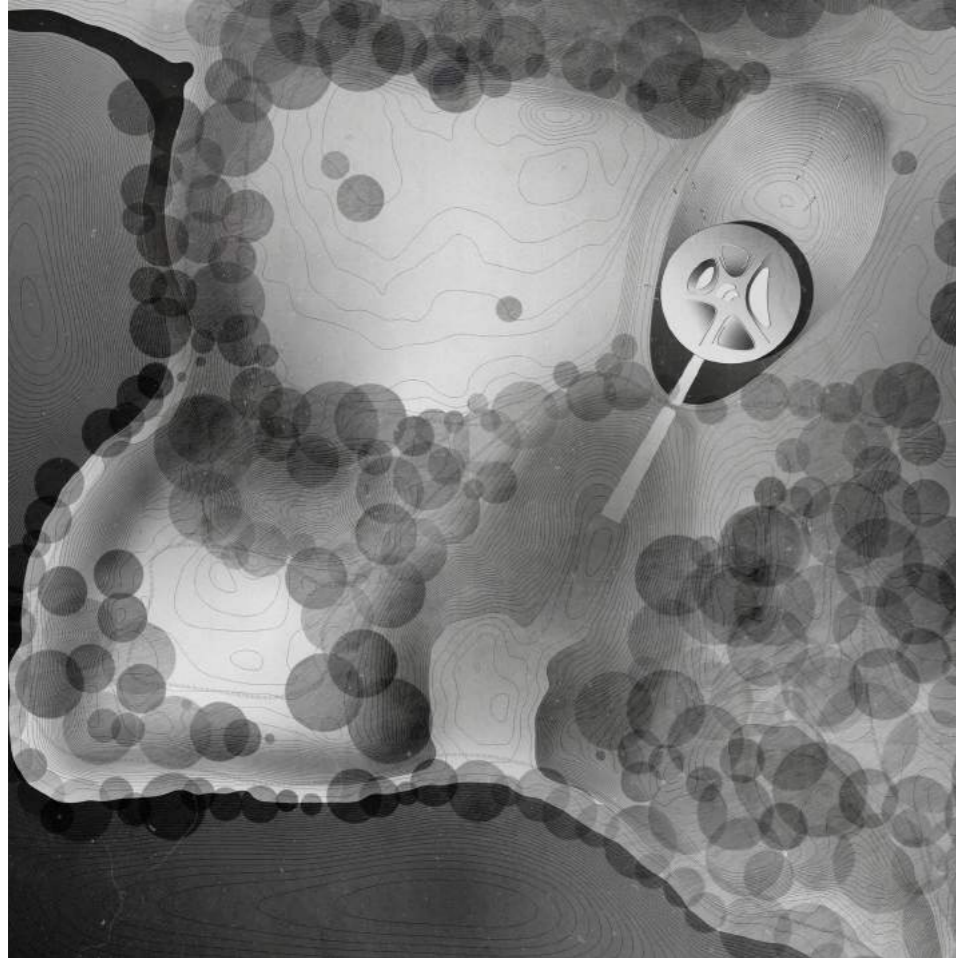




### Dawn Dreams at the Emerald Necklace

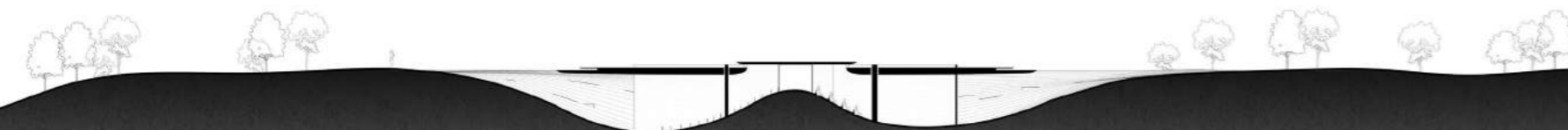


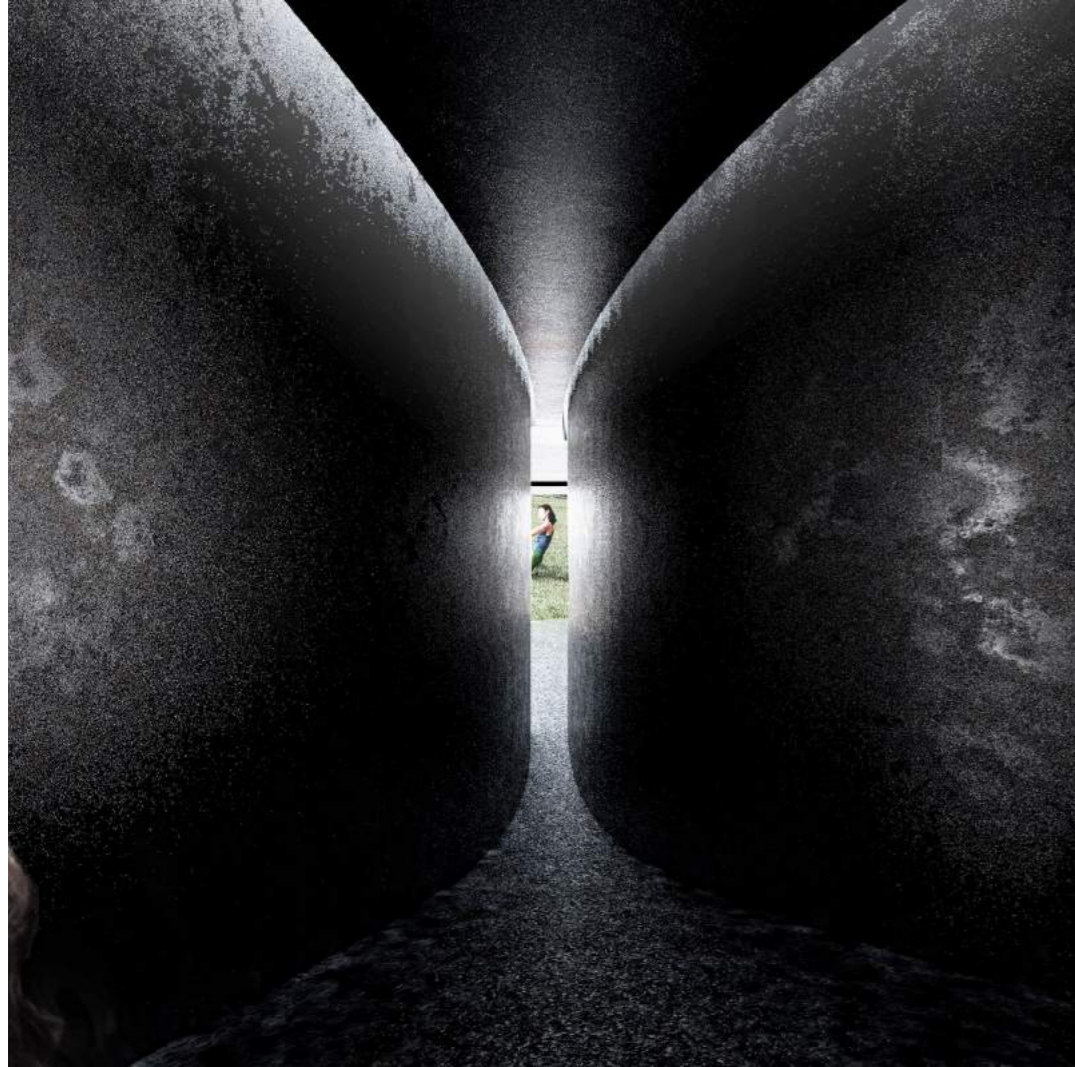
*The fog started to clear, the morning haze still heavy. The early guardians of the park started to appear as my brother and I arrived. It was my first time there so early in the morning. To my surprise, it wasn't silent as I expected. The park was alive, in an unusual way. The park was different at that time of day. It was hours later, when the city would wake up and the daily transformation took place. We followed a path by a large pond. The pond was frozen and reflected the pale blue colour of that morning daylight.*

*We were unsure and worried if we were in the right place until we approached an opening in the landscape that pulled us in. It felt like the ground had wrapped to allow us to gravitate towards a sunken space ahead. As we were lowered in, I sensed the everyday continuing to cross over and inhabit the park above me. I was leaving the park as I knew it. The space was dimming down as we walked past and under the hovering disk. Our progression was gradual, I was unaware there were so many of us following this same path, as we slowly flowed as a unified body into the ground, activating the crunching sounds of the gravel.*



MIT Core 1  
 Fall 2019  
 An interactive performance and theatre  
 Instructor:  
 Brandon Clifford





*We were confronted by a curious and eerie mound. It seemed to have always been there. What lied behind it was unknown though. We followed a wash of light and crawled up and around the mound, taking our positions, sitting still in silence. All we could hear was the murmur of anticipation in the crowd, craning our necks to see the falling leaves through a narrow slit of light between the walls.*

*Suddenly, a figure appeared, revealing to us where to look. It flickered in and out of view, too quickly for me to comprehend what was happening. Eventually, I started to read the movements better. I realised it was more than one figure. They slowed down with the passage of the performance, the articulation and gestures of their hands and necks were clarified and the focus was intensified on every slight move. They were dressed with layers of light sheer fabric. Their figures were obscured by the thin flowing material.*

*The figures were imitating the ground around us, gently beckoning us to follow them. We moved to a looser array, and more was revealed. The figures flashed across the 3 slits. Our last movement drew us out through one of the slits. I was pressed against the lady with the young girl as we exited into an open space.*





*We could now see it all. Uninterrupted, clear view of a performance that was build up to a climax we never received. The performer disappeared and it took a while to realise that the performance had ended. We were back in the park as we knew it. The pond started to melt. The day had commenced.*

## The politics of stacking

Can architecture **visit** the land ?

On the coast of Maine's Mount Desert island, home of Acadia National park and the Wabanaki people's sacred land, we propose an architecture that questions ownership and permanence. This architecture of transience, encouraged by the responsibility of building on indigenous lands, is achieved by stacking locally sourced materials. Offcuts of stones are scavenged from Crotch Island quarry, and Hemlock logs are sourced from the thinning of local forests. They are not mere material commodities in the architecture, but objects with personalities. The material and their elemental deployment will express different narratives through their assembly and eventual disassembly on Dorr Point. This primitive assembly, otherwise known as cribbing, acts as a storehouse for matter to be used in future architectural and agricultural application. It is an architecture that will visit rather than eternally impose itself on the site of Dorr Point.

MIT Core 3

Fall 2020

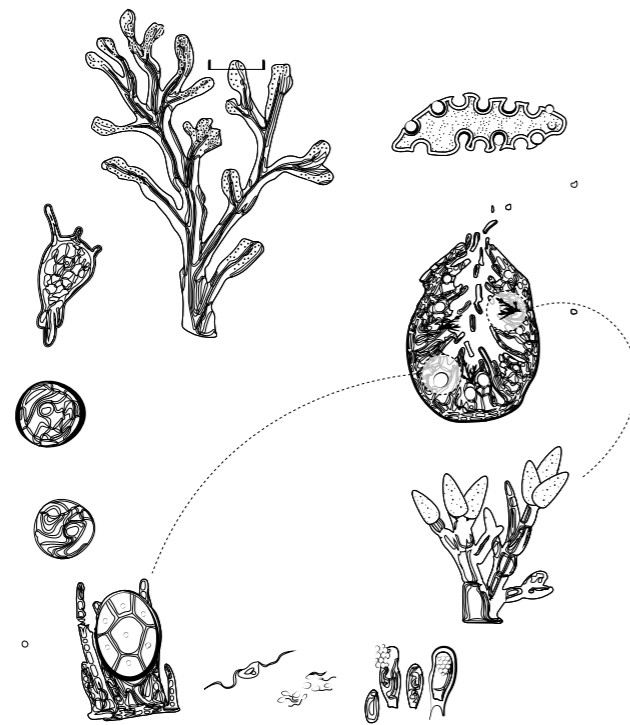
A seaweed farm and processing facility in Dorr Point, Maine.

Group Project with Natalie Pearl, Tim Cousin and Wilson Marshall.

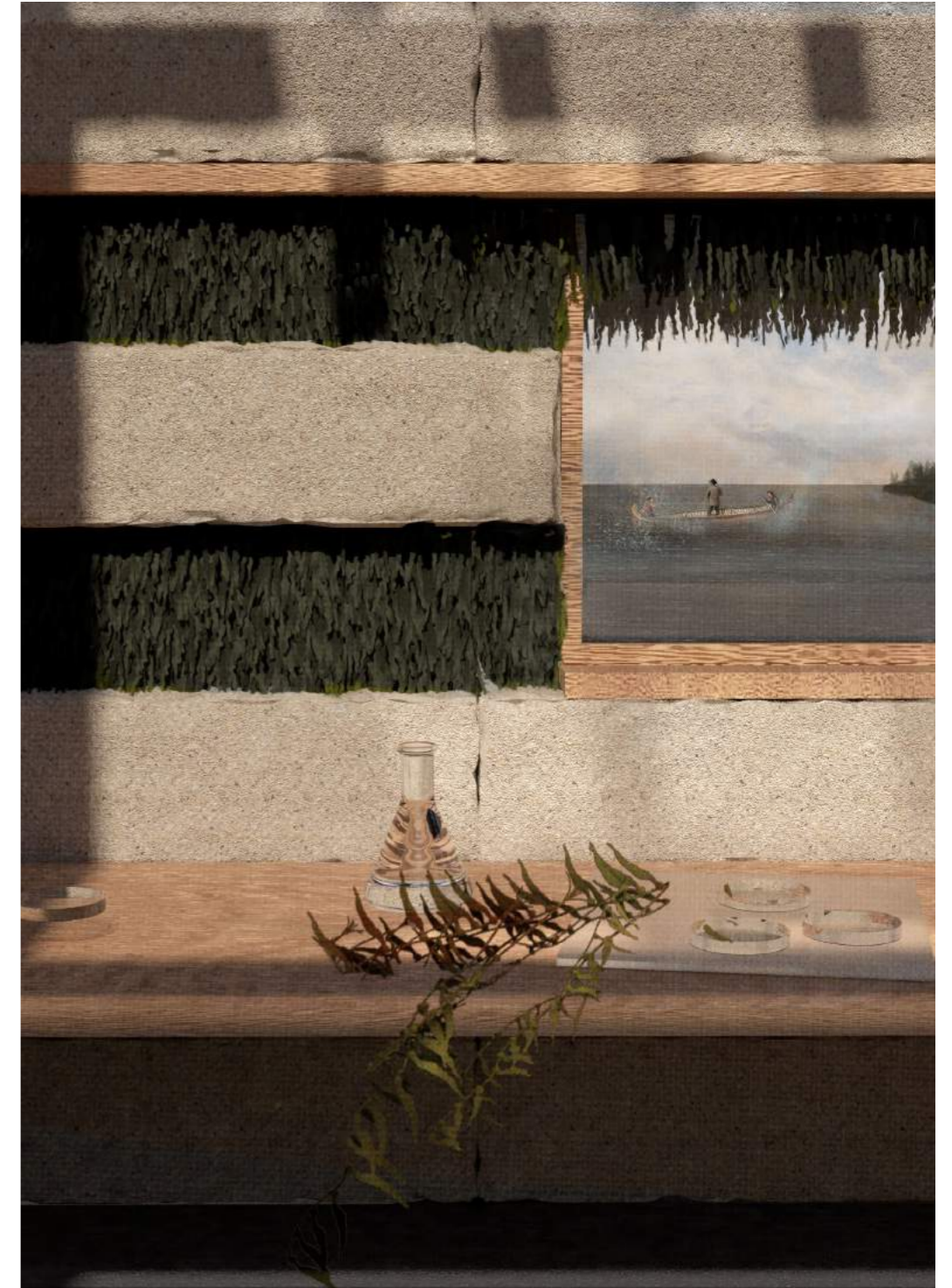
Instructors:

Sheila Kennedy, Cristina Parreno and Rami Al Samahy

*\*All images were rendered and post processed by Latifa, with the exception of the top left, which involved all group members. 3D modelling was done collaboratively across the team.*



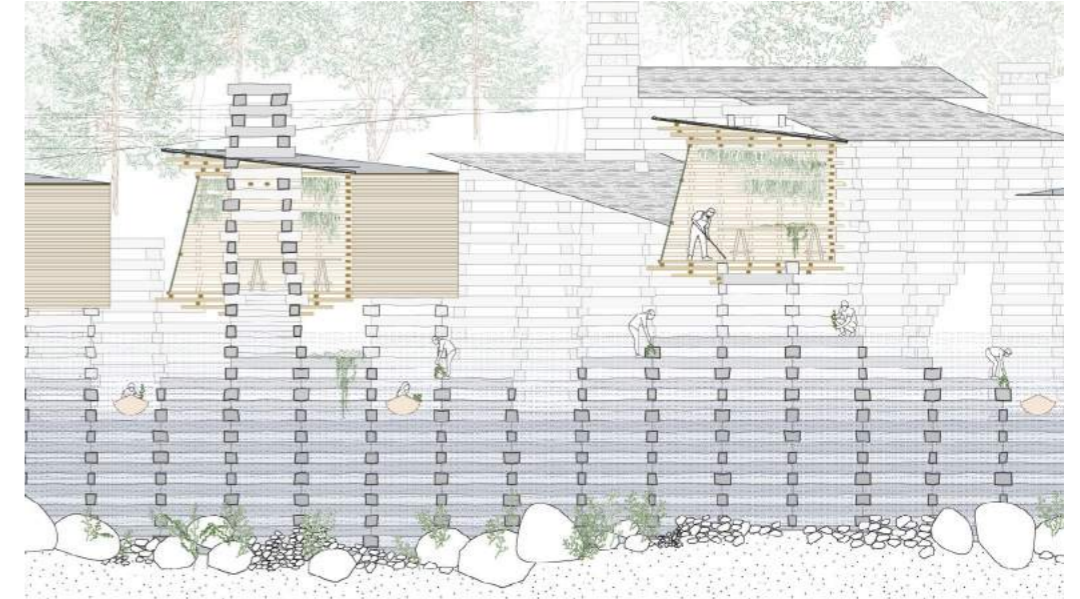
Seaweed Life Cycle





The ownership, or lack thereof, will be dictated temporally and seasonally. The cribbed stack is paired with the seasonal deployment of seaweed as insulation and waterproofing to be operated as a seaweed harvesting and processing facility in winter and a Wabanaki space in summer. This shared structure will welcome communities within the transitional seasons of fall and spring. Stacking and cribbing, as a repetitive system, has been eroded and provoked to create program-matic spaces. Where stone can't span, the constructive system continues in timber, both materials merging into a hybrid form. The goal is not to designate spaces for these communities but to make these communities spatial.

Permeable at times and enclosed at others, the stack serves human visitors as well as the coastal ecosystems among the foundational stone cribbing, spreading as an inter-tidal garden joining land, coast, and ocean. As ecosystems are restored and expanded, sustainable harvesting of the seaweed and other coastal life will occur on site and within the complex. The architecture will address the coast's temporal nature, dancing with the tide, allowing its highs and lows to be experienced, and utilized programmatically in the farming and processing of aquaculture. This stacked architecture is temporary, and dynamic not only in construction but in its response to the environment.





## Algorithmic circular design with reused structural elements: Method and Tool

Abstract:

Structural systems are responsible for a significant portion of embodied carbon emissions in buildings. A potential path to increase sustainability is to integrate circular economy principles in structural design, which advocate for prioritizing the reuse of structural materials to extend their service life, limiting their physical transformation to locational and functional changes. In this way, structural projects of the past can not only serve as an inspiration for the future, but the material itself can also be reappropriated. Recently, computational approaches for material reuse have gained traction. This paper extends previous work by comparing several algorithmic formulations for reuse-driven design, introducing a new Grasshopper-based tool that implements them, and demonstrating their application on a case study. structural value considered.

Independent Study Spring 2021

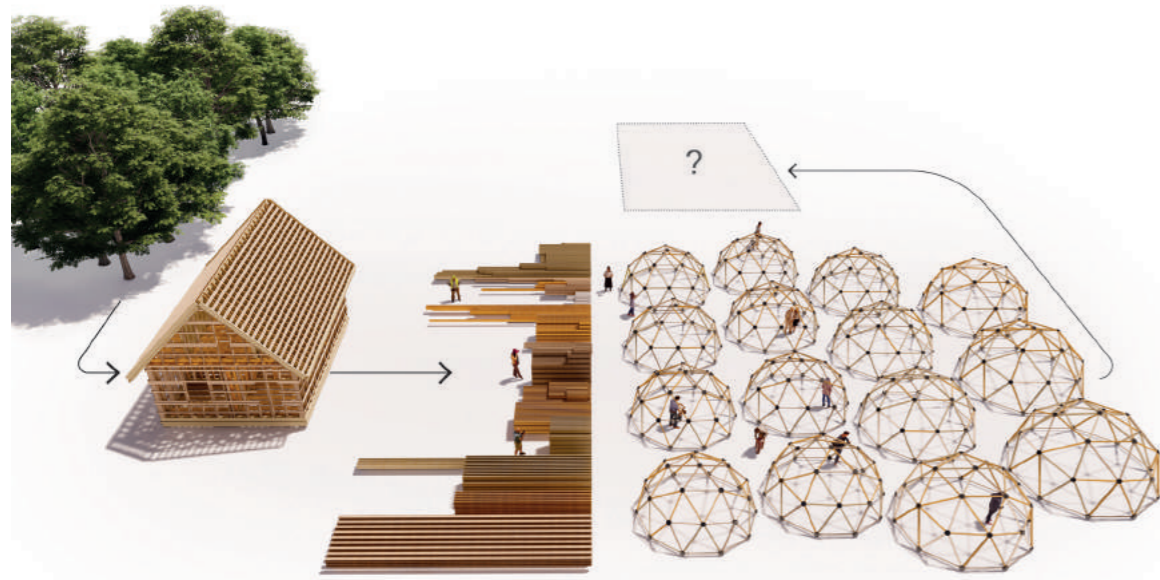
Co-authors:

Caitlin Mueller

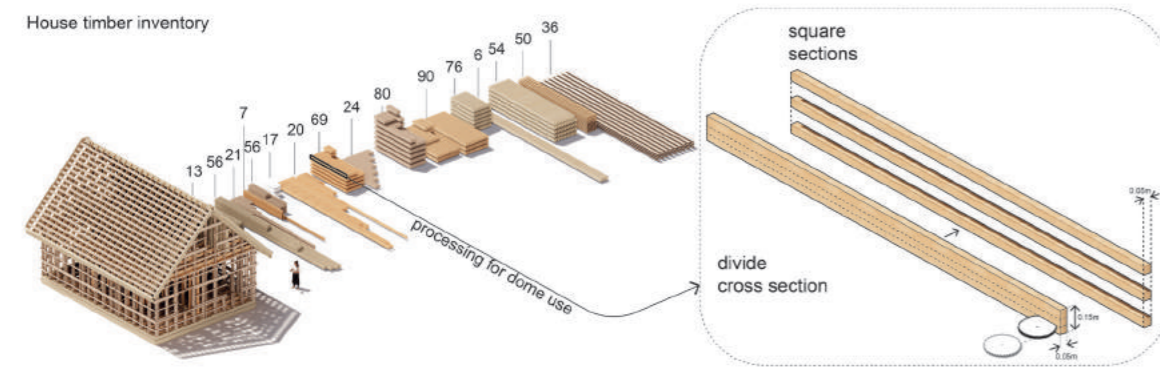
Catherine De Wolf

Yijiang Huang

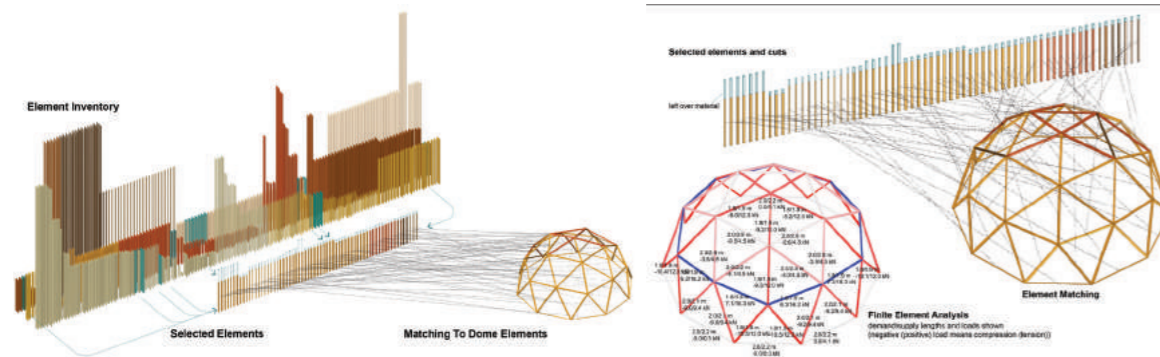
All illustrations drawn by author with  
Yijiang Huang.



Theoretical Circular Process of Reuse

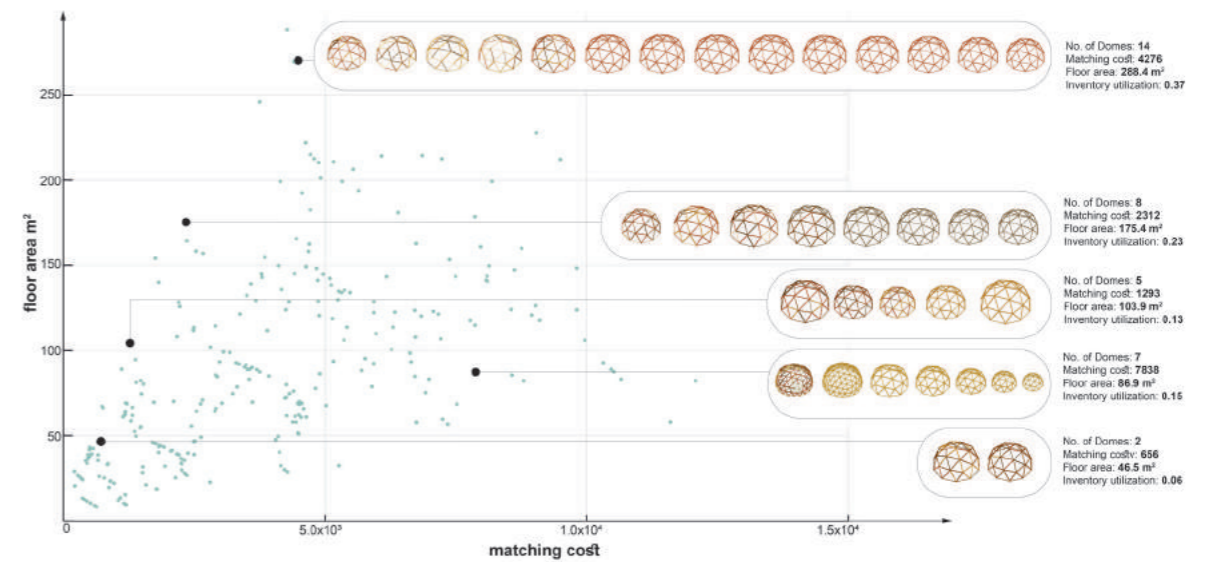
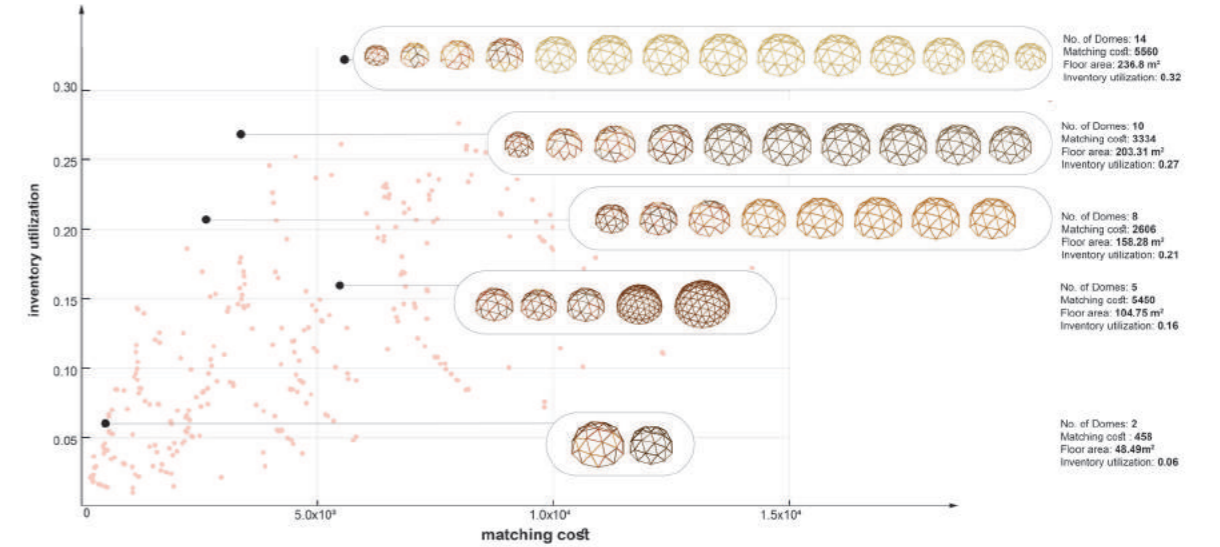


Cutting of the elements into square sections



Matching of elements from the library to the dome

Finite Element Analysis determining element section size used in the dome



Top: Multi Objective Optimization for maximum inventory utilization and low matching score for element length and structural section size. Bottom: Multi Objective Optimization for maximum floor area and low matching score for element length and structural section size.



