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boundaries

**MICHAEL LAU**

COLUMBIA GSAPP

boundaries is a *diary* of my work at GSAPP; all of which are bounded by an intrinsic curiosity and exploration of *boundaries*.

**Multiscalar Postnatural Marine Landscapes** proposes the formation of marine landscapes that *serve as a protective boundary*, protecting endangered blue whales from the ecological injustices caused by offshore wind energy, while simultaneously enhancing the ocean's natural carbon absorption capacity.

**The Ground:Up** housing project seeks to reclaim and reactivate the ground level, *breaking down socio-economic boundaries* by empowering local businesses and promoting equal distribution of wealth and resources among community members.

**Democratizing Consensus Mapping** *challenges conventional mapping boundaries* by prioritizing the perspectives and knowledge of under-represented entities like Caribou migrations and Inuit populations in Nunavut, promoting an inclusive and equitable representation in map-making and consensus building.

**Mind-Flow**, a meditative healing center, *blurs boundaries between humans and nature* by creating a sensory experience that encourages individuals to connect with their environment and tune into their senses; an alternative to traditional methods of addiction recovery by emphasizing humans' connection to the natural world.

**School of Senses** deploys curtains that *delaminate the functional boundaries of traditional building enclosures*, creating a sensory and interactive learning environment that evolves with the needs of students and challenges the traditional conventions of a static classroom.

**Recasting the Collective** *breaks down physical and nonphysical boundaries* of the Amsterdam Houses community facing gentrification. Resident-run studios and pockets of common spaces introduce social services and the local circulation of capital; while interconnected terraces extend domestic space and foster a sense of collectivity.

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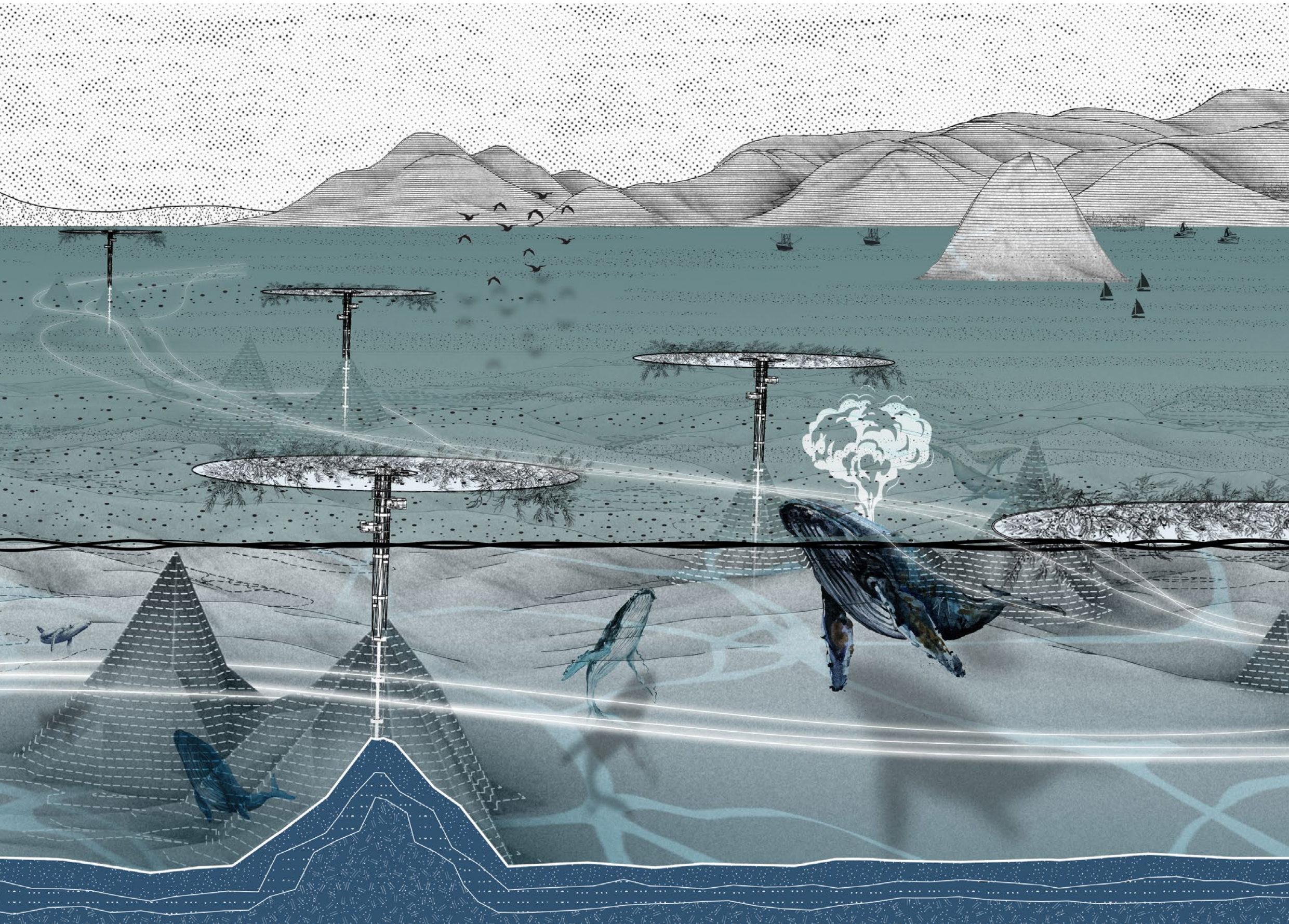
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## MULTISCALAR POSTNATURAL MARINE LANDSCAPES

FROM WHALES TO SARGASSUM:  
ENHANCING THE OCEAN'S NATURAL  
CARBON ABSORPTION CAPACITY

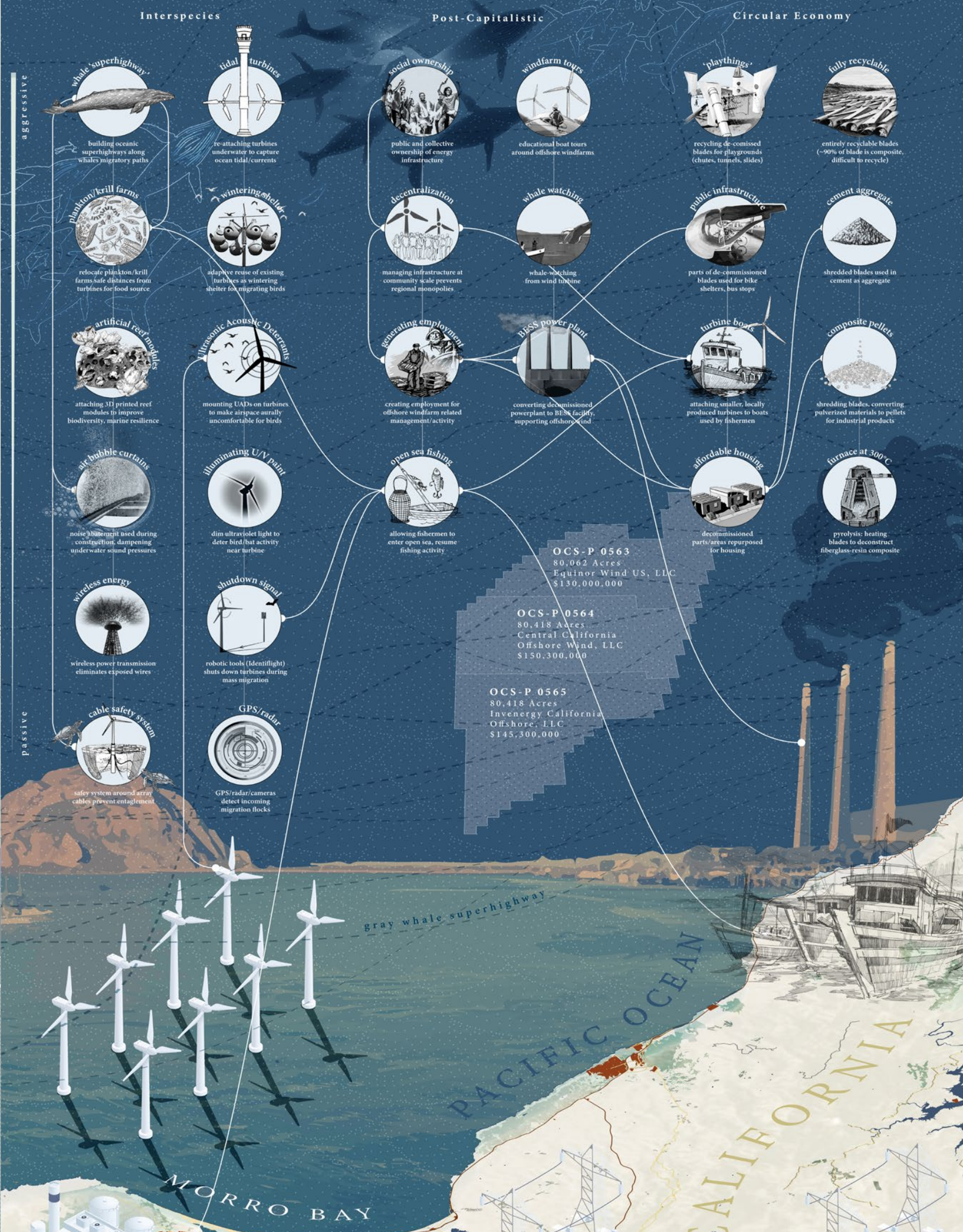
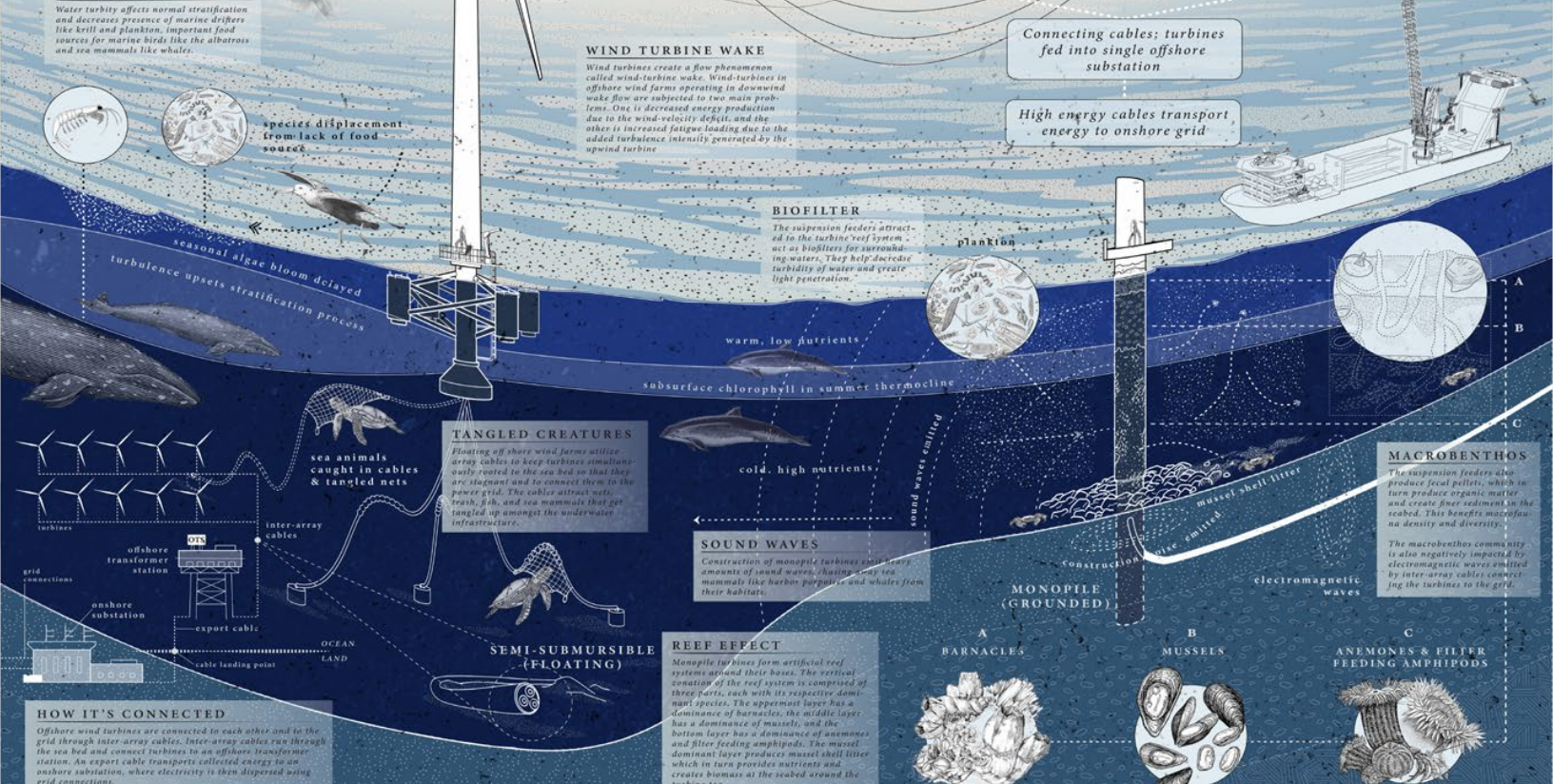
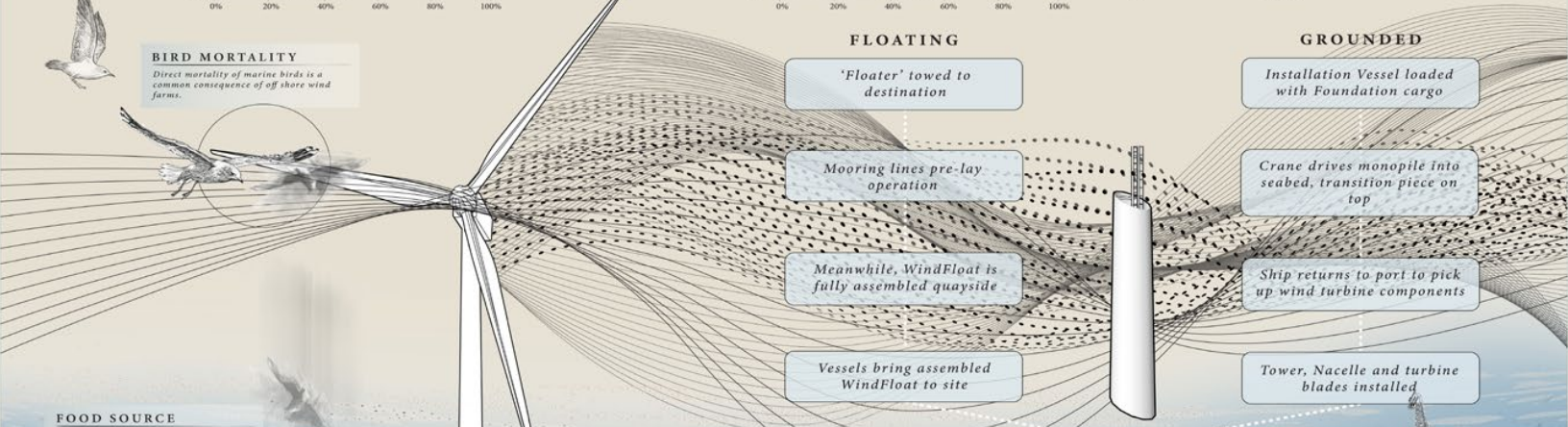
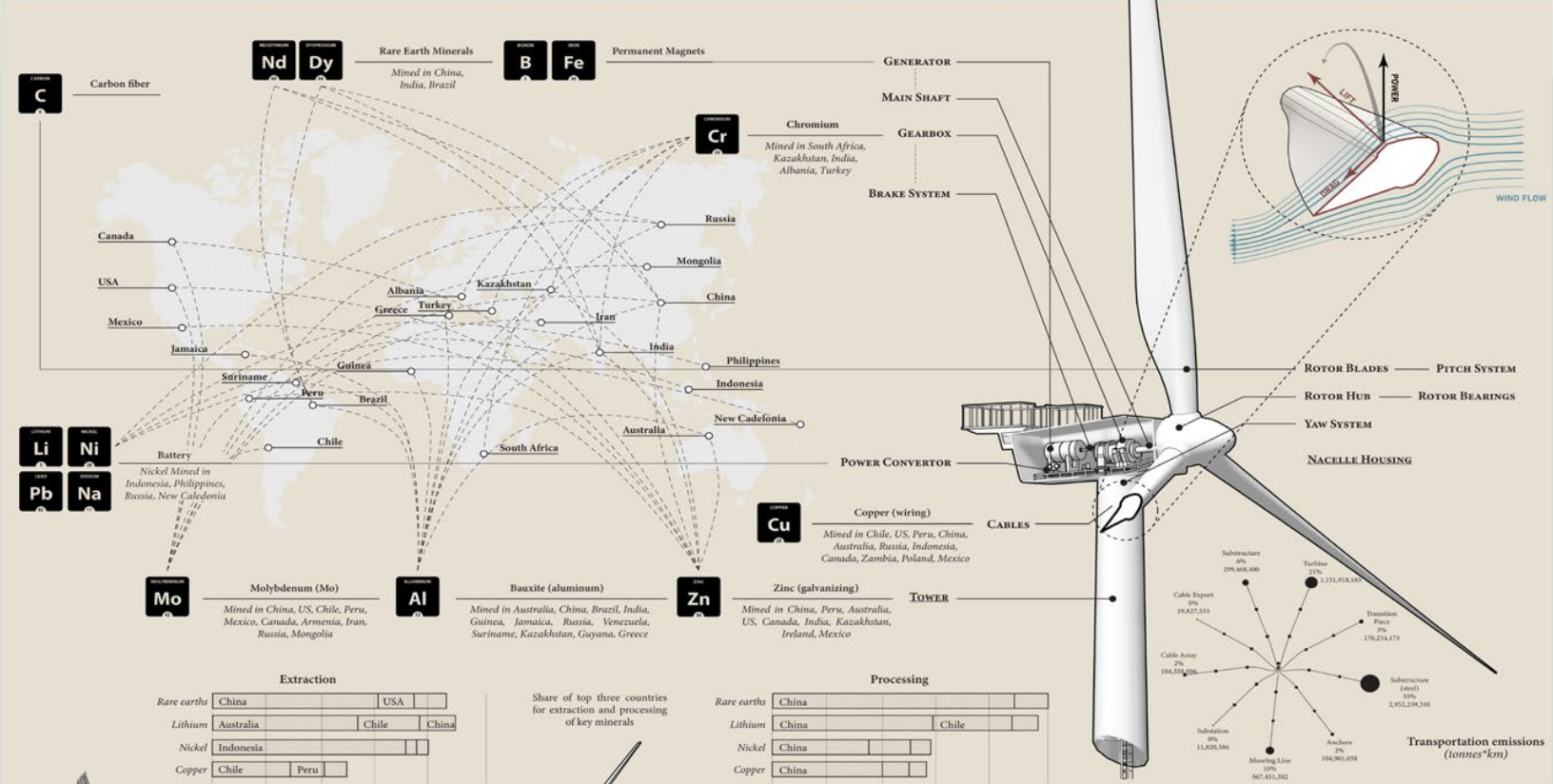
The project challenges and pushes back on the oceanic ecological injustices of renewable offshore wind energy. The intervention focuses primarily on Morro Bay in the North Pacific Ocean, where 240 thousand acres of planned offshore wind farms would endanger migrating blue whales, which are critical to the ocean's natural carbon capture capacity.

A proposed post-natural marine landscape of seamounts stacked over time with compressed sargassum protects endangered whales, gently altering whale migratory routes over time, while promoting oceanic biodiversity and enhancing the ocean's natural carbon capture capacity. The spectacle of the (infinitely) scalable, continuous marine landscape juxtaposes the immense scale of the wind farm - reclaiming agency of the ocean's natural environment and its ecosystems.

