




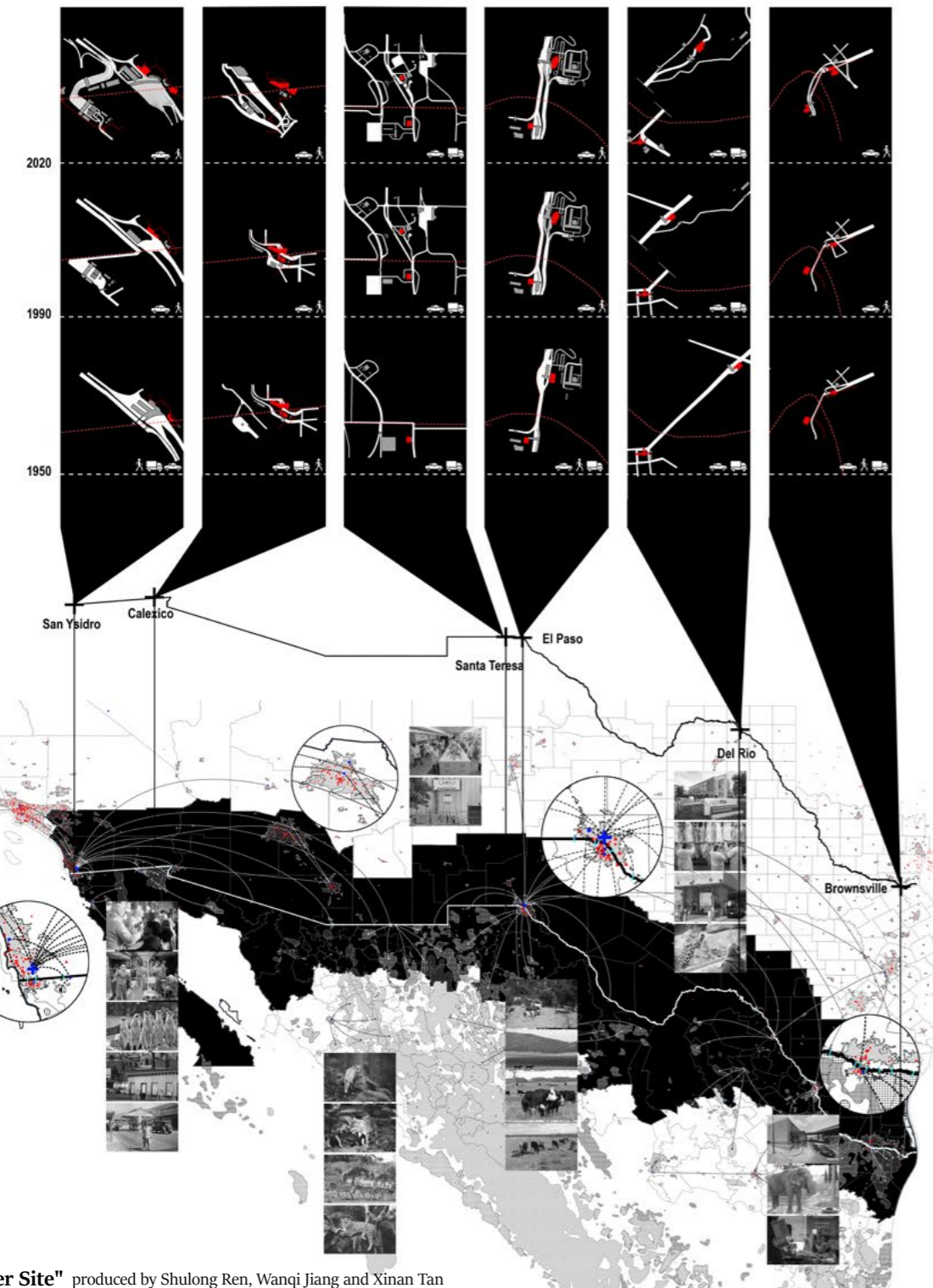
Annual Portfolio 2021 - 2022
Traveling Between Spaces

Xinan Tan
Columbia GSAPP MSAAD
May 2022



C o n t e n t

01	<i>Borderland Biostrucutre</i> Summer Entangle Studio	4
02	<i>Transscalarities</i> Summer Elective Course	20
03	<i>Future Current</i> Advanced Studio V	27
04	<i>Re-thinking BIM</i> Fall Elective Course	40
05	<i>History of Architectural Theory</i> Fall Elective Course	48
06	<i>Facade Detailing</i> Spring Elective Course	62
07	<i>94 Days</i> Advanced Studio VI	64
08	<i>If Building Could Talk</i> Spring Elective Course	86
09	<i>Generative Design</i> Spring Elective Course	102



"Border Site" produced by Shulong Ren, Wanqi Jiang and Xinan Tan

01

Borderland Biostructure

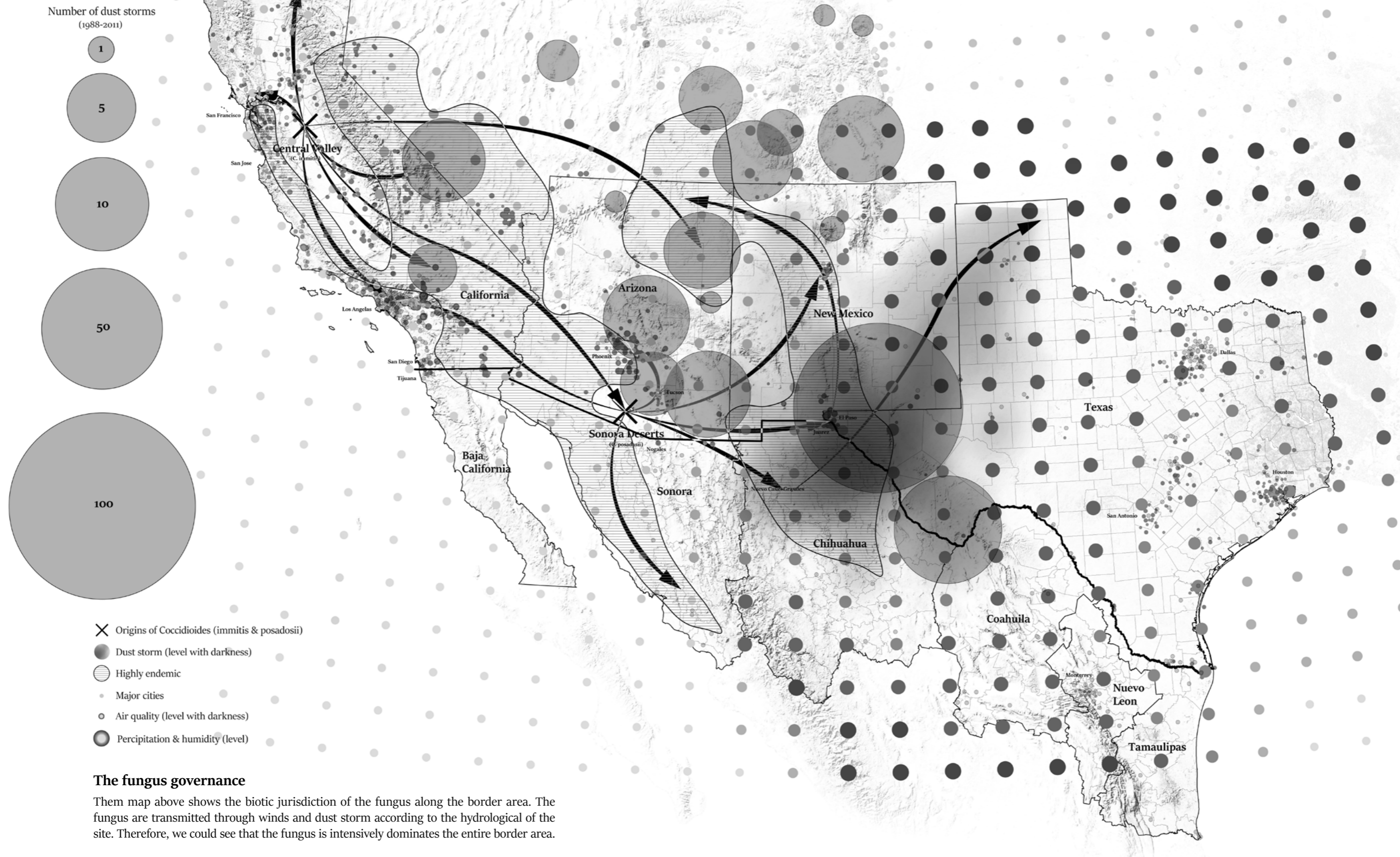
Air Governance: socio-urban design

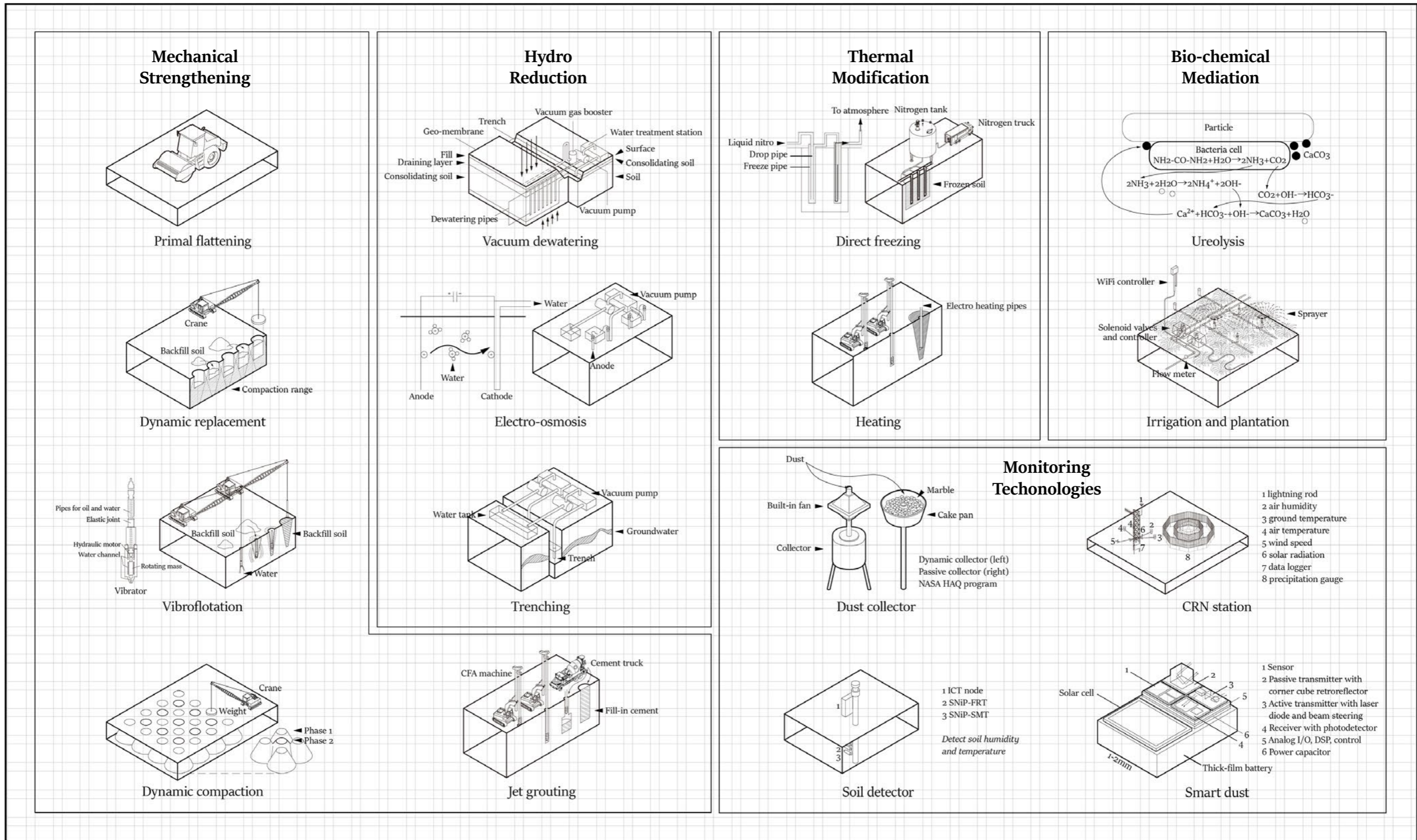
Instructors: Stephen Mueller + Ersela Kripa
 Summer Entangle Studio / June 2021
 Personal research and design

Biosecurity has always been a critical and contradictory issue along the border area. In fact, it's quite easy to manage human immigrants and animal imports, but not so easy on governance airborne pathogen, such as Coccidioides, our protagonist in this project. This fungus locates in the surface of soil and would be transmitted through winds and leads to a disease called valley fever. Environmental issues such as dust storm is so prevalent along US-Mexico border that make the borderland an endemic area. **The question of how to counteract the governance of fungus and how to establish a new system that could manage air condition, environmental quality and human health is casted on the topic.**

A new binational governance is designed considering different potential actors that would engage in the project, including government, scholars, initiators and workforce. Also geo-engineering techniques are introduced to the project to modify the soil and ground condition in order to improve the environmental quality for the border area. New binational relation are established after the execution of the planning above.

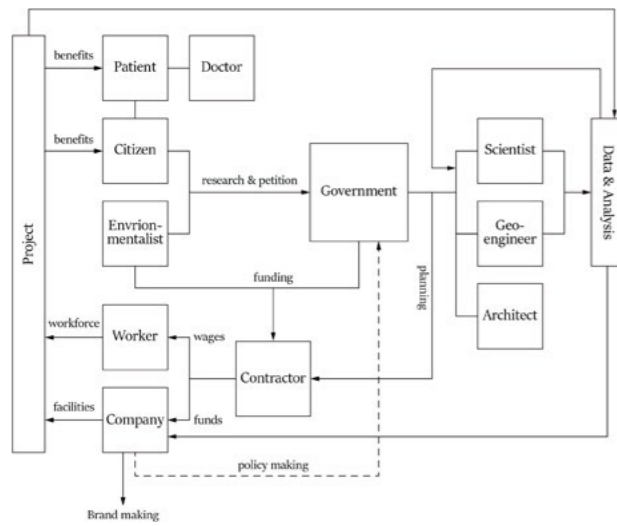
Furtherly into architectural scale, the air chimney and nonwoven fabric is introduced for indoor living quality improvement. The air chimney locates at the center of the house or public facility, which is for the installation of air purifier or air pipes; while the nonwoven fabric is used for enclosing the architecture and create a semi-open space to attract people to the outside environment.



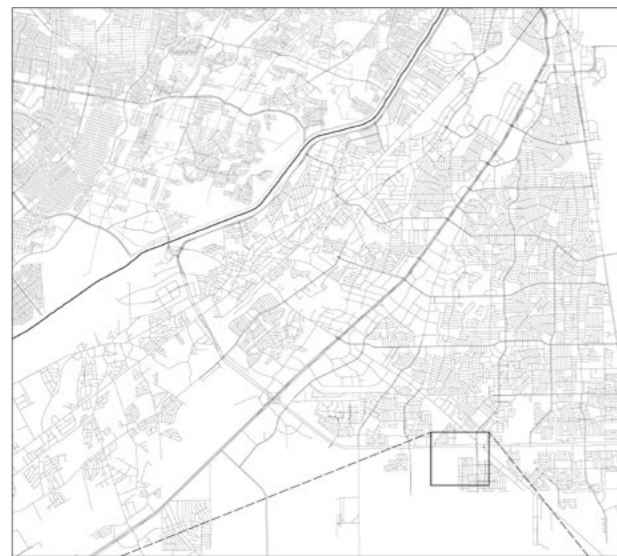


The Tool Box

Five categories above would help to modify and consolidate the soil in different levels in terms of costs, biodiversity, etc., so that the dust situation could be eased. And it could also help to establish a new monitoring system. Project planners could select appropriate techniques from the tool box according to the condition of the site.



Binalational governance



Site: El Paso

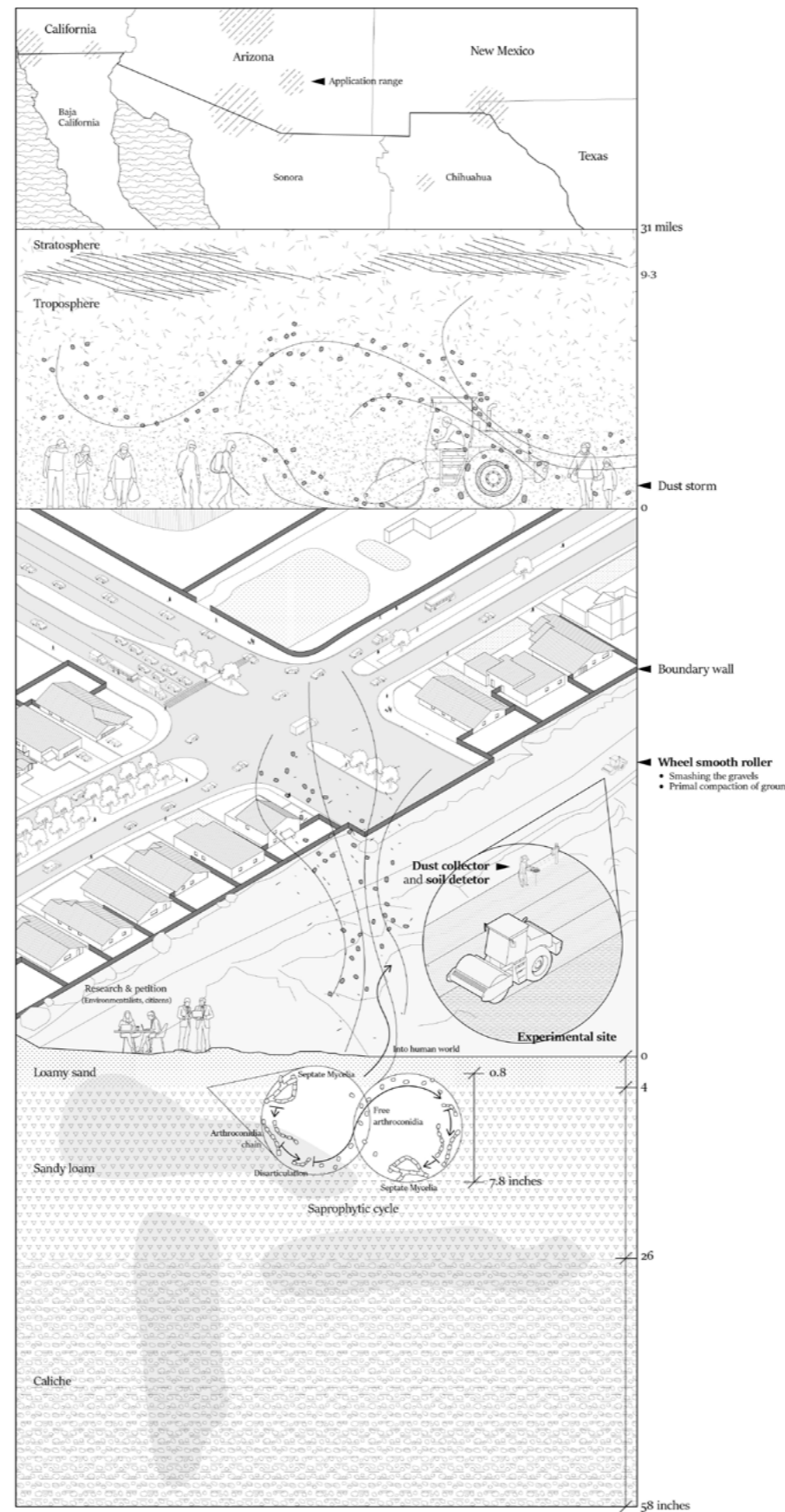
The experimental site locates at the east margin of El Paso, which is the center of the storm range and the endemic area.

Application range
where to apply this action

Atmospheric section
human reaction to the fungus

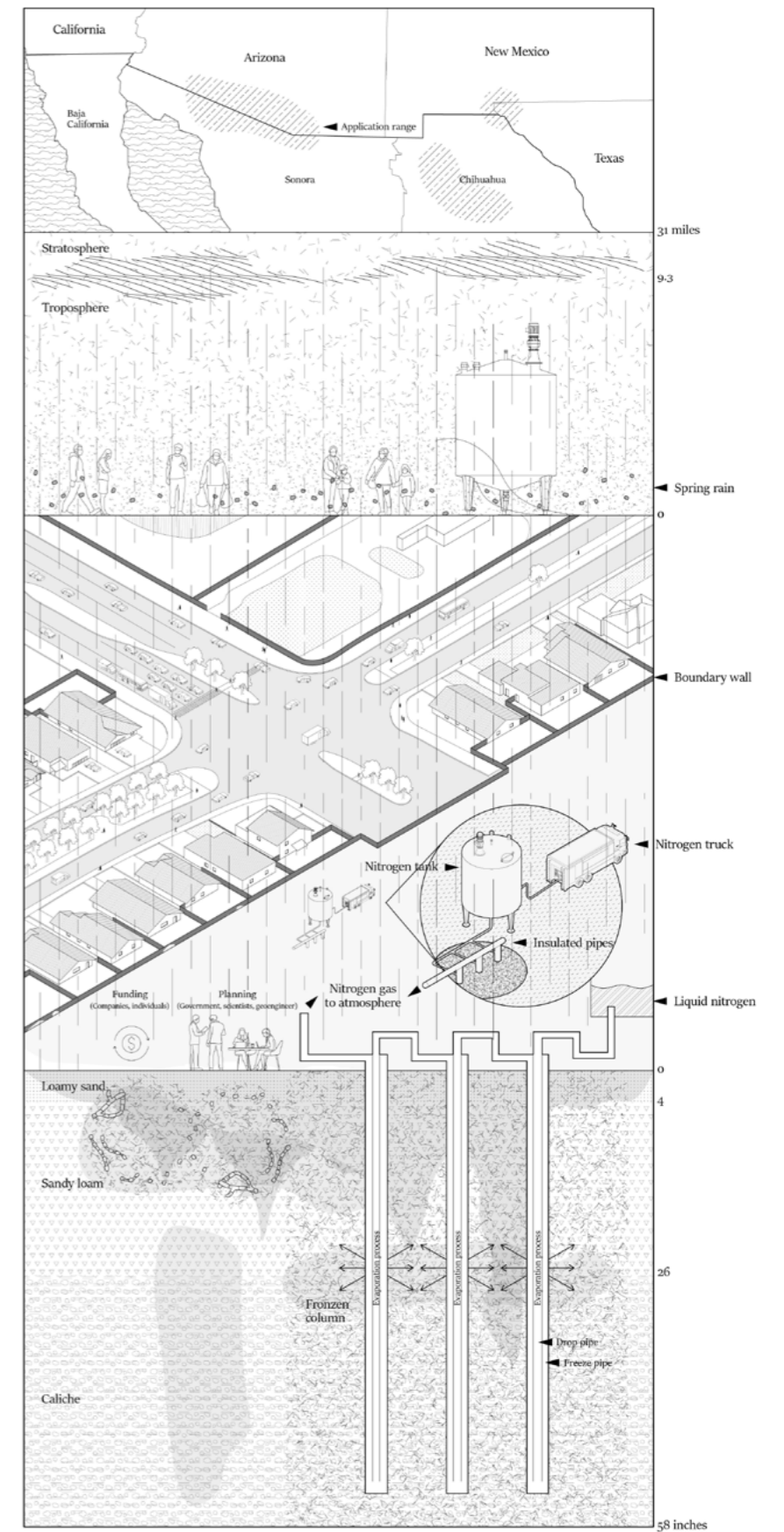
Action axonometry
participators and
action demonstration

Soil section
stratification and
structure of the soil



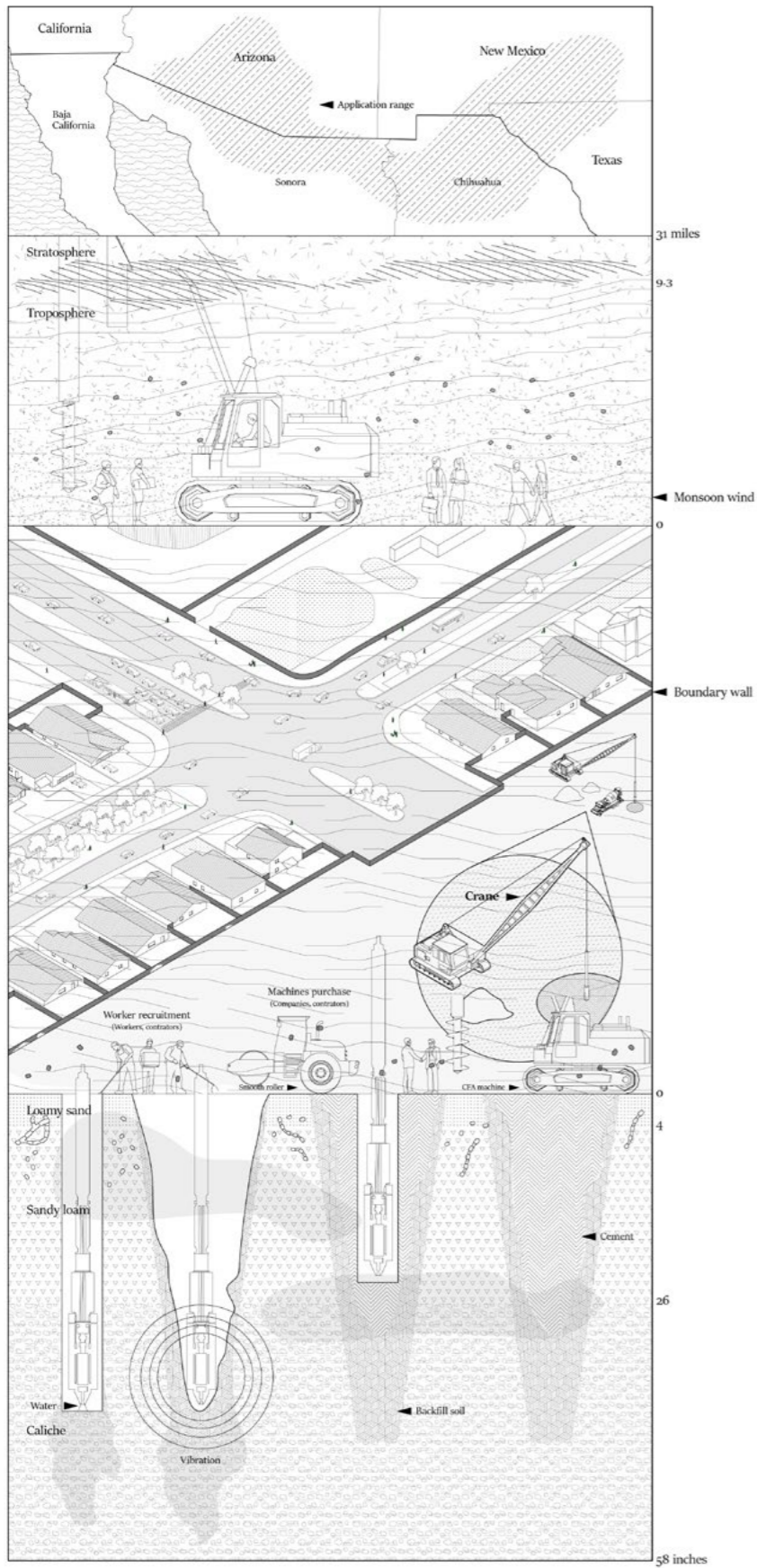
Action 1: Primal flattening

A primal process of the ground condition at the beginning phase of the project.



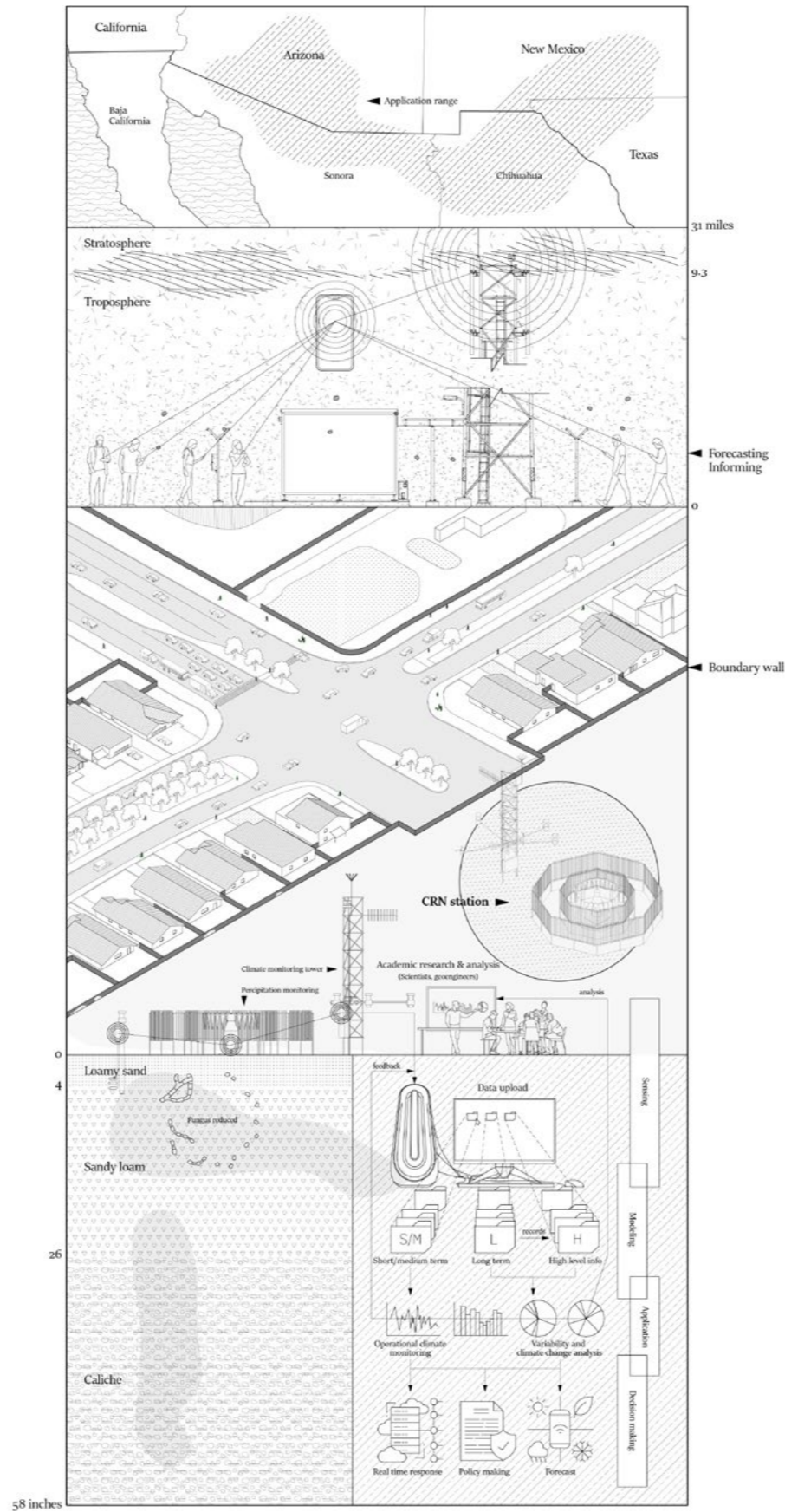
Action 2: Ground freezing

A temporary technique to consolidate the soil and inhibit the growth of the fungus.



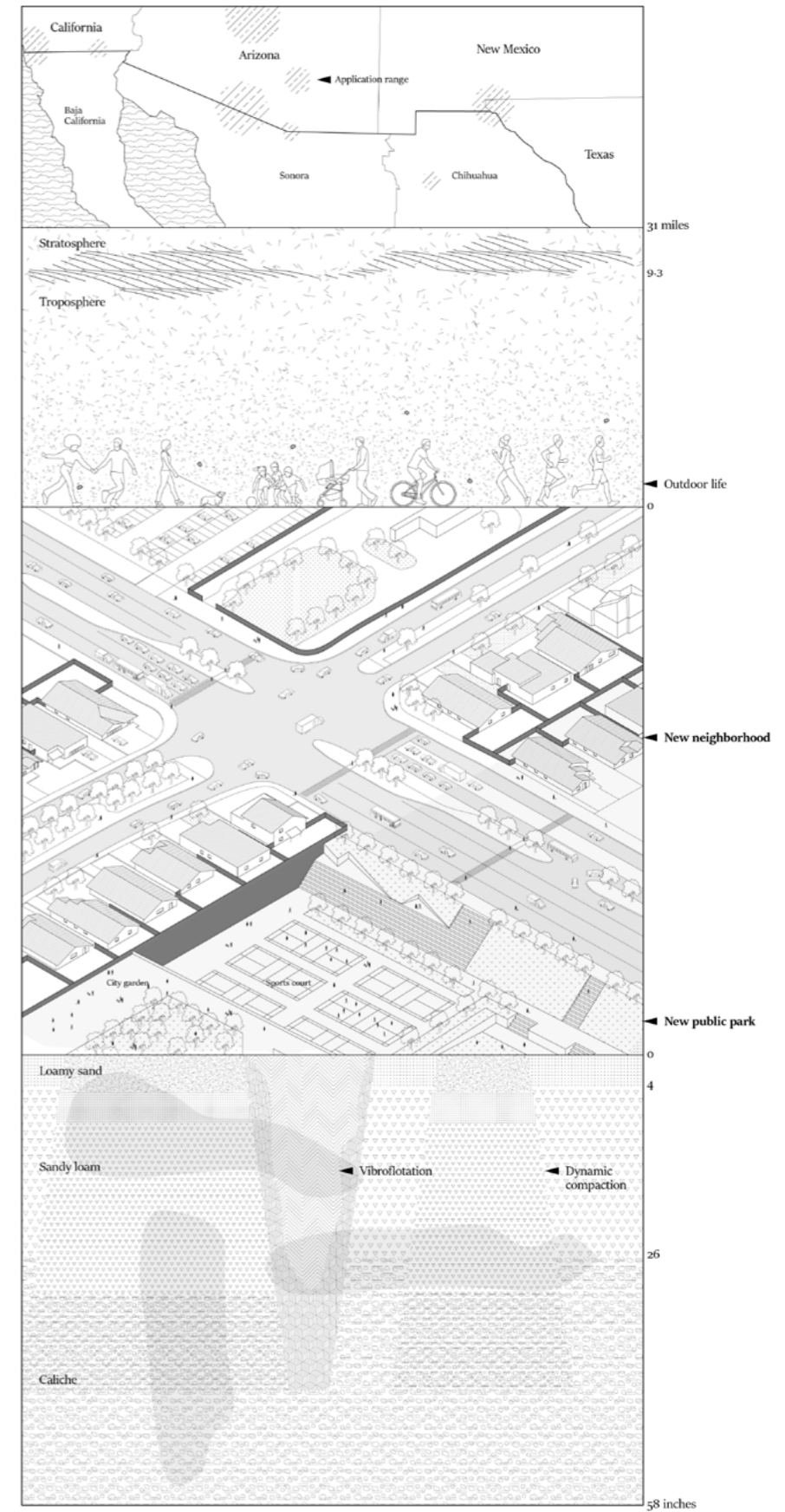
Action 3: Vibroflotation

A permanent technique to consolidate the soil and modify the territory condition.



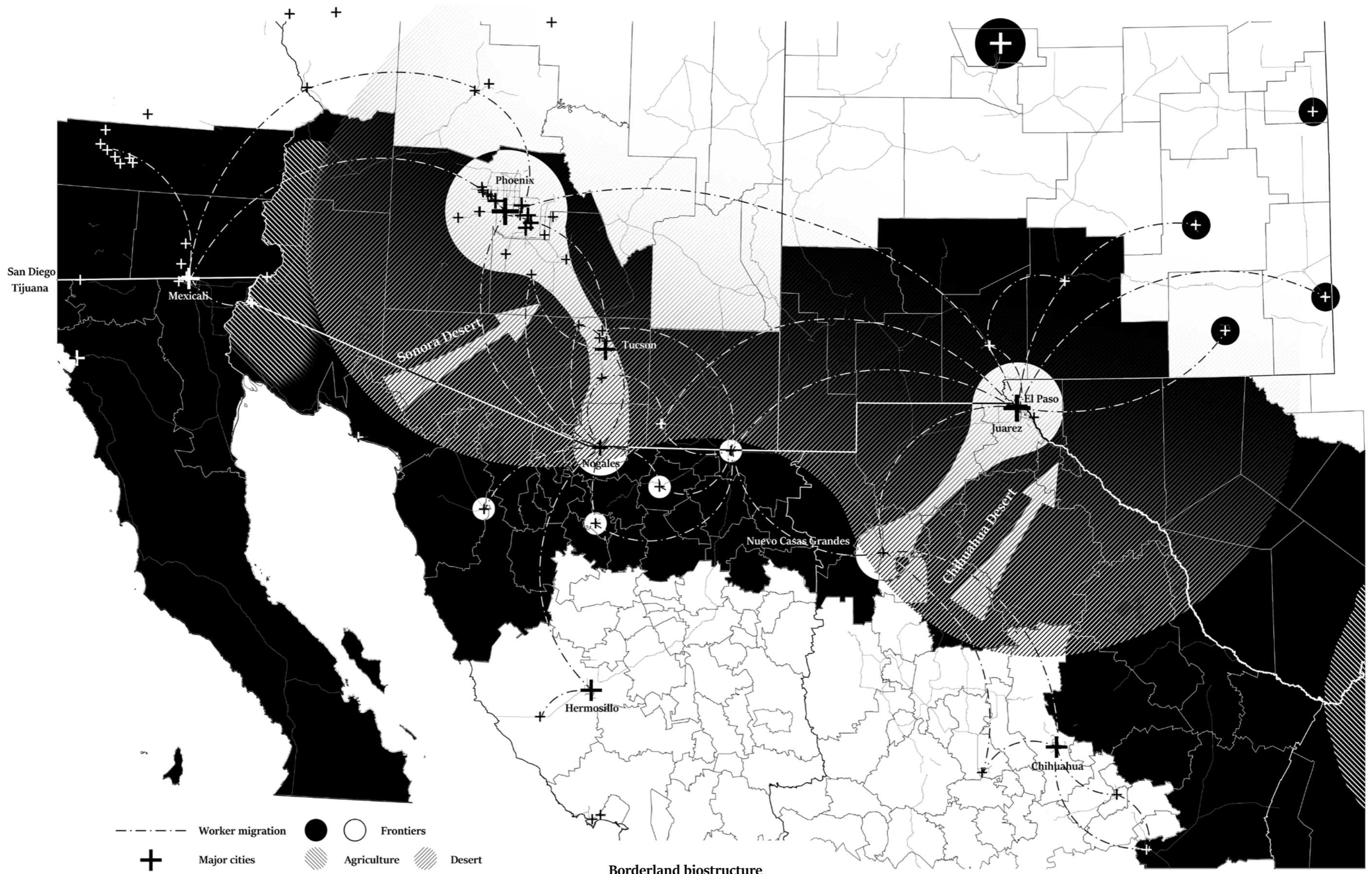
Action 4: Monitoring

The new monitoring-to-forecasting system for incidents real time response (dust storm, fungus alert, etc.)



