CELIA CHAUSSABEL

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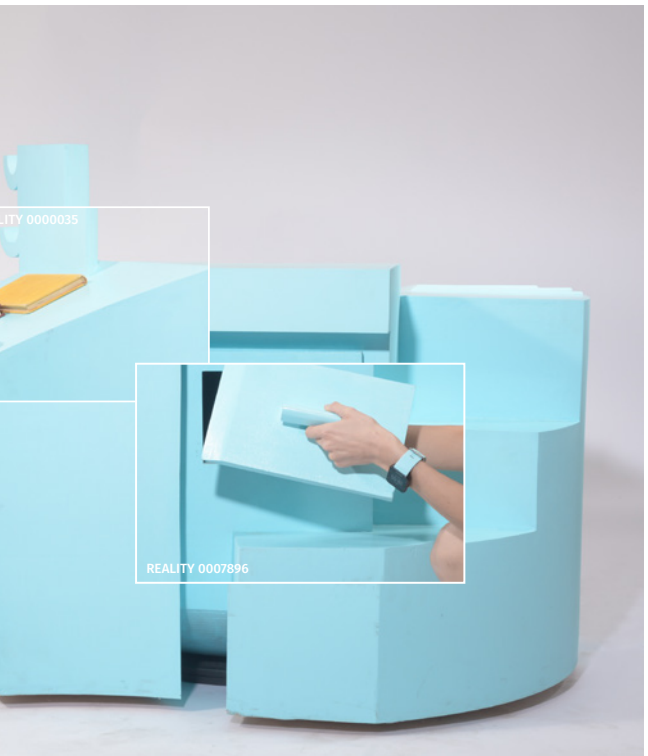
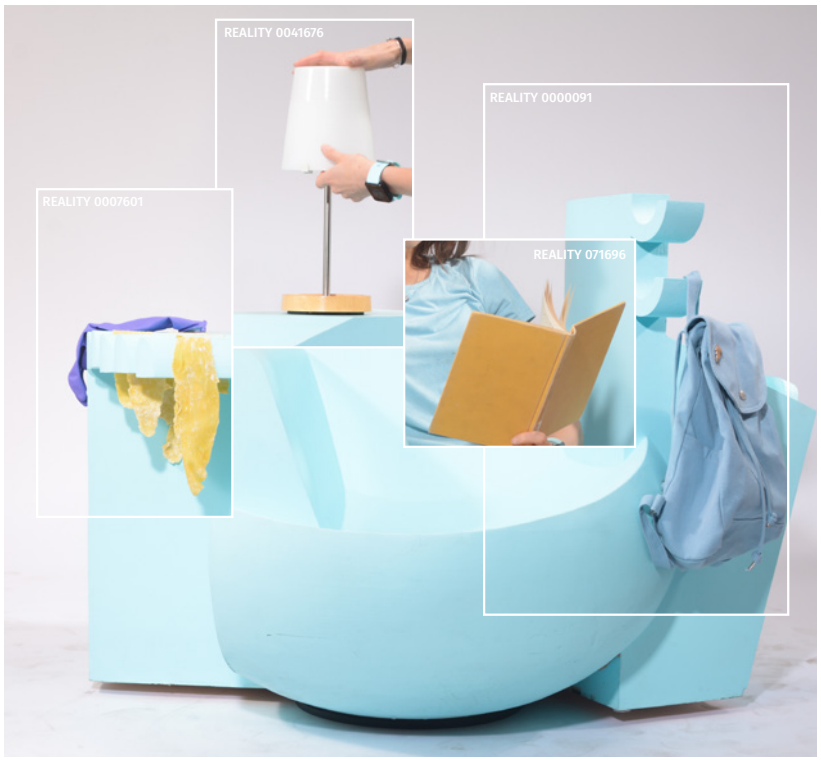
206-359-1734

SMArchS Architectural Design





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PROFESSIONAL EXPERIENCE

ROTOR, Brussels
Material reuse research, Nov 2022-present
- Research and analysis of ten projects in Europe that were designed and built with salvaged materials. Calculation of reuse rates by building layer (skin, structure, services, space plan), analyzing which layers pose the most challenges to reusing materials and why. Development of graphics and drawings to communicate this analysis to clients, contractors, and architects for implementation in future projects. Findings will be published this year as part of the European government-funded project, FCRBE: Facilitating the Circulation of Reclaimed Building Elements.
- On-site material inventories of buildings in Brussels that are slated to be demolished. Evaluating the reuse potential of their materials

LEWIS.TSURUMAKI.LEWIS ARCHITECTS, New York City
Project manager and designer, February 2021-Oct 2022
- "Manual of Biogenic House Sections" book, published by ORO Editions
  Drawings of fifty-five houses that use low-carbon strategies in sectionally interesting ways. Modeled and drew the houses; researched and diagrammed material life cycles for the introduction of each chapter; developed an embodied carbon estimation methodology and calculations for ten of the houses; managed the graphic design and delivery of the book files to ORO; communicated with architects for redlining of drawings.
- "Five Biogenic Houses"
  On a team researching and developing speculative house designs to expand on the architectural, spatial, and structural possibilities of building with biogenic materials. The two houses I designed had a focus on the pairing of load-bearing jumbo straw bale construction with spans and stabilization from CLT.
- "Biogenic House Sections" Exhibition, Princeton University, Oct-Jan 2023
  Led the design, fabrication, and installation of a traveling exhibit for the Manual. The exhibition displays spreads from the book, drawings and one-to-one mock-ups of the five biogenic house designs, and a selection of building materials organized by their amount of embodied carbon.

IWAMOTOSCOTT ARCHITECTURE, San Francisco
Designer, July 2019-February 2021
- Exhibition Pavilion in Chengdu, China: new construction
  Design team member from concept to CD phase. Led the design of the ground floor, landscape, stair cores, and observation tower. Coordinated with the executive architect in Chengdu, prepared client presentations, and detailed the facade system and interiors.
- Pinterest HQ, San Francisco: tenant improvement
  Led the design of the lobby, social spaces, and a 15-story communication stair. Coordinated the design with the structural and mechanical engineers of the core and shell; worked with Pinterest's internal workplace team. On a design team of two from programming to design development.

GUY NORDENSON AND ASSOCIATES, New York City
Intern, April 2019
- Built a diagrammatic model of an elevated pool deck structure for communicating structural intent to architect and fabricator

TIGHE ARCHITECTURE, Los Angeles
Intern, Jan-June 2018
- Developed conceptual master plan schemes for Watts neighborhood in LA
- CAD drawings for an office building in Lowell, Massachusetts

NBBJ, Seattle
Intern, Sept-Dec 2017
- Designed and presented 3 schemes for a new medical center in Seattle
- Schematic design and design development of a skyscraper tenant improvement in downtown Seattle

SKILLS

SOFTWARE Rhino, Revit, Grasshopper, Adobe Suite, AutoCAD, Enscape, VRay, SketchUp, Adobe AfterEffects, Maya
FABRICATION Laser cutting, 3D printing, CNC milling, TIG welding, general metal- and wood-working, exhibition fabrication
LANGUAGE Fluent in French

ARCHITECTURE LICENSURE In progress, anticipated completion in Spring 2023
AXP hours completed; four of six exams passed

EDUCATION

CALIFORNIA POLYTECHNIC STATE UNIVERSITY, SAN LUIS OBISPO, *2014-2019*
Bachelor of Architecture
+ LOS ANGELES METROPOLITAN PROGRAM, *Winter/Spring 2018*
Fourth-year studio program based in Los Angeles with internships, a lecture series, public exhibitions of studio work, and studio project reviews by Los Angeles professionals and educators
+ STUDIO TICINO, *Summer 2017*
Study-abroad program with art workshops and travel in Europe

EXHIBITIONS & HONORS

"HIGH RISE, MID RISE, LOW RISE: HOUSING IN L.A TODAY" *June 2021*
- Project "Cloud Neighbors" exhibited at Helms Design Center, showcasing built and speculative designs of housing at different scales in Los Angeles

RIBA PRESIDENT'S MEDAL NOMINATION *June 2019*
- Thesis "Characters, Subjectivities, and Contradictions" nominated

"THE LOS ANGELES SCHOOLS", ARCHITECTURE+DESIGN MUSEUM *Oct-Jan 2021*
- "Characters, Subjectivities, and Contradictions" and "Cloud Neighbors" models and drawings exhibited alongside student work from Sci Arc, USC, UCLA

VELLUM FURNITURE DESIGN COMPETITION *Grand prize, Nov 2018*
- Furniture piece "Norm" awarded grand prize trip to Salone del Mobile in Milan in annual school-wide exhibit.

AIA HENRY ADAMS MEDAL *June 2019*

MORPHOSIS BEST DESIGN AWARD *June 2018*
- Awarded by jury to best studio project in the L.A. Metro program

ROBERT ODO SCHOLARSHIP *Second place, April 2018*
- Faculty-nominated award recognizing ability in design and academics

AIA INTEGRATION AWARD *First place, June 2017*
- Third-year project "Soft Robots" recognized for excellence in narrative, graphics, and communication of building systems integration

THIRD YEAR "BEST OF SHOW" *First place, Dec 2016*
- Third year project "Food Loops" selected by a panel of invited architects from a third-year-wide exhibit of projects

"ARCHITECTURE + DESIGN + DISCOURSE" PUBLICATION *2016, 2019*
- Projects published in annual school publication

KOBERG ARCHITECTURE HISTORY SCHOLARSHIP, 2015, 2016

TEACHING EXPERIENCE & ACTIVITIES

ARCHITECTURAL LEAGUE OF NEW YORK MENTORSHIP PROGRAM
Mentor, July 2022-present
- Mentoring an architecture student completing their undergraduate degree at Kean University in New Jersey through studio crits, office visits, software tutorials, and meetings

"THIRD YEAR SUPER REVIEW", Cal Poly
Panelist, March 2021
- Participated on a panel with four other architecture professionals and educators to review the work of eight third-year studios, followed by discussion about common themes and Q&A with students and professors

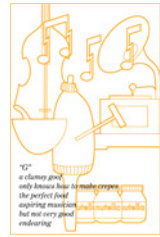
TRANSFER STUDENT WORKSHOP, Cal Poly
Teaching assistant, Sept 2019
- Taught and mentored incoming third-year transfer students
- Led software tutorials and office hours

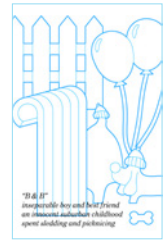
HISTORY OF WORLD ARCHITECTURE SERIES, Cal Poly
Teaching assistant, 2016-2019
- Held office hours, created lecture materials, and administered the course

SOM, Los Angeles
Women's Initiative shadowing, Jan 2019
- Workshops, site visits, and mentorship from architecture professionals

THIRD-TO-FIRST YEAR MENTORSHIP PROGRAM, Cal Poly
Committee member and organizer, 2016-2017

AMERICAN INSTITUTE OF ARCHITECTURE STUDENTS, Cal Poly
Board member, appointed, 2015

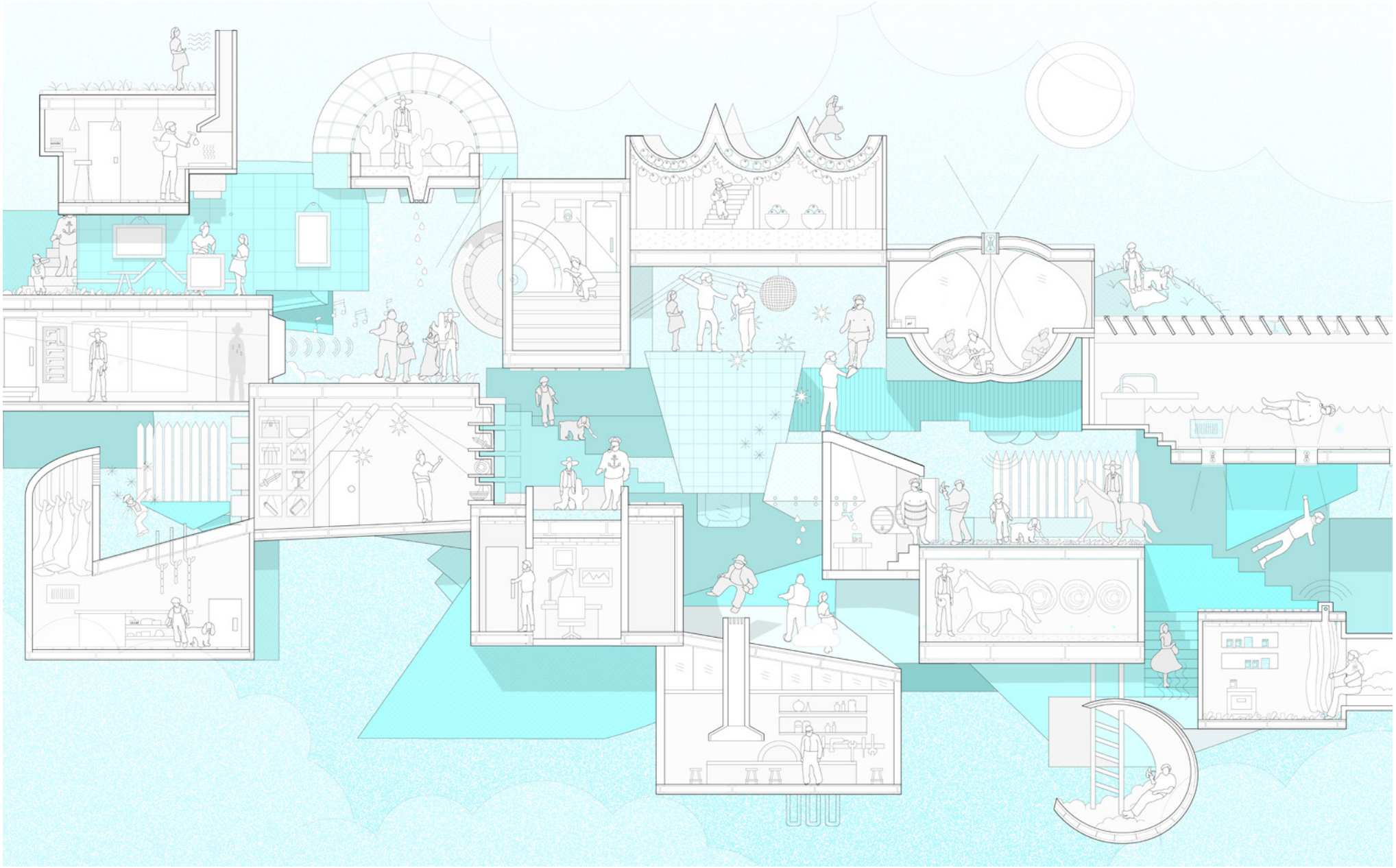




CHARACTERS, SUBJECTIVITIES, & CONTRADICTIONS

ACADEMIC WORK: CAL POLY SLO
B. ARCH THESIS, 2018-2019
RIBA DISSERTATION MEDAL NOMINATION
"THE LOS ANGELES SCHOOLS" EXHIBITION

Characters, Subjectivities, and Contradictions proposes a hypothetical form of space - at once urban and domestic - which enlists the idiosyncratic worldviews and fantasies of its inhabitants in the design of architectural affordances. The matrix as a form of spatial organization maximizes encounters between inhabitants. Ambiguous forms, unstable atmospheres, and rampant materiality encourage contradictory interpretations of architectural space and the exchange of personal perspectives through programmatic performance. *(Professor: Doug Jackson)*



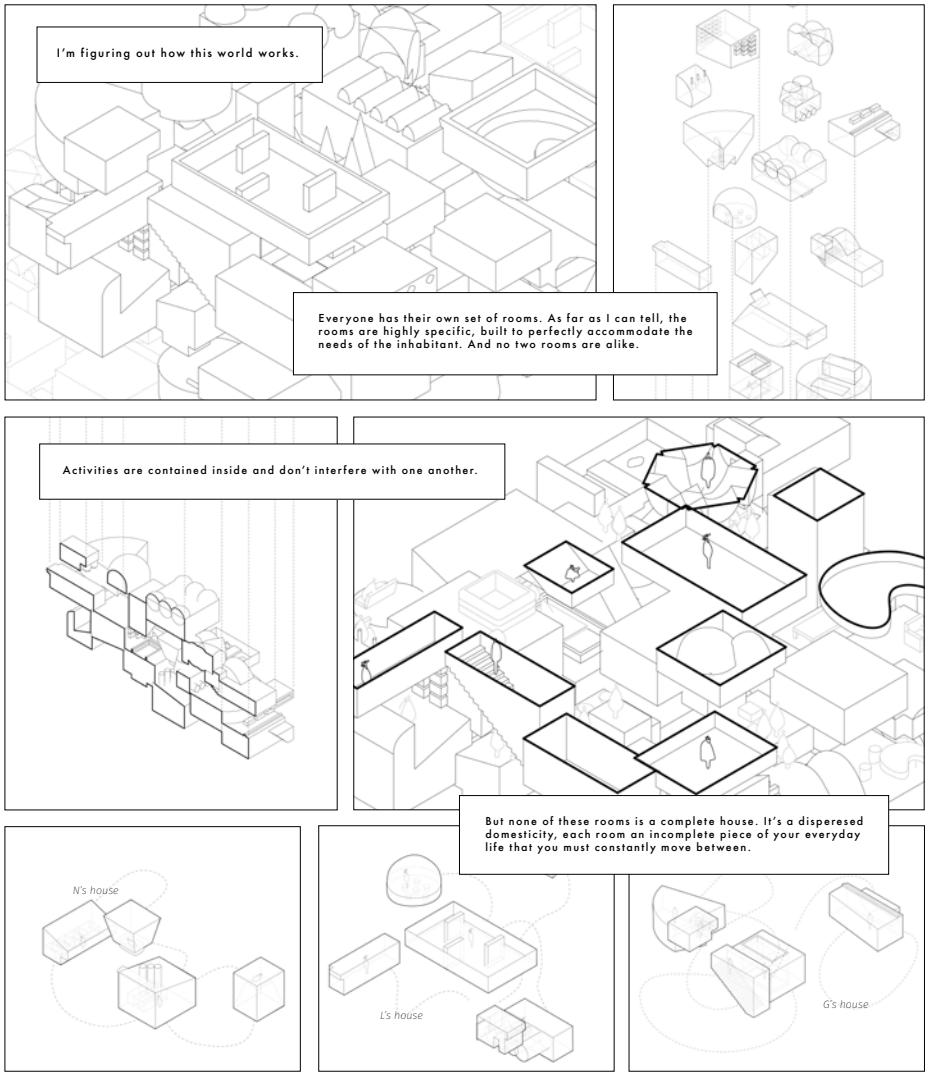
If domesticity serves to preserve our view of the world and reaffirm our values, this thesis argues that public space is valuable because it allows for unplanned encounters that challenge personal views and acknowledge the different perspectives that can coexist.

