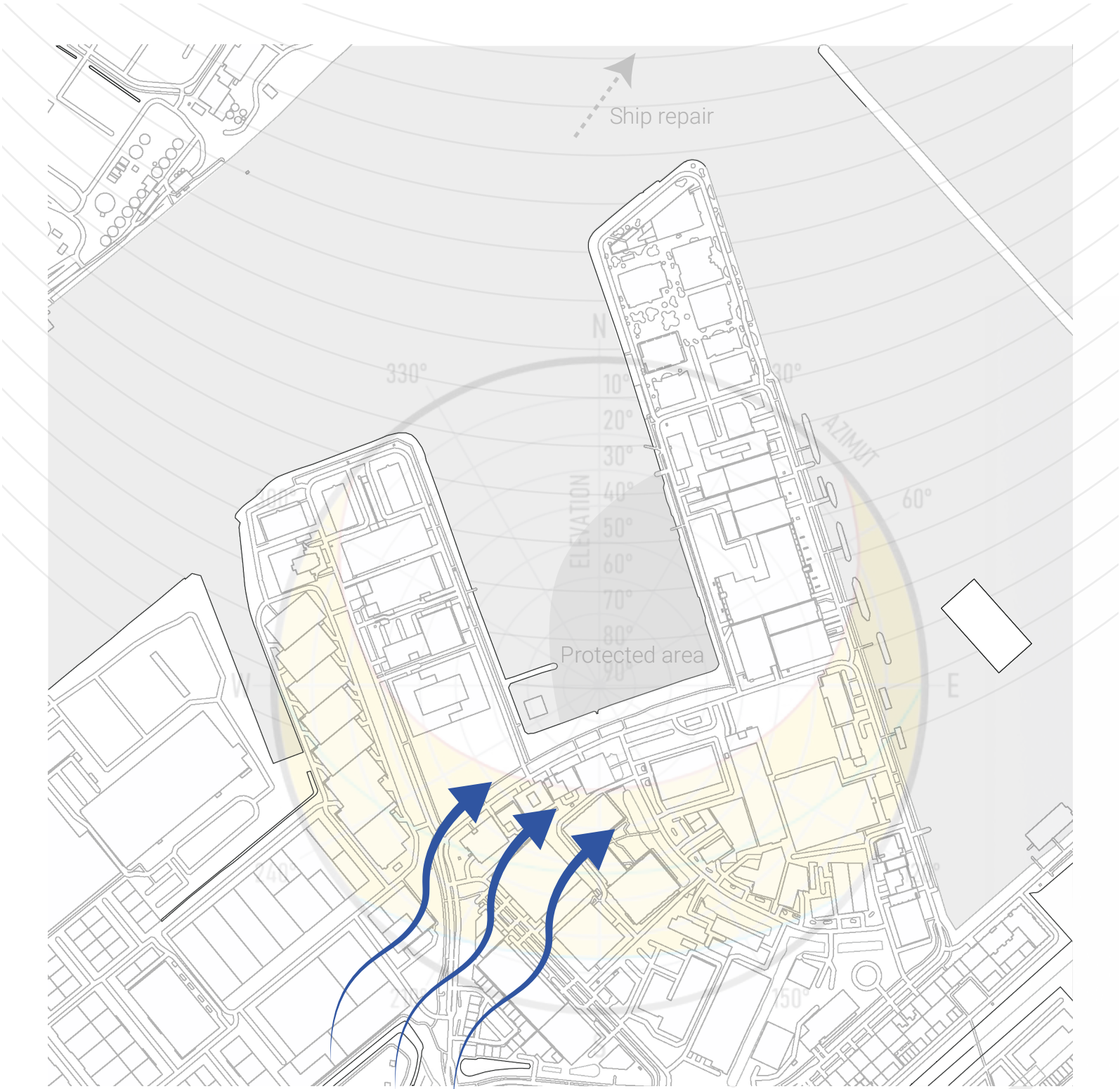


- Planned bike connections
- Planned ferry line
- Planned metro line

50m 100m 200m

Mobility - 1:5000



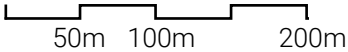
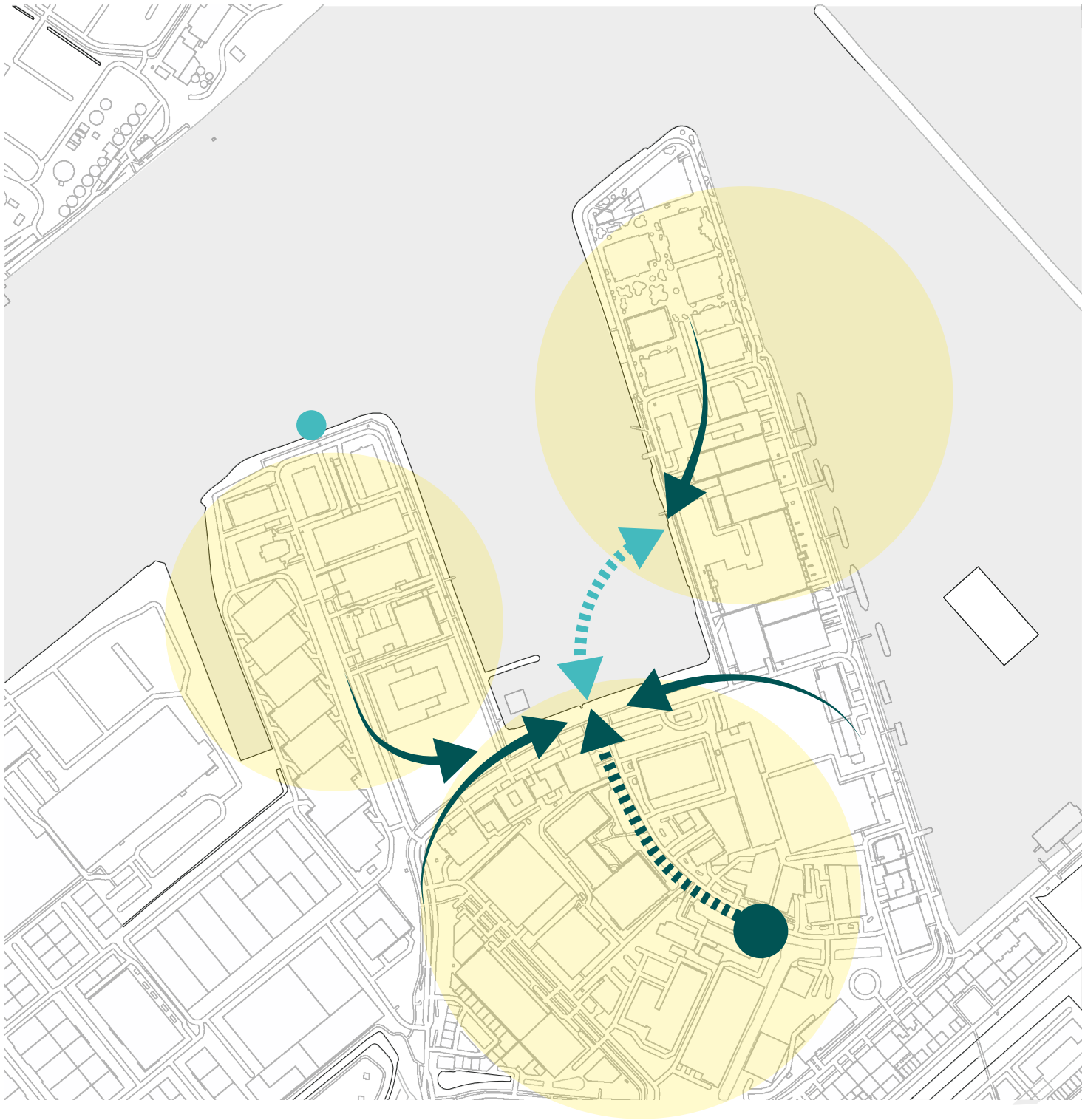


