

Portfolio

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2022 -- 2023

Columbia University GSAPP  
MS. AAD

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2022 Summer

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2022 Fall

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2023 Spring



01

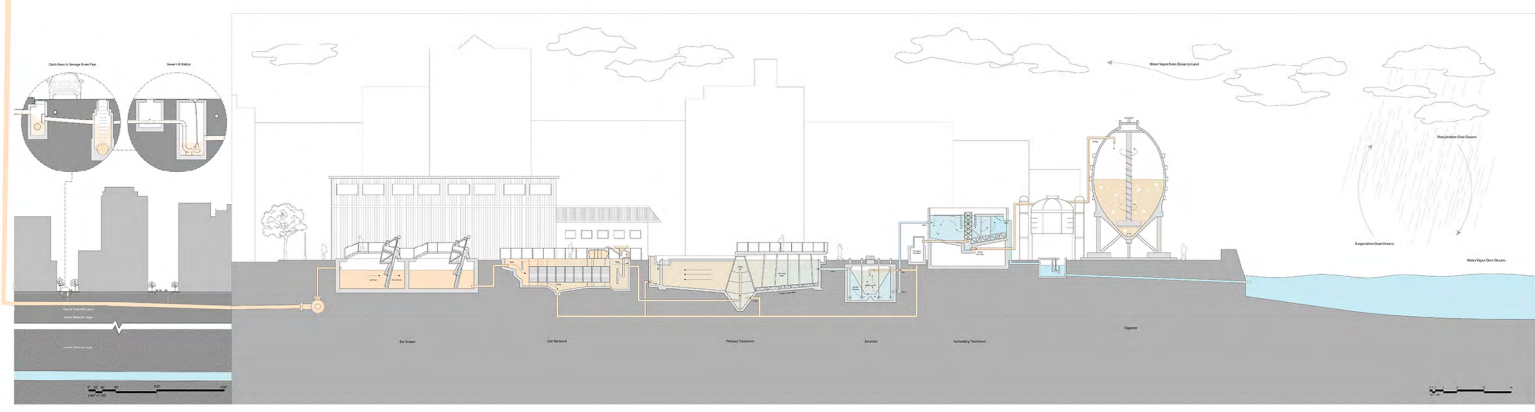
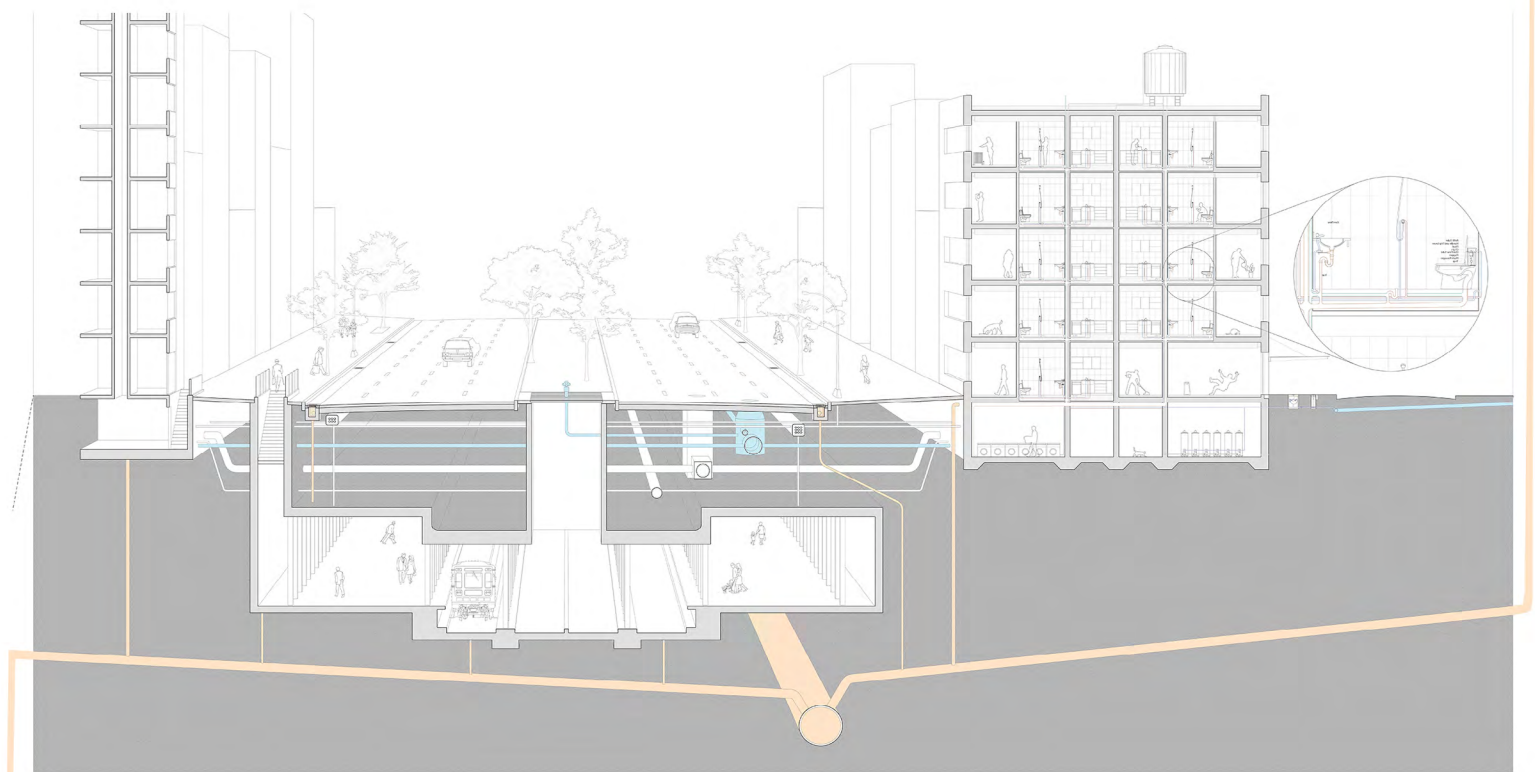
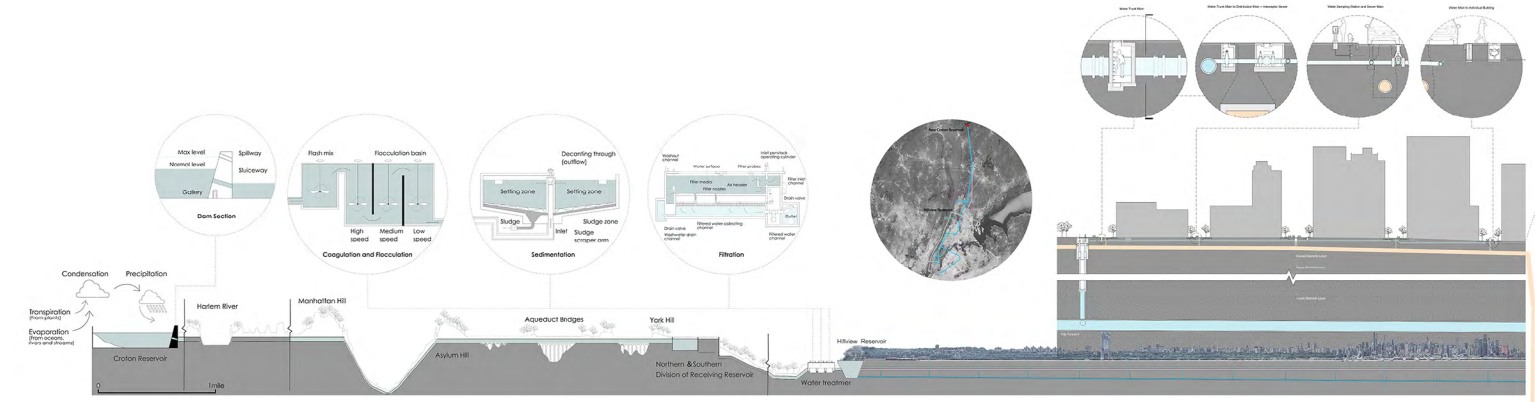
## Rethink Wastewater

*WATER CISTERN APARTMENT  
COMPLEX*

Advanced Design Studio, 2022 Summer  
Columbia University GSAPP  
Instructor: Dan Wood  
Individual Work

Human beings have a long history over the bathroom usage. Visiting the bathroom is so much a part of people's daily routine, it probably doesn't give it much thought. Humans started using communal space to dump waste and separate room to clean their body. Gradually they start to address the privacy and it appeared the preliminary lavatory. The emergence of plumbing and sewage system brings every elements together and all evolve together until today. The project will examine the urban and infrastructural networks that are connected through the septic system. It will look at the history of sewers and sewage and how the public has interacted with them. It explores the design of a sewage treatment facility for the future. A real building that integrates networks, education, social equity, public space and in the creation of a new radically green septic icon for the city.





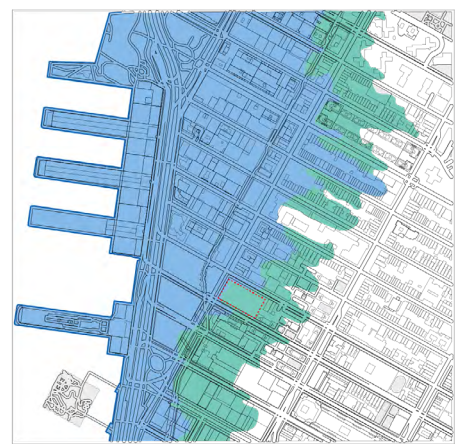
Cadavre Exquisse Septique\_ Analysis of the NYC Water Supply System, All Septic Studio Candidates



**Site\_ West Chelsea, New York**  
 It is a neighborhood on the West Side of the borough of Manhattan in New York City. The area's boundaries are roughly 14th Street to the south, the Hudson River and West Street to the west, and Sixth Avenue to the east, with its northern boundary variously described as near the upper 20s or 34th Street, the next major crosstown street to the north.



