

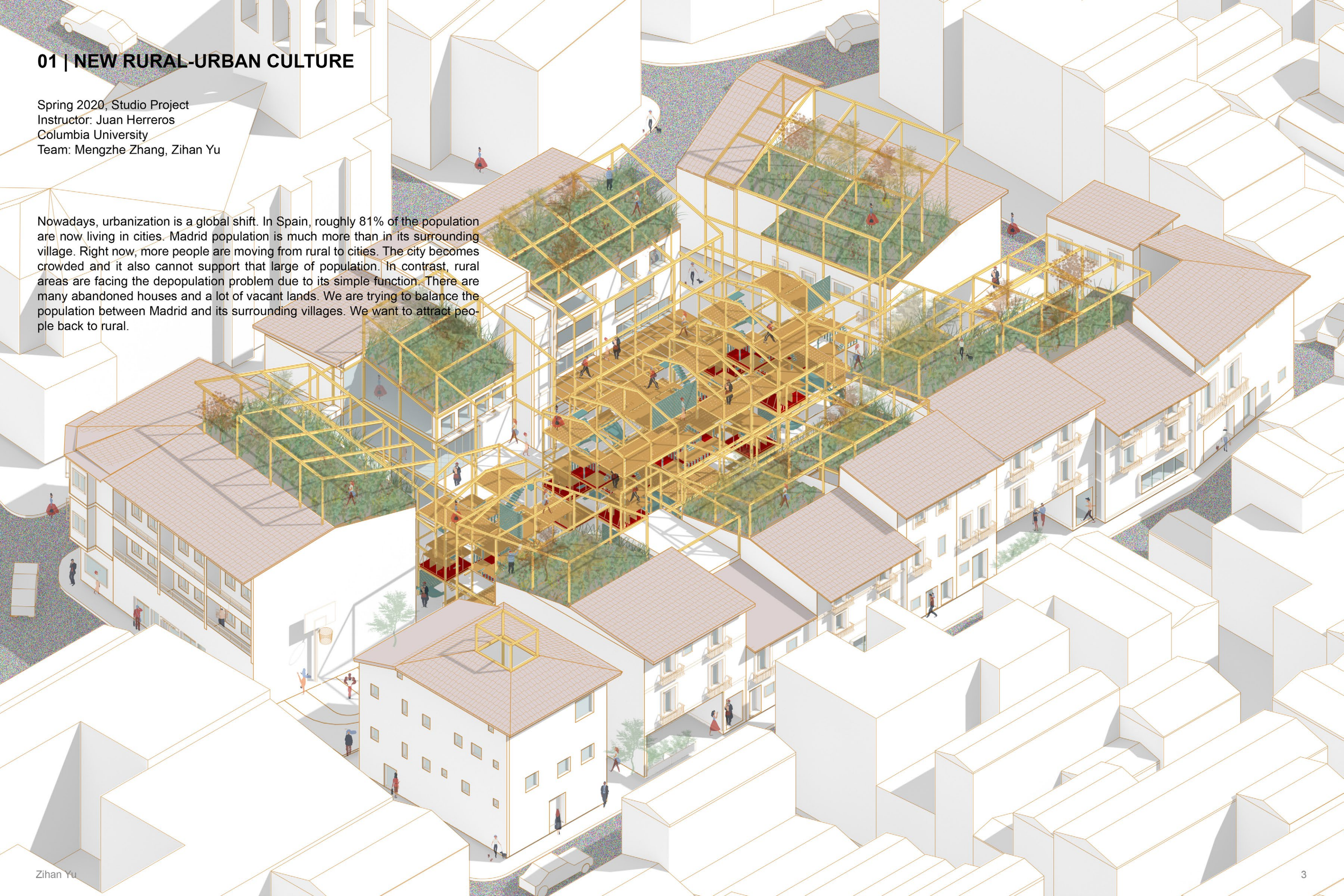
# Portfolio of **Zihan Yu**

M.S. Advanced Architecture Design  
Columbia University

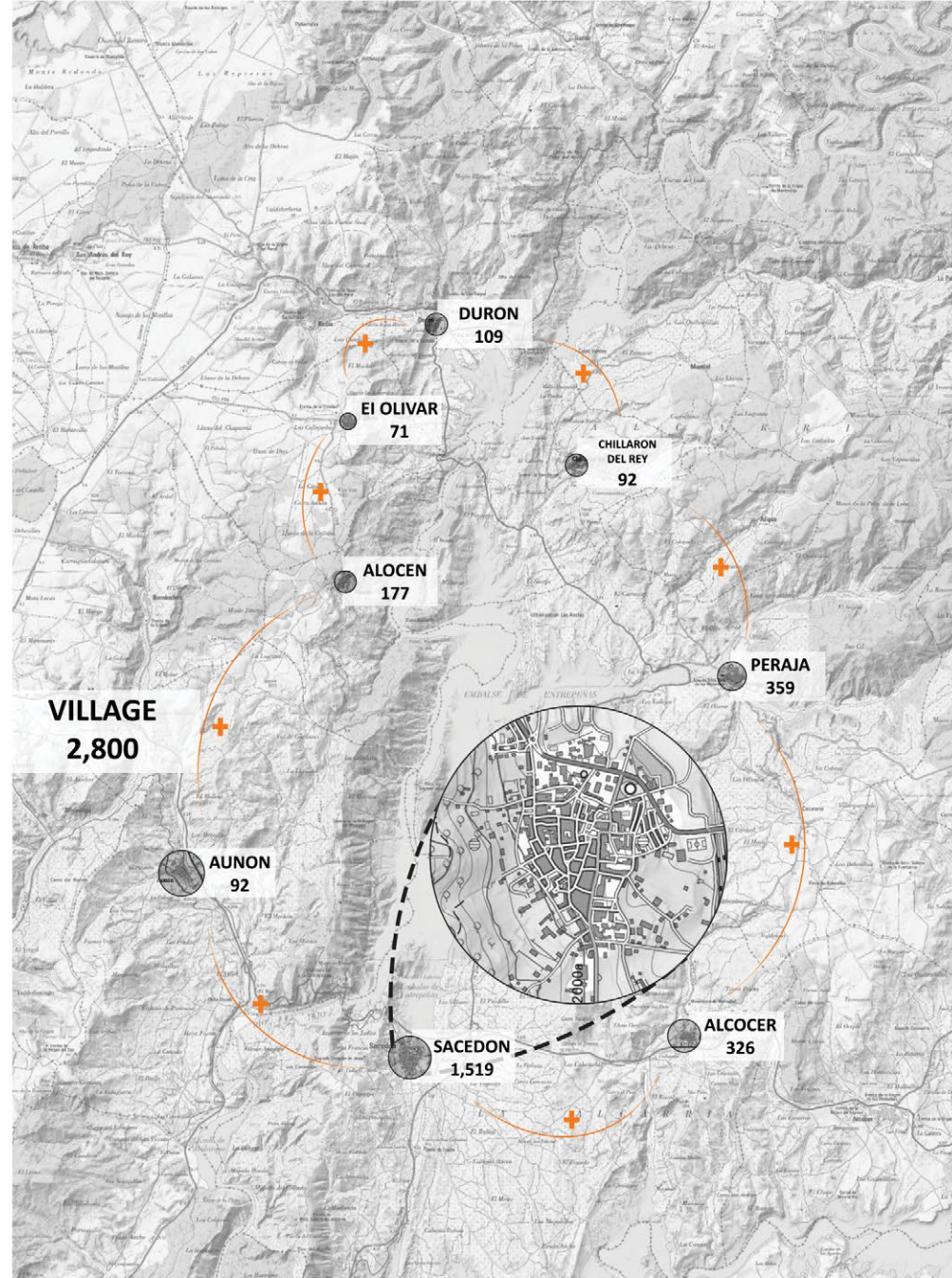
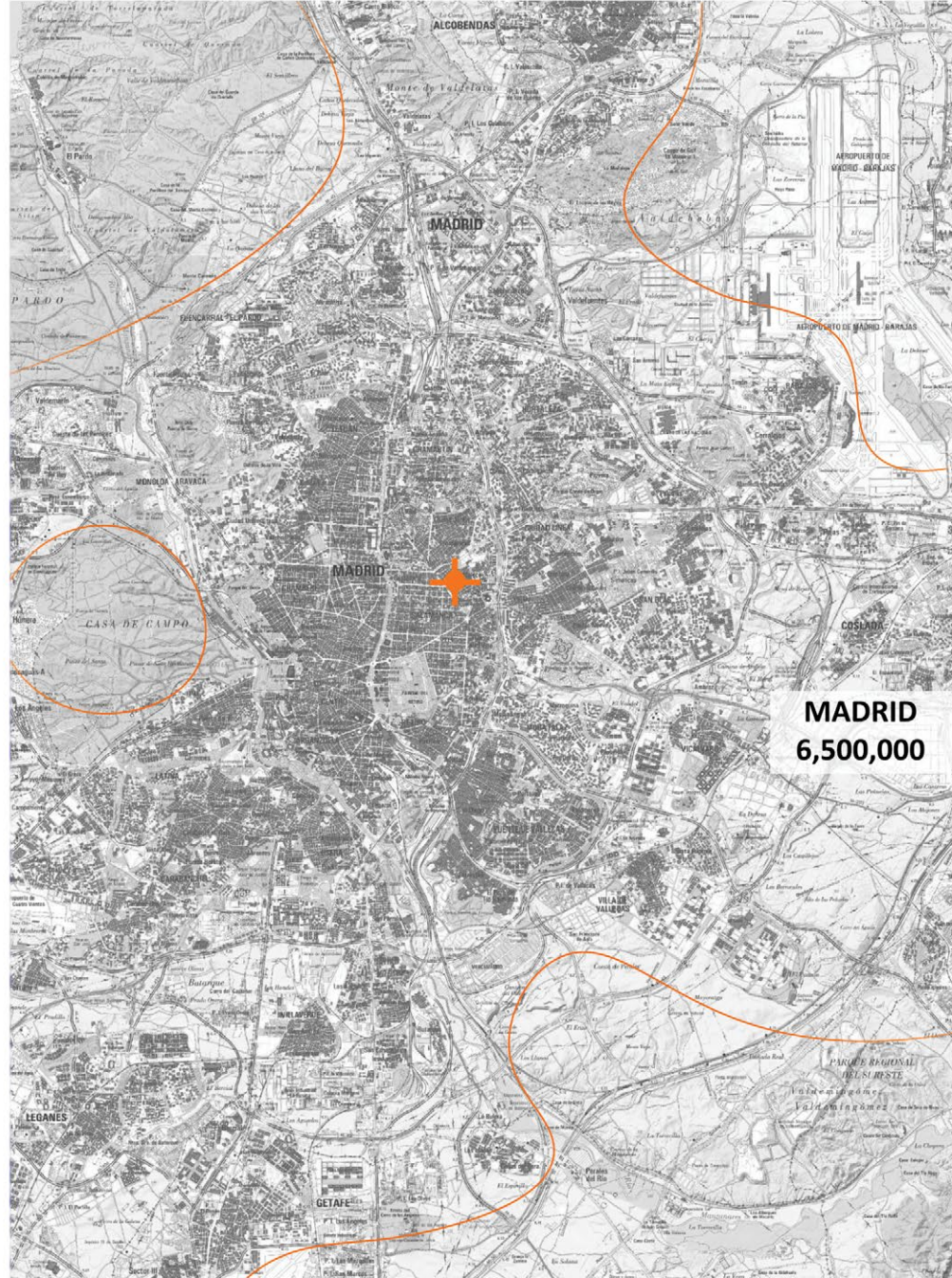
# 01 | NEW RURAL-URBAN CULTURE

Spring 2020, Studio Project  
Instructor: Juan Herreros  
Columbia University  
Team: Mengzhe Zhang, Zihan Yu

Nowadays, urbanization is a global shift. In Spain, roughly 81% of the population are now living in cities. Madrid population is much more than in its surrounding village. Right now, more people are moving from rural to cities. The city becomes crowded and it also cannot support that large of population. In contrast, rural areas are facing the depopulation problem due to its simple function. There are many abandoned houses and a lot of vacant lands. We are trying to balance the population between Madrid and its surrounding villages. We want to attract people back to rural.



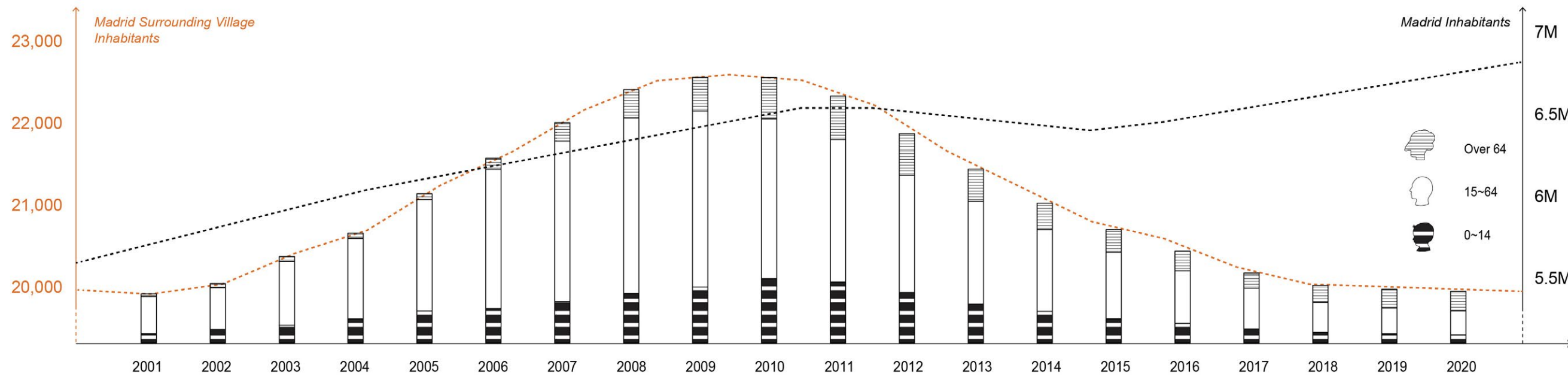
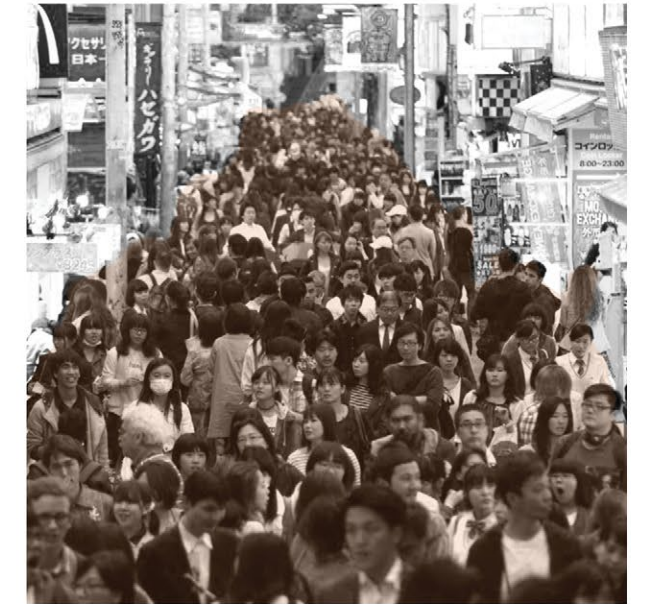
# I. PROBLEM ANALYSIS



Unemployment in the Contry



Crowded City



Abandoned House in the Village



## II. SITE ANALYSIS



### SACEDON

We chose Sacedon as our site since among most of the villages near the Tagus River, it has a typical Spanish village layout and the population size is proper to work with. It is a place full of residential buildings and a few public buildings. Inside the village, we chose the area which is highlighted in color for further development.

The block as a traditional village block, has residential houses at sides and a vacant space in the center.

There are one small restaurant nearby the selected block.

It is the only hotel in the village. There is one public plaza which is the community space for the village inhabitants.

The only City Hall provide services for the inhabitants.

The Church is next to the public plaza and provide social connections for inhabitants.

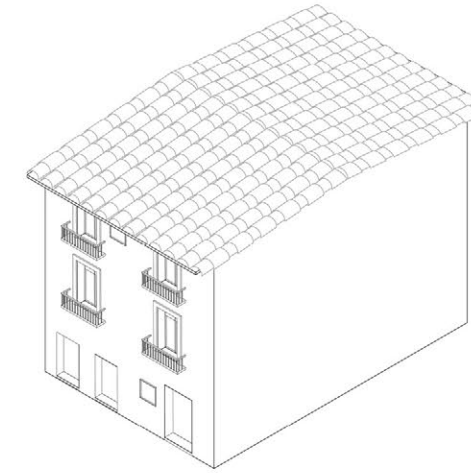
Same as many rural villages, Sacedon also has a abandoned Bullring

### III. CONCEPTUAL DRAWING



If we think about city elements, there is a diverse public infrastructure to provide more social connections and work opportunities. For rural elements, the function is very simple. Most of the buildings are residential houses. Each family is isolated from society. Our idea is to bring the city's social connections into rural, combined with existing rural elements in a more natural and self-sufficient way.

### IV. DEVELOPMENT STRATEGY

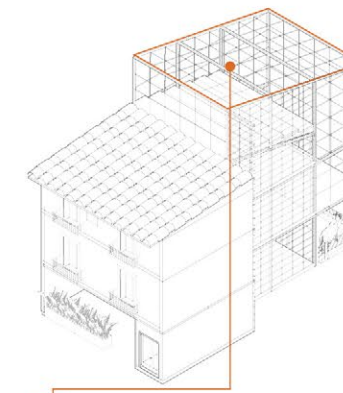


ORIGINAL LOCAL HOUSE



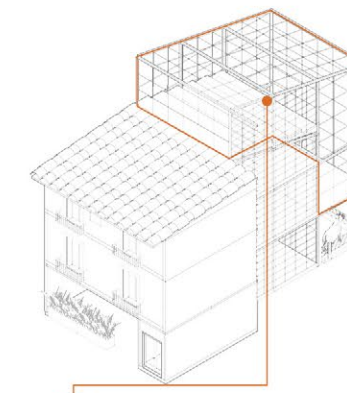
RECONSTRUCTED HOUSE

The existing house has a current neighborhood connection and beautiful traditional facade that we like to keep, but the building just has a single function. So, our developing strategies are adding a courtyard, roof garden, greenhouse, livestock area, and water collection.



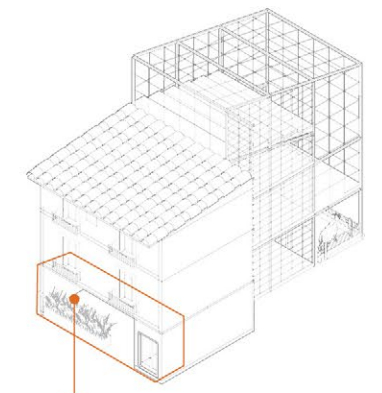
**Water Collection**

Build up a water collection system and connect the block together.



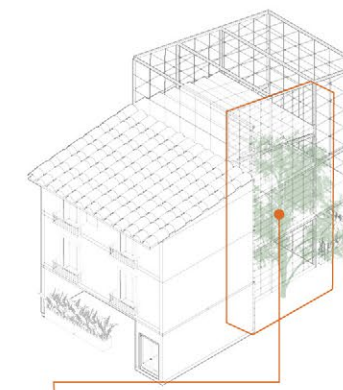
**Greenhouse**

The greenhouse cover half of the original house.



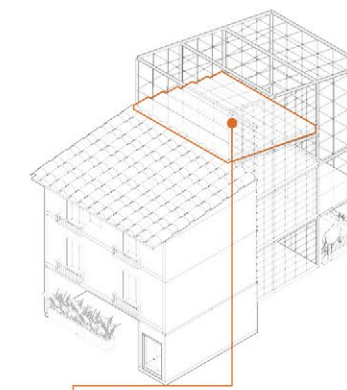
**Portico**

Add a portico in the front of the house.



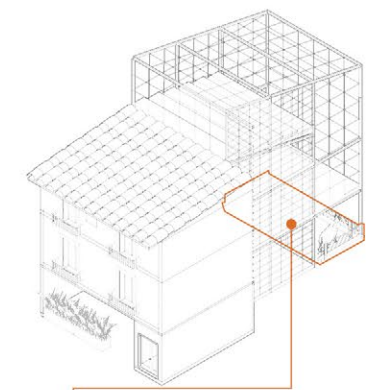
**Courtyard**

Build up a courtyard between two houses.



**Greenroof**

Add a greenroof on the existing roof.




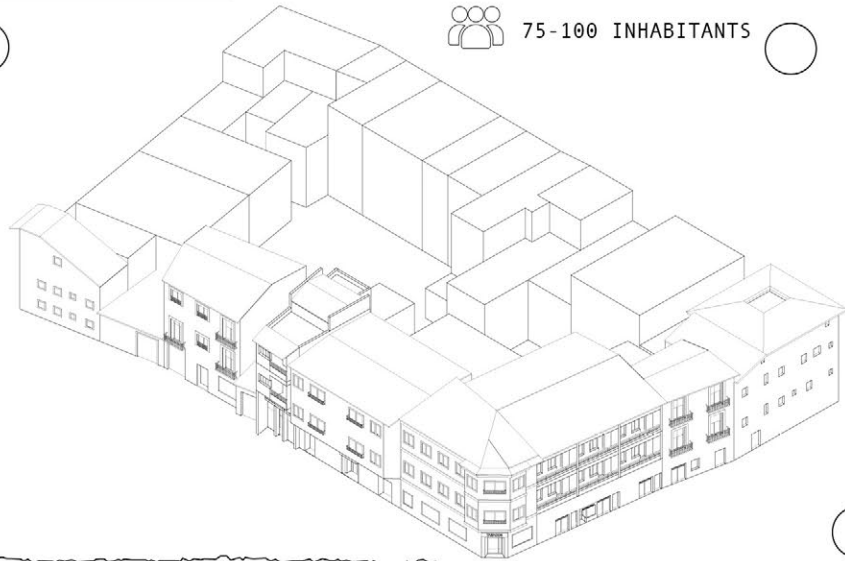
**Livestock**

Livestock area below the greenhouse.

# VILLAGE NOTICE BOARD

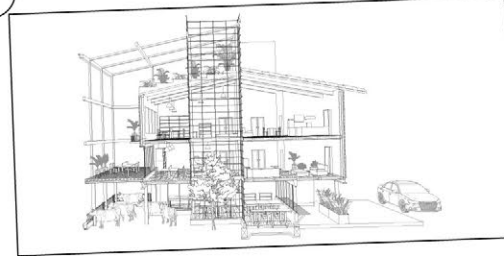
## BLOCK INFORMATION

 75-100 INHABITANTS



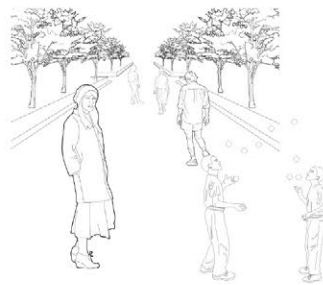
## LIVING AND WORKING

50,000 sqft commercial area  
60 housing and 200 units for  
500 inhabitants in Secedon block



**WE WILL BUILD ONE MORE BLOCK NEXT YEAR!**

In the last week, the city's development department raised the target for housing to 1,000 units. We are going to develop another block in Secedon by using the same strategies.



