

PORTFOLIO

ARCHITECTURE +
COMPUTATIONAL DESIGN



JEBREEL BESSISO

PROJECTS

PAGE

Jebreel Bessiso

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EDUCATION

Cornell University, Ithaca, NY

Bachelor of Architecture | Expected Graduation: May 2026 | Grade Point Average (GPA): 3.935

Relevant Courses: Design I-IX, Structural Concepts, Structural Systems, Environmental Systems, Parametricism, Healthy Building Materials, AI from MLPs to APIs, Object-Oriented Programming and Data Structures

SKILLS

Software: Adobe Creative Suite, Rhinoceros 3D, RhinoCAM, Grasshopper, Vray, Enscape, Revit, AutoCAD, ArcGIS Pro + StoryMaps, Blender, Microsoft Office Suite

Fabrication Skills: 3D Printing, Laser Cutting, Woodworking, CNC Mill Programming, Model Making

Programming Languages: Python, Java, Processing, p5.js

Languages: English (fluent), Spanish and Arabic (conversational)

AWARDS AND RECOGNITION

Cornell AAP Dean's List (6x)

United States Presidential Scholar in the Arts Semifinalist (2021)

YoungArts Finalist in Visual Arts & Honorable Mention in Design Arts (2021)

WORK EXPERIENCE

Center for Community Transportation | Ithaca, NY

3D Modeling & Visualization (Freelance)

August 2025 – September 2025

- Used Rhino to 3D-model and Vray + Photoshop to create multiple renderings of the Center for Community Transportation's proposed mobility hubs as part of their NYSERTA grant application.

RESEARCH

Realtime Urbanism Lab | Ithaca, NY

Research Assistant

July 2025 – September 2025

- Used Revit and the Tally LCA plug-in to demonstrate the impact of various sustainable building strategies (deconstruction, preservation and infill, vertical expansion, etc.) on the embodied carbon, cost, architectural design and functionality of ongoing and proposed building projects throughout Ithaca, NY.
- Used ArcGIS Pro and ArcGIS StoryMaps to communicate and present findings to stakeholders.

Martin Miller Lab | Ithaca, NY

Fabrication Assistant (Volunteer)

February 2025 – August 2025

- Assisted in fabrication, assembly, and installation of the MushHaus Pavilion, made of mycelium modules.

Cornell University Sustainable Design (CUSD) | Ithaca, NY

Sustainable Mobility Shelter: Co-Leader

January 2022 – present

Multidisciplinary team designing a modular bus shelter with integrated lighting that responds to approaching buses.

- Co-leading a redesign of the bus shelter into a modular catenary structure with integrated lighting.
- Designed and 3D-printed prototypes of a triangular building module for use in the structure.
- Scripted a preliminary parametric model of the bus shelter in Grasshopper.
- Collaborated with mechanical engineering members on design iterations and improvements.
- Assigned design tasks to 5+ architecture and engineering sub-team members.
- Designed presentations and led meetings with potential stakeholders for the project.
- Managed project workflow through Slack and Google Drive.

E-board member representing Sustainable Mobility Shelter

September 2024 – December 2025

- Recruited, interviewed, selected, and onboarded Sustainable Mobility members.
- Prepared and delivered workshops on Environmental Product Declarations and Life Cycle Assessments

THE RIBBON LIBRARY

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BINGHAMTON RAMP-UP

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THE ENFIELD NEIGHBOR

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SPECTRUM OF REUSE

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GAZA'S DESTRUCTION

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MUSHHAUS

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MASSINGMODEL

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FUTURETENSE CHAIR

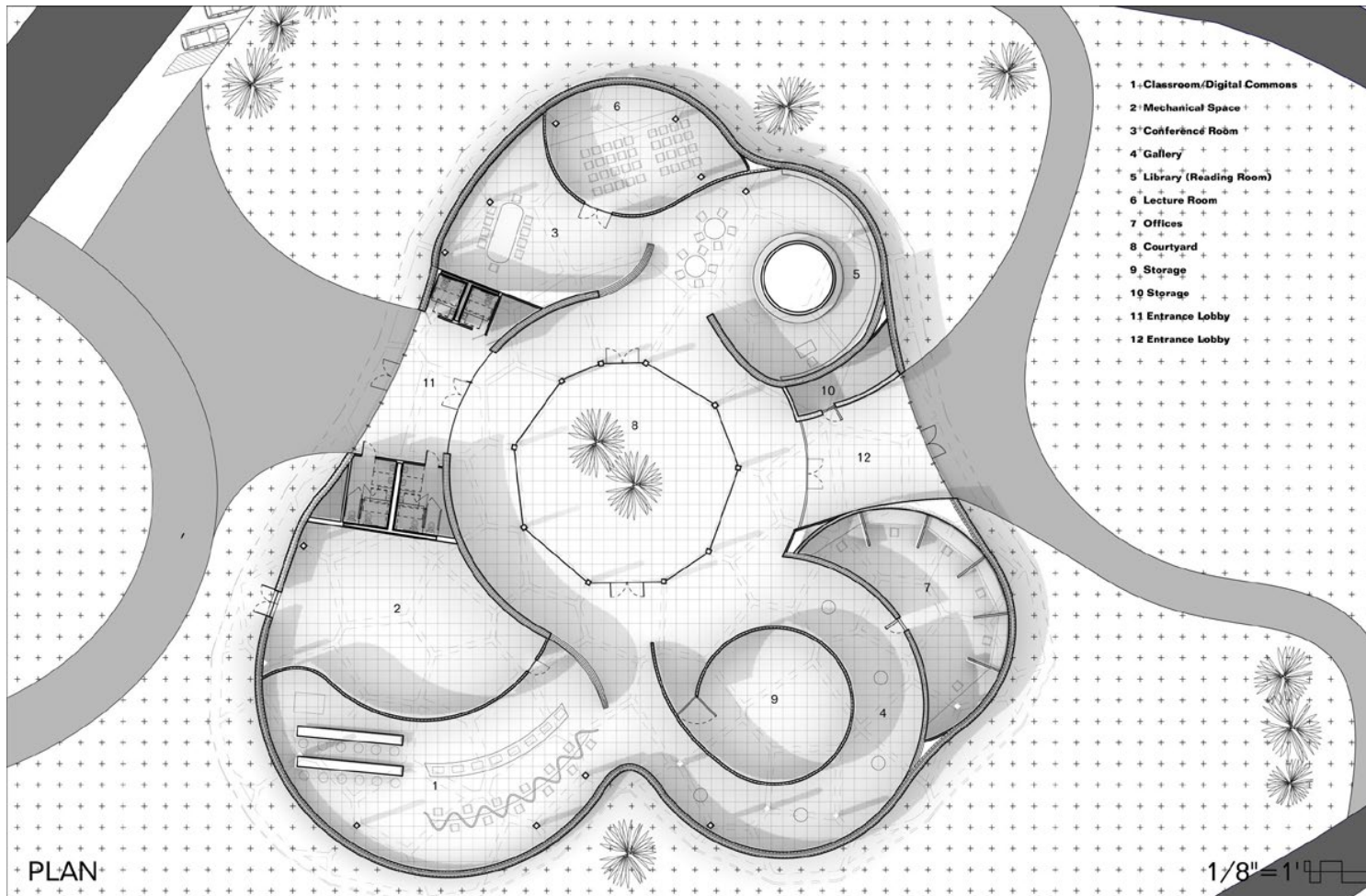
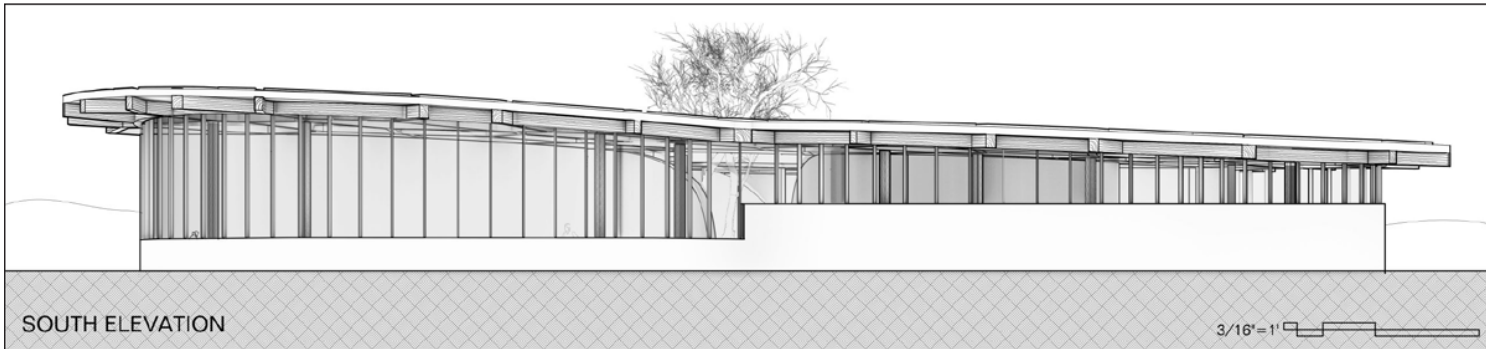
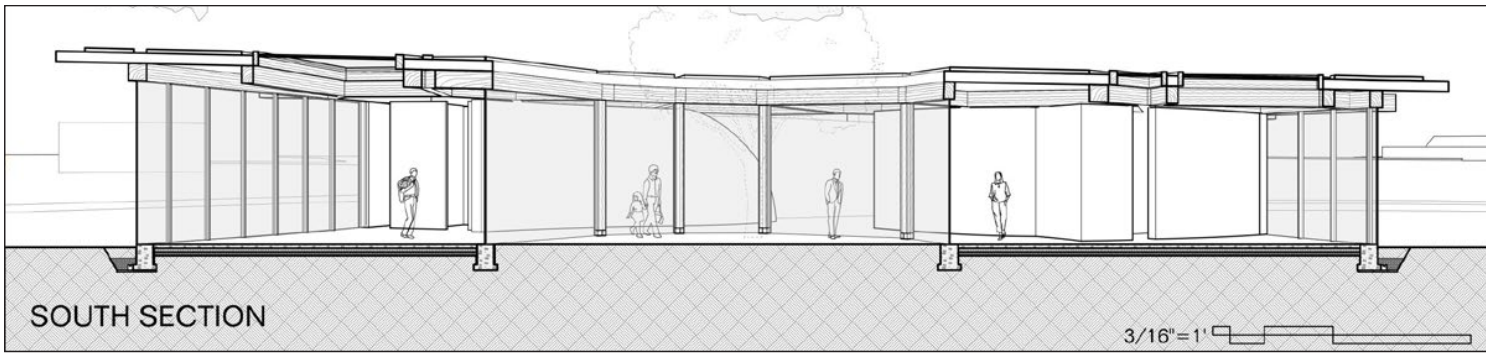
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CUSD BUS SHELTER

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SPRUCE FRAME

28

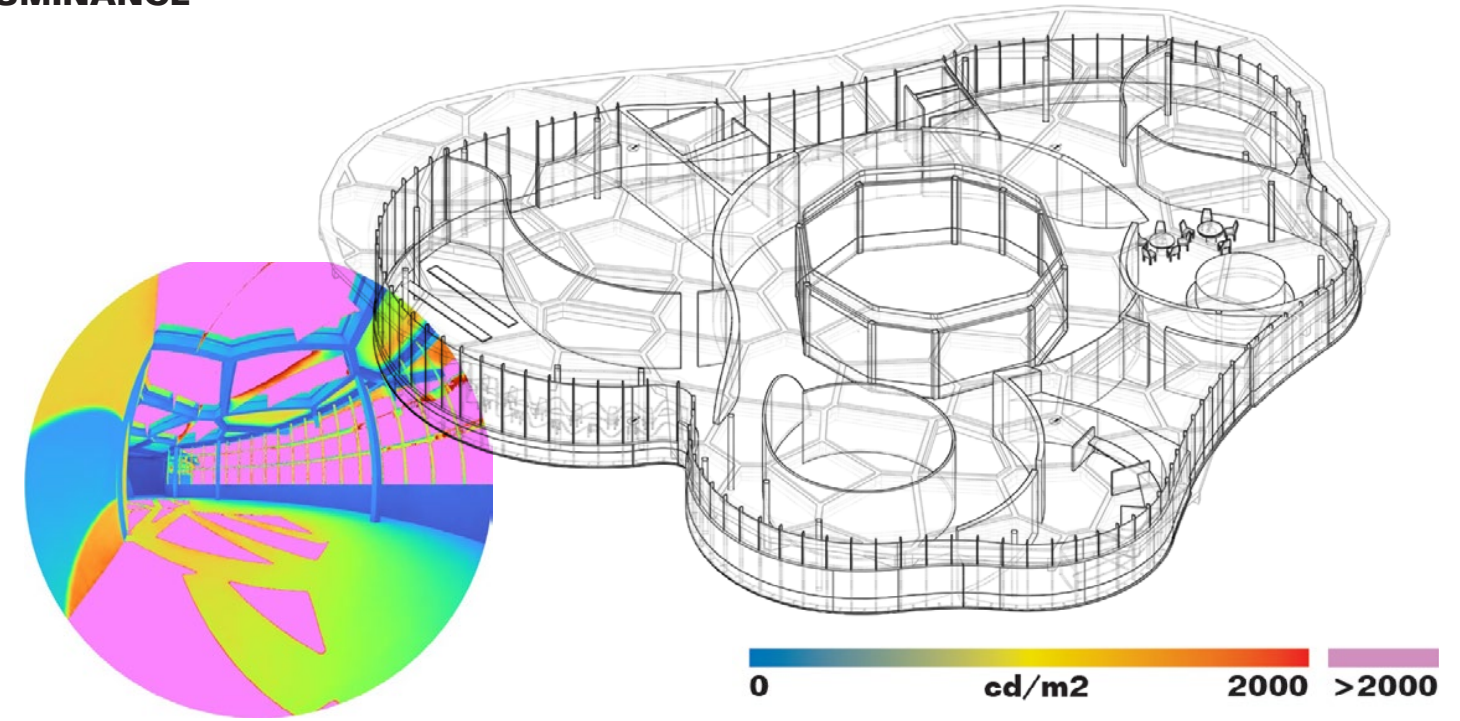


- 1 Classroom/Digital Commons
- 2 Mechanical Space
- 3 Conference Room
- 4 Gallery
- 5 Library (Reading Room)
- 6 Lecture Room
- 7 Offices
- 8 Courtyard
- 9 Storage
- 10 Storage
- 11 Entrance Lobby
- 12 Entrance Lobby

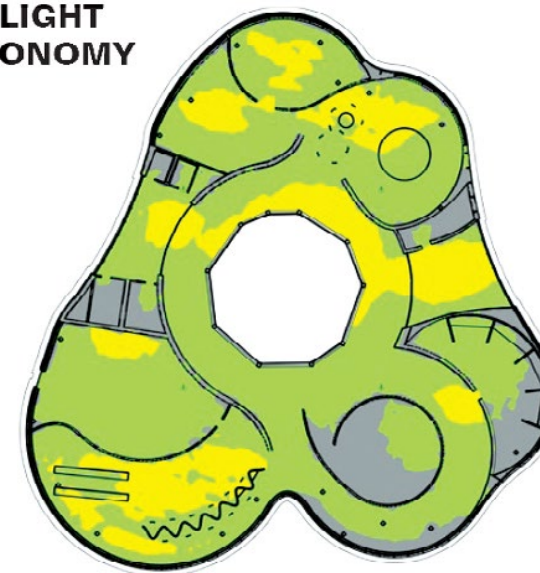
How can a library's construction help it serve as a community hub?

The Ribbon Library | Integrative Design Studio
 Program: Library
 Completed: 2023
 Software Used: Rhino, Grasshopper, ClimateStudio
 Location: Cass Park, Ithaca, NY
 Role: Designer
 Professor: Katharina Kral

LUMINANCE



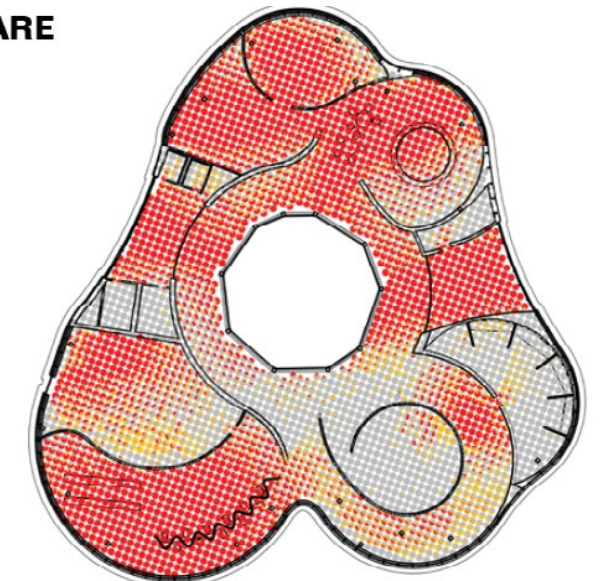
DAYLIGHT AUTONOMY



SPATIAL DAYLIGHT AUTONOMY: 84.1%

ANNUAL SUNLIGHT EXPOSURE: 20.5%

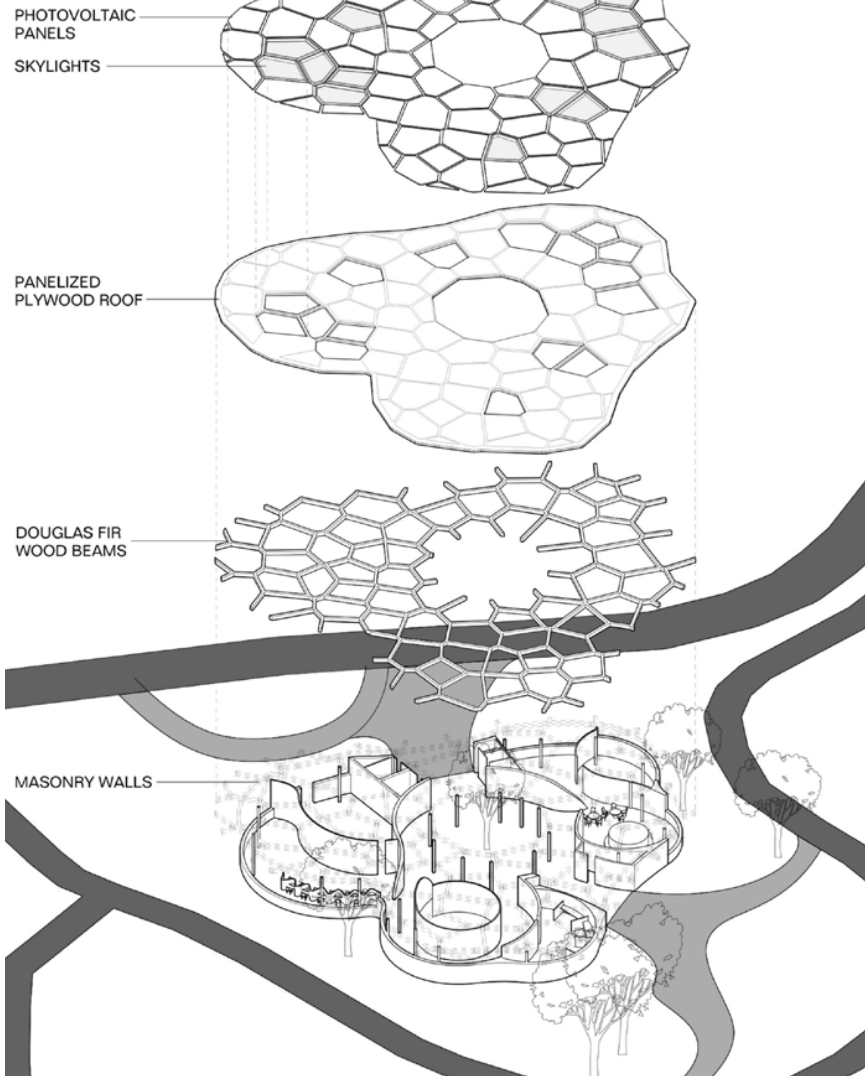
GLARE



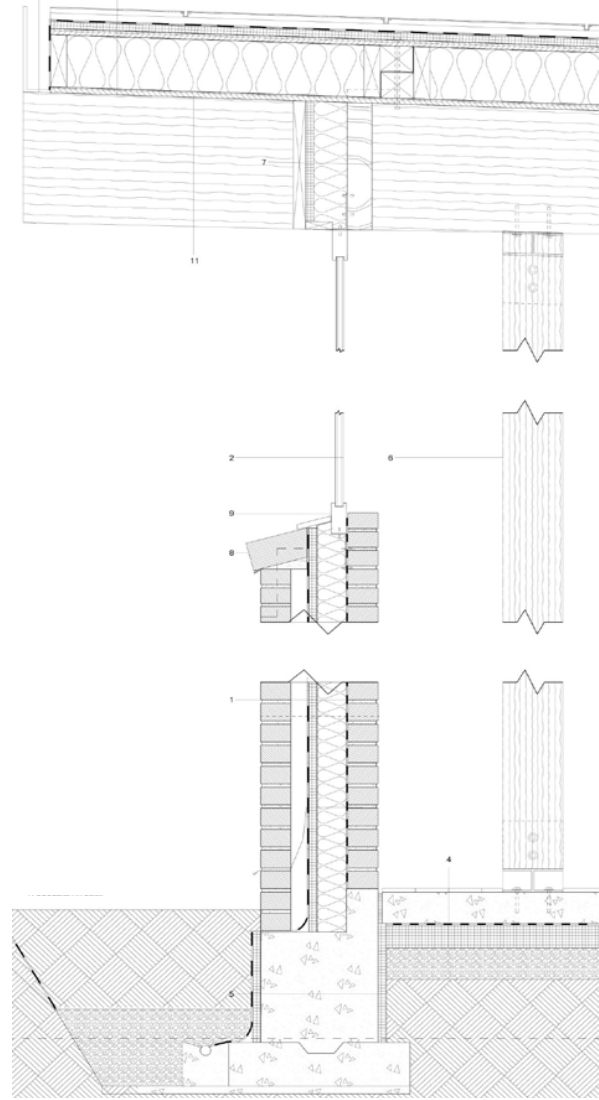
IMPERCEPTIBLE GLARE COMFORT RATING INTOLERABLE

The Ribbon Library utilizes a fragmented plan organization as a formal strategy to connect the library with the site. Intended to serve as an annex of the Cornell University Library System, it not only serves the student body of Cornell but the local Ithaca community as well. The placement of the distinct building masses was generated by considering the areas of the site that library-goers would want to see—Cayuga Lake and the Waterfront Trail. The masses were then “massaged” and merged together with ribbon-like brick walls to create a fluid promenade and allow programs to flow into each other. The masses loop around themselves to create a hallway that connects them to the central courtyard. The loops combine with the central mass to create a radial circulation pattern that encourages exploration of all the library’s spaces.

