PORTFOLIO

SHINING HONG_GSAPP '23

TIMBER
DIGEST

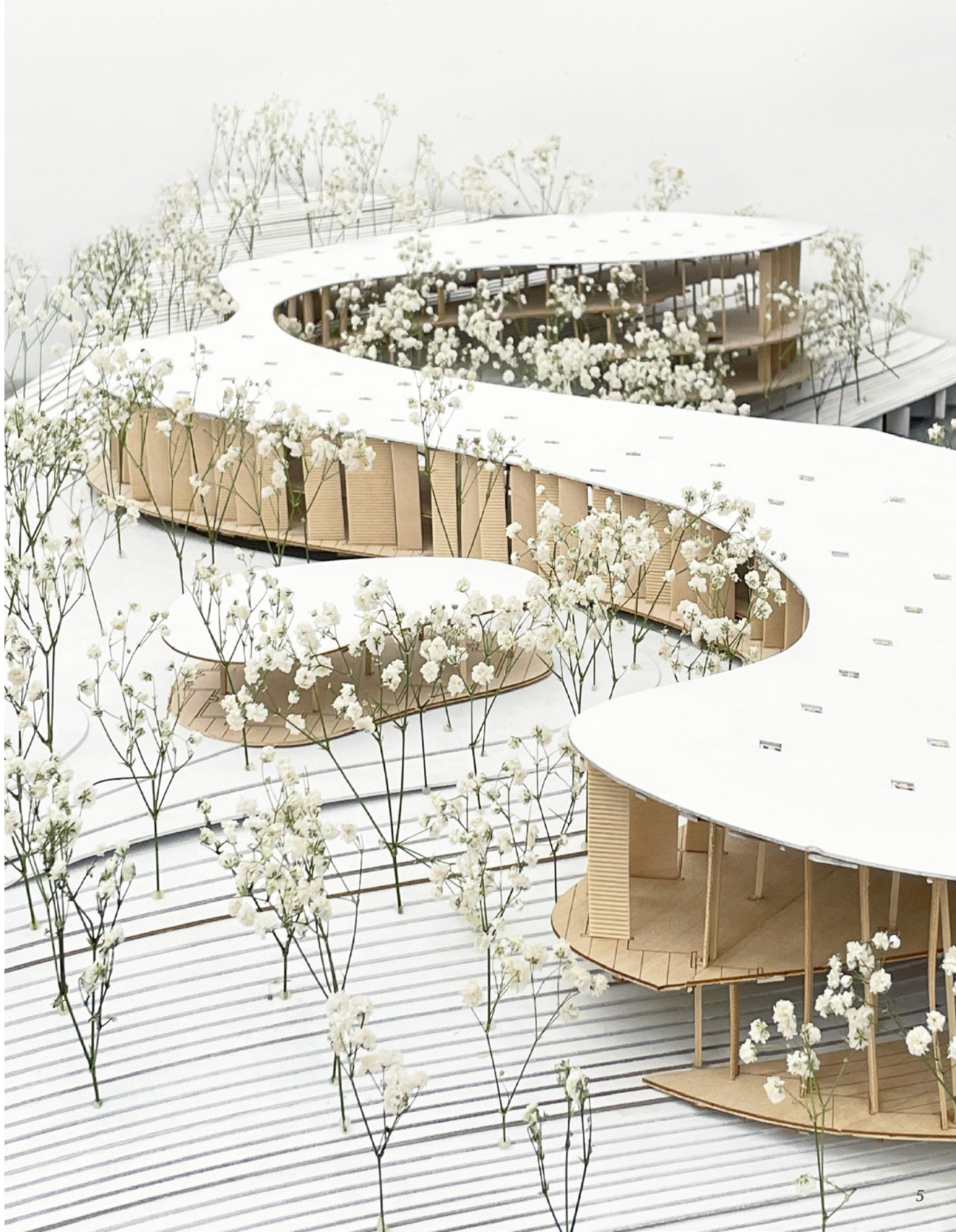
MASS TIMBER EDUCATION AND FACTORY

Instructor: Lindsey Wikstrom
Studio: Adv 4, Spring 2022
Collaboration: Lesley Li
Site: Black Rock Forest, NY

Timber Digest is a research-based design exploration in the Black Rock Forest in upper New York State. Our findings result in a mass timber education center with a innovative DLT (Dowel Laminated Timber) factory using two abundant local supply of trees: sugar maple and hemlock, with sugar maple being the main softwood supply for panels and hemlock for hardwood nails. The two primary programs are placed on two sides of the road to avoid vehicle and pedestrian circulation contradictions and are connected with an overhead bridge.

The word digestion has three layers of meanings: diet, wood, and knowledge. The human body's digestive system is very similar to the production of DLT, and knowledge is key to sustaining a healthy diet, seeing the potential to turn waste into valuable products, and imagining a sustainable mass timber future.

Therefore, we invented the DLT beam structure. The I profile allows the beams to interlock, creating a reciprocal frame beam grid for an open floor plan. Then, Chinese traditional Dou Gong inspired us to develop a bracket system with DLT I-beam that connected the column and the beam grid. The depth of the I-beams allows for gradual stepping down of the roof, allowing it to tilt along with the terrain and shed rainwater. The structure spreads fluidly along the terrain lines and embeds within the forest, while the floors are elevated from the ground to be least disruptive to the ground ecosystem.



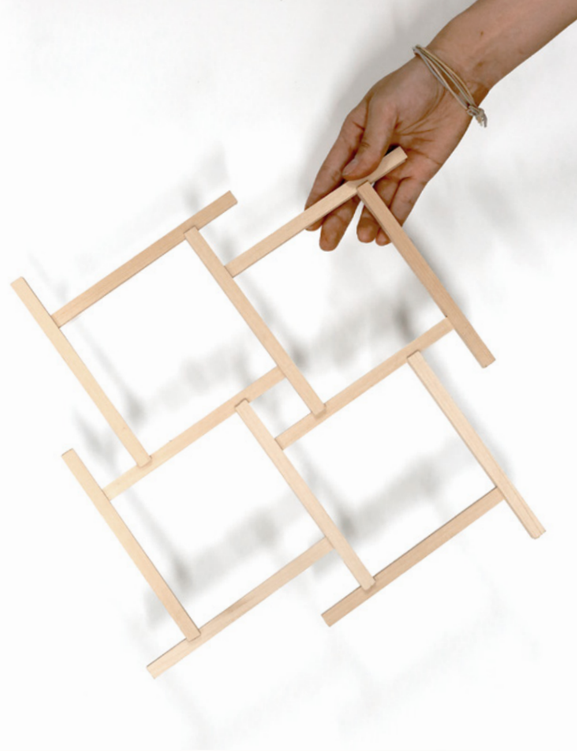
FOREST PLANTER STUDY

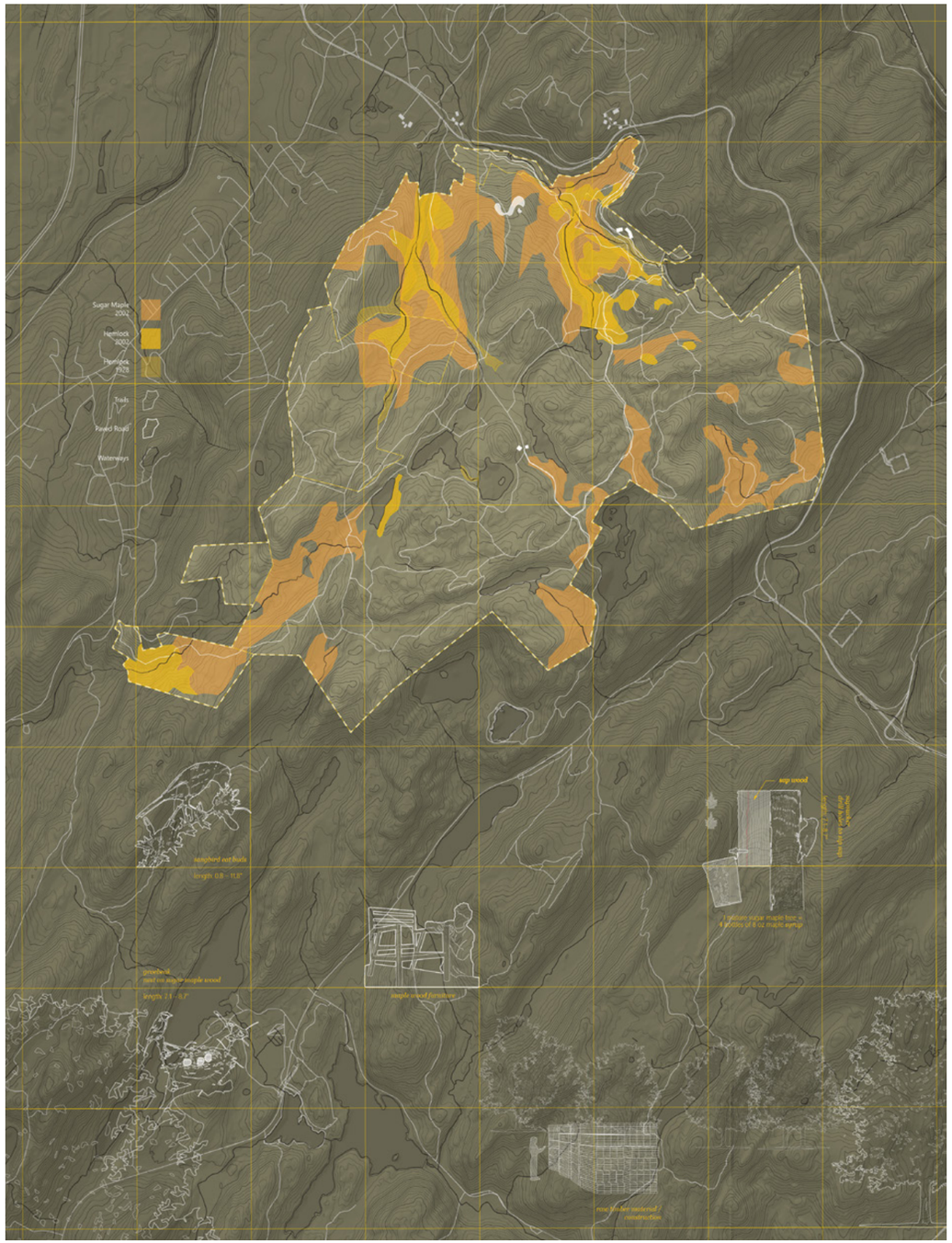
Study shows that current planters can burn up to 8,000 calories a day, which causes huge burdon upon their body (heart rate constantly over healthy aerobic capacity line) and requires 238 white pine trees to offset their diet (coming a lot from meat consumption). We imagined a more sustainable future for the planters with the assistance of high tech machinaries, reducing heart rates and the pressure to consume large amount of food.

DLT Recirpocal Grid

For this project, structural elements are the foundation, and we first created an innovative DLT (Dowel Laminated Timber) I-profile beam element that requires no glue to assemble, which allows the beam elements to interlock with each other and create a gradual stepping down effect for the roof to shed rain. We also arranged the beams into a reciprocal frame structure to achieve wider spans for the factory open plan and material efficiency.

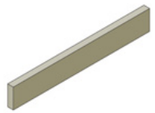
The picture below shows the versatility of the DLT beam grid when combined with the bracket system, which can adapt to the slopping roof, the floorplates, and the stepping terrain.

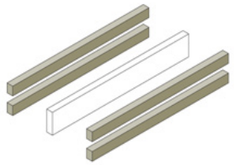


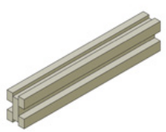


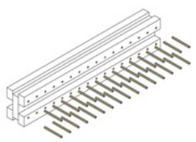
BLACK ROCK FOREST SITE RESEARCH

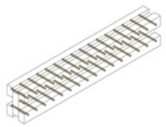
Black Rock Forest locates in upper state New York. We studies tree migration patterns in the forest and found that sugar maple and hemlock are the most abundent today, thus using these two species as the main ingredient of our mass timber structure. We also studies the full life cycle of sugar maple trees and their impact on other living species such as providing nest and food for birds and syrup and building material for human.