Robin Evans' "Figures, Doors, and Passages"

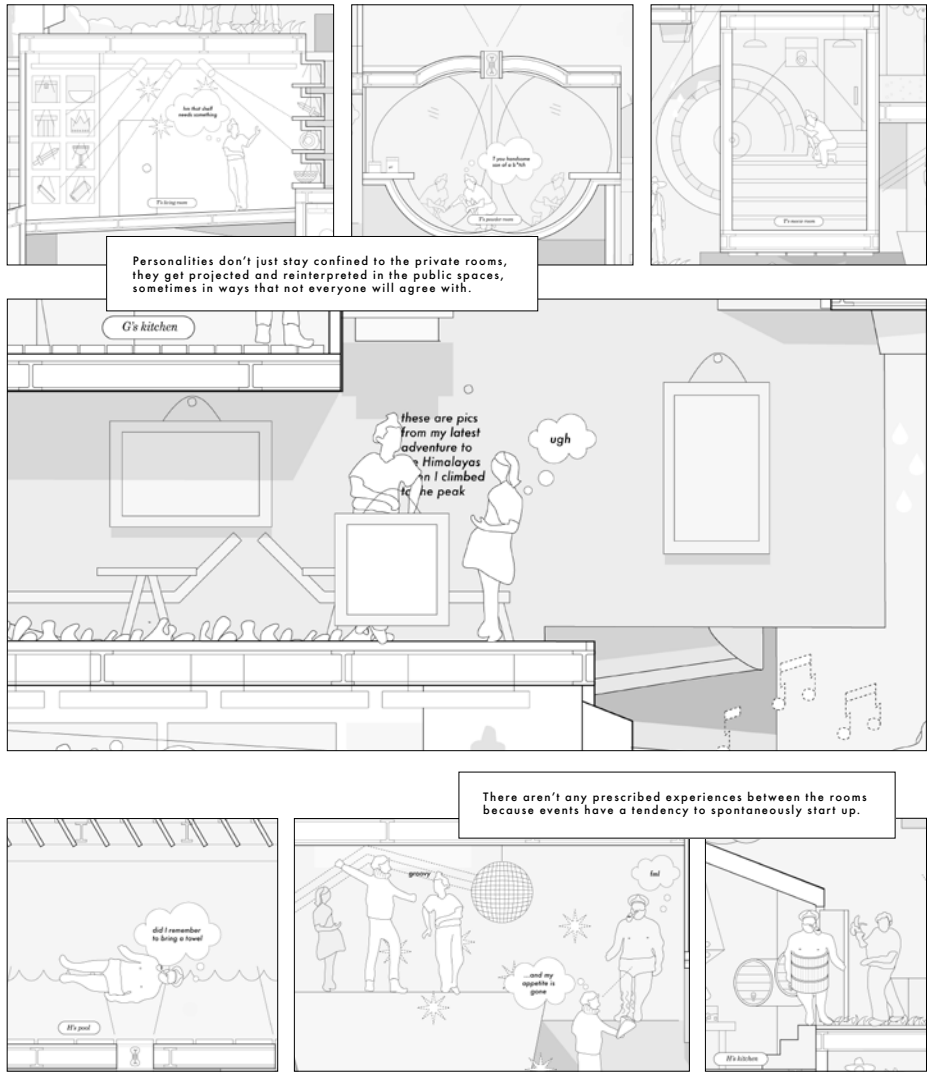
matrix organization privileges encounters

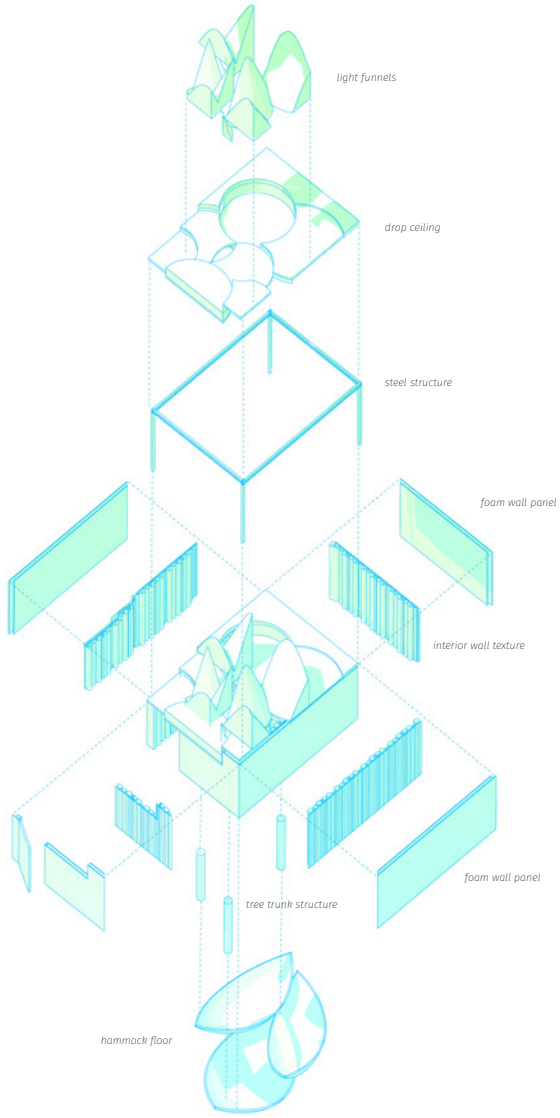
OMA's Parc de la Villette

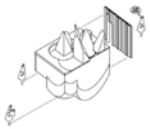
activation of unplanned social performances



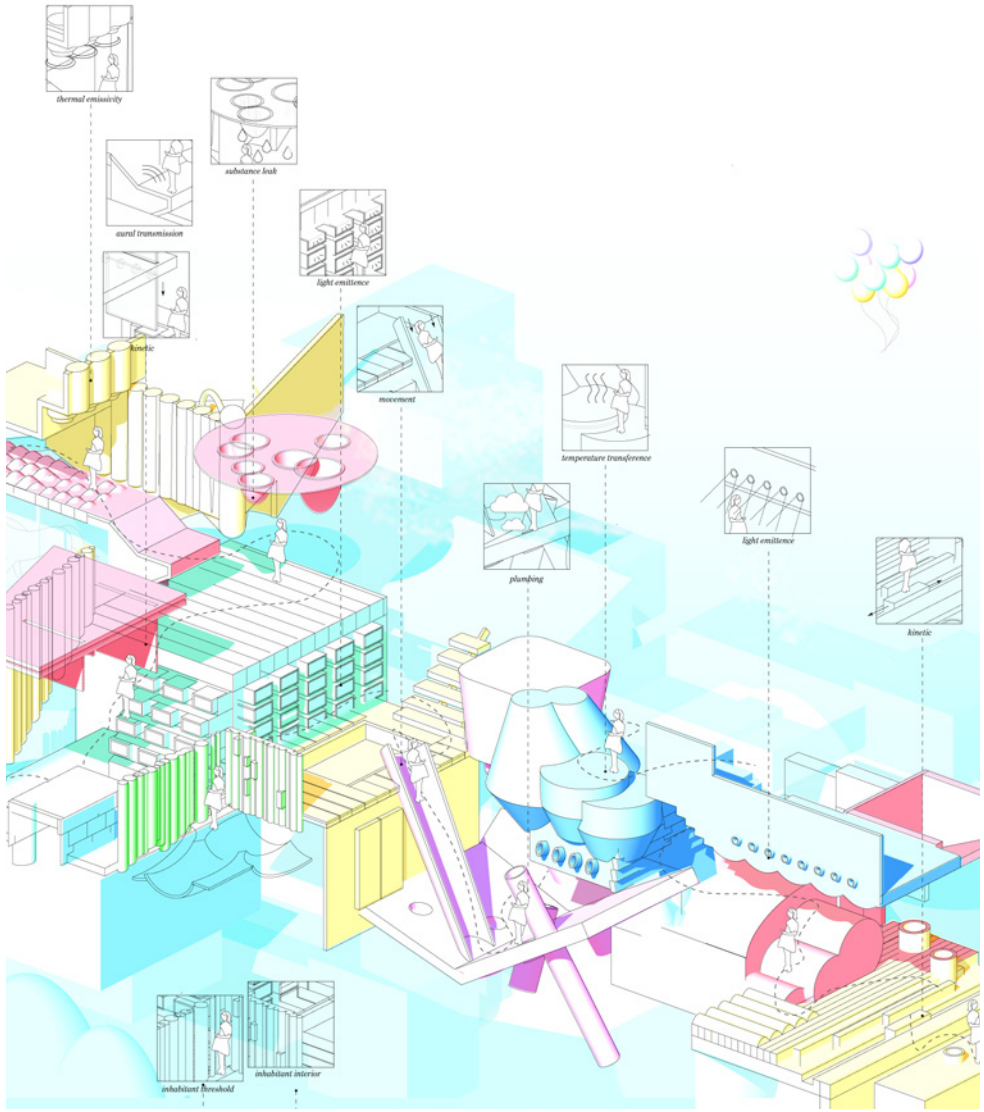
Excerpt from thesis book. After weeks spent in a hotel room as part of a housing experiment, the narrator enters a new world, where the perfect house has supposedly been created.



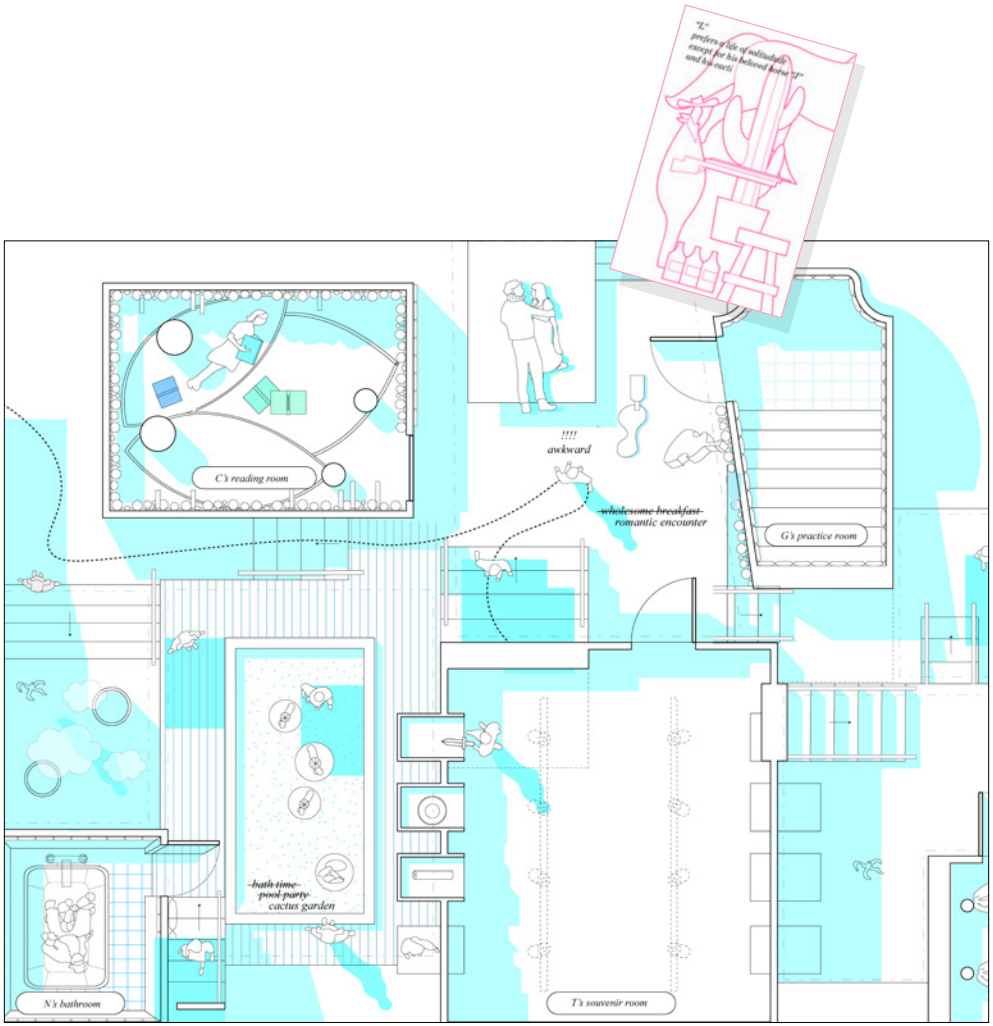




The construction of our narrator's optimized forest-napping-reading room.



There are constantly shifting atmospheres, resulting from the (unknown) activities happening within the rooms. The inhabitants in the shared spaces must adapt. New performances ensue.



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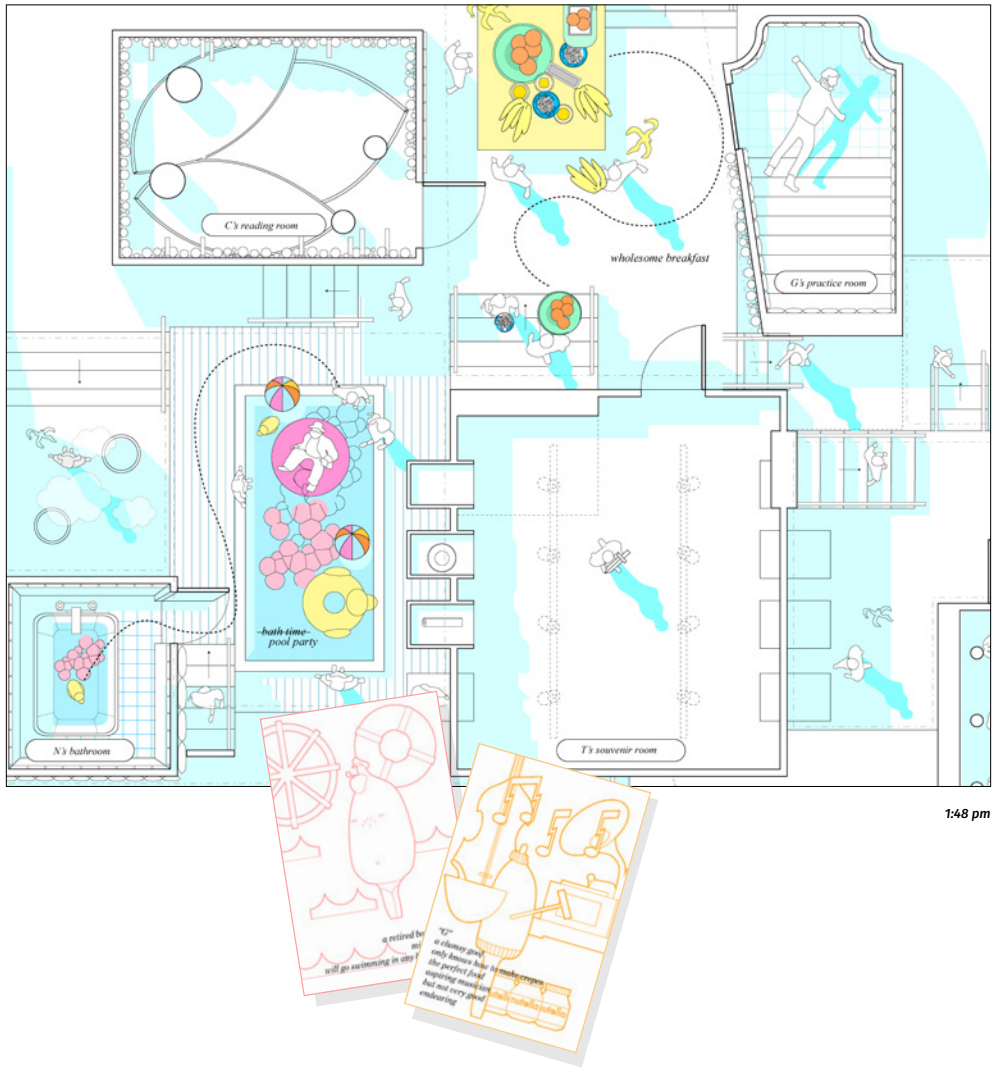
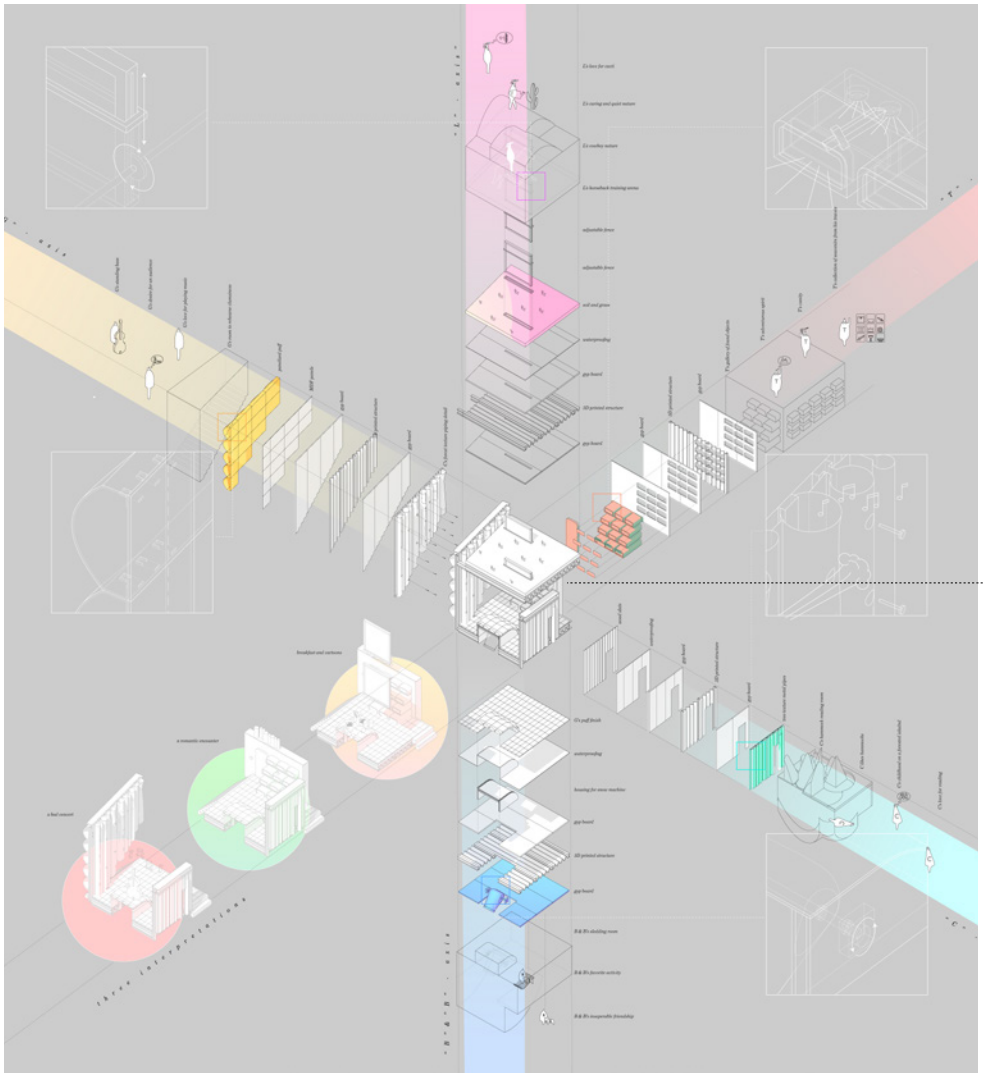


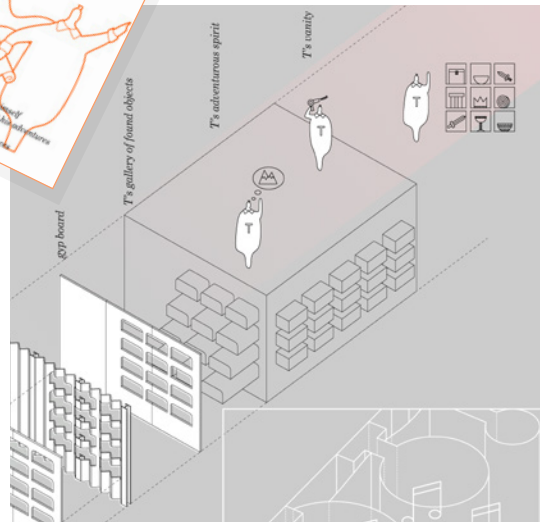
1:48 pm

Early design experiment physically modeling a matrix of rooms. Each has a distinct form based on the inhabitant's domestic activities. This study was more object-based, with less consideration for the spaces in between. What happens in between the rooms eventually became the focus of the thesis.

