PORTFOLIO

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MSAAD Columbia GSAPP

UNI: zg2484

selected work 2023-2024

Quartet for the End of Time

Chapel from Music
Granada, Spain

Academic, Individual Work

Feb. to Apr. 2024, 1st Year Graduate

Instructor: Steven Holl, mail@stevenholl.com
& Dimitra Tsachrelia, dt2236@columbia.edu

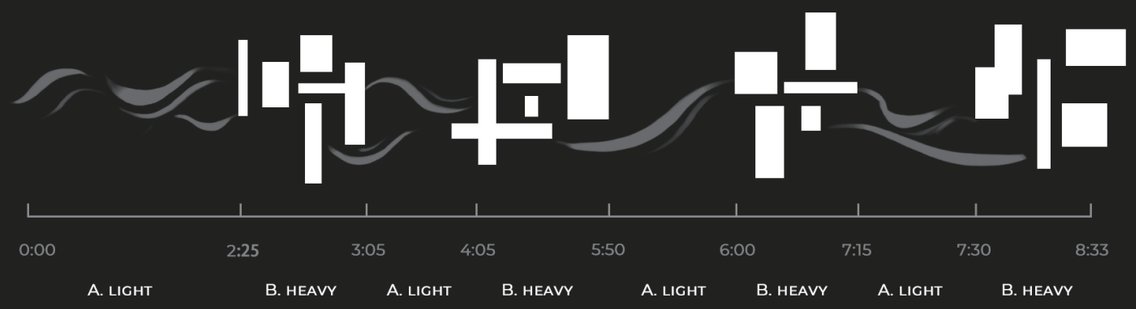
The project is from Steven Holl's studio, *Architectonics of Music*. The chapel is a translation of Chapter 7 of *Quartet For The End Of Time*, written by Olivier Messiaen when he was in a prison camp during World War II.

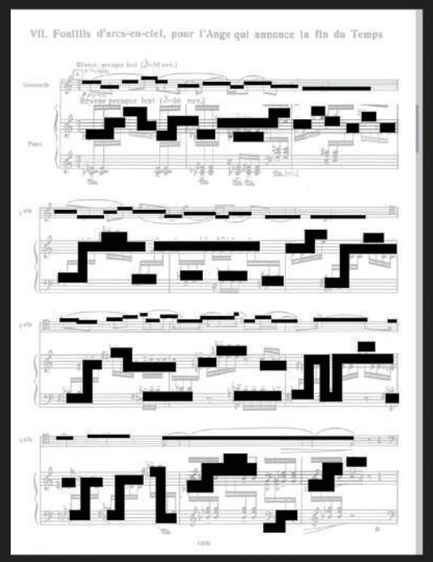
Chapter 7 features two distinct performance styles: TYPE A, characterized by continuity and soothing qualities, and TYPE B, fragmented with many short, detached notes, staccato, and disquieting accents. The selected part alternates between TYPE A and TYPE B, creating a contrast between light and heavy. This contrast guided the formation of the concept diagram.

Developing the concept graph, the heavy squares are developed into structural, weighty volumes, while the curves become light roofs with varying transparency, floating curved walls, or ramps. The logic of three-dimensional cubes is based on the selection of three typologies of TYPE B fragments: interspersion of several geometries (conflicting interactions of different instruments), up-and-down intervals of the blocks (leaps of notes), and ascending stairs (musical scales).

DEFINE LANGUAGE | Heavy and Light

Timeline Of Chapter 7

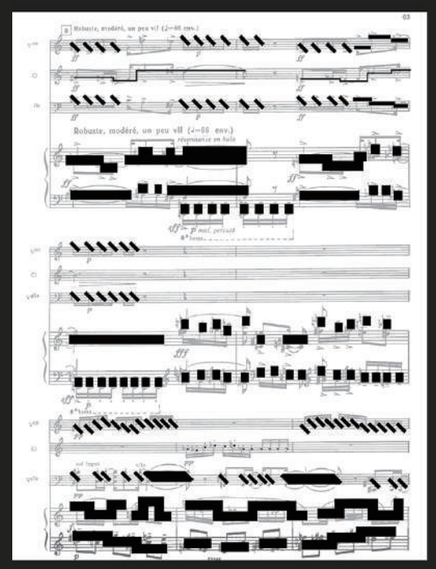




LIGHT

A

CONTINUOUS
STRETCHED

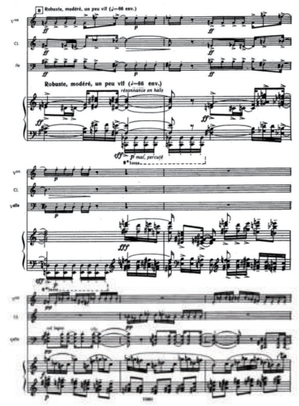


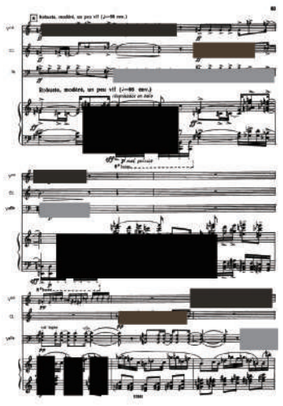
HEAVY

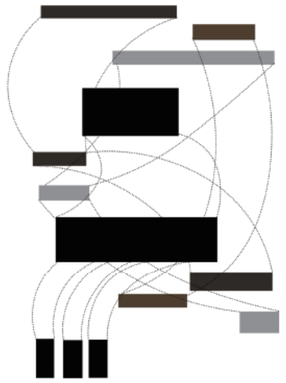
B

FRAGMENTED
BOUNDED

MUSIC SCORE ANALYSIS



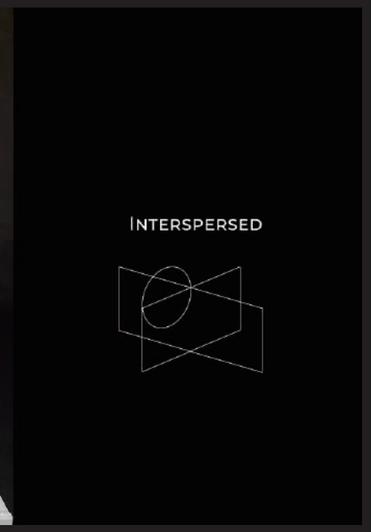


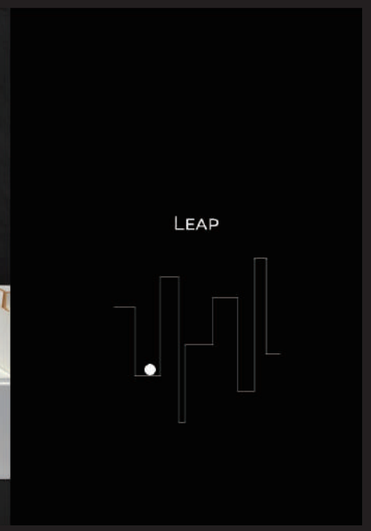


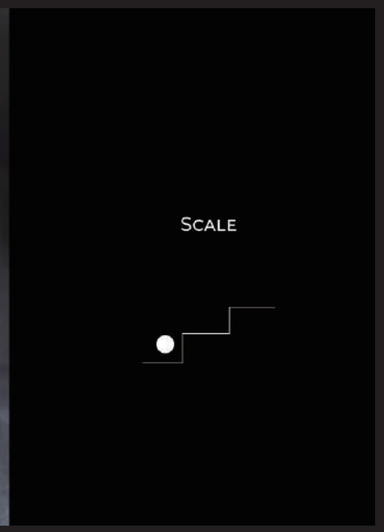
CONCEPT DIAGRAM

CONCEPT MODEL | Curves and Rectangles

The logic of three-dimensional cubes is based on the selection of three typologies of TYPE B fragments: interspersion of several geometries (conflicting interactions of different instruments), up-and-down intervals of the blocks (leaps of notes), and ascending stairs (musical scales).







CYPRESS | End of Time

CONTEXT OF GRANADA

***Isle of the Dead* -** Arnold Böcklin

Based on research on Granada plants, Cypress, with its tall, slender and dense growth characteristics, has become an excellent medium to create the "end", whether it is the end of life or the end of time.