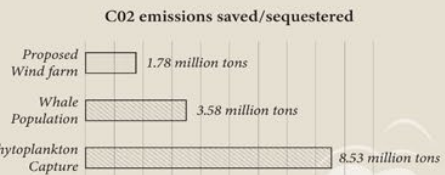
Year of completion:  
Project type:

Spring 2023  
Partner w. Julie Kim  
Prof. LUZÁRRAGA, Mireia  
and Prof. MUIÑO, Alejandro

Instructors:



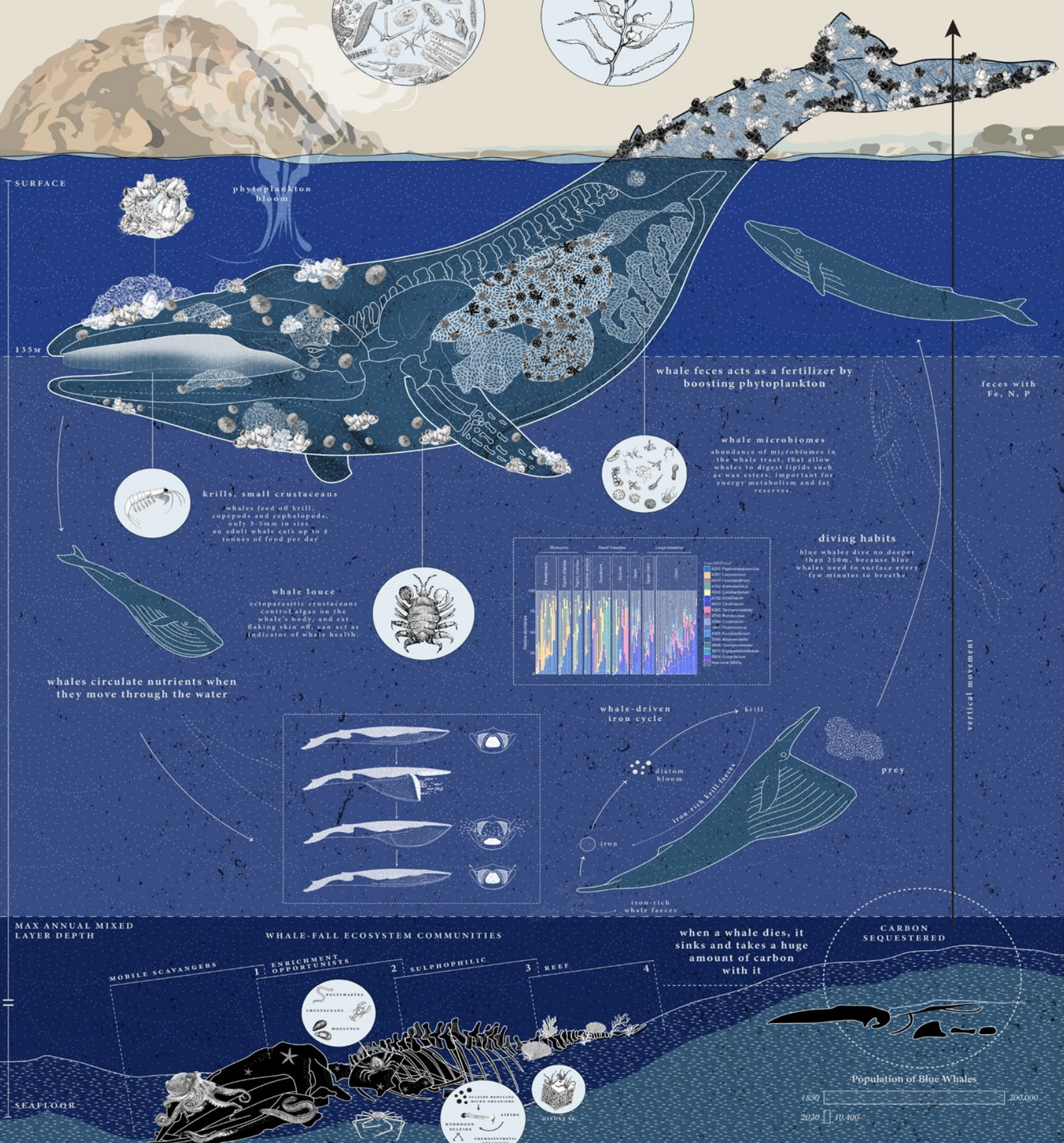
**BLUE WHALES: CARBON VESSELS**  
ECOLOGICAL PROCESSES OF THE BLUE WHALE



Phytoplankton absorb 40% of global carbon emissions and produce over half of the world's oxygen

Sargassum grows twice its size in two weeks & has a high carbon to nutrient ratio, making it a very efficient carbon consumer

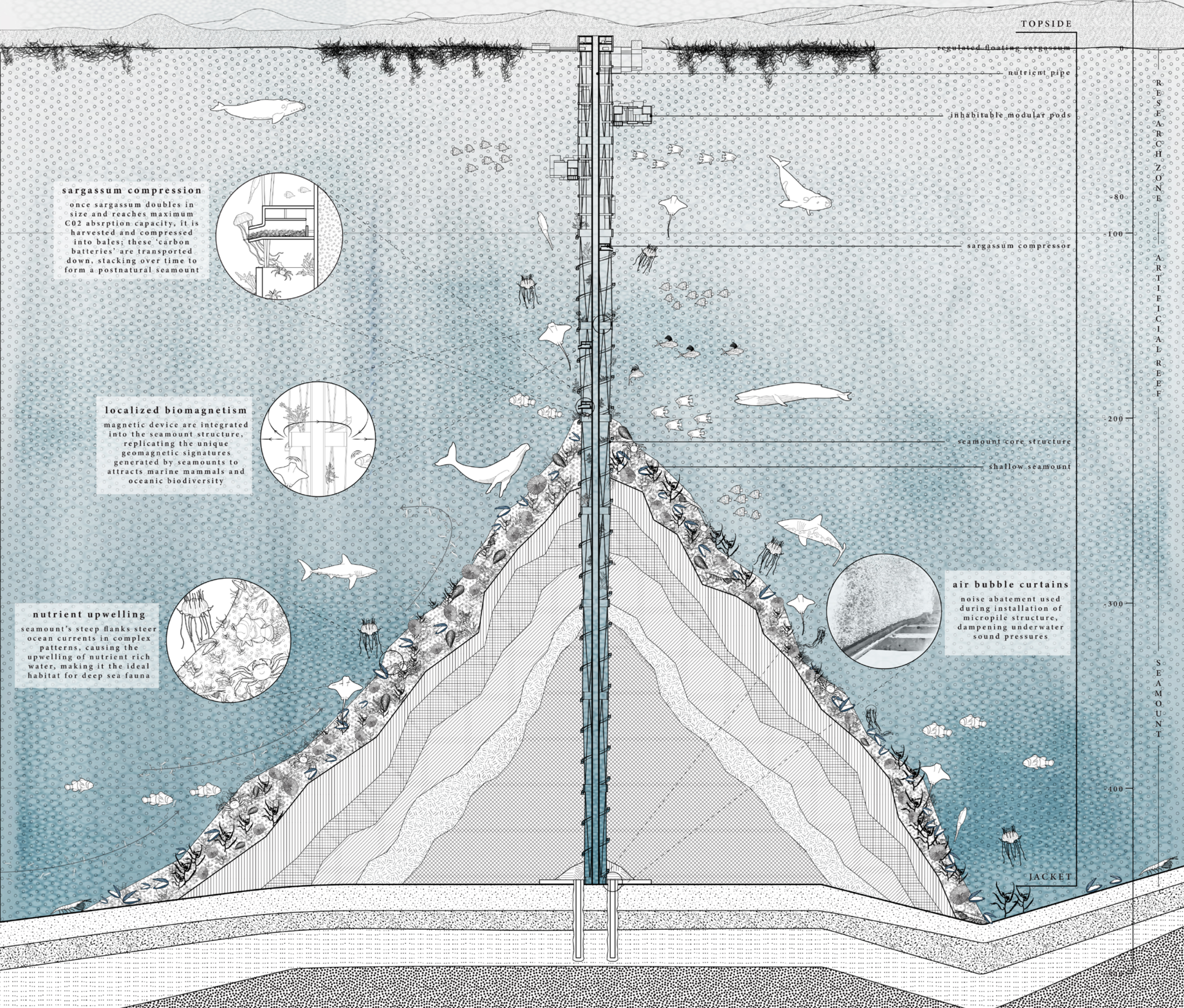
33 tons of C02 per blue whale  
= 37.5 trees over 80 years



speculative plan for future blue whale migratory 'superhighways'

When whales die, they sink to the bottom of the ocean, each great whale sequestering 33 tons of C02 on average; equivalent to 3000 trees (48 pounds C02 a year). Their decomposing bodies create whale-fall ecosystem communities; different stages of carcass decomposition support a succession of marine biological communities.

Moreover, whales are hugely important to the productivity and growth of phytoplankton. Phytoplankton is the ocean's biggest carbon capture device - these microscopic creatures capture 37 billion metric tons of C02, around 40% of all C02 produced, while contributing to at least 50% of all oxygen in our atmosphere.



**sargassum compression**  
 once sargassum doubles in size and reaches maximum CO2 absorption capacity, it is harvested and compressed into bales; these 'carbon batteries' are transported down, stacking over time to form a postnatural seamount

**Localized biomagnetism**  
 magnetic device are integrated into the seamount structure, replicating the unique geomagnetic signatures generated by seamounts to attract marine mammals and oceanic biodiversity

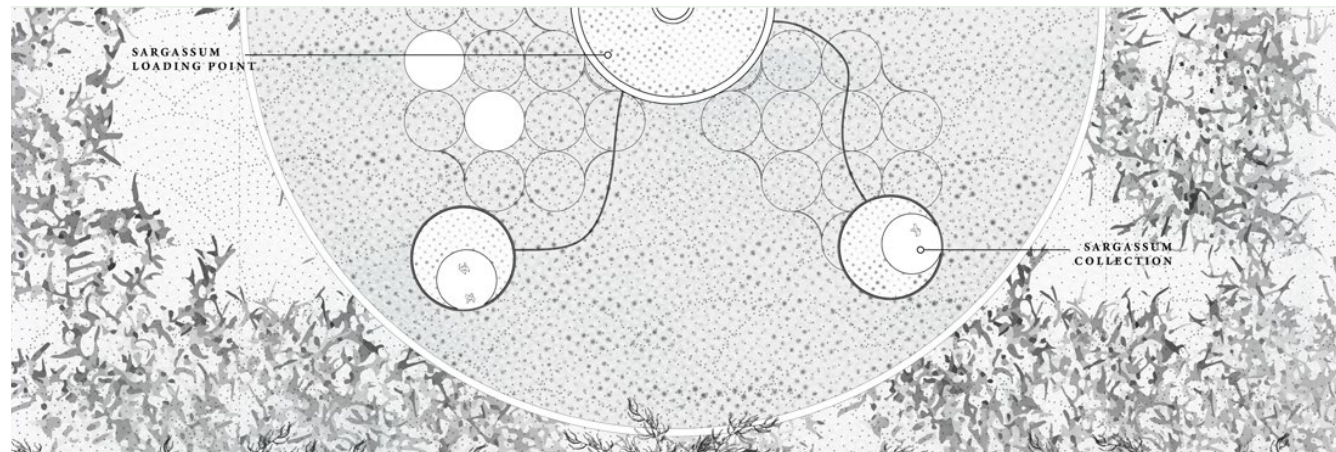
**nutrient upwelling**  
 seamount's steep flanks steer ocean currents in complex patterns, causing the upwelling of nutrient rich water, making it the ideal habitat for deep sea fauna

**air bubble curtains**  
 noise abatement used during installation of micropile structure, dampening underwater sound pressures

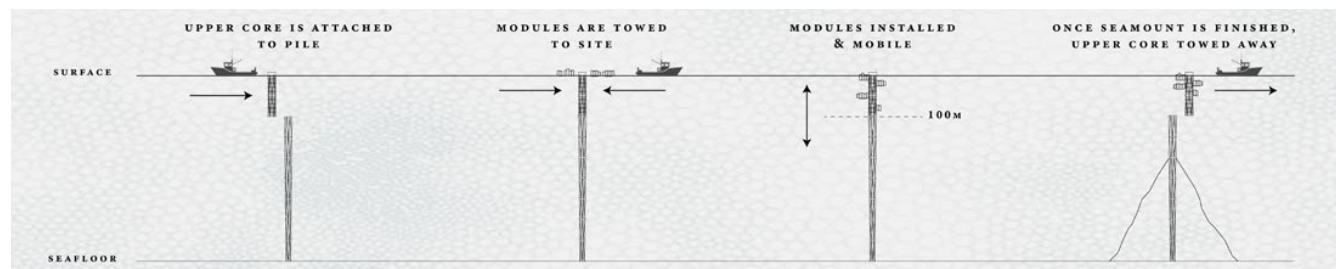
Seamounts, undersea mountains formed by volcanic activity, are a crucial part of the whales migratory navigation; due to the rich biodiversity it hosts, and their unique geomagnetic signatures. They serve as resting and feeding stops for whales, and even a 'singing stage' for humpback whales to gather an audience.

A vast postnatural landscape of seamounts will be formed by the stacking of compressed sargassum. Sargassum is extremely efficient at absorbing carbon, doubling in size while doing so; they can sequester 10 times more carbon than phytoplankton with the same nutrients provided. Regulated ranching of free floating sargassum is completely safe and productive; the sargassum absorbs CO2 before being harvested, compressed and delivered down to the seabed, a form of organic carbon capture in itself.

The seamounts also stimulate phytoplankton and seaweed growth, creating a full cycle ecosystem of carbon sequestration. Its steep flanks steer ocean currents in complex patterns, causing the upwelling of nutrient rich water, making it the ideal habitat for deep sea fauna.

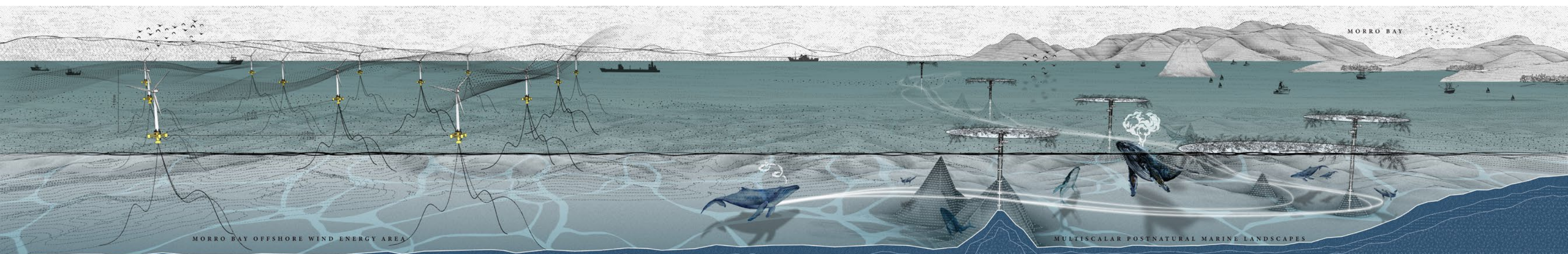
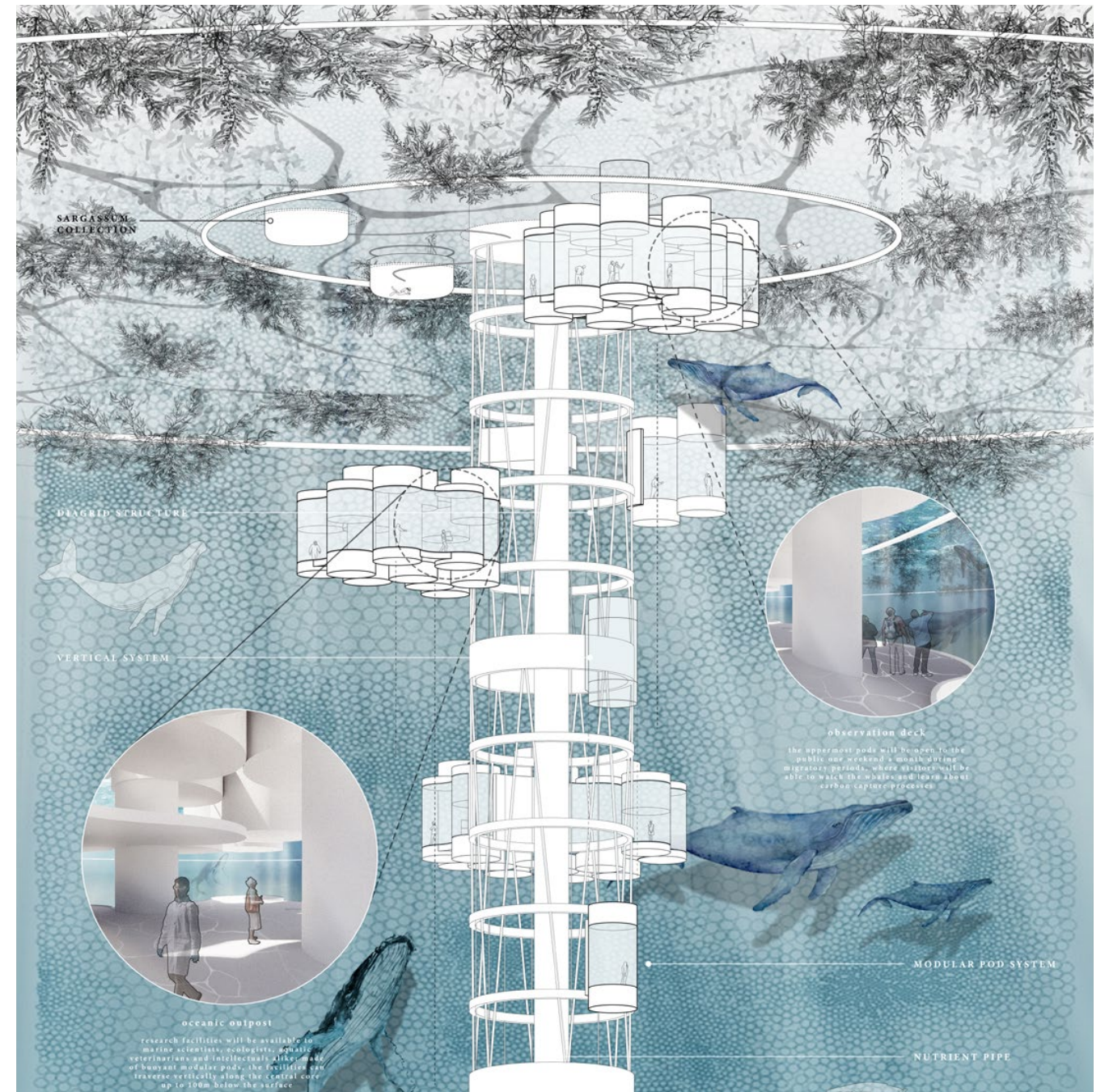


regulated ranching of free floating sargassum



seamount upper core (un)installation life cycle

Nutrient pipes control the free-floating sargassum, while drawing nutrient rich water from the deep ocean. The intervention will initially be towed to site, from there on all processes are localized. A non-intrusive, lightweight core structure is extended to seabed, temporarily anchoring the station for the delivery and distribution of compressed sargassum. Air bubble curtains are deployed during the installation of micropiles structure, dampening the underwater sound pressures.





## GROUND:UP

### DEMOCRATICIZING THE GROUND PLANE AND RESTORING SENSE OF BELONGING

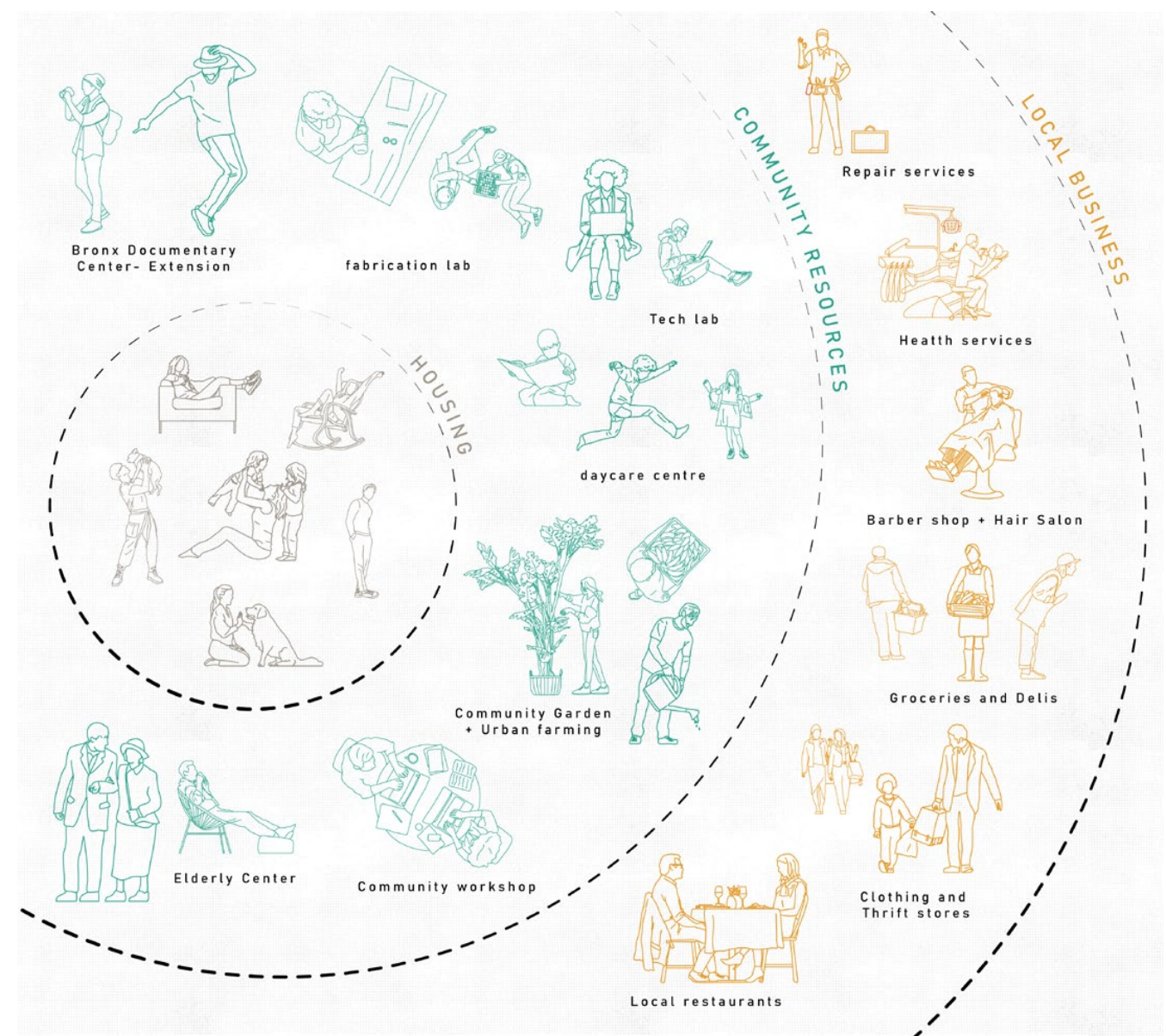
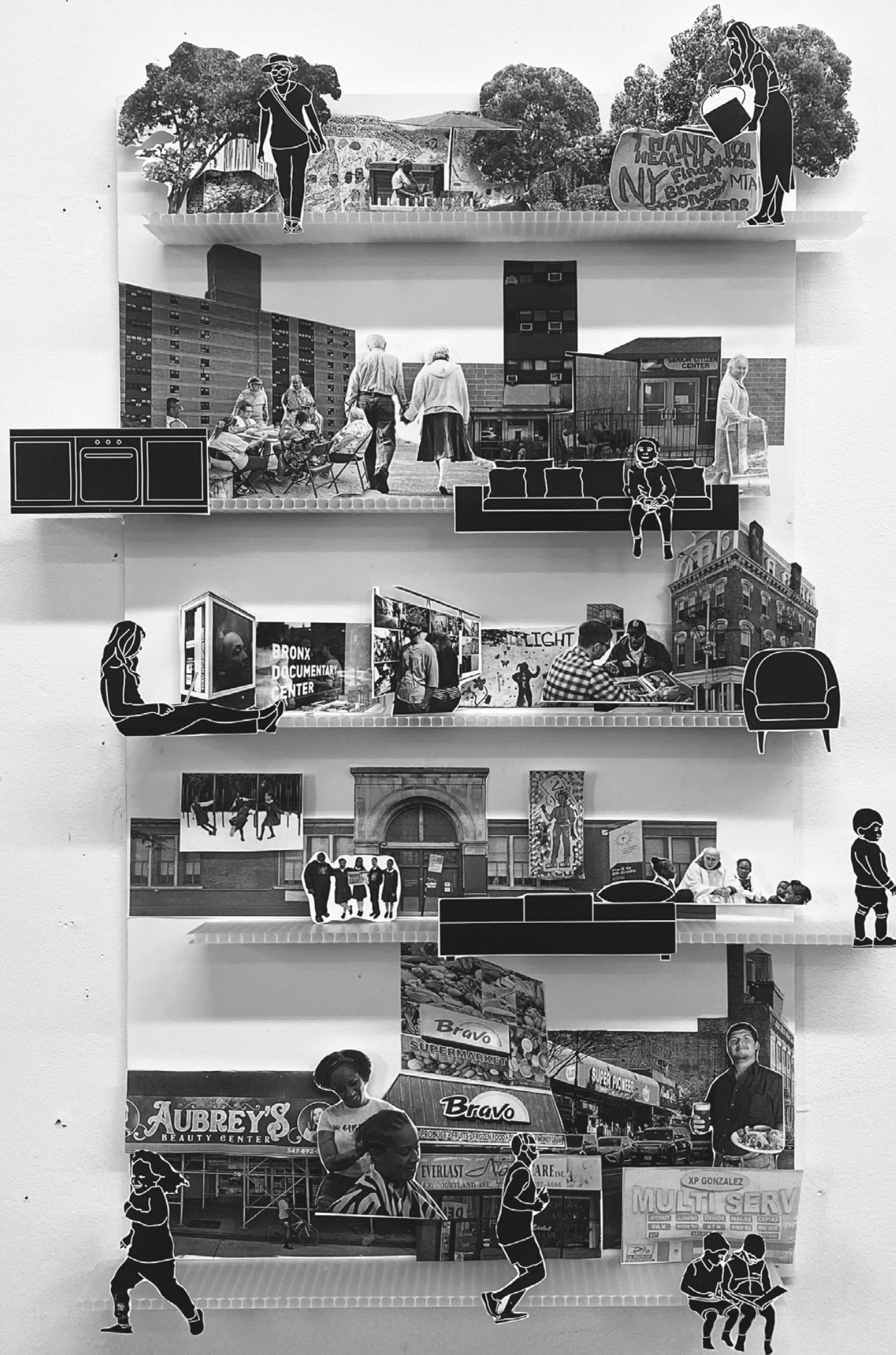
Ground:Up recalls the neighborhood's sense of pride and belonging by reclaiming the ground plane, linking existing anchor institutions of the Bronx to stimulate locally run businesses and democratizing wealth and resources within the community.