Mix-used Block



Flood

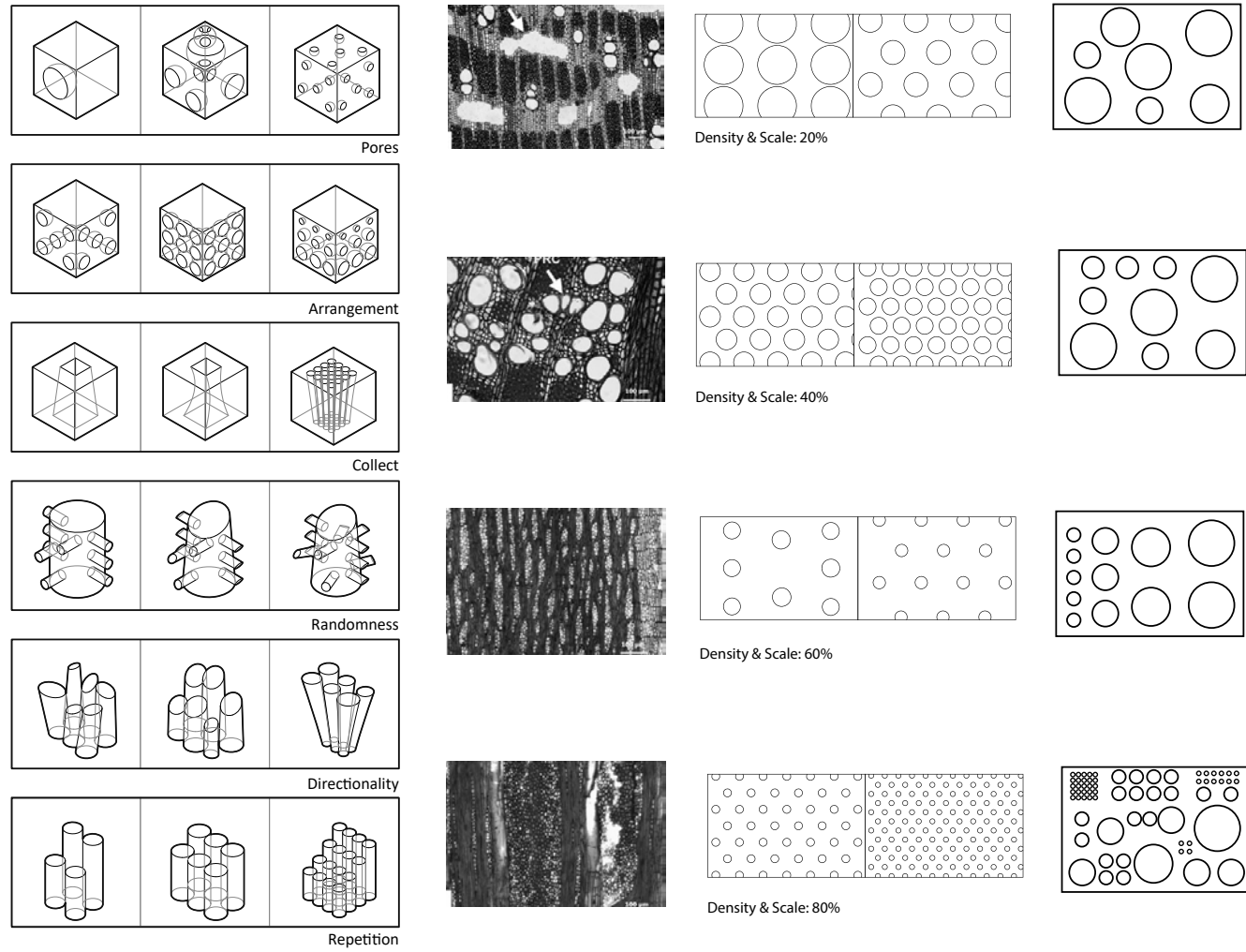


Green Space Park



Art Gallery





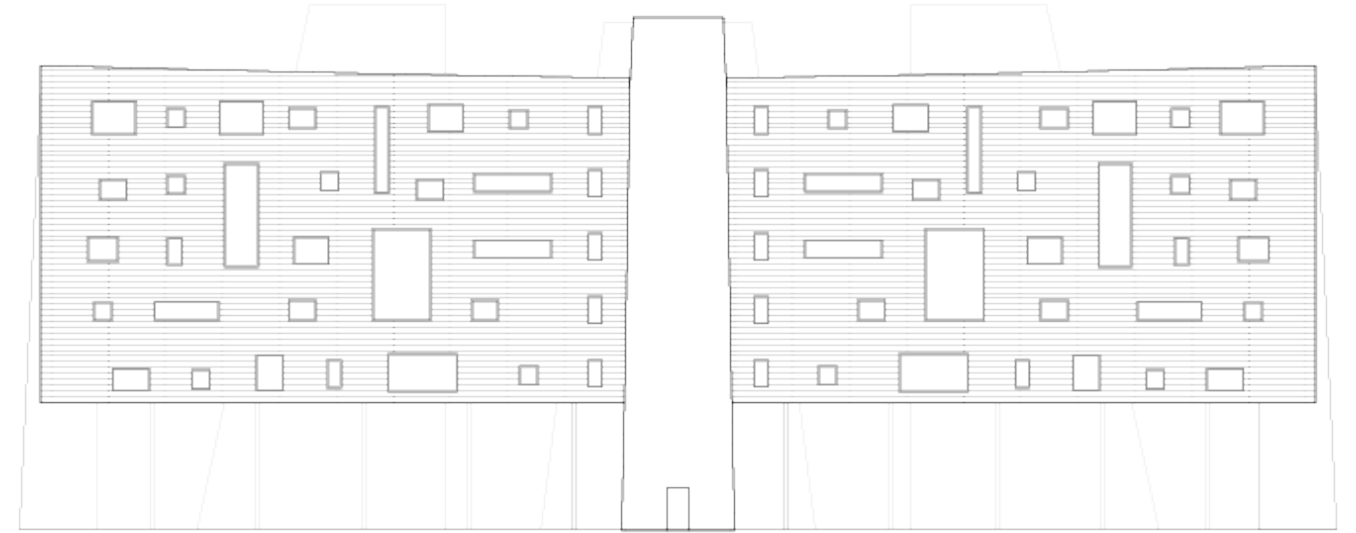
Typology Study Diagram\_ Porosity & Scale



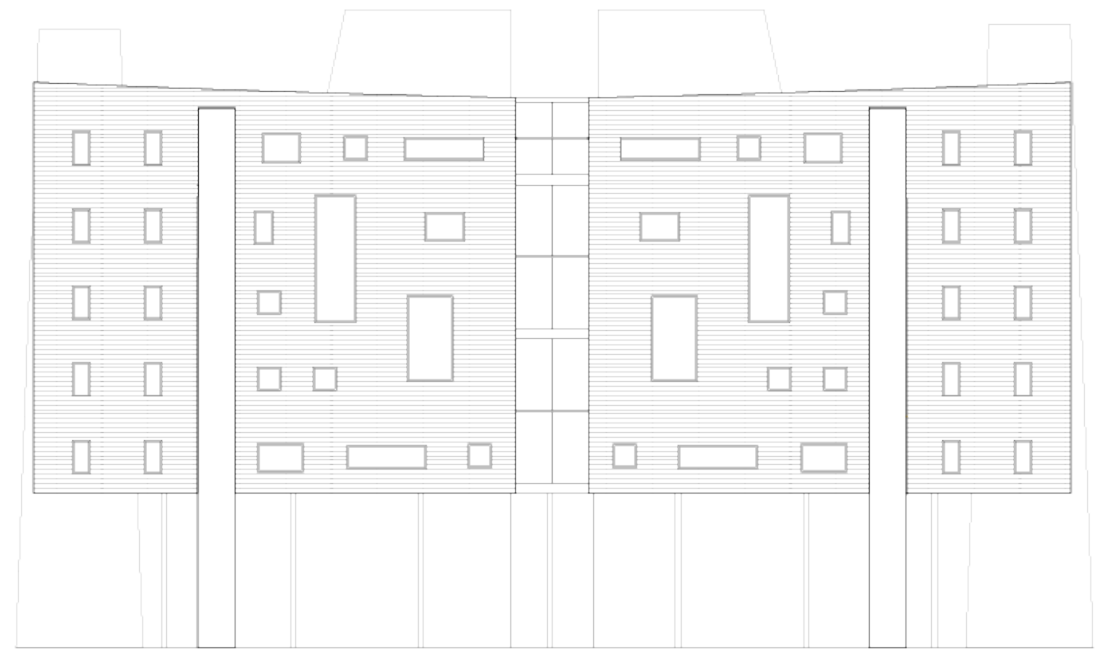
**Scheme**

The project located in the West Chelsea, NY, along with one of the exit point of the high line. Initial form takes inspiration from plant pores and scale of transporting waster, reflecting the mechanism into the architectural scale.

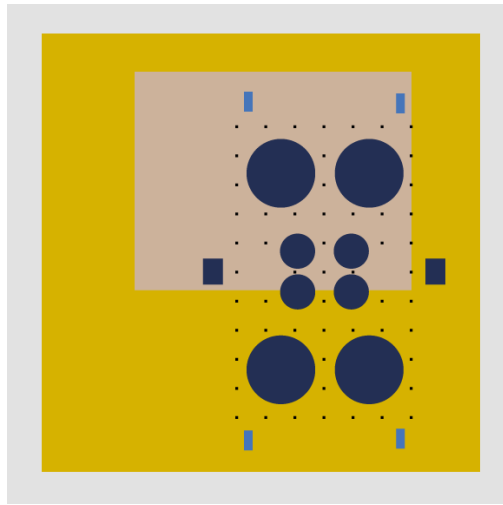
The room and artist workshops are distributed vertically within a set of structural cores creating a unity in housing. The facade is not just an external face for the public. It is a projective frame through which residents can establish connections beyond the limits of their units. This evokes a new definition of community, one that transcends proximity and forges new relationships from within, across, and beyond each unit.