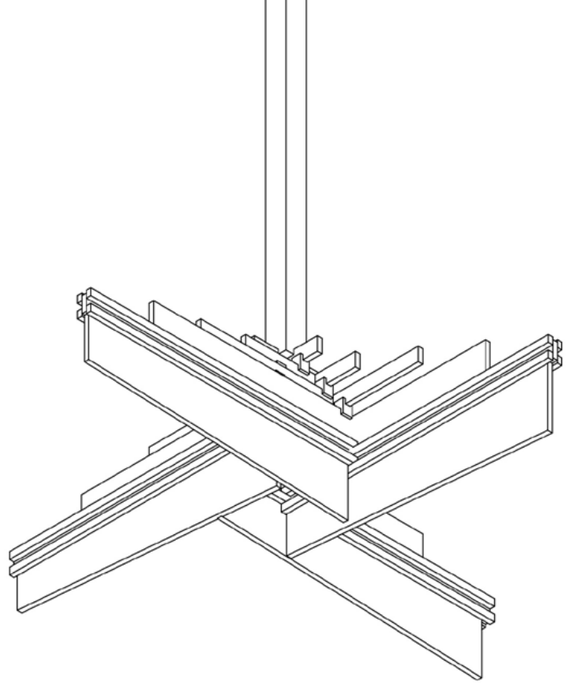








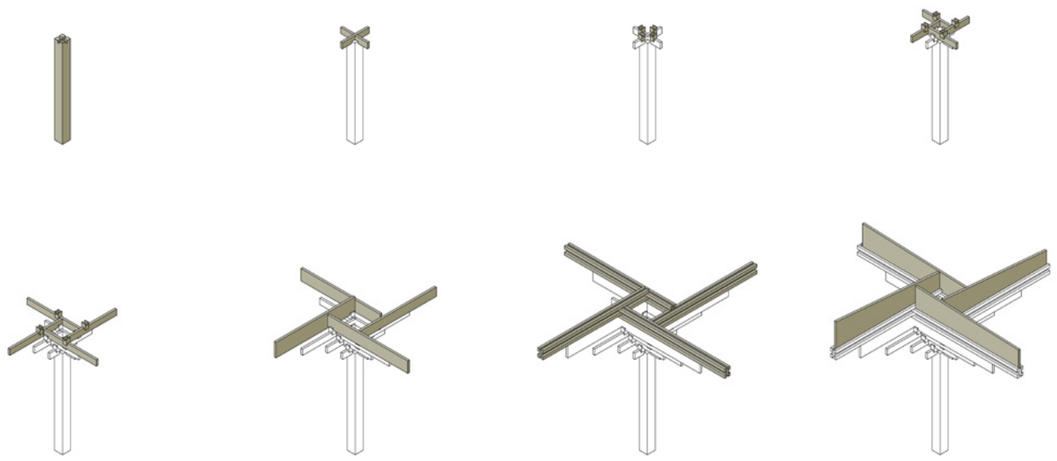


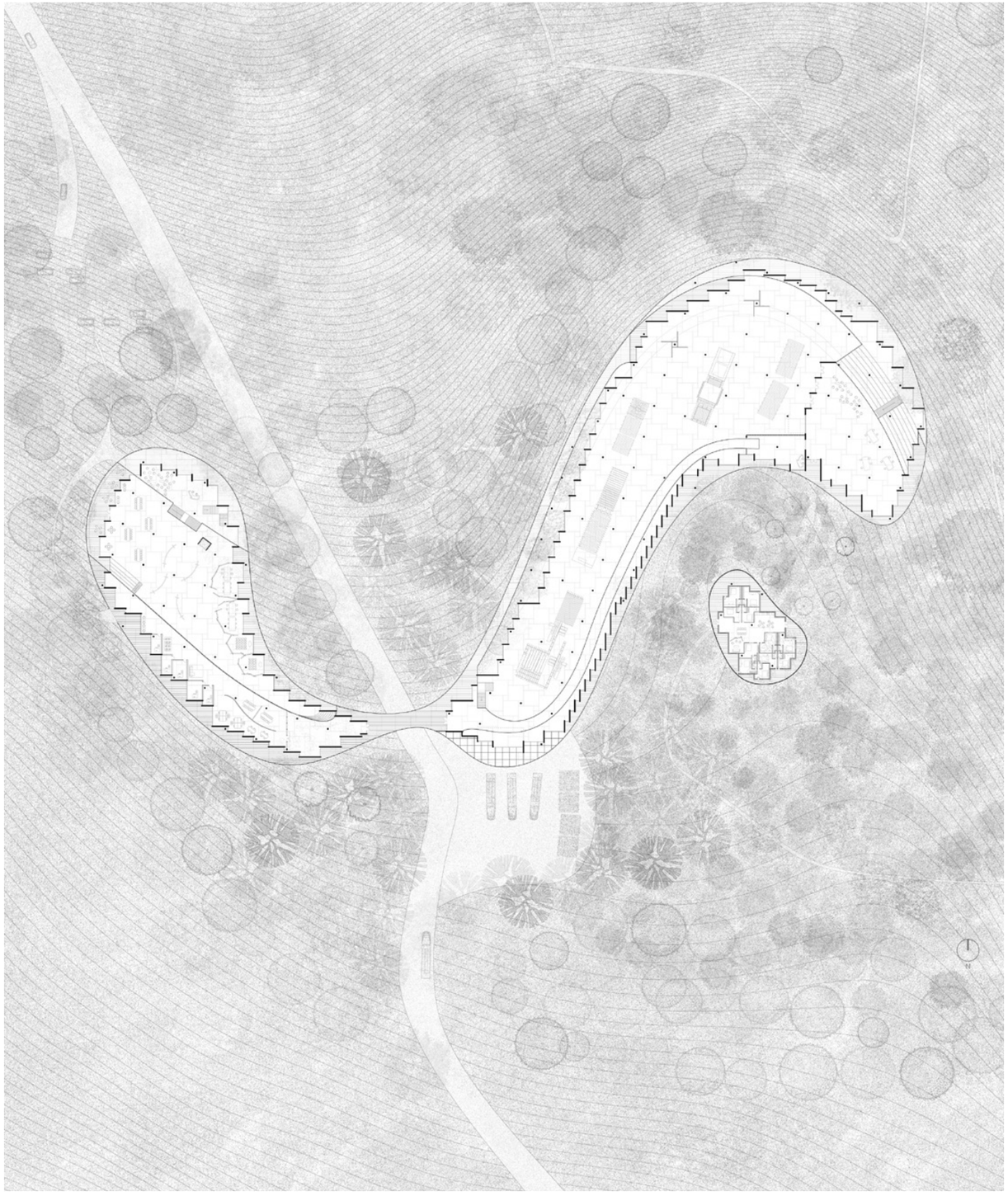


We are also inspired by the traditional Chinese Dou Gong structure, which requires no glue or nails to provide support between the roof and the column. Such elegant bracket system allows light to gentally filter through the gaps, from the skylight above into the factory and the education center below, reducing the demand for artificial light in the space.

MASS TIMBER FACTORY

The ramp connects the education center to the factory, which eventually brings the visitors and the workers together to the same plane. Along the visitor's gradual descent, they are able to learn the entire process of mass timber production. The current system often hides the labor away from the public, and this is a place not only to gain knowledge on the possibilities of mass timber but also to understand the labor and production behind it.





The entire building follows the terrain and thus adopts the sinuous form in the woods. On the left is the education center where visitors learn about mass timber and on the right is the factory where mass timber products are being produced. A bridge connects the two spaces above the road to avoid conflict between cars and people. A domitory is also provided for the workers, situates close to the building yet enjoys privacy from the woods. The structure connects to the road system for easy transportations and to the trail network for hikers to explore.

Floor plates are elevated from the ground to avoid ground ecosystem disturbance

(IM)
PERMANANCY

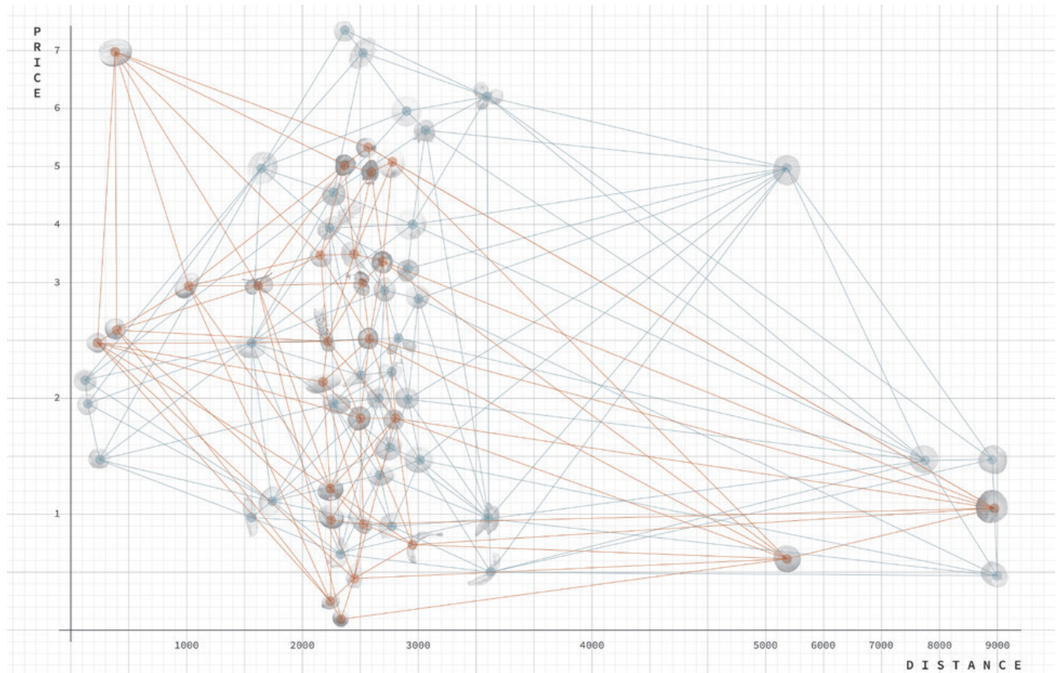
COMMUNITY HOUSING

Instructor: Benjamin Cadena
Studio: Core 3, Fall 2021
Collaboration: Lesley Li
Site: Bronx, New York City

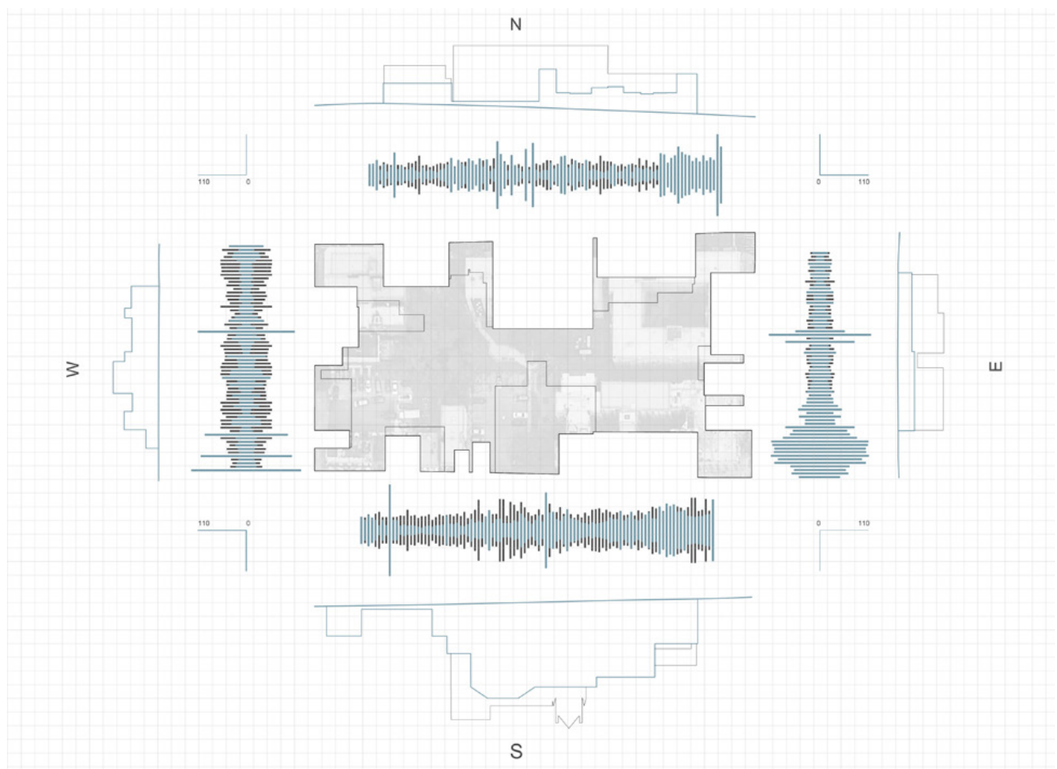
As NYC's average household size kept decreasing for the past decades, it leads to a significant shortage in smaller size apartments. People might have to leave familiar neighborhoods for a more suitable housing type, because one's lifestyle and demands change constantly throughout life. Therefore, this project provides a variety of smaller-size units ranging from 300 ft2 to 900ft2 accomodate the demand.

Our project encourages multi-generational families of today to closely bond within while maintaining high levels of privacy and freedom. We also provide maximum flexibility through loose but versatile unit layouts, and residents are welcomed to shape their homes to meet new demands. We creatively challenged the status quo and contemporary assumptions about housing by removing the typical number-of-bedroom naming conventions and let the residents decide whether the larger unit should perform as a studio, or a smaller unit should serve a family in need. Cores, which identified as spaces and appliances attached to a wet wall, are freed from division walls and placed in the center to allow circular movements within the apartments.

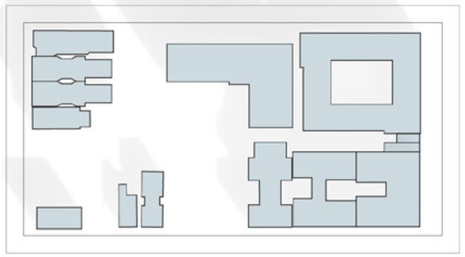
Community wise, the project provides onsite farming and farmer's market opportunities to offset the relative inaccessiblility to fresh and local produce, increasing people's health and significantly decreasing the carbon foorprint associated with produce transportation.



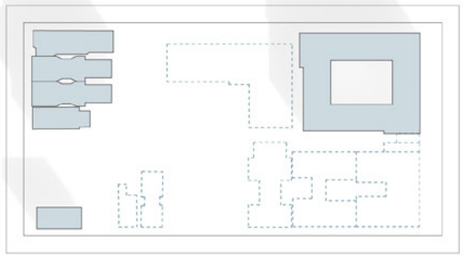
Access to fresh produce disparity between Bronx (red) and Manhattan (blue)



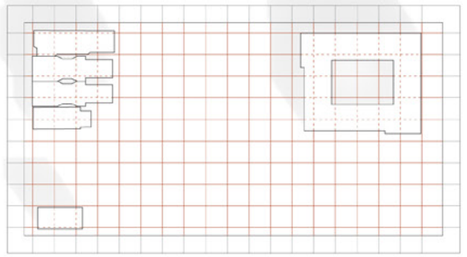
Noise study around the site at 11 am (black) and 6 pm (blue)



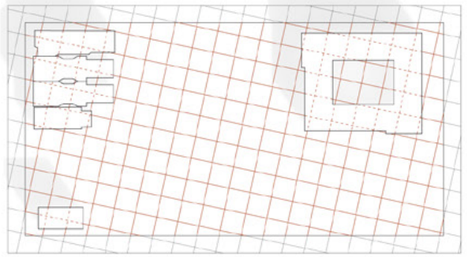
1. Original Massing



2. Remove Unsuitable Buildings



3. Apply 25′ x 25′ Grid System



4. Rotate the Grid by 12 degrees

5. Locate Ground Massings

6. Define Cores throughout

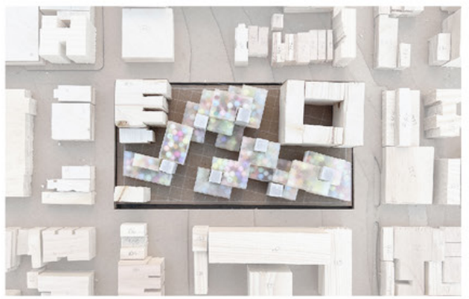
7. Locate 3rd and 4th fl. Massings

8. Locate 5th and 6th fl. Massings

The initual massing strategy removed several buidlings that don't support multigenerational living or have access to good lighting. The 25′ by 25′ grid is optimal for a mass timber structure, and it is rotated to have more sun exposure and create opportunities for community pocket spaces. The ground massings are placed to avoid thorough vision thus natually discourage pedestrain crossing. Upper floor massings are shifted from the ground ones to call attention to the central courtyard and to provide sufficient rooftop spaces for farming and activities.

Early Conceptual Massing

Unit Massing Study



Final Massing

This model shows the heaviness of the cores and the translucency of the facade. The colorful beads represent the diverse and everchanging lifestyles of the residents, which are unbounded by the architecture.

3rd and 4th floor Plan

N

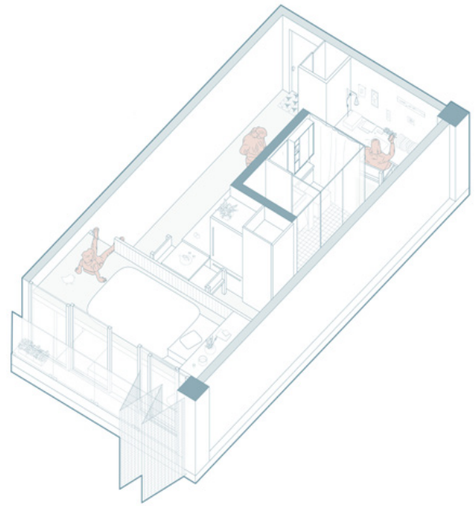
1/8" = 1'-0"

1st and 2nd floor Plan

5th and 6th floor Plan

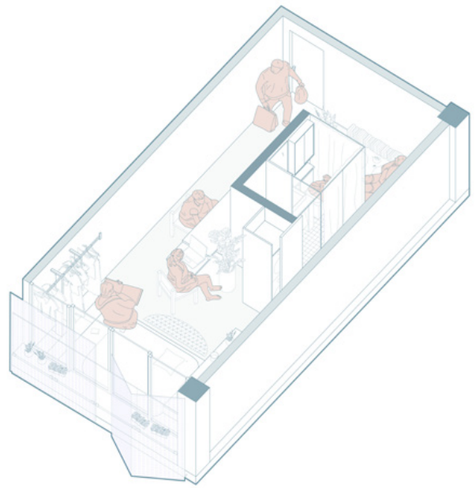
Street View of Pocket Space, differences between commercial and residential spaces

In a Unit Looking into the Central Courtyard, Which is Hosting a Community Farmer's Market



Single Prent with Kids

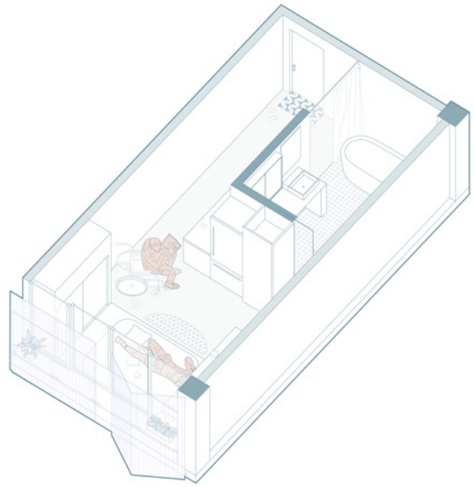
A 300 ft^2 apartment can also serve a family in need. Here, one kid is doing homework at the work station and the other is listening music on the buck bed. The mother is preparing delicious dinner for her two kids.