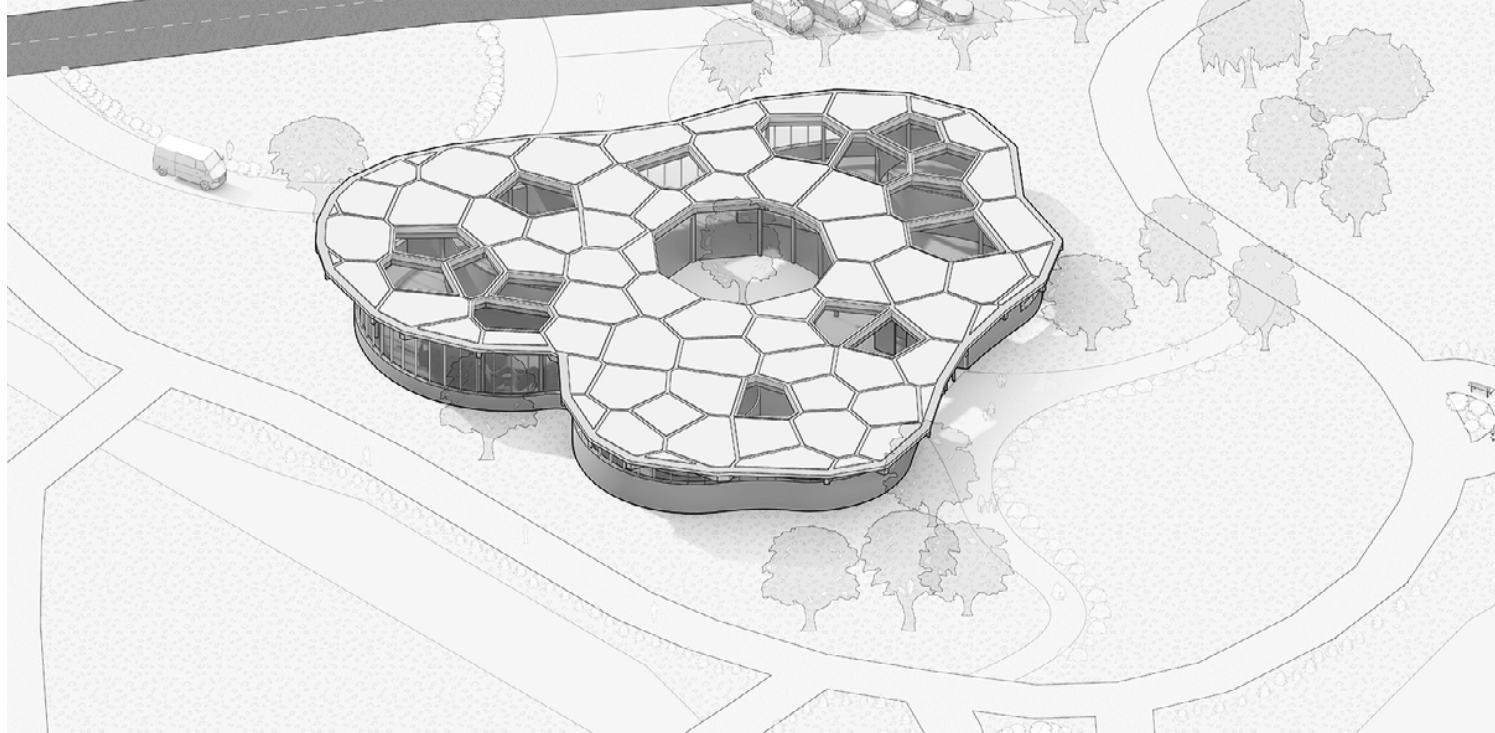
EXPLODED AXONOMETRIC

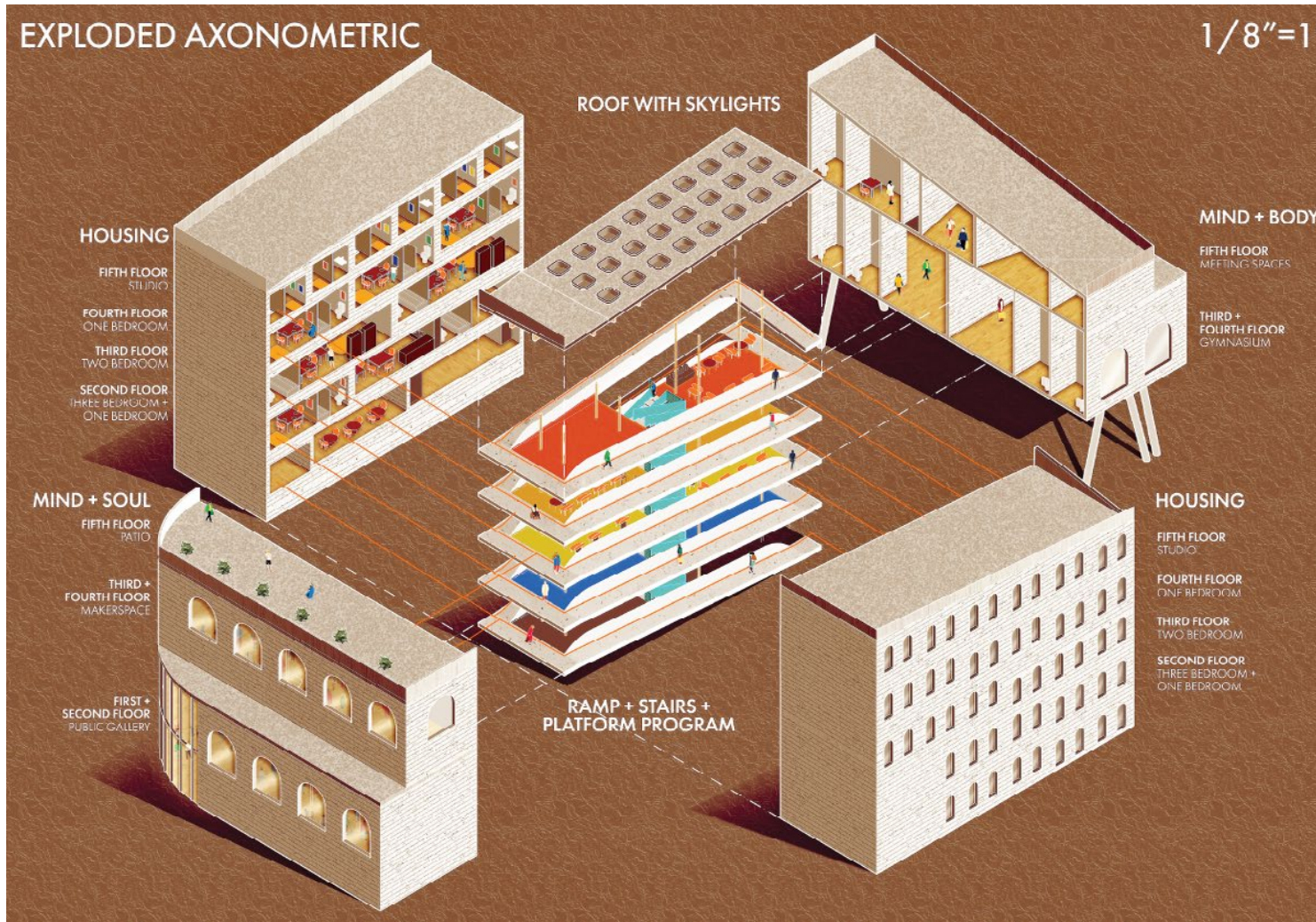
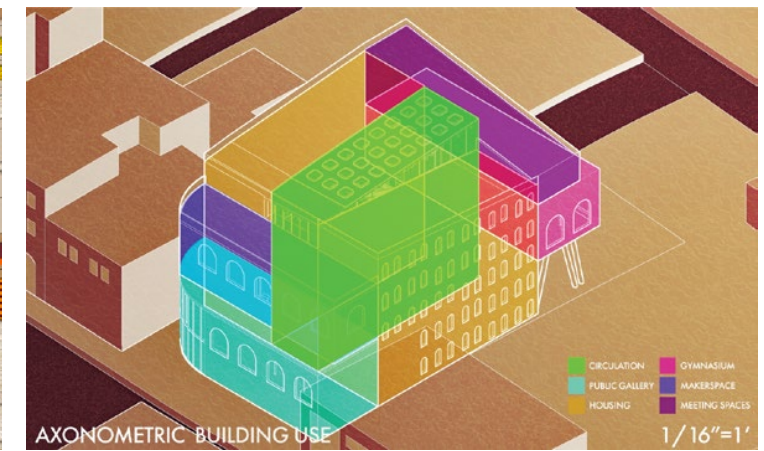
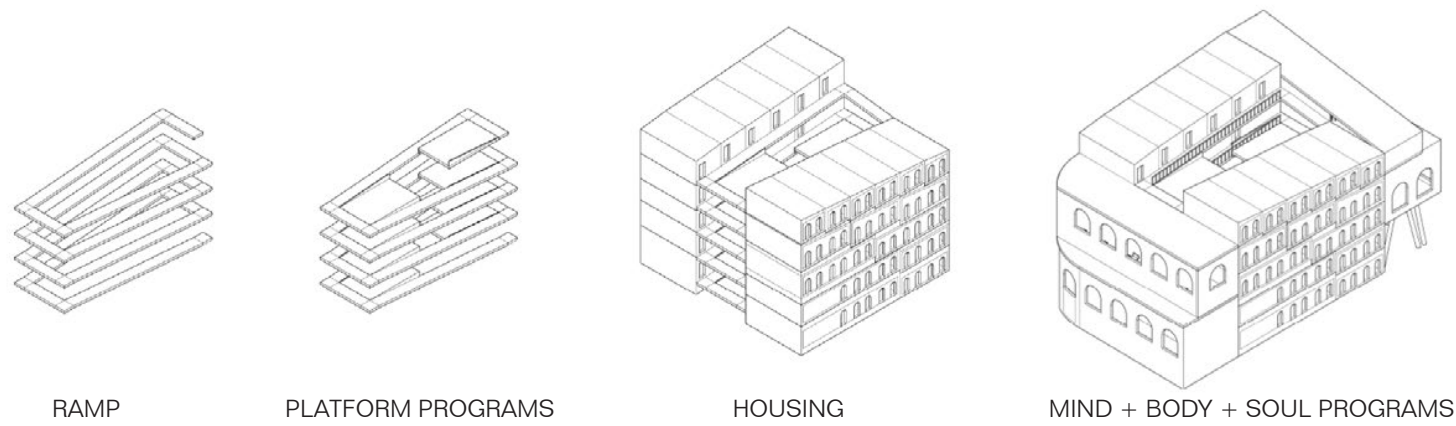


WALL SECTION



ISOMETRIC





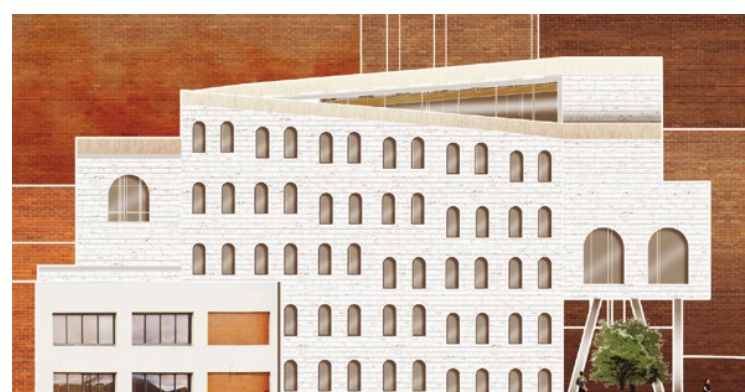
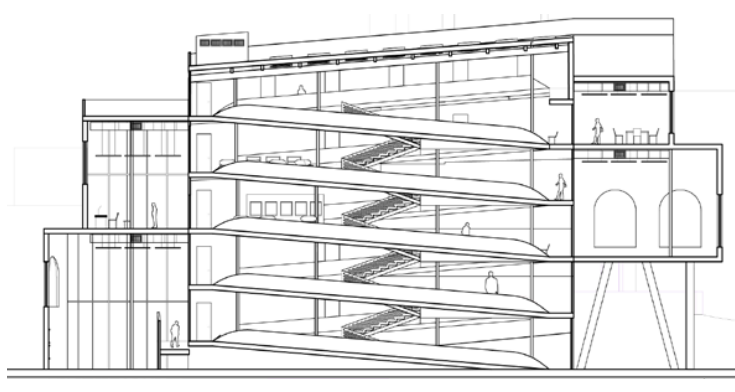
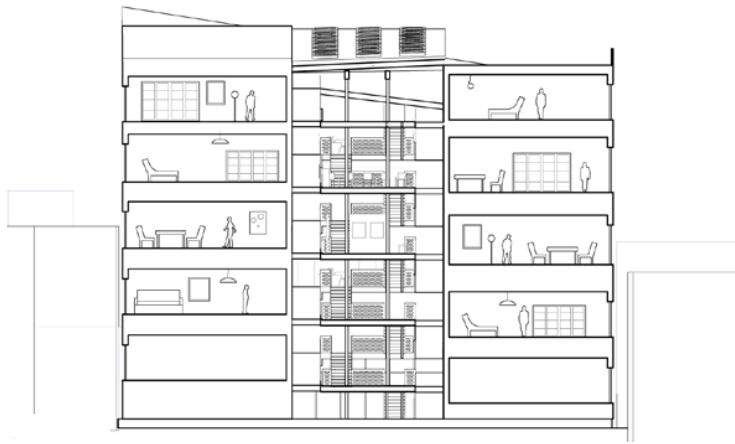
Above: Diagram depicting the assembly of different kinds of programs in the building.
 Below: Exploded axonometric revealing the building's various programs and spaces.