The project intends to be an active hub of both living and working, where the new mixed-commercial area on the ground is owned and run by residents of the housing and where community resources are provided for the training and support of growth of the next generation of entrepreneurs.

Year of completion:  
Project type:  
Instructor:

Fall 2021  
Partner w. Lucas Pereira  
Prof. SOLOMONOFF, Galia

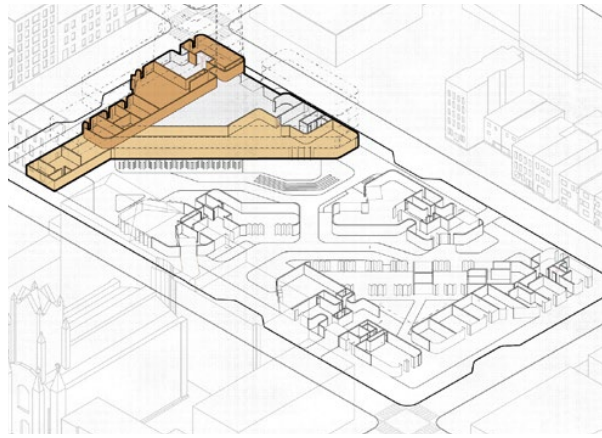




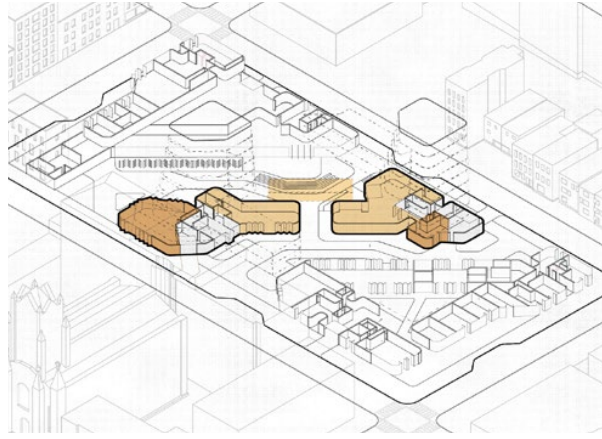
Aspirational Diagram of Community Networks

In our site visits, we noticed the nuances of activities and moments that eventually give identity to the neighborhood. The latin music playing constantly in the background, the elderly sitting on the sidewalk, the loud and lively latin hair salon, the engagement of the community garden and the Bronx Documentary Center, and the informality of local businesses with improvised storefronts are all spontaneous spots of urban life happening in small spaces.

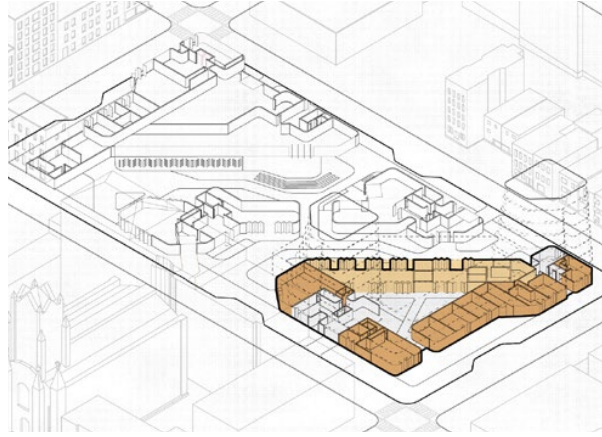
Ground:Up



GROCERY STORE  
HARDWARE STORE  
REPAIR SERVICE  
MONEY EXCHANGE SERVICES  
POST OFFICE  
BRONX DOCUMENTARY CENTER  
GALLERY AND STUDIO



FABRICATION LAB STORE  
FRESH MARKET + FLOWER SHOP  
COWORKING SPACE  
URBAN FARMING  
FABRICATION LAB



ARTS AND CRAFT SHOP  
BOOKSTORE  
DENTIST  
PHARMACY  
HAIR SALON  
THRIFT SHOP  
RESTAURANT  
TAX SERVICES  
POST OFFICE  
FABRICATION LAB STORE  
FRESH MARKET + FLOWER SHOP  
COWORKING SPACE  
URBAN FARMING  
FABRICATION LAB

The project is linked to existing anchor institutions of the south Bronx, such as hospitals and universities, making use their purchasing power to inject money into local businesses, to democratize the wealth such that the dollar runs within the local community. This allows for a variety of ground floor programs to foster a self sustaining community, which can not only provide for its residents but also the neighborhood around it.

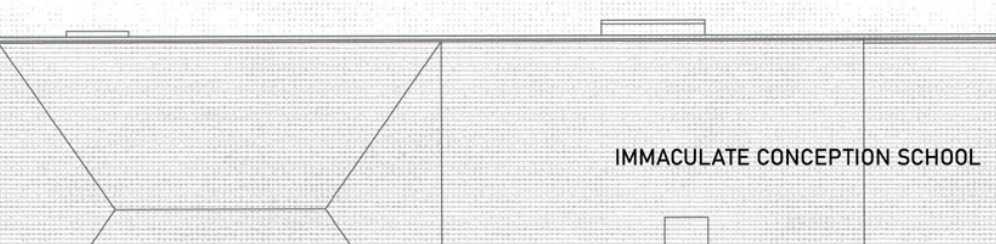
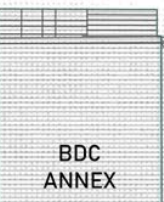
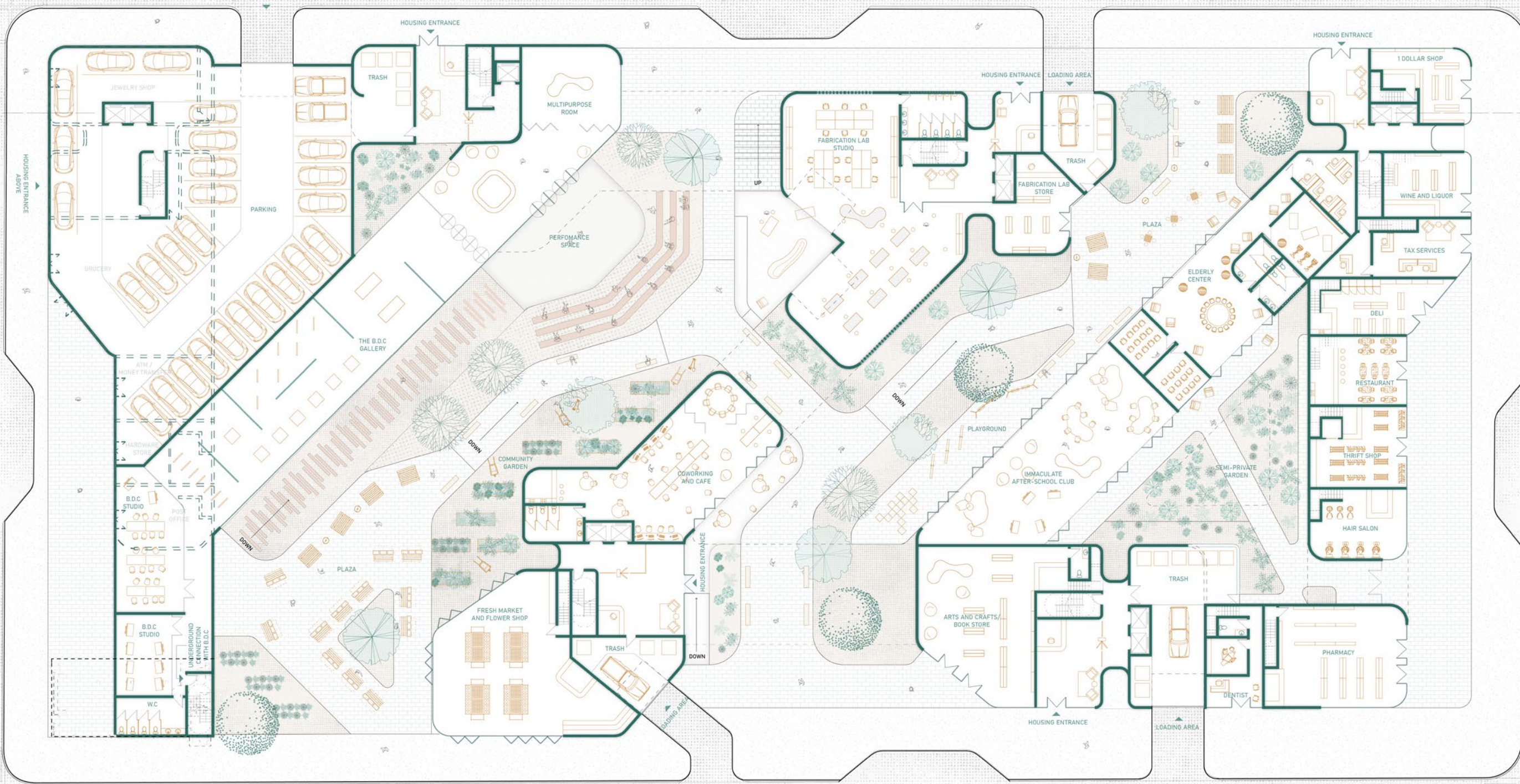


COURTLANDT AVENUE

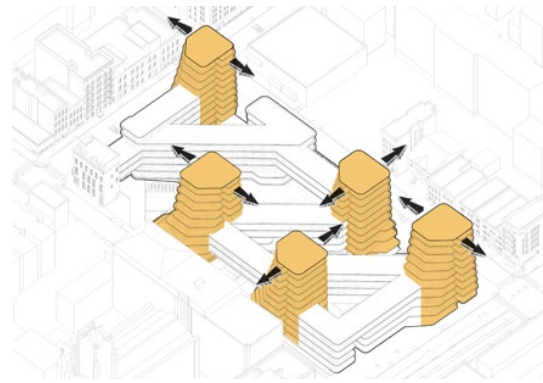
E 152nd ST

MELROSE AVENUE

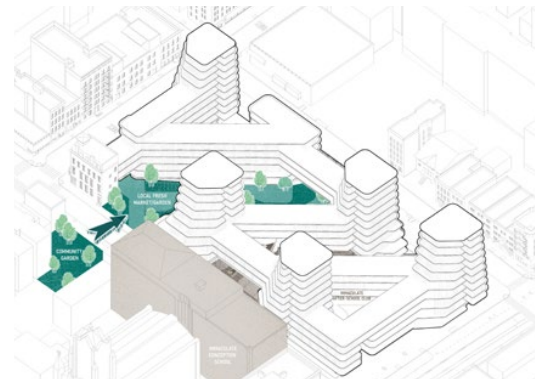
E 151st ST



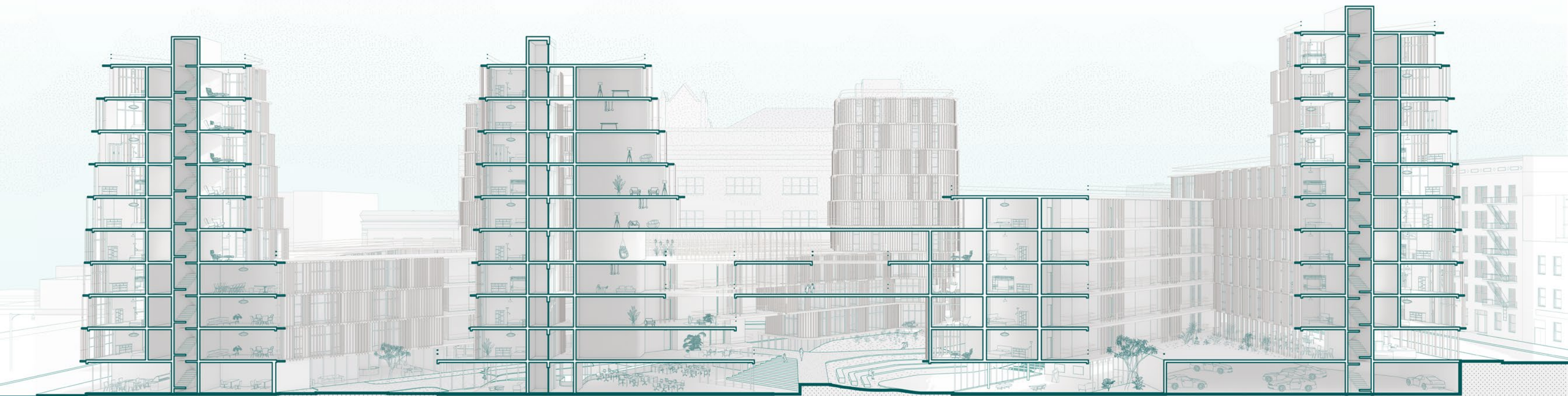
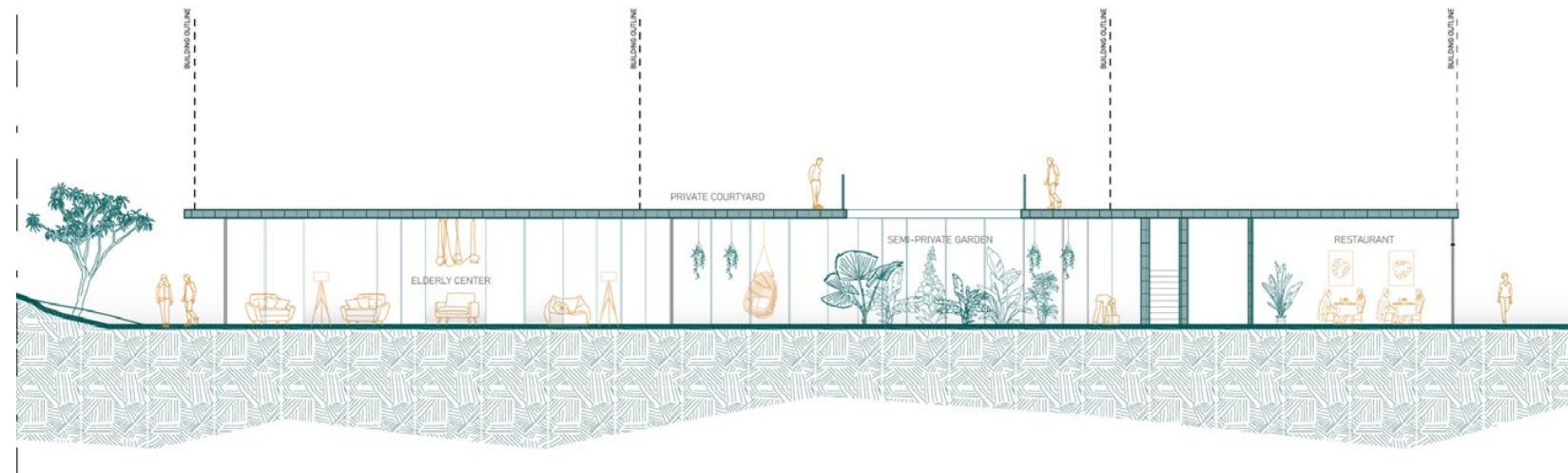
N  
 FLOOR PLAN - GROUND FLOOR  
 1" = 1/8"

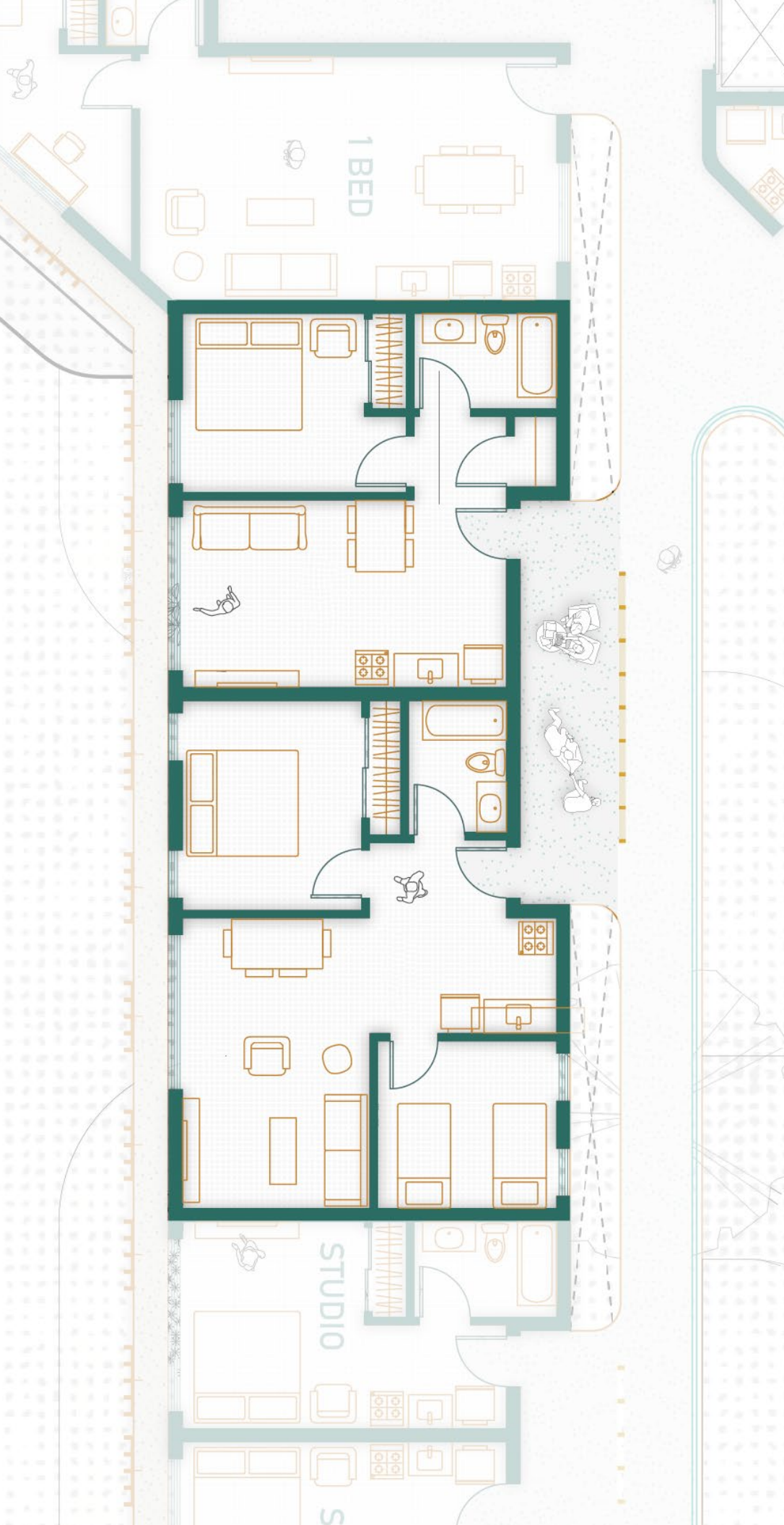


The project provides an interconnected ground floor plan, with varied densities and public spaces that ground the entire project in the site, while actively engaging with the streetscape as opposed to creating a plinth.