Wind direction
Waves direction

50m 100m 200m

Climatic conditions - 1:5000





Urban connection - 1:5000

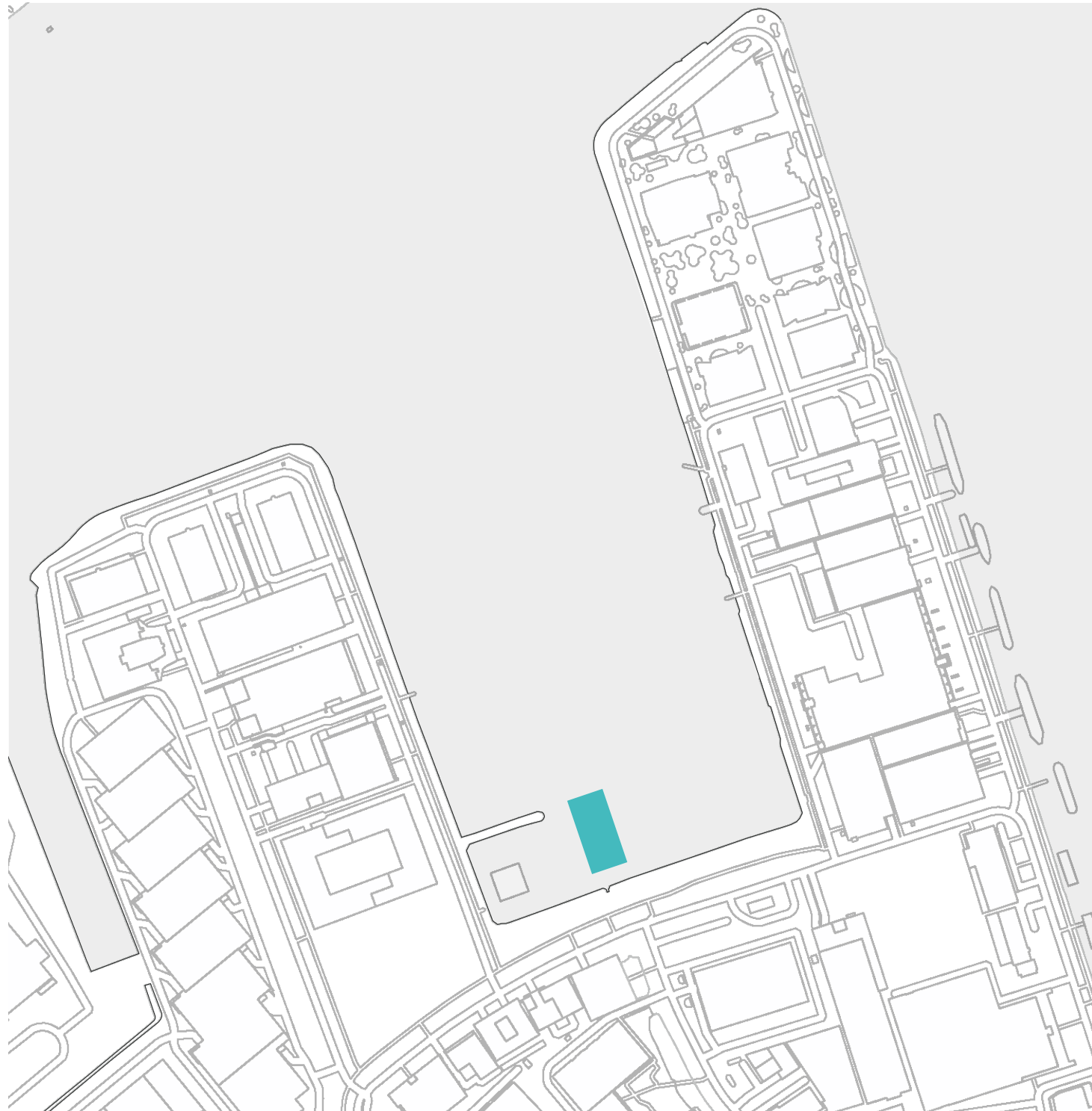




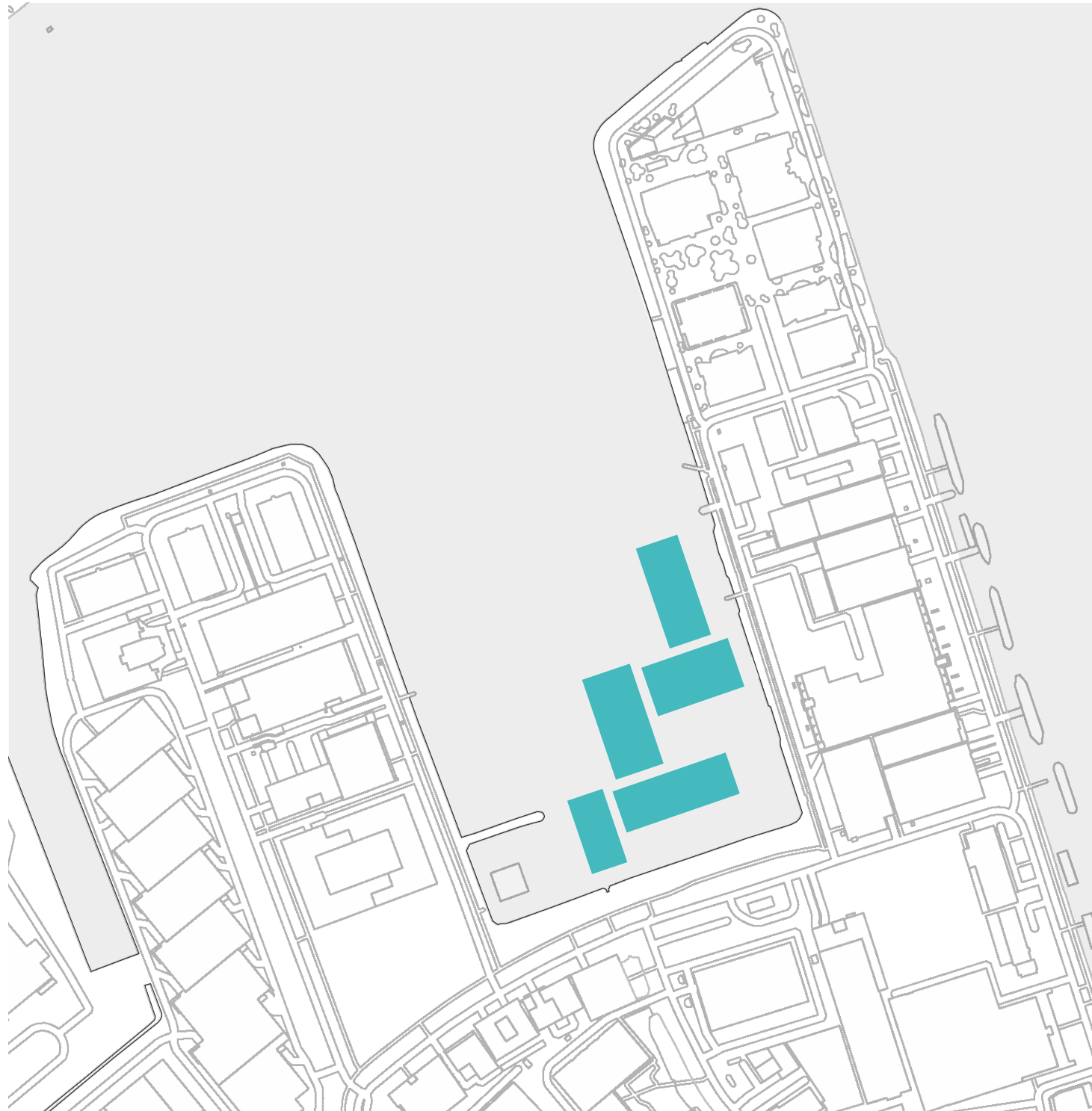
50m 100m 200m

Massing - 1:5000





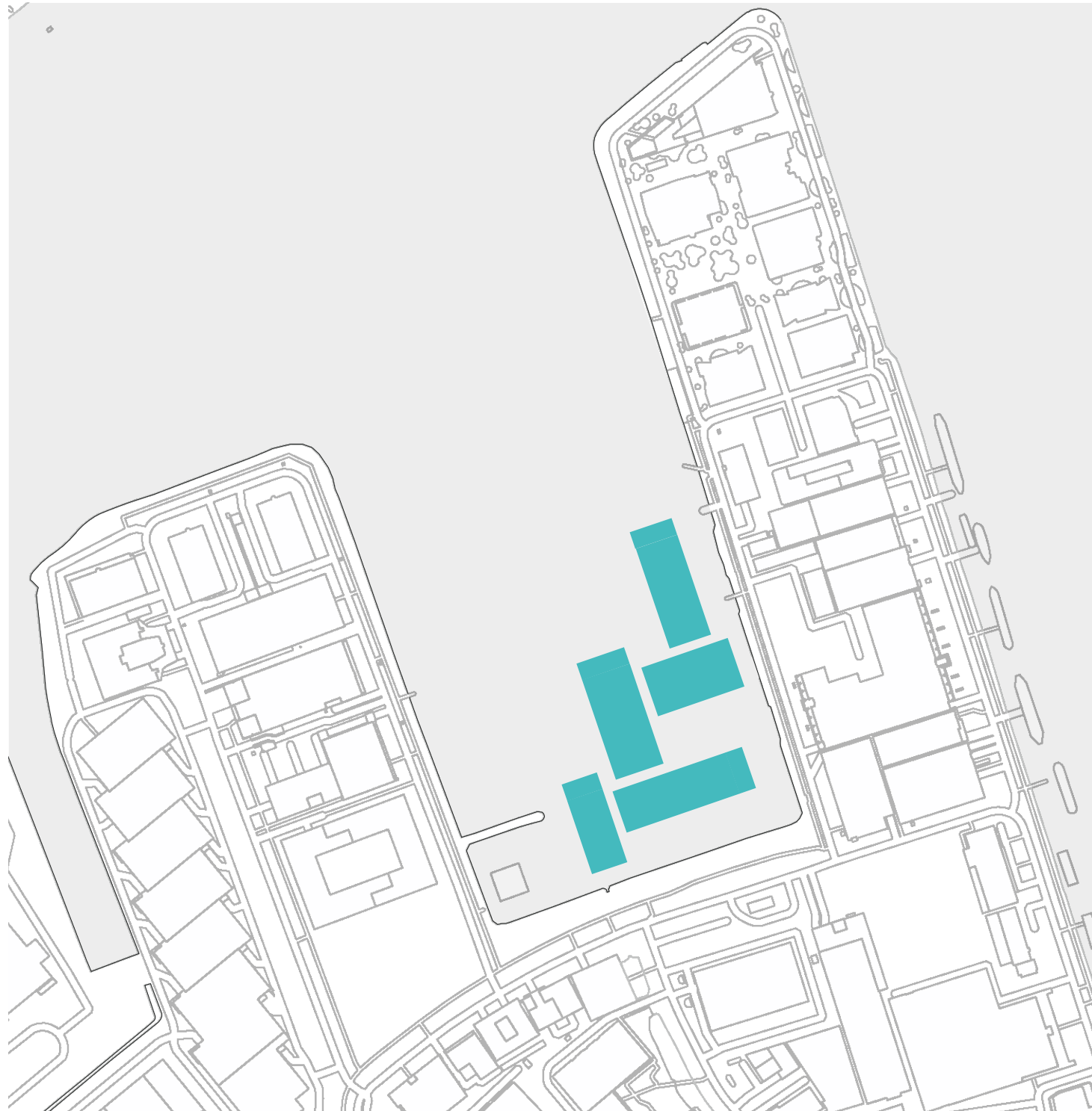
Adaptability & expandability



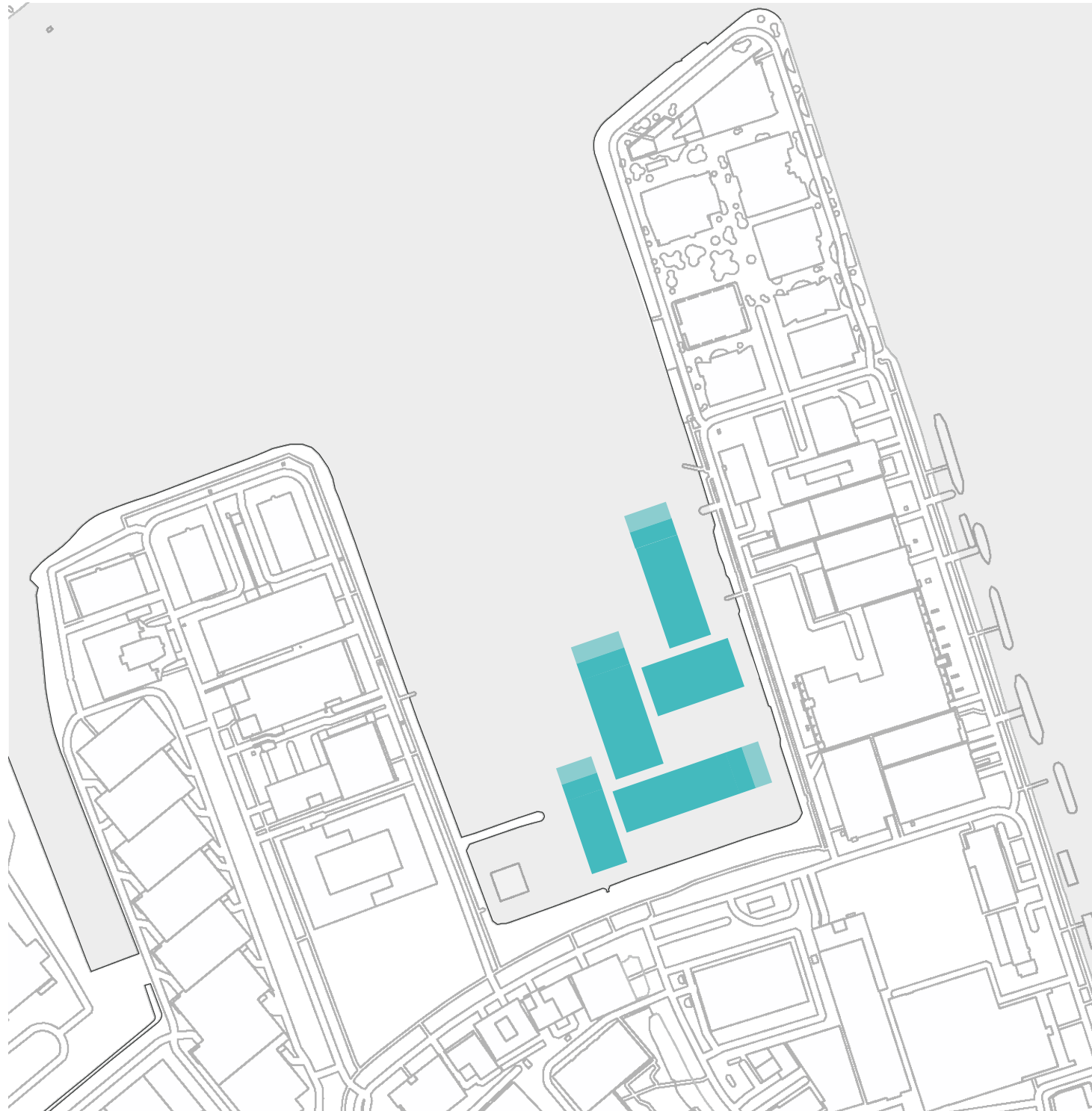
Adaptability & expandability



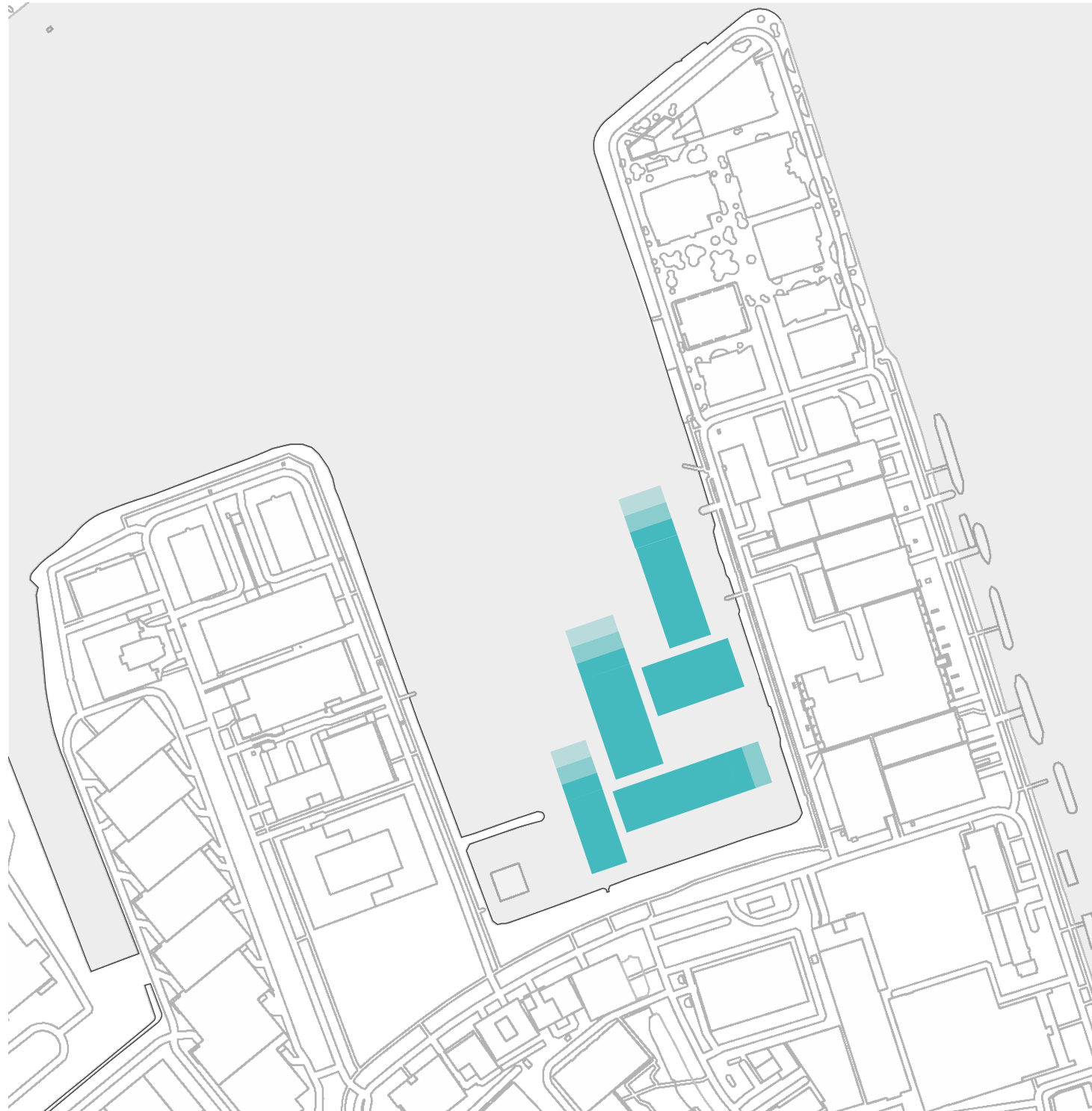
Adaptability & expandability



Adaptability & expandability



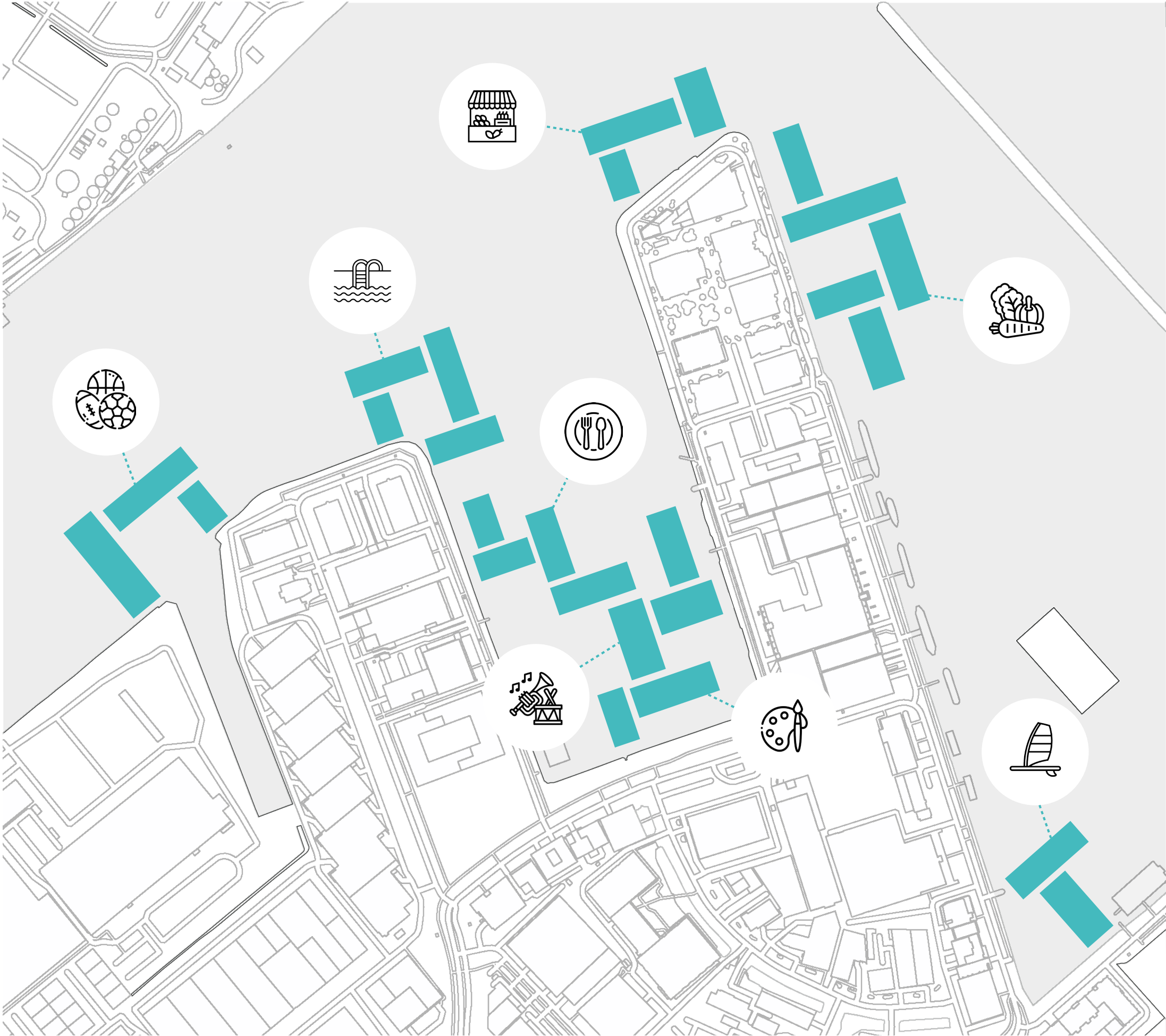
Adaptability & expandability



Adaptability & expandability



