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Project Book

URBAN TAKEOFF – WATER AIRPORT OF HEALTH AND PLAY

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DESIGN BRIEF SUMMARY

01

01.1 Site

As a group with "health" as main strategy, projects would be aiming to tackle pollution problems in the urban area. Areas with high thermal pollution, air pollution and traffic-related noise pollution would be considered. (Fig. 1)

With these in mind, projects of the health group would be restricted to a certain area in Berlin, mainly in the centre where most pollution occurs.

As a result, 9 projects are situated in Berlin as shown on the group site plan. (Fig. 2)

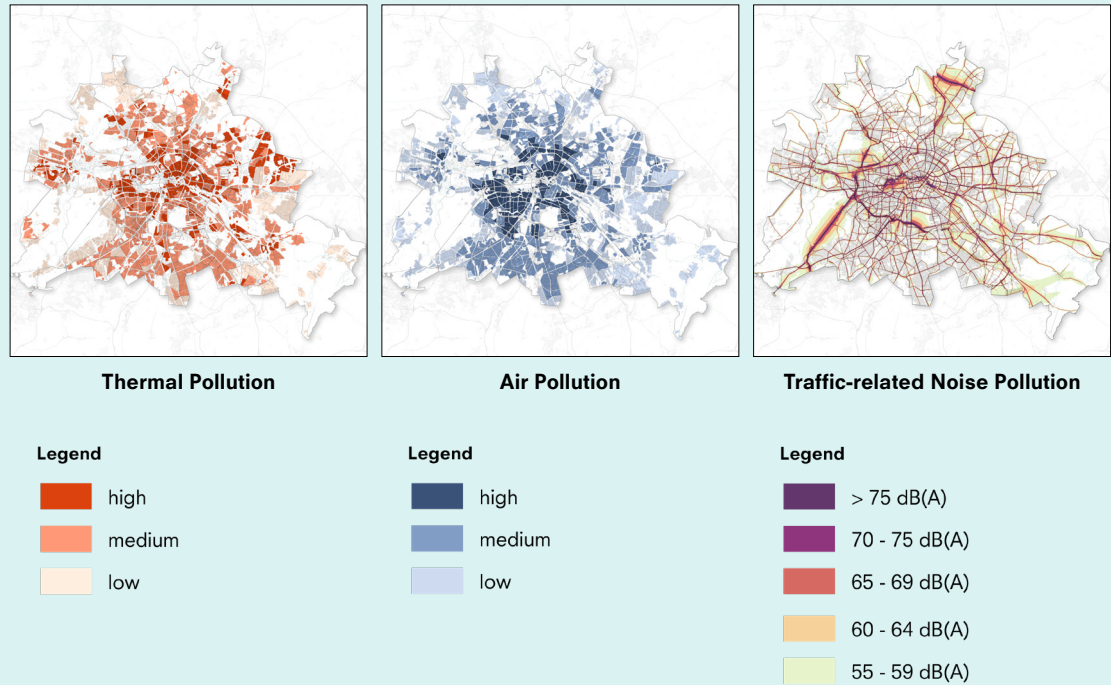


Fig. 1 Mappings of thermal pollution, air pollution and traffic-related noise pollution.

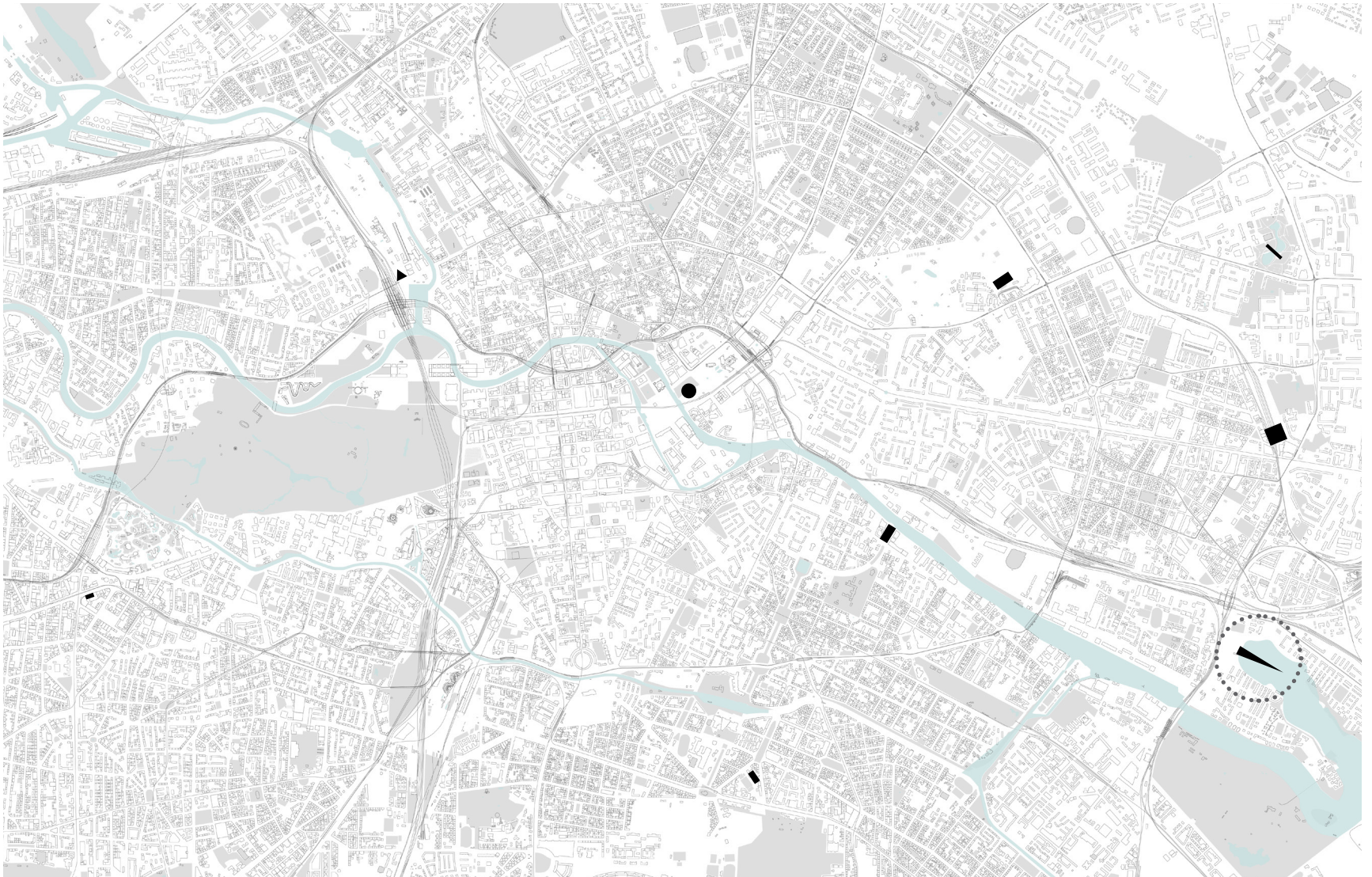


Fig. 2 Health group site plan.

Despite the aforementioned group research based on health, other criteria would also be developed based on program and more specific water airport - related requirements.

The site has to be next to waterbody, located in a densely populated area and existign similar functions would have to be the least within 5 min. walking radius. In addition, the site has to be a brownfield, near a railway station and allows the design of water runways. (Fig.3)

A final site would be selected in Rummelsburger Bucht with the site area of 24,654 m². (Fig. 4)

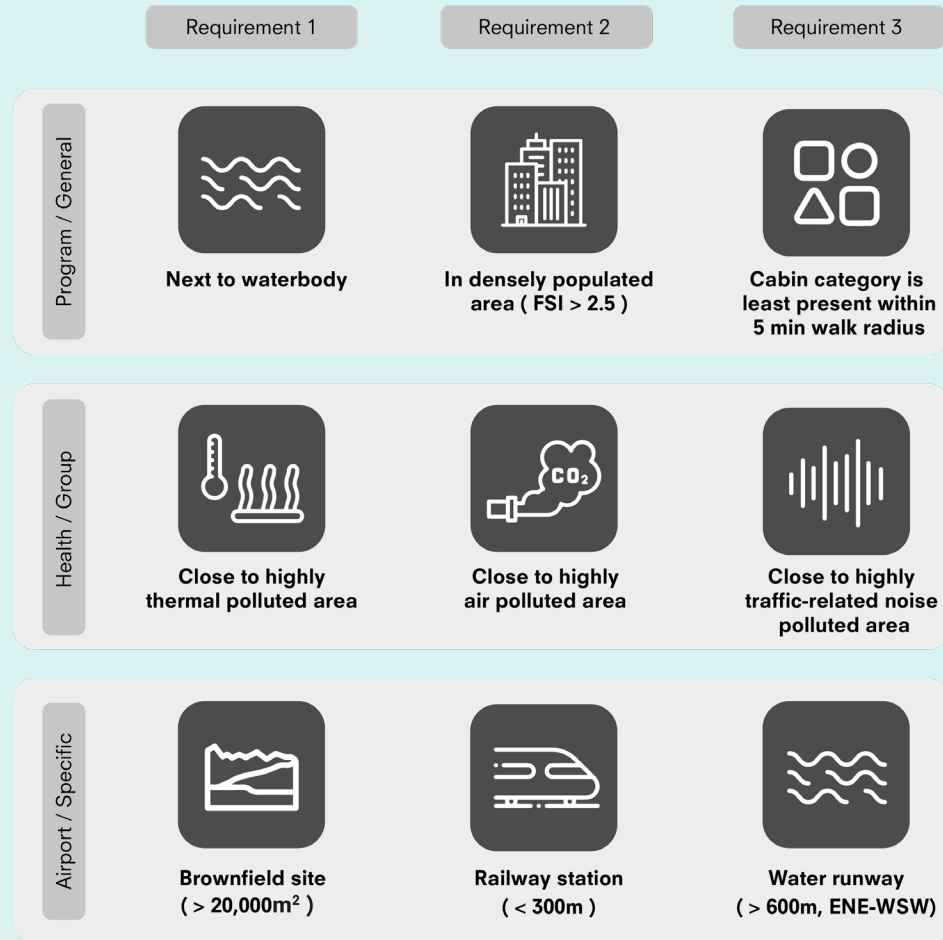


Fig. 3 Site selection criteria.

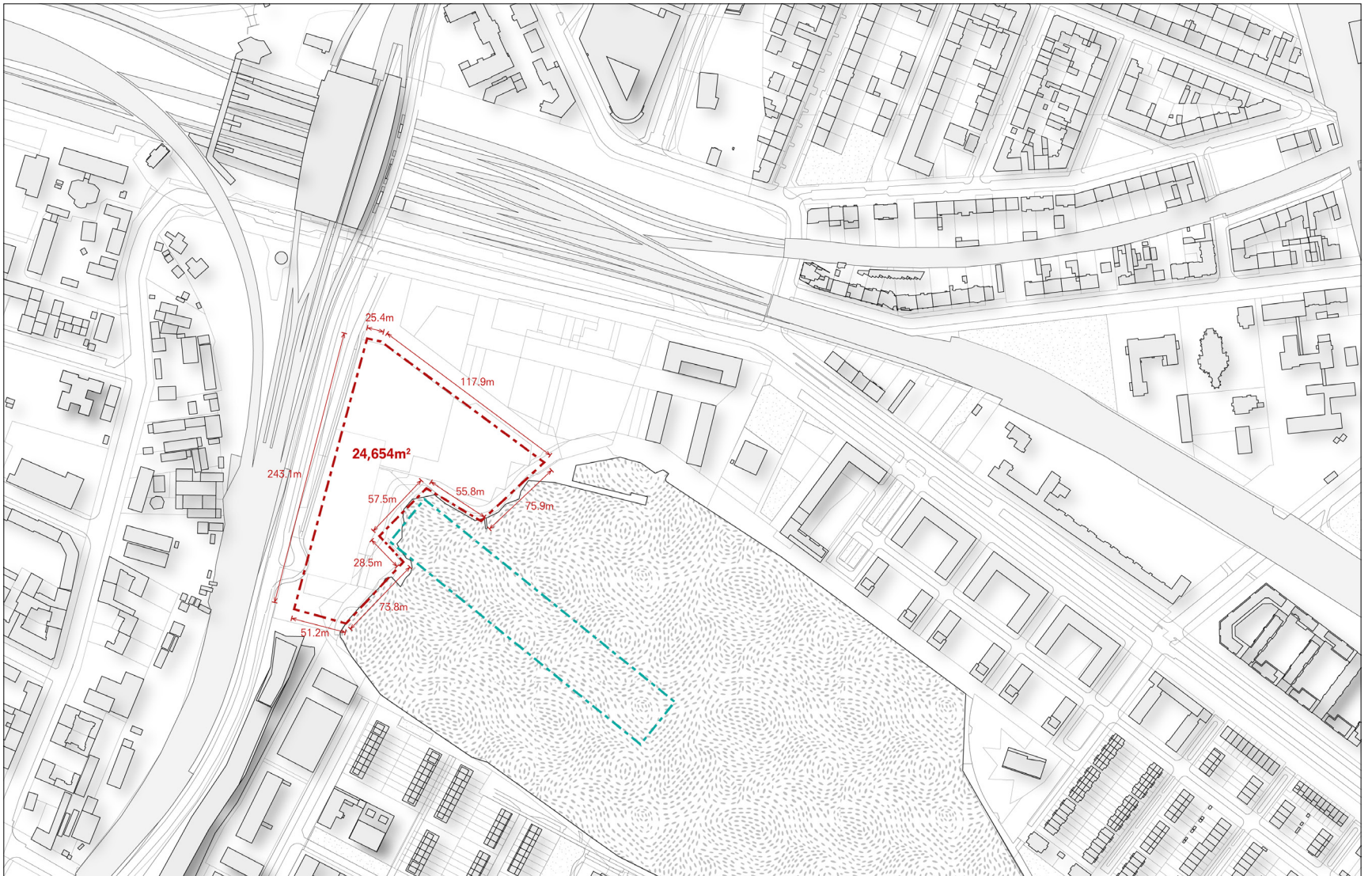


Fig. 4 Site plan with site boundaries.

01.2 Program

To begin with, the specification of seaplane would be defined. (Fig. 5) Following that, relevant projects would be studied and spatial organisations would be summarised. (Fig. 6)

Program bars and a relation scheme of this project would be obtained from referencing case studies. (Fig. 7-8)

At last, specific functions would be added to the water airport, mainly in relation to hydrogen facilities and play facilities. (Fig. 9-10)

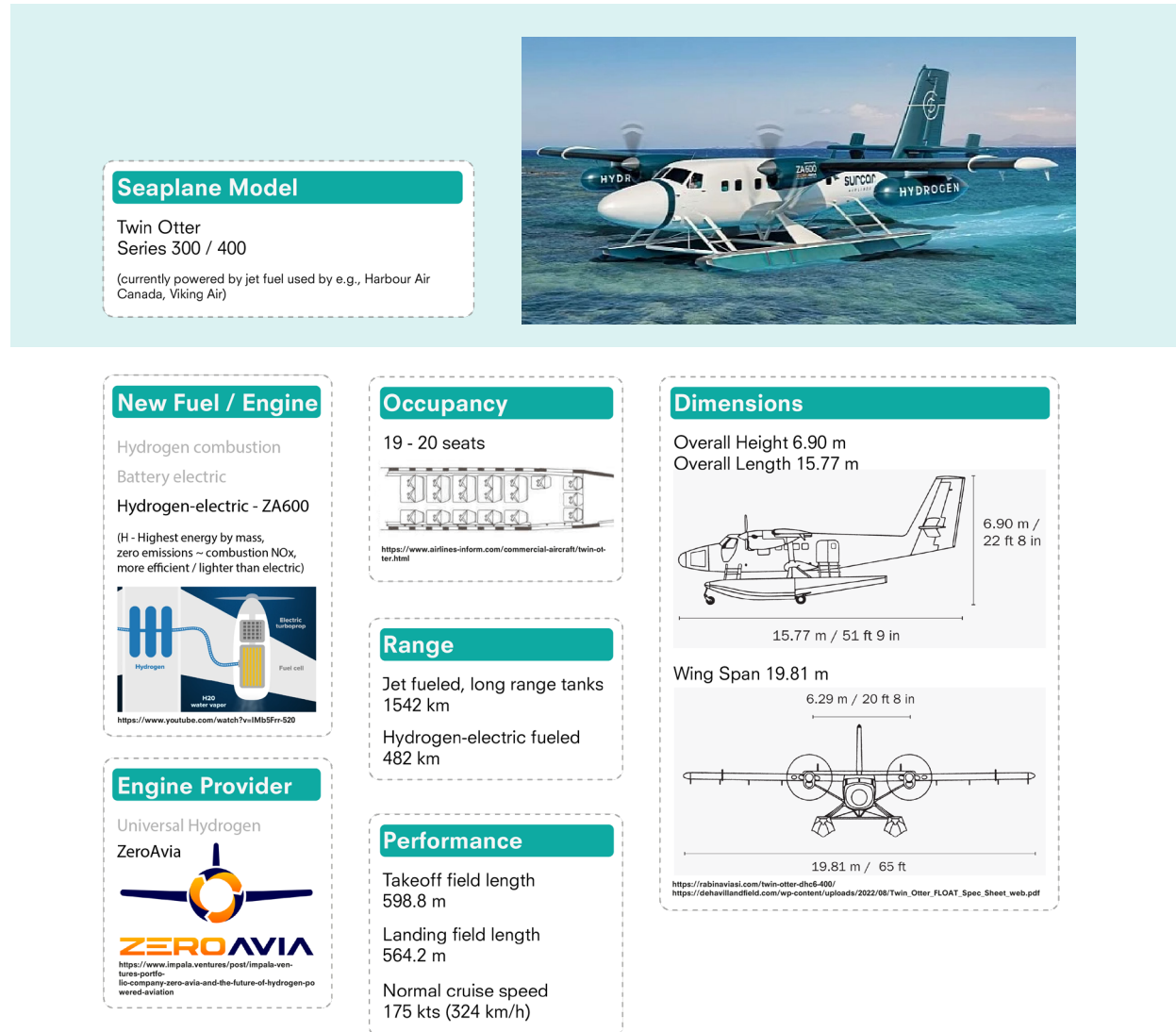


Fig. 5 Seaplane specifications.

City Airports



London City Airport
1987, London, UK

Seaplane Bases



Sea Airport of Elefsina
In progress, Athens, Greece

Large-scale Airports



Brandenburg Airport
2020, Berlin, Germany

Small-scale Airports



Banyuwangi Airport
2010, Blimbingsari, Indonesia

Cruise Terminals



Yokohama Terminal
2002, Yokohama, Japan

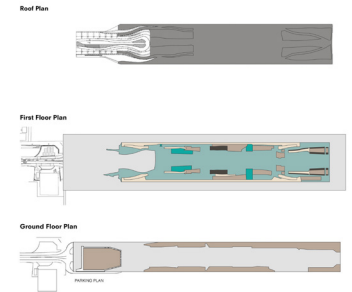
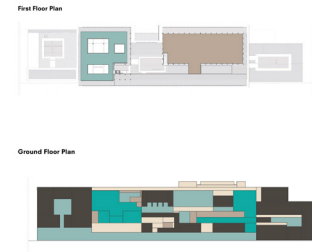
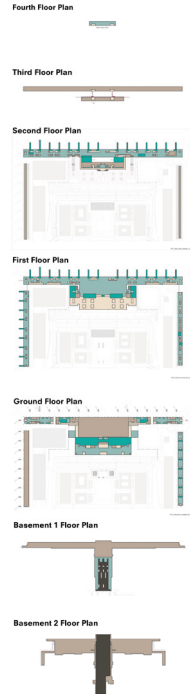
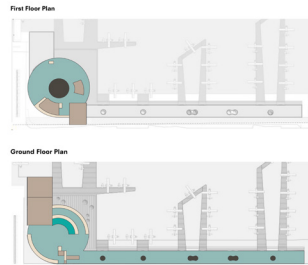
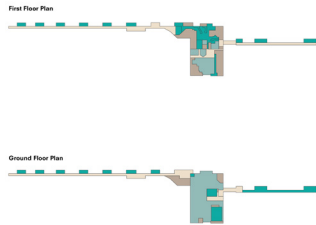


Fig. 6 Program organisation analysis.

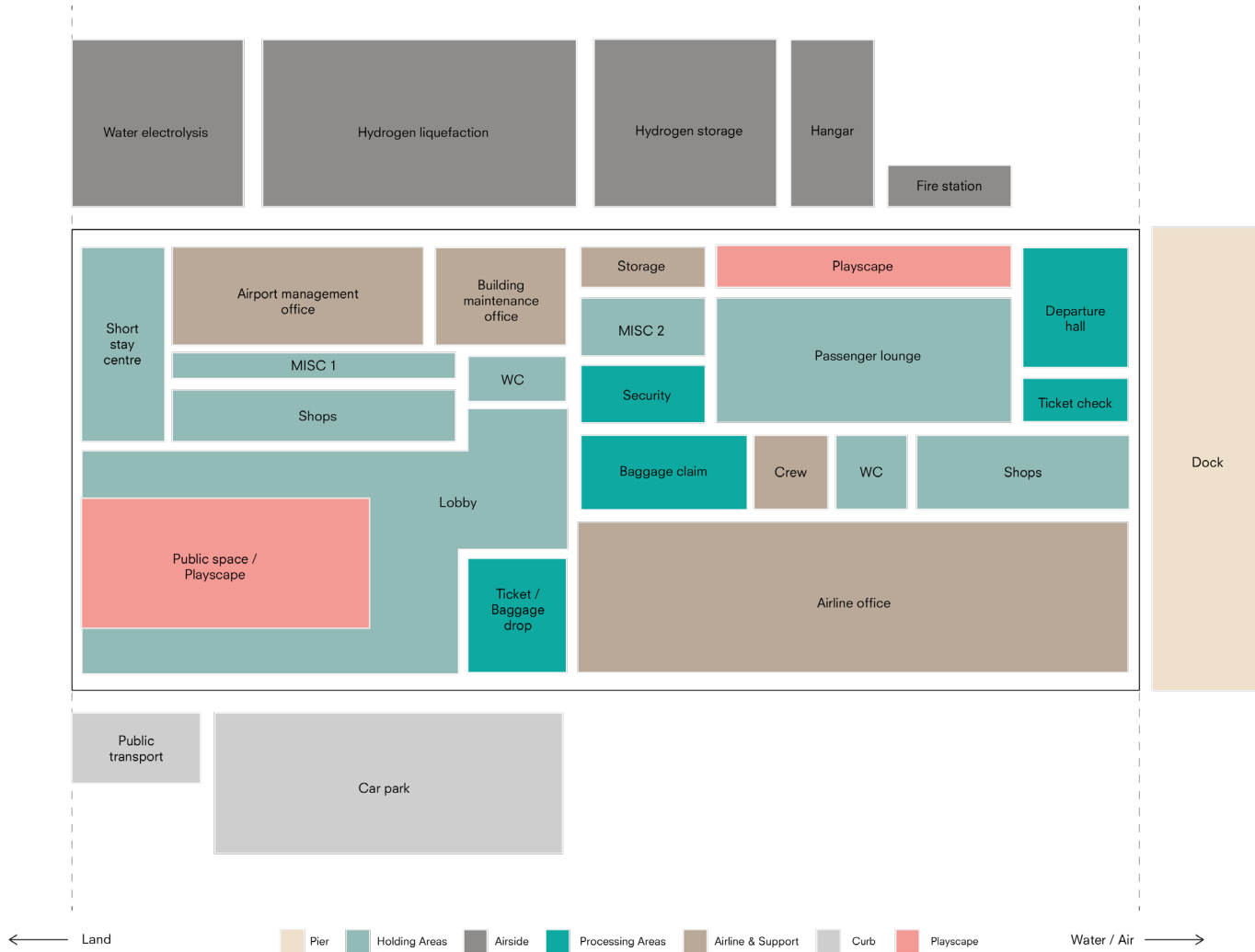
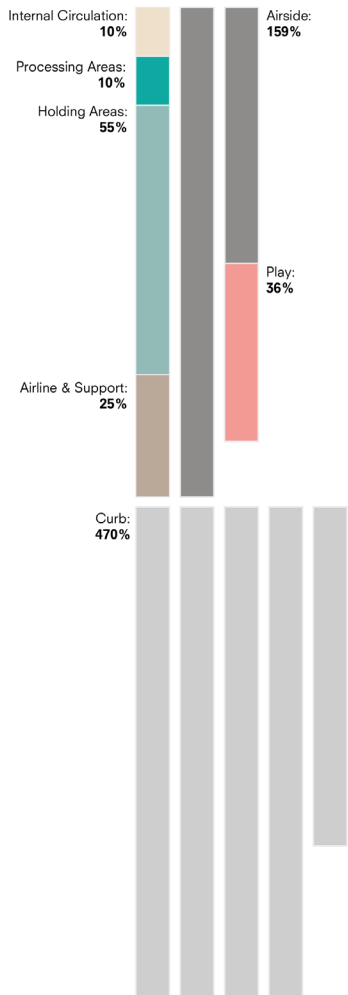
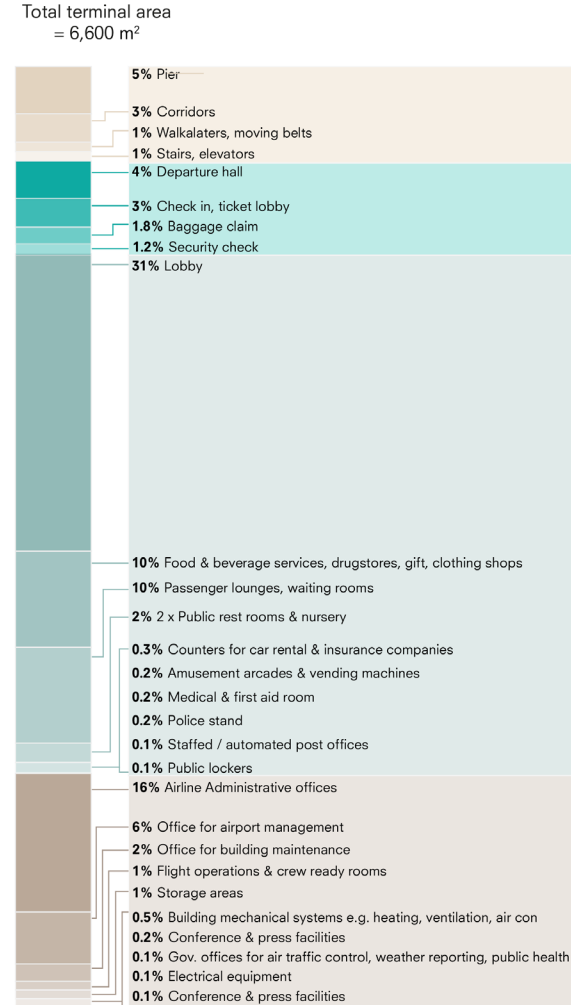


Fig. 7 Relations scheme.