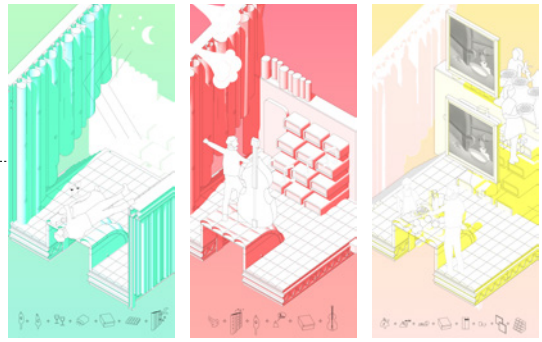


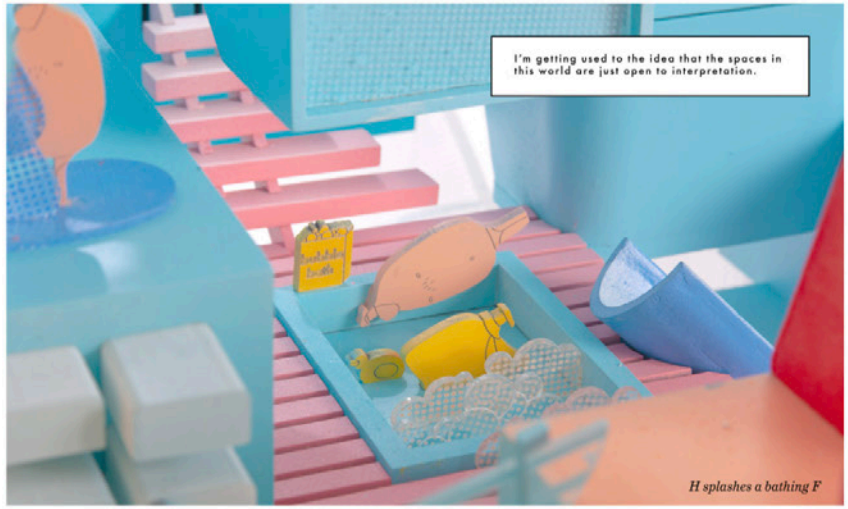
A take on the Morphosis 2-4-6-8 House drawing. Instead of limiting the architectural elements to walls, insulation, structure, etc, why not draw the characters and their personalities as is they are part of the architecture too?

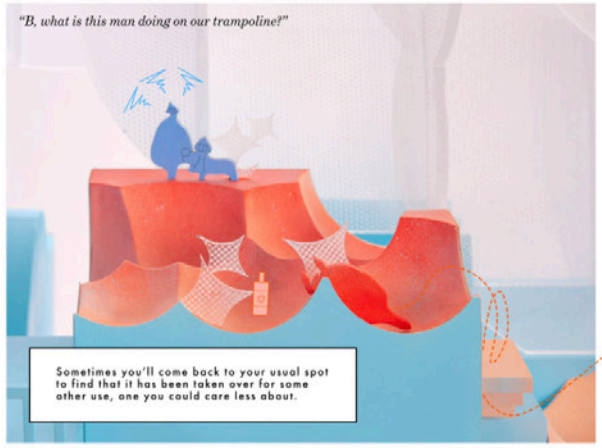
"T", and his obsession with his travels and souvenirs. His vanity results in a room full of display shelves to show off his treasures. On the outside, the shelves can be reinterpreted as steps or cabinets or ?



Depending on the combination of characters, desires, and architectural atmospheres present in a space, any number of events can unfold... a make-out session, a cello concert, breakfast and cartoons, or ?



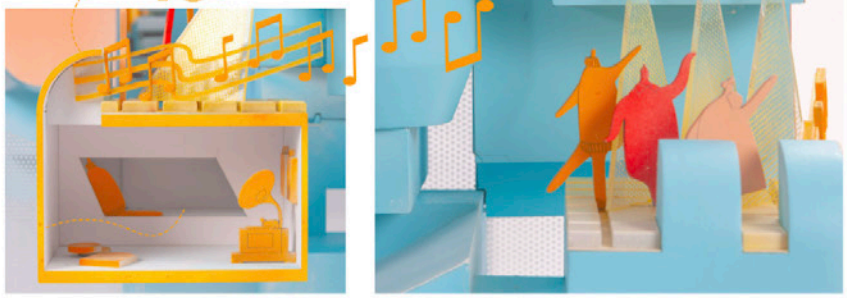




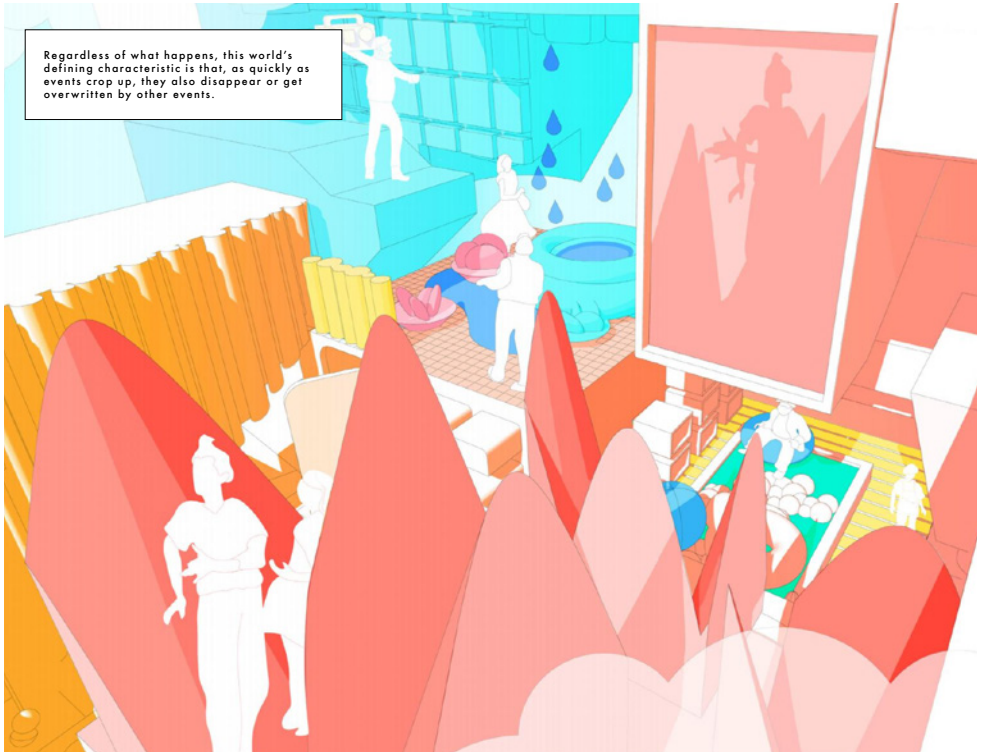
"B & B" are inseprable best friends. An innocent suburbam childhood spent playing and picnicking.

"T" is vain, likes to be tan. Attracted to reflective surfaces.

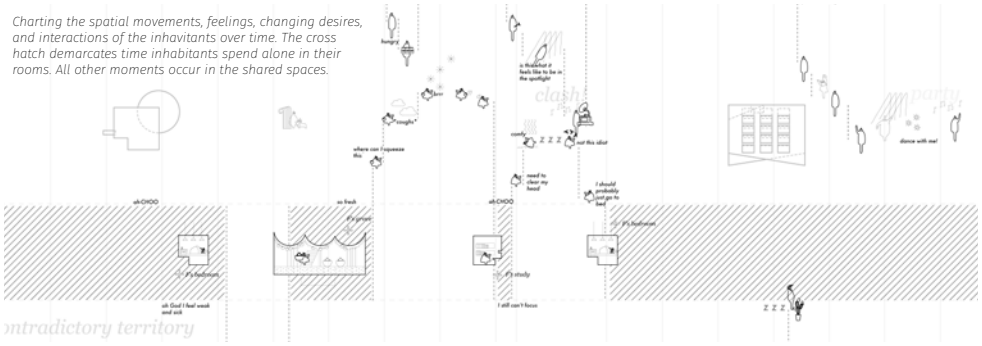
"L" loves a good sunset and would REALLY prefer solitude.

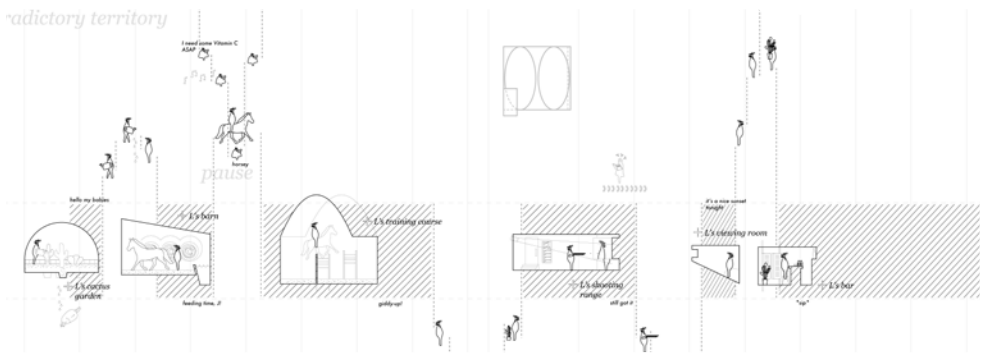


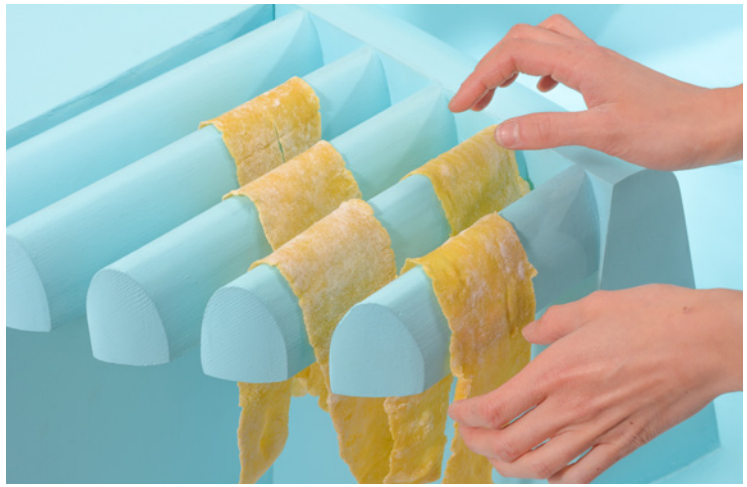
Excerpt from thesis book overlaying model photos with character portraits and stories. Playing with the flatness of the model photographs and the space of the page.



Charting the spatial movements, feelings, changing desires, and interactions of the inhavitants over time. The cross hatch demarcates time inhabitants spend alone in their rooms. All other moments occur in the shared spaces.



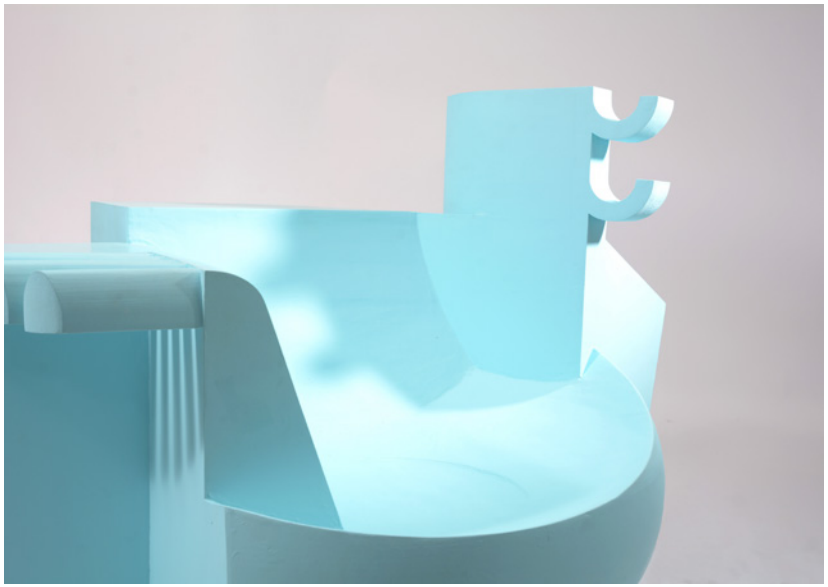


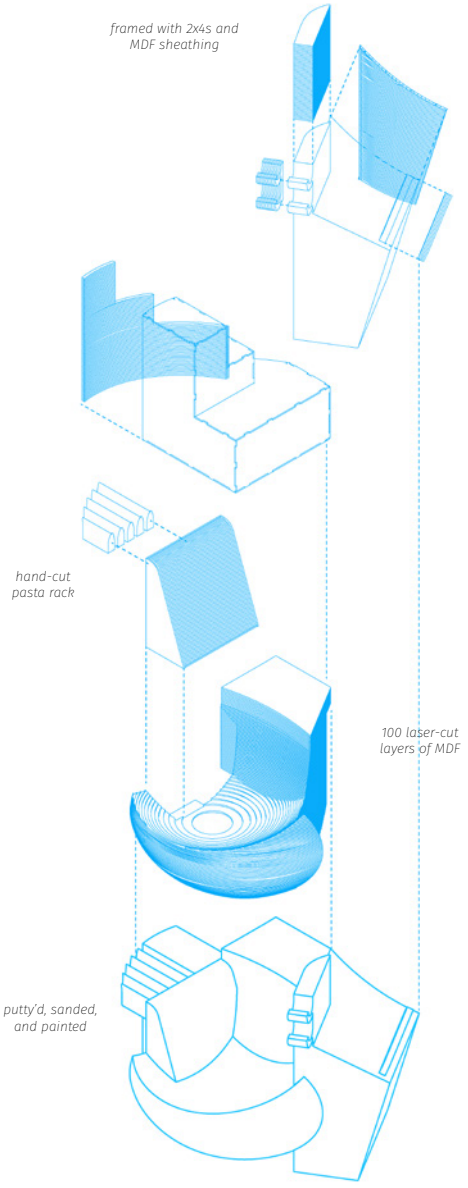


NORM

ACADEMIC WORK: CAL POLY SLO
B. ARCH THESIS, 2018-2019
MILANO GRAND PRIZE
VELLUM FURNITURE DESIGN COMPETITION,

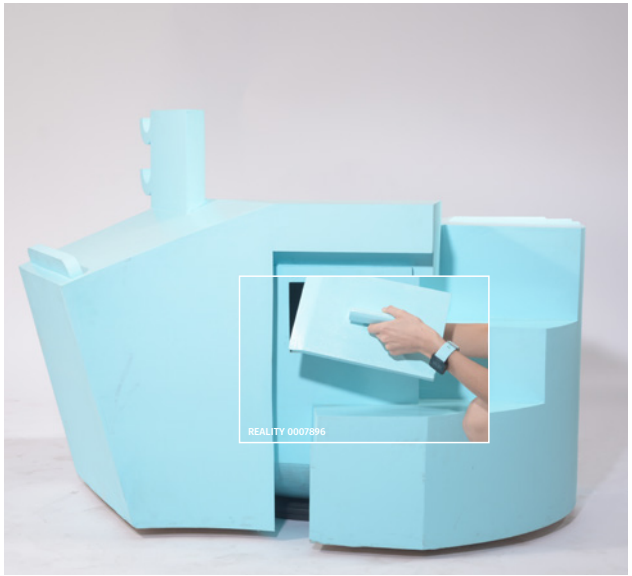
Norm is a chair on an adventure across time and space to collect as many uses as possible. Rather than associating with one primary use, Norm is impressionable, bearing traces of all the uses it encounters. By physically representing the less obvious uses, they cannot be ignored or forgotten. As we engage with Norm's various functions, we cannot avoid confrontation with the multiple realities of a chair. All of Norm's functions are part of its identity, regardless of whether or not they are a part of our own understanding of a chair. *(Professor: Doug Jackson)*

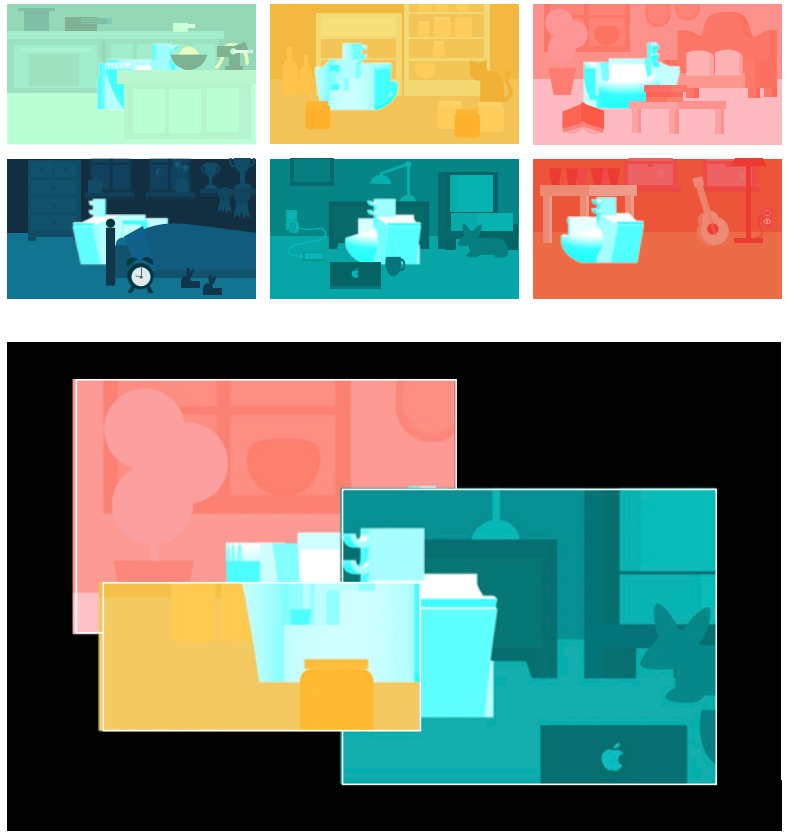




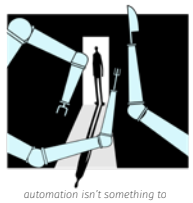
Norm's formal iterations, tested through 3D models and 3D prints. Which realities to embody? How to display all the realities equally?

