

M U
ZICHUAN

2022-2023 SELECTED WORK

Columbia University - GSAPP - M.S.A.A.D 2023'

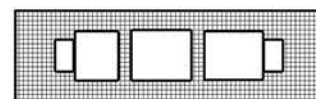
01

WATER BODY

Water System Design Based on School



The pollution of water resources has always been an important social problem, and water resources will become scarce in the future. How to do a good job in sewage treatment and water resource conservation? Architectures are important carriers of urban water systems. Perhaps in the future, some functional buildings will take on the role of small-scale water treatment to reduce sewage treatment and save water resources.



GSAPP Summer Studio Individual Work

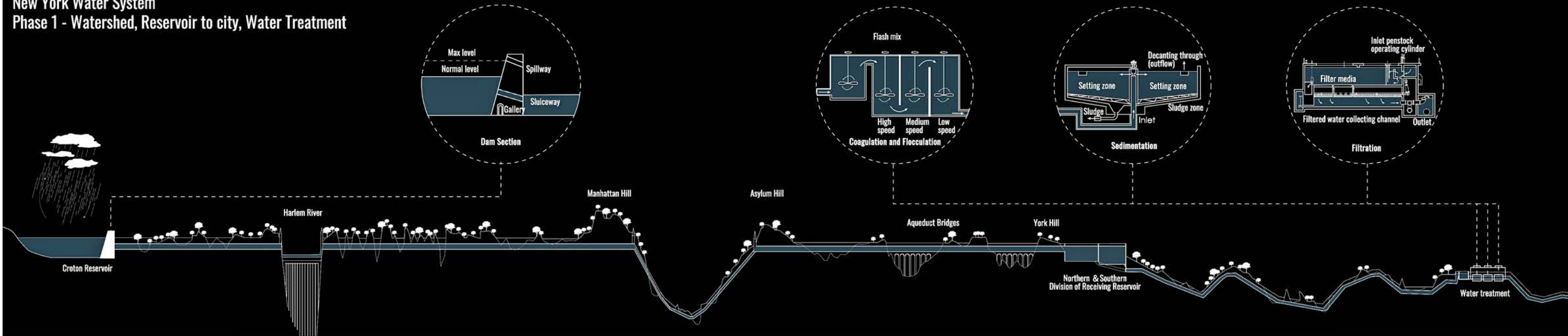
Location: New York, US

Date: Jun 2022 - Aug 2022

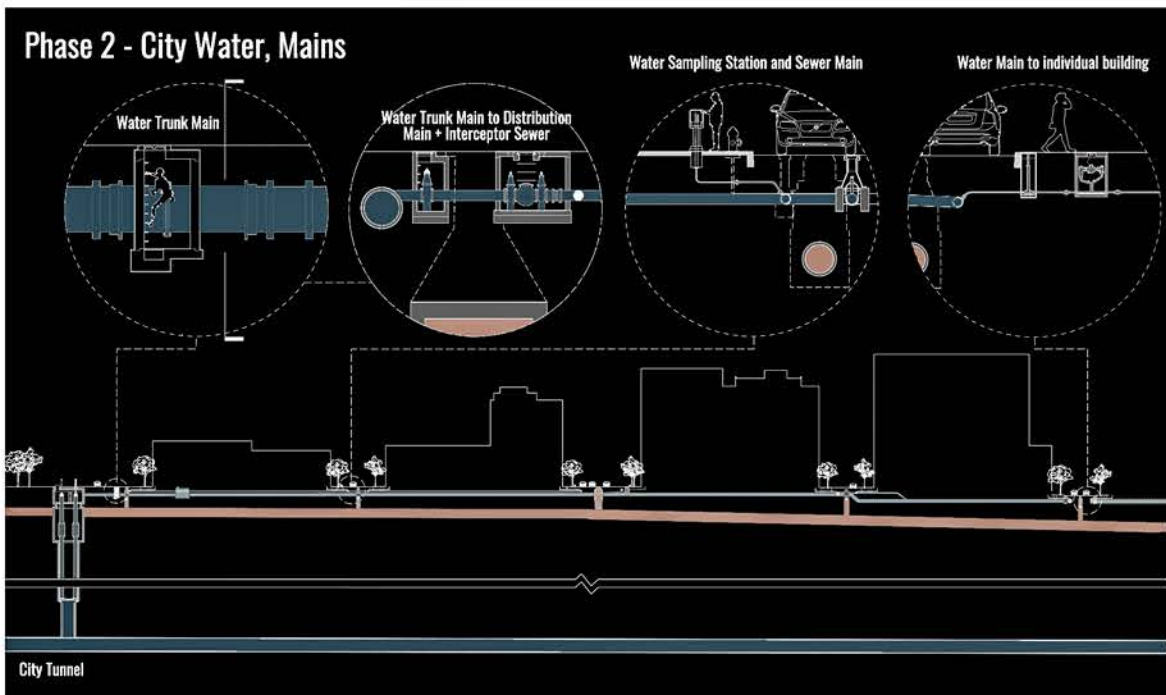
Critic: Dan Wood

New York Water System

Phase 1 - Watershed, Reservoir to city, Water Treatment



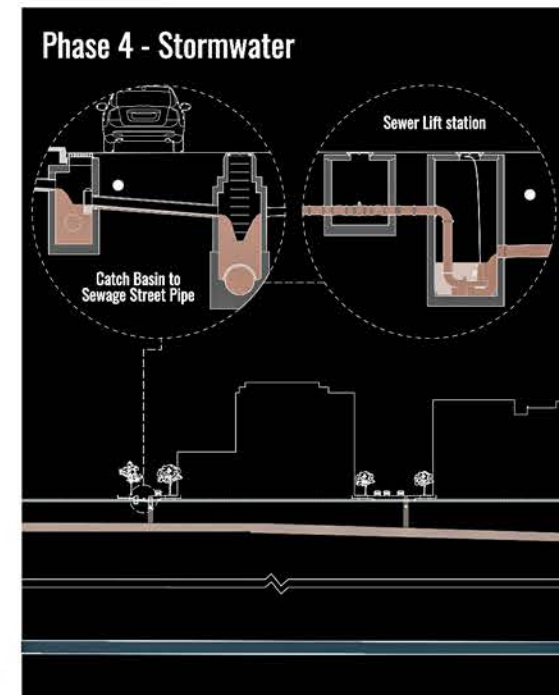
Phase 2 - City Water, Mains



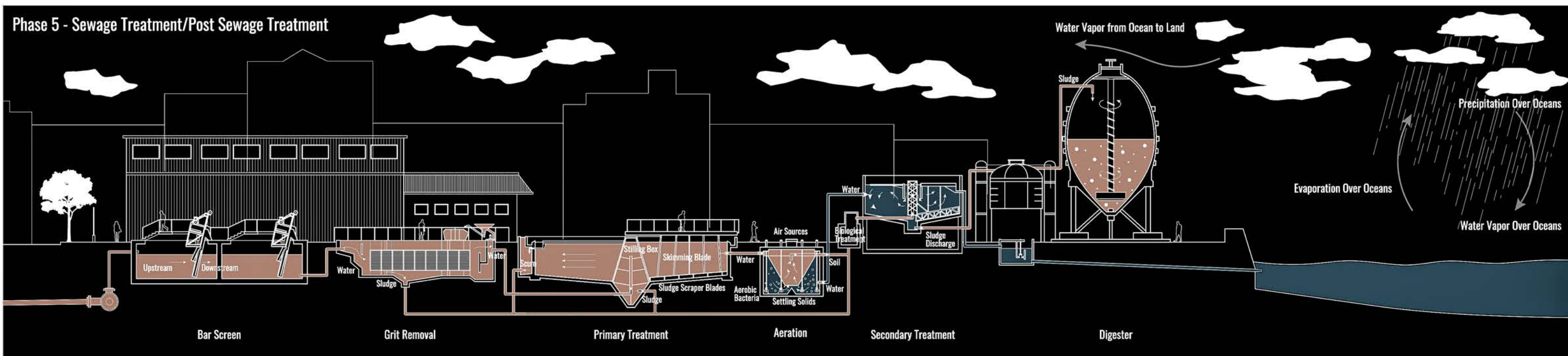
Phase 3 - Apartment, Building Inflow/Outflow



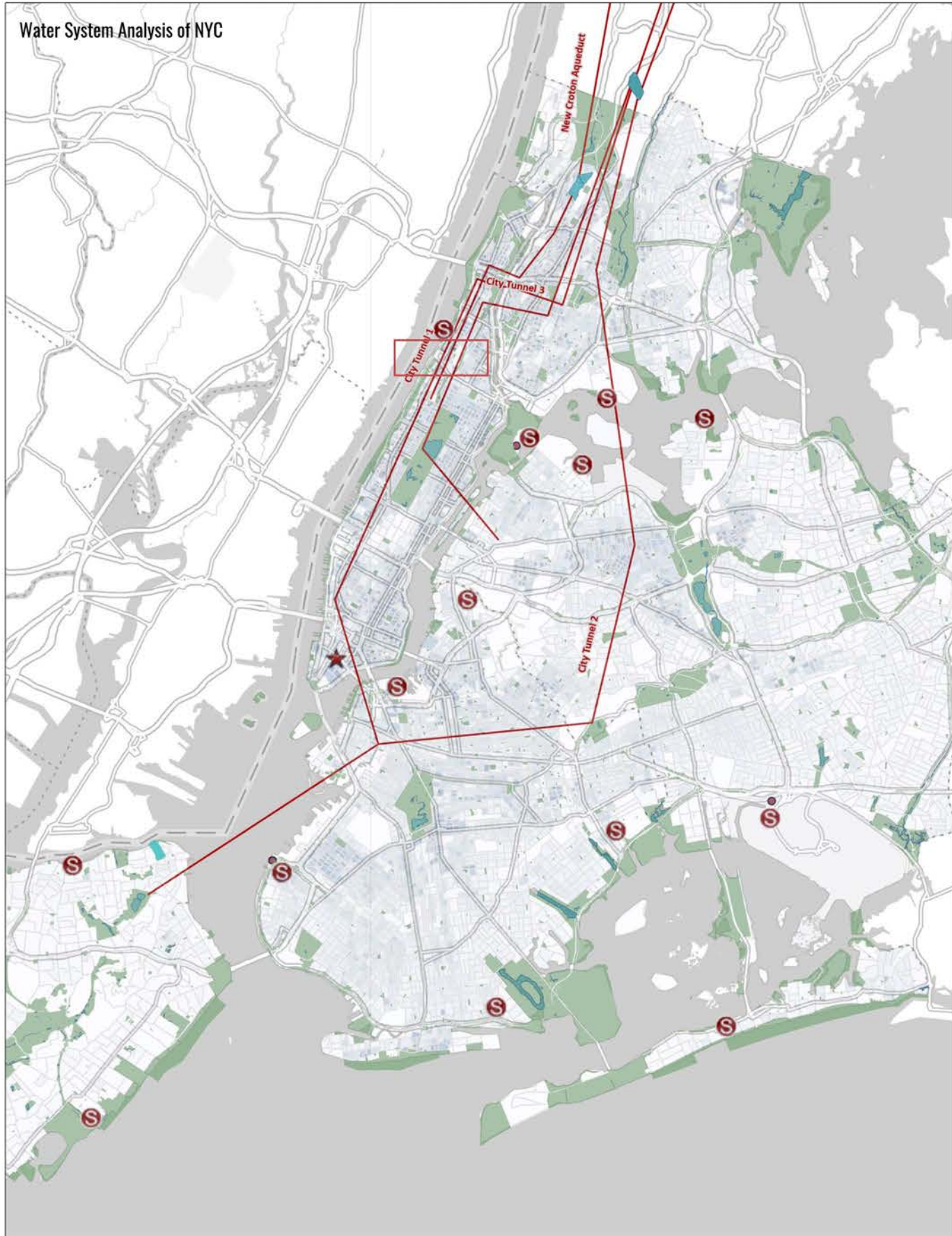
Phase 4 - Stormwater



Phase 5 - Sewage Treatment/Post Sewage Treatment



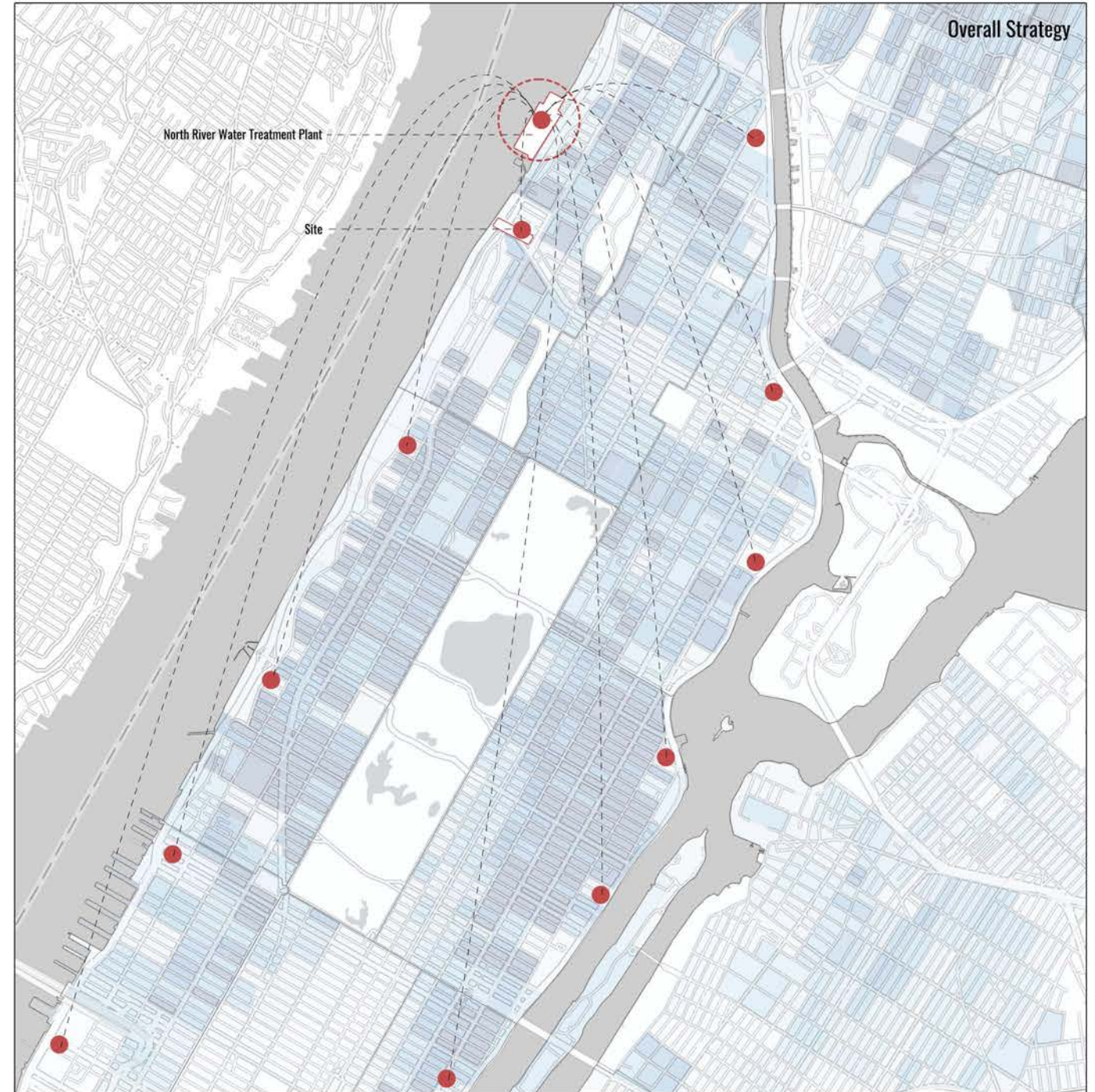
Water System Analysis of NYC



- Site
- ★ City hall
- Reservoirs
- S Sewage treatment plants
- Parks
- Aqueducts

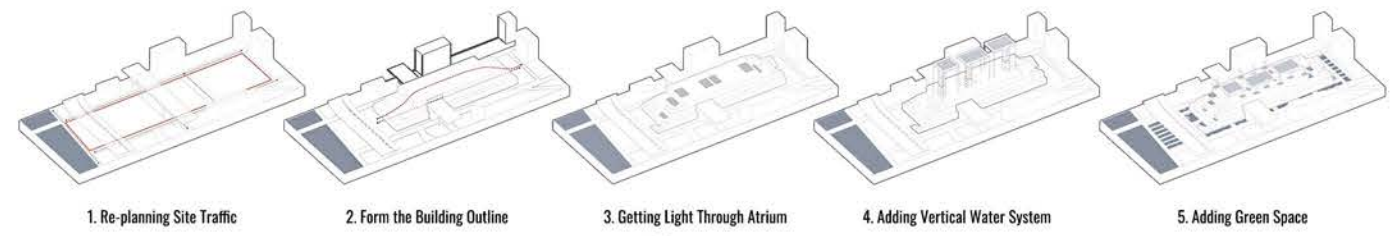
The water source of New York City is mainly transported from the Croton Watershed by the long and narrow aqueduct. Manhattan Island is an important hub, Manhattan Island is an important hub, and the North River Wastewater Treatment Plant is the only sewage treatment plant. There is a long and narrow open space between West 129th Street and West 130th Street, with the Hudson River to the west and beautiful scenery.