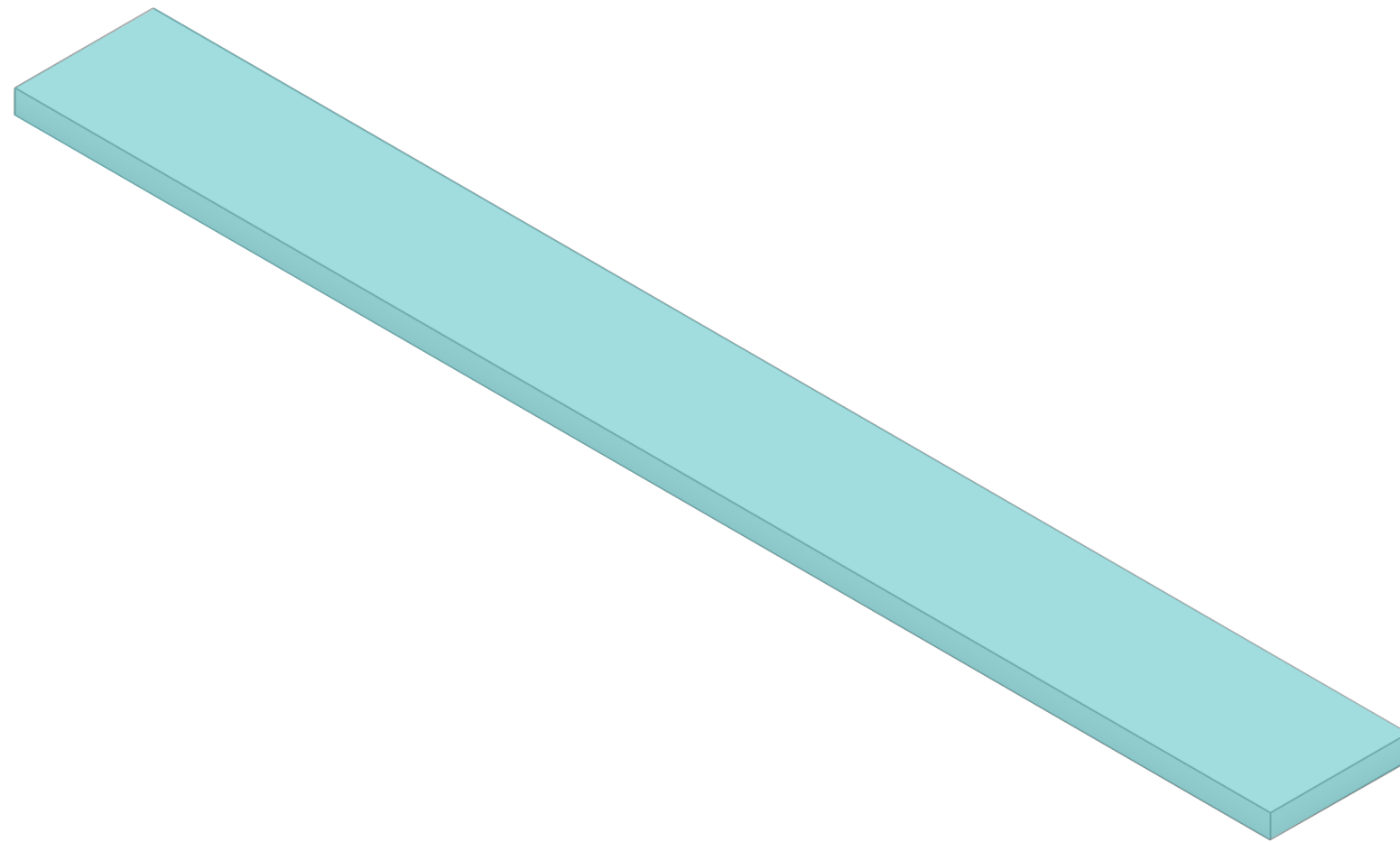
Adaptability & expandability



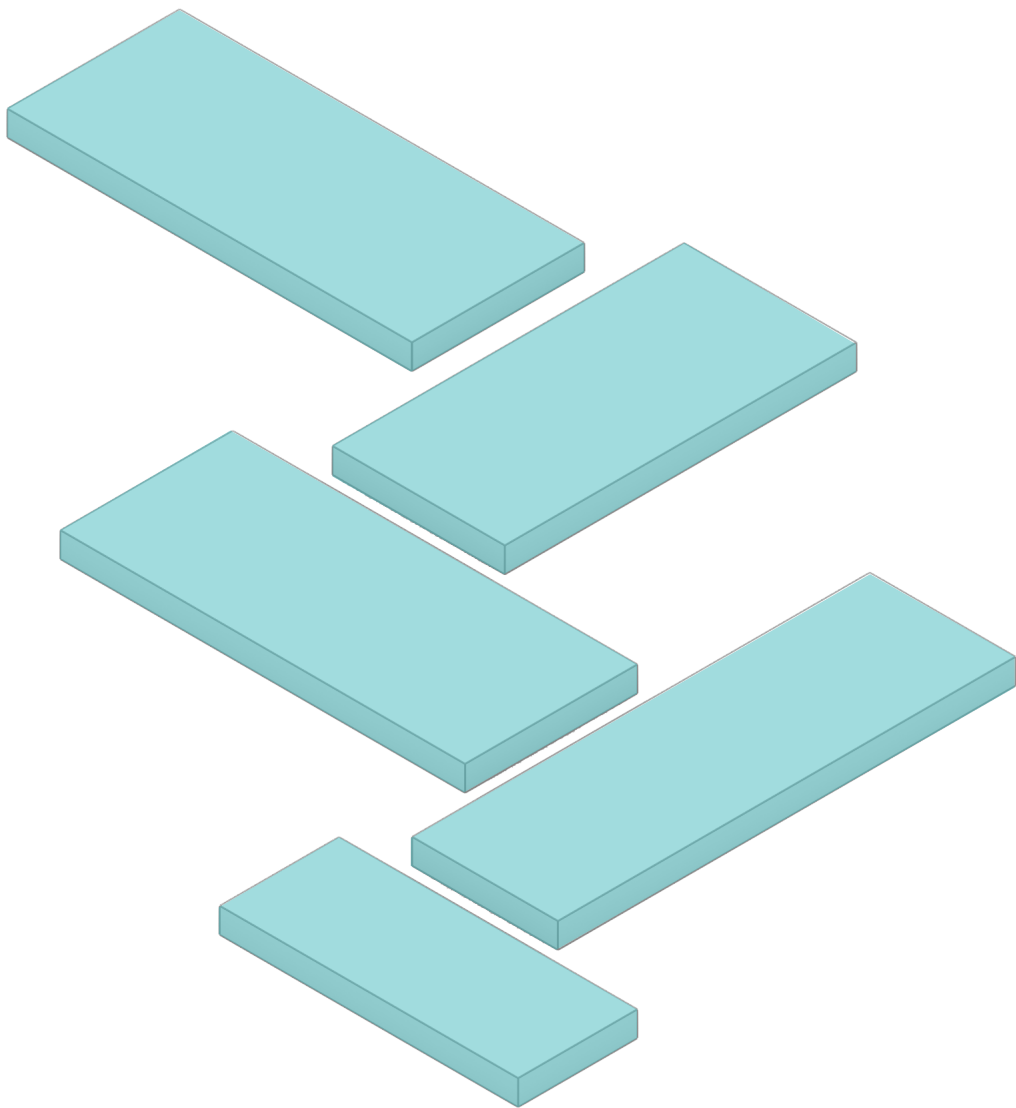
Maximum expansion



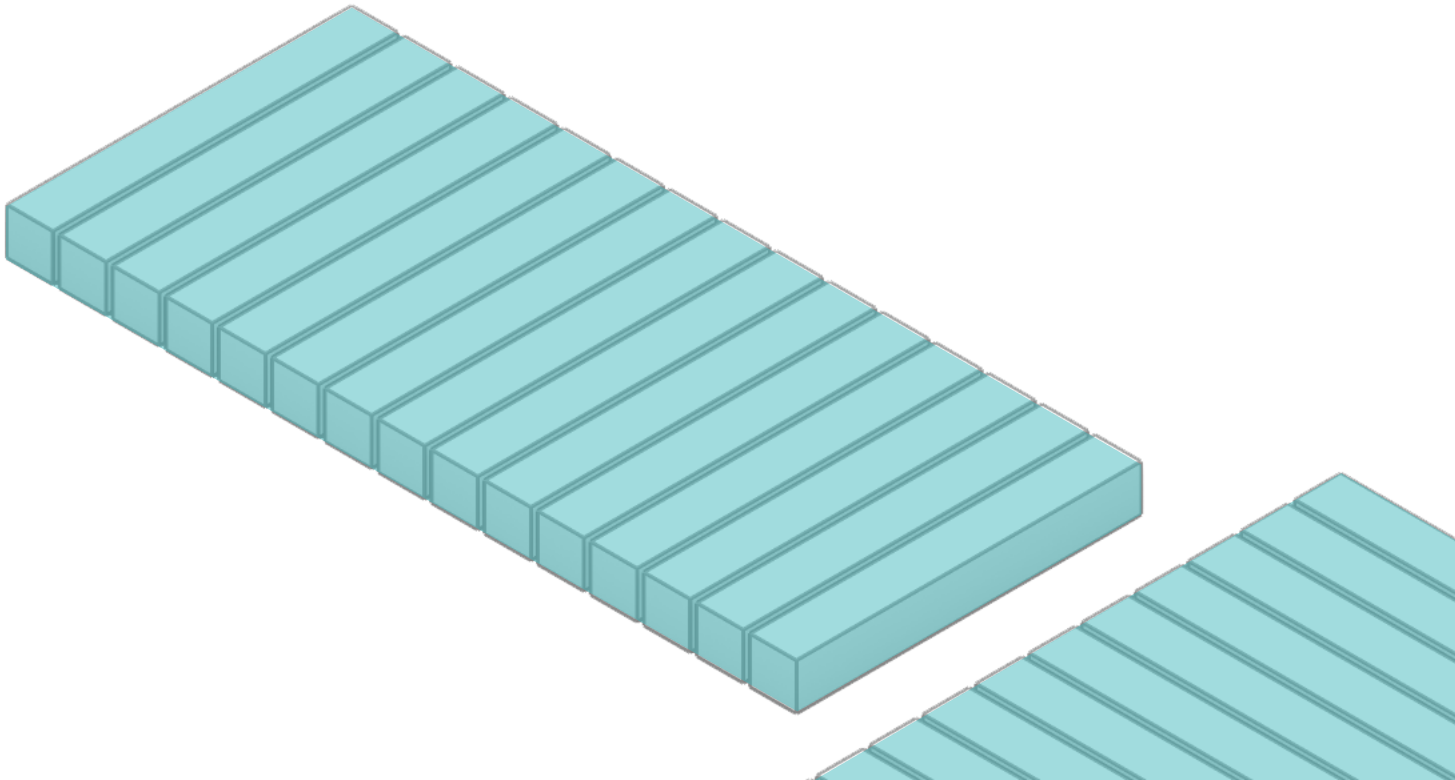
3. SYSTEMIC DESIGN



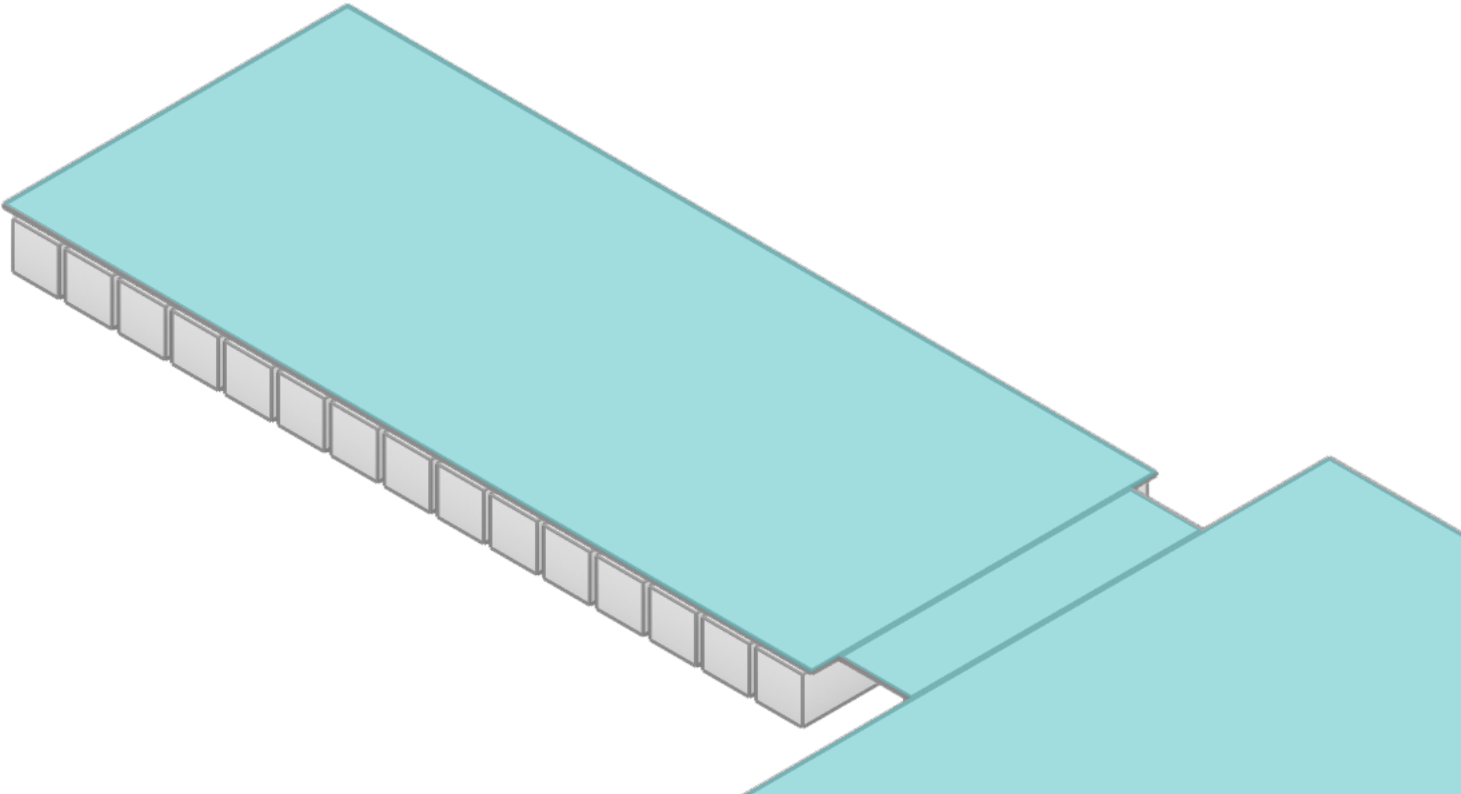
Floating platform



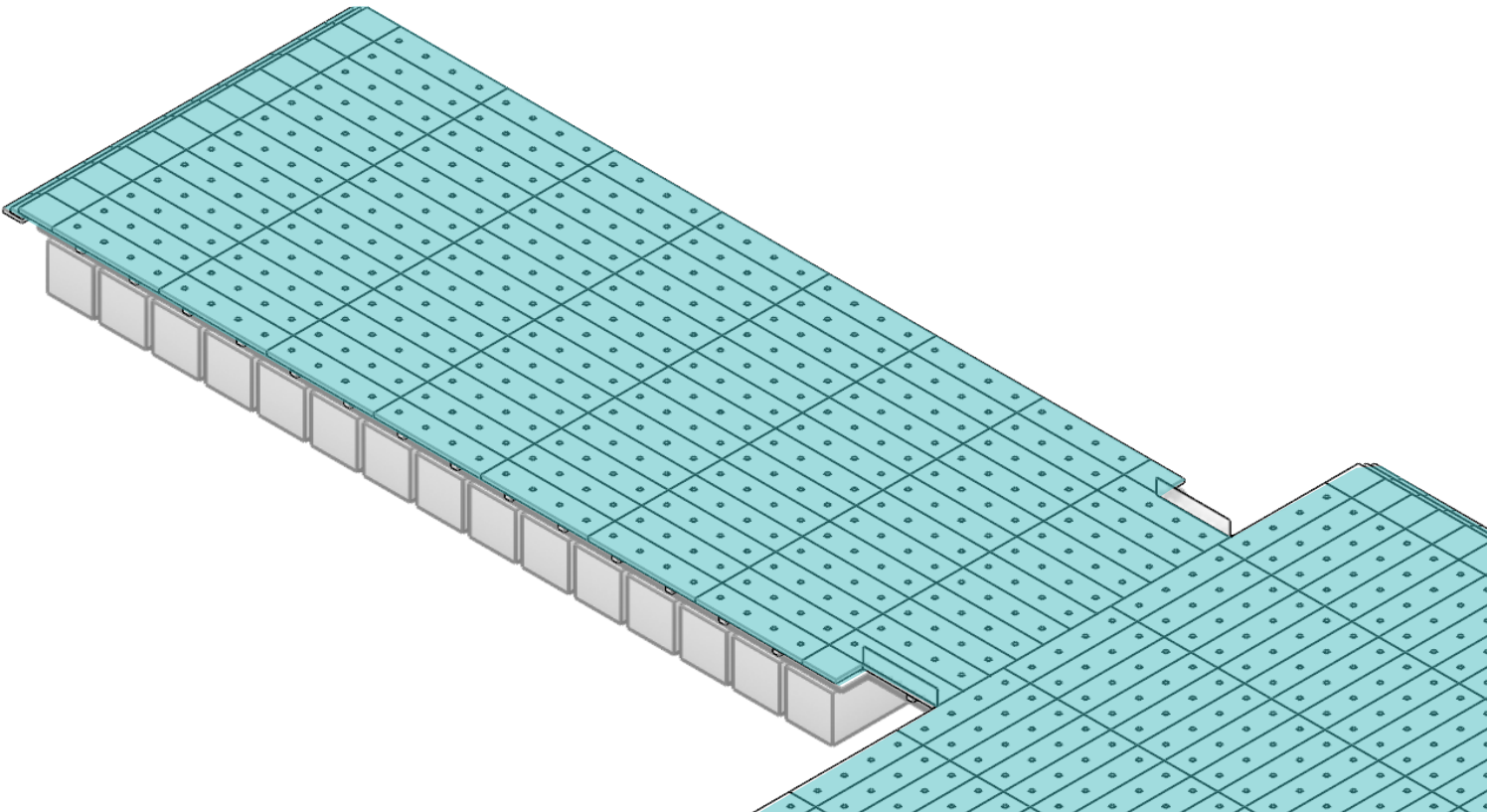
Platform division



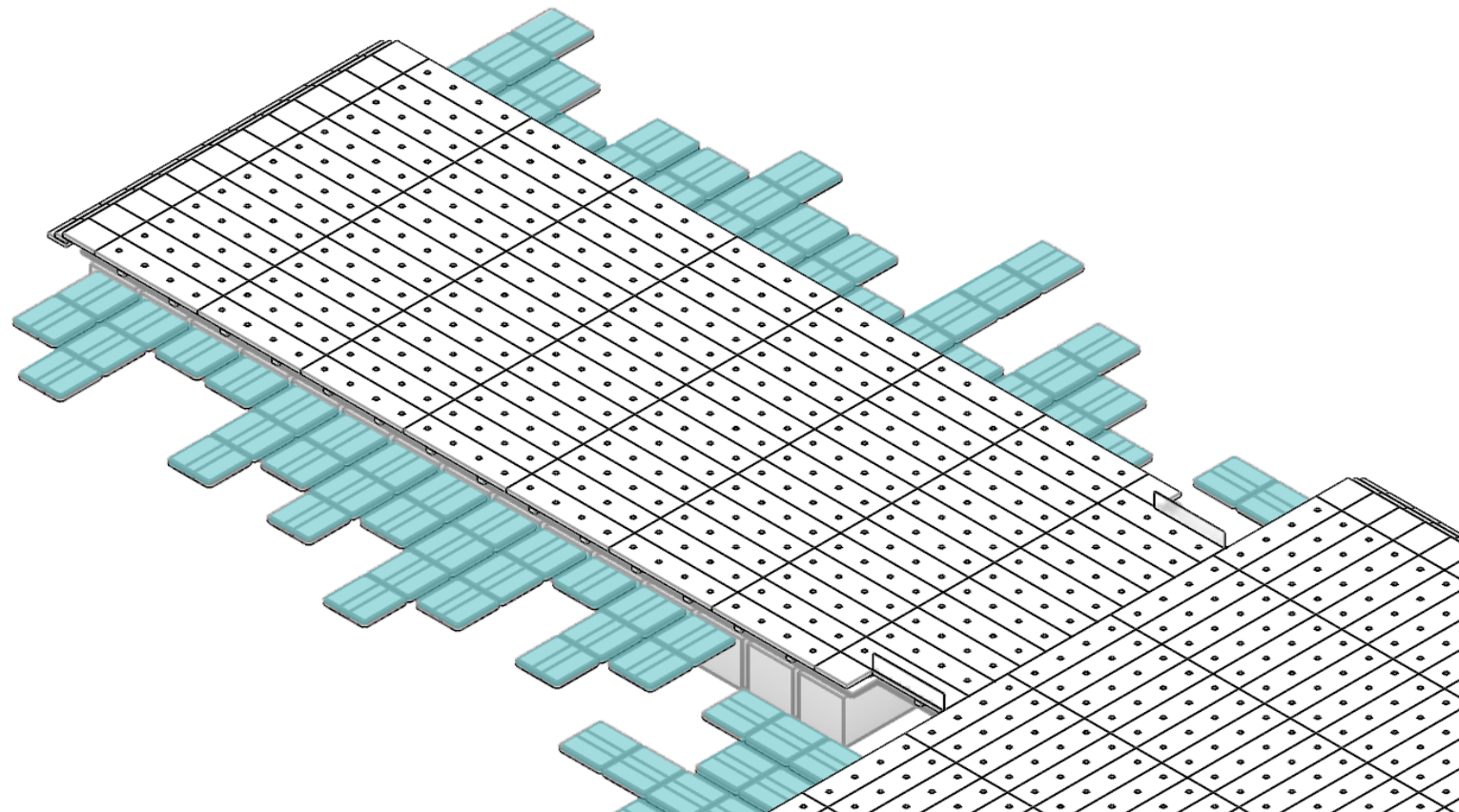
Modular platform



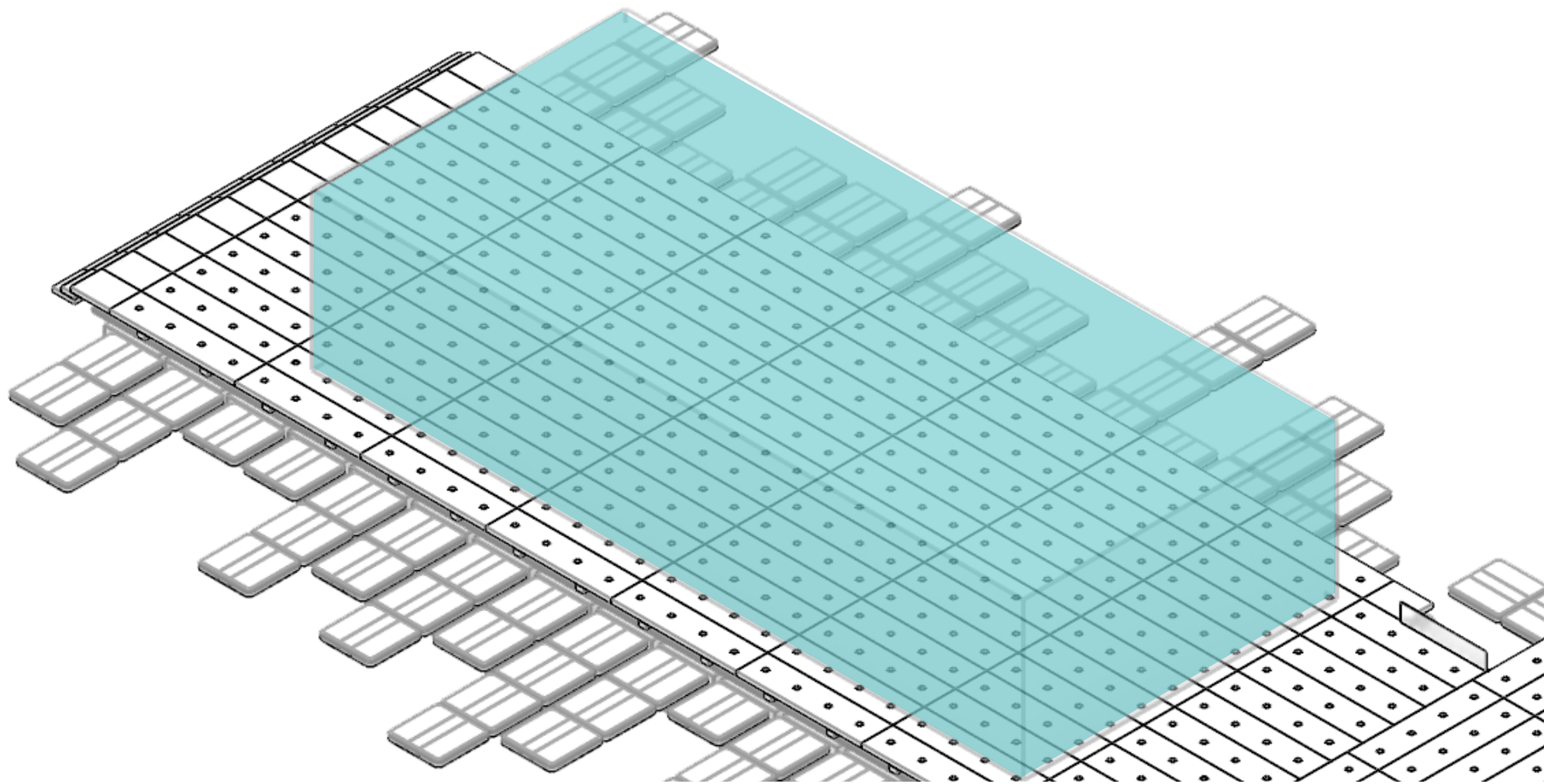
Deck



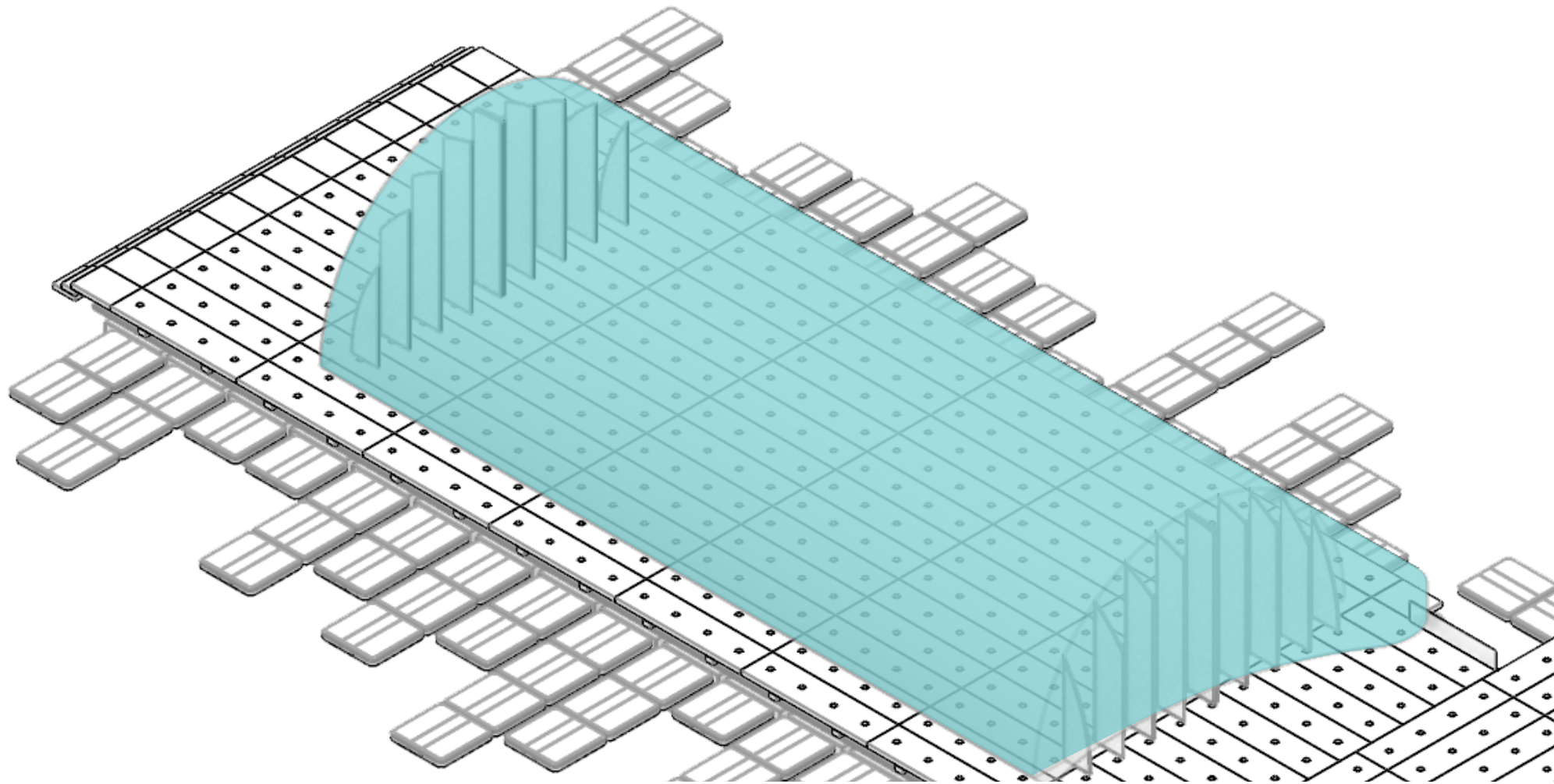
Modular deck



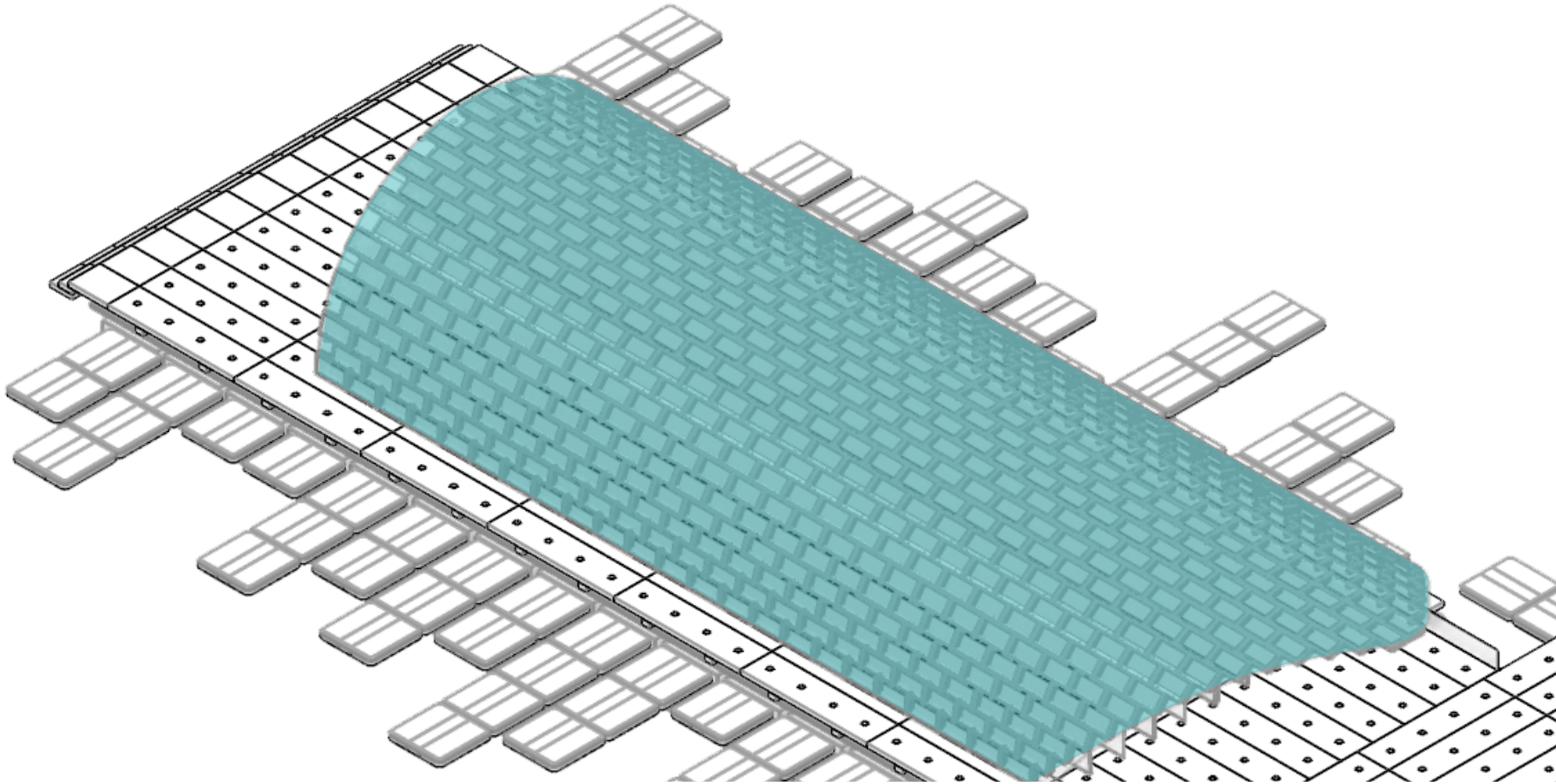
Floating ecosystems



