

Architecture in the Posthuman Threshold

A Prototype for Carbon Positivity

AIM705 : Master Thesis Project

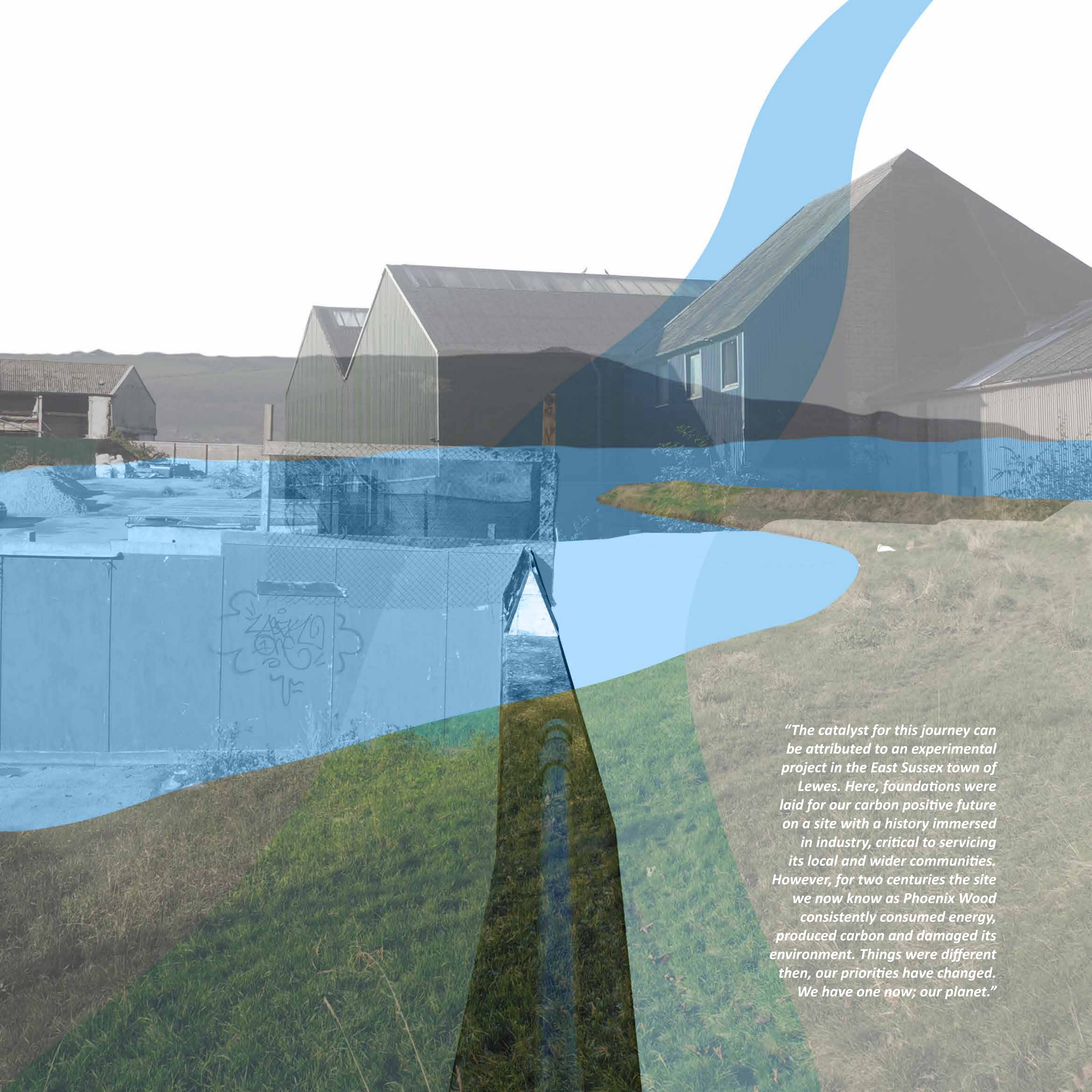
Jack Elliott : Studio 4

31.05.2122

- article by @postArchitect

“Nowadays, we Architects are bound to designing buildings that positively effect our environment. We are bound by legislation enforcing carbon positivity. We are bound by our desire for a continued human existence. And we are bound by the journey we have taken in the last 100 years.”

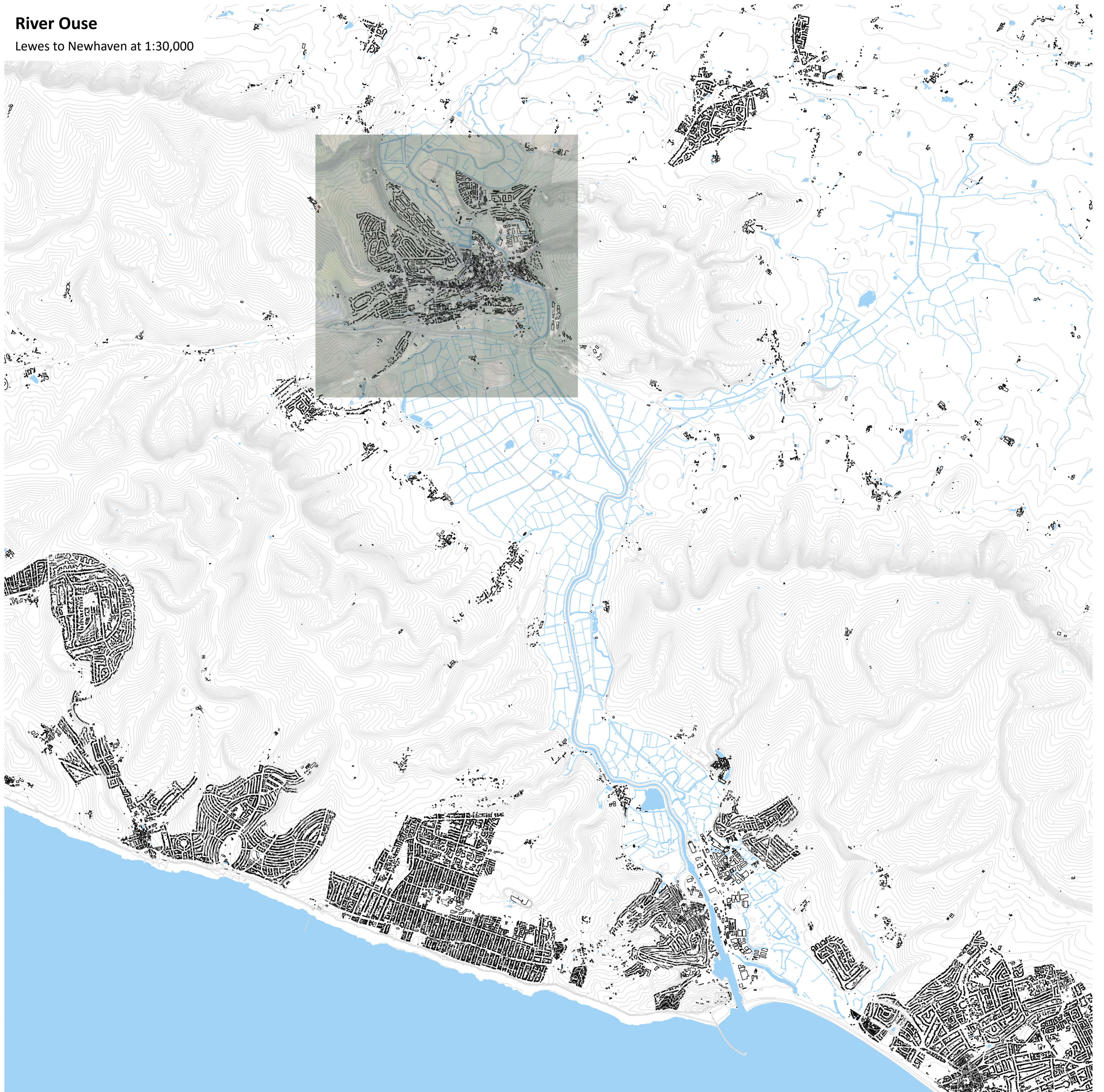
**@postArchitect is a fictional character.*



“The catalyst for this journey can be attributed to an experimental project in the East Sussex town of Lewes. Here, foundations were laid for our carbon positive future on a site with a history immersed in industry, critical to servicing its local and wider communities. However, for two centuries the site we now know as Phoenix Wood consistently consumed energy, produced carbon and damaged its environment. Things were different then, our priorities have changed. We have one now; our planet.”

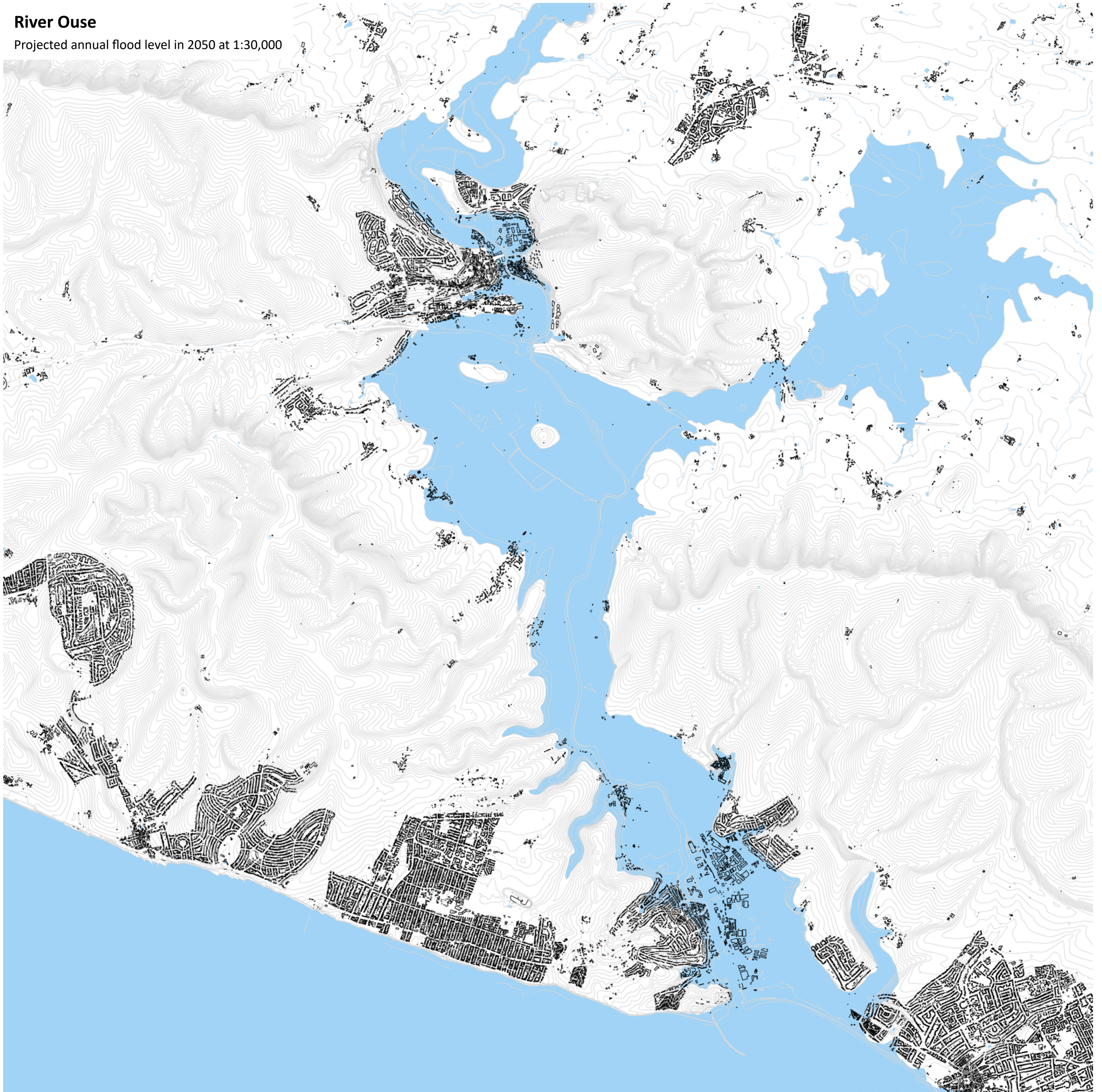
River Ouse

Lewes to Newhaven at 1:30,000



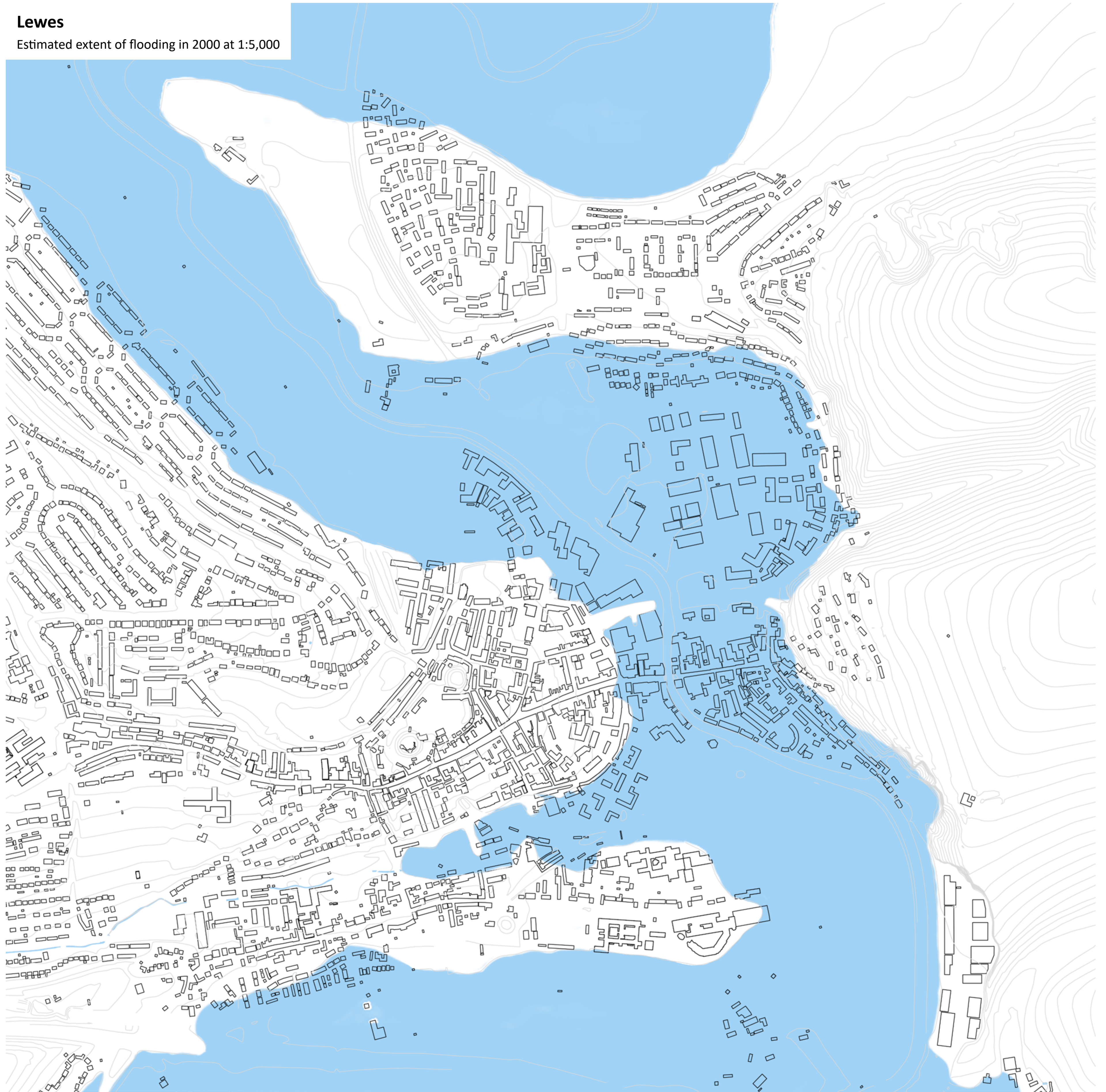
River Ouse

Projected annual flood level in 2050 at 1:30,000



Lewes

Estimated extent of flooding in 2000 at 1:5,000

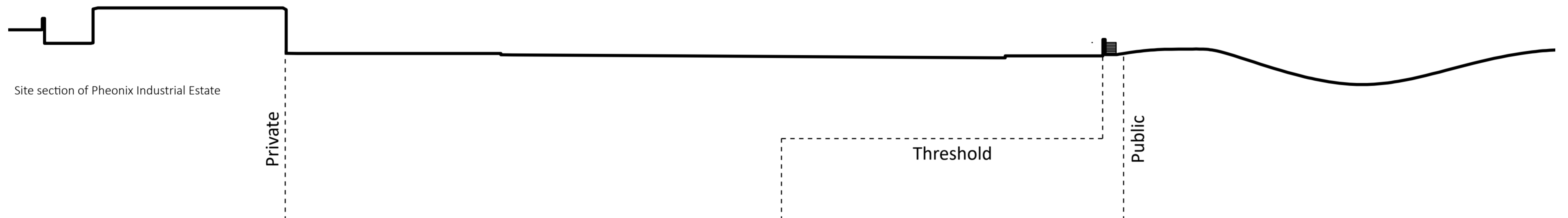


Pheonix Industrial Site

Investigating the threshold



Sectional site model of Lewes



Site section of Pheonix Industrial Estate



Workshed door ajar revealing private working space inside



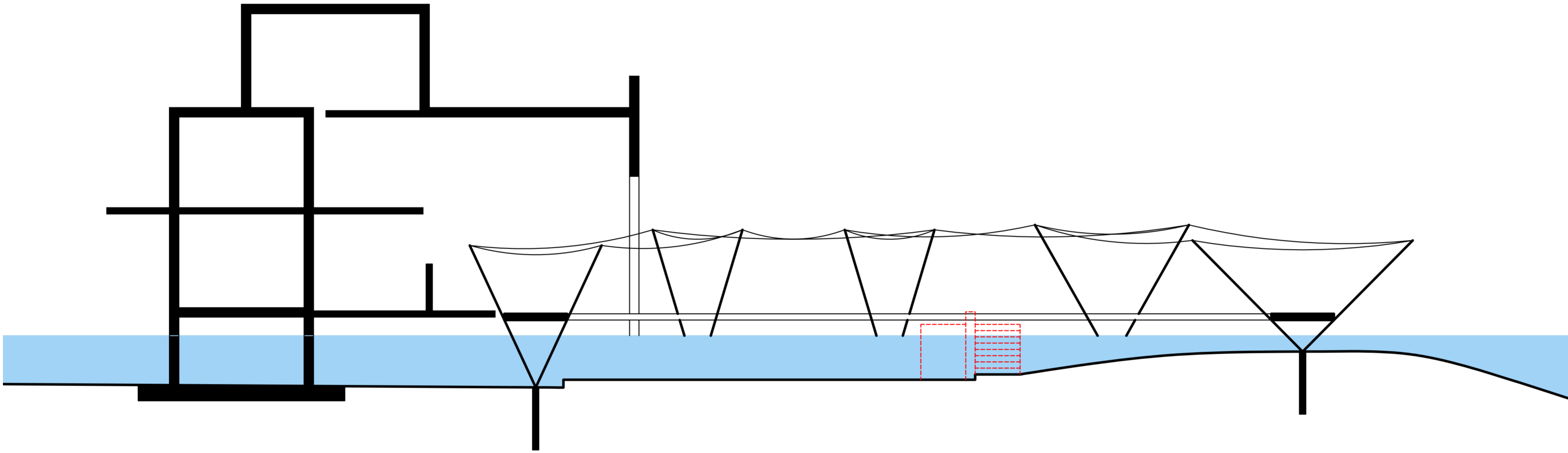
Flood defense wall providing a threshold between the site and nature



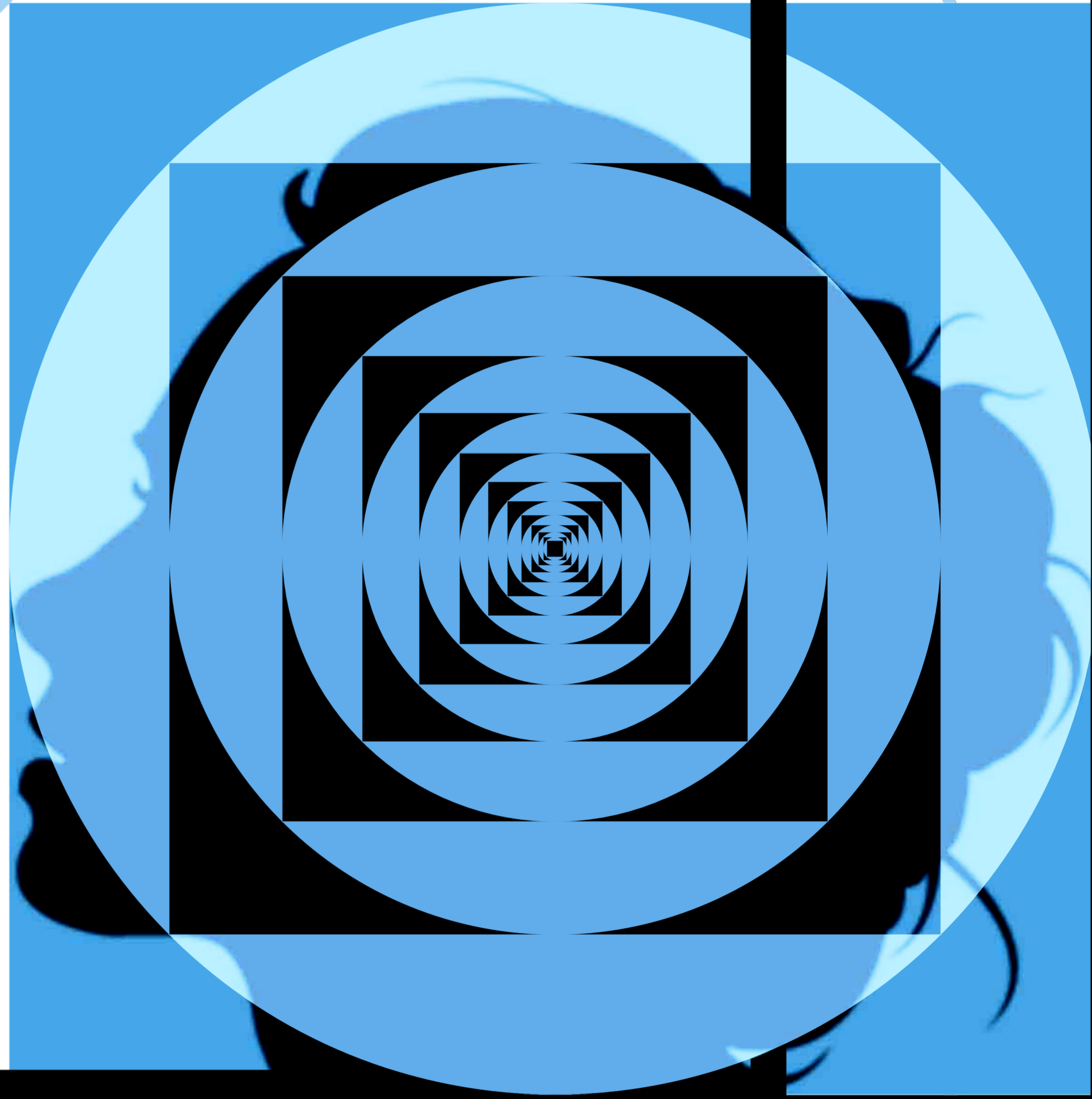
Flood defenses appear large to human scale but not to nature

Threshold Proposition

Phoenix Industrial Estate partial site section at 1:100



"Today, the site is 40 years into its reclamation by nature following the European Ash Research and Development Institute's planned closure. A concept we are now familiar in architecture with but that was innovative of its time. Today, we understand why legislation is in place restricting the sourcing radius for construction materials. No longer do we demand speed and economic value, rather we are patient with lengthy building programmes focused on protecting and enhancing our precious environment."



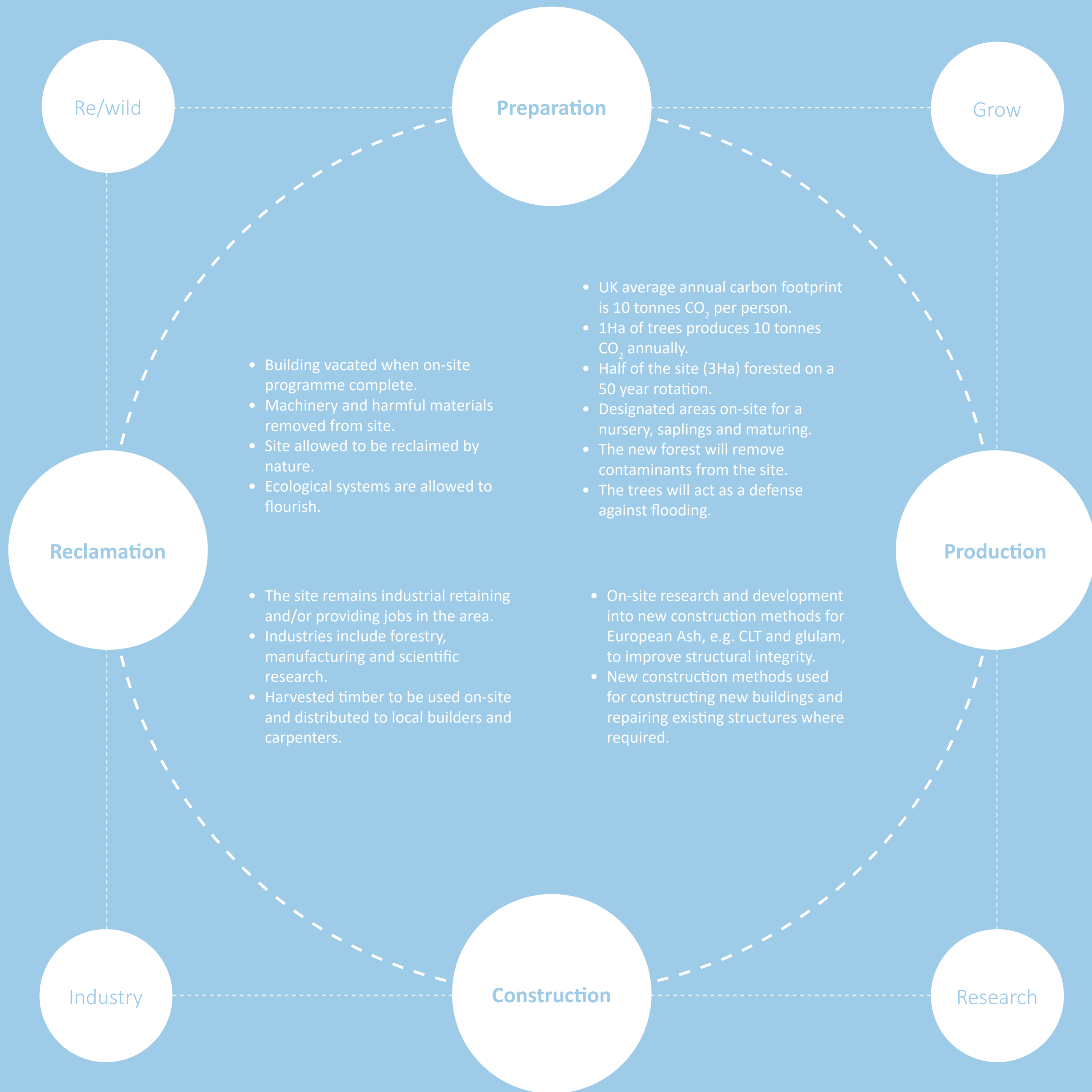
Posthumanism

By design



Architecture in the Posthuman Threshold

A prototype for carbon positivity

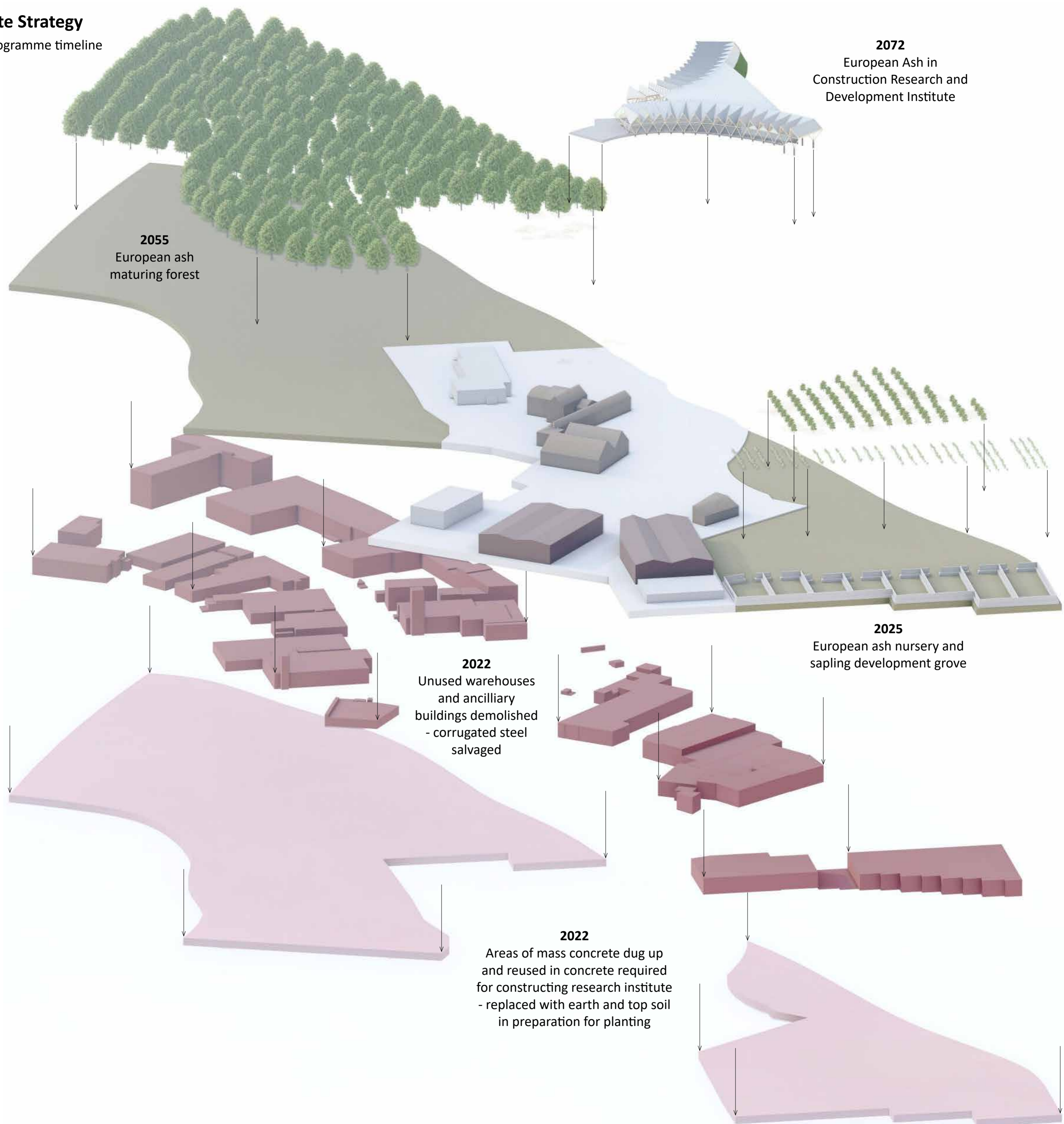


“On this day 100 years ago, a drastic transformation began on the Phoenix Industrial Estate, as it was known then. Initially, with declining industry, disused and underused warehouses, factories and ancillary structures were demolished with reusable materials salvaged. Then, much of the mass concrete ground, which had been holding and slowly leeching harmful contaminants into the River Ouse, was excavated, broken down and stored to be recycled on-site.”



