

SIRAPHOB **KUPTIPHONGKUN**

GSAPP | MSAAD PORTFOLIO

Columbia University

IN THE CITY OF NEW YORK

THE GRADUATE SCHOOL OF ARCHITECTURE PLANNING AND PRESERVATION

400 AVERY HALL

May 15, 2024

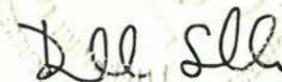
Siraphob Khuptiphongkun
M.S. Advanced Architectural Design

Dear Siraphob,

I am very pleased to inform you that you have been selected to receive the M.S. AAD Program's **Peer to Peer Award**. This non-monetary, student-nominated award is given in recognition of outstanding service to classmates, faculty, and school.

Please accept my congratulations and those of the faculty.

Sincerely,



Danielle Smoller
Associate Dean
Academic and Student Affairs
Graduate School of Architecture, Planning and Preservation
Columbia University

01

INVADING
the INVASIVE



02

EELS
& EBB



03

ALGAE + EGGS
and ARCTIC



04

SERVED with
the STAGE



01

INVADING the INVASIVE

BREATHING with an UNLIKELY ALLY

Course: Summer Studio 2023

Professor: Nerea Calvillo | TA: Simran Raswant

Location: Freshkills, Staten Island, NY

We identified the hard landscape of the Staten Island Mall and its surrounding new neighborhoods as invasive landscapes, whose existence are detrimental to older neighborhoods in the north of Staten Island, whose lower elevation made them bear the blunt of the redirected street flooding.

We utilized *phragmites australis*, an invasive species, as a means to return the commercial blocks to a soft landscape through series of small interventions, such as puncturing small holes across the landscape and setting up fabric barriers to guide the spread of the phragmites during hurricane season.

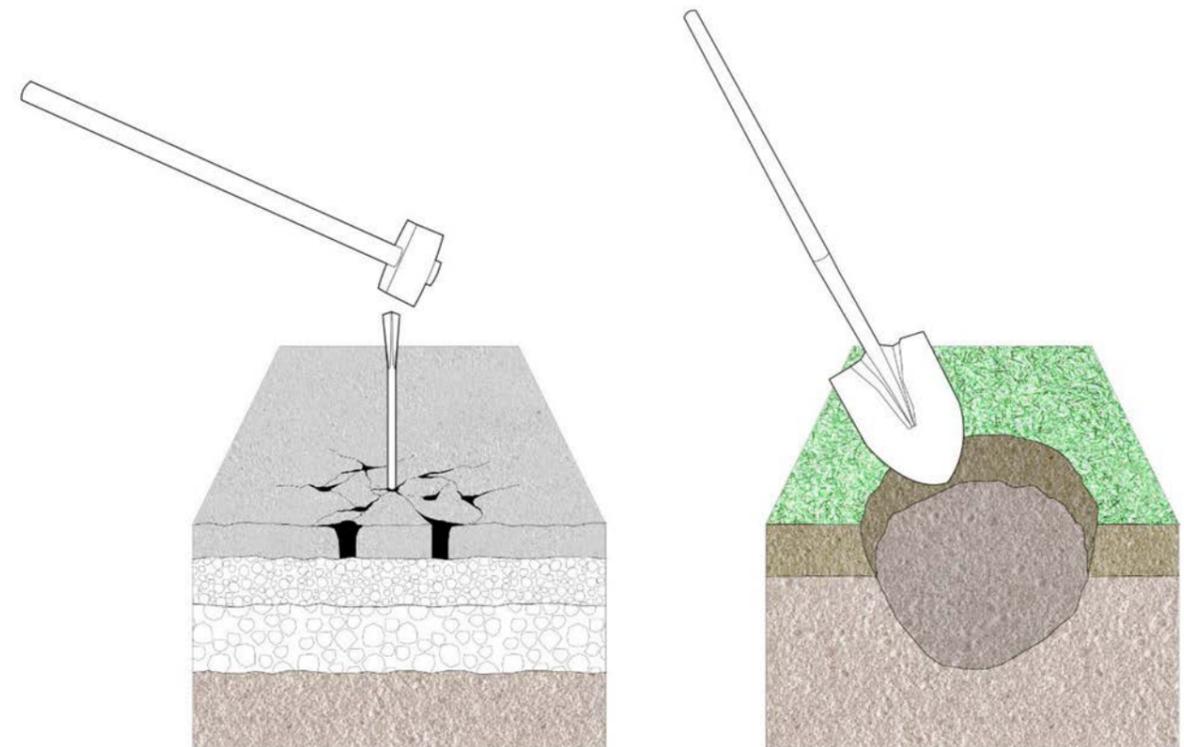
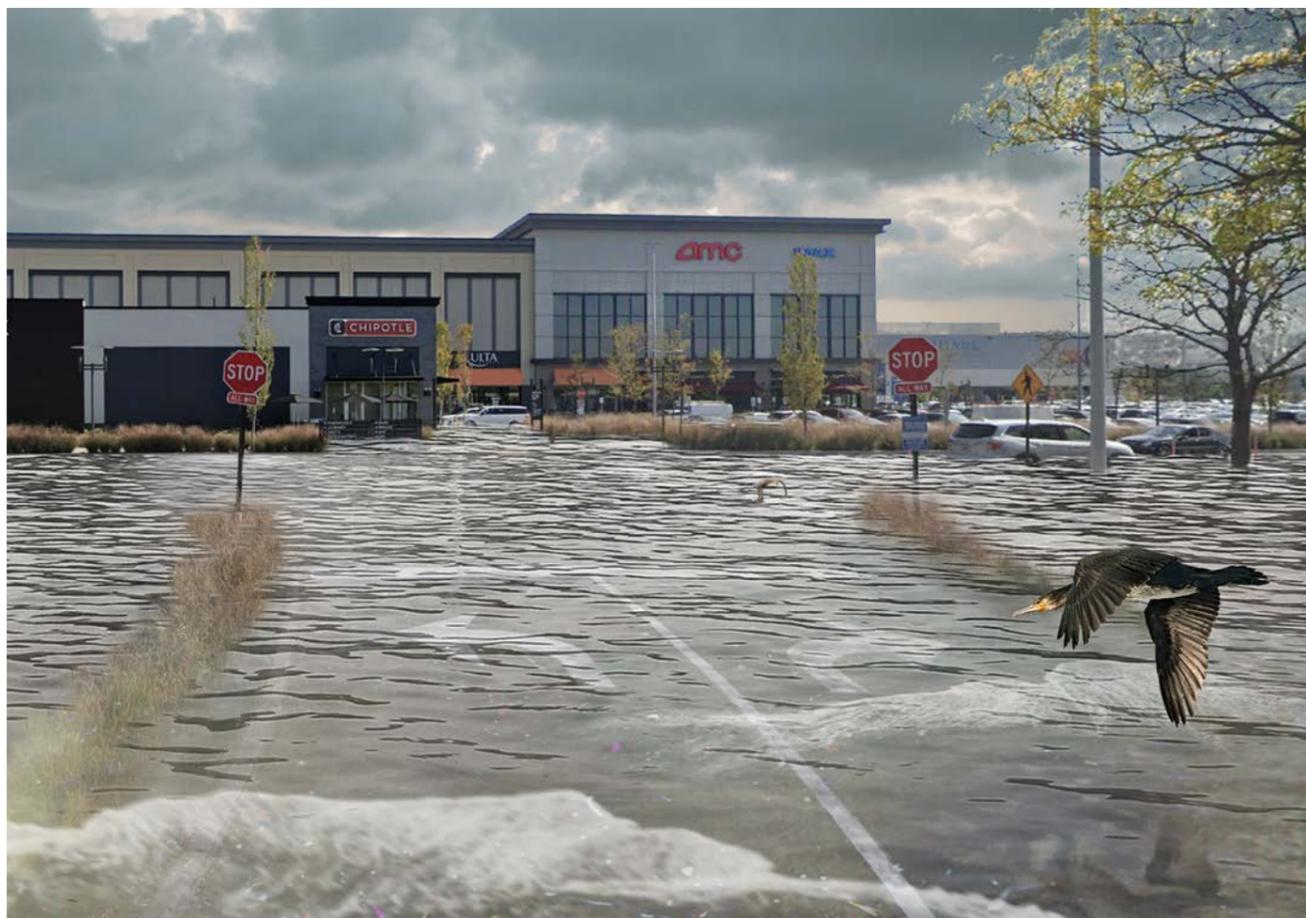
By allowing the soil to breathe through phragmites as an invasive breathing machine, we undrown flood-prone, old neighborhoods of Staten Island by drowning invasive landscapes with invasive species.