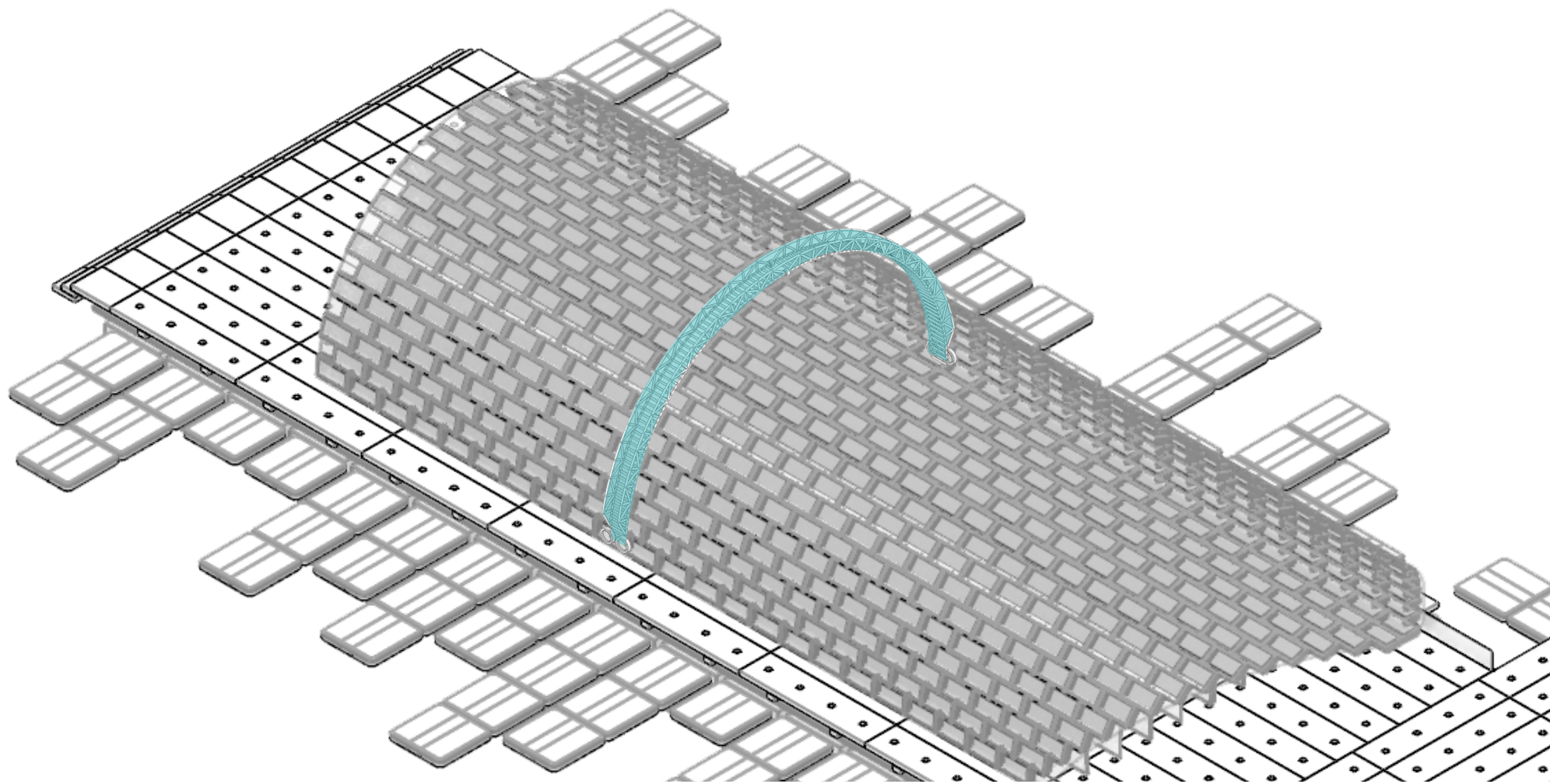
Weather protection



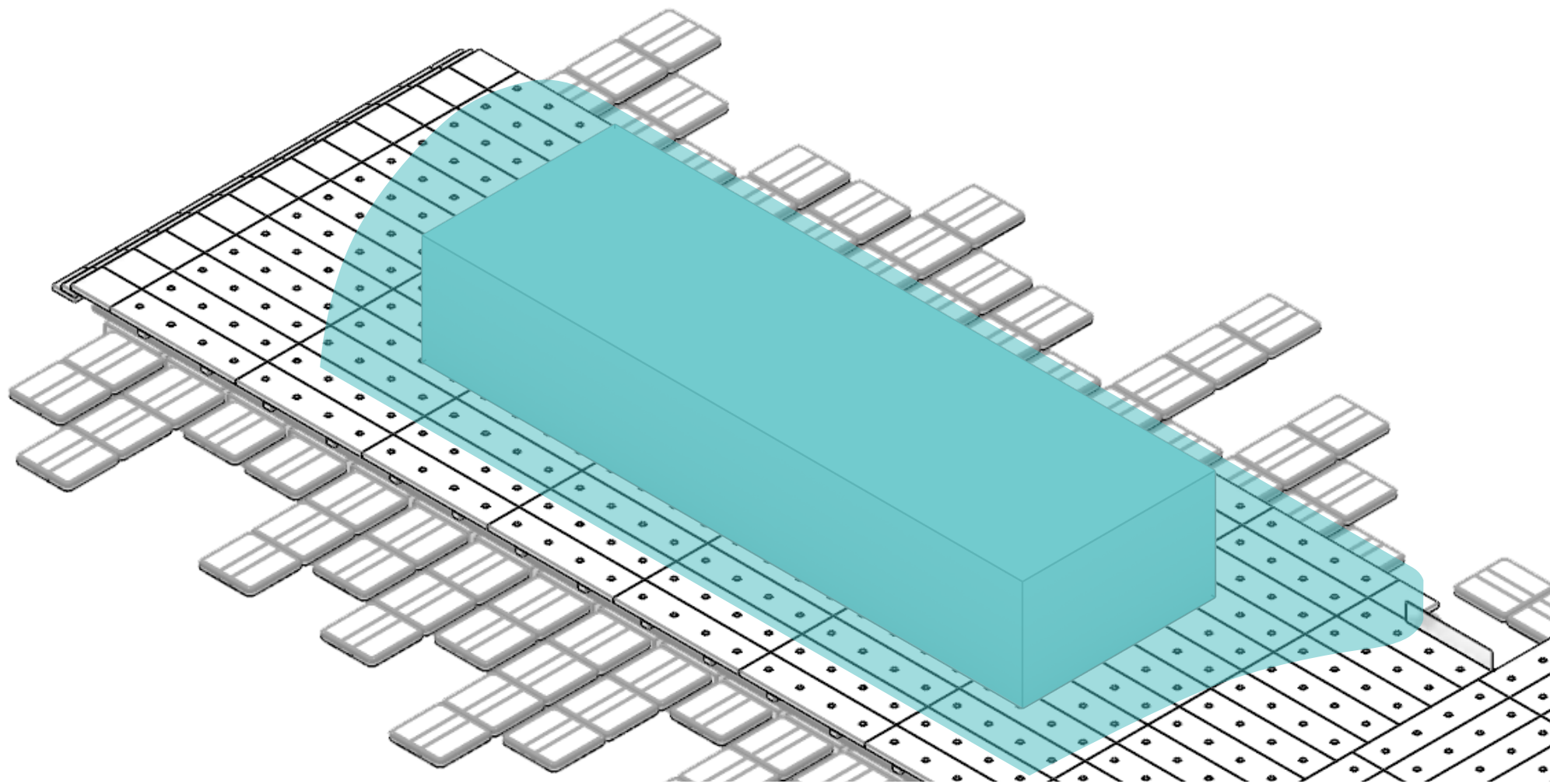
Welcoming



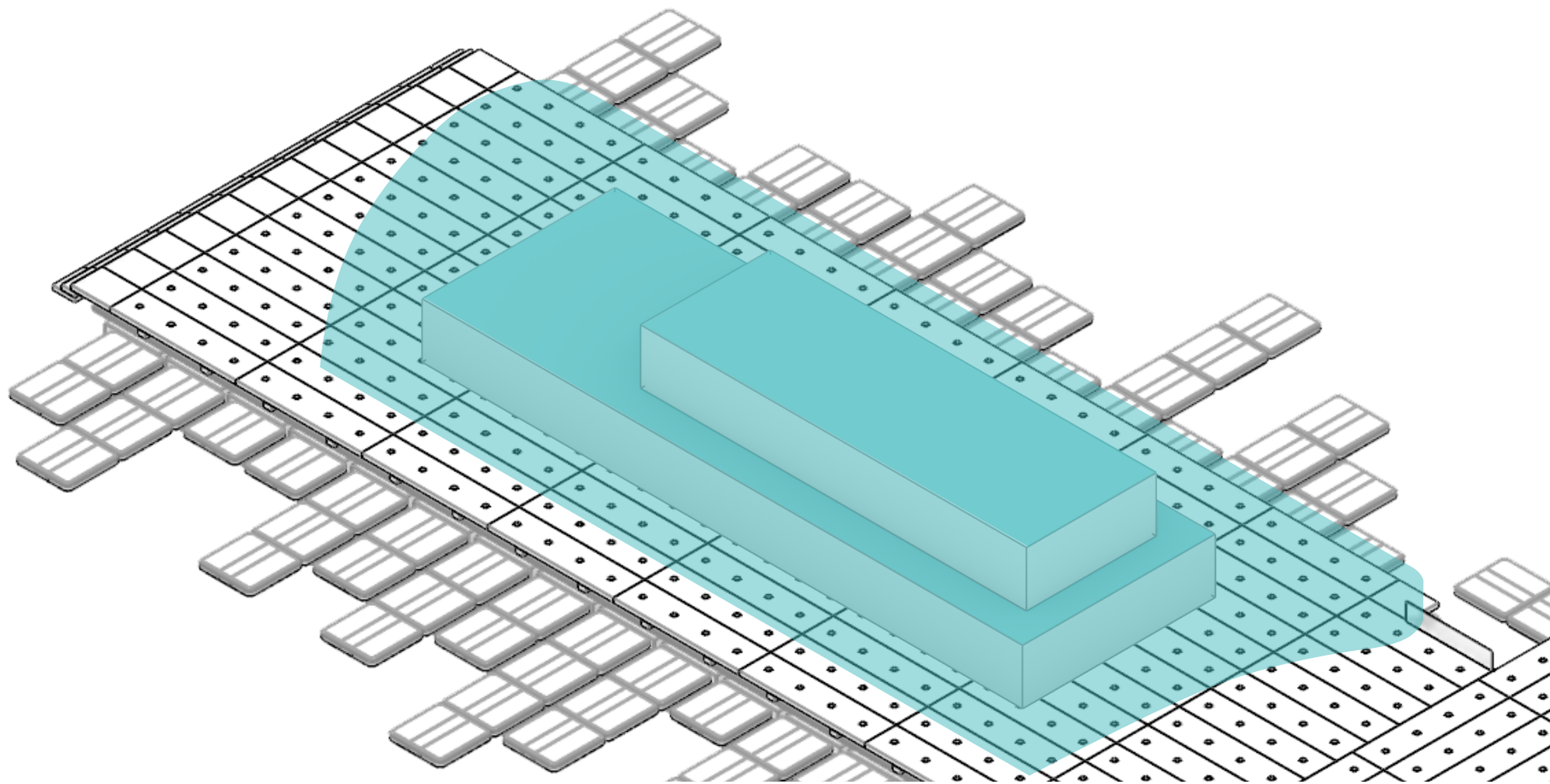
Modularity



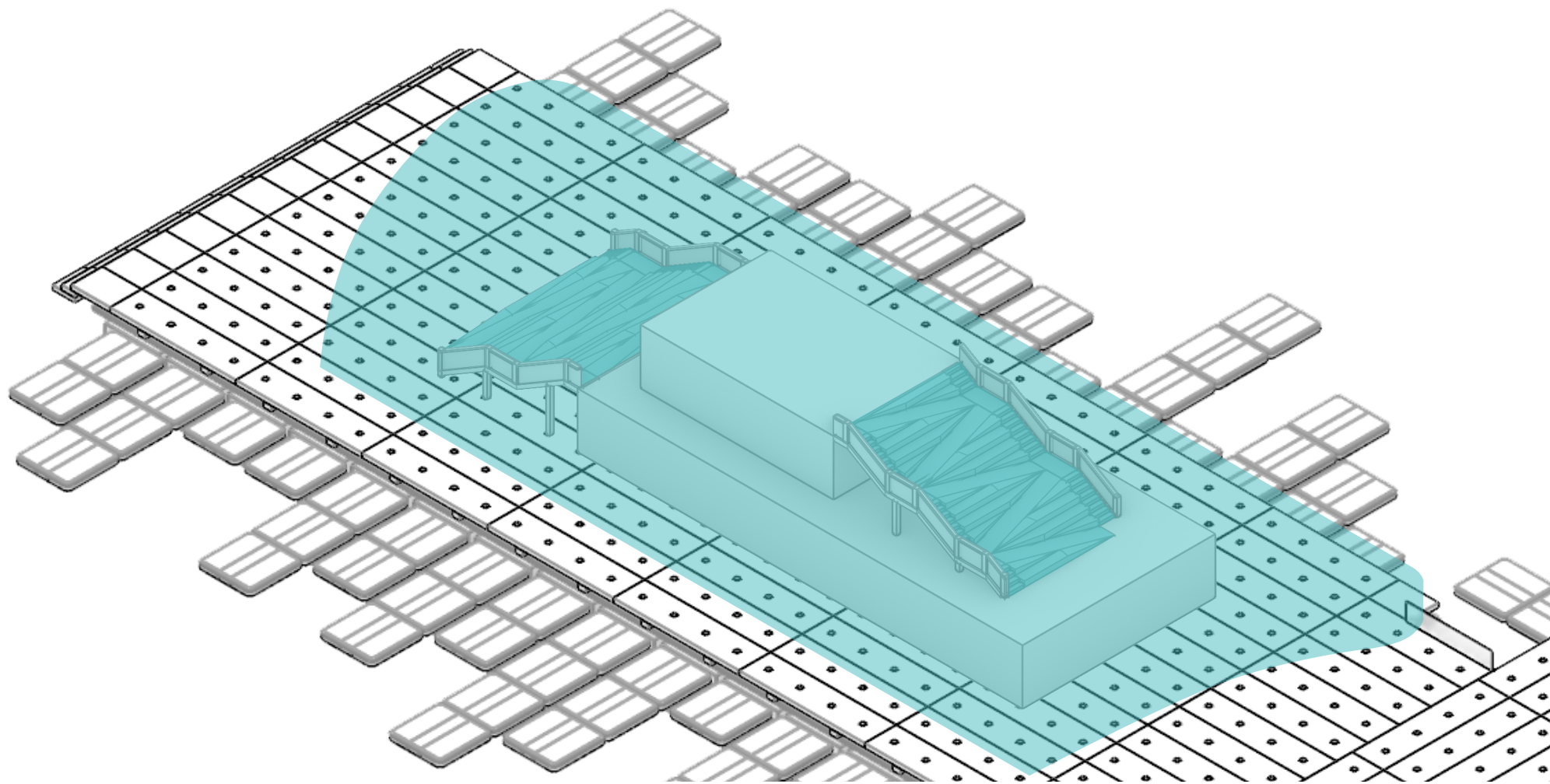
Constructibility



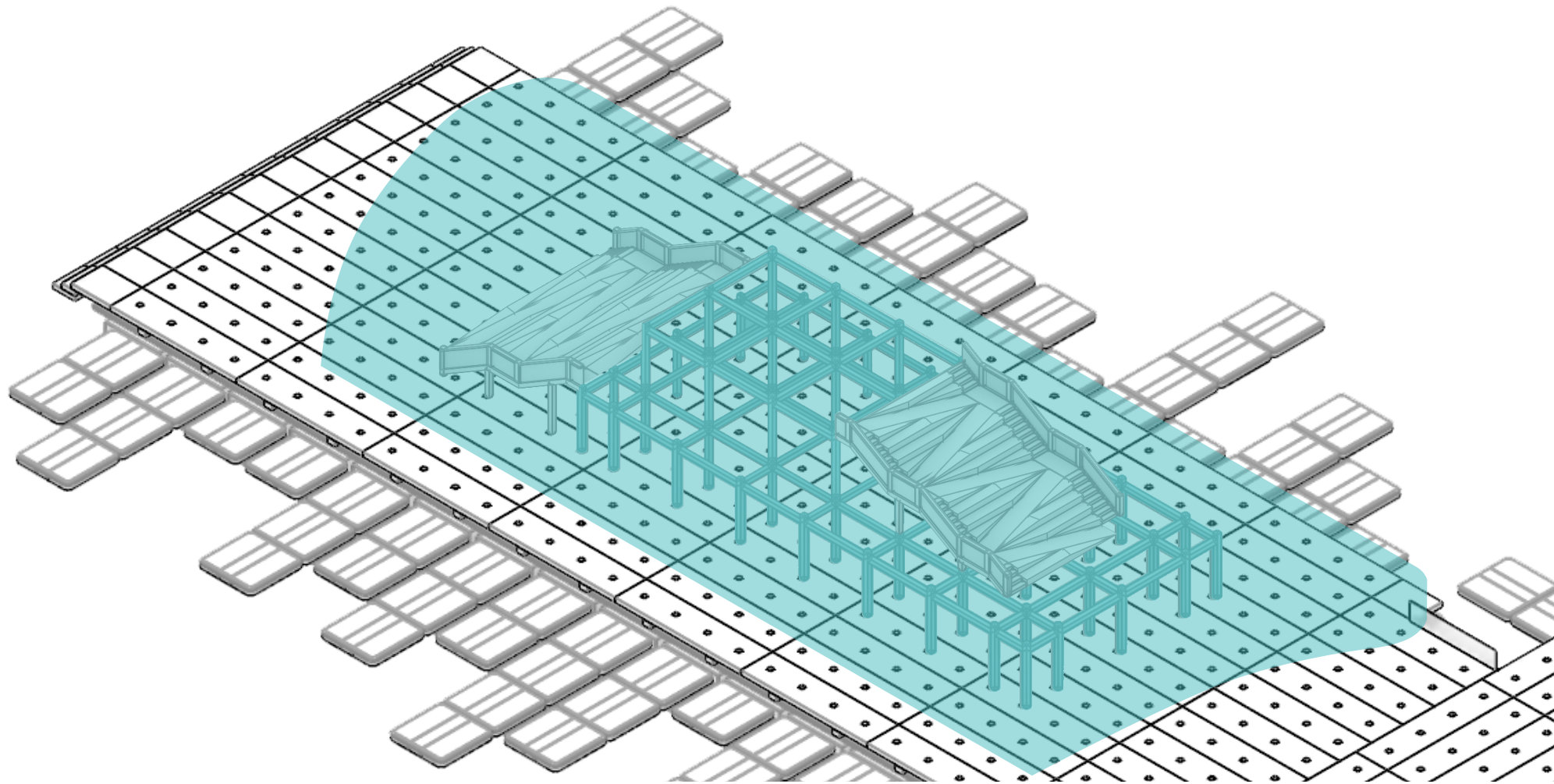
Building volume



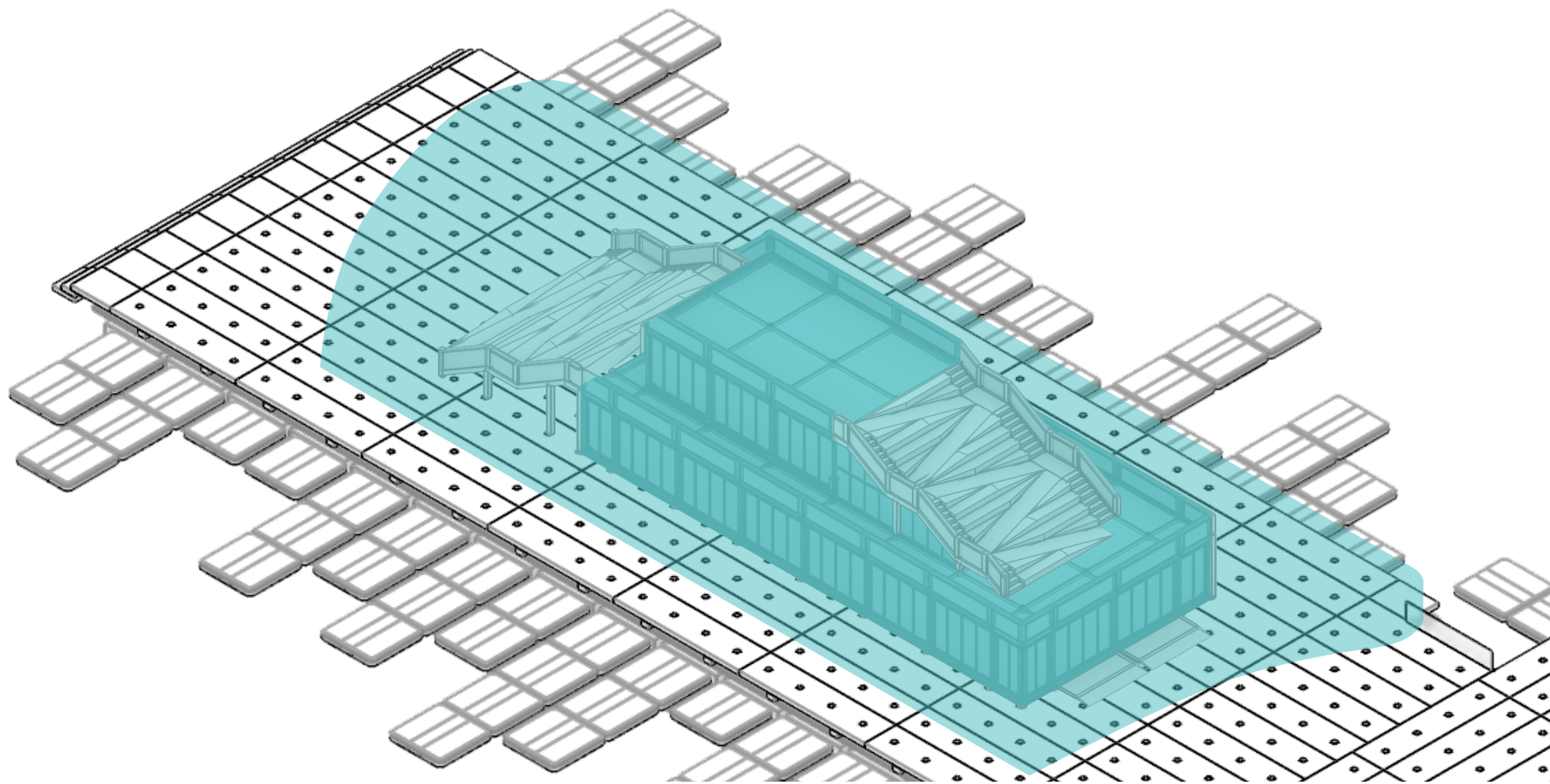
External circulation



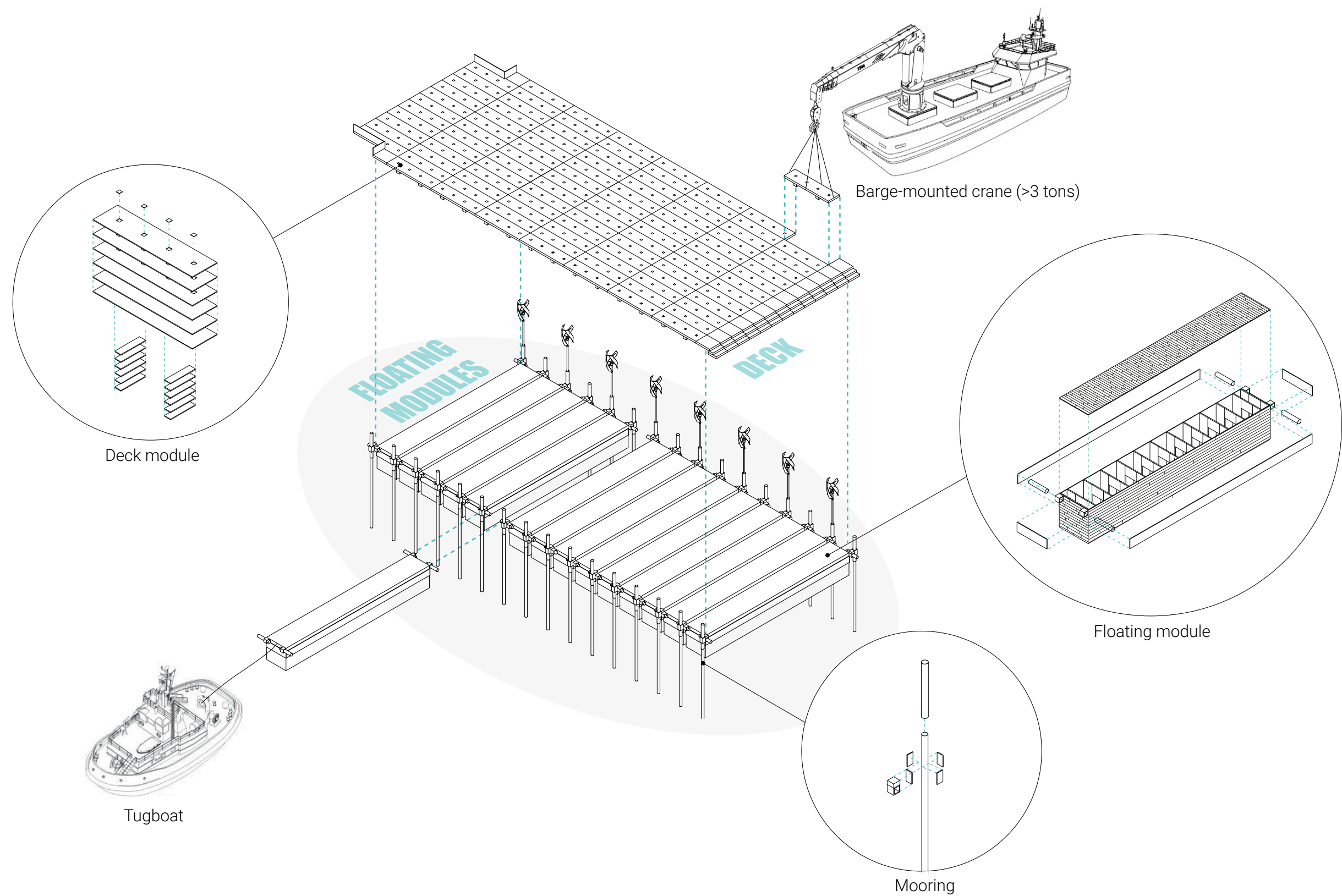
Ramps & stairs



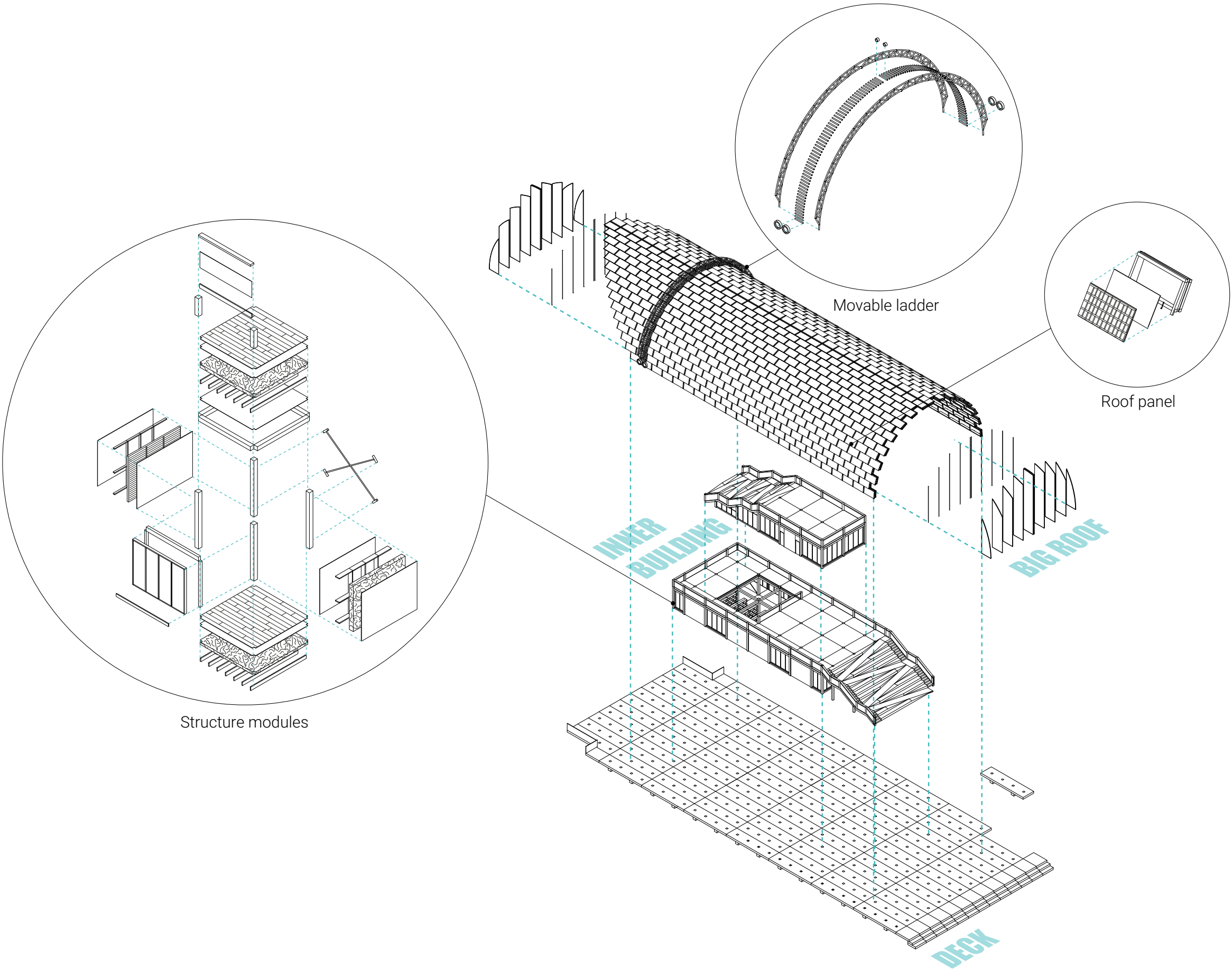
Modular structure



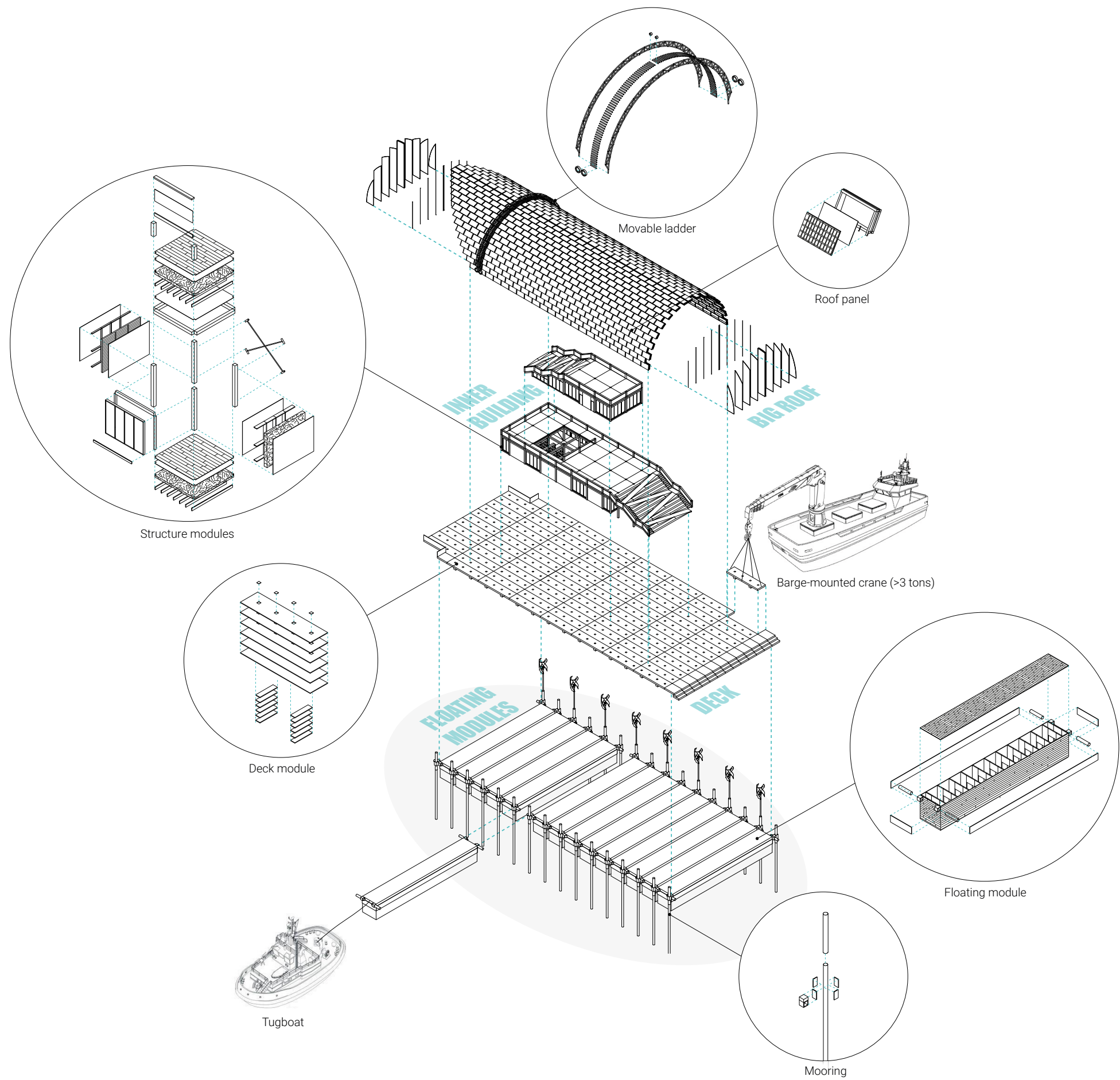
Thermal skin



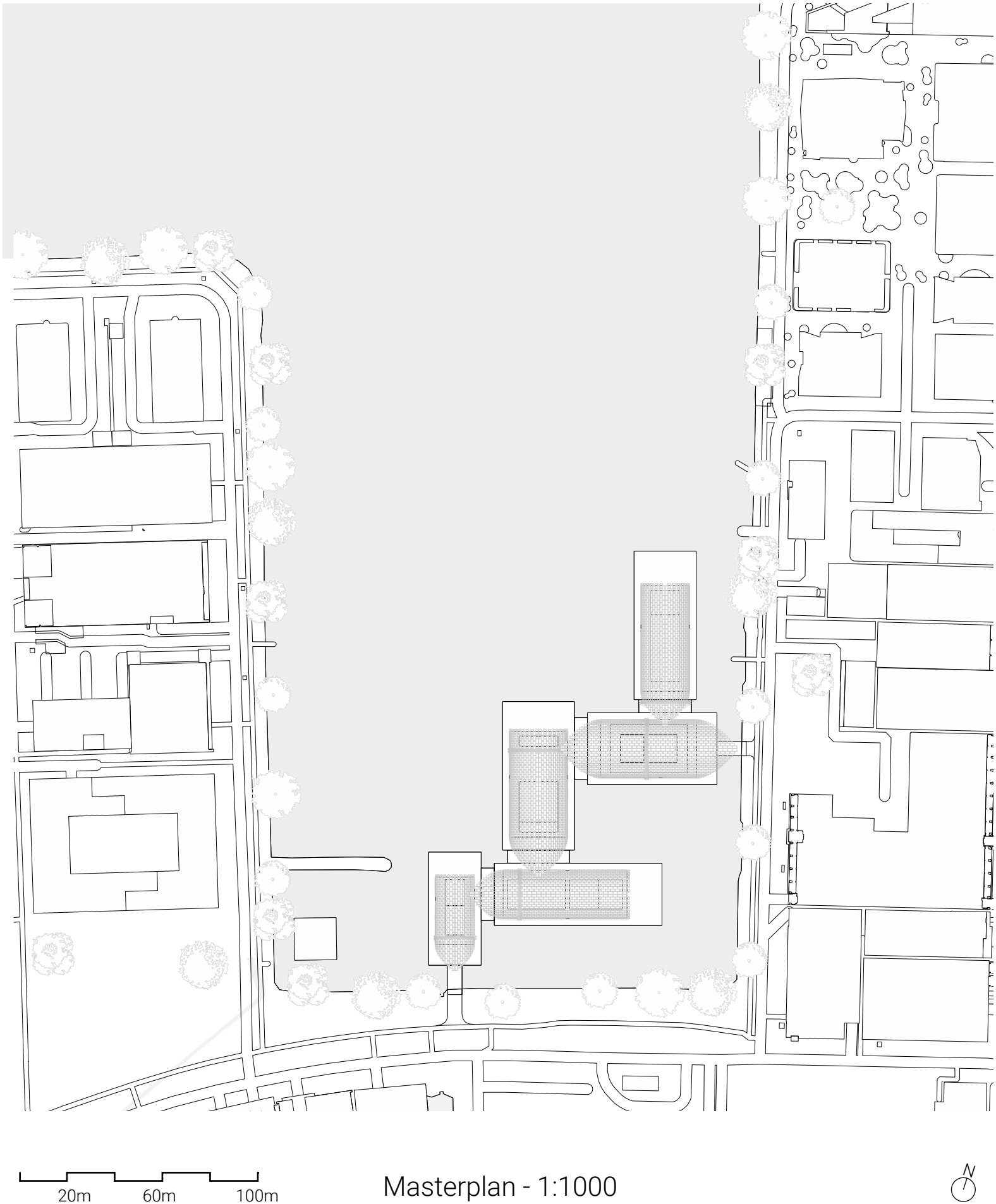