**COMMUNITY ACTIVITY!**

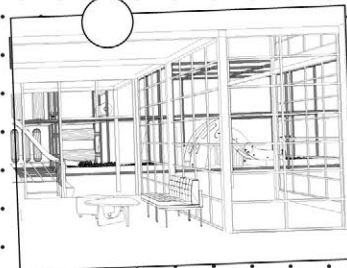
**WE ARE HIRING!**

JOIN US!  
xxx company

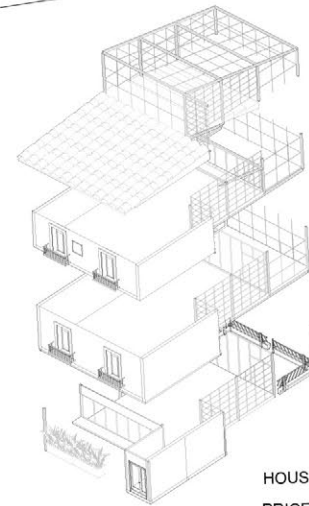


  
**JACK DAVIS**  
XXX Company  
111-222-3333  
xxxxxx@mail.com

111-222-3333  
xxxxxx@mail.com



**SALE**



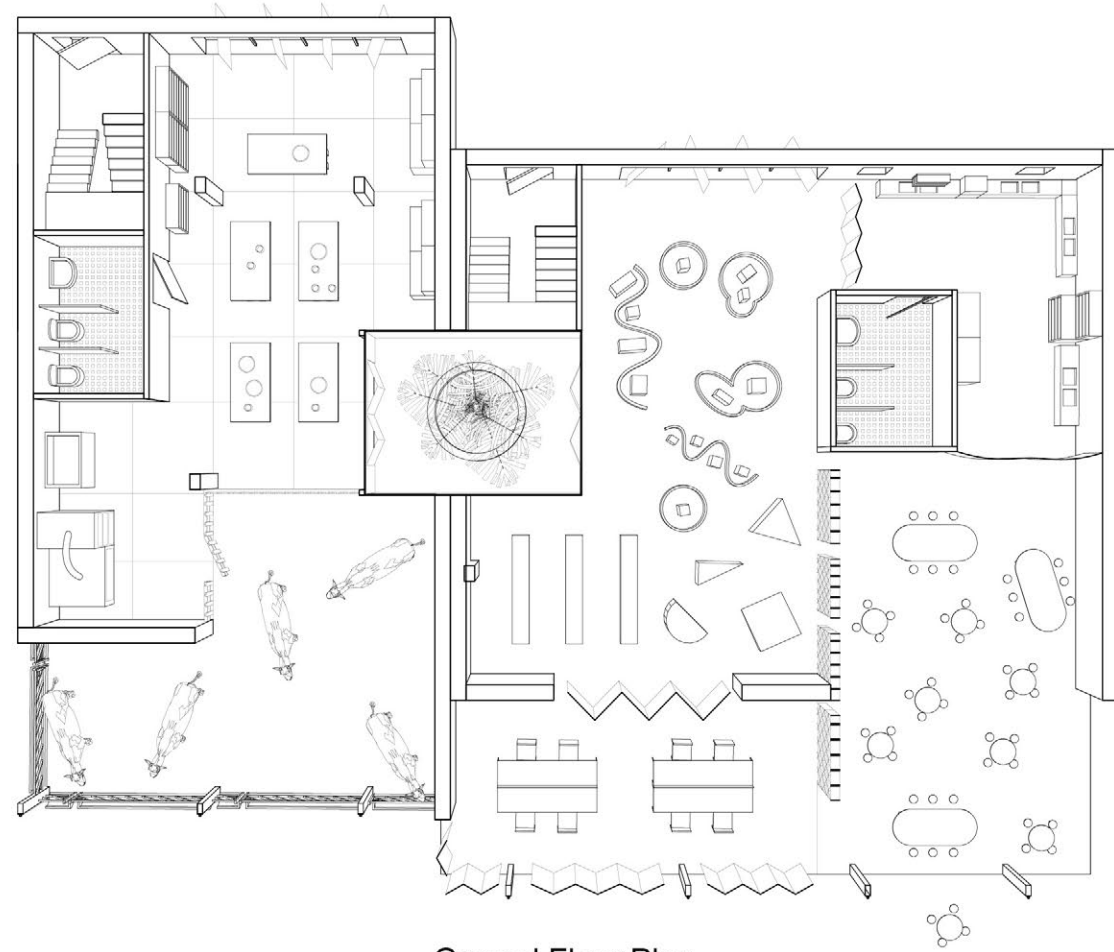
HOUSE 32-5  
PRICE: \$XXX



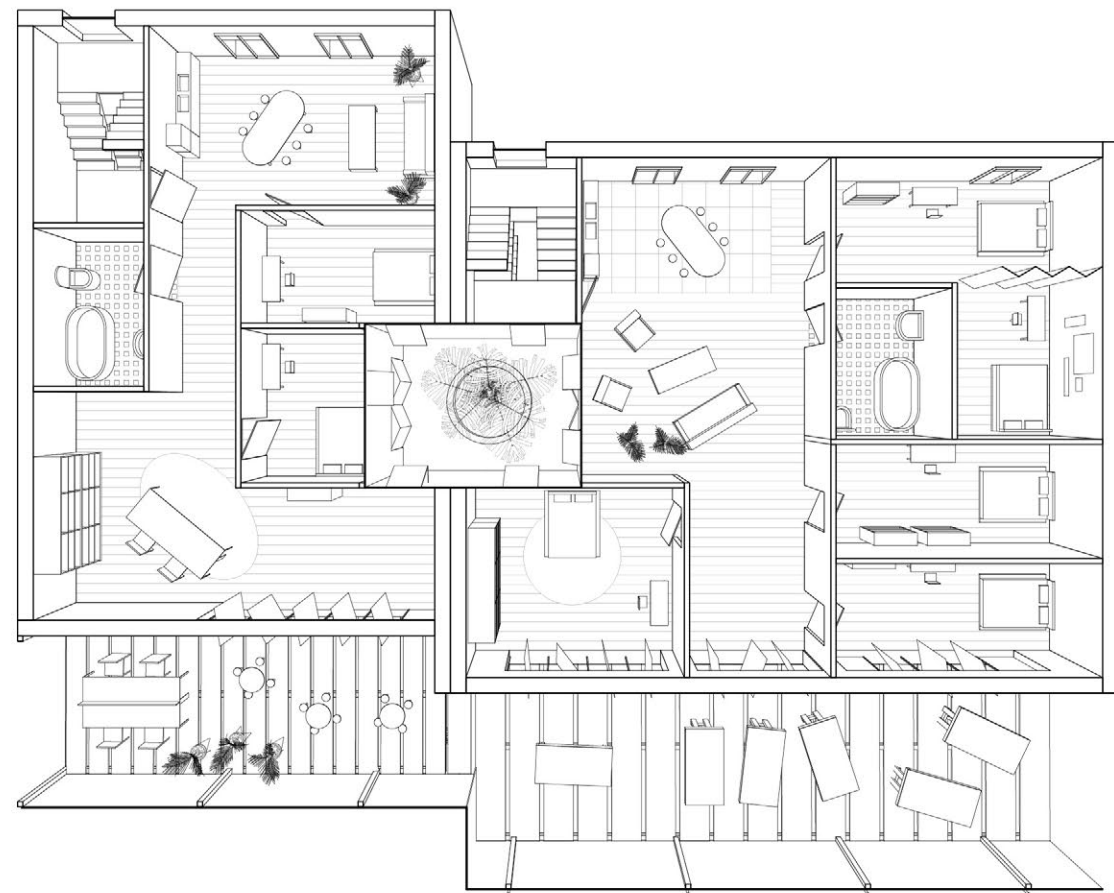
Welcome your family home to a wonderful 4 bedroom home with over 2,000 sq. ft. of finished living space!  
1). Ground Floor is commercial space for rent! With a under roof garden could use for livestock or green vegetables.  
2). Second and third floors are private living area, with green house and green roof!

Join Us Now!  
111-222-3333  
xxxxxx@mail.com

## VI. HOUSE'S FLOOR PLAN



Ground Floor Plan

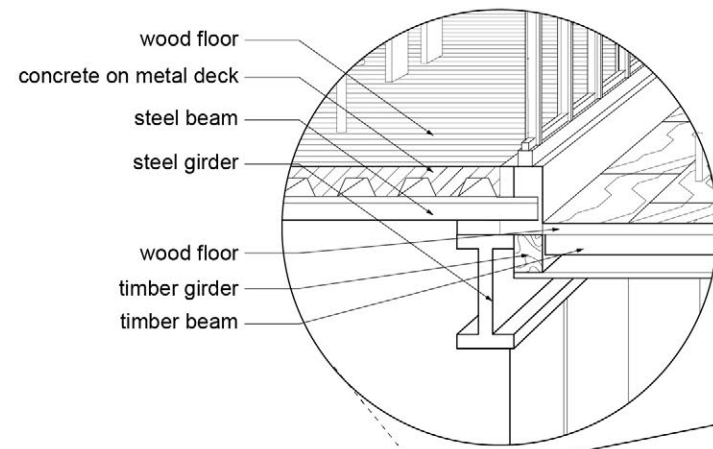


Second Floor Plan

## VII. HOUSE RENDERINGS



# VIII. HOUSE SECTION



## ROOF GARDEN

It serves the purpose of providing architectural enhancement, temperature control, habitats for wildlife and food.

## COURTYARD

It brings the natural ventilation and sunlight to the house and provide a more comfortable living condition.

## GREENHOUSE EXENTION

It not only provide planting area for the residents, but also extends the living area.

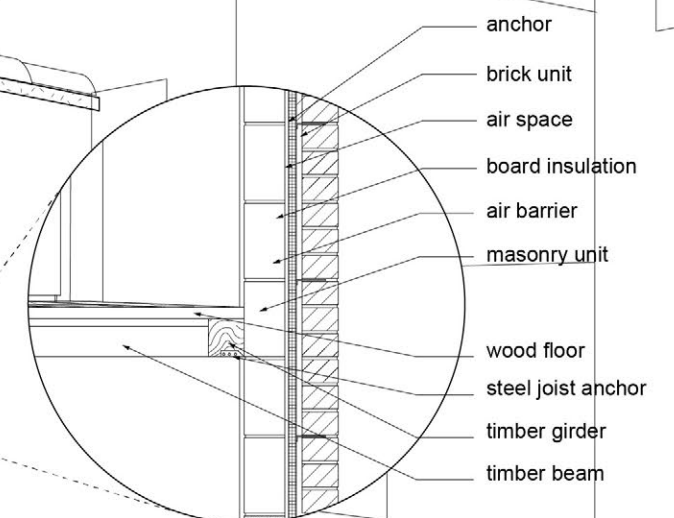
## PORTICO

It enhances the social connection of the neighbourhood and provides a social area.

## LIVESTOCK

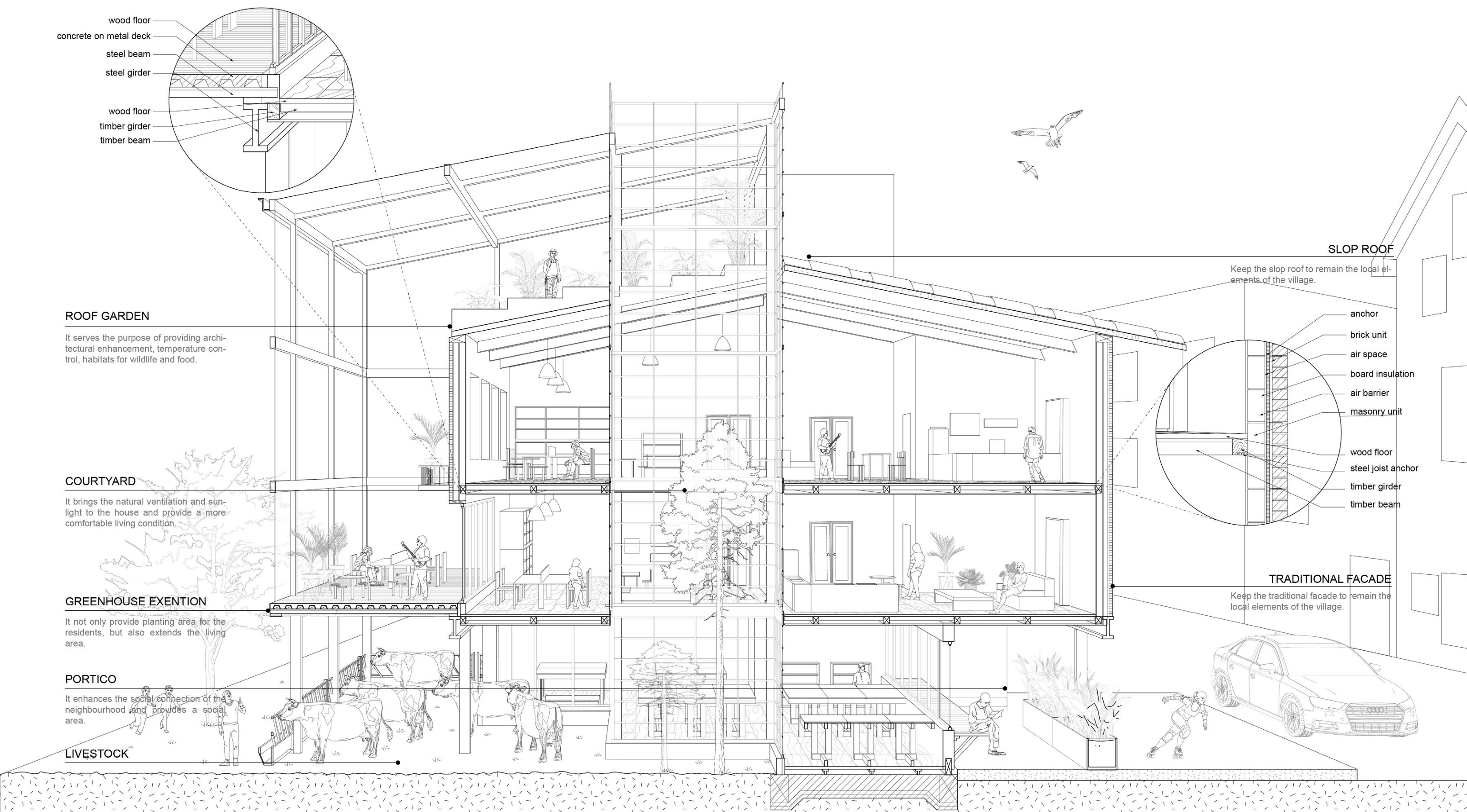
## SLOP ROOF

Keep the slop roof to remain the local elements of the village.



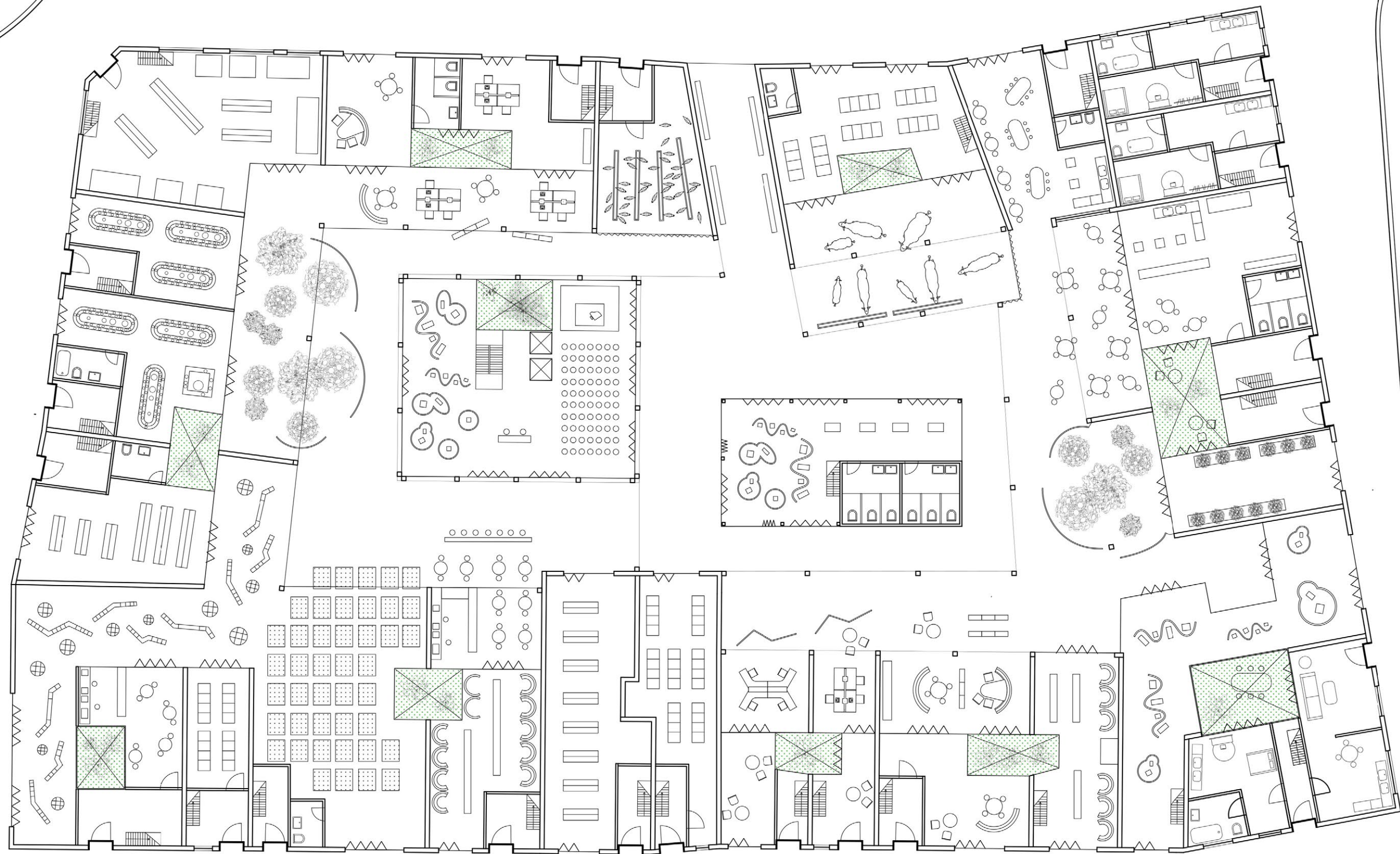
## TRADITIONAL FACADE

Keep the traditional facade to remain the local elements of the village.





IX. BLOCK SITE PLAN

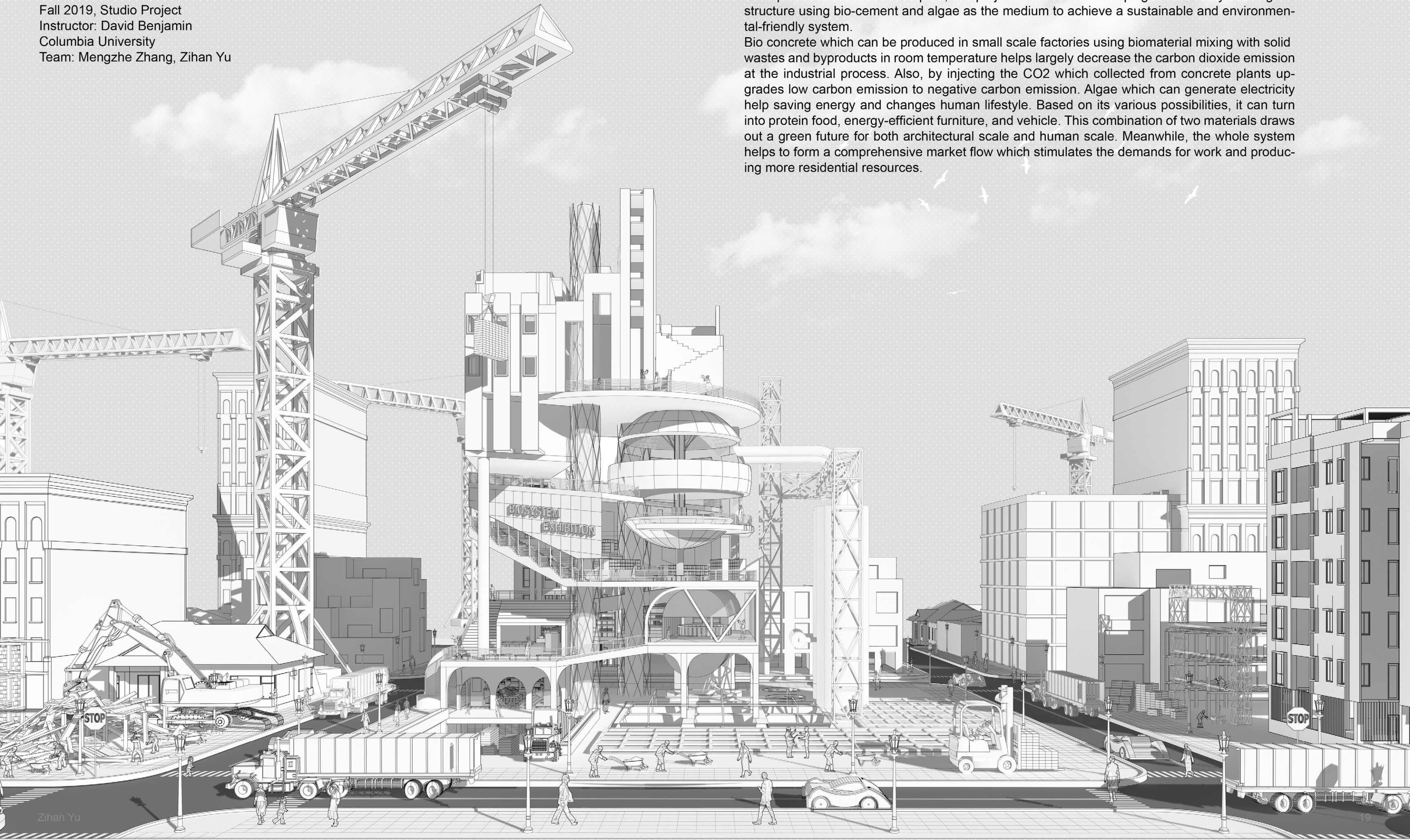


## 02 | BIO-COMMUNITY

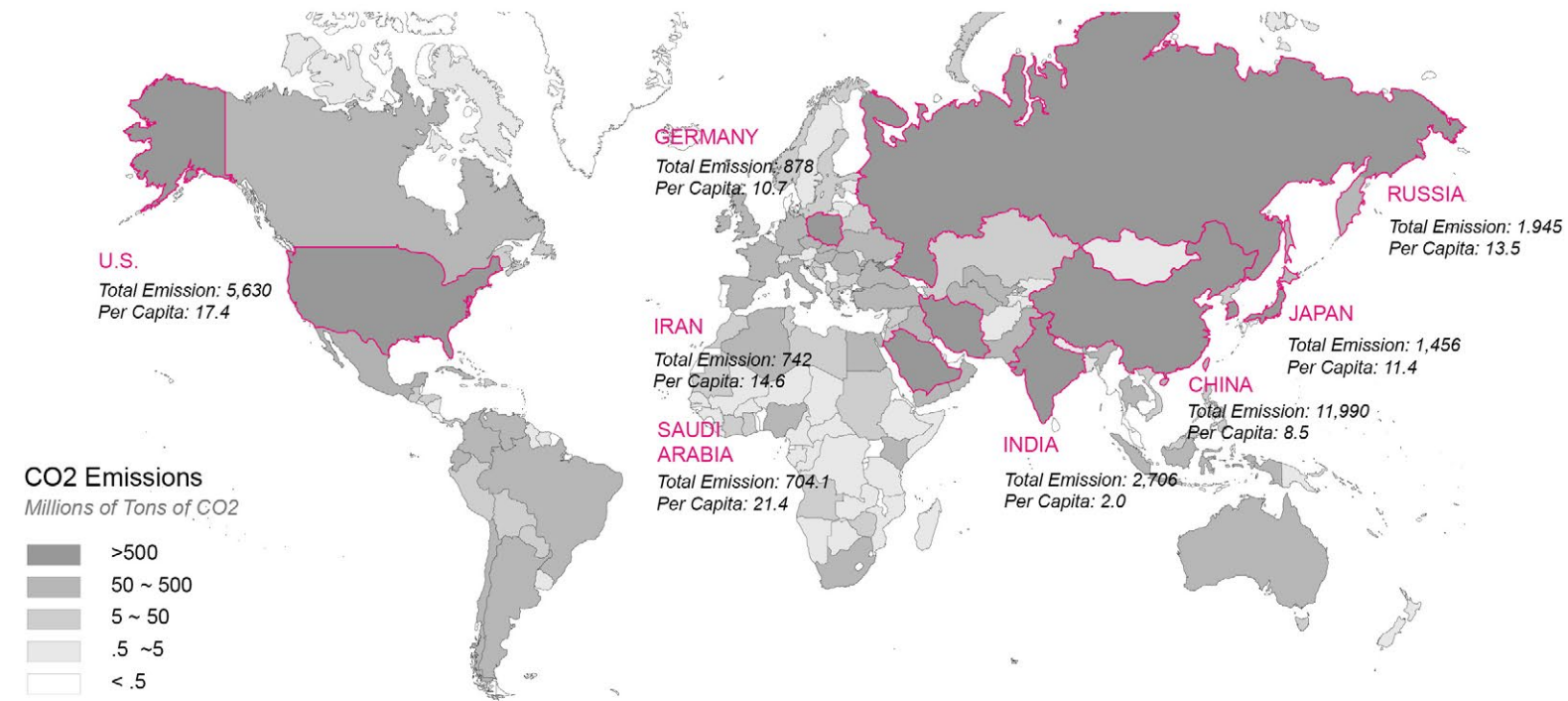
Fall 2019, Studio Project  
Instructor: David Benjamin  
Columbia University  
Team: Mengzhe Zhang, Zihan Yu

In response to low carbon footprint, this project focuses on developing a multifamily building structure using bio-cement and algae as the medium to achieve a sustainable and environmental-friendly system.

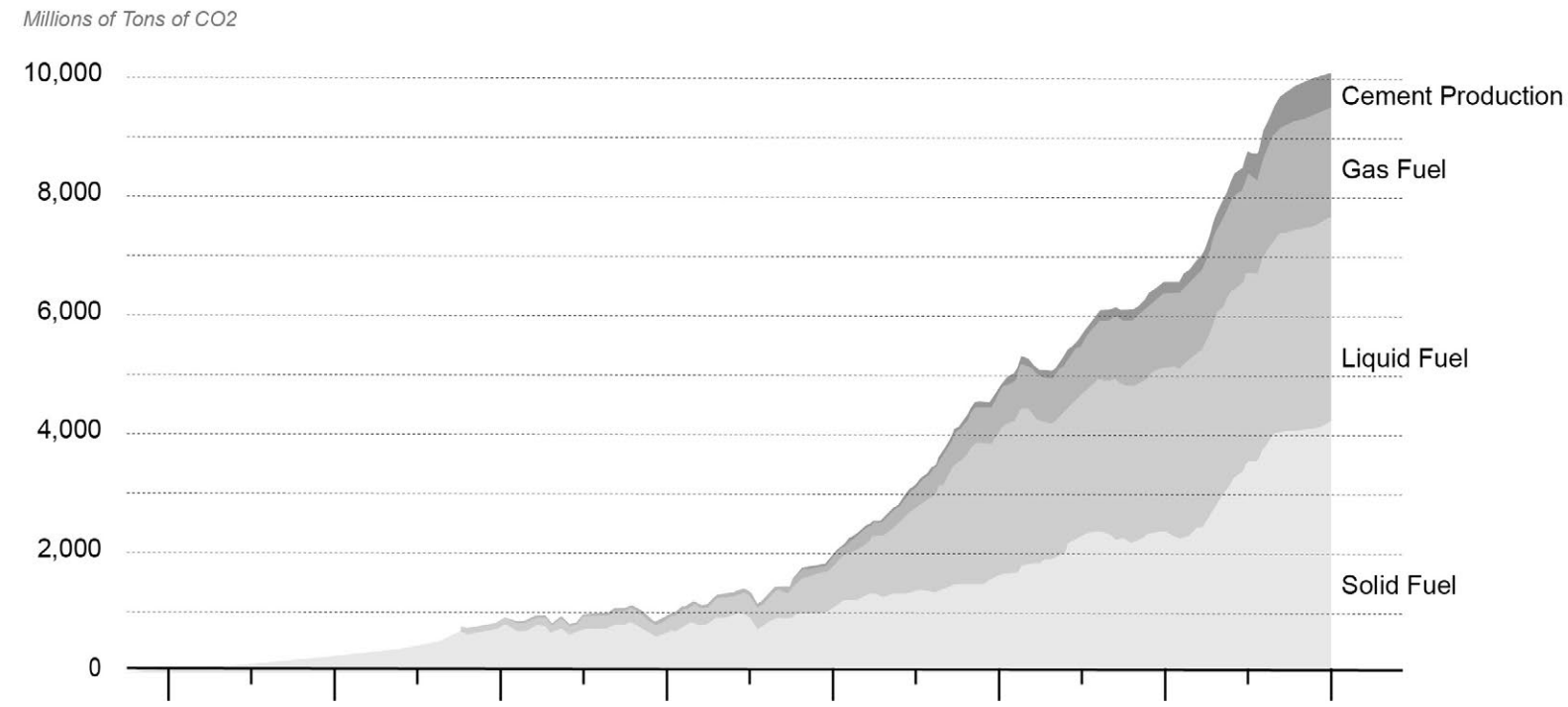
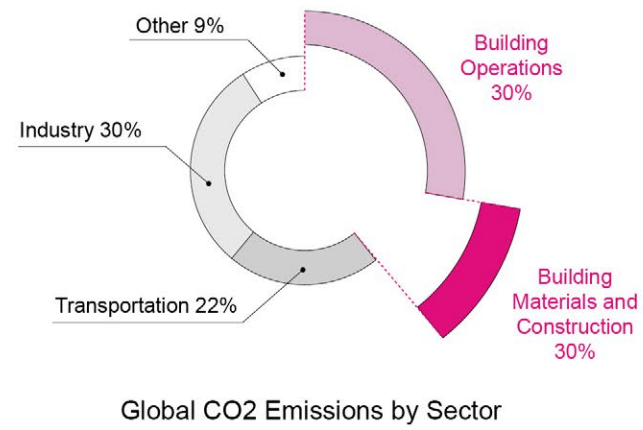
Bio concrete which can be produced in small scale factories using biomaterial mixing with solid wastes and byproducts in room temperature helps largely decrease the carbon dioxide emission at the industrial process. Also, by injecting the CO<sub>2</sub> which collected from concrete plants upgrades low carbon emission to negative carbon emission. Algae which can generate electricity help saving energy and changes human lifestyle. Based on its various possibilities, it can turn into protein food, energy-efficient furniture, and vehicle. This combination of two materials draws out a green future for both architectural scale and human scale. Meanwhile, the whole system helps to form a comprehensive market flow which stimulates the demands for work and producing more residential resources.



