bits & pieces

zackary bryson

2024

This document contains pieces of my graduate work completed at the Graduate School of Architecture, Planning, and Preservation between 2021 and 2024. Chronologically cataloging only bits of everything that went into the making of these projects, in the form of photographs, drawings, paintings and texts. Ultimately this is a reflection and archive of the tools used and arguments I developed with the immense support of my peers, instructors, and loved ones, without whom none of this would have been achievable.

This book is dedicated to,

my mother, Anny
my father, Nathan
my brother, Jonah
and my love, Mimi.

Columbia University

Graduate School of Architecture,
Planning, and Preservation

submitted in partial fulfilment of the
Masters of Architecture

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Content

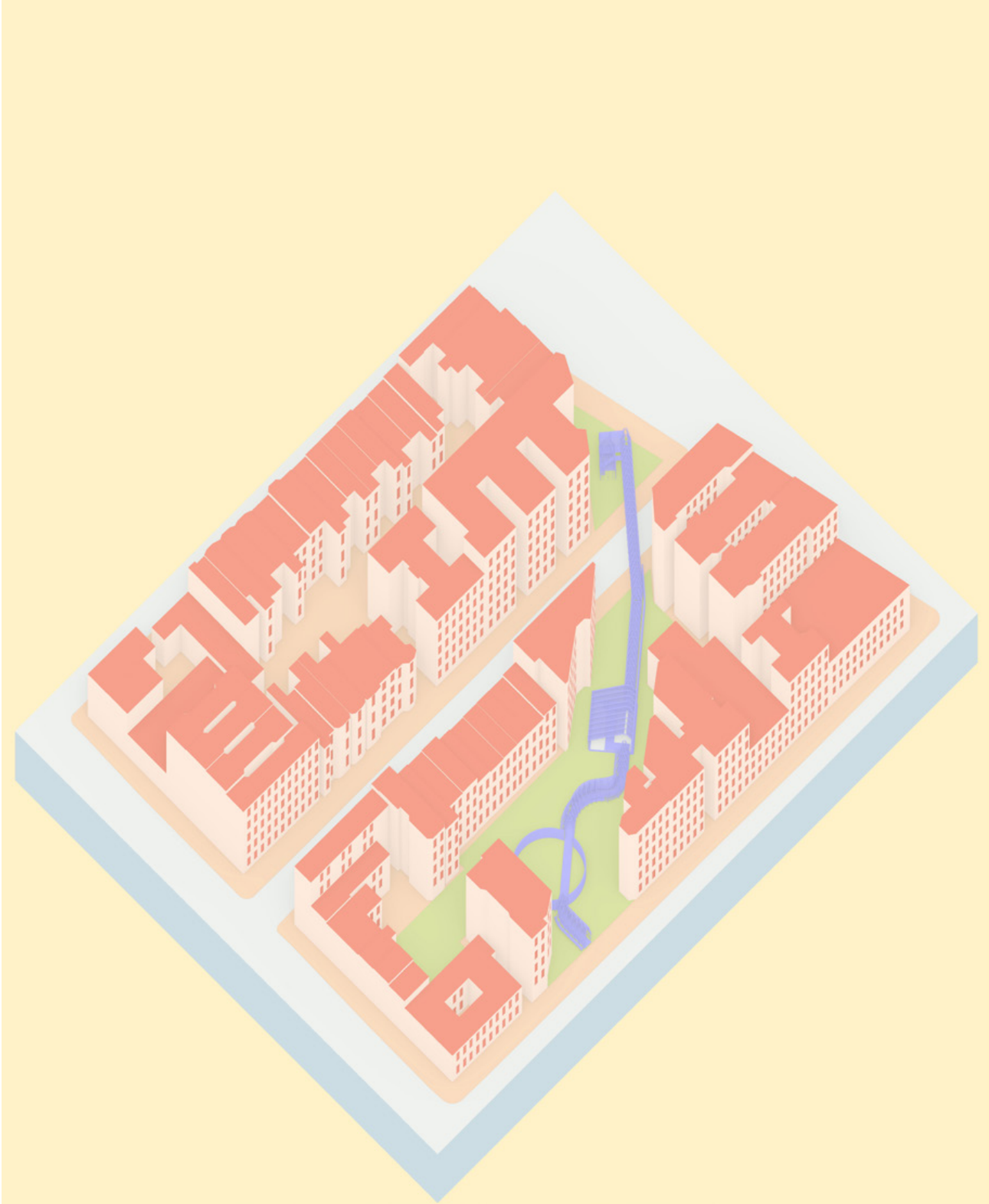
pieces.

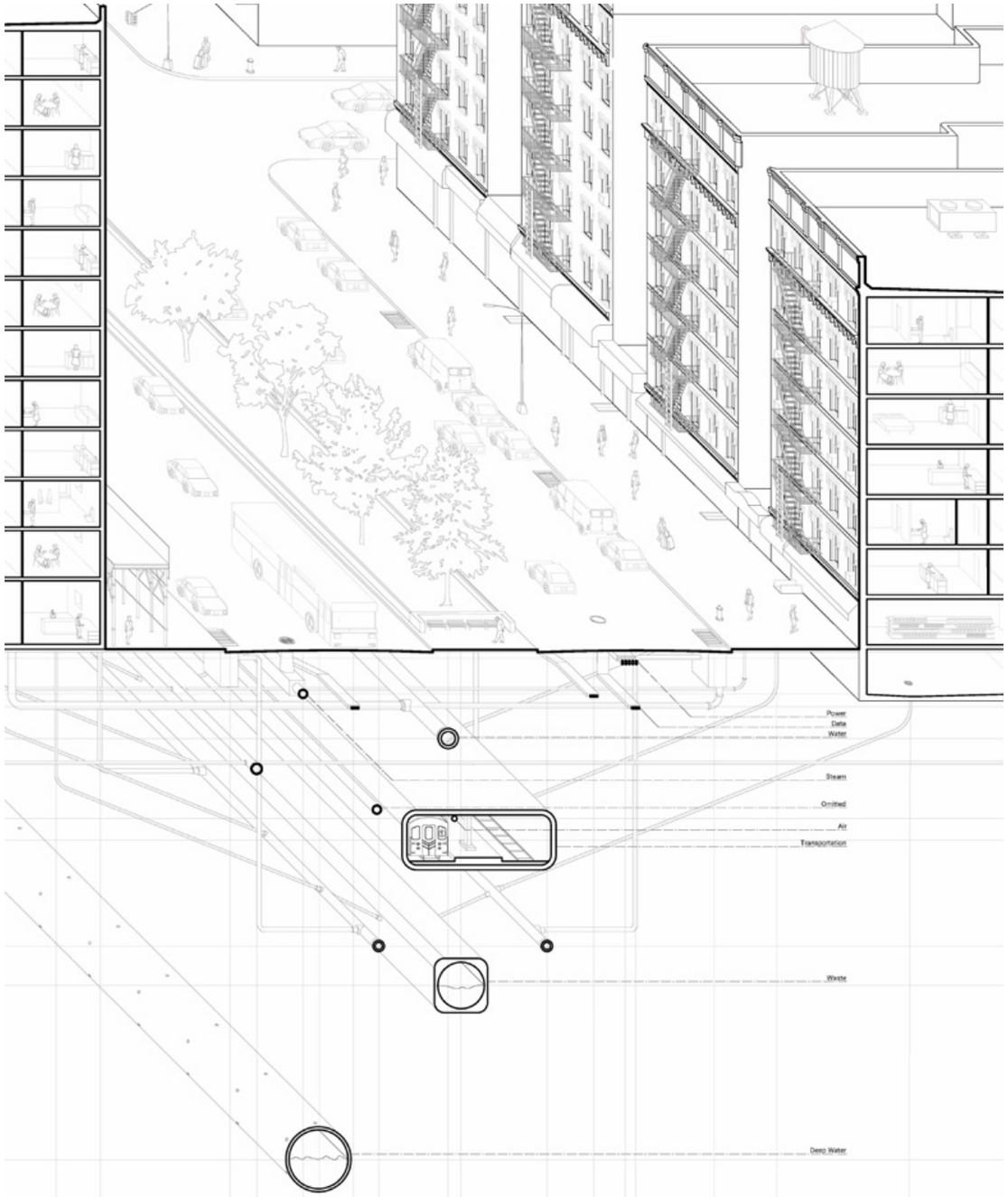
Made-Land

With Miku Dixit as critic and Marc-Henry Decrausaz as teaching assistant.

Location: New York - Washington Heights

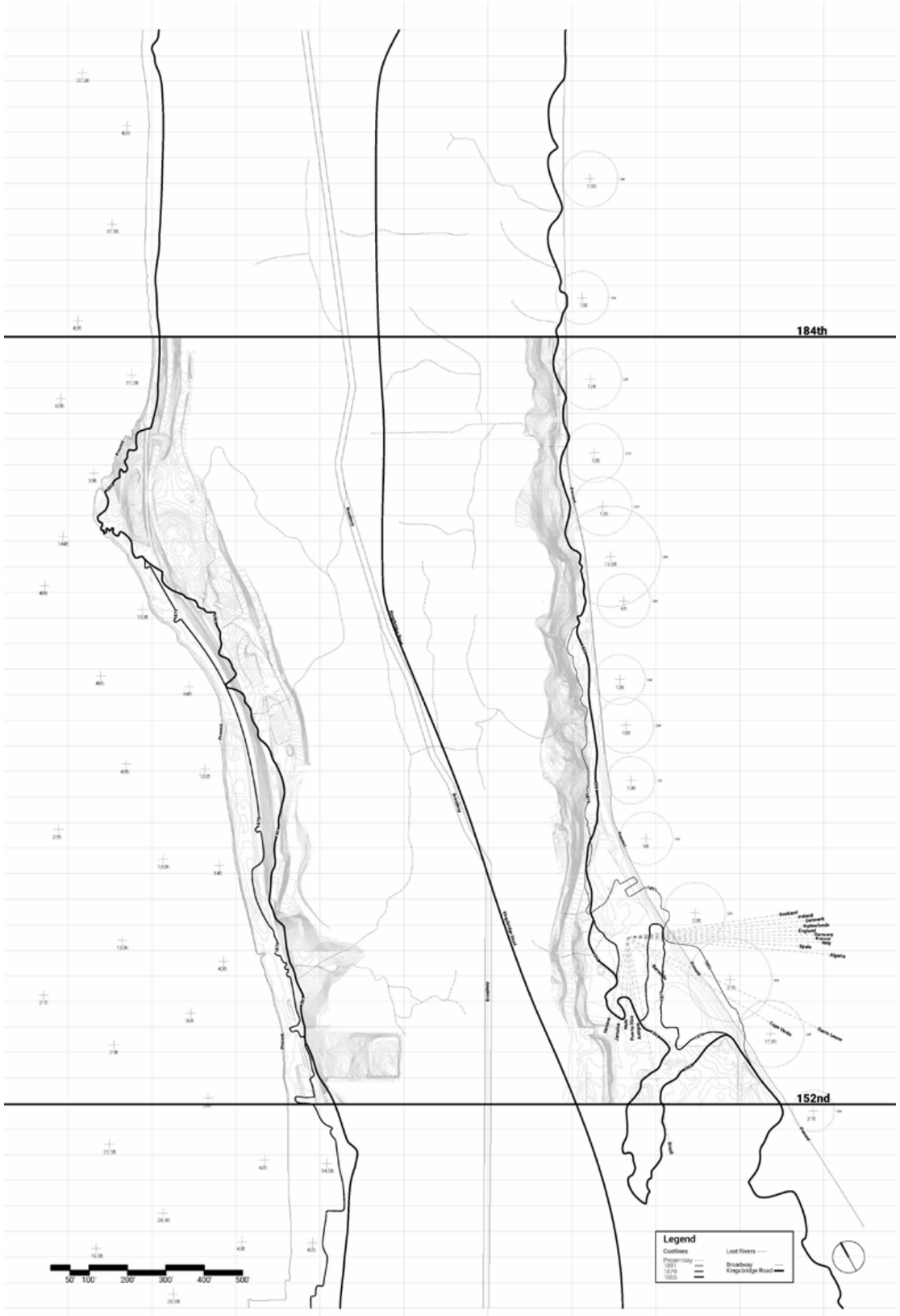
Made-Land aims to promote a discourse around land ownership, management, excavation and the origins of the soil which constitutes this “land.” Tracing the histories of the ground and the flora, points to a fragmented history of colonization and racial injustice. The bay, which ran between the northern most point of 8th avenue, and collides with the Harlem River at140th st, served as a dumping ground for the ballast of ships entering New York City’s international port for nearly 10 years beginning in the 1860’s. Plants growing from the soil rendered a visual history of commerce made between nations. The flora on “made-land territories” was documented by botanist Addison Brown, enabling the tracing of these soils. The adventive flora, quickly became known as “weeds,” “invasive,” and “aliens.” Concurrently the United States’ immigration and naturalization laws for the human species began to transform in the 1870’s and 1880’s discriminating against race and nation. The proposal positions itself to expose the history of the soil which shaped the island of Manhattan as it is known today. In displaying the adventive flora it serves as an agent in revealing this landscape of brutality and a history of colonization and inequality.





section through broadway and its infrastructure

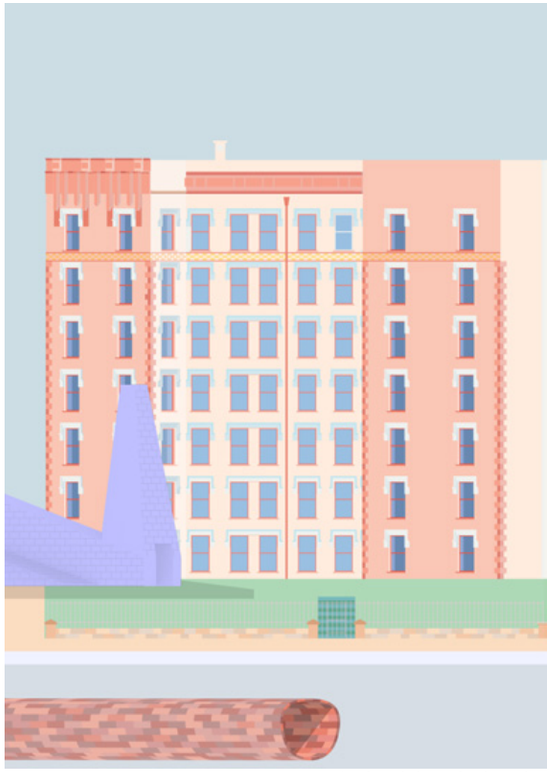
Prior to the colonization of Manhattan, the edge condition of the island was drastically different. Over the span of 150 years, the transformation is especially evident between 152nd to 162nd along the Harlem River. This site, among many in New York City, was a dumping site for the ballast of ships.



site plan and soil origins

Fall 2021

making of the compressed earth blocks

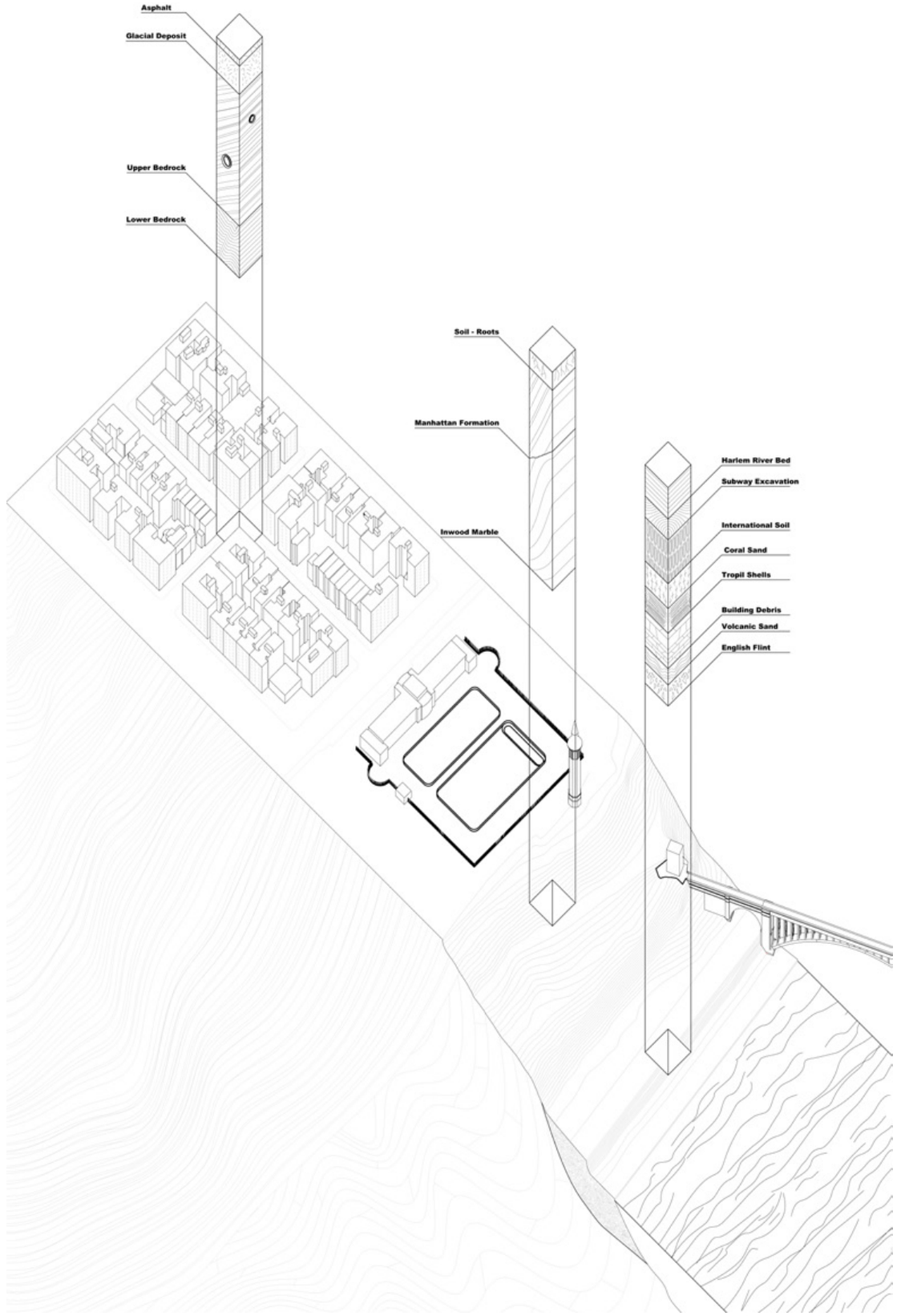


section through the road and aqueduct

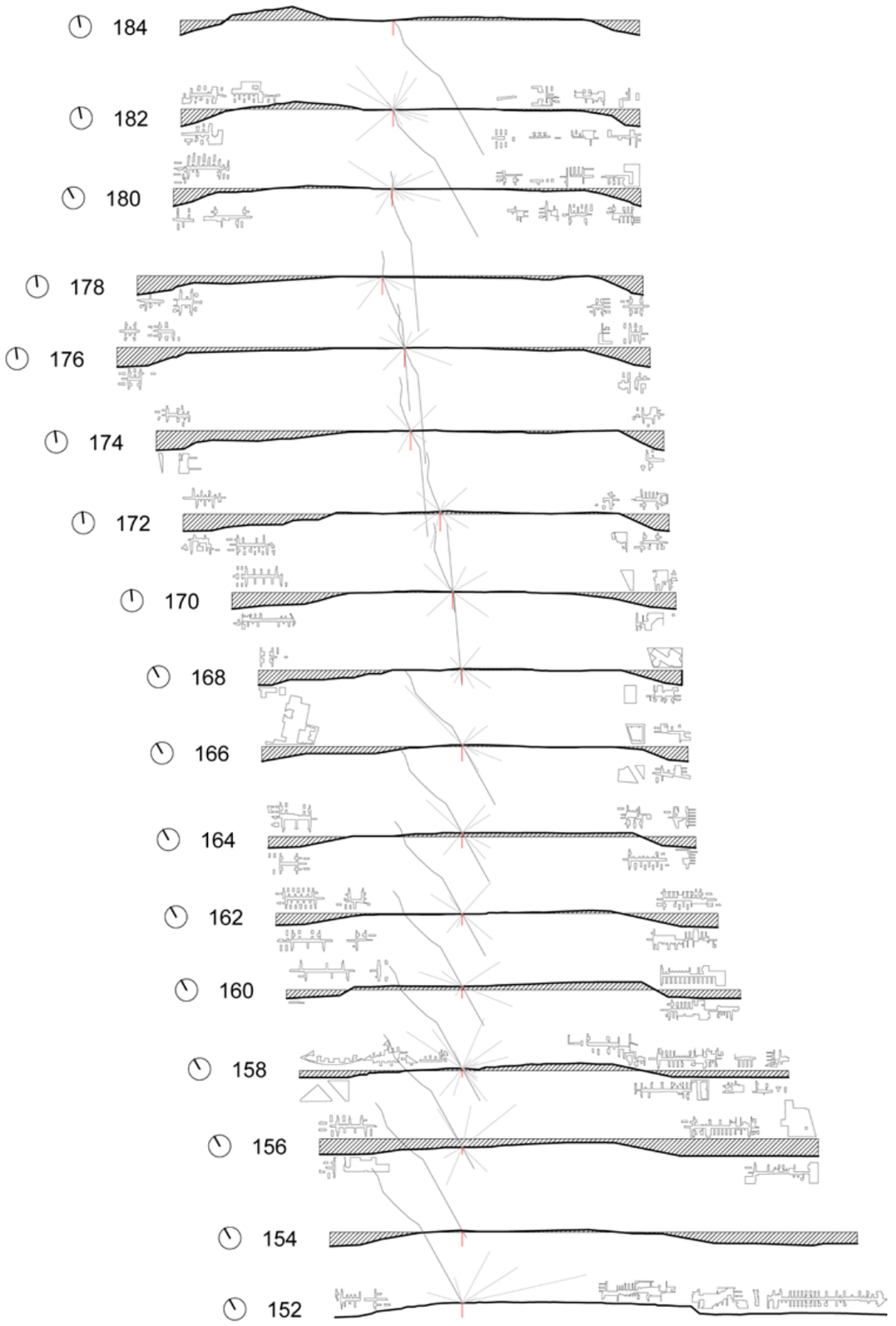
The synthetic carpet laid atop the island is now embedded with infrastructure, which is often the most permanent component of the built environment, serving as an agent between social life and the architecture which accommodates it. The three planes which frame Broadway as a ‘show’ serve to hide these systems which enable us to live our lives.

By having a closer look at the composition of the soil layers of history the transformation that has been imposed on the island is understood. From the soil brought over during the transatlantic trade of enslaved people to debris from the world wars, the edge is far from the island’s original geological make-up. This manufactured landscape consisting of leveled schist and filled in creeks, provided a tabula rasa on which to build.

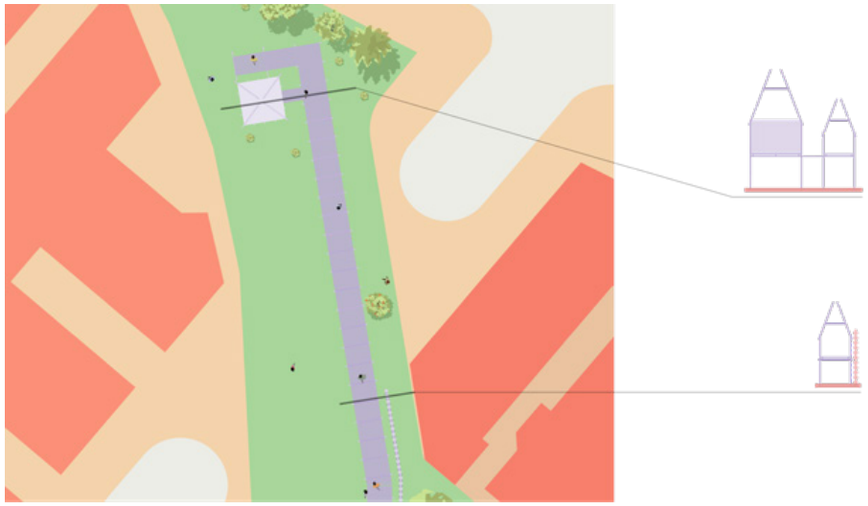
Made-Land

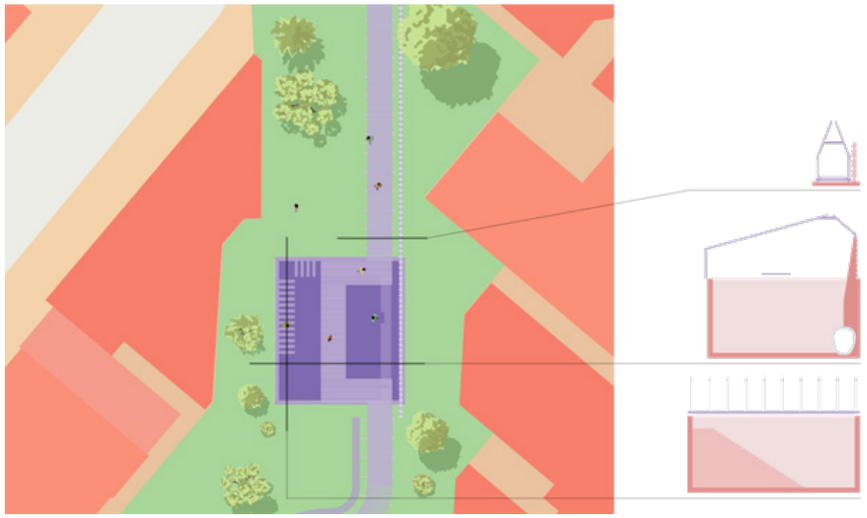


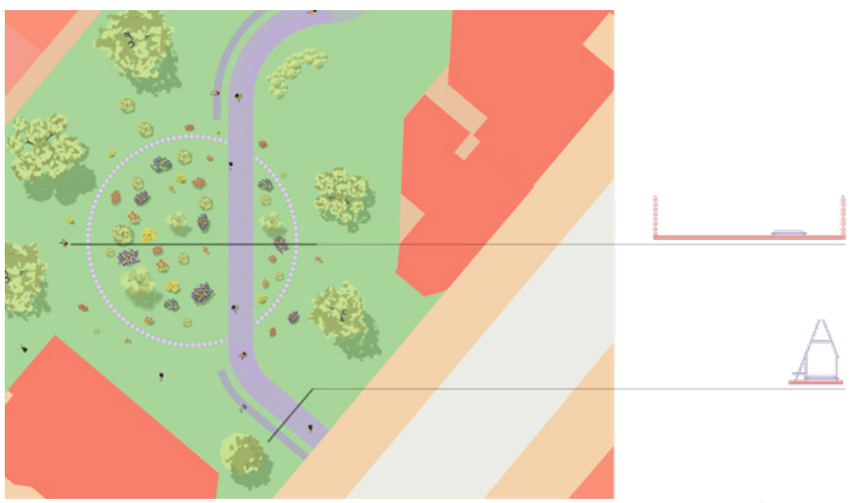
soil composition along manhattan



elevation change and interstitial spaces







plan & sections

Different conditions along the aqueduct highlight how infrastructure is responsible for mediating the relationship between bodies and their environments.

As it crosses St. Nicholas Avenue the aqueducts cuts through the grid diagonally forbidding any construction above head. This results in a city block quite unique to this site and a consequence of the unseen infrastructure. This became the site for the proposal.

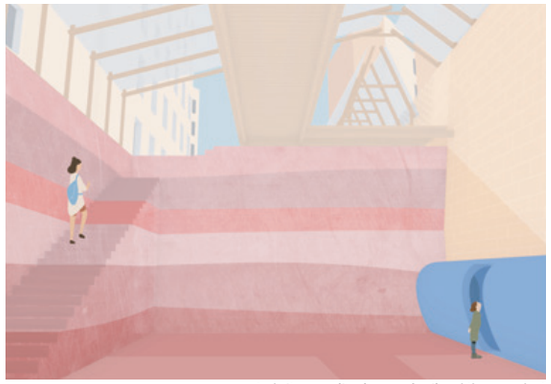
The proposal positions itself to expose the history of the fabricated landscape which shaped Manhattan. By taking elements of outdoor architectural exhibitions, it expands on thematics through context and situations beyond those afforded by the museum or galleries.

In turn, the site provokes an affinity to the community and recognizes the human and more-than-human entanglements which are a product of this locale.

By working within the bounds of the existing gated community garden, the intervention aims to interfere with it as little as possible by weaving a light timber walkway, elevated off the ground, through existing trees and allowing for access throughout.

