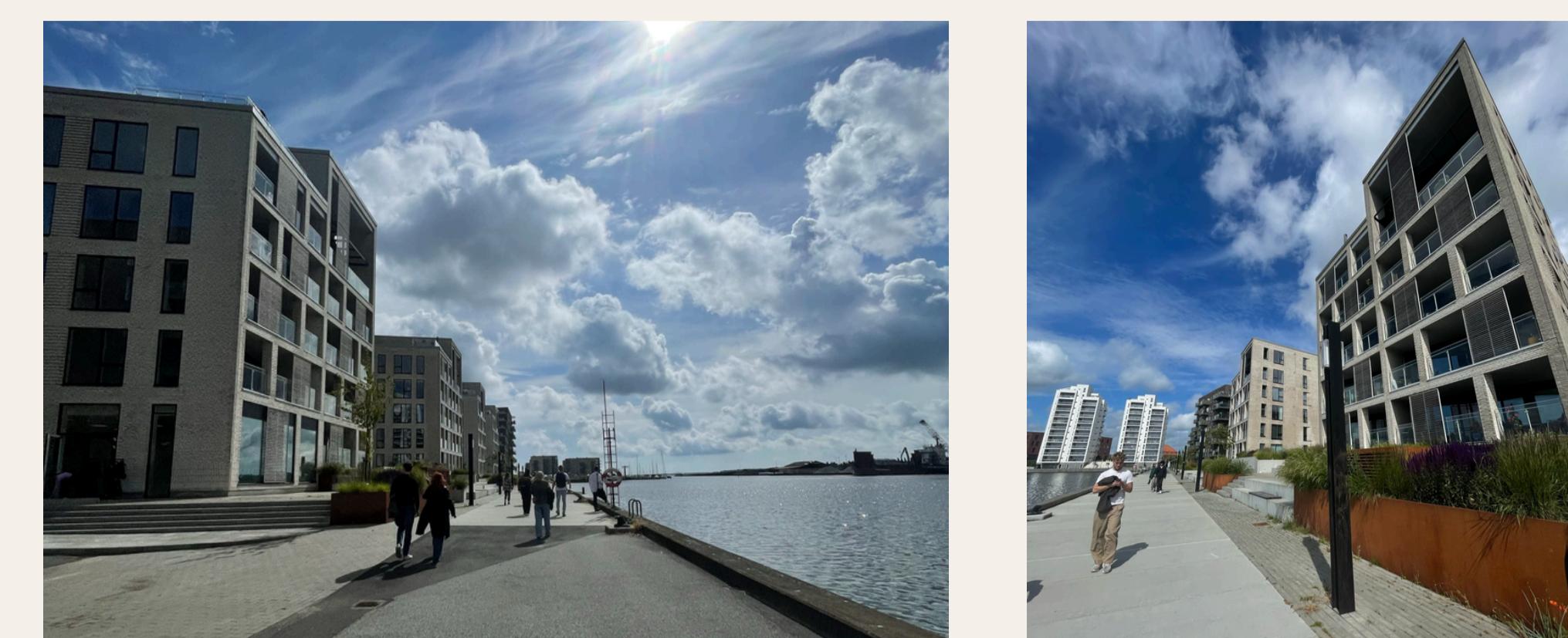
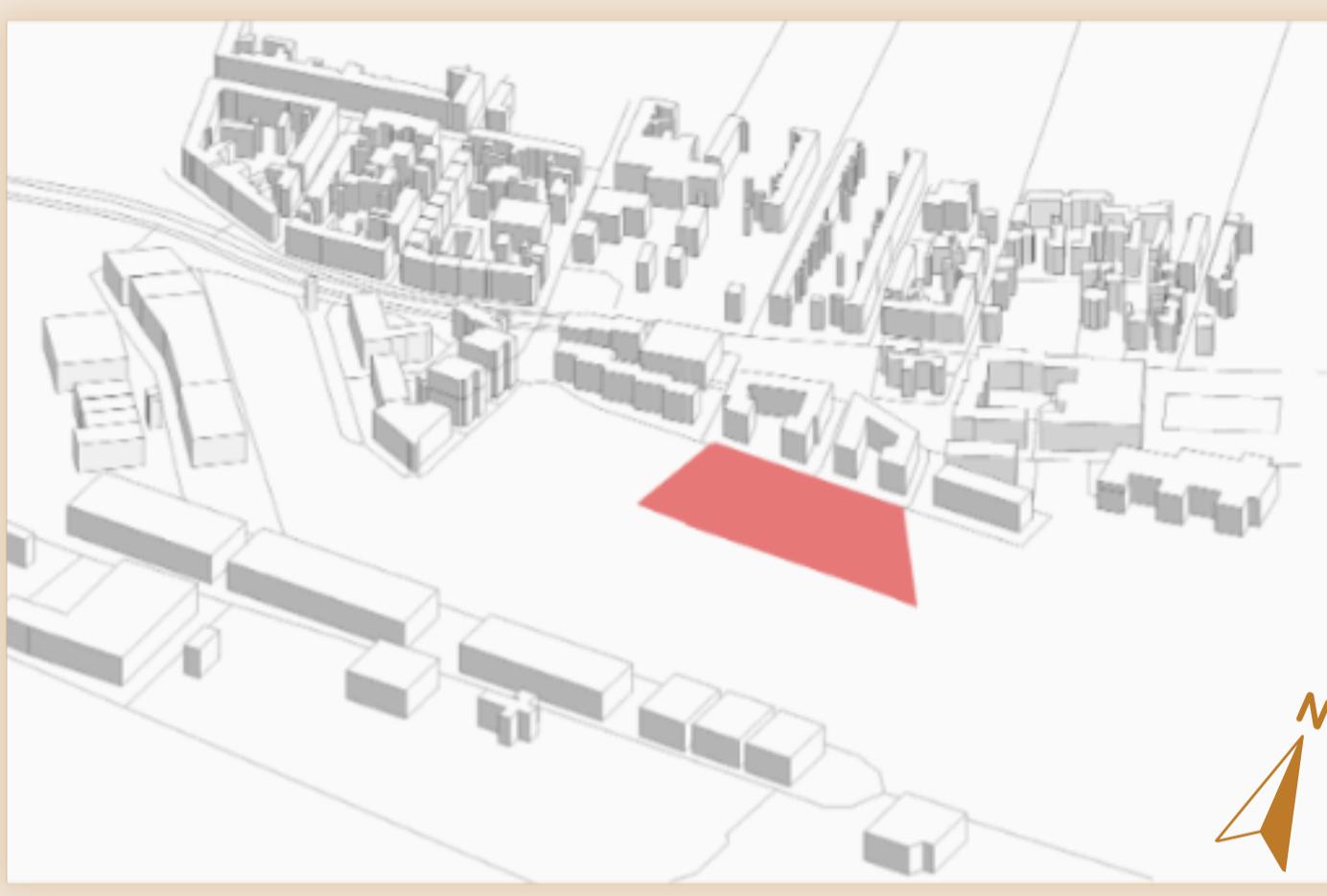


