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Columbia, GSAPP M.arch '24

# Preface

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This portfolio represents a synthesis of my architectural pursuits at GSAPP, spanning the academic years from fall 2021 to spring 2024. Central to my exploration has been a thematic inquiry into notions of autonomy and self-discovery, underpinned by a focused investigation into self-build methodologies and incremental/modular architecture.

My work aspires to provide pragmatic responses to the multifaceted challenges encountered by everyday communities globally, whether addressing critical issues such as affordable housing or climate crisis resilience.

Just as my intellectual journey remains in perpetual evolution, so do the ideas and innovations in this body of work.

## Core I

“Deep Histories”

*Fall 2021*  
*Lindy Roy*



## Adv. IV

“Casa de Culebra”

*Spring 2023*  
*Pedro Rivera*



## Core II

“Discovery School”

*Spring 2022*  
*Carlyle Fraser*



## Adv. V

“Water Works”

*Fall 2023*  
*Amina Blacksher*



## Core III

“Nuestra Casa”

*Fall 2022*  
*Gary Bates*



## Adv. VI

“In Flux”

*Spring 2024*  
*Ada Tolla*  
*Guiseppe Lignano*



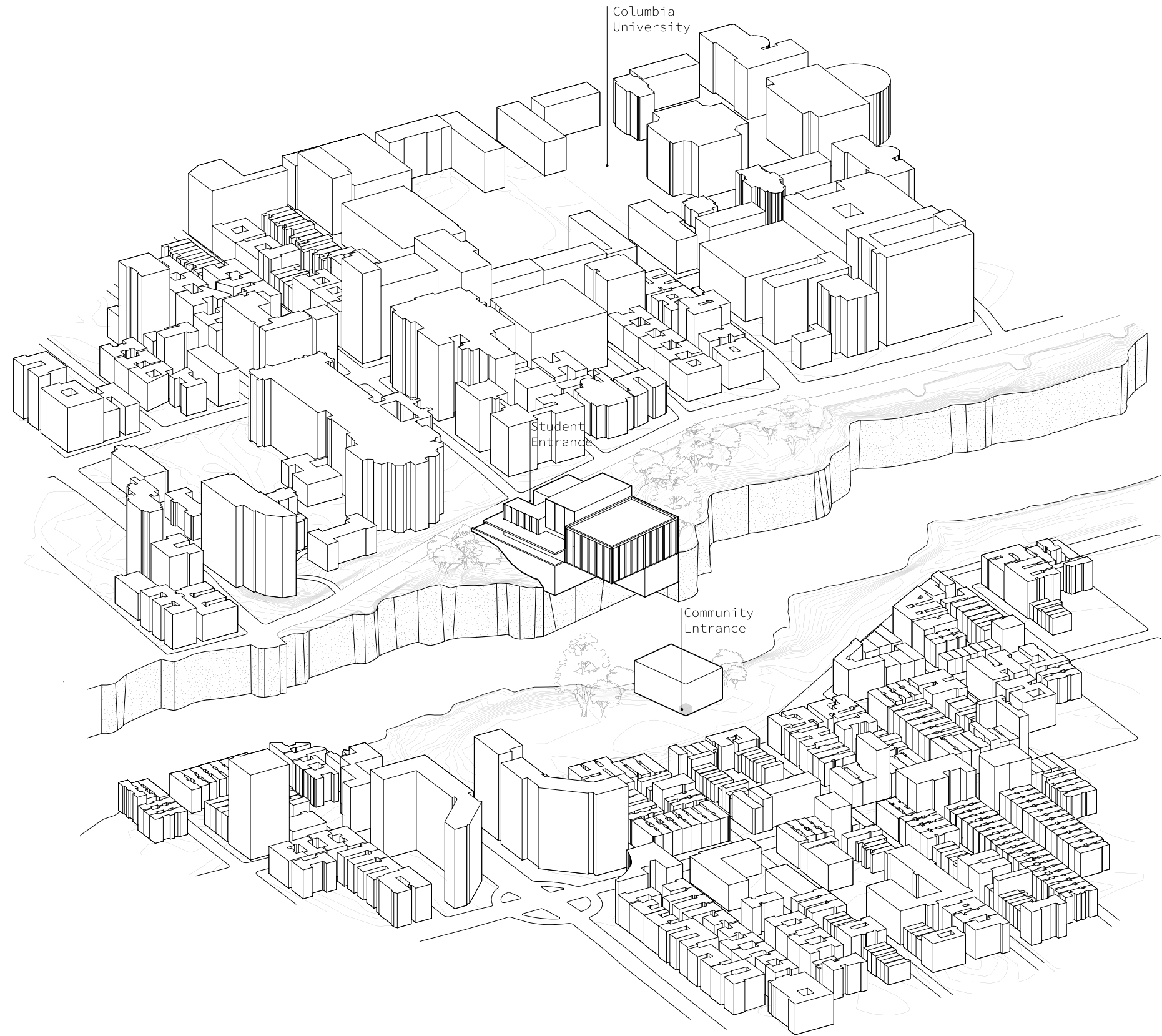
## Core I Deep Histories

The history of Columbia University's strained relationship with the Black and Latinx communities of Harlem and Morningside Heights can be traced back to a competition for physical space. The ongoing tension arises from the desire of local residents to maintain control over their living and recreational areas in the face of the significant power wielded by the university as a landlord, as well as through its sporadic campus expansion plans.

In 1968, the start of construction on an \$11 million, 2.2-acre gym for Columbia students in Morningside Park, a public park that had become a boundary line between the campus and

neighboring communities to the east, added to existing tensions on campus. The building's design, with separate entrances for students and local residents, highlighted its segregated intent and reinforced the broader separation between the university and surrounding communities.

Opposition to the Vietnam War and the recent assassination of Martin Luther King Jr. further heightened tensions, setting the stage for the present-day exploration of Morningside Park as a site for the development of new and inclusive formulations for public space.



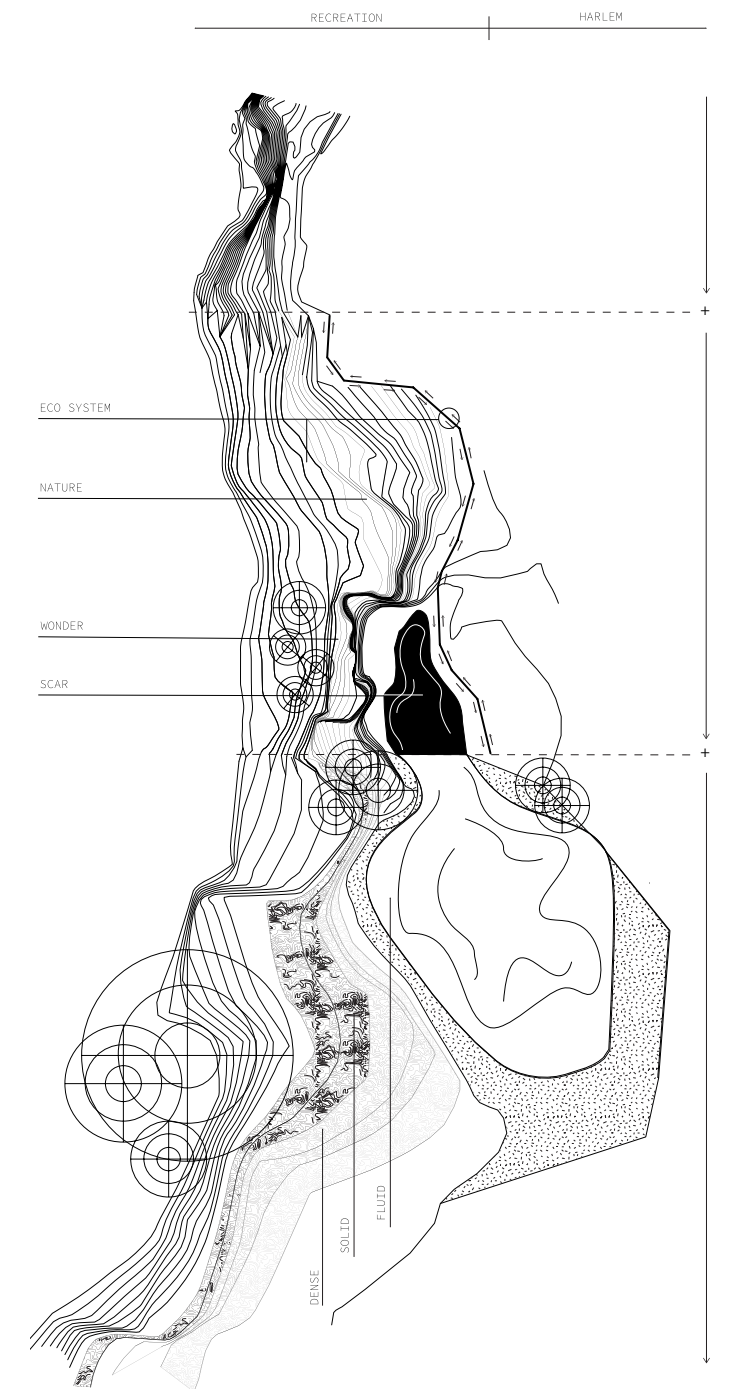
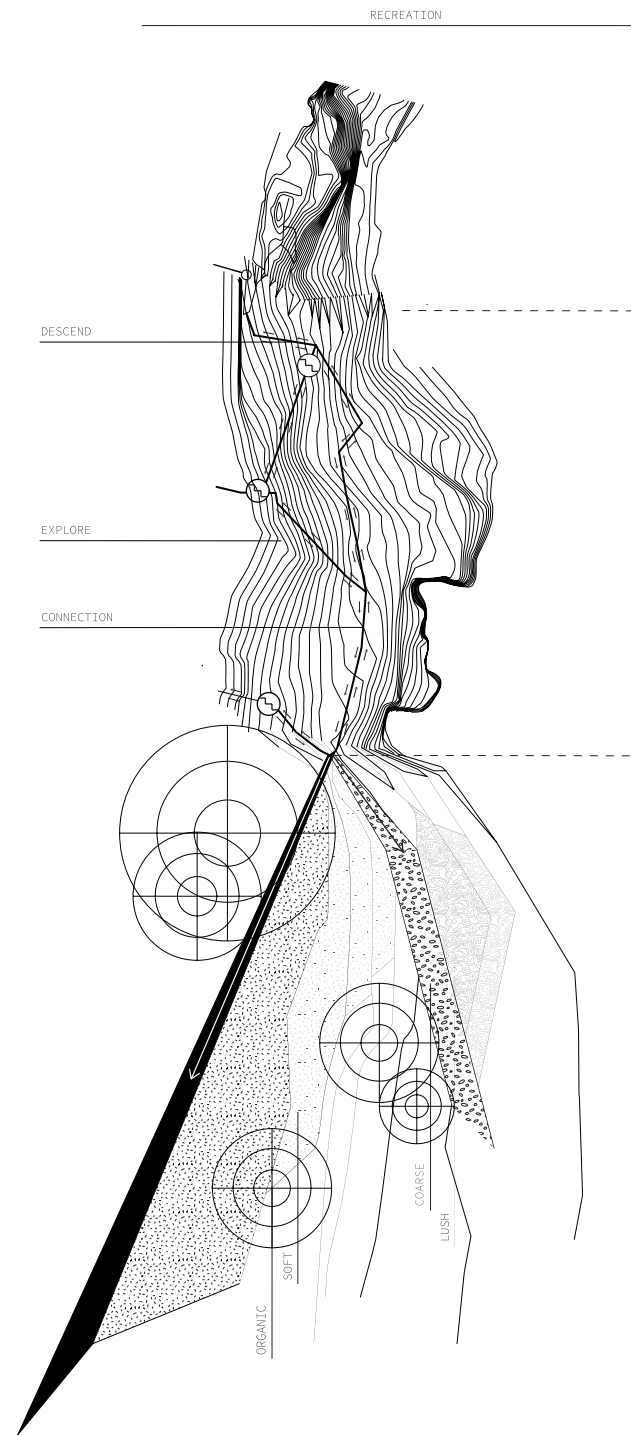
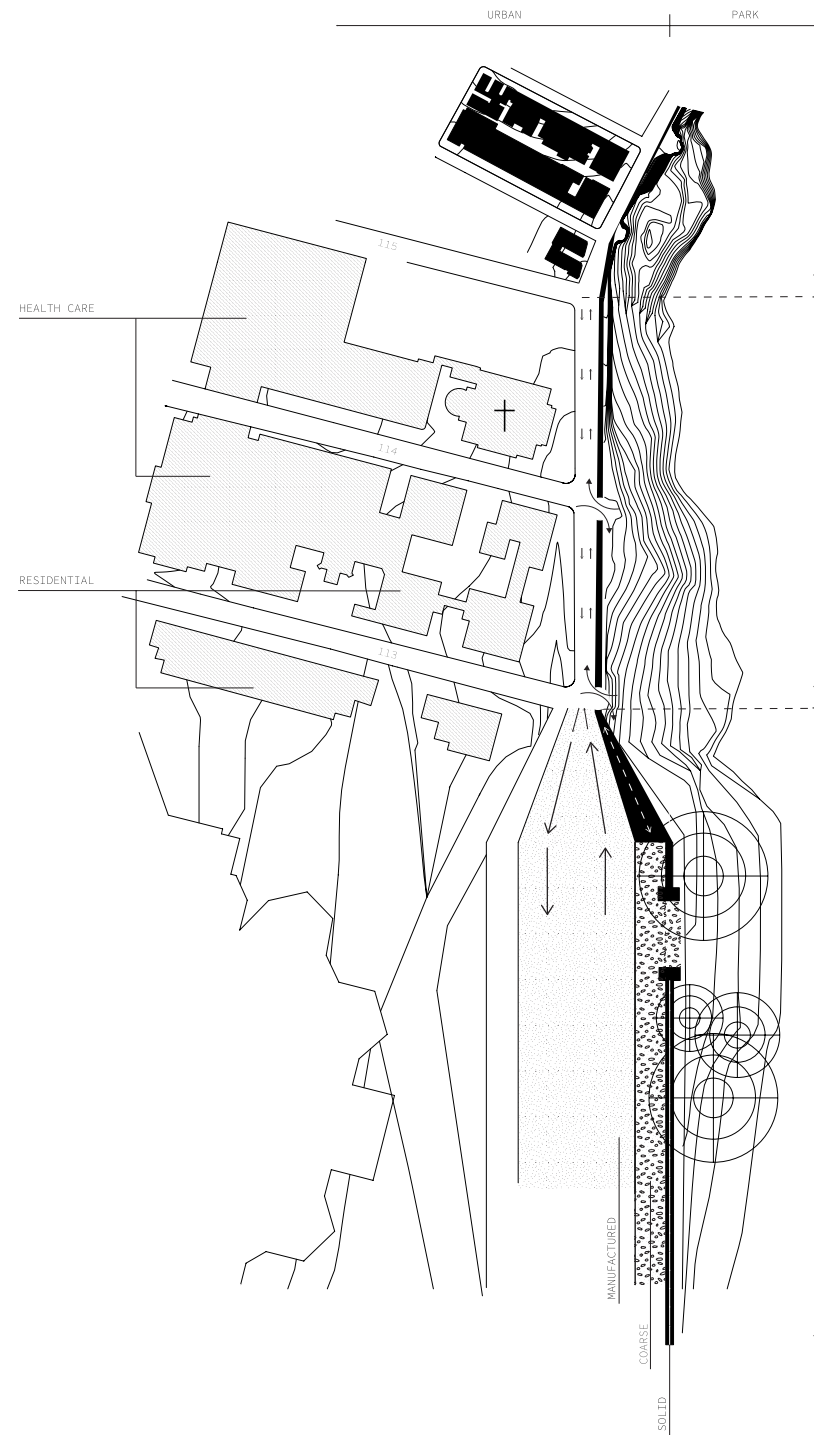