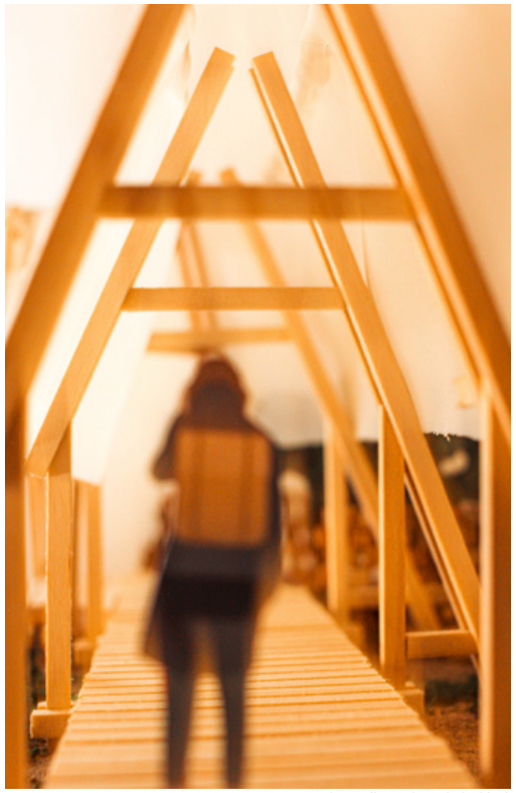
timber walkway through block

community garden



excavated site revealing layers of soil and the aqueduct

Fall 2021



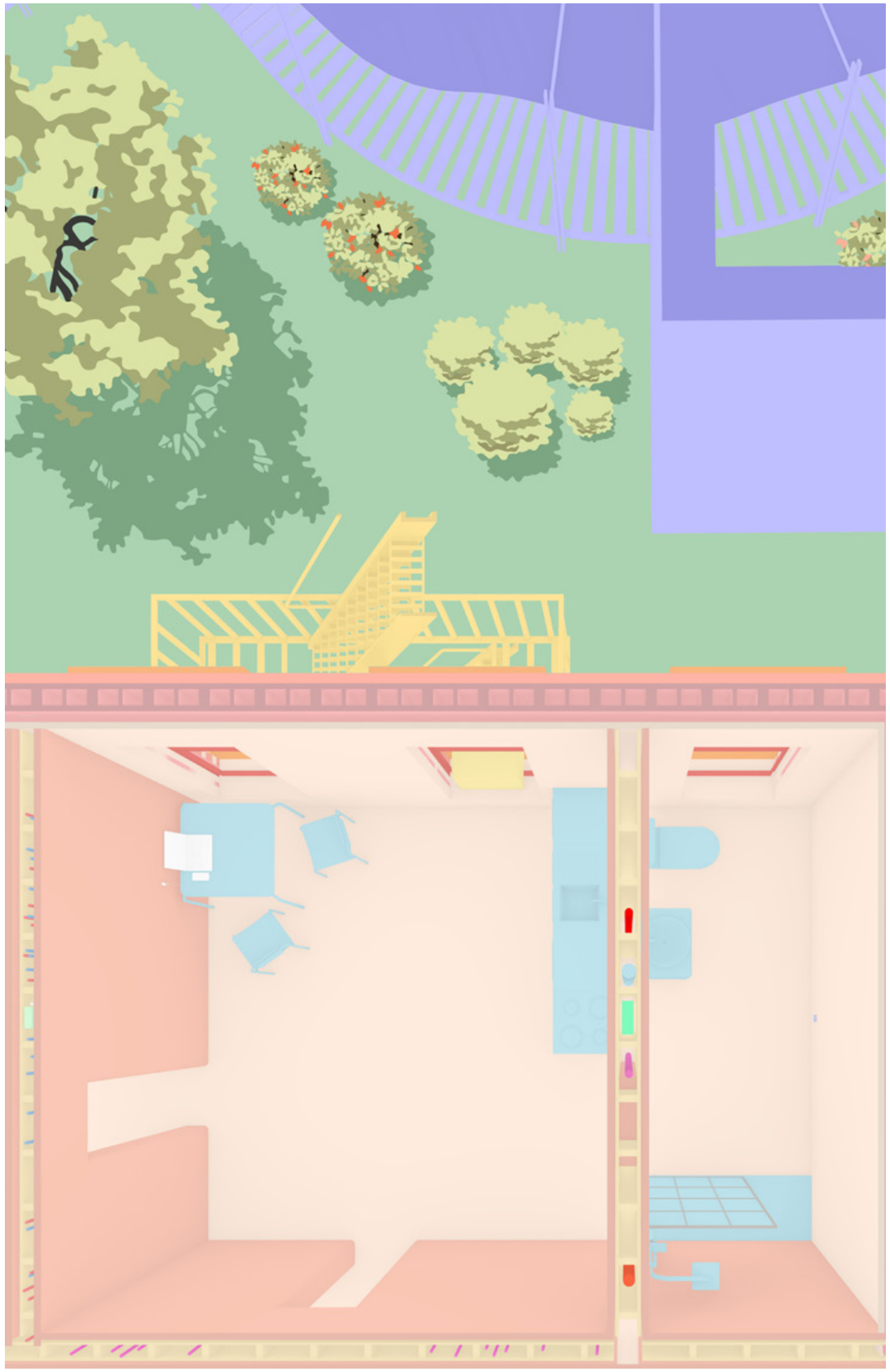
timber walkway through the block

community garden

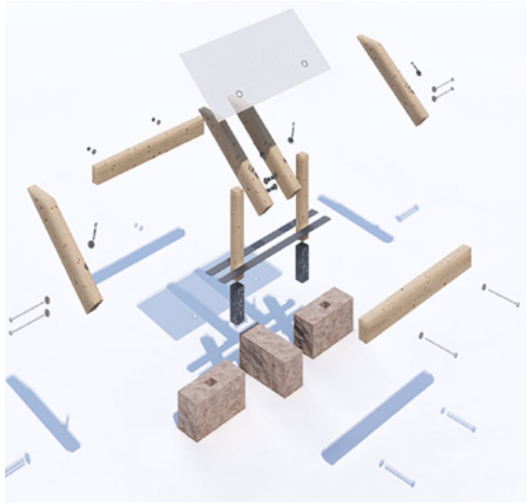
Blocks are made of soil from various “made-land” sites around the city of New York, representing the trans-nationality of the island. The blocks become the vessels which welcome the seeds to grow from within, and overtime inevitably fracturing and breaking them, resulting in the ruin of the earthen construction.

The remaining timber structure acts as a skeleton on which the plants can continue to grow and take over. As they do, the resilience of the plants which were once known as “alien” or “invasive” species, generate a time capsule reminding us of the events which shaped the city.

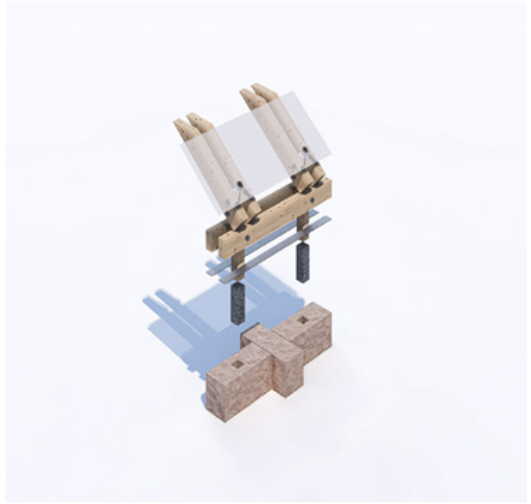
Made-Land



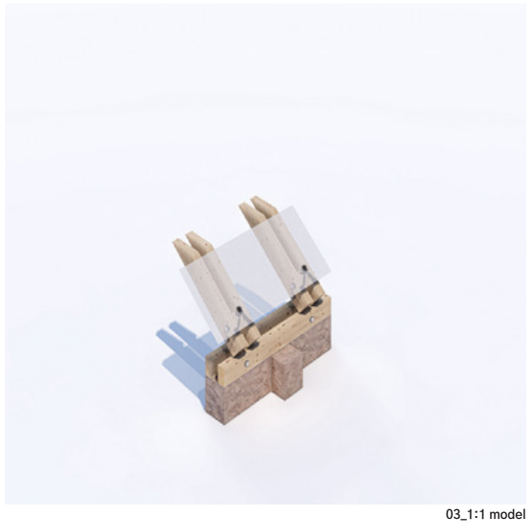
infrastructure in apartment building



01_exploded 1:1 model

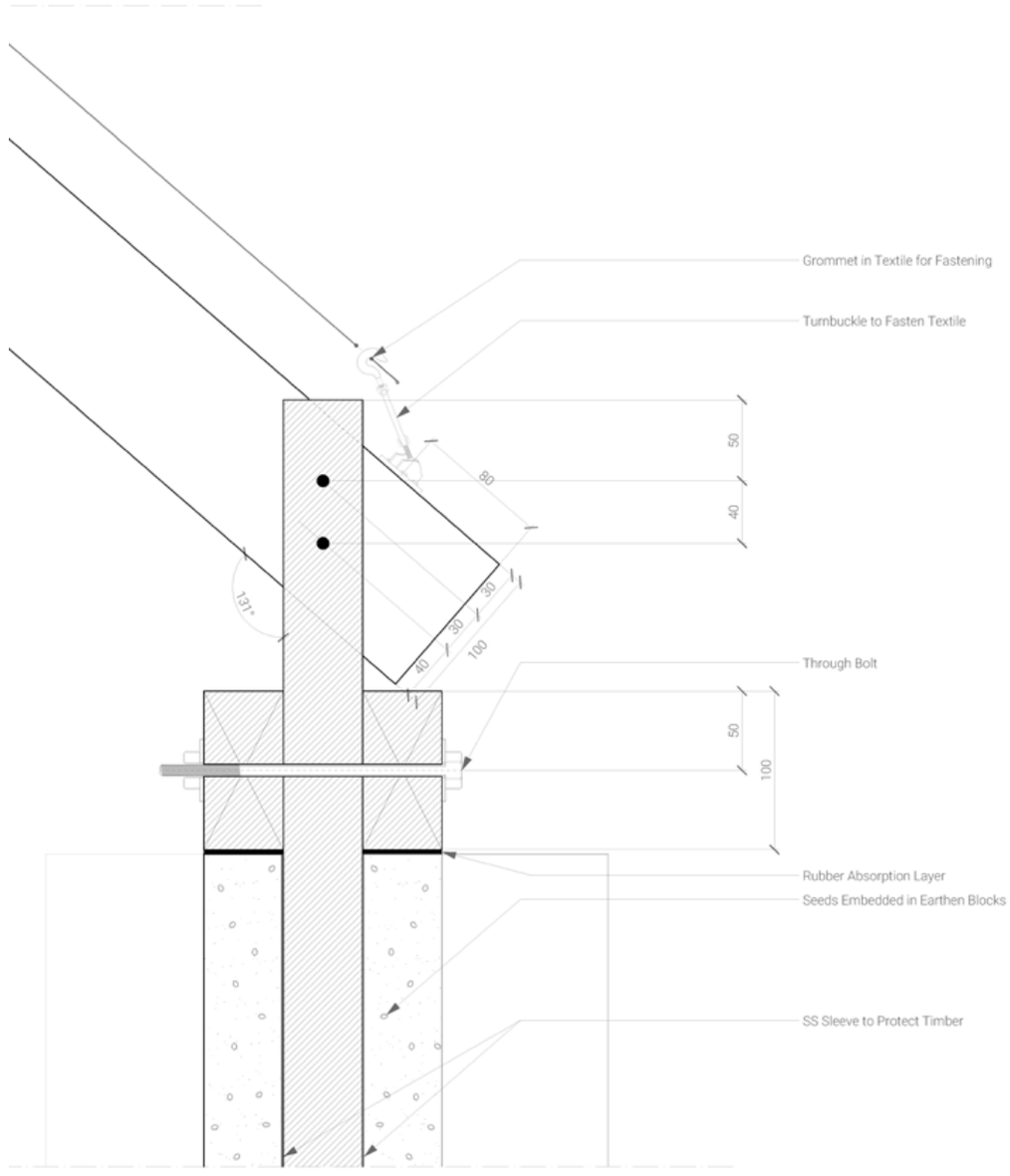


02_exploded 1:1 model



03_1:1 model

04_1:1 model after plan growth



1:1 detail drawing

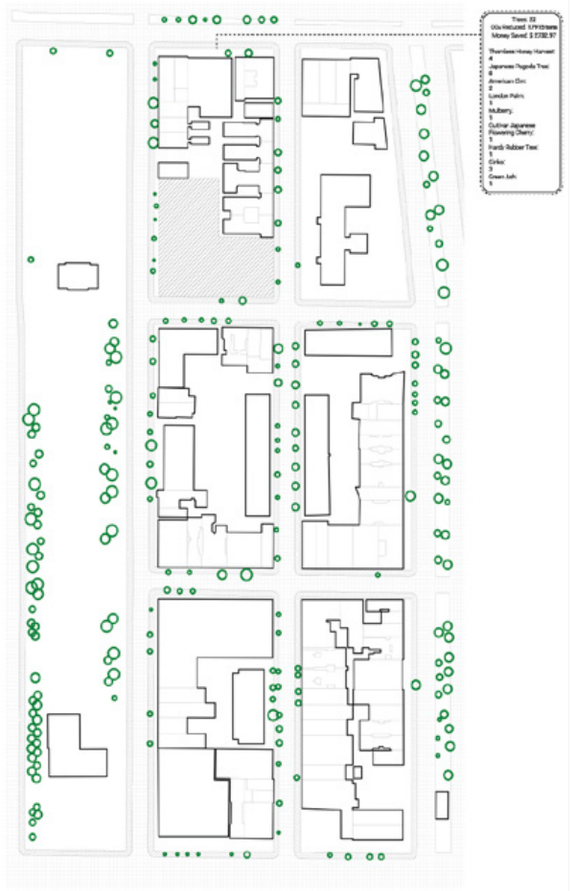
Micro School 30

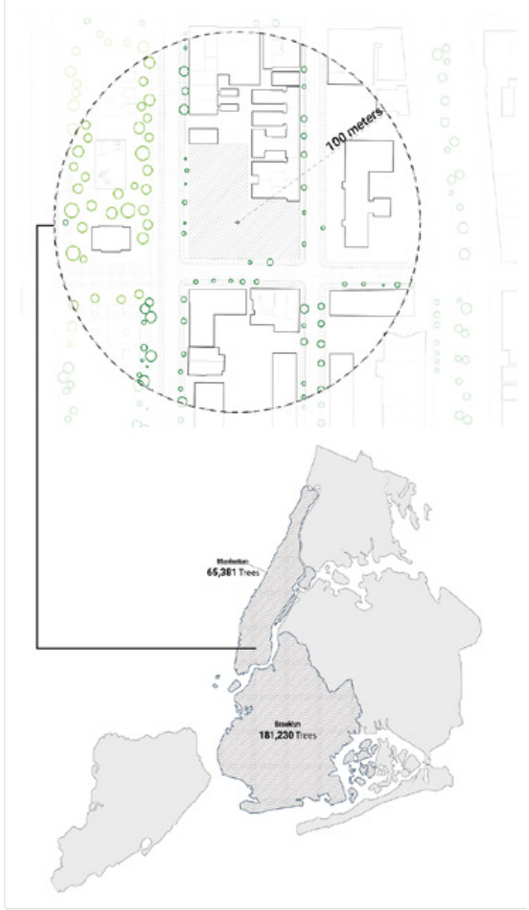
With Miku Dixit as critic and Reem Makkawi as teaching assistant.

Location: New York – Lower East Side

As humans, the way we live is influenced profoundly by our ecosystems. It can be easy to take the familiar natural landscapes of our local communities for granted. There is great value in an education rooted in the local community and it can be argued that centering this education on the local community results in students who are grounded in their understanding of the world. The goal of the curriculum is to introduce students to the biodiversity of flora, and the connections between plants and their ecosystems.

Through the school, the goal is to shift away from western allopathic medicinal practices which lack transparency, access, and affordability, which often focusing solely on symptoms – to plant based medicine which focuses on the preventative means to ensure the well-being of the person. All done through a community oriented education, and a curriculum which revolves around plant-life, specifically herbs, and herbal medicine.





tree mapping on site

By focusing on plant life and thermal comfort, the project introduces micro climates within the school in order to allow for children to grow and learn about a variety of different climates and the plants which can be grown in them. It also make use of existing systems in the school to generate the climates and promote passive systems.

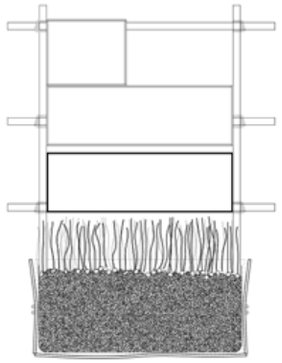
It is through plant life that this building addresses the pillars which the World Green Building Council describes as the key features to designing a healthy school: indoor air quality and ventilation, lighting, and thermal comfort.

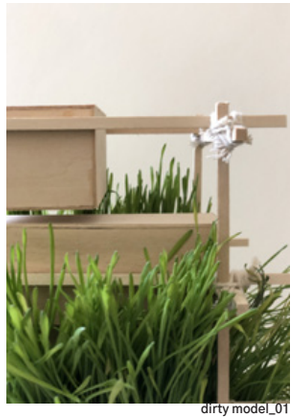
The school, situated at the intersection of Forsyth and Stanton, across Sara D Roosevelt park, is raised on 4 masts which support the ‘bars’ running across the site which make up the school.

tree shadow study on site

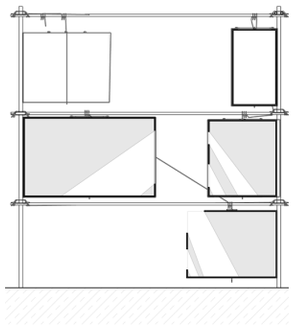
Spring 2022


dirty model_01


section of dirty model_01

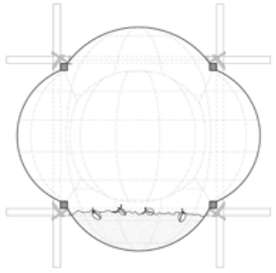

dirty model_01


study model_01


section of study model_01


study model_01


dirty model_02


dirty model_01


dirty model_02

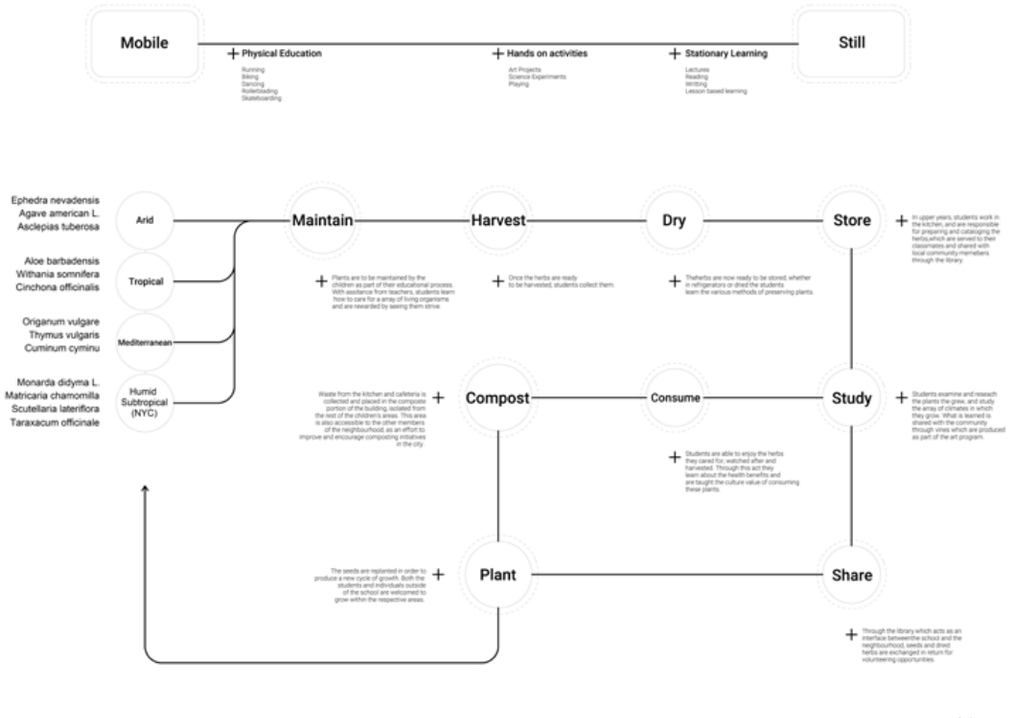
Micro School 30


1/4” detail model

Raising the building not only reduces the impact on the land on top of which it sits, but allows for air circulation and an array of micro-climates to be present in service of growing plants and ensuring a healthy learning environment. The lift also presents itself as an extension to the park both by extending underneath where children will have room to play and grow plants and above where plant beds, drying rooms, and community oriented programs are located.

The move aims to invite members of the community into the school through extending the park by allowing them to use the school as means to educate themselves and share generational knowledge around plant use as medicine. Those interested in the program could both grow plants within the school but also access the seed bank and grow their plants at home – in doing so, they would be invited to volunteer in the summer months when students are not present.