Norm going to the show (three people required to carry).

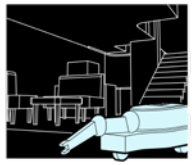




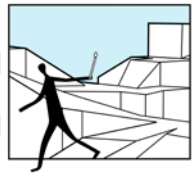
Excerpt from an animation made in Adobe Aftereffects, recounting the adventures of Norm.



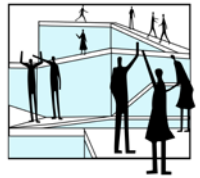
automation isn't something to be afraid of



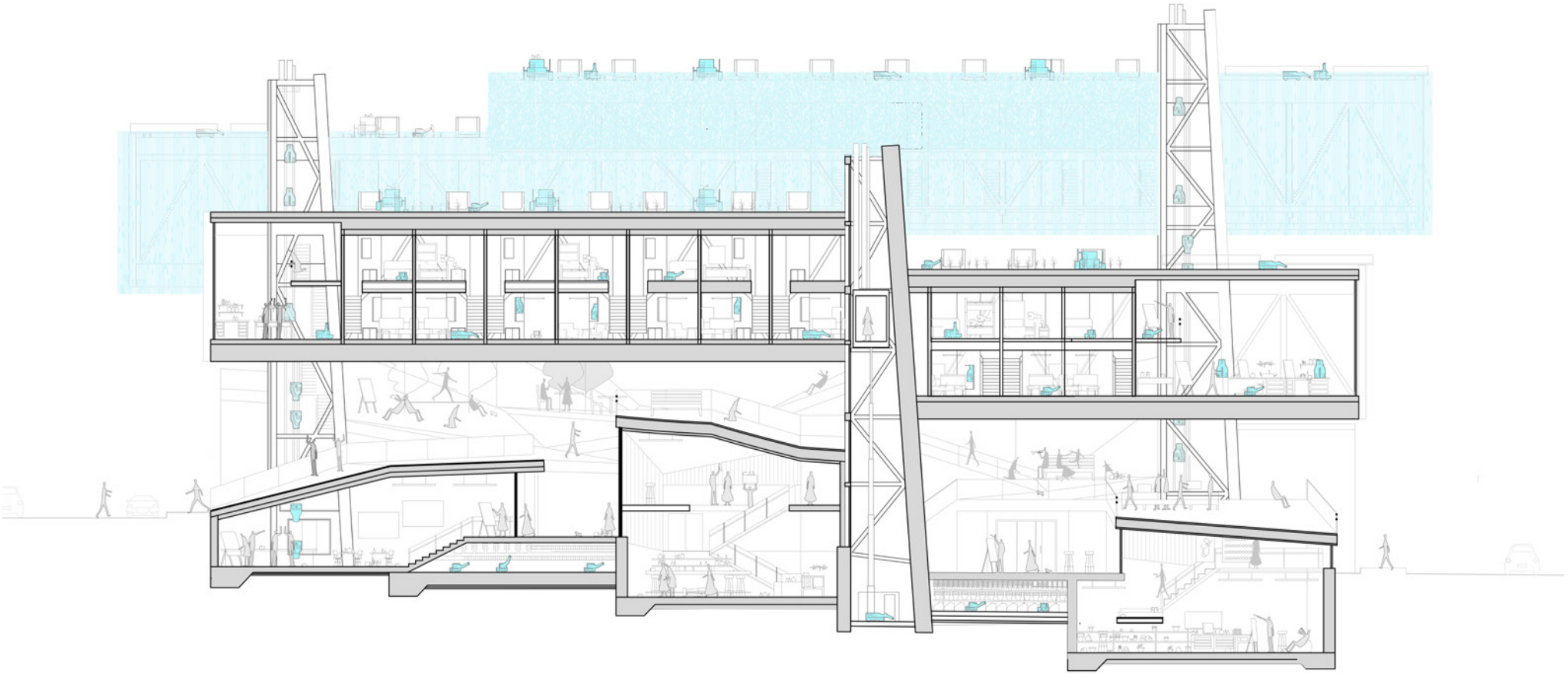
let robots do the domestic work



explore your passions!



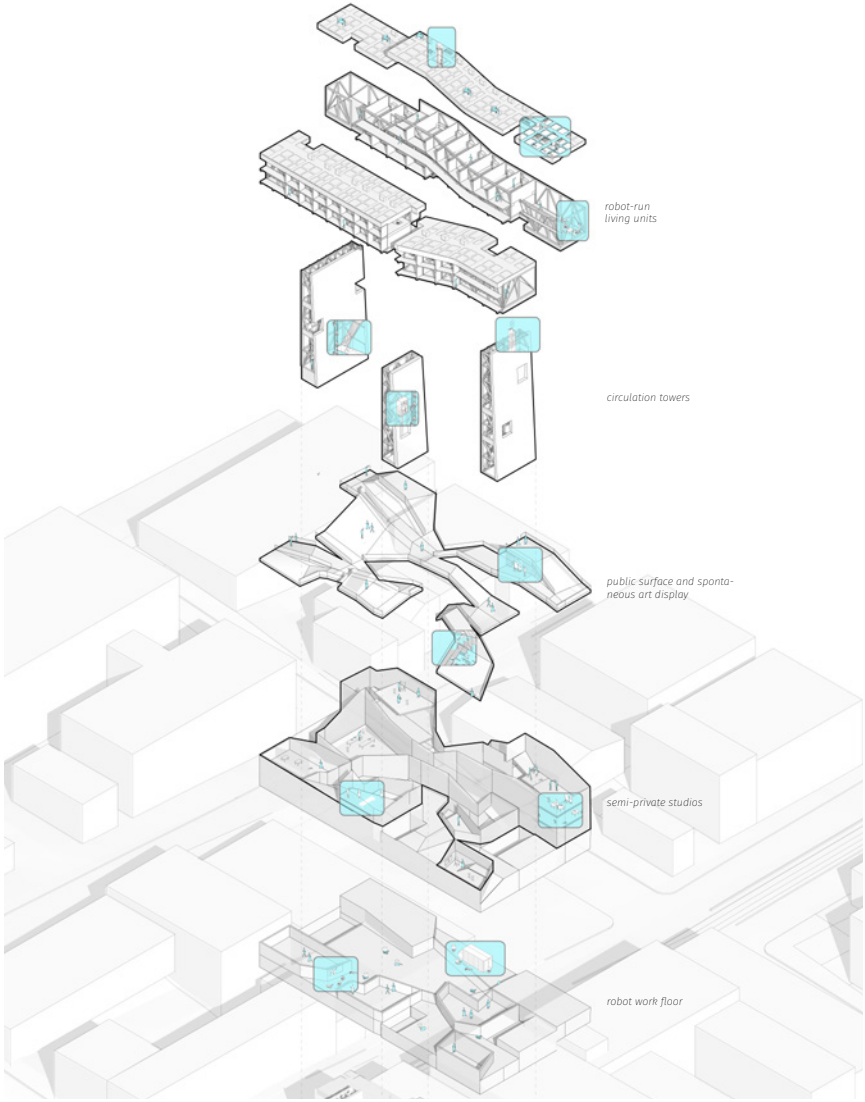
share with others!



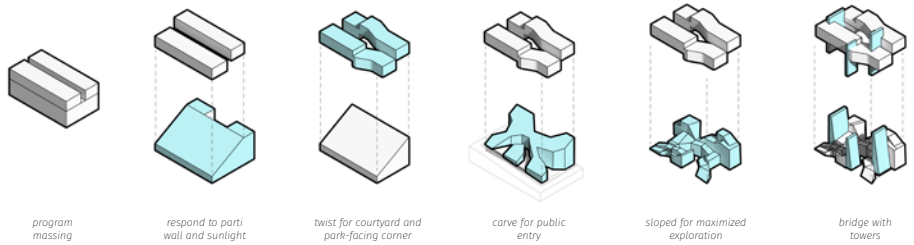
SOFT ROBOTS

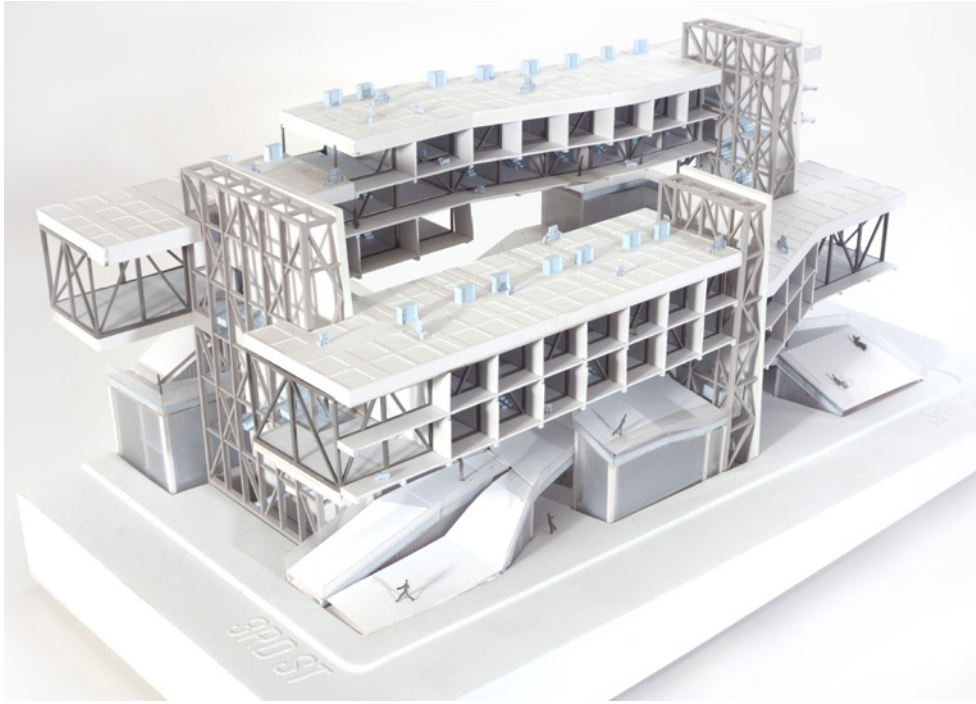
ACADEMIC WORK: CAL POLY SLO, SPRING 2018
TEAM PROJECT WITH GRANT MATTINGLY
AIA INTEGRATION AWARD

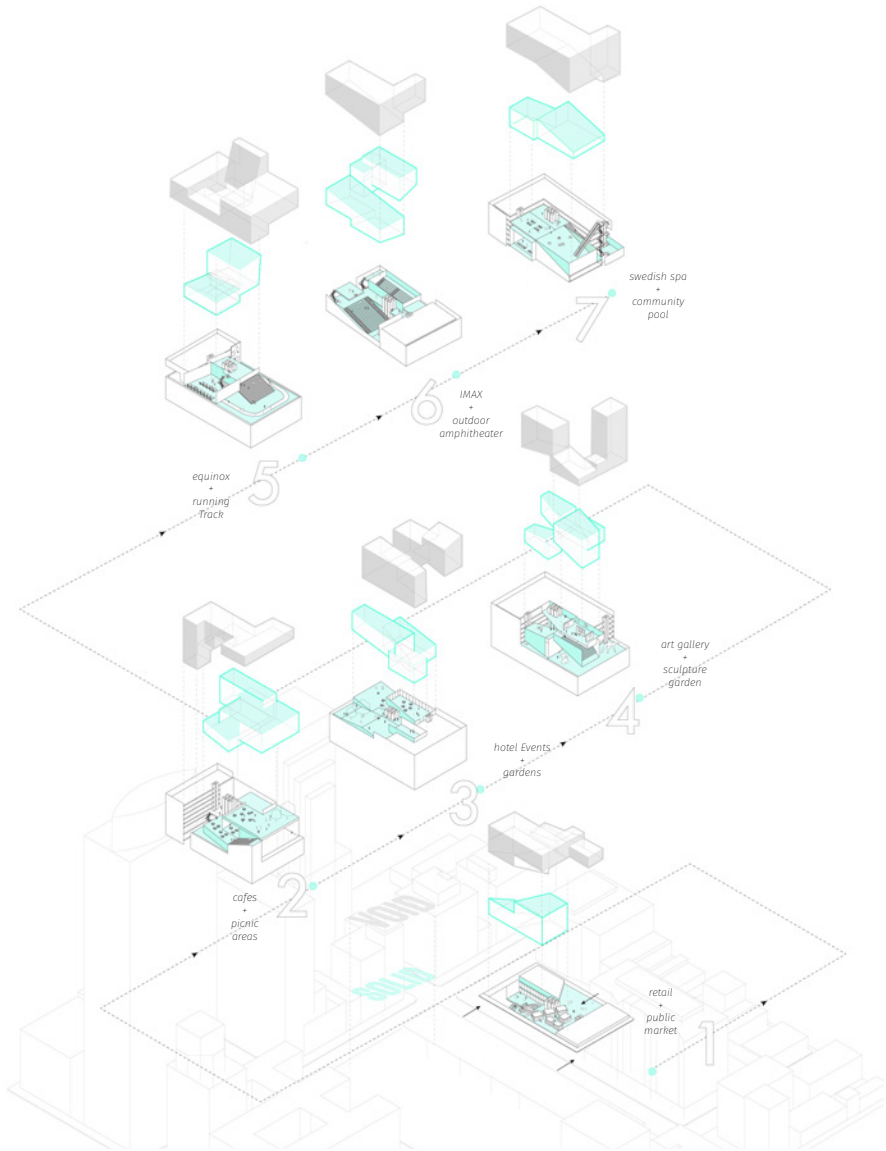
Looking to a future where increased machine labor is applied domestically, Soft Robots is a testing ground for friendly robot-human co-habitation. With all domestic labor tasked to the robots, residents have leisure time to pursue their creative passions. Orderly living units above allow for efficient robotic work. Below, the messier, flexible spaces serve as studios for the humans, with public traffic as an unexpected factor for spontaneous interaction. *(Professor: Jeff Ponitz. Role: All drawings shown here by me. Model was built by me and Grant.)*



Exploded axonometric showing layers of robot and human spaces.

