Lilly Saniel-Banrey
Selected Works
2025

ABOUT THE AUTHOR

Welcome -

This portfolio stands as a collection of my positions on design: to be hopeful, to create community, to seek and make beauty - at all scales and through all mediums.

I graduated Cum Laude from The Ohio State University with a Bachelor of Science in Architecture with Honors Research Distinction and a Minor in Real Estate & Urban Analysis. Additionally, I competed for the University in Varsity Cross Country & Track and Field.

I have worked with NBBJ, Utile, Jonathan Barnes Architecture and Design, and the Joint Center for Housing Studies on a range of project types, from buildings to books.

I recently graduated from Harvard University's Graduate School of Design with a Master of Architecture where I held multiple positions as a Studio Teaching Assistant and as a Research Assistant with the Joint Center for Housing Studies.

I will always be learning. I will always be sowing joy and wellbeing into the details of everyday life.

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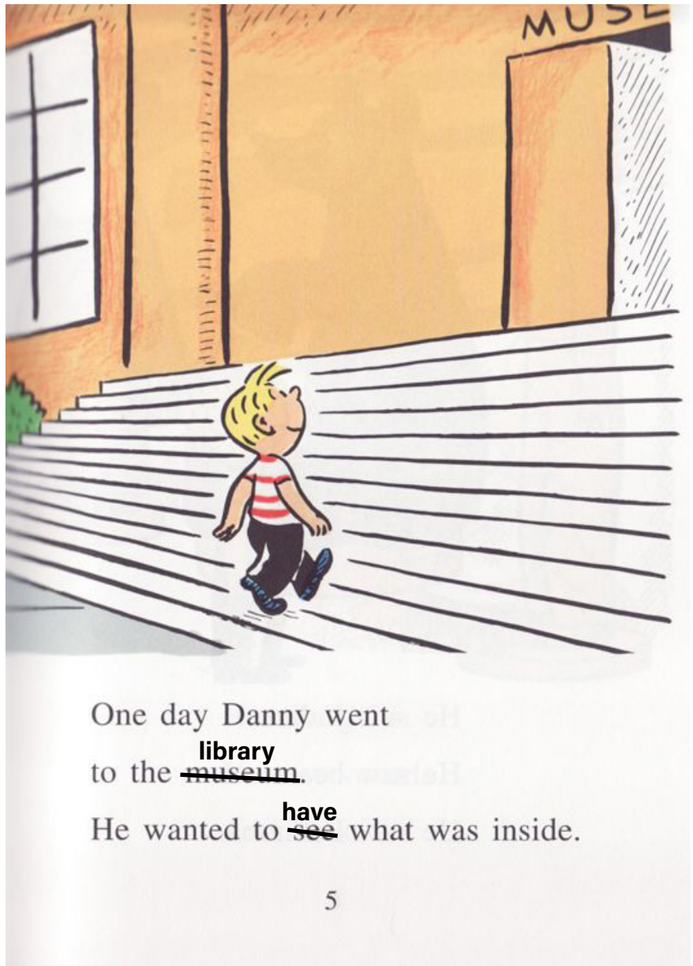
Checked Out: Visions of a New Public Library

Harvard Graduate School of Design
Thesis advised by Elle Gerdeman
Site / Houston, Texas
VRay, Illustrator, Photoshop, Physical Models

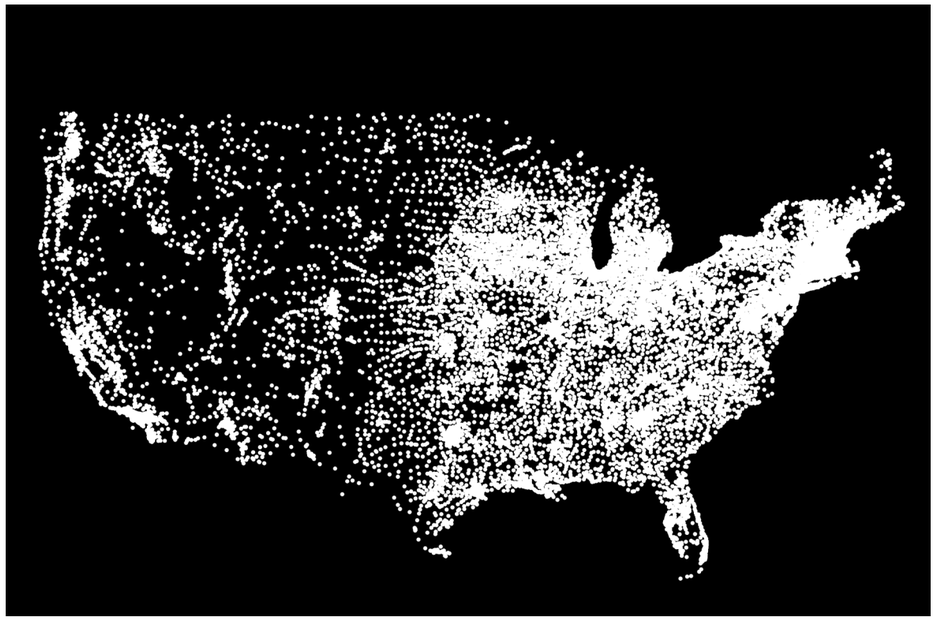
The public library is both nostalgic and contemporary. Casual and monumental. A place of first looking, longing, and learning. Its reputation precedes it. Its architecture no longer supports it. Today the role of the public library floats amidst dynamic responsibilities far beyond knowledge provision to a means of chosen or necessitated escape. A split screen architecture emerges. The crisis of the everyday meets the crisis of a century. This thesis proposes a new form for the library. Enter the kiosk, the warehouse, and the theater. Together they browse for themselves a use depending on the day. Step toward visions of both the library's most nostalgic and dire associations: to seek, to learn, to borrow, and to offer everything in between.

CHECKED OUT: VISIONS OF A NEW PUBLIC LIBRARY

DANNY AND THE DINOSAUR READING

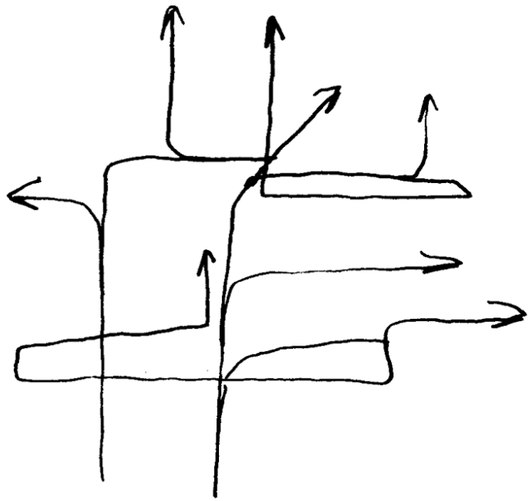


Danny and the Dinosaur
Syd Hoff
1958

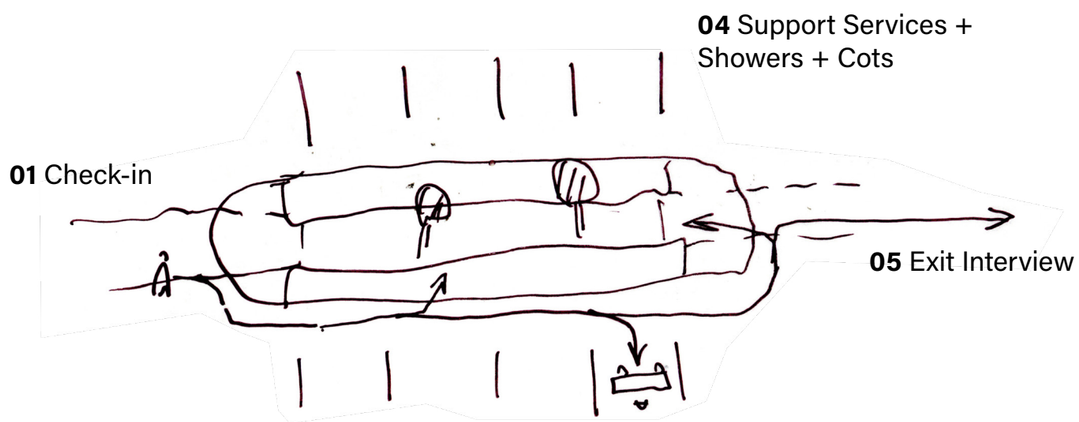


Map of Public Library Locations in US
2024

UNITED STATES LIBRARY LOCATIONS MAP



BROWSING DIAGRAM



FEMA DISASTER CENTER DIAGRAM

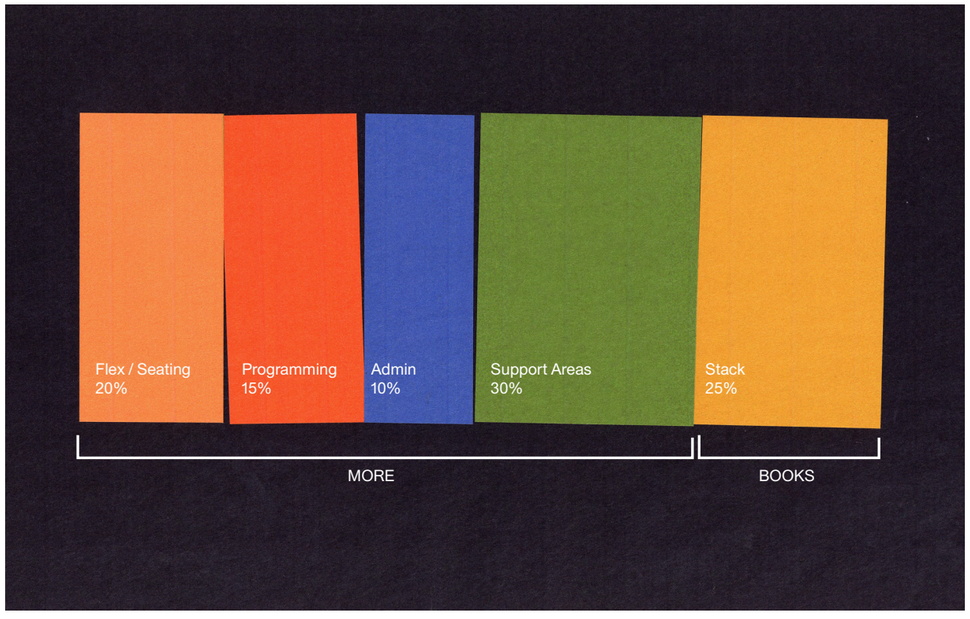
AN EVOLVING DIAGRAM OF BROWSING

Historically, the changing identity of the library has in tandem birthed a corollary architectural response. From Boulle's 1785 re-imagination of the Bibliotechque de Roi straight passage through to OMA's 2004 Seattle Library spiral to the present moment in which just over 20 years later, this diagram is already failing to address the forms of browsing as influenced by the collapsed attention network relative to phenomenon such as the "infinite scroll". An experience much more fractal and looped than unidirectional.

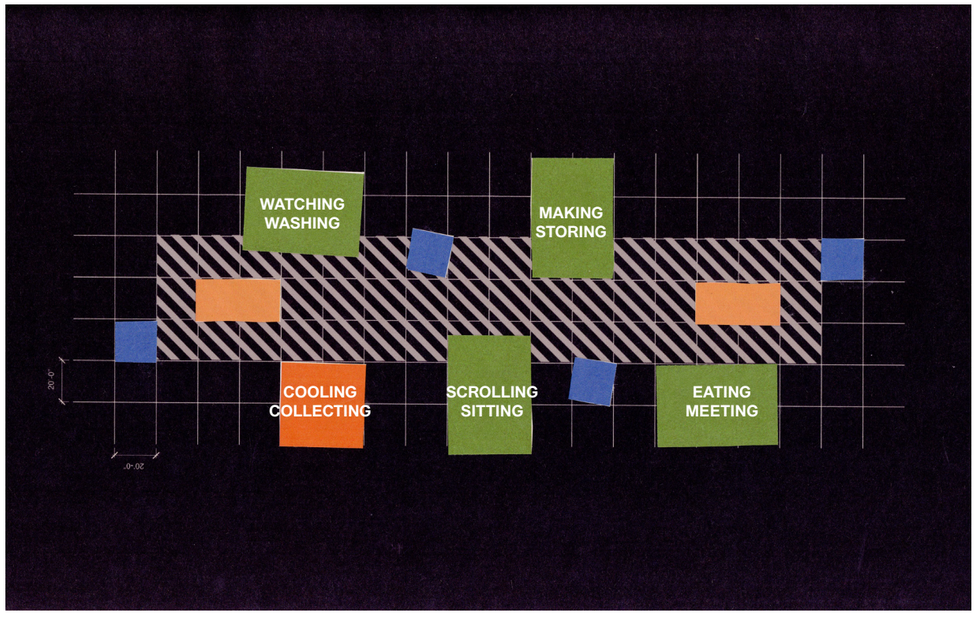

A
B
C
D
E
F
G
H
1
2
3
4
5
6
51
15
22
0
1 Miles


48
52
55
46
51
61
15
22
0
0.25
0.5
1 Miles
Near Northside, Houston TX
Carnegie Neighborhood Library

