

*XIUCONG  
HAN*

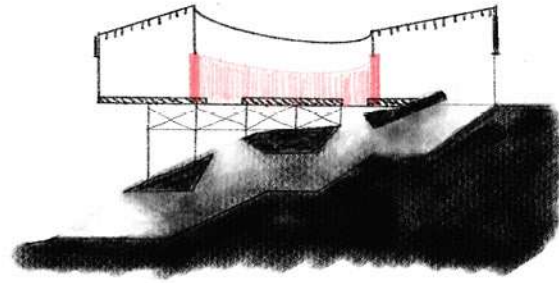
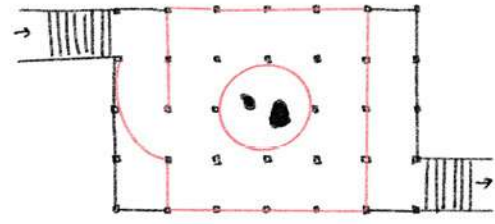
Graduation Portfolio 2022

Columbia GSAPP  
Master of Architecture

*an assemblage of*

*cultures / spaces / technologies  
learning / practices / cooperatives*

01	Split Rock : a Museum Portal
02	Thresholds : the Binary House
03	Stereotomic Granite : Penn Station
04	Adaptive (Re)use : School
05	Factory : Brewery Incubator
06	broadway stories : in public space
07	Envelope : Glowing Pillow
08	Computation : City of Billboards



## 01 Split Rock: a Museum Portal

Columbia GSAPP  
Core IV, Spring 2021  
Instructor: Robert Marino

### Museum of Ramapough Native Indian Arts

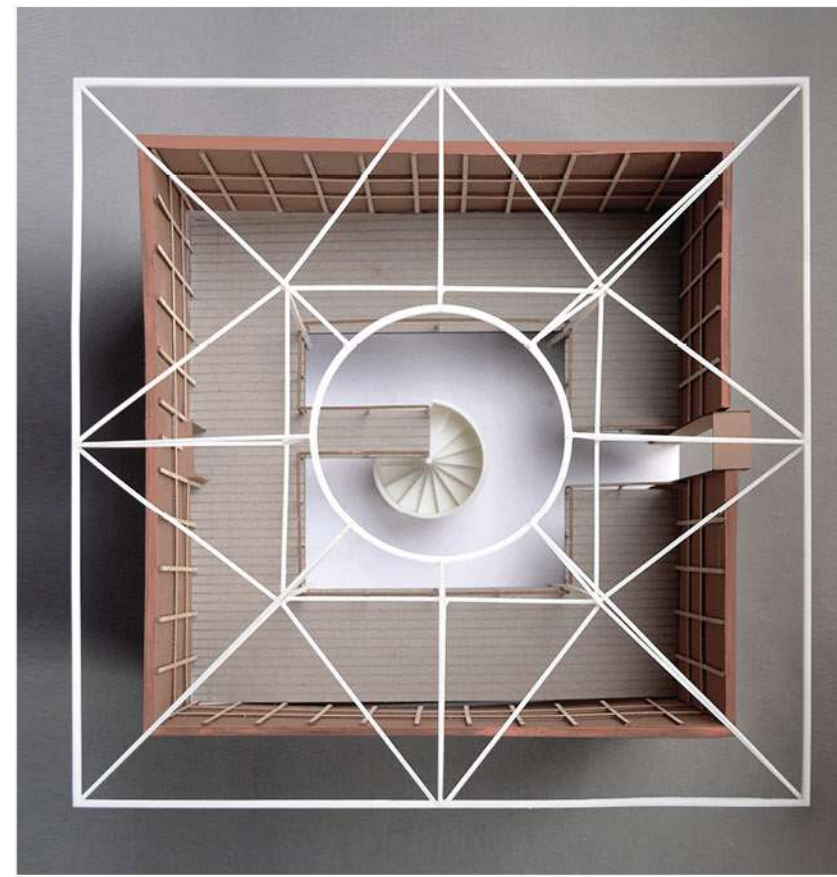
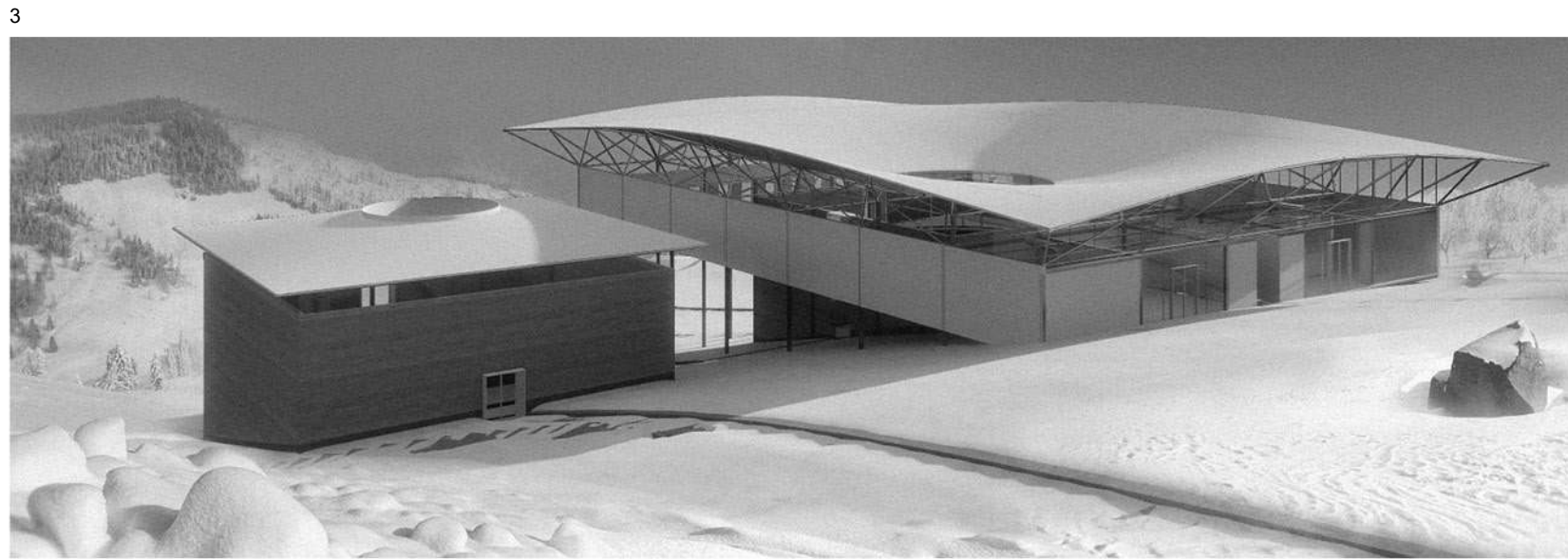
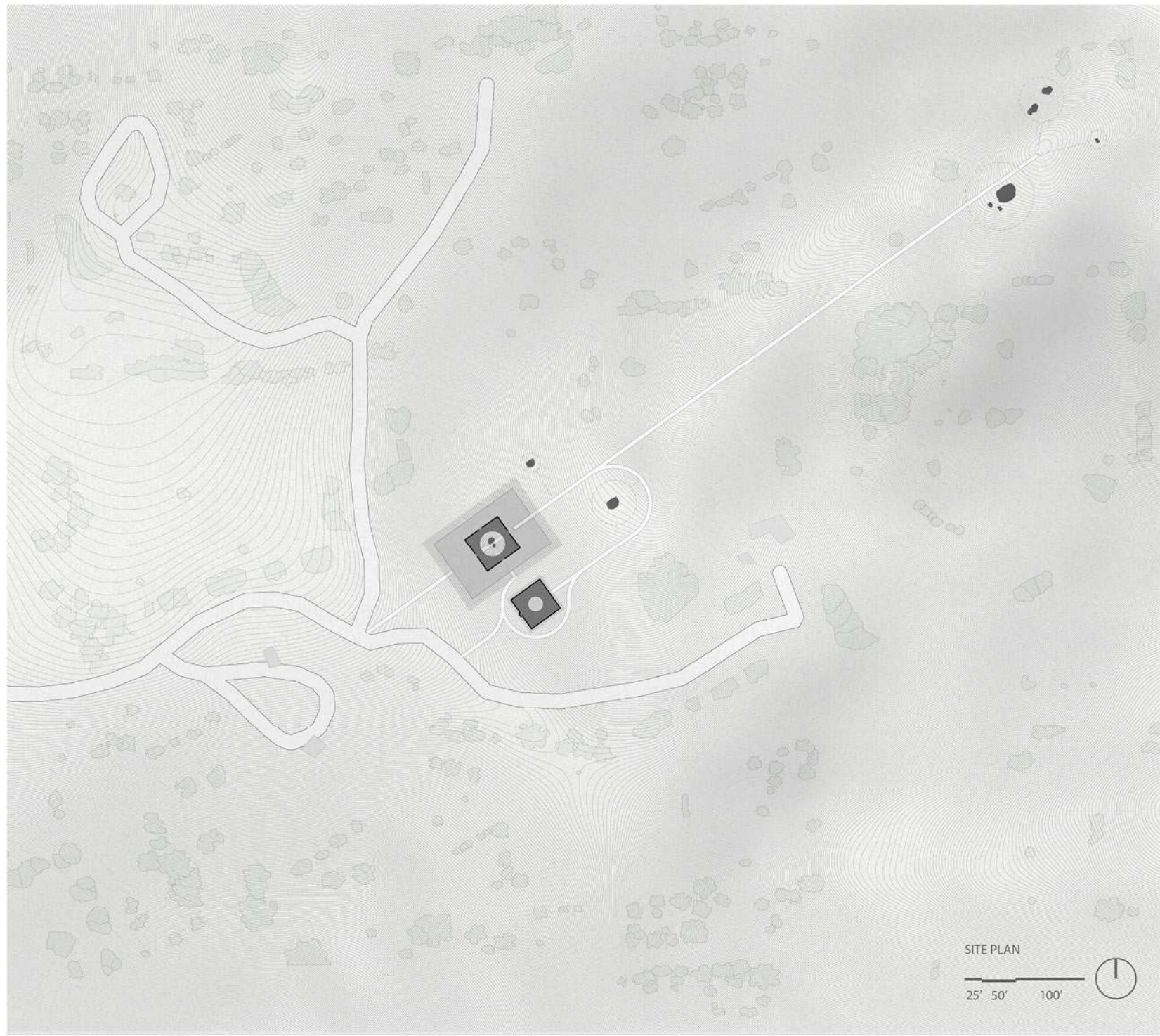
The Museum of Ramapough Native Indian Arts is a portal, an entry point of transcendence, a gateway to the spirit world. The Lenape Ramapough Tribe is proposing the possibility of a small museum adjacent to the sacred territory of Split Rock, a very rural, solid granite ridge near the town of Millburn, New York. The project is intended as a physical symbol of the tribe's presence, its history, and its traditions.



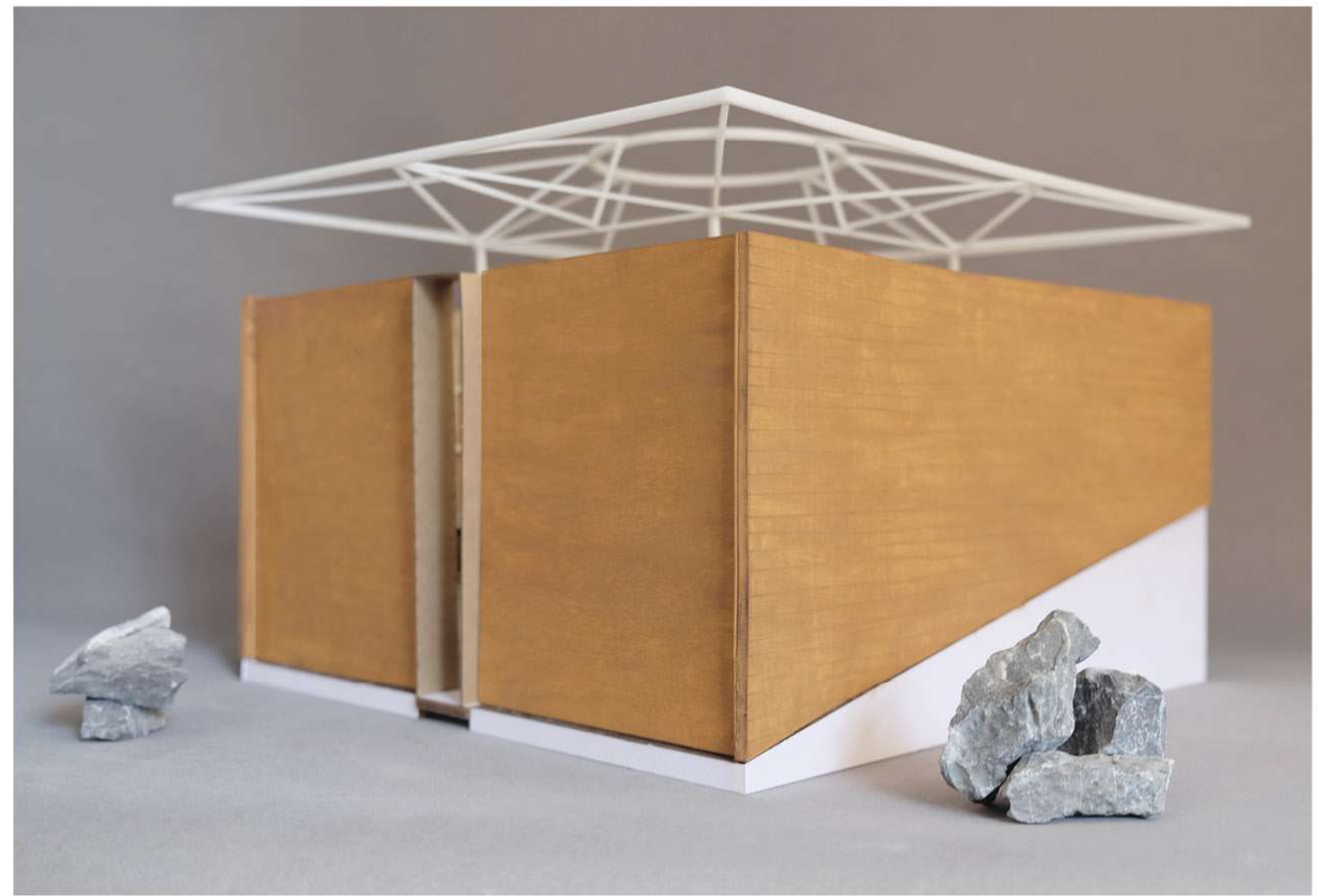
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Sitting at the Ramapo Ridge, a carved staircase along with the topography subtly invites visitors to step on their journey. In the sunken courtyard, scattered rocks are presented under the light as a preview of the spiritual experience ahead. In the center atrium of public gallery space, visitors will return to the moment on a different hierarchy to embrace Ramapoughs values. The private gallery resembles the same architectural elements. However, it indicates a fully different story that becomes a vessel of their tribal memories. The structure made by rammed earth and steel carries the sensitivity of American's primitive construction, while implicitly presenting a pair of galleries for native cultures through inverse languages.



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3 site plan  
4 site render

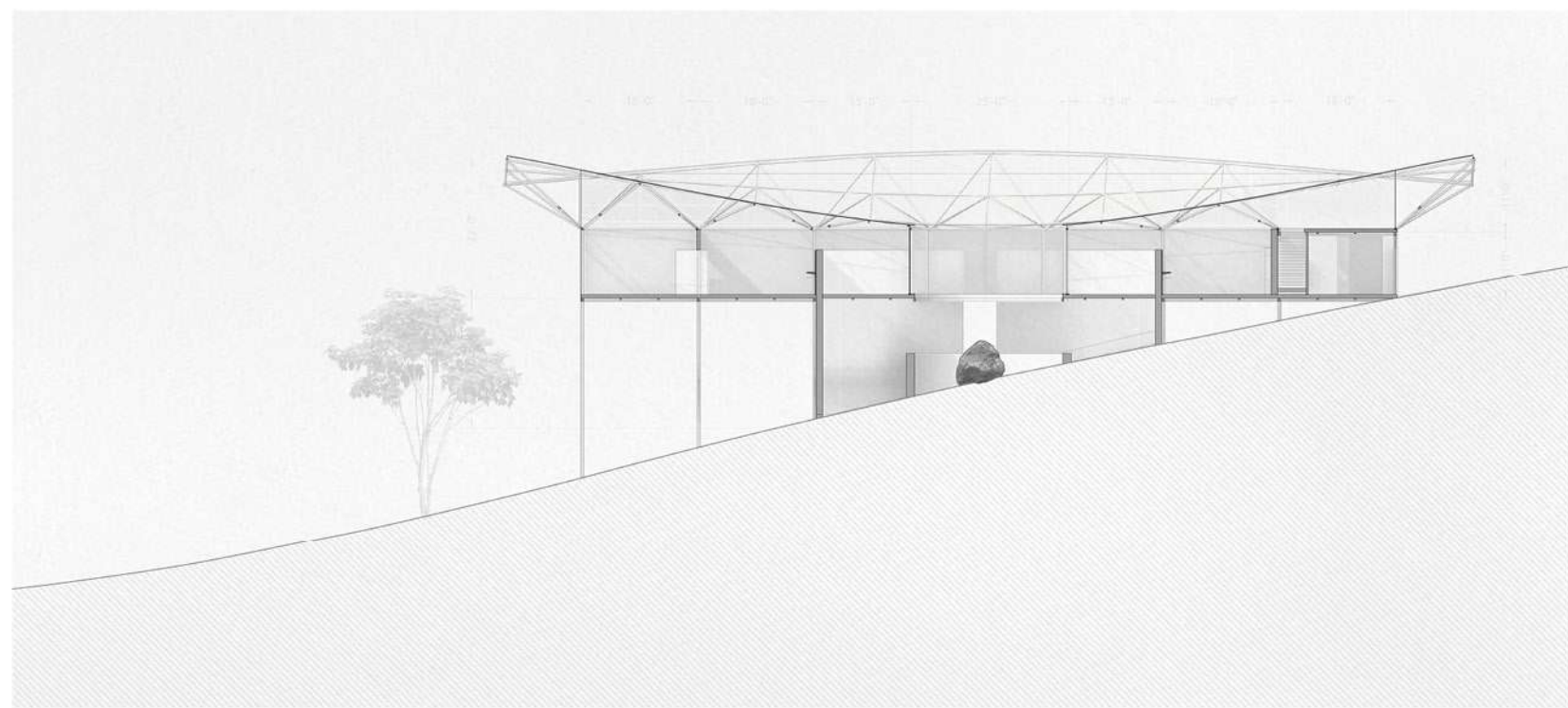
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5 model  
6 model

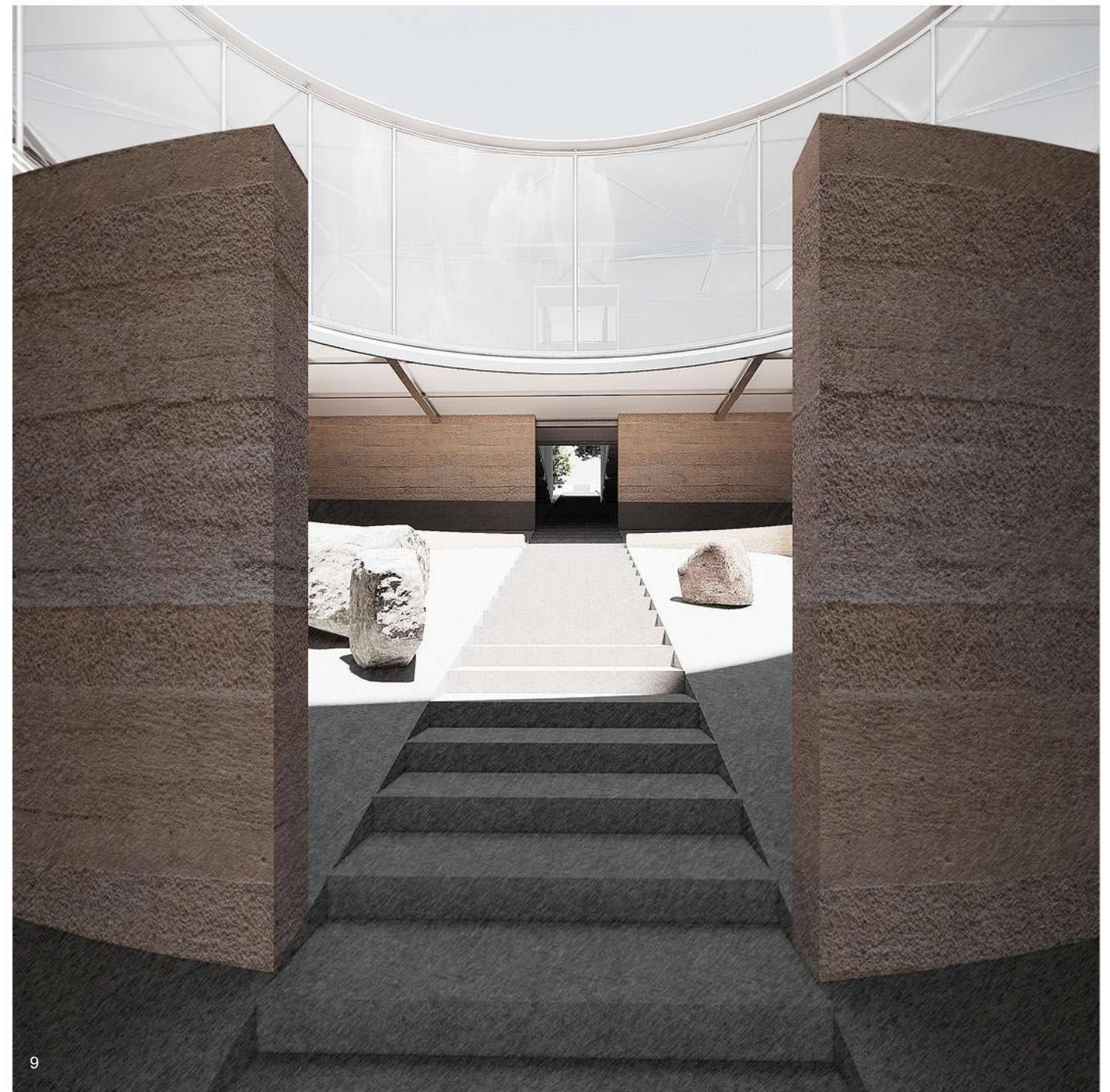


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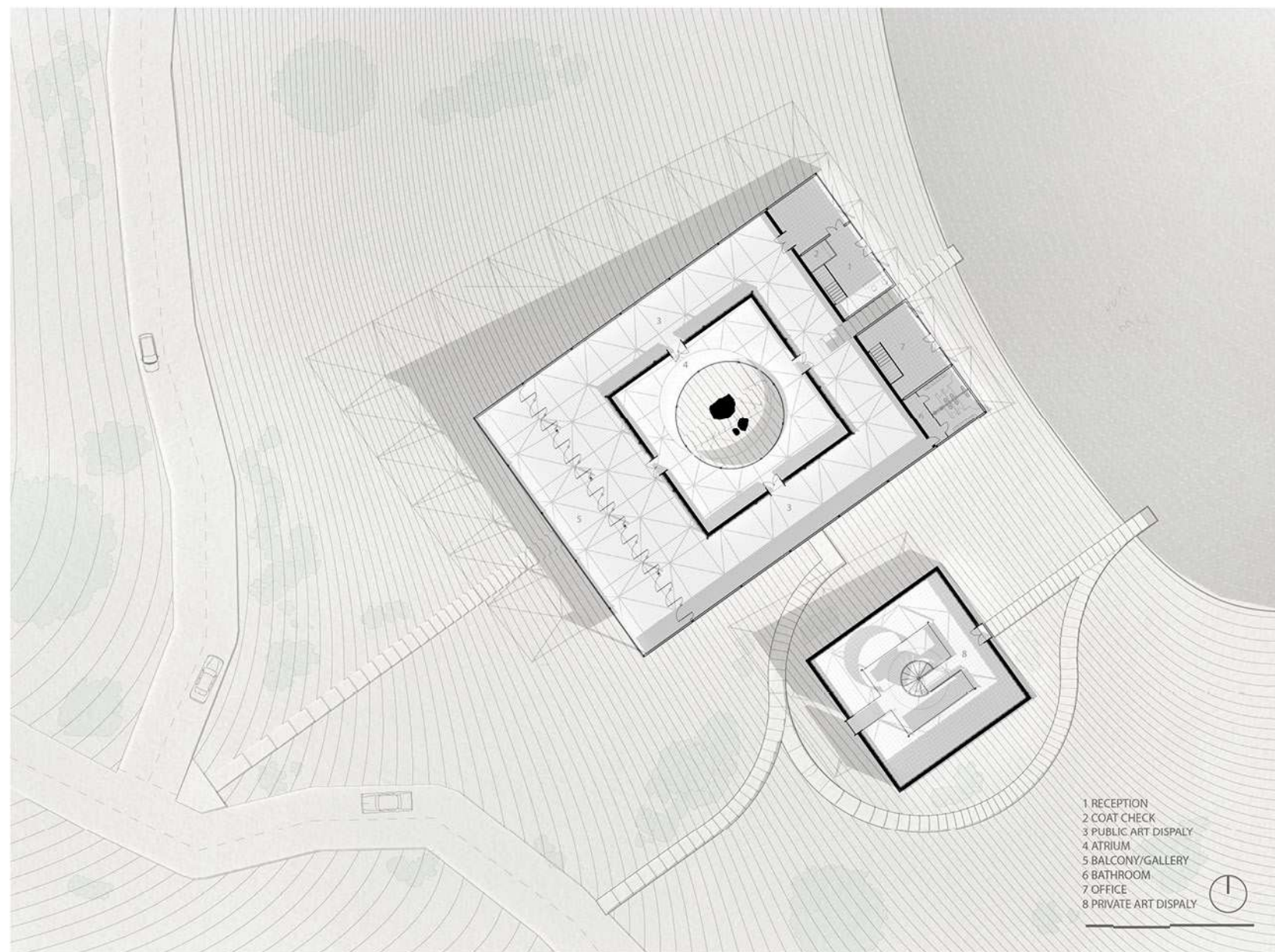
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7 ground plan, passing through sunken courtyard  
8 section of public sector

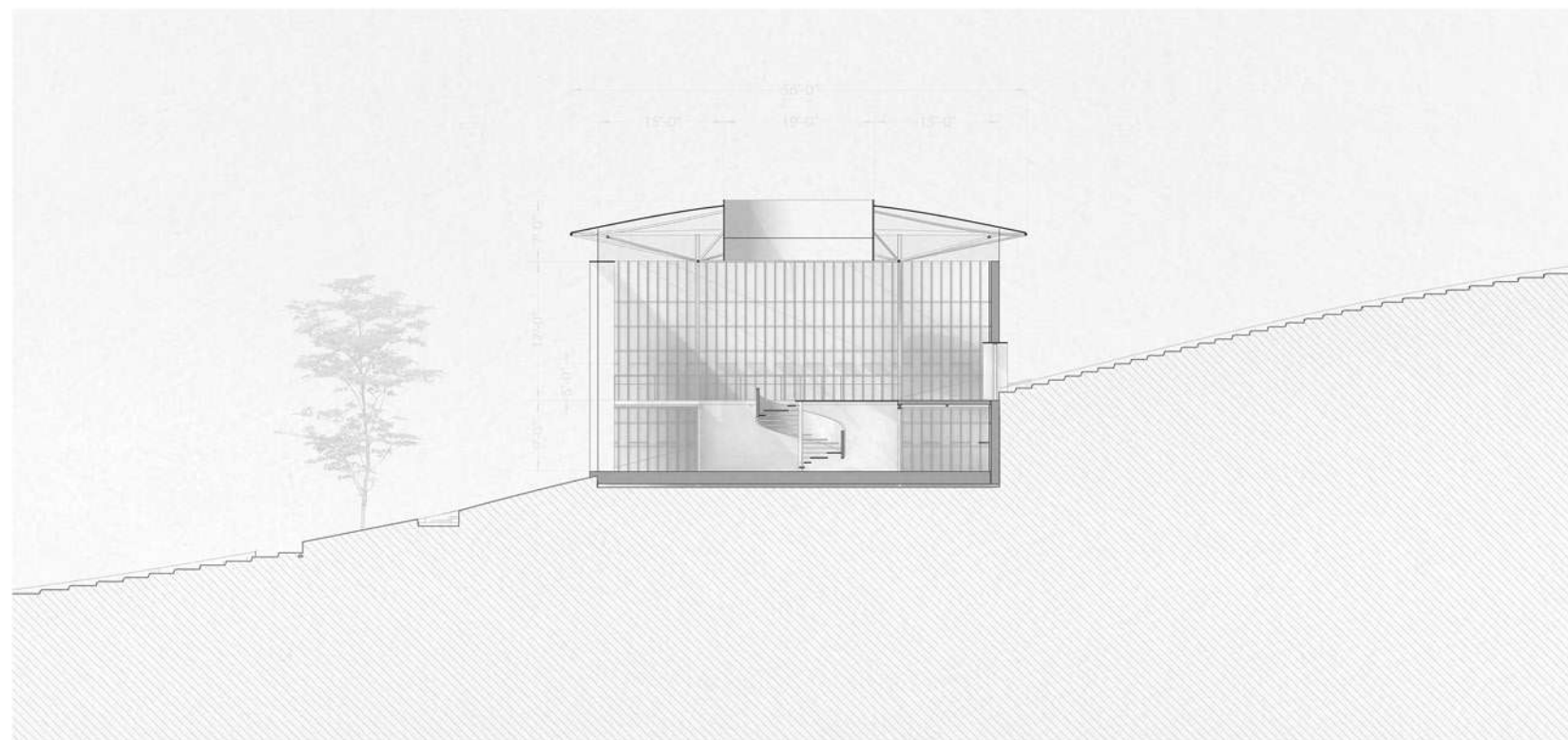


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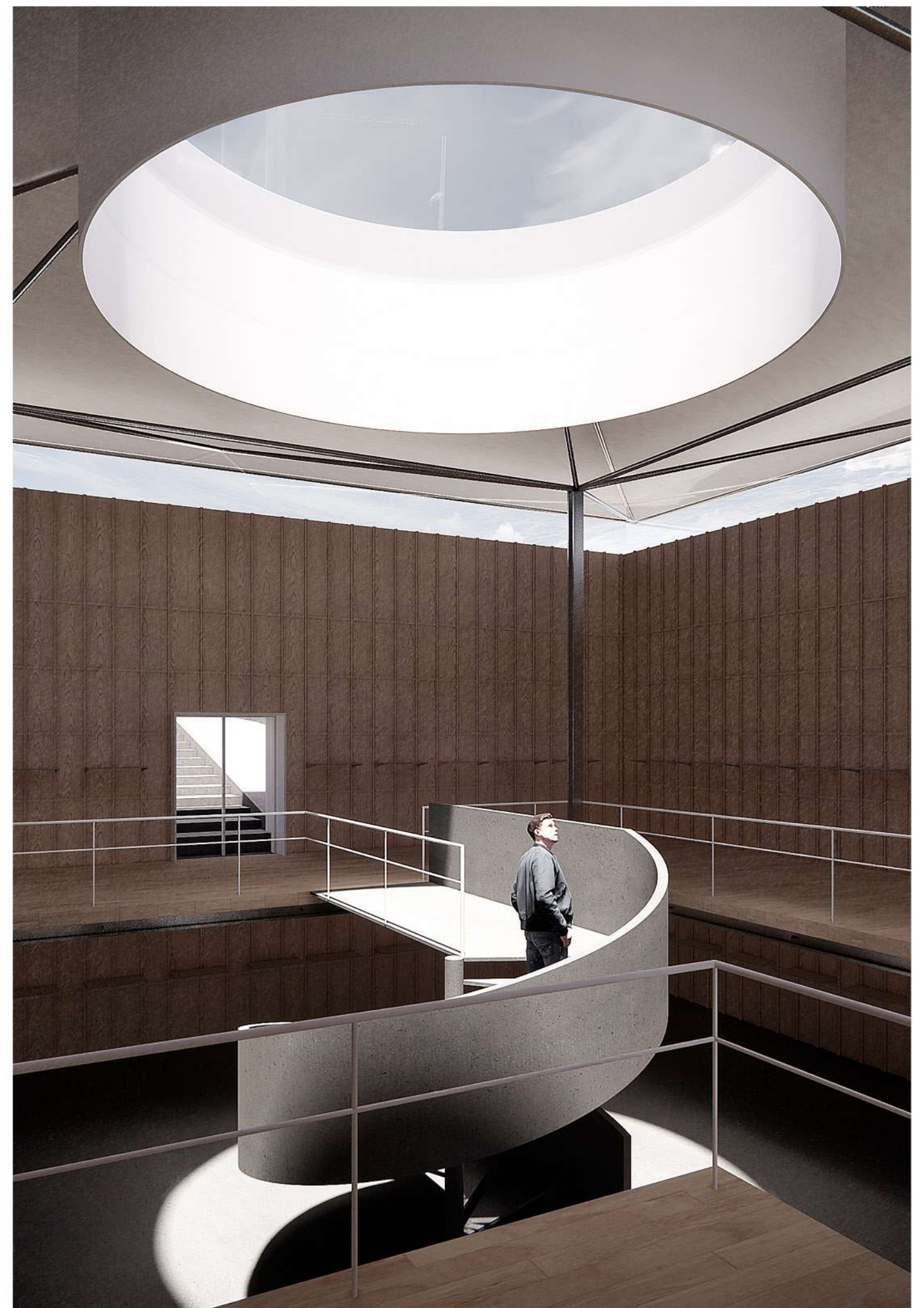
9 render of entry / preview of spit rock