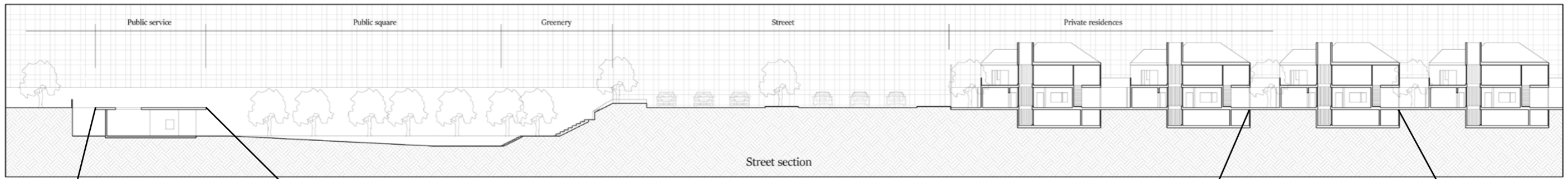
Action 5: New city

The design and construction of a new neighborhood after the improvement of the ground condition.



Borderland biostructure

The prototype could form an active binational worker migration and currency flow. It provides job opportunities and establish a new outpost against the dust storm. There are two outpost: one is in Sonora desert and another is located in Chihuahua desert.

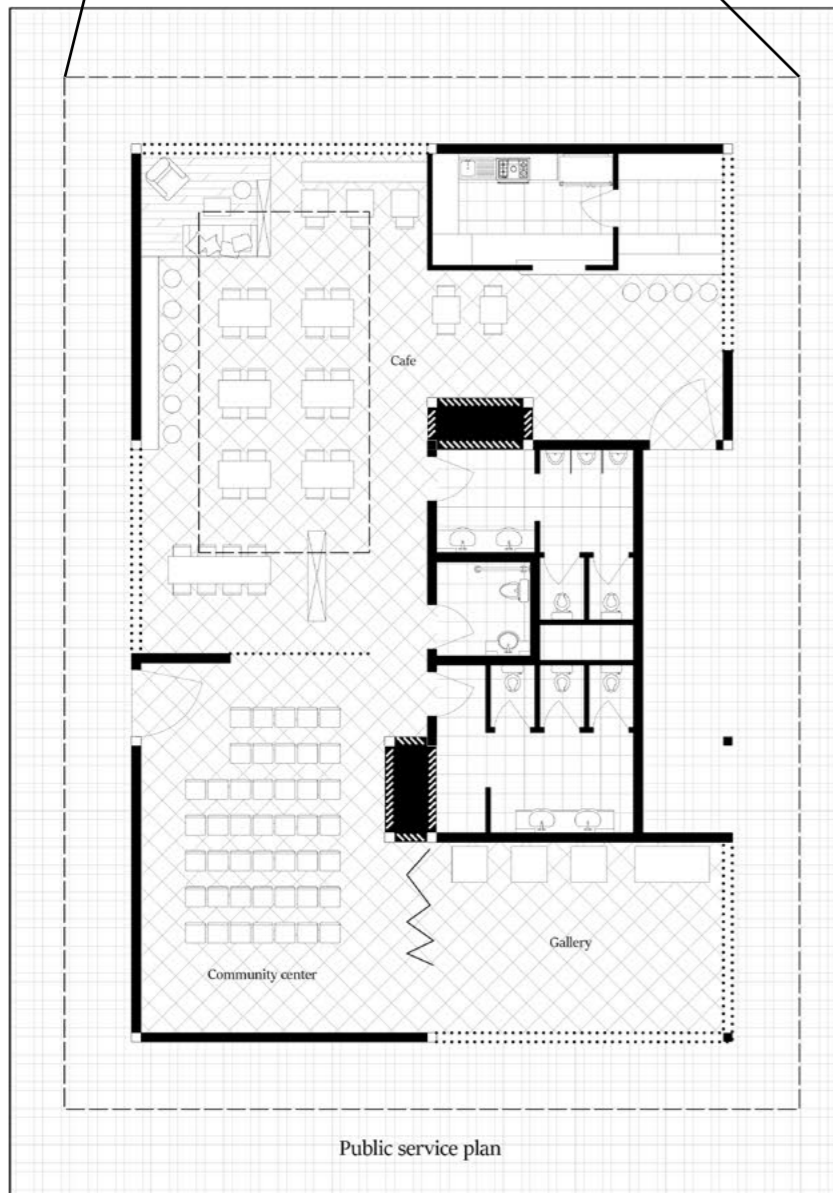


Street section

The new neighborhood design is introduced in public and private session. The public is on the left and the private is on the right of the street section above.

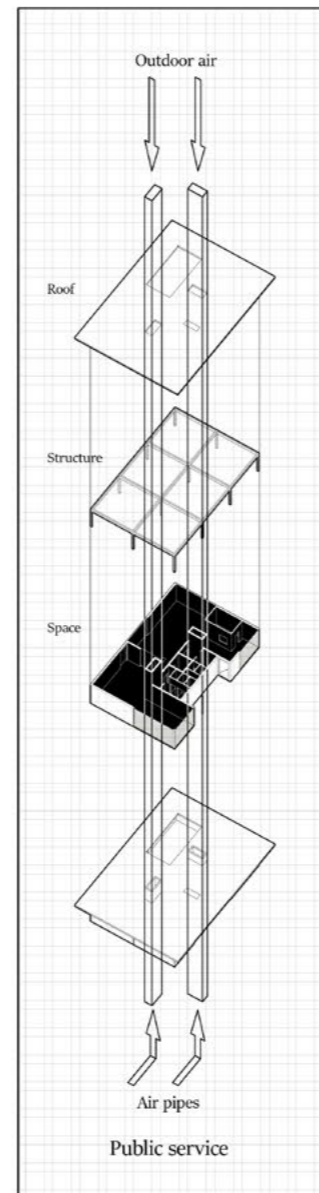
Public

Private

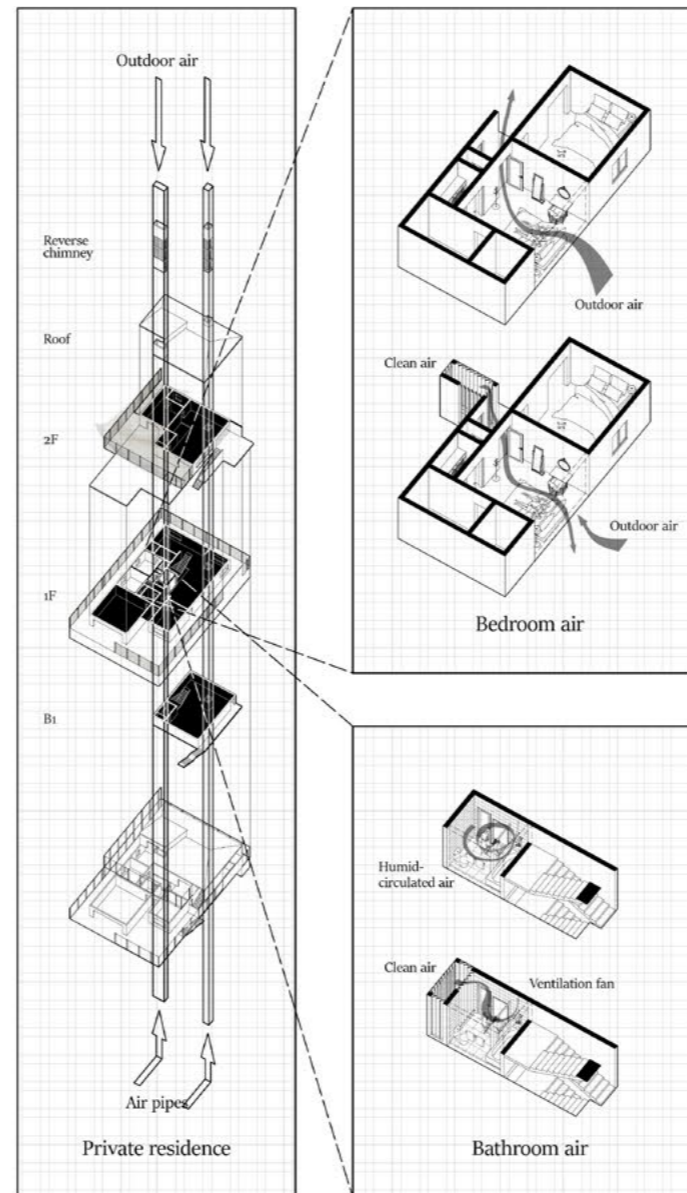


Public service plan

The air chimney is at the centre of the public spaces. The non-woven fabric encloses the facade.



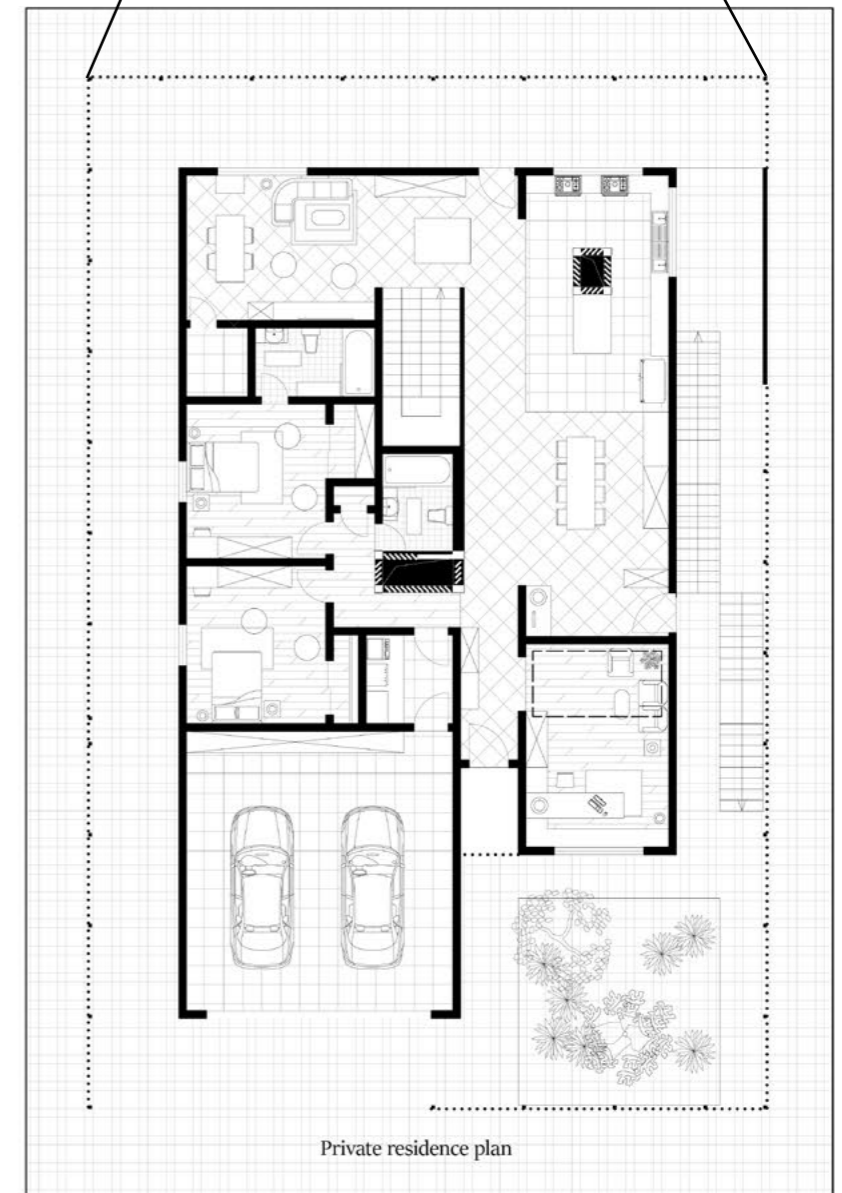
Public axon



Private axon

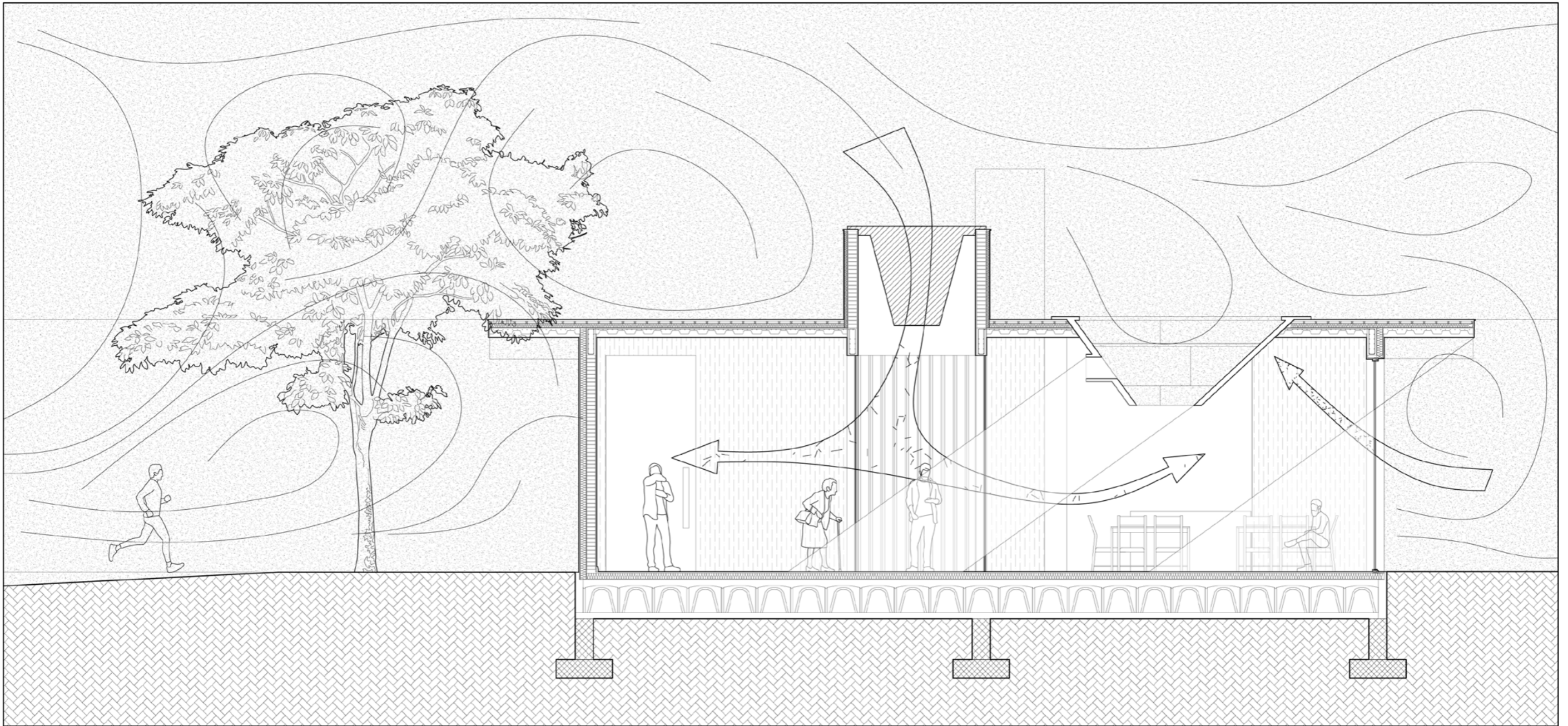
Human scale

Human reactions to the installation of the air chimney.



Private residence plan

The air chimney become the centre of the living area.



New lifestyle

The intervention will change the lifestyle of the neighborhood in terms of air usage. The public service will provide a temporary air-clean space for the citizens who is on the public square during emergency events such as dust storm or air pollution.



02

Transscalarities

Cross-field architectural theoretical analysis

Director: Andres Jaque
Instructor: Malcolm Rio
Summer Elective Course / June 2021
Personal research essays

This course queries the ways in which architectural devices of reference, which have shaped the discourse of the field over the last few decades, are characterized by their transitioning through spatial and temporal scales. The course explores the agencies architectural devices unfold through transscalar conditions—that is to say, the specific political modes that architectural devices perform, and the way they multiply their reach, influence, and sensitivity: for instance, from the microbiological to the mineral, the atmospherical, the ecosystemical, the genetic, and the planetary. Operating from a climatic paradigm, this course characterizes architectural devices as both relational and environmental entities in the way they build up interdependencies with each other and with other entities; and in the way they participate in composites where economies, institutions, societies, biology, ecologies, technologies, normativities, media, environments, aesthetics, and cultures are enacted as intersectional. The architectural devices of reference that will be analyzed throughout the course, both in their embedded characteristics and in their trajectories throughout time, mobilize notions and positions that confront those mobilized by other devices.

Transscalarities

from

Functional Public Spaces

to

Techno Infrastructure

Researches on
Parque de la Gavia
by Toyo Ito

Xinan Tan
Summer 2021
Transscalarity

Parque de la Gavia is a public park initially designed by Toyo Ito in 2007. However, the project left semi-built in its first phase due to funding problems, and was picked up again in 2019, incorporating new facilities. However, the recent condition of the park is not optimistic: the site is still left unbuilt and filled with yellow sands (fig.1). **In my point of view, transscalarities not only means differentiate scales but also a perspective to analyze entities in multiple dimensions/fields.** Therefore, the transscalarities would be discussed in the following two aspects: 1) the combination of functional publicity and techno

▲ Fig.1 Design (above) and reality (below)



infrastructure and 2) the balance between these two aspects and its impact on the project.

The environmental co-living is the main intention that the design wants to bring to the neighborhood: incorporating environmental technologies into public spaces should benefit both sides of the aspect. This combination methodology is different from typical sustainable architecture or from incorporating zero-emission technologies into architecture construction and usage, and this approach of combination could be a new trend of architecture and urban design since the world is eagerly calling for the protection of ecological good and a stop for climate change. **The combination enhances the efficiency of**

► Fig.2 Water world (middle) and Plaza del agua (below) in rendering



architectural functions and improves social connection between different people from different backgrounds. Similarly, the famous CopenHill project designed by BIG is another example that puts sports activities such as skiing, hiking and rock climbing on the roof top and on the façade of a waste treatment factory (fig.3).

However, a question of balance between these two components would be casted concerning the success/failure results of the project. On the surface, the funding issue is the reason why the project is suspended until now, but in my opinion, it could also be the loss of balance that causes the failure. From the available resources of the project, the information is solely focusing on the introduction of the techniques used in the project from urban scale to materiality scale, which from my perspective it doesn't incorporate the thinking of the collective social aspect that I discussed above. The techno aspect should not overweight the collective aspect of the project. **Furthermore, the mechanism of the two aspects should not be isolated but somehow entangled.**

To elaborate this entanglement, I would use a rendering image of the project as an example (fig.2). In the imaginary Plaza del Agua, the watertree infrastructure separates



▲ Fig.4 Failure of the project



▲ Fig.3 CopenHill by BIG

the square and attracts users toward the watertree and center. On one hand the infrastructure helps to purify the water in the river of Gavia, on the other hand it should also provide a recreational and leisure area for users. This trend of attraction is like a smaller London developing along the Thames River, the watertree is an artificial "Thames". **Therefore, it shows social tendency and urban value in this construction of ecological infrastructure and public spaces.** The project supposes to create a collective community that could enhance the quality of lives and mutual relationship but fail on balancing (fig.4). ■

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- 1 David Vollmer, "Parque De La Gavia - 2021." Madrid Proyecta, 14 Feb. 2021, www.madridproyecta.es/parque-de-la-gavia/
- 2 "El Nuevo Parque De La Gavia Costará 25,8 Millones De Euros y Estará Listo En 2021." Gaceta Madrid, 3 May 2019, gacetaMadrid.com/2019/05/03/el-nuevo-parque-de-la-gavia-costara-258-millones-de-euros-y-estara-listo-en-2021/
- 3 Eric Baldwin, "CopenHill: The Story of BIG's Iconic Waste-to-Energy Plant." ArchDaily, 7 Oct. 2019, www.archdaily.com/925966/copenhill-the-story-of-bigs-iconic-waste-to-energy-plant.

Capitalism Design

Fast Consumption and Internet Famous Architecture

Critical study of
Optical Glass House
by Hiroshi Nakamura

Xinan Tan
Summer 2021
Transscularity

As we all know, today's world has already been colonized by capital and market for centuries. Under these circumstances, the tendency of fast consumption becomes more and more salient in terms of fashion, food industry and so on, such as H&M, Zara, Bershka, McDonald, Starbucks and etc. However, in the recent decades, this tendency starts to penetrate into the architectural regime and create this "photogenic architecture" and somehow turns architecture into a fast consumption good. Hereby, I'll use the Optical Glass House by Hiroshi Nakamura as an introduction to the transscalarities in this case, which are the physical and social advantages and problems created by the famous glass façade in different

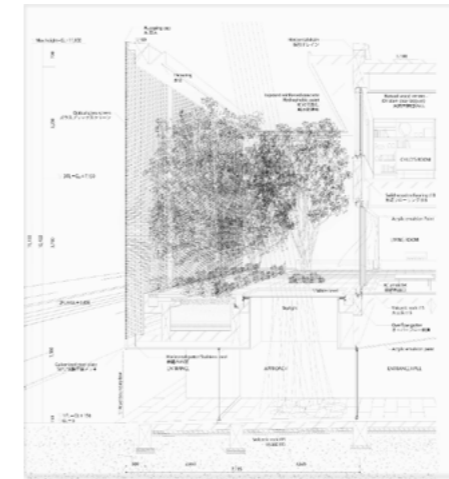
▲ Fig.1 Isolated island in huge city context



scalar levels in the following paragraphs.

Urbanely speaking, the house is like an isolated island embedded inside the huge noisy city context, in which it shows a kind of exclusive opaqueness in the boundary making (fig.1). However, when we go to a smaller scale, the house really does create a Zen atmosphere in the front garden, which changes through time by light and air. The glass façade is made of 6000 pure borosilicate glass blocks, which are well-performed acoustical insulations and meanwhile could ensure the visibility thanks to its high transparency. The glass wall works as a selective filter that makes the city into a mime movie. Thus, it creates a comfortable living environment within the house (fig.2). Behind this inclusiveness that the façade brings in, it actually requires money and capital to carry out all these expensive high tech measures (the 13-tons borosilicate glass wall, the hanging garden, etc.), which leads to my critical topic of this case: capitalism design (fig.3).

▲ Fig.2 The garden (above) and the bedroom (below)



◀ Fig.3 Construction details of the facade and the garden

Although the transparent façade incorporates the city view into the private living spaces, it still becomes a boundary wall towards the outside: the passersby on the street could only see a glimpse of the inside garden, but couldn't experience what it provides to the living area. It actually results in the problem of distancing people from architecture instead of inviting. The social exclusiveness of the wall not only posts upon humans, but also on the non-human factors. There's an interesting discovery on the site: the decay building on the left of the project has been deconstructed in recent google map street view (fig.4). It might call into question whether this fancy project puts pressure on the destruction process, in order to give a pleasant view to the client and to the street.

▲ Fig.4 The disappearance of the left building from 2012 (left) to 2021 (right)



The isolation and distancing discussed above actually derives from the vicious circle of capitalism design, whose core is fast consumption: these internet famous architectures attract attention and stimulate income for the clients; they build up fame for architects; more clients ask them to conduct more capitalism designs. In this way, architectures become photogenic fast consumption goods for social media users, who are also unconsciously engaged within this vicious circle of capitalism design.

In the end, architecture shouldn't become a one-time production for fast consumption in the capital world. The wall should be a two-sided filter for mutual sociality, but not single-sided opacity. Architecture design should be driven by spatial experiences instead of capital, and incorporate more humane interactions instead of profits and money flows. ■

Bibliography

- 1 Joey Morris, "Optical Glass House, Japan." Behance, 28 Oct. 2020, www.behance.net/gallery/106842803/Optical-Glass-House-Japan.
- 2 Rayen Sagredo, "Optical Glass House / Hiroshi Nakamura & NAP." ArchDaily, ArchDaily, 13 Sept. 2020, www.archdaily.com/885674/optical-glass-house-hiroshi-nakamura-and-nap.
- 3 Ken Tadashi Oshima, "Optical Glass House, Hiroshima, Japan." Architectural Review, 6 May 2021, www.architectural-review.com/awards/ar-emerging-architecture/optical-glass-house-hiroshima-japan.



03

Future Current

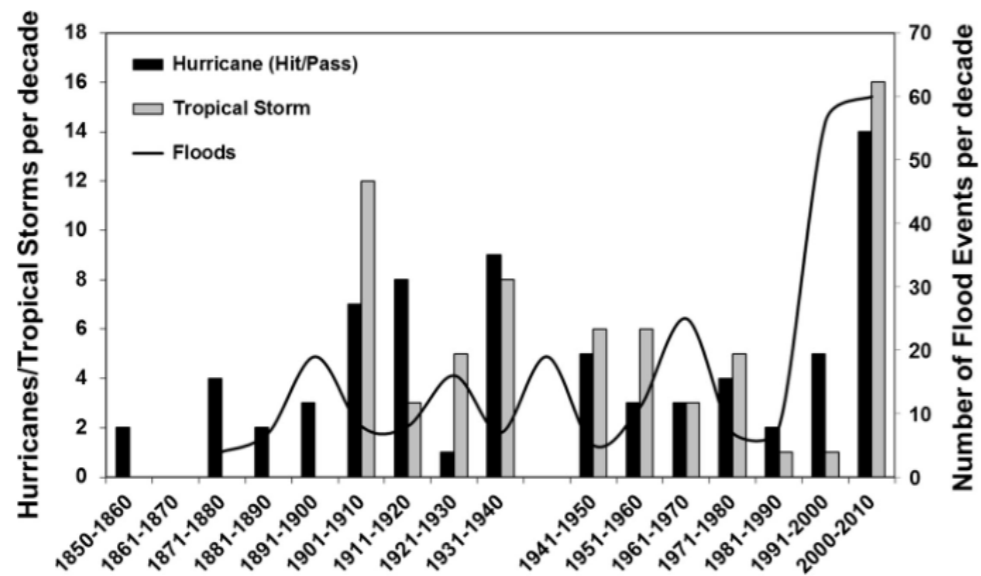
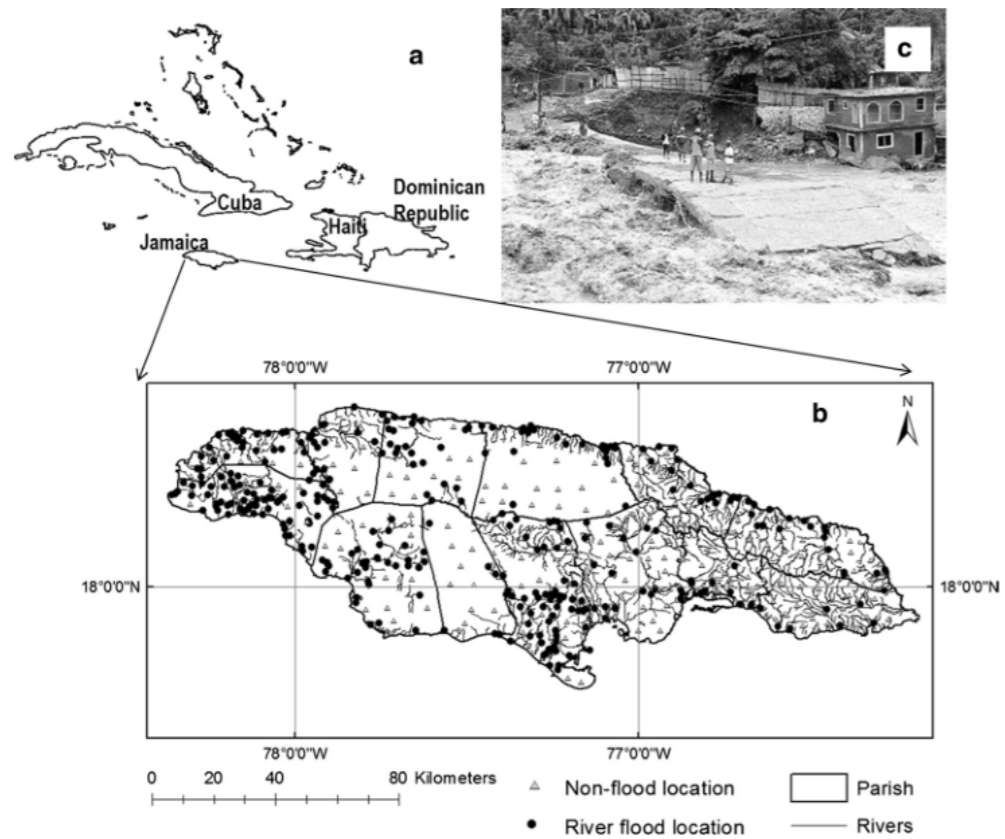
Architectural + environmental device design

Instructors: Vanessa Keith + Andrew Homick
Advanced Studio V/ September 2021
Group research with Leah Smith and personal design

According to the book *Our Final Warning: Six Degrees of Climate Emergency*, written by Mark Lynas, he says that the global warming have already become a non-negligible problem in the new century. Jamaica is an island country where environmental issues are influential and deciding. With further research, we found that flooding and drought might become a critical issue on the island in the future due to climate crisis. **Therefore, the question of how to combine architectural design with resilient adaptive technology to tackle with environmental problem needs to be put on the table.**

A simple design of rainwater collection is introduced to the project, in order to give resilience to the riverine flood condition, and help to redistribute the water resources during drought period. The design could be incorporated with the architectural structure and water supply/drainage system. Collaborating with FMJ property, the project is considered to be a beach hostel that provides amenities and services for the ecotourism in Jamaica, which could generate economic benefits for the region and client.

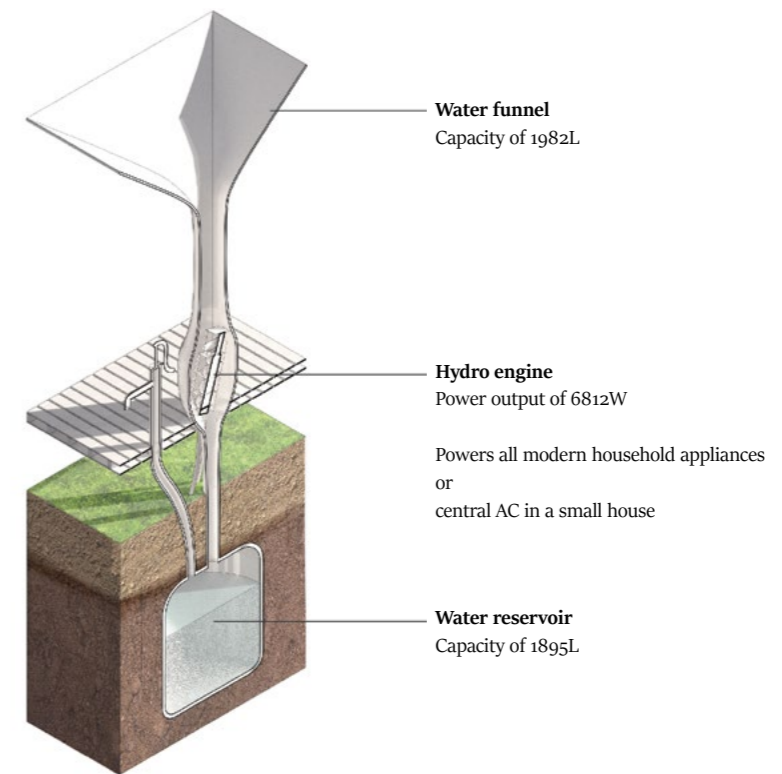
The core of the design is a series of water collector funnels that collect, purify, recycle and reuse the water from outdoor environment and within, to maximize the efficiency of water use and also to create a unique interactive atmosphere with water.



Arpita Nandi, Arpita Mandal, Matthew Wilson, David Smith. 10 March 2016. *Flood hazard mapping in Jamaica using principal component analysis and logistic regression*. Springer-Verlag Berlin Heidelberg 2016

Flooding future

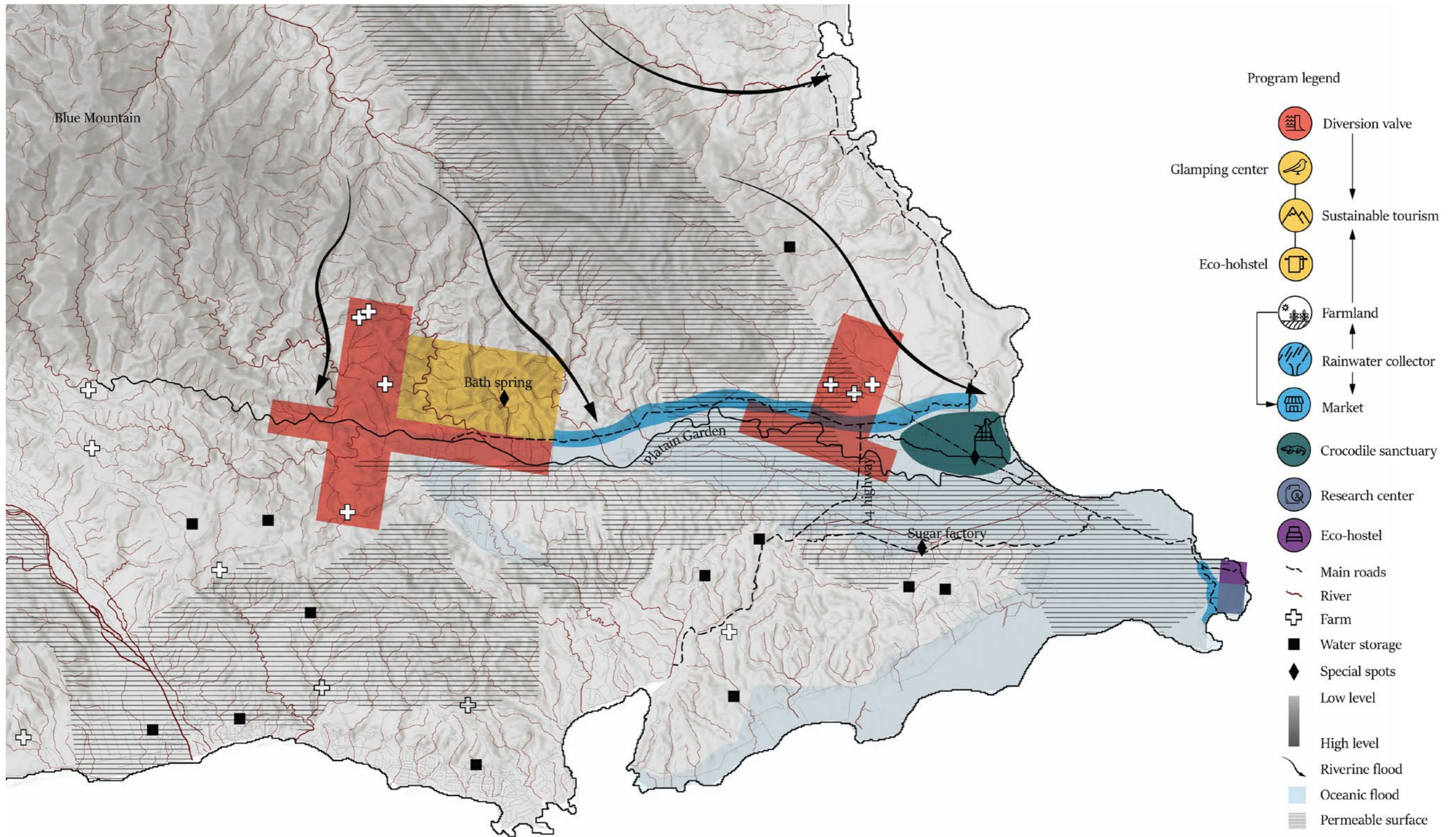
Due to the intense river system in the east part of Jamaica, coastal flooding as well as riverine flash flood will occur in the site area. Also these flooding areas are highly overlapping with agriculture zones. Therefore, our project intends to mitigate this situation and incorporate devices into infrastructure and architecture.



Water collector device prototype design by Leah Smith. Drawings produced by Leah Smith.