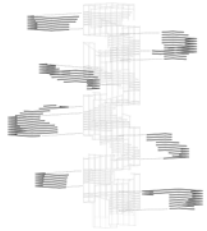






"super floors" stabilize between public cantilevers

residential floors supported by structural "super floors"



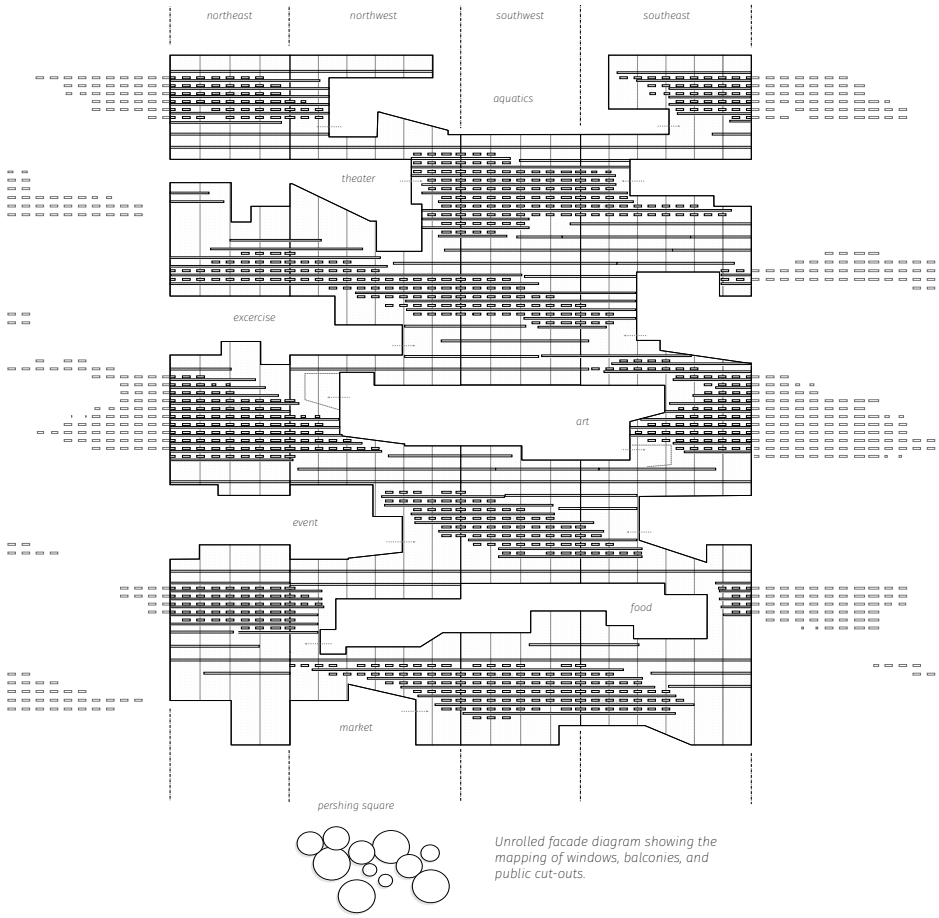
perimeter column grid supports facade and balconies

CLOUD NEIGHBORS

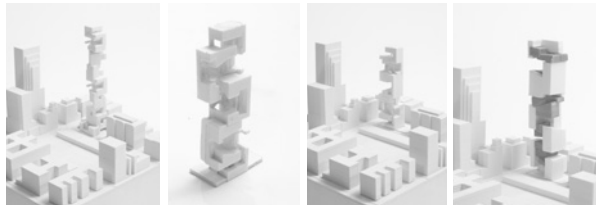
ACADEMIC WORK: CAL POLY L.A. METRO, SPRING 2019
MORPHOSIS BEST DESIGN AWARD
"LOW RISE, MID RISE, HIGH RISE: HOUSING IN L.A." EXHIBITION
"THE LOS ANGELES SCHOOLS" EXHIBITION

Seventy stories of housing, hotel, office, and public programs in downtown Los Angeles organized into seven mixed-use vertical neighborhoods. A different public activity is attributed to each, so despite having the programmatic components, each neighborhood is unique because of its configuration around the form of a public activity. By serving as the departure point for all tenants and members of the public, each of these seven public "super-floors" have the potential to mix classes of people that normally live in very separate areas of Los Angeles. *(Professor: Stephen Phillips)*

1/16" = 1'-0" physical model

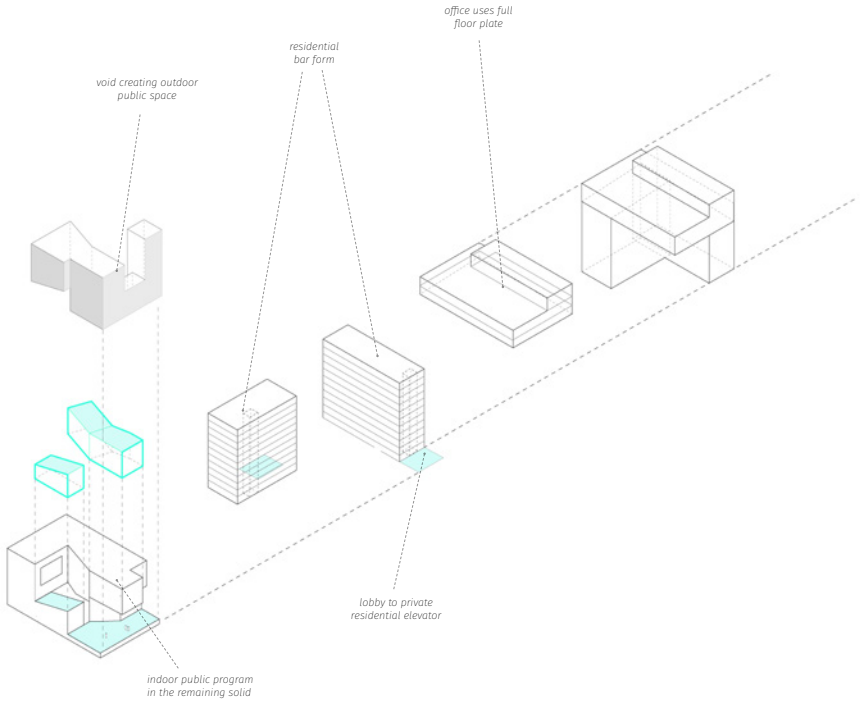


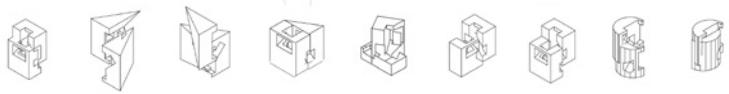
Unrolled facade diagram showing the mapping of windows, balconies, and public cut-outs.

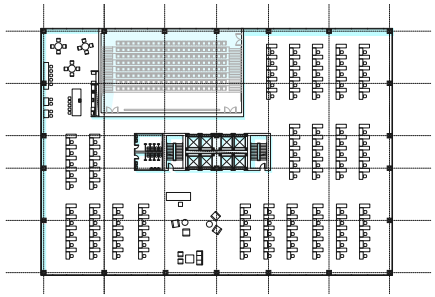


Early massing studies placed in the site.

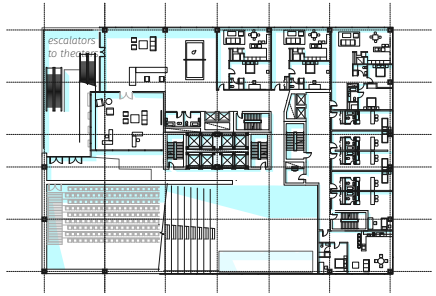
Anatomy of a neighborhood: The relationship between solid and void corresponds to a relationship between private and public programs. Each of the seven neighborhoods is composed of a similar kit of parts. Early form studies are shown below.



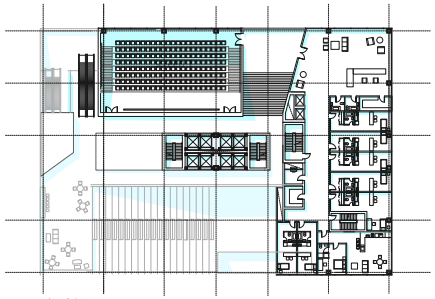




level 65



level 62



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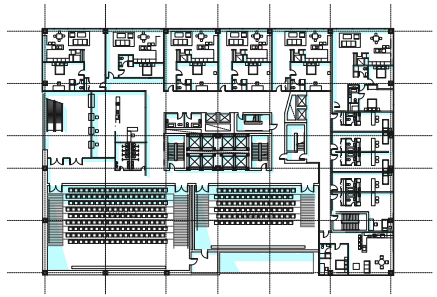
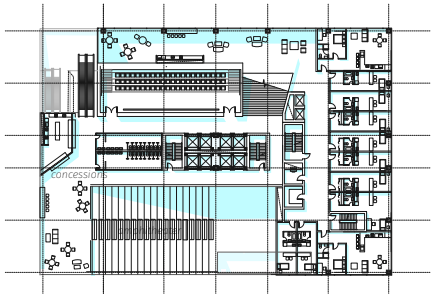


level 61



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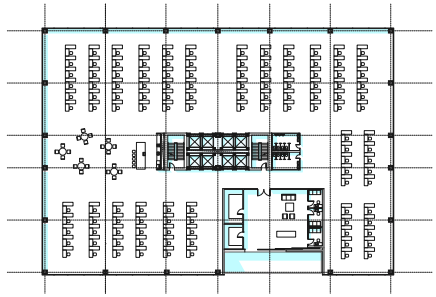
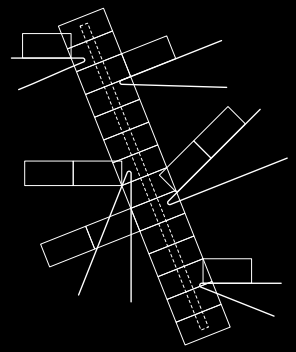
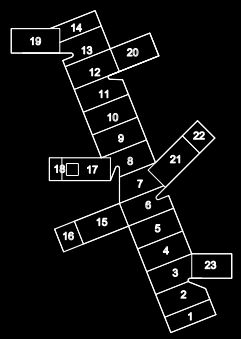


level 60

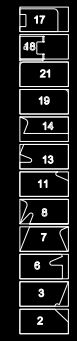
Plans of one full neighborhood, Neighborhood 6 (Theater). On one floor there might be apartments, a movie theater, and a public park. Private, ticketed theater-goers pass through the outdoor arrival floor, mingling with non-ticketed enjoyers of the public amphitheater. Programs mix.



Layout of plywood blanks to fill the exhibition space. Addition of select fillets in the arms.



Layout by piece. Optimizing for least amount of waste material



HEADRUSH

ACADEMIC WORK: CAL POLY SLO
B. ARCH THESIS STUDIO EXHIBITION, SPRING 2019
DESIGNED AND BUILT BY THE STUDIO

Headrush **was an exhibition of our thesis studio's work. The design comprised of a welded steel central spine on which screens displayed our 2D representations, while large scale models were displayed on a plinth whose curves and protruding arms create pockets of space to linger around the projects. The plinth was designed to waste the least amount of material; the plywood sheets and concrete blocks could be disassembled and reused after the exhibition.** ***(Professor: Doug Jackson. Team: the 18-person studio. Role: Led the design of the plinth and organized the milling and construction of the plinth pieces on a small budget. Photos by Doug Jackson and Josef Kasperovich.)***

stairs spill out, pulling people in from the office floors

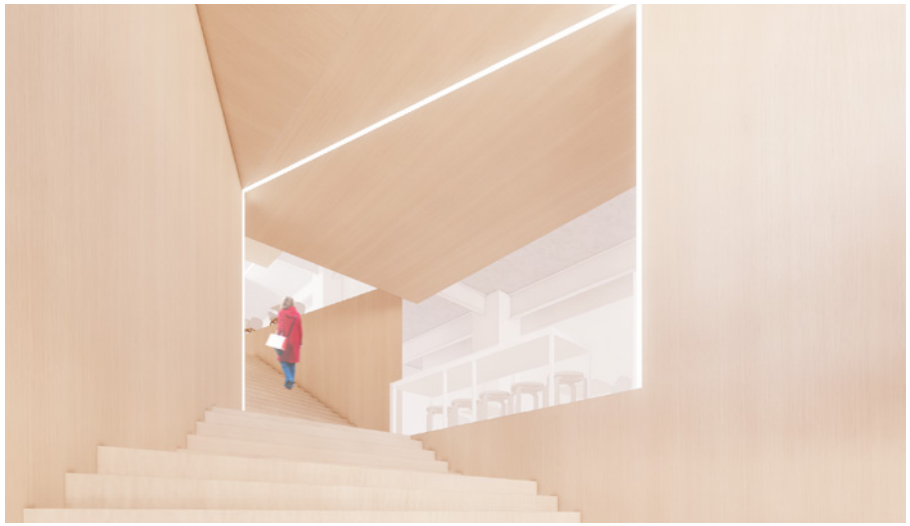
stair hosts social spaces and frames views across

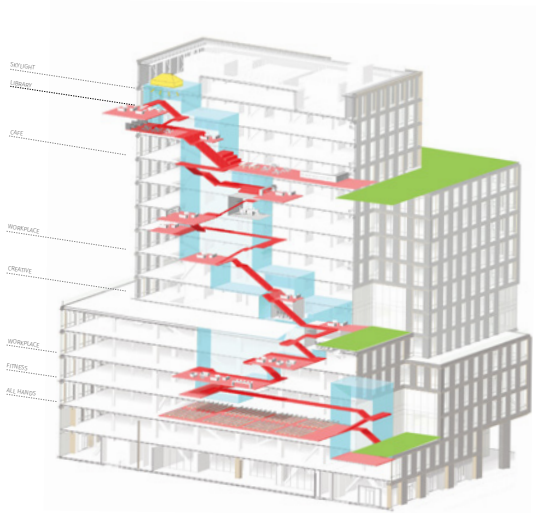
office programs overlook the stairs

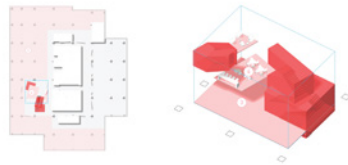
PINTEREST HQ

PROFESSIONAL EXPERIENCE: IWAMOTOSCOTT
DESIGN TEAM MEMBER
JUNE 2019-MARCH 2020
SITE: SAN FRANCISCO, CALIFORNIA
CONCEPT DESIGN TO DESIGN DEVELOPMENT

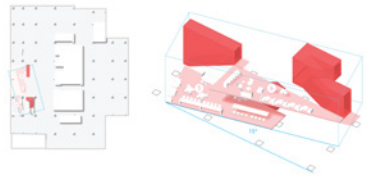
A 15-story communication stair connects outdoor terraces and unifies Pinterest's headquarters in section, weaving circulation with social spaces and office programs to encourage interaction between floors. Through the interplay between stair and programmatic volume, a dynamic experience of overlooks, framed views, and encounters is created. (Principals: Lisa Iwamoto, Craig Scott. Team: Shirley Chen, Celia Chaussabel. Executive architect: Brereton Architects. Role: Design of communcation stair, lobby, and social spaces. Representation through rendering, diagrams, and floor plans. Coordination of the design with the structural and mechanical engineers of the core and shell.)



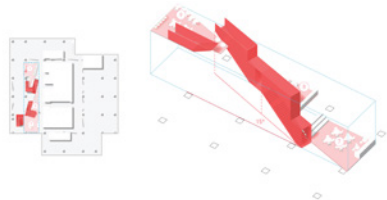




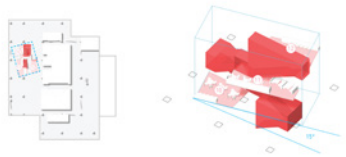
levels 3 and 4: wide, for gathering



levels 5 and 6 window-facing

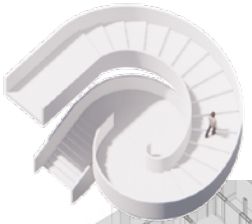


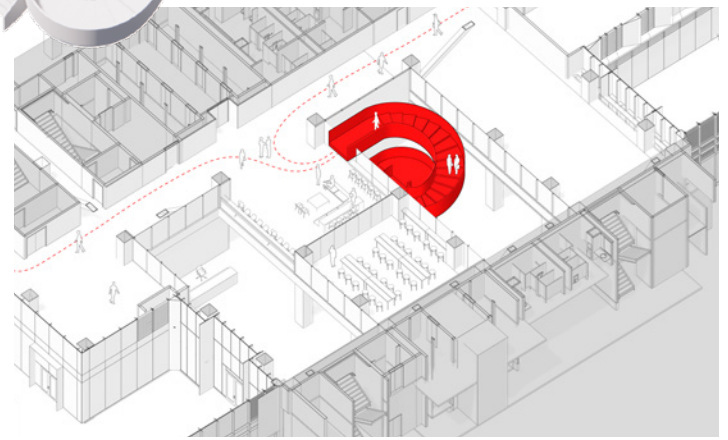
levels 7, 8, 9: extended, social

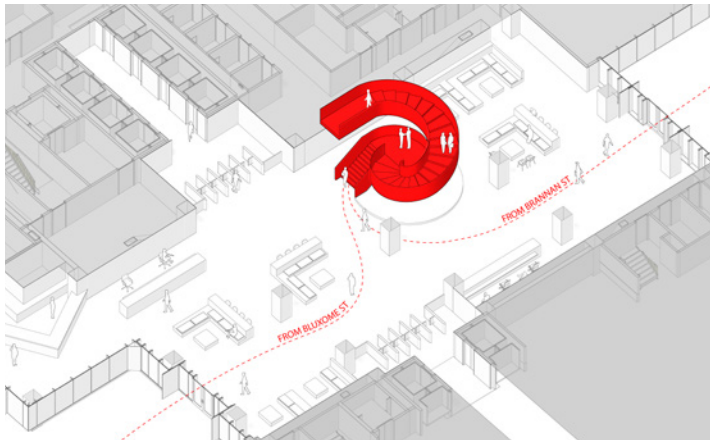


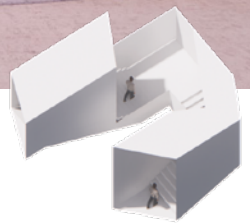
levels 10, 11, 12: compact, inward-facing

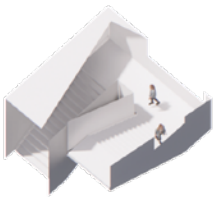
Full building diagram showing how the communication stair jumps from bay to bay, connecting terraces and creating distinct social spaces over the course of the fifteen stories.











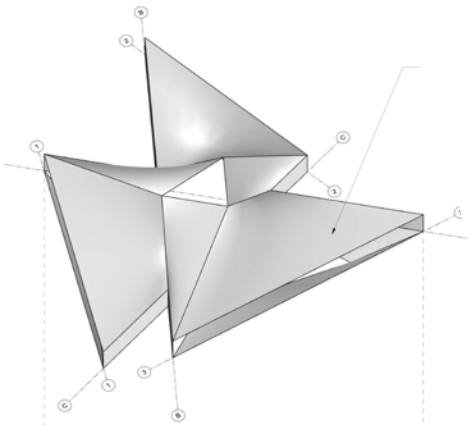
For its headquarters, Pinterest wanted an iconic centerpiece of a stair that would announce the company's presence and draw people in from both sides of the urban lobby. Derived from the company's logo, the form of a spiral within a spiral allows circulation to flow from all sides and offers a moment of pause at its center.