Structural concept below the deck

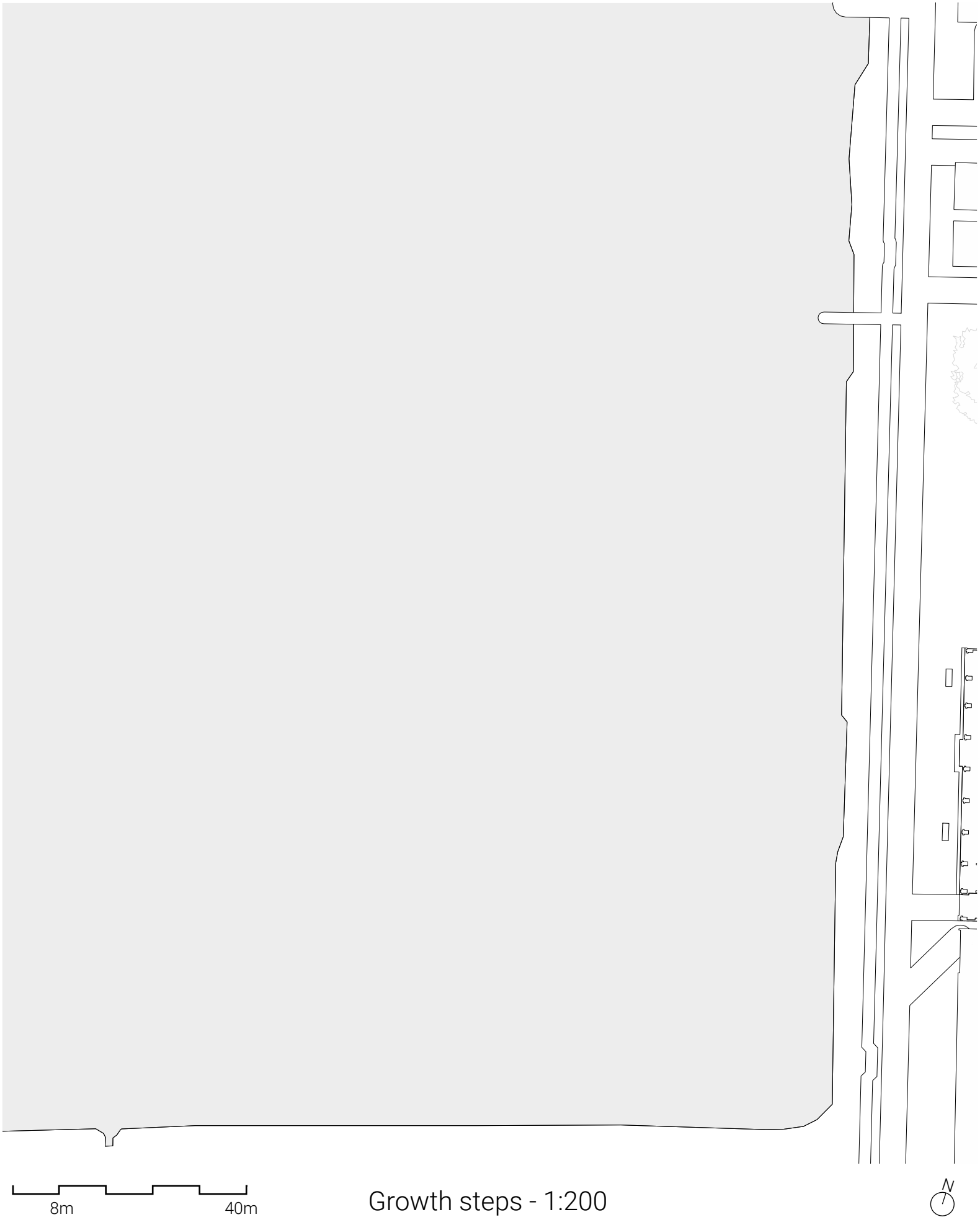


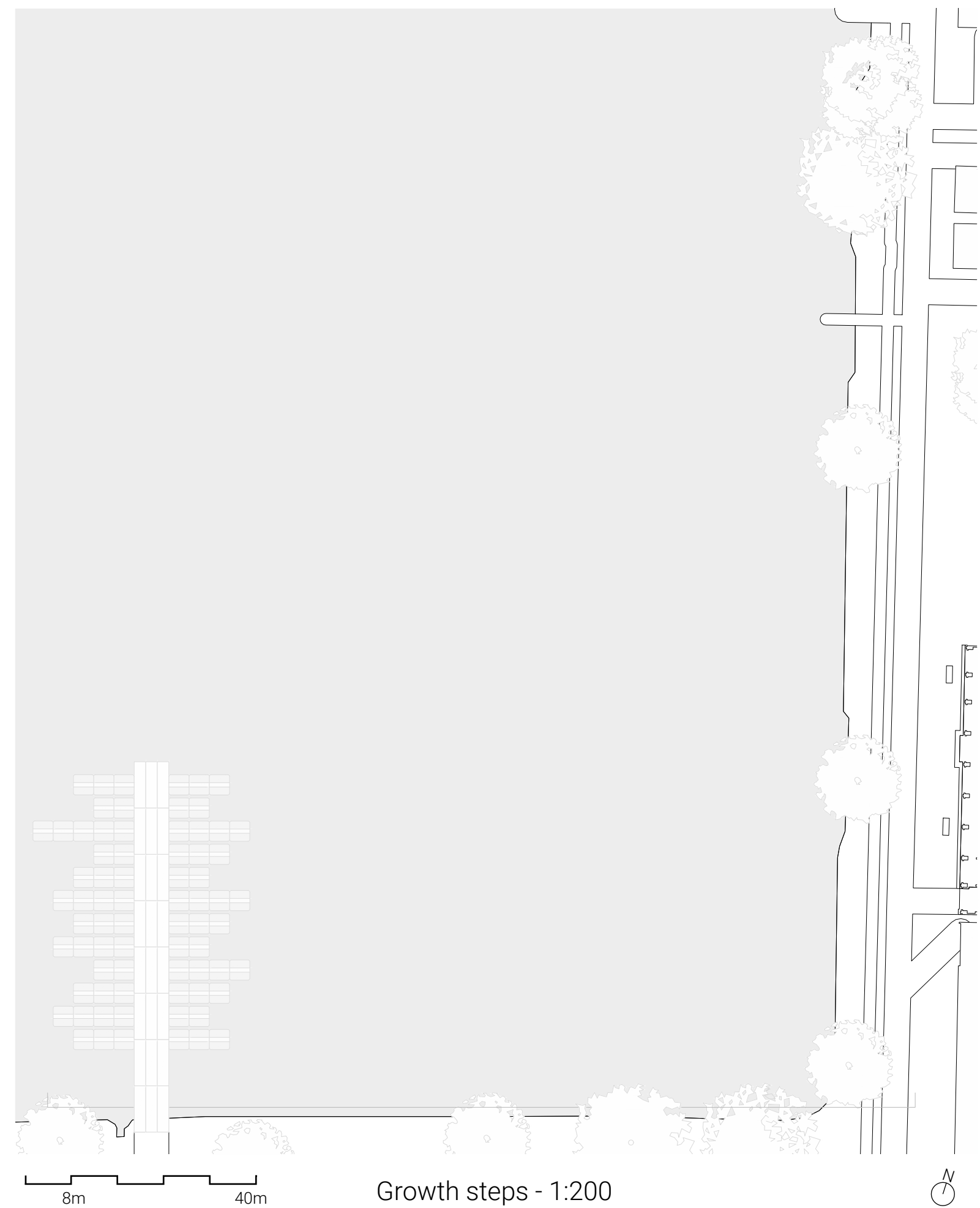
Structural concept above the deck

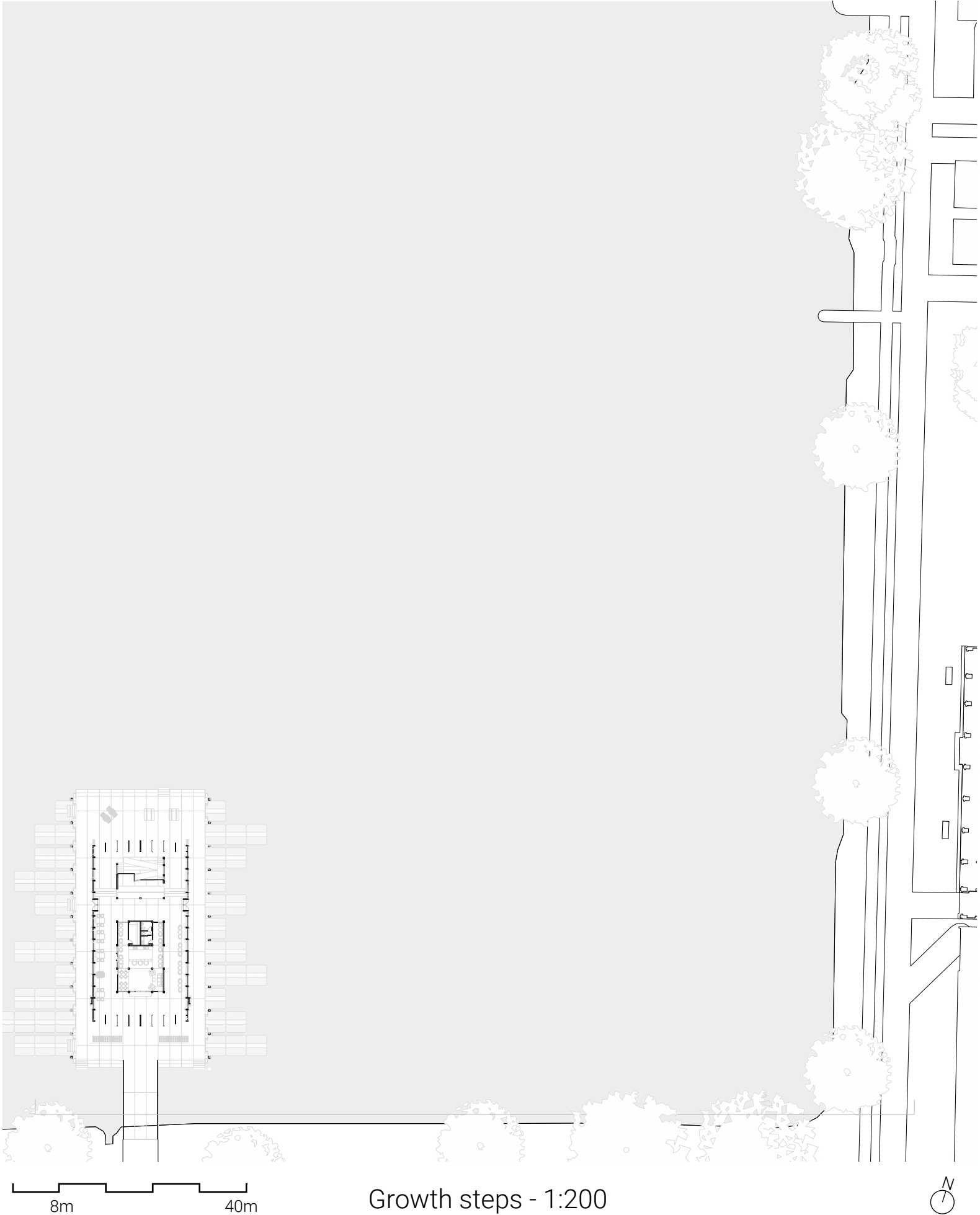


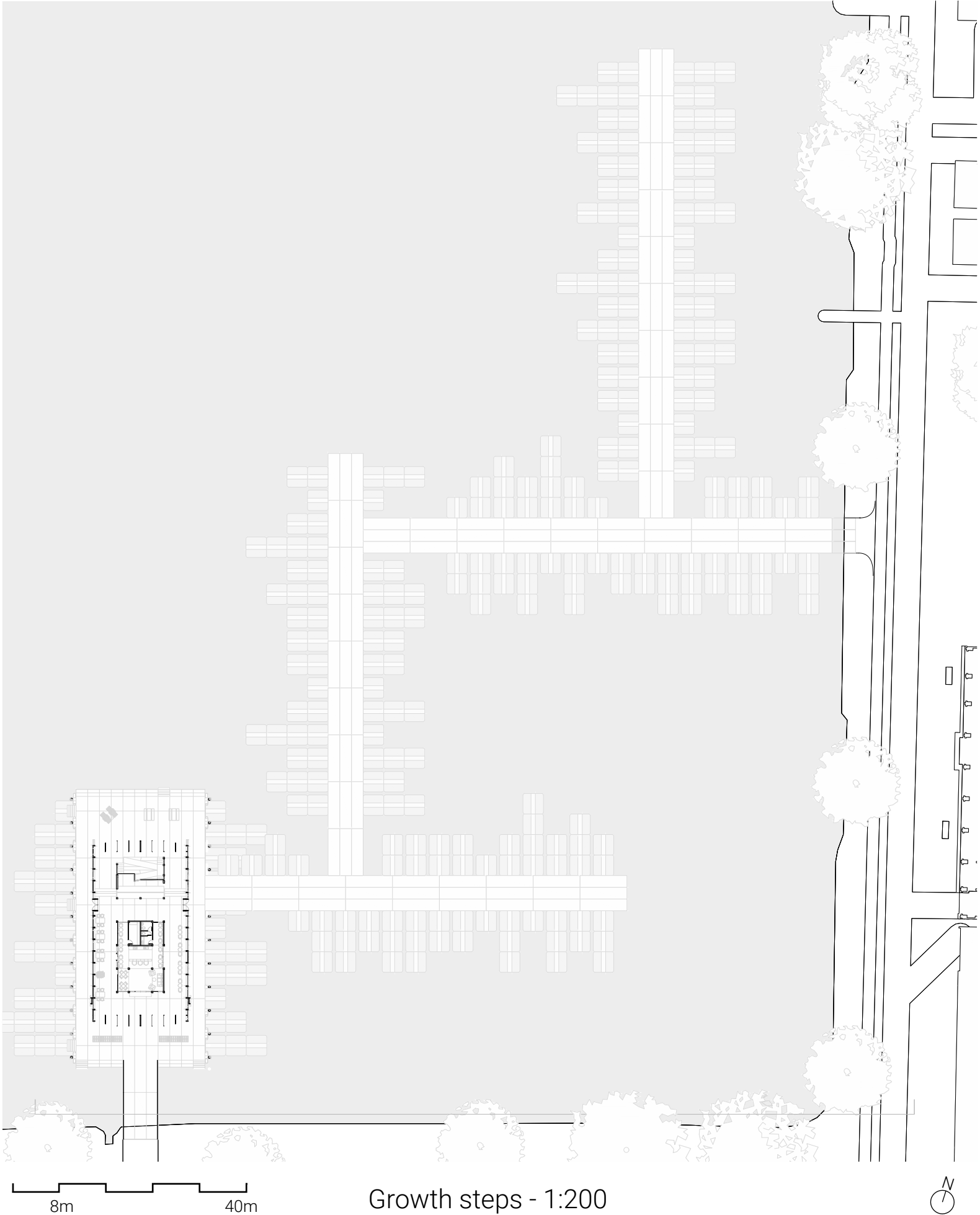
Structural concept

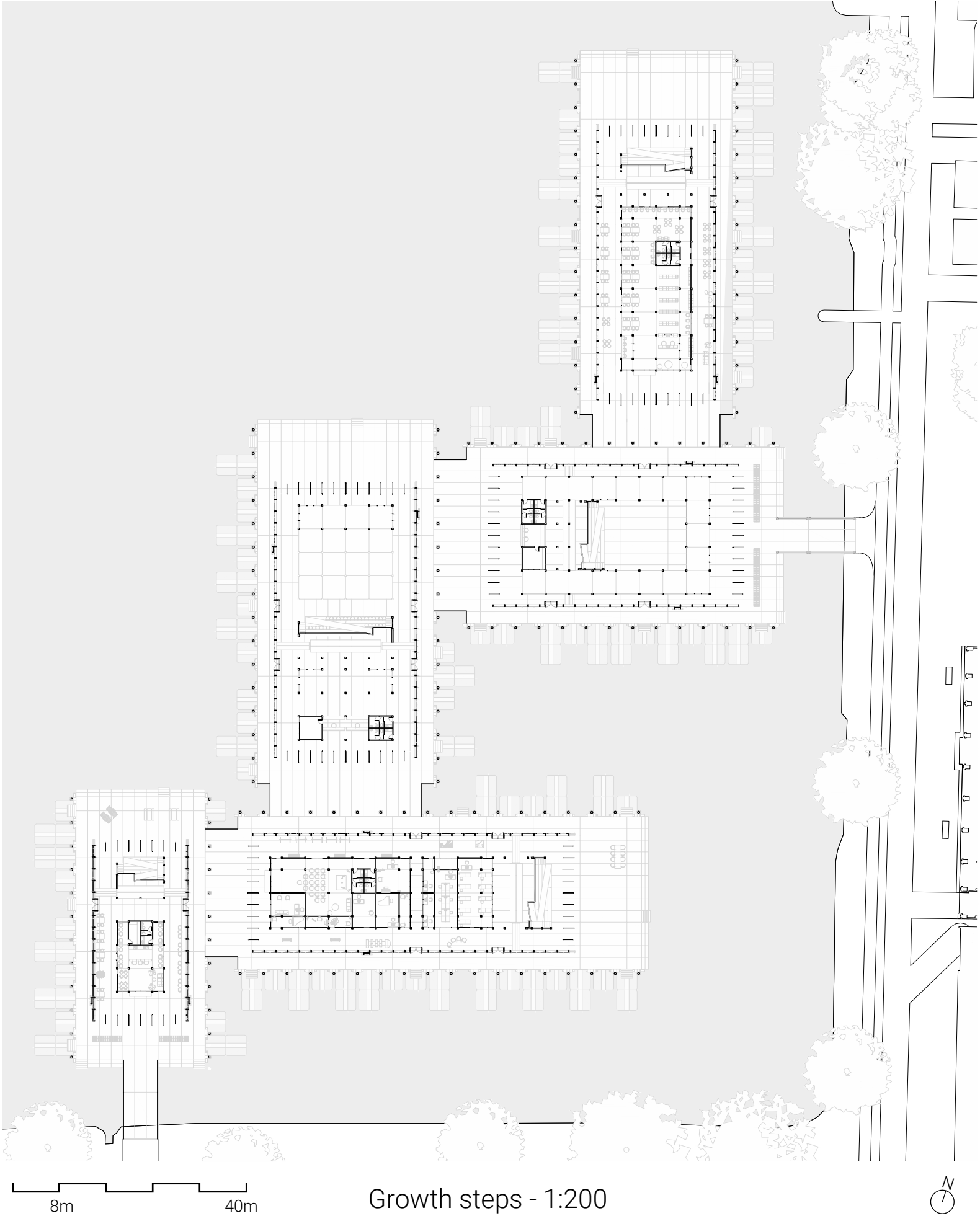


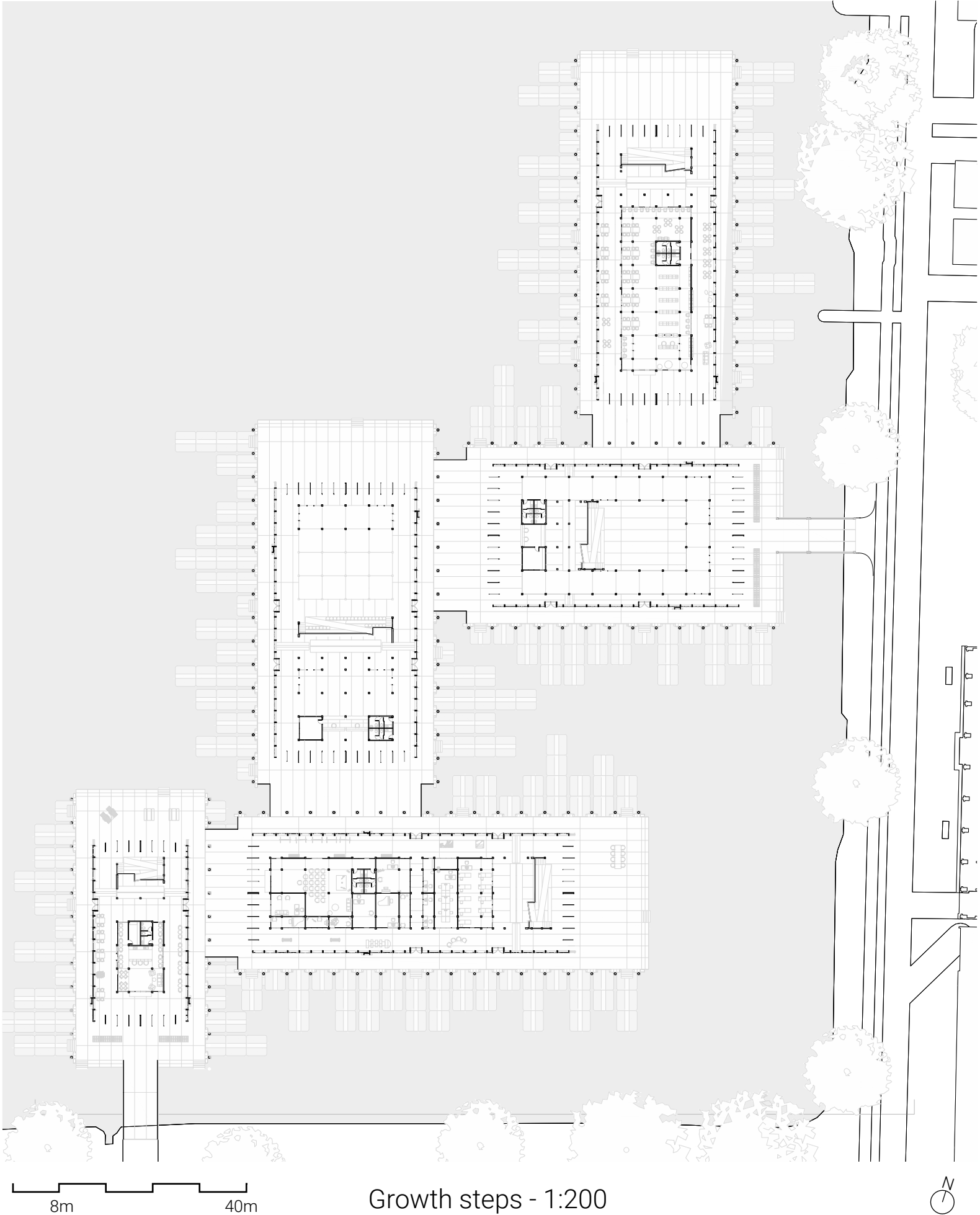






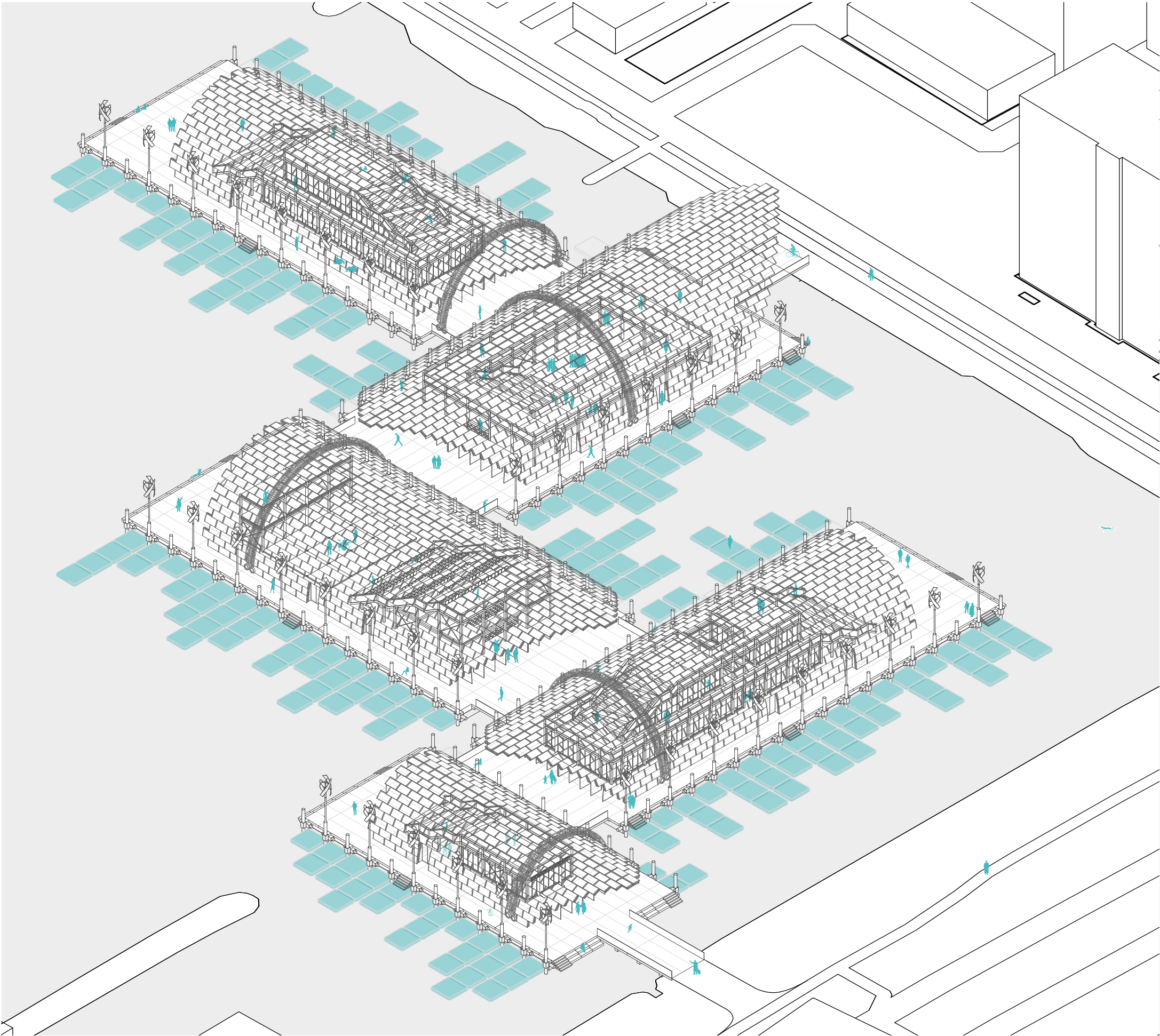




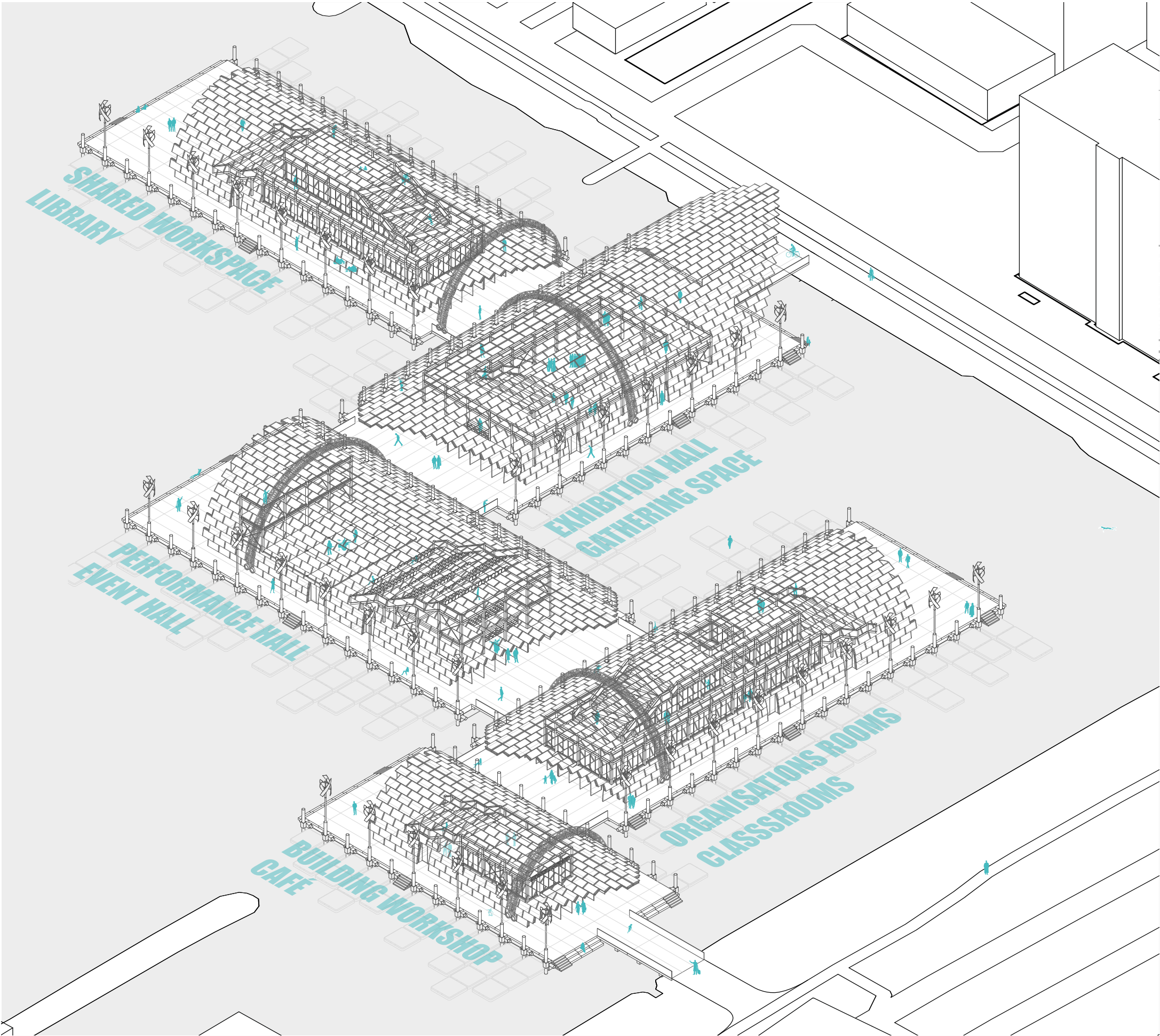




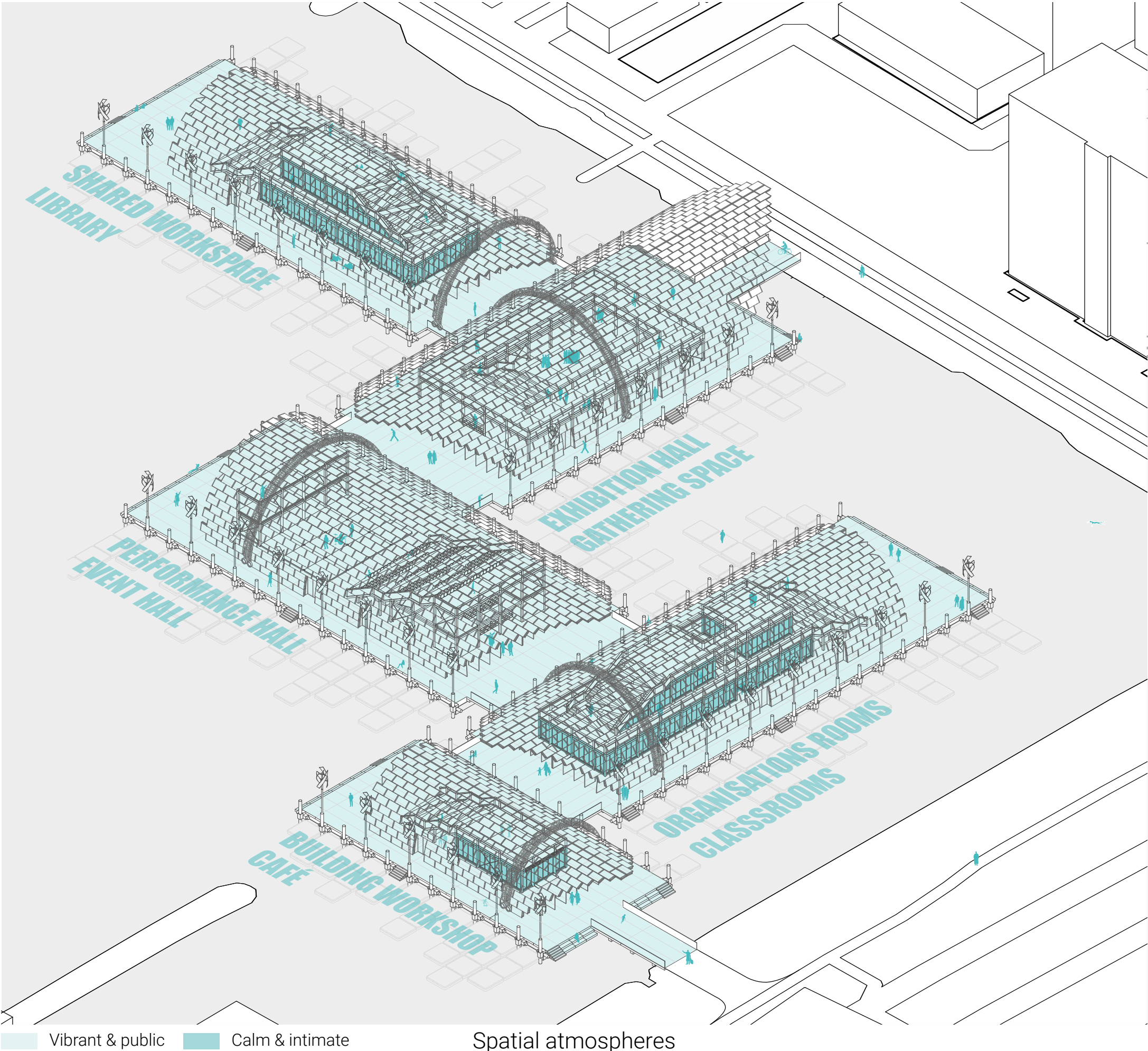
4. USER EXPERIENCE



General organisation

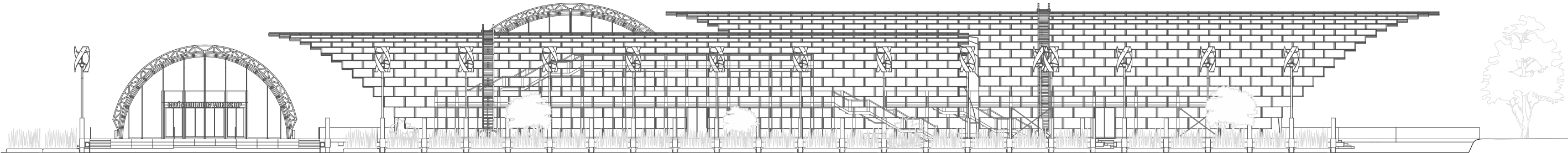
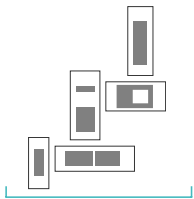