BOOKS + MORE DIAGRAM

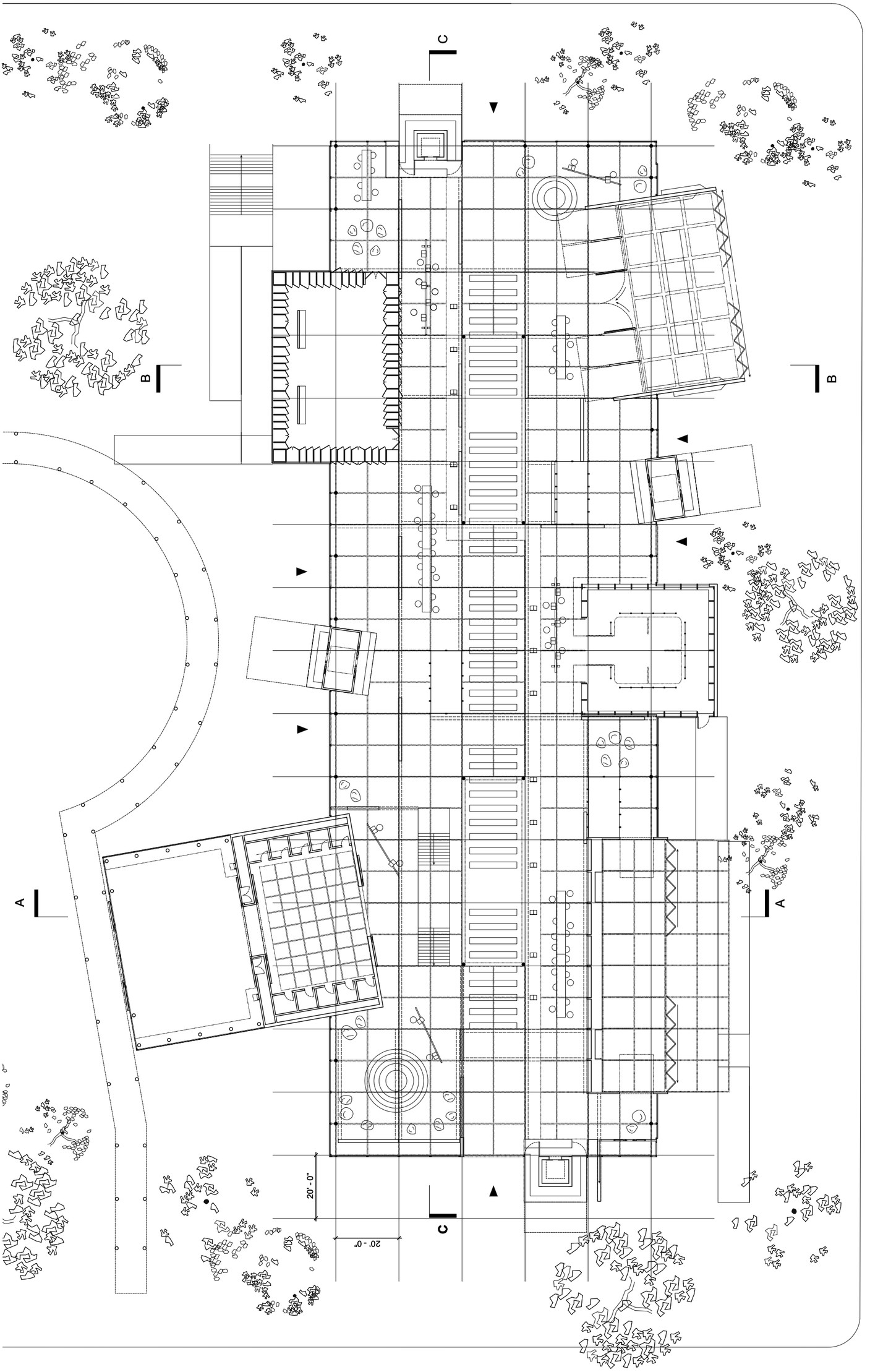


PROGRAM PLAN DIAGRAM

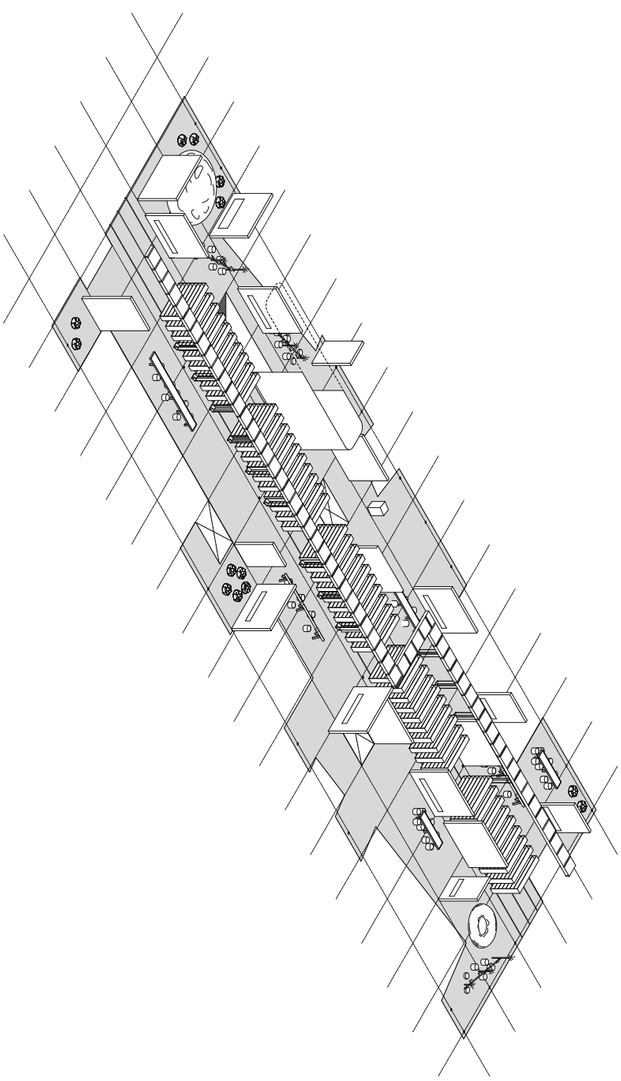


MODEL PHOTO

MODEL PHOTO



GROUND PLAN



SECTIONS

RENDERINGS

MODEL PHOTO

MODEL PHOTO

A Home for Ten + Friends

Harvard Graduate School of Design
Studio led by Lina Ghotmeh
Site / Melides, Portugal
Rhino, Illustrator, Photoshop, Physical Models

Through the lens of the still life, contemporary media culture, and the shifting urban condition of Chelsea, Massachusetts, this project proposes loose ends, lean-tos, and architectural backdrops as a new aesthetic for urban housing models and as an expedient densification device. Large CLT additions protect existing office structures, transforming an existing office block into over 500 beds and 100,000 square feet of public programming. The architectural gestures are caricatures in nature, exaggerrating an existing blankness or monotony present in multi-family design. This exaggerated blankness is punctuated by moments of collective impulse and energy.

A HOME FOR TEN + FRIENDS

SITE PLAN

GROUND FLOOR PLAN

SITE SECTIONS

SITE DIAGRAMS

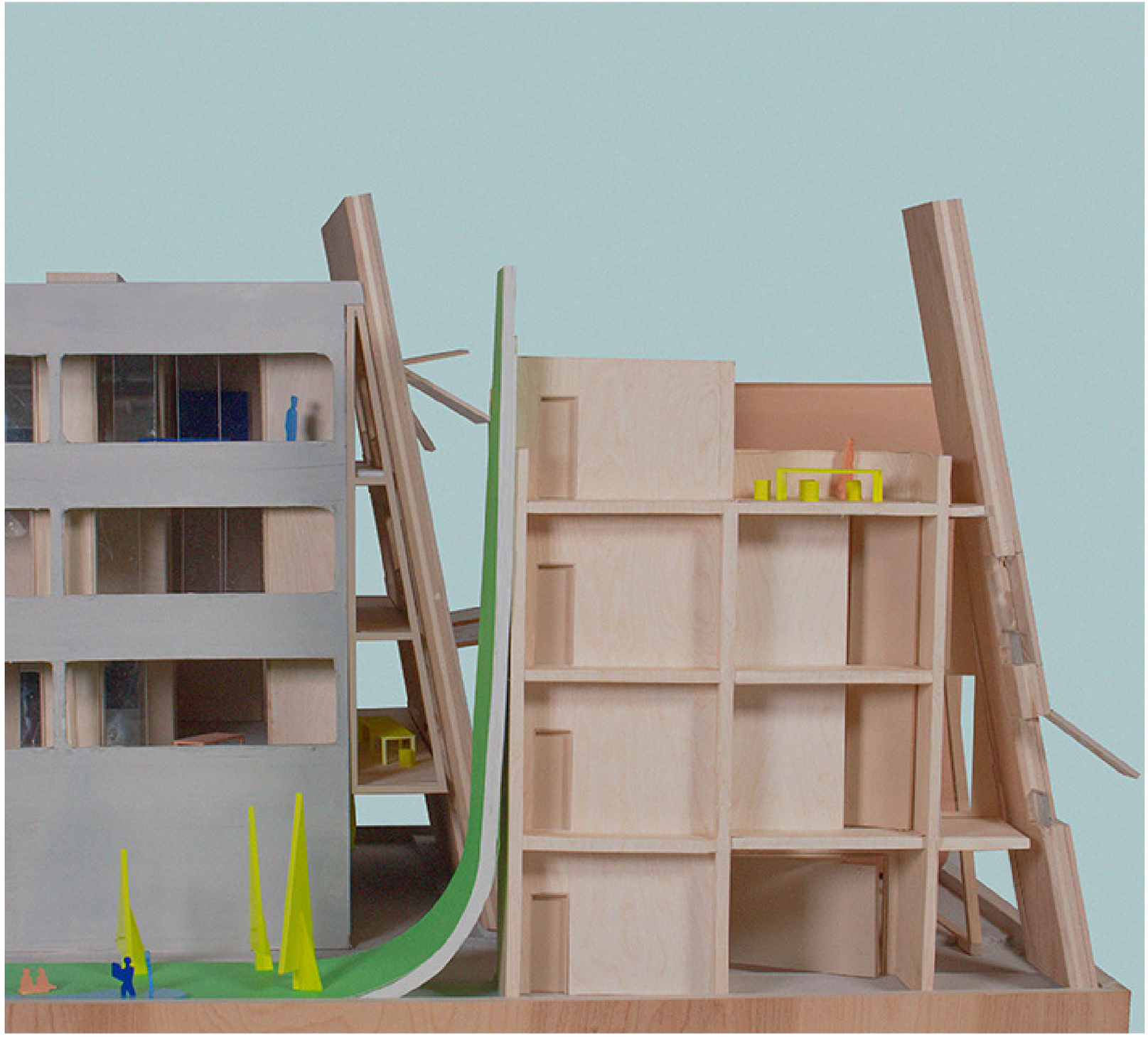
MODEL PHOTO

MODEL PHOTO

Loose Ends, Lean-Tos + Backdrops

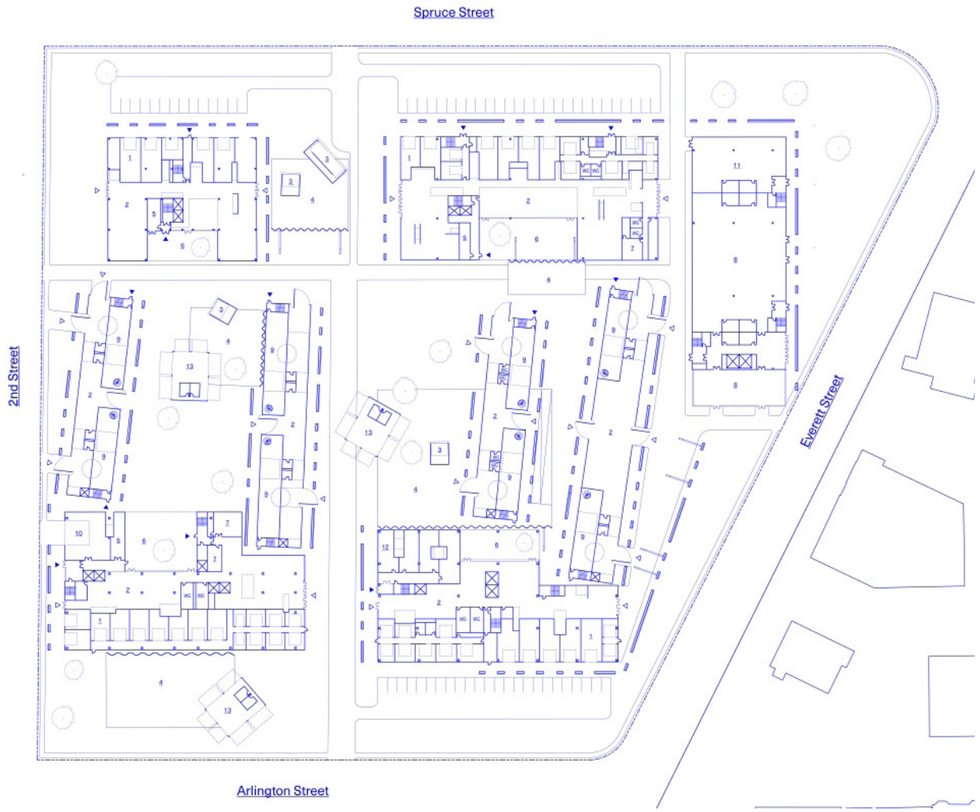
Harvard Graduate School of Design
Studio led by Jennifer Bonner
Site / Chelsea, MA
(partnered project- all media an exclusive effort,
Renderings in collaboration with Kirsten Sexton)

Through the lens of the still life, contemporary media culture, and the shifting urban condition of Chelsea, Massachusetts, this project proposes loose ends, lean-tos, and architectural backdrops as a new aesthetic for urban housing models and as an expedient densification device. Large CLT additions protect existing office structures, transforming an existing office block into over 500 beds and 100,000 square feet of public programming. The architectural gestures are caricatures in nature, exaggerrating an existing blankness or monotony present in multi-family design. This exaggerated blankness is punctuated by moments of collective impulse and energy.



