YIFEI KIT TANG



ARCHITECTURE

PORTFOLIO

STATEMENT

Millions of eyes look up at windows, bridges, capers, and they might be scanning a blank page. Many are the cities like Phyllis, which elude the gaze of all, except the man who catches them by surprise...

- Invisible Cities, ITALO CALVINO

Ideas are the pursuit among the people and their culture, manifested through the means of materiality into architecture. By inheriting unique constituencies constructs and varying geographical contexts, Architecture expresses the memories of the population through time.

The fabric of cities emerge and diminish as its citizens' memories - foreign and local - rise and fade. Architectures, in turn, crystallize fragments of moments that tell tales of fossilized memories. Believing that architecture shall be a reflection of people and their cultures, I find myself fascinated by the characters carried through built objects as they express attitudes, agreements and searches - marking the memories of generations, giving forms to the intangibles. Upon such belief, I carefully curate my projects – rendering materiality and memories of places and their citizens

TABLE OF CONTENTS

00 INFORMATION & RESUME P. 03-04

01 TARRAGONA SAILING SCHOOL P. 05-18

02 CITY VIEW APARTMENT ADDITION P. 19-30

03 30 WORKS OF 12 GARDNES P. 31-44

04 DORCHESTER PUBLIC LIBRARY P. 45-56

05 SPRING GARDEN HOSTEL P. 57-58

06 A BUILDING'S HANDSHAKE P. 59-60



+1 617-697-8026
kittang99@gmail.com
5506 Fifth Ave. Pittsburgh
www.linkedin.com/in/yifei-tang-74a049192

ACADEMIC

2019 - 2024 **Bachelor of Architecture**
Carnegie Mellon University

2023 **International Visiting Semester**
September - December
Universitat Politècnica de Catalunya

AWARDS

2023 **Luther S. Lashmit & Louis F. Valentour Traveling Scholarshps**
Travel Funding Granted through Open Competition

2020 - 2024 **Deans List**
Granted by the career grades above 3.5 in a 4.0 Scale

EXPERIENCE

2023 **Funded Travel & Study in Spain**
Summer & Fall

2022 **Researach Assistant**
Summer
Full time assistant for Research Project carried out by University Professor involving Concrete 3D-Printing and Parametric Design

2020 - 2024 **Monitor for Digital Fabrication Lab**
Monitoring the Digital Fabrication Lab in the School of Architecture. Managing machinaries including CNC Router, Laser Cutter, 3D Printer, Robotic Arms, Vacuumn Forming, etc

2020 - 2024 **Teaching Assistant**
TA for: Material & Assembly, Digital Media I&II, Drawing I&II, Structural Design I, Materiality & Construction Systems

TOOLS

Rhinoceros	●●●●●
Grasshopper	●●●●○
Revit	●●●○○
Photoshop	●●●●●
Illustrator	●●●●●
InDesign	●●●●○
AutoCAD	●●●○○
Vray	●●●●●
Lumion	●●●○○
Drawing	●●●●●
Model Making	●●●●●
Rhino CAM	●●●●●
CURA	●●●●○
Carpentry	●●●●○
Glasswork	●●●○○
Office Suite	●●●●○

MISC

ENGLISH Native
MANDARIN Native
SPANISH Proficient - B1
CANTONESE Communicational



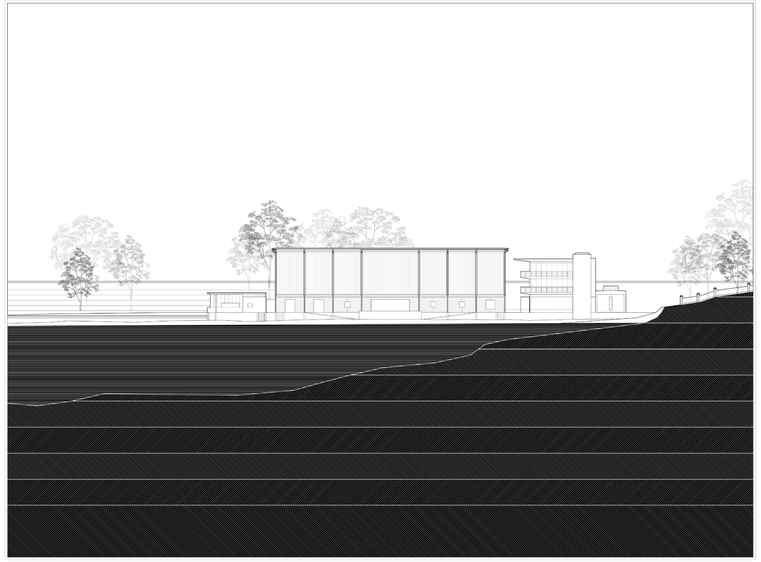
SITE PLAN

01. TARRAGONA SAILING SCHOOL

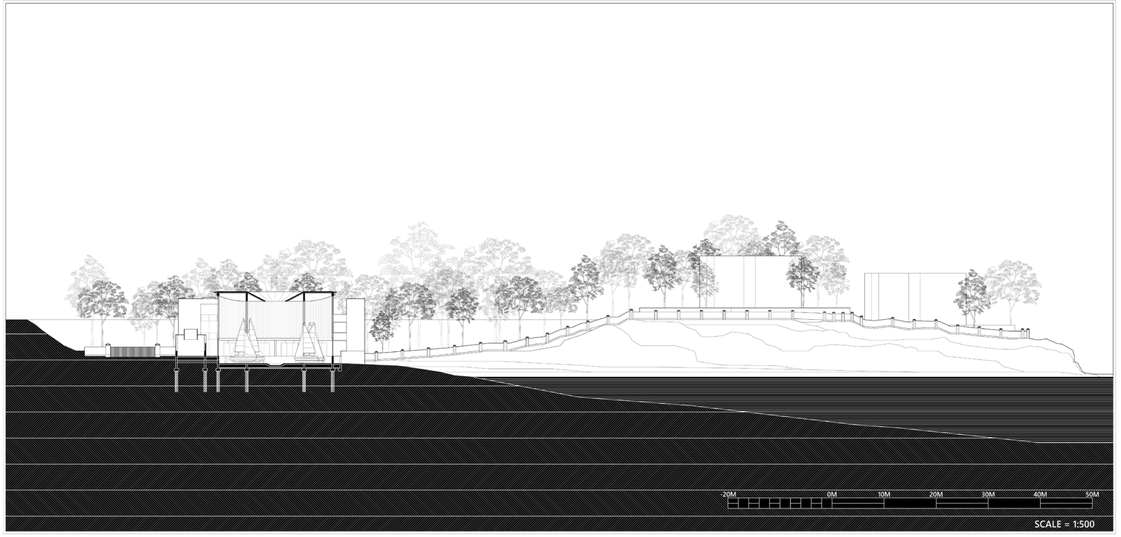
2023 FALL INSTRUCTOR: Jordi Adell Roig UPC - ETSAB

Along the endless coast of Tarragona, Spain an array of beaches is scattered. For eons, the tides of the Mediterranean wash the smooth sand as the wind brushes against the rocky cliffs. Nothing has changed much until a sail emerged on the horizon – a ship from a distant empire – announcing the arrival of the Roman settlers. Cities were built and abandoned, civilizations formed and forgotten. Then a thin line of rail prowled across the plain of Catalunya, laying itself along the coast of Tarragona. Hence comes the train, the noise, the visitors, the ancient hospital atop the sandstone cliff and now – riding the same waves that has indifferently embraced the sand and wind -- rises a sailing school.

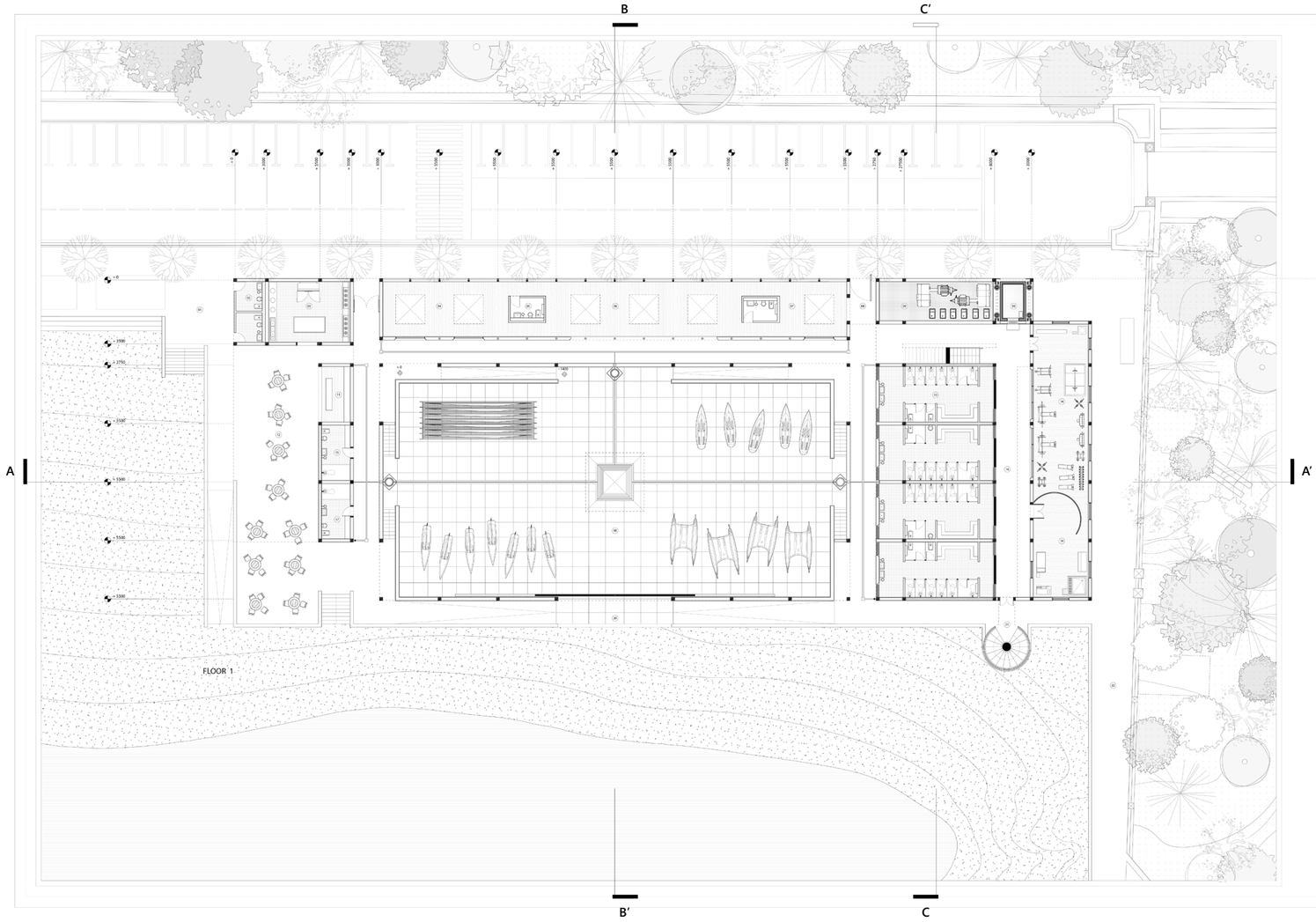
The school situates itself at the junction between a rocky peninsula and a modest beach lined with a lovely boardwalk. The program of the school revolves around a central plaza - now acting as the main hangar where sailing boats are docked during off-seasons -- around which all service programs such as changing room, warehouse, repair shop and a small cafeteria are composed around. With higher levels of the building complex made with removable timber, the plaza, changing rooms and cafeteria are constructed with concrete that is cast into the landscape. They will remain long after the school is rendered obsolete -- providing necessary infrastructure for daily uses, or simply mark the remembrance of those who cherished the ancient wind and waves of Tarragona.



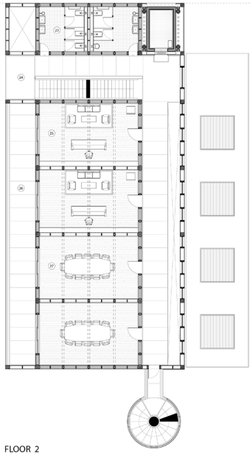
AA'

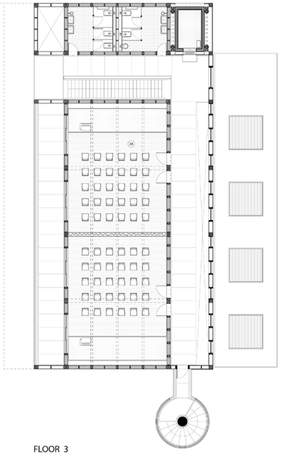


BB'



01. Beach Access
02. Public Bathroom
03. Kitchen
04. Repair Shop
05. Private Bathroom
06. Storage
07. Reception Hall
08. Entrance
09. System
10. Elevator
11. Bar Reception
12. Outdoor Dining
13. Changing Room
14. Gym
15. Trainer Office
16. Corridor
17. Physical Therapy
18. Athlete Lounge
19. Hangar
20. Main Gate
21. Egress
22. Beach Walkway
23. Staff Bathroom
24. Atrium
25. Administration Office
26. Balcony
27. Conference Room
28. Classroom/Assembly