Main uses



 Vibrant & public  Calm & intimate

Spatial atmospheres

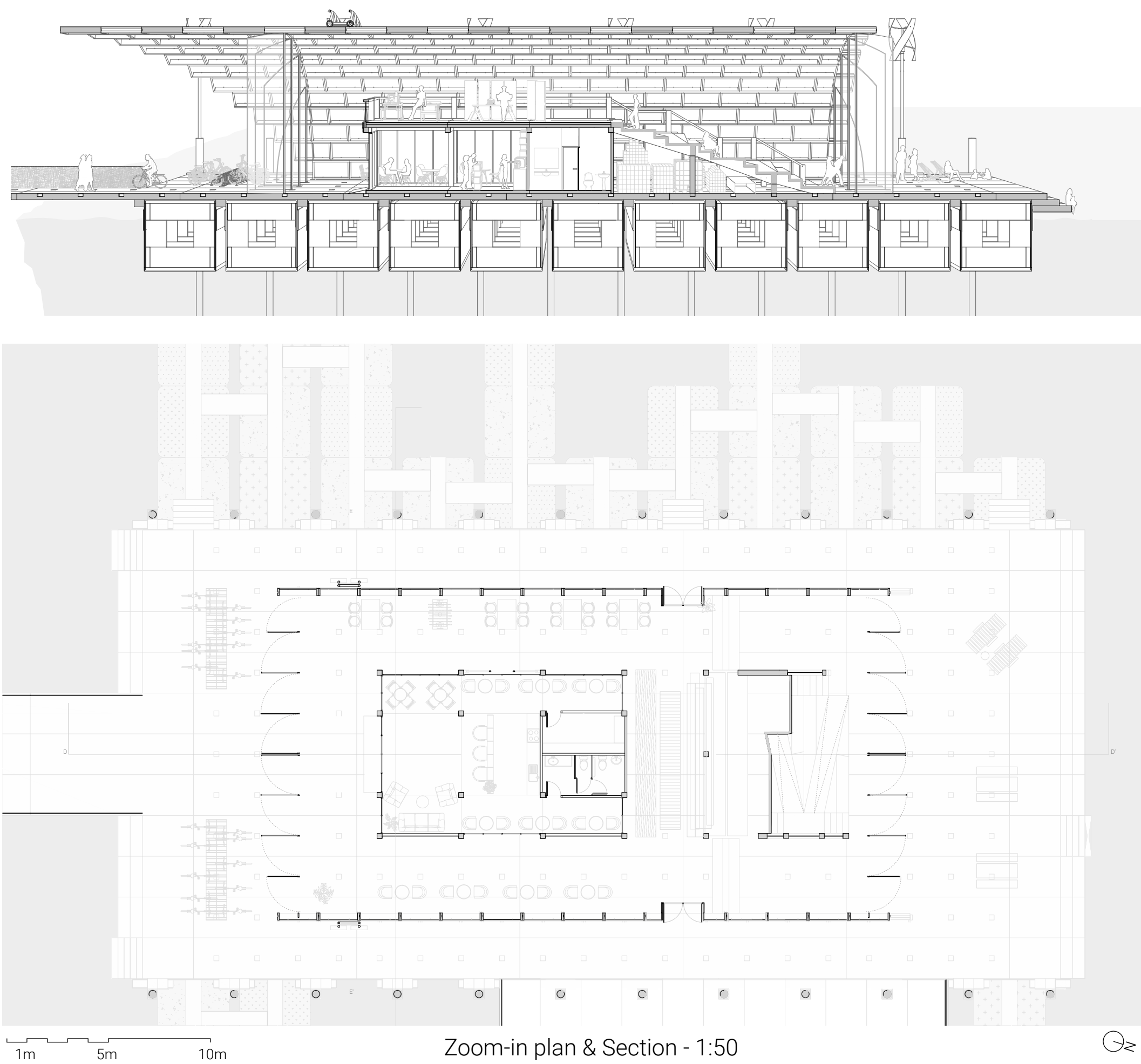


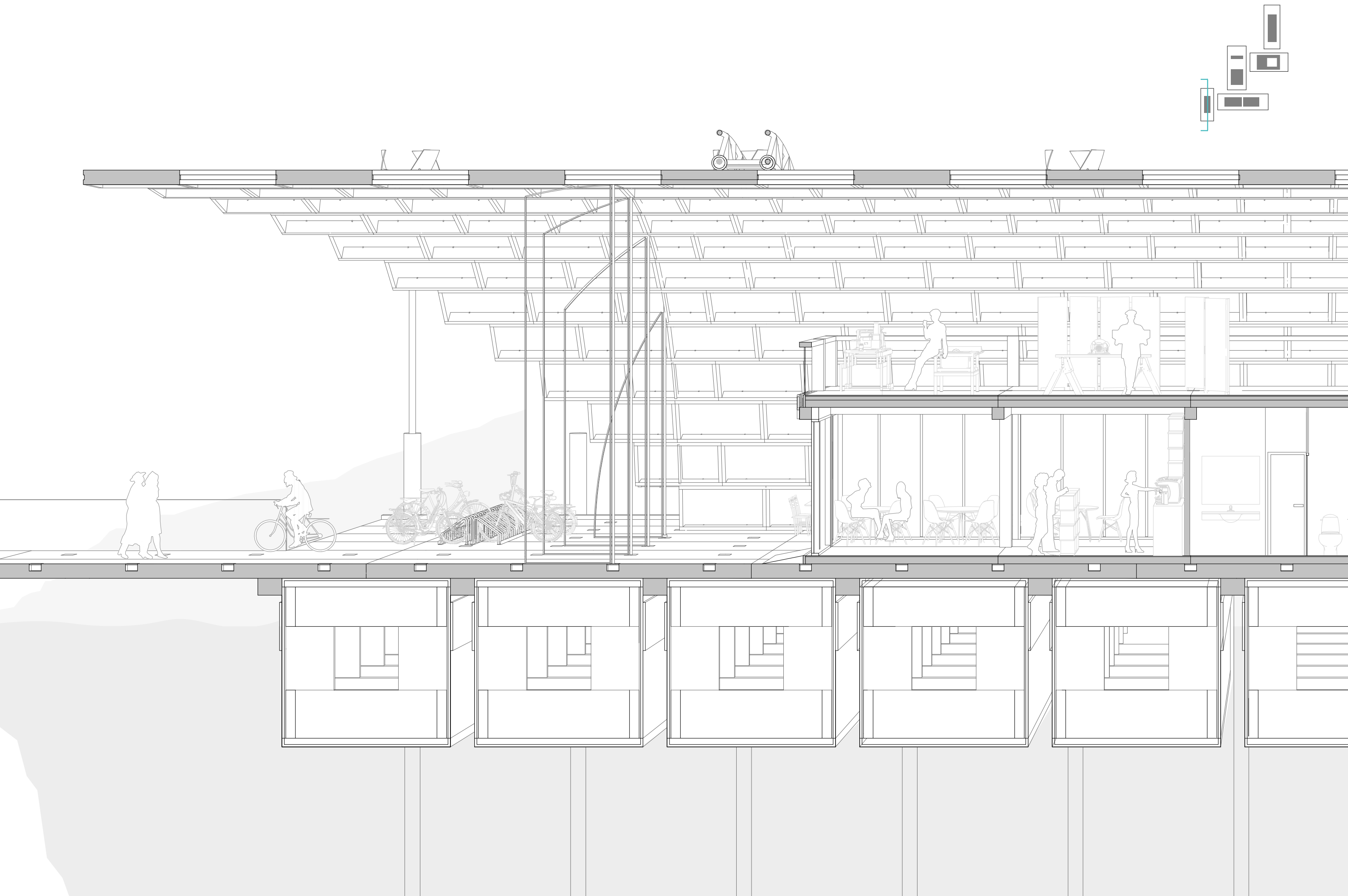
2m 10m 20m

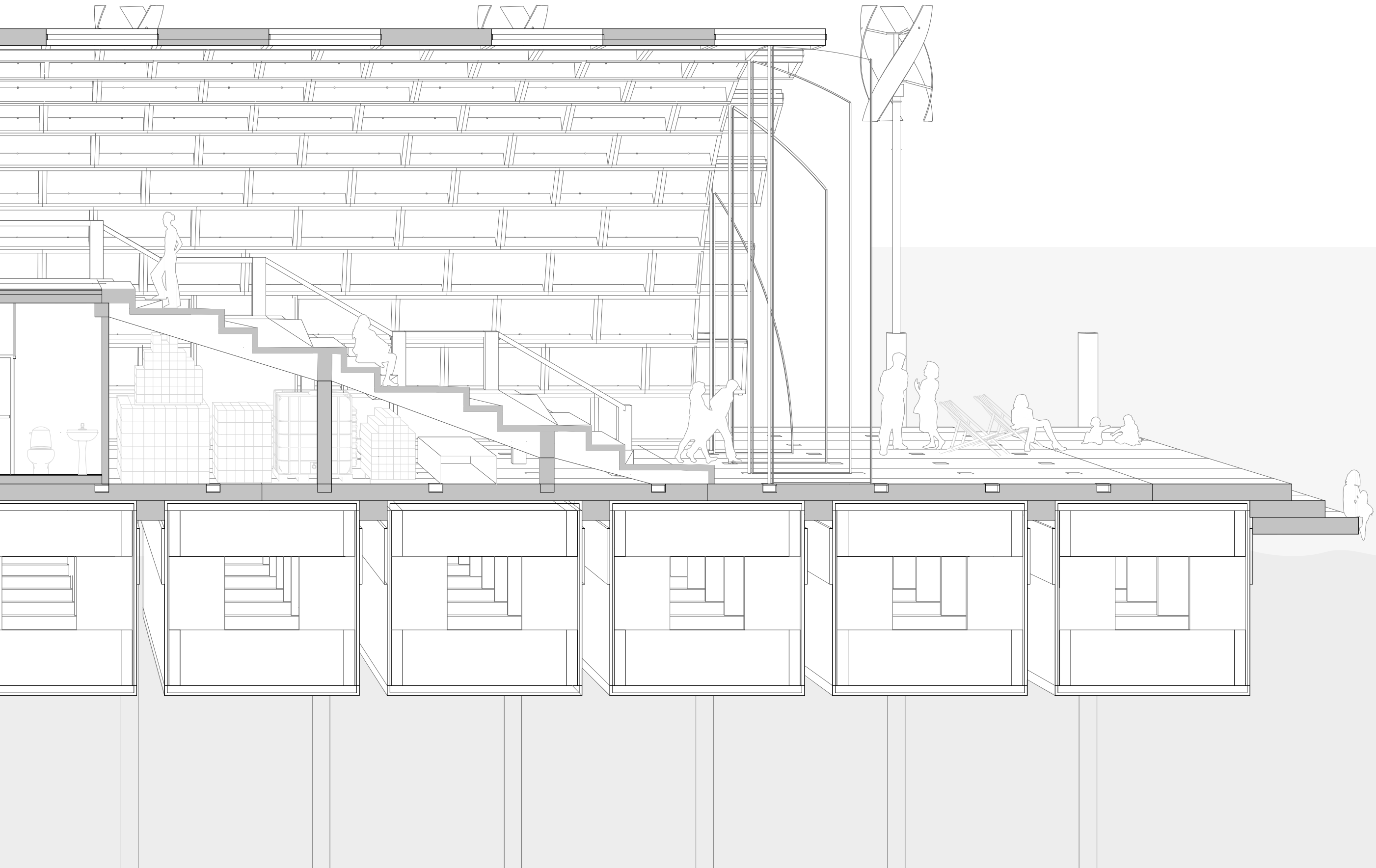
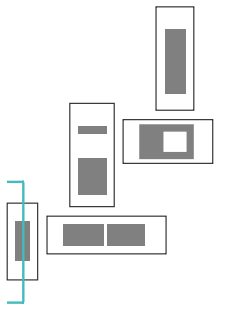
General sections & elevation - 1:200

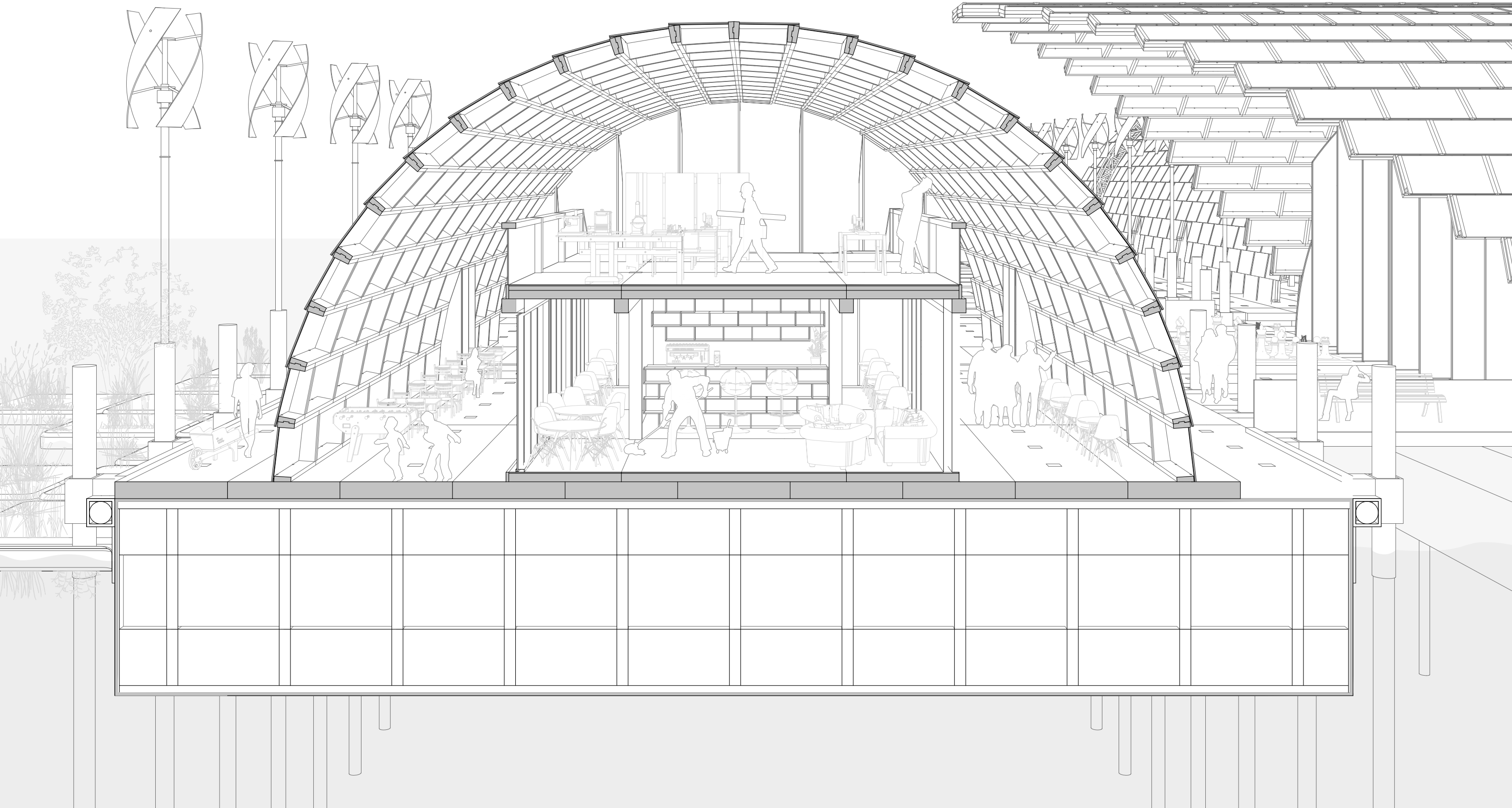
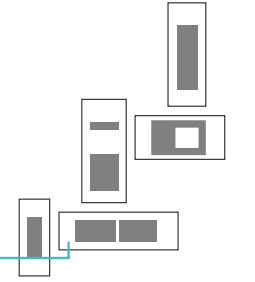


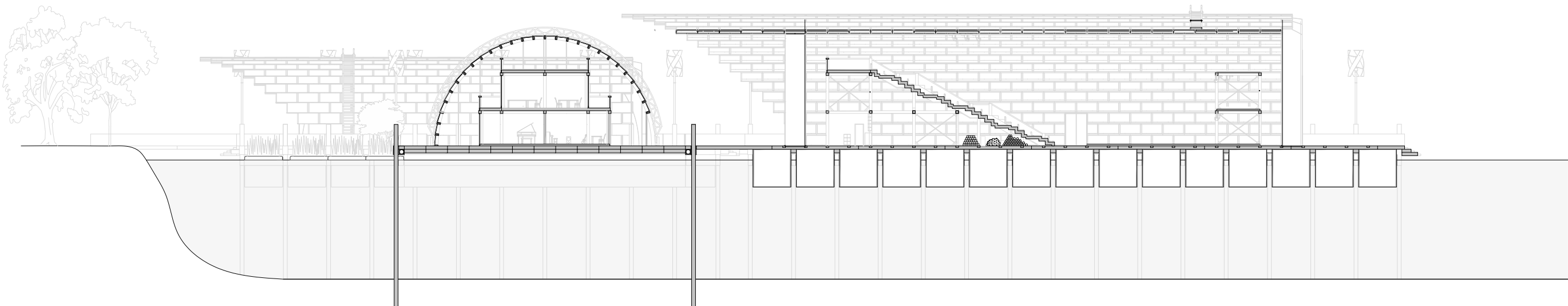
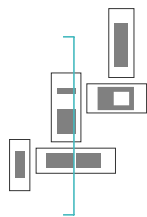
Main entrance





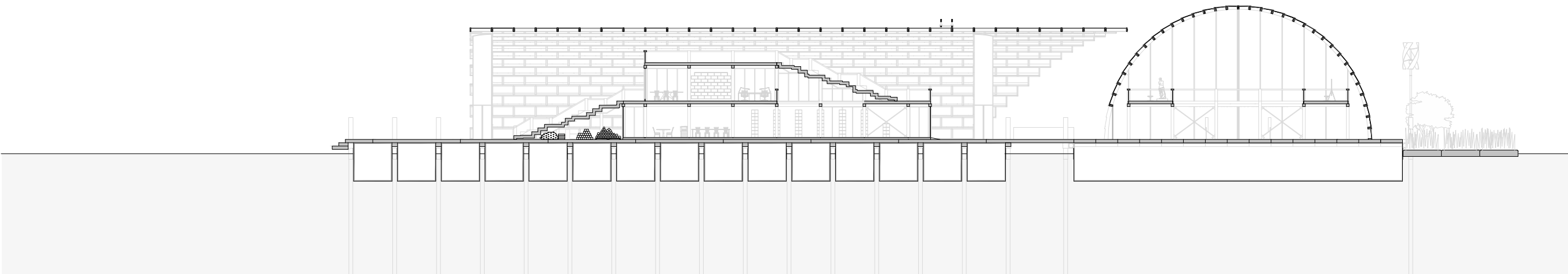
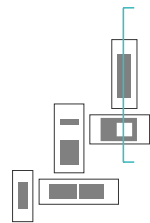