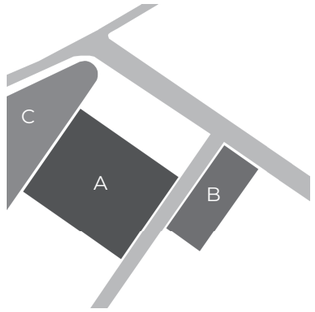
Cypress Tree

Holm Oak

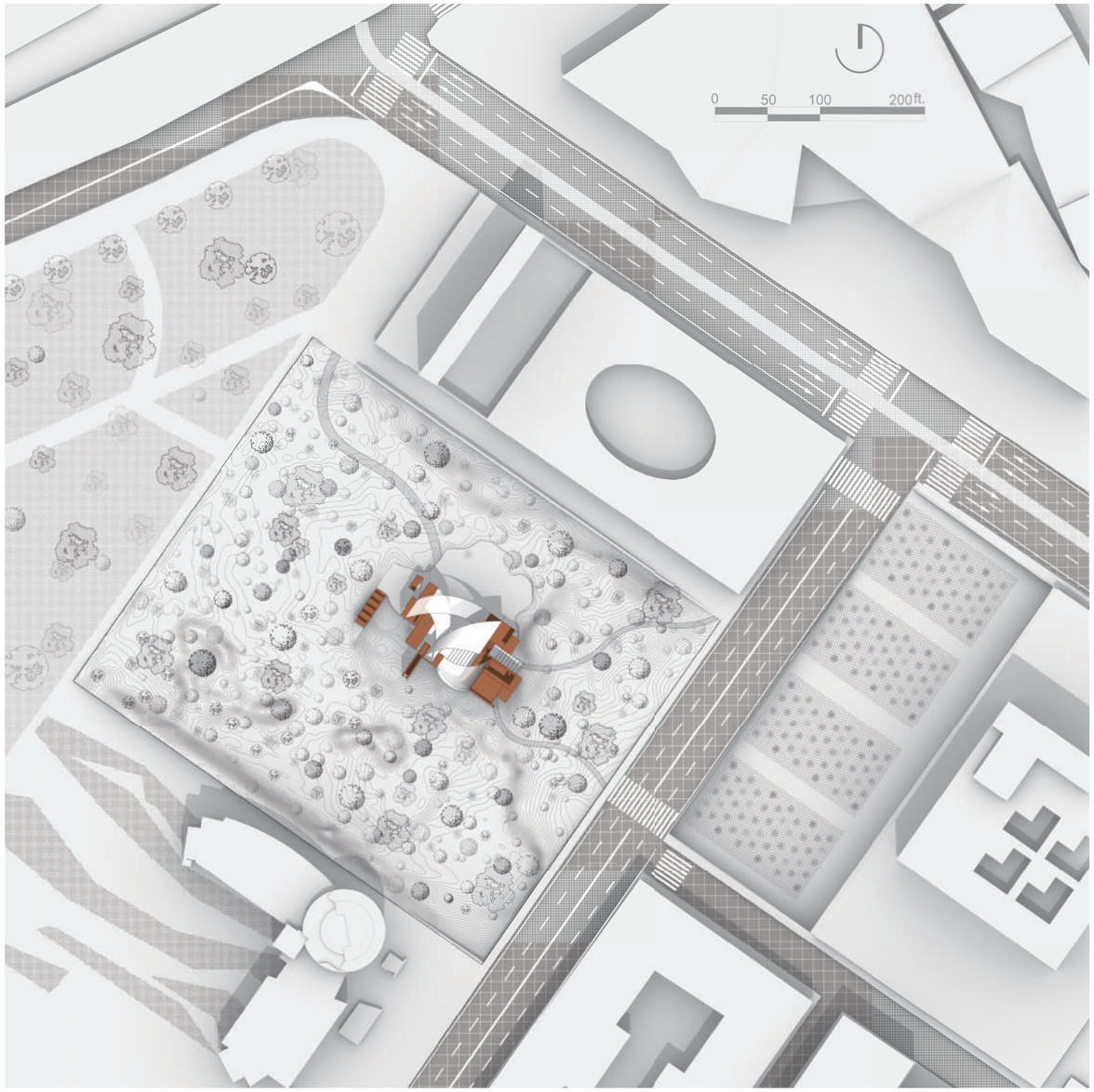
Aleppo Pine

SITE PLAN | Comparison with Other Two Types of Greening

High-density planting of cypress, as well as a small amount of Holm Oak and Aleppo Pine, hide the music chapel in the mysterious forest. This high-density cypress forest contrasts sharply with the small park planted with large, sparse trees to the west and the sunken garden of the office building with regularly planted olive trees to the east.

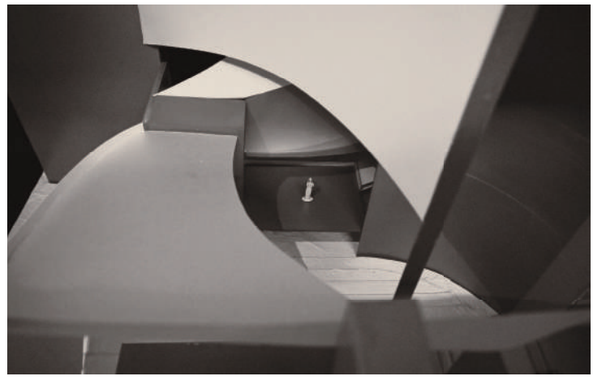


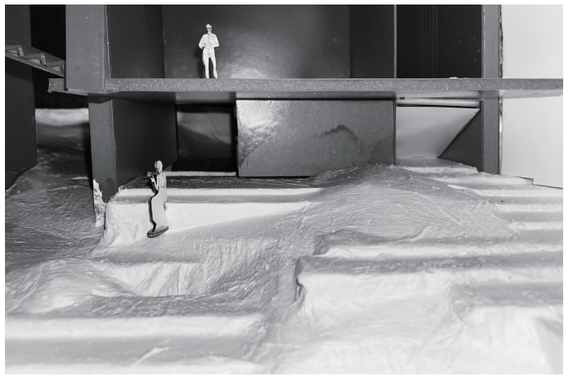
A. Site - dense cypressforest B. Sunken Garden - regular olive trees C. Park - sparse trees

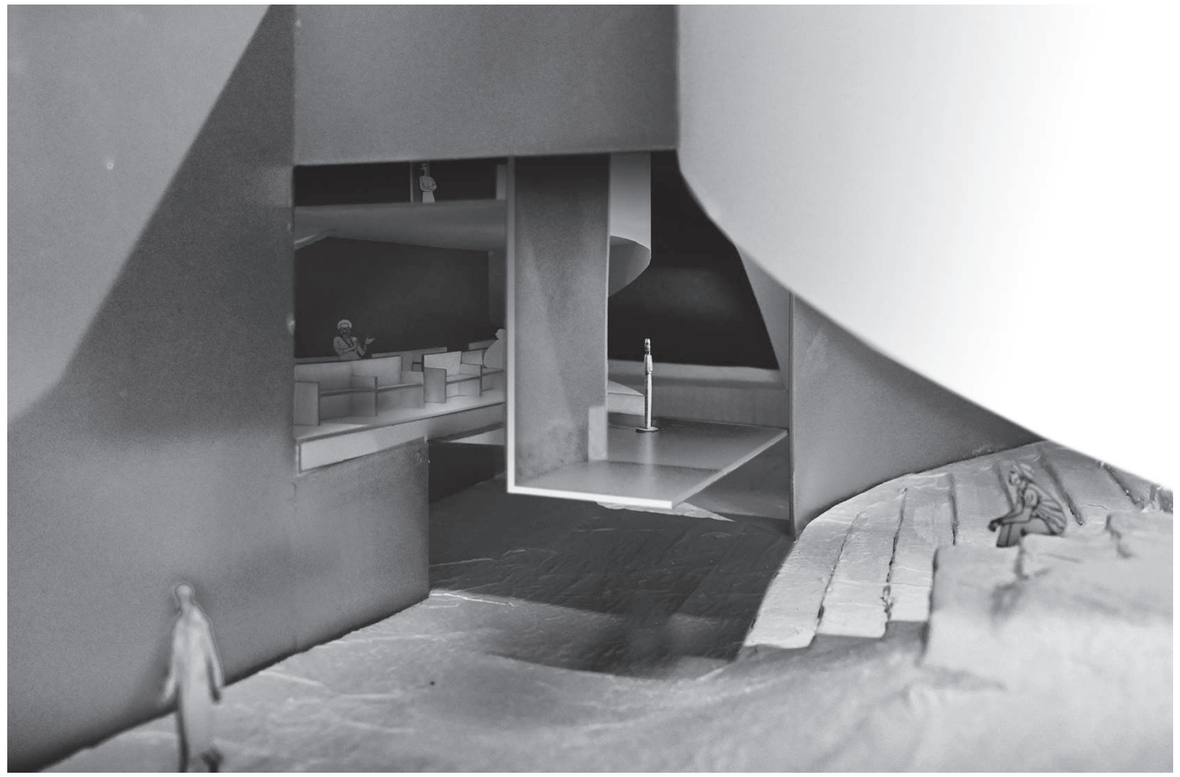


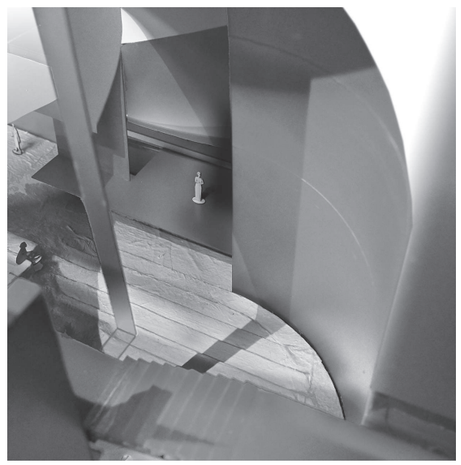
1st FLOOR PLAN | Introduce Nature

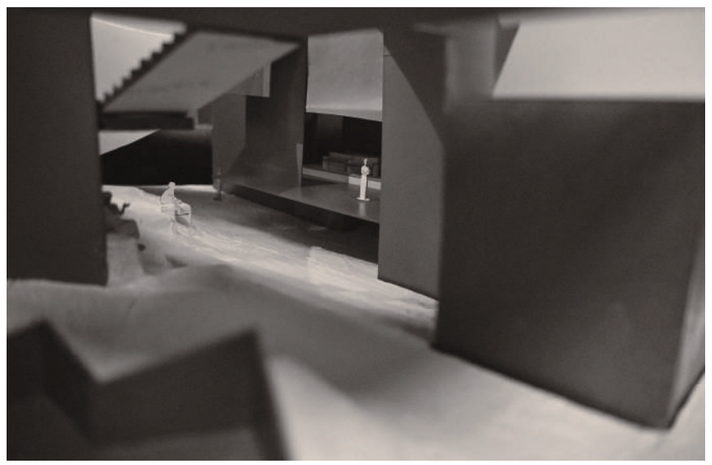
1. Lobby and Infomation
2. Plazza
3. Liftable Seating
4. Storage Room
5. Green Room
6. Stage
7. Library Entrance
8. Office Entrance