INTERNATIONAAL PROJECT

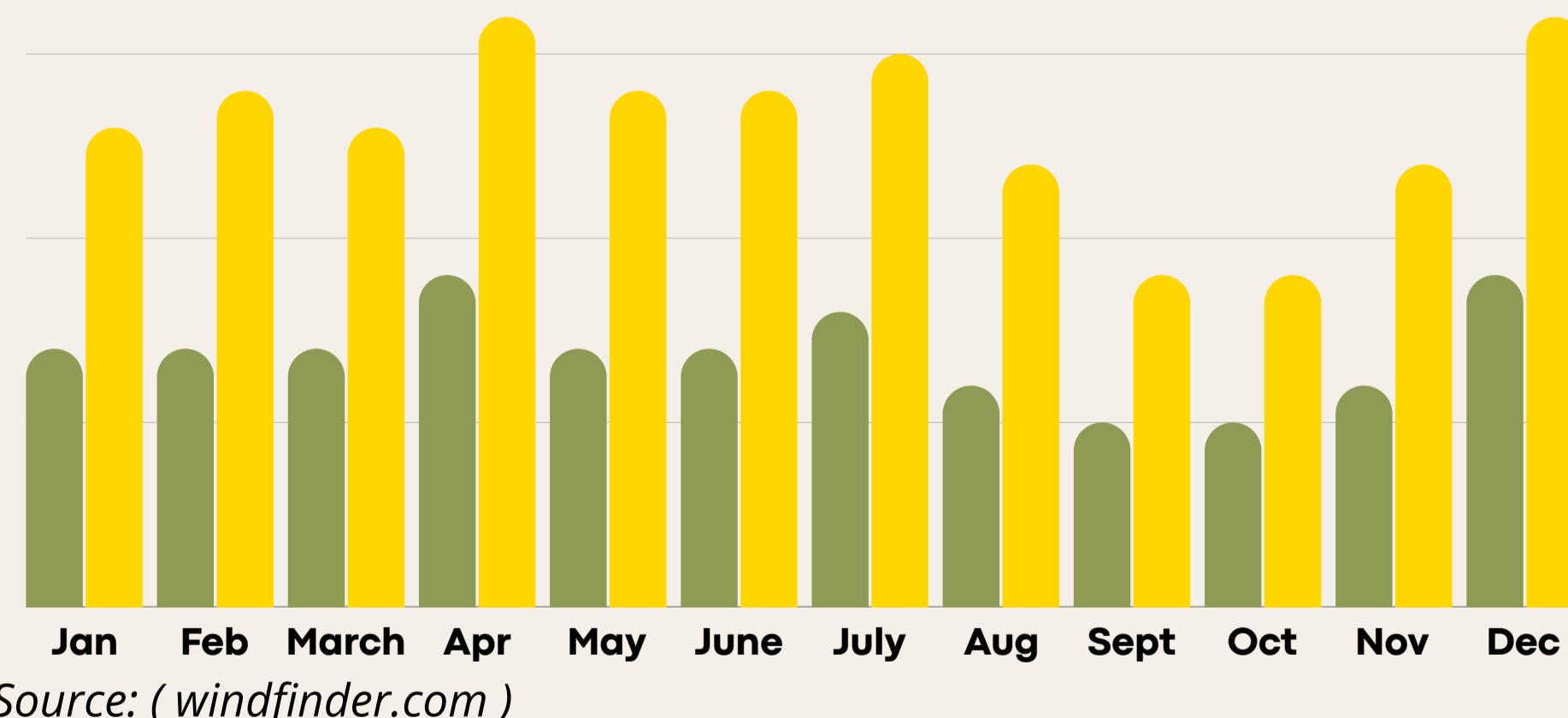
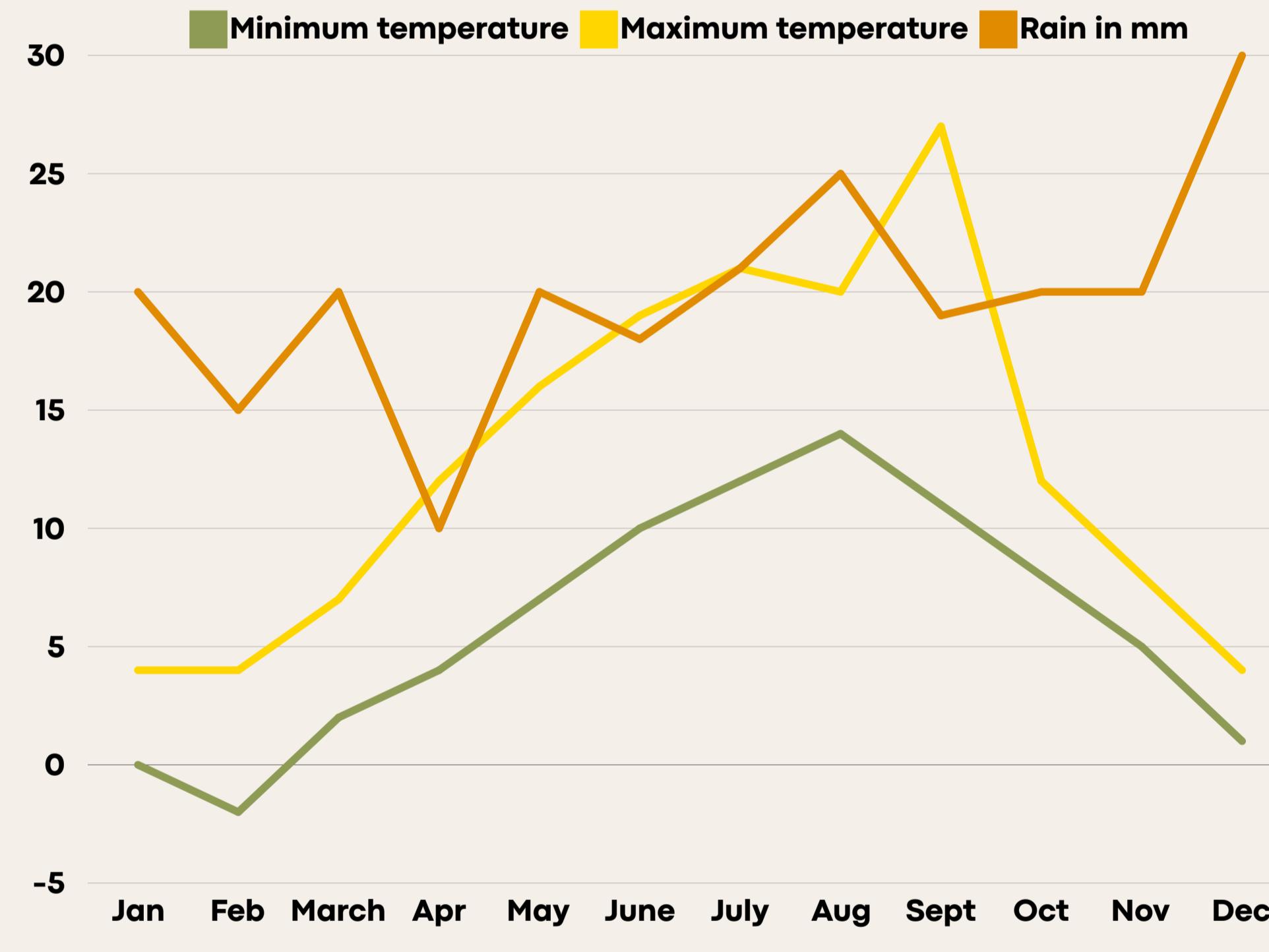
HORSSENS

Location

Horsens is located on the left side of Denmark. The lot is in the fjord of Horsens. Building in the waters of a fjord brings some complications. A fjord means: narrow inlet of the sea between steep cliffs. One characteristic of a fjord is that it experiences wave action, that will lead to high differences. The hights difference can go up to **4 meters**.



Climate



Conclusion

Building in the fjord of Horsens presents challenges due to significant wave action and strong winds. The building is fully exposed to the sun, so to regulate the heat inside the building, louvers are used. In bad weather, they can be opened, and in full sun, the heat can be kept outside by closing the louvers. In the design will be some changes to break down the vertical en horizontal wind.

Requirements

Needs:

- Stability and Safety:
- Strong anchors and durable materials
- Safety measures like life jackets and fire protection

Basic Amenities:

- Clean drinking water and sustainable energy (solar panels, water turbines)

Accessibility:

- Bridges and ramps for 4-meter height difference, accessible for everyone

Environmentally Friendly:

- Green spaces (rooftop gardens)
- Recycling programs

Recreation:

- Parks, playgrounds, and water sports facilities
- Community spaces for gatherings

Commercial Spaces:

- Shops, cafes, and restaurants

Cultural Center:

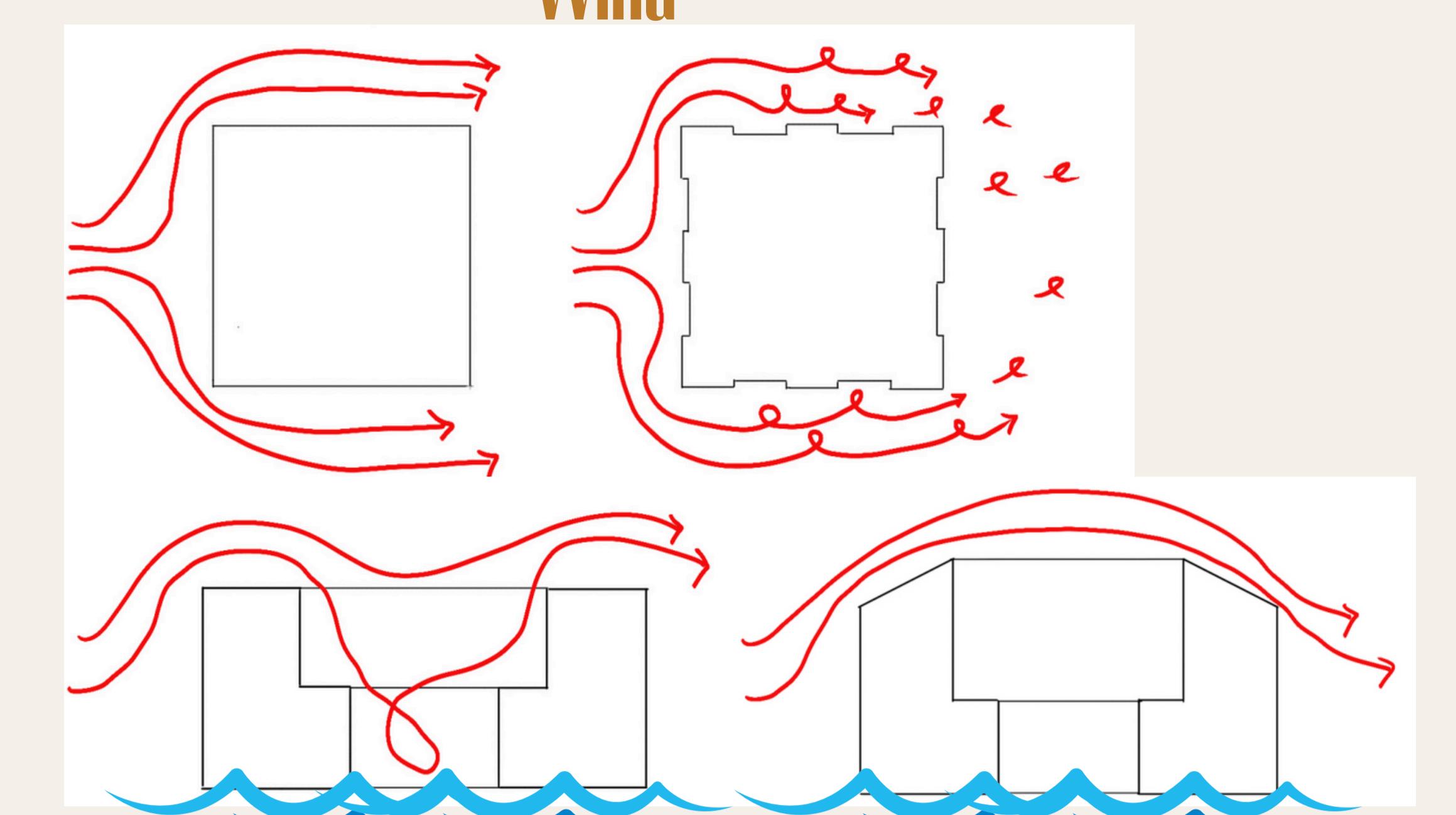
- Spaces for art, workshops, and performances
- Meeting rooms and classrooms

