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## 01. Monumental Armory Reuse **CROSSROADS**

Fall 2023

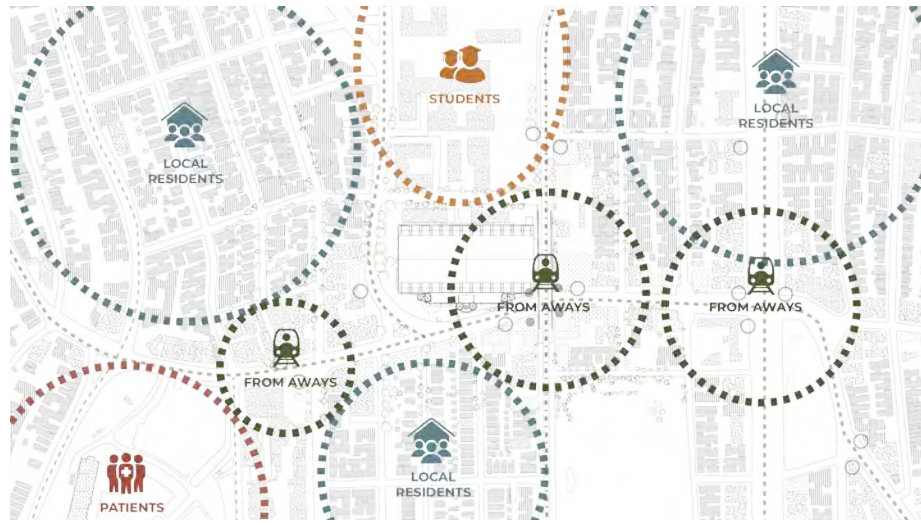
Collaborated with: Lula Chou

Instructor: Laurie Hawkinson

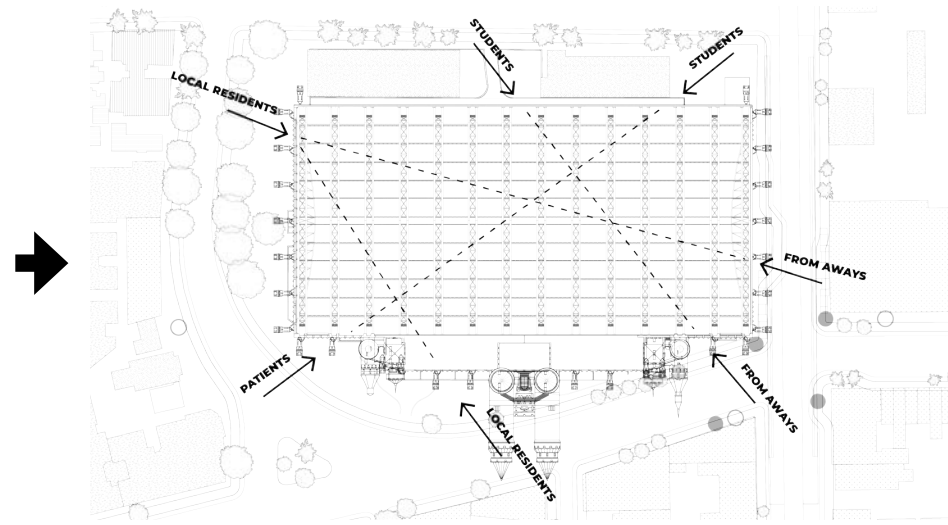
**What if the armory transcends its physical boundaries and becomes an urban condenser, a local culinary center, and a nexus of human connection?**

With a balance of landscape and buildings, density and expanse, passages and destinations, this proposal utilizes the space under the armory roof to **integrate various programs and specialized services for the surrounding neighborhoods.** Different user groups of the neighborhood meander through four interconnected towers under the reused armory, each dedicated to address specific local needs, gaining a diverse range of experiences and social interactions with others. Opening up the exterior facade and sculpting pathways allow people to **use the building as a portal to shortcut passages and continuous journey experiences.**

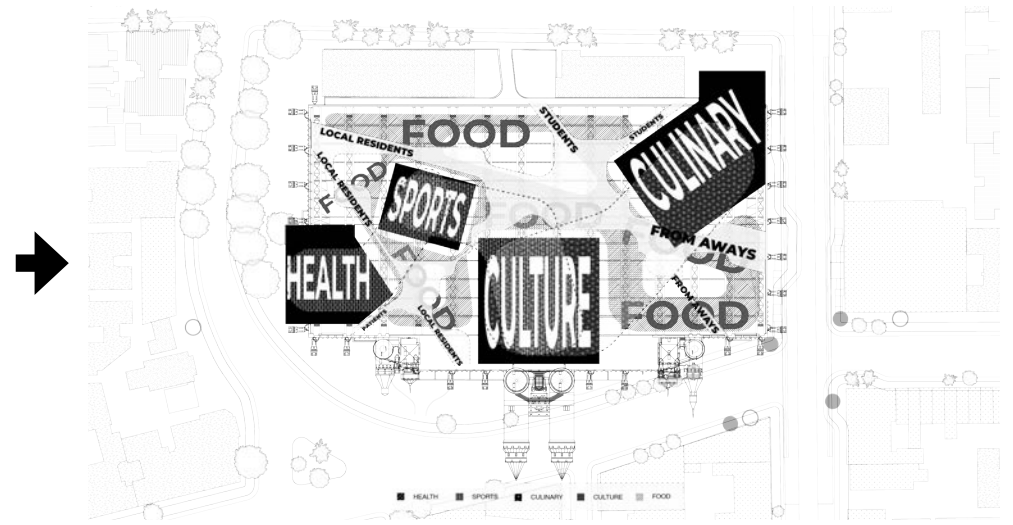
SITE ANALYSIS INFLUENCE ON PLAN



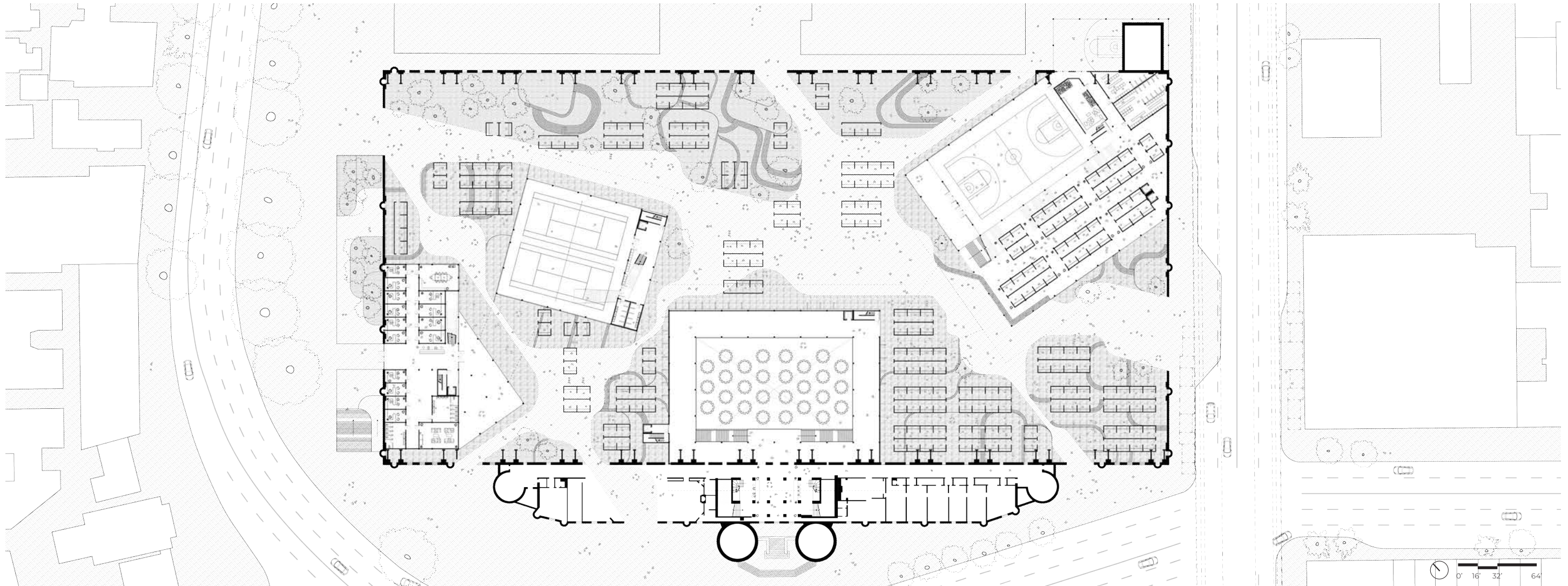
4 User groups: Patients, Students, From Aways, and Local Residents



User Groups Dictate Path Cuts, Create New Entrances, and Protect the Existing Ornamentals