Airport as a whole



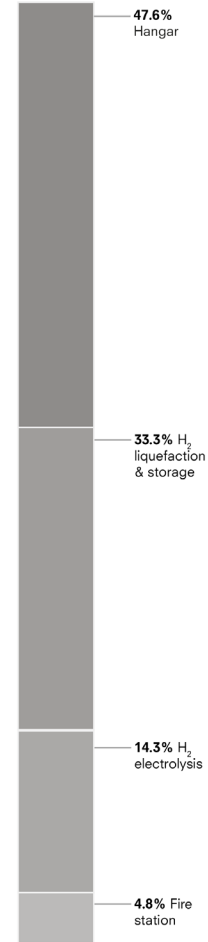
Program breakdown



Total play area = 2,400 m²



Total airside area = 10,500 m²



Total curb area = 31,000 m²



Fig. 8 Program Bar.

Hydrogen generation & usage in airport

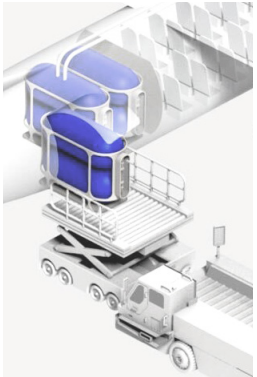
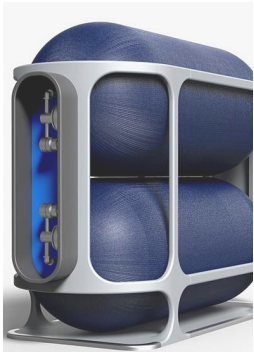
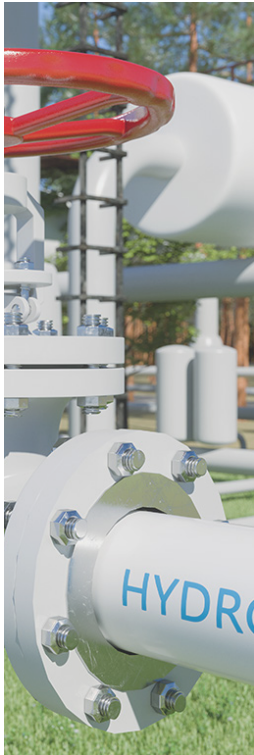


Fig. 9 Hydrogen facilities: impact on airport infrastructure.

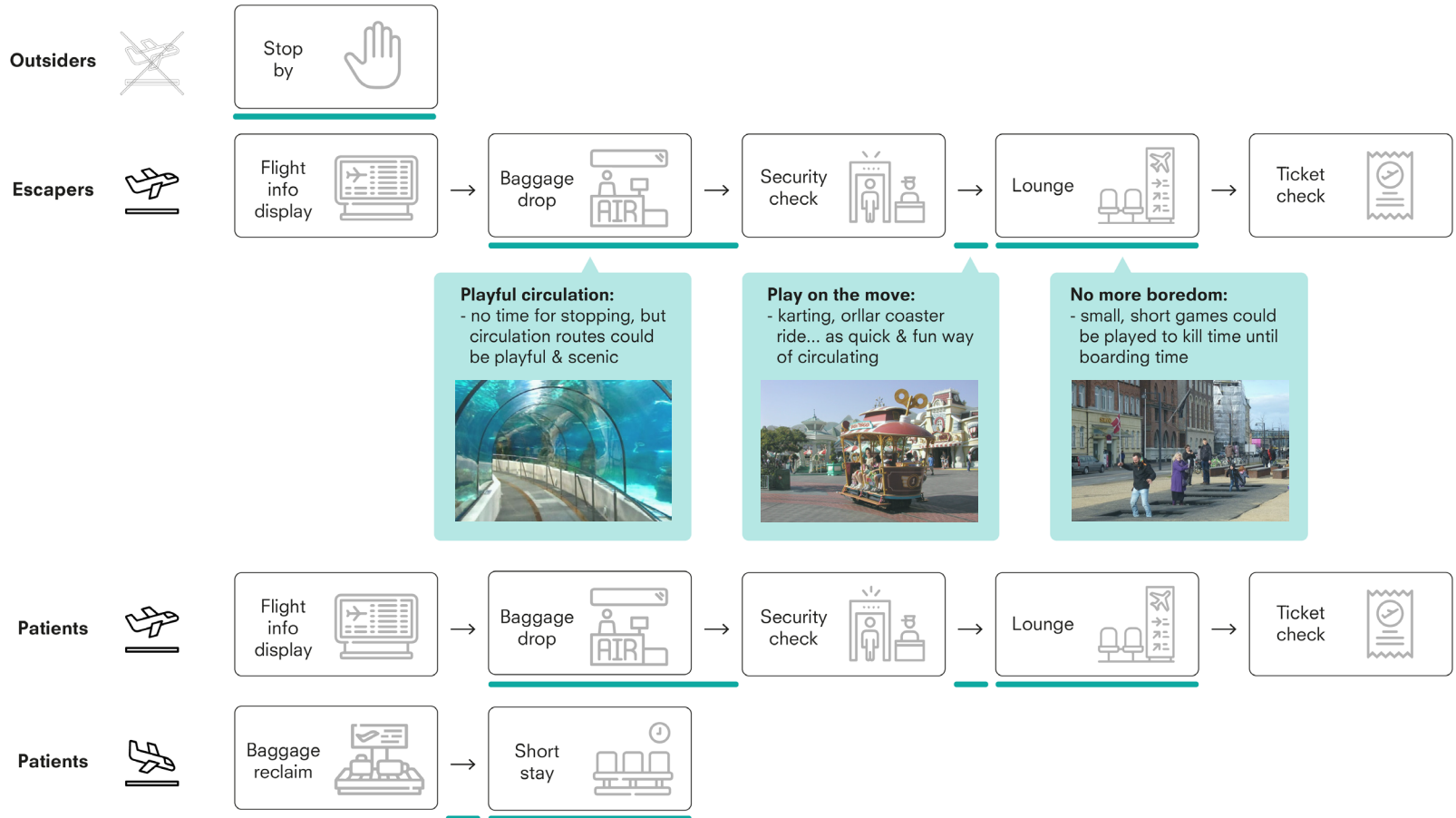


Fig. 10 Example of play in passengers' flows.

01.3 Client

The project targets three types of users: rural patients seeking medical support in Berlin, urban escapers hoping to depart so as to release stress, and public visitors wishing to enjoy free time in the centre of Berlin. (Fig. 11)

In order to fulfill the needs of these main users, corresponding government and private organisations would be investing in the project. (Fig. 12)



Fig. 11 Target users.

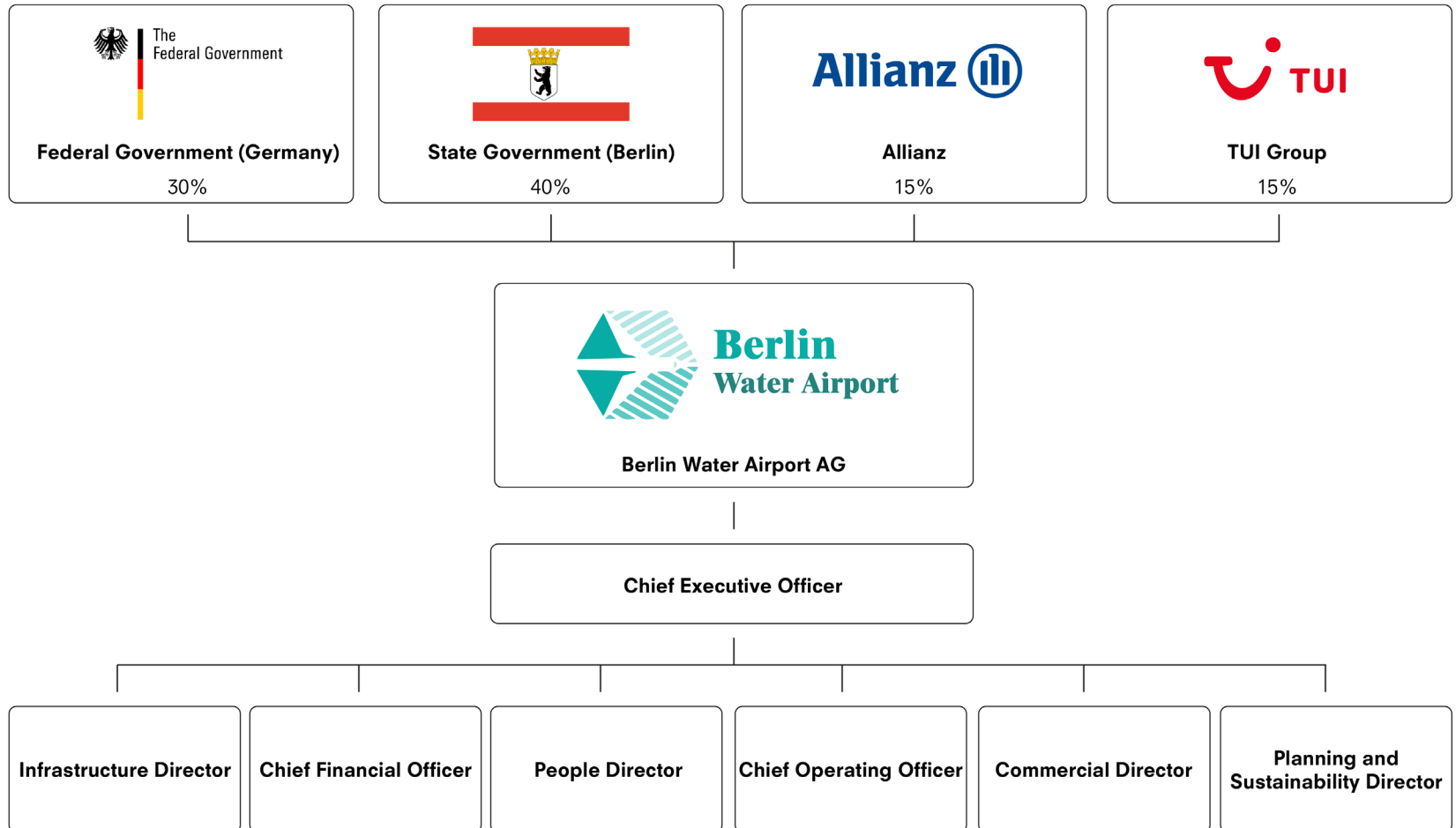


Fig. 12 Organisational structure of Berlin Water Airport AG.

DESIGN CONCEPT

02

02.1 Massing

The concept design stage of this project would start with imagining how the building mass reacts to site conditions, being near the waterfront. In addition, ideas of play and requirements of being a seaplane port would be considered. (Fig. 13)

Accordingly, relevant massings would be developed based on site, program and client considerations. (Fig. 14-17)

Out of the 9 massings, 3 of them would be selected for further exploration: bridge, 2 piers and waterfront. These concepts would be tested on their variations, plans, sections, urban relations, structures and materials. (Fig. 18-20)

Finally, three 1:500 models would be done as a conclusion to these studies. (Fig. 21)



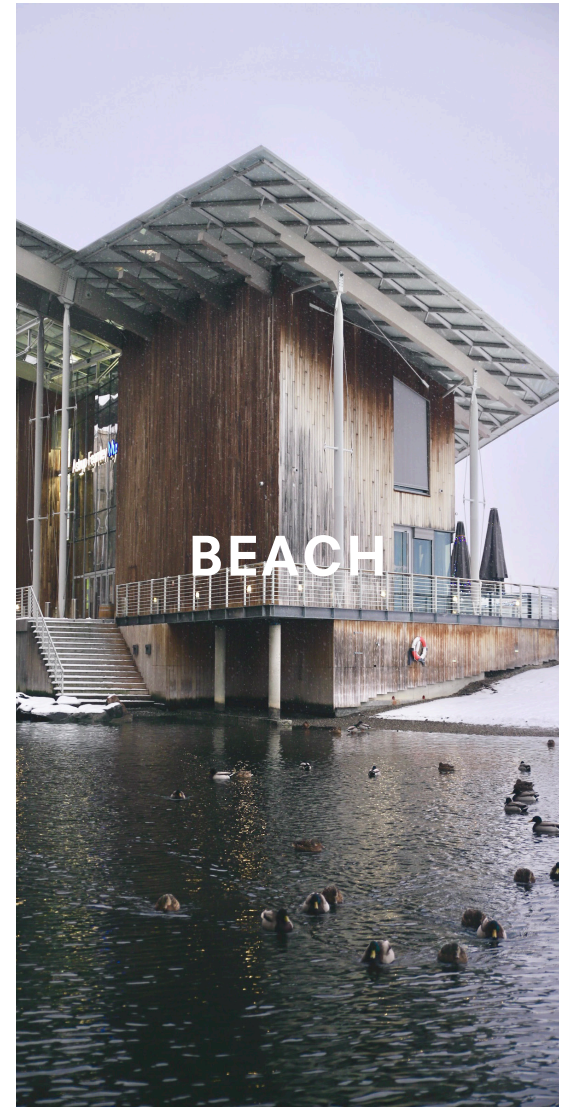
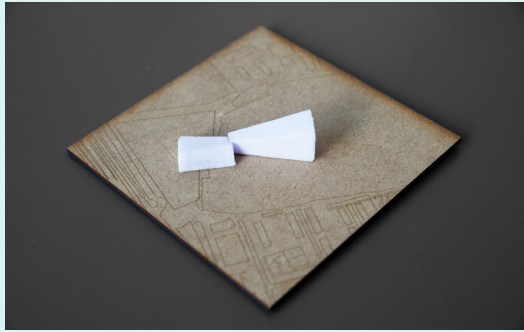
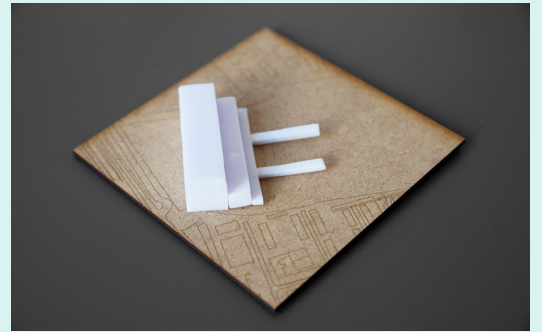
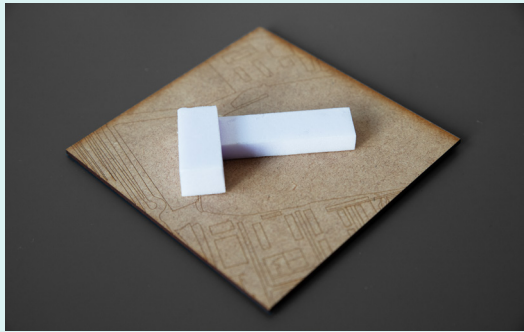


Fig. 13 Design elements and ideas.

Site-driven



Program-driven



Client-driven

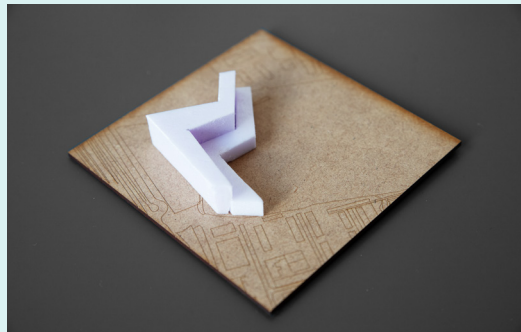
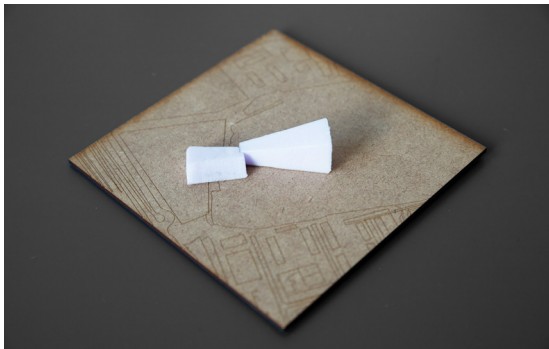


Fig. 14 Overview of 1:1500 massing studies.

Viewing



Bridge



2 Steps

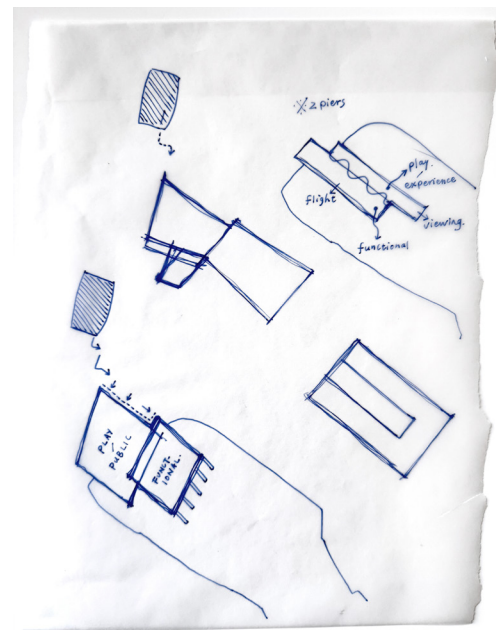
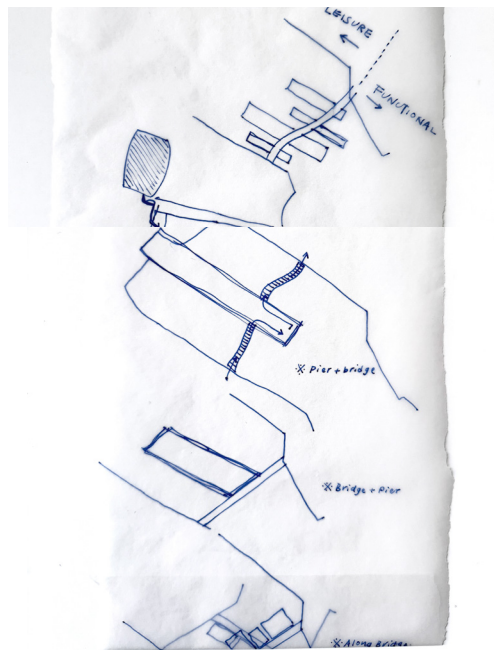
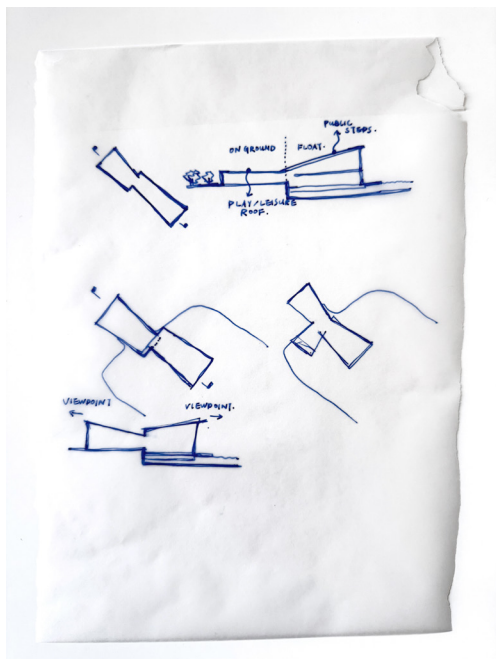
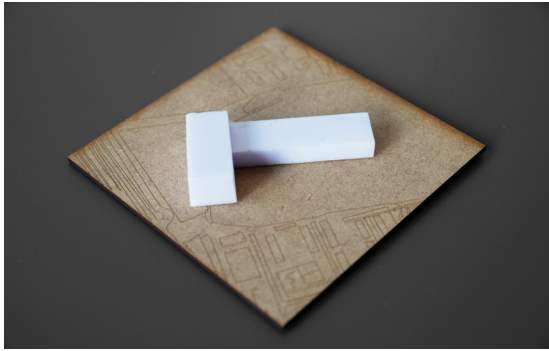


Fig. 15 Site-driven massing studies.

Corner



Intersection



Linear Distribution

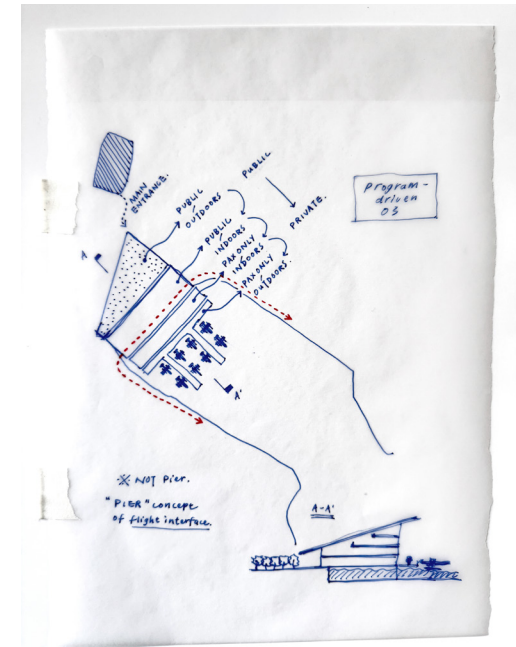
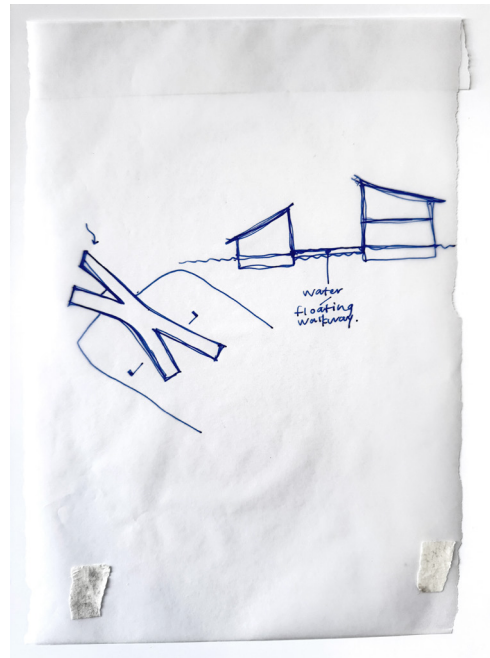
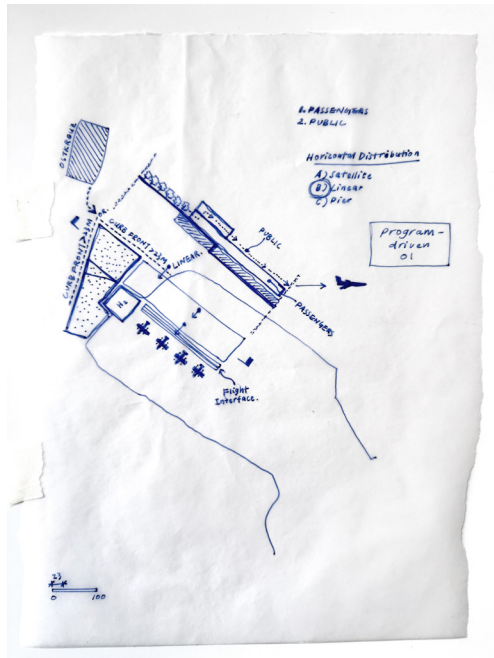
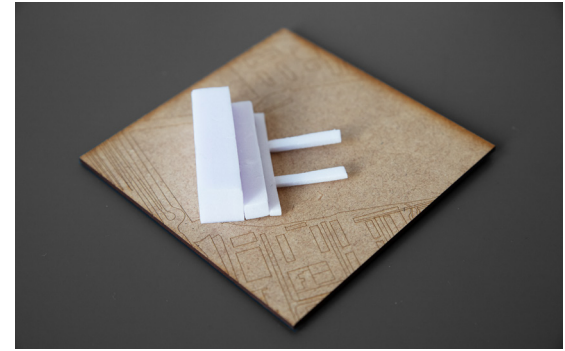
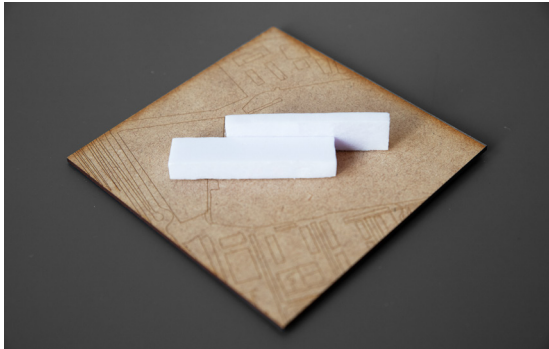
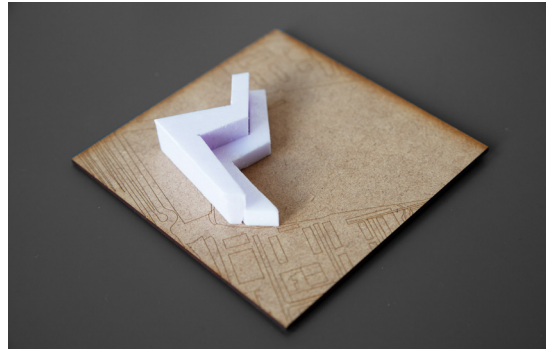


Fig. 16 Program-driven massing studies.