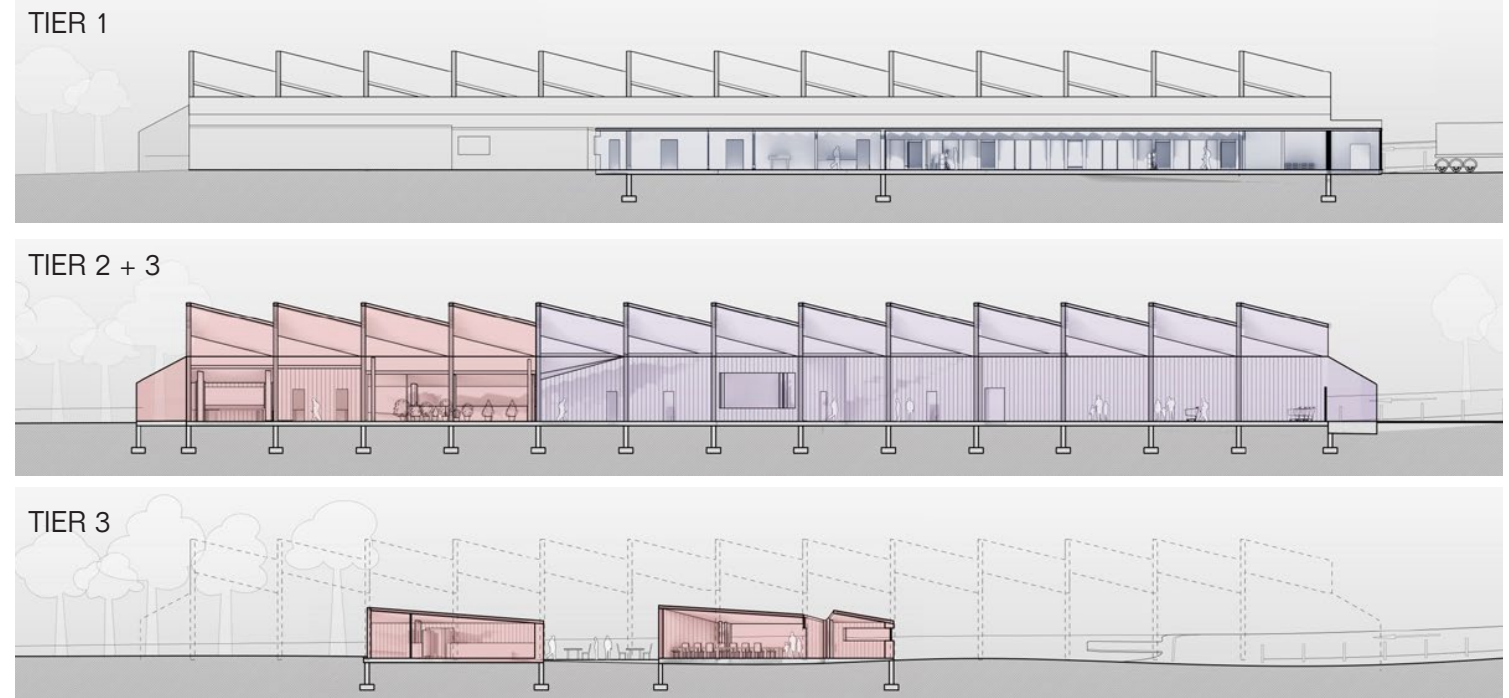
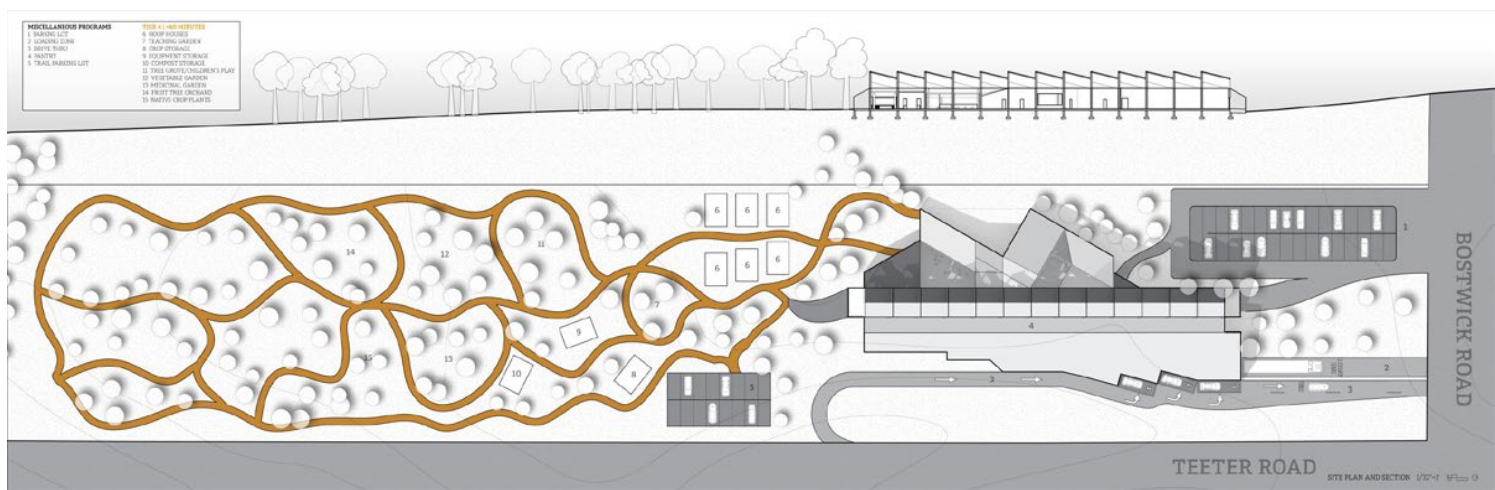
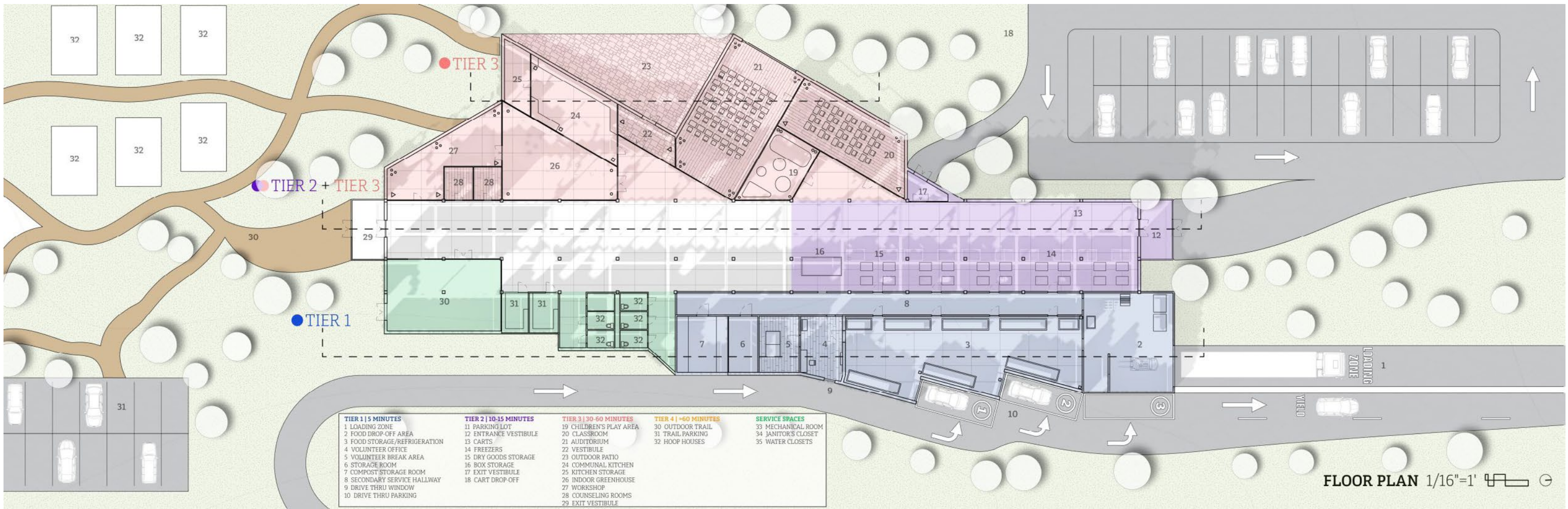
Above: Site plan and axonometric building use diagram.
 Below: Site axonometric.

How can mixed-use student housing revive a Rust Belt city's industry?

3rd Year Urban Building Studio
 Program: Mixed-Used Residential
 Completed: 2024
 Software Used: Rhino, Illustrator, Photoshop, Vray
 Location: Downtown Binghamton, New York
 Role: Designer
 Professor: Sydney Maubert

Binghamton Ramp-Up is a multi-use residence for students who want to use the skills they learn from Binghamton University to create new products, services, and companies that can "ramp-up" Binghamton's industrious nature once again. At the center of the Binghamton Ramp-Up is the ramp that connects housing, leisure, and work programs to each other. The combination of ramps surrounding the housing units and stairs connecting the platform programs creates two speeds of interior circulation. At the center of the ramp are the platform programs, which provide public spaces close to the housing units that enhance the experience of residents by providing modified or miniaturized versions of the building's other programs. Arched windows and masonry construction reflect the site context of downtown Binghamton history of Binghamton.

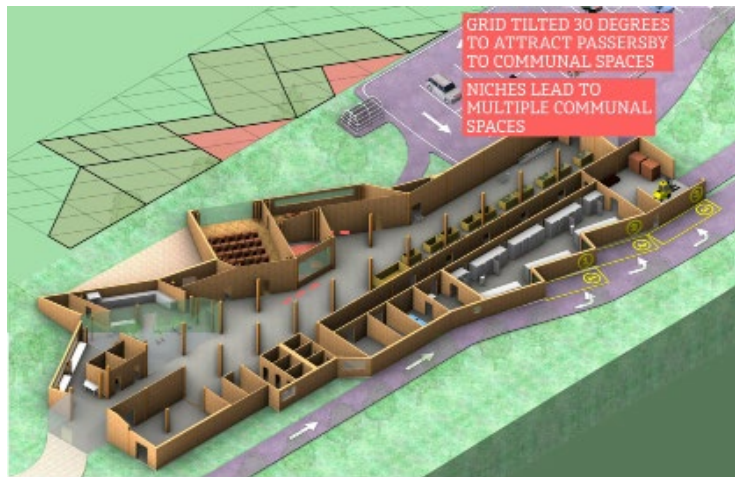
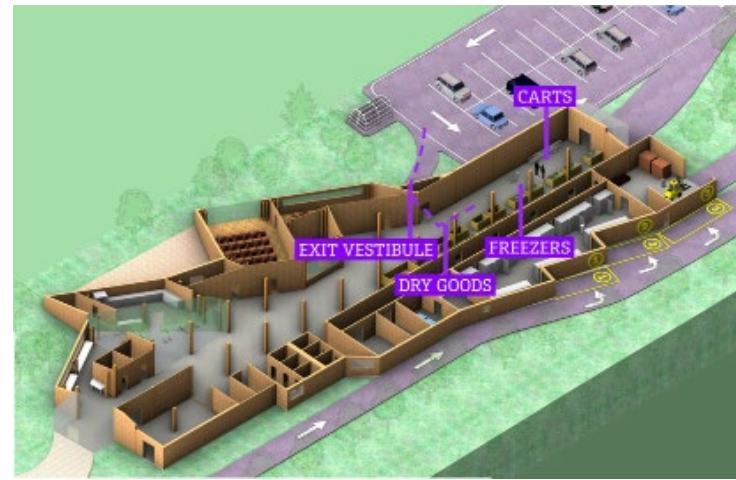
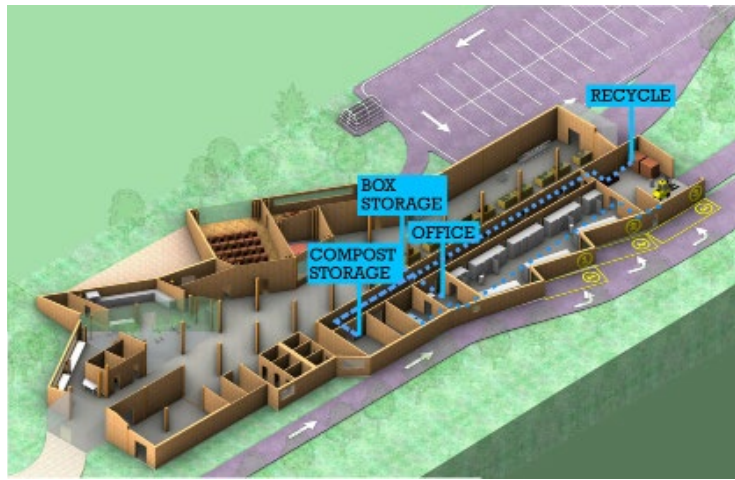
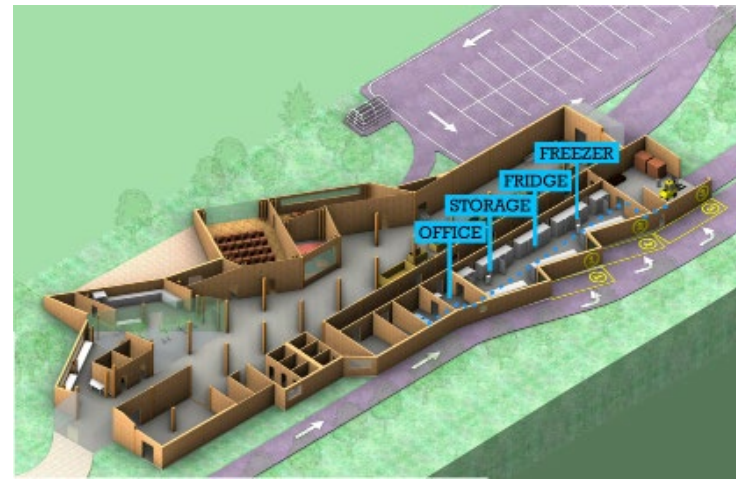
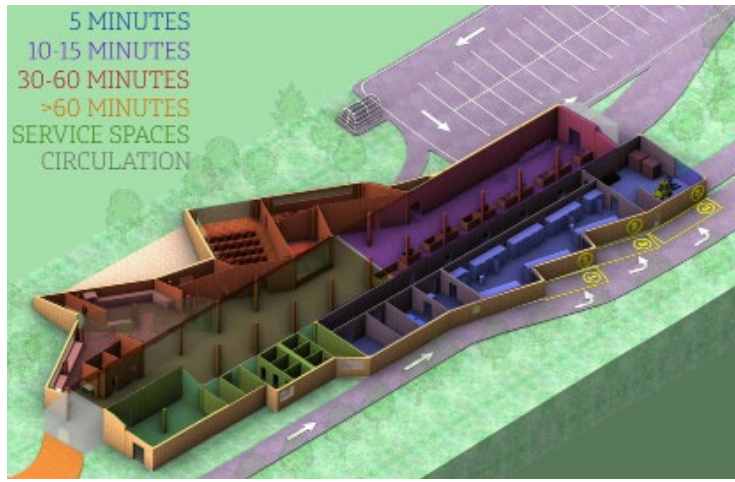




How can a food pantry address the needs and desires of a rural populace?

The Enfield Neighbor | Community Engaged Studio Program: Food Pantry, Community Center
 Completed: 2023
 Software Used: Rhino, Grasshopper, After Effects
 Location: Intersection of Bostwick and Teeter Road, Enfield, NY
 Size: 23,189 SF
 Professor: Mustafa Faruki

Rural needs, desires, and tastes are diverse, and a food pantry and community center situated in a rural area must respond to all of those tastes. There are some people who want only the food they sorely need and leave, while barely engaging with other people; others want to engage with their neighbors and foster greater community connections. As a response to this, The Enfield Neighbor is organized into four specific tiers of time-shopping, each with its own programmatic focus. Its architectonic qualities result from subtle manipulations of the monitor barn typology, familiar to the rural landscape and used in the iconic Ithaca Farmer's Market, which respond to and enhance new programs that barns have not traditionally held.



Stills from a movie explaining the various programmatic tiers and circulation systems implemented in the Enfield Neighbor. Opposite: 1/32"=1' model depicts the site strategies and formal qualities of the Enfield Neighbor; renders of (clockwise from top) central walkway, children's play area, and community classroom.

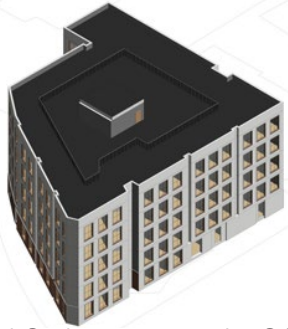
Orchestrating Systems

Tier 1 streamlines and synthesizes the food delivery, storage, and drive-thru systems to make delivery joyous for the workers and efficient for the patrons. Tier 2 is designed to create a smaller passageway through the building so that people using the pantry inside can enter and leave quickly. Tier 3's sheared grid creates dynamic spaces and programmatic adjacencies that draw people in and connect different activities together. Tier 4's meandering pathways encourage relaxation in Enfield's rural landscape.

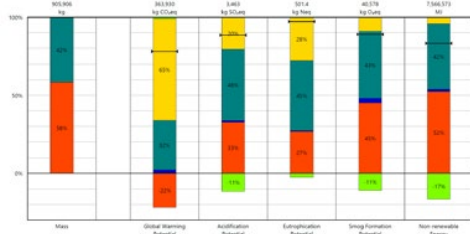


201 OAK AVENUE, ITHACA, NY

Scenario 1
Demolish + Build New with Sustainable Materials



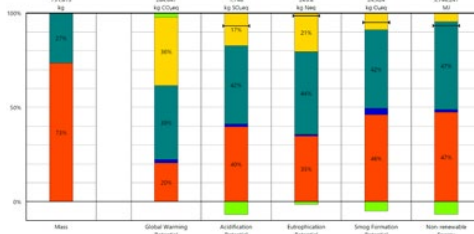
Embodied Carbon: 338,455 kg CO2



Scenario 2
Preserve + New Construction



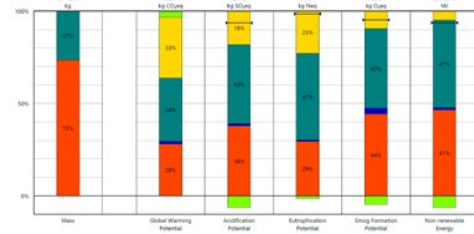
Embodied Carbon: 290,723 kg CO2



Scenario 3
Deconstruction + Build with Reclaimed Materials

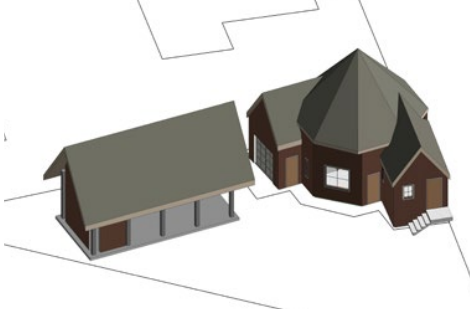


Embodied Carbon: 219,701 kg CO2 eq

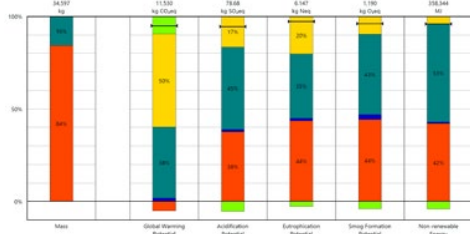


601 DRYDEN ROAD, ITHACA, NY

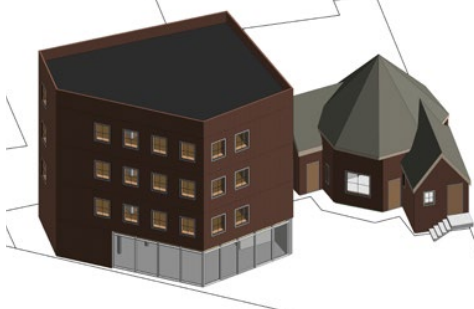
Scenario 1
Preserve + Add Shade Structure



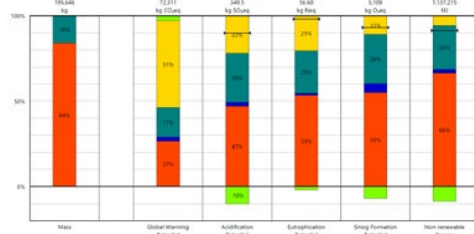
Embodied Carbon: 15,150 kg CO2 eq



Scenario 2
Preserve + New Construction



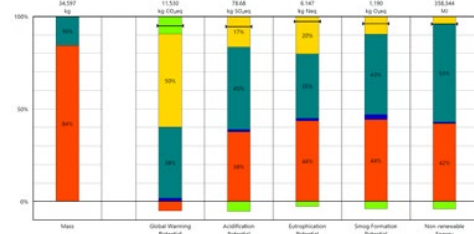
Embodied Carbon: 76,517 kg CO2 eq



Scenario 3
Move-Off + Build New



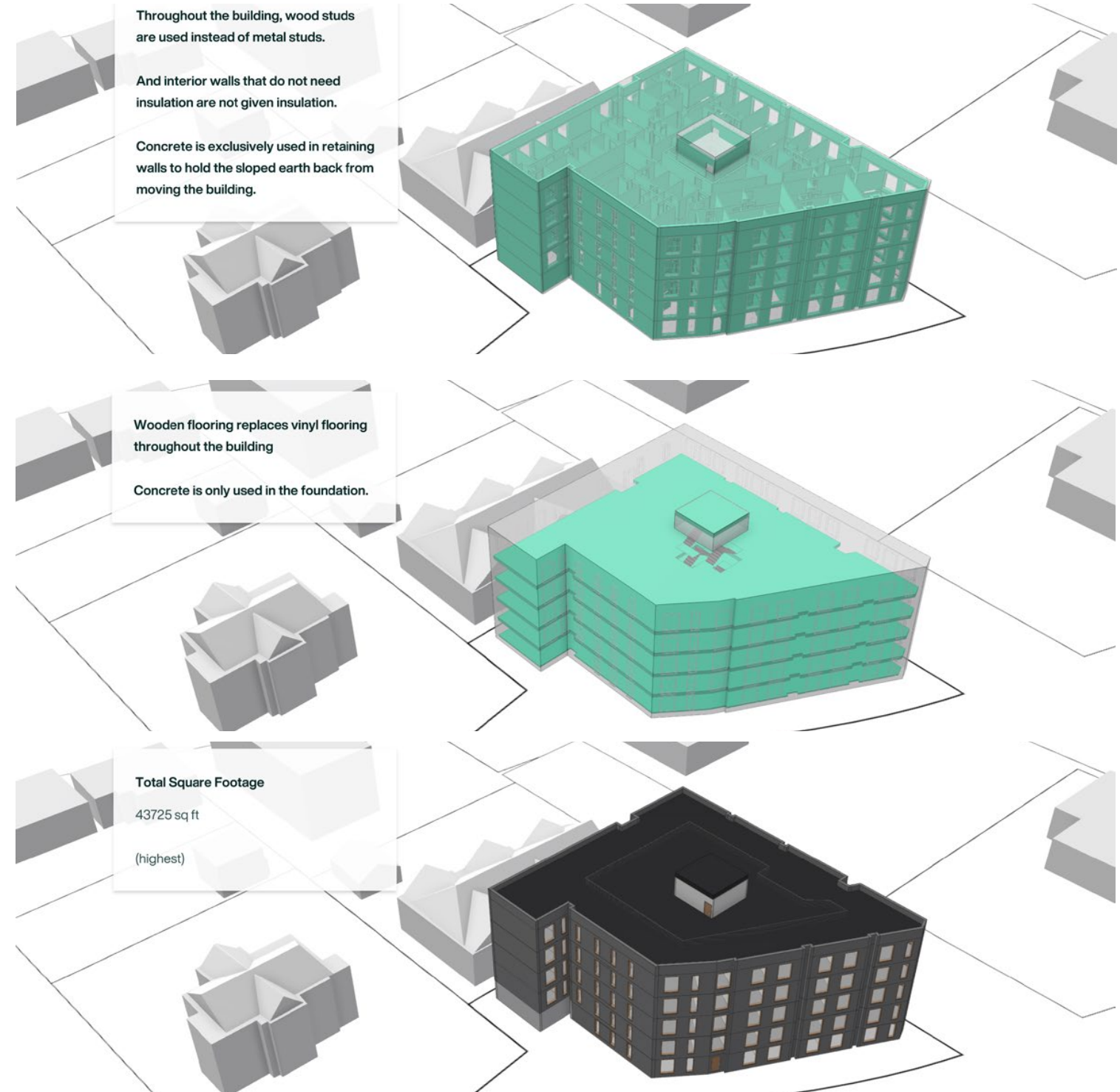
Embodied Carbon: 100,645 kg CO2 eq



For each of the sites, a "status quo" demolition scenario and three sustainable building scenarios were digitally modeled in Revit and then analyzed for their embodied carbon via the Tally LCA plug-in.

