

P O R T F O L I O

S E L E C T E D W O R K 2 0 1 7 - 2 0 2 1



CHAO QUN ZHANG

Chao Qun Zhang

B.Arch 2022 | Minor: Interior Design

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A: Brooklyn, NY

+ Profile

As a passionate student concentrating in Architecture and Interior Design, I yearn for creating innovative designs that elevate the quality of spacial experiences. I am also enthusiastic to meet other innovative thinkers who share the same goal.

+ Experience

Academic experiences

- Rapid Prototyping** | Laser Cutting Lab Monitor
Brooklyn, NY | Feb 2021 – May 2022
My position here involves in processing numerous laser cut digital submissions, providing guidance for student, and series of lab projects including material setting table calibration, laser cutting guide book, facility upgrade furniture design and furniture fabrication.
- Pratt Pi-Fab** | Digital Fabrication Labs Monitor
Brooklyn, NY | Feb 2021 – May 2022
The responsibilities include operating all related machines at all associated fabrictaion labs while working on self motivated projects using the facility.
- Consortium Research & Robotics** | Robotic Lab Monitor
Brooklyn, NY | Spring 2021
The work consists of exploring fabrication methodology through robotic arm 3D Printing and generating form work using Rhino grasshopper.

Collective experiences

- AIAA 2021 ASCEND Conference** | Speaker
Las Vegas / Online | Nov 16th, 2021
Was choosen to representing the FA20 – SP21 NASA X-Hab spcae studio to present its 1 year-long project. Presentation given was succinctly and deliberatly framed into a 5 minete prestantation at the Mars Habitat Student Panel.
- Pratt Buddy Program** | Student Mentor
Pratt Institute Campus | Fall 2020 – Fall 2021
Enthusiastically provide guidance to undergraduate freshman students as an experienced upperclassman and to serve as intermediate for the students to find the right resources.
- AAPI Heritage Month Community Art Event** | Volunteer
Brooklyn Bridge Park Pier 6 | May 15th, 2021
Responsibilities during the event include assisting in curating and hosting the event onsite, participating art work desmonstration lectures, and guiding incoming guest in the event.

+ Education

- Pratt Institute**
School of Architecture
B. Arch | GPA: 3.49
Minor: Interior Design
Brooklyn, NY | 2017-2022 (Expected)
- The New School**
Parsons School of Design
B. FA | GPA: 3.44
New York, NY | 2016-2017
- J.N. Burnett**
Secondary School
Vancouver, Canada | 2011-2016

+ Honors / Publications

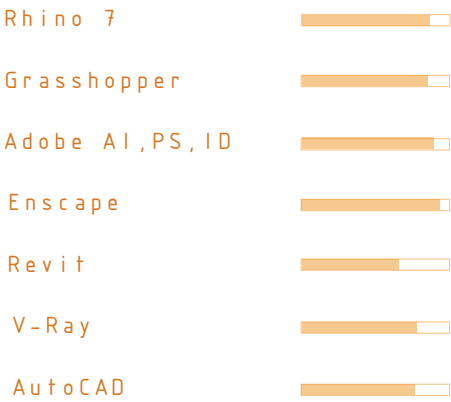
President’s List Recipient
Fall 2020 – Spring 2021

Dean’s List Recipient
Fall 2017– Spring 2019

Class Projects Archived
Publication: In Progress
Fall 2017 – Spring 2018



+ Skills



Digital Fabrication Skills

- Robotic Arm
- 3D Printing
- CNC Milling
- Laser Cut

+ Table of Content

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01	The Boradcasting Box Theatre Tower / Cinematic Office ARCH Design Studio 202 Spring 2019	04
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THE "BROADCASTING" CRYSTAL

A monumental glass tower of cinematics

Program | Film Production Company Tower
Studio | ARCH Design Studio 202
Professor | Michael Chen
Date | Spring 2019
Location | New York, New York

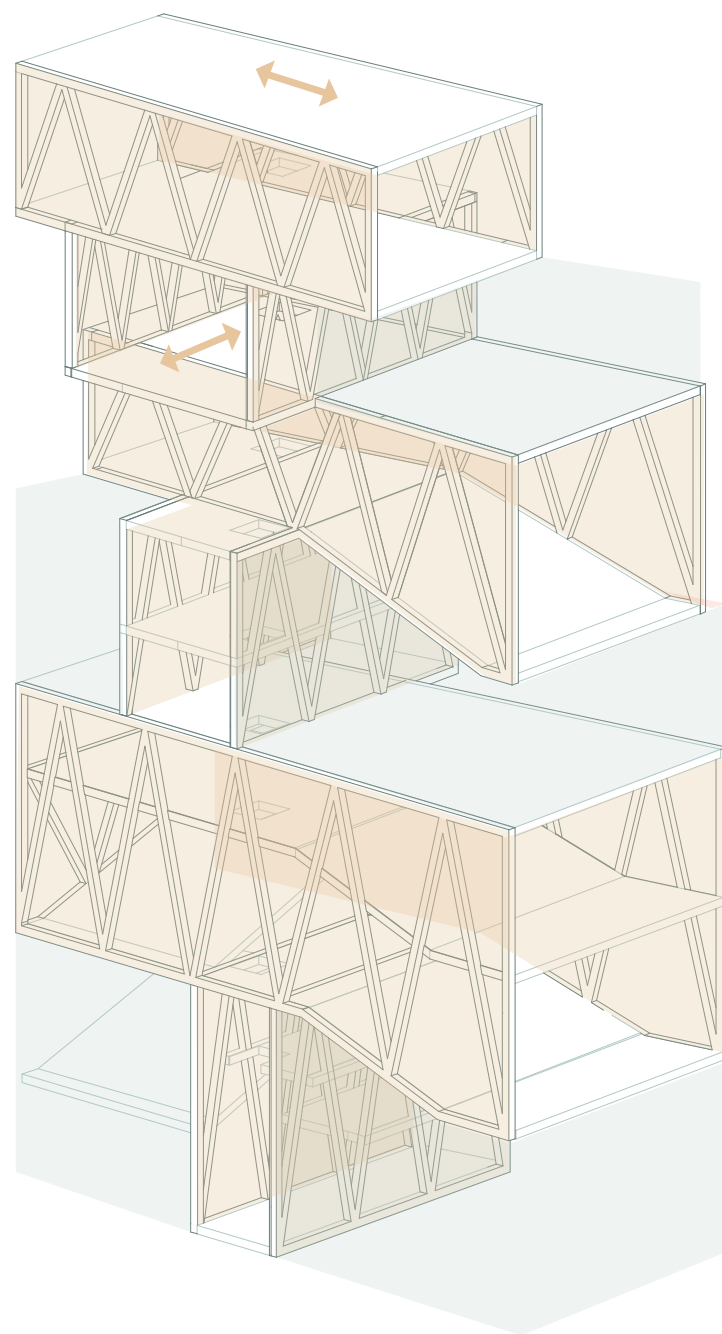
This project is defined by a request to propose a contemporary film production company and theatre tower. My approach is to create a monumental tower for modern movie culture. According to the screening schedule, people from the street would constantly see attending audiences swarming up and down the building. This phenomenon explicitly created through the tower typology and architectural organization establishes a cinematic context at the streetscape scale, setting the pedestrian into this monumental

atmosphere through their visual connection with the tower. The circulation is specifically designed to channel the attendees to spiral on the building's edge, so their movement is visible from the street, enhancing the perceived phenomenon. The film projects onto a two-way screen that blurs images of the movies from the outside. The building is perceived as a semi-transparent glasshouse with the installed fritted glass facade during the daytime. When seen at night-time, the building becomes a lit glasshouse with light in a gradient

of shades created through different transparency in the fritted glasses facade. The theater rooms are perceived as hanging dark boxes within the structure.

TOP LEFT
Day Time Axonometric Rendering

TOP RIGHT
Night Time Axonometric Rendering



■ STRUCTURE FREE

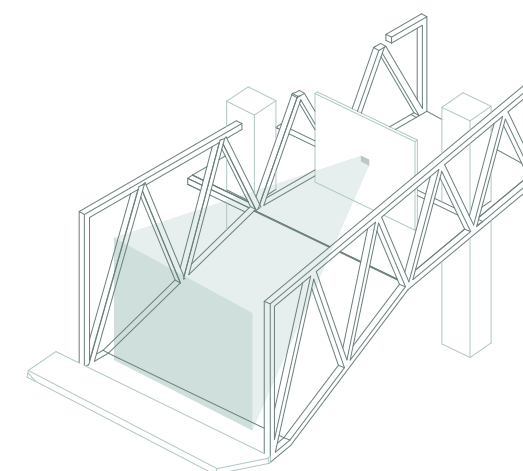
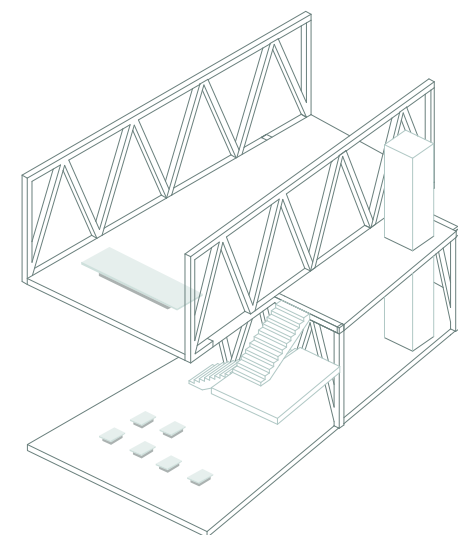
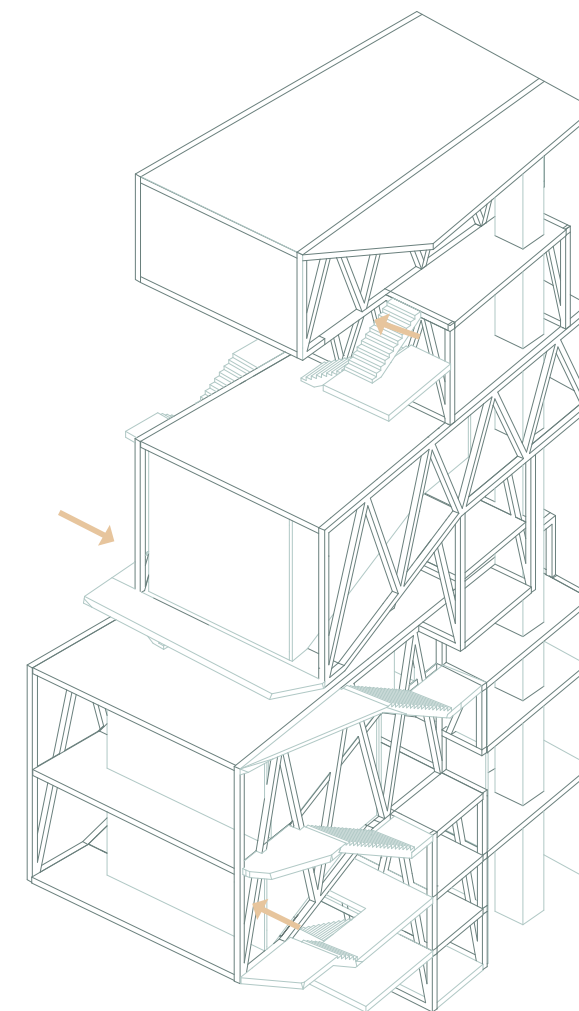
■ CROSS STACKING

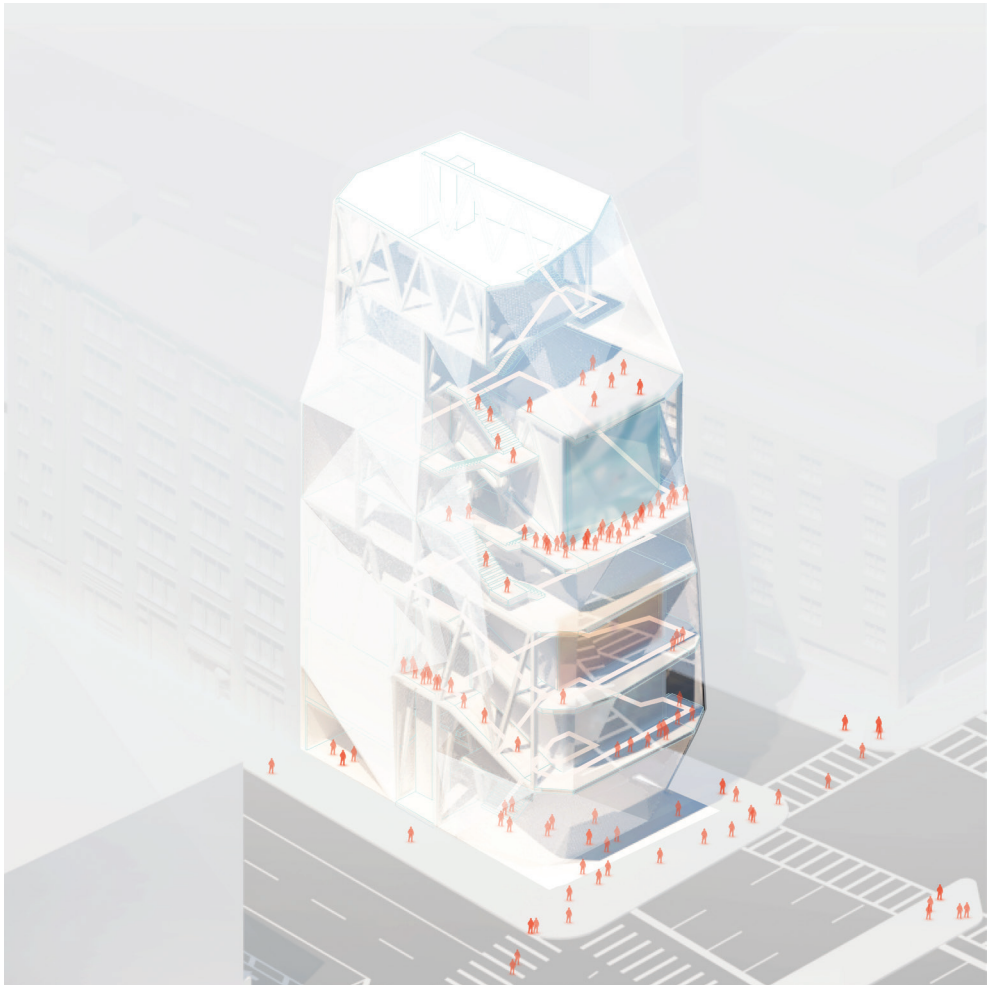
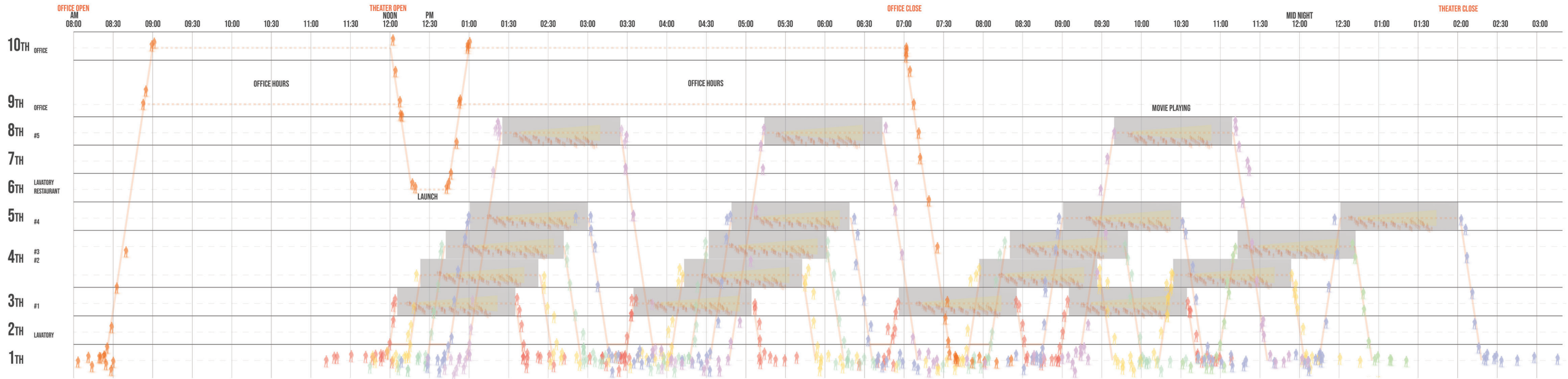
The developed structural strategy allows large areas within the building to be the structure-free area where no additional structural elements need to be introduced. These areas resemble Le Corbusier's domino house and remove all its necessary columns. This is achieved through a cross stacking of linear trussed massing. The trussed structure pulls the floorplates in stress load within each trussed massing as they are also the ceiling hanged for space below it.

Within the building, two space typologies are developed. One is the lounge / Office space typology acting as the free-roaming space where occupants use to circulate the building. The other is the theatre space typology, where an enclosed auditorium is set up as black boxes within the whole building.

The trussed massing is shifted sideways to make room for vertical circulation. This ensures the movement of vertical circulation is exposed and visible to the street pedestrians.

- ▼ TOP LEFT
Structural Design Logics Diagram
- ▼ TOP RIGHT
Massing Shifting Diagram
- ▼ BOTTOM MIDDLE
Lounge / Office Space Typology
- ▼ BOTTEM RIGHT
Theatre Typology

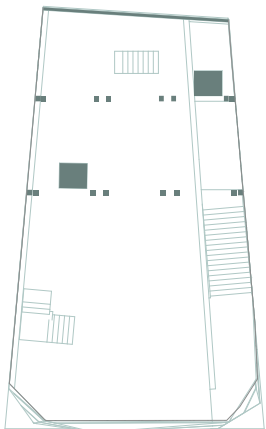




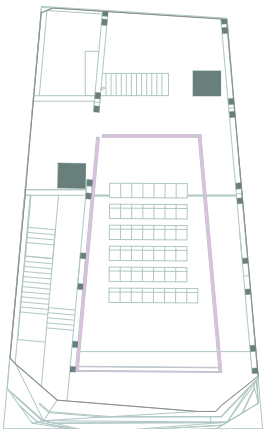
CIRCULATION CONCEPT

With the need to design the circulation enhancing the phenomenon of occupants circulating up and down the building, a movie scheduling system is developed. Crowds attending the movies can be seen circulation each half-hour throughout the day. The phenomenon starts at noon when the first movie is scheduled and ceases at 2: 00 AM when the last movie is scheduled.

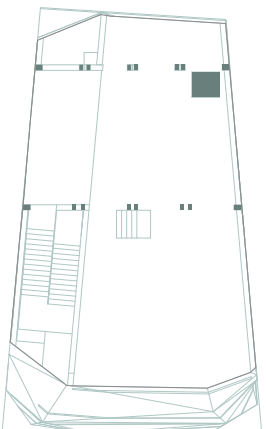
- ▲ TOP
Movie Schedule Sheet
- ▲ BOTTOM LEFT
Circulation Diagramatic Rendering
- ▲ BOTOM RIGHT
Floor Plans



