

# **NIA RICH**

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06 FROM THE GROUND UP

# NIA RICH

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nia\_rich@mit.edu

## EDUCATION

**Massachusetts Institute of Technology**  
**2022 - Feb. 2026**  
Candidate for Masters of Architecture

**Georgia Institute of Technology**  
**B2017-2021**  
Bachelor of Science in Electrical Engineering

## INTERESTS

fabrication and assembly, community sustainability, interdisciplinary design, technology aided design, materials innovation

## SKILLS

**Programming:** MATLAB, html, css

**Software:** Rhino, AutoCAD, Grasshopper, Adobe Illustrator, Adobe InDesign, Adobe Photoshop, Adobe Dreamweaver, qGIS, KukaPRC, MasterCAM

**Fabrication:** Laser cutting, soldering, 3D printing, casting, CNC, circuit design, wood-working

## AWARDS AND GRANTS

MIT School of Architecture Schlossman Research Award 2025

Grant awarded to Masters or PhD students to continue research that reflect emerging opportunities in architecture. Awarded for "Reverberations Of Place: An Exploration of Sound as a Medium for Community Archiving and Resistance within the context of Atlanta" thesis proposal.

## EXHIBITIONS

The Next Earth: Computation, Crisis, Cosmology Venice 2025

Exhibited plan and section drawings of a surveyed Tuskegee Institute historical building for display in the Venice Biennale exhibition by Antikythera & MIT Architecture.

## TEACHING

Teaching Assistant, Cultures of Form Fall 2025

Assisting Professors Brandon Clifford and Mariana Popescu in teaching graduate students logic, thinking and practical applications of computational and geometric based design and how modeling and drawing within rhino and grasshopper can be translated to the real world.

Teaching Assistant, Architectural Assemblies Spring 2025

Assisted Professors Adam Modesitt and Mark Goulthorpe in teaching graduate students the fundamentals of assembly and construction. Held office hours, coordinated reviews and provided logistical support to students and faculty.

## LEADERSHIP AND SERVICE

MIT NOMAS Co-Chair June 2023 - June 2025  
Coordinates and runs the executive board of the MIT chapter National Organization of Minority Architects.  
Representative and advocate for the Masters of Architecture Class of 2026

Opportunity Research Scholar Leader August 2020 - May 2021  
Appointed position  
Held weekly office hours to assist students with career goals, time management, and research skills



## EXPERIENCE

### Architectural Design Intern

Taller11 Cooperativa D'Arquitectura / Summer 2025

*Served as an Architectural Intern to Taller11 Architecture Cooperative in Sant Cugat de Valles, Spain*

- Modeled and Rendered a new construction home using Rhino, Vray and Photoshop
- Designed a roof structure and passive cooling strategies for a new construction home in Lleida, Spain. Produced construction details and sections for the project.

### Exhibition Installation Design Assistant

Cristina Parreño, Magma Matter / January 2025 - March 2025

*Served as a design and fabrication assistant for pieces to be displayed in Venice for the 2025 Beinnale*

- Generated grasshopper scripts for quick design iteration and visualization
- Designed and built molds for glass and molten lava casts

### Design Research Team Leader

Shoreline Project / Summer 2024

*Served as lead for a design team under John Ochsendorf for artist Elizabeth Turk's Shoreline Project*

- Designed and prototyped an origami solar cell array for personal use.
- Oversaw and directed two undergraduate researchers in both the design and engineering aspects of the project.

### Architectural Designer,

Morningside Academy of Design / June 2023– January 2024

*Serve as a designer for interior spaces concerning MAD spaces within MIT's Metropolitan Warehouse Project as part of a two person team.*

- Coordinated between several key stakeholder in the project to propose designs for interior spaces for Morningside Academy of Design and MIT architecture undergraduate spaces in the new MET Warehouse for MIT SA+P.
- Designed and rendered lobby and studio spaces to maximize flexibility
- Designed and prepared a mill-work package that proposed shelving that could serve as a system of storage, display and furniture.

### Design Team Member

J. Yolande Daniels The BLACK City Astrolabe / January 2023 – May 2023

*Part of design and fabrication team for Gender and Geography Installation at Venice Biennale 2023*

- Designed and implemented a system employing Grasshopper, Rhino and MATLAB for efficiently locating installation components
- Conducted several test models with a focus on materiality and methods of fabrication for wood and metal.
- Built a wooden scaled site model for the installation as part of a team of five.

### Radio Frequency Engineer

ViaSat Inc. / May 2020 - August 2023

*Work within ViaSat's Antenna Systems Group as an RF engineer and designer for ground satellites*

- Coordinated the assembly, test and documentation of a boresight tower antenna system with modifiable polarization and frequency bands to be used to test 19 to 24 meter diameter ground station antenna programs.
- Coordinating the design, test, and assembly of a 7 meter portable antenna.
- Serving as liaison between ViaSat and Georgia Tech's School of ECE for a senior design project concerning new analysis and fabrication techniques for a frequency selective surface.

# FIGURES OF FORCE

## **An exploration of axis-changing spinning top forms**

Figures of Force is an ongoing exploration of formal variations on multi-axis spinning tops studied thoroughly in the discipline of physics. The behavior of spinning tops relies heavily on ratio of curvature and center of mass to achieve what is often perceived as gravity defying movement.

In these explorations, I both designed, modeled and fabricated, multiple iterations of spinning tops that spin bidirectionally, harnessing forces of friction to changes its axis of rotation, in an effort to create a three dimensional Lissajous figure, a visual mathematical representation of harmonics.

Spinning tops were made using both 3D-printing, and milled wood.

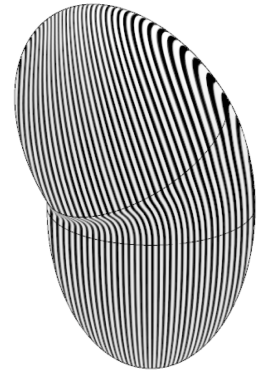
**CLICK [HERE](#)  
FOR VIDEO**

ACADEMIC WORK / HOW TO MOVE A MEGALITH / BRANDON CLIFFORD/  
FALL 2024

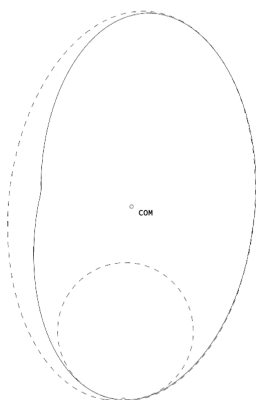




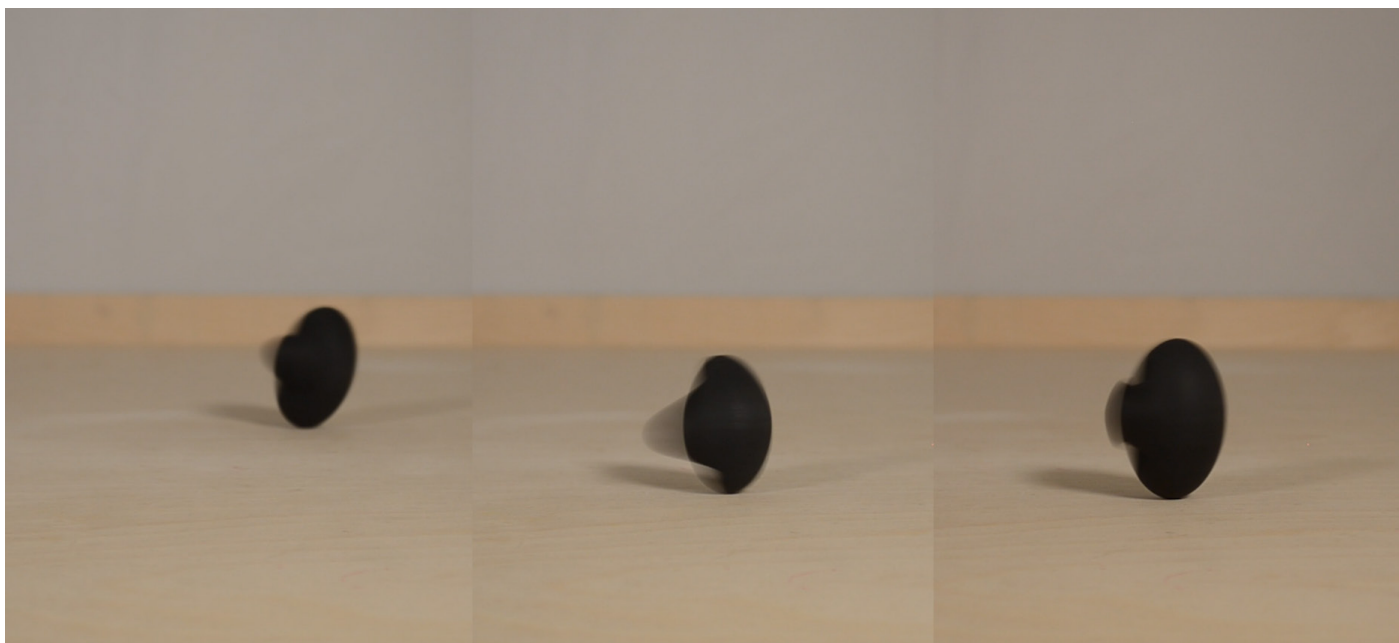




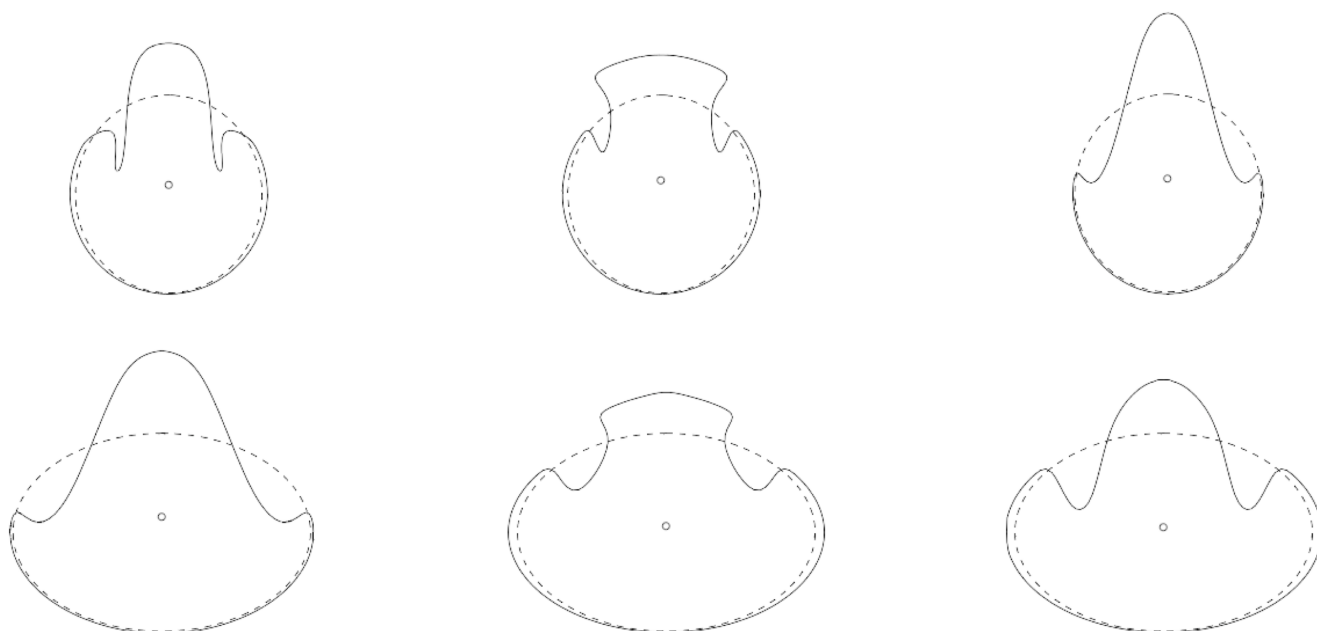
PHI TOP VARIATION (BENT PHI), The bent phi is a spinning top variation of the phi-top invented by astrophysicist Kenneth Brecher, which starts on one axis and then begins to stand and spin upright. In the bent phi, top half of the ellipsoid is rotated, leading to a "bent" shape, while maintaining the center of mass of the original shape. This results in a "lag" between the two halves, mimicking the spin of a dancer or skater.



TIPPY TOP VARIATIONS, The three tops, explored using mesh and sub-d modeling aimed to keep the similar ratio and center of mass to that of the phi top, while formally achieving asymmetry. These characteristics lead to a phenomena in which they have the ability to spin on three different sides with one spin.