Legend

- Net value (impacts + credits)
- Life Cycle Stages
 - Product [A1-A3]
 - Transportation [A4]
 - Maintenance and Replacement [B2-B5]
 - End of Life [C2-C4]
 - Module D [D]



201 Oak Avenue



601 Dryden Road

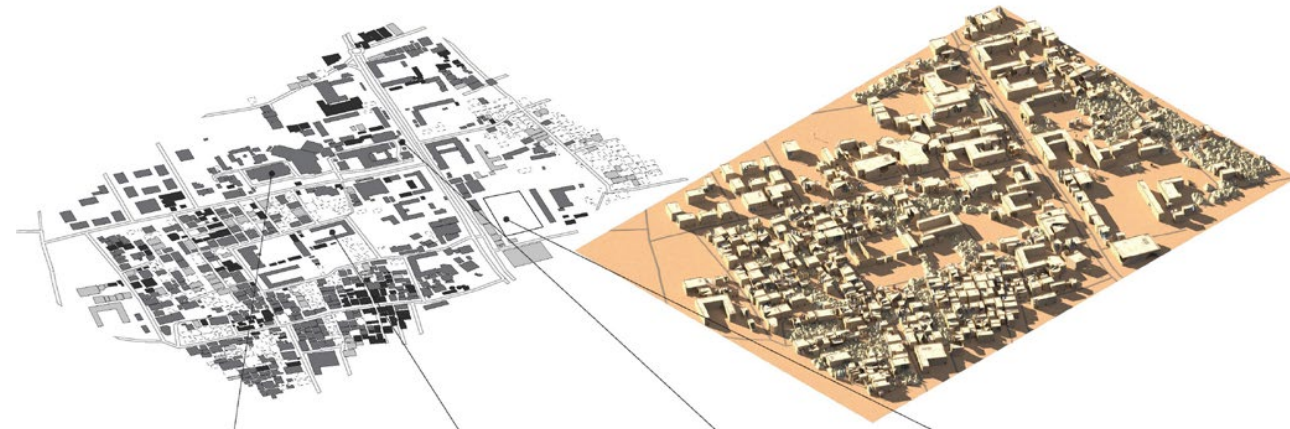
Screenshots from ArcGIS StoryMap designed to showcase research results.

How can we represent the advantages of sustainable building strategies?

Spectrum of Reuse | Research
 Research Program: Building Reuse Modeling
 Grant: National Center for Preservation Technology & Training
 Completed: 2025
 Software Used: Revit, Tally LCA, ArcGIS Pro + StoryMaps
 Role: Modeling, Calculation, Visualization
 Research Advisors: Farzin Lotfi-Jam, Jennifer Minner

Spectrum of Reuse looks at various planned or in-progress construction projects in Ithaca, New York and investigates how various strategies of reuse (deconstruction, preservation and infill, vertical expansion, etc.) affect the embodied carbon, monetary cost, and functionality of the proposed building project. Revit was used to model the building strategy, while the Tally Life Cycle Assessment plug-in was used to calculate the embodied carbon of each of those strategies. ArcGIS Pro and ArcGIS StoryMaps were then used to create interactive websites exhibiting the sites, the proposed project, and the analysis completed in Revit and Tally LCA.

KHAN YUNIS CAMP, KHAN YUNIS



Al-Tahrir Clinic
Pediatric clinic affiliated with the Nassar Medical Complex network in Khan Yunis. It has been damaged by Zionist airstrikes during the genocide.



Sheikh Jamil School
One of many UNRWA-run schools in Khan Yunis. It was struck by a GBU-39 bomb on December 15, 2024, killing 20 people.

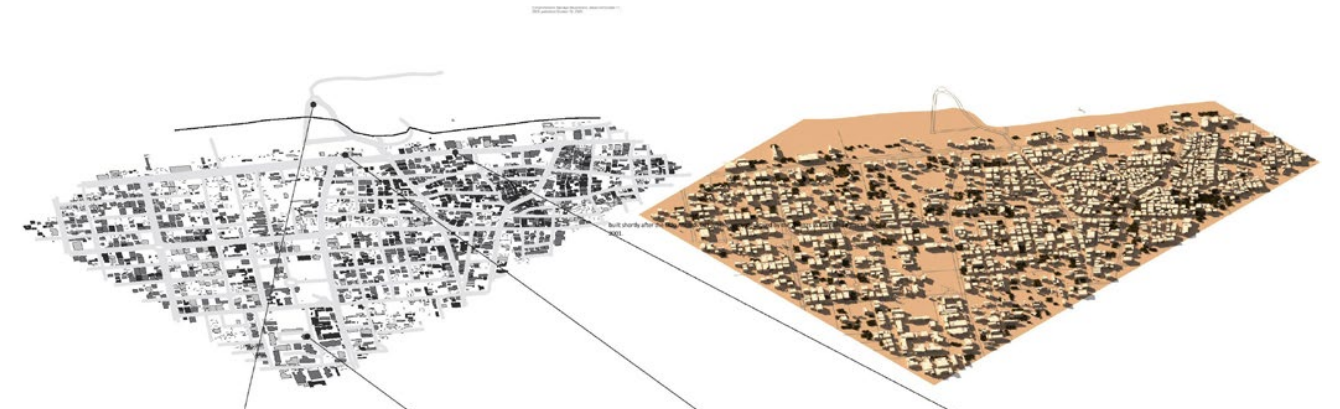


Akka Secondary School for Girls
Another school in Gaza, seemingly not run by UNRWA. It has been damaged by Zionist airstrikes during the genocide.



Khan Yunis Municipal Stadium
Once the largest stadium in the Gaza Strip, it has since been completely destroyed during the genocide, and it is now the site of a tent city.

PORT OF GAZA/AL-RIMAL, GAZA CITY



Port of Gaza
The only major port of Gaza, only large enough for fishers who were limited by the Zionist occupation to sail a maximum of three nautical miles from the coast.



Al-Azhar University
A public university near the coast of Gaza founded in 1991. It recently reopened for in-person instruction despite damage from Zionist bombs.

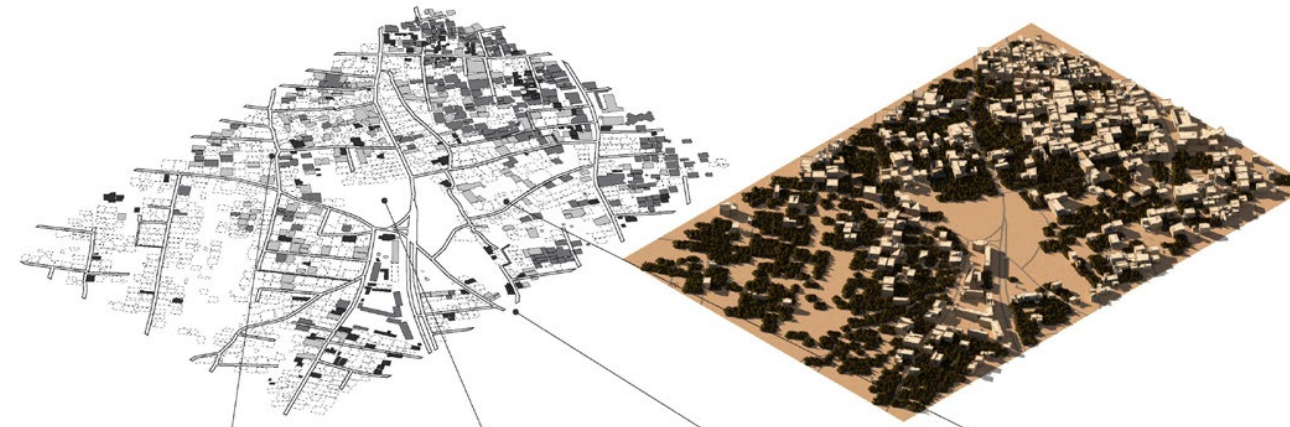


Phoenix Hotel
One of many hotels along the coastline of Gaza City.



Al-Rasheed Street
One of the main streets in the Gaza Strip that goes along the Mediterranean coastline from north to south.

SHUJA'IYYAH, GAZA CITY



Destruction
Shuja'iyyah has been the site of three major Zionist ground invasion operations. As such, it has faced an especially high level of destruction, even when compared to other sites in Gaza.



The "yellow line"
As part of the first phase of the ceasefire agreement, Zionist troops must retreat east of the so-called "yellow line". In violation of the ceasefire, Zionist forces have killed any Palestinian who crosses that line, which bisects Shuja'iyyah.



Zionist military bases
Zionist military forces have paved and asphalted a military base they established in Shuja'iyyah, despite having to eventually withdraw under the terms of the ceasefire.



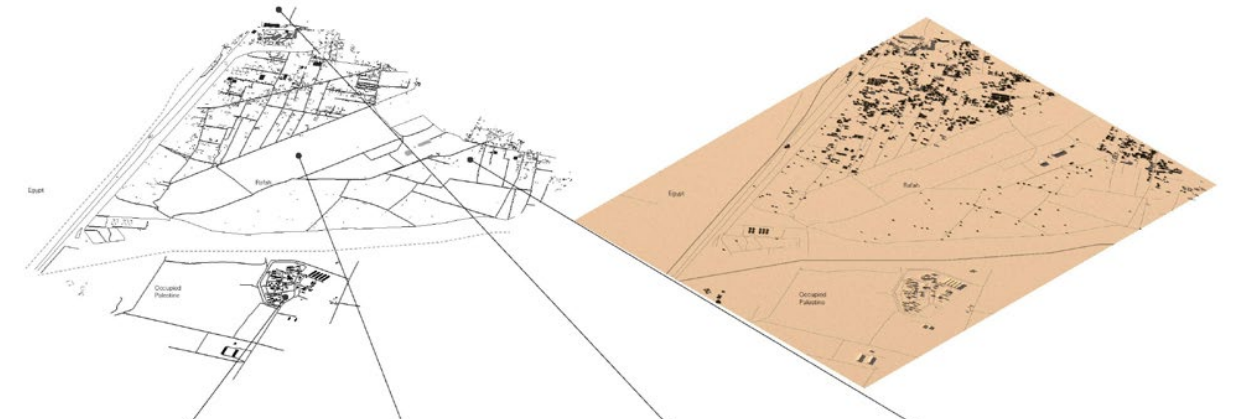
Housing
Much of the buildings in Shuja'iyyah which were subsequently destroyed are housing units, meaning many people are homeless or living in makeshift tents.

BUILDING DAMAGE

- Possibly Damaged
- Moderately Damaged
- Severely Damaged
- Destroyed

Source: Copr/Bernd/Mape, United Nations OpenStreetMap Satellite Applications Programme (UNOSAT), Gaza Strip, Copernicus Damage Assessment, observed October 11, 2025, published October 21, 2025.

KAREM ABU SALEM, RAFAH



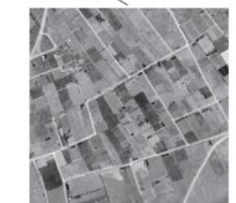
Karim Abu Salem Crossing
Land crossing into occupied Palestine that has been closed during the genocide.



Yasser Arafat International Airport
An airport that opened in 1998 but was subsequently destroyed by the Zionists in multiple phases since 2001. During the time it was operating it was Palestine's only airport.



Rafah Land Port Crossing
Land crossing on the border with Egypt that has been closed during the genocide.

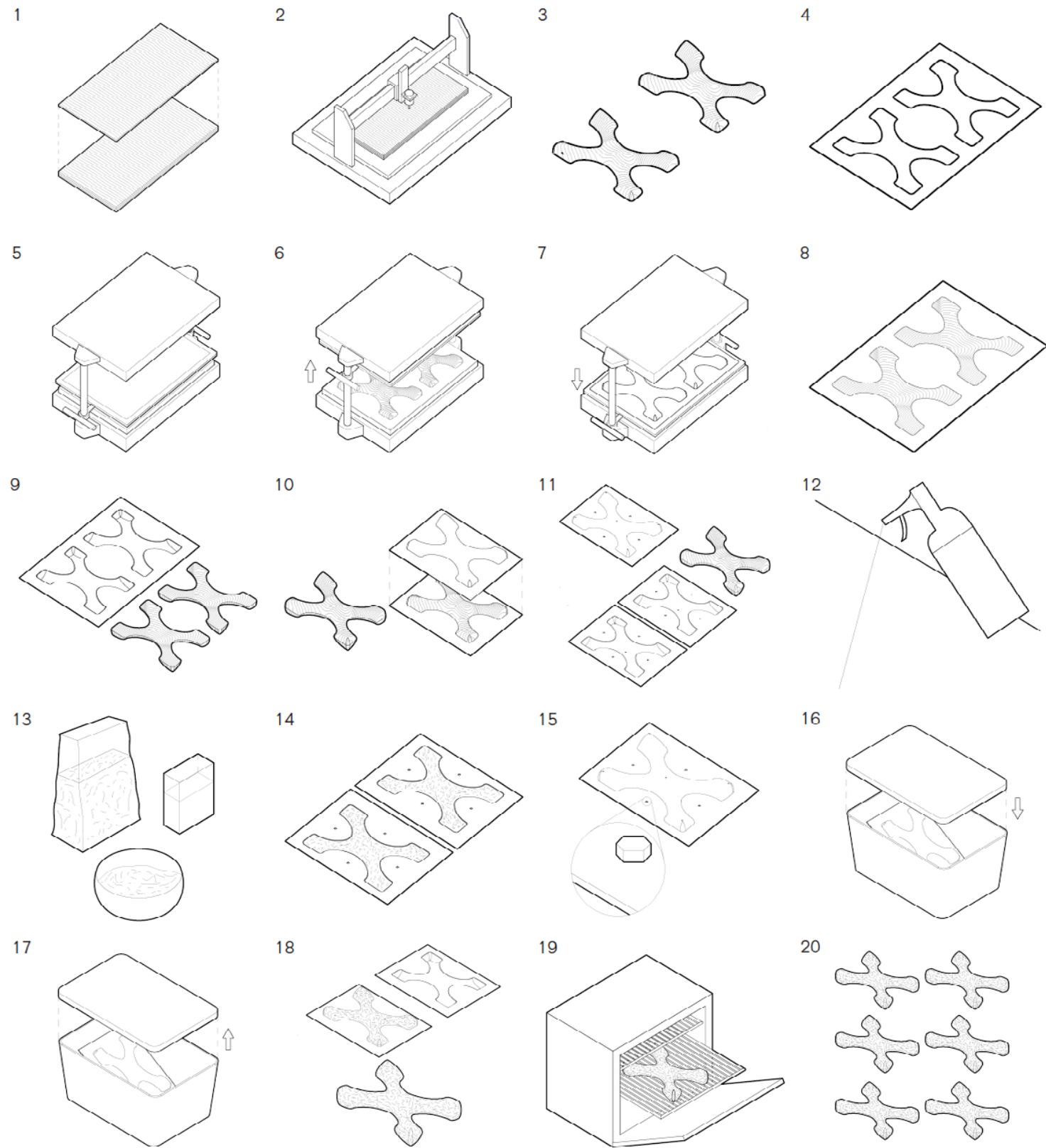


Housing
Much of the land in this part of Rafah are agricultural lands.

How can we visualize the extent of the genocidal destruction of Gaza?

Bombs, Bans, and Sanctions Option Studio
Program: Research
Completed: 2025
Location: Gaza, Palestine
Role: Researcher
Software Used: Grasshopper, OpenStreetMap
Professor: Farzin Lotfi-Jam

The Zionist military forces have damaged or destroyed 81% of the buildings in Gaza during the course of its genocide of the Palestinian people in Gaza. This project used a custom Grasshopper workflow that integrates data published by the United Nations Satellite Centre (UNOSAT) and OpenStreetMap data to create maps digital models of various neighborhoods in Gaza and demonstrate which buildings have been moderately damaged, severely damaged, or completely destroyed. The digital models exist as textured meshes of buildings with various degrees of mesh face deletion to simulate damage; in the case of completely destroyed buildings, the building meshes are replaced with rubble. The research also highlights specific buildings, landmarks, and infrastructure important to each neighborhood, including some that have been damaged or destroyed.

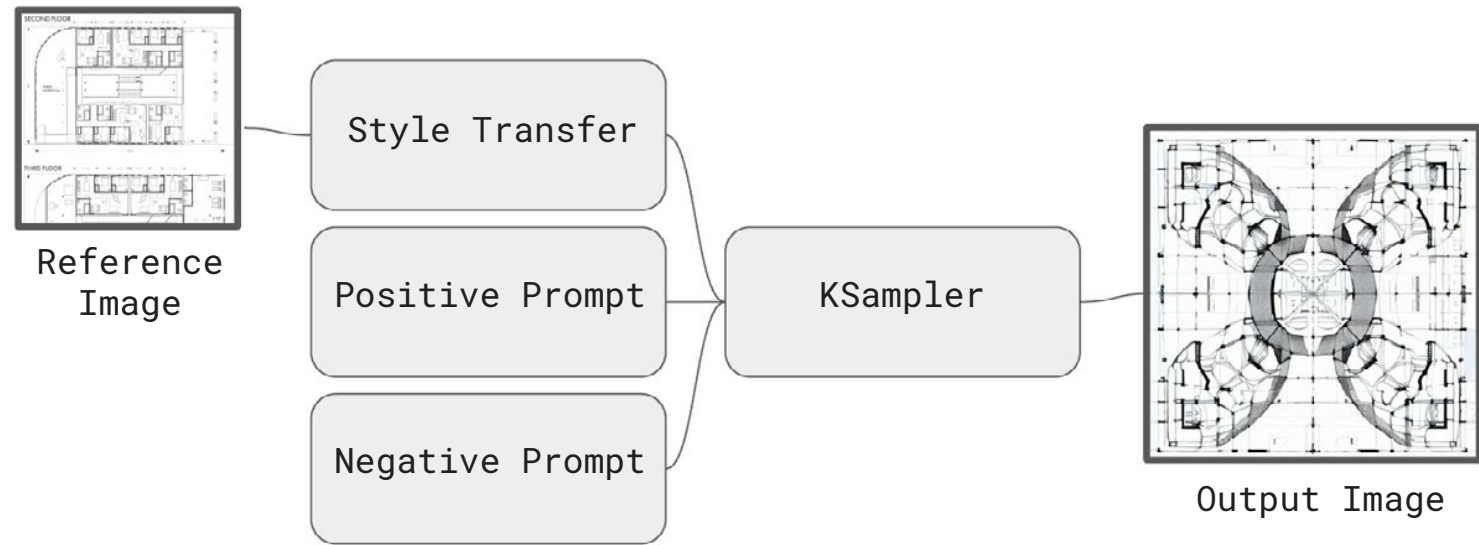


How can mycelium be used to create a structural modular assembly?