# I. PROBLEM ANALYSIS

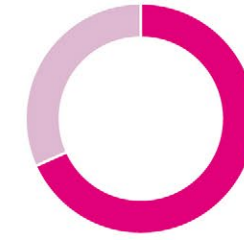


Greenhouse gases have far-ranging environmental and health effects. They cause climate change by trapping heat, and they also contribute to respiratory disease from smog and air pollution. Extreme weather, food supply disruptions, and increased wildfires are other effects of climate change caused by greenhouse gases.



# II. BUILDING CARBON EMISSIONS

Embodied Carbon  
28%



Operations Carbon  
72%

Material Transportation 6%

Building Material 8%

Building Maintenance 3%

Building Construction 8%

Other 3%

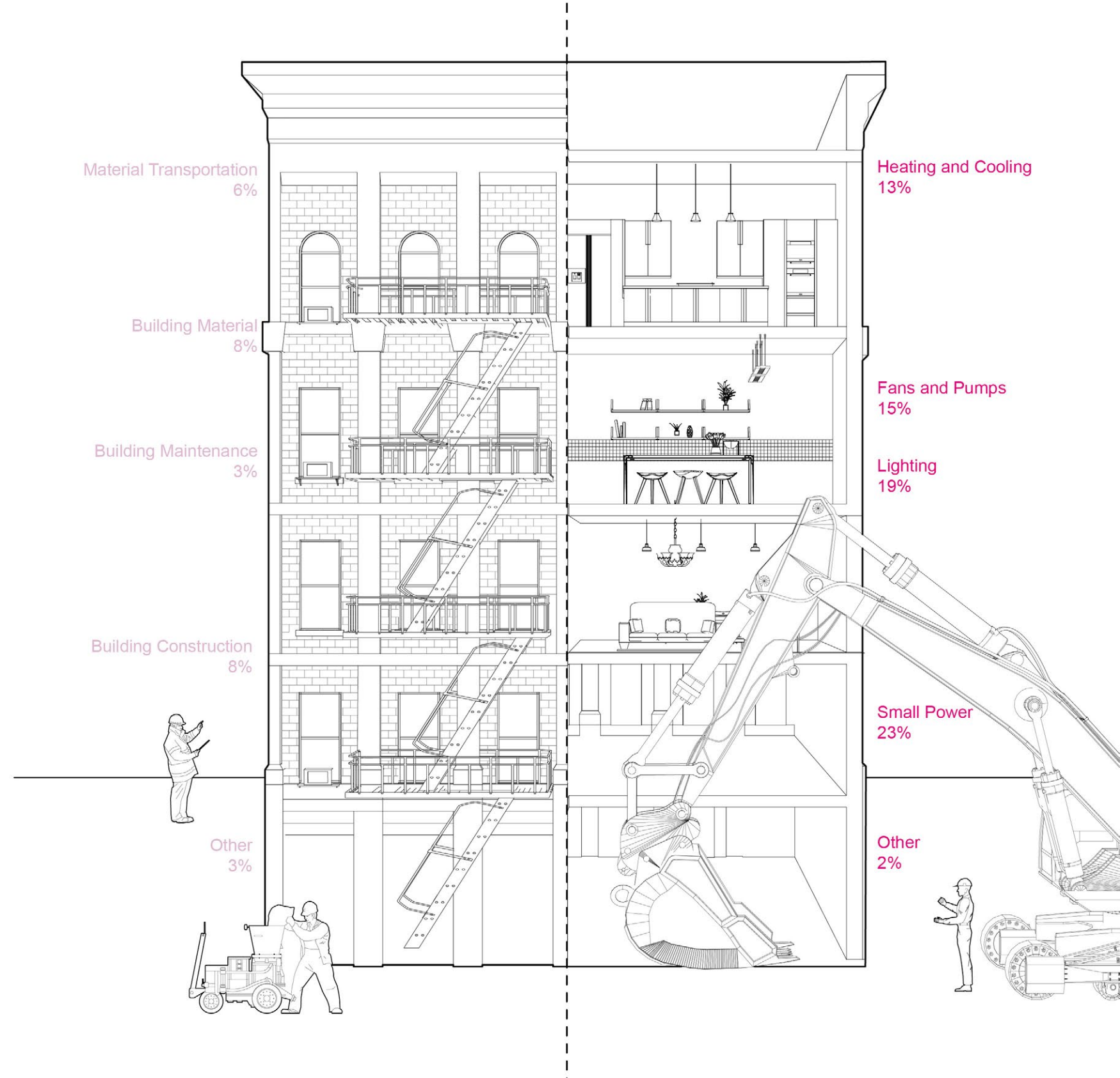
Heating and Cooling 13%

Fans and Pumps 15%

Lighting 19%

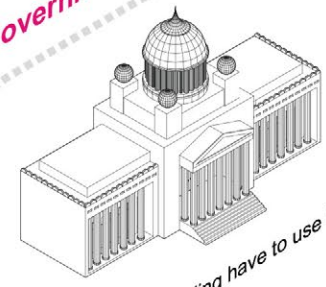
Small Power 23%

Other 2%



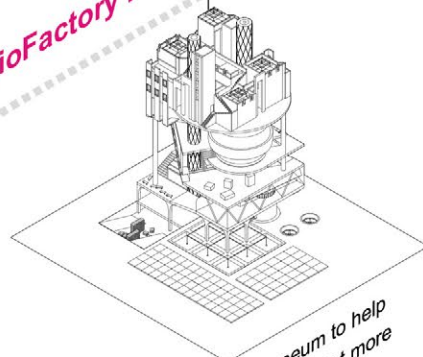
### III. PROCESSING PHASES

#### Government Buildings



New government building have to use bio-cement and algae system.

#### BioFactory Museum



Government build the factory museum to help people understand the biosystem and let more and more people willing to use it.

#### BIOSYSTEM ENCOURAGE POLICY

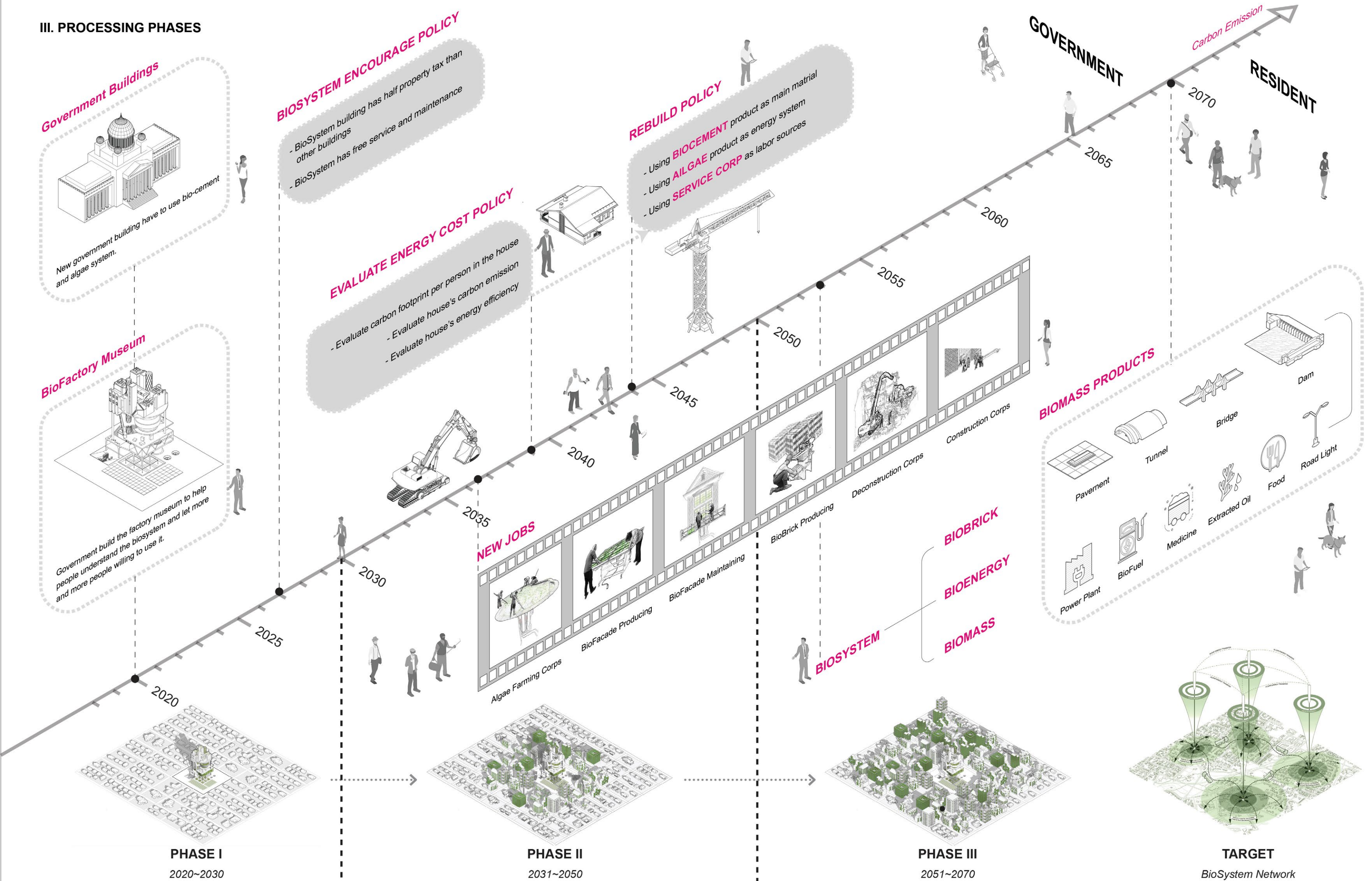
- BioSystem building has half property tax than other buildings
- BioSystem has free service and maintenance

#### EVALUATE ENERGY COST POLICY

- Evaluate carbon footprint per person in the house
- Evaluate house's carbon emission
- Evaluate house's energy efficiency

#### REBUILD POLICY

- Using **BIOCEMENT** product as main material
- Using **AILGAE** product as energy system
- Using **SERVICE CORP** as labor sources