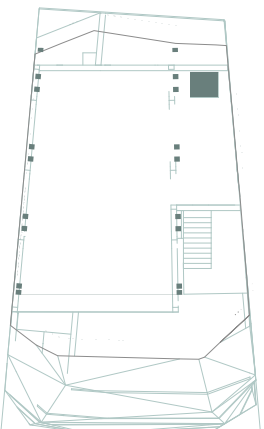
FLOOR 5



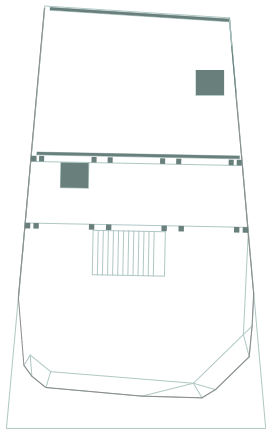
FLOOR 6



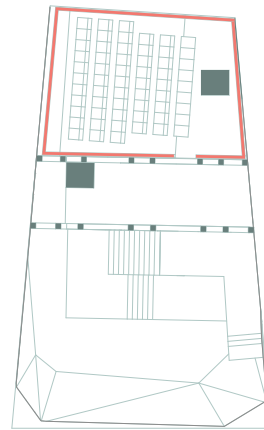
FLOOR 7



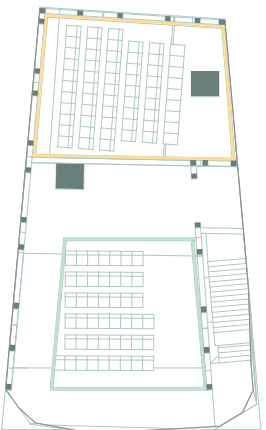
FLOOR 8



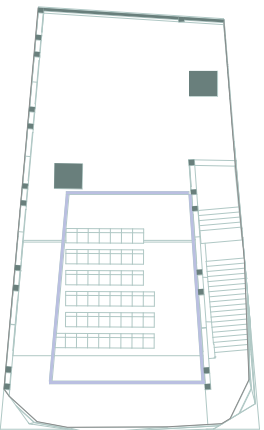
FLOOR 1



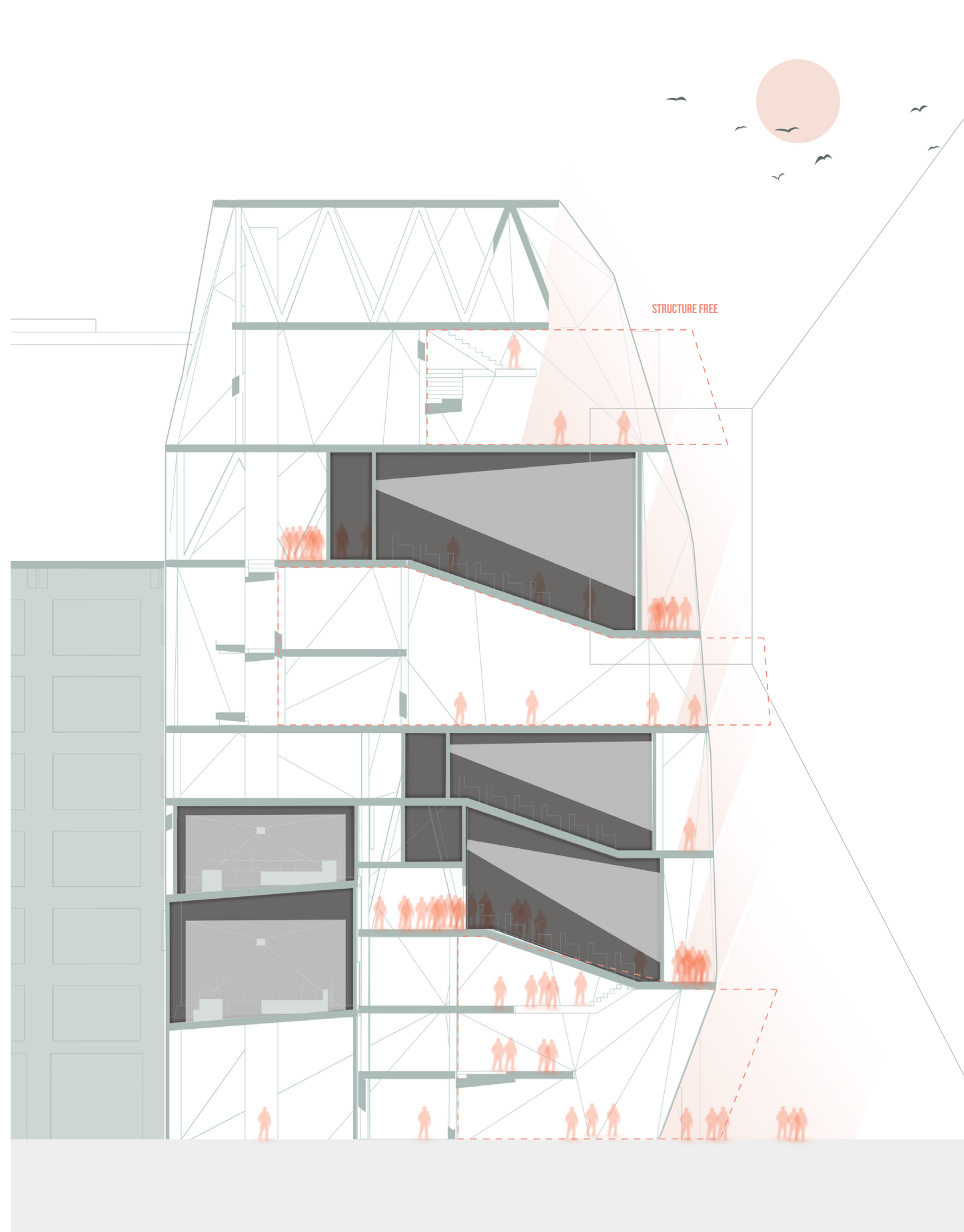
FLOOR 2



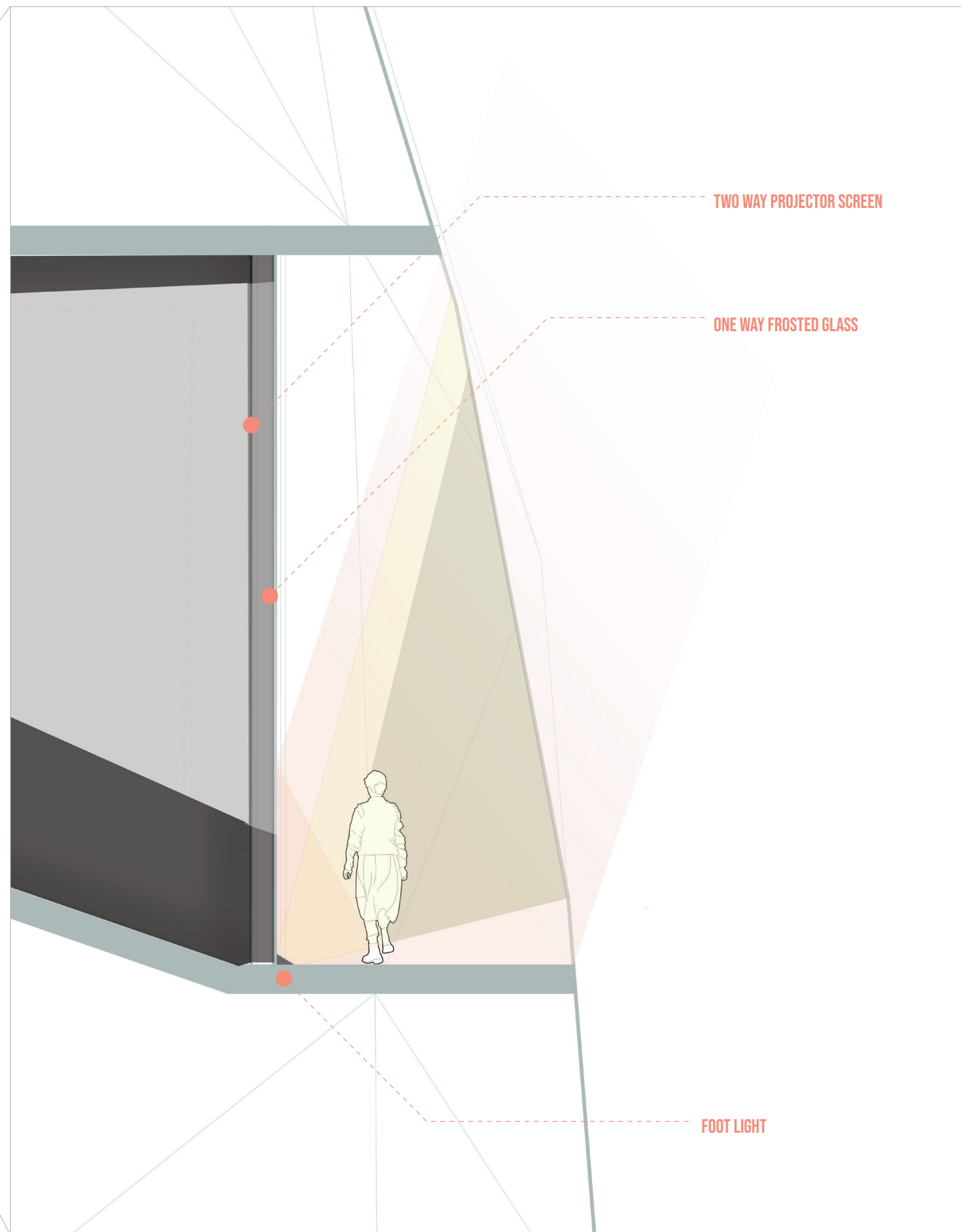
FLOOR 3



FLOOR 4



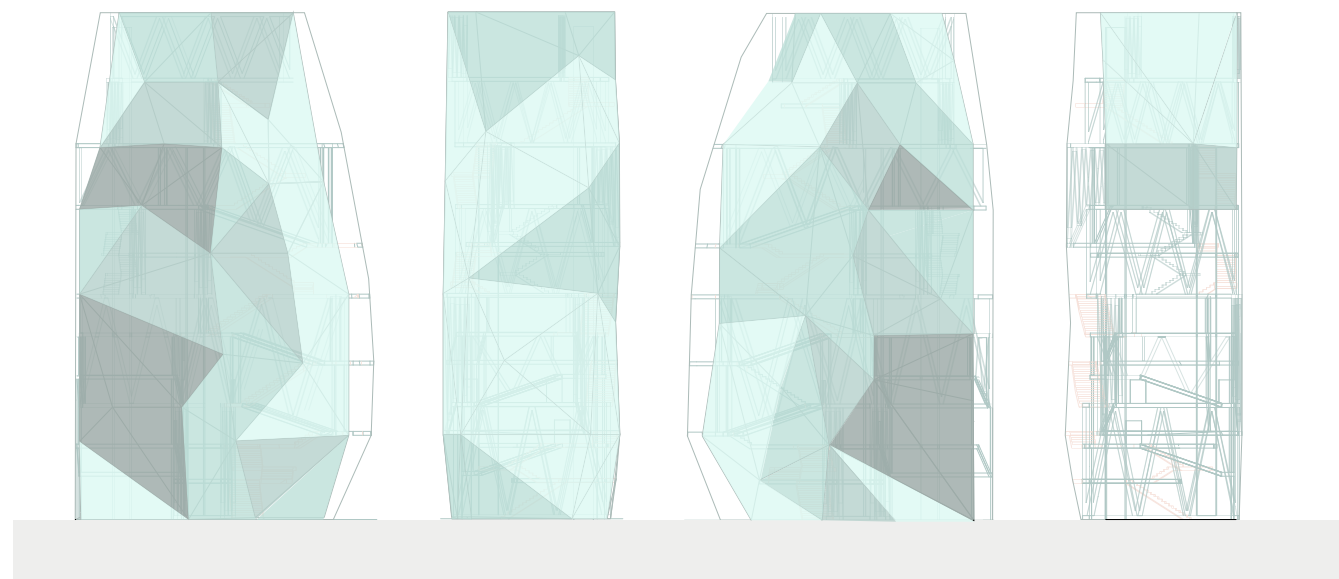
SECTION DRAWING



DETAILED SECTION



FACADE DESIGN



CLEAR GLASS

SMALL FRITTED GLASS

LARGE FRITTED GLASS

OPAQUE GLASS

To further optimize the designed phenomenon, The facade glazing varies in transparency, drawing the pedestrian's eye onto the most transparent side, the front side, also the side where blurred images of movies are broadcasted to the street. The gradient is achieved through the density difference in the fritted glass.

◀ LEFT

1" - 1/8" Scaled Model Photograph

▶ TOP RIGHT

Facade Elevation Drawing

▶ BOTTOM LEFT

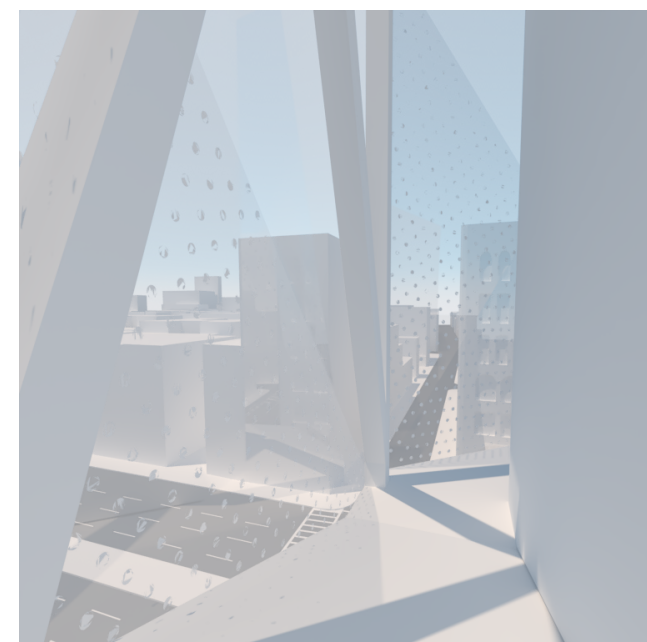
Front Entry Rendering

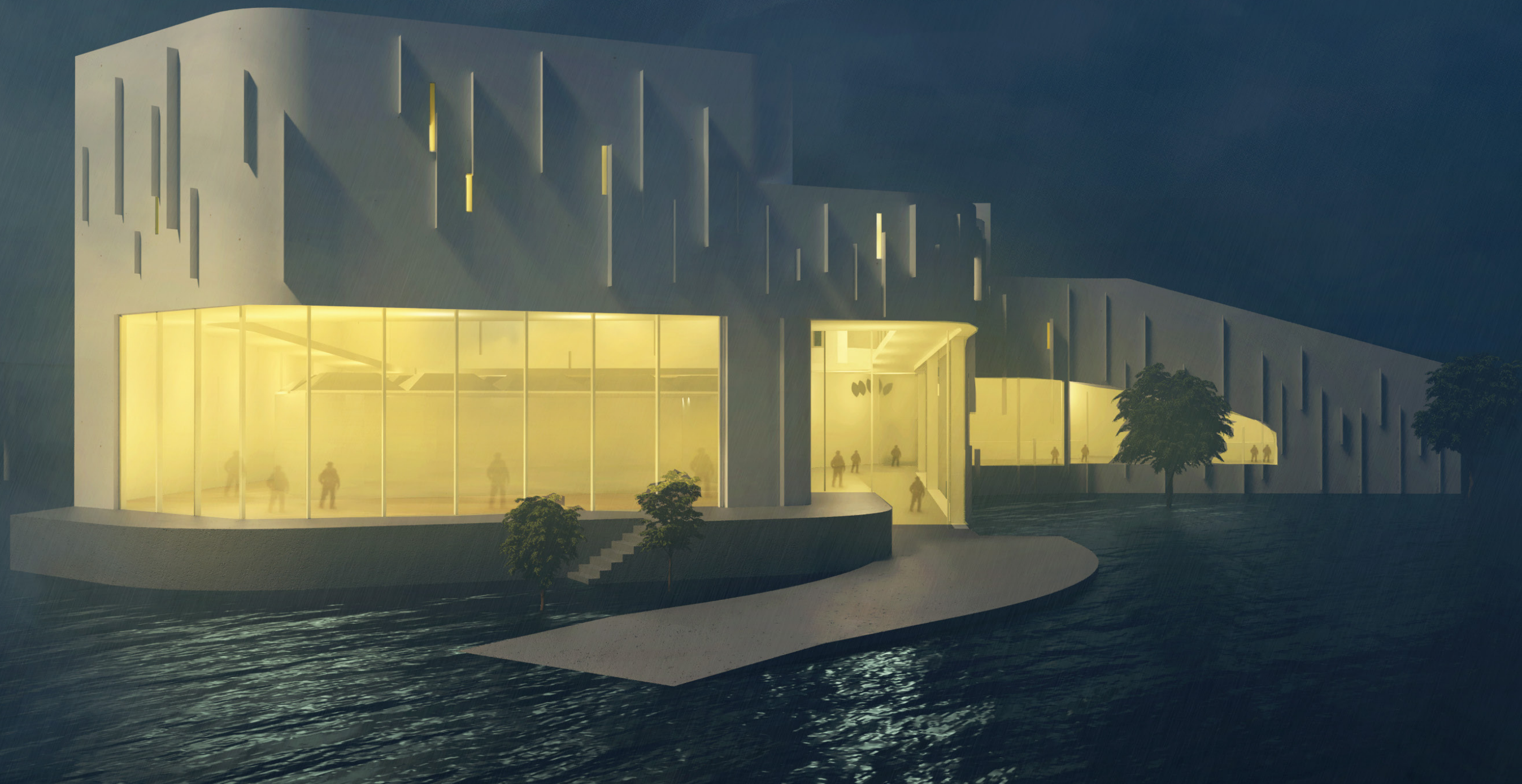
▶ BOTTOM RIGHT

Circulation Area Rendering



FACADE DESIGN





ABOVE WATER

A way to adapt the climate change

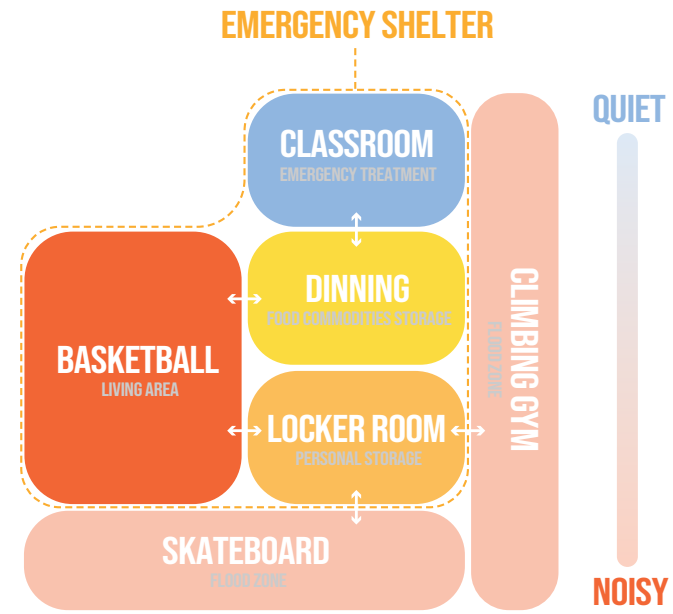
Program	Community center / Gymnasium / FEMA Emergency Shelter
Studio	ARCH Design Studio 302
Professor	Leonard Leung
Date	Spring 2020
Location	Far rockaway, Queens, New York
Partner	Leon Yang

In an era of climate change, more robust storms have been witnessed worldwide. During the 2012 Hurricane Sandy, a large portion of new york's coastal area was severely flooded, raising designers' attention to include consideration of the changing climate context in their design. In this community center project, the FEMA regulation requirement was added to the design criteria. Methods of addressing the potential flooding issues have to be considered, and ways to convert this community center into

an emergency shelter need to be developed. In response to the high flood elevation, the existing ground floor elevation that is 6 ft above sea level is further elevated by 8 ft to surpass the 13 ft requirement. This grand design decision in this project limits the flooding area to only the outdoor sports area while all other indoor programs remain functioning. During nonemergency periods, the community center draws the population from the surrounding community by offering a community-friendly sports center where a

▲ TOP RIGHT
Strong storm time rendering

climbing gym, skateboard palace, and basketball court are included.



As we analyzed the site, we discovered the noise and quiet difference in different locations based on the amount of traffic vs. pedestrians exposed. On the quieter side, the south side, sports programs such as climbing gym, basketball court, and skateboard park are placed next to each other, creating a zone of sport. A bike lane is placed on the boundary of this sports zone which separates the walking zone of the park from the sports zone. Right next to it, a ramp faces towards the subway station that draws people to the main entrance of the building. With these design decisions, we aim to create a people-gathering zone between the subway station and the building.

TOP LEFT

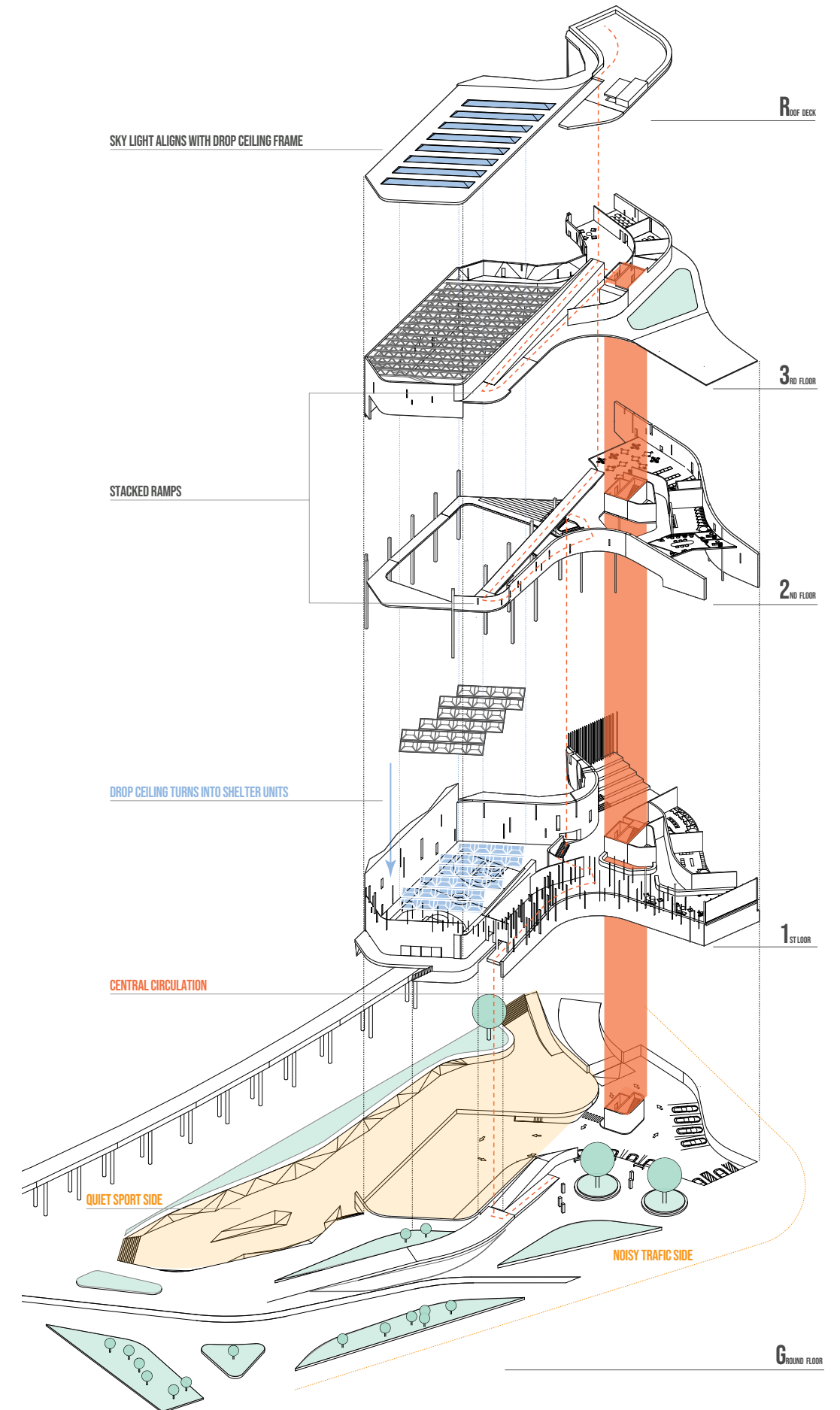
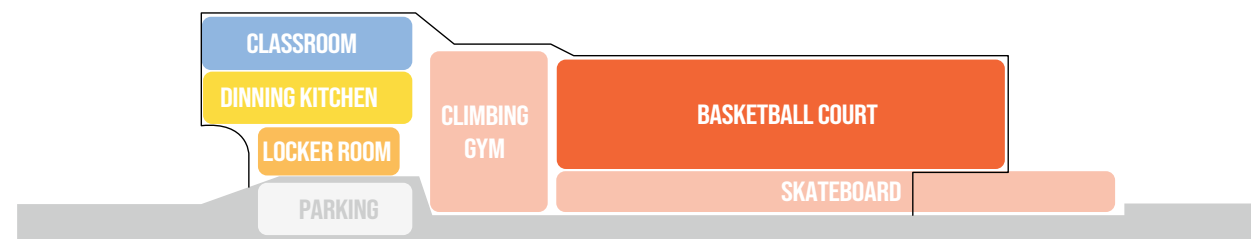
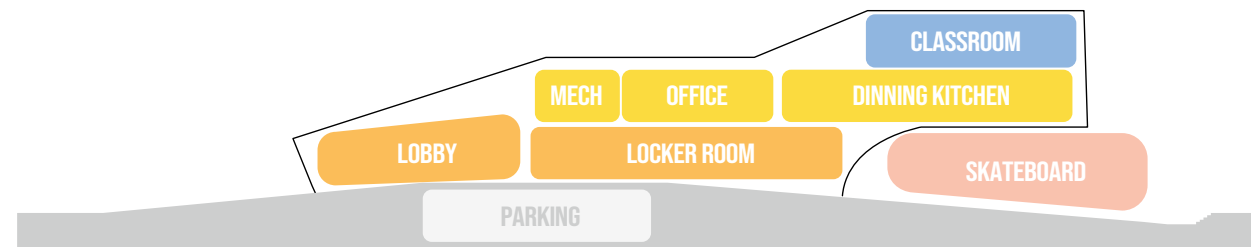
Sectional Planning Diagram