Site Strategy

Programme timeline



Material Strategy

European Ash

The research institute will be focussed on developing construction methods for European Ash. European Ash is a native species to Britain and is relatively fast-growing with trees fully maturing within 50-60 years. Its root system is suitable in flood risk areas and can survive being submerged in water for periods of time.

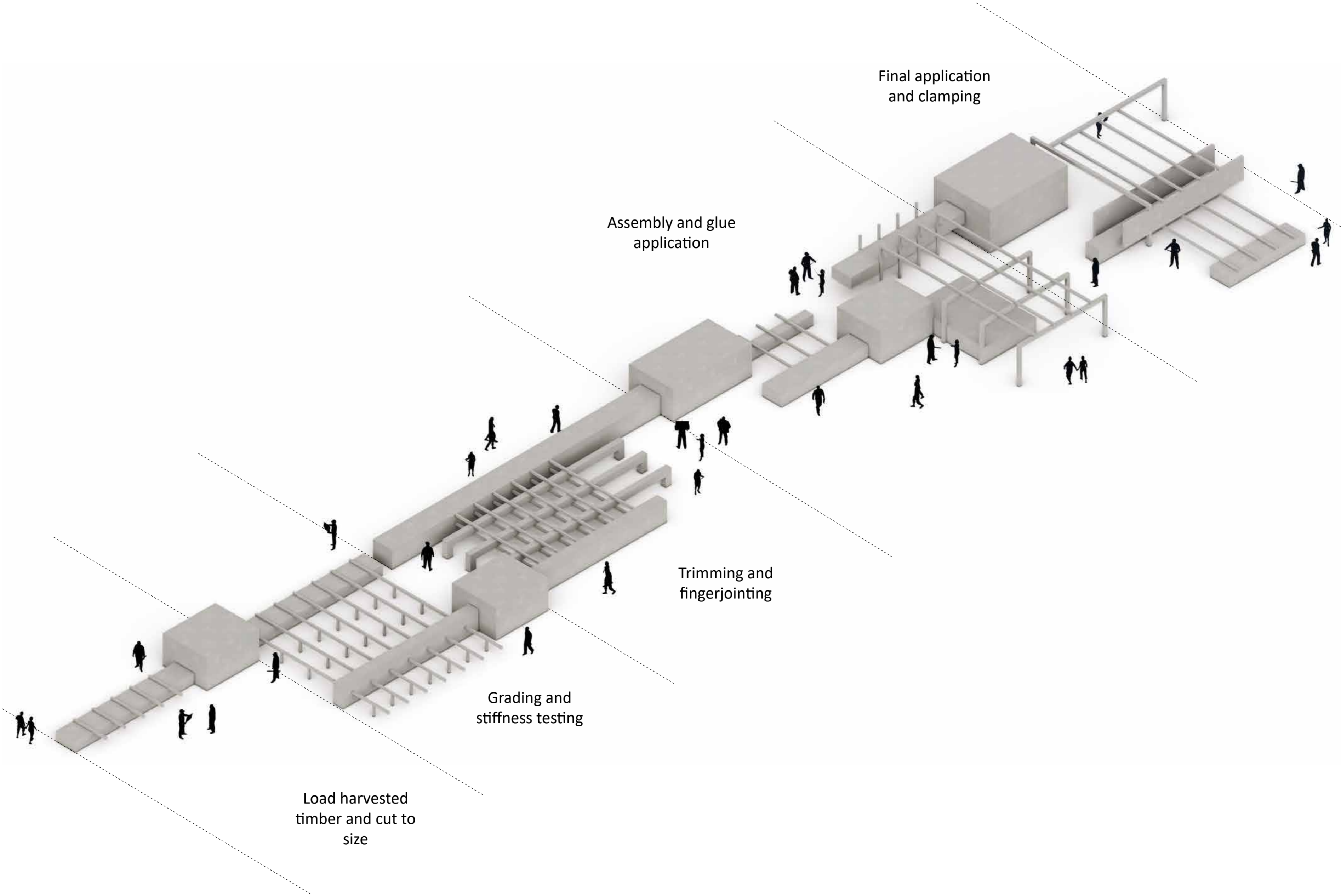
However, currently Ash is typically only used for manufacturing furniture and other joinery items. It doesn't have the required strength to be used for structural purposes. The goal of this research institute is to develop Cross Laminated Timbers made from Ash that can be used this way in construction. This would allow even more timber to be sourced within Britain and used locally as a building material.

The concept for the site would be that it could be possible to grow European Ash, develop construction methods for it, and then build the institute with it.



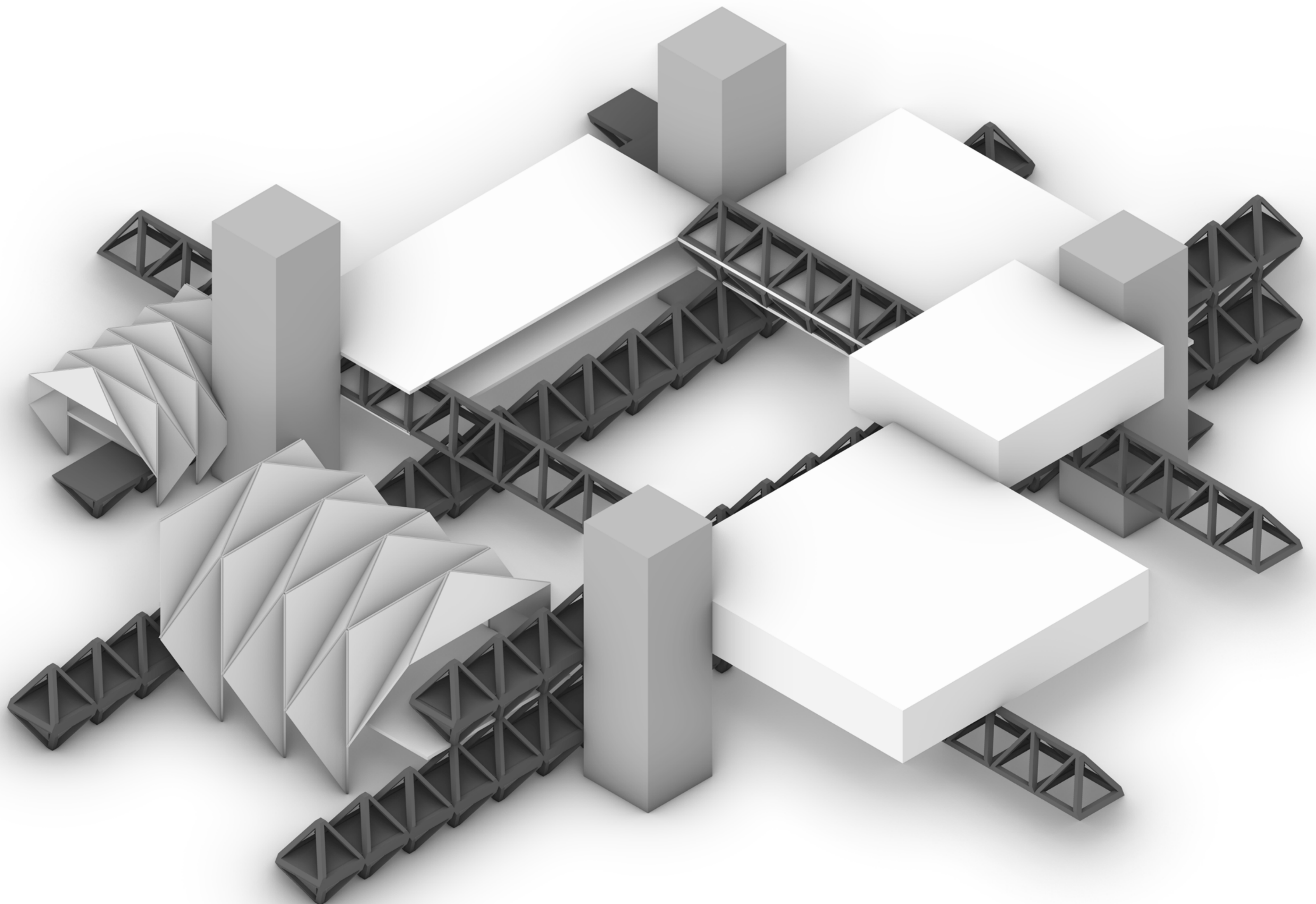
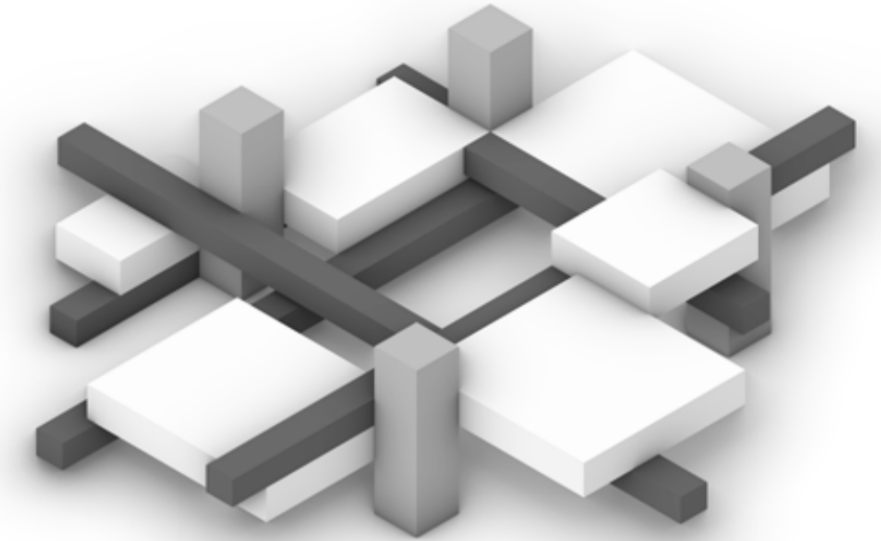
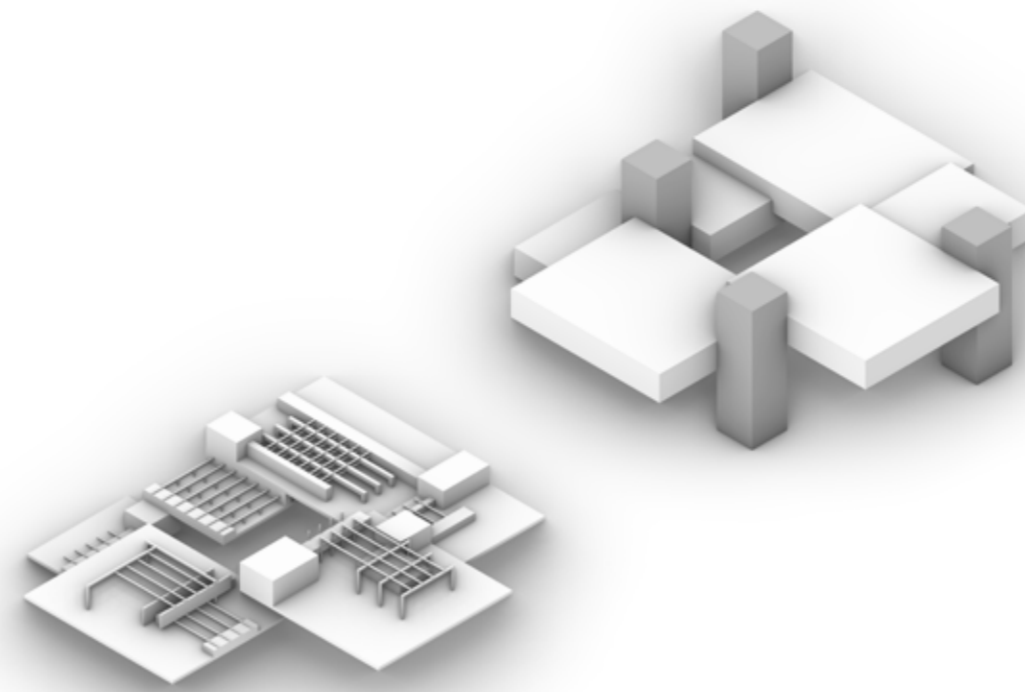
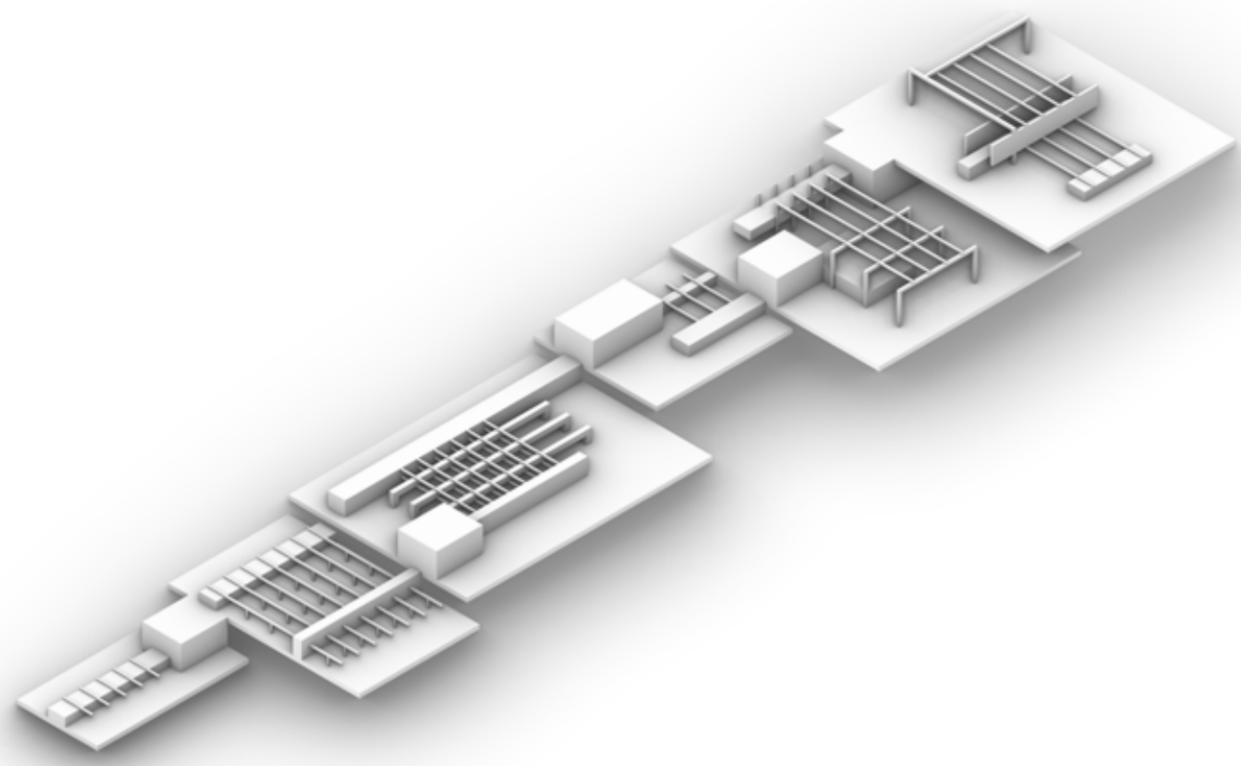
Manufacturing

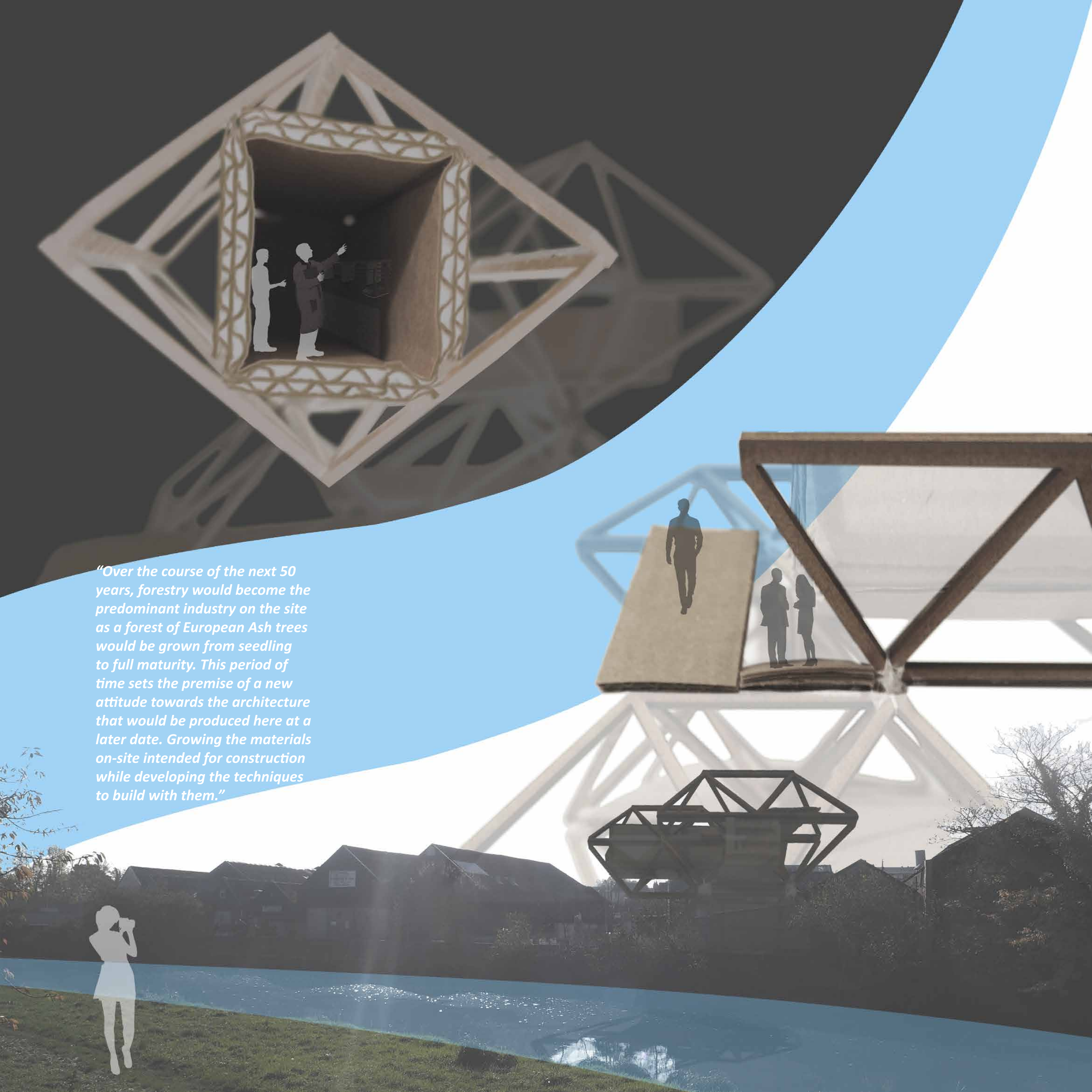
CLT line



Manufacturing

Manipulating the process?

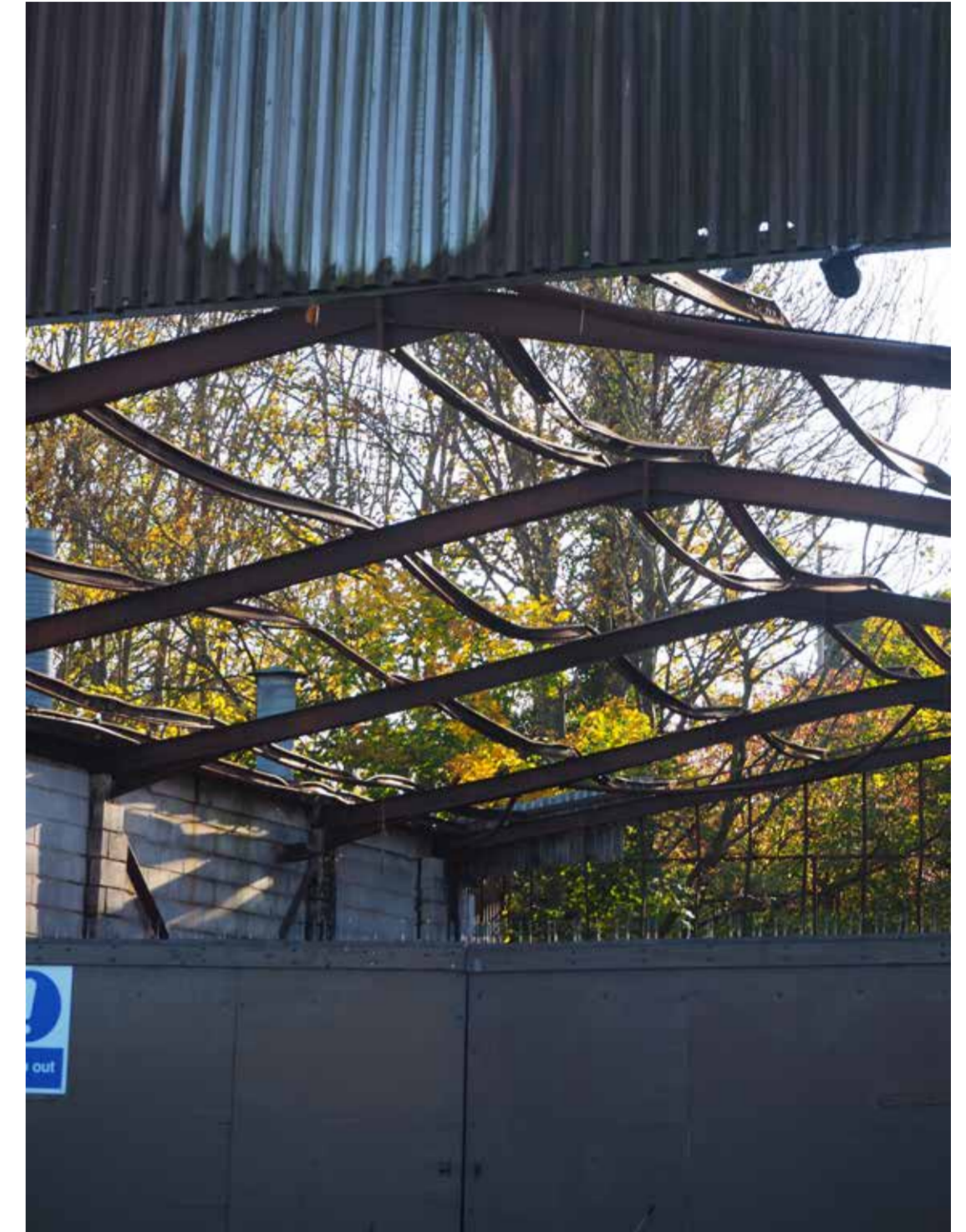
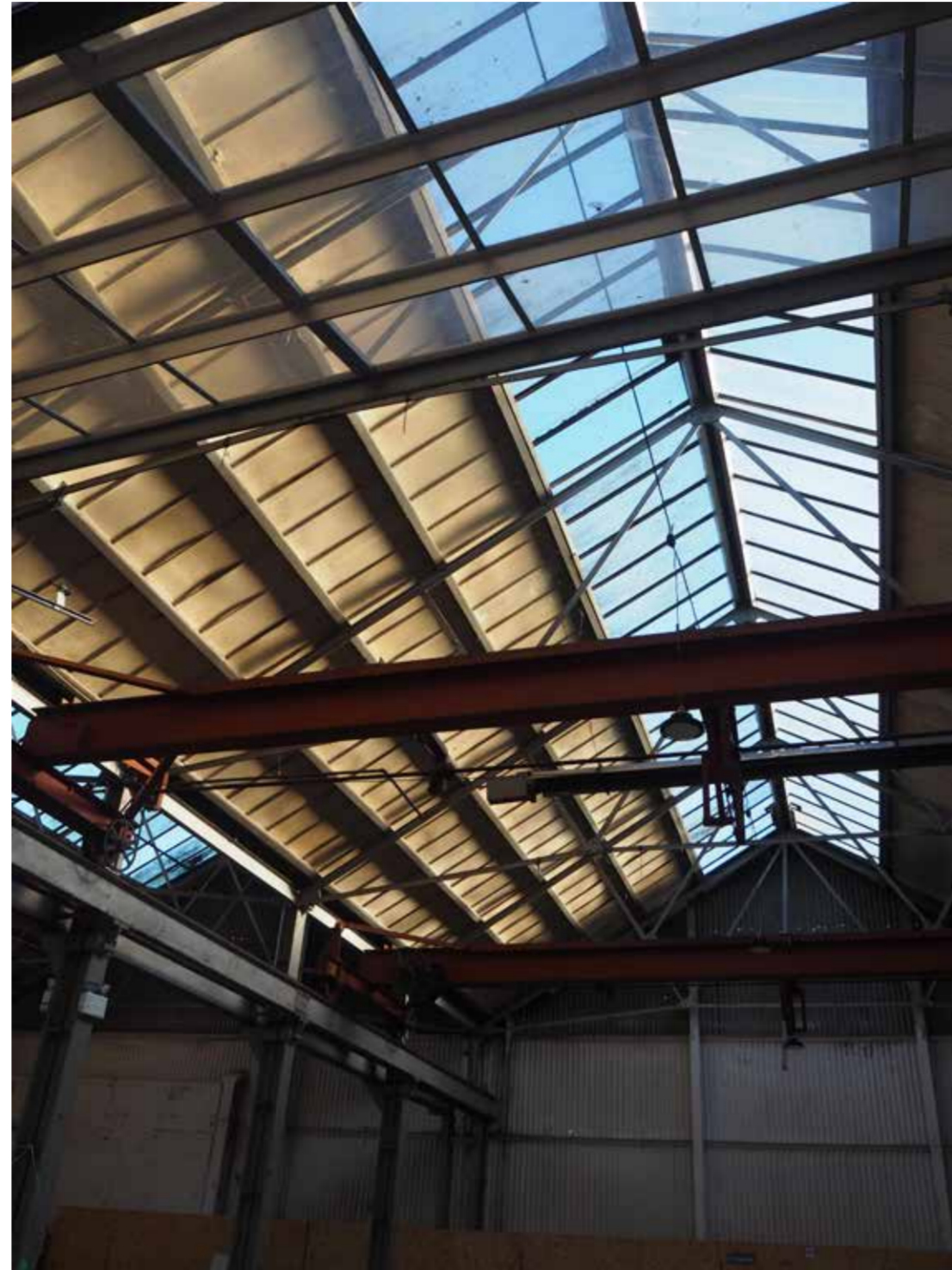




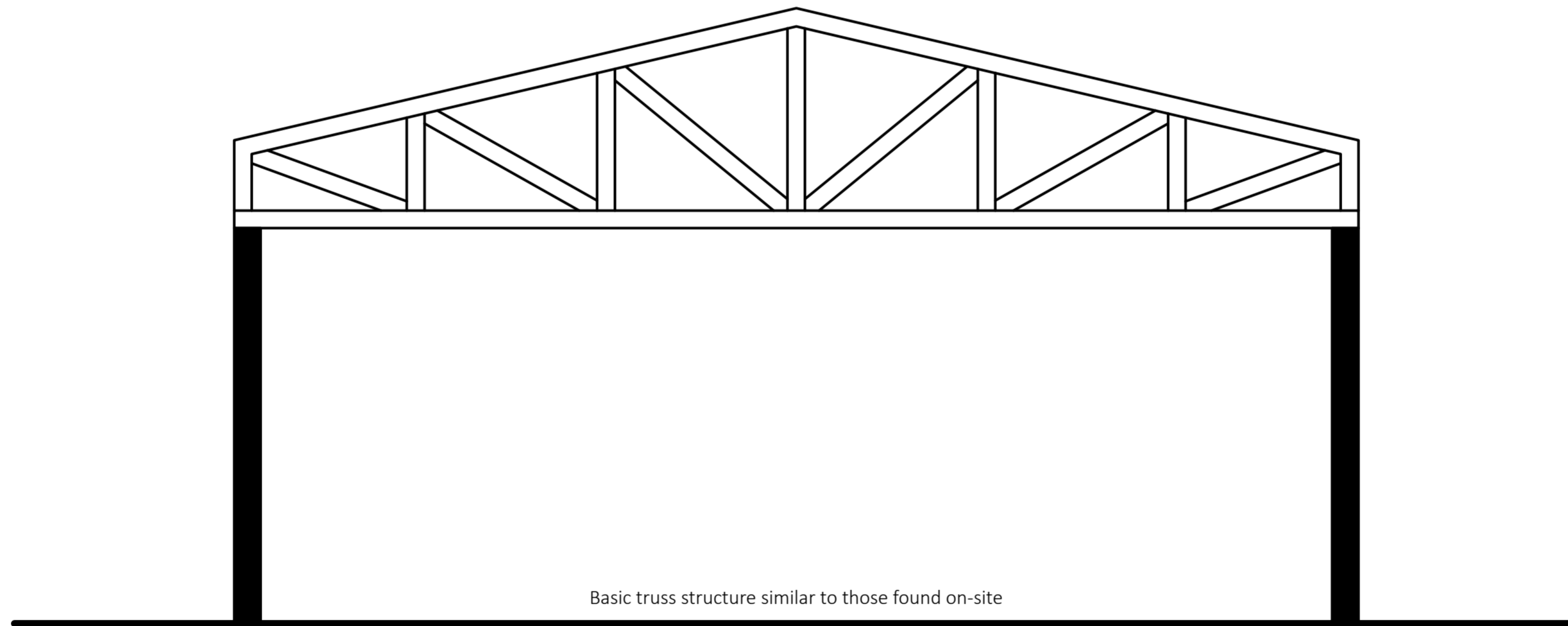
“Over the course of the next 50 years, forestry would become the predominant industry on the site as a forest of European Ash trees would be grown from seedling to full maturity. This period of time sets the premise of a new attitude towards the architecture that would be produced here at a later date. Growing the materials on-site intended for construction while developing the techniques to build with them.”