2 Piers



Stepping Down



Satellite Distribution

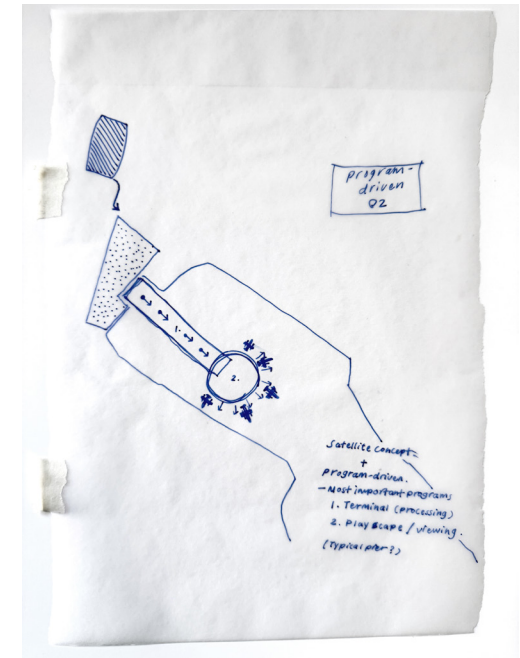
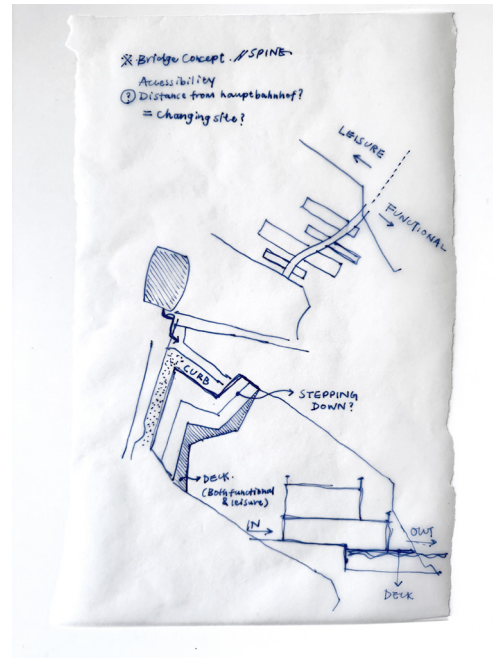
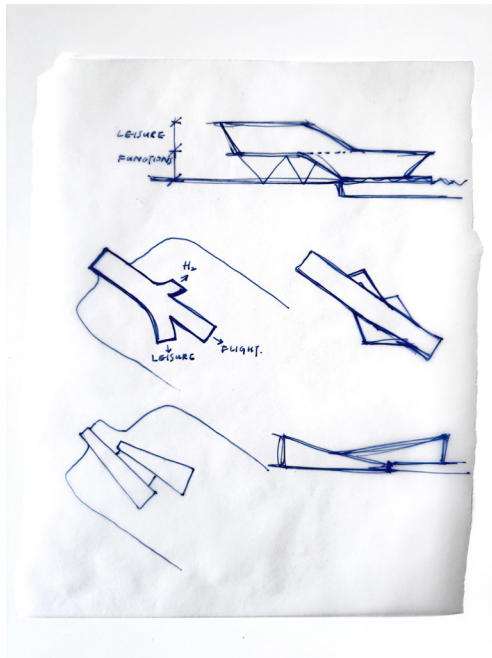


Fig. 17 Client-driven massing studies.

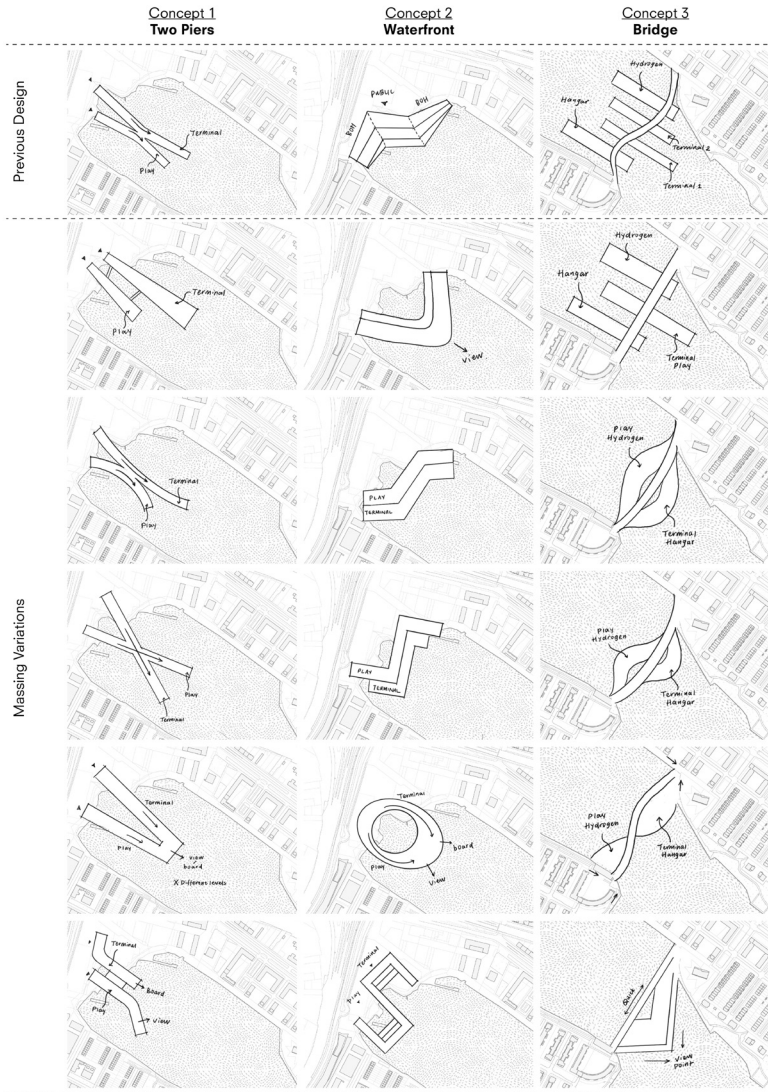


Fig. 18 Concept explorations: massings.

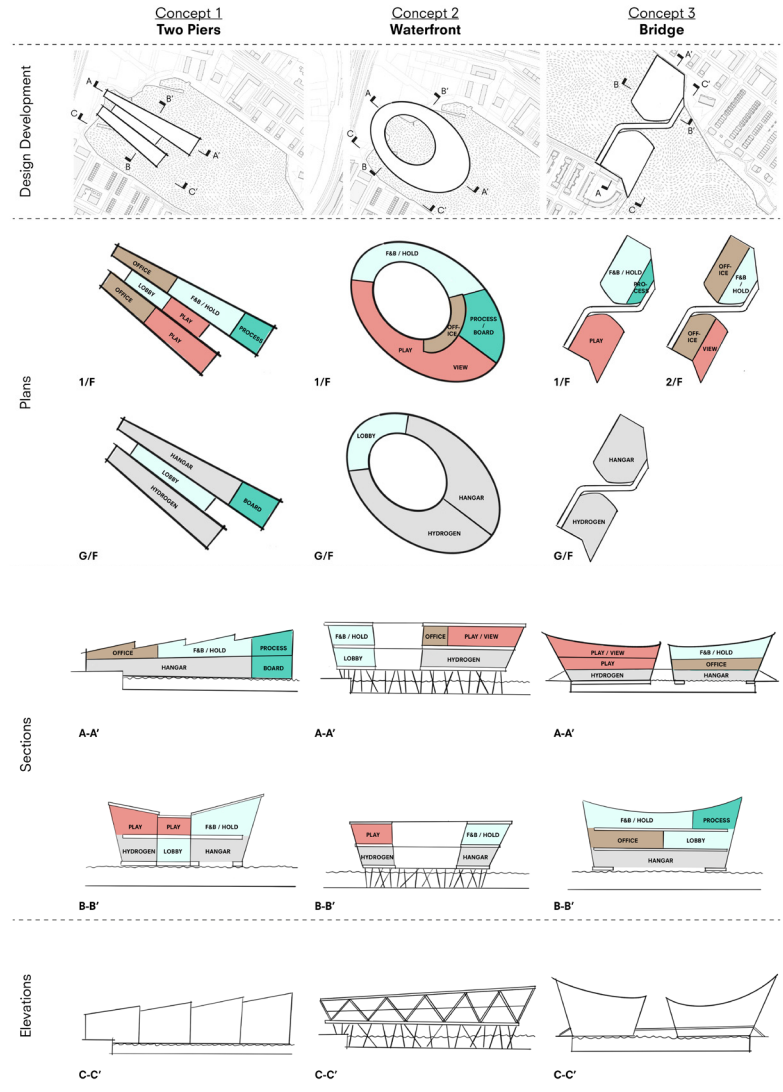


Fig. 19 Concept explorations: plans and sections.



Fig. 20 Concept explorations: urban relations, structures and materials.

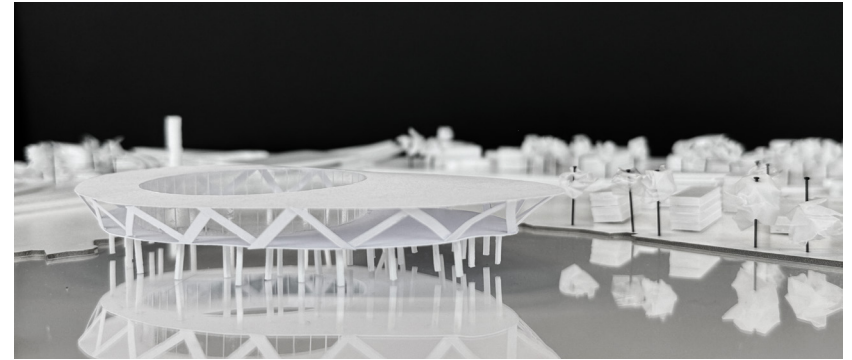
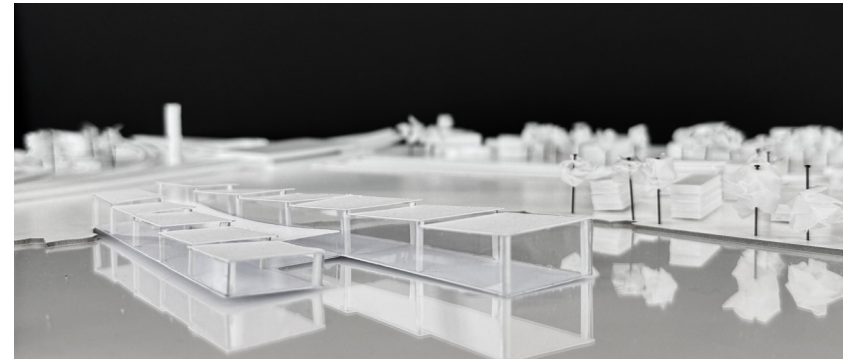


Fig. 17 Client driven massing studies.

Fig. 18 Concept explorations: massings.

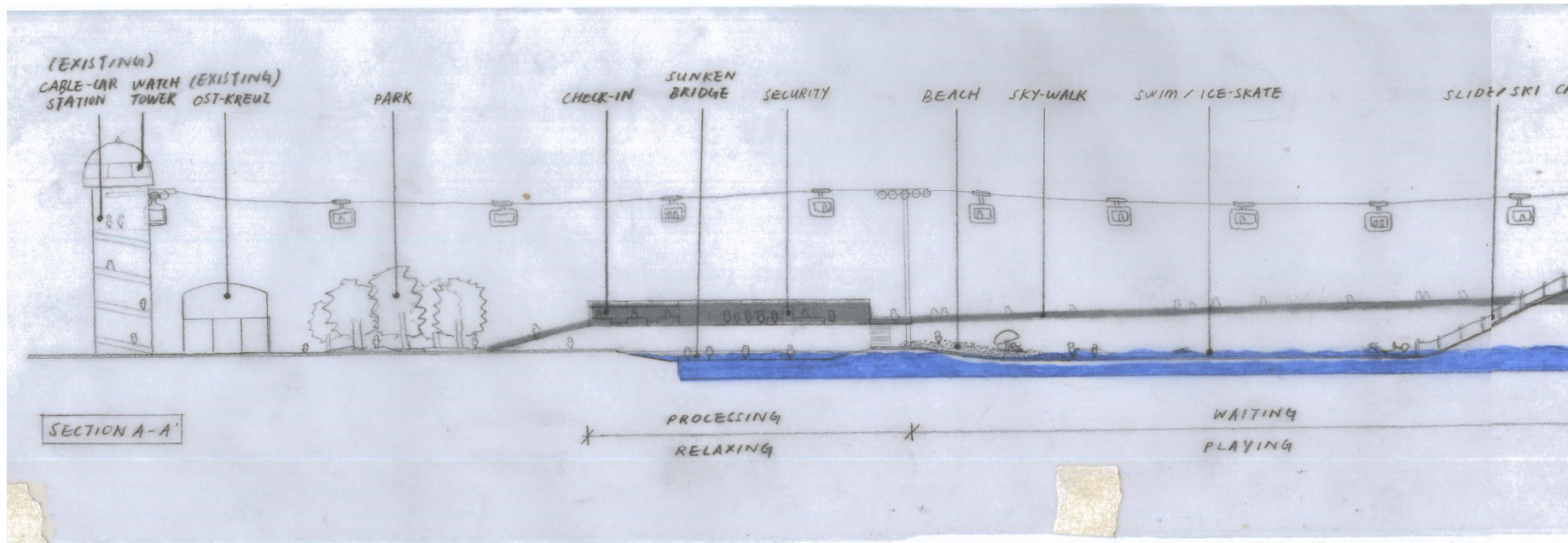
Fig. 19 Concept explorations: plans and sections.

Fig. 20 Concept explorations: urban relations, structures and materials.

Fig. 21 1:500 Models of 3 massings.

02.2 Concept

Following the diverse massing studies, the concept of this project would be finalised by first creating the ideal section of the building in relation to the site. It also showcases relations between the two main functions and flows: passengers and public visitors. (Fig. 22)



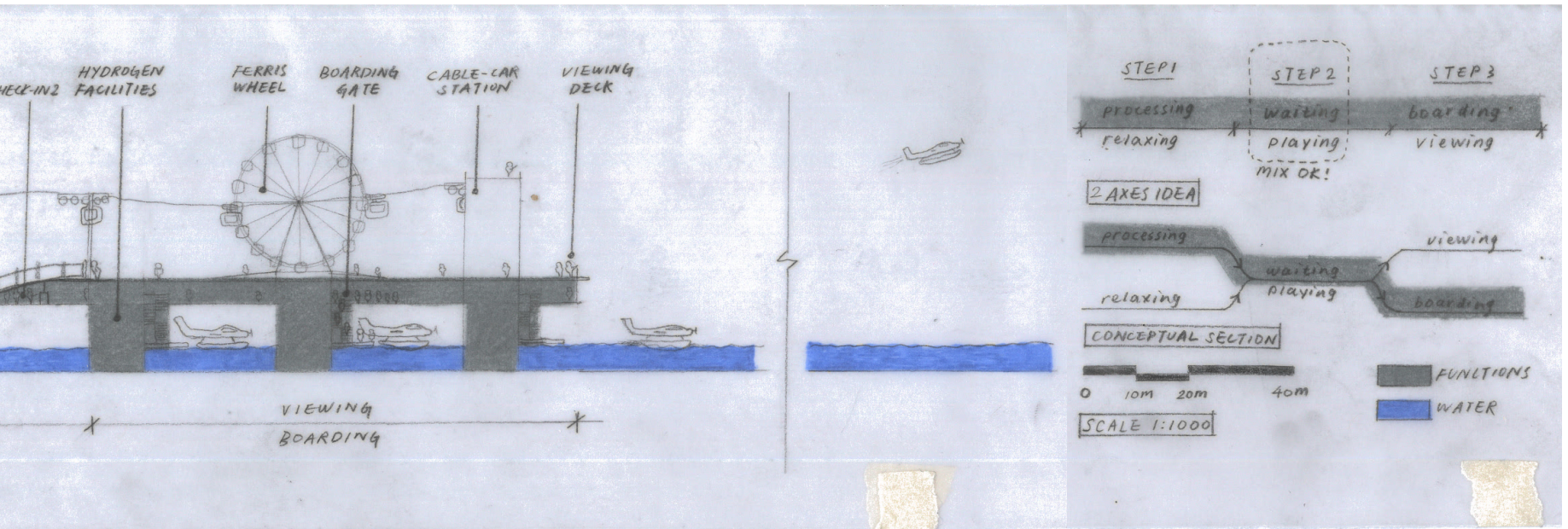
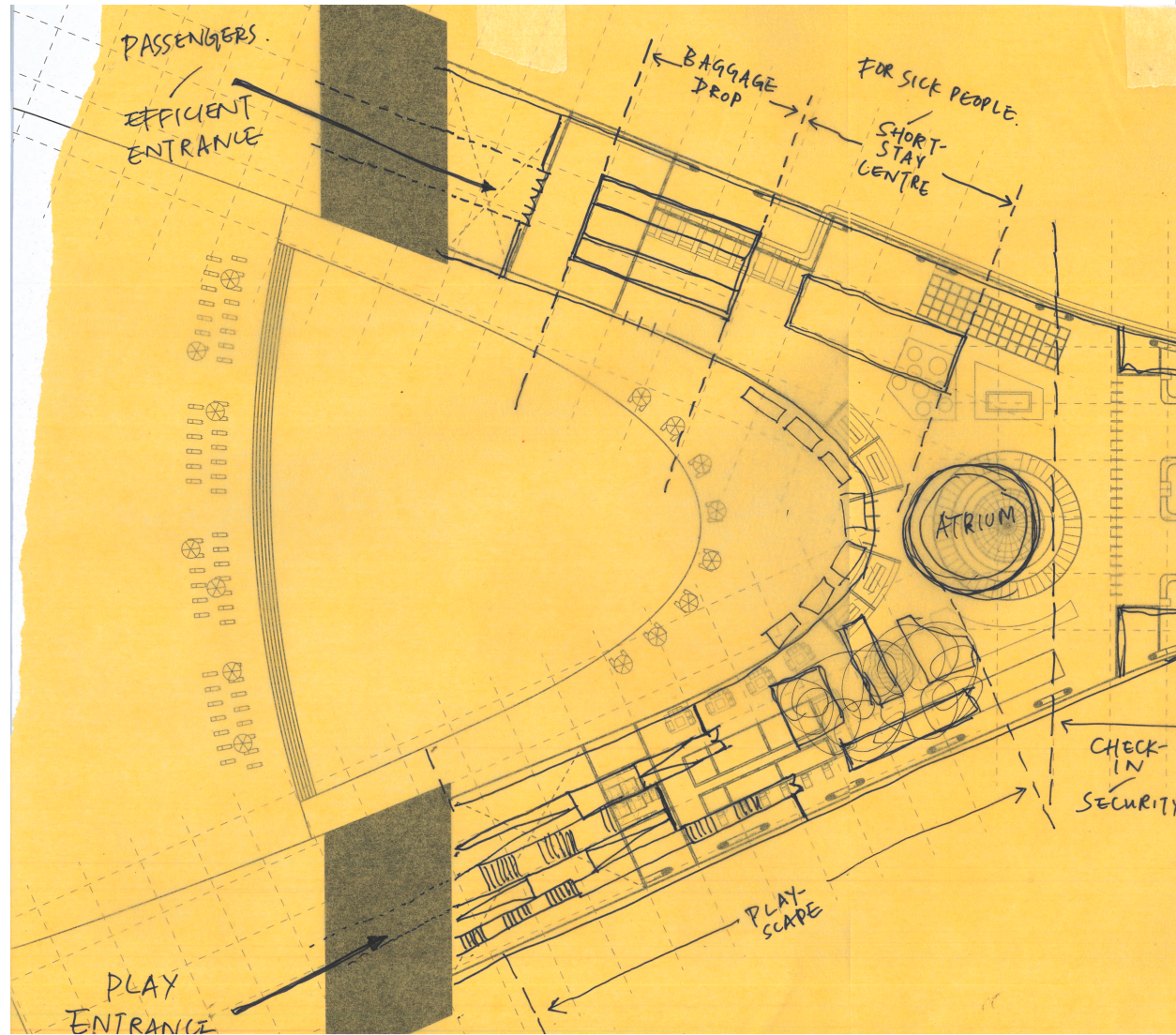


Fig. 22 1:1500 sectional sketch.

Furthermore, floor plan would be sketched in order to determine how the different user flows and functions would be organised in the building.(Fig. 23)

Therefore, the design concepts would be concluded in plan and in section. (Fig. 24-25) The summarising diagram would be presented in Fig. 26.



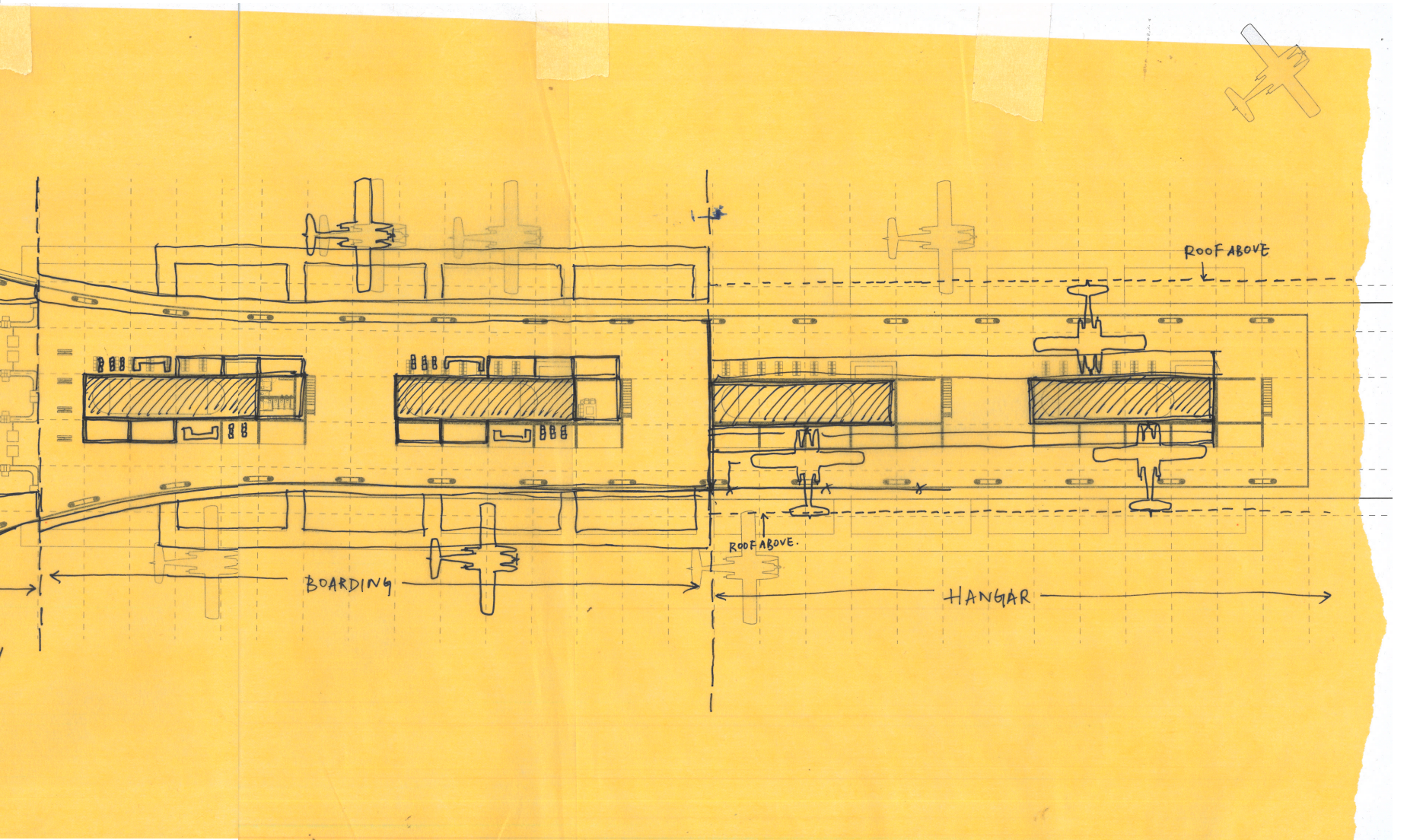


Fig. 23 1:500 Plan sketch.