Funnel device

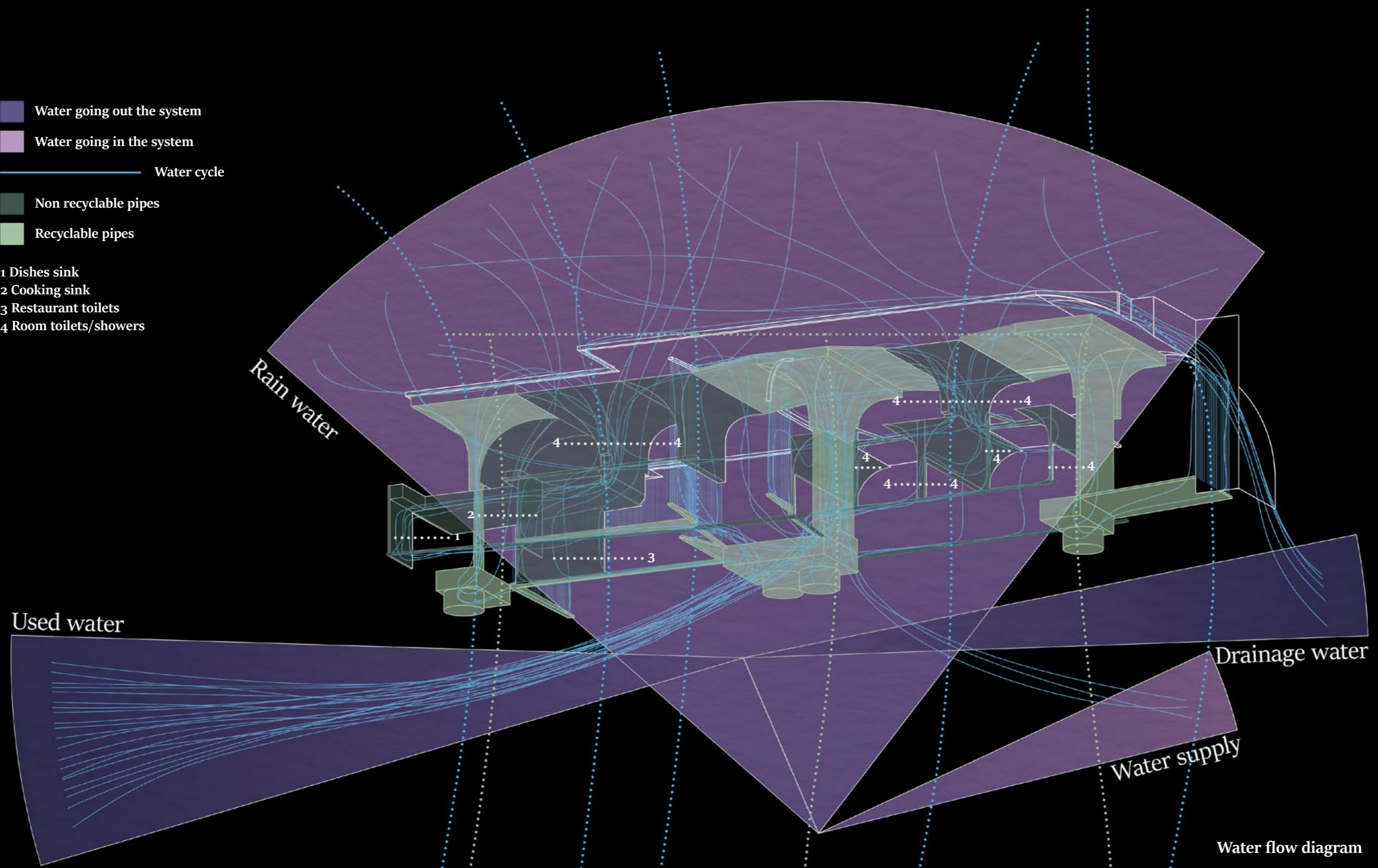
Flash floods always occur during rainy season and around intense river systems. Therefore, a funnel-like rainwater collection prototype is designed for mitigating the situation. This device could be incorporated into architectural structure and design, as well as itself being a leisure destination. The funnel functions to collect rainwater and allow it to travel through the hydroelectric power generator. The water can then be stored and pumped up again for irrigation during drought conditions



Programming

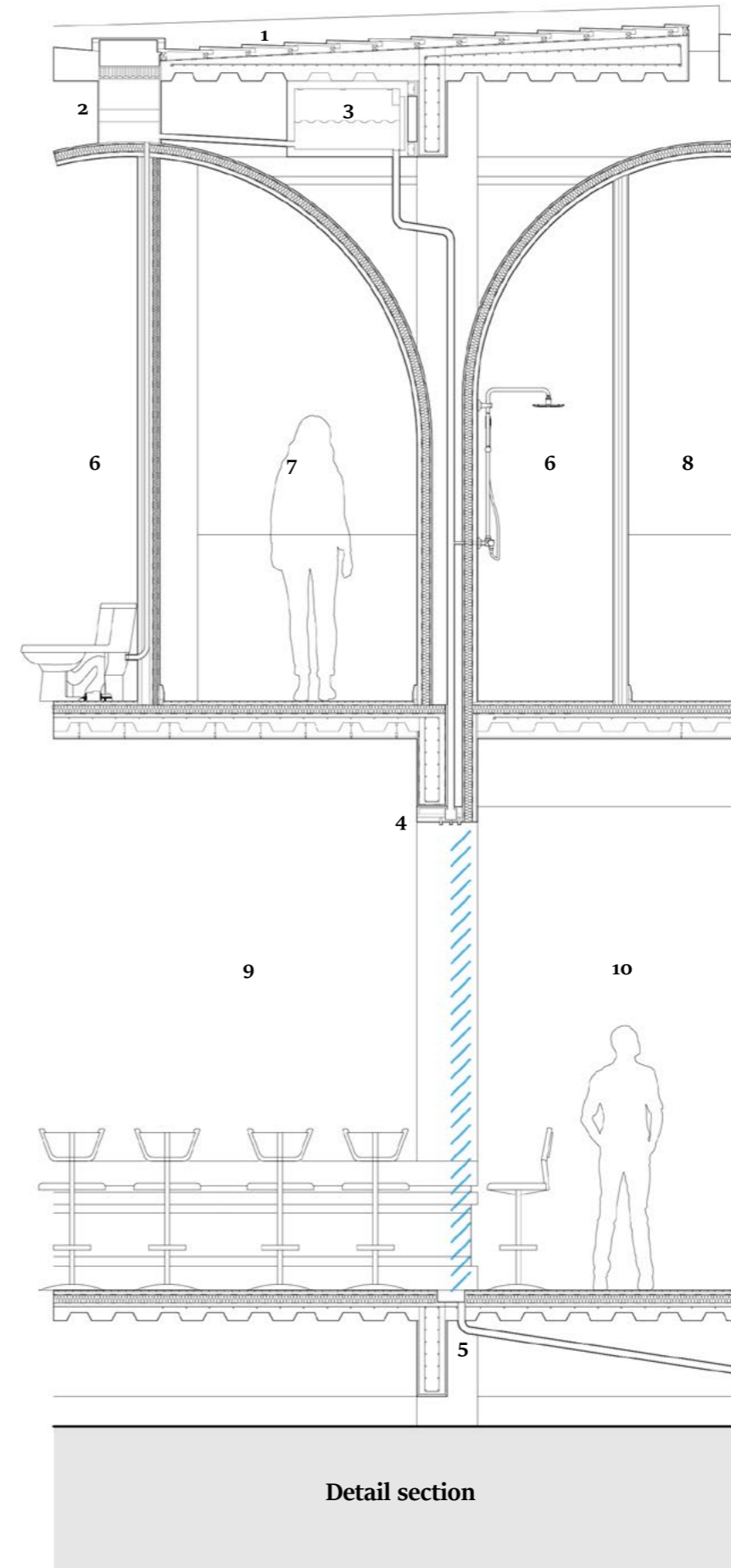
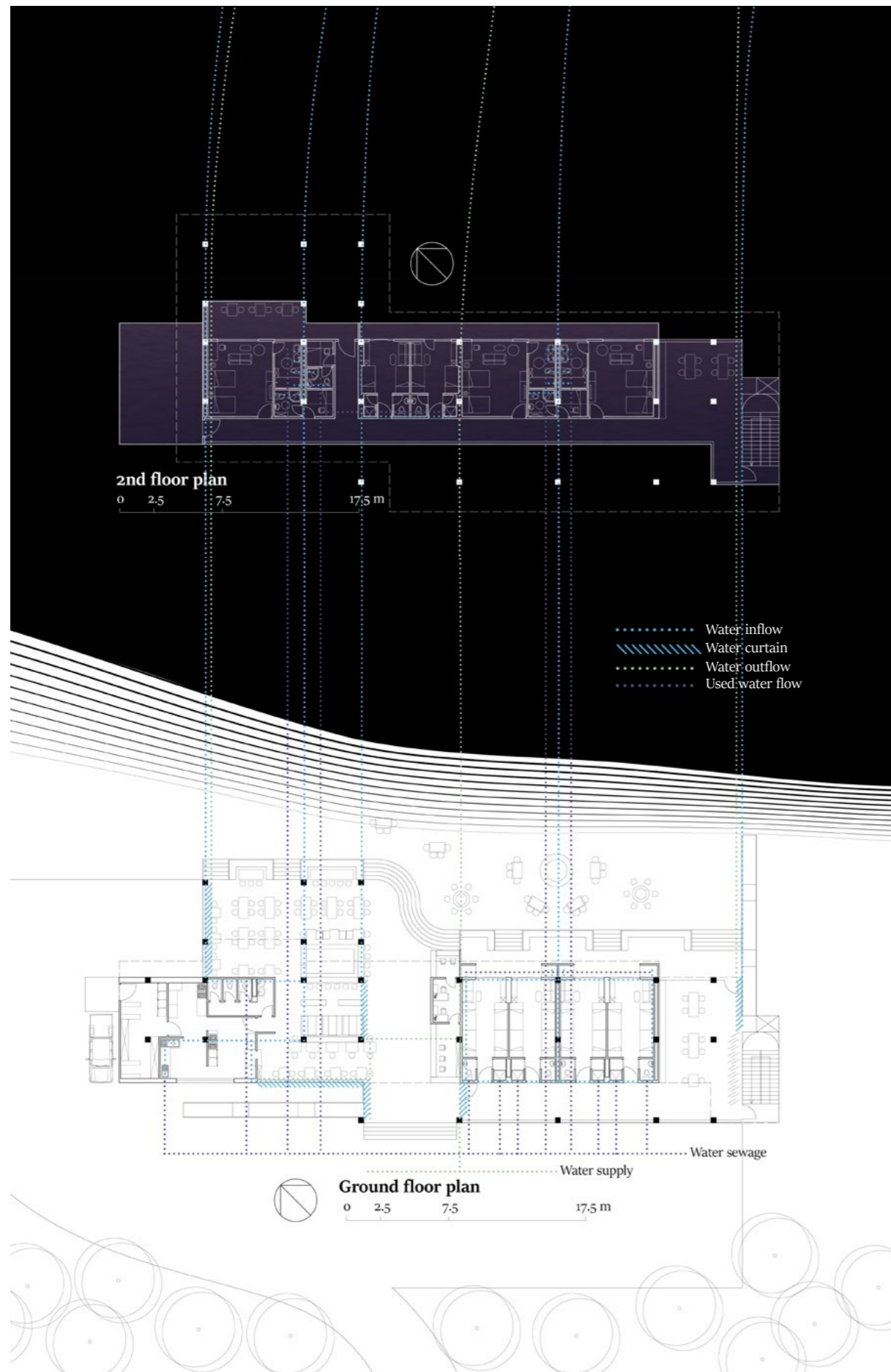
According to the analysis of the topography and hydrological features of the east end, the site is separated into three parts: the upper river, the lower river and the east end. The upper river is our frontier site for the diversion valve system, to divert the riverine flood at its beginning. In the lower river region, we are considering setting up a series of markets as well as parking spaces for road trip travelers. This would form a linear protection barrier, which is in blue, for the crocodile sanctuary, which is in green. And lastly, the East End, where our eco-hostel and oceanographic research center are located.

- Water going out the system
 - Water going in the system
 - Water cycle
 - Non recyclable pipes
 - Recyclable pipes
- 1 Dishes sink
 - 2 Cooking sink
 - 3 Restaurant toilets
 - 4 Room toilets/showers



Water flow diagram

The project's core is the circulation and flow of water. Rainwater comes from above and enters the funnel collector leading to down pipes that are for the services such as guest rooms and restaurants. Some water will go through a water curtain system that would give the visitors a different feeling of walking through and between water. And that water will enter the storage tank installed below the deck of the first floor. After the treatment process, the water could circulate back to the roof through the light green funnels and be used for water curtains again or for services usage. The used water will leave the system through the drainage pipes.





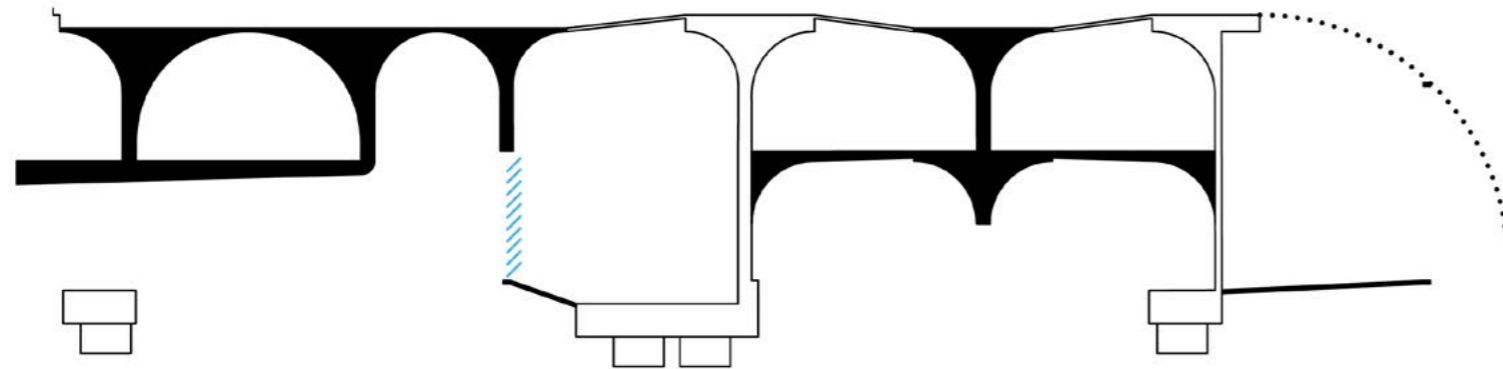
Beach bar

The water curtain at the beach bar could also be used as a projection screen for the guest in reception lounge.

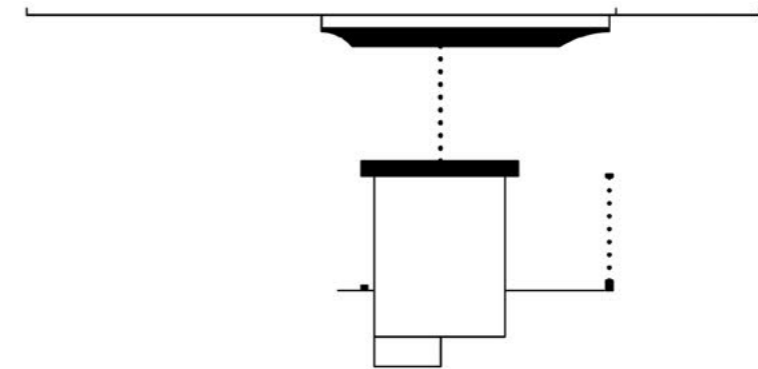


Sunset surfing

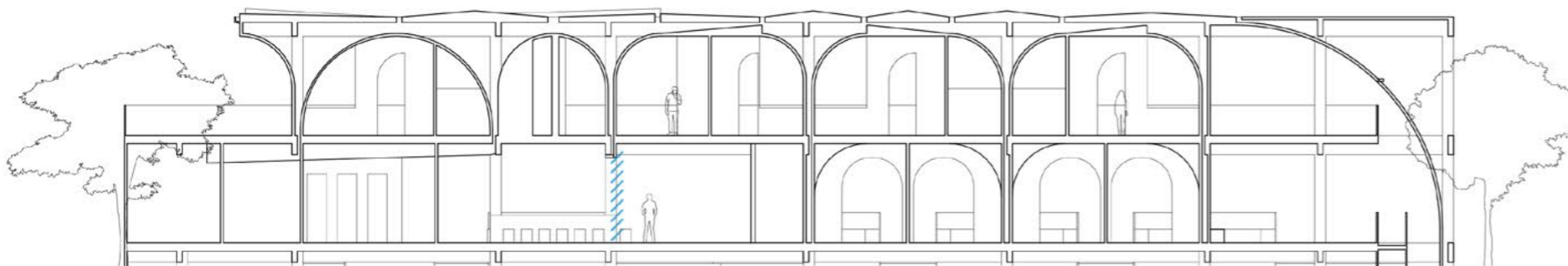
The waterstiel located at the beach provides amenities and services for adventurers to have fun along the sea shore.



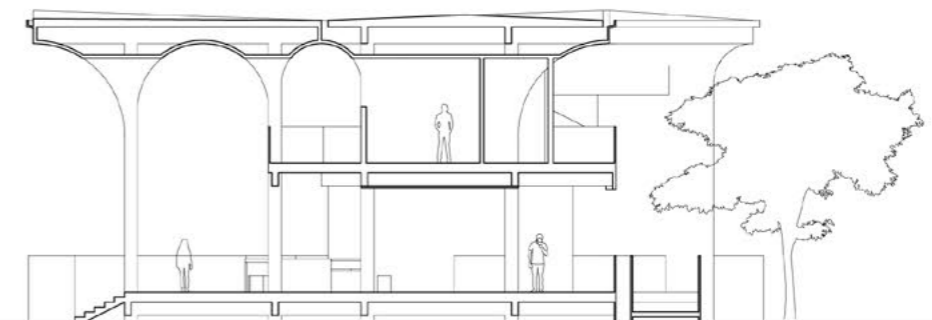
Water cycle diagram



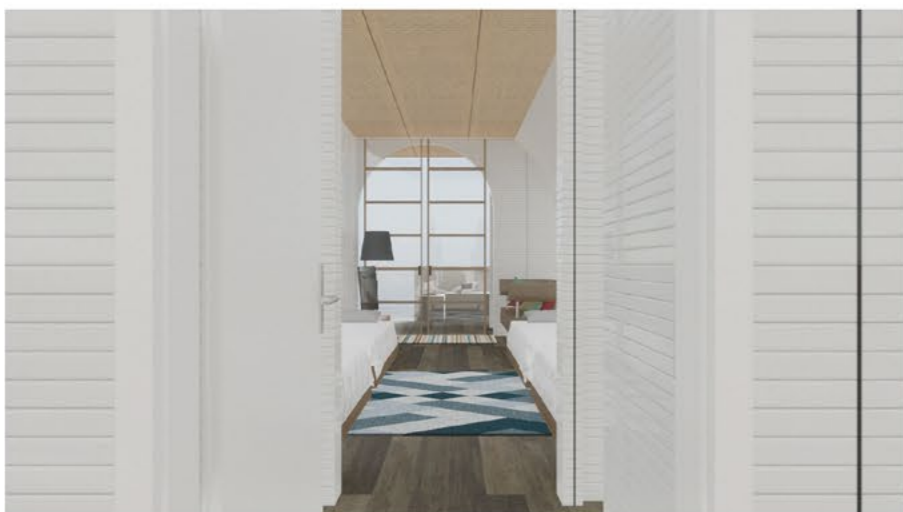
Water cycle diagram



Longitudinal section

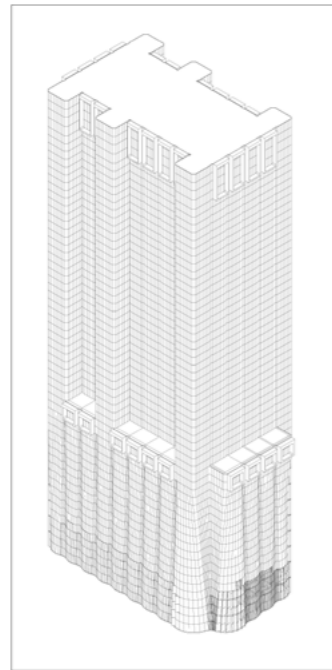


Lateral section

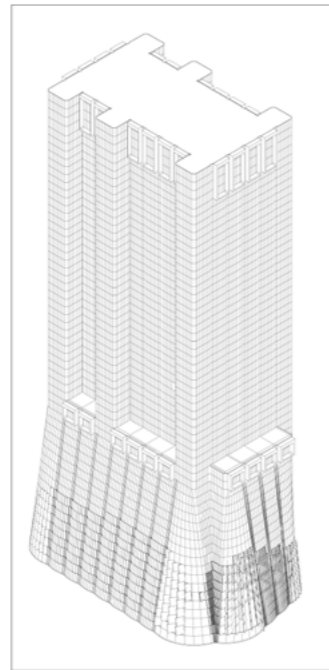


A Rainy Day in Waterstel

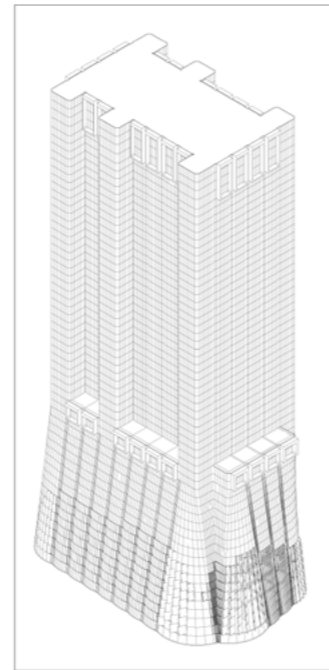
- 1 restaurant & reception lounge
- 2 beach bar
- 3 corridor on first floor
- 4 surfboard lounge & staircase
- 5 corridor on second floor
- 6 public lounge
- 7 4 bunk bed room
- 8 full suite
- 9 balcony towards the sea



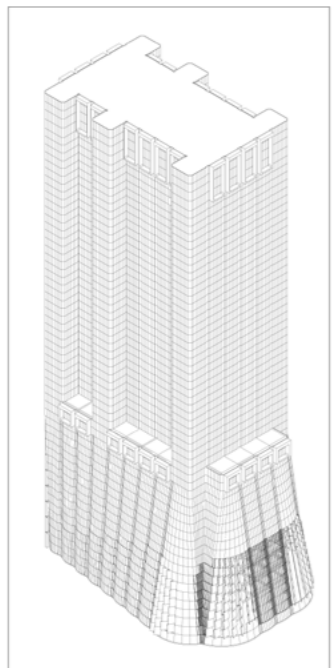
Original design



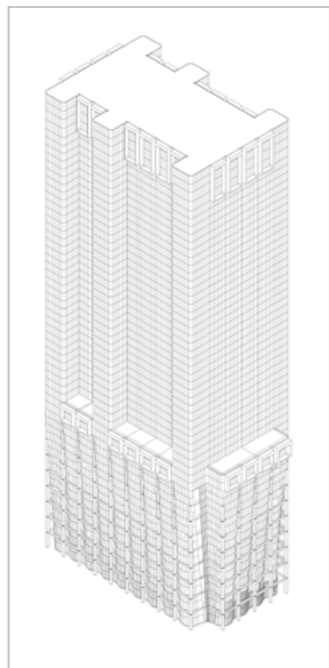
1 small station flow rate increased



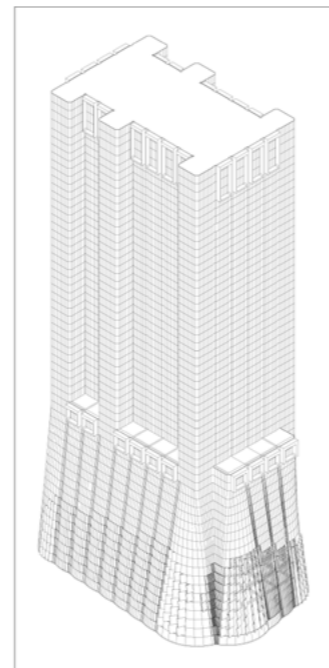
2 stations closed (flow rate 0)



1 station closed (flow rate 0)



Halved distance domain



Double distance domain

04

Re-thinking BIM

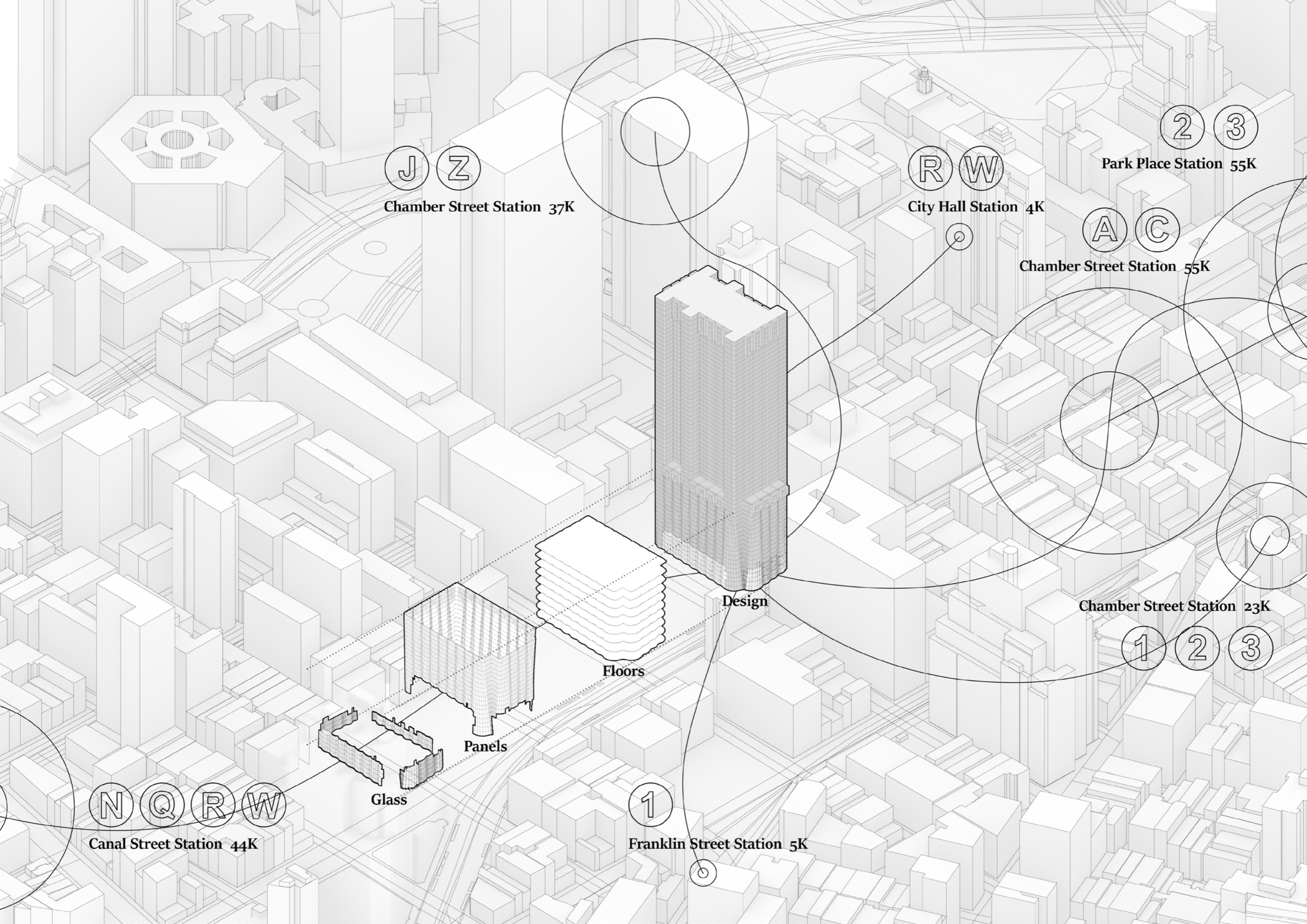
Long Line Building facade renovation workflow design

Instructors: Mark Green
 Fall Elective Course/ September 2021
 Group research and design with Ralph Cheng

Our capabilities as architects today, to create and leverage organized building information, is continuously expanding the possibilities for designing and understanding what we build and how we can build it. Developing a literacy of the digital tools and how to leverage them through informed design practices that exist both within the architectural field and more broadly, is an increasingly essential competency for designers. This class challenges students to develop robust methodologies and frameworks to better drive possibilities for creative iteration and validation of design solutions through analysis, automation, simulation, optimization, and representation.

This course is intended to provide foundational knowledge of building information modeling (BIM) practices, as well as relevant options for alternative design-platform interoperability and integration.

For the final project, students will select one or more approach to interoperability and design intervention, leverage the affiliated platform(s) to develop their advanced parametric and design-informed methodologies, and apply them to the models developed earlier in the semester with a revised set of design goals.



(J) (Z)

Chamber Street Station 37K

(R) (W)

City Hall Station 4K

(A) (C)

Chamber Street Station 55K

(2) (3)

Park Place Station 55K

(1) (2) (3)

Chamber Street Station 23K

(N) (Q) (R) (W)

Canal Street Station 44K

(1)

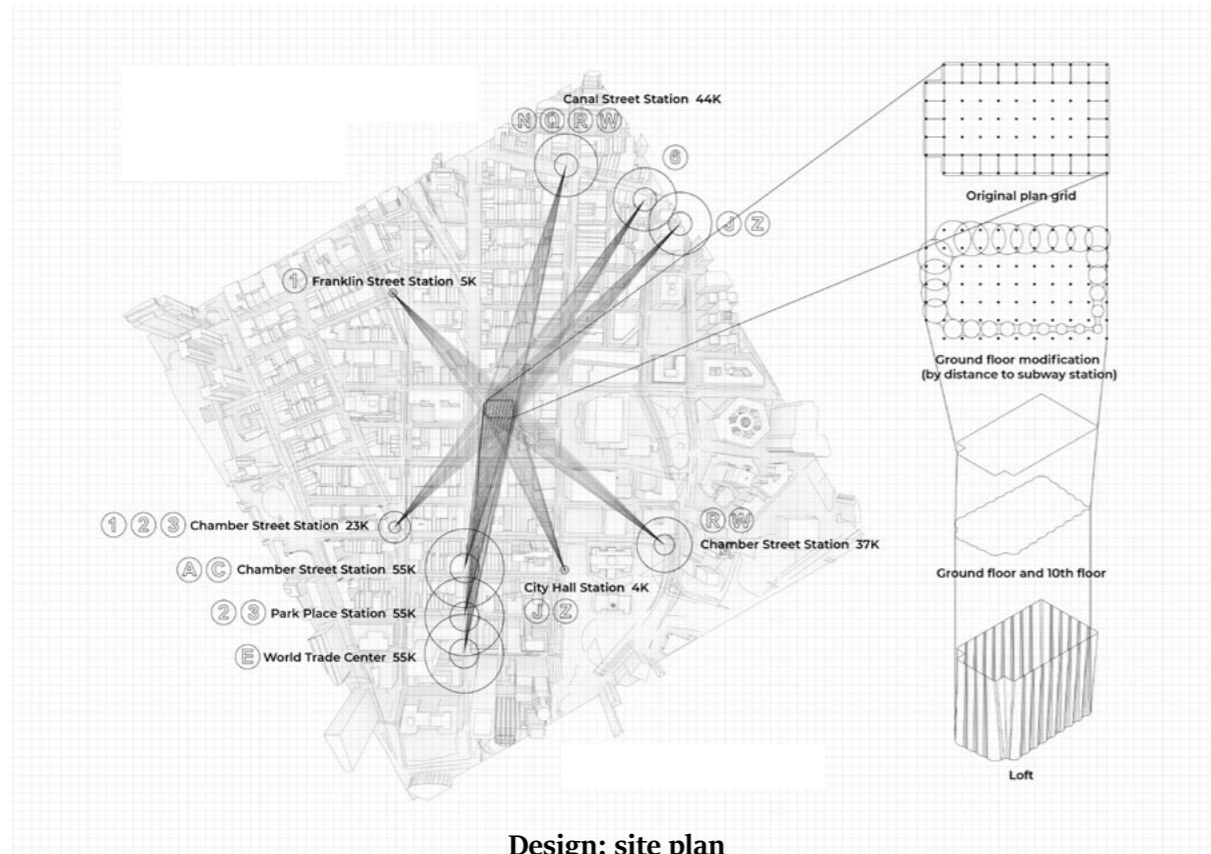
Franklin Street Station 5K

Design

Floors

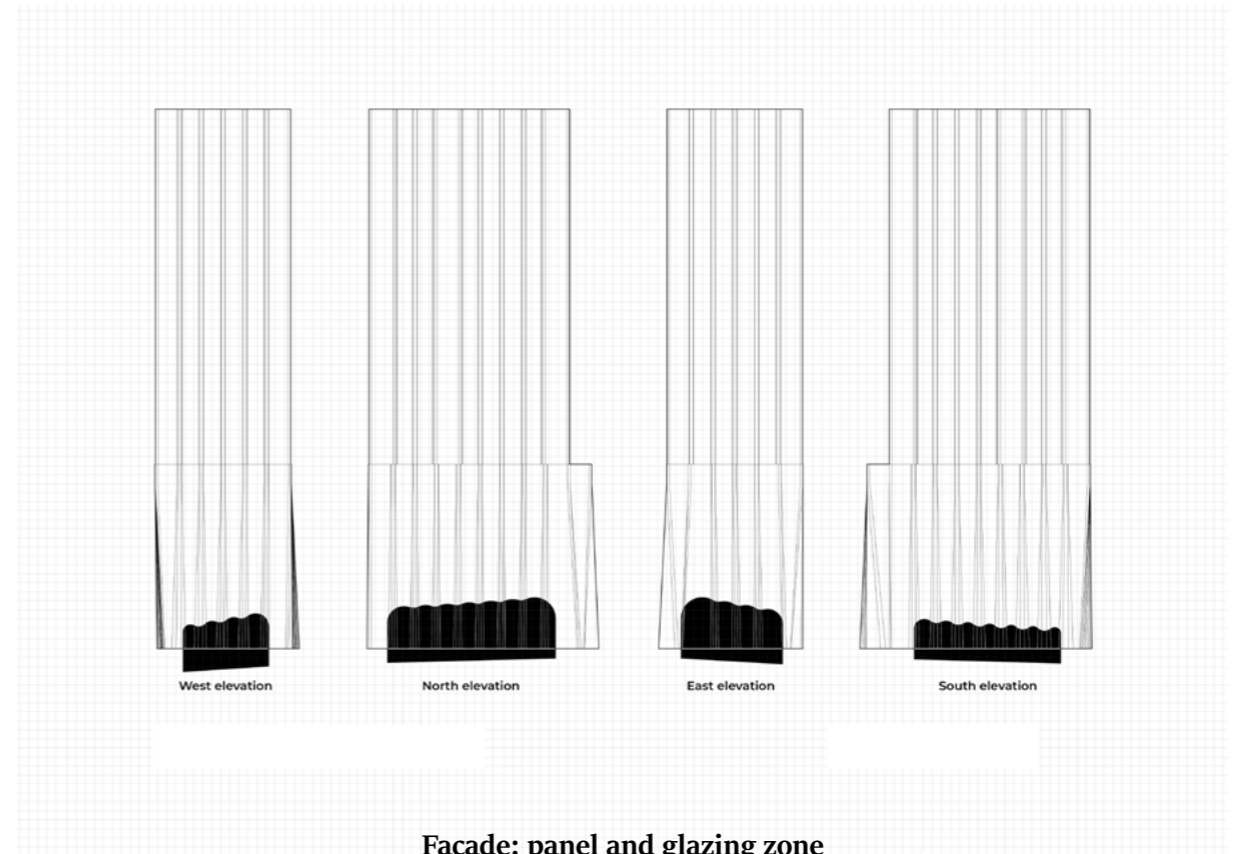
Panels

Glass



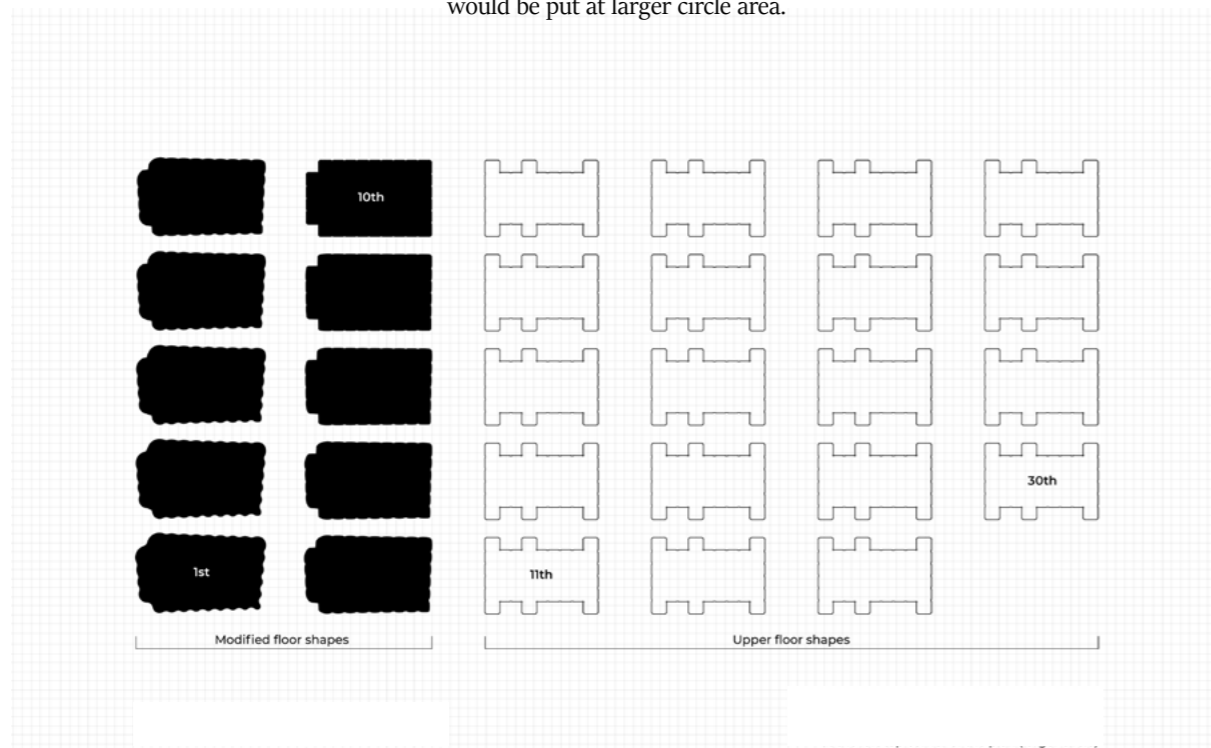
Design: site plan

The design using the distance from each grid's centroid to the nearby subway stations as parameters and their flow rates as weight to control the shape. The larger the circle is, the more closely related to the station. Therefore, more public function would be put at larger circle area.