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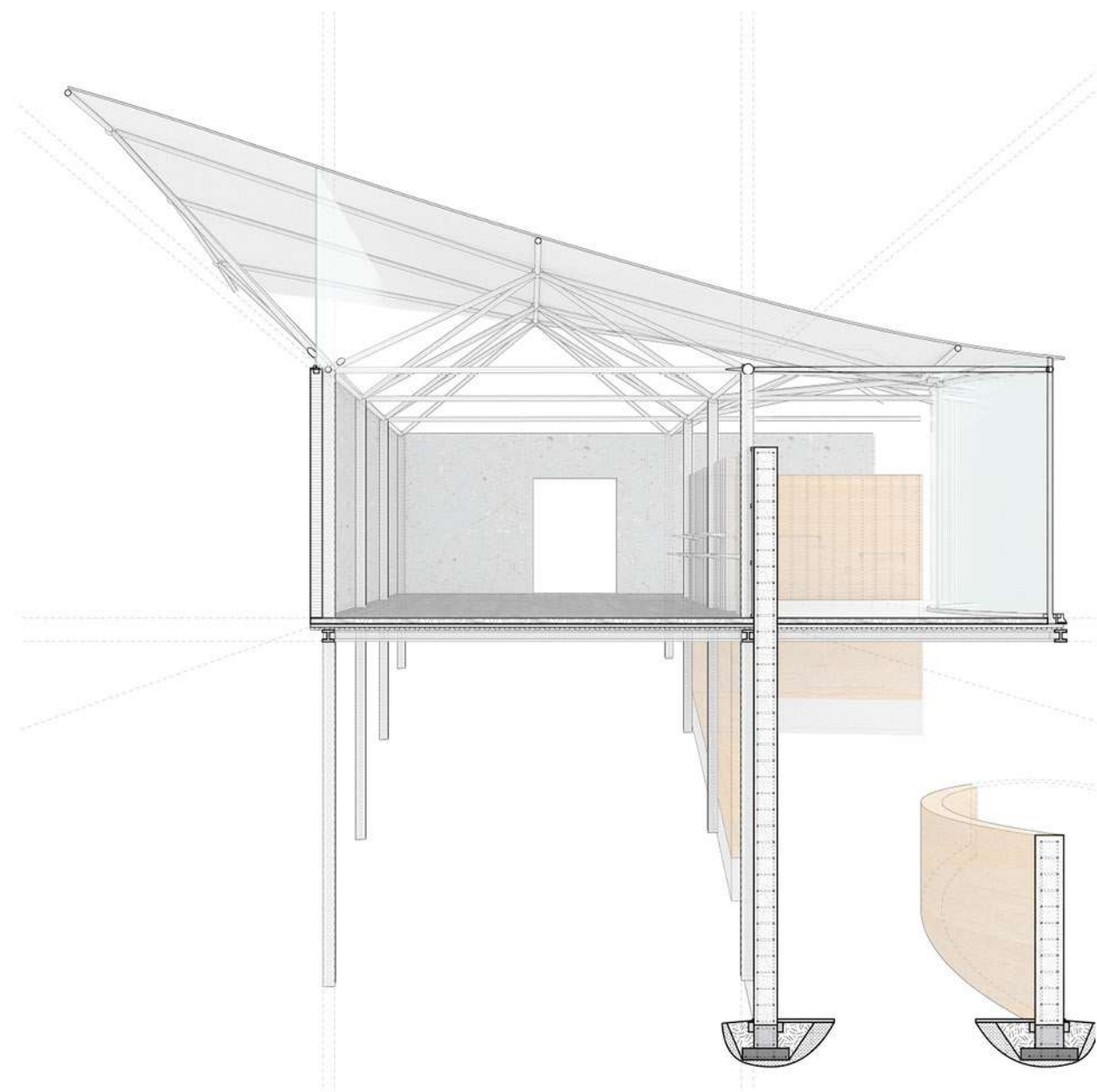
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10 plan of main gallery spaces  
 11 section of private sector

12 render of private gallery with skylight above



13



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13 structure detail section  
14 cross section of two galleries

Architecture is one of the most significant ways in which American Indian societies modified the natural landscape. Traditional American Indian architecture is vernacular in type, and the design, construction, and use of built environments incorporates shared values and traditions. Thus, how this portal to sacred territory is to be constructed becomes vital. The main structure is rammed earth combined with steel structure that elevates the gallery space and supports the roof. After rammed earth construction, selected parts of the wood form-work will be kept for future display shelves and recycled for furniture. The solidity of rammed earth and the lightness of the pvc fiber roof co-exist in the same space and will lead people to look up and down, to the light and to the shadow.



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15 -18 interior renders



02

## Thresholds: the Binary House

**Affordable studio and housing for Bronx artists**

Columbia GSAPP  
Instructor: Annie Barrett  
Collaborate with Xuanyi Chen

Cultural engagement represents an important dimension of community wellbeing by building social connections within groups and across social divides. The arts provide a resource that people can use to make sense of the world as it is, to connect with collective memory, and to imagine the future. The BINARY HOUSE is aiming to design a community that provides affordable housing and a variety of art-oriented services to local artists. By introducing an in-between art space into the traditional housing unit, the project advocates a work-life integrated lifestyle. It encourages local residents to participate in the vibrant culture of Mel-rose, and enhances neighborhood revitalization, social inclusion, and community wellbeing.





### Dynamic culture

artists are welcomed to participate in the interior design. This project provides a platform for artists with a variety of backgrounds to express and exchange ideas.

### Communal kitchen

For units that are not equipped with kitchen appliances, shared communal kitchens will be provided, which serves as an informal social space at the same time.

### Adaptation

provides maximum flexibility in layouts. A variety of configurations of standardized parts will be offered to create individual residences that suit each resident.

### Affordability

The binary house provides not only affordable living space but also working and performing space and commercial programs at the ground level for local artists.

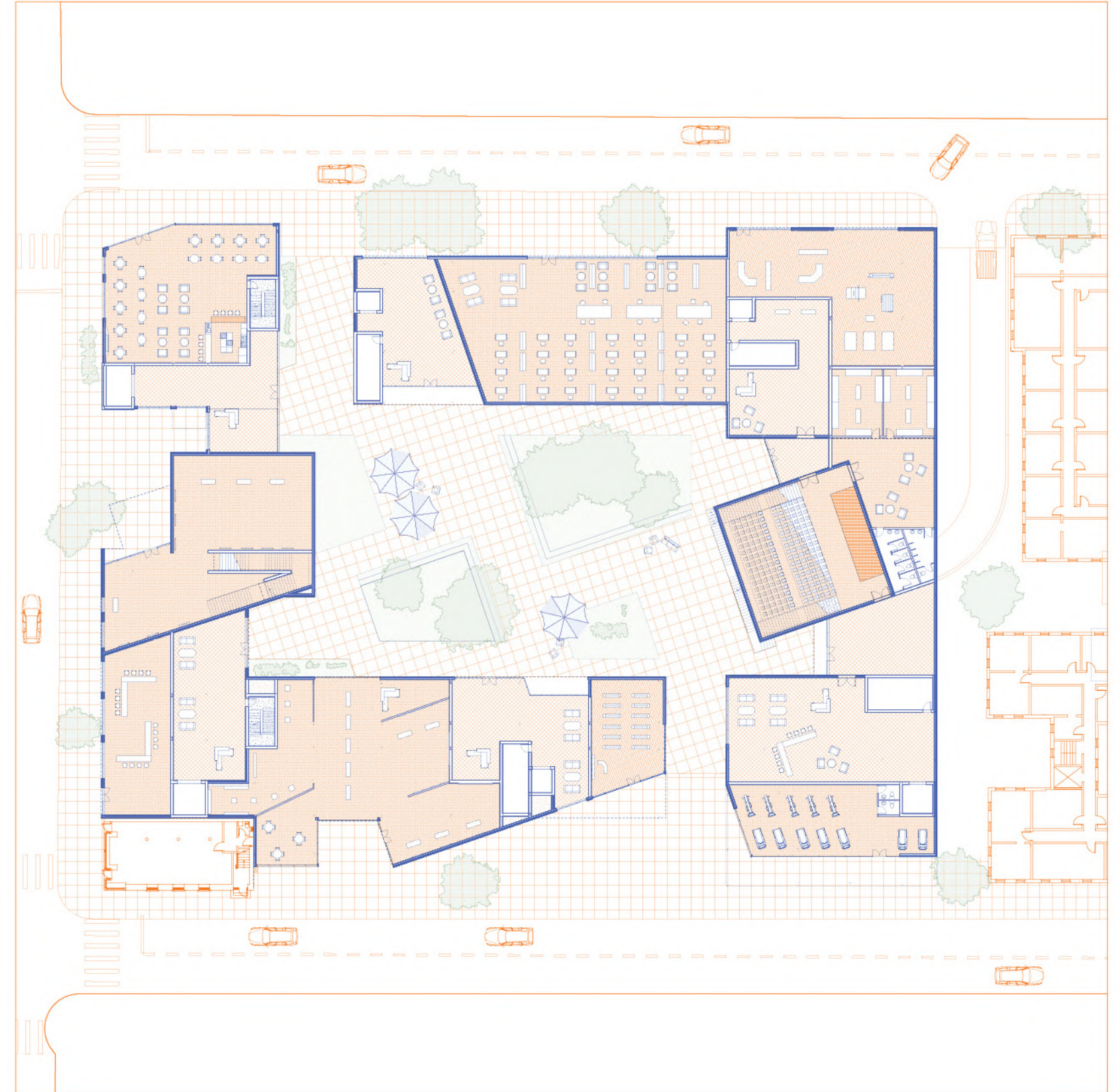
### Live & work

The art-life integration housing is an adaptation of the generic affordable housing, it is composed of micro-unit and a studio space. Residents can also decide the arrangement of their living and working space.



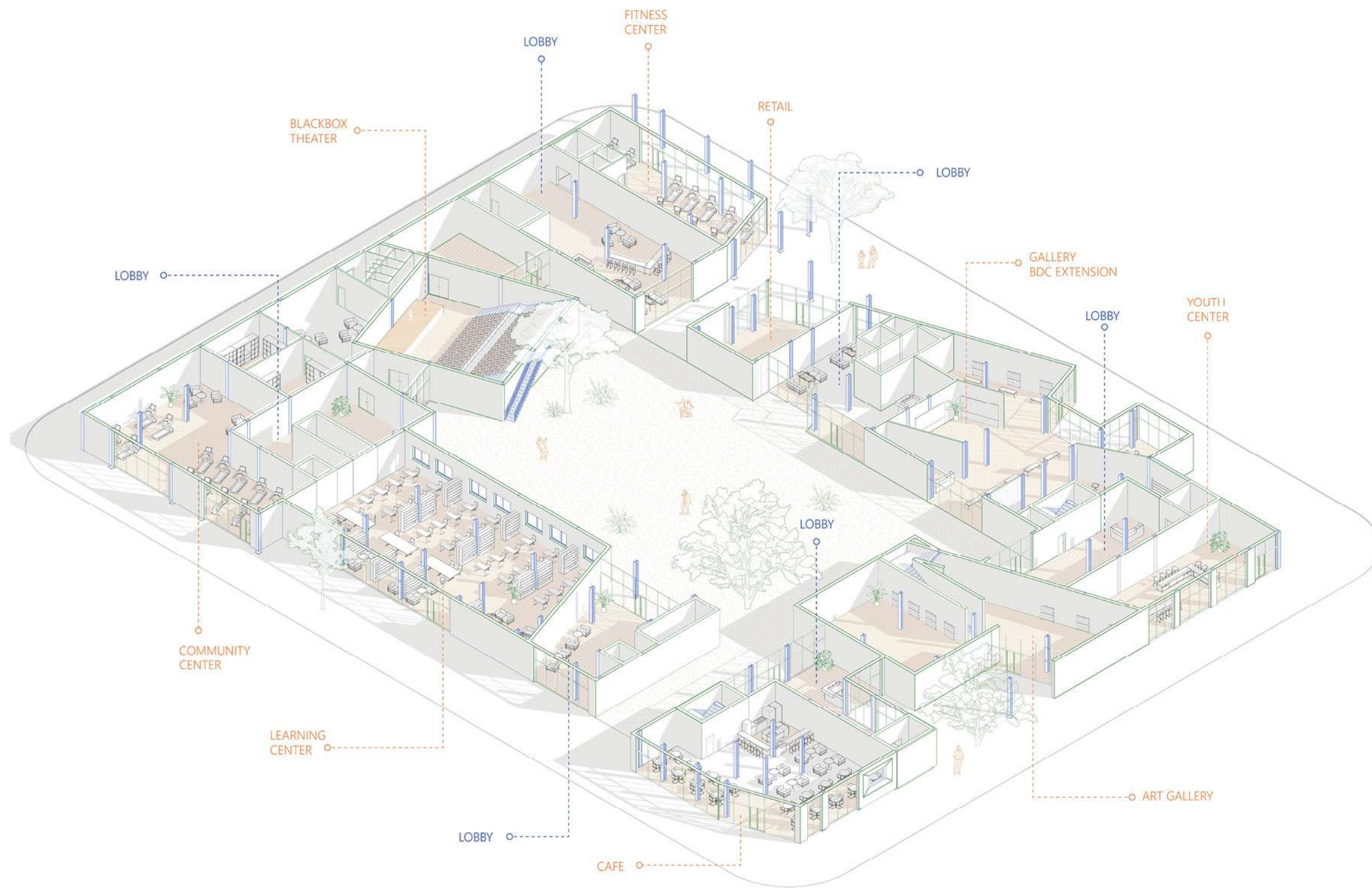
3

3 axon view



4

4 ground plan



PUBLIC

PERFORM

- BLACKBOX THEATER
- BDC EXTENSION
- ART GALLERY
- LEARNING CENTER
- YOUTH CENTER

SEMI-PUBLIC

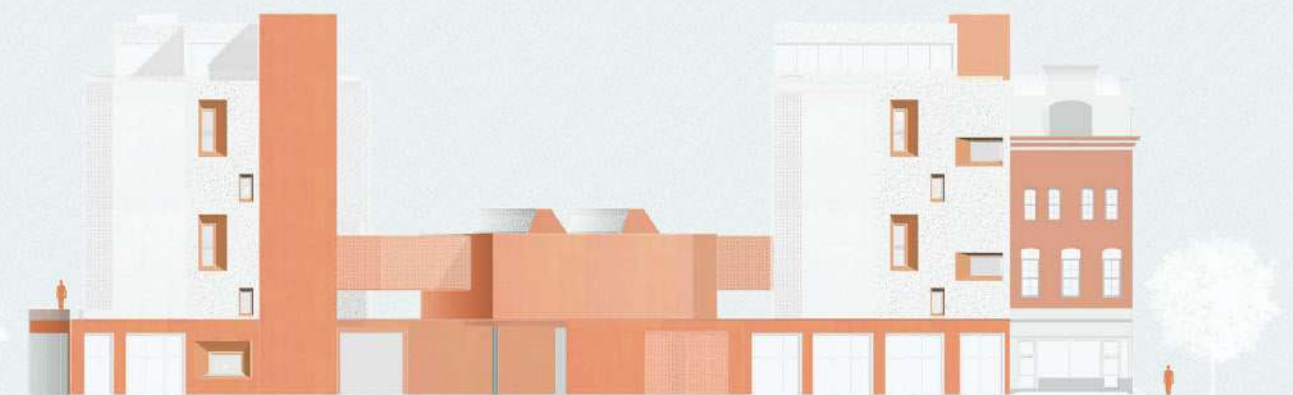
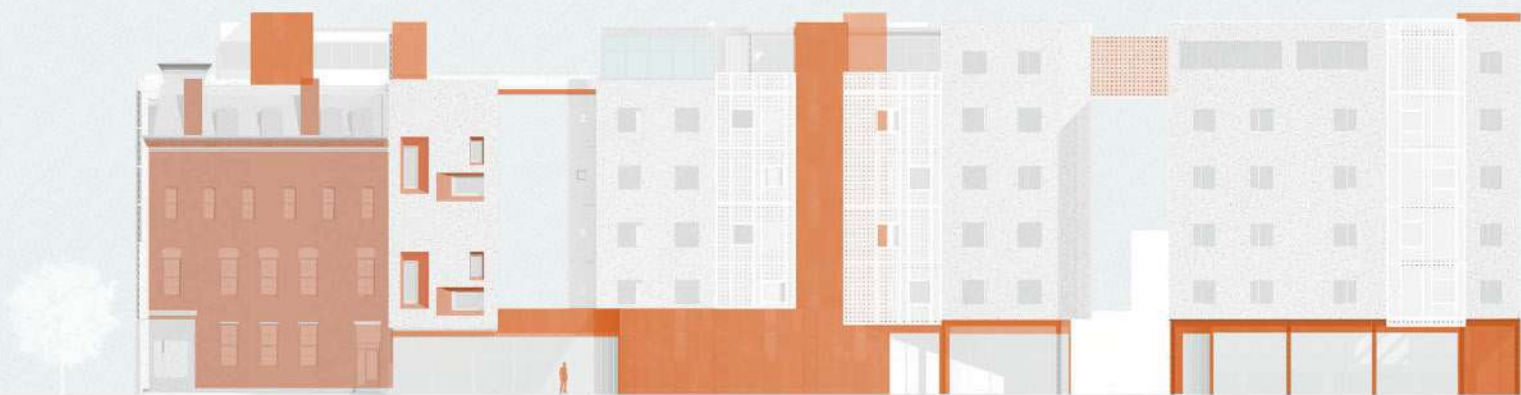
PRACTICE

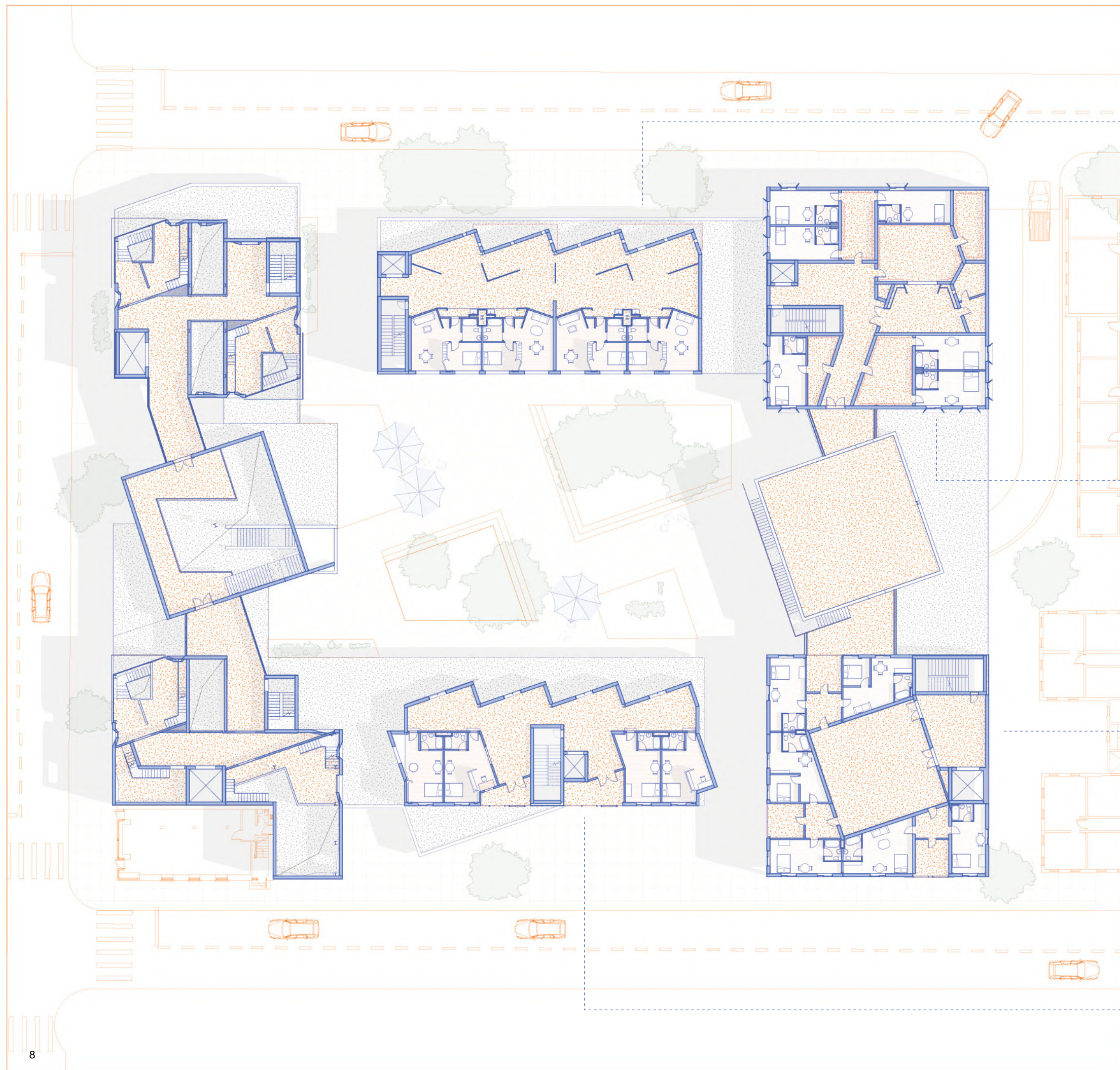
- SOUND STUDIO
- MOVEMENT STUDIO
- DIFFUSED LIGHT STUDIO
- NORTHERN LIGHT STUDIO
- VERTICAL STUDIO

PRIVATE

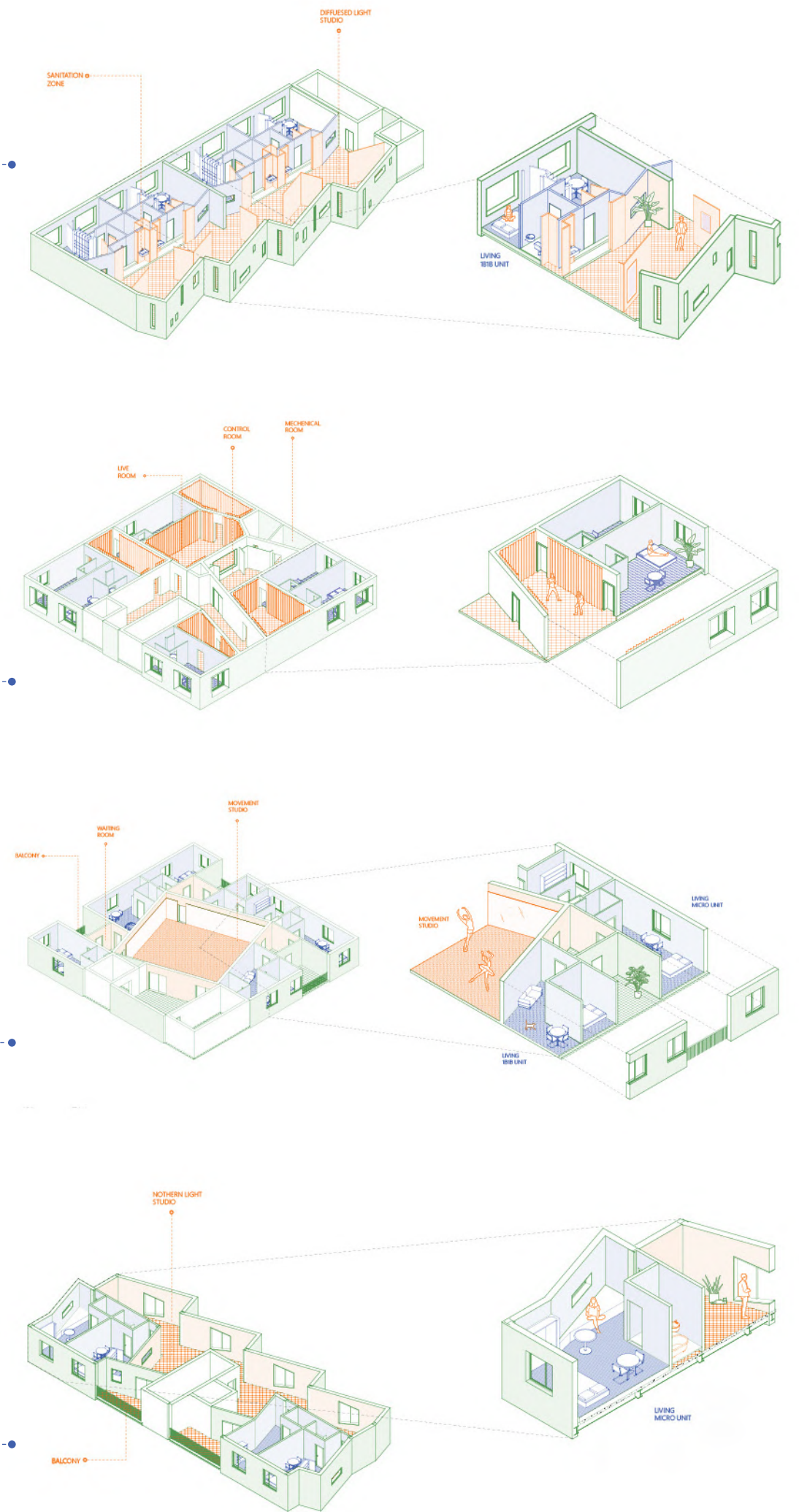
LIVING

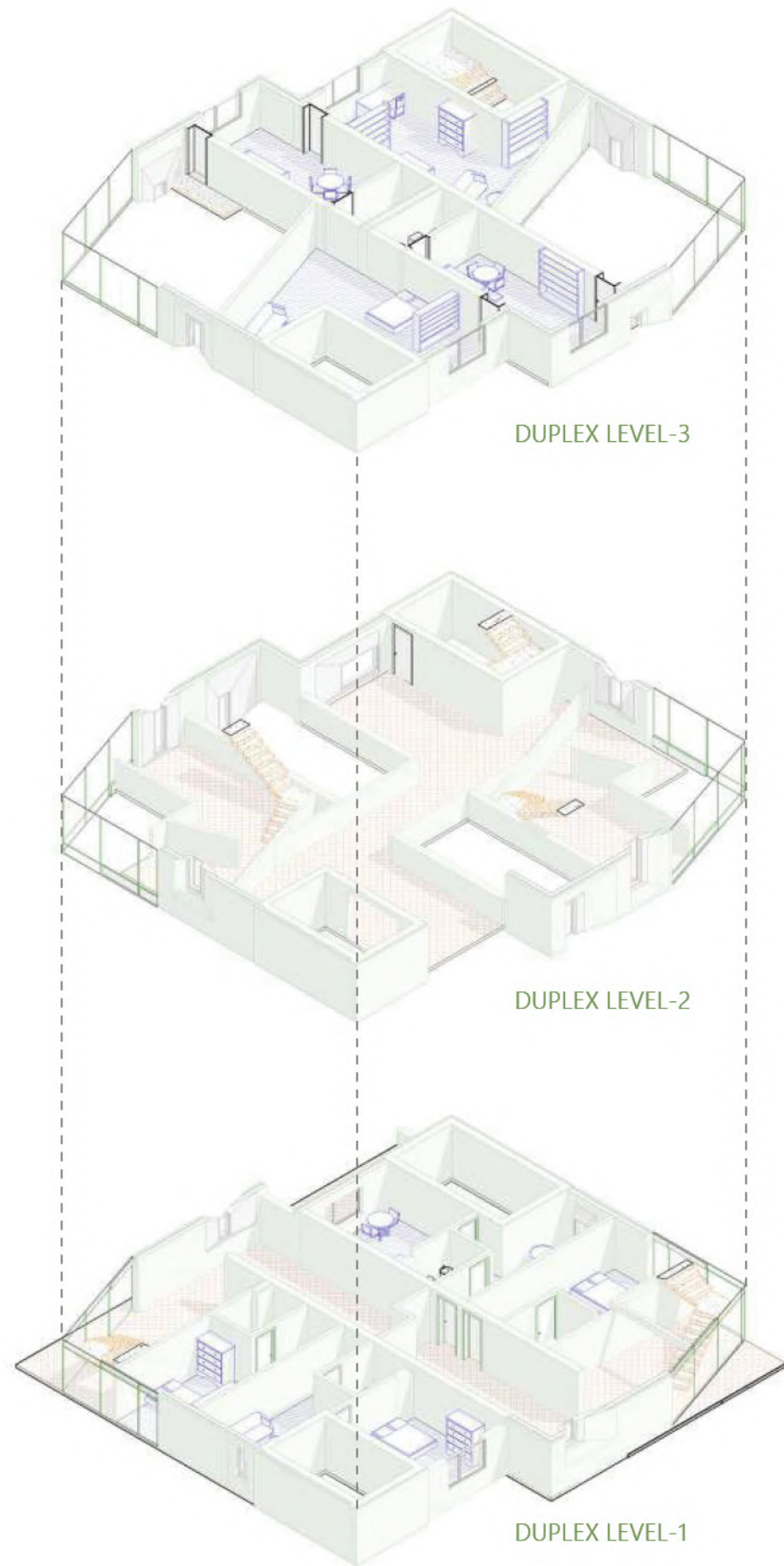
- MICRO UNIT
- ONE BEDROOM UNIT
- TWO BEDROOM UNIT
- DUPLEX





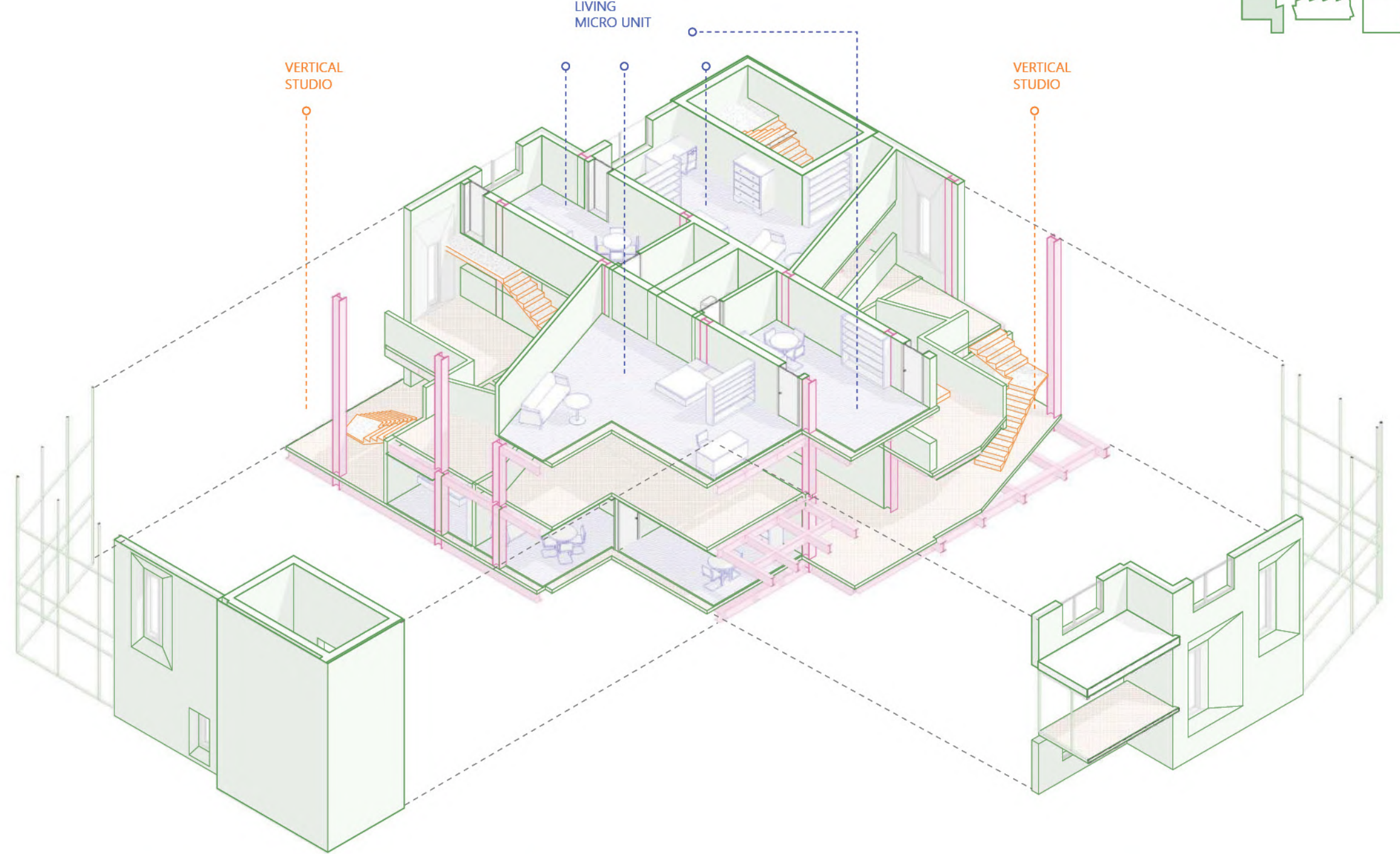
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13 exploded duplex diagram