4 Program Groups Contained Within Their Own Stack While the Food Program Sprawls Across the Entire Project

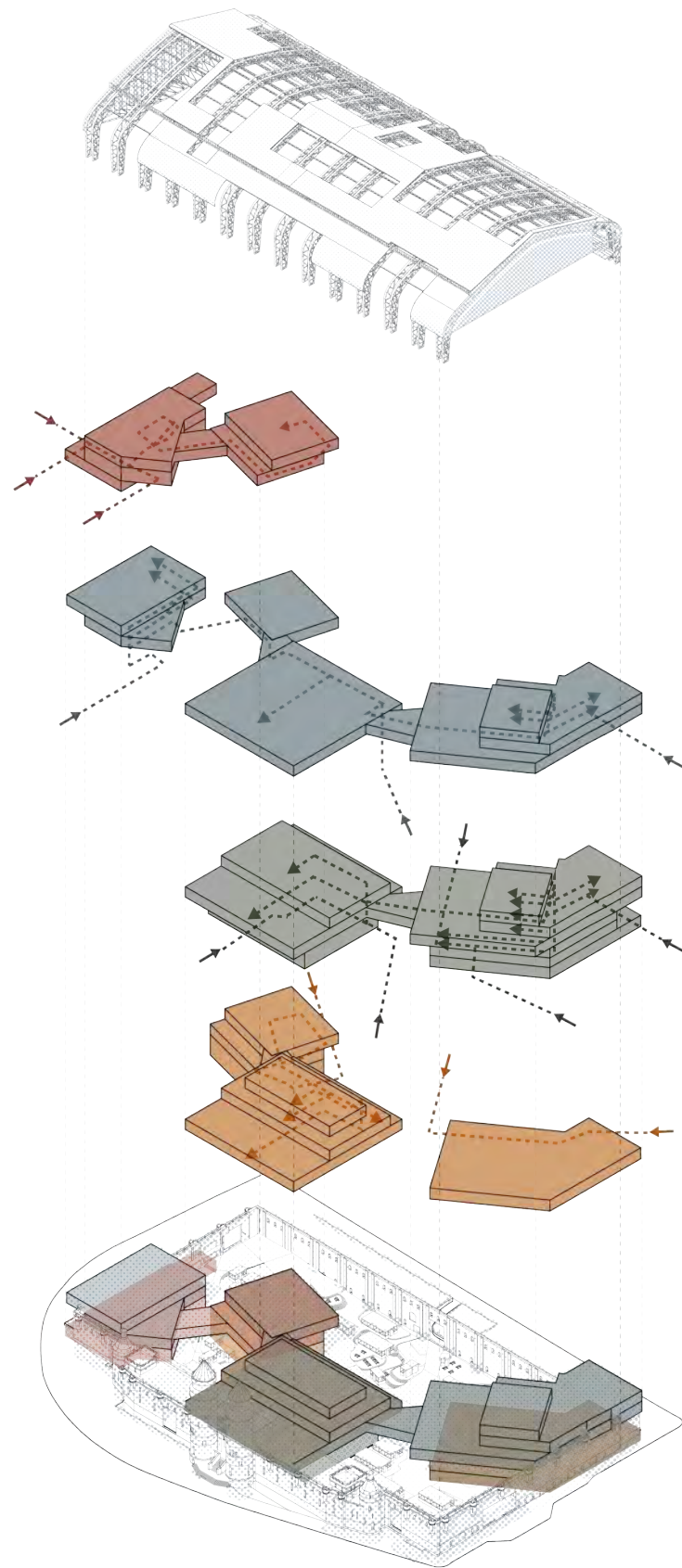


First Floor Plan: Difference in Orientation Between Stack and Field

OVERALL VIEW FROM ON TOP OF ROOFTOP FARM



USER ACTIVITY ZONE AND EXPERIENCE



**PATIENTS**  
ACTIVITY ZONE AND CIRCULATION

**LOCAL RESIDENTS**  
ACTIVITY ZONE AND CIRCULATION

**FROM AWAYS**  
ACTIVITY ZONE AND CIRCULATION

**STUDENTS**  
ACTIVITY ZONE AND CIRCULATION



Courtyard and Bridge between Health and Sports' Stack.



Across Bridge and Social Interactions on Upper Level



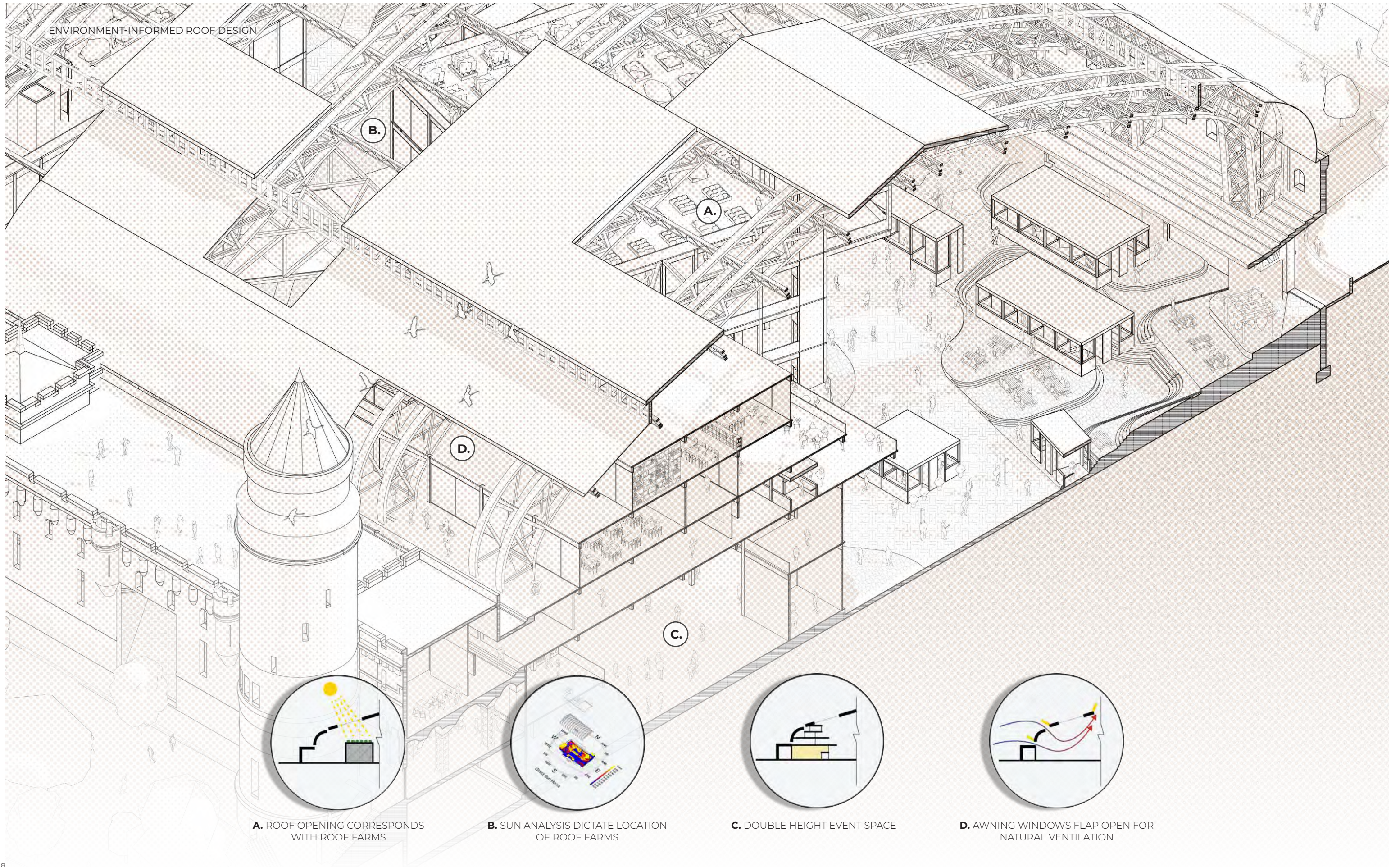
Subway Station Connection



View Inside Library

SECTION THROUGH STACK AND TERRAIN





**A.** ROOF OPENING CORRESPONDS WITH ROOF FARMS

**B.** SUN ANALYSIS DICTATE LOCATION OF ROOF FARMS

**C.** DOUBLE HEIGHT EVENT SPACE

**D.** AWNING WINDOWS FLAP OPEN FOR NATURAL VENTILATION





Subway Entrance Connection Directly into the Cultural Stack



Opening Leading to Internal Path



Sunken Courtyard and Stack Extrusion Out of the Existing Armory Walls.



Bridge Connection to Cultural Stack



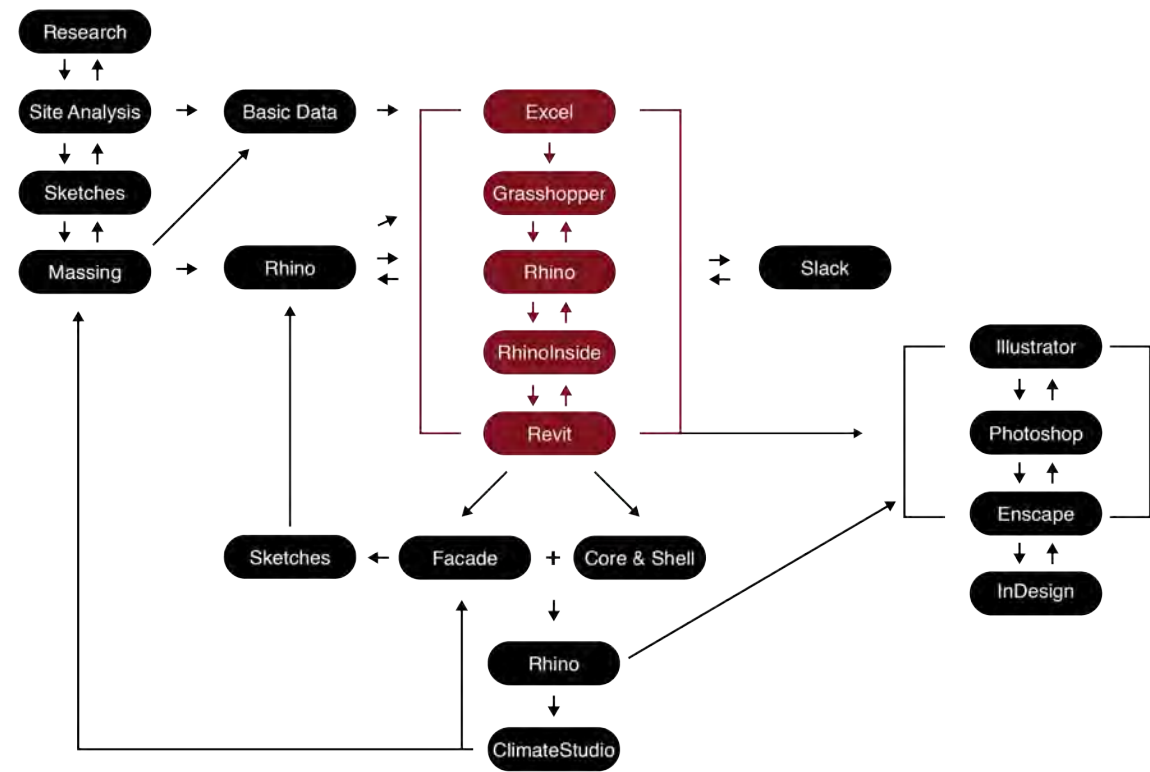
## 02. Environmental-Driven Computational Skyscraper **CURTAIN**

Fall 2023

Collaborated with: JJ Jin, Tai Ning, Chung An Lu  
Instructor: Joe Brennan

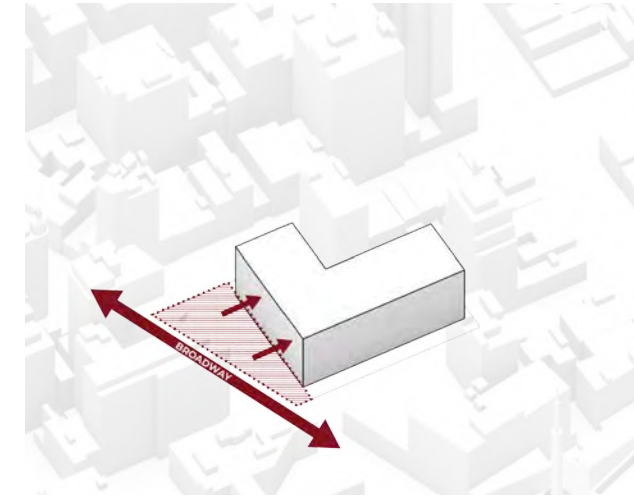
Located on a 29,990-square-foot lot on Broadway, near Madison Square Park and east of Penn Station, the **mixed-use building will capitalize on its prime location and Broadway's future conversion into a pedestrian-only street** by featuring commercial hotels, serviced apartments, and offices. The tower's orientation, size, and form are informed by zoning research, FAR calculation, and environmental analysis to maximize occupancy, square footage, comfort, and energy efficiency. User contentment is additionally elevated by façade introduction, which not only **improves the building's environmental response** further, but also **optimizes quality views** for the users.