Students for a Democratic Society (SDS) and Students for Afro-American Society (SAS) led a university wide, week-long student protest. Protesters tore down the fence around the construction site and occupied four academic buildings. The protest was non-violent at first, but police were sent to stop the demonstration by the end of the week.

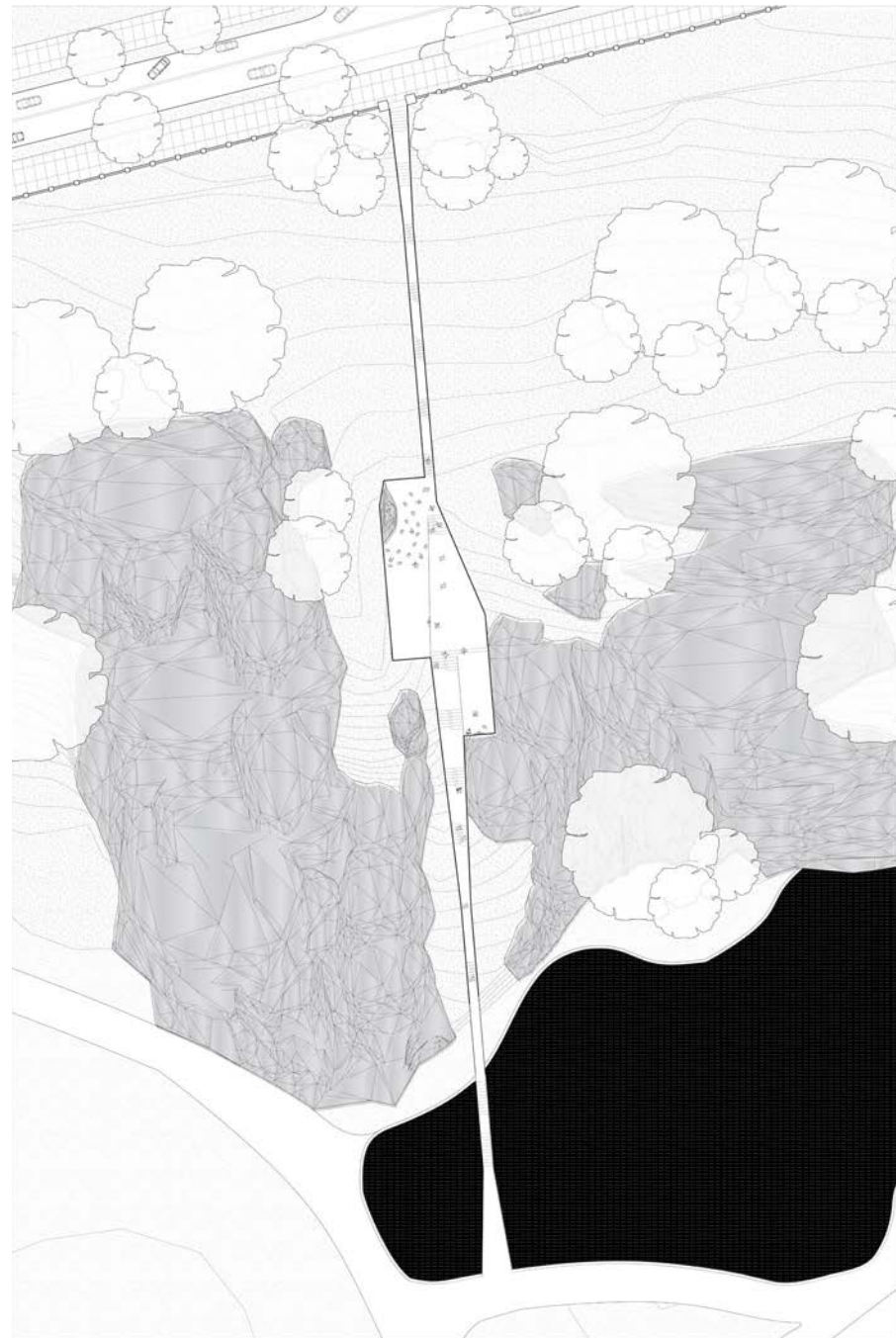
### A Divisive Landscape

During my initial site visit, I conducted an analysis of the location using three different scales: the broader urban context, materiality, and minute textures, in order to gain a comprehensive understanding of the environment. This analysis informed a series of mappings, in which I identified three distinct zones within the site. These mappings revealed that although the construction of the gym was unsuccessful, a physical barrier still exists within the park, dividing public spaces between Columbia affiliates and Morningside residents who predominantly use the upper part of the park, which is quiet and secluded. In contrast, Harlem residents primarily use the lower part of the park, where all community facilities and activities are located. This lower level is visually separated from the upper part by dense overgrowth and a steep rock face, reminiscent of the segregated nature of the gym proposal.





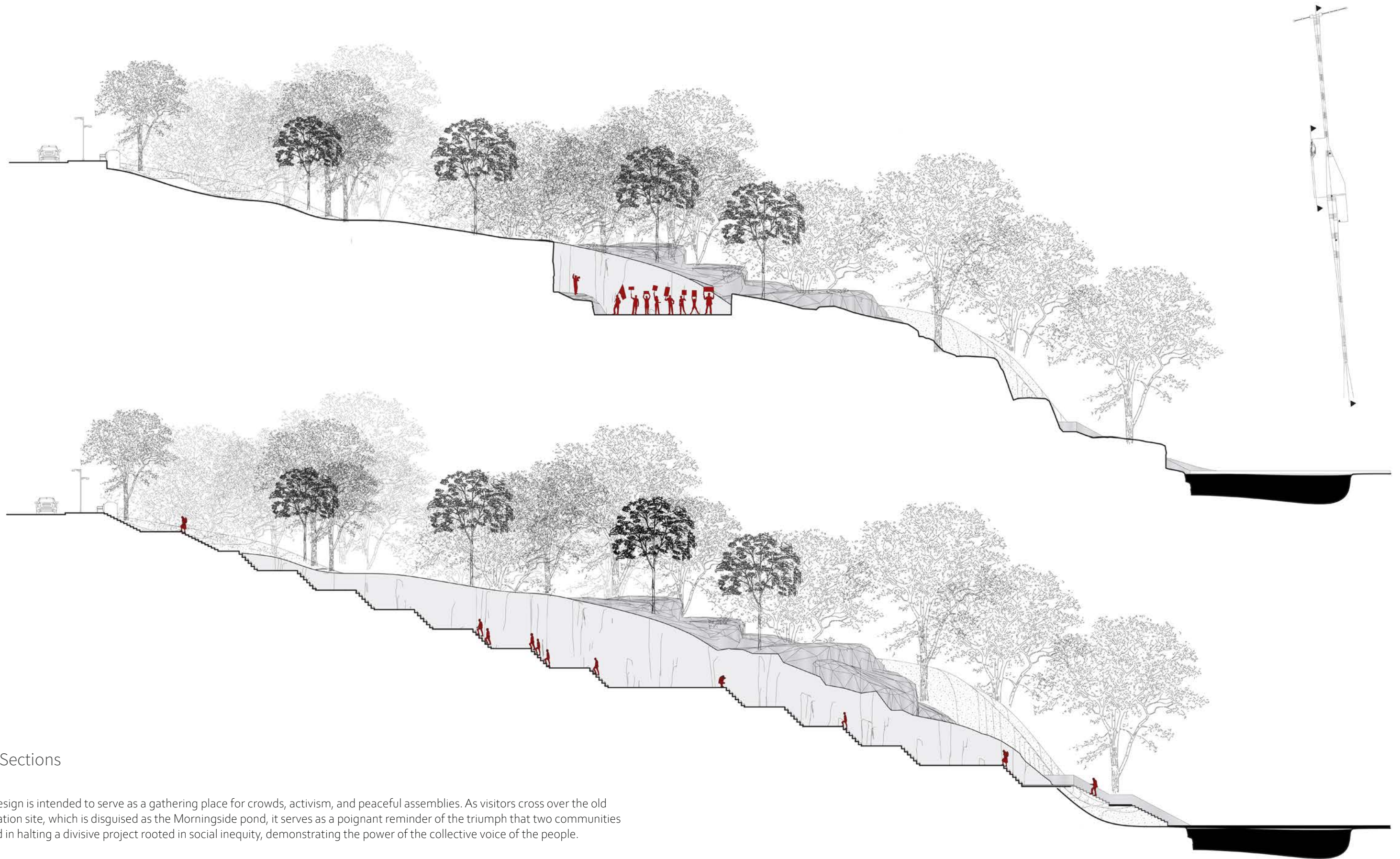
Project Proposal:



The final design consists of a deep cut into the rock face, which creates a canyon-like pathway leading visitors from Harlem up through the cliff side onto Morningside Drive via a series of stairs. These stairs are situated at the two original planned entrances to the gym, and by following this path, visitors can retrace the steps of the historic marches/protests that took place on the site in 1968.