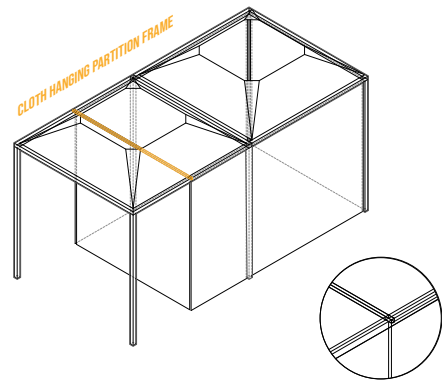
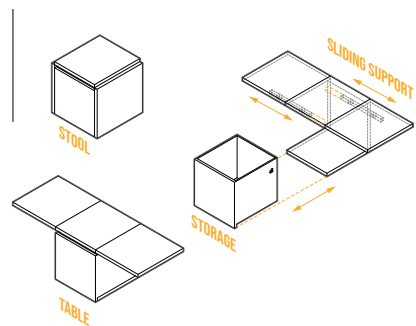
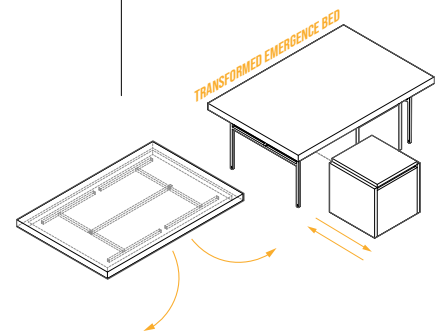
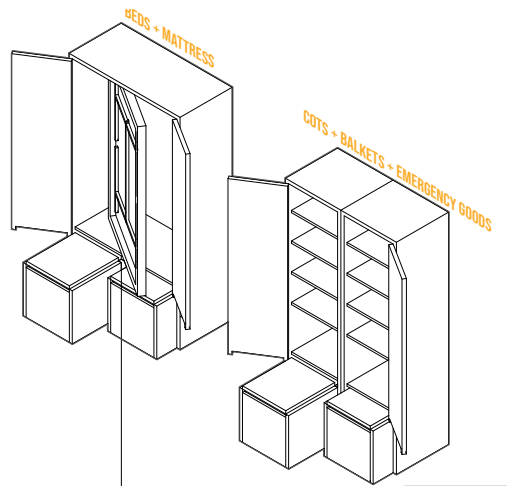
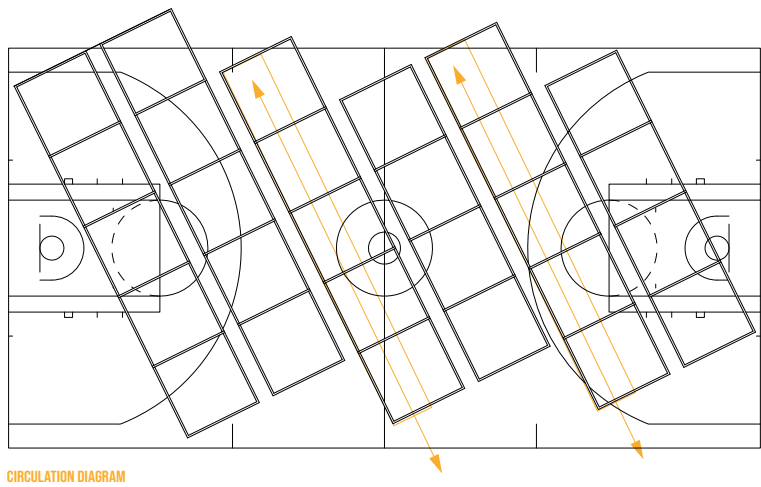
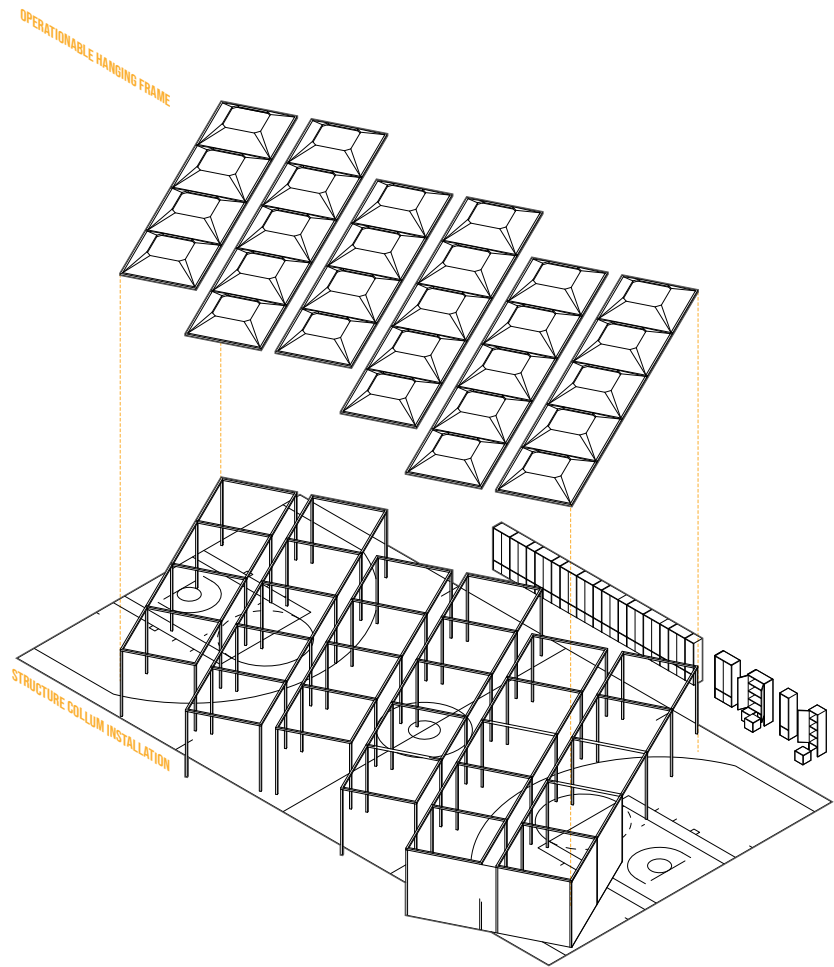
BOTTOM LEFT

Cross section Planning Diagrams

RIGHT

Exploded Axonometric Drawing

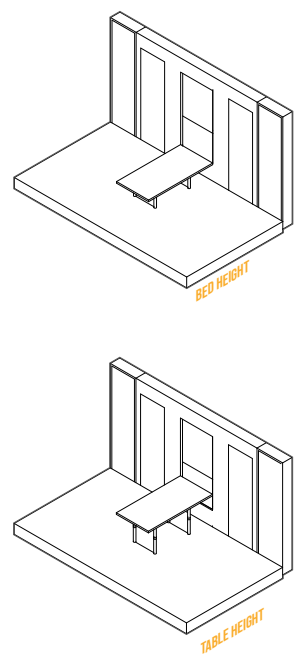
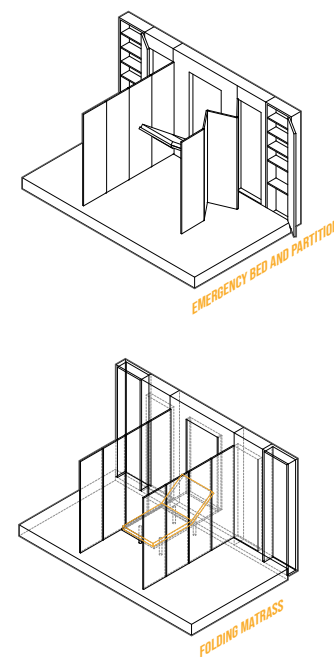
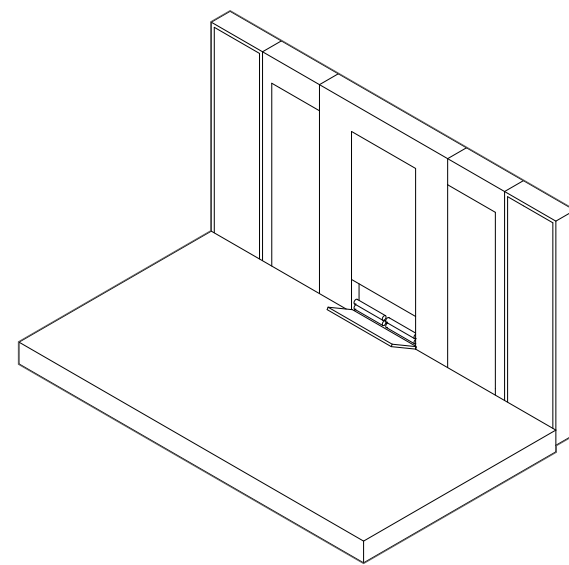


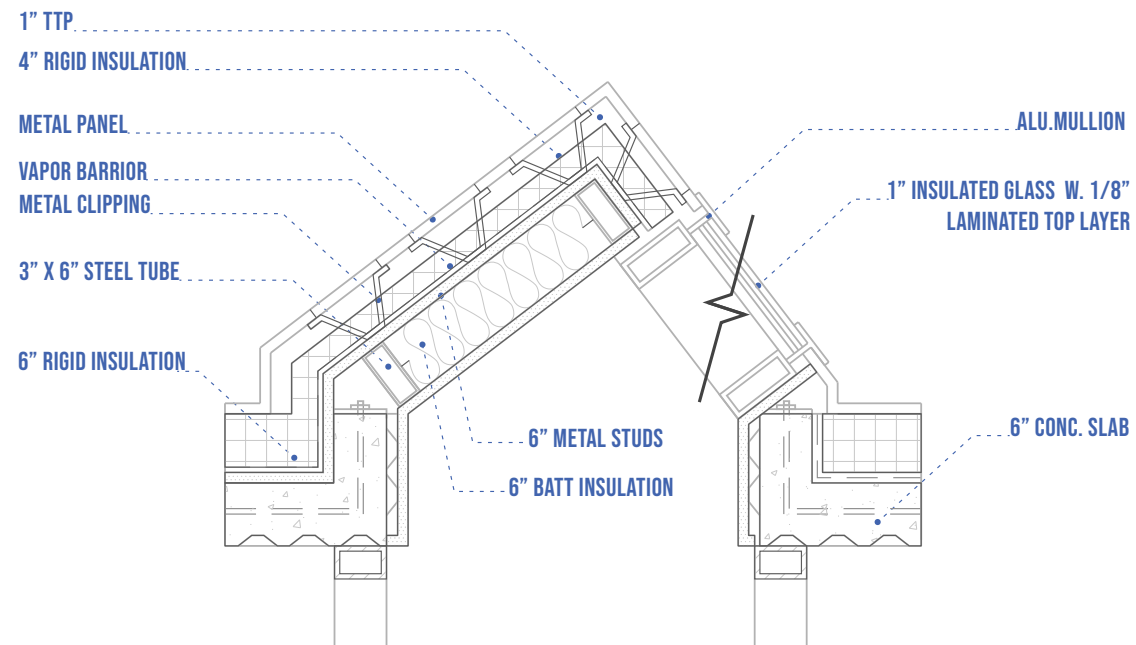


TOP RIGHT
Basketball court rendering

BOTTOM RIGHT
Classroom / medical unit transform system

With the need to transform the building into an emergency shelter, a pulleyed “shelter grid” system was designed. The grid is lower and anchors on the ground of the basketball court. The frames act as the framework for the living space of the shelter. During normal circumstances, this pulleyed ceiling would be attached to the skylight providing diffused natural light. Multipurpose foldable furniture is placed on the edge of the basketball court for shelter use. A foldable wall system was also developed to transform classrooms into emergency medical units.