WORKFLOW & ANALYSIS

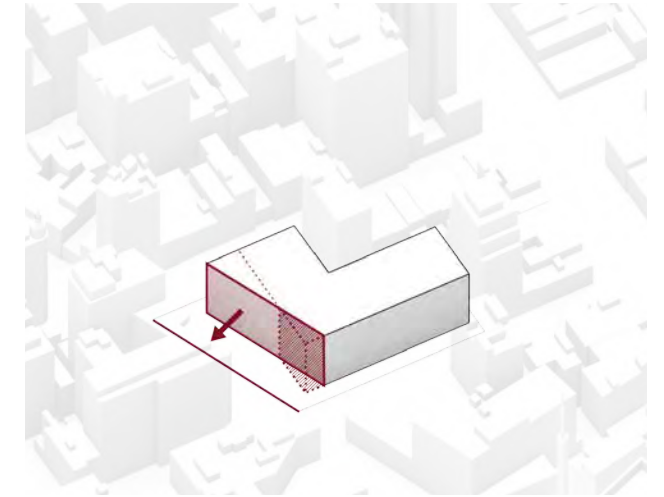


The project is based on a computational workflow between **Excel, Grasshopper, Rhino, RhinoInside, and Revit**. The workflow allows easy alterations through an iterative process that is **informed by continued building simulation and analysis**.

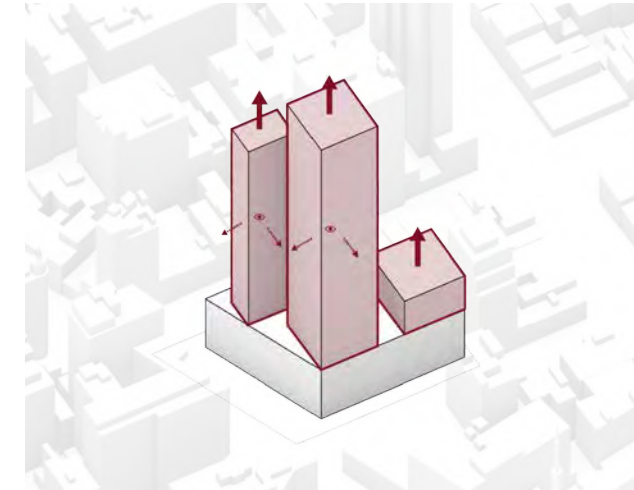
MASSING DECISIONS



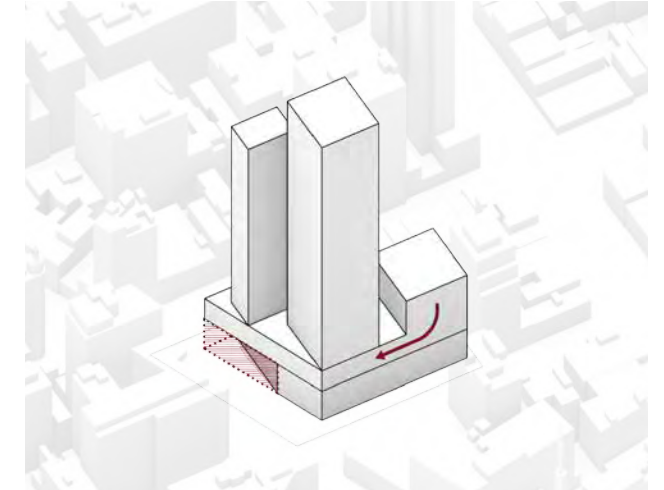
Pushed Back for Open Space



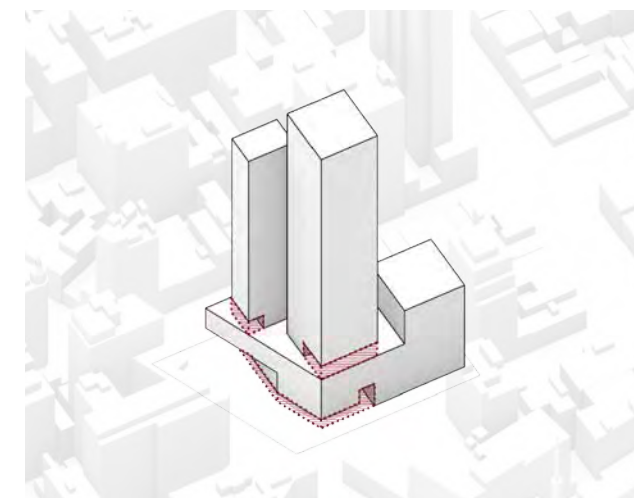
Match Lot Lines



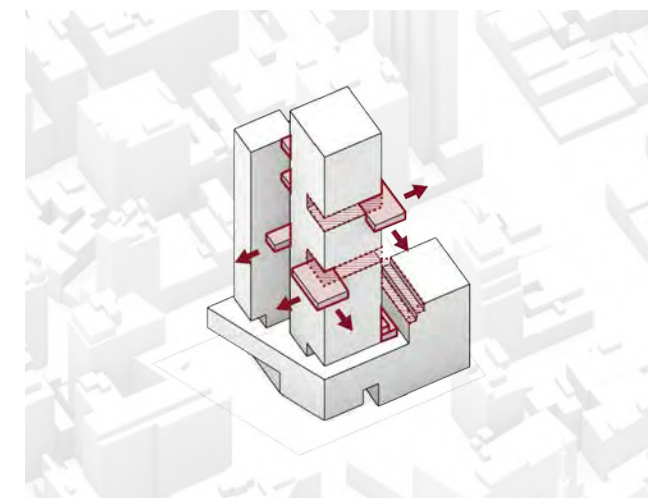
Towers Staggered to Eliminate View Obstruction