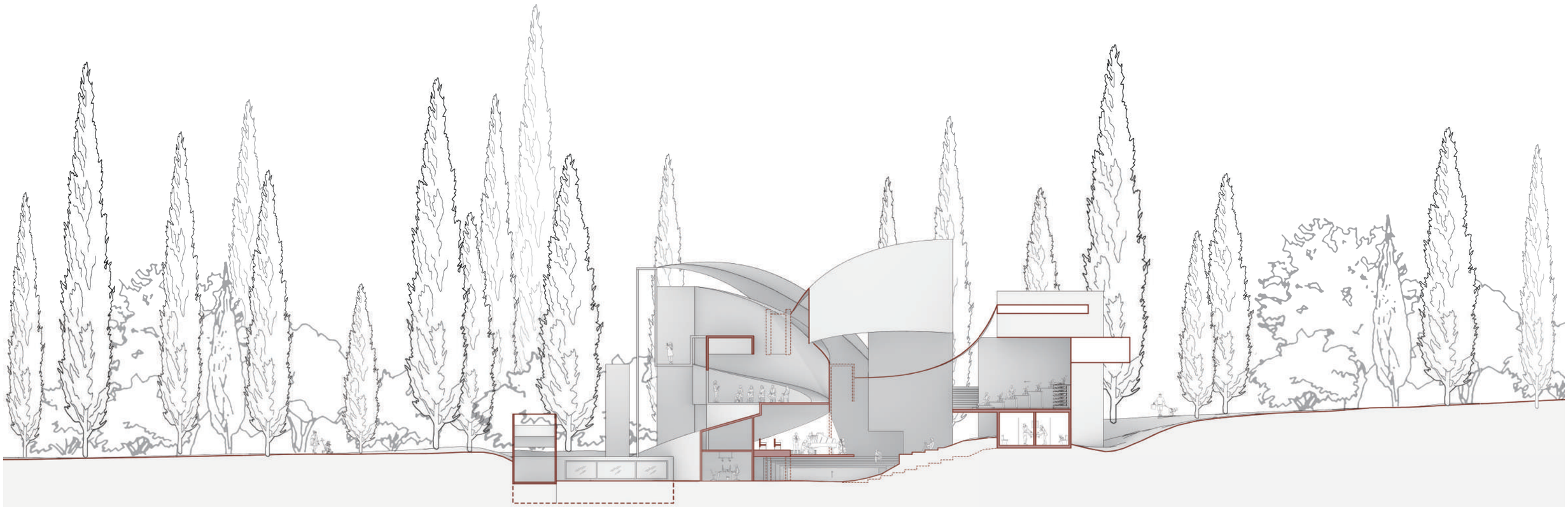






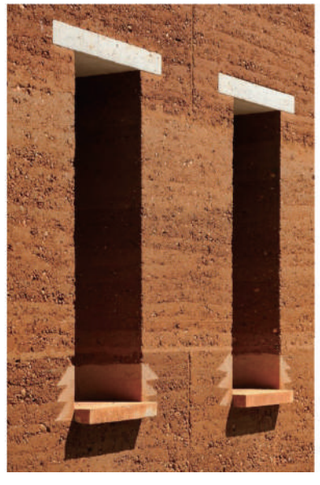
SECTION | Hidden in the Cypress Forest

To make the most of the original terrain, some entrances to the chapel are connected to natural slopes. Therefore, I did not close the chapel, making it an outdoor space. The floating stage is also designed to preserve the natural ground beneath the stage that allows people to pass through it. The seats directly in front of the stage emerge from the original rocky ground, which makes the chapel seem to grow out of nature.



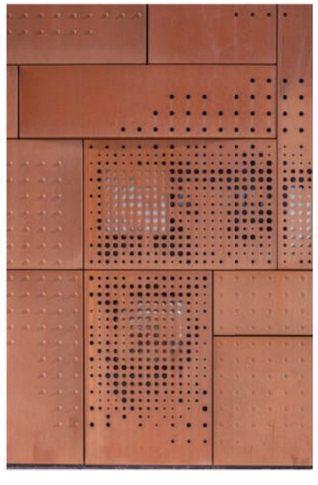
MATERIAL | Material juxtaposition of Alhambra

As the most iconic building in Granada, Alhambra has undergone many renovations and reconstructions over the past thousand years. From this perspective, you can see the updated materials of buildings in three eras at the same time.



A. Rammed Earth
(Original construction)

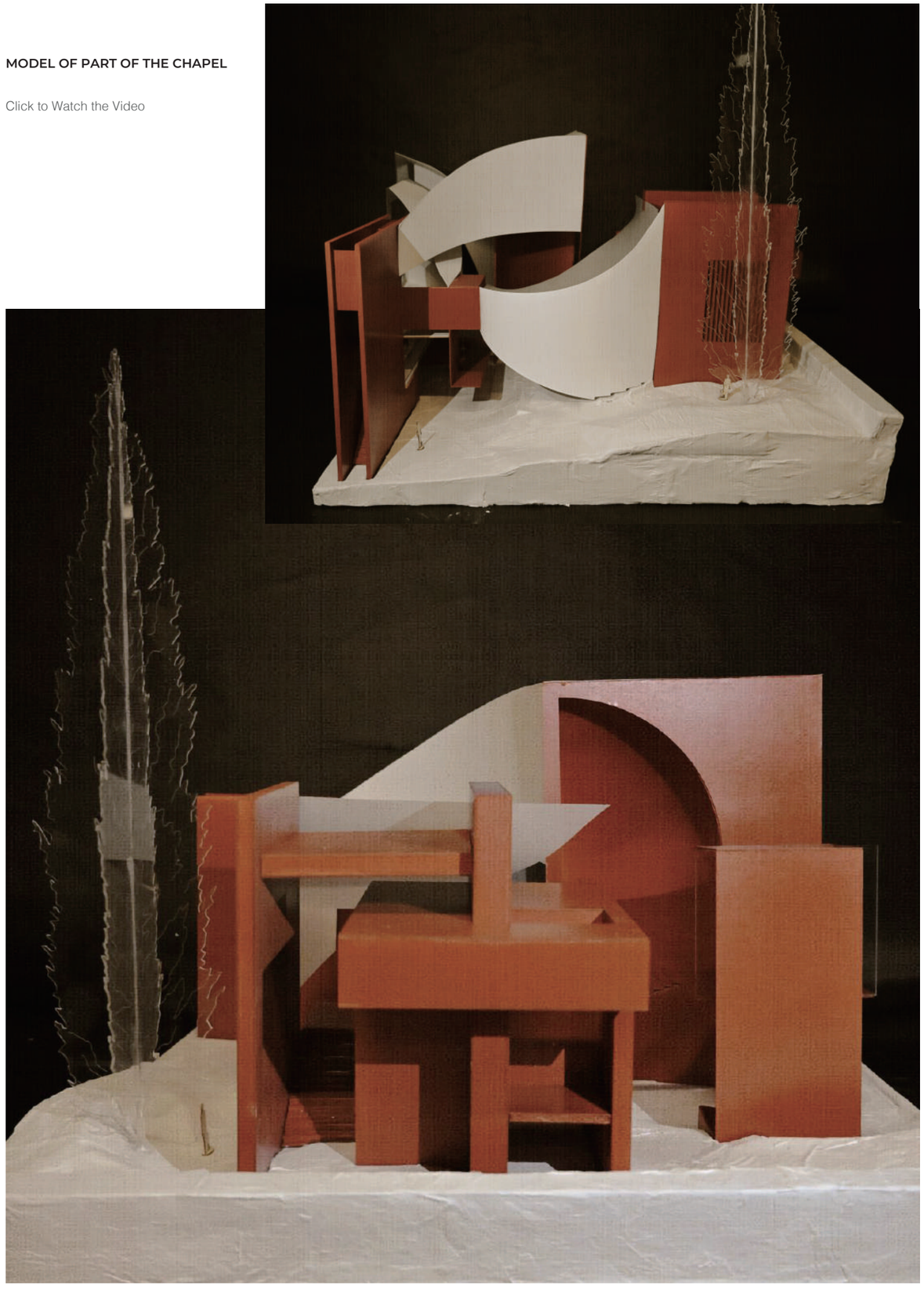
B. Red Brick
(Restoration in the 19th and 20th centuries)



C. Rusty Steel
(Now)

MODEL OF PART OF THE CHAPEL

Click to Watch the Video



Reuse Stone Waste

Structure Cast With Sand

Academic, Group Work with Kainan Zhang

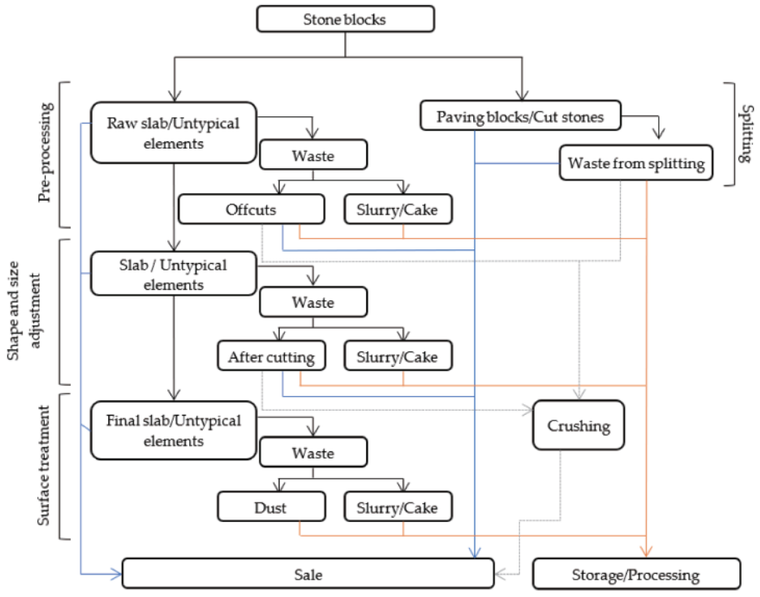
Jun. to Jul. 2023, 1st Year Graduate

Instructor: Elias Anastas, ea3054@columbia.edu
& Yousef Anastas, ya2493@columbia.edu

This project consists of a series of experiments, including material experiments and formal experiments. We pay attention to a lot of waste production in natural stone processing, so we attempted to create new materials with different types of waste to alleviate this problem. After a series of studies, we used hydraulic lime, waste crushed limestone, marble dust, wood sawdust, steel wire pieces, paper sludge, and other waste materials to improve the various properties of the new limecrete.