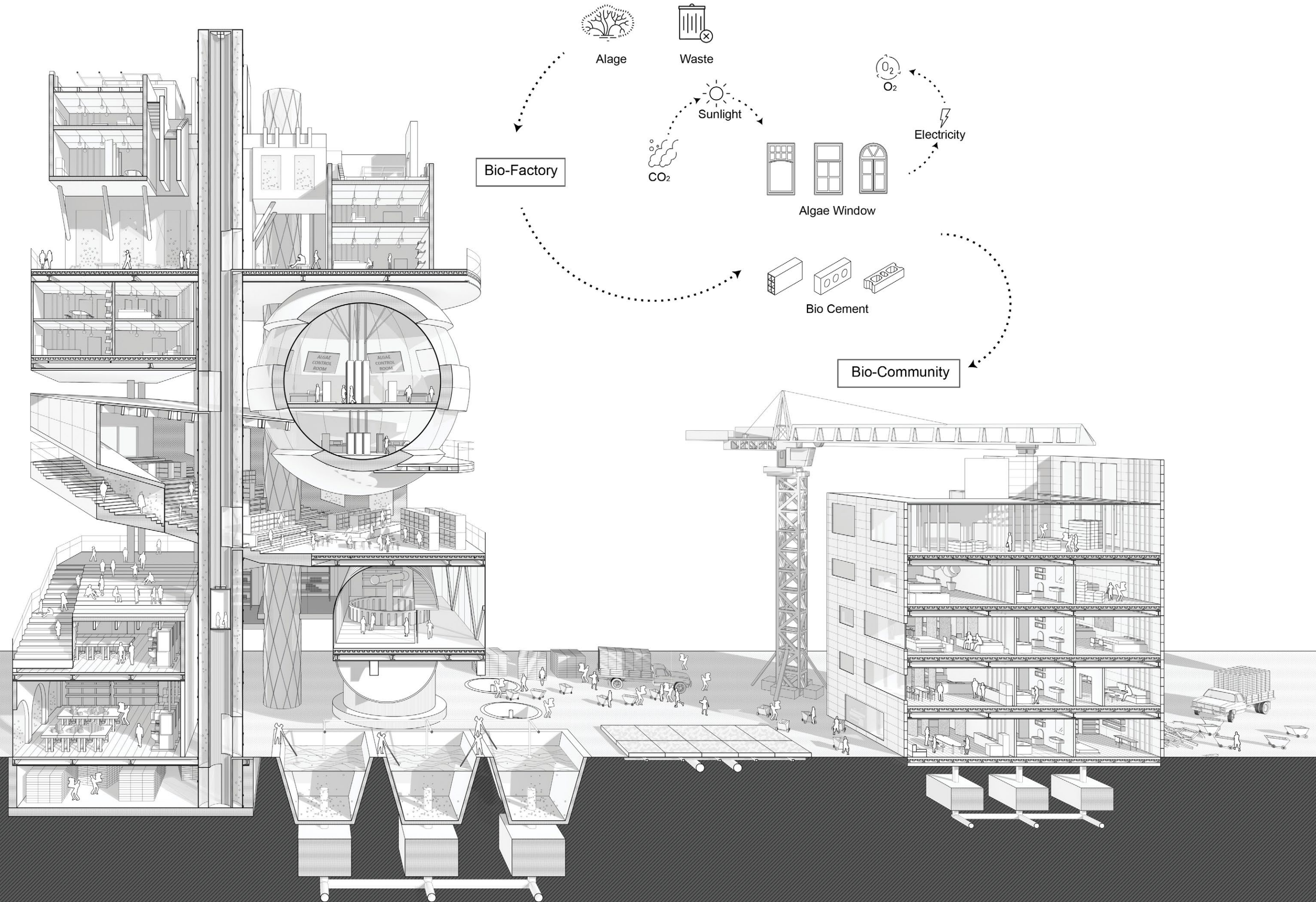
**PHASE I**  
2020~2030

**PHASE II**  
2031~2050

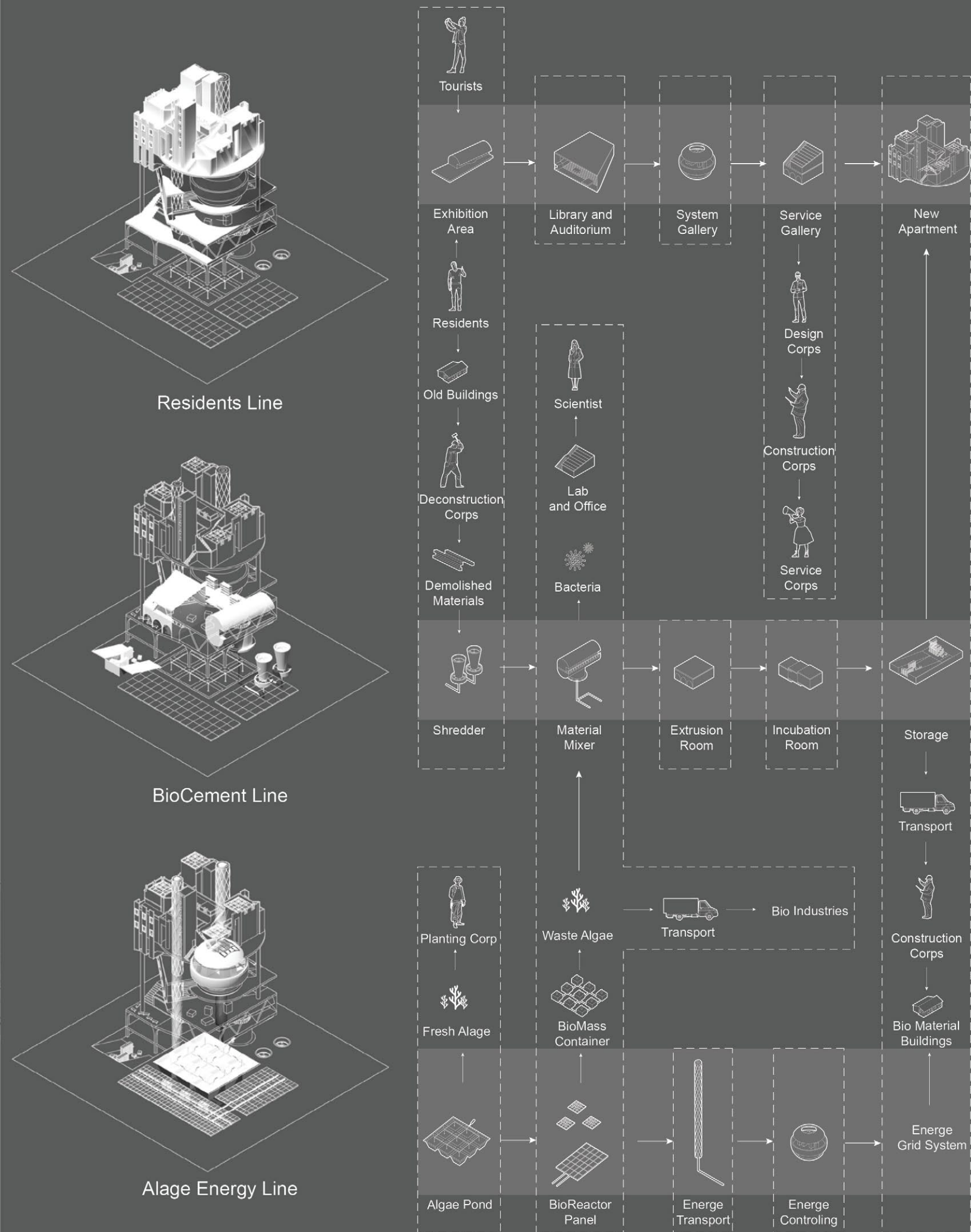
**PHASE III**  
2051~2070

**TARGET**  
BioSystem Network

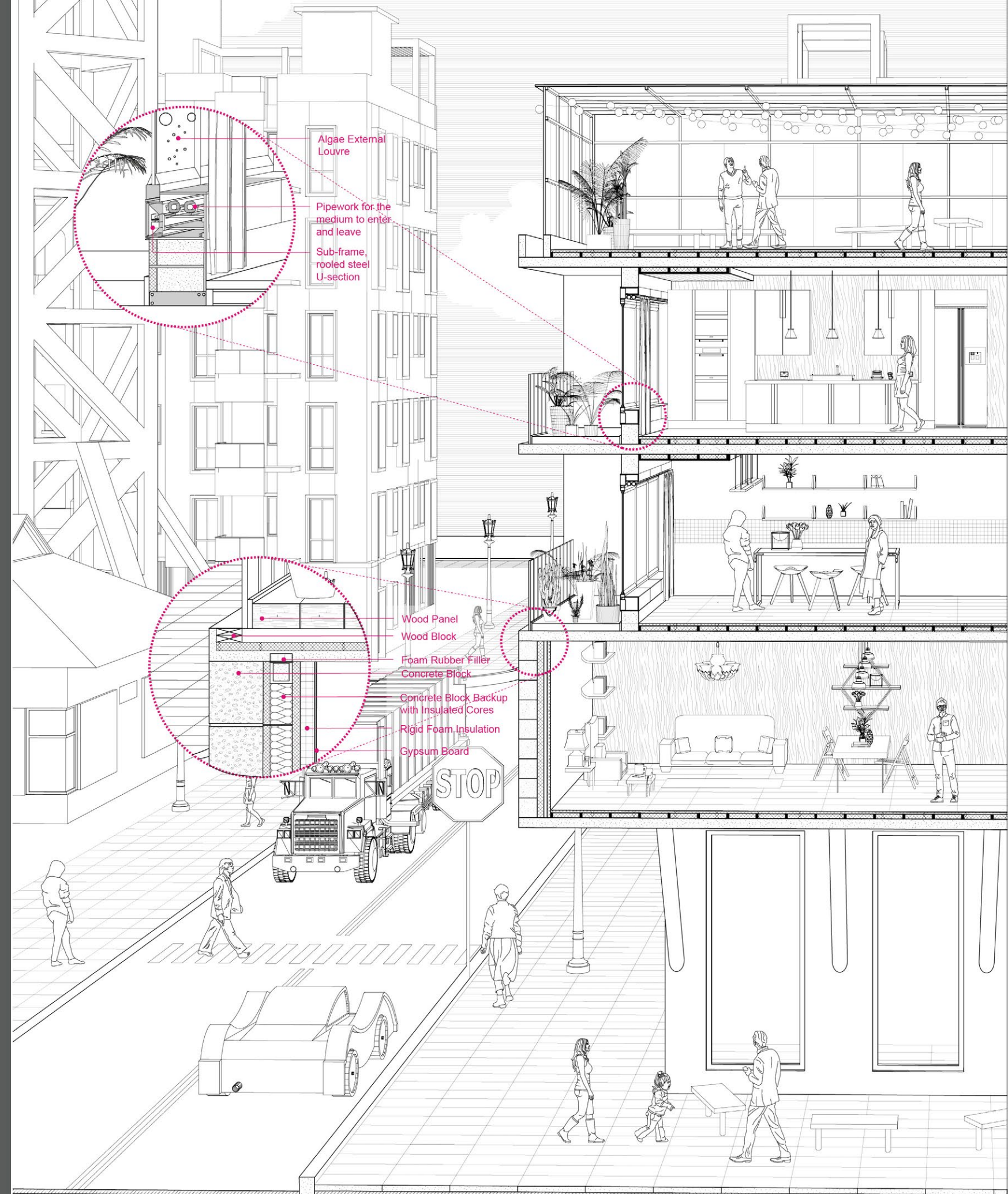
# IV. BIO-COMMUNITY SECTION



## V. FACTORY FUNCTION ANALYSIS



## VI. RECONSTRUCTED BUILDING SECTION



# VII. CHANGES OF COMMUNITY LIFE

## Traditional Building Material

Carbon Emission: ★★★★★☆  
 Efficiency: ●●○○○○  
 Cost: \$\$\$\$

## Air Conditioner

Carbon Emission: ★★★★★★  
 Efficiency: ●○○○○○  
 Cost: \$\$\$\$

## Traditional Road Light

Carbon Emission: ★★★★★☆  
 Efficiency: ●●○○○○  
 Cost: \$\$\$\$

## Traditional Car

Carbon Emission: ★★★★★★  
 Efficiency: ●●○○○○  
 Cost: \$\$\$\$

## Utility

Carbon Emission: ★★★★★★  
 Efficiency: ●○○○○○  
 Cost: \$\$\$\$

UTILITIES BILL  
\$203.19

## BioSystem Building Material

Carbon Emission: ★☆☆☆☆☆  
 Efficiency: ●●●●○○  
 Cost: \$\$\$\$

## Alage Shading Window

Carbon Emission: ★☆☆☆☆☆  
 Efficiency: ●●●○○○  
 Cost: \$\$\$\$

## Alage Powered Light

Carbon Emission: ☆☆☆☆☆☆  
 Efficiency: ●●●●●●  
 Cost: \$\$\$\$

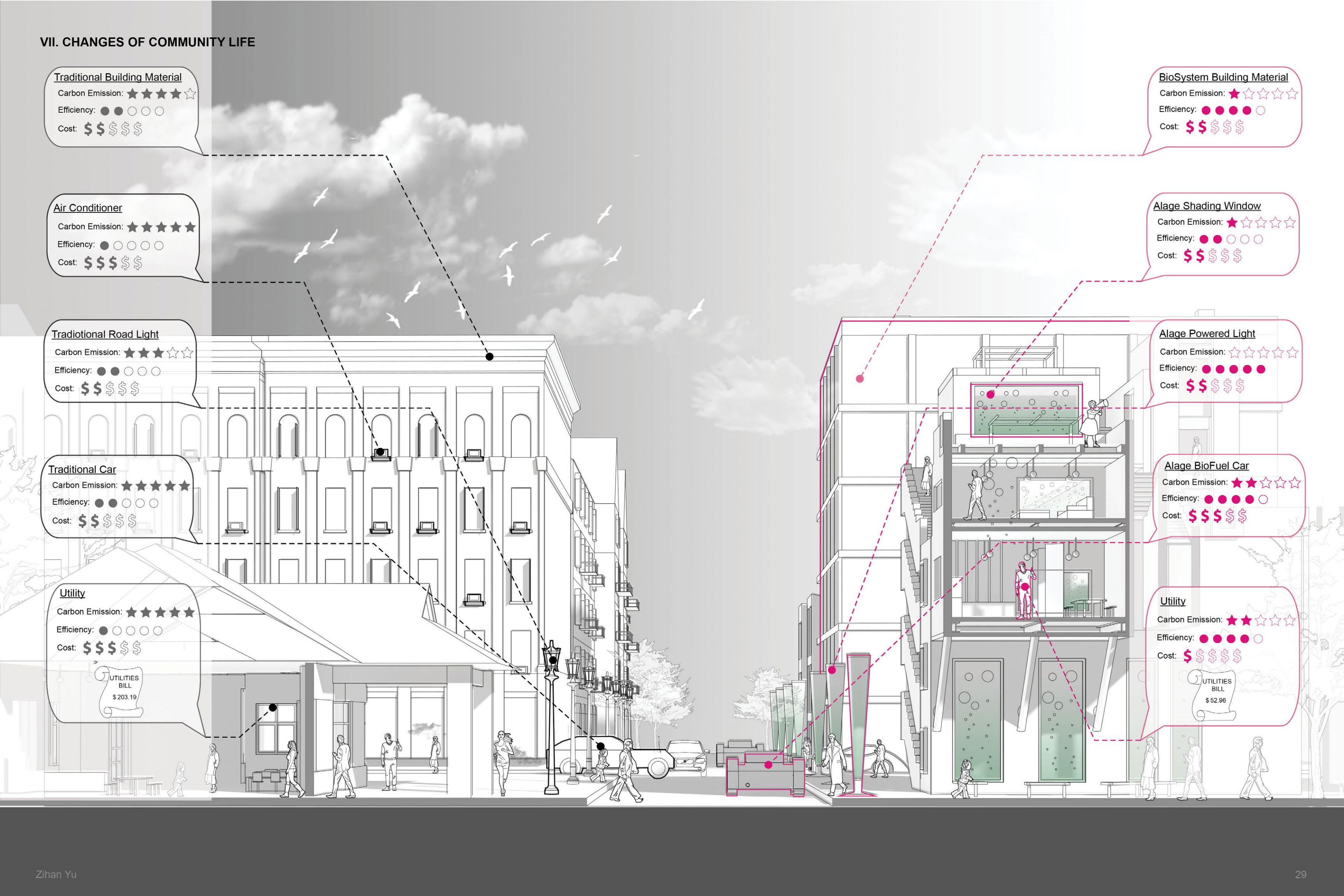
## Alage BioFuel Car

Carbon Emission: ★★★★★☆  
 Efficiency: ●●●●○○  
 Cost: \$\$\$\$

## Utility

Carbon Emission: ★★★★★☆  
 Efficiency: ●●●●○○  
 Cost: \$\$\$\$

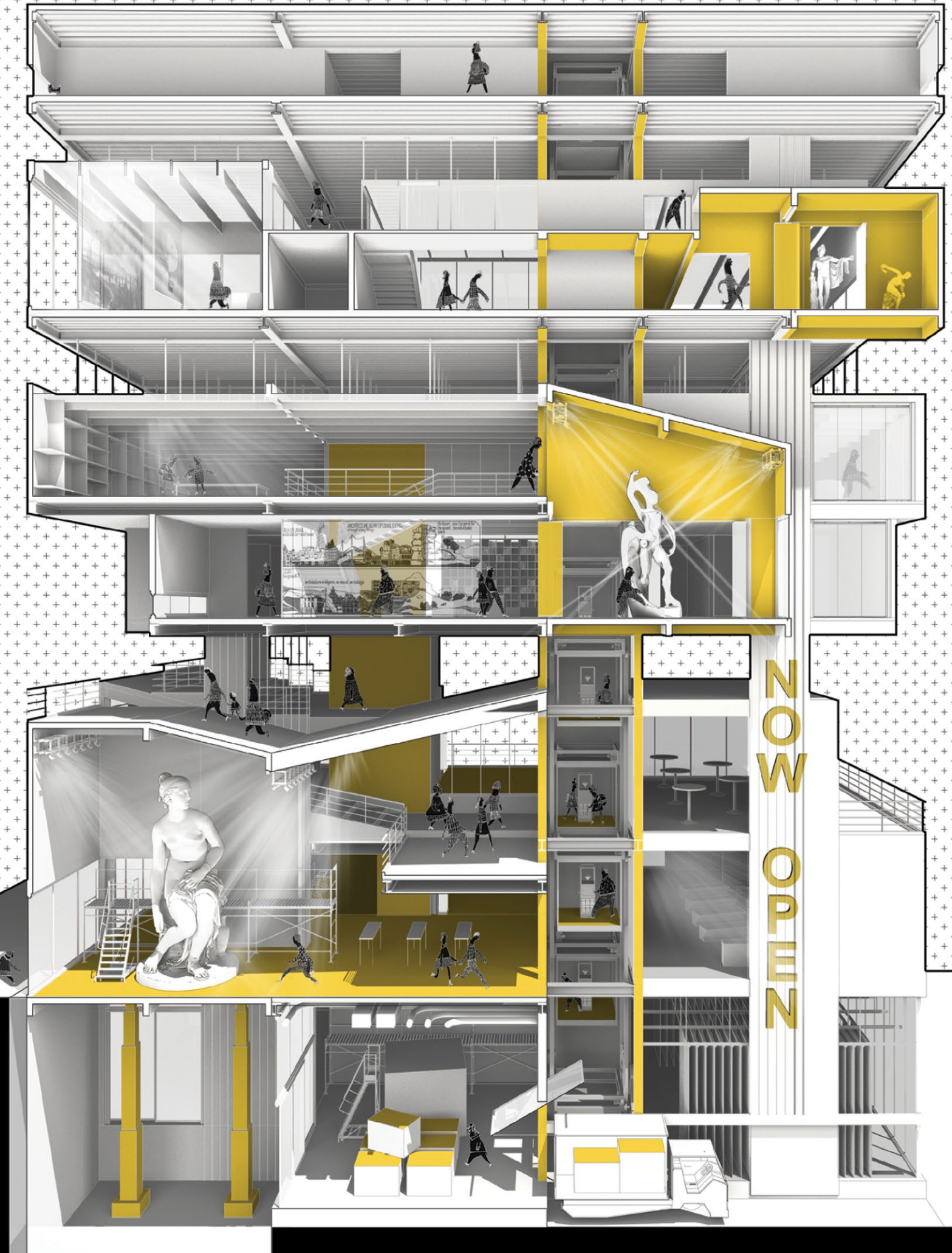
UTILITIES BILL  
\$52.96



### 03 | GALLERY IN MOTION

Summer 2019, Studio Project  
Instructor: Mimi Hoang and Eric Bung  
Columbia University  
Team: Yuxin Hu, Zihan Yu

Gallery creates an isolated-white-box space for the artwork to be viewed and judged. Conversely, in the back of house space, artworks are much more vibrant when they are transported, decorated, repaired and so on. However, all those forms of movement are not accessible to visitors, which in some degree makes the artwork incomplete. 'Moving' as the most important design strategy in our design process. The project focuses on the movement of people and artwork. To achieve the special spatial experience in the space, we create different moving scale and frequency for both people and artwork. Through the movement of art boxes in varying frequency, different types or styles of art are able to create unprecedented dialogues and artwork can be reinterpreted in different contexts.





# I. MUSEUM ANALYSIS

**Maxxi Museum**  
2010  
Area: 290,000 sqft

Gallery	Circulation	Others
Changed	Fixed	

MAXXI is a national museum of contemporary art and architecture in the Flaminio neighborhood of Rome, Italy. The museum is managed by a foundation created by the Italian ministry of cultural heritage. The building was designed by Zaha Hadid, and won the Stirling Prize of the Royal Institute of British Architects in 2010.

**Centre Pompidou**  
1977  
Area: 1,111,200 sqft

Gallery	Circulation	Others
Changed	Fixed	

The Pompidou Centre is a complex building in the Beaubourg area of the 4th arrondissement of Paris, near Les Halles, rue Montorgueil, and the Marais. It was designed in the style of high-tech architecture by the architectural team of Richard Rogers and Renzo Piano, along with Gianfranco Franchini.

**Whitney Museum**  
2015  
Area: 2,000,000 sqft

Gallery	Circulation	Others
Changed	Fixed	

The Whitney Museum is an art museum in Manhattan. The Whitney focuses on 20th- and 21st-century American art. Its permanent collection comprises more than 23,000 paintings, sculptures, drawings, prints, photographs, films, videos, and artifacts of new media by more than 3,400 artists.

**Met Breuer**  
2016  
Area: 782,910 sqft

Gallery	Circulation	Others
Changed	Fixed	

The Met Breuer is a museum of modern and contemporary art at 945 Madison Avenue and East 75th Street in the Upper East Side of Manhattan, New York City. It is part of the Metropolitan Museum of Art, also called the Met.

**New Museum**  
2007  
Area: 58,700 sqft

Gallery	Circulation	Others
Changed	Fixed	

MAXXI is a national museum of contemporary art and architecture in the Flaminio neighborhood of Rome, Italy. The museum is managed by a foundation created by the Italian ministry of cultural heritage. The building was designed by Zaha Hadid, and won the Stirling Prize of the Royal Institute of British Architects in 2010.

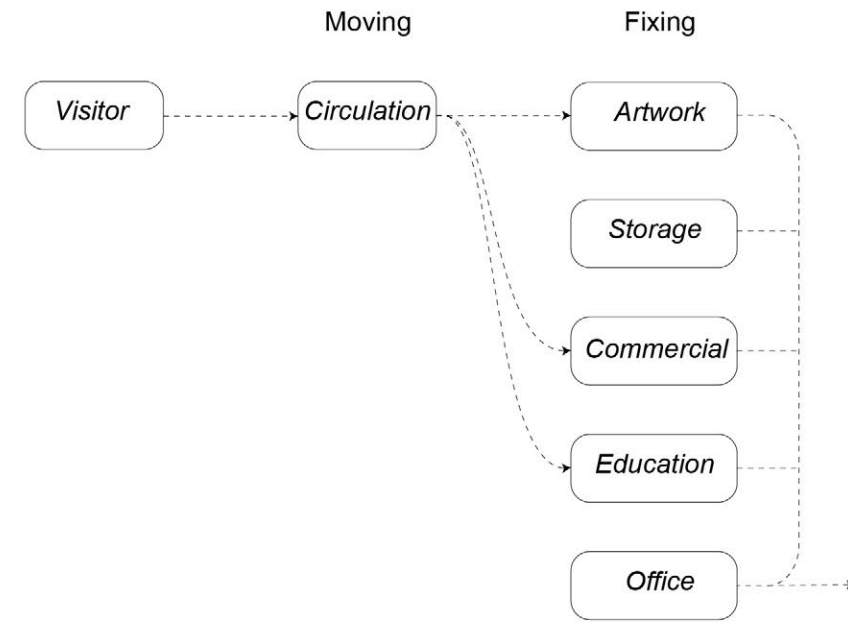
**Solomon R. Guggenheim Museum**  
1959  
Area: 44,170,000 sqft

Gallery	Circulation	Others
Changed	Fixed	

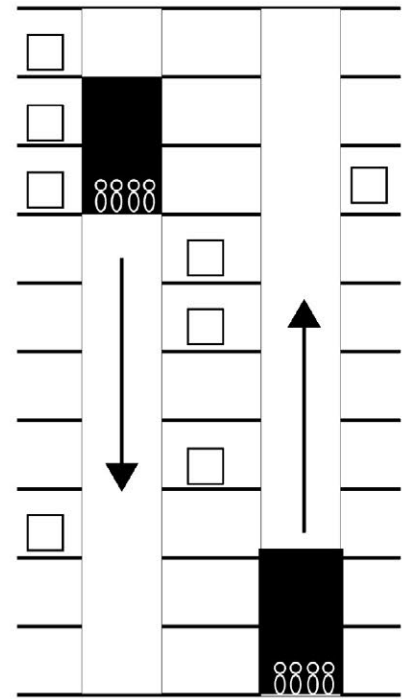
The Solomon R. Guggenheim Museum is an art museum located at 1071 Fifth Avenue on the corner of East 89th Street in the Upper East Side neighborhood of Manhattan, New York City. It is the permanent home of a continuously expanding collection of Impressionist, Post-Impressionist, early Modern, and contemporary art and also features special exhibitions throughout the year.

# II. IDEATION

## 1. Current Museum Situation

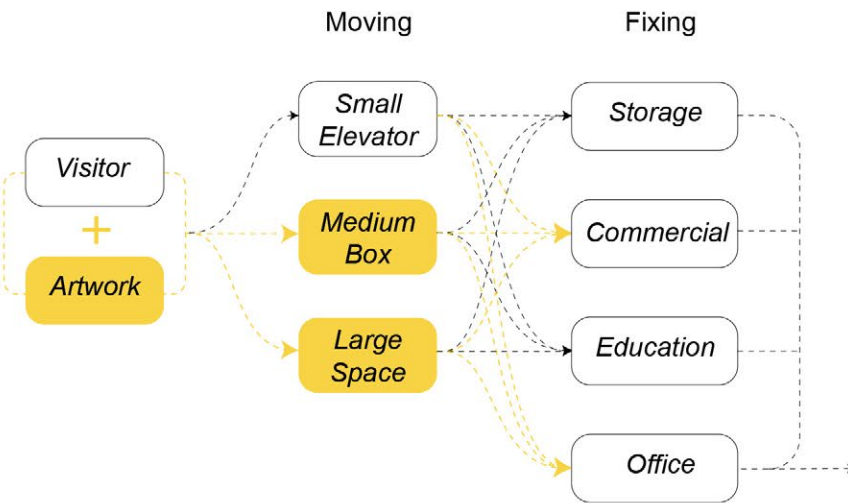


The gallery creates an isolated-white-box space for the artwork to be viewed and judged. Conversely, in the back of house space, artworks are much more vibrant when they are transported, decorated, repaired and so on. The relationship of visitors usually have movement and the artworks are stable.

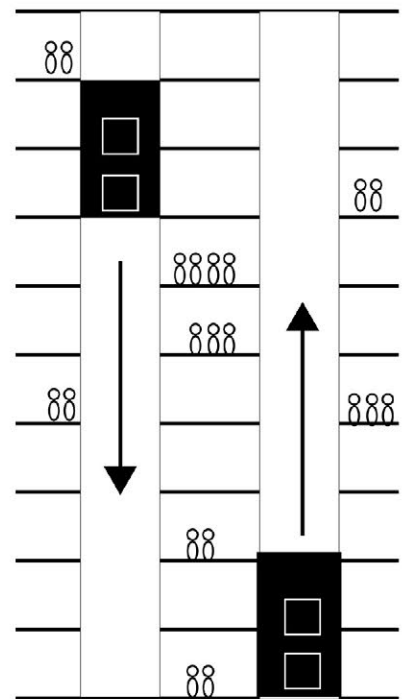


Stable Arts with Moving Visitors

## 2. Design Achievement

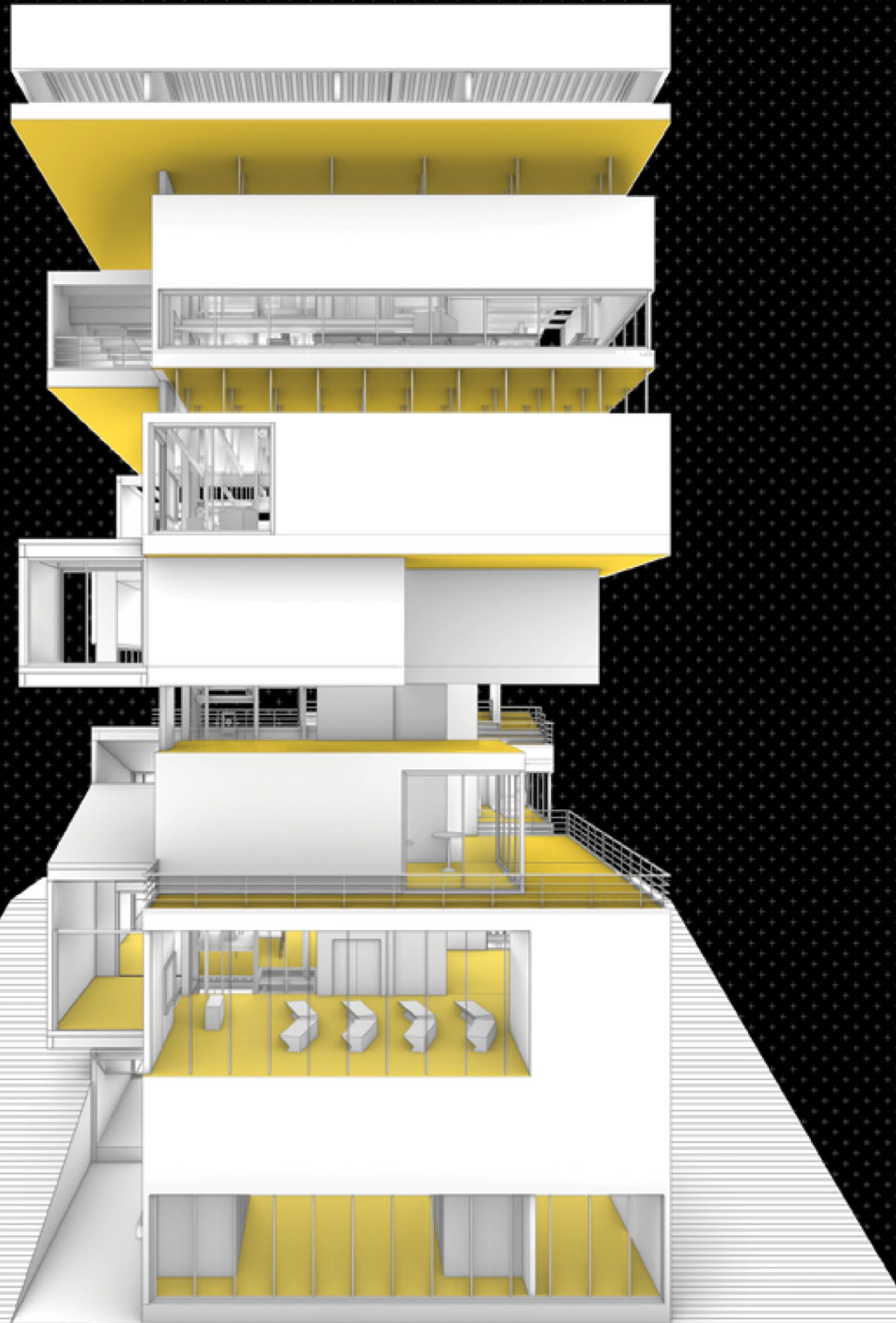


In our design, we would like to give the movement of artworks too. There are three different sizes of moving components, which could carry the artwork and combine with different programs to create various experiences. When those components move from one place to another, they not only reorganize the circulation but also change the special experience (even reverse the interior and exterior space).



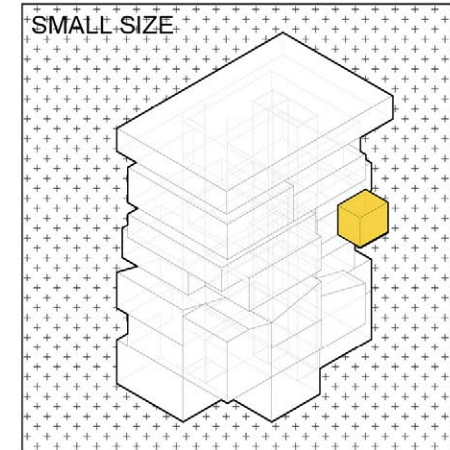
Moving Arts with Moving Visitors

### III. FRONT ELEVATION

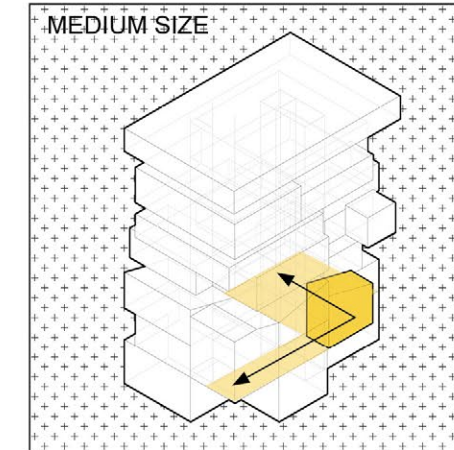


### IV. DESIGN COMPONENTS

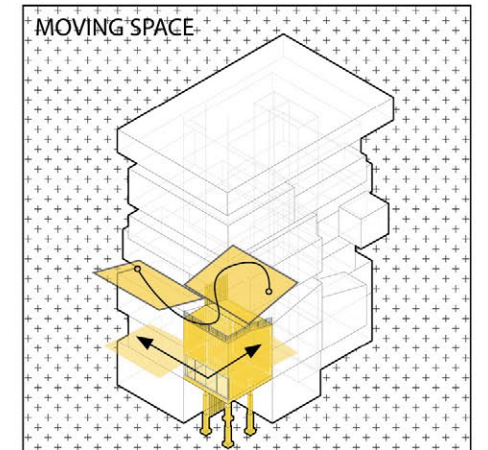
#### 1. Impact on Space



Circulation  
Artworks

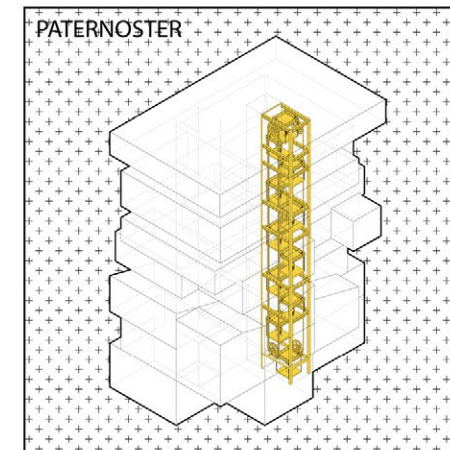


Circulation & Program  
Artworks and Functions

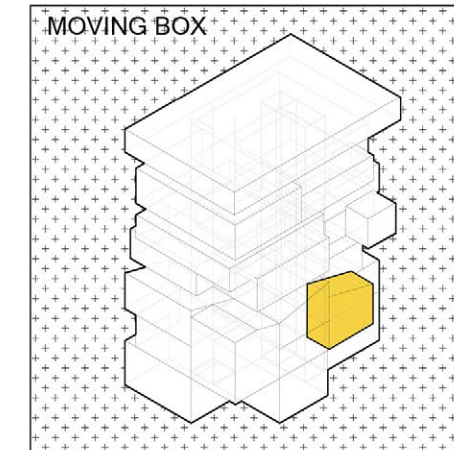


Circulation & Program & Envelope  
Artworks, Functions and Facades

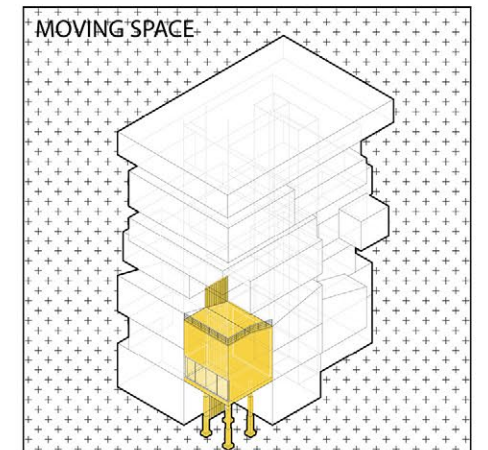
#### 2. Frequency of Movement



Constantly Moving  
Vertical Corridor

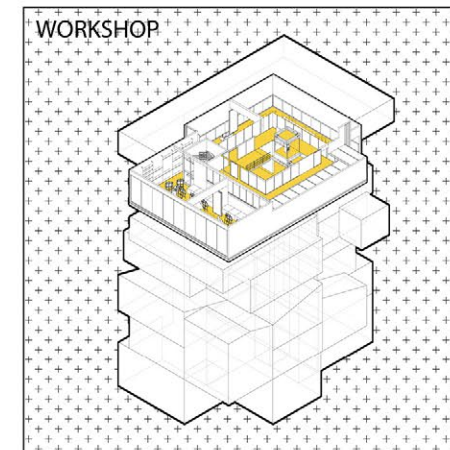


Moving Daily  
Single Visit Experience

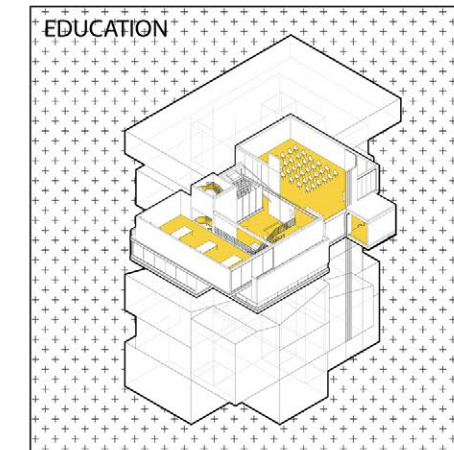


Moving Seasonally  
Multiple Visits Experience

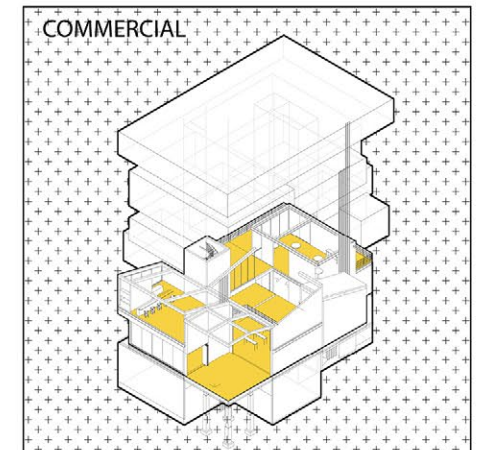
#### 3. Program of Space



Workshop  
Fifth Floor and Sixth Floor

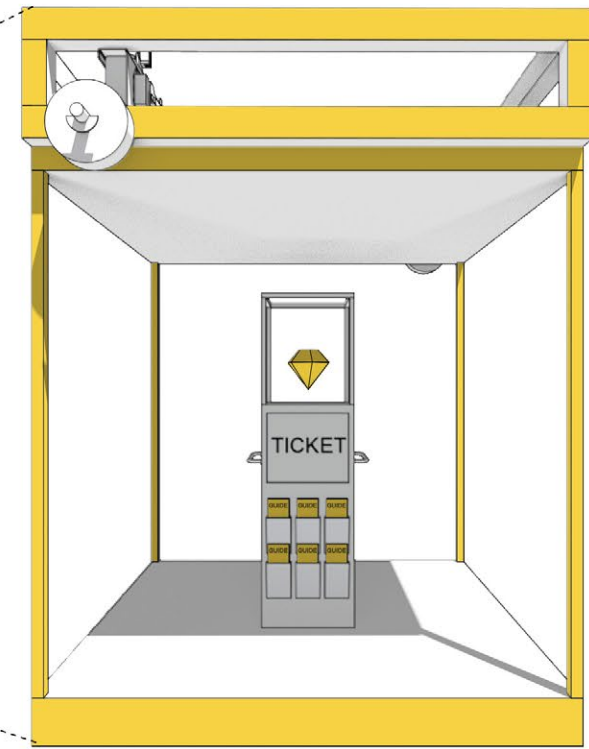
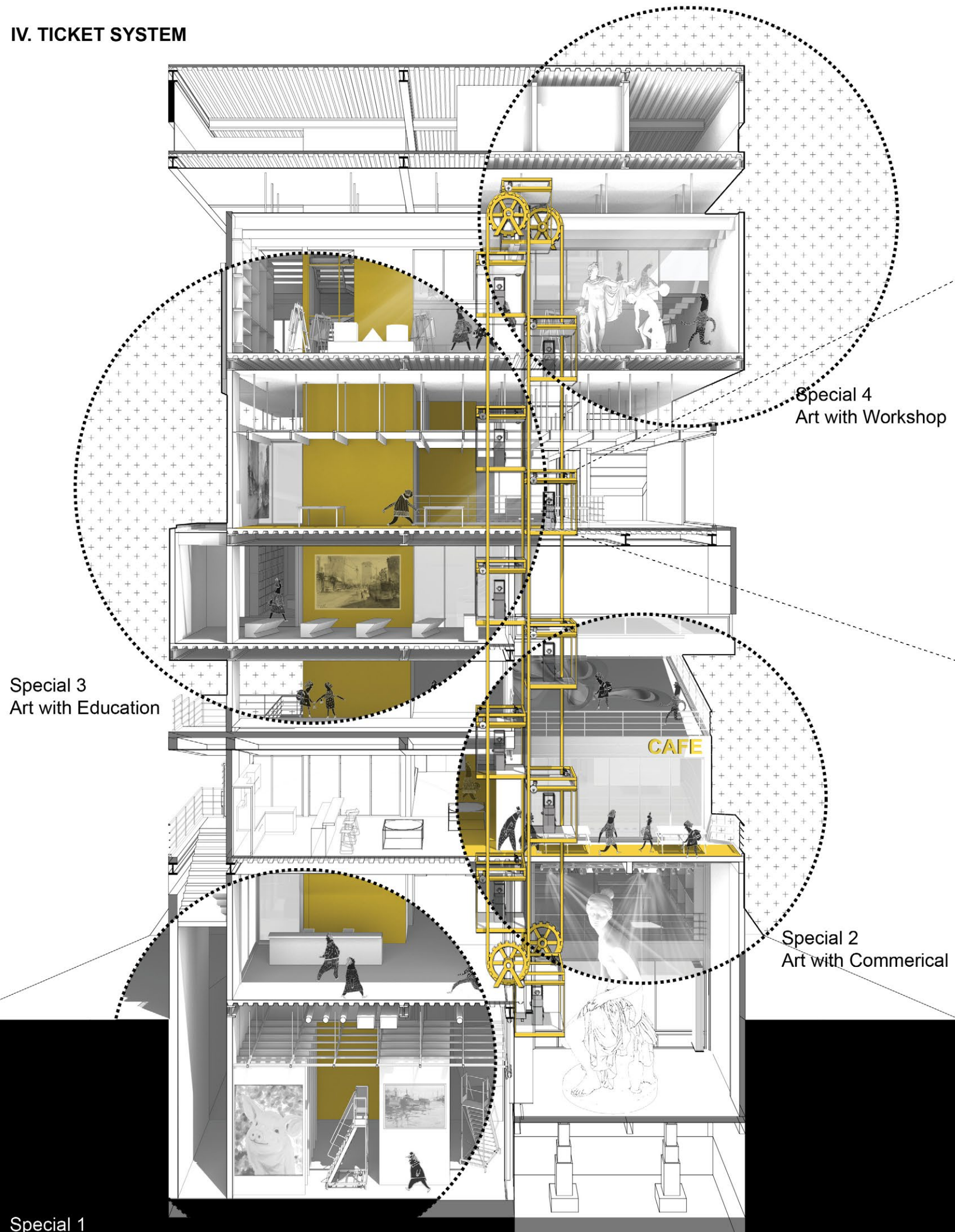