Overall Strategy



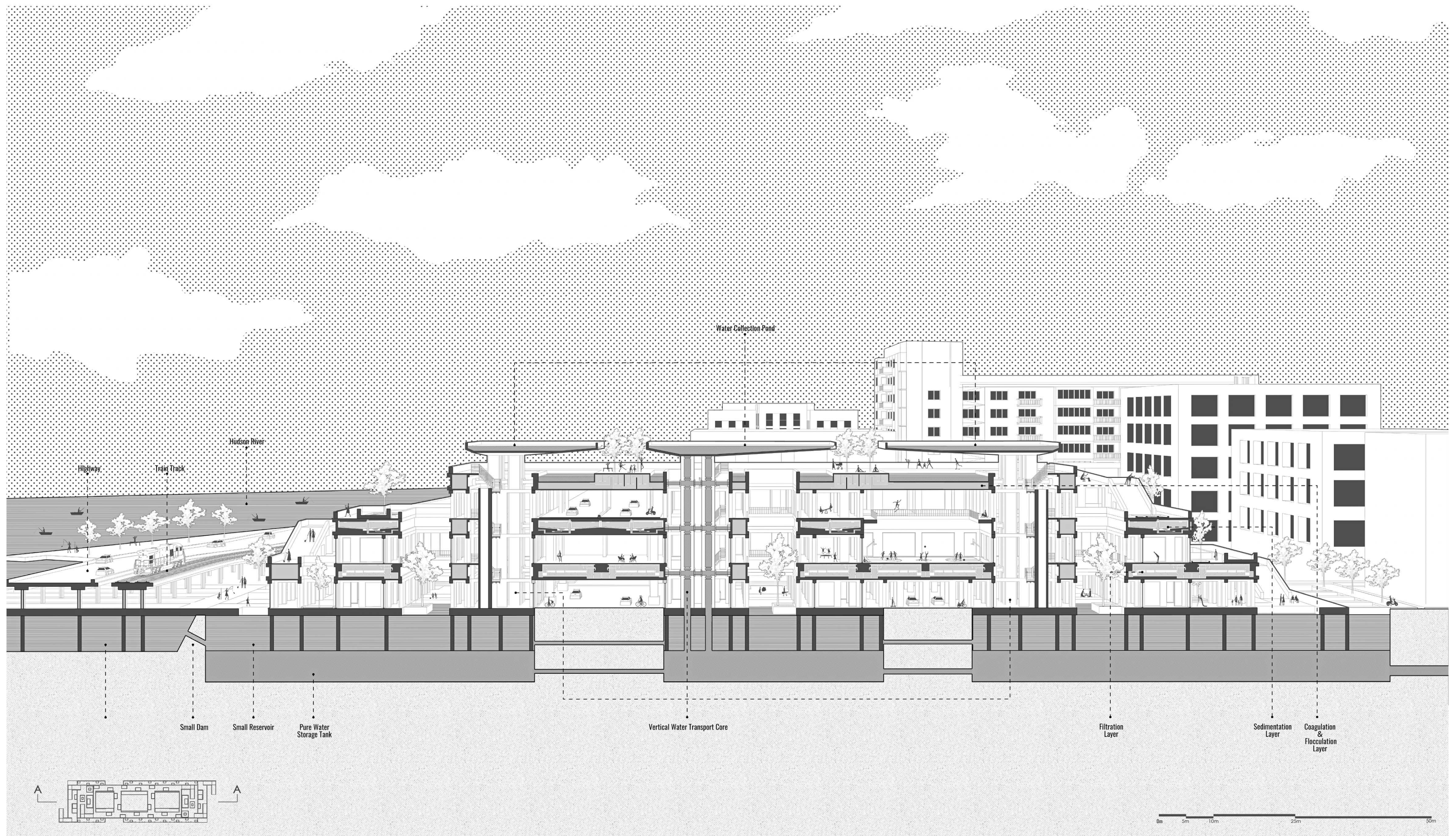
- Main Water Treatment Plant
- Secondary Water treatment plant
- Site
- Community

Take Manhattan Island as an example. There is only one water treatment plant on Manhattan Island, but the population density is extremely high, and the pressure on water treatment is increasing. Buildings along the surrounding river can be integrated into the water treatment system and be responsible for the water treatment of the communities in which they are located. Thereby alleviating the increasing pressure on water treatment.



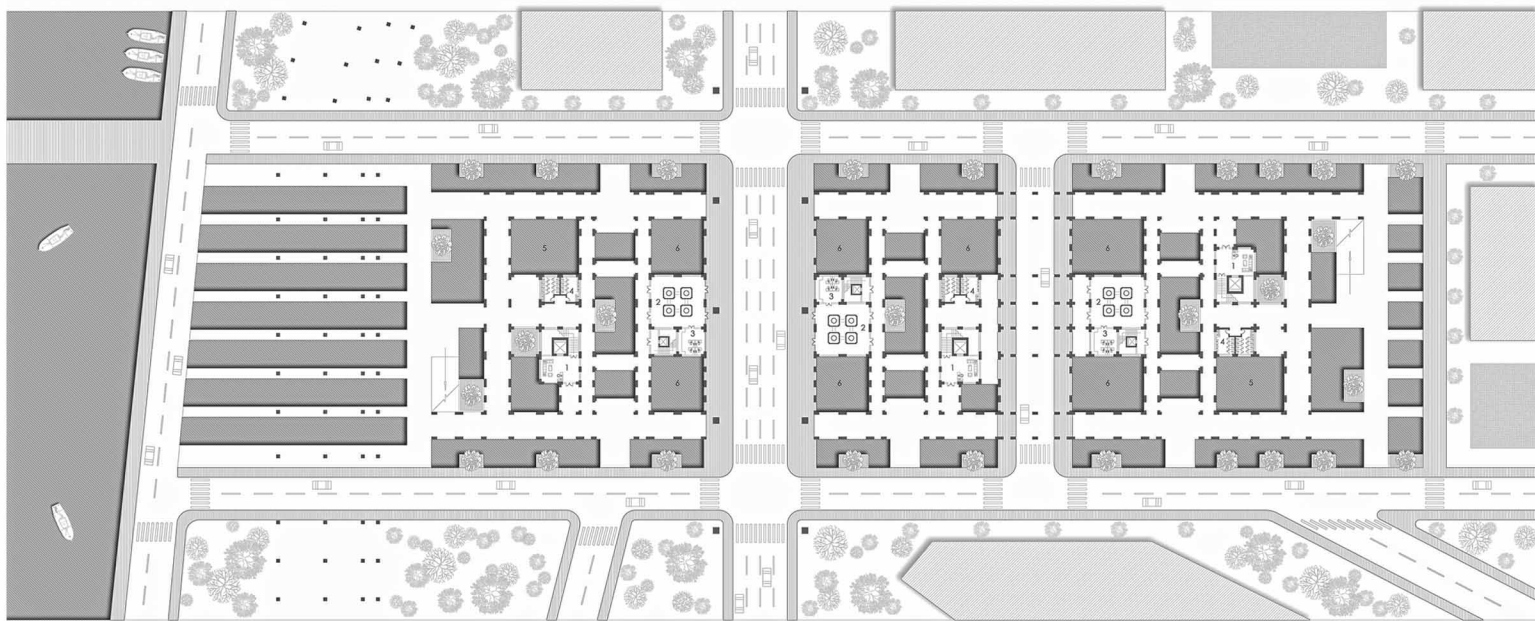
Process

The traffic inside the site is relatively complicated, but in order to maintain the continuity of the building space, the building is integrated with the bridge and the road. At the same time, the sides of the building change from high to low, as if a new bridge has been built for pedestrians.



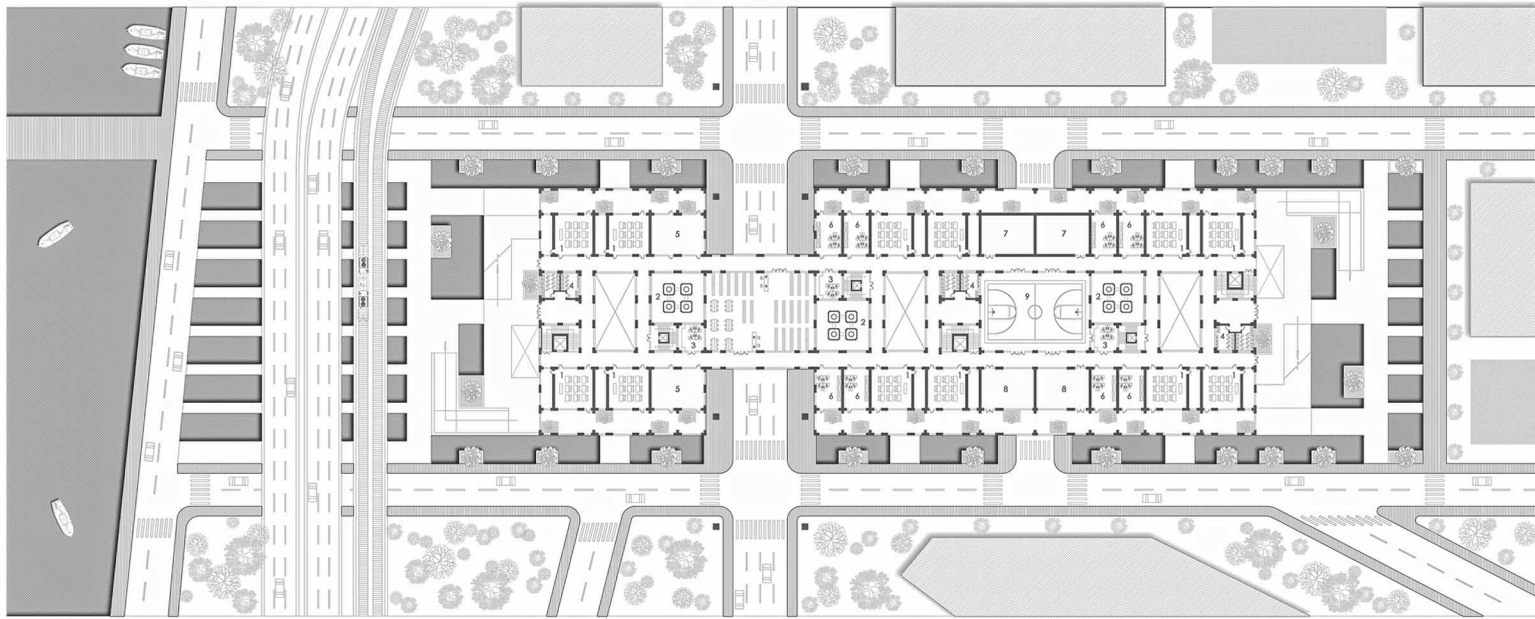
SectionA-A

The water system throughout the building is led by three vertical transport cores. On top of these three cores are three rainwater collection tanks that also temporarily store water. The interior of the third floor is the first step of water treatment-Coagulation and Flocculation. The treated water travels along the vertical core to the second floor, the second step of water treatment-Sedimentation. Then follow the vertical core to reach the first floor, which is the third step of water treatment-Filtration. On top of these three cores are three rainwater collection tanks that also temporarily store water. Inside the slab of the third floor is the first step of water treatment. The treated water travels along the vertical core to the second floor, which is the second step of water treatment. Then follow the vertical core to reach the first floor, which is the third step of water treatment. After this, the Entirely treated water can be stored in underground water tanks and eventually transported to the community area that this building is responsible for.



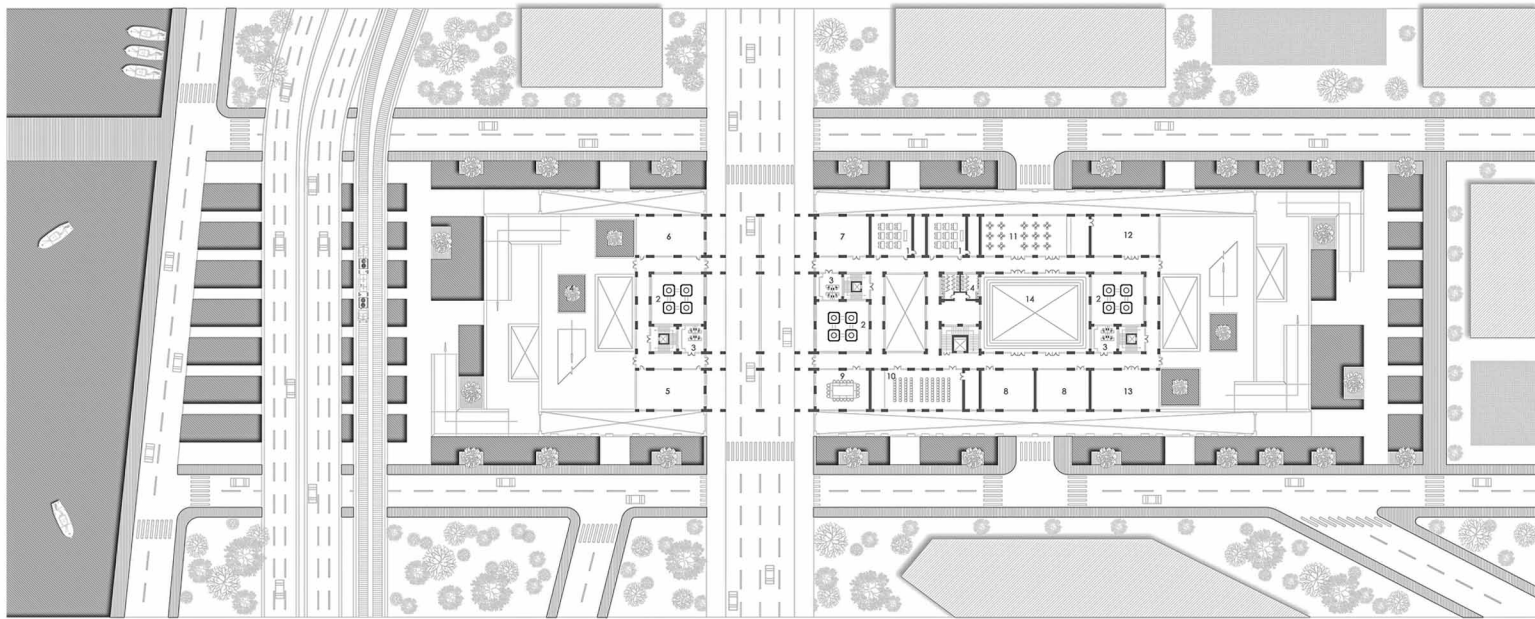
First Floor Plan

- 1.Hall
- 2.Vertical water system
- 3.Water system office
- 4.Toilet
- 5.Fishing Pond
- 6.Swimming or playing



Second Floor Plan

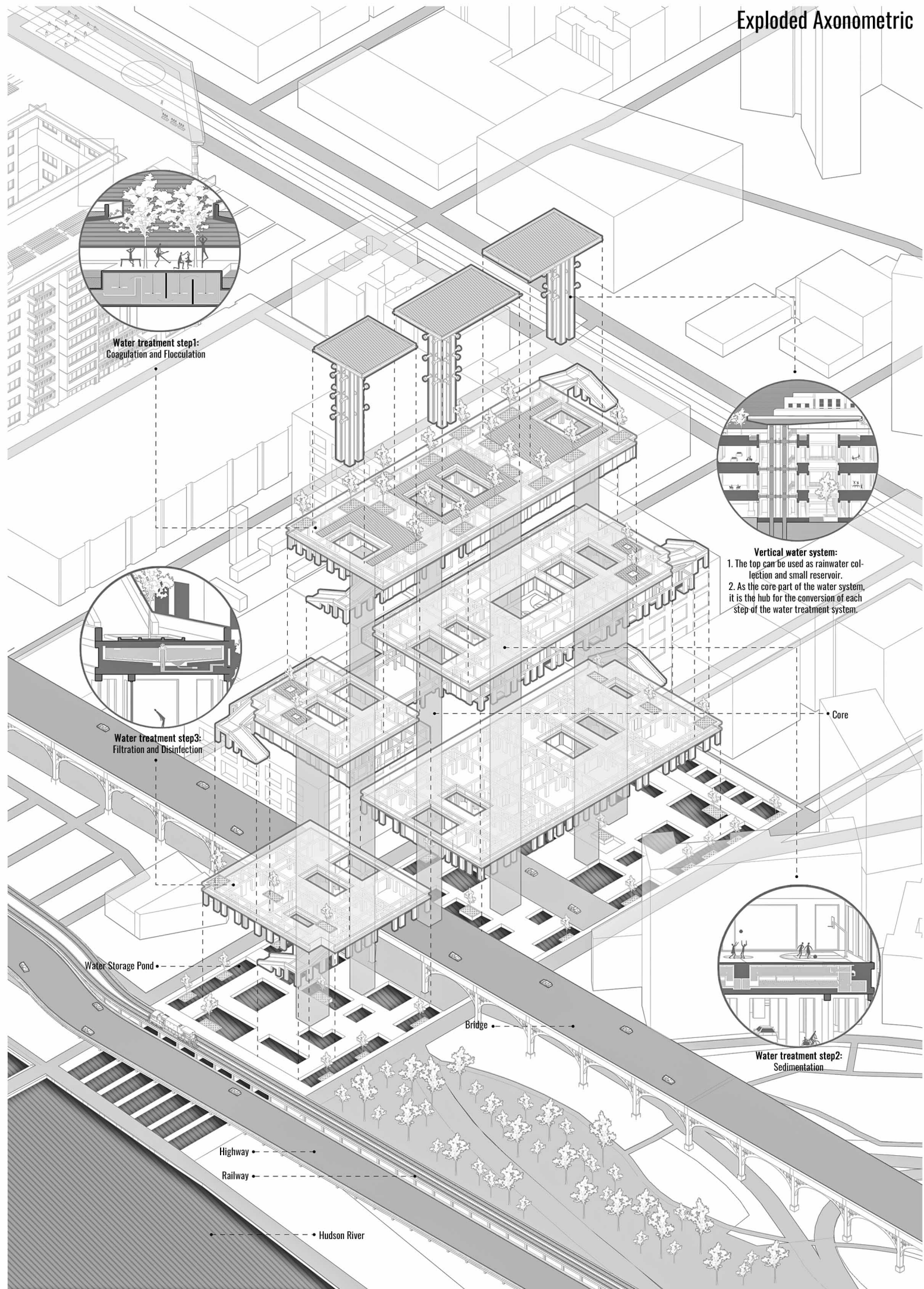
- 1.Classroom
- 2.Vertical water system
- 3.Water system office
- 4.Toilet
- 5.Activity Room
- 6.Teacher's office
- 7.Bath and changing room
- 8.Music classroom



Third Floor Plan

- 1.Special classroom
- 2.Vertical water system
- 3.Water system office
- 4.Toilet
- 5.Dance classroom
- 6.Health center
- 7.Resource center
- 8.Art classroom
- 9.Meeting room
- 10.Lecture hall
- 11.Dining room
- 12.Kitchen
- 13.Exhibition room
- 14.Runway

Exploded Axonometric



Water treatment step1:
Coagulation and Flocculation

Water treatment step3:
Filtration and Disinfection

Vertical water system:
1. The top can be used as rainwater collection and small reservoir.
2. As the core part of the water system, it is the hub for the conversion of each step of the water treatment system.