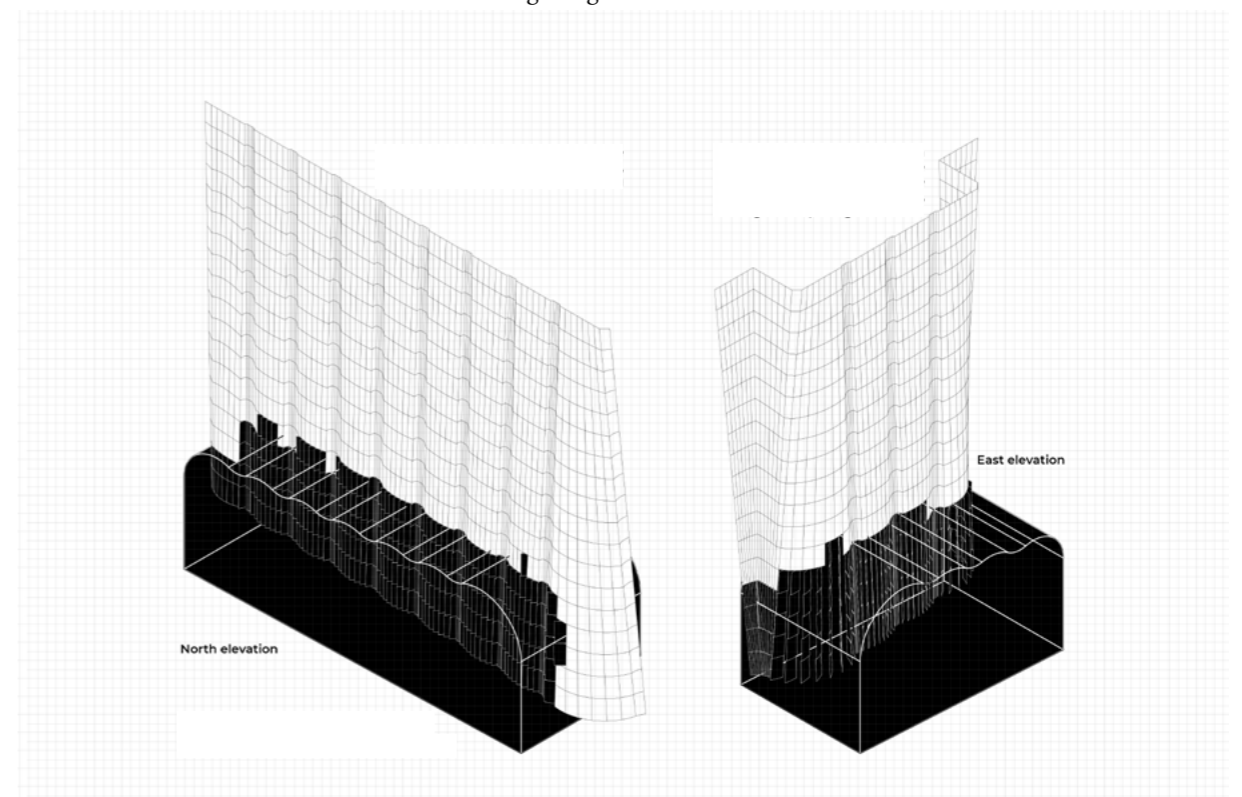
Facade: panel and glazing zone

Black areas use similar method as plan formation, to control the size of glazing area on the facade



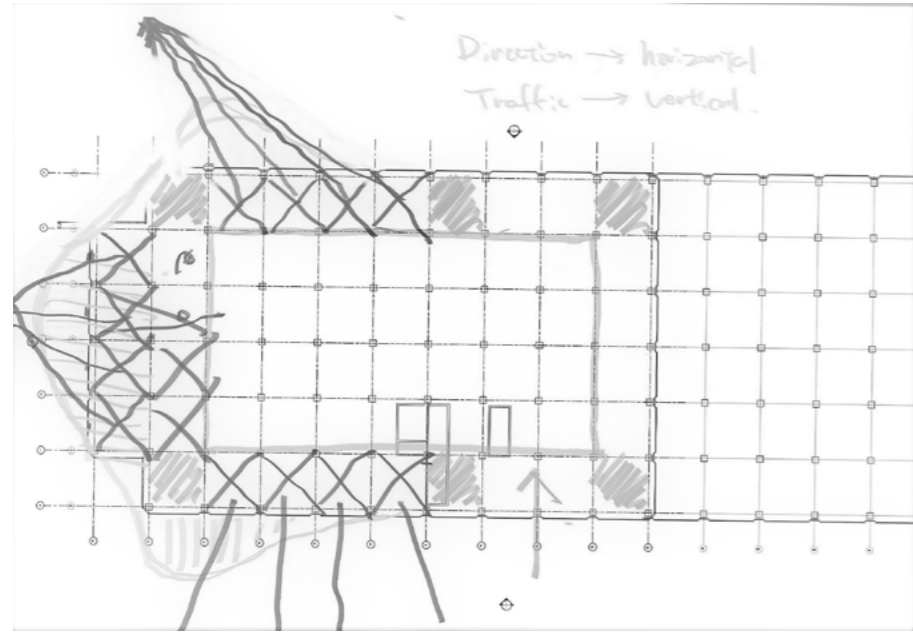
Floor: forms

Black floor plans are the modified floor plan for the design, using the distance and flow rate as parameters. Public services such as cafe will be located at the left top corner of the plan.



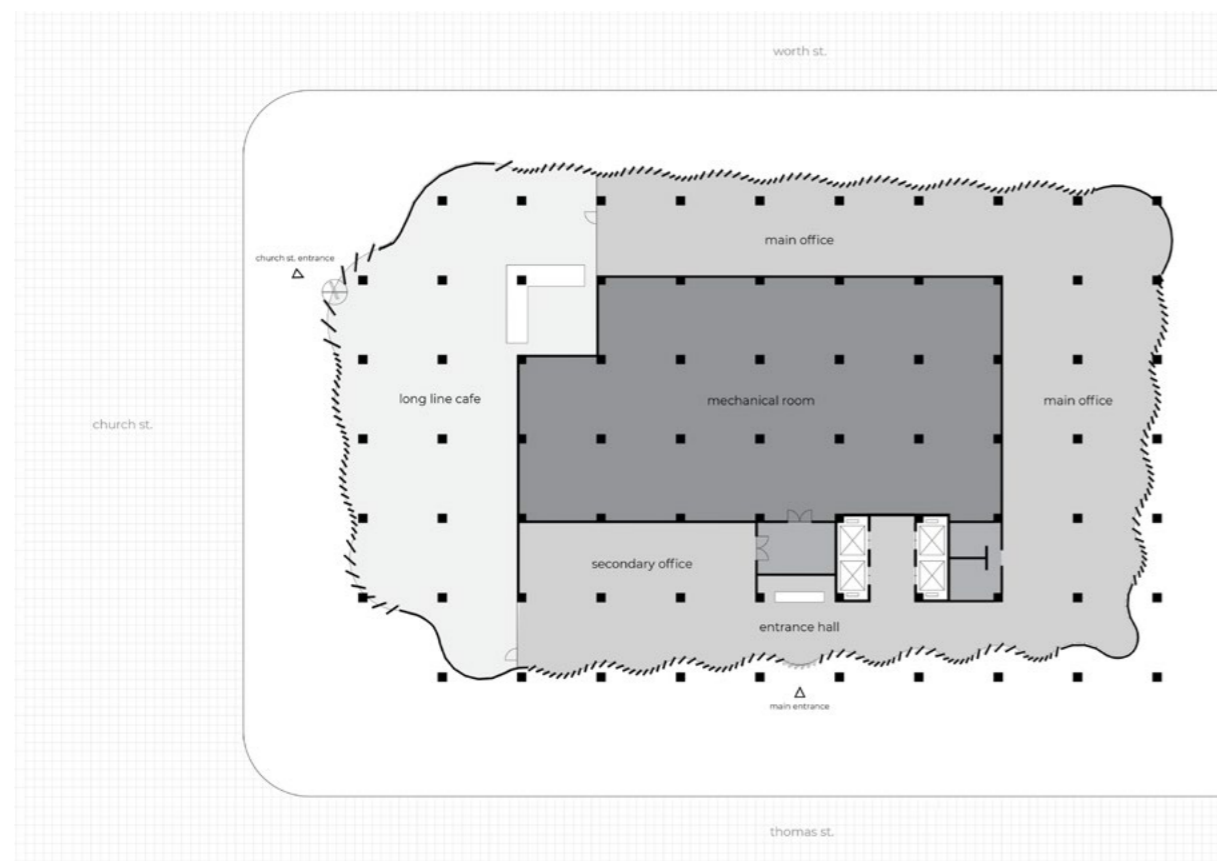
Facade: glazing rotation

If the centroid of panels could be projected onto the surface (black areas), the panels become glass glazing. The glazing panels rotate in a certain angle corresponding to the distances from each stations.



Conceptual draft

Draft diagram showing the conceptual ideas of using distances to modify the floor shape



Floor plan

The ground floor plan showing the main functions such as the cafe (at the top left corner), the entrance hall with elevator shafts, the office area, etc.



Perspective rendering

The rendering showing the renovated facade with the rotating panels, the new floor plans and the surrounding environment with people and vehicles



Soviet Pavilion in Russia: an architecture for world revolution

05

History of Architectural Theory

Theory reasearch essay on Russian Constructivism

Director: Mark Wigley
Instructor: Ashraf Abdalla
Fall Elective Course/ September 2021
Individual essay

Architecture emerges out of passionate and unending debate. Every design involves theory. Indeed, architects talk as much as they draw. This class will explore the way that theory is produced and deployed at every level of architectural discourse from formal written arguments to the seemingly casual discussions in the design studio. A series of case studies, from Vitruvius through to social media, from ancient treatises on parchment to flickering web pages and tweets, will be used to show how the debate keeps adapting itself to new conditions while preserving some relentless obsessions. Architectural discourse will be understood as a wide array of interlocking institutions, each of which has its own multiple histories and unique effects. How and why these various institutions were put in place will be established and then their historical transformations up until the present will be traced to see which claims about architecture have been preserved and which have changed.

In each session, particular attention is paid to the way that architectural theory--statements about what architecture could be, should be or should not be--act as overt or covert agents of privilege and subordination, crafting inclusions and exclusions through active racializations, genderings, class stratifications and sexual stereotyping. Architectural theory, that is, is positioned in a hot cauldron of fear, desire, power, pleasure, prohibition, and transgression.

Towards Russian Constructivism

Xinan Tan

Final essay | History of Architectural Theory

Abstract

If we say that architectural theories evolved and transformed from Vitruvius, then we could say that each theory was born within its specific social context and time background. And within each era, the prevalent theory always guided a certain way of construction or aesthetic design. That is to say, the background helped to nurture the core concept of a theory, spread it back to the society and reshaped people's concept and mind in corporeal forms that gradually changed the core of certain theory. The mechanism between the different actors within this system is quite complex and interesting to discuss since it is not just a topic of design theory, but a subtle dynamic transformation also concerning the social aspect. Therefore, this essay puts focus on Russian Constructivism during the beginning of 20th century, concerning the multi-layer of historical events that shaped and reshaped social forms. The break from Capitalism to Socialism also paved the way for post-constructivism theories (such as socialist realism and futurism) from constructivism. Hereby, a historical background research concerning 20th century Russia is made in order to discuss the social structure and ideology of that time, so that an image of the contextual society could be constructed. Furthermore, the transformation from capitalism to socialism became one of the main factors that influenced the development and formation of the constructivist theory. As a result, different schools of architects and artists such as Naum Gabo, Vladimir Tatlin and El Lissitzky emerged at that time. Later on, however, during the reign of the later Stalinist regime, under the influence of futurism, the architectural style started to transform towards a more centralized controlled one, which gradually lost the very concept of the diversity of Russian Avant-gardes and constructivism.

Constructivism emerged from the beginning of 20th century, in the complex background of industrialization and World War I in Russia. The historical and social context of that period is so complicated that the birth of Constructivism needs to be analyzed and discussed deeply and detailedly. Also, the Bolshevik Revolution also stimulated the formation and development of the theory, in which the divisive parties and groups created huge gaps between social entities. The conversation of Russian history from the 1880s to the 1920s will be put on table as the basic background for the theory, and furtherly lead to the discussion of the formation of Constructivism through several theories shifted at that time. Also, the definition of "constructivism" is not accurate and needs to be redefined according to the material we have nowadays. From different angles of analysis of the formation of the theory, the conclusion is that it is the multi-conflicting ideologies deriving from the historical context that make constructivism as a collective methodology of design to represent various dilemmas and aspects of the society at that time.

Furthermore, the nuances between the concept of constructivism and productivism need to be discussed and clarified. Naum Gabo and Vladimir Tatlin were two major leaders of constructivism and productivism theory, respectively. Their argument between each other and their works represented the essence of the ideologies of these theories, which influenced and helped to develop many future theories and styles among the world. And their spirits and core ideas within the theories also give the audience from all over the world to understand the Russian Empire and Soviet Union in the struggling years from the 1890s to 1920s. After the death of Lenin, the Stalin government started to officially unitize and formalize the communism theory into practical policies and measures. Therefore, the whole social structure shifted again into a more homogeneous status.

Keywords | Typology, theory, style, context, Russian history, World War I, Bolshevik Revolution, Socialism, Communism, Capitalism, Constructivism, Productivism, Naum Gabo, Vladimir Tatlin, El Lissitzky

Context matters: theory, typology and style

The first thing that comes into my mind when talking about theory and its relationship with social background, is the term "typology". There are so many entanglements between these two concepts that it's hard to define their relationship. Hereby, a series of examples is used to elaborate these concepts and their relative terms.

What is typology? This is a critical question in the long history of architecture. It is easy to think that a typology is a type, meaning a collection of different objects or elements that share common characteristics and attributes. However, when the concept of classical architecture and Renaissance architecture are put together on the table, it's obvious that they don't belong to the same typology. Classical dome in the Roman period is the symbol of perfection, eternity, and the heavenly sky. This symmetrical geometry also reflected the idea of fairness and democracy, which was prevalent within the society during that period. When Brunelleschi designed the Lantern dome on the Cattedrale di Santa Maria del Fiore in Florence, he combined the characteristic of classical dome and gothic lantern, with eight ridges, to represent an entirely new type that no one could've imagined before. Posterity always praises this piece of architectural splendor as an engineering miracle since it doesn't employ any centring (wooden or iron structure) to support the 4 million bricks masonry (fig.1). However, the significance of Brunelleschi dome should derive from its social background. The reason why Brunelleschi designed in this way is probably because the gothic idea of theocracy was discarded from the long medieval time, he only took the advantages from gothic architecture structure, but not the religious core of the architecture style. It is a dome, but it's not a classical dome anymore. Therefore, architects and craftsmen who imitated this new style of dome also helped to develop and extend the concept of this new typology of Renaissance architecture for more than 300 years. Although the Renaissance architectures could find their prototype in classical ones, their inner meanings and core spirits changed throughout the history. Therefore, typology could be transformed according to the background. Often, external events, such as new techniques or changes in society, are responsible for impelling architects toward the creation of a new type. That is to say, the consistency of gradual change of typology actually overlaps with the idea of the iteration of theory development. Typology is a theory of collecting elements and it has the same ability of being transformed as theory has.

What is theory? It can most simply be defined as a series of thinking which helps to guide a certain technique or corporeal construction craftsmanship. From this point of view, theory is also a collection of mind and thinking, which is very similar to the core idea of typology: collection of things that have common attributes under a certain background. Nevertheless, theory is more of a virtual term than typology. That is to say, theory could be considered as a mindful version of typology: typology is a broader concept, while theory is partial to it.

Thus, the relationship is gradually revealing between these two terms. Typology contains theory, and in the meantime theory is the precedent that guides typology. Taking the example of Renaissance architecture again as an example: the essences are the ideas generated in architects' heads, which is the criticism and disdain of the bureaucracy controlled by the churches and religions, and the justicial and impartial symbolism of Classicism that the society was looking forward to, that resulted in the product of Renaissance typology. Hereby, it is not the building being designed that mattered, but the reason why it was borned. The context comes first, generating the theory that constructs the realistic objects later.

To talk about "style", Durand's contribution on developing the notion of typology must be discussed (fig.2). In Durand's opinion, typology such as "classical order" should not be a typology, but just a mere decoration. "...Durand says that the architect's task is to combine these elements, generating more complex entities, the parts of which will, at the end, through the composition, be assembled in a single building." [1] Therefore, he came up with the idea of genre, which is very similar to today what we called Functionalism, meaning to classify architecture according to their use and program, such as libraries, museums, residences, hospital, etc. The concept of style was then established based on the system that Durand created: since architecture is a compound of different elements, the way they combine could

lead to multiple variations, where the style comes out. “...Style was something that could be added later, a final formal characterization given to the elements after the structure of the building had been defined through a composition, which somehow reflected its program.”[1] By then, style defines typology and theory. It is the common characteristics that share along in the same type of building. Style becomes attributes, theory becomes guidelines, and typology becomes results.

There are many words ending in “-ism”, classicism, romanticism, eclecticism, futurism, modernism, etc., by which it could indicate a typology, a theory, or a style. The relationship is just clarified in the last paragraph. We finally come to our topic of constructivism, which was born in Russia during the beginning of 20th century and overlapped with modernism. Both of these two theories were generated during one of the most important events in human history: World War I. Additionally, mass production and industrialization started to rapidly grow during that period. The Art Nouveau and series of theories such as cubism, purism, futurism that were prevalent during that period, were paving the path for constructivism. However, while modernism is always a main and extremely broad theme to discuss in architectural theory, constructivism is actually less often mentioned. The Russian-born background might be one reason for it, and the main difference between constructivism and modernism is the topic that is discussed throughout this session: the context. The socialism/communism context in Russia and capitalism context in the whole western world.

A Russian story: the WWI and the Bolshevik revolution

The story should start with the industrialization process of the Russian Empire at the end of the 19th century. While machines and industry made a great impact on Russian society, the Tsar and the ministry were actually still quite conservative. Each of the ministry departments could report to the Tsar separately and always caused conflicts between different ministry departments. The proposal of some relatively radical ministries sometimes contradicted the ones proposed by conservatives, which led to divisive superstructure of Russian Empire society. The final outcome was the fragile balanced attitude: industrialization should respect the traditional social structure and culture. This resulted in a very embarrassing scenario: the policy did not focus on the peasantry and the lack of agriculture reformation created more problems, while the industrial revolution was incomplete, also led to problems in another aspect. The ideology therefore was unconsciously influenced by the divisive points of view.

The industrialization of steel production and treatment in the western world led to the rise of the Art Nouveau movement. The wide range usages of steel to create curvature design and imitate flowery and leafy forms. When the architectural style of Art Nouveau was introduced to Russia from Brussels around 1890s, the style was pretty similar to what Victor Horta did in his famous Hotel Tassel. For instance, the Stepan Ryabushinski's house built in 1900-1903 indicates the vicinity to its Brussels origin in terms of its facade and the staircase in the interior (fig.3). However, under the contradictory ideologies between new industry and tradition mentioned before, the Art Nouveau style hereby started to transform into more of a Russian version. The Pertsov's Apartment building built in 1907-1908 is an embodiment of Art Nouveau and neo-Russian style. The colorful tiles and bricks on the facade and the Russian style pitched roof almost conceal the vegetal decorations from the details (fig.4). In this case, the designer and the client's aesthetics and requirements unconsciously reflected the struggling ideologies of superstructure.

The problems became more acute in the prewar time. The workers from the factories were not able to benefit from the policies and the Labor Laws, and the continuous low wages aroused more and more strikes. “...During 1906, there were frequent strikes and workers energetically set about testing authorities' ability to uphold the restriction on the trade-union organization.” [4] Partial reasons for the strikes were from the disappointment towards capitalism. Therefore, it turned Russian people to Marxism from almost half a century ago. The domestic discontent for the Tsarist government became stronger and stronger, everything was at the edge of collapse in the 1910s. On one hand, the Tsar and his government couldn't placate the rage; on the other hand, the Russian Empire's colonies dispute with other countries

also started to intensify. Then came the First World War.

The war began with the Three Conflicts: France-Germany, Russia-Austria Hungary and Britain-Germany. The conflicts were mainly about the ownership of different colonies around the world. Therefore, in 1882, Germany, Austria-Hungary and Italy established the Triple Alliance, while in 1907, the establishment of the Triple Entente consisting of France, Russian Empire and Britain, which was intended to antagonize the Triple Alliance. With several years of conflicts and war, the major situation was formed: “...the continent of Europe split into two opposing alliances; the Allied Powers, primarily composed of United Kingdom of Great Britain and Ireland, the United States, France, the Russian Empire, Italy, Japan, Portugal, Greece, Serbia and Montenegro; and the Central Powers, primarily composed of the German Empire, the Austro-Hungarian Empire, the Ottoman Empire and Bulgaria.”[2]

Throughout the history of Russia, World War I definitely could be counted as one of the most unstable eras. It was the period that the Russian Empire came to collapse after the February Revolution and October Revolution and the period of the establishment of the Soviet Union after the civil war in the 1920s. The transformation from Tsarist despotism to the socialism/communism guided by the Marxism theory created a chaotic and disordered background and influenced the ideologies of people at that time.

P.A. Riabushinskii said in July 1915 that “We need all factories and workshops at the present time to become one gigantic factory, working only for the Army.” [3] This indicated the dramatic shift of the Russian Empire's economic structure at the wartime. Due to the uneven distribution of fuel and raw materials, the Russian Empire started its mobilizing industry based on the transportation of resources to factories located in different parts of the country. Everything was for only one aim, that is to produce as many weapons and ammunitions as possible. In order to do that, the need for recruitment of new labor forces increased intensively during that period, including workforce for large-scale production and long-distance shipment of raw materials and final products. All unemployed workers, new unskilled entrants to industry, even refugees, prisoner were dispatched to different places to work. The major conflict was that the high input of human labor forces actually didn't give back much higher production output (fig.5).

With the pressure and exploitation from the tyrant Tsarist government and the reign of Nicholas II, people's lives were getting harder and harder, everything was in the precondition for the October Revolution. After the outbreak of civil revolution, the condition took even a more dramatic turn, almost all the industries were stagnant and stopped, except for clothing, printing, art and animal products. The most vital industry, food, drink and medicine, decreased by 70% in 1918 compared to 1913, leaving the Russian people into famine. It was not until 1922 when the United States started to ship foods to the new Soviet Union by president Hoover that the condition started to turnaround.

The pressure from WWI split the entire Russian society into different fractions and groups. Due to the incomplete industrialization and capitalism infusion, the Tsar's government imposed exploitation on people to fight the war and produced as many weapons as possible to tackle the war. The Russian socialists and “...the revolutionary working class of Petrograd kept up an attitude of menacing expectancy, in the hope that their brethren in Germany and Austria, as well as France and Great Britain, would support them.” [12] However, the European alliances were proclaiming a national truce with the capitalists, which helped the Mensheviks, a bourgeois reformist wing of the early Russian labor movement in eastern Europe and northern Asia, to support the Tsar's government. The bourgeois's benefits from the war, in terms of the colony ownerships, strengthened the entanglement between the superstructure of Russian society. This political act concerning the European socialists, the Mensheviks and the residual Tsar's government made the political background even more divisive at the end of the war.

Under certain circumstances, the main leaders of the “...Bolsheviks were at that time abroad, as exiles in various countries” [12], so that their voices and political opinion couldn't reach the masses. The turning point was on May 3rd, 1915, when the Russian front was defeated on the battlefield of Galicia. The Bolsheviks started to gather their voices,

protesting and condemning the exploitation from the government and the collusion between the government and the Mensheviks. In March 1917, under the leadership of the Bolshevik Party, a strike involving 300,000 people was held in major factories in the capital. The revolutionary storm frightened Tsar Nicholas II, who ordered that any measures must be taken to quickly restore order in the capital. The arrest of various leaders of the Bolshevik Petrograd Committee and other revolutionary activists provoked great anger among the masses. They took to the streets to protest against the government, but were treated with even more brutal repression. So the Committee, which led the strike, decided to turn it into an armed revolution and overthrow the Tsarist government. After the February Revolution, the Tsar's empire announced its abdication, giving the political power to the Provisional government that was established by the Mensheviks. The unbalanced relationship between the Provisional government and the Bolsheviks led by Lenin resulted in the Bolshevik Revolution in November 1917, which opened a new chapter for the Russian Soviet Republic.

With the ongoing war and revolution, Russia was in the midst of intense social turmoil at the end of the 19th century. The final result of the socialism revolution led to a completely new form of ruling, which influenced the basic social structure at that time. The idea of community and publicity spread throughout the Soviet Union ruled under Lenin, so that the concept of "individualism" and "capitalism" were gradually out of discussion. In El Lissitzky's words, "The individual, private client has now been replaced by the so-called 'social commission'. Emphasis has shifted from the intimate and the individual to the public and the universal." [14] Also, from intellectuals to ordinary people, all expressed dissatisfaction with the old system and hoped for changes. This desire for change is reflected in art and ideological structure, which questioned and denied traditional art and the yearning for new art. [13]

Heading Towards Constructivism: Capitalism and Socialism

Russia had to face the problem of hunger and resources shortage, including manpower, exhausted by the series of wars and revolutions. Materially speaking, economy and production must be reconstructed and developed as soon as possible with the newly introduced industrial technology; meanwhile, the art and architecture also need reformation under the change of the bigger framework of socialism, as mentioned above. "We need new forms. New forms are needed, and if we can't have them, then we had better have nothing at all!" [5] This was a line written by Konstantin Treplev in his play at the end of the 19th century, which indicated the increasing and urgent appeals for new ideologies that could manage to save the Russian people from the deep tragedy that was caused by the pressure within the society and the coming war. Corresponding to the struggling of the divisive opinions between Russian ministries, the architectural and art theories generally were also split into two different directions, which were:

1 A search for a completely new style that has nothing to do with the past, because people were tired and afraid of past traditions and the old ideologies that led to the despotism empire and autocratic government in those days. This thinking was affected by the basic Art Nouveau movement and the coming Modernism from Europe and the US and would lead to the futurism concept after several years.

2 A retrospective point of view that looked to the past. Just like any other architect during Renaissance and Gothic revival period thinking that the glorious past was the implications of prosperity, these architects went back to the past for the same reason: they wanted to sort out the reason why classicism was always a prevalent style throughout the long history of architecture.

Although the conflicts existed among cultural, social and architectural aspects, the growing power of socialism unconsciously reformed the ideologies of people. As discontentment grew and Marxism started to spread throughout the entire country, the concept of union and solidarity gradually formed within people's minds under the big context of industrializing society, especially among those workers that were treated unfairly in their labor. Therefore, "...while

the still modern (modern style) and the 'retrospective positions appear to be antagonistic – the former based on the principle of the new, the latter on a love of the past – they share a hostility to the lifeless eclecticism' of the previous generation and they both sought to develop an all-encompassing approach to design." [5] This resulted in the new architectural idea of stylistic unity, despite the differences. This new form of unity implied an organic relationship between forms and functions of buildings and it collected conceptions across multiple scales. The integration of different aspects in arts and architecture were the main focus of Russian architects, the key to the survival of architecture culture in the coming collapse of the Russian Empire.

The introduction of heavy industries also brought capitalism into Russia in the beginning of the 20th century. Therefore, feudal imperialism, capitalism and socialism coexisted in this country. As Marx defined that the bourgeoisie and the proletariat are the two main conflicting classes under the capitalist system, the working class, for example, artists and architects in our context, is always on the conflicting side with the bourgeoisie, who is also the governing class of the society in Soviet Union. In one way, the artists and architects might engage their perceptions and ideologies in a more humanistic perspective, so as to represent the ideas of the masses, which means art has become a representative form of cultural labor. Therefore, under this circumstance, there will always be sarcasm and criticality towards the governing class and system. However, the new artistic aspirations actually flourished in the fertile soil of bourgeois, supported by the great merchants, meaning invested and culminated by the wealth, so that it became more and more isolated and contradictory by its original definition of opponents to the superstructure.

For example, the architecture field was monopolized by wealthy investors such as royalty and the middle class that benefited from industrialization and the revolution. "...The first permanent displays of this new ideal of stylistic unity appeared in the building type favored by the growing merchant class: the *osobnyak*." [5] Also, Talashkino, a newly established art institute at that time, was designated for training local artisans to produce furniture, household tools, and decorative art with stylistic unity and decorative integrity. This is where sarcasm came from as mentioned before: that these institutes were actually driven by capitalism but instead intended for spreading socialism ideas. On one hand, since capitalism is about improving efficiency and gaining controls and orders, we might assume that the original purpose of establishing these high hierarchy art institutes was to regularize and monopolize the art fields. However, the purpose of it changed afterwards, and I'll get to that later. On another hand, unity was paralleled with socialism, or communism, in terms of it symbolizes equity/fairness, and the heterogeneous attributes of objects within unity also provides efficiency in the background of mass production under industrialization. Hereby, capitalism and socialism are all seeking for efficiency, the only difference is the former is for individuals and the latter is for community benefits. Therefore, the establishment of Talashkino and other organizations were for the interests of the founders in the beginning. However, with the infusion of socialism, the audience shifted to the civilians and local people. The institutes intended to create a union atmosphere for not only the upper ten but also for the lower class and workers. It was an educational intention for spreading new ideology and theory of art and architecture in more of a Russian folkway.

In 1902, the Exhibition of Architecture and Arts Industry in the New Style imported art objects, furniture and interior household design to Russia from Europe. The imports of corporeal objects brought along with the new idea of modernism, which stimulated the future occurrence of various schools in Russia. "For the first time, Russian architects, designers and the interested public could immerse themselves in an environment designed completely in the new style." [5] In the exhibition, Ivan Fomin designed one dining room together with another two living rooms inside the small apartment. The asymmetrical organization of the rooms broke with its past of regular classical configuration, cohering with the Art Nouveau style mentioned before (fig.6). The success of the interior design came with the multiple layers of surfaces in visual contacts and the richness of the material used. Also the Ryabushinski's house designed by Feodor Shekhtel took Victor Horta as precedence of the still modern, which has already been mentioned and discussed before in the above section (fig.3).

In the art regime, Russian futurism could be considered as an example of the new stylistic unity. Under the influence of cubism during that time by Picasso, the Italian poet Filippo Tommaso Marinetti started the new school of futurism from the avant-garde movement. After spreading into Russia, the Russian artists combined cubism and futurism into cubo-futurism with its special Russian background. In 1912, the Russian futurism group “Hylaea” issued the manifesto “A Slap in the Face of Public Taste”, celebrating “..the ‘beauty of speed’ and the machine as the new aesthetic.” The cubo-futurism (Russian futurism) inherited the essence of cubism, which is to represent the multiplicity of things through different perspectives in the construction of the paintings, and combined with the imaginary future with machines and industry, expressing the idea of controversy by repudiating the art from the past, saying that Pushkin and Dostoevsky should be heaved overboard from the steamship of modernity. The Hylaea acknowledged no authority and even rejected Marinetti, whose principles they had earlier adopted. This implied the eagerness of creating a new independent school of art and architecture that helped to survive from the chaotic social context.

Russian futurism flourished in the 1910s, however, most of the eminent architects, such as Shekhtel and Fomin, were turning back to classicism, just as what described in the beginning of this section. Fomin went back to the Academy of Fine Arts after he explored the early stil modern theory and became a leading figure in the classical revival movement. For example, in his Polovtsev House, the ionic columns and entablatures show the classical order without any disguise (fg.7). The plan also is reminiscent of the Palladian architecture, such as the Villa Capra Rotonda and Villa Emo. And also in the design of the Moscow Merchants’ Society building by Shekhtel, it represents the truth of structure and rationalism. Although the building erased all the existence of ornamentations and kept the columns as clean as possible, classicism still concealed behind the modernist outlook of the building (fg.8). The architecture in 1910s Russia started to develop and serve for the coming socialism political system, meaning heterogeneity, symmetry, mass production and symbolism, which could be seen from the works of Fomin and Shekhtel described above.

Cubo-futurism and classical revival, just like stylistic unity, together formed the new theory of constructivism. In the mid 1910s, Vladimir Tatlin and Alexander Rodchenko came up with the concept of constructivism: a theory aimed to reflect the industrialized society, Soviet socialism and the Bolsheviks regime ideology. The movement derived from cubism and purism, sharing the same concept, which is to simplify the figuration and geometry in a straightforward iconographic repertoire of everyday objects. The repudiation of decorative elements and the favor of industrial assemblage of material were driven by the post-war ideology that sought efficiency and production. After the 1917 war and Revolution, constructivism turned its attention to the new social demands and industrial tasks required by the new regime.[7] There were two different prevalent points of view at that time in terms of the definition of constructivism, where one stressed “the world is given us through vision, through color”, focusing more on the abstract volumetric form of art, where color and painting became a transfer point for architectural design. However, in El Lissitzky’s view, the leading character of this color theory, Kazimir Malevich, failed to recognize the objective reality of the world, so that the outcome products were not practical enough to be used. In the meantime, the other view stressed that “the world is given us through touch, through material”, which highly corresponded to the industrialized condition and post-war condition of that time. And it was this “material theory” that led to the final architectural constructivism movement, which was led by Vladimir Tatlin.

In general, thinking of Constructivism as:

- 1 deriving from stil modern and retrospective position
- 2 contradictory ideologies between artists and the riches in terms of art development at that special social environment
- 3 a result of cubism, futurism and purism
- 4 a result of 2D paintings to 3D materialized architecture forms

means that this theory is deconstructing different forms into elements and re-assembling them through the very

opposite and conflicting ideas that derived from the complicated historical background of Russia/Soviet society in the beginning of 20th century. The “...later series of experiments with materials and models gave birth to the term constructivism. The present ‘constructivist’ generation of professional architects look upon this work as formalistic or even ‘symbolic.’” [14]

One of the first projects of constructivism was the office building for the newspaper *Leningradskaya Pravda* (fg.10). “The design of the building represents a characteristic solution in a period yearning for glass, steel, and concrete. All accessories – which on a typical city street are usually tacked onto the building – such as signs, advertising, clocks, loudspeakers, and even the elevator inside, have been incorporated as integral elements of the design and combined into a unified whole. This is the aesthetic of constructivism.” [14] Also from the plans of the Soviet Pavilion designed at the Paris World’s Fair, we could see the similar composition of constructivism from the work of Malevich and Lissitzky, but in the meantime creating a new spatial experience from the texture of materials and the daylighting (fg.11)(fg.12).

Constructivism and Productivism: Naum Gabo and Vladimir Tatlin

Around the year of 1922, constructivism generally split into two antagonistic counterparts, which turned into constructivism and productivism in the future. Constructivism, led by Naum Gabo and his brother Antonine Pevsner, following their most influential essay at that time, the Realist Manifesto, which was concerned with space and rhythm, and since Gabo and Pevsner were both artists, the constructivism school were more focusing on the aspect of painting and sculpture rather than architecture. However, Productivism, led by Vladimir Tatlin and Alexander Rodchenko, were more interested in socially-oriented aspects, and wanted their works to be absorbed in industrial production. There are actually very few definitions of “productivism” in any resource, therefore, the clarification of this concept is quite vague even until nowadays. Constructivist architecture, a common phrase mentioned multiple times on the internet, should be called productivist architecture, which is characterized by a combination of modern technology and engineering methods and the socio-political ethos of Communism.

In the Realistic Manifesto, Gabo and Pevsner gave a quite harsh criticism of cubism, saying that it was too superficial, “...having started with simplification of the representative technique ended with its analysis and stuck there”. They criticized cubism for its simplicity of representation and nothing else, it “... do not touch on the base of it seeing plainly that the end result amounts to the same old graphic, to the same old volume and to the same decorative surface as of old.” However, they were quite indifferent towards futurism, giving some critics and some praise to it. Constructivism, in their opinion, is designated for space and time, about an abstraction of art and ideology. Most importantly, it was about today: “...Today is the deed. We will account for it tomorrow. The past we are leaving behind as carrion. The future we leave to the fortune-tellers. We take the present day.”

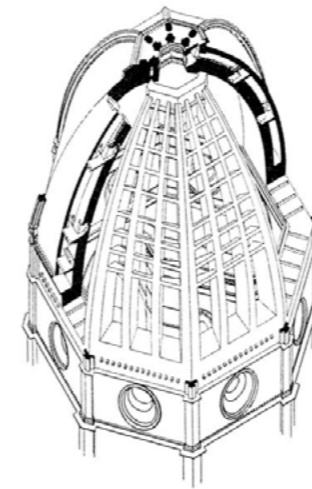
In Russia and Constructivism, an interview with Naum Gabo by Arbam Lessaw and Ilya Bolotowsky, 1956, Gabo gave his opinion towards Vladimir Tatlin. In his mind, artists and architects should be indifferent towards any political party; however, Tatlin and his group, meaning the productivists, were an ideology of a purely Marxist and political kind. The idea of Tatlin, practical and following the trend of socialism, contradicted Gabo’s idea of absolute, independent and could perform in any social structure background. But an interesting way to think is that, all the theories at the period, including constructivism by Gabo, were all influenced by the socialism and communism background of the society somehow. The rejection towards the past and the background is actually a runaway from reality, just like what the Russian futurists did: rooted from the past but never recognized its origin.

Vladimir Tatlin is famous for his project for the Monument to the Third International, also called the Tatlin’s Tower (fg.9). The design largely reflects his idea towards productivism and his political tendency that was criticized by Gabo.

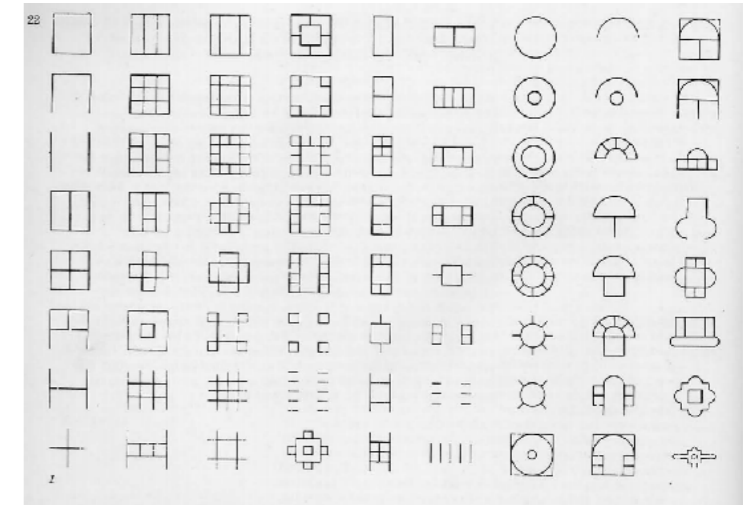
Similar to the constructivism idea, the design follows a series of abstract geometries: a cube on the base for the venue lectures, conferences halls, etc.; then a smaller pyramid housing executive activities; finally a cylinder on the top with a hemisphere for radio equipment. Each of the geometry rotates at a certain speed and is under a twin helix structure that spiraled up to 400 meters in height. The idea of abstraction, of mass production of steel, iron, glass and other industrial materials, of Soviet propaganda, of modernity, are all incorporated in the design for this productivist tower. Although it was criticized by Gabo, it still represents a revolutionary thinking of design under a complex background: all of the entanglement and struggle between economics, society, superstructure and aesthetics, could be seen not only from this design, but also from all of the ideas and theories at that specific moment in the history.