LOOSE ENDS , LEAN-TOS + BACKDROPS

SITE PLAN

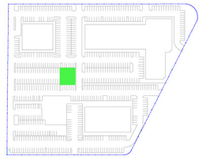


A LOOSE ASSEMBLAGE

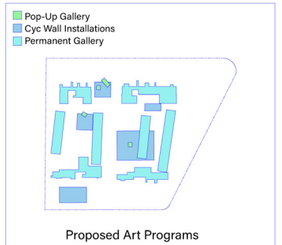
Housing, galleries, and storage are held loosely across the site, creating multiple neighborhoods of activity but always following the same strategies of permeability and addition. The ground floor provides access to permanent gallery spaces, storage, and sic wall courtyards. At an urban scale, the arrangement allows for the puncturing of housing with impromptu public engagement while maintaining much of the original office buildings from which the project was born.

SITE DIAGRAMS

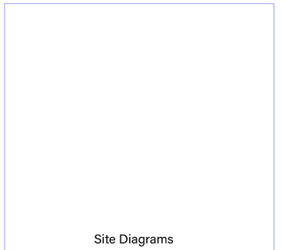

A Center for Art in Chelsea


Existing Green Space


Proposed Green Space

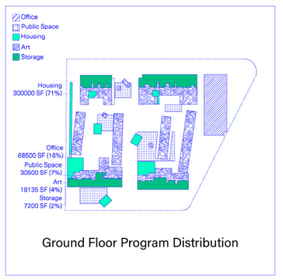


Proposed Art Programs

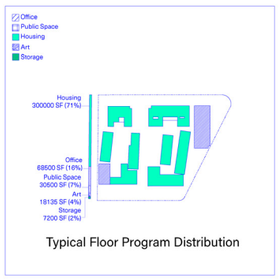

Site Diagrams

Proposed Housing Strategies

Existing Program Distribution



Ground Floor Program Distribution

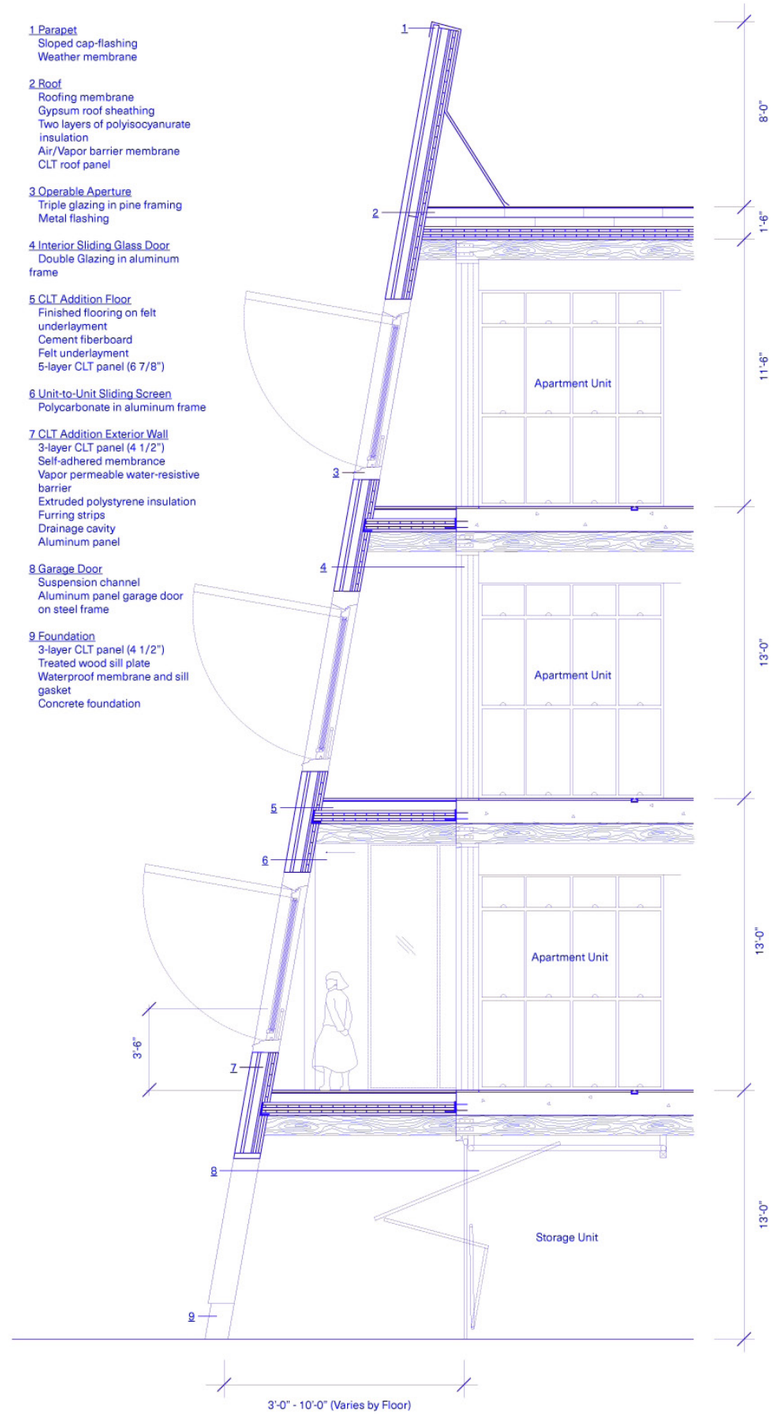


Typical Floor Program Distribution

EXTERIOR RENDERING

Renderings in collaboration with Kirsten Sexton

DETAIL SECTION 01



MODEL PHOTO

Through flashes of layering, architectural exaggeration, and the exploitation of temporality, the project ties up the loose ends of the surrounding urban condition, done by extracting the genericism of familiar parts to form a provocation not about what housing looks like, but what it may come to be.

CYC WALL URBANISM EXAMPLES

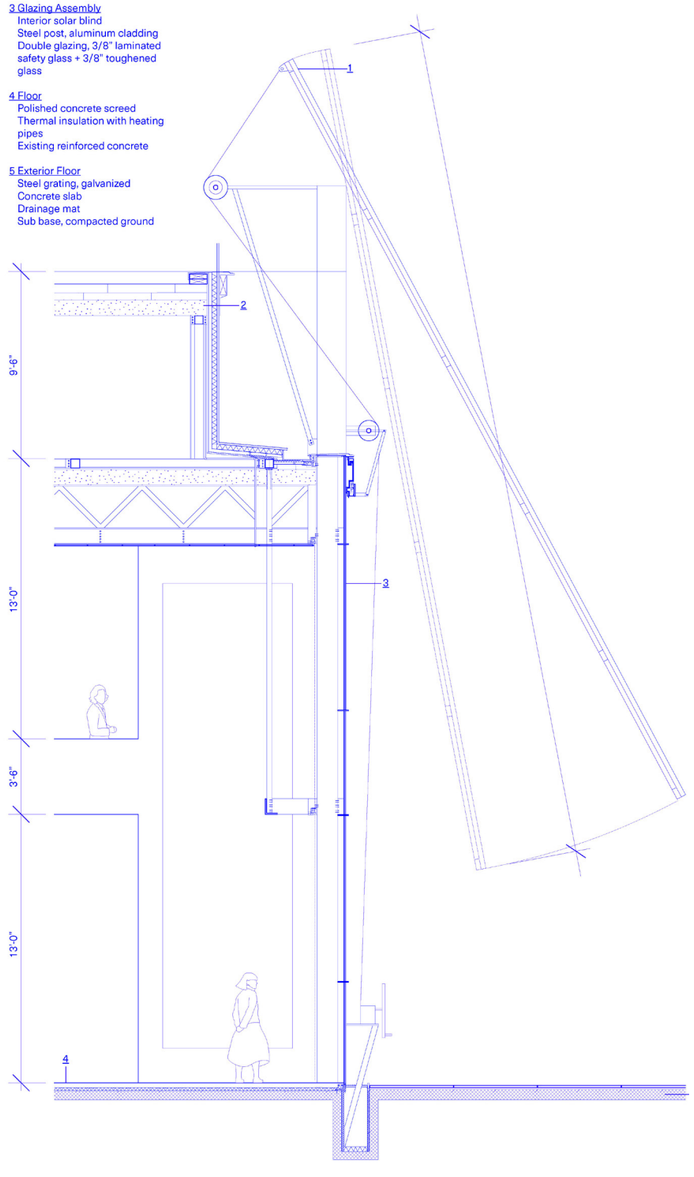
1 Shade Mechanism
Aluminum Panel
Steel Frame

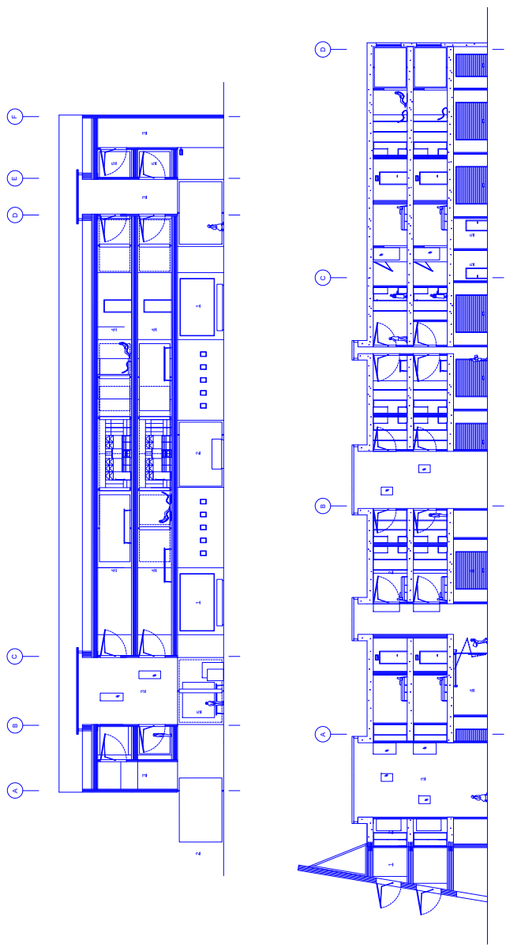
2 Roof
Roofing membrane
Gypsum roof sheathing
Two layers of polyisocyanurate insulation
Air/Vapor barrier membrane
Existing concrete

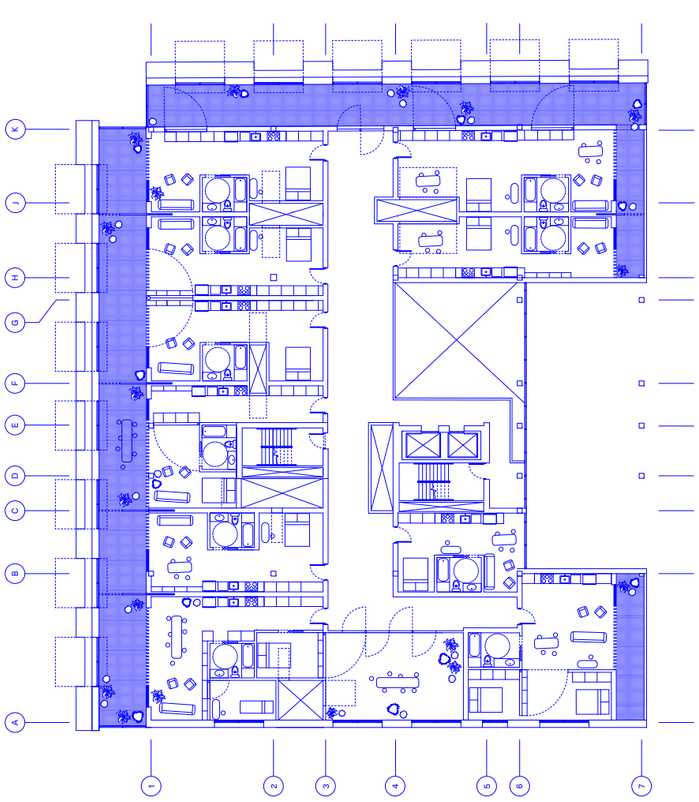
3 Glazing Assembly
Interior solar blind
Steel post, aluminum cladding
Double glazing, 3/8" laminated safety glass + 3/8" toughened glass