Core

Water Storage Pond

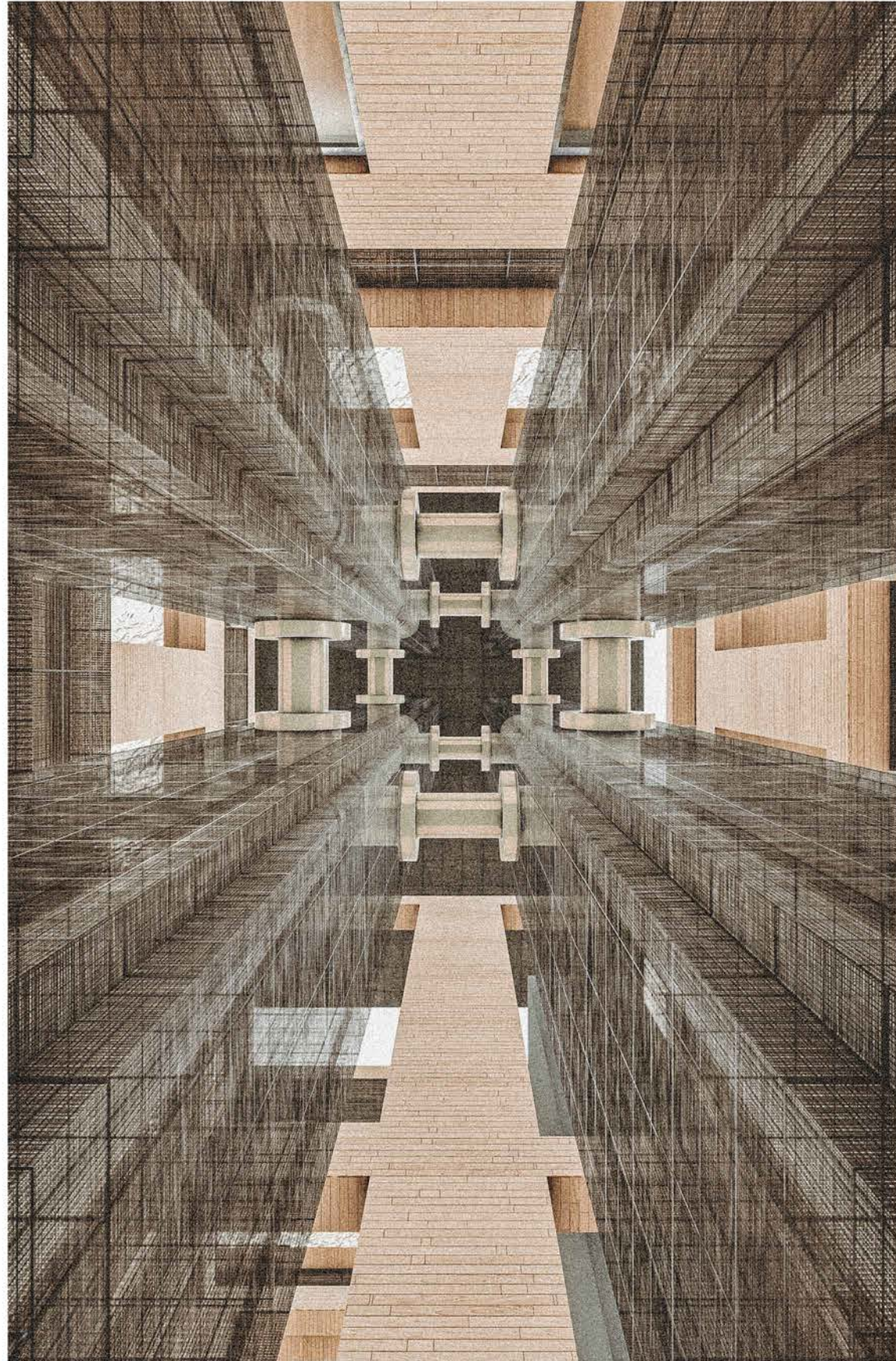
Bridge

Water treatment step2:
Sedimentation

Highway

Railway

Hudson River



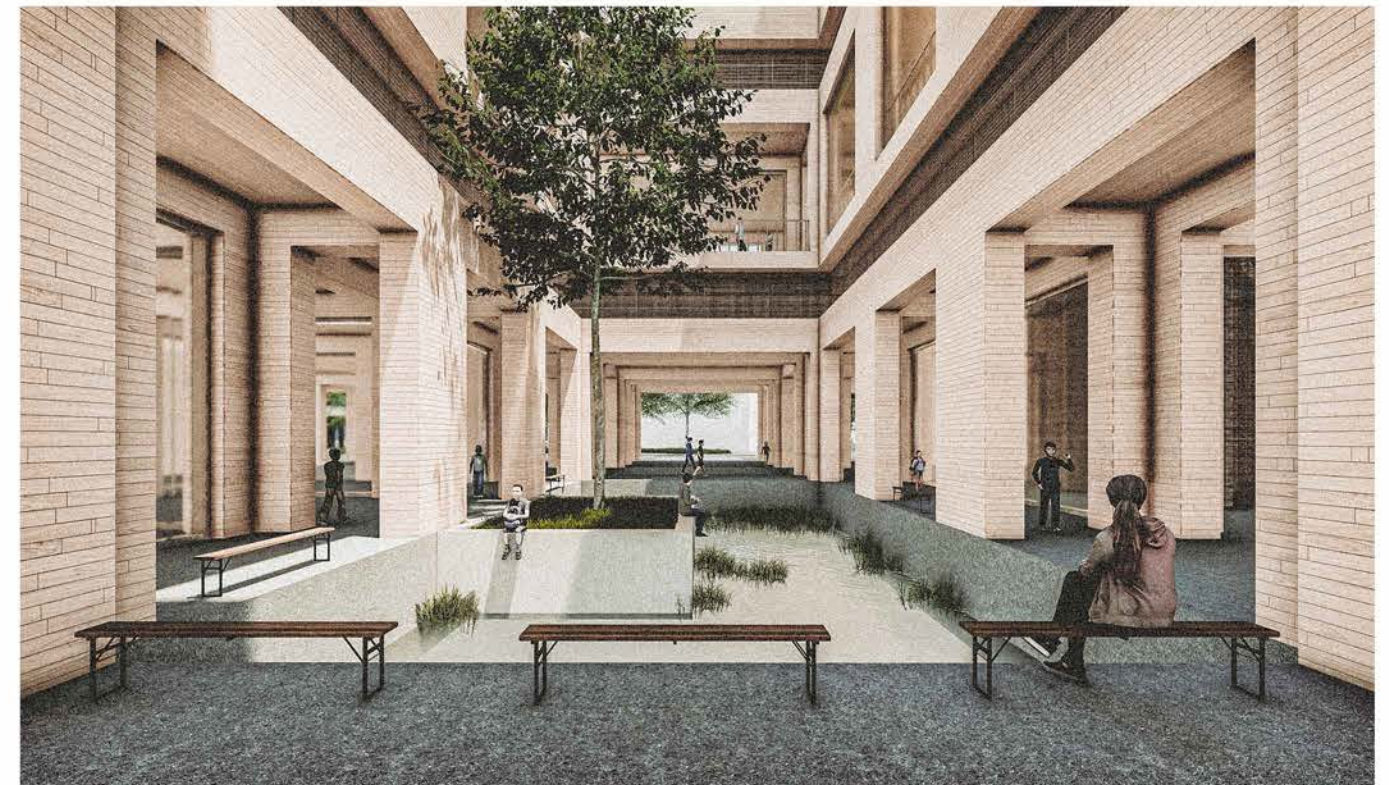
Vertical Water System

The vertical water system is the core connecting the water treatment steps of each layer, and has the function of pumping water from the bottom layer and sending water to the lower layer.



Activity Corridor for Children

The corridors on the ground floor of the building are wide and surrounded by water, providing a good place for children to play. The pool on the ground floor serves partly as a pond and partly as a swimming pool for the children.



Lighting Atrium

The building is relatively finished, and several lighting atriums are built in the middle to make the interior of the building full of ecology. The atrium is also a gathering space, where the vertical circulation is located.



West Side of the School

The west side of the school faces Hudson River and has an excellent view. There is also a road and a railroad between the school and the Hudson River. The roof of the school is suspended above the viaduct, providing a place for pedestrians to relax and entertain while enjoying a beautiful view.

02

THE THICKNESS BETWEEN HUMAN AND SEA

Public Jetty Design



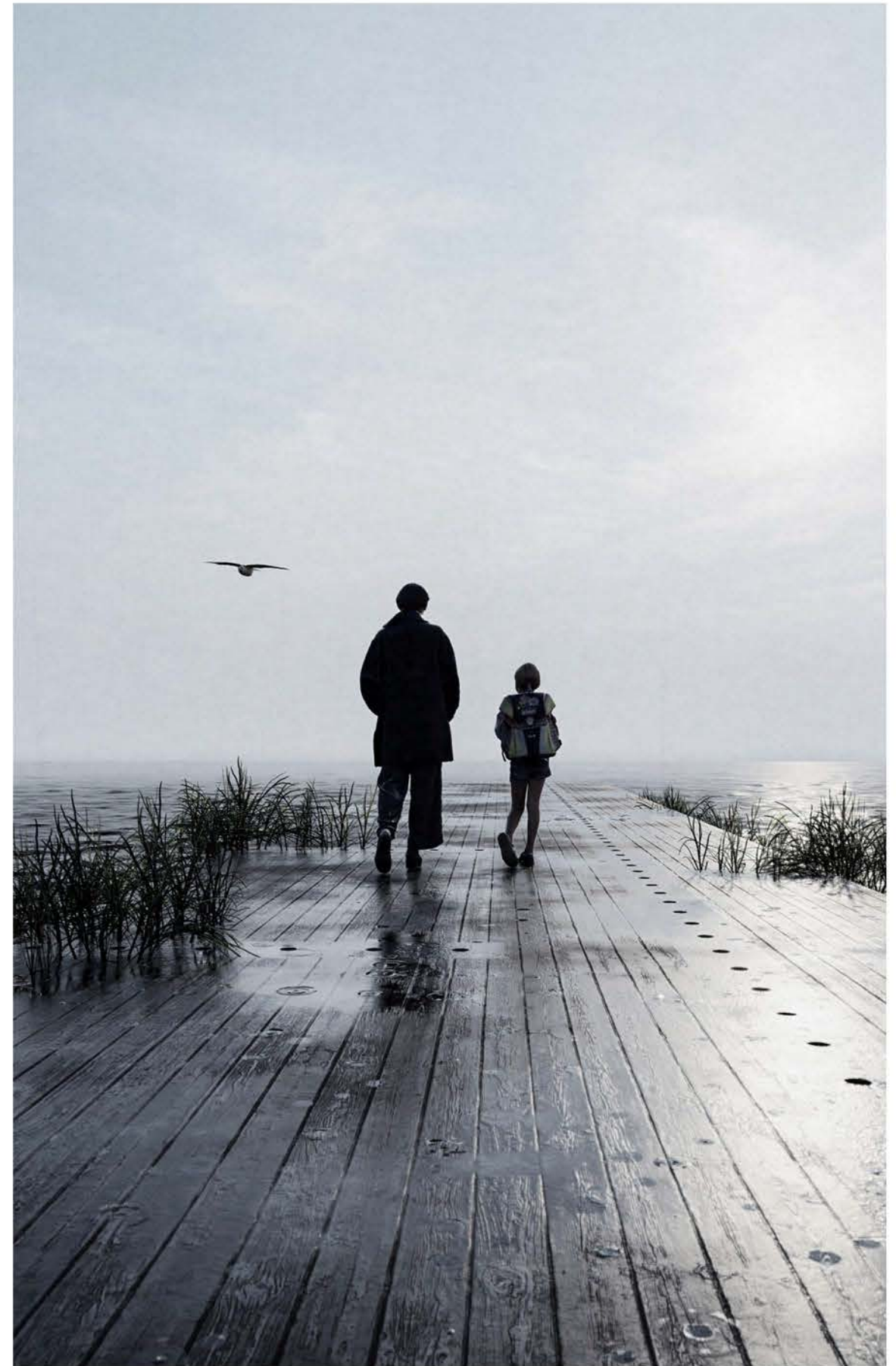
GSAPP Fall Studio Individual Work

Location: New York, United States

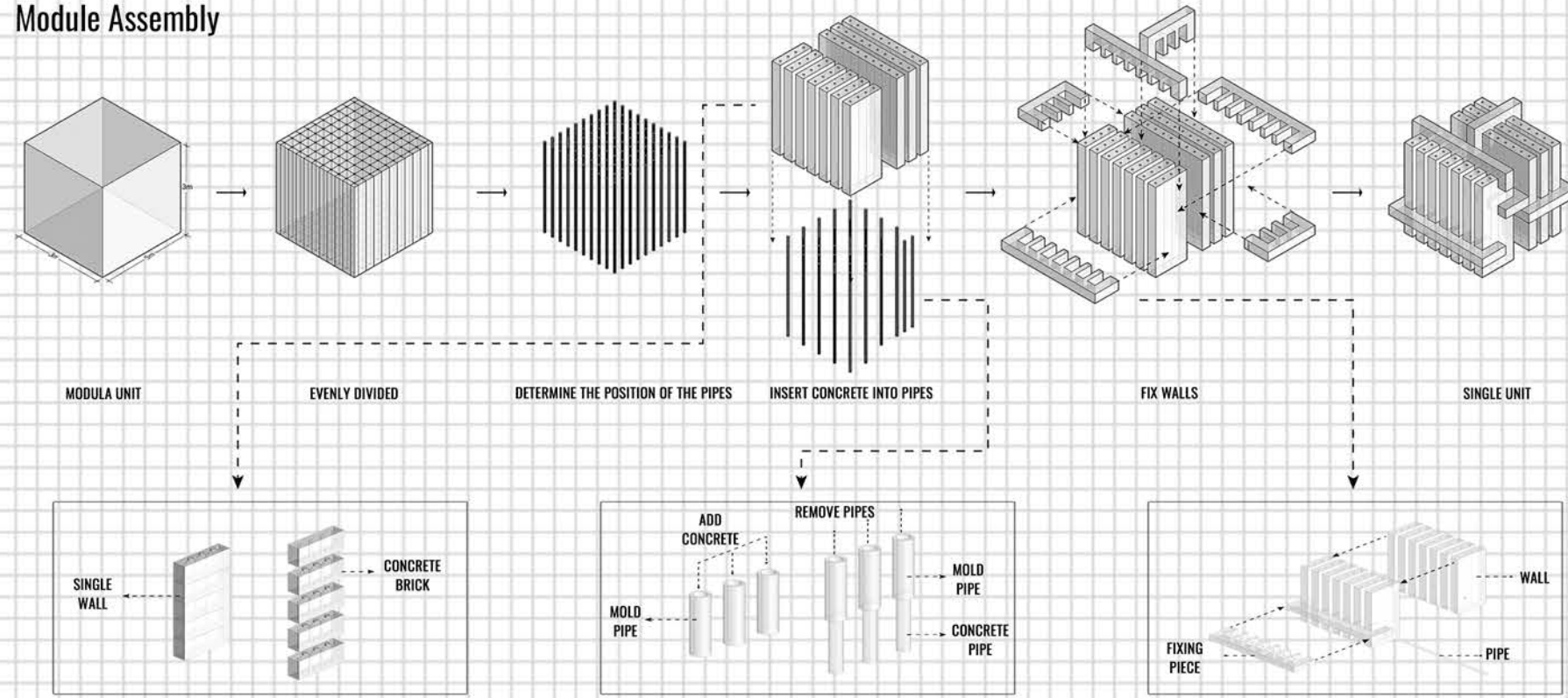
Date: Oct 2022 - Dec 2022

Critic: Marc Tsurumaki

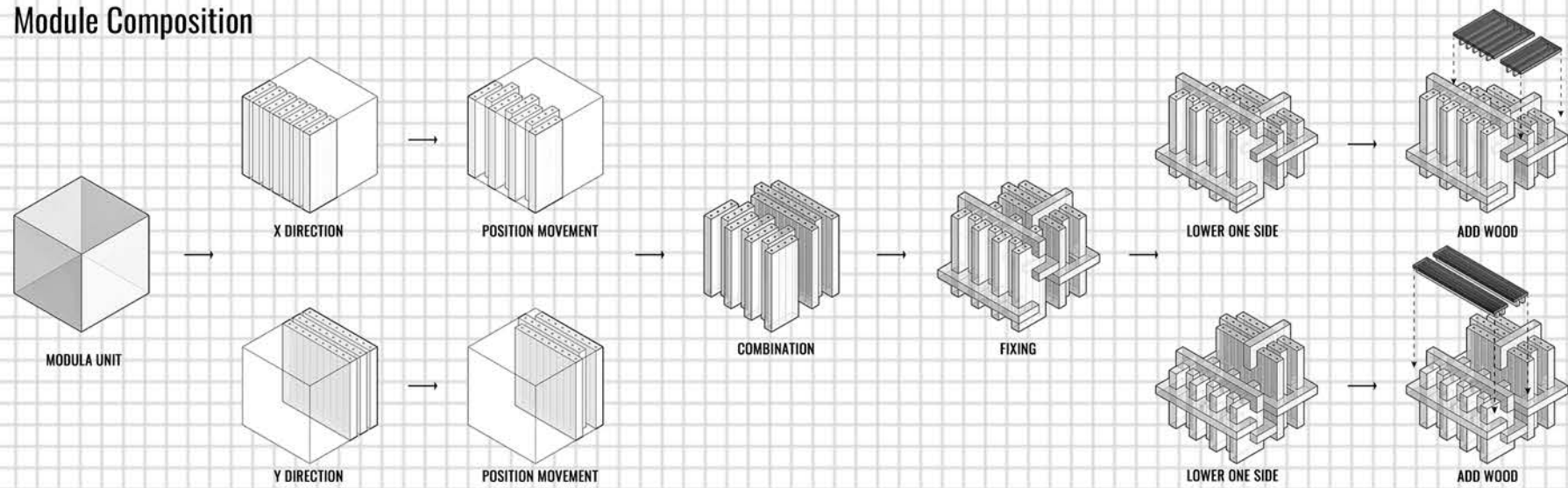
In the near future, sea levels may continue to rise, and natural disasters may become more frequent, which will affect human life. Preventing coastal erosion is an effective measure to prevent natural disasters such as floods and storms, and building jetty is one of the effective measures to prevent coastal erosion. Jetty will serve as the thickness between humans and the sea to save the coastline that will be submerged by sea water.