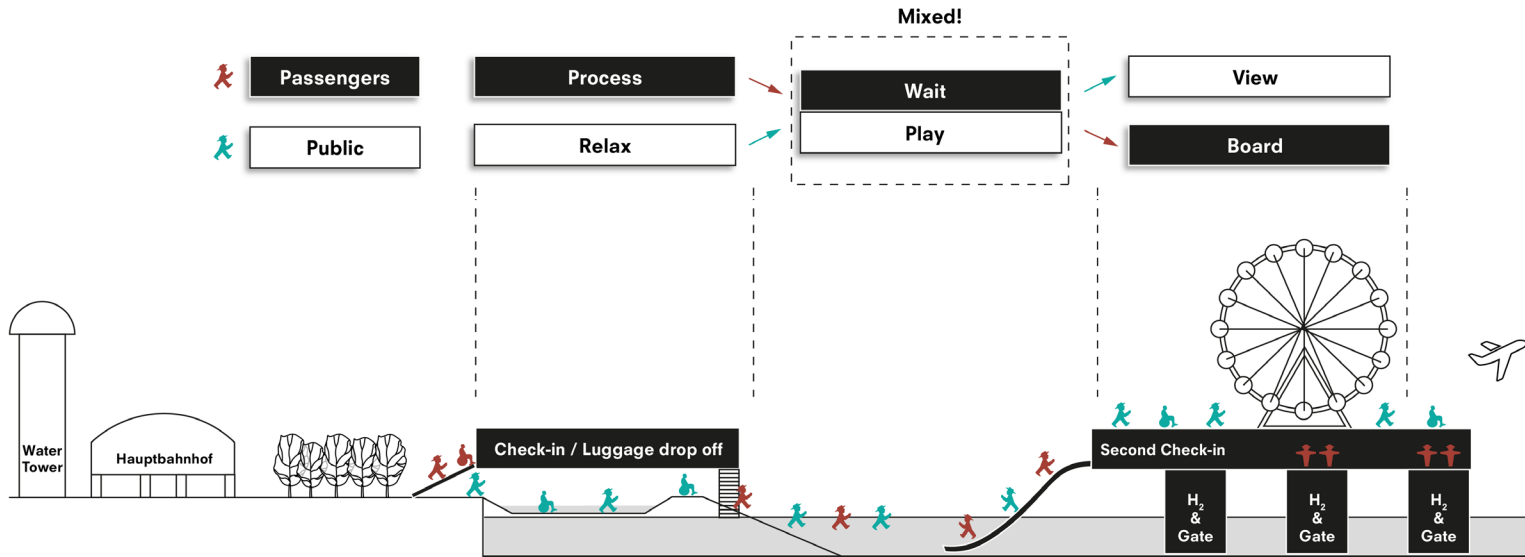
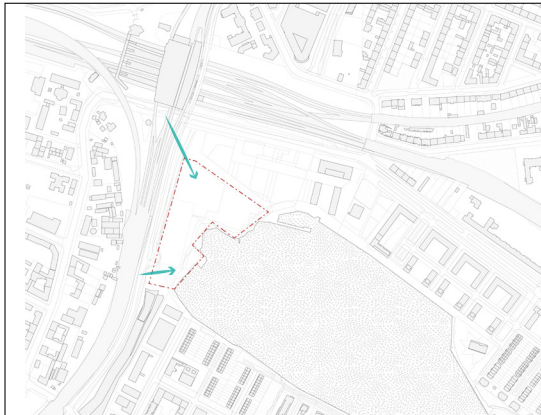
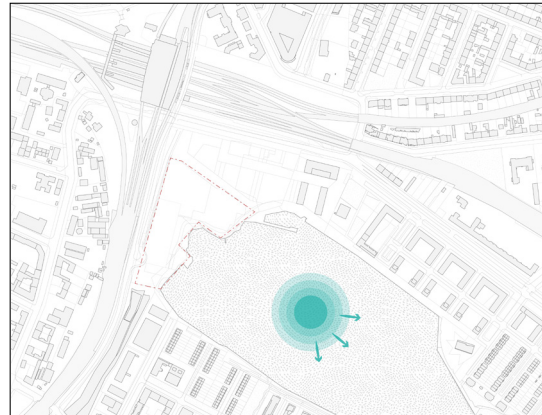


Fig. 24 Design concept in section.

Two entrances



One point of vista



Converging focal point

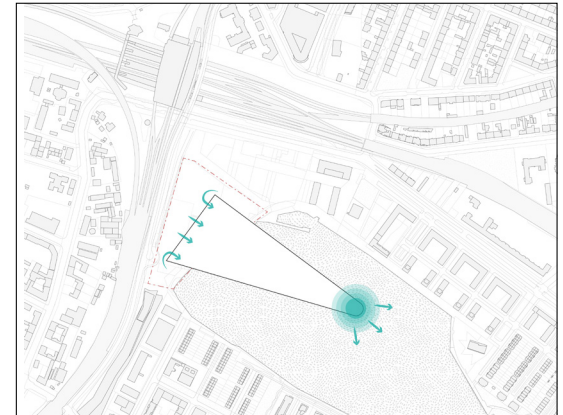


Fig. 25 Design concept on plan.

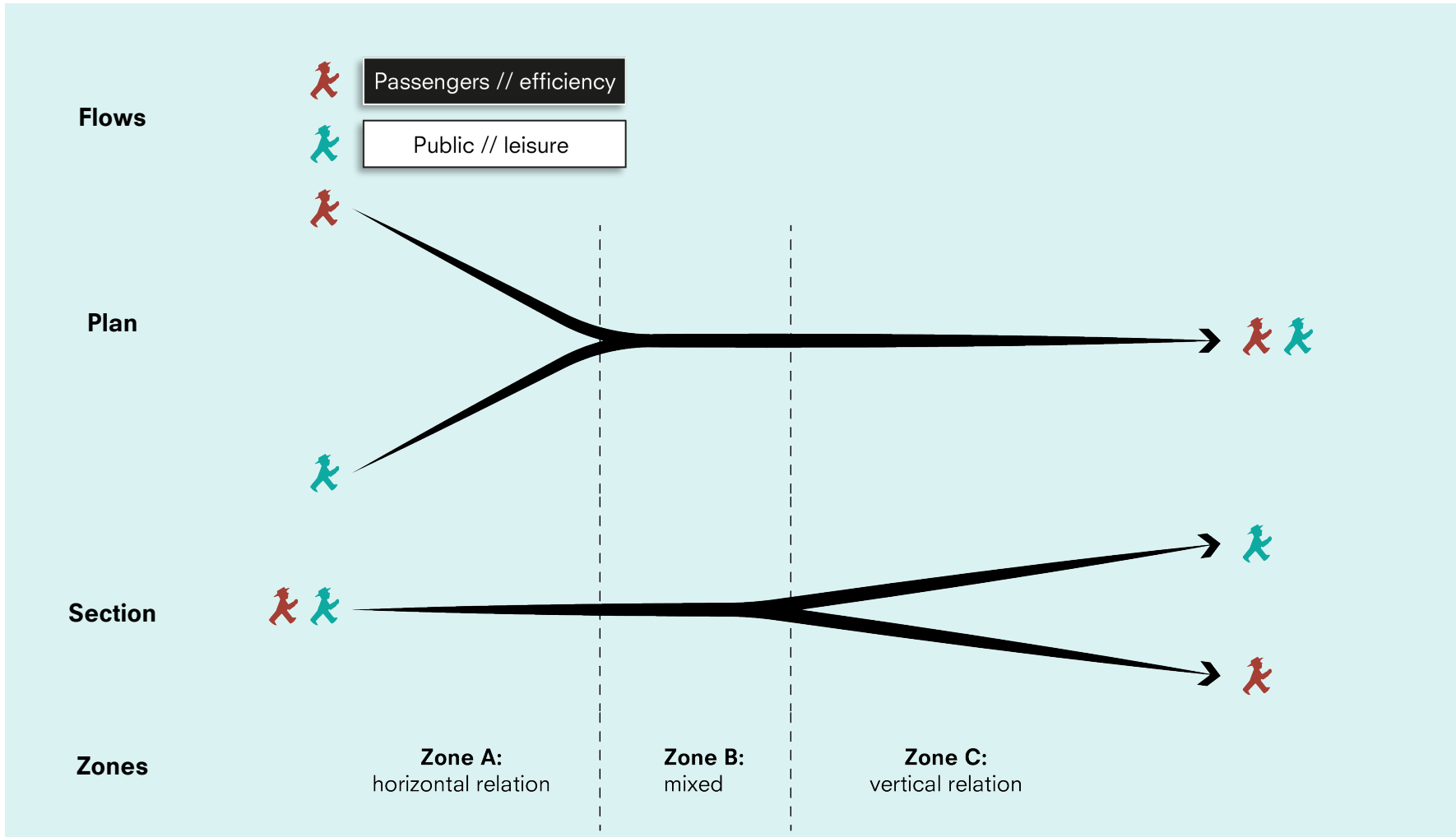


Fig. 26 Design concepts summary.

IMPLEMENTATION

03

03.1 Urban Implementation

As a result of the massing studies, the final design would suggest a linear building which locates entire above the river.

In relation to the site, the plot on ground would be designed to allow three types of circulation. Primary circulation would be along the waterfront and accommodating the existing jogging route. A secondary street would also be created to allow people walking to and from neighbouring buildings. Lastly, the site periphery would also be addressed and extra emergency and vehical access would be provided. (Fig. 27)

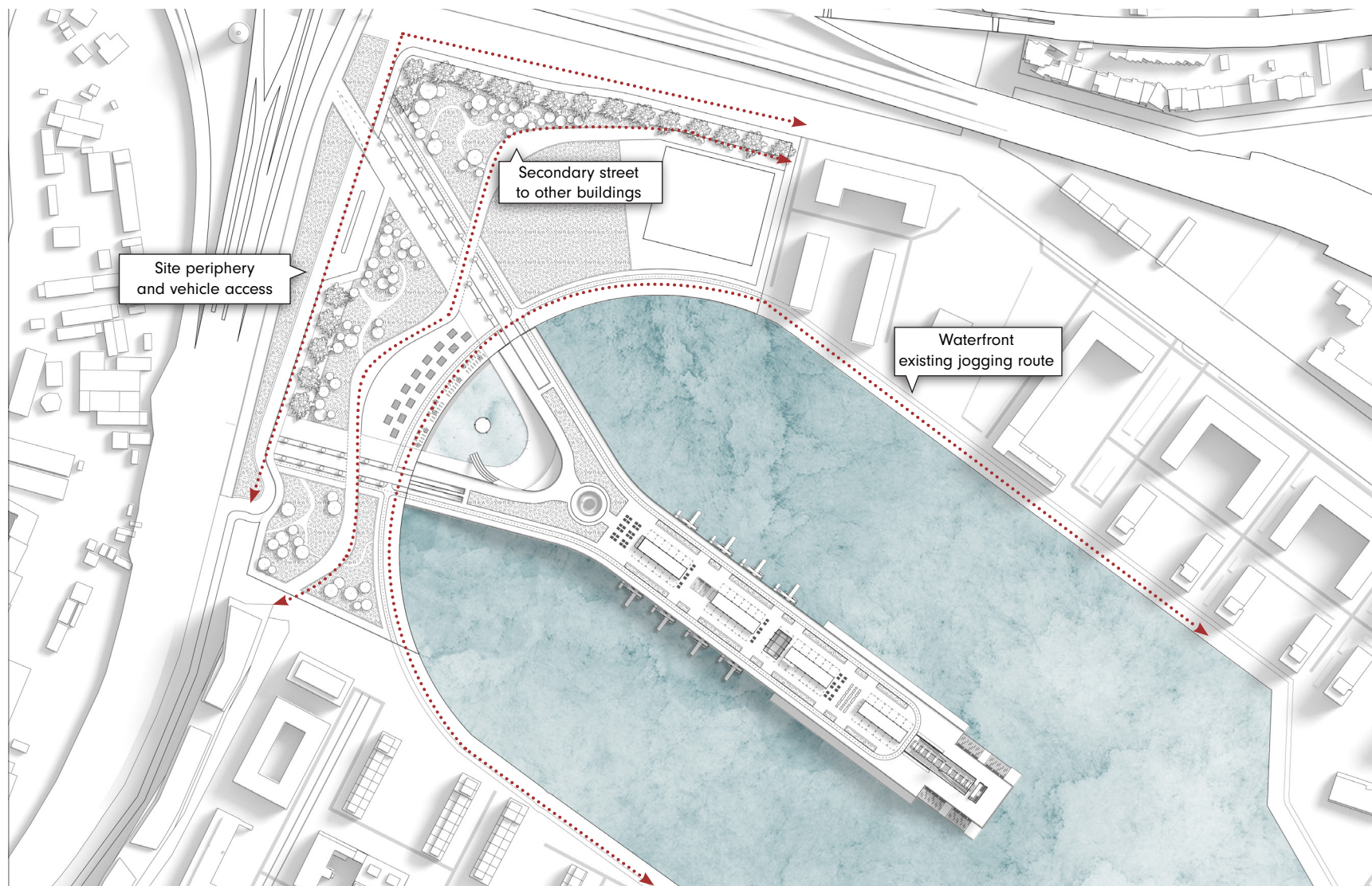


Fig. 27 Urban implementation.

03.2 Building Implementation

Zooming in to the building scale, the site elevation represents how the building is perceived from the perspective of the promenade users. (Fig. 28)

The longitudinal section shows how the building is organised: with 4 hydrogen cores serving 8 gates in total. At the end of the pier, a sunken ferris wheel would be designed to serve as a symbol and attraction from far away. It also allows visitors to reach the highest point for planes and scenery viewing at the end of the pier. (Fig. 29)

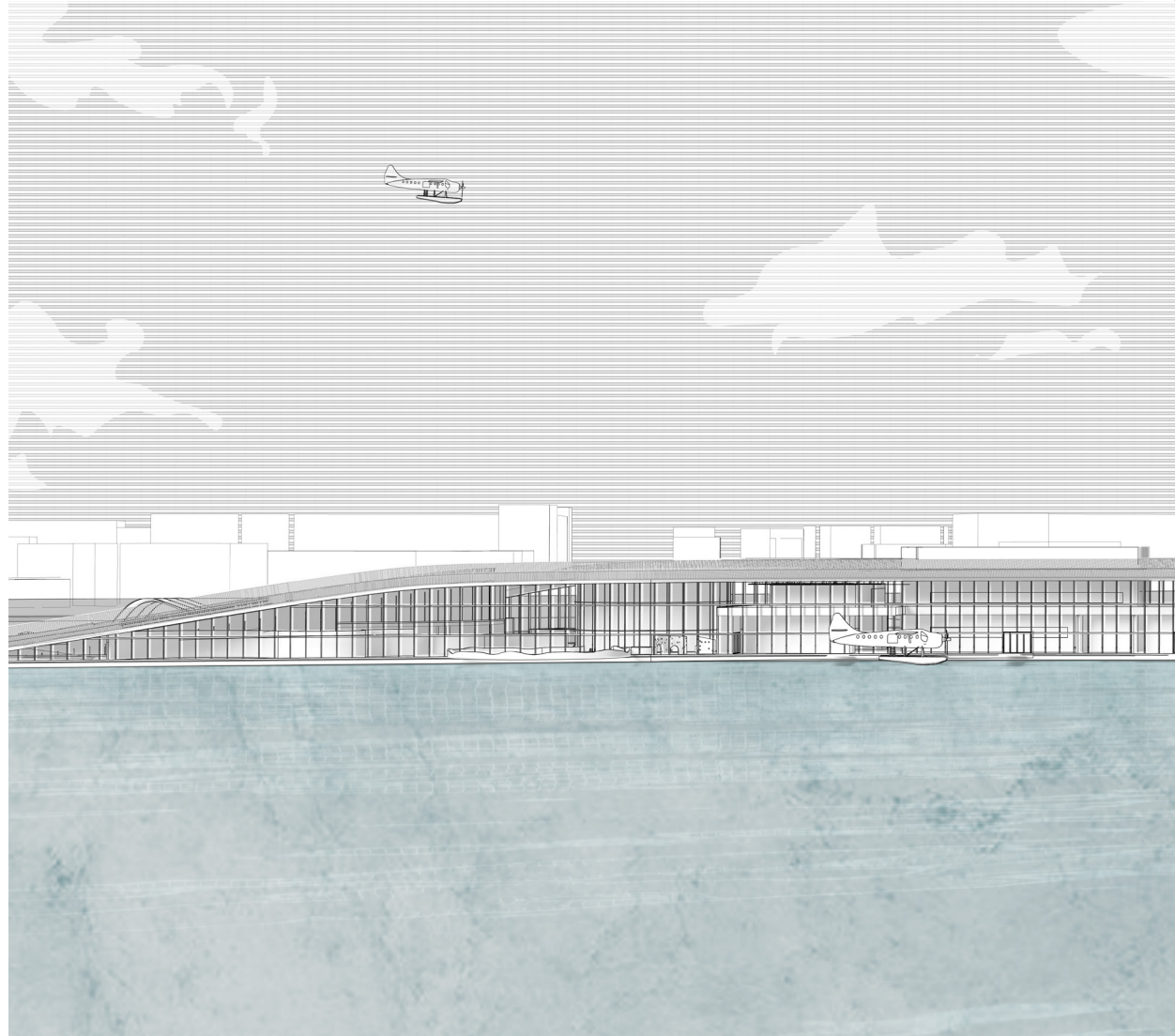
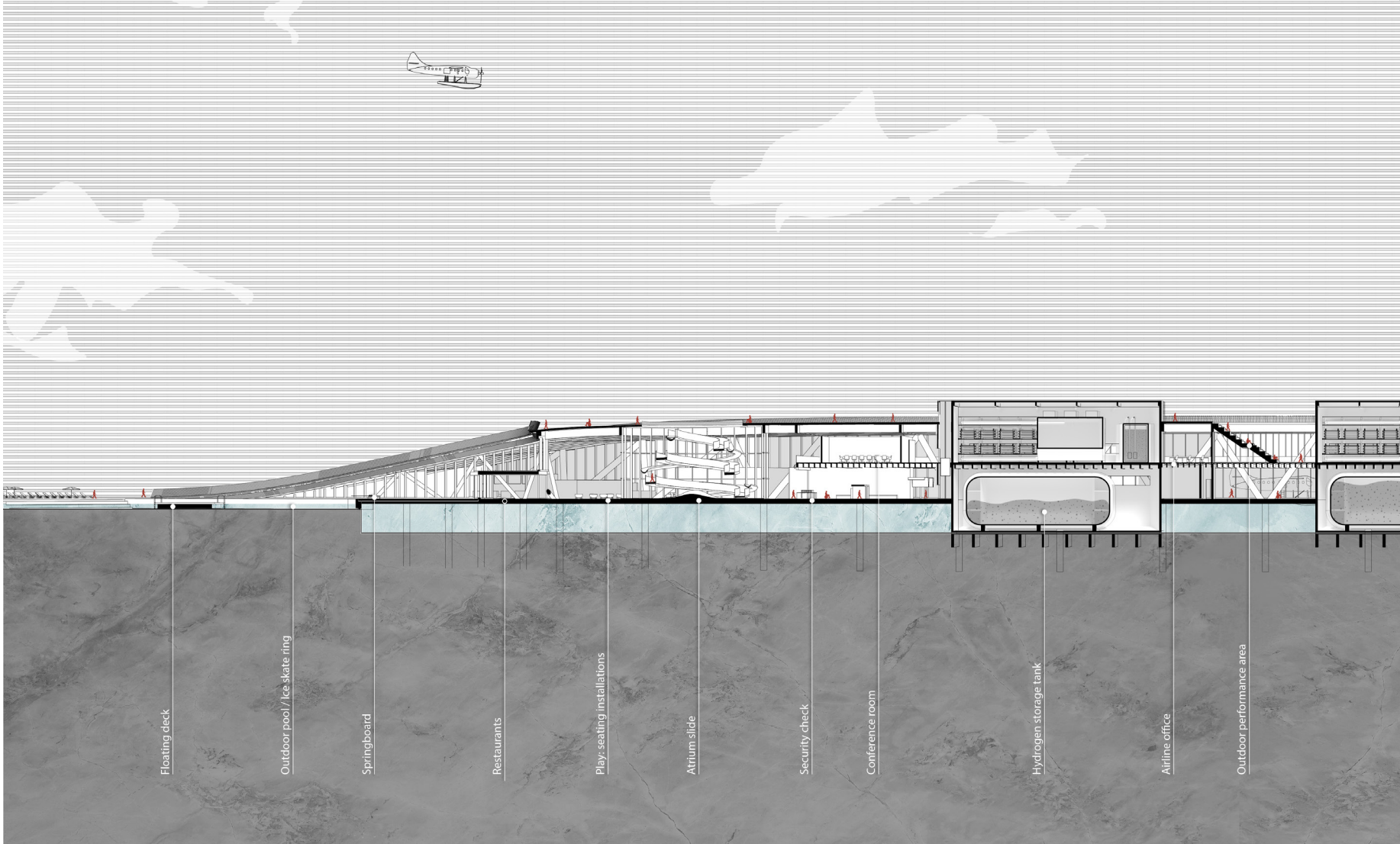




Fig. 28 Longitudinal elevation.