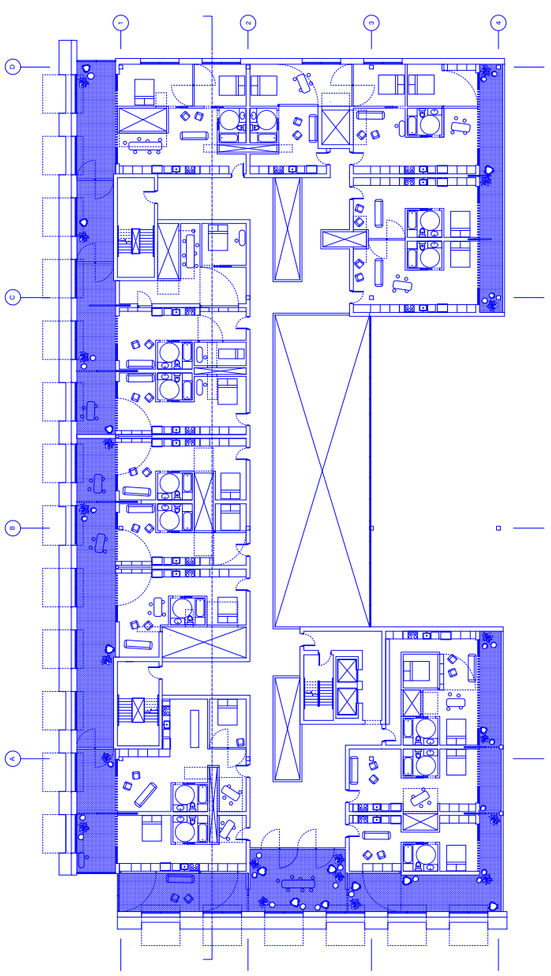
4 Floor
Polished concrete screed
Thermal insulation with heating pipes
Existing reinforced concrete

5 Exterior Floor
Steel grating, galvanized
Concrete slab
Drainage mat
Sub base, compacted ground









DISTILLERY 01

Distillery 01

Harvard University Graduate School of Design
Studio led by Eric Höweler (AU 22)
Site / Roslindale, MA
Rhino, Enscape, Illustrator, Photoshop, Physical Models

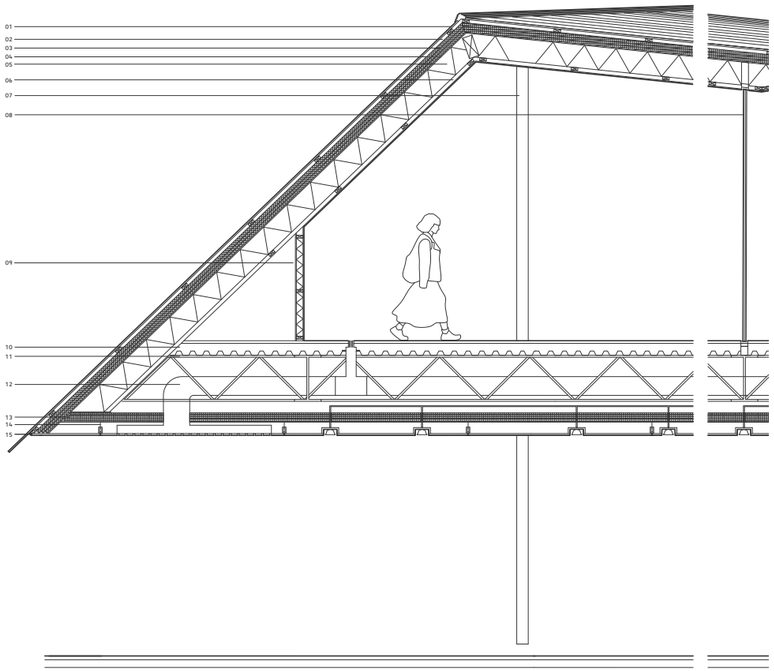
This project blurs the edge between industry + artisan, contrived + natrual, productive + unproductive. The distillery mediates between elements but ultimately focuses around the narratie of a product. Instead, the distillery can shift from the farse of a singular image of experience toward a gentler, more deferential expression of the balance between nature and industry. Negotiating edges of site, neighborhood, and temporality, Distillery 01 uses the roof as a performative examination of edge. Seemingly floating above the ground on a series of slender columns, the roof obscures production (hidden below ground) but ultimately opens and is eaten away by trees on the site . In culmination, The roof interacts with a series of “strings” - mechanical, circulation, plumbing and structural elements which puncture the roof line and create a folly-littered open plaza at the ground floor.

DISTILLERY 01

SITE MAPS

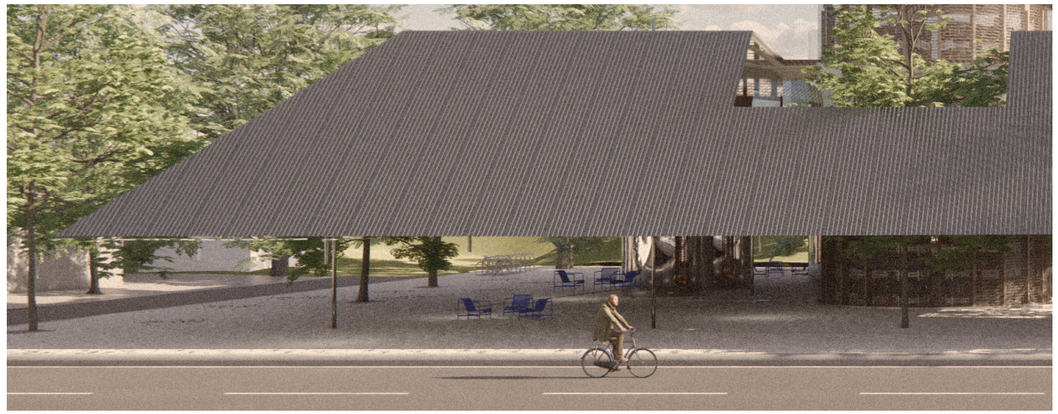
PUPPETEER - STRINGS - PUPPET

DETAIL SECTION 01

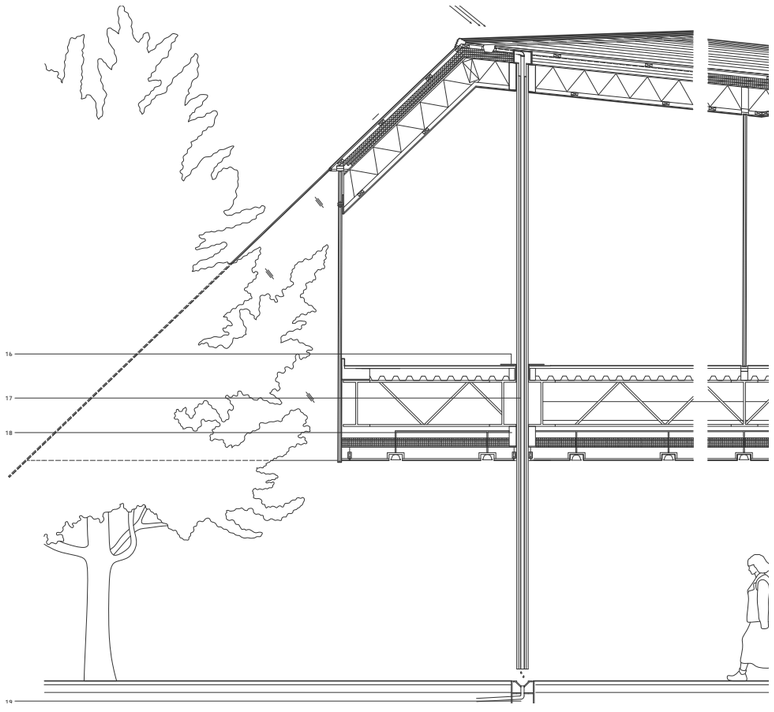


01 CORRUGATED METAL ROOF PANELS
02 TIMBER BATTENS, SPRAYED SILICONE ROOF SEAL
03 7.5" RIGID INSULATION
04 WEATHER MEMBRANE, SHEATHING BOARD
05 STEEL ROOF TRUSS
06 PLYWOOD SHEATHING, TIMBER BATTENS
07 PAINTED 1/2" GYPSUM BOARD
08 DRAINAGE PIPE, BEYOND
09 DOUBLE GLAZED CURTAINWALL, STAINLESS STEEL FRAMING 2X6 STEEL FRAMING, FIBERGLASS INSULATION, PAINTED 1/2" GYPSUM BOARD
10 CORRUGATED METAL ROOF PANELS
11 STEEL FLOOR TRUSS
12 HVAC SYSTEM, STAINLESS STEEL DIFFUSER GRILL
13 7.5" RIGID INSULATION, SHEATHING BOARDS
14 PANEL SUPPORTS
15 SANDWICH PANEL AT EDGE OF ROOF
16 STEEL ANGLE PLATE
17 COLUMN Ø6", STAINLESS STEEL CHS, 2" CONCRETE DOWNPIPE
18 STEEL PROFILE
19 STEEL PROFILE FRAME, FOOT PLATE, DOWNPIPE

WEST + SOUTH ELEVATIONS



DETAIL SECTION 02



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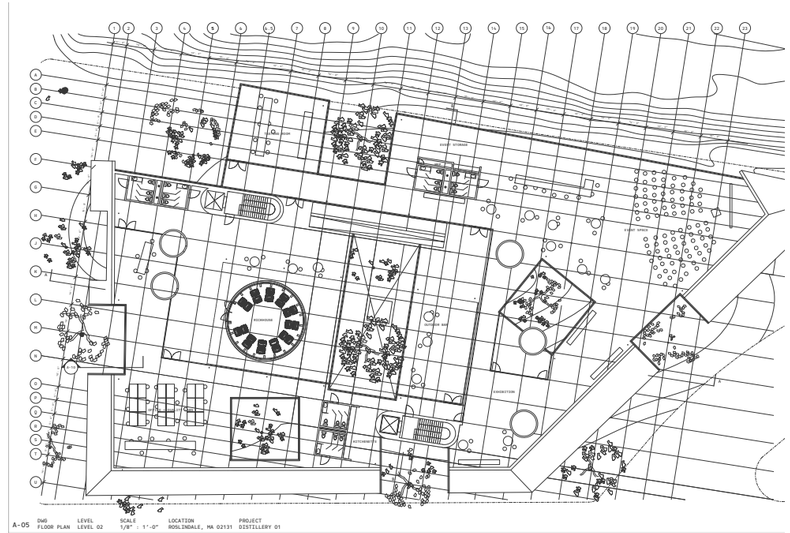
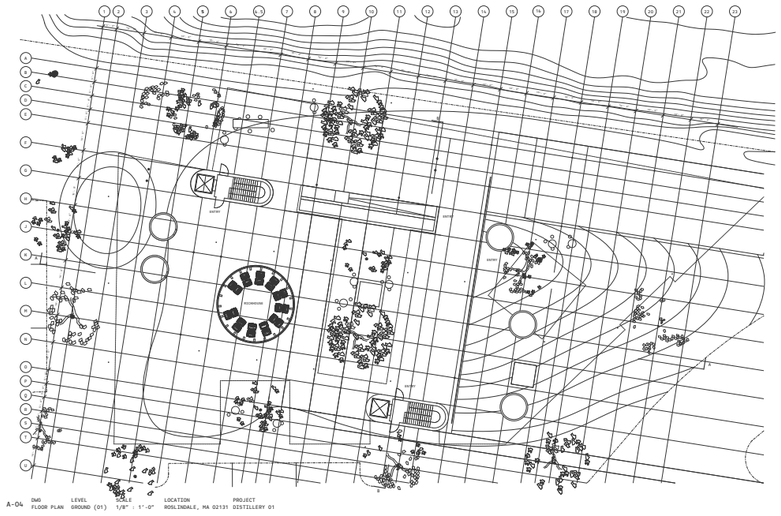


A-05 DWG FLOOR PLAN | LEVEL LEVEL 02 | SCALE 1/8" : 1'-0" | LOCATION ROSLINDALE, MA 02131 | PROJECT DISTILLERY 01



A-04 DWG FLOOR PLAN | LEVEL GROUND (01) | SCALE 1/8" : 1'-0" | LOCATION ROSLINDALE, MA 02131 | PROJECT DISTILLERY 01

SECTIONS

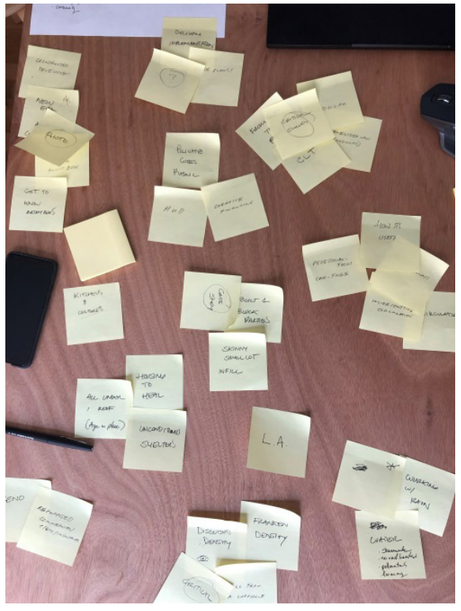
The State of Housing Design

Joint Center for Housing Studies
Co-edited by Sam Naylor, Dan D'Oca,
and Chris Herbert
Published November 2023

The State of Housing Design 2023 is the first book in a new series that reviews national trends, ideas, and critical issues as they relate to residential design. This volume examines recently built housing projects of notable design that address issues of affordability, social cohesion, sustainability, aesthetics, density, and urbanism. Through critical essays, visual content, and a crowdsourced survey of responses, it provides both designers and the general public with an overview of the forces at play in contemporary design of housing. The book launched with the State of Housing Design 2023, held at Harvard University's Gund Hall.