14

14 duplex unit typologies



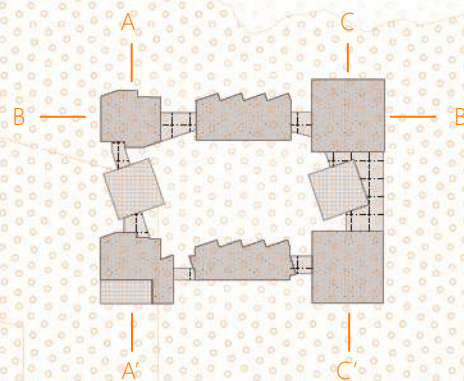
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15 render of inner courtyard

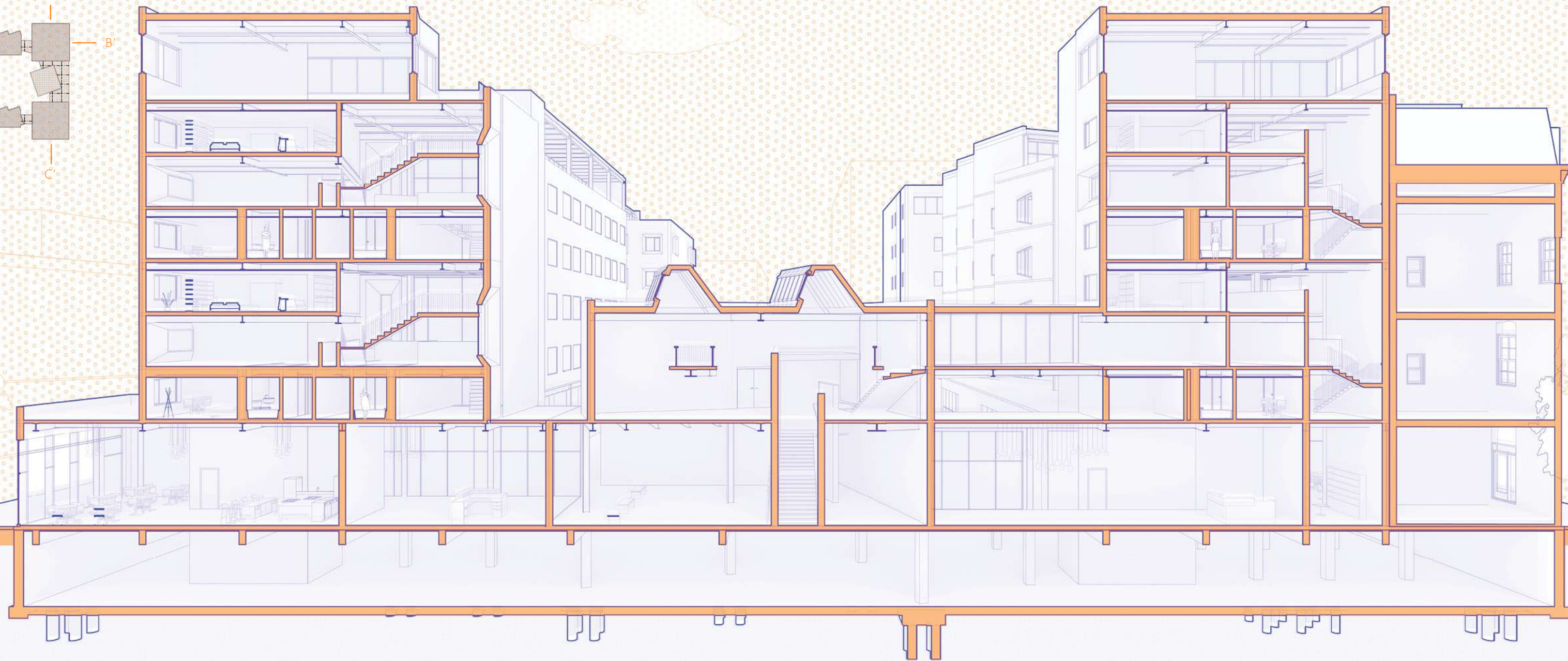


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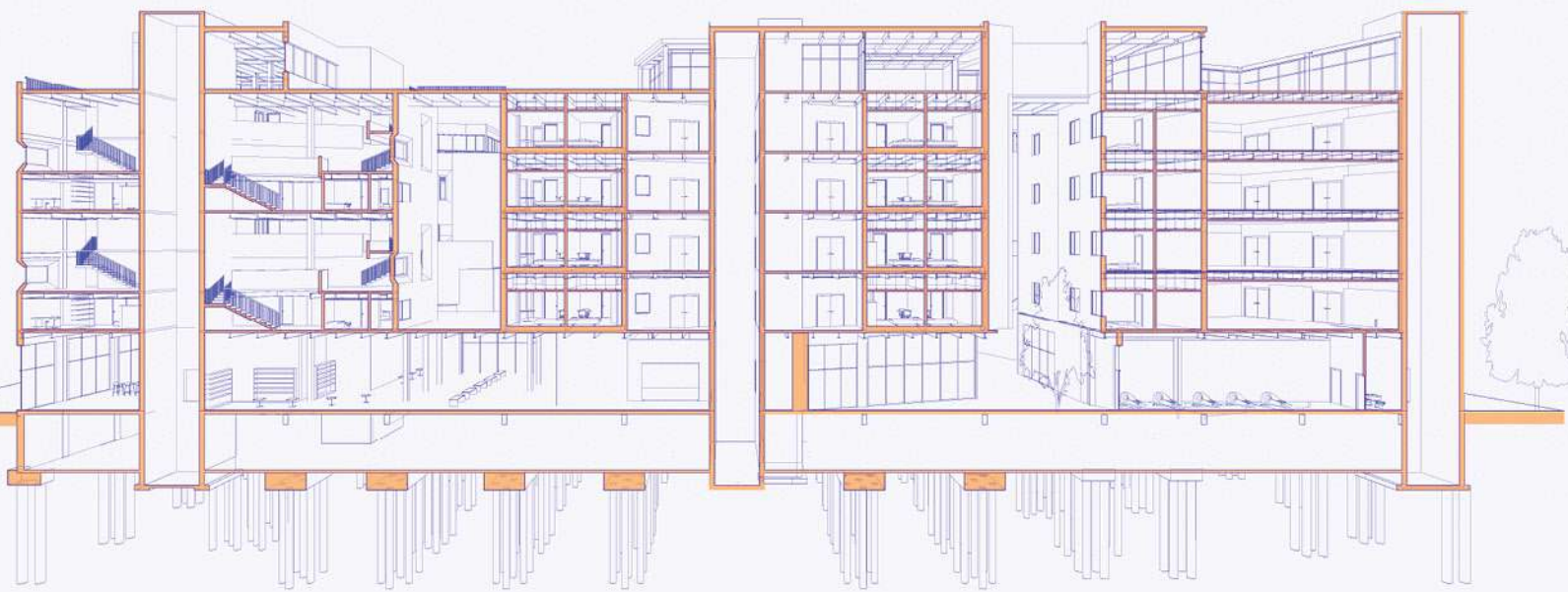
16 render of northern light studio space



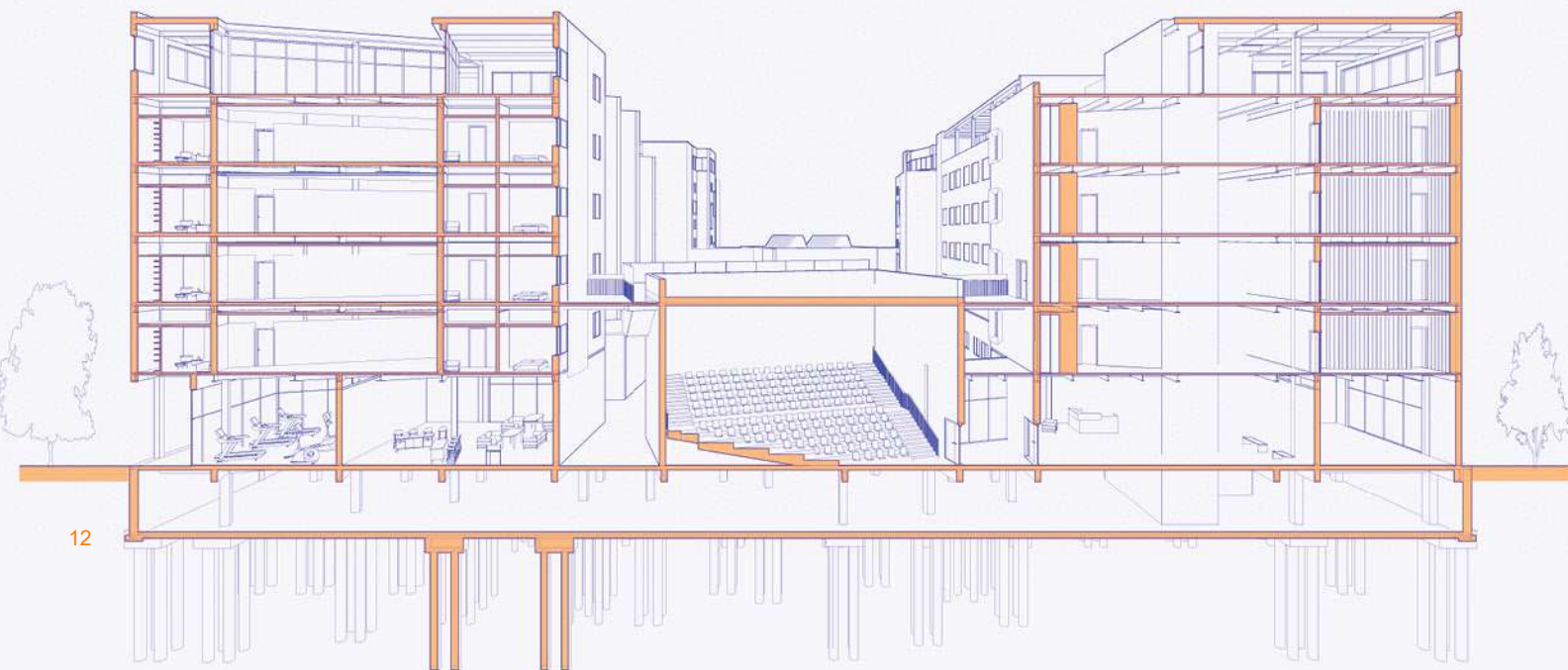
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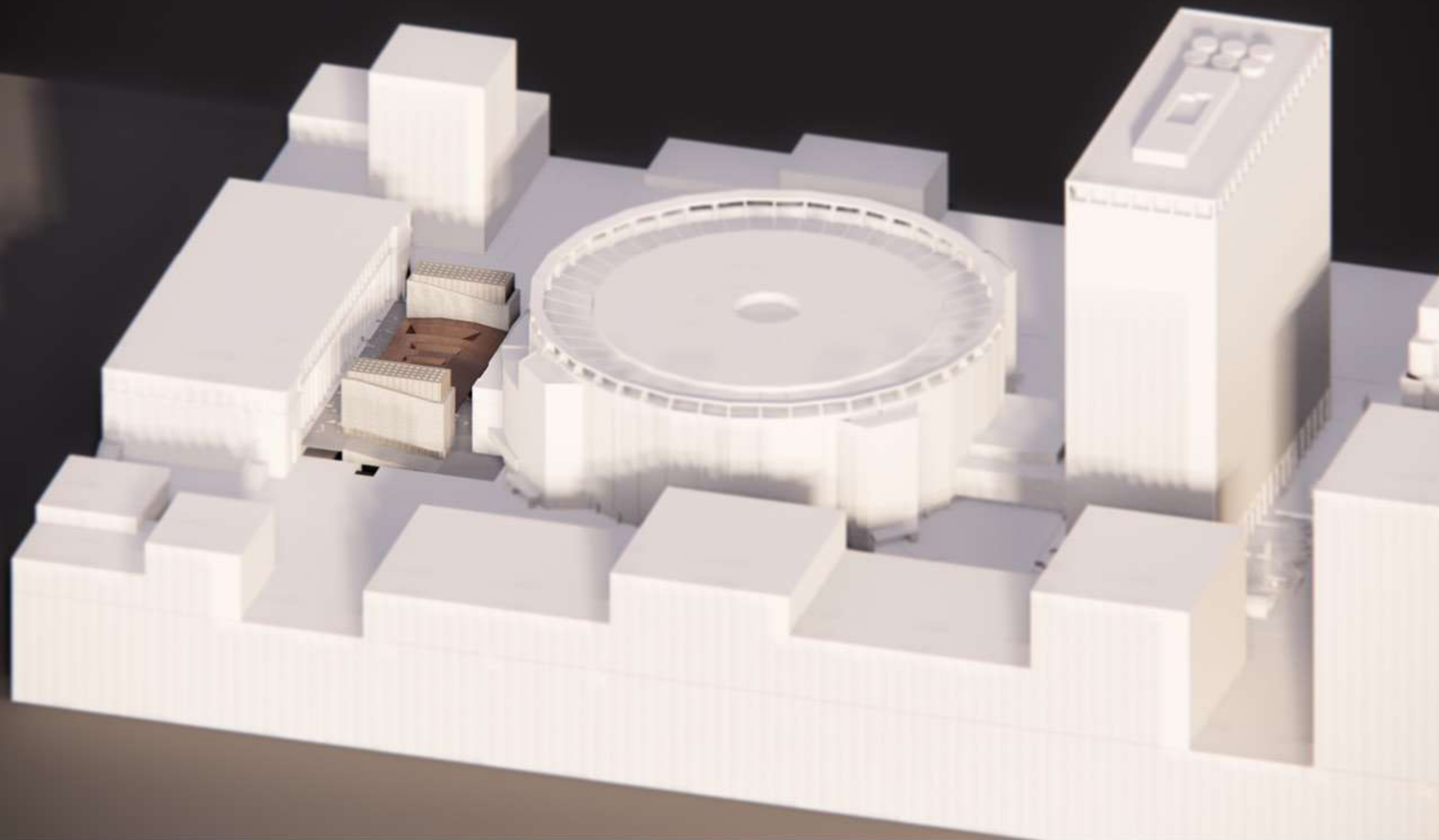


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10 cross-section aa'

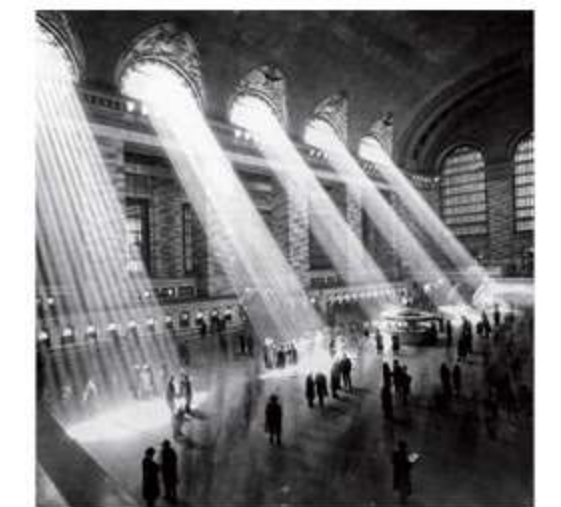
11 section bb'  
12 section cc'



*Barre Grey*



*Reclaimed Granite*



*Old Penn Station*

03

## Stereotomic Granite: Penn Station

Columbia GSAPP  
Advanced V, Fall 2021  
Instructor: Ivi Diamantopoulou, Jaffer Kolb

1 Diagram Model

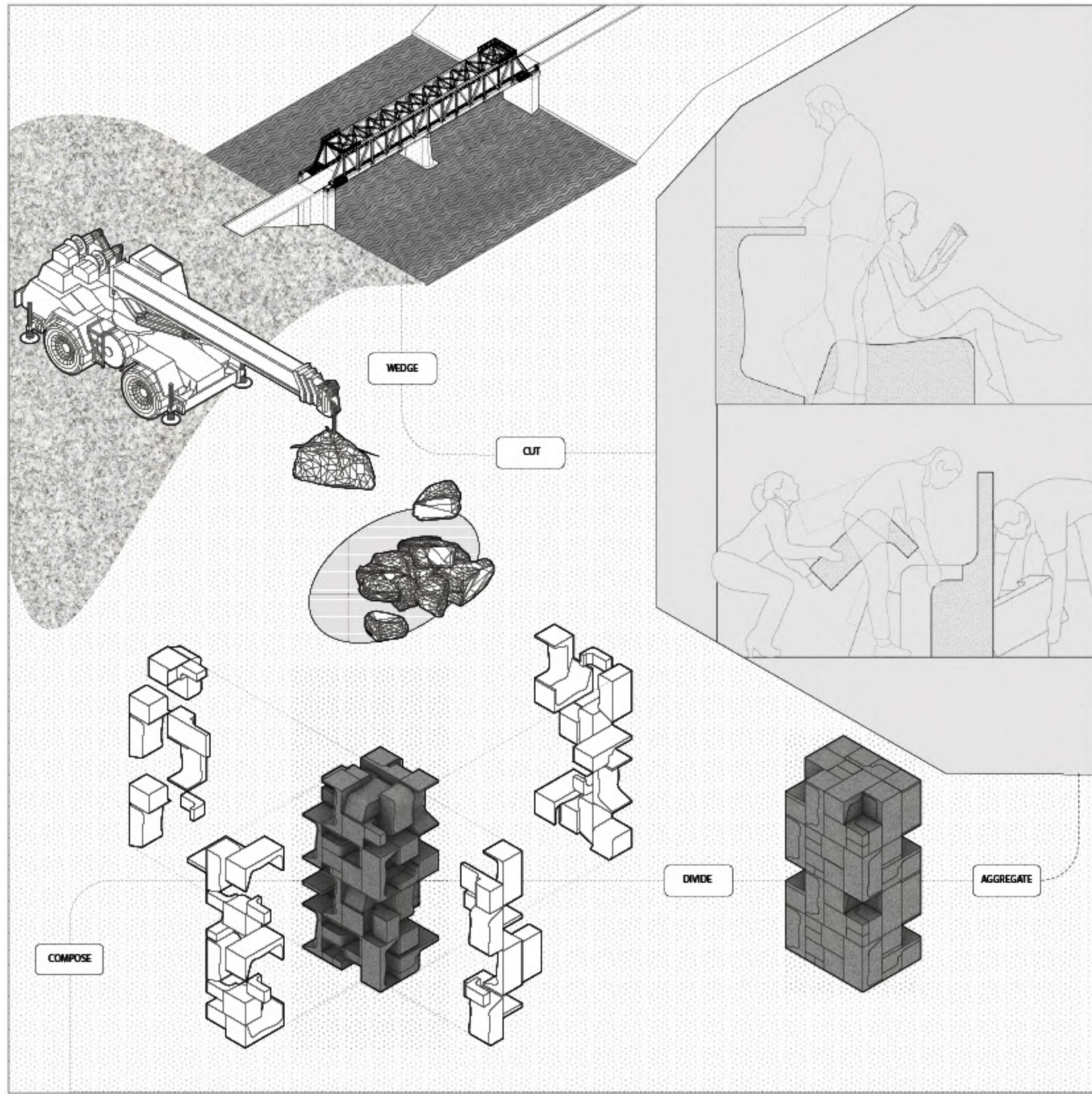
The extension of Penn Station should surmount the existing issues, the lack of coherence, connectivity, and a clear image. It connects with both stations, meanwhile negotiates with their unrelatable plan arrangements and sectional conflicts. The extension, a civic corridor composed of granite, aspires to bring multiple layers of comfort: multi-directional connection, social gathering, and a historical gallery as well as a library of granite.



Obstruction 1 / Multiple Lives or stone-hunting

The stone hunting started with three huge granite blocks that sit at the corner of 97th and west end. This drawing shows the journey of my granite. Barre granite is mined at the E. L. Smith Quarry, near the town of Barre in Washington County, Vermont. They are highly durable and regionally appropriate, locally sourced, and are often recycled from a demolished urban

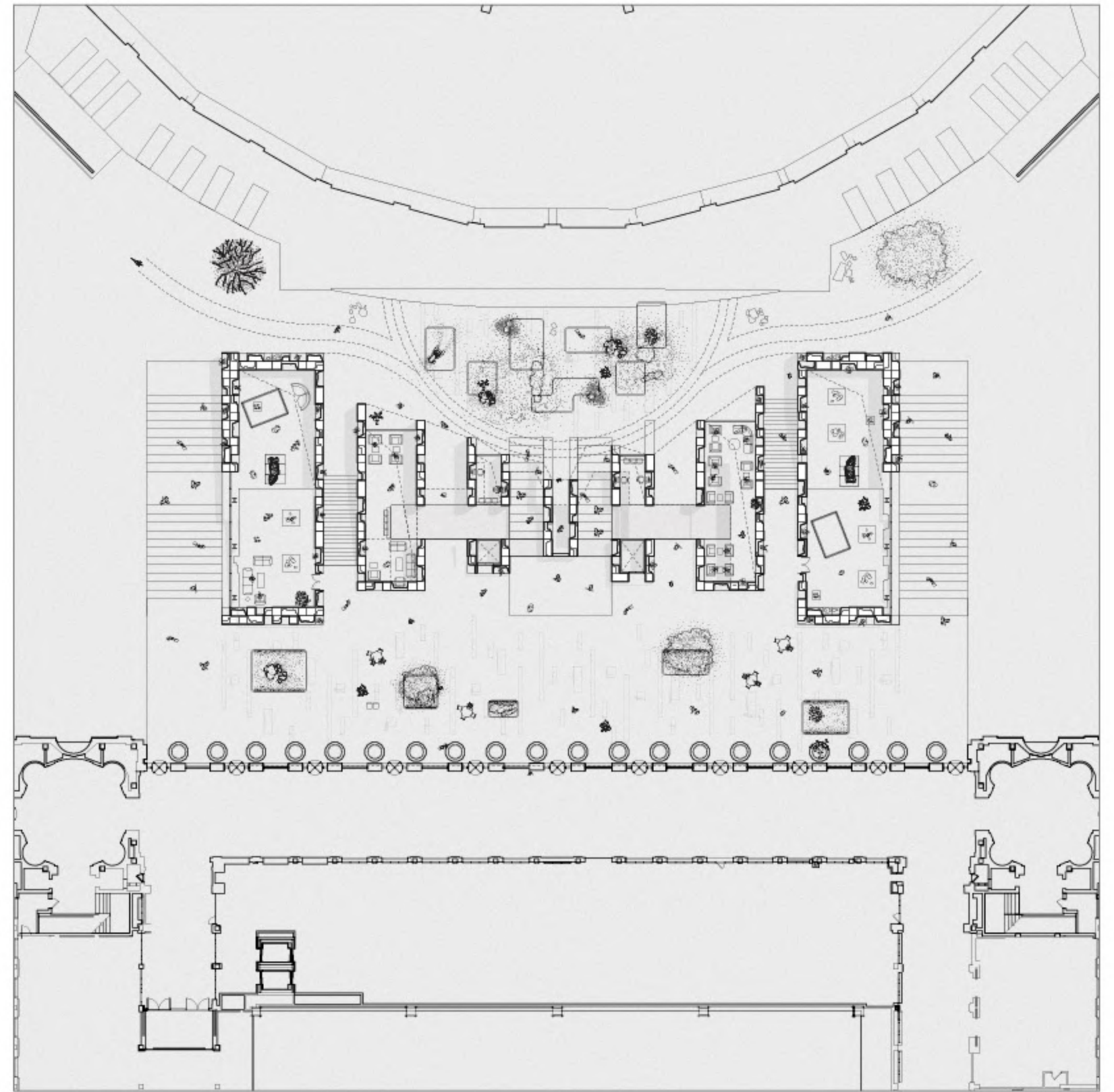
infrastructure, such as bridges and tunnels. Their second destination was at north Washington Bridge. NYCDOT uses a lot of granite blocks in and around plaza spaces to create a sense of enclosure and to buffer the plaza from motor vehicle traffic. These blocks are often placed along the edge of plazas or streets, acting as barricades, as well as street furniture.



3

Obstruction 2 / Wedge or space

The recycling and preservation of reclaimed granite is the main driving force in this project. Through the process of wedge, cut, aggregate, divide and compose, they form into breathable spaces.



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The two edges are responding to the facade they are facing. On the east side, the space offset back from the MSG Moynihan's facade and become a bazaar under Pavillion.

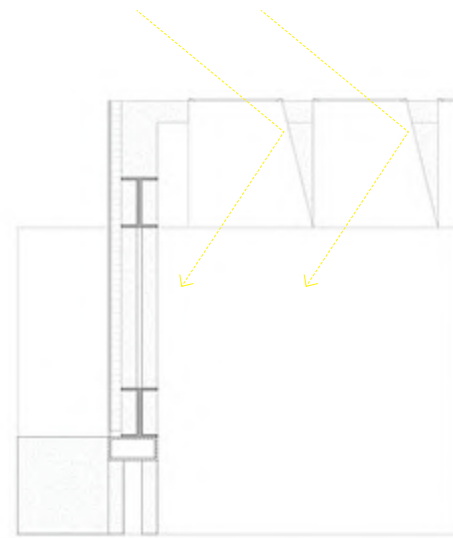




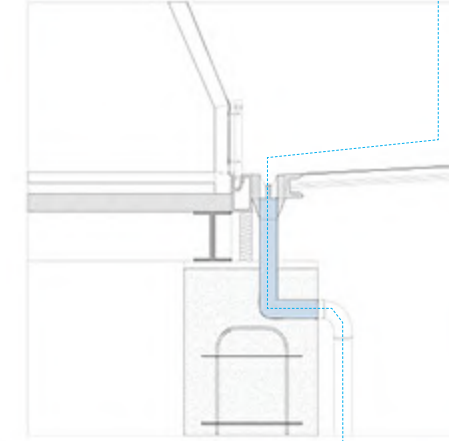
Obstruction 3 / Saving Face or a memorial for granite

The facade performs as a memorial of demolished infrastructure in history, a gesture inviting people to occupy, and a variety of spaces for individuals to take a pause, recharge, and step back to the ground again. A slit of opening following the grand staircase emphasizes the directional movement between the two existing stations. Meanwhile, it lifts the granite up and creates a lightness that contrasts with the heavy nature of the material.

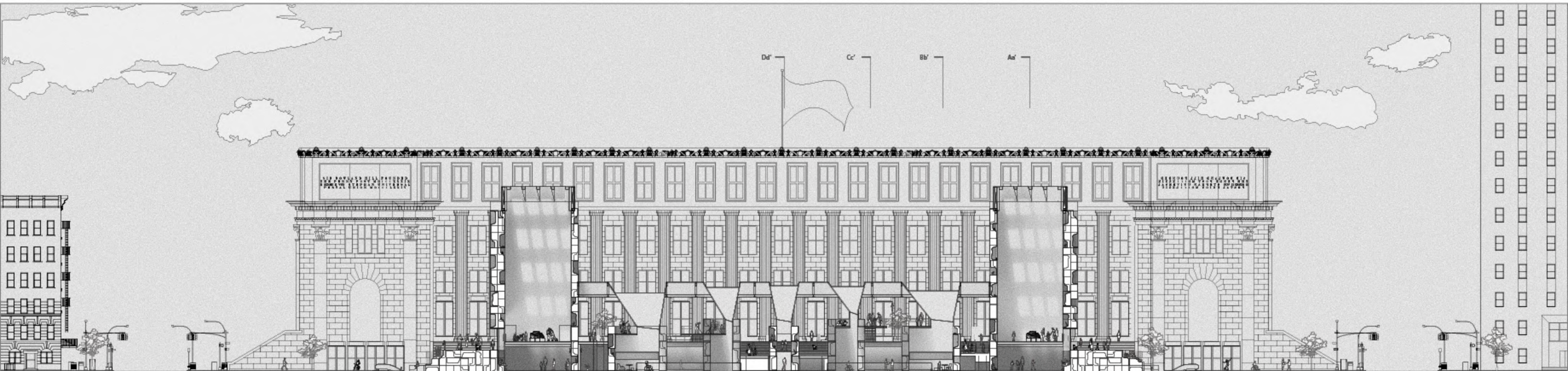
In plans, the extension reads as a collision of the two stations. In section, it captures the same compression between the underground and the above as well. Meanwhile, the galleries at two ends are responding to the height of both stations. However, the in-between spaces are designed for human scale. Moving from a sublime space to a condensed space, from gigantic infrastructure to furniture, it carries the potential of granite as an acquiescent material.