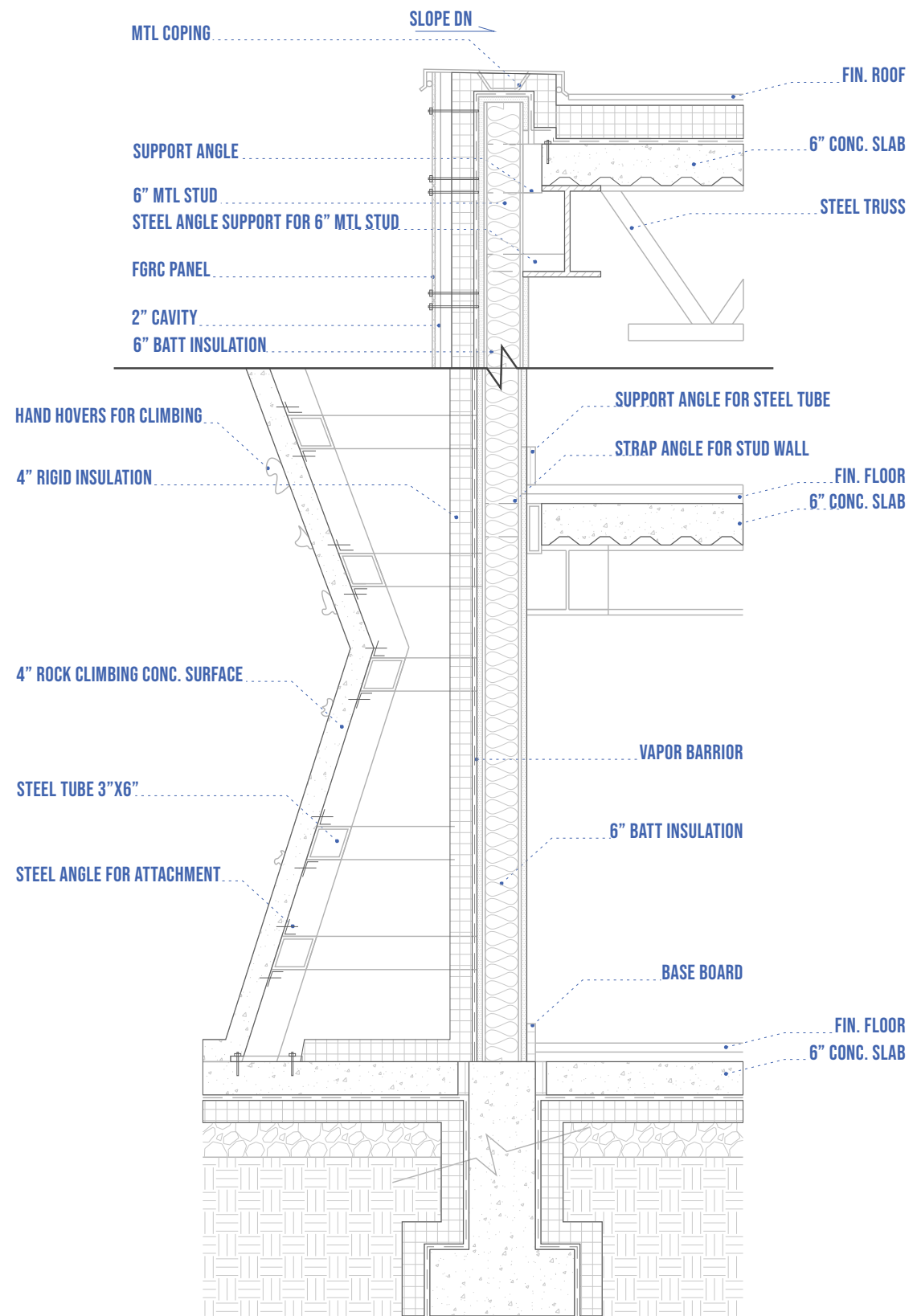




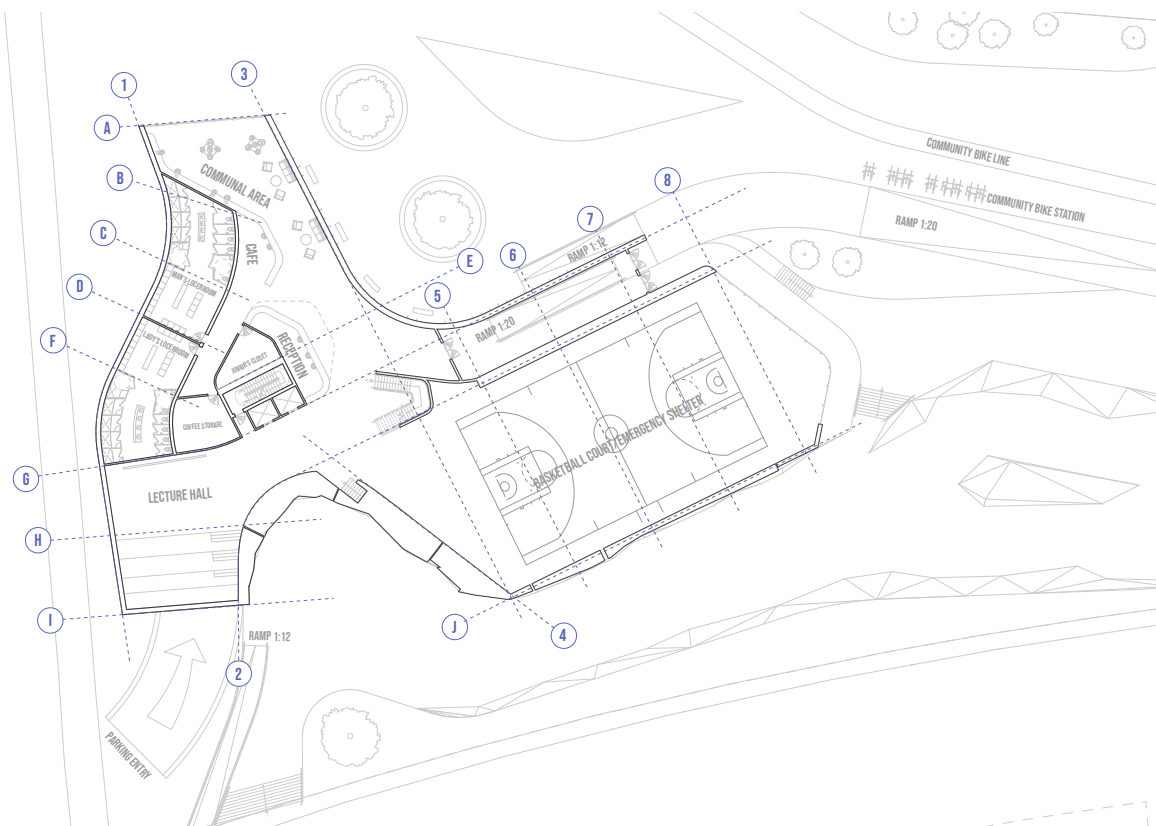
SKYLIGHT DEATIL SECTION



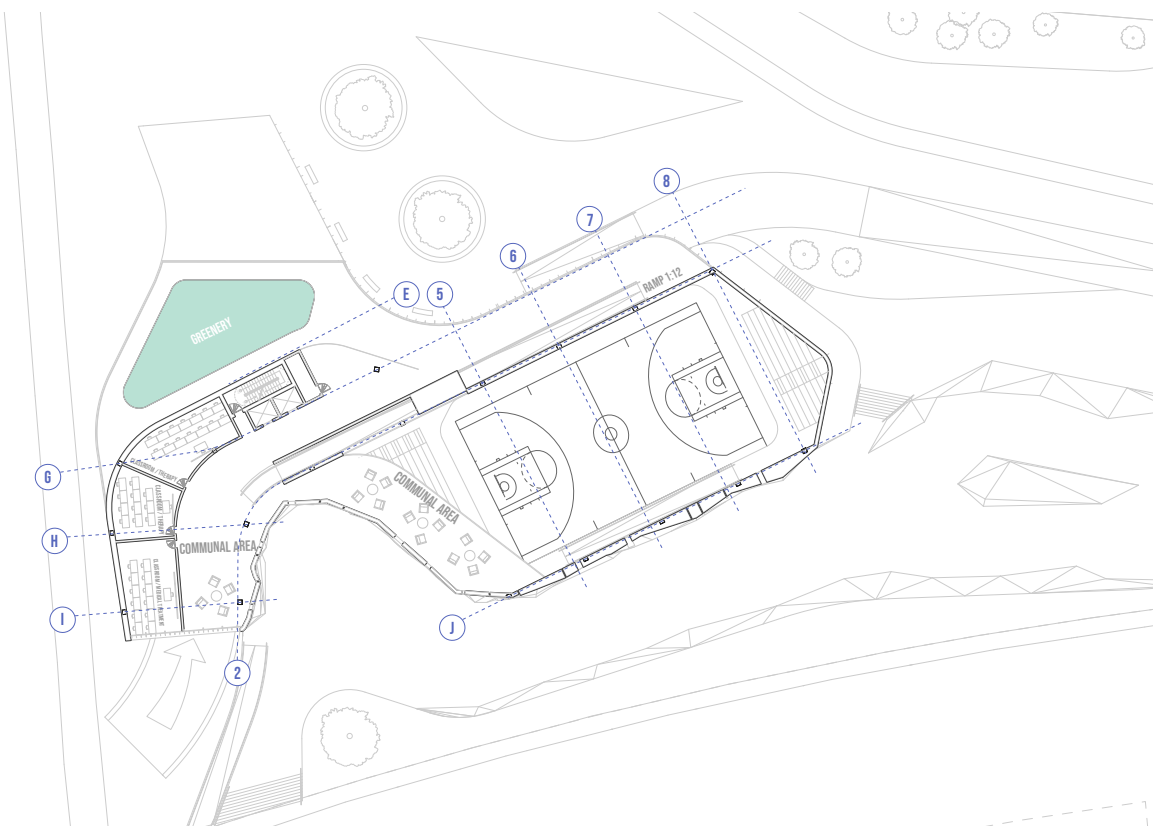
ELEVATION RENDERING



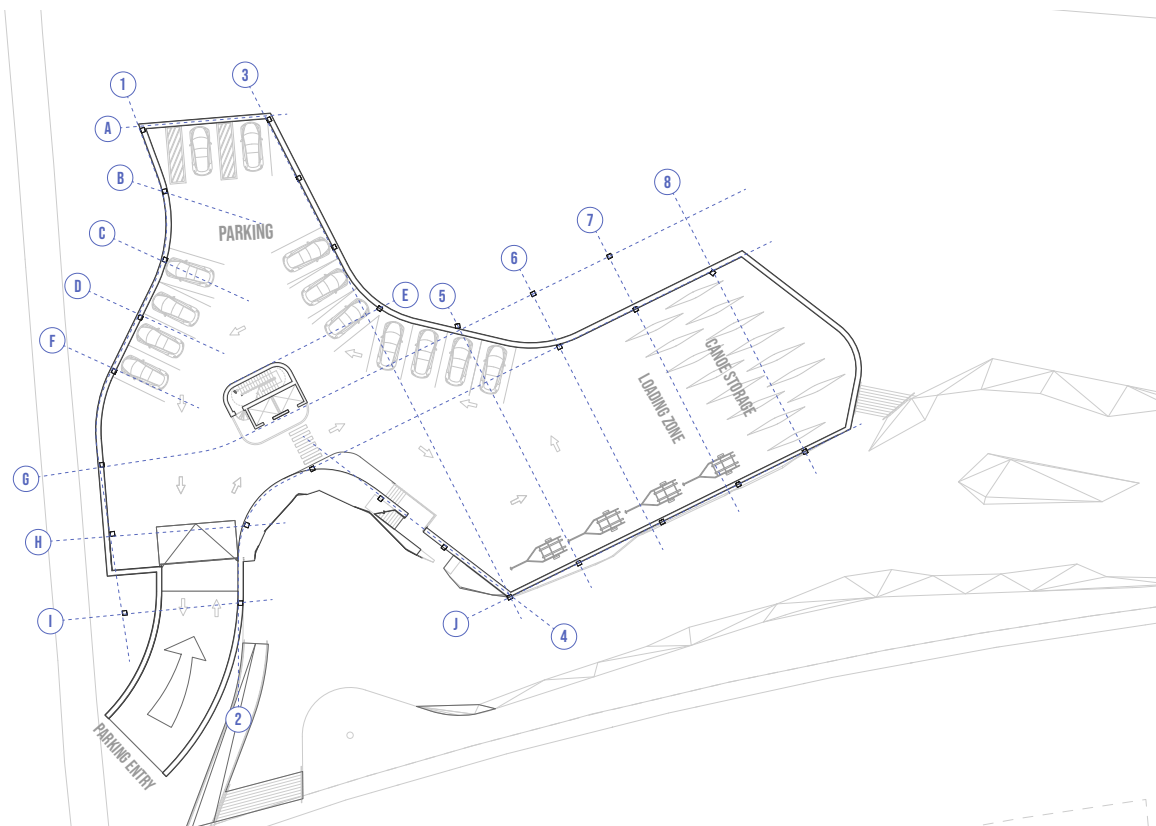
FACADE DETAIL SECTION



1ST FLOOR



3RD FLOOR



BASEMENT



2ND FLOOR



THE LUNAR "OASIS"

A habitat on the moon

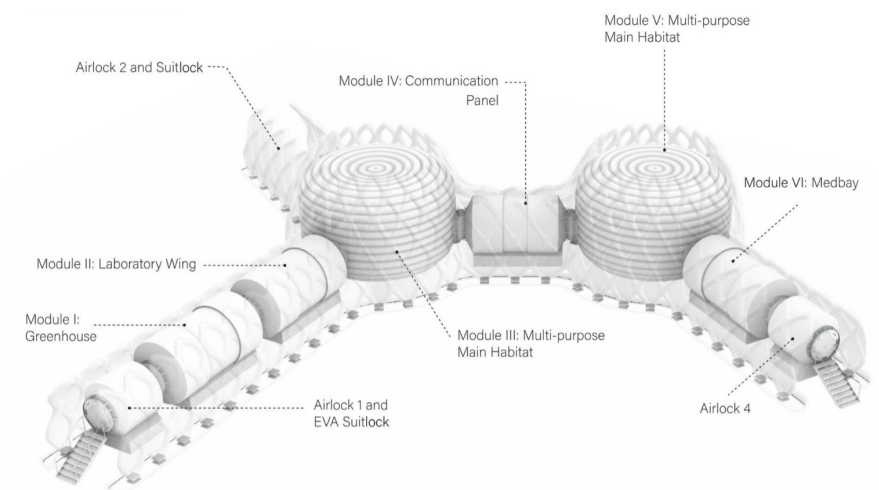
Program	Lunar Habitat / Landing Pad
Studio	NASA X-Hab Studio: "Moon to Mars"
Professor	Michael Morris / Mark Parsons
Date	Fall 2020 - Spring 2021
Location	Shackleton Crator, Moon (Physical Model: Brooklyn, NY)
Team Members	20 students from 2 consecutive semesters

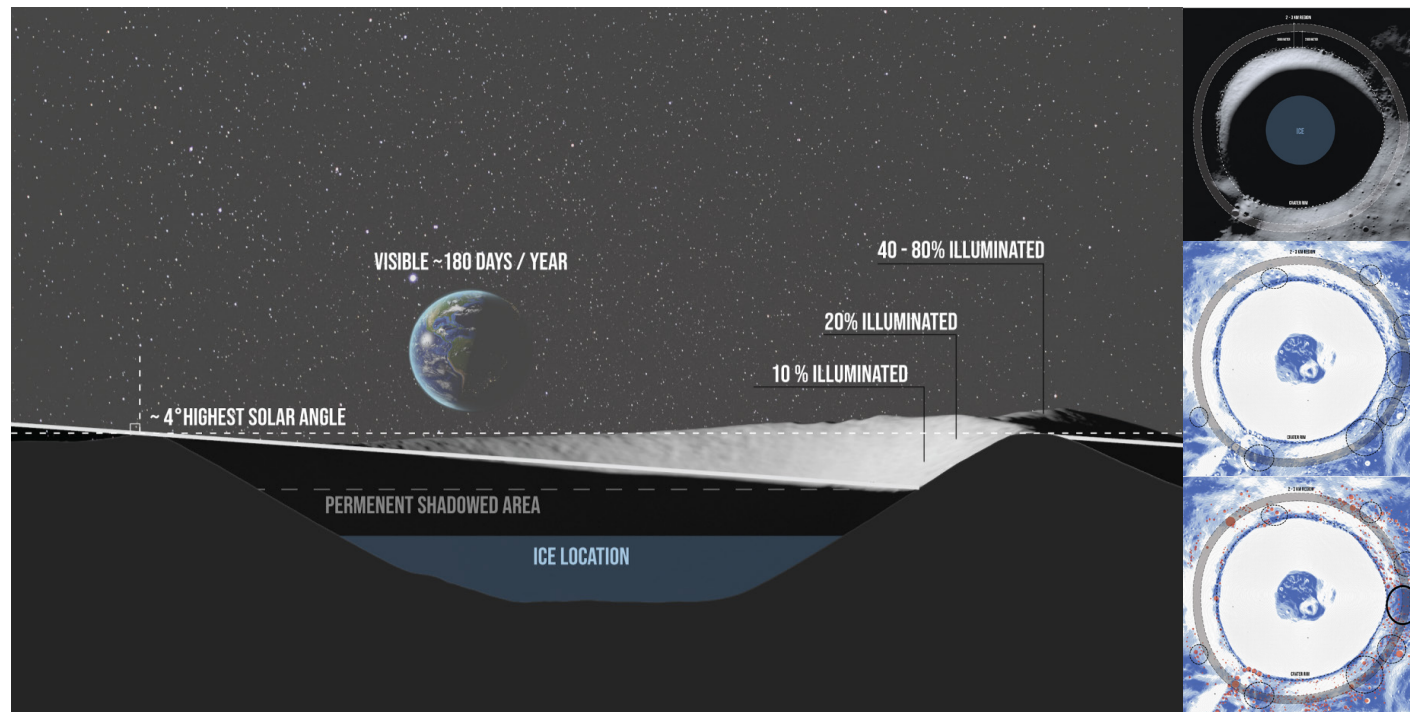
This project is a lunar habitat proposal for NASA's Artemis program. It serves as a trajectory for NASA to use the moon as a jump pad for deep space exploration ultimately reaching Mars. During the first semester, we researched and investigated the precedents and existing conditions of the moon, and made 2 schematic proposals for a lunar habitat each with valuable aspects that we adopted to formalize a single project in the second semester. The ideas we brought forward are the 3D printed protective diagrid structure that uses in situ lunar regoliths as the construction material and the pressurized modular habitat assemblage that's launched and brought from earth. In the second semester, we developed this proposal further by outfitting the interior of the habitat and later built a quarter-scale prototype model.

The proposed habitat named the lunar oasis is derived from the concept of the NASA precedent RLSD II(Robotic Lunar Surface Operation 2). The idea is to excavate the perma-frozen regolith inside RLSD's site Shackleton Crater at the south pole to extract water out of its volatiles. For the RLSD, the water extracted can be used to produce Liquid Hydrogen and Oxygen propellant for future Mars launch missions. For our habitat, it provides the water source for irrigating the hydroponic farms and it is where the name Lunar Oasis is derived from. The regolith excavated is also used as a construction material through regolith sintering robots printing the diagrid protective layer of the habitat. This protective layer address several threats including, meteorites impacts, radiation exposure, frequent and long-lasting seismic activity with the highest magnitude recorded at 6, and extreme thermal differential that shifts from 120 degrees Celsius to negative -130 degrees Celsius.

◀ **LEFT SIDE**
1' - 3" Physical Scaled Model

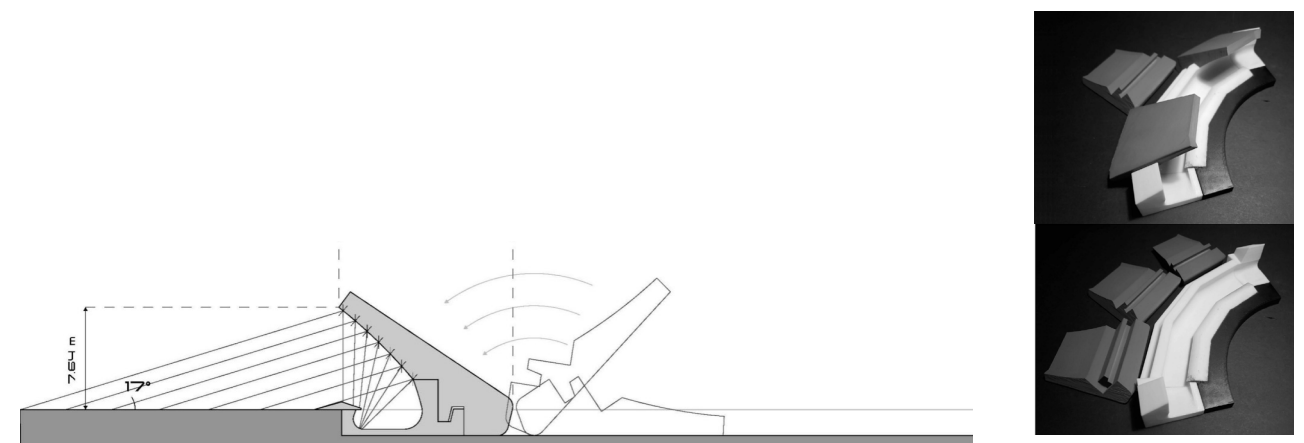
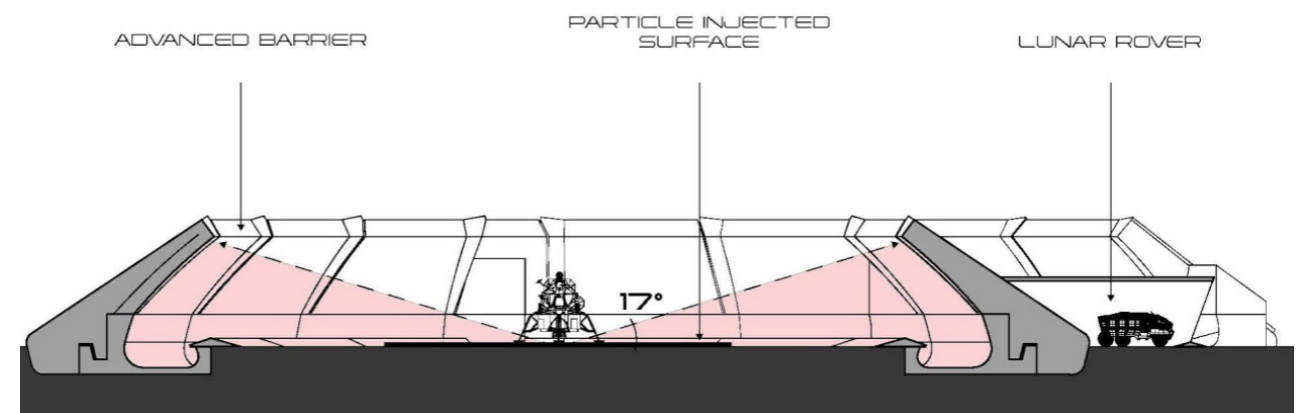
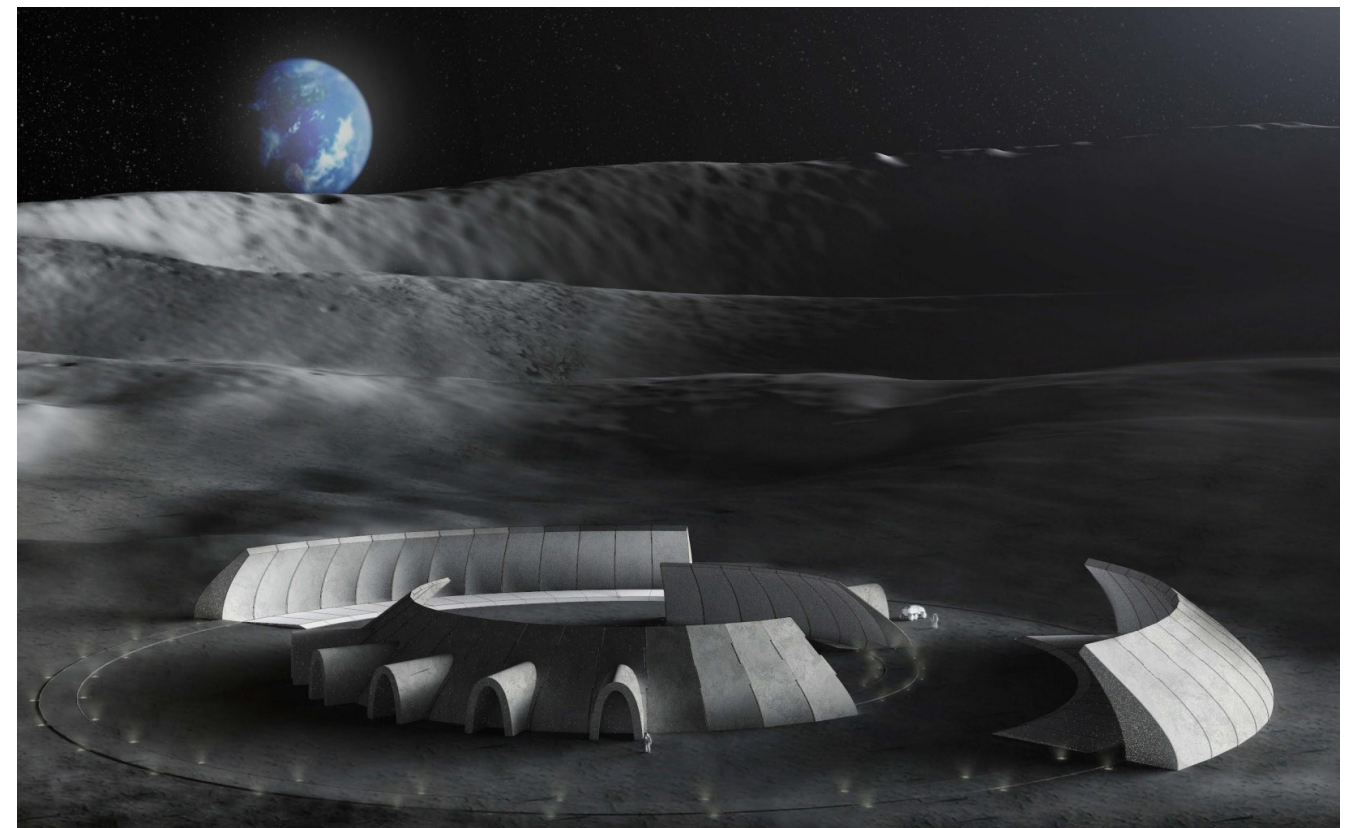
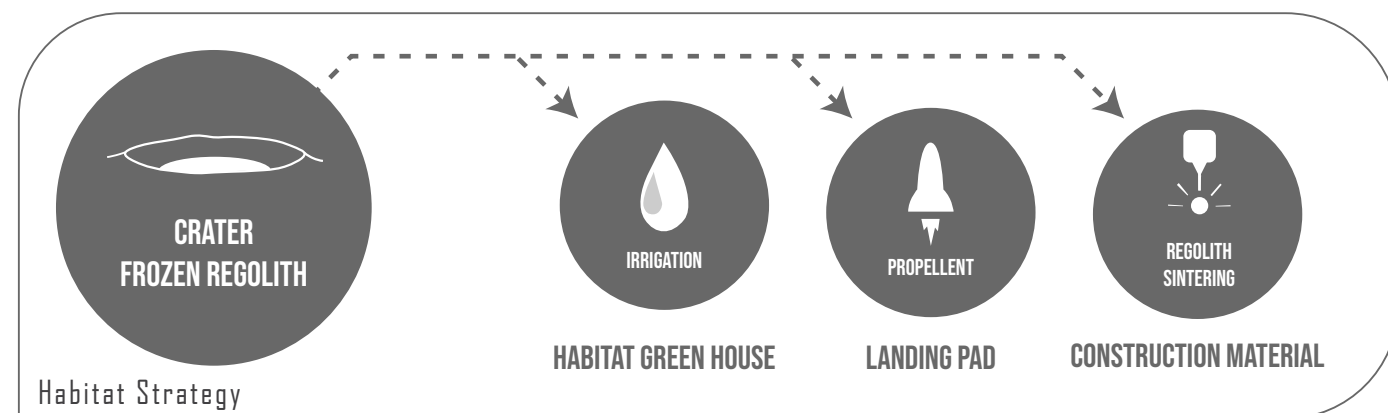
▼ **BOTTOM RIGHT**
Habitat Layout Axonometric