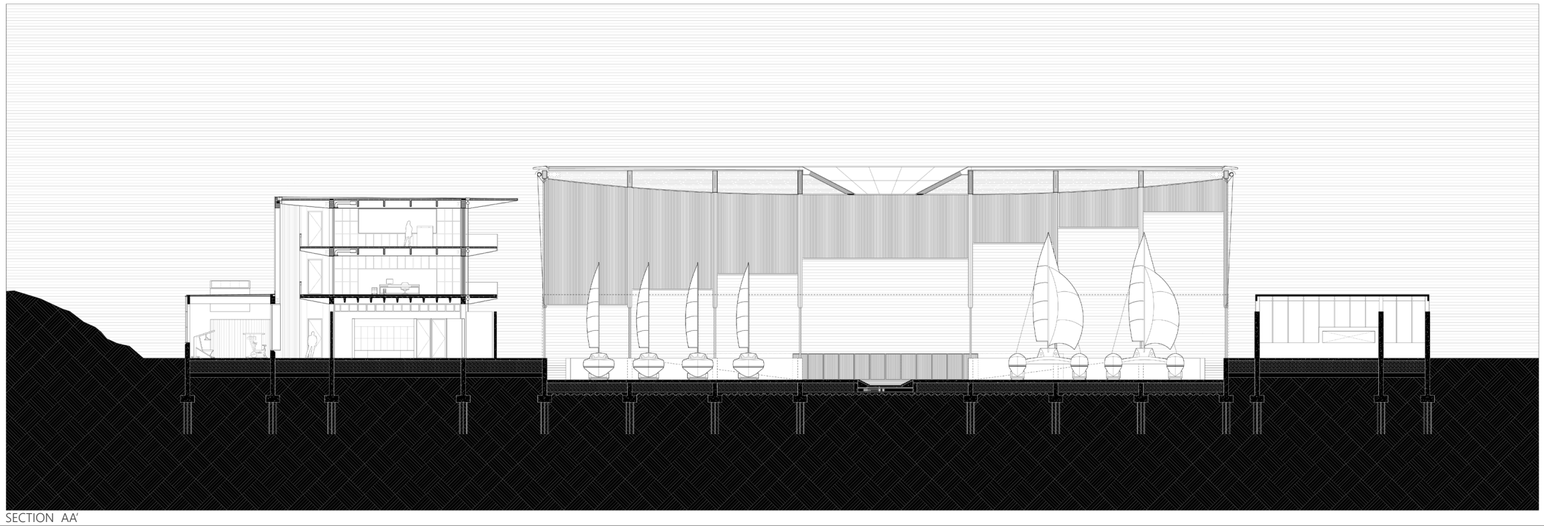




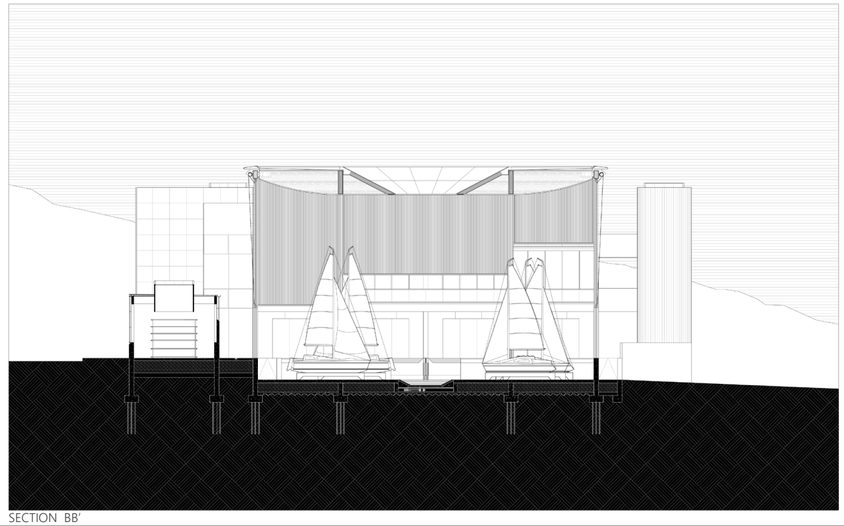
FLOOR PLAN - TARRAGONA SAILING SCHOOL

SCALE: 1 - 200

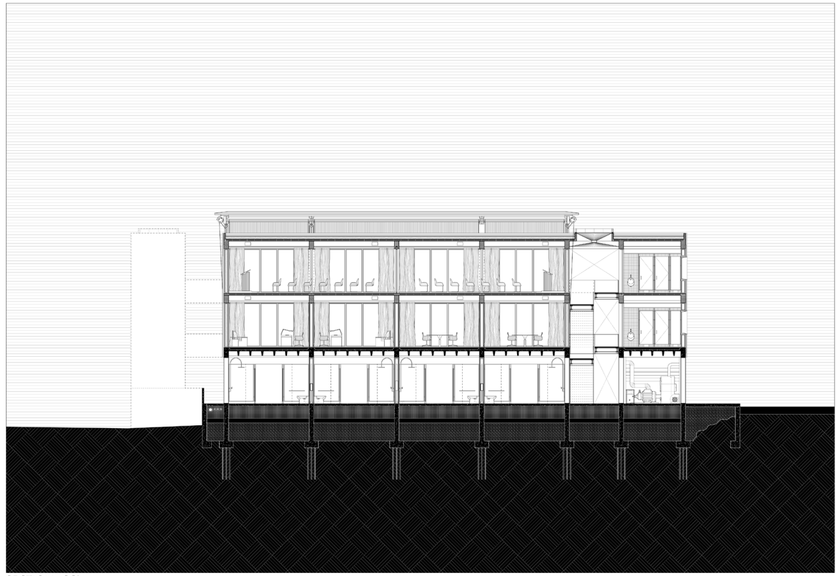
1M 5M 10M 20M



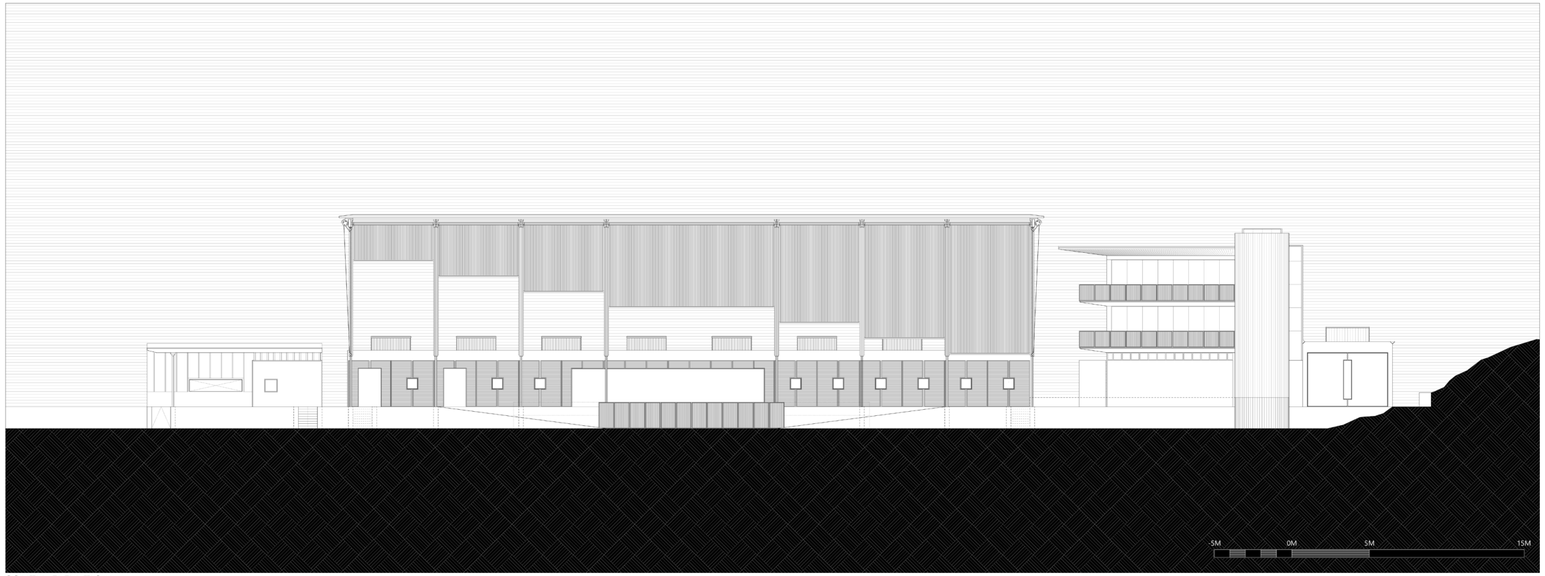
SECTION AA'



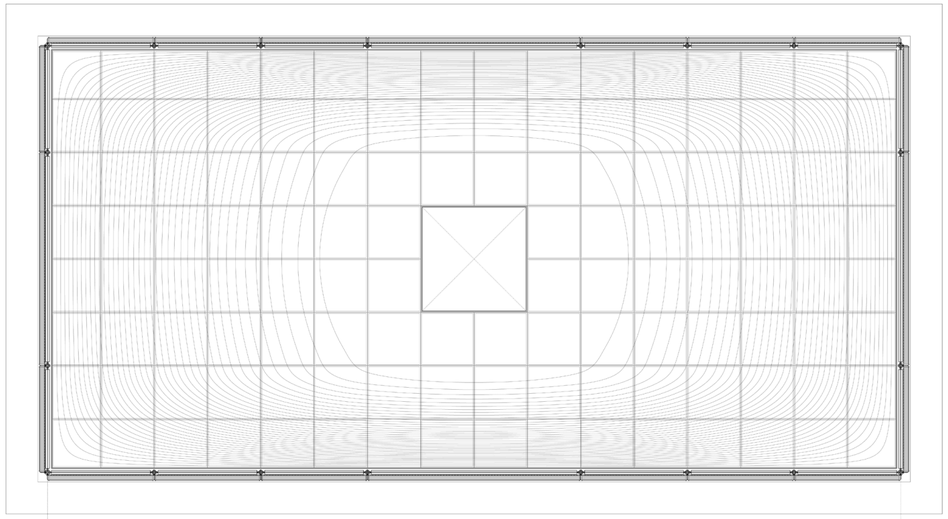
SECTION BB'

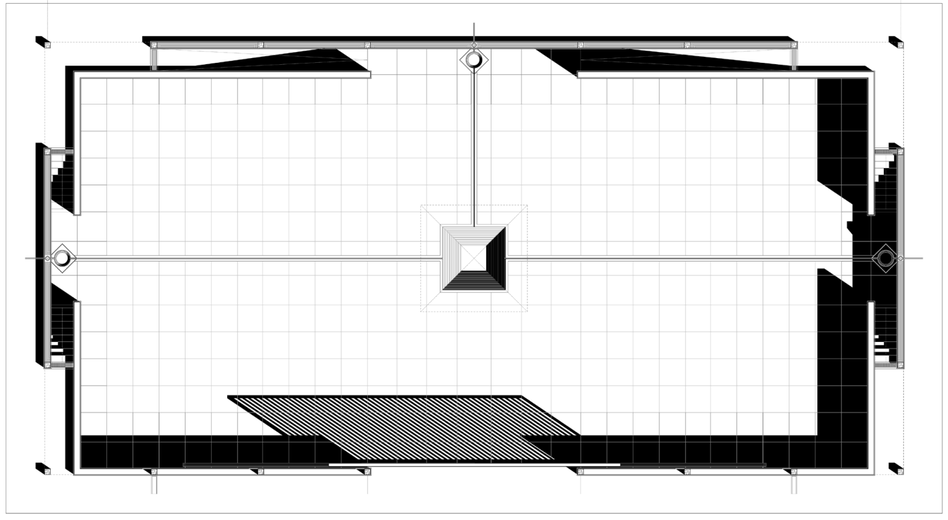


SECTION CC'



SOUTH ELEVATION





HANGAR - PLAN & REFLECTED CEILING PLAN

PLAZA & CANOPY

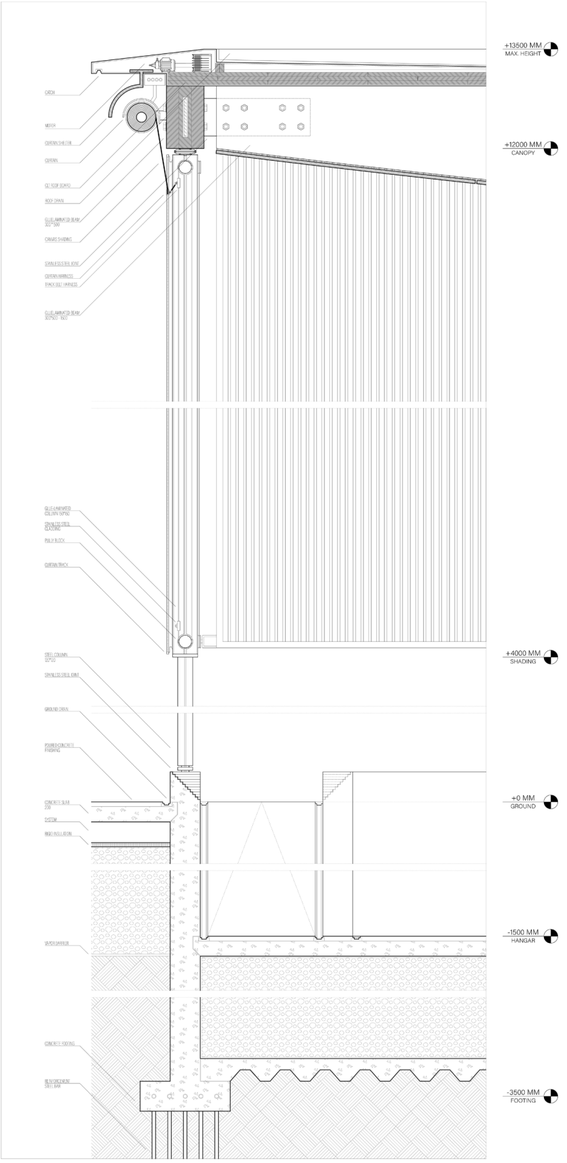
The Hangar is the central space around which the sailing school is programmed. A light weight canopy shelters the sailing boats during off-seasons, underneath which the concrete plaza rests in between the stony peninsula and the gentle waves.

THE CANOPY hovers above the expansive hangar space. Its timber skeletal frame dips gently towards the central oculus, where daylight and rain are introduced into the sanctuary. Twenty slender columns span 5.5 Meters on center to support the massive canopy. They are covered with reflective stainless steel and gradually taper down as they touch the ground. In between them drape mesh curtains, which are operable through a series of pulley system, allowing optimal control over the interior climate.

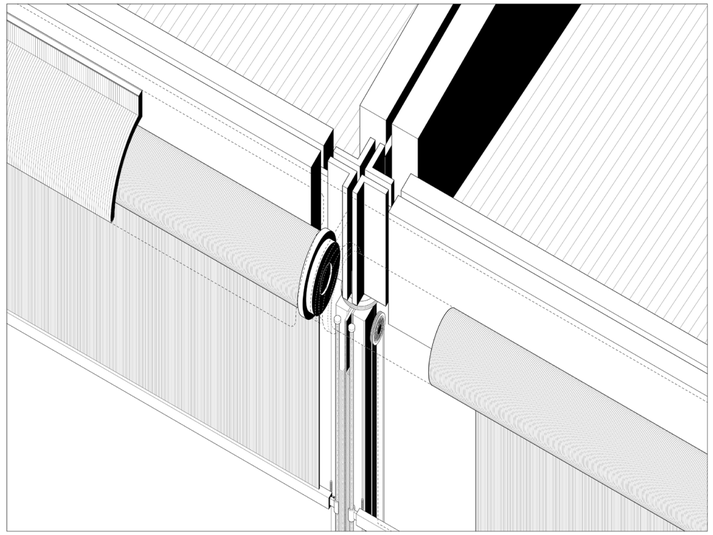
THE PLAZA -- now serving as the dry dock of the sailing boats -- is cast permanently into the coast of Tarragona. Along with the modest, single story structures that surround it, the plaza will remain as a necessary infrastructure that oversees the coastline long after the obsolescence of the sailing school. The floor of the Plaza is lined with concrete tiles, among which three water canals converge at the center. Water collected from the drainage system in the surrounding structures are channeled through the canals into the central pool -- underneath a frame of clear sky freed by the oculus above.



HANGAR - PLAZA



CONSTRUCTION SECTION - HANGAR



AXONOMETRIC - CURTAIN SCREEN ASSEMBLY

DETAILING

THE HANGAR is conceived to be a semi-outdoor space with minimum enclosure. Twenty columns, which carry the timber frame canopy, are wrapped in polished metal sheathing. Dematerialized under the sun, they frame the view towards the ocean.

THE CURTAINS are situated in between the columns. They are anchored against the pedestals and the heavy timber beams of the canopy. A series of cable mechanisms are applied to raise and lower the curtain based on weather condition. The metal mesh screen appear translucent from afar while bearing the capability to protect the sailing boats from heavy rains and wind.

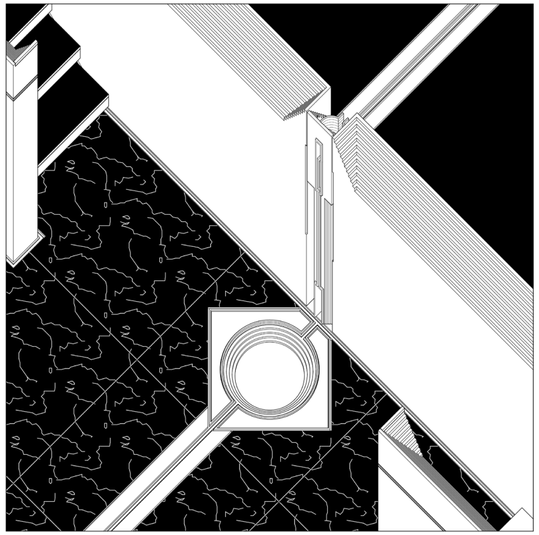
The CEILING of the canopy is lined with the same material of the curtain. They provide a sense of ambiguity that stands contrast against the Oculus in the center. Together, they gently frame the gateway towards the ocean, capturing a piece of serenity between the wave and the wind.



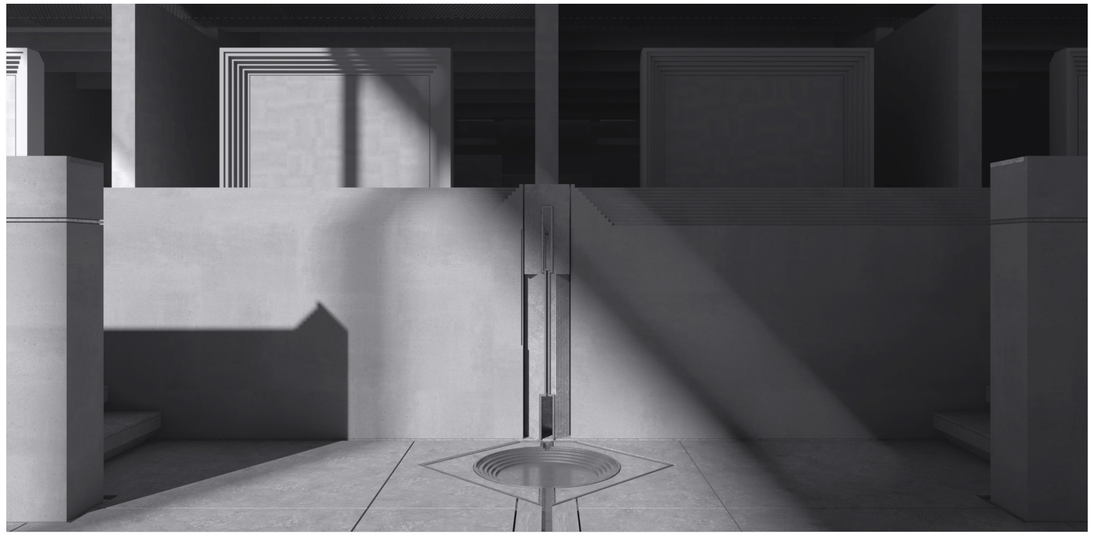
HANGAR LOOKING TOWARDS OCEAN



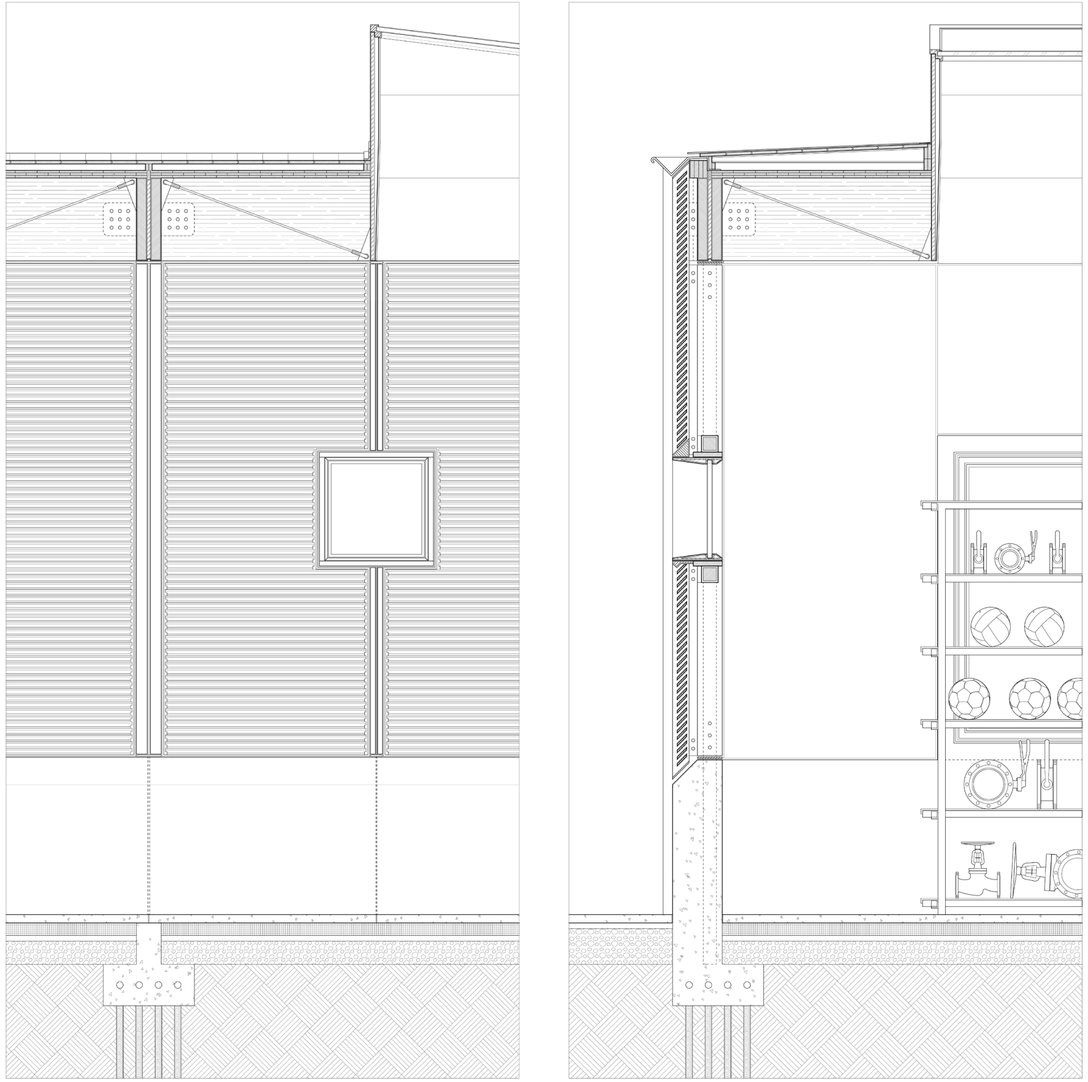
PERSPECTIVE - PLAZA STAIRS



AXONOMETRIC - DRAINAGE



DRAINAGE & PLAZA STAIRS

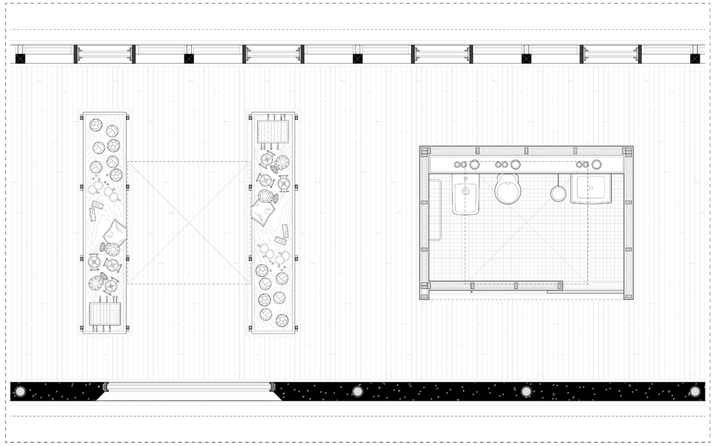


CONSTRUCTION SECTION - WAREHOUSE

STORAGE WAREHOUSE

THE WAREHOUSE is situated on the Northern end of the hangar. This elongated space is supported by a modest timber frame, which houses a series of windows and skylights to ensure sufficient natural light intake.