Book design by Normal

THE STATE OF HOUSING DESIGN



Question 1: Trends

In the last two years, what design ideas have you noticed the most in newly built housing?

Smaller
All Electric
Affordable
Modular
3D-Printed
5-Over-1s
Micro
Open
Home Offices
Large
Multi-Materials
Highly Efficient
Luxury
Adaptive Reuse
Alternate Energy
4/5 Stories
Age in Place
Higher Density
Timber
ADUs
Accessible
Passive
Expensive
Tiny
Wood
Modern
Amenity Spaces
For Families

The above list represents the most commonly mentioned topics in order of response frequency. The highlighted topics on size and density are what we heard most about.

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Here is what we heard about:

Size and Density

Code Official in Montana	"Smaller living space but more storage space."
Academic/Advocate/ Builder/Designer in Massachusetts	"Lack of verticality, acquiescence to neighborhood groups, even for projects at the periphery of neighborhoods and commercial districts."
Advocate in North Carolina	"The designs here in Raleigh, North Carolina, are more Miami-esque, meaning, they are tall/narrow in stature, built on small tracts of land, typically have a lot of natural lighting."
Designer in California	"Out of scale, malproportioned, out of context with surrounding neighborhoods."
Academic/Designer in Oregon	"Smaller residences, tiny houses, clustered developments and townhouses."
Academic/Researcher in Georgia	"Prefabricated structures sited in smaller infill lots."
Academic/ Designer/Developer in California	"In San Diego Co-Housing, multiple tenants share a space with one kitchen and living room. In some configurations, each bedroom has its own bathroom and main entrance, and the shared kitchen and living areas are centrally located."

17

Marginalia

Solar panels, electric-car charging stations, geothermal wells, mini-splits, heat pumps, smart switches/lights/panels/devices, tankless water heaters, battery storage walls, overhangs for summer solar shading: these are but a few of the relatively new elements that architects increasingly opt to creatively incorporate into their buildings to make them more resilient. These kinds of elements appeared often in the projects we surveyed and seemed integral to this book's broader themes. When it comes to resiliency, we might also include more native plants, better floodproofing, raised ground floors, and large indoor bike parking rooms (soon to be more fire-resistant for e-bikes and scooters). Other au courant elements were off-the-shelf truss systems, pre-engineered walls, integrated weather barrier sheathing, and many modes of modular offsite assembly, including a variety of pre-built A-frame cabins. Accessible details result in more step-free entryways, d-pulls for cabinets, door levers, and height-adjustable counters, cabinets, and desks. We might add that housing has become more colorful, with higher contrast, brighter exterior paints, more Hardie board, variation in planes, a lack of verticality, homogenous facades, random siding, sans-serif address numbers, casement windows, and the color gray. On the interiors, we heard rumors of more floating shelves in kitchens, open floor plans, open kitchens, open homes, inclusion of a community room, extra space for remote work, more natural light, larger continuous spaces, fewer foyers, lower furniture, more bathrooms, five-inch baseboards, one-piece shower pans, in-law suites, dual-color casework, more amenities, guest units for rent, micro-units, large tiles, storage built into closets, subway tile, birch wood, and white walls.

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Axonometric Fragments

a Off-the-Shelf Truss
b Height-Adjustable Desk
c Accessible Shower
d Integrated Weather Barrier Sheathing
e Mini-Split
f Sans-Serif Address Numbers
g Drawer D-Pull
h Solar Panels
i Five-Inch Baseboard
j Casement Windows
k Door Lever
l Subway Tile
m Native Plants
n Electric-Car Charging Station

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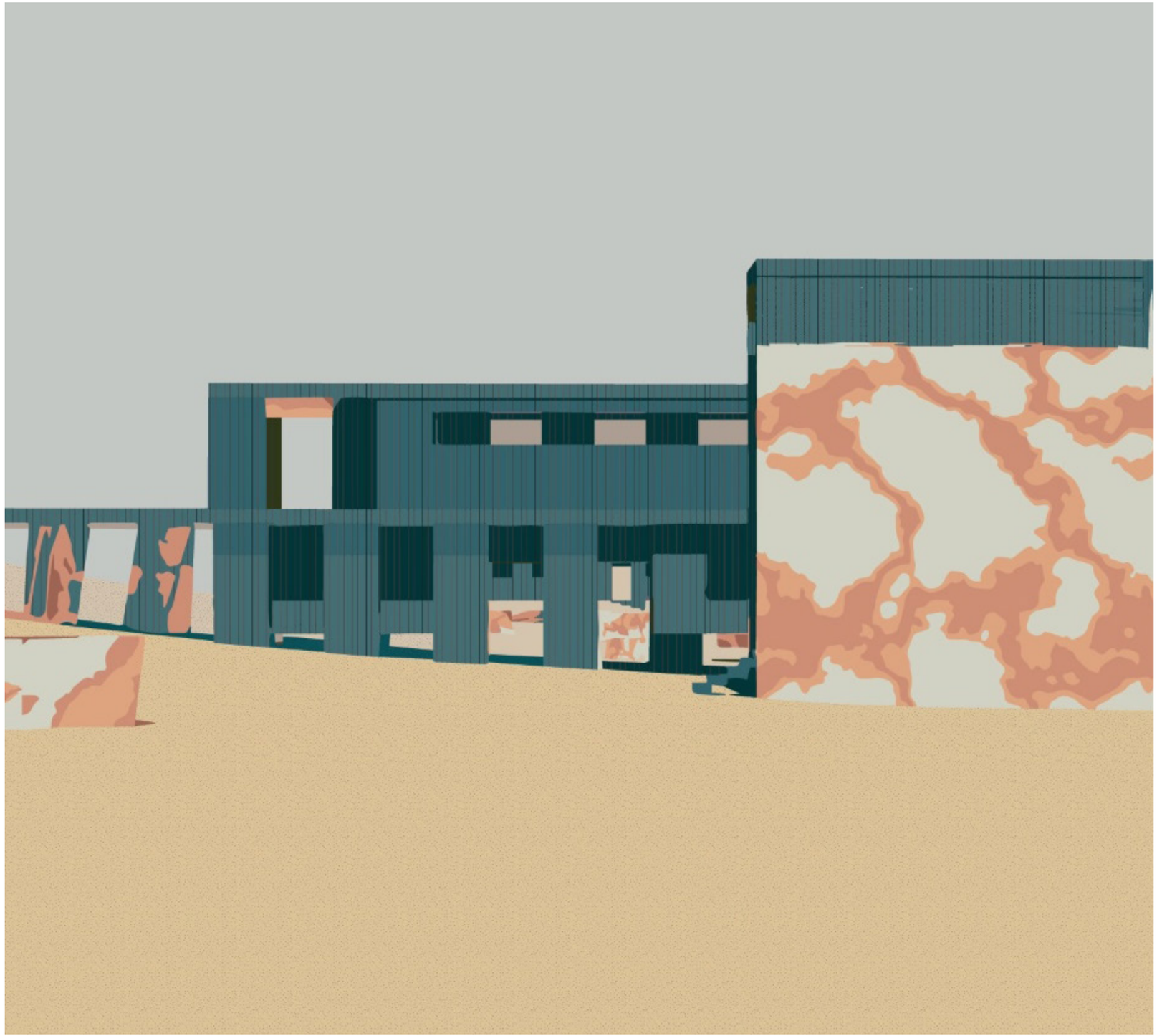
Bleak + Extravagant

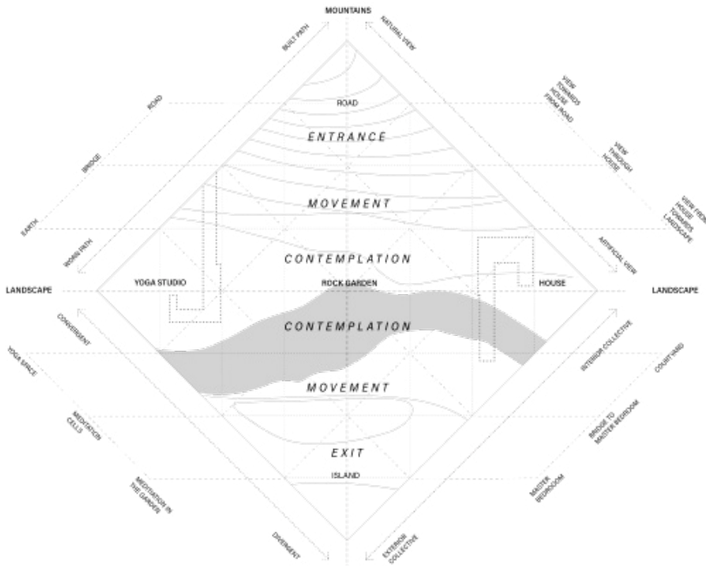
ARCH 3420
Studio Instructed by Kay Bea Jones
Site / Albiquiu, New Mexico
Rhino, Vray, Illustrator, Photoshop

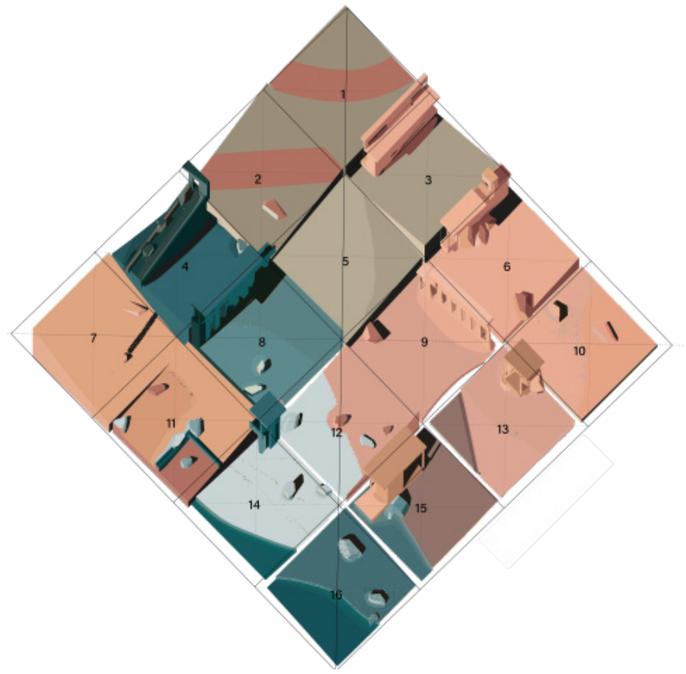
Exploring an arrangement of both vast space and close relationships, this remote New Mexico compound of dwelling and yoga studio studies the extremities in the built environment. The project interfaces seemingly opposite conditions: the expanse of landscape and the object-ness of the house, the built and the unbuilt, the serious and the playful, the aimless and the directed, the individual and the collective. Through the careful study of color, changes in the landscape are reflected clearly through the passing of light through each day. Graphic representation becomes the main means of exploration and provides an opportunity to dwell on an inherent image-making process when designing buildings. Make it picturesque! In turn, the desert landscape and built environment expand into a larger dialogue of the intersection of image and architecture.