Classroom  
Third Floor and Forth Floor



MOVING SEASONALLY  
Ground Floor and Second Floor

IV. TICKET SYSTEM



Ticket

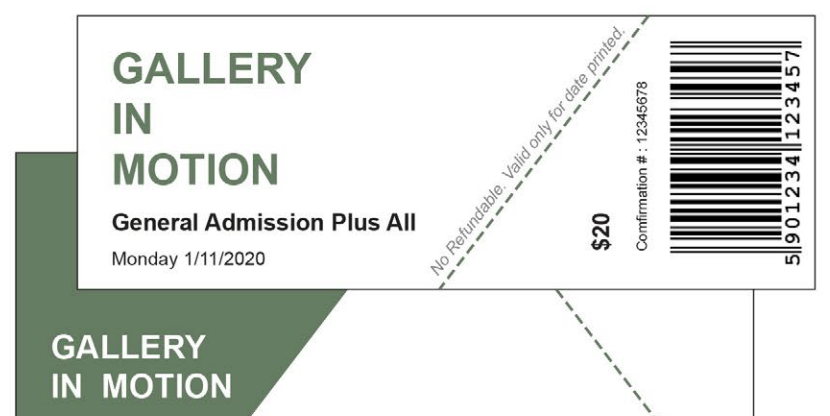
The carriage is transparent and move slowly in a loop up and down inside the building without stopping. Passengers can step on or off at any floor they like. Maximum for four passengers in one carriage.  
 The carriage is like an information center and visitors could get ticket in it. It also carries a little artwork piece, which could give audiences a basic feeling about the exhibition.



**General Admission \$10**  
 Having a chance to get alone with an art piece! A quick way to see the museum. But does not include special exhibitions. (Cannot get off the elevator during the visit.)



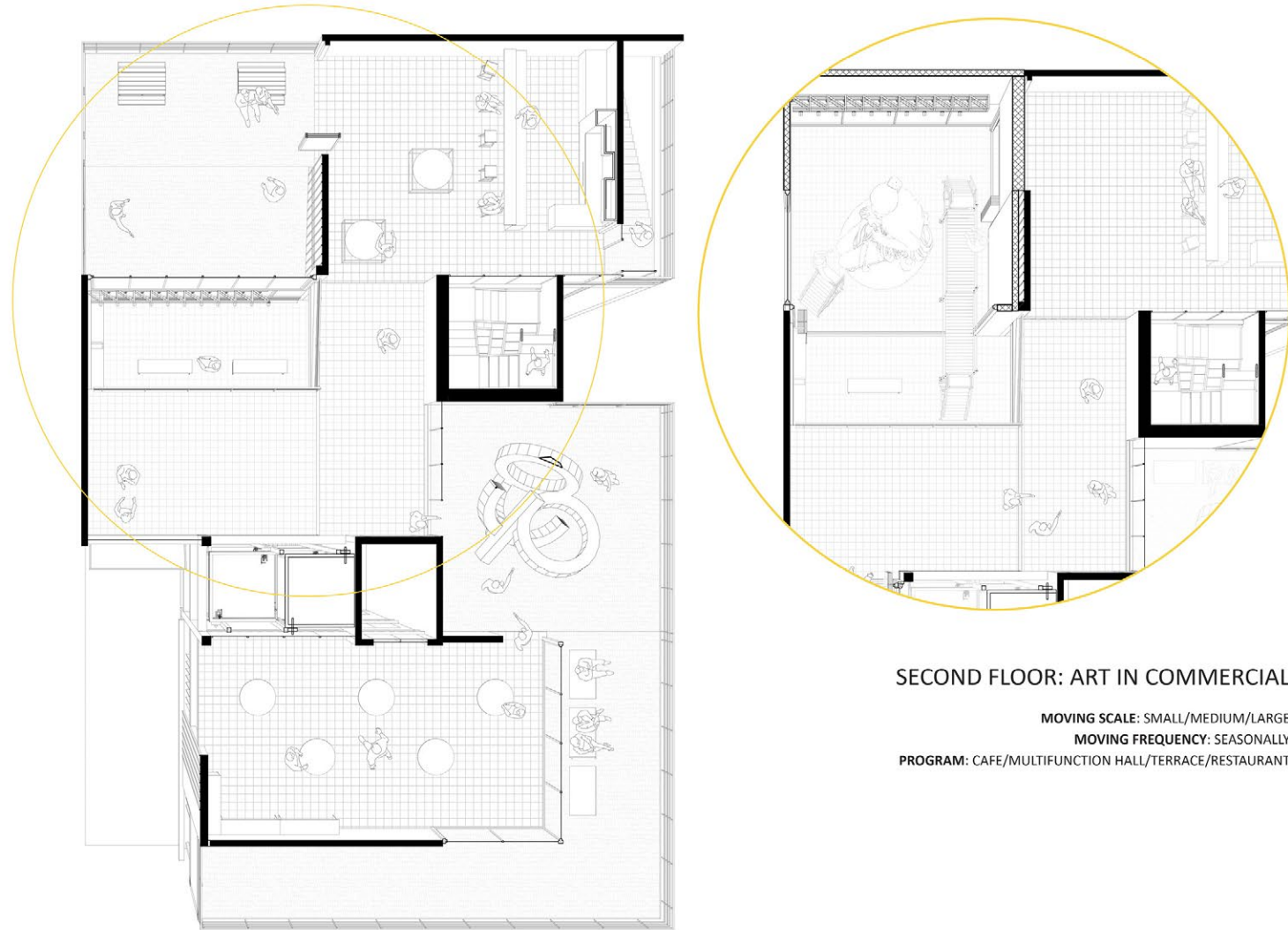
**General Admission Plus One \$15**  
 Includes General Admission plus one special exhibition. Choosing one of the four types of art you want carefully look. (Only could get off during the same type art platform)



**General Admission Plus All \$20**  
 Includes General Admission plus all special exhibitions. Experiencing the whole museum. Get to any type of art!

Special 1  
 Art with Storage

V. SECOND FLOOR PLAN

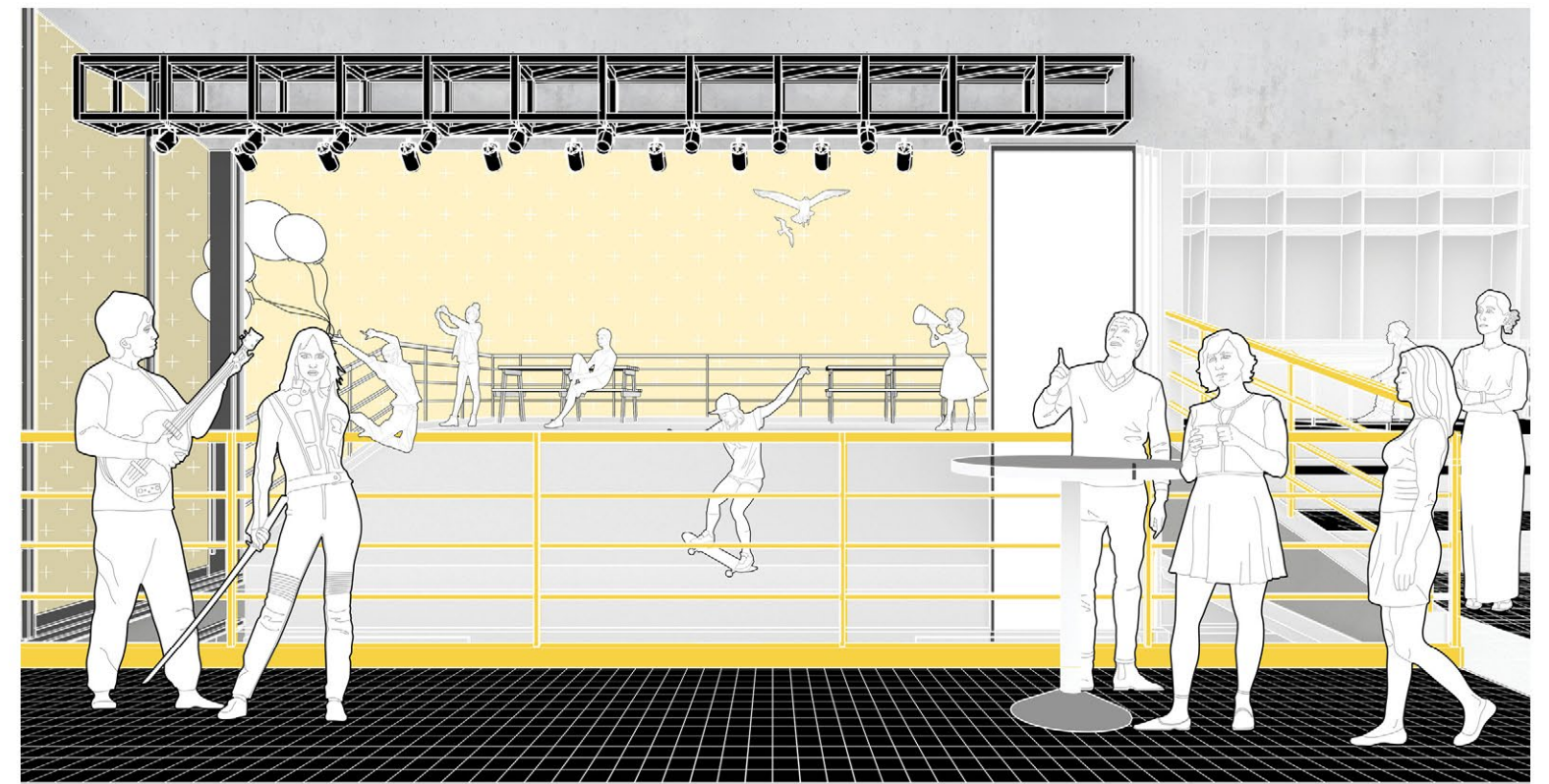
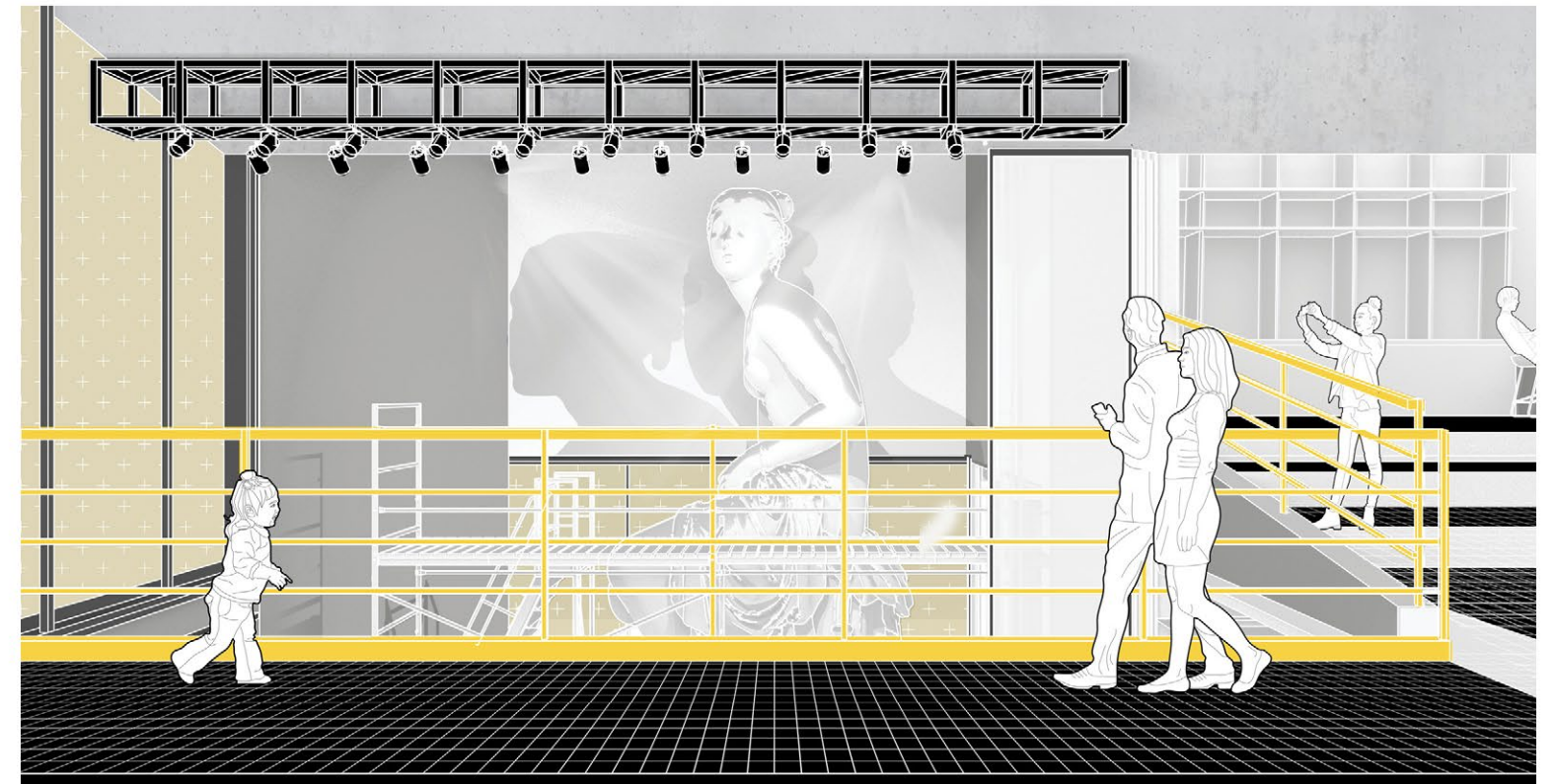


SECOND FLOOR: ART IN COMMERCIAL

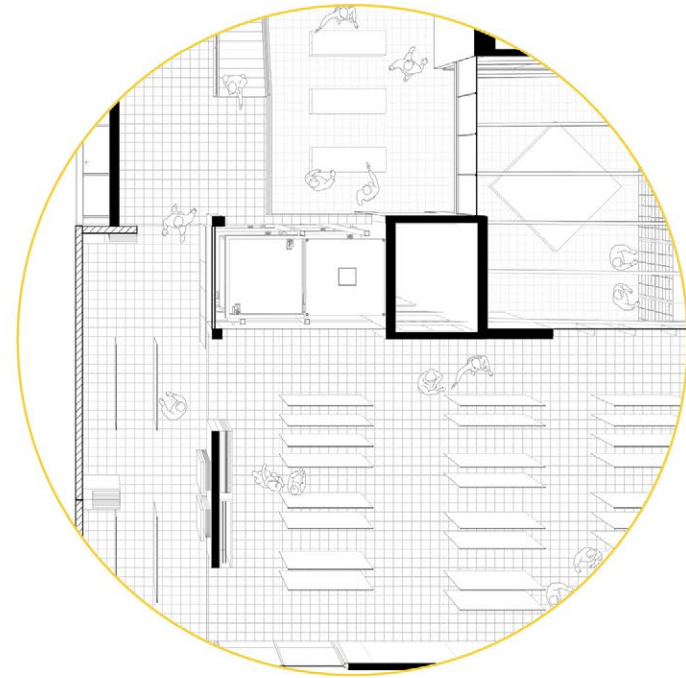
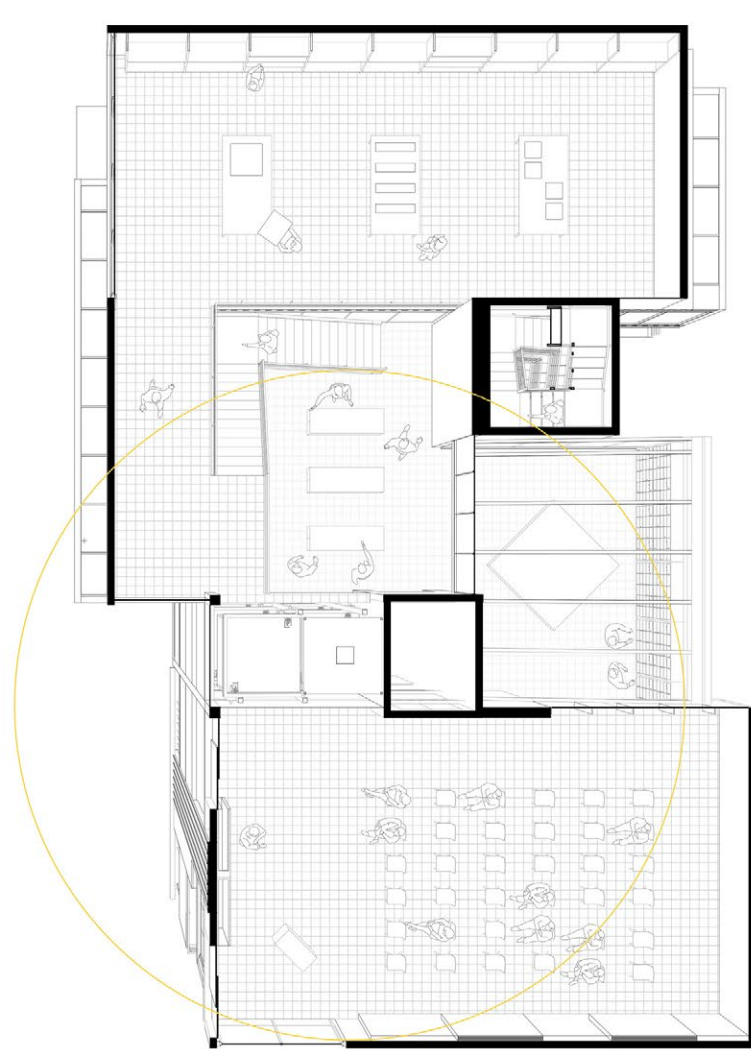
MOVING SCALE: SMALL/MEDIUM/LARGE