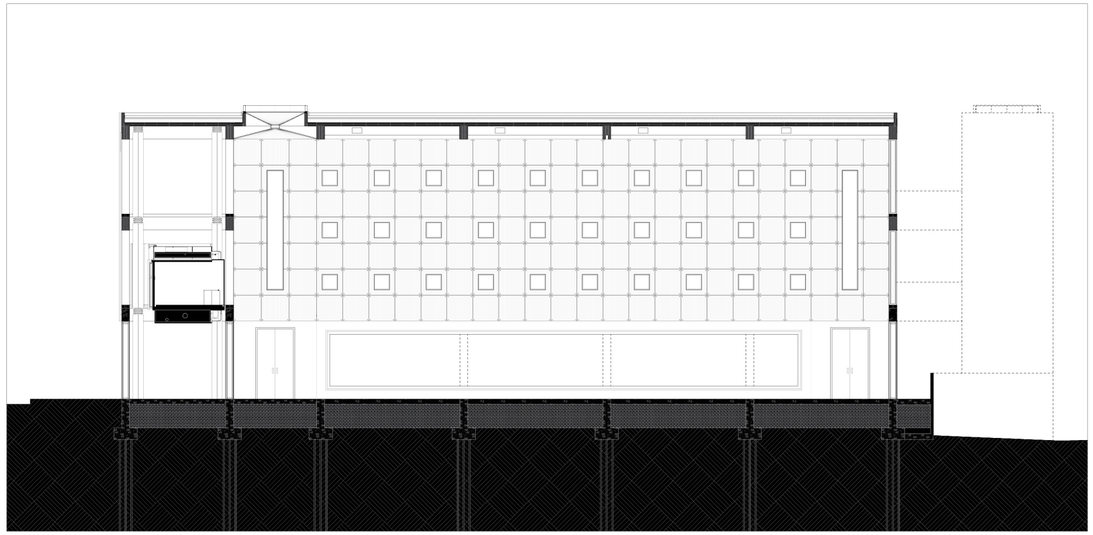
THE FACADE is lined with Polycarbonate Louvers, which brings in diffused daylight while allowing for natural ventilation across the storage space. The facade that faces the street is to have an array of view ports, which is operable based on the weather condition while affording the passerby a peak into the sailing school. The Southern Facade, however, is punctured with large openings -- both enclosed and fully open -- that bring the ocean view into the warehouse.



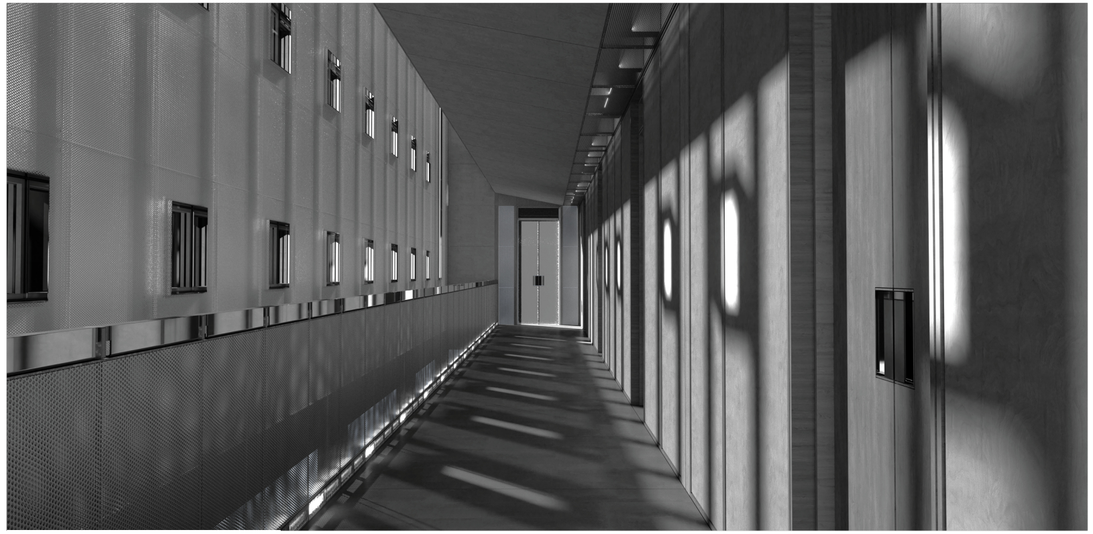
DETAILED PLAN - WAREHOUSE



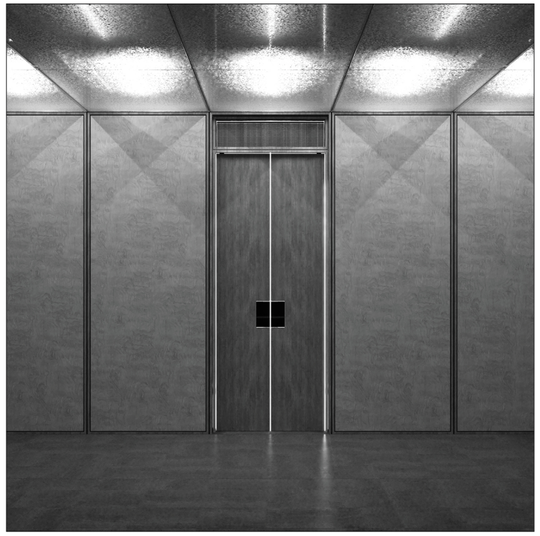
INTERIOR - WAREHOUSE



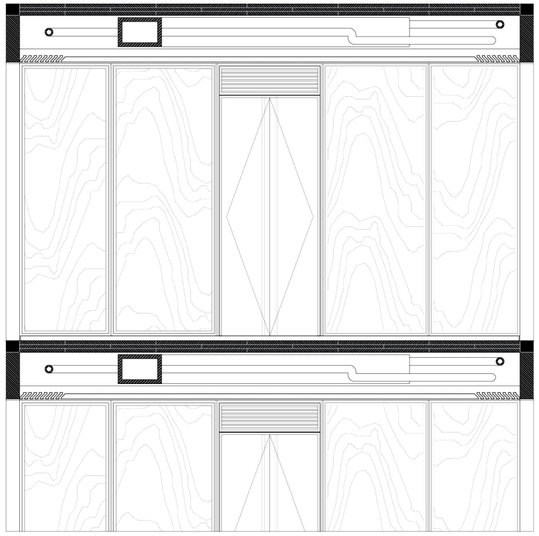
INTERIOR ELEVATION



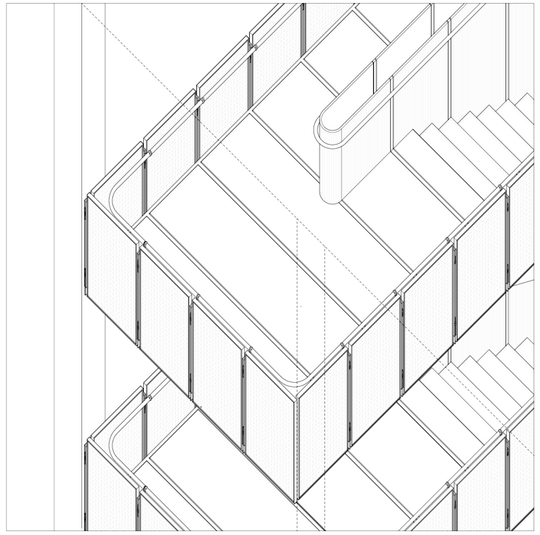
INTERIOR - CORRIDOR



INTERIOR - OFFICE



INTERIOR ELEVATION - OFFICE



AXONOMETRIC - MAIN STAIR



STAIR LANDING LOOKING TOWARDS WEST

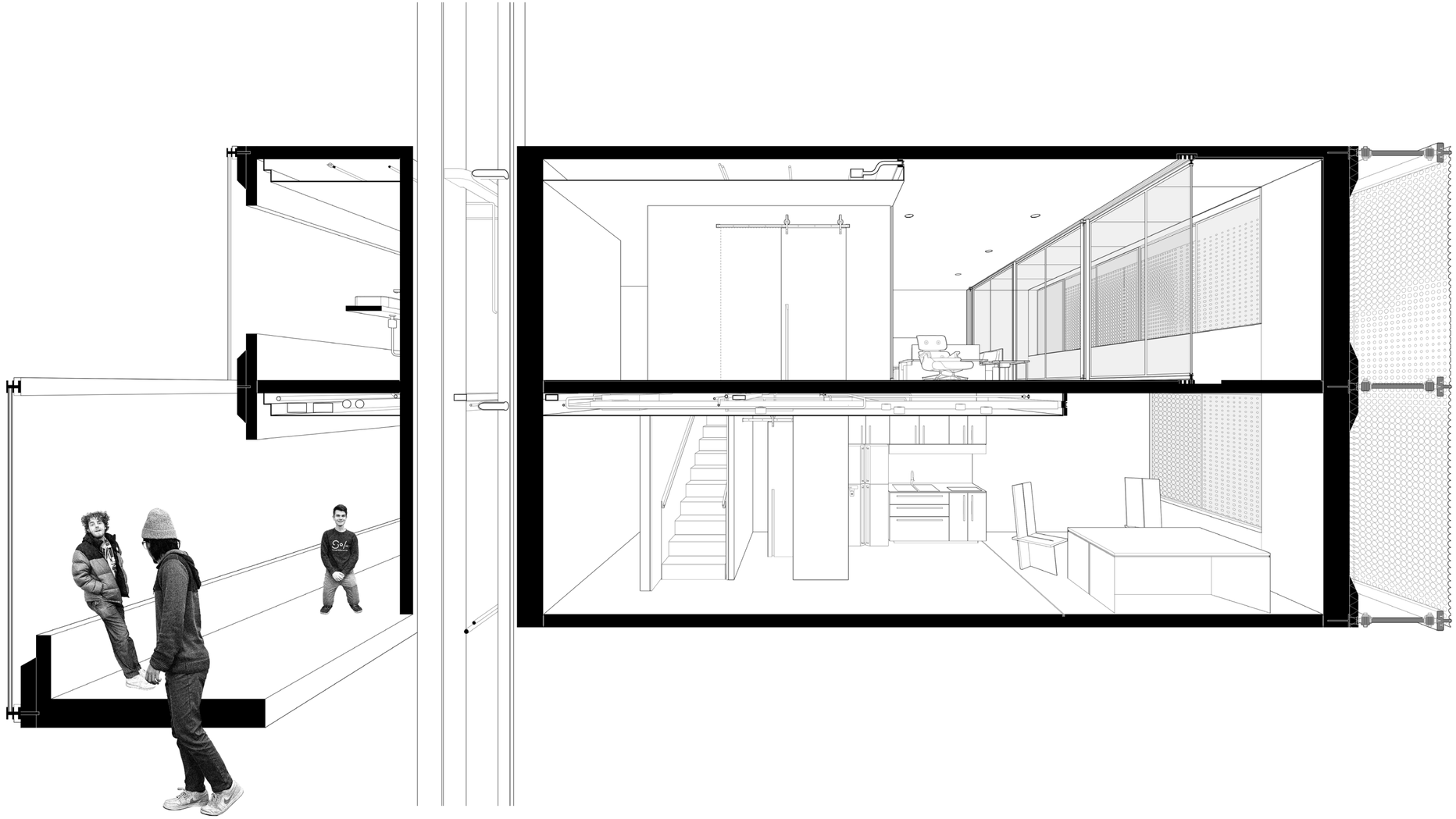
CITY VIEW APARTMENT ADDITION

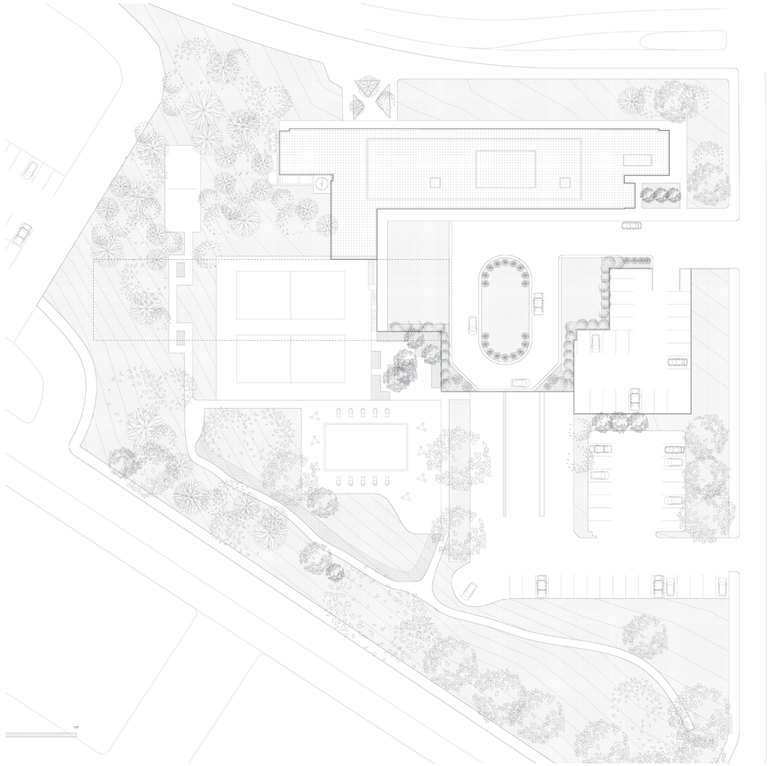
With BRIAN HARTMAN & COLIN WALTERS
Coordinated by GERARD DAMIANI
SoA | Carnegie Mellon University | 2022

Designed and constructed in the 1960s by I.M. Pei, the City View Apartments is part of an urban planning project in Pittsburgh, Pennsylvania that was never completed. Our comprehensive studio reimagines this residential project brought to fruition.

By applying a sectional strategy of an iconic precedent, the massing and planning stages of the design is drastically accelerated, leading to the focus on resolving structure, systems and enclosure. Through analyzing and documenting the existing structure and participating in various meetings with professional consultants, our group developed comprehensive designs that aim to create elevated living experiences while accommodating the residents of the existing tower.

The proposed concrete frame houses various apartment unit types while maintaining the original structural language. Perforated aluminum and bronze panels clad the southern facade, delivering a monolithic elevation that shifts its transparency across the skyline. A moment frame foundation flows along the undulating topography, giving the public space back to the community. The exterior envelope for the Northern facade is glazed through various transparencies, providing residents with living areas bathed in diffused light and single loaded corridors become “streets in the sky” , elevating the living above the roaring streets of the Steel City.





UNITS & TETRIS

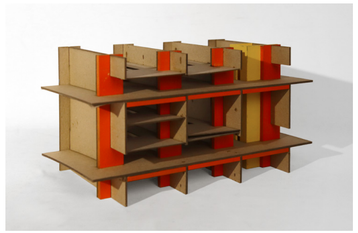
The floor plan and units layout are generated from studying Robinhood Garden, carrying down its unique Tetris-like unit integration.
The new City View tower consists 8 three-story zones each containing 13 residential units that are served by one enclosed corridor on the middle level. Each zone contains 1-bed, 2-bed, 3-bed and accessible studio unit types, covering wide range of demands. The addition of accessible units generates a different interlocking layout from the Robinhood Garden design. The accessible units are directly accessed by the middle level and are equipped with ADA interior programs to ensure accessibility.