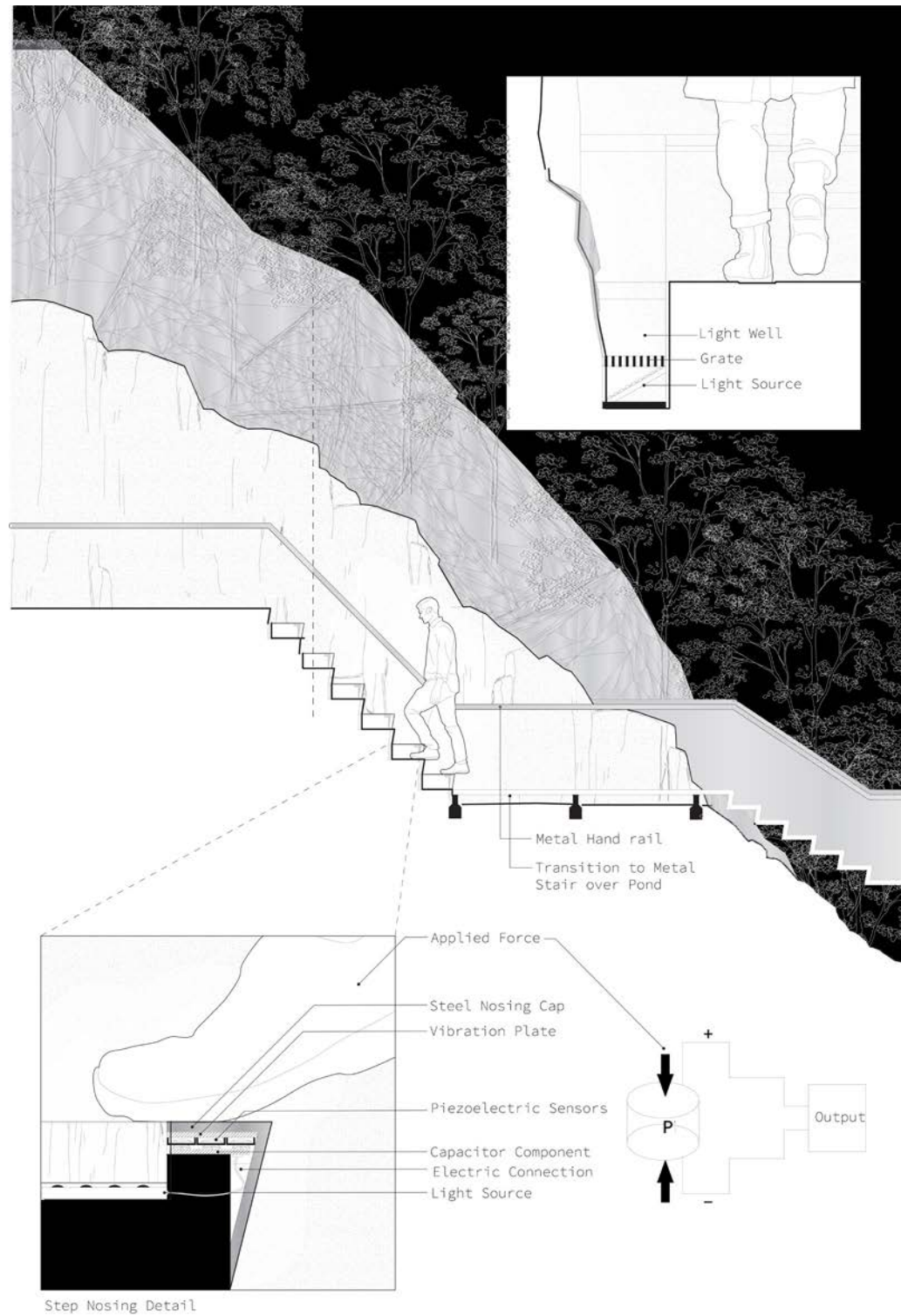




## Site Sections

The design is intended to serve as a gathering place for crowds, activism, and peaceful assemblies. As visitors cross over the old excavation site, which is disguised as the Morningside pond, it serves as a poignant reminder of the triumph that two communities shared in halting a divisive project rooted in social inequity, demonstrating the power of the collective voice of the people.





Piezoelectric Detail

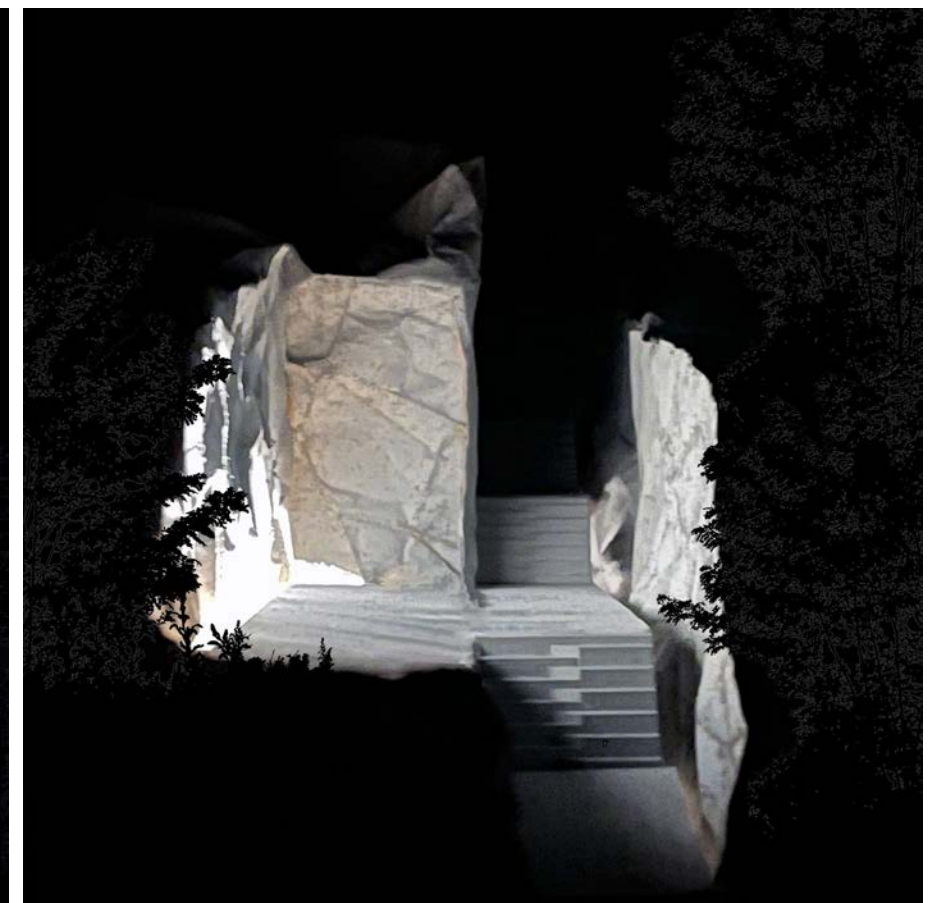
The stairs within the canyon are designed to regulate the speed and movement of individuals or groups traversing through it. As one ascends, strategically placed piezoelectric sensors are activated by their footsteps, sending a charge to a light well that lines the path of movement. At night, this light source illuminates the narrow canyon carved into the rock face, washing it in a sequence that corresponds to the flow of people passing through.

1:1 Model

As part of this project, I constructed a 1:1 mock-up of a stone step that incorporated a piezoelectric sensor in the nosing of the step. This sensor responds to applied pressure by sending an electric charge to a light strip affixed to the side of the step, resulting in the illumination of the adjacent wall corresponds to the flow of people passing through.

Photography Model

As an additional component of this project, I constructed a scaled model to depict the lighting effects that would be generated by the project during the nighttime hours.





## Core II Discovery School

Public education is a fundamental privilege for every child, yet the standard education system in our country falls short in catering to individual learning needs.

The one-size-fits-all approach and the expectation for all children to flourish at the same thing and in the same environment creates a disadvantage for children with undiagnosed learning differences or those who excel in one skill or subject and not perform well in others. The Discovery School aims to address these inadequacies and offer a more personalized learning experience for students.

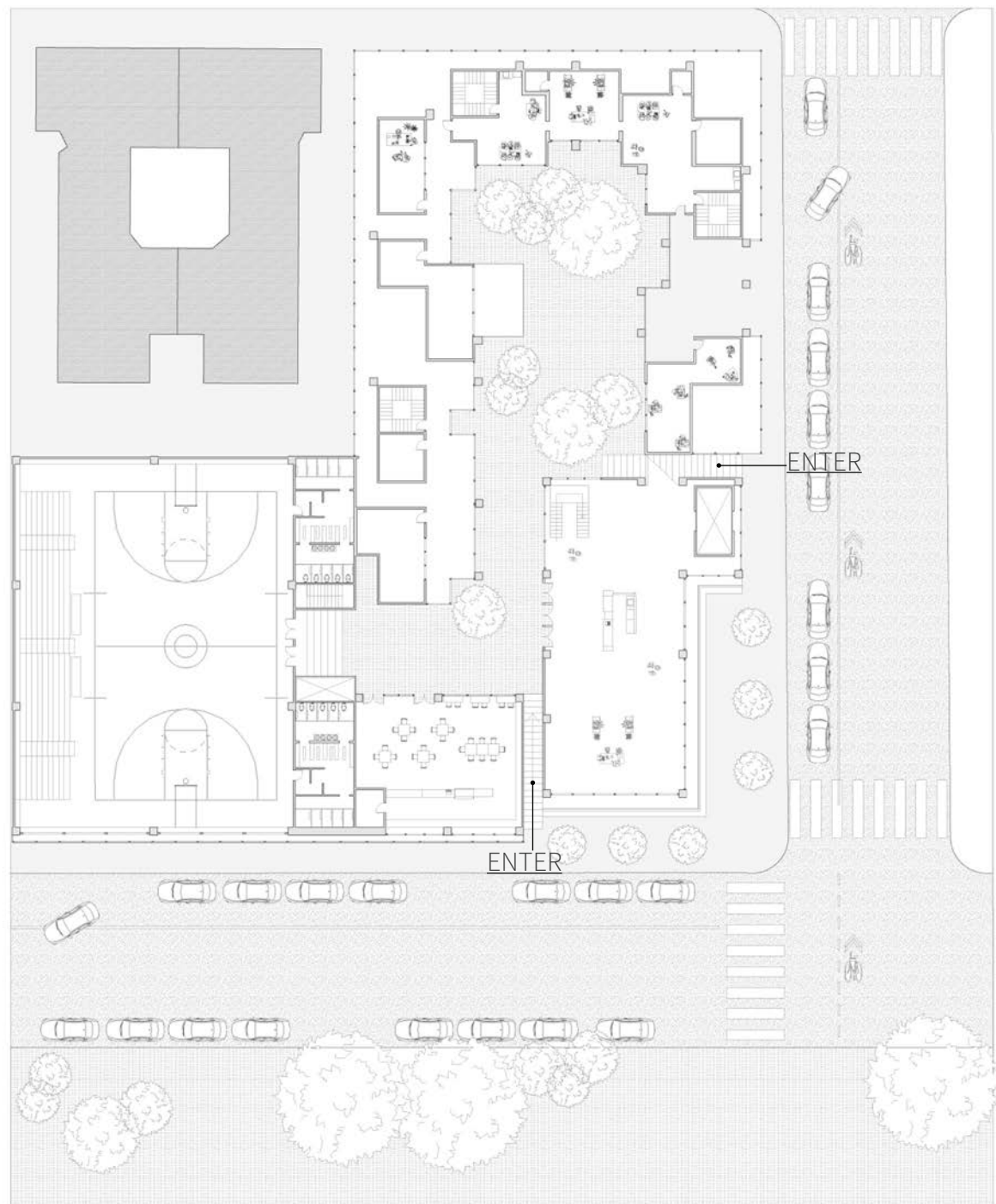
The primary objective of this project proposal is to establish The Discovery School, an institution that offers a unique approach to education by providing a personalized learning experience. The school's focus is to enable children to discover their autonomy in what they learn and how they learn it, allowing them to excel in areas where they possess proficiency rather than struggling to meet generalized standards.

The school will have classrooms consisting of distinct modules corresponding to specific learning trajectories, such as art, math, and science. Students will have the freedom to create a learning trajectory based on their unique interests and capabilities. The modules will intersect and create overlaps where trajectories can combine, allowing students to learn and further explore their education through these adjacencies.

The curriculum will be designed to encourage creativity, critical thinking, and problem-solving skills. Students will be able to learn through a lens of their own making rooted in their interests, thereby creating a meaningful learning experience.