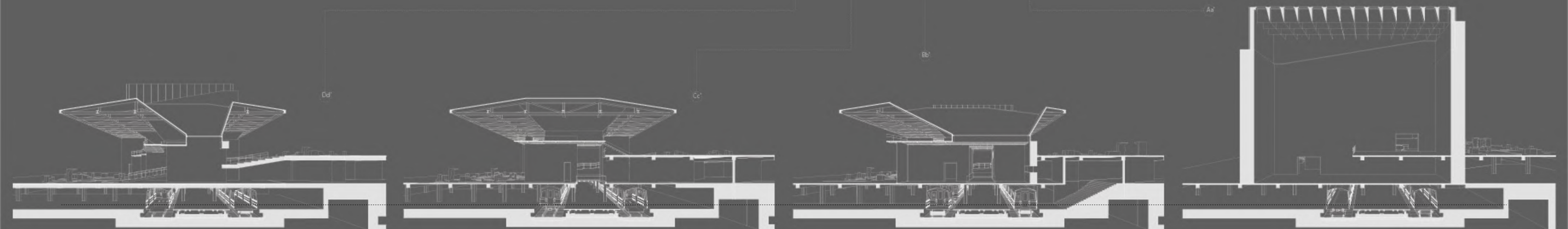
6 Roof : funnel of light

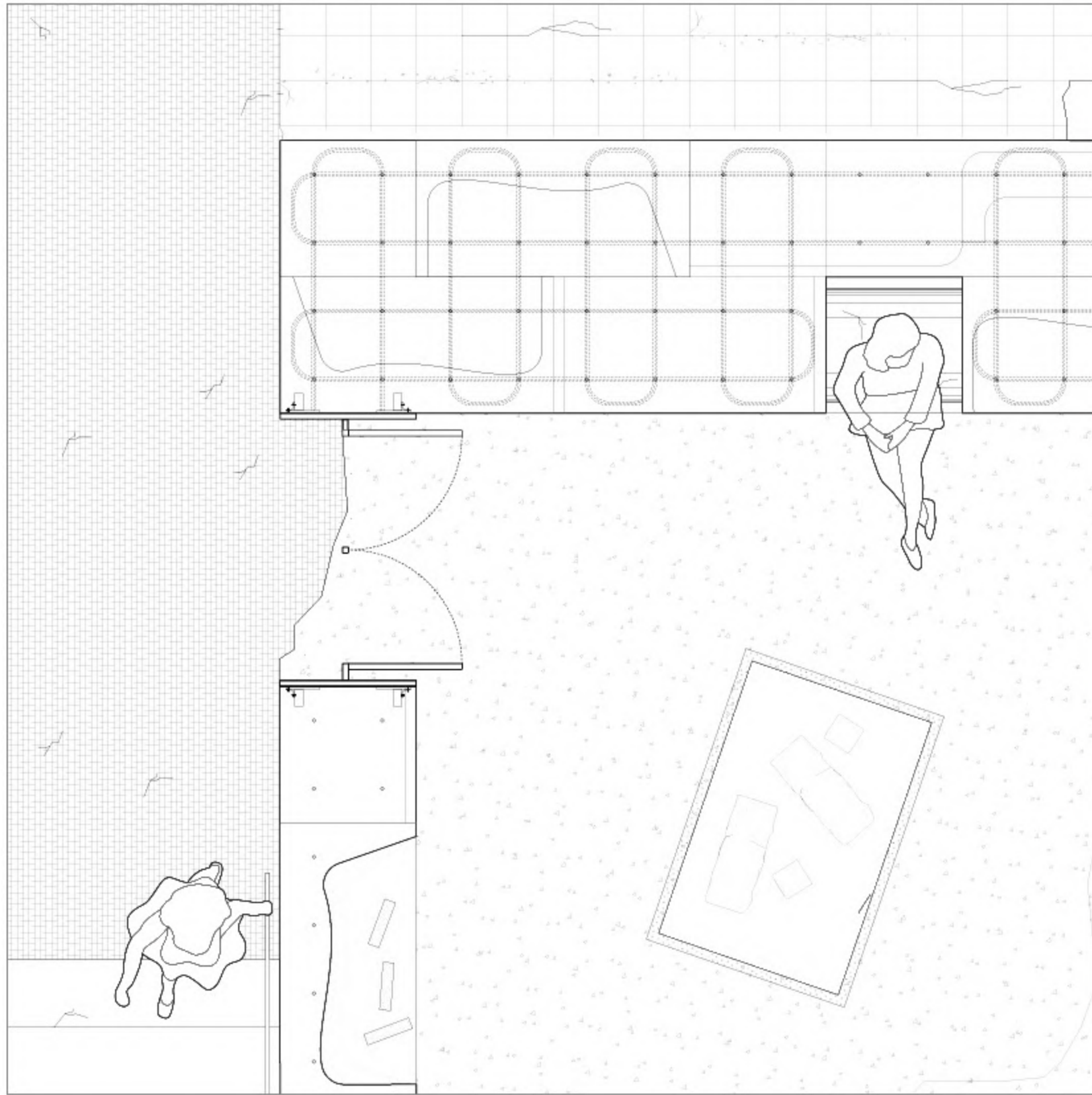


7 Roof : funnel of rain



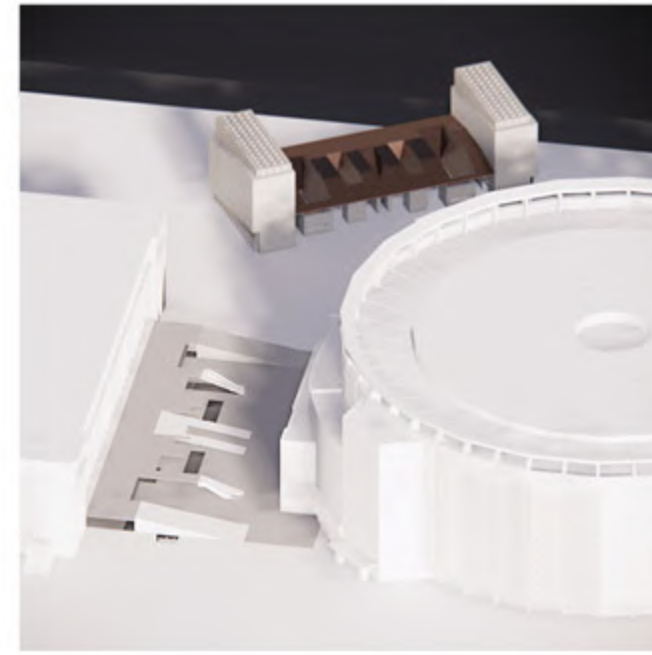
Obstruction 4 / New comfort or collision





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Obstruction 5 / A corridor or a civic space



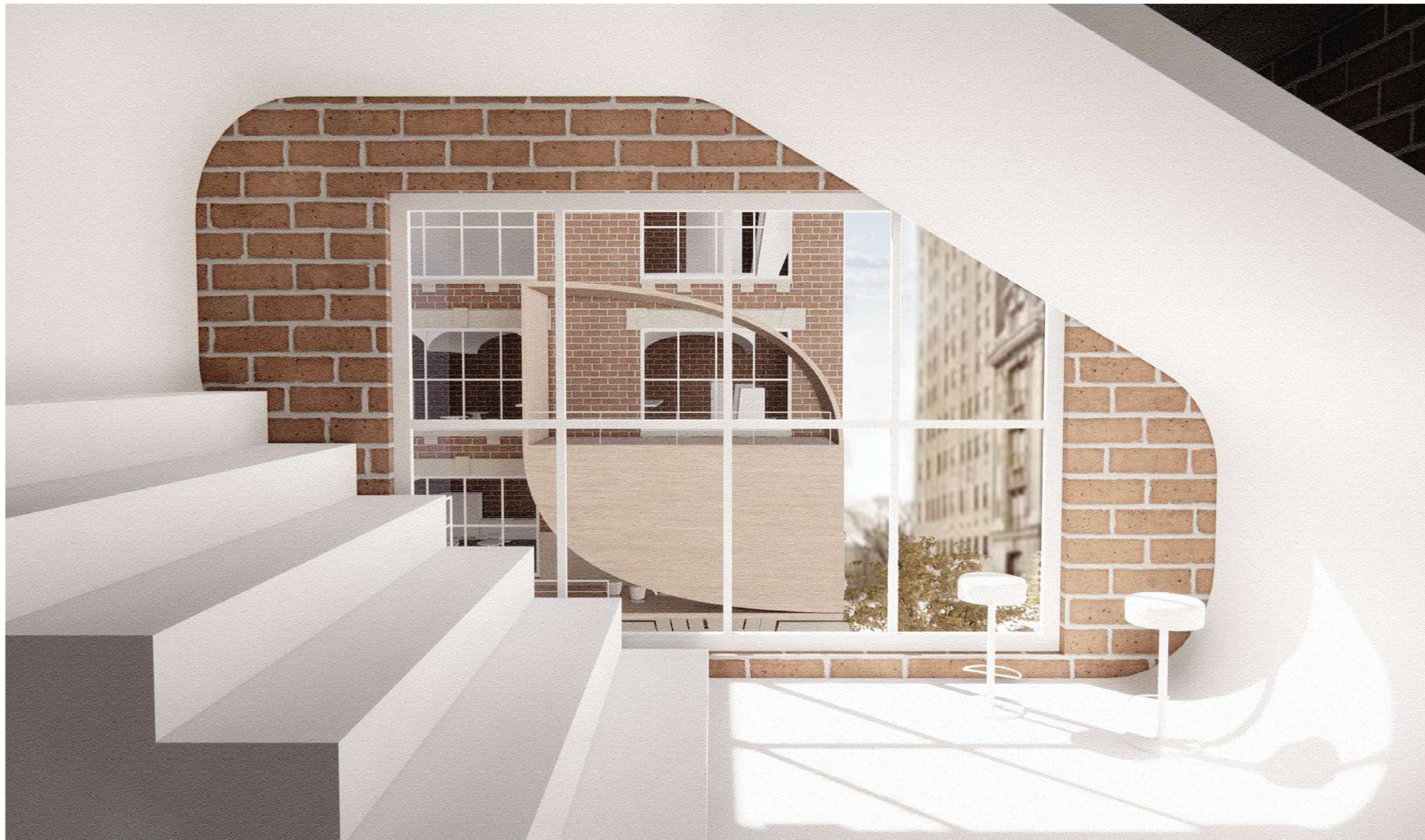
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## 04 Adaptive (Re)use: School for Empathy

Columbia GSAPP  
Core II, Spring 2020  
Instructor: Daisy Ames

### a new proposal for P.S. 64 605 EAST 9TH STREET

This project explores how society might transition from outdated learning environments and outdated construction processes, toward new learning and construction processes for the future. While there are many definitions of the term adaptation this studio engages specifically in the general, biological, and evolutionary interpretations.

This project acknowledges that given the fast-paced nature of the current social, educational, and environmental climates, society is in a constant state of transition between what was and what will be. Therefore, thinking simultaneously about what we can learn from the past and what we imagine for the future is necessary. We believe that EMPATHY is the foundation of intellectual and standardization education, indeed, will help the next generation to perform better in their later life.

Given the diverse demographic of the Lower East Side community, the School For Empathy is a new educational typology to break the cultural, language, and social barriers through a sensorial learning process. When the curve interweaves with the existing building, it injects fluidity to accommodate a child's ingenuity, and defines spatiality with intentional program. The education of empathy will be implemented through these sensorial spaces to achieve the goal of cultural exchange, recognition of identity, and imaginative expression.



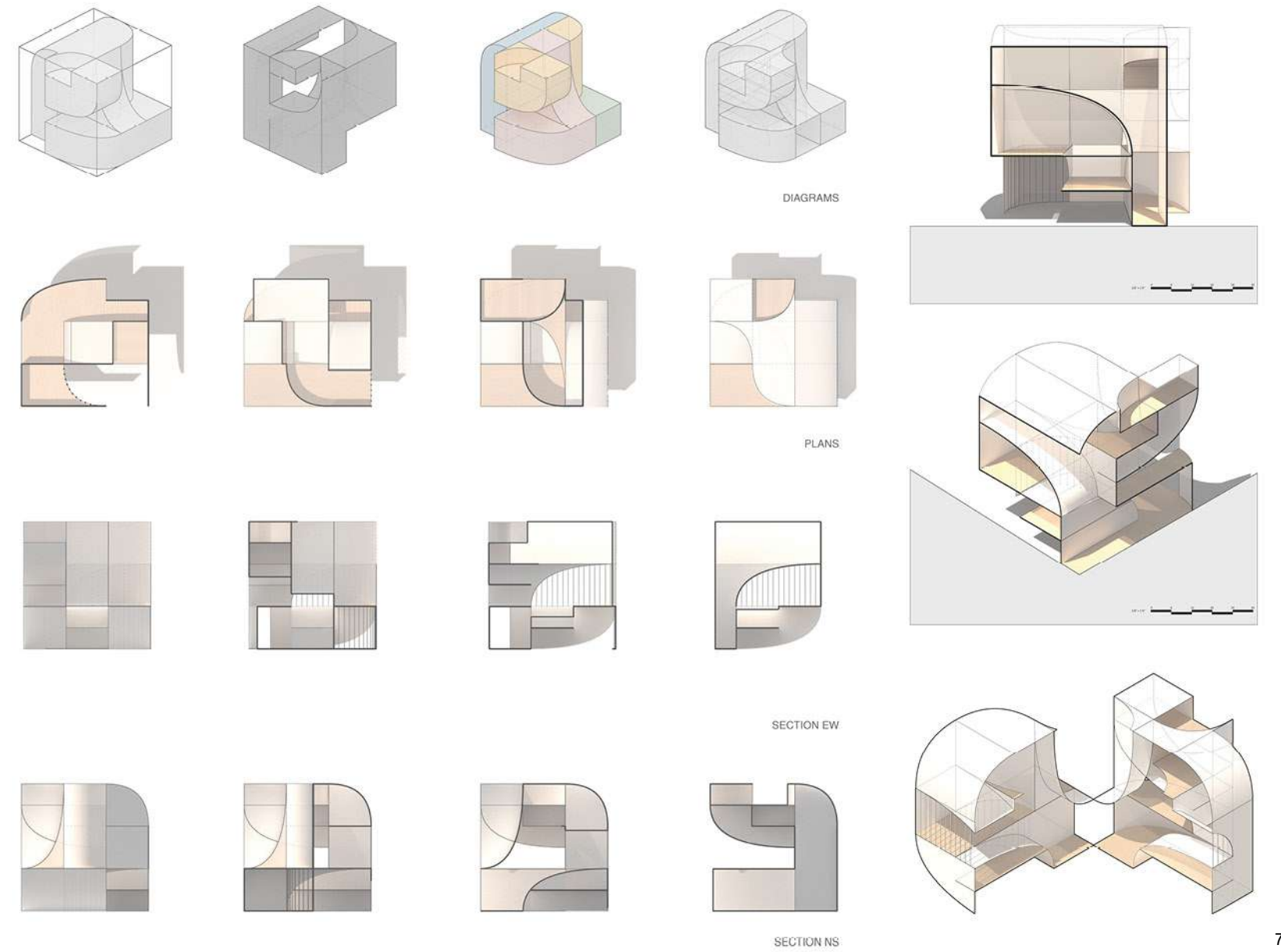
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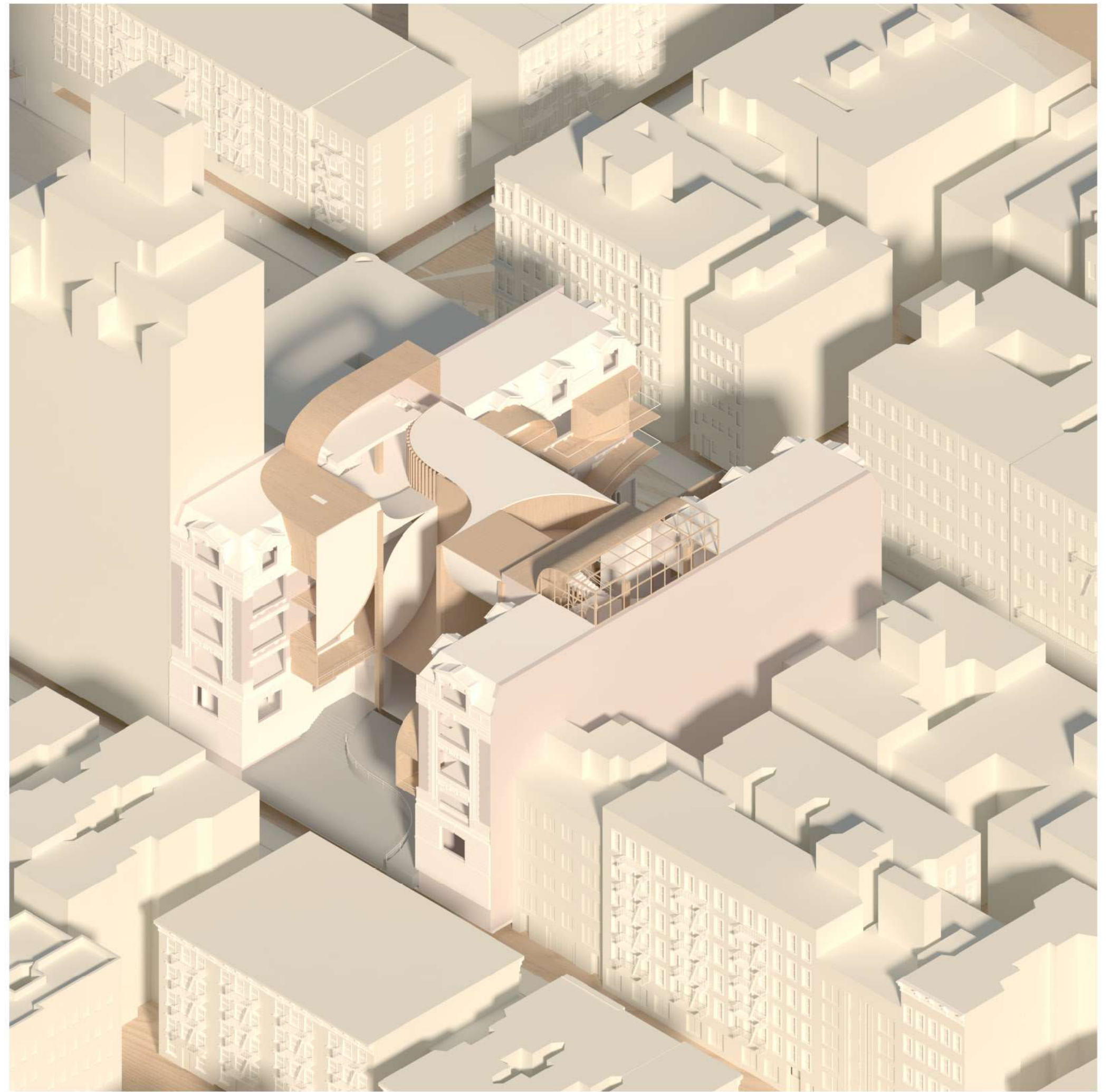
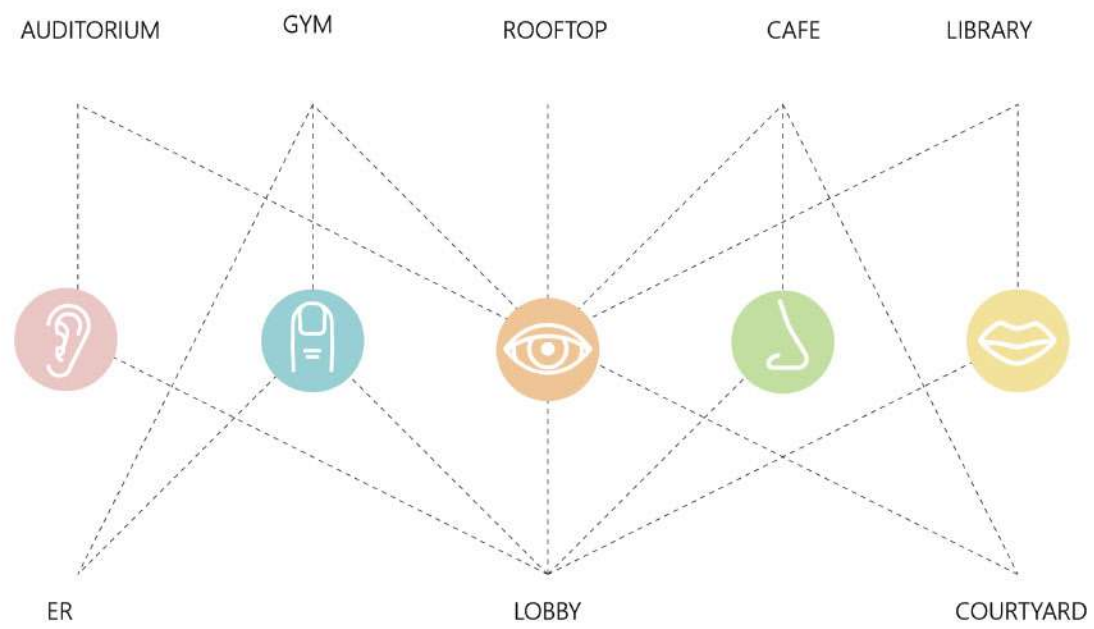
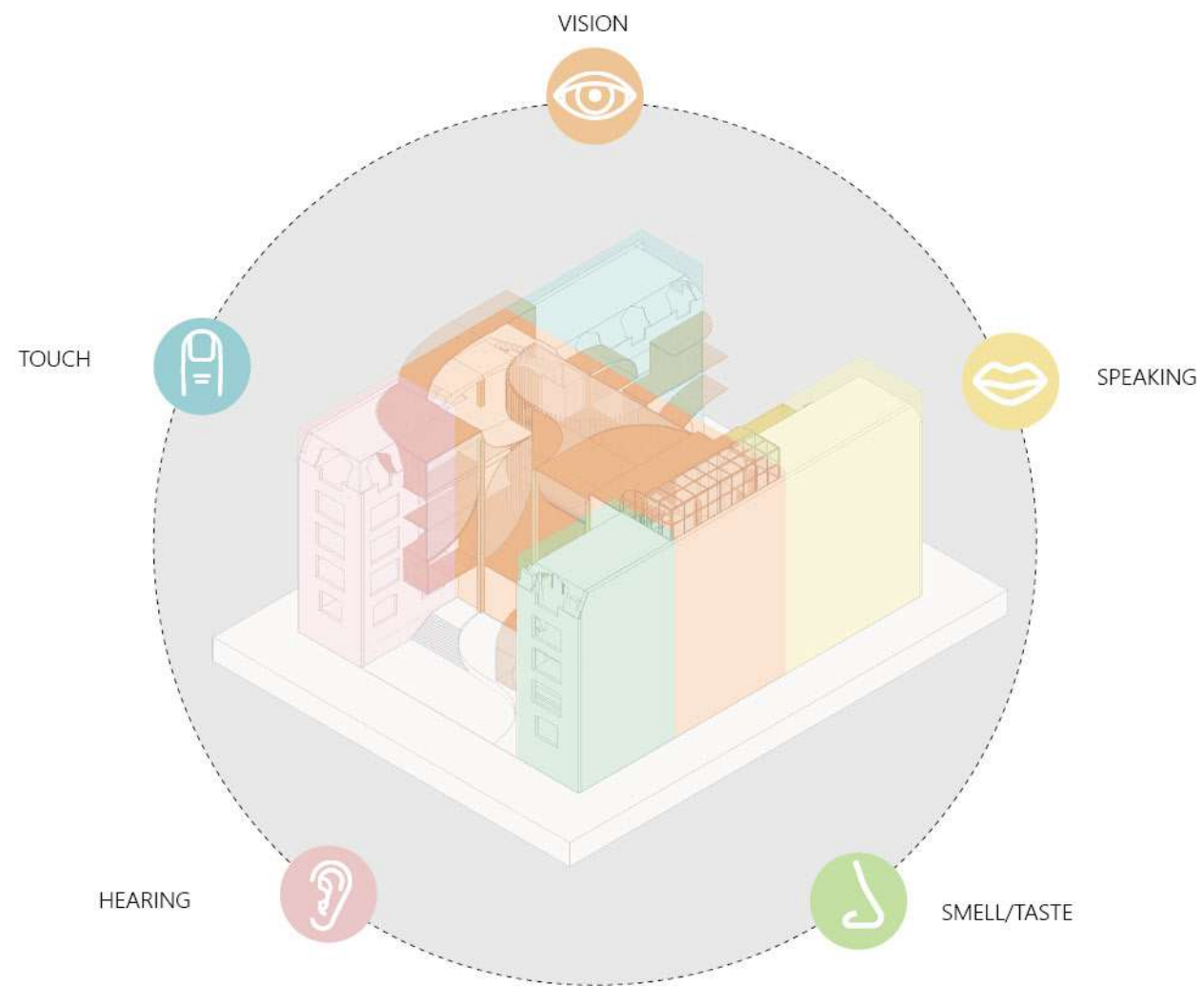
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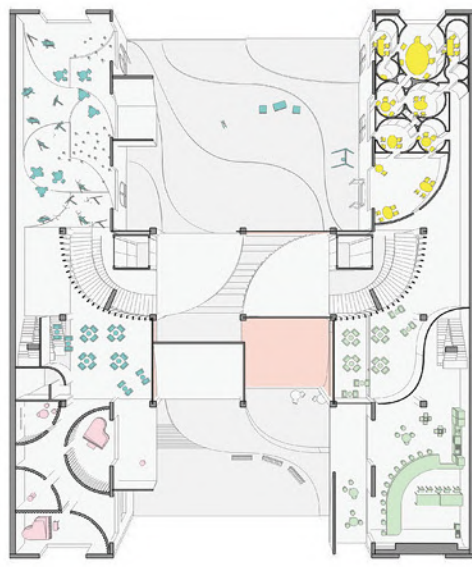


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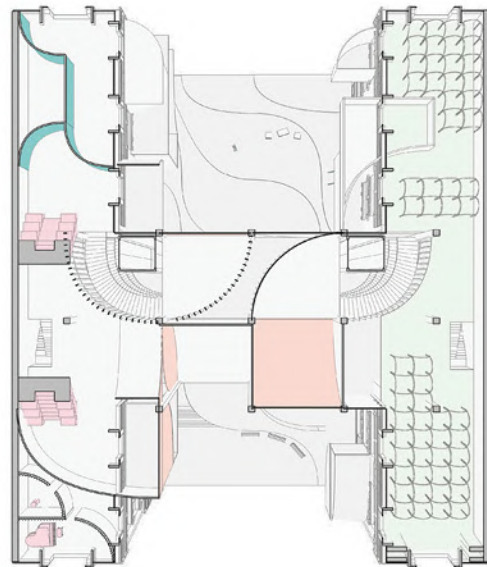


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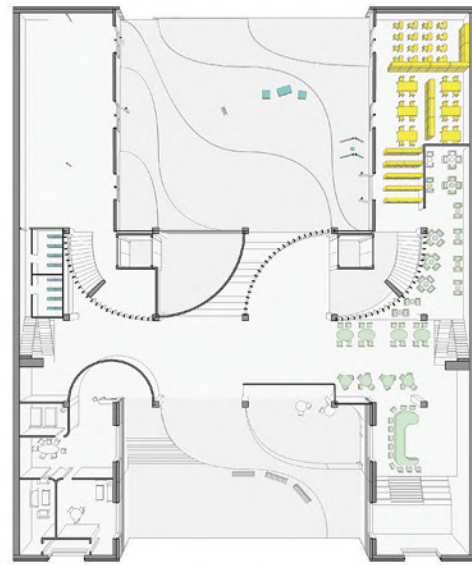




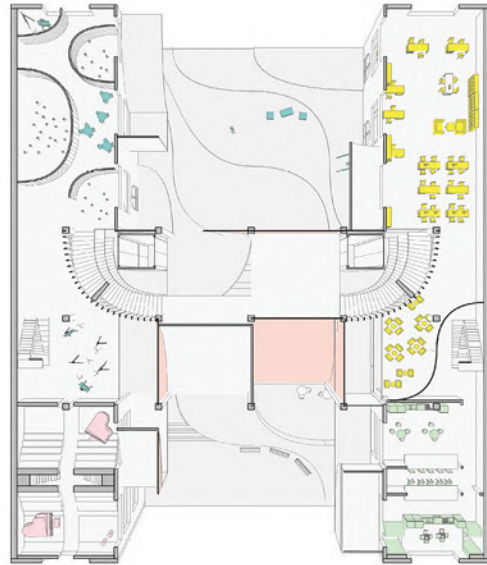
floor plan 2nd



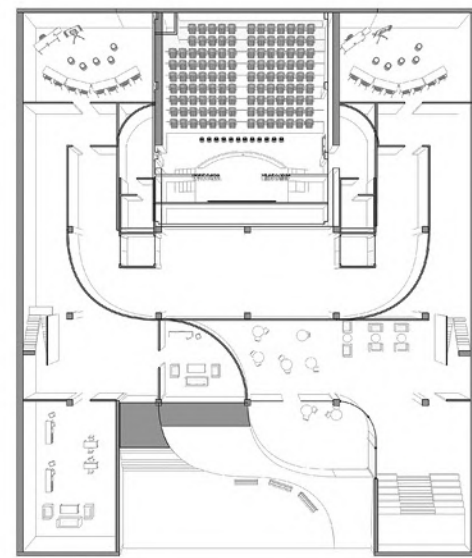
floor plan 5th



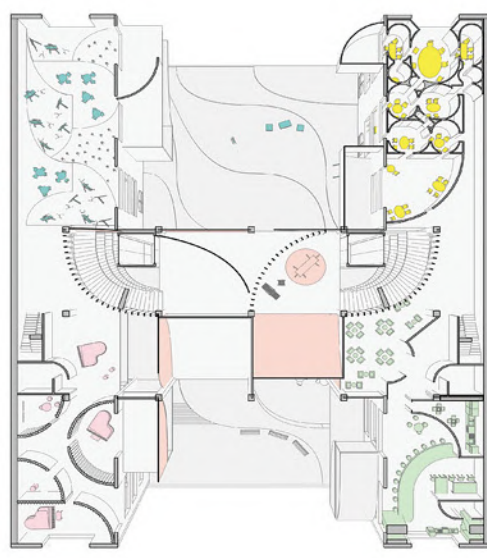
floor plan 1st



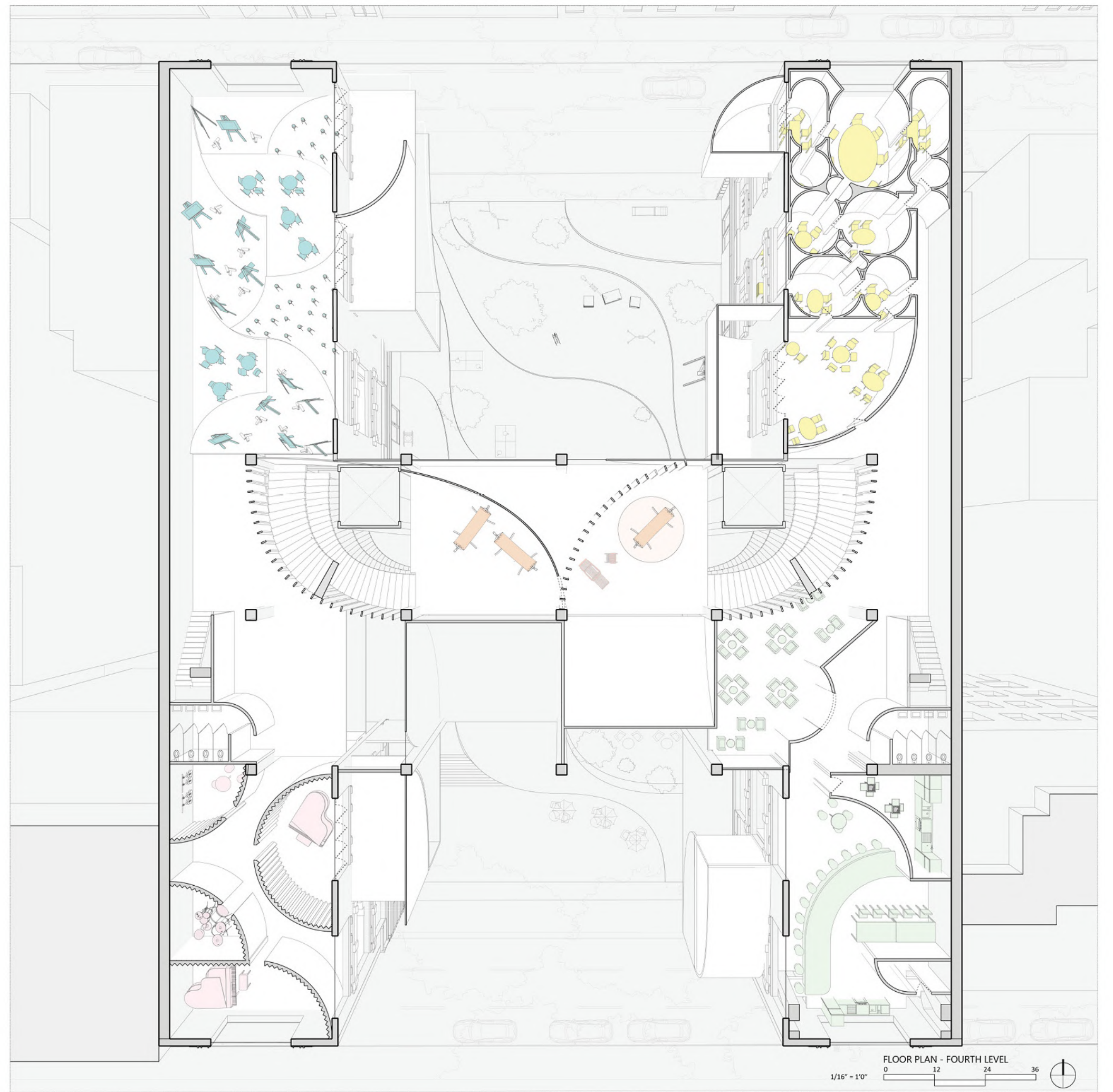
floor plan 4th



floor plan basement



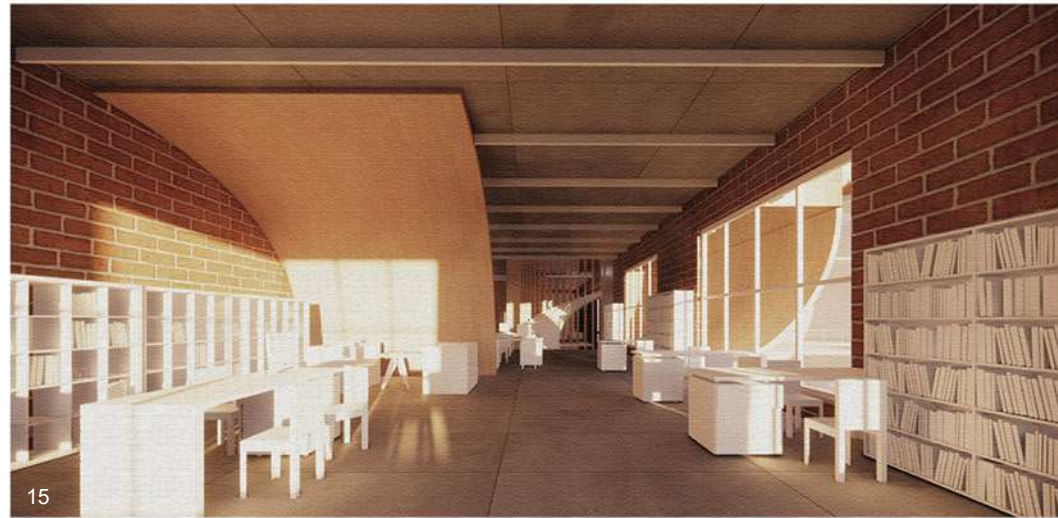
floor plan 3rd



FLOOR PLAN - FOURTH LEVEL  
1/16" = 1'0"  
0 12 24 36



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14 render / courtyard facing east 9th street  
 15 render / library  
 16 render / entrance lobby