Structural Precedents

Steel frame warehouse buildings with trusses



Workshed structures on-site



Basic truss structure similar to those found on-site

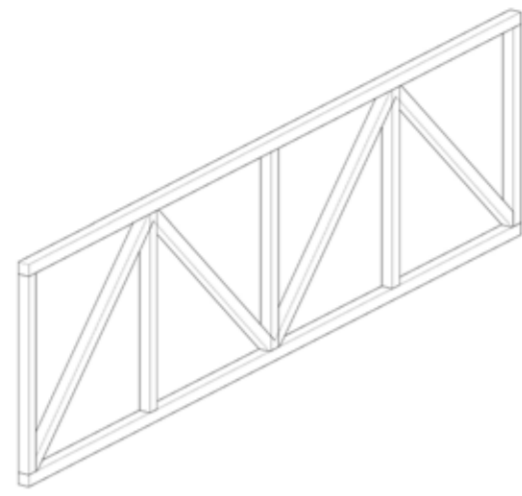


Examples of trusses in architecture

Structural Concept

Truss development

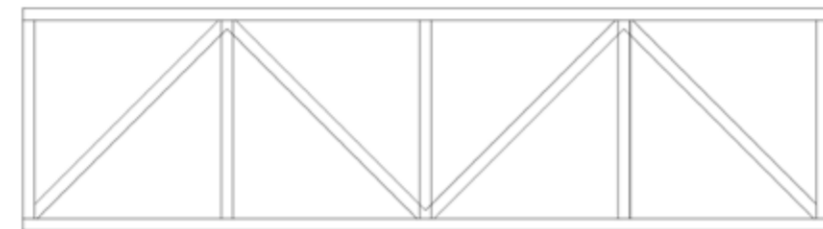
Simple truss



Axo

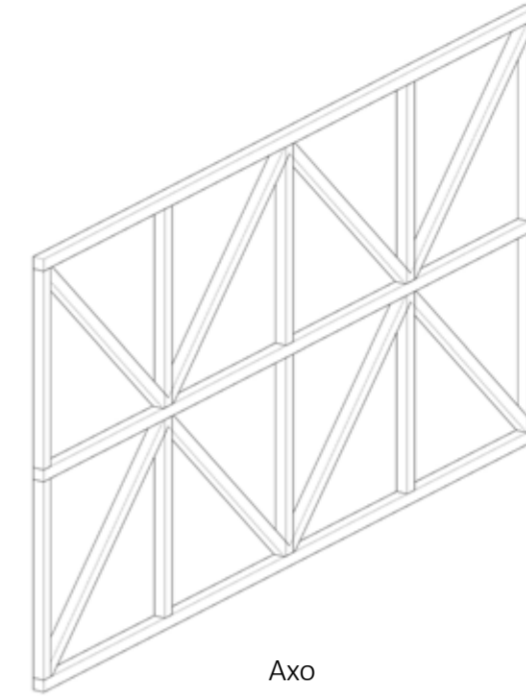


Plan



Section

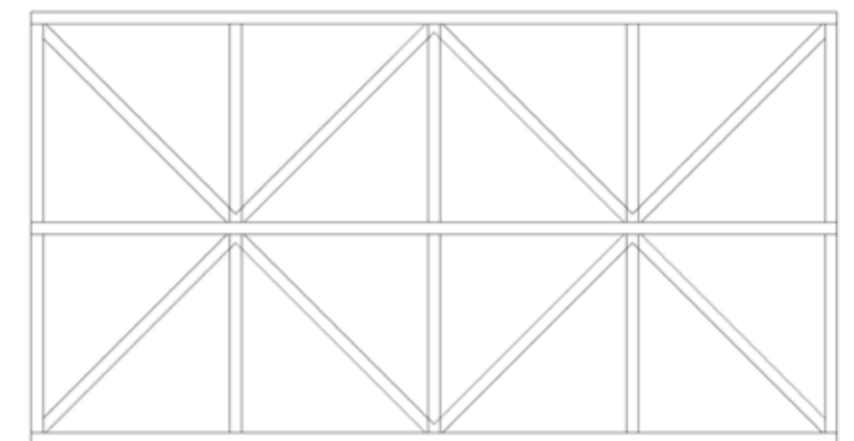
Stacked truss



Axo



Plan



Section

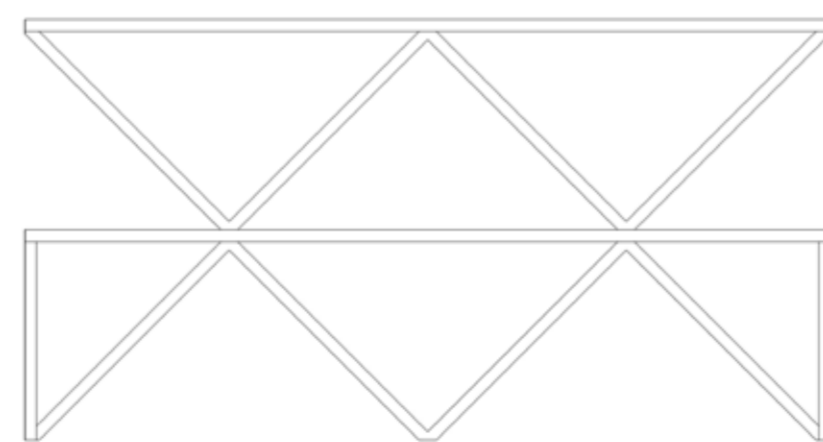
Refined truss with 40% less material



Axo

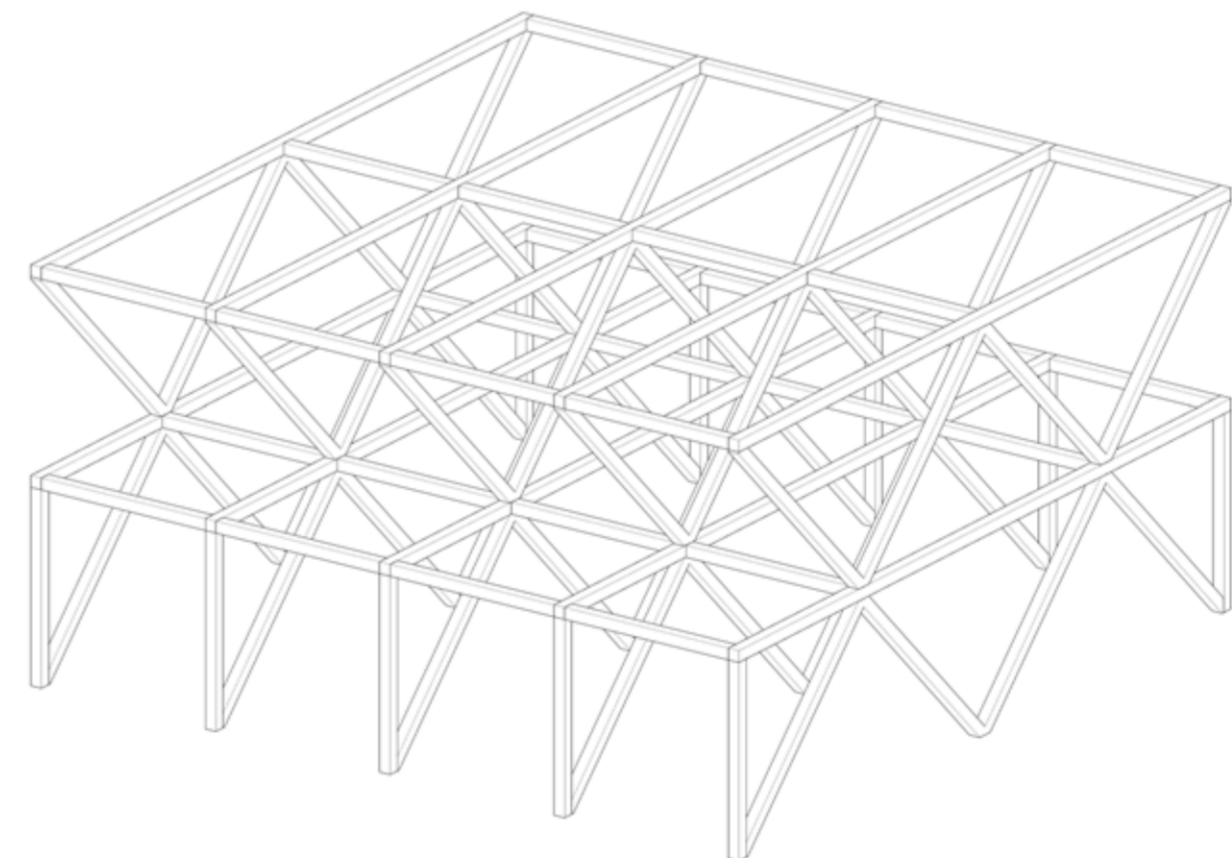


Plan

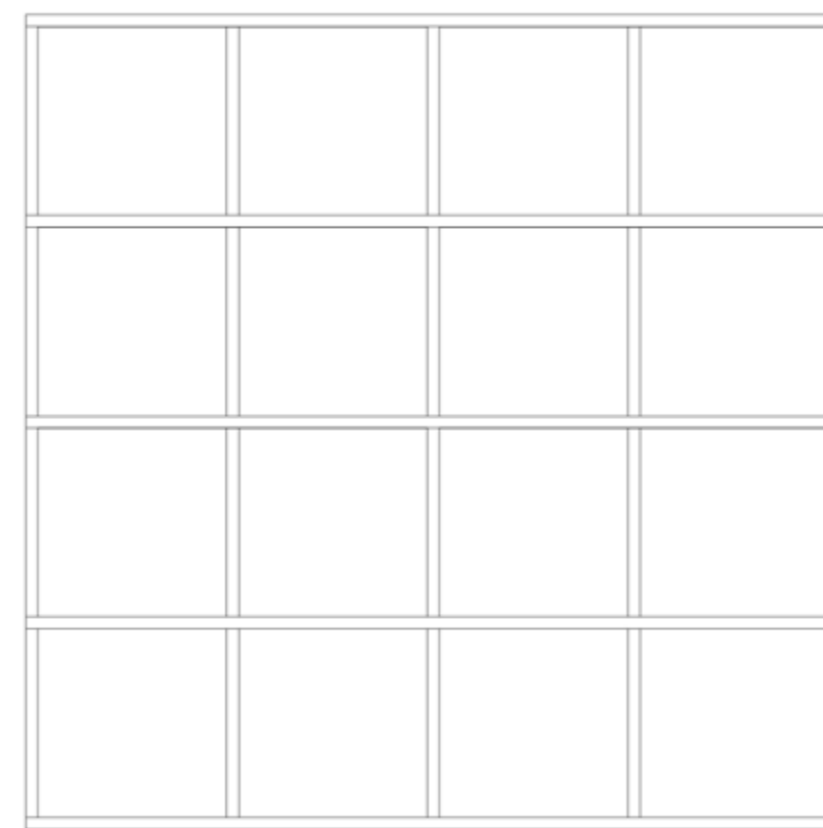


Section

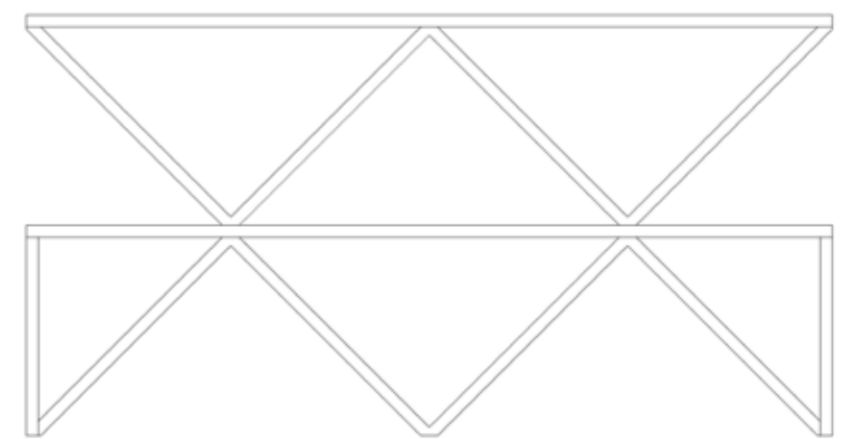
Structural grid formed



Axo



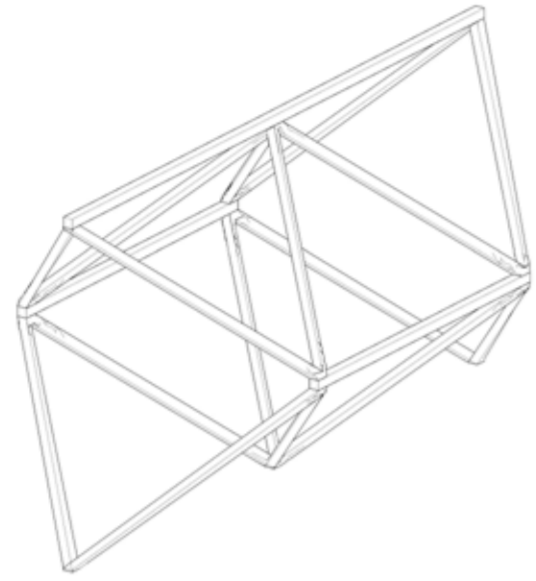
Plan



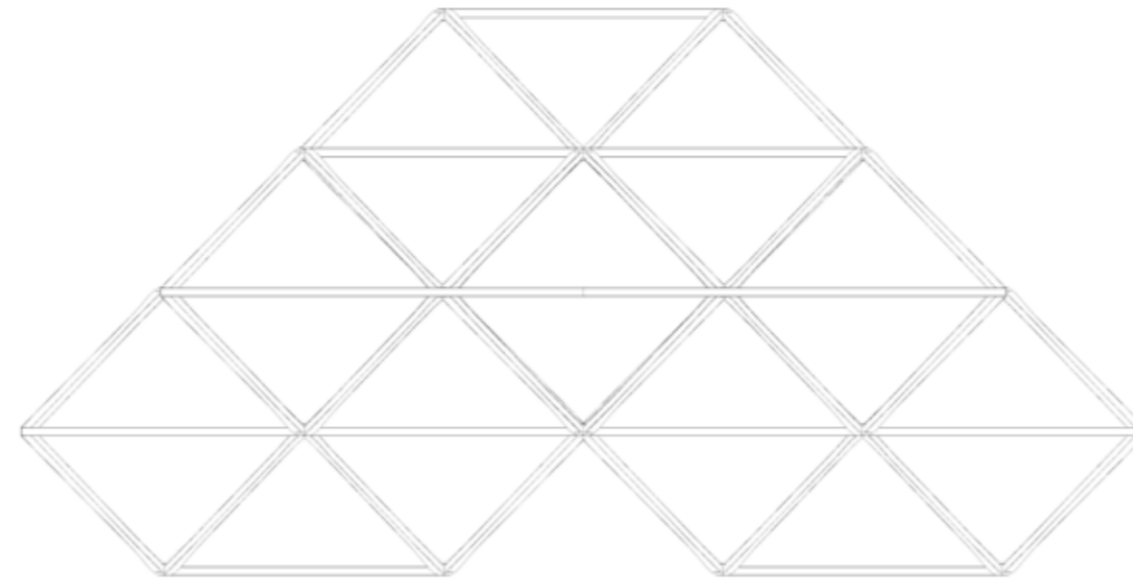
Section

Structural Concept

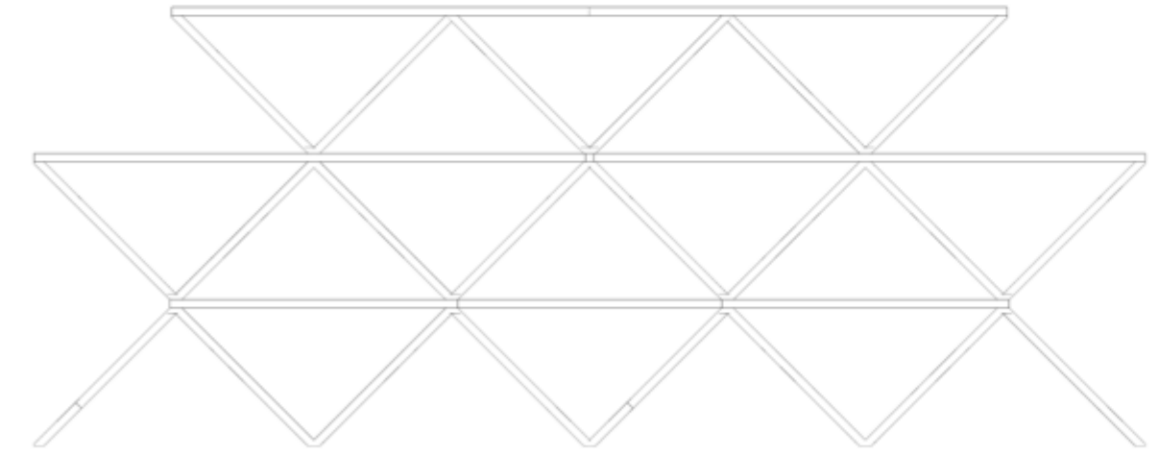
Truss development



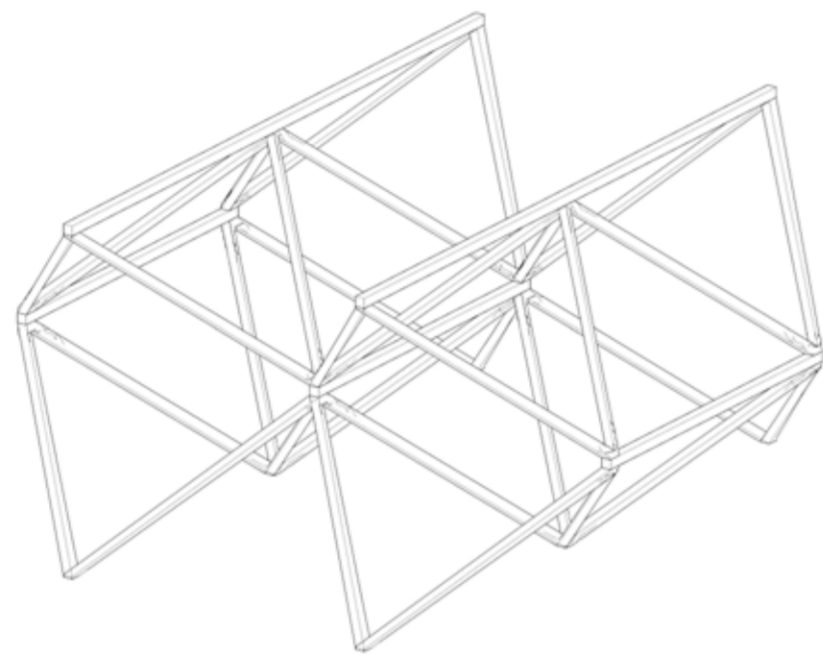
3-Dimensional truss with 55% less material