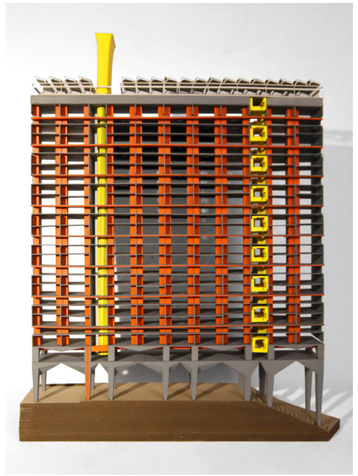






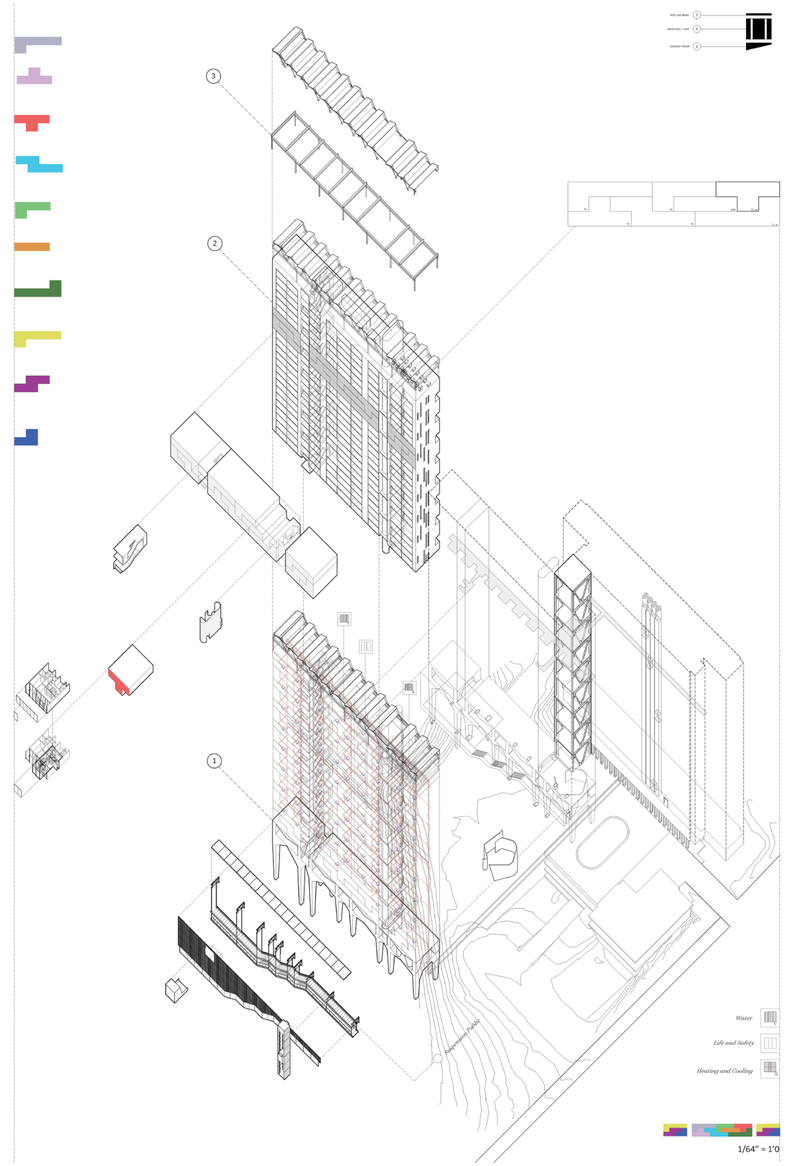






STRUCTURE

The new addition of the building has a cast in place concrete moment frame base. Concrete columns spanning 52' O.C. flow along the topography, generating a large open space for the public program. Joints and certain portion of the plenum are thickened to accommodate additional load from the structures above.
The main section of the building is supported by shear walls spacing 26' O.C. With additional lateral supporting wings and 6" concrete floor plates spanning every 9', they form a rigid frame system that houses the residential units. Interior and non-load bearing walls are pre-made off site with cold rolled steel frame finished with dry wall or wood boards.

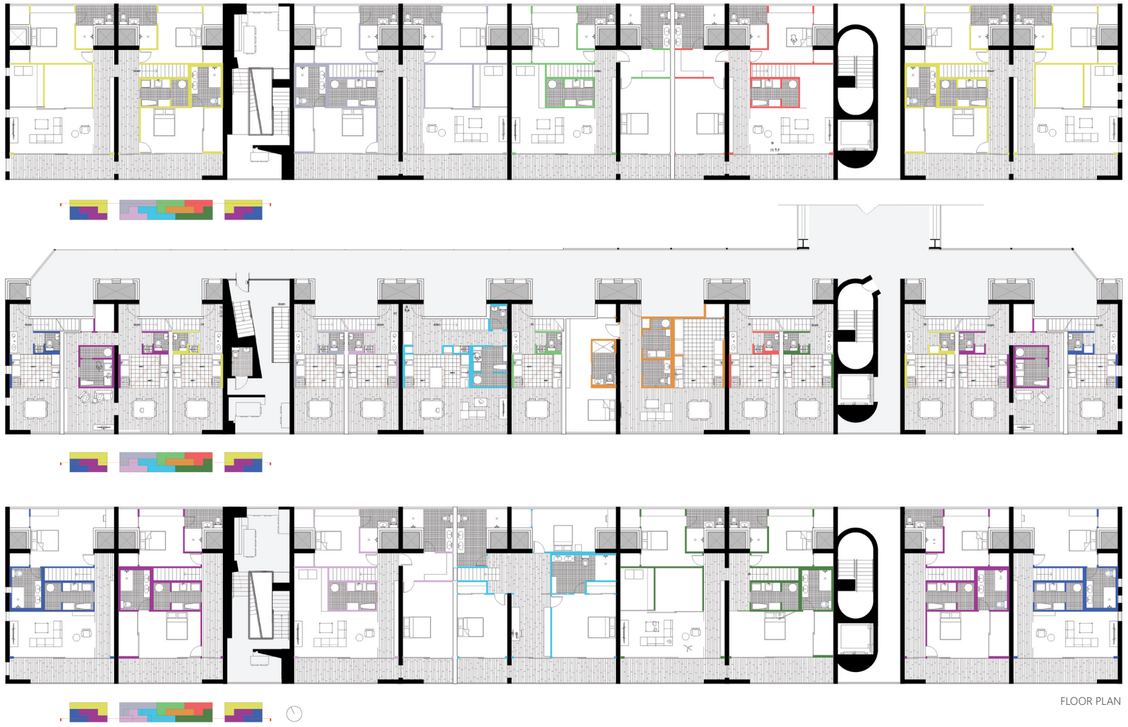


INTERIOR PLANNING

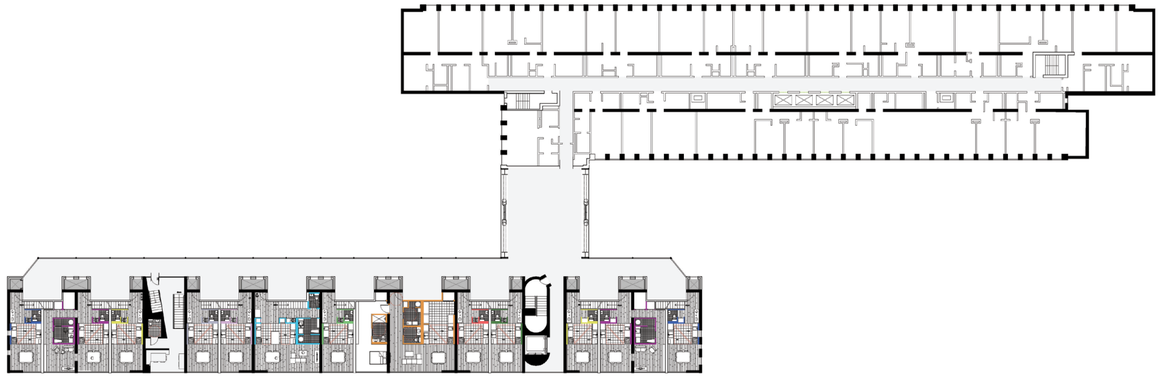
All units are accessed through the middle level within the three-story chunk. The entrance level consists kitchen, dining space and a half bath -- although some unit types have additional living space planned into the corridor level. Interior stairs lead to private sections of the program, including master bedroom, living room and guest rooms. Each bedroom is equipped with a full bathroom while some master bedroom enjoy features such as walk-in closets. Due to the shear wall rigid frame structural system, interior walls are minimized. Service areas such as bathrooms, closets and laundry rooms are utilized as dividers of the spatial programs, generating large, open living spaces.



APARTMENT UNIT MODEL



FLOOR PLAN



FLOOR PLAN with ORIGINAL STRUCTURE



INTERIOR RENDER - KITCHEN



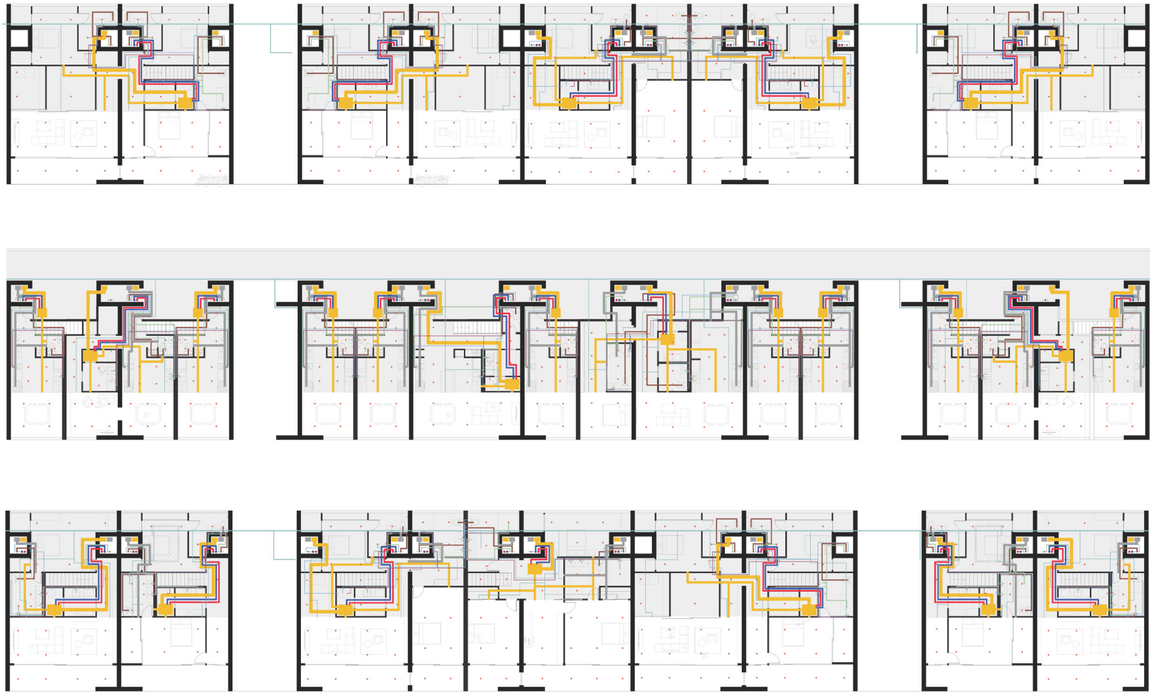
INTERIOR RENDER - BEDROOM



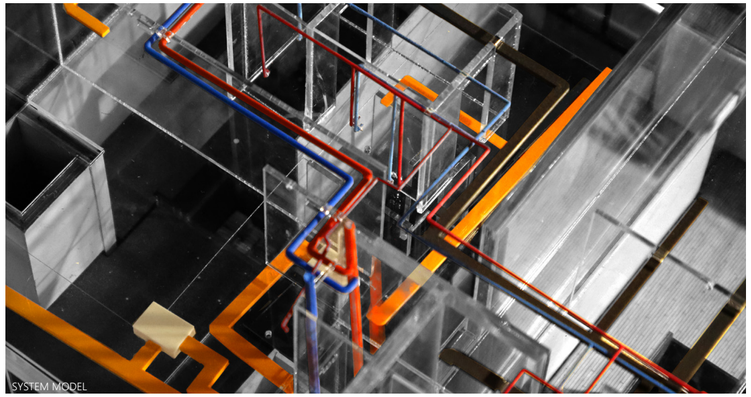
INTERIOR RENDER - LIVING ROOM



INTERIOR RENDER - BALCONY



SYSTEM CEILING PLAN

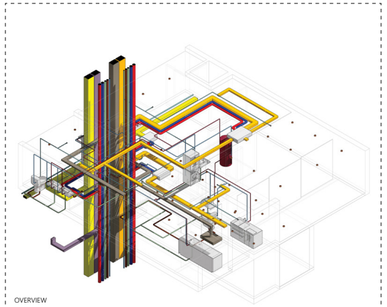


SYSTEM MODEL

SYSTEMS

Each unit is served with an individual heat pump system. Two air handling units -- one for each floor -- draw and dispose heat from two water loops that run through the building at a relatively constant temperature between 55 to 85 degrees Fahrenheit. All the pipes (Air Intake, Exhaust, Water Supply, Black & Gray Water Plumbing, etc) run vertically through the building through the system shafts that flank the shear walls.

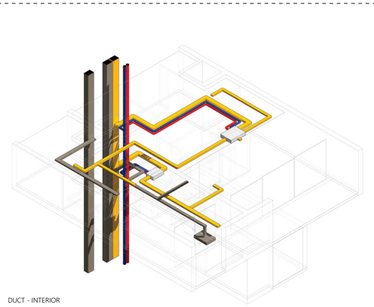
Drop Ceilings house pipes that travel horizontally within the apartment units. They are condensed within the North and central part of the interior space, leaving the Southern side largely open for daylight and view access. Sprinklers travel through egress cores and travel horizontally into the units.