### Wild Wood Solar Kiln

**Abstract:**

This research proposes a computation workflow to build architectural structures with non-marketable bifurcated tree branches. These branches often have small diameters, crotches, knots, and kinks. They are non-standard, and therefore, difficult to build with. A digital work environment was created to pair human intuition with optimization and construct a shell structure from bifurcated three-chord tree branches. This workflow includes, digitally scanning a material inventory, processing the digital inventory, matching inventory onto a target structure with the Hungarian Matching Algorithm, and structural analysis. Design and computation merge to normalize the generation of architectural form with irregular

**Structural Optimization and Research with the Digital Structures Lab Fall 2021**

**Co-authors:**

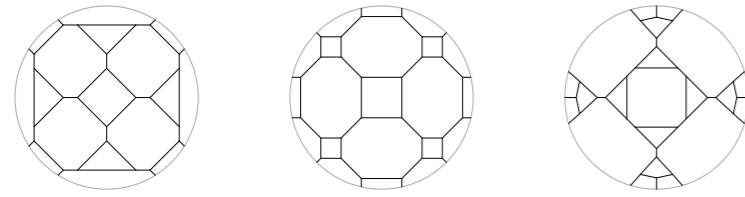
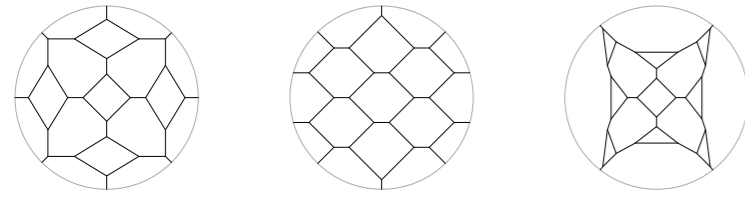
Natalie Pearl

Tim Cousin

**Instructors:**

Caitlin Mueller

Yijiang Huang



Patterns used for target topology.



HA Cost: 84,897  
per node (24): 3,537

HA Cost: 46,171  
per node (22): 2,098

HA Cost: 78,467  
per node (28): 2,802



HA Cost: 49,168  
per node (24): 2,048

HA Cost: 51,747  
per node (28): 1,848

HA Cost: 94,970  
per node (28): 3,391

Unoptimized matching



HA Cost: 72,904  
per node (24): 3,037

HA Cost: 45,208  
per node (22): 2,054

HA Cost: 73,206  
per node (28): 2,614



HA Cost: 43,774  
per node (24): 1,823

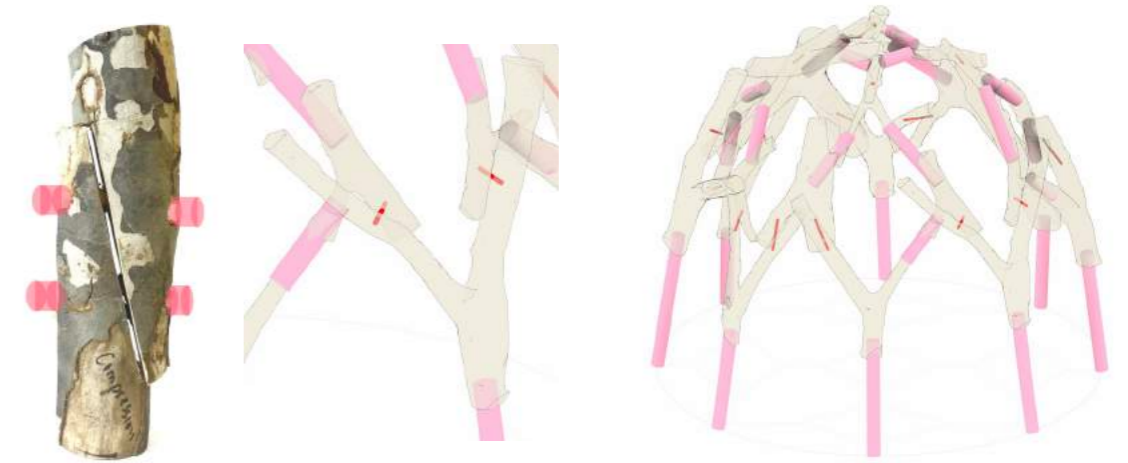
HA Cost: 49,269  
per node (28): 1,759

HA Cost: 76,016  
per node (28): 2,714

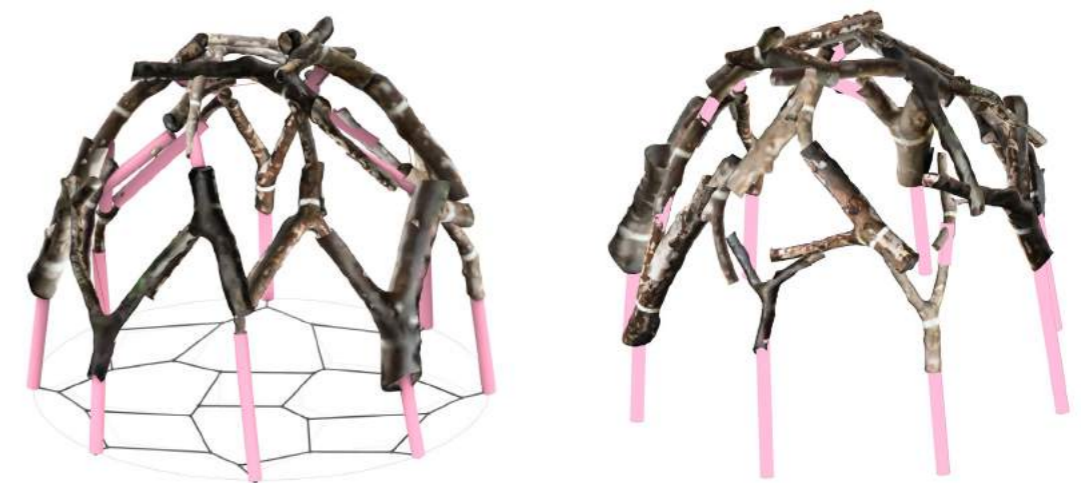
Optimized matching: topology network is 'jittered' to find better matching solutions,



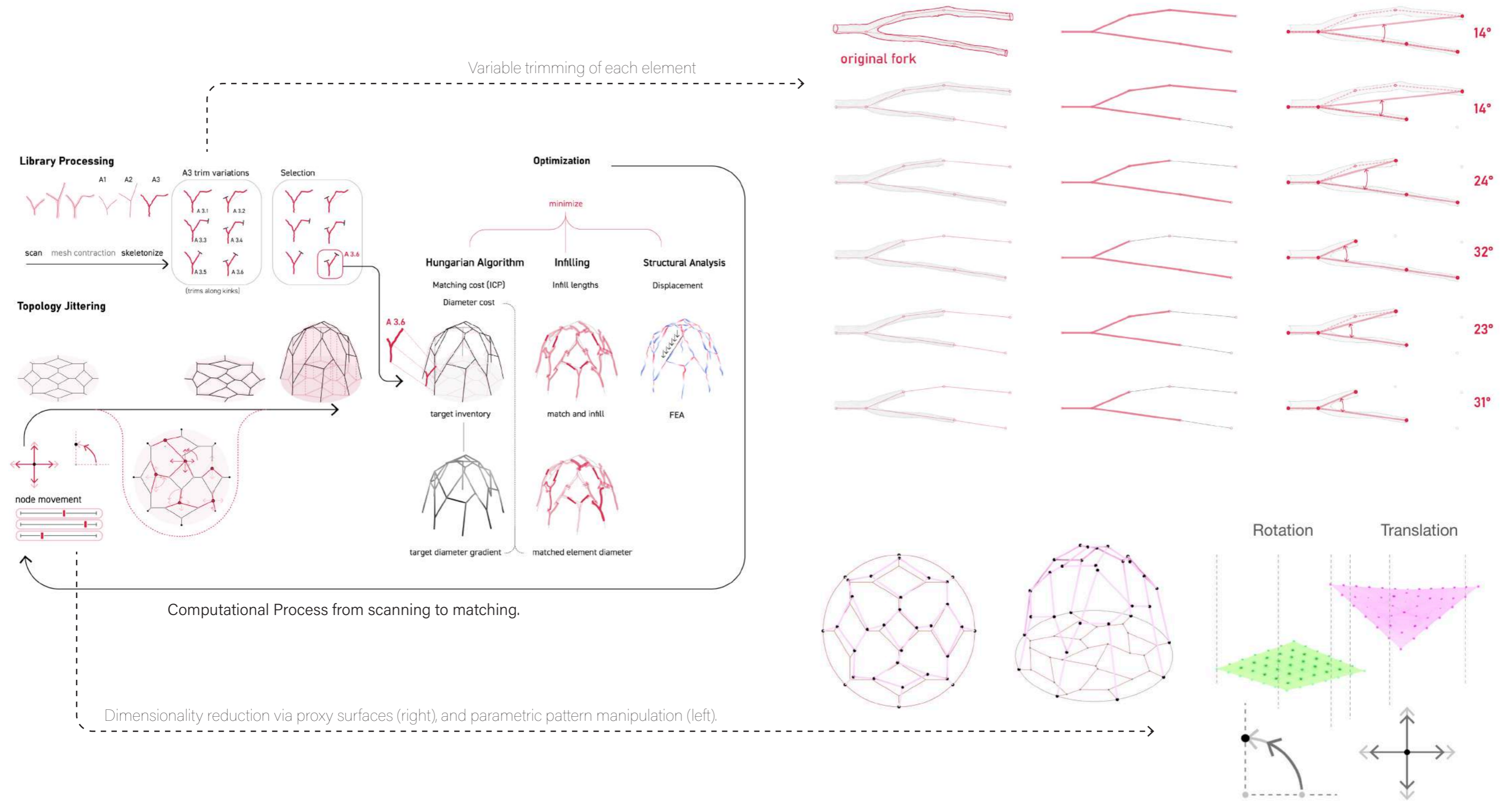
Pattern Projection on target surface



Hungarian Matching of scanned branches from the inventory onto the target topology. Infill used for gaps. Stitches used to digitally simulate the scarf joint. Scarf joint in the photograph fabricated by Aldrin James Gaffud.



Left: Matching with diameter optimization so thicker members are at the bottom. Right: Not optimized for large diameters to be used at the bottom.



## The Peel

Denim, in the clothing industry is arguably as ubiquitous as concrete in construction. This makes more an almost 'universal' material, consequentially making this project context a global one.

Some of the recycling streams for denim result in the shredding and felting of it's cotton fibres at an industrial scale. The intensity of this felting defines how fluffy, fuzzy or rigid the material becomes. The shelf products we find with this nonwoven material includes cotton batting used for insulation, to temporary frozen food transporting bags and most relatable to the U-Haul customer, the moving blanket.

The Peel utilizes the moving blanket, or denim felt as an articulated contraption for foam. Overall, the project looks into achieving complex curvature using sheet material, and in doing so, celebrates insulation. Often hidden away beneath layers in the flesh of buildings (for good reasons), insulation is the invisible skin regulating building temperature. However, rarely is it's structural value considered.

MIT Making Ingredients Studio  
Fall 2021

Instructors:  
Diego Pinochet  
Lavender Tessmer



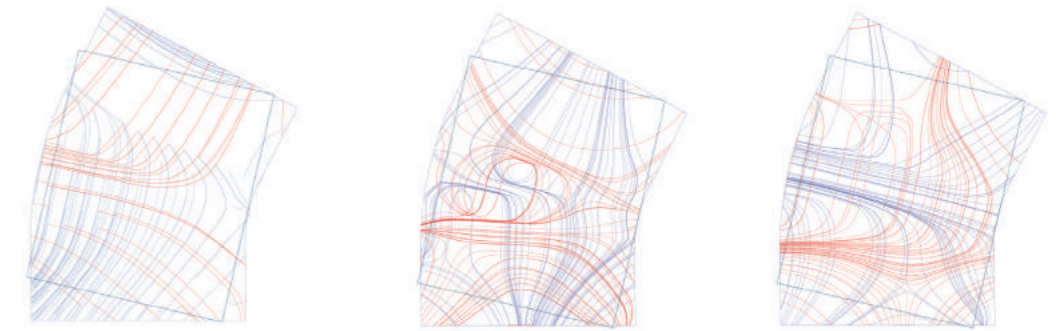
Photograph of the enclosure.

*The making of this enclosure wouldn't have been possible without the labor work of:*

*Diego Pinochet, Gil Sunshine, Lavender Tessmer*

*Angela Montal, Ardalan Sadeghikivi, Natalie Pearl, Patricia Duenas, Paul Gruber, Sasha McKinlay, Sacha Moreau,*

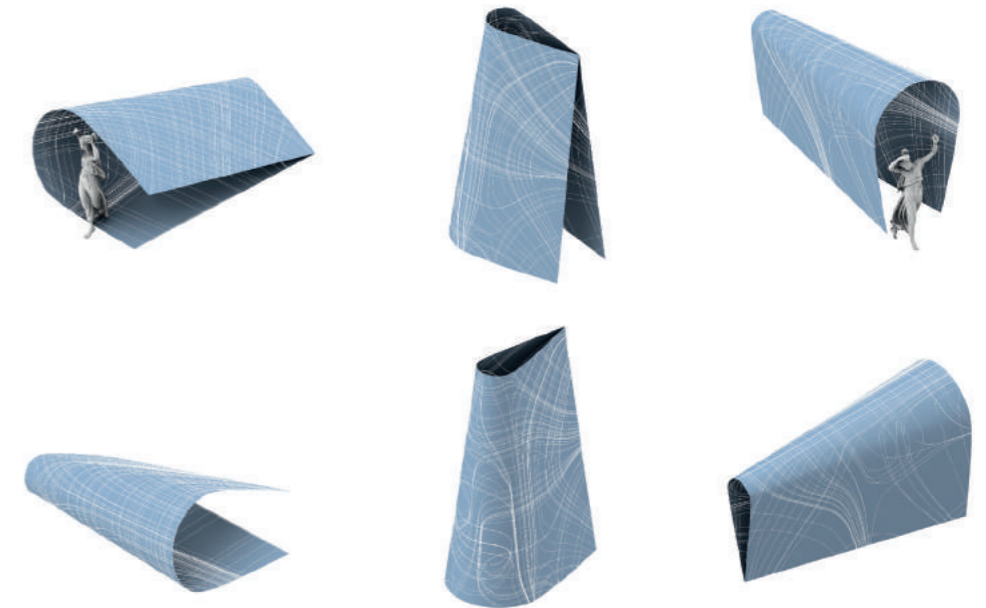
*Sarin Vosgerichian, Vijay Rajkumar, Alicia Delgado, TJ Bayowa*



Peeling

Standing

Arching



Multi Orientation studies of the enclosure. Top Row : Unrolled Lines of Principle Bending Moment for the three orientations. Bottom Rows: 3D representation of the form with the corresponding Bending Lines.