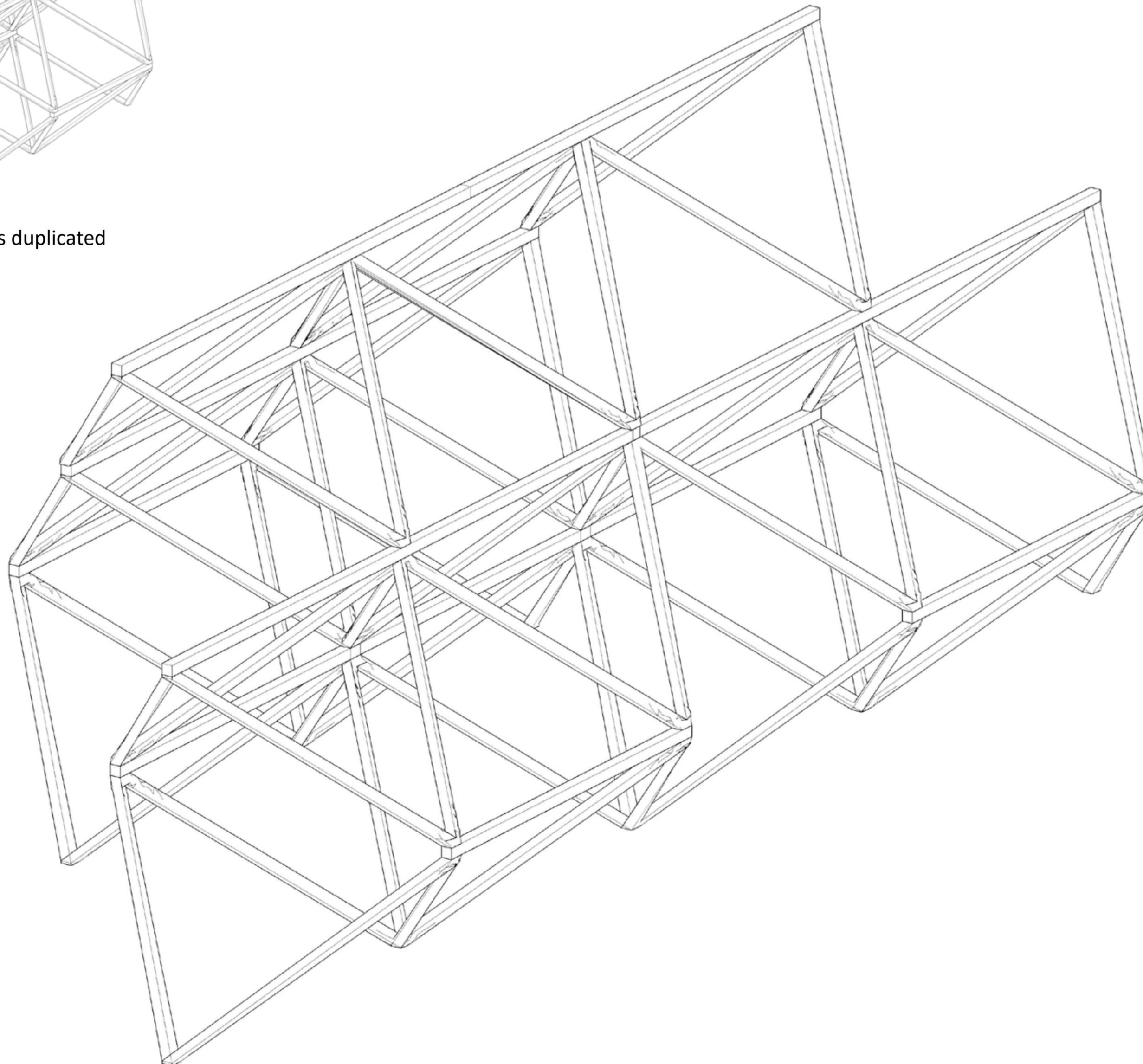
Plan view



Sectional view



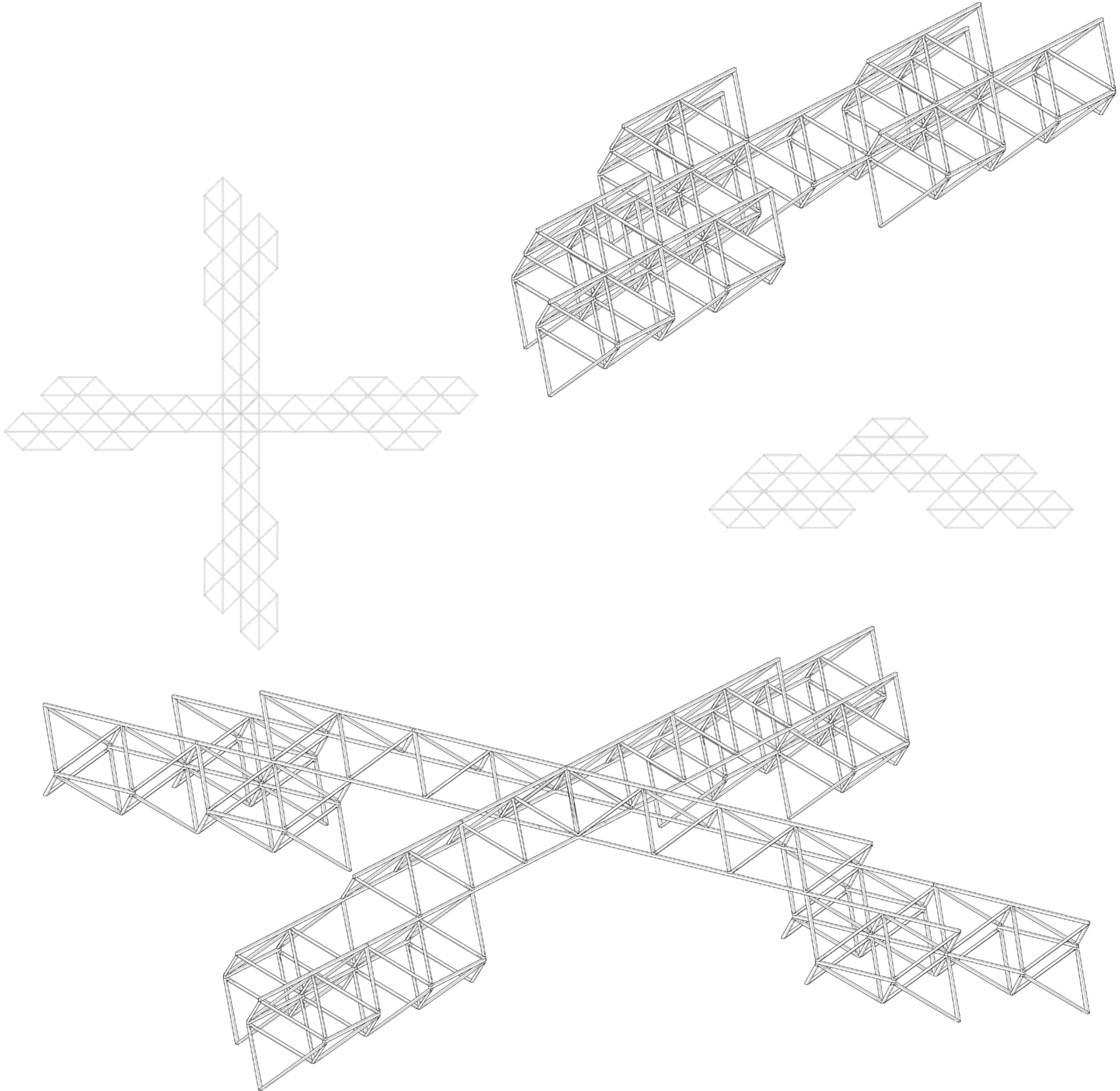
3-Dimensional truss duplicated



3-Dimensional truss staggered and stacked

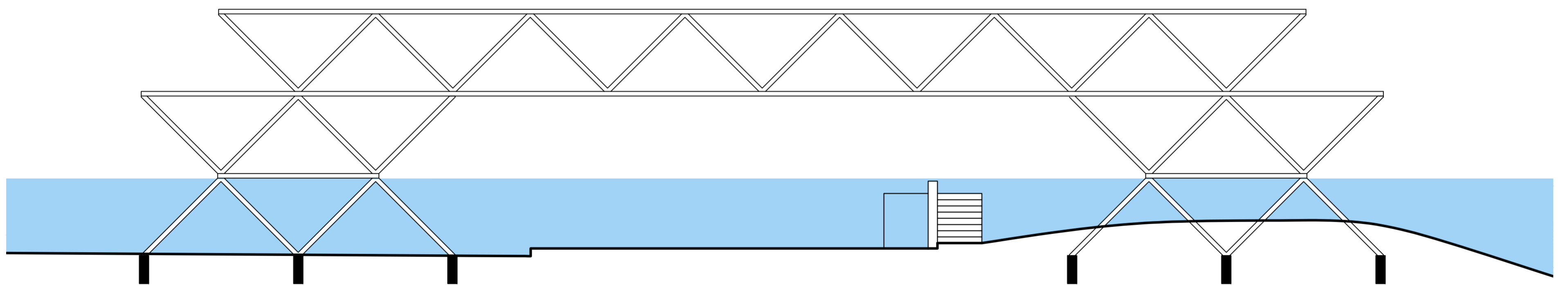
Structural Concept

Truss development



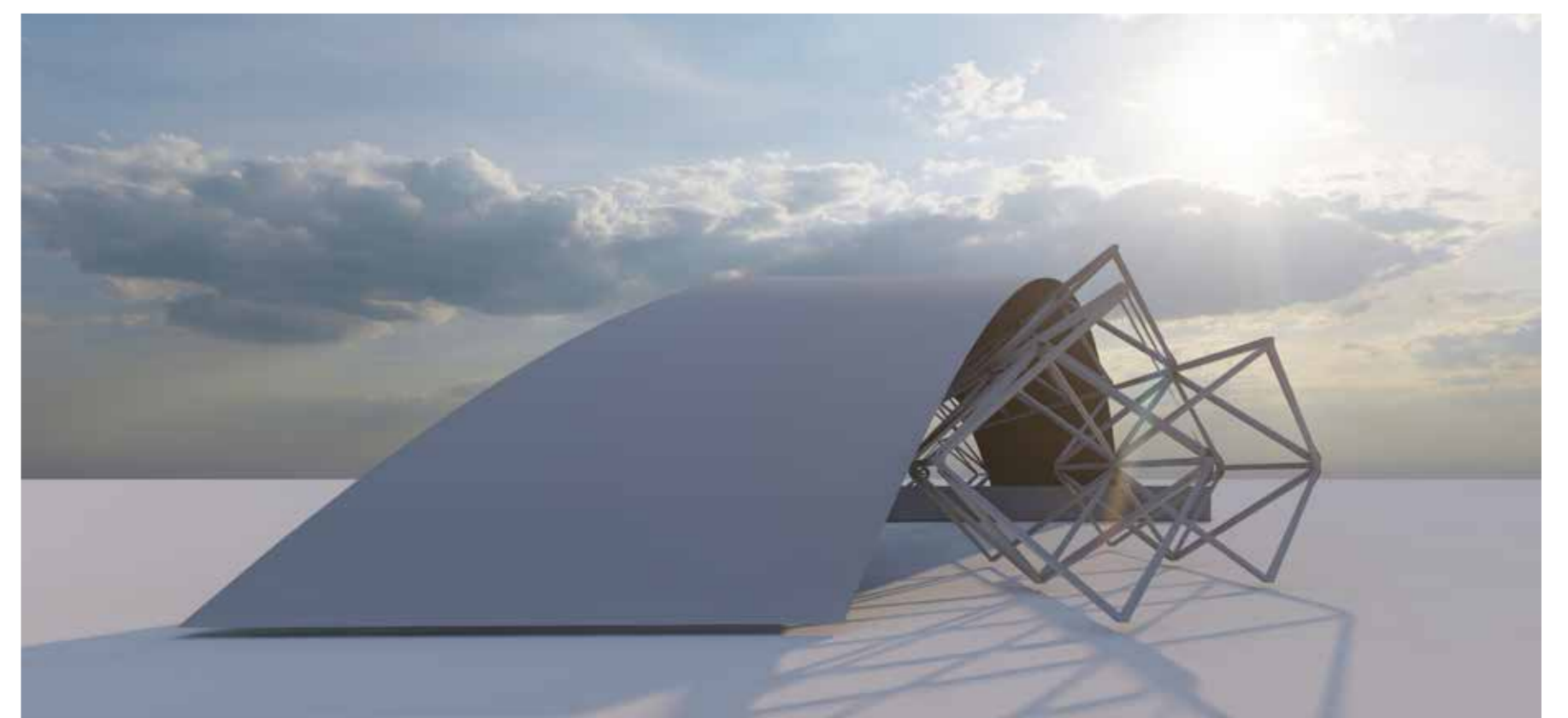
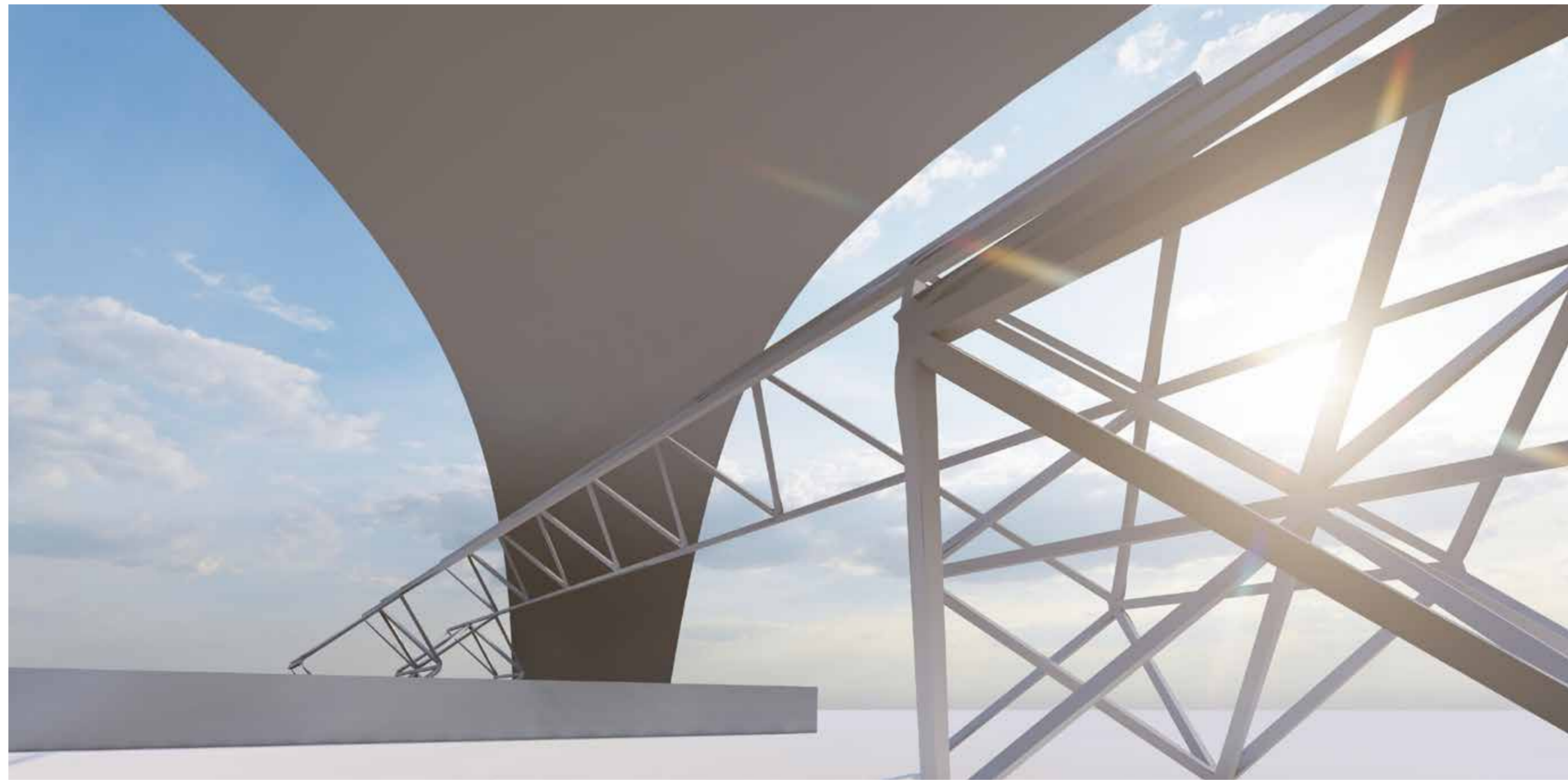
Structural Concept

Possibilities of the truss

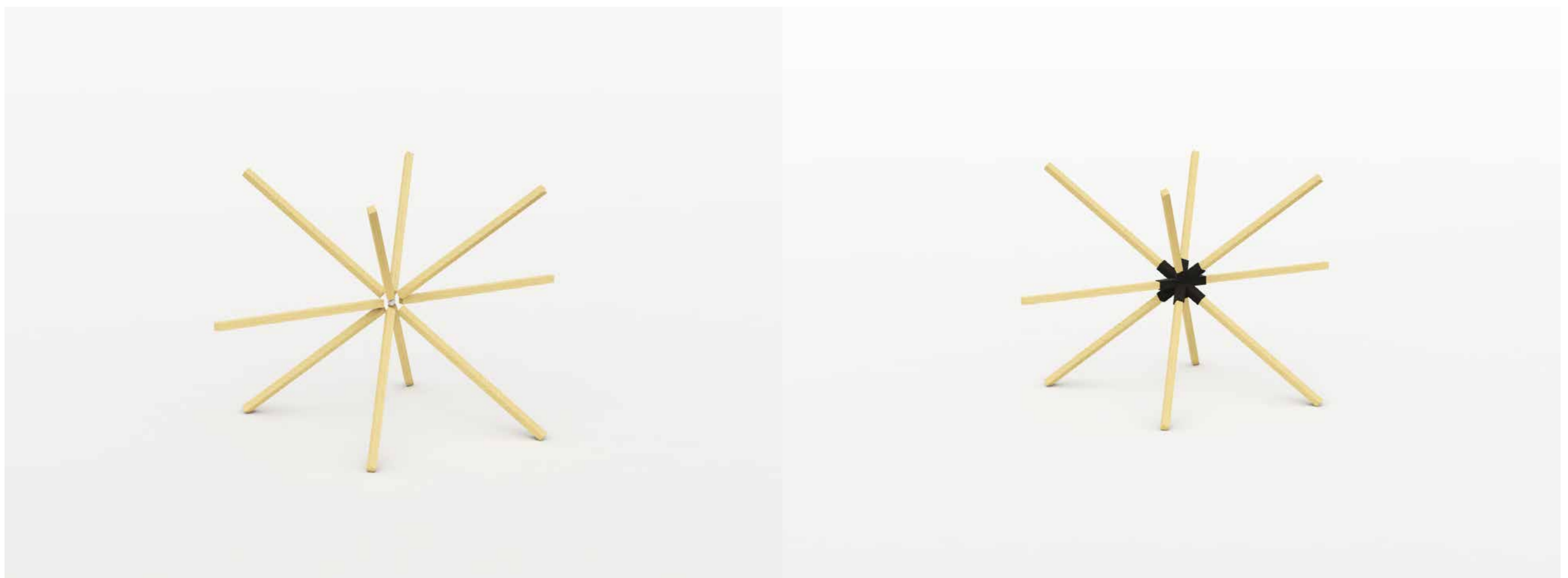


Structural Concept

Enclosing or protecting

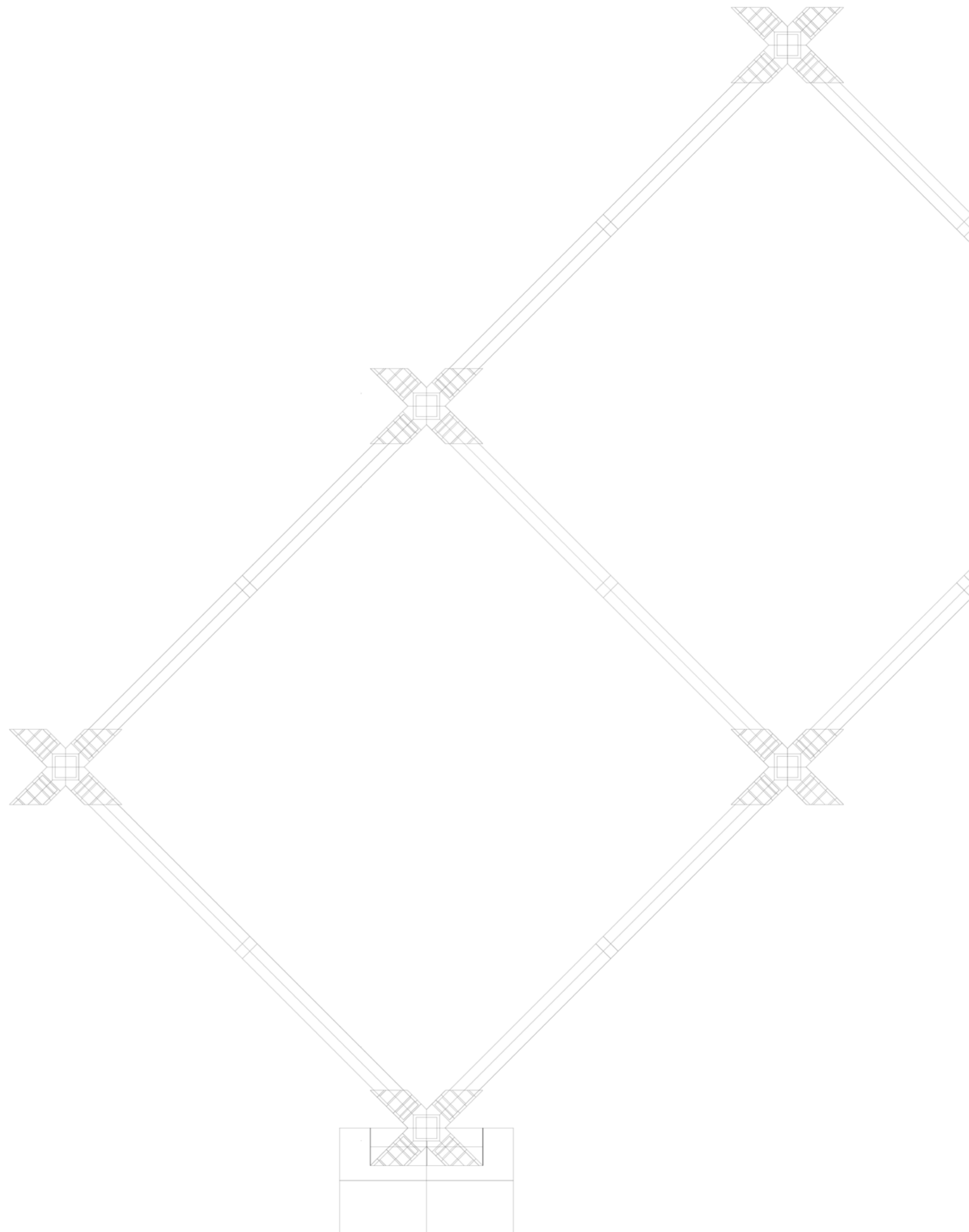
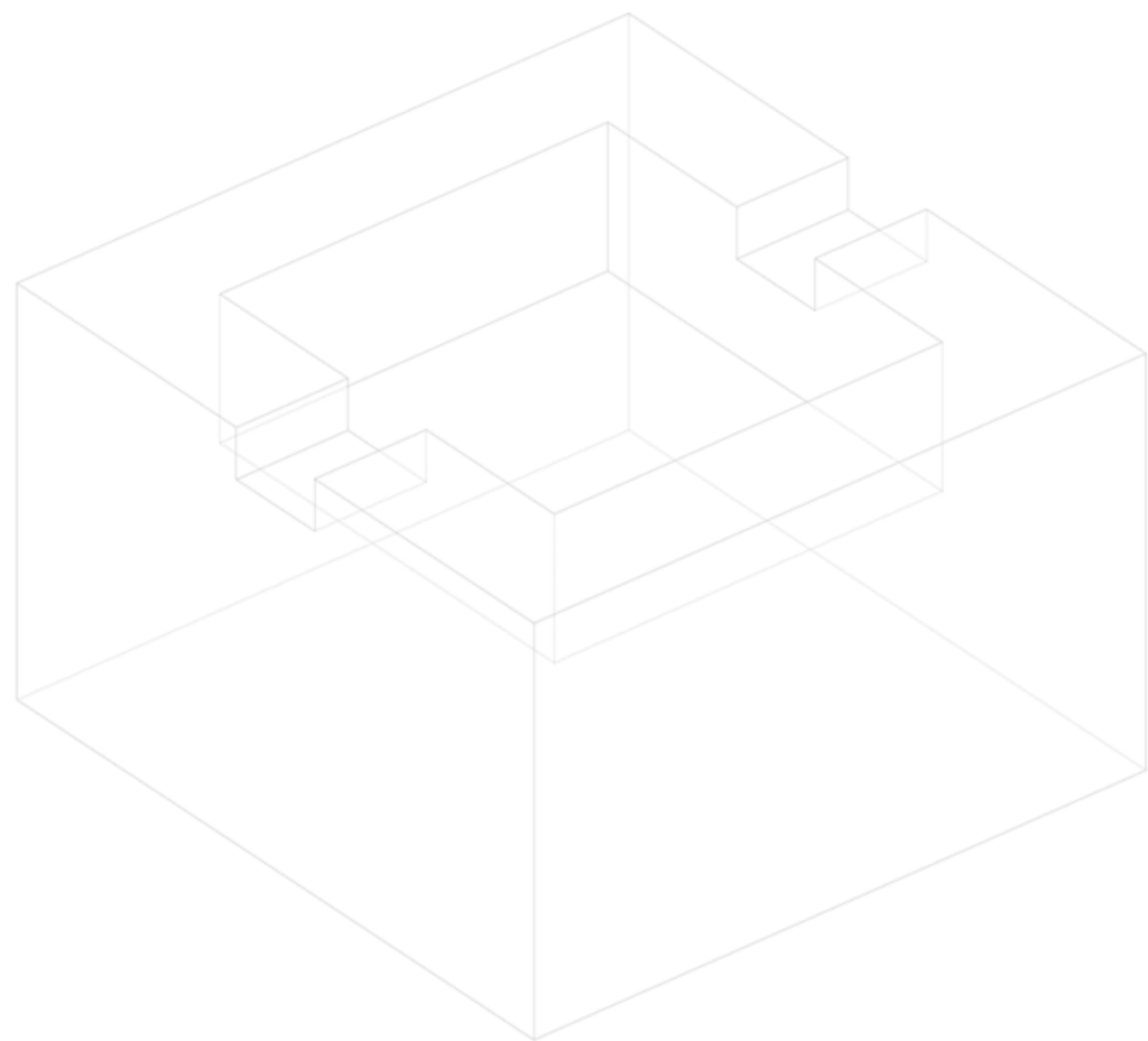
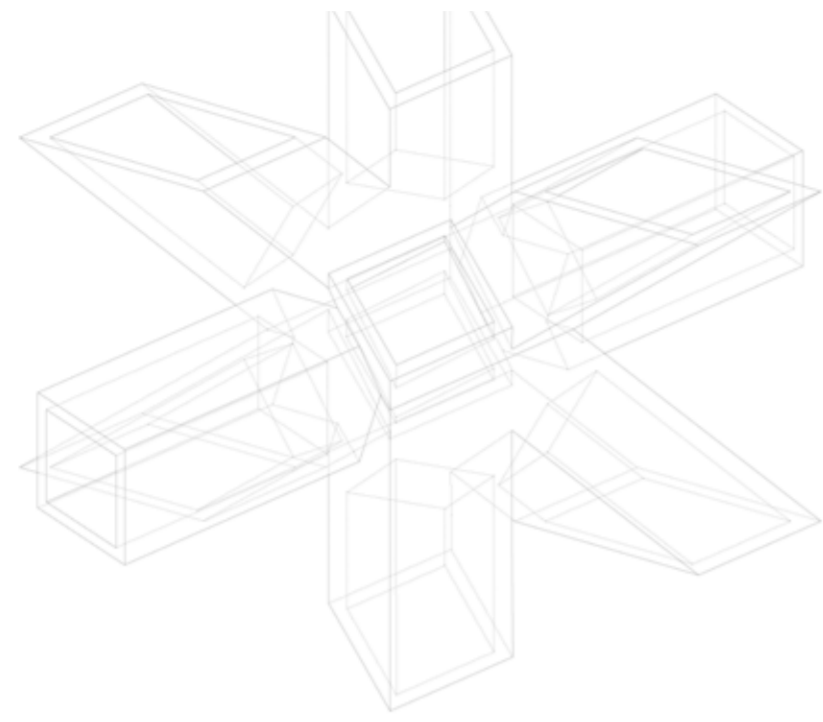


Modular Structure
Nodal connection potential



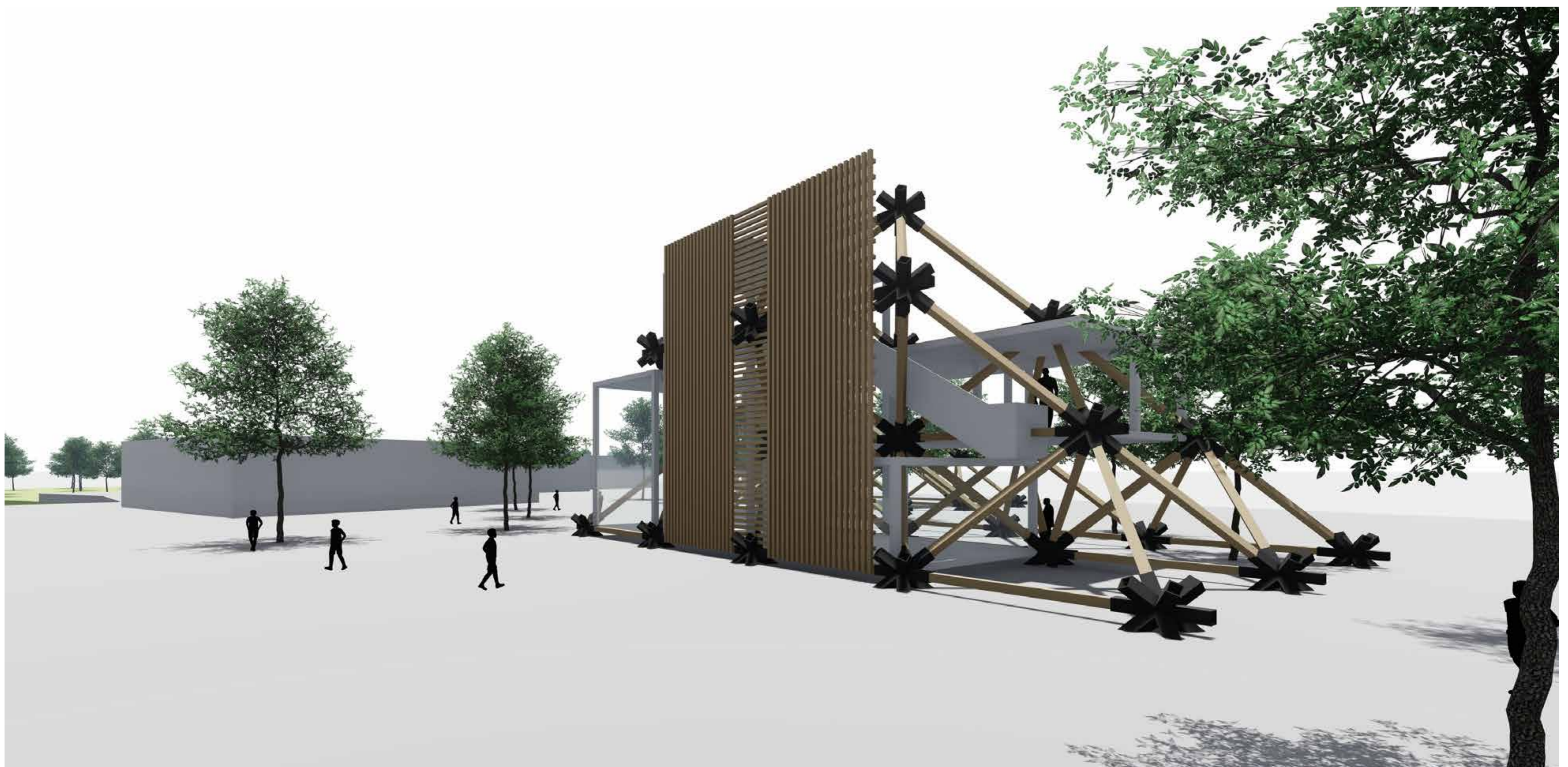
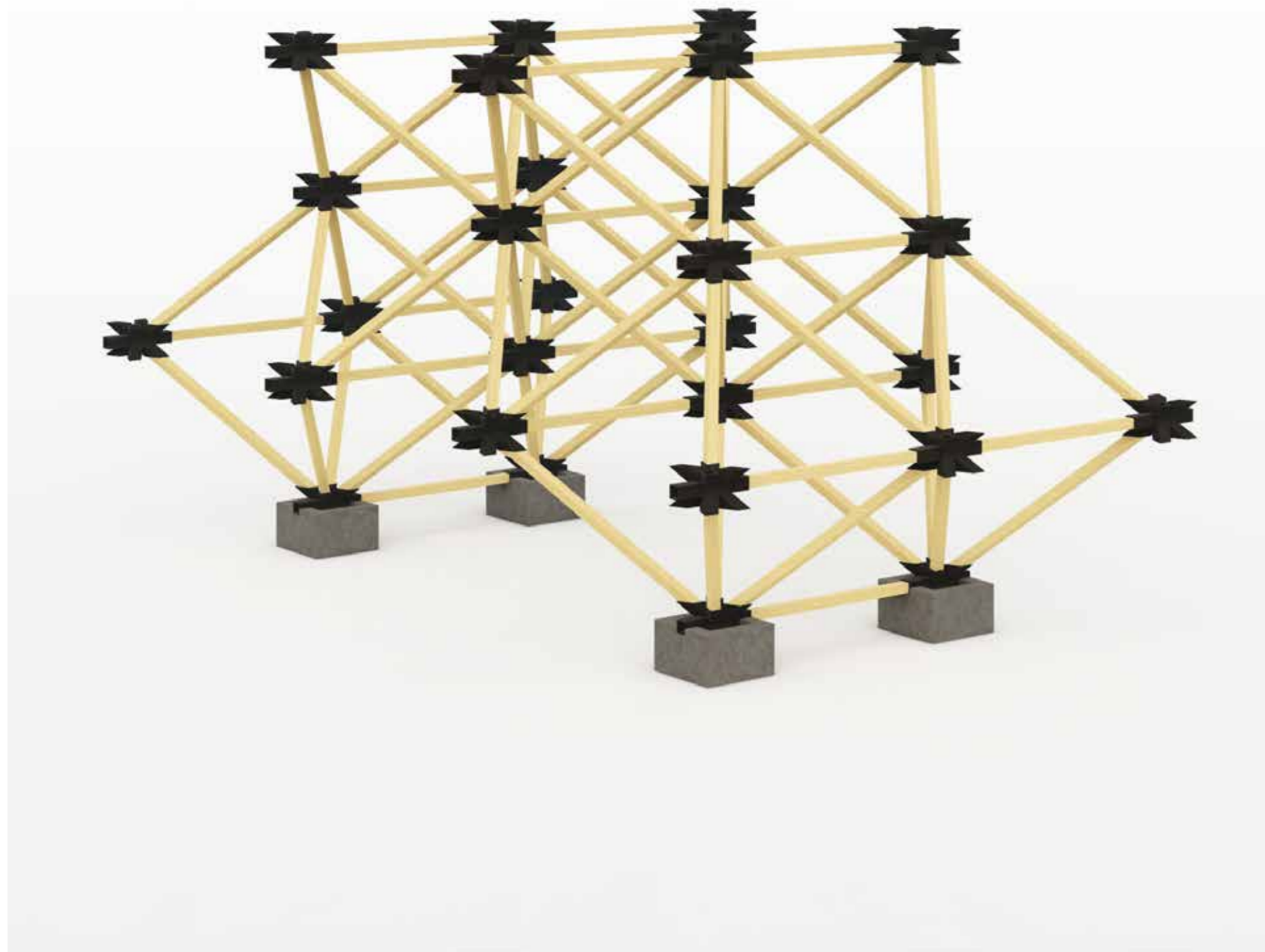
Modular Structure