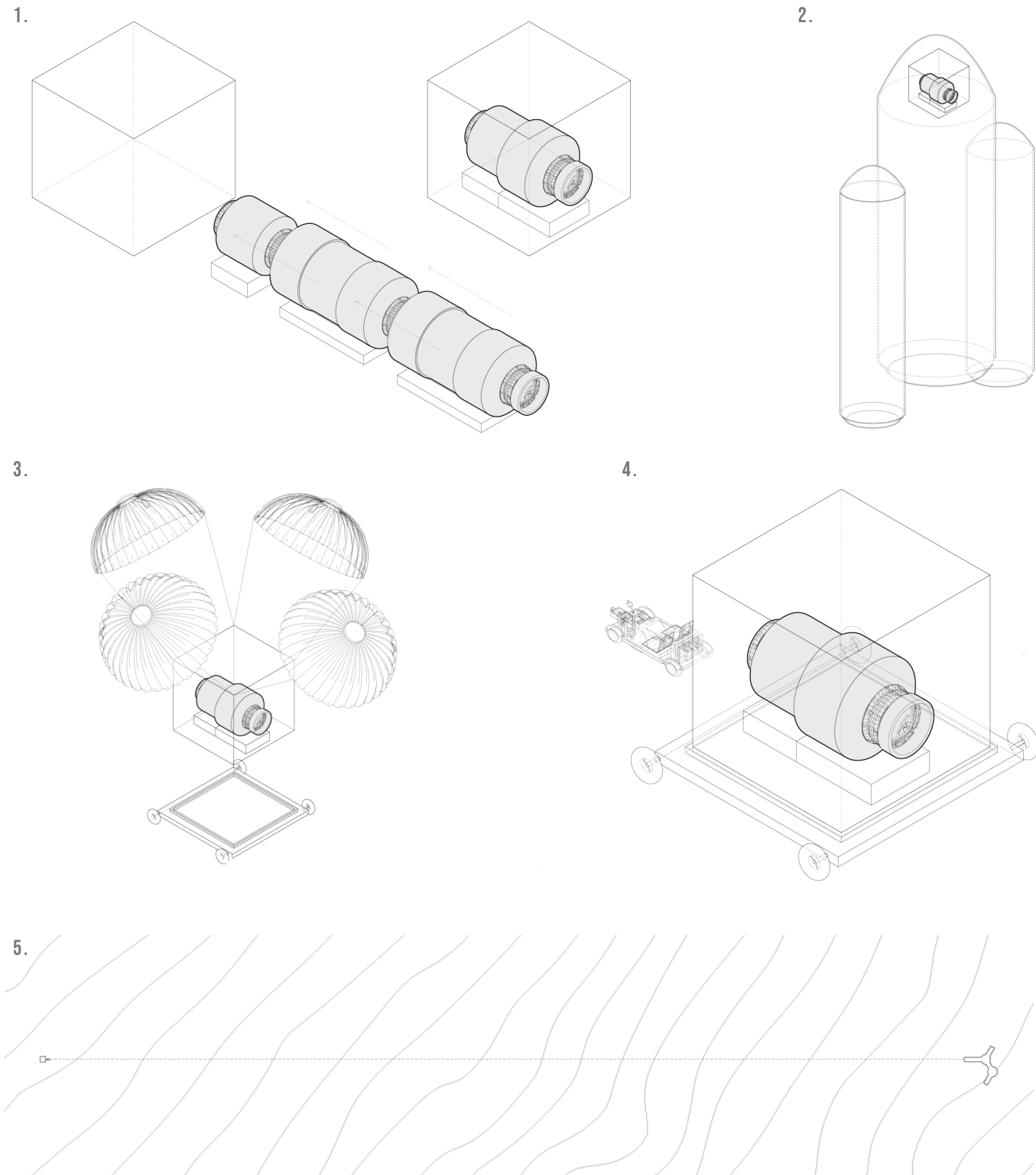




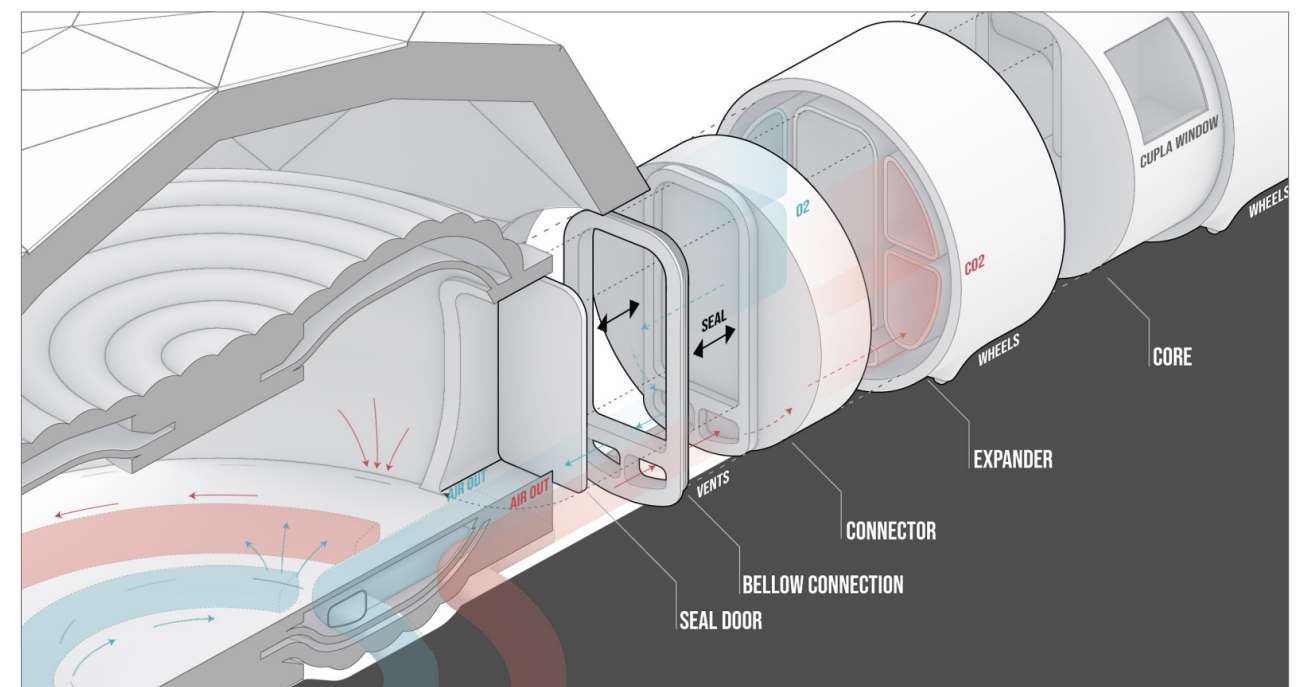
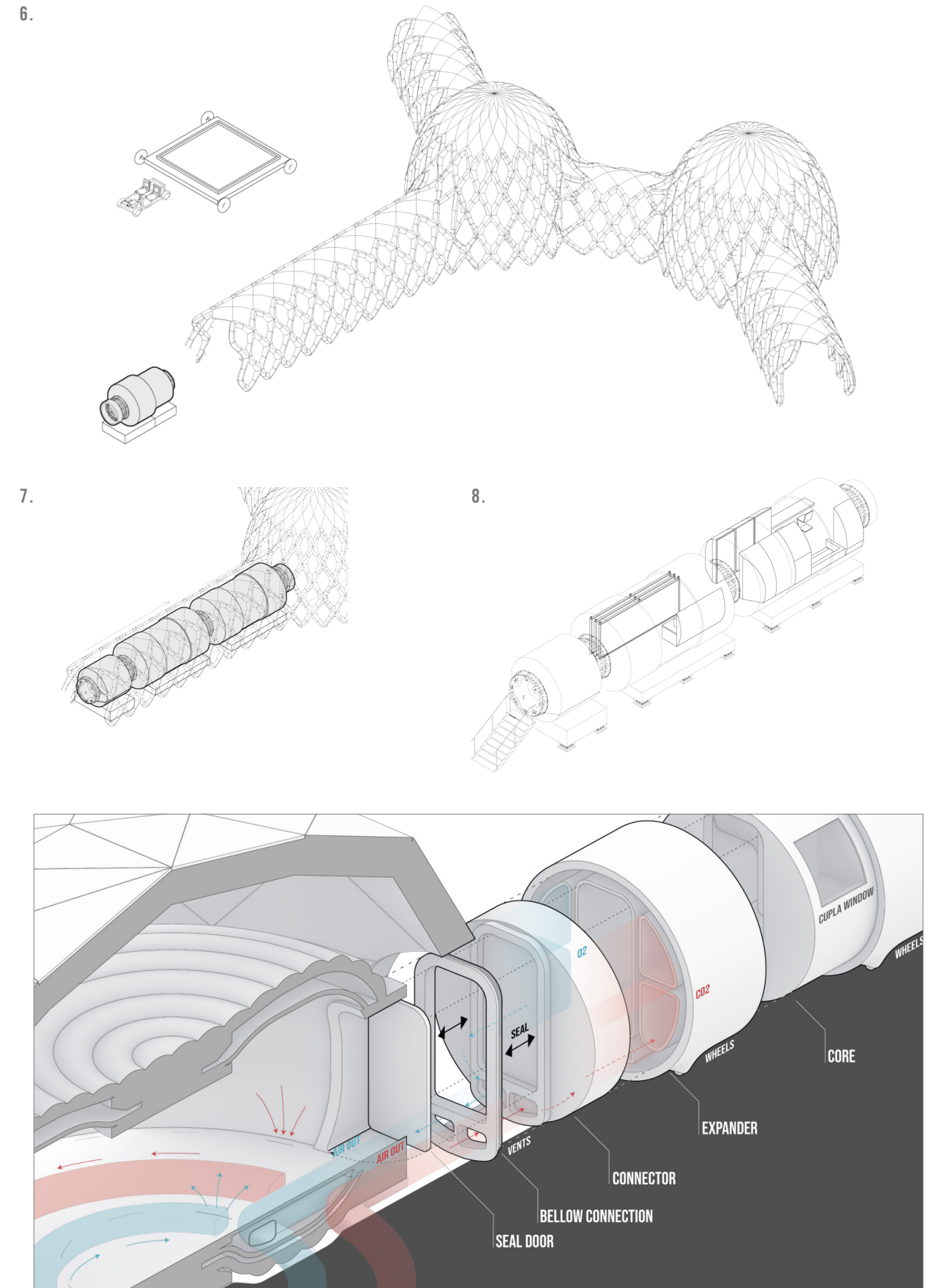
As we researched and investigated the Shackleton crater, we proposed a site location with several requirements. First, a consistent source of solar energy is required. At the Shackleton crater, a large portion of the crater rim is exposed to sunlight most of the year, with its location at the south pole of the moon and the highest solar angle at 4 degrees. This condition provides efficient solar energy for the habitat to remain functioning. Second, a relatively close distance to the ice reserve in the crater is required. Thus an offset distance of 2 km, the optimal length for a current lunar rover to travel, which zones a ring of the desired location around the crater. Third, an area where the terrain slope is closest to flat is also desired for a more efficient habitat construction process. Lastly, a suitable shallow crater needs to be adjacent to the site as these craters are natural lunar dust barriers for a lunar landing pad.

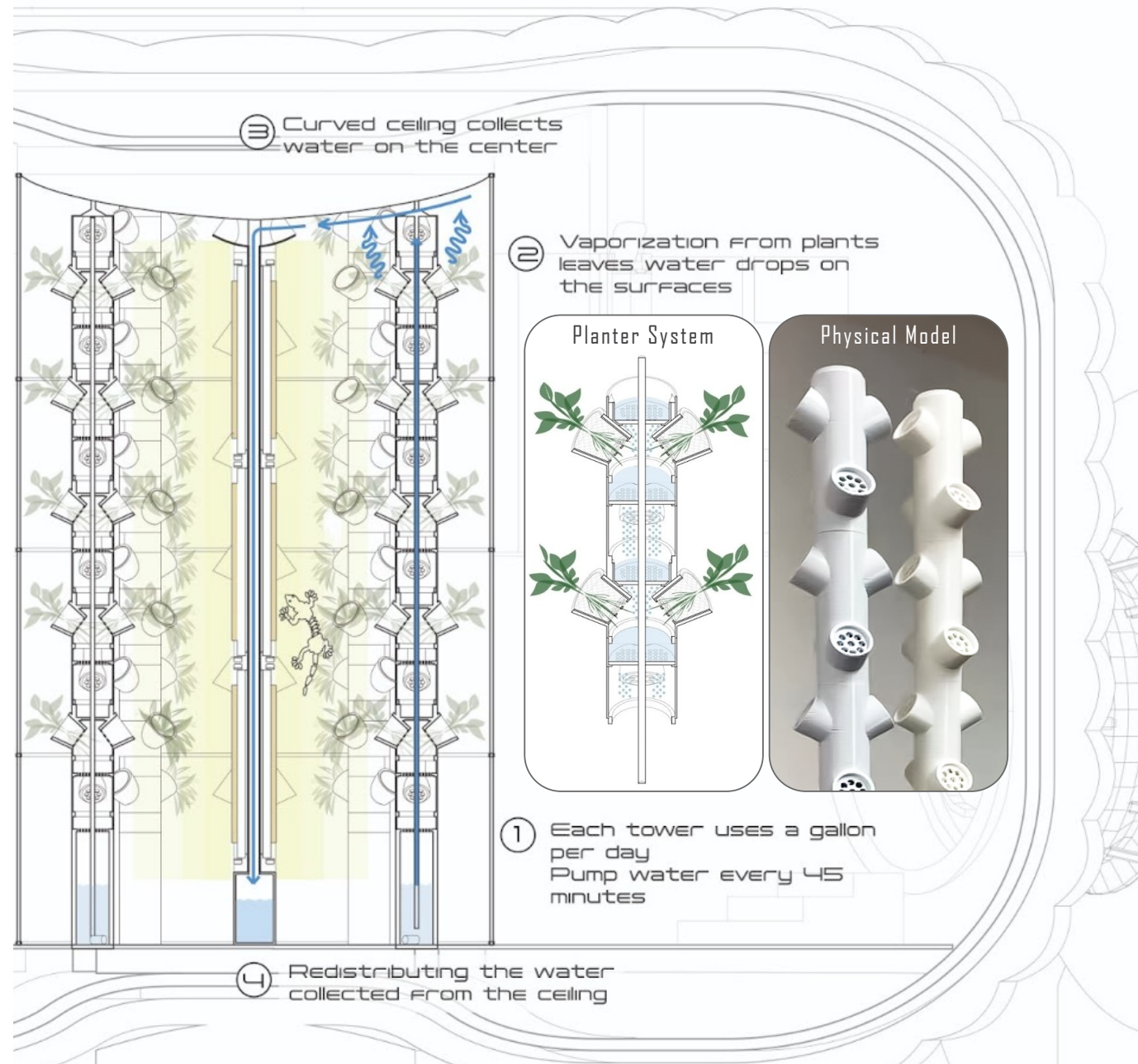
The technology of sintering regolith allows us to construct complex and biomimetic geometries to address different problems and challenges we had to face. We designed a lunar landing pad for future landing and launching missions with this technology available. Landing rockets on the moon will cause lunar dust to eject at a supersonic speed, and this may cause a threat to satellites and adjacent habitats. Thus we designed barriers that surround the landing site to mitigate this threat. The form of the barriers is designed to deflect lunar dust downwards into a trench where robots collect the dust.



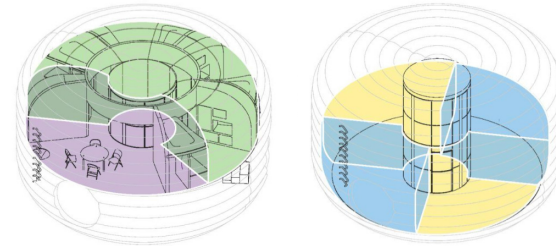


The construction of the habitat consists of pressurized modular chambers that are brought from the earth. The modules are packed and shipped to the moon through rocket launching missions. When they land on the moon, they are brought to the habitat site from the landing pad with robots and robotic gantry. The robots and gantry play the role of assembling the units on the site in place. The outfitting of the units is then unfolded automatically once in place. A system of expandable chambers was developed to incorporate connecting airflow and Environmental Control and Life Support System (ECLSS) while functioning as the connection between the larger circular expandable modules.

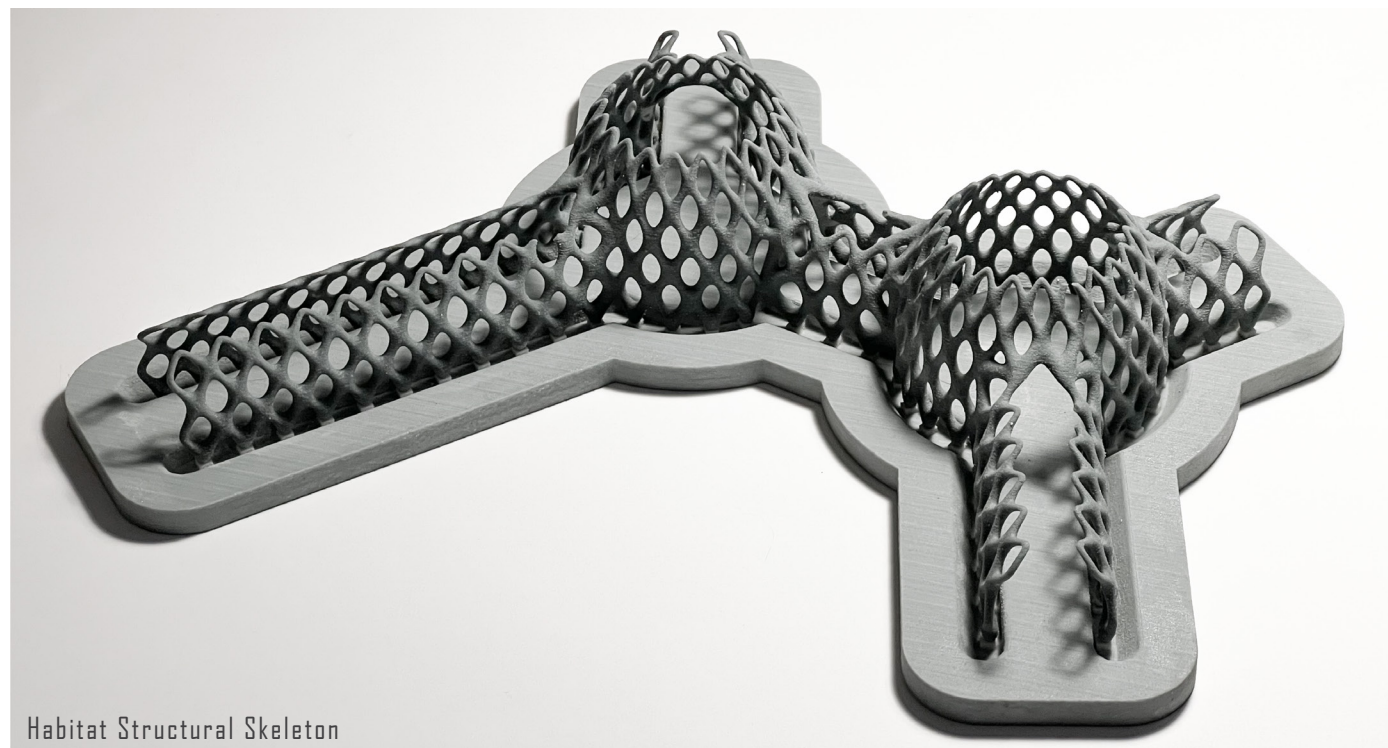




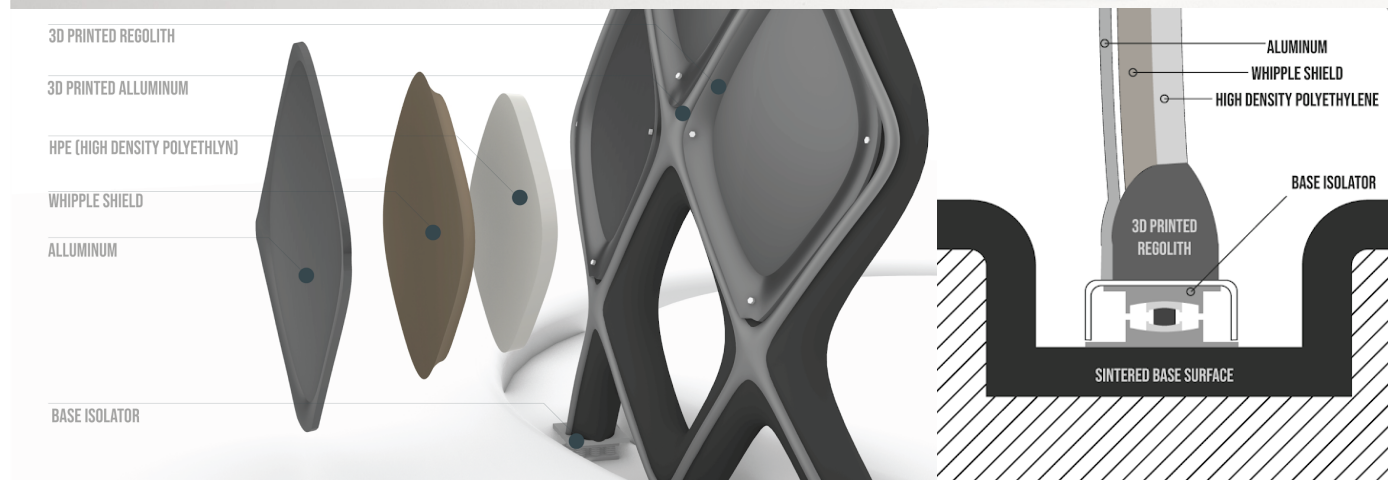
The desolate and lifeless environment on the moon will be detrimental to the psychological health of the astronauts in the habitat. We aim to mitigate this by integrating a zen garden in our habitat oasis project. The zen garden is located at the center of the inflatable module in a courtyard arrangement. We studied chromotherapy and incorporated color coding to enhance the specific program in the space adjacent to the garden. LED lights and Plants in green and purple are used at the dwelling space since green creates a sense of healing and purple promotes socialization. Whereas blue and yellow are used in the workstation area as yellow and blue promote Creativity and Productivity. Within the garden, the modular planter system is fabricated using onsite 3D printers. These planters stack into pillars that situate around the central water tower where water is distributed to each plant through a vertical water pumping system. As the plants photosynthesize while exposed to artificial light, fresh oxygen is also supplied to the astronauts.



LEFT SIDE
1' - 3" Physical Scaled Model
BOTTOM RIGHT
Habitat Layout Axonometric



Habitat Structural Skeleton



The protective layer of the habitat is shaped to cover and protect the core habitat. It is intentional that we designed it as a porous shell so that we can incorporate delivered protective panels to promote efficiency by reducing the overall construction time. These panels have several layers addressing different threats to the habitat. The assemblage of the panel includes a layer of aluminum for thermal protection, a layer of ballistic Whipple shield designed by NASA for meteorites protection, and a layer of polyethylene for radiation protection. Base isolators are also installed at the root part of the structure to address the constant seismic activity on the moon.