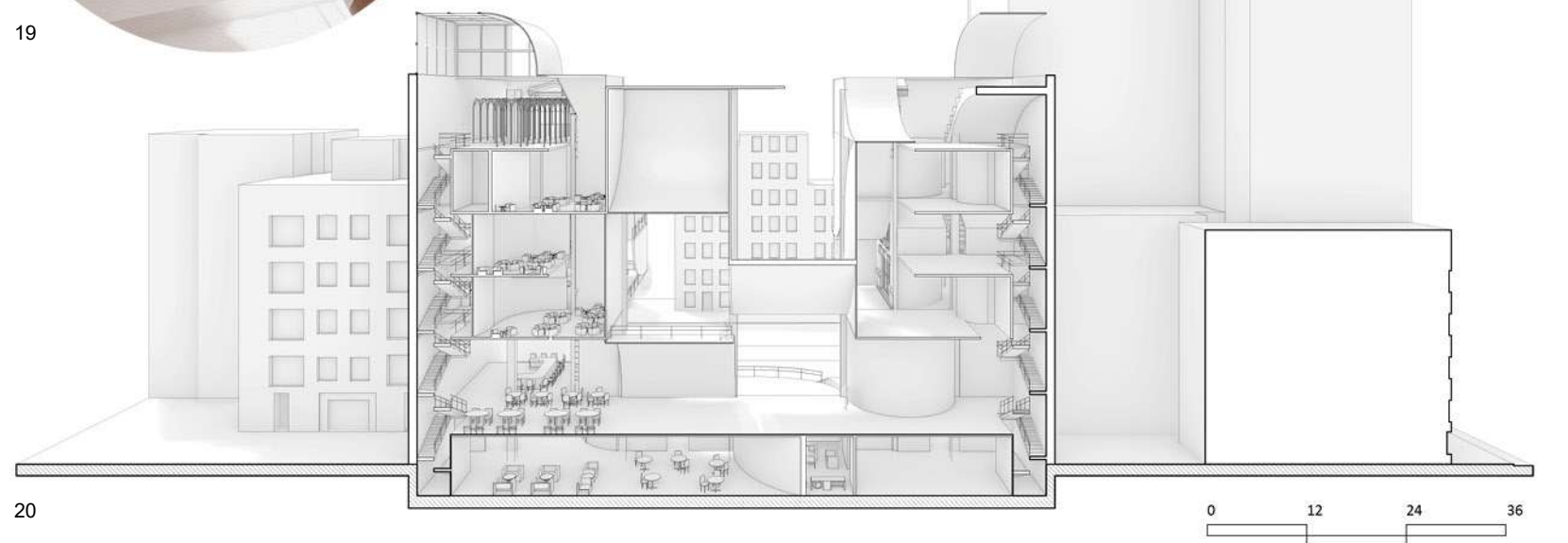
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17 section / east-west  
 18 render / sight / balcony  
 19 render / sight / sculpture stair

20 section / north-south  
 21 render / classroom for touch





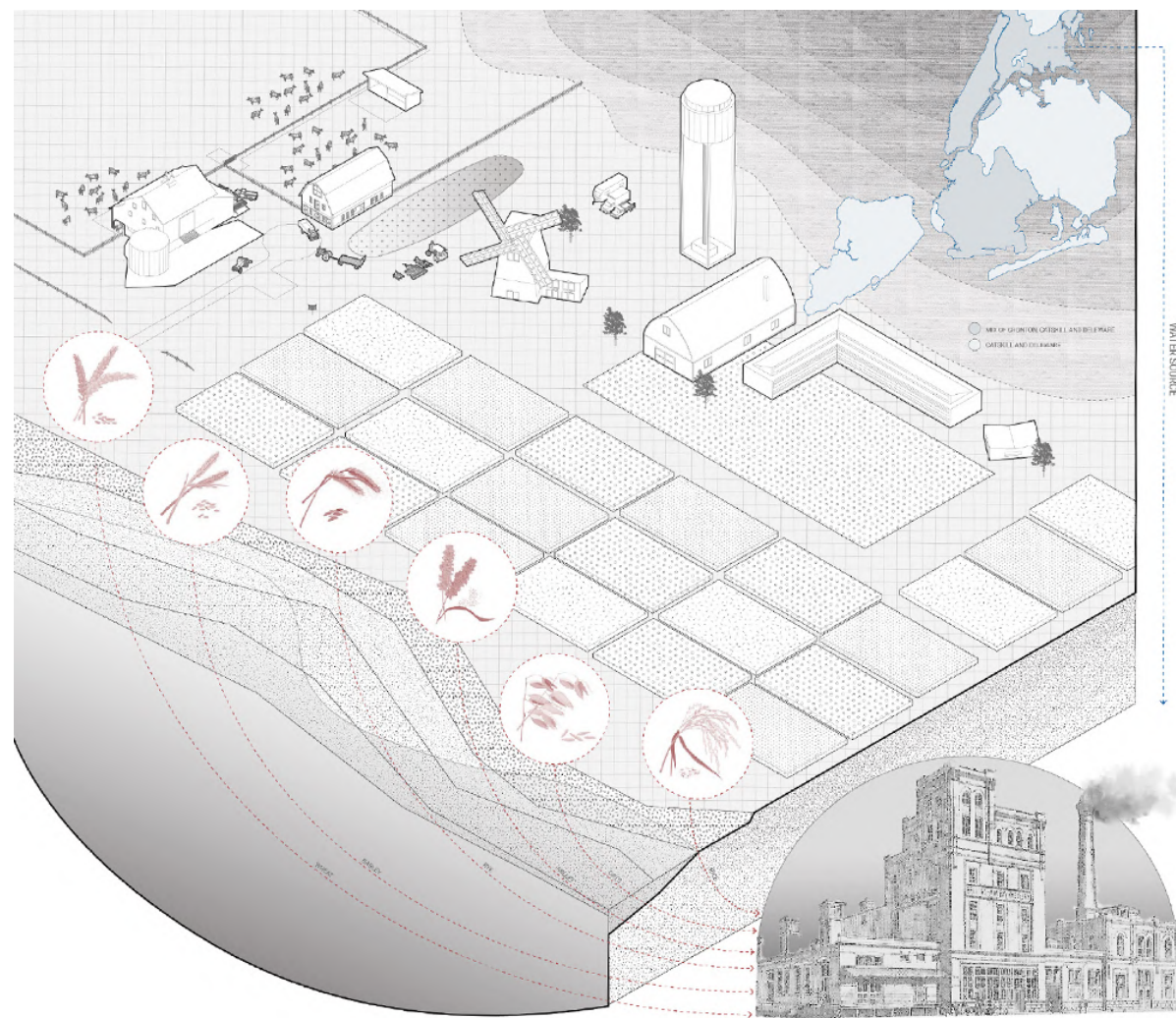
05

## Factory : Brewery Incubator

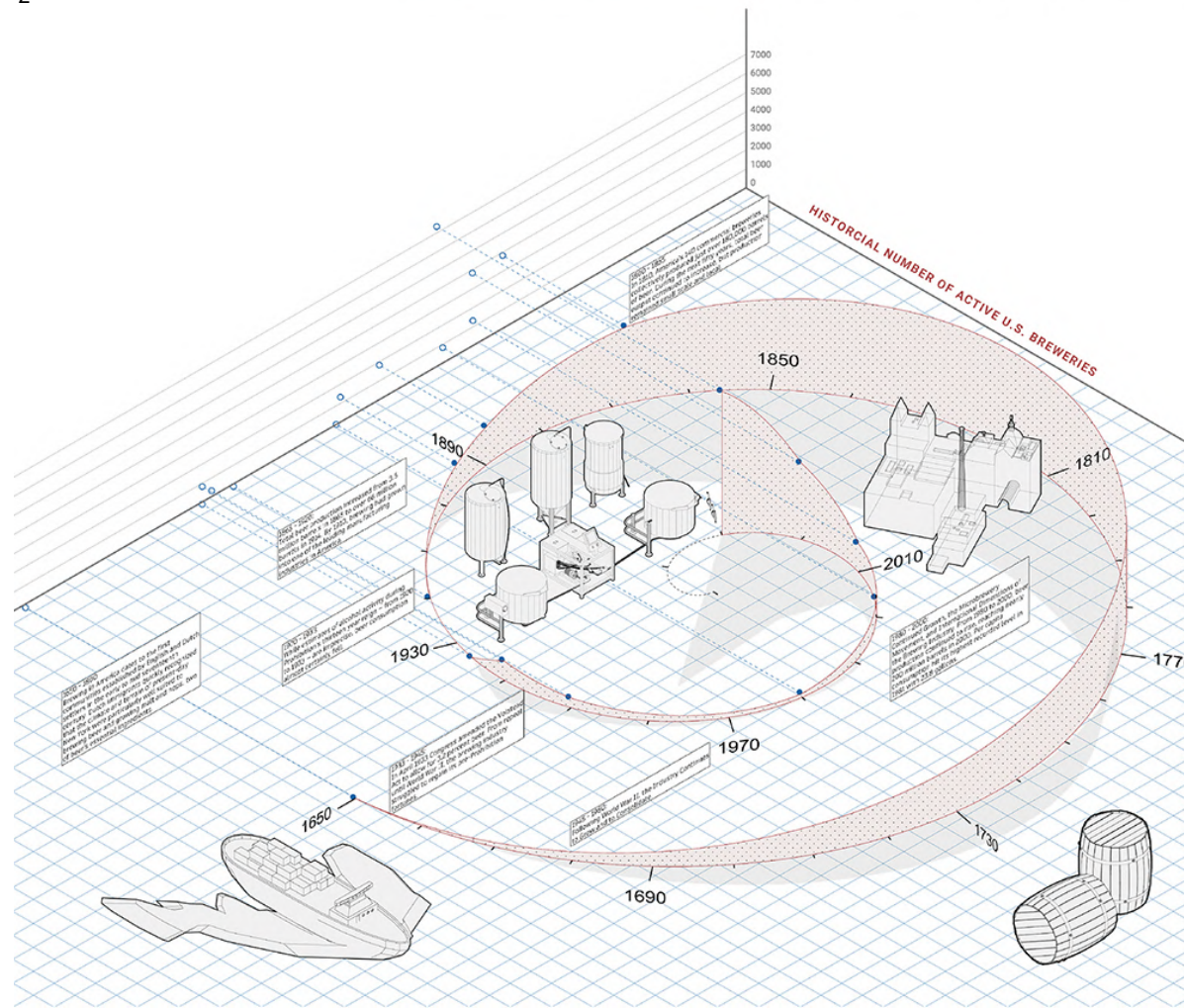
Columbia GSAPP  
Adv VI, Spring 2022  
Instructor: Mimi Hoang  
Collaborate with Danlei Yang

**A chimney, a light well, and a farm.  
A structure, a passage, and a brewery incubator.**

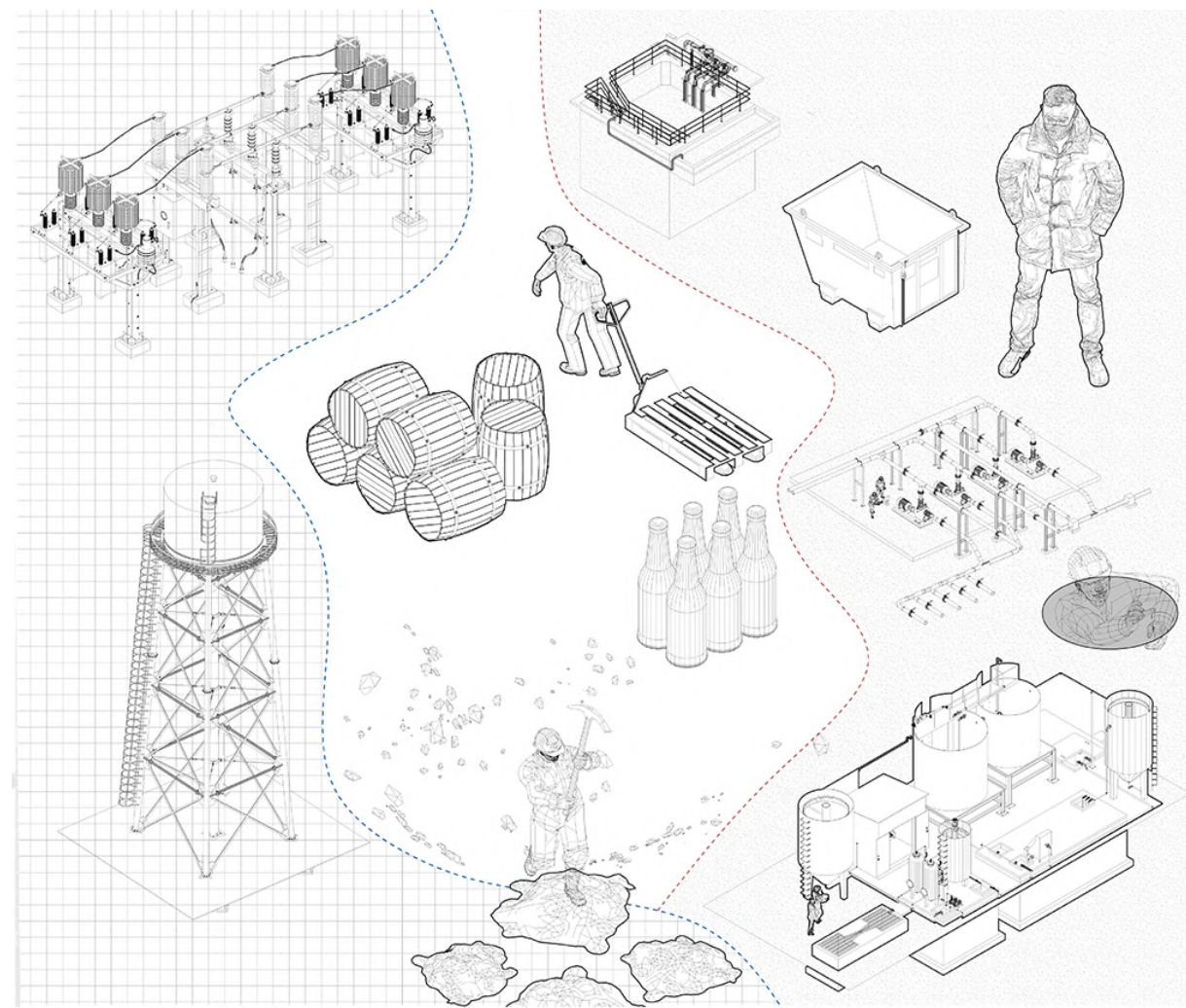
The Vertical Brewery Incubator of Red Hook is designed to provide aspiring brewers with co-working spaces and access to equipment and stimulate interactions and collaborations amongst professionals and homebrewers. It integrates multiple terracotta cores as the permanent infrastructure device embedded with the main resources that are required for brewing, as well as an architectural core to support the building. The new Vertical Brewery Incubator establishes communication between production and the local community, creating a sharing platform between factory workers and the neighborhood. The design drew on the existing industrial character of the surrounding area, and the terracotta material pursued a historical continuity to the local industrial history.



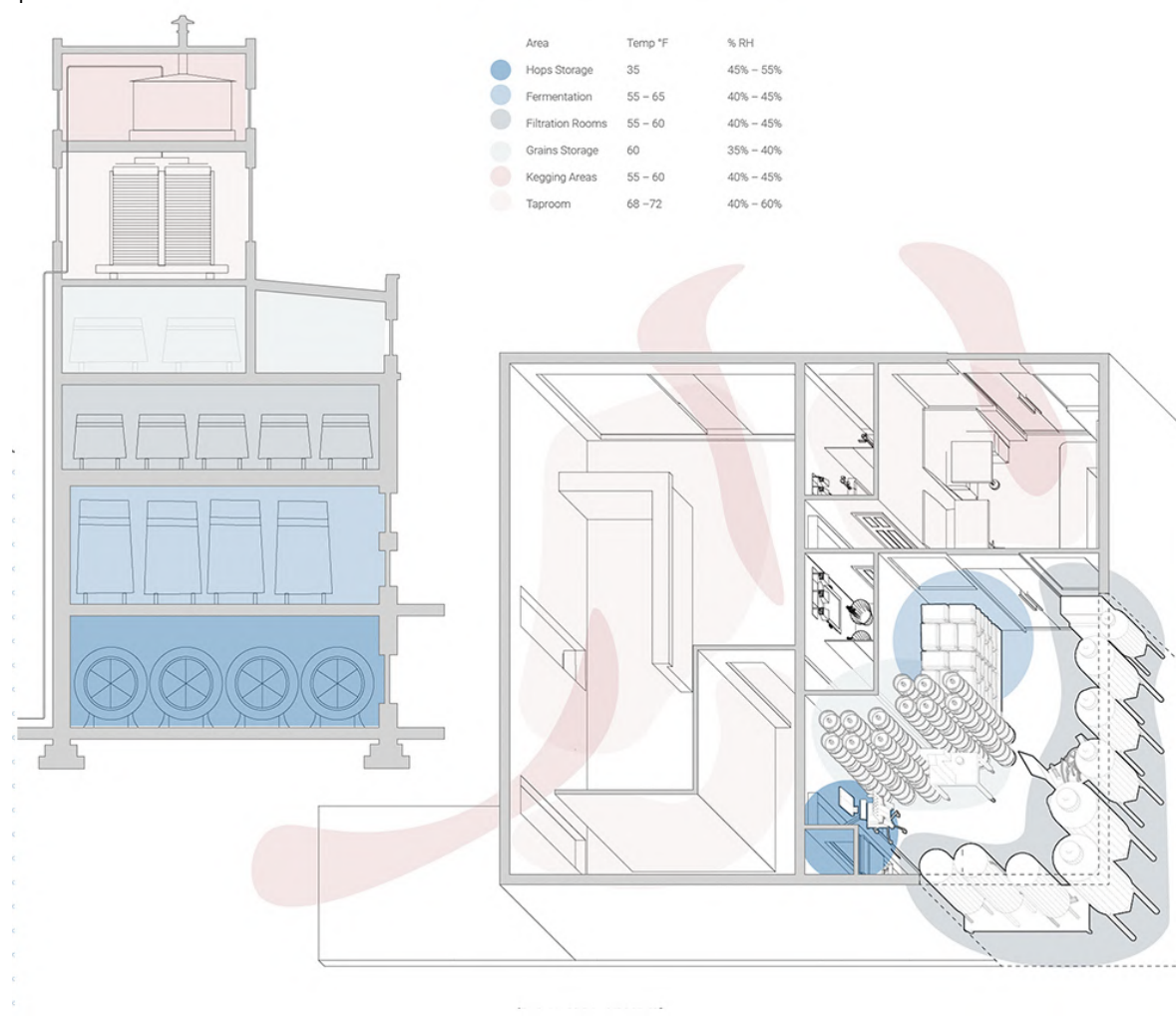
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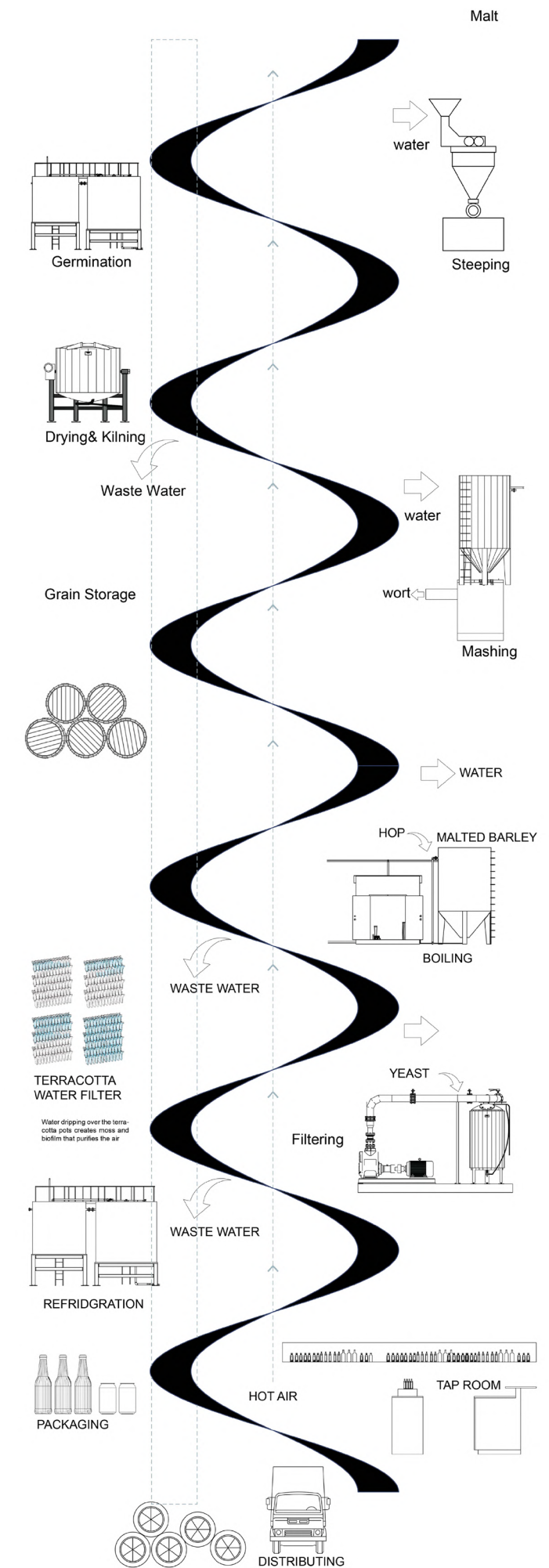
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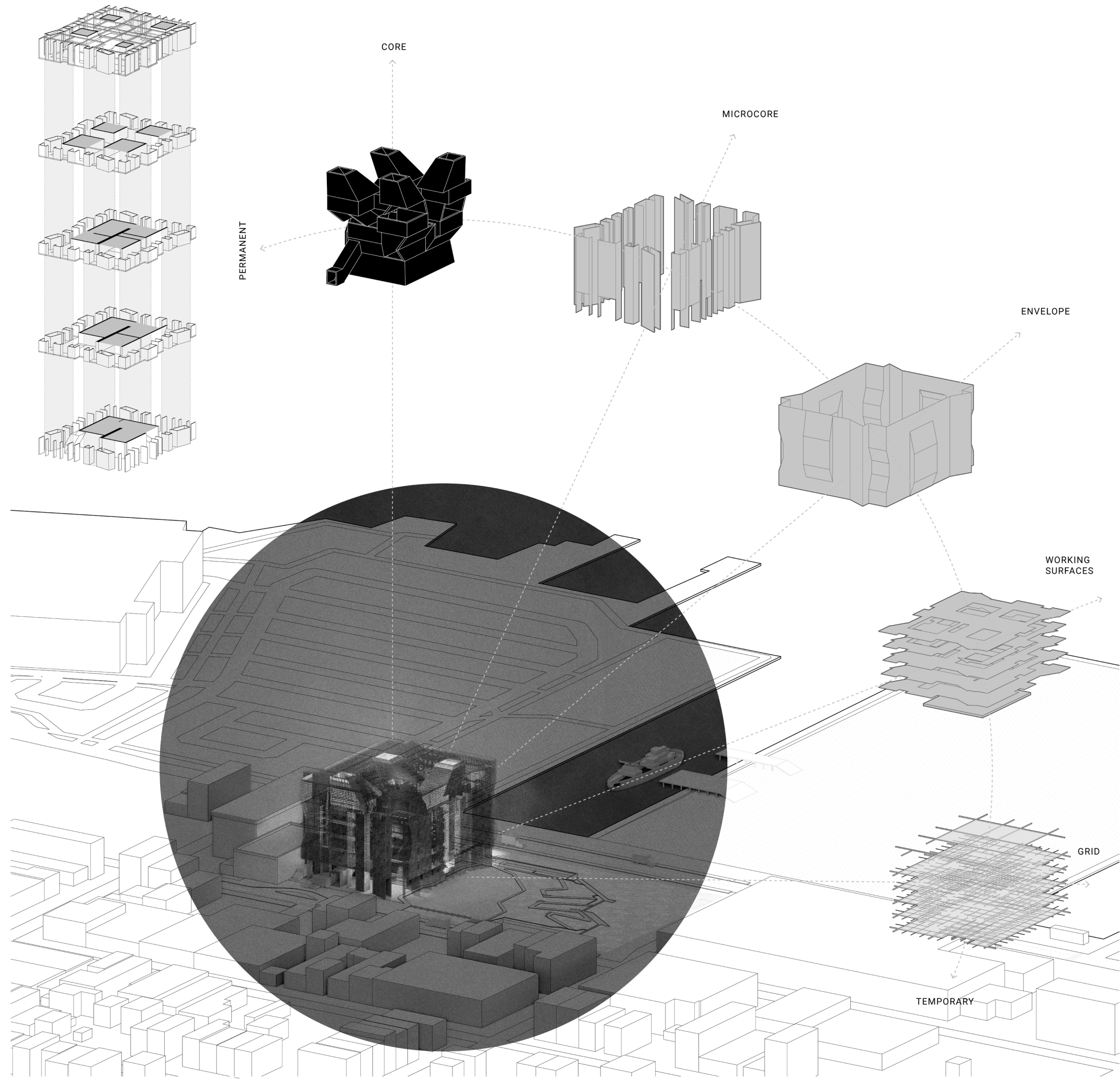


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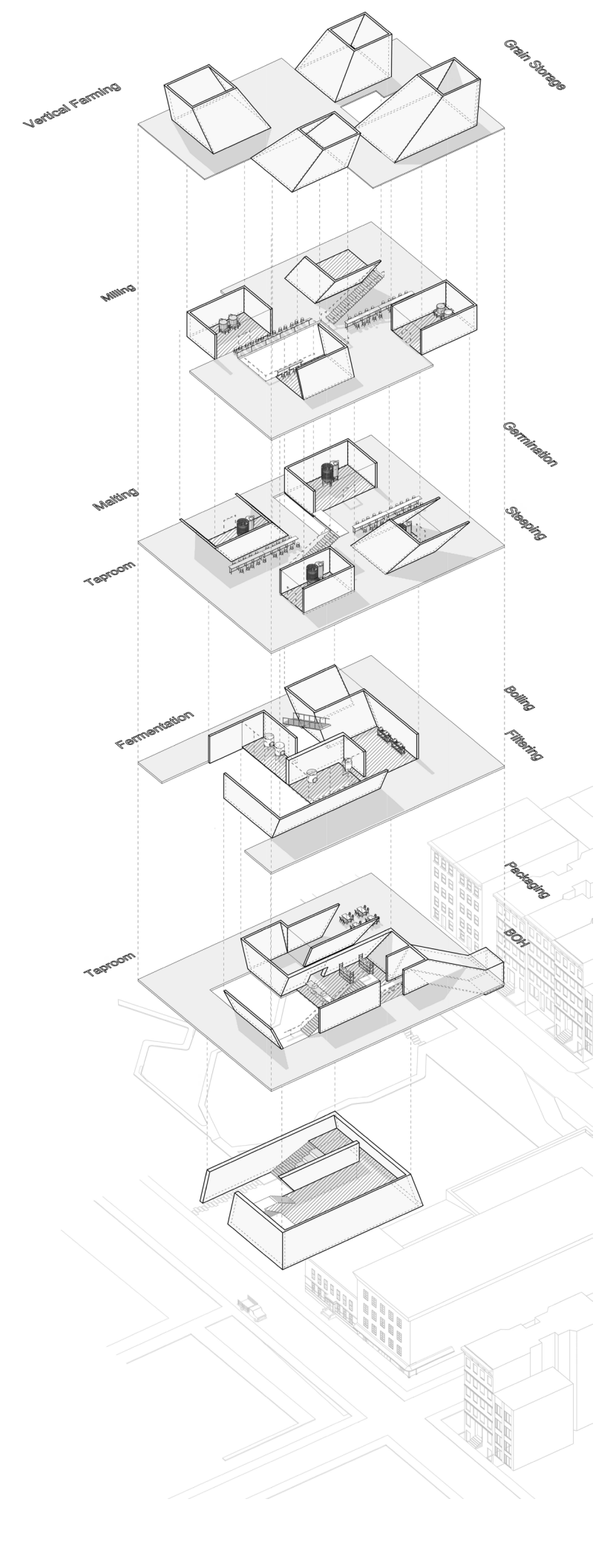


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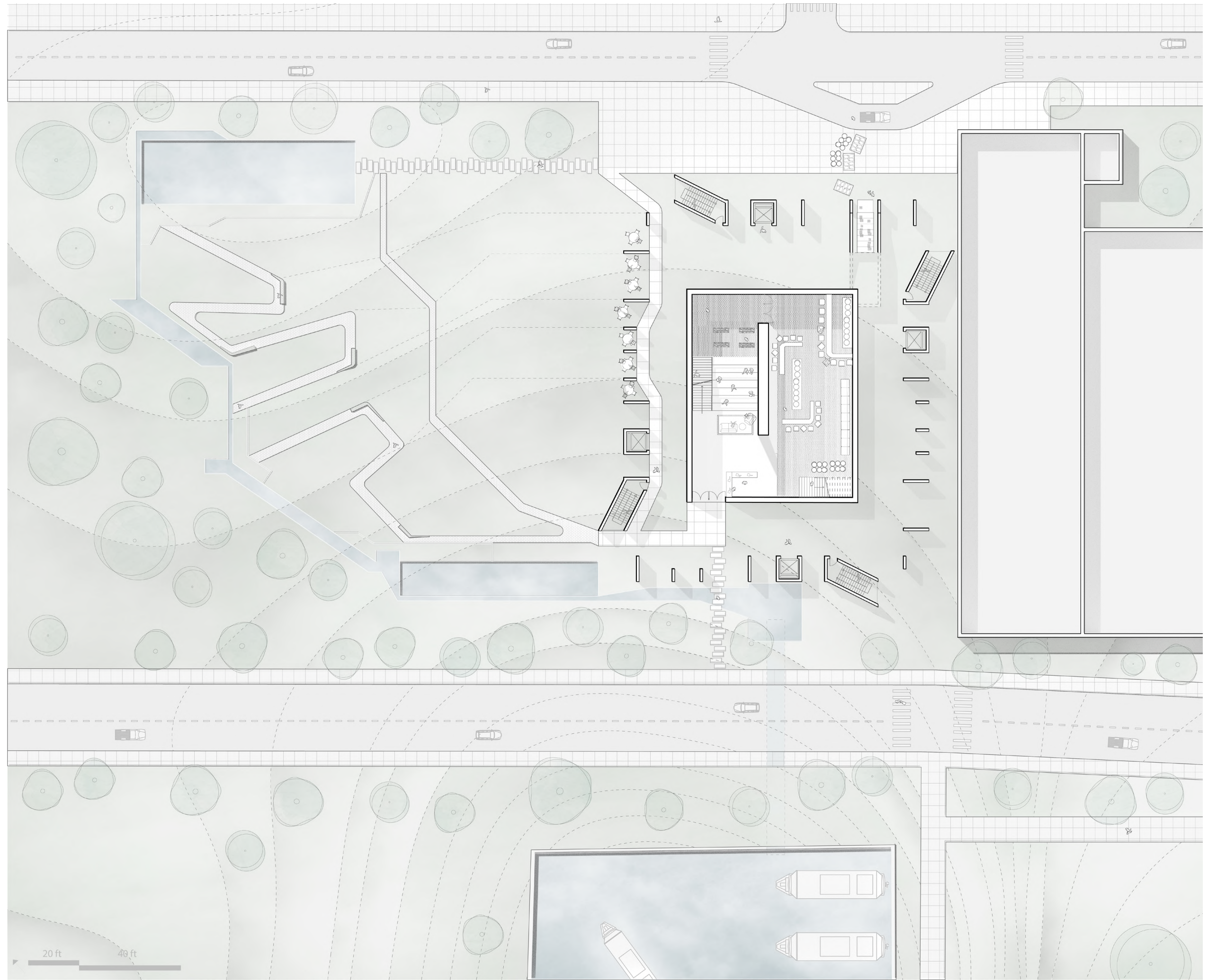