STILLS FROM FIGURES OF FORCE VIDEO



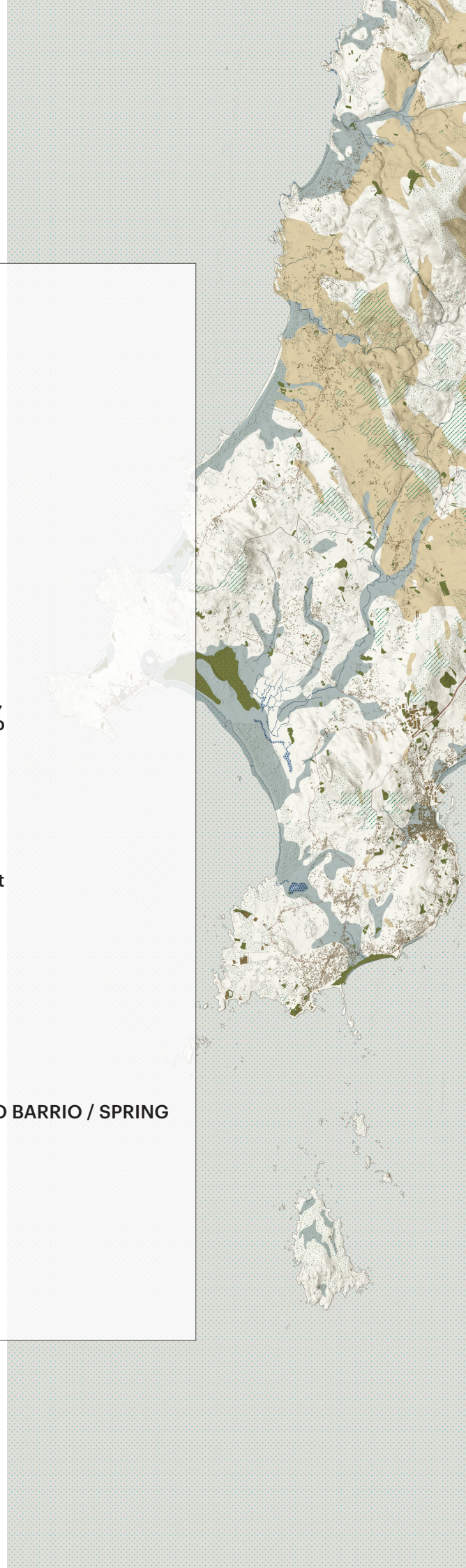
# TELL IT TO THE BEES

A community gathering and learning center surrounding the practice of bee-keeping in Galicia, Spain.

Emulating the dry stacked stone practices of the region the site consists of a network of stone walls sourcing slate, granite, and waste material from the site's existing industrial building to form a network of spolia walls which in turn create a mosaic of interior and exterior spaces. These spaces support programs such as community gardens, markets, honey and beeswax production and a beekeeping/bee byproduct residency program.

The work was featured in Universidade e Territorio exhibition at Fundación Ría in Santiago de Compostela, Spain

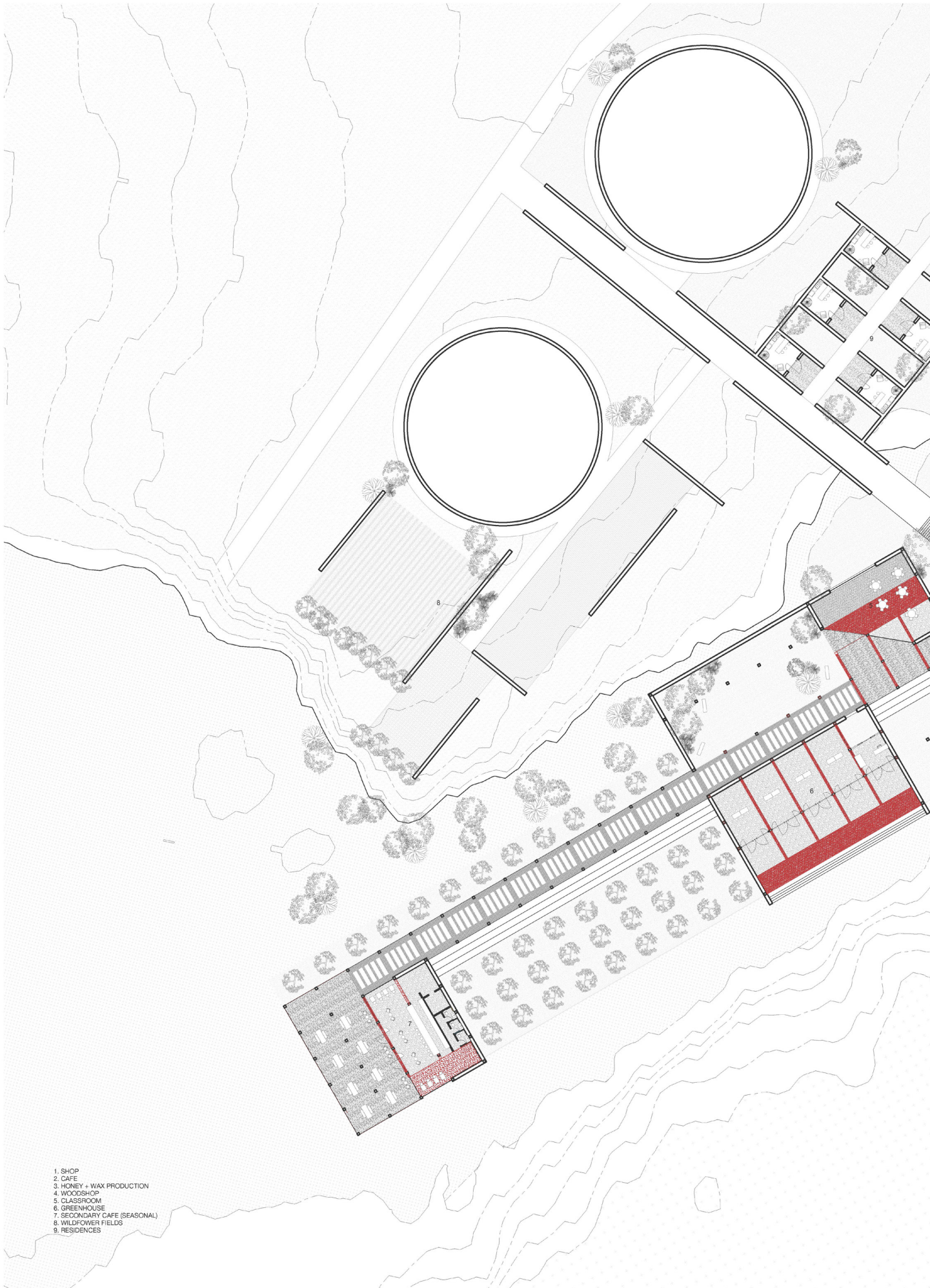
ACADEMIC WORK / TERRITORY AS INTERIOR / ROI SALGUEIRO BARRIO / SPRING 2025





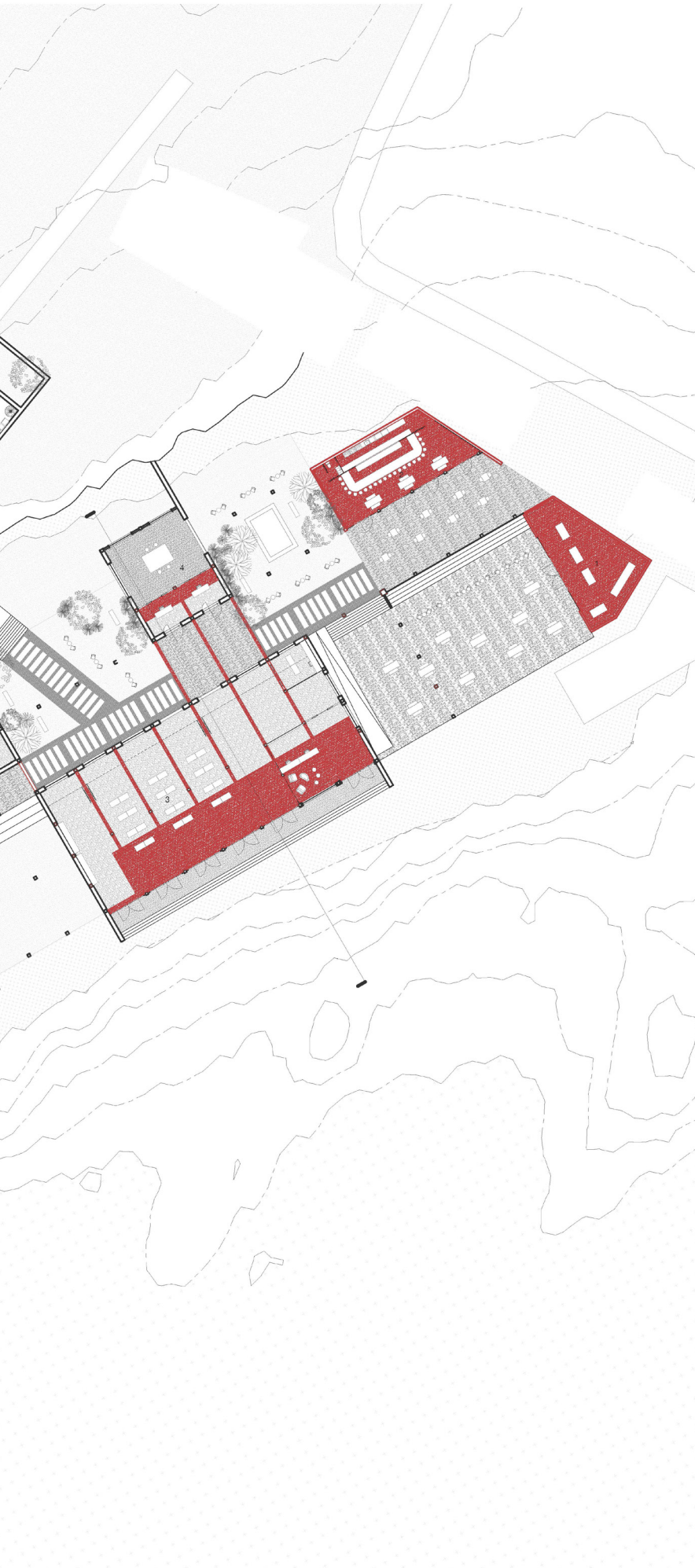




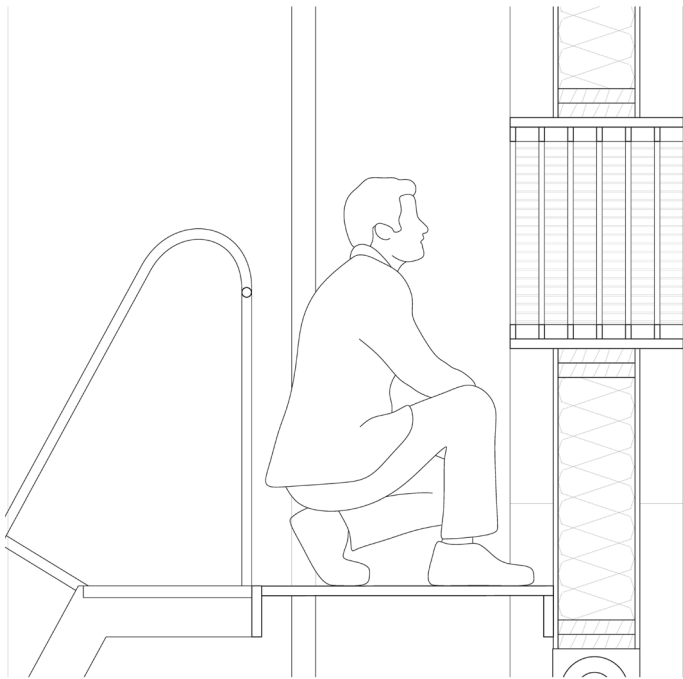


1. SHOP
2. CAFE
3. HONEY + WAX PRODUCTION
4. WOODSHOP
5. CLASSROOM
6. GREENHOUSE
7. SECONDARY CAFE (SEASONAL)
8. WILDFLOWER FIELDS
9. RESIDENCES