Commercial Programs Pushed in to Shade Plaza



Void for Public Traffic Flow, Natural Air Flow, and Lightness to the Tower

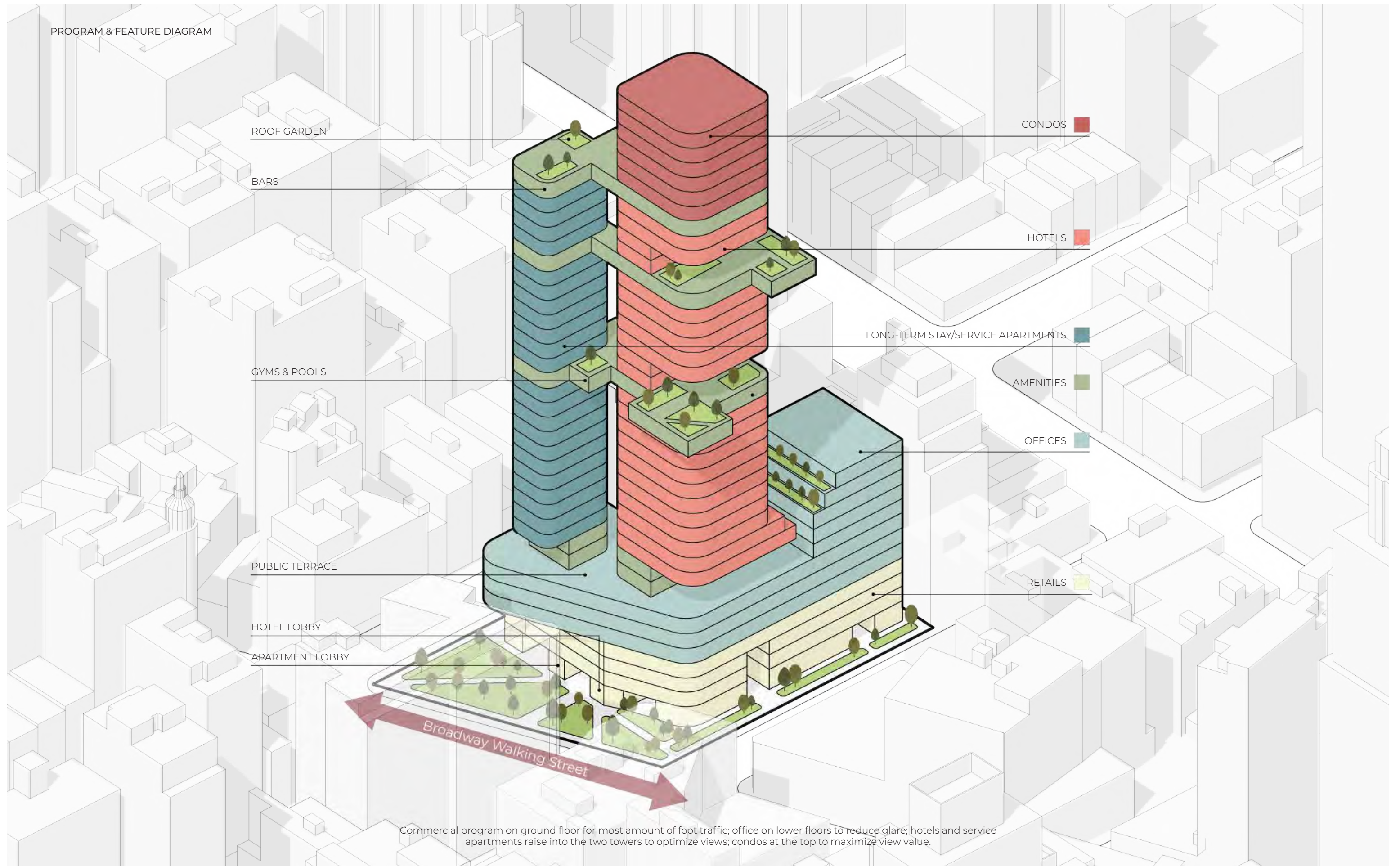


Bridges, Viewing Decks, and Terraces Extend Out to Capitalize on Views

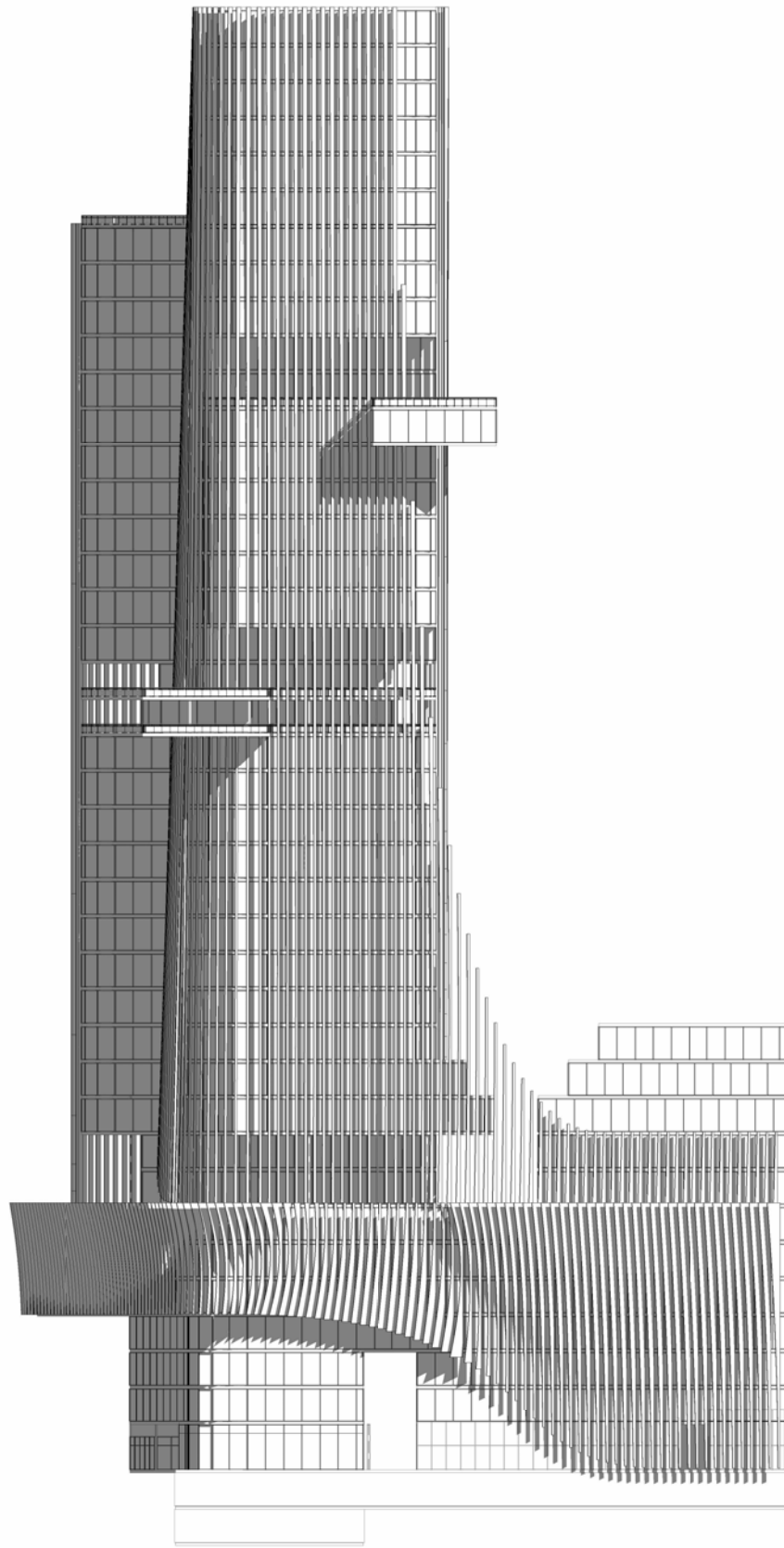


Site is located near landmarks and aligns height to taller surrounding tower.

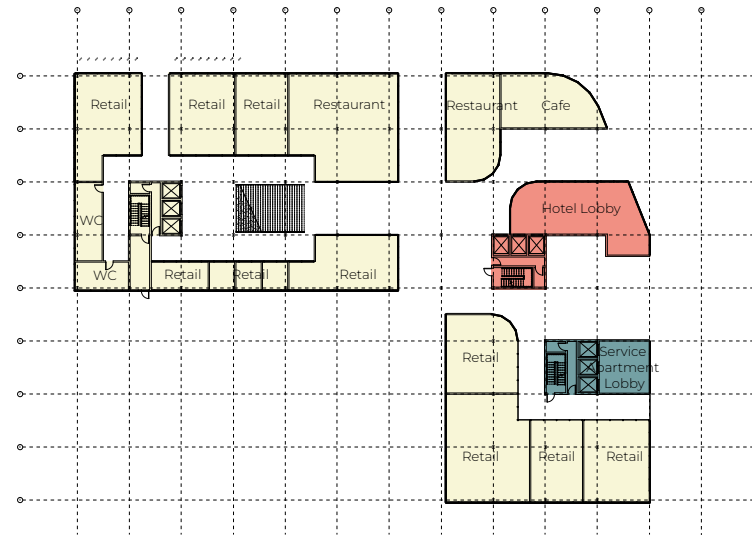
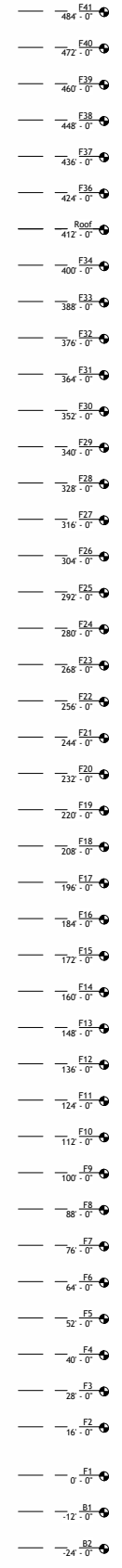
PROGRAM & FEATURE DIAGRAM



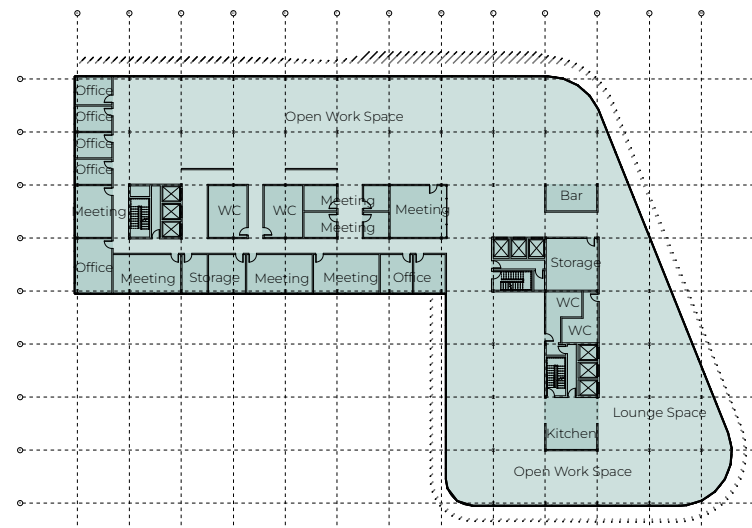
ENVIRONMENT ANALYSIS INFLUENCE PLANS



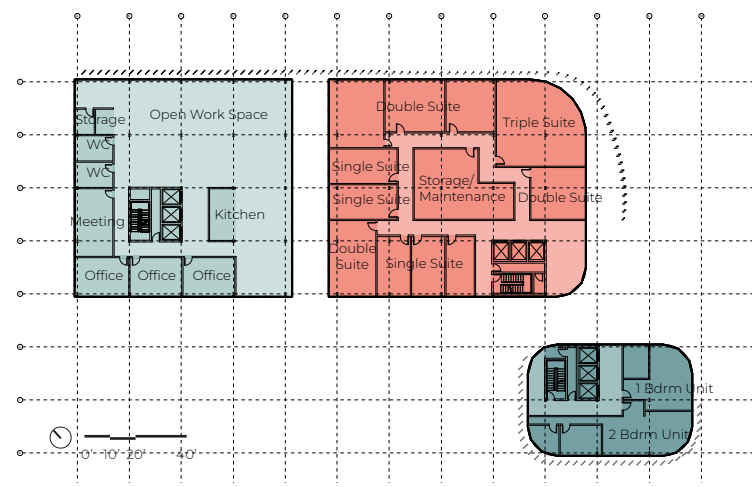
North Elevation: Envelope Response to Environment Analysis



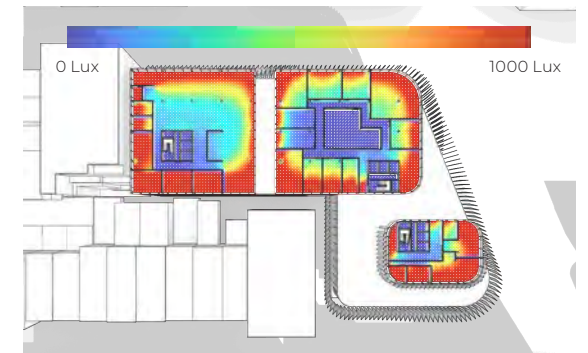
Typical Commercial Floor Plan: Large Storefronts and Easy Circulation



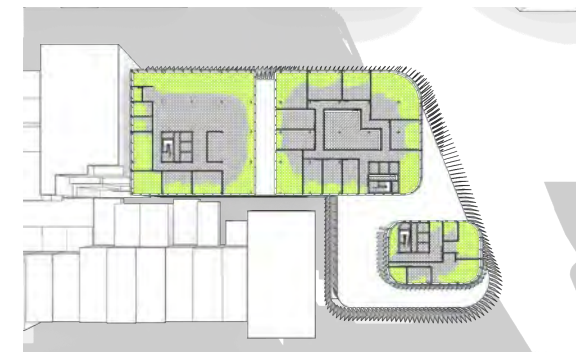
Typical Office Floor Plan: Open Floor Plan



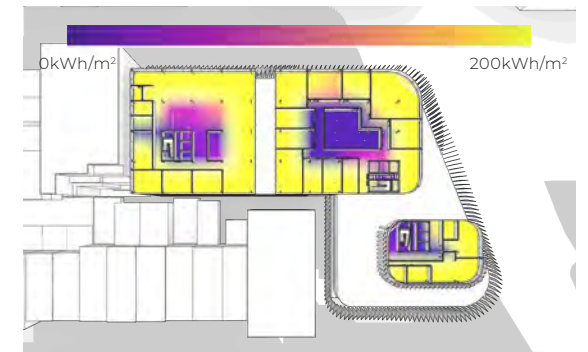
Typical Office + Hotel + Service Apartment Floor Plan: Staggered Towers to Optimize View; Cores of Hotel and Apartment are Located at Only Place Where the Two Towers Overlap