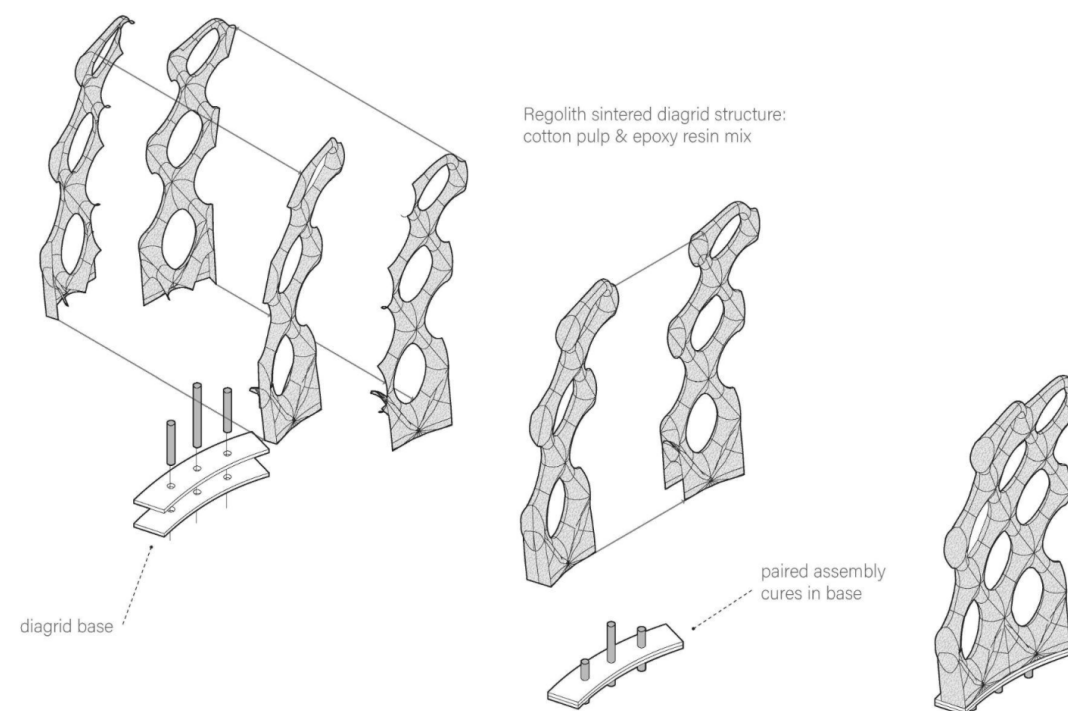
TOP RIGHT
Basketball court rendering

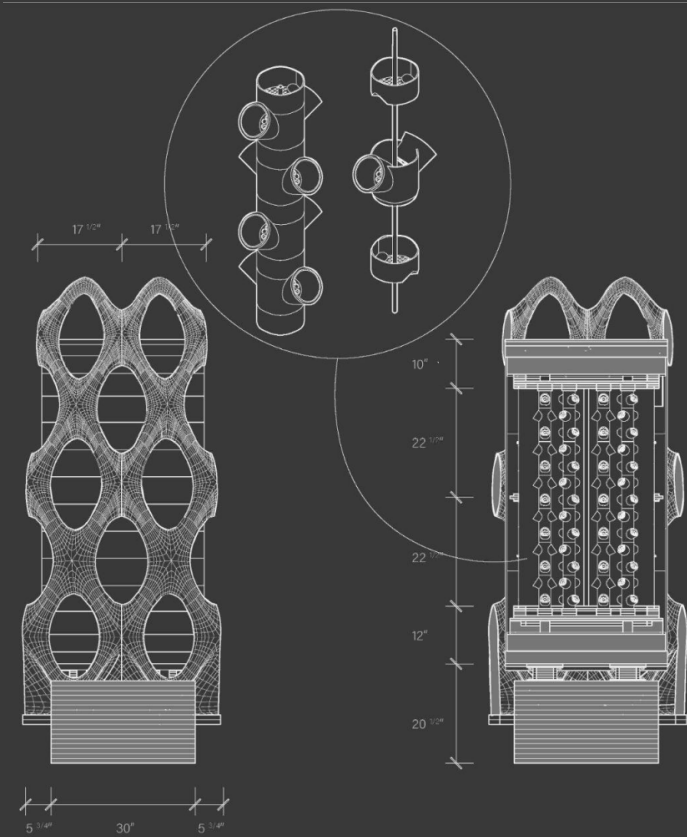
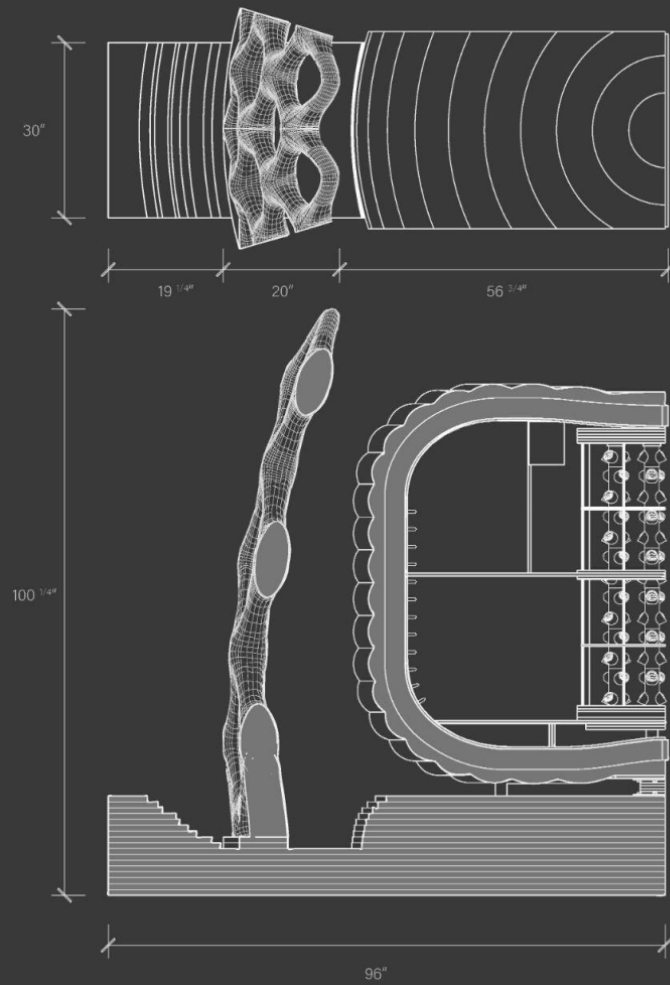
BOTTOM RIGHT
Classroom / medical unit transform system



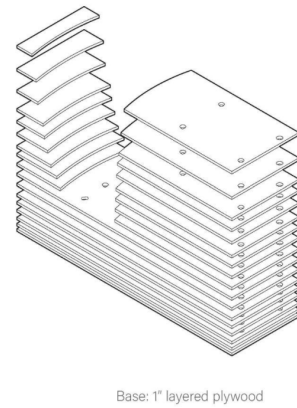
TOP RIGHT
Basketball court rendering

BOTTOM RIGHT
Classroom / medical unit transform system

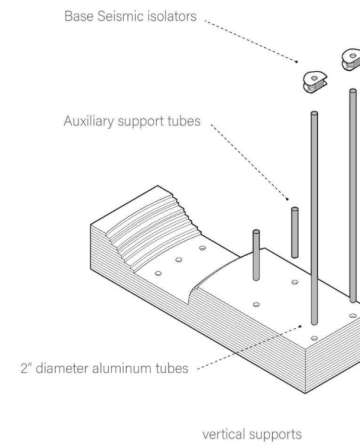




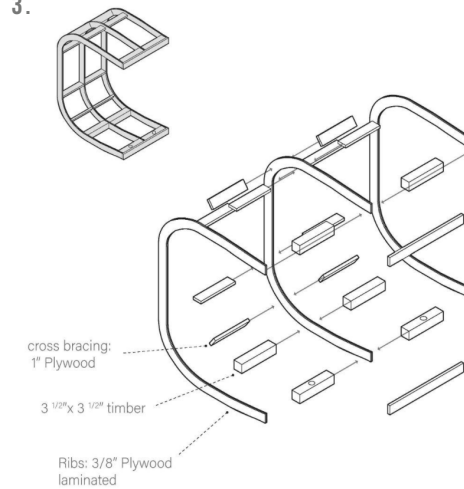
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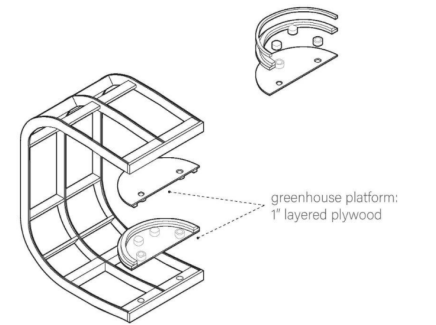
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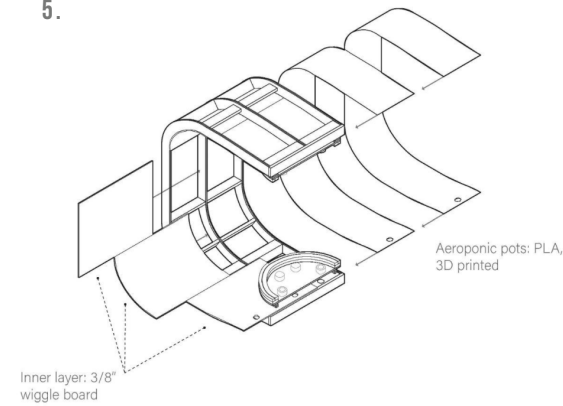
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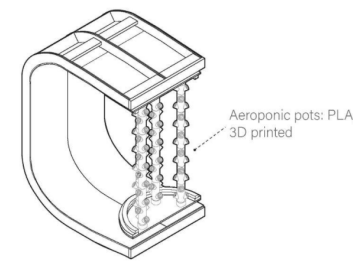
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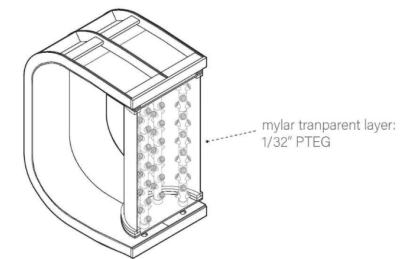
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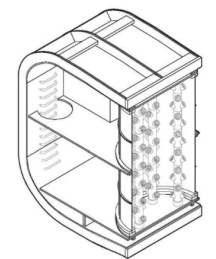
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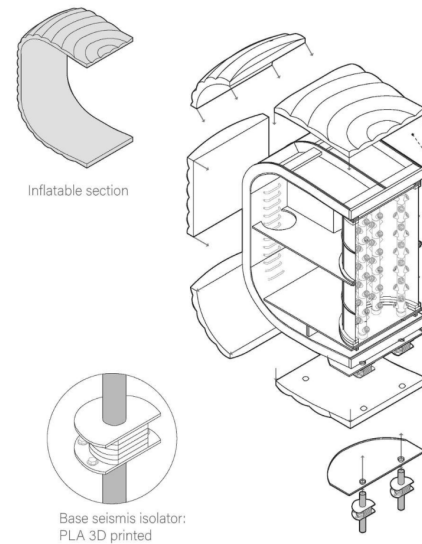
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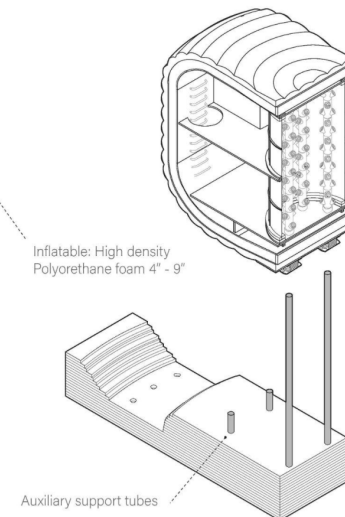
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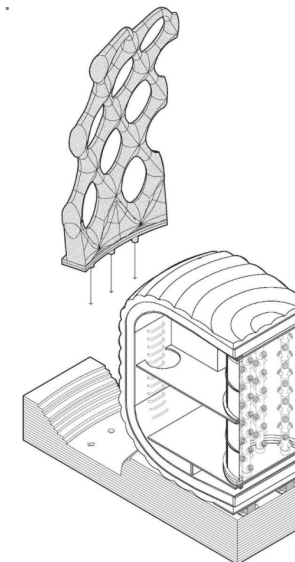
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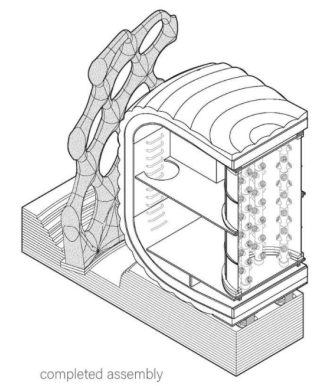
10.



11.



12.





A "SOUNDLESS" HOME

Residential house for a deaf child and his parents

Program	Residential housing
Studio	INT Design Studio 301
Professor	Calvert Wright
Date	Fall 2022
Location	Brooklyn, New York

In this project, a townhouse residence is designed for my clients: a family of 3, Susie, Dirk, and Ray. Susie works in the hospital who takes night shifts occasionally. With the context of a post-COVID domestic reality, a novel lifestyle style is anticipated where productivity and leisure space coexist within a domestic environment. Dirk is a photographer who works in a home studio. Ray is the child

of the family who is born deaf and sensitive to light. These unique qualities require a universal design approach to suit the needs of different light modes that address the family's sensitivities in light. The keyspaces and conditions within my urban dwelling that exemplify and expand this design approach include designated productivity space, Sight increasing wall corners, and switch of uninterrupted

lighting mode and illuminative lighting mode.

▲ TOP RIGHT
Night Time Axonometric Rendering



Susie has been working at the Brooklyn hospital since 2014 and got promoted in 2019. Because of the current pandemics, Susie sometimes works more than 50 hours per week. As the head of the nurse at the Brooklyn hospital, Susie takes 5 shifts a week and 8 hours each shifts.

Susie loves sports. She likes to try all types of sports with her family, and among all sports her favorite is swimming. Susie is very much into coffee as she has worked as a barista during college. She would sometimes even bake her own coffee beans for daily consumptions of her and her husband.

9:00 AM to 5:00 PM Monday to Friday
Occasionally takes Night Shifts



Dirk is a freelance photographer at an age of 38. Dirk loves photography with a passion and have been working as a freelance photographer since high school. He works on both analogue media and digital media so studio with darkroom would be required. Sometimes when its shooting day he will go out and take photos with model, and sometimes he would stay home washing films or editing photos.

Besides photography, Dirk is also into mixologies that he would sometimes make cocktails for him and his wife Susie in Saturday movie nights at home.

Typical routine: 9:30 AM to 6:00 PM
Work schedule is flexible.



Ray was born in 2011 and he is innate deaf with a level of severe (71-95 dB). This make Ray needing to wear hear-aid to help listening.

Ray goes to St. Francis de Sales School for the Deaf. He walks to school everyday.

He also likes fish and has a fish tank maintain by his father Dirk.

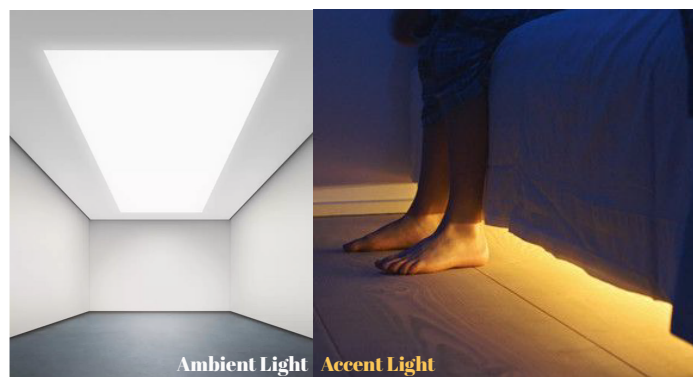
8:00 AM to 3:30 PM Monday to Friday.

Site Selection



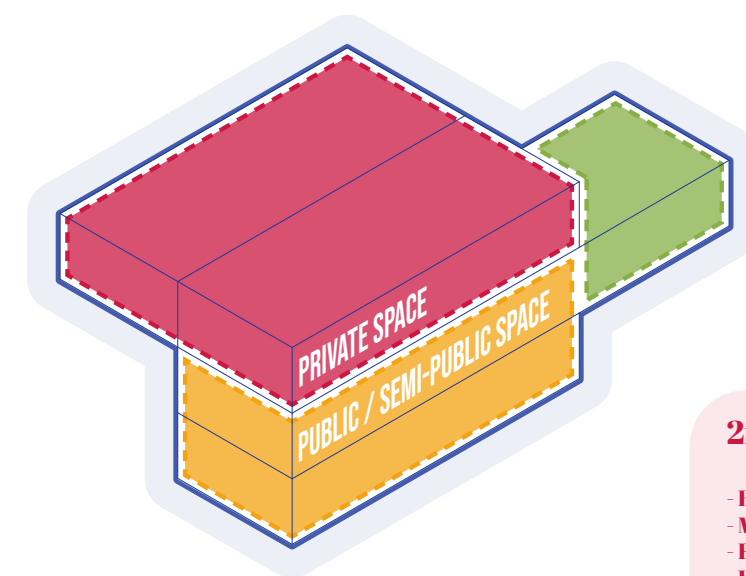
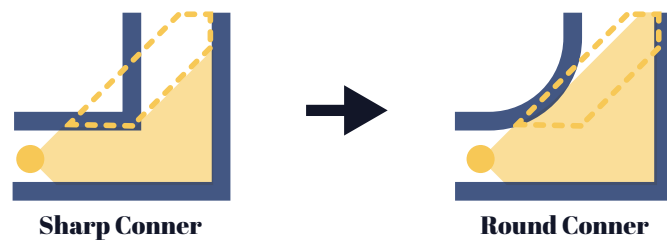
- Access to Cellar Space for Dirk's Darkroom Studio
- Better Privary on Higher Floors

1. Undisturbed Night for Susie's Shifts



Day Night

2. Increase Line of sight for Ray



1st Fl. + Cellar

- Foyer
- Bar (Cocktail & Coffee)
- Living Room

Productivity

- *Home Office
- *Library (Meditation)
- *Dirk's Studio
- *Dirk's Darkroom

2nd Fl.