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▲ Figure 1. Brunelleschi dome structure



▲ Figure 2. Theory: building forms, Duran, 1809



▲ Figure 3. Ryabushinski's house

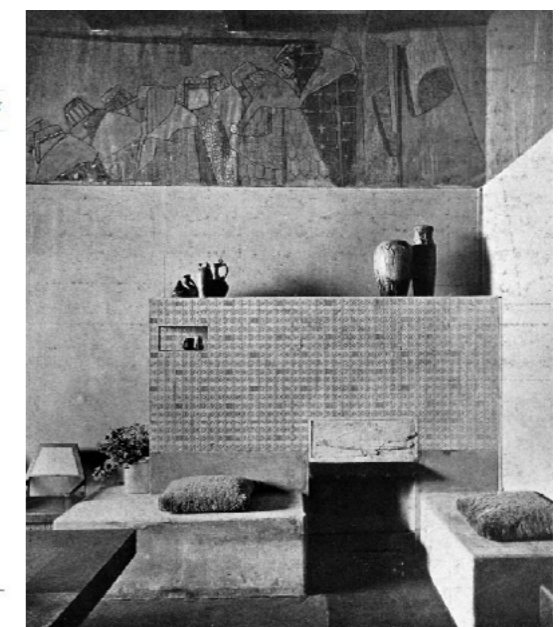


▲ Figure 4. Pertsov's Apartment

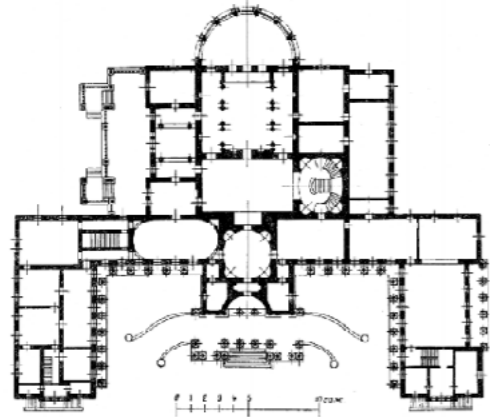
Sector	1913	1914	1915	1916	1917	1918, 1st half
Stone & clay products	100	95.3	91.3	87.2	71.6	56.4
Mining	100	110.5	132.7	92.0	52.4	40.7
Metal-working	100	89.3	113.0	107.9	70.8	40.7
Machine-building	100	98.3	131.6	132.1	89.4	54.2
Wood products	100	95.8	80.1	69.0	49.4	44.2
Chemicals	100	88.8	110.2	127.2	91.7	44.4
Food, drink & drugs	100	121.2	106.9	87.7	62.7	31.4
Animal products	100	106.1	106.3	99.9	79.3	86.9
Leather	100	96.7	88.3	84.1	70.7	62.1
Cotton	100	98.8	95.1	85.1	62.2	50.8
Woollens	100	105.9	100.6	97.2	67.5	50.5
Silk	100	91.8	110.2	96.8	72.9	63.0
Flax	100	118.2	104.7	97.7	72.1	64.7
Hemp	100	95.9	103.3	105.3	80.4	58.5
Other fibres	100	93.6	100.0	129.6	86.2	56.6
Clothing	100	106.9	127.6	130.3	127.4	91.0
Paper	100	96.6	92.9	86.4	71.6	42.6
Printing	100	89.9	80.4	85.7	85.0	92.4
Art & craft products	100	77.1	94.3	66.0	56.3	83.5
Utilities	100	111.5	111.1	117.8	97.9	64.8
All sectors	100	100.9	108.3	104.1	76.0	49.7

Sources: *Sbornik statisticheskikh svyedenii*, 1924, pp. 170-71.

▲ Figure 5. Mean industrial output per day



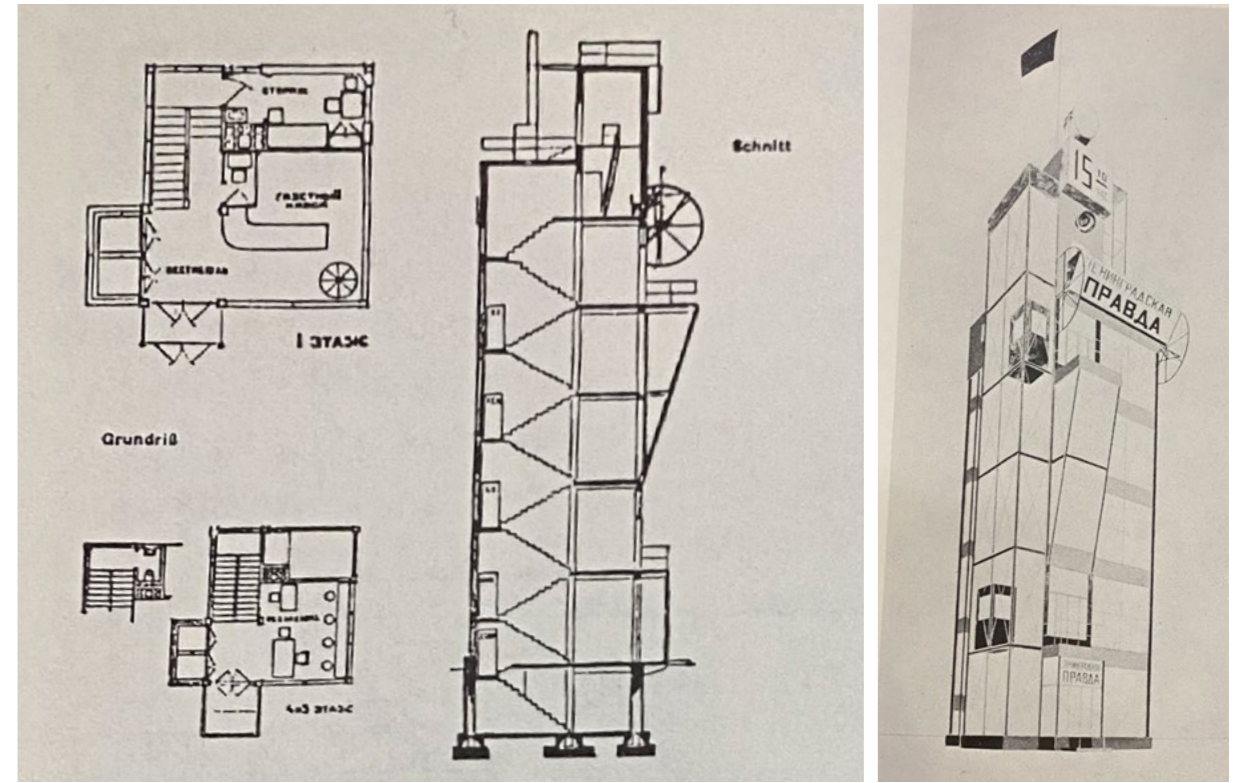
▲ Figure 6. Living room by Fomin



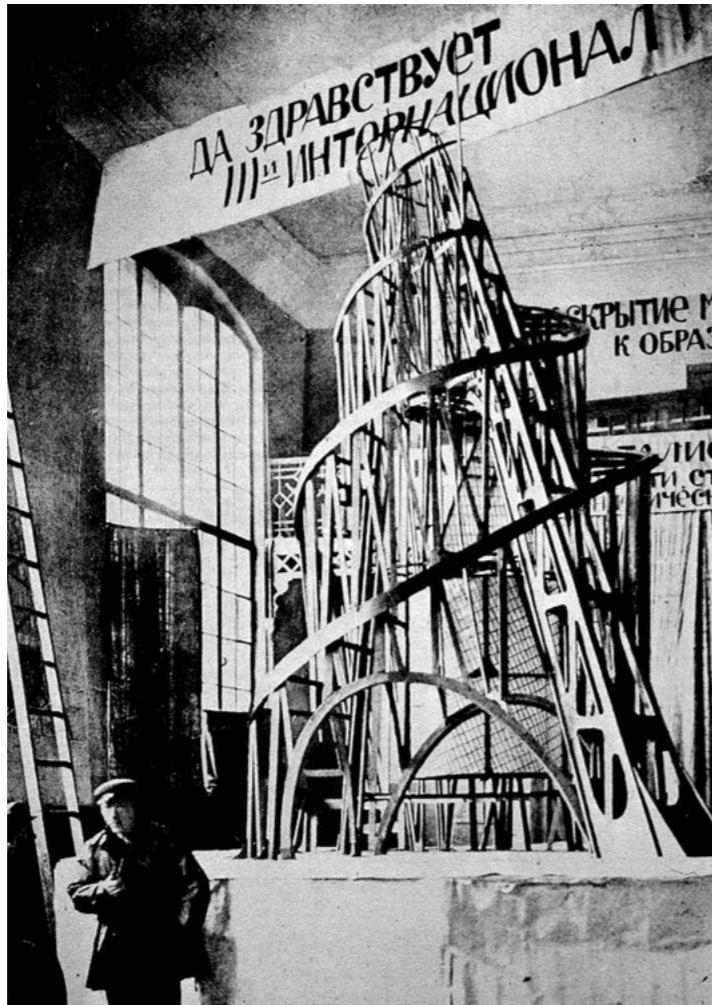
▲ Figure 7. Polovtsev House



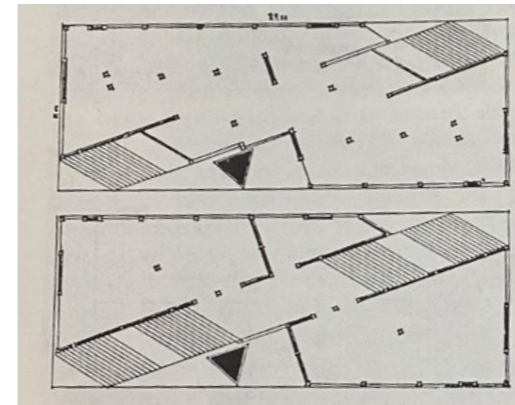
▲ Figure 8. Merchants' Society Building



▲ Figure 10. office building for the newspaper Leningradskaya Pravda



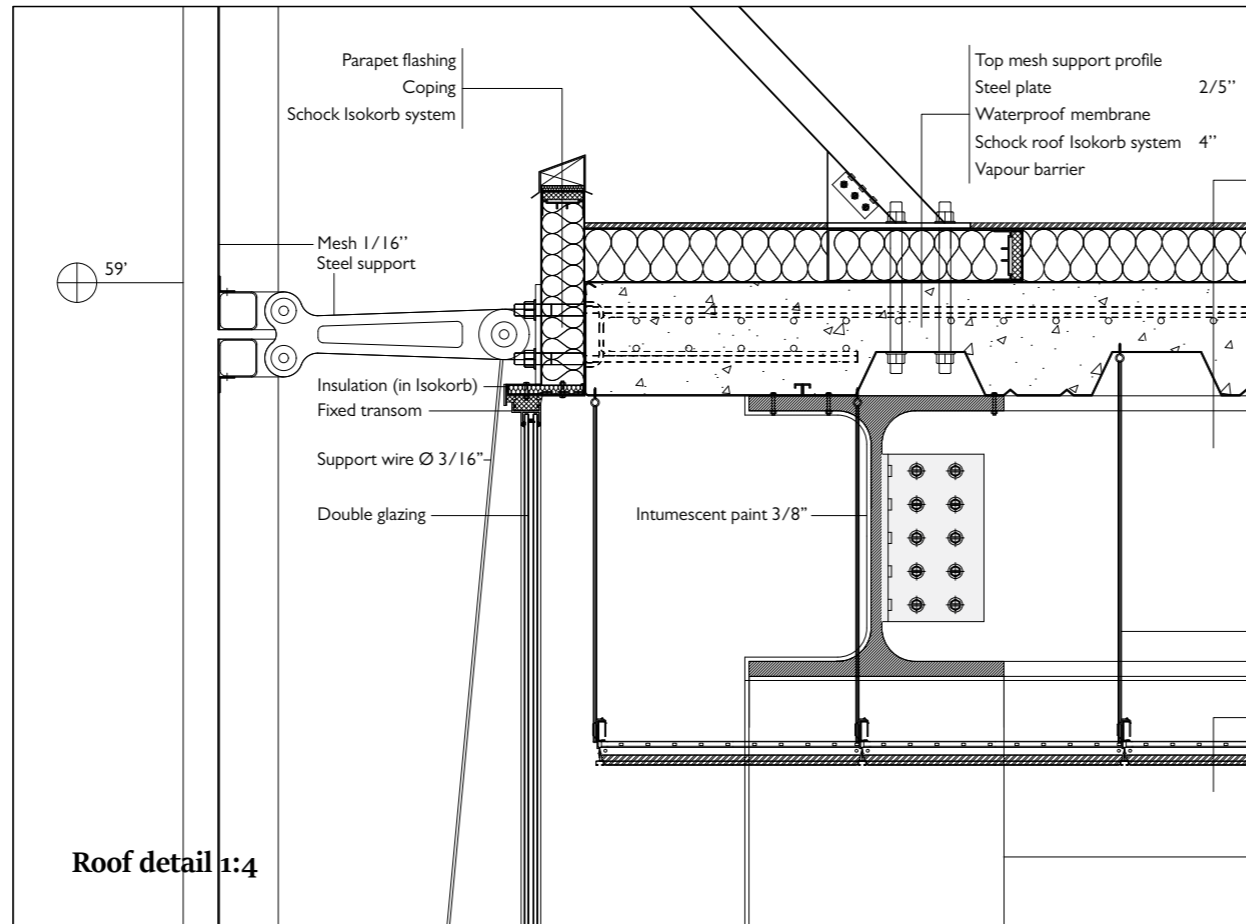
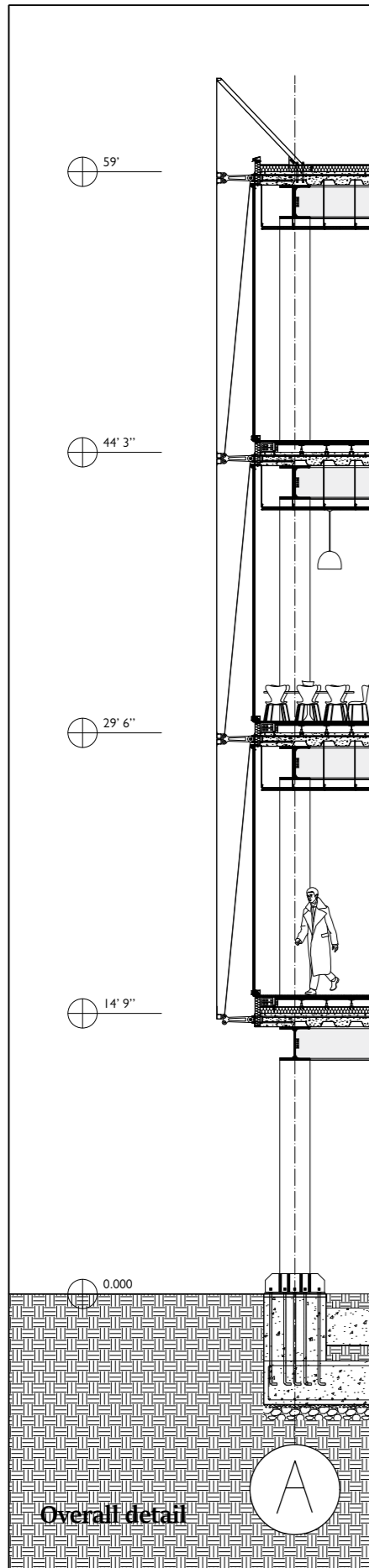
▲ Figure 9. Tatlin's Tower



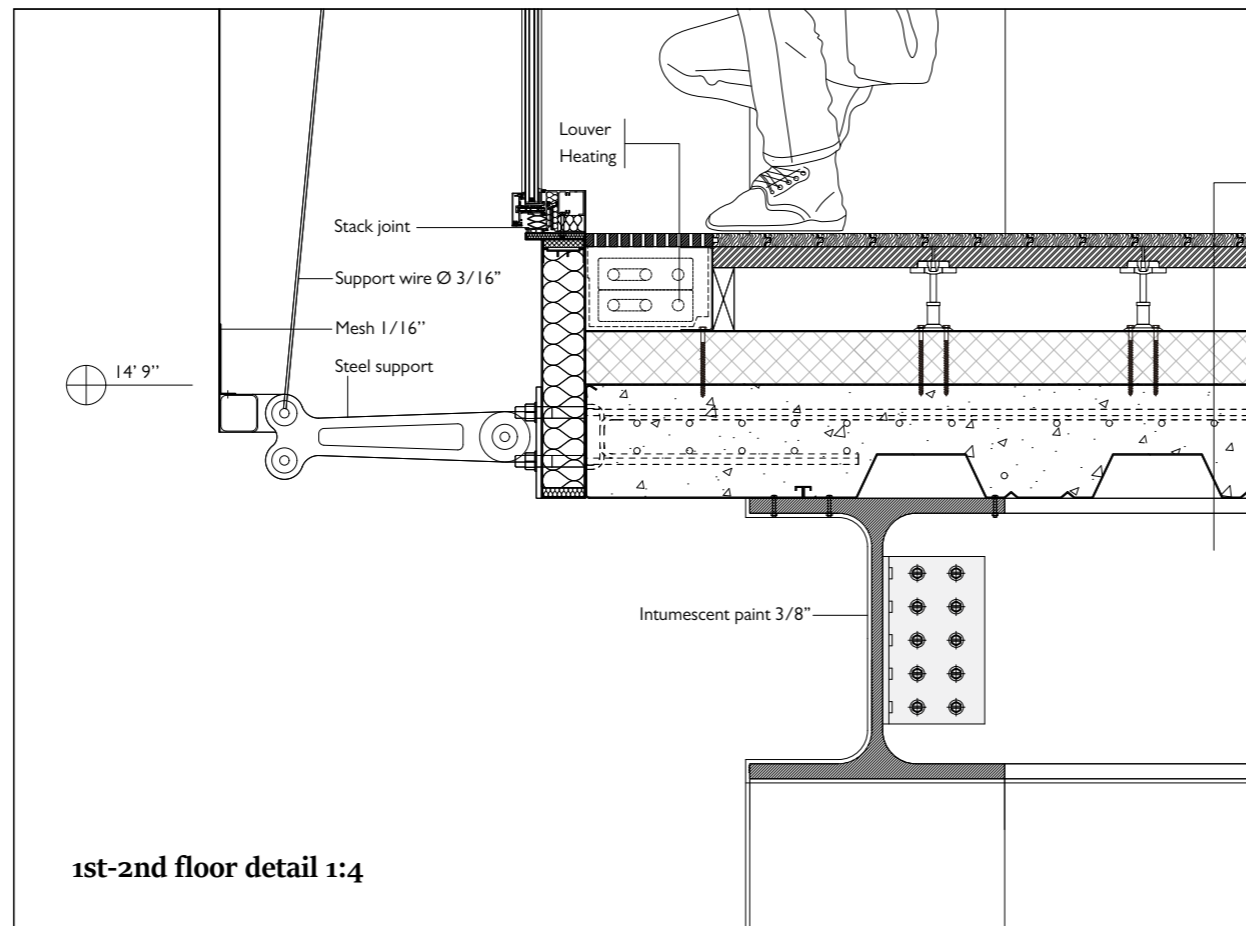
▲ Figure 11. Plans for Soviet Pavilion



► Figure 12. Soviet Pavilion spatial experience



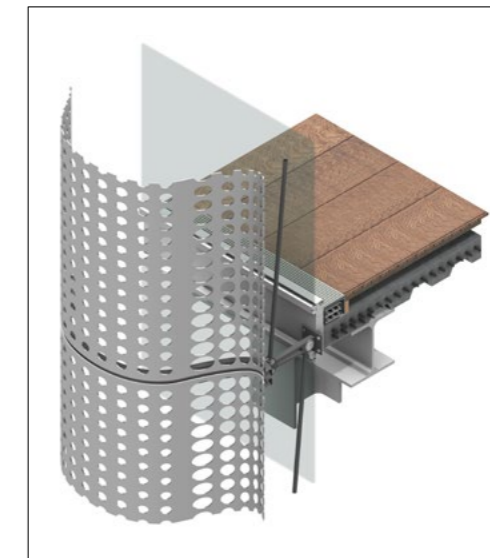
- Plaster 2/5"
- Waterproof membrane 4"
- Insulation 4"
- Vapour barrier
- Cast-in-place concrete 8 1/2"
- Steel deck profile 1/16"
- Steel secondary beam 1' 9 3/5"



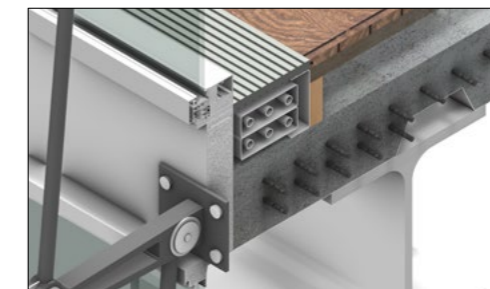
- Wooden flooring 1/10"
- Gypsum board 1 1/2"
- Gap and supports 4 3/4"
- Waterproof membrane
- Insulation 4"
- Vapor barrier
- Cast-in-place concrete 8 1/2"
- Steel deck profile 1/16"
- Steel secondary beam 1' 9 3/5"



Renovated Nordstrom facade



Overall rendering



Detailed rendering

06

Facade Detailing

Nordstrom building facade renovation and detail drawing

Instructor: Kevin Schorn
 Spring Elective Course/ February 2022
 Group project with Yuchen Huang and Tianyi Zhang



07

94 Days

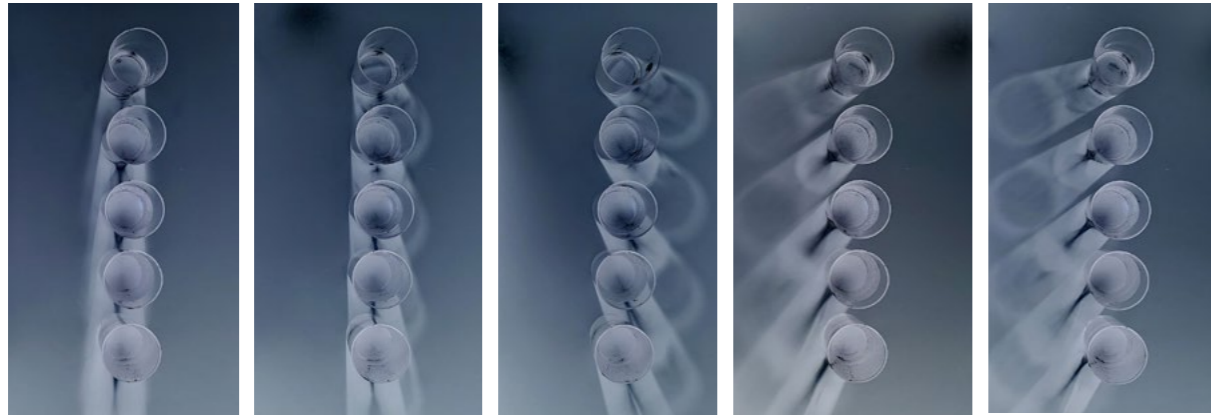
Light experiments and trailhead pavilion design

Instructor: Stephen Cassell + Annie Barrett
Advanced Studio VI/ February 2022
Individual research and design

The boundary between man-made world and the nature has always been a interesting point of view to discuss. Sedona, to which hiking trails and street systems dominated, is one of the most appropriate examples to research and design the relationship of these very opposite concepts. **How to deal with the abrupt rupture from the man-made streets to the hiking trail to wilderness? What kind of junction should it be to deconstruct and reconstruct, or to say, to transform the human mental sprits from one world to another?**

The research started with experimenting how light would be transformed after passing through a series of mediums. The changing of container materials, the mediums, and the environment, would lead to different result of the lighting and shadow and most importantly, the atmosphere and sensation of the space, which becomes the main methodology of the following design. Grasshopper became the major tools to determine the spatial configuration and the volume of the design.

The design is a pavilion that connects the parking lots in the trailhead and the trails to the rocks, where a series of spatial rituals happen and change the visitor's feeling and emotion during the whole walking within the rituals. There's special atmosphere of each space created by its own attribute of size, loudness, brightness (from the design and use of material), which correspond to one mood for the visitor to feel.



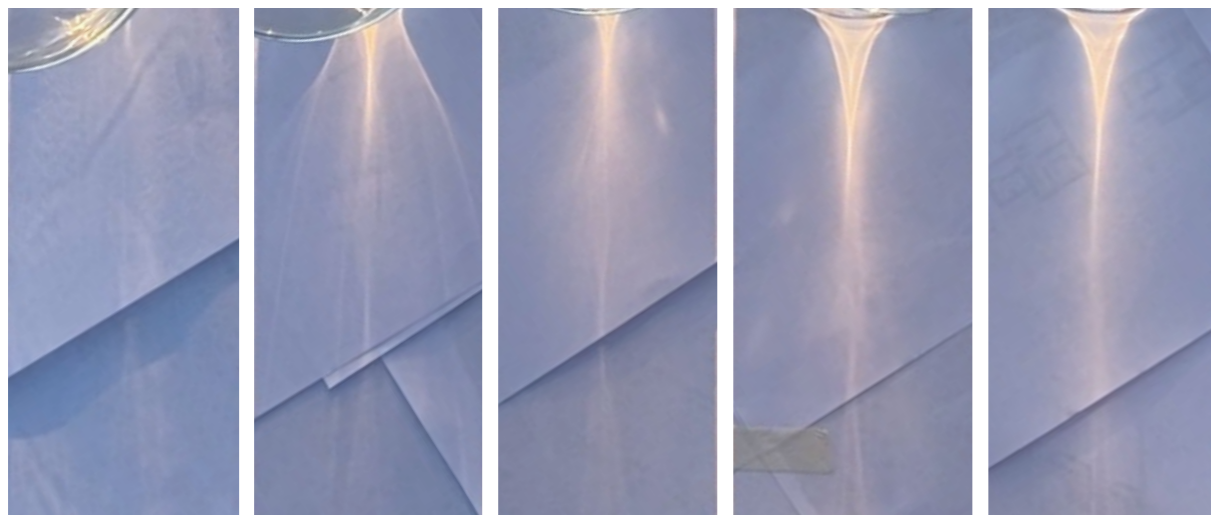
1 Light resource direction

Experiment of testing how the direction of light would affect the light and shadow results



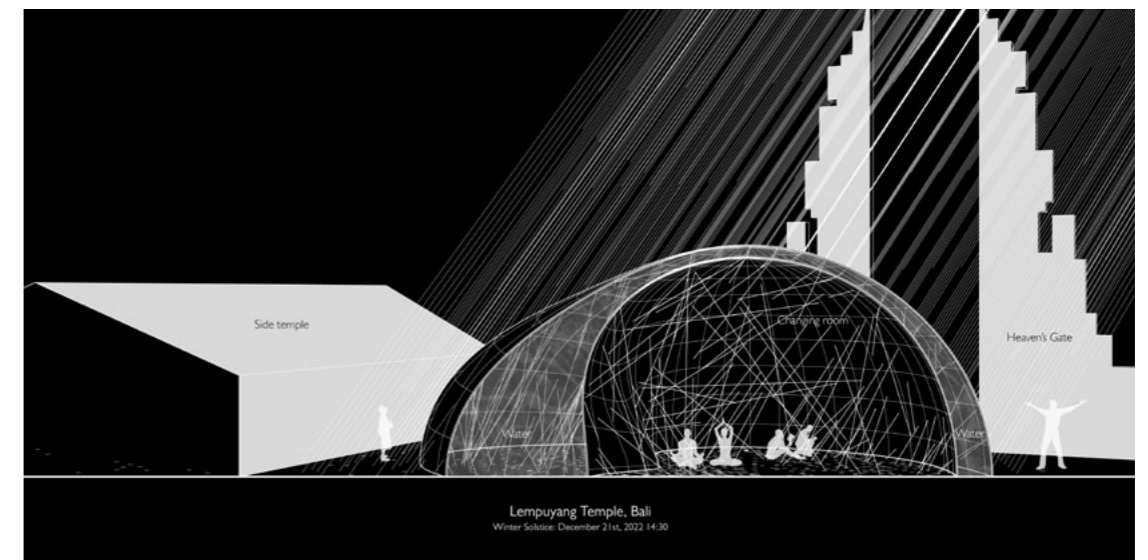
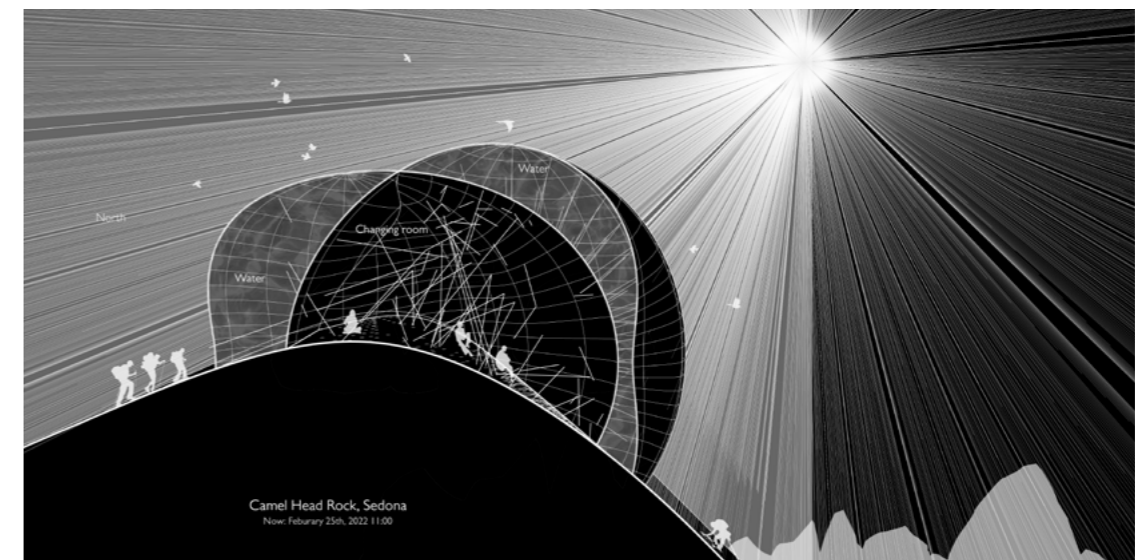
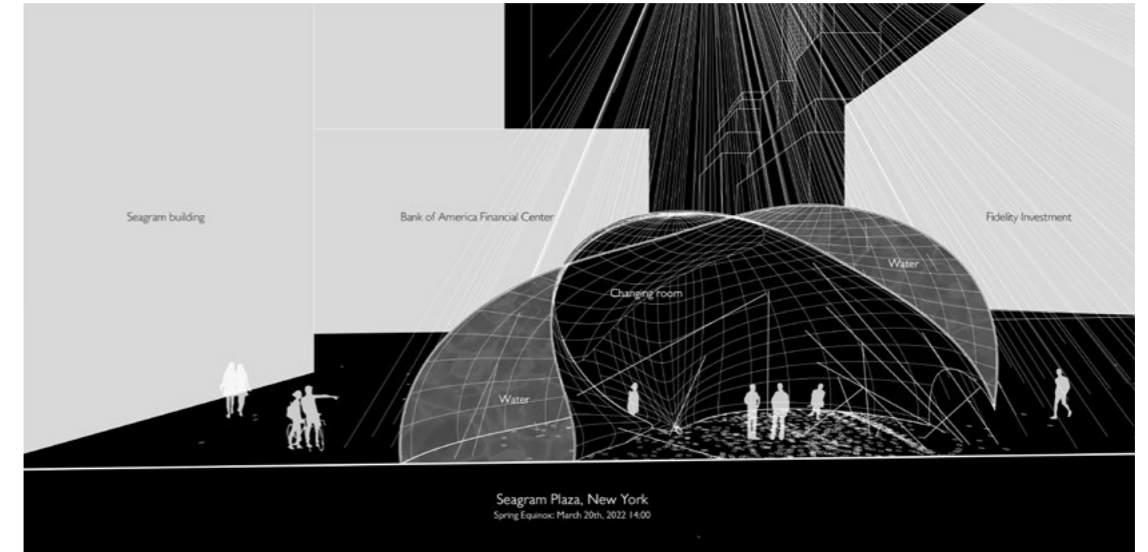
2 Wind

The dynamic lighting effect affected by wind with different amount of water inside glass containers



3 Temperature

The water frozen in below-zero environment so that the lighting turn into static states and faded more due to the setting sun



"Changing" room design

Using grasshopper to simulate the light refraction to see the performance of light within a water bubble pavilion in different site locations



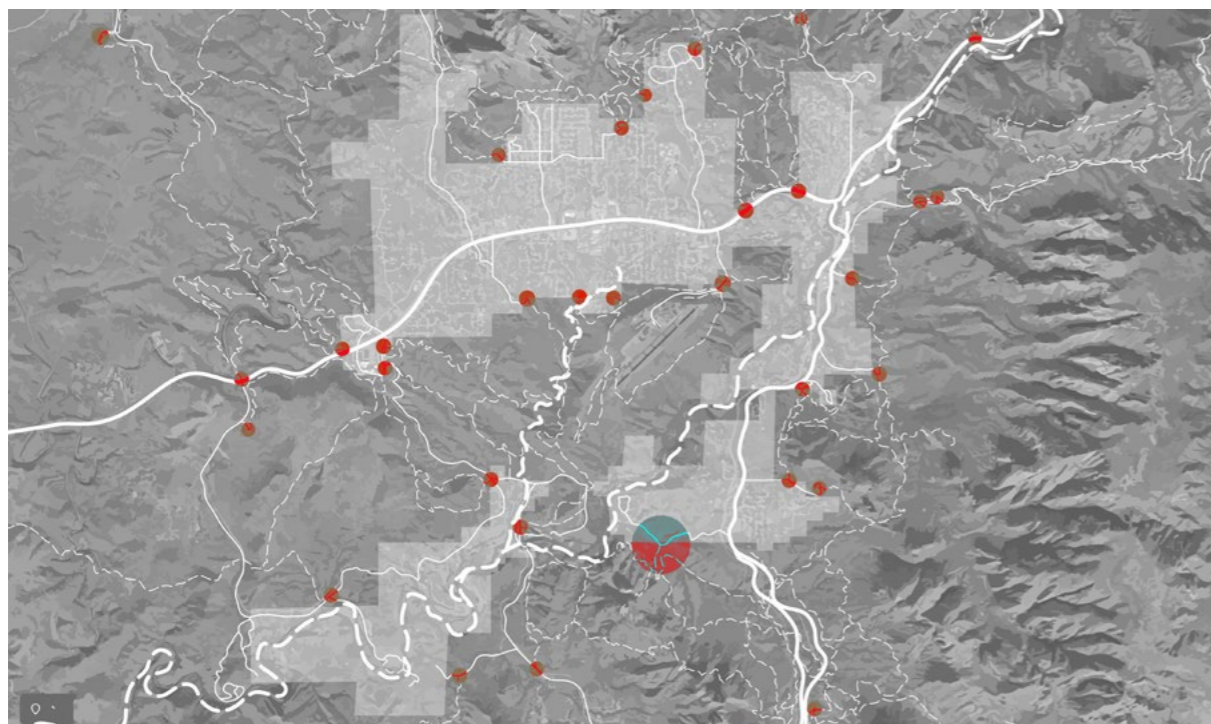
Current site condition

There's an abrupt rupture from the manmade world to the wilderness, where the boundary is too clear and easy to be defined



Cathedral Rock

The relationship between the roads, the parking lot, the trails and the rock could be easily seen from the diagram above, which could help to develop the project's volume and light performance



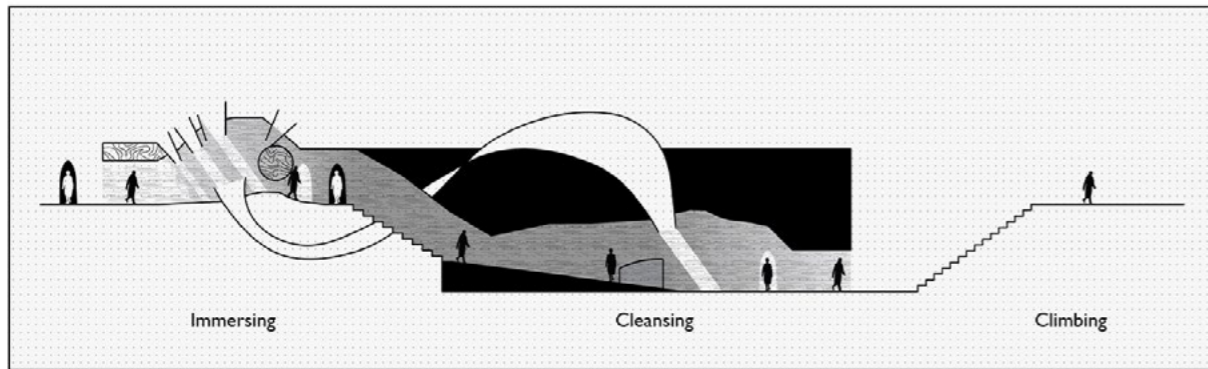
Sedona city plan

The site is chosen at Sedona, Arizona, where hiking activities and road trip dominate the city. The junctions between the trails and roads are shown in red dots, which are the potential sites to put the design pavilions. The largest one is the Cathedral Rock

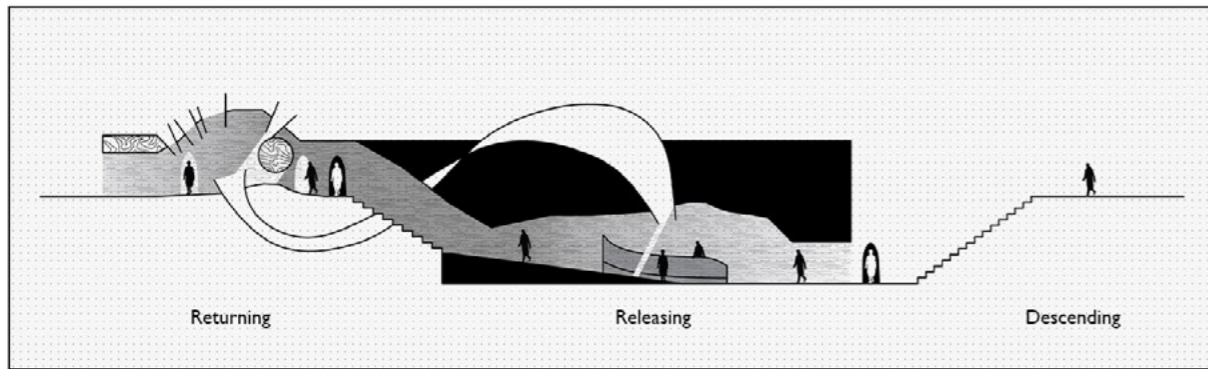


Masterplan

New arrangement of the parking lot gives a transitional pathway towards the plaza in front of the pavilion. The pavilion also works as a transitional spaces between the roads and the trails