MOVING FREQUENCY: SEASONALLY

PROGRAM: CAFE/MULTIFUNCTION HALL/TERRACE/RESTAURANT



VI. FORTH FLOOR

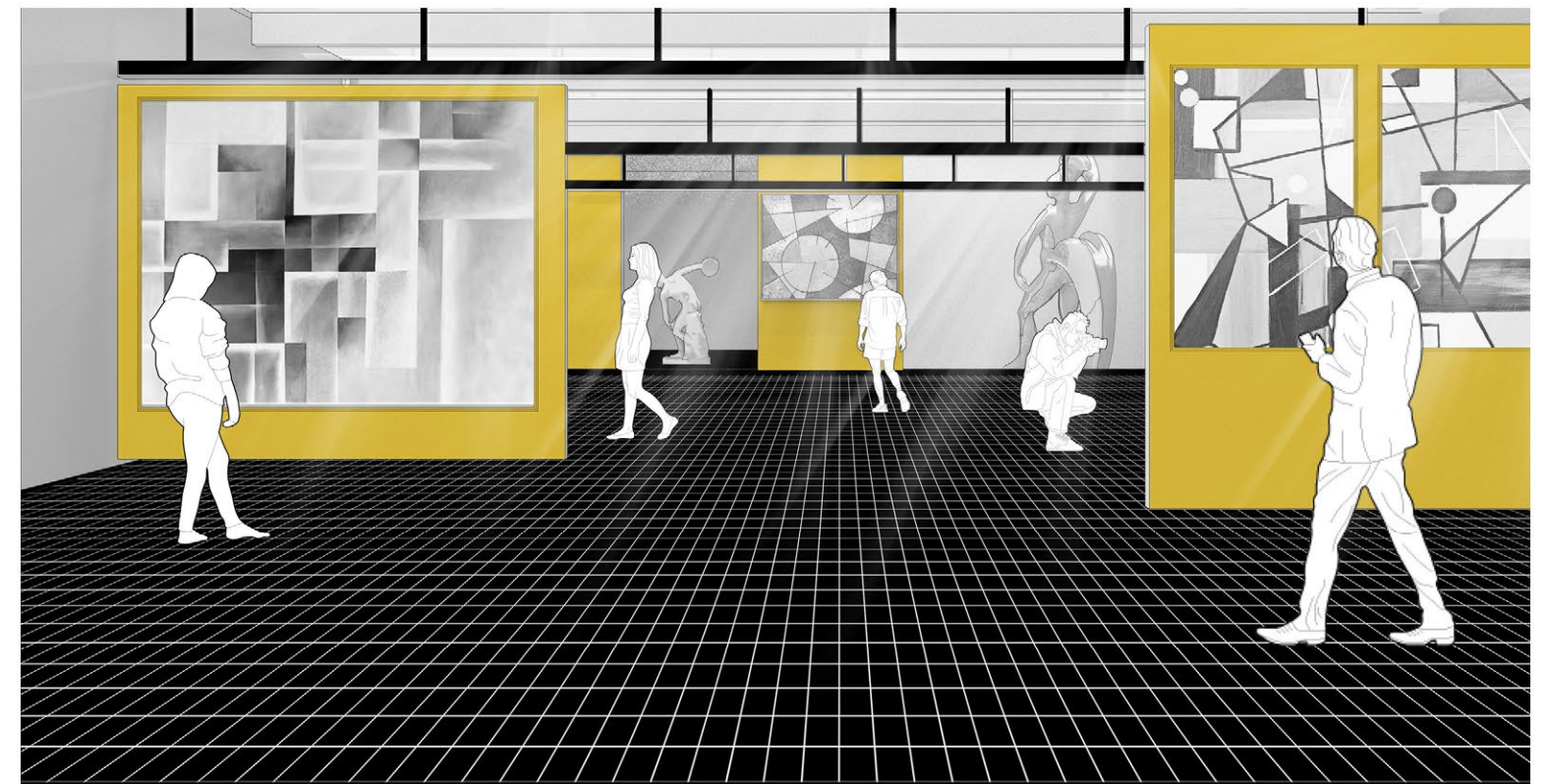


FORTH FLOOR: ART IN EDUCATION

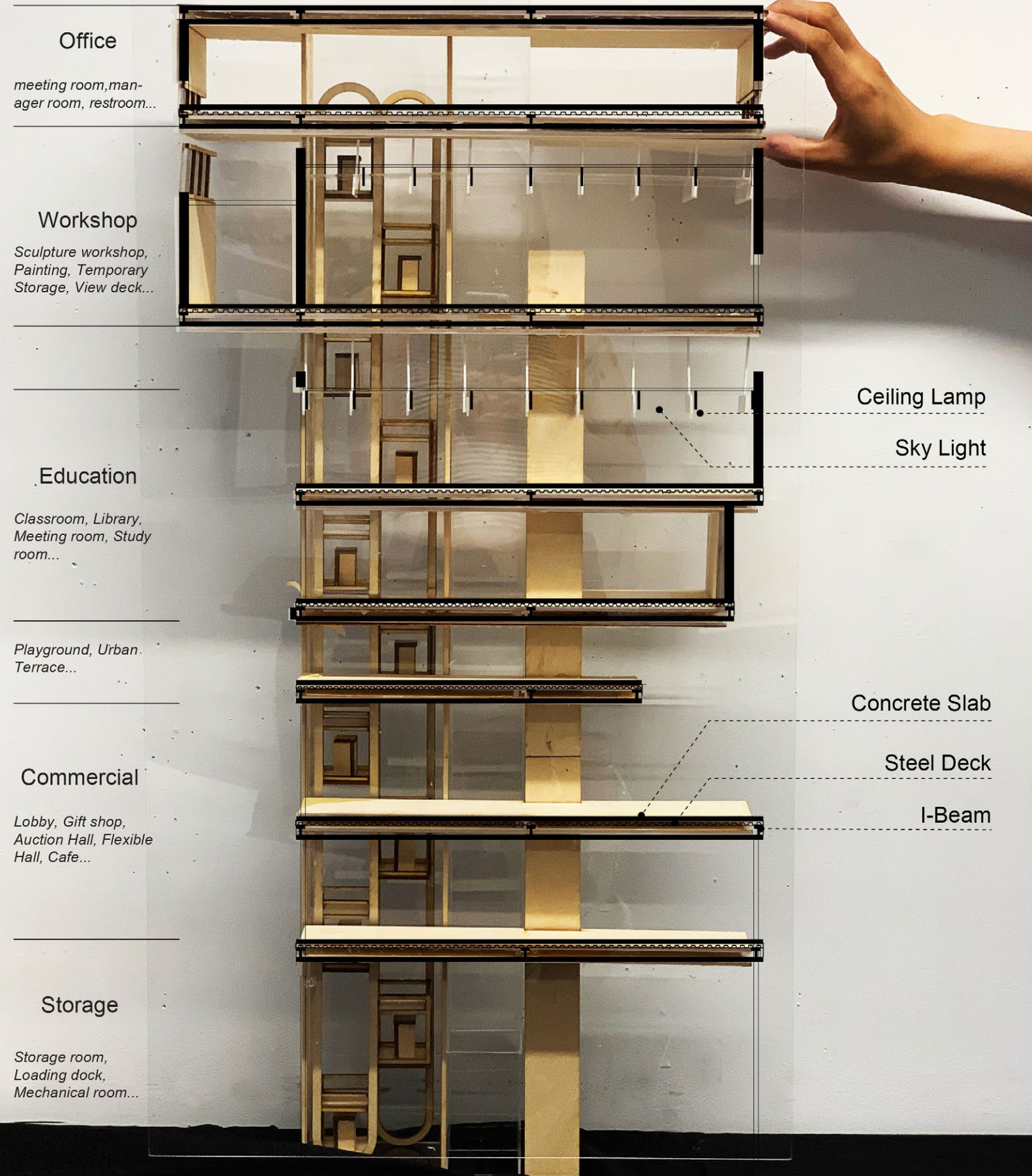
MOVING SCALE: SMALL/MEDIUM

MOVING FREQUENCY: DAILY

PROGRAM: CLASSROOM/PANEL ROOM/LIBRARY/RESEARCH CENTER



VII. PHYSICAL MODEL



West



North



East

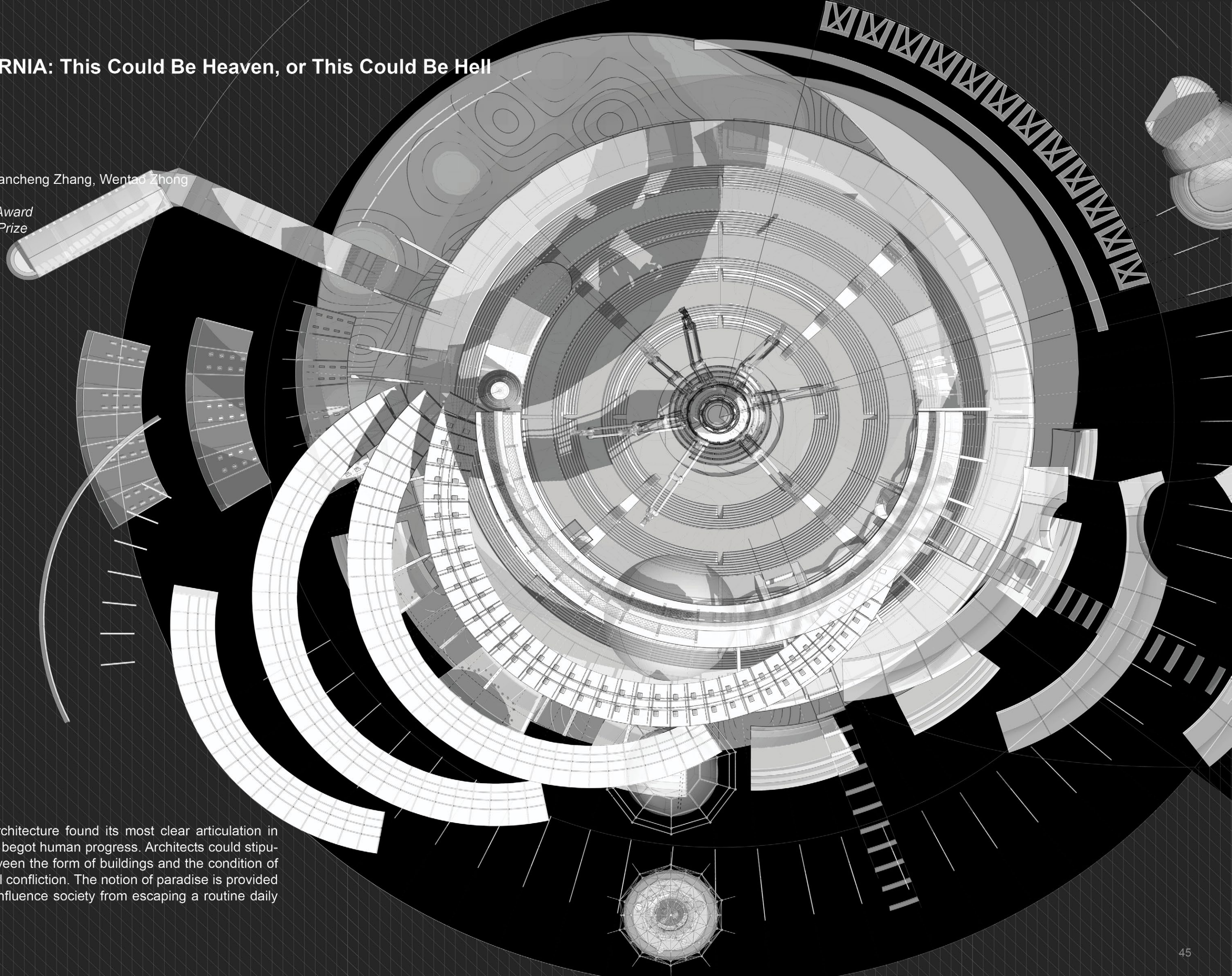


South

## 04 | HOTEL CALIFORNIA: This Could Be Heaven, or This Could Be Hell

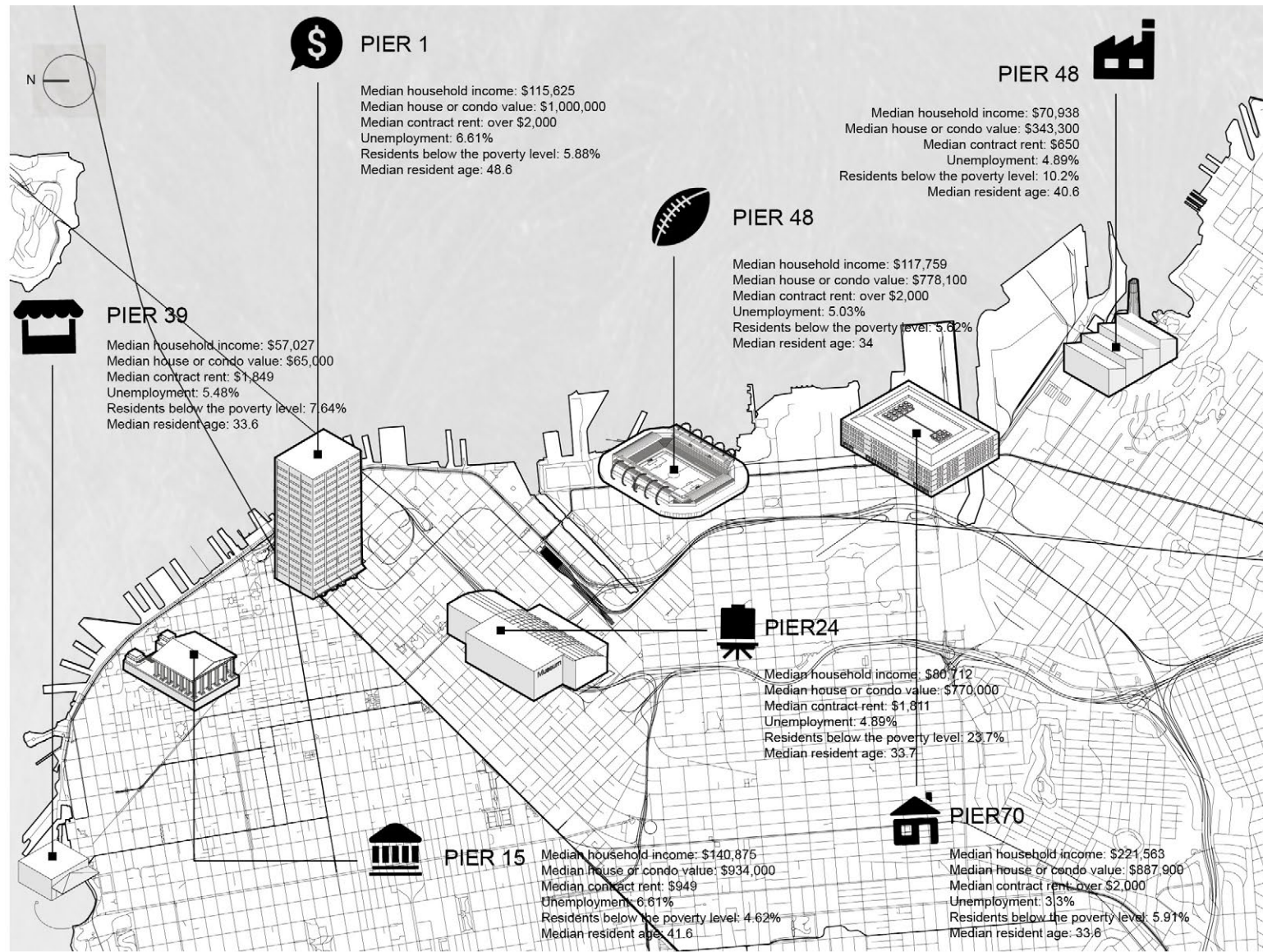
Location: San Francisco, CA  
Fall 2018, Graduated Project  
Instructor: Mitchell Squire  
Iowa State University  
Team: Sirina Reed, Zihan Yu, Hancheng Zhang, Wentao Zhong

2018 The H. Kennard Bussard Award  
2018 CSI Competition Mention Prize



Within the twentieth-century, architecture found its most clear articulation in Modernism, where good design begot human progress. Architects could stipulate an intrinsic connection between the form of buildings and the condition of society in order to prevent social conflict. The notion of paradise is provided by contemporary architects to influence society from escaping a routine daily life.

## I. CITY ANALYSIS: Wealth Gap in San Francisco

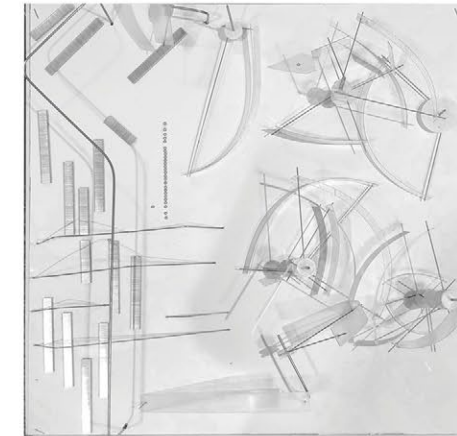


## II. IDEATION

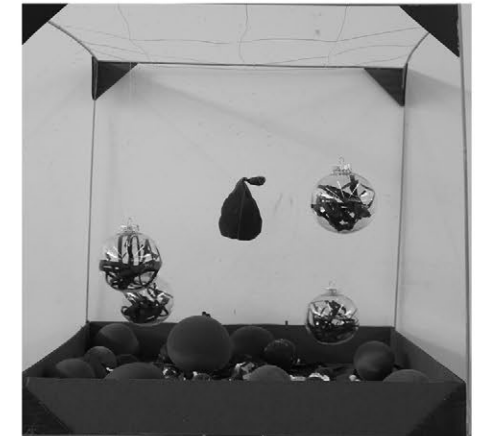
In San Francisco, there is an extensive wealth gap that affects the social culture of the city. Our initial observations were about the vast diversity in demographics there is throughout the city. The separation of people and cultures are very distinct and split into different areas because of the influence of wealth in the city. We recognized that this issue resembles the idea of how the wealth of the city can prevail over the rest of society in respect to its architecture and urban planning.



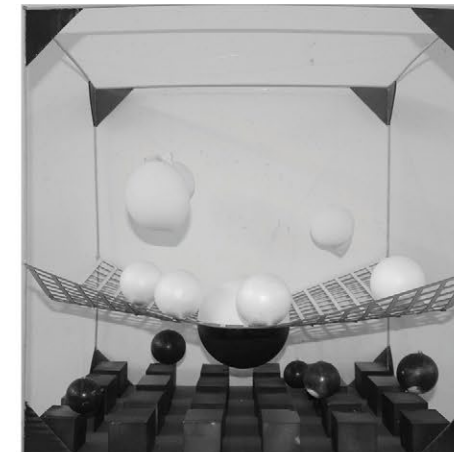
The 1%



The Speed of Time



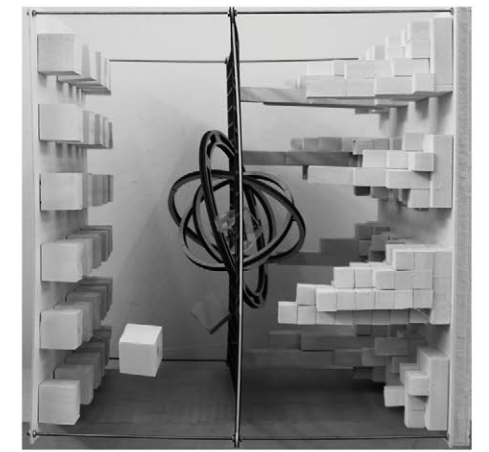
The Reality: Potential Risk



The Dream and Foundation



The Life



The Conflict and Homogenization

## III. TIMELINE

**California Gold Rush**  
The California Gold Rush began on January 24, 1848, when gold was found in Coloma, California, the gold brought some 300,000 people to California from the rest of the United States and abroad.

**Panama-Pac Exposition**  
The Panama-Pac International Exposition (PPIE) was a world's fair held in San Francisco in 1915. Its ostensible purpose was widely seen in the city as an opportunity to showcase its recovery from the 1906 earthquake.

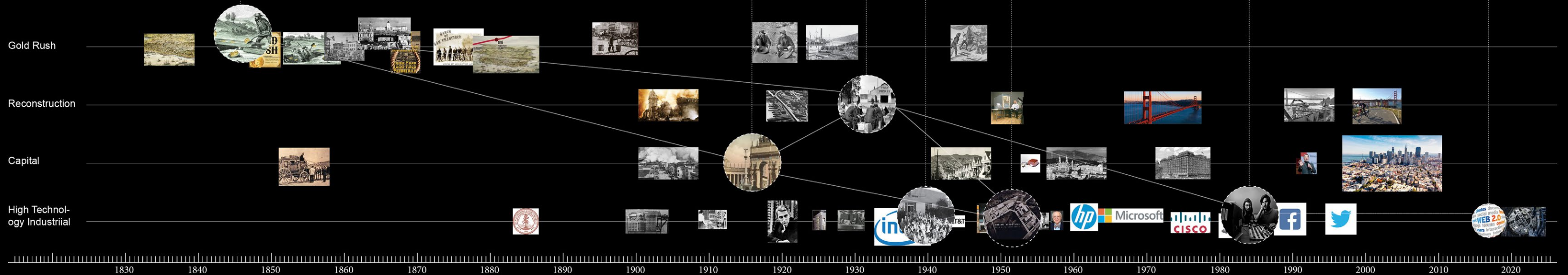
**Great Depression**  
The Great Depression was a severe worldwide economic depression that took place during the 1930s, and it was the longest, deepest, and most widespread depression of the 20th century.

**Birthplace of Silicon Valley**  
The HP Garage is a private museum where the company Hewlett-Packard (HP) was founded. The Palo Alto company that sparked the beginning of Silicon Valley.

**Stanford Research Park**  
Built in 1951, as Stanford Industrial Park, it claims to be the world's first technology-focused office park. It was the first university-owned industrial park at the time of its founding and played a key role in creation of Silicon Valley.

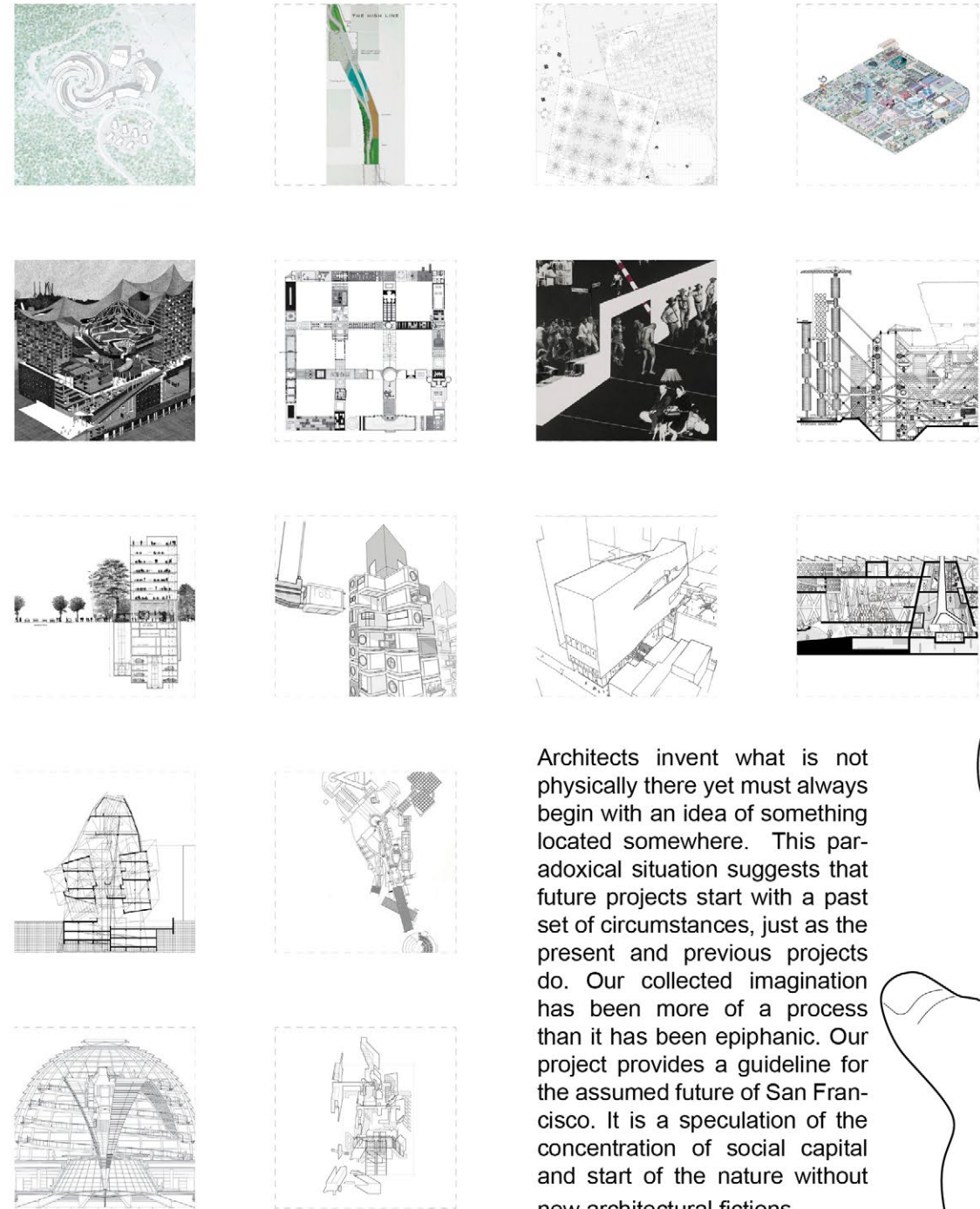
**Apple Inc.**  
Steve Jobs and Steve Wozniak build and illegally sell 'blue boxes' that allow to make phone calls for free. Later, Apple Computer Inc. is incorporated by Steve Jobs, Steve Wozniak and Ron Wayne.

**Web 2.0**  
A Web 2.0 website may allow users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community.

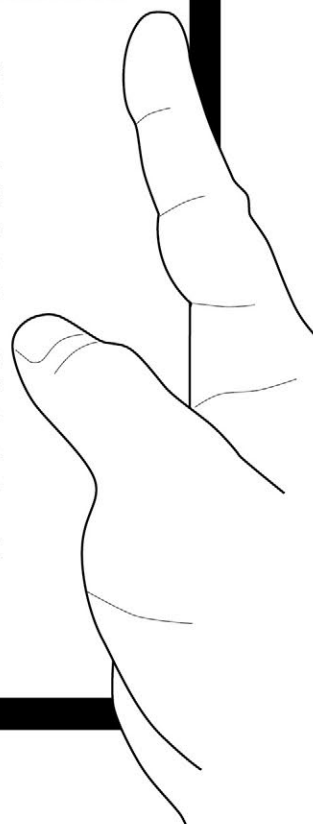




# ARCHITECTURE DISH MENU



Architects invent what is not physically there yet must always begin with an idea of something located somewhere. This paradoxical situation suggests that future projects start with a past set of circumstances, just as the present and previous projects do. Our collected imagination has been more of a process than it has been epiphanic. Our project provides a guideline for the assumed future of San Francisco. It is a speculation of the concentration of social capital and start of the nature without new architectural fictions.



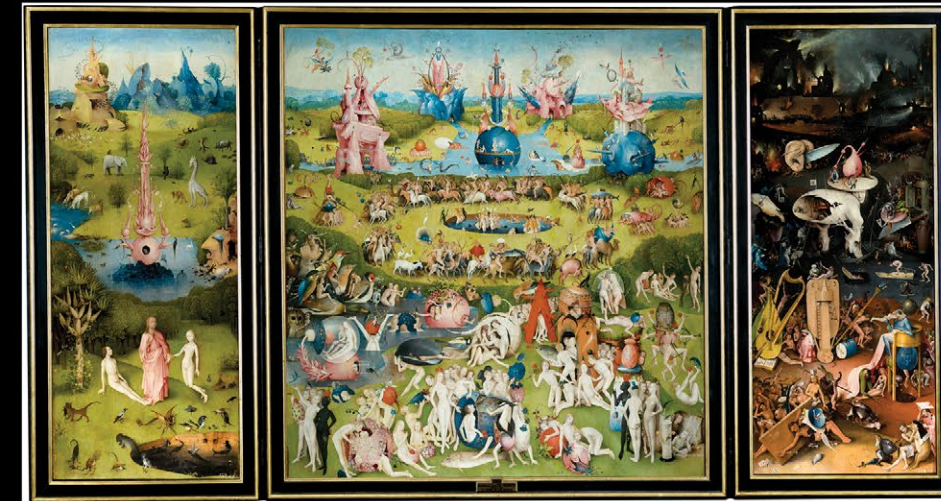
## IV. CONCEPT DEVELOPMENT

par·a·dise /'perə'dīz/

noun

noun: paradise; plural noun: paradises

1. (In some religions) Heaven as the ultimate abode of the just.
2. An ideal or idyllic place or state.
3. An urban lifestyle imagined by contemporary architects.



The notion of paradise is provided by contemporary architects to influence society from escaping a routine daily life. To understand what paradise is, we studied Hieronymus Bosch's Garden of Earthly Delights (1503-1515). This painting shows us what lies beyond the ideas of how we live on earth and refers to a heaven, earth and hell in one setting.

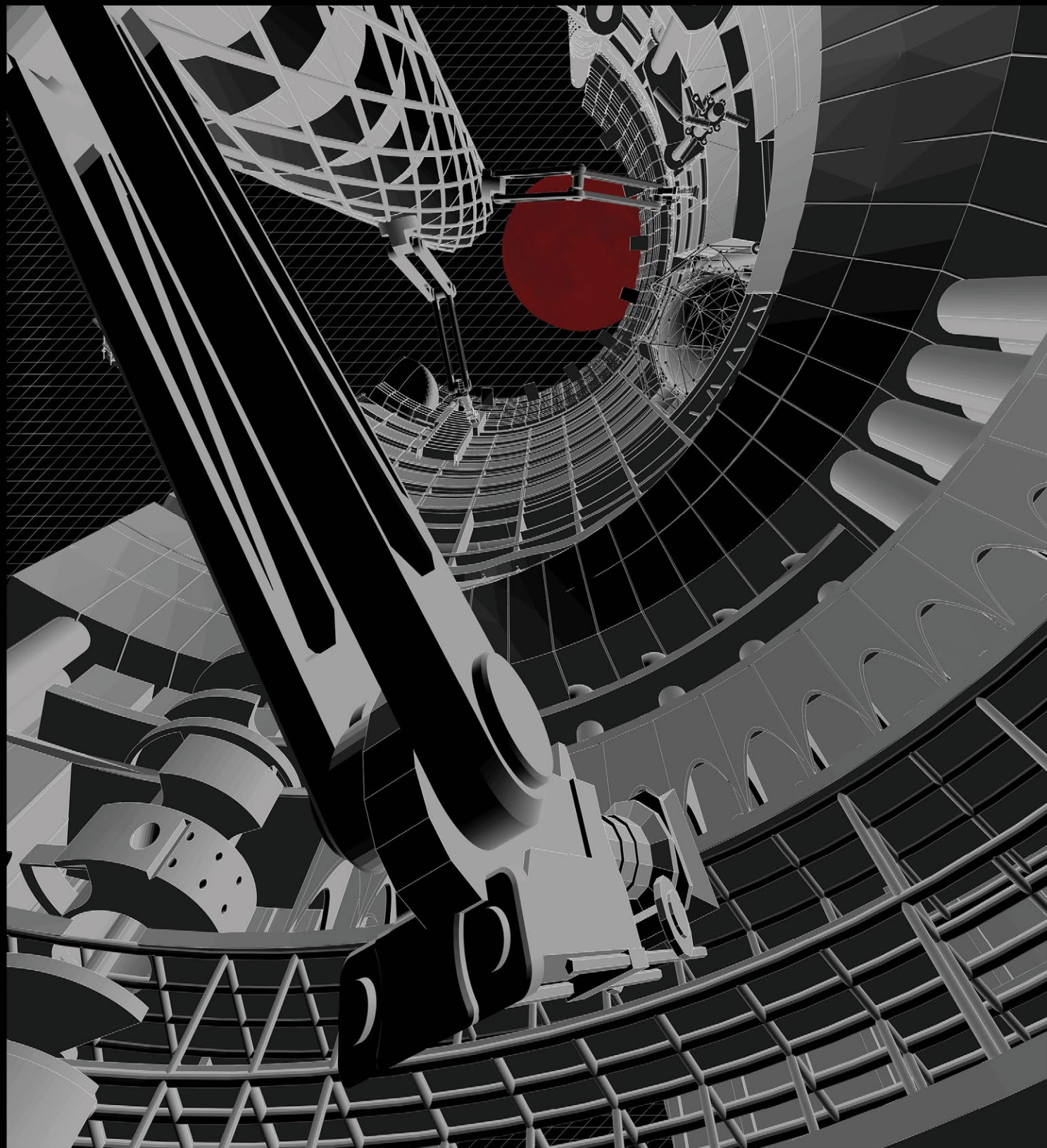


CONCEPT MODEL

This allows us to understand that a paradise is created by both positive and negative elements and that one person's paradise may be another person's hell. Today, architectural fictions, or paradises, are created without the presence of negative impacts. This means, our society will only see positive aspects in the progression of the built environment.