Integration with Shore:

- Attractive and functional bridges to the mainland
- Coordination with existing infrastructure

Additional Amenities:

- Fitness centers, libraries, and flexible spaces



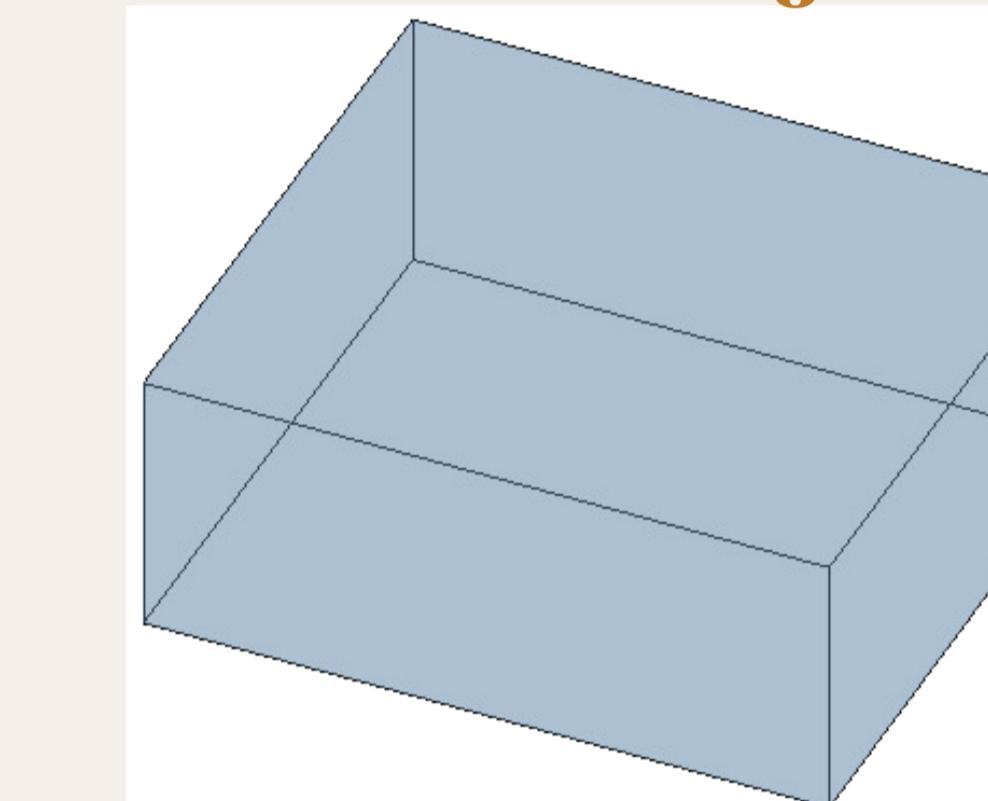
Breaking the wind horizontal:

- Roughness in the facade, made with panels of 400 mm and 200 mm thickness

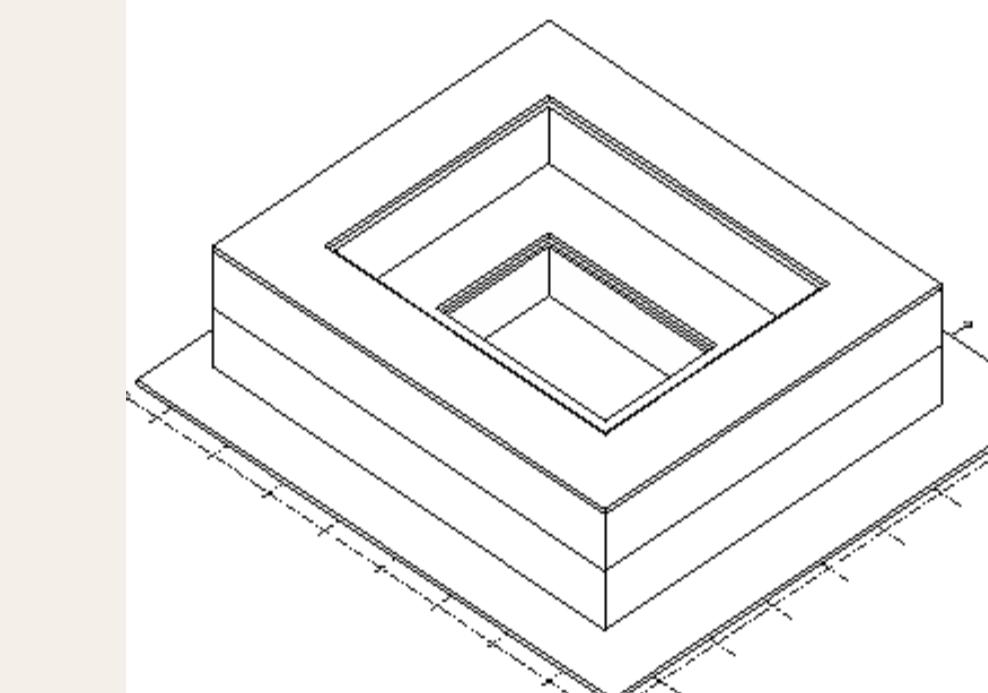
Breaking the wind vertical:

- Adding a sloping roof instead of a flat roof

Design timeline



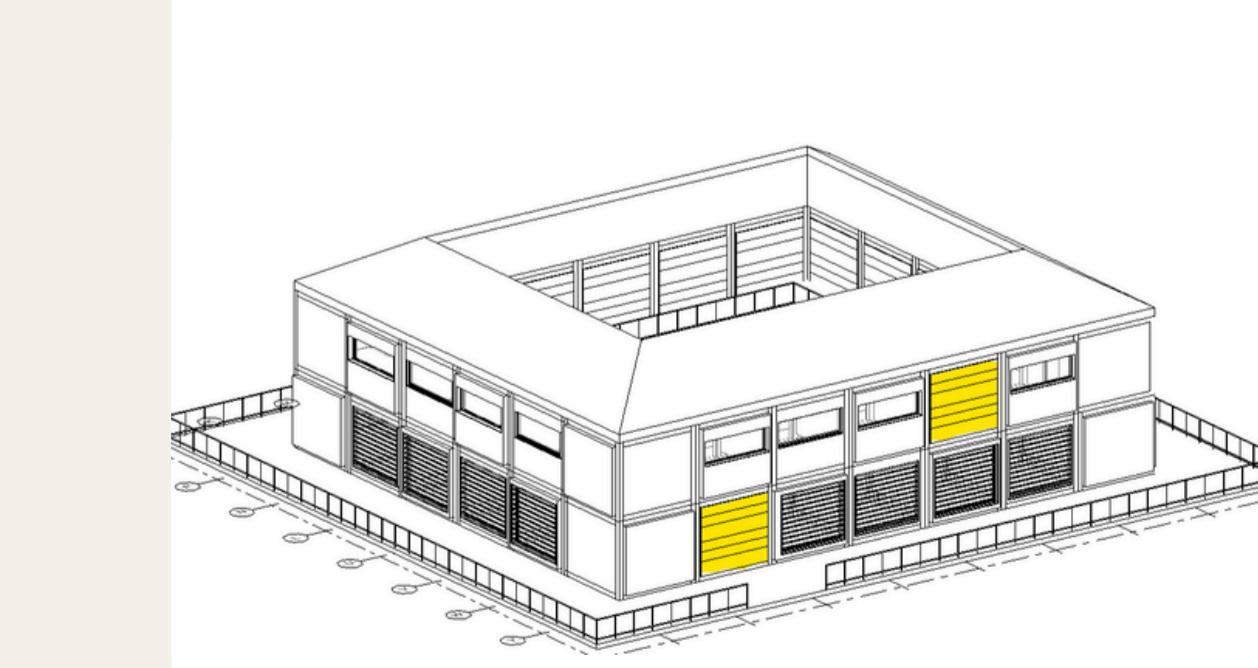
Weight Balance and modular building made the design choice for the shape scarce, so as a starting shape we used a square



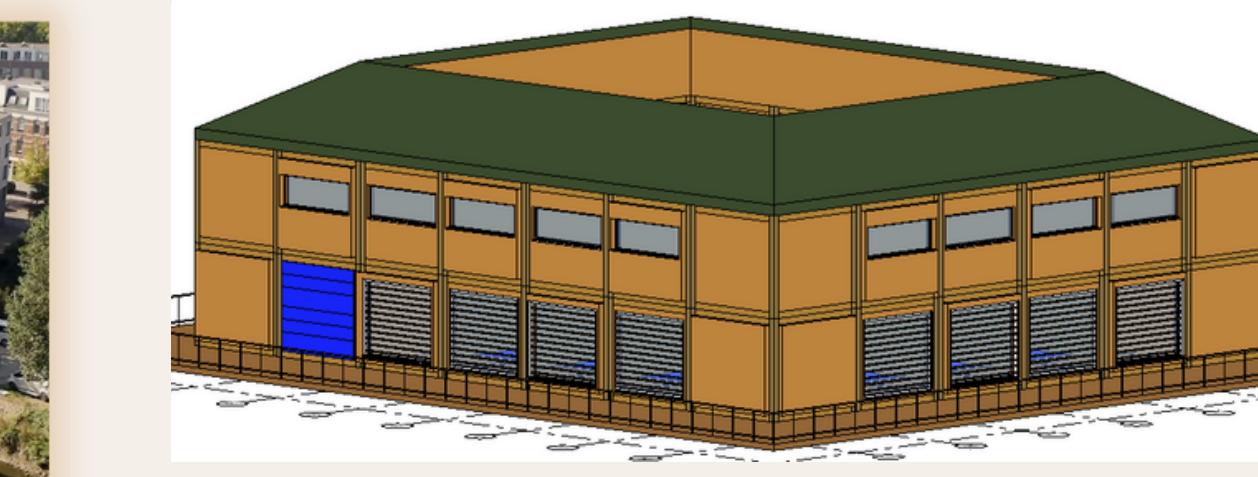
To protect visitors from the unpredictable weather we have created a "courtyard." This also creates a cozy inner square and climate.