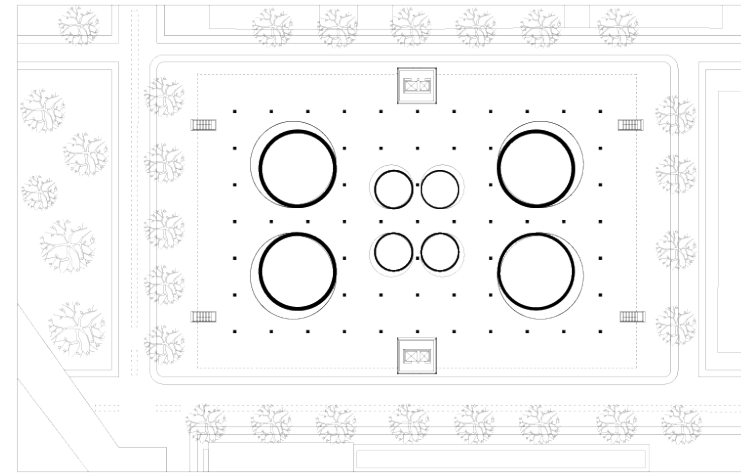
Southeastern Elevation



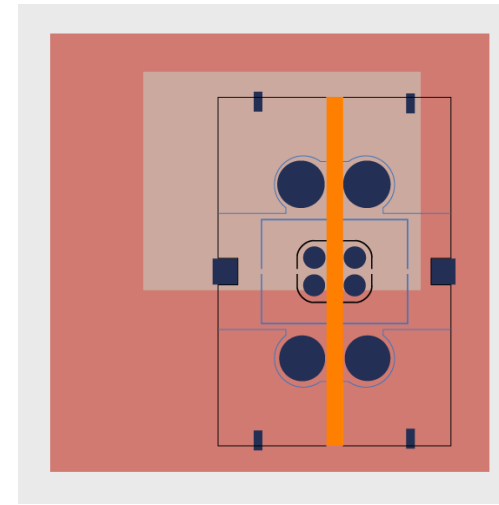
Northeastern Elevation



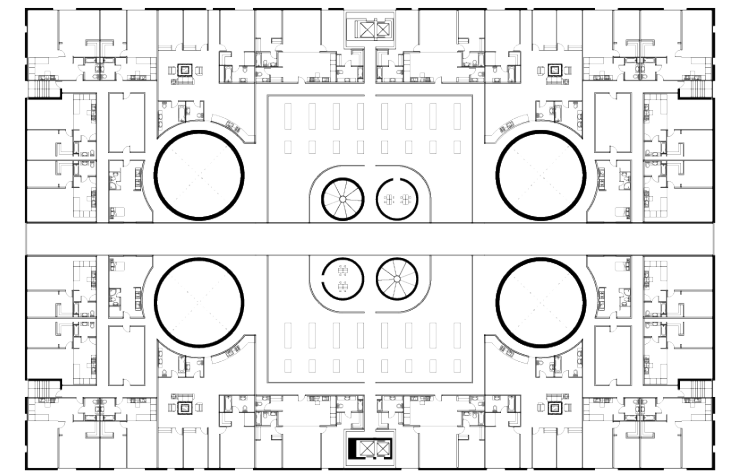
Moment



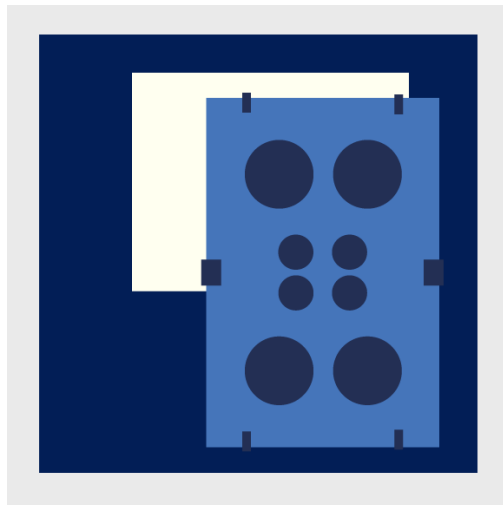
Ground Floor Plan



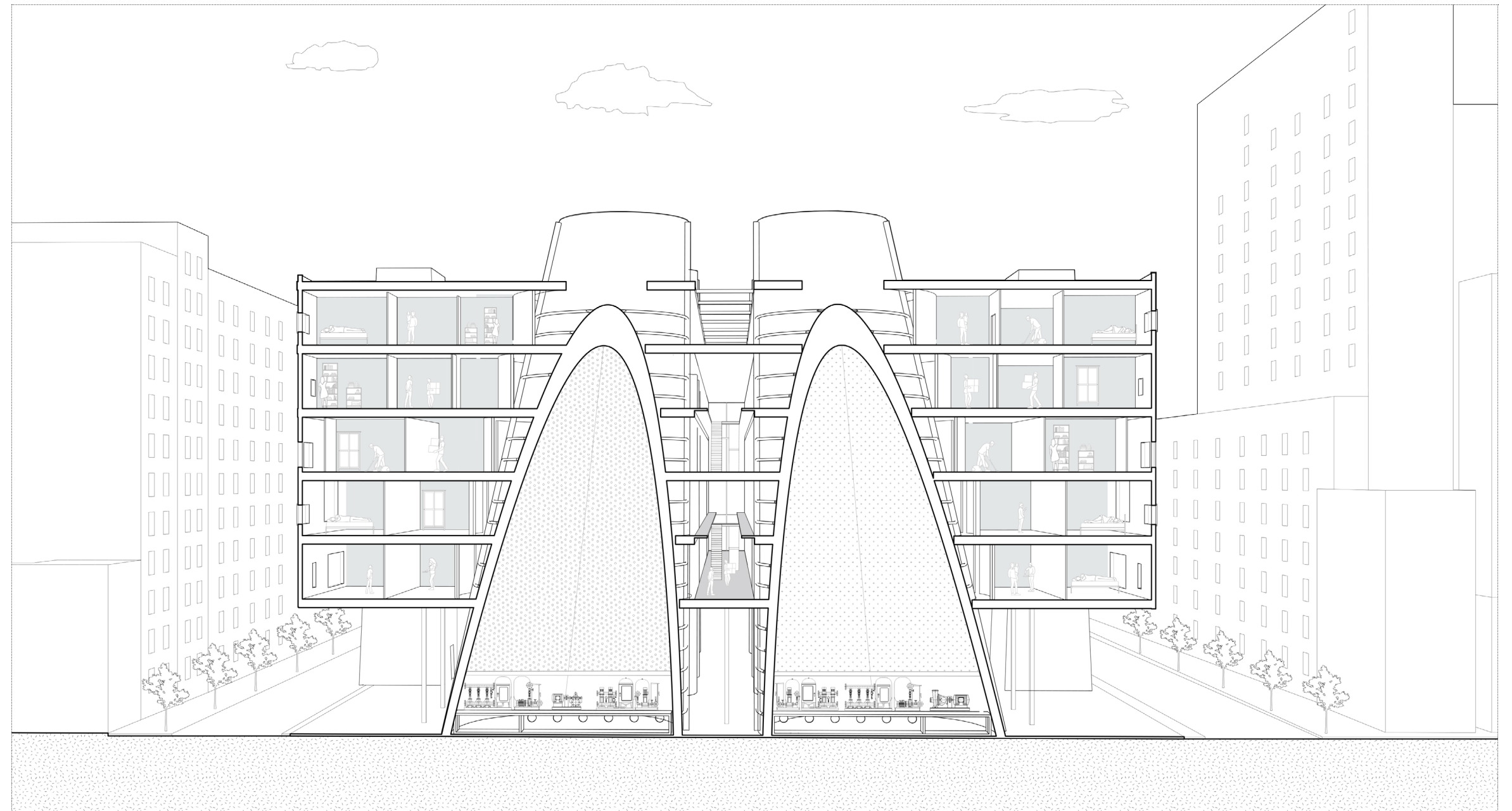
Circulation



Typical Floor Plan (Level 5)



Porosity



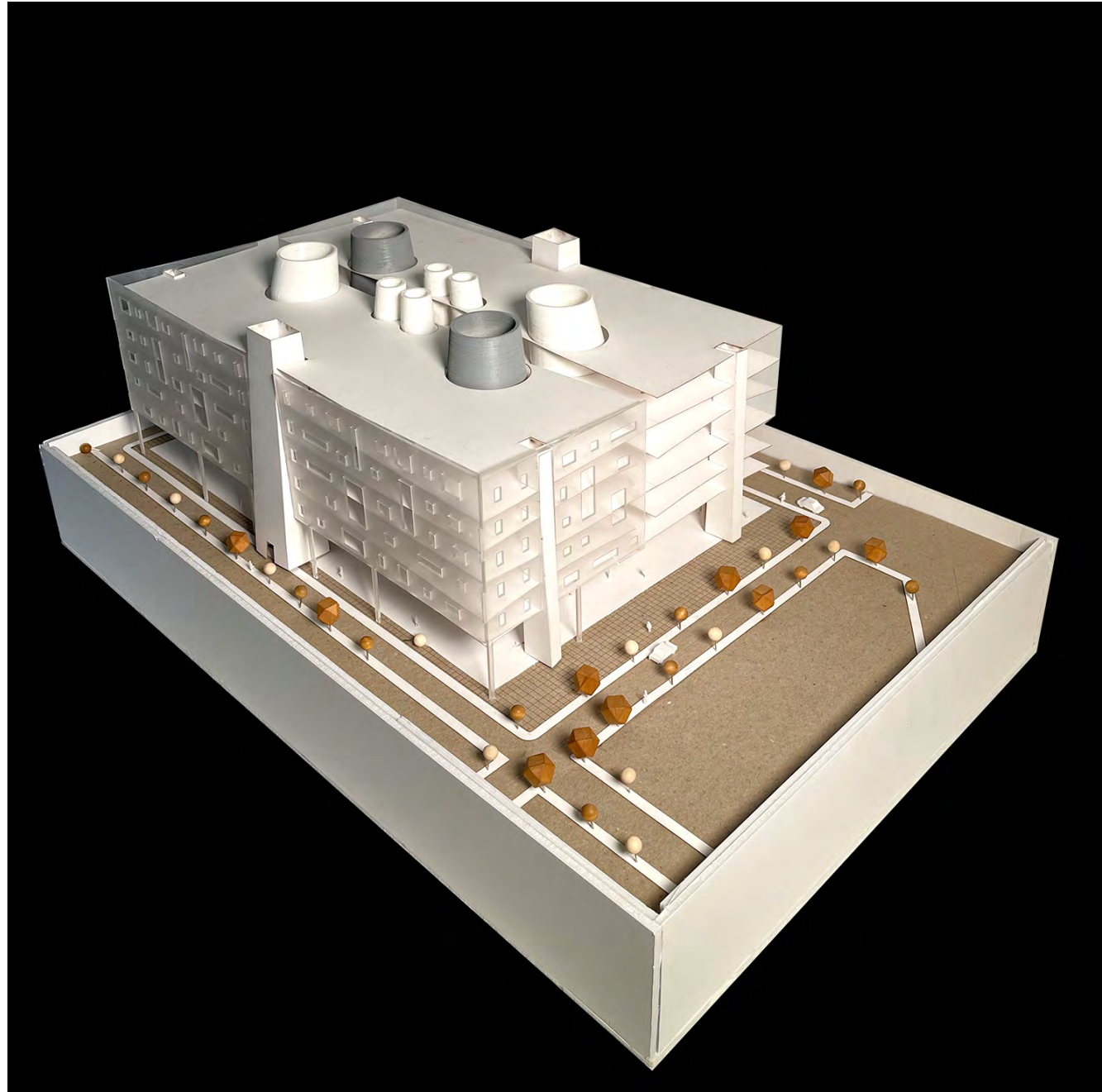
**Planning**

The four water cisterns strikes through the whole plan, with smaller tower connecting to different levels, creating various scale of public space for artist workshop, educated space, and lounges etc. Central passage cut through the building as a communal space, aiming to bring public and residents into the central part and interact with water infrastructures.

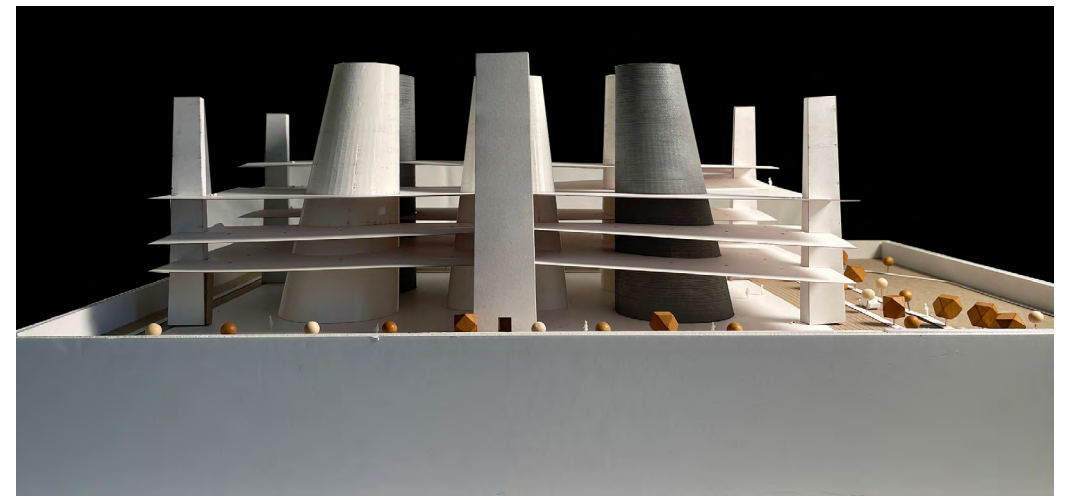
The cisterns are surrounded by irrigation system for growing plants, offering freshness for residents. By collecting all black water and gray water in the building, the apartment combine with neighborhood scaled water infrastructure can be self-sufficient water supply and excessive water can be used for the community.