OVERVIEW



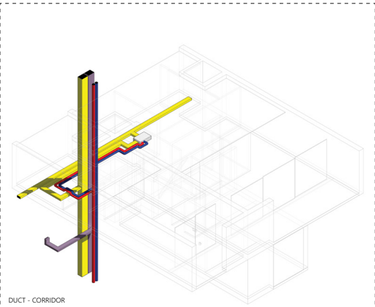
F1 PLAN F2 PLAN



DUCT - INTERIOR



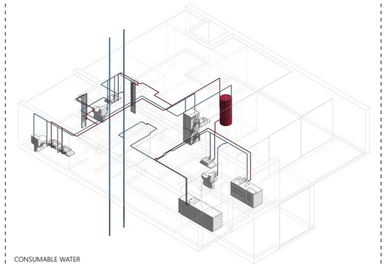
F1 PLAN F2 PLAN



DUCT - CORRIDOR



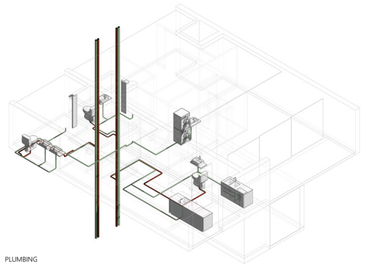
F1 PLAN F2 PLAN



CONSUMABLE WATER



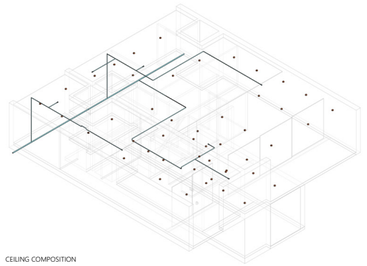
F1 PLAN F2 PLAN



PLUMBING



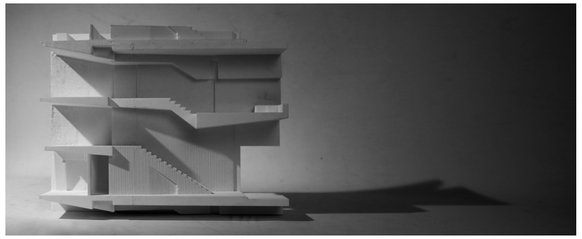
F1 PLAN F2 PLAN



CEILING COMPOSITION

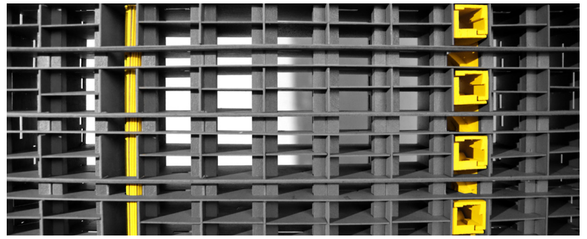


F1 PLAN F2 PLAN

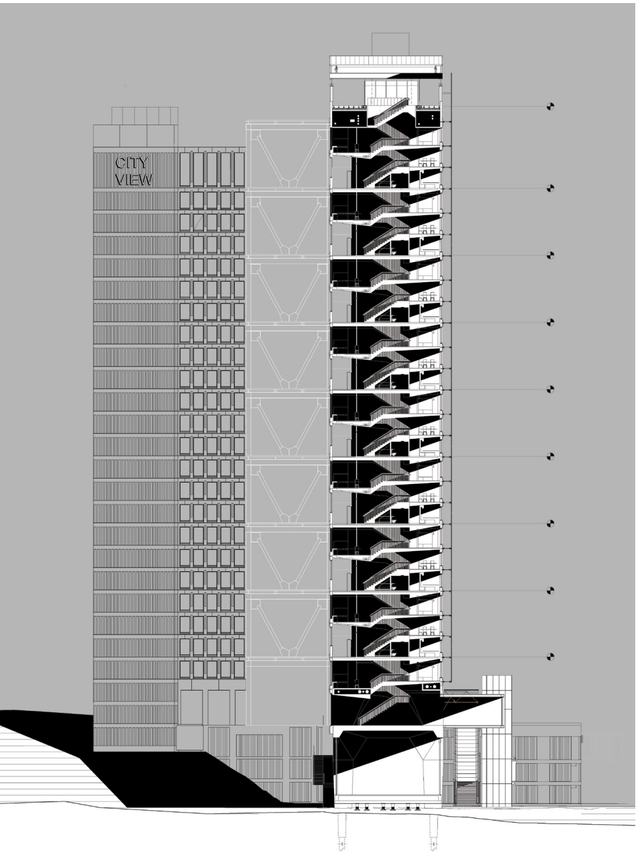


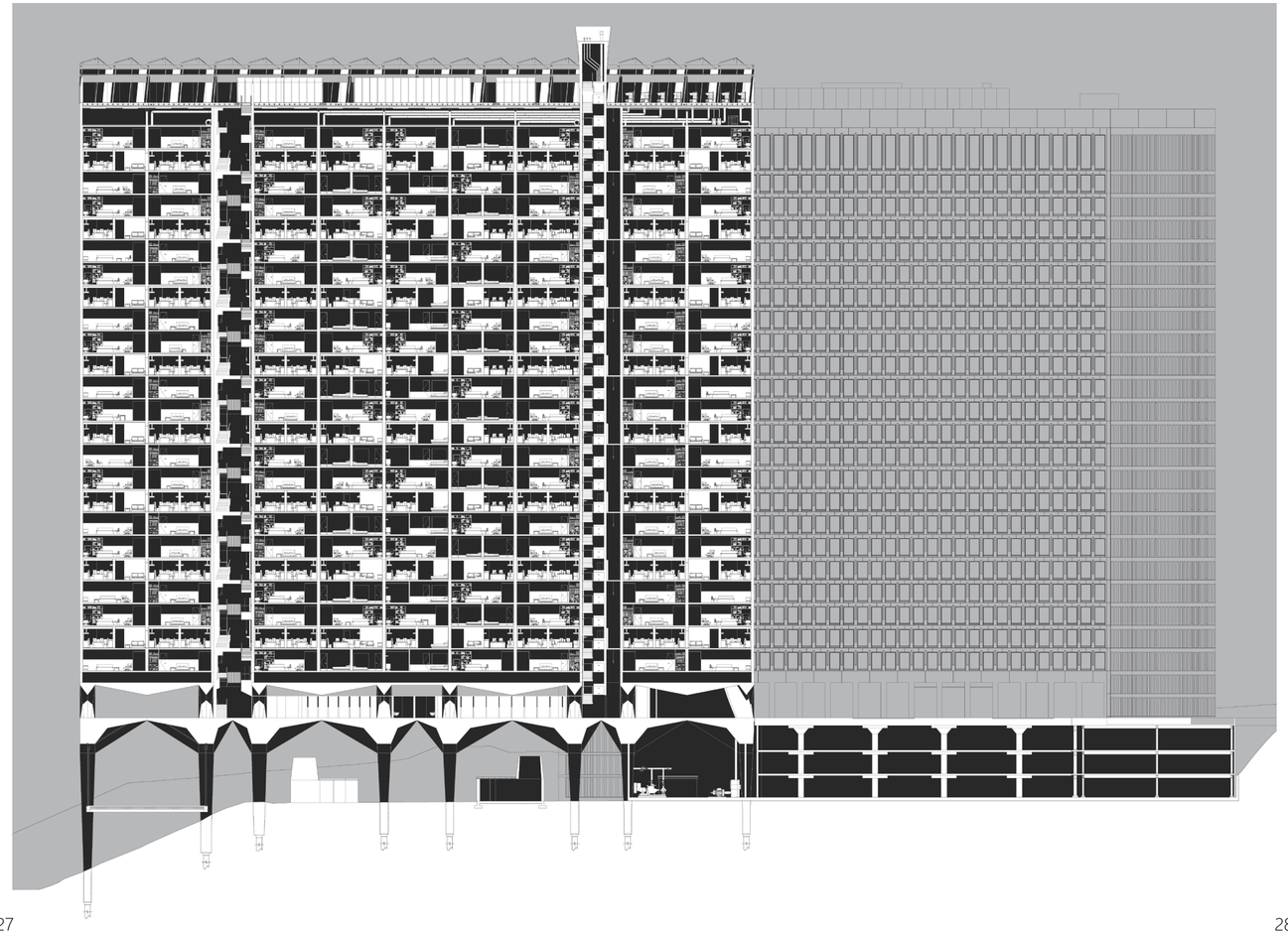
EGRESS

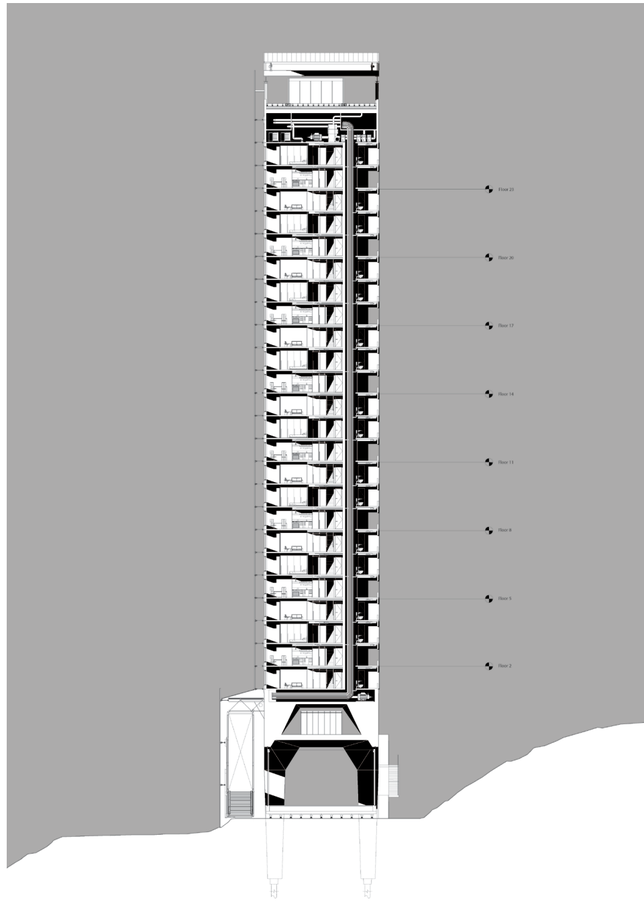
The egress core on the West end of the new tower is expressed as an open, sculptural space. Each multi-story cavity contains a series of public rooms and three sets of stairs that are lined with translucent panels as railing. As sun light enters the egress core through the southern panel glazing, it fills the vertical space with various shades of brightness, complementing the sculptural aggregation while encouraging communal interactions.



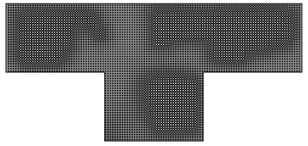
LEFT TOP: EGRESS MODEL
LEFT BOTTOM: CROSS SECTION 1
MIDDLE: LONG SECTION
RIGHT TOP: STRUCTURAL MODEL
RIGHT BOTTOM: CROSS SECTION 2

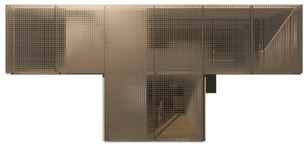


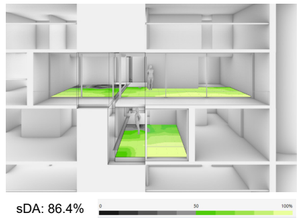


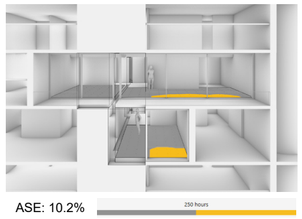


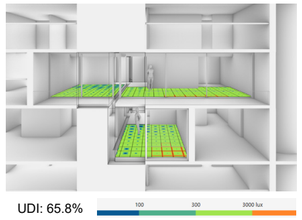












ENCLOSURE

The southern facade is clad with perforated metal panels to ensure privacy and strategic shading. The panels -- two shades of silver and two bronze -- showcase the Tetris-Locking parti of the units. All panels are perforated by the programming behind the enclosure: the diameter of the foramina range from 6-1/2" (in front of glazings) to 2-1/2" (in front of solid walls), generating various levels of transparency across the facade.

Facade panels are attached to the concrete frame through a series of aluminum scaffolding and bracings that bear both vertical and lateral loads. These modularized panels can be operated freely, offering full control of interior shading based on preference while generating unplanned facade patterns.

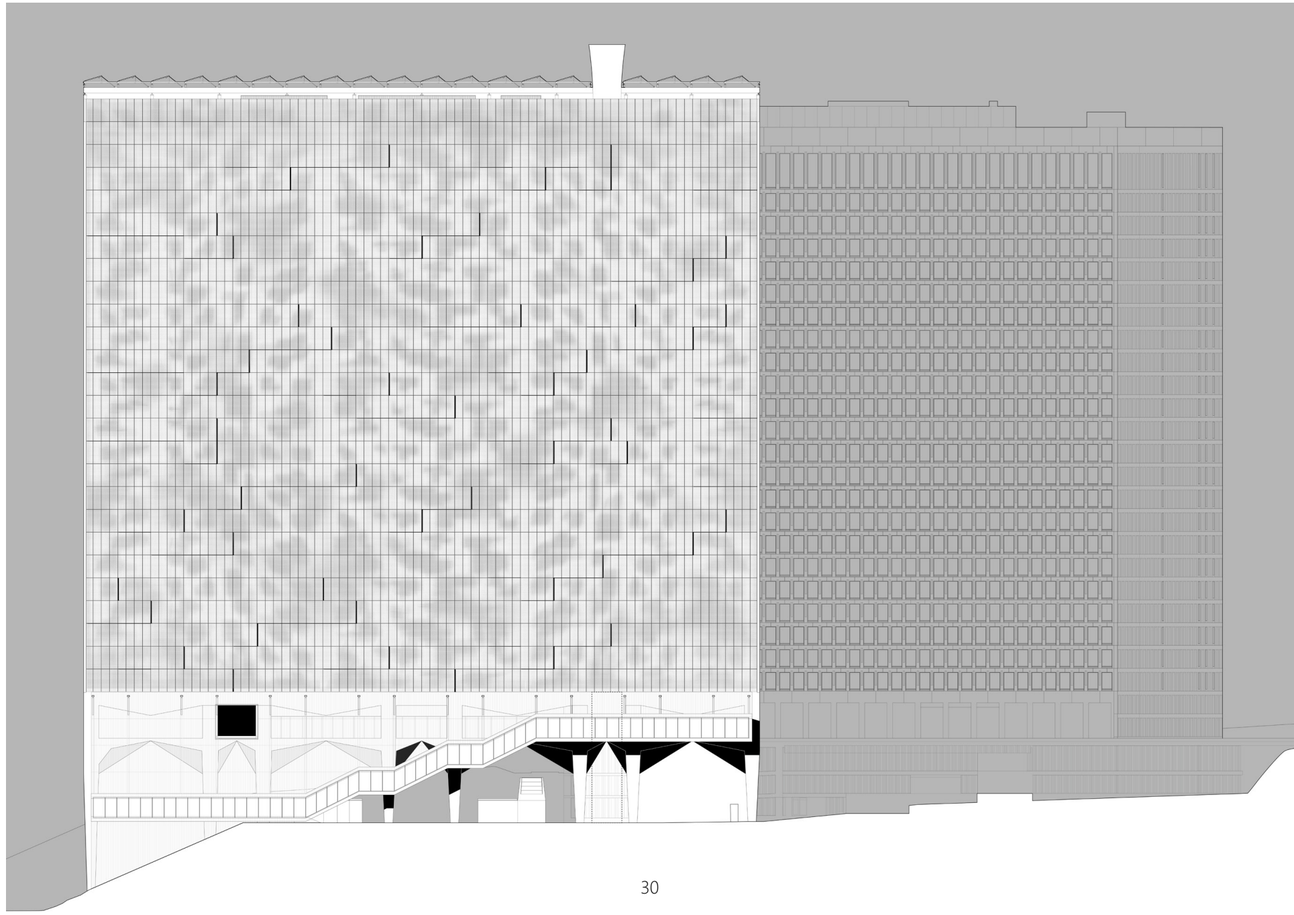
The north facade is entirely glazed. Different levels of privacy of the interior programming is expressed through the variation of transparency of the glazing. Bedrooms and corridors would have windows enclosed with clear glass, whereas more private space like bathrooms would be glazed with frosted glass, which provides both natural light and privacy. East and West facade is left unglazed to showcase the structural logic. Multi-story window slots scatter across the facade, providing view access for the end units.

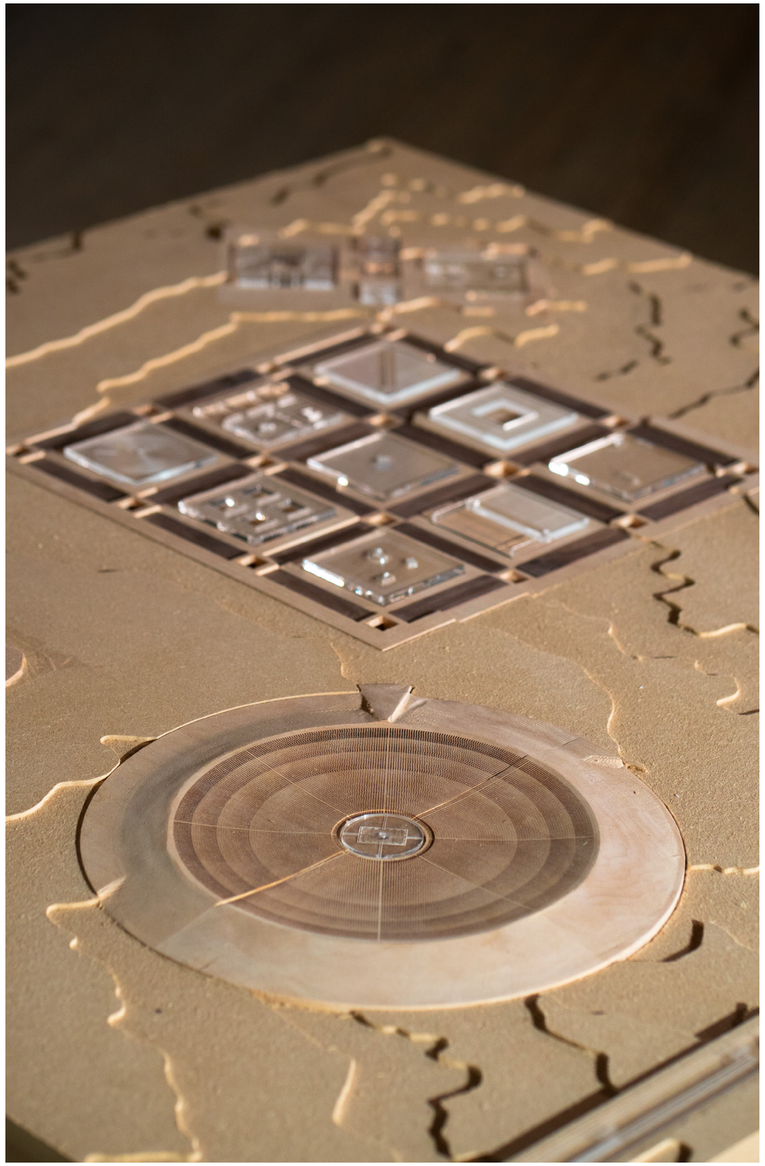


1. FACADE TRANSPARENCY
2. PERFORATION PATTERN
3. CLADDING FOR UNIT
4. sDA
5. ASE
6. UDI
7. SOUTH FACADE RENDERING
8. 1 TO 1 SCALE MOCK-UP 1
9. 1 TO 1 SCALE MOCK-UP 2
10. SOUTH ELEVATION









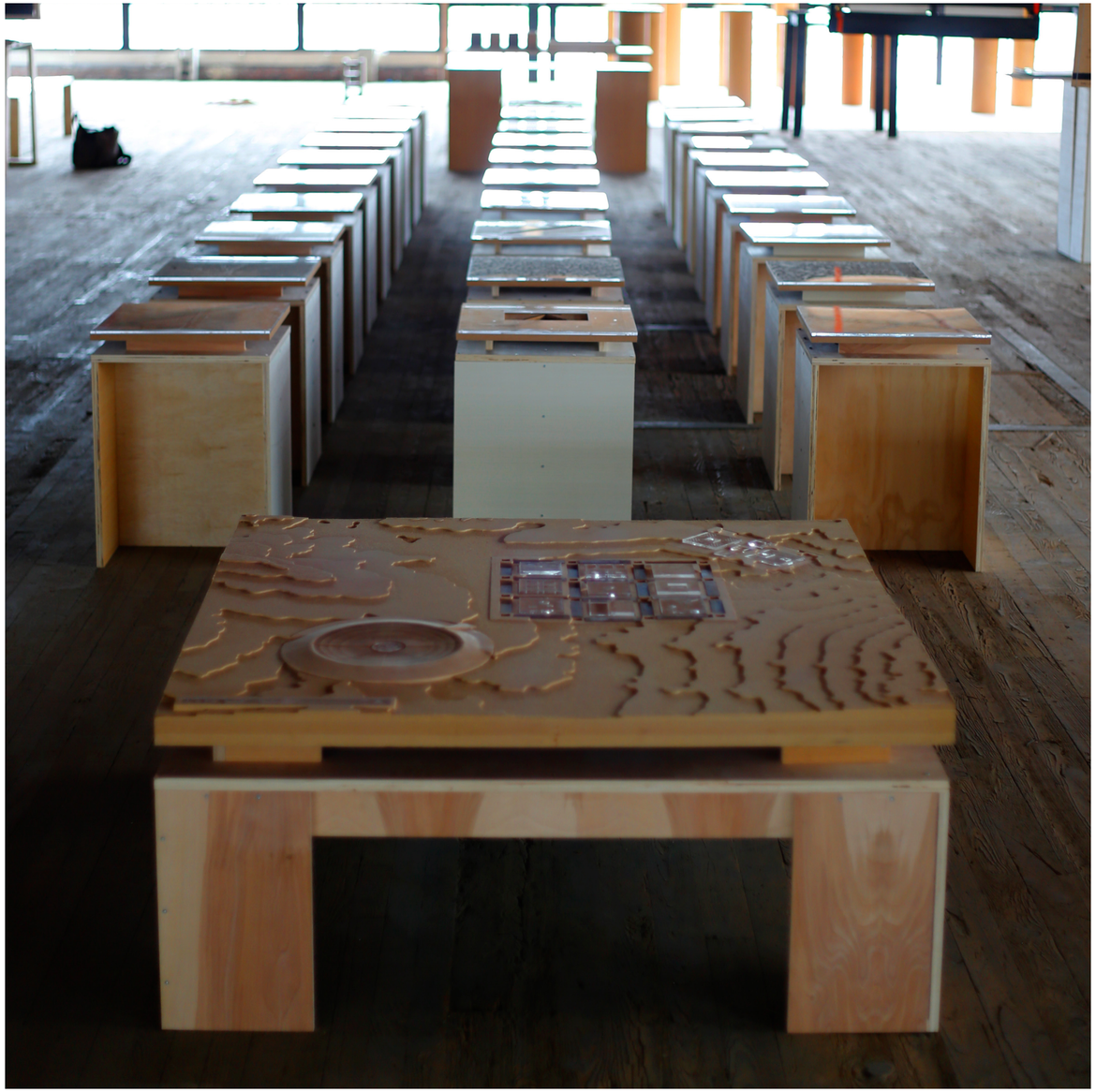
30 WORKS 12 GARDENS

2024 Coordination - **GERARD DAMIANI**

Landart has been considered to be one of the first environmental movements. Its intent was to make one “Earthwise” and to become aware of environmental change through perception and the acknowledgement of geological change/ time. Pushing the design and technology to scales ranging from details to terraforming, this project ventures across the boarders of architecture and land art.