BLEAK + EXTRAVAGANT

DIAGRAMS

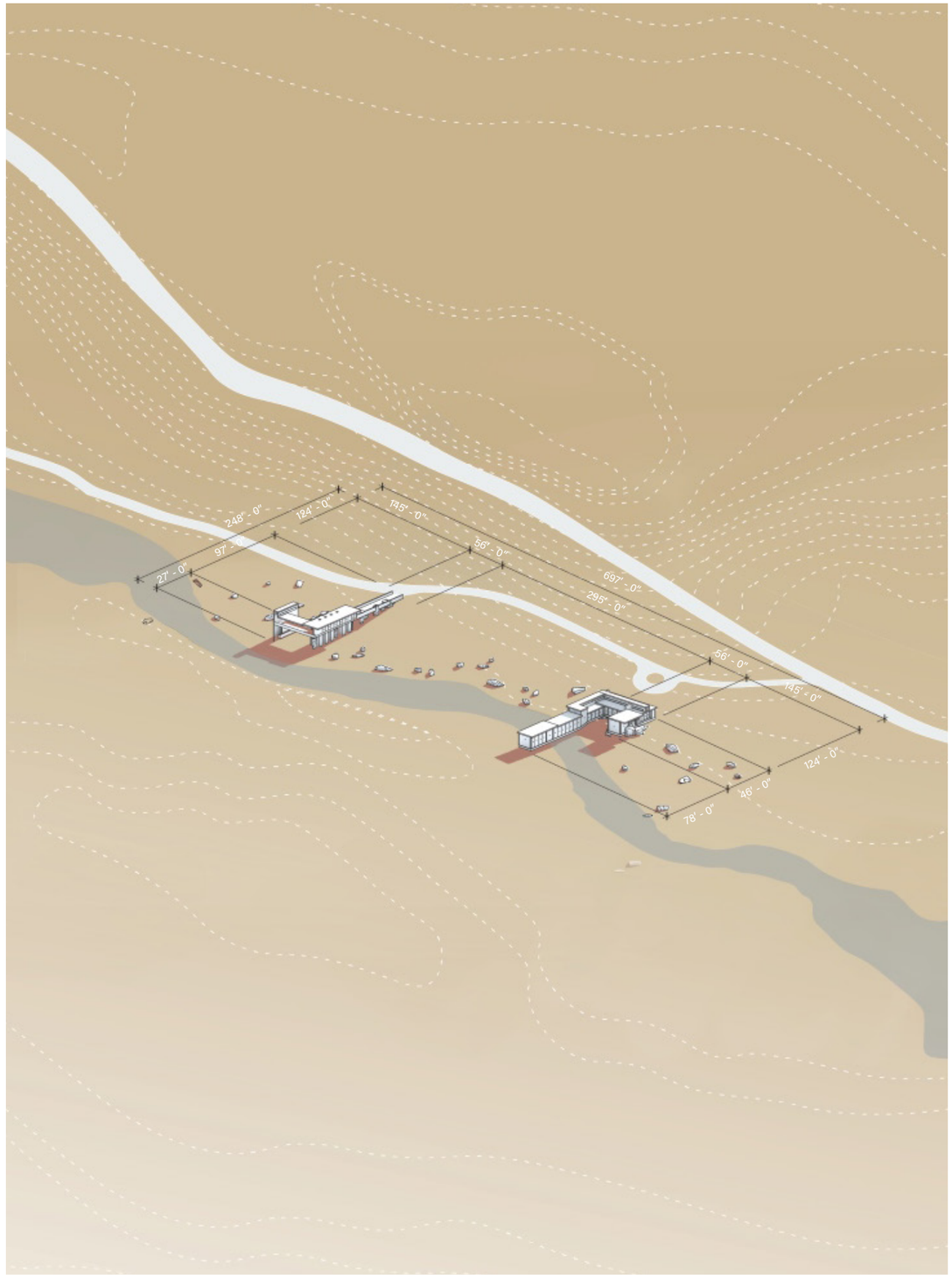


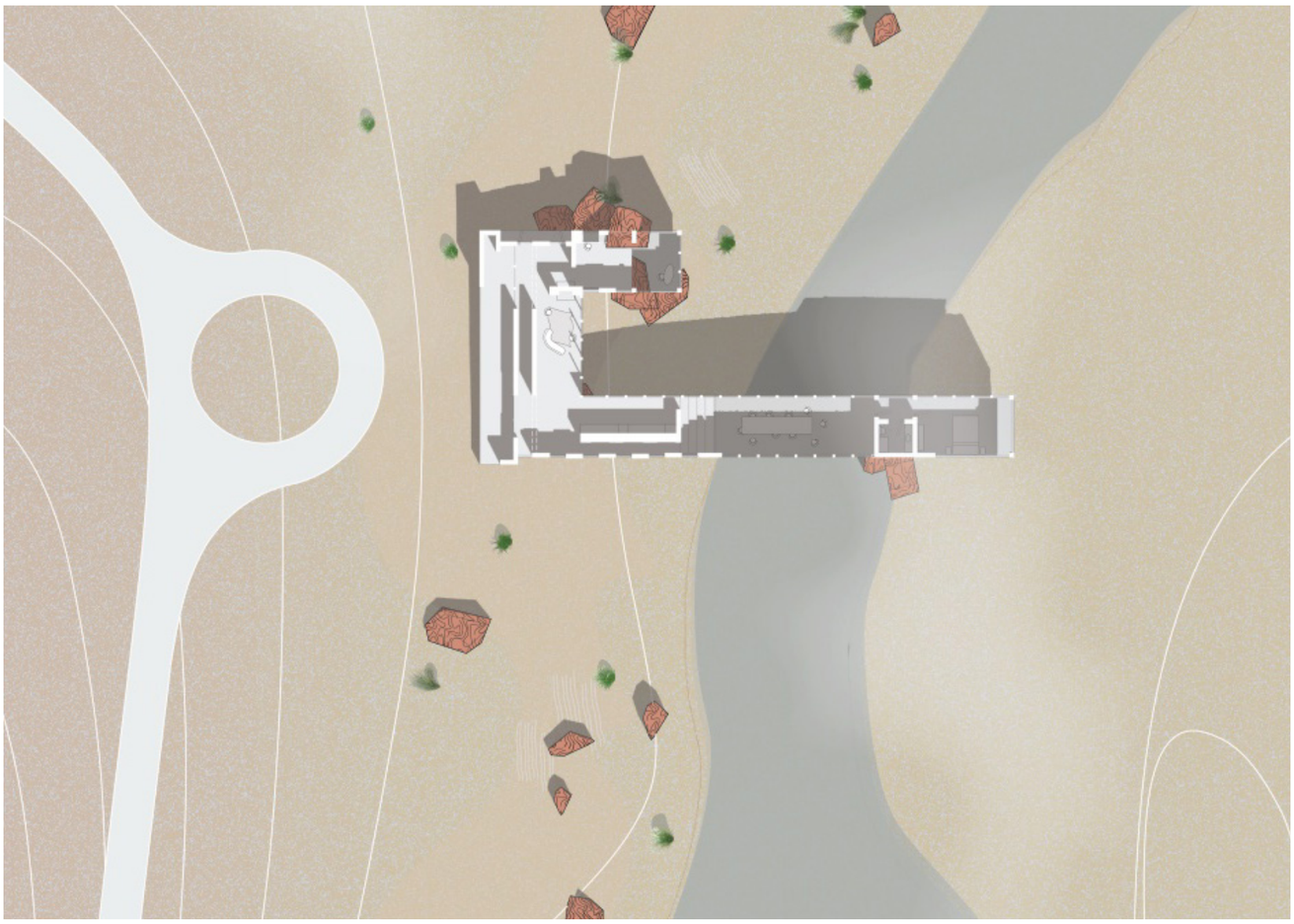


FROM IMAGE TO OBJECT TO LANDSCAPE

The desert landscape acts as an expanded field for the built environment within the natural environment. Progressing through the site, the built environment encounters new programmatic concerns and moments of reflection. Just as the user moves through a yoga practice, a specific procession of spaces and views scripts a practice of reflection as a discrete object with in a seemingly undefined vastness.

SITE PLAN





OSU INTEROTTA

OSU Interotta

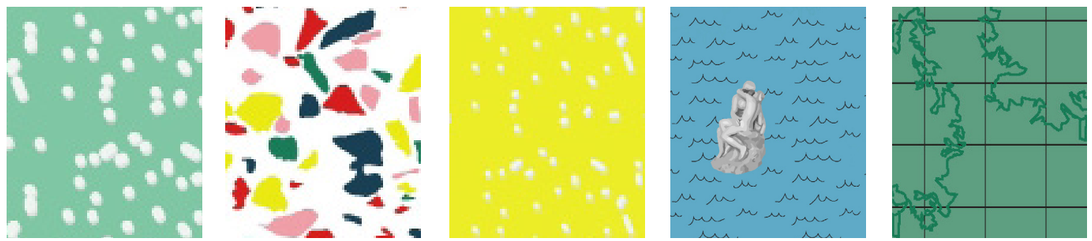
The Ohio State University
Seminar Instructed by Emily Mohr + Jonathan Rieke
Installation in Knowlton Hall
Rhino, Vray, Illustrator, Photoshop

This semester-long seminar focused on the high density drawing as a close reading of architectural drawing technique and its history within the context of maps and architectural vignettes. Precedents ranged from the early works of John Soane and Giovanni Alberti Piranesi to contemporary examples such as Jimenez Lai and Jennifer Bonner. The seminar culminated in a reconsideration of the 1978 Rome Interrotta which brought together 12 international architects to re-imagine the 1748 Nolli Map through a peculiar prompt of designs in which the space was non-existent (or no longer existent). The answers to the prompt addressed not only the question of the appropriation of designs, but also the boundaries of techniques such as projection and collage. The OSU Interrotta played with the same notions as the Rome Interrotta, tasking each student to reimagine a portion of a 1970's campus map of The Ohio State University. The result casted a larger than life projection of the campus 100 years into the future.

OSU INTEROTTA

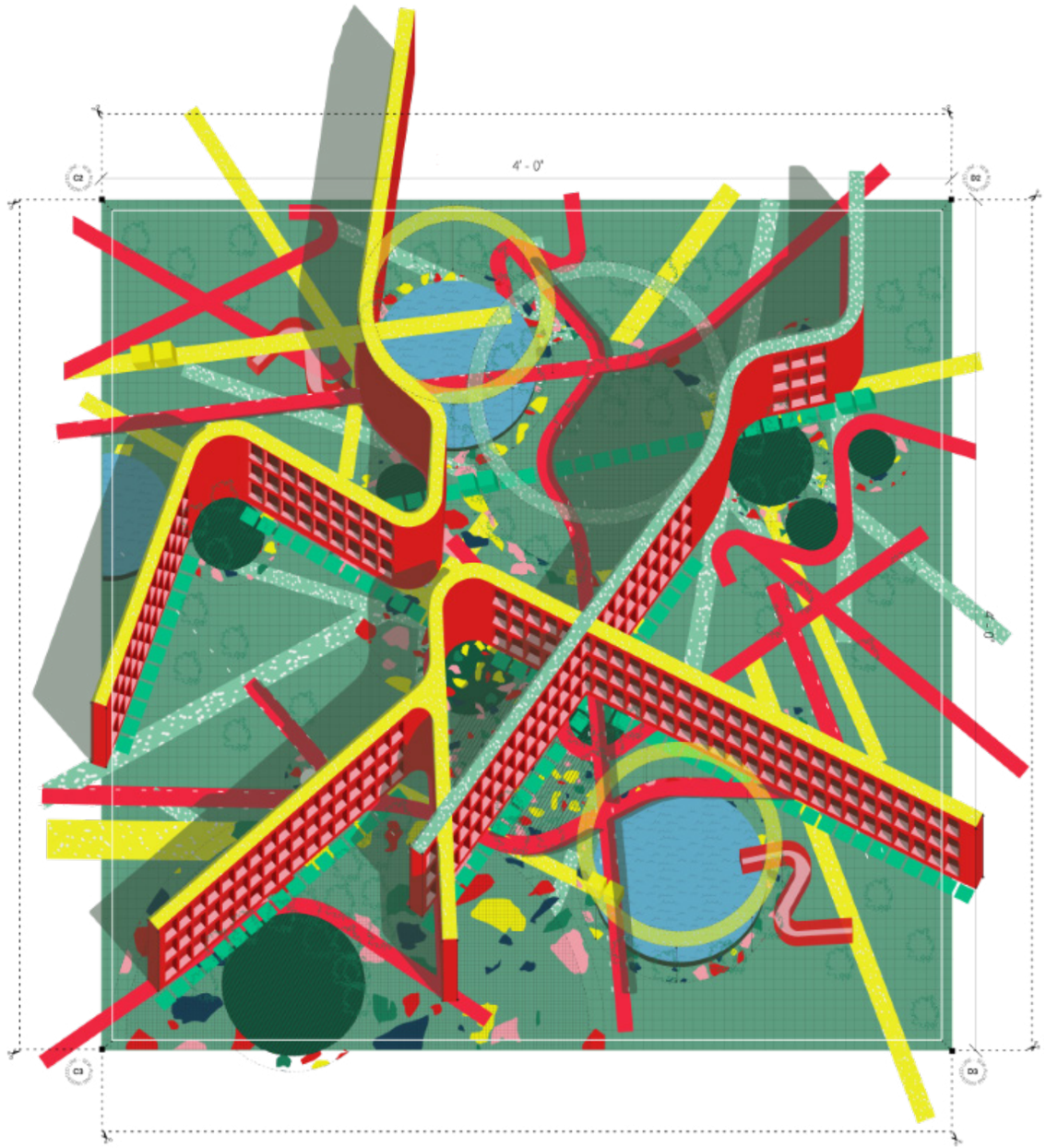
SOURCE MAP + SWATCHES

Original 1970's campus map and individual section close-up



BUILDING A KIT OF PARTS

In addition to advancing an individual drawing, the seminar tasked students with creating a kit of parts exemplifying a particular drawing style. The swatches above are a reflection of this kit and are used as patterns throughout the individual Interotta contribution as a play on the natural becoming a representation of itself.