Construction photos, Spring 2022

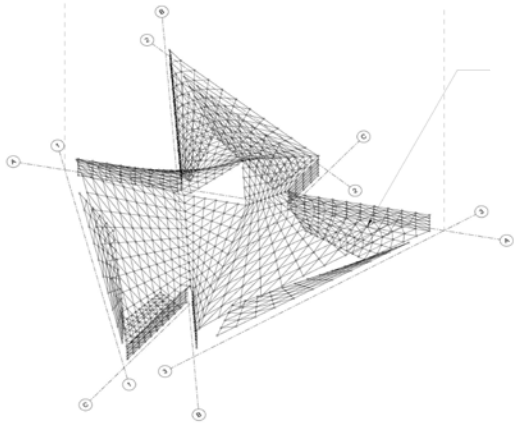
EXHIBITION PAVILION

PROFESSIONAL EXPERIENCE: IWAMOTOSCOTT
DESIGN TEAM MEMBER
MARCH 2020-FEBRUARY 2021
SITE: CHENGDU, CHINA
CONCEPT DESIGN TO CD PHASES
CURRENTLY UNDER CONSTRUCTION

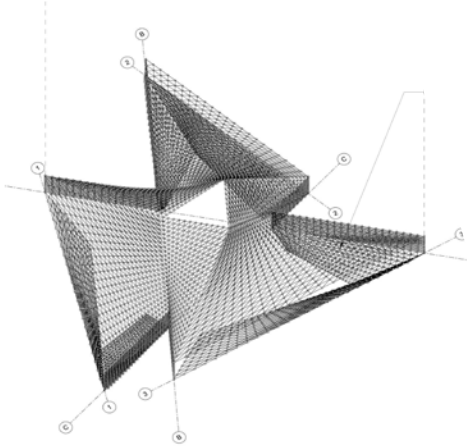
The three key views from the hilltop site drive the three-sided figure of this exhibition hall. At its center, a suspended glass courtyard brings people up to a viewing deck and allows light and fresh air into the exhibition space. *(Principals: Craig Scott and Lisa Iwamoto. Lead: Robert Tranter. Team: Shirley Chen, Bin Zhang, Cat McCall, Htet Llaing, Jake Gelfland, Celia Chaussabel. Executive architect: SADI LDI Chendu. Role: Led the design of the first floor, stair cores, and landscape; renderings and graphics; coordination with the executive architect; documentation using Rhino.Inside.Revit; detailing of facade system and interiors; construction drawing set. Construction photos from IwamotoScott.)*



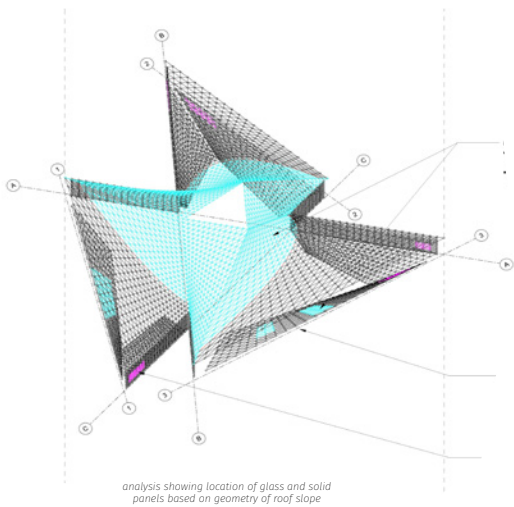
a surface model served as a reference between design in Rhino and documentation in Revit



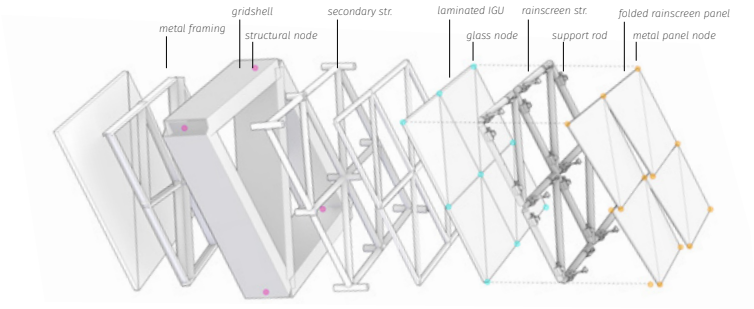
major gridlines and structural nodes for the steel structure

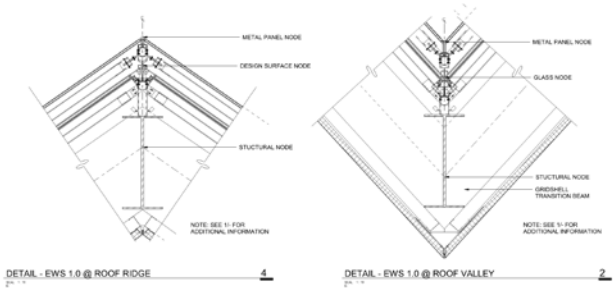


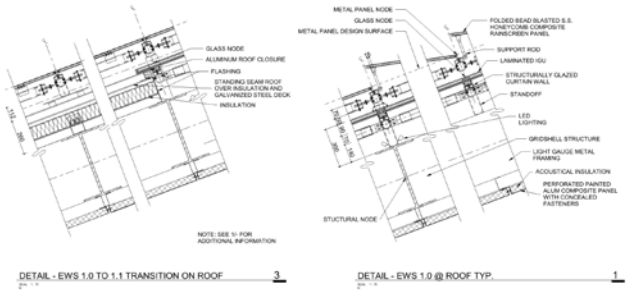
panelization of the skin



analysis showing location of glass and solid panels based on geometry of roof slope

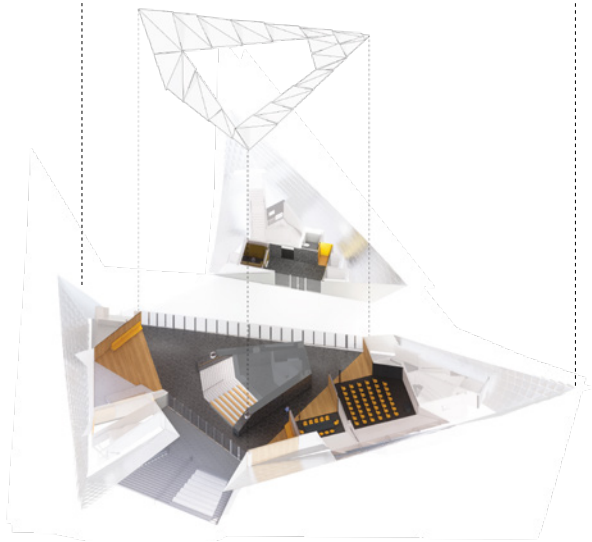




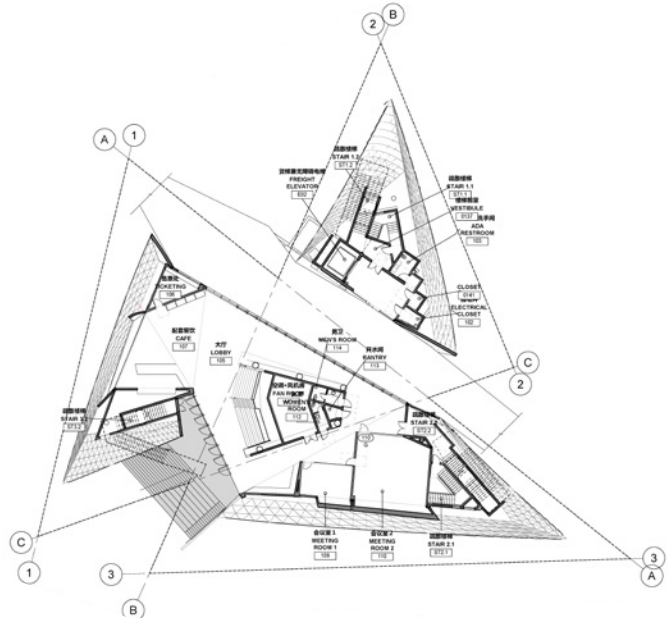


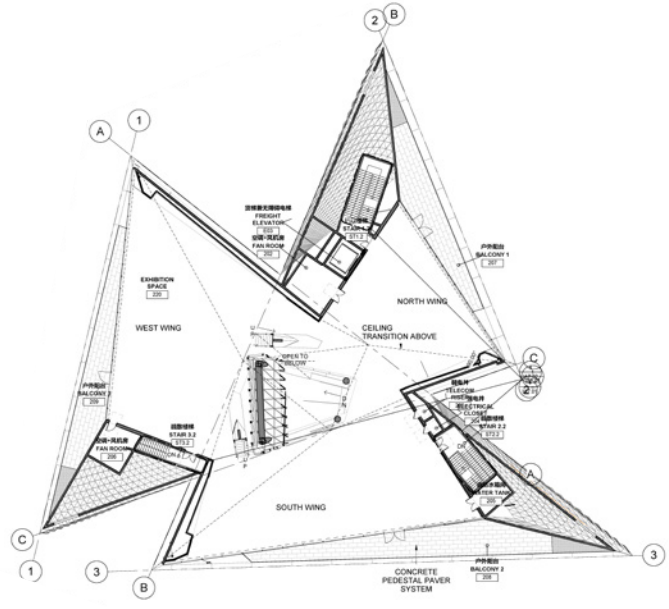
Details of the steel structure and stainless steel facade that I developed in conjuction with the executive architect in Chengdu. Details and structural diagrams developed with help from Robert Tranter and Jake Gelfland.

level 2: exhibition, atrium, viewing platform

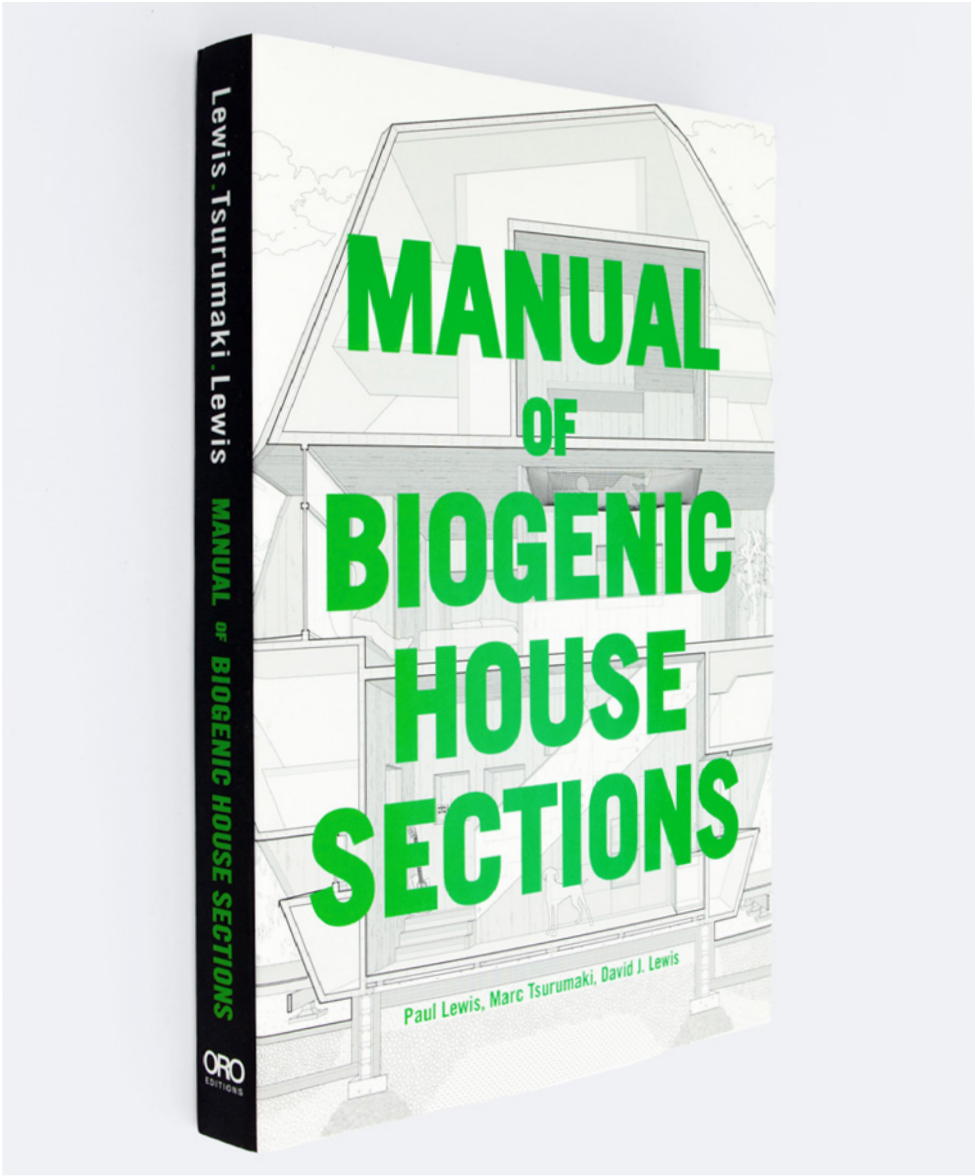


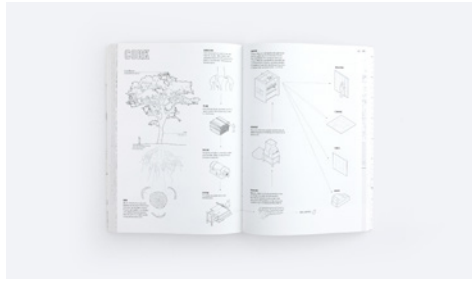
level 1: lobby, ticket office, meeting rooms, cafe, amphitheater





The plans were worked on collectively as a team with the use of the Rhino.Inside.Revit plug-in. I was responsible for the development of the ground floor plan and coordinated with the executive architects for the code requirements and detailing of the three stair and elevator cores.





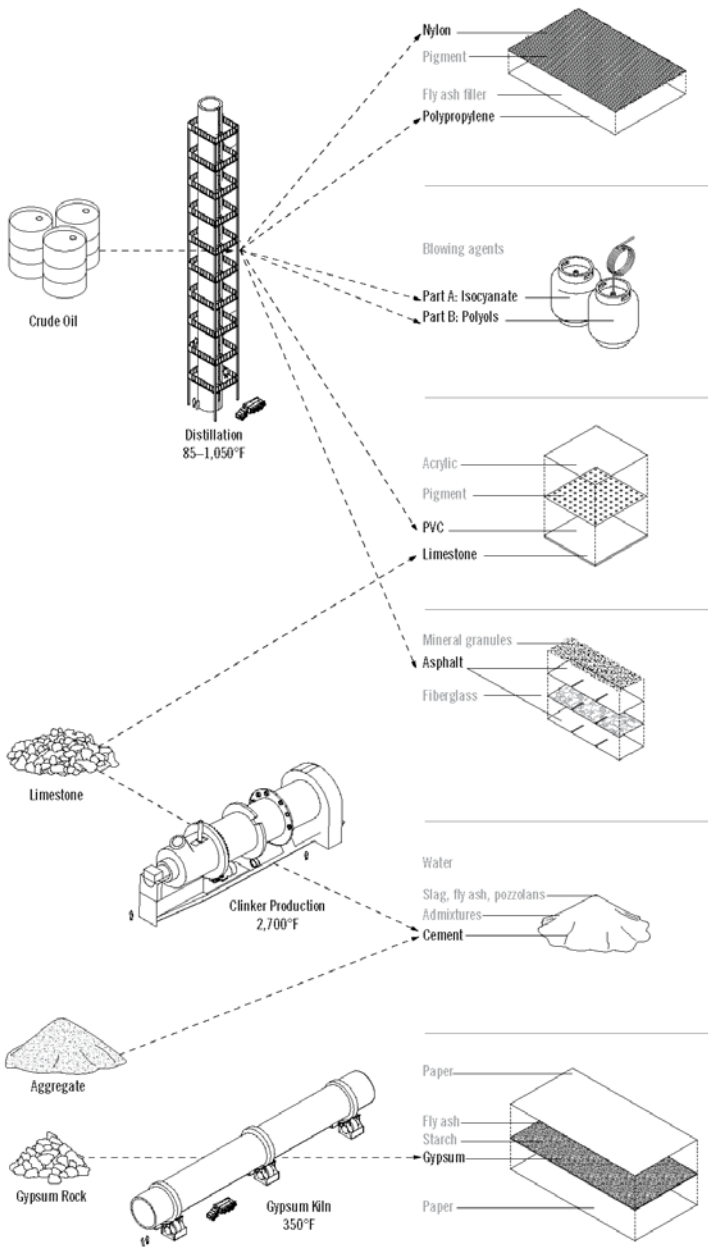
MANUAL OF BIOGENIC HOUSE SECTIONS

PROFESSIONAL EXPERIENCE: LTL ARCHITECTS
PROJECT MANAGER AND DESIGN TEAM MEMBER
FEBRUARY 2021-MARCH 2022
PUBLISHER: ORO EDITIONS
RELEASE DATE: DECEMBER 2022

Manual of Biogenic House Sections is a book of drawings documenting fifty-five houses built with carbon-sequestering materials and other low-carbon strategies such as reuse. Each of the ten chapters opens with life cycle and processing diagrams of the material being featured. (*Principals: Paul Lewis, Marc Tsurumaki, David J. Lewis. Team: Kyle Reich, Celia Chaussabel, with contributions from Jingyuan Zhang, Alena Nagornaia, Max Heintz, Grace Lee, Austin Madrigale, Julia Medina, and Zhiqian Xu. Role: modeled and drew the houses; researched and diagrammed material life cycles for the introduction of each chapter; developed an embodied carbon estimation methodology and calculations for ten of the houses; managed the graphic design and delivery of the book files to ORO; communicated with architects for redlining of drawings. All drawings shown here were done modeled and drawn by me. Book photos by ORO.)*

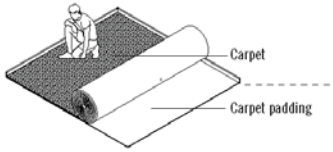
STANDARD HOUSE

HIGH EMBODIED CARBON MATERIALS



CARPET

Carpet comes in a variety of face fibers, backings, and surface treatments. It is often treated with antimicrobials and stain-repellents. Broadloom is the most common type used in residences, but it can also come in tiles.



INSTALLATION

END-OF-LIFE

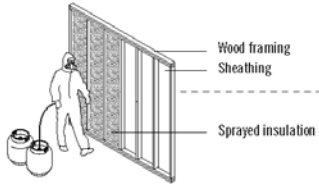
- Landfill
- Some carpet manufacturers offer to take back their own product to be recycled or reused
- Facing fibers can be reused in new products

HUMAN HEALTH RISKS

- Vinyl or polypropylene backing contain hazardous organotins and phthalates
- Fly ash used as filler in backings may contain heavy metals
- PFAs used in stain-resistant treatments are associated with health impacts such as cancer and thyroid disease

SPRAY FOAM INSULATION

Spray foam insulation acts as both insulation and as a continuous air barrier when applied between framing members of a wall or ceiling. The two-part solution gets mixed as it is being sprayed, expands within minutes, and cures in a day.

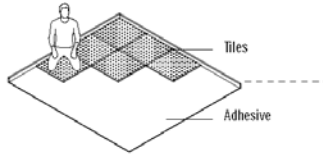


- Landfill

- Exposes installers and inhabitants to isocyanates, an asthmagen
- Toxic emissions can persist past the 24 -hour curing time
- Flame retardants may cause cancer and impair neurological and reproductive development

VINYL TILES

To make vinyl tiles, a mixture of PVC, limestone, and plasticizer is heated, rolled, cut, and coated with an acrylic finish that protects tiles during installation. The tiles come in a wide range of colors and textures and are resistant to moisture, stains, and abrasion.