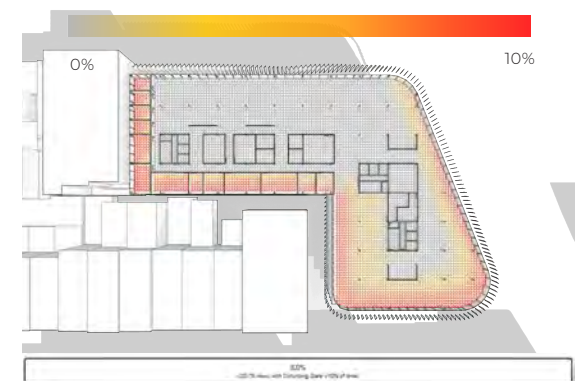
Luminance: 1500 Lux mean value, well-lit for any environment



Daylight: Hotel rooms and offices have >50% daylight

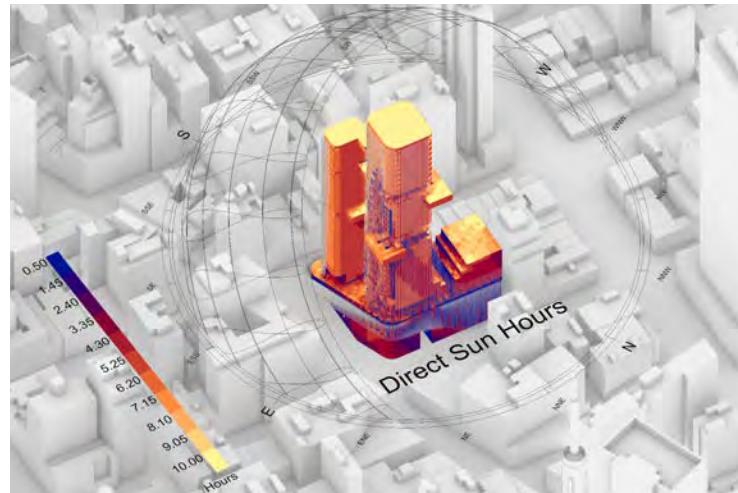


Sun Radiation: Beneficial passive heating averaging 89kWh/m² to reduce artificial heating

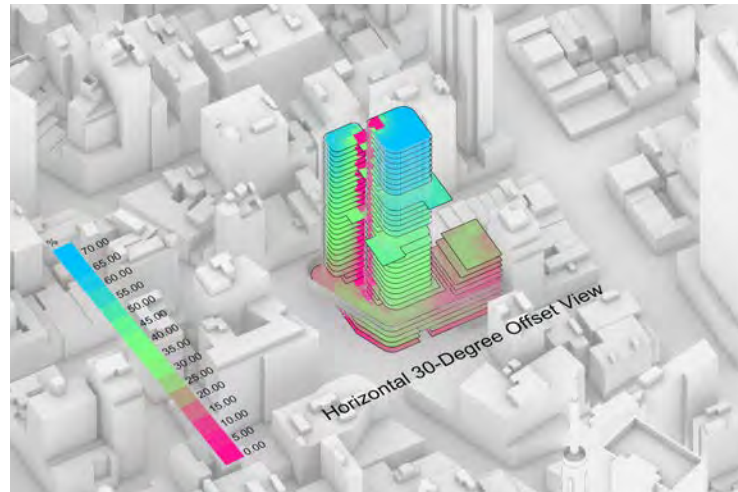


Glare: Open office placed in areas of less glare, while conference rooms are located in areas of more glare

ANALYSIS INFLUENCE FAÇADE STRATEGY



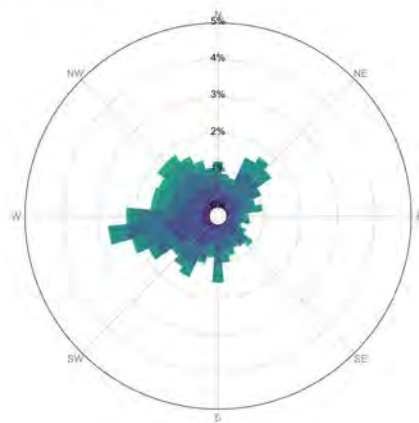
**Direct Sun Hour:** Direct sun hours and heat gain dictate the depth of louvers to reduce overheating and excess energy usage



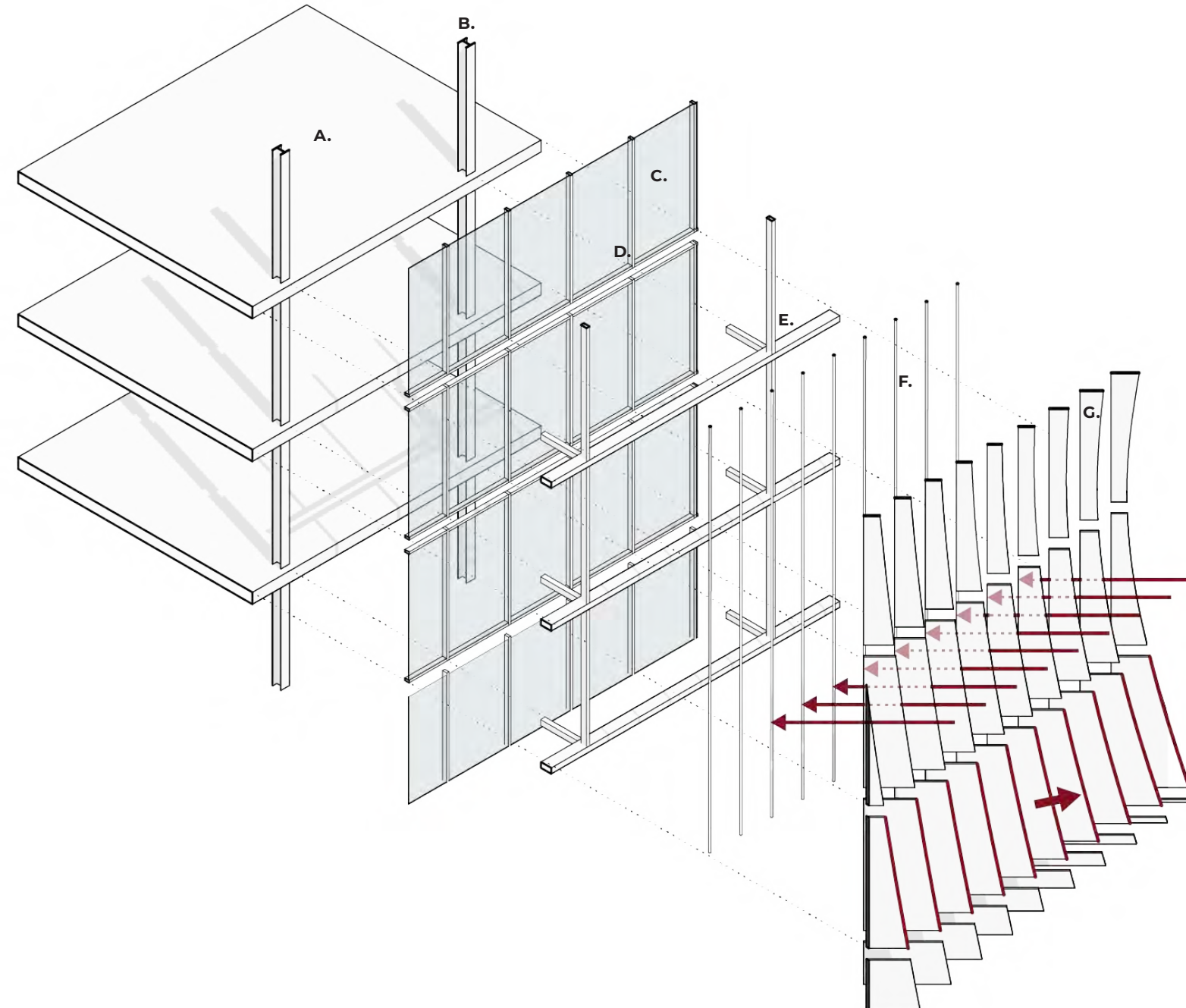
**View:** 30 degree view analysis dictate openings in facade to optimize users' views of landmarks and avoid blockage

Entire Year | Whole Day | > Calm 0 mph | 10 - 95°F | 0% - 100% humidity  
Total 8760 hrs | Medium Speed 0 mph  
New York-Downtown, Manhattan, Heli

- Calm(0 mph)
- Light Air(0.7 mph)
- Light Breeze(3.6 mph)
- Gentle Breeze(7.6 mph)
- Moderate Breeze(12.3 mph)
- Fresh Breeze(16 mph)
- Strong Breeze(24.2 mph)
- Near Gale(31.1 mph)
- Gale(38.5 mph)



**Wind Rose:** Wind rose dictate direction of louver fins to maximize ventilation



- A.** 12" CORRUGATED CAST-IN-PLACE CONCRETE SLAB
- B.** W16 X 12 H-BEAM
- C.** SOLARBAN 60 SOLAR CONTROL LOW-E GLASS
- D.** 2" X 4" CASTED ALUMINUM MULLION
- E.** STEEL LOUVER SUPPORT FRAME
- F.** CAST ALUMINUM MEMBERS
- G.** 2" AF LOUVER PANEL

WIND ROSE ANALYSIS DICTATE LOUVER DIRECTION TO ENHANCE VENTILATION

SUNLIGHT ANALYSIS DICTATE ALUMINUM LOUVER DEPTH TO REDUCE SUNLIGHT AND HEAT GAIN



### 03. Speculative Artificial Island Ecosystem **SWARMING ISLAND** Summer 2023 Instructor: Michael Loverich & Antonio Torres

The artificial island acts as a **self-circulating ecosystem and farm that hosts swarms of different organisms** that perform, produce, gather, and inhabit the island, manipulating and changing the formal qualities of the island. Two sets of circular ecosystem relationships appear on the island: air and water. The swarms of organisms in the air, including bees and butterflies in the air pollinate and inhabit the cliffs of the island, while the swarms of squids and jellyfish in the water activate the underbelly of the island. Through these swarms of organisms, the rigid and fragmented form of the island transforms from barren land to starting to host flowers and corals that support the swarming above-water and underwater ecosystems. The **sympiotic relationship and ecosystems slowly intensify** the population of each species, ultimately creating a **chaotic atmosphere on the island**. Such swarming also **softens the rigidity of the island**. The collision between the different material hardness of the inner and outer islands further emphasizes the formal transformation of the island from natural forces.