We hope that the form of the structure preserves as many natural and primitive traces as possible, so we chose sand to cast this new material. The structural humps of bricks are formed by water impacting sand. Then the position of the humps is determined by a gravity experiment. Finally, to assemble the mass-produced bricks without binders, we used wooden molds to make the upper surface of the modules flat and form specific angles. We handmade each module and appreciate those imperfections and little flaws that make this structure full of vitality. From different perspectives, there is a huge contrast in the perception that structures give people: from above, this structure is a thick and regular shape, while from below, it is lightweight and natural.

BACKGROUNDS | Stone Waste



(a) sludge

(b) crushed slabs
(different waste size)

175 Million tons of quarrying waste are produced each year. 6-69% Of the stone that enters a fabrication plant leaves as waste. Diagram represents waste production in the processing of natural stone

STRATEGY | MATERIAL MADE FROM WASTE

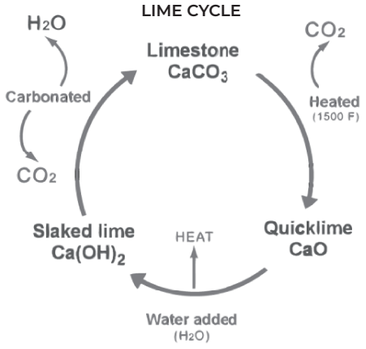
LIMECRETE

More Sustainable
"Breathable"
More Stable & Easier To Handle
Sets More Quickly
Stronger

HYDRAULIC LIME (SLAKED LIME)

We attempted to create a new material with different types of waste. After a series of studies, we found that lime, especially hydraulic lime, is an excellent material to glue all the waste. We learned from the composition of concrete to make our new limecrete.

LIME CYCLE



Stone Powder

Stone Scraps

Sludge

EXPERIMENT I | Material

BINDER:
Hydraulic Lime (Slaked Lime)

AGGREGATES:
Crushed Limestone
Fine Sand
Coarse Sand

OTHER:
Waste Marble Powder
Wood Sawdust
Paper Waste Sludge
Iron Wire Segments
Stone Strengthening
Fiber

RATIO
Lime: Sand: Aggregate: Other

Wood Sawdust | 1: 1: 2: 1

Wire pieces | 1: 1: 2: 1

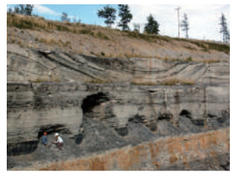
Fiber | 1: 1: 2: 1

Marble Dust | 1: 1: 2: 1

175 Million tons of quarrying waste are produced each year. 6-69% Of the stone that enters a fabrication plant leaves as waste. Diagram represents waste production in the processing of natural stone

EXPERIMENT II | The Influence Of Natural Elements On Spatial Form

GRAVITY
Gravity causes compression between sand and lime

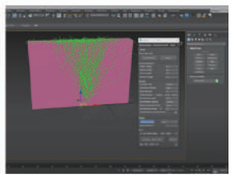


VEGETATION
Plugin simulates the growth of plants and predicts their impact on the morphology of limecrete

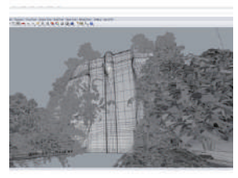
WIND
The erosion of frozen sand by natural winds

WATER
The impact of water flow on sand

NATURAL ELEMENTS



EXPERIMENTS



SPACE

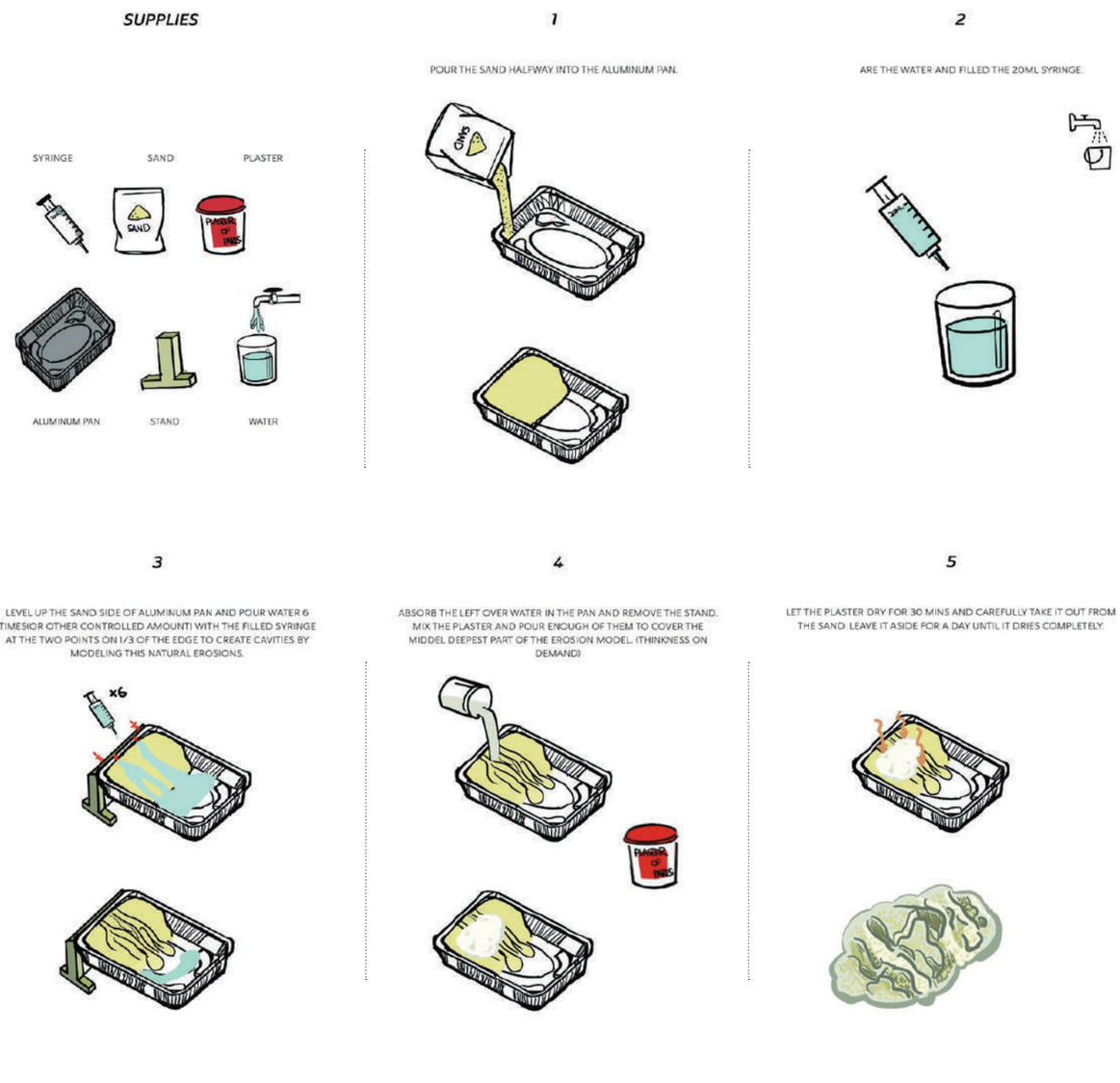
BRICKS | Cast With Water-Eroded Sand

Limecrete can record those natural traces and form beautiful humps where there are sand hollows. If these humps are used as structure, the other part of the brick can be made as thin as possible to save the material.