Ground condition



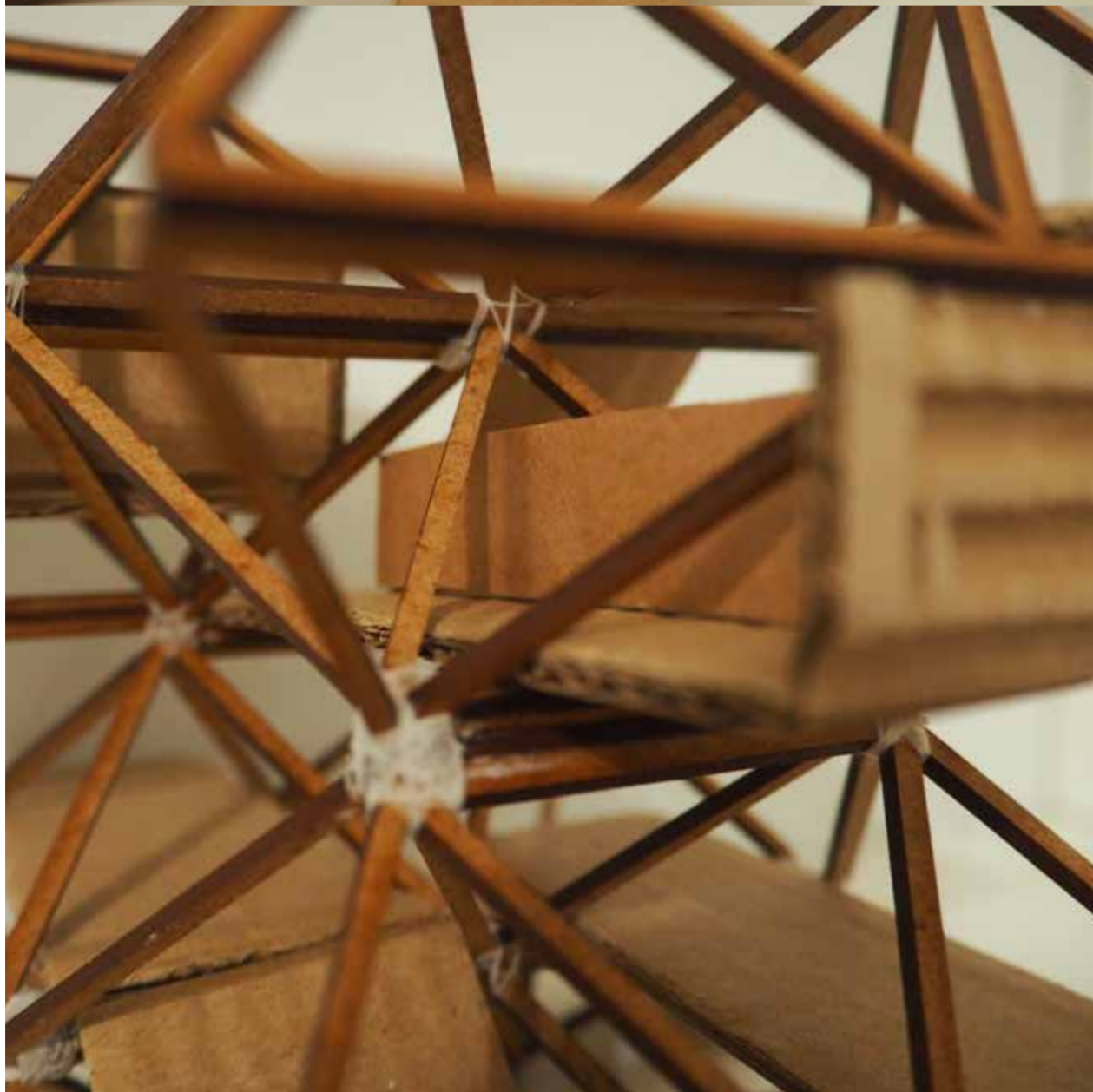
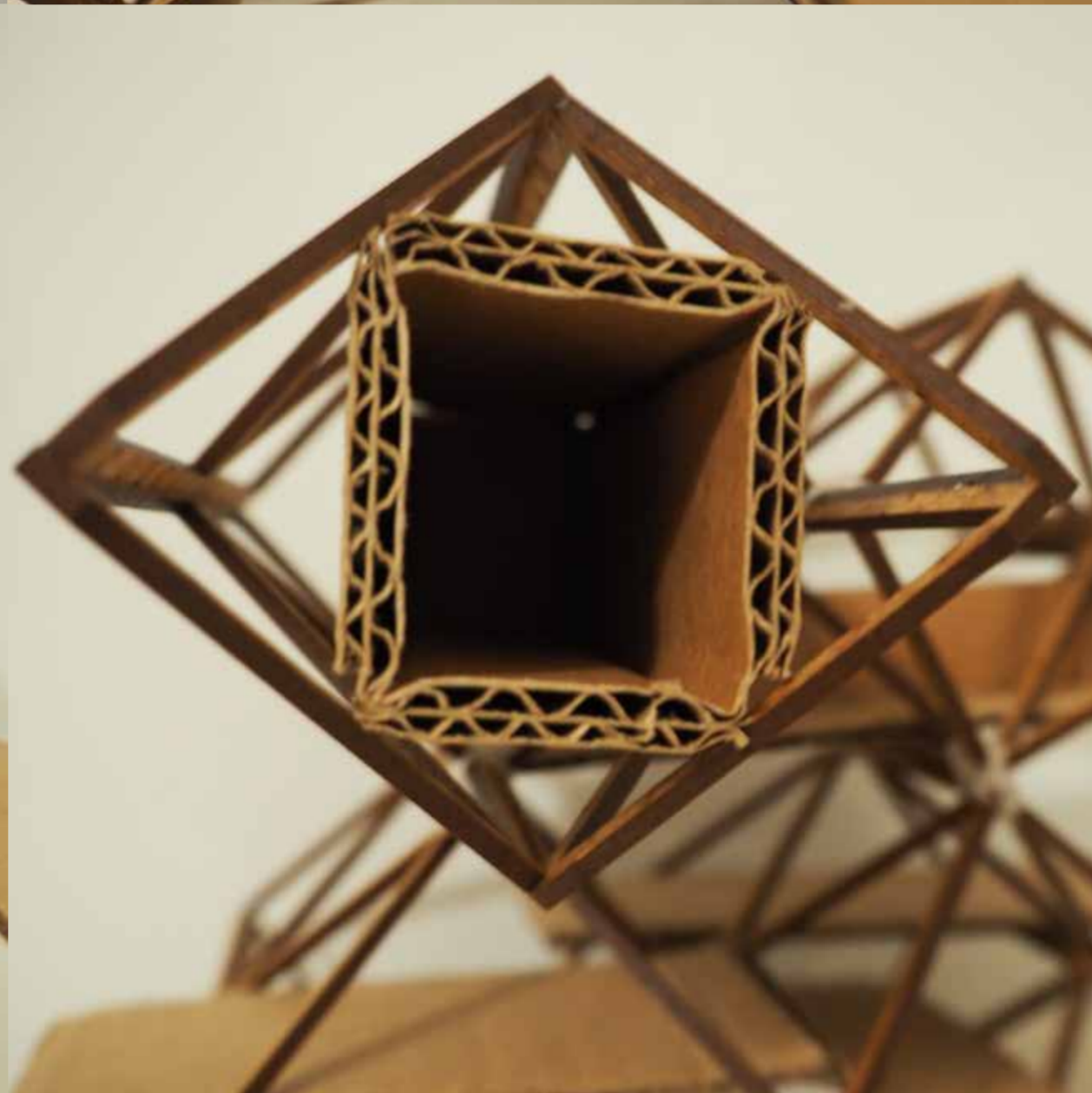
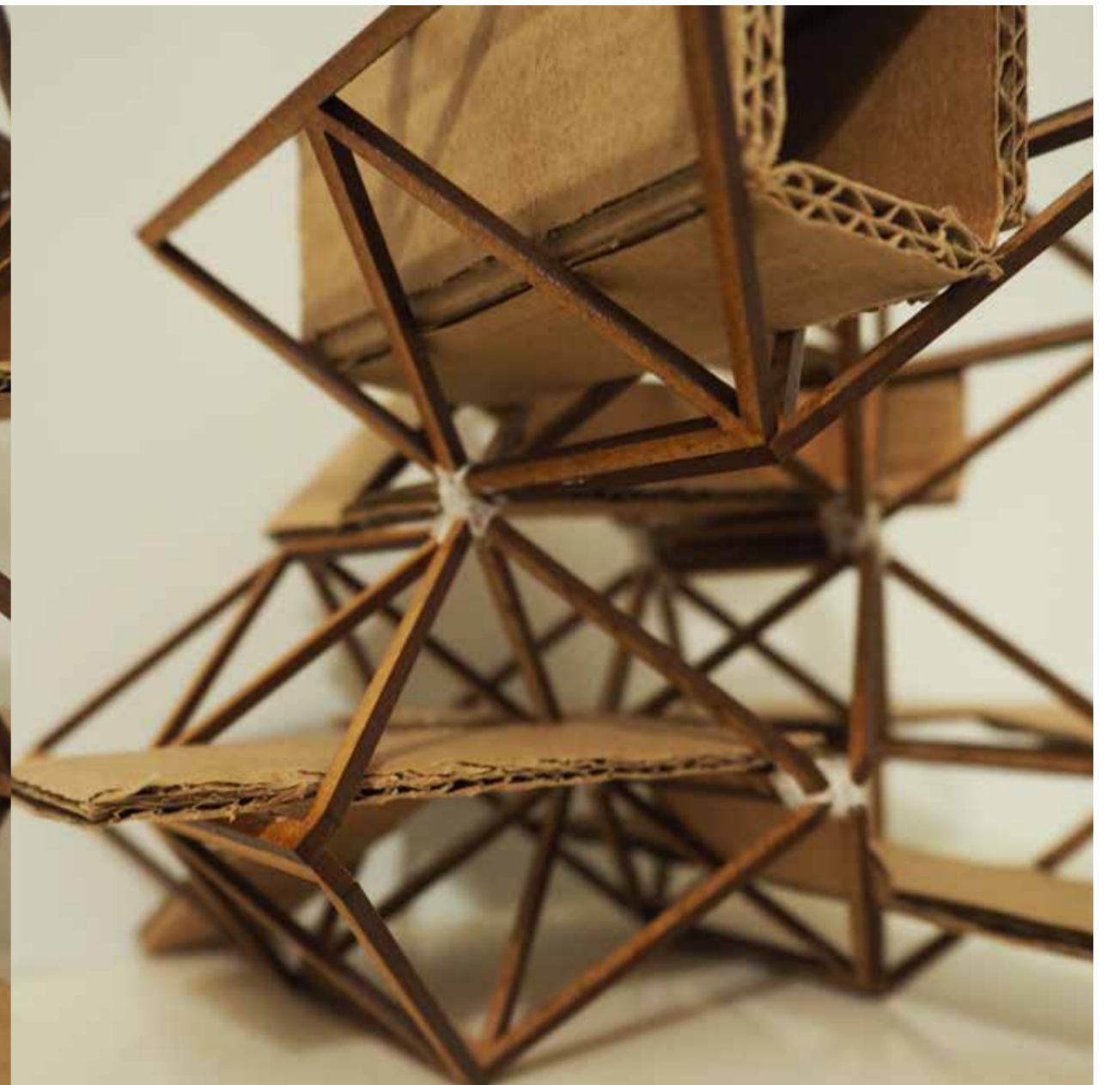
Modular Structure

Concept



Modular Structure

Inhabiting the truss



Modular Structure
Component connection failure



Construction Strategy

European Ash in Construction Research and Development Institute

Stage 4

- Folded plate CLT roof structure installed onto modular CLT structures.
- Large CLT trusses installed spanning across curved wings.
- Solid CLT curved roof installed onto structure.
- Salvaged corrugated steel applied to roof to provide protection from weather.

Stage 3

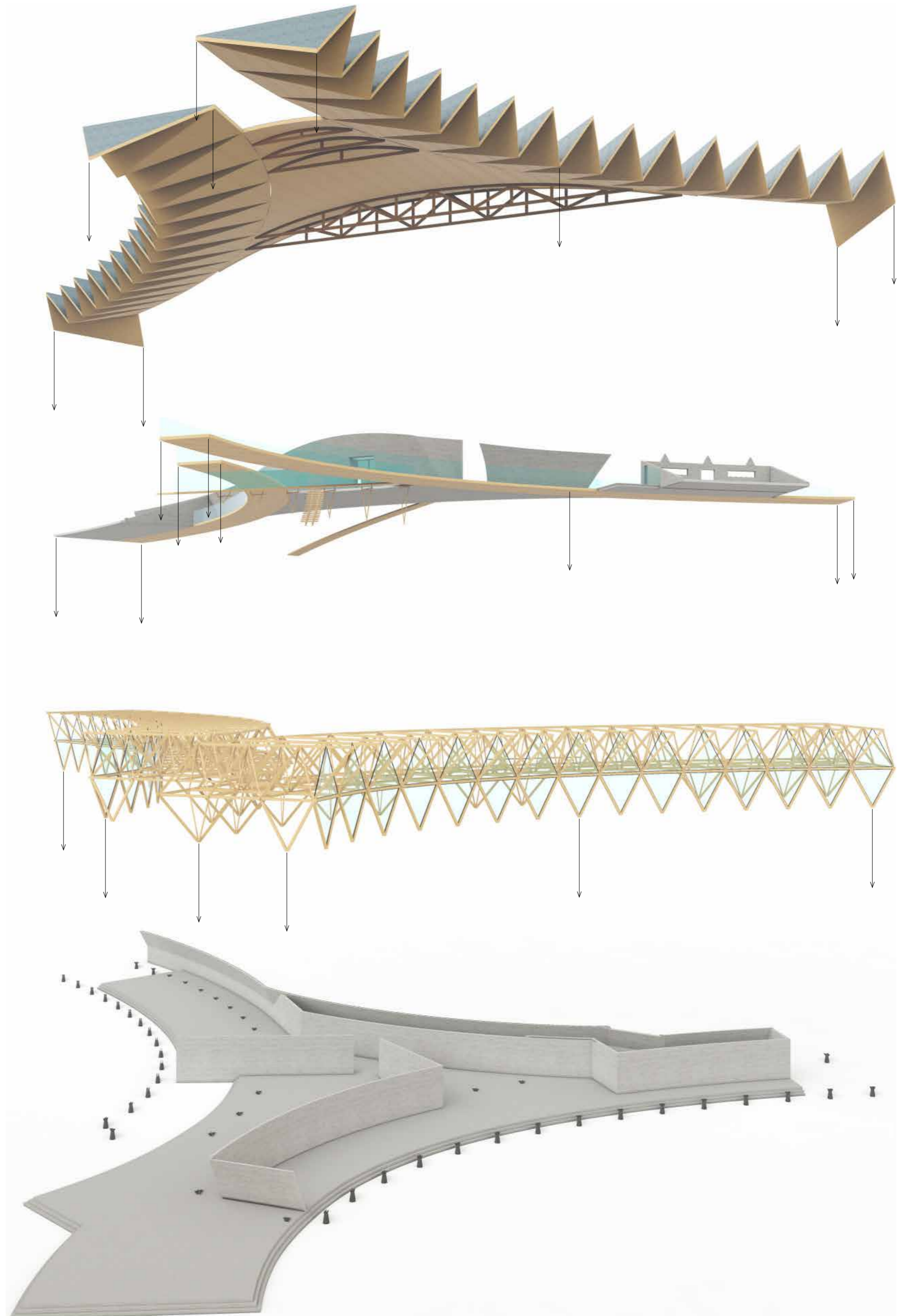
- Reinforced concrete slab on central first floor area.
- Reinforced shuttered concrete walls to create first floor spaces (internally insulated between timber studs with plasterboard and skim coat for inhabited rooms).
- Timber floor walkways installed above work areas with glass balustrades.
- Timber stairs and ramp.


Stage 2

- CLT modular structures manufactured on-site and set into pile foundations, secured with steel plates coated in zinc.
- Glazing installed on outer faces of CLT structures.

Stage 1

- Reinforced concrete pile foundations coated in zinc placed in curved formation to support glazed end of CLT modular structures.
- Reinforced concrete raft foundation with exposed concrete finish and concrete steps around perimeter.
- Ground floor reinforced shuttered concrete walls with exposed finish (internally insulated between timber studs with plasterboard and skim coat for inhabited rooms).



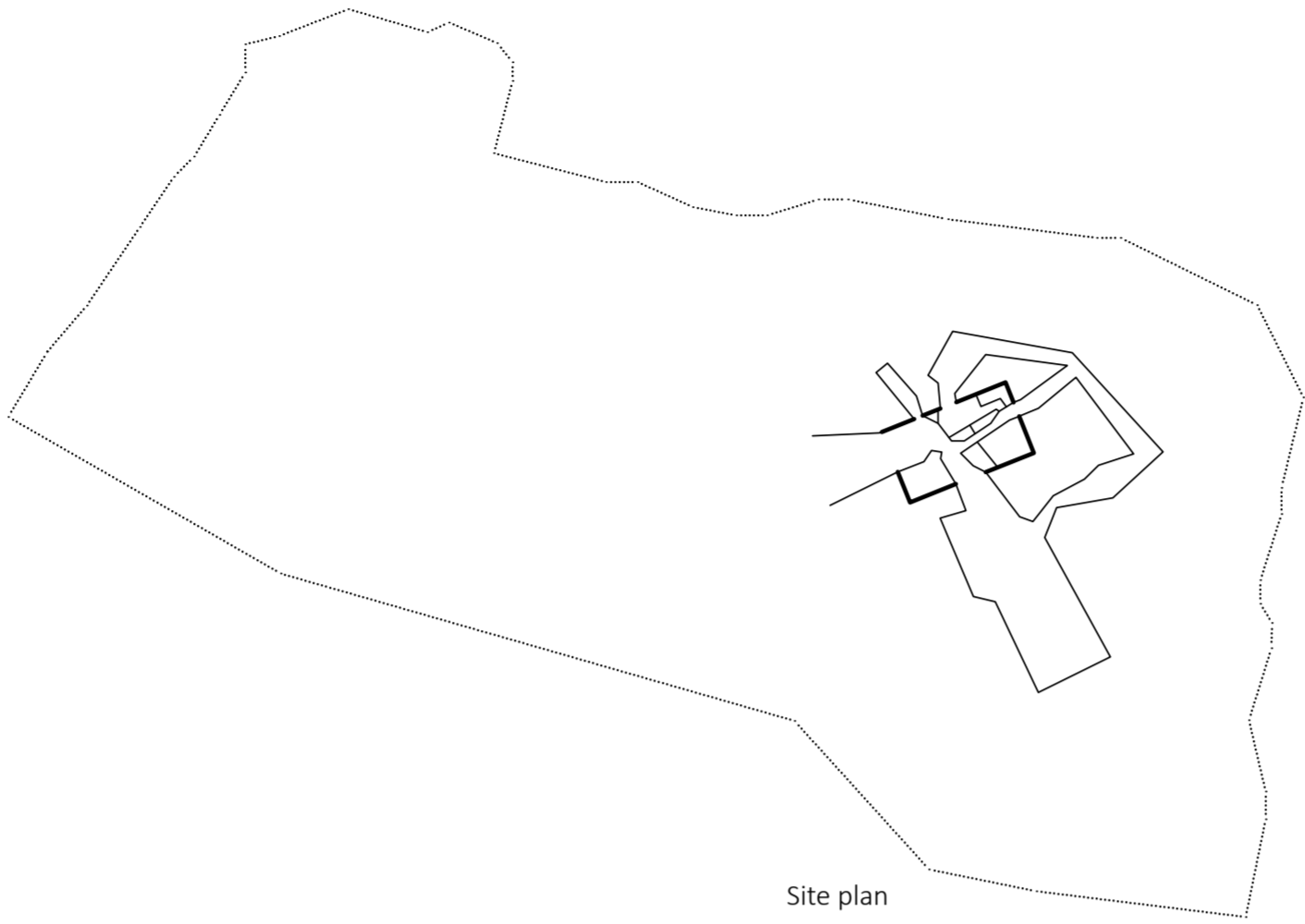
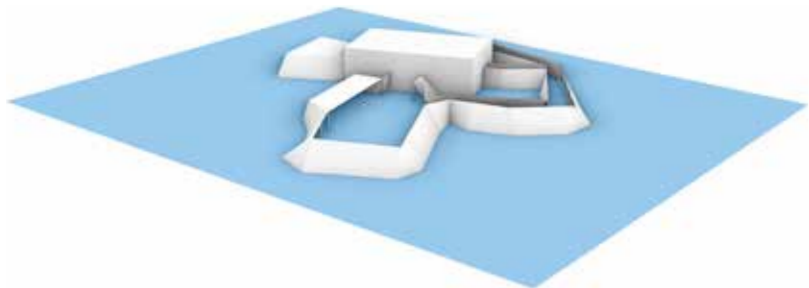


“Thanks to the digital historic re-modelling software, ReArch 3D, we are able to see how this building stood before its reclamation by nature. In examining the plan, we can begin to understand the hierarchy of spaces within the buildings, or indeed the lack thereof due to the ambiguity of the thresholds between them. This ambiguity reminds me of a project in Nimes, Spidernethewood, among others. I visited this house as a young architecture student and was in awe of the Architect’s ability to combine public/private, internal/external, and the space between.”*

*ReArch 3D is a fictional software.

Spidernethewood by R&Sie(n)

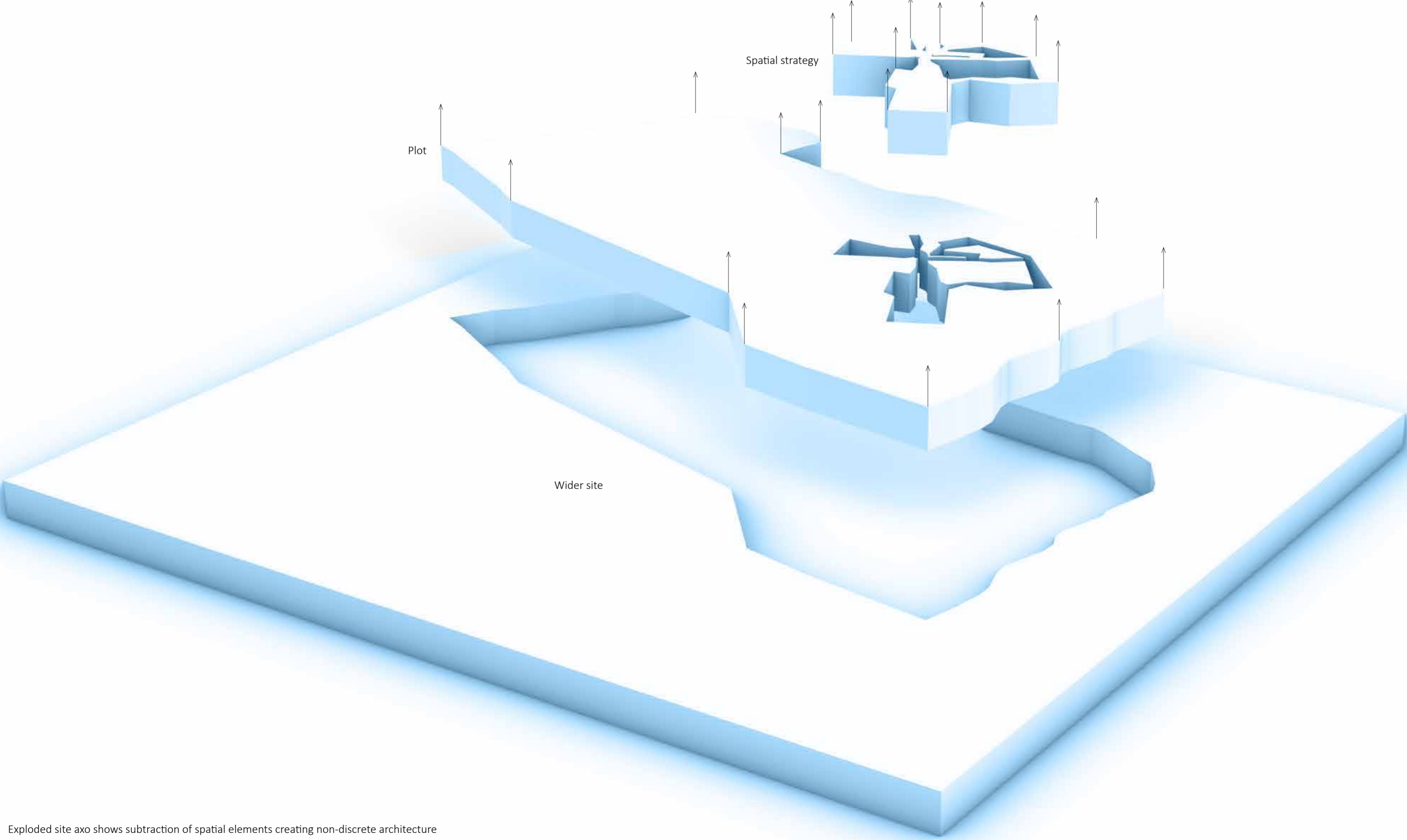
Nimes, 2007



Site plan



Photos show void spaces created by nets and fabric obscuring interior-exterior threshold



Plot

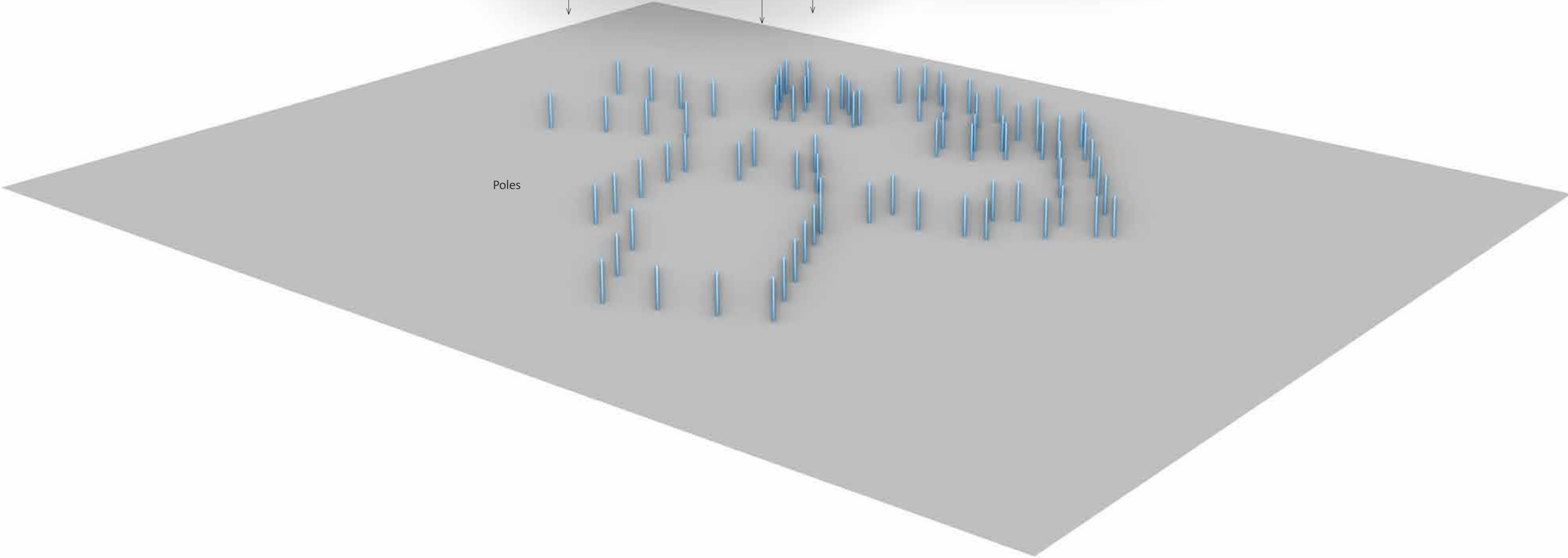
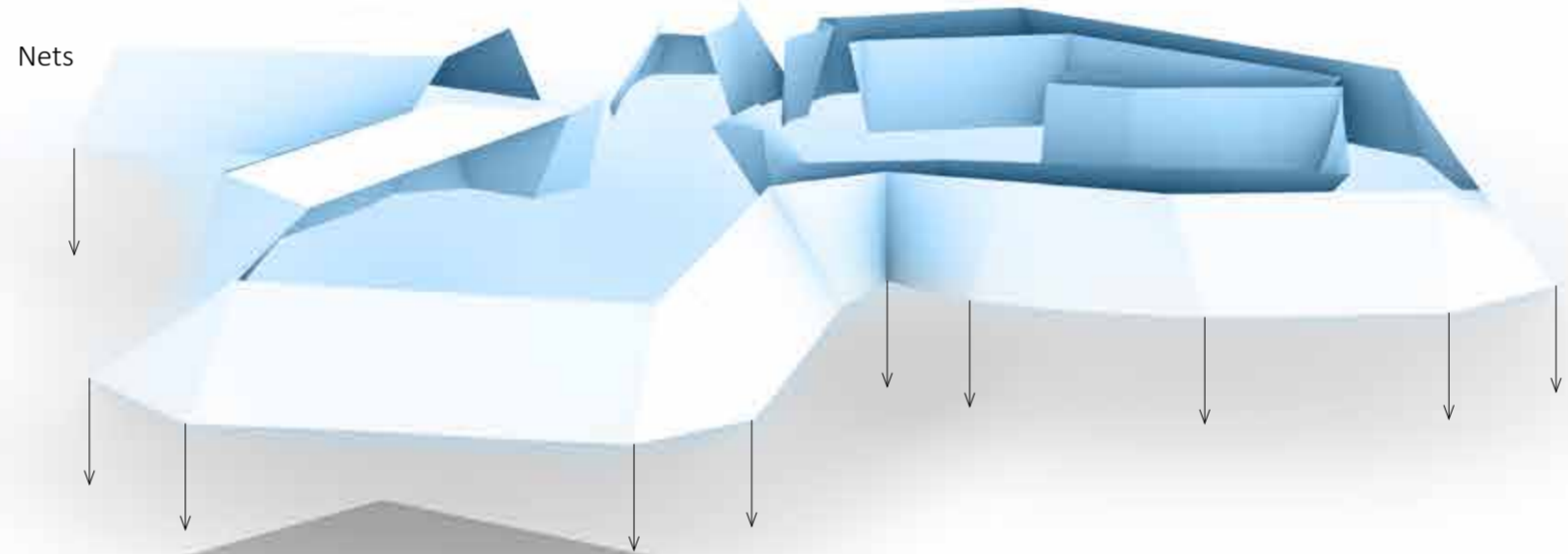
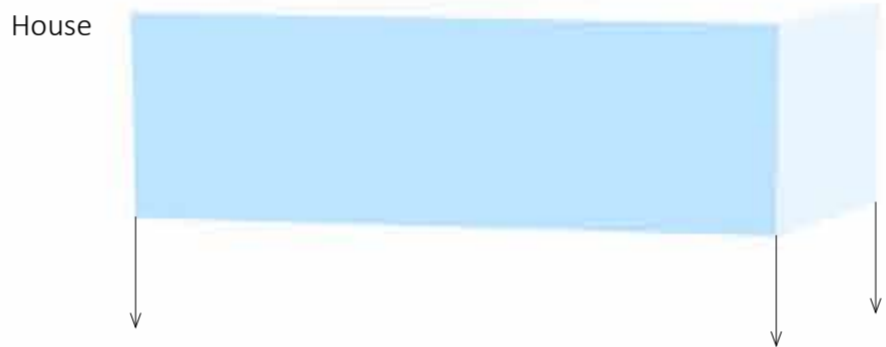
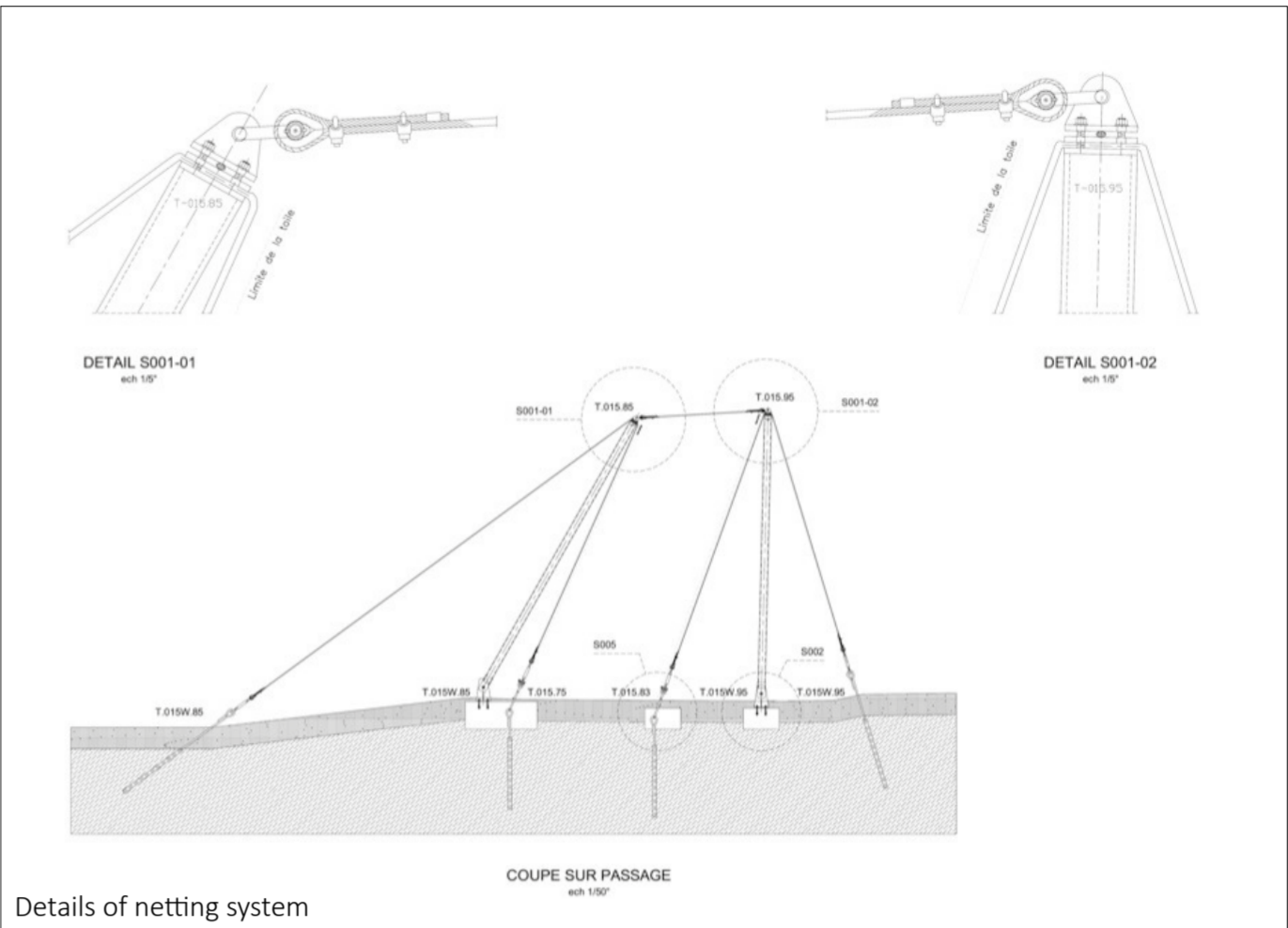
Spatial strategy

Wider site

Exploded site axo shows subtraction of spatial elements creating non-discrete architecture

Spidernethewood by R&Sie(n)

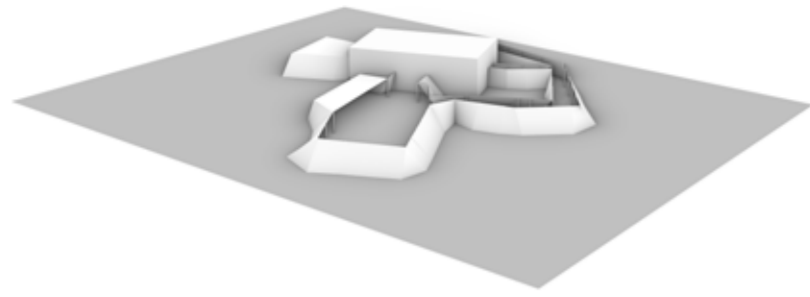
Nimes, 2007



Exploded axo shows non-discreet architectural interventions

Spidernethewood by R&Sie(n)

Nimes, 2007



A report from Bruce Sterling / 2030 ;

Thirty long years had overpassed our rolling globe since the unveiling of Roche's legendary web-house. The inspector and I almost missed the place, which was, of course, the architect's original intention.