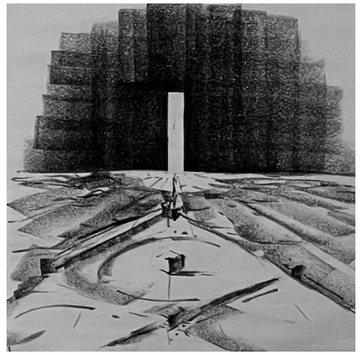
DAC - Direct Air Capture - is a technology emerged to filter carbon molecules from the atmosphere and store them, in the form of a solution or compound, 1 kilometers deep into the sedimentary layer of Earth’s crust. Such plant inherits the technological that calls for the most efficient and logical planning, yet also embodies poetry: its creation bears the attempt to create paradise on a scorched earth - a last resort to refuge the future of humanity - and shall take form as Gardens of the New Age.

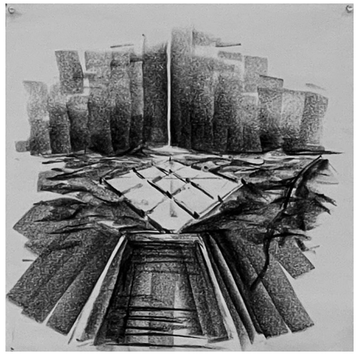
The representation, just as the project itself, attemps to blur the boundary between drawing and models. The final works are of a hybrid nature. They bear critical architectural information as traditional drawings yet take the presence of physical models. One work for the site and guesture, thirty for the gardens, and a desk that sancturiazes concept sketches and objects found through a series of odysseys that contributed to the project.







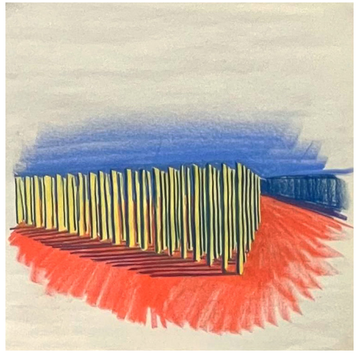




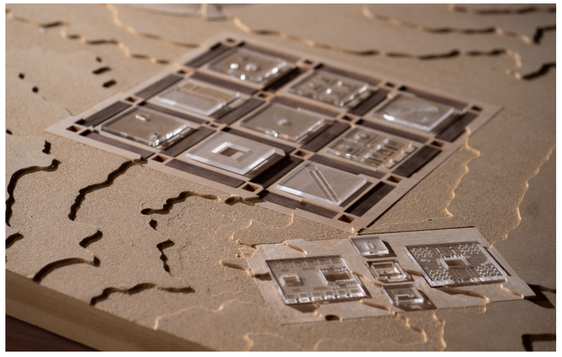










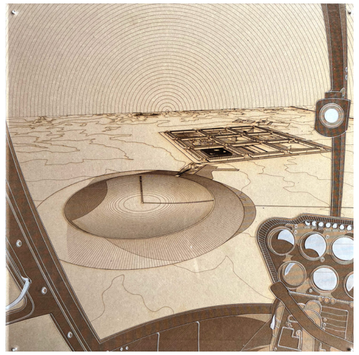
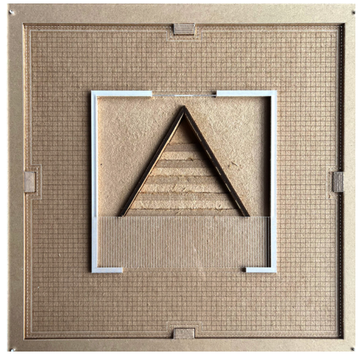
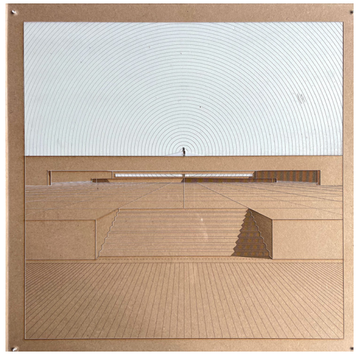
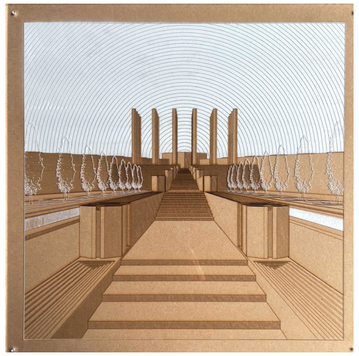
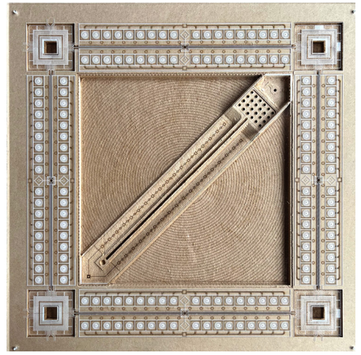
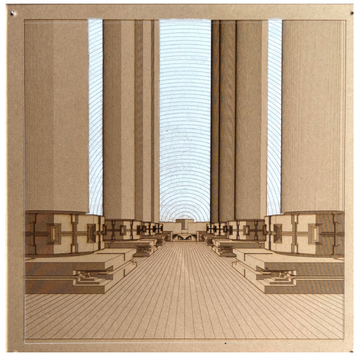
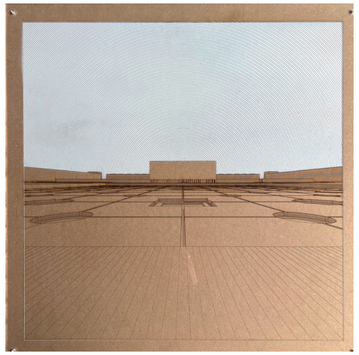
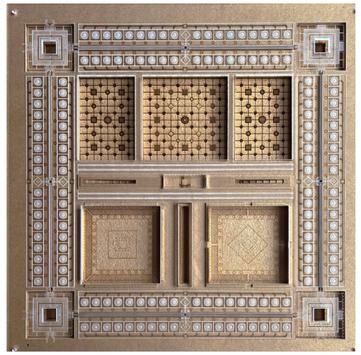
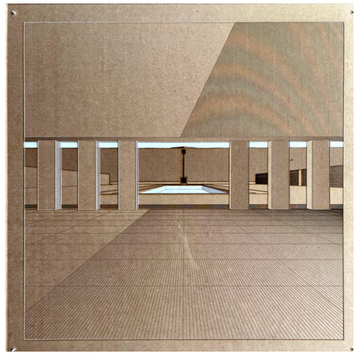










AREAL VIEW
01
GARDEN of GUESTURE
18" * 18" * 24"



PLAN
02
GARDEN of GUESTURE
18" * 18" * 24"



EXPERIENCIAL VIEW
03
GARDEN of GUESTURE
18" * 18" * 24"



EXPERIENCIAL VIEW
01
GARDEN of MAN
18" * 18" * 24"



PLAN
02
GARDEN of MAN
18" * 18" * 24"



EXPERIENCIAL VIEW
03
GARDEN of MAN
18" * 18" * 24"



EXPERIENCIAL VIEW
01
GARDEN of FOLIAGE
18" * 18" * 24"

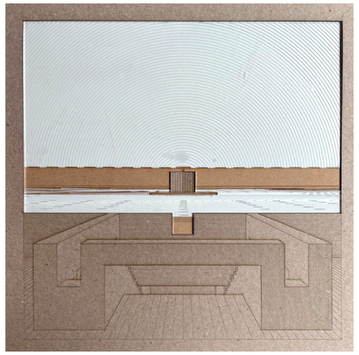
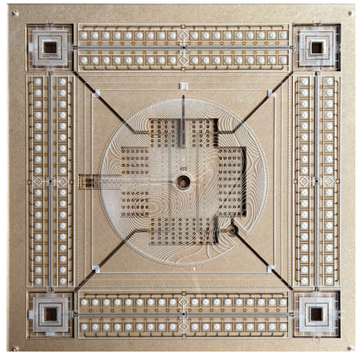
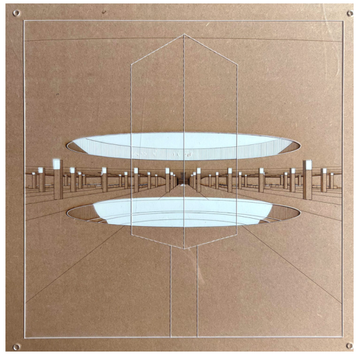


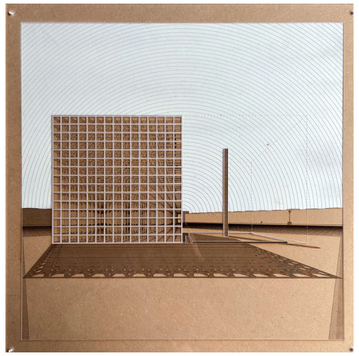
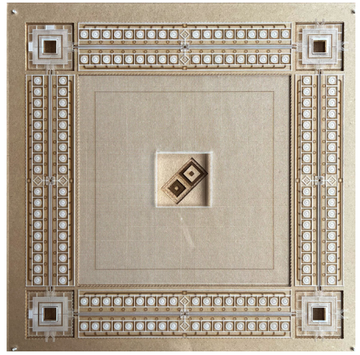
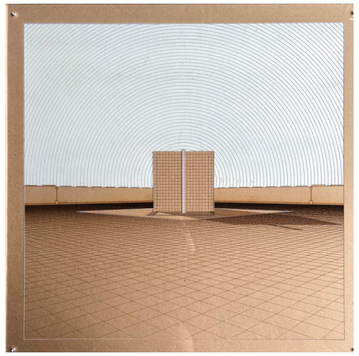
PLAN
02
GARDEN of FOLIAGE
18" * 18" * 24"

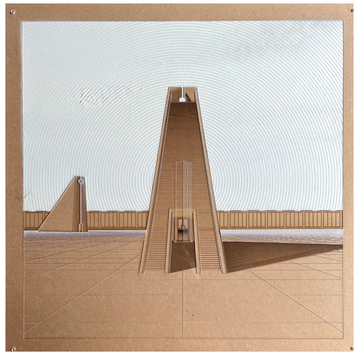
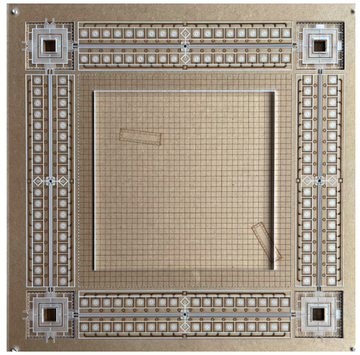
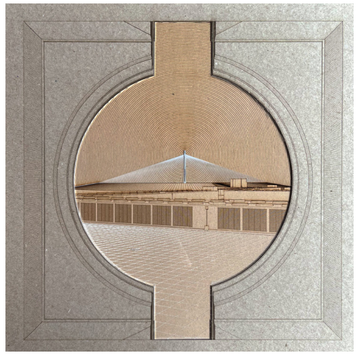


EXPERIENCIAL VIEW
03
GARDEN of FOLIAGE
18" * 18" * 24"



EXPERIENCIAL VIEW
GARDEN of SKY
10
18" * 18" * 24"



PLAN
GARDEN of SKY
11
18" * 18" * 24"



EXPERIENCIAL VIEW
GARDEN of SKY
12
18" * 18" * 24"



EXPERIENCIAL VIEW
GARDEN of REMEMBRANCE
13
18" * 18" * 24"



PLAN
GARDEN of REMEMBRANCE
14
18" * 18" * 24"



EXPERIENCIAL VIEW
GARDEN of REMEMBRANCE
15
18" * 18" * 24"



EXPERIENCIAL VIEW
GARDEN of MONUMENTS
16
18" * 18" * 24"



PLAN
GARDEN of MONUMENTS
17
18" * 18" * 24"



EXPERIENCIAL VIEW
GARDEN of MONUMENTS
18
18" * 18" * 24"



EXPERIENCIAL VIEW

19

GARDEN of COLUMNS

18" * 18" * 24"

PLAN

20

GARDEN of COLUMNS

18" * 18" * 24"

EXPERIENCIAL VIEW

21

GARDEN of COLUMNS

18" * 18" * 24"

EXPERIENCIAL VIEW

22

GARDEN of SHELTER

18" * 18" * 24"

PLAN

23

GARDEN of SHELTER

18" * 18" * 24"

EXPERIENCIAL VIEW

24

GARDEN of SHELTER

18" * 18" * 24"

EXPERIENCIAL VIEW

25

GARDEN of SUN

18" * 18" * 24"

PLAN

26

GARDEN of SUN

18" * 18" * 24"

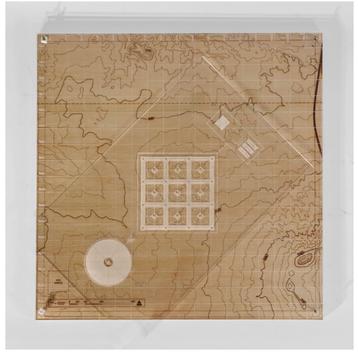
EXPERIENCIAL VIEW

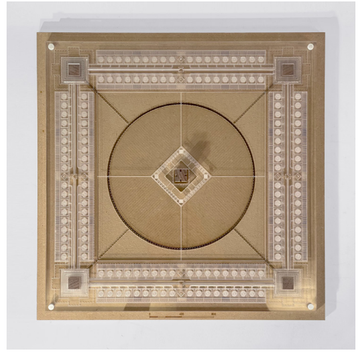
27

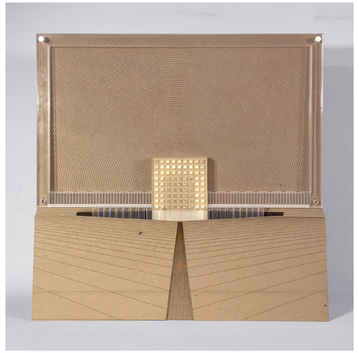
GARDEN of SUN

18" * 18" * 24"





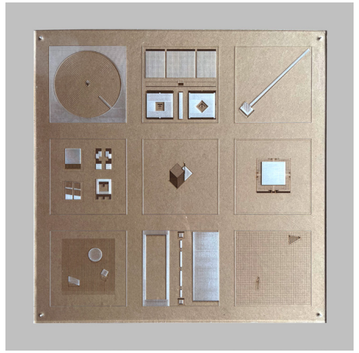


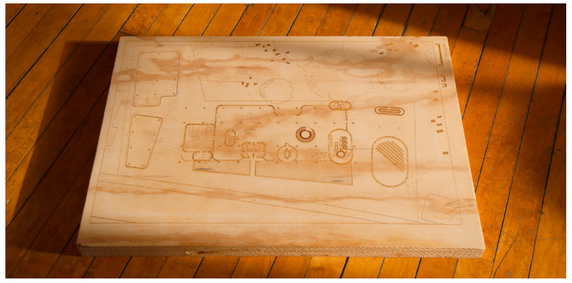
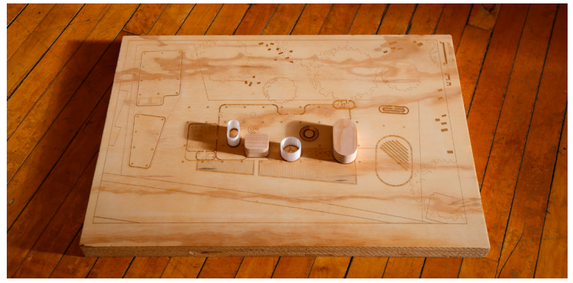
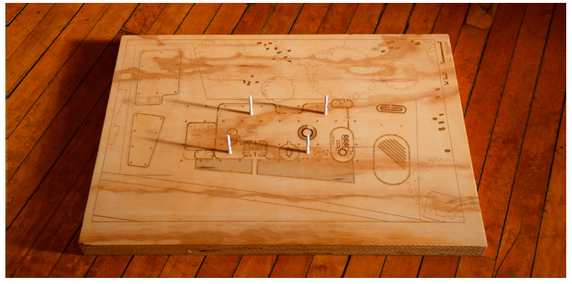
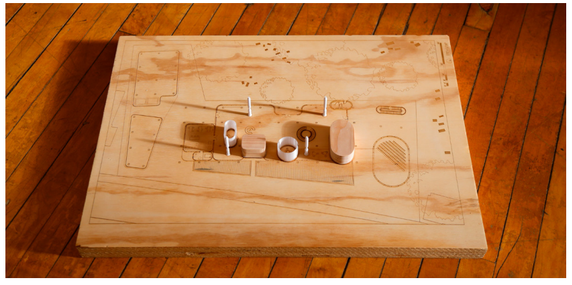
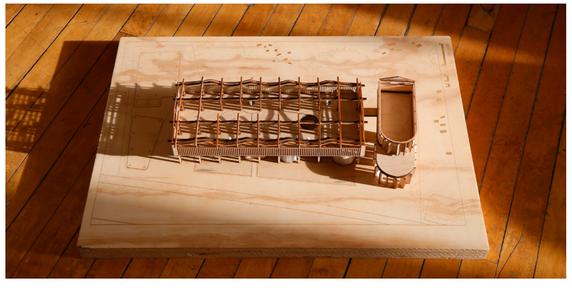
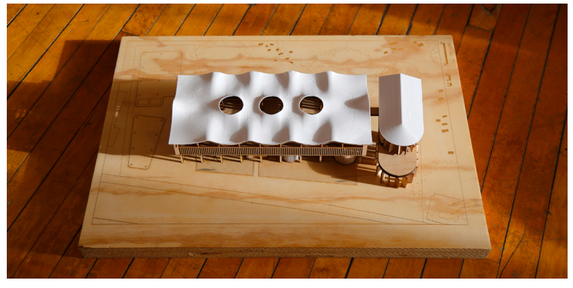






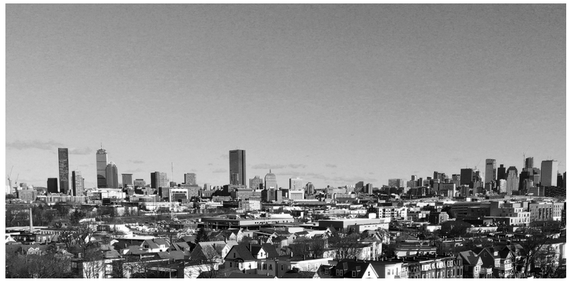




DORCHESTER PUBLIC LIBRARY

JEREMY FICCA - Coordinator
GERARD DAMIANI & ERICA COCHRAN HAMEEN - Instructors
Carnegie Mellon University - School of Architecture - 2022 SPRING



Among the humble red bricks of Dorchester, Massachusetts lies a library that acts as a sanctuary. Dorchester has remained there – a witness to the rapid expansion of the nation. Facing Columbia Road and backing a historical cemetery, the library's site is, and has always been, a junction between roaring currents of the purposeful and the quiet retreat of the wanderers.