EROSION
↓
TWO HUMPS

- Strong Structure
- Allow Light to Penetrate
- Save Material

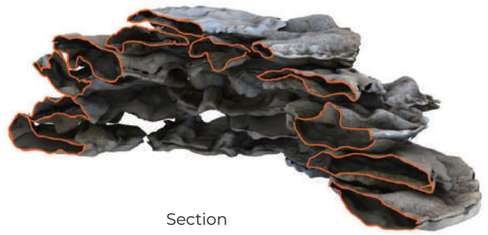
CASTING PROCESS| Record Water Flow Traces With Limecrete



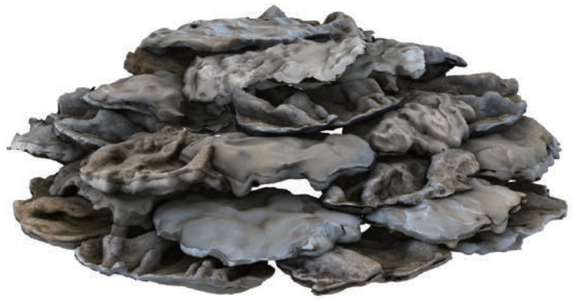
STACKING | Void and Light

After determining the language of each block, we attempted to stack the bricks and explore the space they could form

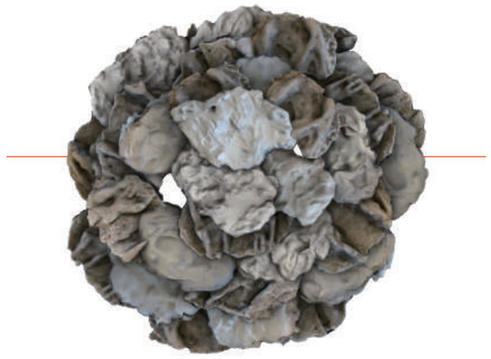
Section



Section

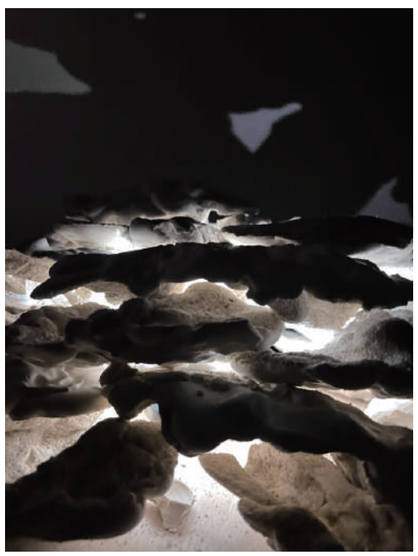


Elevation



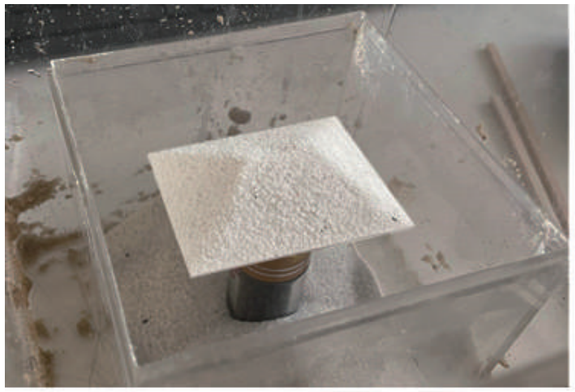
Plan

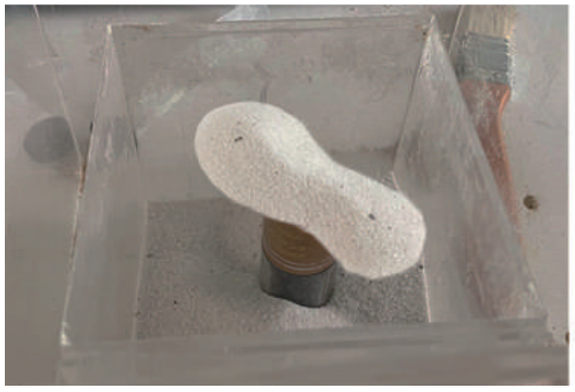
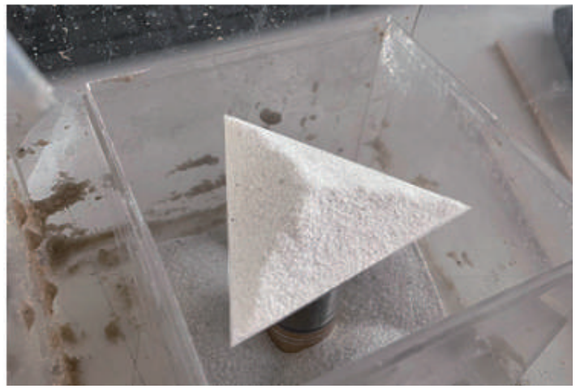
When the bricks are stacked, the gaps formed by the humps create a good lighting effect in the space Then the key issue was to find the right place of the humps on a brick to make it strong as a structure.



EROSION IN THE RIGHT PLACE | Gravity Experiment

We used a gravity experiment to determine the right place of erosion. Pour sand onto a specified shaped bottom plate, allowing excess sand to slowly slide along the edge of the plate, ultimately forming a sand pile with clear ridges. The ridges are exactly where we pour water to create the humps.

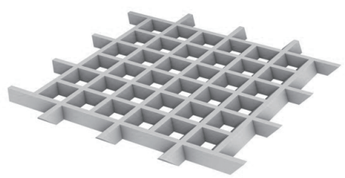
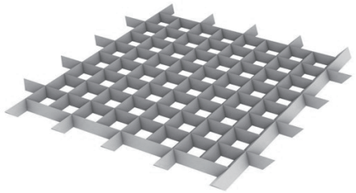


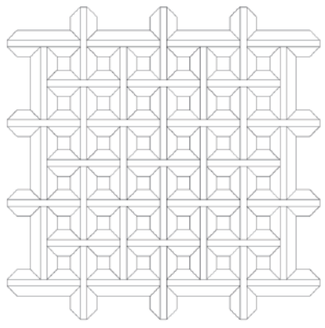
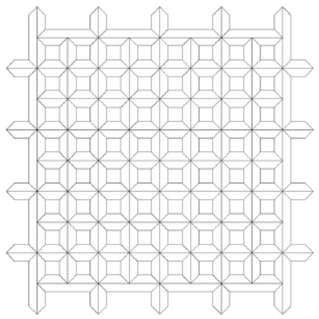
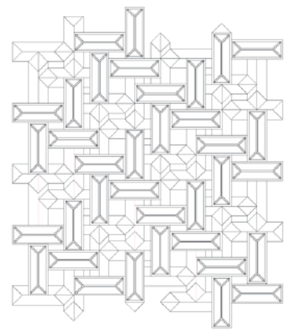





ASSEMBLE | Geometry

Finally, in order to assemble the mass-produced bricks, we used wooden molds to make the upper surface of the modules flat and form specific angles. We assembled the modules into a large-span space, without using binders, only relying on geometric shapes to bear force.

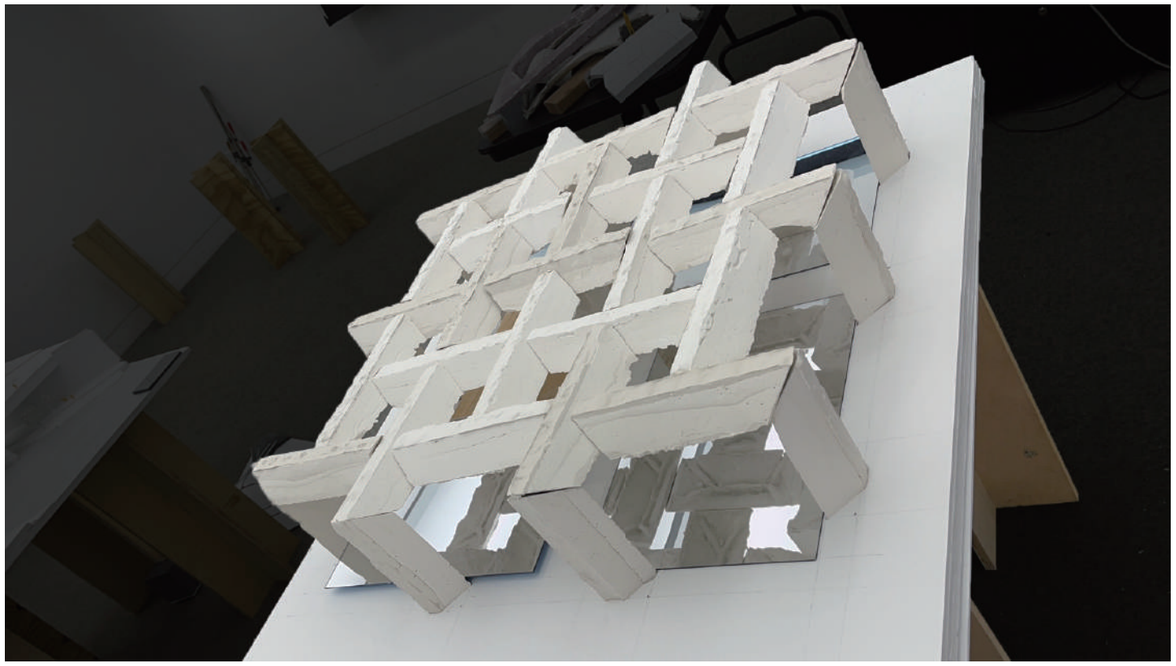




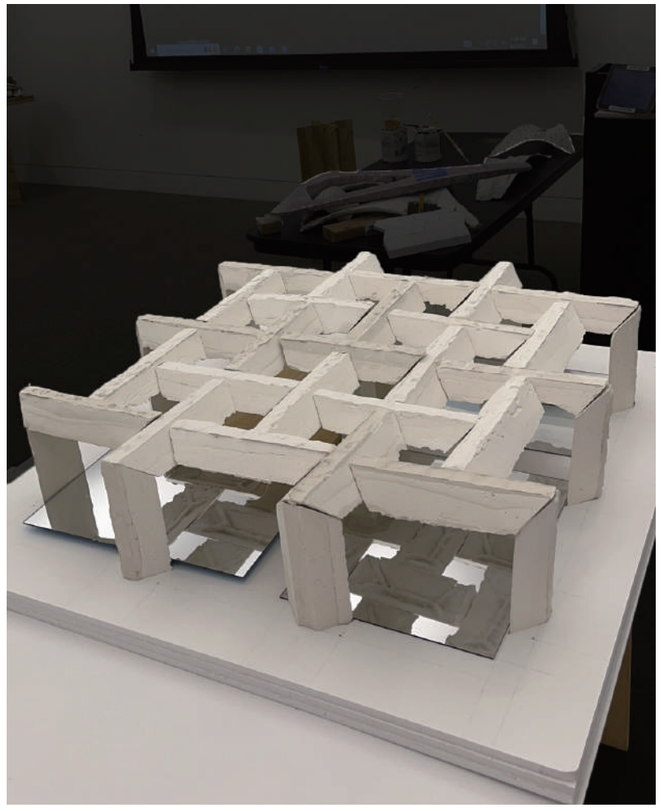
INTERFACES MAKING
Wooden mold forms a flat surface



FINAL MODEL | Thick Upper Surface And Light Lower Surface

From different perspectives, there is a huge contrast in the perception that structures give people: from above, this structure is a thick and regular shape, while from below, it is lightweight and natural.