- Ray' Bedroom
- Master Bedroom
- Family Room
- Kitchen
- Dinning room

Rear Yard

- Patio Space
- Swimming Pool

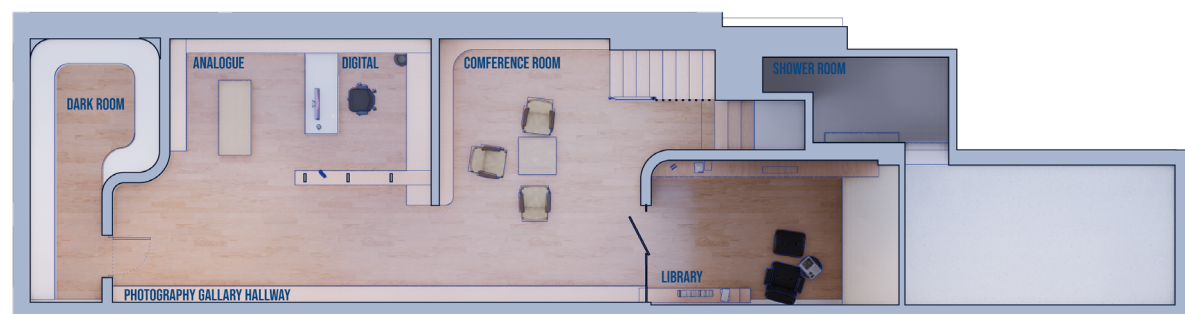
2ND FLOOR



1ST FLOOR



CELLAR FLOOR





HOME LIBRARY



PHOTOGRAPHY STUDIO



TOP LEFT



MEETING ROOM



DAY

NIGHT



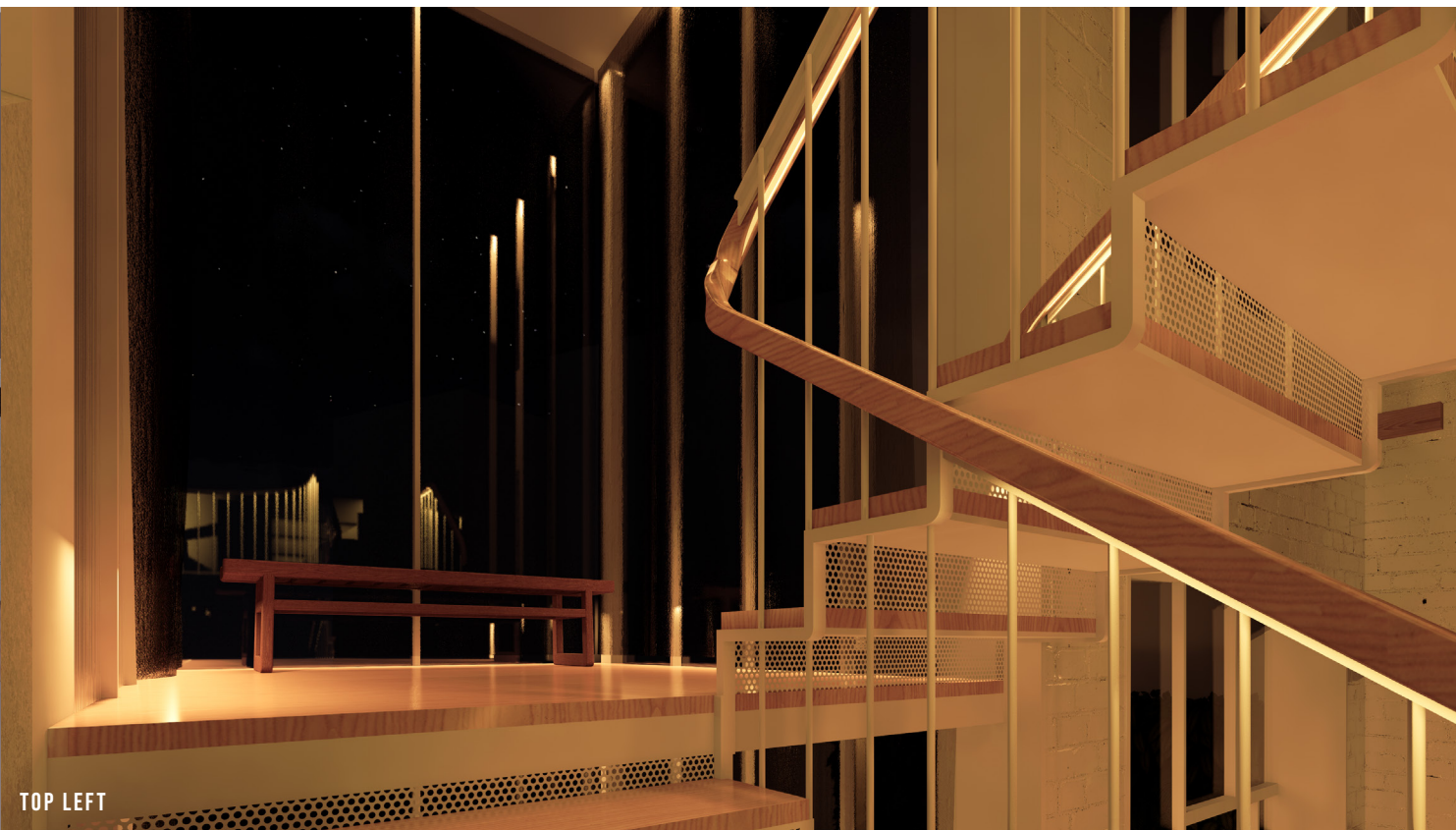
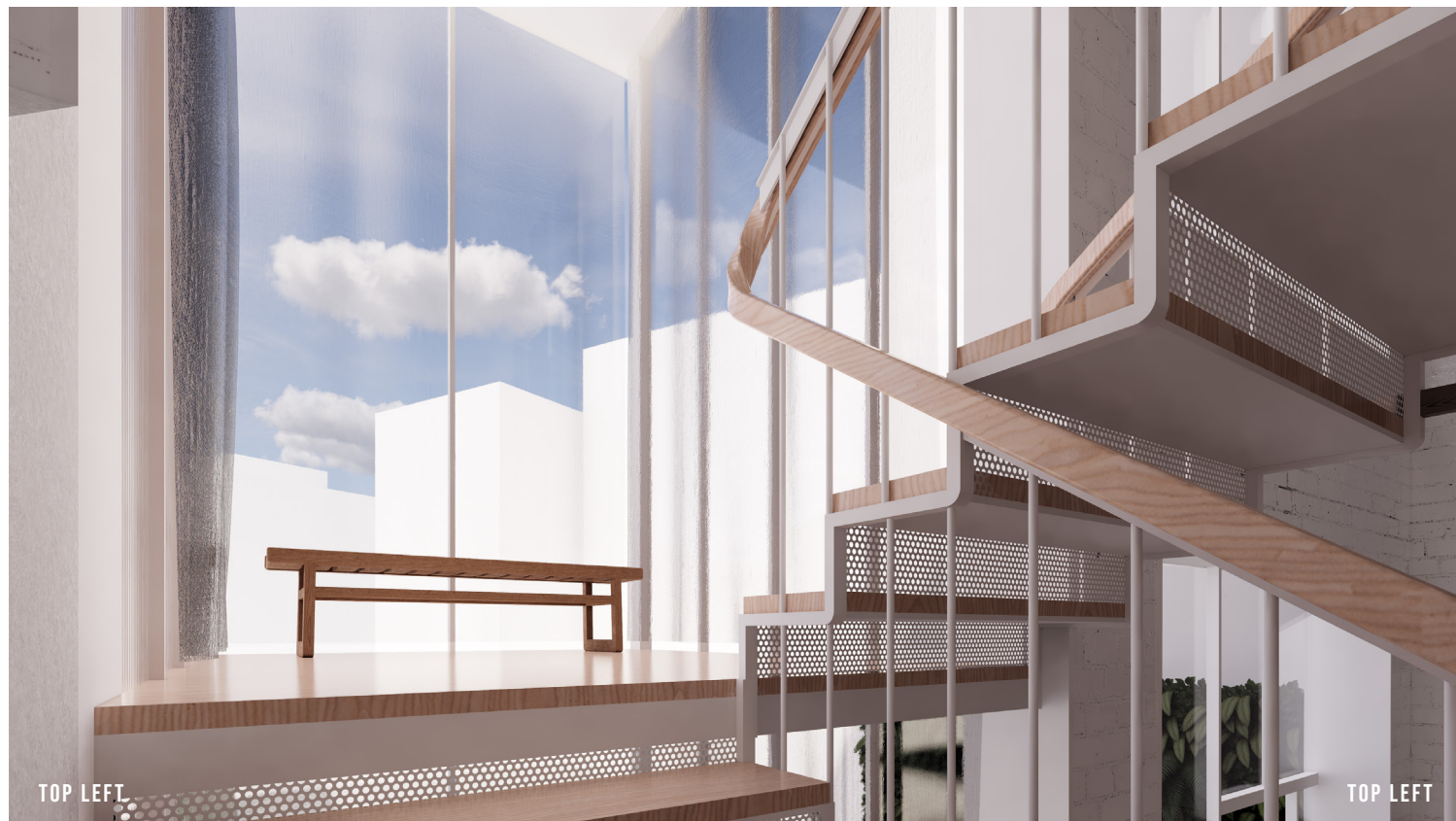
FAMILY ROOM



DAY

NIGHT







MOB BALLET LIBRARY

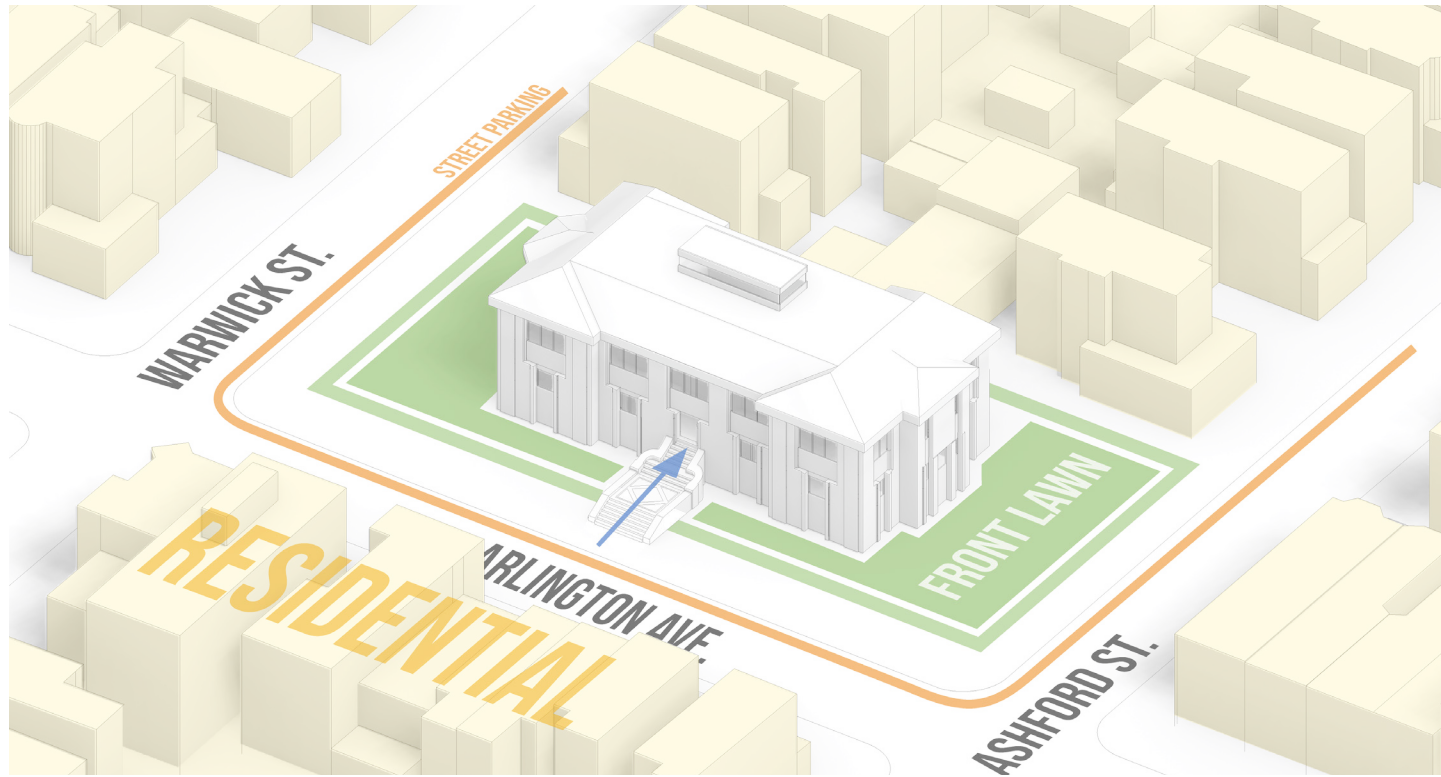
A Modern Re-definition of a historical Carnegie Library

Program	Public library / Ballet Theatre / Community Center
Studio	INT Design Studio 301
Professor	Calvert Wright
Date	Fall 2022
Location	Brooklyn, New York

This project is a renovation and expansion project of the existing Arlinton Branch Brooklyn Public Library. The client for this project is the founder of a non-profit community arts organization called The Memoirs of Blacks in Ballet (MOB Ballet) Foundation. The MOB Ballet was established by renowned ballet dancer, educator,

diversity strategist, and consultant, Theresa Ruth Howard. With the client's desire, a new type of library is develop where the blacks in ballet and the ballet culture is celebrated while the surrounding community are wellcomed with the existing library program.

▲ TOP RIGHT
Night Time Axonometric Rendering



The way I think of historic renovation and expansion project is to cherish the historic value that could be perceived as luxury and at the same time introduce new value from current modern context. The historic value is noble but unapproachable. The modern value on the other hand is more approachable and user oriented. My goal in this project is to metaphorically combine and visually juxtaposition these two values.

In the proposed project, modern glazed boxes are inserted into the historic library. The boxes includes one the entry gateway, one the book tower, and the last one the ballet tower. All 3 boxes juxtapose with the historic form either with the historic facade or the historic mill work. The boxes both symbolically and physically introduces new meaning into the original Carnegie library.

▼ **TOP LEFT**

Existing Site Condition

▼ **TOP RIGHT**

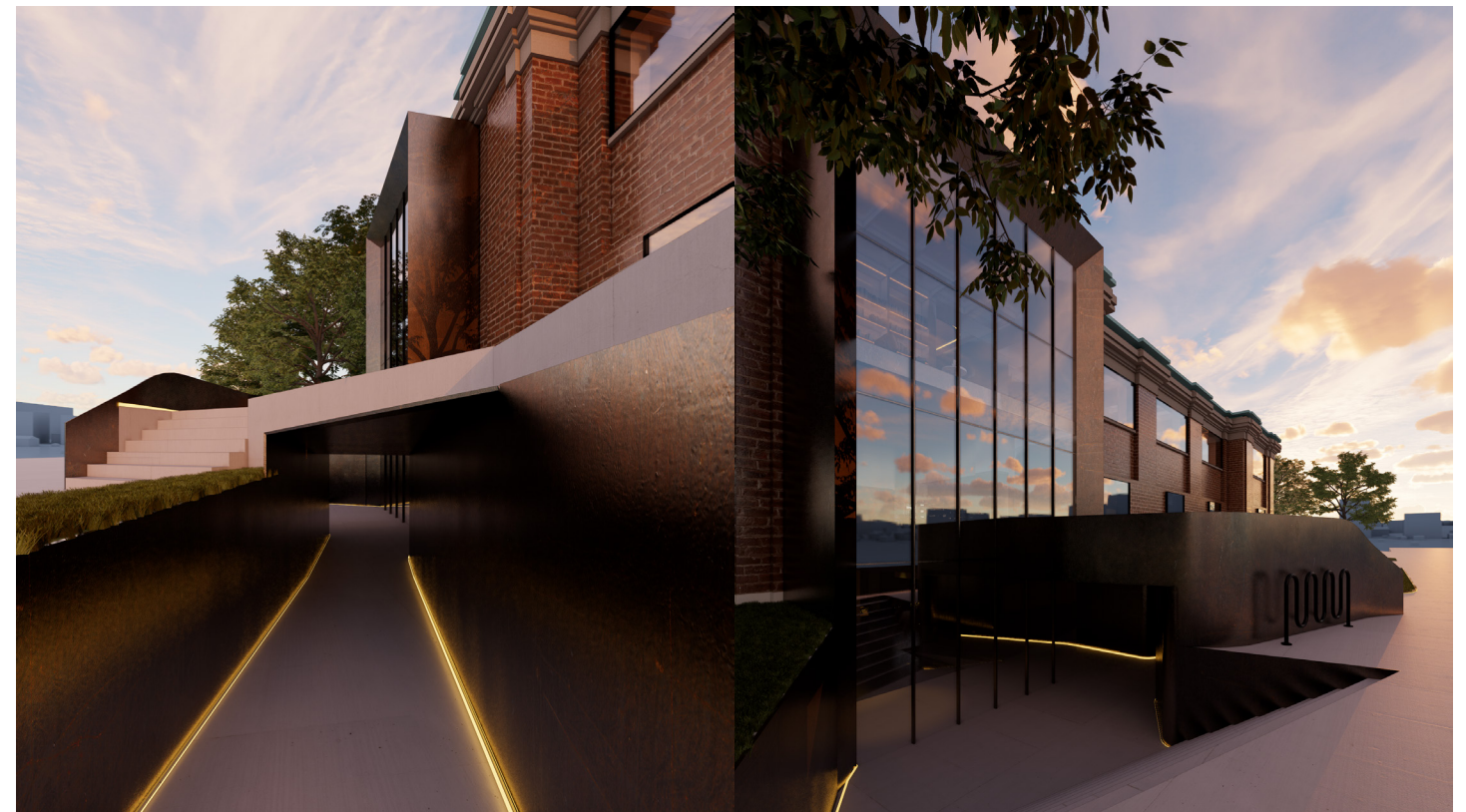
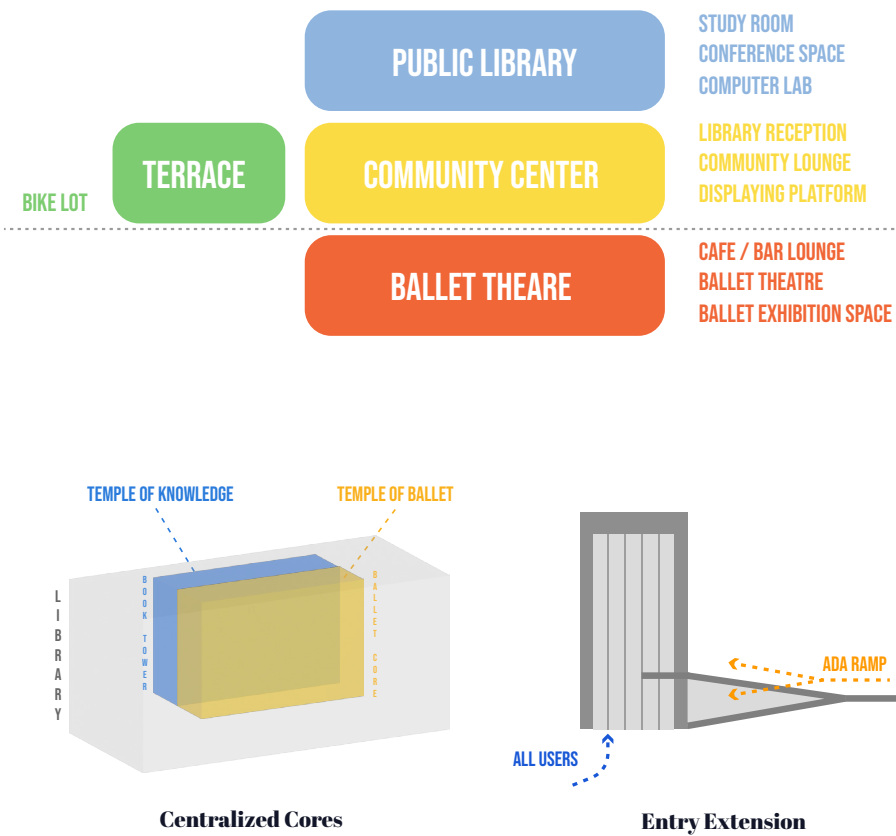
Rare Facade Glass Box Injection Rendering

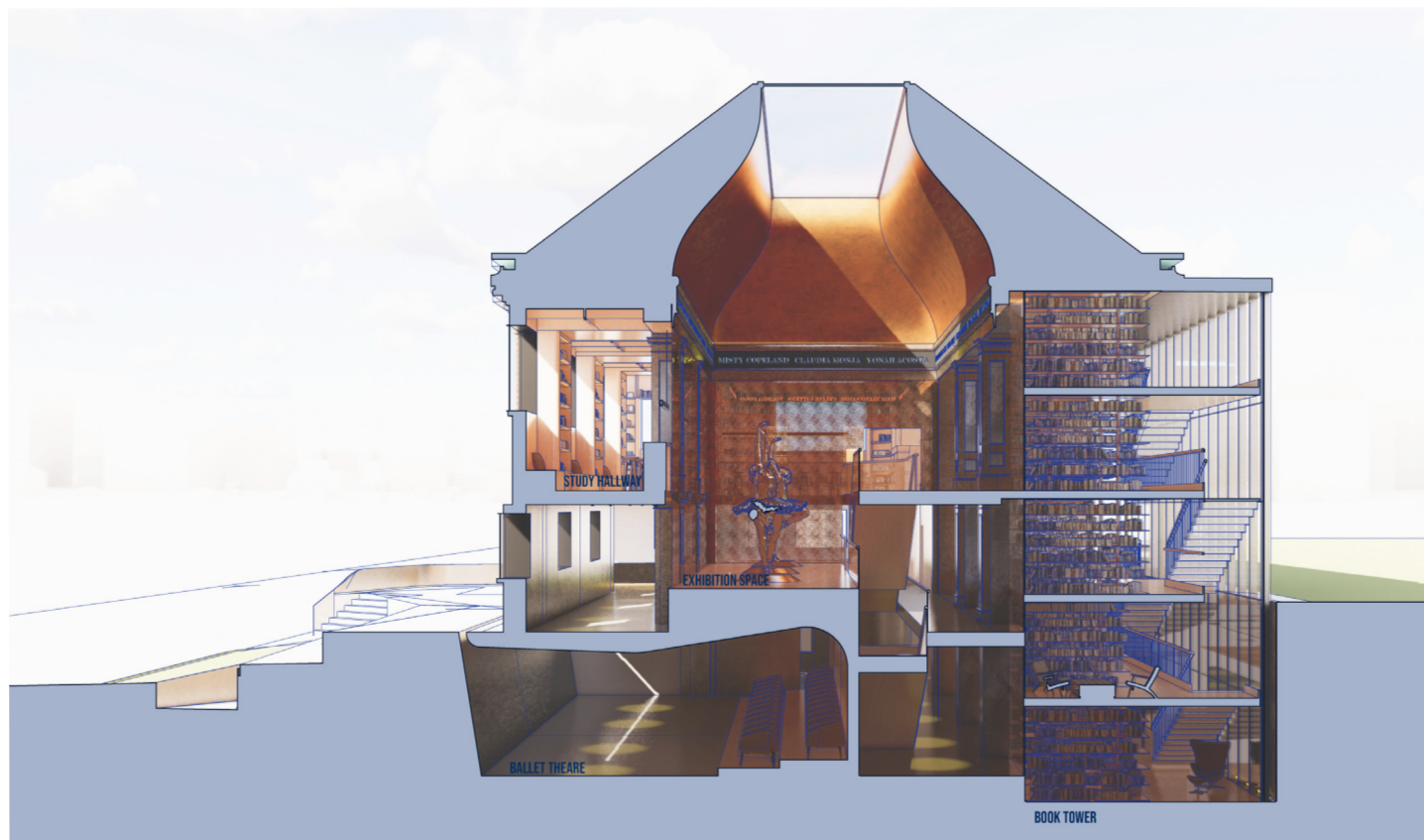
▲ **BOTTOM RIGHT**

Front Stair and ADA Ramp Entries Rendering

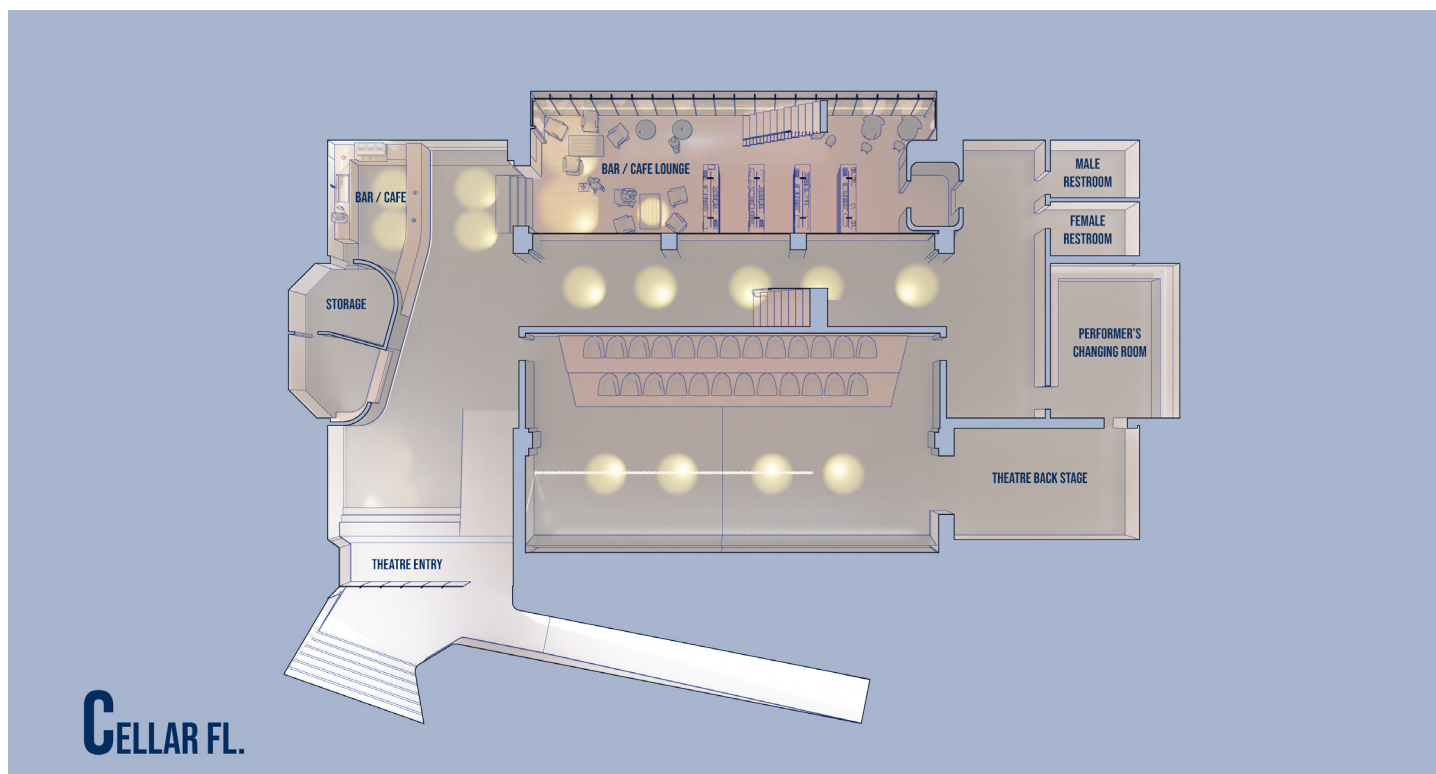
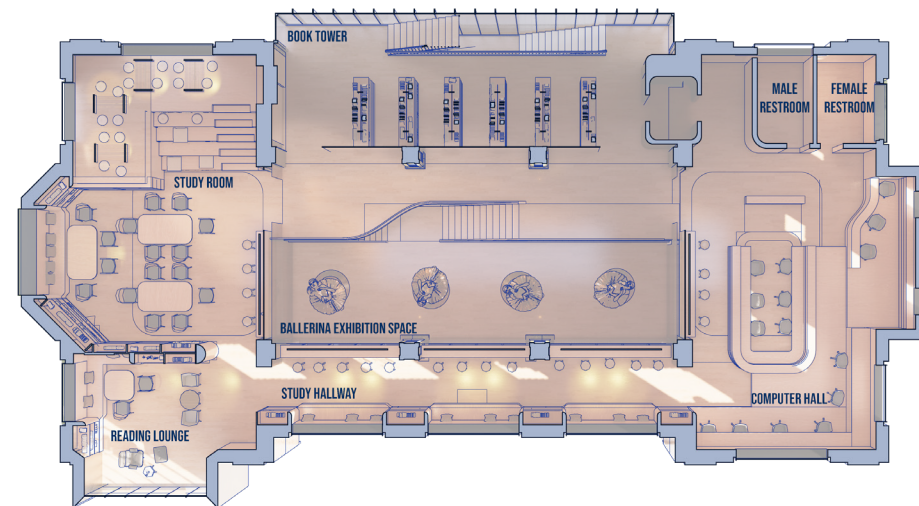