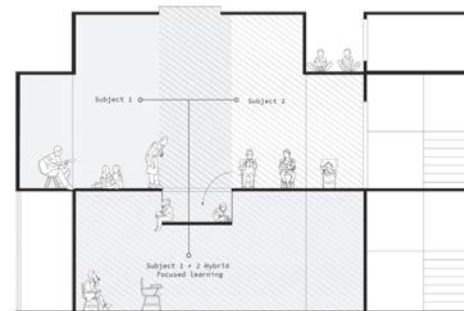






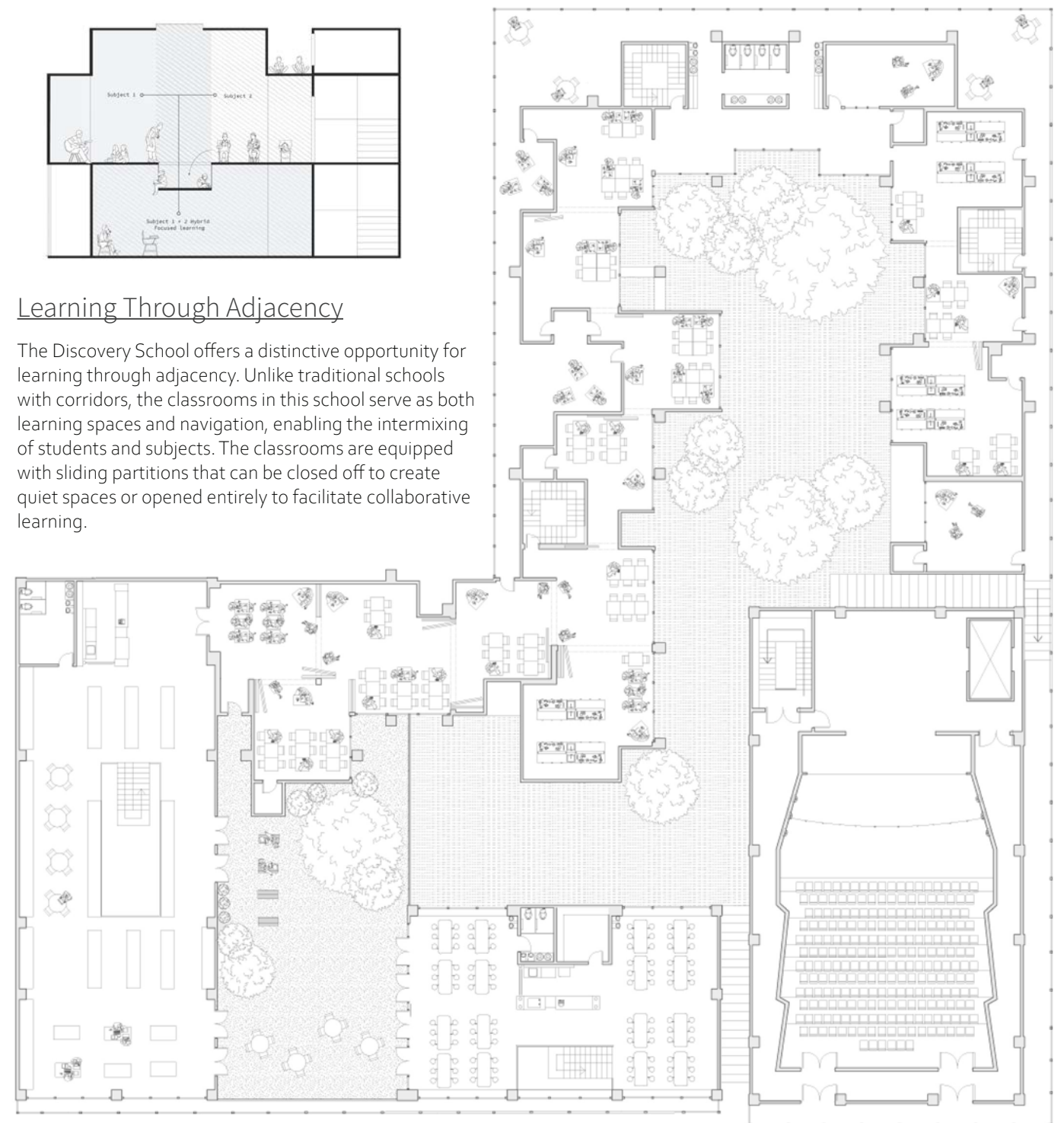
### Sunken Courtyard

Taking inspiration from the concept of discovery, The Discovery School incorporates two inconspicuous entrances from the busy street into the private courtyard. Upon entering either of the two narrow openings in the facade, one is greeted by a spacious courtyard filled with trees and foliage.

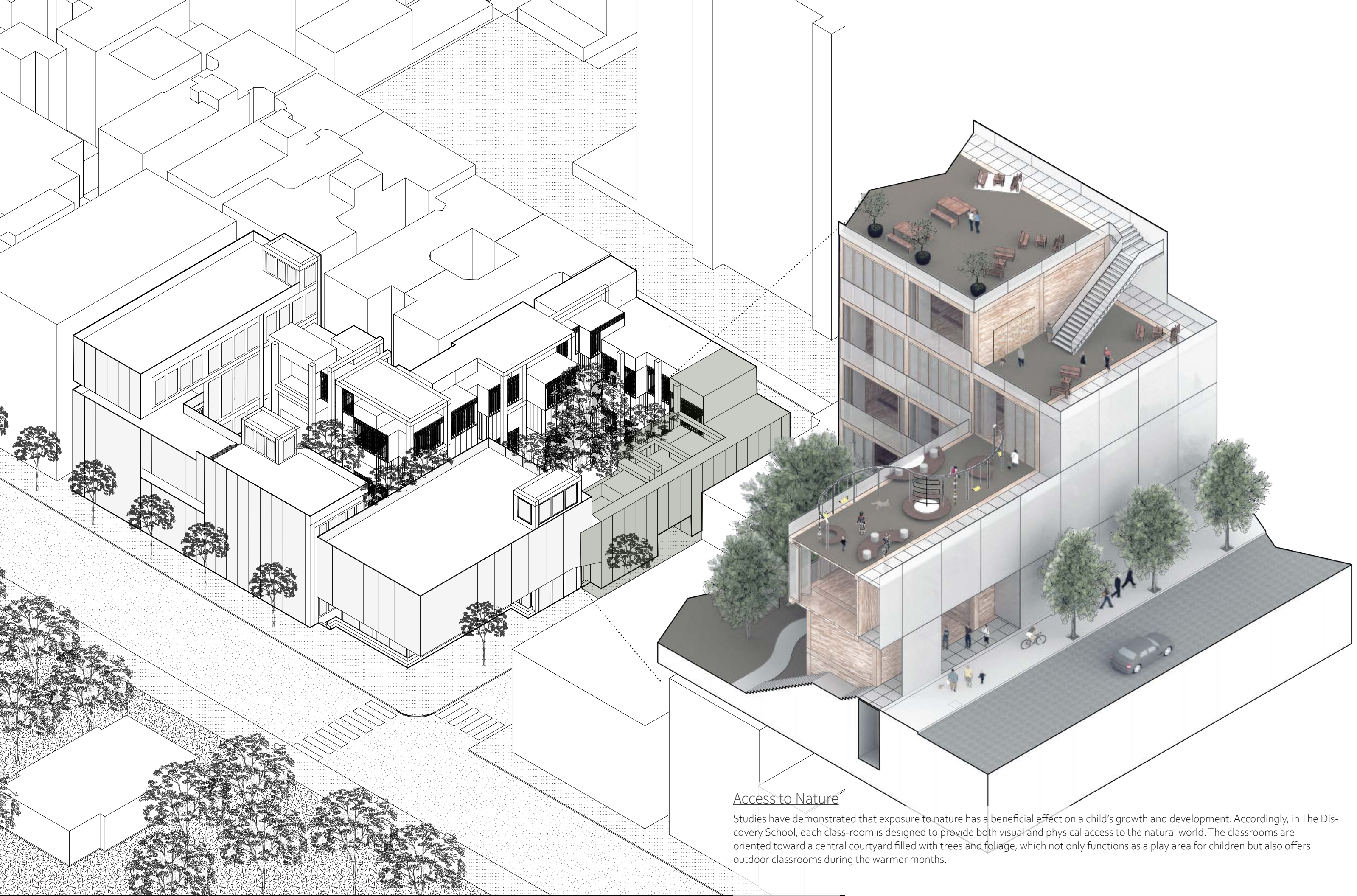


### Learning Through Adjacency

The Discovery School offers a distinctive opportunity for learning through adjacency. Unlike traditional schools with corridors, the classrooms in this school serve as both learning spaces and navigation, enabling the intermixing of students and subjects. The classrooms are equipped with sliding partitions that can be closed off to create quiet spaces or opened entirely to facilitate collaborative learning.



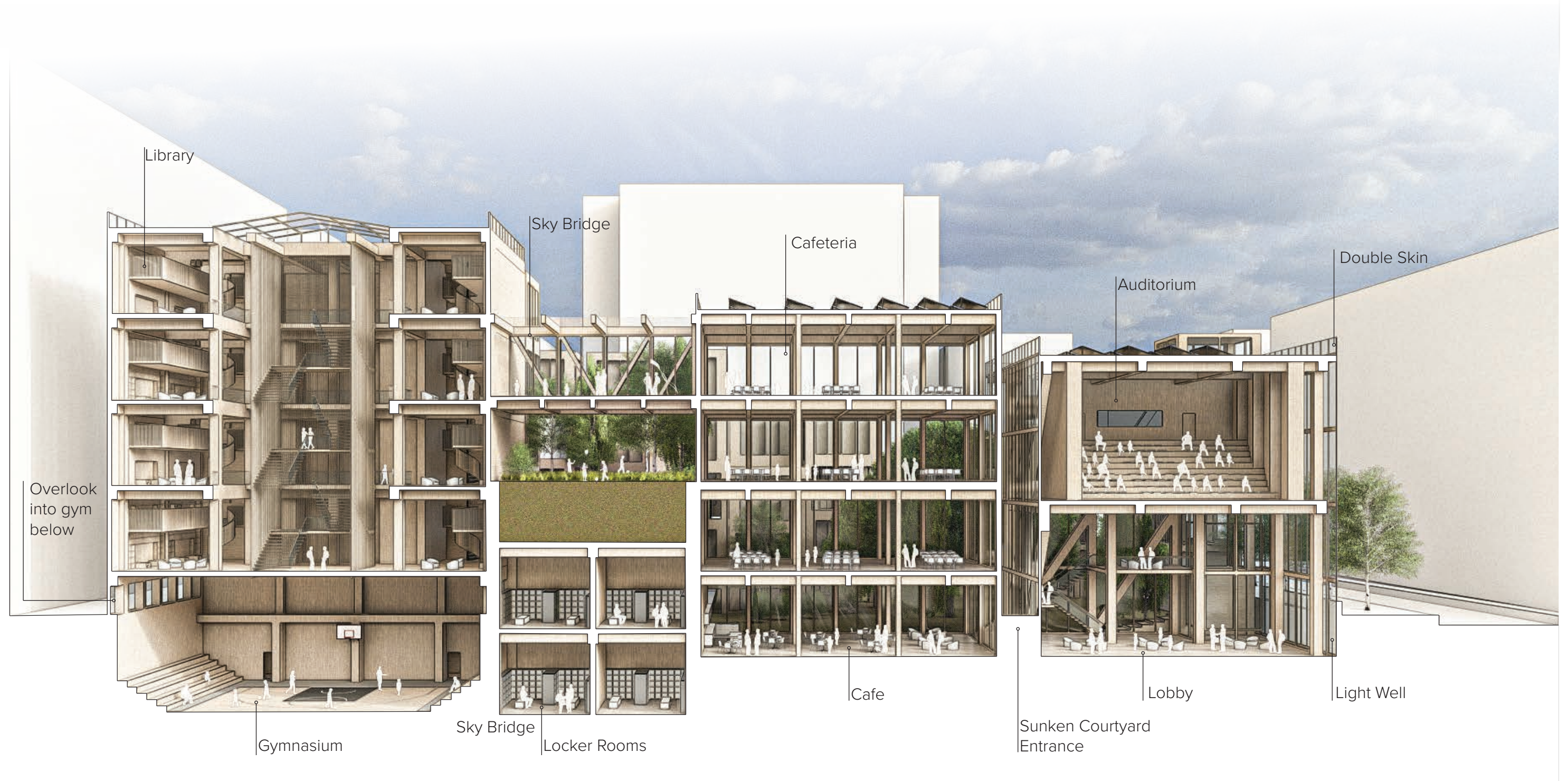




### Access to Nature

Studies have demonstrated that exposure to nature has a beneficial effect on a child's growth and development. Accordingly, in The Discovery School, each class-room is designed to provide both visual and physical access to the natural world. The classrooms are oriented toward a central courtyard filled with trees and foliage, which not only functions as a play area for children but also offers outdoor classrooms during the warmer months.