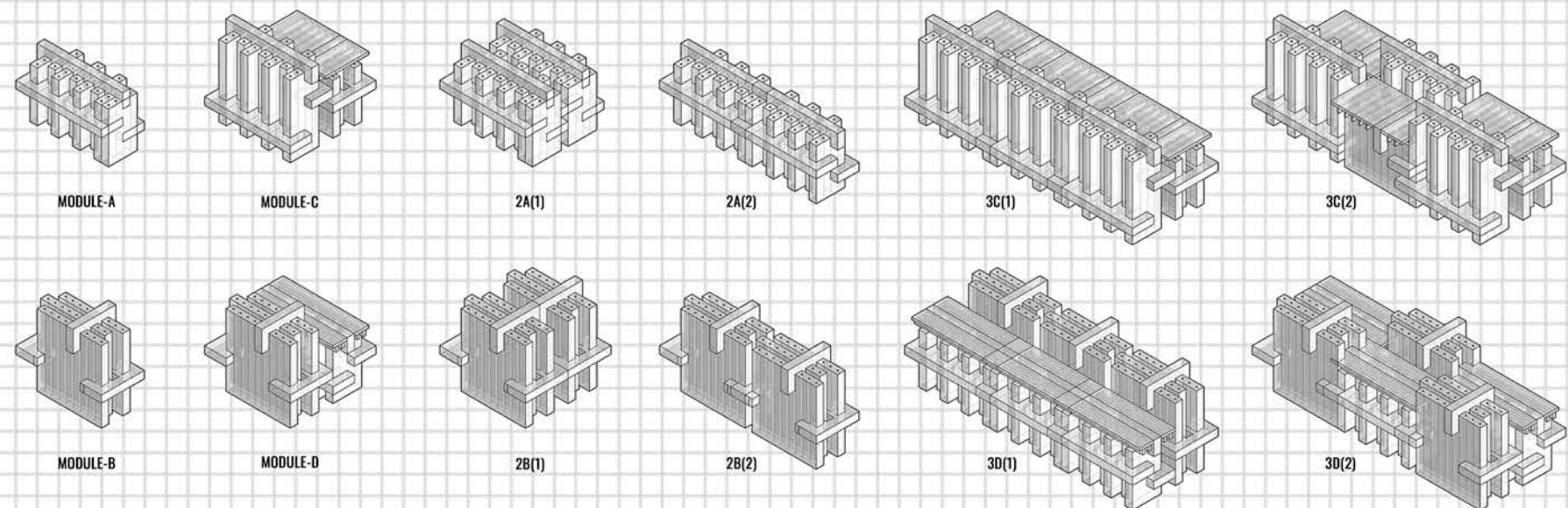
Module Assembly



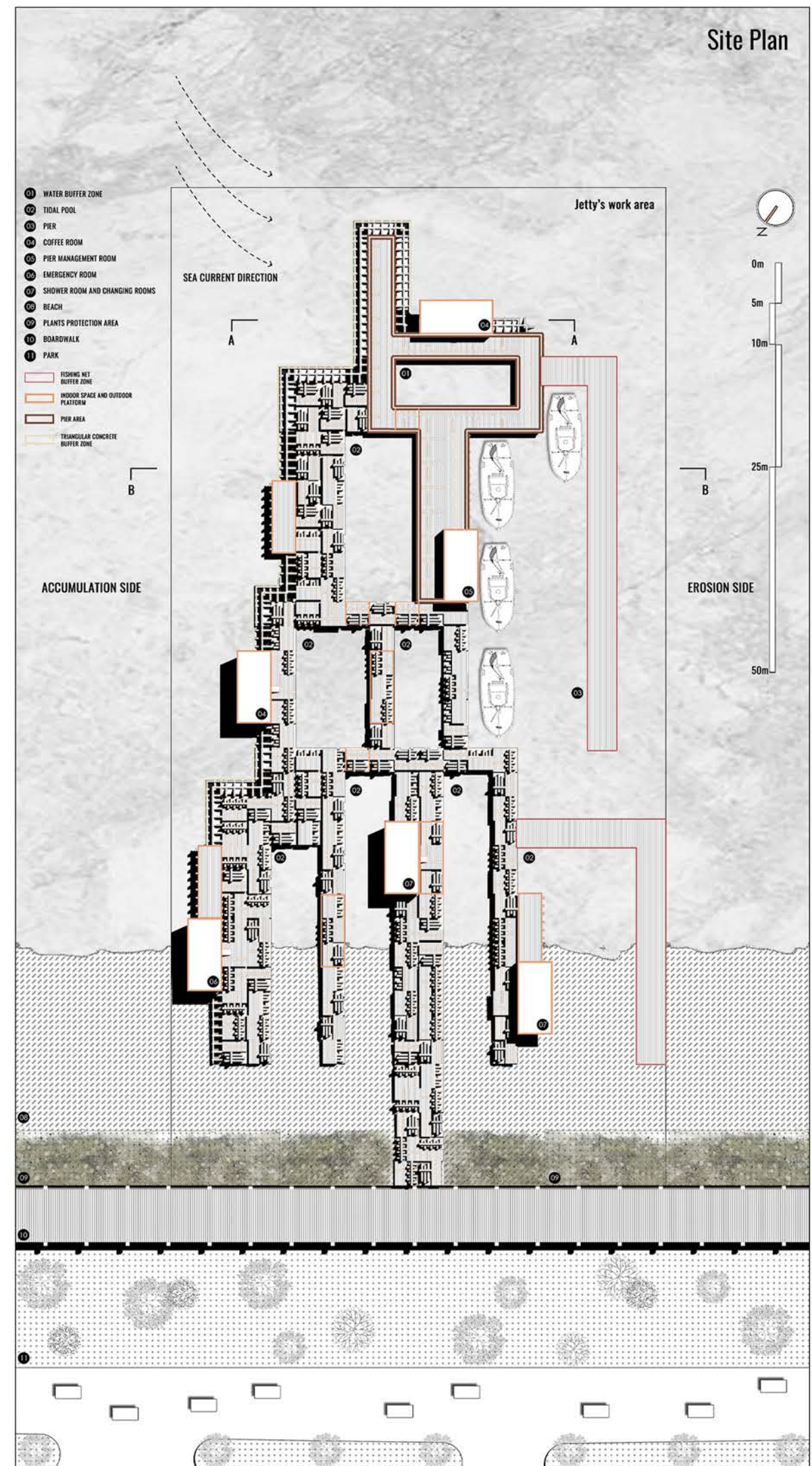
Module Composition

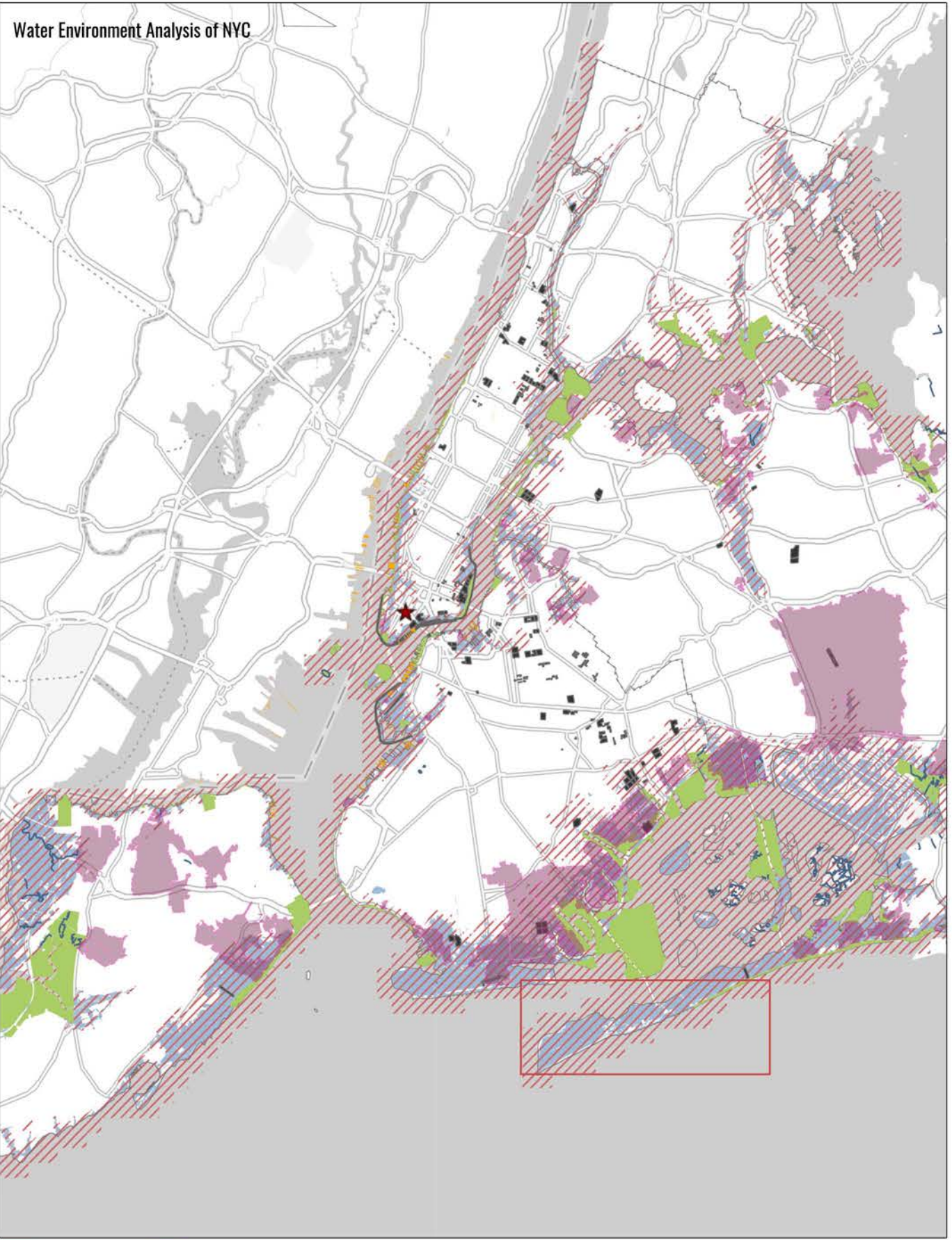


The types of Normal module



Site Plan

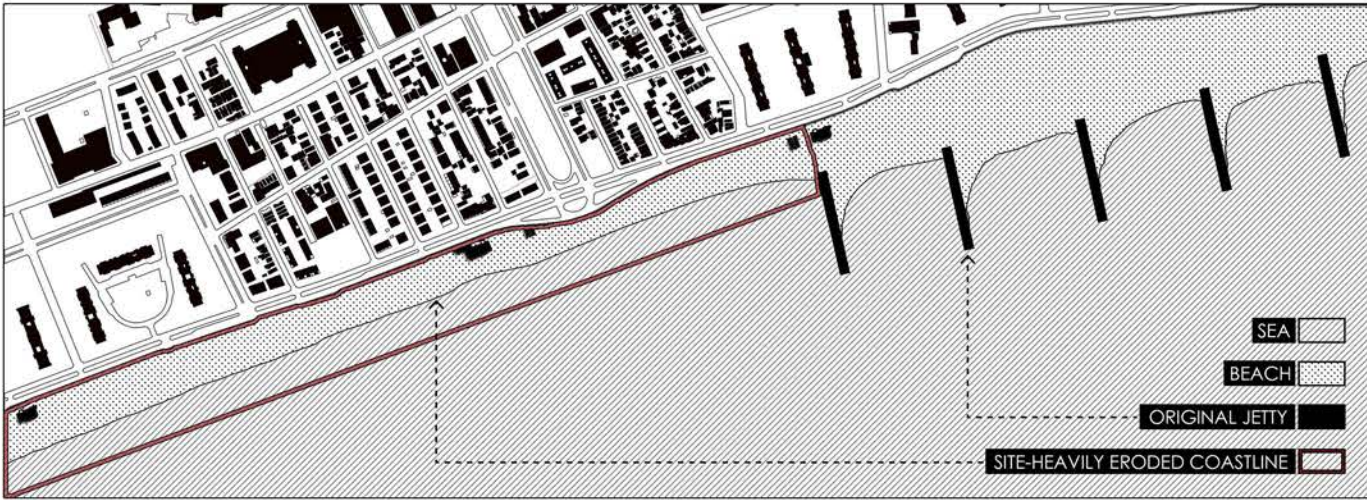




- Site
- NYC Resiliency Projects
- Sandy Zone
- Pier
- Jetty
- Seawall
- Waterfront Park
- MS4 Drainage Area
- Future Water Rise
- ★ City Hall

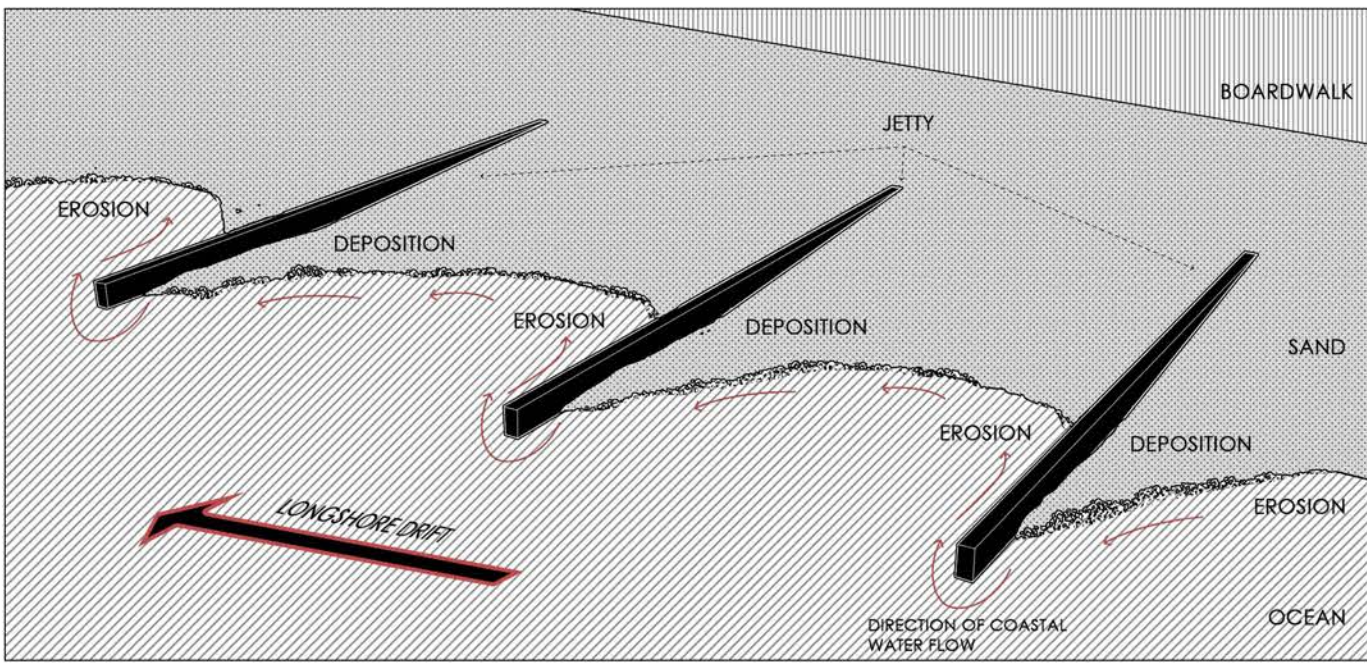
Selection of Site

The areas of New York City most at risk from rising sea levels in the future are Coney Island and the Barrier Islands. However, the barrier islands have a long and narrow coastline, almost entirely of beaches. Therefore, barrier islands also face a huge problem of coastal erosion. Many jetties were built on the barrier island before, but due to the shortcomings of the jetty itself, coastal erosion has not been well solved.