Minimalist Couple

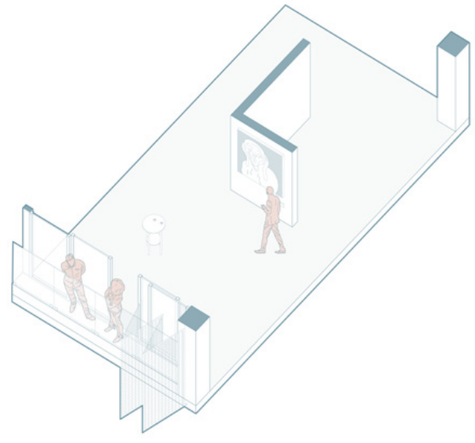
The couple loves minimalism so they own very little things. They both work busy jobs and don't like to cook at home. Here, they are inviting friends over during the weekends for a party with pizza and wines.

Unit Interior View, Minimalistic Living Style



Seniors - ADA Accessible

One of the seniors depends on the wheelchair. The unit now is transformed into an ADA approved apartment with enough room to turn in the bathroom and living space.



Future Gallery

The project not only provides versatile living spaces for users today, but also thinks about future, when housing needs might decrease. Here, partition walls are removed and the space is turned into an open gallery for flexibility.

ADA Accessible Living

Long Section, Versatile Unit Occupation and Lifestyles. Abundant courtyard and terrace spaces.


1


2


3


4


5


6

1. Core and facade contrast
2. Facade details
3. Section cut through the building
4. Section unit view
5. Hallway
6. Street peaking into courtyard

Extensive Community Roof Gardens are provided

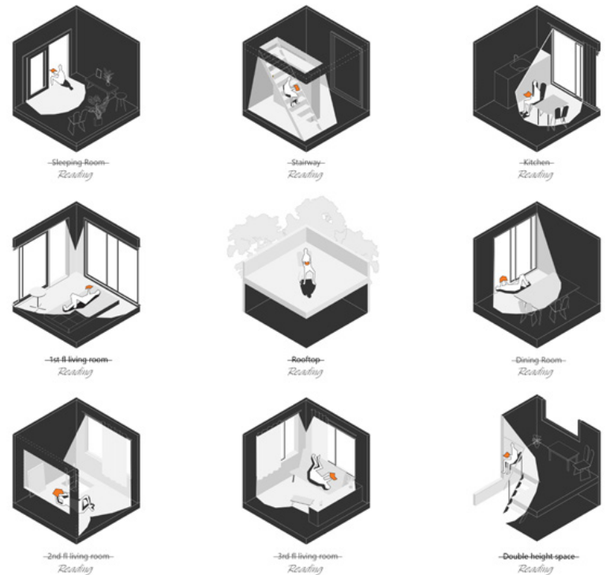
PRECEDANT
STUDY

HOUSING TYPOLOGY RESEARCH

Architects: Ryue Nishizawa
Project: Moriyama House
Studio: Core 3, Fall 2021
Collaboration: Lesley Li

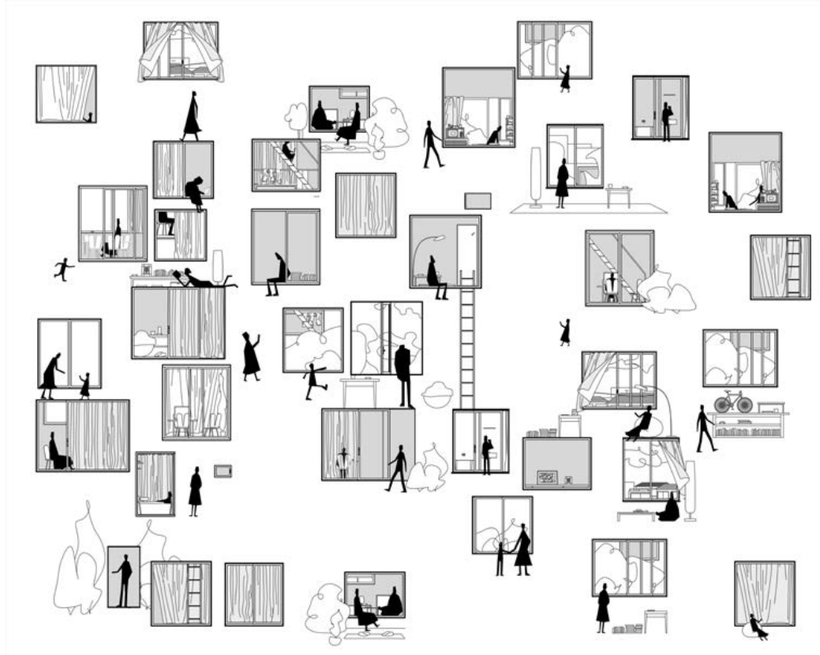
Moriyama house is a project consisting 10 independent buildings varying in scale. They are carefully arranged to provide intimate courtyard spaces and privacy from street view. The courtyard serves as important as the interior spaces, thus we choose to make a Reverse-Moriyama house model, where we imagine the courtyard itself as a house, and warm furniture, vibrant plants, and lively activities fill the house. The original house also appears extremely light, so we investigated the hidden foundations of the buildings, which was heavy and solid in comparison.

Courtyard model: mattboard, basswood, flowers
Foundation model: clay, foam, basswood



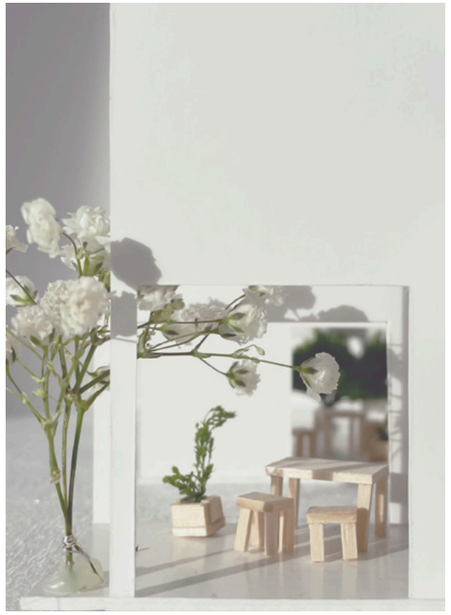
EVERYWHERE IS A READING ROOM

Moriyama San loves reading, and he turned every room into his reading room. Here, habit changes architectural definitions. There's plenty natural light at every corner of his house.



WINDOW. WINDOW. WINDOW.

There are 40+ windows in Moriyama House. They connect people from inside out, from outside in, and put people right in the middle of inside-outside. Every window is different to its different users.



CAT'S CRADLE
SCHOOL

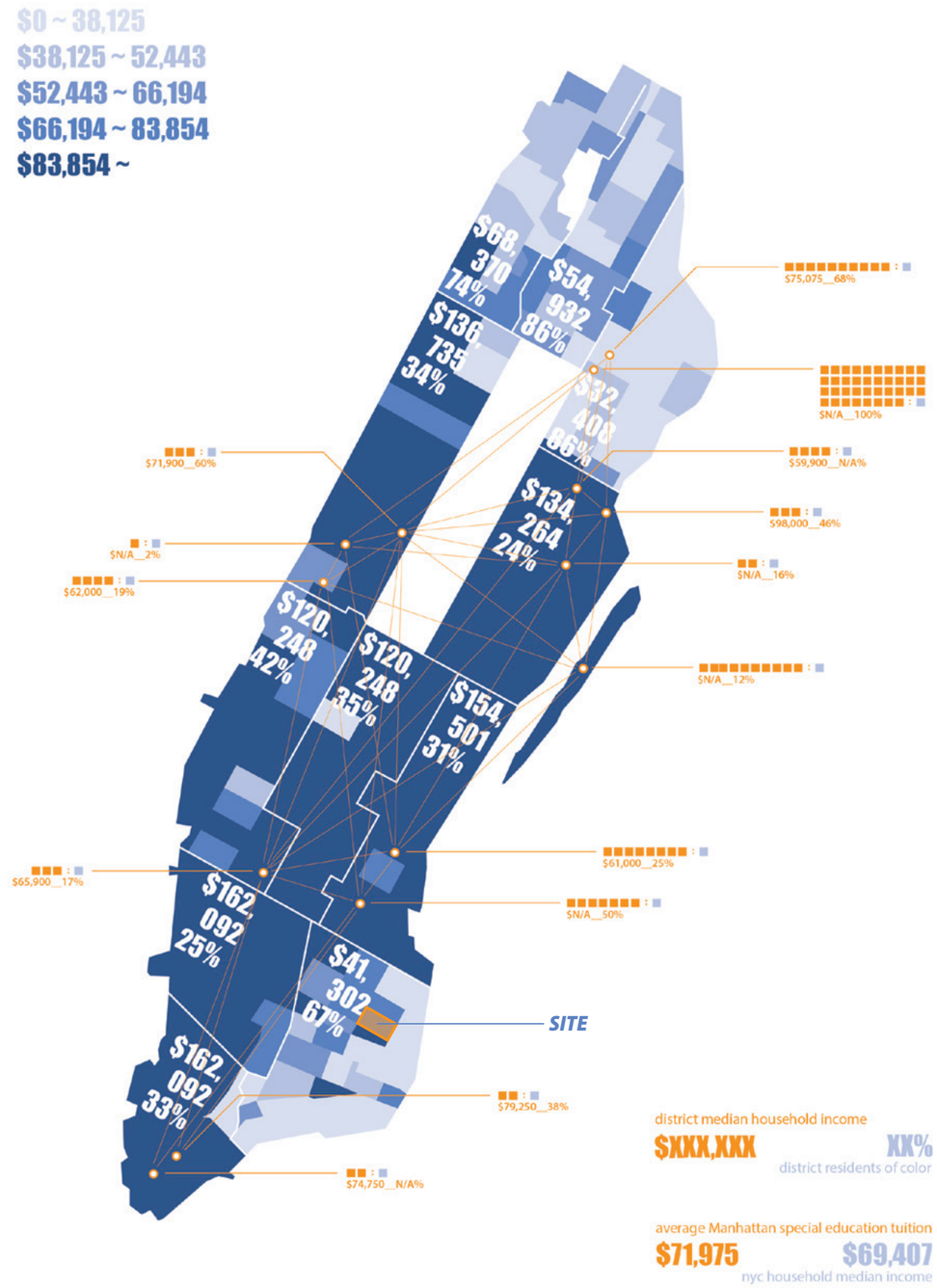
ADAPTIVE REUSE SPECIAL EDUCATION SCHOOL

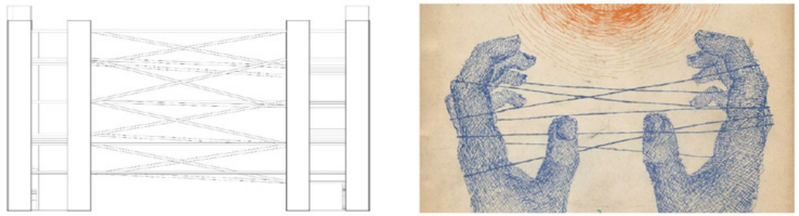
Instructor: Lindy Roy
Studio: Core 2, Spring 2021; Tech 4, Fall 2021
Collaboration: N/A; Lesley Li, Lucas Pereira, Elaine Yu, Karen Polanco
Site: P.S. 64, New York City

Research shows that there is a significant lack of special education schools in New York City where only 14 schools are available and the majority of them locates in higher-income neighborhoods. The site is located in lower eastside, a low income region with no special education facility.

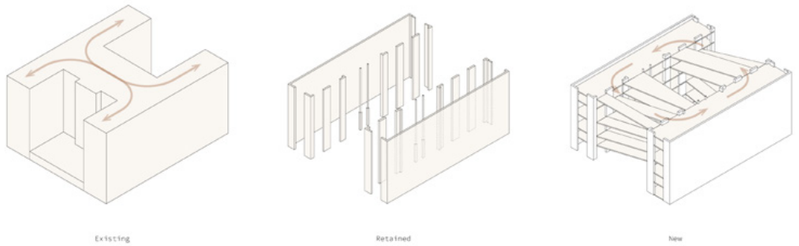
This project transforms the P.S. 64, an abandoned public school, into an special education facility that reused the structural facade of the building and creatively interweaves ramps in between the two wings of the school. The school performs like the game cat's cradle where the newly added transparent ramps are like the string, weaving between the heavier sides of the preserved massing that work like the stable hands. Although there are only one string in the game, countless patterns are being created, and you never know what the next one looks like. Similar experiences are provided within this school; there are two ramps for each direction of travel on every level for students to freely circulate up and down, creating distinct journeys and unique experiences based on each student's preferences and needs.

This project is further explored in a Tech class where the entire building was refined to comply with code while keeping the original concept of the design. We carefully revised the ramps to be ADA approved and structures to support a long span of 80 feet, and explored other crucial topics such as MEP distribution, electric and water services, egress routes, PCR plans, facade details, etc. The entire tech project is carried out in Revit with BIM 360, and the final product includes a full set of sheets from concept to construction.



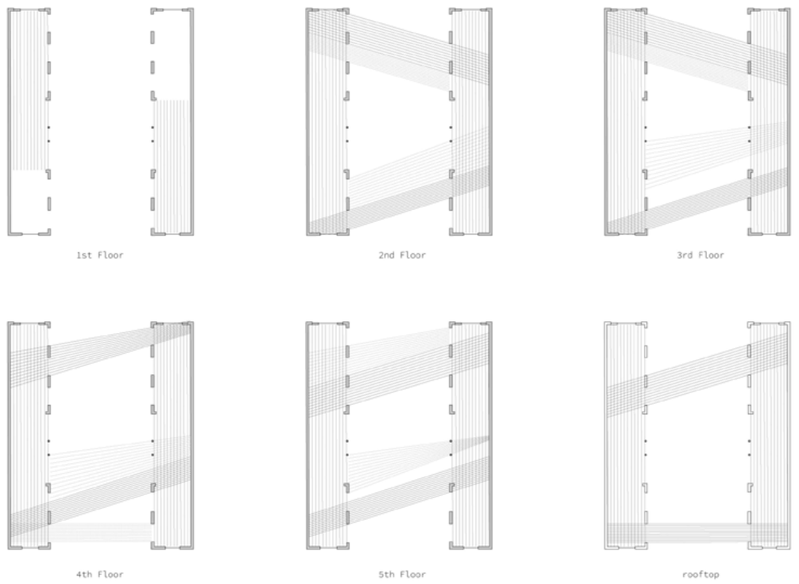


Inspiration from Cat's Cradle



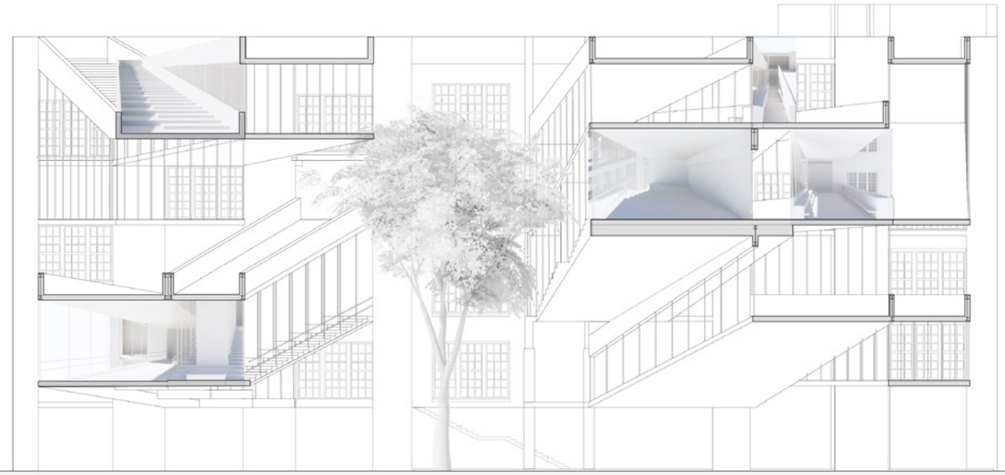
Renovation Process Diagram

The existing H massing features a central circulation with limited paths to destinations. The renovated school kept the heavy load-bearing walls of the two sides and introduced a series of ramps weaving in between the two bars, creating a fun circular circulation.