Library

Sky Bridge

Cafeteria

Double Skin

Auditorium

Overlook into gym below

Gymnasium

Sky Bridge

Locker Rooms

Cafe

Lobby

Light Well

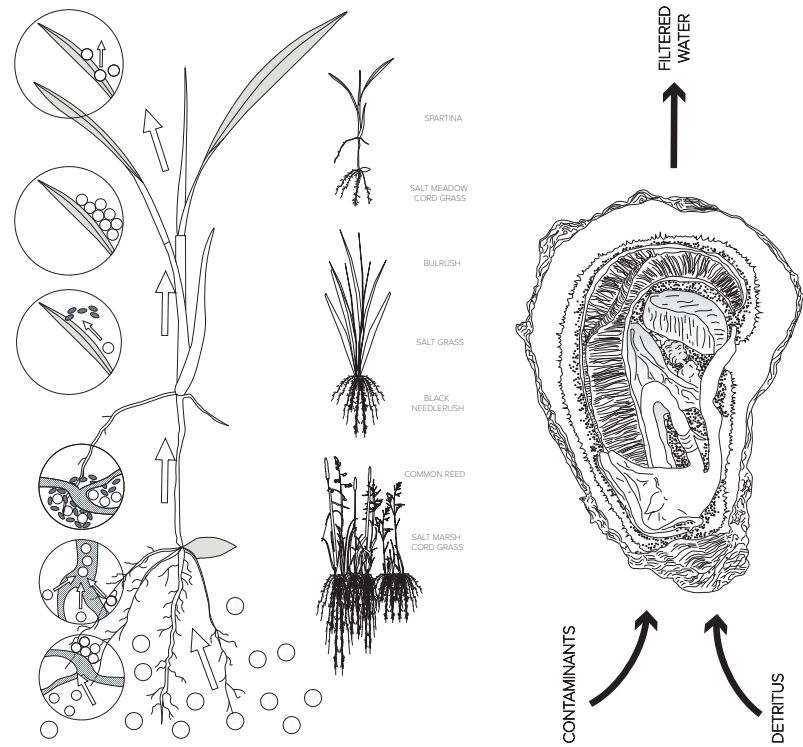
Sunken Courtyard Entrance



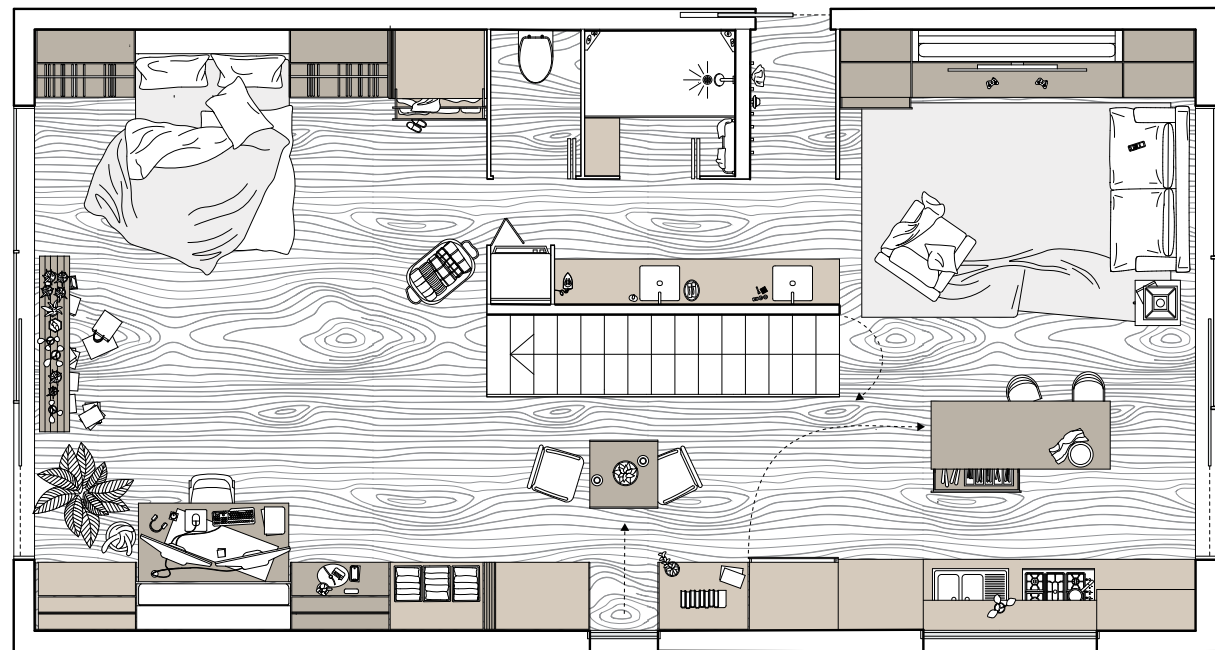
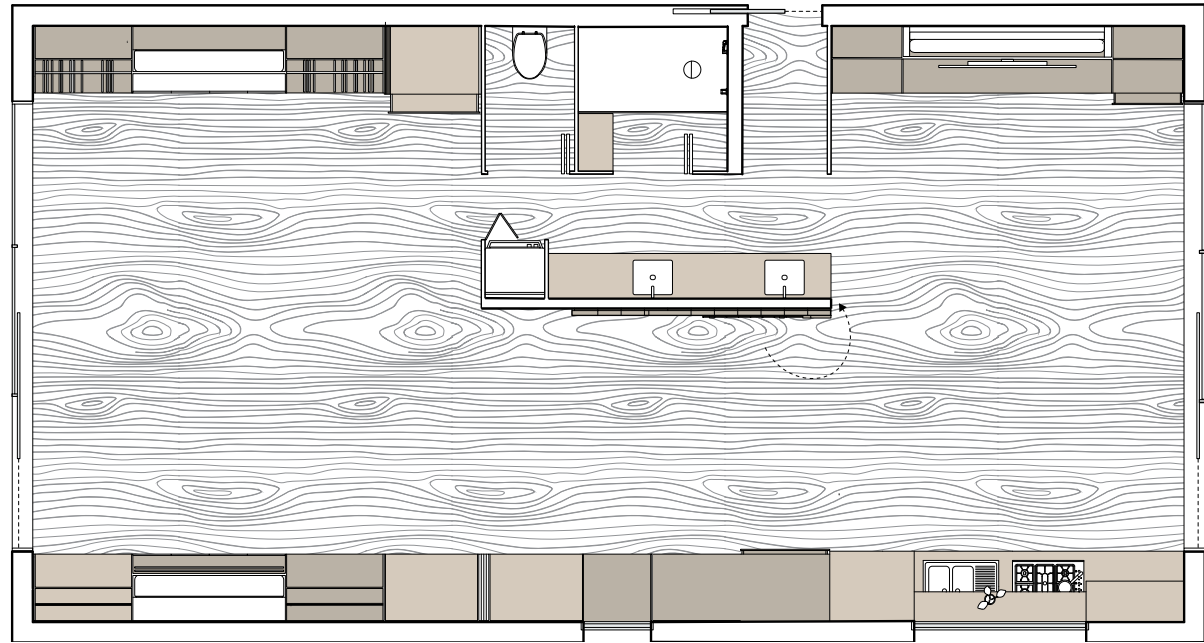
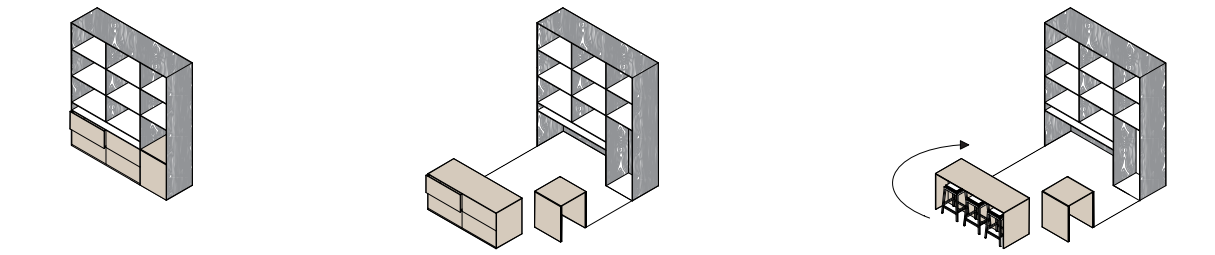
# Nuestra Casa

This project addresses social and environmental challenges faced by South Bronx residents while introducing an innovative approach to affordable housing. It unfolds in two phases, with the initial phase restoring the waterfront to a tidal marsh. This ecological restoration brings back native species, creating opportunities for residents to engage with the river's ecosystem. This interaction fosters education, recreation, and participation in efforts to enhance the river's health, providing benefits not currently available to the community. Additionally, waterfront remediation combats air, soil, and water pollution, resulting in a healthier

living environment. The second phase introduces a floating housing typology, inspired by historical models on the Harlem River. This approach responds to climate change and rising sea levels by imagining an alternative housing concept that is both low-rise and high-density. Nestled within the revitalized landscape, this housing encourages community engagement and programs. The design places a strong emphasis on intergenerational living, accommodating diverse family structures. The units are adaptable, featuring movable wall partitions on a track system to accommodate changing occupancy needs.









DOCK  
MARSH  
MARKET

107









# Casa de Culebra

Culebra Island, located off Puerto Rico's coast, faces housing challenges exacerbated by its vulnerability to natural disasters and limited affordable housing options. Our architecture studio visited the island, engaging with locals and organizations to understand their needs.

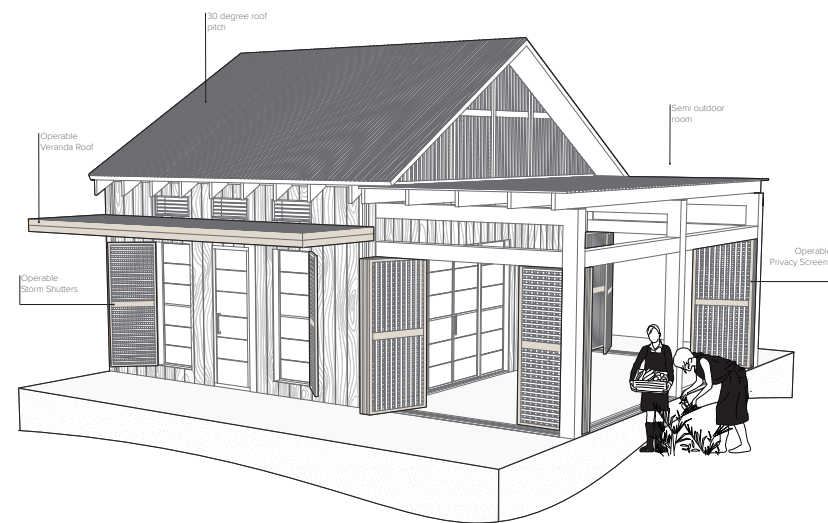
We became aware of a housing crisis: many homes were destroyed by hurricanes, and affordable housing was scarce. Through discussions with residents like Valentina and organizations like Mujeres de Islas, we learned about their struggles and aspirations for stable housing.

To address these challenges, we proposed an infill approach, utilizing vacant housing inventory

and considering various land types' risks. Our goal is to create sustainable, culturally sensitive, and hurricane-resistant housing solutions.

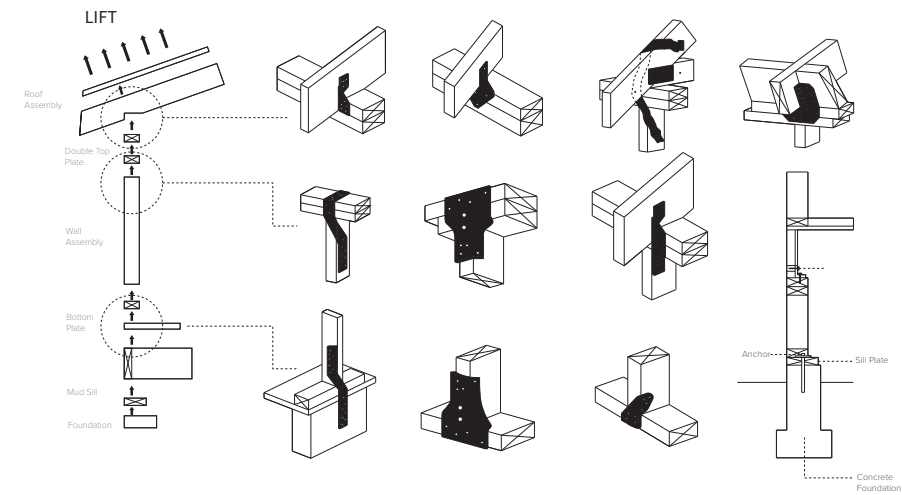
Acknowledging locals' nostalgia for wooden construction, we developed hurricane-resilient wood structures, ensuring safety without compromising cultural identity. Our design features a nucleus unit that can expand over time to accommodate growing families, offering flexibility and permanence.