2 larger open axis connects the community garden to the flower market and the primary school to the afterschool club, while pockets of semi-private courtyards are created for the residents.





The "switches" in the plan mark moments of shared community resources

The units are designed with 3' of recess so when clustered in a pair, in addition with a 2' gap between corridor and unit, they create these in between moments shared by the two residents. This space can work as a mud room or a seating area, mini garden, storage, and more.

Scattered through the plan, there are moments where the corridor switches position. These moments are marked by community areas such as art rooms, laundry rooms and computer rooms. They would work as a small scale community resource space.

E 152nd ST

COURTLANDT AVENUE

MELROSE AVENUE

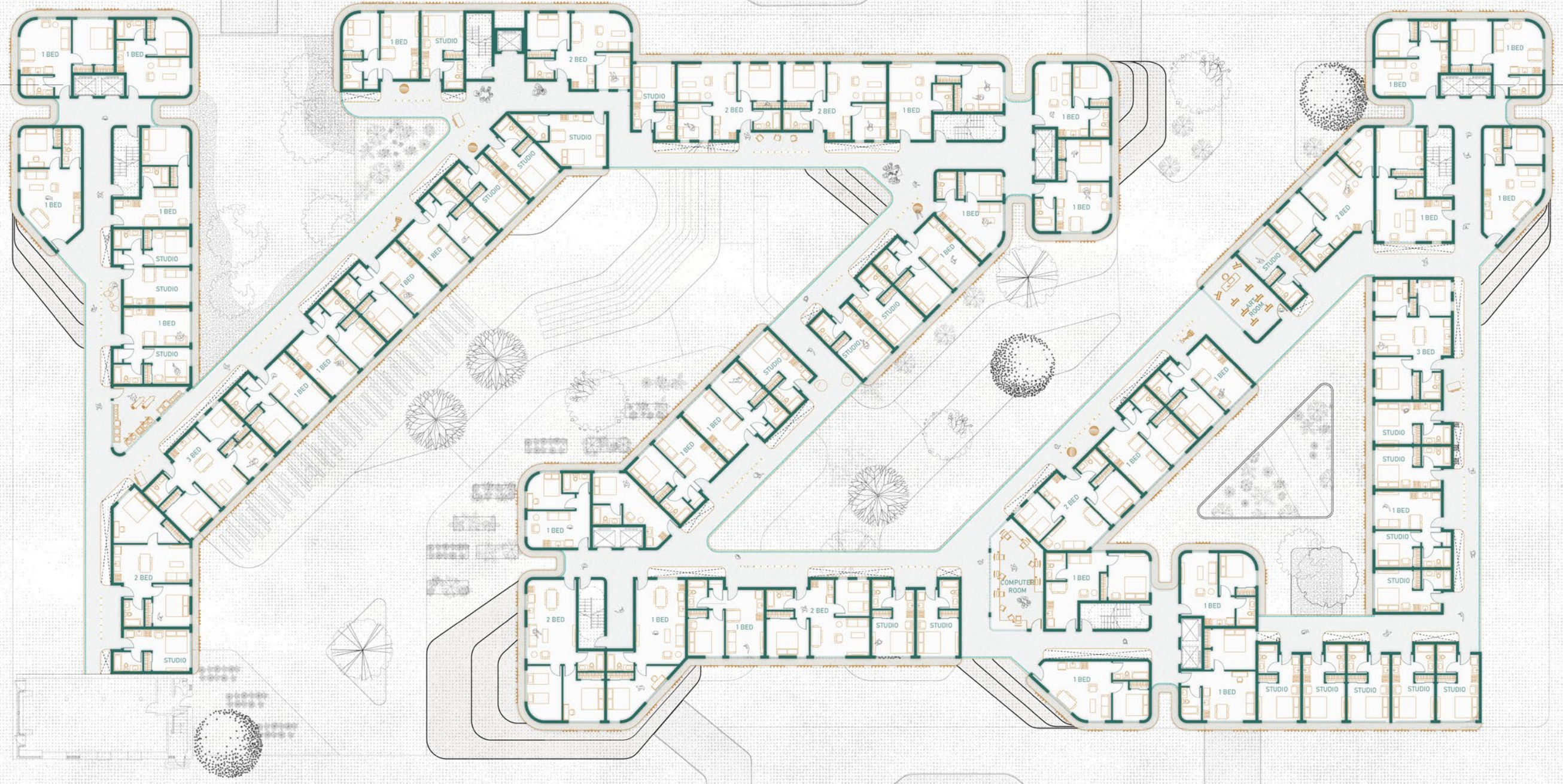
E 151st ST

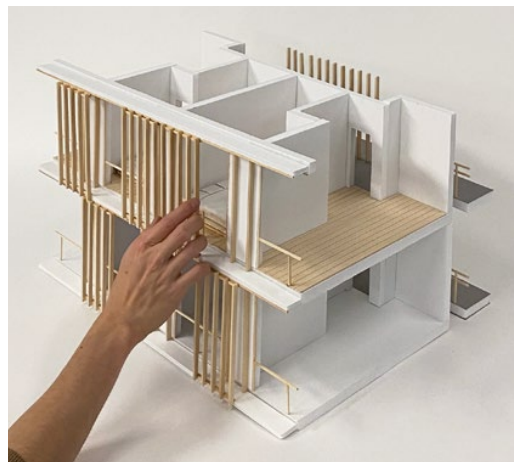
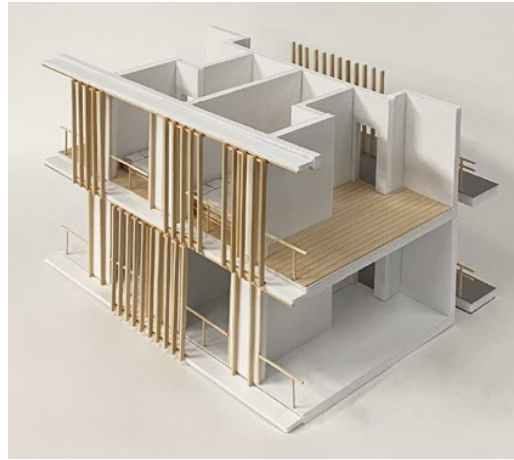
COMMUNITY GARDEN

BDC ANEX

IMMACULATE CONCEPTION SCHOOL

N  
FLOOR PLAN - TYPICAL FLOOR  
1" = 1/8"



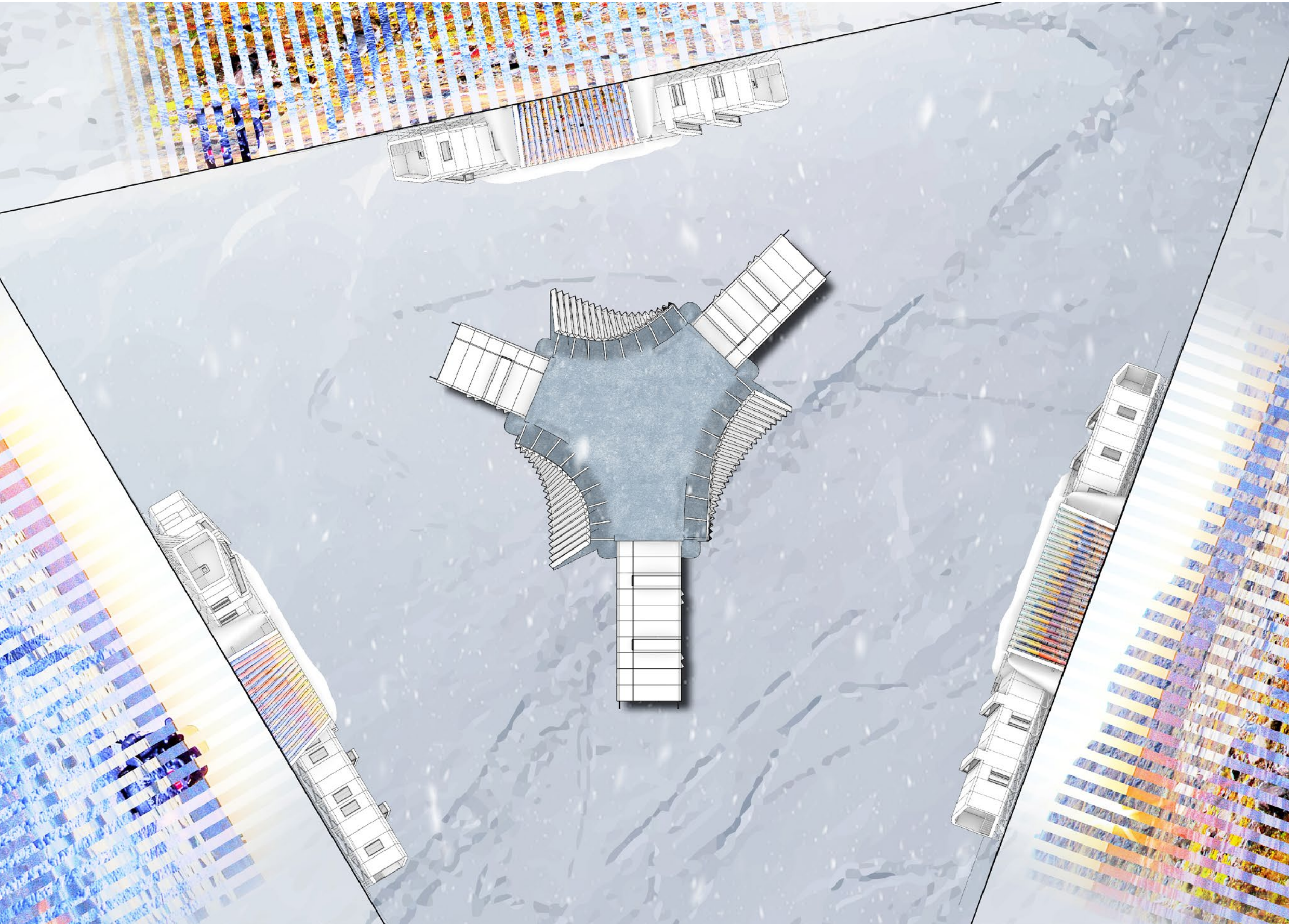


A vertical shading element runs on a track on architectural fins projected 2' from the interior slab edge. This creates for a textured, ever-changing facade which allows for the individuality and expression of the residents, in addition to their environmental benefits. The shading element also softens the horizontality of the project, giving it a mound like appearance.









## DEMOCRATIZING CONSENSUS MAPPING

RESEARCH OUTPOST FOR CONSENSUS  
BUILDING IN NUNAVUT, CANADA

The Northwest Passage, one of the most commonly used passages for shipping and tourism purposes, intersects a large amount of icy harbours - meaning that icebreakers are utilized to carve passageways for vessel traffic.

These external activities affect Dolphin Union Caribou in particular, whose migratory routes and breeding grounds have been broken up by icebreaking and vessel activities. This in turn affects local Inuits, whose diet and culture largely revolved around caribou.

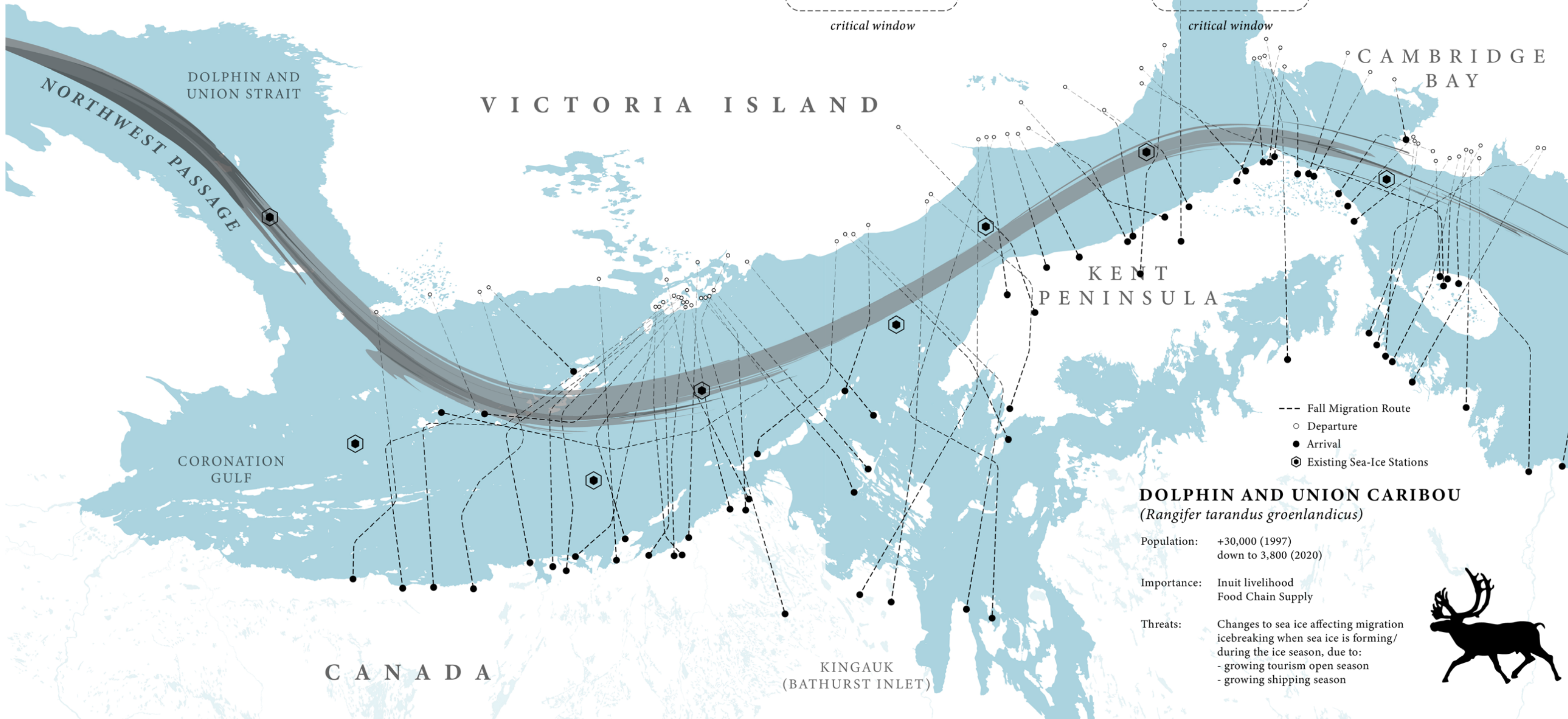
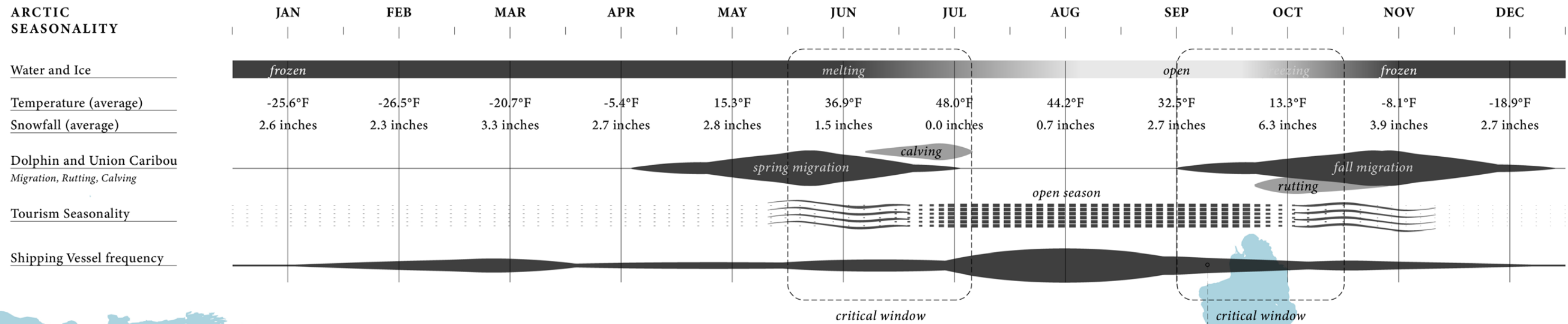
A research outpost for map-making between under-represented entities of the Nunavut region in Canada - Caribou migrations and Inuit populations, utilizing a bottom-up approach to research and data collection. Catoptric devices inspired by local Inuit wayfinding practices, and traditional earth-berming techniques inform the outpost station.

Year of completion:  
Project type:

Fall 2022  
Partner w. Julie Kim  
Prof. GILL, Leslie  
and Prof. NGUYEN, Khoi

Instructor:

**ARCTIC SEASONALITY**



**DOLPHIN AND UNION CARIBOU**  
*(Rangifer tarandus groenlandicus)*

Population: +30,000 (1997)  
down to 3,800 (2020)

Importance: Inuit livelihood  
Food Chain Supply

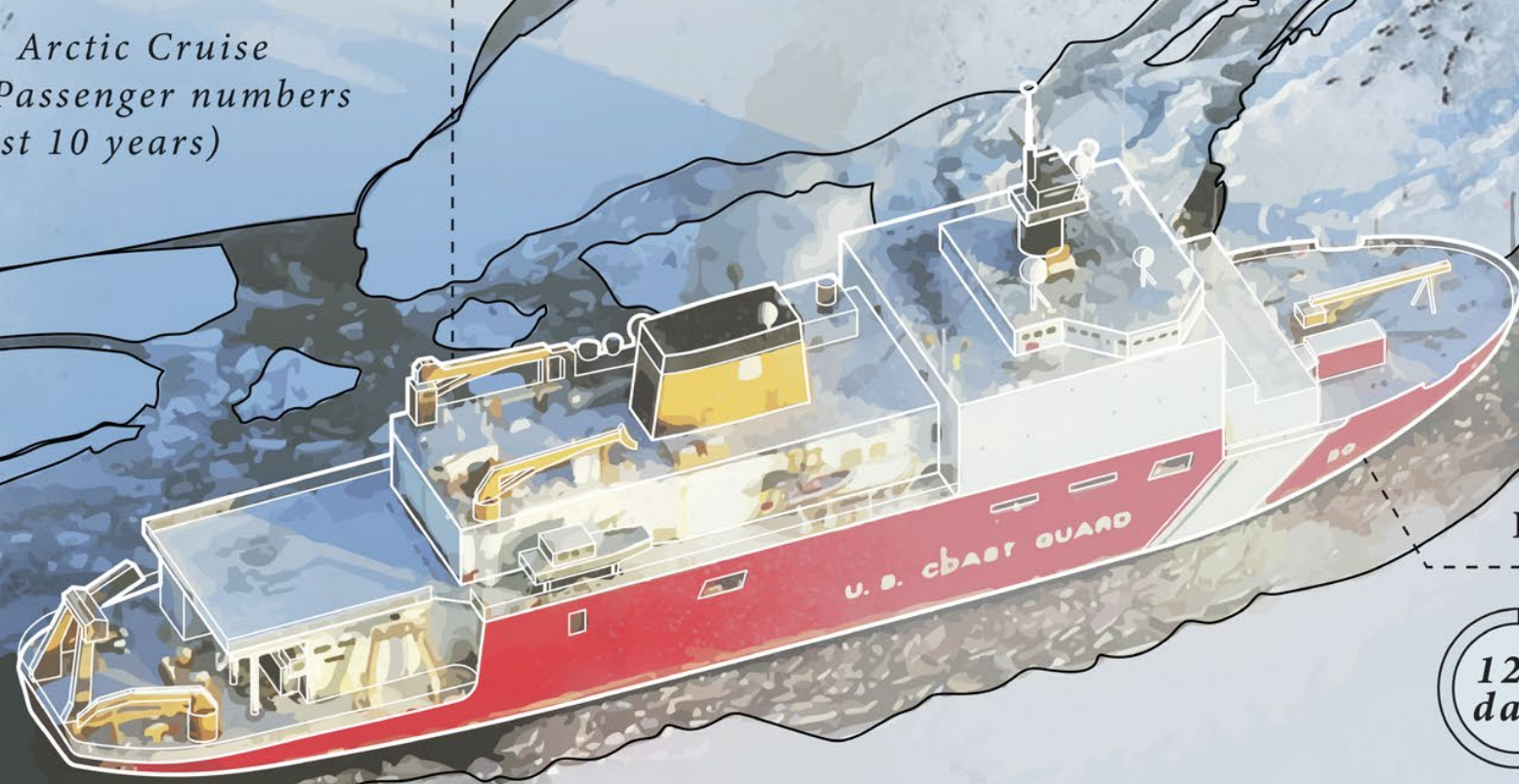
Threats: Changes to sea ice affecting migration  
icebreaking when sea ice is forming/  
during the ice season, due to:  
- growing tourism open season  
- growing shipping season



## ECONOMICS OF TOURISM



*growth in Arctic Cruise  
Tourism Passenger numbers  
(in the last 10 years)*



## ECONOMIES OF SHIPPING



*transportation time saved  
using NWP (22 days)  
vs Suez Route (34 days)*



*increase in number of  
vessels from 2013 - 2019  
(112 - 160 per year)*

## DOLPHIN AND UNION CARIBOU



*caribou drowned caused by  
2-3 boats during migration*



*remaining D&U caribou  
population as of 2020  
(from 30,000+ in 1997)*

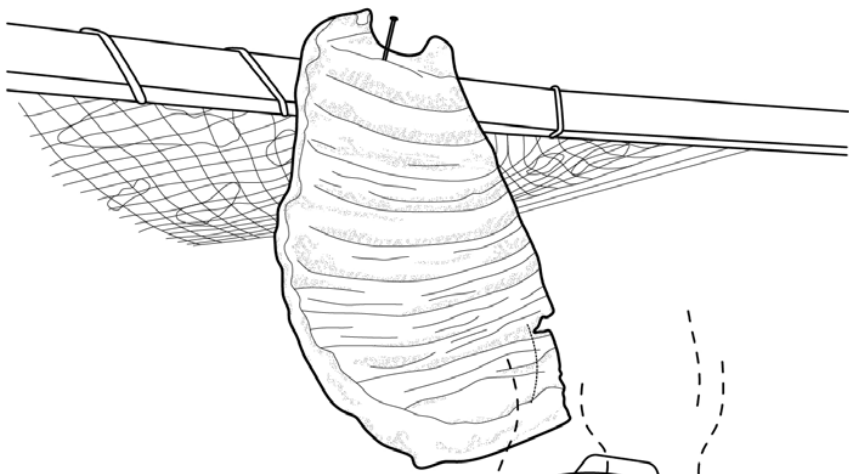


## INUIT PEOPLE OF NUNAVUT



*delay in new ice formation  
(~4" thick) due to icrebeaking,  
affecting migration & food security*