Floating deck

Outdoor pool / Ice skate ring

Springboard

Restaurants

Play: seating installations

Atrium slide

Security check

Conference room

Hydrogen storage tank

Airline office

Outdoor performance area

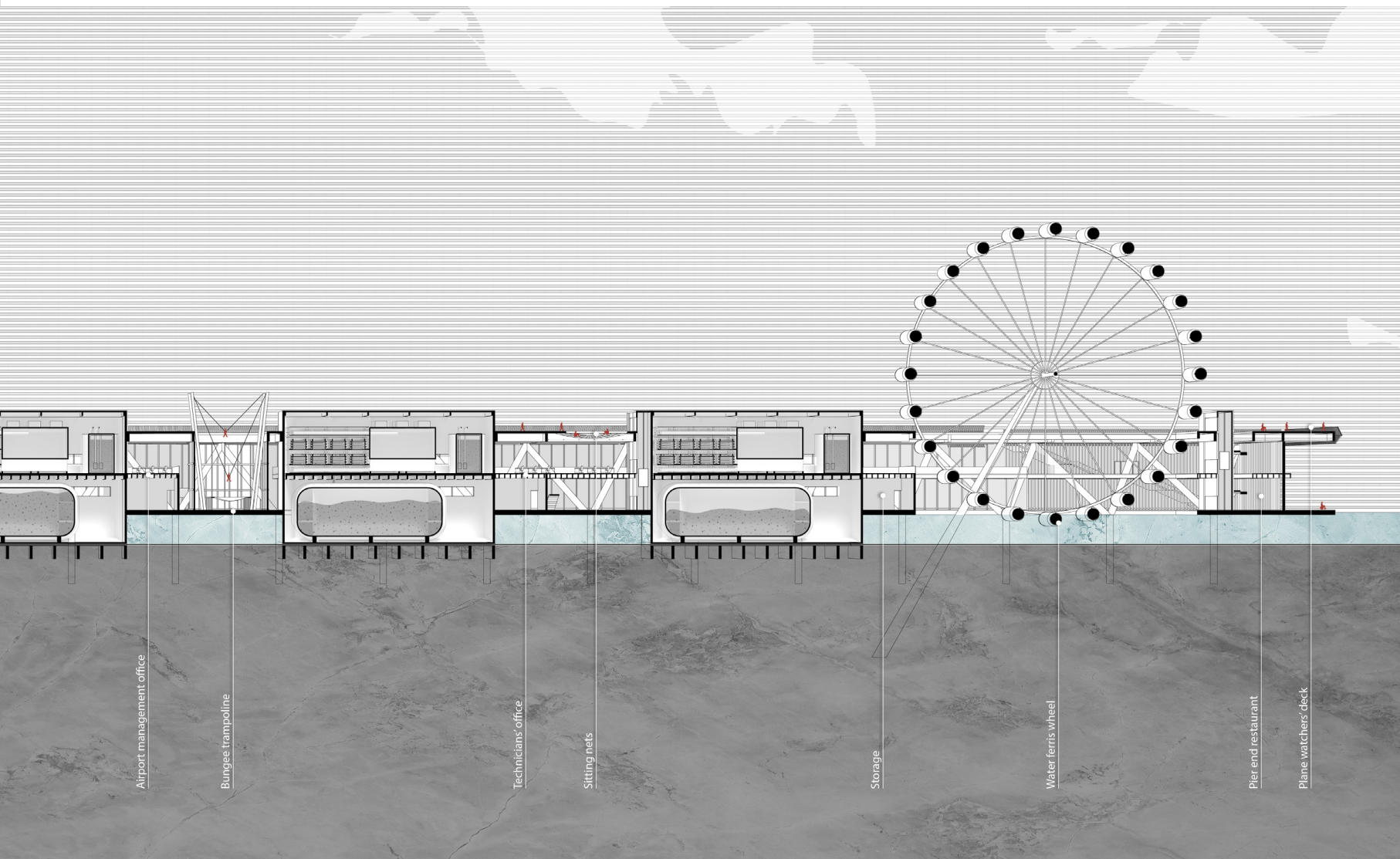
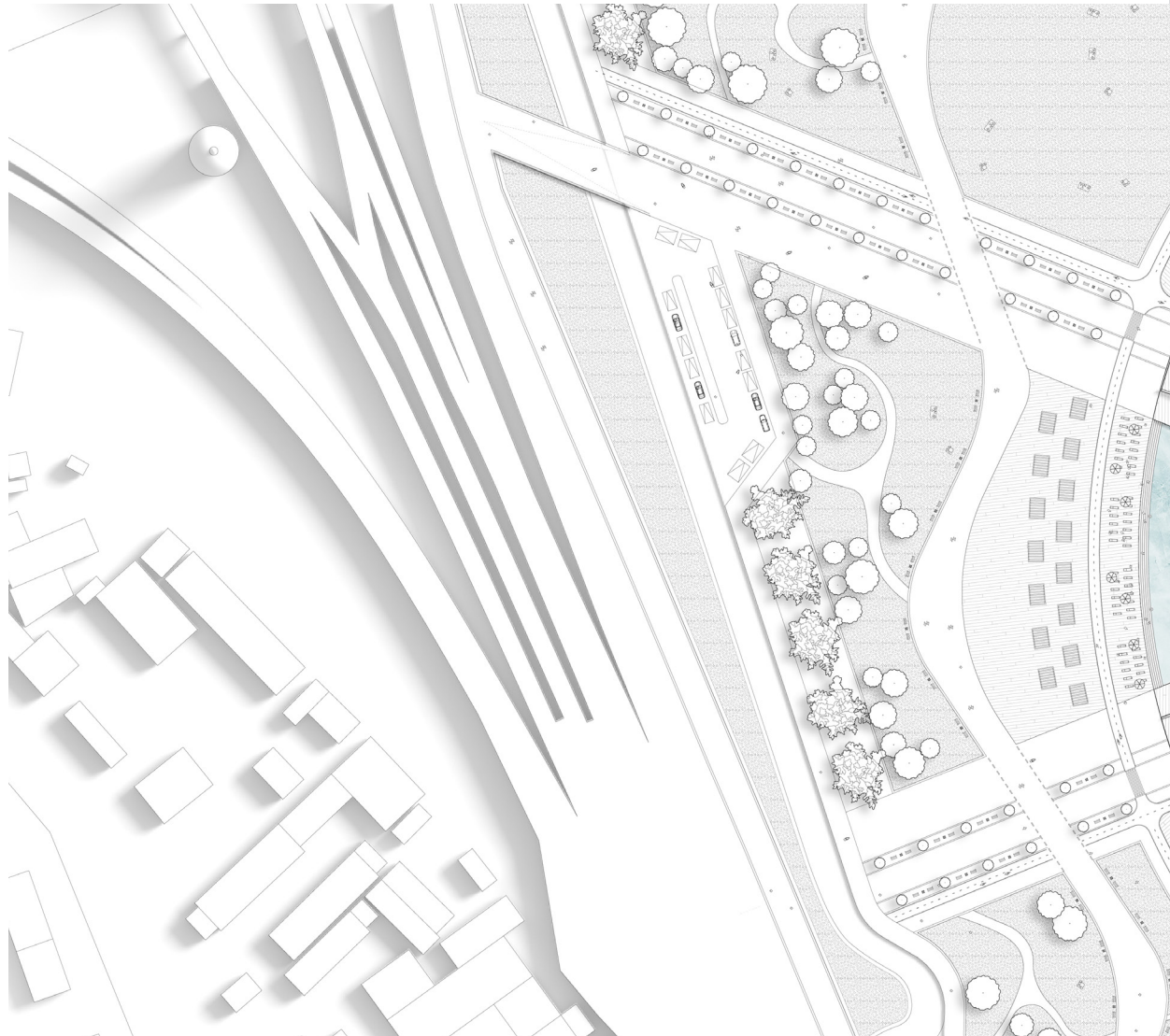


Fig. 29 Longitudinal section.

On the roof level, mostly leisure activities would be found, such as: outdoor performance area, outdoor pool and ice-skating ring, lawns, trampolines, and so on. The roof plan also demonstrates how passengers would be guided from the train station to the building. (Fig. 30)

The mezzanine level mainly serves as private office spaces for airlines, airport management and technicians. In addition, conference rooms and meeting rooms would also be provided for necessary activities. (Fig. 31)

The terminal would be located towards the coastline on the ground floor where all users could easily reach. Two entrances would be provided for two types of circulation: passengers and public visitors. At the intersection point, a playscape would be designed to allow more space and a more enjoyable waiting time. Nevertheless, the hangar locates further from the coastline for aircraft maintenance. (Fig. 32)



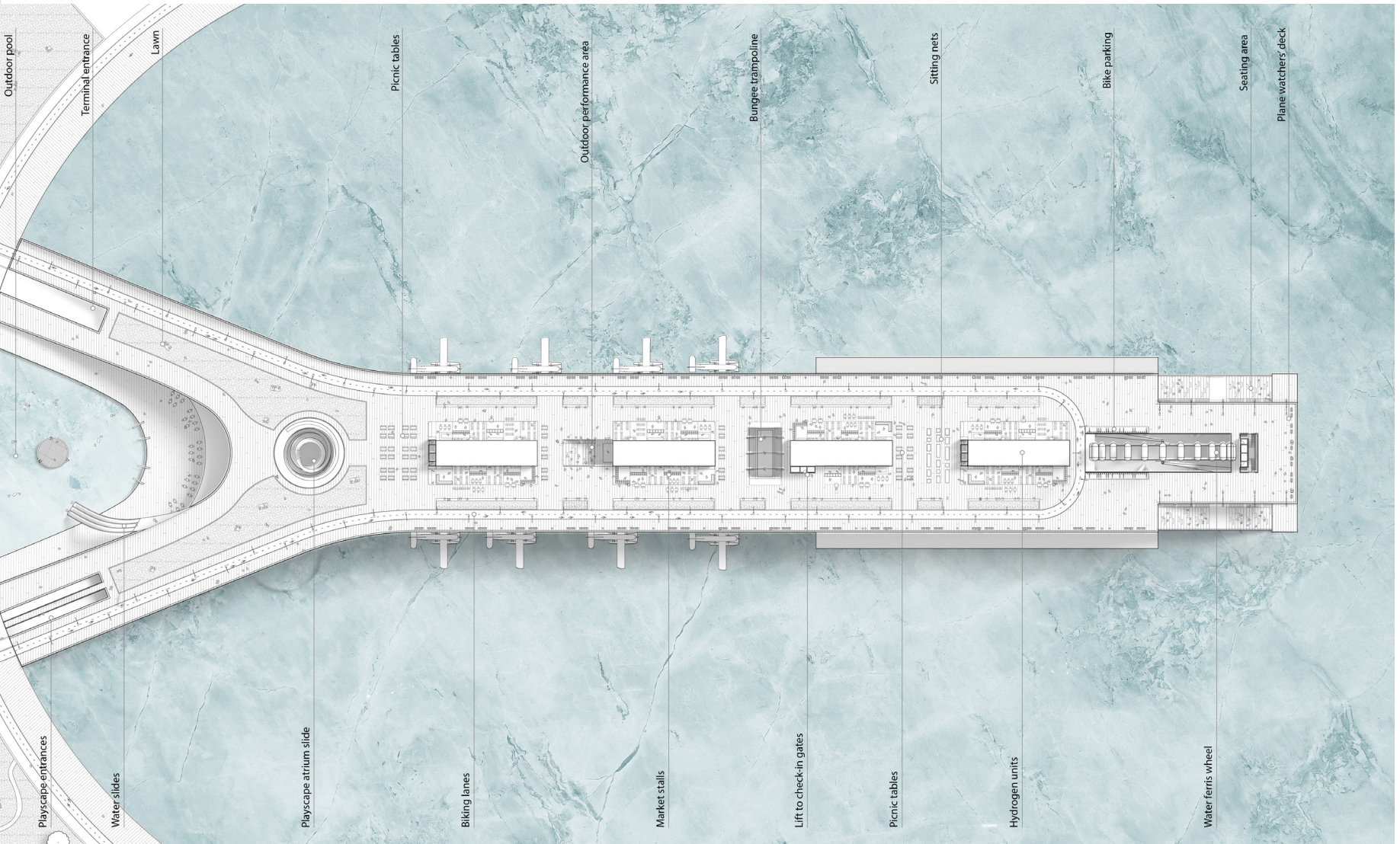
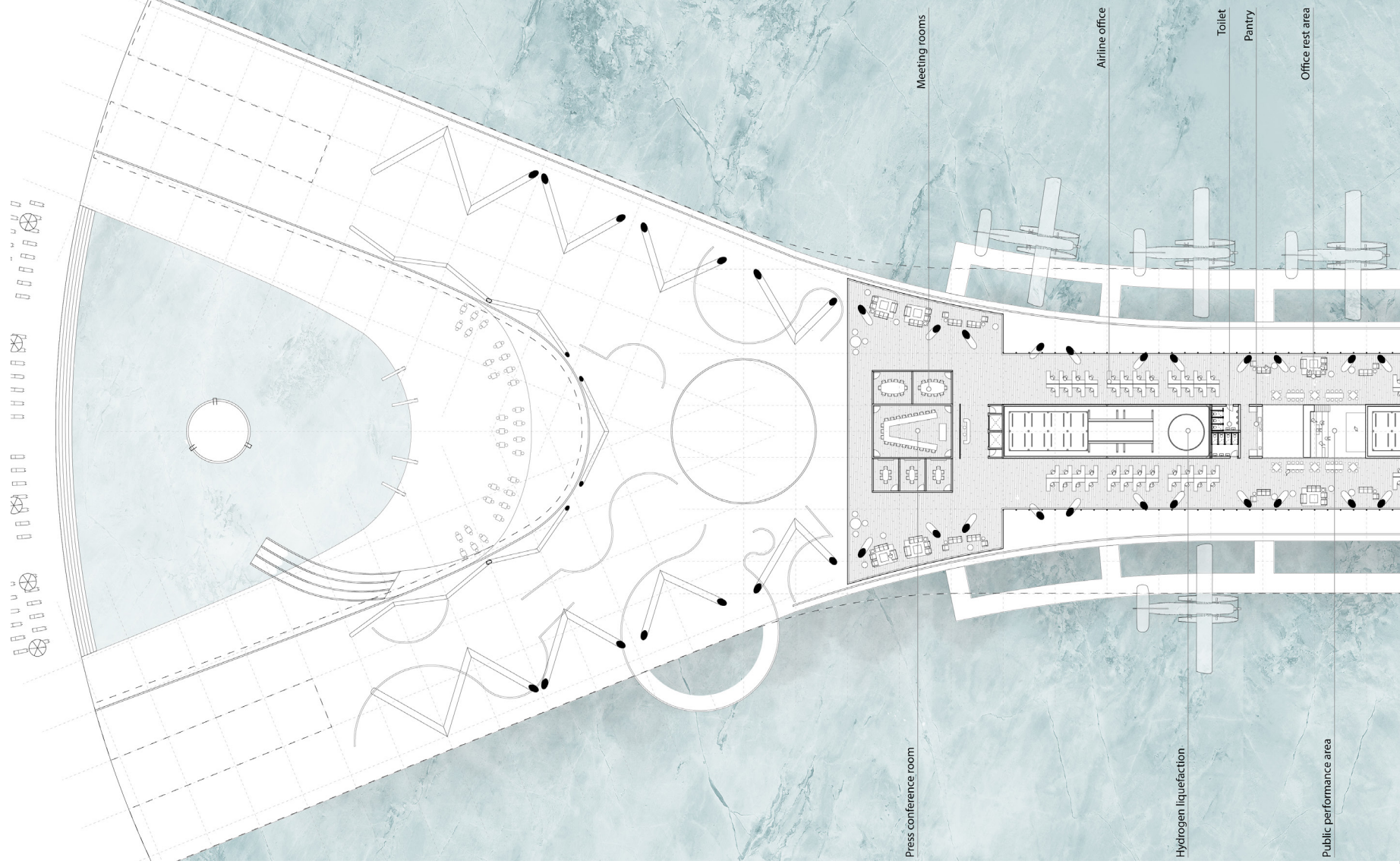


Fig. 30 Roof plan.



Press conference room

Meeting rooms

Airline office

Hydrogen liquefaction

Toilet

Pantry

Office rest area

Public performance area

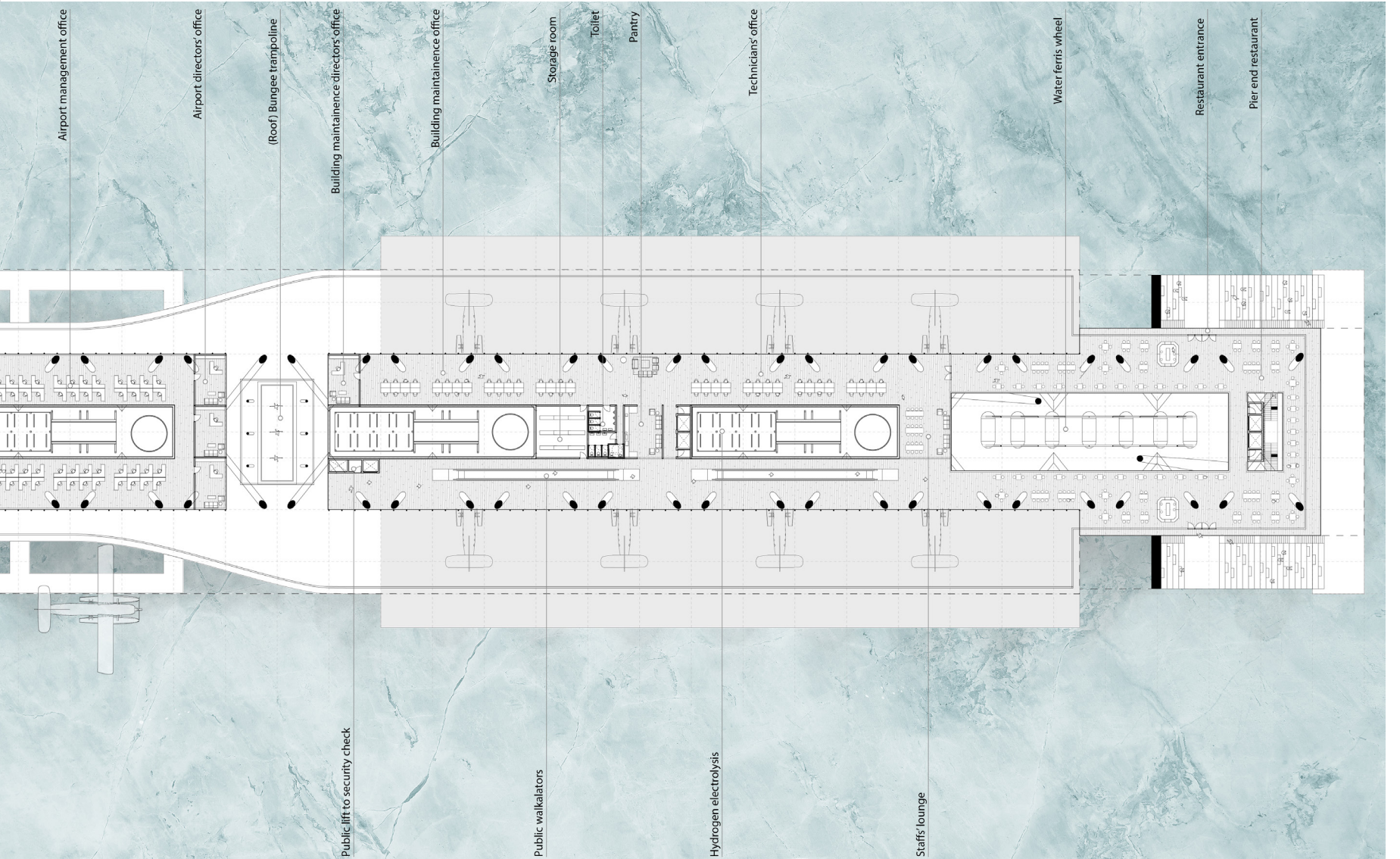
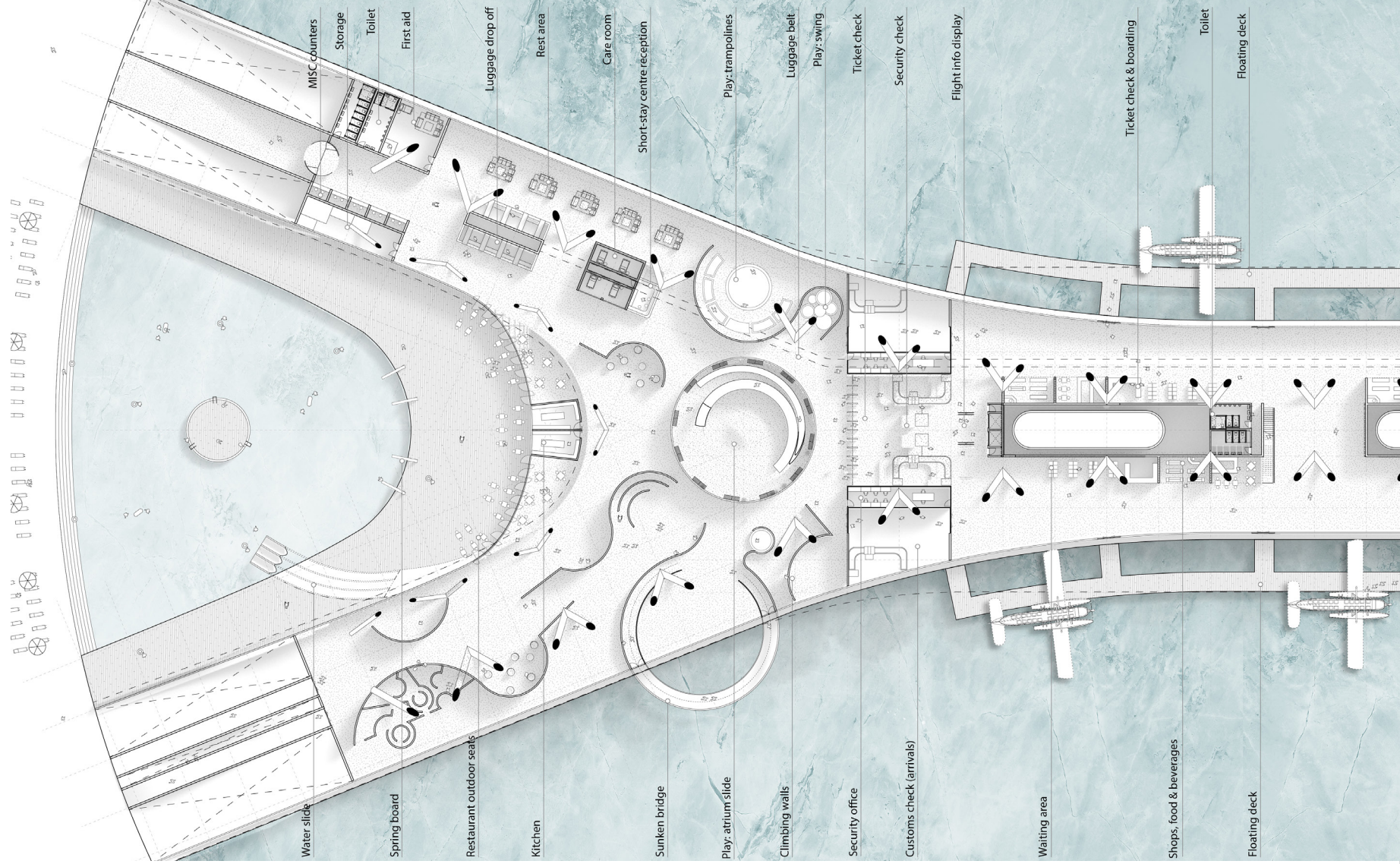


Fig. 31 Mezzanine plan.



Water slide

Spring board

Restaurant outdoor seats

Kitchen

Sunken bridge

Play: atrium slide

Climbing walls

Security office

Customs check (arrivals)

Waiting area

Shops: food & beverages

Floating deck

MISC counters

Storage

Toilet

First aid

Luggage drop off

Rest area

Care room

Short-stay centre/reception

Play: trampolines

Luggage belt

Play: swing

Ticket check

Security check

Flight info display

Ticket check & boarding

Toilet

Floating deck

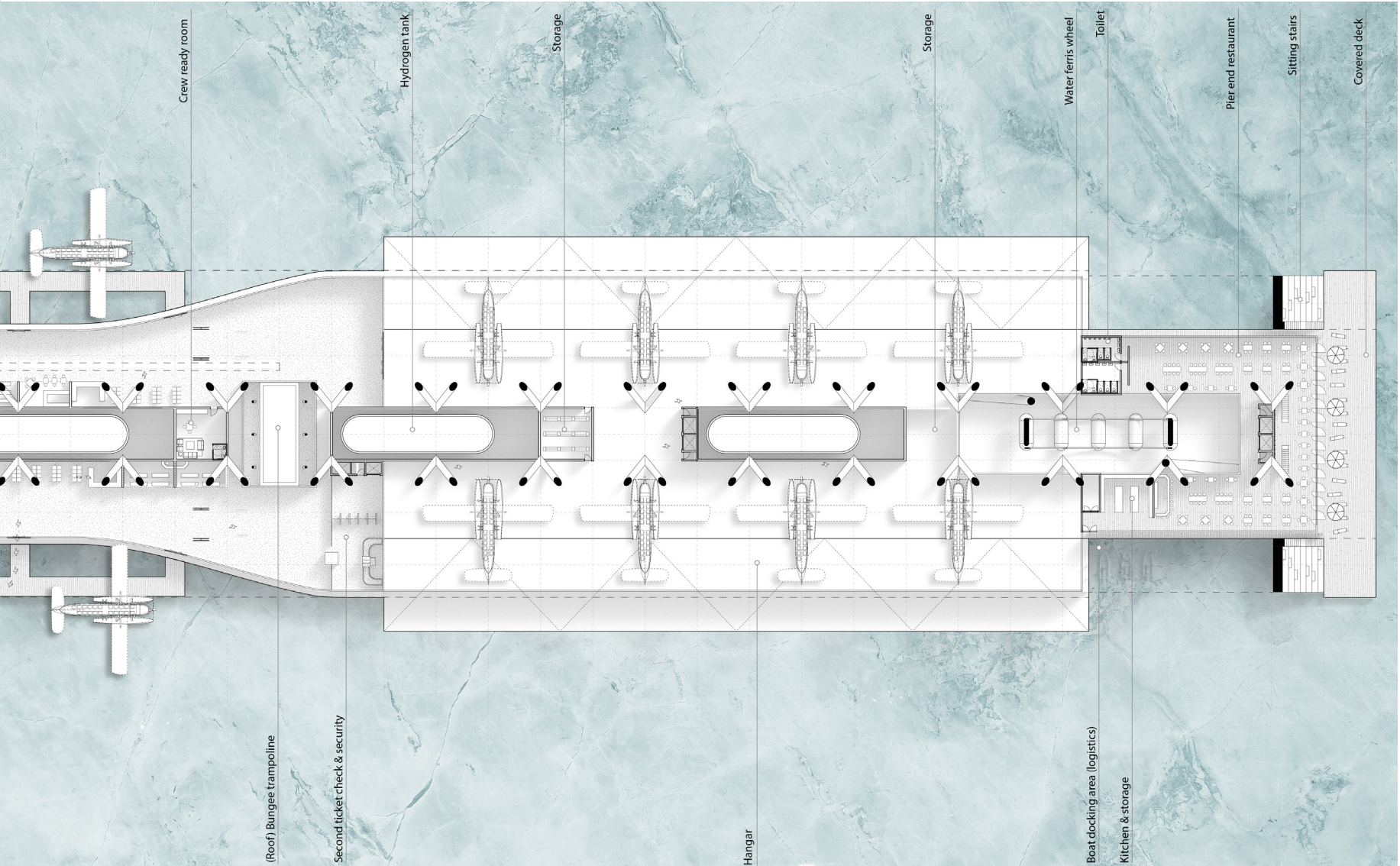


Fig. 32 Ground floor plan.