By integrating community feedback and leveraging local resources, we aim to provide affordable housing solutions tailored to Culebra's unique needs and environment.





# Hurricane Resiliency Handbook



Our clients expressed their nostalgia for wood construction. However, Hurricane Hugo demolished 80% of the wooden structures on the Island, leading to a rebuilding effort primarily of concrete homes, something that the locals feel does not resonate with them culturally or with island living. The challenge for us was finding a way to design with wood while ensuring that the structures were hurricane-safe and resistant.

To achieve this, we researched hurricane-safe wood construction, referencing sources such as Habitat for Humanity and FEMA. We created a toolkit for hurricane-resilient wood structures that our implemented design would follow. This toolkit explains how our housing proposal will be constructed and guides how Culebrenses can fortify their existing wooden structures.

After learning how to design for hurricane resilience, the next step was to design housing that could withstand the forces of nature while being flexible enough to adapt to the ebb and flow of life.



### Heavy Foundation - to avoid overturning, sliding, and flooding

It is essential to ensure that our home's foundation is more resilient than the force of the wind. The foundation should possess a substantial weight to prevent the wind from tipping our house.

To withstand the lifting force of the wind, we must verify that our foundations are appropriately sized. If the foundations are robust and firmly attached to the walls, then even strong winds would be unable to upturn our house.

The base plate is bolted to foundation every 32 inches with washer and nut to fasten the wooden structure onto the foundation.

The blocks will be filled with concrete.

BRC fabric mesh. Do not forget to overlap at the end with at least 2 squares.

Ground slab: 4 inches well compacted concrete above at the least one foot of compacted soil.

Concrete mix ratio:  
1. Cement  
2. Sand  
3. Gravel

3 rows of blocks

3 FT

2 FT

As a general rule, hurricanes bring flooding. Thus, it is advisable to construct our dwelling on a raised platform that surpasses the highest known flood level of the area.

### Braced Walls - to avoid racking

We need to make sure that our walls are rigid and strong. If our walls are made with light materials they must be braced in order to avoid racking.

Walls with string braces that are properly anchored to foundations will make our house safer.

Brace at 45 degrees

No less than 30 degrees and no more than 60

Brace every wall.

Brace below roof

Brace between roof trusses

Nail timber or galvanized steel straps

The strongest brace is created by nailing timber and galvanized steel straps.

### Bracing Corners

Connect every upright with the wall plate with hurricane straps.

Double uprights and reinforcement at the openings.

Brace the corner to improve rigidity.

Brace every wall in both directions and as close to 45 as possible.

Connect the uprights of the corners with hurricane straps too.

Overlap the double base plate and wall plate.

### Bracing Openings

Strong connection on each upright.

Double uprights at opening.

Door

Stairs

Brace to strong node.

Double base plate anchored to foundation with washer and nut.

### Important Connections

- Join wall plate to foundation
- Join wall plate to foundation
- Join base plate to foundation

### Connection Studs with wall plates

Hurricane straps can also be used to reinforce the connections.

Metal brackets or straps are reinforcing the unions against the wind.

Hurricane straps can also be used to reinforce the connections.

Gusset plates can also be used, especially for diagonal connections in trusses or bracing.

T-shape hurricane straps are strong because they have more nails.

Hurricane straps that go under the base plate are the strongest.

We used the same connections used for the wall plate to the studs, we use for the base plate to the stud.

Just nailing the baseplate to the concrete is not strong enough for the winds.

If the rebars are there, the best solution is to bend them and reinforce the joint with some nails in both directions.

If there are no rebars to connect the baseplate to the foundation, we can use hurricane straps.

Use a joist with washer and nut to be baseplate to the foundation every 32 inches.

### Strong Roofs

If the eave is too long it is easier for the wind to lift the roof of our house.

If the eave is short it will be more difficult for the wind to lift our roof.

Verandas and car ports should have a separate roof so the wind will lift this roof only, and our main roof will not be affected.

**Reinforcing the wooded roof structure:**  
We have to ensure that the upper vertex triangle and the rest of the nodes are properly connected, so we will use straps.

Twisted galvanized umbrella nails/screws and washers. If it goes over the purlin, hold it.

3 FT short for rest of roof.

2"x4" purlin. Join to rafters through hurricane strap.

1/2" from edge.

Hurricane Strap

Rafters join to wall plate through hurricane strap.

2"x6" fascia board for protection.

30cm/12" maximum.

Double wall plate.

Wood Wall.

**Hurricane Strap:** best way to make strong joints. There are many different knots depending on the type of joint, but it is very important to always use them.

**Making purlin-rafter joints stronger:**

- Tie with rope.
- Tie with rebar and nails.
- Tie with timber cleats (both sides).
- Tie with hurricane straps (both sides).

Zinc sheets. Use 24 - 26 gauge (28 - 30 is too thin).

Overlap at least two corrugations.

### Strong Roofs

We have to give our rafters space on the edge in order to reinforce our roof.

Reinforce the edge of our roof with more nails will make it more difficult for the wind to lift.

Overlap at least two corrugations.

Galvanize / umbrella nail and washer.

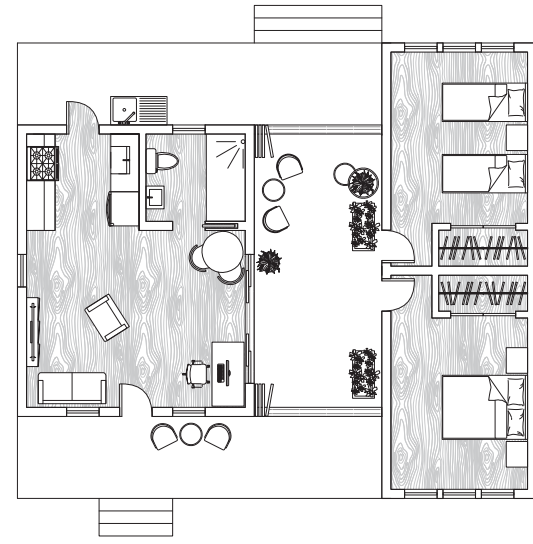
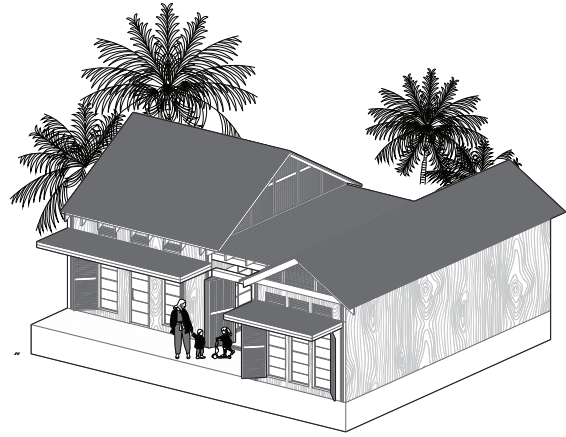
Screw with washer and nut.

If we fold the nails we have more resistance against the wind, therefore a more secure roof.

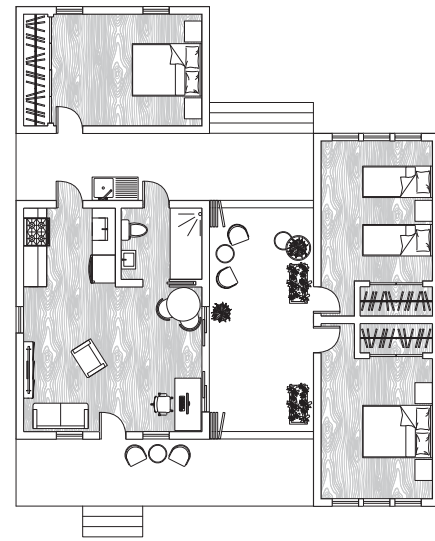
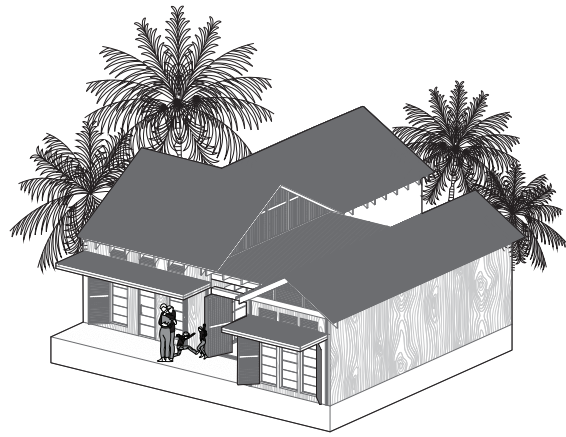
We have to nail the highest part of the corrugation to protect our house from heavy rains.



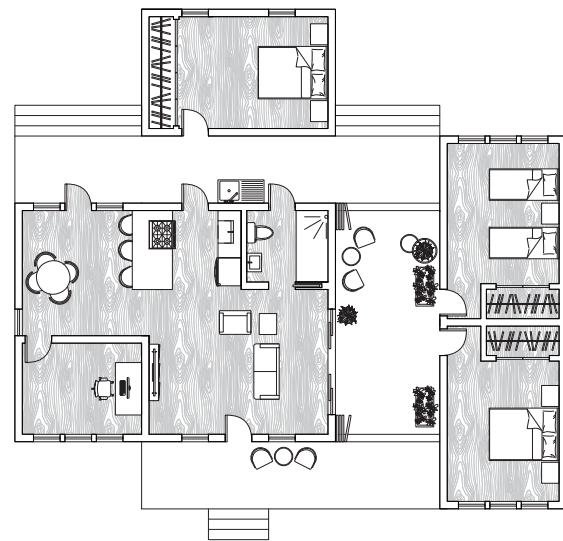
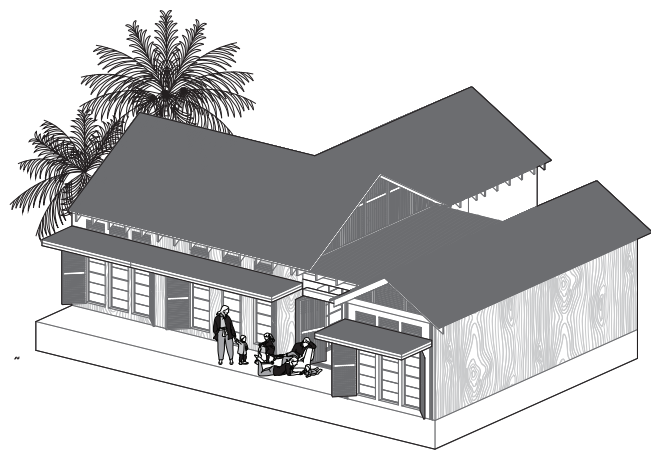
Familia de 2-4  
Dormitorios: 2  
Ft<sup>2</sup>: 744