INDIVIDUAL PRINT

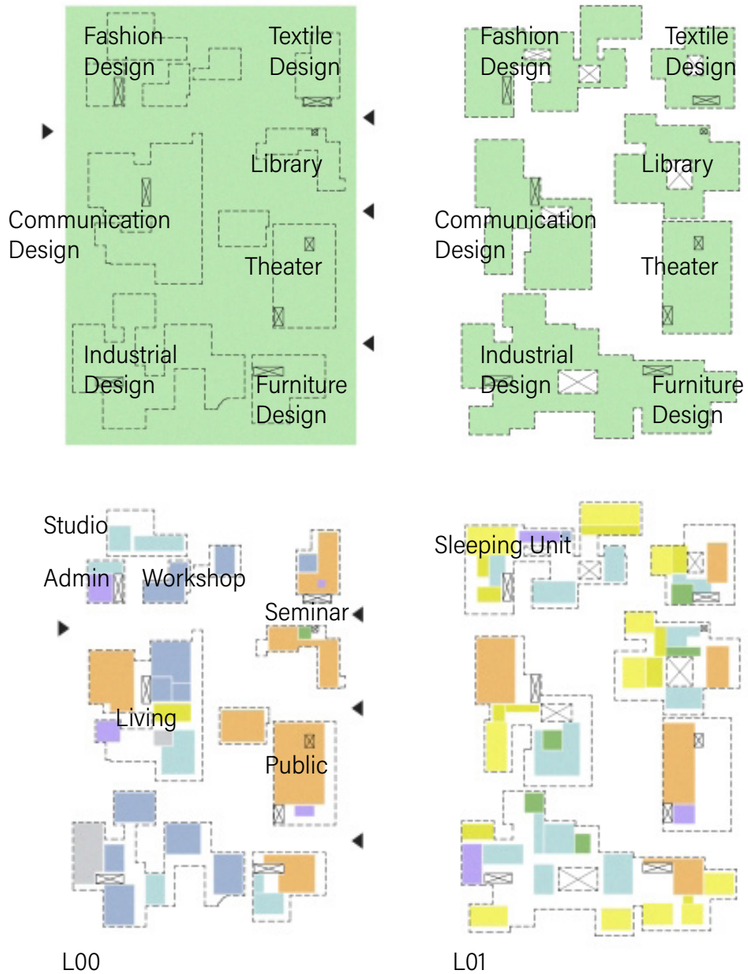
Puddled Pedagogies

Harvard University Graduate School of Design
Studio led by Li Hu + Wenjing Huang
Site / Chongming District, Shanghai, China
Rhino, Vray, Illustrator, Photoshop, Physical Modeling
(partnered project- all media an exclusive effort,
Renderings in collaboration with Kirsten Sexton)

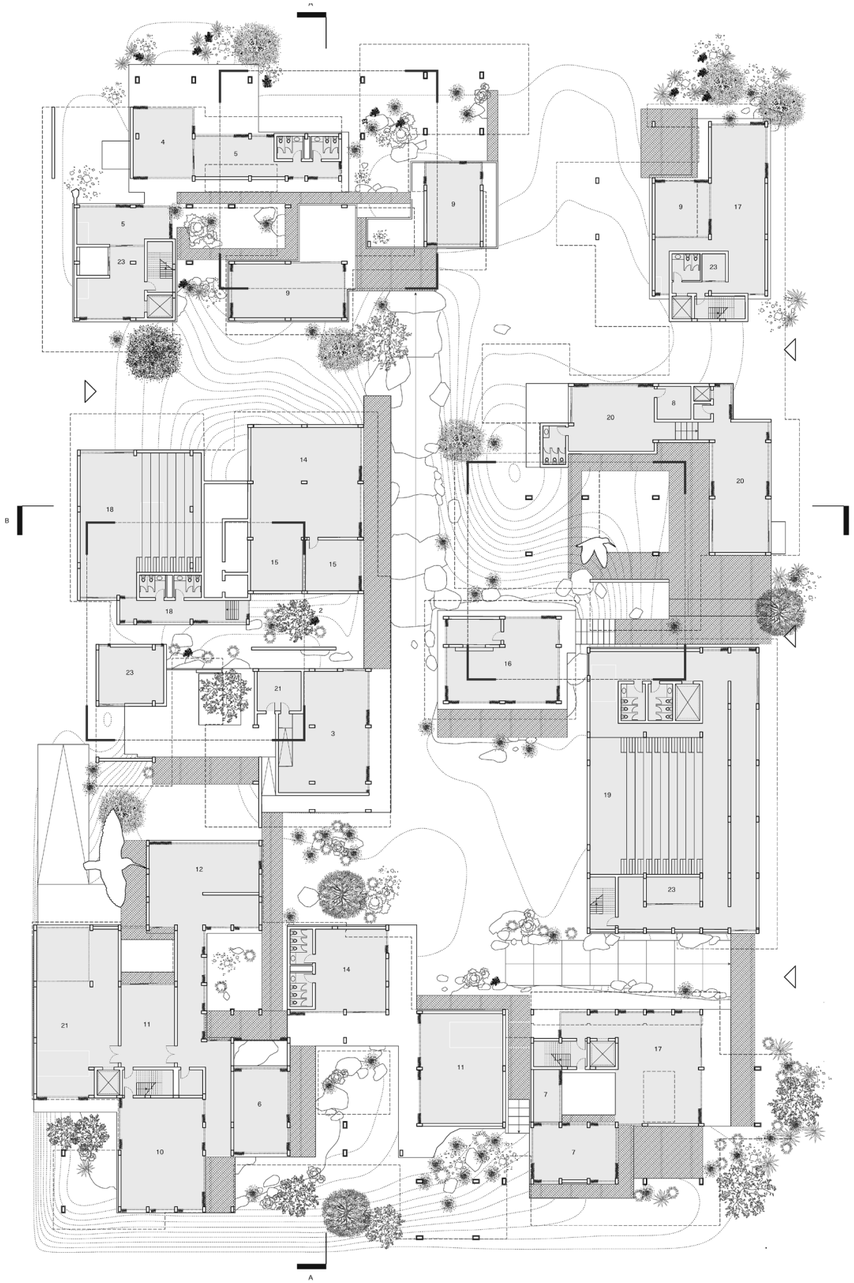
Design schools need to take a deep breath. Breath in fresh air and ideas, inhale their surroundings and people from many places, and release something beautiful, vibrant back to the world. Migrating to school is a destination on a long journey; a transition. We learn how to synchronize rhythms of making and living, for ourselves and with others, nature and designers in community. As such, the project cultivates an environment for designers of all species to thrive: a new kind of symbiotic design school, akin to an artist residency village. This school purposefully slows down and intermingles making and reflecting, where students return to instinct, feeling, and exploring the unknown. The pressure releases because nothing is precious, everything is in progress. The school acts as a garden for the campus, an ever-evolving and unfolding experience for both student and visitor. Students move through the canopied landscape, providing both depth and breadth to the educational journey. Not just a campus building - a designer's theater in the forest - mediating ecologies of making, living, and exhibiting.

PUDDLED PEDAGOGIES

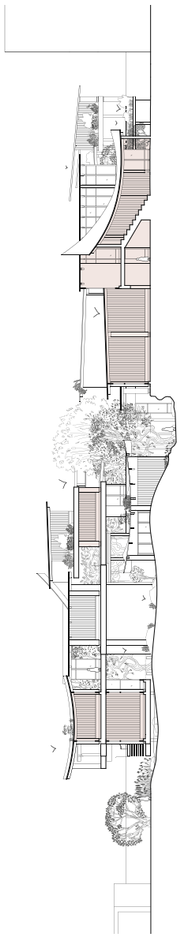
PROGRAM DIAGRAMS



The School acts as a garden for the campus, an ever evolving and unfolding experience for both student and visitor. Students move through the canopied landscape, providing both depth and breadth to the educational journey. Within Department Canopies, students travel between work and home through restorative landscapes. At the ground floor, porous workshops and public programs land the theater of making. On the above floors, dwelling, sleeping, making and exhibit mingle in a skyward landscape.



FIRST FLOOR PLAN



Research Building 4

NBBJ
DD - 50% CD Documents
Site / Columbus, OH
Rhino, Enscape, Illustrator, Photoshop

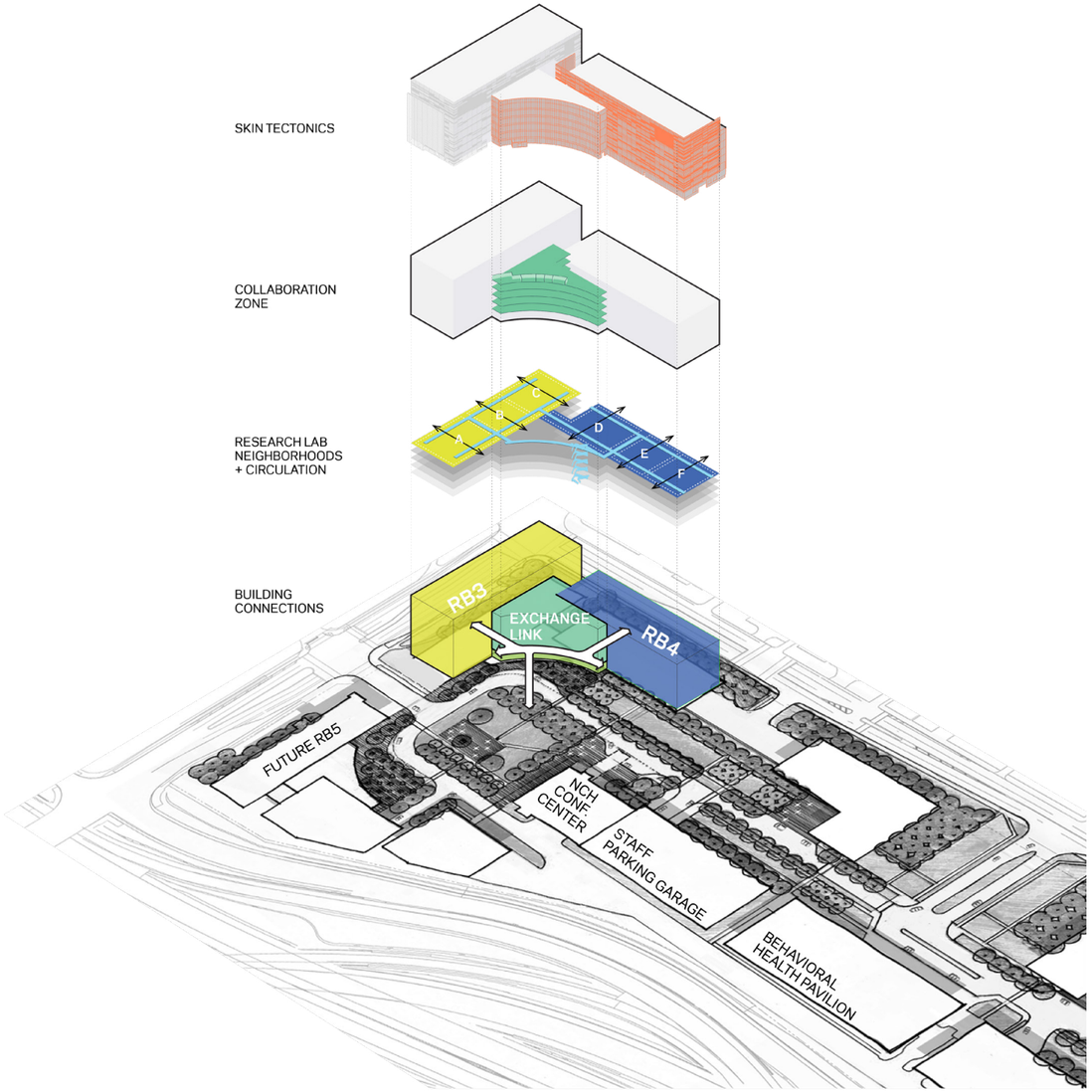
NBBJ has a long and trusted relationship with Nationwide Children's Hospital in delivering research and medical facilities for one of the largest and most awarded not-for-profit free-standing pediatric healthcare systems in the US. Research Building 4 is currently being delivered as part of a larger master renovation of the Hospital's downtown campus. RB4 adjoins to RB3, built by NBBJ in the early 2000s, and will fulfill growing research and administrative needs due to the expanding campus. The addition addresses an increased turn towards collaboration and networked research models. The curved "collaboration zone" stitches two facilities with common meeting rooms, open collaboration spaces, and dining spaces. The "collaboration zone" also addresses Nationwide Children's Hospital sustainability efforts through a calculated frit pattern and fin shading strategy to reduce energy costs while prioritzing access to light and views towards downtown Columbus.

Image used with permission.

NATIONWIDE CHILDREN'S HOSPITAL RESEARCH BUILDING 4

INHABITING THE CURVE

Connecting the existing Research Building 3 to the new Research Building 4, The central curvature brings researchers from both buildings together in collaboration. At the ground floor, the curve creates entry and is flanked on both ends by warm moments of wood coves. Nationwide Children's Hospital's iconic terrazzo winding floor inlay is softened to welcome the adult inhabitants of RB4 while making a playful reference to the Hospital's network of child-centric interiors. On the floors above, the central curvature houses enclosed meeting rooms, semi-private collaboration zones, and open kitchenettes.



LAYERING CONNECTIONS ACROSS SCALE

At a community level, RB4 anchors the West campus edge and heads a vital campus green space. Within the building, RB4 acts as a continuation to RB3 through the Exchange Link. Internally, the Collaboration Zones housed in the Exchange link connect various research neighborhoods through a central feature stair. Skin tectonics dress the interior connections to local daylighting goals and views towards downtown Columbus.