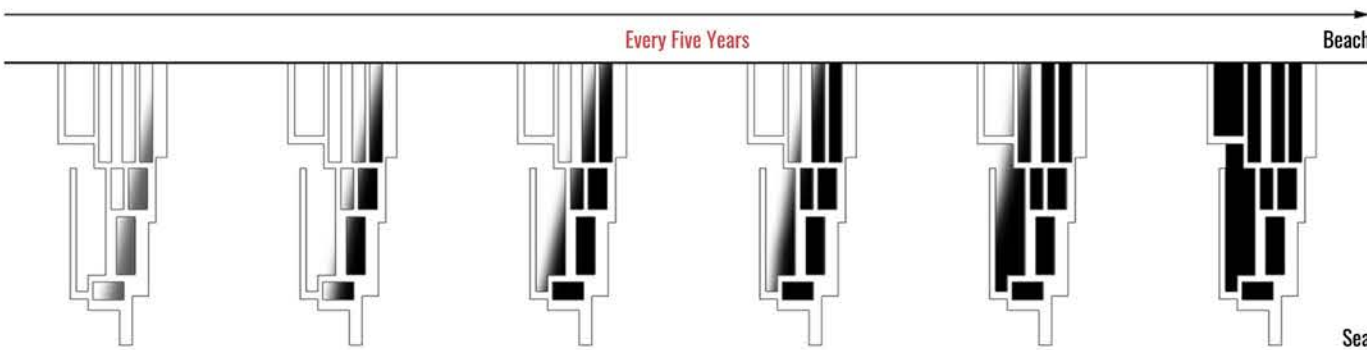
Site Situation

The site is in the middle of Rockaway Beach with no jetties. The right side of the diagram is the original jetty arranged in an orderly manner, and it can be clearly seen that the erosion of the part of the coastline without jetties is more serious, so we can build new jetties here.



Work Principal of Original Jetty

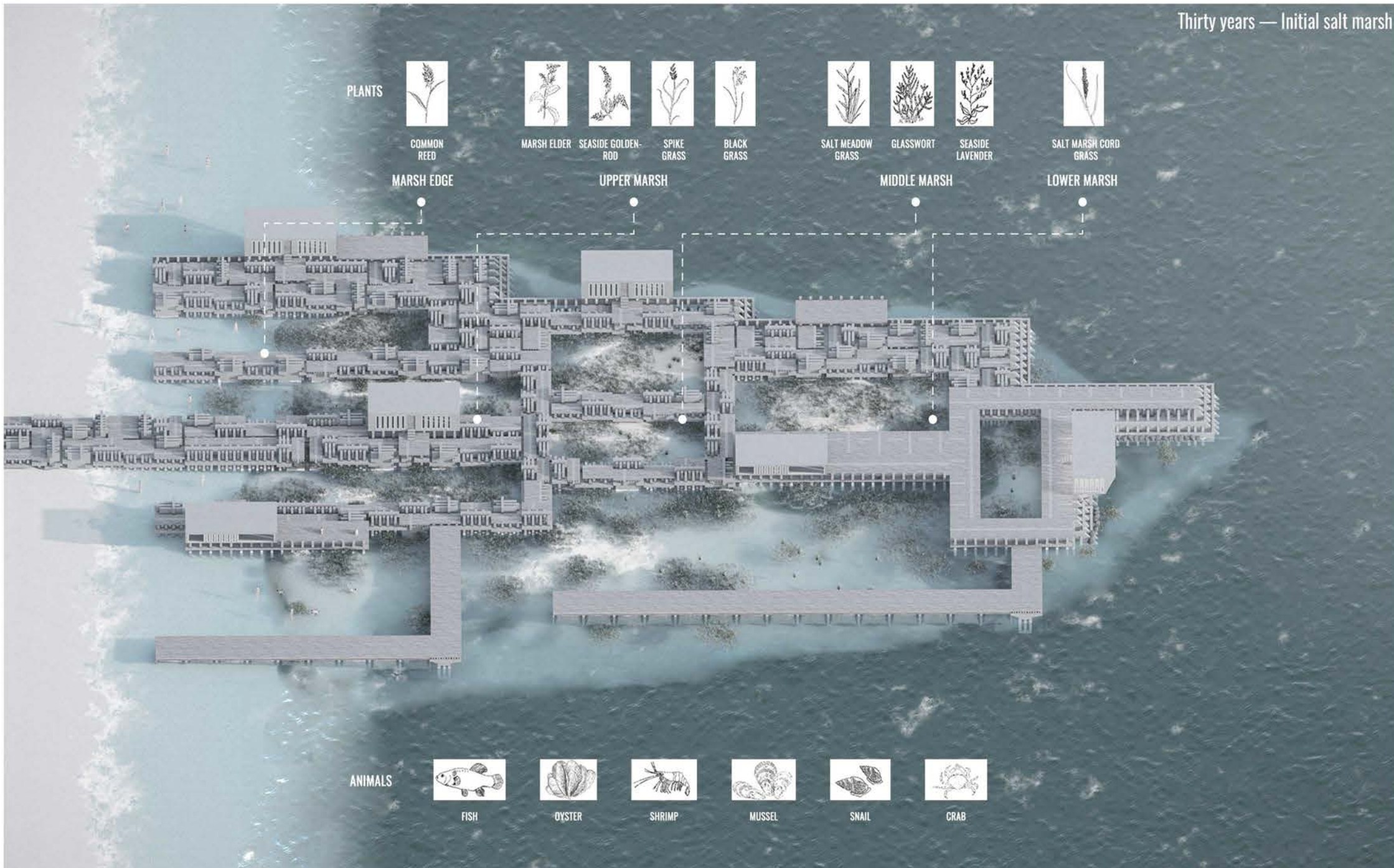
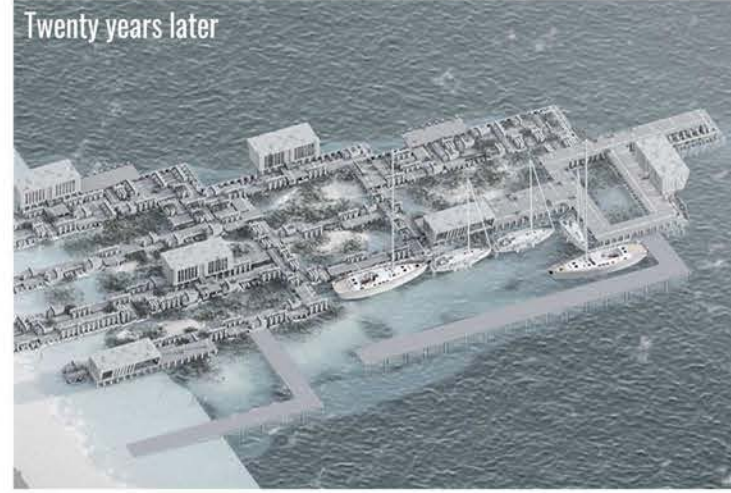
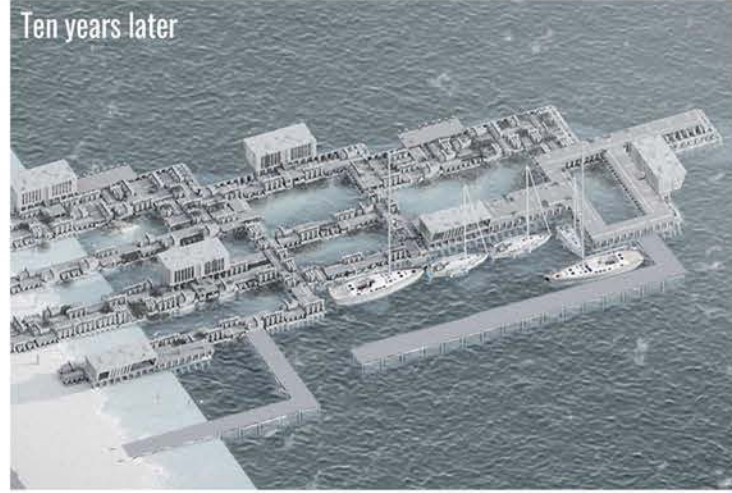
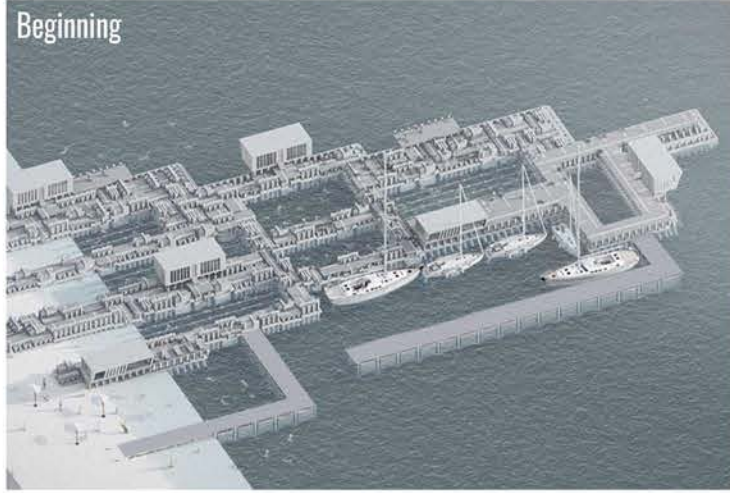
There will be different phenomena on both sides of jetty. Along the direction of longshore drift, the beach on the left side of jetty is easy to be eroded, and the beach on the right side is easy to accumulate sand. So we can figure out how to mitigate erosion while at the same time collecting sand.



Definition of the Thickness

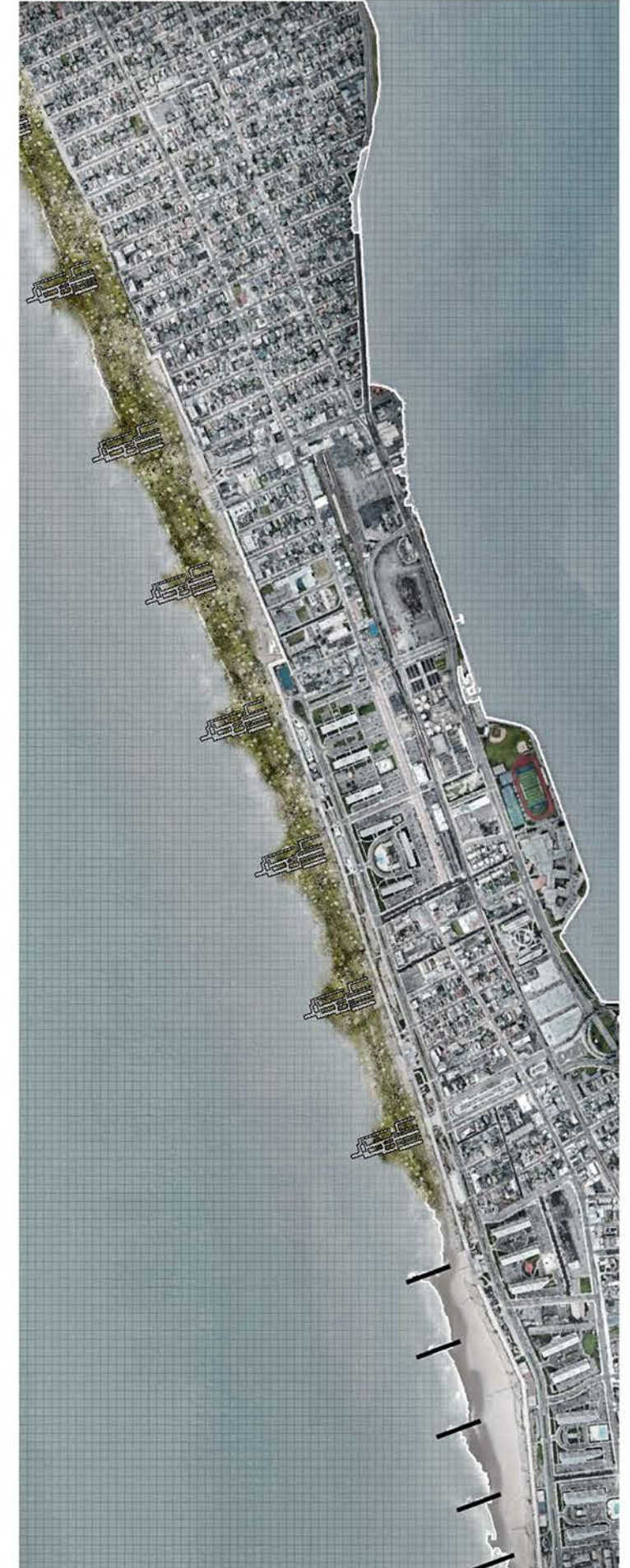
The new type of jetty is like a mold, on the side where the sand accumulates, the sand can slowly penetrate into the jetty and gradually migrate to the other side of the jetty. On the eroded side, the impact of sea water could be weakened, thereby reducing sand loss. In the interior of the jetty, there is both collected sand and a habitat for some marine life. This is the so-called thickness between human and sea.

Single strategy



In order to reduce the coastal erosion caused by the drawbacks of the original jetty, we built this new type of jetty that allows drifting sand to infiltrate slowly and deposit gradually. The jetty is like a mold, and the empty part inside will be filled with collected sand, and at the same time, marine life can easily gather in the interspace.

Overall Strategy

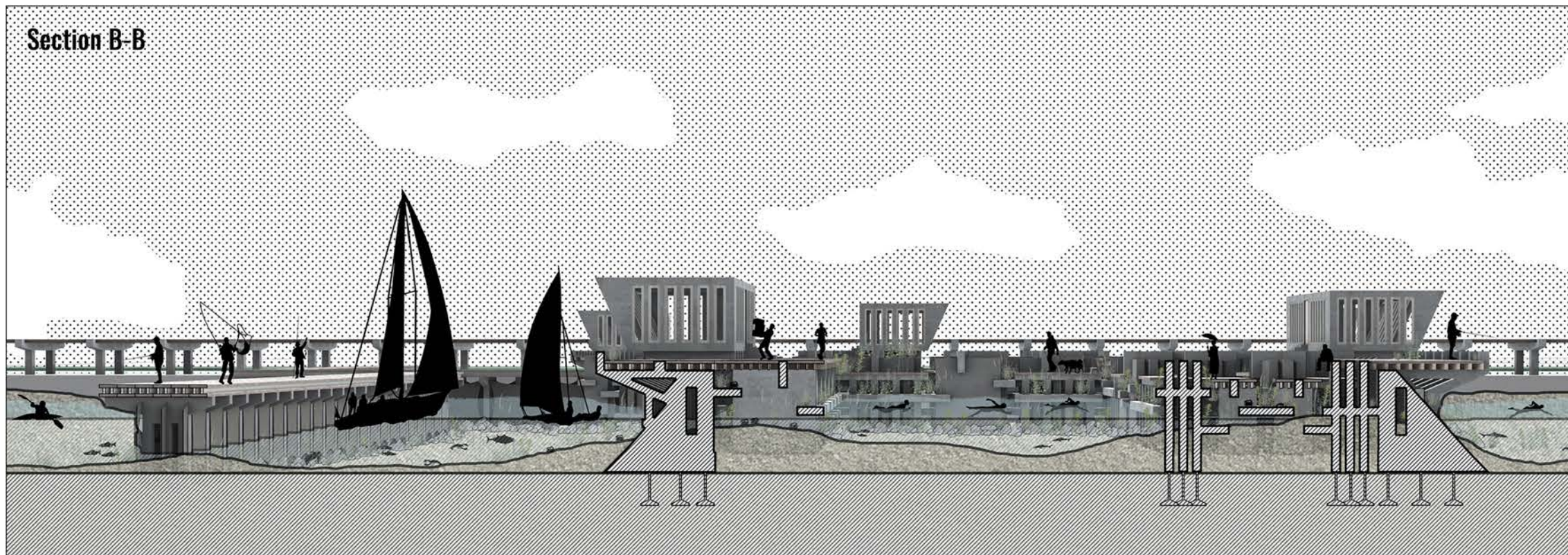


The overall strategy is to use more new jetties, continuously collect sand, and provide breeding places for marine life. Let the coast gradually evolve into wetlands over a few decades to reduce the impact of future sea level rise.