I stroked the cracked screen of my vintage iPhone. "The GPS coordinates of this structure seem to have been deliberately mis-allocated."

"Typical," sniffed the inspector.

I knew the place from photos, but not from recent ones. The sturdy poles were moss-eaten, their guywires festooned with vines, and the trees on the site had grown huge. Given that the plastic mesh was integrated into the forest, the web-house was all parabolic arcs and delirious sagging. Much-stained by years of fallen foliage, the structure had the spotty look of forest camou. An army could have marched by it and never seen a thing. The inspector hefted her tricorder. "Aging plastics tend to offgas," she sniffed. Locating the entrance with difficulty, we entered the dense fabric maze. The visual effect was literally indescribable, a fact I attributed to the stark exhaustion of conventional architectural rhetoric. "Visionary interventions of this sort were sadly rare during the culturally retrograde epoch of the War on Terror."

The inspector's face soured. English was not her first language.

"Worse yet, the regulatory environment was so rigid and harsh that Francois Roche was forced to disguise his ingenious designs as 'conceptual-art installations.'"

"I *love* conceptual art," the inspector insisted, wincing.

The sun was setting. Faithful solar-charged globes flicked on. We emerged from the glowing labyrinth to confront a drained swimming pool. "Tres J.G. Ballard," I remarked, but the inspector wasn't having any of that.

The original owner had kept the place in good shape, but then it had passed into the hands of the creature who made it notorious: one Novalis Nico, the "Spider of Geneva," a legendary Swiss currency speculator. Nico had holed-up for years in these forests of southern France, hunched over his busy laptop. When not obsessively collecting glamour photos of high-tech street junk, the reclusive mogul used thousands of sock-puppet fake identities to pervert the seething rumors in investment weblogs.

So, with one Fantomas- Mabuse stroke of hacker cunning, Nico could send the Euro spinning right out of control. Within this lair he had reaped heaps of electronic wealth beyond the dreams of 20th-century mankind.

Except for the many rusting satellite dishes, Nico's long, secretive haunt hadn't much affected the vicinity. The dead zillionaire's wealth had always been entirely virtual. He'd sold off the original owner's tastefully minimalist furniture and replaced it all with inflatable chairs. Their deflated rags draped every room, like discolored pools of hippie candle-wax.

"It looks very 'pop-up' in here," I told the inspector.

"It's very 'plug-in city.'"

The inspector brushed dead leaves from her padded shoulders. "I think I smell bats."

"Come on, you can't mix bats and e-commerce fanatics."

The inspector examined her tricorder. "That guano gives off a definite spectral emission." She pursed her lips and scanned the walls and floors with her radar nozzle. "At least the structural members are still sound."

"So you're really gonna let the new buyer live here?"

She took offense. "It is not up to me to declare that!

I'm not a housing dictator! I'm just a simple, everyday

Environmental Sustainability Inspector from the Heritage Bureau of the Euro-Parliamentary Commission for the Regulation of the Creative-Economy."

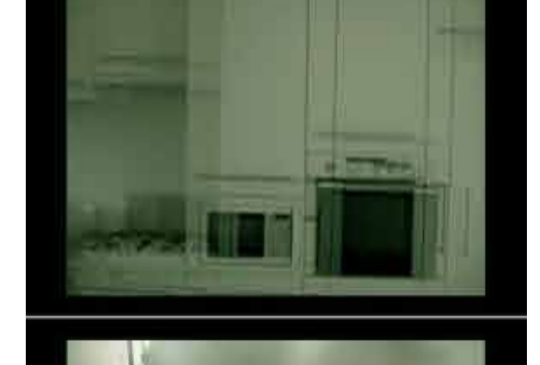
I gazed around the sleekly barren cells where the Spider had passed his days, weeks, years. It had taken four or five years for mankind to even realize the guy was dead; he'd lurked inside here with profound success, and his automated trading systems had given him veritable Osama bin Laden global-media brand-extension.

Who had dared to penetrate the legendary web-house?

Anybody? Until just now?

I set my heavy backpack on the curving stairs. "Well darling," I told her, "this is where we finally celebrate our secret love"

Bruce Stirling, 2007



Institutes

Public/Private

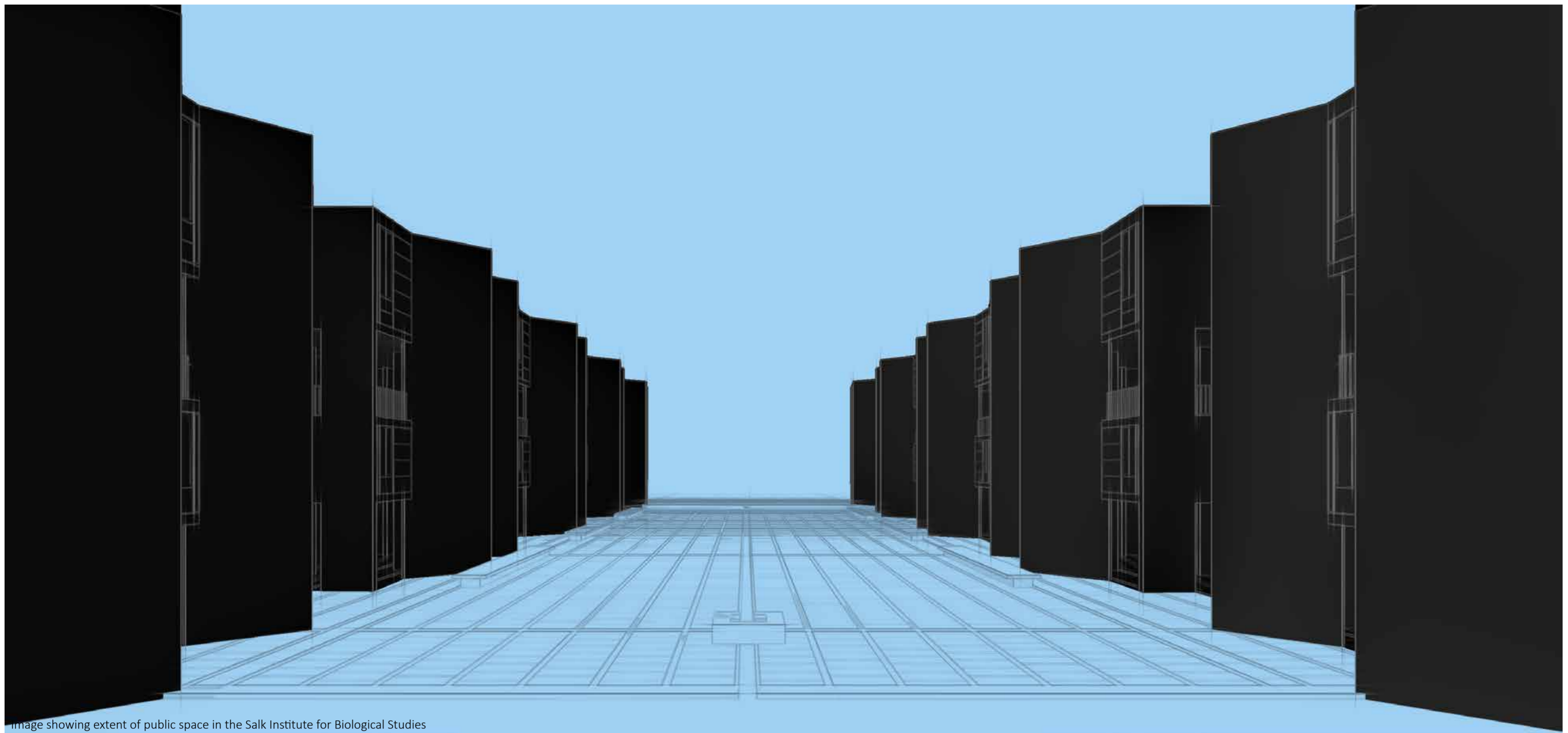


Image showing extent of public space in the Salk Institute for Biological Studies

Salk Institute for Biological Studies by Louis Kahn

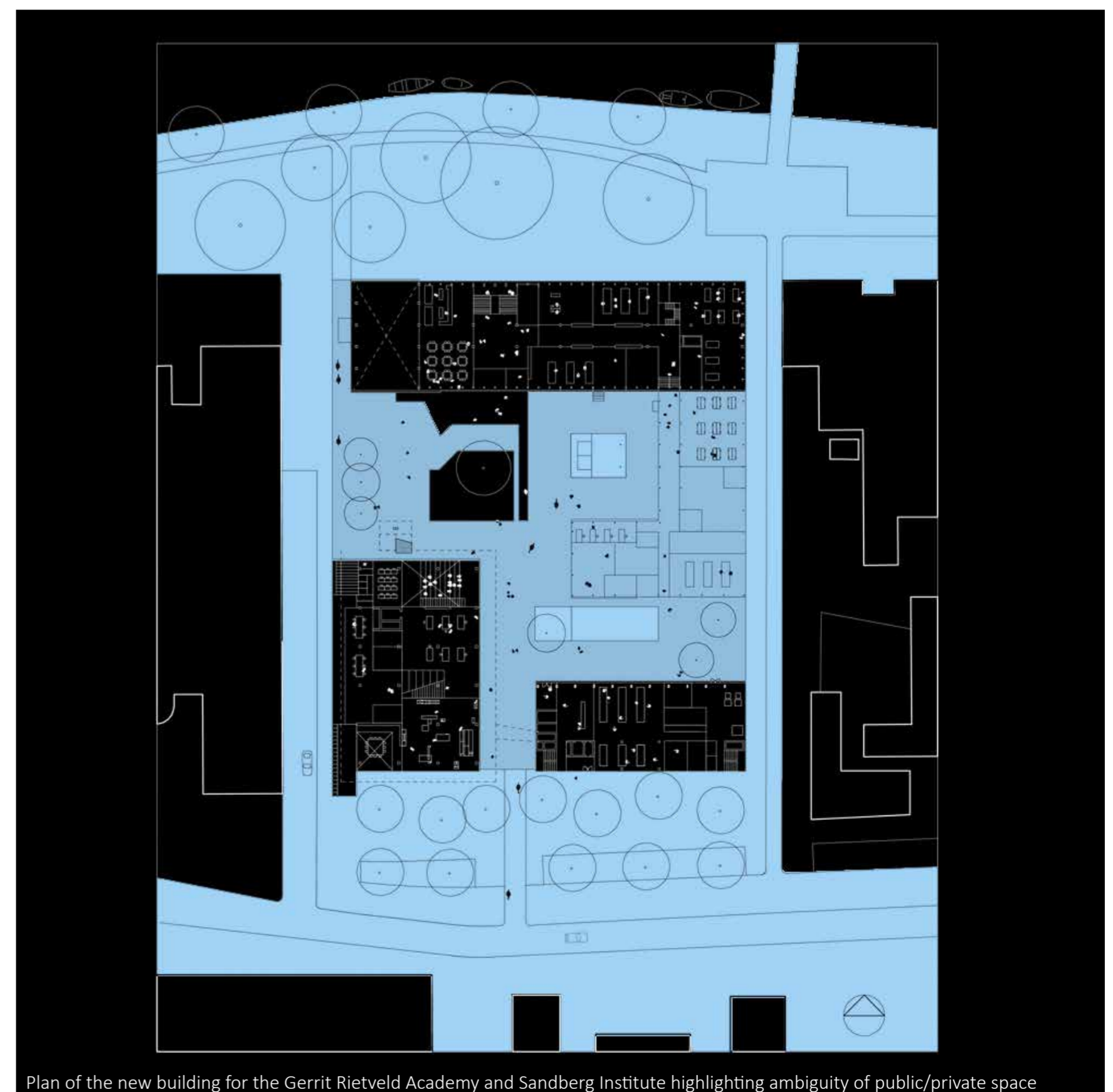
San Diego, 1965

- The Salk Institute displays a **clear boundary** between the private (office and laboratory spaces) and the public (courtyard space)
- The **private** is emphasised by the **massing, orientation and materiality** of the buildings
- The **public** is emphasised by the vast **openness** of the courtyard blending into the seascape
- Both spatial types make reference to the **horizon** evoking a calmness and **focus** required to carry out the research within the institute

New building for the Gerrit Rietveld Academy and Sandberg Institute by Studio Paulien Bremmer

Amsterdam, 2019

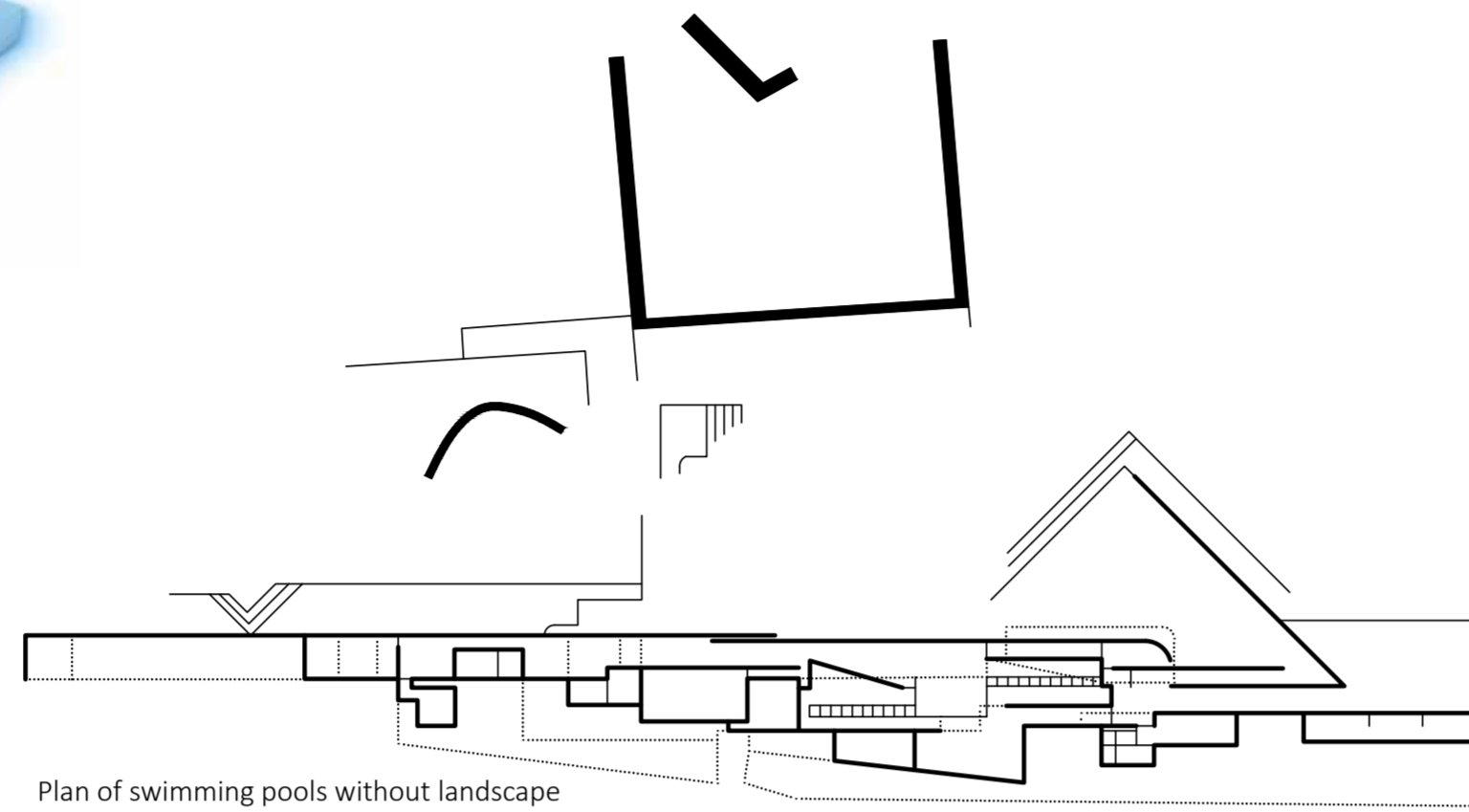
- This project **blurs** the boundary between the private (workshop and laboratory spaces) and the public (street, meeting rooms and circulation spaces)
- **'White spaces'** within the interior of the building used by third party and community groups
- The **permeability** of the facade system emphasises the ambiguity of public/private space
- The architecture promotes a **multi-disciplinary, interactive and dynamic** research and learning **environment** for the institute



Plan of the new building for the Gerrit Rietveld Academy and Sandberg Institute highlighting ambiguity of public/private space

Swimming Pool by Alvaro Siza

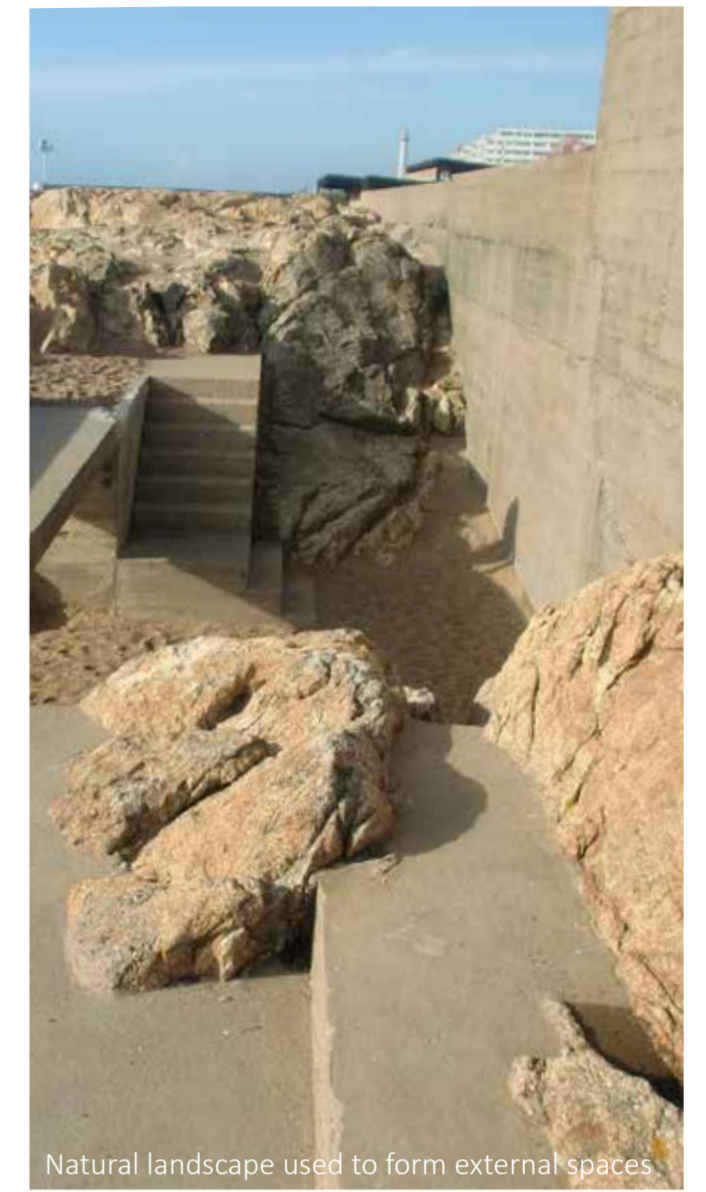
Leça de Palmeira, 1966



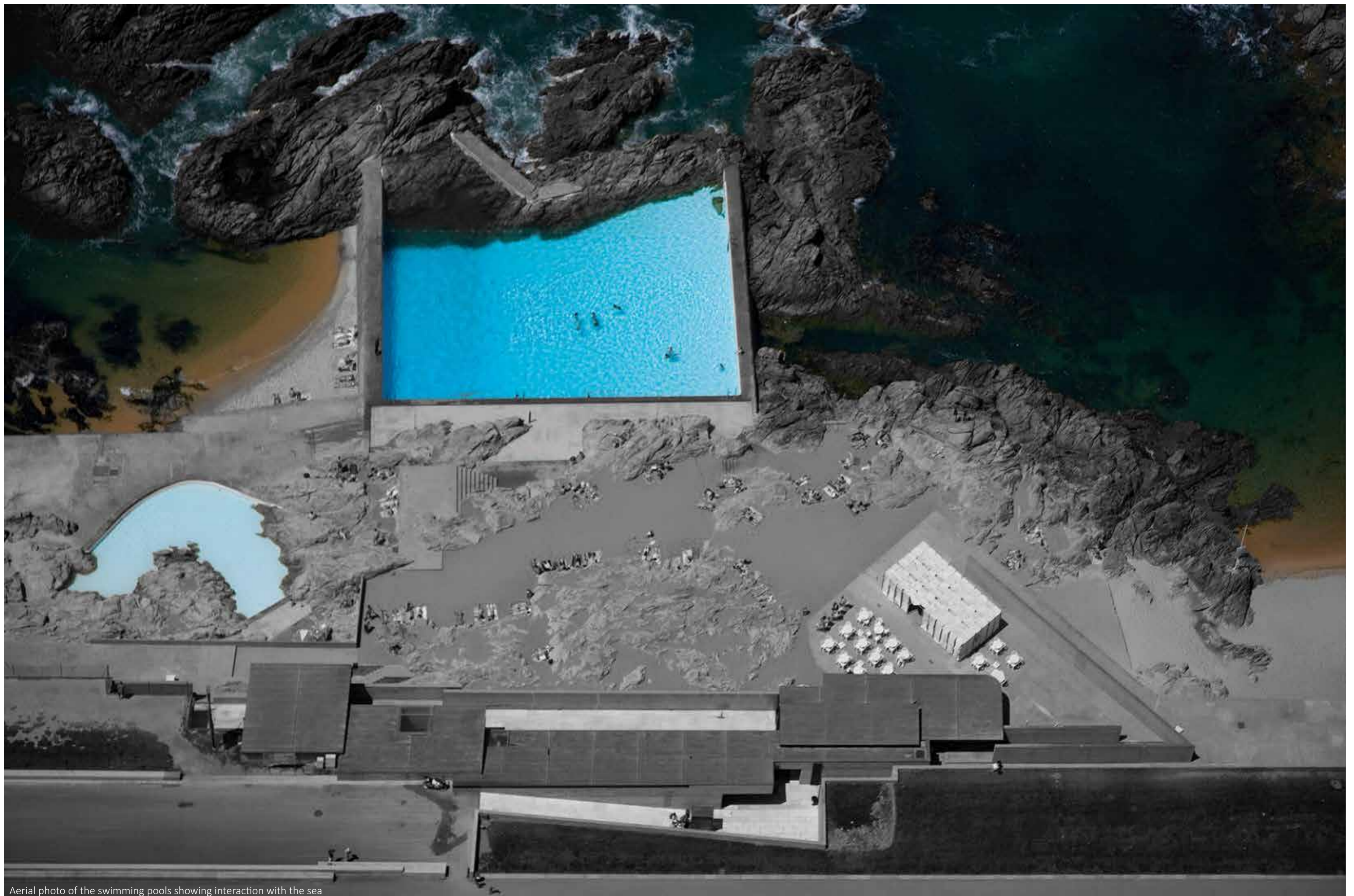
Plan of swimming pools without landscape



Ambiguity between natural and man-made



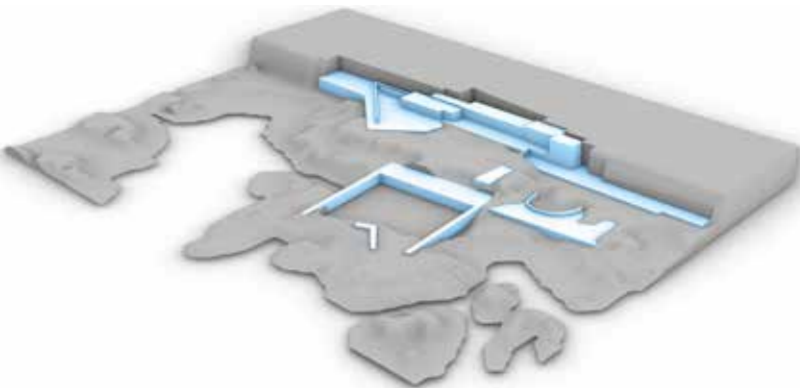
Natural landscape used to form external spaces



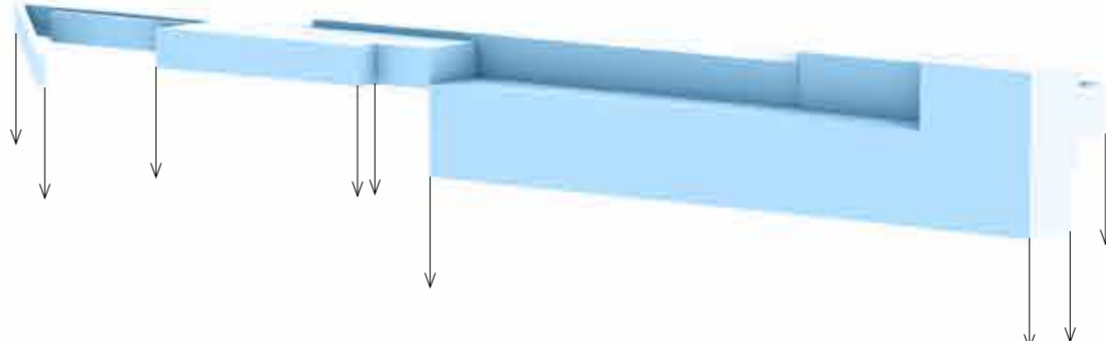
Aerial photo of the swimming pools showing interaction with the sea