Spring 2022

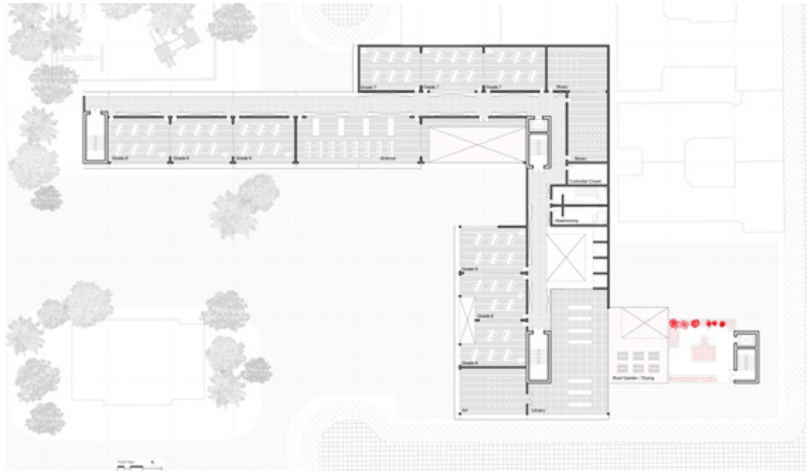


organizational diagram

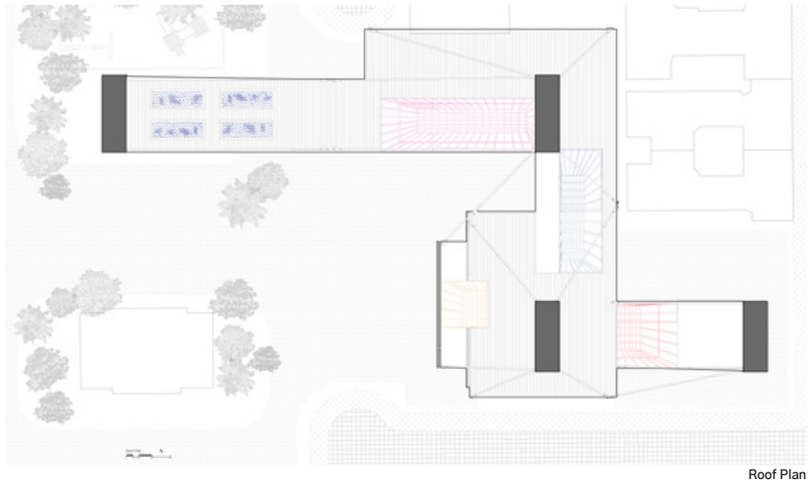
1/4” detail model

Micro School 30

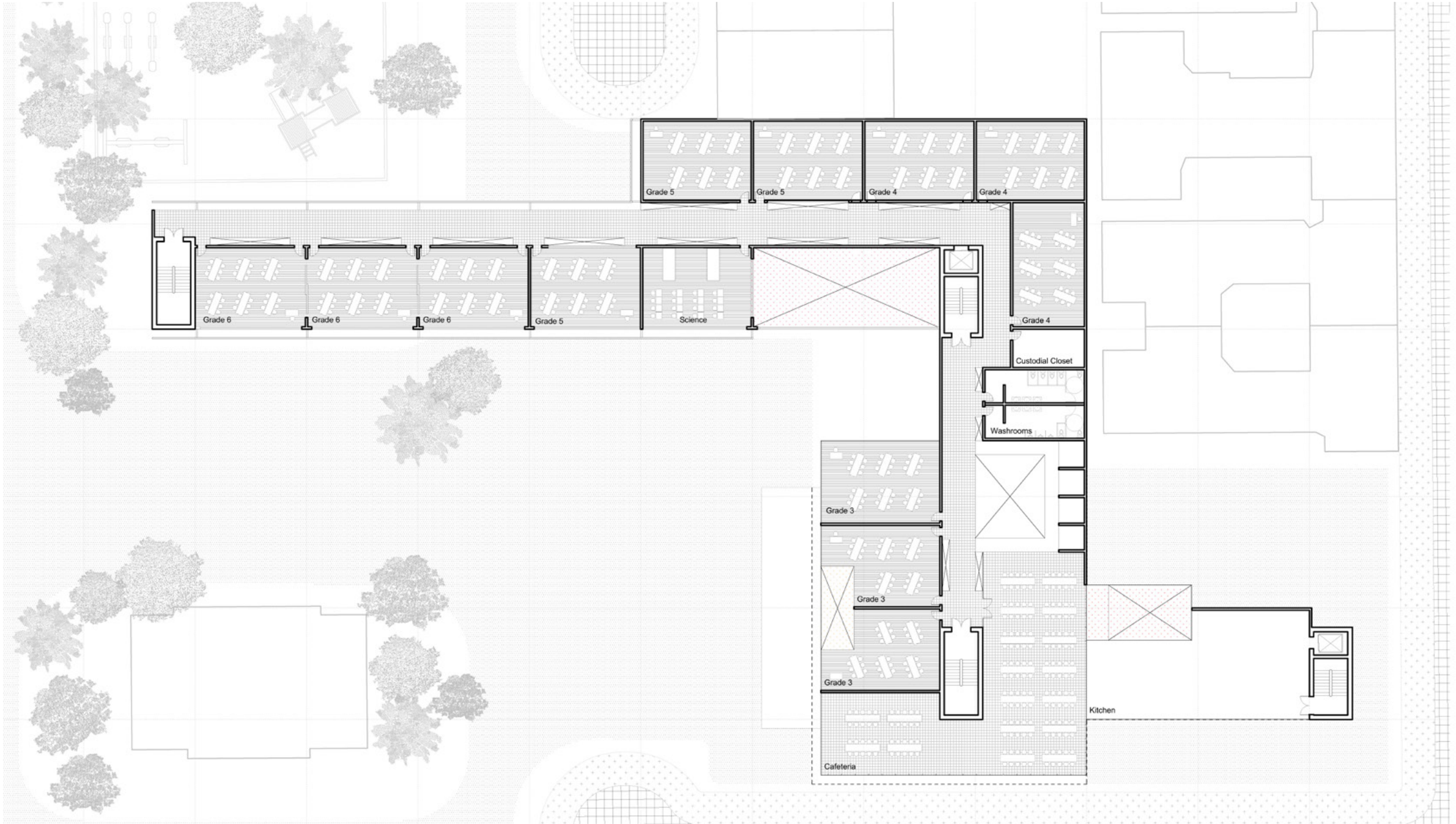
ground floor plan



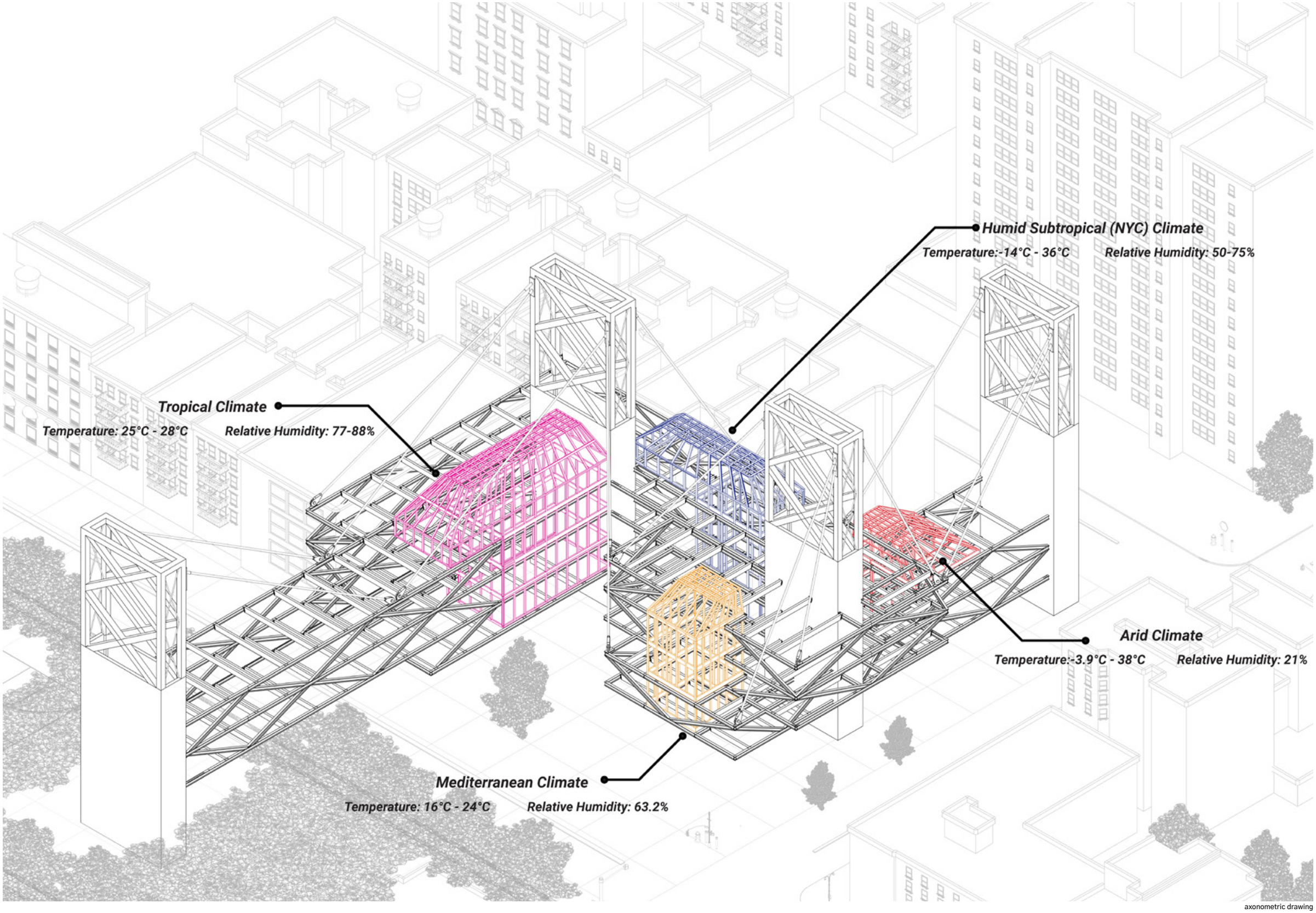
third level floor plan



Roof Plan

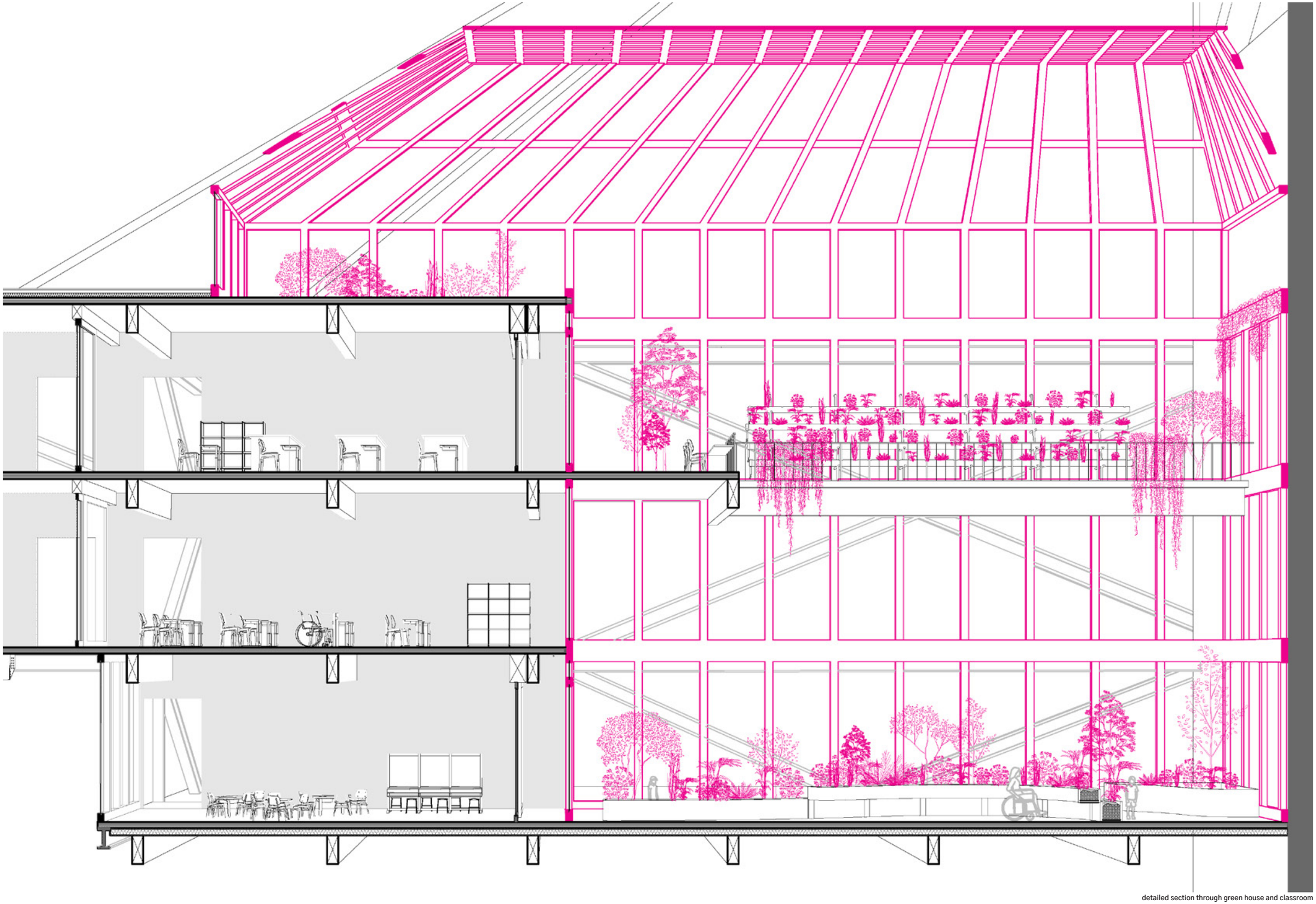


second level floor plan



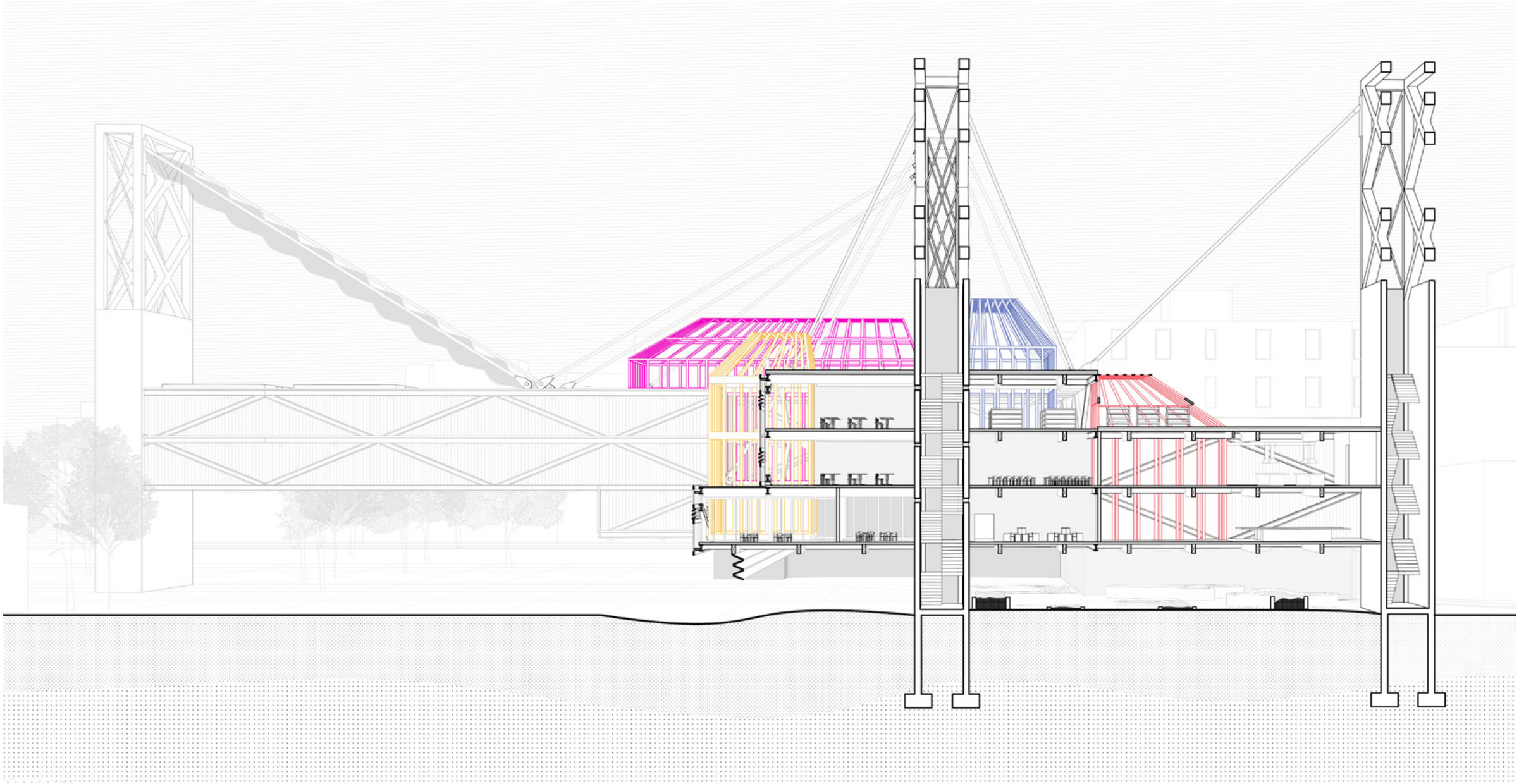
axonometric drawing

kindergarten classroom and mediterranean greenhouse

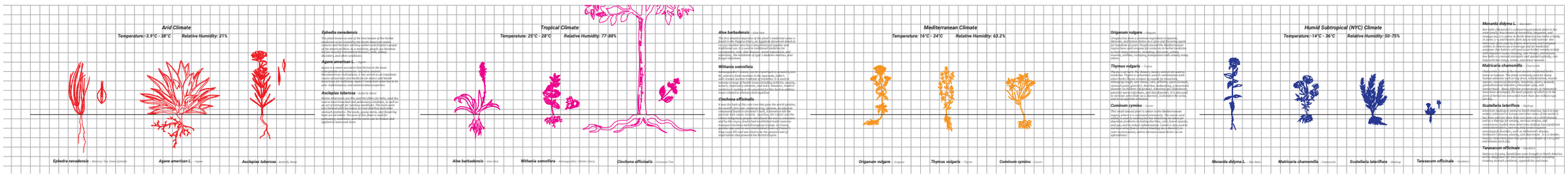


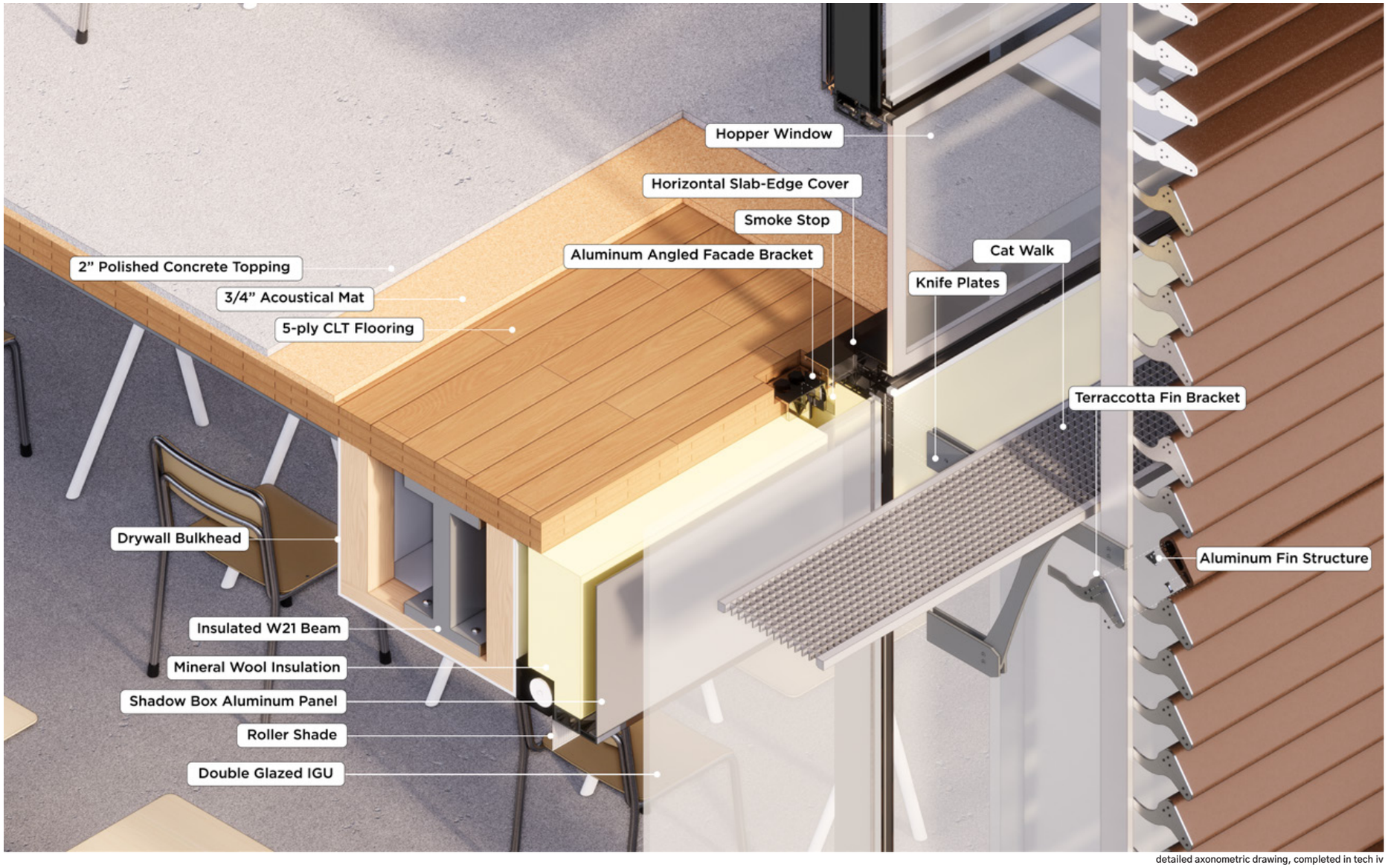
detailed section through green house and classroom

tropical greenhouse looking into the science classroom



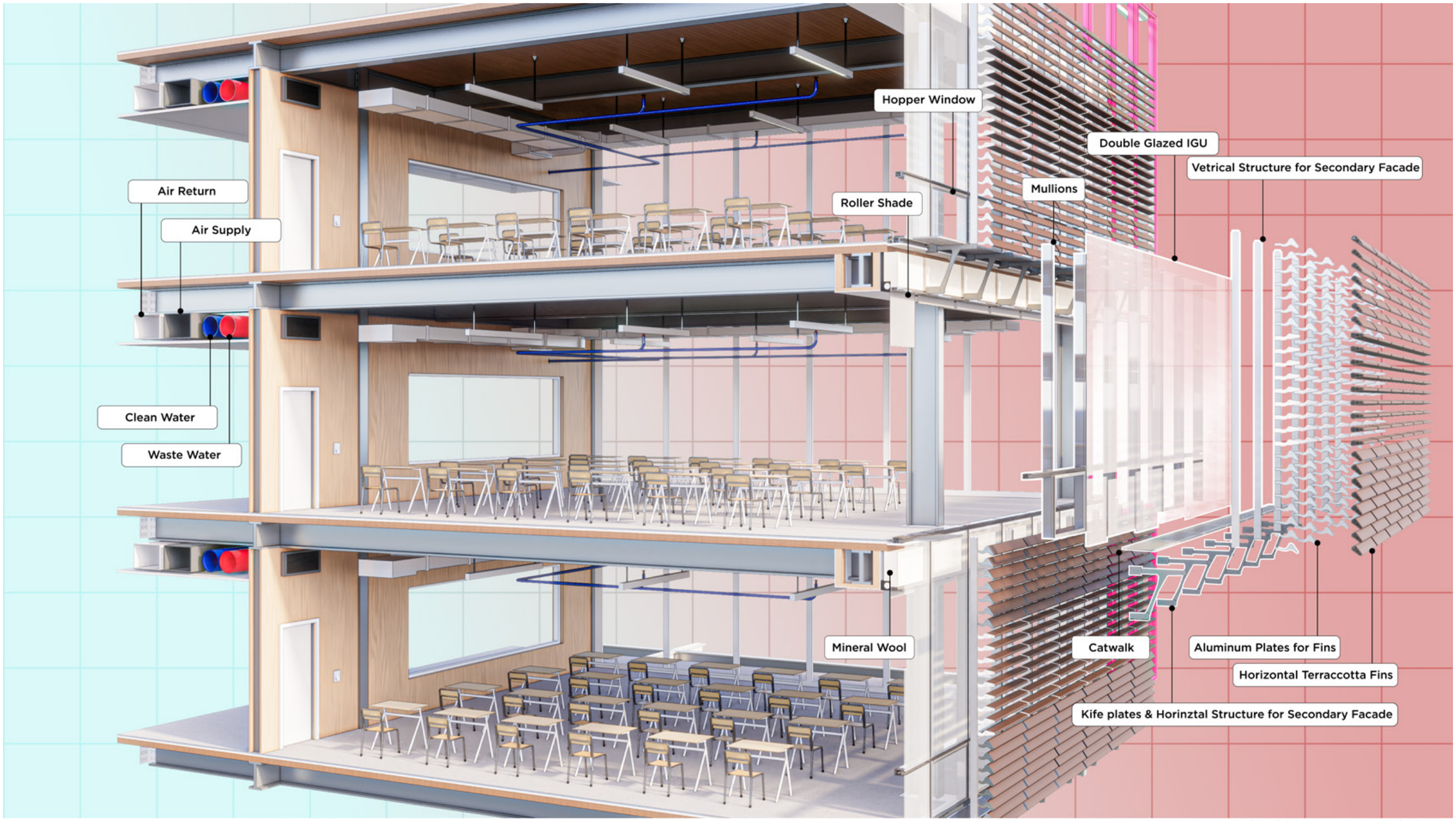
longitudinal section





detailed axonometric drawing, completed in tech iv

kitchen classroom and greenhouse



detailed exploded axonometric drawing, completed in tech iv

Fall 2022

Rooms for Commons

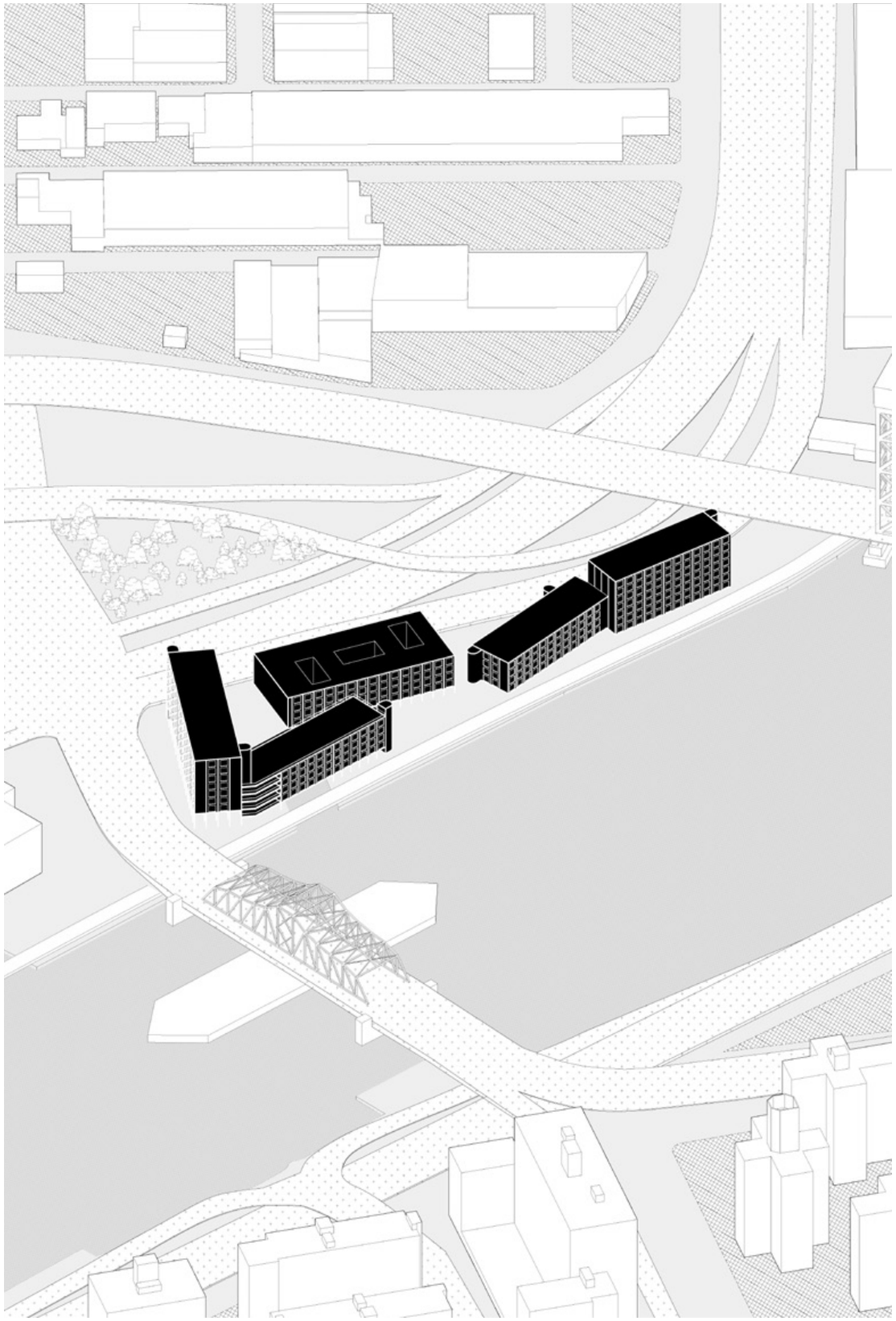
With Christopher Leong as critic and Rachel Chen as collaborator.

Location: New York – South Bronx

Housing should serve as a framework for community. Housing should foster community. Housing should be viewed as a communal experience. Housing should allow for growth and change.

Community living is shaped by two spatial conditions: being alone and being together. Within this housing framework, Individual space is minimized for a household to live comfortably. While the collective space is increased and entangled into the fabric of the co-operative, it becomes the site for both domestic labor to be exposed and shared by the collective, but additionally encourages interpersonal relationships through sharing and living in these community spaces.

Through a collaborative economy, this project challenges the ideas of property and ownership, promoting the notion of access in an effort to confront housing defined by capital. Housing design should return to a more collaborative building practice and question the role of private property, private space, and private ownership.



axonometric site drawing

site massing

Co-housing has the potential to positively impact current levels of loneliness & social isolation by fostering subtle everyday interactions & relationships. Whether encounters happen more formally around communal meals, requiring coordination and effort, or more informally, such as in the communal laundry room, they are vital to building a sense of community, and even to building friendships.

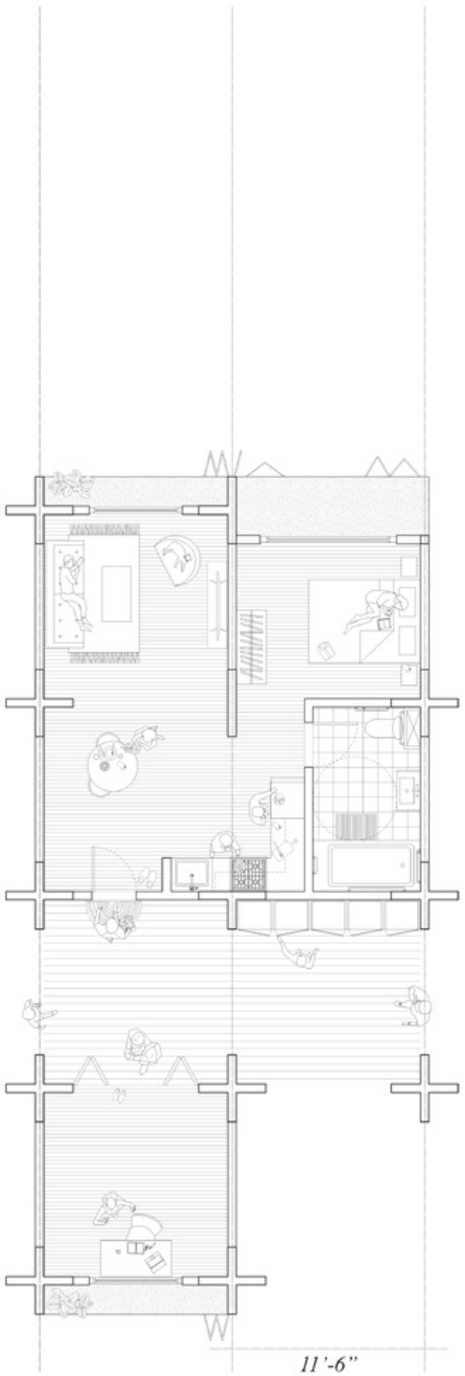
A crucial consideration for this project is understanding of the spheres of sharing. By organizing the program by degrees of privacy, ranging from the dwelling, where sleeping and bathing happen, to the most public programs such as the gym, and the community center, both residents of the building and members of the community can gather and interact.