Diagramatic Plan with Ramp Circulation

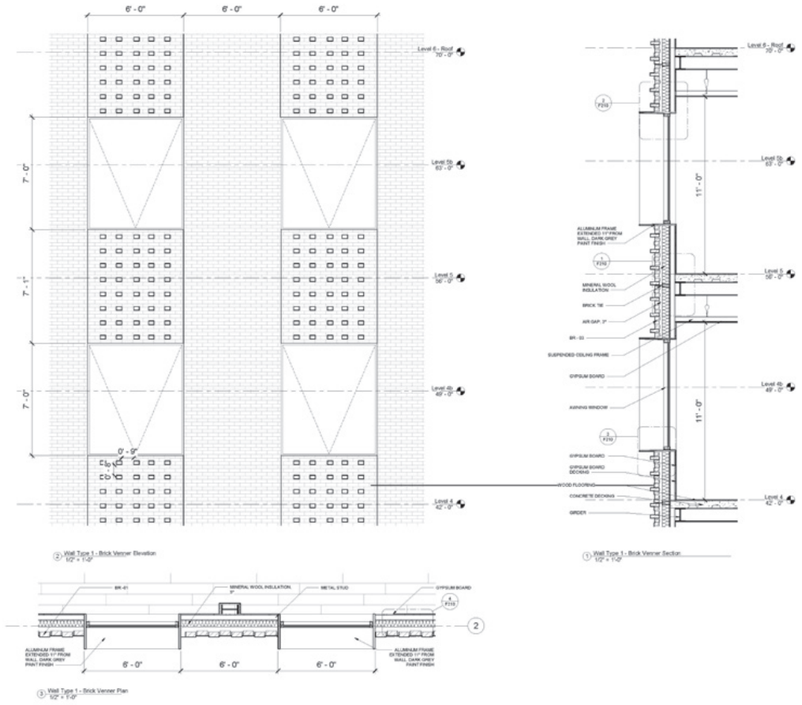
Typical Reflected Ceiling Plan



Ramp Section Showcasing Different Qualities and Experiences of Moving Through the School

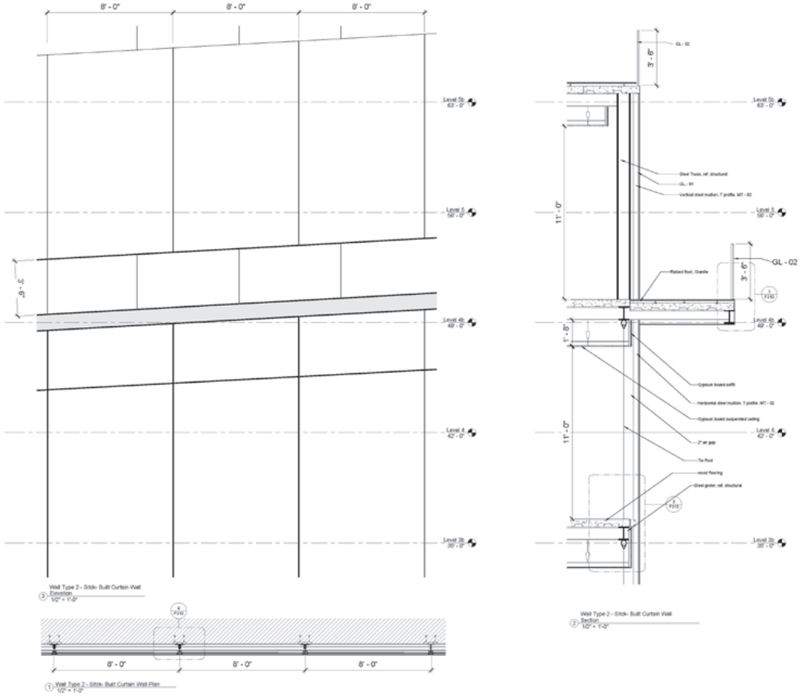
Brick-Window Facade

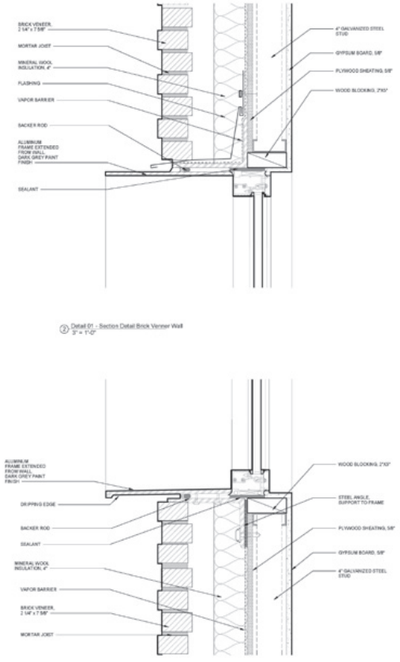
This facade typology is used at the two side wings. Patterned bricks are used to create a visual connection between the existing brick walls and provide variation as well. Large windows promise suggicient sunlight in the wings and views into the central courtyard.



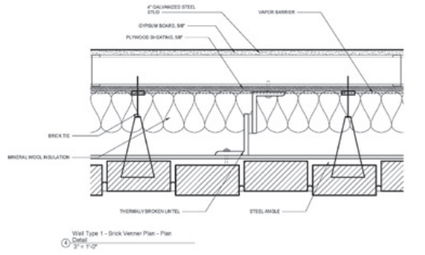
Stick-Built Glass Facade

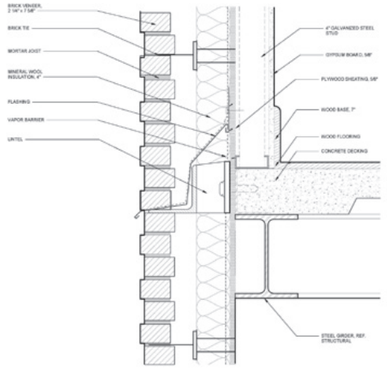
This facade typology is used for all the ramps going in between the two wings, including a glass railing. The ramps are held together through tension with a series of tie rods to ensure a clean and light look even at a span of 80 feet.



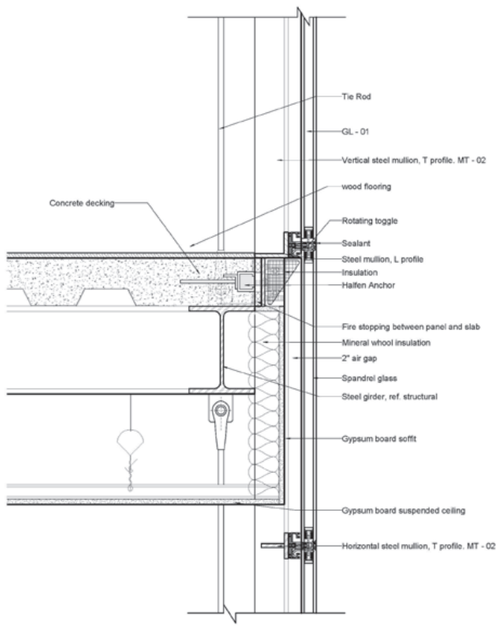


Brick-Window Connection Detail

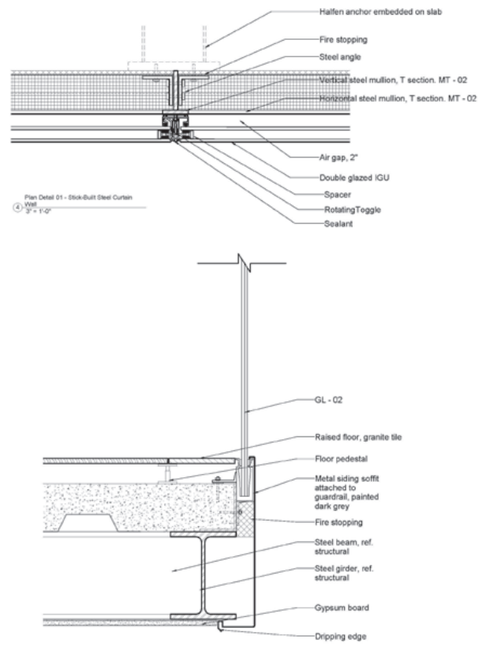




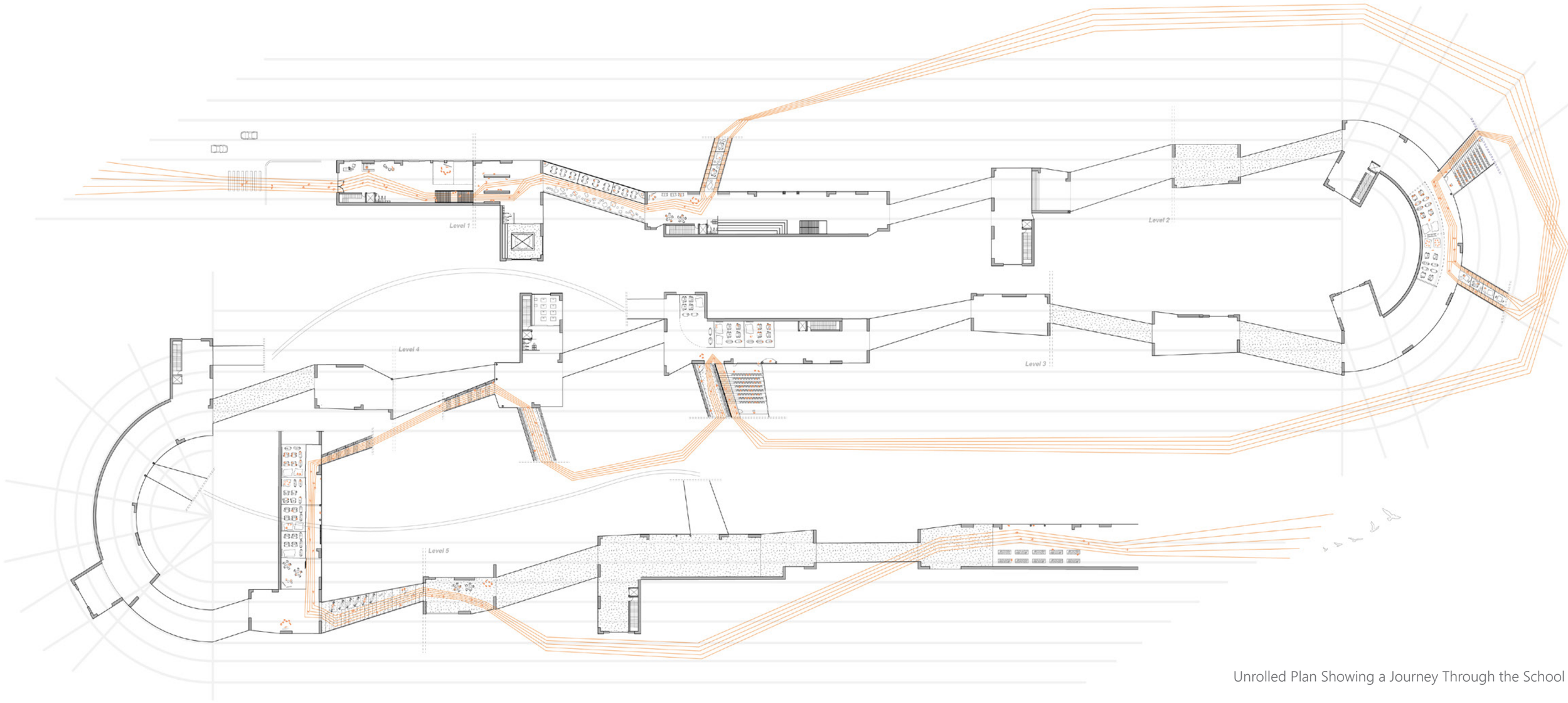
Brick Facade Detail



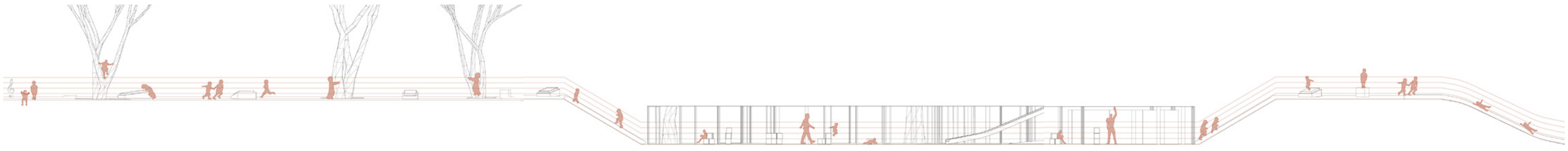
Glass Facade and Slab Connection Detail



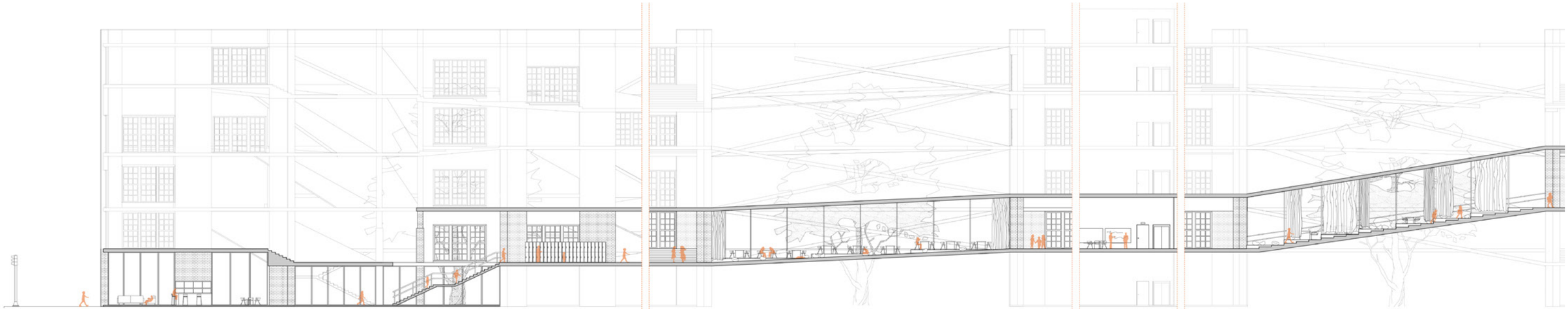
Cantelivered Ramp Edge Detail



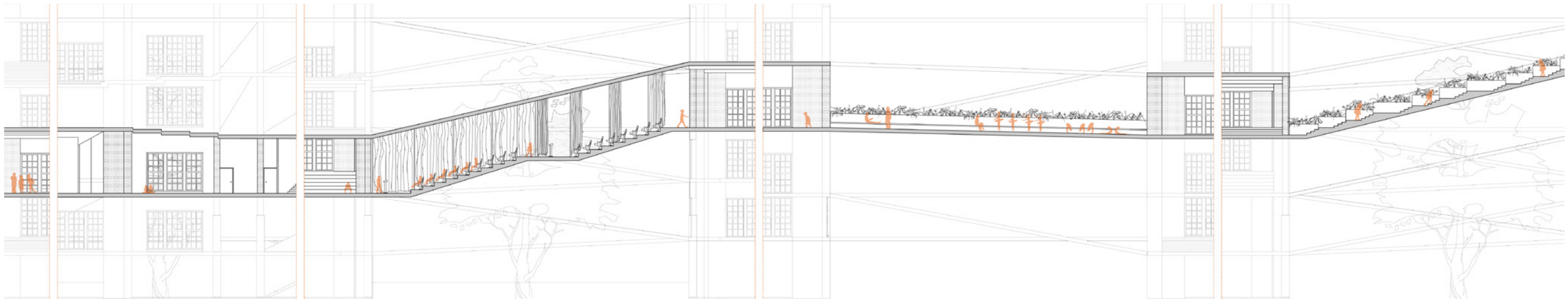
Unrolled Plan Showing a Journey Through the School