2m 10m 20m

General sections & elevation - 1:200



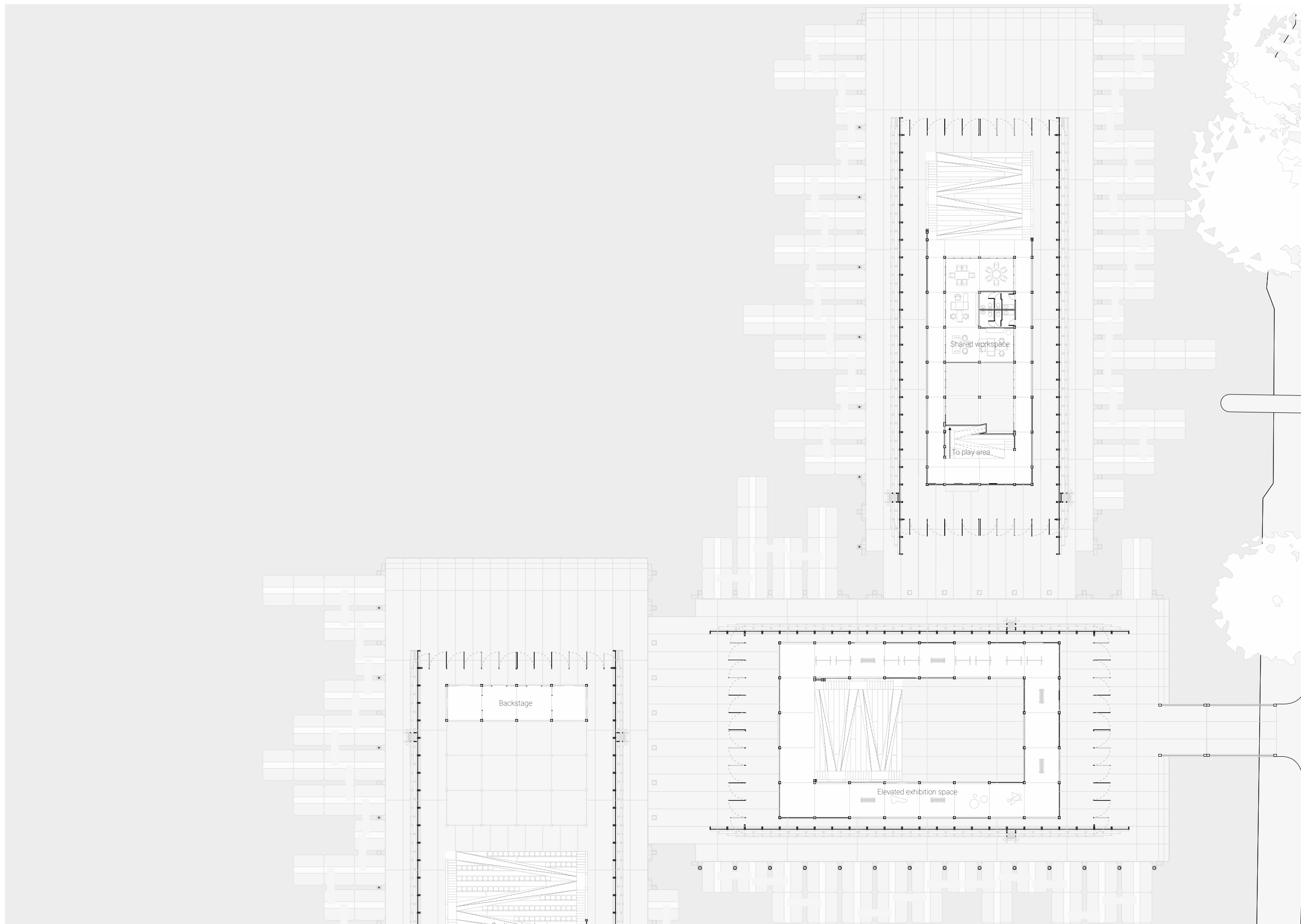
2m 10m 20m

General sections & elevation - 1:200



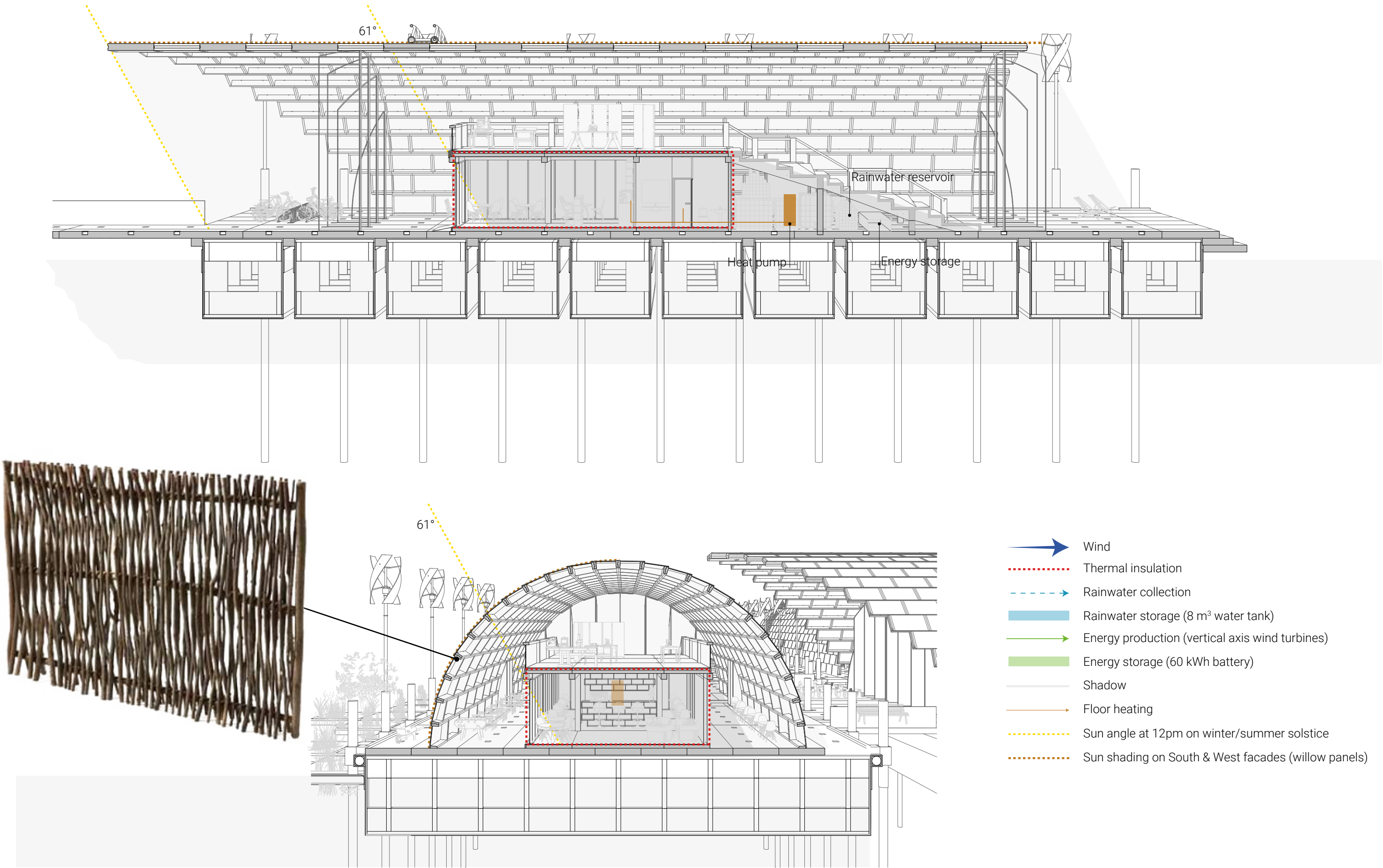


Floating ecosystem

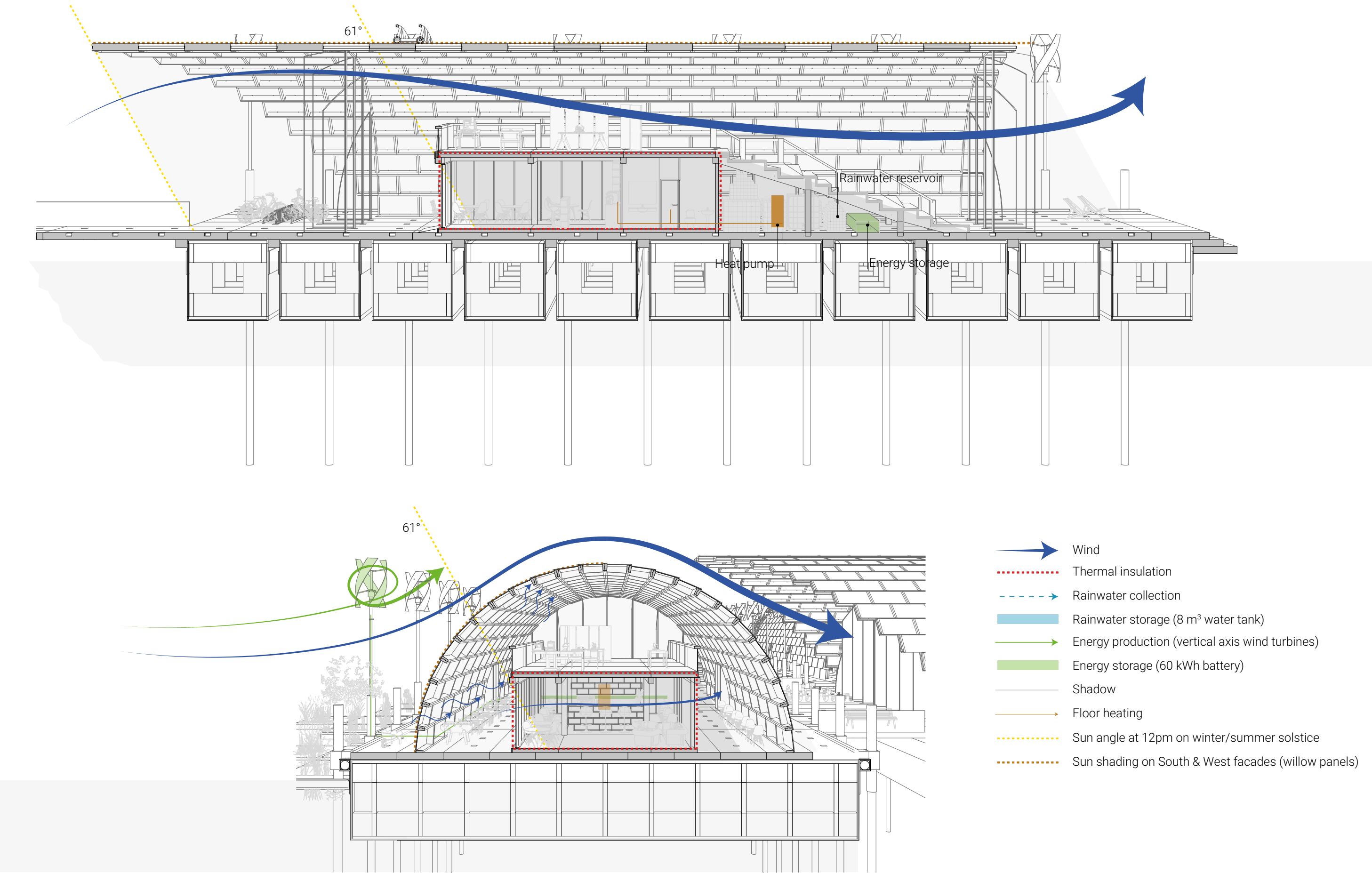




Performance hall



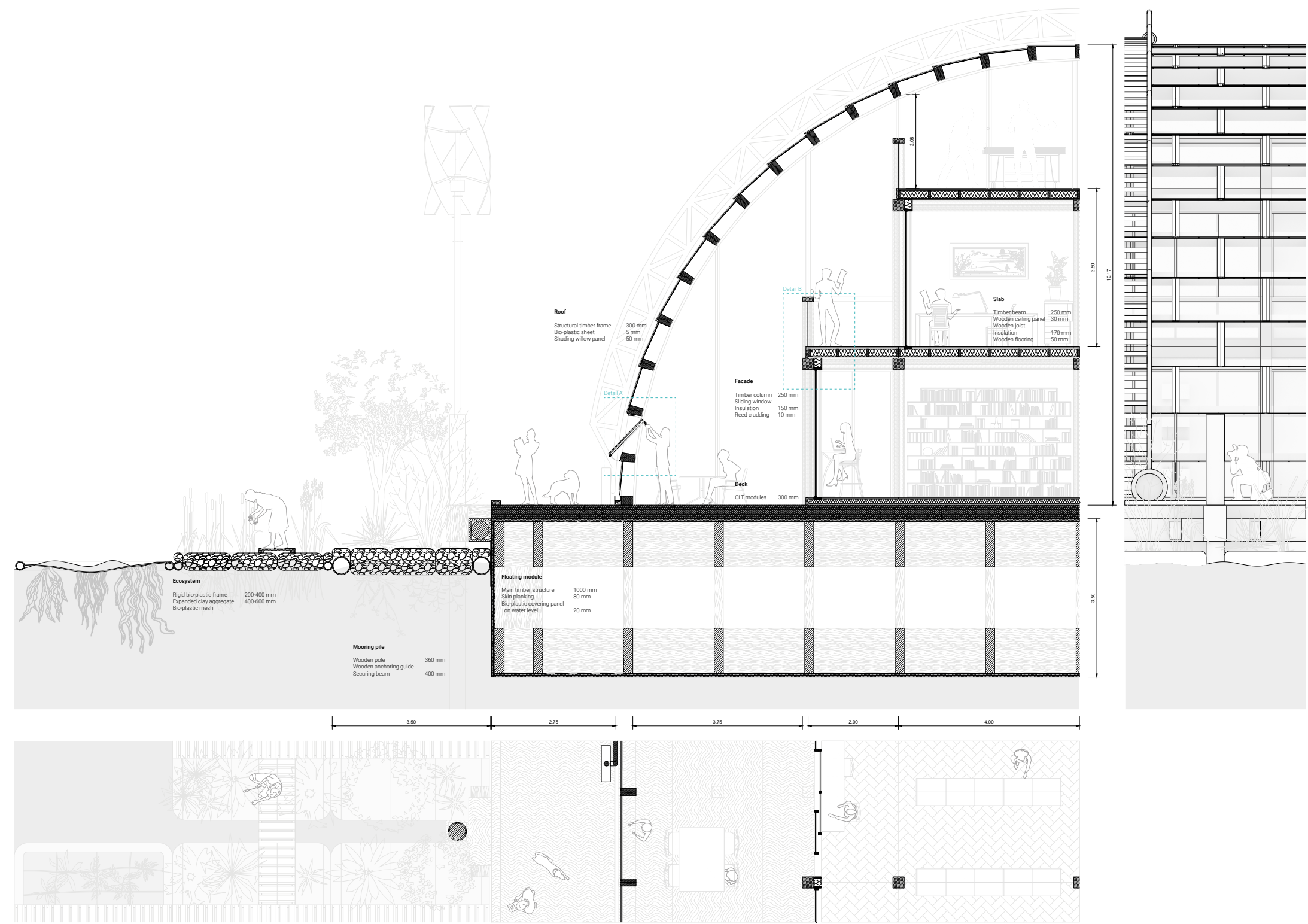
Climate design - Summer



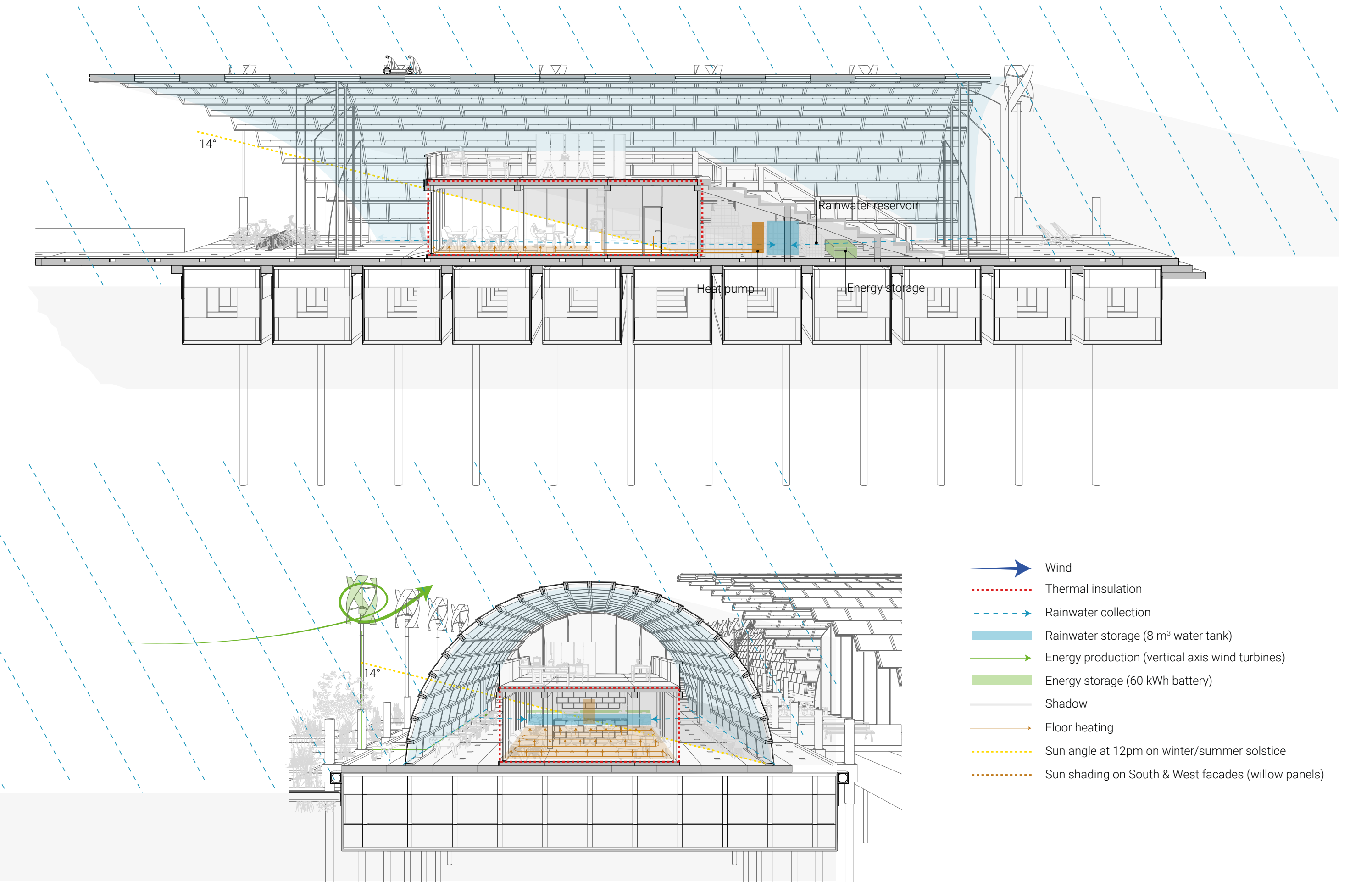
Climate design - Summer



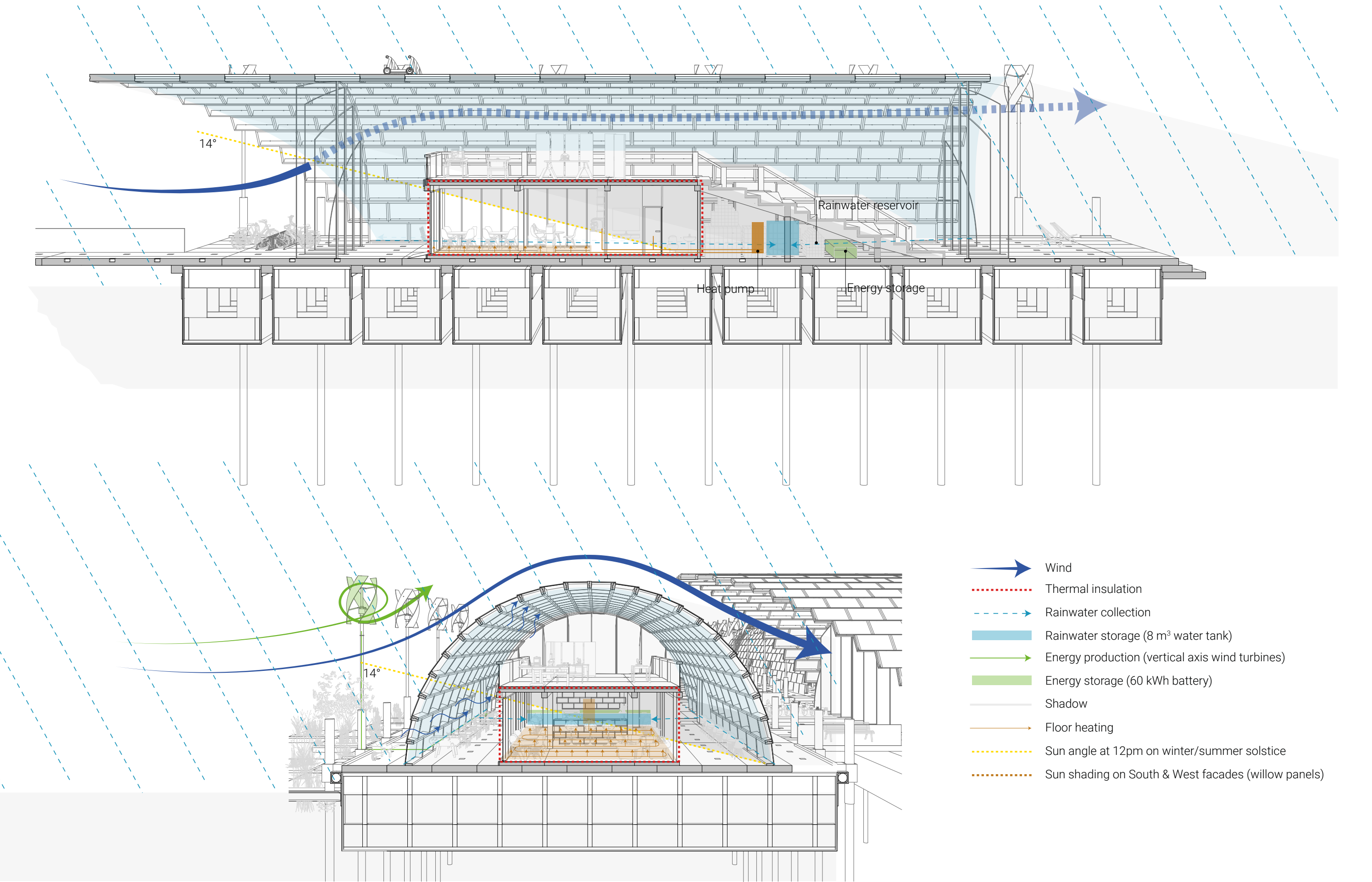
Café



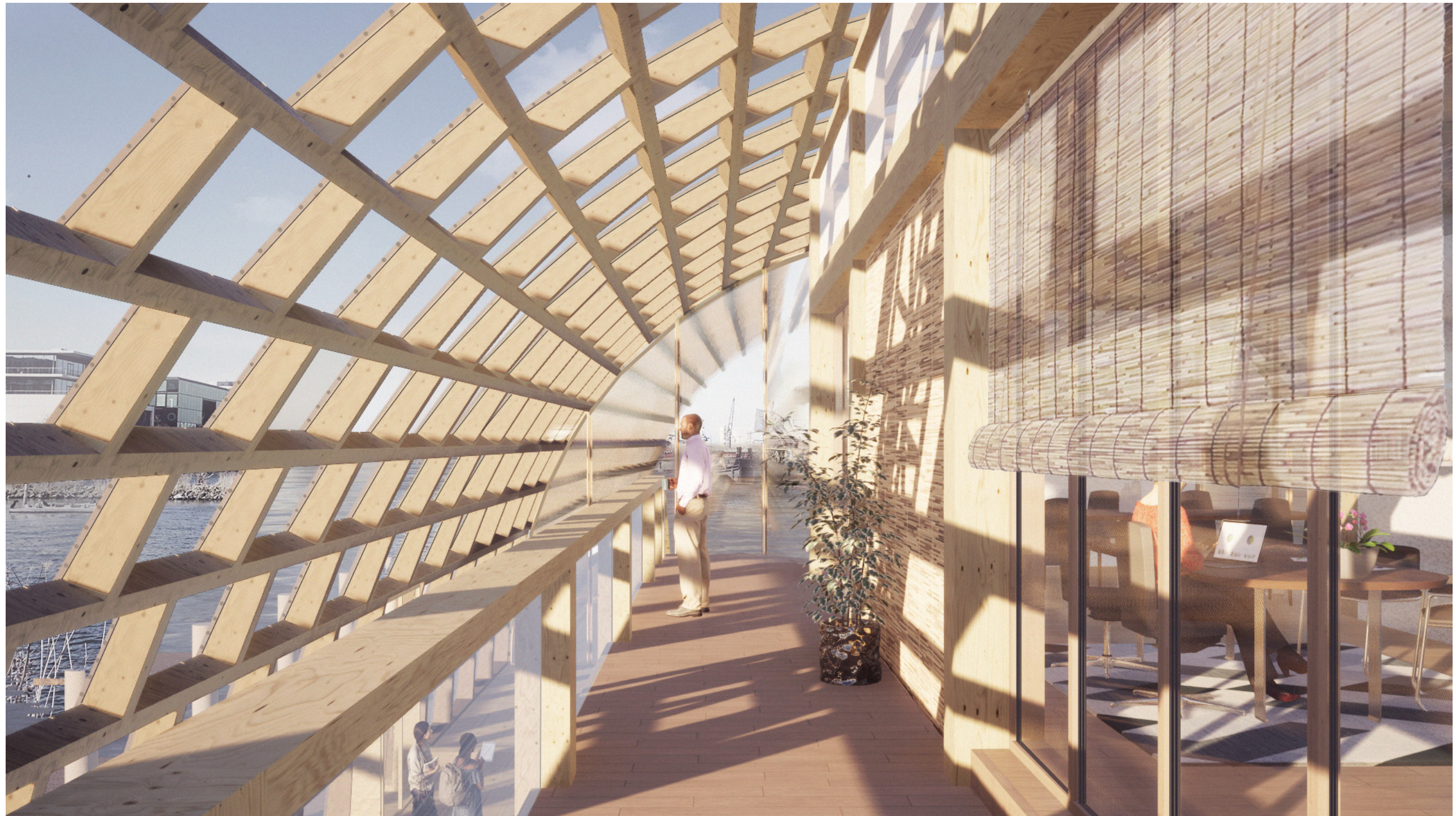
Fragment - 1:20



Climate design - Winter



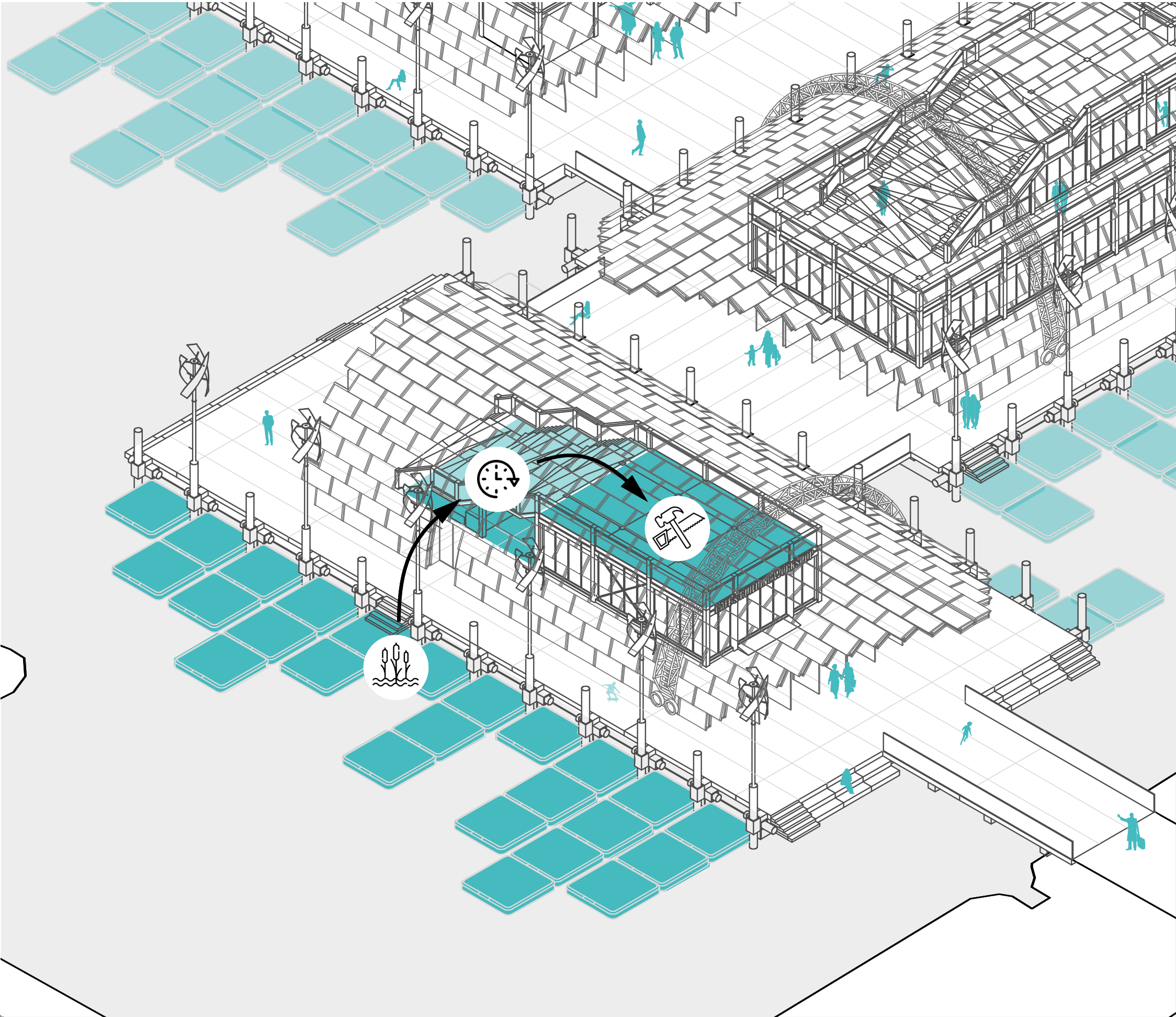
Climate design - Winter



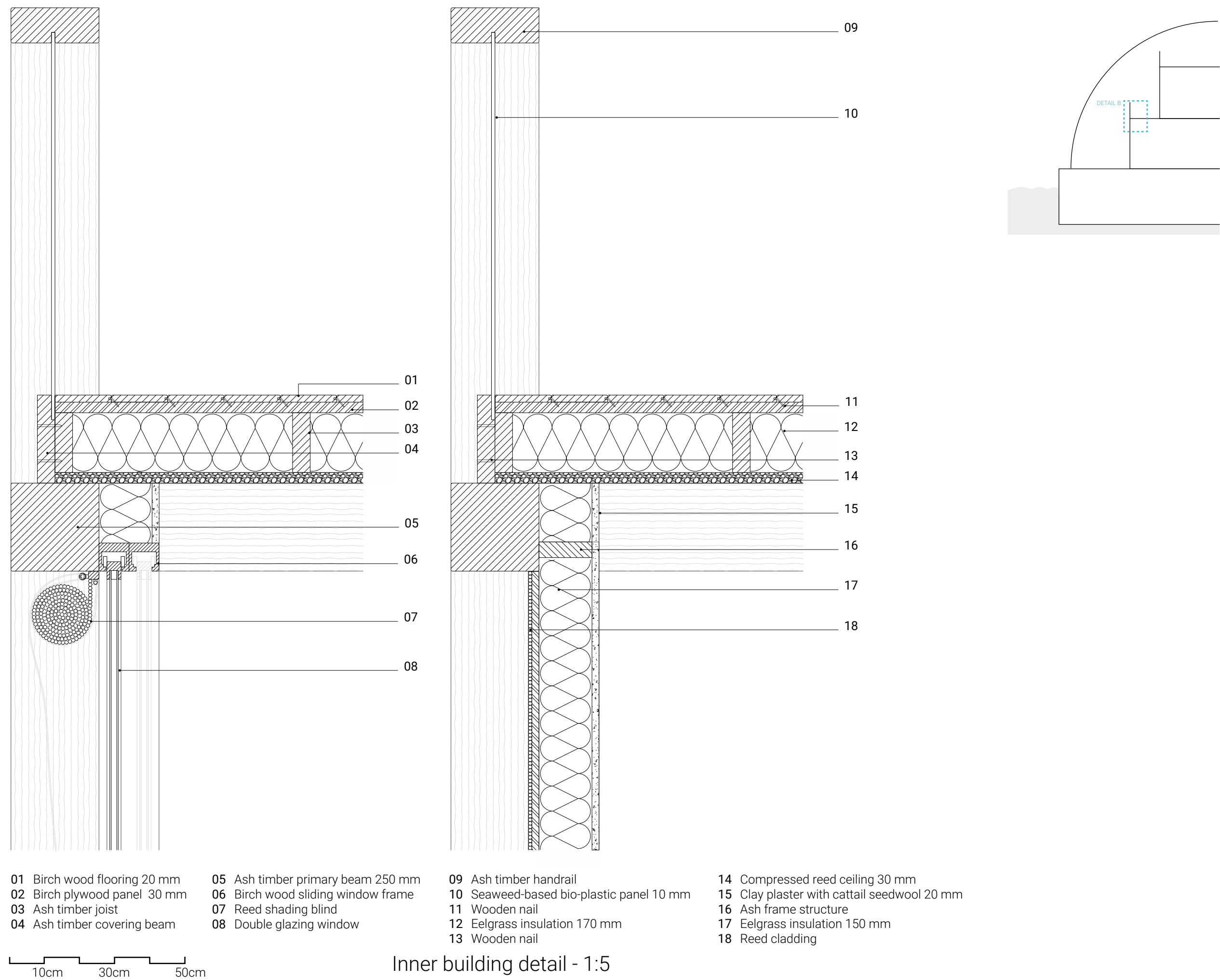
Circulation space

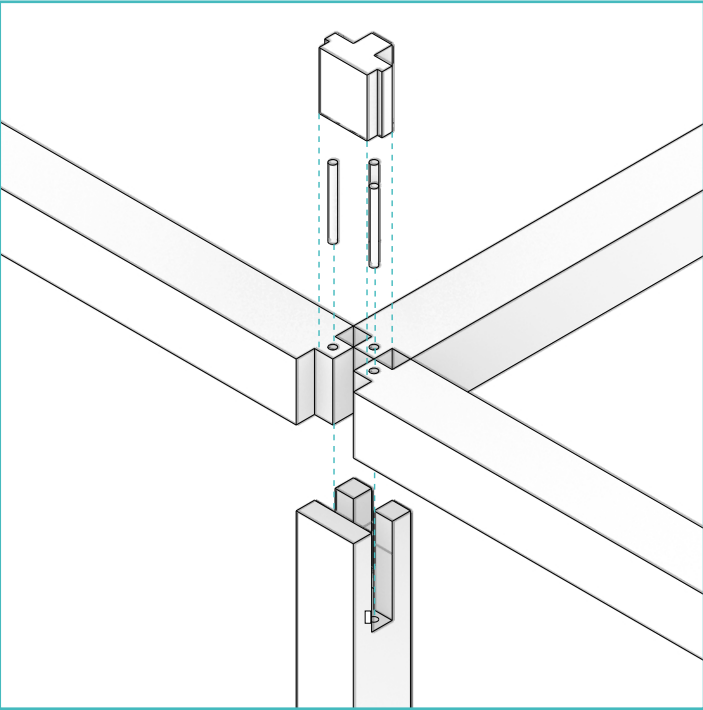


5. COMMUNITY BUILDING

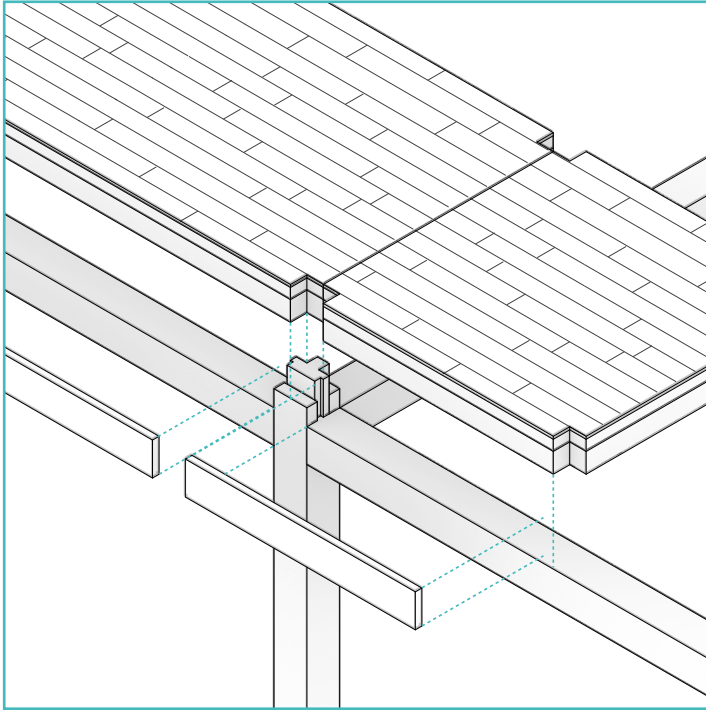


Prefabrication steps

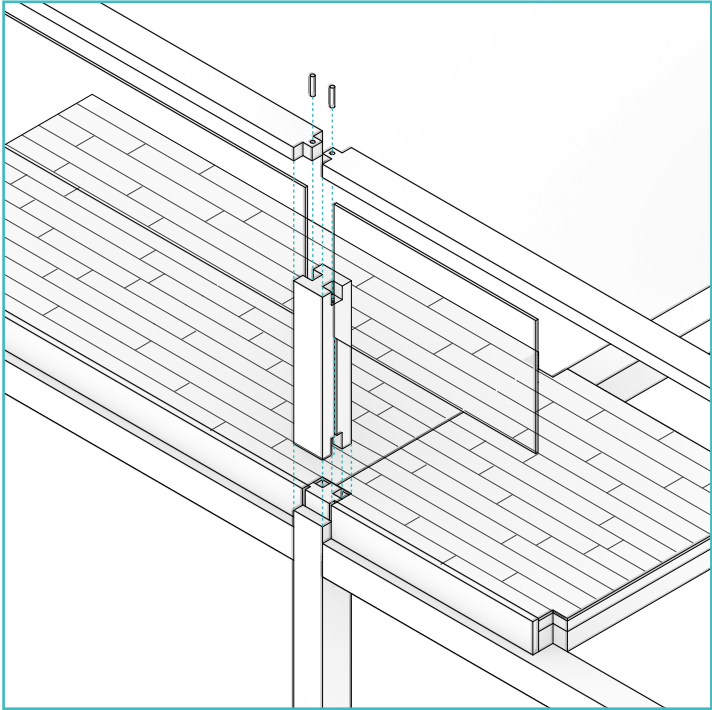




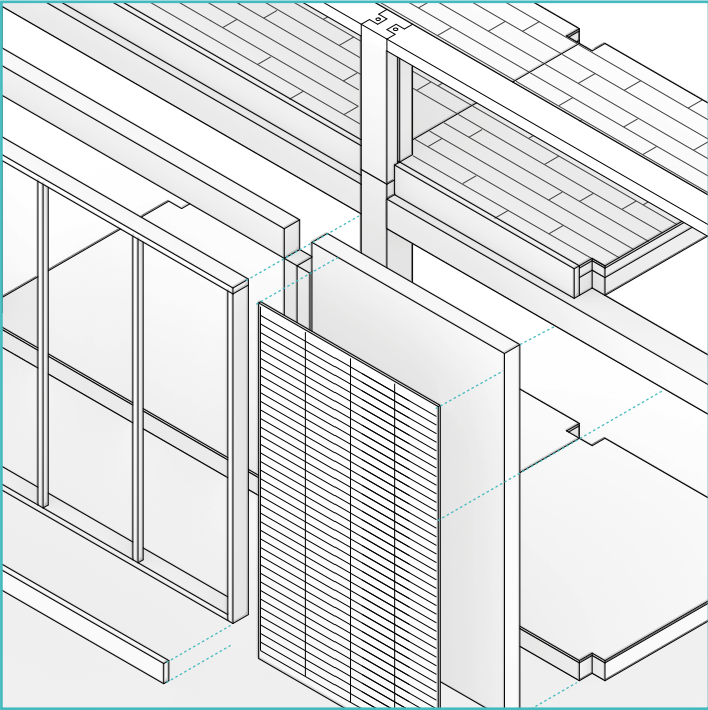
1- Bearing structure



2- Ceiling & flooring

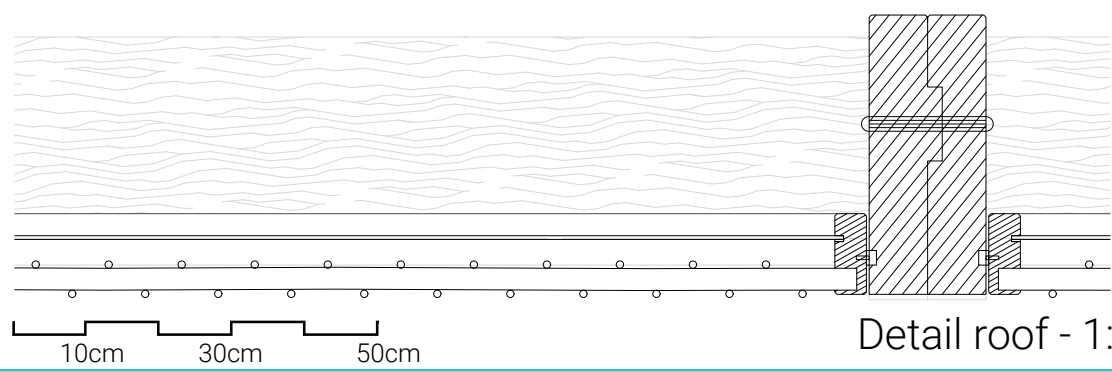
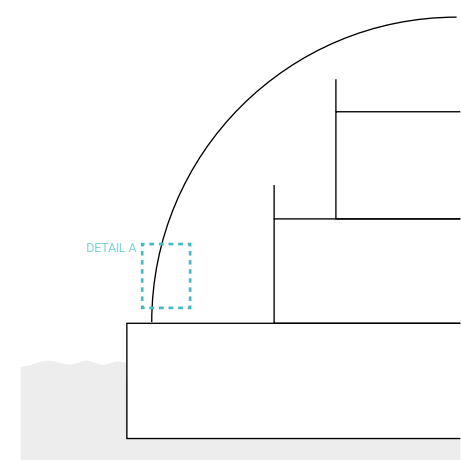
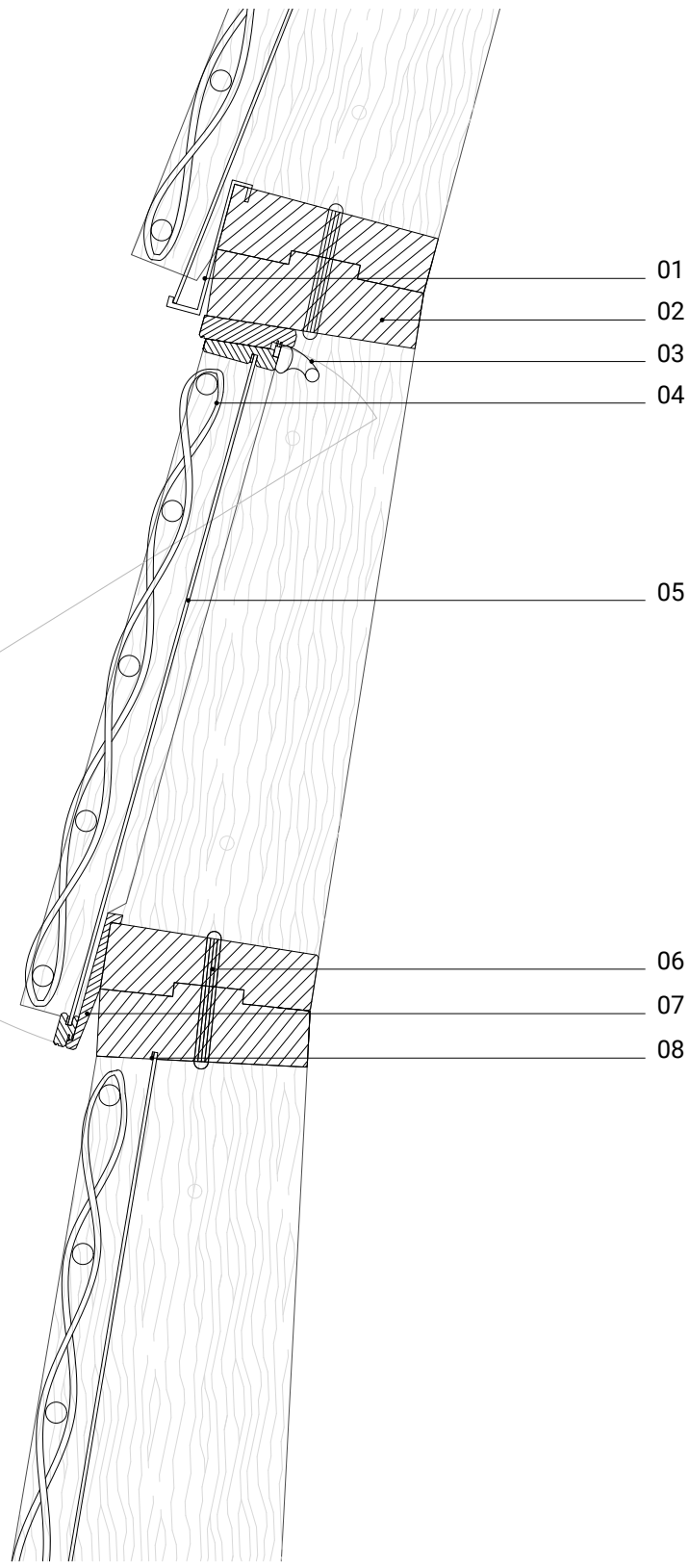
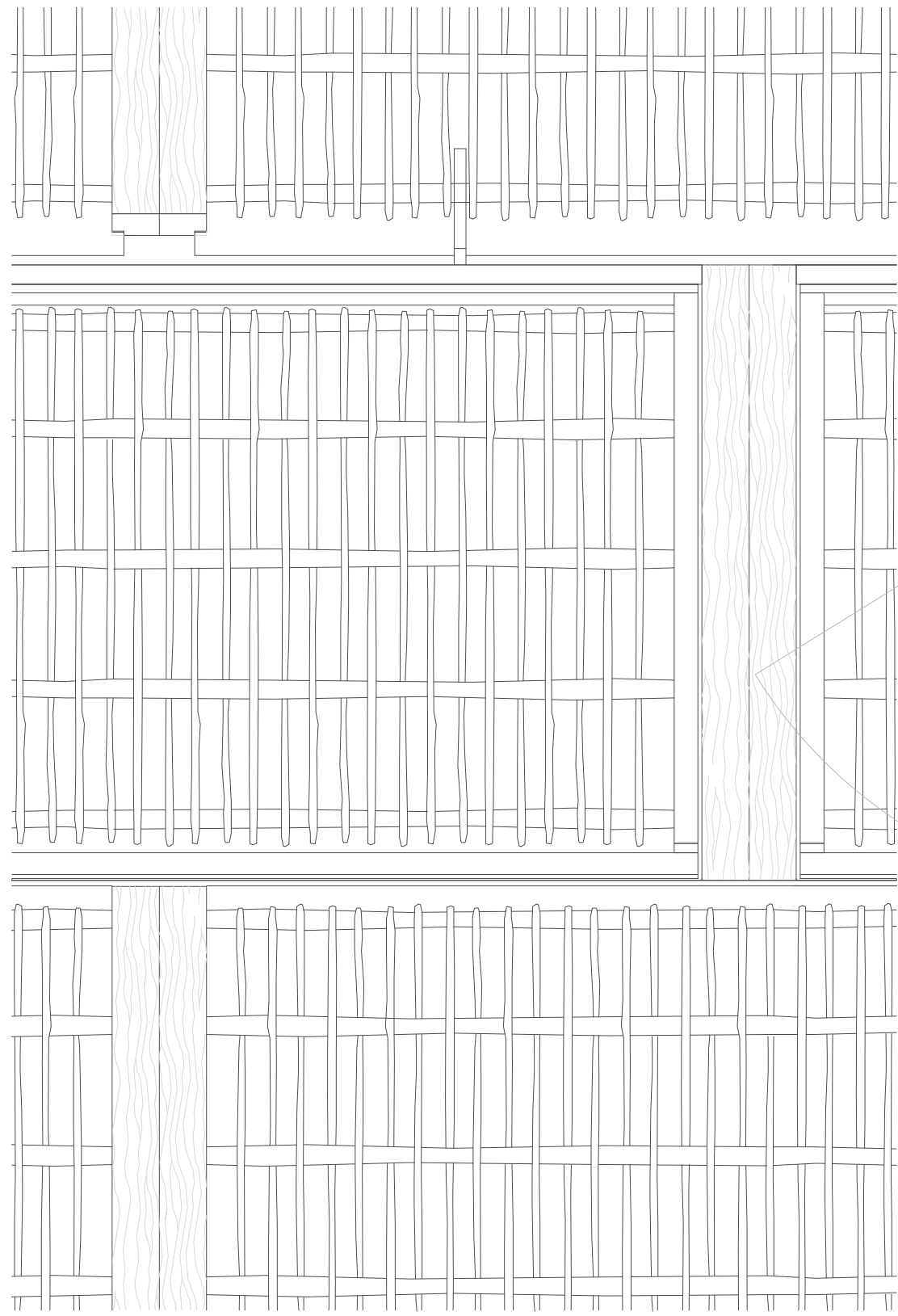


3- Handrails



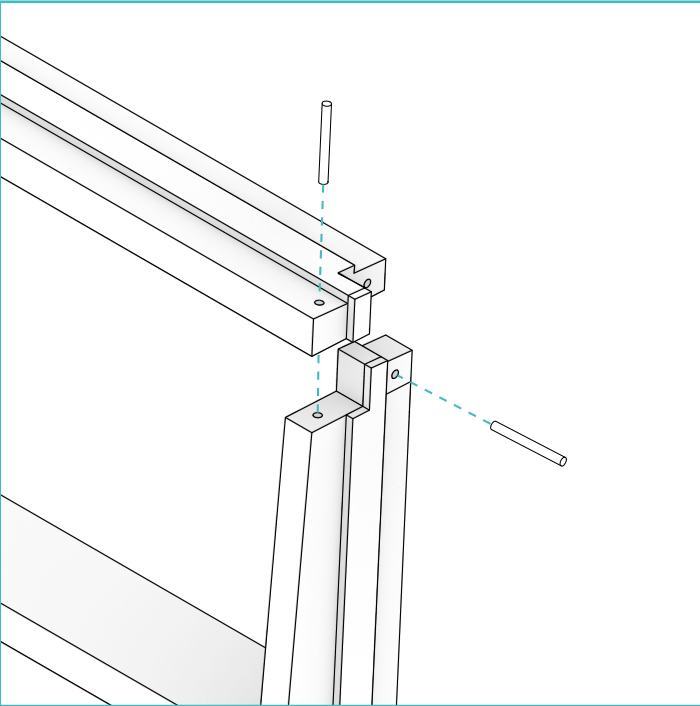
4- Facade

Inner building construction steps

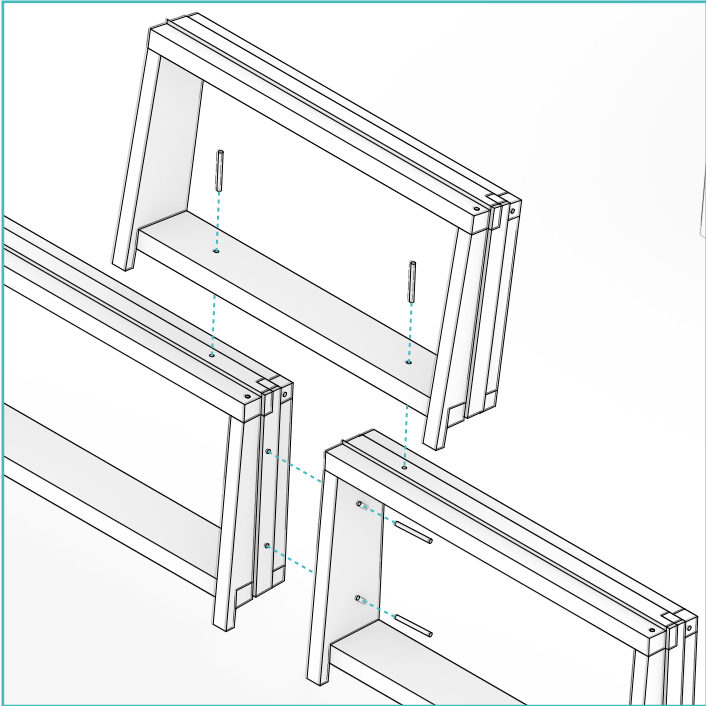


- 01 Seaweed-based bio-plastic clip
- 02 Alder horizontal structure
- 03 Pivoting window handle
- 04 Woven willow shading panel
- 05 Seaweed-based transparent bio-plastic sheet
- 06 Alder dowel
- 07 Alder pivoting panel frame
- 08 Sealing gasket