Material Re.form Elective + Martin Miller Research
 Program: Pavilion
 Completed: Built (2025)
 Location: Soil Factory, Ithaca, NY
 Role: Fabrication and Assembly Assistant
 Faculty and Researcher: Ian Fletcher, Martin Miller

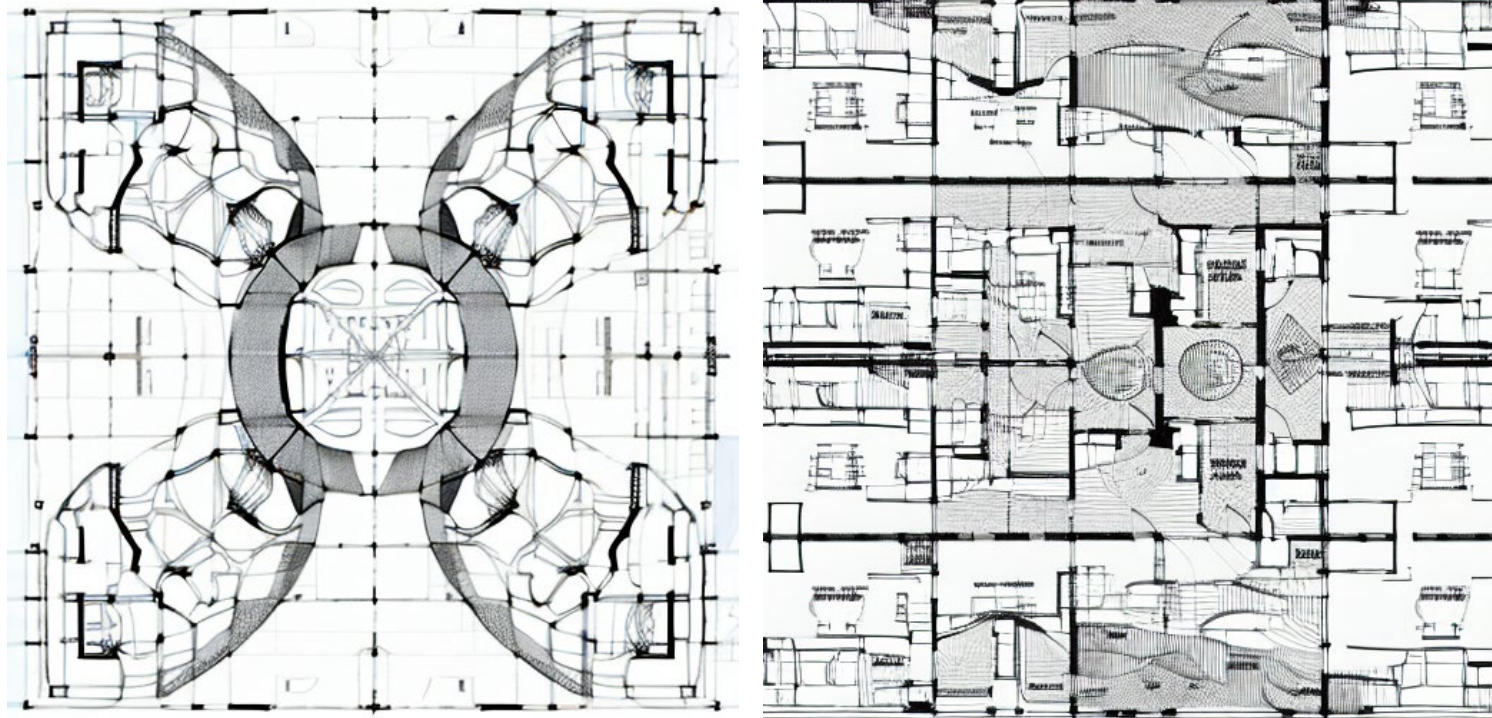
Many pavilions, chairs, and products made with mycelium so far utilize mycelium only as a cladding material, neglecting its ability to serve as a structural building material. Other projects use mycelium as a mere replacement for masonry bricks, taking on its form and dimensions without critically understanding what a natural mycelium form could be. MushHaus aims to demonstrate how mycelium-based composite modules can be used in a lightweight, architecturally appealing assembly and thus probe the as yet uncovered potentials of this biogenic, renewable material. A series of mycelium modules are held in place with custom plywood "clamps" to form a structural catenary arch.

SYNTHETIC DATASET DEVELOPMENT

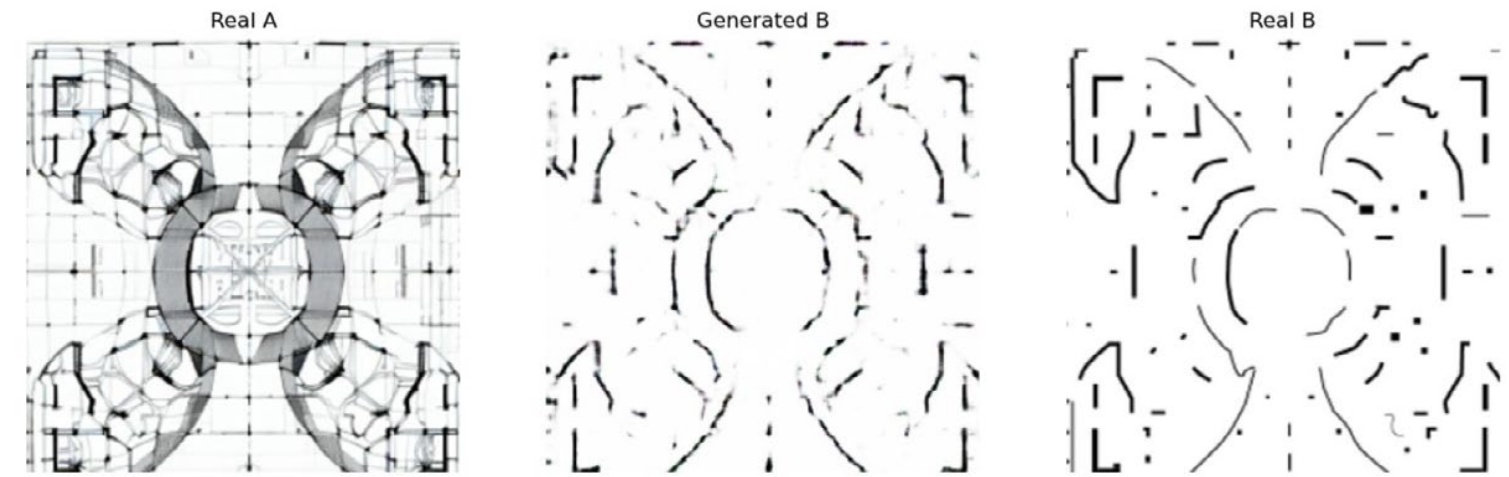


(curvilinear:1.85) (organic:1.4) museum (plan drawing:1.6) precise computer-drawing, ((thick black:1.6)linework:1.15) (repetitive pattern:0.5), (asymmetrical:1.45), (flowing:1.55)

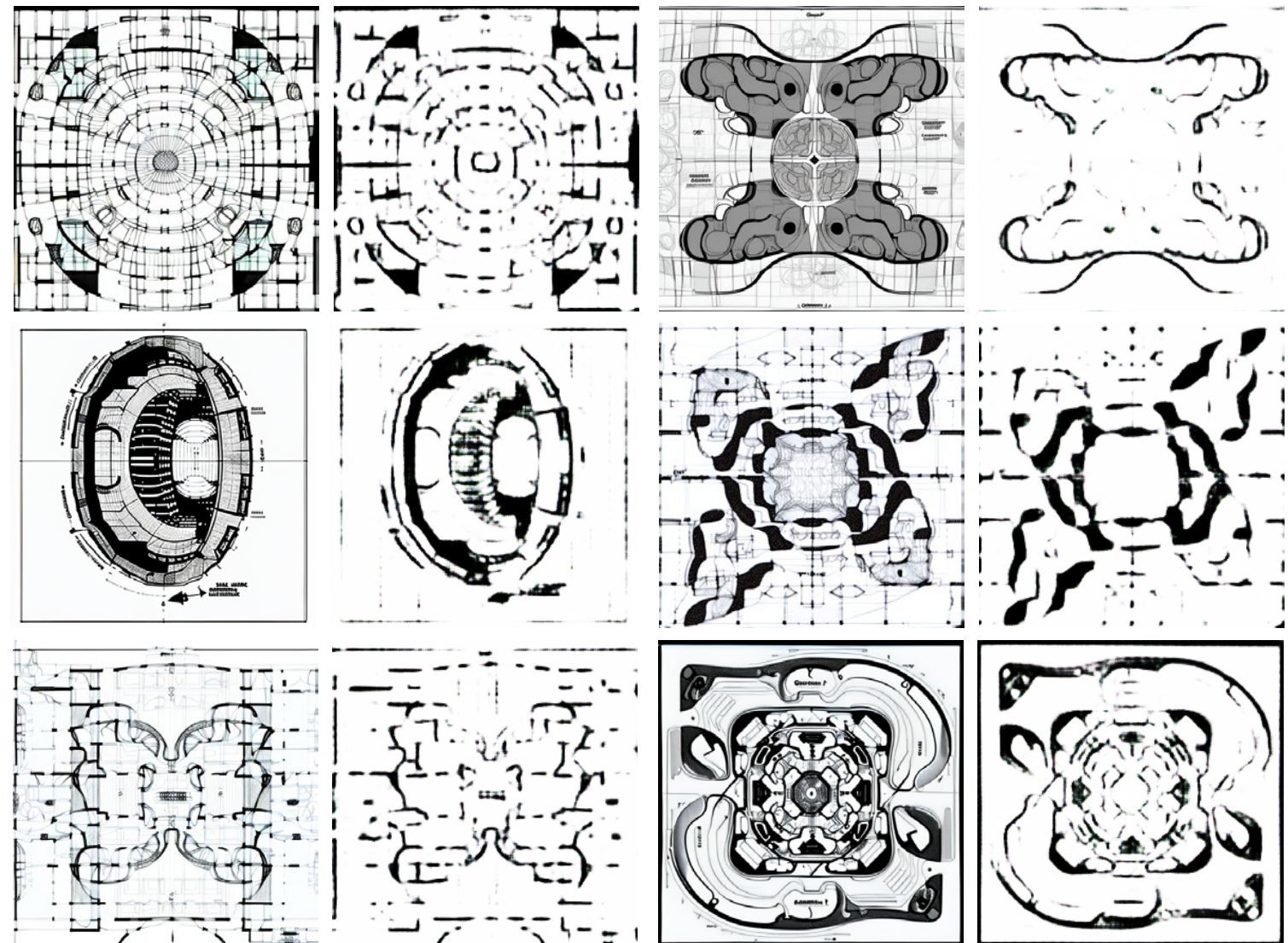
SYNTHETIC PLANS



PIX2PIX MODEL



PIX2PIX INPUTS AND OUTPUTS

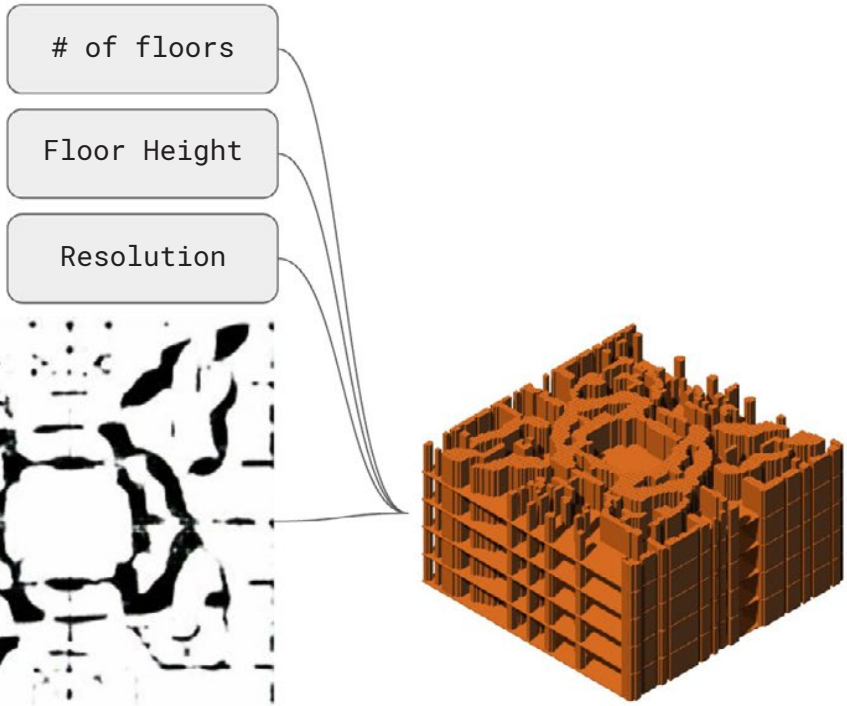
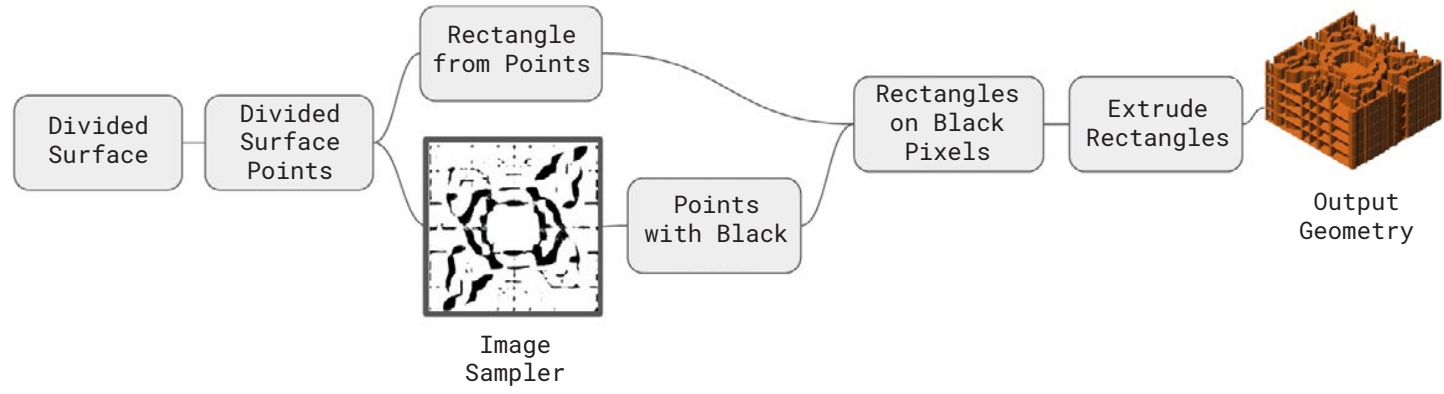


How can we train artificial intelligence to think like an architect?

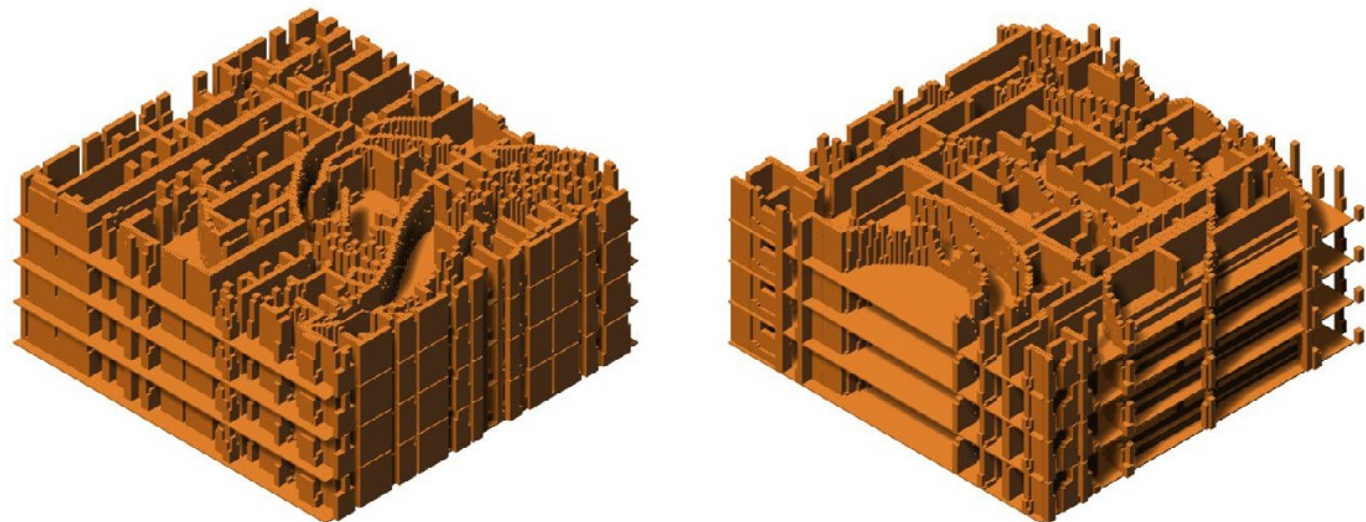
From MLPs to APIs Seminar
 Program: AI-Developed Massing Models
 First Exhibited: December 18th, 2024
 Software Used: Python, Stable Diffusion, ComfyUI, Grasshopper
 Role: Designer, Programmer
 Professor: Adam Burke

MassingModel is a design workflow that quickly generates spatially-intriguing CAD models in Rhino3D. This model begins with generating a synthetic dataset of spatially-intriguing building plans developed in ComfyUI. This synthetic dataset is then turned into a simple black-and-white image via a custom self-trained pix2pix model (an example of a conditional generative adversarial network). The AI-redrawn plan is finally input into a Grasshopper workflow that generates the digital massing model from the image. Such a workflow automatically generates massing models that have an embedded architectural understanding of sections which can serve as a starting point for more beautiful, thoughtfully designed architectural spaces.