To break the wind on the outside, we staggered the facade elements and added a sloped roof. Additionally, we narrowed the promenade to create more plaza space.

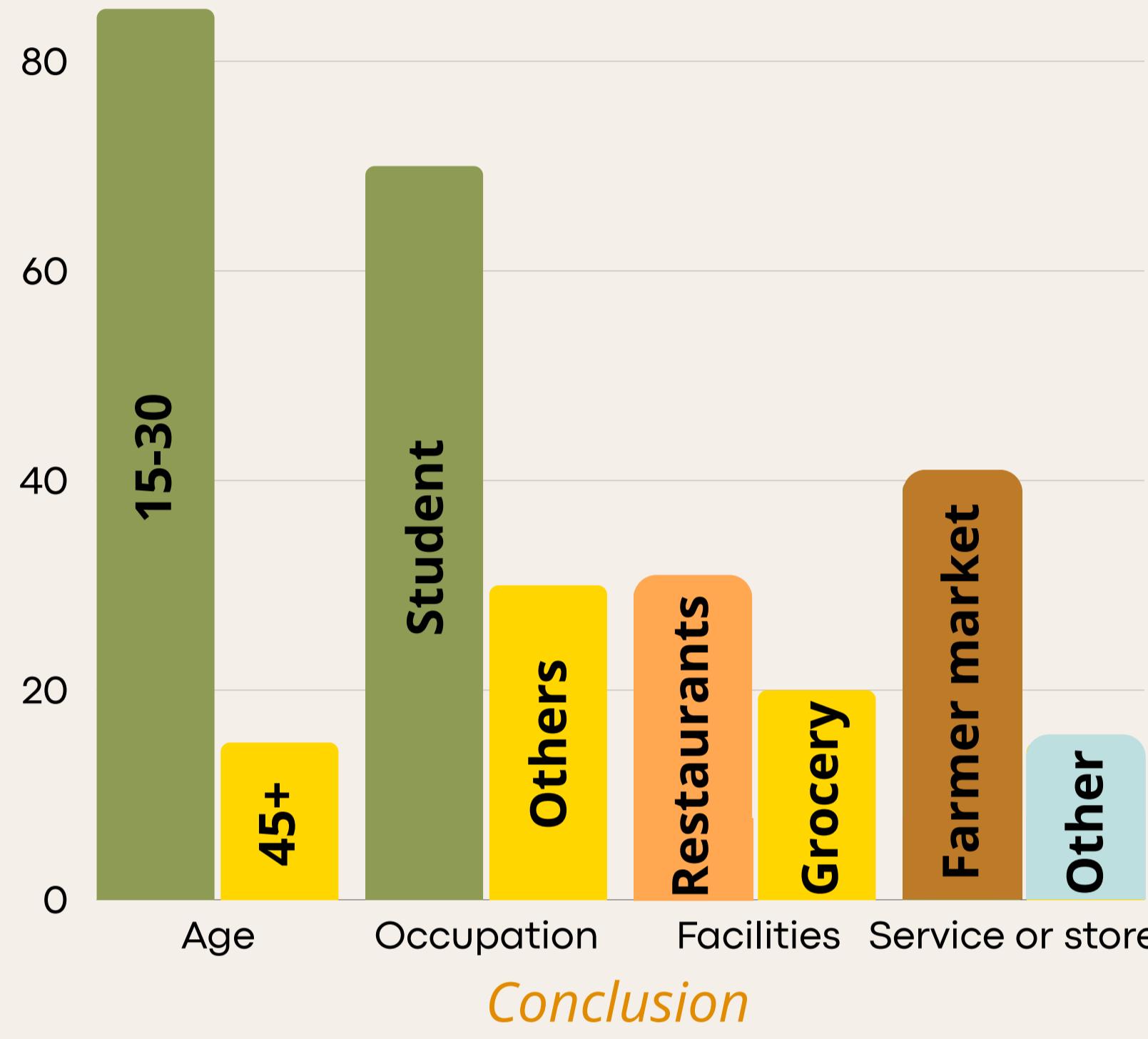


For a consistent and efficient access, we have chosen three exits: two at the front and one at the back. The exit on the ground floor is intended only for service and emergency use.



For cross-connections and sufficient daylight ingress, we have chosen for no windows in the corners. On the ground floor, larger windows are installed to provide restaurants and cafes.

Local people - Survey answers



The nearby residents are primarily aged between 15 and 30 years old, with most being students due to the proximity of the university. The facilities they most desire are restaurants and grocery stores, particularly farmer's markets.

Zero - footprint

Construction Impact:

- The construction industry is responsible for 40% of global CO2 emissions, 40% of all material production, and 35% of global demolition waste.
- Reducing waste and using sustainable materials are essential.

Zero Footprint Concept:

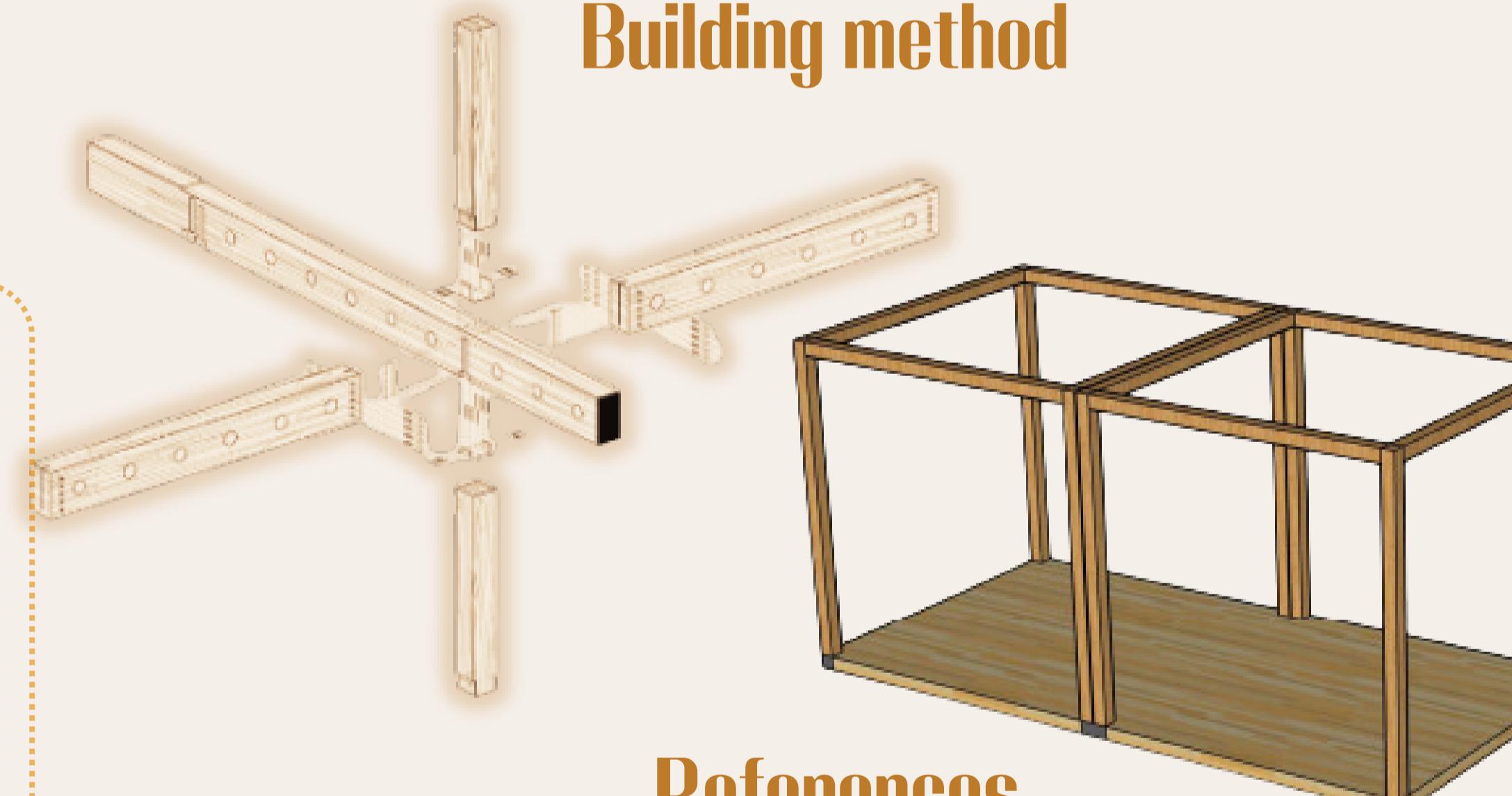
- Aims to minimize environmental impact by reducing energy consumption and using sustainable materials.
- The goal is for the building to consume zero energy and generate its own, benefiting both the environment and the community.

Our Building:

- Designed with sustainability at its core, using materials that meet technical and environmental standards.
- Energy-efficient during and after construction, with no harmful emissions during its use.
- Enhances natural surroundings and provides recreational value to local residents, fostering ecological and social benefits.



Building method



References

The natural pavilion, Floriade

- Sustainability and circularity
- Modular and demountable

Source: (The Natural Pavilion, Floriade Expo 2022, z.d.)