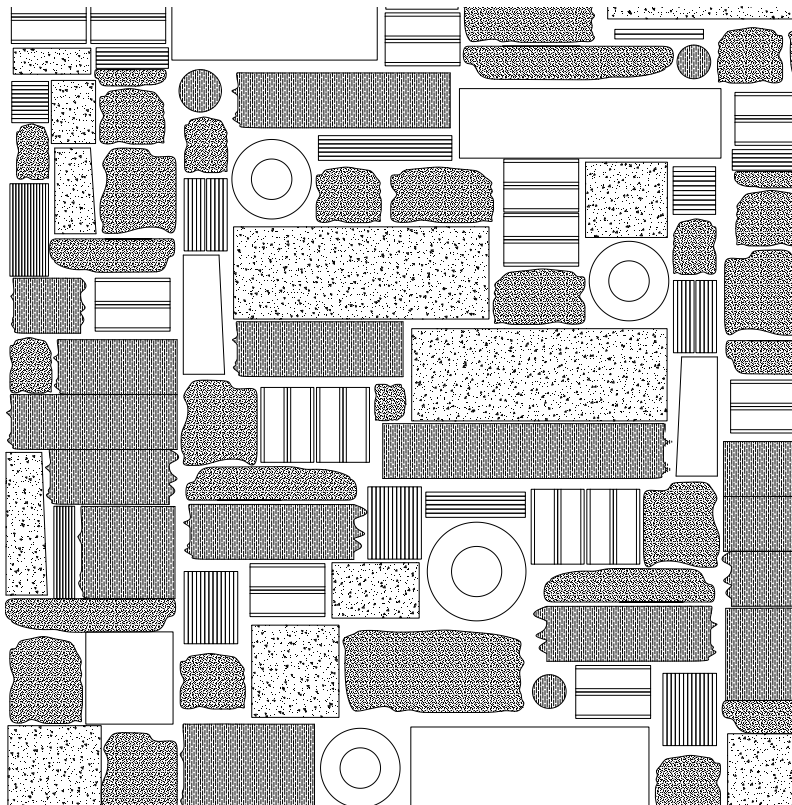




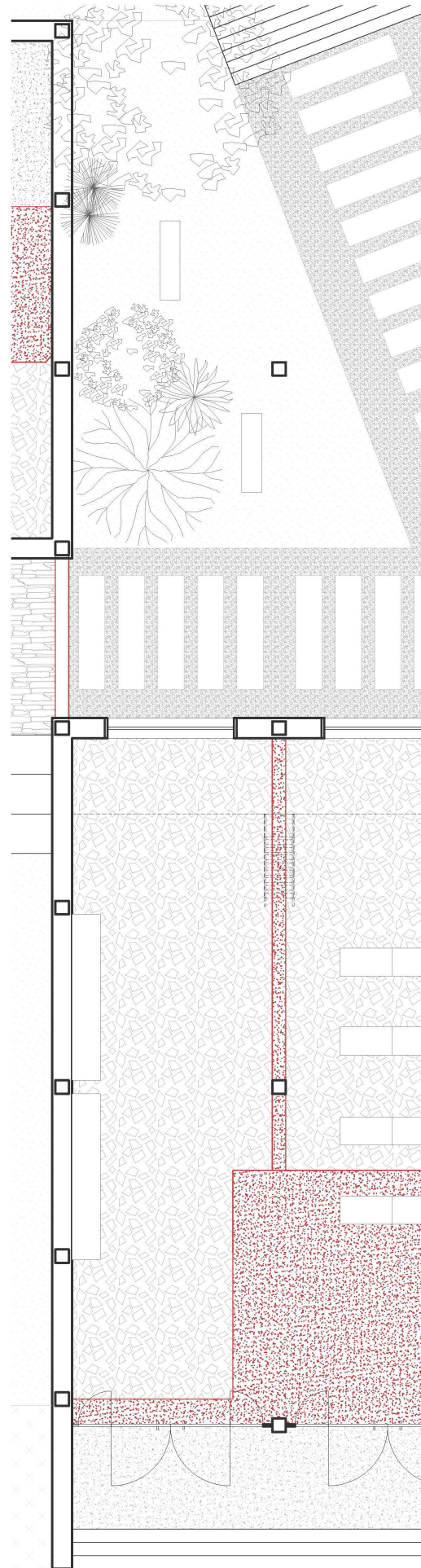
LEVEL 0 PLAN



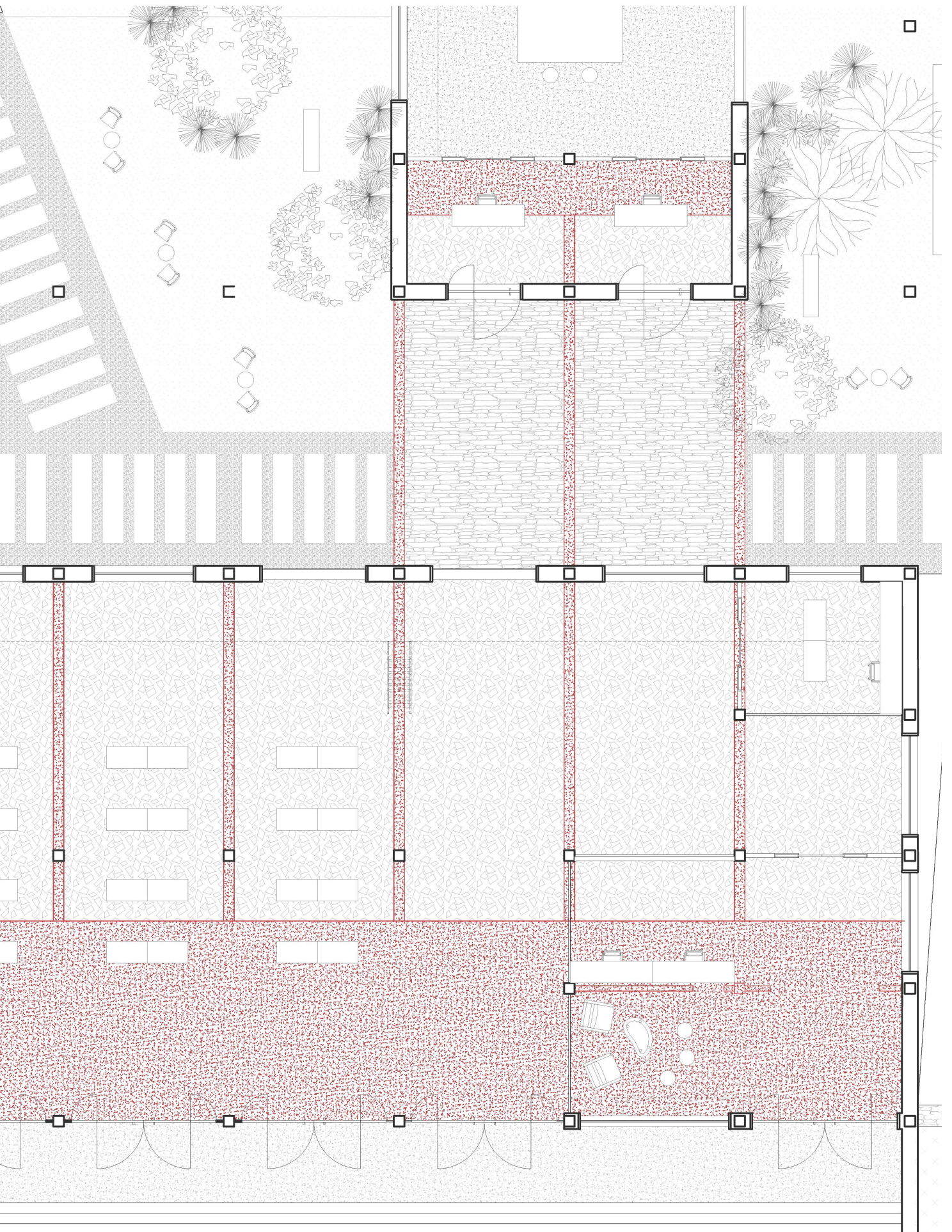
IN WALL BEE HIVES, Taking inspiration from ancient aviaries in Galicia, the main production area features bee-hive places amongst the spolia in the wall, which can be accessed from the interior of the building for bee product harvesting.



SPOLIA WALL, a close up of the spolia wall patterning used throughout the site.



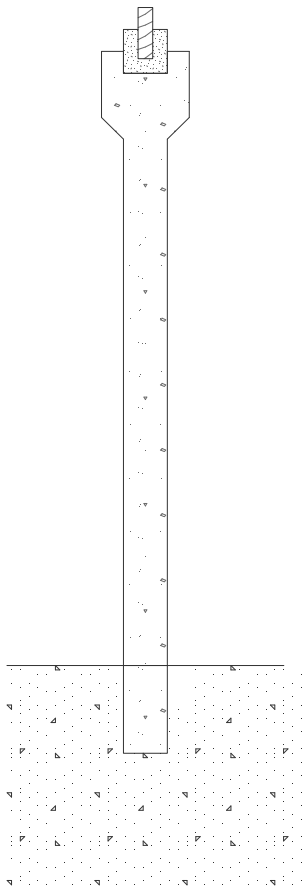




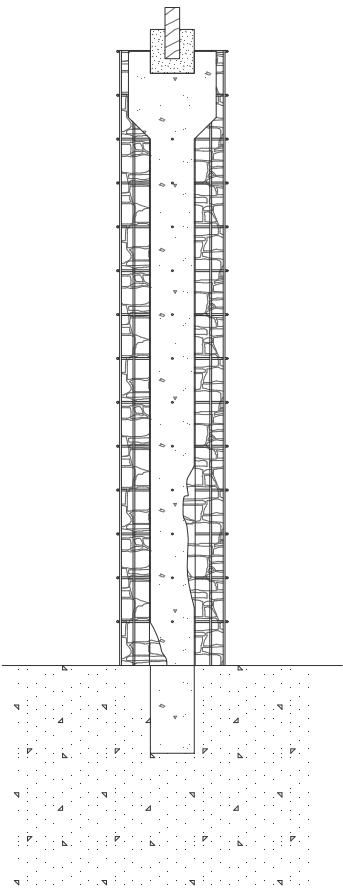
HONEY + WAX PRODUCTION AREA PLAN,  
Floors hatched in red are original to the site.



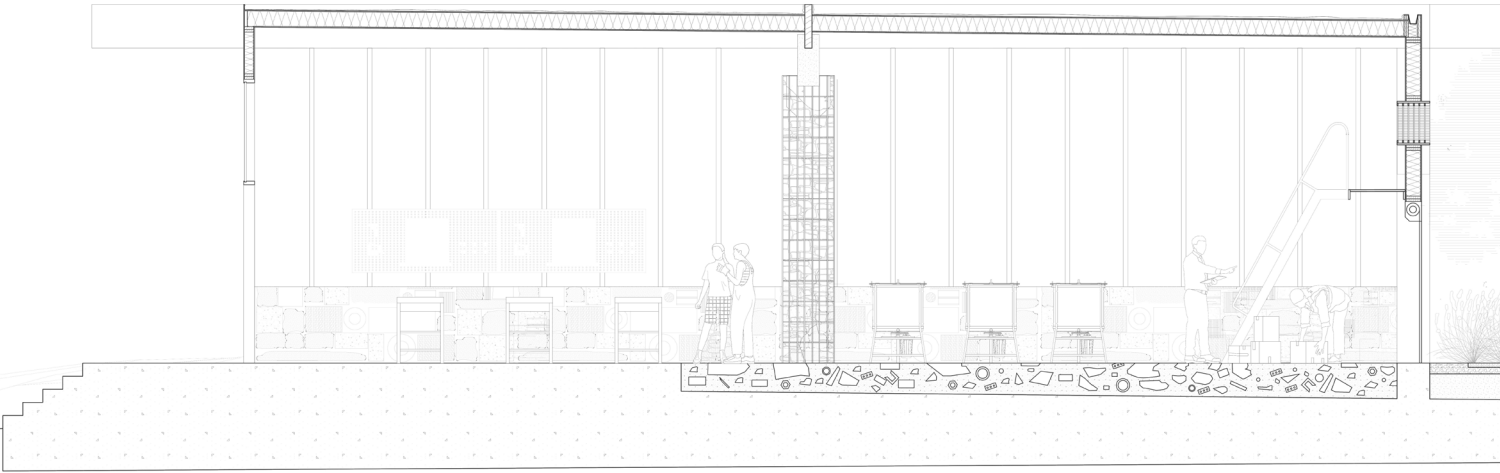
ORIGINAL COLUMN + ROOF BEAM



GABION REINFORCED COLUMN

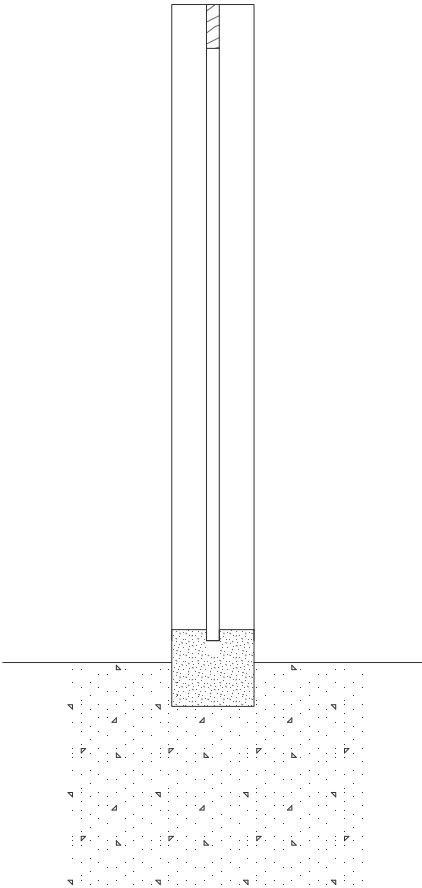


STRUCTURAL CATALOG, The project proposed the reuse of materials on site, keeping columns that had maintained there structural integrity, reinforcing others with a gabion like outer envelope consisting of site rubble, following a similar logic of the spolia stacked walls.