Section A-A



Section B-B

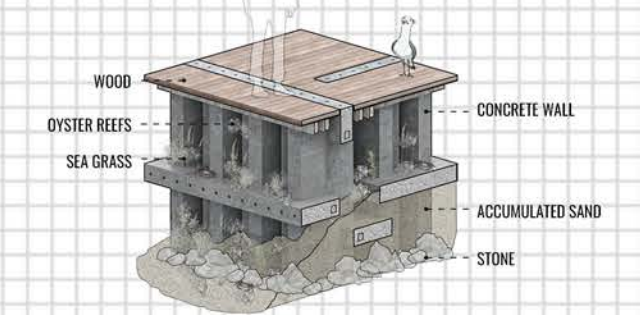


Special Modules

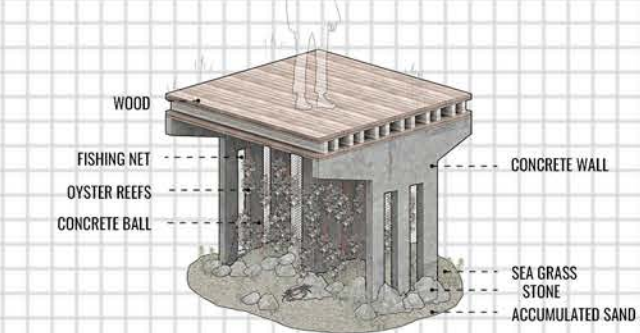
1. MODULE ONE



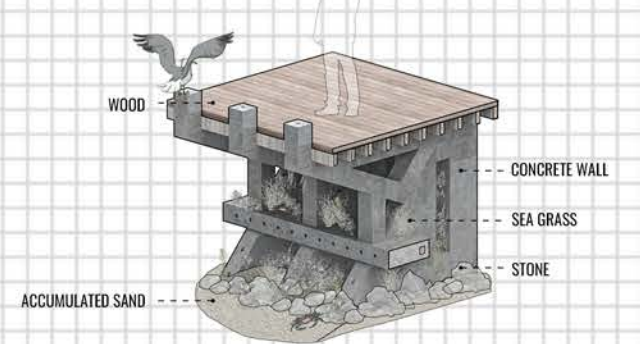
2. MODULE TWO



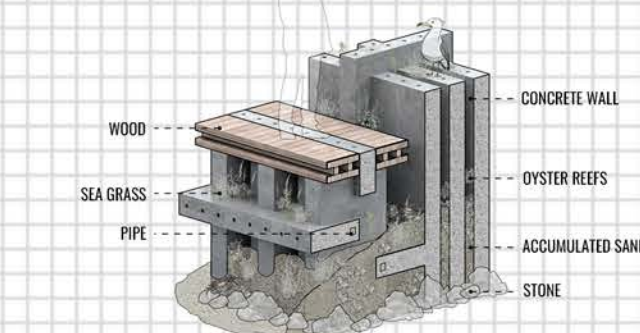
3. MODULE THREE



4. MODULE FOUR



5. MODULE FIVE





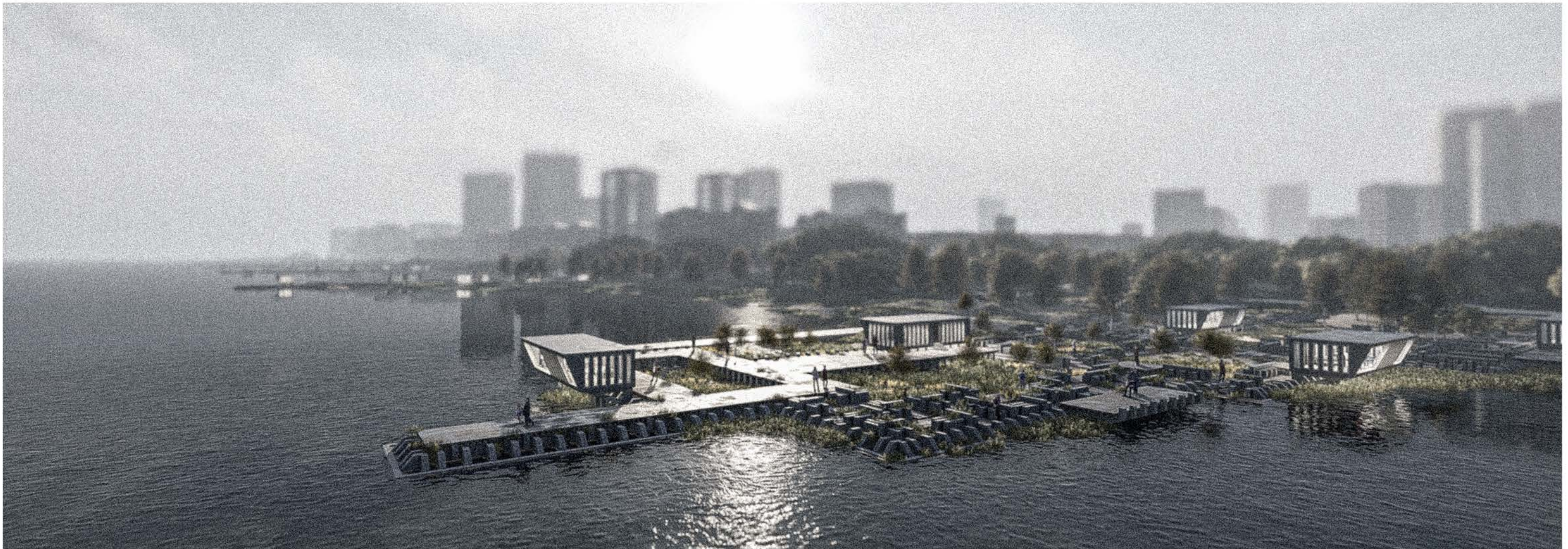
Corridor of Jetty

People can walk freely on the wood deck, and the concrete slabs protruding from the water can be used as seats and guard-rails. The corridor and the water surface can have a good interaction.



Internal Pool and Platform

In the inner pool, people can swim and play in the water safely. Over time, more sand will accumulate and it will become a habitat for marine flora and fauna. The platform can be used for people to fish.



Aerial View of Jetty

The long and narrow jetty will continuously collect drifting sand, gradually transition the sand to the central area of the jetty to increase the thickness, reduce coastal erosion on the other side of the jetty, and provide a habitat for marine life.



03

INDUSTRIAL INCUBATOR

Design of Industrial Upgrading Oriented Complex



GSAPP Spring Studio Group Work
Location: New York, US
Date: Feb 2023 - Apr 2023
Critic: Galia Solomonoff

This building reconstruction aims to solve Argentina's economic issues through industrial upgrading in agriculture and husbandry. Argentina faces severe economic challenges, including a high inflation rate, causing citizens to spend most of their funds on daily necessities. The Argentine economy cannot withstand the influence of world politics and has become relatively less complex over the last two decades, leading to a drop in economic complexity ranking. The proposed project envisions a research center for new technologies, a place to learn about Argentina, a communication hub for government, NGOs, and companies, and a system to study how to use byproducts in the industrial chain. By focusing on upgrading agriculture and husbandry, the project could provide Argentina with a much-needed economic boost and improve self-sufficiency.

Site Situation

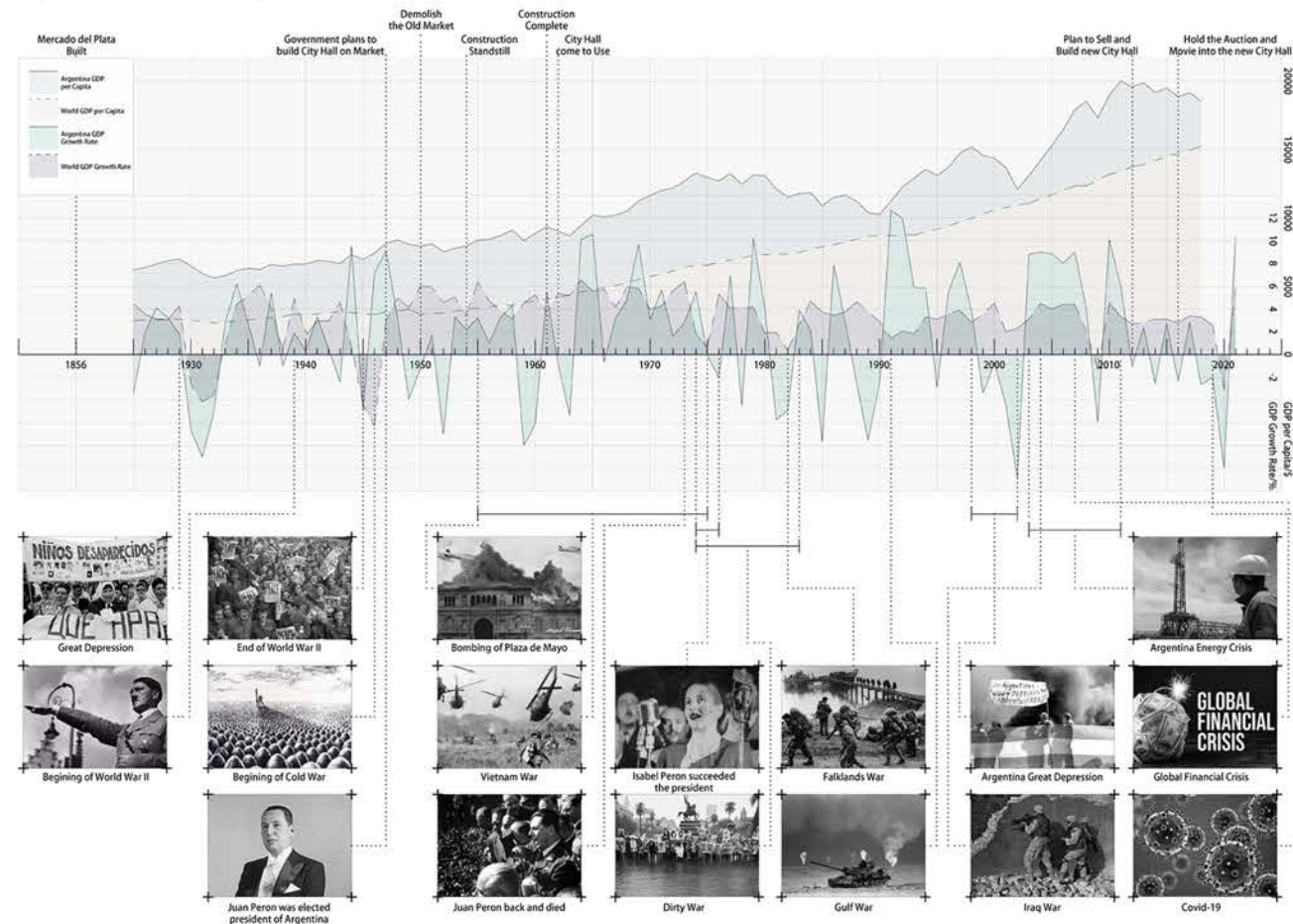


The Edificio Mercado del Plata was built in 1962 and is located in the heart of Buenos Aires, Argentina. It was designed to house government functions but was sold to a real estate and banking conglomerate in 2016. Since then, the building has remained vacant for more than eight years and is considered inadequate for banking and office use. Its prime location, adjacent to three subway lines and a central artery with 12 lines of traffic, makes it ideal for mixed-use development that could include civic, office, and banking functions. The building's 400 feet façade runs along Avenida 9 de Julio, and its free-plan design allows for cross ventilation and natural light.



Today, the building is inadequate for banking and office use. It has remained vacant for more than eight years. The building is an empty vessel and an urban canvas. Due to its central location, the unused Mercado del Plata is often covered with banners from protesters overnight and taken by the authorities quickly after, or used as the site of art projects. The site and building's best and highest use is as a mixed-use for civic, offices, and banking functions.

Argentine Economic Changes

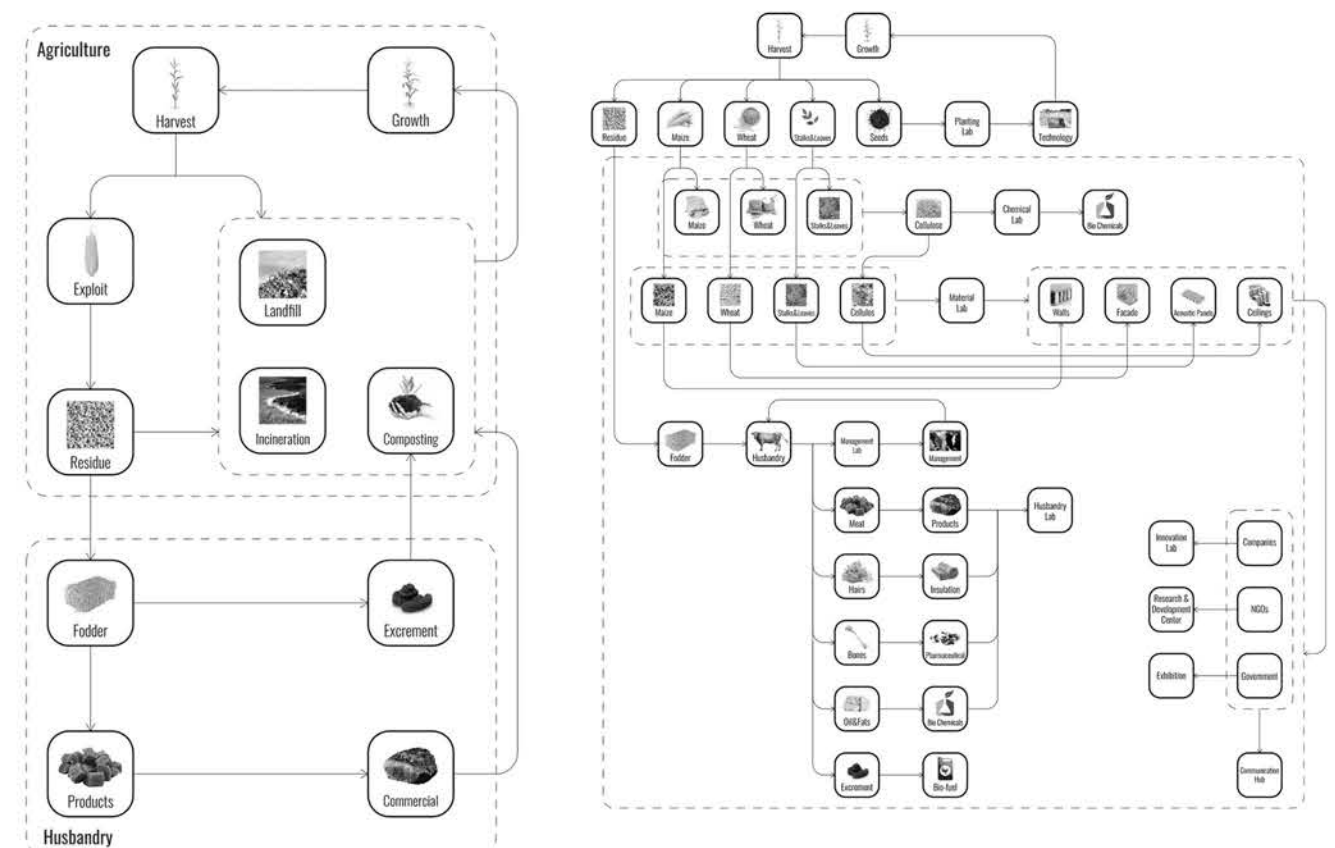


Compare Argentina's GDP with world average GDP and relate to world and Argentina history. In this timeline chart, we can see that in many cases when wars or economic crises occur, Argentina's economy will experience relatively large fluctuations. Their economies cannot resist the influence of world politics. Our research suggests that Argentina's economic problems are due to a single industrial structure. Their economy highly rely on agriculture and husbandry. Besides, during the last 20 years, Argentina's economy has become relatively less complex, its economic complexity ranking moving from 35th to 60th.