Havenlofts, Rotterdam

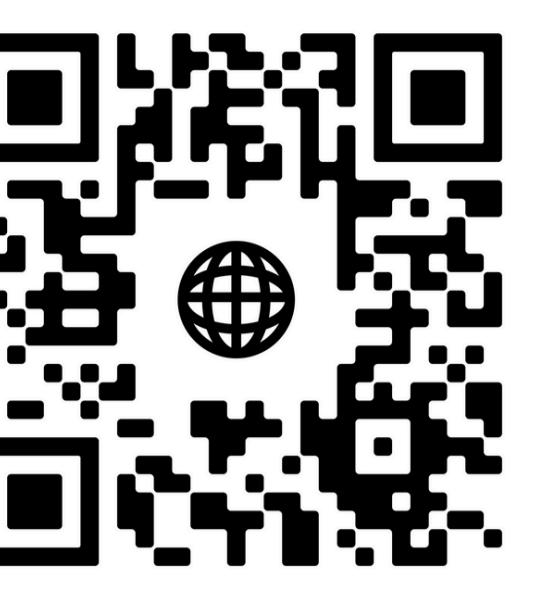
- Move with the tide
- Maintenance-free concrete pontoons

Source: (Zapartan & Zapartan, 2021)



INTERNATIONAAL PROJECT

HORSENS



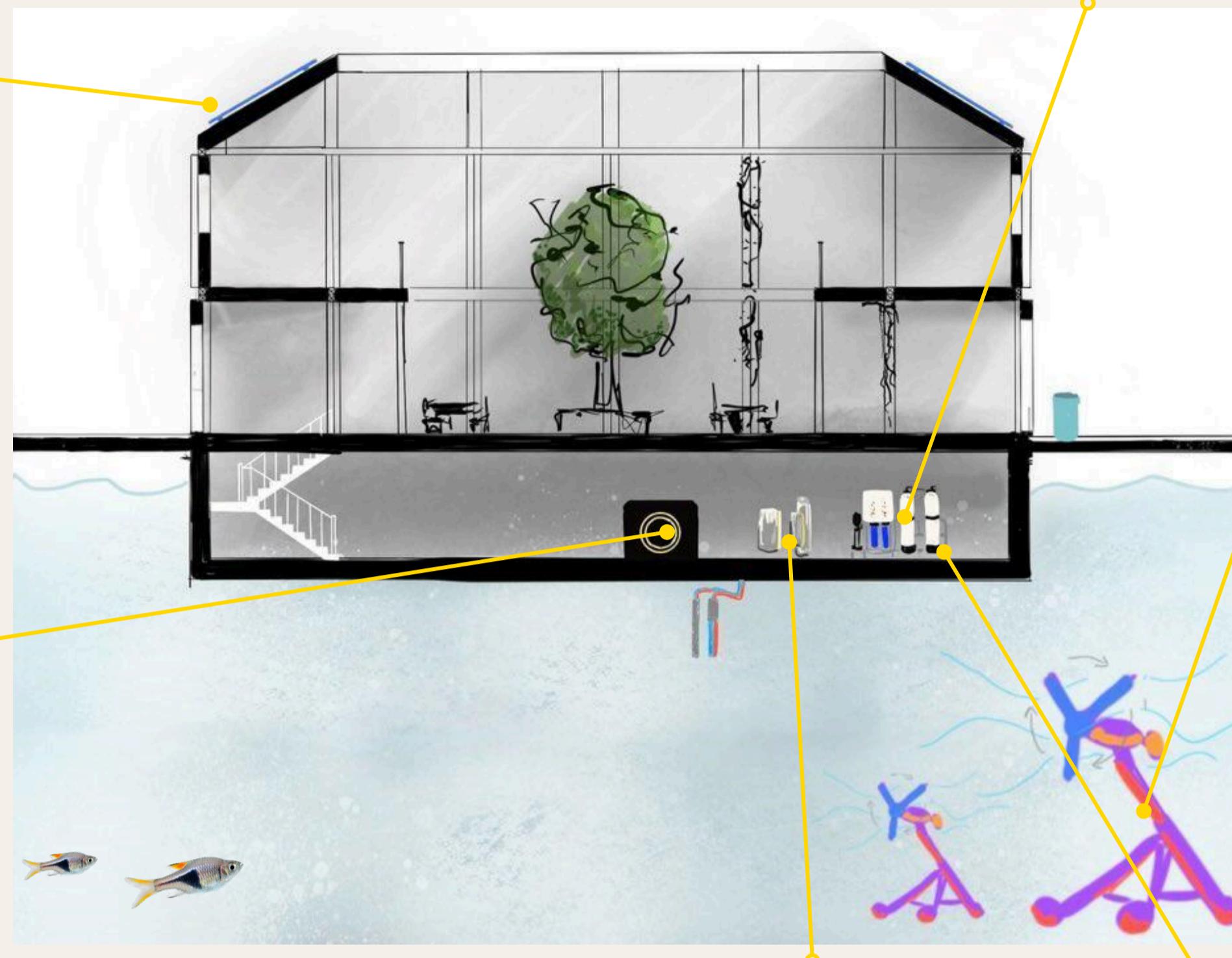
SCAN ME

Installations



PV panels

- 185 m² in total
- Gives 32.4 MWh every year



Grey water system

- Collects 392.120 liters of grey water every year

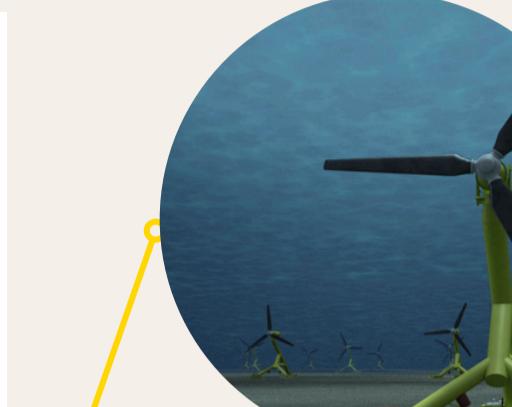


Transformer

- Transforming the collected energy from the tide turbines

Water heat pump

- To heat and cool water
- Reducing energy consumption



Tidel energy turbines

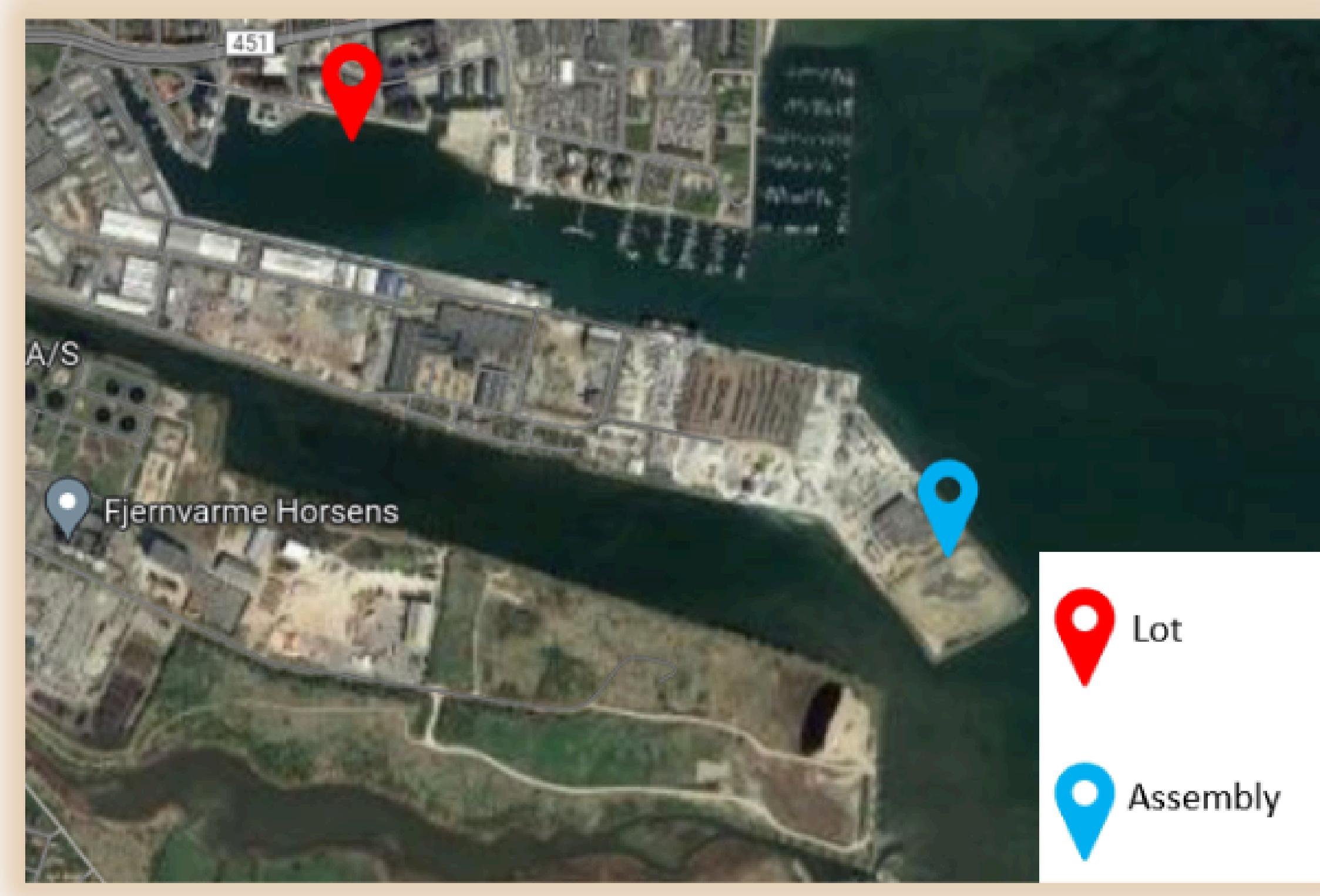
- Draws energy from the flowing water
- Gives 4.424 MWh of energy
- Can provide 77% of Horsens with energy

Water filter system

- Cleans and reuses used water
- Helps saving water, giving water a second chance