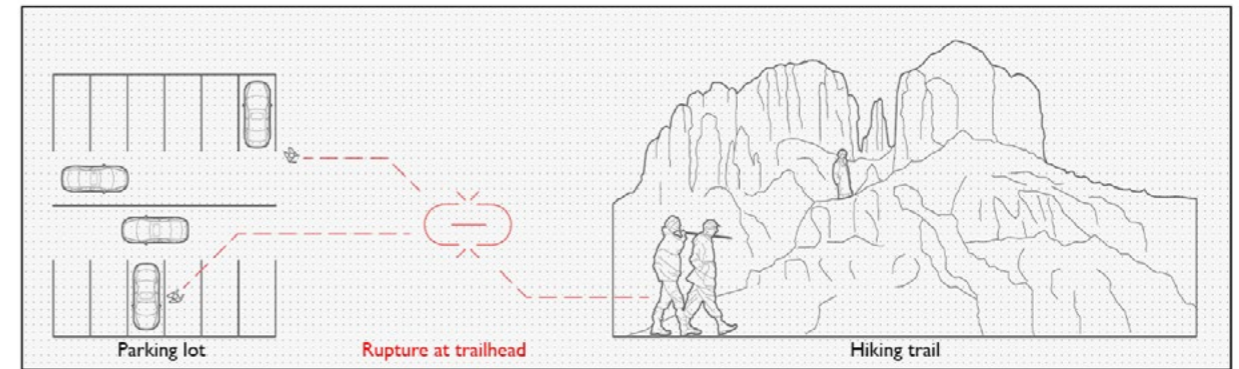
► Departure



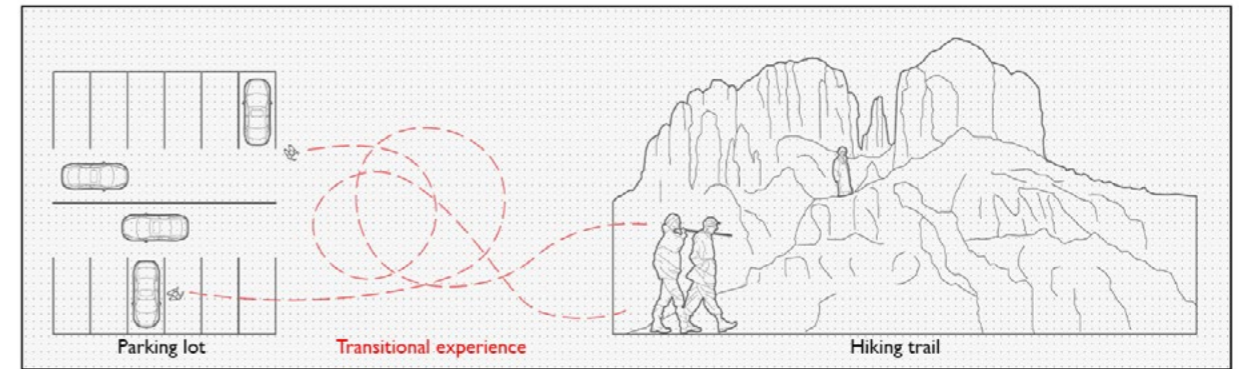
◄ Return

Same space, different experiences

With the changing of time and light, the spatial experiences within the pavilion would also shift during the different time of day. Also the perspective of the visitors would vary in their departure route towards the rock and their return route towards the parking area



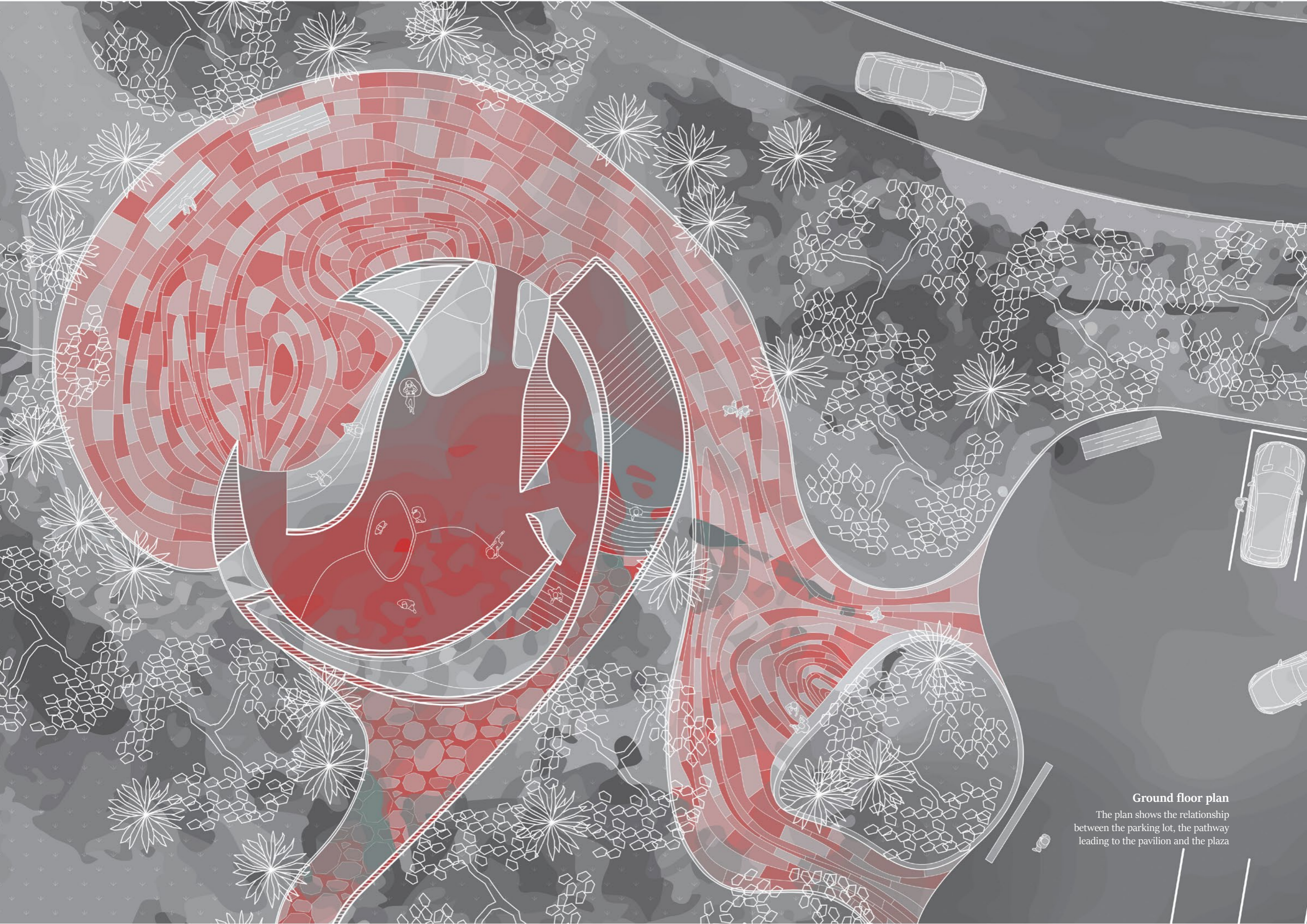
Current condition



Design proposal

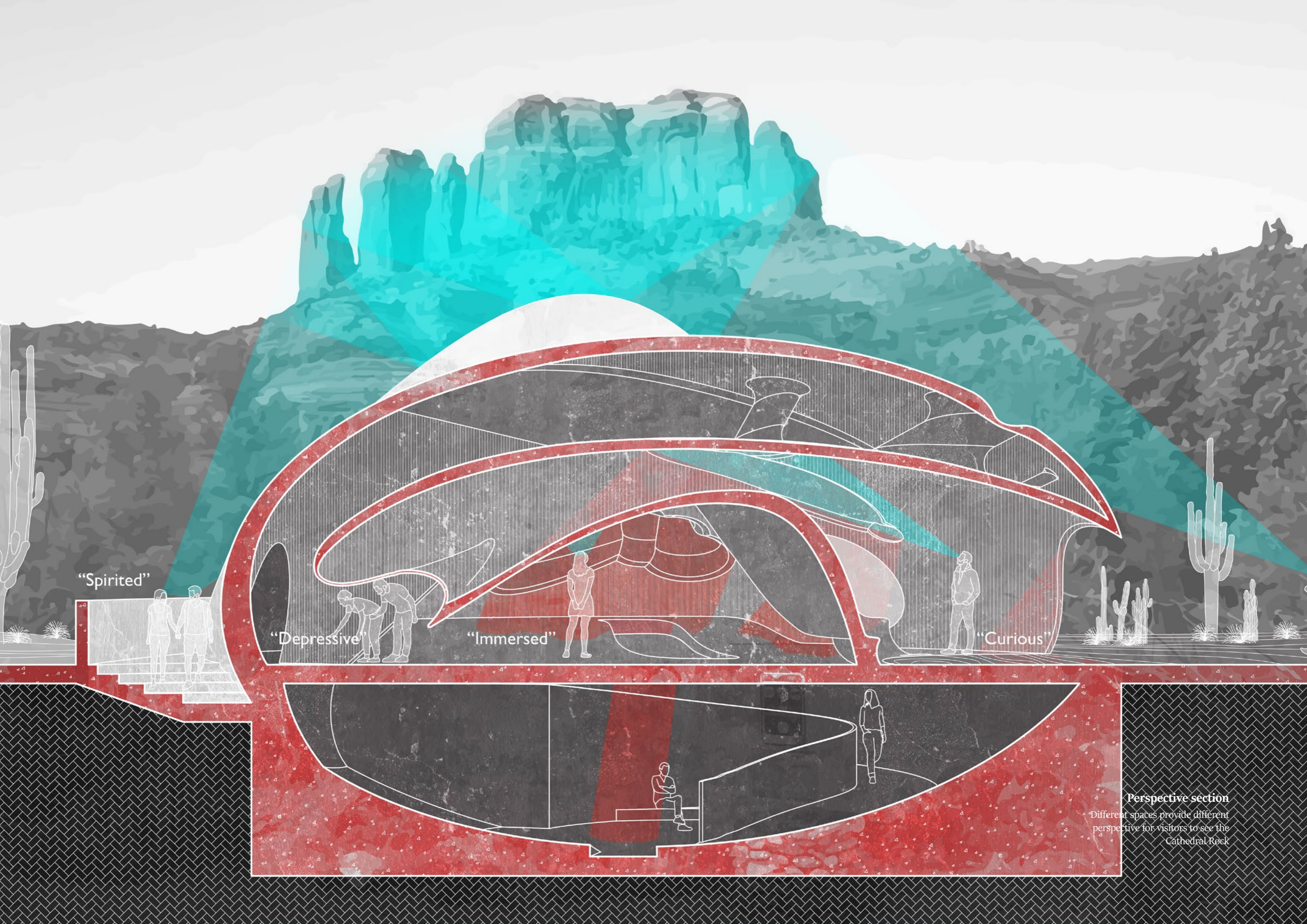
From rupture to transition

The current condition of the site at Cathedral Rock has been a direct connection between the two worlds, the design proposal is trying to create a different transitional experience for the visitors to emerge into brightness and darkness, preparing for their journey to the rocks



Ground floor plan

The plan shows the relationship between the parking lot, the pathway leading to the pavilion and the plaza



“Spirited”

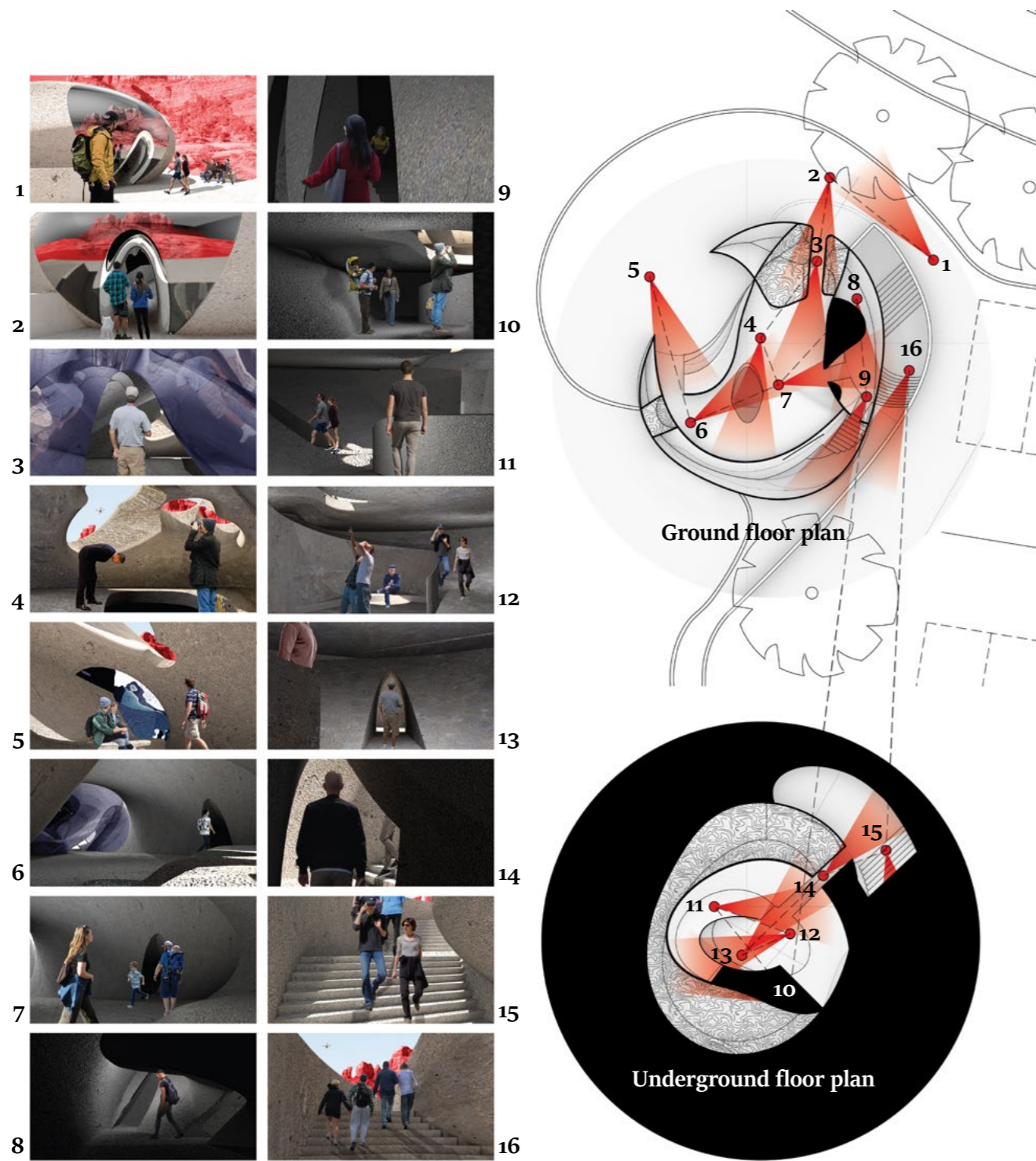
“Depressive”

“Immersed”

“Curious”

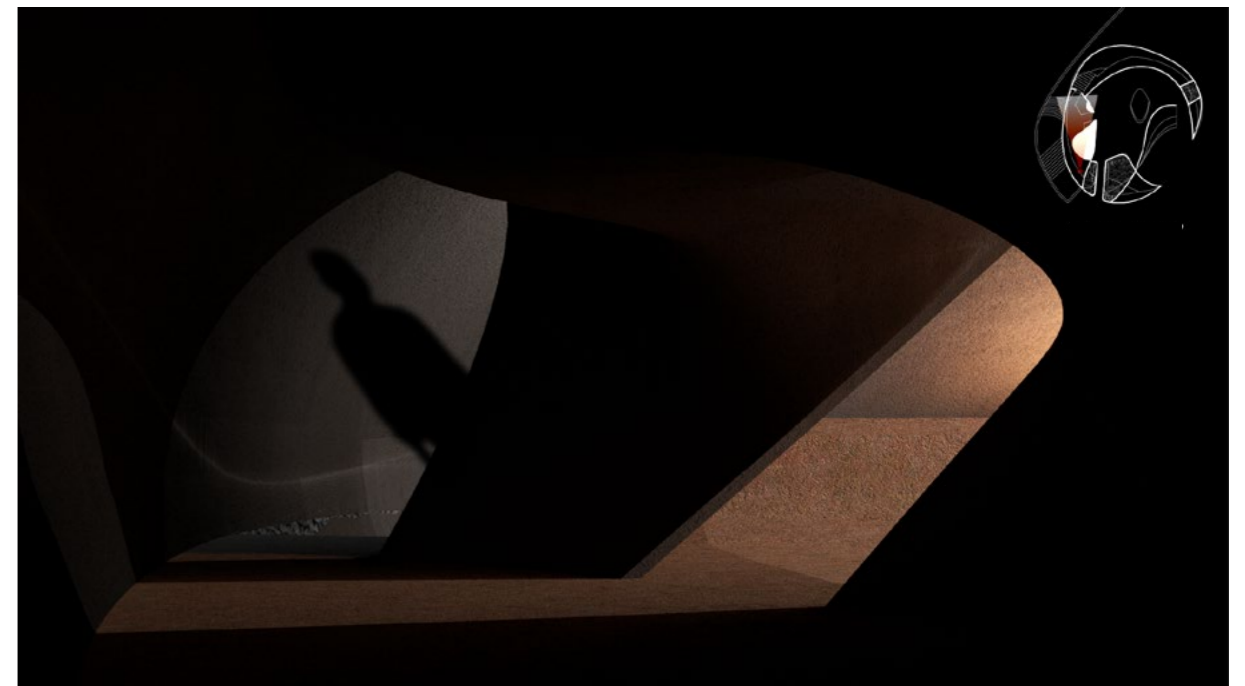
Perspective section

Different spaces provide different perspective for visitors to see the Cathedral Rock



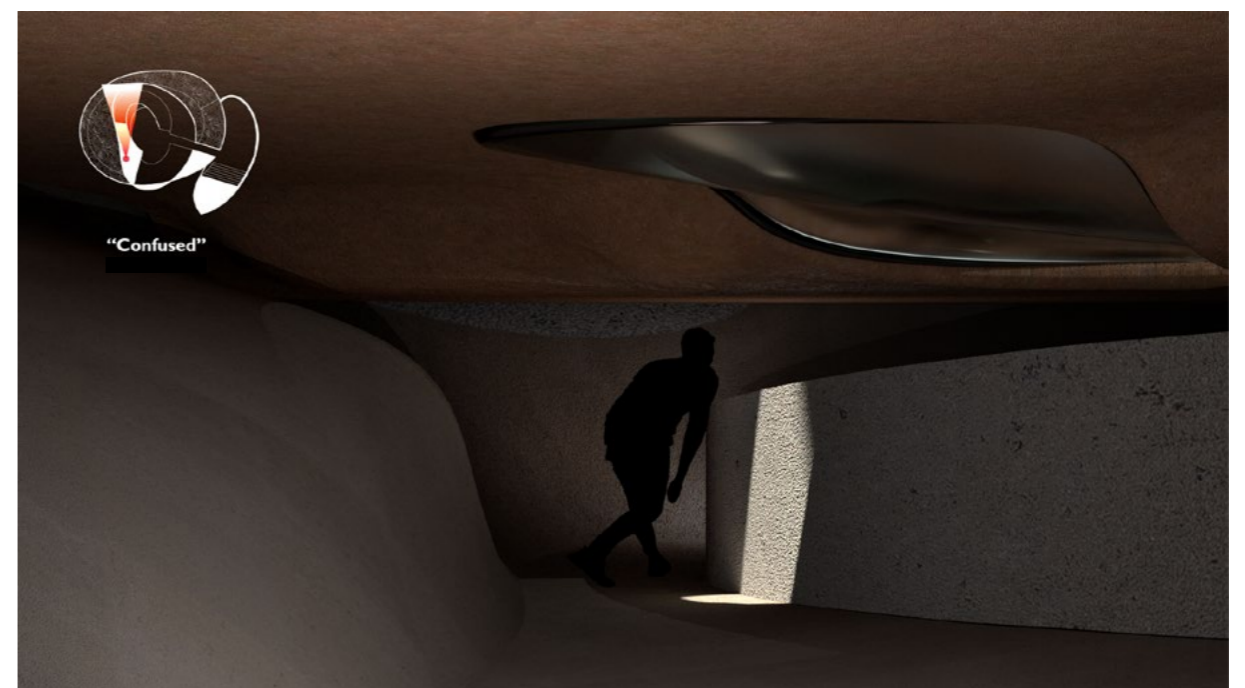
Sequence of Ritual

The pavilion provides different spatial experiences for the visitors as a ritual. Ground floor is designated for light experience with water bubble as well as perforated holes oriented towards sunpath direction. The staircase between floors works as a dark transitional experience for the visitors and re-connect themselves with the nature in the underground floor



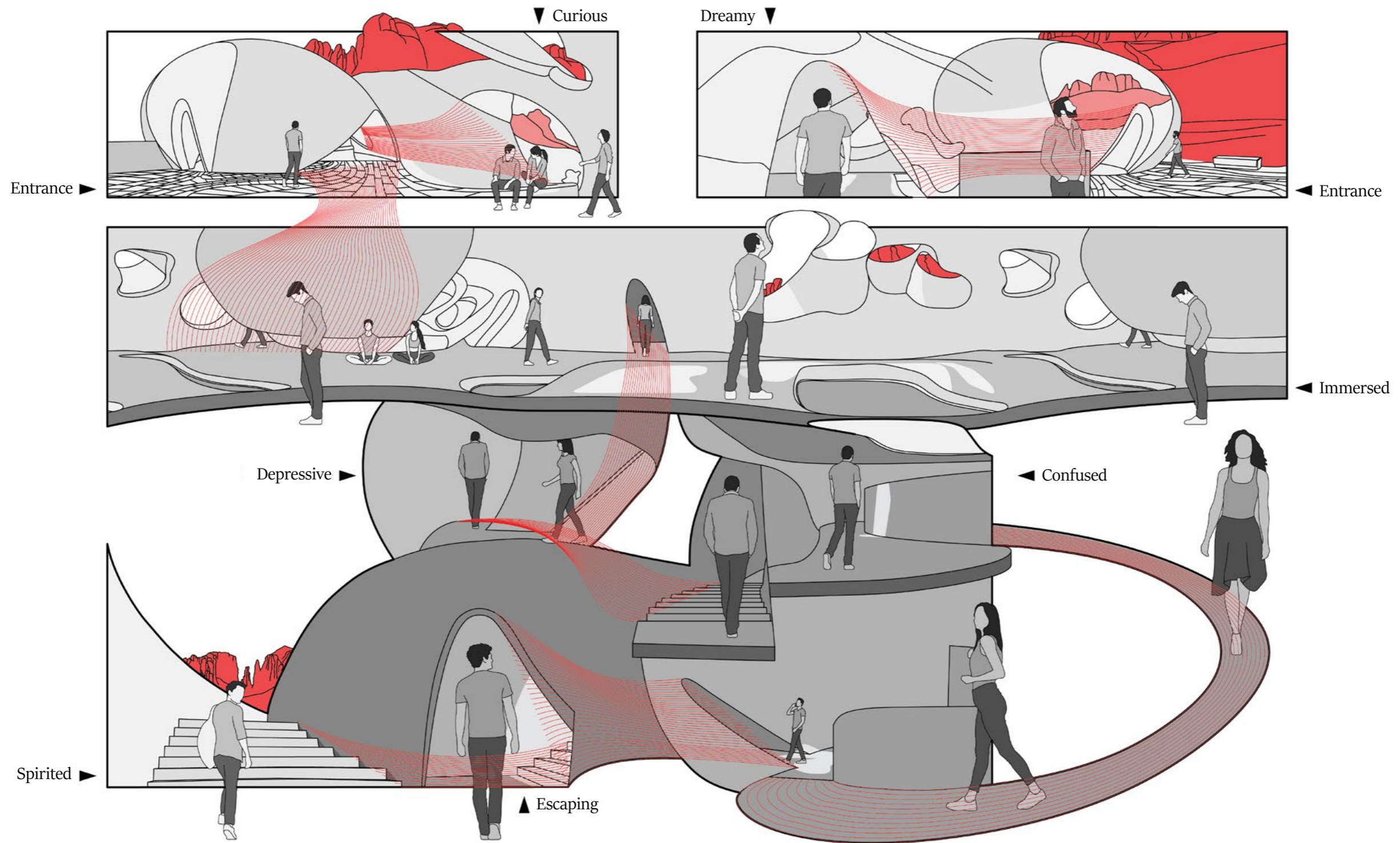
No.8 "Depressive"

The Depressive is a space with dark/negative atmosphere. It is a dark space intended for visitor to go through a depressive/down mood.

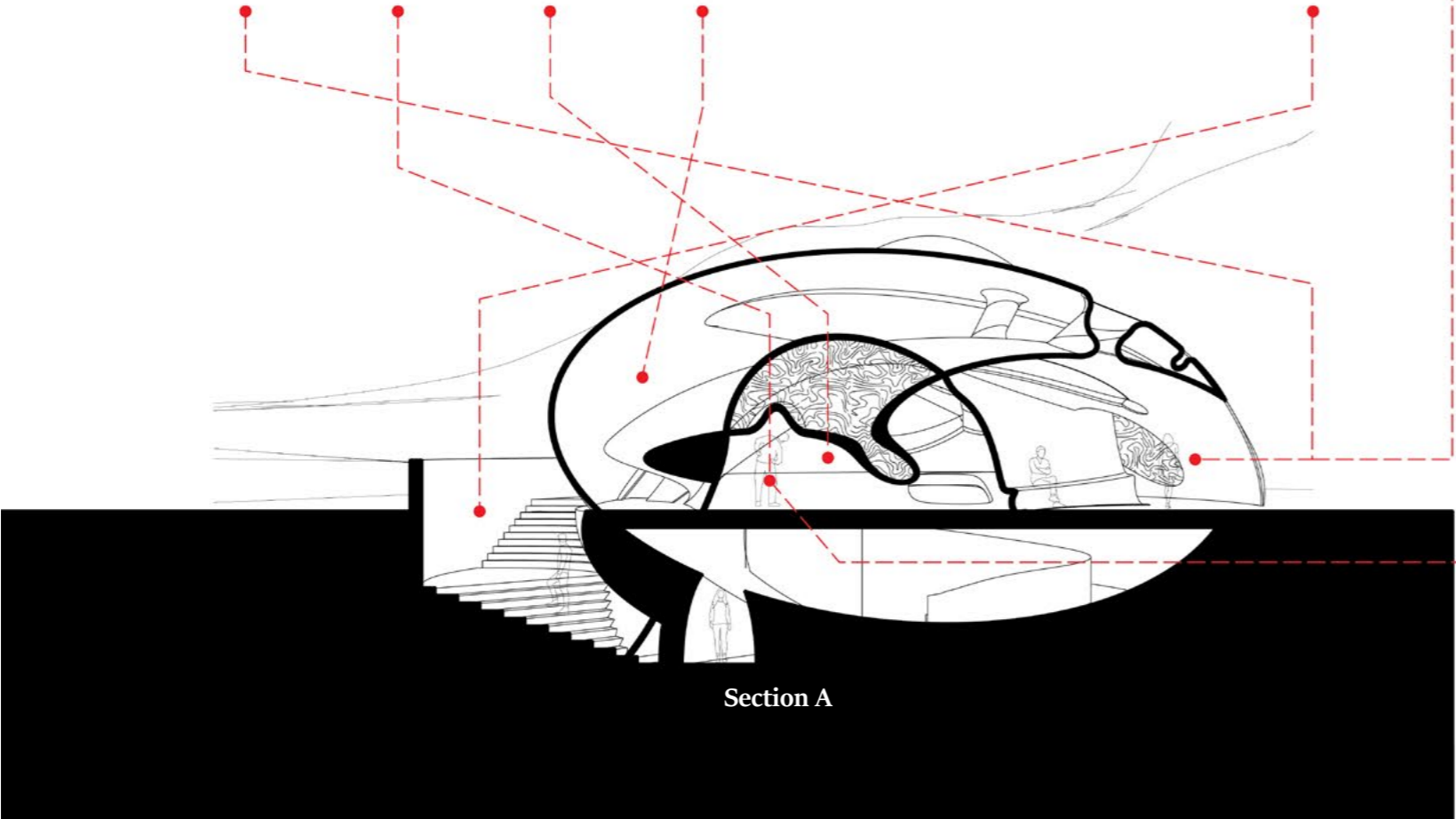
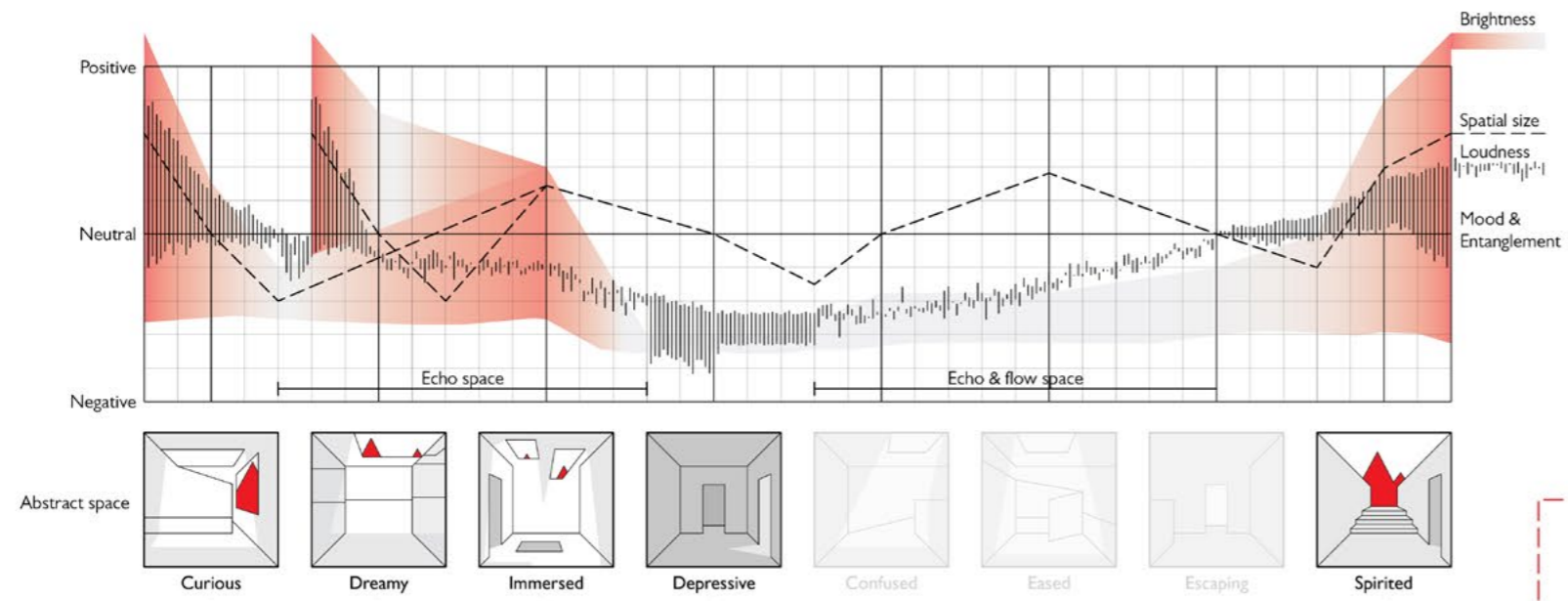


No.10 "Confused"

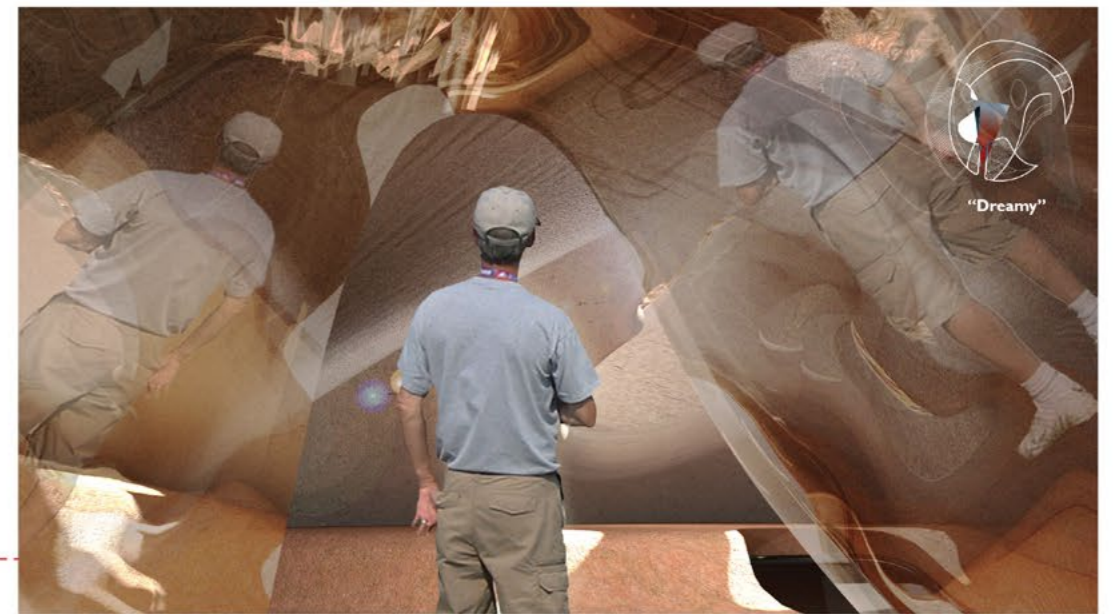
The Confused space is at the end of the stairs leading from the ground to the underground, where the ramp disappear in the darkness, making visitors wonder where it would lead to



Sequence of Ritual

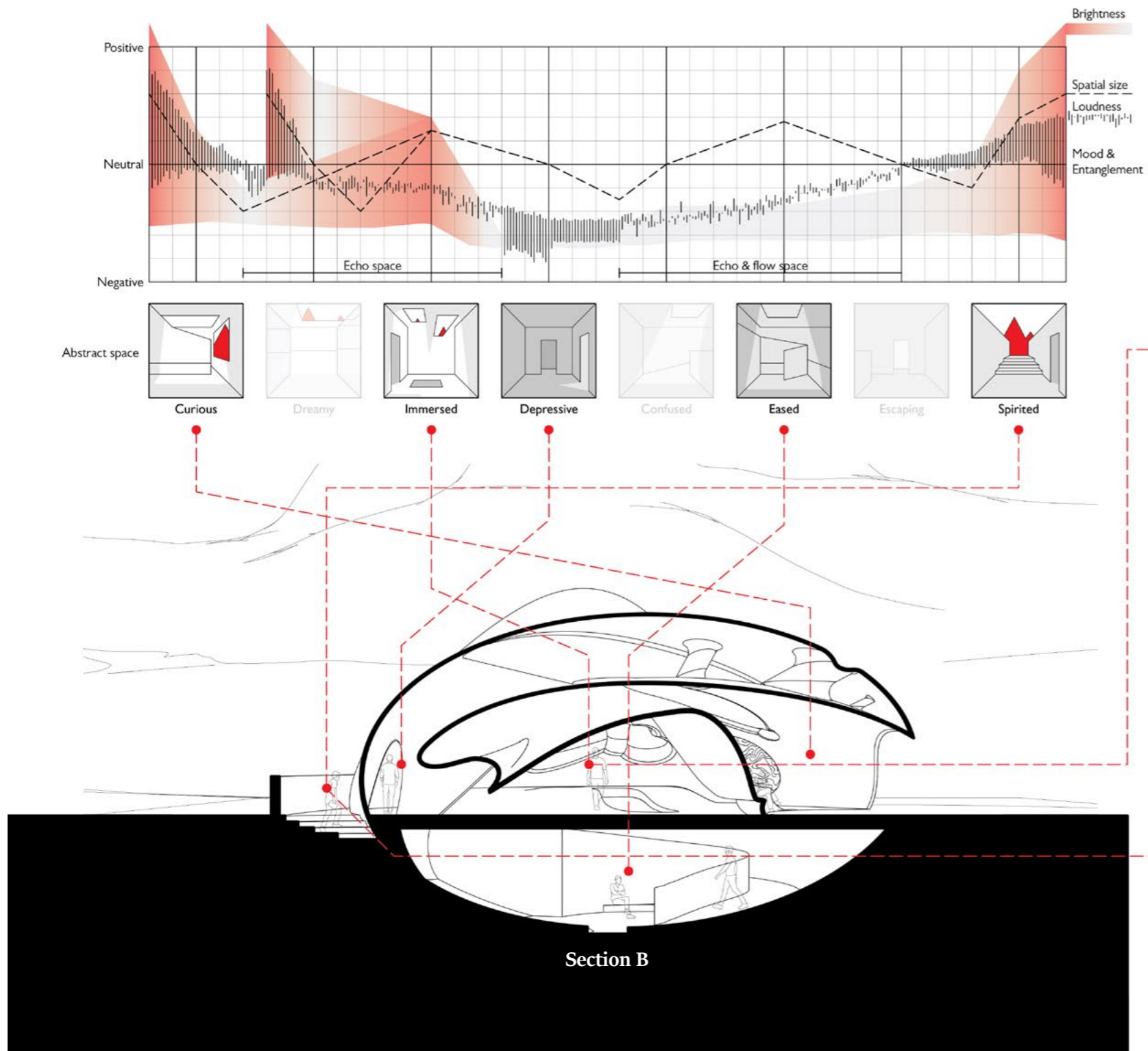


"Curious"



"Dreamy"

Curious and Dreamy are the two entrances/exits of the pavilion, where the water bubble locates. Both of the spaces create different atmosphere of attracting (curious) and distortion (dreamy)