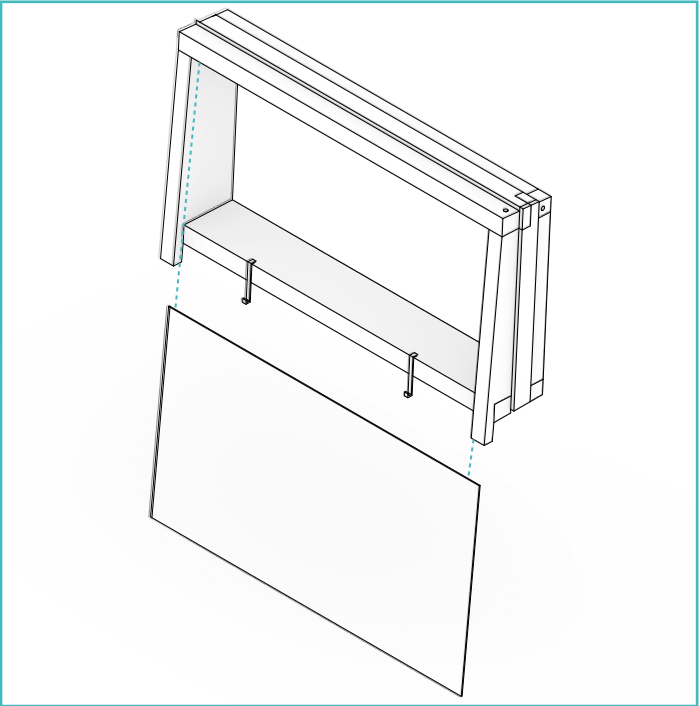
Detail roof - 1:5



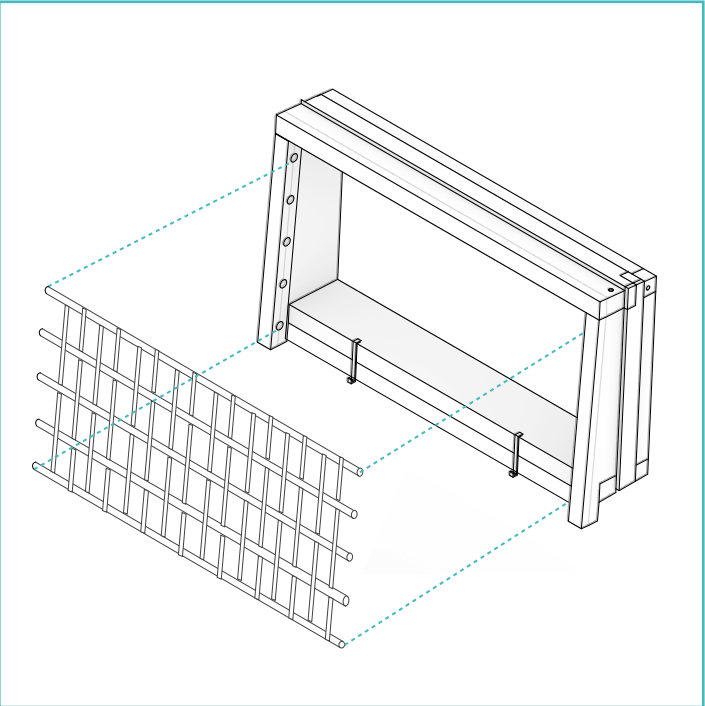
1- Frame



2- Installation on the roof



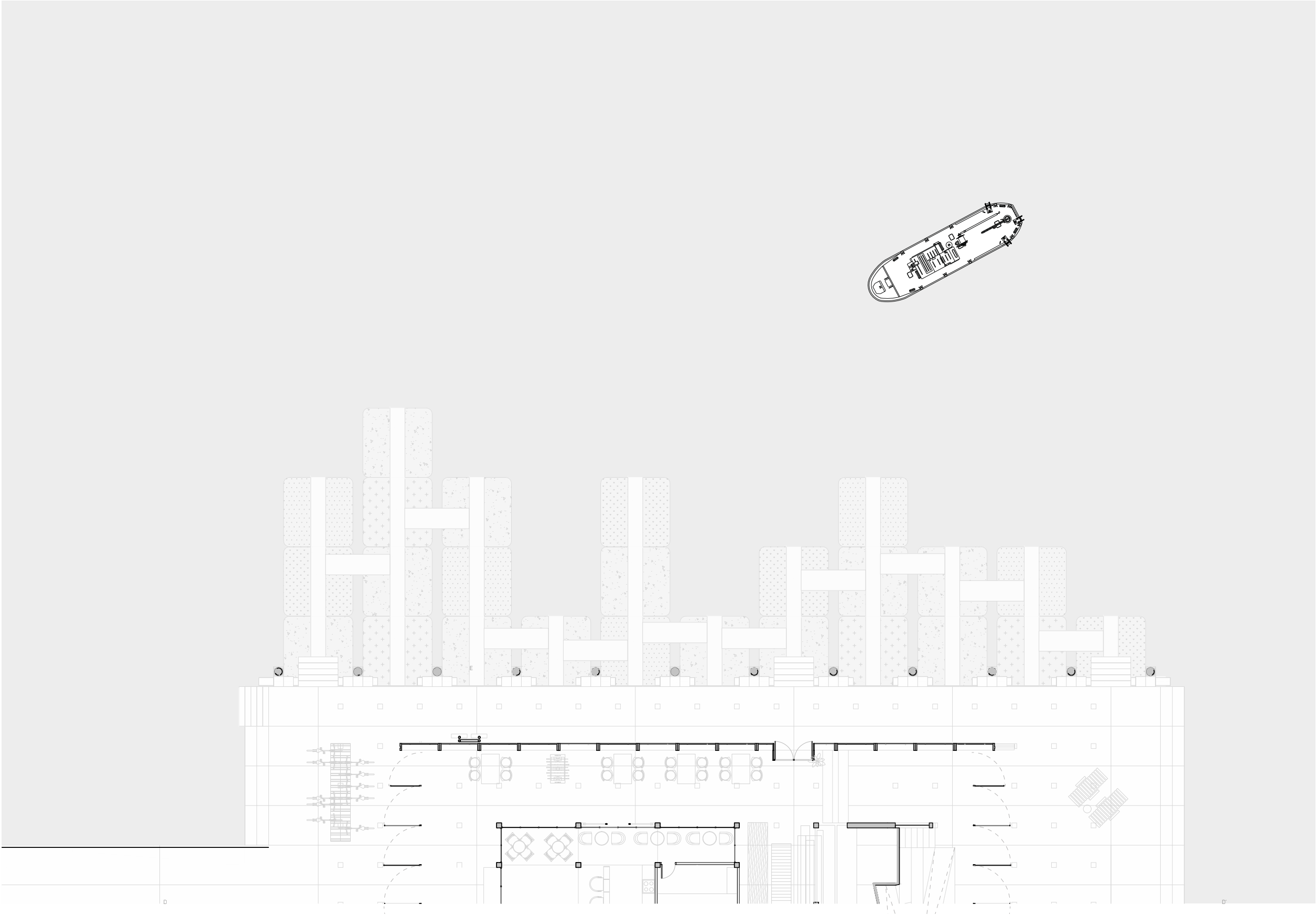
3- Bio-plastic panel



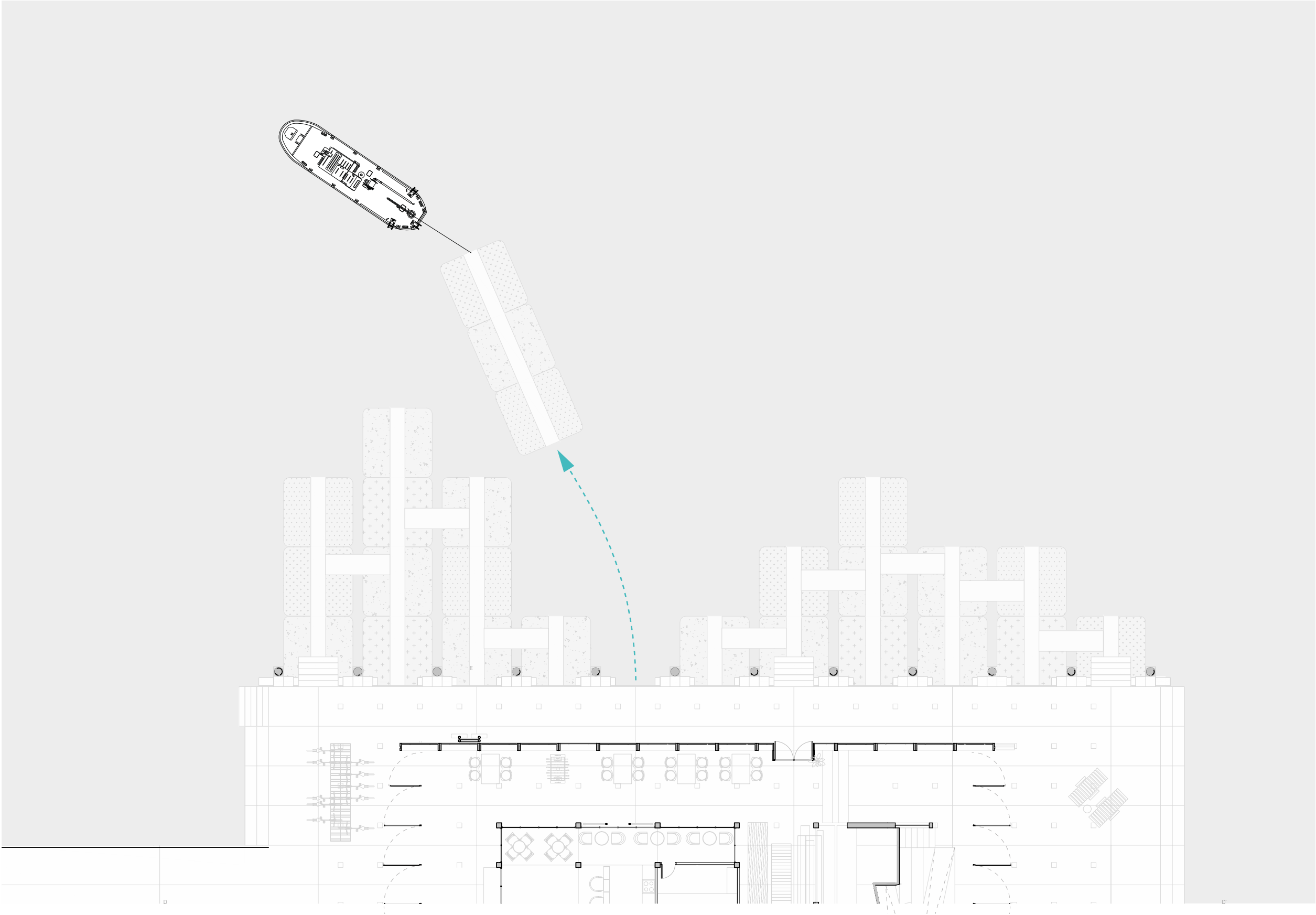
4- Woven willow panel



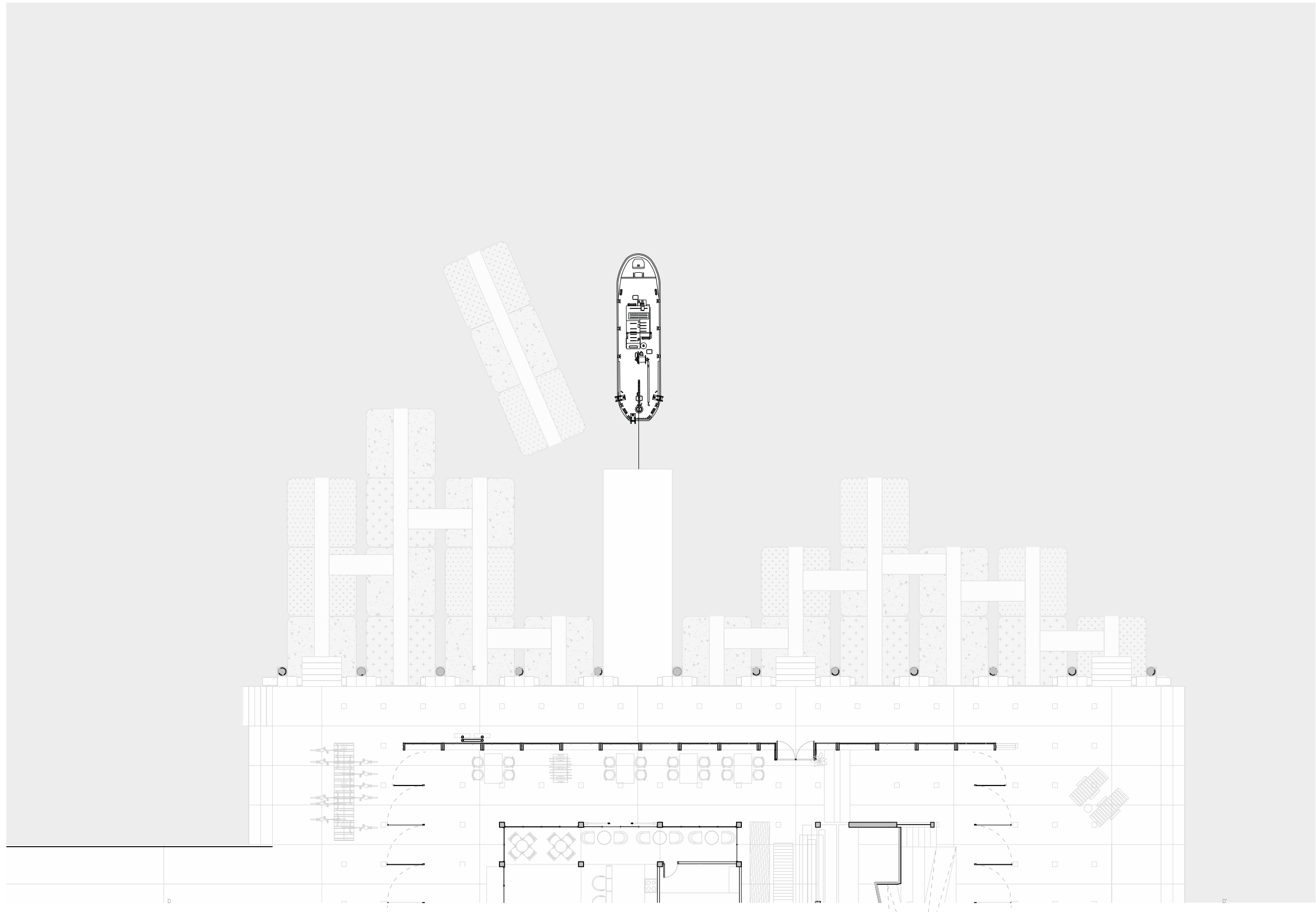
6. MAINTENANCE & REPLACEMENT



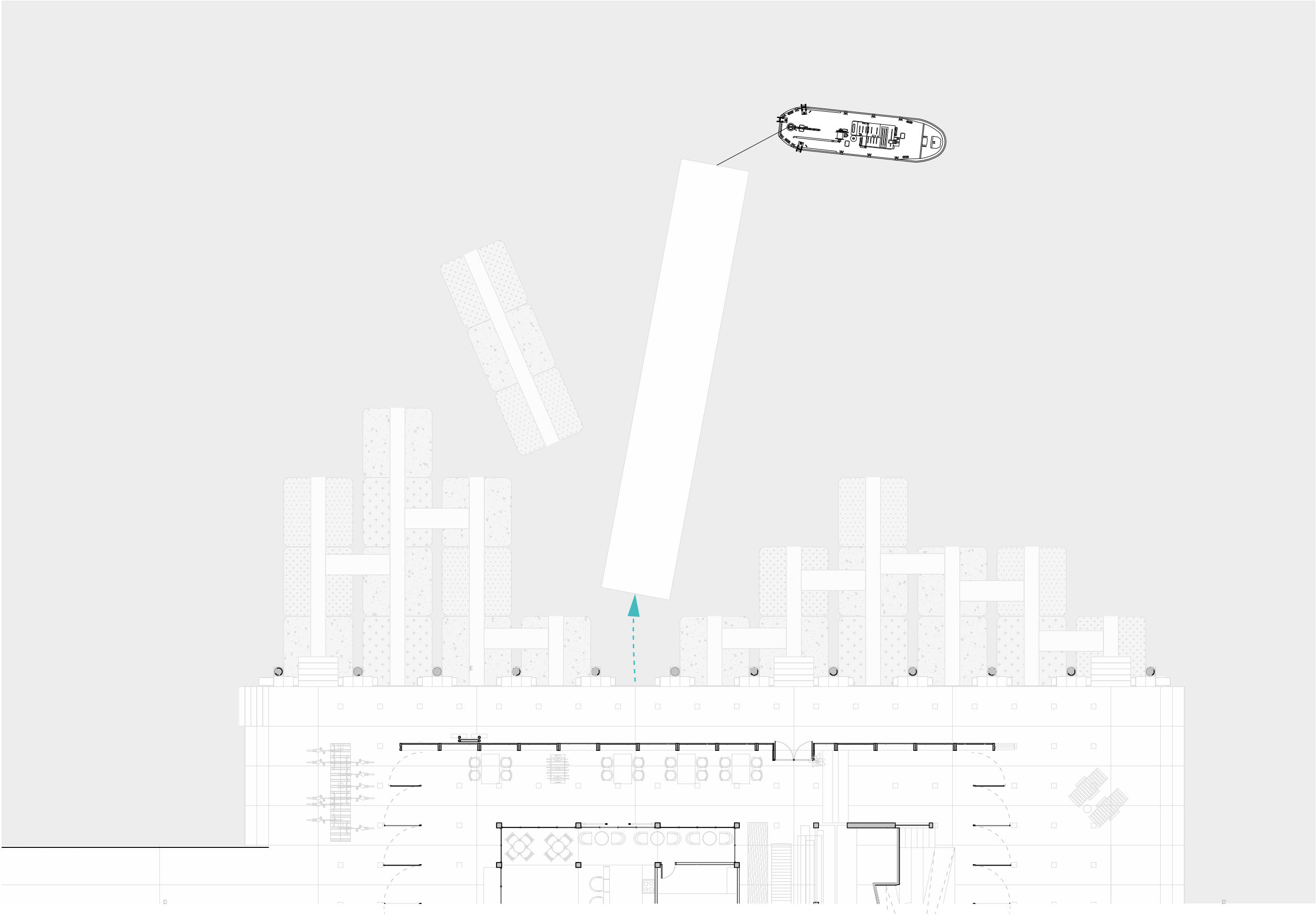
Tugboat intervention




Ecosystem detachment



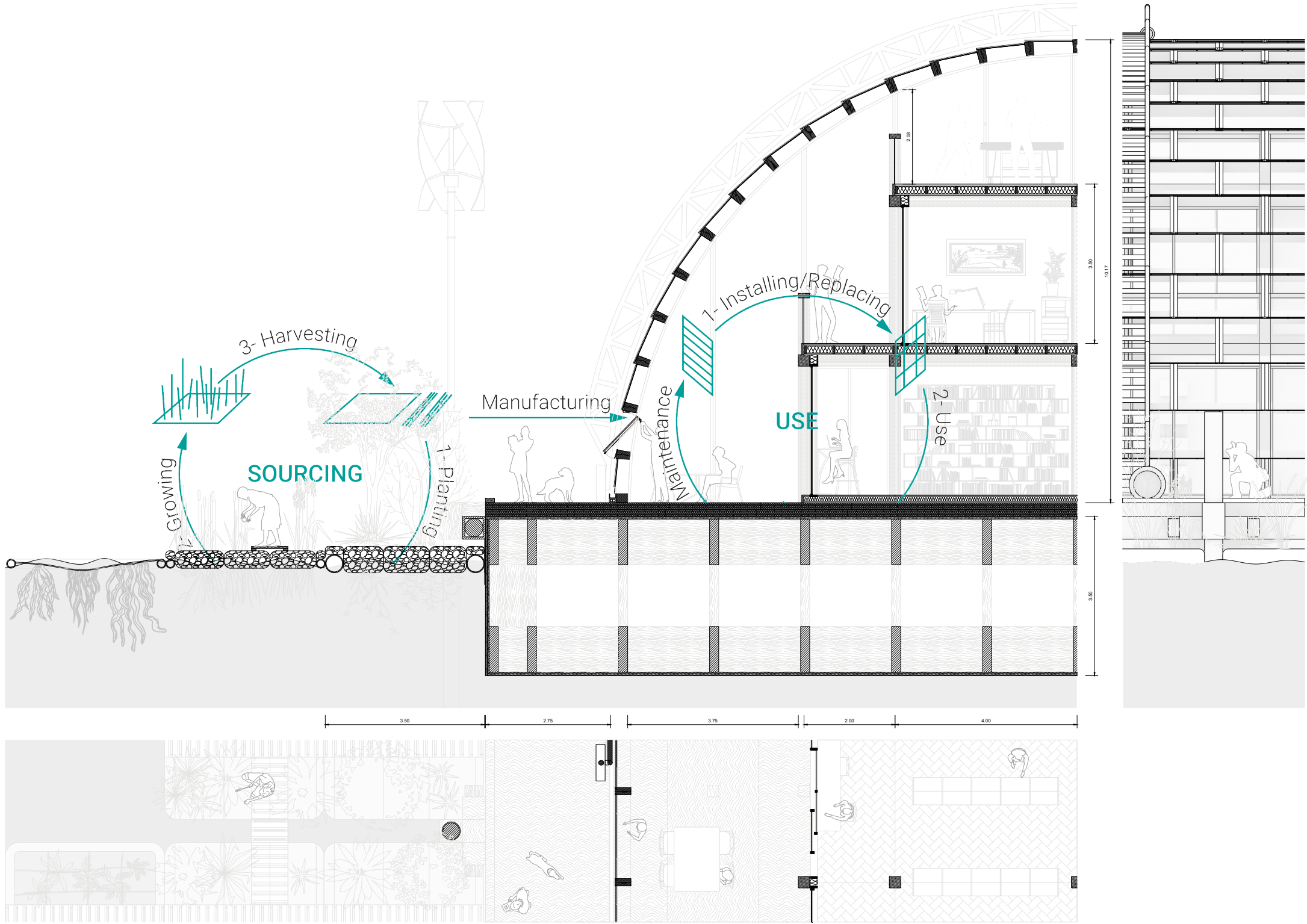
Floating module pulling



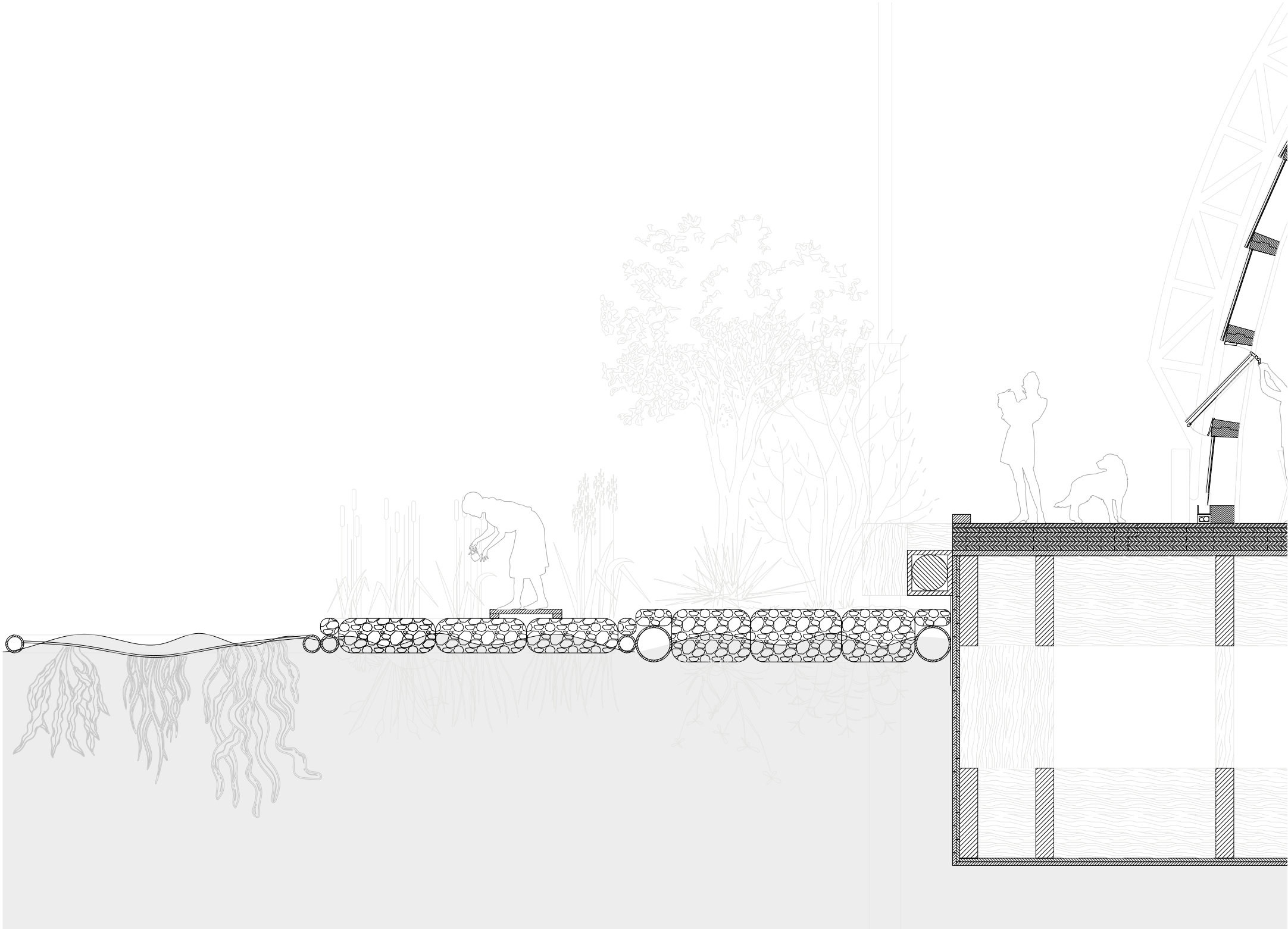
Floating module transportation



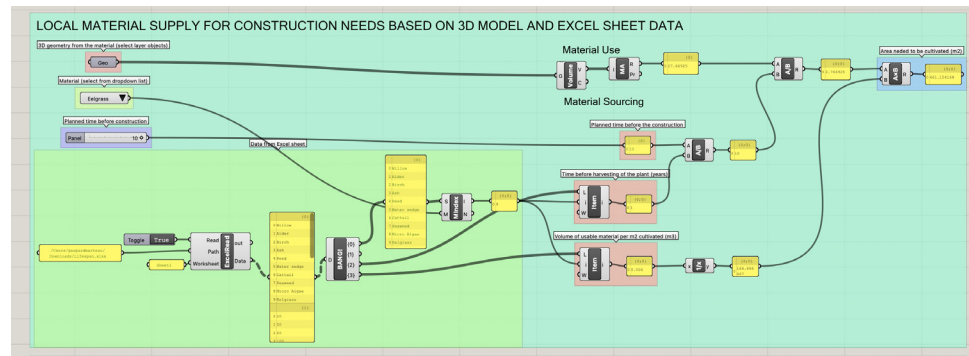
7. SYSTEMIC ANALYSIS



Fragment - 1:20



Fragment - 1:20

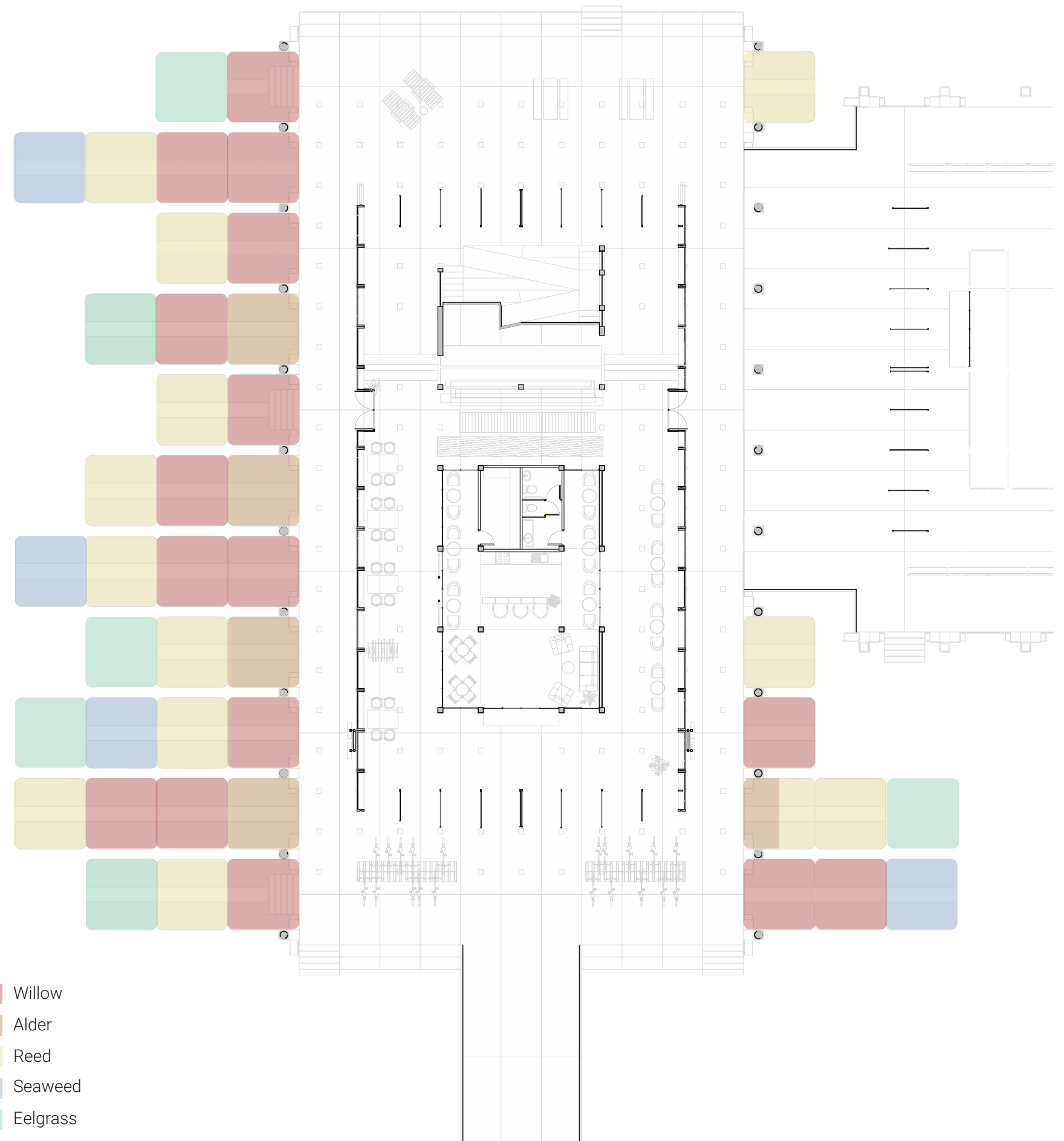


VOLUME OF MATERIAL IN THE BUILDING

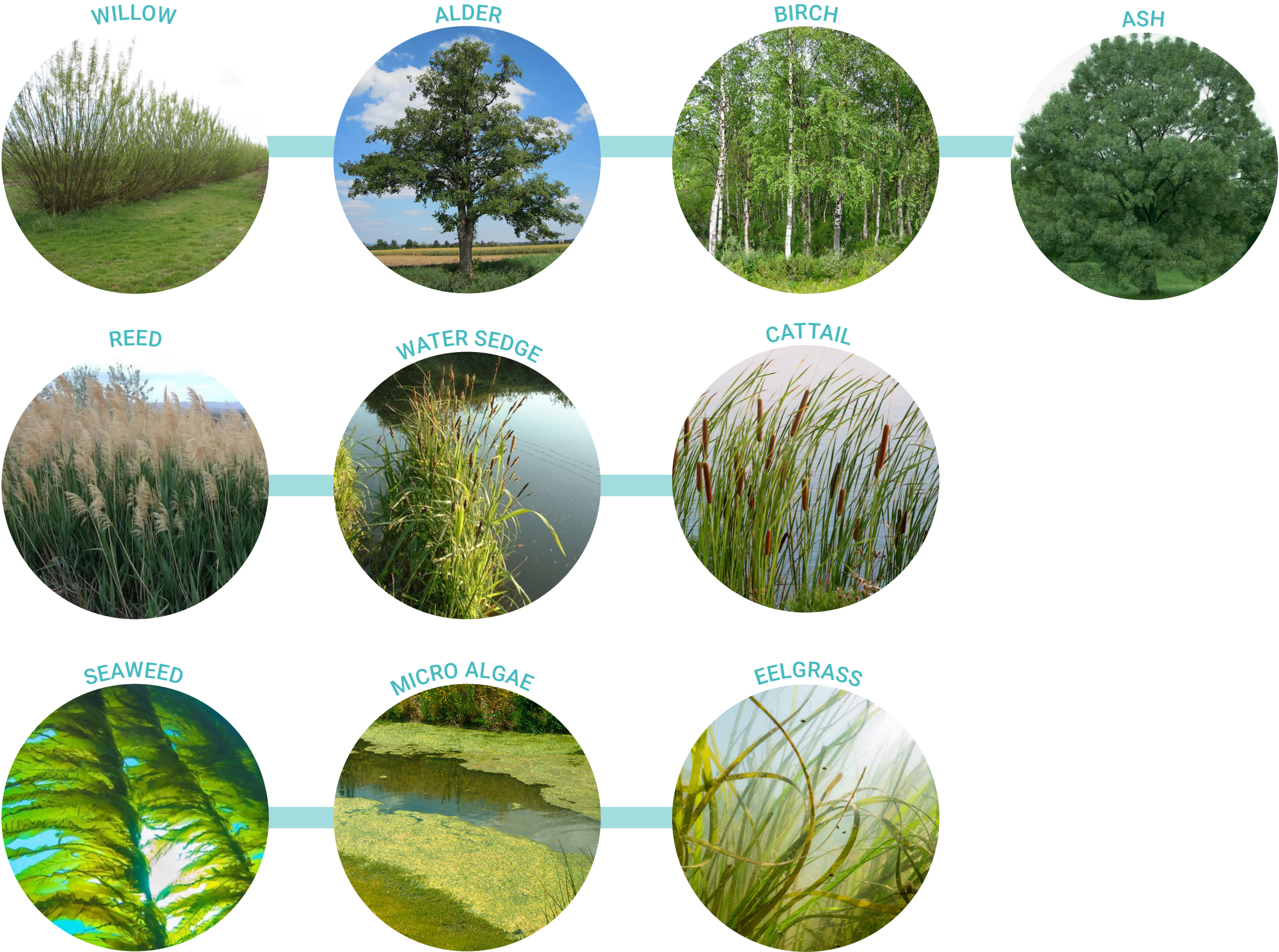
- Willow = 20.50 m³
- Alder = 898.57 m³
- Birch = 34.41 m³
- Ash = 754.36 m³
- Reed = 9.15 m³
- Seaweed (50% of bio-plastic) = 22.13 m³
- Eelgrass = 23.12 m³

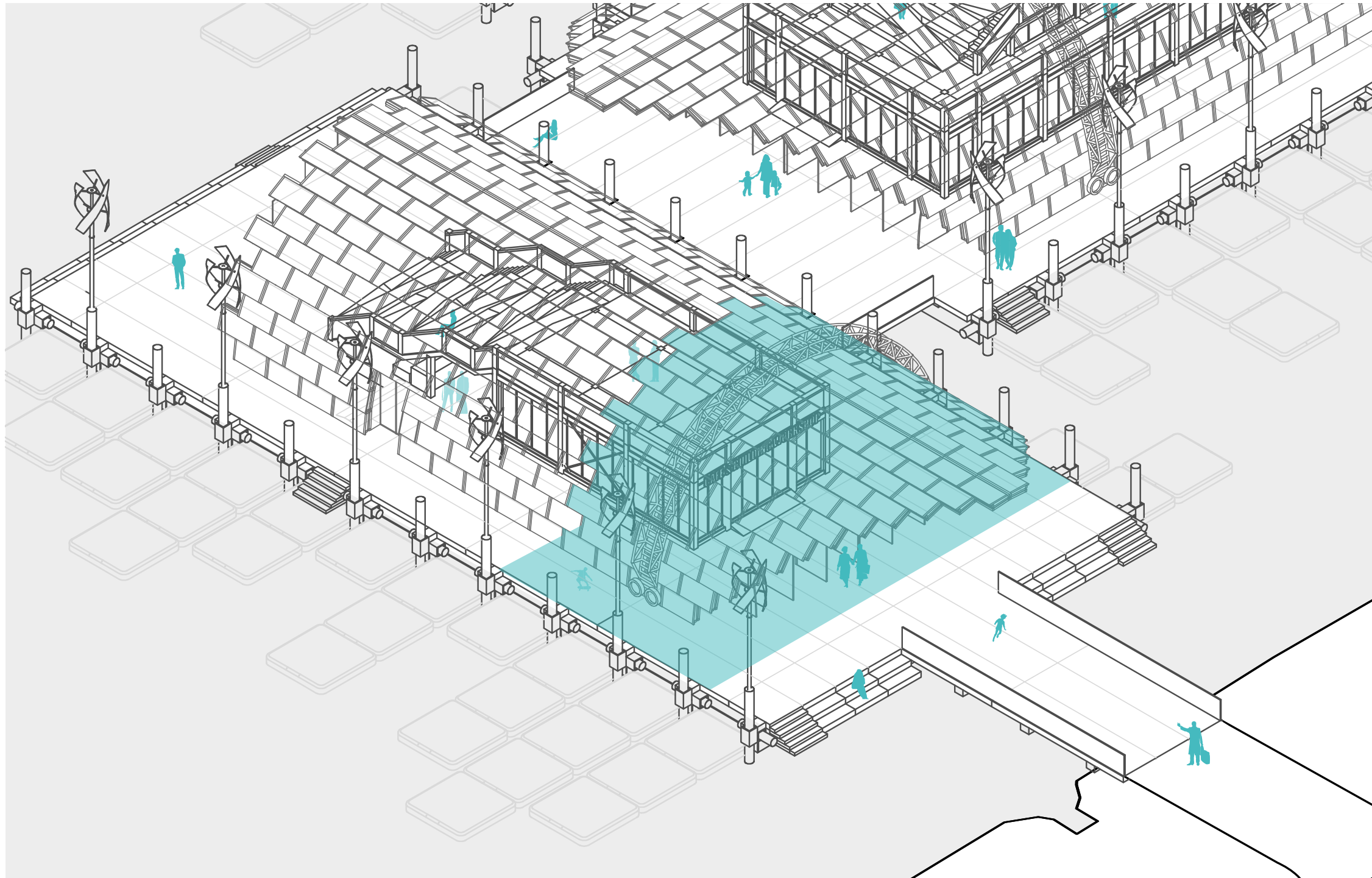
SURFACE OF MATERIAL TO GROW FOR REPLACEMENT NEEDS

- Willow = 206 m² --> 16 ecosystem modules
- Alder = 10269 m² --> 680m x 15m along the water bank & 5.6 ecosystem modules
- Birch = 458 m² --> 30m x 15m along the water bank
- Ash = 4694 m² --> 312m x 15m along the water bank
- Reed = 152 m² --> 12.4 ecosystem modules
- Seaweed = 49 m² --> 4 ecosystem modules
- Eelgrass = 77 m² --> 6.3 ecosystem modules



Cultivation area for replacement needs of the first building





Prototyping

A detailed architectural rendering of a modern waterfront building complex during sunset. The main building on the left features a large, curved, copper-clad roof with a grid-like pattern. A person is standing on a set of steps leading up to it. In the foreground, there are tall, golden-brown reeds and a small body of water with a duck. To the right, another building with a similar copper-clad roof is visible, along with several tall, slender poles topped with large, stylized, cross-shaped sculptures. The sky is a mix of orange, pink, and blue, with a few birds flying in the distance.

THANK YOU!

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P5 Presentation
26-06-2025

Architectural Engineering Graduation Studio

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