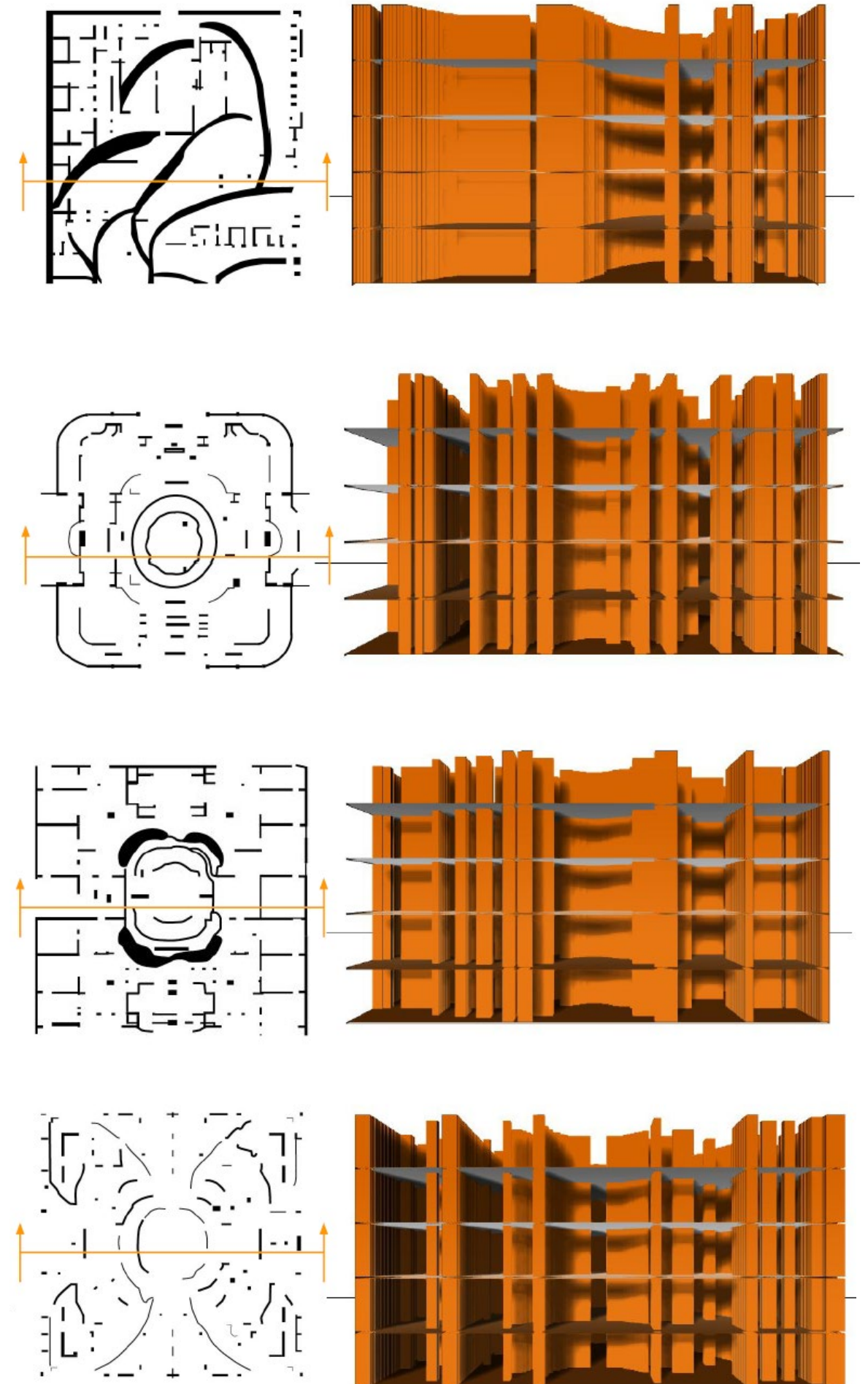
GRASSHOPPER WORKFLOW



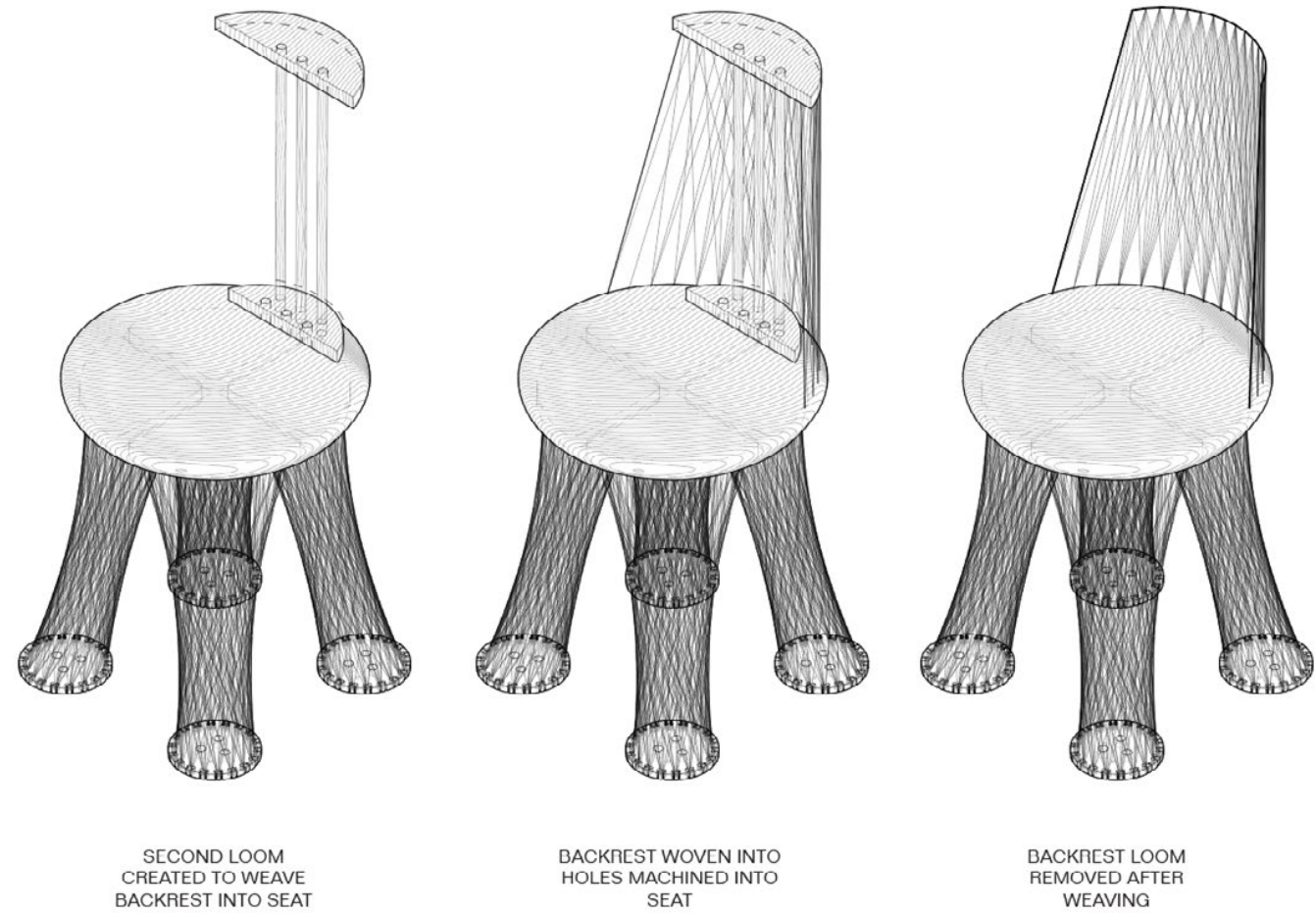
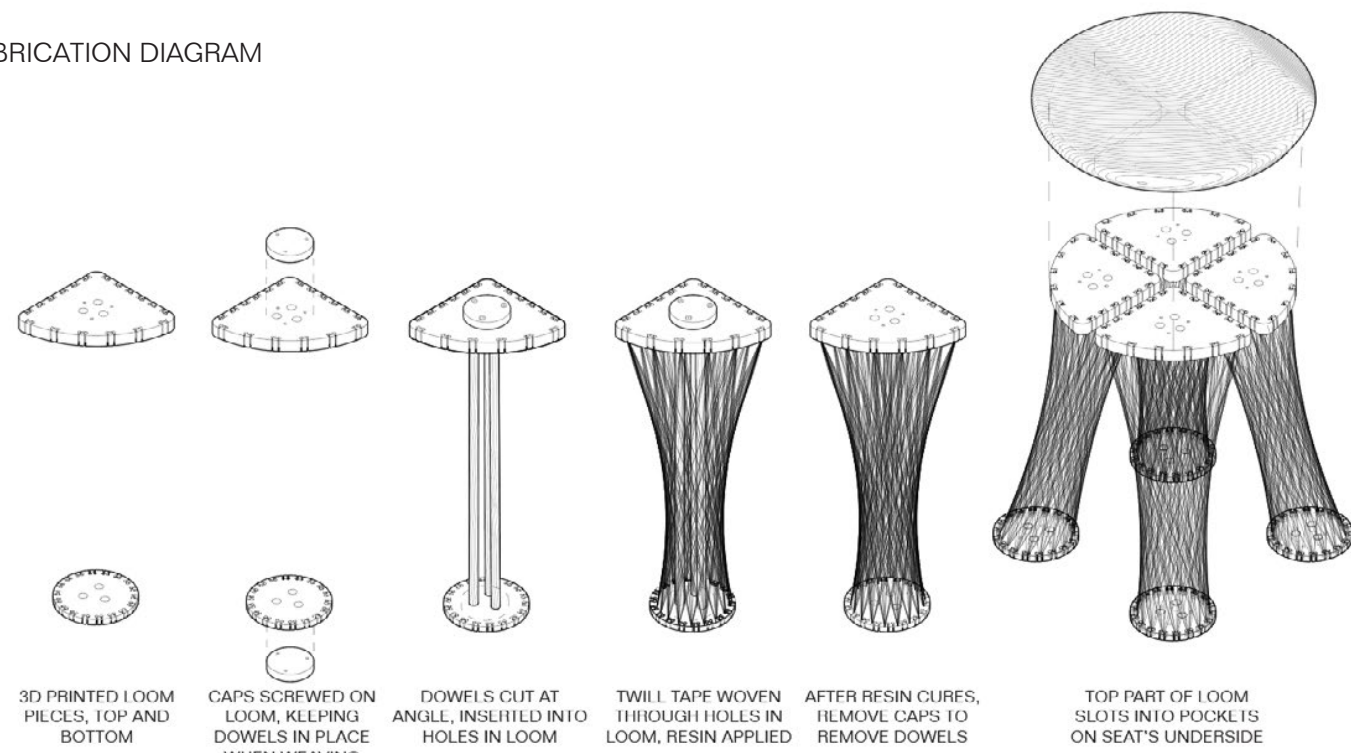
MASSINGMODEL RESULTS



MASSINGMODEL SECTIONS



FABRICATION DIAGRAM

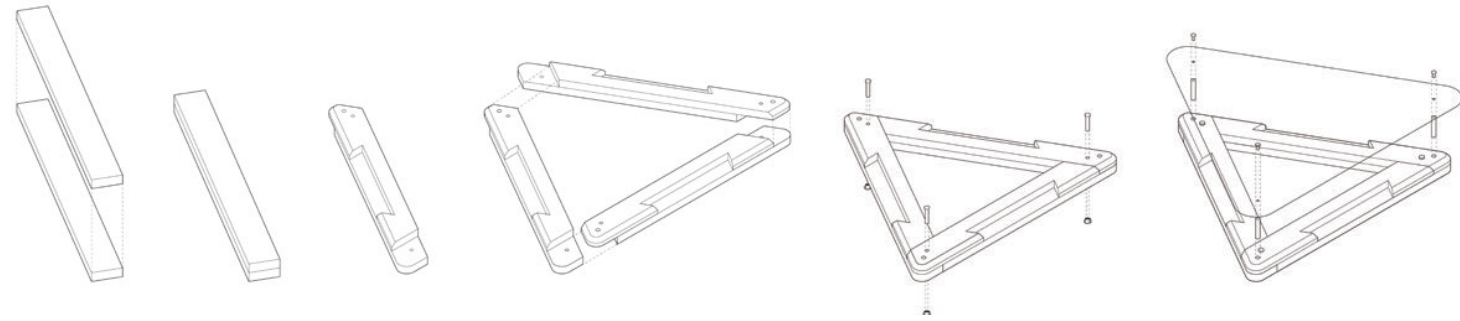


How can thread be transformed into a primary load-bearing member?

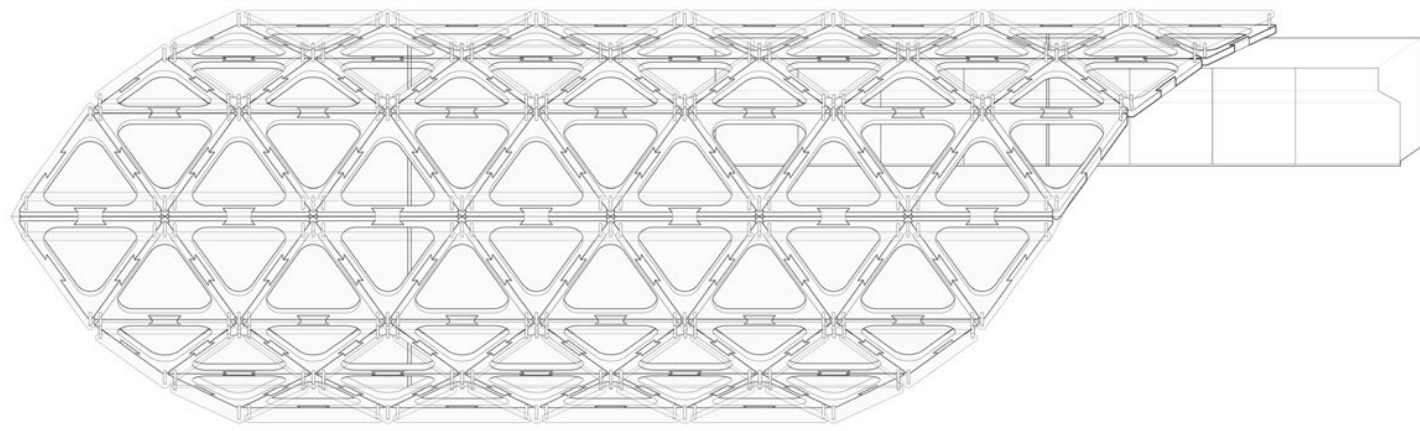
Futuretense Chair | Digital Craft Option Studio
 Program: Chair
 Completed: 2024
 Software Used: Rhino, RhinoCAM, Grasshopper, Vray
 Location: Ithaca, NY
 Role: Designer
 Professor: Martin Miller

Futuretense is a new language of structural design and its resultant aesthetics, emerging from seeking a material and structural alternative to wood that is more quickly cultivable and inspired by the fiber fabrication processes of the livMatS Pavilion. The Futuretense Chair explores the novel forms, functions, and assemblies that utilizing fabric threads as structural members enables. Cotton twill tape is woven around a loom, and as more layers of thread are woven tightly across previous layers, the older layers are stretched, adding tension to the form and effectively creating a minimal surface. Resin is applied, hardening the thread and pre-tensioning it so that it works in tension even under compressive forces. This results in chair legs that are remarkably light—just under 11 ounces (311.8 grams) in weight each—but that together hold at least 150 pounds (68 kilograms).