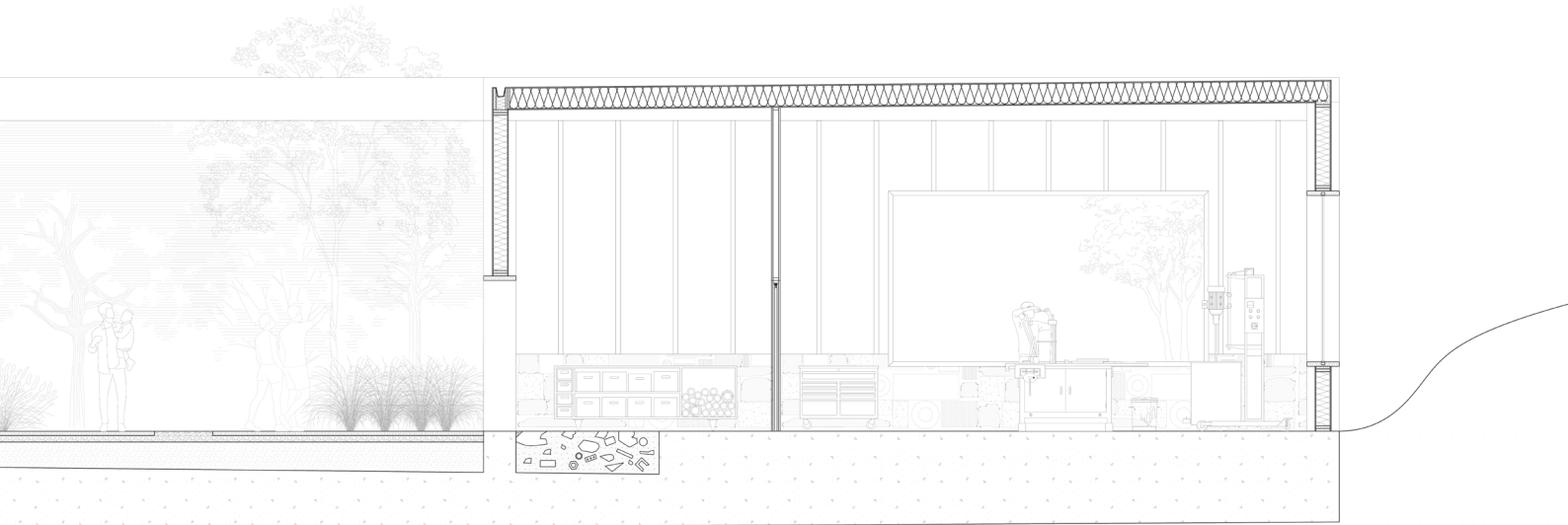
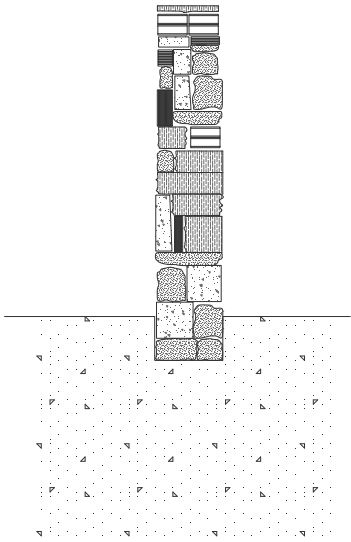


TRANSVERSE SECTION

NEW CRUCIFORM TIMBER COLUMN



SPOLIA STACKED WALL









SECTION MODEL

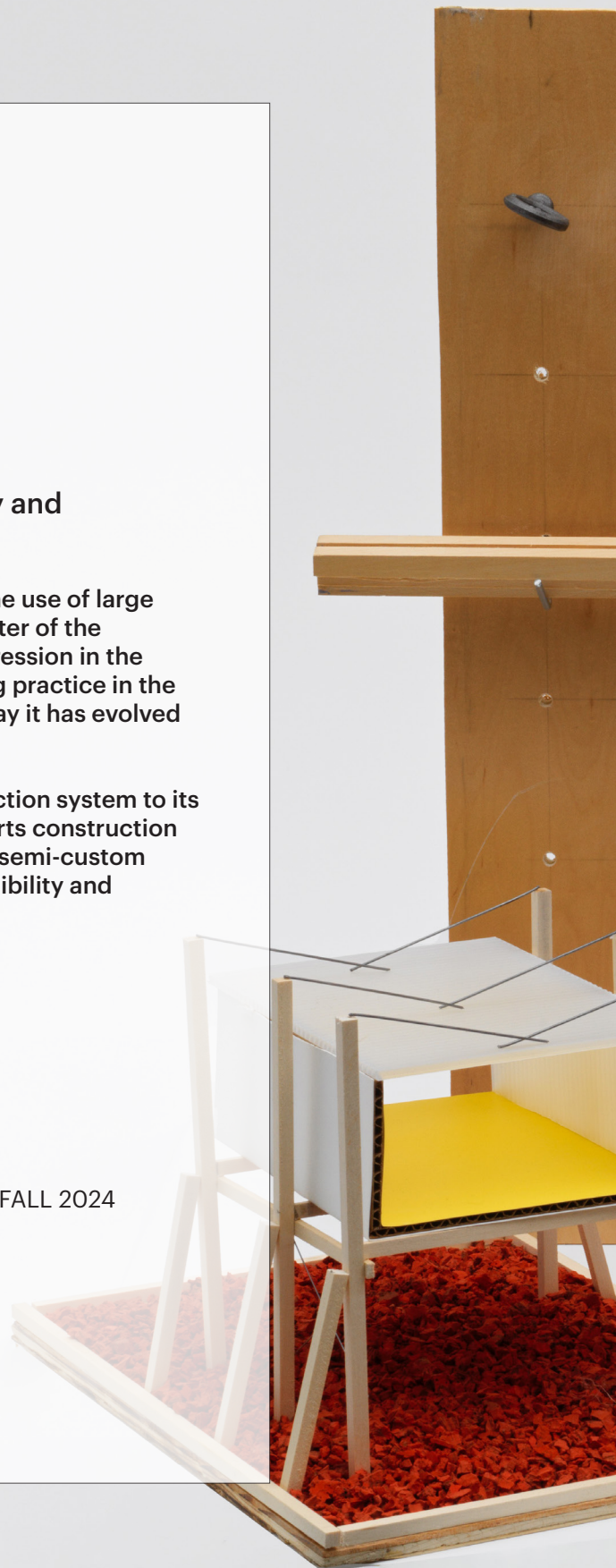
# BUDDY BARN

**A tool inherent pole barn designed for assembly and disassembly small groups**

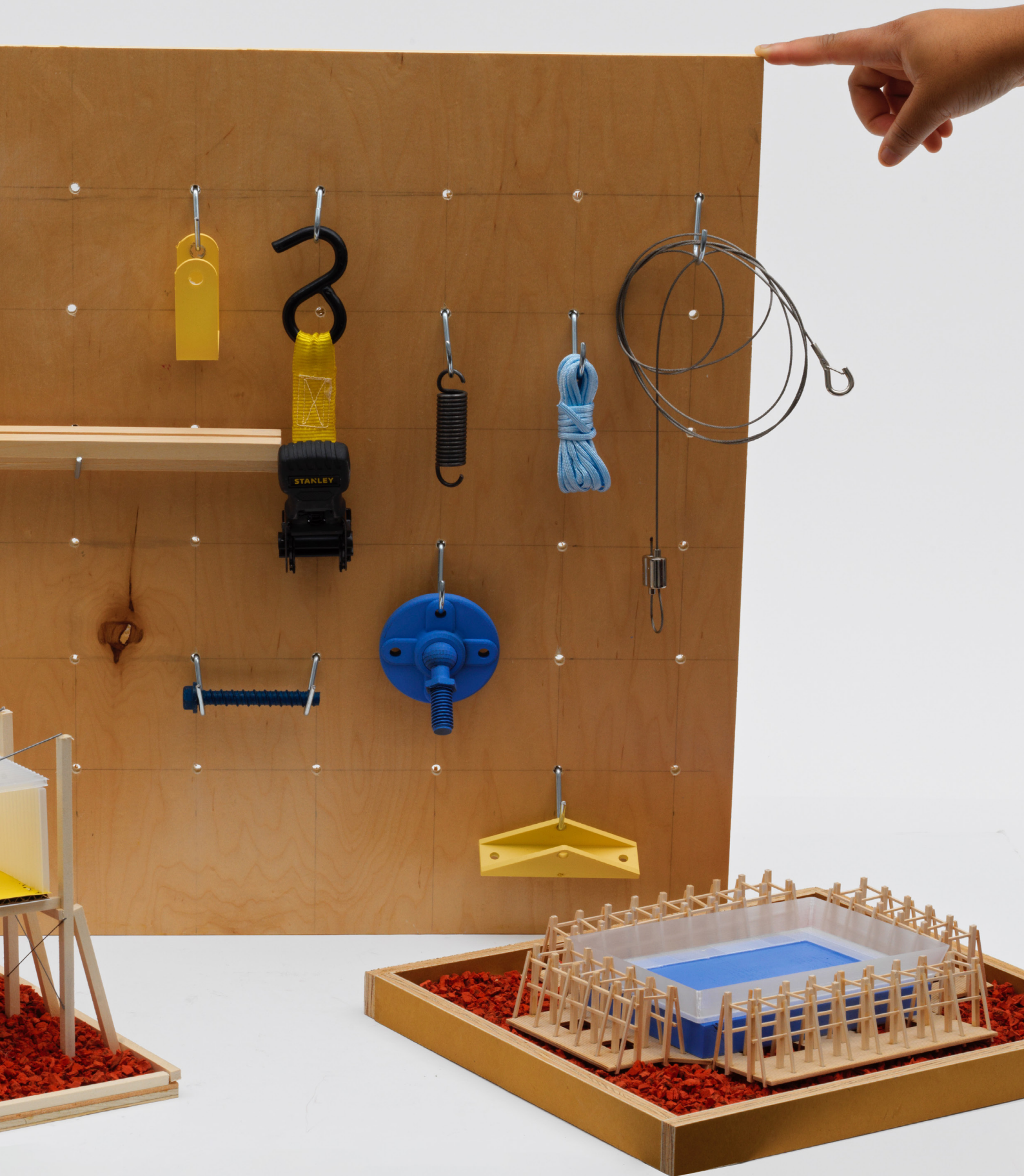
The pole barn, a system of construction which features the use of large poles or posts serving as both the foundation and perimeter of the building, was born out of necessity during the Great Depression in the United States and evolved as a community based building practice in the American Pacific Northwest in the mid-20th century. Today it has evolved again as a feat of the solo, often male, "diy-er."

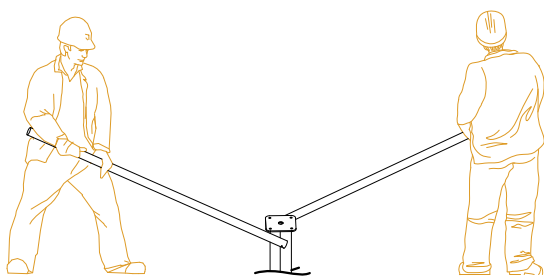
The Buddy Barn attempts to return the pole barn construction system to its group and community effort origins, designing a kit of parts construction system featuring edited versions of standard lumber and semi-custom connectors that provides assembly (and disassembly) legibility and encourages the creation of a building with friends.

ACADEMIC WORK / KIT 4 A BIT STUDIO / XAVI AGUIRRE / FALL 2024

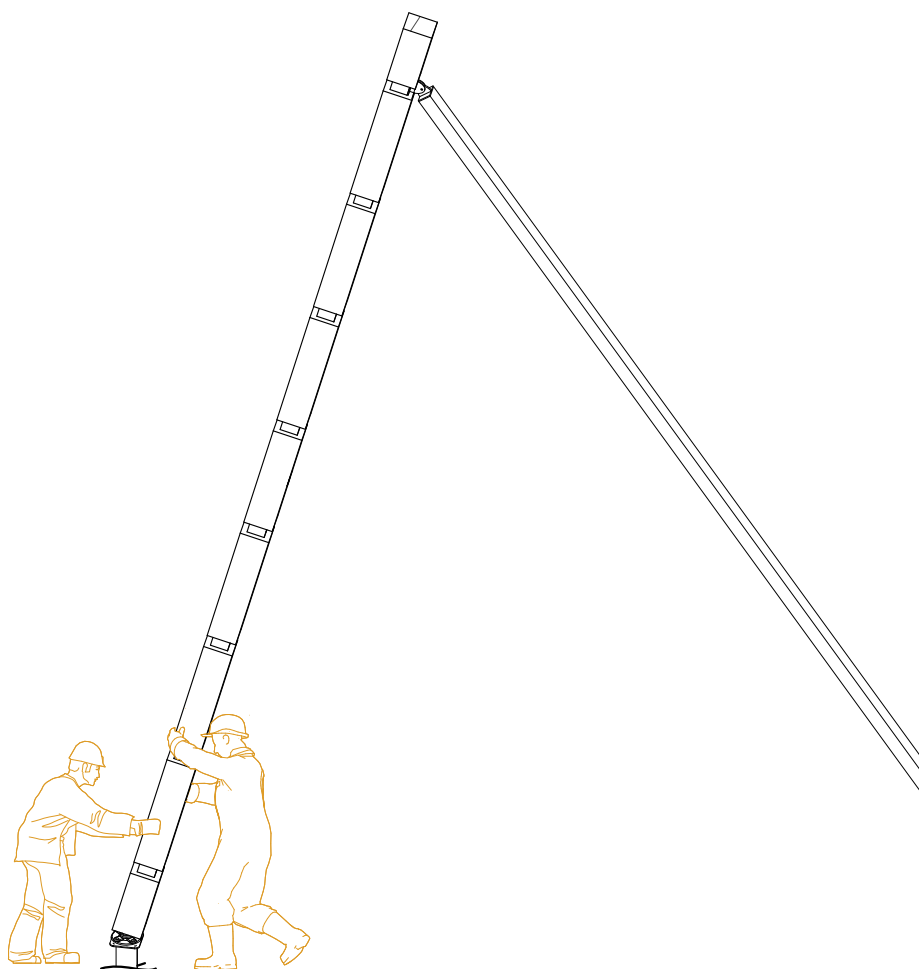








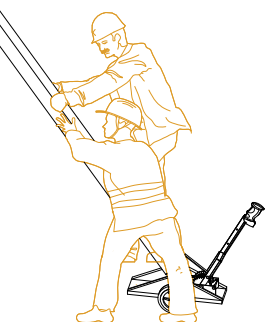
GROUND, two "buddies" are needed to drive the screw pile into the ground and provide a foundation for the structure.



WALL, Four "buddies" are needed to erect the wall system. This system consists of 8x8 notched posts and 6x6 supports connected to each other by custom hinges.



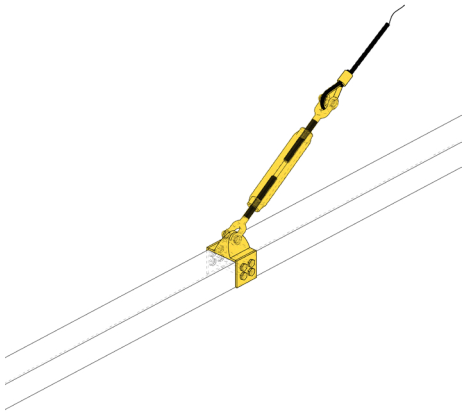
ROOF, Two “buddies” are needed to raise the roof system. Roof beams are connected to the erected wall system and are winched into place, much like a crane.