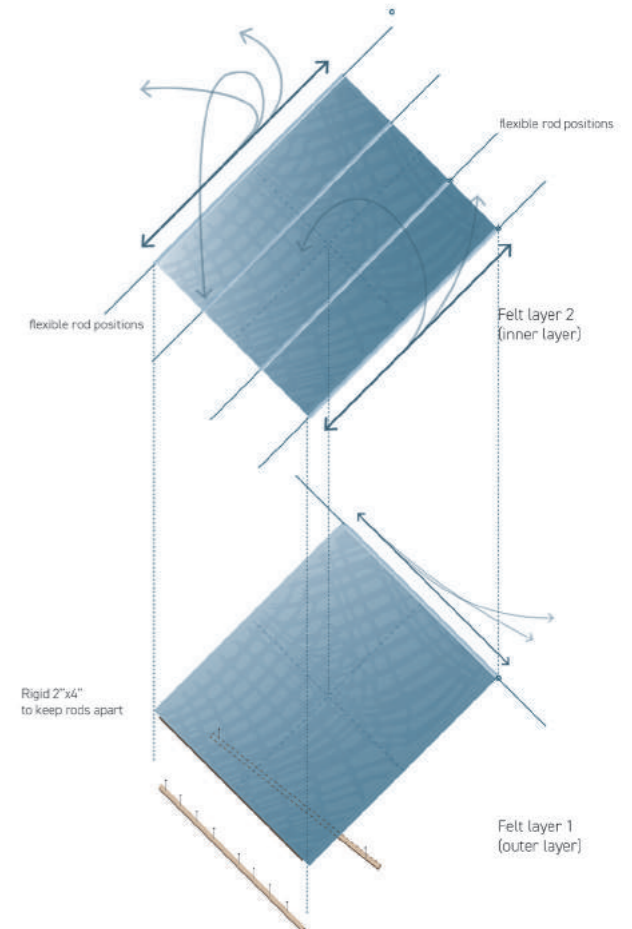
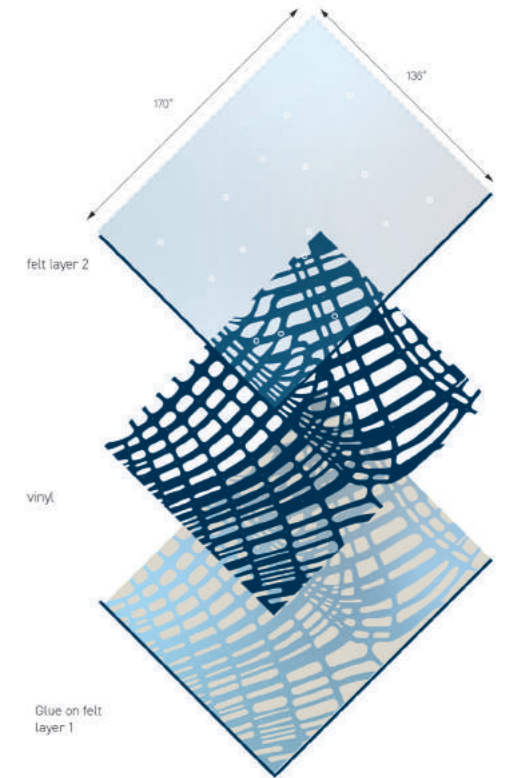
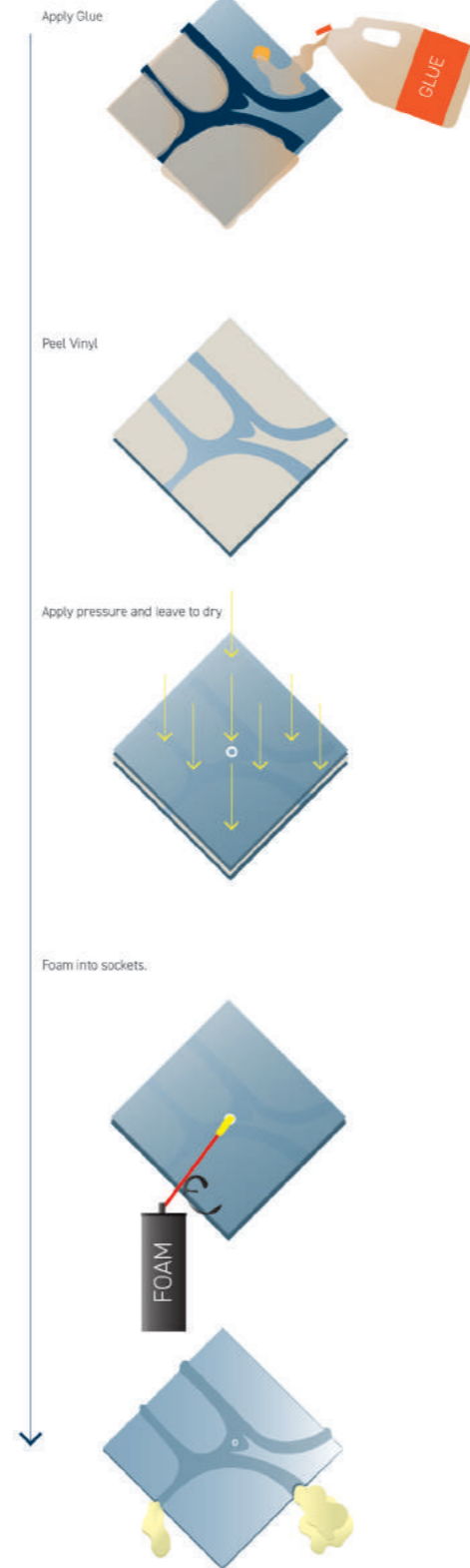
Left: Abstract Rendering of the enclosure with the 'rib-like' form. Right: Photograph of the form being repositioned into a standing orientation from the peeling one.

The Peel is a test for using PU Spray Foam as a scaffold for the next step in a larger layering building process. The material used is imagined as a composite, and it's making involves a multistage transfer process to achieve precise and prescribed articulations.

The intention was to coat the structure with a layer of concrete and felt, forming a concrete-felt-foam composite.



Fabrication Processes



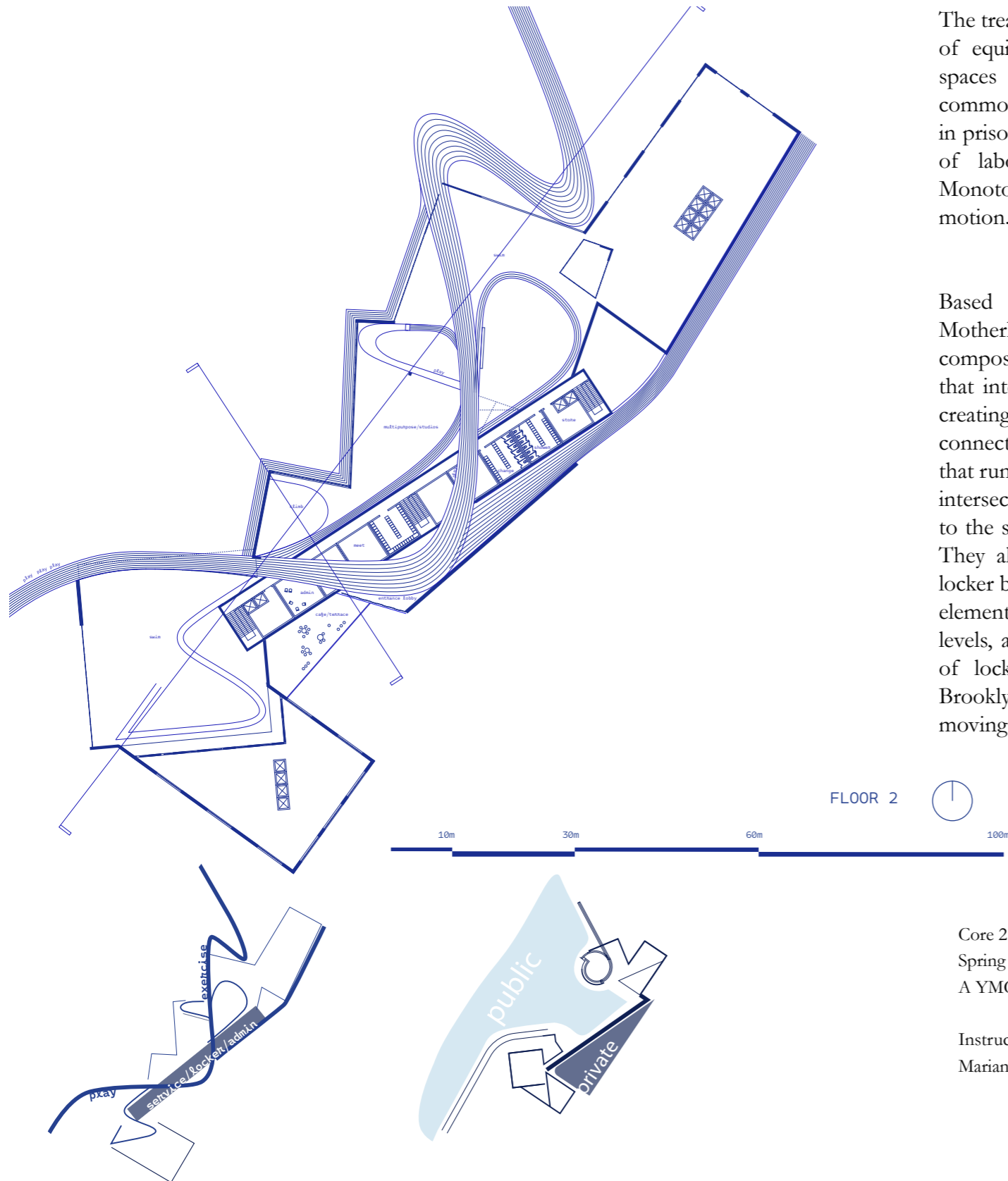


Details from the inflated foam-felt surfaces. The white circular elements were plugs from which the spray foam straw was inserted and foamed.

### The Blue YMCA

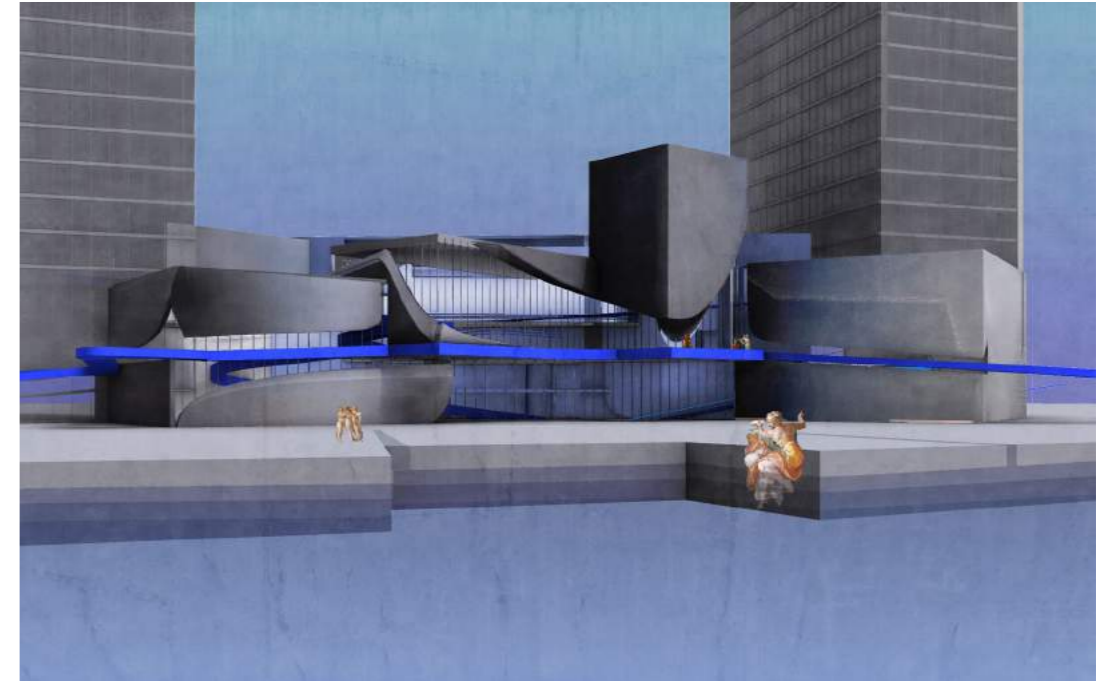
The treadmill, a ubiquitous piece of equipment fills our exercise spaces in large arrays. This common feature was invented in prisons driven by the concept of labor without production. Monotonous machine controlled motion.