Transport



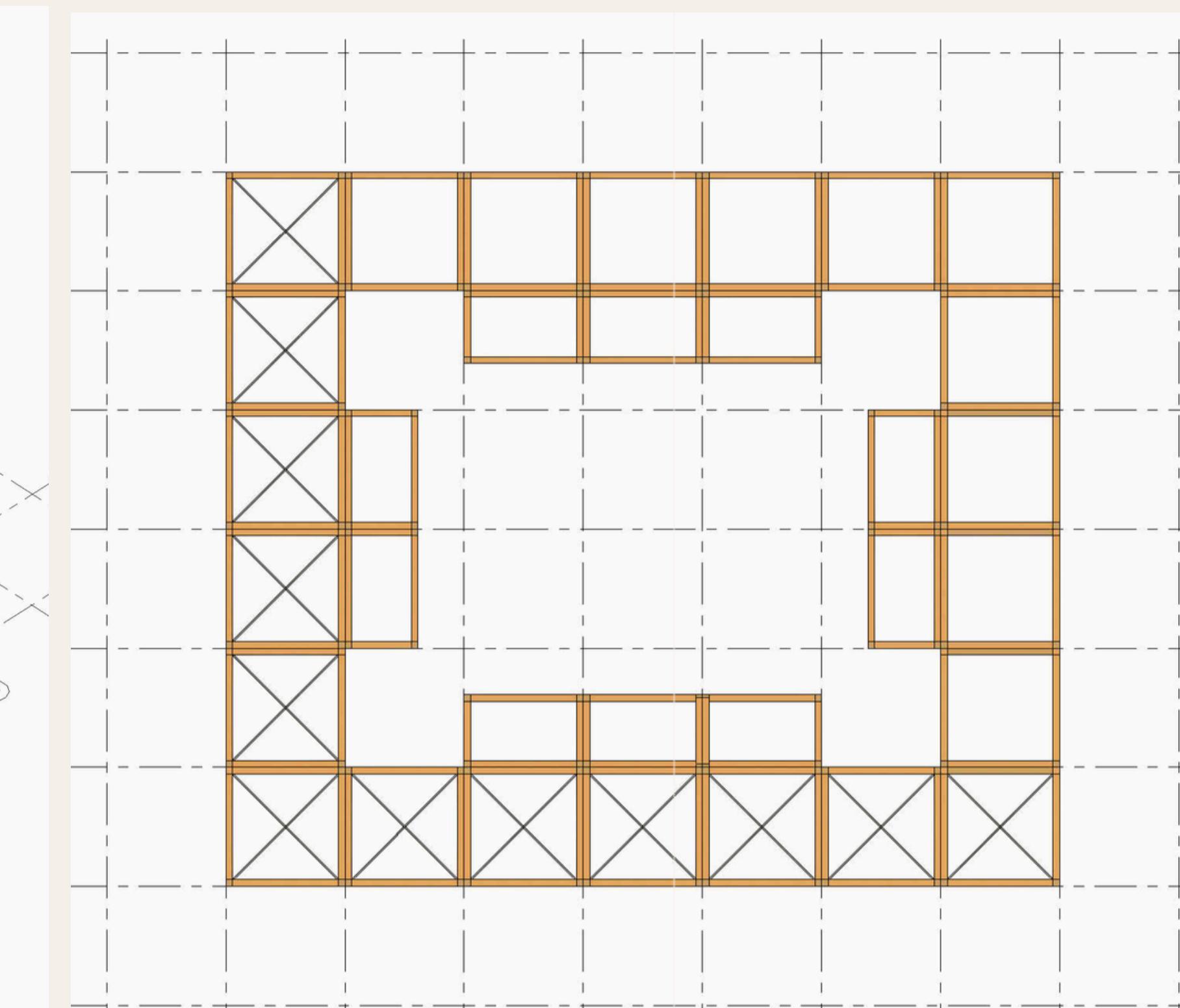
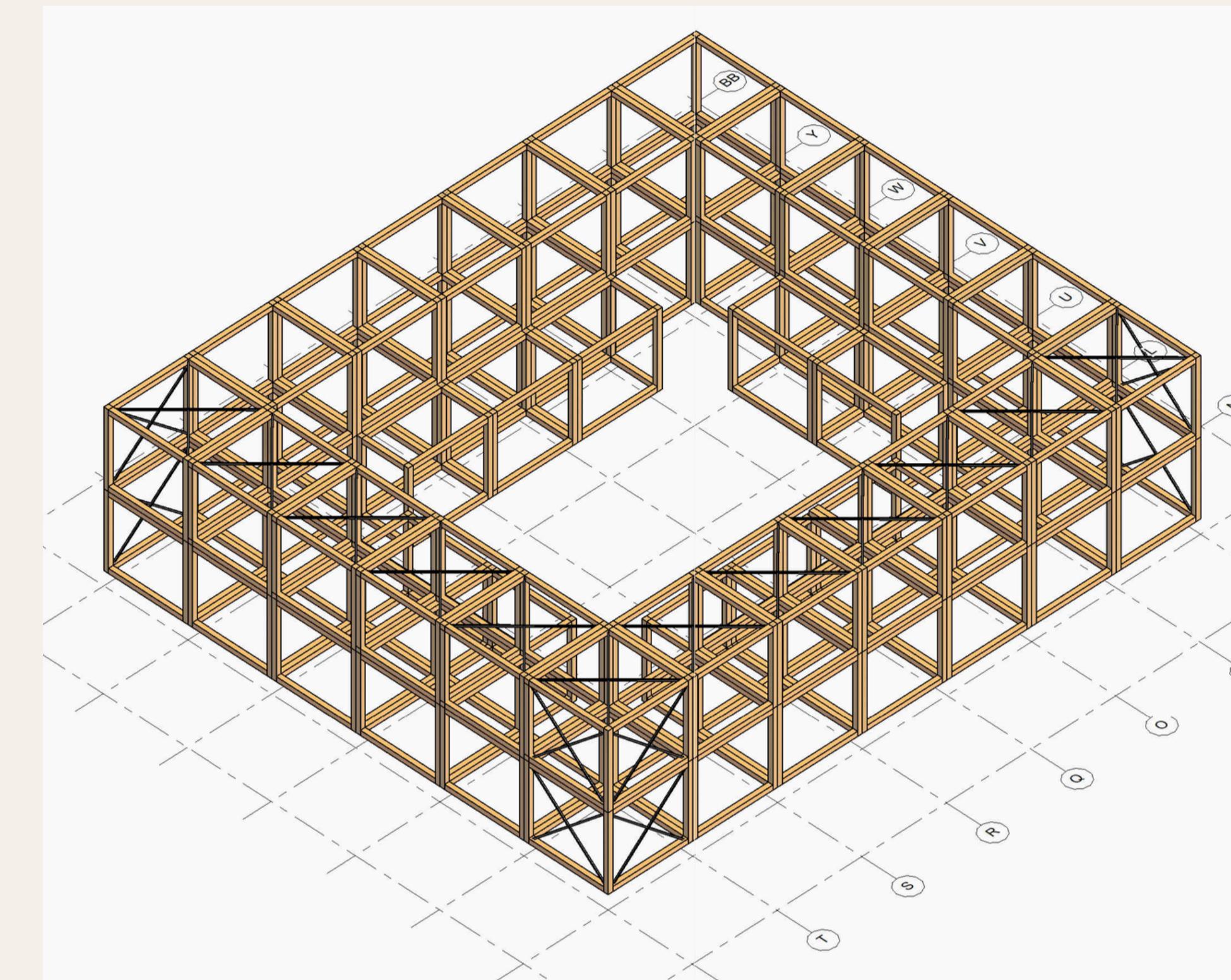
Lot
Assembly

Tidel energy turbines

Tidal energy is productive because it offers predictable power generation due to consistent tidal patterns, has high energy density due to water's density, and provides a long operational lifespan with minimal visual and noise impact. However, tidal current turbines come with high initial costs, location limitations, and complex maintenance. Denmark, with its maritime expertise, innovative policies, and suitable geography, can lead in tidal energy development, aligning with its goal of carbon neutrality by 2050.



Construction



Hout

Breedte

Lengte/20

Kolommen

$3,6 \times 3,6 = 3600 \times 3600$

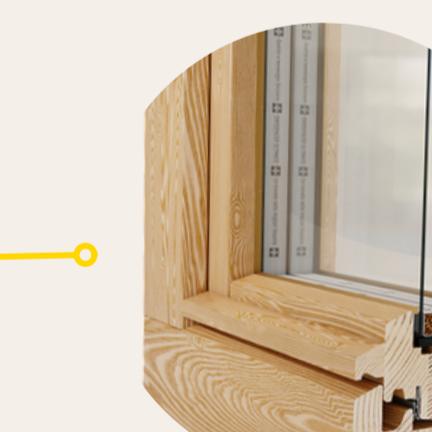
$3600/20 = 180 \text{ mm dik}$

CLT kolom

200 mm

Dus voldoet

Materials



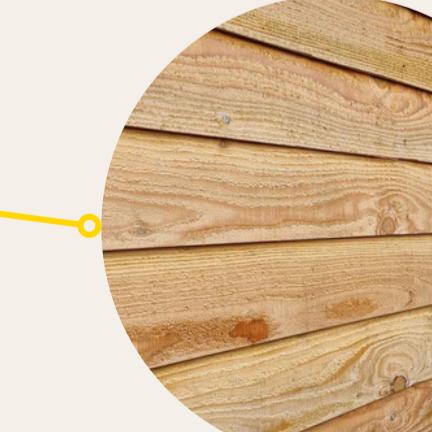
Triple glazing with wooden window frames

- Insulating
- Reduces condensation



Louvers

- Control over the amount of sunlight



Cladding

- Same style as the louvers



Green roof

- Absorbs rainwater
- Increases the efficiency of solar panels
- Good for the environment and biodiversity