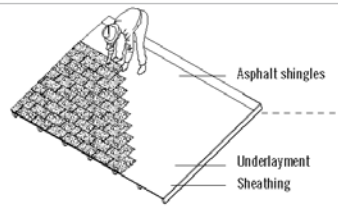


- Landfill
- Some flooring manufacturers offer to take back their vinyl tiles to be recycled or reused

- The processing of chlorine, a key ingredient in PVC, releases chlorine gas as well as mercury, asbestos, or PFAs depending on the process used
- The chemical byproducts of PVC production build up in the ecosystem locally at production facilities and globally wherever PVC is transported and used
- Recycled vinyl may contain lead, arsenic, PCBs, and plasticizers

ASPHALT SHINGLES

A fiberglass mat is coated in asphalt and mineral granules, then cut into multi-tab strips to give the appearance of separate shingles while allowing for ease of installation. The shingles must be installed with an overlap to ensure that water sheds off the roof.

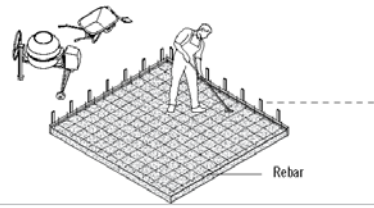


- Landfill
- Can be ground down, screened, and remelted for use in paving and new roofing
- Can be reused as aggregate

- Worker exposure to asphalt fumes can result in headaches, rashes, fatigue, coughing, and skin cancer

CONCRETE

Concrete is commonly used in house foundations and basements. It is the result of a chemical reaction between cement and water, which, when combined with an aggregate, reinforced with steel bars, and left to cure, forms a strong and durable material.

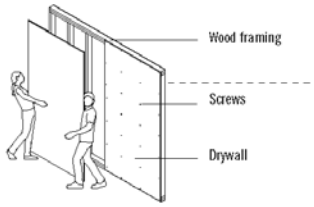


- Landfill
- Can be crushed, screened, and sorted for use as aggregate

- Fly ash, which is recycled from industrial processes for use in concrete, may contain heavy metals
- Cement can cause injury to the skin and lungs of workers

DRYWALL

Drywall is composed of gypsum plaster pressed between two layers of paper lining. It is used in interior walls, ceilings, and partitions to cover framing and insulation. Drywall can come in moisture-resistant, mold-resistant, fire-resistant, and acoustical varieties.



- Landfill
- Gypsum can be reused in the production of new drywall or in the production of cement
- Used for soil amendment to improve drainage and plant growth

- Fly ash used in recycled gypsum products may contain heavy metals that can leach out
- Antimicrobials used in mold-resistant treatments may be toxic
- Gypsum breaking down in landfills releases poisonous hydrogen sulfide

REUSE

MATERIALS - TECHNOLOGICAL LOOP

REUSE

Reuse is preferable because it requires little processing. Barriers are a lack of standardization of the components, cost, and time to properly dismantle and separate materials at the end of a building's life, and ensuring the performance of the material in its new use.

RECYCLING

Recycling of mineral or metallic products into new products of similar quality is preferable to their disposal in landfills, particularly for materials whose original manufacture is energetically consumptive. This approach captures anthropogenic materials in closed cycles. However, the processes that are needed in a technological loop still require energy, often from fossil fuels.

DOWNCYCLING

Like recycling, downcycling involves energy for processing and transport, with diminished return on value. Downcycling is often progressive with loss of quality leading to disposal over time.

END-OF-LIFE

In a technological loop, materials that aren't able to be recovered typically end up in a landfill, with little potential for energy generation. Some materials will humify or decay but at a slow rate.

MINERAL

EARTH

This includes rammed earth construction and earth blocks. The earth is usually taken from the project's immediate site and can be returned to the earth or used elsewhere if cementitious binders are not present.

STONE

Stone can be reused as large pieces if disassembly without breakage is possible, making mechanical fastening systems preferable to mortar. Otherwise it is downcycled as aggregate.

BRICK

Brick reclamation is labor-intensive. Mortar may be chiseled or saw cut to separate a brick. Brick may best be reused through direct sourcing for projects but general purpose recycling may be difficult, which results in most bricks being downcycled into aggregate.

CONCRETE

Concrete requires carbon-intensive processing for its initial production and is difficult to reclaim. Despite its ubiquity in building construction the majority of concrete ends up in landfills. Concrete may be downcycled into aggregate for reuse.

GLASS

Glass can be infinitely recycled if properly sorted. However, glass is generally downcycled into products of lesser quality. While it would seem plentiful, sand, a primary component in the manufacture of glass is fast becoming an extremely rare resource without viable substitutes, making the recycling of glass increasingly critical.

GYPSUM BOARD

Most gypsum board currently goes into landfills but there is the potential to reuse gypsum in the production of new gypsum board if properly separated during disassembly.

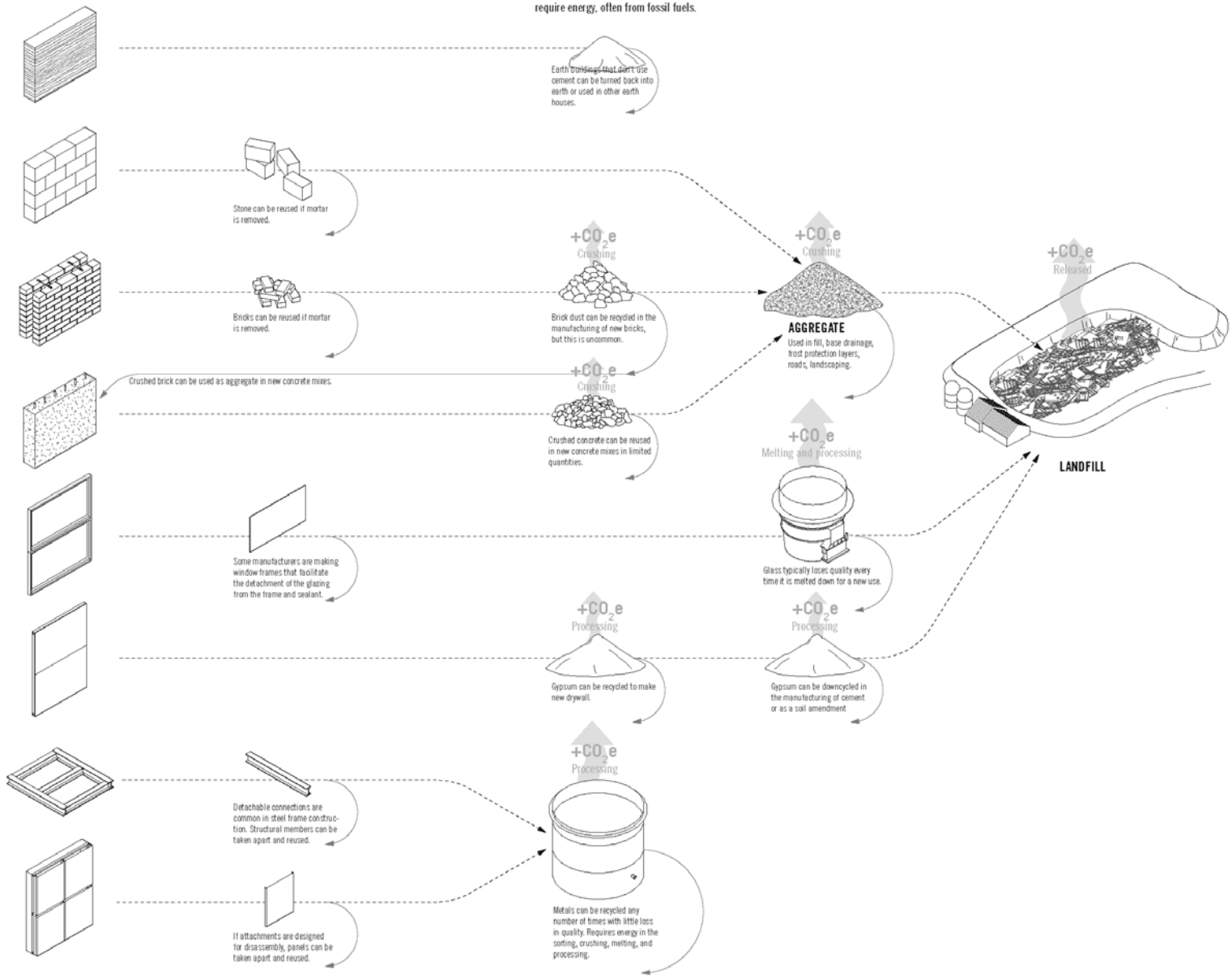
METALLIC

STEEL STRUCTURE

Though its initial manufacture is energy and carbon intensive, steel can be recycled or even upcycled into stainless or weathering steel when reprocessed. The recycling of steel requires 1/4 of the energy of making new steel.

METAL PLATES, EXTRUSIONS, AND CLADDING

This includes zinc, copper, aluminum, corten, stainless steel, and coated steel panels. These materials can be readily recycled, particularly if detailed for easy separation.

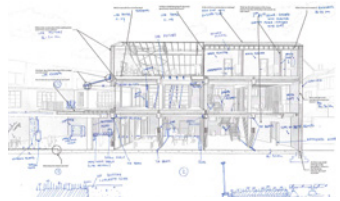


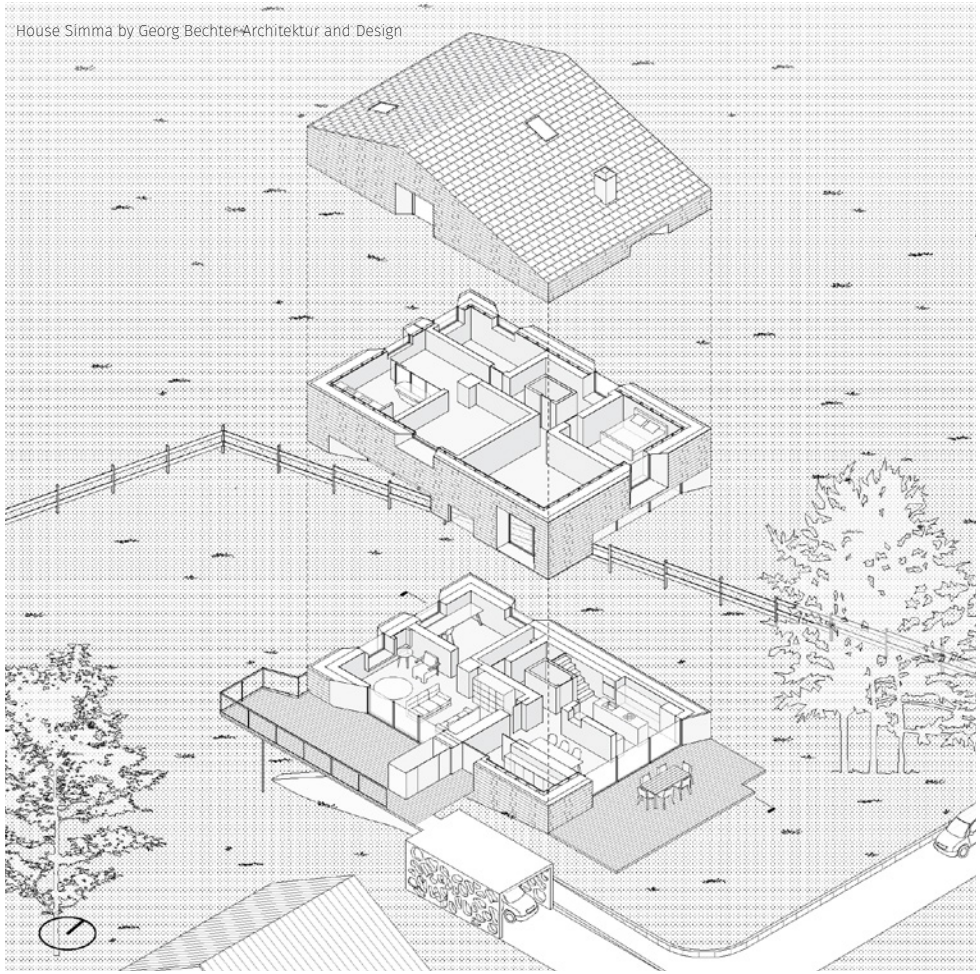
Research, text, and diagrams by me. Text edited by Marc Tsurumaki.

Verbiest by AgwA

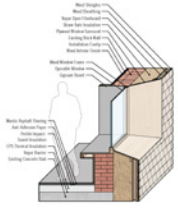
This is a house I found on Opalis, a database of material reuse dealers, manuals, and case study projects. The existing industrial structure was retained but the footprint of the enclosed, conditioned spaces was kept to a minimum. The resulting unconditioned spaces function as a greenhouse, a ceramics studio, and a deck. Concrete slabs and terra cotta roof tiles were reused in-situ. Stone, roof tiles, and railings were reused from a nearby site in the Brussels area.

Redlining of the section drawing, courtesy of AgwA Architects. The architects provided documentation and photographs, which I referenced to digitally model and draw the house.



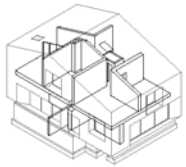


The exploded plan shows the existing brick farm house walls that were wrapped with straw for the new construction. The section "chunk" shows a typical angled window reveal that makes use of the thickened walls.

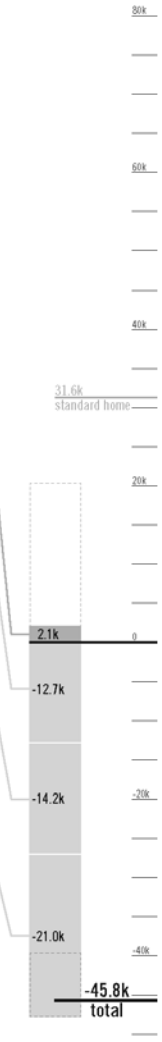


Reuse

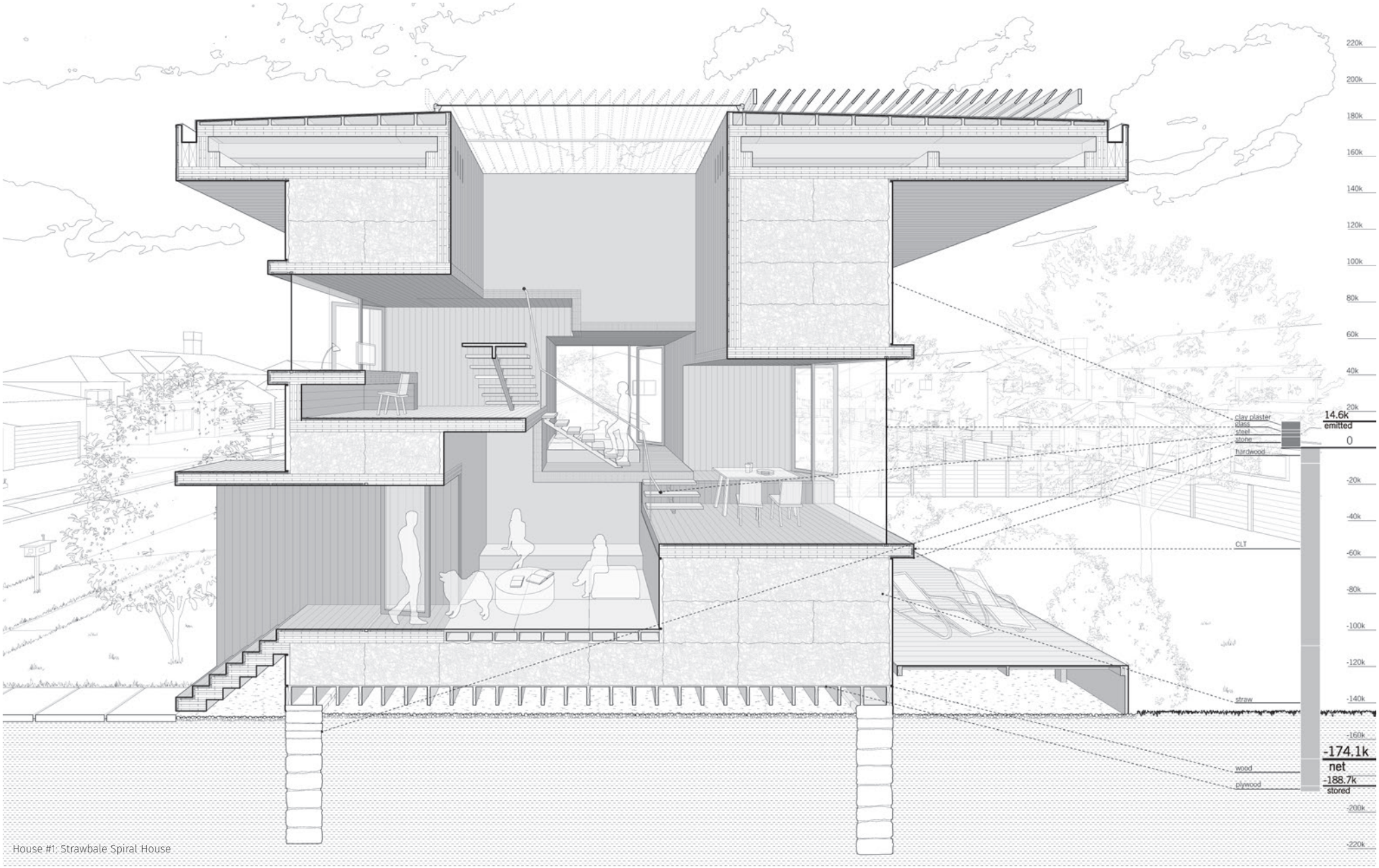
House Simma
Georg Bechter Architektur + Design



Location	Material	Quantity	$kgCO_2e$/unit	Total $kgCO_2e$
Foundation				**2108**
	Expanded Polystyrene Insulation	26.81 m^3	49	1314
	Mastic Asphalt	2.97 m^3	233	694
	Perlite	0.99 m^3	61	61
	Vapor Barrier	99.07 m^2	0.4	40
	Concrete (reused, no impact)	75.10 m^3	246	18482
Interior				**-12696**
	Concrete	15.00 m^3	246	3690
	Gypsum Board	4.22 m^3	224	944
	Lime Plaster	4.49 m^3	190	853
	Glass	0.05 m^3	3593	162
	Mastic Asphalt	0.31 m^3	233	73
	Dimensional Lumber	29.96 m^3	-615	-18418
Roof				**-14217**
	Clay Roof Tile	279.91 m^2	16	4445
	Bitumen Membrane	279.91 m^2	2	647
	Vapor Barrier	279.91 m^2	0.4	112
	Glass	0.02 m^3	3593	64
	Gypsum Board	0.17 m^3	224	37
	Dimensional lumber	6.43 m^3	-615	-3955
	Plywood	10.43 m^3	-472	-4920
	Straw	83.05 m^3	-128	-10647
Exterior				**-20970**
	Glass	0.55 m^3	3593	1982
	Vapor Barrier	478.85 m^2	0.4	191
	Gypsum Board	0.65 m^3	224	145
	Wood Fiber Board	2.73 m^3	-182	-498
	Plywood	1.41 m^3	-472	-667
	Straw	66.02 m^3	-128	-8464
	Dimensional Lumber	22.22 m^3	-615	-13660
	Brick (reused, no impact)	28.36 m^3	242	6873
	Mortar (reused, no impact)	7.09 m^3	187	1325
	Total			**-45,776 $kgCO_2e$**
	Area			251 m^2
	Total per Area			**-182 $kgCO_2e/m^2$**



Carbon calculations of select houses, using volumes measured from the digital models. To develop a methodology, we compared many existing databases and systematically selected the most relevant information. The calculations are challenging because of the range in carbon data from database to database, the lack of data on carbon-sequestering biomaterials, and the insufficient construction details for some of the houses.