ground plan

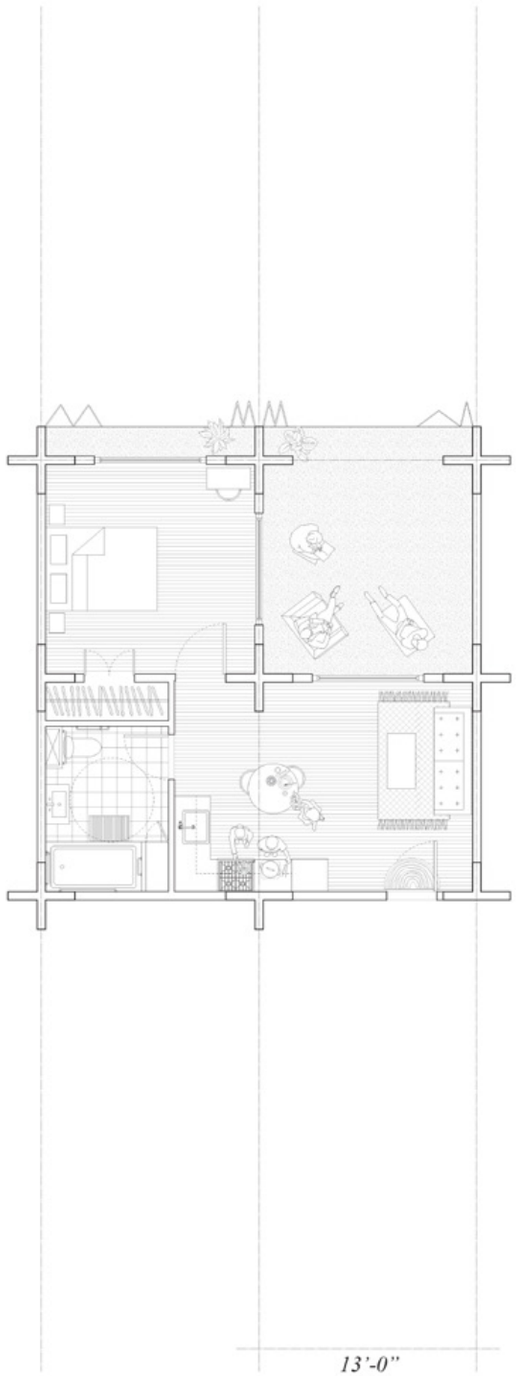
facade

public exterior space

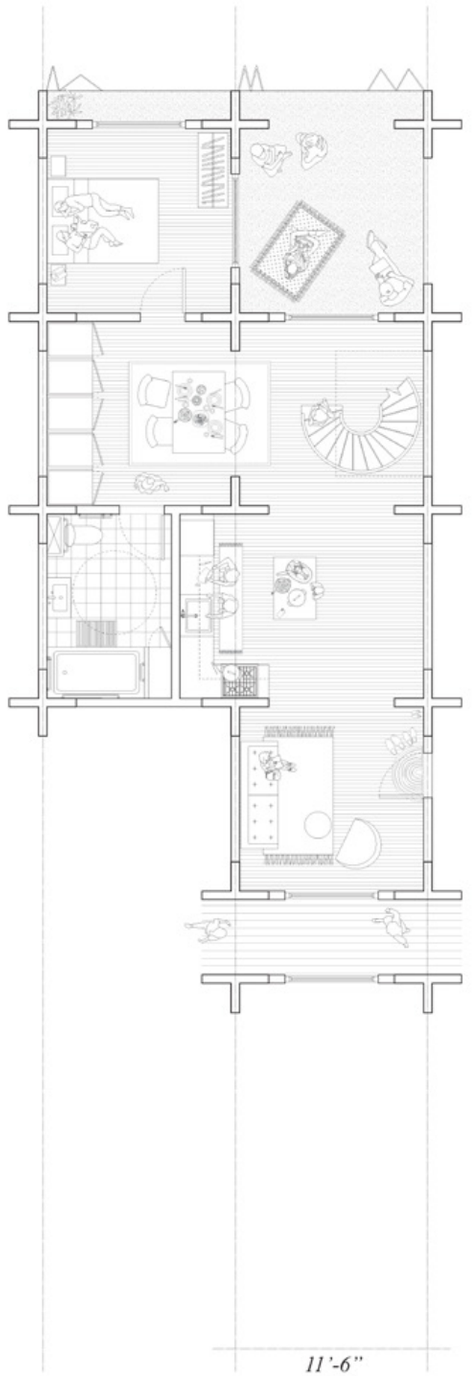
shared terrace between units



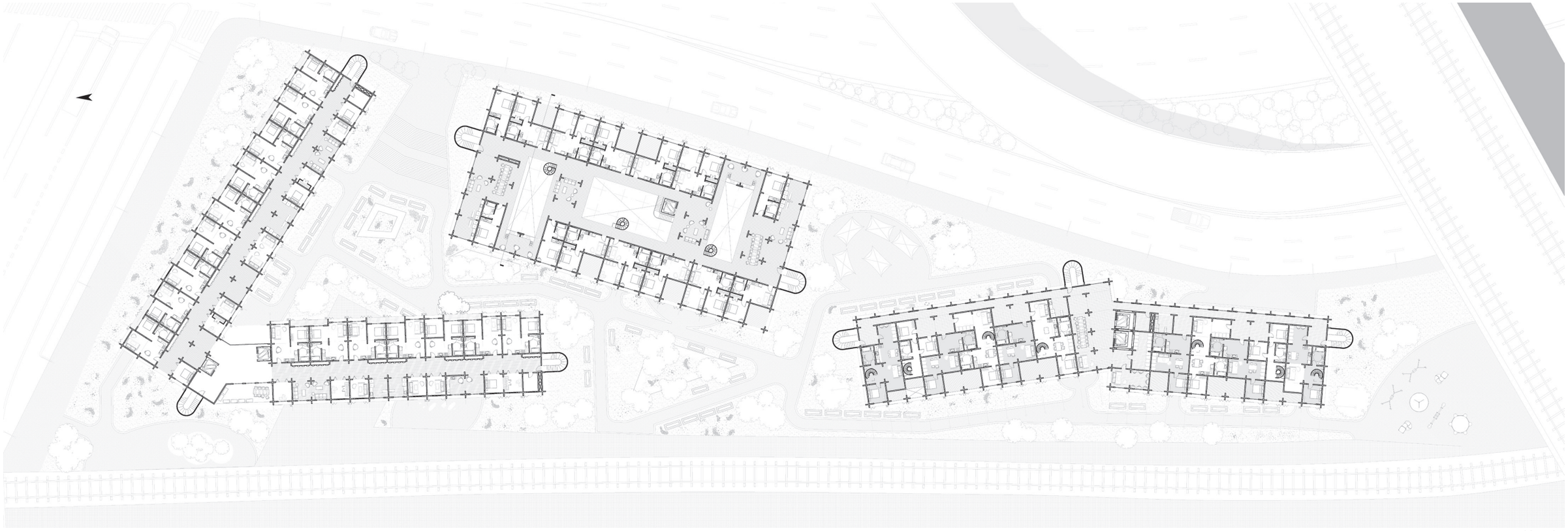
Typical Unit_Young Adults



Typical Unit_Elderly



Typical Unit_Family



typical floor plan

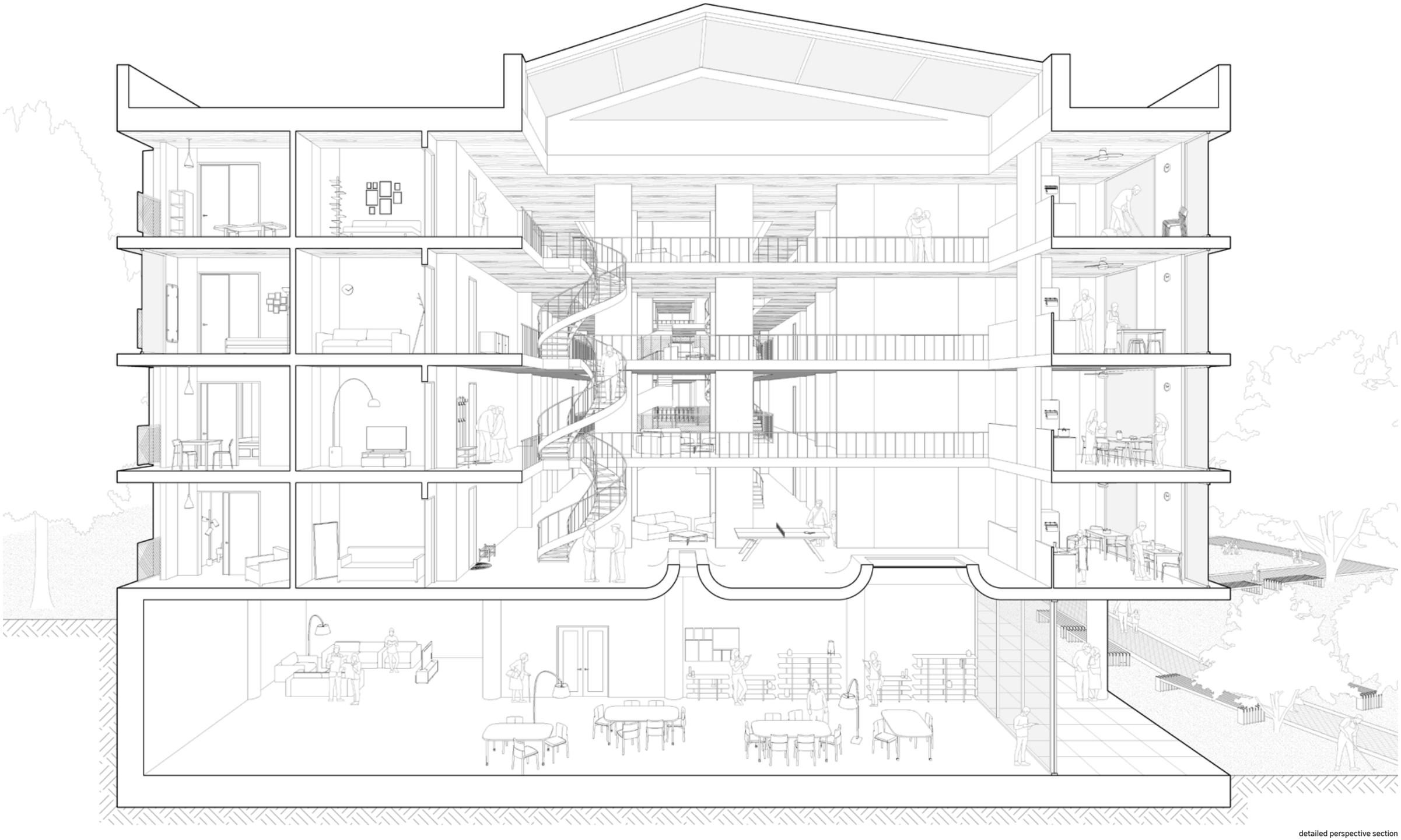
The floor plan for this project acts as a response to large and stable communities which have been replaced with precarious and atomized collections of apartment units with few roots and a poor sense of belonging. Interactions have decreased. Loneliness is the consequence.

Today, buildings are made up of approximately 80–90% private dwelling and 10%–20% “shared” space, which generally consists mainly of circulation and corridors.

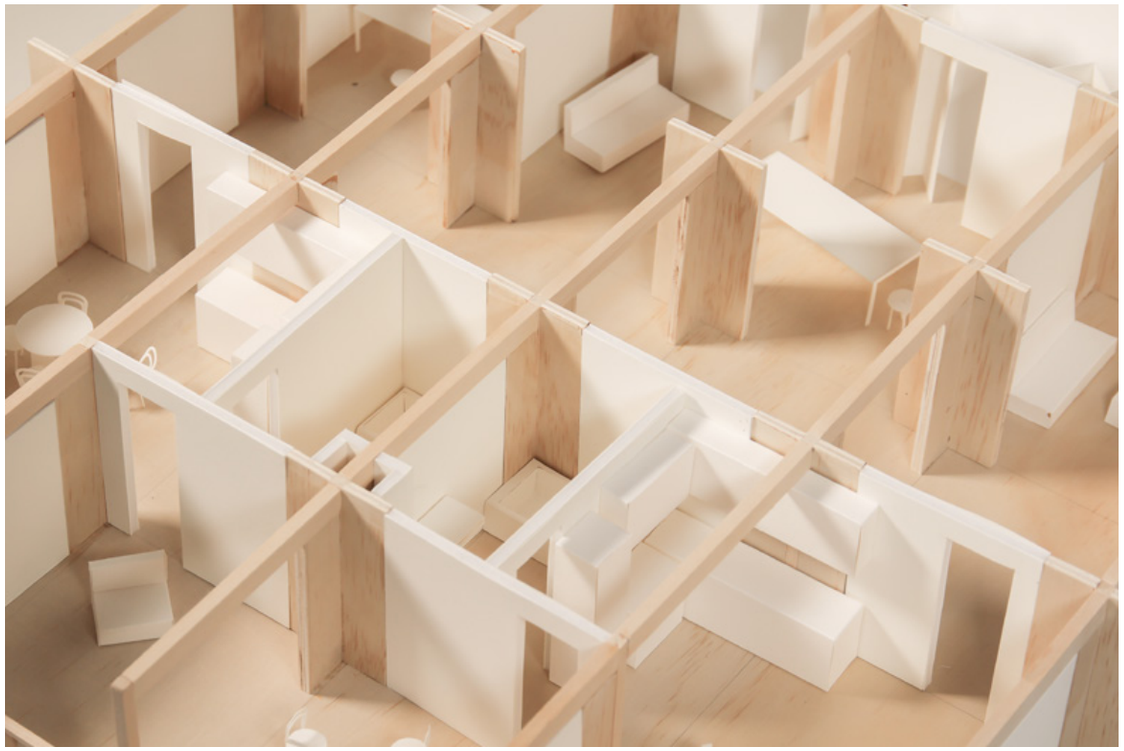
This proposal offers a model which would relocate the more public spaces of an apartment into the shared portion of the building, allowing people to have access to more than they would if it were limited to their apartment alone. More importantly this provides residents with the possibility to have more shared interpersonal relationships with other members of their community.

shared laundry space

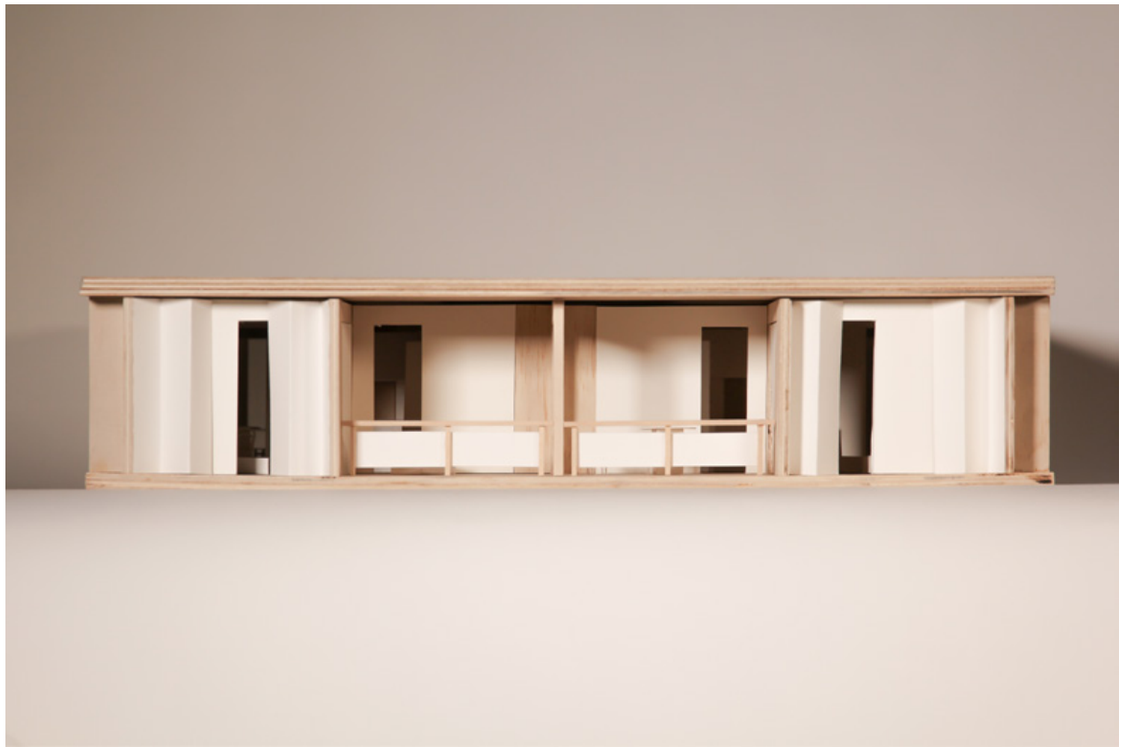
bedroom



detailed perspective section



1/4” detail model



1/4” detail model

Spring 2023

Long History of the Atlantic White Cedar

With Feifei Zhou as critic and David Zhang as collaborator.

Location: New York – Orange County

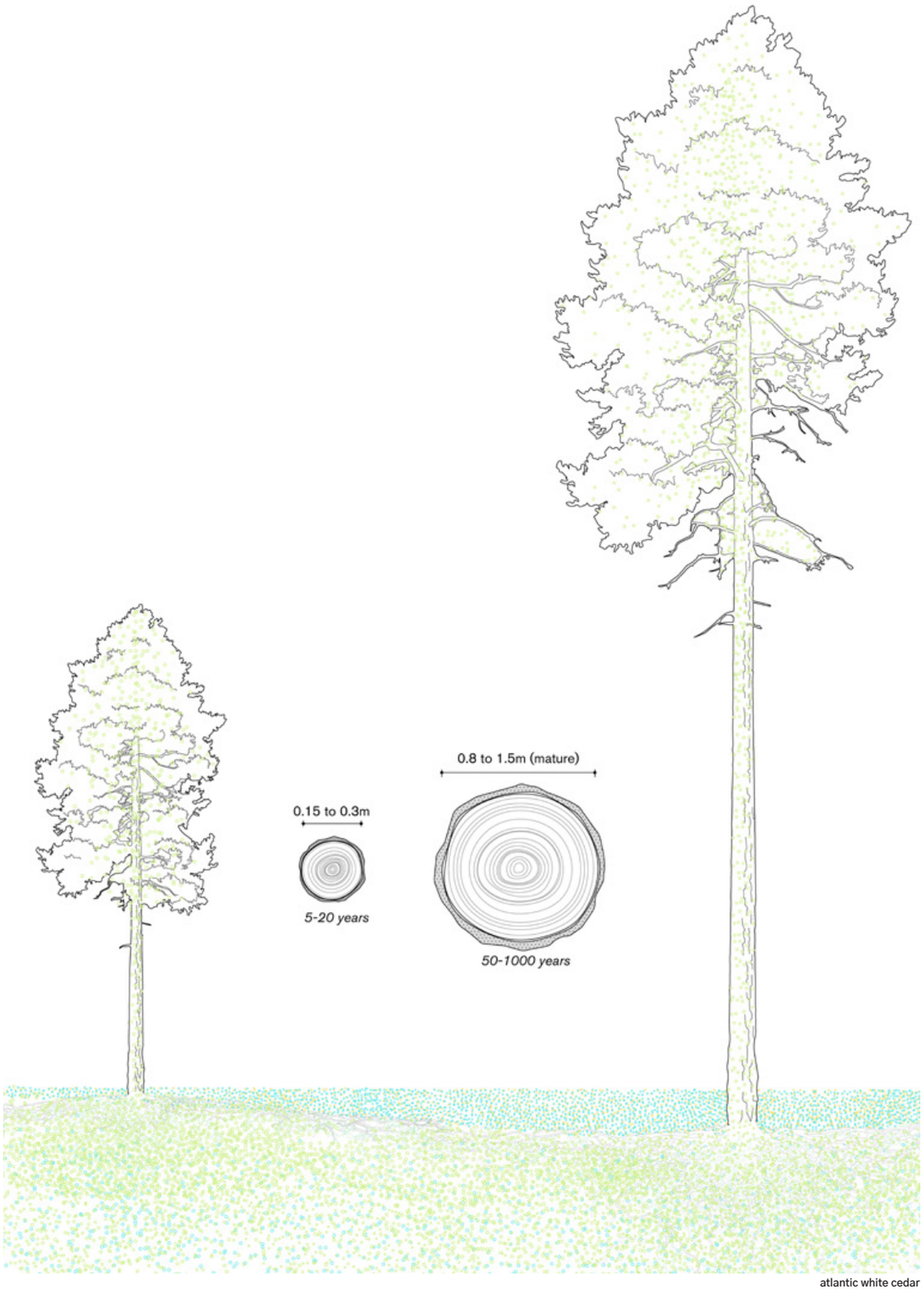
This project focuses on drawing out the long history of the nearly extinct, yet presently resurgent Atlantic White Cedar wetlands in the Black Dirt of Orange County, NY. The history is told by positioning architectural production in an intimate relationship with the agricultural production and the dynamic ecosystem surrounding it. Specifically, through the exploration of historical changes in food production and forest usage, and its subsequent architectures: from the Lenape Longhouse built of adolescent cedar trees to the Dutch barn built of mature parent trees. Each of those architectures are inextricably bound within the production of local resources and land relationality, from trail foraging/polyocultural food practices to enclosed industrial agriculture. Building off of the momentum of naturally resurgent Atlantic White Cedar wetlands in the disturbed, over-nutrified, economically inviable lands downstream of the Black Dirt Region, this proposal for both wetland polycultural farming and the architecture to support it, seek to challenge normative measures of material efficiency (minimal materiality/span/envelope) by situating hyper-local timber based architecture within intentional forest thinning practices.

research narrative drawing

Split into three parts this project first seeks an understanding of native Lenape land use, understanding Dutch architectural and monocultural land use, and finally looking into contemporary entangled conditions which have resulted from this long history.

The agricultural relationship between the Lenape people and the wetlands of this area was characterized by trail foraging systems and dedicated areas of polycultural planting.

Lenape polycultural planting practices relied on three staple crops, corn squash and beans, providing them with a consistent diet throughout the year. This method has been popularized as “Three Sisters Planting,” but this understanding unintentionally places the human role above those of the plants. We began to prefer the term “Four Sisters,” coined by Robin Wall Kimmerer, which positions humans in collaborative relationships with our non-human cousins. In a more than human society.

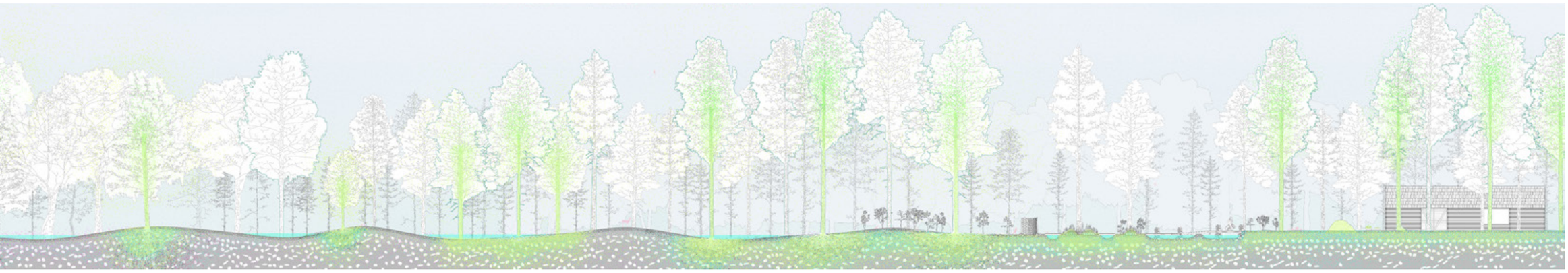


atlantic white cedar

24' long history section drawing of the site

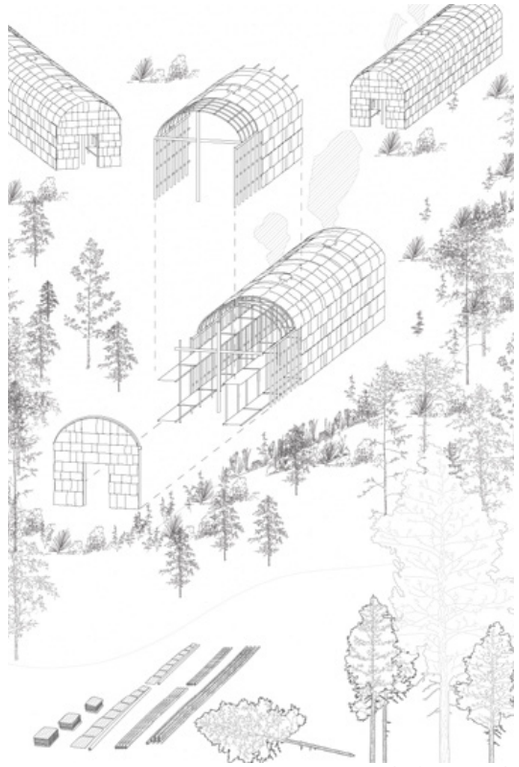
Within this storyline, what interests us is the ways in which colonial architectures such as the sawmill and the Dutch Barn foster ecological disturbance. While the Lenape Longhouses were built with cedar trees in their adolescence, the large span architecture of the Dutch required the cutting down of mature trees. In the case of the Dutch Barn, the larger the tree, the better.

While the Atlantic White Cedar (AWC) is especially rot resistant, it is also a relatively soft wood. In the case of the Dutch Barn, cedar was used throughout as cladding and roofing materials in a manner not dissimilar to the Lenape.



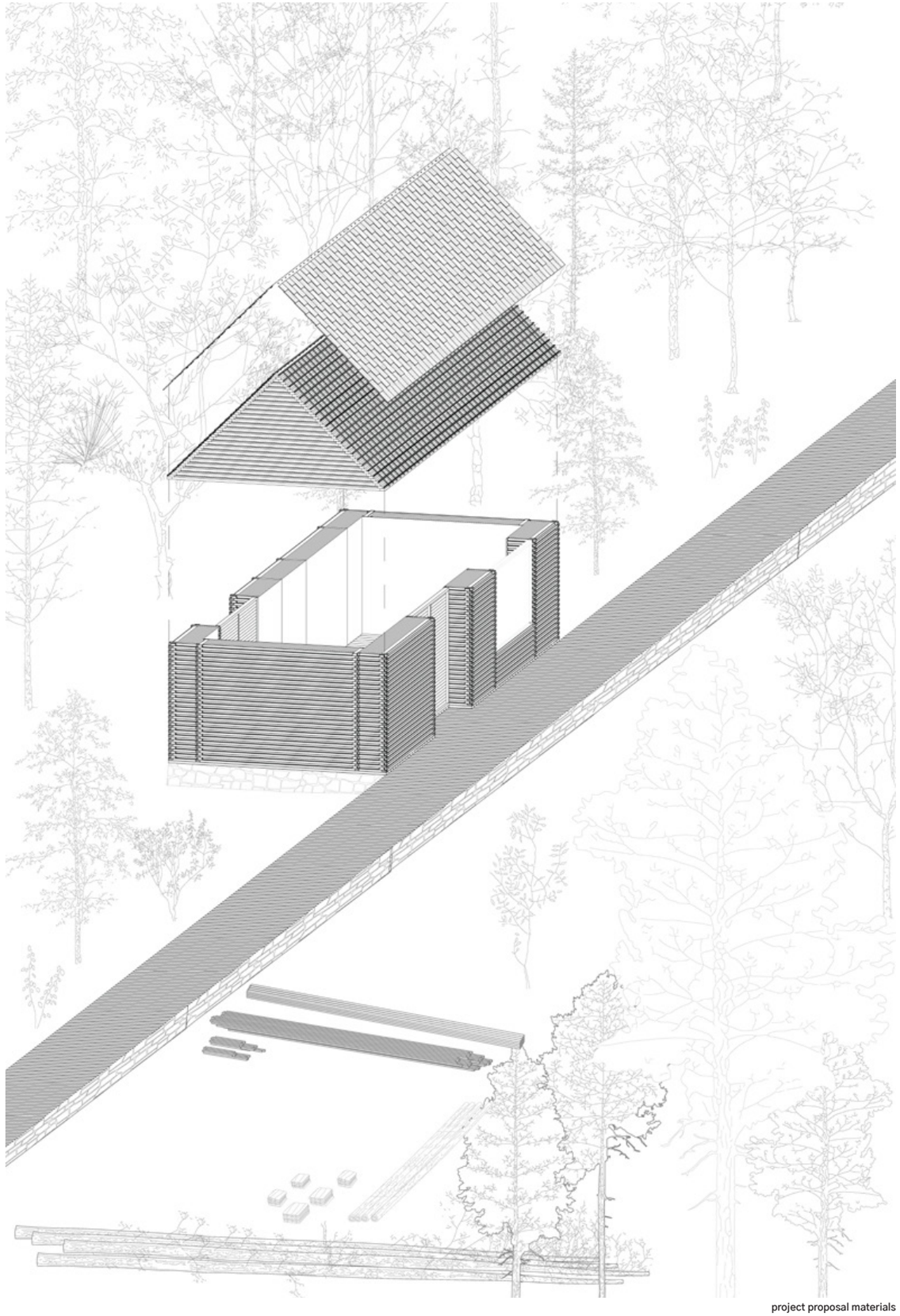
Our timber structures seek to learn from the long history of local architectural production, taking the principles of small tree construction from the Lenape Longhouse and pairing it with the simple engineering prowess of the Dutch.

dutch barn materials



longhouse materials

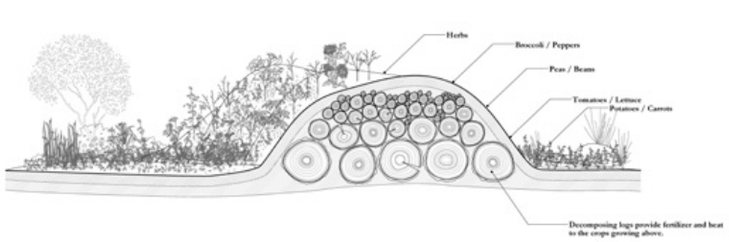
Atlantic White Cedar wetlands have been significantly impacted by colonial land use practices such as clear cut logging and drainage of wetlands for agriculture and development. Large scale clear cutting for agriculture also created economic opportunities for the lumber industry. For a few decades, the logging and lumbering industry thrived in a seemingly harmonious relationship to the agricultural economy. This relationship ultimately ended by the mid 1800s as loggers were forced out by the channelization of the river. Following these large scale changes, remaining wetlands began to transition to hardwood forests, drastically altering the water table and reducing wetland ecologies due to hardwood species' increased water uptake and transpiration.

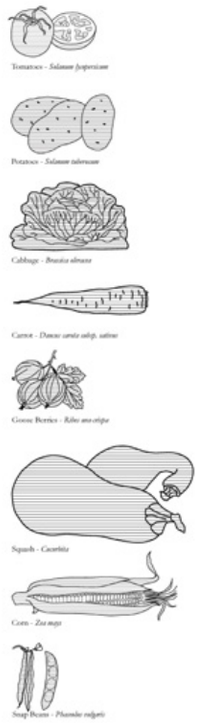


project proposal materials

Spring 2023

view of storage facilities



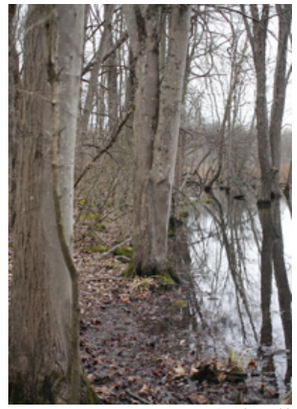


mound farming plan & section

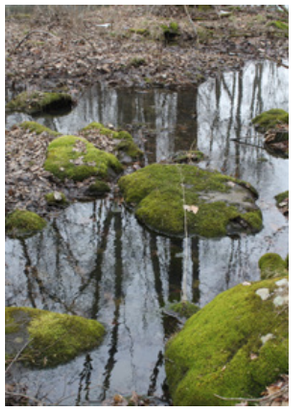
Long History of the Atlantic White Cedar

site photo_01

site photo_02



site photo_03



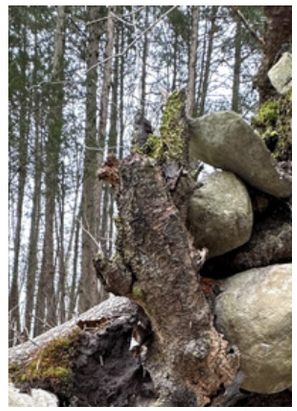
site photo_04

site photo_05

site photo_06

site photo_07

site photo_08



site photo_09

Spring 2023

mushrooms

carrots

peppers

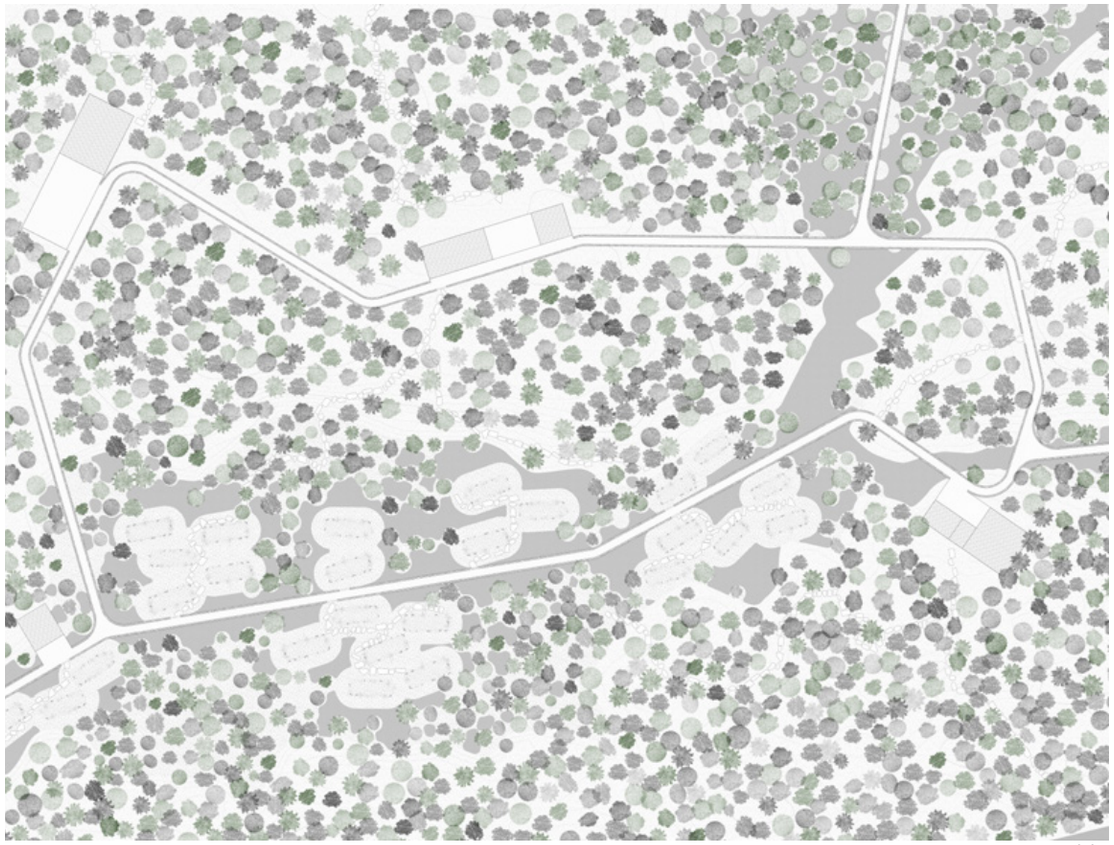
sweet peas

Our project proposes that these swamplands act as a nutritional basin for polycultural farming practices through a network of mound farming, linked by a foraging trail and related programmatic architectures. This project is not only an agricultural proposition, but also a long term re-establishment of collaborative relationships with Atlantic White Cedar trees. Along the way, we seek to promote local neighborhood engagement and educate visitors from both agricultural and tourist sectors to understand how feral conditions can themselves be doors to new productive futures.