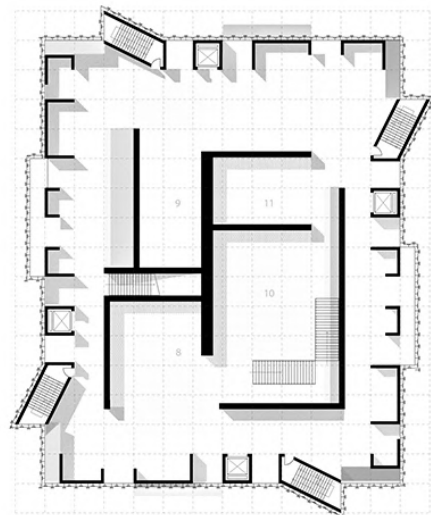


6 axon diagram

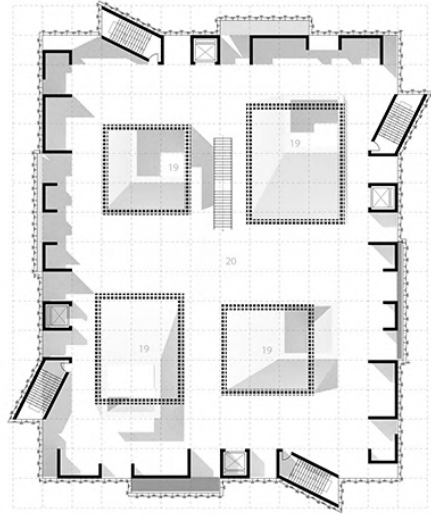


7 exploded diagram

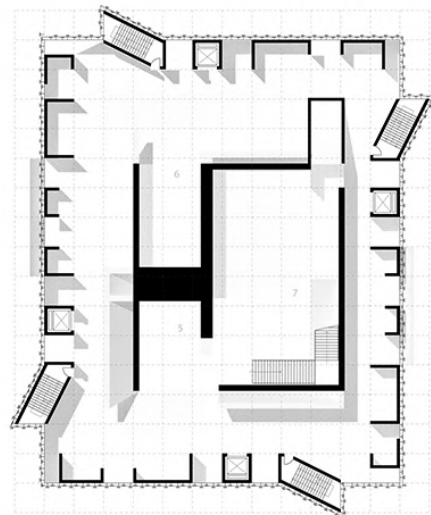




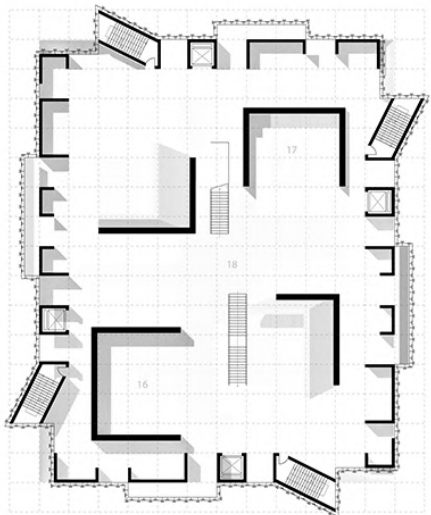
**LEVEL 3**  
 8 Filtration  
 9 Cooling  
 10 Gammatron  
 11 Boiling



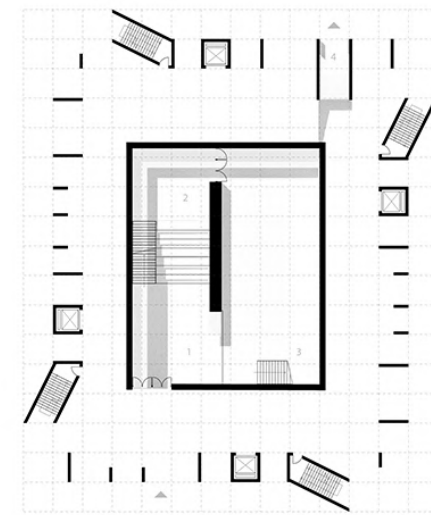
**LEVEL 6**  
 19 Vertical Farming  
 20 Roof Garden



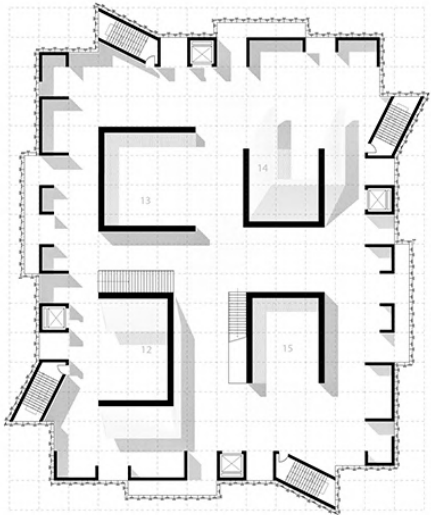
**LEVEL 2**  
 5 Storage  
 6 Fermentation  
 7 Packaging



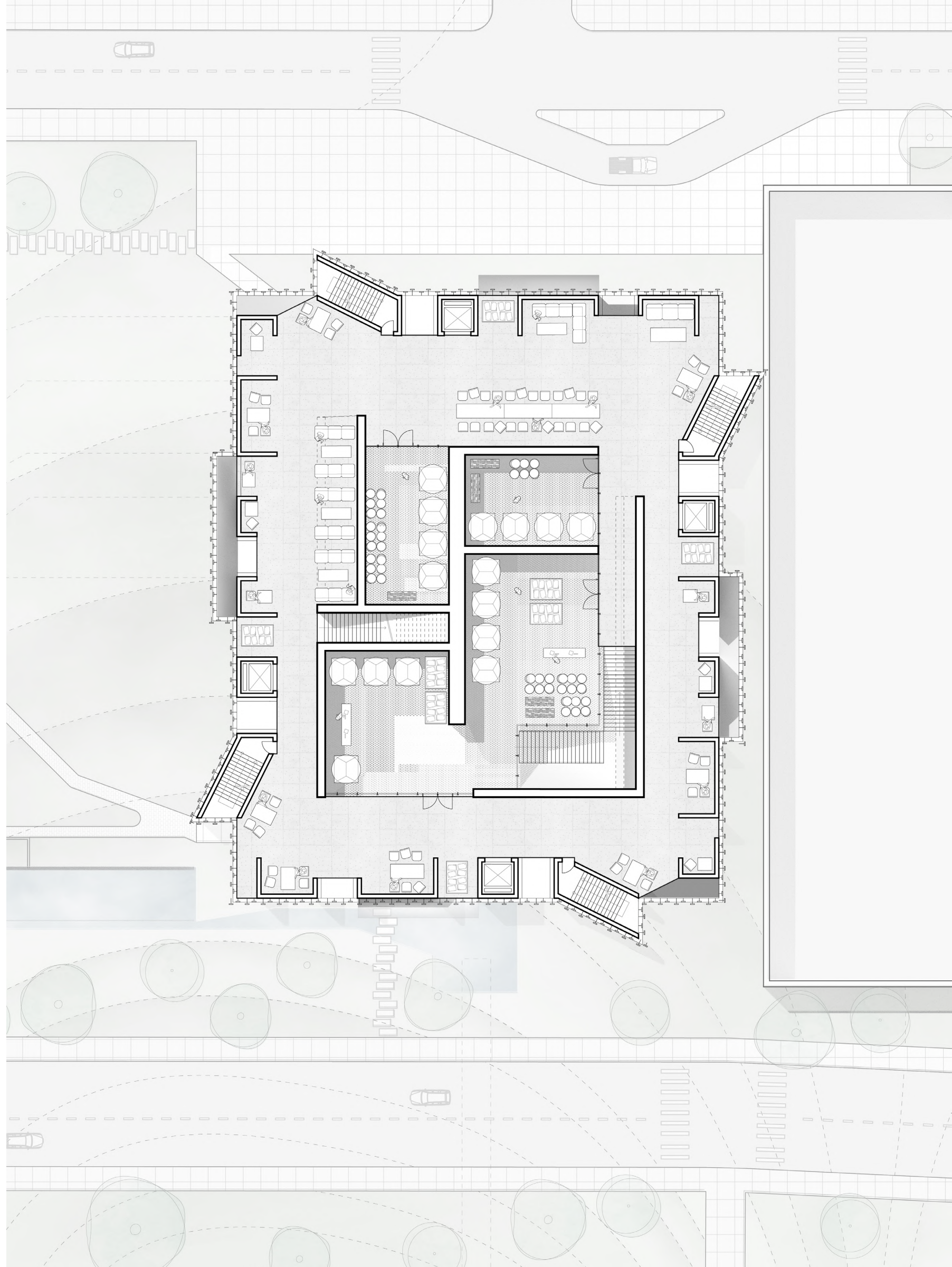
**LEVEL 5**  
 16 Milling  
 17 Steeping  
 18 Pop-up Cafe

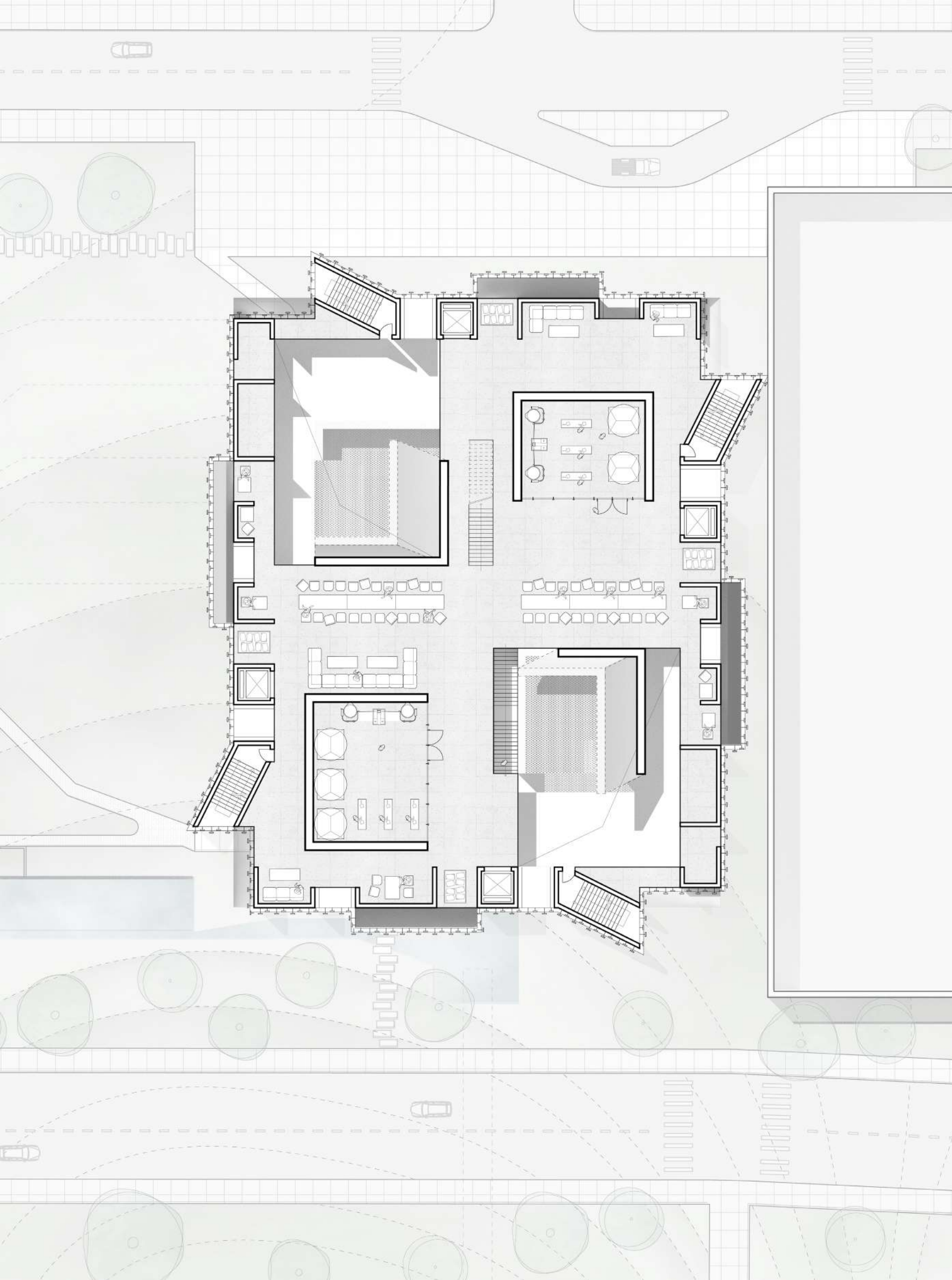


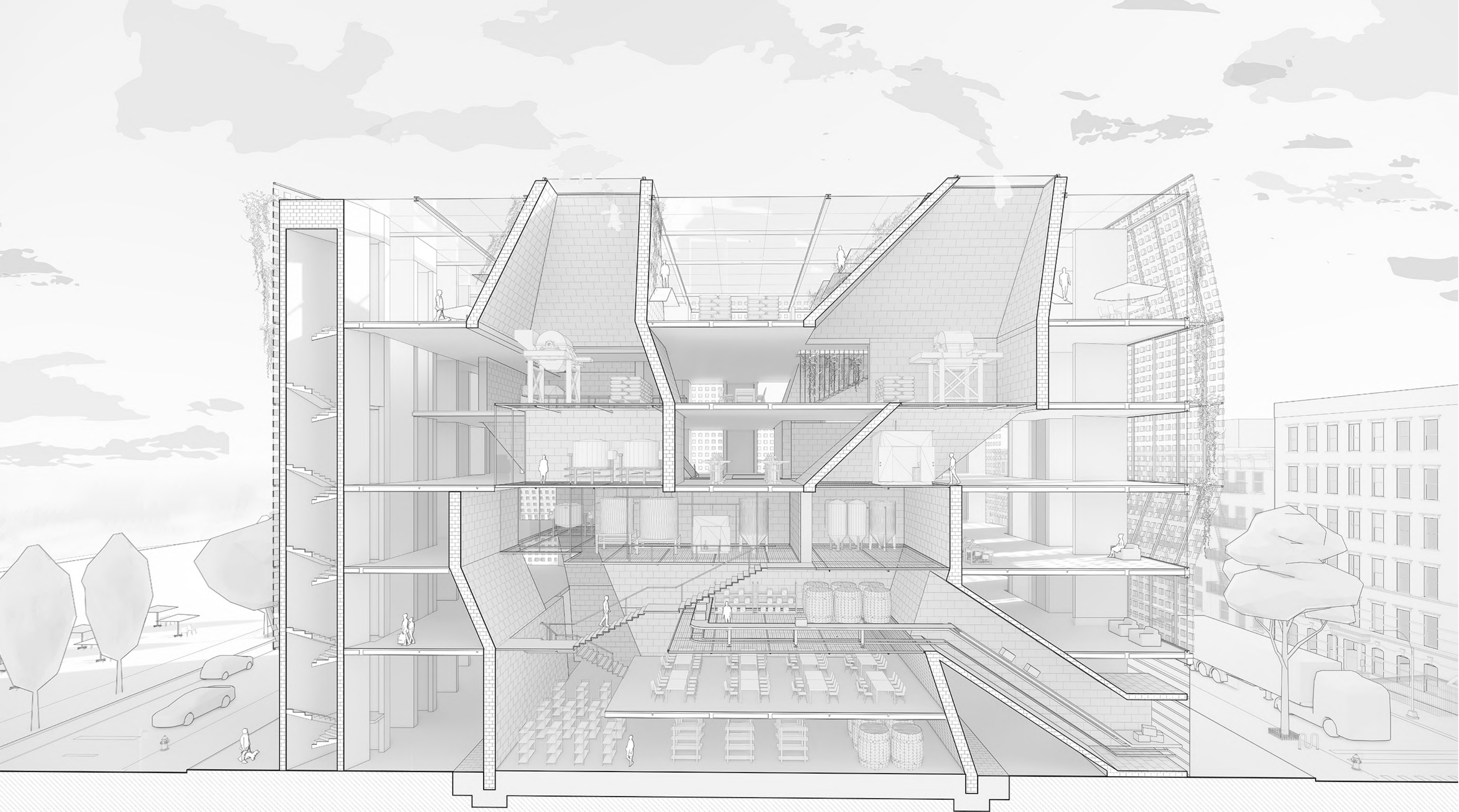
**GROUND**  
 1 Reception  
 2 Event Space  
 3 Taproom  
 4 BOH Distribution



**LEVEL 4**  
 12 Micro Brewery A  
 13 Micro Brewery B  
 14 Micro Brewery C  
 15 Home Brewers







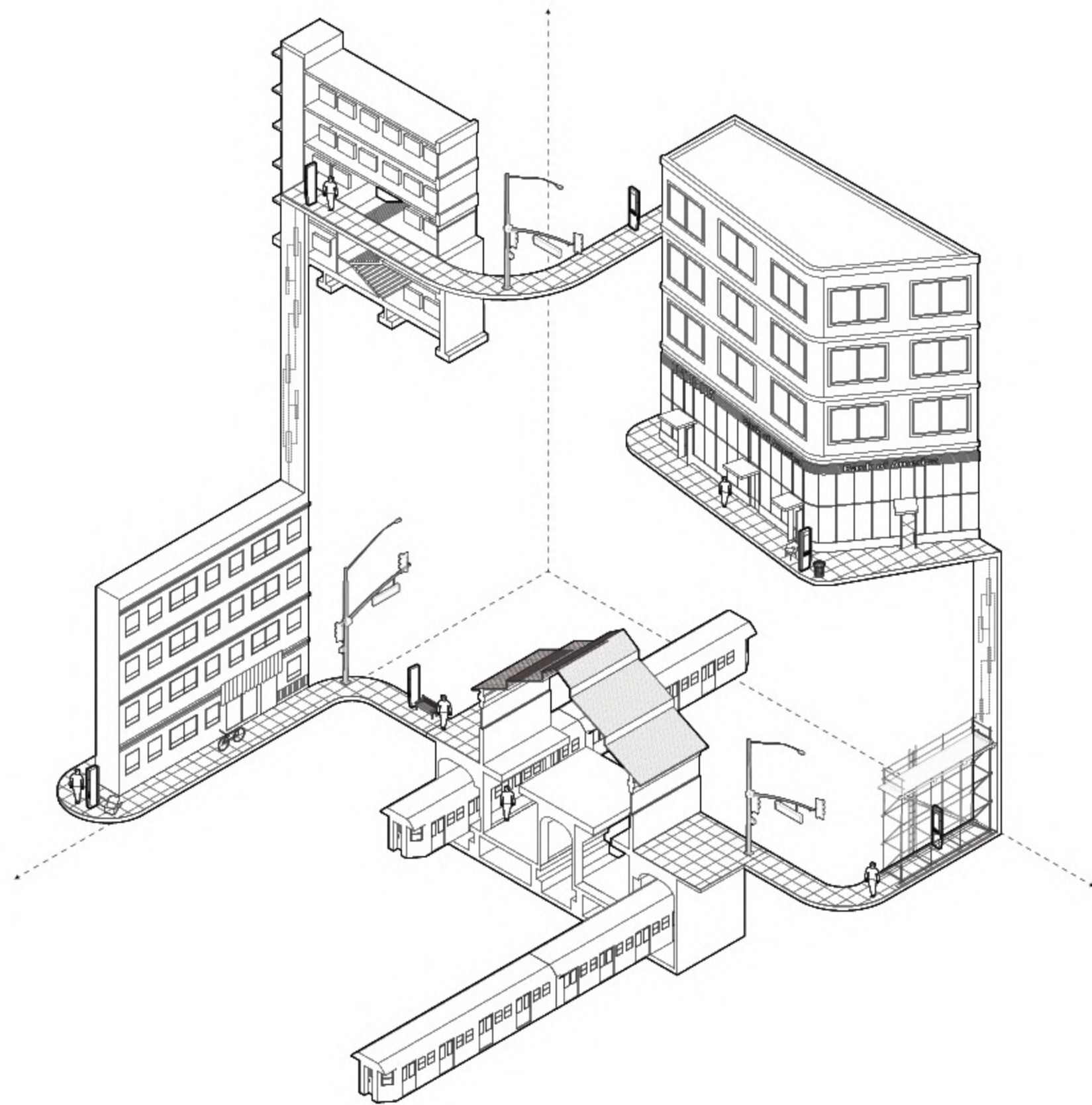
North-South Section

10 ft 20 ft









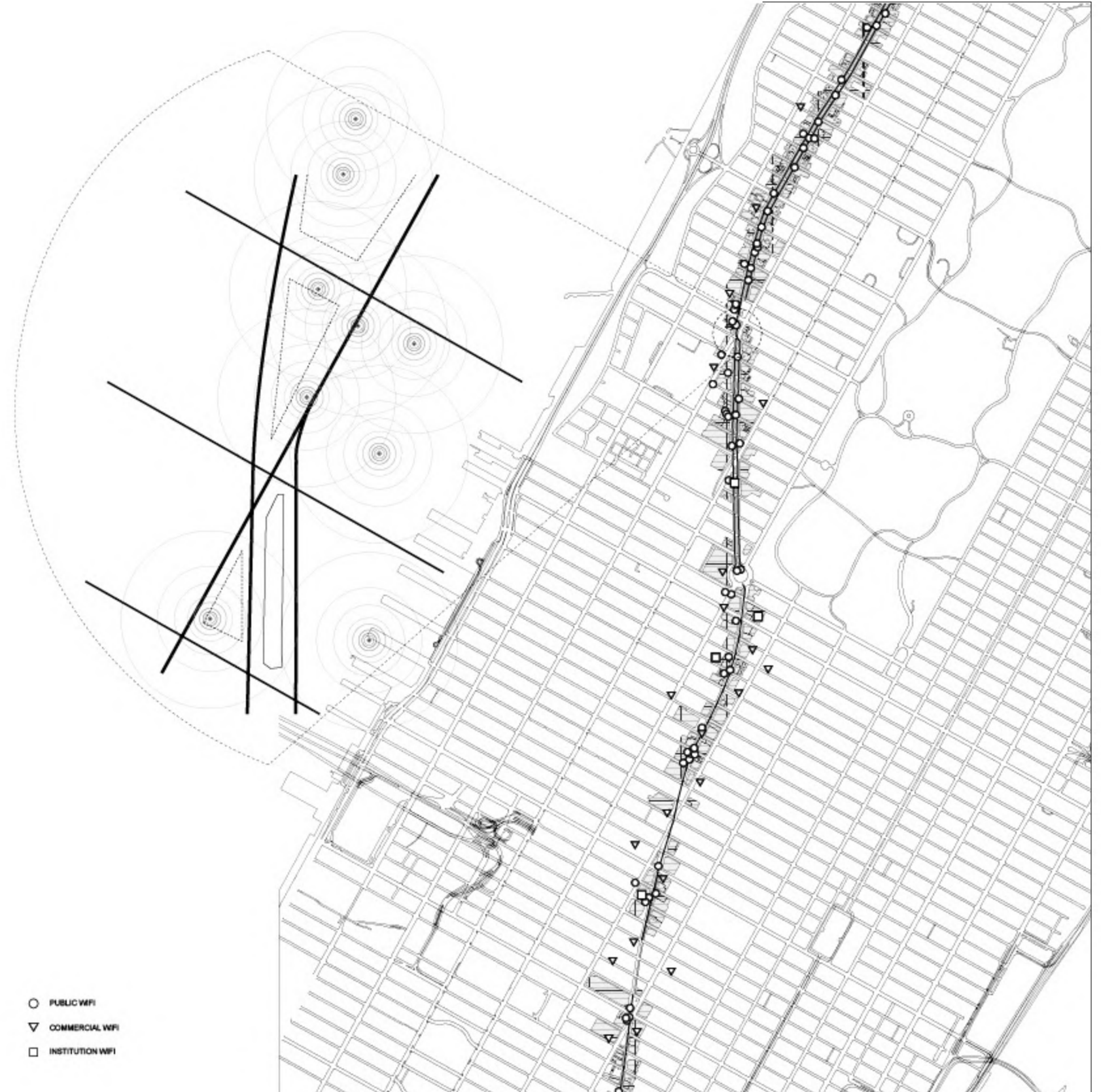
1

06

Columbia GSAPP  
Core I, Fall 2019  
Instructor: Anna Puigjaner

# broadway stories : in public space

1 Conceptual Drawing of how digital landscape changes physical landscape on Broadway



2

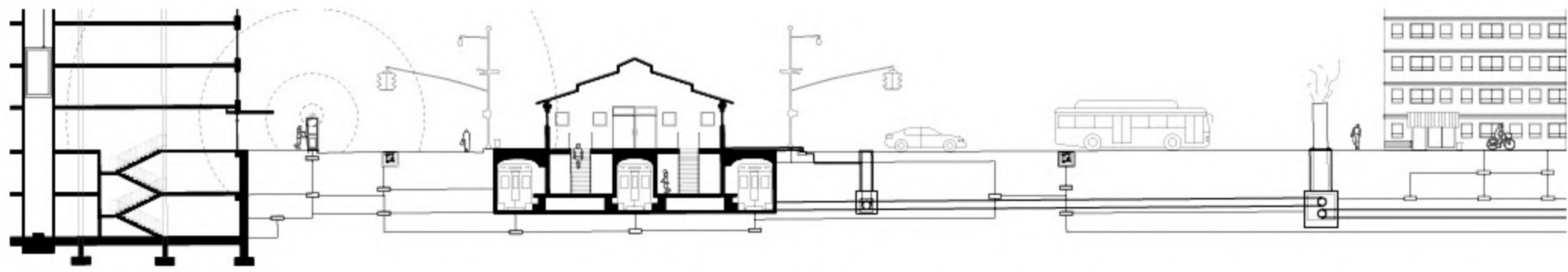
## Chapter 1 : Digital Landscape on Broadway, LINK NYC wifi stations

“LINK NYC” performs as a digital landscape on Broadway and adds a new layer to the cityscape that modifies physical spaces.

The set of drawings illustrates how does digital technology expanding its limit of private and public, and physical and nonphysical.

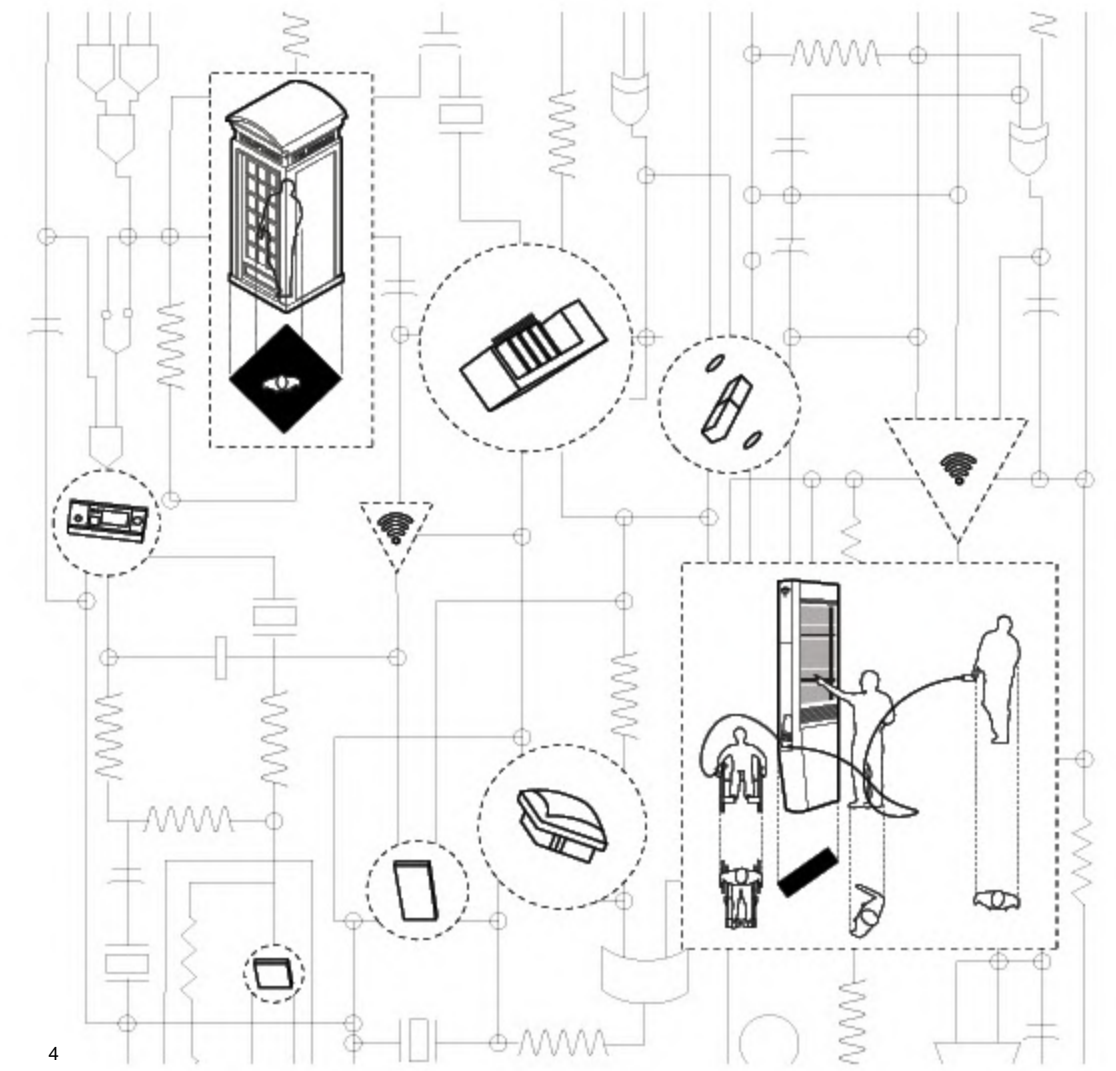
At the intersection of Broadway and 72nd street, human interaction, social events, and commercial activities take place in the digital public space.