Cross-laminated timber

- Absorbs CO₂
- Renewable product
- Aesthetically pleasing
- Insulating properties

Work breakdown structure

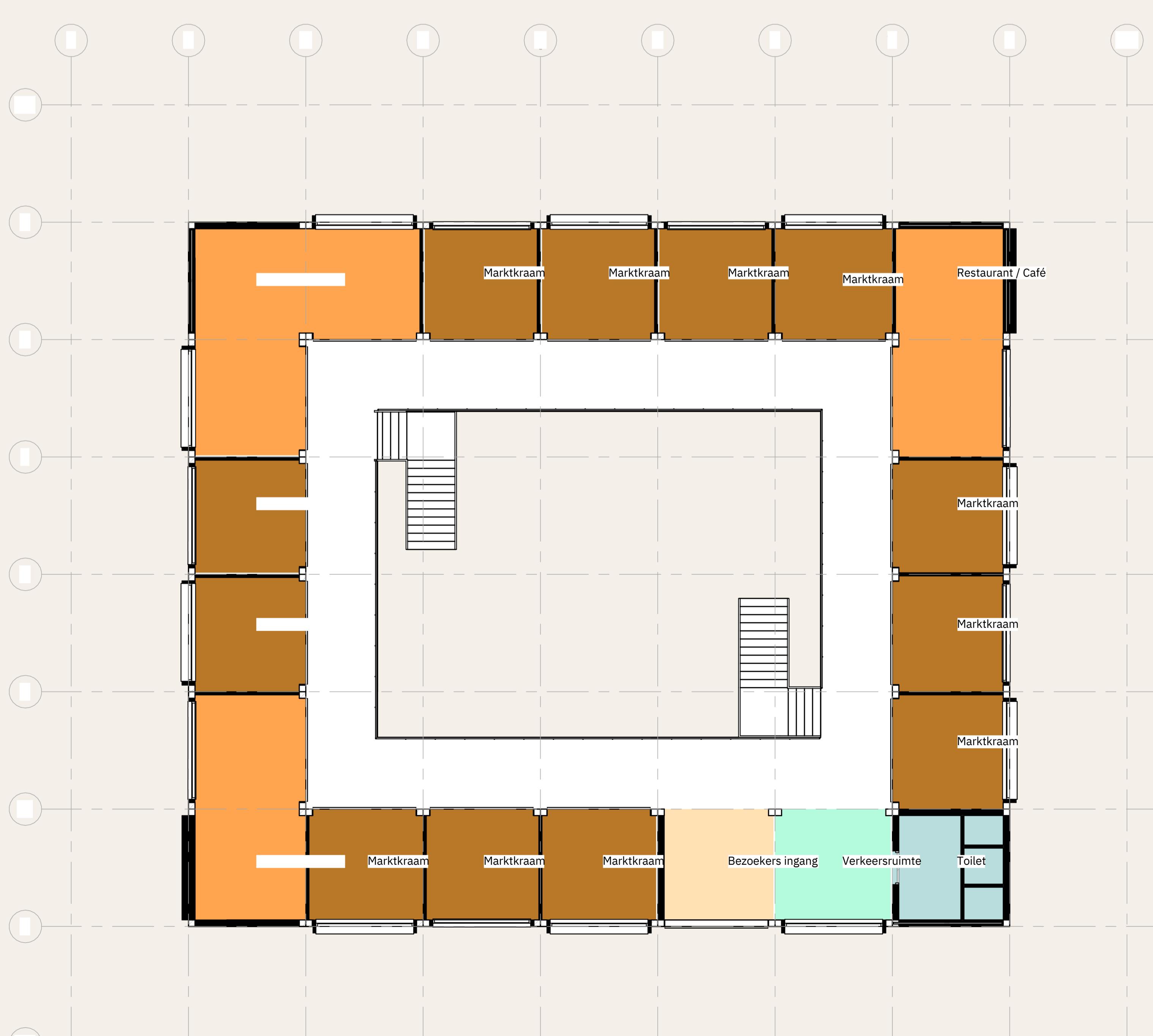
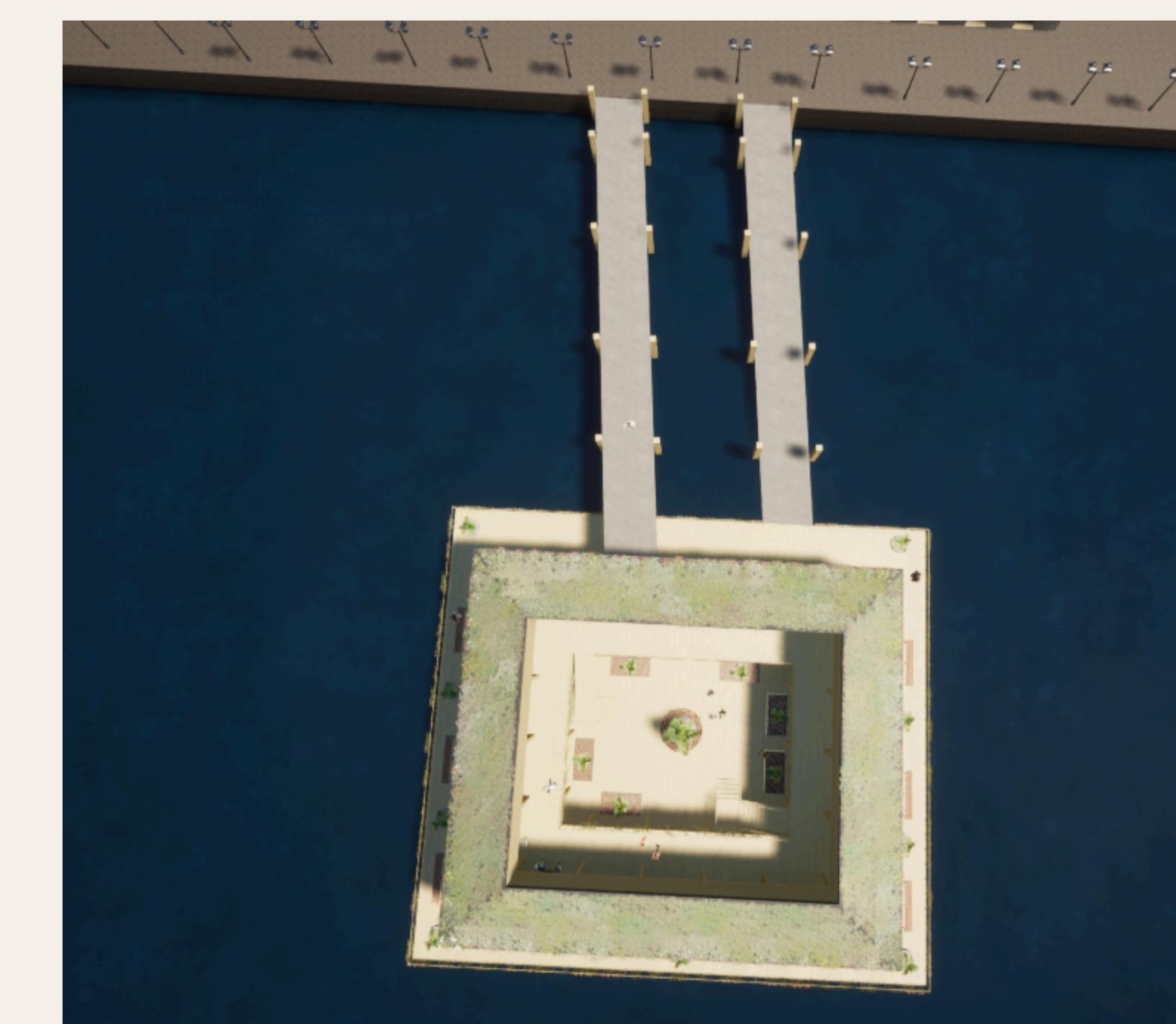
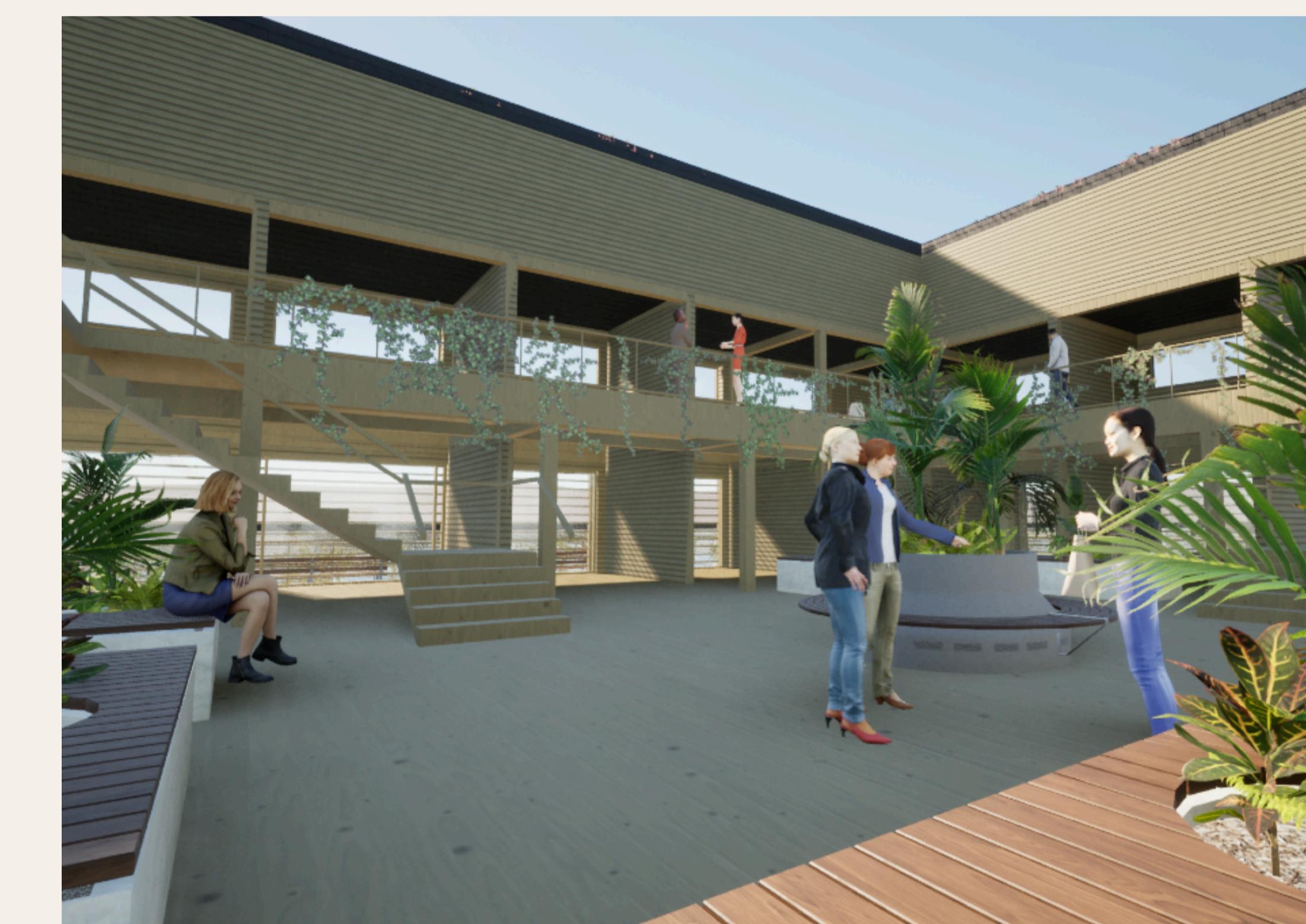