EXPANSION AND APPLICATION | Thick Upper Surface And Light Lower Surface

25 Modules

49 Modules

81 Modules

Gallery

Market

We handmade each module and appreciate those imperfections and little flaws that make this structure full of vitality.

For the carbon-based space, it is essential to find its advantages of rich, delicate, and continuous physical experience.

[Introduce Nature - Animals]

Awakening

Office Building Renovation
New York, US

Academic, Group Work with Teonna Nichol Cooksey

Sept. to Dec. 2023, 1st Year Graduate

Instructor: Katie Shima, shimamachine@gmail.com

This is an office building renovation project located in the heart of New York City. The aim is to introduce other species, including birds, bees and greenery, into people's office and residential life in the heart of the city. The design focuses on the facade. We created a facade that allows small animals to stay, breed, and even enter the interior space. The lower floors of the project serve as semi-private spaces with sky gardens, and the upper floors serve as apartments. Each household has an independent portal between nature and humans.

The building is intended to serve as an object lesson in enhancing the urban environment with green technologies, including plant life and other creatures, in designing for other species, and in conveying images of new possibilities for the urban environment. This project alone will not save the bees and birds but it will crucially raise awareness about our much-loved insect residents.

Echinacea purpurea

Eupatorium spp.

Liatris Spicata

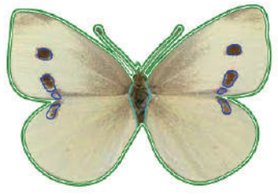
Monarda Didyma

Salvia Coccinea

Solidago spp.

Tagetes Patula

Verbena spp.



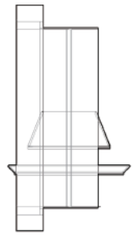
Family Pieridae
Cabbage White (Pieris rapae)

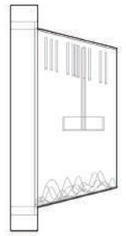
Family Pieridae
Clouded Sulphur (Colias philodice)

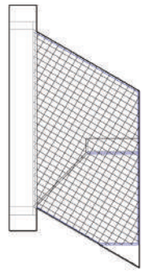
Family Pieridae
Orange Sulphur (Colias eurytheme)

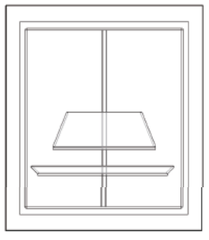
Family Lycaenidae
American Copper (Lycaena phlaeas)

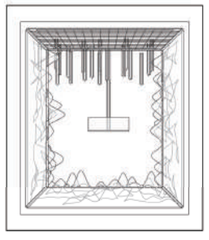
Family Lycaenidae
Gray Hairstreak (Strymon melinus)