Section, 1'-0" = 1/16"





Physical Model, 1'-0" = 1/8"



Physical Model, 1'-0" = 1/8"





02

## Dust as Resource

*INTENTIONAL COMMUNITY OF  
NEW LIFESTYLE*

Advanced Design Studio, 2022 Fall  
Columbia University GSAPP  
Instructor: Nahyun Hwang  
Team: Jie Lai, Lalinthip Maholarnkij

In the Plein Air studio, we focus on the atmospheres to matter, the no form of natural matter - Dust. Dust is made of fine particles of solid matter. It is such a general part of everyday life that people need to concentrate to notice it. Dust is always pervasive, it can easily accumulate at a fast speed and eventually become a dust storm as a natural sublime. It emerges with sudden disasters or massive ecological changes. We would like to propose a community which embraces the dust as a new lifestyle, forcing it to coexist with the imagery and matter of dust and pollution. It forms as an intentional community with an alternative lifestyle that's built upon the notion of embracing and experiencing the sublimity of the dust that coexists with future living conditions.



**Air**  
/er/

-the invisible gaseous substance surrounding the earth, a mixture mainly of oxygen and nitrogen.  
-an impression of a quality or manner given by someone or something.

**Atmosphere**  
/'atmɒs'fɪr/

-the envelope of gases surrounding the earth or another planet.  
-the pervading tone or mood of a place, situation, or work of art.

**Dust**  
/'dɒst/

-fine, dry powder consisting of tiny particles of earth or waste matter lying on the ground or on surfaces or carried in the air.  
-an act of dusting.

**Dust Bowl\_ Dust Storm\_ Human**

From 1930 to 39', the so-called Dust Bowl swept the American Plains, concurring with the Great Depression, the Dust Bowl forced 60% of the people in the western US to emigrate. In 1950, the great leap forward in China led to severe dust storms and the second greatest famine in the world. Dust not only transformed into an environmental disaster, it became associated with the failures to coordinate the modern development of architecture, land and settlement. It appears as a vengeful force of mismanagement of humans.

**1918**  
The 1918 influenza pandemic was a global event that caused an estimated 20-40 million deaths worldwide. It is often referred to as the "Spanish Flu".

**1921 Dust Bowl**  
Dust storms hit the "Millionaire" and "Billionaire" farms, dust from the westward and westward migration.

**May 11, 1933**  
The 1933 Chicago fire was a catastrophic event that destroyed much of the city's downtown area, including the Hull-Healy department store.

**June 16, 1934**  
Blackburn signs the Taylor Grazing Act, which gives the US Forest Service authority to regulate grazing on public lands.

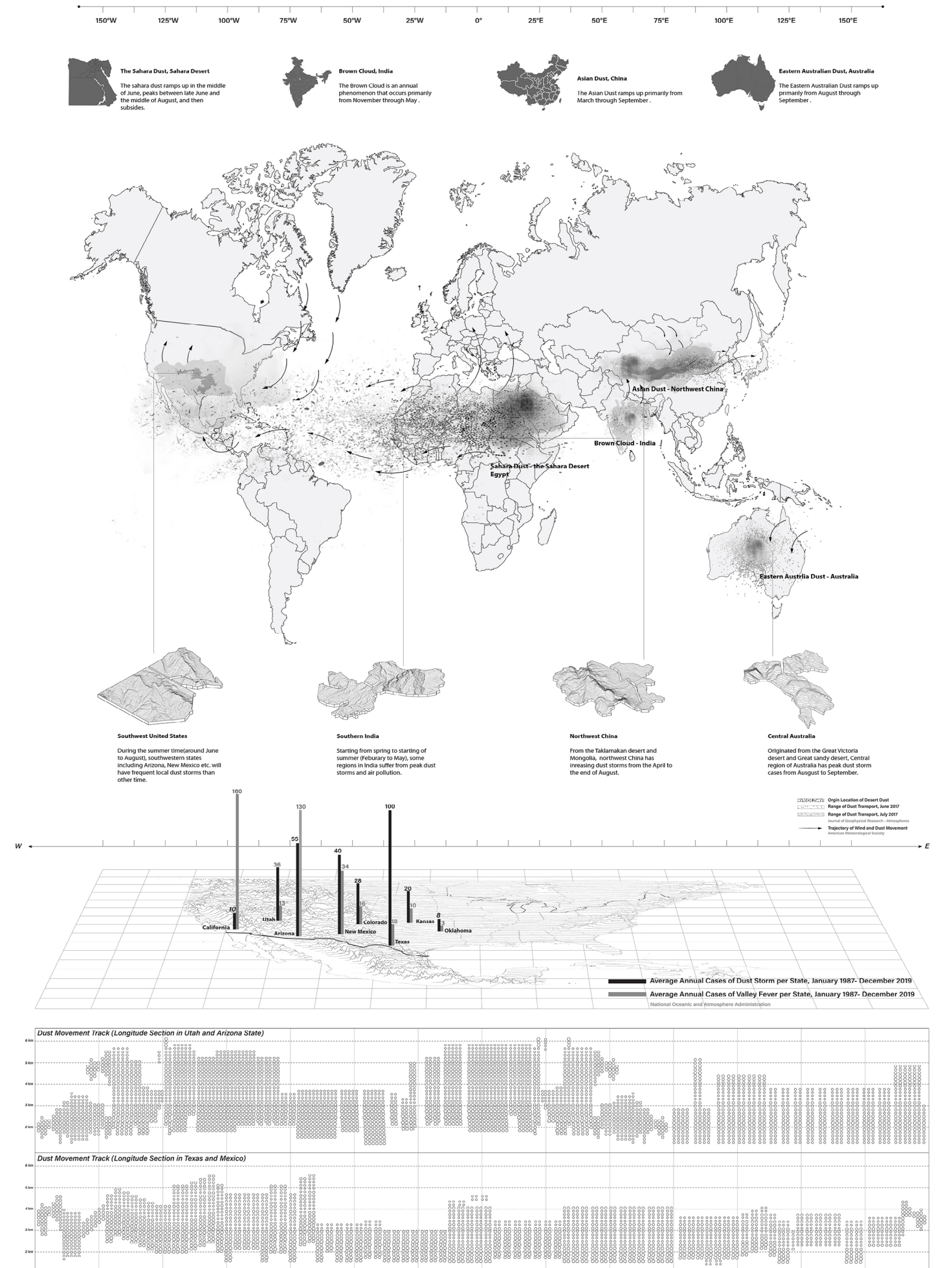
**1938 大跃进**  
Great Leap Forward  
The Great Leap Forward was an economic and social campaign in China from 1958 to 1962, which resulted in the deaths of tens of millions of people.

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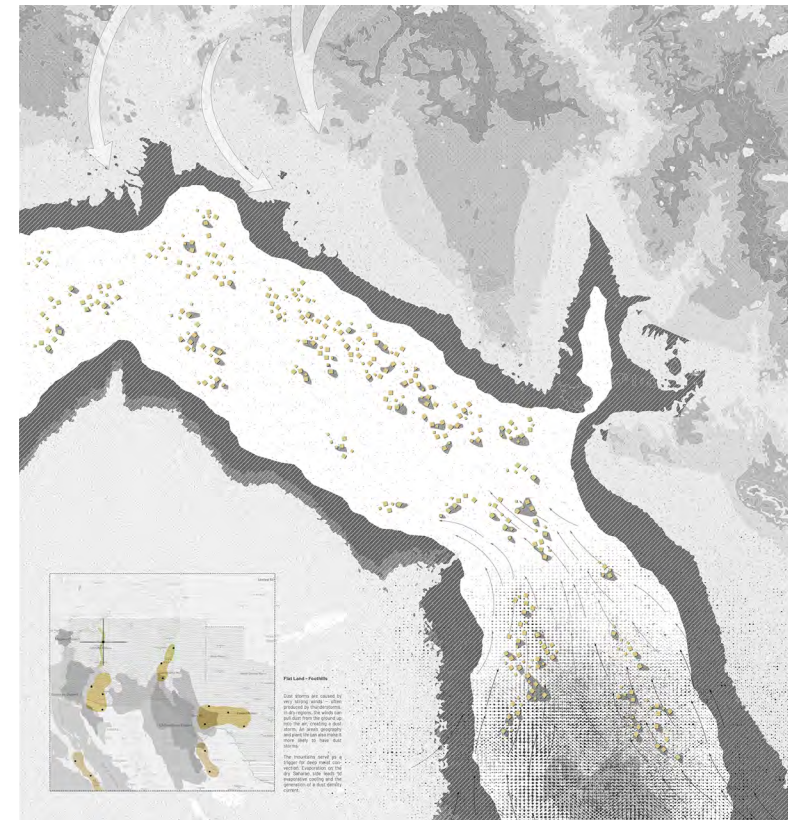
**November 15, 1937**  
The Great Black Blot Dust Storm of 1937 was a severe dust storm that hit the Southern Plains, including Oklahoma, New Mexico, and Texas.

**2006 Current, Atmospheric Brown Cloud**  
The 2006 Current, Atmospheric Brown Cloud is a layer of air pollution that is visible from space, covering the entire globe.

**2007 Current, Asian Dust**  
The 2007 Current, Asian Dust is a phenomenon that occurs primarily from November through May, originating from the Taklamakan desert and Mongolia.







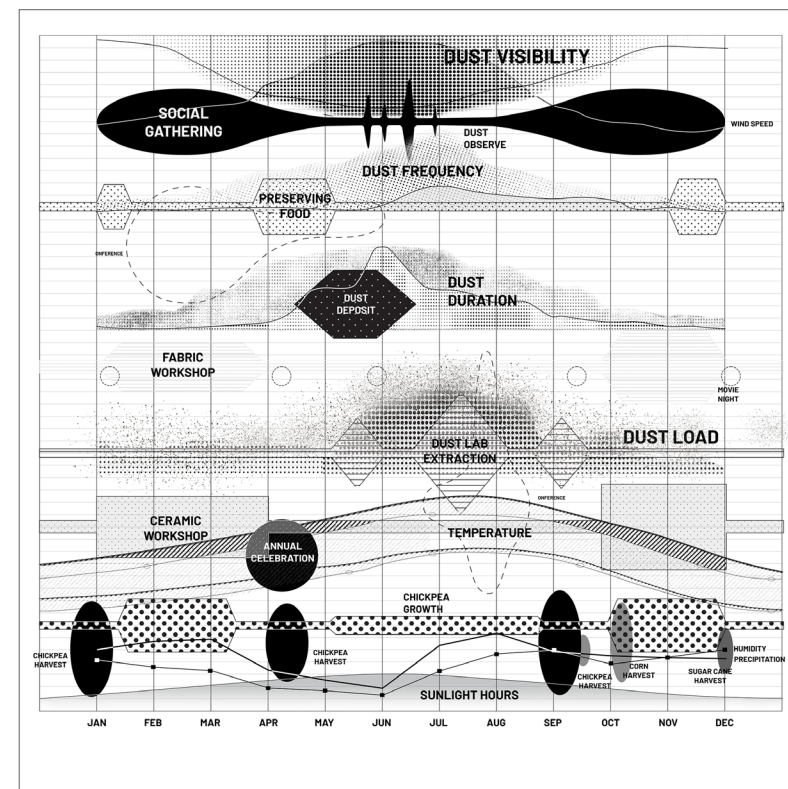
Site Plan, 1'-0"=1/128"

### Embracing Dust

We would like to propose a community which embraces the dust as a new lifestyle, forcing it to coexist with the imagery and matter of dust and pollution.