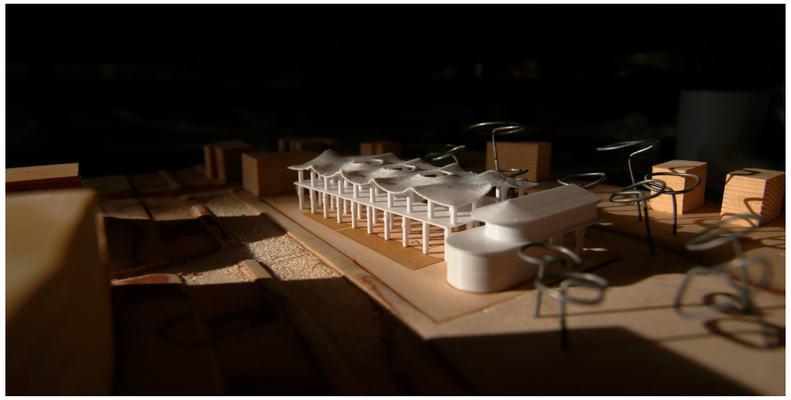
Ever since its establishment in the early 1800s, Columbia Road has been a major artery that channels cars and pedestrians through Dorchester and Boston. Visual connections from the interior of the library relate to the directional movement of the road and sidewalk. On the other side, the cemetery sits quietly through centuries of oceanic wind. Careless squirrels twirl through the shadow of the ancient trees as aimless wanderers stumble across the moss of nameless stones – every movement is freed from the linear efficiency of urban life.

Bridging the phantom of tail lights flashing by and the empty tequila bottles left behind, a library stands as a terminal that facilitates two systems of movements – bringing visitors from two worlds that hardly meet while sanctuarizing the moments of encounter among this post-pandemic society.





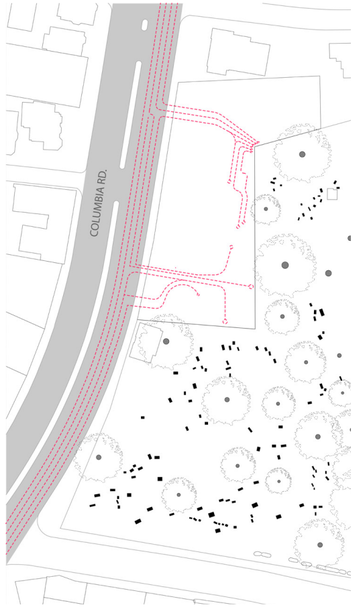




CONCEPT MODEL

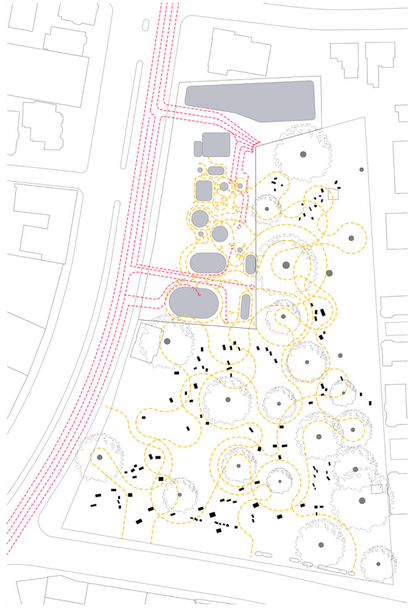
TERMINAL OF MOVEMENTS

The lower floor is designed for transparency. The majority of the room is enclosed with glass panels except for the private areas such as bathrooms and utility chamber. The entrances of the building are set to the back side of the parcel, working alongside with the glass façade, the vista of the cemetery is largely celebrated.



PURPOSEFUL

Whether being a commercial street that hosts various shops or a widened highway where viechles canal, the west side of the parcel is marked with rushing purposes.



CONFLUENCE

Bridging the phantom of the tail light flashing by and the empty Tequila bottles left behind, the library shall be a terminal that facilitates two systems of movements.



WANDERER

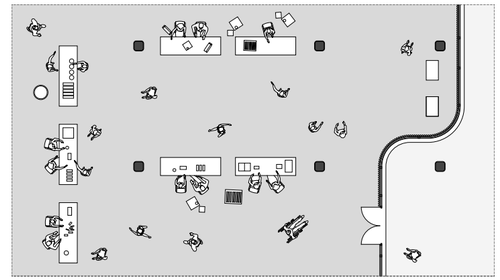
Trees and headstones become gravitational points around which the movements of the people revolve, giving the seemingly random motions a hidden pattern.



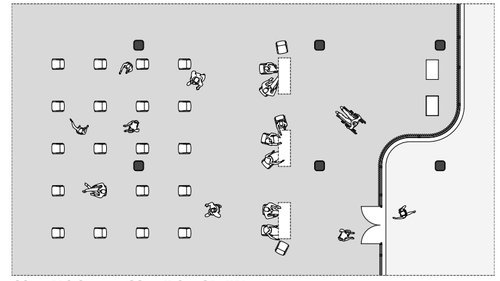
FIRST FLOOR PLAN

The utility spaces, such as meeting rooms, bathrooms and system rooms are pavilionized as objects. They are the destinations where movements revolve around. The negative spaces generated by those objects become hot zones where the flow of motion densifies -- transforming them into pockets of surprises.

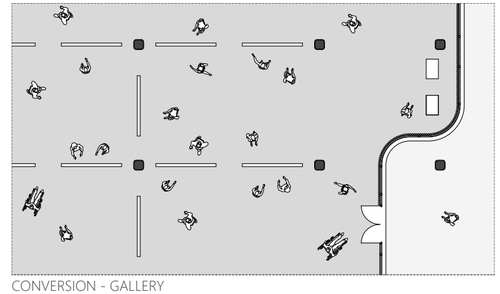
The meeting room and maker spaces are enclosed as bubbles within opening. Application of curtains ensures controllable privacy.



CONVERSION - FAIR



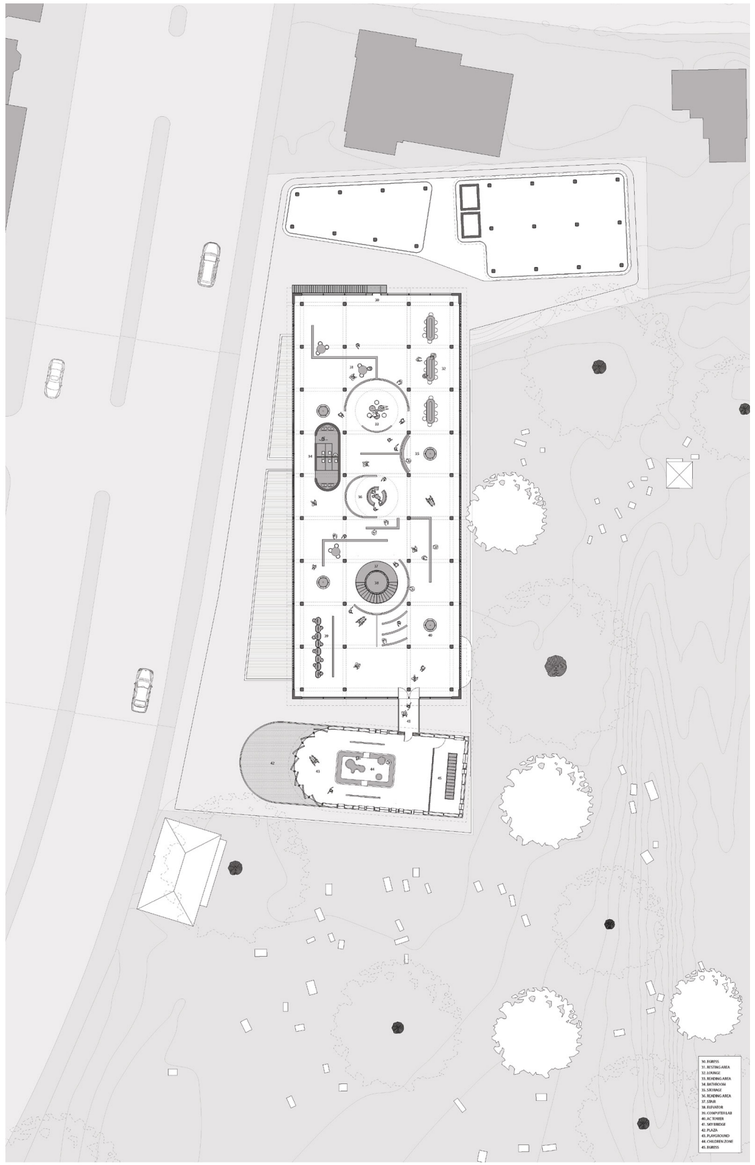
CONVERSION - VACCINATION CENTER



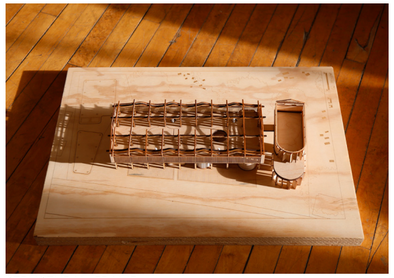
CONVERSION - GALLERY

The central area is left unprogrammed for the gathering of people. In time needed, the library is equipped with the room and means to be converted for various purposes, such as hosting vaccination centers, small fairs, and temporary sanctuaries.

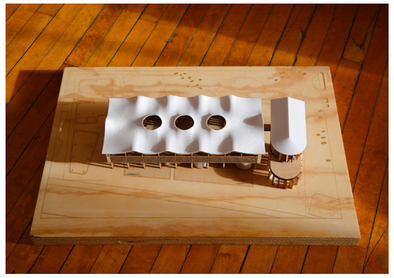
It is within those moments of encounters that the community lives.



SECOND FLOOR PLAN



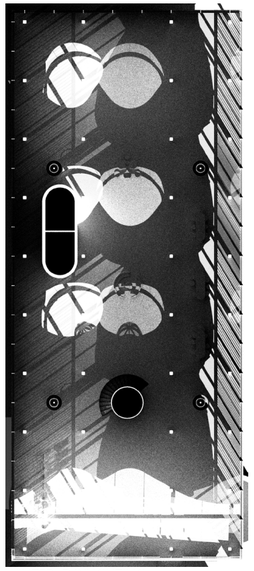
STRUCTURAL FRAME



ROOF & OCULI

STACKS

The upper floor is entirely dedicated to the books. Customized shelves vary in height and forms, but never exceeds eye level. Their arrangements are carefully composed to facilitate the movements of the visitors but leave the space visibly open. Gradient density louvers span across the east and west façade according to the program. Those in front of the bathroom and computer booths are designed to be denser to ensure privacy and avoiding glares on the screens. The rest of the façade areas are cladded with relatively larger spans, providing sufficient daylight intake and view accessibility. The roof flows along the profile of the canopy, crowning the reading area with pleasant elegance. Three oculi are generated by the flow of the roof curvatures, through which direct daylight is brought down to the visitors -- setting free the mind of the readers, beyond the flow of the canopy.



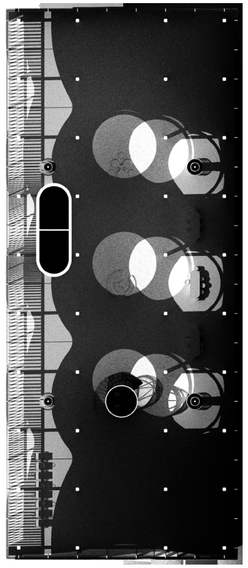
WINTER DAYLIGHTING



READING AREA



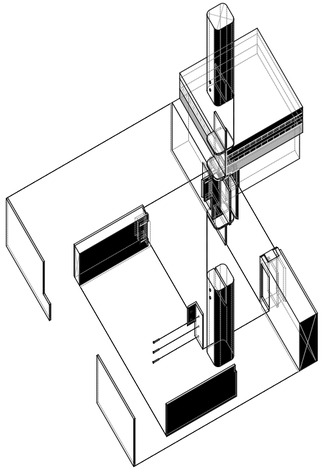
CHILDREN AREA



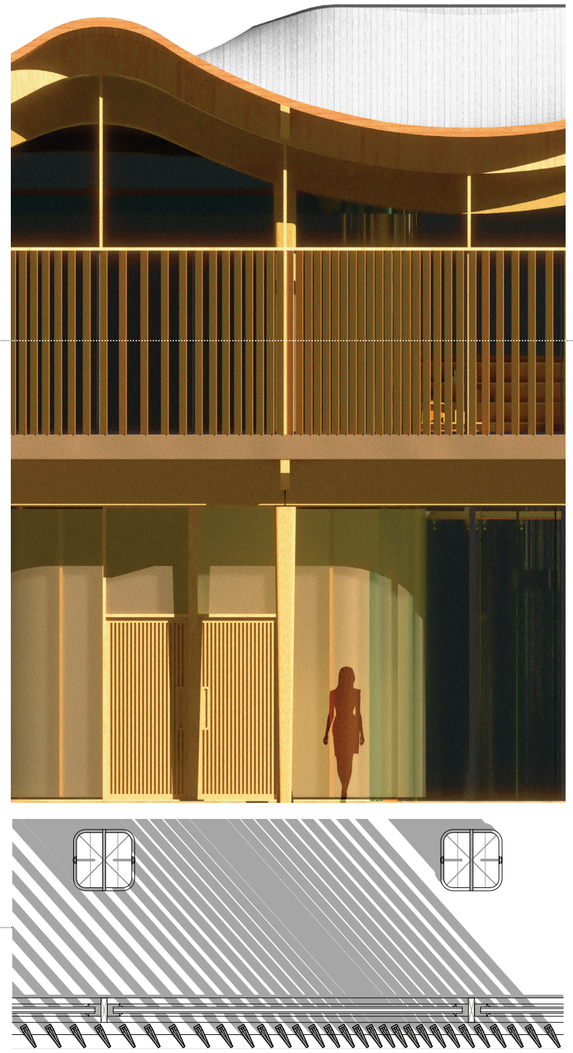
SUMMER DAYLIGHTING

STRUCTURE

The library sits on a column grid that span 20 feet apart, creating a large open area that allows the composition of utility pavilions and flexible arrangement of the furnitures. Glue laminated timber columns with 8" by 8" cross section taper in towards the bottom, hovering 1/2" above the ground over stainless steel footings. 1 foot deep glue laminated beams are braced onto the columns through a series of customized steel joints, holding up the cast in concrete floor plates on top. An additional layer of 4" thick timber sheet is applied over the exposed part of the steel joints, protecting the metal from potential fire and heat. The beams on the second floor curve along the flow of the roof, holding the canopy while housing system pipes within the grid cavities. A matrix of light weight plywood louvers made through CNC processes are hung over the roof beams, shielding the systems while emphasizing the flow of the roof.