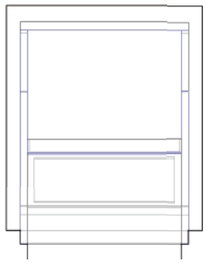


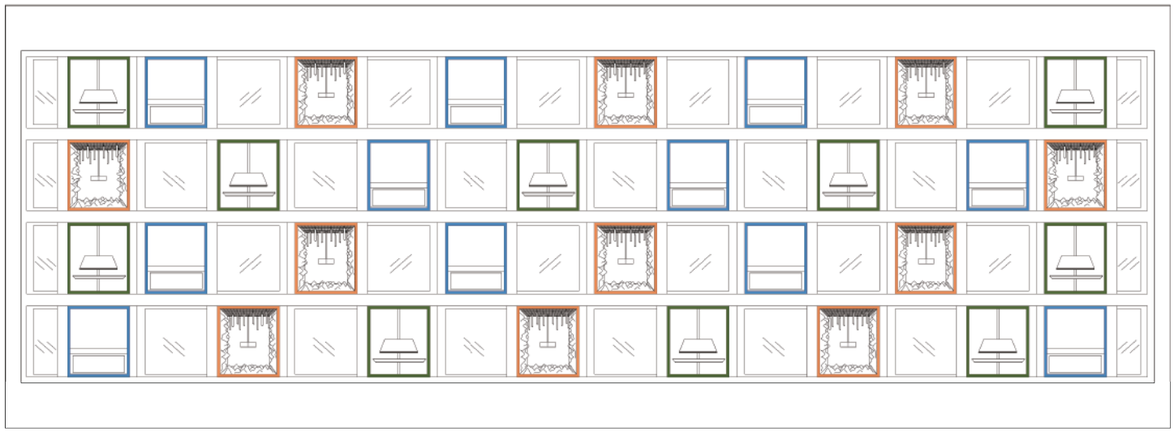


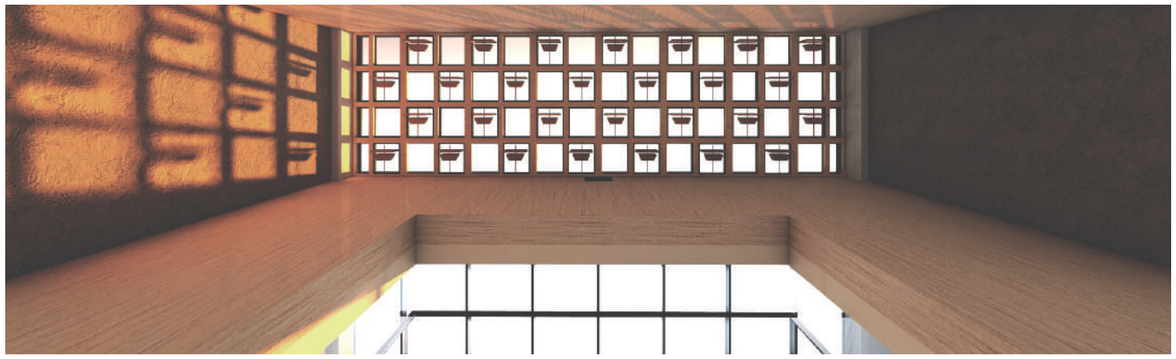




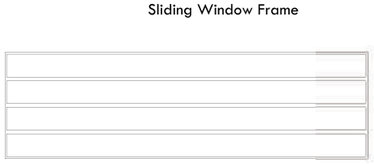




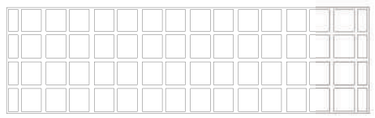




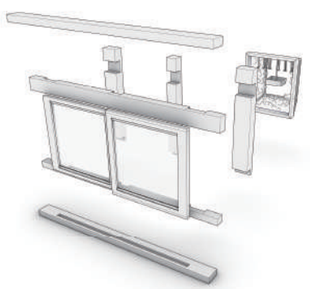
Sliding Window Frame

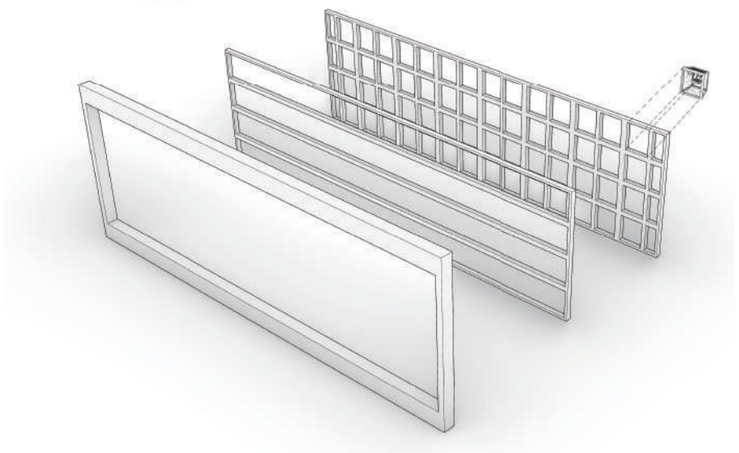


Prototype Frame

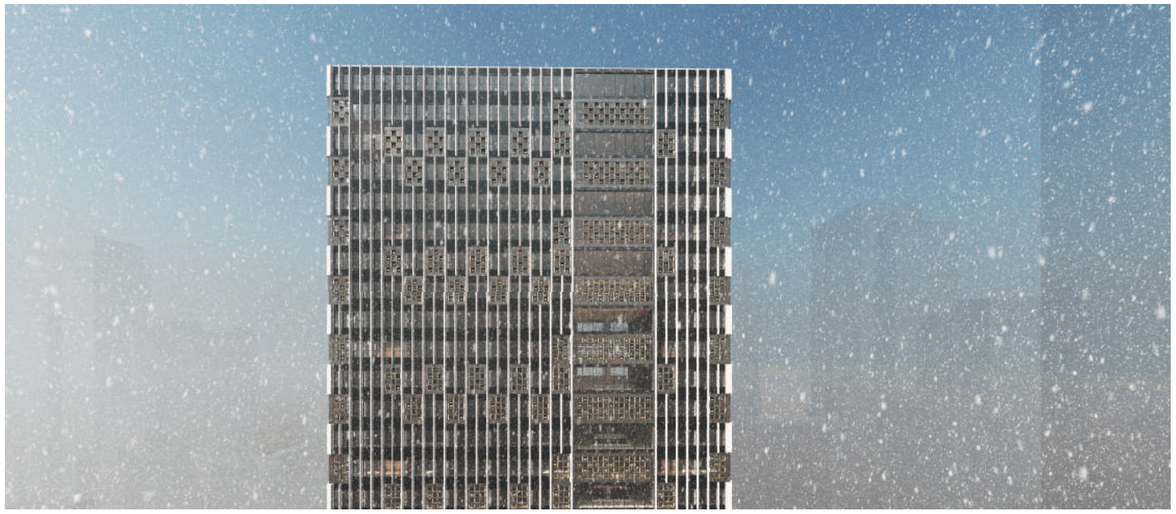


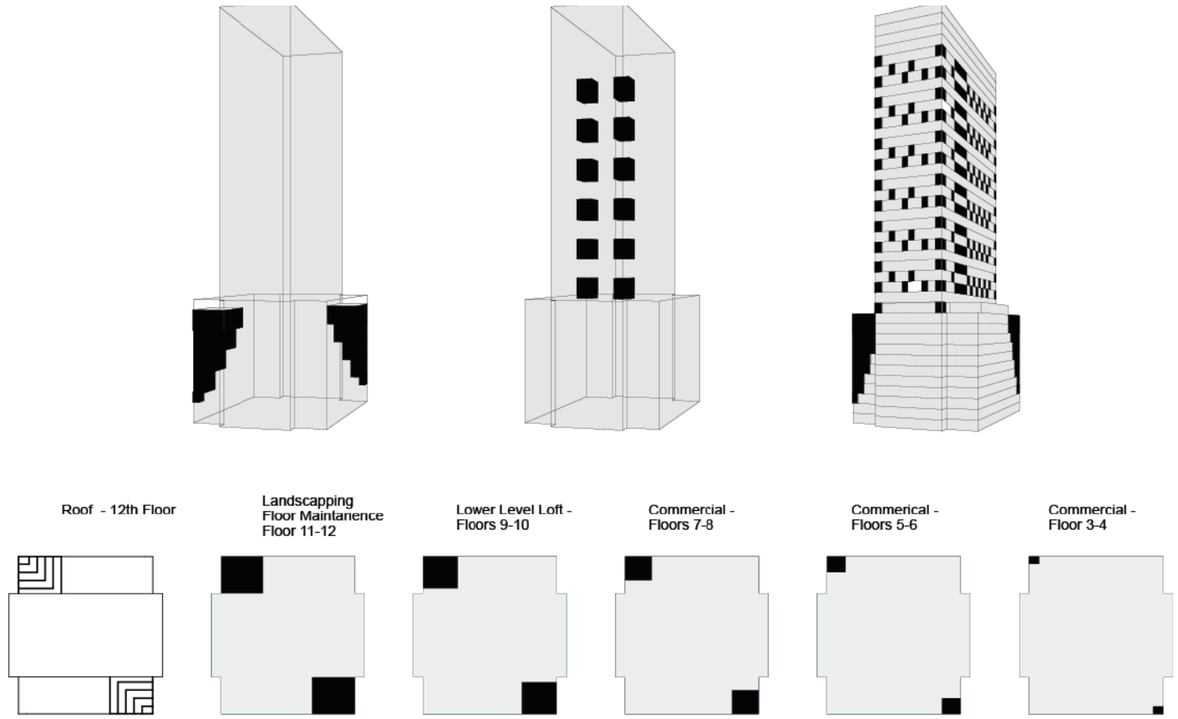
General Frame

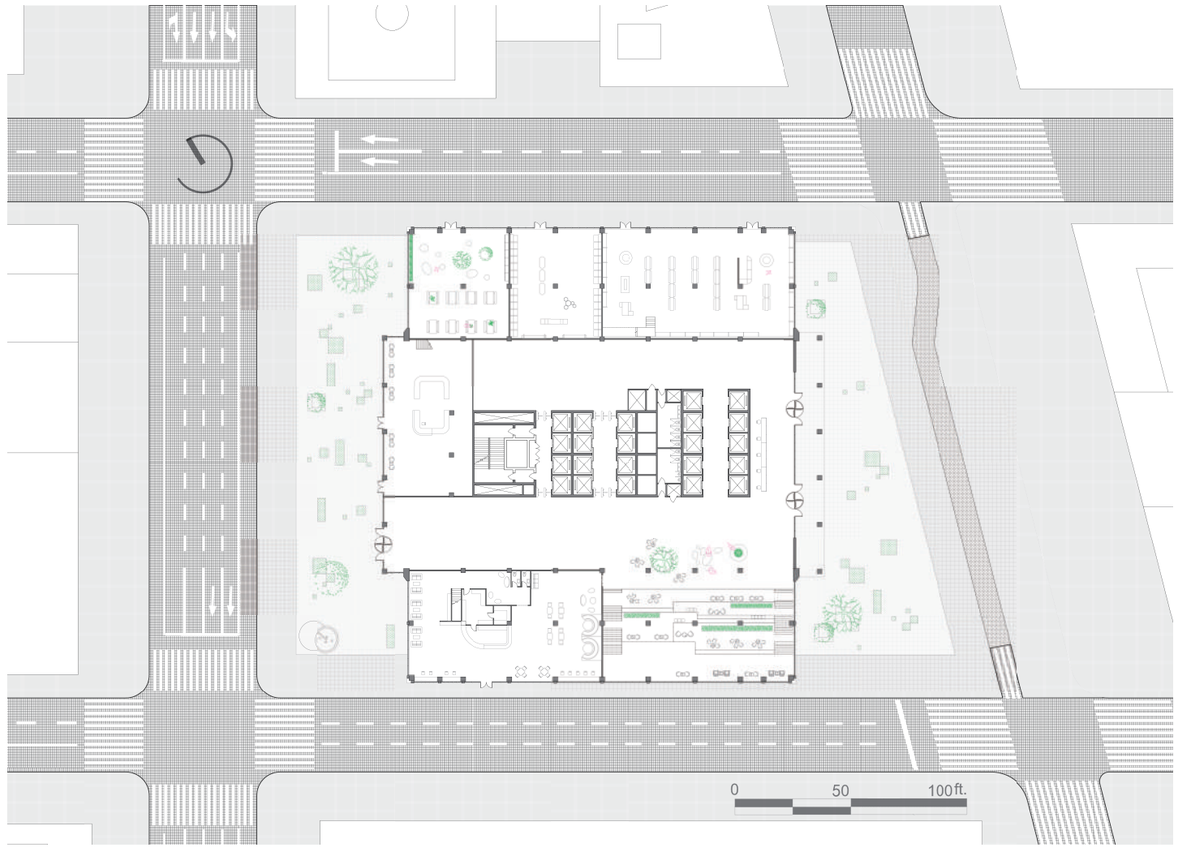




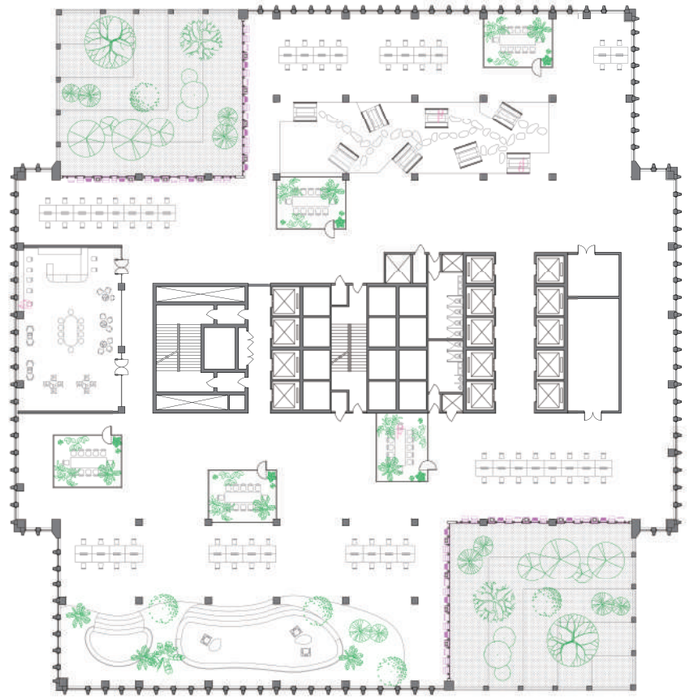
CONCEPT | Portal Between Nature And Humans