DEVELOPMENT

04

04.1 Circulations

04.1.1 Rural Patients

Most medical users of this building would come from the country side of Germany. They would require (regular) medical treatments in Berlin and seaplanes would be a convenient way to commute to and from remote areas.

Upon arrival in the Berlin Water Airport, they would get off the plane through a floating deck, go pass customs check, wander or rest in playscape and at last leaving the airport at the entrance nearer to the train station. (Fig. 33-34)

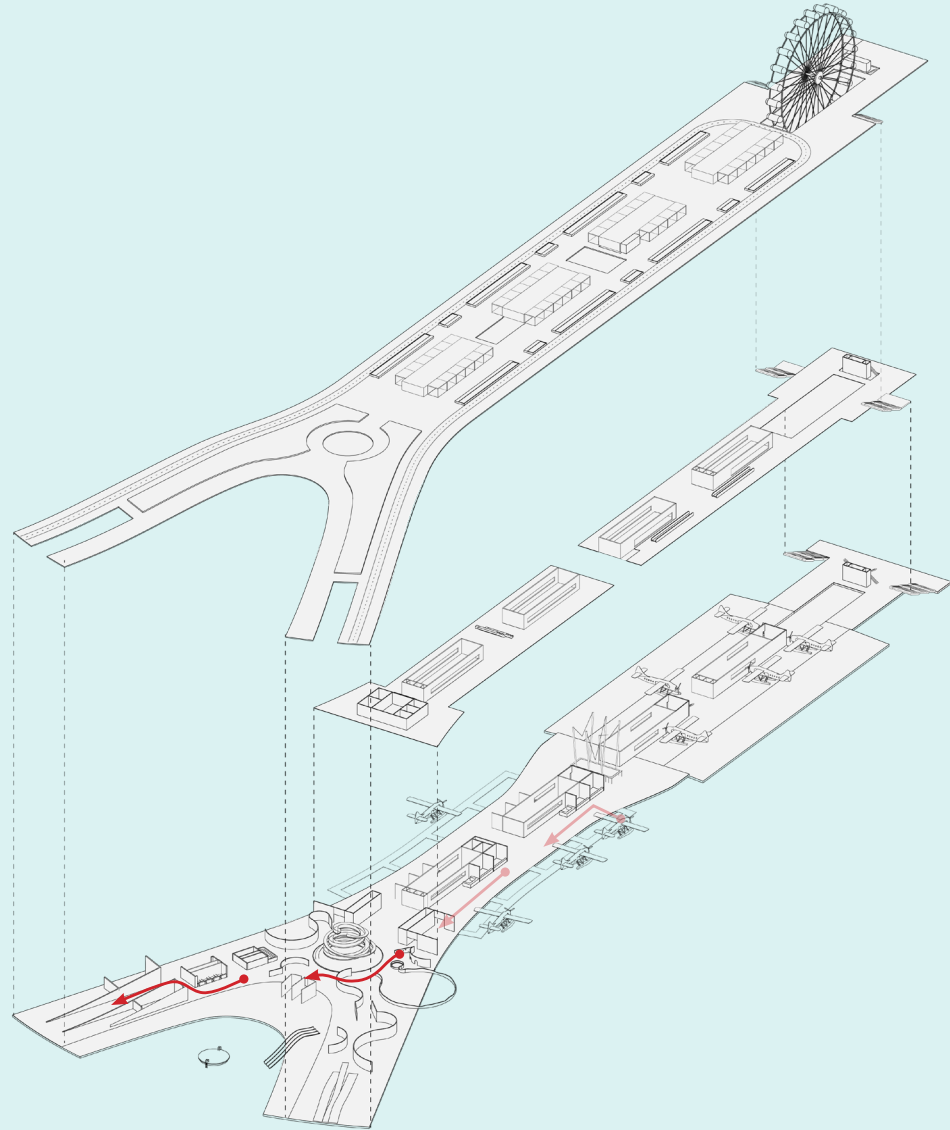


Fig. 33 Circulation of arrival rural patients.

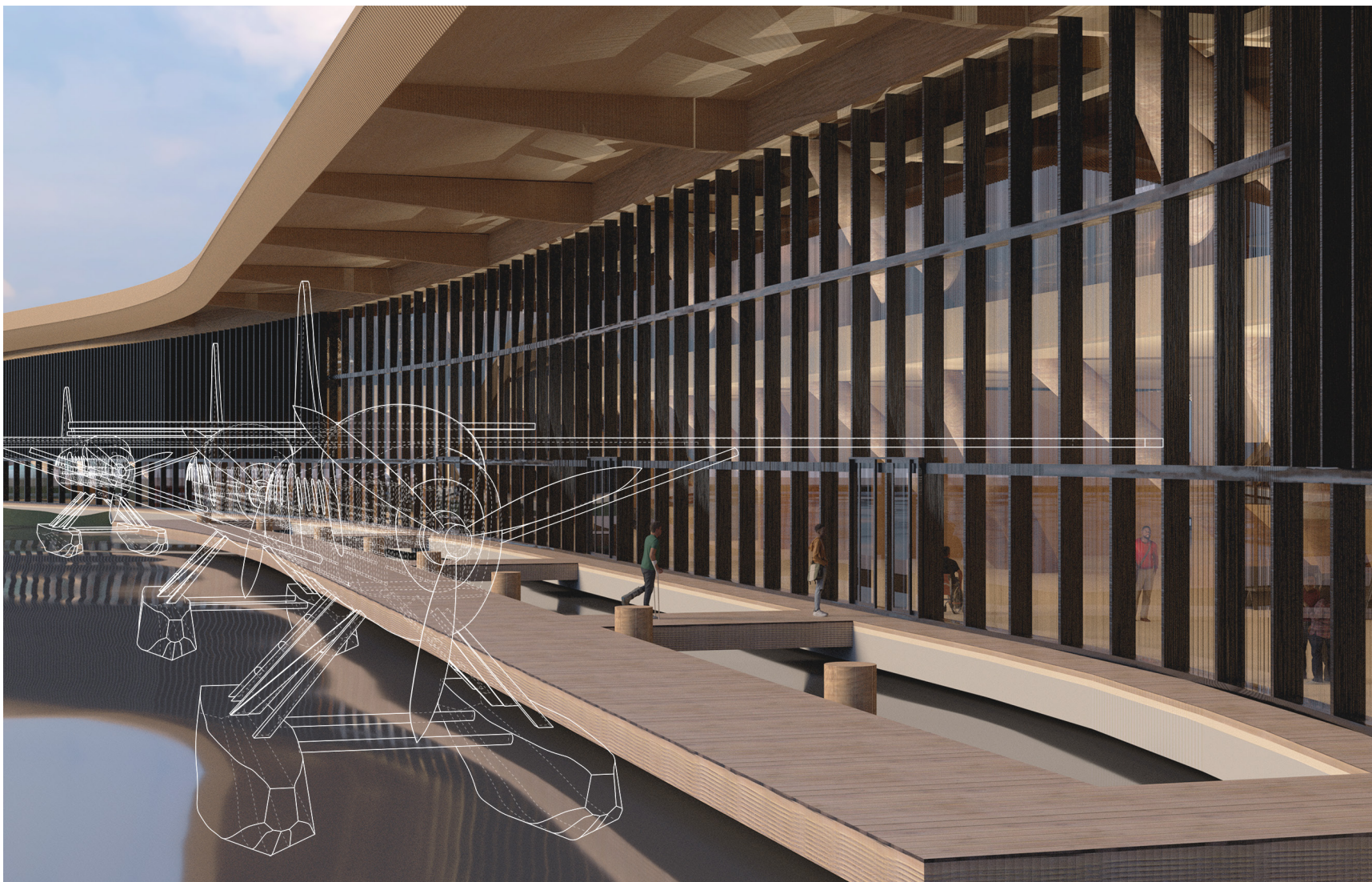


Fig. 34 Visualisation: floating deck.

04.1.2 Urban Escapers

Another type of travellers targeted would be urban escapers living in Berlin and hoping to escape from the dense city.

They would enter the building from the train station's side, passing through check in counters and they would reach the playscape which attracts them to take a walk during the long waiting time for boarding.

On the way, they would encounter market stalls, sunken ferris wheel, and a restaurant, which then walkalators leads them to the secondary security check through the short cut, easily back to the boarding gates. (Fig. 35-36)

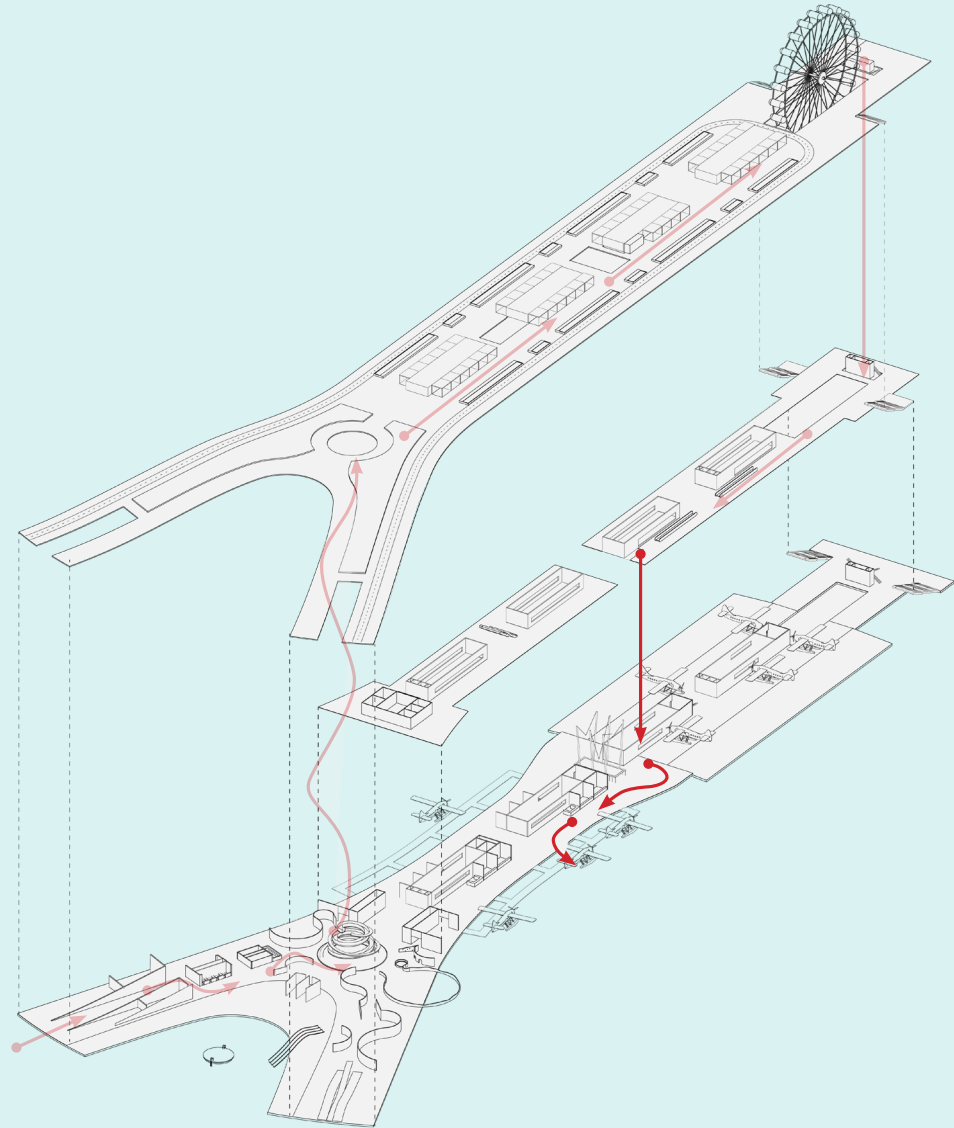


Fig. 35 Circulation of arrival urban escapers.



Fig. 36 Visualisation: check-in desks.

04.1.3 Public Visitors

Despite seaplane passengers, public visitors would also be very welcomed in this airport, which is quite different from conventions.

Public visitors who wish to spend fun and quality free time with their family and friends, could come to this water airport.

They would first encounter the outdoor pool or enter the building to the more exciting ramp side. The playscape would be where they are mixed with other passengers, and the roof level would also be accessible to them.

Their day trip could end at the highest point of the ferris wheel, in the plane spotting area, or at the pier end restaurant with a panoramic view. (Fig. 37-38)

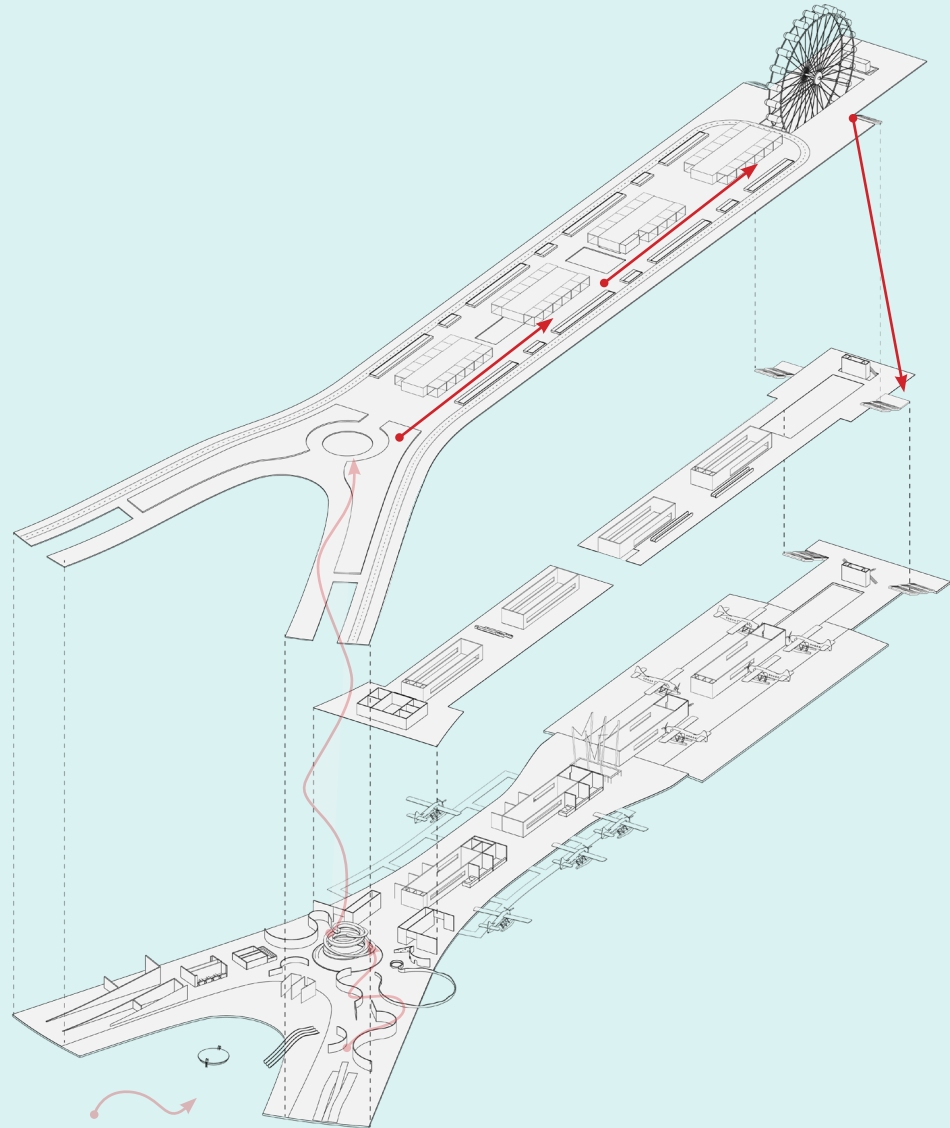


Fig. 37 Circulation of arrival rural patients.



Fig. 38 Visualisation: roof top market stalls.

04.1.4 Staff Members

Last but not the least, circulation staff members of the airport would also be considered.

As a most efficient and direct way, they could get to their respective offices from the playscape. It would be required for them to also pass through security, but afterwards they could take the private elevator to the mezzanine office level.

For technicians, they could also walk through the departure gates and reach the hangar area. (Fig. 39-40)

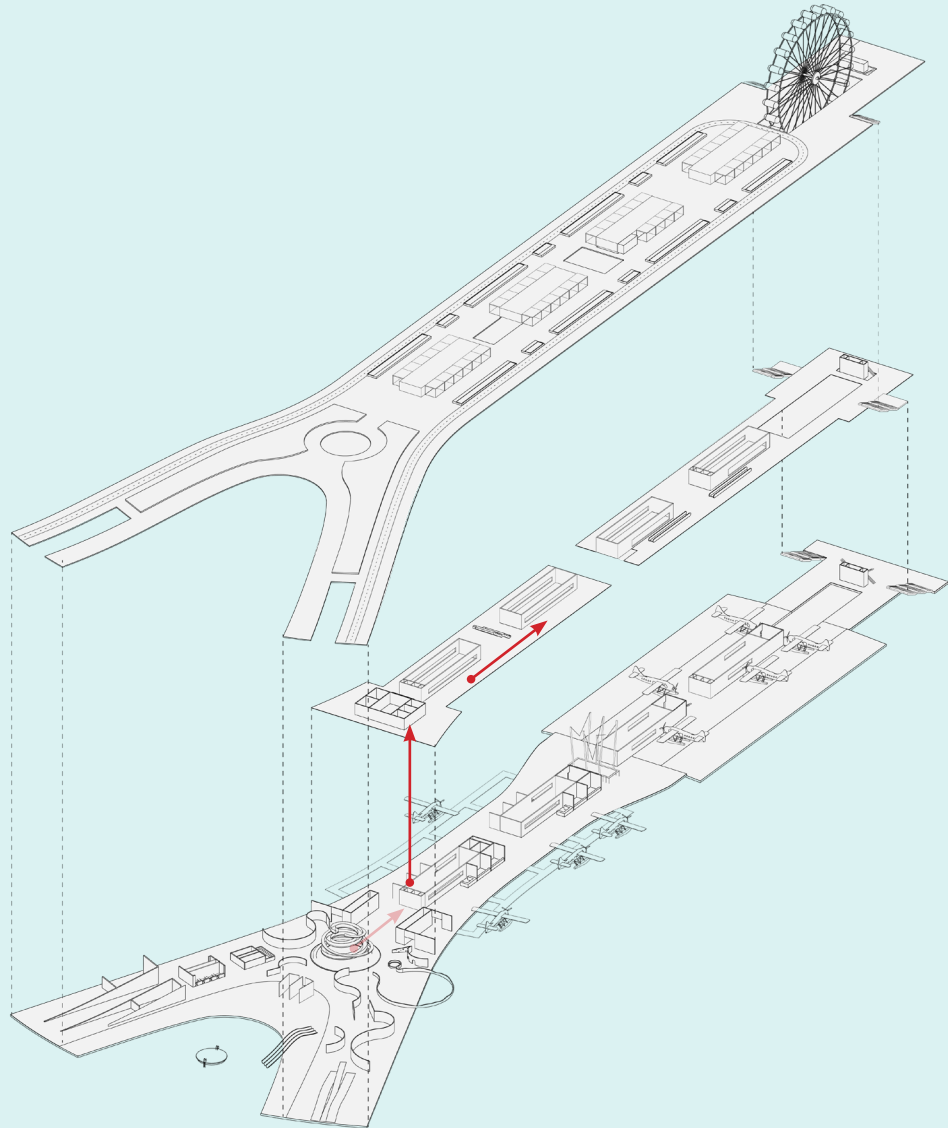


Fig. 39 Circulation of staff members.



Fig. 40 Visualisation: security gates.

04.2 Flows Intersections

Airports designs are, most of the time, more focused on the design of circulations. From the aforementioned circulation routes, each users may seem independent from one another. The following part displays how they actually encounter one another in different ways in different parts of the building.

In the first part closer to the building entrances, different users interact horizontally. (Fig. 42)

In the playscape, users are all mixed together. (Fig. 43)

In the last part of the terminal area and hangar, users have visual connections with one another as the flows intersect vertically. (Fig. 44)

Last but not least, the building could be simultaneously used by all users throughout the year. (Fig. 45)

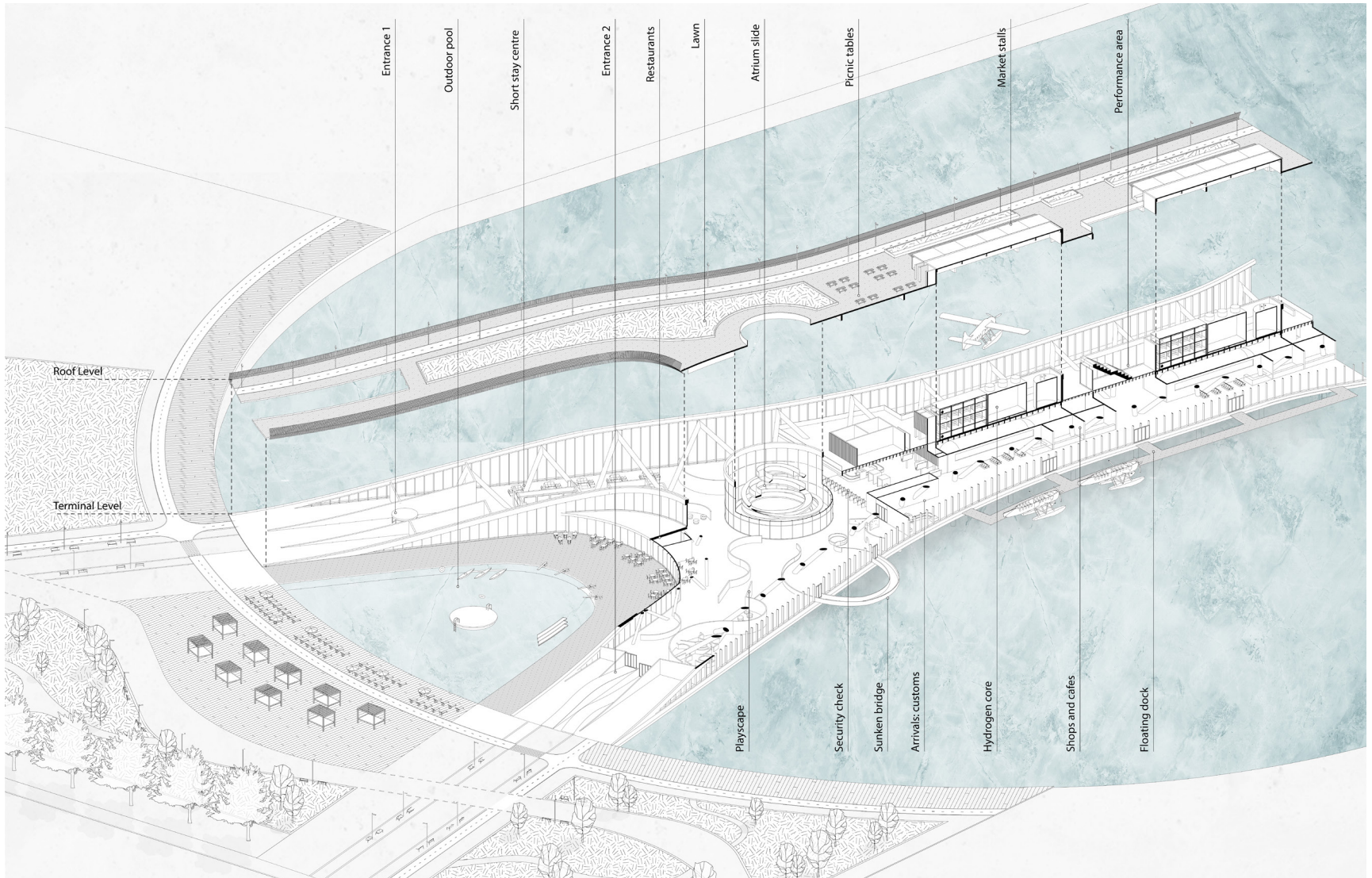


Fig. 41 Key drawing.

04.2.1 Intersection 1: Horizontal

In the first part of the building, two types of main users would enter the building from two separate entrances. In the middle, and outdoor pool would be designed for water activities in summer time and ice skating in winter time.

In this image, horizontal interaction of different users could be demonstrated. In the foreground, public visitors would be having fun with water activities. Meanwhile, passengers would be travelling through the building to get necessary boarding procedures done.