BEEES SWARMING



SQUID SWARMING



BAT SWARMING



KRILL SWARMING



PHYTOPLANKTON SWARMING





ISLAND TRANSFORMATION

BARREN LANDSCAPE



FLOWER BLOOMING  
BEE SETTLEMENTS BEGAN  
CORAL ECOSYSTEM FORMULATION BEGAN



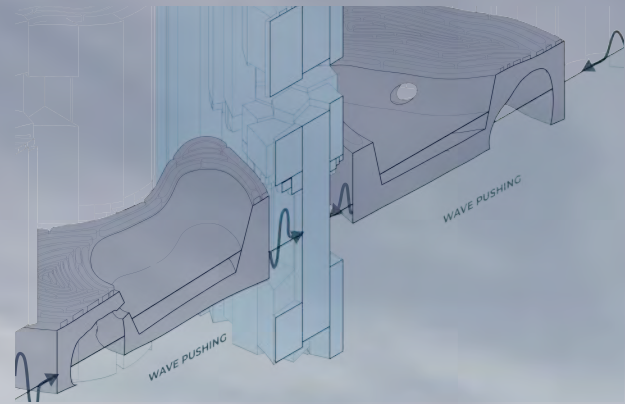
MORE FLOWER BLOOMING  
BEE SETTLEMENTS ON CLIFF FACE  
CORAL ECOSYSTEM BLOOM  
CLIFF DEBRIS FALLS FROM COLLISION



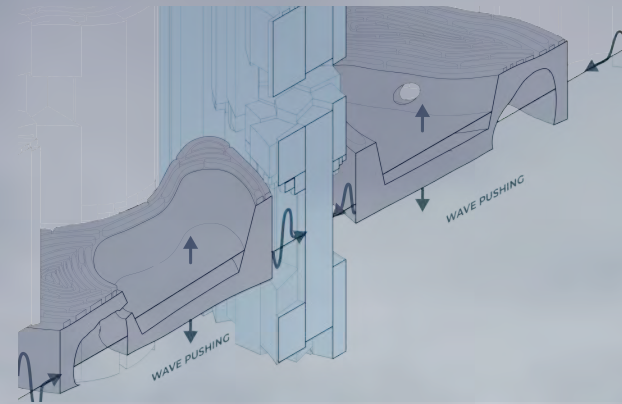
FLOWER BLOOMING MATURES  
BEE SETTLEMENTS SOFTEN CLIFF READING  
CORAL ECOSYSTEM MATURES  
MORE CLIFF DEBRIS FALLS FROM COLLISION



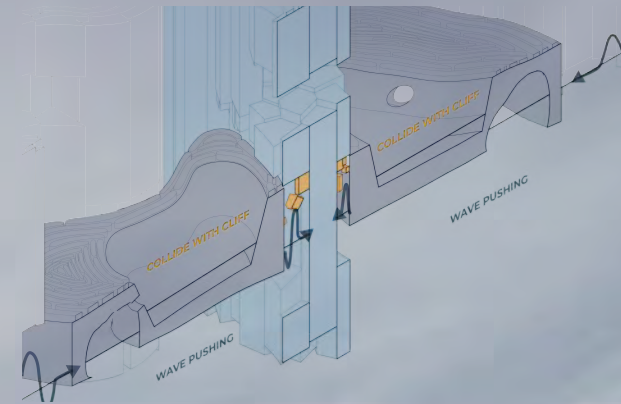
ISLAND FORMAL ALTERATION BY NATURAL FORCES



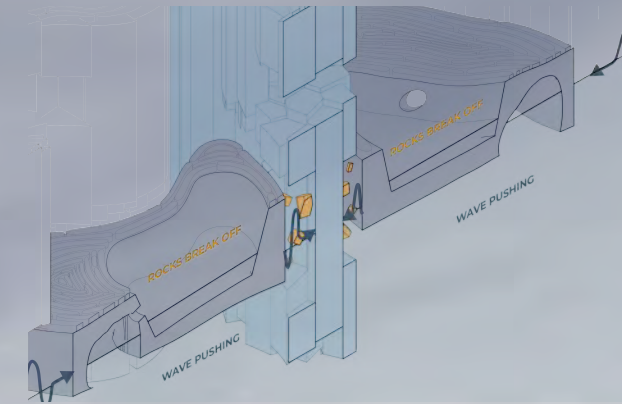
Waves push and pull interior island



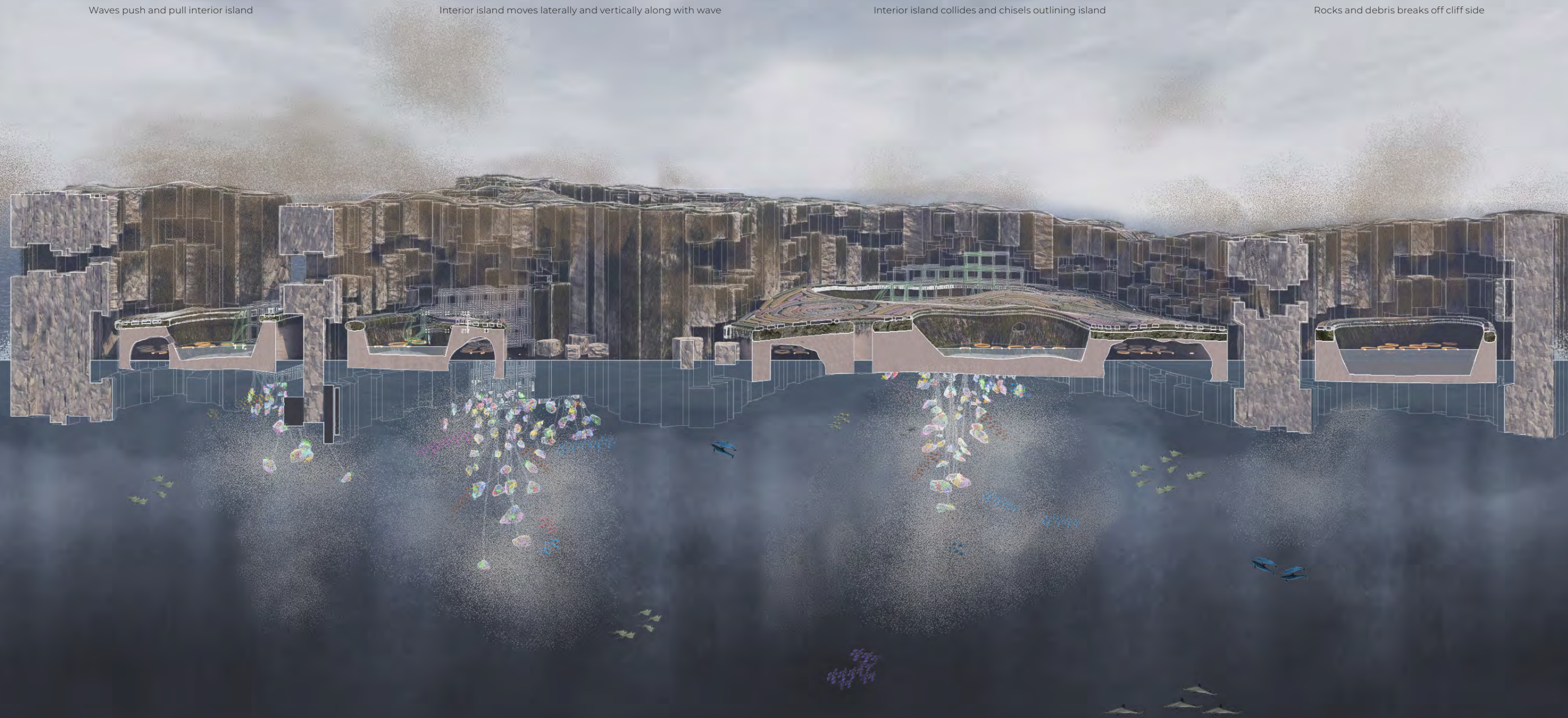
Interior island moves laterally and vertically along with wave



Interior island collides and chisels outlining island



Rocks and debris breaks off cliff side



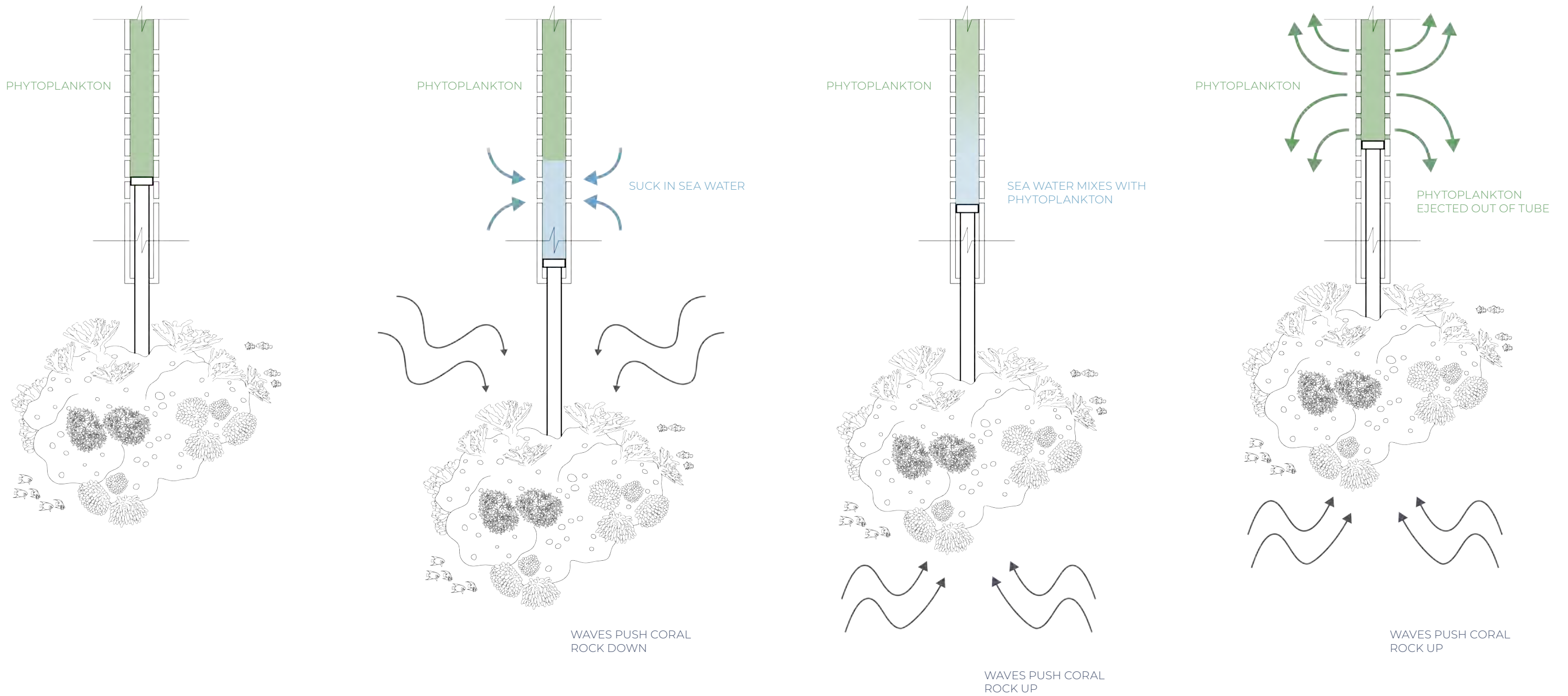


**Aerial Plan:** Above water ecosystem, softening the edge of the rigid island surface.



**Underbelly Plan:** Below water ecosystem, crowding around the phytoplankton farms and fueling the underwater ecosystem.