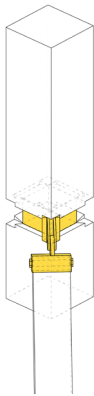
CONSTRUCTION SYSTEM, the building system is categorized by ground, wall, and roof and quantifies the expected human labor needed by each task. The system was designed with the expectation that a building could be designed with a group of 6-10 people.



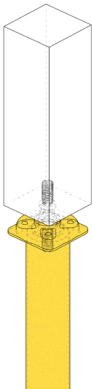
WALL AND ROOF STRUCTURAL SYSTEM MODEL



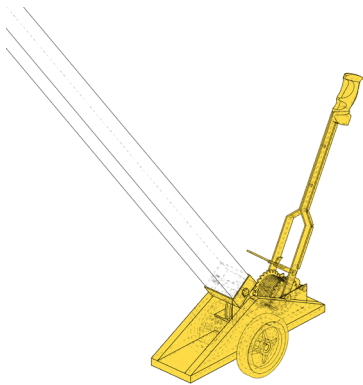
CONNECTOR ON ROOF BEAM



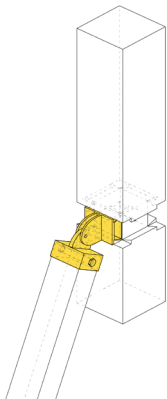
POST NOTCH CORNER BRACKET



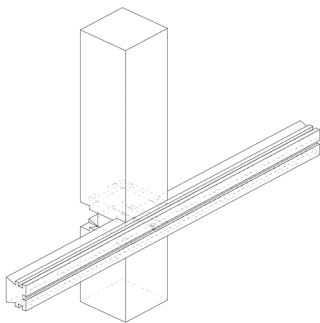
BALL JOINT CONNECTION BETWEEN SCREW  
PILE AND POST



SUPPORT BASE AND WINCH SYSTEM



POST NOTCH BRACKET CONNECTION



SLIDING WALL LATERALS

DETAIL LIBRARY, A series of brackets and joints were designed for connection between foundation, posts, supports, roof with a focus on ease of assembly and reconfigurability. The wood of the buddy barn is expected to decay over time, while the metal connectors remain, allowing for opportunities of redesign, reconfiguration and replacement as the building ages.



# GROUNDWORK

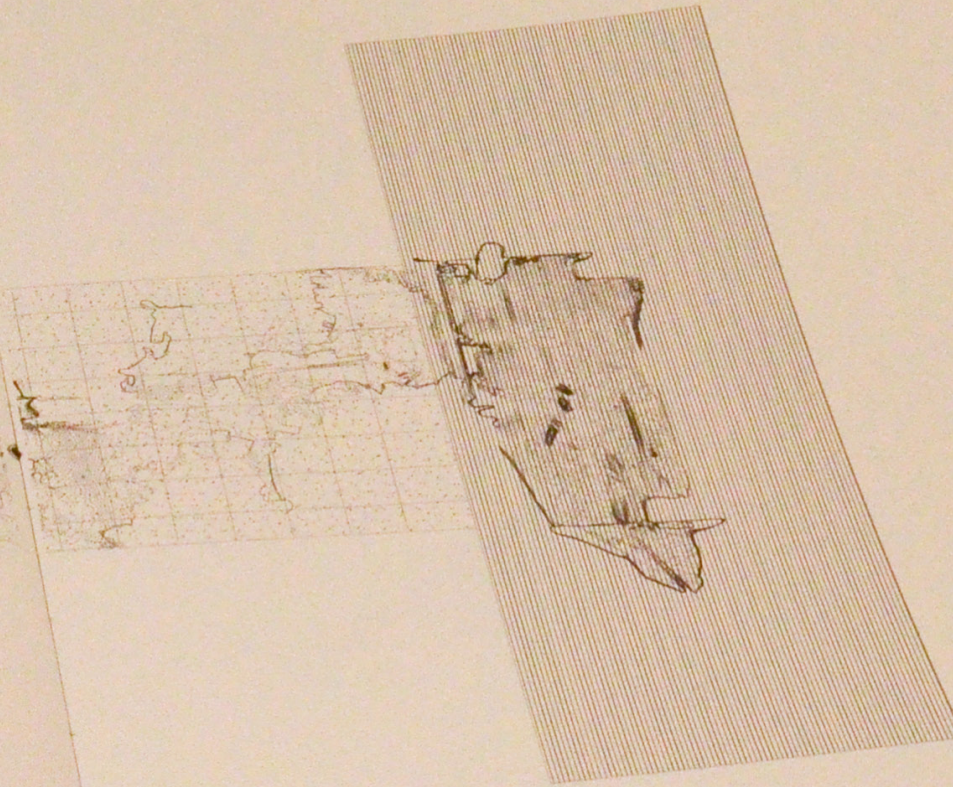
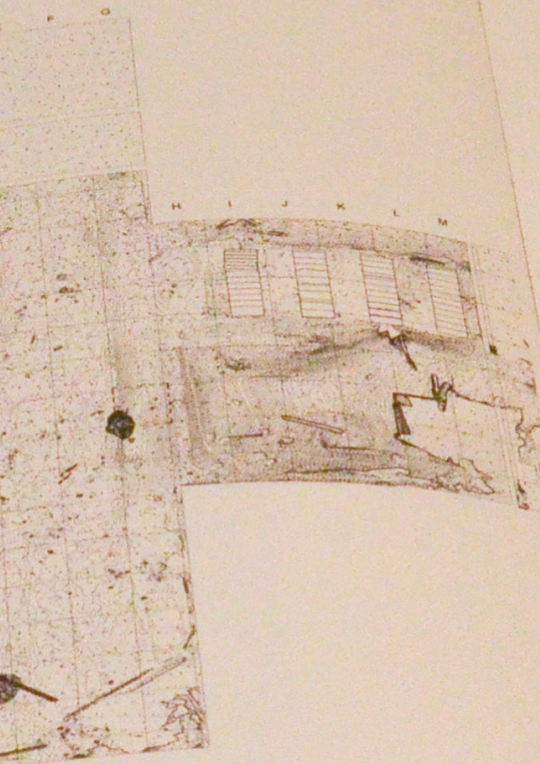
**A detailed survey of the ground conditions of a Tuskegee University building.**

In the conventional building survey there is a general disregard for the ground conditions of a site beyond the textured hatch of a floor pattern or the contour lines of a landscape. There is little speculation about the past instances, natural or man-made, that have led to the present foundations of a building. In geology, to survey takes on a different attitude to the ground. Depth, becomes paramount to the understanding of the passage of time. In parallel, the brick, a collection of clay and mineral from the earth that is fired, can also be considered a ground section and in turn a section of time. Zooming into these detailed units of ground, a narrative of the site's history arises and its place in time becomes living rather than stagnant.

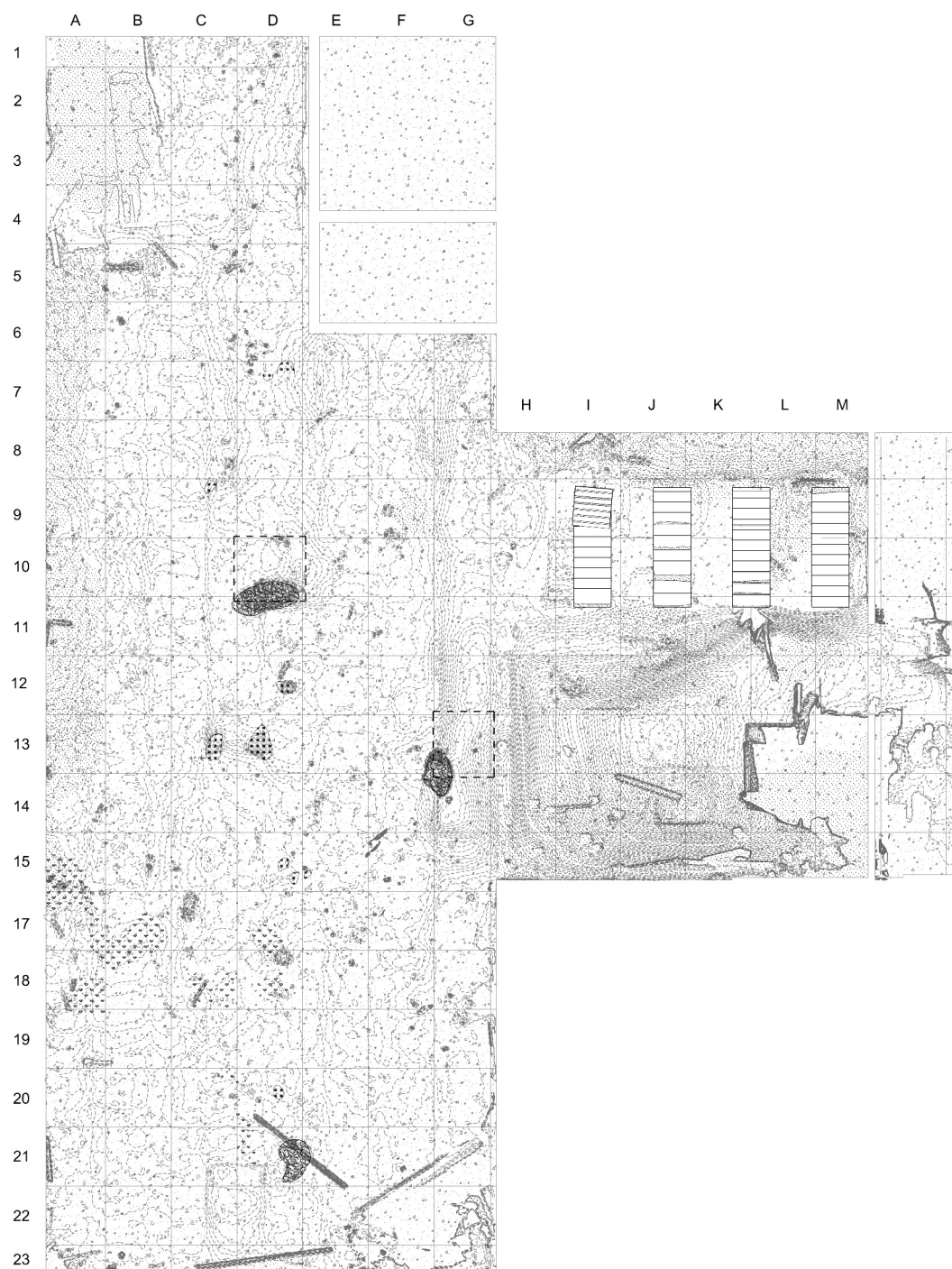
These drawings and images explore these concepts in the context of Tuskegee University, a historically black college in Alabama. Founded in 1881, students manufactured bricks and constructed the buildings that would populate the campus. This work was featured in a publication that served as a summarization of the class's work and was additionally showcased at The Next Earth: Computation, Crisis, Cosmology presented by Antikythera & MIT Architecture at the 2025 Venice Architecture Biennale

ACADEMIC WORK / BRICK X BRICK / CARRIE NORMAN / SPRING 2025



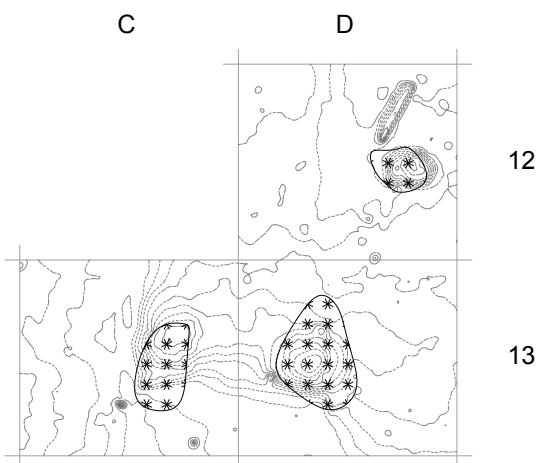
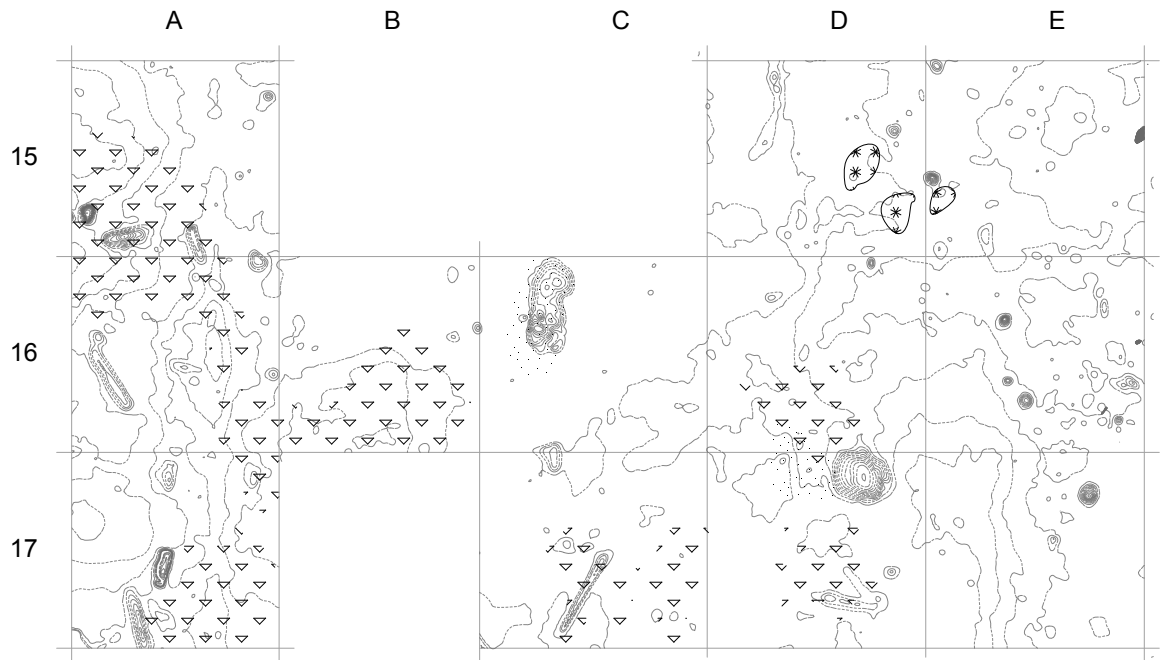
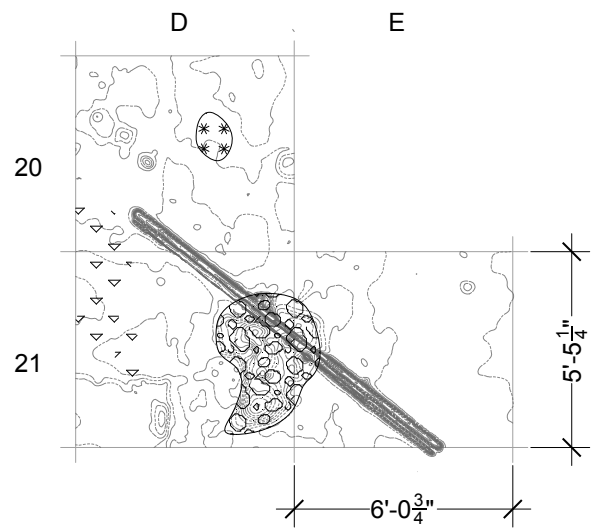






TOPOGRAPHICAL PLANS AND DETAILS  
OF WILCOX D BUILDING AT TUSKEGEE  
UNIVERSITY, achieved by utilizing detailed  
photogrammetry scans of the building.