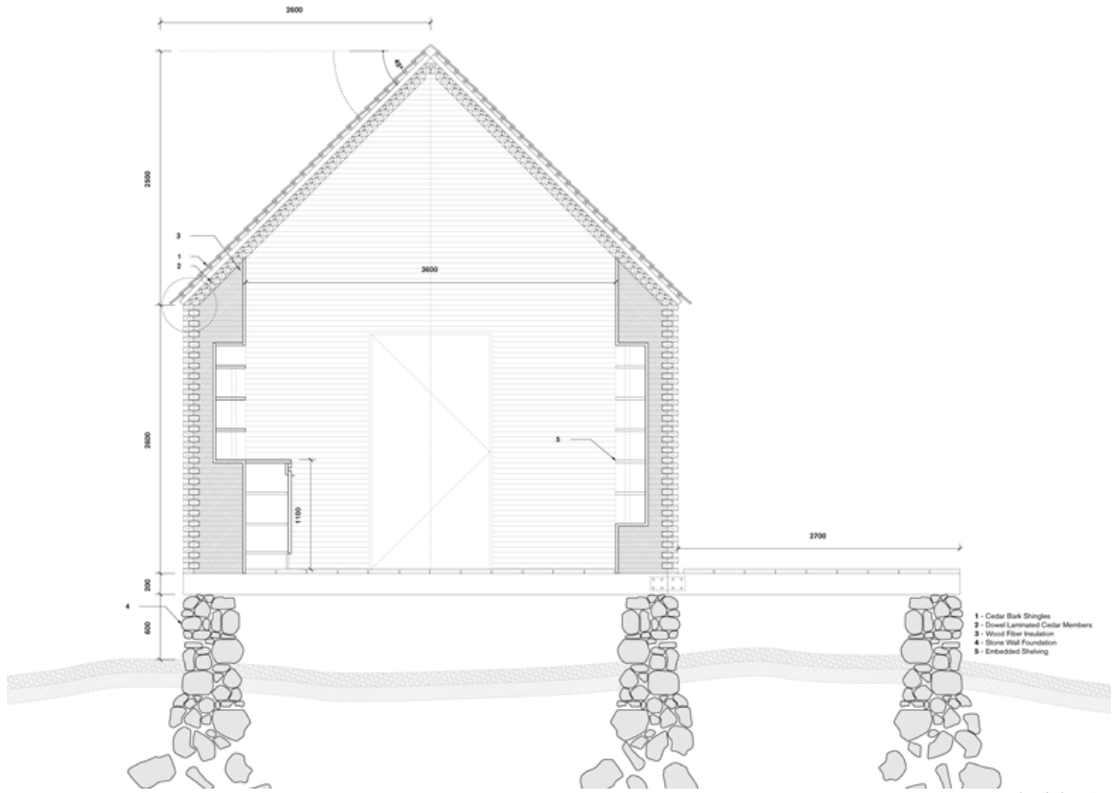
While the intergenerational cycles of the forest are sometimes difficult to relate to at a human scale, they refer to the practices of continued tree thinning and calculated disturbances in coordination with the responsiveness of the forest. On the immediate seasonal scale, we must consider that polycultural farming is far more dynamic than that of industrial monocultures, and that planning for the health of one species means considering the health of all. A holistic understanding of entangled plant schedules is required and an allowance for failure must be considered.

Long History of the Atlantic White Cedar

elevations



roof plan



detailed section

The hardwood trees which are thinned out within the swamplands become the foundation for our polycultural mound farming practice, inspired by the German Hugelkultur and the Central American Chinampa system, both of which utilize biologically rich mounds in wetland conditions to create microcosms for plant life to grow within. These two seemingly foreign systems of polycultural farming place the tree at the heart of their productivity. In the case of the Hugelkultur, logs are set at the bottom of the mound, and in the case of the chinampa, smaller trees weave along the edges of floating islands, providing stability and creating safe conditions for plant life.

What this has resulted in is an architectural language that derives itself from the usage of thin tree members, from cedars ranging 10 to 25 years old, 15 to 30 cm in diameter. The building method consists of nail laminated timber blocks, 4 to 9 meters in length, lap jointed at the corners to create 50 cm cavities for insulation and utility purposes. The typical member is roughly 5x10cm (2x4in), with rabbet grooves running along the length to improve stability.

175,000

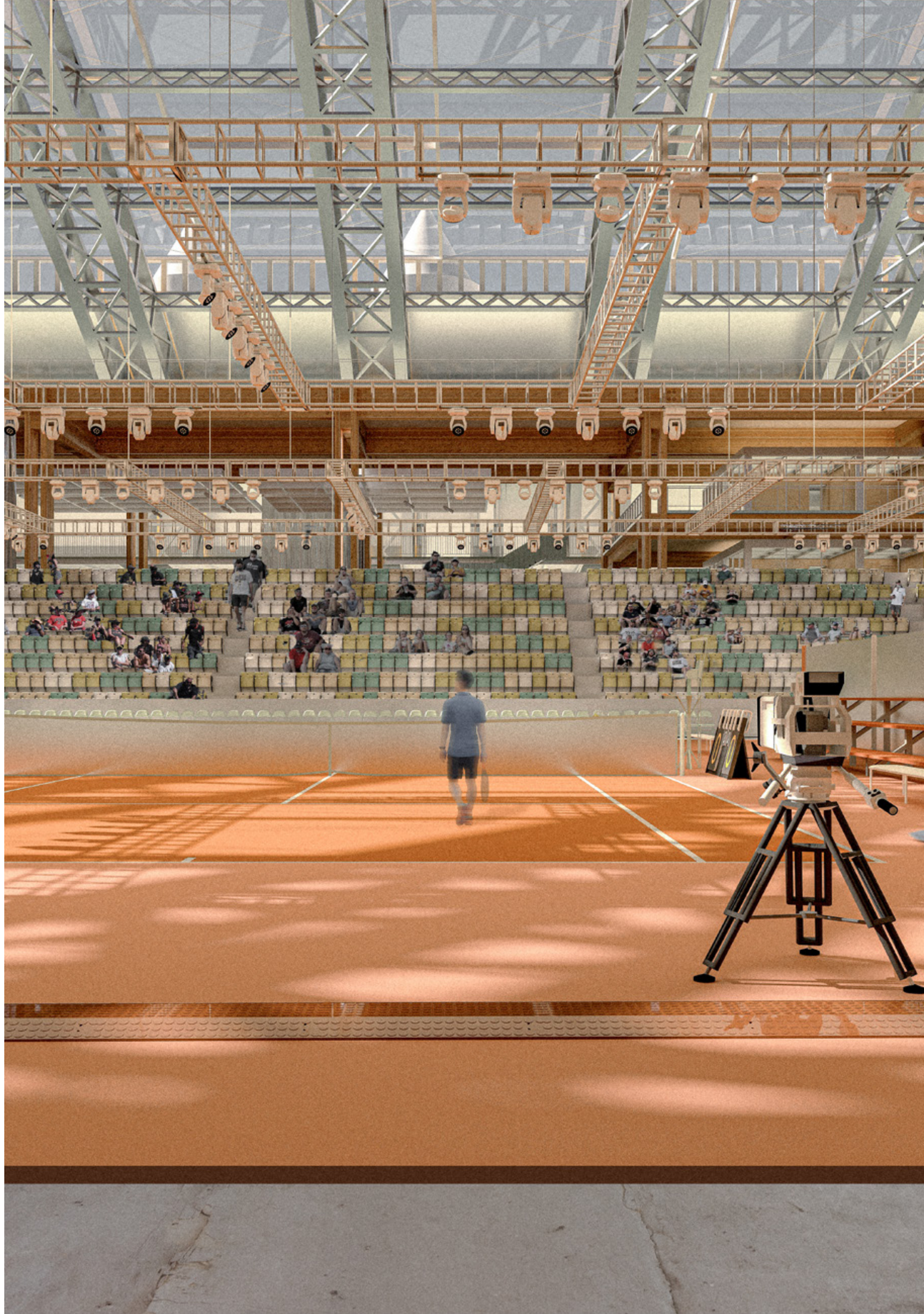
With Wonne Ickx as critic and Adam Fried as collaborator.

Location: New York – Kingsbridge, Bronx

What if we worked with what we have? Where, by building as little as possible, the armory's most unique quality—open space— stays intact for current and future use. Taking a careful approach to preservation, the underground space is considered a resource, and thoughtfully reused.

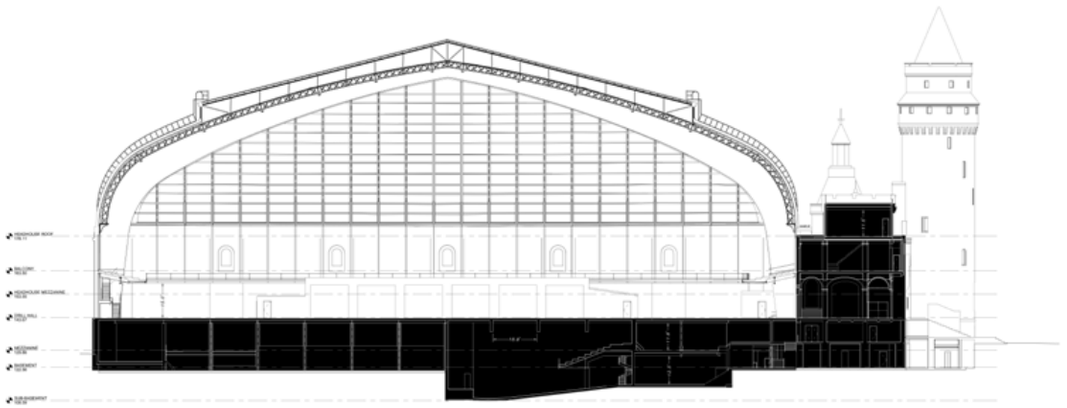
By creating clear access and circulation, the basement is divided into bands of different programs and linked by a large public corridor. These bands create programmatic tension: a pool lies adjacent to a theatre, a gymnastics hall next to an art gallery. Above the drill hall floor, a mass-timber structure adds 50,000+ sf, extending the head-house into the drill hall, and leaving the rest of the floor open and flexible.

Stitching into the neighboring educational corridor, the Kingsbridge armory links athletic and leisure facilities, with robust programming.



Fall 2023

diagram of square footage comparison



section through existing space

175,000

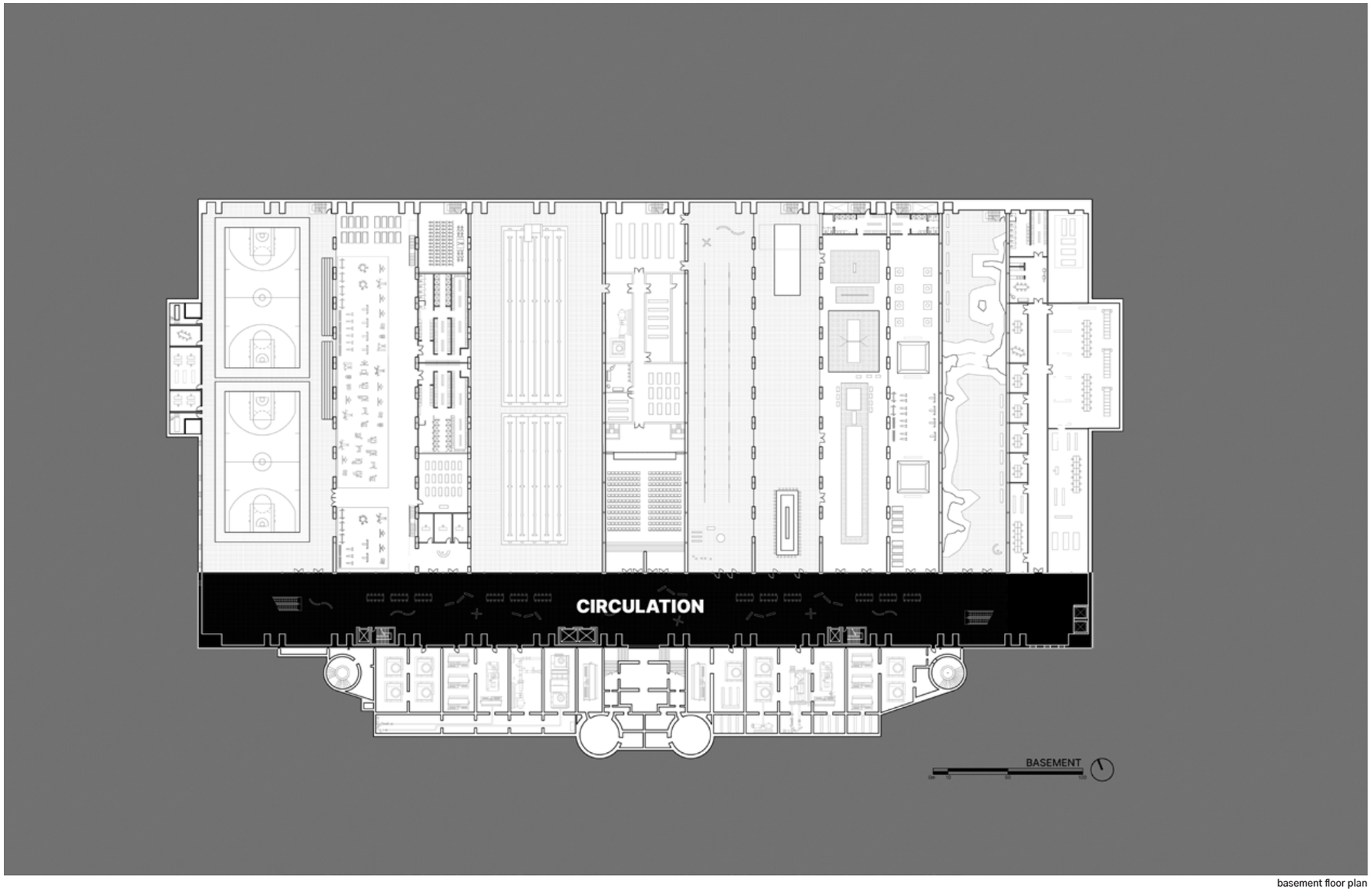
Saint Jerome in His Study – Antonello da Messina

The armory functioned as a club akin to others of its time, including the New York Athletic Club, Manhattan Athletic Club, Downtown Athletic Club. While these clubs emphasized athletics, they were essentially social clubs promoting leisure, dining, and wellness for an elite group.

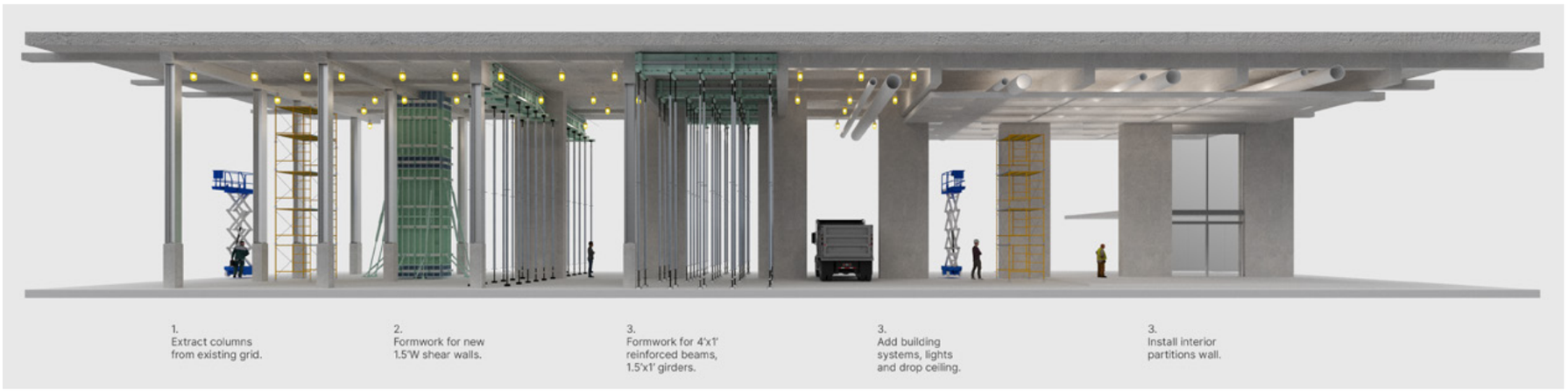
The armory served the Washington Greys who themselves were a group of wealthy men able to volunteer their time to the national guard and spend their time socializing the head house.

Our project signifies a shift by challenging the historical exclusivity of the armory, establishing a new model where leisure and wellness spaces become a public entitlement.

To safeguard the expansive open space of the drill hall floor, our project's approach involved a meticulous examination of the entire building to determine its potential uses. Starting from the basement, historically occupied by regularly used spaces, we aimed to maximize its utility and comfort. Similarly, with the head house, our goal was to repurpose this historically ornate social space into a venue for the community archives, as per the programmatic requests received from community members. Lastly, if there was a necessity to construct anything on the drill hall floor, our strategy was to view it as a piece of furniture, akin to the portrayal of St. Jerome in His Study.



basement floor plan



basement construction sequence

In contrast to the clear layout of vertical athletic clubs, where programs are organized by floors and connected by elevators, the armory's layout on a Cartesian plane is thoroughly disorienting.

Hence, the core strategy for the armory involved segmenting it into bands (similar to the floors in the DTAC), establishing an "elevator" of circulation on the southern end of the basement levels of the armory. In this context, the escalator serves as the elevator, facilitating automatic circulation that guides people along a horizontal circulation axis.

To facilitate the required spans for the programs held in these areas, we opted to remove columns, reinforce beams, and install the necessary mechanical and lighting systems. This was done to ensure a pleasant and user-friendly environment for the occupants of these spaces.

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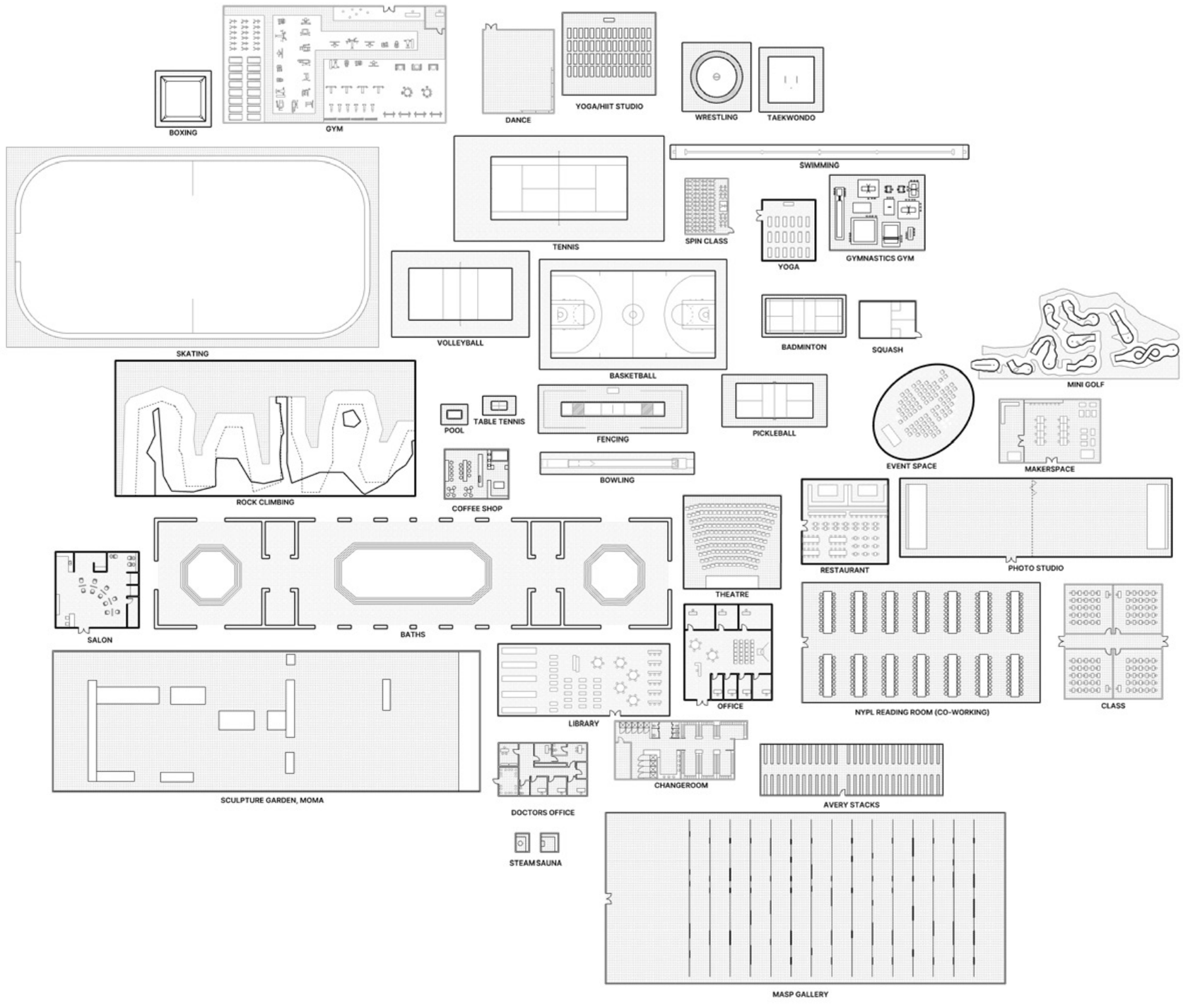
175,000

construction of basement


BOXING
GYM
DANCE
YOGA/HIIT STUDIO
WRESTLING
TAEKWONDO
SWIMMING
SKATING
TENNIS
SPIN CLASS
YOGA
GYMNASTICS GYM
VOLLEYBALL
BASKETBALL
BADMINTON
SQUASH
MINI GOLF
ROCK CLIMBING
POOL
TABLE TENNIS
FENCING
PICKLEBALL
EVENT SPACE
MAKERSPACE
BOWLING
COFFEE SHOP
RESTAURANT
PHOTO STUDIO
THEATRE
SALON
BATHS
OFFICE
NYPL READING ROOM (CO-WORKING)
CLASS
LIBRARY
SCULPTURE GARDEN, MOMA
CHANGEROOM
AVERY STACKS
DOCTORS OFFICE
STEAM SAUNA
MASP GALLERY

Fall 2023

Gymnasium Band

Pool Band

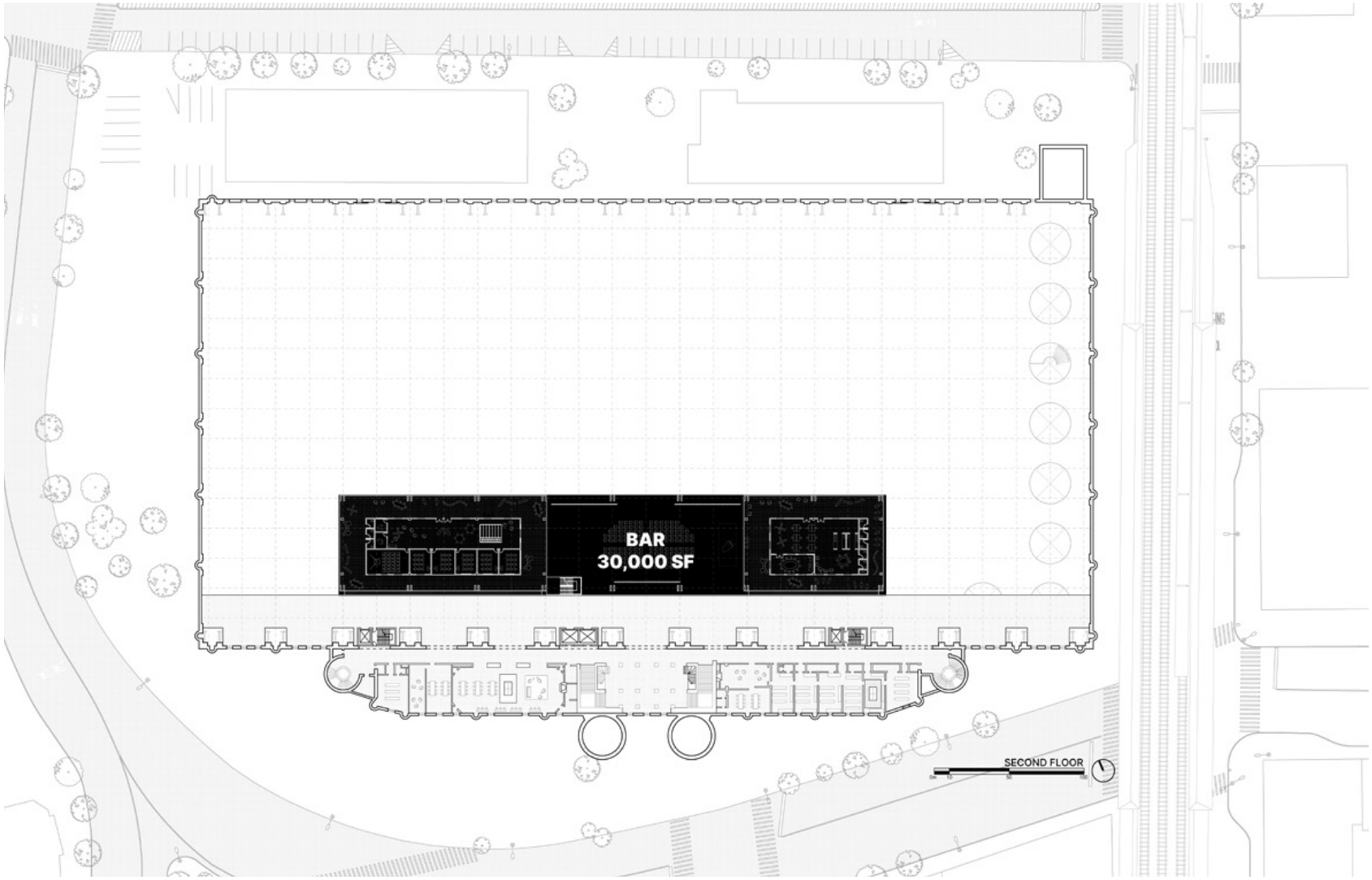
175,000

Mezzanine Food Court

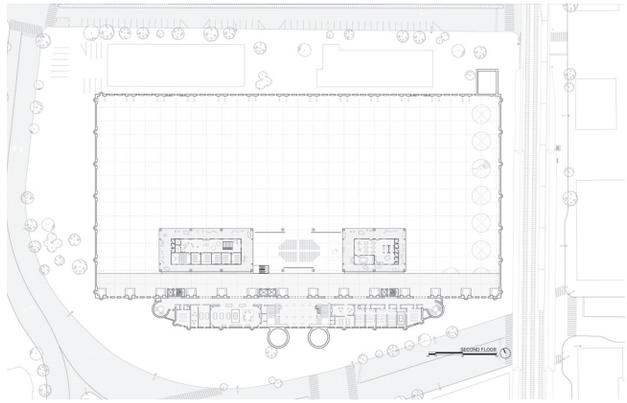
circulation band in basement

Fall 2023

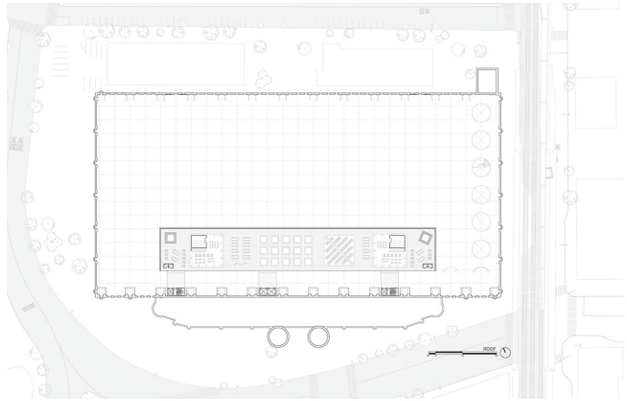
175,000



2nd Floor Plan

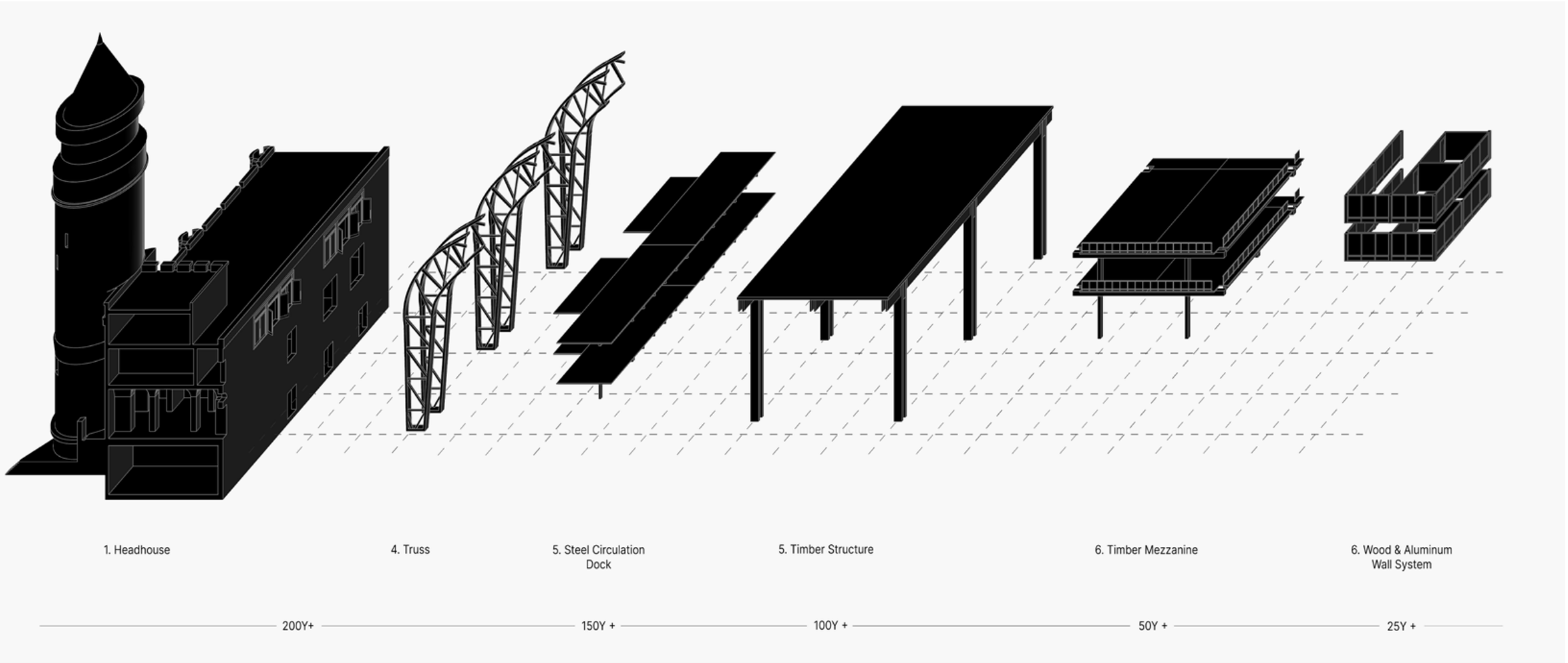


Ground Plan

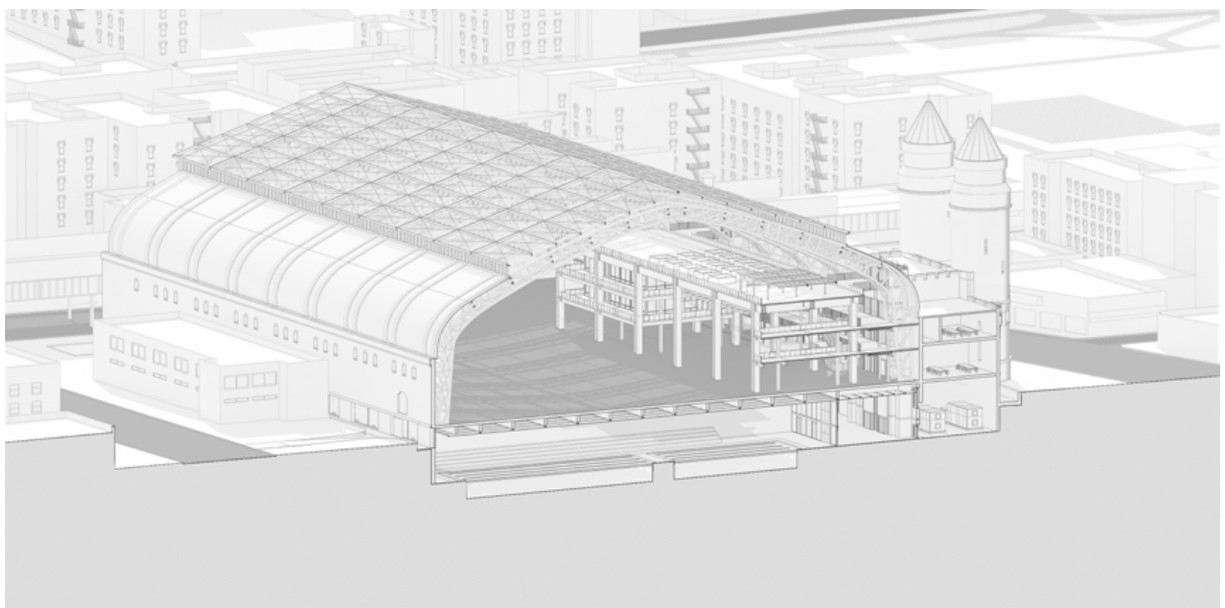


Roof Plan

The incorporation of the three-story bar on the drill hall floor, designed to maintain minimal contact with the floor itself, preserves the openness of the space. This bar serves as the administrative hub of the building, essential for coordinating events in the drill hall floor and ensuring the day-to-day operations of the basement and head house. Connected by the dock that spans the length of the armory, the bar features a more intimate open space at its core, suitable for small events and gatherings that can complement or run parallel to activities in the drill hall floor. Additionally, the roof hosts a restaurant and cafe, taking advantage of its proximity to ample sunlight that infiltrates the armory. Furthermore, a community garden is situated on the roof, making use of the favorable conditions for plant growth.