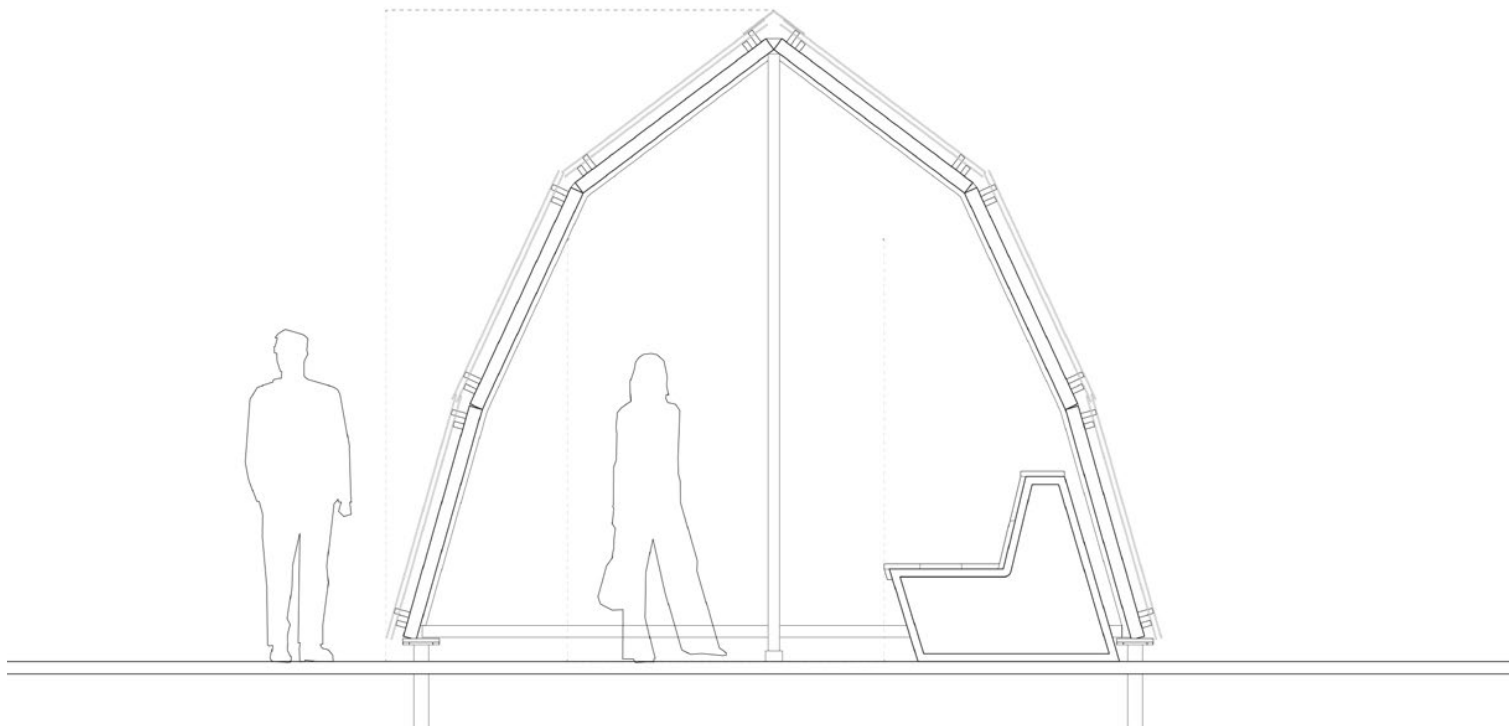
MODULE ASSEMBLY



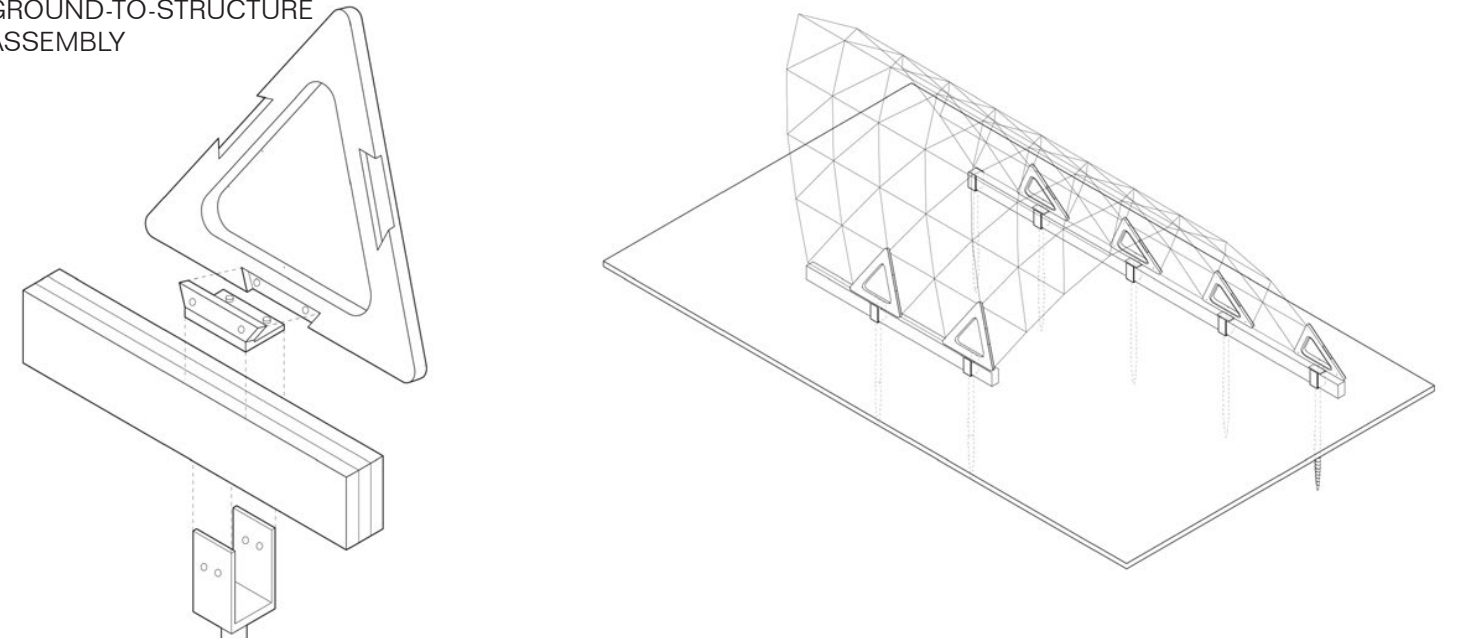
SHELTER PLAN



SHELTER SECTION



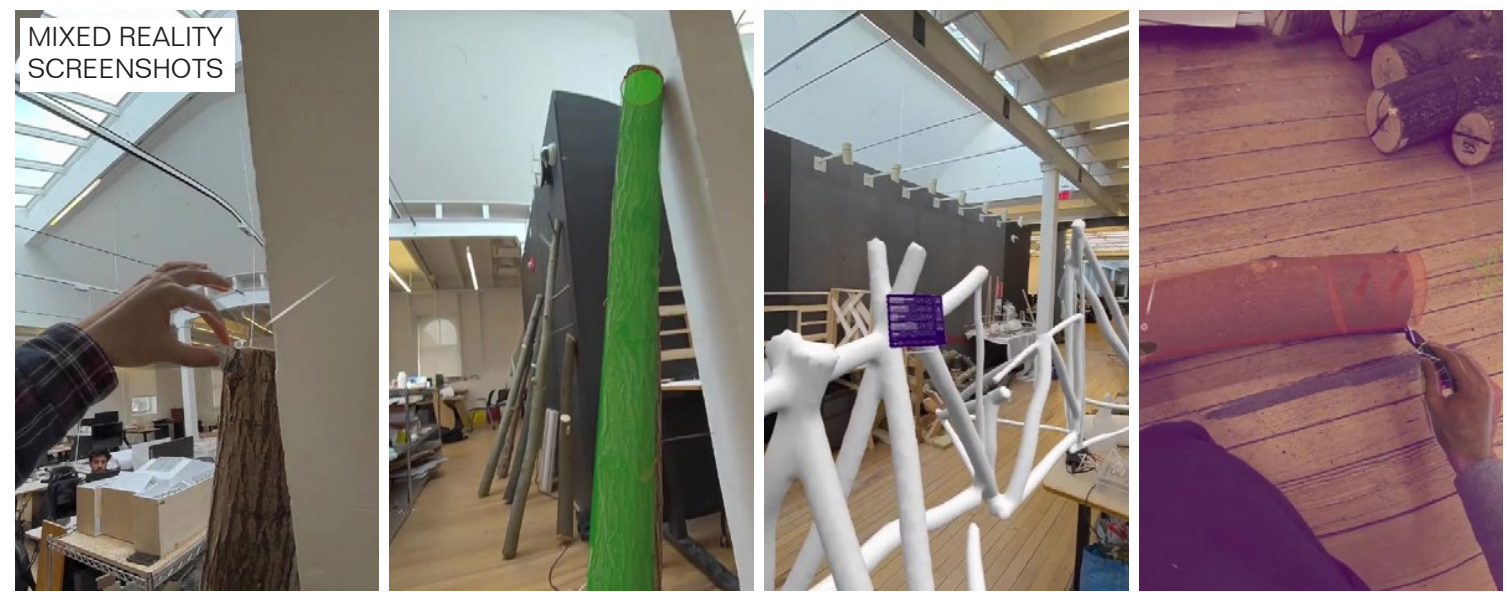
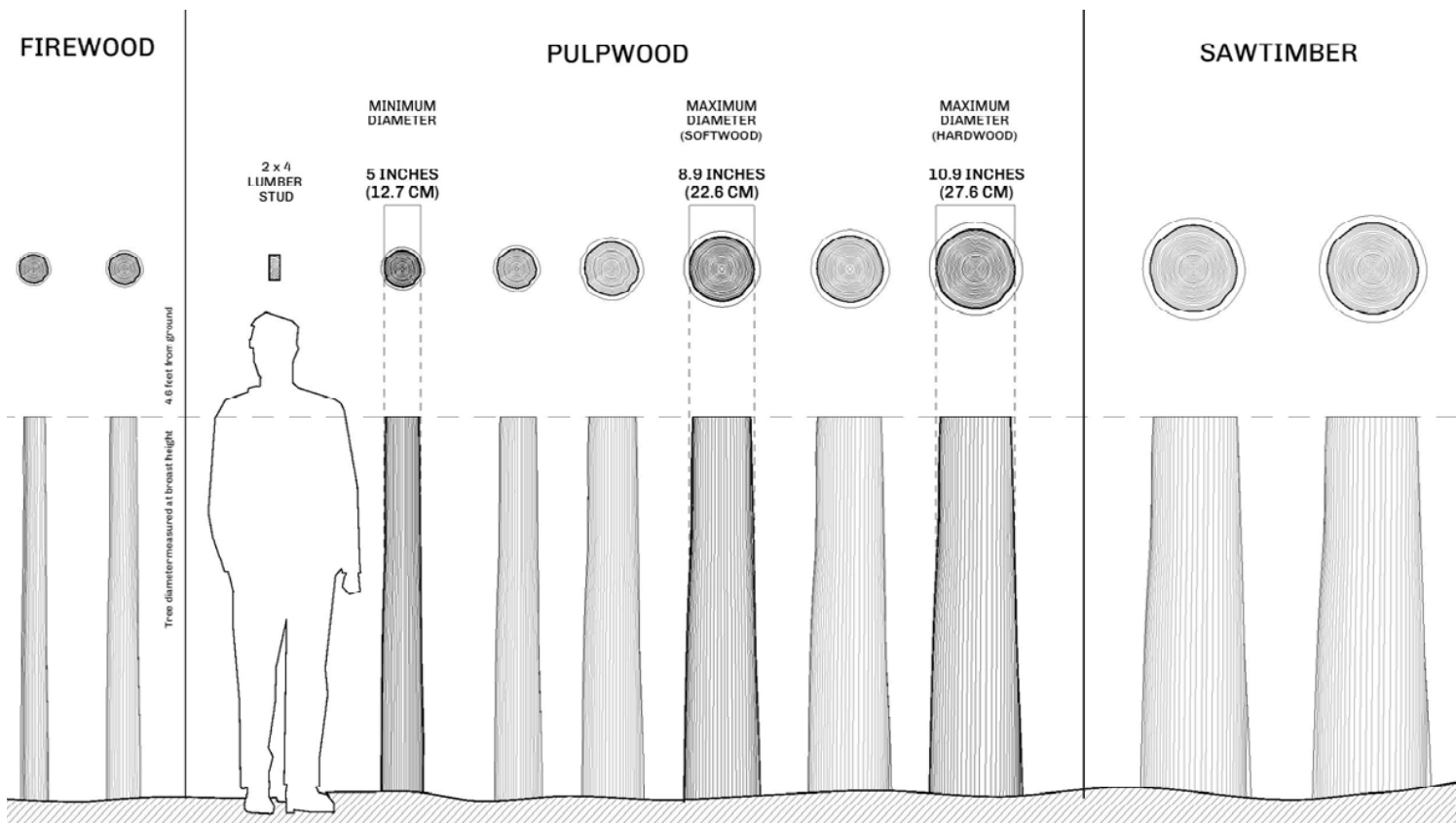
GROUND-TO-STRUCTURE ASSEMBLY



How can modular design enable utilitarian and elegant structures?

CUSD Bus Shelter | CUSD Sustainable Mobility Program: Bus Shelter
 Completed: In progress
 Software Used: Rhino, Grasshopper
 Location: Ithaca, NY
 Role: Co-Lead of Interdisciplinary Design Team
 Faculty Advisor: Siritetta Simoncini

Cornell University Sustainable Design (CUSD) is working to realize a modular bus shelter made of environmentally responsible materials. For the last three and a half years I have been co-leading an interdisciplinary team of architects, engineers, and designers to design this shelter. I helped create smaller sub-teams focused on addressing the multiple aspects of the shelter's design, including form, materials, bench design, electrical systems, and assembly. In addition to leading the overall design team I also worked on designing and prototyping variants of a block-like module connected with dovetail joints, creating a model of a possible bus shelter form in Grasshopper, and structurally simulating the shelter. (Renders completed by Nate Jones)



How can XR technologies turn discarded materials into inhabitable structures?

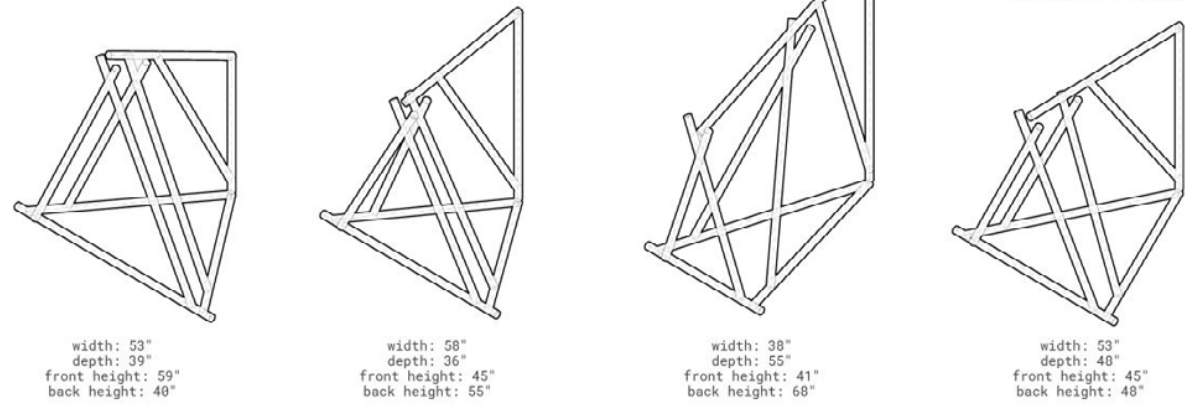
Spruce Frame | Augmented Option Studio
 Program: Space Frame/Wall Assembly, Cabin
 Completed: 2025
 Software Used: Rhino, Grasshopper, Fologram w/Meta Quest
 Location: Ithaca, NY
 Role: Designer
 Professor: Leslie Lok



SCAN QR CODE OR [CLICK HERE](#) TO VIEW MOVIE EXHIBITING THE MIXED REALITY WORKFLOW

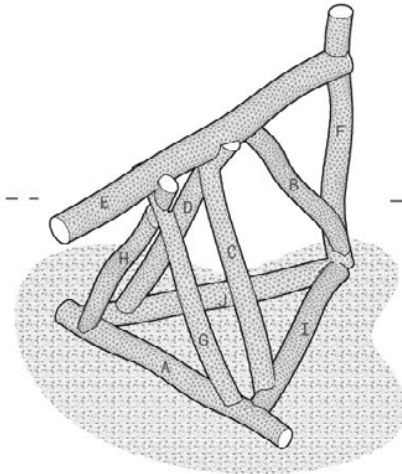
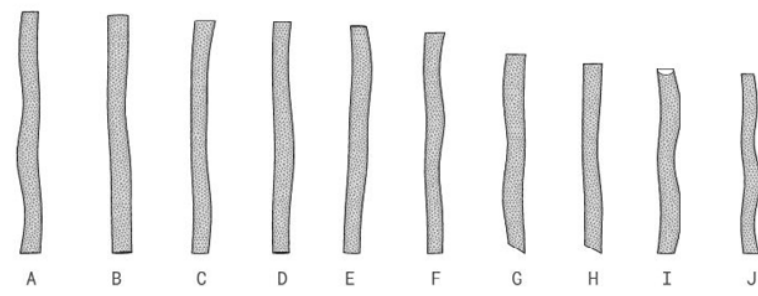
Pulpwood is wood that is too small in diameter to be used to make standardized lumber components but large enough to still withstand large compressive and tensile forces. Pulpwood is often overlooked in modern construction techniques because of its non-standard form and size. Spruce Frame utilizes mixed reality scanning and parametric workflows to make a strong space frame module out of a catalog of pulpwood logs. Spruce Frame Cabin utilizes these assembly logics to create a formally captivating dwelling unit.

DESIGN PHASE

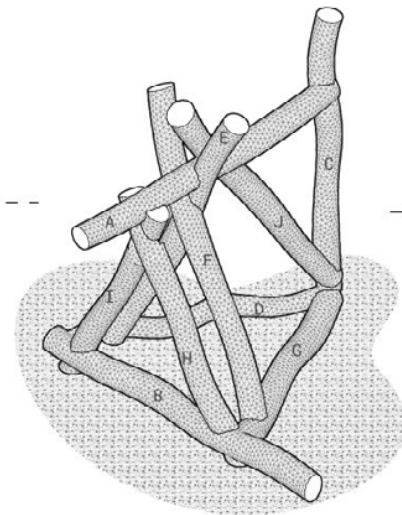
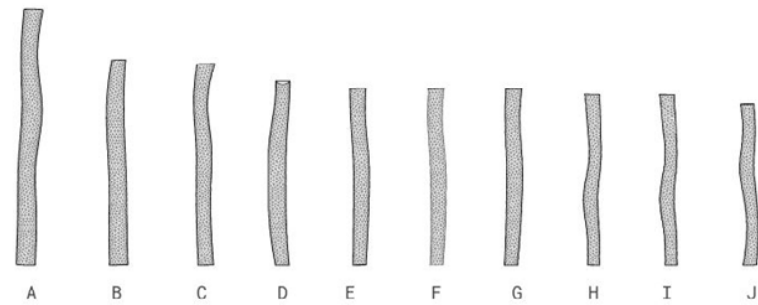


MIXED REALITY (MR) PHASE

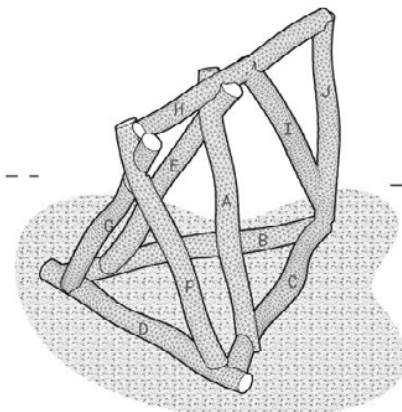
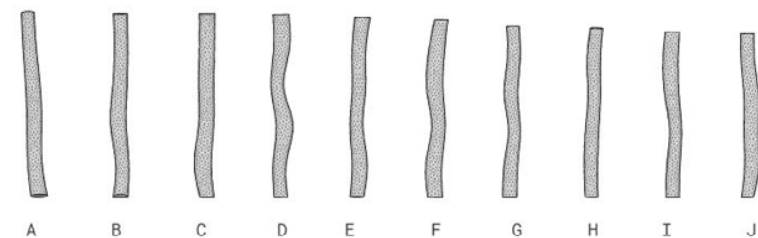
CATALOG 1 LARGE LOGS



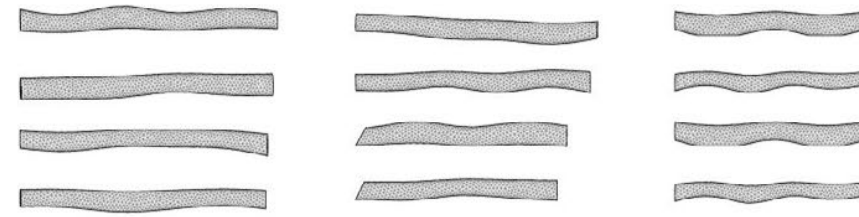
CATALOG 2 LARGE + SMALL LOGS



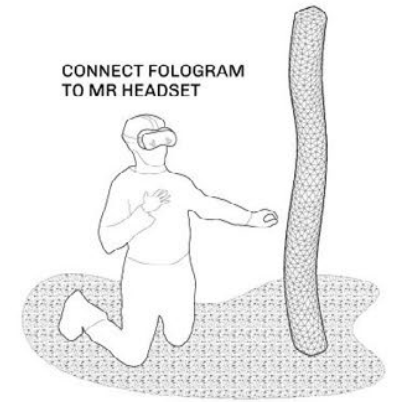
CATALOG 3 SMALL LOGS



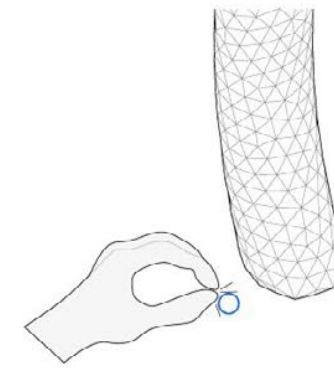
GATHER LOGS



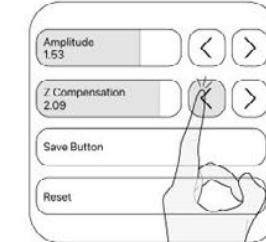
CONNECT FOLOGRAM TO MR HEADSET



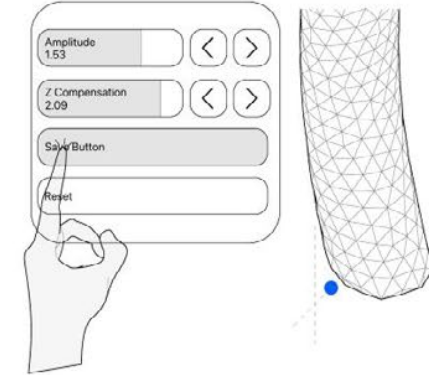
PLACE POINT ON LOG BY PINCHING



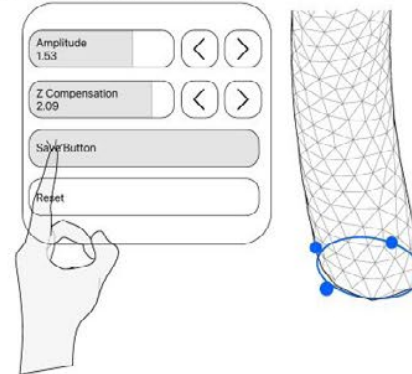
ADJUST POSITION OF POINT FOR ACCURACY



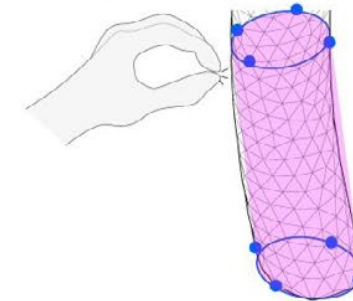
ONCE ADJUSTED, PRESS SAVE BUTTON TO SAVE POSITION



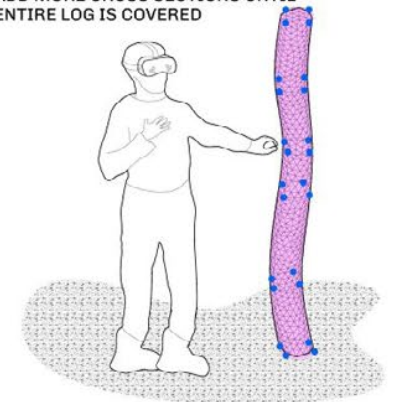
ADD FOUR POINTS TO MAKE ELLIPTICAL CROSS-SECTION



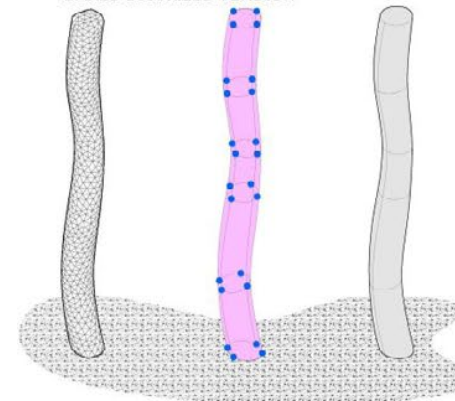
3D GEOMETRY PREVIEWED AFTER EACH NEW CROSS-SECTION



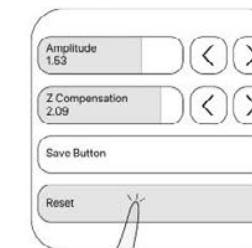
ADD MORE CROSS SECTIONS UNTIL ENTIRE LOG IS COVERED