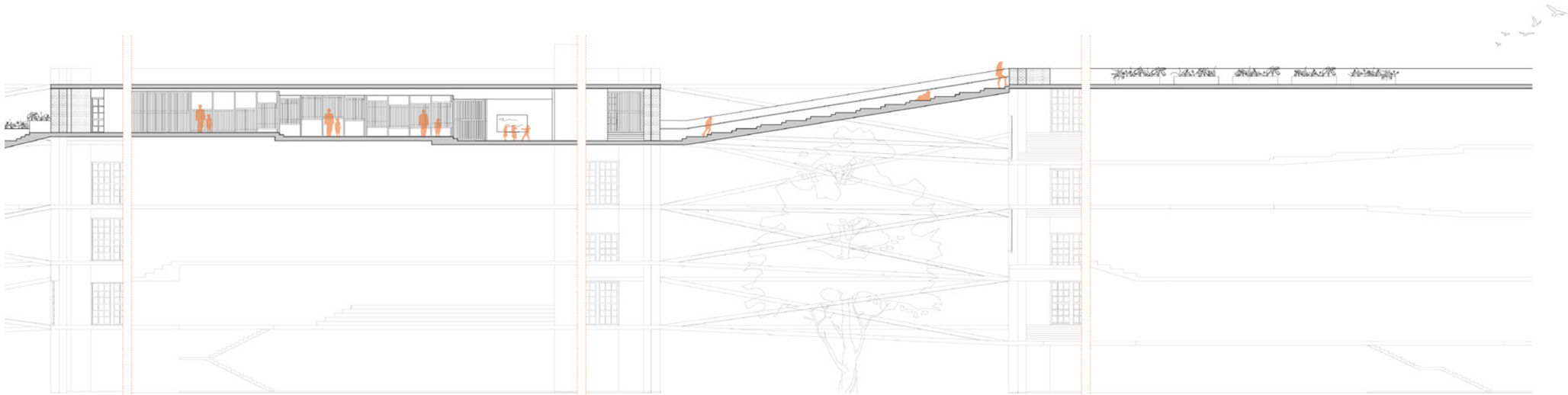


Analysis Diagram: Inspiration from the Fuji Kindergarten in Japan, where the school is a loop and the kids can circulate around freely like playful notes on a sheet music, and the boundry between inside and outside is blurred



Unrolled Section Showing a Journey Through the School





FOLDING
JACKSON HEIGHTS

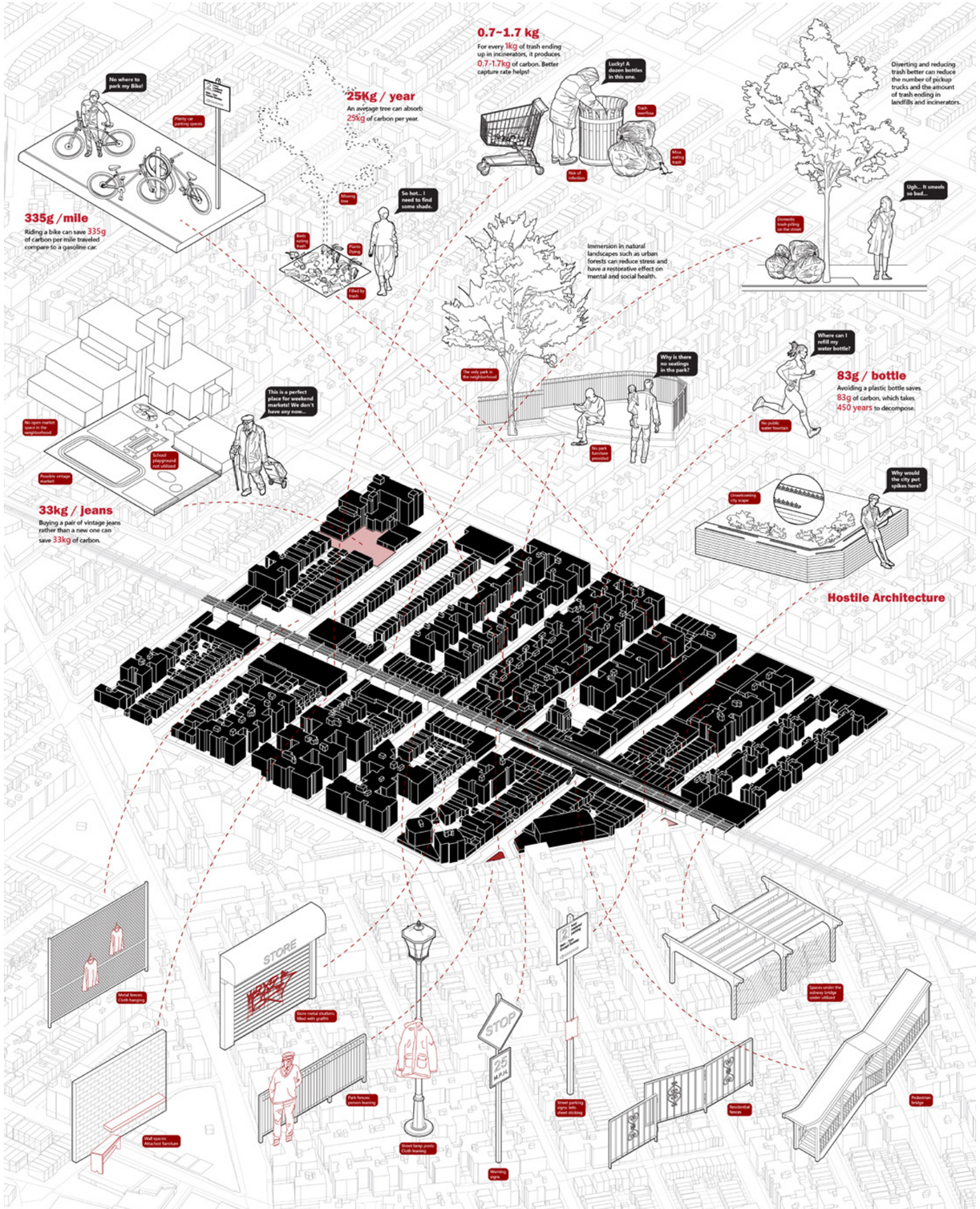
FOLDING STREET FURNITURE

Instructor: Jing Liu
Studio: Adv 5, Fall 2022
Collaboration: N/A
Site: Jackson Heights, New York

During the site visits in Jackson Heights, I get to experience the lively neighborhood, but spotted many unpleasant conditions as well, including trash overflow, hostile architecture, lack of public space and infrastructure, etc. Further research and site analysis shows that Jackson Heights has one of the highest population density and lowest trash diversion rate (13%) in Queens, yet not enough sanitation resources are being allocated to Jackson Heights.

In addition, due to dense urban planing, very little space is dedicated for public use, and parks usually takes place at left-over pockets of the neighborhood. If current traffic and buildings cannot be altered, interventions are limited to the narrow and crowded street, which inspired this project in designing street furniture that utilizes or creates vertical space of the street such as fences, walls, light poll, etc. to provide infrastructure for a more sustainable and lively lifestyle. This is a project that are almost invisible from a plan perspective, but impactful in sections and interactions of daily life.

All the furnitures are designed and folded with peforated metal sheet for easy and efficient production and transportation, possibly happening at the local scale. This system of street furniture is menat to serve as a pilot project, that it will not only stay in the neighborhood of Jackson Height, but also spread out to other neighborhood with similar conditions and needs. Although the architecture of this project exists in a small scale, the implementation of it is envisioned to break boundries and spread in a much larger scale.



Site Conditions, Boundries, Limitations, and Opportunities






Current Site Conditions: Issues

Left to right, top to bottem: trash overflow, bike rack occupied by food truck, tree missing, merchandise hanging on light poll, trash smelling in residential zone, fence for merchandise display, street barrier occupying street space, hostile architecture

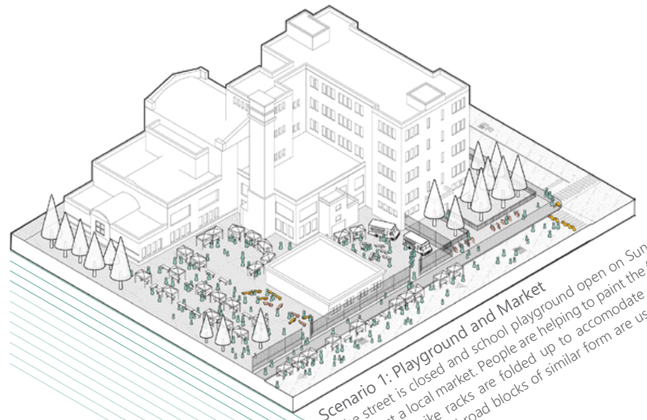




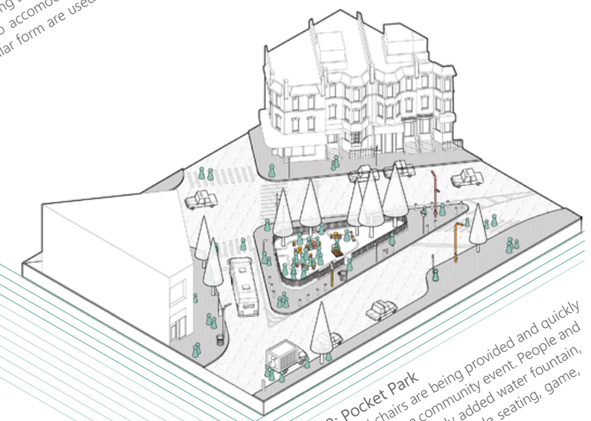


Current Site Conditions: Opportunities

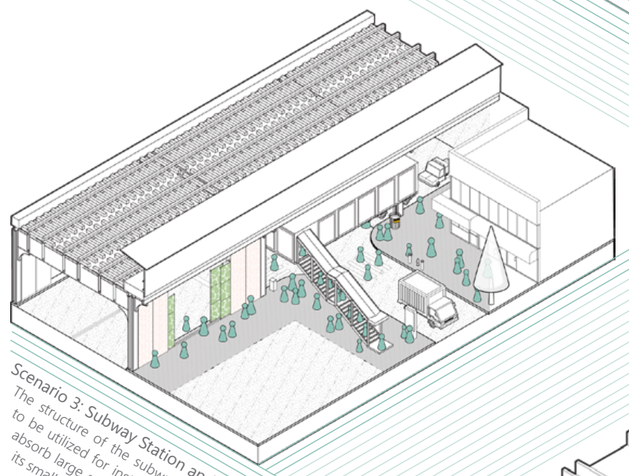
Left to right, top to bottem: subway bridge underside, subway entrance, school playgrounds after school time or on the weekends, empty wall, residential fence, subway structure, store row down gates, park fence



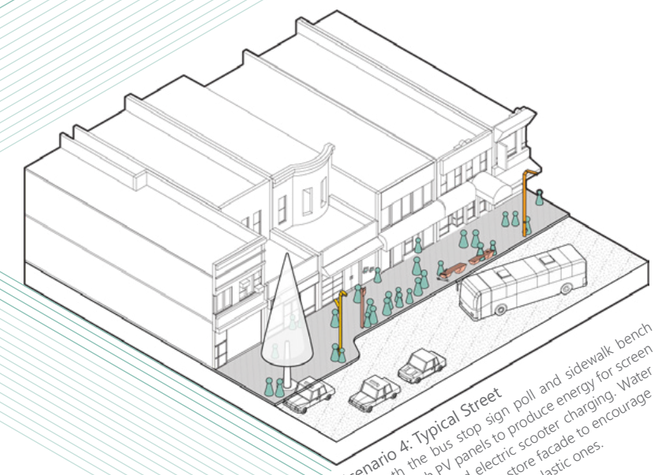
Scenario 1: Playground and Market
The street is closed and school playground open on Sunday to host a local market. People are helping to paint the folding bench, bike racks are folded up to accomodate more bike visitors, and road blocks of similar form are used to regulate traffice.



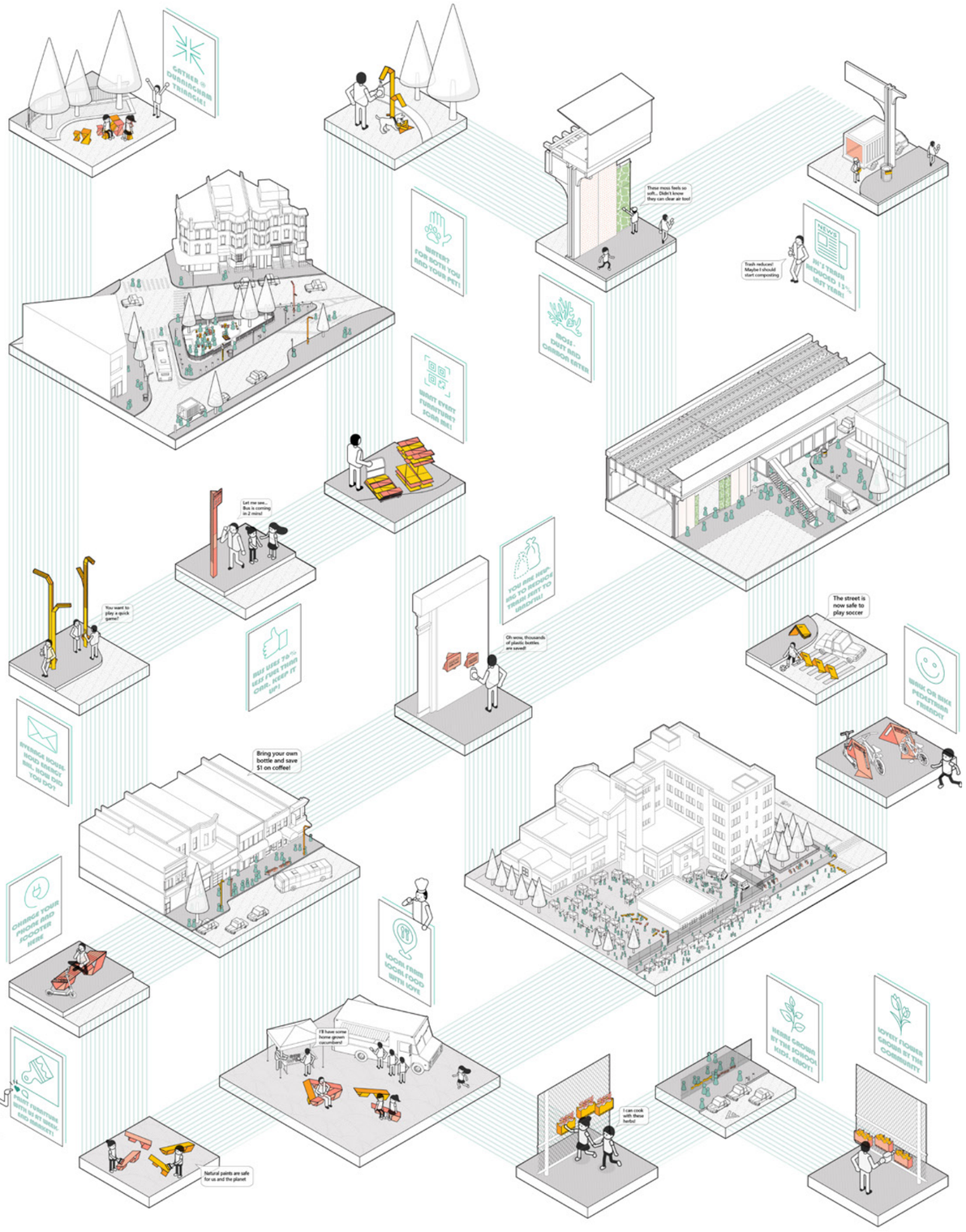
Scenario 2: Pocket Park
Folding tables and chairs are being provided and quickly assembled at the park for a community event. People and pets can enjoy water at the newly added water fountain, and light polls are converted to provide seating, game, and information boards.