CARIBOU MEAT DRYING ON RACK

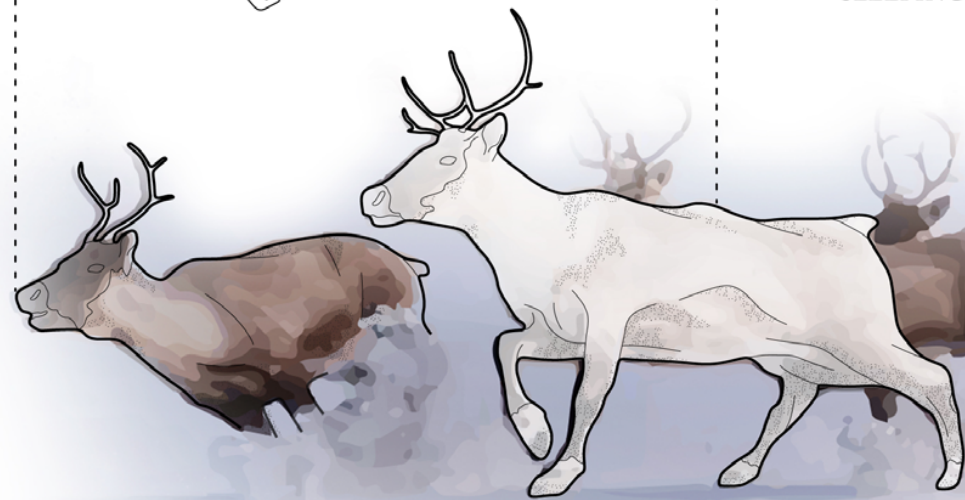


FOOD SOURCE

STEW



RAW TENDERLOIN



SEAL & CARIBOU SKIN CLOTHES - WOLF - FOX  
PTARMINGAN - ARCTIC HARE  
KELP - TURBOT

WINTER  
DECEMBER-JANUARY-FEBRUARY



CLOTHES BAG

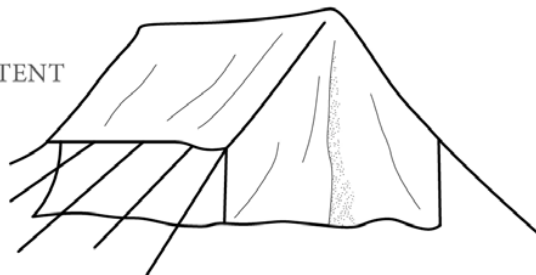
BOOTS

MITTS

PANTS

DOMESTIC

TENT



SLEEPING BAG & SKINS

LAMP FAT

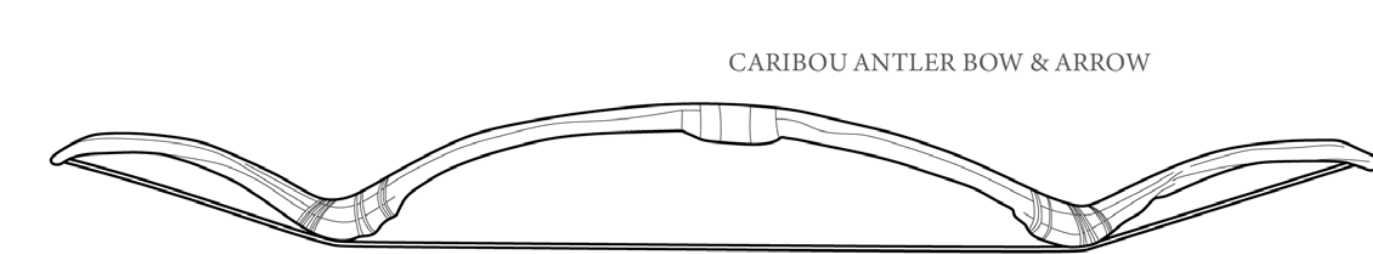
MUSIC

LAKE & PACK ICE HUNTING & FISHING  
PTARMINGAN - ARCTIC HARE  
TURBOT - SEAL PUPS

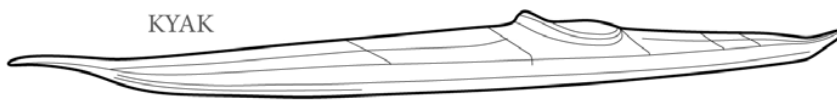
EARLY SPRING  
MARCH-APRIL-MAY

SEALSKIN TENTS & KAYAKS  
GEESE - ELDERS - EGGS  
CLAMS - BELUGA - WALRUS

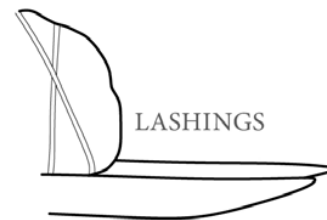
SPRING  
JUNE



CARIBOU ANTLER BOW & ARROW



KYAK



LASHINGS



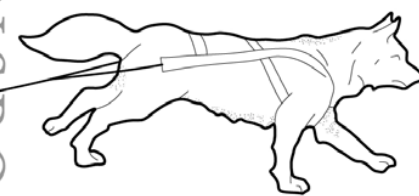
SLED ANCHOR



SCRAPER



TRANSPORTATION



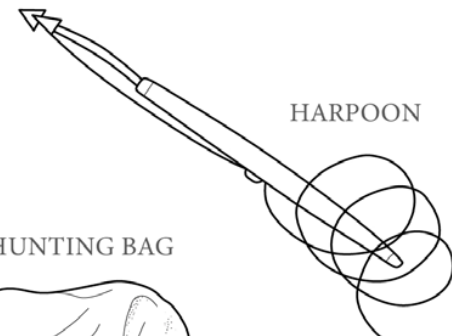
DOG TRACES & HARNESS



KELP - CLAMS - NARWHAL  
BERRIES - MOUNTAIN SORREL  
CARIBOU SKIN PREPARATION - MOSS QULLIQ WICKS

SUMMER  
JULY-AUGUST-SEPTEMBER

HUNTING



HARPOON

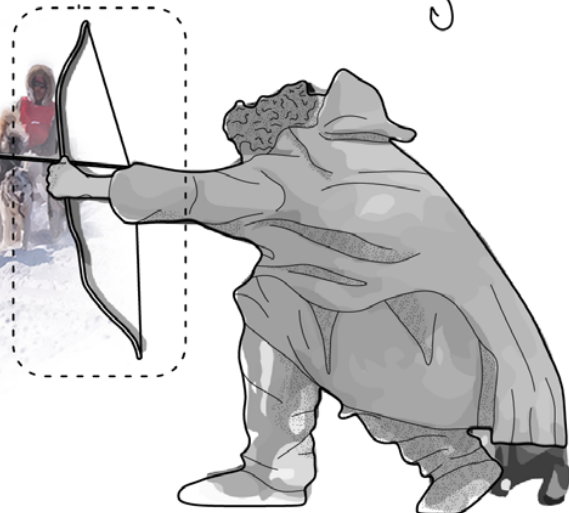
HUNTING BAG



GUN CASE



FISH LINE



NARWHAL - KELP  
DUCKS - HARVESTING HEATHER  
QAMAQS - CARIBOU SKIN CLOTHES

FALL  
OCTOBER-NOVEMBER

**NET GUNNING VIA HELICOPTOR**



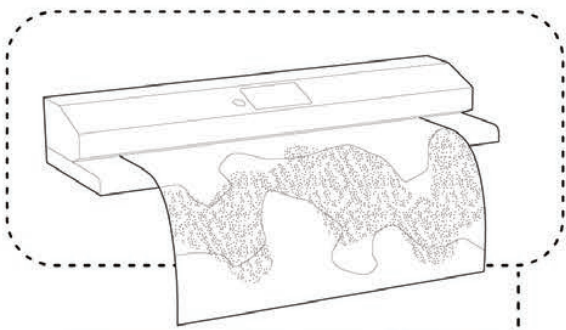
**CARIBOU TAGGING**



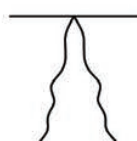
**COLLAR**



**DIGITIZING PHYSICAL MAPS FROM WORKSHOPS**



**BEWARE OF LEADS!**



**INUIT PARTICIPATORY MAPPING**



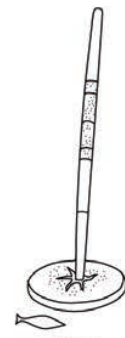
**MYLAR OVERLAY**

**LOOK FOR ICE BRIDGES**



**CAMBRIDGE BAY**

**CHECK SEA ICE STRENGTH WITH HARPOON**



**PAY ATTENTION TO DRAINAGE HOLES & WHIRL POOLS**

**VICTORIA ISLAND**

**SEA ICE BUOYS PLACED AT EXISTING SEA ICE STATIONS & INUIT TRAILS**



31 KM

28 KM

52 KM

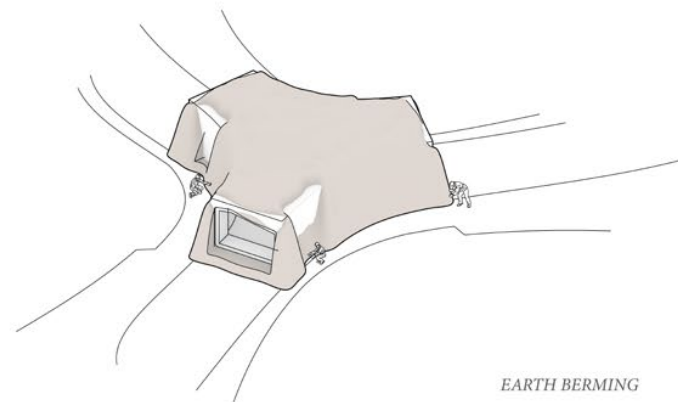
53 KM

49 KM

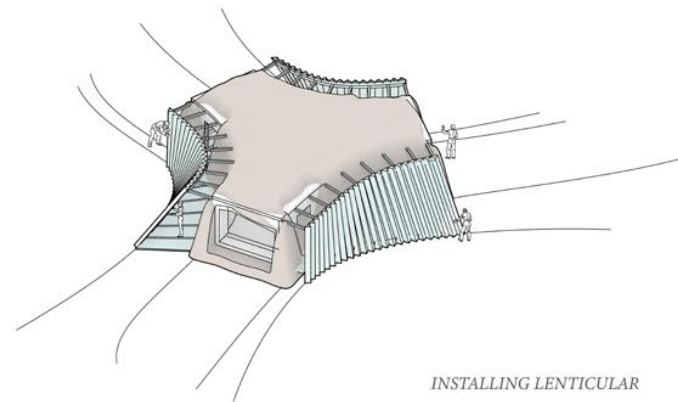
59 KM

35 KM

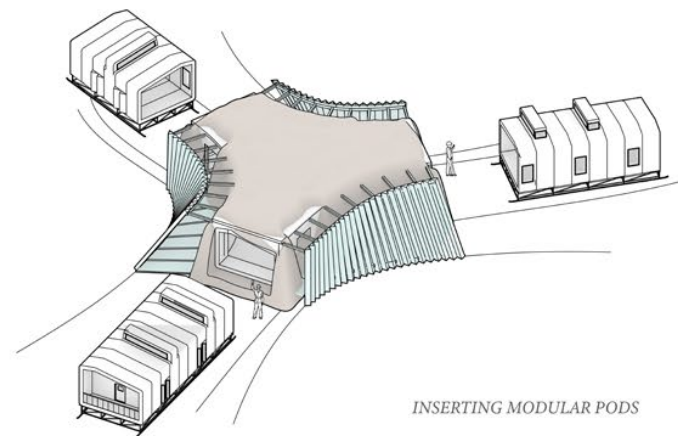
**CANADA**



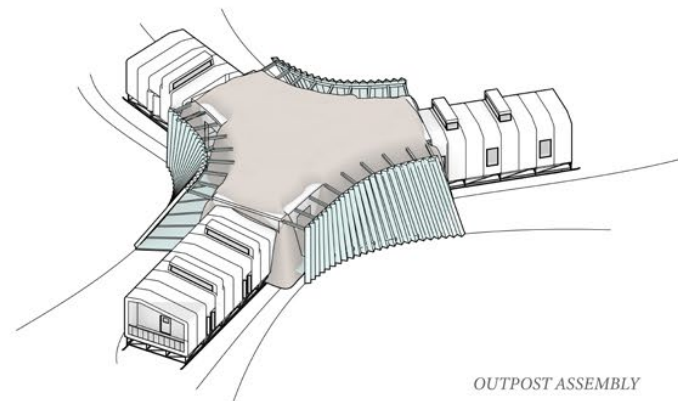
EARTH BERMING



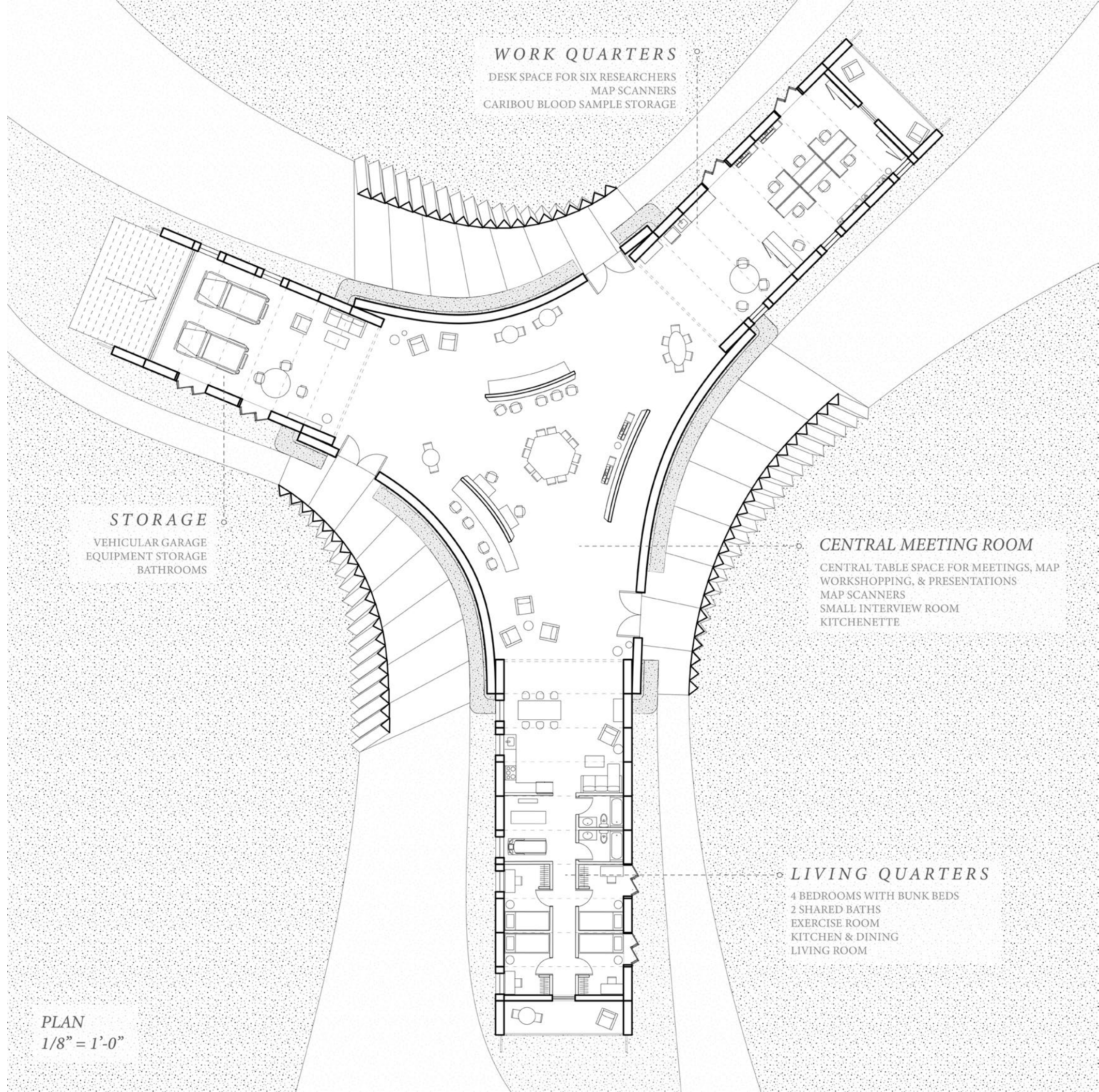
INSTALLING LENTICULAR



INSERTING MODULAR PODS



OUTPOST ASSEMBLY



**WORK QUARTERS**

DESK SPACE FOR SIX RESEARCHERS  
MAP SCANNERS  
CARIBOU BLOOD SAMPLE STORAGE

**STORAGE**

VEHICULAR GARAGE  
EQUIPMENT STORAGE  
BATHROOMS

**CENTRAL MEETING ROOM**

CENTRAL TABLE SPACE FOR MEETINGS, MAP  
WORKSHOPPING, & PRESENTATIONS  
MAP SCANNERS  
SMALL INTERVIEW ROOM  
KITCHENETTE

**LIVING QUARTERS**

4 BEDROOMS WITH BUNK BEDS  
2 SHARED BATHS  
EXERCISE ROOM  
KITCHEN & DINING  
LIVING ROOM

PLAN  
1/8" = 1'-0"



(west reflection)



catoptric device as a means of wayfinding



(east reflection)



outpost longitudinal section



## MIND-FLOW

### SENSORY HEALING THROUGH MEDITATION WITH NATURE

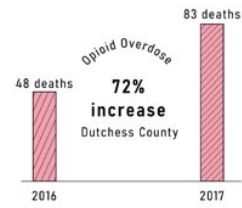
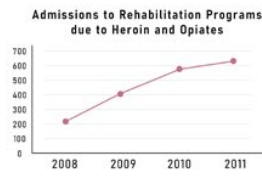
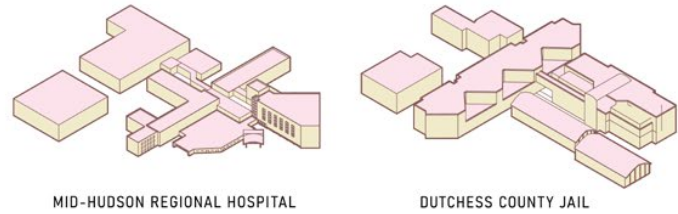
Mind-Flow is a meditative healing center that challenges traditional boundaries between human beings and nature by creating a sensory experience that encourages individuals to connect with their environment and tune into their senses.

Through the delamination of enclosures and the blurring of boundaries, the center promotes a sense of liberation and freedom akin to the flow state experienced during meditation. This approach to addiction recovery offers an alternative to traditional methods by emphasizing the interconnectedness of humans and the natural world.

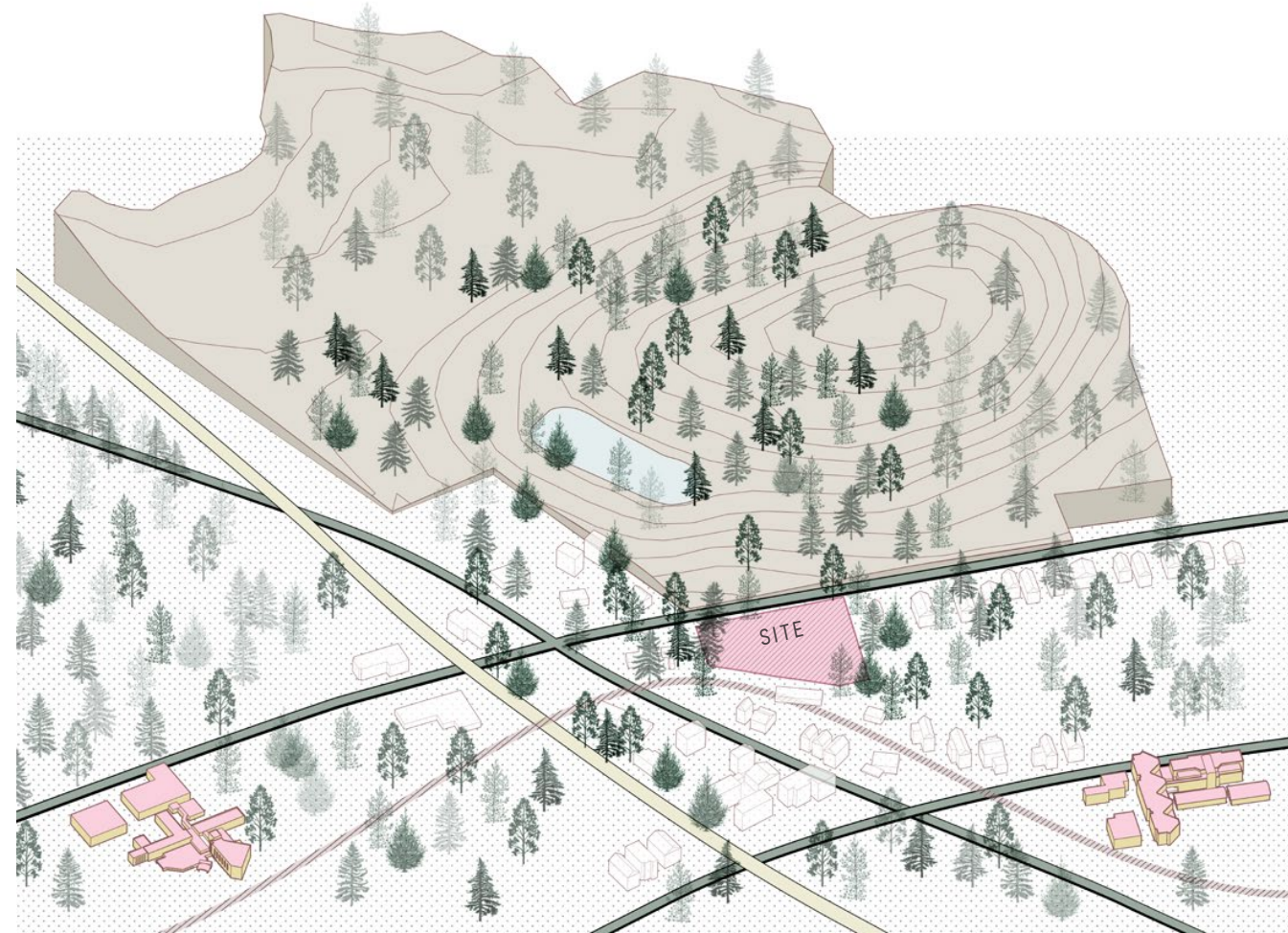
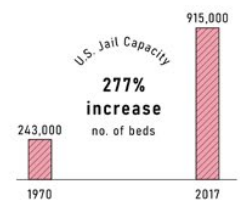
Year of completion:  
Project type:  
Instructor:

Spring 2022  
Partner w. Nicolas Nefiodow  
Prof. ROBERTS, Bryony





Our intervention in Poughkeepsie aims to serve the community in helping people find stability and wellbeing through a variety of meditation offerings, providing addiction and substance abuse recovery services (both in patient and out-patient), considering the adjacency of the site to the Dutchess County Jail and it's proposed \$200 million dollar expansion. With scientific studies proving the benefits of meditation to PTSD and addiction, as well as the intrinsically democratizing nature of meditation, our intervention encourages a exploratory and experiential mode of healing, where anyone can 'learn to begin again.'