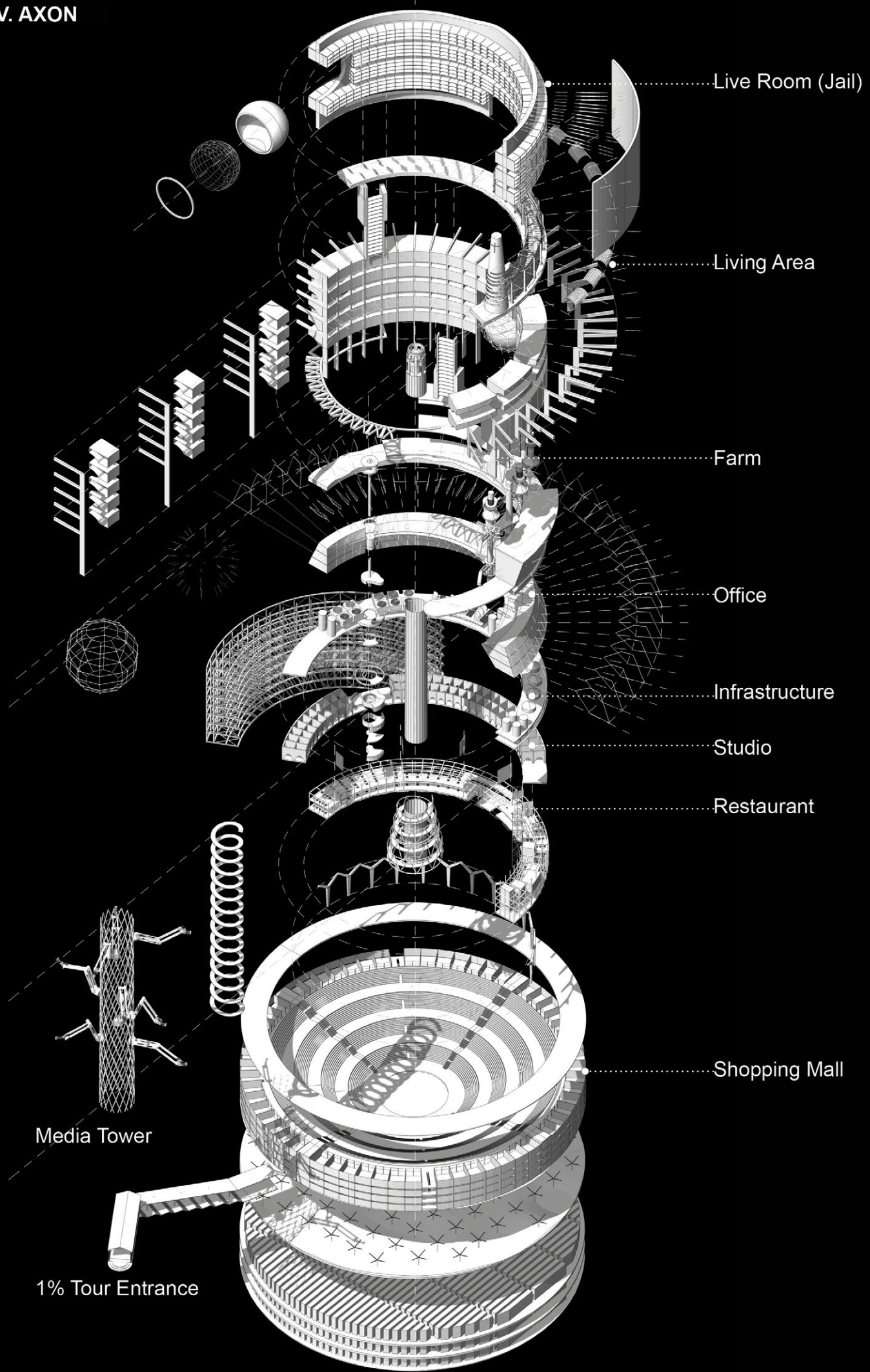


Different Understanding of Paradise



In the near future of San Francisco, the idea of self will be manipulated by the built environment. This built environment is proposed and designed by the wealthiest 1% of the population of San Francisco in order to regulate the 99% of the population. At this point in time, the 1% has full control over the city's capital. The 1% will use visionary architects and architecture as a toll to control the 99%. They will claim the improvement of society and the environment to make sure these architects are on board with their ideas for development. The 1% will advertise this architecture by providing separate spaces and experiences for free thinkers, the homeless, artists, consumers, environmentalists, etc. They are influencing the way people live and circulate without making it seem as though the threat to total control is not relevant. The 1% sees to prevent the eruption of social conflict by implementing this architecture within the city to place restrictions on the rest as the society because they believe that if the rest of society has full control over their actions there will be chaos.

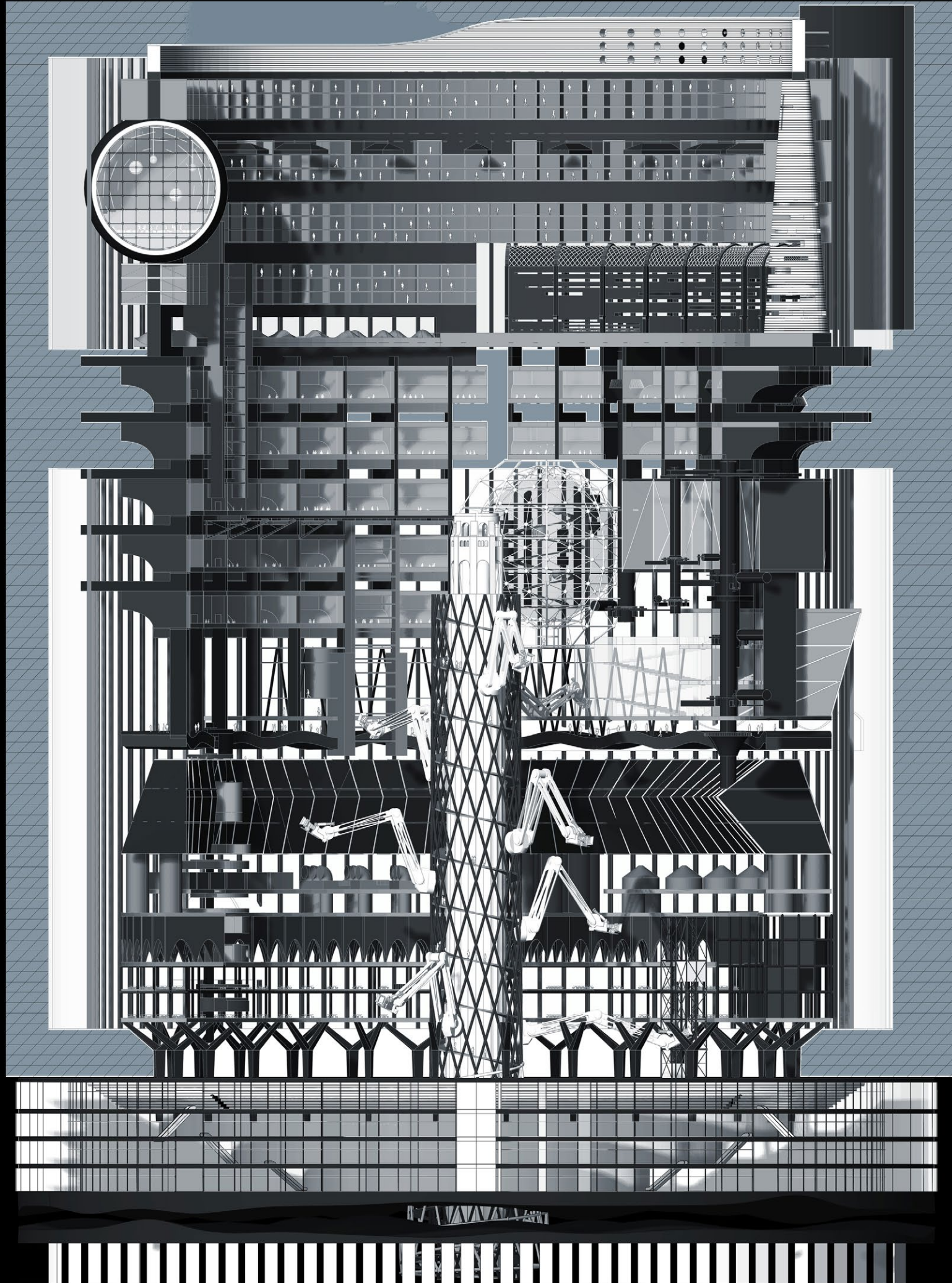
V. AXON



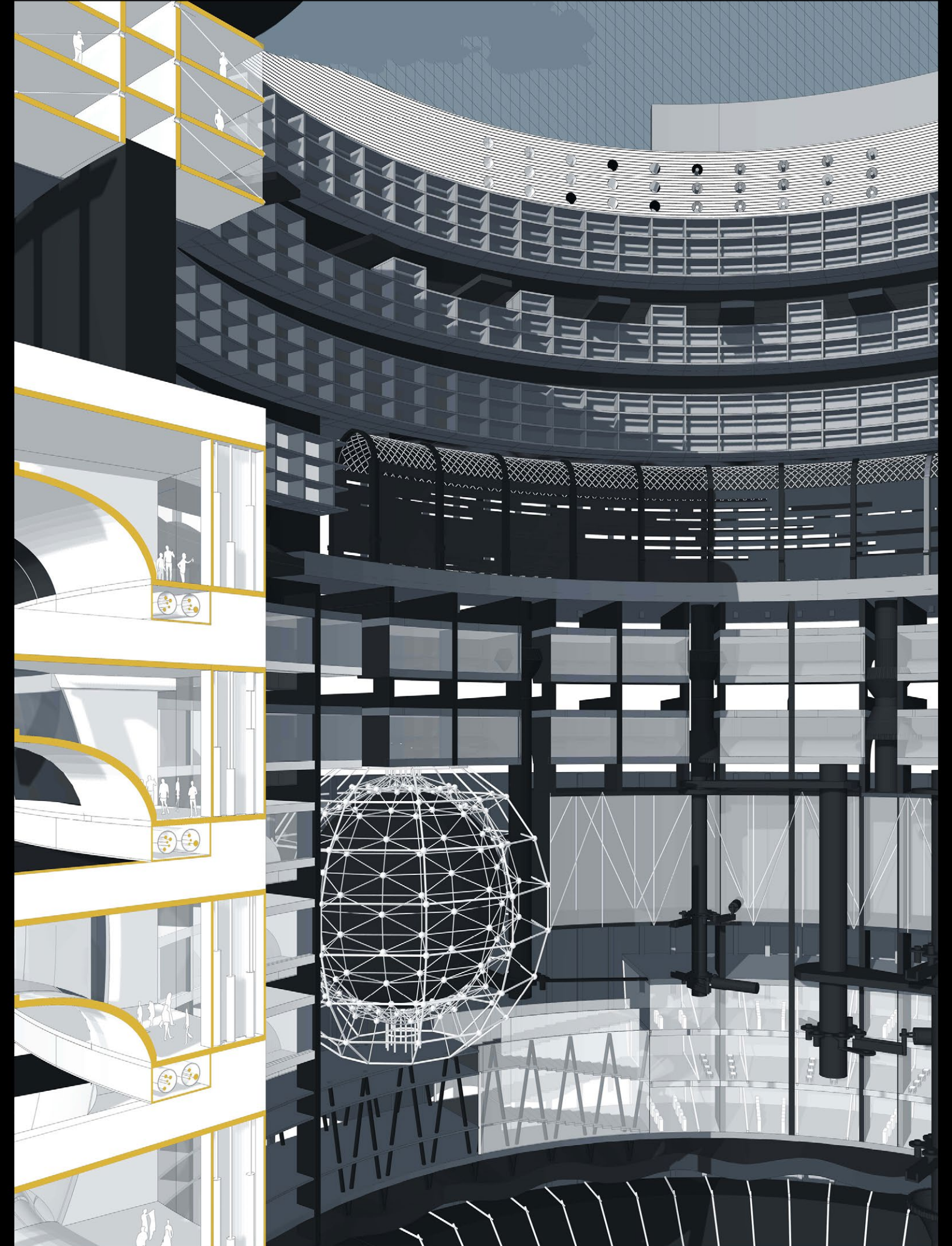
VI. MONITOR FOR TOP 1%



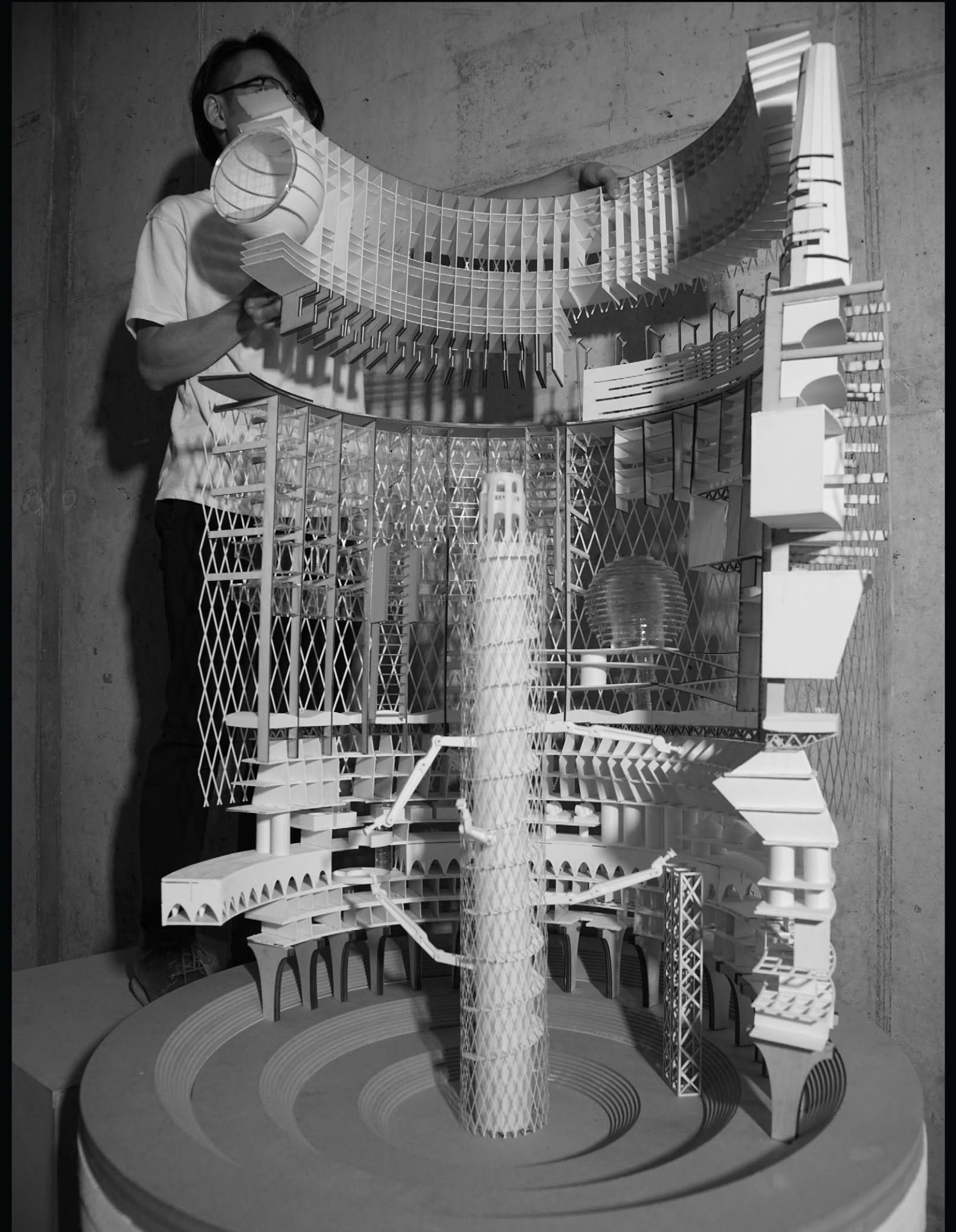
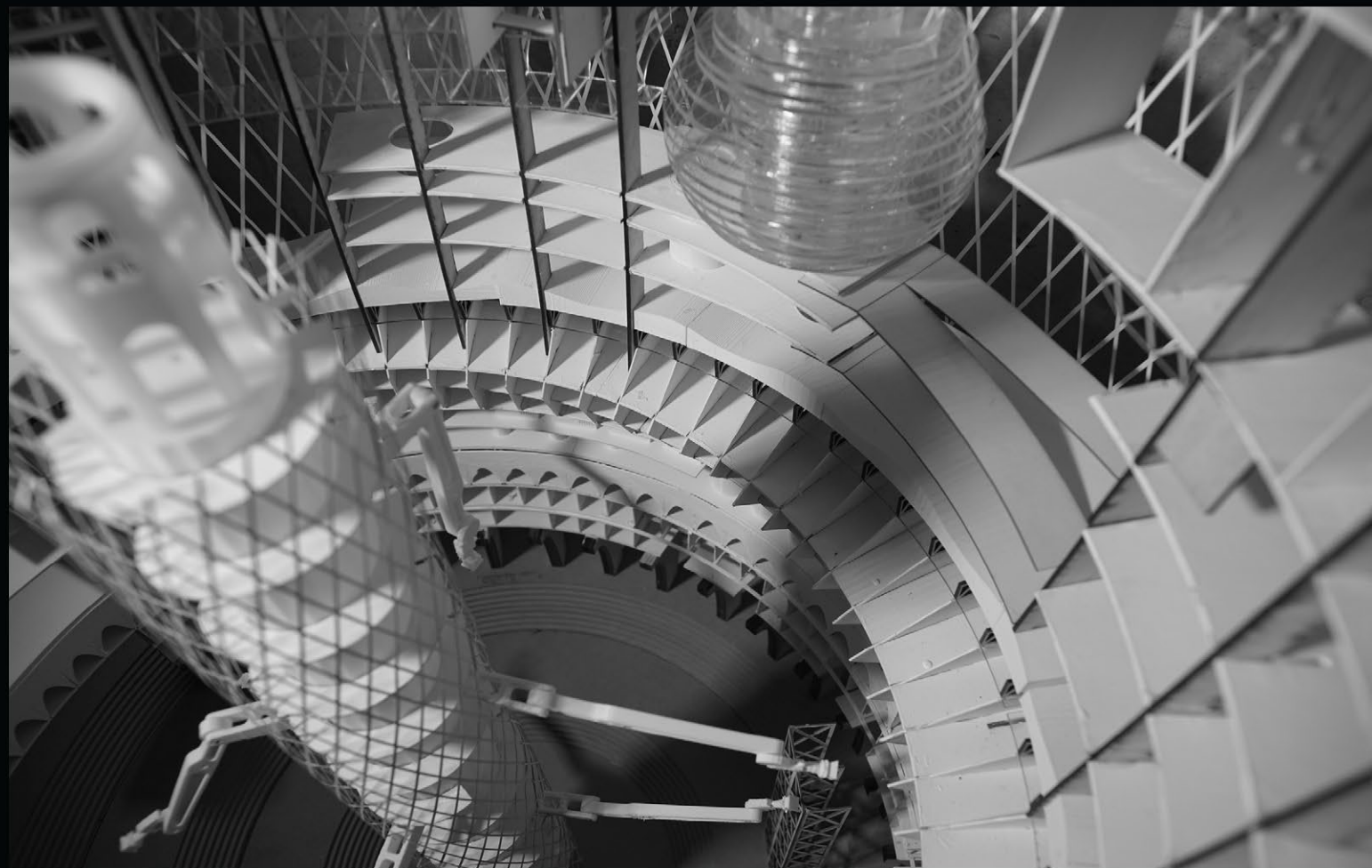
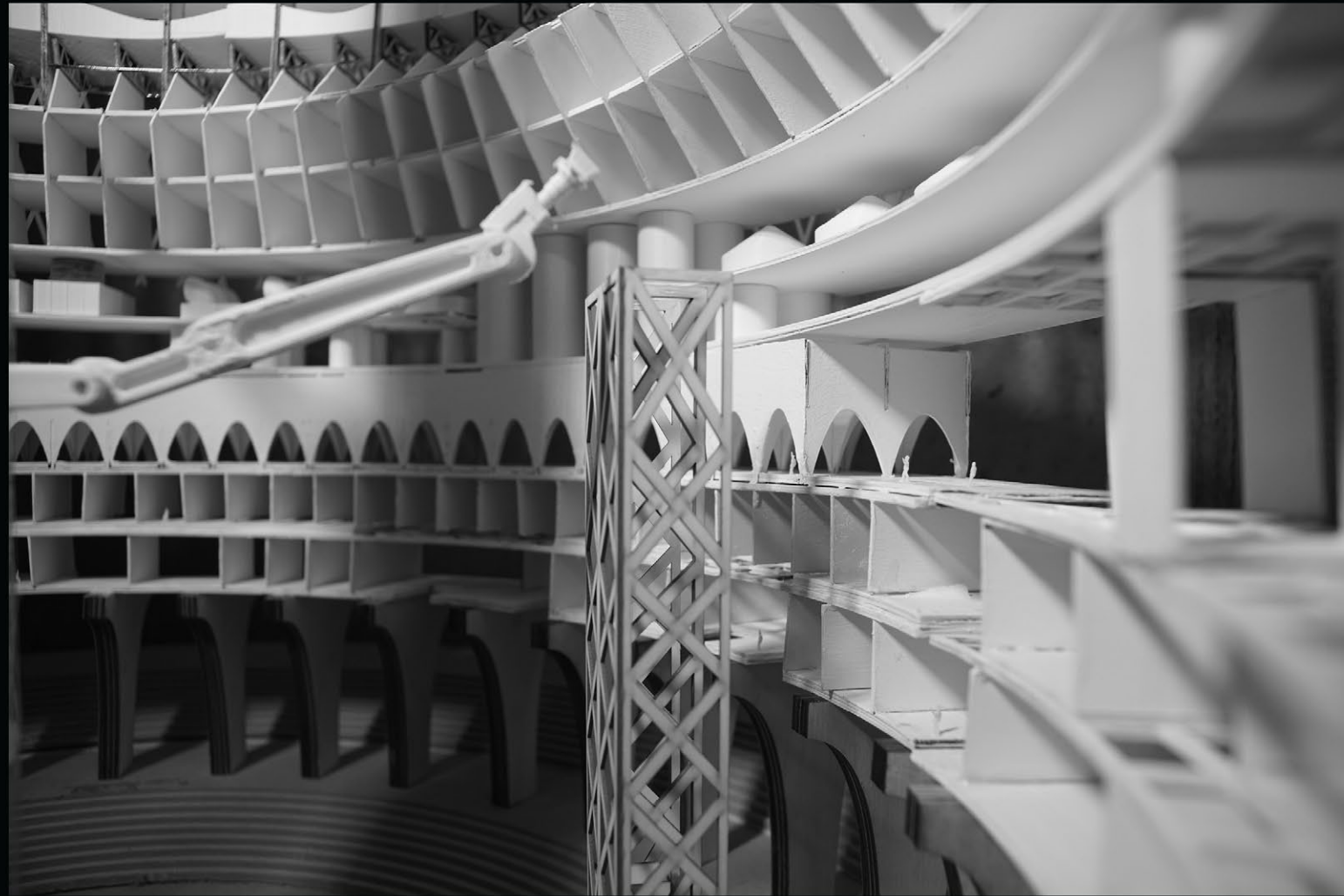
VII. ELEVATION DRAWING