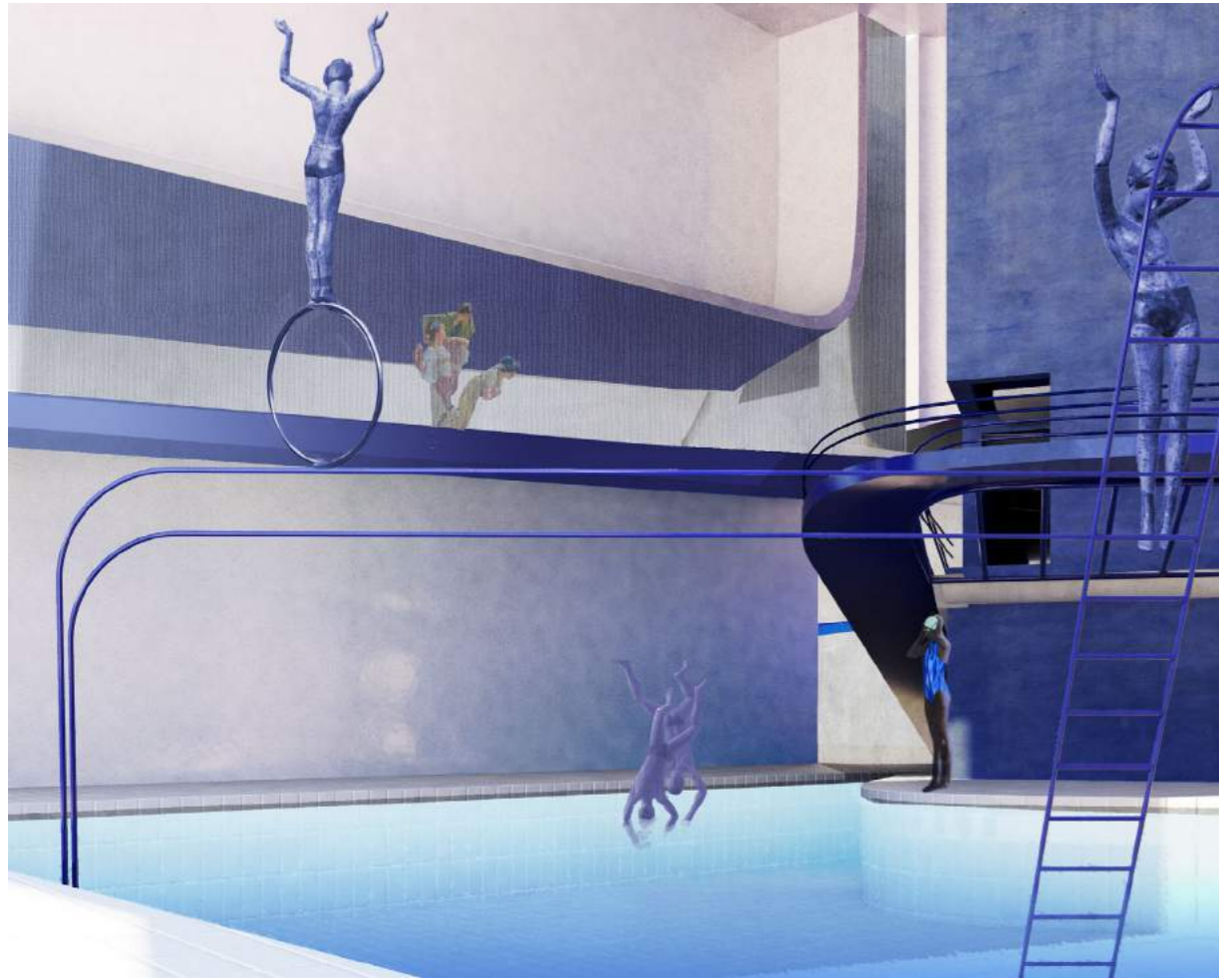
Based on the Louis Kahn Motherhouse, the plan is composed of platonic shapes that interfere with one another, creating hybrid spaces. These are connected with a long conduit that runs parallel with, interferes, intersects and at times, adheres to the series of hybrid volumes. They also all plug into a rigid locker bar; a circulation and core element that runs through all levels, and also serves a surplus of locker rooms provided for Brooklyn's geg economy workers moving through the Y.



Core 2  
Spring 2020  
A YMCA in Williamsburg, NYC.

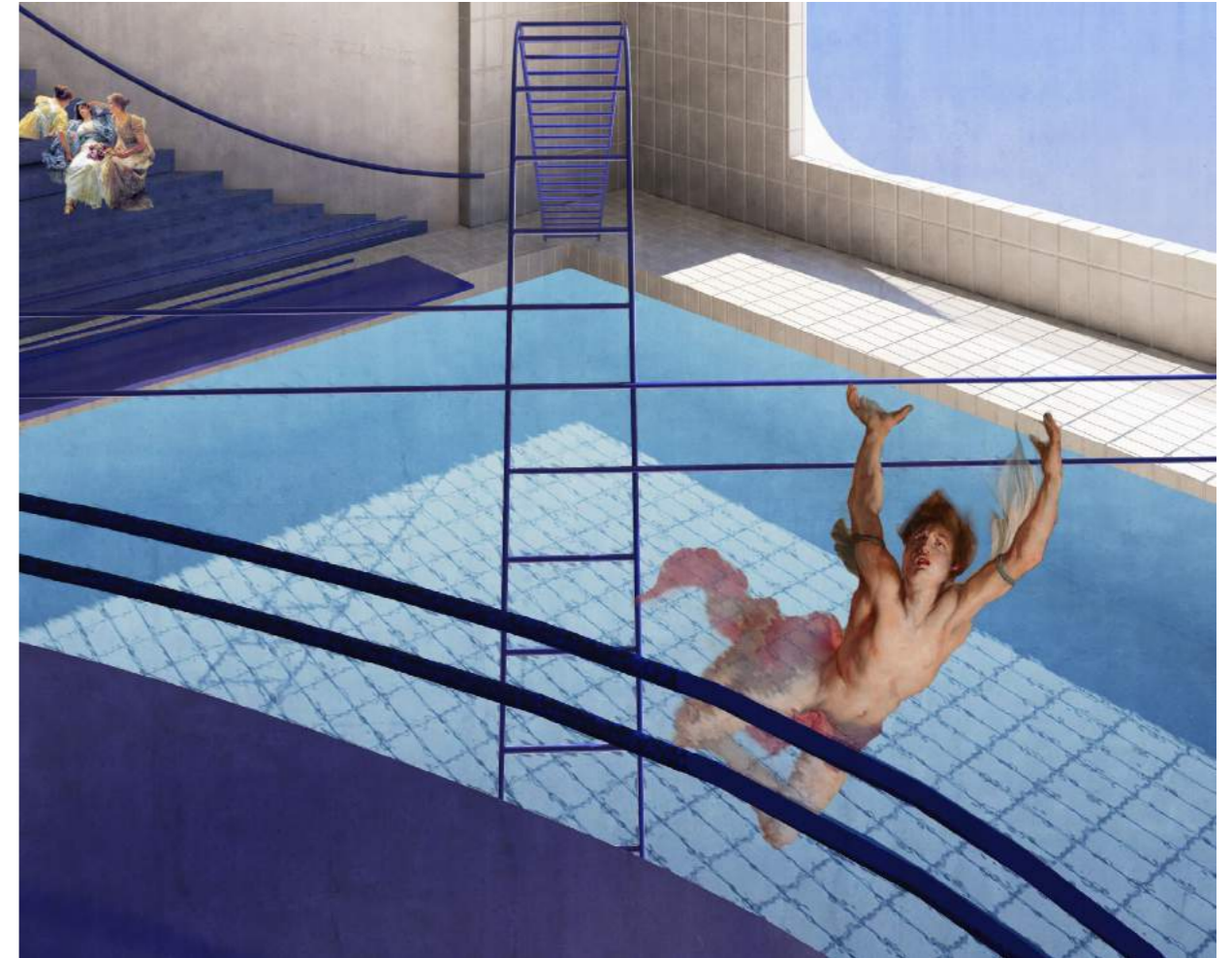
Instructors:  
Marianna Ibaez & Max Kuo





The Y Williamburg edition revisits these themes by turning the whole Y into a conduit of exercise and spaces, stringing together series of programs. Essentially turning the whole YMCA into a machine for play, an architecture that constantly engages the body. It encourages touch beyond the hand rail and door knob. In fact, it eradicates the door in most spaces to allow for continuous movement.

These ideas were highly influenced by archival images of early YMCA exercise spaces and gymnasium typologies. The structure, the circulatory elements such as ladders and stairs were tools that contributed towards engaging the body and encouraging playful use and movement.





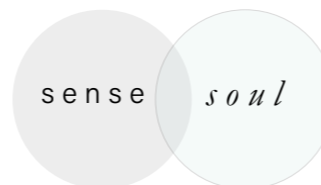




## A marriage of sense & soul

Set on the Isle of Portland, the project aims to investigate the theme of the wilderness, with a focus on the human quest to the unknown, from prehistoric to modern times. It explores the immensity of the beyond, and how this realization unveils the immensity of what is within. Parallels between the scientific and the spiritual are drawn in this search.

This is manifested in the form of a Neutral Buoyancy facility for an Astronaut Preparatory and Re-Acclimatisation Space. This would contribute to the emerging future of space travel and exploration. The challenge is the invitation of the public to a highly private and individual focused program. A platform for surface level engagement with the Isle of Portland is incorporated through tidal pools and a gentle walking path for micro scale exploration. The mid-level engagement is through a diving excursions facility, which supports the most intense level ; the astronaut underwater training; (macro scale) initiative.



Bath Final Project

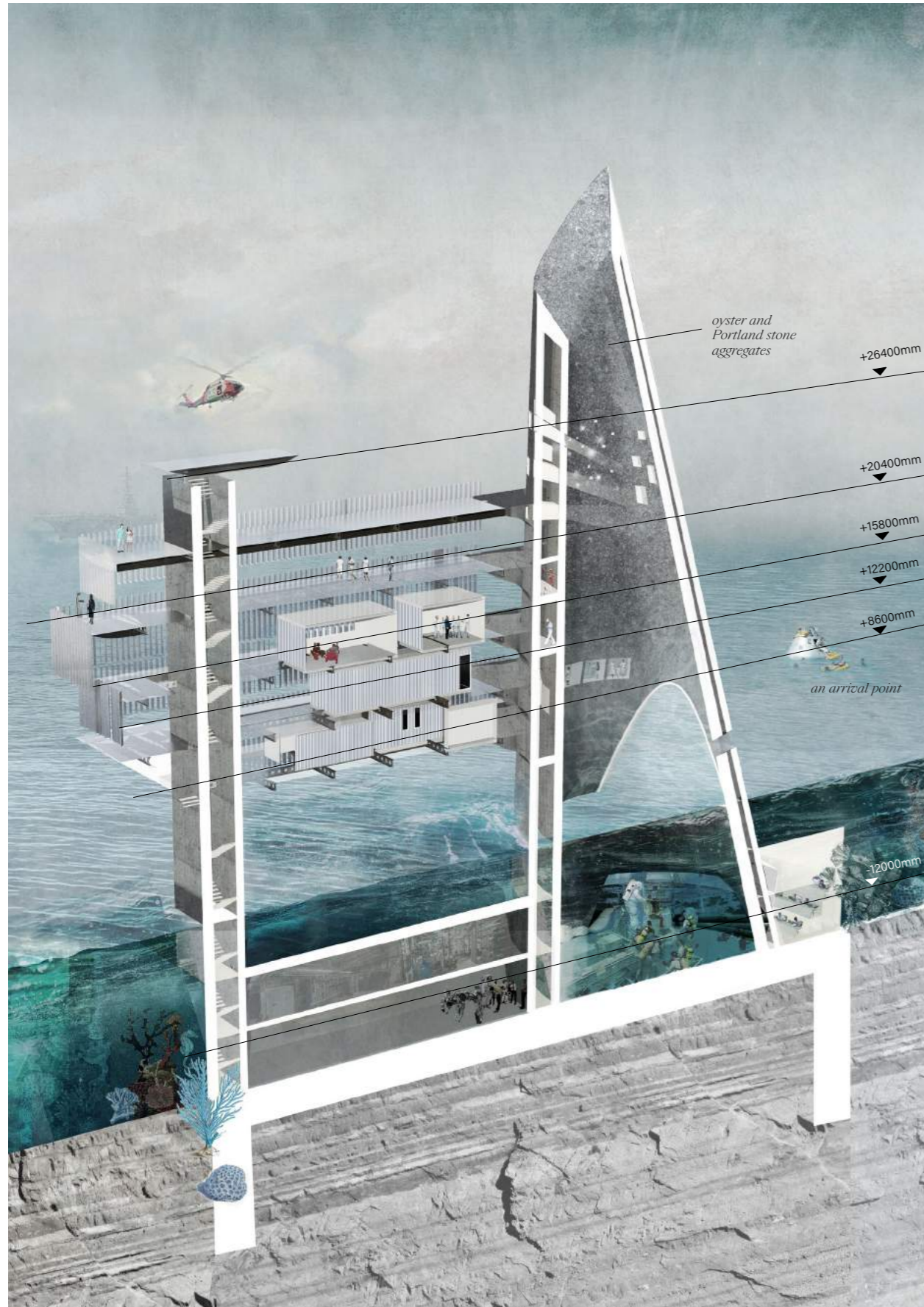
Spring 2018

A pre and post space flight facility in the Isle of Portland in the United Kingdom.

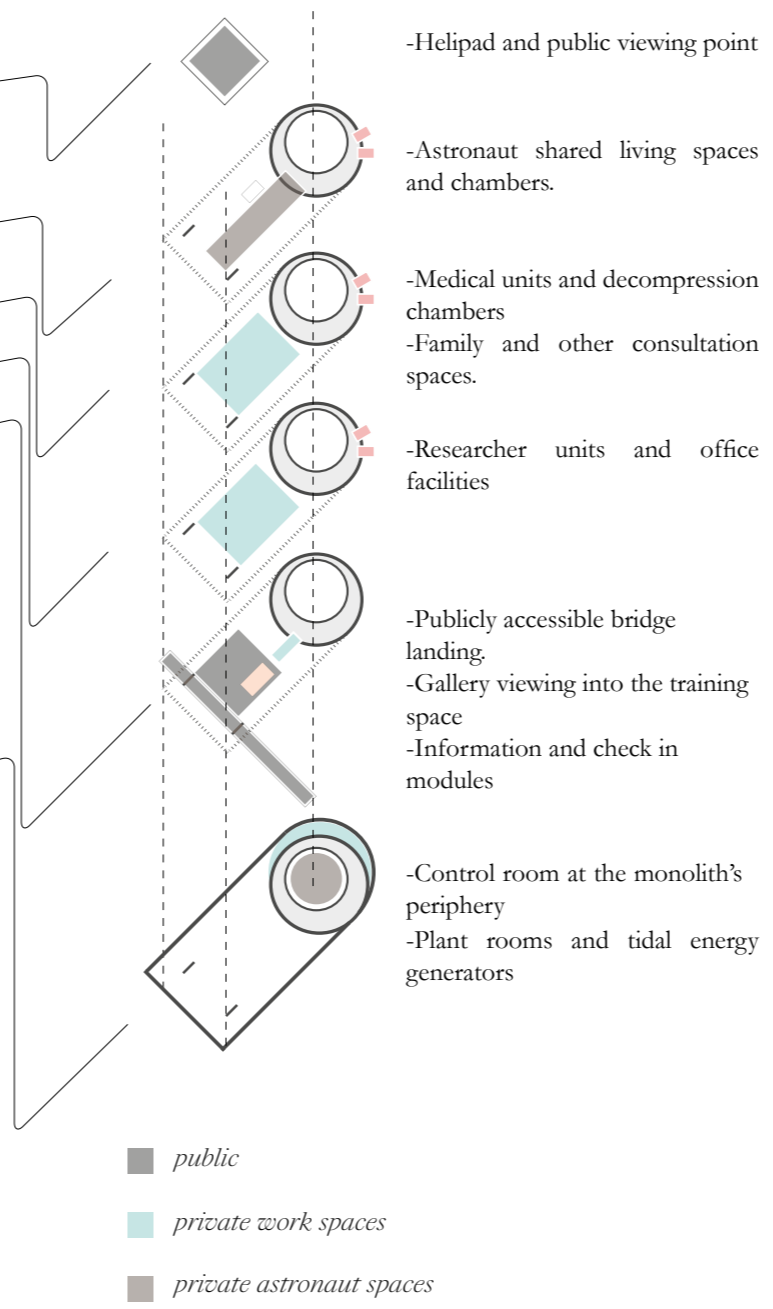
Instructors:

Martin Gledhill & Caroline Almond



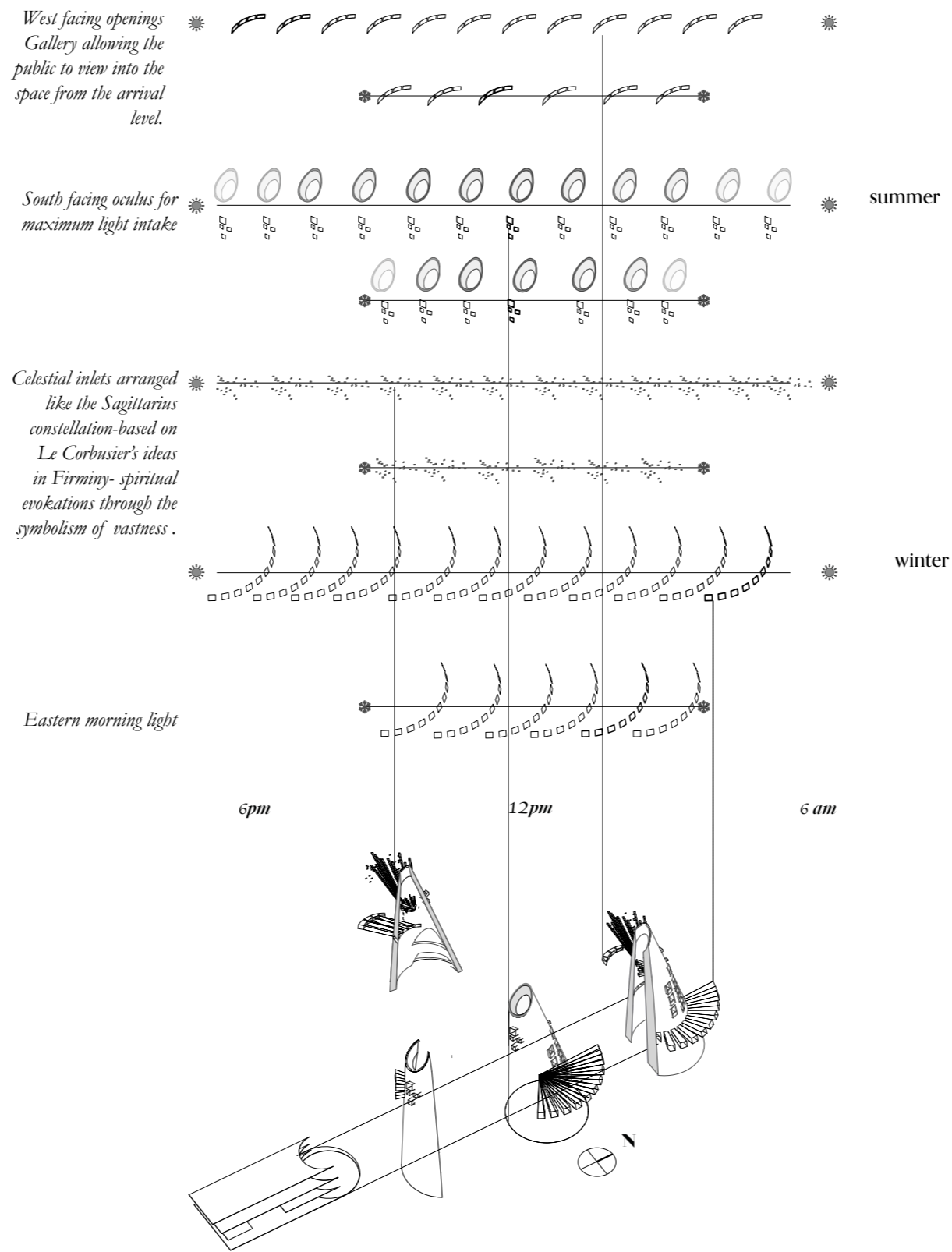


Zoning



Preflight Residence mimicking space station spaces.

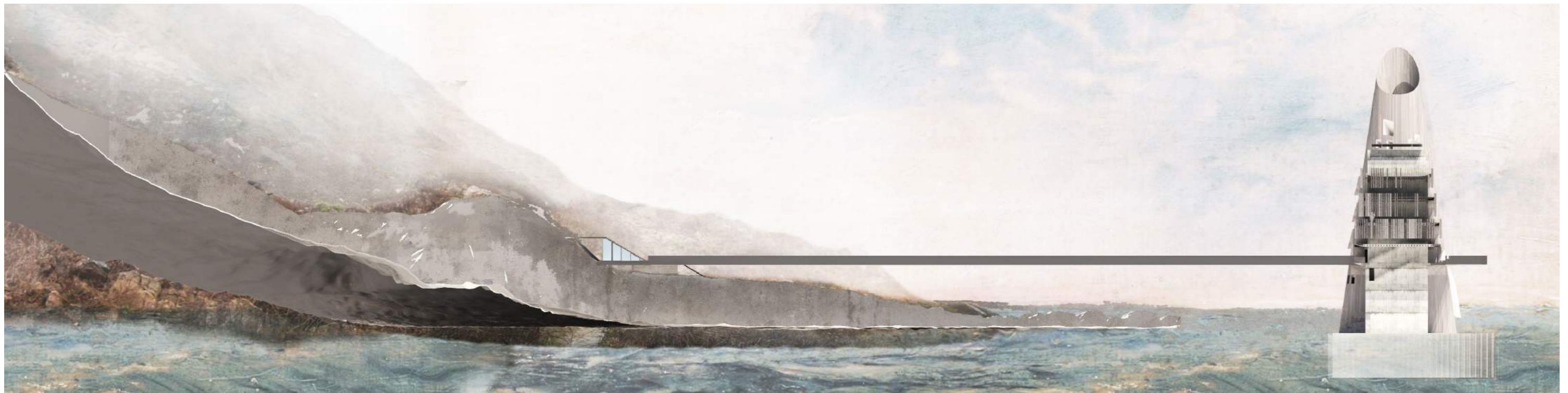
### Orientation Study

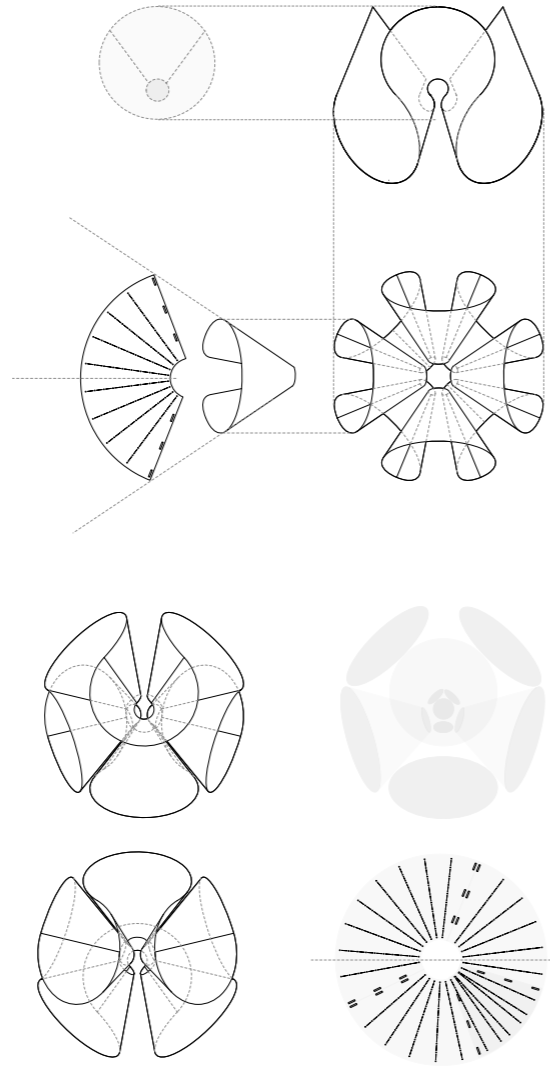
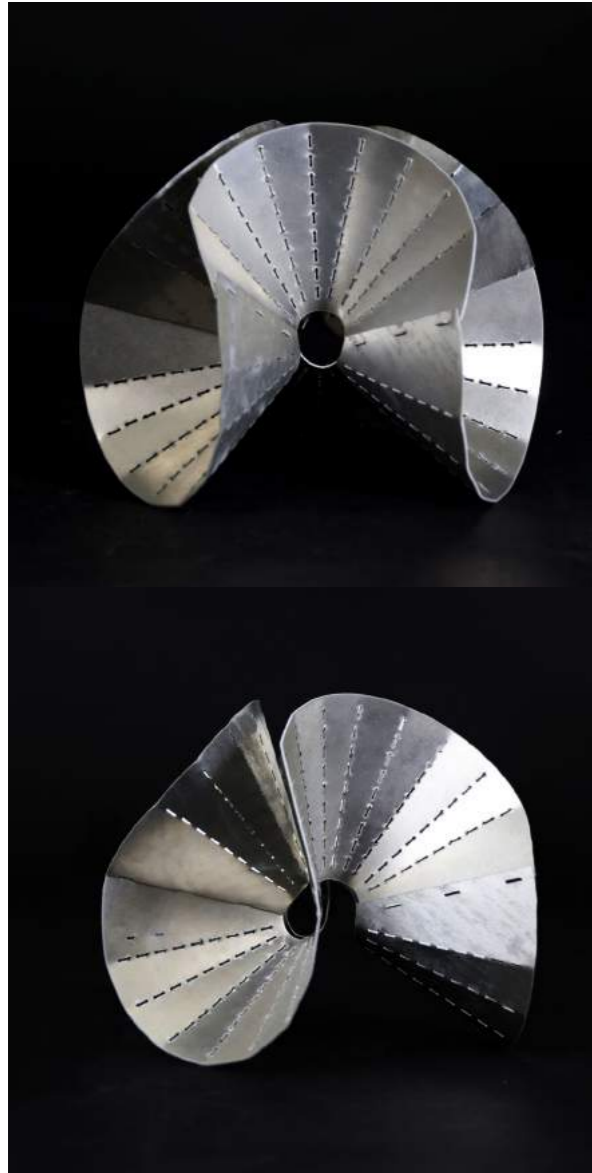




The Isle of Portland is a peculiar beauty. Mostly uninhabited, the main anthropogenic presence is the many abandoned quarries. That is, the absence of the stone . It felt eerie, yet enchanting. Unapproachable, yet potentially reconcilable.

The terrain, the tumbled grey boulders and the paleness of the sea evoked a lunar feel. The inconsistent, rough coast line was offset with sediments from erosion. Textures of the fallen quarried stones visually blend with the site, as though they had always been and meant to be there. The ecology has grown around it and embedded it in the land.





## Bidirectional Stability through Geometry

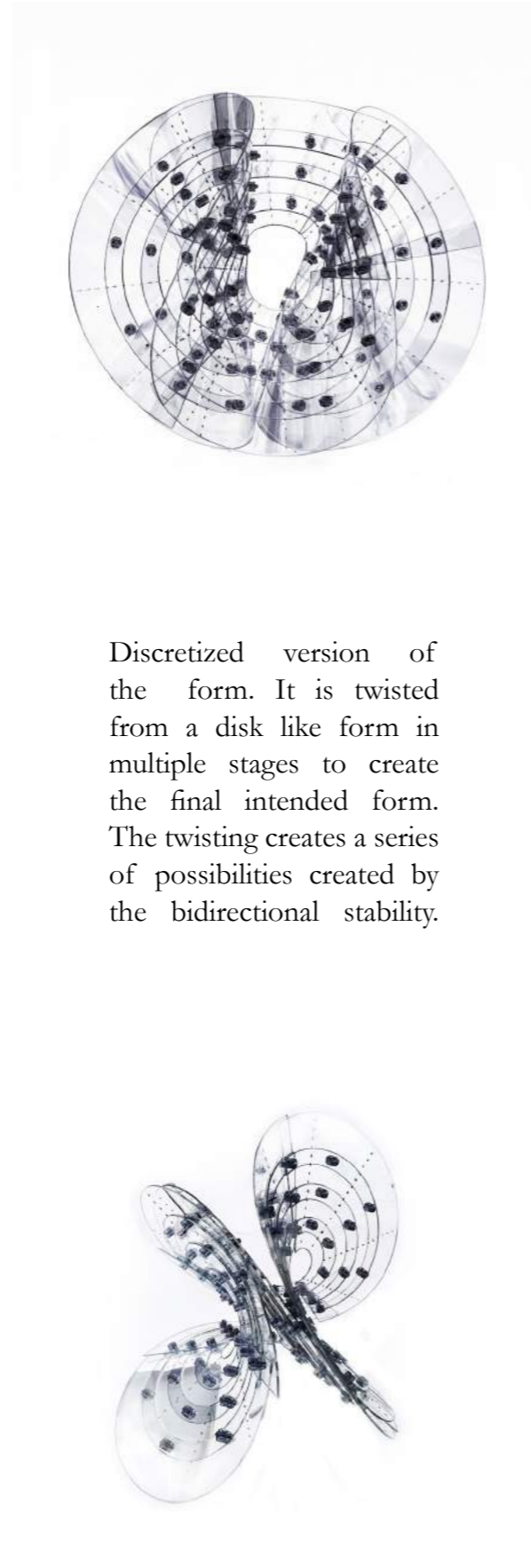
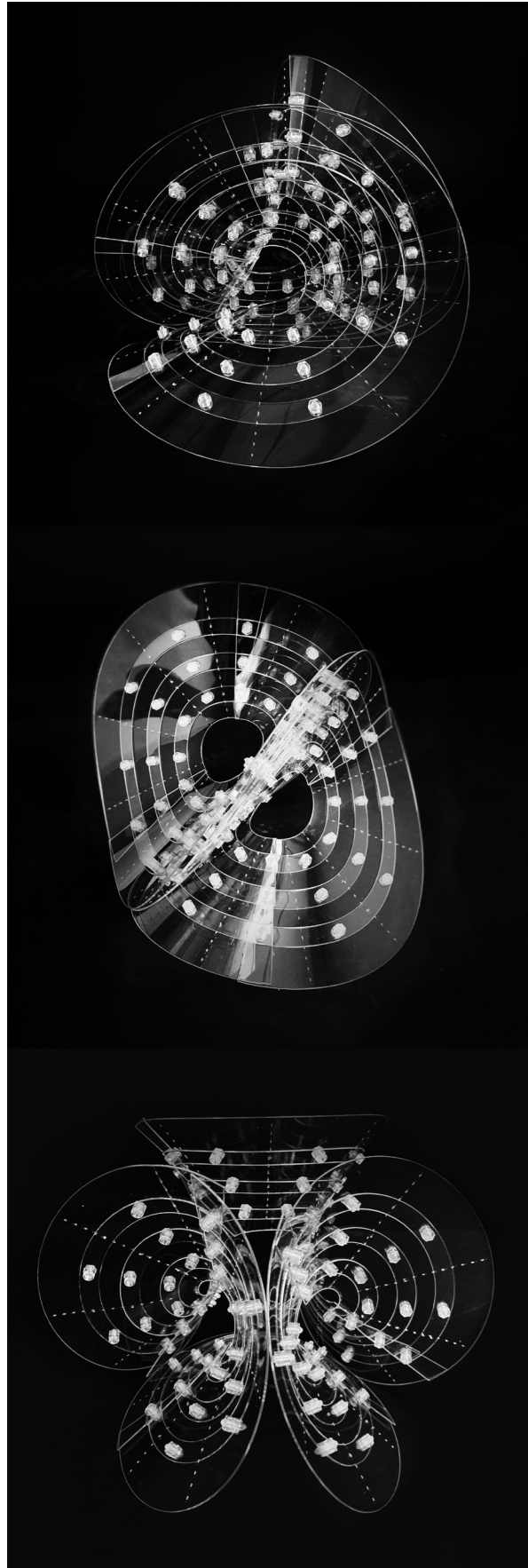
Inspired by Naum Gabo's sculptures, the geometric form incorporates 8 cones (the parts) that connect tangentially to create a whole. The project was a study of means of materializing this form using flat sheet materials with various flexibilities.