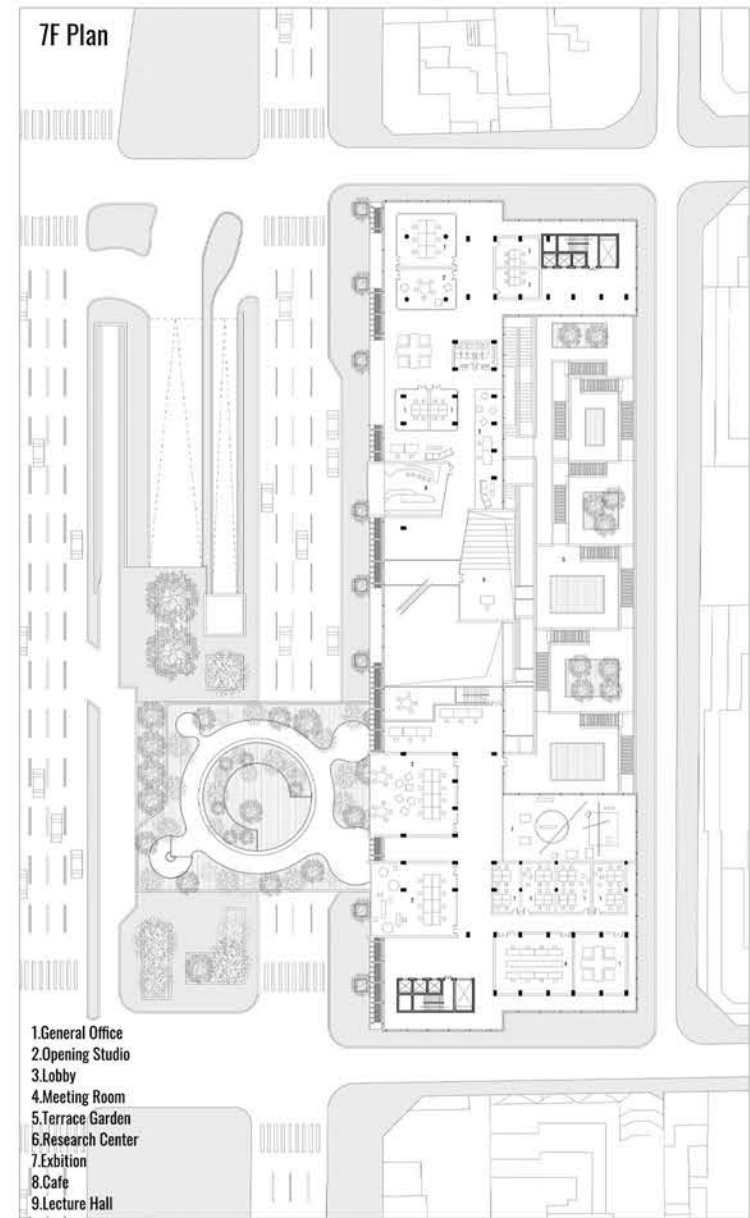
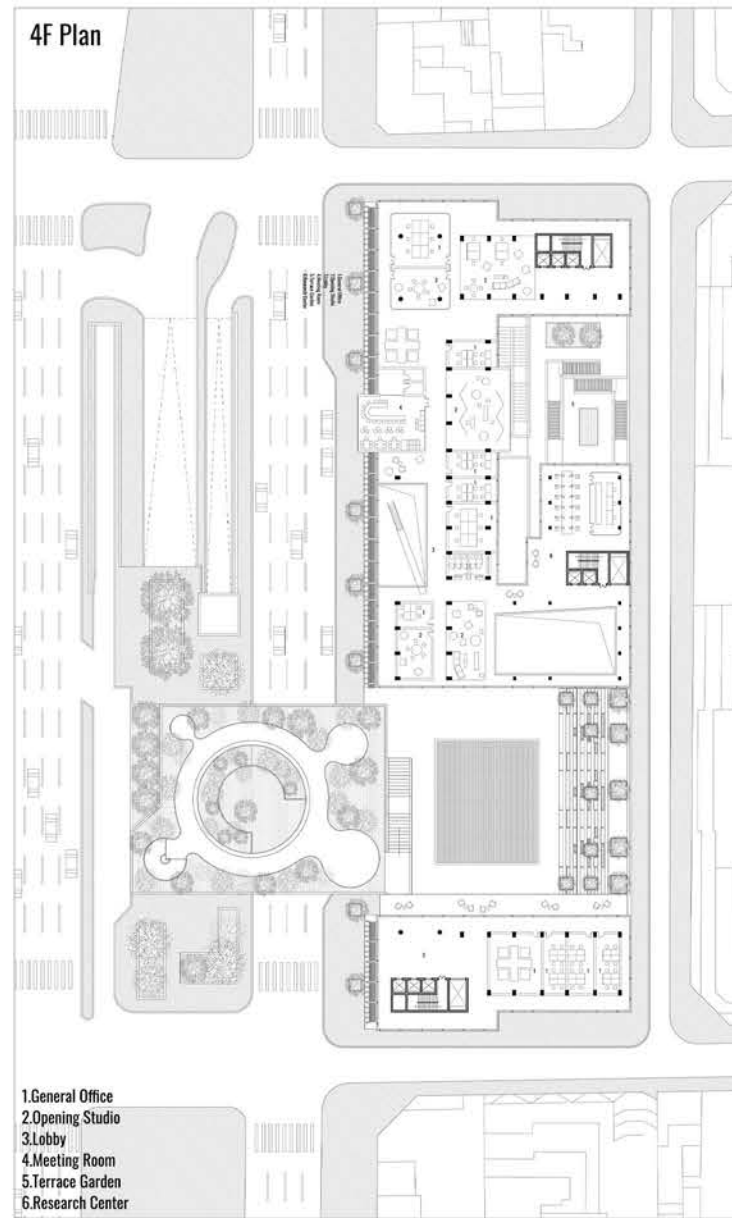
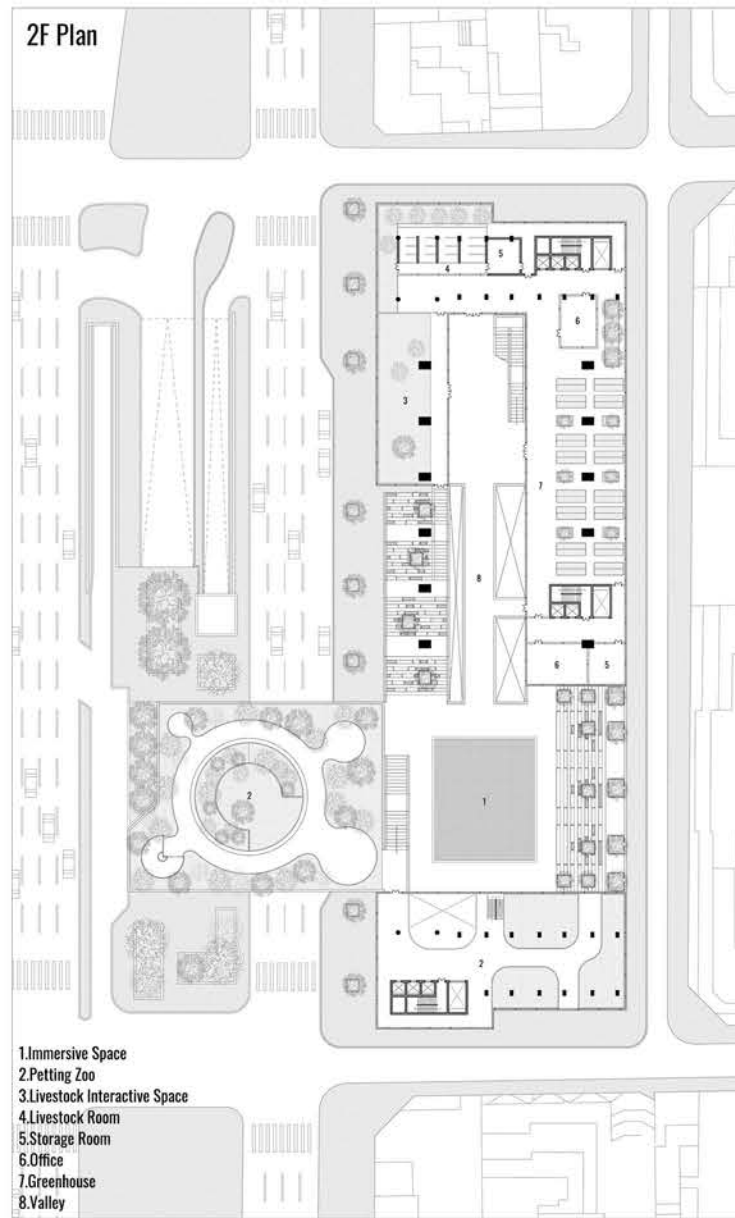
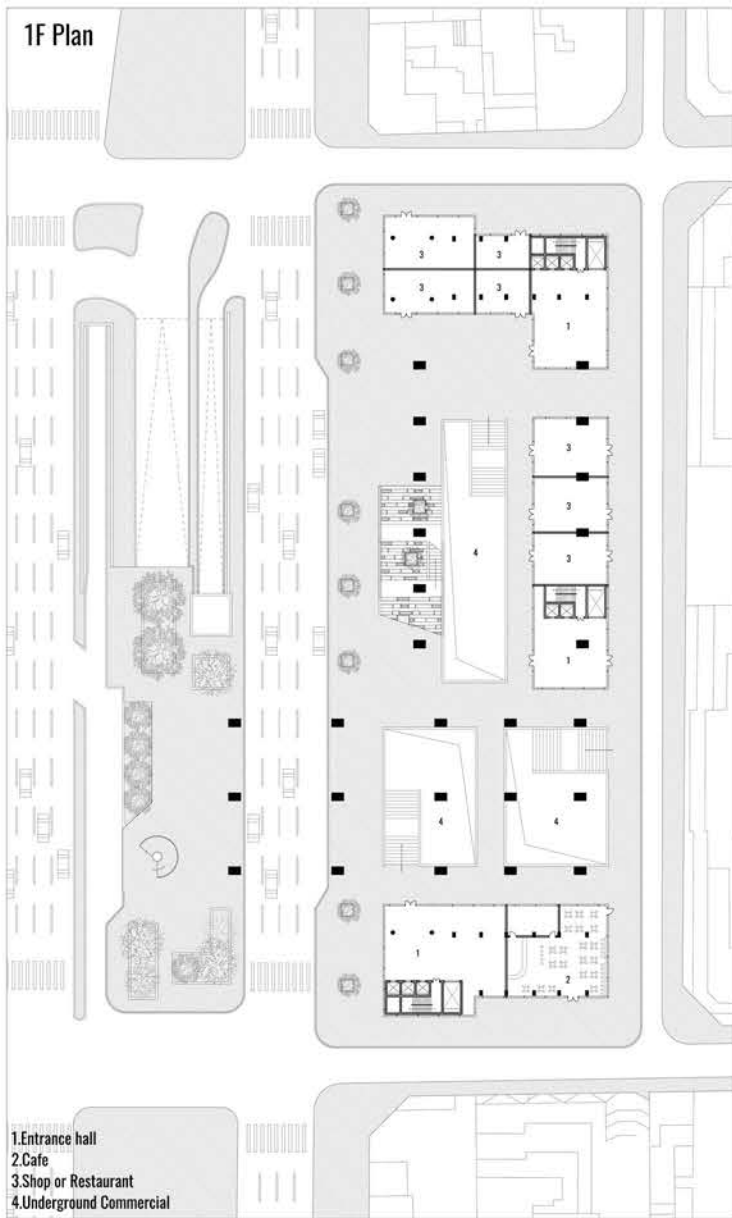
Overall Strategy



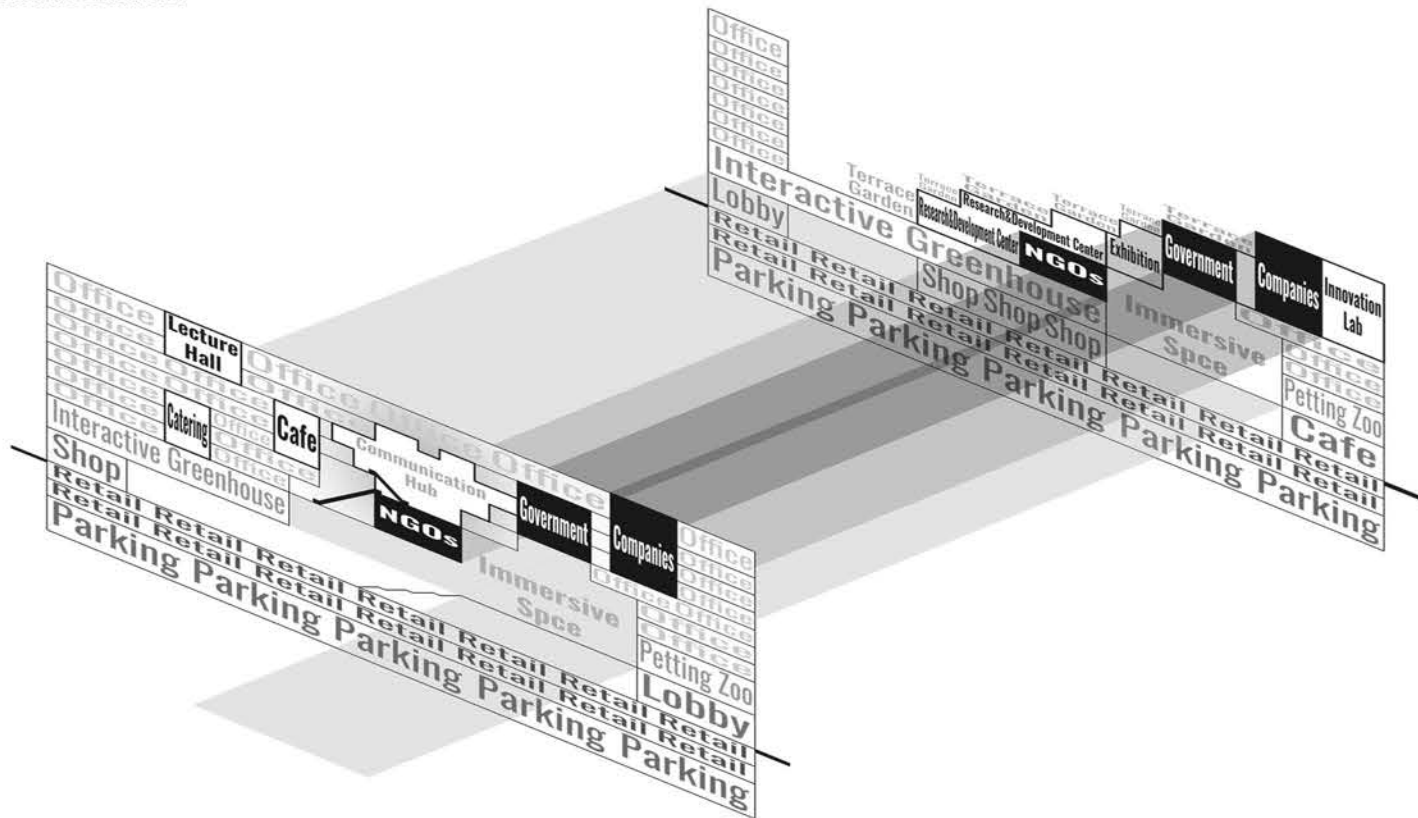
We propose solving them through industrial upgrading of agriculture and animal husbandry. Our project aims to become a research center for developing new technologies, a hub for promoting collaboration between various parties, and a system for utilizing by-products. Communication and cooperation among farms, companies, NGOs, and governments are challenging due to their location. However, our site offers an opportunity to break down those barriers and become a link between materials and new technologies.



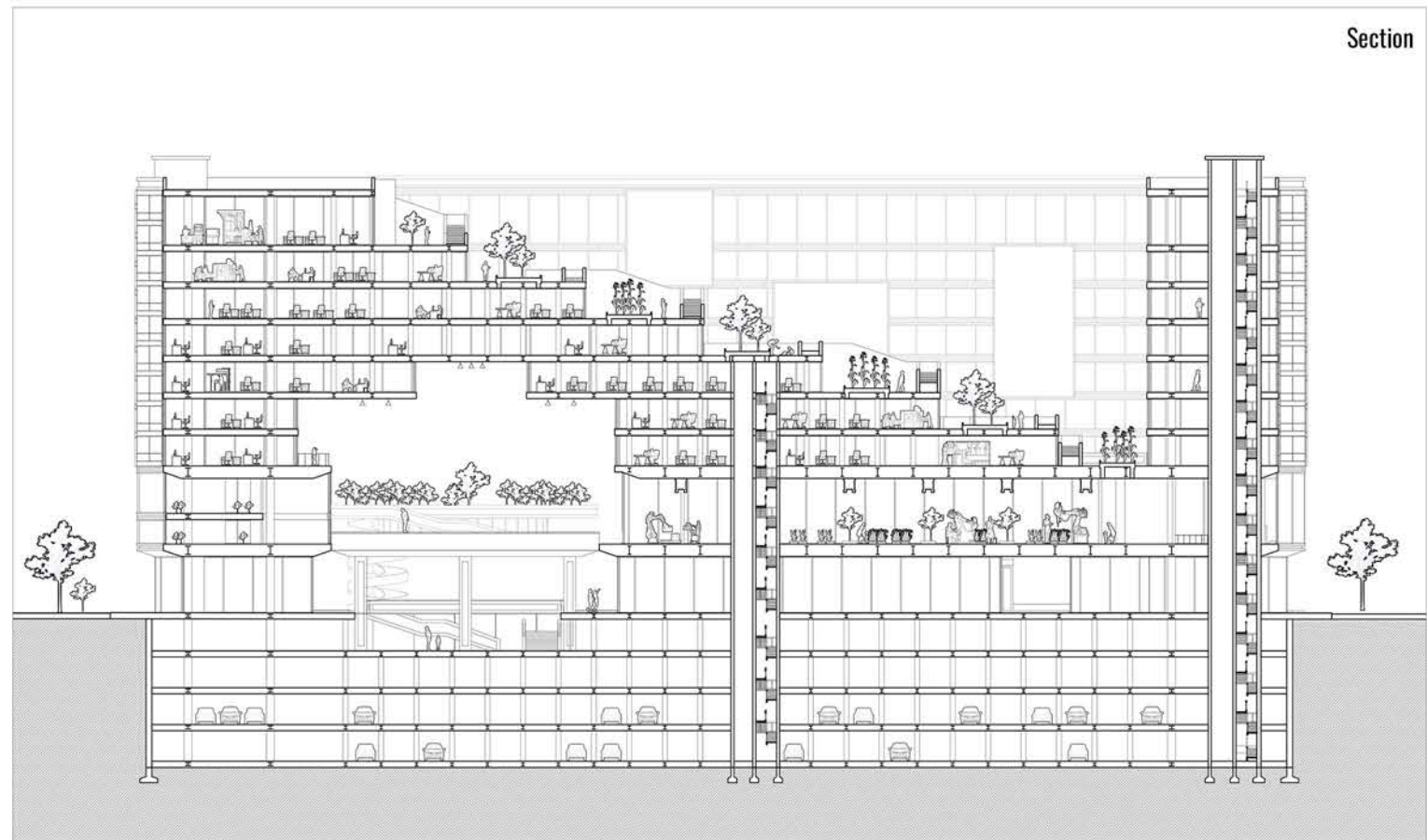
Our proposed system for Argentina's agricultural and animal husbandry raw materials addresses the low utilization efficiency and imperfect recycling system, enabling the intervention of new technologies. Raw materials will be taken to the planting laboratory to optimize crop growth and soil conditions, and the materials laboratory will study how to create biomaterials for architectural elements. Agricultural residues will be transformed into livestock feed, and the Sustainable Livestock Management Lab will focus on reducing waste and improving efficiency. This system improves utilization efficiency and supports the implementation of new technologies.