2 Urban mapping of digital infrastructures type and density along Broadway

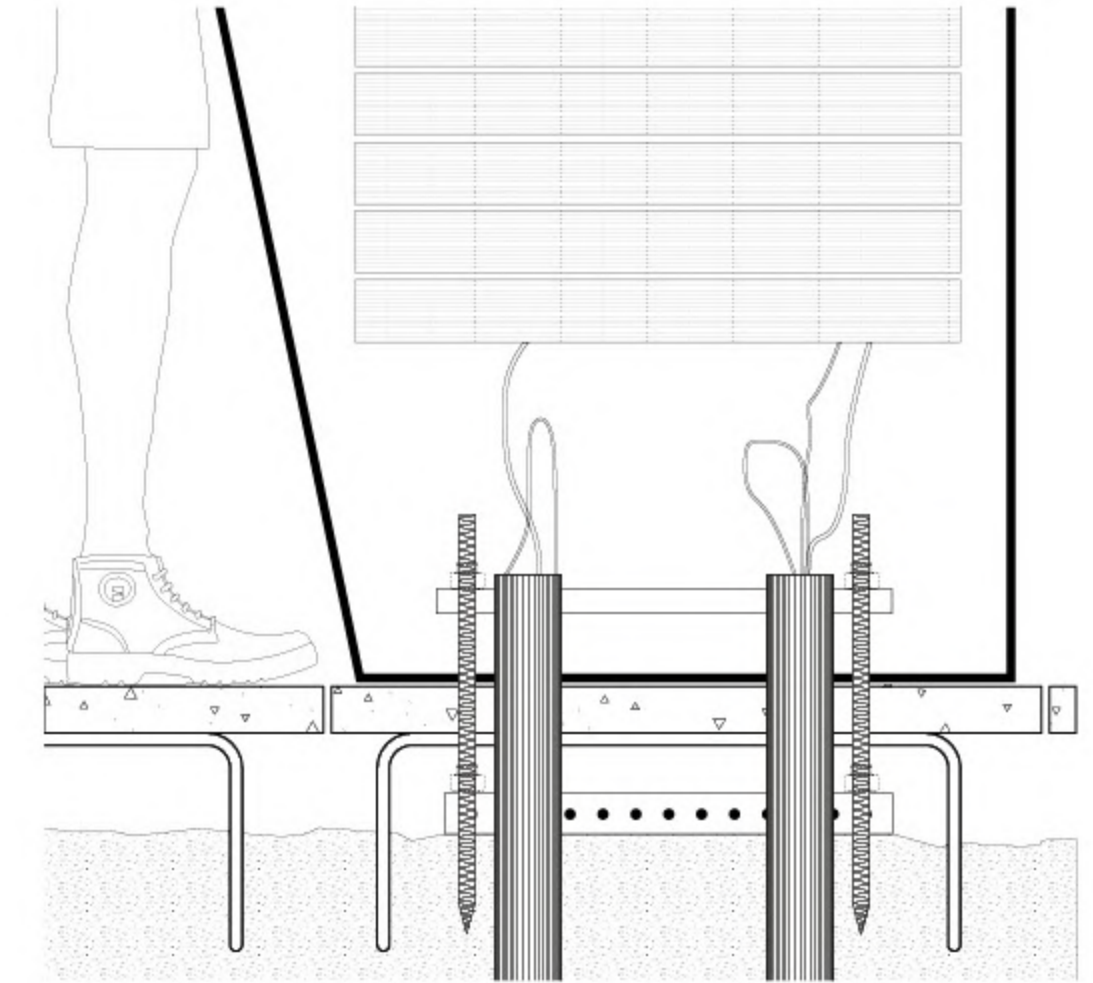


3

3 Section and Plan at the intersection of Broadway and 72nd street



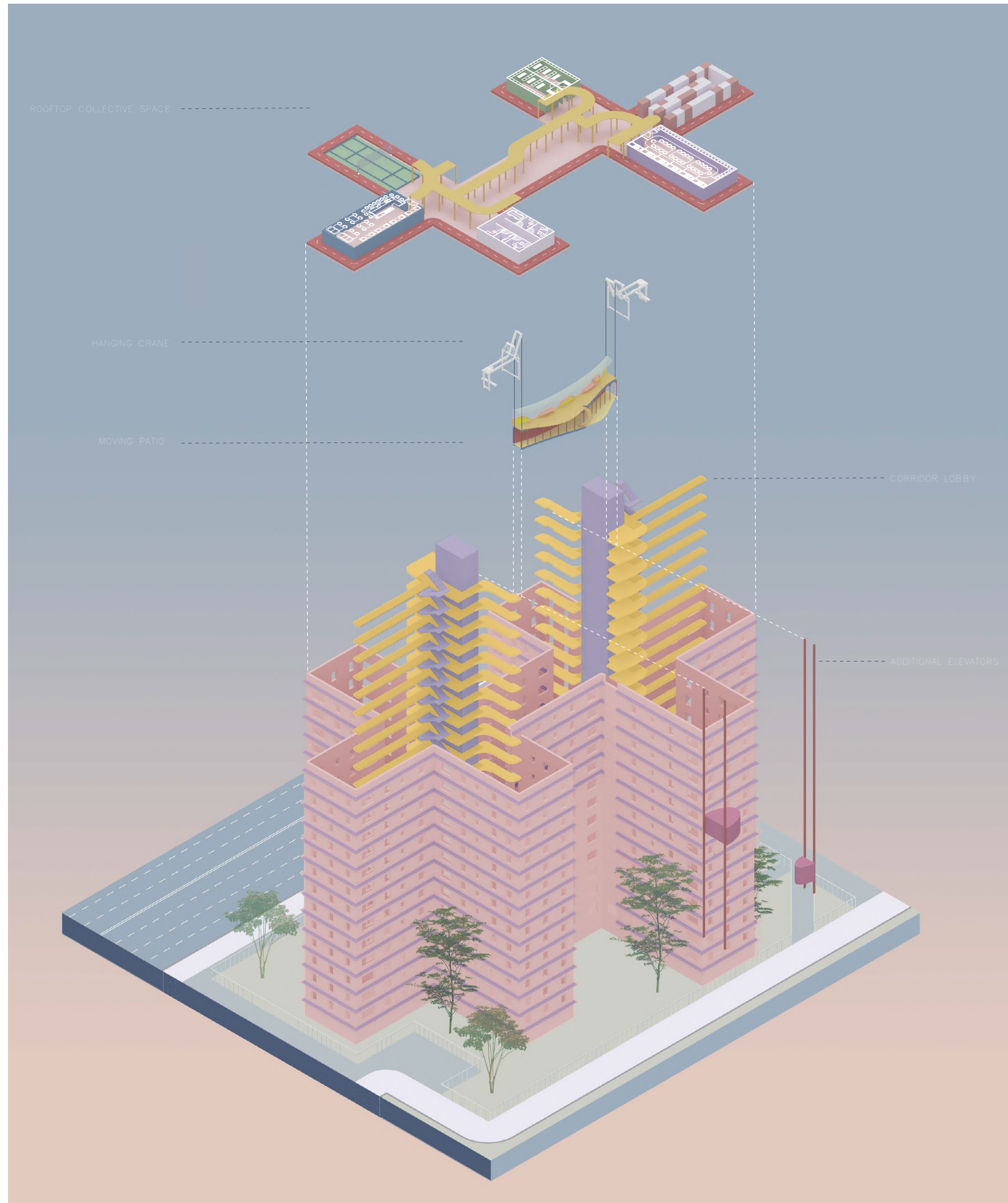
4



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4 Conceptual Diagram of LINK NYC system

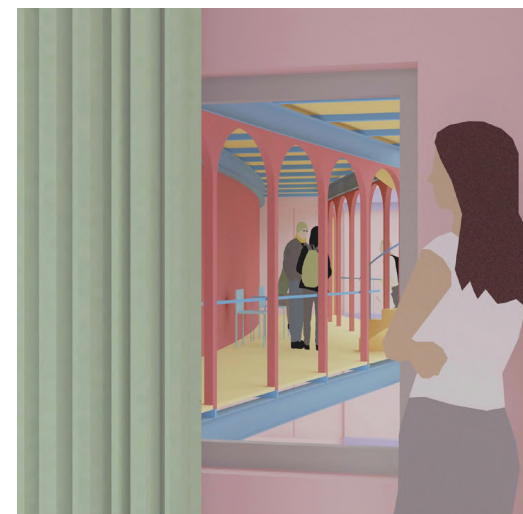
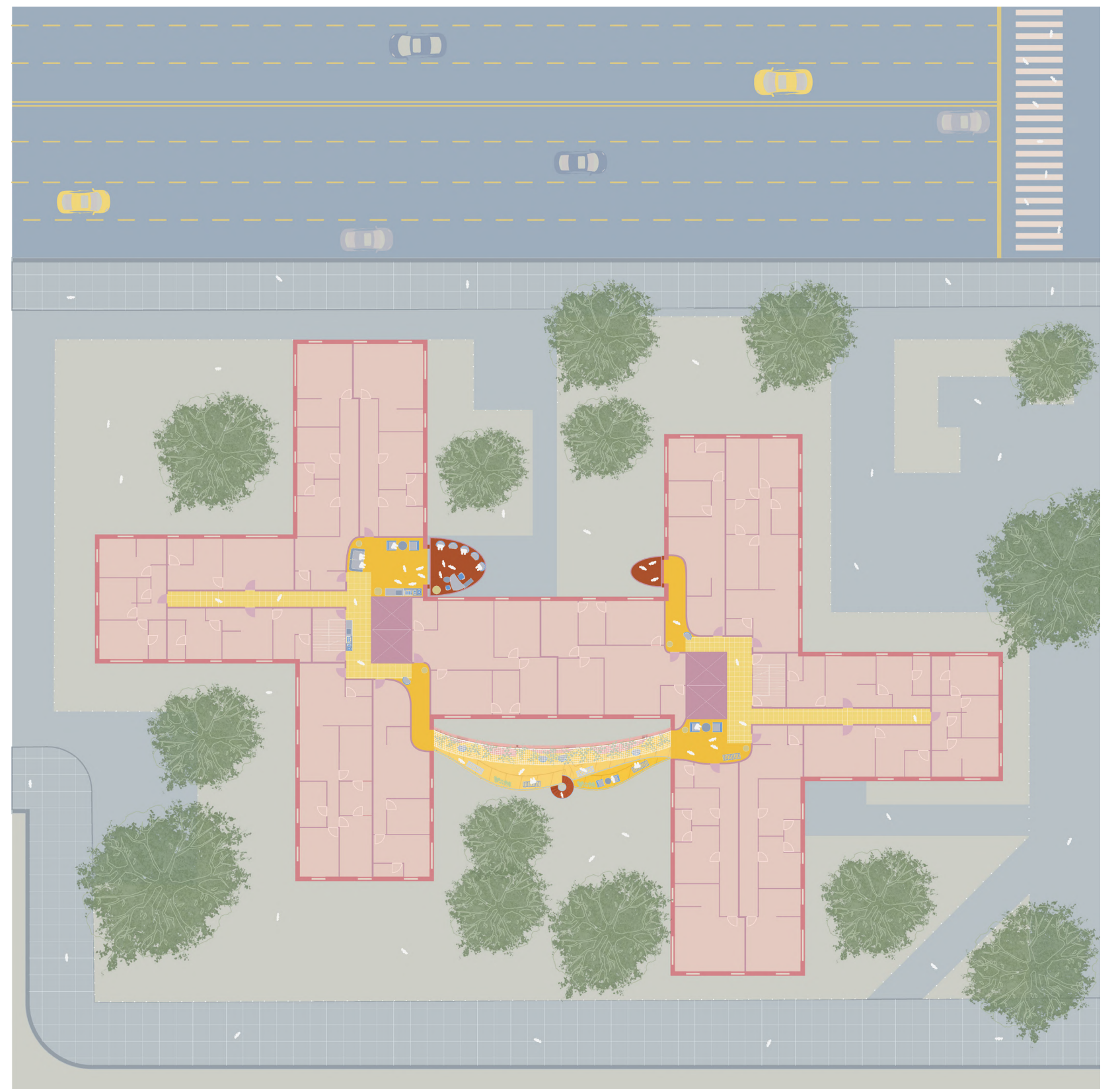
5 Detail section of digital device on street



## Chapter 2 : Collective Space for NYCHA

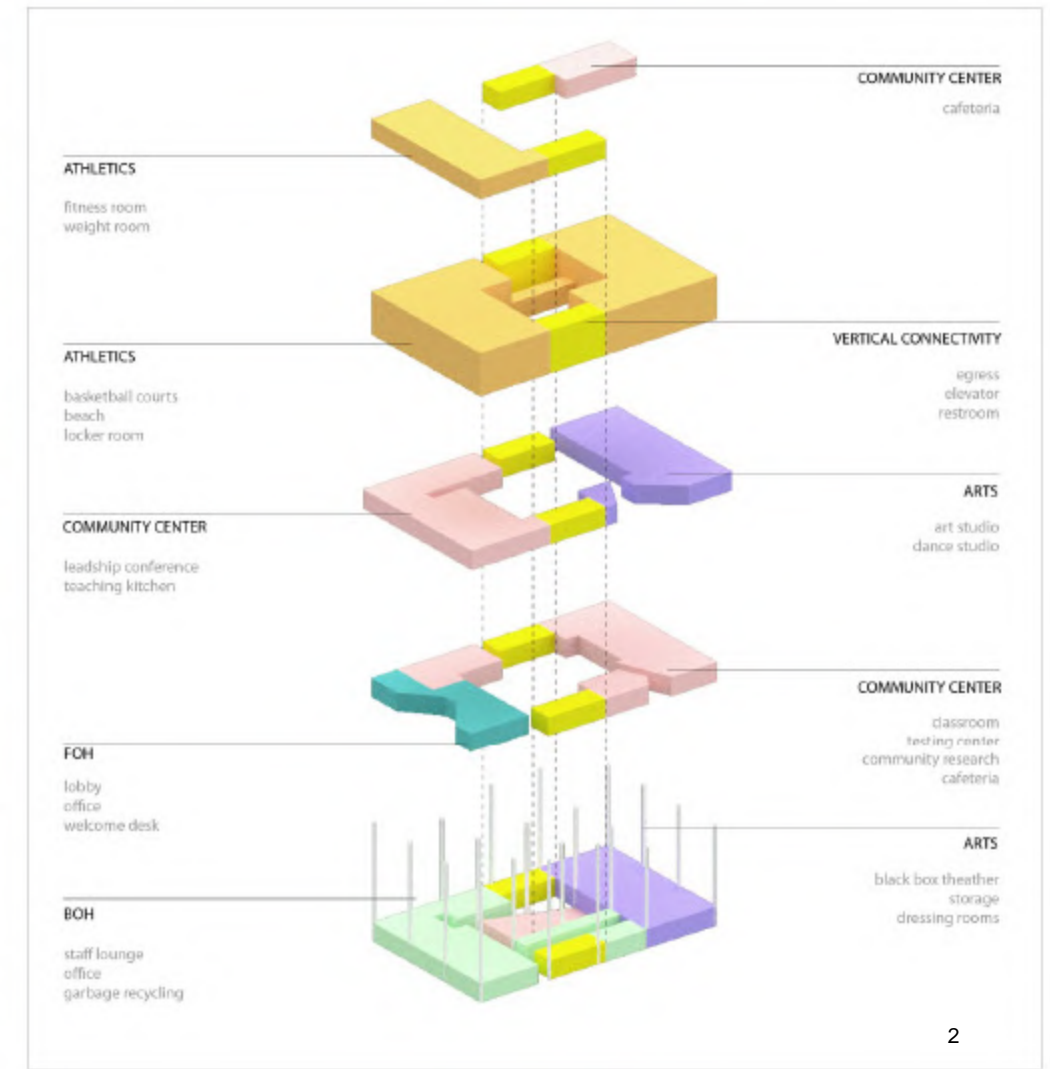
The “moving public space” repurposes the existing infrastructure system and facilitates a new type of spacial and social connection for NYCHA housing. The Amsterdam Houses neighborhood is mainly occupied by families and senior demographics who highly rely on disabilities facilities. The core of two wings in each building will be linked through the inner corridor, where it broadens and provides communal space for each floor. The double-deck outdoor pavilion performs as a paternoster lift that moves vertically along the facade and can be adapted to different temporary events. On the rooftop, the public use programs return the takeaway square-footage from residents.







The major programs of community center are arranged in the first and second floor. It creates a convenience for citizens access those public functions. Art studios locate in the second floor. The third, fourth and top floor mainly contain the athletics programs like, basketball courts and fitness rooms. On the rooftop, there is a mini cafeteria. Main entry is on the west that funnels to a view of the inner courtyard, with corridors surrounding it that connects to the cafeteria and classrooms on the other side of the building.



07

Columbia GSAPP  
Tech III & IV, Fall 2020

collaborate with  
Agnes Anggada  
Jiafeng Li  
Yumeng Liu

Architectural Consultant : Stephen Ruiz  
Structural Consultant : Shinjinee Pathak  
Mechanical Consultant : Oliver Meade  
Enclosure Consultant : Ryan Donaghy

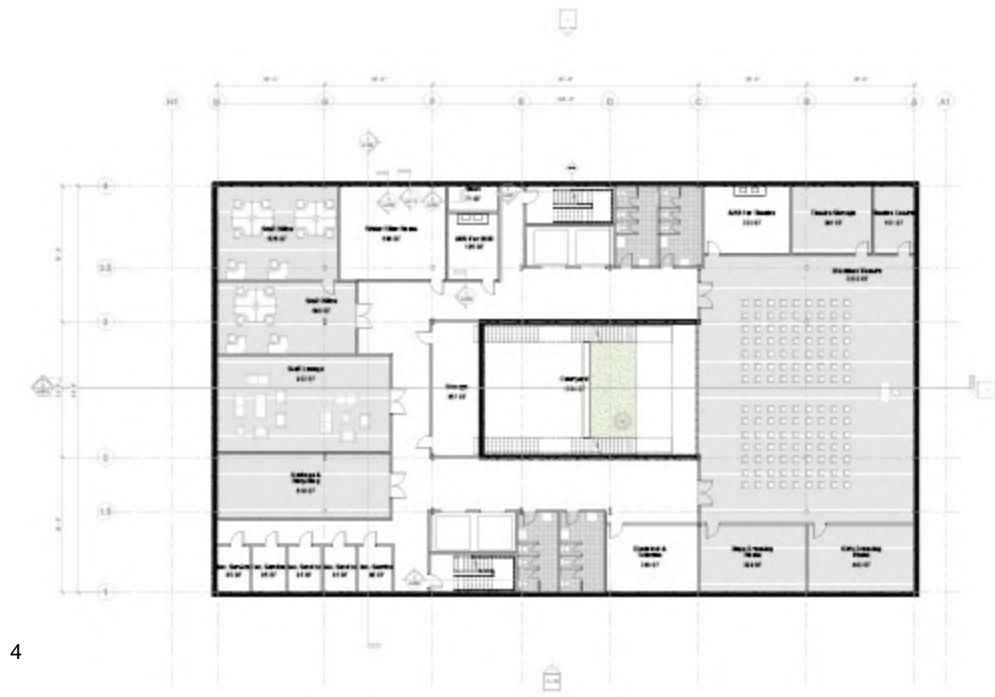
## envelope : glowing pillow

### Mel-rose Community Center

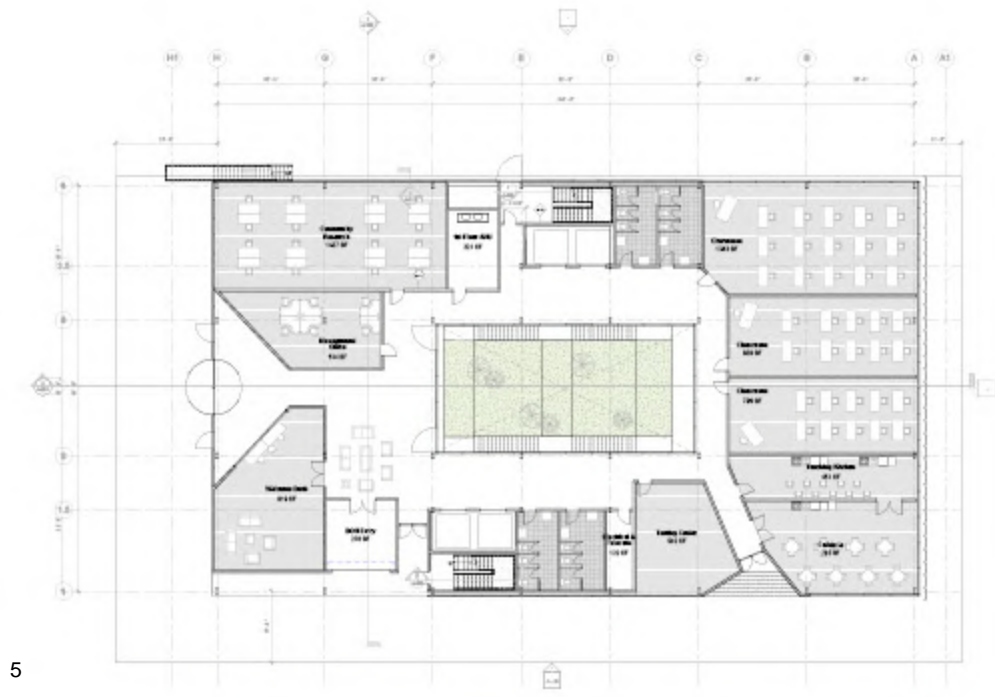
Located in the South Bronx, the lot has a south facing entry from 151st street and sits in between an existing park and community garden, with a sloping topography going down towards the east. The Bronx community center is located in a very active and chaos community. Behind it, the tiny house was the Bronx documentary center, a landmark of this community.

There are four main wall types of facades system: glass curtain wall, translucent double façade, sandstone veneer wall and roof coating. This translucent skin is composed of glass tubes providing natural light to the basketball courts and other spaces, forming a “cool jacket” around our building. This layer of façade reduces solar gain and at the same time creates cooling energy. During the night the translucent skin will be lit from the inside, then as a result we have a glowing pillow floating in the air.

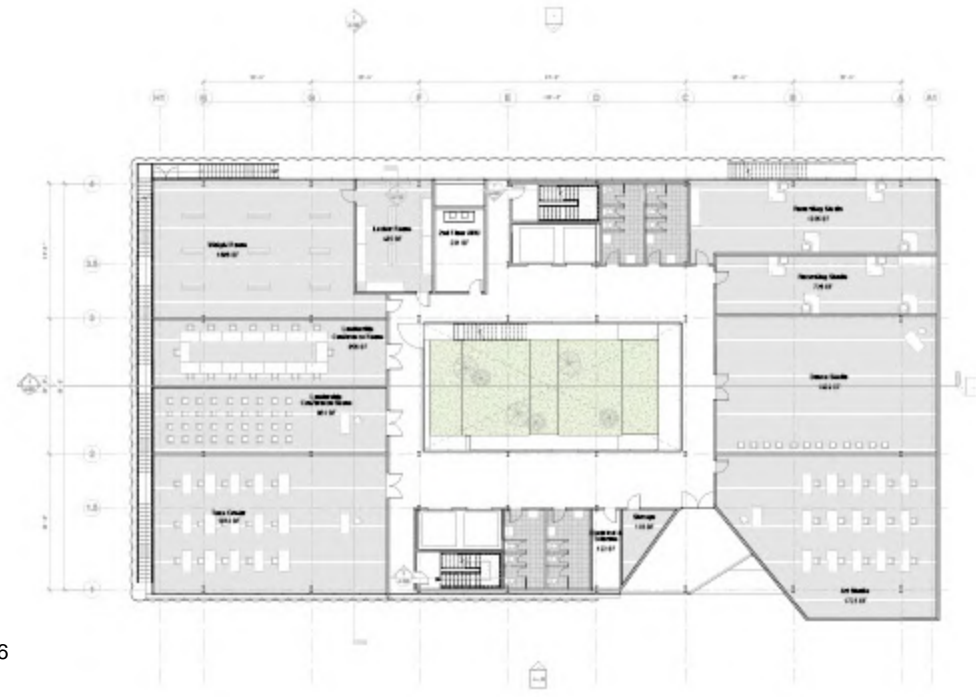




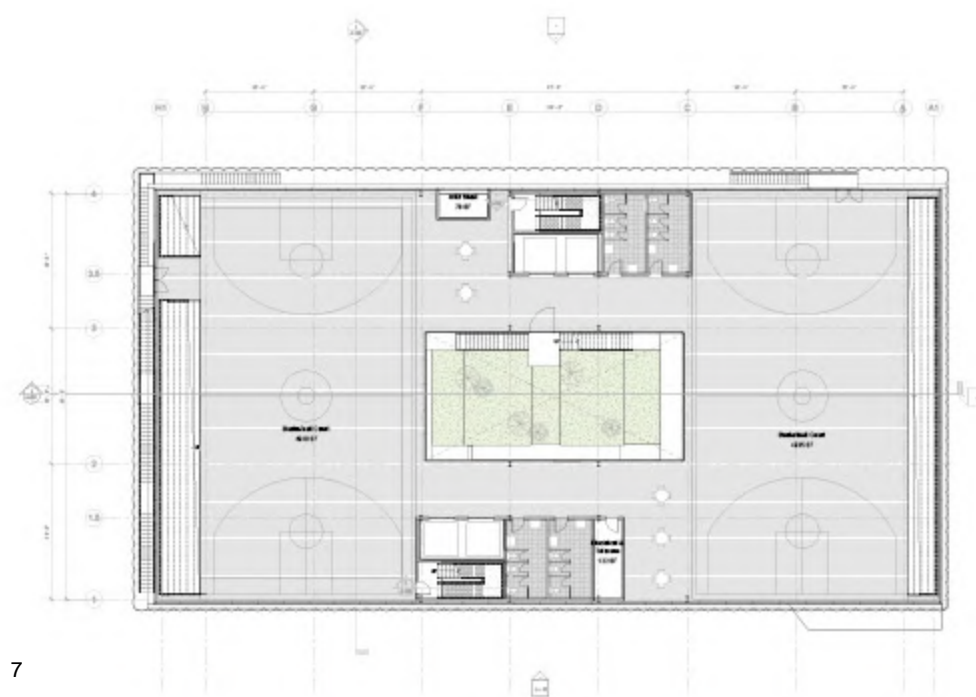
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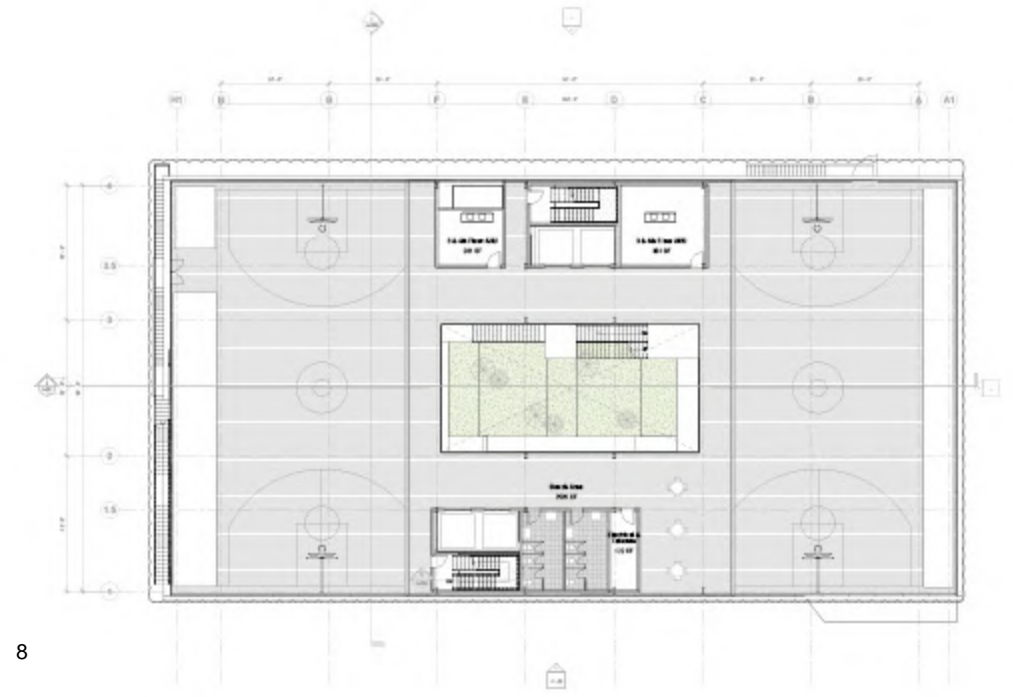
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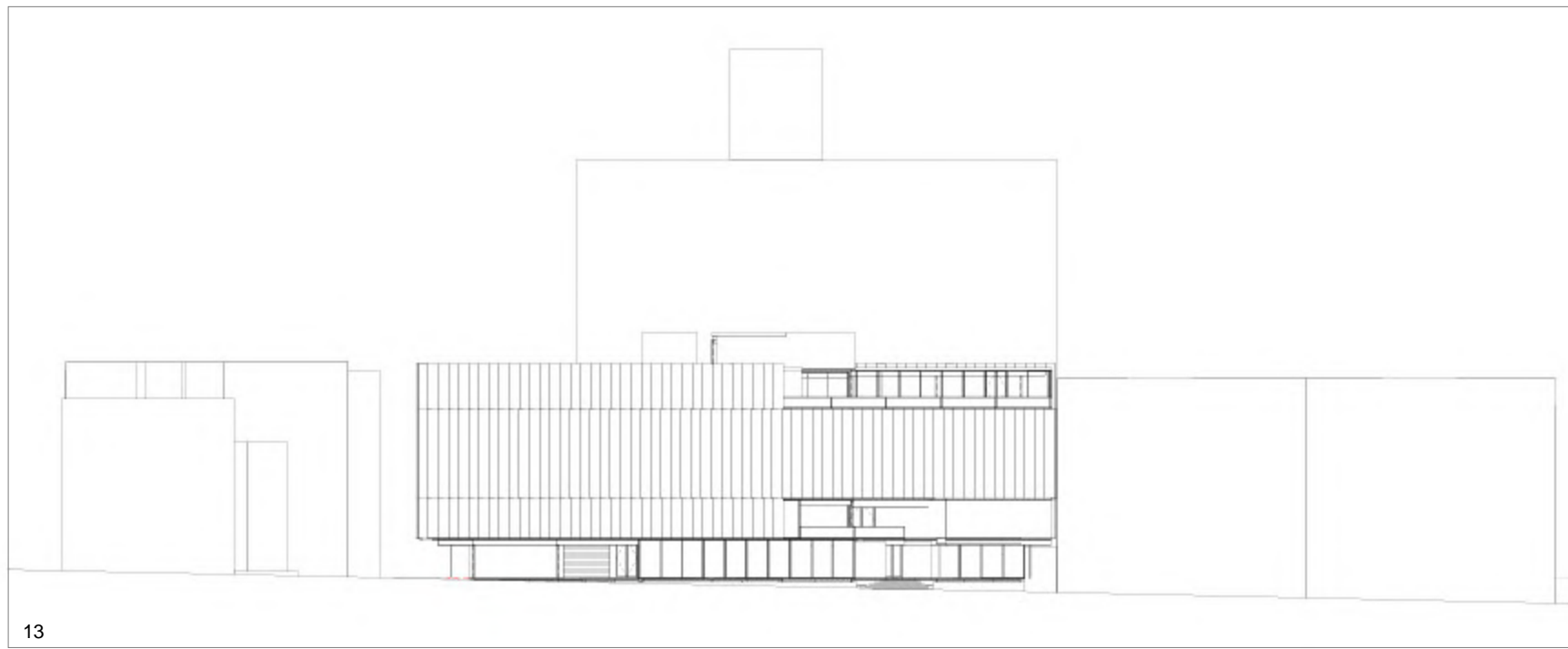


12

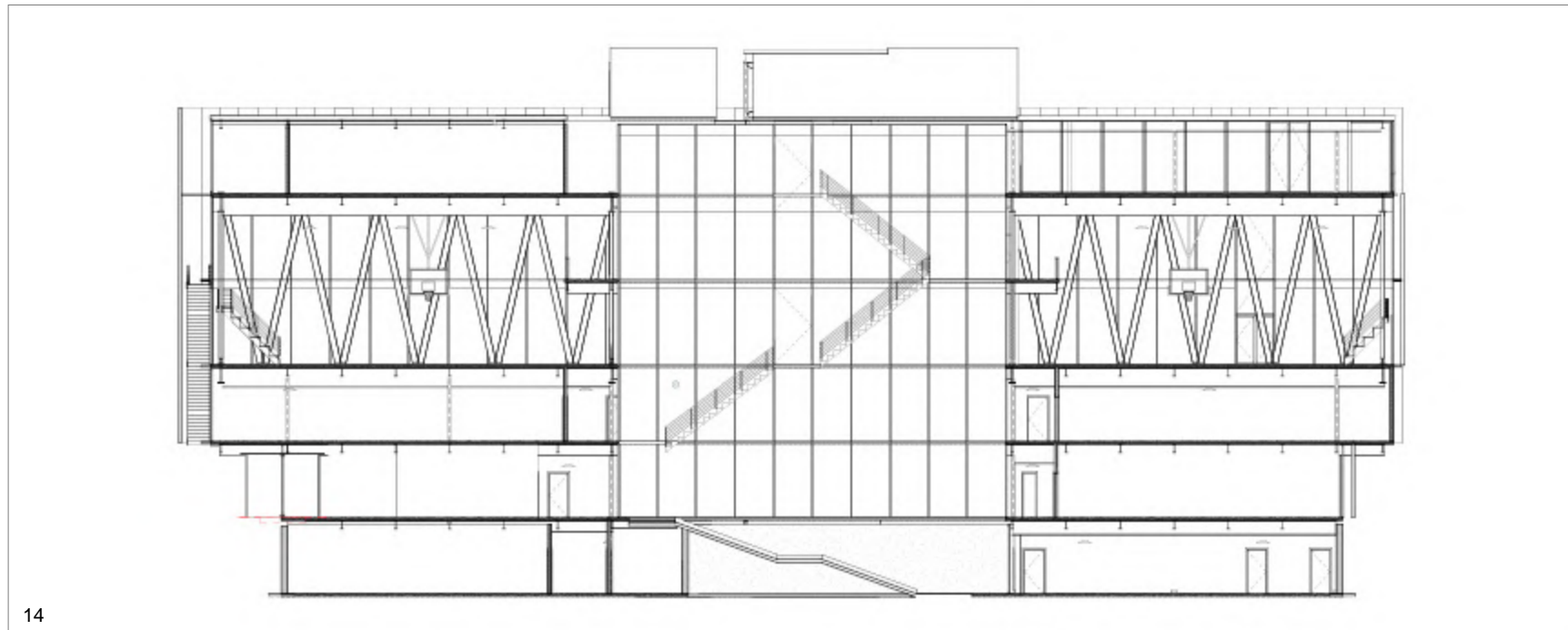
4 basement plan  
5 first floor plan  
6 second floor plan