Berlin Water Airport

Fig. 42 Visualisation: horizontal encounters of users.

04.2.2 Intersection 2: Mixed

Arriving rural patients, departing urban escapers and the public visitors would be mixed in the playscape, located at the middle of this building. The playscape consists of different playful elements such as sitting installations, climbing walls and even trampolines.

The atrium, spiral ramp and slide would occupy the centre of the playscape which serves as public vertical circulation. It would also guide users to their destinations in the middle of the playscape.

Behind the atrium, passages for departing and arriving passengers would be found. Therefore, the playscape would also be where greetings take place.

Last but not least, the mezzanine level is also visible in the background of this image. This would be the office spaces for staff members.





Arrivals 2

Fig. 43 Visualisation: mixed circulations of users.

04.2.3 Intersection 3: Vertical

Moving to the gate areas of the terminal, passengers and the public would encounter one another in a vertical manner.

On the ground level, secondary security checks and information screens could be found. Rural patients and urban escapers are moving in the foreground of this image.

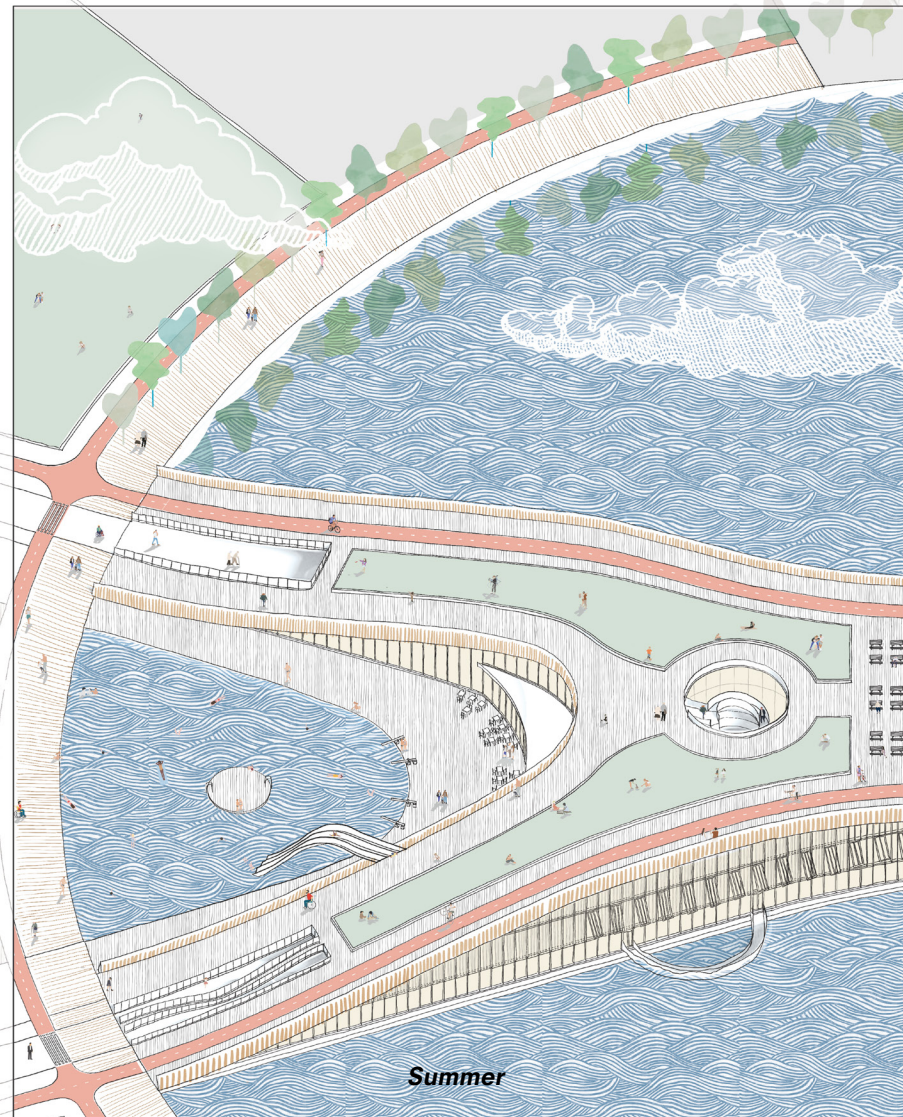
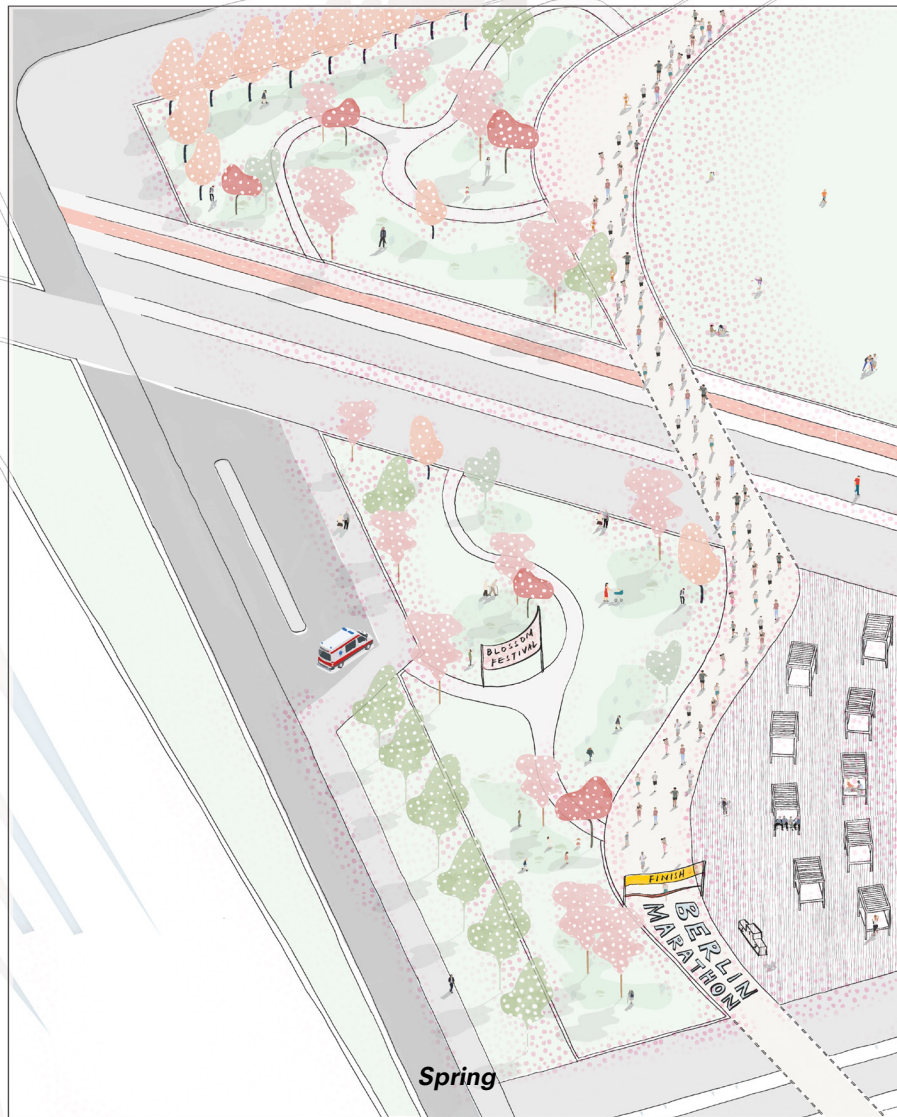
In the meantime, behind the passengers, an atrium could be found, in which public visitors would be enjoying the bungee trampoline, jumping off from the roof level to the trampoline on the ground level.

It is hoped that the passengers could also feel the joyful moments brought by play.





Fig. 44 Visualisation: vertical encounters of users.



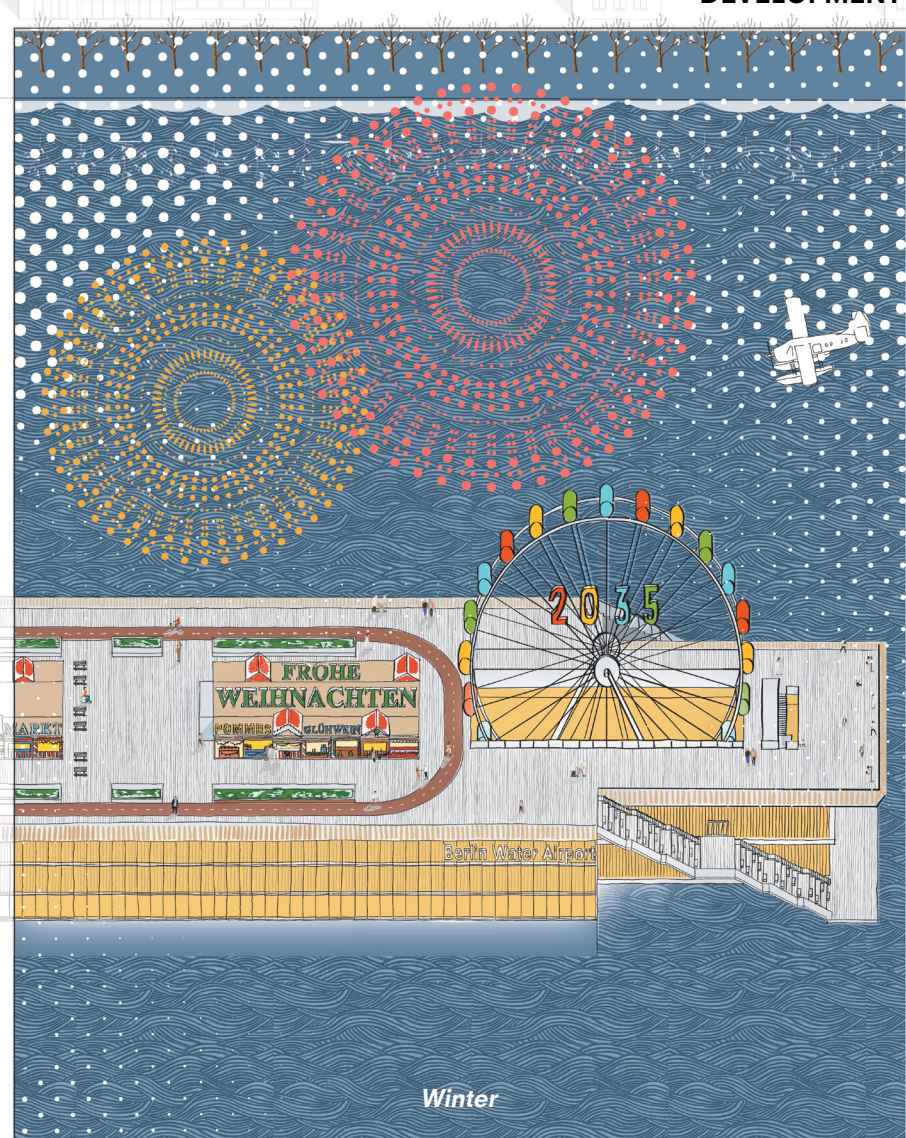
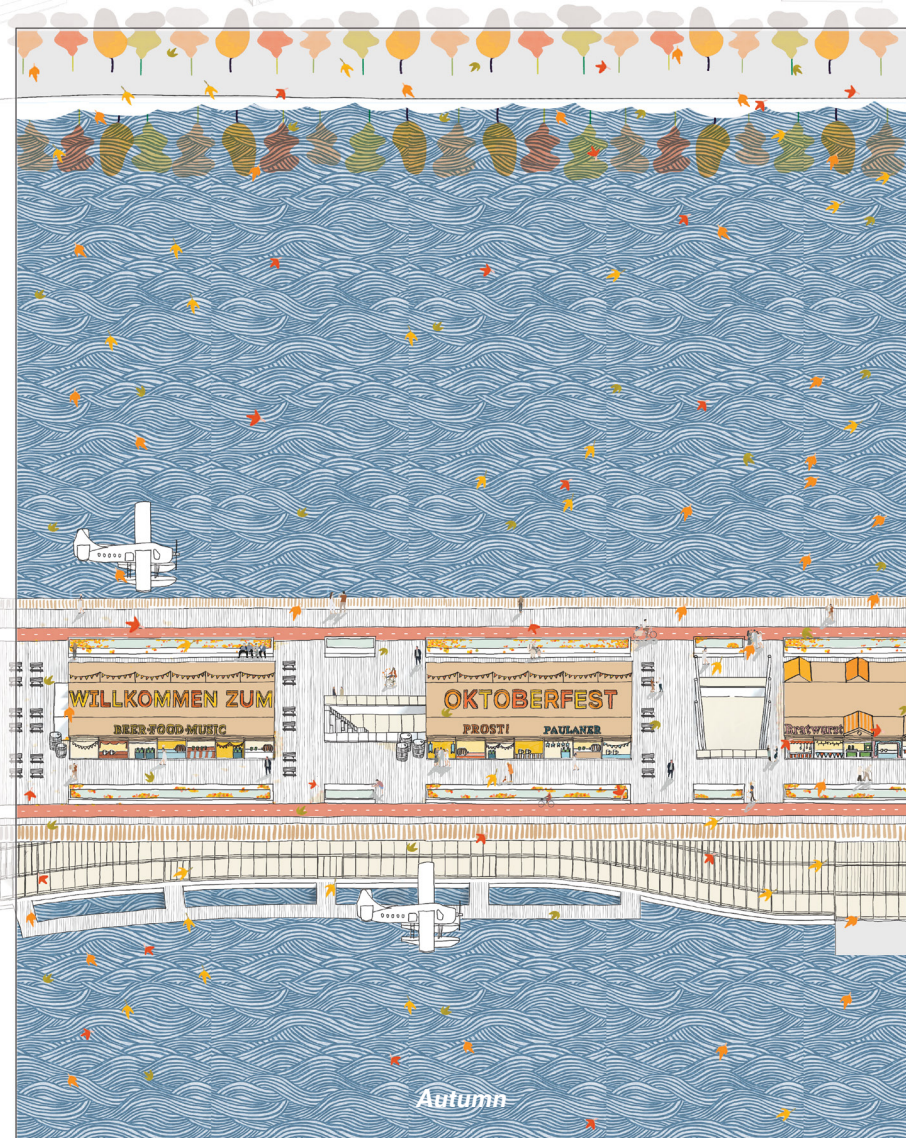


Fig. 45 Visualisation: activities throughout 4 seasons.

04.3 Building Technology

The material choice of this project would be a mix of wood and concrete. (Fig. 46)

This building fragment consists of a concrete core in the middle. The ground floor would be supported by concrete columns and raised above water level. Natural tree trunk columns would be supporting the public roof level.

Below the roof, the mezzanine office floor would be suspended from above. A glass facade would continue throughout the whole building. (Fig. 47-53)

Lastly, climate strategies were considered: facade louvres with different densities across building, night cooling and heat exchange. (Fig. 54-55)

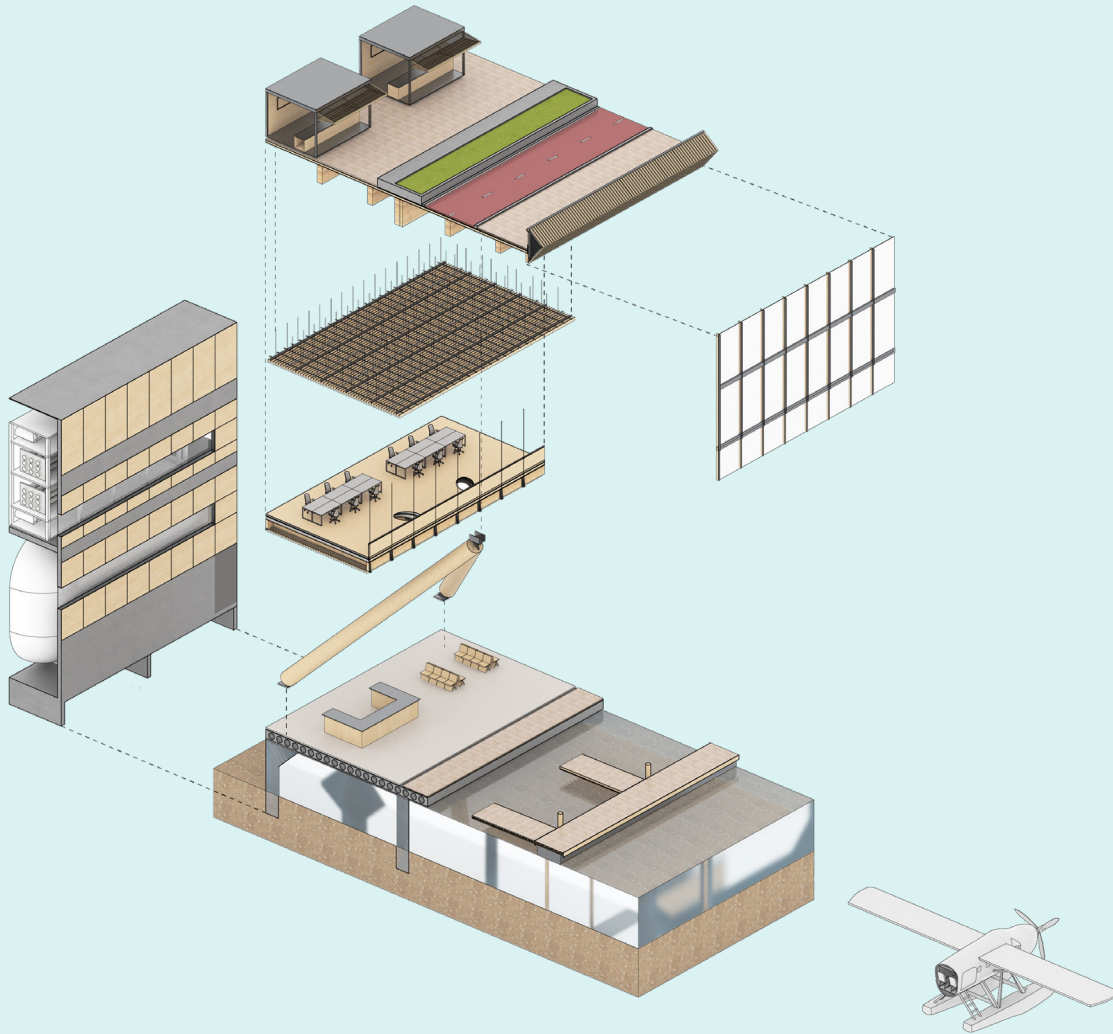


Fig. 46 Building composition diagram.

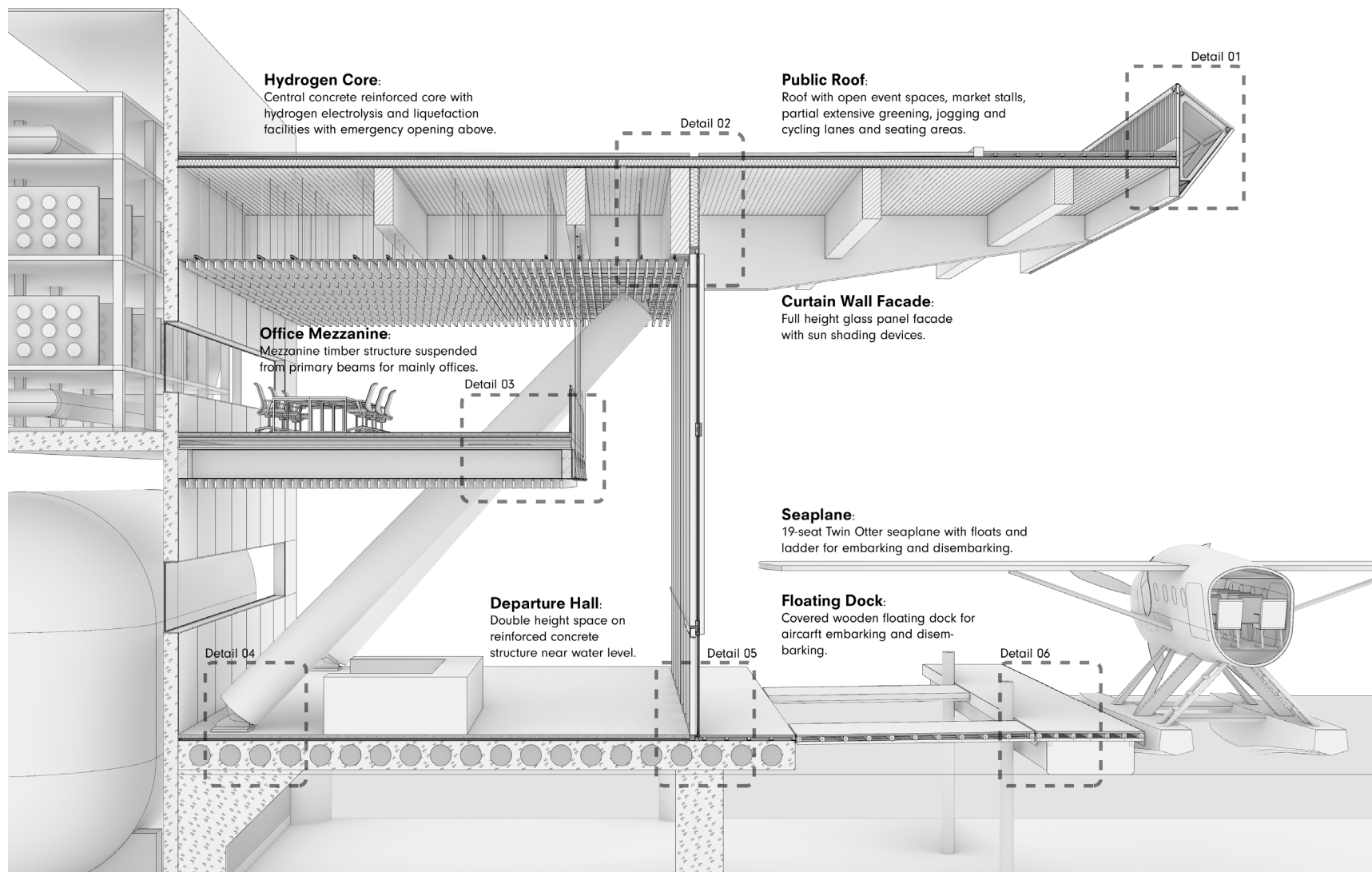
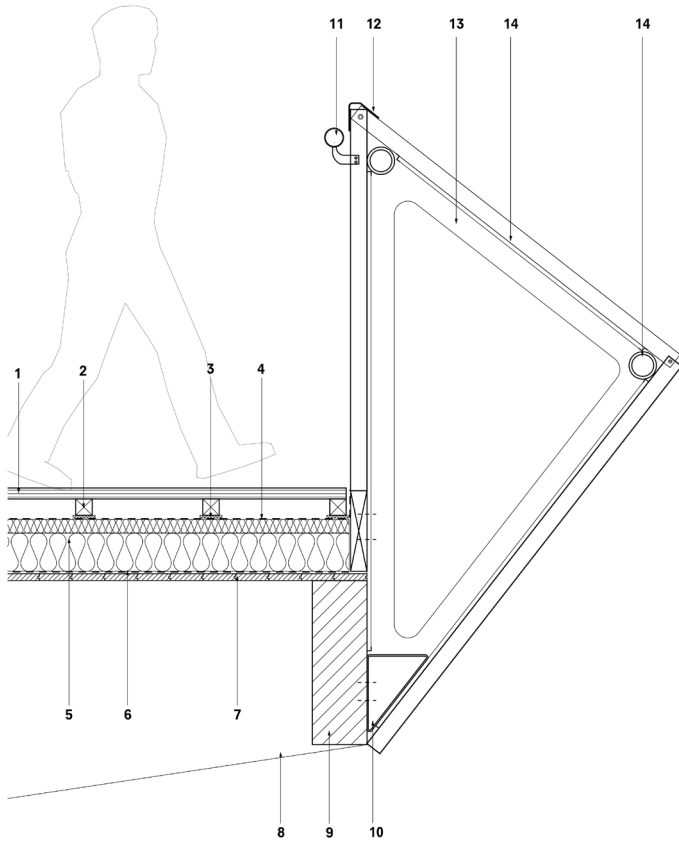


Fig. 47 Facade fragment.