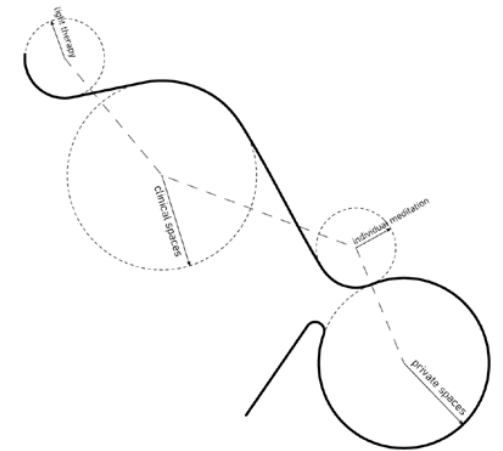


demand for an alternative healing for addition recovery in Poughkeepsie

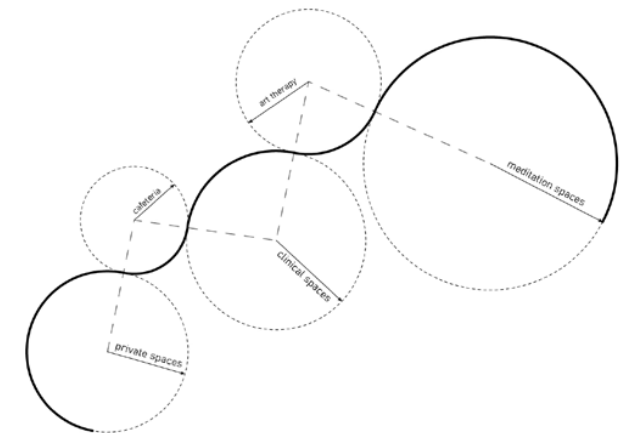
Outside of its religious forms, there are also universally accessible meditation techniques such as Transcendental Meditation, which can be practiced anytime and anywhere, with scientifically proven benefits to addiction and PTSD.

A taxonomy of sensory healing experiences includes a range of meditation practices, as well as sensory experiences such as light and gong therapy to be deployed throughout the project.

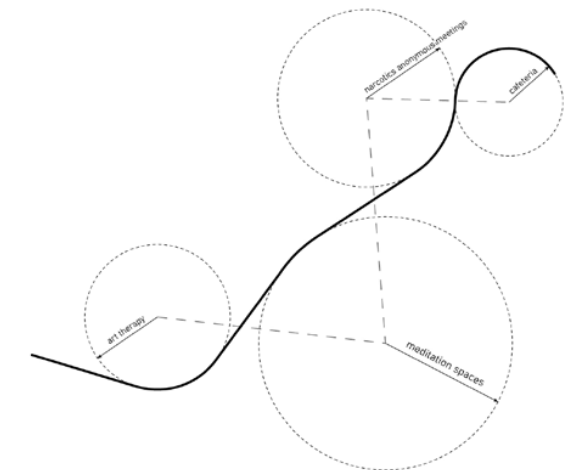
The narrative models explore the sensory and spatial aspects of spaces conducive of meditation; whether it is skylights, or mesh or materiality that create both a sense of movement and privacy. As opposed to creating confined rectangular rooms, each curve creates both dynamic spaces of moving meditation, as well as static spaces which wrap around and give a feeling of protection.



inpatient (early stages)

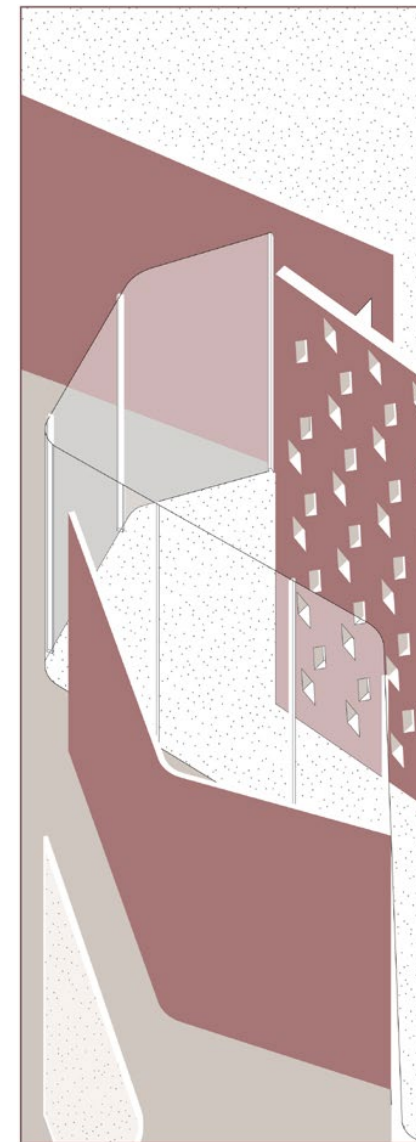
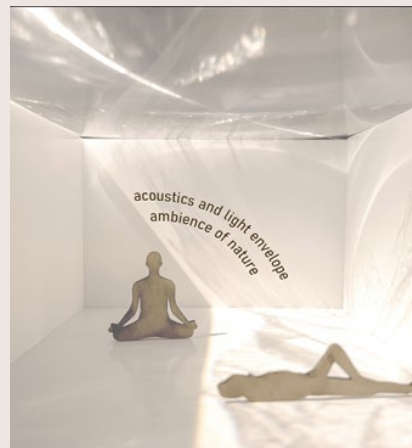
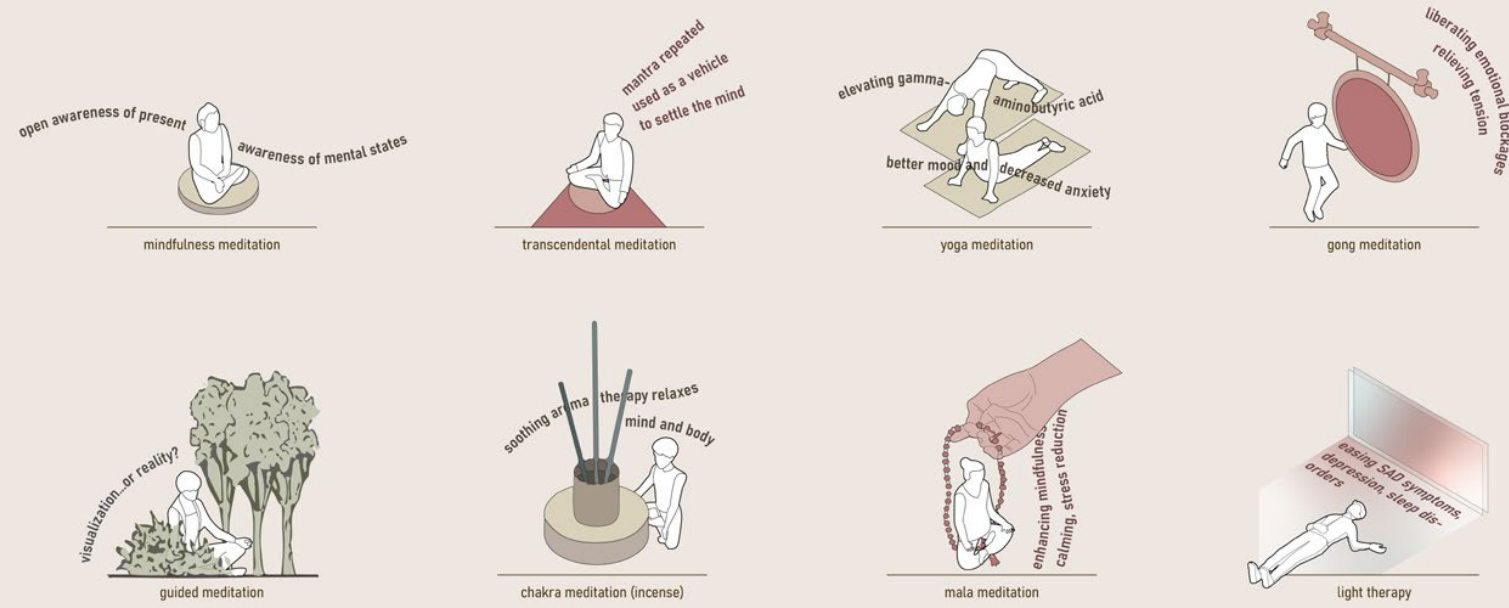


inpatient (intermediate stages)

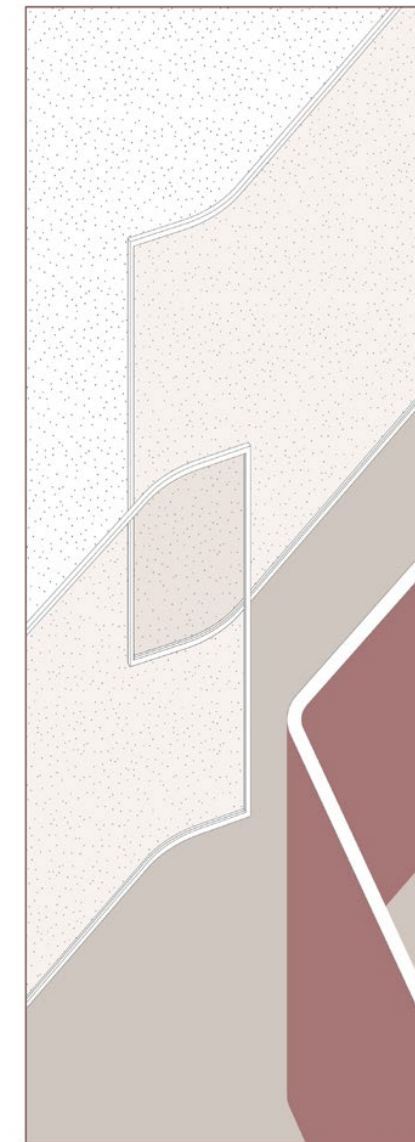


outpatient services

TAXONOMY OF FRAMED SENSORY HEALING EXPERIENCES



DELAMINATION OF ENCLOSURE



BLURRING BOUNDARIES (WALLS)



COMPRESSION/DECOMPRESSION

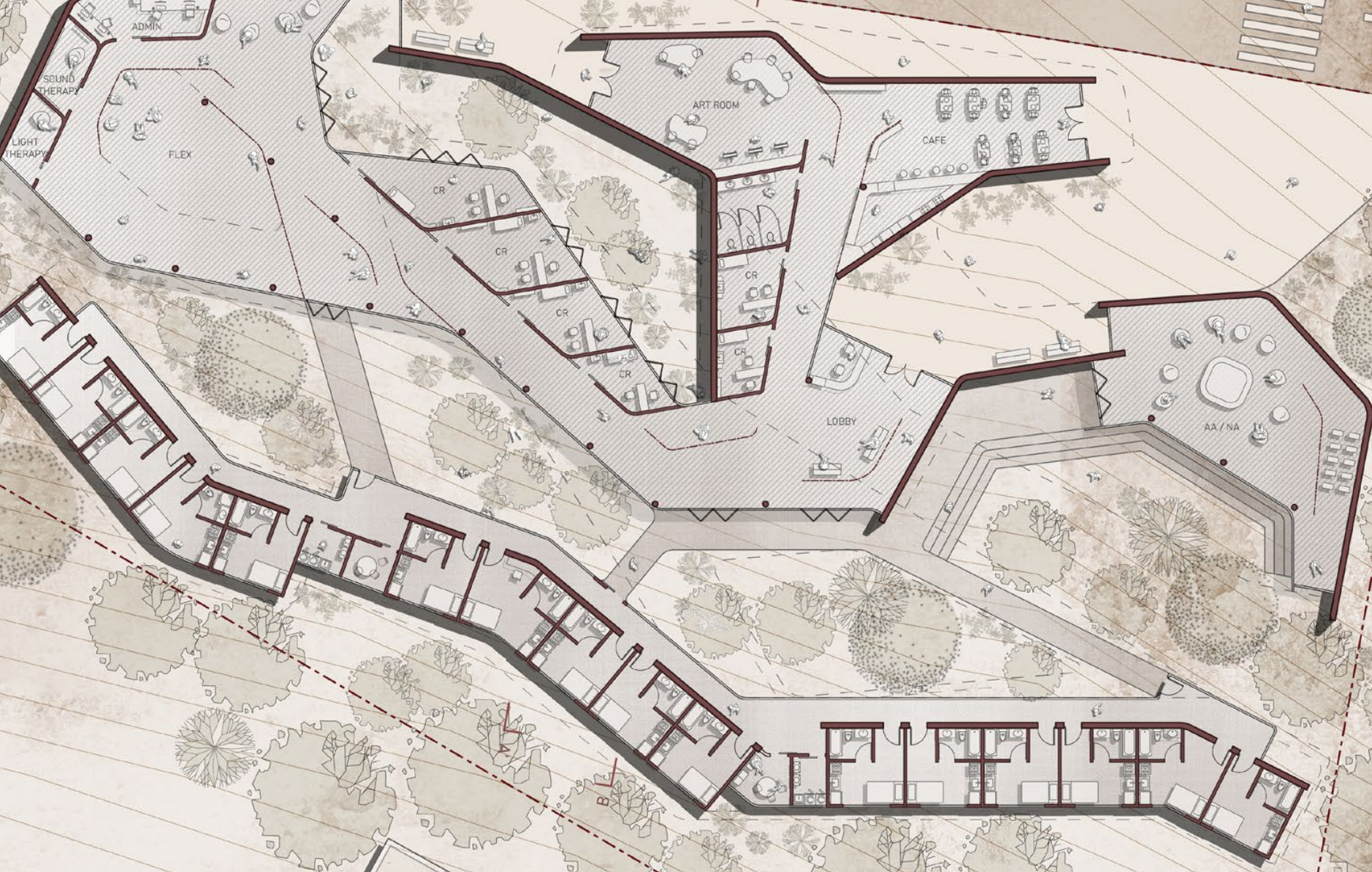
Principles that guide the design include: the delamination of enclosure from solid walls to glass (visually transparent) to mesh (transparent in multiple senses); the blurring of boundaries with walls and roofs that run past each other in both plan and section; and working with the existing topography to generate compressions and decompressions which create a choreography of movement. trees that run diagonally across the site, which acts as a buffer zone between the outpatient and inpatient facilities.