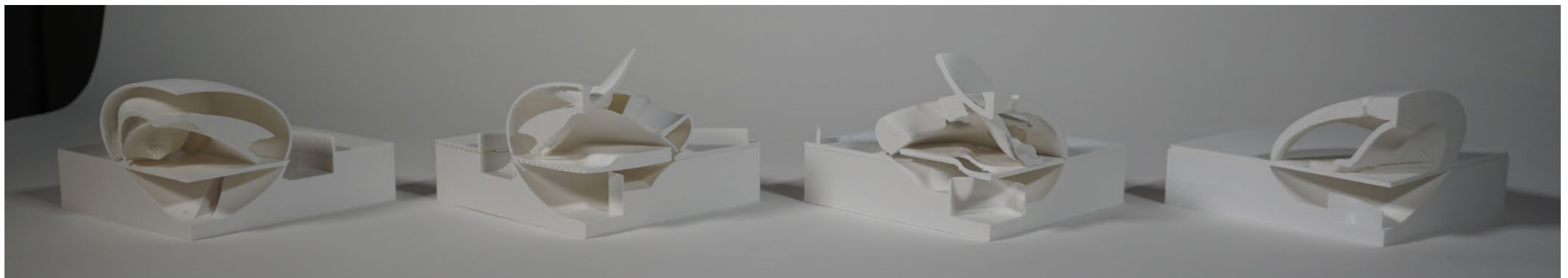
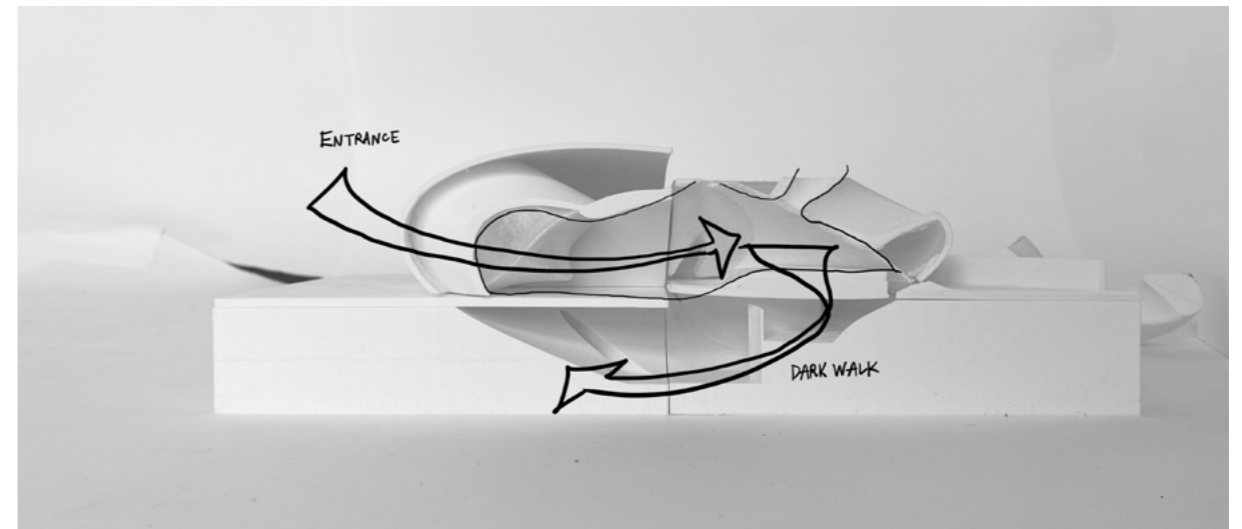
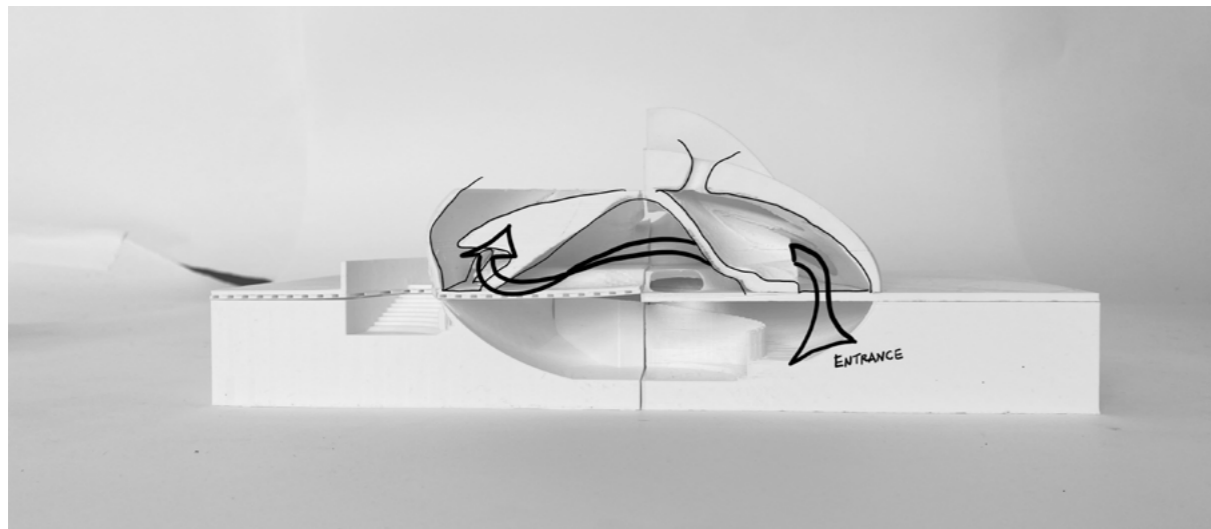
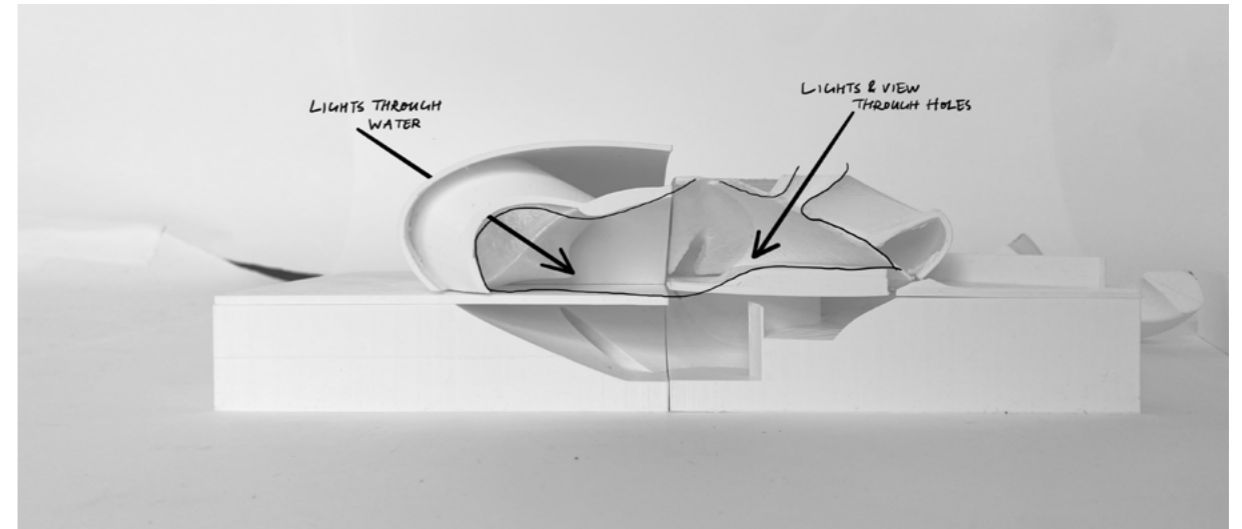
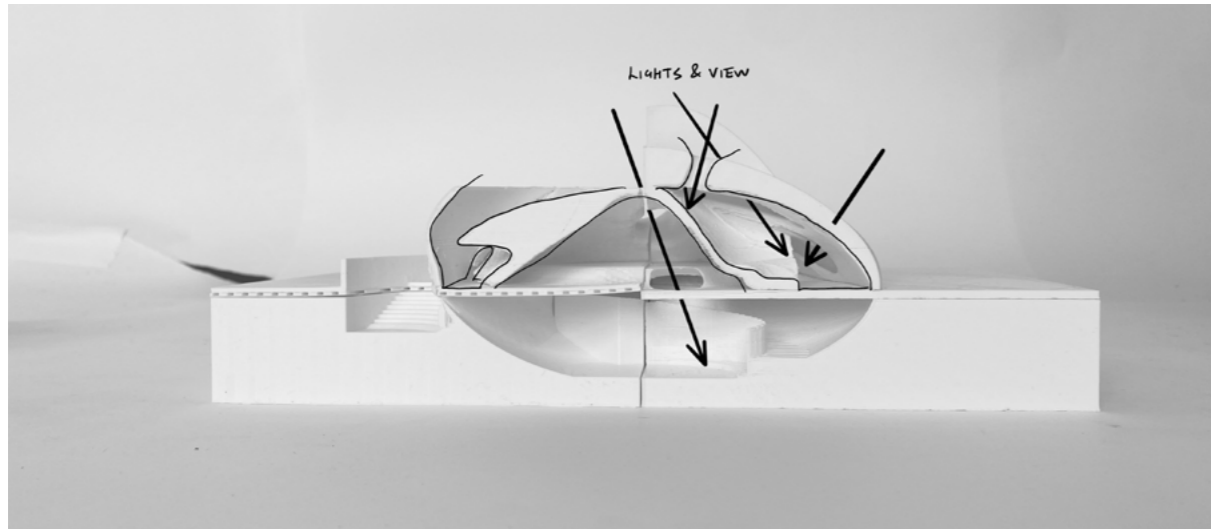


"Immersed"



"Spirited"

The Immersed space is where skylight enter the room from the various size of openings. The ground window also gives lights to the Eased space below. From the Spirited space, visitors could see the Cathedral Rock emerging from the stairs as if it's growing out.



Spatial models

The project is cut into 4 parts to show the interior spatial relationship between rooms and floors. Some diagrams are made to show the ritual's pathway within the pavilion and its corresponding light path



o8

If Building Could Talk

Back to Back: interactive installation design

Instructor: Sharon Ayalon
Spring Elective Course/ February 2022
Group design with Bisheng Hong, Chuqi Huang, Hao Zheng and Hazel Villena

Aiming to link Harlem's daily life and diverse culture heritage to Columbia University, the project is located at the most dynamic stairway on the central axis. Boxes are designed as containers to support daily activities for Columbia communities while recording the everyday life of Harlem.

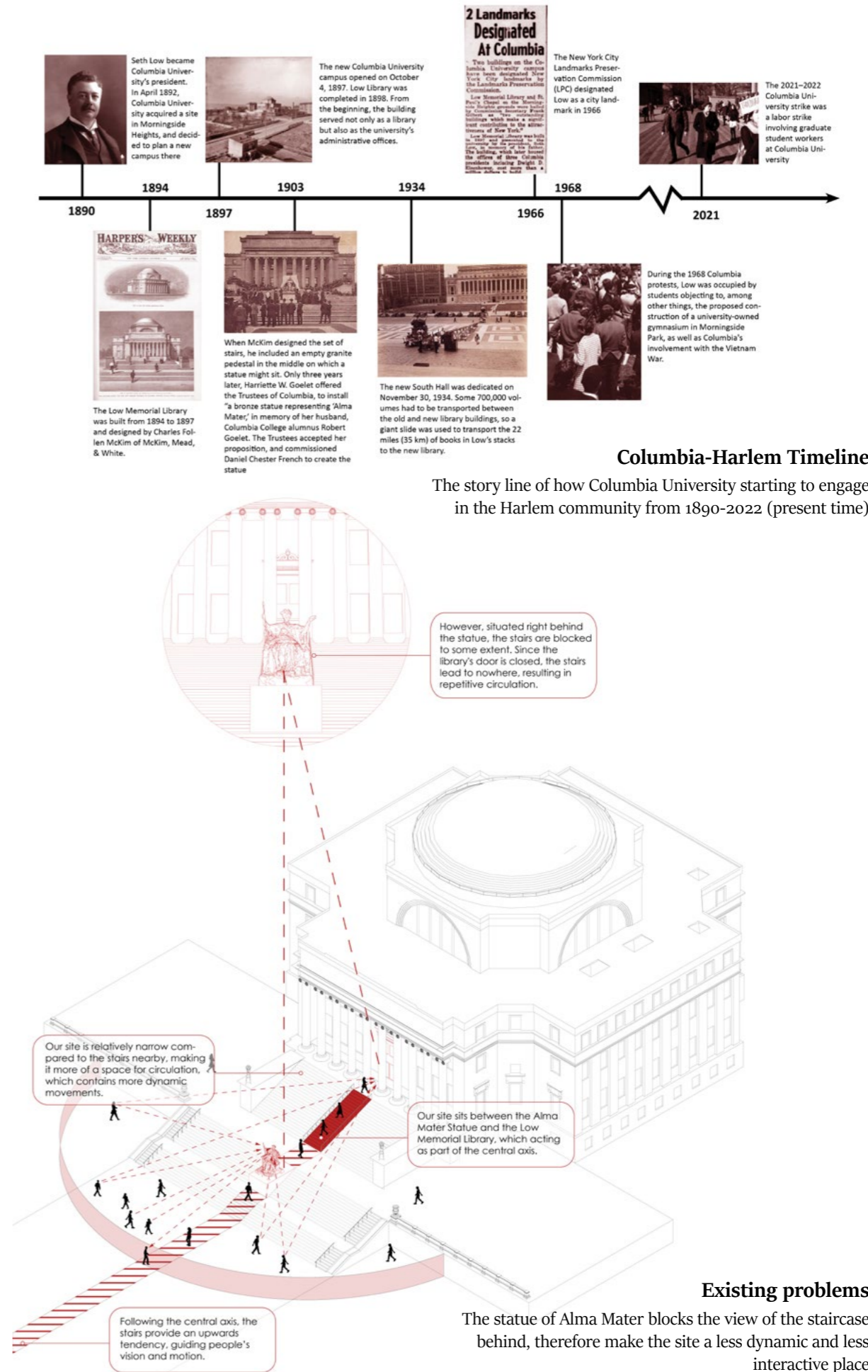
Four maps related to the food, art, music, and historical building are set on the eight boxes as puzzles. By moving around the boxes, people can actively explore the miniature Harlem. At the same time, the volumes can turn into small tables or shelves for people during their break.

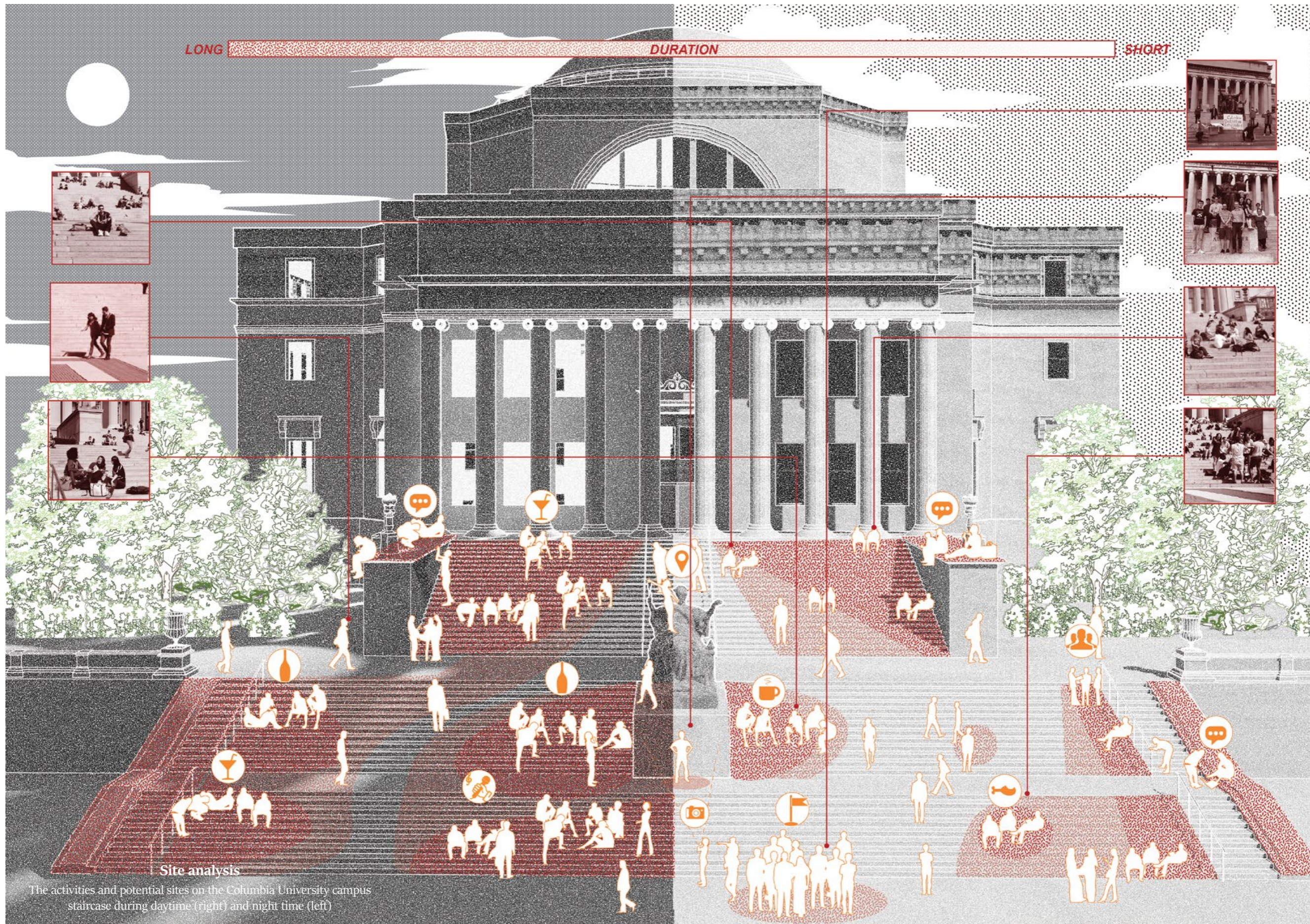
During the daytime, materials with different textures and colors are used to guide the puzzles, enabling people to participate in the interaction. Pockets are designed to place in iPhones as lighting sources. The translucency of the materials makes them possible to explore during nighttime as well.



Conceptual proposal

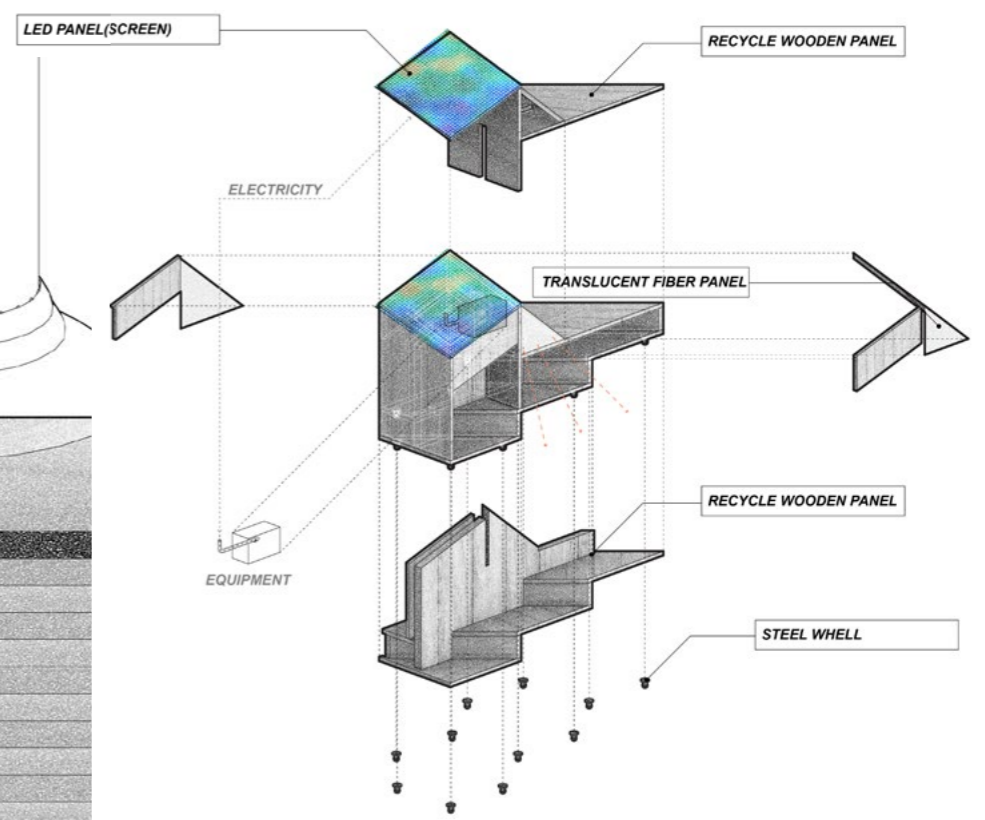
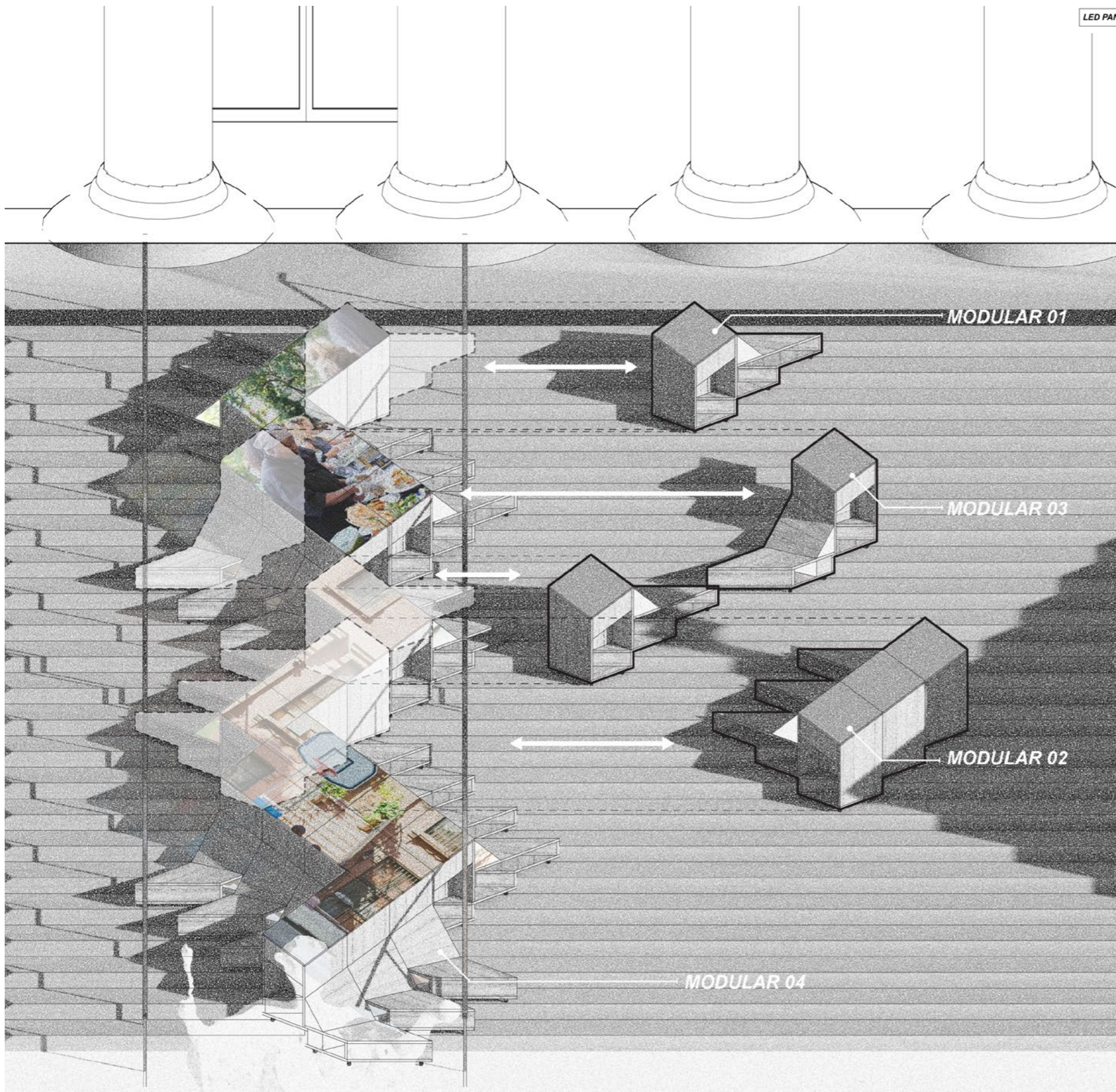
The project is designated to create an interactive installation that reconnect Harlem and Columbia University. Back TO Back means the reestablishment of relationship between Harlem neighbourhood and Columbia University campus





Site analysis

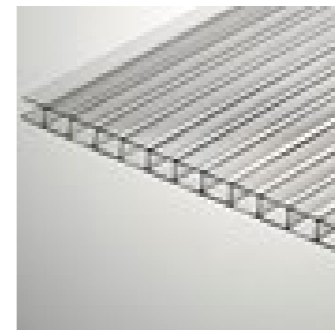
The activities and potential sites on the Columbia University campus staircase during daytime (right) and night time (left)



Steel wheel



LED panel



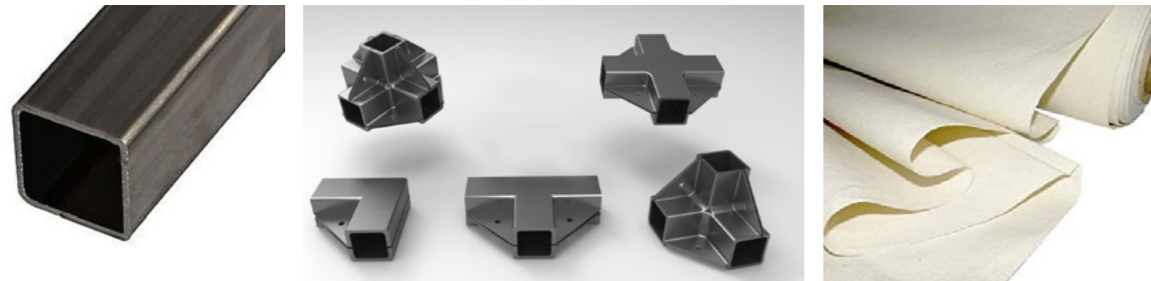
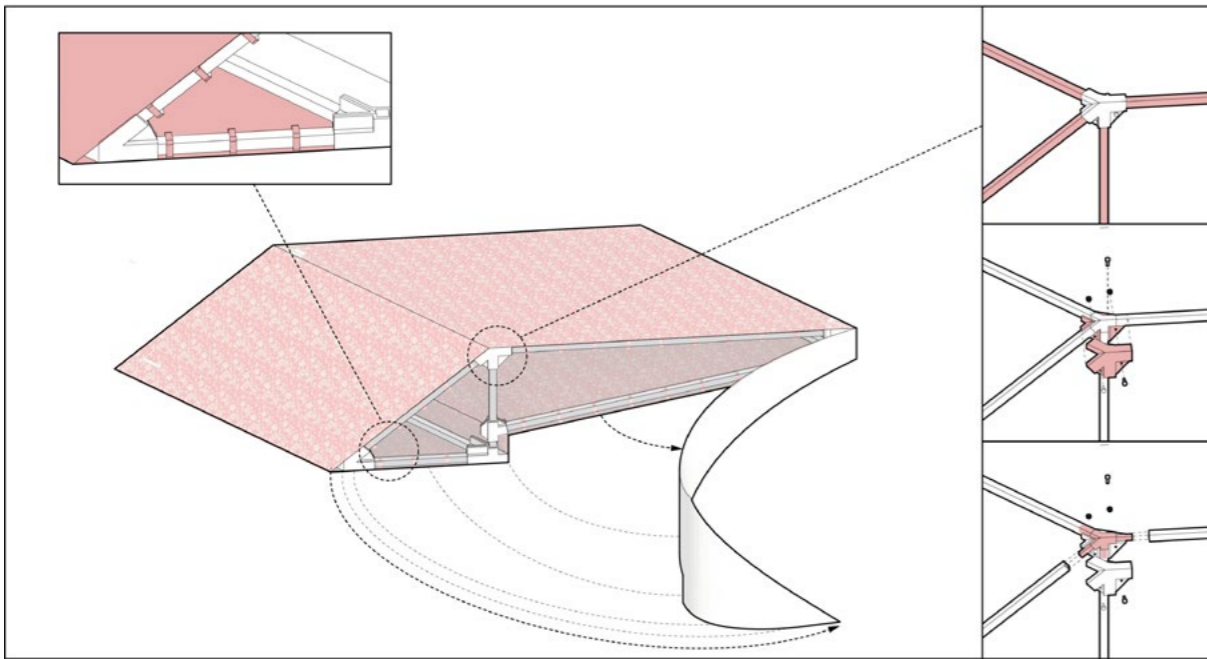
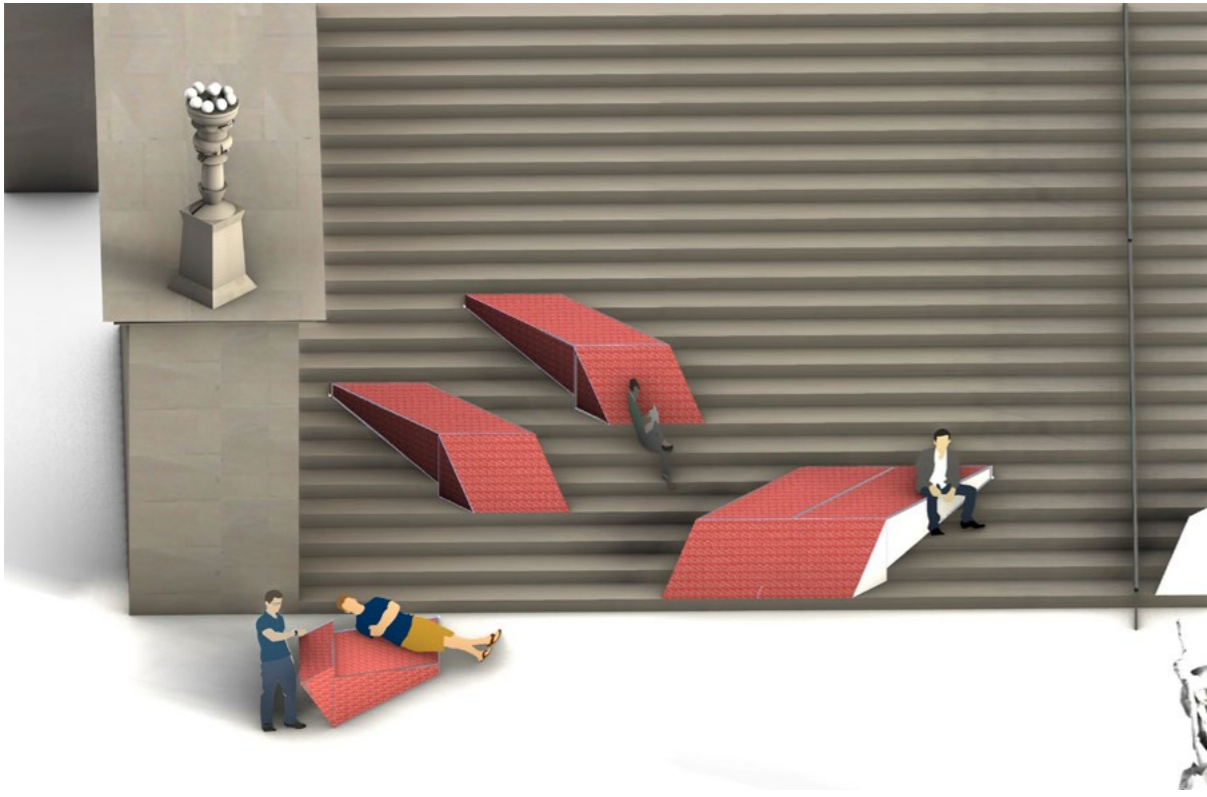
Translucent fiber panel



Recycle wooden panel

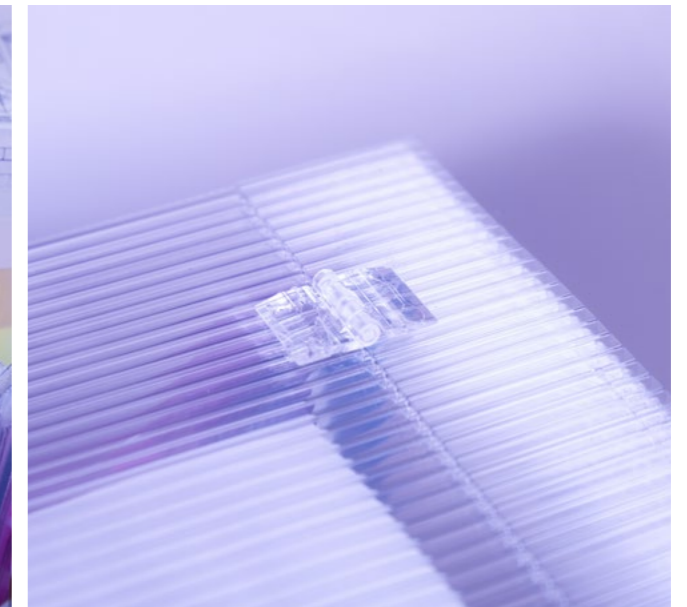
1st proposal

Use multiple media, high technology and materials to project, expose and show information for the users, while creates playfulness within the installation



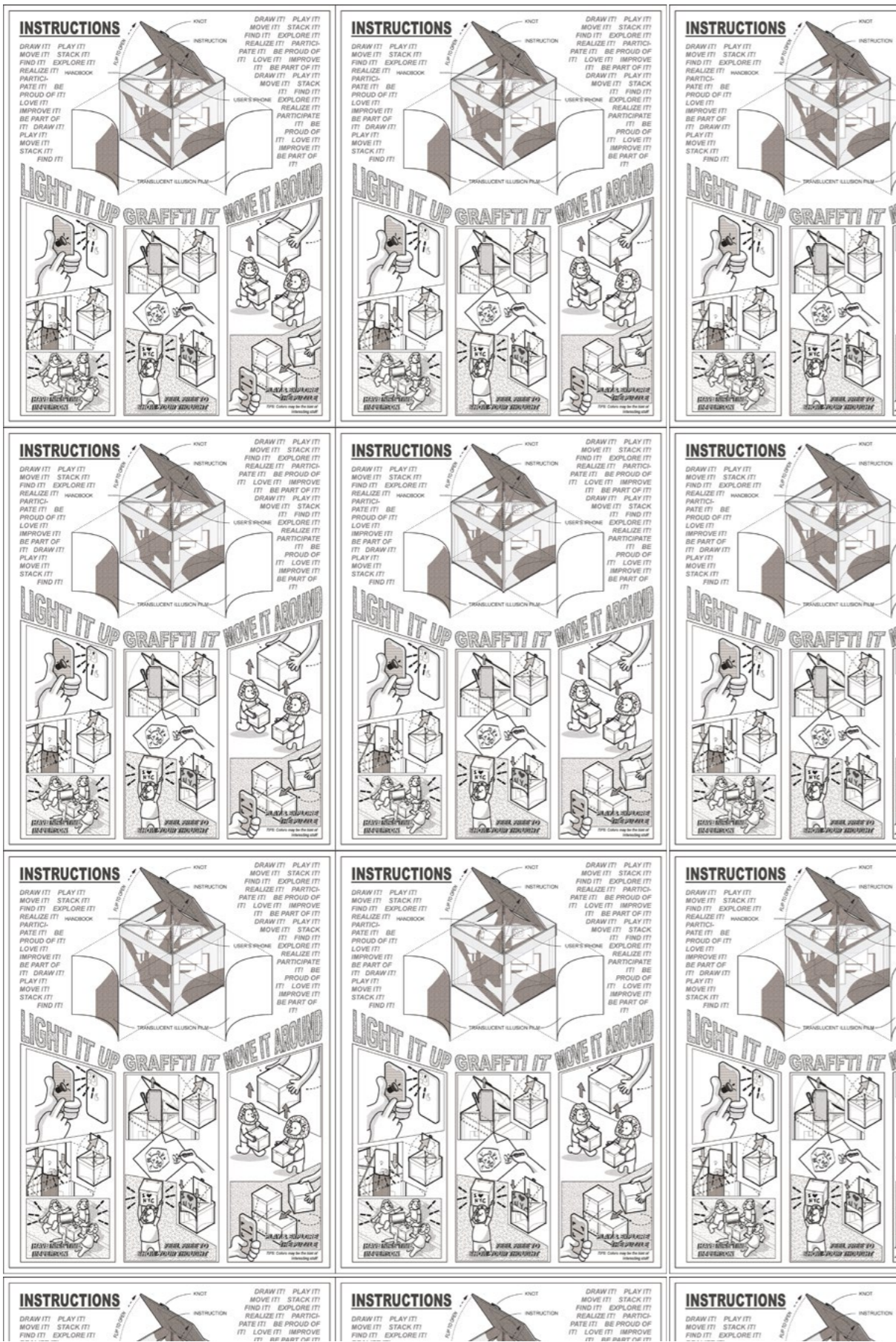
2nd proposal

Simplified structure and materials for easier production

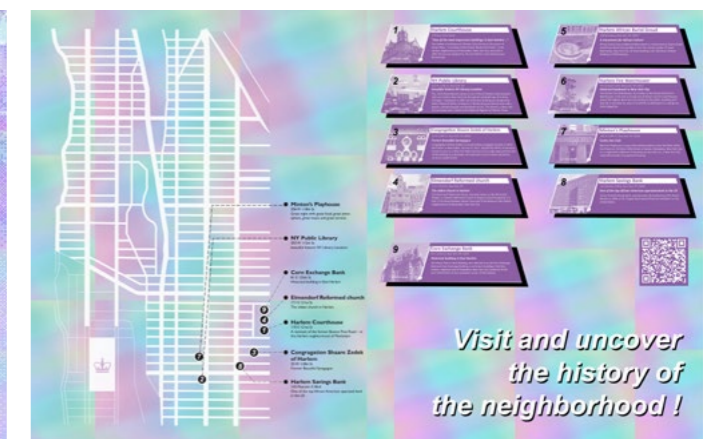
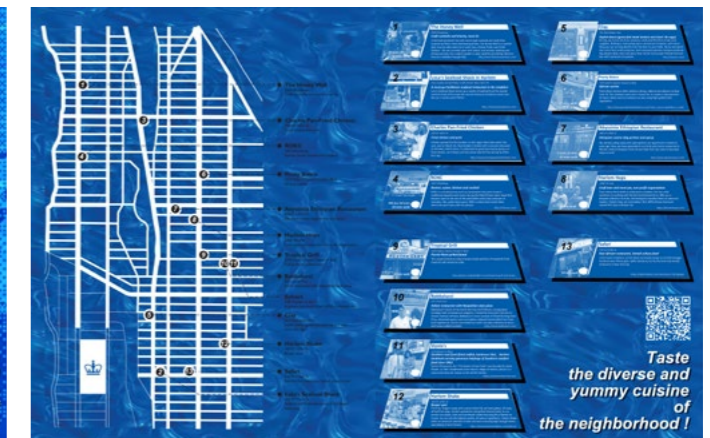
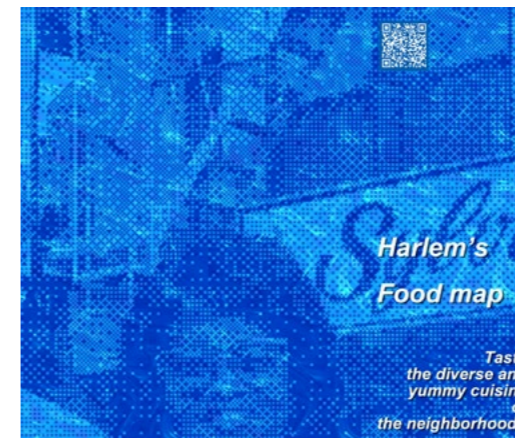
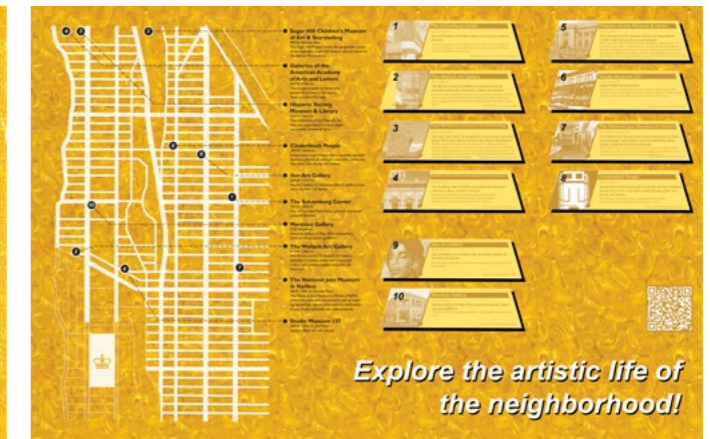


Final design: the BOX

The BOXes could work as small tables and temporary storage for the users. There're 4 maps showing different information of Harlem on the surface of the box, while the colorful translucent maps could also used as color filter at night time. The maps are also puzzle for users to play with, in order to create playfulness and interactivity between users.