Familia de 3-6  
Dormitorios: 3  
Ft<sup>2</sup>: 940



Familia de 3-8  
Dormitorios: 3-4  
Ft<sup>2</sup>: 1,172

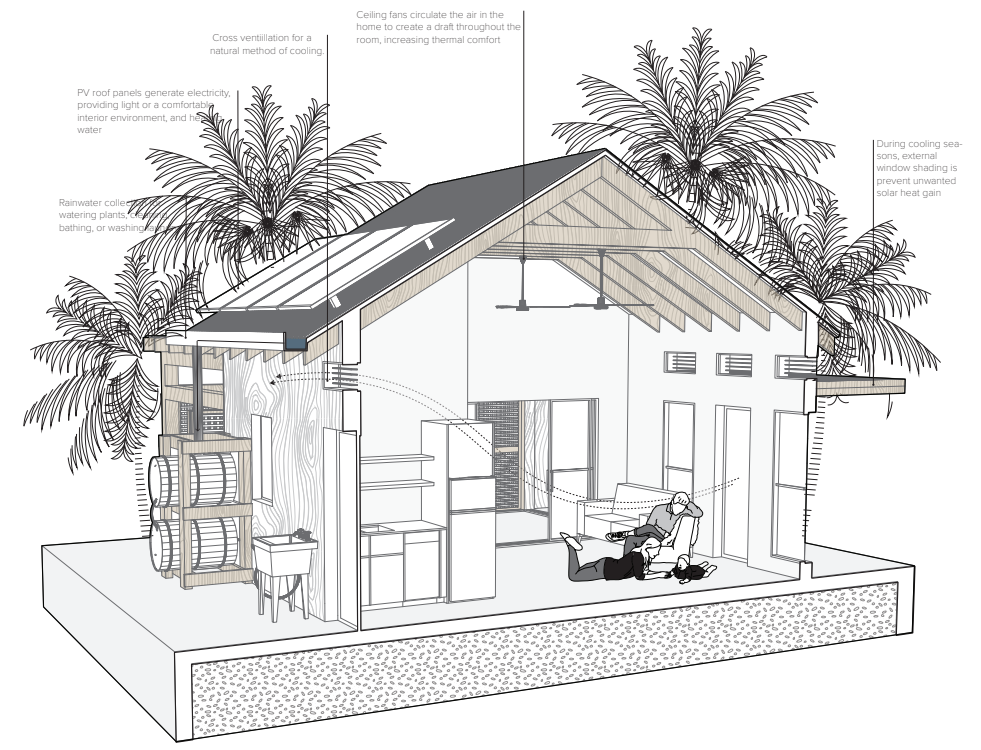
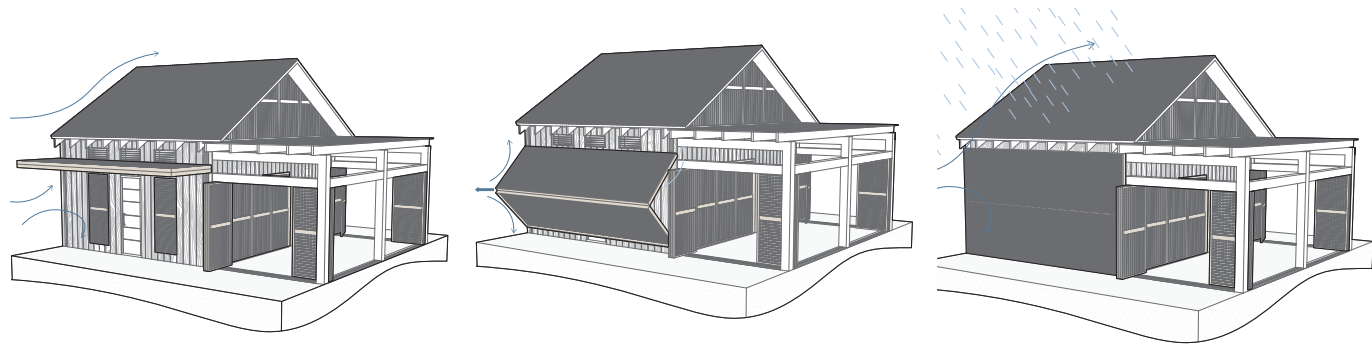


#### Incremental Housing Design:

The design begins with a central unit that we call the nucleus. The nucleus is the hub for all main living, electrical supply, water usage, and drainage and features a wrap-around veranda for outdoor living, laundry utilities, and growing food. Over time, the home can be built upon, following our toolkit based on the family's needs. The house can grow from the nucleus, a studio apartment of about 370 square feet, to a 4-bedroom home of roughly 1,170 square feet that can sleep up to 8 individuals. By providing a flexible and adaptable housing solution, we hope to meet the needs of the community, particularly young families, while ensuring the structure's permanence against natural disasters.









## Water Works

"In response to the challenges posed by widespread sea level rise along NYC's coastline in 2100, our project proposes adaptive solutions aimed at reclaiming flooded spaces for everyday use. Centered on the ground level of Spring Studios in Tribeca, our multi functional intervention re-imagines formerly submerged areas as vibrant venues for art events, fostering a symbiotic relationship with rising waters.

By introducing a simple toolkit, our design empowers buildings like Spring Studios to adapt and thrive in the face of sea level rise, ushering in a resilient and innovative urban future.

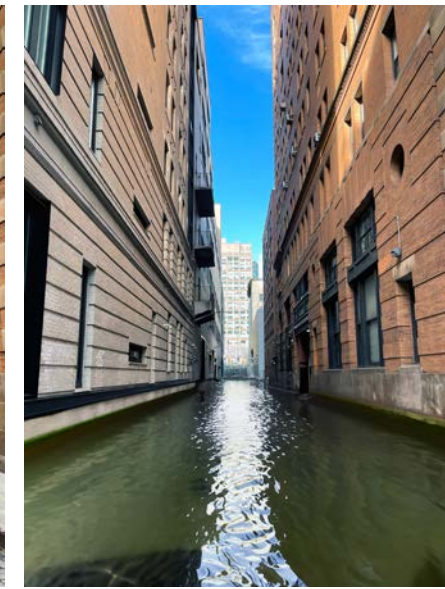
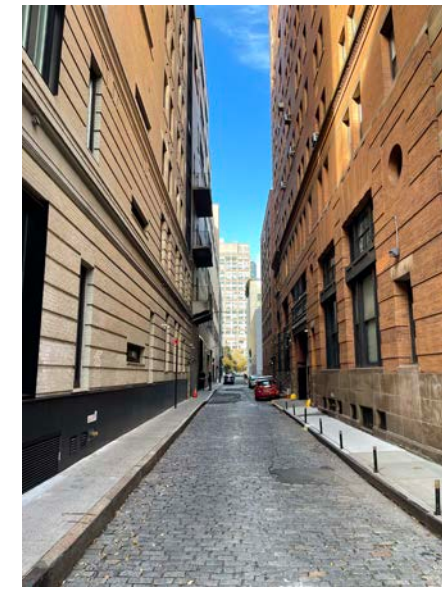




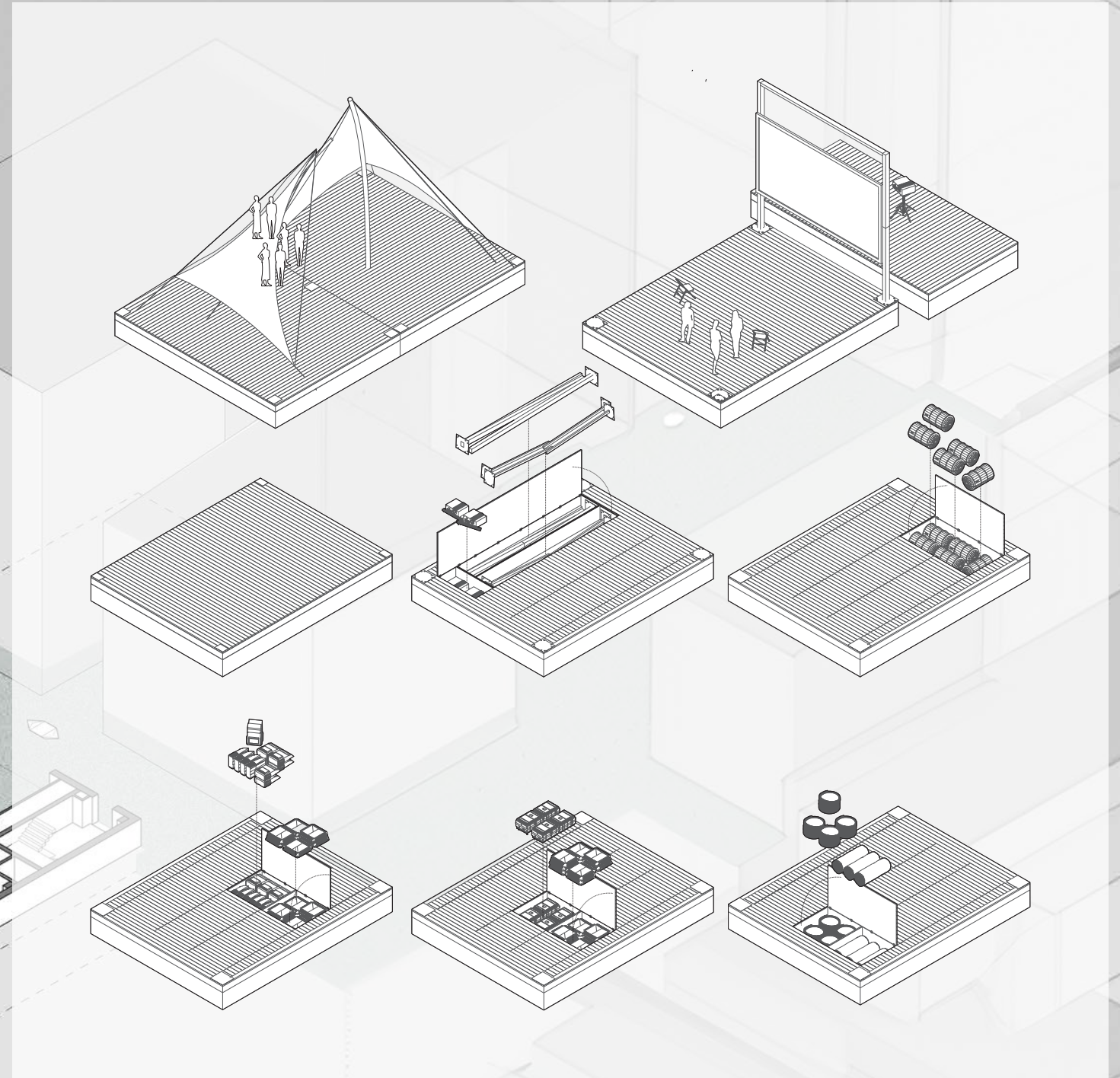
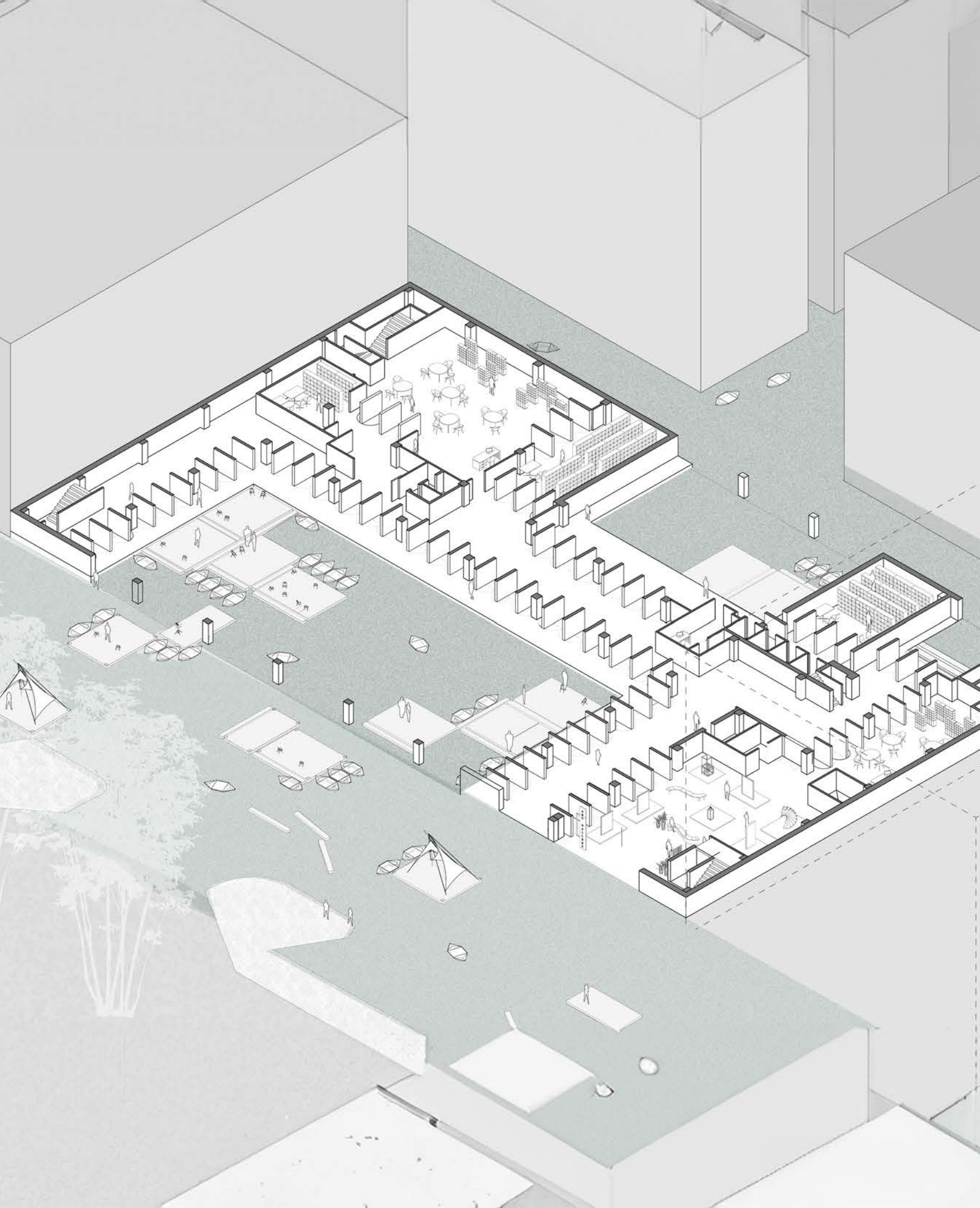
## Preliminary Research

We initiated our research by examining different edge conditions throughout New York City. Our analysis involved studying historic maps to grasp the original water edge of Manhattan, understanding infill processes, exploring historical and contemporary techniques for maintaining the water edge and averting erosion into the river.