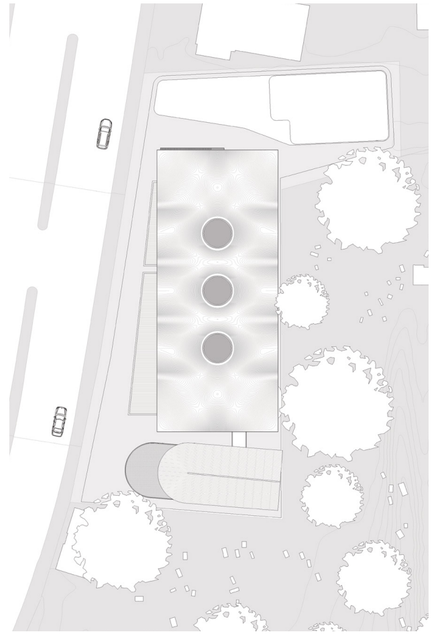


TIMBER JOINT DETAIL



SECTION & DETAIL

SECTION



SYSTEMS

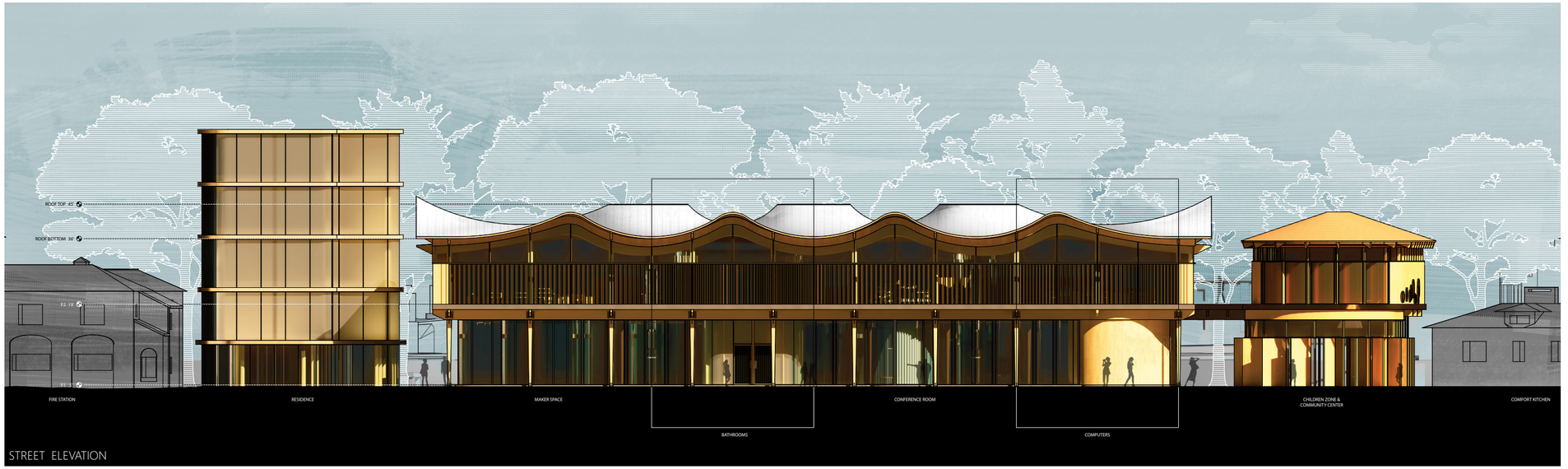
Systems are designed to be the vessel of the building. 4 Large air conditioning towers pierce through the floor – their presence becomes object themselves. The glass panels that clad the façade of the lower floor remain closed during the cold winter of Massachusetts and can be pivoted open during the warmer time of the year. Cooler air above the reflecting pool gets sucked into the building, it travels along the AC shafts through the floor openings and leave the building via the ventilation windows around the oculus on the roof. Fire sprinkler pipes are celebrated as indicators of pathways. With lighting fixtures and reflection louvers installed on top of the brass tubes, they shower the library floor with diffused light, guiding visitors through the field populated with pavilions.



STREET VIEW



LIGHTING DETAIL & FIRST FLOOR



STREET ELEVATION

COMMUNITY

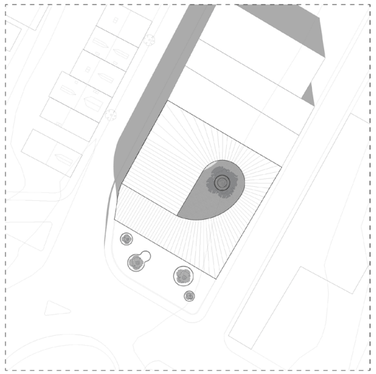
As the spring breeze whistling across the hanging eaves of the library, the city gently awakes from the shrouds of the pandemic. Roaring vehicles start to fly by the quiet neighborhood, gradually populating the old streets of Dorchester. Unbothered wanderers float underneath the sprouts among the ancient trees, wondering about what surprises await them ahead of the morning sun. They proceed, turn, run into each other at the junction of pavilions. They nod, smile, reach out to pick up the same book. It feels just like the old days, where the wind carries the unrecognizable chattering across racks of books, the community revives among the encountering of its citizens.

SPRING GARDEN HOSTEL

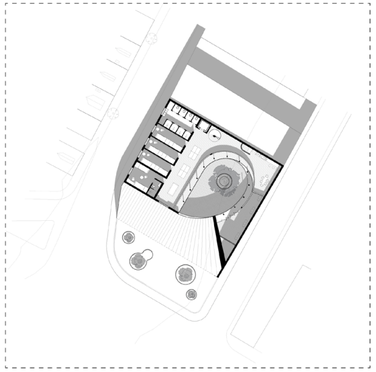
Coordination - **JEREMY FICCA** Instructor - **KYRIAKI GOTI** 2021 SPRING

Sitting at a crossroad in the small neighborhood of Spring Garden, the hostel aims to provide a private and comfortable retreat for both locals and visitors to gather and enjoy community activities.

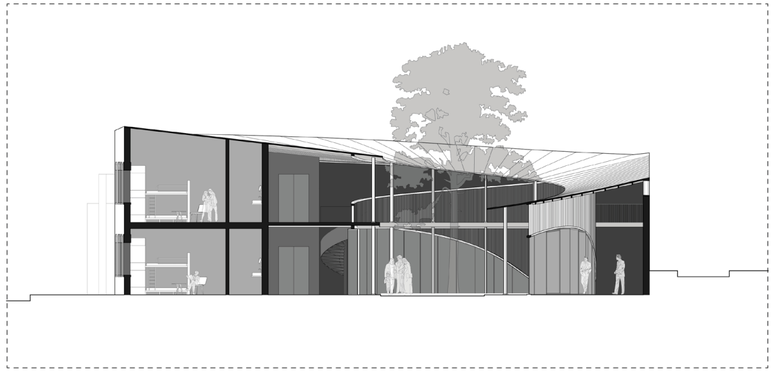
The main entrance faces the busy crossroad and shelters the public program, which is arranged along a linear circulation that revolves around a central garden. The sleeping quarters are nestled inside an existing brick wall that used to house a local factory, providing privacy while ensuring sufficient natural lighting. Facade composed with glass mullions and wooden louvers direct views towards the inner garden, with varying transparency adequate to the accordance spatial programs, they guide visitors along a sequence of delicate spaces, funneling the focus and activities towards the center.



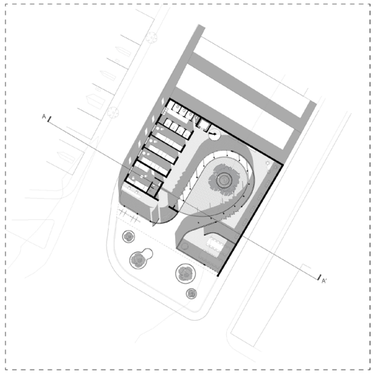
ROOF PLAN



SECOND FLOOR PLAN



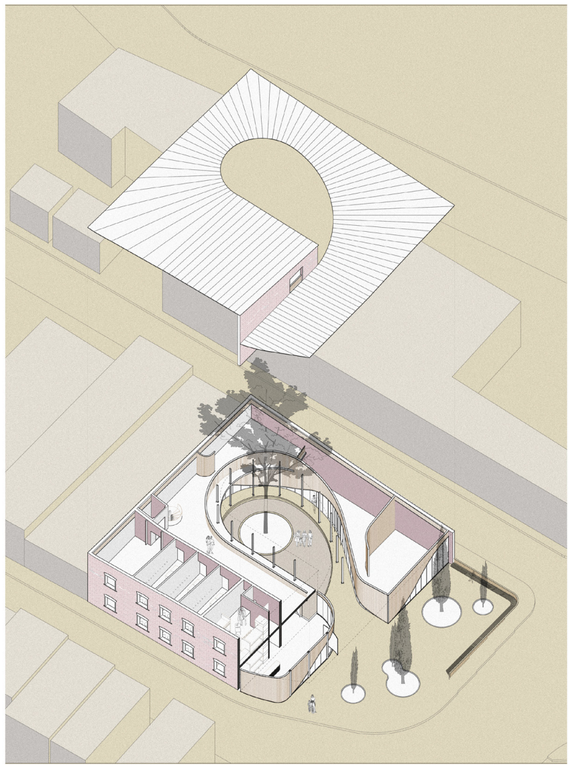
SECTION AA'



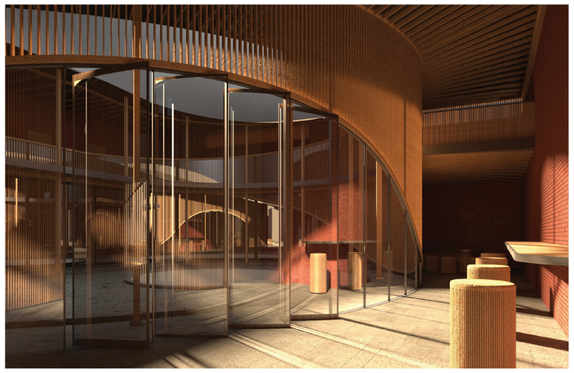
FIRST FLOOR PLAN



SOUTH-WEST ELEVATION



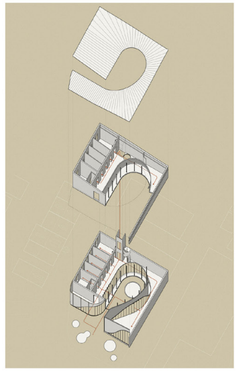
PROGRAM



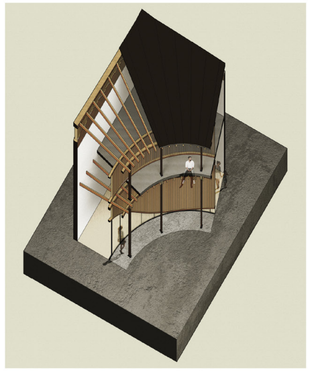
MAIN CIRCULATION - CAFE



MAIN CIRCULATION - ATRIUM



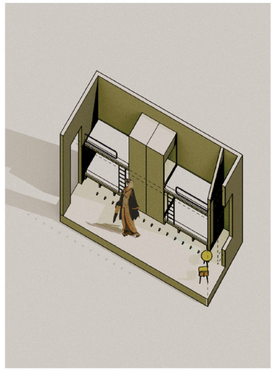
CIRCULATION



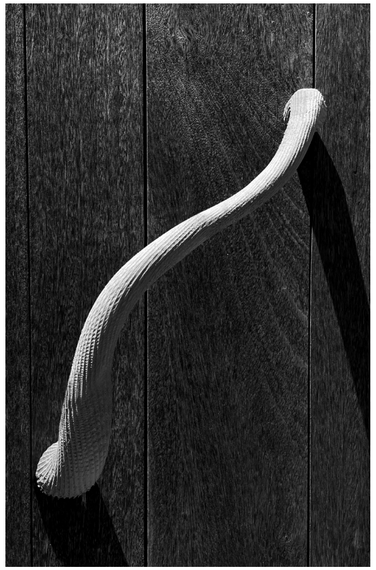
STRUCTURE



FAMILY SUITE



DORM ROOM



PROTOTYPE 1



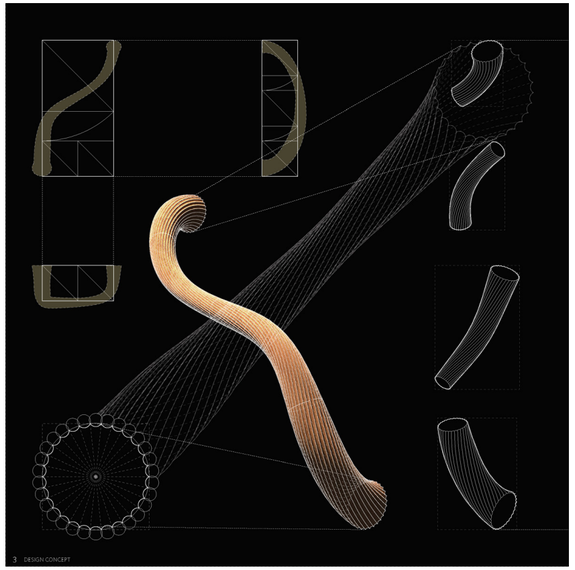
PROTOTYPE 2

A BUILDING'S HANDSHAKE

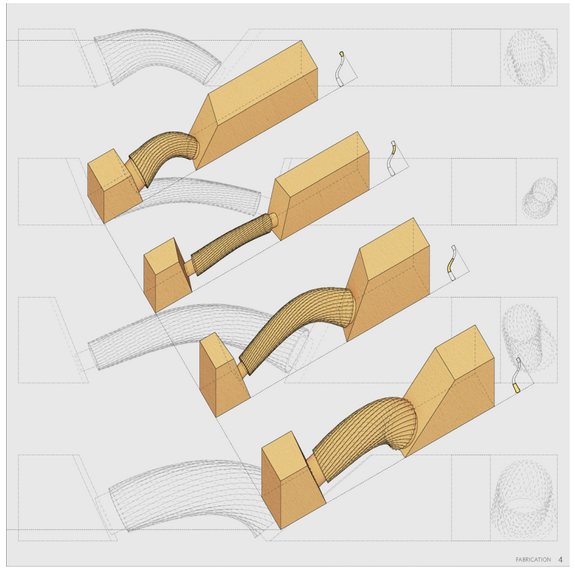
A door handle is the first greeting from a building - a proper gesture that introduces the architecture.

This project explores - in two stages - the progress of designing, prototyping, and manufacturing in the materialization of building details.

The first door handle is conceived under a subtractive process through 4-Axial CNC router, while the second one is to be understood as a casted volume. From their different manufacturing logics, corresponding materials, forms and scales generated themselves naturally, showcasing unique attitudes and personalities.



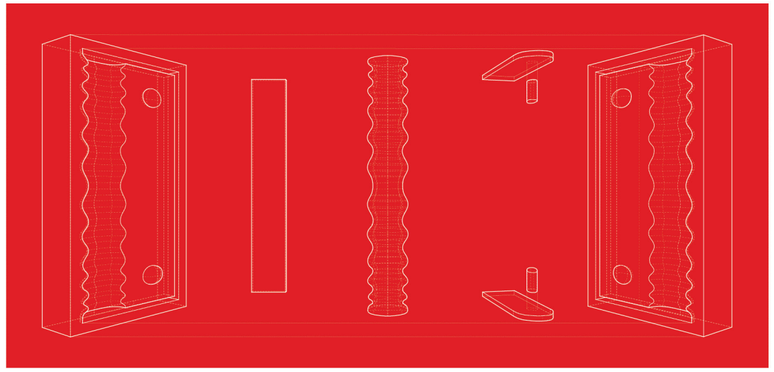
DESIGN CONCEPT



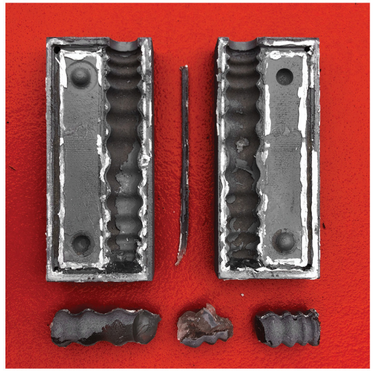
FABRICATION



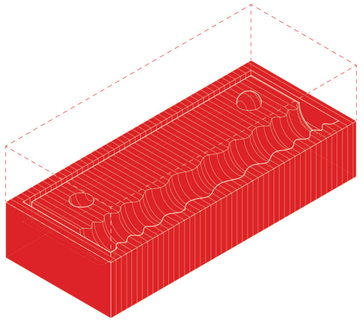
MOLDING COLLECTION



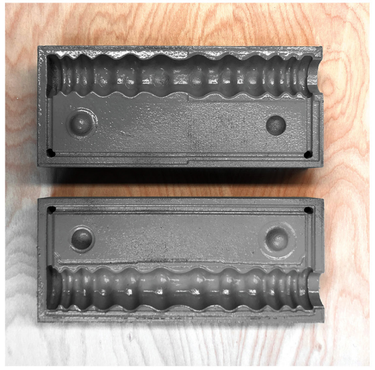
DESIGN CONCEPT



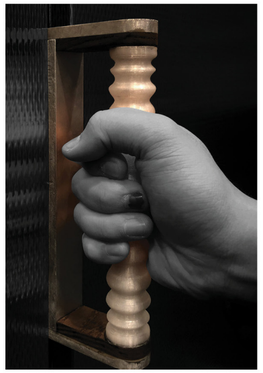
CASTING TRIAL 1



MOLD DESIGN



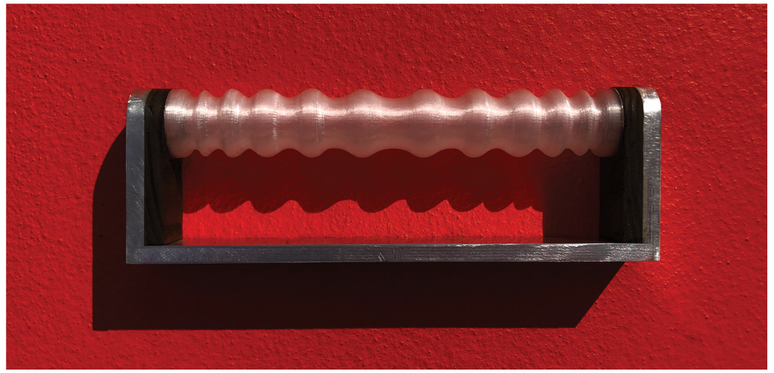
MOLD



PROTOTYPE 1



ASSEMBLY



PROTOTYPE 2