Scenario 3: Subway Station and Bridge
The structure of the subway allows the bridge underside to be utilized for installation such as moss wall, which can absorb large amount of air pollutants and CO_2 considering its small size. Bottle recycling collection boxes are attached to existing trash bins to help increase diversion rate.



Scenario 4: Typical Street
Here, both the bus stop sign poll and sidewalk bench are equiped with PV panels to produce energy for screen display and phone and electric scooter charging. Water fountains are attached on the store facade to encourage water bottle usage over single-use plastic ones.



Here, the neighborhood of Jackson Heights is imagined onto a game board, where the site becomes puzzle pieces. The unpleasant conditions are represented by the black pieces; as the game goes on, the colorful designed items come in, replacing the black ones. While more pieces enter into the game to complete the board, more colorful objects appear and paint the corresponding puzzles. Eventually, players come in and travel freely on the gameboard, choosing their own object to claim.

CASCADE
PARK

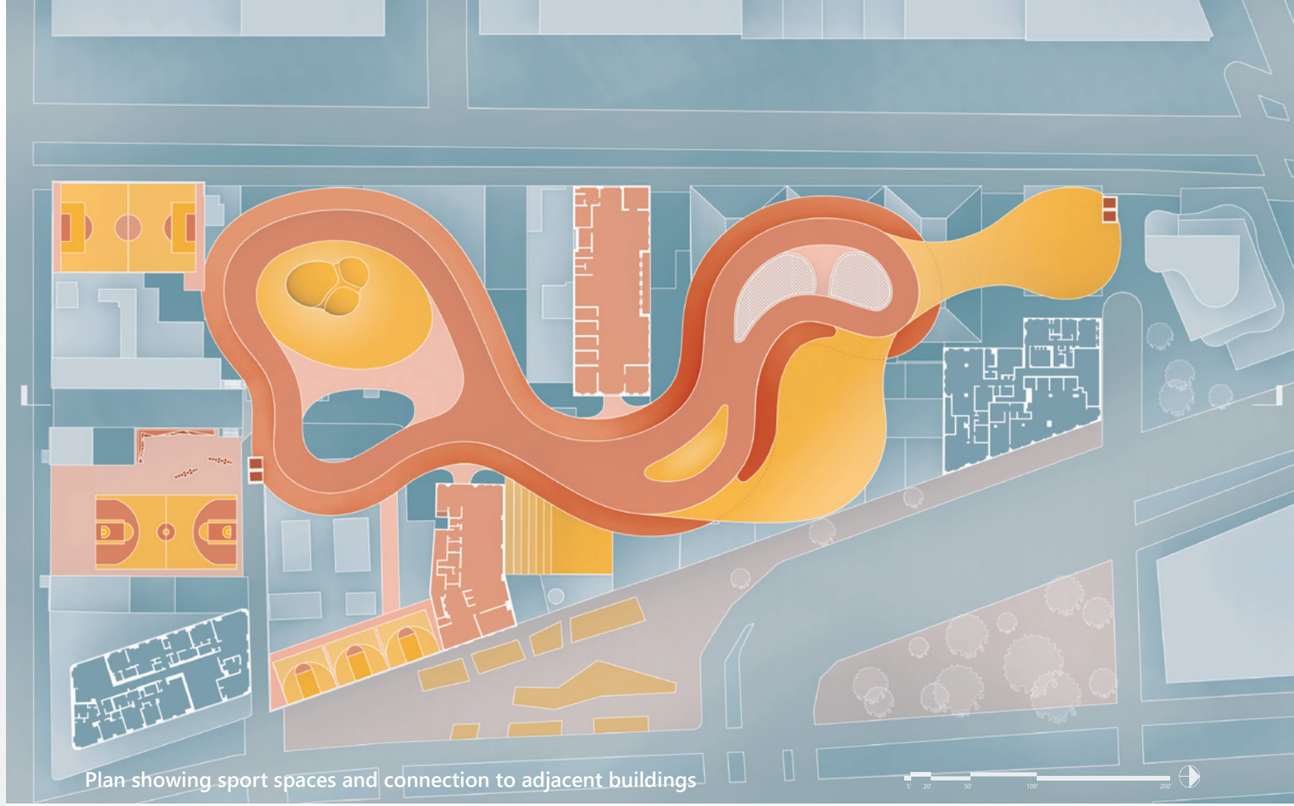
PUBLIC SPORTS PLATFORM

Instructor: Amina Blacksher
Studio: Core 1, Fall 2020
Collaboration: N/A
Site: Noho Historic District, New York City

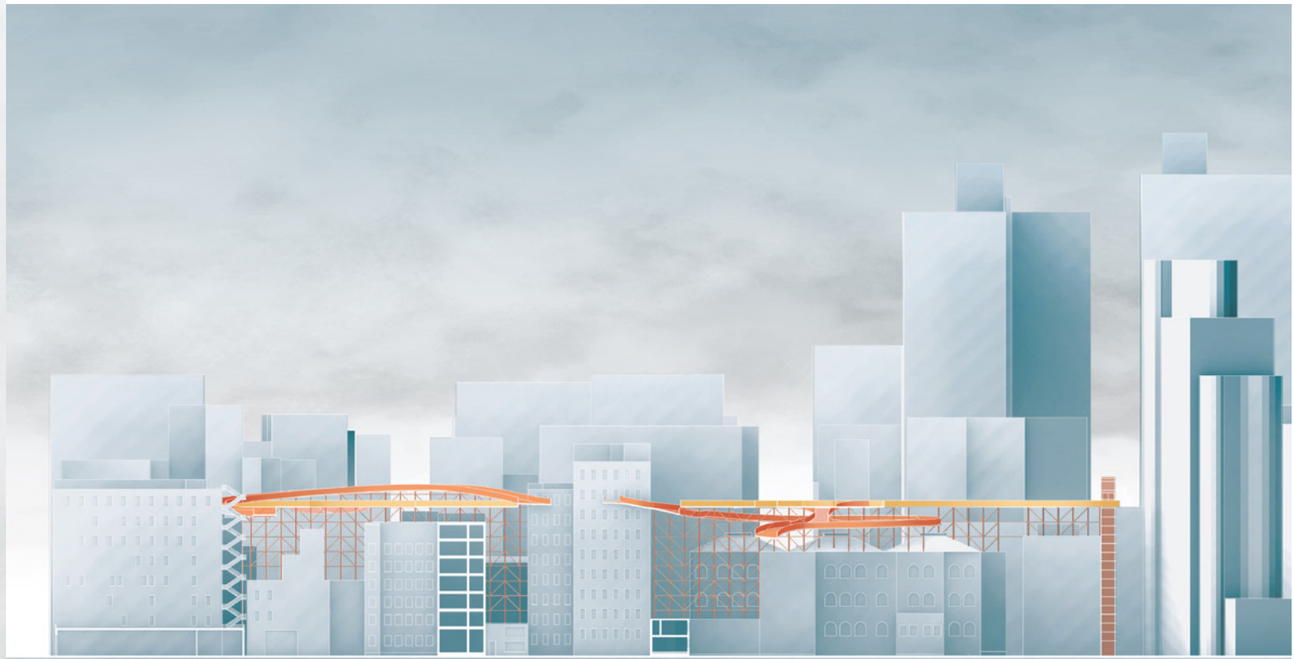
NYC, especially Manhattan, is known for having very limited land. In the district of Noho, there are essentially no parks or public sports facilities, yet numerous private gyms thrive in the area. This posed a serious health disadvantage on lower income families in the region, which I saw as an opportunity to address as a way to mediate income inequality.

The project looks into the only vacant lot in the block, which has been abandoned for several decades, as well as the unused air space above the existing buidlings as the site for a publically accessible sports park for all people. The empty lot is transformed into a basketball court and features a rock climbing facility directly accessible to the street. The upper park can be accessed through two elevators on either ends of the platforms. The park offers two sets of distinct experiences. One is completely flat and be used as running track, playgrounds, and outlook deck, thus ADA friendly. On the other hand, the up-and-down ring gentally follows the roof heights and offers an adventurous experience, mimicing hiking in the mountain in a complete urban fabric.

The height of the park provides visitors a gorgeous city view for free, which is often only accessible from luxurious buildings. The supporting structure is made of scaffolding, which can be constructed quickly and adjusted easily. The scaffolding also supports numerous platform typologies ranging from tracks and sports courts to trampolines and grass.

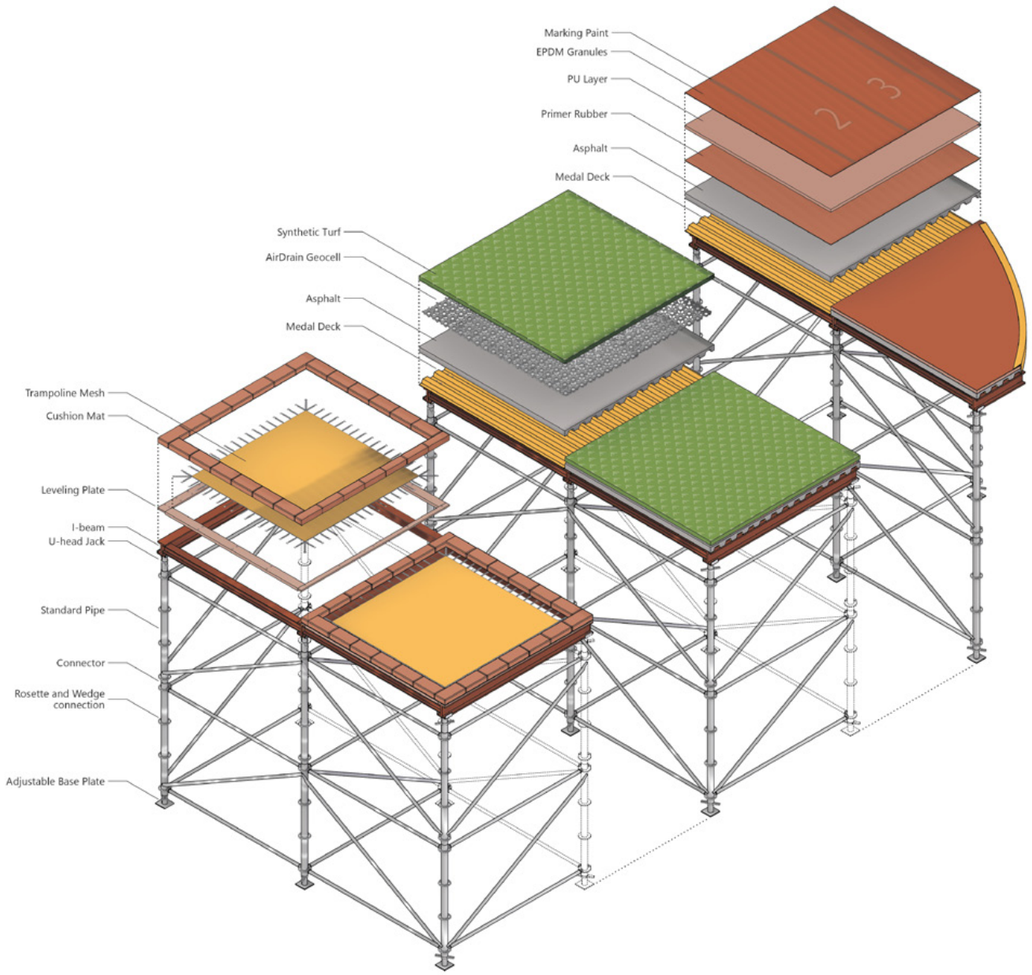


Plan showing sport spaces and connection to adjacent buildings



Longitudinal Section showing track level change

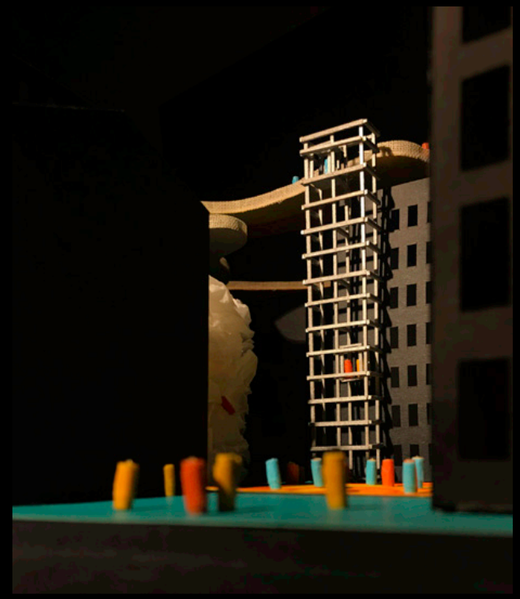
Axon showing program locations and human interactions



Platform Typologies

The axon drawing shows some of the possible platform typologies on top of a more uniform scaffolding system. The three options showed here (left to right) are trampoline, turf grass, and running track. The scaffolding grid can also support curved forms.