VIII. SECTION DRAWING



IX. PHYSICAL MODEL



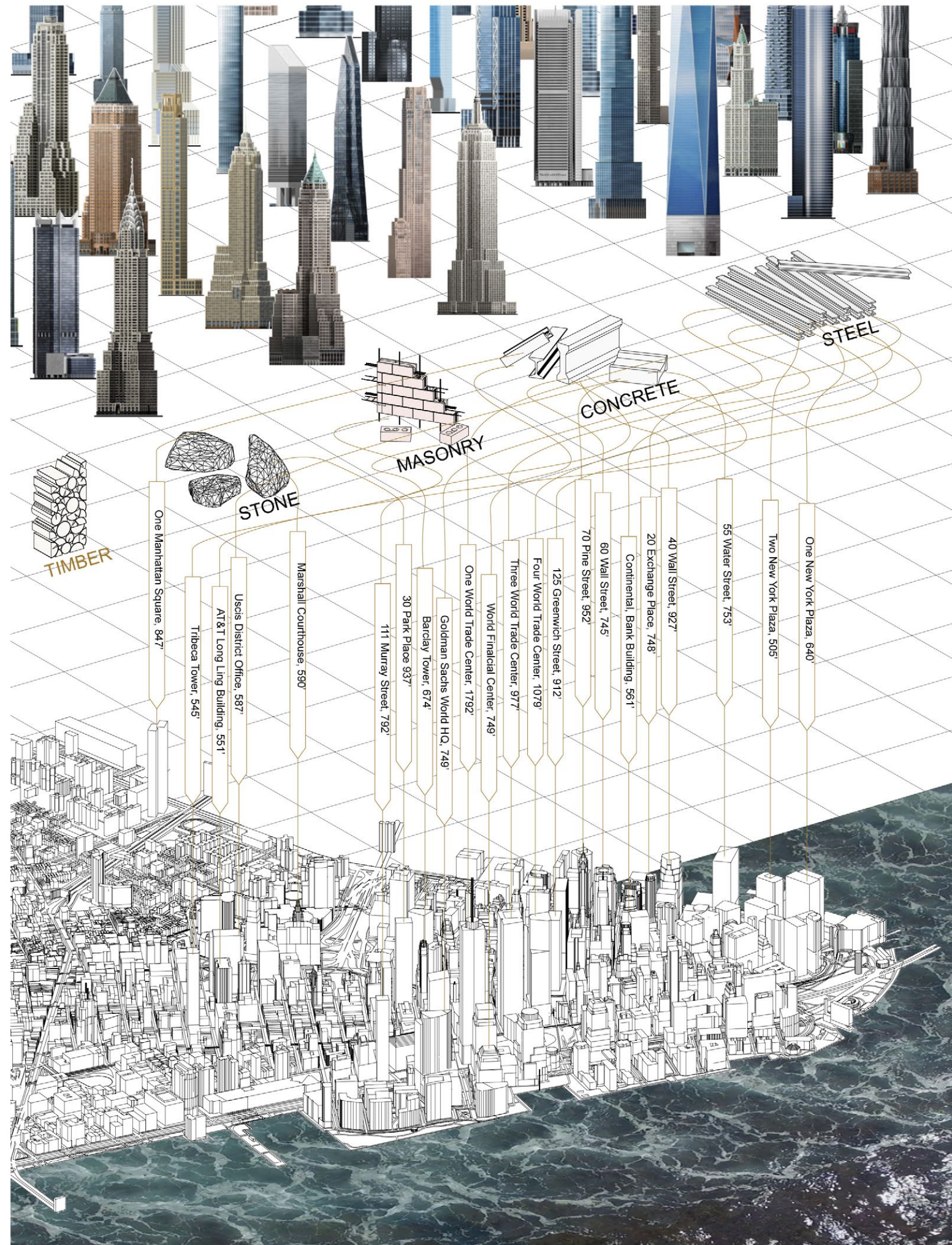
## 05 | THE CONVERGENCE

Location: New York City, NY  
Spring 2017, Studio Project  
Instructor: Calvin F. Lewis  
Iowa State University  
Team: Hansen Sentosa, Zihan Yu

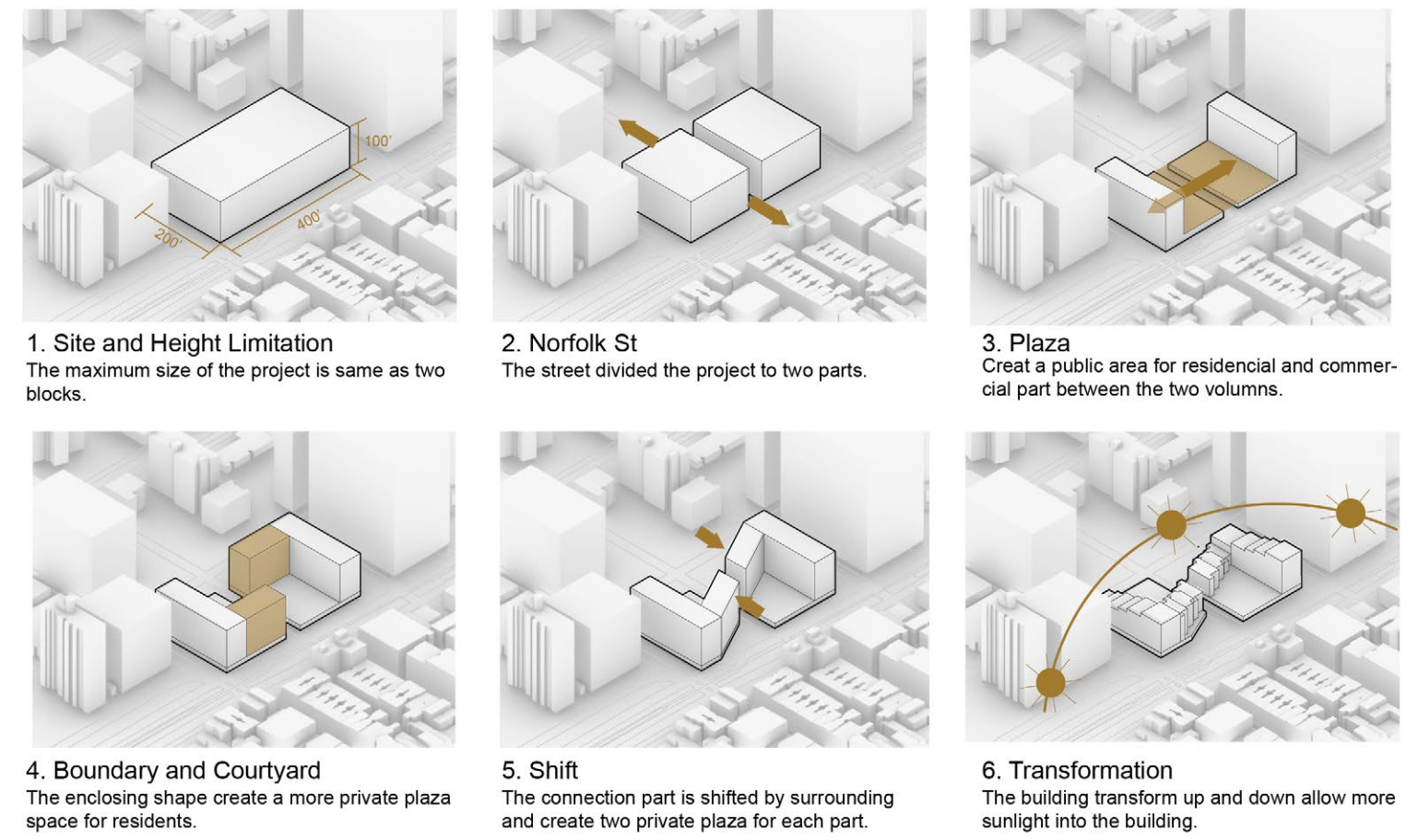
The project challenge us to interpret, invent, and deploy numerous methods of building systems, with a focus on innovations in wood design on a real site. For thousands of years, solid wood has been used as a building material. Modern timber products and systems have greatly expanded the potential uses of this historic material. Timber is an ideal green building material: it is well suited for a broad range of structural and aesthetic applications, it offers economical construction and high performance characteristics; and wood is an economic driver to maintain forests and protect jobs in rural communities.



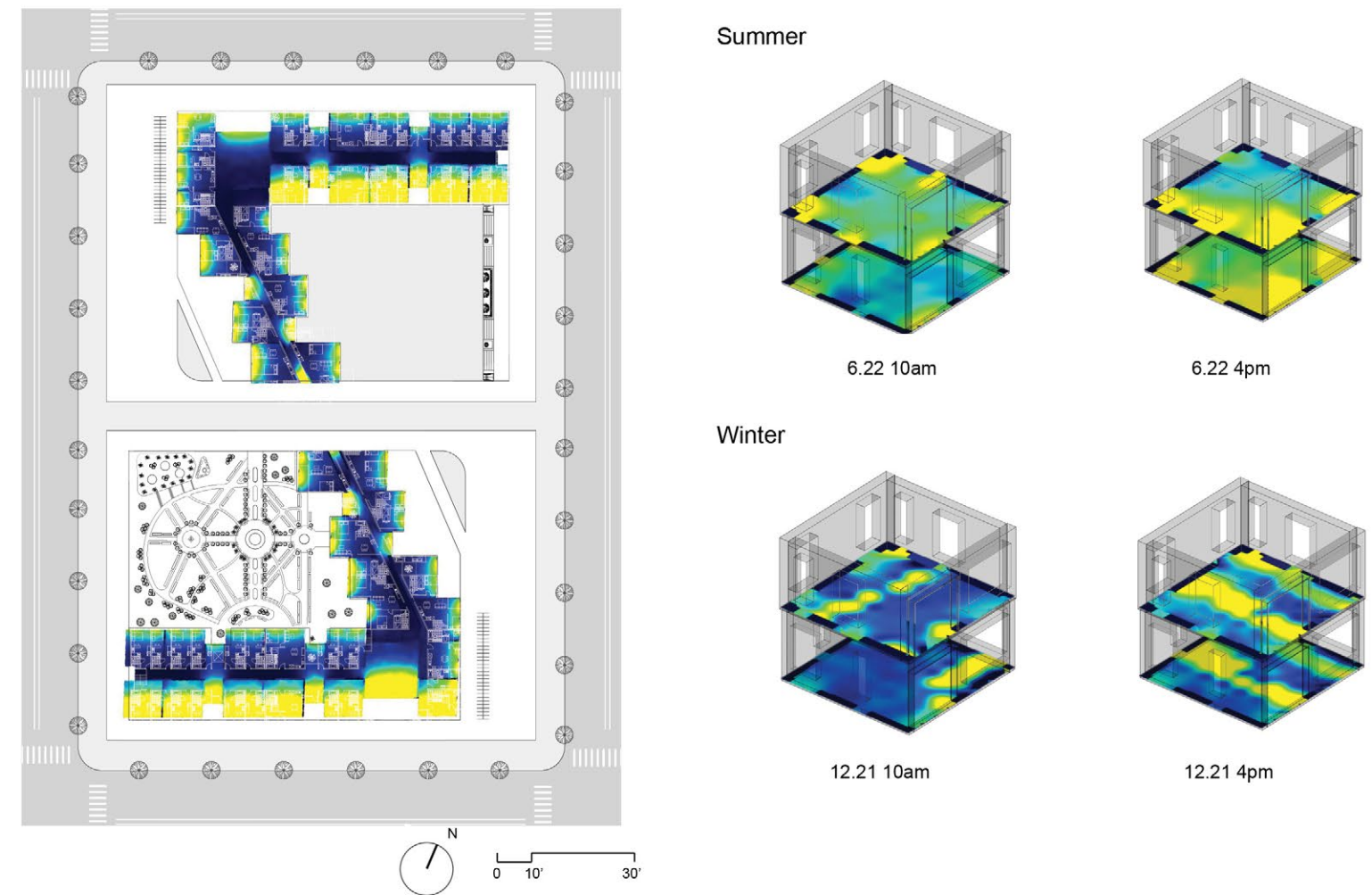
# I. SITE ANALYSIS



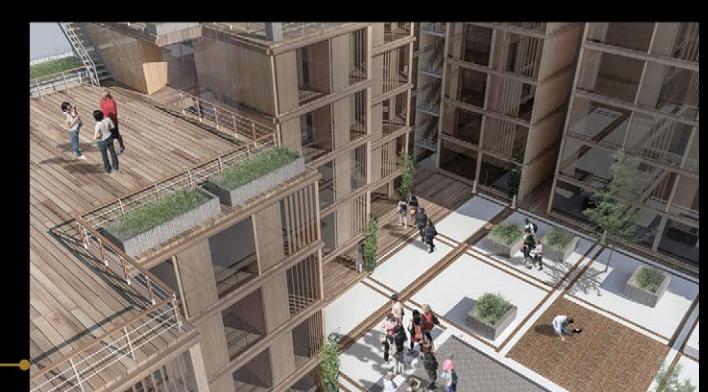
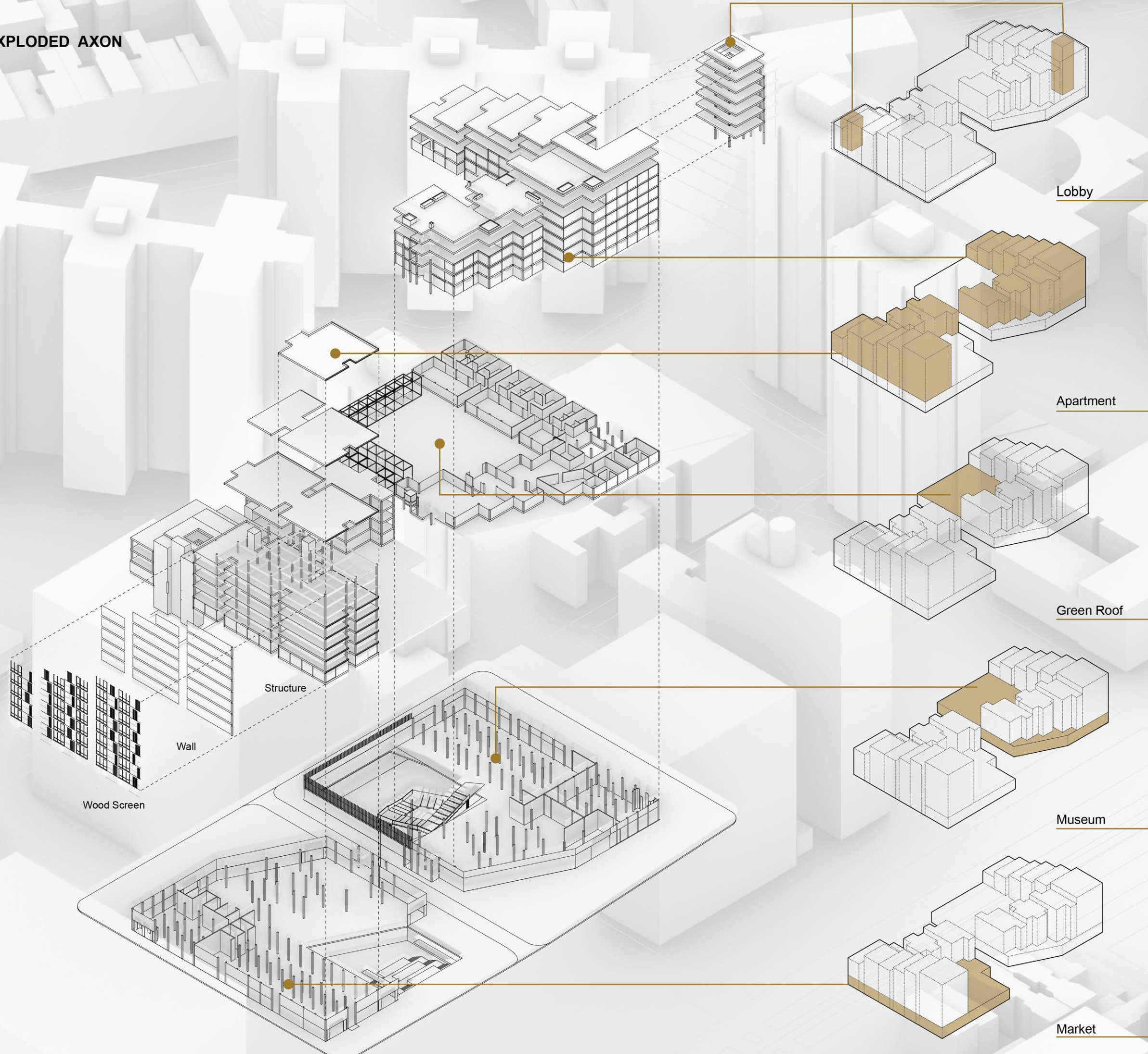
# II. CONCEPT DEVELOPMENT



# III. SIMULATIONS



IV. EXPLODED AXON





## V. PERSPECTIVE SECTION



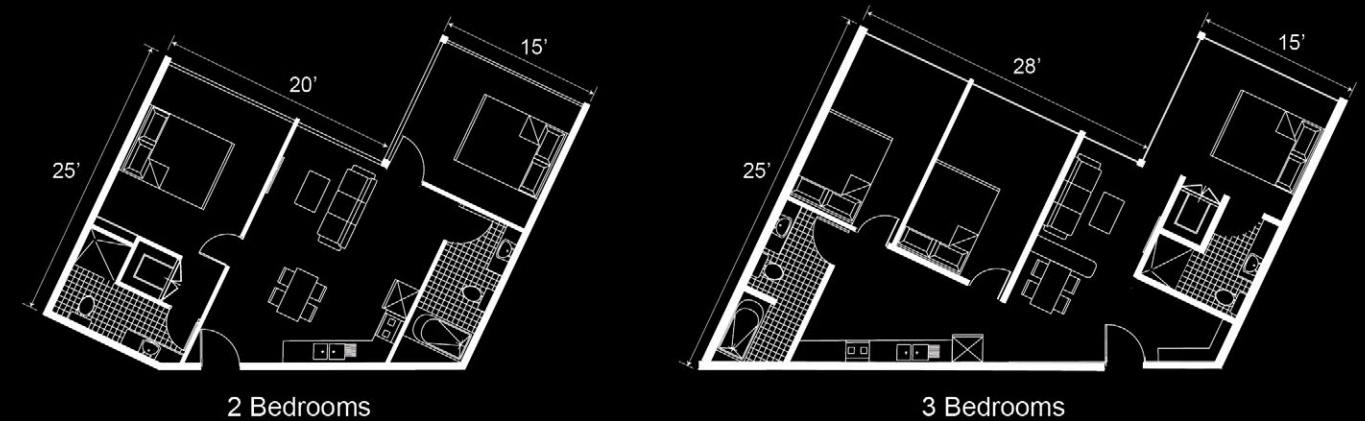
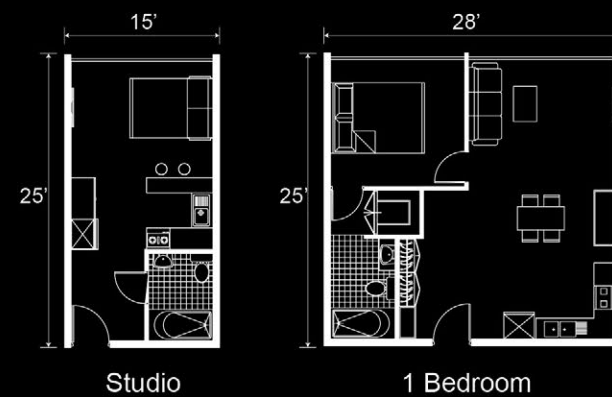
## VI. UNIT FLOORPLAN



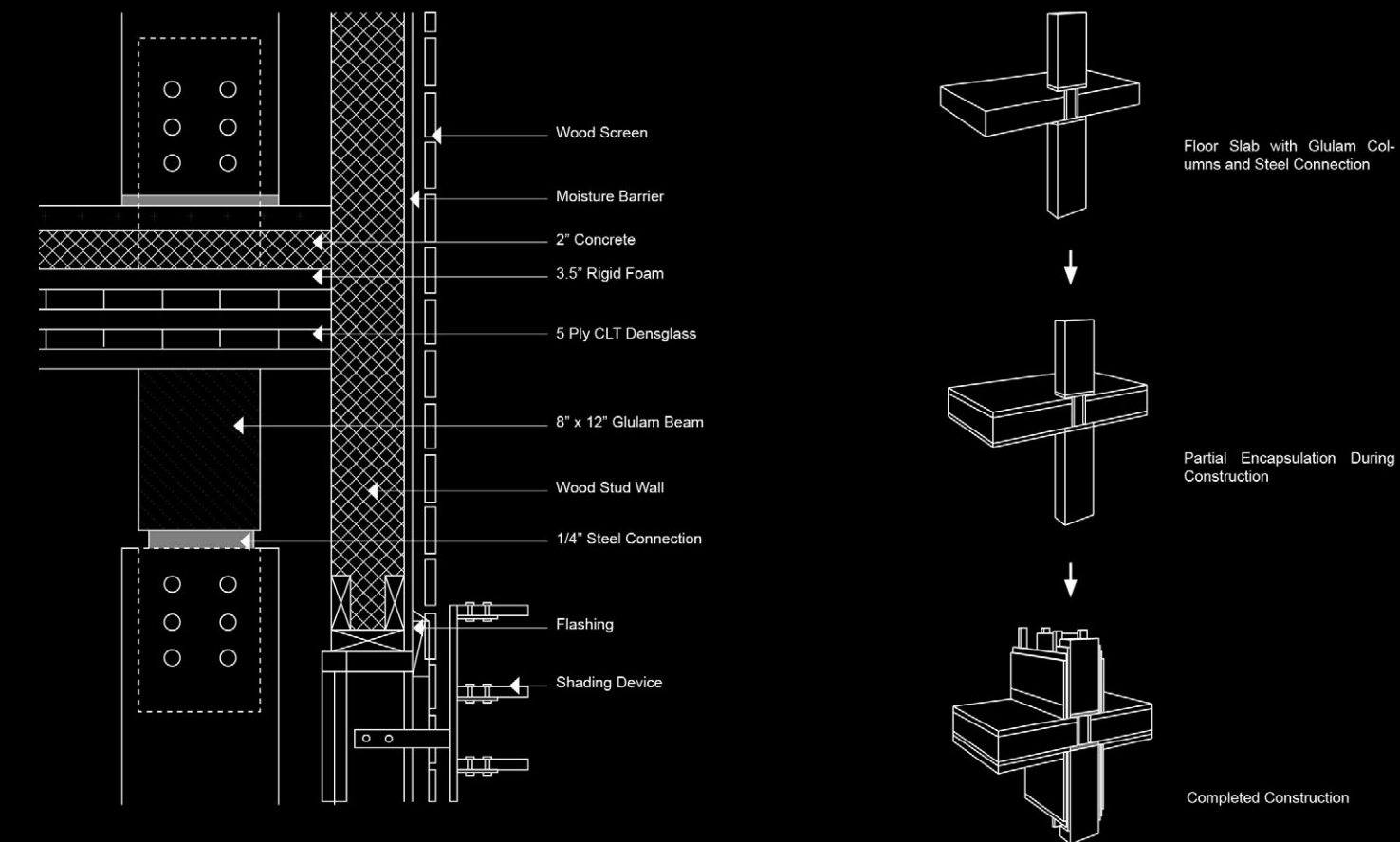
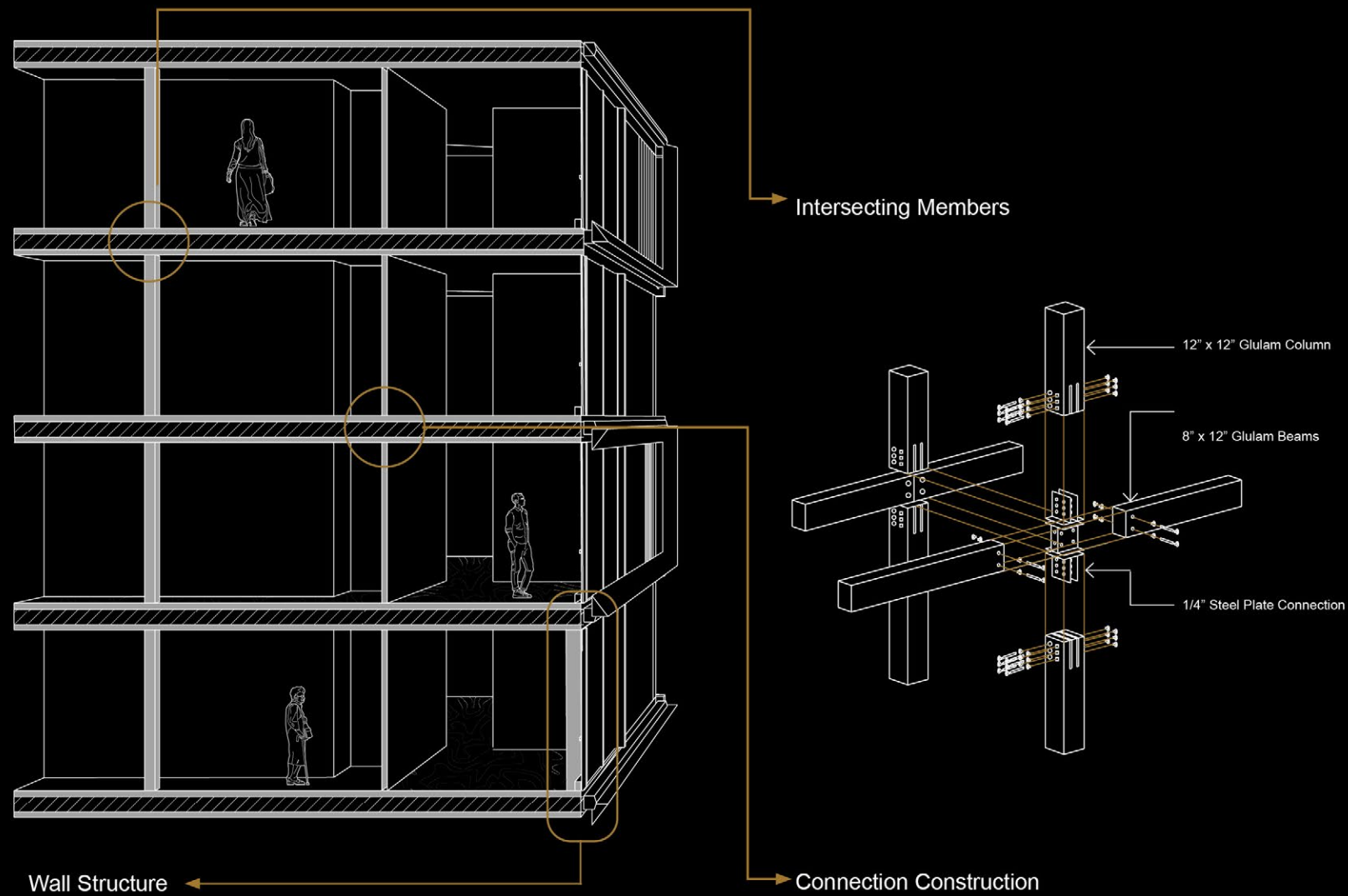
### BREAK UP LONG CORRIDOR

The long corridors are common in apartment buildings. But the closed and narrow space usually could make residents uncomfortable. It is also frustrating to decorate because there is a limited amount of space to work with.

- The first idea is using 6 units as one group, which share a staircase and elevators. The staircase breaks up the long corridors and it also brings sunlights into the closed hallway.
- For the multiple bedroom units, the zigzag shape makes sure every room could have natural light and also breaks up the corridors with green space.



## VII. STRUCTURE DETAILS



## VIII. RENDERINGS