The instruction pamphlet



The information maps



Pamphlets and maps

On the left shows the pamphlets and maps printed and put inside the BOX with the scannable QR code. On the right shows the overall maps after finishing the puzzles.



Historic site



Jazz bar



Art institute



Restaurant



Scattering as tables

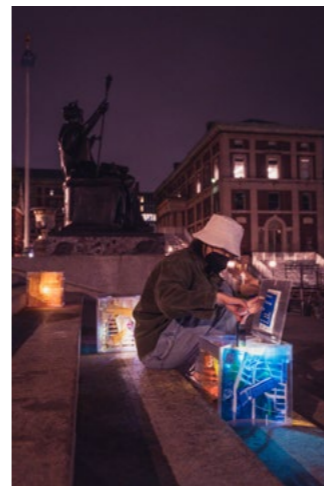


Moving as puzzle

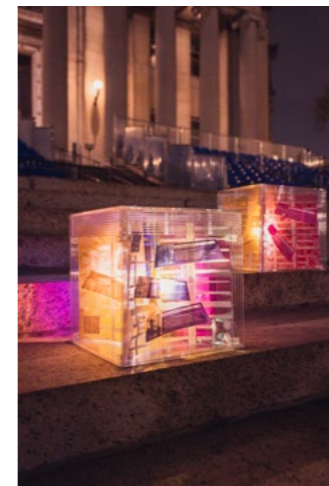


Reorganized as message boards

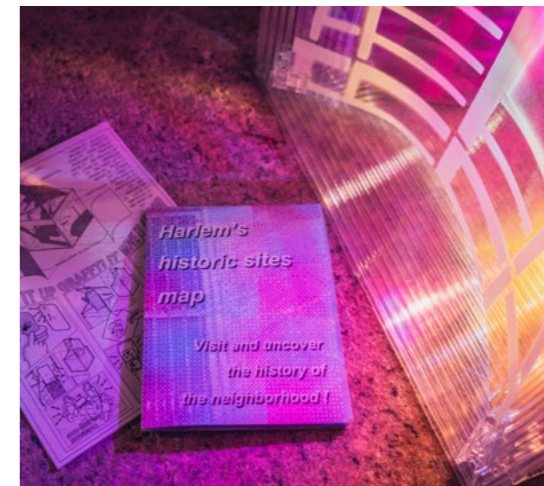
Day time



Phones as lighting resources

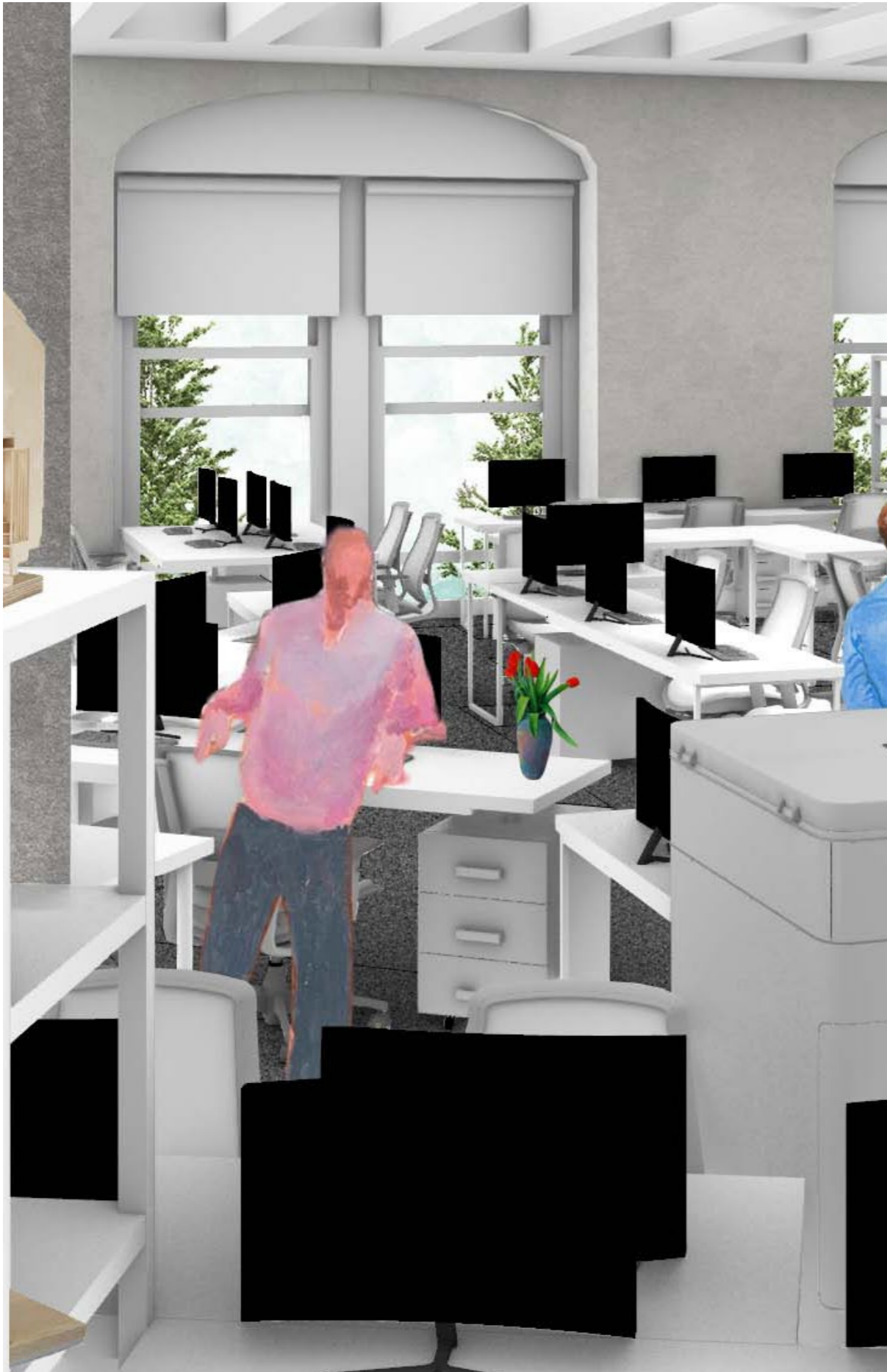


Lighting map



Instruction and pamphlet

Night time



09

Generative Design

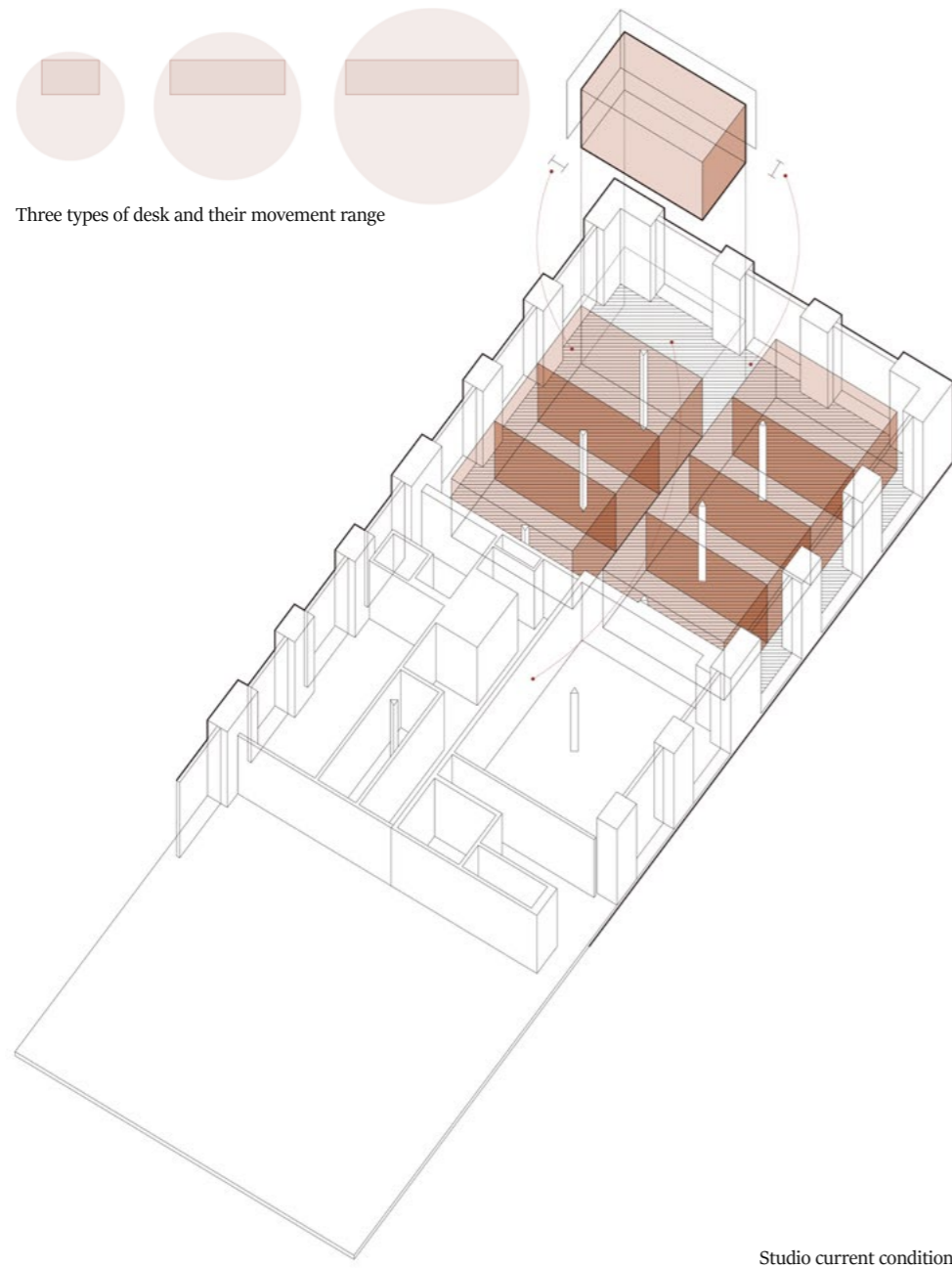
Optimization project on studio seating re-organization

Instructor: Danil Nagy
Spring Elective Course/ February 2022
Group research and design with Siye Huang, Siyu Xiao, Yuening Jiang
and Yutong Deng

In the past decade, our interaction with the world has been deeply affected by artificial intelligence. Many industries including finance, science, and manufacturing have been revolutionized by developments in Machine Learning, optimization, and other artificial intelligence technologies, which have allowed them to leverage the power of computing to solve complex problems in new and innovative ways.

Meanwhile, architectural design practice has been barely impacted by these developments. Although almost all designers use computers in their practice, the tools they rely on have not leveraged these emerging technologies. As a result, the design profession has not substantially evolved since computers were first introduced to the design world nearly four decades ago.

This course will introduce students to the basic concepts of generative design and teach them how to create complex models that can be controlled and evaluated by an automated search algorithm. The Python programming language will be introduced as a way to amplify the generative complexity of parametric models in Grasshopper. We will also cover techniques for evaluating designs including using third-party Grasshopper plugins for structural and environmental analysis.



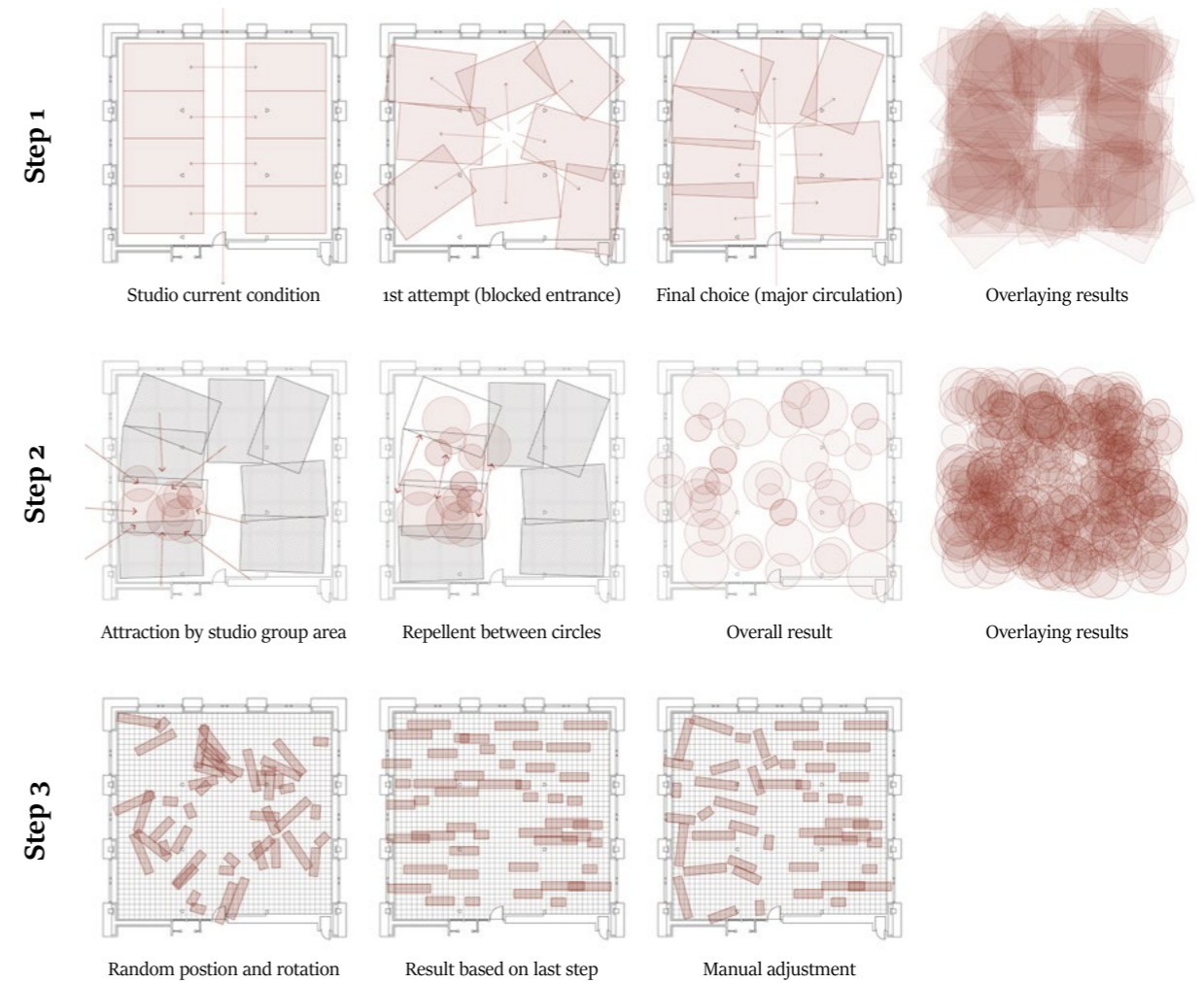
1 Introduction

The current condition of classroom seating arrangement is in a linear organization, meaning an central axis of major circulation, with branches to each of the studios. This organization ignores the privacy between students and the collective relationship within each studio. Also, it minimizes the possibility of interaction, communication and creativity. It is difficult for students to discuss while giving individual spaces with only one long desk.

Therefore, our project intends to reorganize the seating for the studios, in order to enhance the possibility of communication and interaction. We provide three different types of desk: single, double and triple, for different group structures (individual work, 2 people or 3

people group work) as basis for our rearrangement.

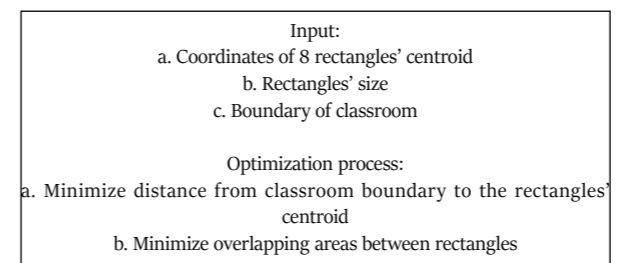
However, it is still difficult to quantify the term “privacy” and collectiveness”, and the traditional way of putting desk manually might be subjective and less effective. Therefore we introduced Grasshopper and Discover to optimize the seating organization with certain parameters: distance and overlapping area. The larger the overlapping area is, the more collectiveness the area could get, or vice versa, the smaller the overlapping area is, the more privacy the area could have. With these two different opposite trends that control the whole optimization process, we believe that there will be a balance in between for the best arrangement for the students future use.



2 Methodology

We set a series of points in the studio classroom plan for generating the studio group area, the desks and their movement range. We start our optimization process by minimizing the overlapping area between desk movement ranges (for privacy) and by maximizing the overlapping area between desk movement range and the studio group area (for collectiveness) to reach a balanced state. Our process are introduced below:

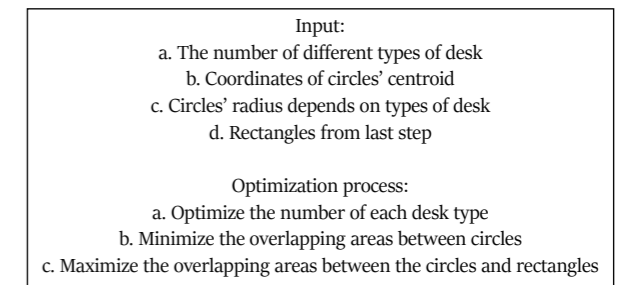
Step 1 Optimizing the area and position of 8 groups in the studio, using the distance to the classroom boundary as parameter to control the major circulation space from the entrance to each of the studios.



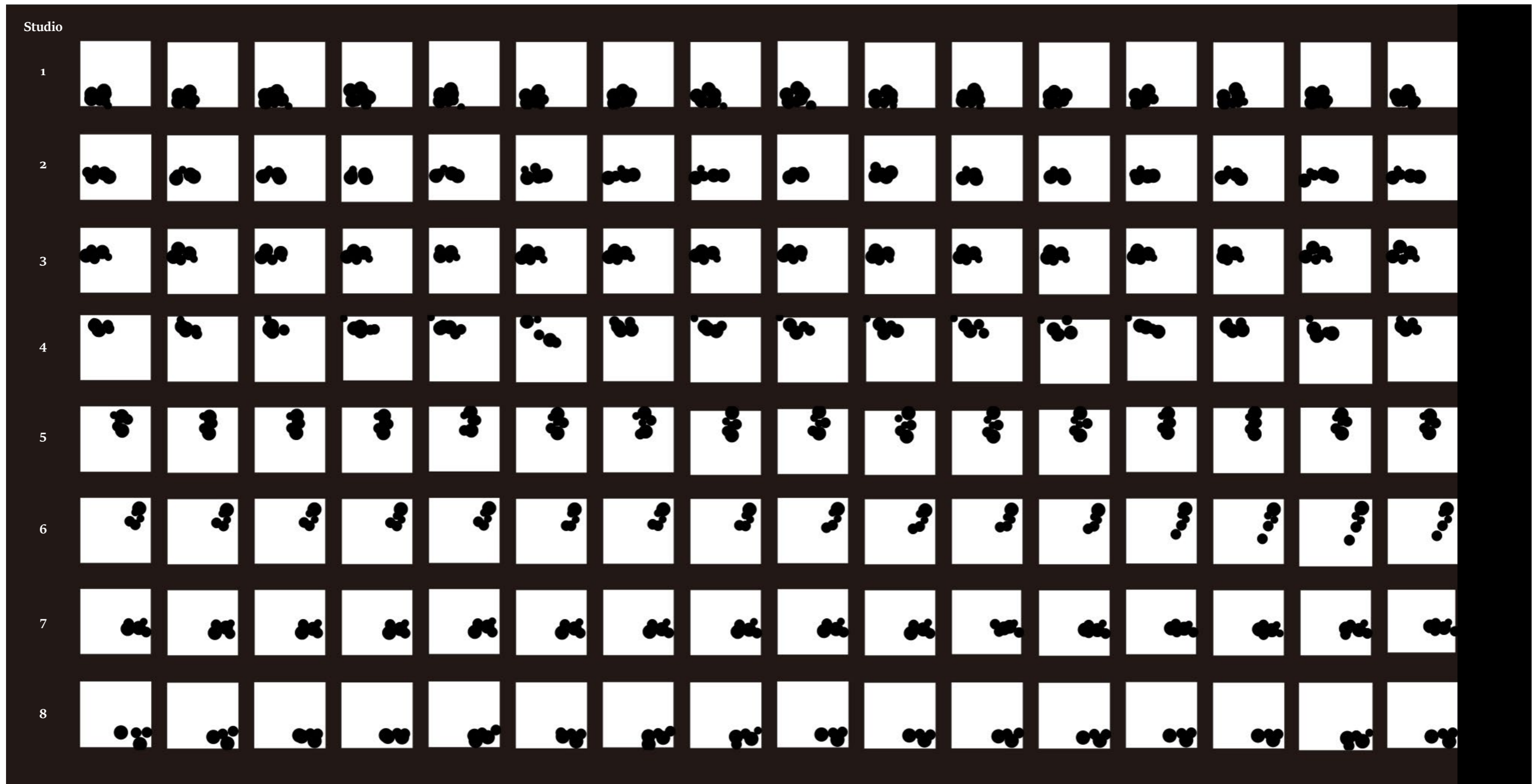
Step 2 Each group contains around 12 people(11-13), a set of circles(representing movement range of different types

of desk for discussion and individual work) are distributed in each group boundary(the rectangle).

For each group, the circles are optimized to repel each other (privacy between students) while attracting by the rectangle (collectiveness within the studio). And between groups, the circles are also set to repel each other. Both privacy and collectiveness are controlled by the overlapping area between circles and rectangles. The process is conducted group by group instead of 8 groups together.



Step 3 Manually operating and adjusting the orientation of the desks to better fit in the classroom for circulation

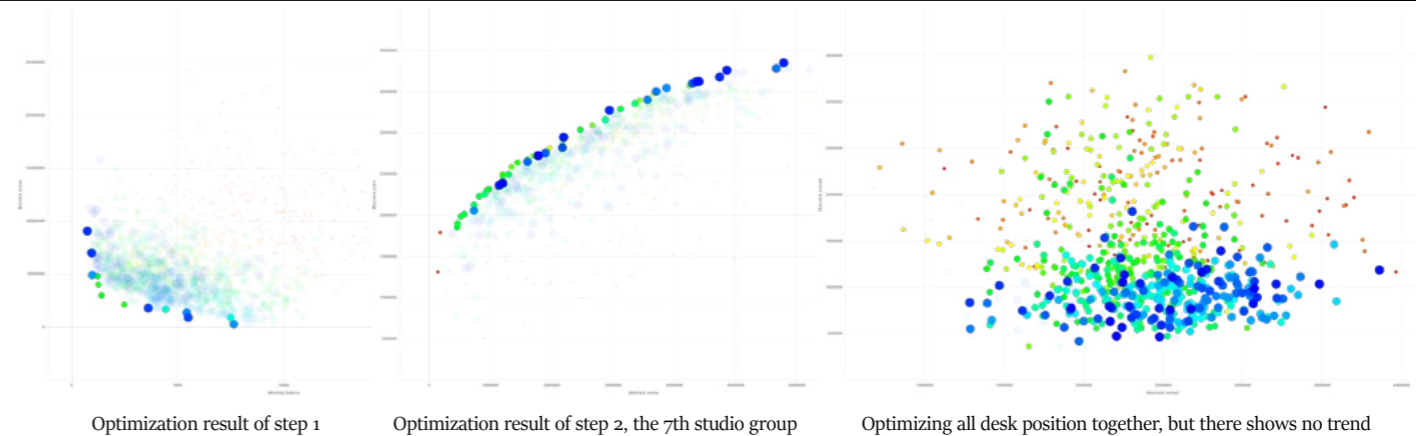


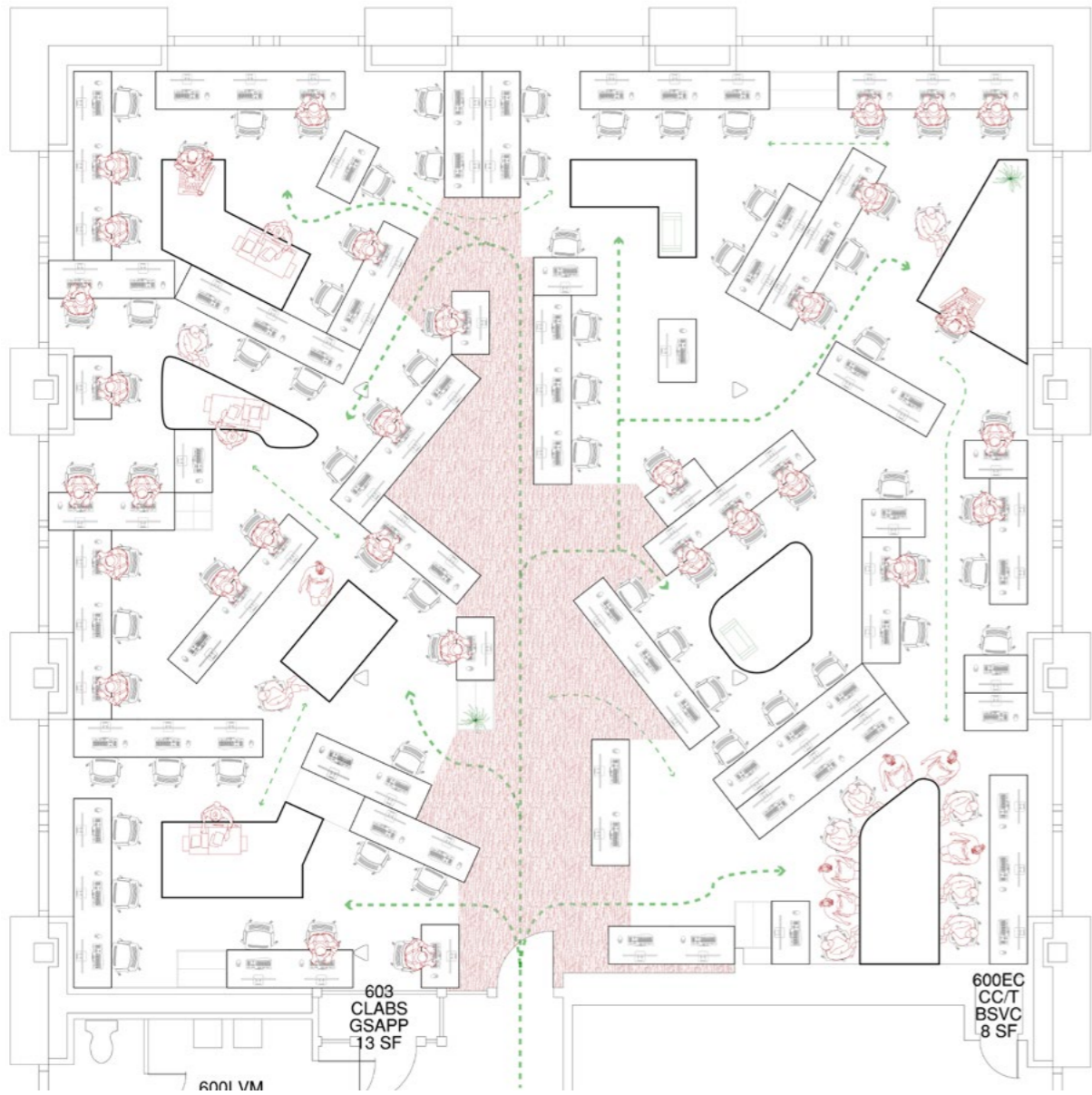
Optimization results of each studio group in step 2

3 Results

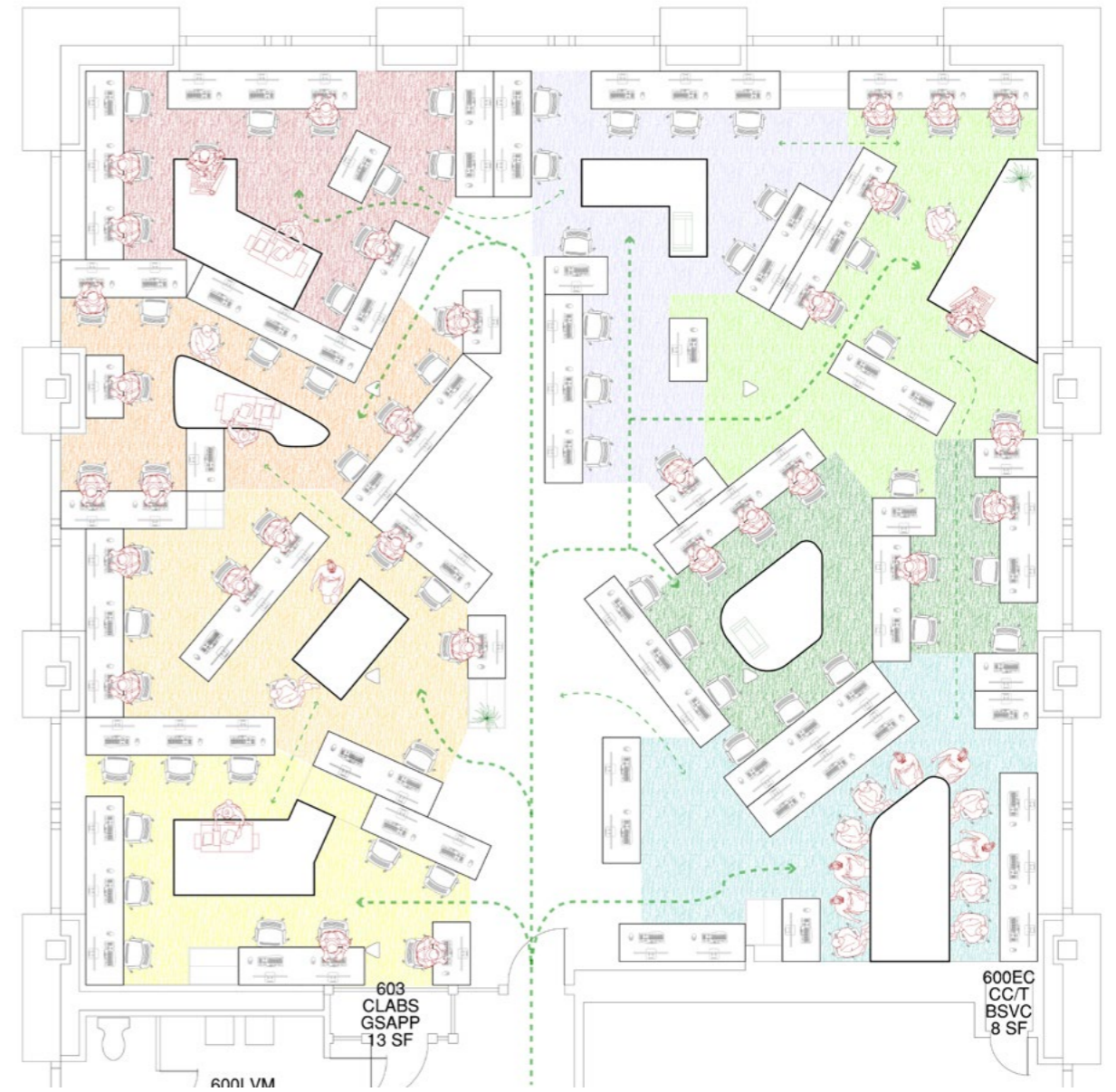
We try to optimize the position of the desks all together, however, the result doesn't show any trend. Therefore we decided to change our plan to optimize group by group, so that the trends could be salient. As a result, from the Discover chart we could see that the trend is salient in all the optimization (step1 & 2)

In step 3, we also try to rotate the desks in certain angles as input parameters, and set the constraint that the overlapping area should be less than 0. However, Discover doesn't give us any optimal result, so we choose to manually adjust the angles of each of the desks.





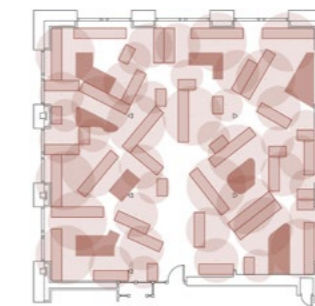
Avery 600N re-organized plan circulation diagram



Avery 600N re-organized plan zoning diagram



Optimization result of circulation and draft zoning for each studio group



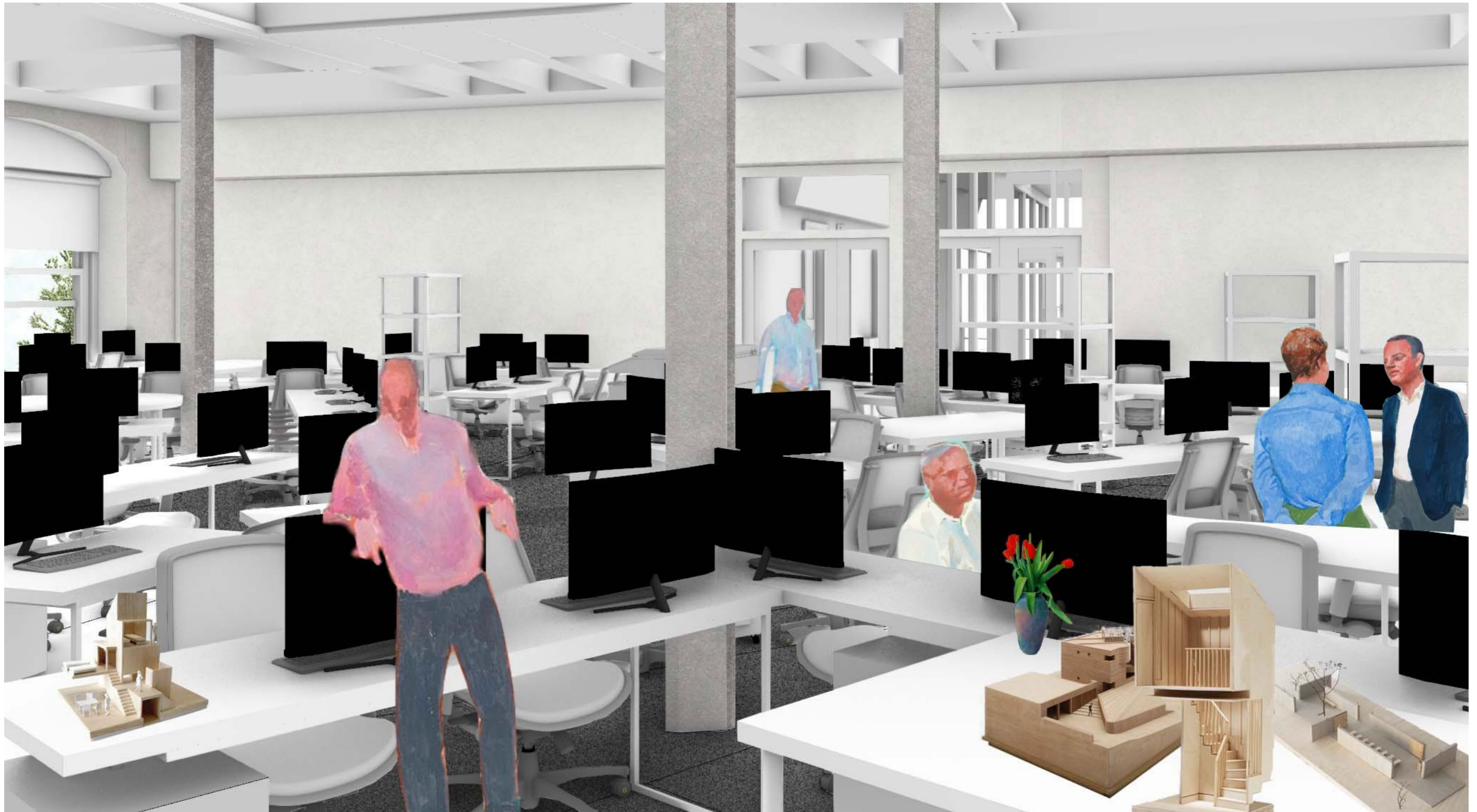
Optimization result of desk movement ranges and manual adjustment of desk orientations

3.1 Central circulation space

The red hatch in the plan shows the major circulation space designed from the optimization result. The central circulation space provides entrances for each studio group

3.2 Zoning for each studio group

Different colors of zones on the plan diagram shows the 8 different areas intended and designed for the required studios in the classroom. Within each studio group, students have their private desk top, while sharing the collective working table with other students in the same studio



4 Rendering

Rendering showing the general view inside the studio after the re-organization process



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