## KEY



CRACKED, BROKEN



STAINED, LIGHT



STAINED, HEAVY



CHIPPED



TOPOGRAPHY LINES

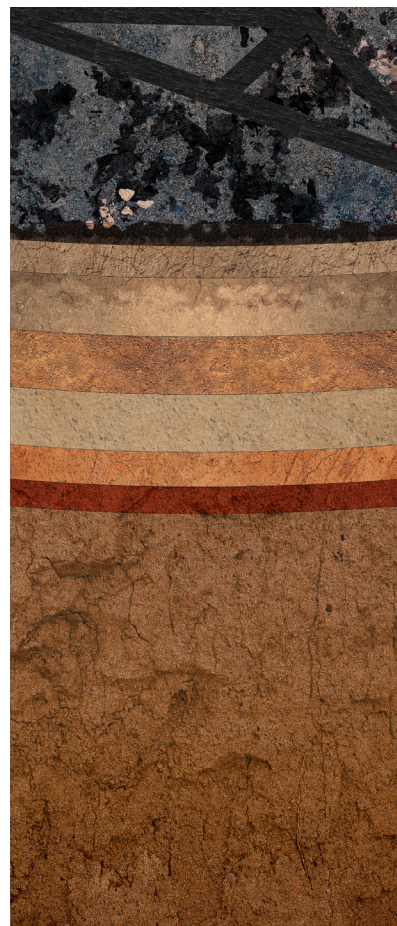




1825



1899



1918



1920

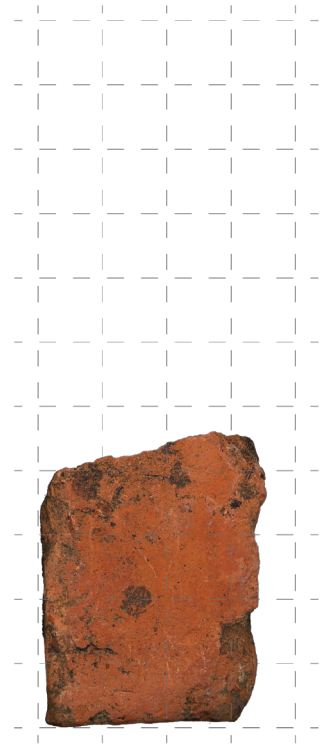
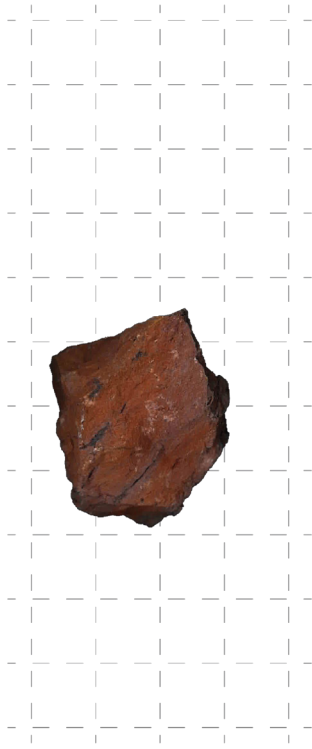


1941



2025





GROUND SECTIONS (LEFT), The series of sections cut several feet lower than the building, Wilcox D on the university's architecture program's campus, showing subtle changes in site at lower depths while depicting history of the building and campus on the surface.

BRICK SCANS (RIGHT & ABOVE), Brick fragments were collected from the site and scanned at high resolutions showing both the details of ground and time contained within the unit material.

# M.A.D AT THE MET WAREHOUSE

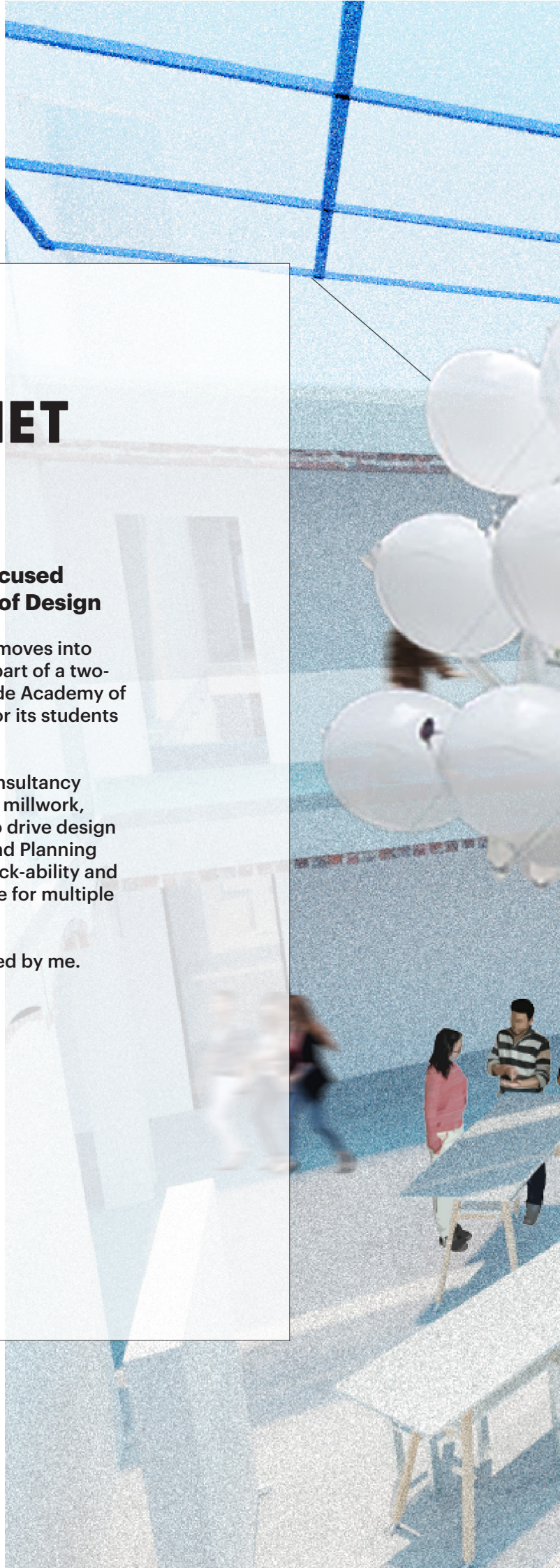
## **A branding and student engagement focused interior for MIT Morningside Academy of Design**

As the MIT School of Architecture and Planning moves into its new home at the Metropolitan Warehouse a part of a two-person design consultancy team, the Morningside Academy of Design desired a distinctive and flexible space for its students and faculty to create and innovate.

In response, as a part of a two-person design consultancy team, I proposed interior designs in the forms of millwork, furniture layouts and visualization as package to drive design discussions with Met Warehouse Architecture and Planning team. The designs were driven by a desire for hack-ability and legibility to students as well as flexibility of space for multiple different classroom and workshop scenarios.

All images and drawings featured were completed by me.

PROFESSIONAL WORK / SUMMER 2023  
COLLABORATOR: DOMONIQUE VALENZUELA



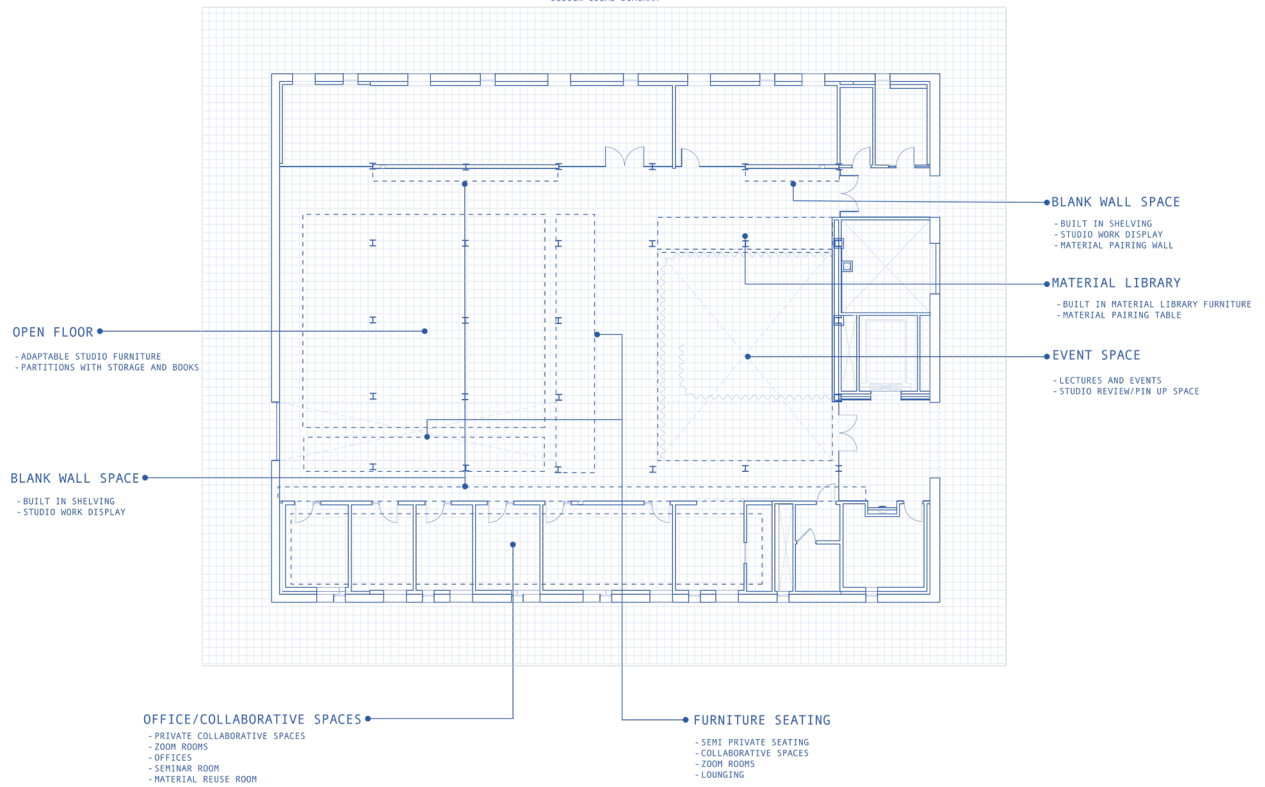




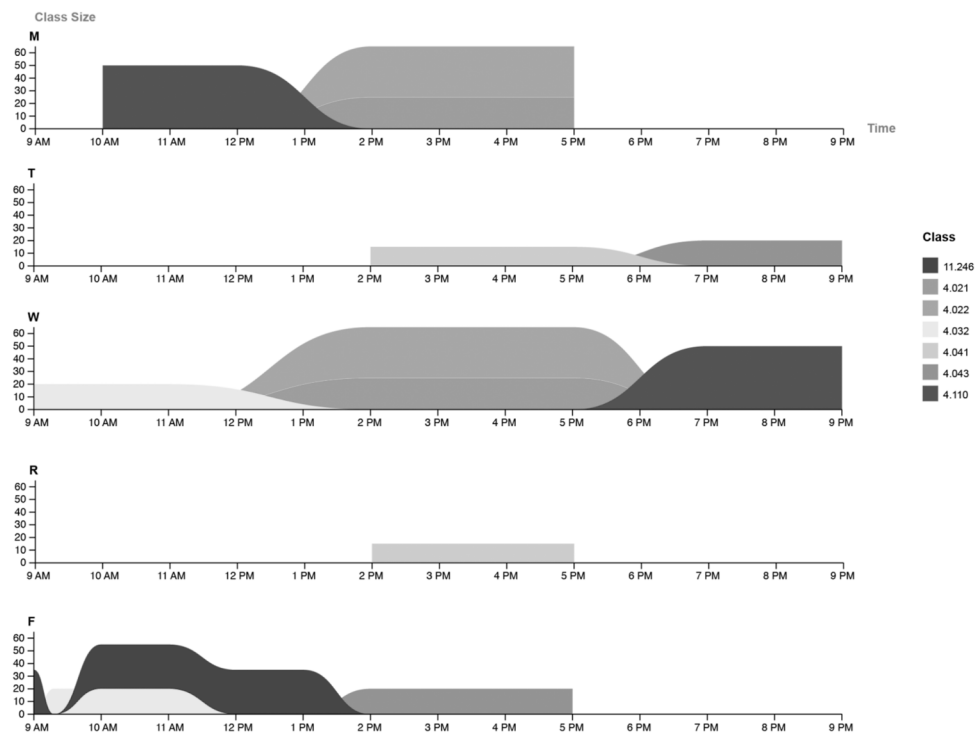


## BUILDING 5 3RD FLOOR MAD SPACES

DESIGN IDEAS DIAGRAM



ANALYSIS, Diagram of 3rd floor Morningside Academy space



ANALYSIS, Spring class schedule and capacity





PROPOSED MILLWORK CONCEPT RENDER, the millwork was designed to be modular and easily constructed on campus as a way to give both faculty and students a sense of ownership to the space and an ability to "hack" it in the future.