It speculates on potential construction and manufacturing means with the use of various techniques including metal folding and heated plating forming.

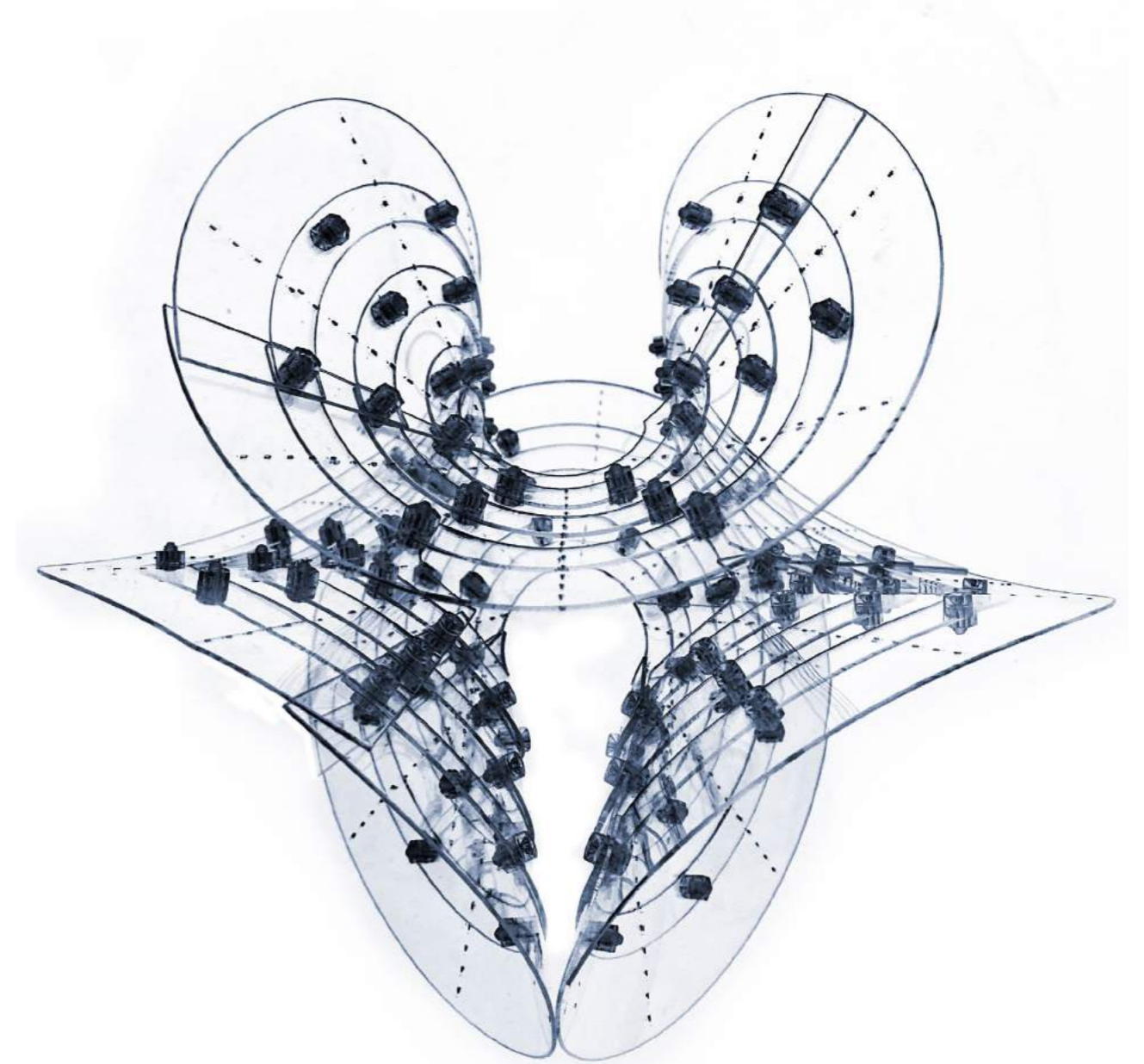
MIT Geometric Disciplines  
Fall 2019

Instructor:  
Jeremy Jih





Discretized version of the form. It is twisted from a disk like form in multiple stages to create the final intended form. The twisting creates a series of possibilities created by the bidirectional stability.



## Harness the Heat

Across major urban centers like New York City, there are incredible inefficiencies and environmental hazards related to heat escape from infrastructure, buildings and utilities. The most visible of which are the ubiquitous orange cones set up across Manhattan streets funneling steam from over 100 miles of district heating pipes lying below the city streets. On average, a fully emitting steam cone has a temperature of 80-100°C. Harness the Heat identifies, collects and utilizes wasted heat to provide more comfortable and liveable outdoor public spaces.

The start up incorporates small interventions compounding across scales. It shines light on the golden opportunity to create value from waste, allowing cities to aspire towards a newfound resilience.

DesignX start up

Co-founders:

Angela Montal

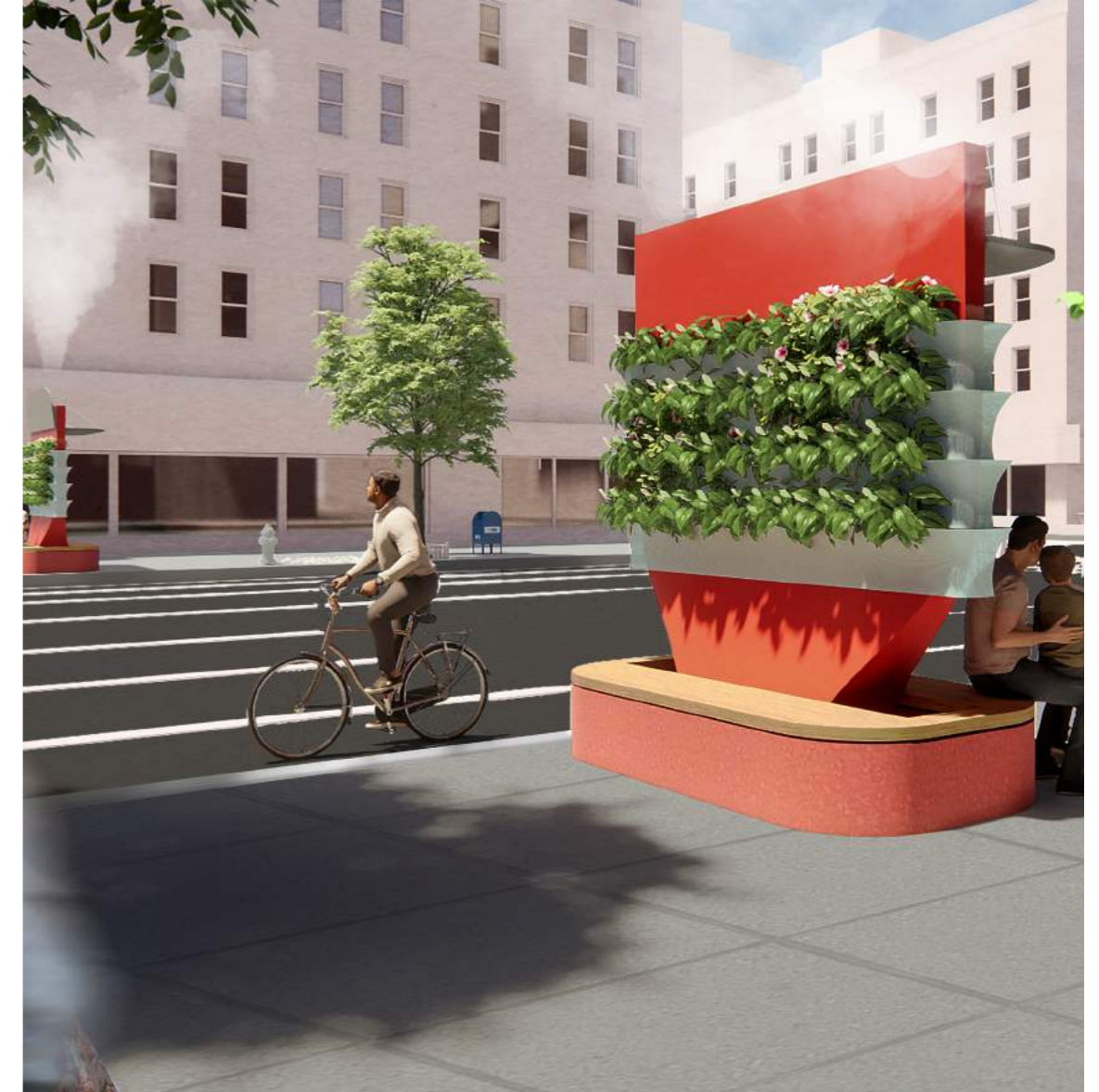
Jules Kleitman

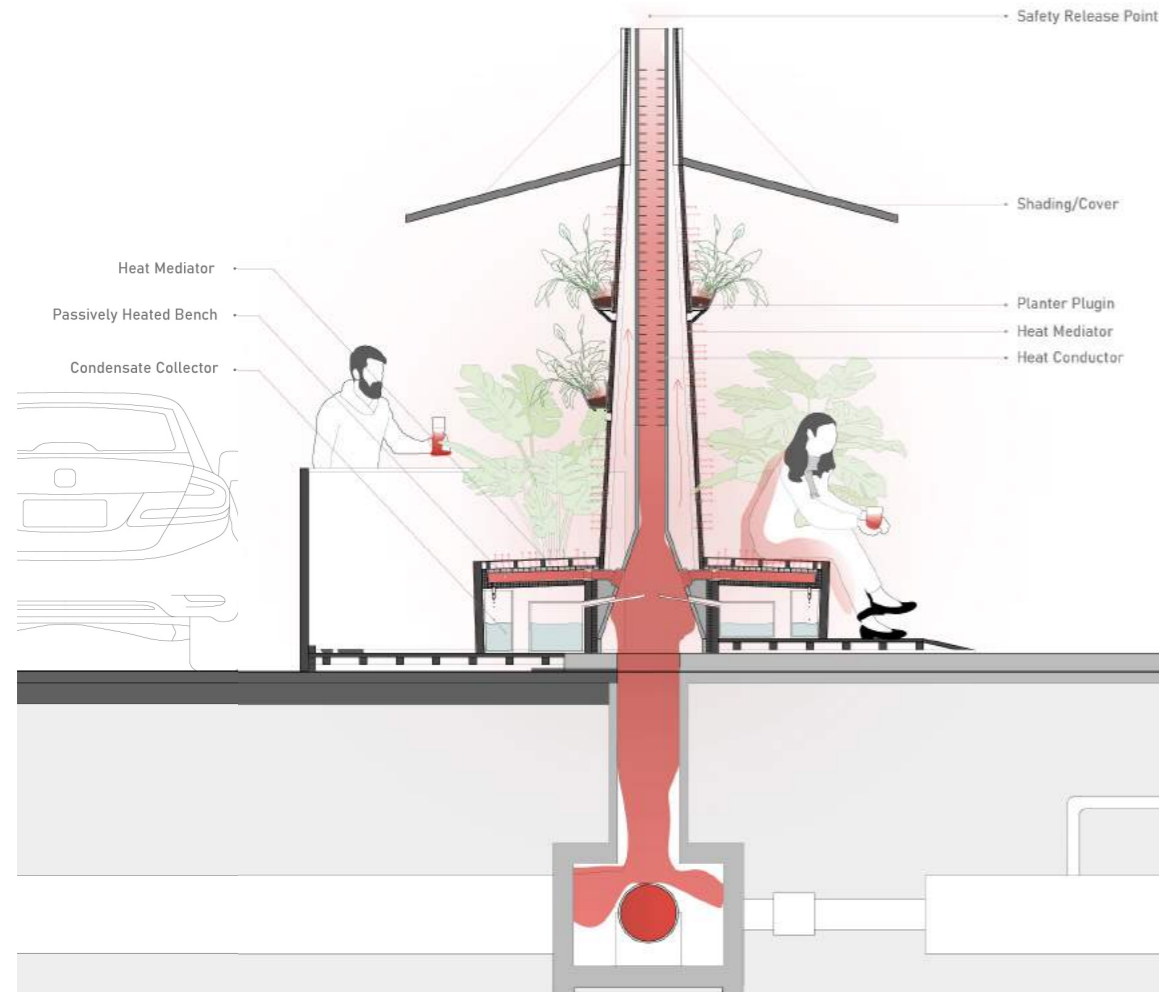
Ous Abou Ras

*Images shown have been a collaborative effort by the whole team.*

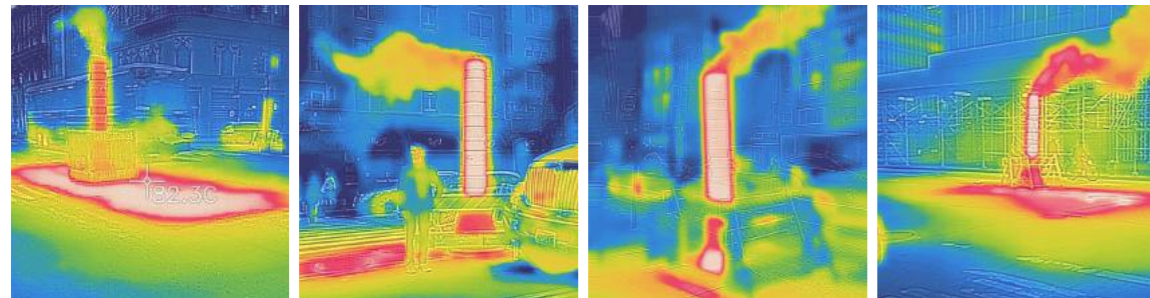


Top Left: Bench with wind breaker and shading. Top Right: Potential fans powered by steam with misting for summer months. Bottom Left: Bench with planter and manhole cover storage. Bottom Right: Enclosed heated 'mini' winter garden.