NBBJ ANTI-RACISM INITIATIVE

Columbus Conversations

2020-2021
NBBJ Sponsored, in partnership with Stephen Clond
Self - initiated
Mural, Illustrator, Excel, Smartsheets

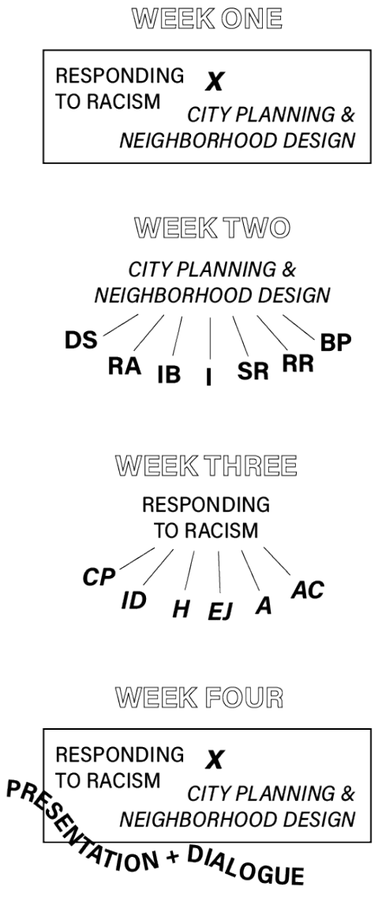
As part of NBBJ's commitment to Anti-Racist measures as an integral practice of company culture and methodology, the Anti-Racism Taskforce was founded. The taskforce collated desired actions, provided educational opportunities from estabilished experts, and built a large framework for the firm's ongoing equitable retooling of the practice. Within the scope of the Anti-Racism Taskforce, Columbus Conversations was developed as a response to the need for candid conversation and continued education of an Anti-Racist Architecture at a studio level. The series engaged the participants at an intimate scale through a multi-dimensional learning and discussion model. This model was developed around conducting conversations as a research tool and encouraging meaningful conversation directed towards building understanding and pressing towards design solutions. As the series unfolded, insights were documented, shared, and synthesized to become methodologies and artifacts of an Anti-Racist Architecture in practice.

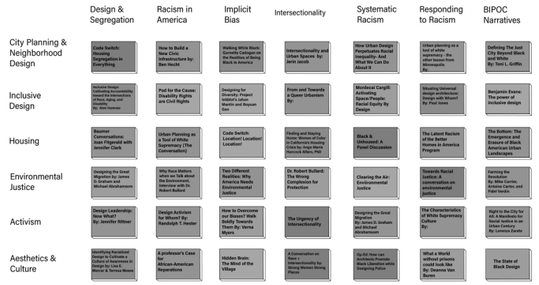
01GROUP FORMATION

Group formation centered around creating enough variants in topics while allowing for an interchange of information across groups. Each participant was sent a survey guiding them through their desired media choice, a "focus theme" through which they would analyze the media, and a "cultural lens" as prompts to their selected themes. Each end point in the survey corresponds to a group on the full resource matrix. Their focus themes and cultural lenses also determined which "cross cutting" sessions they would attend.

02 SERIES CYCLE AND PROGRAMMING

The program relies on a 4 week cycle of individual group meetings, two rounds of "cross-cutting" sessions where information is shared across themes and cultural lenses, and a final week of synthesis in the form of a panel, charette, or studio-wide dialogue.

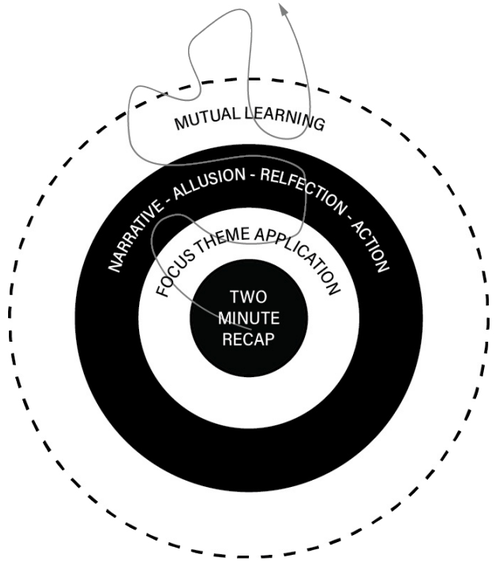




full resource matrix

03 DIALOGUE TOOLS

Although each dialogue session is to remain open-ended, a kit of tools was developed to encourage thorough analysis and invite productive conversation. Each tool highlights a specific mode of investigation into the resource. Groups are encouraged to meander through each tool.



NBBJ ANTI-RACISM INITIATIVE

Instructions for a Wooden Stool

Core II (Materials)
Instruction led by Jonathan Grinham
Site / not applicable

As part of the Materials instruction, students are tasked with investigating a material through the making of a stool. Materiality is pushed through its perception and manipulation. In addition, students are tasked with drawing out the life cycle analysis and making costs of producing the stools. Final projects were displayed in a “science fair” style review, encouraging posters.

INSTRCUTIONS FOR A WOODEN STOOL

PROCESS POSTER

How to Build a Wooden Stool

GROUP 4

Evan de Lara
Lilly Saniel-Banrey
Vivienne Shi
Juno Zhu

PROJECT DESCRIPTION

The wooden Socket Stool evokes a heightened sense of materiality by, paradoxically, disrupting the very materiality of wood. Patterns are strategically inscribed to the wooden seat to disrupt the reading of wood, while the connecting mechanism between the seat and legs mimics the organic socket-and-ball connections in the human body. The outcome is a wooden stool that defies expectations: square, homely, and highly practical with a mortise-and-tenon structure, which have been too often associated with wood furniture in general. The considerable uses of recycled materials and wooden ready-mades imply a potential of this design to have a low overall carbon footprint: it is created with used materials in mind, while it will be eventually recycled to inspire future projects.

MATERIAL BIOGRAPHIES

Recycled plywood sheets are used to fabricate the the seat. They are laminated and then milled using the CNC router. The plywood used for this stool are wastes from the Krzysztof Wodiczko exhibition in Druker Design Gallery which has just concluded.

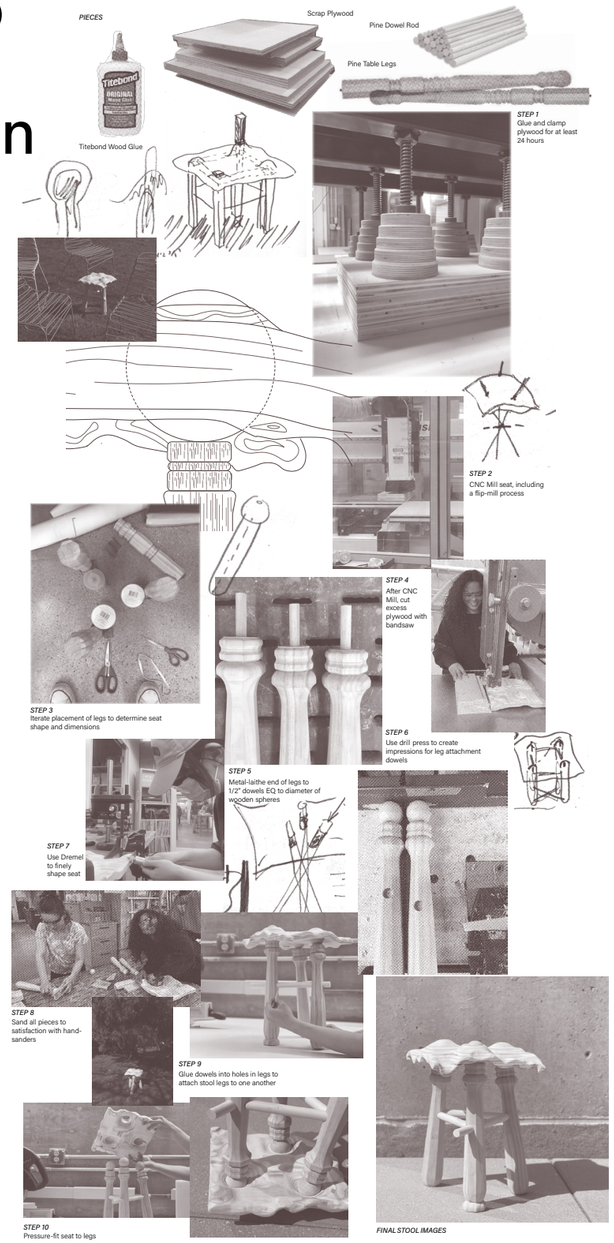
Staircase spindles as ready-mades are adapted into stool legs, giving clues to how the sockets in the seat should be designed. While staircase spindles were purchased for this particular stool, old staircase spindles could be recycled for iterations of the same design in the future.

Wood glue is used for laminating the plywood. The connection between the seat and legs uses dowels in a guise of the human socket-and-bone connection.

PROCESS REFLECTIONS

Making stools and being mindful of material and system use is not easy! The design changed as the process divulged (and became more iterative) based on issues that were unforeseen in the beginning. In creating the stool and being mindful of the materials, it would be an interesting experiment to track the energy use within the design process itself: time spent getting help from staff, miles driven to hardware stores, energy of tools used to shape and shape and cut.

Aesthetically, precision is a skill and requires more than one iteration. Future iterations would look further into stool design to work out angles of legs, making jigs, and assembling of the the supports between the legs.



How to Analyze the Life Cycle of a Wooden Stool

GROUP 4

Evan de Lara
Lilly Saniel-Banrey
Vivienne Shi
Juno Zhu

SOCIAL LIFE CYCLE ANALYSIS OVERVIEW

All three countries involved in the production of the socket stool are formidable political and economic bodies: China which supplies the plywood, Canada which supplies the pinewood, and the US which supplies the glue and where manufacture takes place. Domestically, human rights and social issues are concerning in all three big countires. Internationally, geopolitics and the current weakened state of globalization could greatly impact the global supply chain and thus the time and cost of stool production.

CONCERNS AND ACTIONS

Community: human rights in China are tied to the larger political milieu and how individual rights could be compromised in such a framework. It has been manifested saliently in the recent lockdown of Shanghai where people are not allowed to get out of their house, forced into government-organized quarantine, and where inflation is rampant. Shanghai Port has been operating at half of its capacity for a month, causing a world-wide supply chain trouble as more time and cost are needed for global ocean freight. As a solution, using more locally sourced materials would not only eliminate carbon footprint, but also make the design more resilient against global supply chain crises. Campaigns and education could be promoted so that the general population have a higher awareness of their own rights.

Workers: Workers in both China and US could earn more rights and protection, and especially in this case since wood factory workers in China and glue plant workers in the US face uncompromising natural and indoor environment. Minimum wages should be established or raised. For workers in hazardous working conditions, company-provided insurance should be mandatory. Workers' unions should be allowed to established.

Society: All three countries involved are big countries, where issues of corruption and bureaucracy, significant ecological footprint, and social instabilities are usually more salient. There could be more initiatives for transparency in government activities and actions to control corruption. Policies should be made to encourage or require low-carbon footprint materials and manufacture methods to be used. For example, British Columbia has committed $19 million to increasing carbon stored in B.C. forests through indigenous-led low-carbon systems.

- Worst Case 565,972 miles (148 trips)
- As-Built 461,806 miles (121 trips)
- Base Case 214,236 miles (56 trips)
- Best Case 202,083 miles (53 trips)

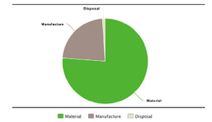
Visualize the Impact of Mass Production

Mass Producing the Wooden Stool (5000 stools per year) will cost in terms of Flight Mileages and Number of Trips Between Boston and Zürich*. That's a lot of exchange students to ETH every year.

Carbon emission per trip (550kg) retrieved from Google based on Swiss Air Lines LX53. Mileage data (3825 miles planned per trip) retrieved from FlightAware based on Swiss Air Lines LX53 .

Find the Base Case Material Breakdown

The plywood seat will cause the most carbon footprint (4.5 kg, 94.2%). It is not only because plywood makes up most of the total mass of the stool (31 kg out of 3.6 kg), but also probably because it is sourced from China, where the manufacturing technology is not the most efficient and environmentally friendly.

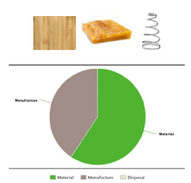


Plywood (1.069 kg)
Birch Dowels (0.430 kg)
Rubber Band (0.000127 kg)
Stainless Steel Spring (0.000029 kg)

Find the Best Case Material Breakdown

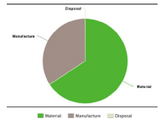
Natural, locally sourced materials have a lower overall carbon footprint. Meanwhile, the End of Life Potential is key to the overall carbon footprint of the stool. With the changes in end-life usages to either recycle or reuse, the end of life carbon potential of all materials used is (-8.4kg), which makes the total carbon footprint 5.82kg, while cutting the overall energy used almost half in comparison to the base case.

Bamboo (1.5 kg)
Natural Rubber (0.000127 kg)
Stainless Steel Spring (0.000029 kg)



Find the Worst Case Material Breakdown

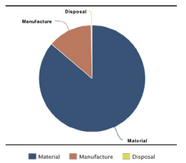
Replacements of materials that are produced via chemically intense processes induce a significantly higher carbon footprint.



Phenol formaldehyde (1.5 kg)
Ethylene Vinyl Acetate Rubber (0.000127 kg)
Nickol Alloy Spring (0.000029 kg)

Find the As-Built Material Breakdown

A great amount of plywood was used in the actual production since the seat was carved out of a big chunk. It substantially increases the overall carbon footprint. The rubber bands and springs are taken out due to structural issues in the original design. Russia and Thailand are no longer involved in the production of the stool. It changes the social LCA significantly, since the Ukrainian-Russia War has notably impacted global ocean and air freight routes. Workers and societal instability in Thailand, likewise, are not in the scope of analysis anymore. The end-of-life potentials of all components are changed to reuse, thus greatly eliminating the overall carbon emission by 81.5kg.



Plywood (8.82 kg)
Pinewood legs and dowels (0.444 kg)
Stainless Steel Spring (0.000029 kg)

Trace the Material Through Production

LIFE CYCLE ANALYSIS POSTER