shear layers



section

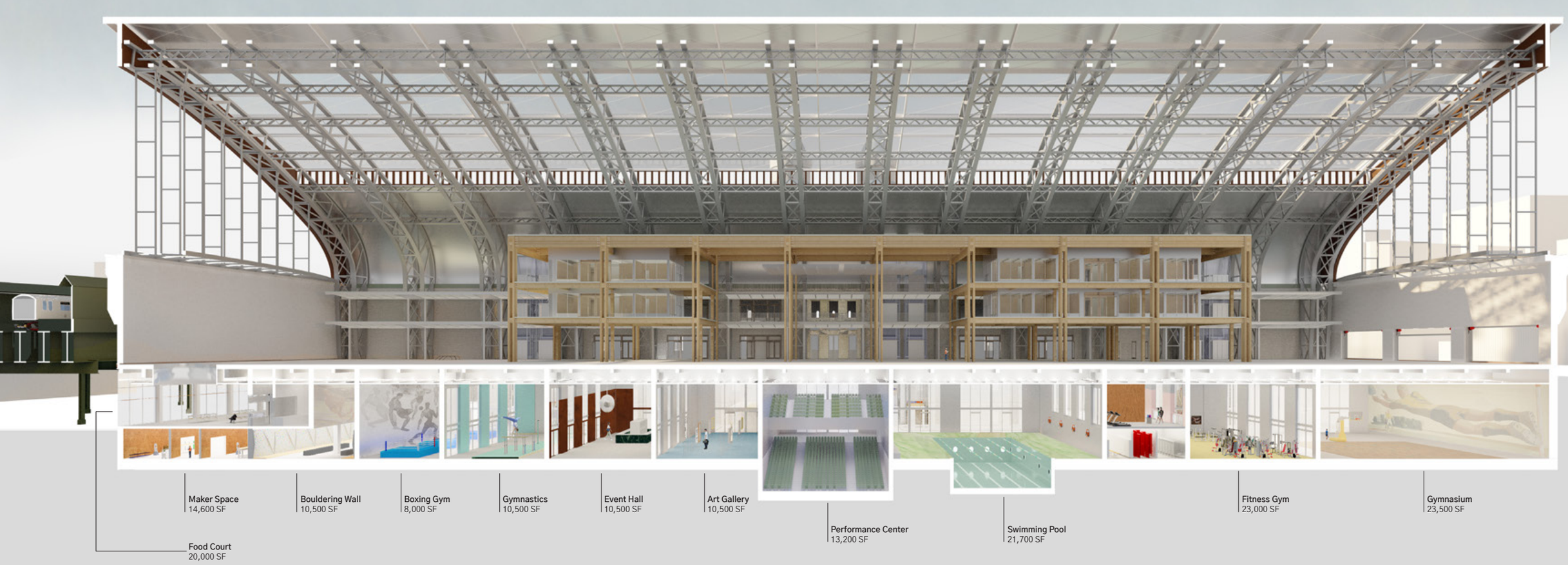
The project adopts Stewart Brand's concept of "shear layers" and applies it to both the existing building and the new addition on the drill hall floor. Through this perspective, we recognize that the existing armory will endure beyond this addition, allowing for future adaptability of the system. The dock, connecting the existing head house to the new administrative and educational spaces in the bar and mirroring the circulation band in the basement, stands out as the most permanent addition. Importantly, it guarantees ADA access to the existing building.

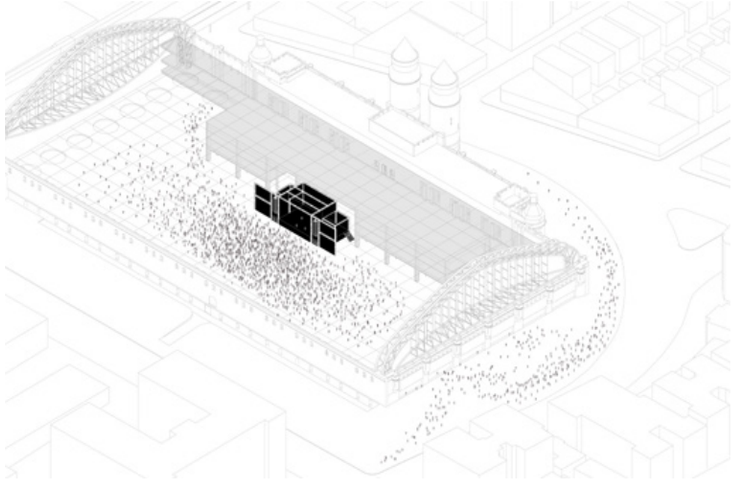
flex event space in timber structure

Fall 2023

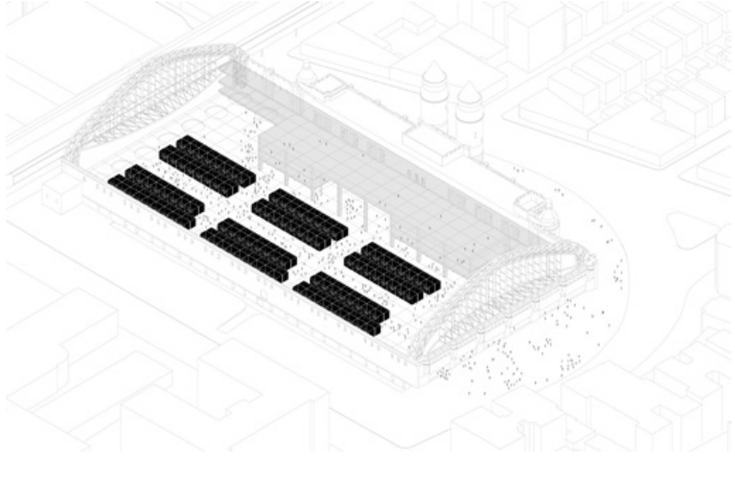
175,000

conversion of headhouse into public library and archive

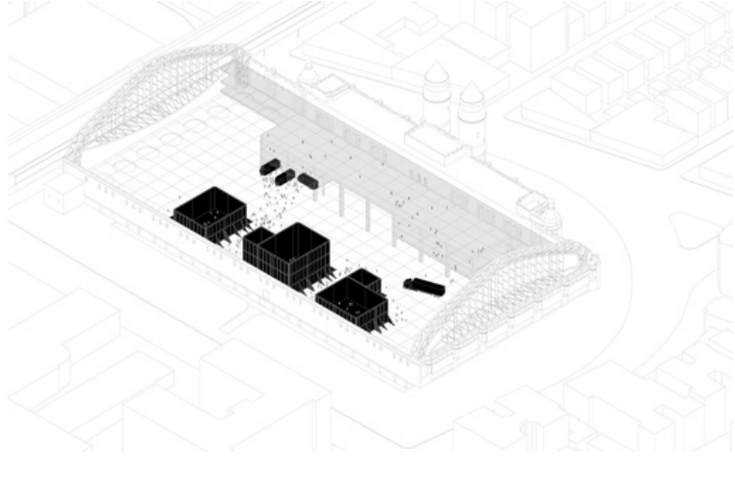

Maker Space
14,600 SF
Bouldering Wall
10,500 SF
Boxing Gym
8,000 SF
Gymnastics
10,500 SF
Event Hall
10,500 SF
Art Gallery
10,500 SF
Performance Center
13,200 SF
Swimming Pool
21,700 SF
Fitness Gym
23,000 SF
Gymnasium
23,500 SF
Food Court
20,000 SF



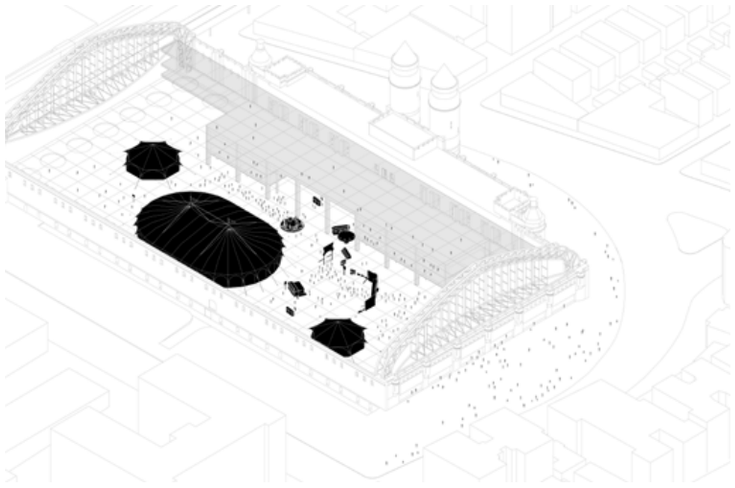
Concert



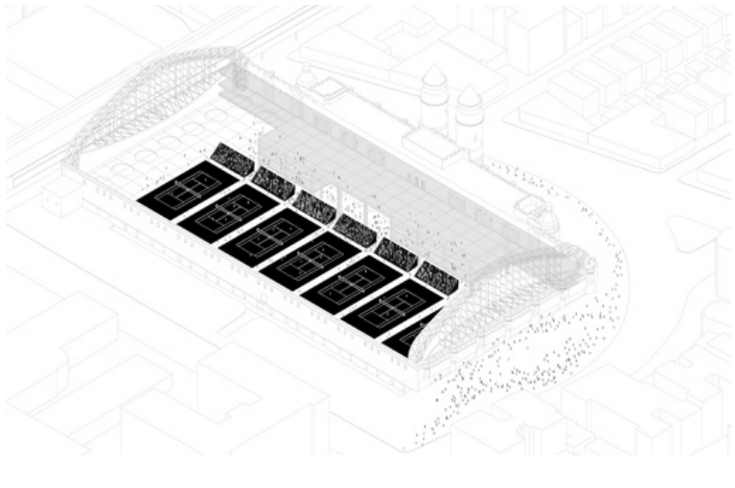
Fair



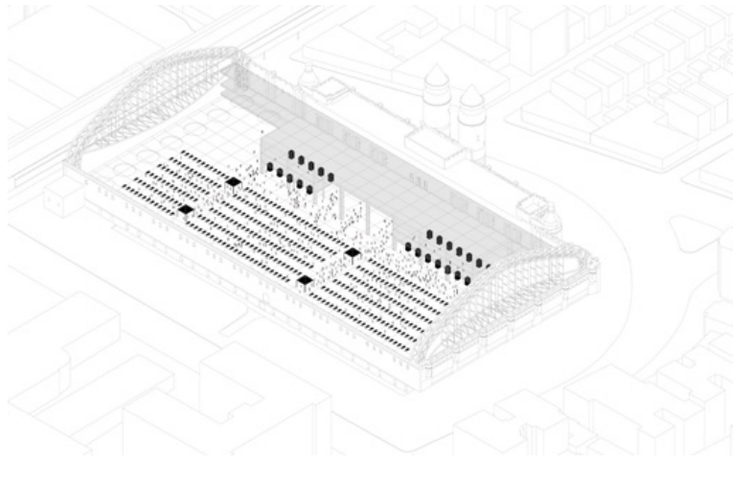
Sound Stages



Circus



Sporting Event



Disaster Relief Center

Fall 2023

175,000

construction / deconstruction of timber structure

Tó hóló (there is water)

With Chris Cornellius as critic and Anoushka Mariwala + Juliana Yang as collaborators.

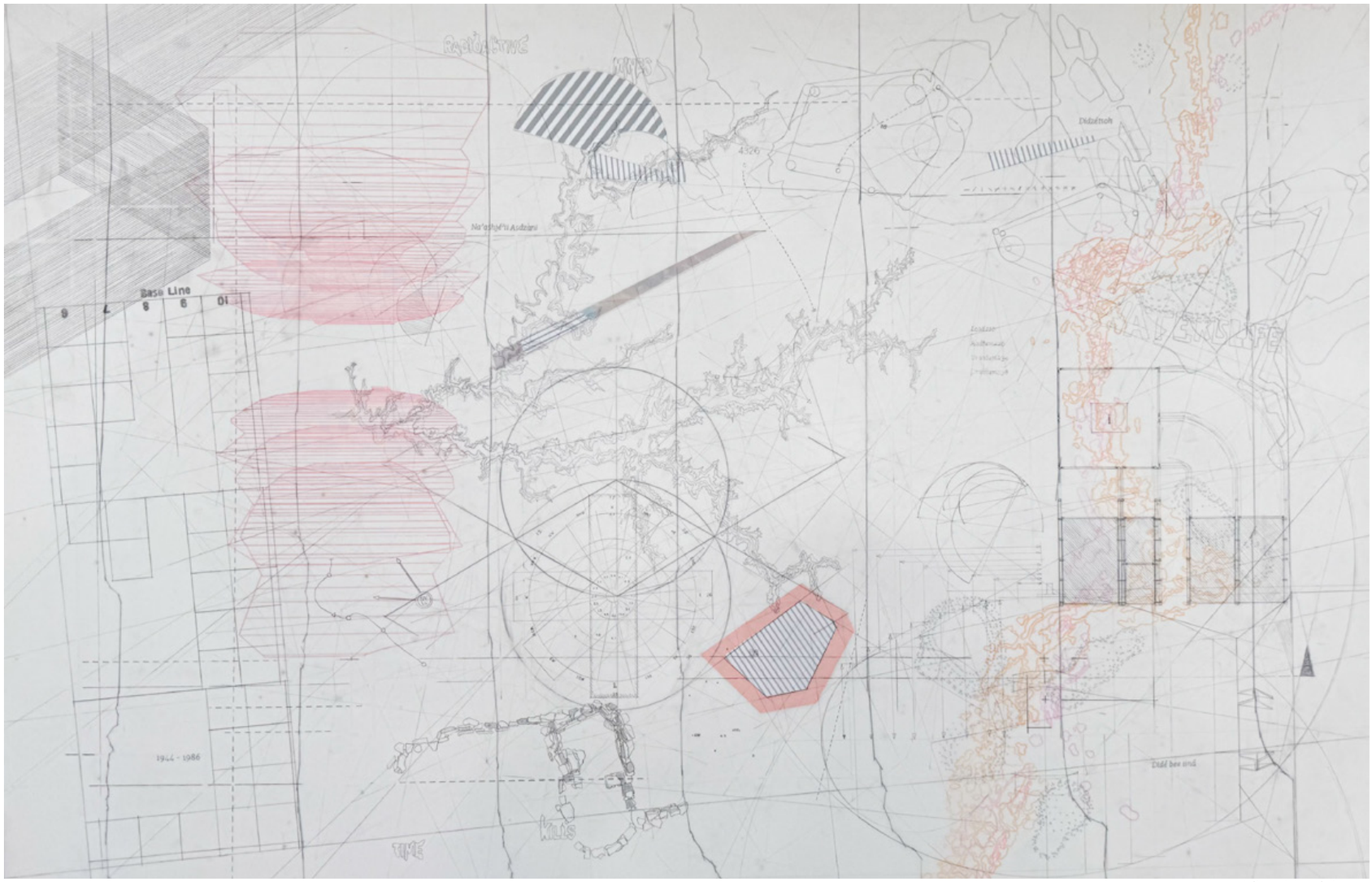
Location: Round Rock – Navajo Nation, Arizona

The site is waiting. Where do you wait, and with whom? What do you do, do you sit or stand, in a car or under shade, what do you think, make, learn from waiting?

át'ahálo (wait. Át'ahálo is a Navajo expression that means "wait!" It's a way of saying, "hold on" or "sit tight" without needing the entire set of conjugated verbs for "to wait." In speech, it is sometimes shortened to either át'ah or t'ahálo.)

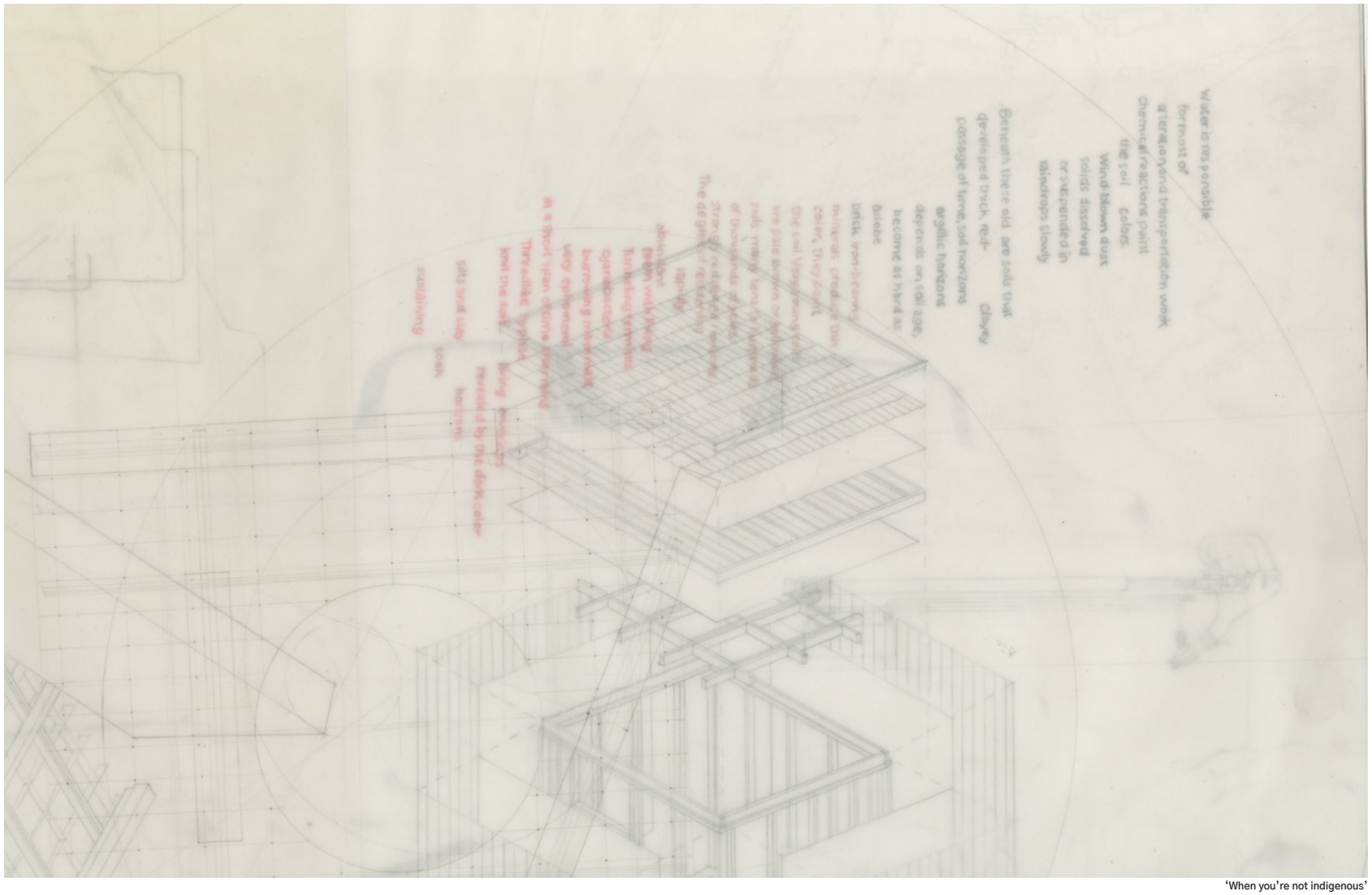
To wait is an exercise in listening to the water, and stories. Knowing the place as abundant (time) rather than scarce (material / resource).

adah'íílí (flowing downward, adah, the downward direction. water (tó) from melting snow (yas) flows downward from the mountain (dził). Or, it may be fog, or clouds that flow.)



Midterm Research Drawing

The first half of the semester was spent researching the Navajo Nation and understanding the context in which we were to design. My research began with Danika Cooper's insights in "Deserts are not Empty" where she shed light on the exploitation of U.S. deserts, revealing a history of genocide, land grabs, and ecological harm. The portrayal of deserts as barren wastelands on maps and drawings served capitalist interests, erasing indigenous connections to the land. Acts like Captain Thompson's destruction of Dine orchards aimed to justify displacement. Uranium mining exacerbated environmental and health crises for the Dine. Despite this, Dine resilience, seen in practices like weaving taught by Spider Woman, emphasizes the importance of recognizing deserts as more than resources. They're intricate ecosystems with sacred ties to indigenous cultures. Preserving this complexity and respecting indigenous relationships with the land are crucial for environmental and cultural sustainability.



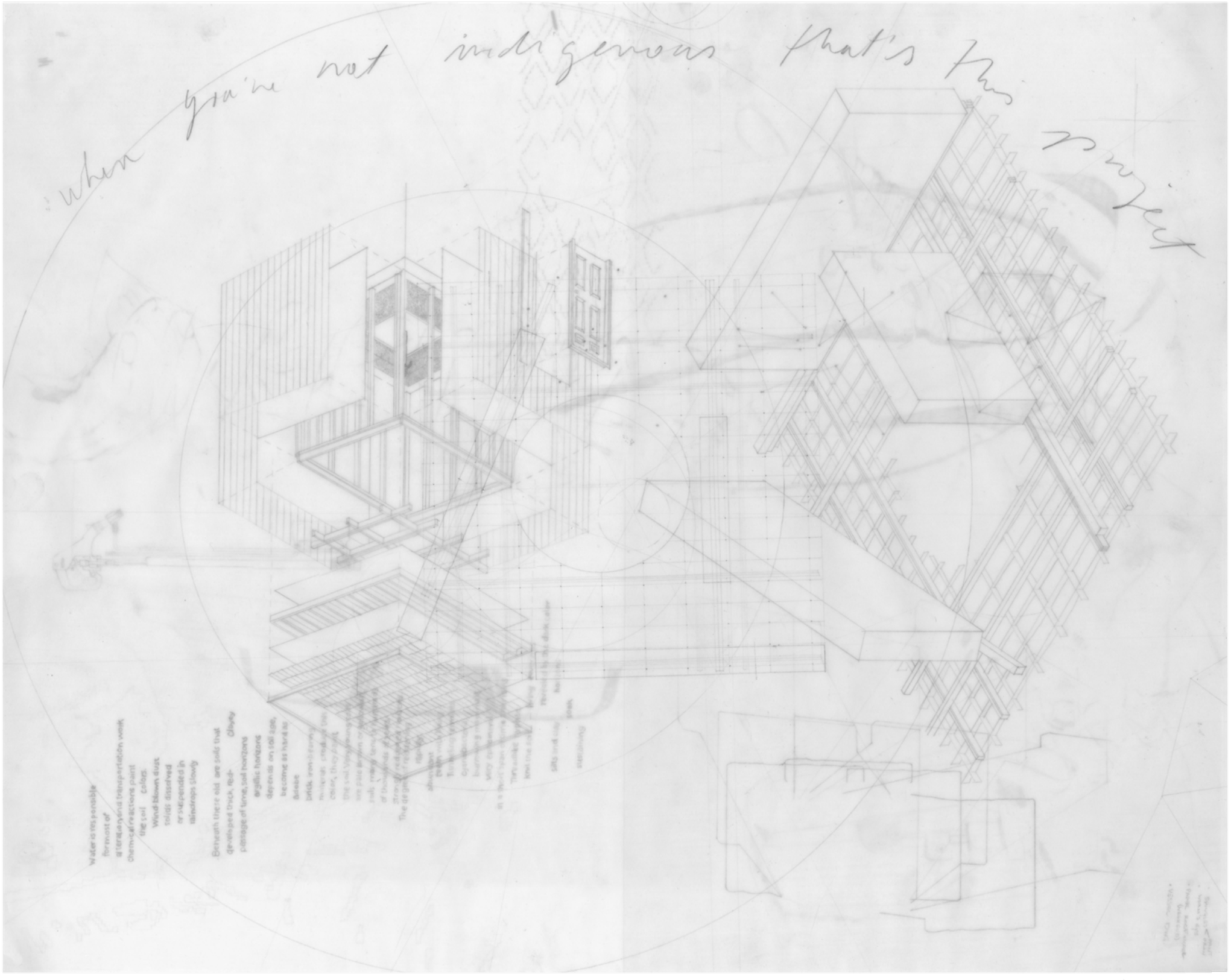
'When you're not indigenous'

site photo_01

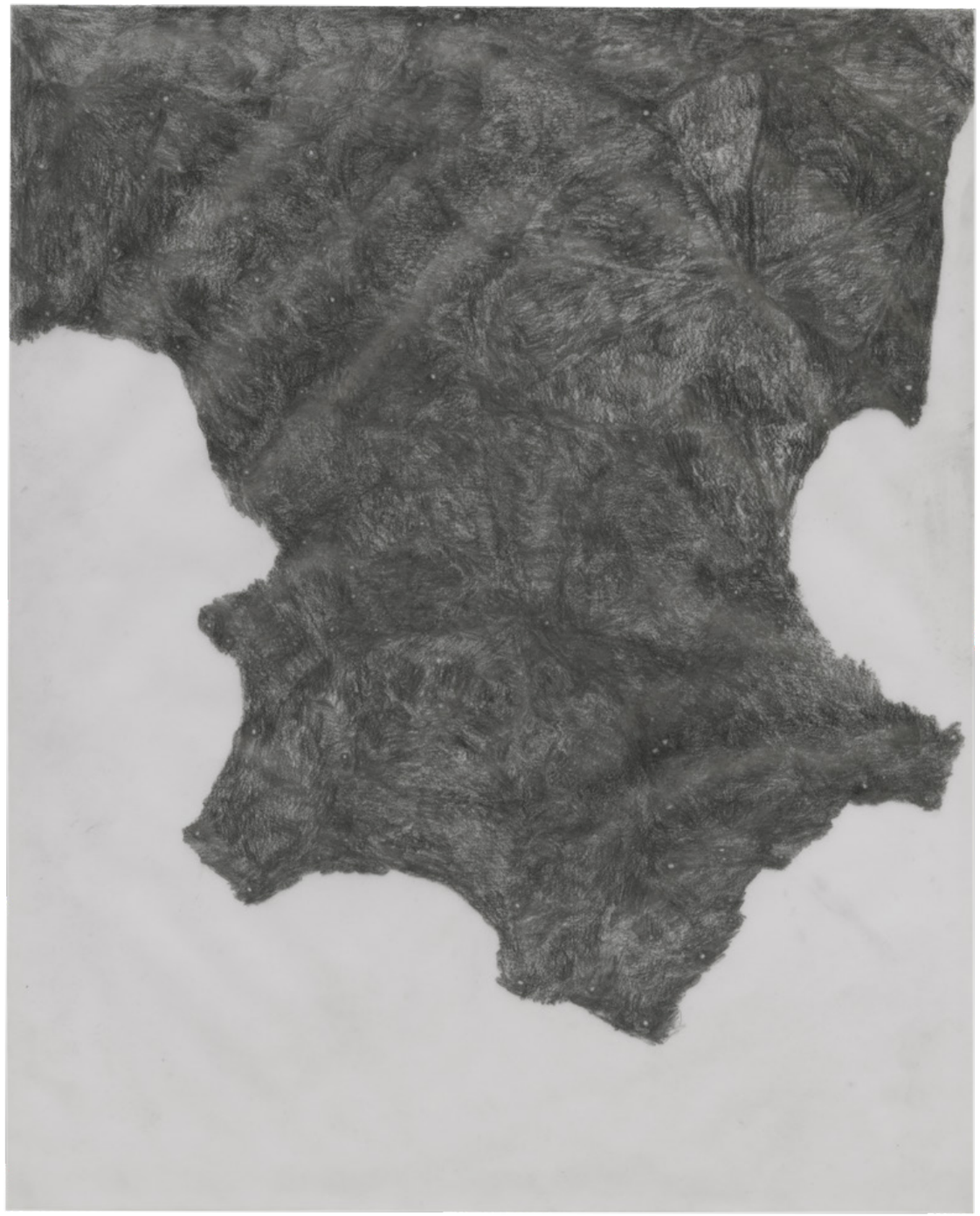
site photo_02

When a hole is uninterrupted
what is the difference
anyway
between fullness and emptiness or down and
up when you are inside the moon
or a rain drop in a well
or in any wetness at all
or in the dark.