Conceptual Section of a multifunctional prototype for a microclimate utilizing steam leaks.



Flir Infrared Camera Imagery from New York City, whereby a range of temperatures between 80C-100C were observed.

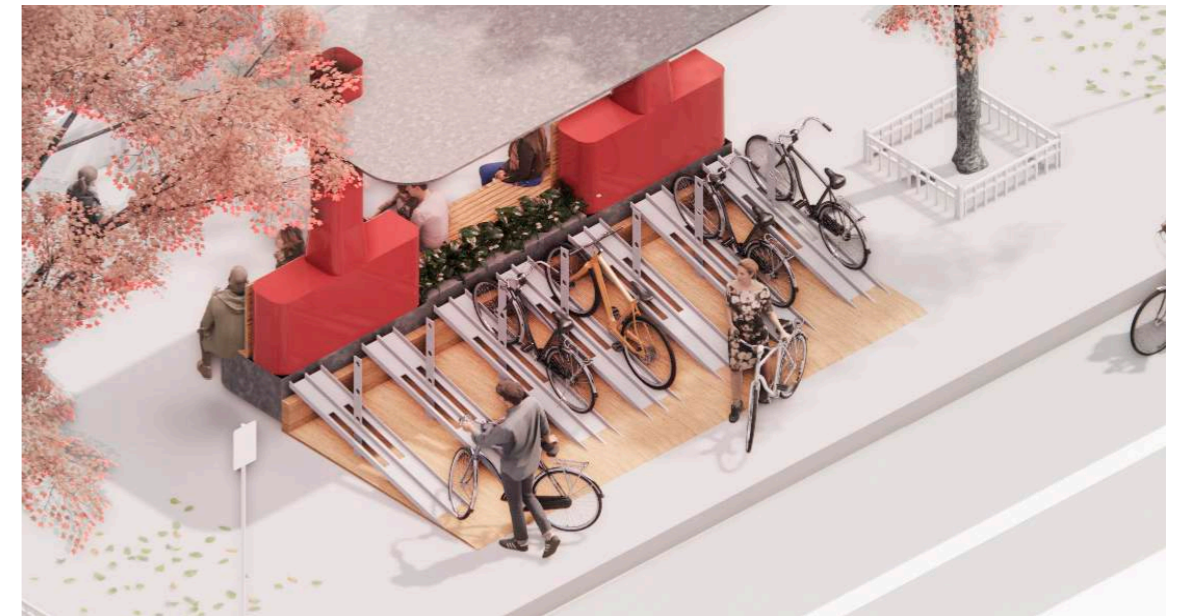
Currently, energy companies circumvent the problem by merely pushing the steam out of sight, with adhoc and clumsy barriers.

Instead, our proposal uses passive technology to redirect the energy into beneficial use rather than carelessly allowing it to heat up the atmosphere. It includes warm benches for an extended season of outdoor seating, heated planters to support plant growth in colder weather, condensate collection for watering plants and reducing heat island effects in the summer along with features targeting comfort outdoors such as adjustable shading and charging points.

The nuisance of wasted heat can turn into an urban oasis of comfort and delight. This takes form through an array of pop ups events including outdoor dining experiences, vegetation growth and mobility stations, all revolving around the city's dweller's experience at their core.



Conceptual Representation of a winter heated plant pot and bench system.



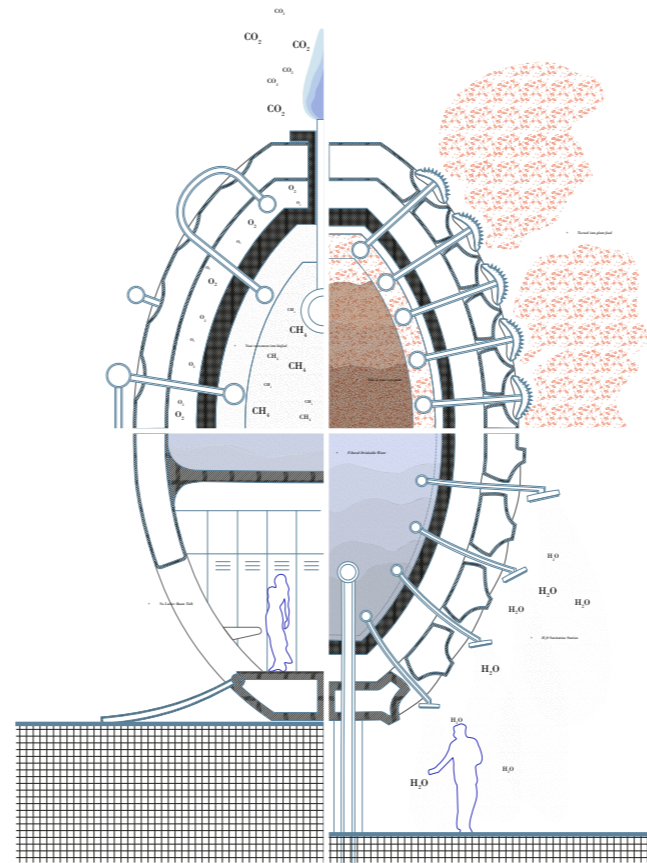
Conceptual Representation of a mobility bike storage station with shading and warm benches.



## The People's Pool

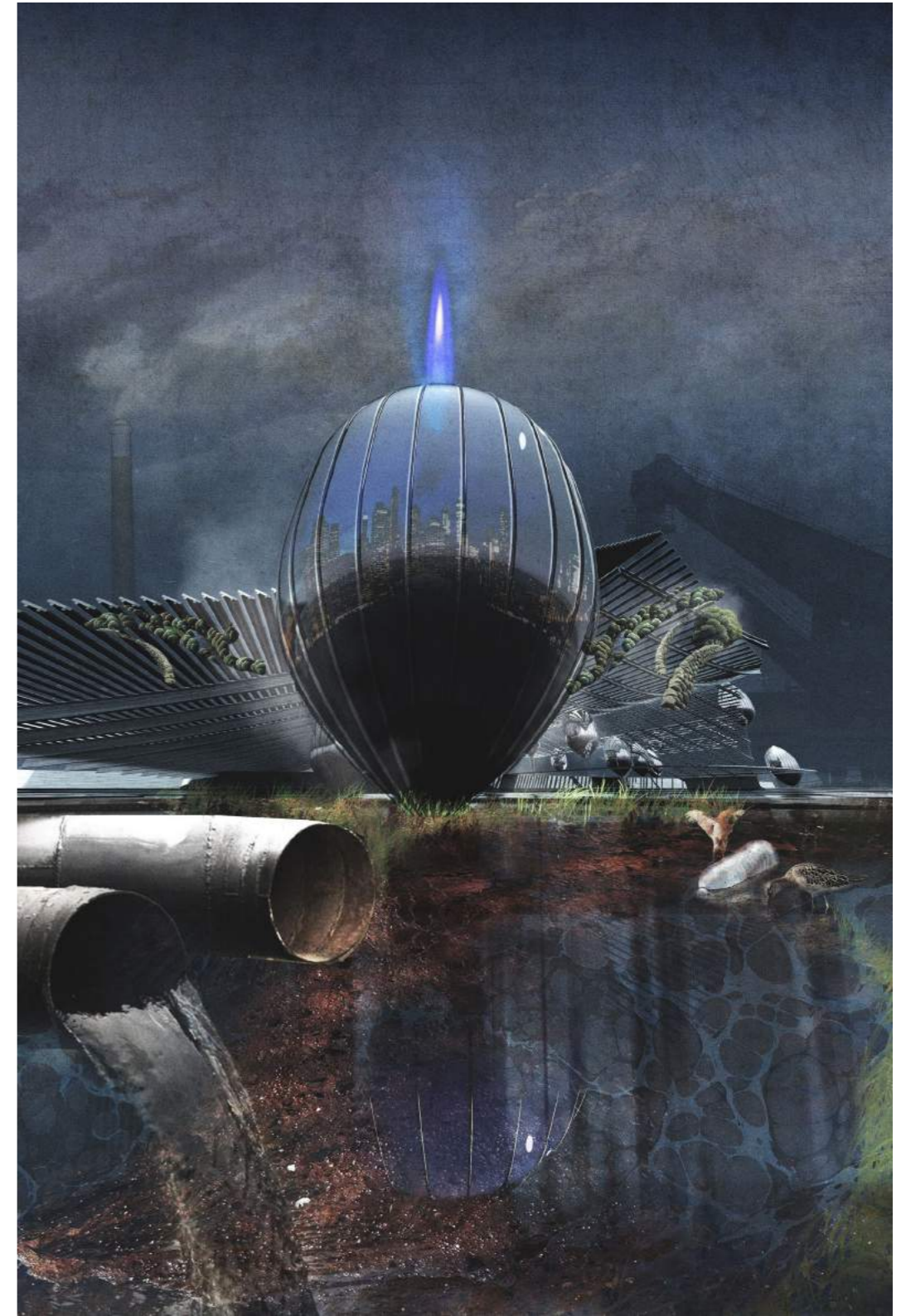
Can the pro-cessing of 170,00,00 gallons of NYC's human waste become inter-twined with a YMCA in Dumbo, Brooklyn?

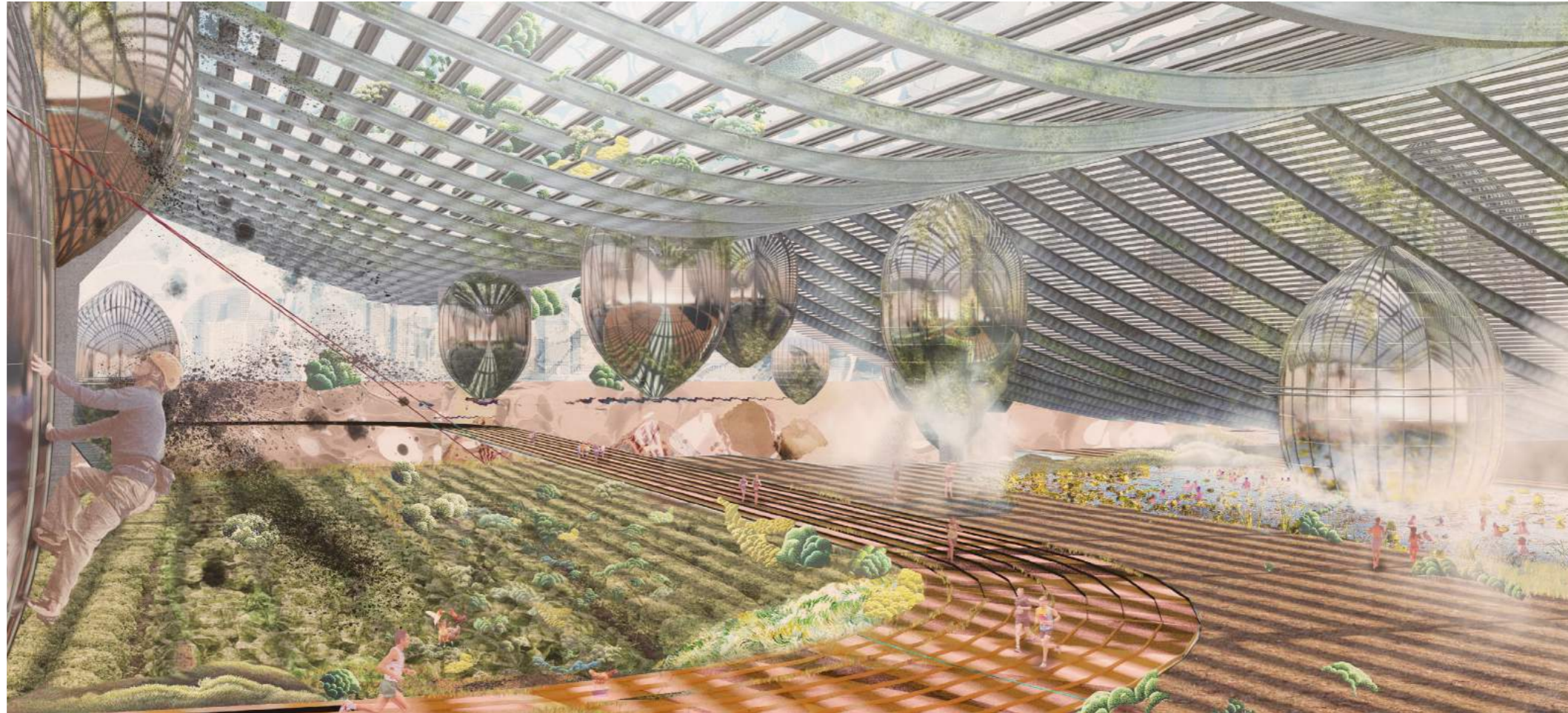
Our response to a public fitness facility on a waterfront site and a call to radically reimag-ine the YMCA came after our team researched NYC's sewage and waste water systems. Overburdened by storms, waste water will overflow into the Hudson and East rivers, severely polluting them. The city stands surrounded by filth. Yet, despite this condition, BIG and Two Trees plan to have a beach bustling with watersports.



Core 2  
Spring 2020  
Group with : Tristan Searight & Sacha Moreau

\*All 3D modelling and base rendering by Latifa, with some post processing by Tristan Searight.





We take this noble but naive ambition and add a mix of reality and absurdity to it. To clean the city's waters, our proposal suspends large "digester eggs" under and above a massive steel roof. These eggs, like those used at the nearby Newton Creek Wastewater Treatment plant, are at once functional and spectacular. Inside, they filter waste water and digest fecal sludge; producing clean water and flammable gas. The products of this process – hot water, steam and fertilizer – is expelled through the egg's iridescent metallic shells. Visitors bathe and shower around these eggs, climb them, are kept warm by them in winter and exercise between the vegetation which grows next to them.

Our proposal confronts the filth of NYC's waterfront head-on; bringing it right into the YMCA to create a controlled, detoxified mess.



*Latifa Alkhatat*