7 third floor plan  
8 fourth floor plan  
9 fifth floor plan

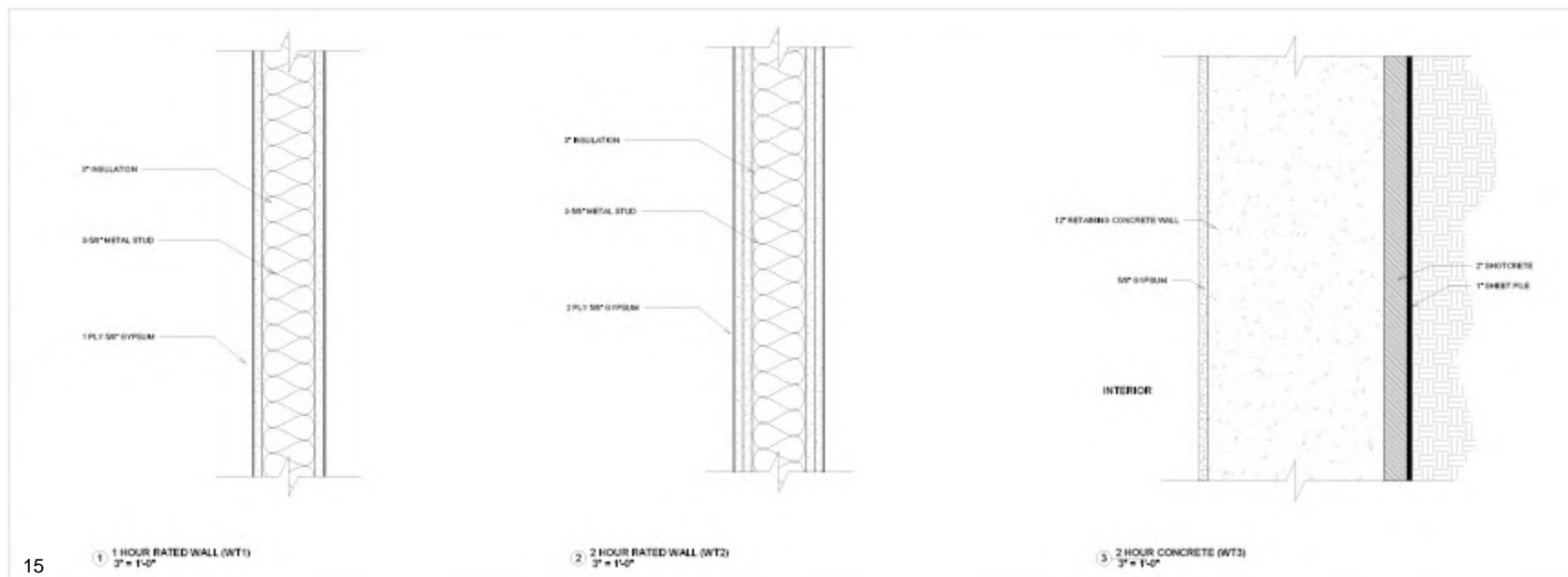
10 render of egress in between envelope and building  
11 render of gym space  
12 render of courtyard view



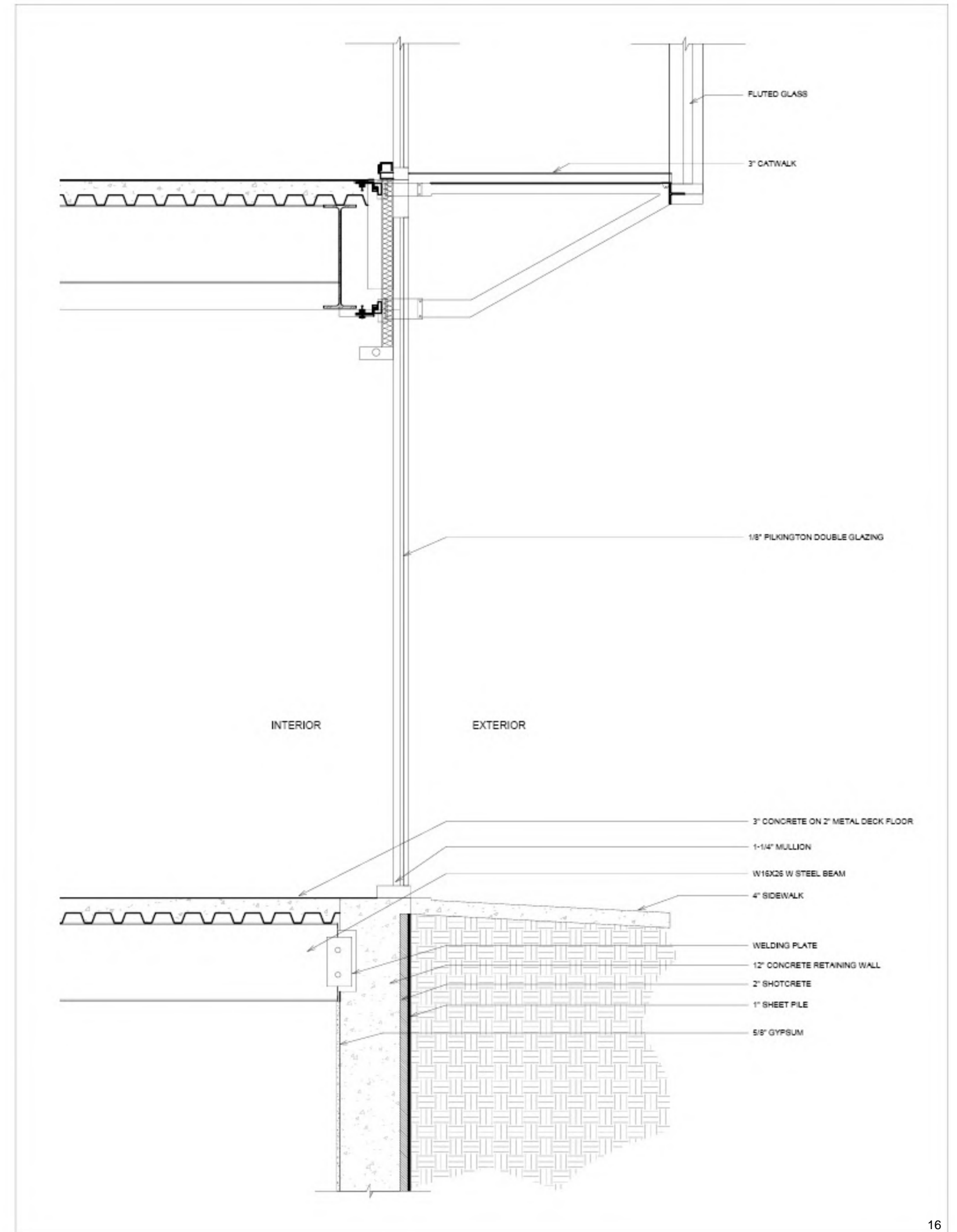
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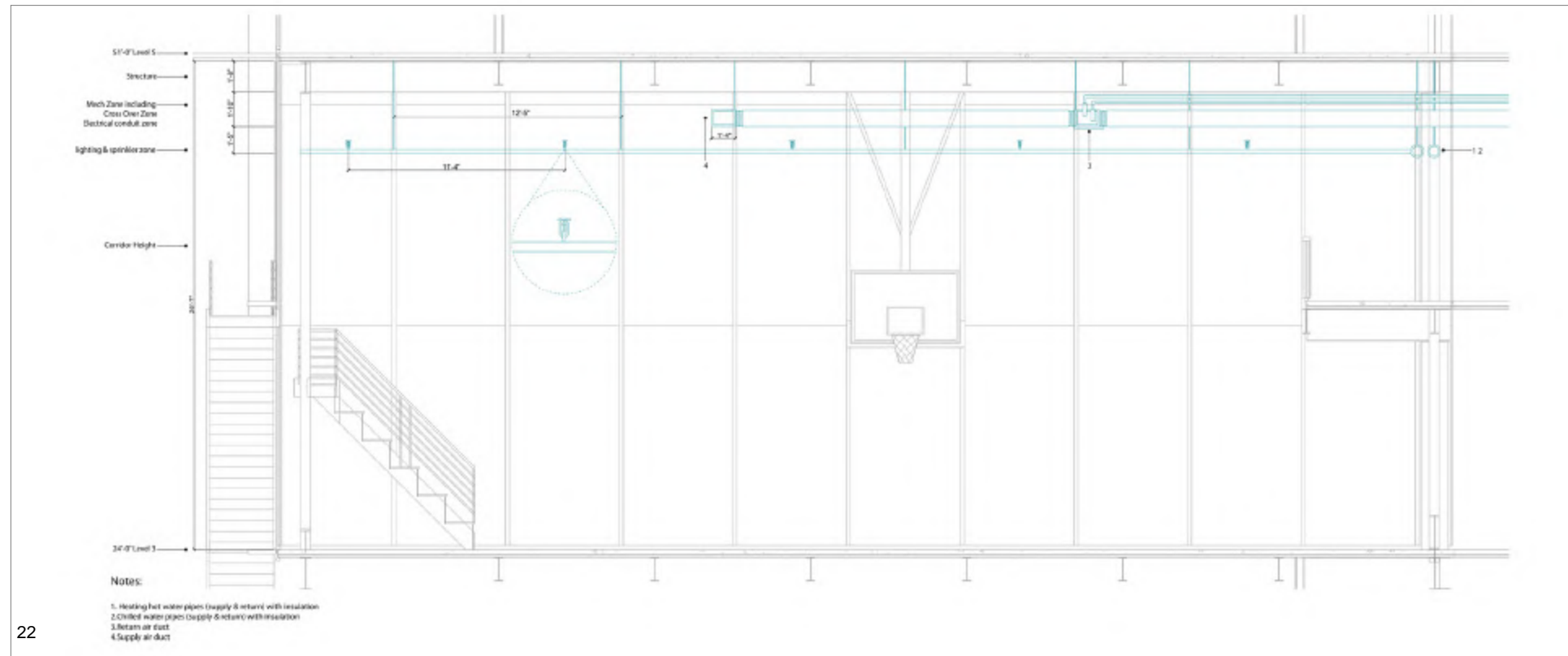
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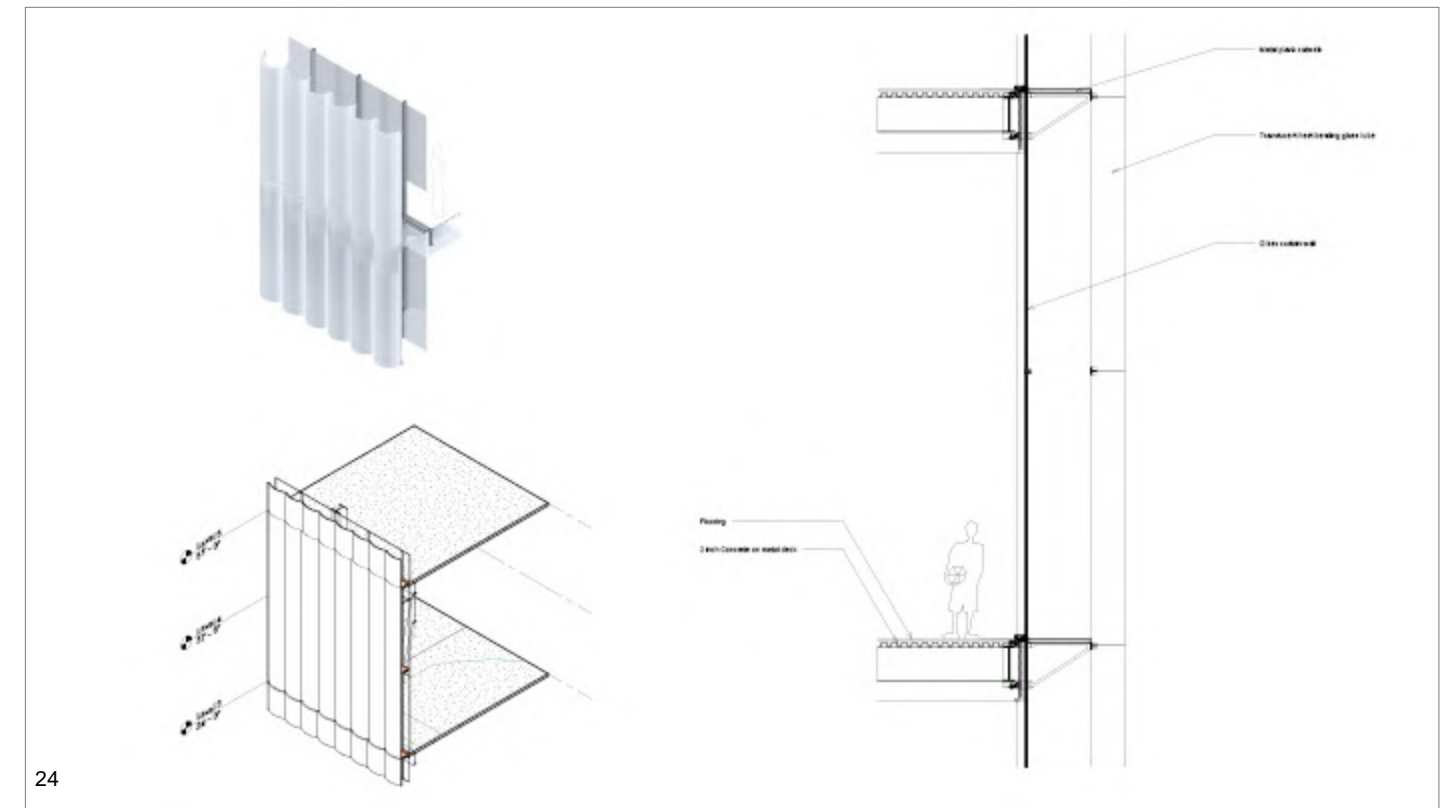
16



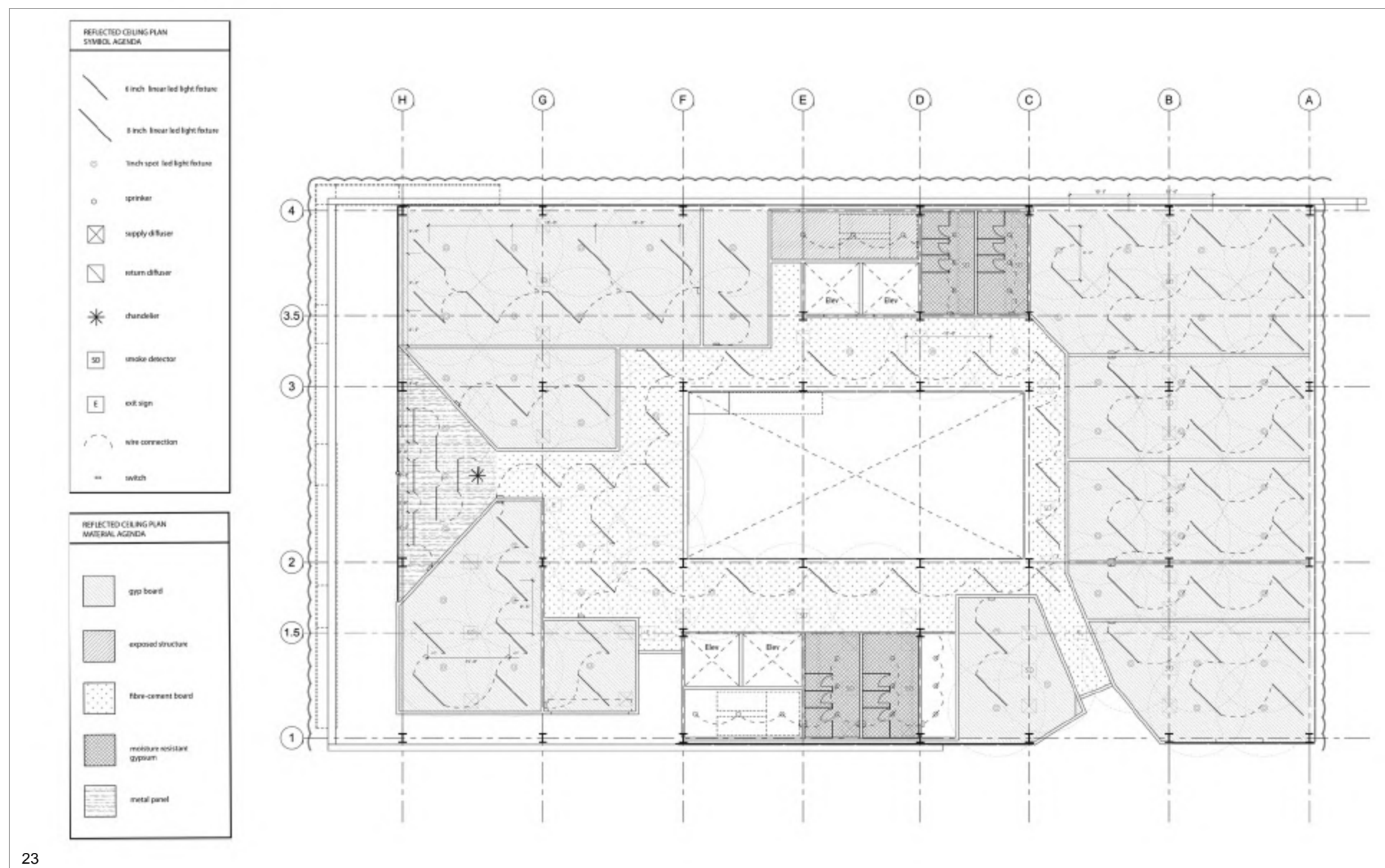




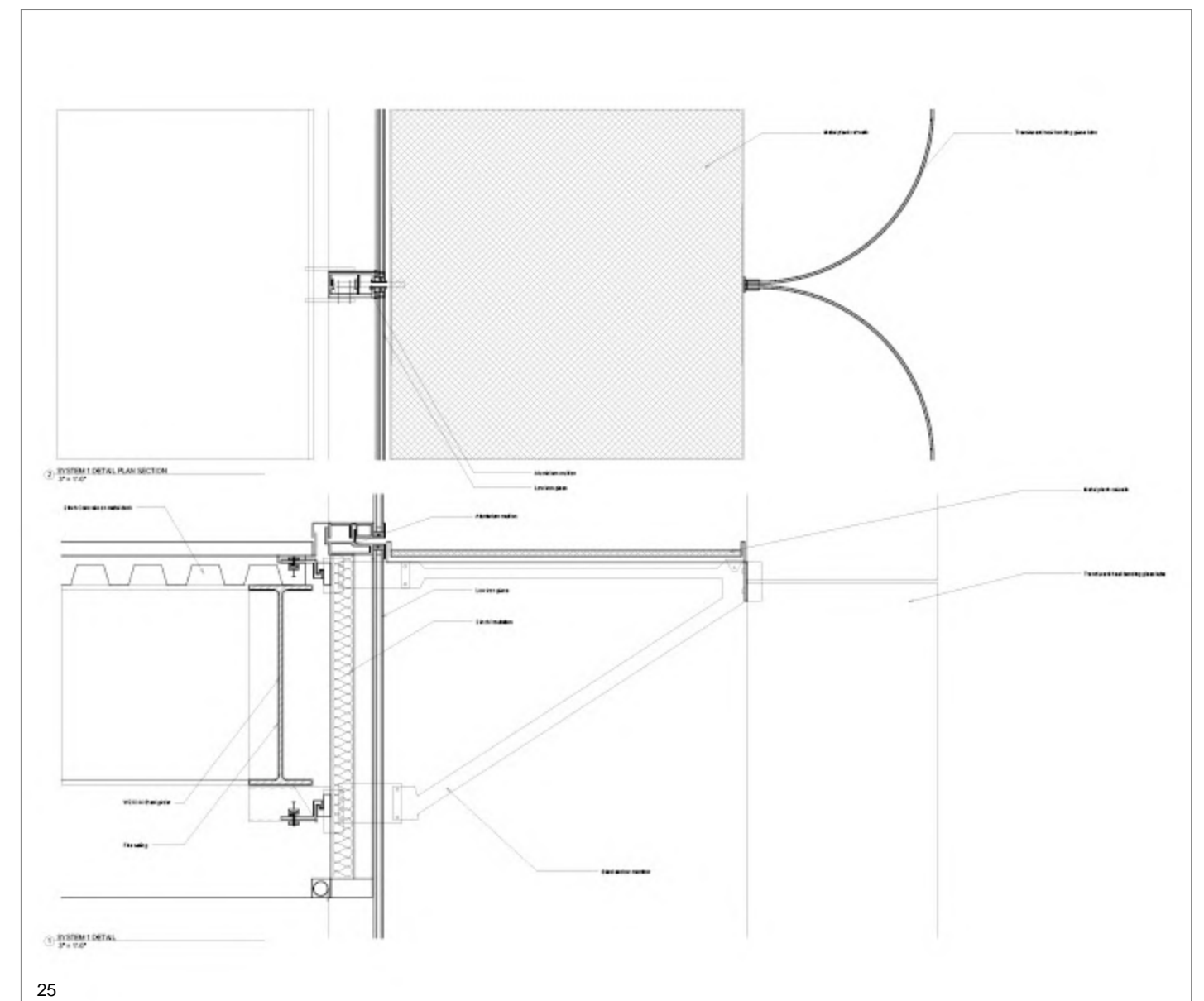
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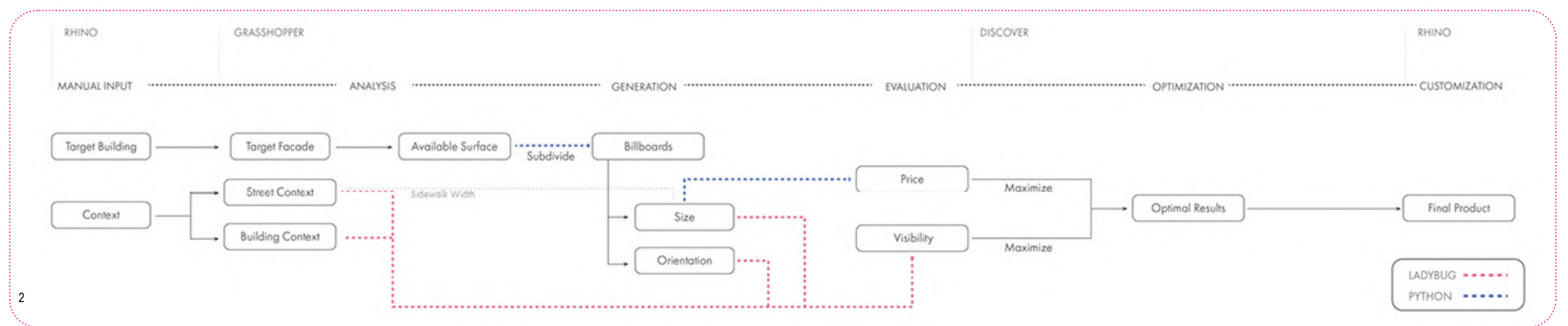
### A study of optimizing placements of billboards on existing facades in high-density cities.

Billboards are essential for advertising and propaganda in the capital world. Their dazzling graphic styles and lines always catch pedestrians' eyes at their first glance. In the era of information explosion, people perceive information nonstop. In the cityscape, billboards as the second layer of facade influence people's mood, mind, and action. The increasing need for marketing and advertising for products has spurred the need for billboards. In cities already cramped in high density, it is unreasonable to construct new structures for advertising. Therefore, the project aims to use generative design as a method, combined with the application 'Discover' to generate designs that maximize the use of the existing structures in cities while improving the advertising quality. At the same time, customization is considered, allowing users to choose the layout that fits their needs most. The generative model provides flexibility for the arrangements of billboards with different dimensions and orientations to achieve maximum visibility. It could also be used as a tool to find optimized layouts for a designated building or block to achieve maximum profits.

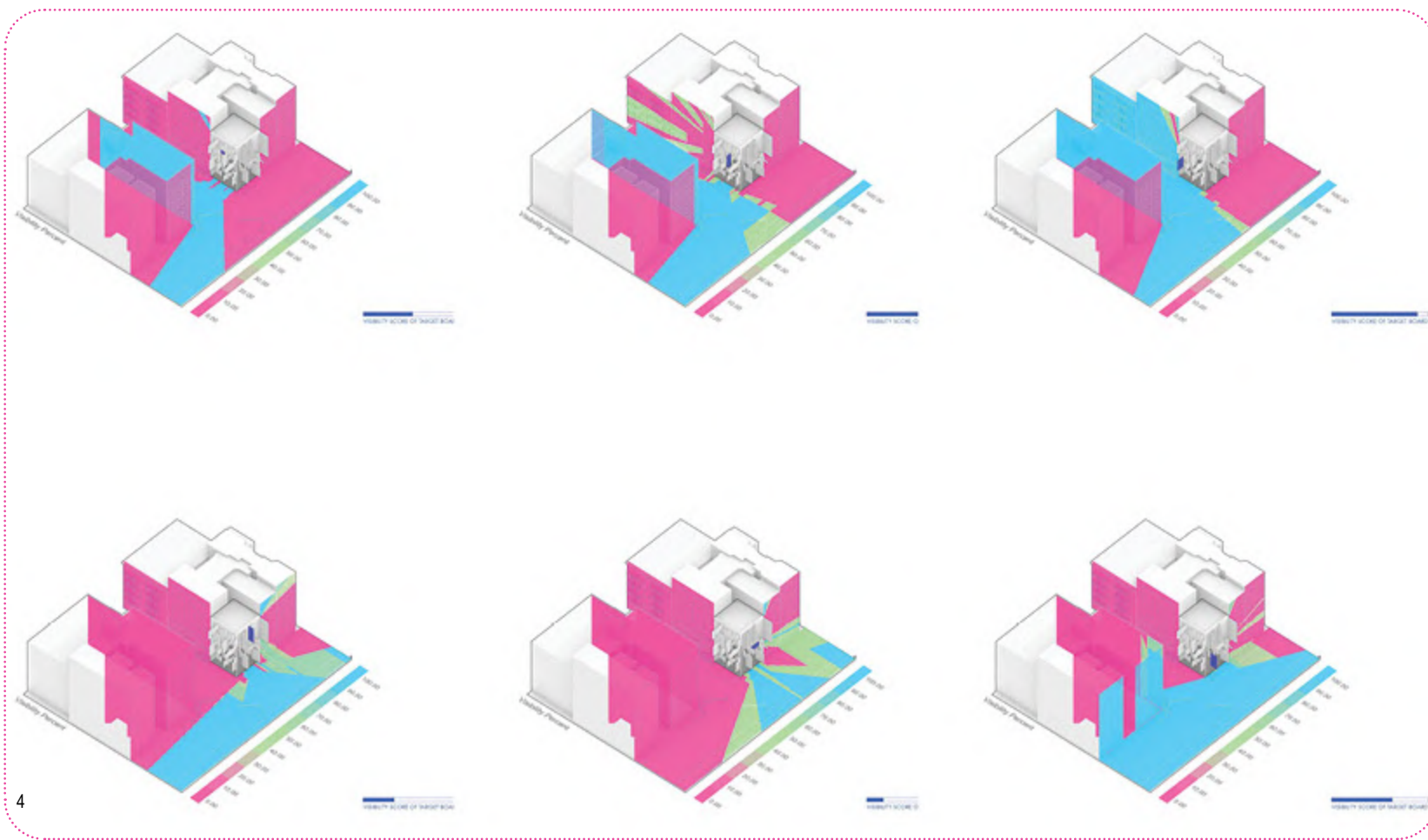
08

## Computation : City of Billboards

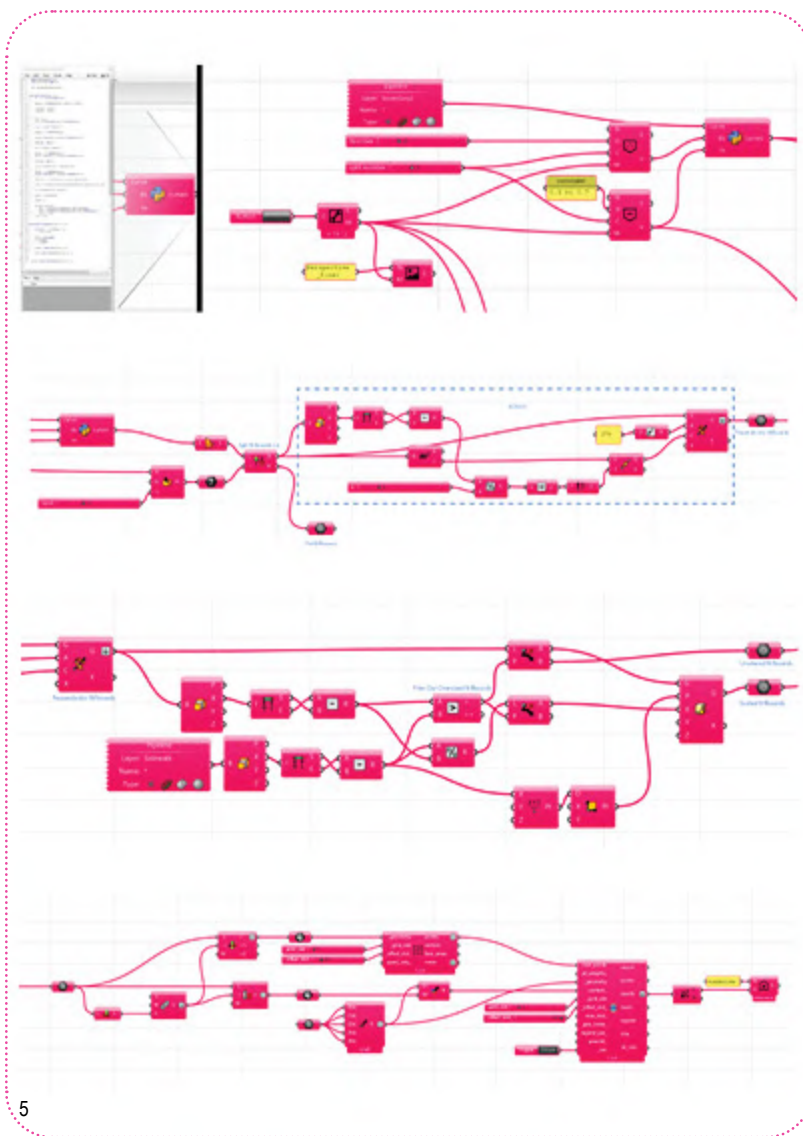
Columbia GSAPP  
Generative Design, Fall 2021  
Instructor: Danil Nagy  
Collaboration with:  
Xuanyi Chen, Duo Xu, Chuqi Huang, Hao Zheng



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### Design Space Model

The project's ambition is to adapt the program to various façades while achieving maximum visibility and profit. Based on the idea, the generation of billboards on the designated surface could be divided into four steps: 1. Generate general logic for the billboards' layout. 2. Design the placements of billboards, including different sizes and orientations. 3. Add in profit and visibility as metrics to measure the performance. 4. Generate the optimal options and let the users choose which better fits their needs. Input Parameters

**Target Façade** - The project starts with inputting information on the designated facade to get the optimized billboard layouts with maximum profit and visibility. The facades we are intervening could be divided into the following two conditions: 1. Facades with openings. 2. Facade without openings.

### Performance Metrics

**Visibility** - Since billboards are generally set up to advertise and promote, visibility is of the utmost importance. We do a reverse design to maximize visibility, making billboards the starting point of sight. The more the sights cover the surrounding contexts, the better the visibility.

**Profit** - The occupiable area of the façade calculates the total profit. The larger ratio of the billboards to the facade, the more profit the building has to the owner. Since maximizing the profit for the building owner is one of our intentions, we programmed to make use of the surface as much as possible.



6

The two sets of objectives can then be calculated using the genetic algorithm to find the possible layouts of billboards arrangement for optimization. The optimized design options are visualized by connecting the grasshopper batteries to Discover.

### Results

We got the optimized designs after running 12 generations with 15 designs generated per generation. With the X-axis representing the price and y representing the visibility, the optimization trend is going upwards diagonally from left to right.

The optimal results can be generally classified into three groups. One group prioritized the profit; one group balanced these two parameters; the last group prioritized the visibility. Interestingly, the height of the billboards and the amounts of the perpendicular ones influenced the visibility and profit. When the billboards go higher, the profit goes up while the visibility goes down. When there are more perpendicular billboards, the visibility goes up while the profit goes down.

The results reach our goals that the grasshopper and Discover could generate layouts with inclination to different objectives, letting the users choose the design with the factor they value more. In conclusion, the optimization processes described above justified the possibility and efficiency of generating the layouts of billboards on facades using computational skills such as rhino, grasshopper, python, and Discover.

Video : <https://youtu.be/LcM3aOhdWwY>



7

thank you