Based on the research of dust storm frequency, we map out several potential areas and choose one of them with most frequent dust storm cases located near Yuma, Arizona, which is at the edge of the U.S. - Mexico border.

Within the next 50 years, researchers find that drought and expanded cropland are driving more frequent dust storms near the site. As much as we try to control it, dust pervades and invades us stronger and stronger. It goes trans-border and carries all the matters globally such as toxin from the Sahara desert or pollutants hidden in the soil in Mexico, caused by the extreme mining process under the developers from China, U.S. and Canada.



Monthly Calendar Diagram

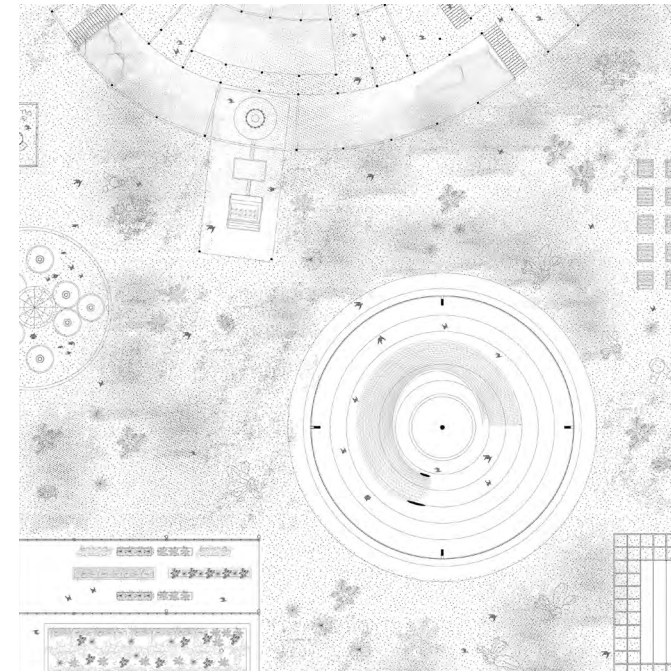
### New Lifestyle

In response to this new lifestyle, we consider a new time schedule in a yearly manner with comparison of natural conditions in the next 50 years. In this diagram, we organize different events in the calendar, showing how the estimated time span of the dust storm season affected people's daily lives. Like crop harvesting, the duration of dust ceramic and fabric manufacturing, social gathering and ritual events, and various activities in the community. It forms as an intentional community with an alternative lifestyle that's built upon the notion of embracing and experiencing the sublimity of the dust that coexists with future living conditions.





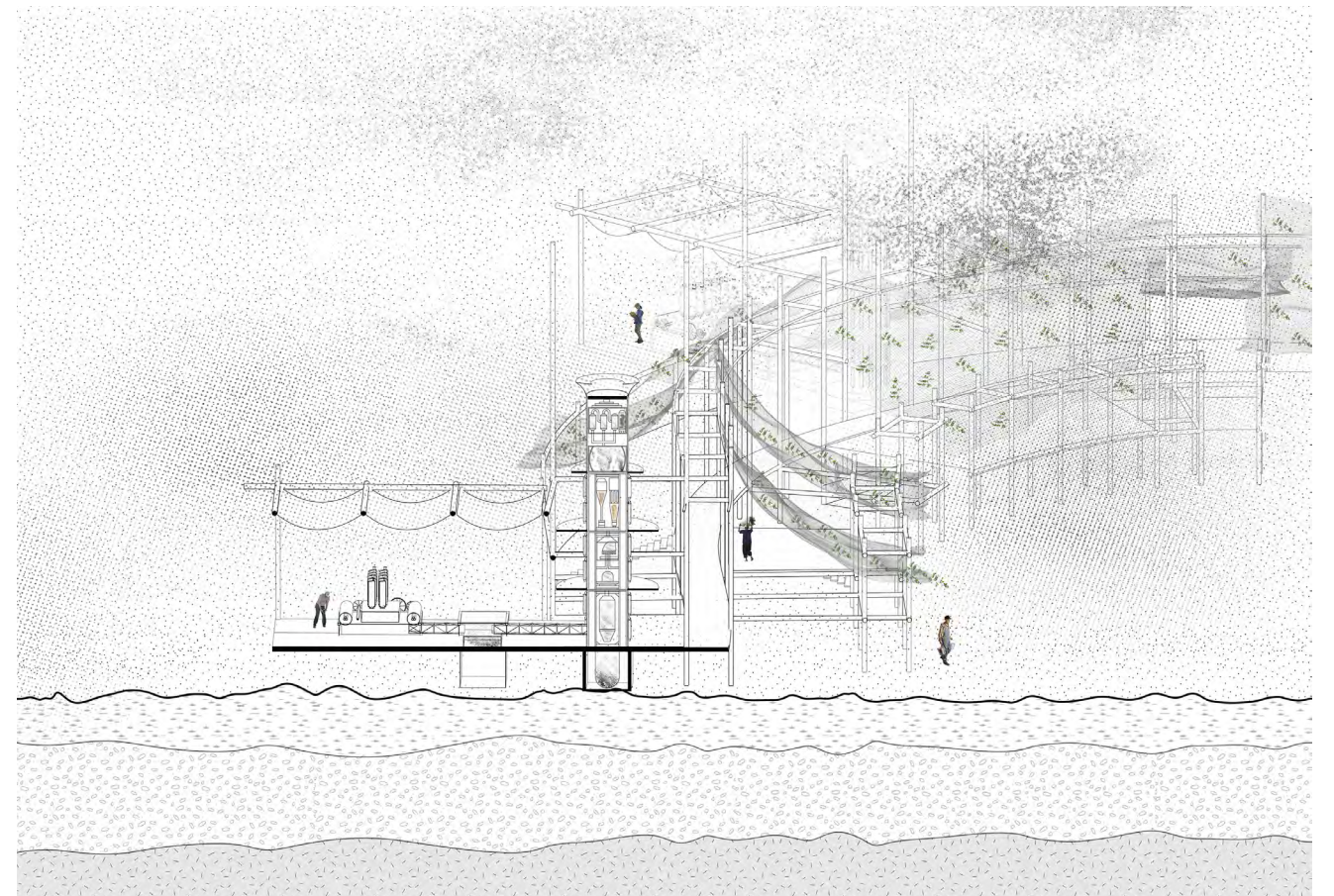
Physical Model, Concept of Dust



Plan, 1'-0"=3/16"

**Capture Dust**

To capture the dust, we use the net system to accumulate the dust during storms, in the second layer, we can grow plants like chickpeas or wheat, which can capture dust and trap the nutrient in it to grow themselves. People can extract the dust on the net through the electrostatic machine and it goes through the integrated device tower. It filters and extracts the different dust particles in different layers, stores them in the container for people to collect and transform as a raw material used in the workshop.



Dust Factory Section, 1'-0"=1/8"





Programs Master Plan

**Planning**

-The overall strategy of the programs is based on the amount of dust that touches the building surfaces corresponding to their functions. Dust storms usually move from west to east, where we plan to place the dust factory at the front to capture more dust.

-The Dust Tower combines with the weather balloon device to detect the incoming storm in 60 km, which offers a space for people to view the extreme pleasure of natural sublime.

- Considering the rising temperature, water shortage and severe global toxic air are threatening the future living conditions for plants and animals. The 'Nature Reserve' which the exterior is covered with the glass fiber membrane that can filter the toxin in the dust storm, will house endangered plants and provide shelters for the animals.

- For residential, we realize that the local residents in Yuma struggle with poor housing conditions in RV parks or movable houses, which are easily destroyed by the storm. Accordingly, The community aims to create collective living spaces where people can enjoy living, working, and be able to grow as a self-sufficient community. The residential combine with dust ceramic workshops and communal kitchens, which share the kiln platform as a common space while the energy will be generated by the solar panels and portable wind turbines.



View of Inside the Dust Storm





View of the 'Nature Reserve'