Swimming Pool by Alvaro Siza

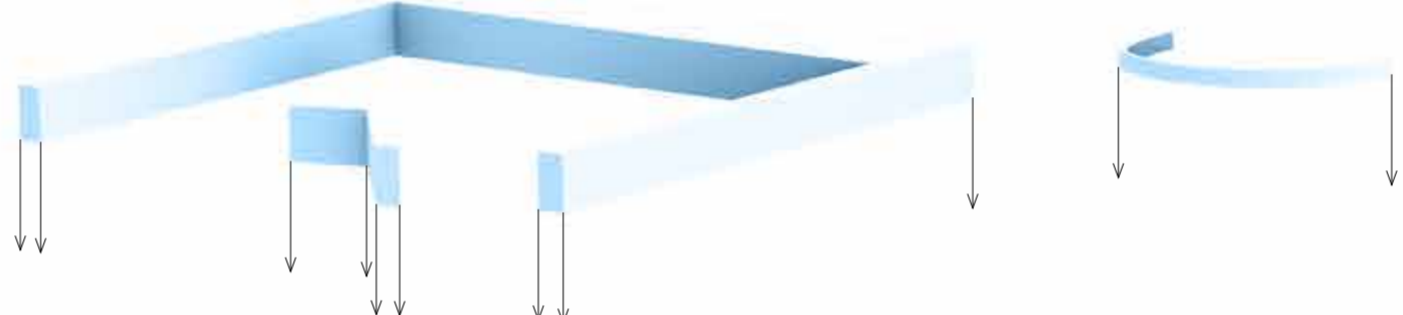
Leça de Palmeira, 1966



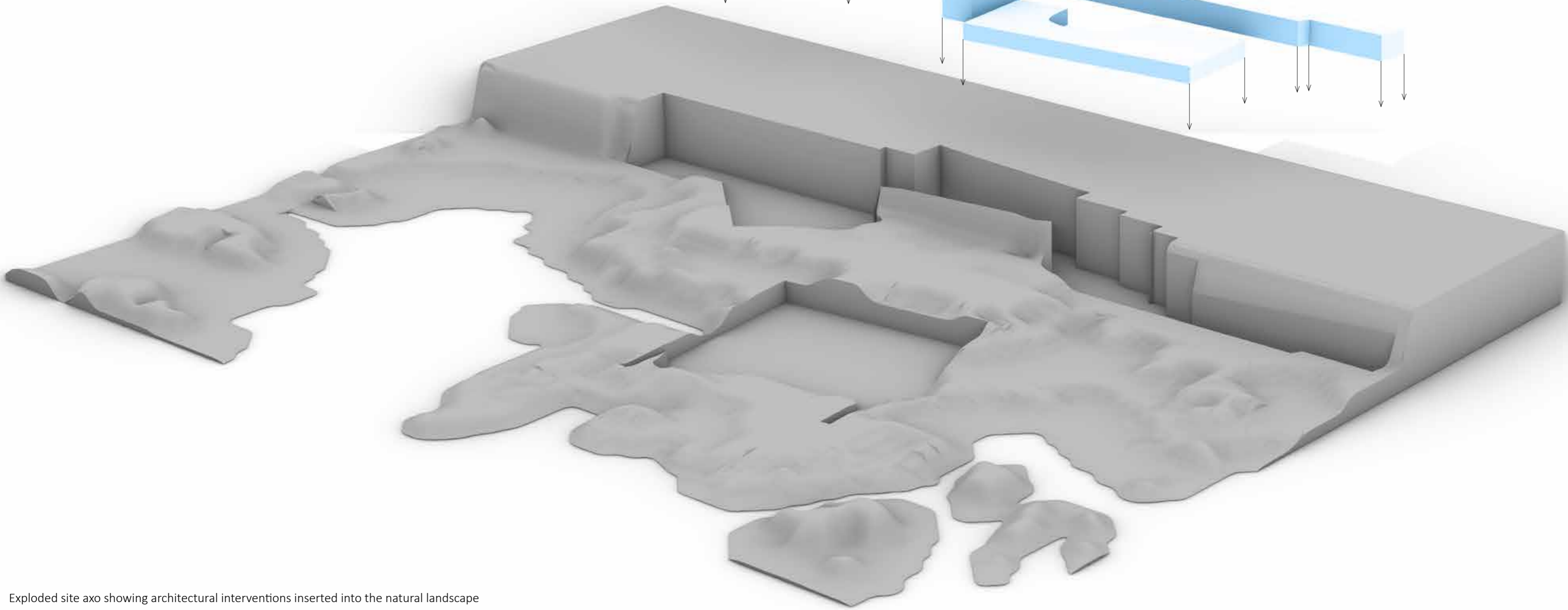
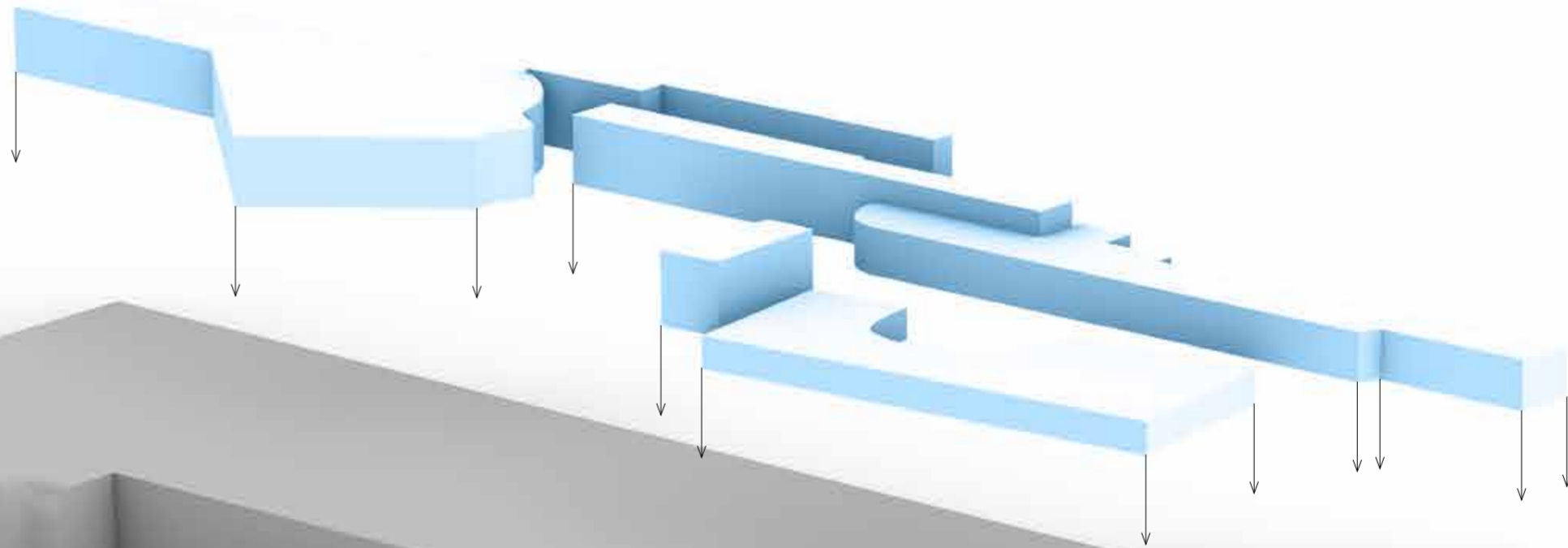
Changing facilities and other buildings layered on top of platforms



Partial boundary walls placed to create pools



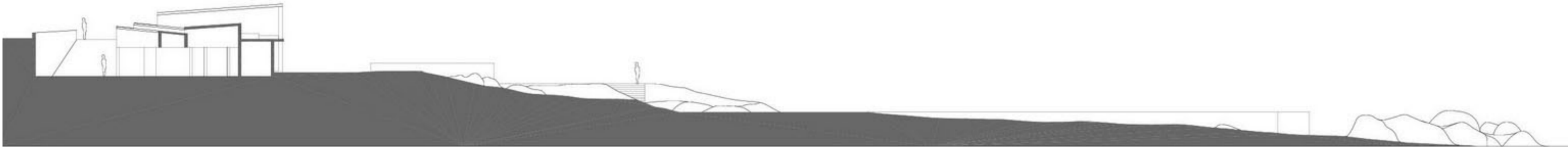
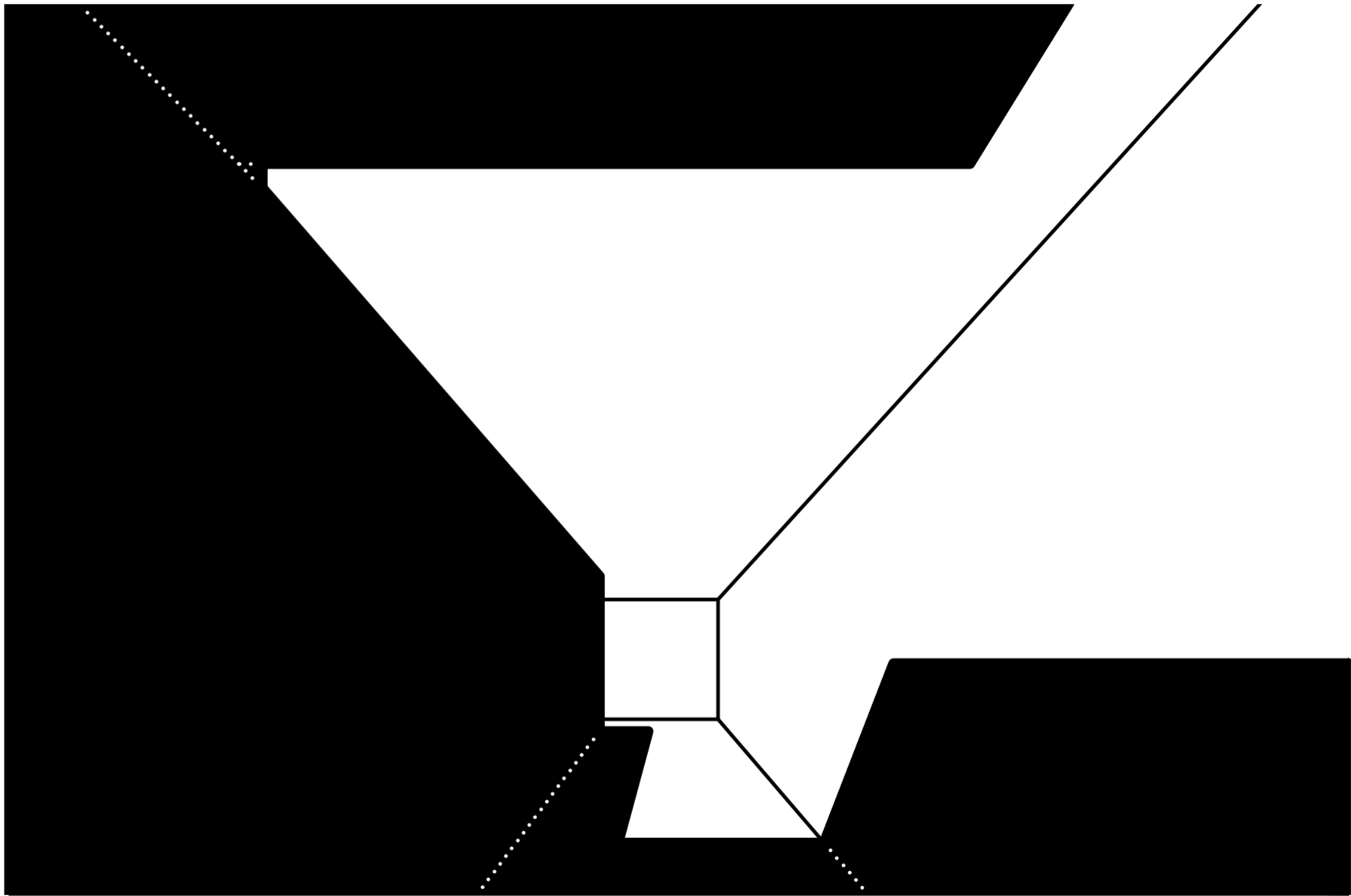
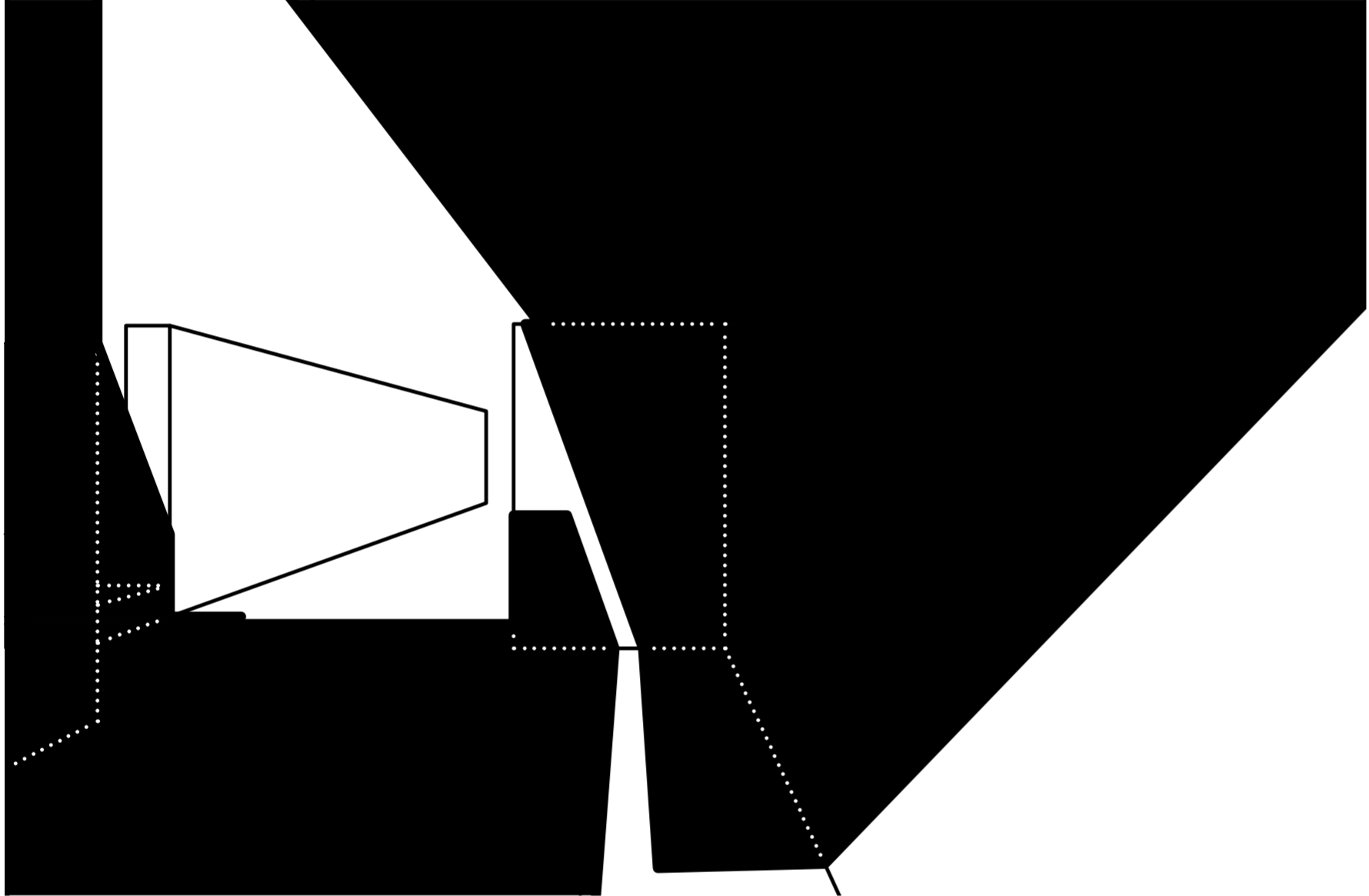
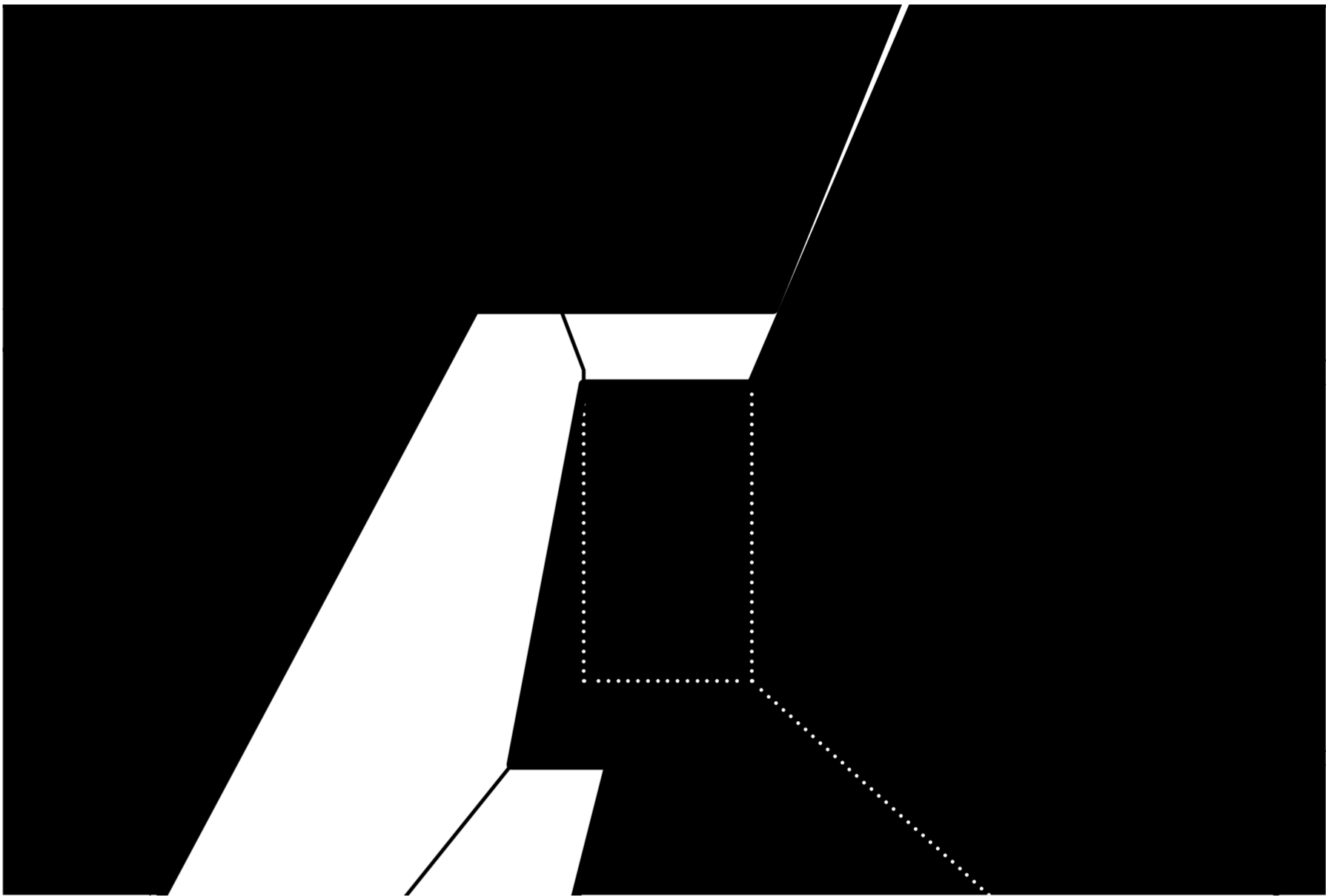
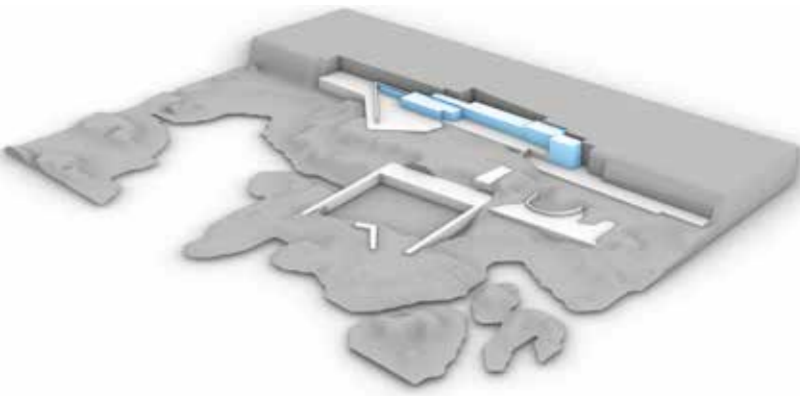
Platforms inserted into landscape



Exploded site axo showing architectural interventions inserted into the natural landscape

Swimming Pool by Alvaro Siza

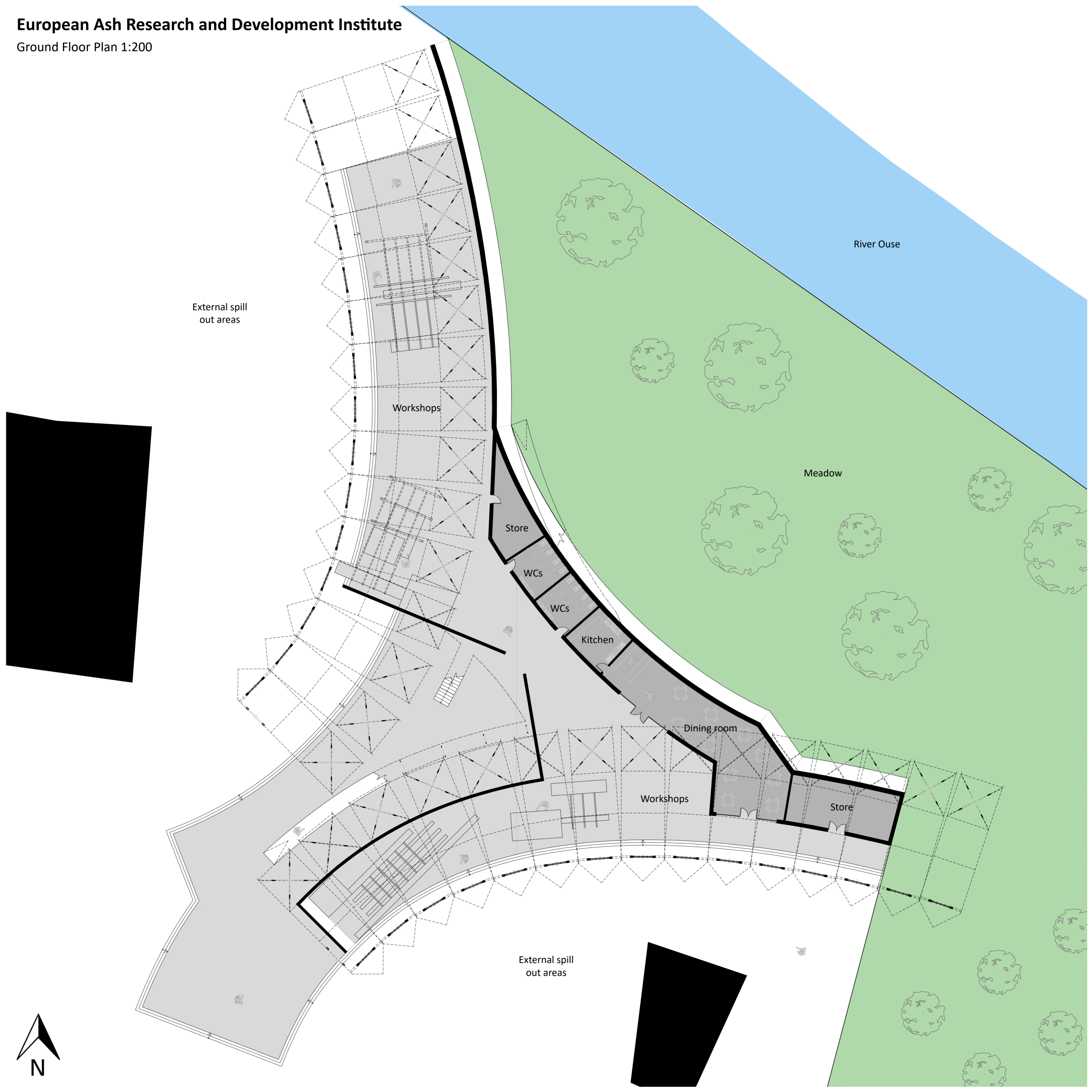
Leça de Palmeira, 1966



Line drawings of light & shade, solid & void and site section

European Ash Research and Development Institute

Ground Floor Plan 1:200



External spill
out areas

Workshops

Store

WCs

WCs

Kitchen

Dining room

Workshops

Store

Meadow

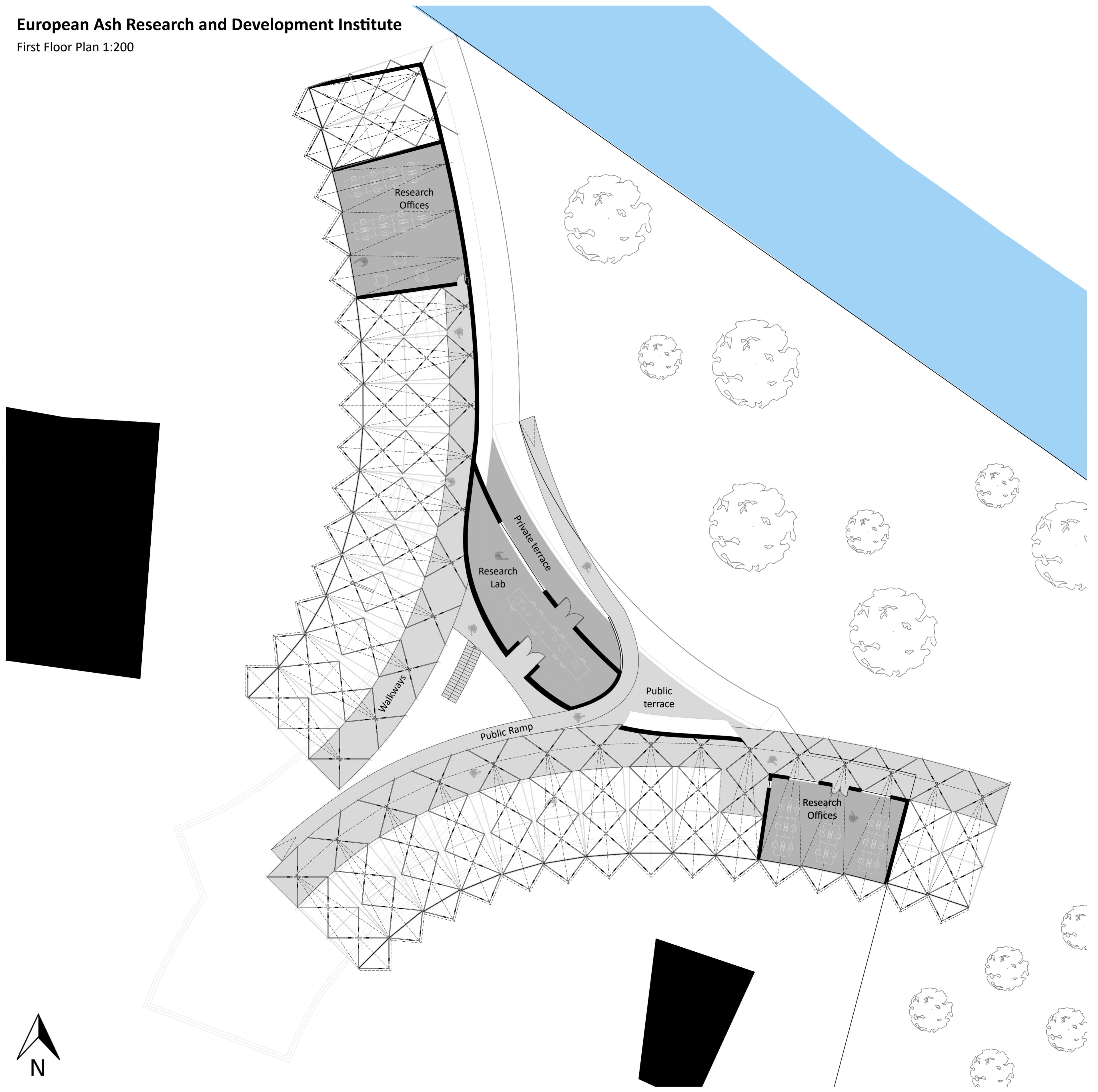
River Ouse

External spill
out areas



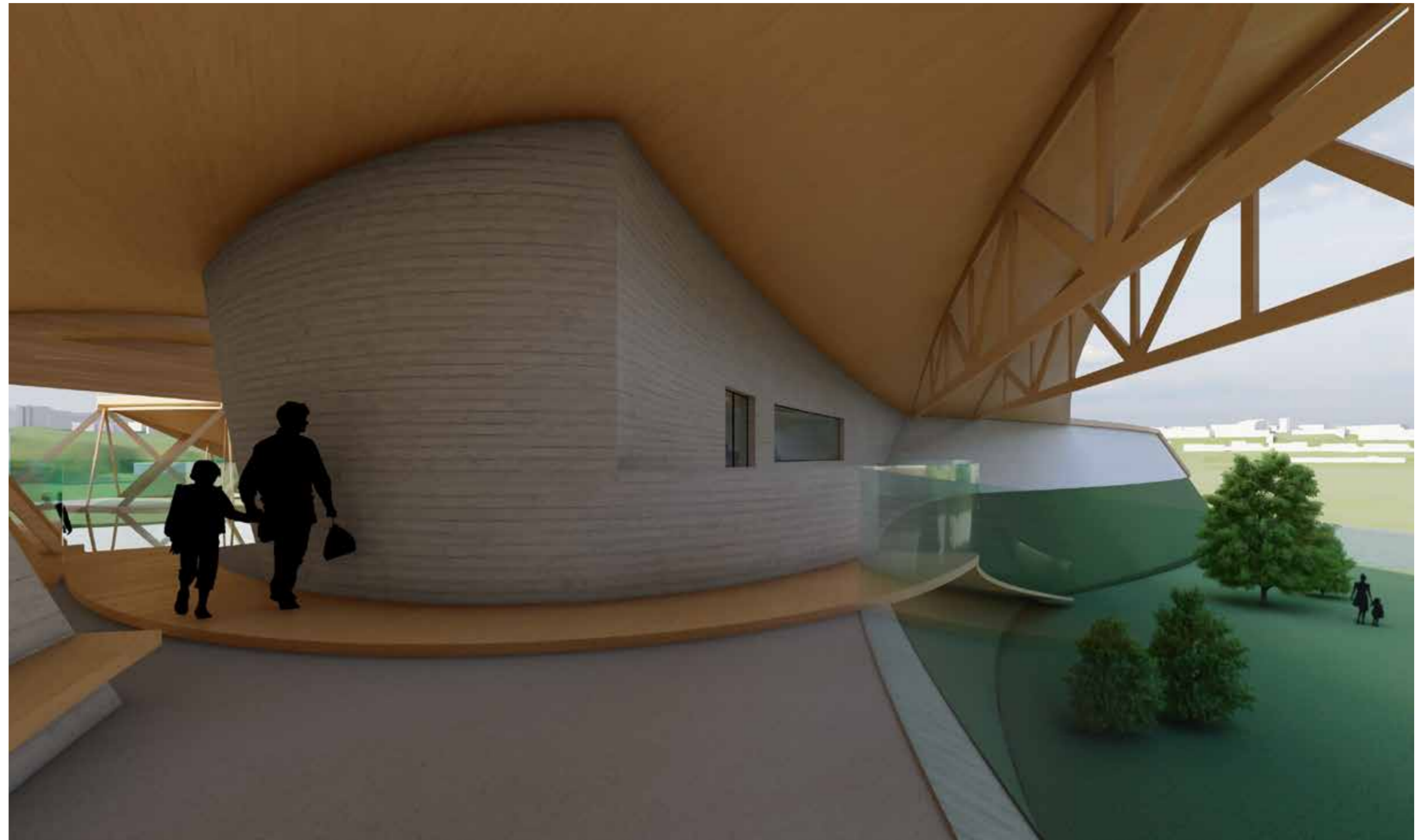
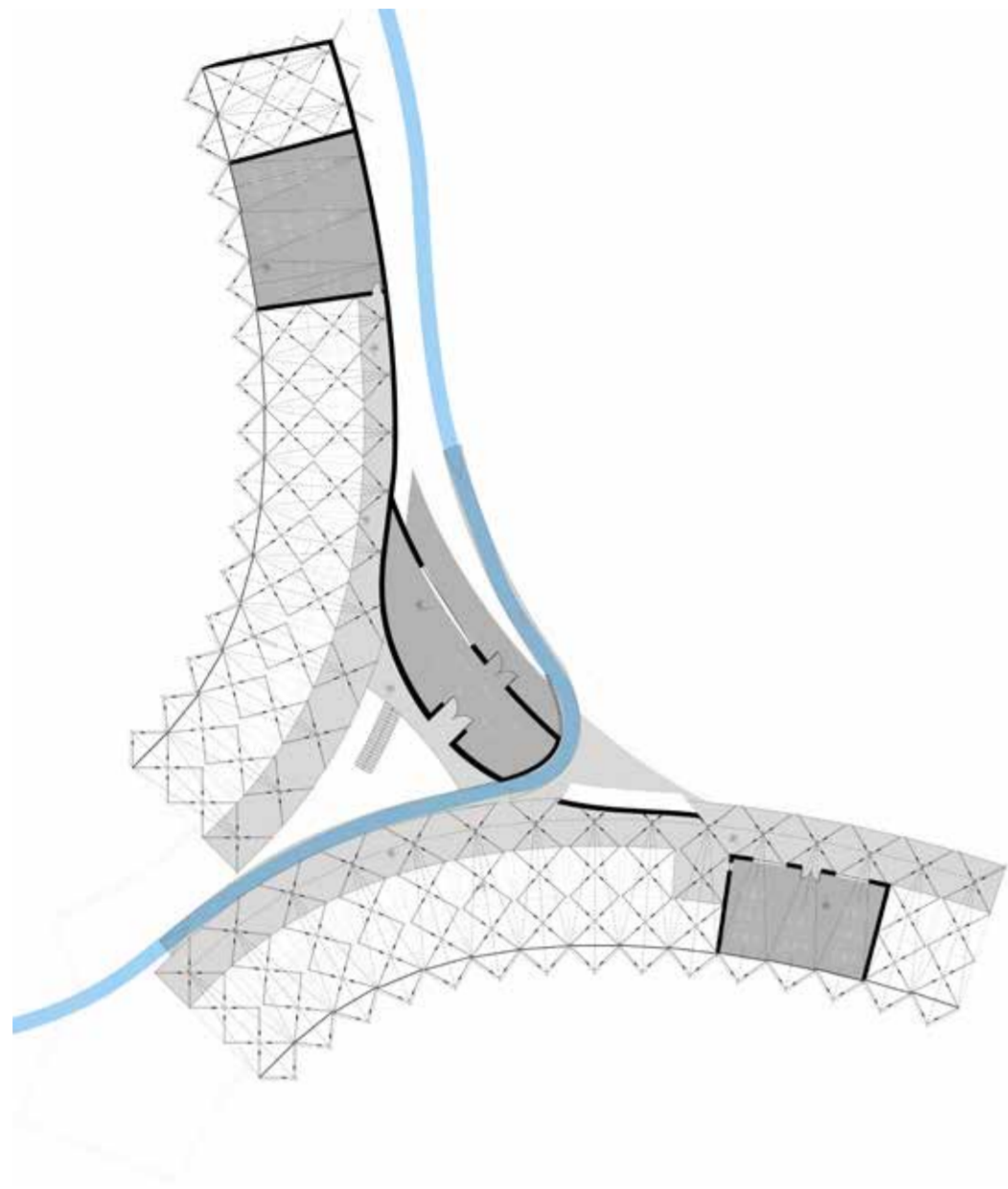
European Ash Research and Development Institute