Detail 01 - Vertical Section
Scale 1:10 on A3

- 1 70/40mm treated timber planks
- 2 60/60mm treated timber substructure
- 3 20mm rubber pad
- 4 6mm elastomeric bitumen layer



- 5 50+140mm mineral wool thermal insulation
- 6 15mm 2-ply polymer bitumen sealant layer
- 7 25mm spruce siding
- 8 40/60-1800mm spruce beam

- 9 200/600mm spruce joists
- 10 Extruded triangular main steel structure
- 11 Smooth extruded aluminium handrail
- 12 Extruded 3mm aluminium capping

- 13 Extruded main steel structure
- 14 Steel diaphragms
- 15 100/100 Technowood AluProfile in ash coating

1:10 on A3

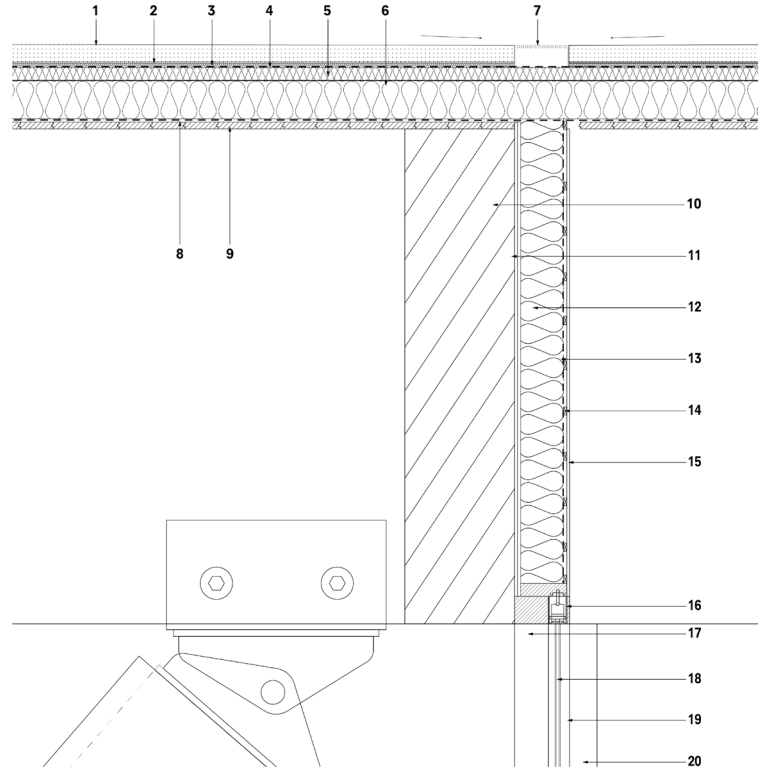
Fig. 48 Detail 01.

Detail 02 - Vertical Section
Scale 1:10 on A3

- 1 80mm extensive roof greening + substrate
- 2 1.1mm filter fleece
- 3 40mm drainage layer
- 4 6mm elastomeric bitumen layer

- 5 50mm mineral wool thermal insulation
- 6 140mm mineral wool thermal insulation
- 7 10mm drainage
- 8 15mm 2-ply polymer bitumen sealant layer

- 9 25mm spruce siding
- 10 400/800mm spruce beam
- 11 Interior wood finish
- 12 140mm mineral wool thermal insulation



- 13 15mm 2-ply polymer bitumen sealant layer
- 14 25/75mm wood furring strips
- 15 Exterior wood finish
- 16 Steel frame with silicone sealant

- 17 60/150mm cross laminated timber
- 18 Insulated glazing: toughened safety glass 6mm + internal gap 16mm + toughened safety glass 4mm

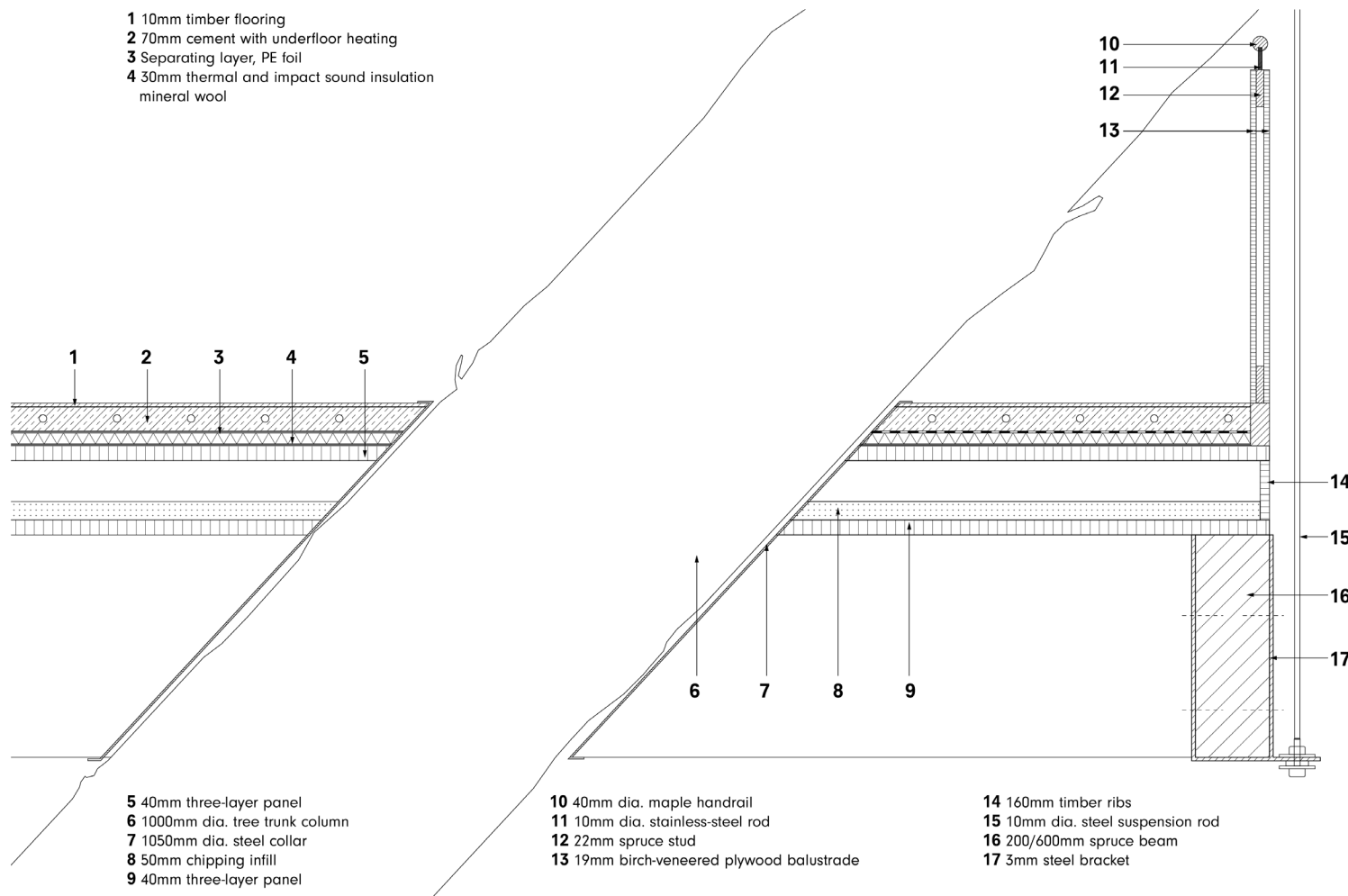
- 19 3mm profiled aluminium capping
- 20 Sun shading: 50/100 Technowood AluProfile in mahogany coating

1:10 on A3

Fig. 49 Detail 02.

Detail 03 - Vertical Section
Scale 1:10 on A3

- 1 10mm timber flooring
- 2 70mm cement with underfloor heating
- 3 Separating layer, PE foil
- 4 30mm thermal and impact sound insulation mineral wool



- 5 40mm three-layer panel
- 6 1000mm dia. tree trunk column
- 7 1050mm dia. steel collar
- 8 50mm chipping infill
- 9 40mm three-layer panel

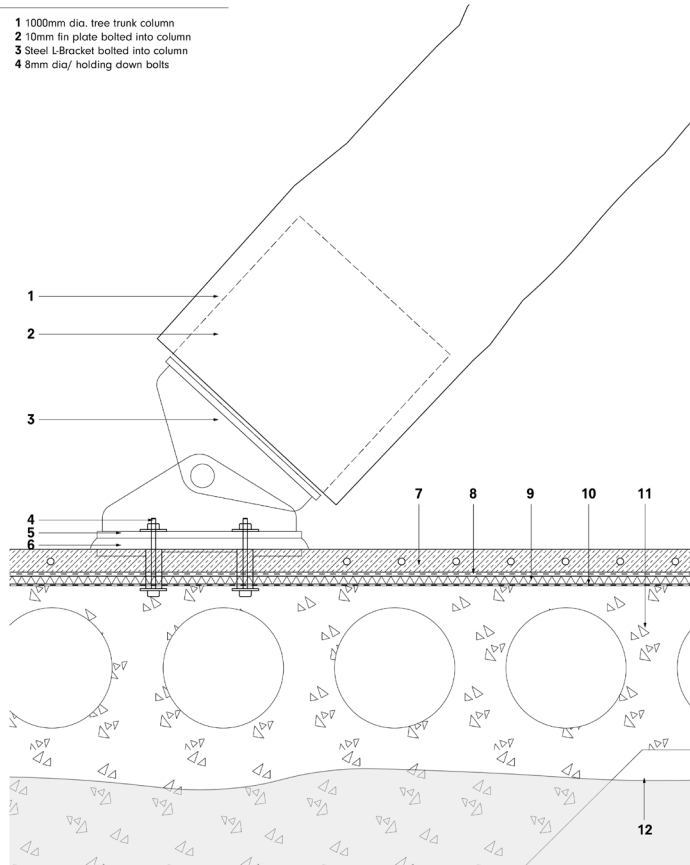
- 10 40mm dia. maple handrail
- 11 10mm dia. stainless-steel rod
- 12 22mm spruce stud
- 13 19mm birch-veneered plywood balustrade

- 14 160mm timber ribs
- 15 10mm dia. steel suspension rod
- 16 200/600mm spruce beam
- 17 3mm steel bracket

Fig. 50 Detail 03.

Detail 04 - Vertical Section
Scale 1:10 on A3

- 1 1000mm dia. tree trunk column
- 2 10mm fin plate bolted into column
- 3 Steel L-Bracket bolted into column
- 4 8mm dia/ holding down bolts



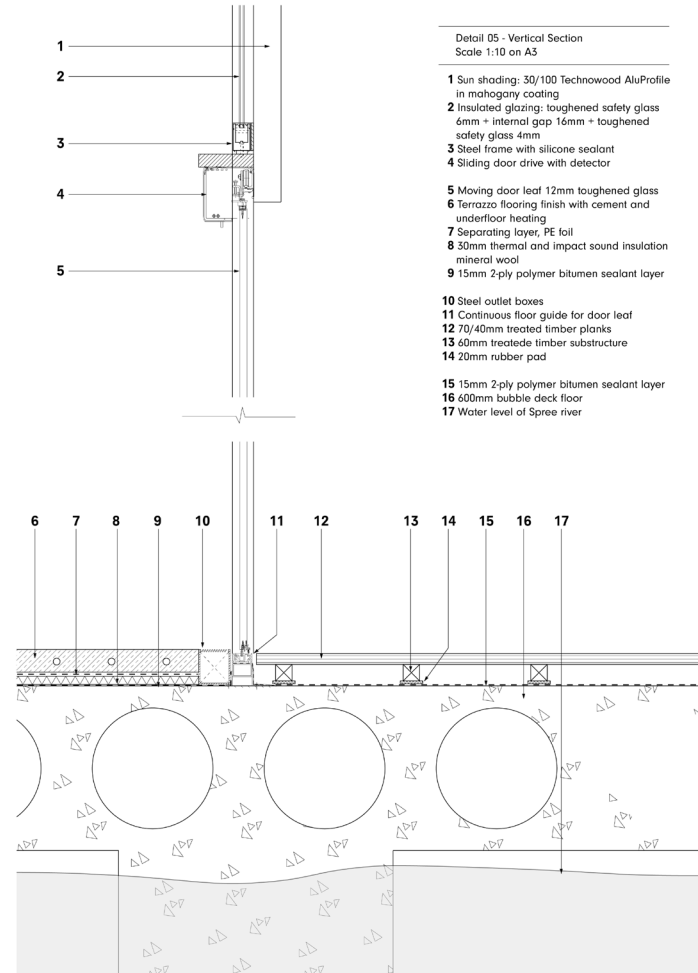
- 5 15mm base plate
- 6 50mm bedding space
- 7 Terrazzo flooring finish with cement and underfloor heating
- 8 Separating layer, PE foil
- 9 30mm thermal and impact sound insulation mineral wool
- 10 15mm 2-ply polymer bitumen sealant layer
- 11 600mm bubble deck floor
- 12 Water level of Spree river

1:10 on A3

Fig. 51 Detail 04.

Detail 05 - Vertical Section
Scale 1:10 on A3

- 1 Sun shading: 30/100 Technowood AluProfile in mahogany coating
- 2 Insulated glazing: toughened safety glass 6mm + internal gap 16mm + toughened safety glass 4mm
- 3 Steel frame with silicone sealant
- 4 Sliding door drive with detector
- 5 Moving door leaf 12mm toughened glass
- 6 Terrazzo flooring finish with cement and underfloor heating
- 7 Separating layer, PE foil
- 8 30mm thermal and impact sound insulation mineral wool
- 9 15mm 2-ply polymer bitumen sealant layer
- 10 Steel outlet boxes
- 11 Continuous floor guide for door leaf
- 12 70/40mm treated timber planks
- 13 60mm treated timber substructure
- 14 20mm rubber pad
- 15 15mm 2-ply polymer bitumen sealant layer
- 16 600mm bubble deck floor
- 17 Water level of Spree river



1:10 on A3

Fig. 52 Detail 05.

Detail 06 - Vertical Section
 Scale 1:10 on A3

- 1 300mm dia. galvanised stainless steel pipes drilled to riverbed
- 2 3mm aluminium hinge
- 3 70/40mm treated timber planks
- 4 60mm treated timber substructure

- 5 Cross members of timber substructure
- 6 High-density polypropylene foam-filled float
- 7 Short take off and landing 19-seat seaplane
Twin Otter Series 400
- 8 Water level of Spree river

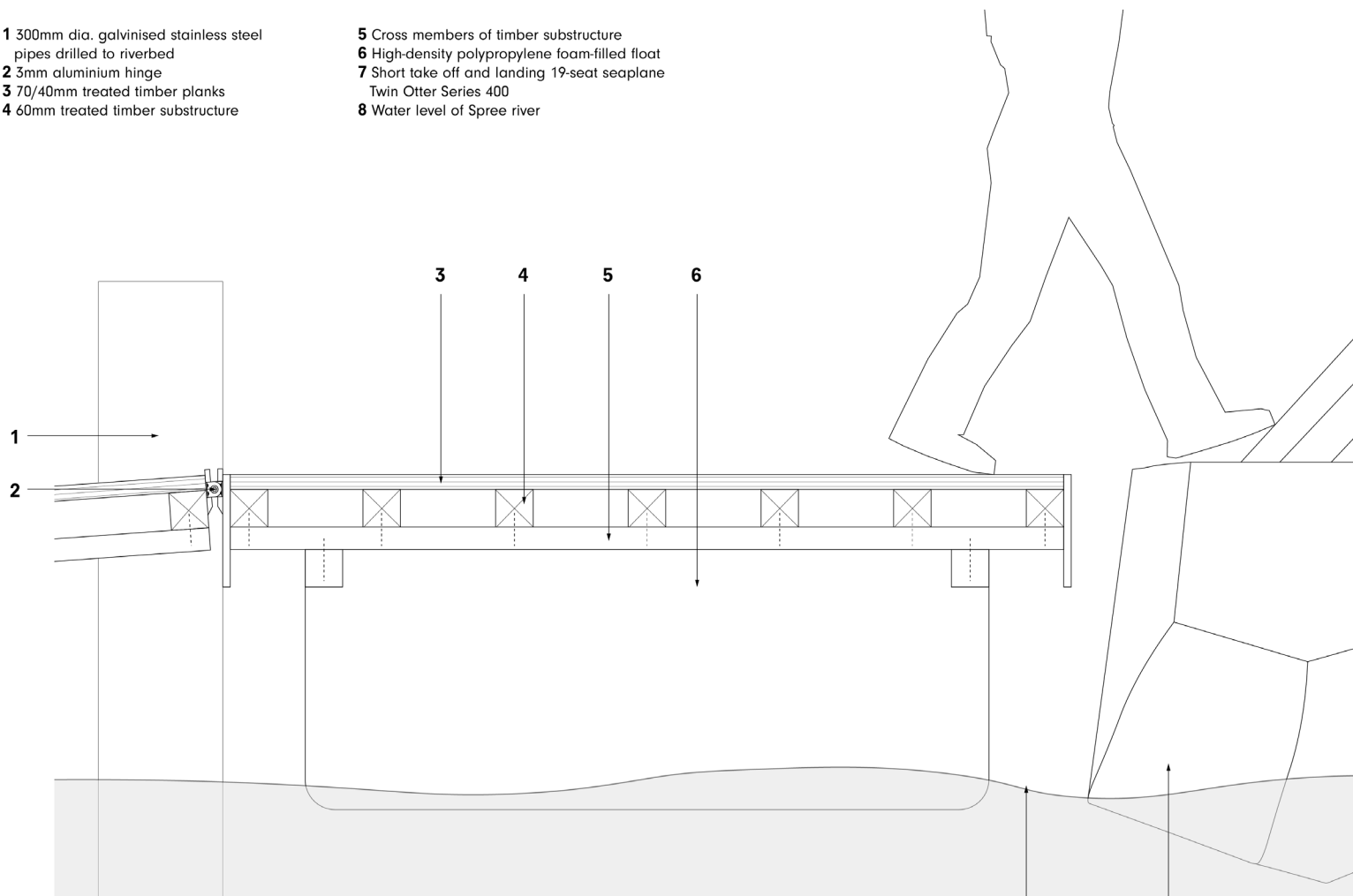


Fig. 53 Detail 06.

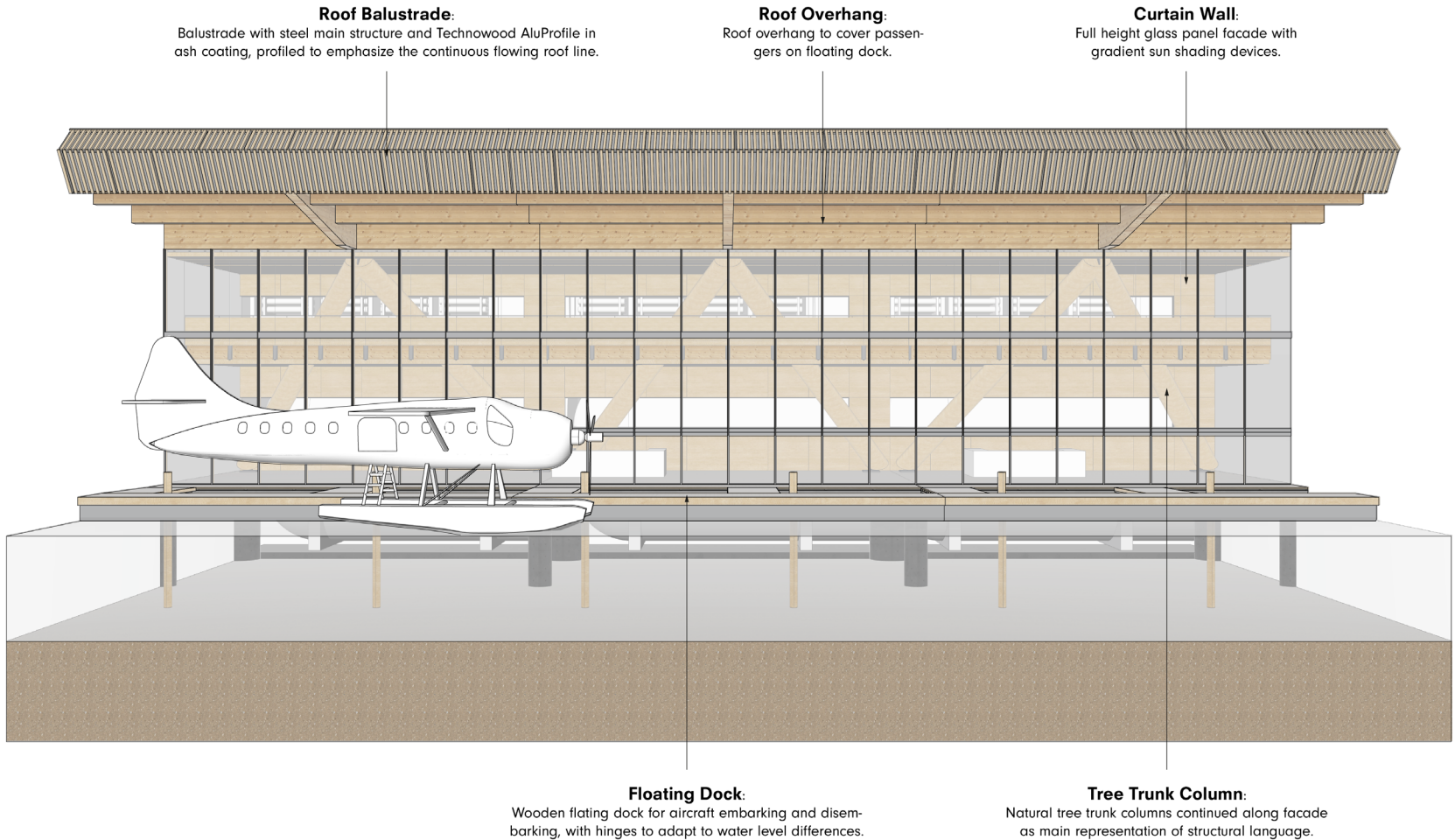
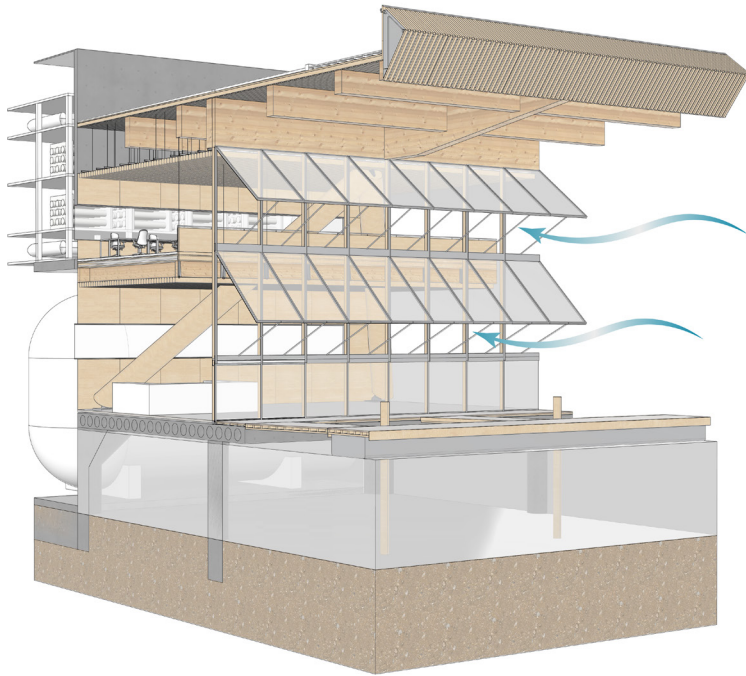
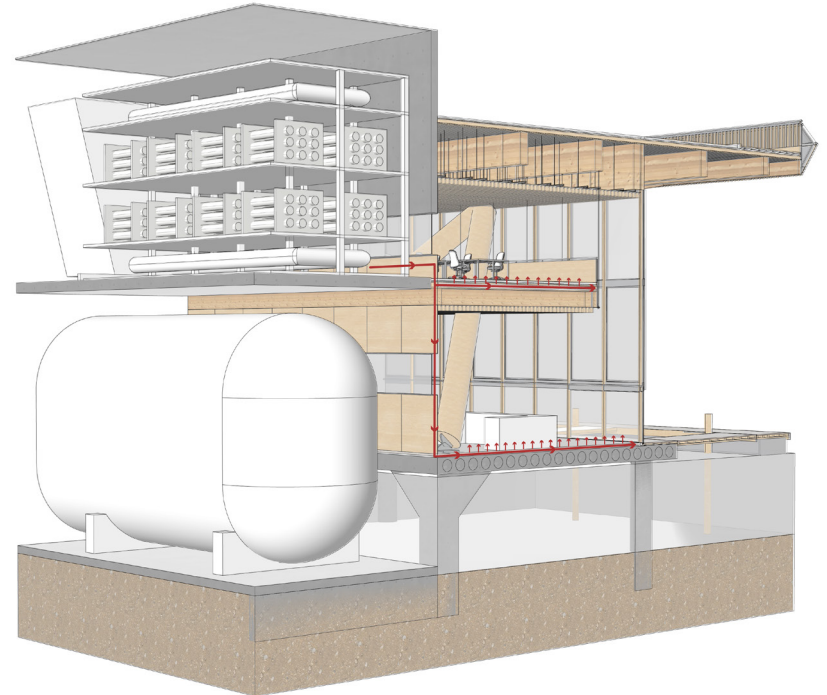


Fig. 54 Facade components.



Night cooling

Operable windows allowing natural ventilation from river.



Heat exchange

Heat released from exothermic hydrogen liquefaction directed to underfloor heating system.

Fig. 55 Climate strategies.

BIBLIOGRAPHY

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