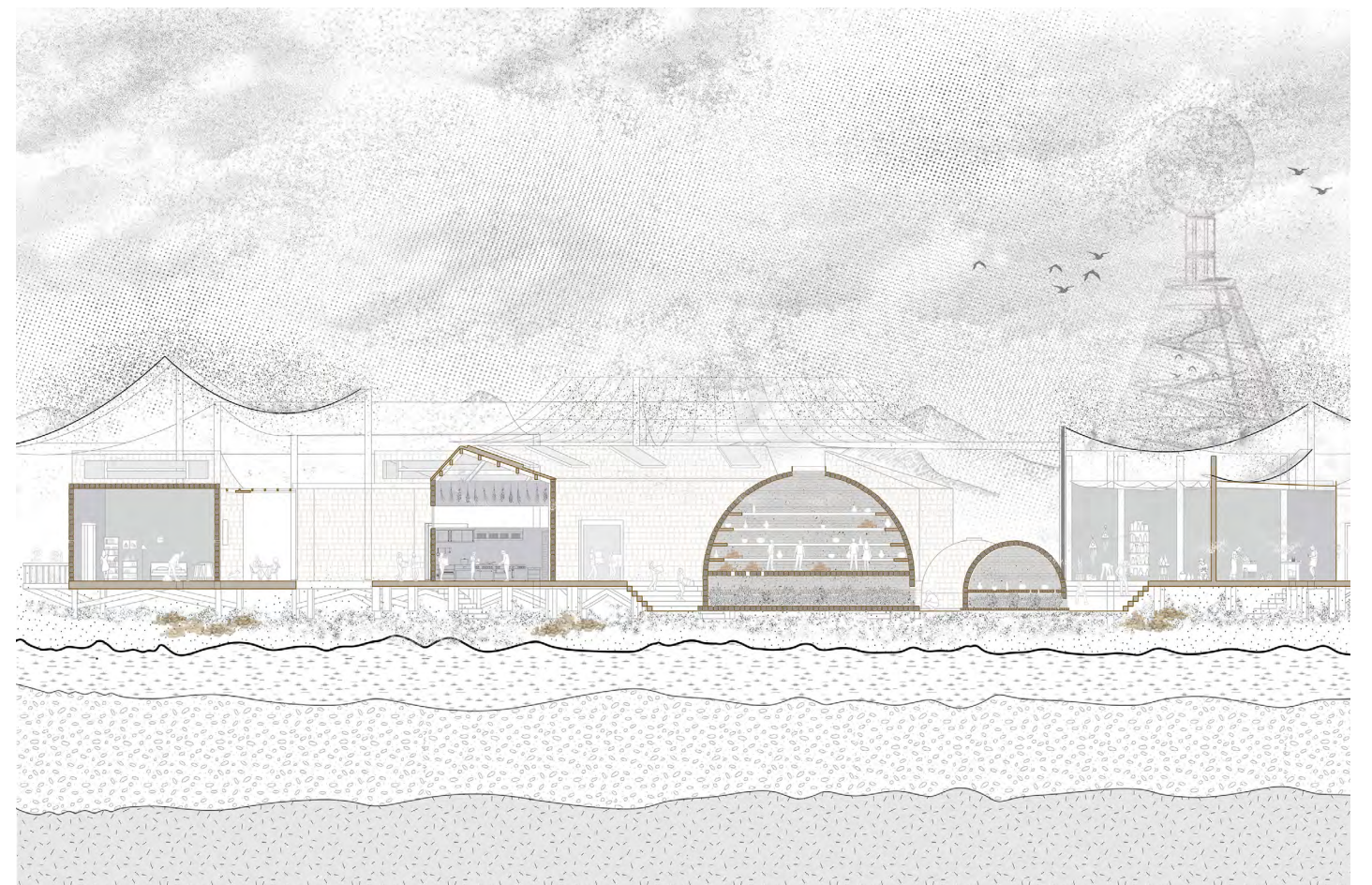
Living Working Social Space

**Collective**

Above instances show the dust as a force of nature, the result of landscape transformed by the disaster. Under the context of modernity, we take the dust as a social form to create a more active, more alive collective space. We aim to provide a social ground of living, working and dining together but also have a certain level of privacy. The central kiln will take the corn stalks as fuel to produce ceramic. Along the workstation, people take the raw material from the dust particles to craft artifacts.

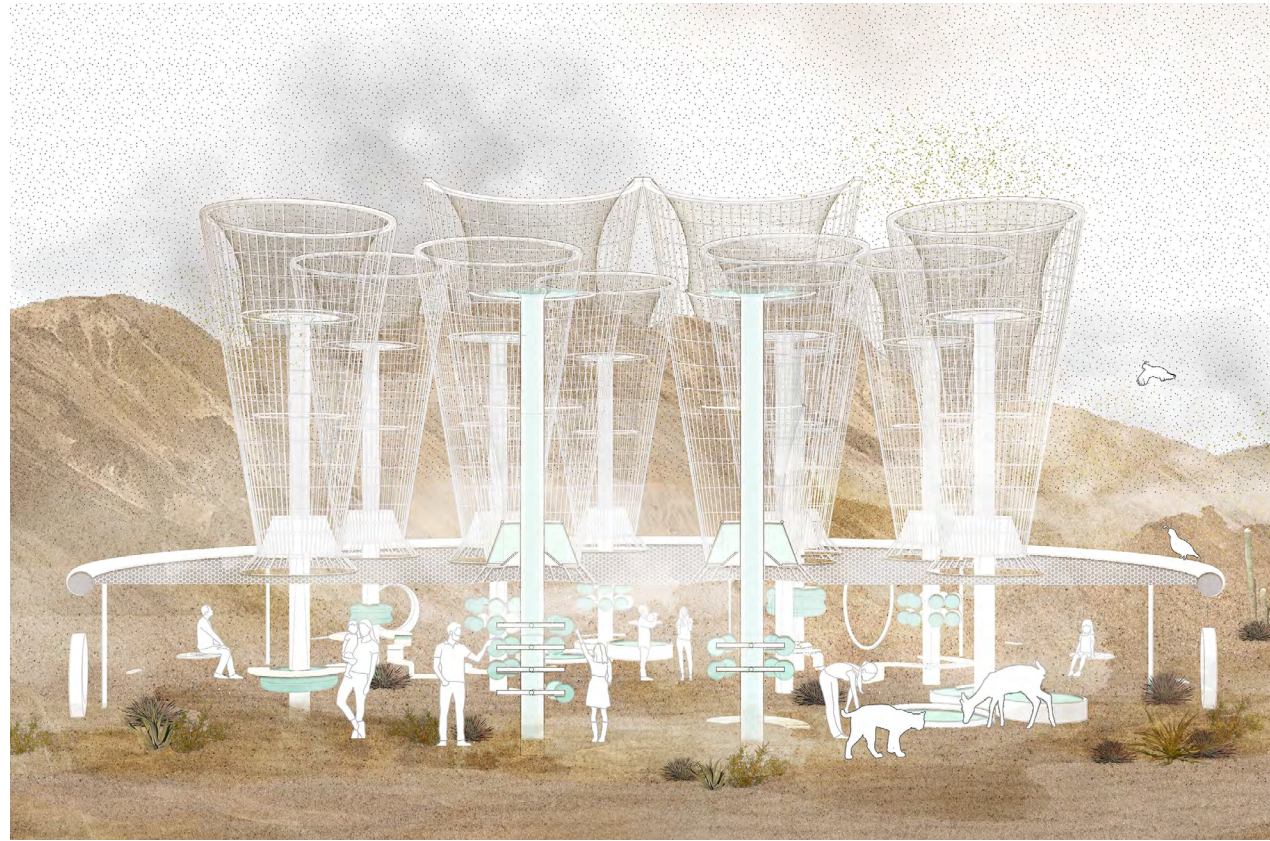
Besides, the communal kitchen will go through the drying food process, preservation for food storage and offers a cooking-eating social space. The main material of the building is made from desert sand, which can be transformed into sand bricks for future construction.

The nature reserve not only provides a safe-house for endangered plants and animal species, but also has educational spaces for plants nursery, seed preservation and experiments like bio-fuel or material tests like clear gel film, which can pull water from the air, absorb, and keep moisture for plants.



Collective Social Space Section, 1'-0"=1/8"





View of the 'Water Village Well'



View of Cropland, Growing Chickpea and Wheat



View of the 'Fabric Studio'\_ Movie Night



View of the 'Observatory Tower'\_ Experience Sublimity of Dust Storm

**Activity**

The water tower as a village-well offers a public space and nourishes humans, flora, and fauna. The net captures the fog and through condensation, transport and store it in the container which also combines with the water-well for animals to drink in the desert.

In the fabric studio, we combine the workshop with leisure activities. The central fabric roof with different shapes serves different activities like a theater screen for movie night.

During the big dust storm coming, it is so dense, and the human visibility is lower to zero and may not get back easily. The observatory tower provides a unique experience for people to safely view the storm coming, offering a different sensory experience inside the unusual weather condition of the dust storm.





03

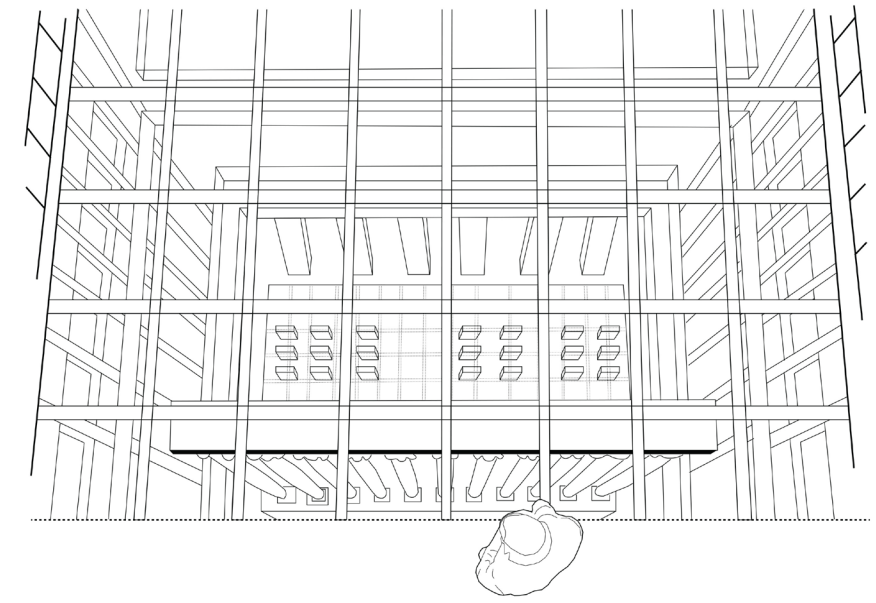
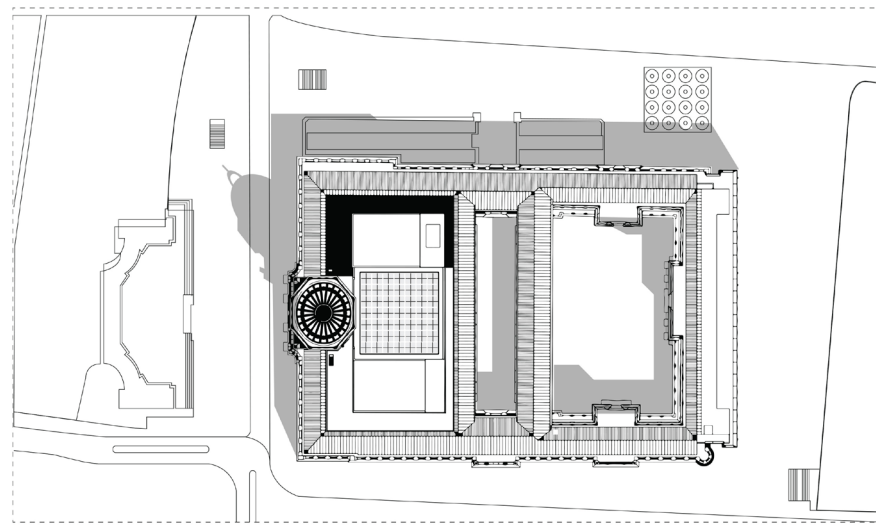
## Measured Displacement

*MEASUREMENT AND MICRO-  
CLIMATE IN ARCHITECTURE*

Advanced Design Studio, 2023 Spring  
Columbia University GSAPP  
Instructor: Emanuel Admassu  
Team: Jie Lai, Christopher Scheu

Measurement enables the production of a body of knowledge that seeks to remove the human from the equation. The measurable, predictable and reproducible forms of knowledge that enable the development of sophisticated technology and the modern nation-state are inextricably linked to systems of sustained imbalance. In the case of the Humboldt Forum, measurement played a vital role in garnering support for the reconstruction of the Prussian Palace as well as in the process of meticulously reconstructing it from documents, photographs and remaining pieces of the original palace. Simultaneously, the construction of the archive and through it an objective body of knowledge serves as justification for exhibiting a portion of the Ethnologists Museums massive collection of artifacts, many of which are stolen or acquired under dubious circumstances. By understanding the role of measurement in selective reconstruction of history through the Humboldt Form and the as justification for collecting the objects that it now houses, one can better understand what is being mis-measured, or left out of the picture.