House #1: Strawbale Spiral House

TWO STRAW HOUSES

PROFESSIONAL EXPERIENCE: LTL ARCHITECTS
SPECULATIVE HOUSE DESIGNS
DESIGN TEAM MEMBER
APRIL-AUGUST 2022

As a continuation of the work on the book, our team at LTL developed five speculative house designs to expand on the architectural, spatial, and structural possibilities of building with biogenic materials. I designed two of the five houses and chose to focus on the novel types forms and spaces that can result from a pairing of load-bearing straw bale construction and CLT. *(Principals: Paul Lewis, Marc Tsurumaki, David J. Lewis. Team: Kyle Reich, Tengku Sharil Bin Tengku Abdul Kadir, Danial Mahfoud, Celia Chaussabel. Role: Design, drawings, carbon estimations, and renderings of the two straw houses.)*

GROWTH
Trees take decades to grow. Responsibly managed forests are critical to wood's overall carbon impact.

CLT PANEL
This design works from the standard dimensions of a CLT panel, 10'x50', which is derived from the press size.

PREFABRICATED CLT MODULES
Built off-site, these modules integrate all the systems of the house, including mechanical, electrical and plumbing lines.

CANTILEVERED ROOF
Alternating spans of CLT panels, combined with structural timber beams create a stress skin roof that supports the cantilever that extends beyond walls to help protect the straw.

Timber

Straw

JUMBO STRAW-BALES
The design derives its efficiency from the use of jumbo straw-bales as the building unit to speed erection and set the formal organization of the interior.

GROWTH
The growth cycle of straw is less than a year, and straw is a waste product of the food grains they produce.

LAY THE FOUNDATIONS
Stone foundations with a vapor barrier and wood joists serve as an alternative to concrete slab on grade. Straw-bales are thus lifted off the ground and protected from moisture penetration.

STACK THE STRAW-BALES
Uncut jumbo straw-bales set the construction module, are load bearing, and speed the assembly of the house.

INSERT THE CLT MODULES
The prefabricated CLT modules knit into the straw-bale walls. These modules help stabilize the bales, and provide all the systems of the house.

BUILD THE ROOF
To protect the straw wall even with clay plaster, the roof is designed to shield the walls from most direct rain fall and excessive moisture. The weight of the roof acts as further ballast to compress the straw.

COMPOST
Biogenic materials can be composted and used to grow more raw materials.

STRAW

CLT

Reuse

Stone, timber and CLT can be disassembled and reused in other projects. Reused biogenic materials continue to sequester carbon.

STONE

Operable shading

Overhang

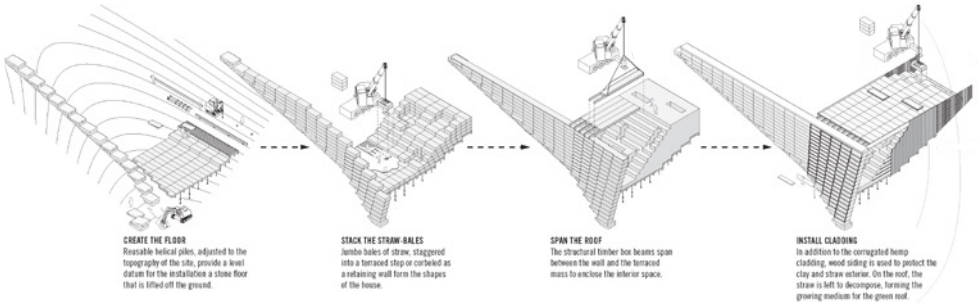
Bedroom

Study

Kitchen/Dining

Bath

Entry

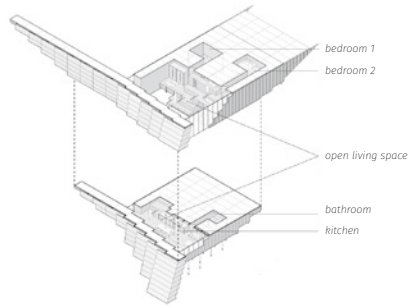


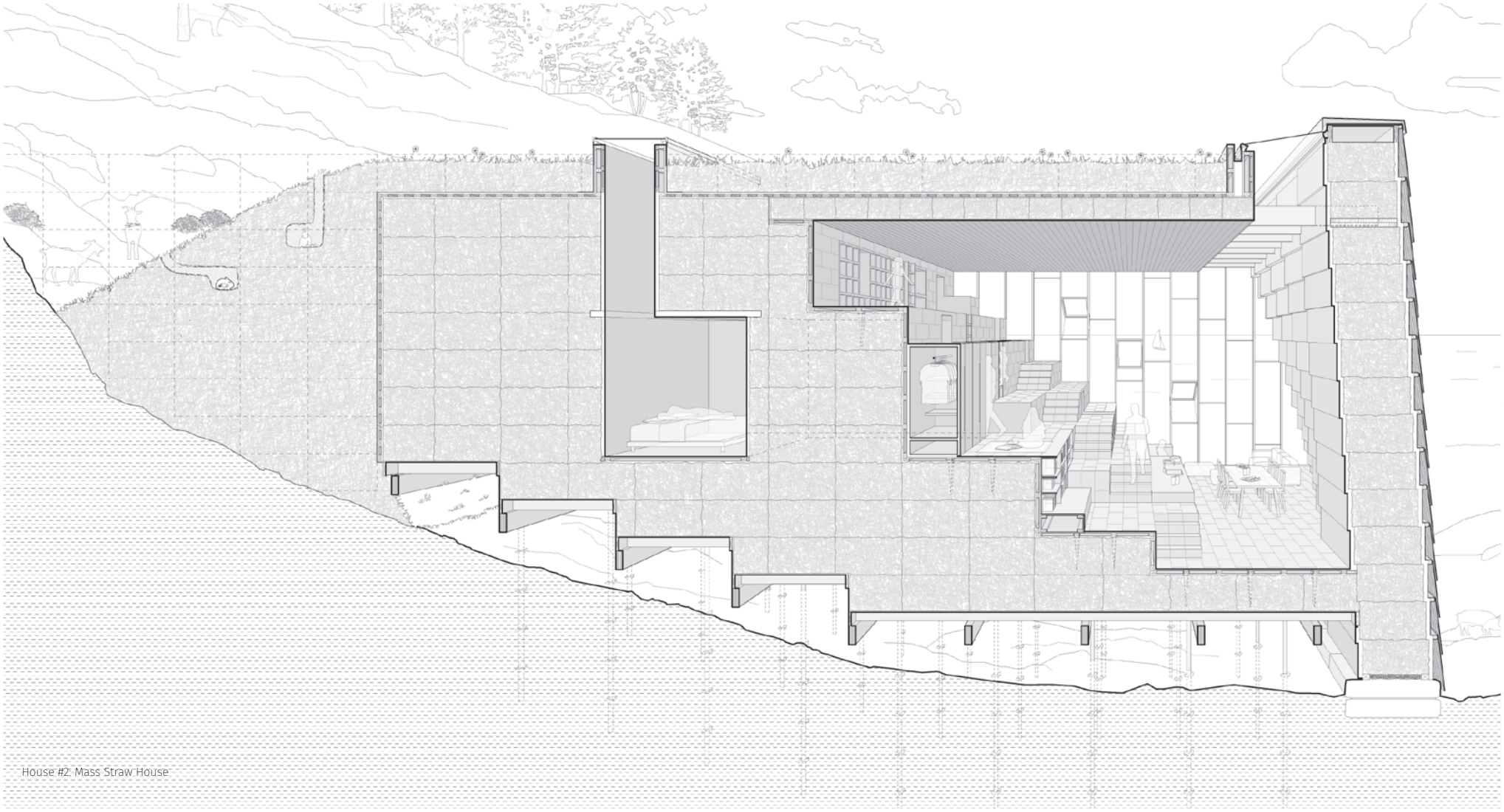
CREATE THE FLOOR
Reusable helical piles, adjusted to the topography of the site, provide a level datum for the installation a stone floor that is lifted off the ground.

STACK THE STRAW-BALES
Jumbo bales of straw, staggered into a terraced step or corbeled as a retaining wall form the shapes of the house.

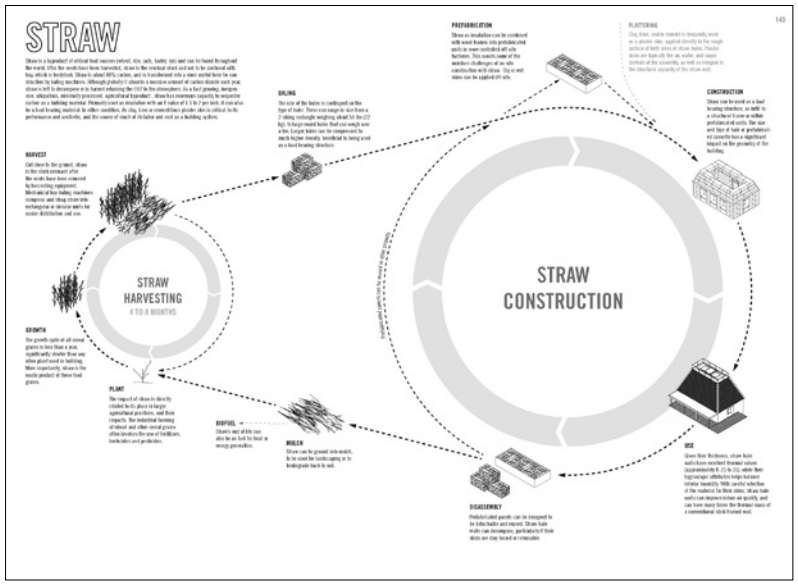
SPAN THE ROOF
The structural timber box beams span between the wall and the terraced mass to enclose the interior space.

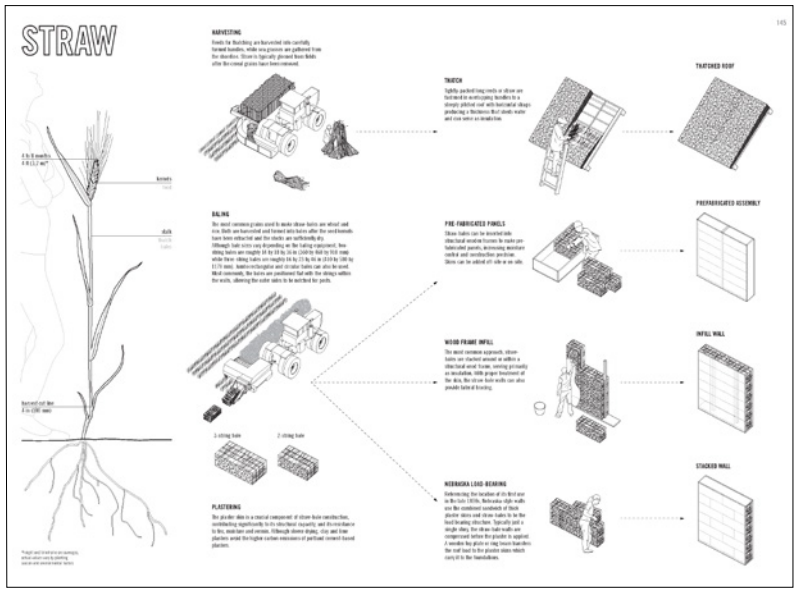
INSTALL CLADDING
In addition to the corrugated hemp cladding, wood siding is used to protect the clay and straw exterior. On the roof, the straw is left to decompose, forming the growing medium for the green roof.

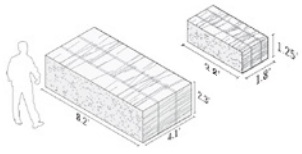




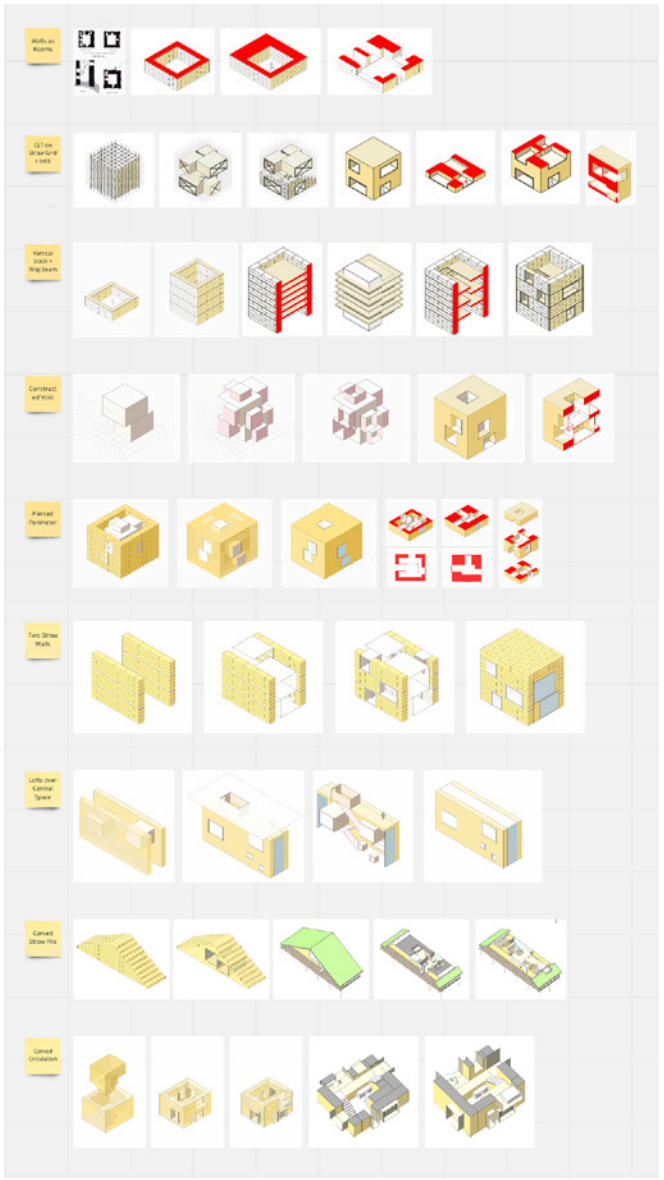
House #2: Mass Straw House



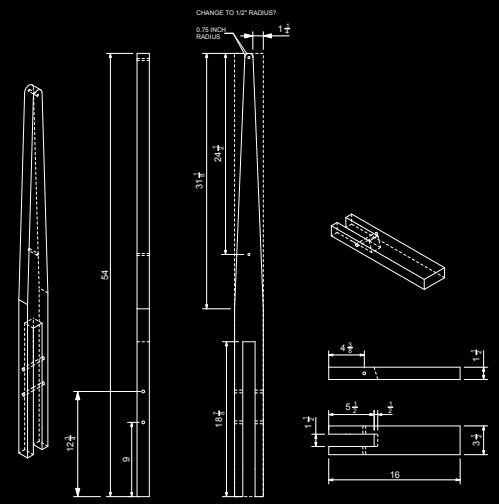


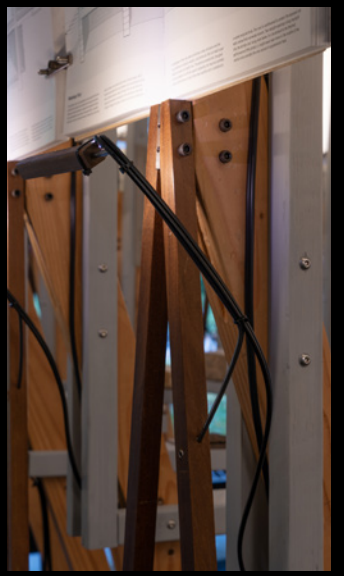


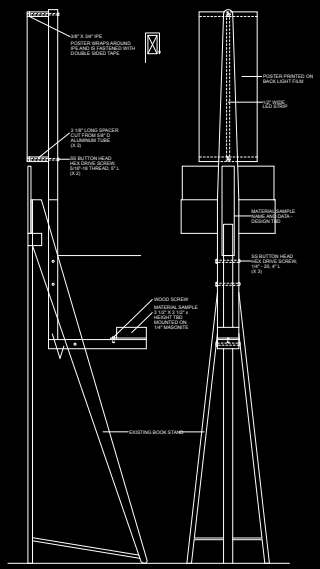
The designs are based in the research I did on straw for "Manual of Biogenic House Sections". From the structural limitations and modular nature of the bales, I developed several possible designs that are a direct consequence, and take full advantage, of straw's capacities as a material.



Iterating through 3D modeleling, diagrams, and cuts.







BIOGENIC HOUSE SECTIONS EXHIBITION

PROFESSIONAL EXPERIENCE, LTL ARCHITECTS
PROJECT MANAGER, FABRICATOR, AND DESIGN TEAM MEMBER
AUGUST-OCTOBER 2022
SITE: PRINCETON UNIVERISTY

The exhibition displays spreads from the book, drawings and one-to-one mock-ups of the five biogenic house designs, and a selection of building materials organized by their amount of embodied carbon. *(Principals: Paul Lewis, Marc Tsurumaki, David J. Lewis. Team: Kyle Reich, Celia Chaussabel. Exhibition assistants: Tengku Sharil Bin Tengku Abdul Kadir, Danial Mahfoud, Olivia Ahmadi, Katharine Solien. Role: Led the design, fabrication, and install. Exhibition photos by Michael Vahrenwald.)*