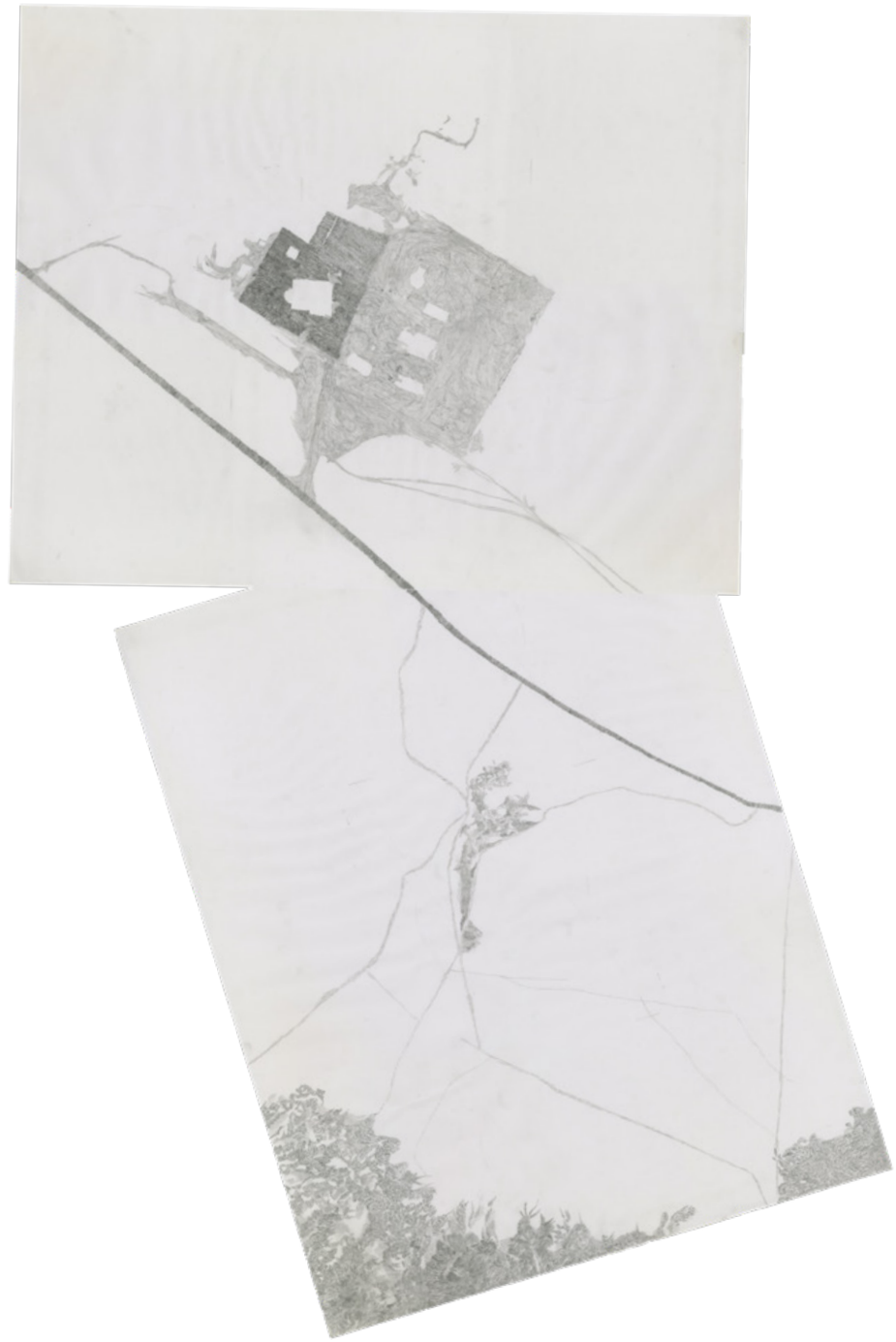
By dismantling the existing water shed, the symbol of infrastructure and presumed progress we propose a new structure which surrounds and supports the activity and ritual of collecting water, not only for human consumption, but as a gift to all beings, including the moon.



'When you're not indigenous'

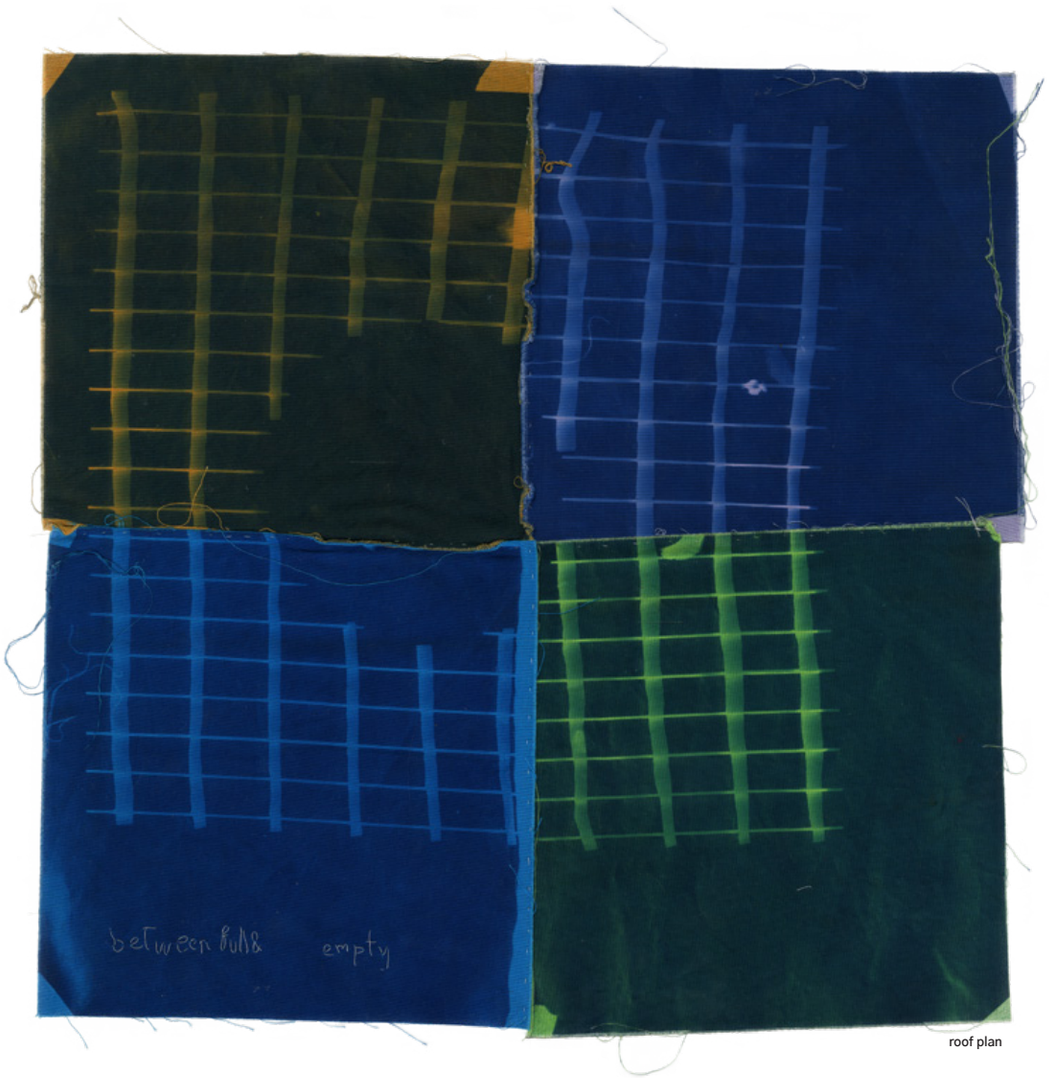


stars



site plan

plan



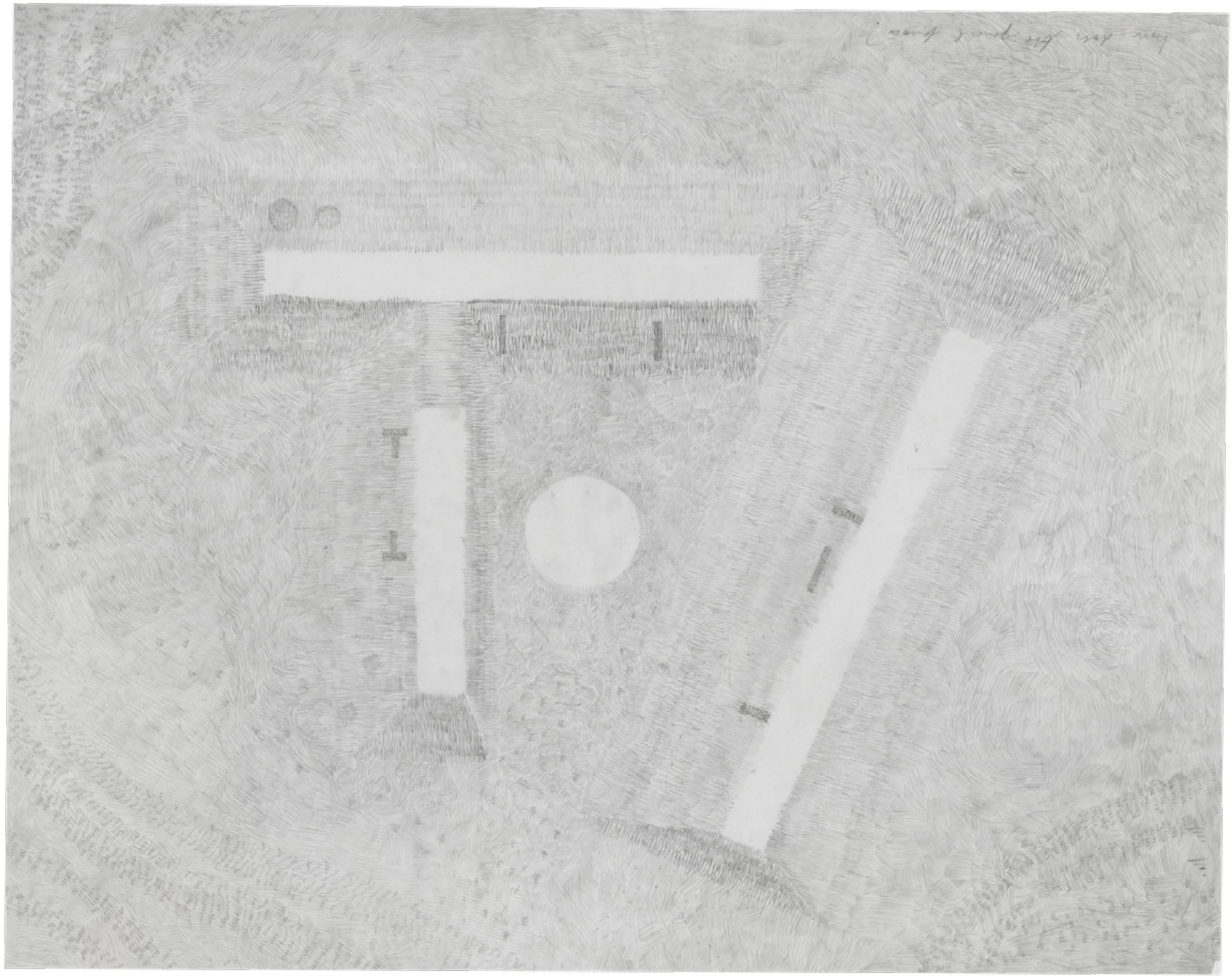
roof plan

vessels & walls

Well; or reuniting aquifer and moon

Earthen walls; or moving the ground closer to the clouds

Roof; or the ground lifted to meet the rain before it evaporates
each part hangs in equilibrium; as the elements get higher from the ground, they get lighter, but there are more of them



ground plan

Tó hóló (there is water)

distil
the picture into
painting.
they only need
to know about
colour
and
speed.
they don't get everything
they're thirsty for;

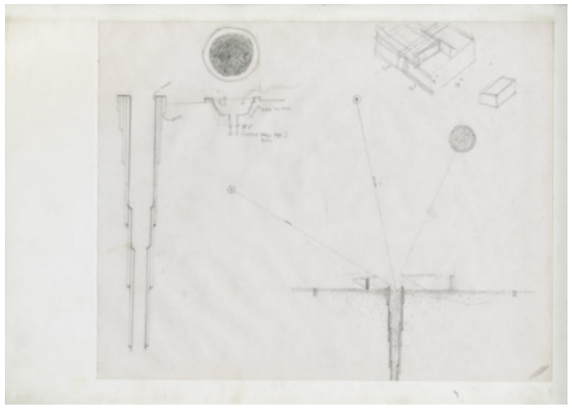
like Sun
making glowing
shapes on
sacred
Rocks.
they don't
get to
look up.
only
at
the
pavement
and
fences
and
plastic.
the ground's
presence
is only
because
she is
ineluctable.

we
don't
deserve
him here
but
that is the
generosity
we get
Anyway.

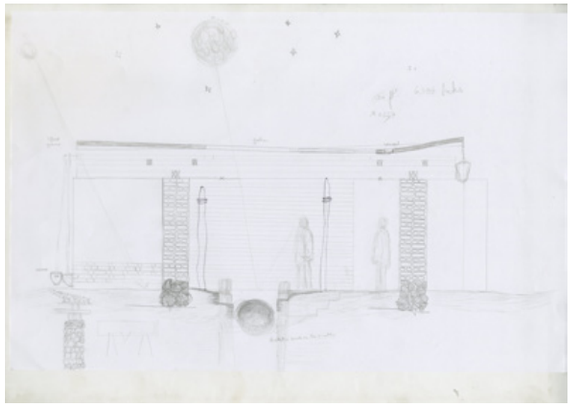
Spring 2024

section

Tó hóló (there is water)



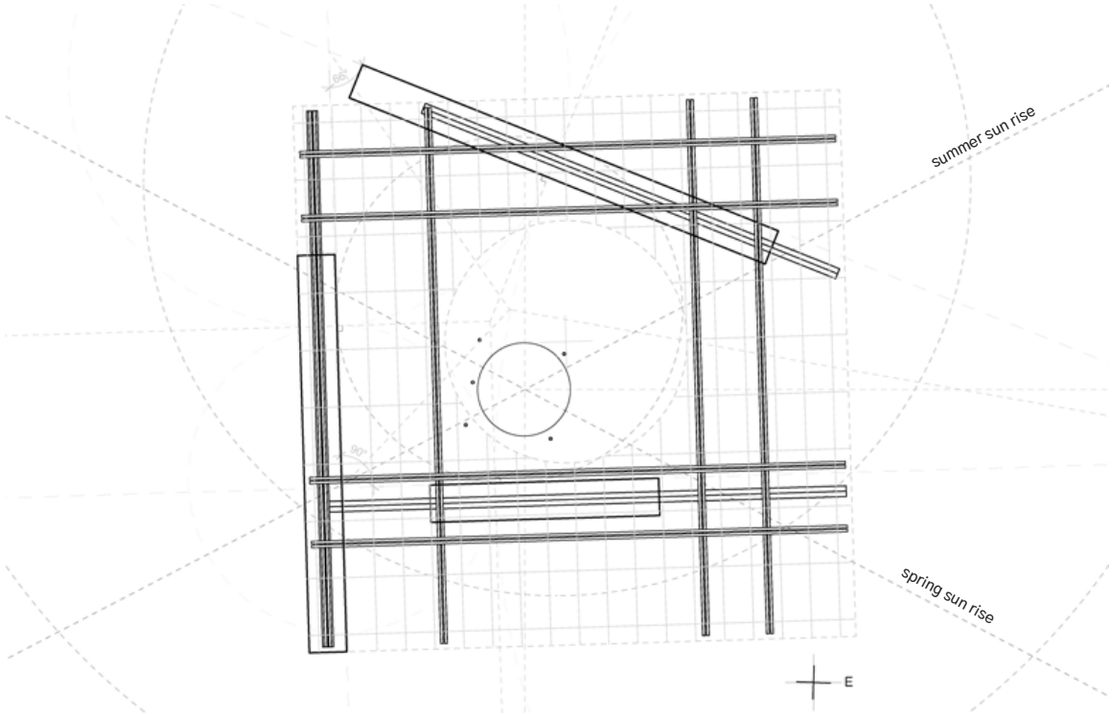
section sketch_01



section sketch_02

roof plan ‘drops of rain’

Spring 2024



plan

interior

Tó hóló (there is water)

site photo_03

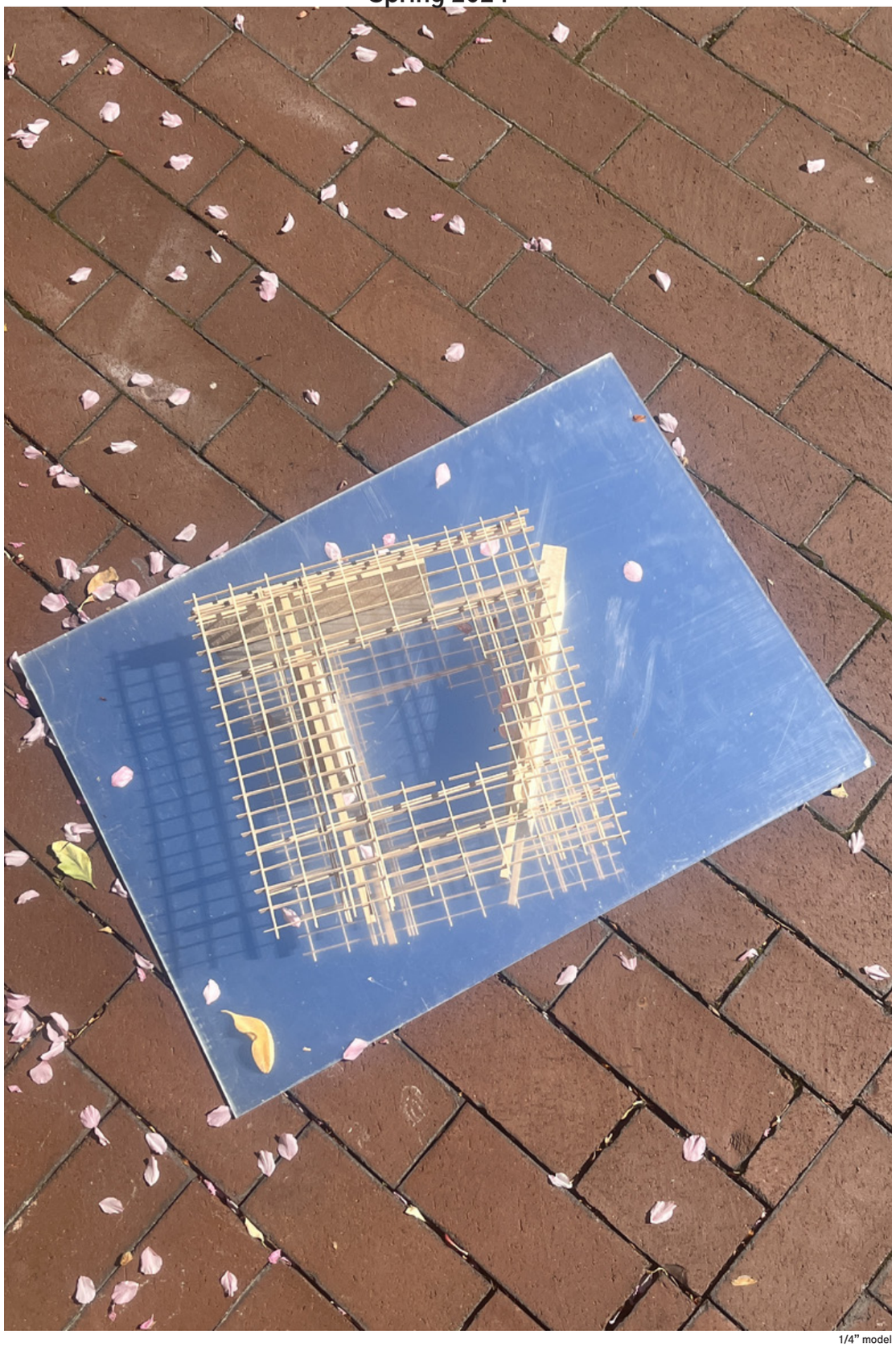
site photo_04

site photo_05

site photo_06

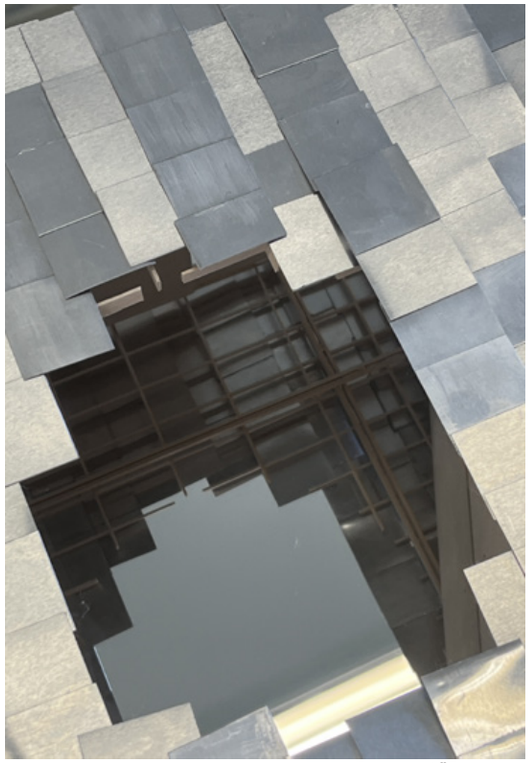
site photo_07

Spring 2024



1/4” model

Tó hóló (there is water)



1/4” model – roof

1/4” model – roof

1/4” model

bits.

Fall 2023

‘1 Acre’ examines the complex story of forestry practices in North America, between two poles of history and territory, the Longleaf Pine and the Black Spruce. Both trees, from different times but existing together in our built environment,have the potential to challenge our traditionally human-centric temporal and generational lens.

How can we relate these practices in conversation with one another?

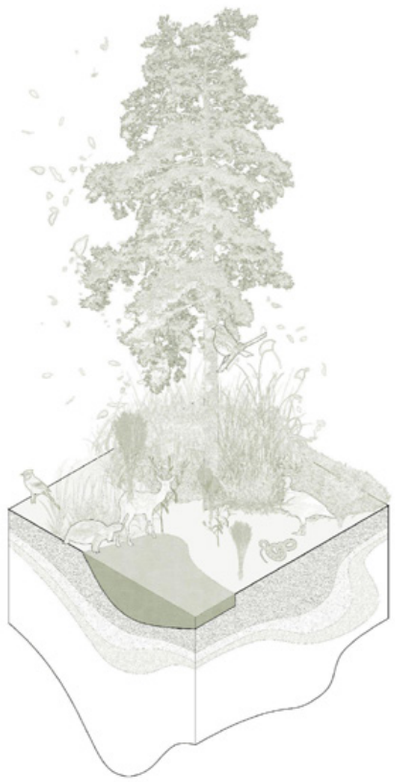
2. The Black Spruce, Central Quebec

1. The Longleaf Pine, East Texas

1 Acre

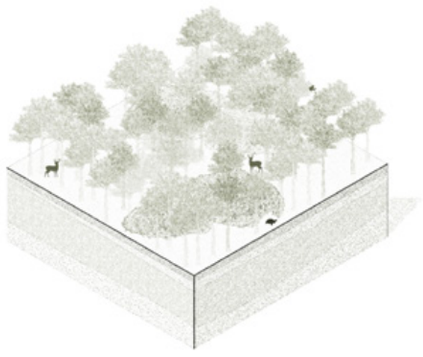
With Tommy Schaperkotter as critic and David Zhang + Meghan Jones as collaborators.