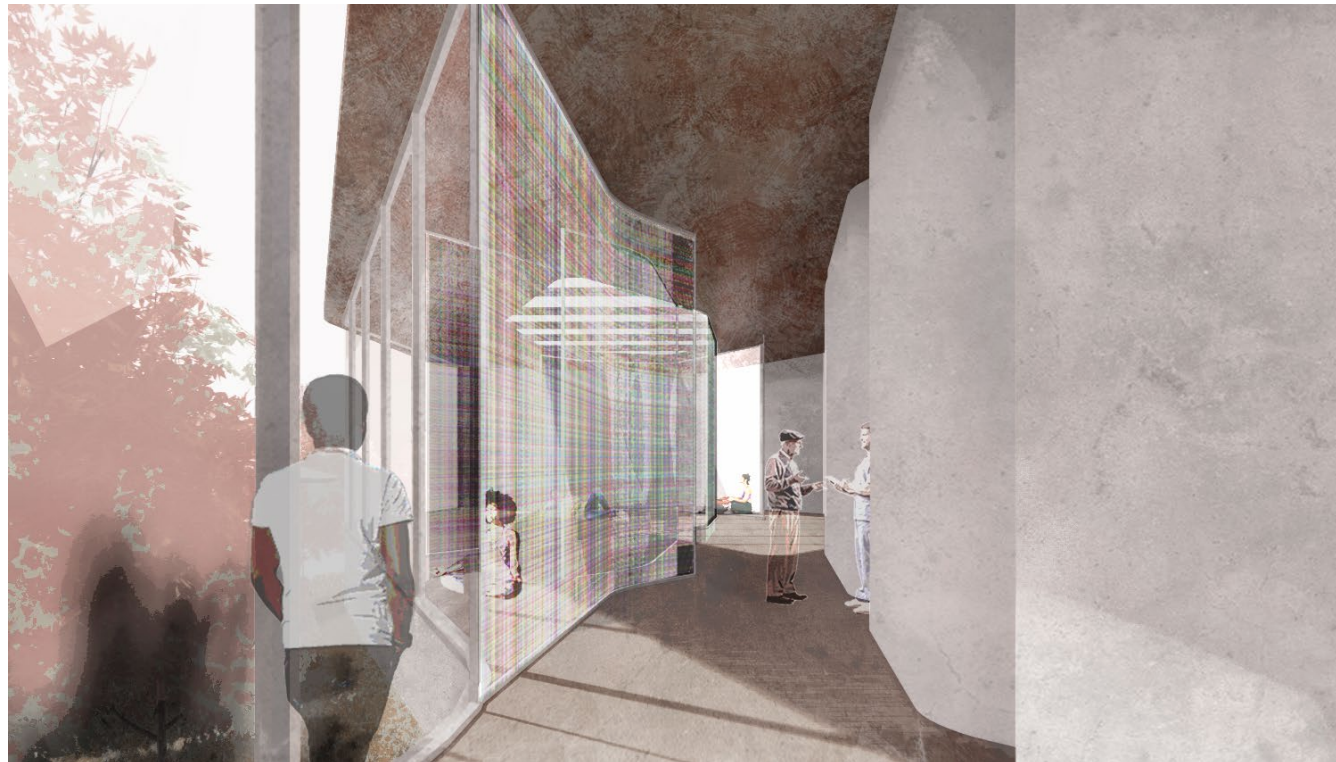


N CLINTON STREET

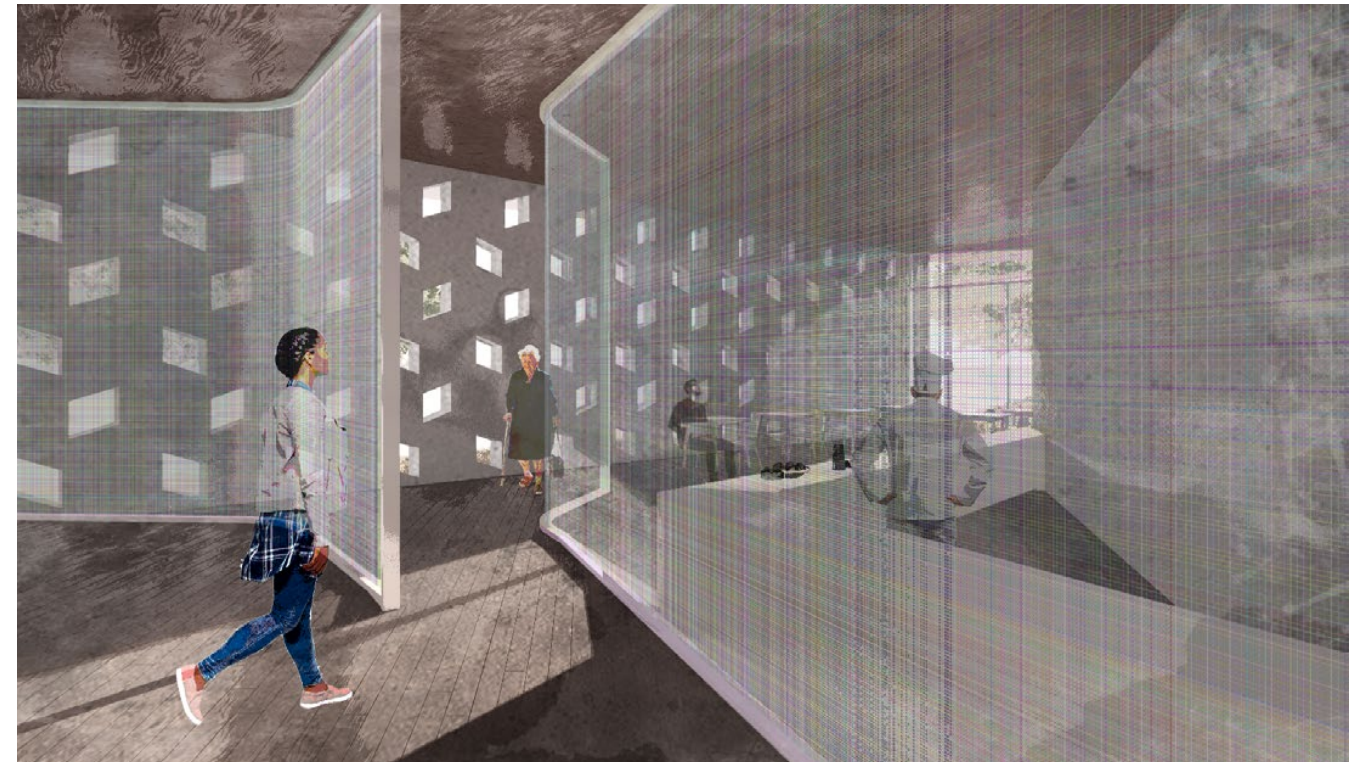
PARKER AVE

Floor Plan - G/F

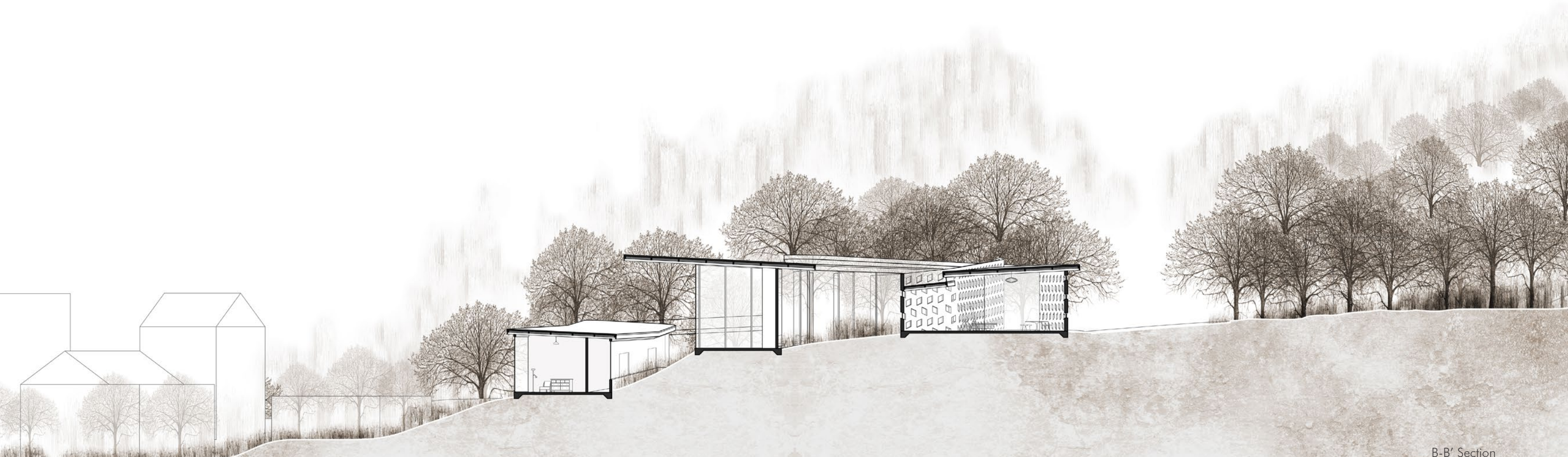




interstitial circulatory space with flexible meditation partitions



cafeteria area; play between wall and partition porosity



B-B' Section



## SCHOOL OF SENSES

DELAMINATION OF SENSORY EXPERIENCE  
INTO A KINETIC LEARNING

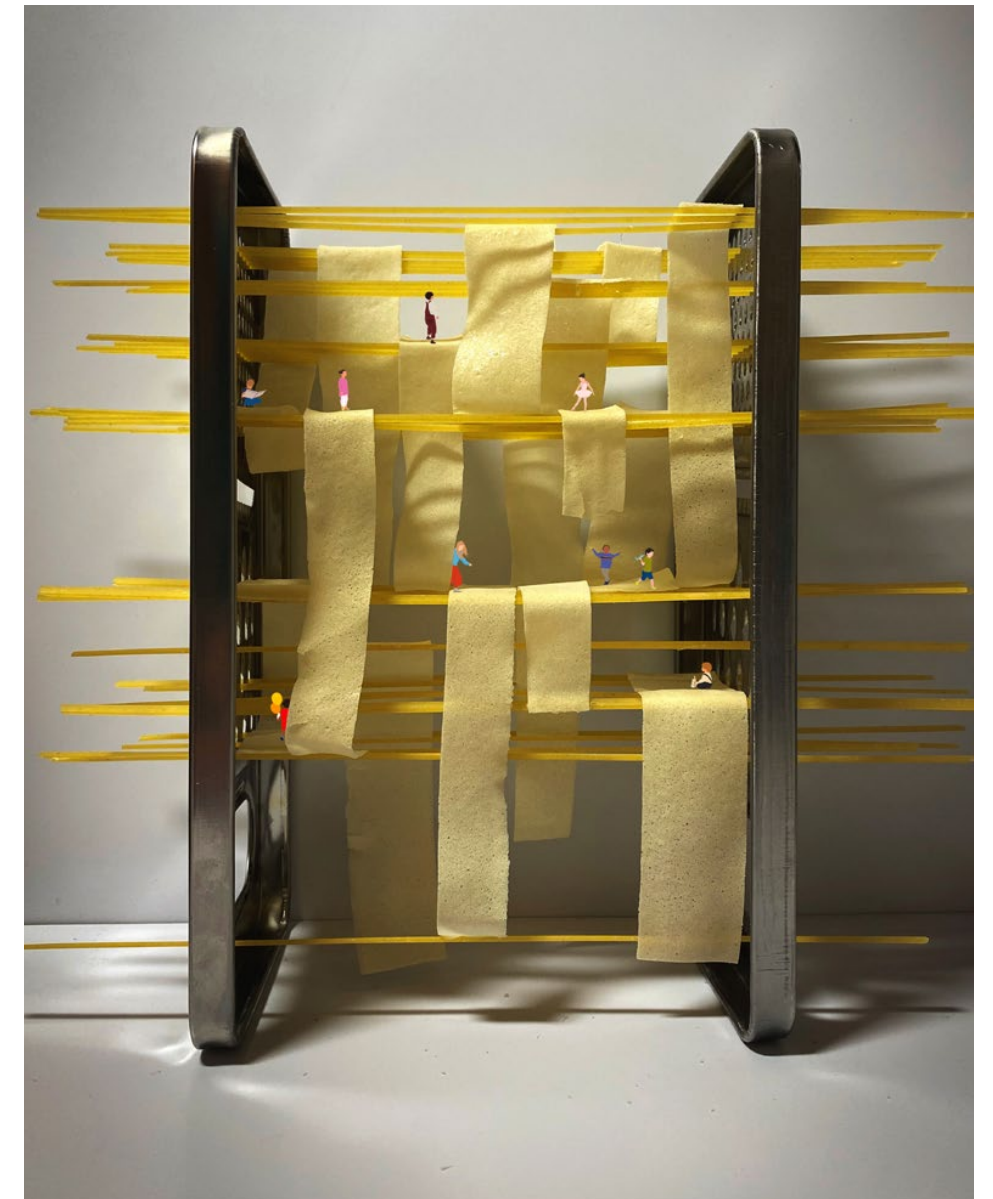
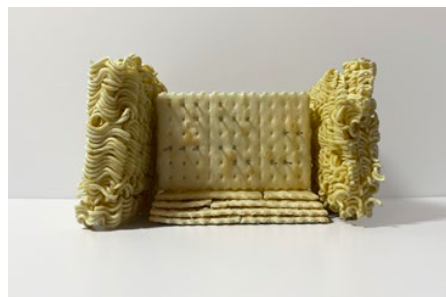
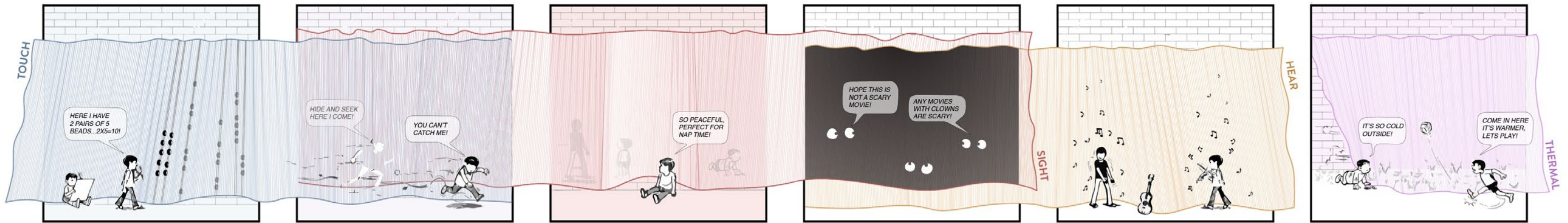
The aspiration of the school is to create a sensory, kinetic learning environment for children, through deploying curtains that delaminate the functional enclosure of a typical building wall into sensory experience.

By preserving the H wings of the existing 19th century P.S. 64 school and working within the recessed front facade, a stage set is created, serving both the school and the city.

Curtains divided into categories of touch, sight, hearing and thermal creates the possibility of defining spaces through different senses and combinations of materials, which are interchangeable and can be manipulated throughout the course of a day, month and year.

Year of completion:  
Project type:  
Instructor:

Spring 2021  
Individual Studio  
Prof. ZEIFMAN, Emmett



Using food as readymade objects to create study models, an interesting relationship of sectional overlapping was revealed. Translating to the building and its sensory environment, this allows for a combination of different sensory curtains, creating different tactile environments to host a variety of school activities.

### DAY - THE SCHOOL

During the day, the curtains are drawn according to various sizes and functions required by the school curriculum, creating for a flexible learning environment.



### NIGHT - THE PERFORMANCE

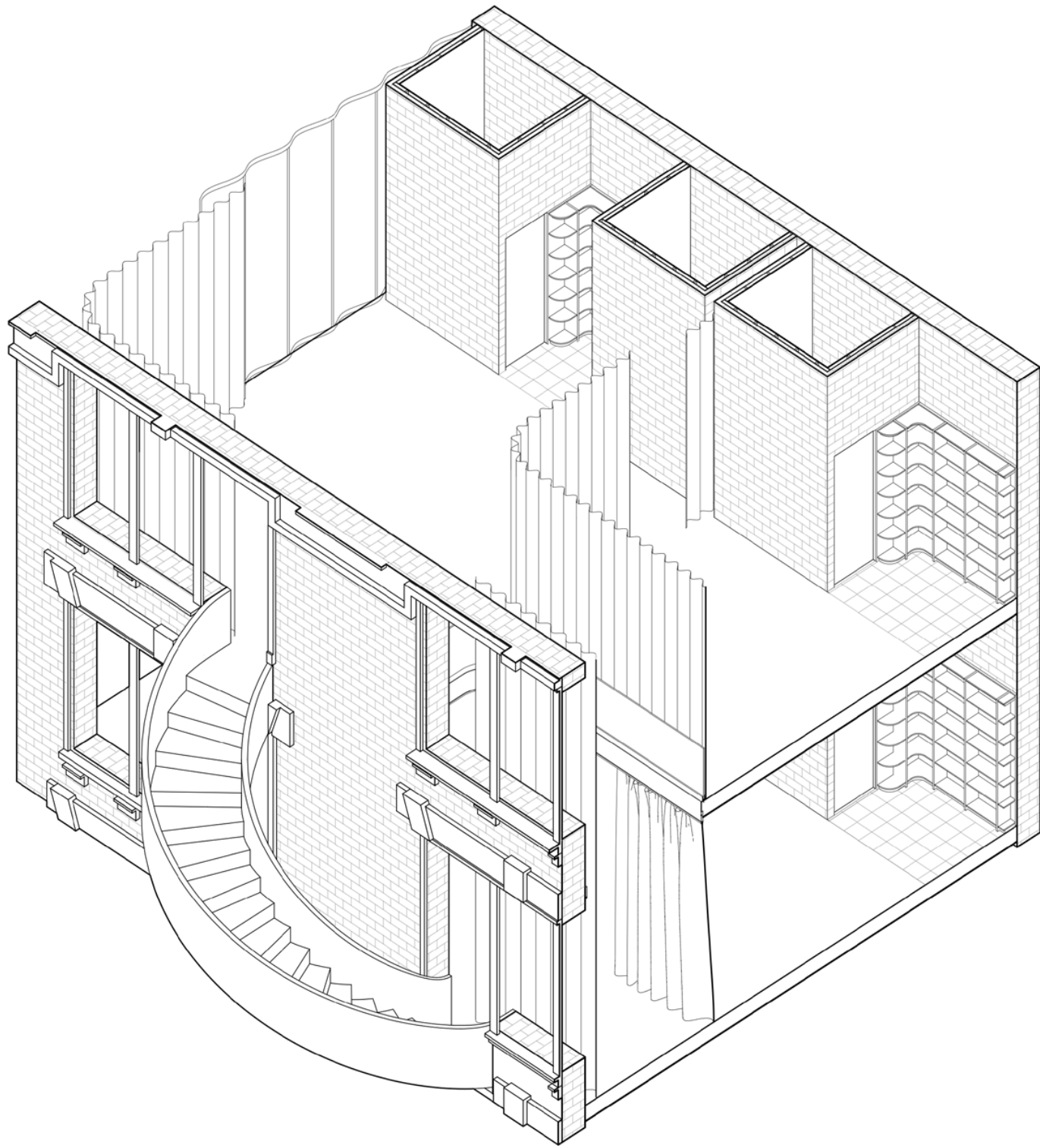
At night, the school transforms into a glowing stage of the city, as the outdoor porch is activated, while the circular staircases also act as elevated viewing mezzanines for watching the performances.



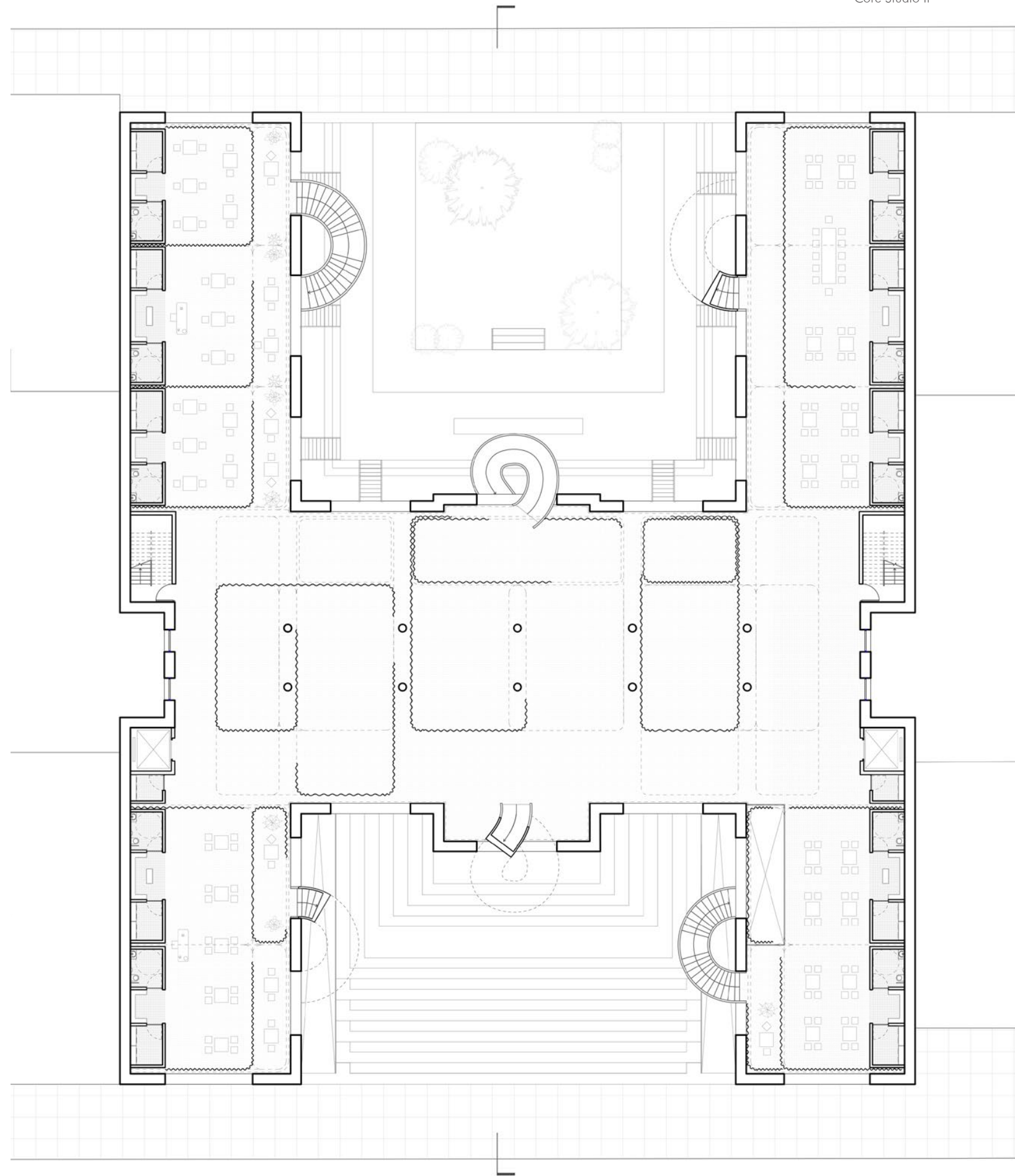
### EVENING - THE REHEARSAL

As students prepare for their afterschool performance to their parents and the city, the curtains are drawn, transforming the image of the school.





Detailed Isometric



2F Plan



## ENLARGED SHARING

The 'sight' curtains are largely pulled back, as the 'touch' curtain beads from the floor above drape down creating a mildly partitioned but largely open learning area.



INTERMEDIATE

As the 'sight' curtains are pulled, a more enclosed and intimate classroom starts to be defined, but the flexibility between spaces still remains.



## INDIVIDUAL CLASSROOM

An opaque 'sight' curtain creates an ambient, safe space for individual study, while the semi-permeable 'tactile' curtain invites students to engage the outdoors.