Site Synopsis, The Humboldt Forum and View of Agora

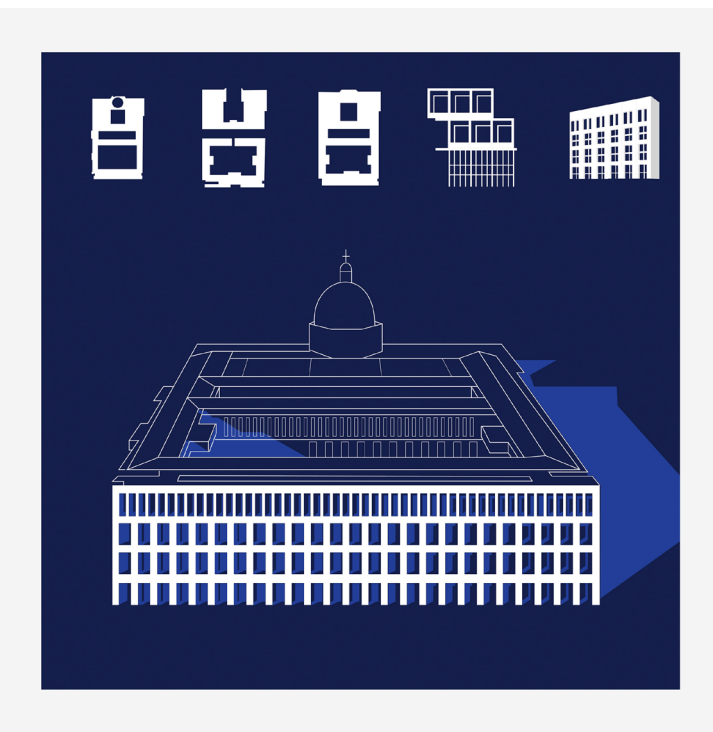
### Humboldt Forum\_ Rationality

The Humboldt Forum is the commissioning body of the ambitious cultural re-construction project. It makes this historic locality in the German capital a free center of social and cultural life. The reconstruction, prescribed by the program, concerns the buildings and the court of honor of the Palace and volumetric repositioning of the transversal building.

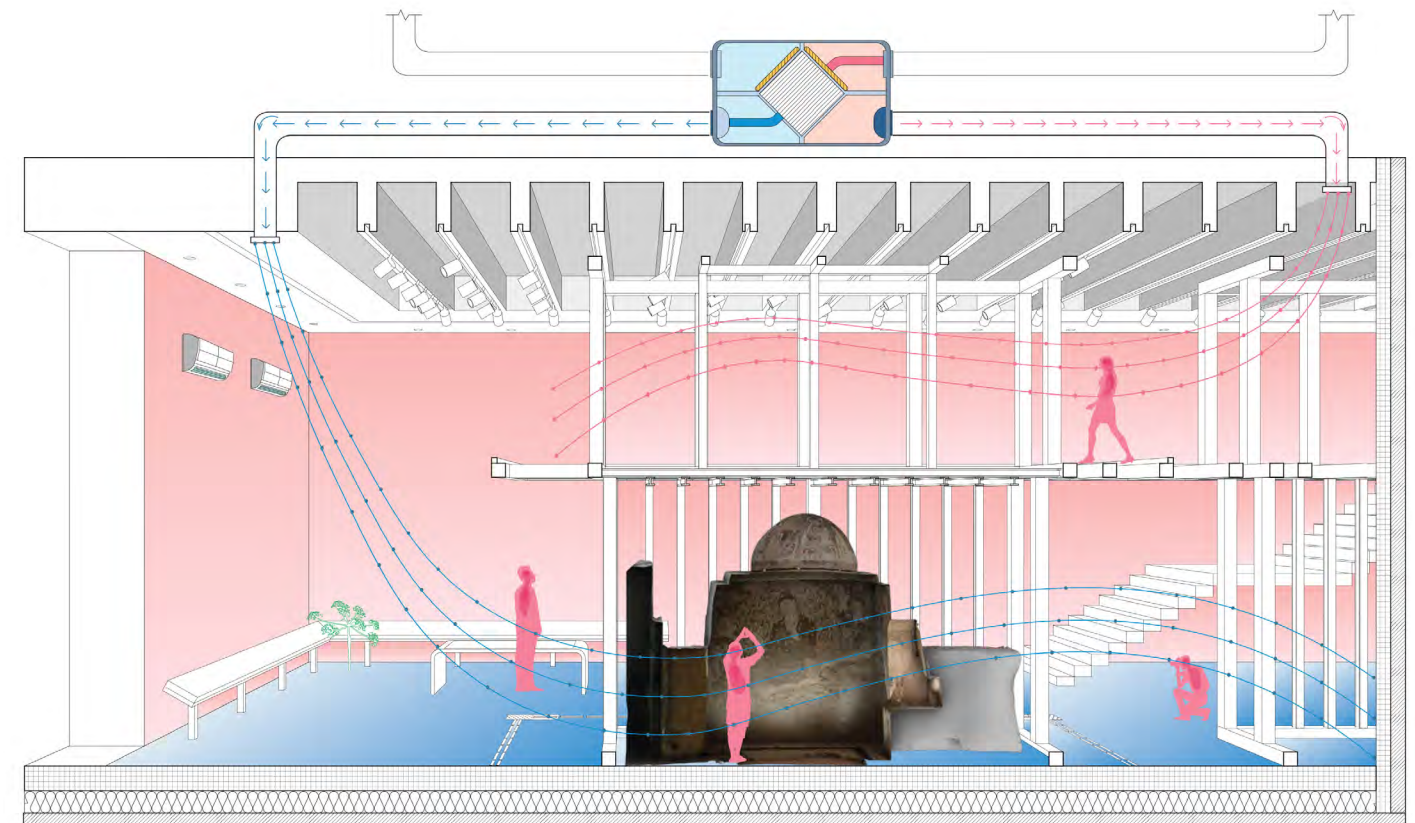
Looking into the 'Agora' of the reconstructed part of Humboldt. It best represents an absolute articulation of rationality in the new design. The so-called Agora were built for the first time, a set of places and covered spaces of general interest (theater, auditorium, restaurants, exhibition halls and more). The exhibited items are regulated under the grid categorized system, placed inside a western contemporary cultural context.