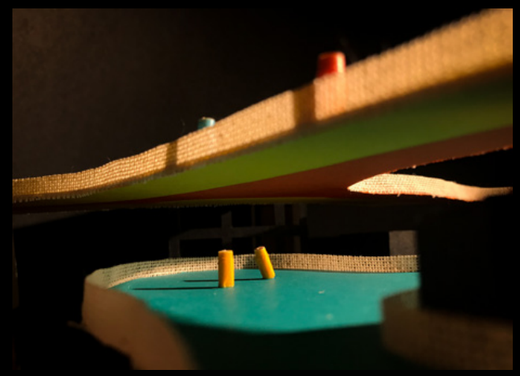
On the platform that can accomodate many people. Connection to the adjacent building for indoor activities

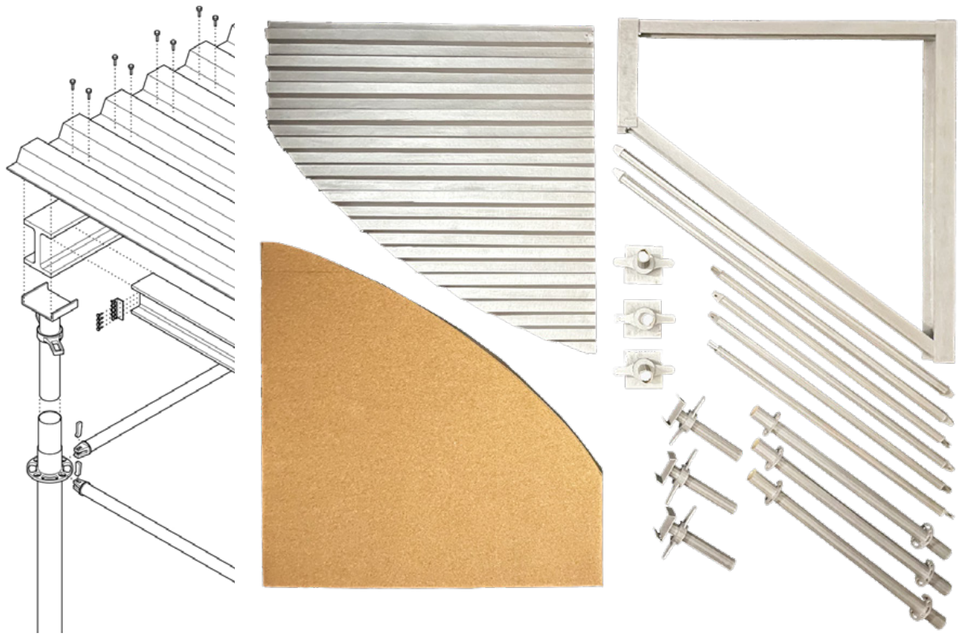


From south entrace to the 24/7 sports court. Elevators as main vertical transportation to platform above.

On the platform looking back to the sports court. Basketball court and rock climbing facilities are provided.

Lower track, showing interesting spacial and lighting qualities where the tracks overlaps.





Material Kit for 1:1 Model

This model is constructed during Covid, which I had very limited material and tools. However, I managed to use chipboard, foam, and cork, hand cut every piece, and assemble everything at home. The set of photographs on the right demonstrates the process of assembly.

RADICAL
POZNAN

TRAIN STATION ADAPTIVE REUSE

Instructor: Olga Aleksakova
Studio: Adv 6, Spring 2023
Collaboration: Simon Galecki
Site: Poznan, Poland

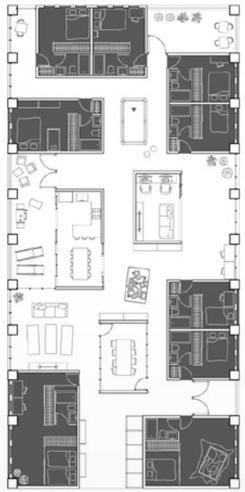
Through research we learned that there is currently a huge housing shortage across Poland due to an influx of migrants. We also found out that there is a network of abadoned train tracks and stations in the country as transportation shifts to car and planes. The site we picked is located in central Poznan, where the old station was abandoned when a larger new station opened next door. We though it showcases a perfect opportunity to tranform the old station and train platforms into housing complex to mitigate the urgent need. The neglected train tracks are tranformed into a green park, which reconnects the west part and the east part of the city that was formerly disrupted by the train routes.

For the train station, we kept majority of the existing structural elements and introduced a series of communities that adopt differnet lifestyle with different levels of privacy and sharing. There is no typical corridor in this housing complex; instead, plenty public spaces traverse through and around the living space, forming a circulation that is filled with programs and community activities. Residents are able to visit any part of the station housing through such a path and choose where to reside according to each person's unique lifestyle preferences.

For the platform, we also preserved everything on site and adopted a system of prefabricated units with three module, which provided 12 unit types with various layouts and scales. These units can be quickly transported with the existing train system and installed on site at any abandoned train platforms, providing a possible solution to partially alleviate the housing shortage.

Room Typology

Maximum privacy in each bedroom yet shares everything else with the residents of the station housing. Multiple ways to navigate through the public space.



Apartment Typology

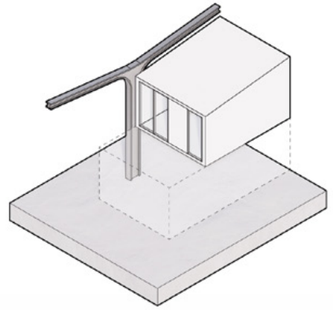
Similar to usual apartments, residents have their own room and shares facilities in the unit. When doors are open, the living room becomes a part of the public space outdoor for larger events.

House Typology

Sharing mostly happens among the residents in this community. This typology further increases its internal publicity by opening up part of the bedroom spaces to join the central shared area.

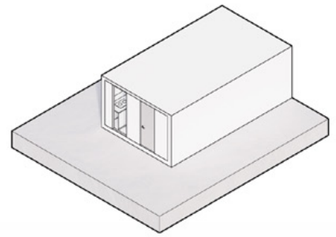
Module 1

This module is only applyed on the second floor. It has a sloped roof to follow the existing slope of the platform shed, and is half the length of the platform width (17.5') so it can be applied on both sides.



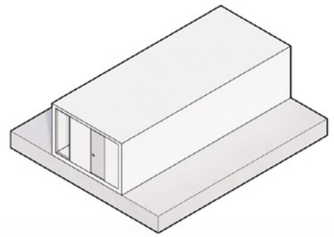
Module 2

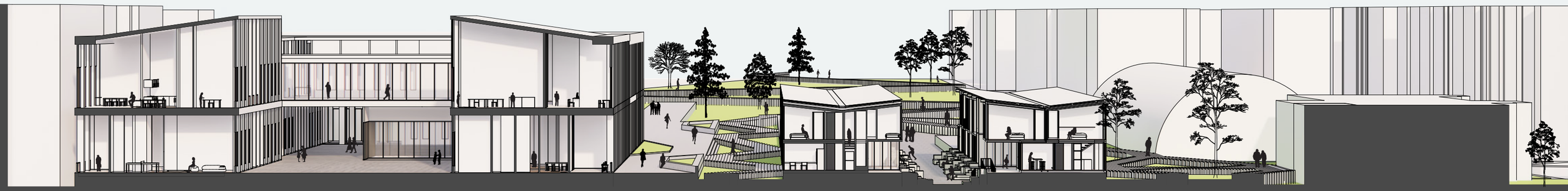
This module is 15' wide by 25' long to create a terrace space either at front door for shareing and gathering or at backyard for private uses. It is also the smallest unit available in the platform housing complex.



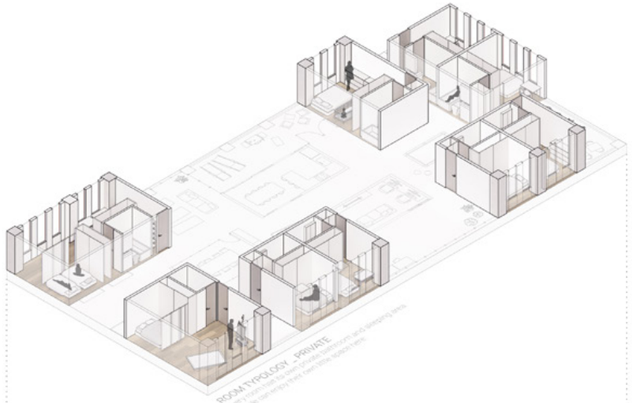
Module 3

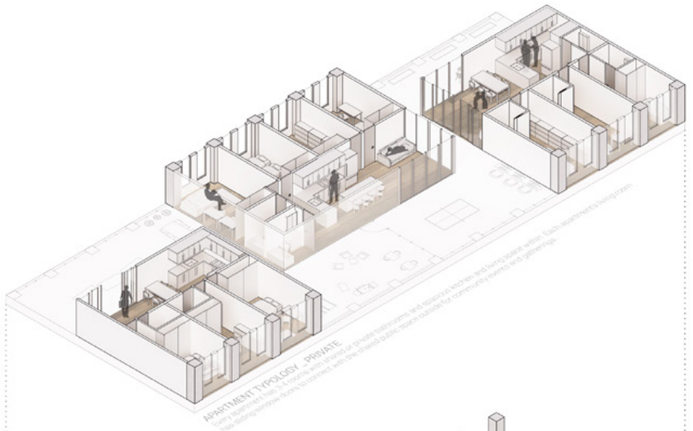
Similar to module 2, this module is 15' wide but is slightly longer in length (35'), occupying the entire width of the platform. When applied with module 2, they create an offsetting effect for the facade.

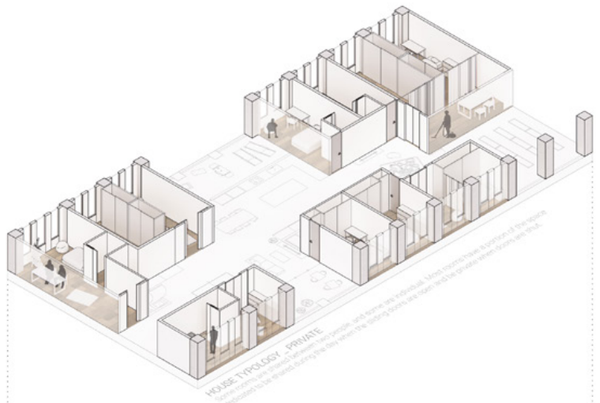


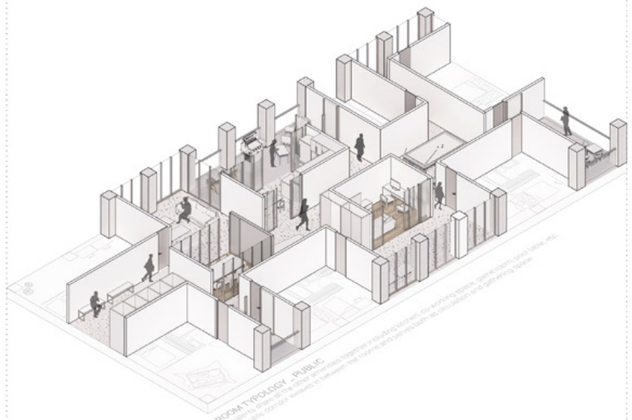


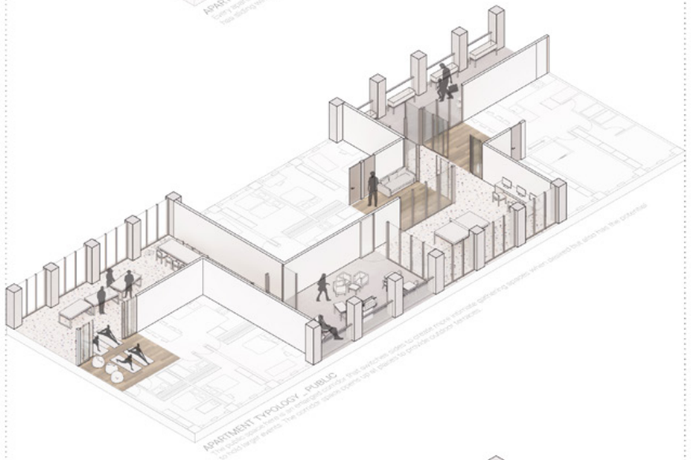
Section showing the connection through new station, station housing, park, platform housing, tram station, and service building