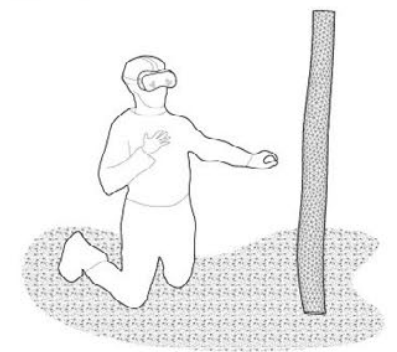
ORIGINAL LOG, GEOMETRY USED TO MAKE DIGITIZED VERSION, BAKED DIGITIZED VERSION



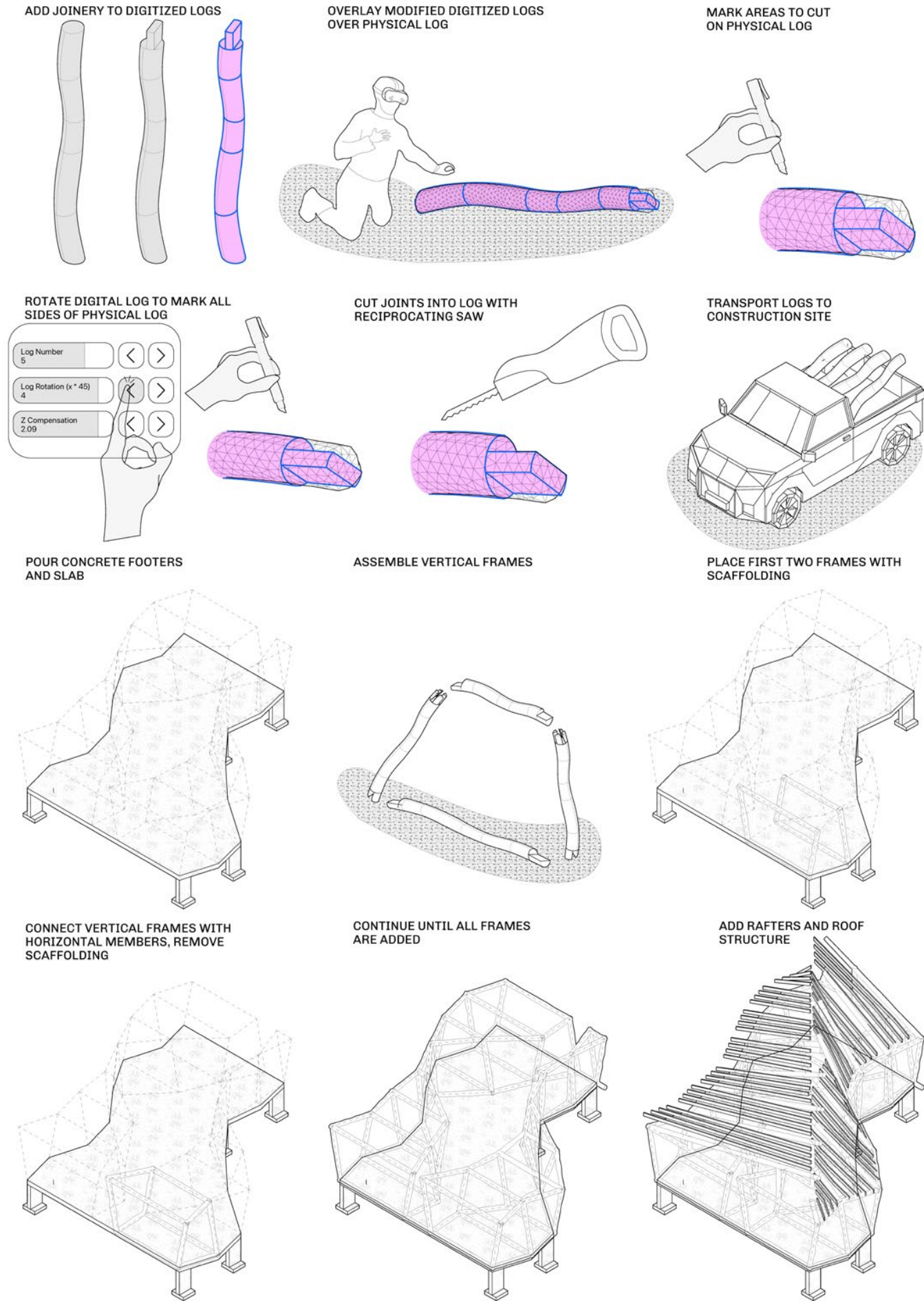
PRESS RESET BUTTON TO SCAN NEW LOG



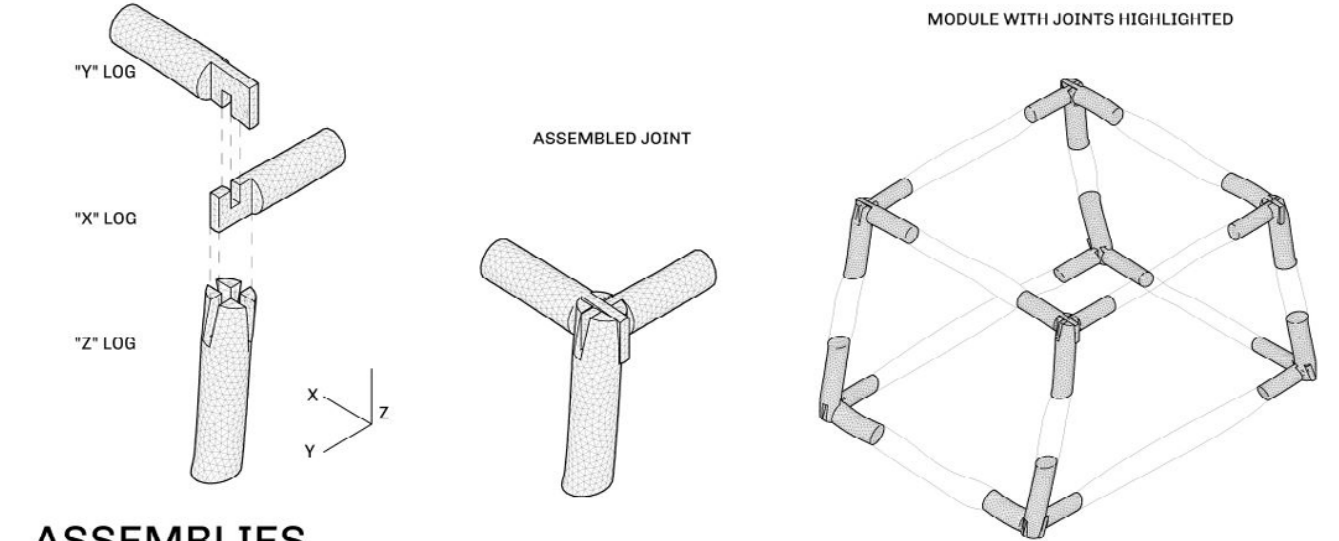
CONTINUE UNTIL ALL LOGS ARE DIGITIZED



CONSTRUCTION PHASE



MODULE JOINERY



ASSEMBLIES

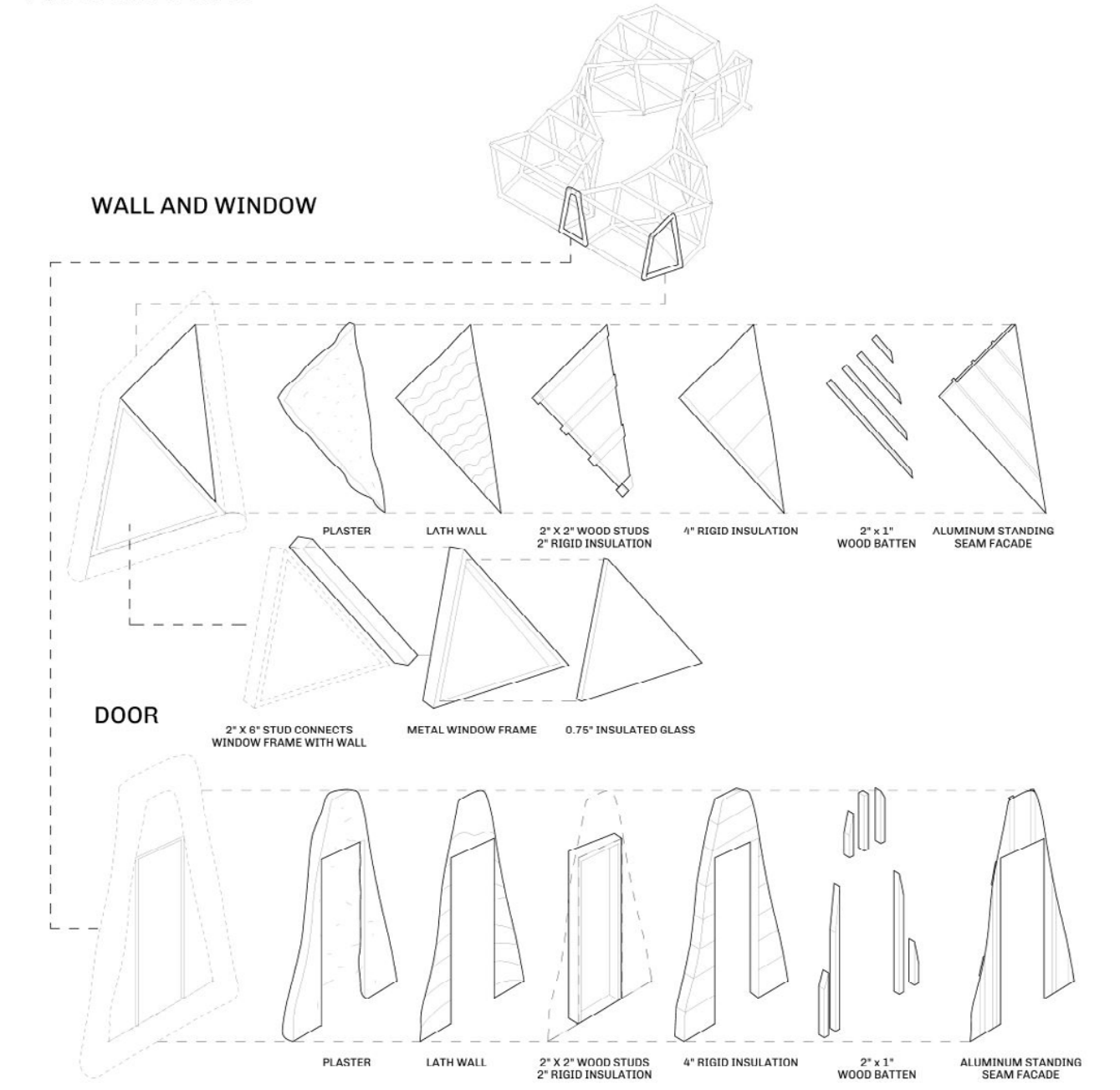
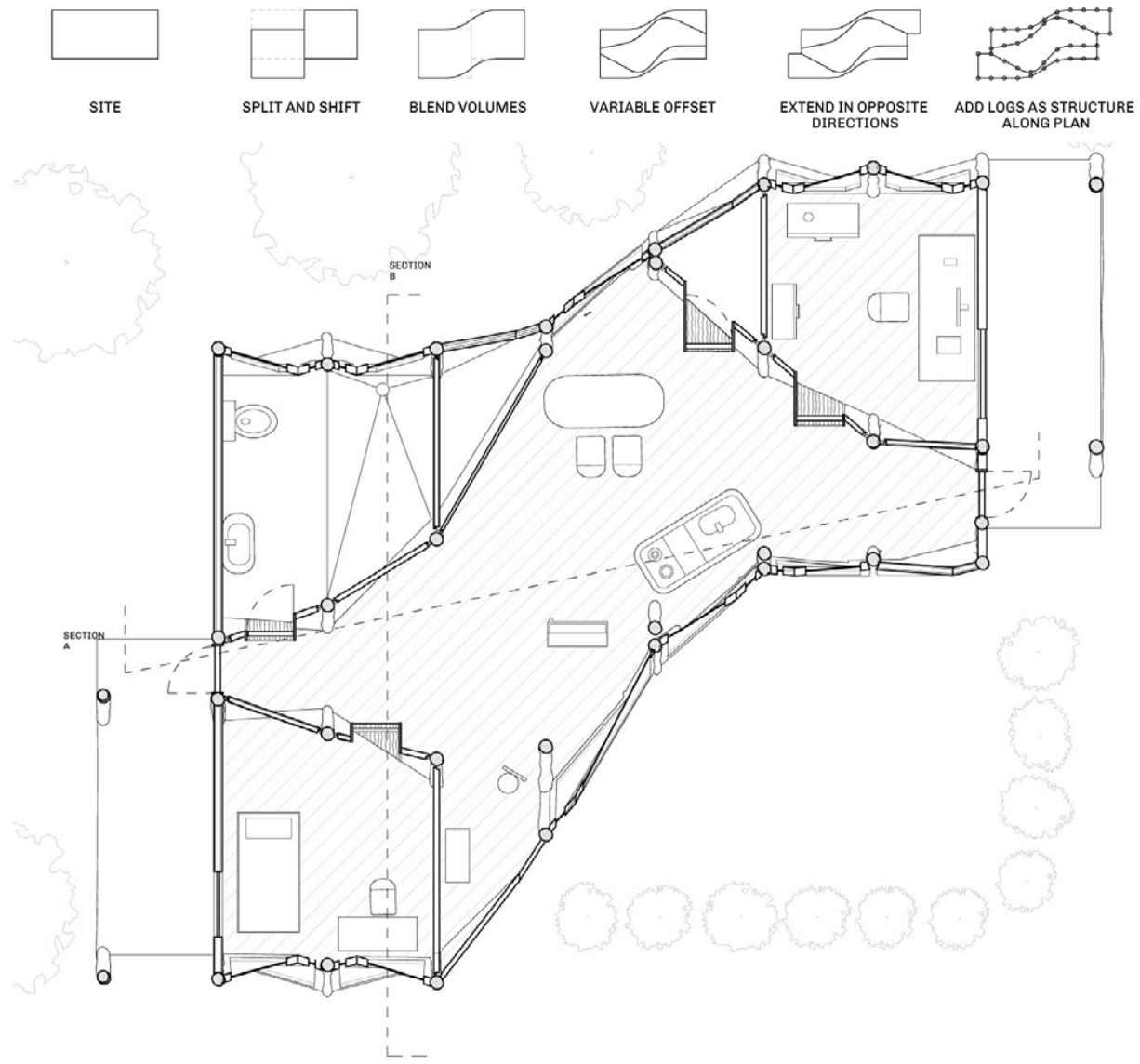
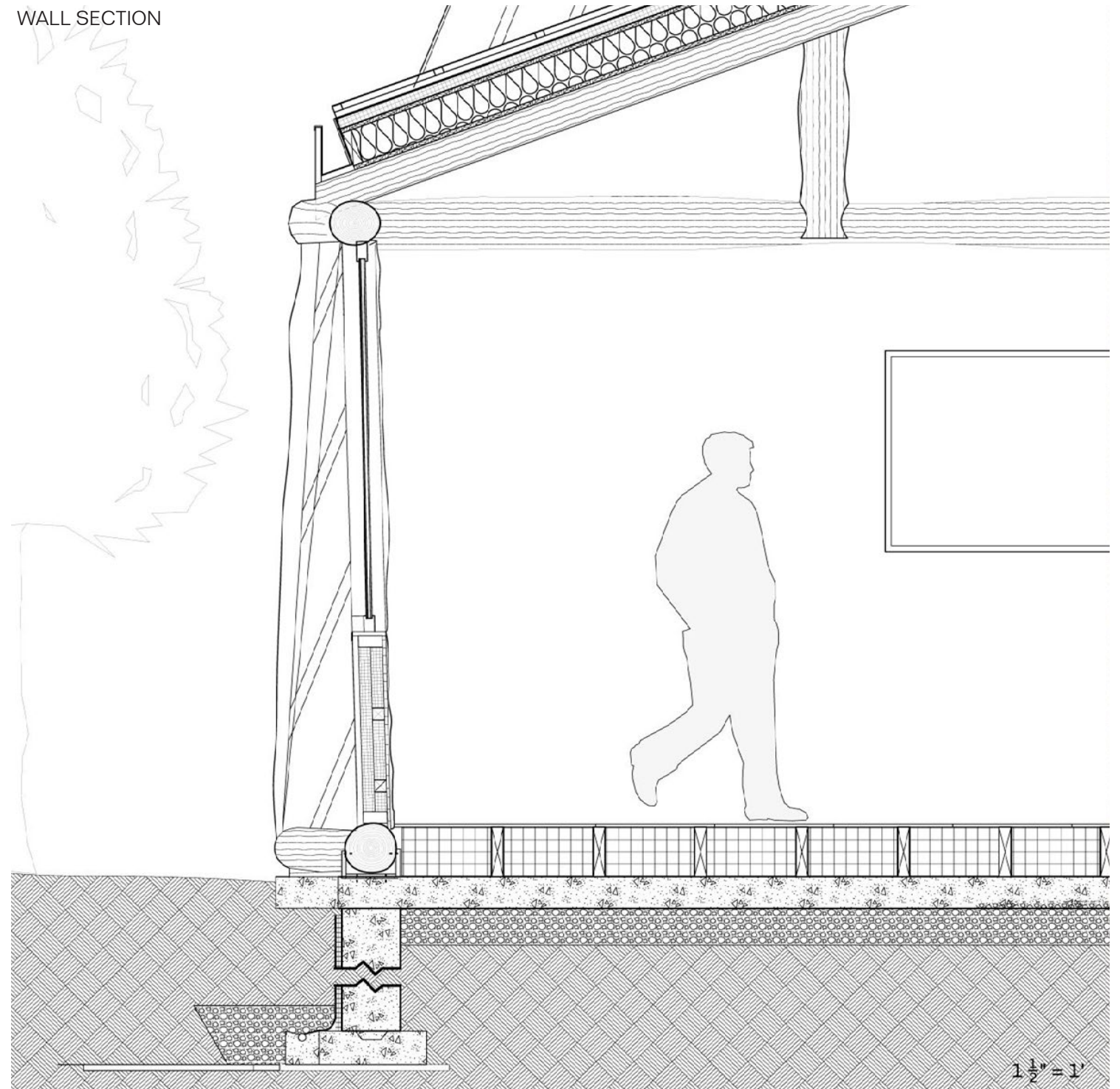


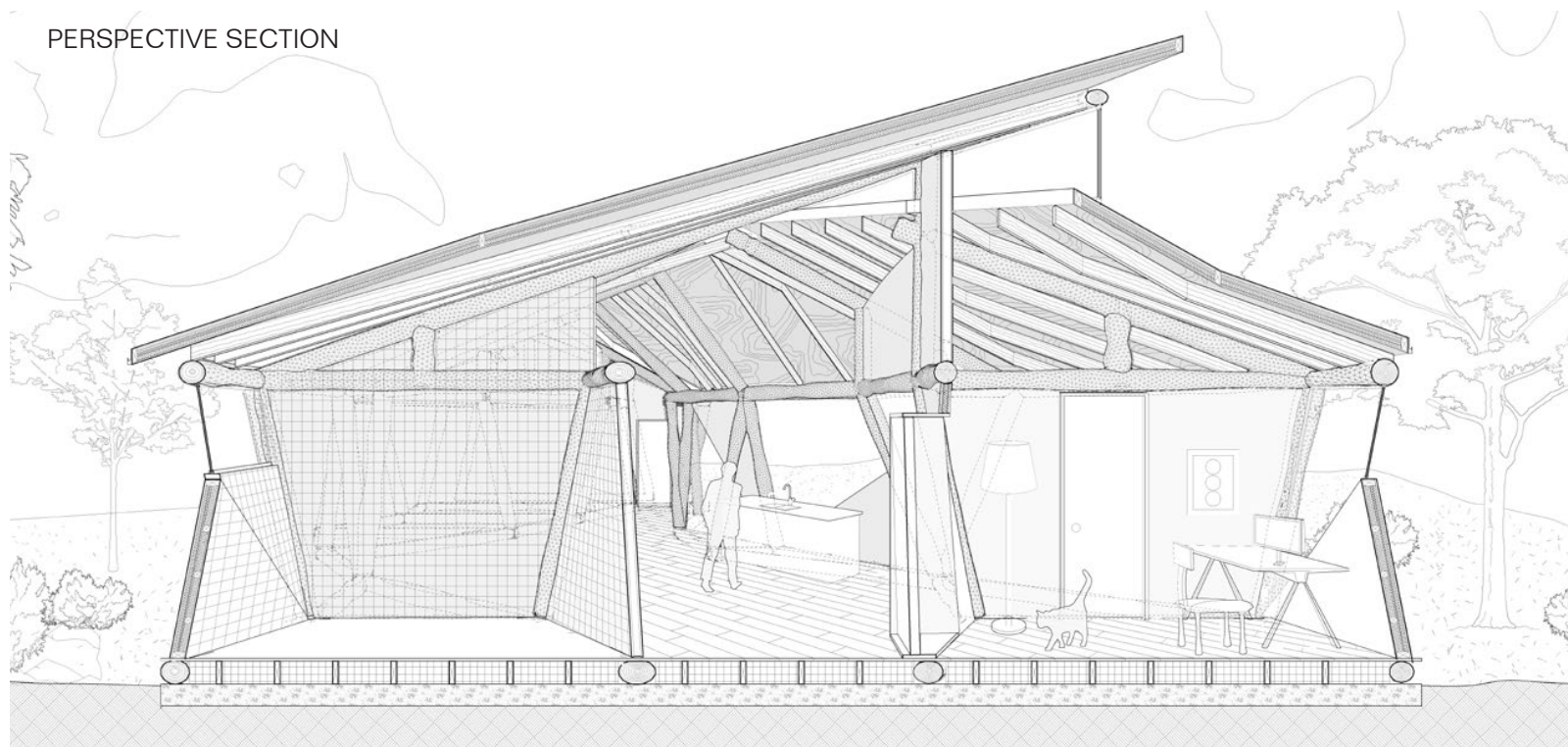
DIAGRAM AND PLAN



WALL SECTION



PERSPECTIVE SECTION



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