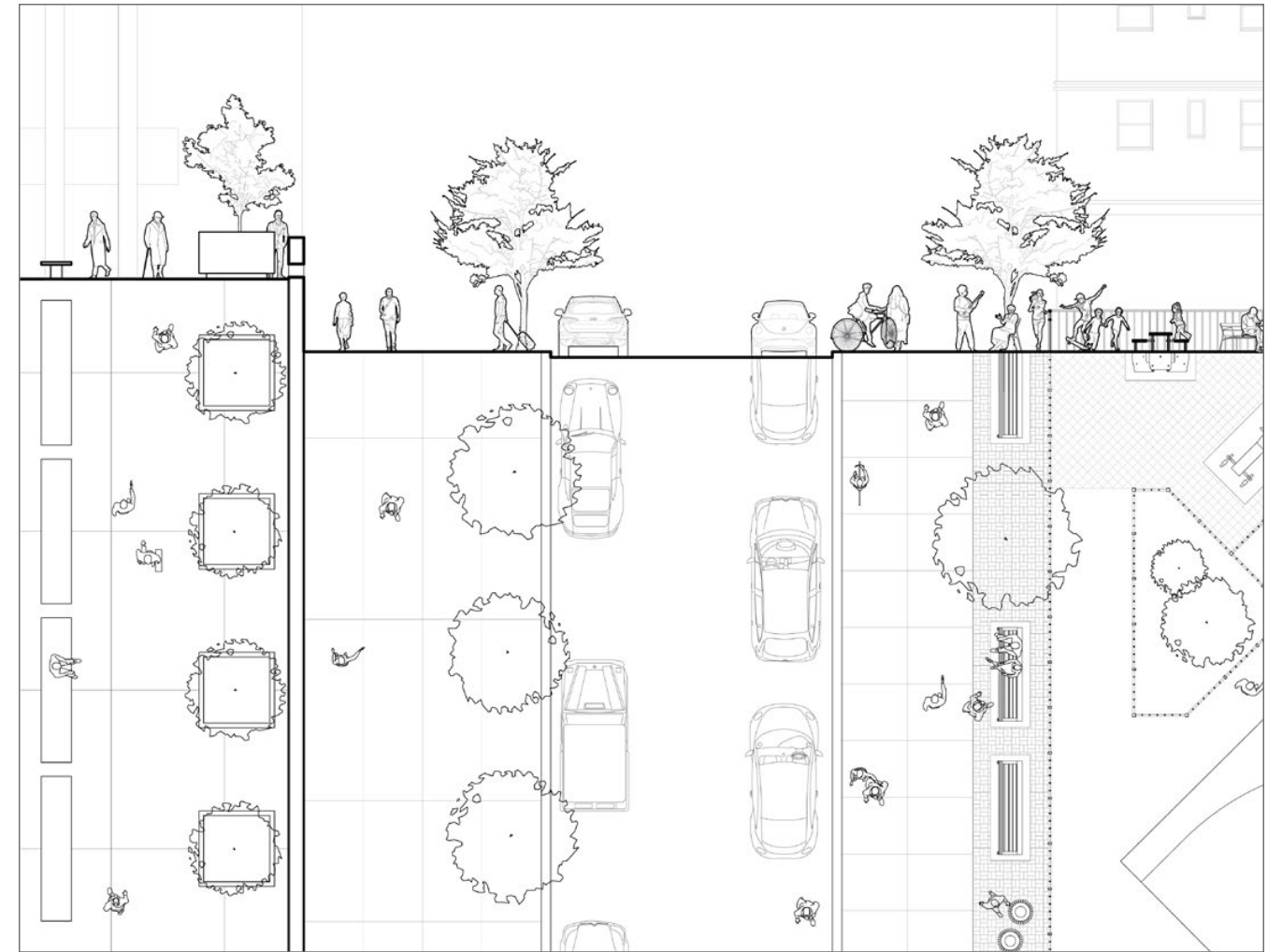
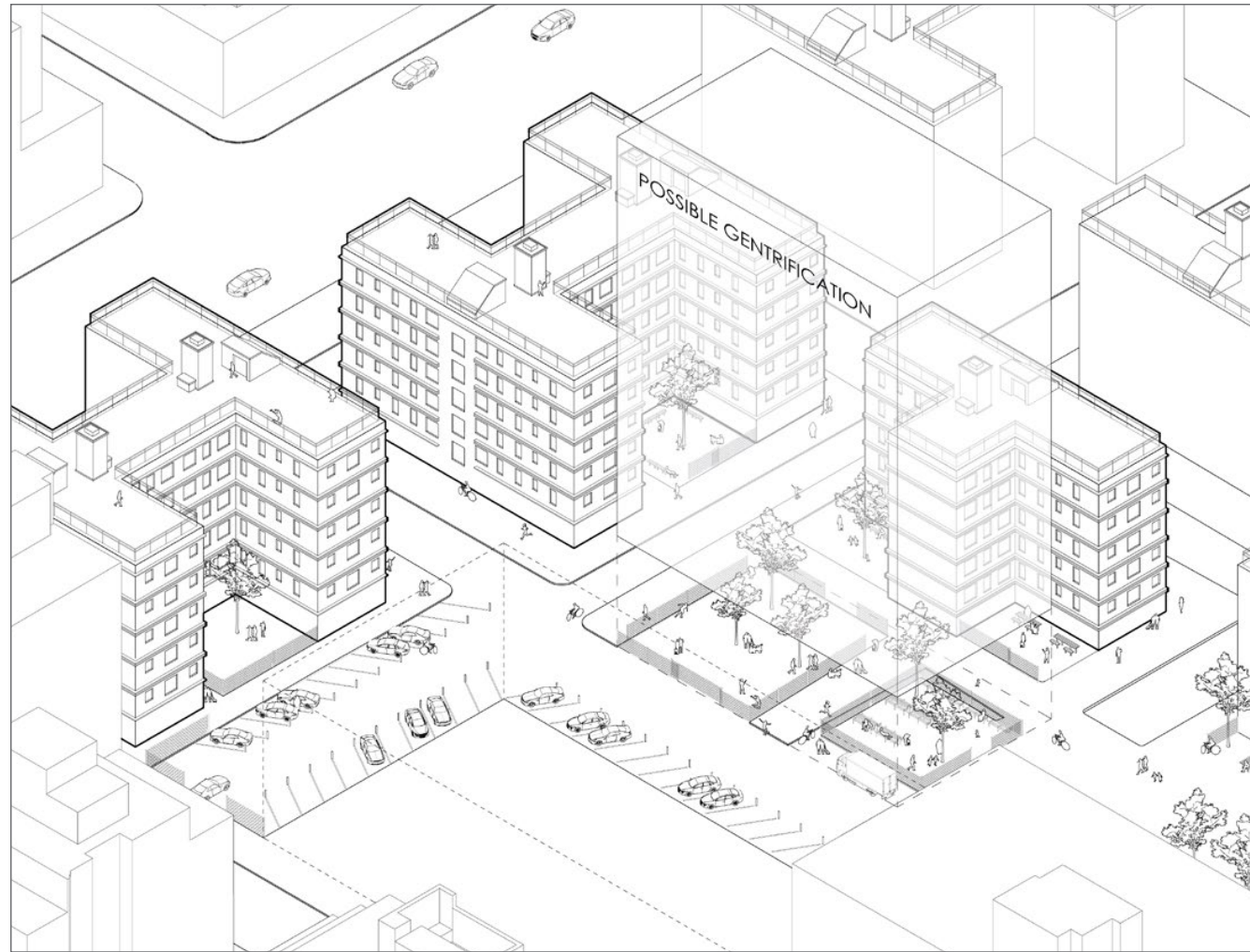
## RECASTING THE COLLECTIVE

DEMOLISHING UNPHYSICAL BOUNDARIES AND FOSTERING COMMUNITY

Recasting the Collective breaks down both physical and nonphysical boundaries of the Amsterdam Houses community facing gentrification. Resident-run studios and pockets of common spaces built with recycled bricks of former barrier walls introduce social services and the local circulation of capital; while interconnected terraces extend domestic space and foster a sense of collectivity.

Year of completion:  
Project type:  
Instructor:

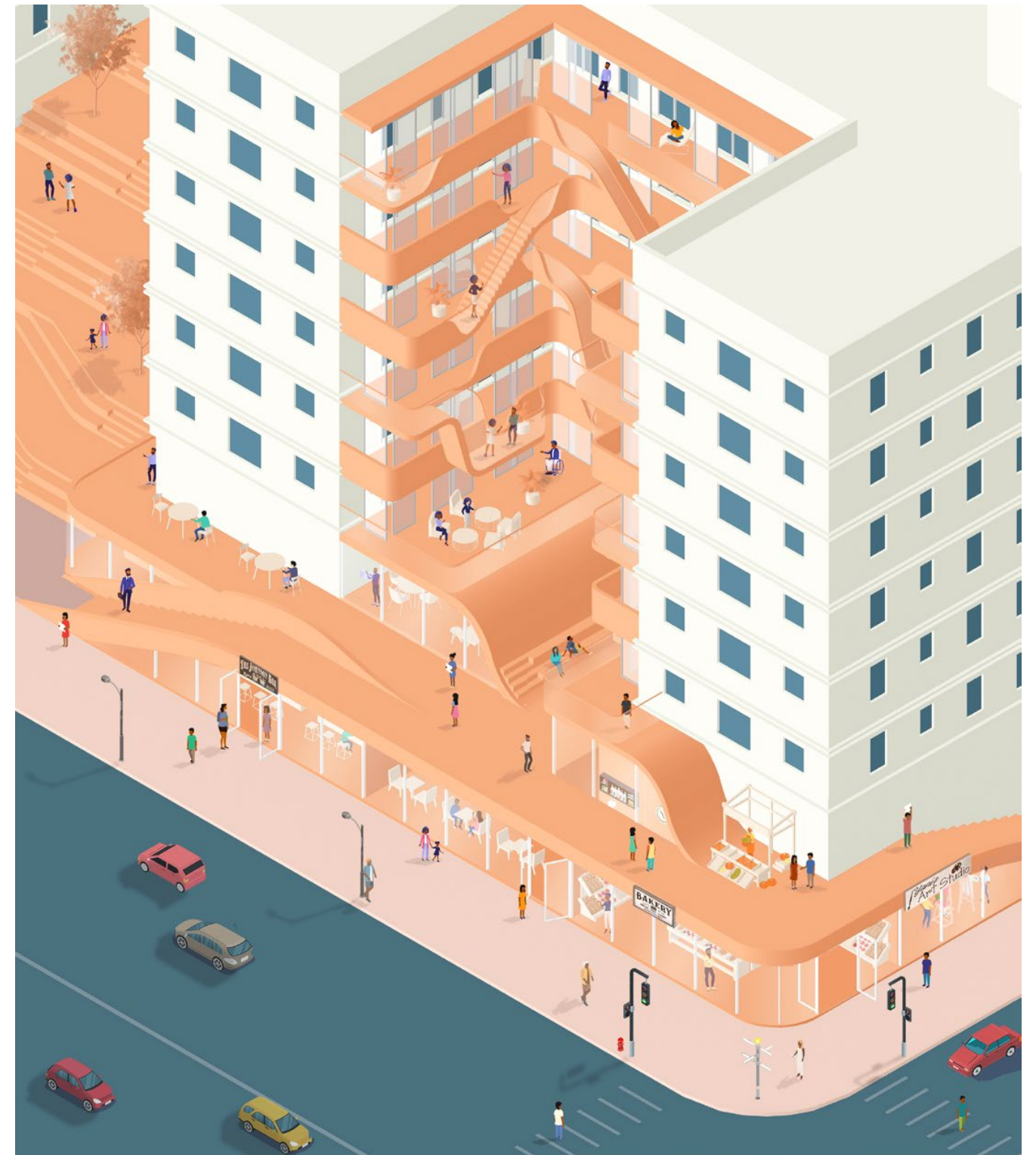
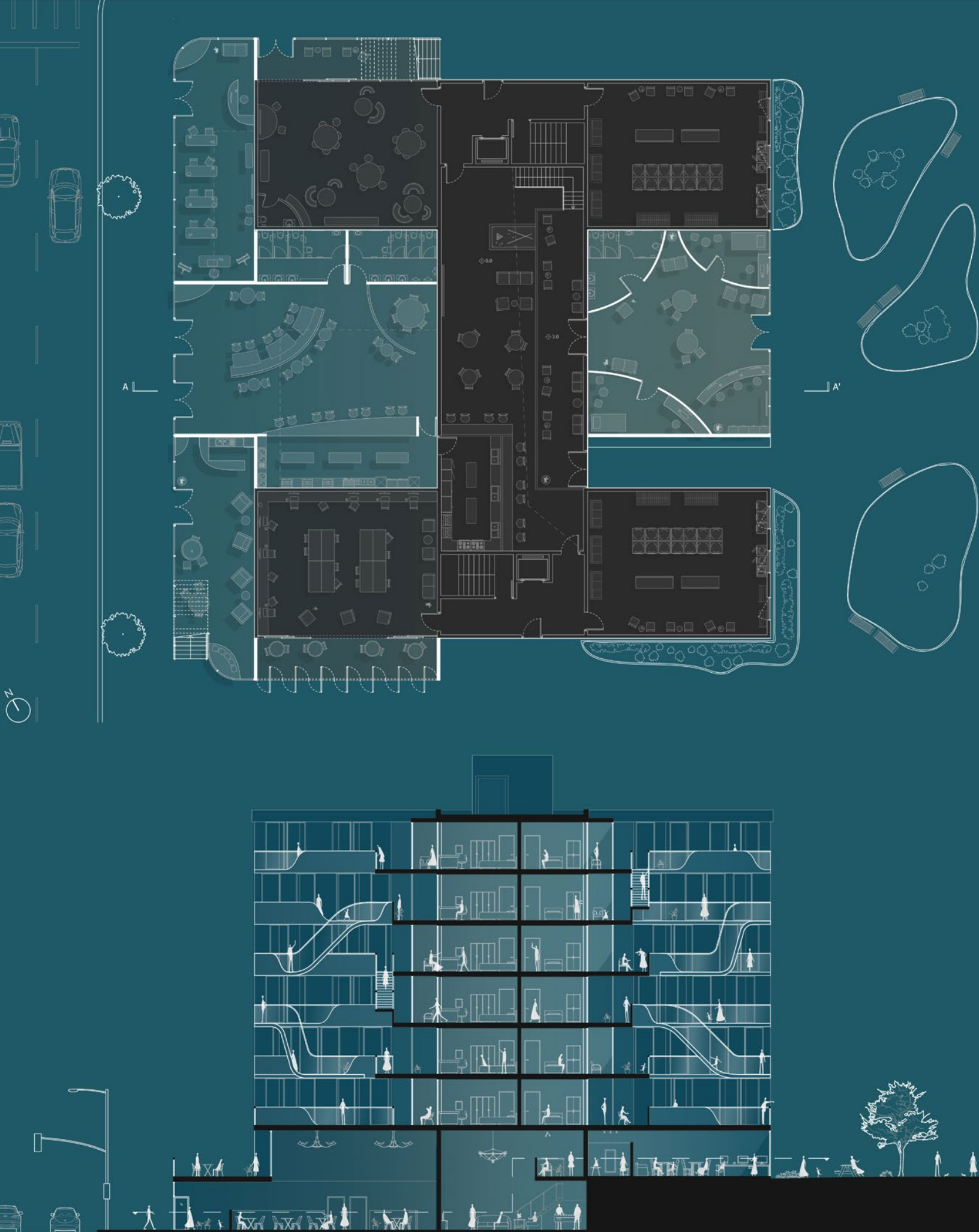
Fall 2020  
Individual Studio  
Prof. PUIGJANER, Anna



Gentrification as an unseen boundary



Street level walls and elevated sidewalks as devices of social control



Focusing on the West End Avenue edge condition, the prominent brick retaining wall segregating the NYCHA community from the streetscape is removed.

Instead, spaces of productive labour are generated on the ground floor, where self-run small businesses and art studios allow the residents to express themselves, while also bridging the income boundary as the dollar is being circulated within the community, as opposed to outside larger corporations.



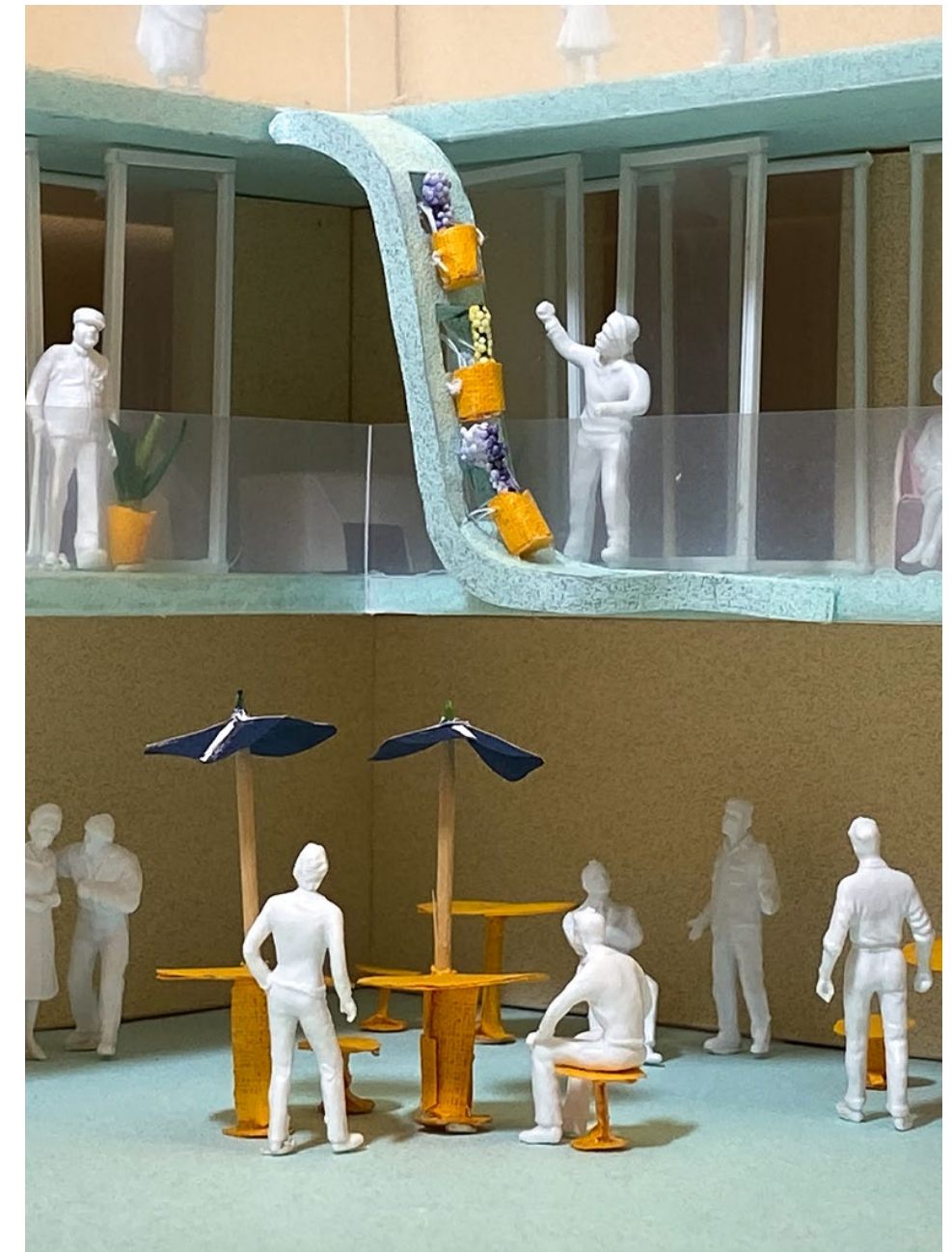
EXTENSION OF PRIVATE SPACE

The existing facade of the NYCHA housing, consisting of small windows and bricked walls, could be interpreted as another visual boundary of the site. Void spaces are created at the original windows to create full height openings, allowing for an extension of the residents private space and an expansive outdoors view.



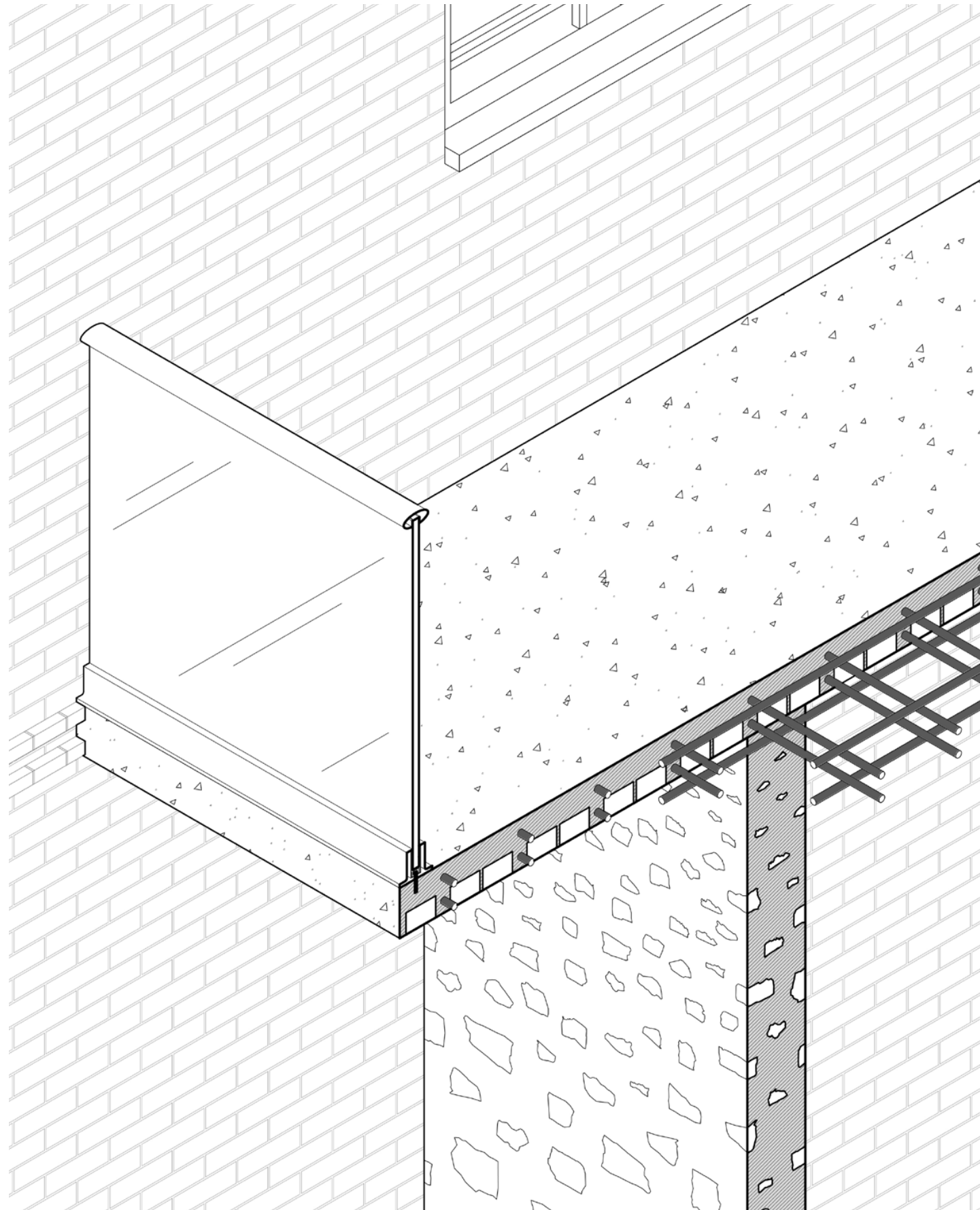
WINTER GARDENS AS SEMI-OUTDOOR SPACE

Winter gardens not only act as an extension of residents' private space, but also improve the thermal performance of the building, insulating the apartment during the harsh winters of New York City.

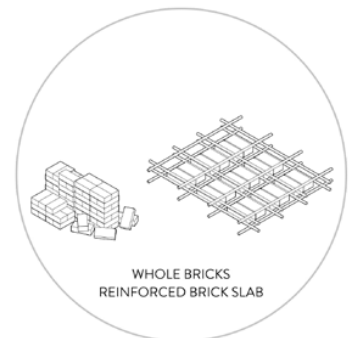
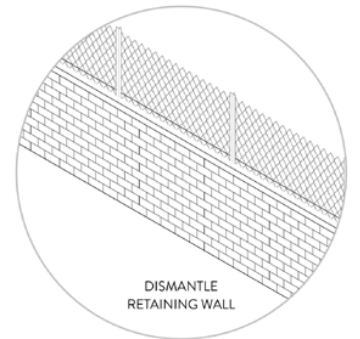


INTERCONNECTED BALCONIES FOSTER COLLECTIVITY

Stairs and ramps take on the curvilinear forms of the ground floor interventions, creating interconnected balconies which allow for vertical connectivity between households and promote the expression of home and culture.



Using the bricks obtained from the excavation of the G/F street level wall, the project explores an eco-friendly concrete which reuses broken bricks as large pieces of aggregate to reduce cement paste consumption.





**MICHAEL LAU**  
COLUMBIA GSAPP