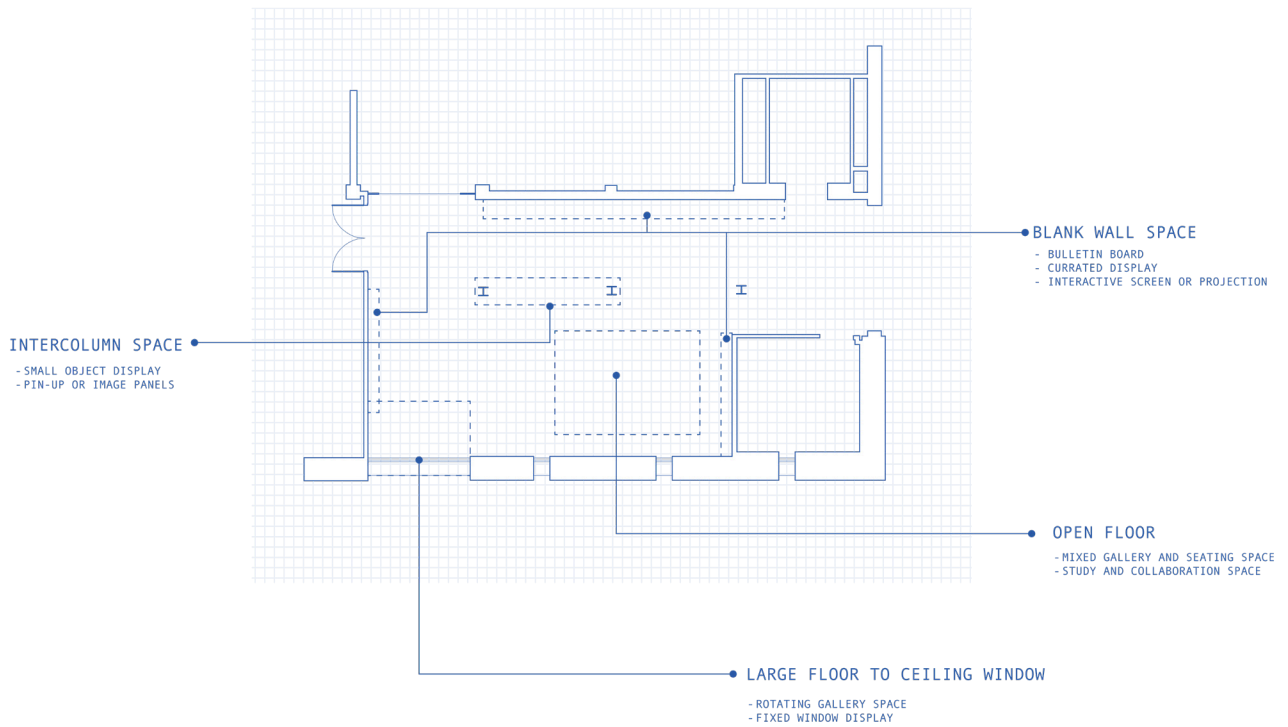


PERSPECTIVE STUDIO RENDER, flexibility in terms of movable furniture was paramount for a successful creative working environment and to accommodate several class typologies.



## DESIGN LOBBY

DESIGN IDEAS DIAGRAM

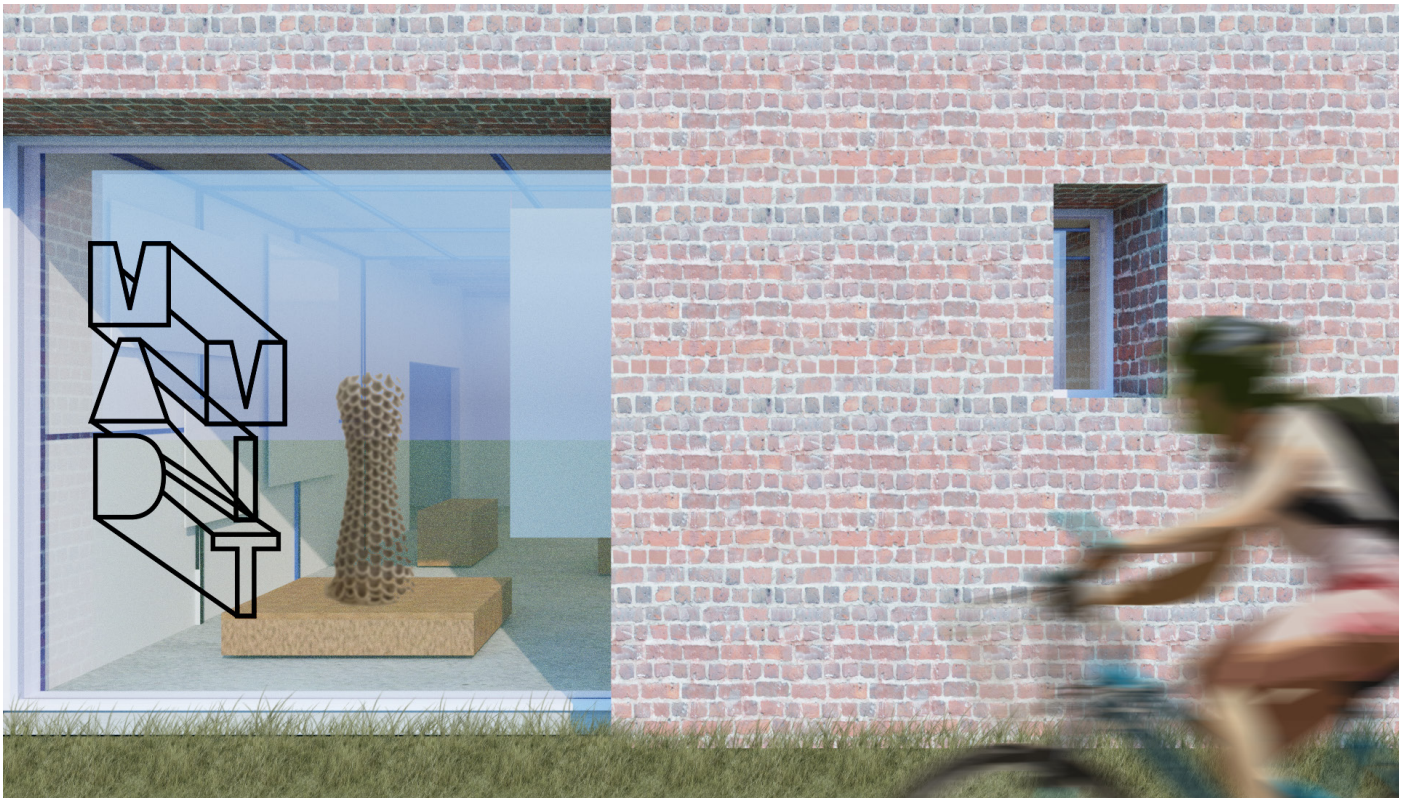


ANALYSIS, DIAGRAM OF EXHIBITION SPACE





PERSPECTIVE MAD GALLERY SPACE, featuring a superimposed grid for installations



PERSPECTIVE MAD WINDOW DISPLAY, allowing for branding and visibility from the main student thoroughfare



# FROM THE GROUND UP

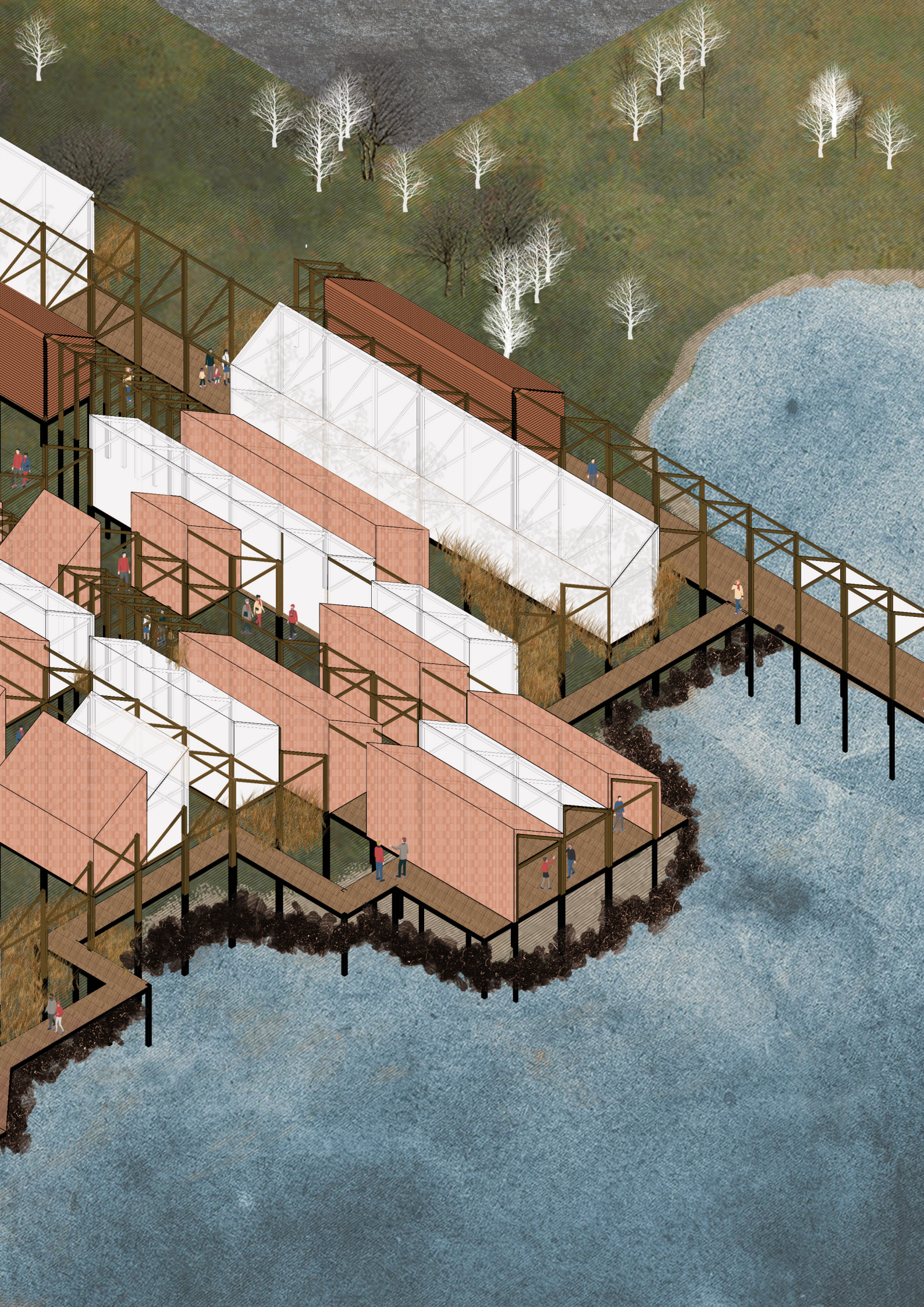
## **A community garden designed for collective healing and empowerment in East Boston**

From the Ground Up is an imagined urban garden centered on community gathering and cooperation, developed in resistance to the gentrification and erased history of East Boston. The project is framed as a retrospective documenting the development of this community garden, learning center and marketplace that first broke ground 15 years prior. The following drawings and models suggest one possible outcome of a collective and phased building process by the community over time. The buildings and surrounding gardens become contingent figures, drawing from the typology, domesticity and history of the shotgun house from the American south. A coordination of rhythms of interior-exterior, glass-terracotta define the garden site, unassuming amongst the organicism of the surrounding landscape. It is an urban productive and creative ecosystem with domestic proportions, grounded by courtyards and porches that draw connections to the rich cultural lineage of East Boston.