First Floor Plan 1:200

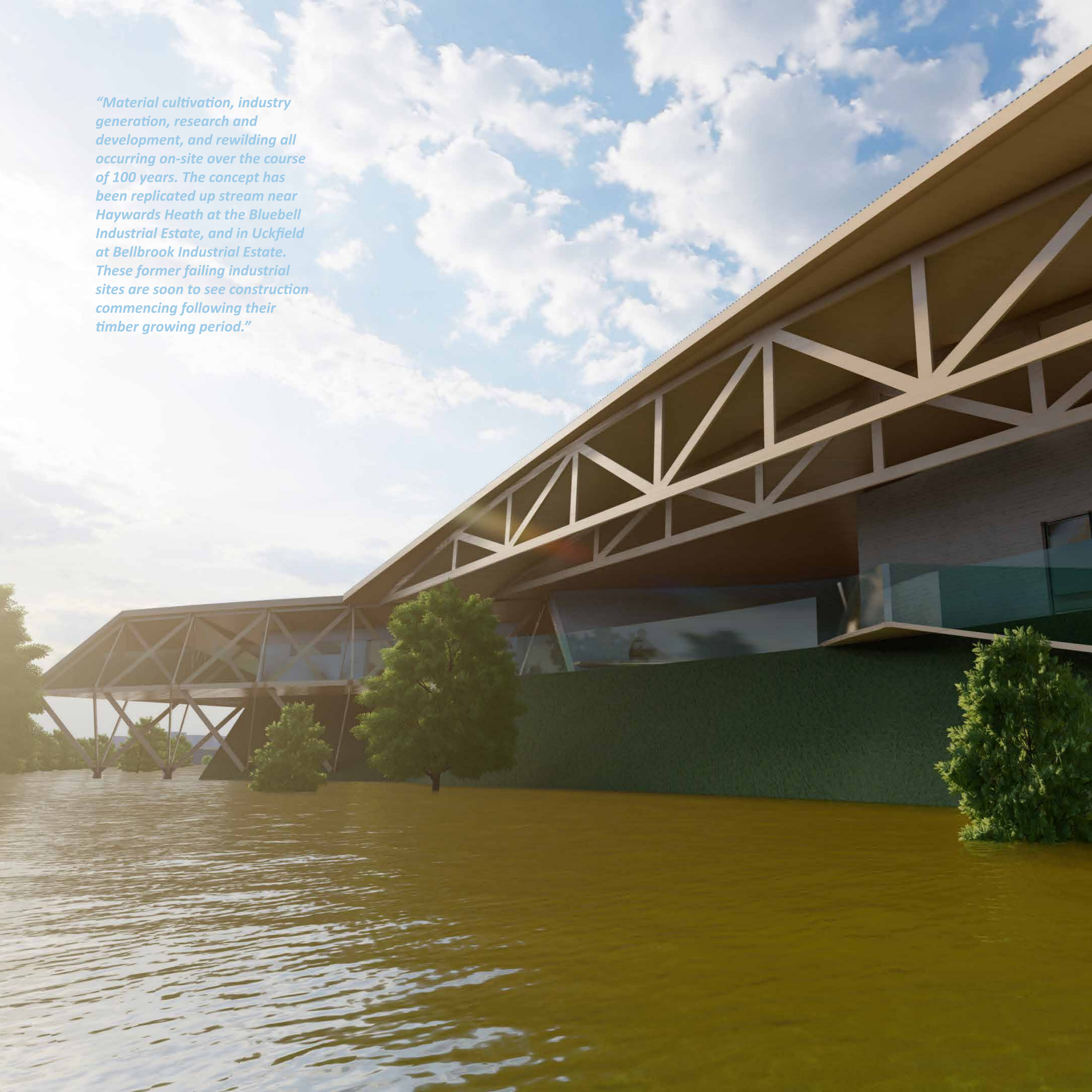


Public/Private

Section 1:200 & 3D Image

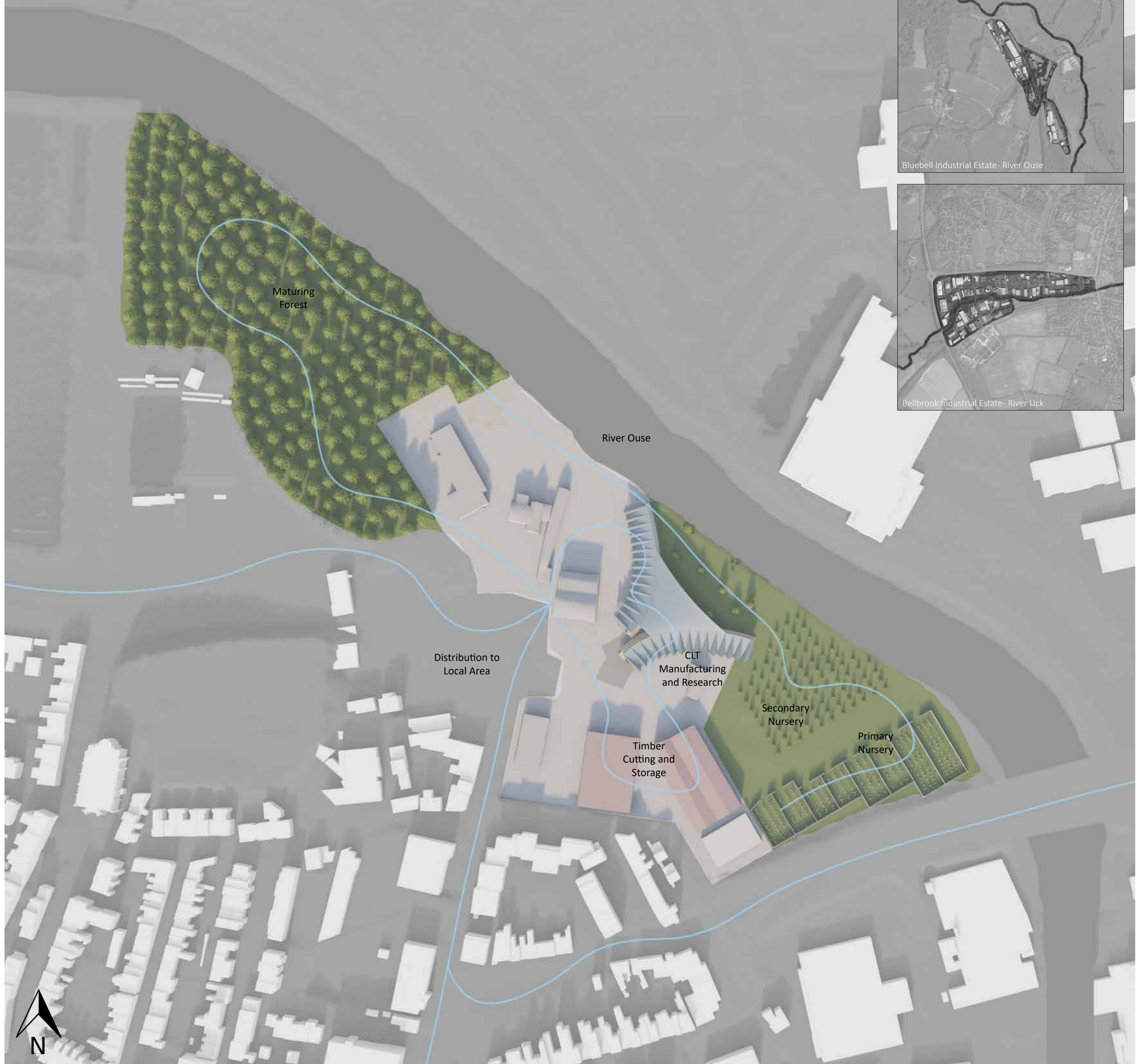


“Material cultivation, industry generation, research and development, and rewilding all occurring on-site over the course of 100 years. The concept has been replicated up stream near Haywards Heath at the Bluebell Industrial Estate, and in Uckfield at Bellbrook Industrial Estate. These former failing industrial sites are soon to see construction commencing following their timber growing period.”



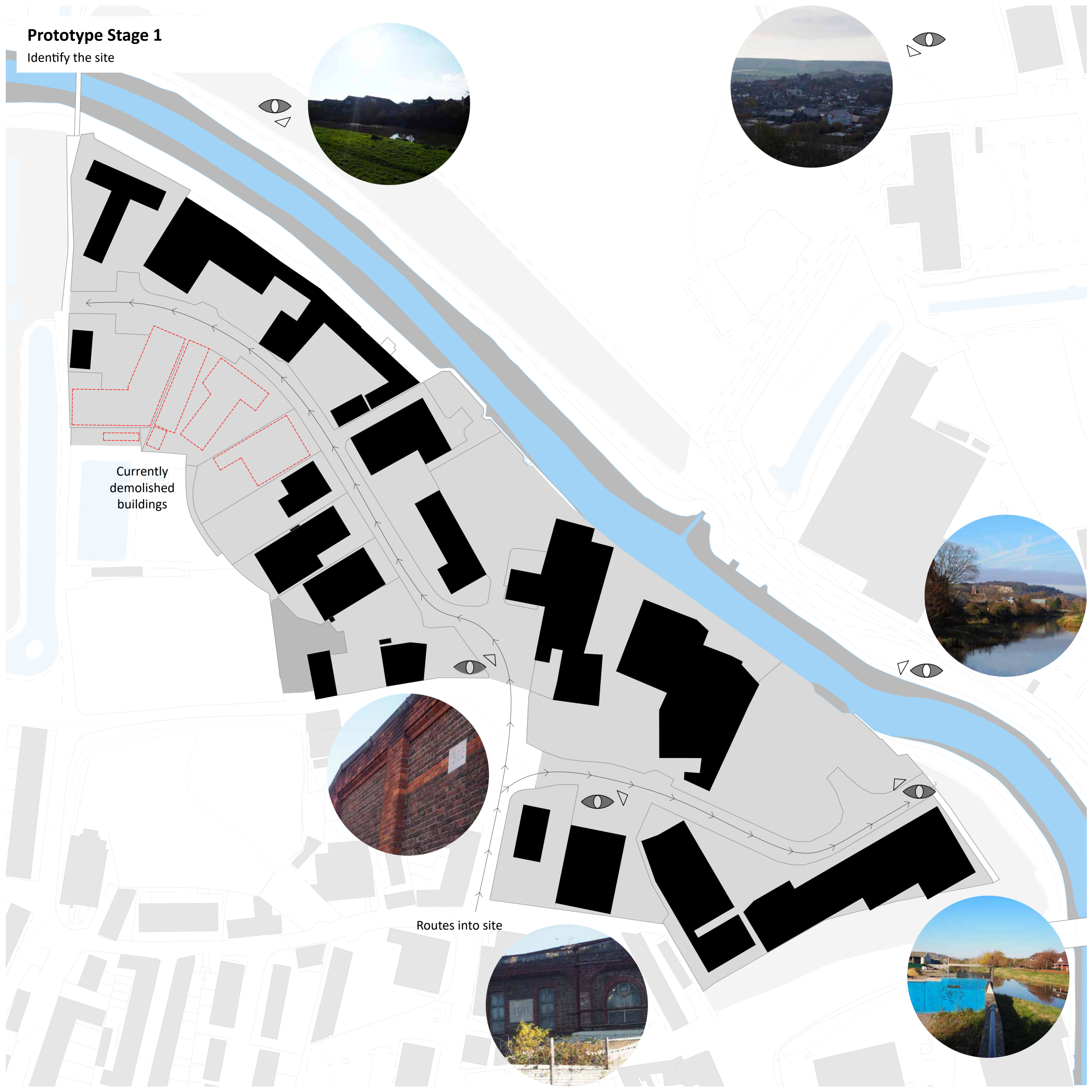
Programmatic Journey

Within site and wider expansion possibilities



Prototype Stage 1

Identify the site

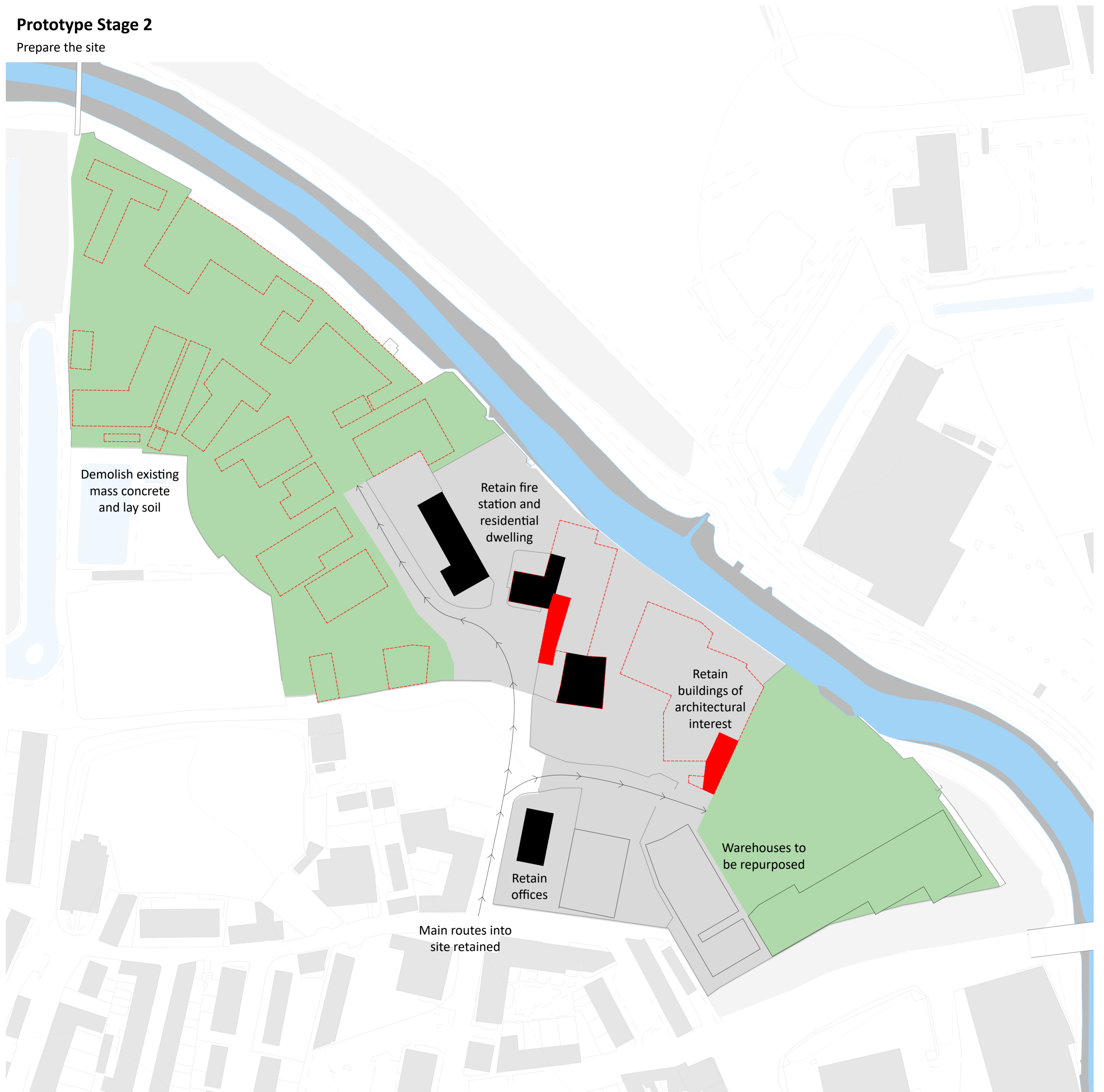


Currently demolished buildings

Routes into site

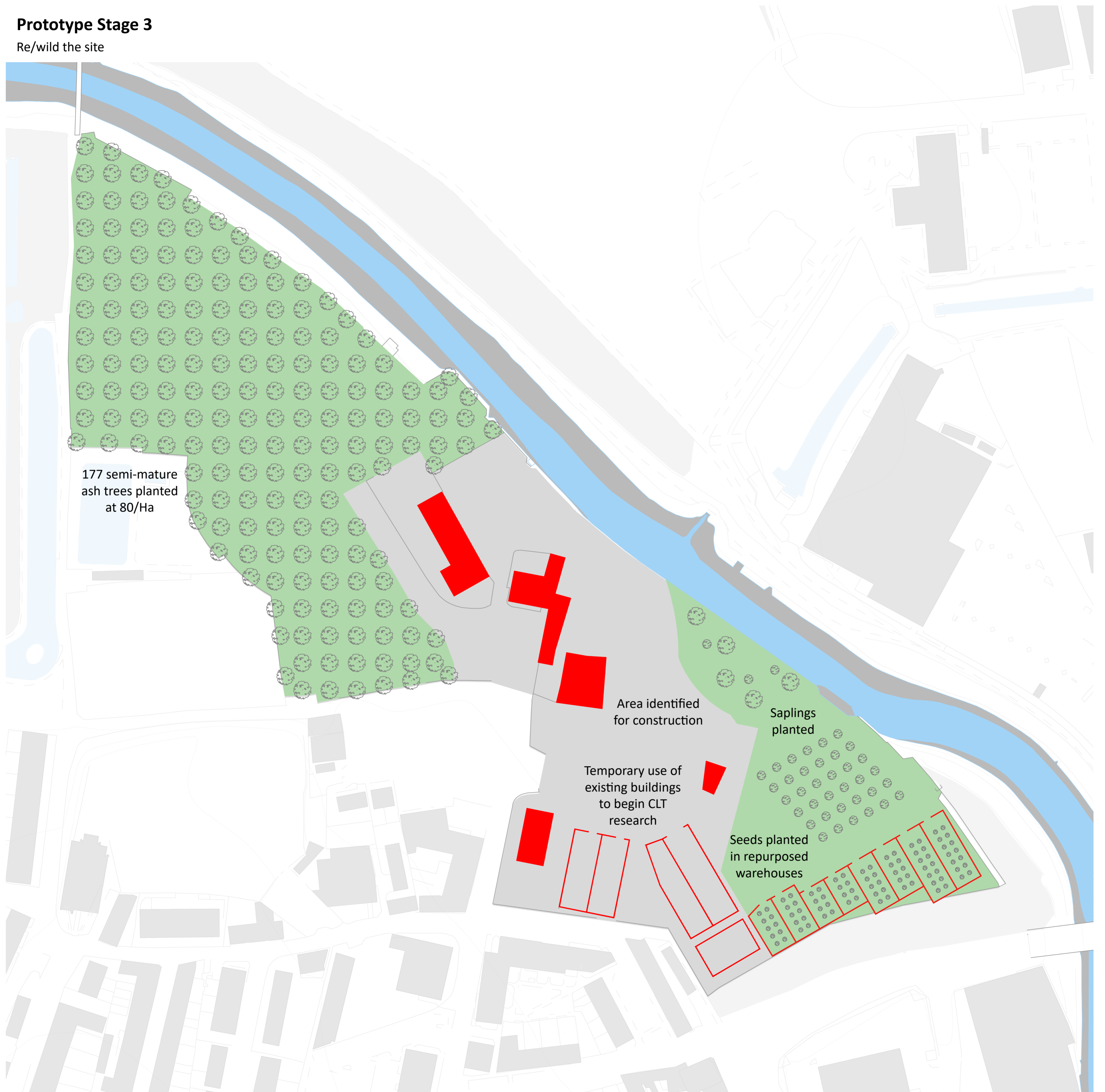
Prototype Stage 2

Prepare the site



Prototype Stage 3

Re/wild the site



177 semi-mature ash trees planted at 80/Ha

Area identified for construction

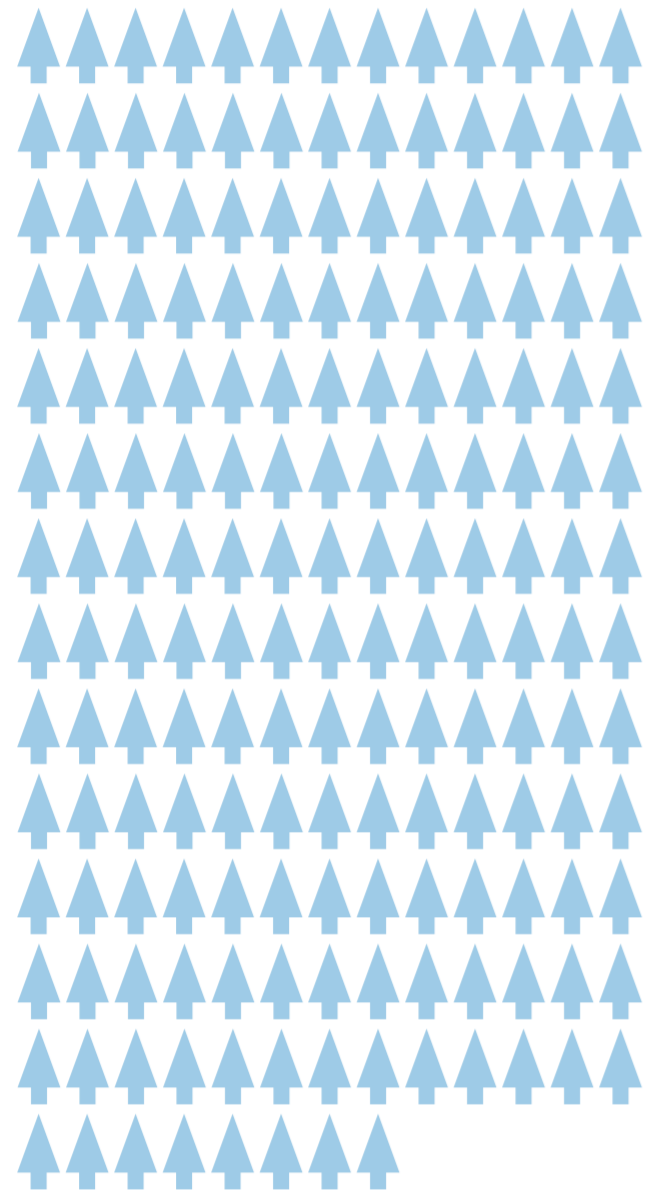
Temporary use of existing buildings to begin CLT research

Saplings planted

Seeds planted in repurposed warehouses

A Case for Carbon Positivity

Section 1:200 & 3D Image



177 European Ash trees

=

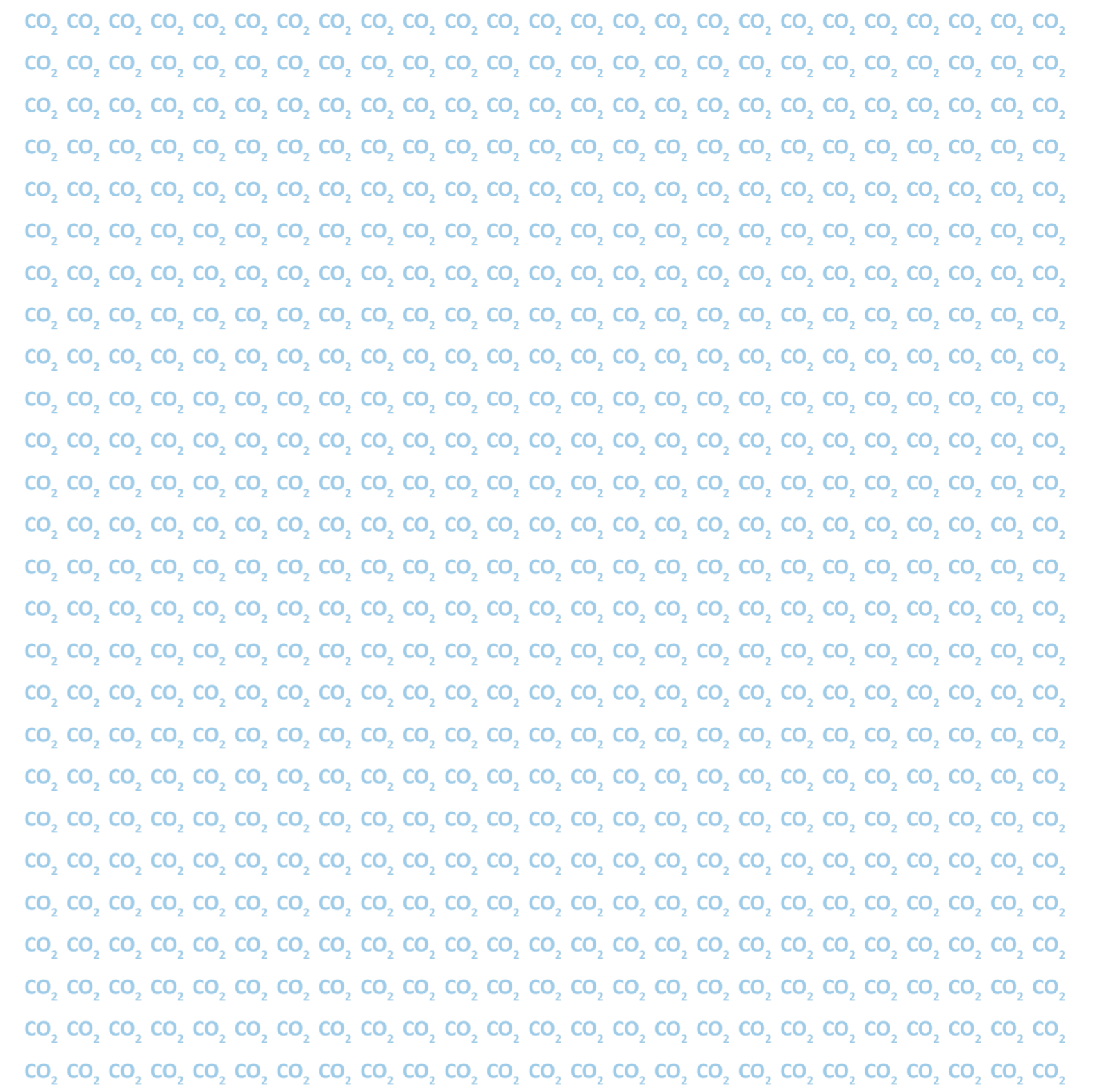
CO₂

CO₂

=

CO₂

30 tonnes CO₂



1,500 tonnes CO₂ in 50 years

||

Carbon footprint of 150 people

Climate impact of main construction materials (2021 average)

- Concrete = 410 kg/m²
- CLT = 80 kg/m²

All the concrete required is salvaged from breaking up the existing mass concrete ground. The timber for the CLT will be grown, harvested and manufactured on-site. As the materials are sourced from the site, there will be no CO₂ produced from transportation.



European Ash Research and Development Institute

Grown from the site



European Ash Research and Development Institute

Return to nature



“Not only does this project interrogate ‘the threshold’, and not only is it set within the posthuman threshold, but in itself it represents the threshold of an architecture that looks first to the planet we live on, and aspires to give itself back to the natural environment that built it.”