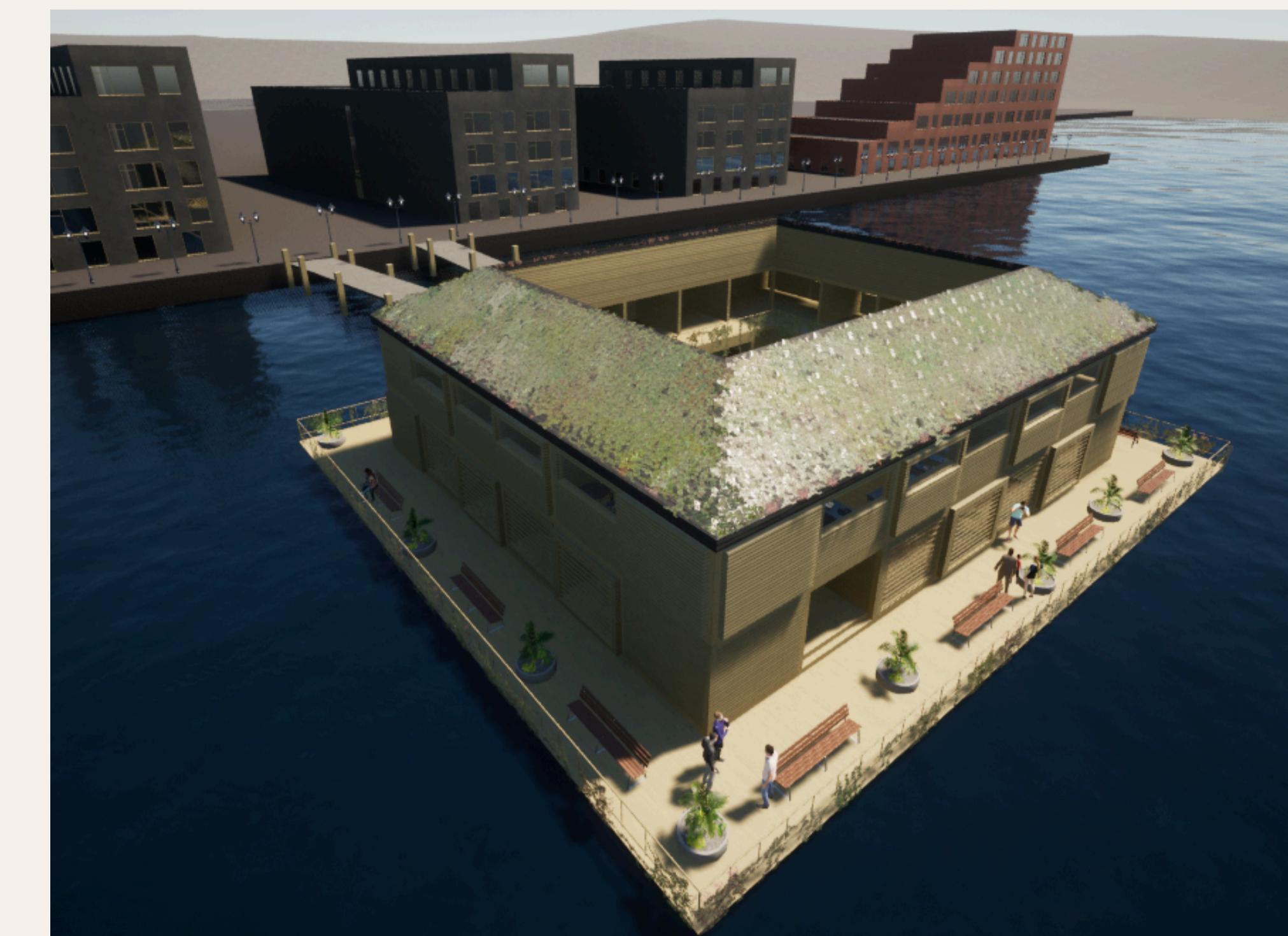
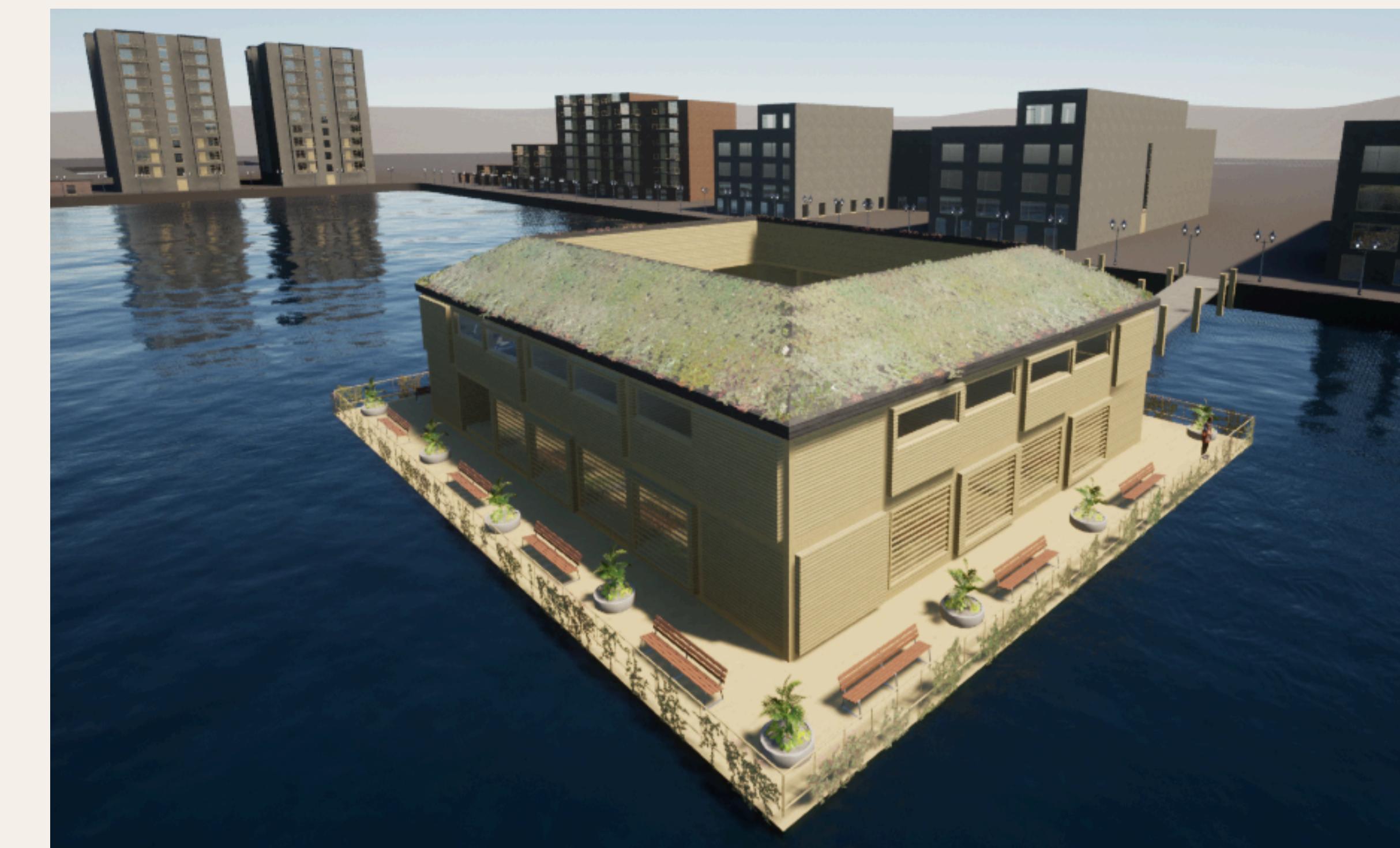


Map of the building



Horsens

- Dienst ingang
- Marktkraam
- Restaurant / Café
- Toilet
- Uitgang



Horsens

- Bezoekers ingang
- Marktkraam
- Restaurant / Café
- Toilet
- Verkeersruimte