PHYTOPLANKTON FARM MECHANICS



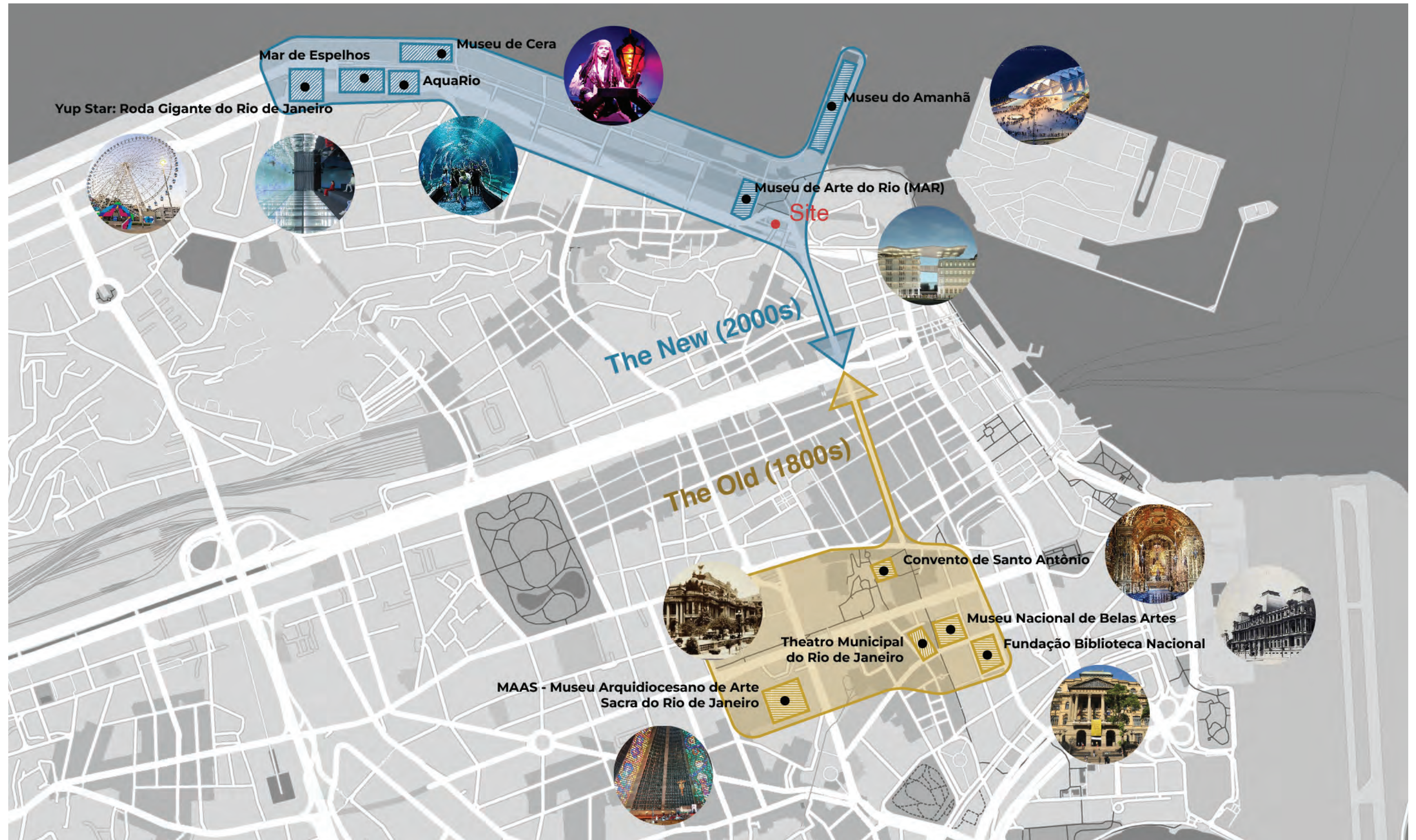
The phytoplankton farm hangs off the internal island, sandwiched between the internal and outline islands, free-floating in the water with coral rocks inhabited by coral micro ecosystems attached at the bottom. The contraption **mimics the idea of a Wave Energy Hydraulic Pump**. Using the force of the waves, the coral rocks **act as the pump head, pulling down as the wave pushes the rock, sucking in water** into the plastic tubes through small perforations. As the **wave pushes up, the phytoplankton are ejected from the tube to feed the coral ecosystems** and krill beneath the water surface.

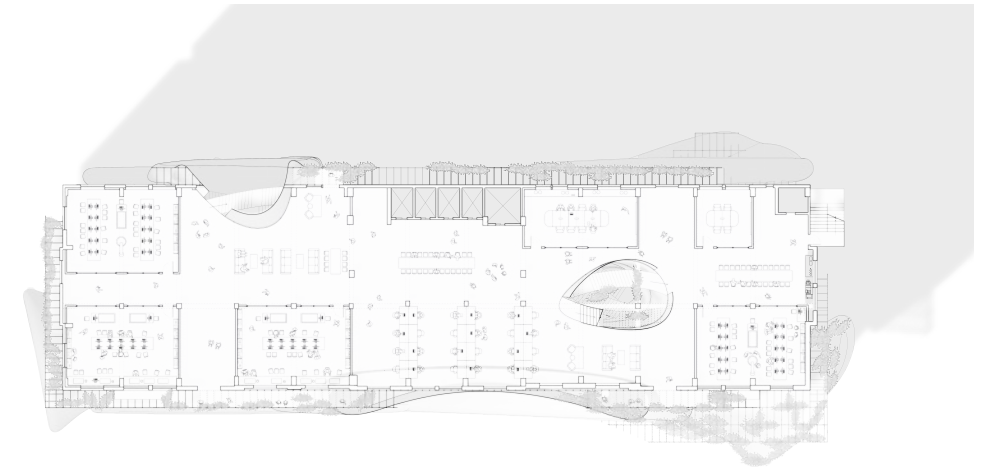
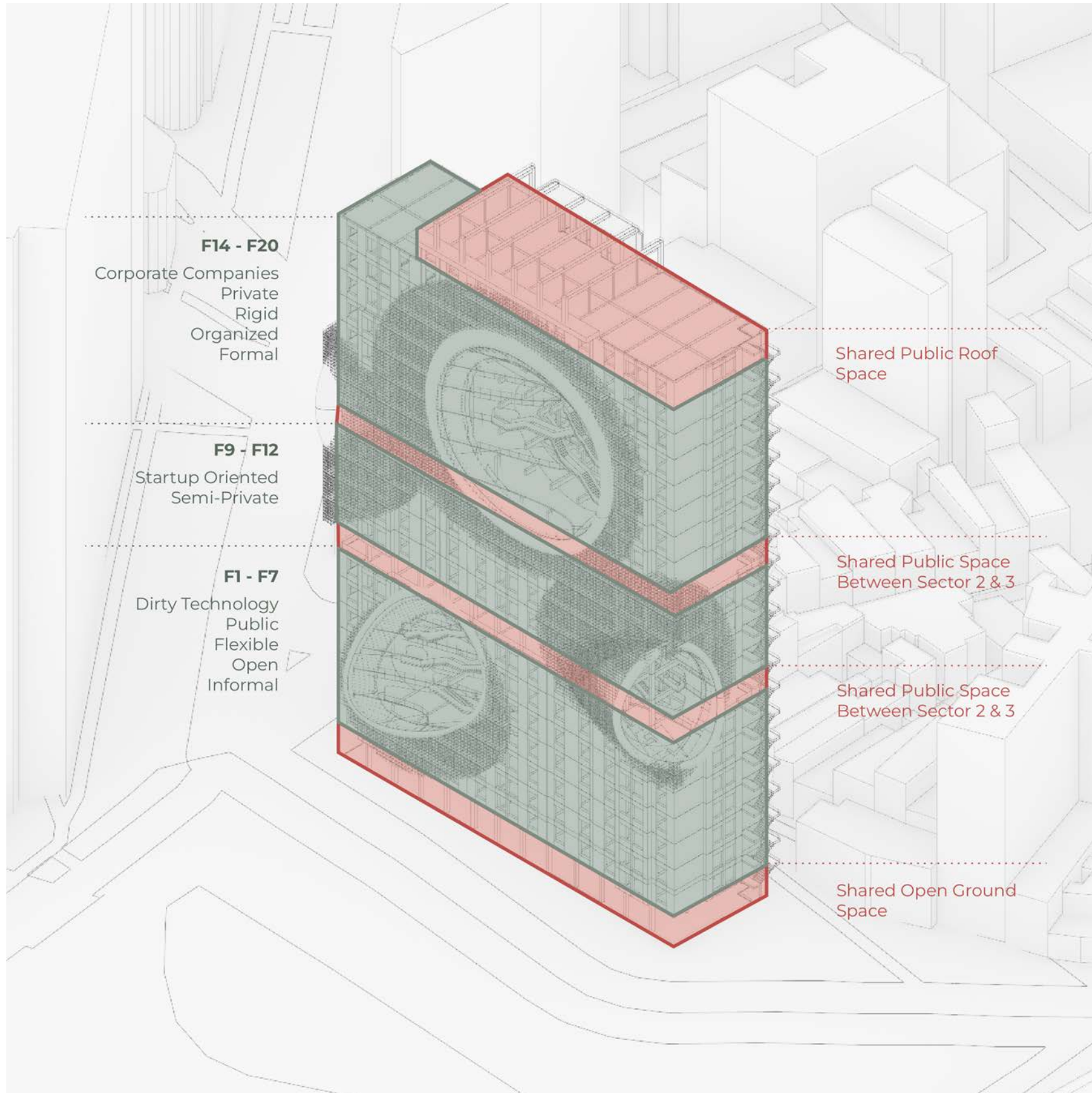