ACADEMIC WORK / MIT M. ARCH CORE 3 / FALL 2023  
COLLABORATORS: HANA DAVIS







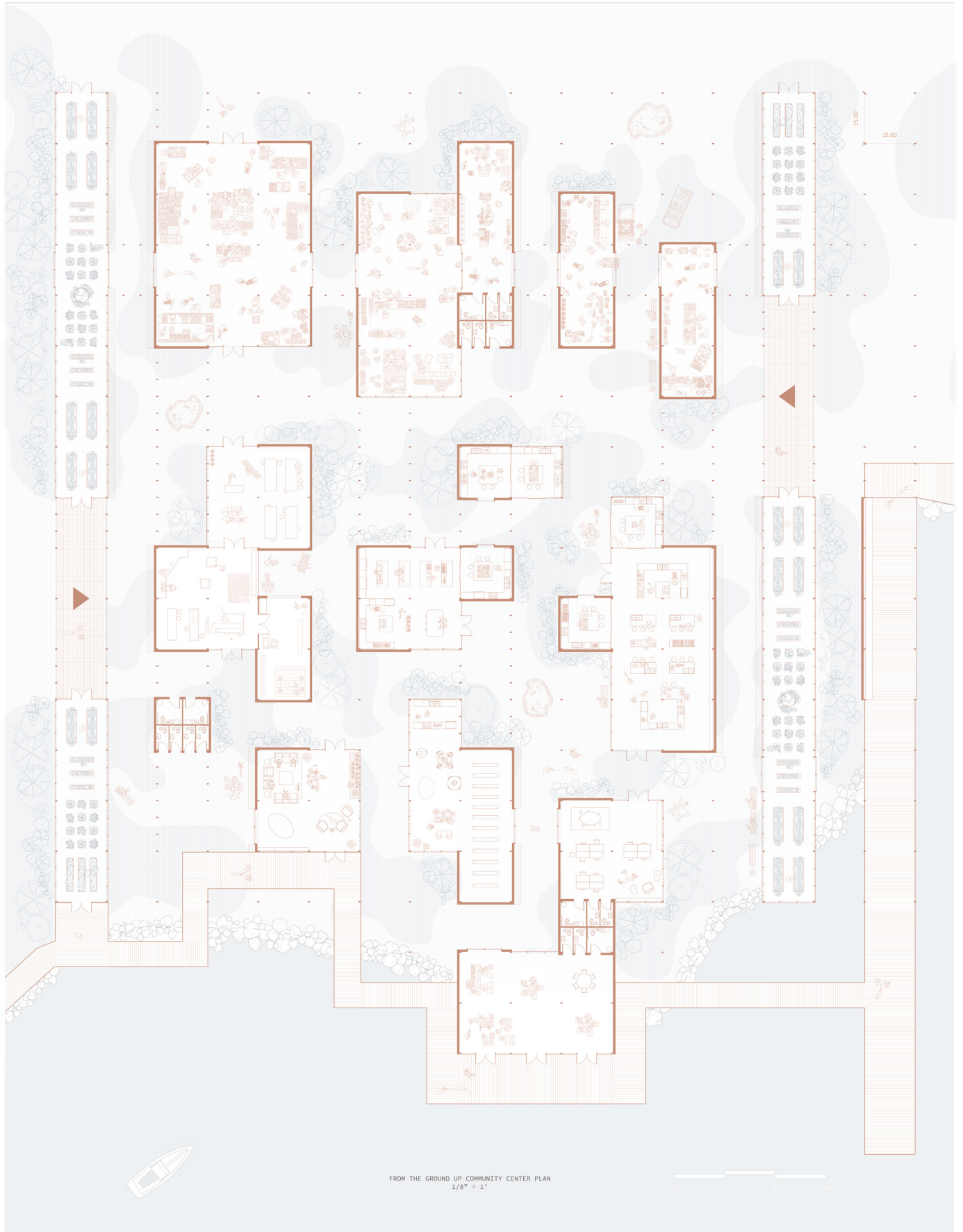




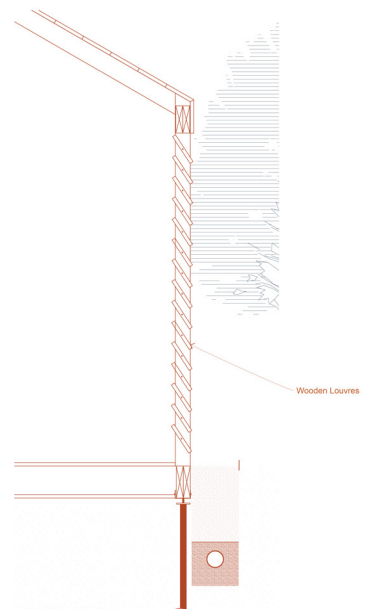
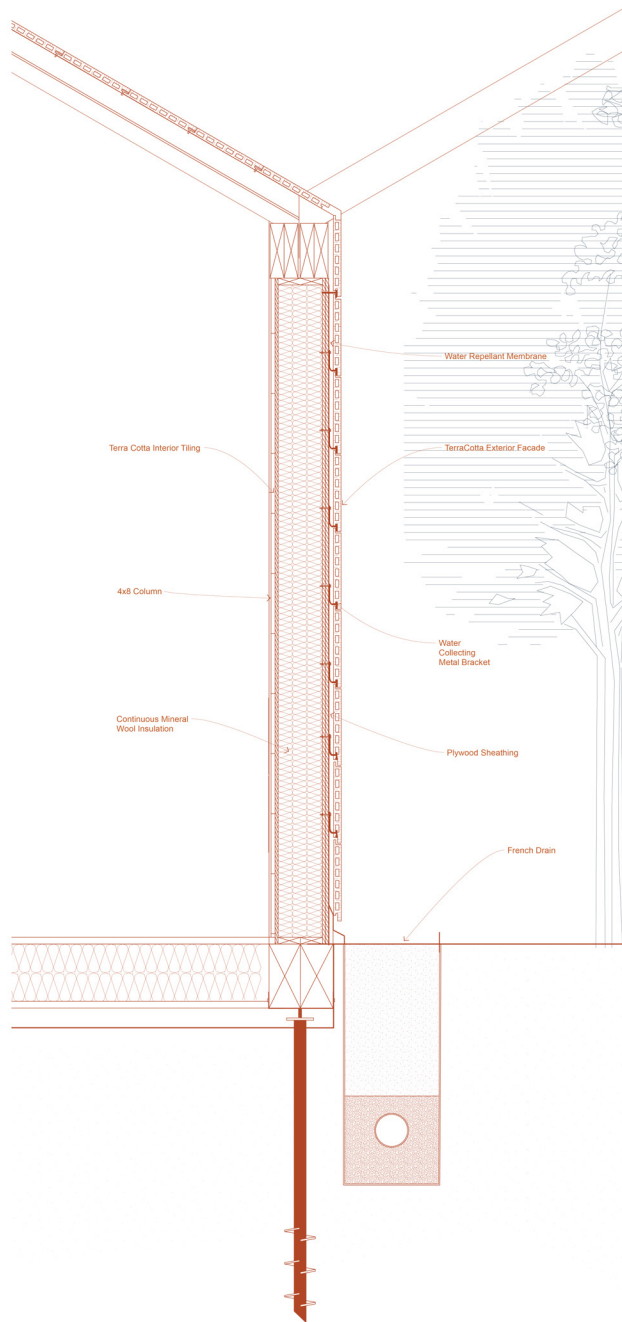
CASTED BRICK MODULES

PROGRAM DIAGRAM, as one projected outcome, the organization of program positions markets towards the road for access to deliveries of food, and community center spaces towards the water. At the center are the spaces of making, allowing visitors to gather around both the creation of food and also the building themselves. The site is edged with two lines of greenhouses contributing to the feeling of being surrounded and protected by nature.

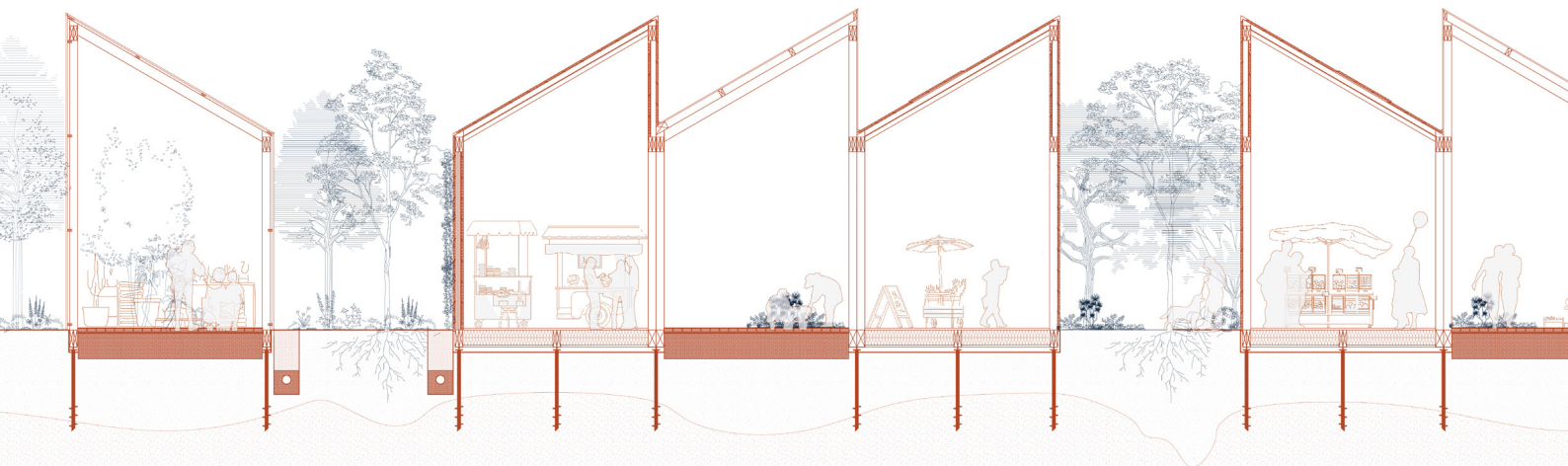
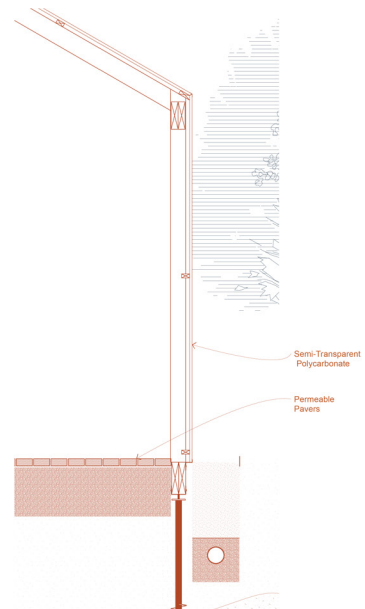




FROM THE GROUND UP COMMUNITY CENTER PLAN  
1/8" = 1'



WOODEN LOUVRE WALL SECTION  
1/2"=1'

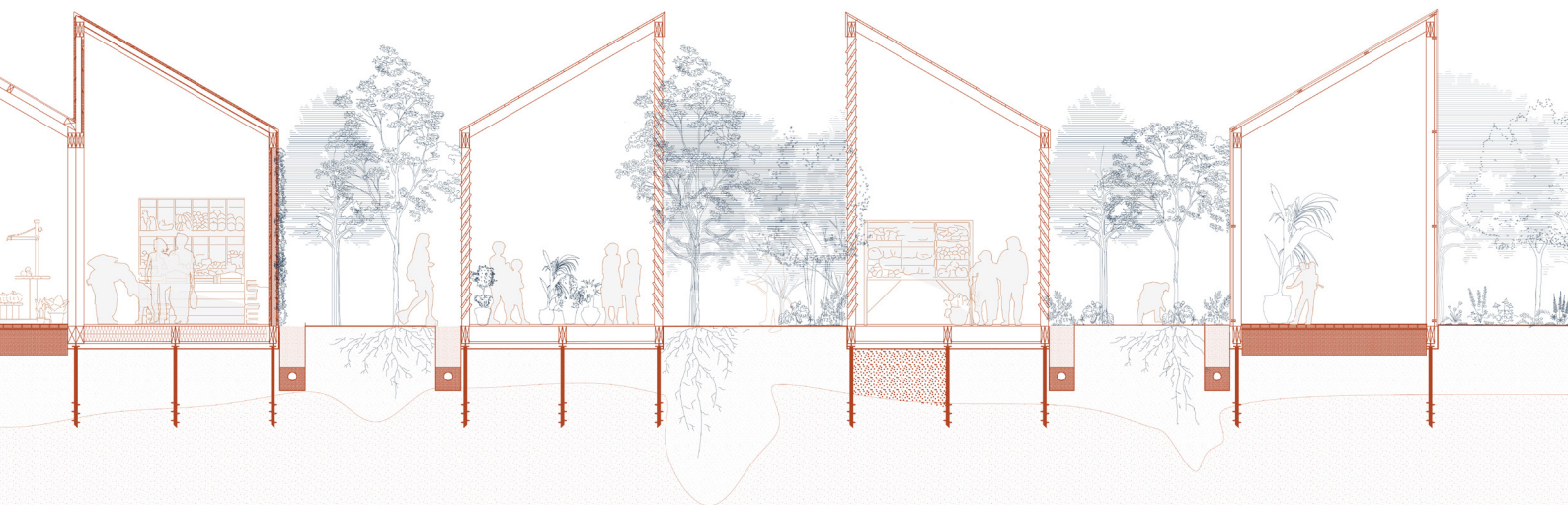


TRANSVERSE SECTION





SECTION DETAIL (LEFT) AND WALL TYPOLOGY MODELS (ABOVE), The buildings vary in facade resulting in a patterning of terracotta, glass and open air. The terracotta wall is designed to maximize the collection of water allowing for plants to grow on the wall's surface and irrigating the rest of the site by directing water into the French drain system.







MODEL, The primarily wood model with movable pieces, reveals a fixed figure ground and allows for variability of organization of the site in real time. The base of the model was cnc and inscribed with the site grid from a section of a tree.