Long Leaf Pine Tree Forest



1 Acre of Longleaf Forest
***90** million acres of original forests (1500)* [2]
***2.7** million acres remain (2023)*

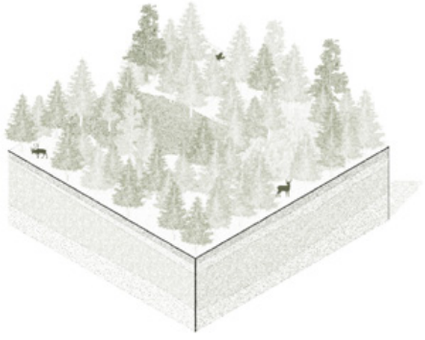
5	level II ecoregions
>5	different soil orders
>16	associated tree species
>50	associated shrubs
>36	species of mammals
>88	species of birds
>73	species of reptiles/amphibians [3] [4]



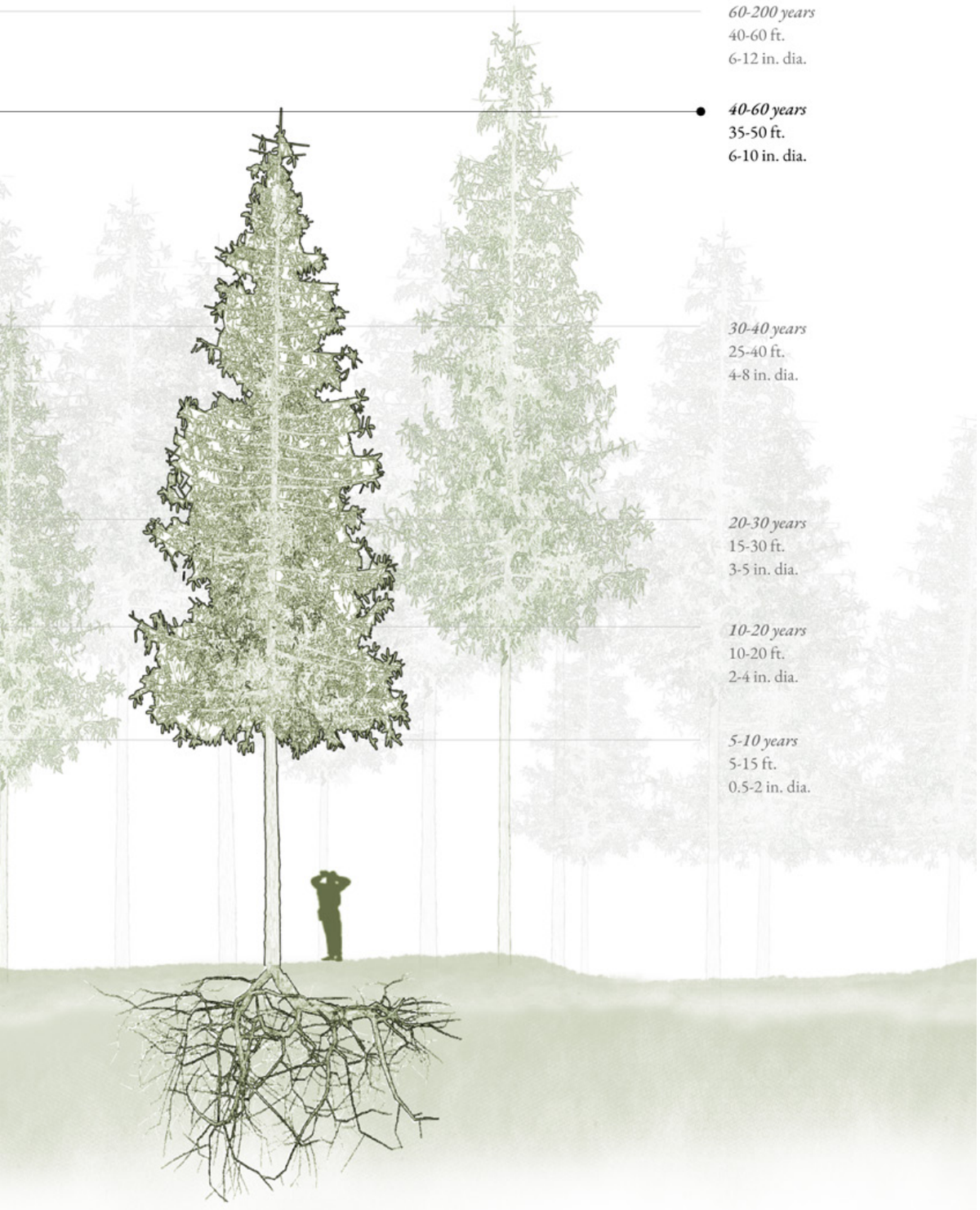
1908

1 Acre of Black Spruce Forest
***1.6** billion acres of original forests (imm.)* [5]
***3** million est. annual harvest (2023)*

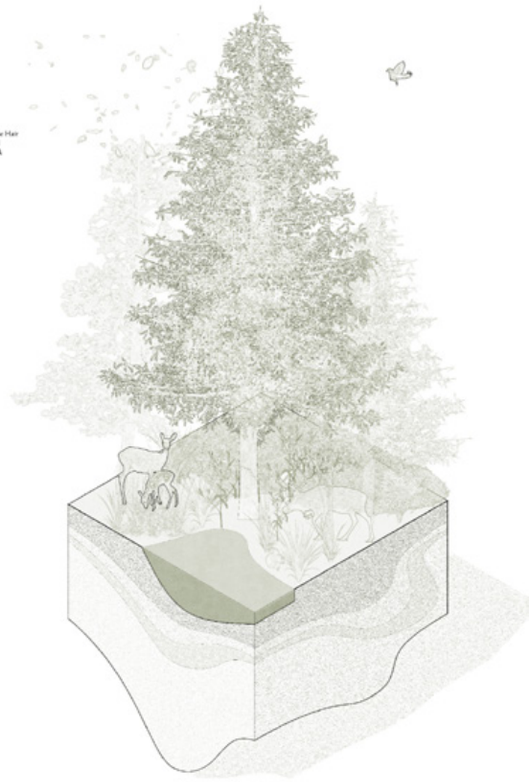
16	level II ecoregions
>7	different soil orders
6	forest cover subtypes
>20	associated tree species
>54	associated shrubs
>200	species of mammals
>310	species of birds
>350	species of reptiles/amphibians [4]



2023



The Black Spruce Forest Ecology



1 Acre of Longleaf Forest
Thompson Lumber Company, Texas
***59,536** acres of private forests (1908)* [7]

500	mature trees (24-36" d.b.h, 100' tall)
125,000 bd. ft.	of lumber
9,615	2 x 4 x 8 boards
20	1000 ft^2 single family homes

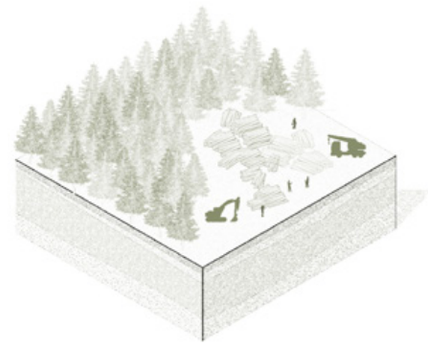
/per acre

1 Acre of Black Spruce Forest
Chantiers Chibougamau Timber Company, Quebec
5.9 *million acres of private forest* (2023) [8]

1200	mature trees (6-10" d.b.h., 50' tall) [5]
30,000 bd. ft.	of lumber
2,308	2 x 4 x 8 boards
5	1000 ft^2 single family homes

/per acre

1908



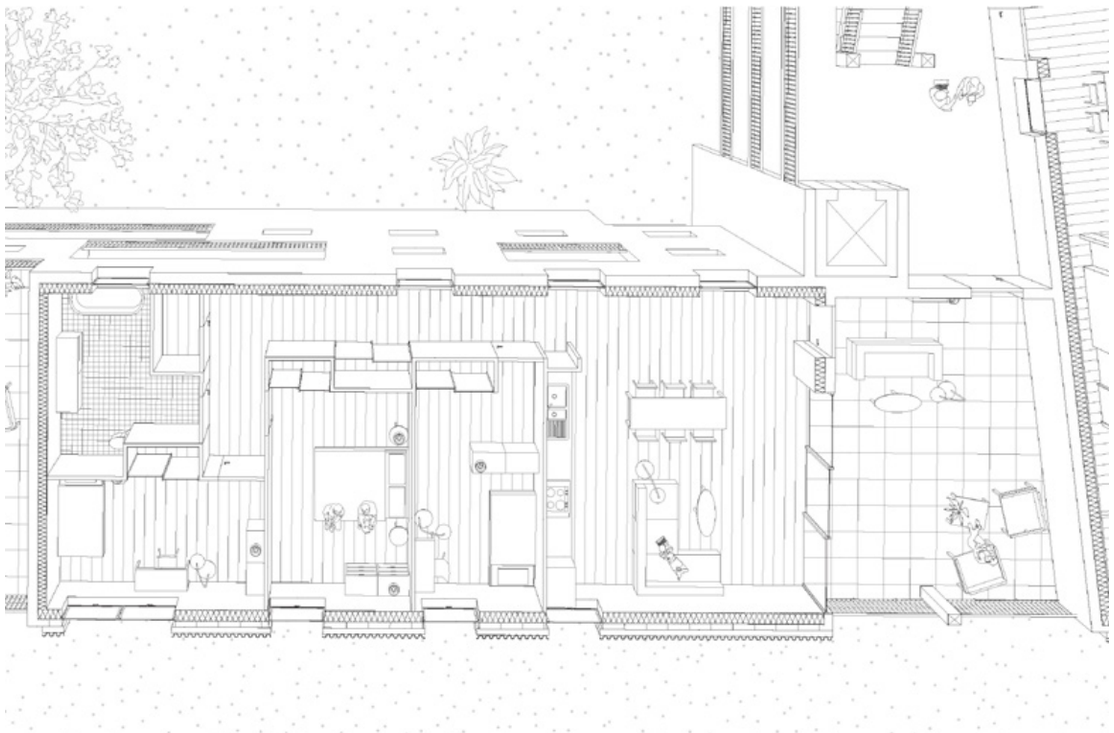
2023

Year 1
(Initial Harvest)

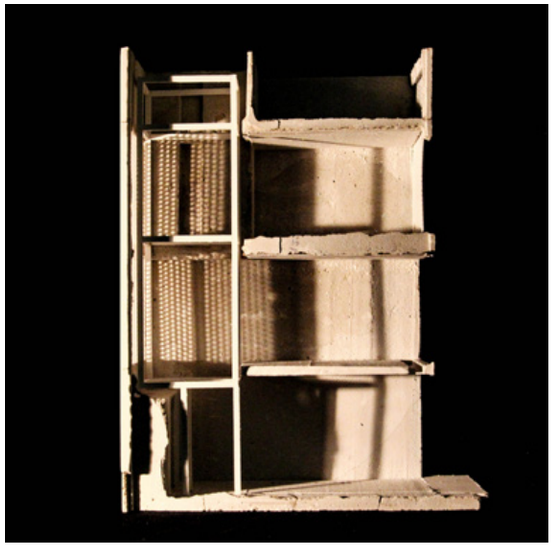
Fall 2022

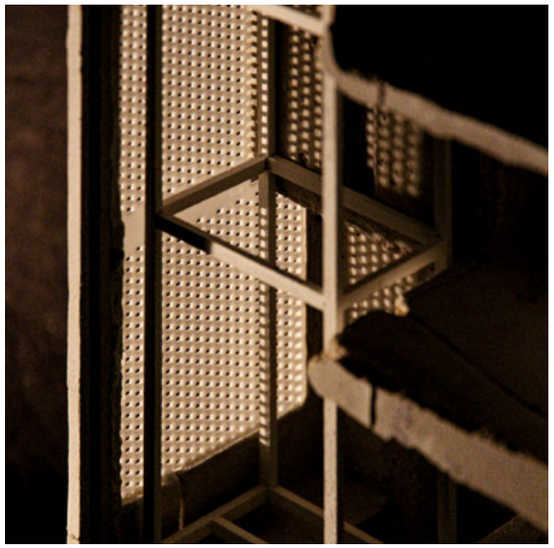
Precedent Study: LAN's 79 Collective Housing Units

With Chris Leong as critic and Erisa Nakamura + Kelvin Lee + Rachel Chen as collaborators.



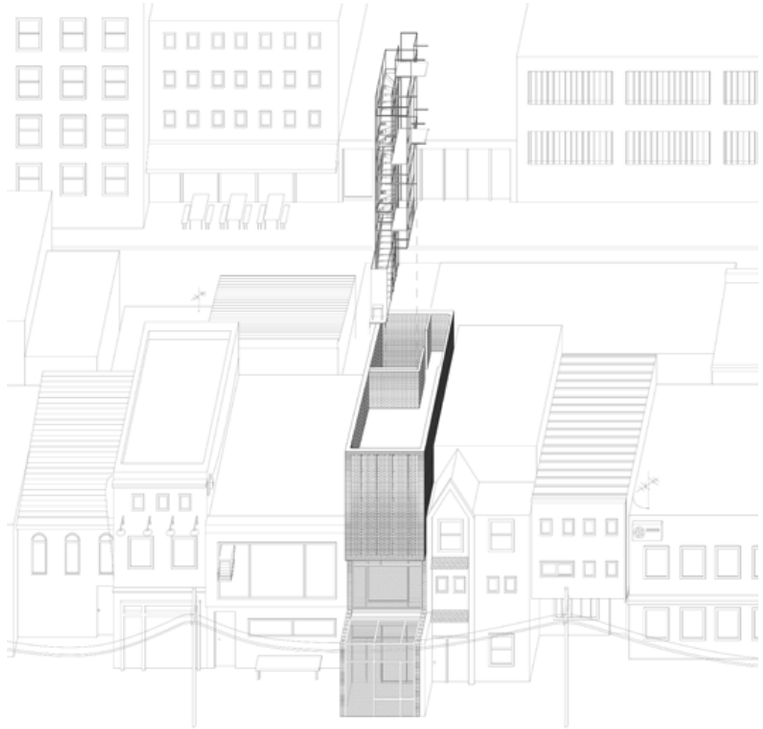
Fall 2021

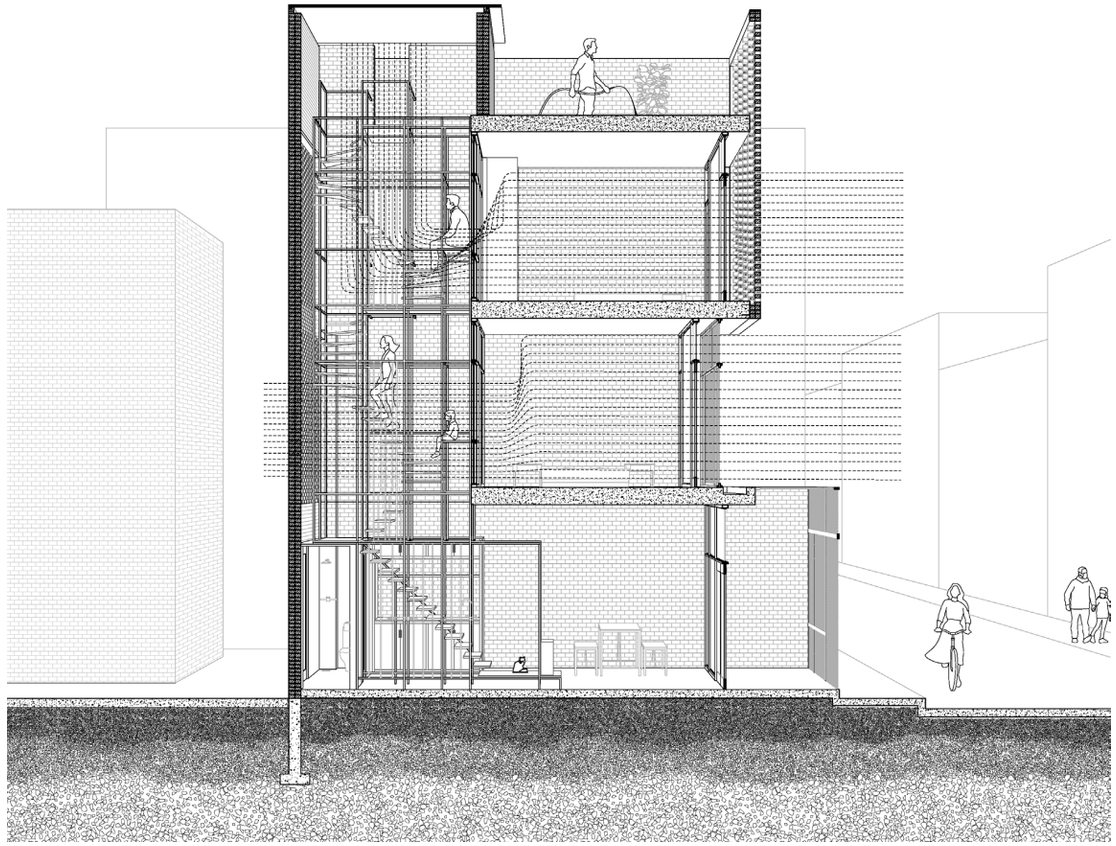




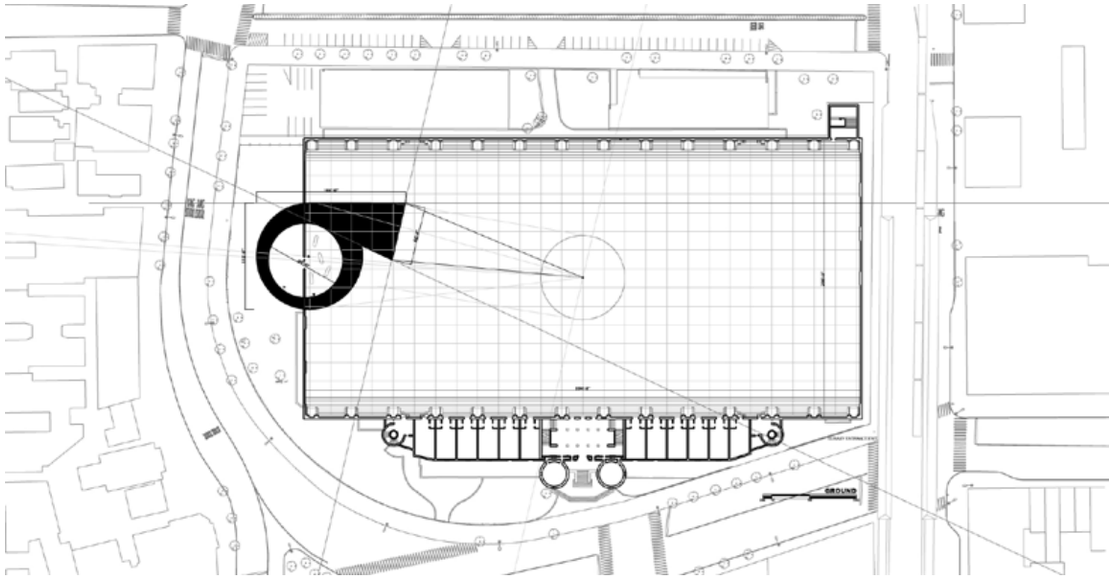
ADR 1: Tropical Space Co.’s Wasp House

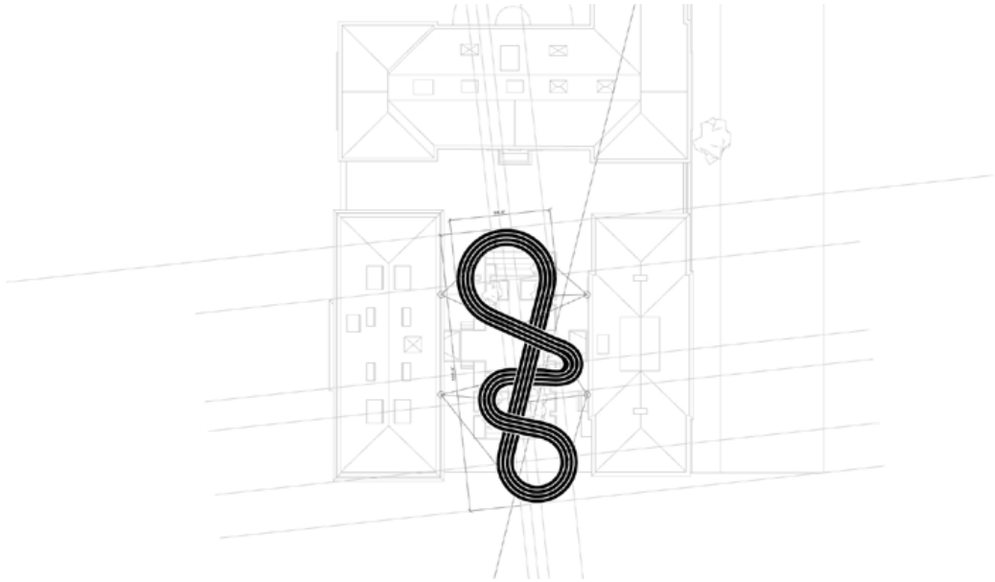
With Jelisa Blumberg as instructor.

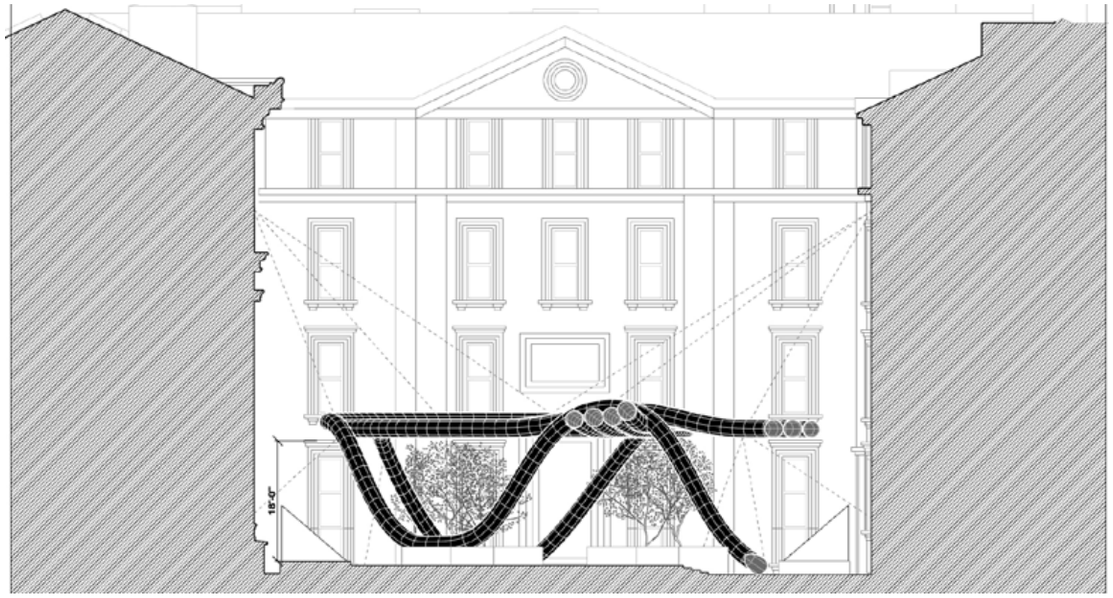




Spring 2024

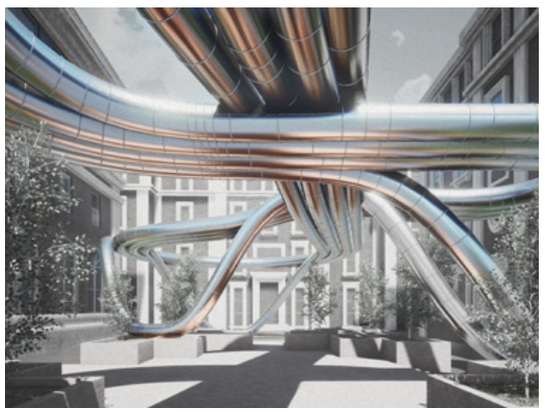


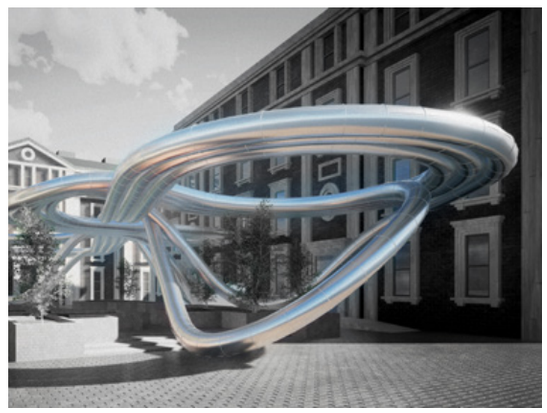




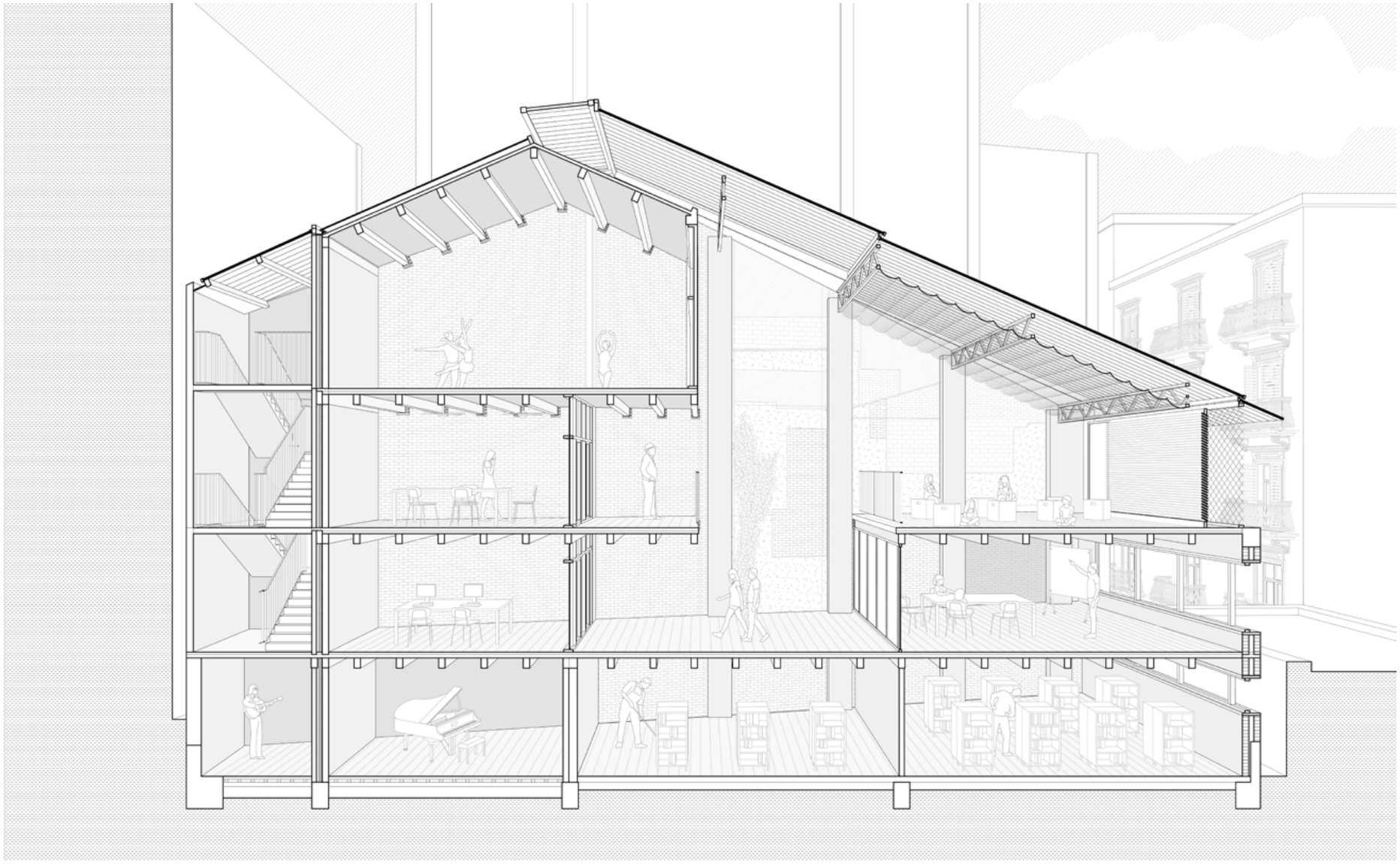
Outside In: Design Competition

With Galia Solomonoff + Laurie Hawkinson as instructors.





Spring 2023



Seminar of Section: HARQUITECTES' Lleialtat Santsenca

With Marc Tsurumaki as instructors.

Fall 2021 – Spring 2023

Natural Materials Lab Research

With Lola Ben-Alon as Advisor.

International Conference on Non-conventional Materials and Technologies
NOCMAT 2022

TOWARDS 3D PRINTED EARTH- AND BIO-BASED INSULATION MATERIALS: A CASE STUDY ON LIGHT STRAW CLAY

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[1]*Graduate School of Architecture, Planning and Preservation, Columbia University, New York, NY, 10027*
[2]*Civil, Environmental, and Architectural Engineering, University of Colorado Boulder, Boulder, CO 80309*
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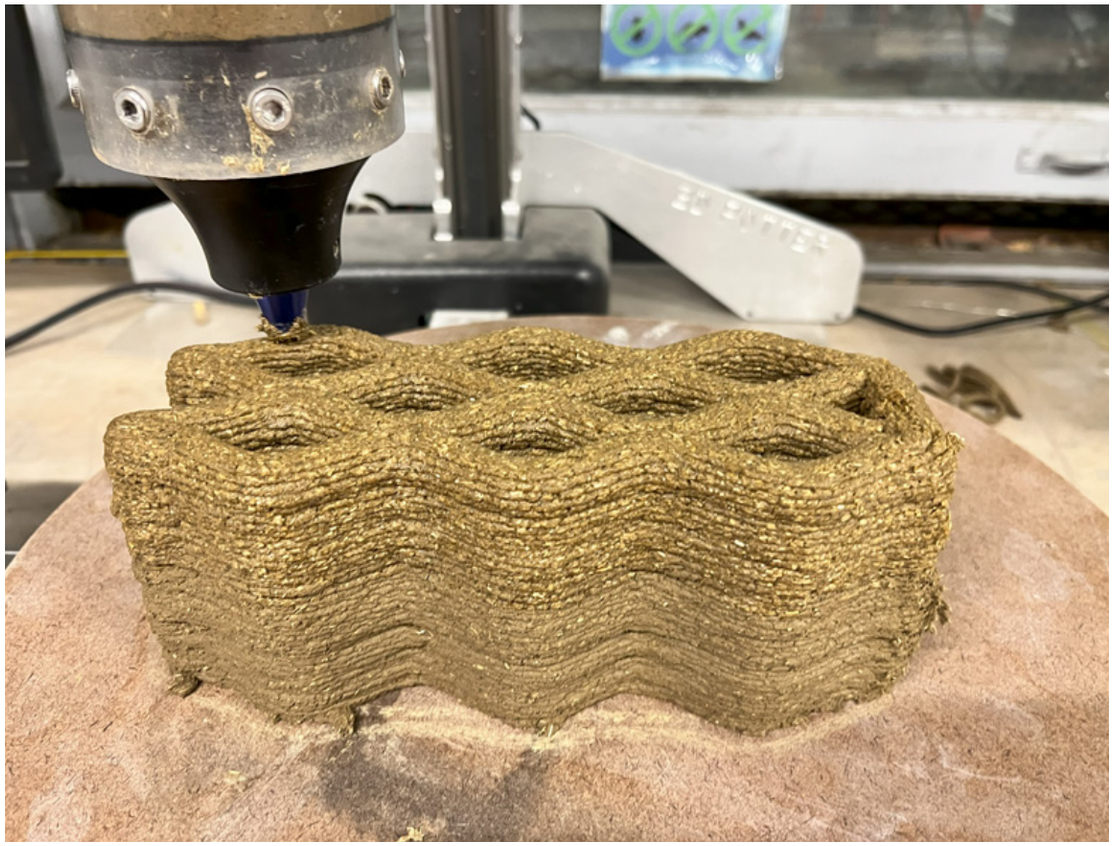
*To whom all correspondence should be addressed: rlb2211@columbia.edu

ABSTRACT
With a growing interest in sustainable construction practices and recent advances in the field of digital fabrication, 3D-printed earth has gained significant interest. However, research in 3D printed earth remains limited to cob, thus resulting in low thermal conductivity. Maximizing fiber content can provide greater thermal resistivity, while increasing carbon storage. This paper presents the development of 3D printed earth-fiber composite with fiber content ranging from commonplace cob (2% fiber) to newly developed printed light straw clay (64% fiber). This work contributes to critically needed advancements and framework for the development of low-carbon and high-performance materials for digital fabrication.



I would like to express my deepest gratitude to all those who have contributed to the creation and development of this portfolio. Without their support, guidance, and encouragement, this endeavor would not have been possible. First and foremost, my professors, Miku Dixit, Christopher Leong, Feifei Zhou, Wonne Ickx, Chris Cornelius, Lola Ben-Alon, Tommy Schaperkotter, Robert Herrmann, Michael Bell, Lucia Allais, Hilary Sample. Their guidance will forever remain a source of inspiration and motivation. I am also grateful to my friends and collaborators, Rachel Chen, David Zhang, Adam Fried, Anoushka Mariwala, Juliana Yang, Kayla Parsons, Emilie Kern, Lucy Baird, Marika Falco, Meghan Jones, Kelvin Lee, Christopher Armstrong, and many more. And of course, I would like to acknowledge the support of my mother, father, brother, and Mimi Vaughan, whose encouragement, patience and understanding, have been a source of motivation through my academic career and beyond.

Thank you all.