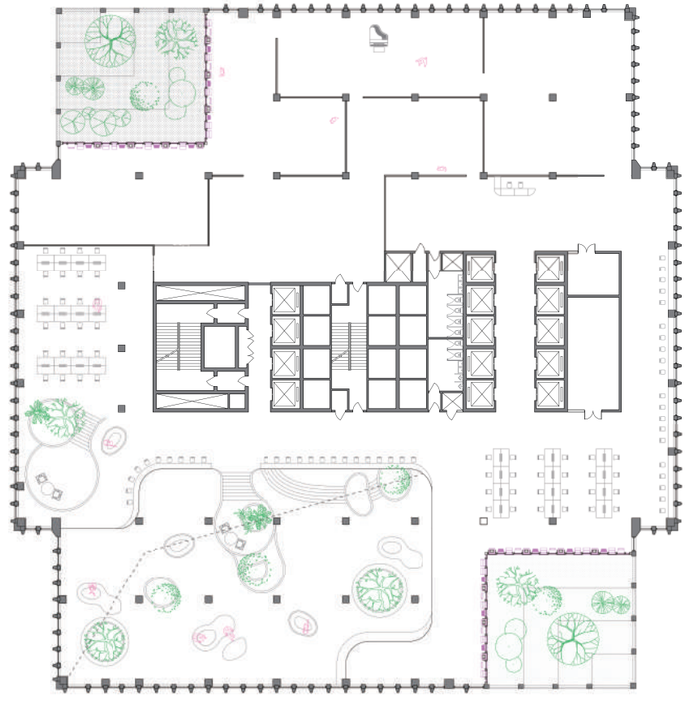




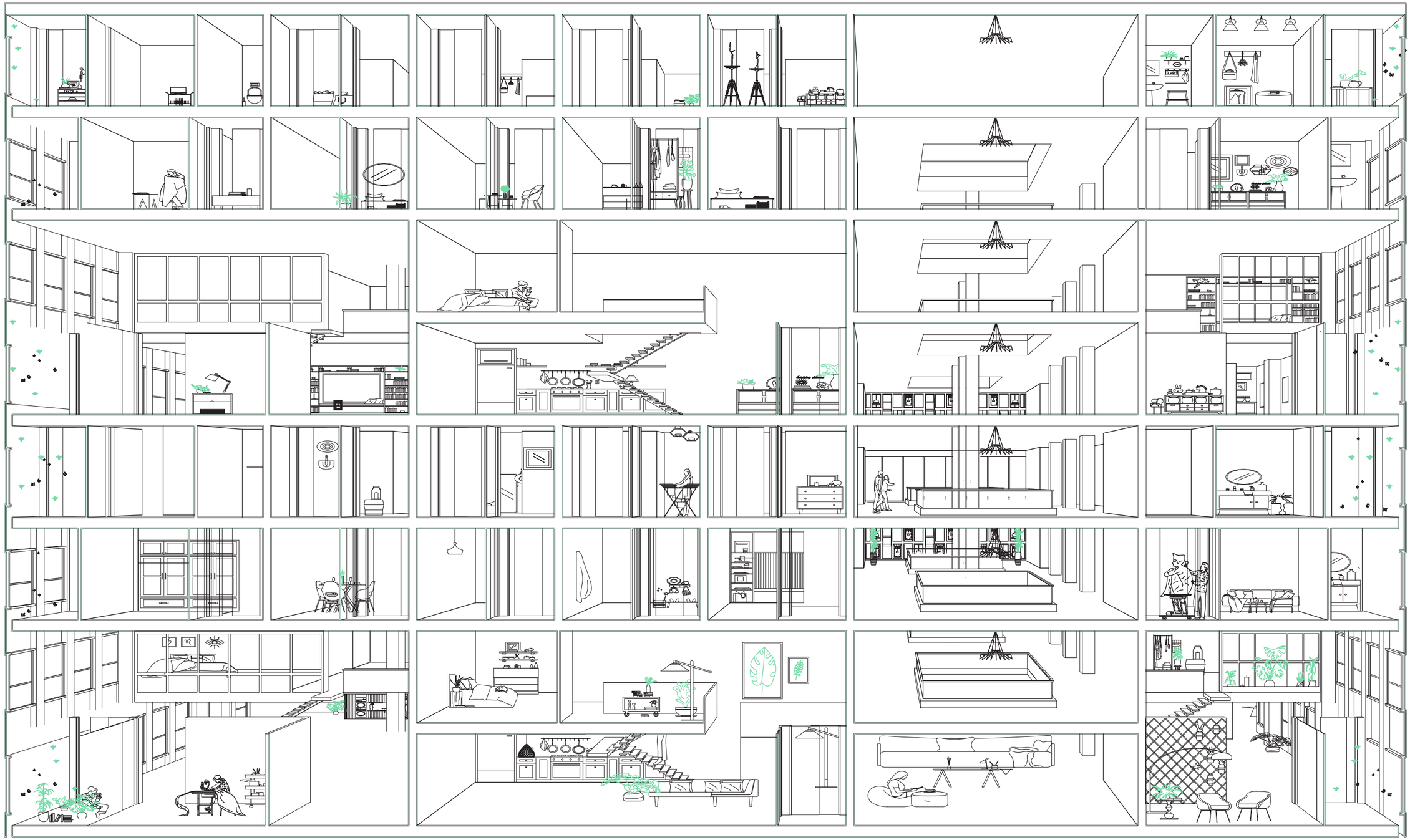


LOWER FLOOR PLAN | Create Different Vibes





UPPER FLOOR SECTION | Portal Between Nature And Humans



Other Works

Transparency

1:1 Crafting and Fabrication of Details

Group Work with Cecil Xu & Alexander Wu

Feb. to Apr. 2024

Instructor: Zachary E. Mulitauaopele

We made a 2×2×5 shelf out of transparent materials, mainly Resin, Acrylic and Polycarbonat. It contains three removable modules. We wanted all materials including the structure to be transparent so we cast the joints in Resin and used acrylic square tubes for the frame. Some of the acrylic components can be disassembled and used as new furniture, such as a coffee table and small seats on the second level and storage boxes on the third level.

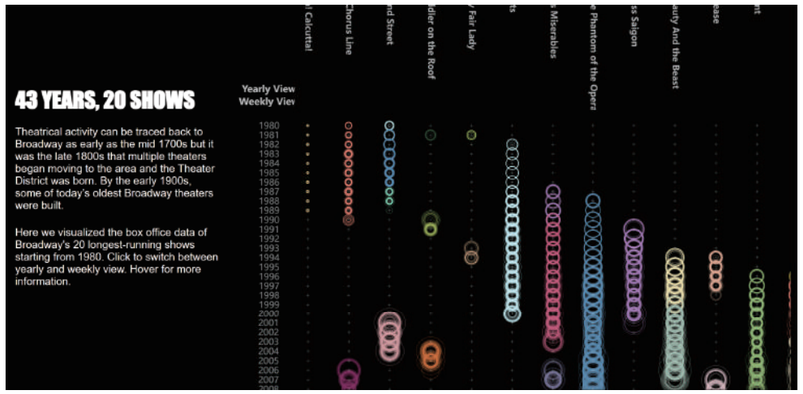
Transparency

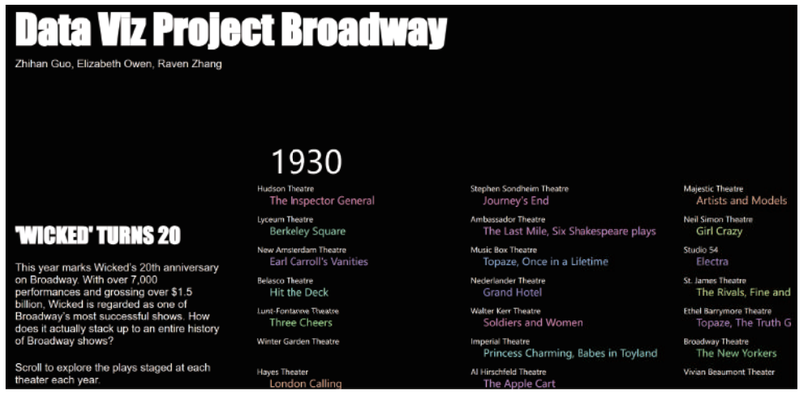
Interactive data visualization

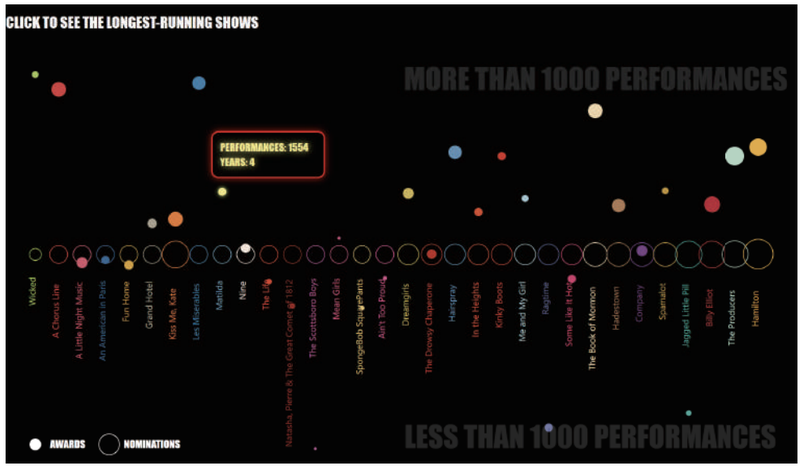
Group Work with Raven Zhang & Libby Owen

Sept. to Nov. 2023

Instructor: Jia Zhang







Video Link: https://drive.google.com/file/d/1N4n8fyEDQ-KASj8lEuTMXHYQDXsF0k6k/view?usp=drive_link