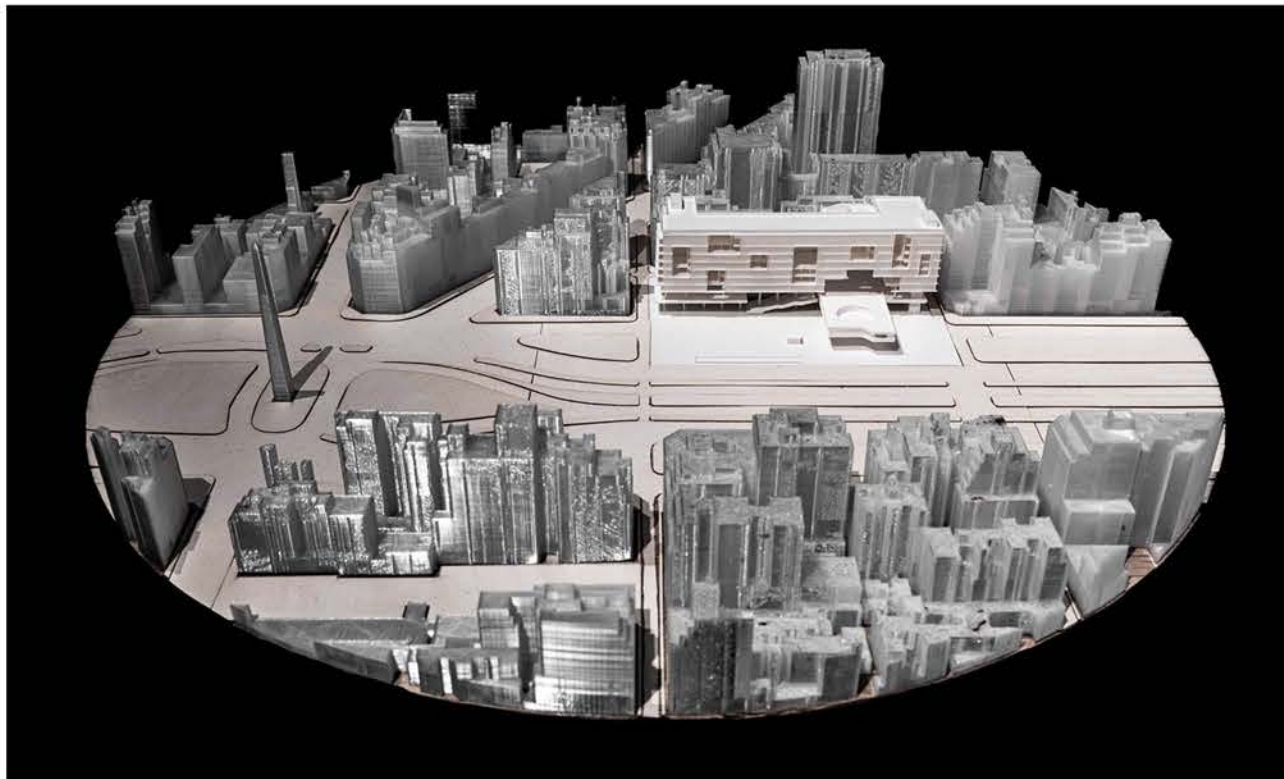
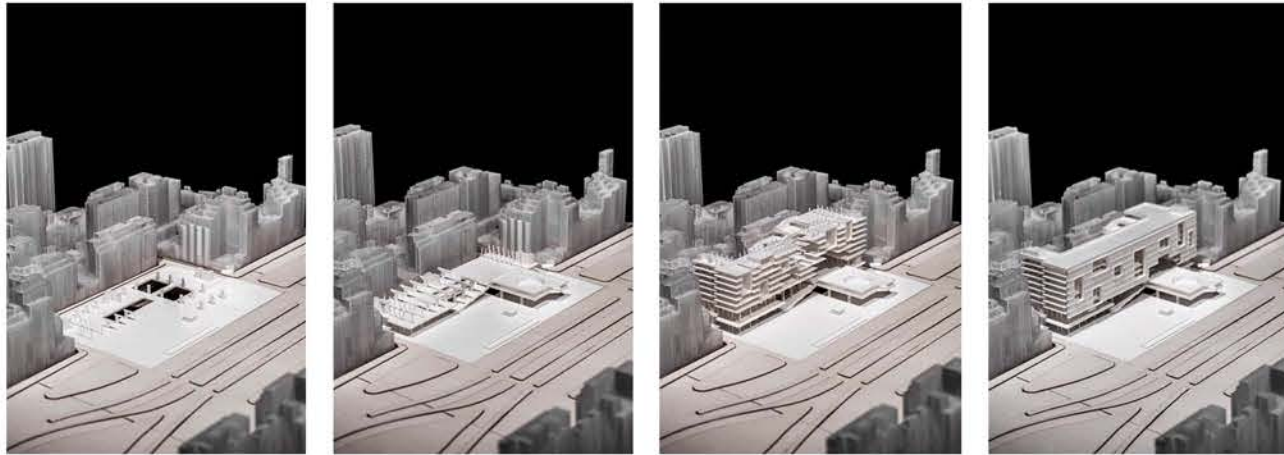


Functional Distribution



Section





Outside Petting Zoo

There is an outdoor petting zoo on the bridge to enhance the interaction between the park and people. The types of animals will be changed regularly to maintain the freshness of people here.



Livestock Interaction Space

Both adults and children can interact with livestock here and watch their breeding process, which is of rich educational significance. By-products of livestock will also be collected for research.



Terrace Garden

People can go to the terraces on the back through the stairs on the second floor, where they can visit the outdoor planting and enjoy the green space. At the same time, they can also visit part of the office area to form a visual interaction



West Facade

The west façade faces the strong western sun, and at the same time has a strong interaction with the street. Therefore, vertical louvers made of biological materials are used to shade the sun, and the public space inside the building is covered with plants to form a partly hidden and partly visible feeling.

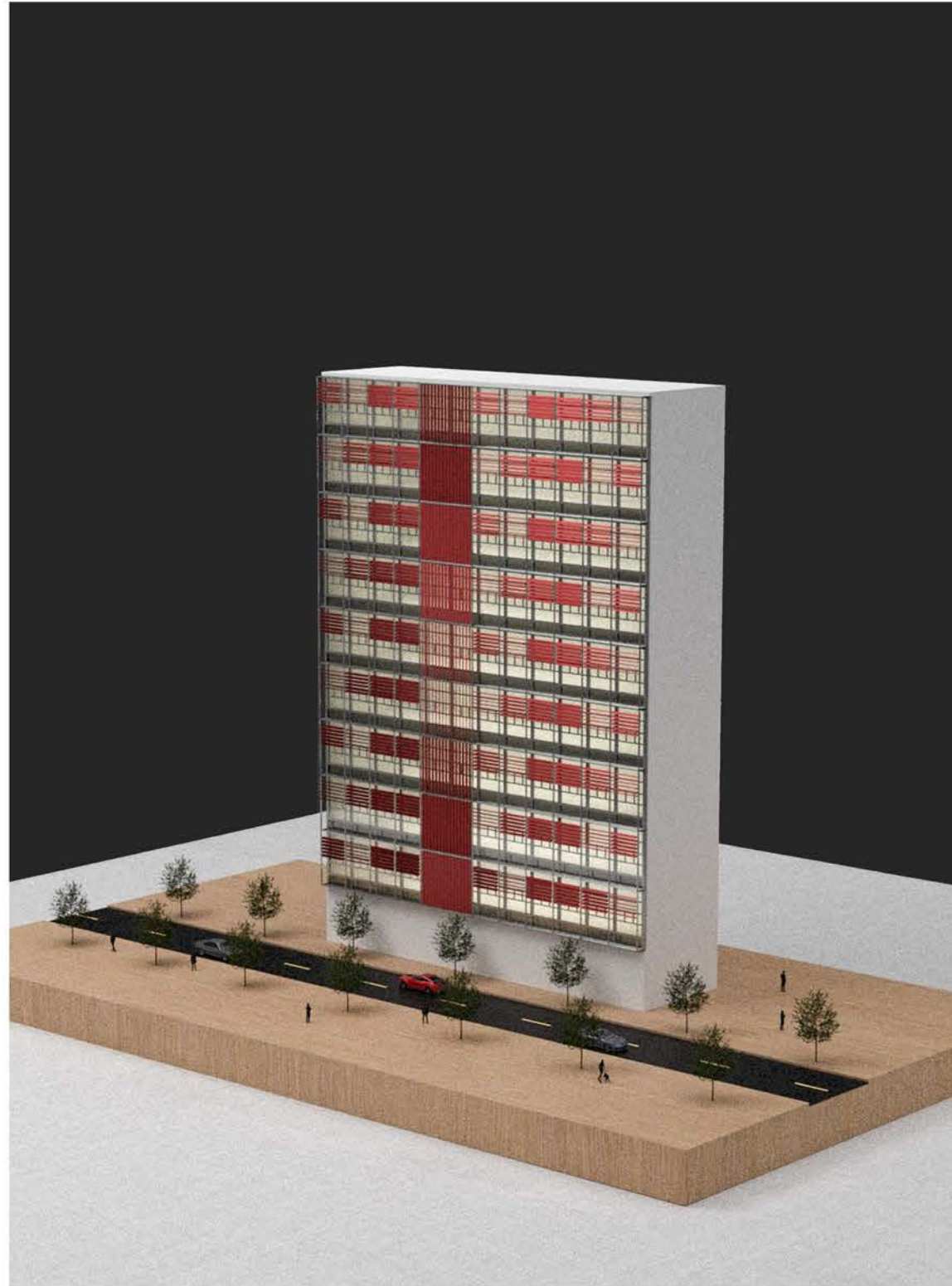


Horizontal Park

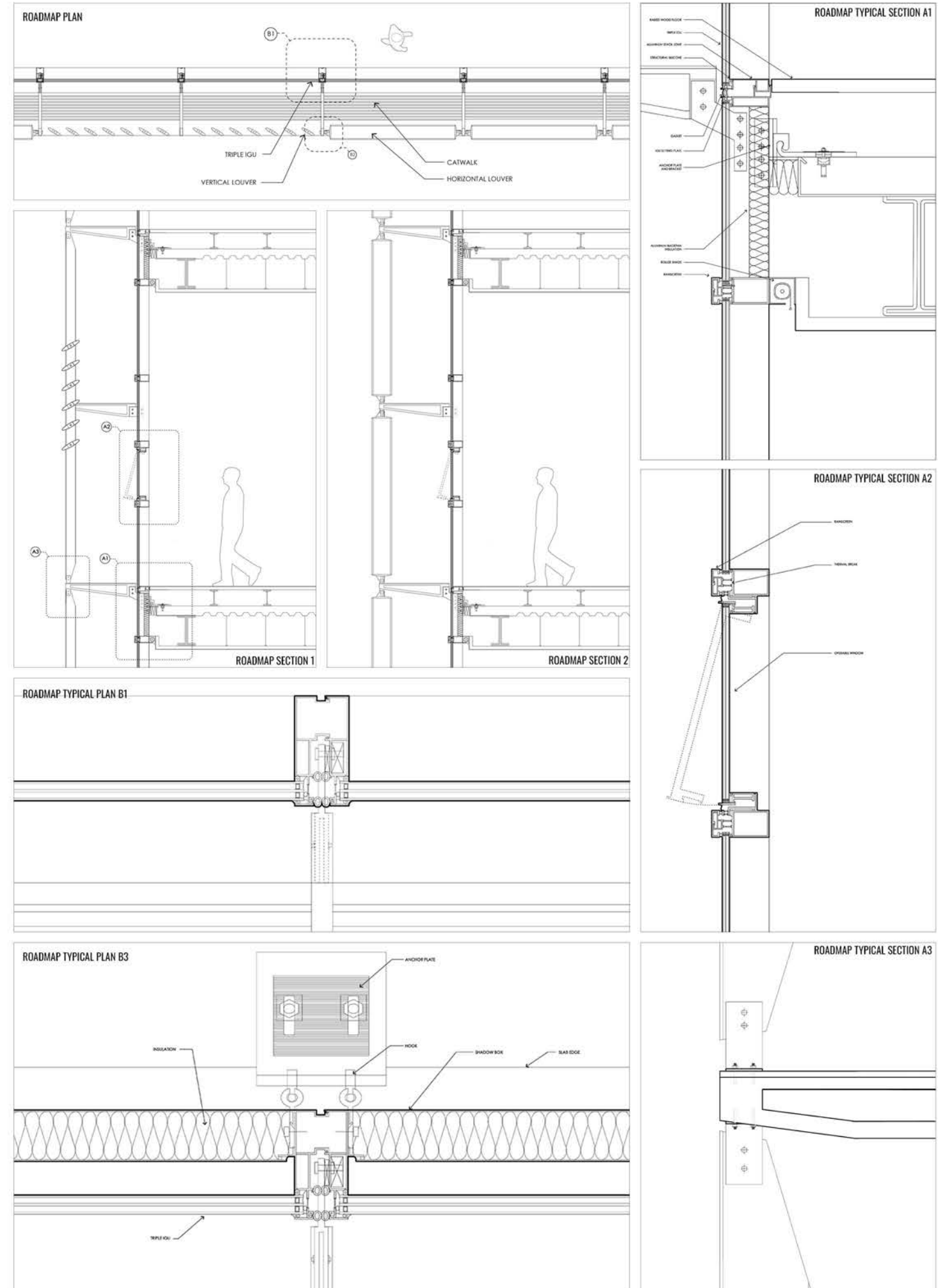
Considering that the small park on the other side of the highway is not highly utilized and public, we connected it with a bridge. The park greatly enriches the publicity of the building, and people can enjoy the excellent view of the city center here.

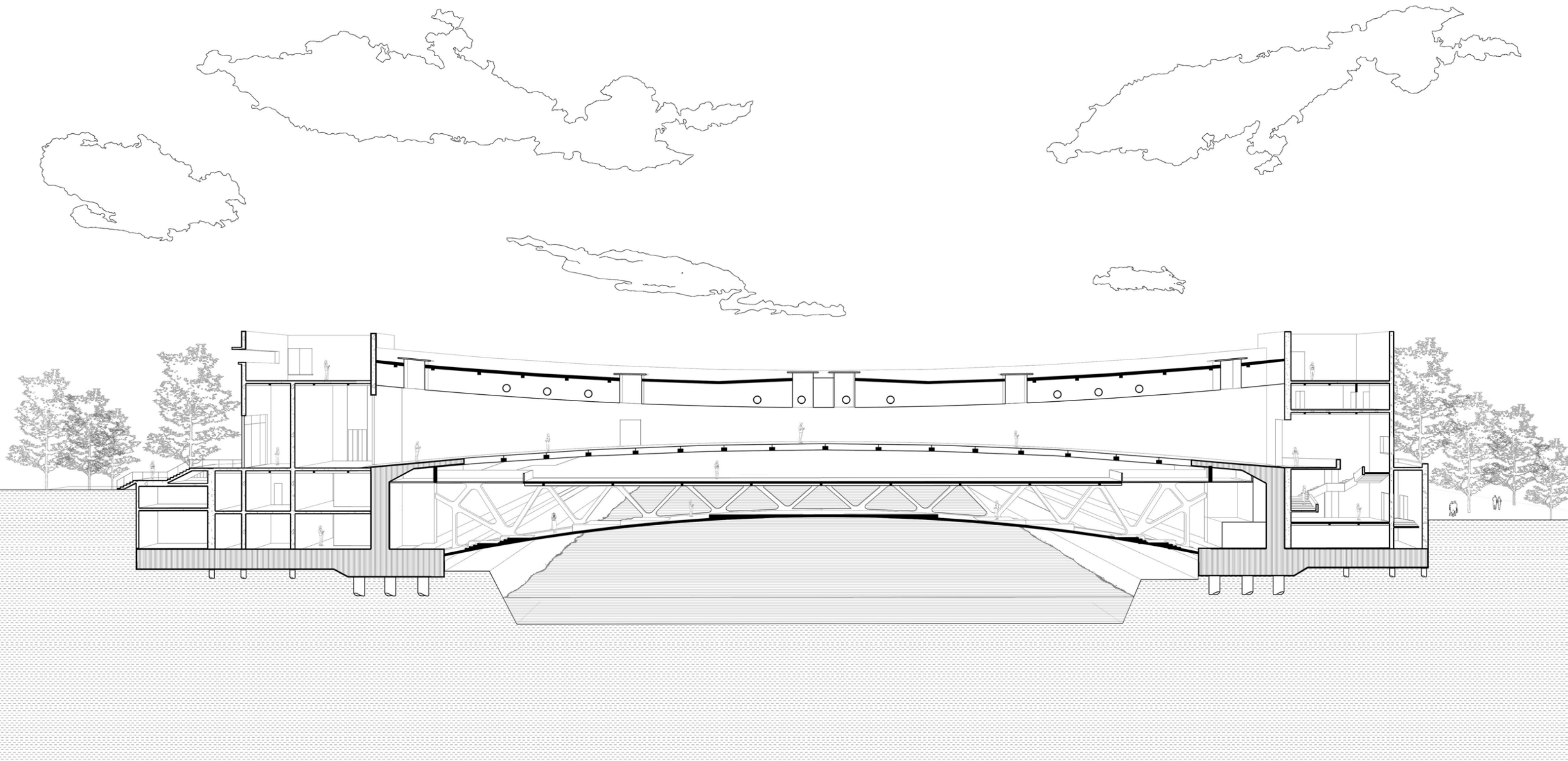
Other Works

Advanced Curtain Wall
 GSAPP Fall 2022
 Critic: Daniel Vos



This is an aluminum and glass unitized curtain wall system with stainless steel frame and shading system. System consists of insulating glass four-side structural silicone glazed onto unitized frames of thermally broken, custom profile extruded aluminum. On the outer face of the curtain wall is a stainless steel frame mounted on vertical mullions. The vertical louvers and horizontal louvers are mounted on the frame through stainless steel pipes. System is anchored to building structure at top of concrete slab.





Section of Jishou Art Museum

The Jishou Art Museum, designed by Yung Ho Chang, is situated on the banks of the river in Jishou City, Hunan Province, and its design is inspired by the surrounding landscape with a bridge-like structure that connects both sides of the city. The lower bridge section provides pedestrians with a covered street, while the upper level is a concrete arch bridge with galleries inside and skylights atop. The exhibition hall, enclosed by a glass curtain wall and tubular tile sunshade system, is located between the two bridges for temporary exhibitions. Service areas, such as the foyer, administrative offices, shops, and tea rooms, are in the bridgehead buildings at both ends, and visitors can access the museum from either side of the river.