### Master Plan Composition\_ Humboldt Forum, Berlin, Germany

Heat Map on Site



Synopsis Images, Taxonomy of Humboldt and Rationality

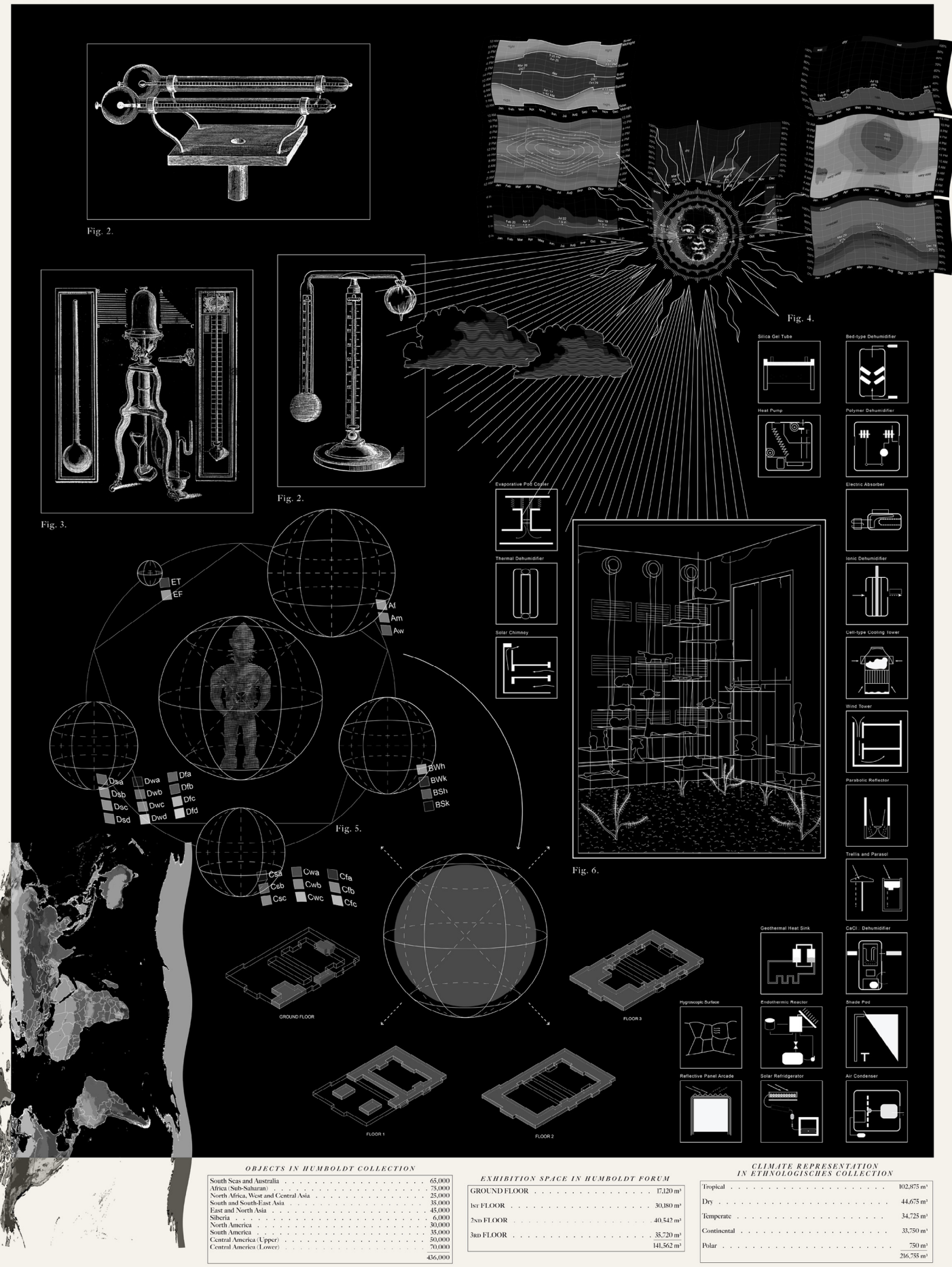


Section, Current Room of Reconstructed Kizil Cave Pieces

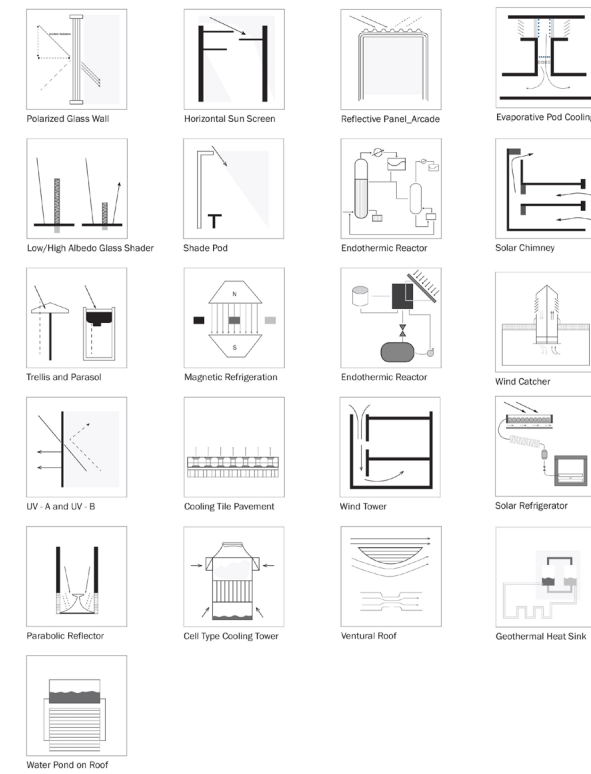


# RES ET CLIMA IN HUMBOLDT FORUM

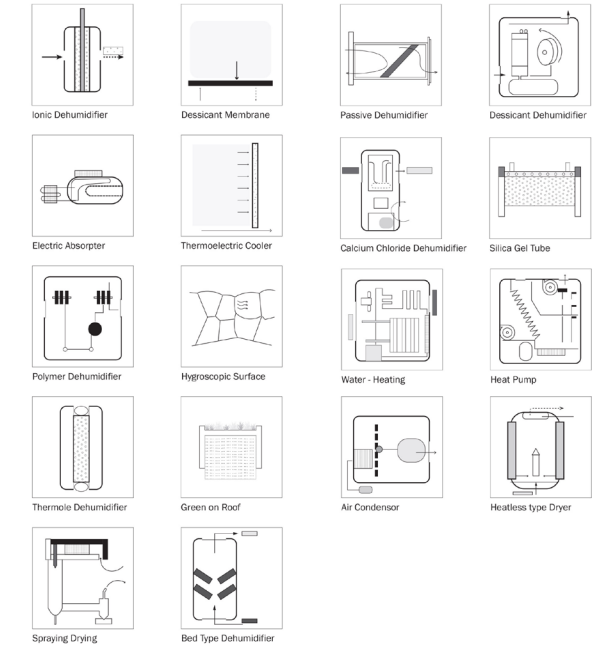
PLATE I.



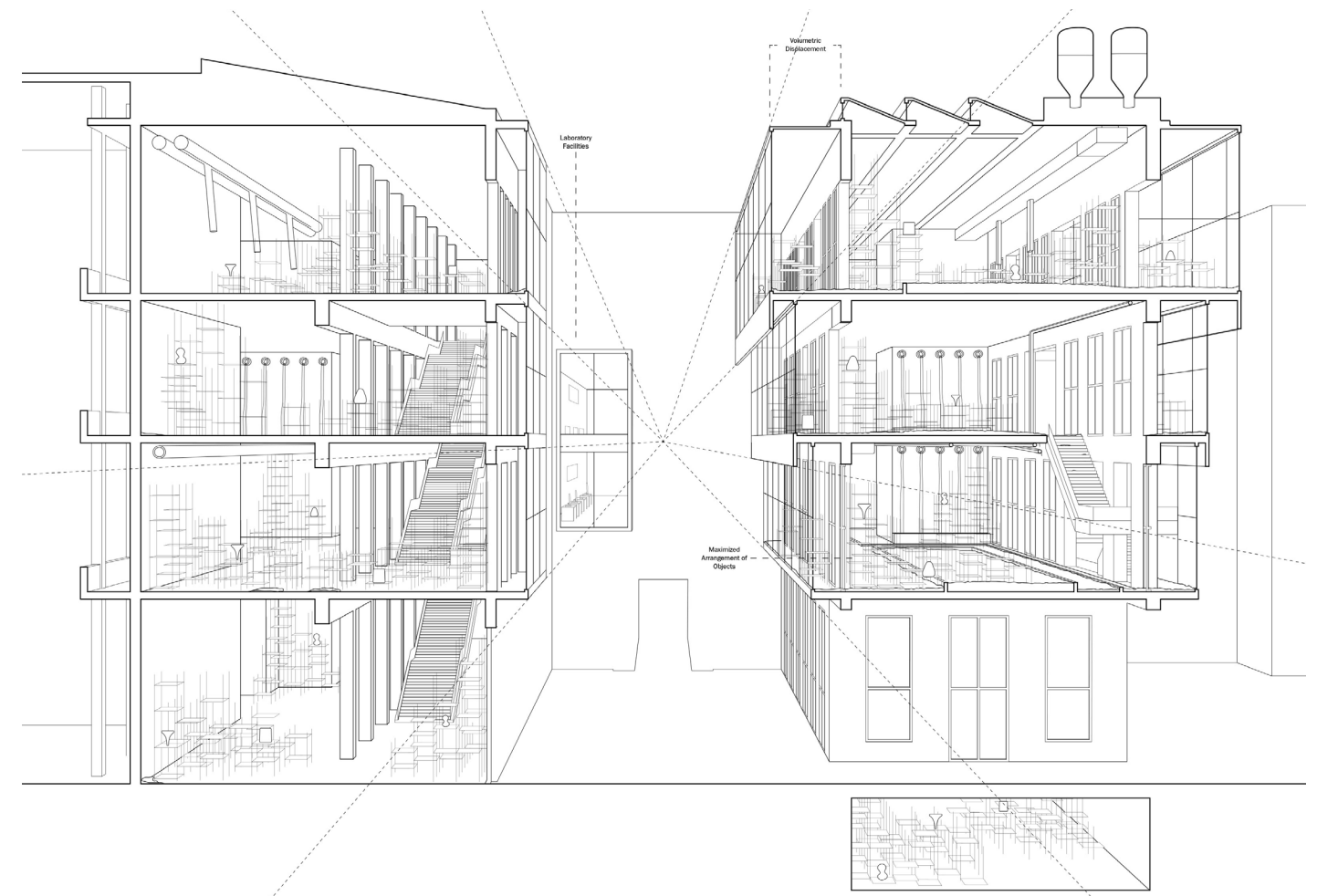
## Selected Devices to Heat & Lighting



## Selected Devices to Humidity

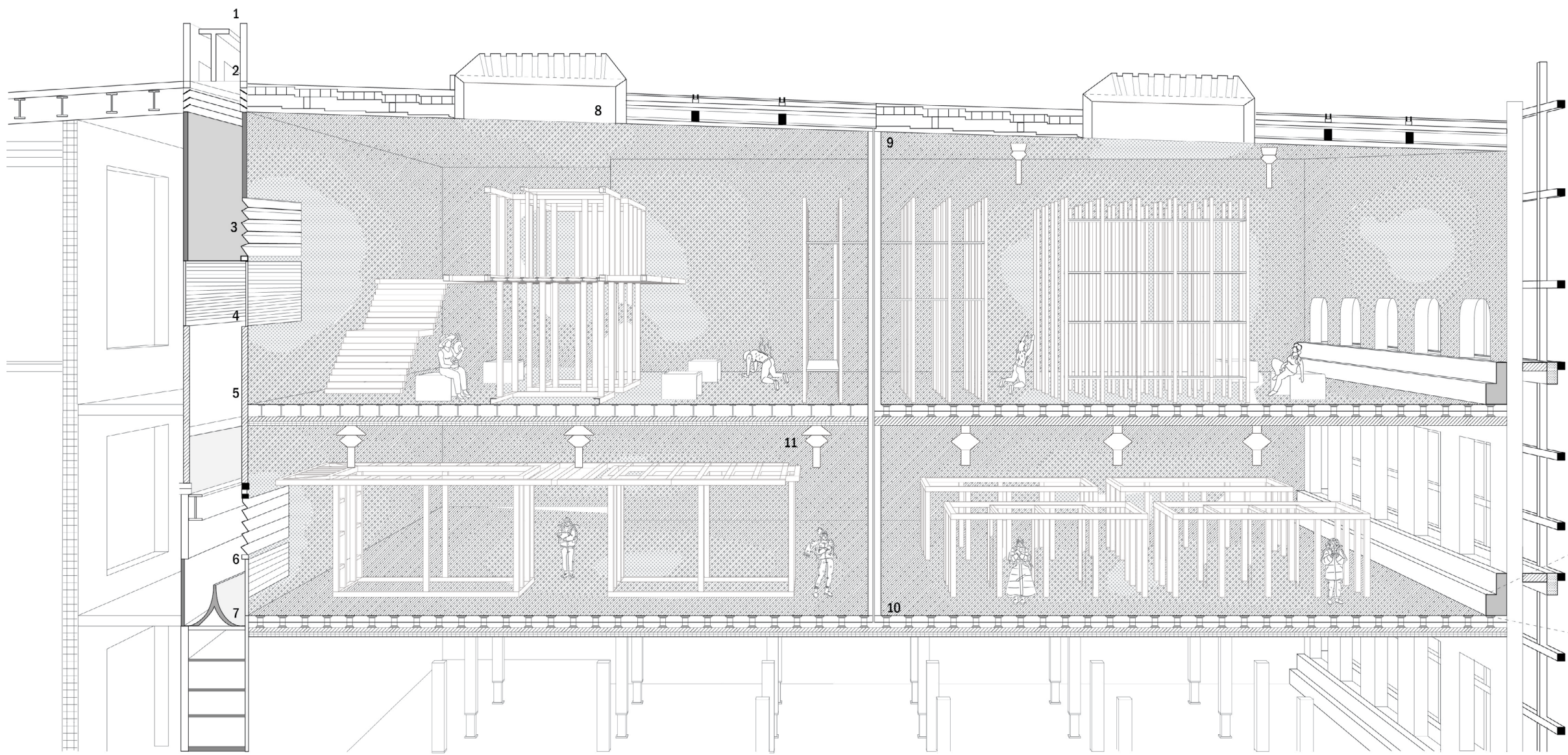


Climatic Devices Catalog

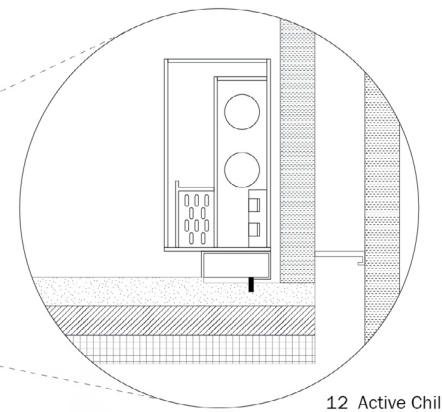
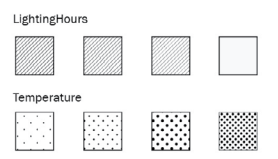


Perspective Section, Modification with Climatic Devices





- 1 Skylight
- 2 Highly Reflective Louver\_Daylight Dimming
- 3 Motorized Insulated Glass Louvers
- 4 Reflective Panels
- 5 Insulated Shaft Wall
- 6 Prismatic Light Directing Glass
- 7 Parabolic Reflector
- 8 Rooflight\_Diffusing Sunlight
- 9 Water pipe for Recirculation
- 10 Cooling Pavement/Tile
- 11 Air Pipe



12 Active Chiller Beam System



Portfolio

JIE LAI

Selected Works  
2022 -- 2023

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