# 04. **WORMHOLE**

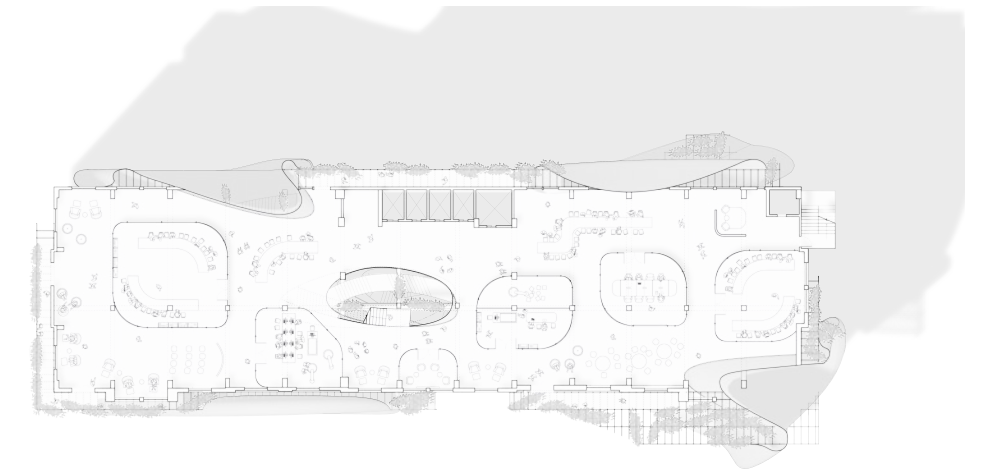
Spring 2024  
Instructor: Galia Solomonoff

Wormhole is a **high-rise reuse** project that creates a symbol and a **beacon for the future economic driver of Rio de Janeiro: Technology**. The technology hub is separated into three sectors that host different users, **from the more public, free, and exploratory technology to the more rigid, controlled, and organized technology**. The three sectors are connected with an **experiential circulatory wormhole** that brings social interaction and circulation through the building and attracts natural ventilation to cool the building in the humid climate of Brazil. The technology hub educates and gathers people of different interests in technology as an **urban biophilic core** for the future economic driver of Rio de Janeiro.





**F14 - F30:** Structured and rigid organization plan, focusing on corporate research and experiment.



**F9 - F12:** More controlled and organized plan, but still have flexible freedom for entrepreneurial population.



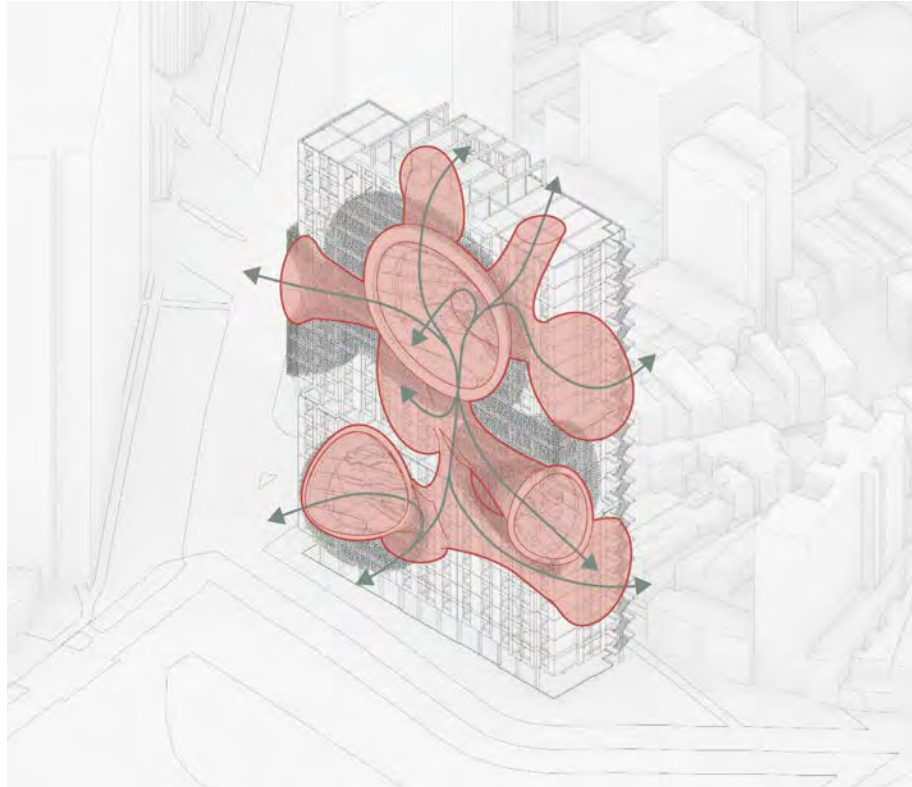
**F1 - F7:** Free and flexible first sector for public exploration and education.



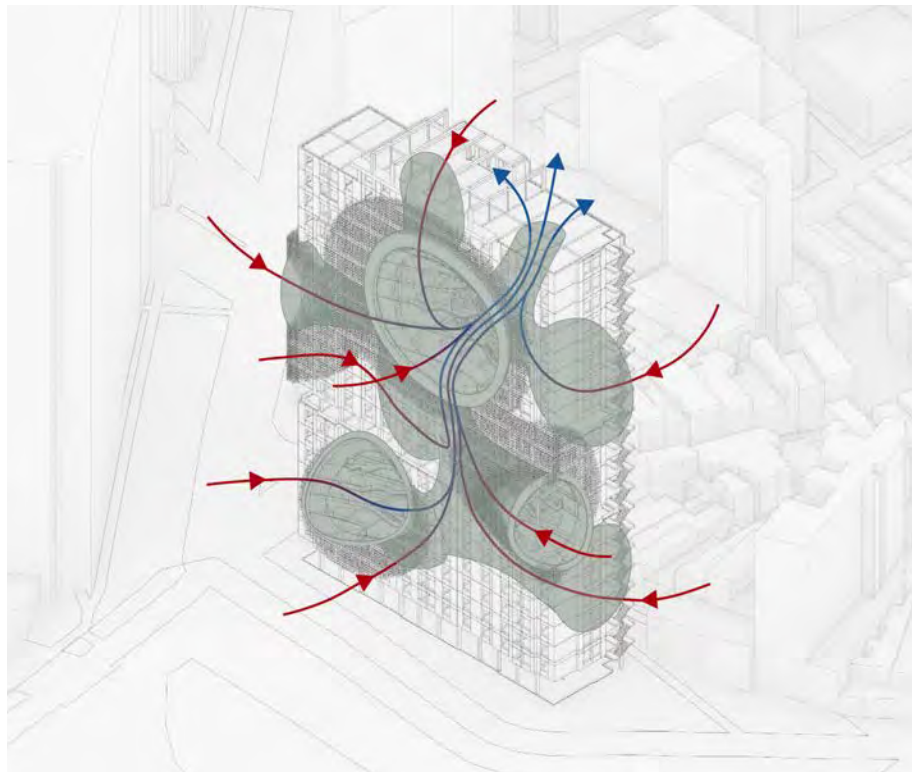
SHARED PUBLIC SPACE BETWEEN SECTORS



EXPERIENTIAL CIRCULATION



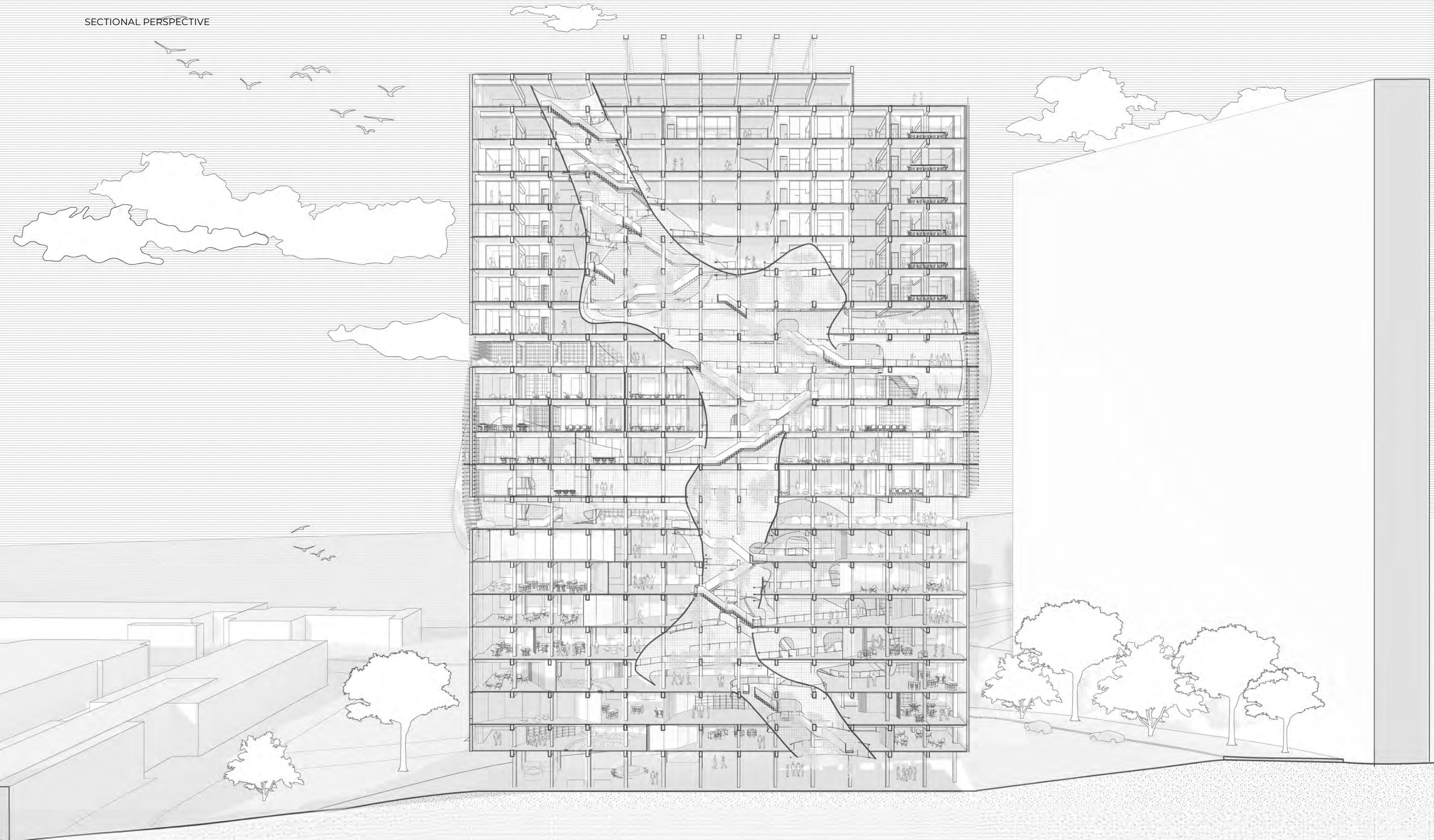
Experiential Circulation



Natural Ventilation through the experiential circulation



SECTIONAL PERSPECTIVE



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