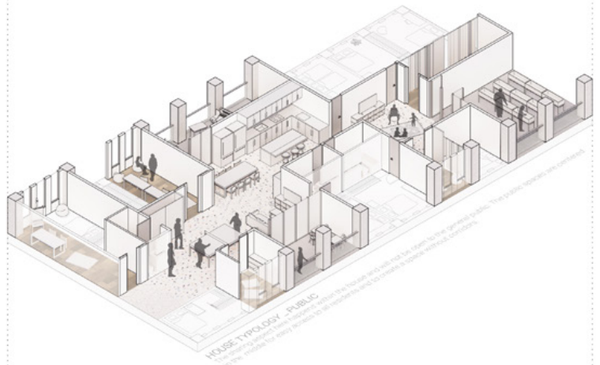

ROOM TYPOLOGY _PRIVATE

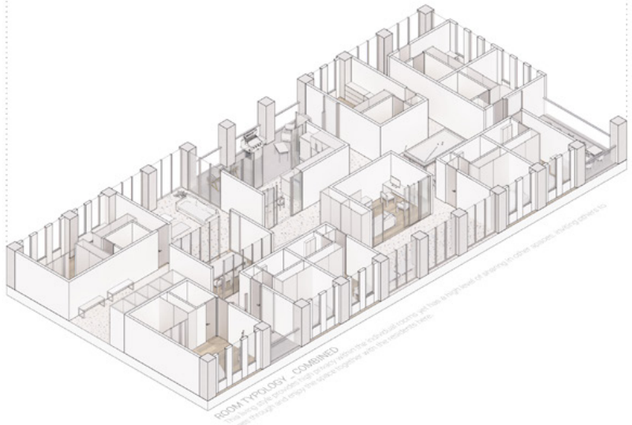

APARTMENT TYPOLOGY _PRIVATE

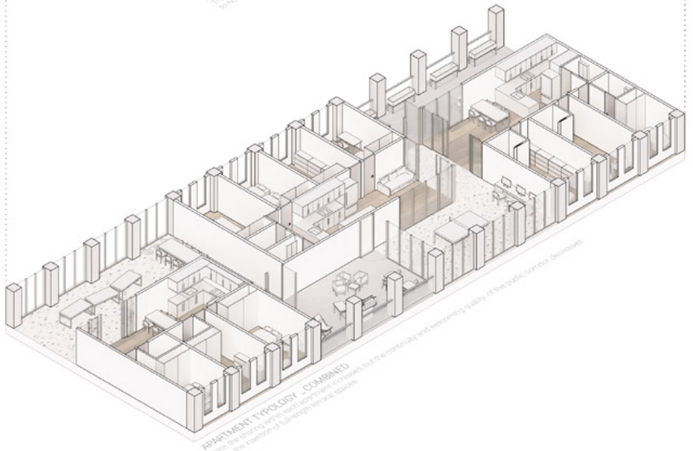

HOUSE TYPOLOGY _PRIVATE

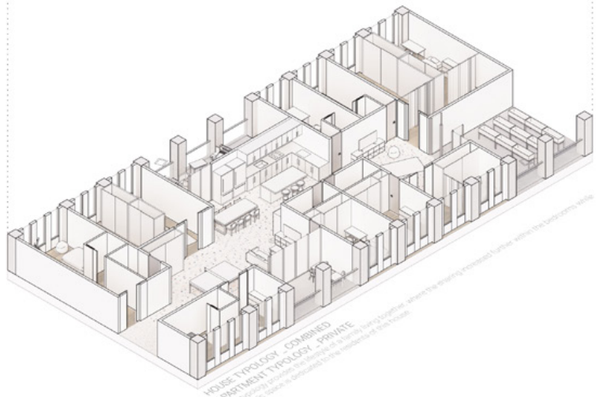

ROOM TYPOLOGY _PUBLIC

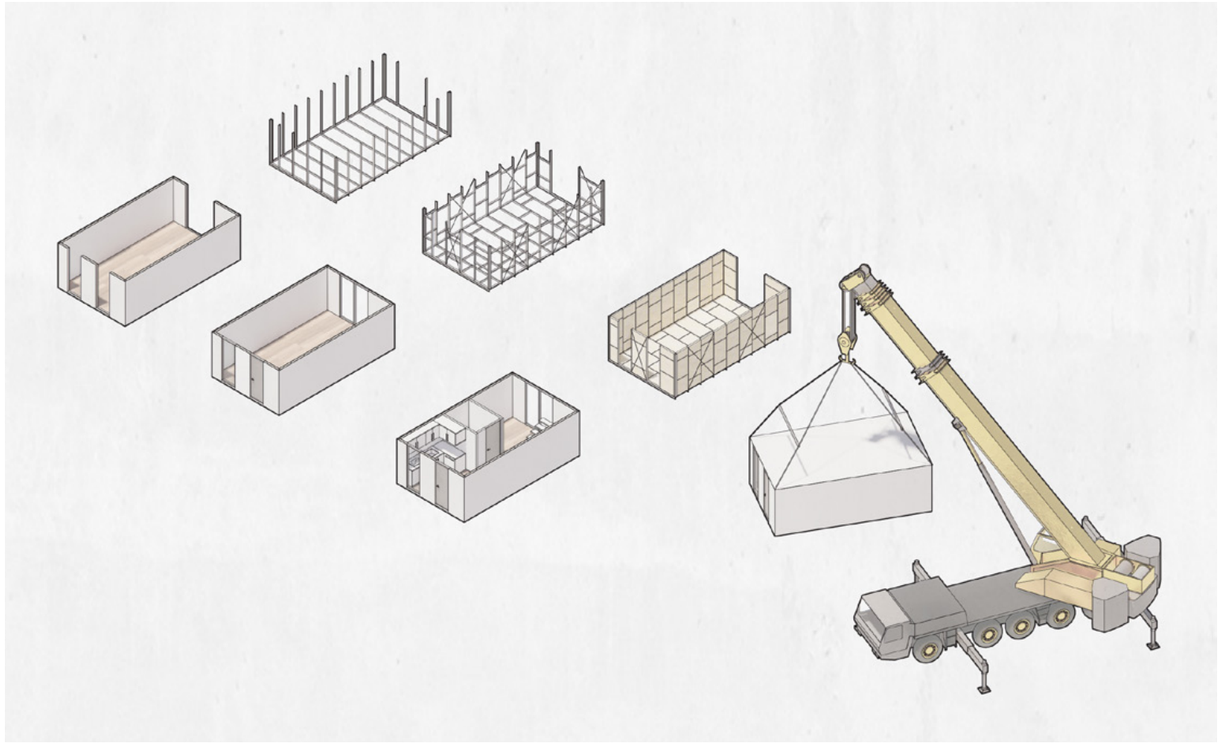

APARTMENT TYPOLOGY _PUBLIC


HOUSE TYPOLOGY _PUBLIC

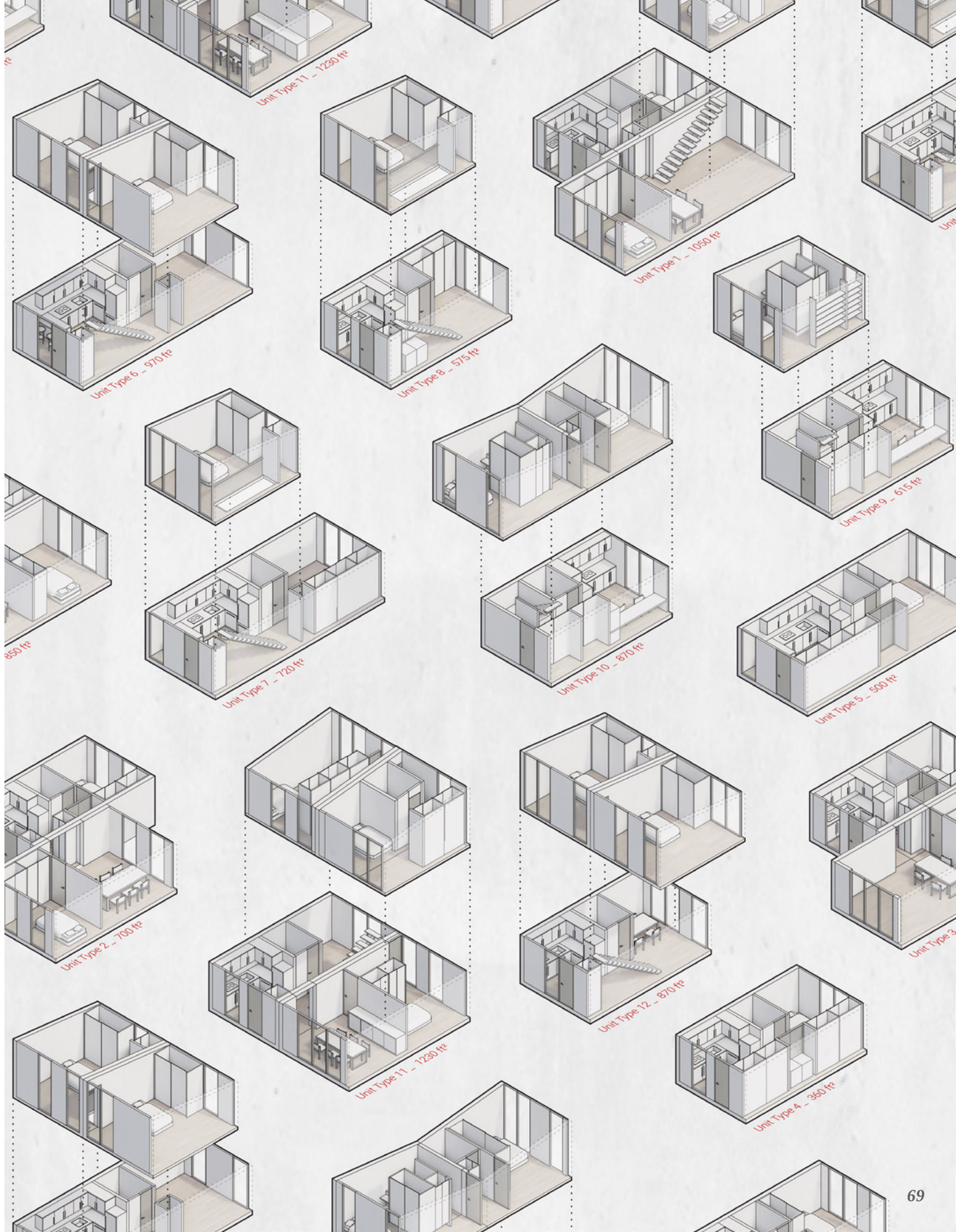

ROOM TYPOLOGY _COMBINED


APARTMENT TYPOLOGY _COMBINED


HOUSE TYPOLOGY _COMBINED
APARTMENT TYPOLOGY _PRIVATE



68 Park between the platform housing and the station housing



TRANSITIONAL GEOMETRIES

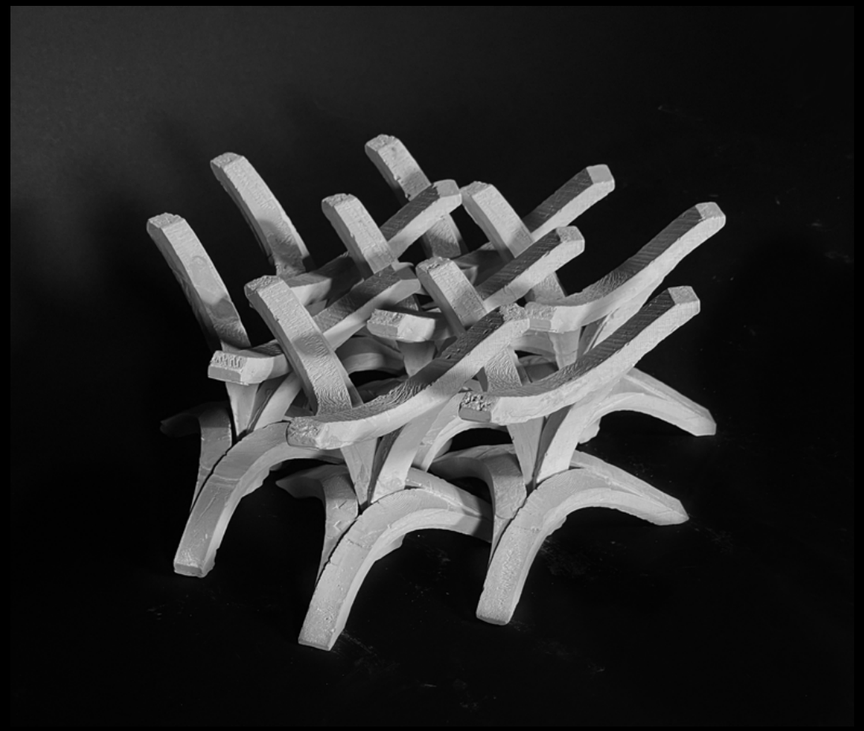
THE BEAUTY OF TESSELLATION

Instructor: Josh Jordan
Class: Transitional Geometries, Fall 2022
Collaboration: Jackie Pothier

The tiles first exist in the form of a pattern drawing, then be translated into the three-dimensional world. My partner and I was interested in how tiles can weave among each other while still have the ability to expand in all three directions, performing like a spacial object, rather than only growing in two directions, acting like a mat or a facade.

The final result was fascinating that with only two tiles, produced in larger quantity, we are able to create such a diverse catalog of forms. The material efficiency and lightness quality of the tiles does not compromise its spacial qualities. The iterative design and making process helped us to learn from our errors and insufficiencies, a truly unique experience!

Tile Material: Rockite
Mold Material: Silicone



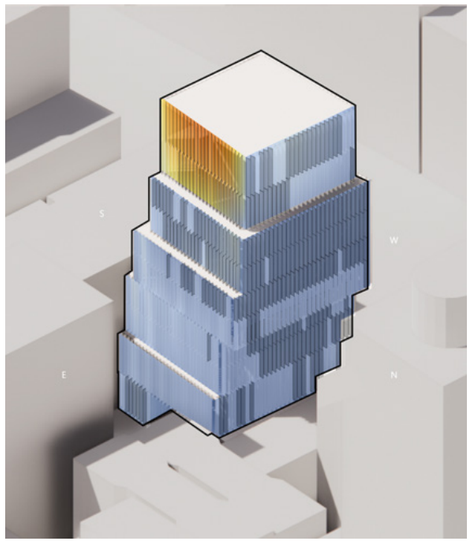
RE-IMAGINE
NEW MUSEUM

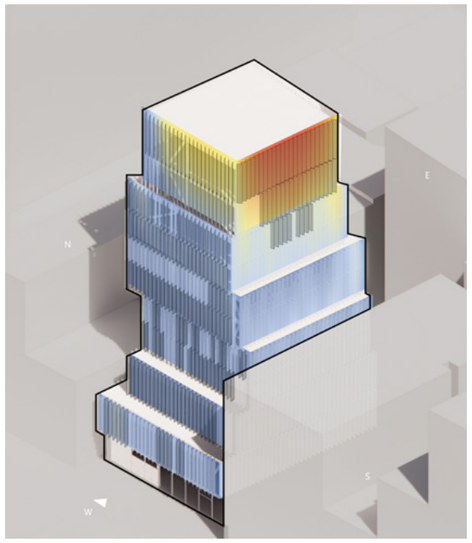
GENERATIVE FACADE SYSTEM

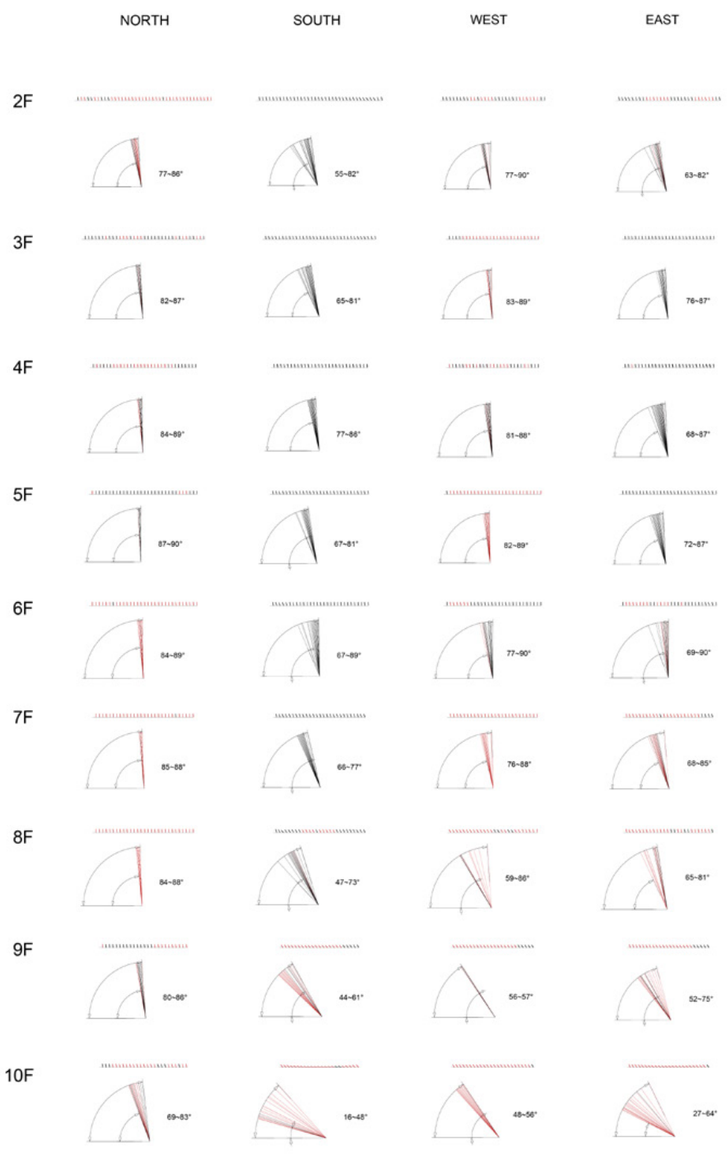
Instructor: Joseph Brennan
Class: Rethinking BIM, Spring 2022
Collaboration: Lesley Li, Qingning Cao

The class asks student to target a mid-size building in New York and reimagine it through generative design. Through research, we found the New Museum has a complicated layer of trusses burried under its white walls and metal screens. We see it as a opportunity to expose the unique structural elements while achieving daylight control and sunlight harvesting simultaneously.

The new generative facade features two types: PV films (the darker ones below) and solid panels (the lighter ones). The building is able to harvest 80% of solar energy with only 50% of the panels turned into PV files (compared to turning 100% of the panels to PV). The angle of the panels, from 15 degrees to 90 degrees, are adjusted according to sun intensity and radiation. In the illustrated case here, the angles are set to avoid glare on upper floors and bring gentle light into the space on lower floors.

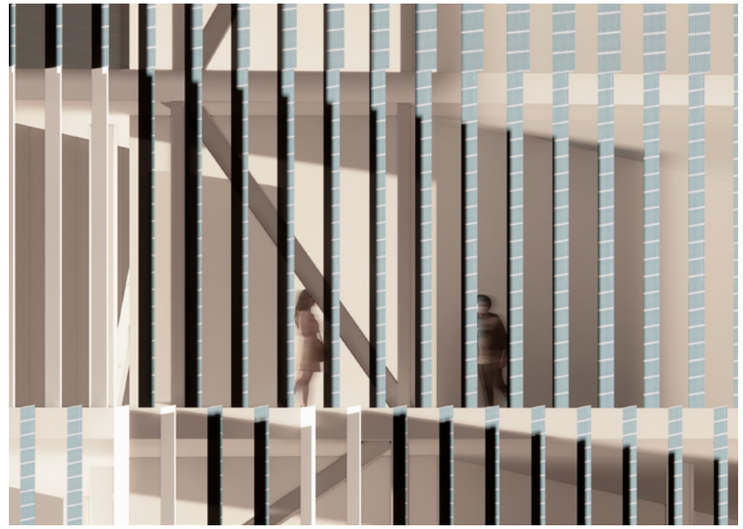






PANEL ANGLE CATALOG

This catalog maps out all the facade panels in the project. As you move upper floors, the angle of panel becomes smaller to avoid glare and more panels have PV due to higher exposure to sun.



PVs and solid panels create interesting pattern for the facade

Interior view of the newly imagined New Museum

Shining Hong