Additionally, we investigated ship hulls and underwater storage methods. This comprehensive study served as a foundation for our design approach in retrofitting our previously dry site into a wet network.



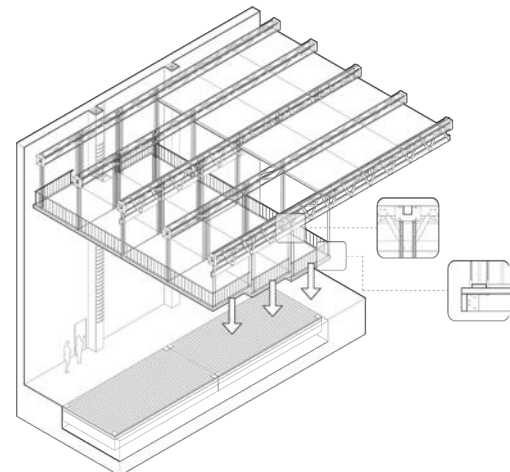
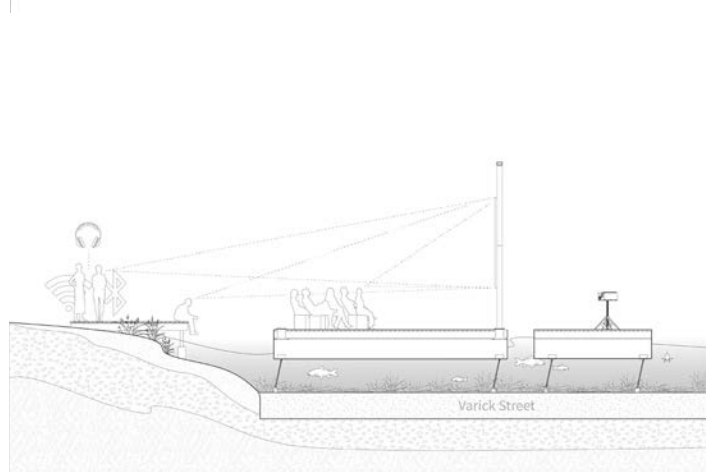
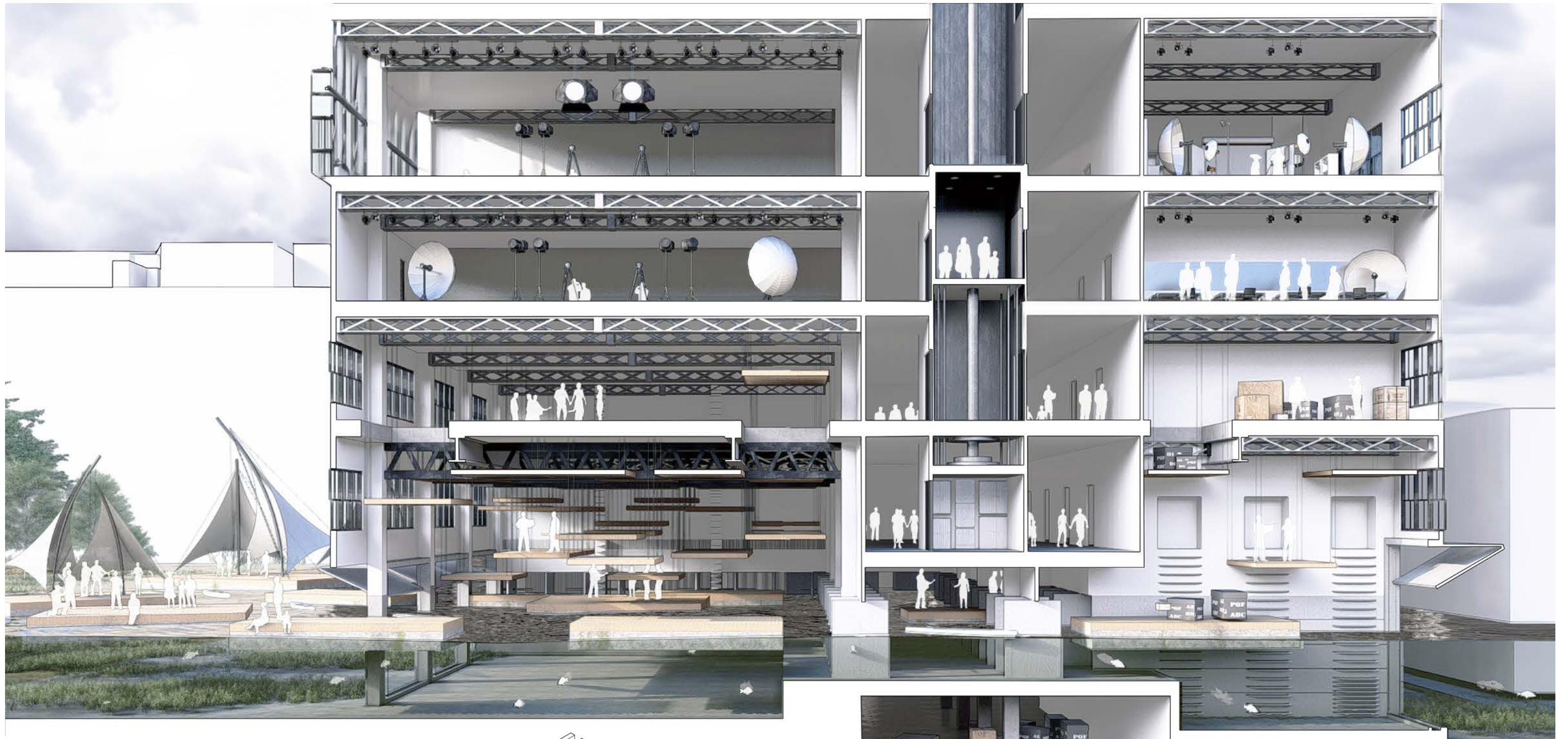




Our initial step involves transforming a significant portion of the ground floor into a dry dock condition, designed to accommodate flooding while functioning as a basin for our floating platform network. This dock space features essential infrastructure, including an overflow drainage valve that adjusts to tidal changes, a drainage and flooding pump, and floor blockings to support the platforms during dry conditions.

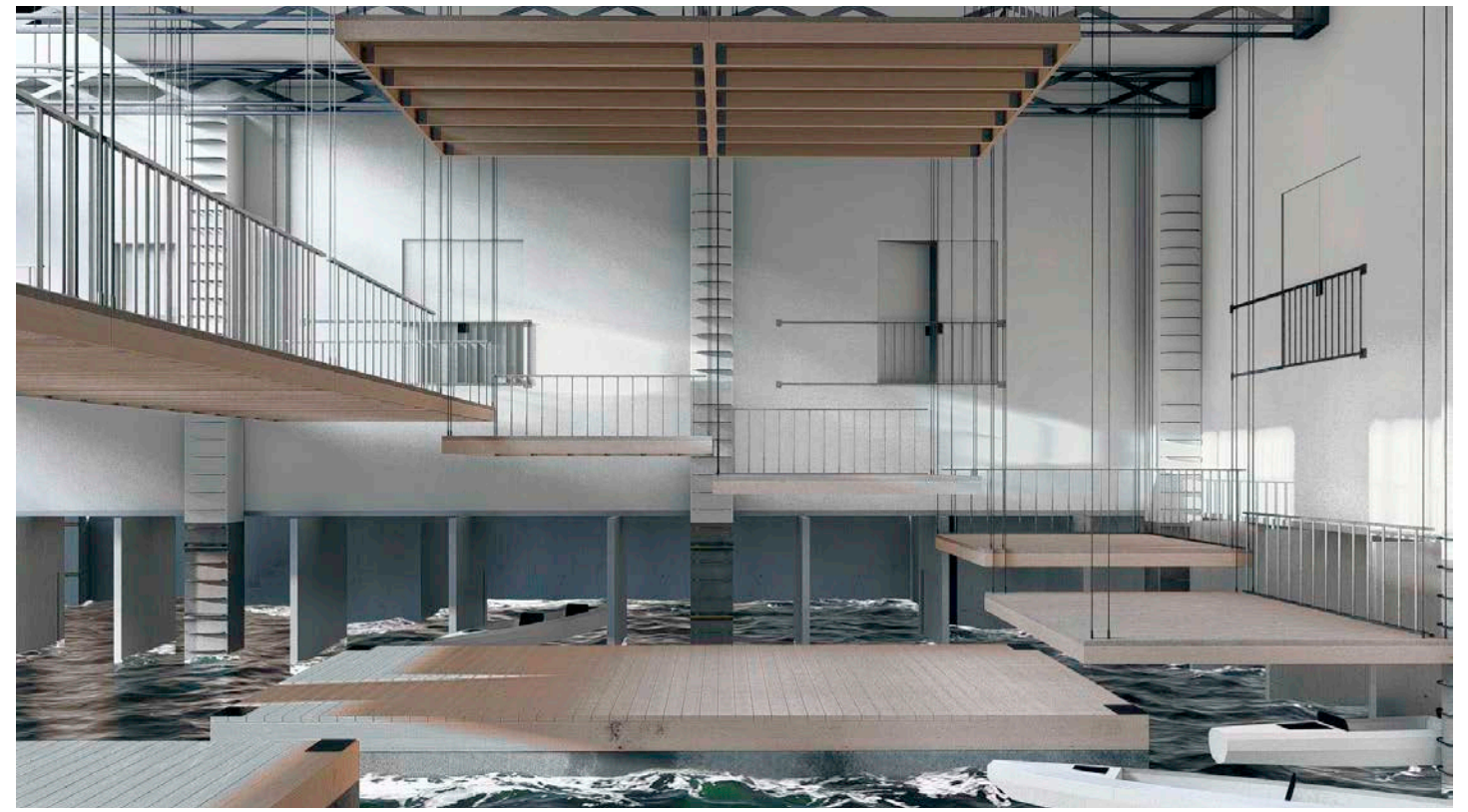
The floating platforms serve a multitude of purposes, acting as versatile surfaces that can be reconfigured for various activities. They facilitate tasks such as transporting cargo for back house operations, ferrying visitors to and from city foiler stations, hosting daytime recreation, and screening films at night. To prevent drifting into open water, each platform is anchored to the canal floor while in use. Additionally, the platforms double as self-storage units for operational needs, housing equipment for film screenings and sun shades, compressed life rafts, kayak backpacks, inflatable furniture, first aid provisions, ropes, and sails.





Our focus lies on re-adapting the first three floors of the building. The dry docks at the first level created a basin for the multipurpose platforms that can move around based on event types and function. The hanging docks not only respond to vertical circulation but also create unique seating and flooring variations. This allows for the system to adapt for different events. These mezzanines on the third floor then provide access to the existing fixed program floors. On the back end, at St Johns street - the same system allows for back of back of house operations.







## I IN FLUX I

My journey through this semester is represented in the pages of "In Flux", a book that mirrors my constant evolution in the pursuit of personal growth. Delving into its chapters and accompanying the intricate levels of my totem sculpture, I've explored the interconnected elements of tactility, fluidity, memory, and introspective thought, all working together in my practice of mindfulness.

This semester has been a continuous exploration, each layer peeling back to reveal deeper connections between my obsessions and the components of my totem. Through this process, two distinct relationships emerged: the interplay of tactility and memory, and the relationship between introspective thought and fluidity.

From these revelations, two new obsessions have taken root: Tactile Memory and Fluid Thought, forming the foundational structure of my book.

These newfound obsessions find expression through my photography, shedding light on the intricate relationship between Tactile Memory and Fluid Thought.

As I conclude this semester's journey I don't see this body of work complete or finished but rather scratching the surface of a deep exploration of myself as a person and creator.