In this MOB Ballet Library, the end users can be summarized into 2 major groups, one is the ballet community that's composed of performers and general audiences who enjoy the ballet culture, and the other is the local community members and researchers who enjoys the additional space provided by the library. Both these end users of the library are attracted and guided into this community library / MOB ballet theatre through an expanded and renovated entry that gathers and redirected people into several designated spaces. Within this renovated Carnegie library, also known as the temple of knowledge, a book tower that both emphasis the symbolic meaning of books and the phenomenon of users circulating it and absorbing the knowledge is centralized as the core of the library. In addition to that, the ballet culture is layered in front of the book tower as an dance exhibition symbolizing the ballet performance part of the temple ---- Temple of Ballet

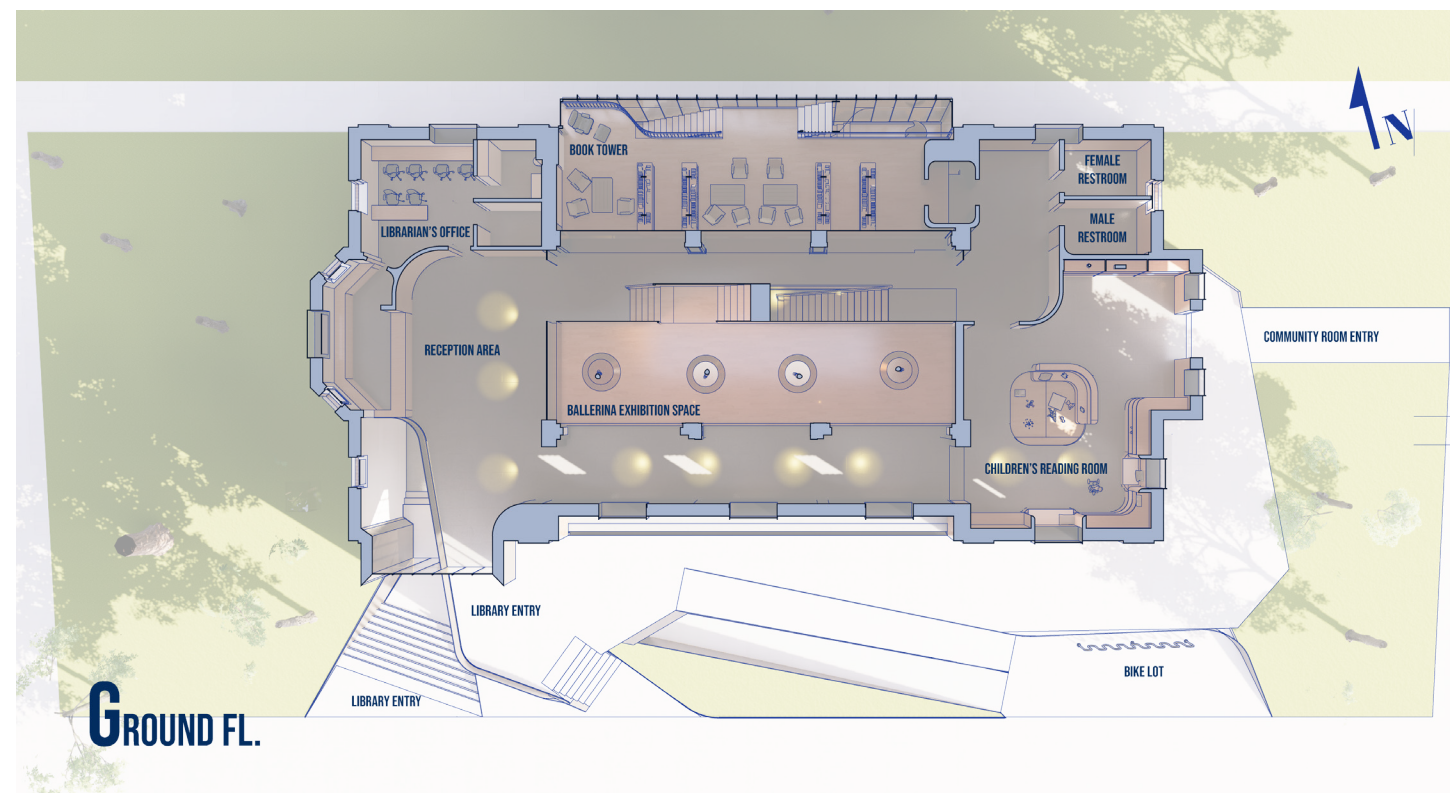




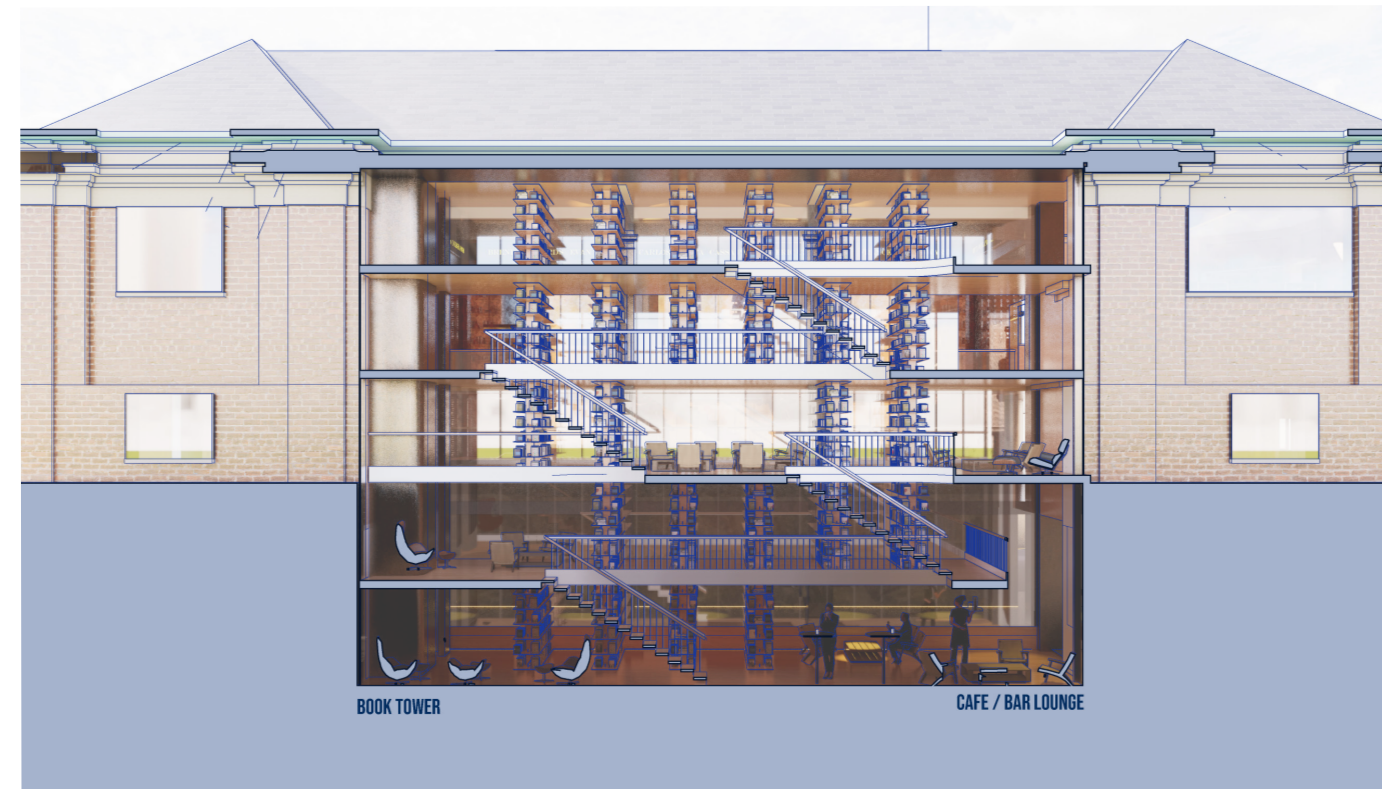
2ND FL.



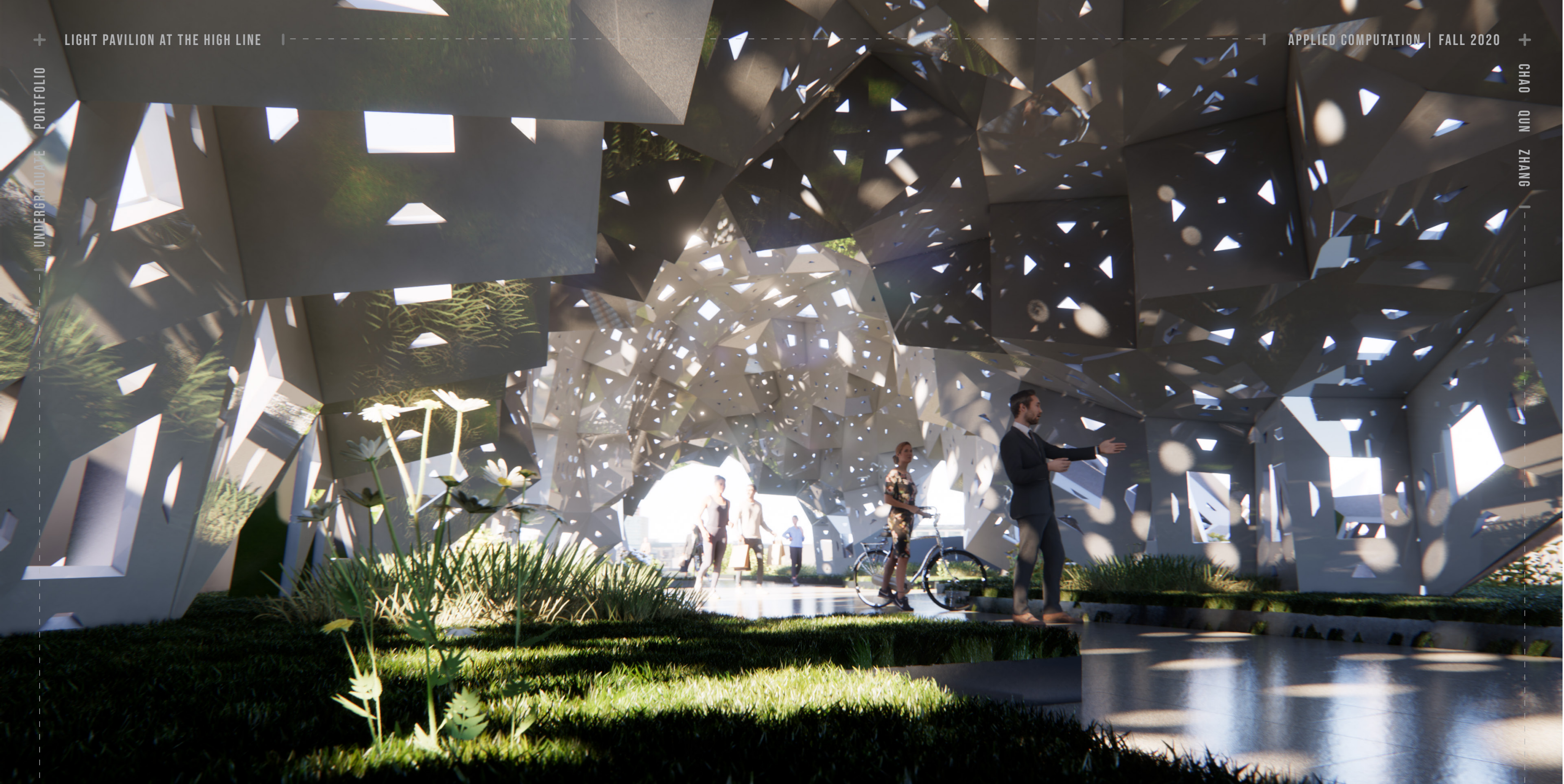
CELLAR FL.



GROUND FL.







LIGHT PAVILION AT THE HIGH LINE

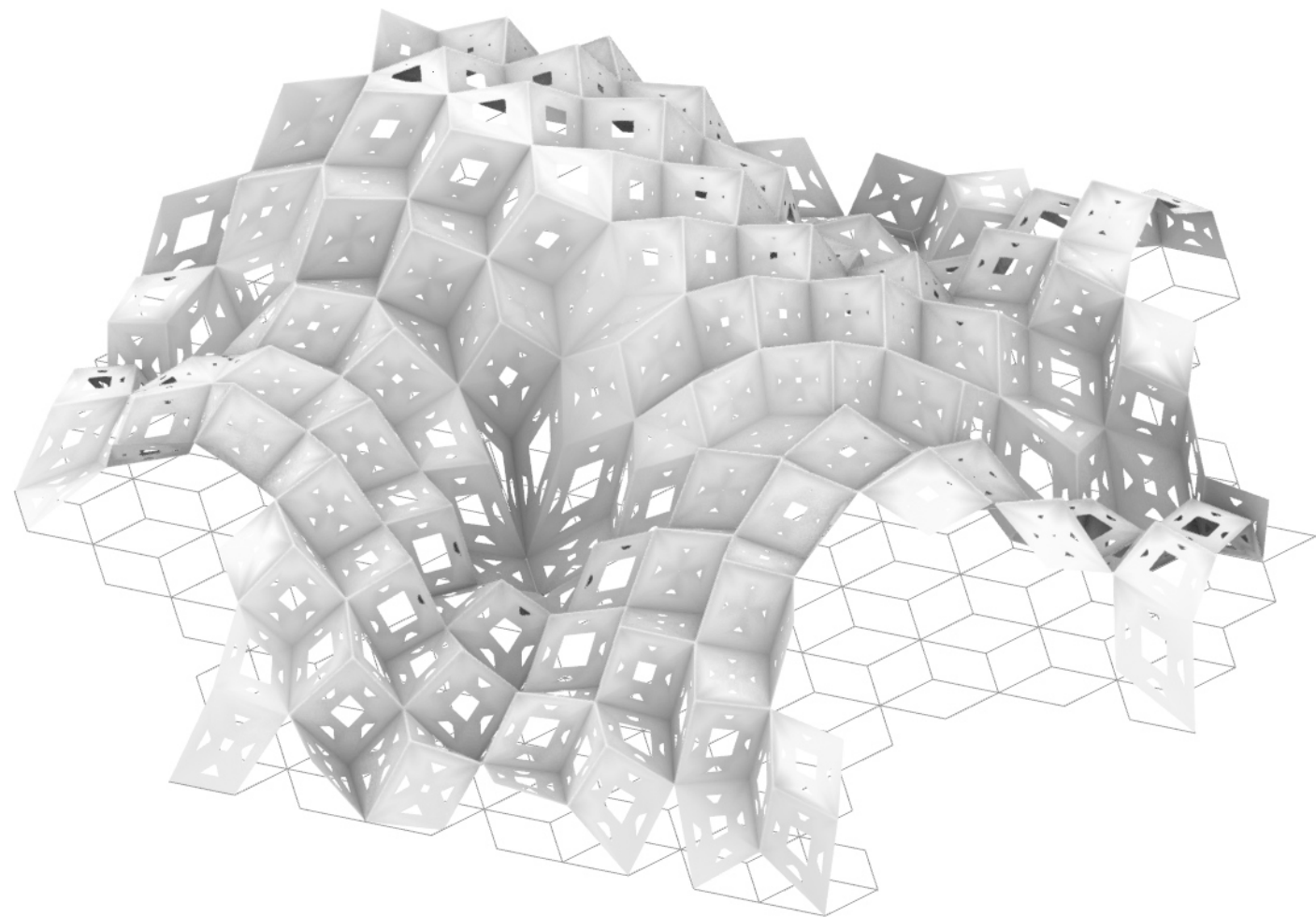
A kaleidoscopic tunnel of light

Program	Parametrically Designed Pavilion
Studio	ARCH Applied Computation
Professor	David Mans
Date	Spring 2021
Location	High Line, New York, New York

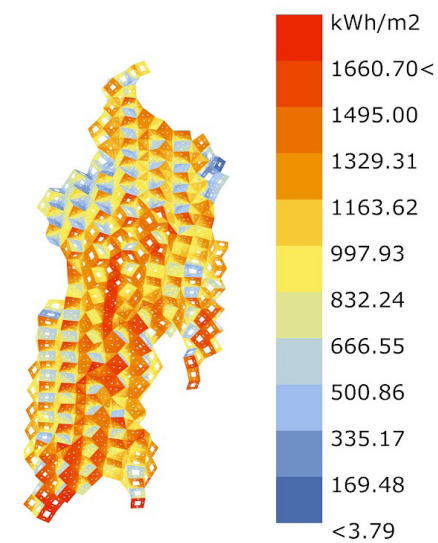
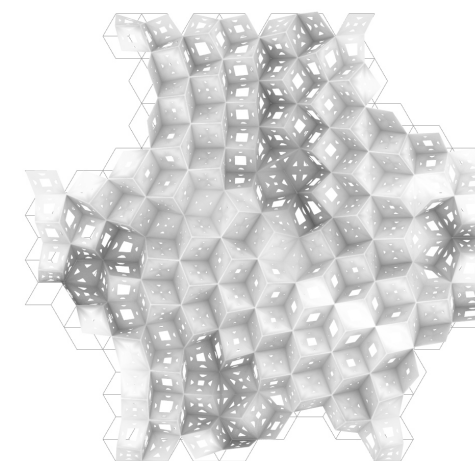
Parametrical or computational language extends the possibility of architectural design. This digital mindset in space design removes many analog design restrictions caused by over-tedious procedures. In this project, a parametrically formed pavilion was designed to create a unique experience in an existing context. Led by an industry leader, Professor David Mans, this pavilion

was developed, starting from planar tessellations to a structurally integrated light pavilion. The occupants experience a kaleidoscopic view through the light permeating from the panel openings and reflection on the surfaces.

▲ TOP
Pavilion Interior Rendering

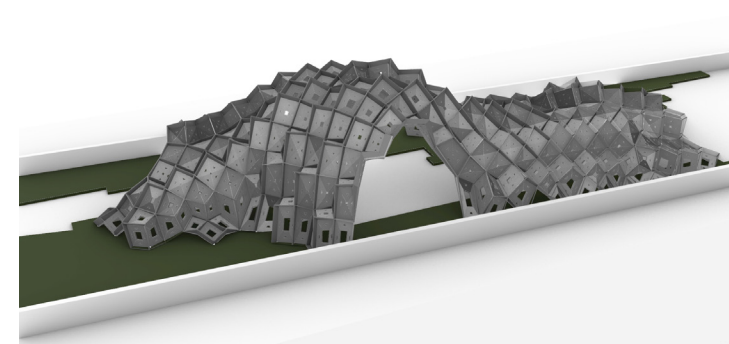


This shell is created by applying the Ngon frame on the cellular mesh twice. The outcome of this is a small pavilion with planar panels. There are five openings on each panel, consisting of 4 smaller ones and one larger one. The larger one follows a modifier in which the highest point and the middle of the height are the largest. The small ones follow another modifier in which the closer to the bottom, the larger it gets. The material of this structure could potentially be metal panels as the planes are all flat. The structural plates are applied on the exterior of the whole assembly hiding from the end-user underneath the structure and leaving the inside of the structure a cleaner surface.



Radiation Analysis
New_York_Central_Prk_Obs_Belv_NY_USA_1977
1 JAN 1:00 - 31 DEC 24:00

- TOP LEFT
Day Time Axonometric Rendering
- TOP RIGHT
Night Time Axonometric Rendering
- TOP RIGHT
Night Time Axonometric Rendering
- TOP RIGHT
Night Time Axonometric Rendering



THANK YOU



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