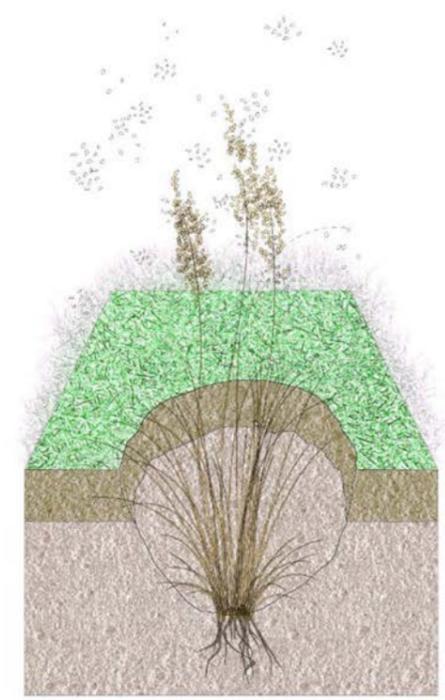
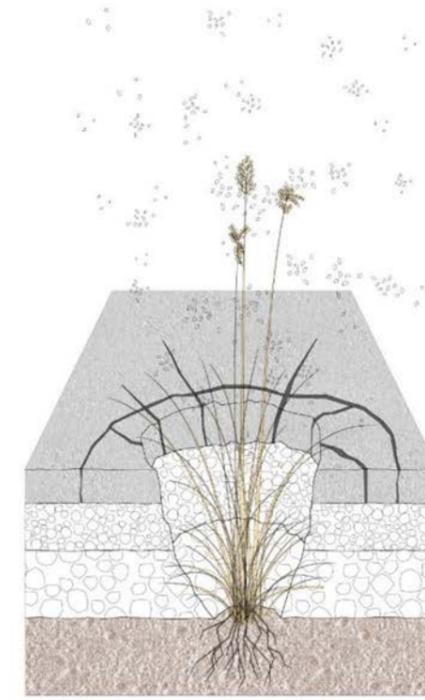
PRESENT

We identified the relatively newly constructed shopping mall and golf course as invasive landscapes due to the harm they caused.



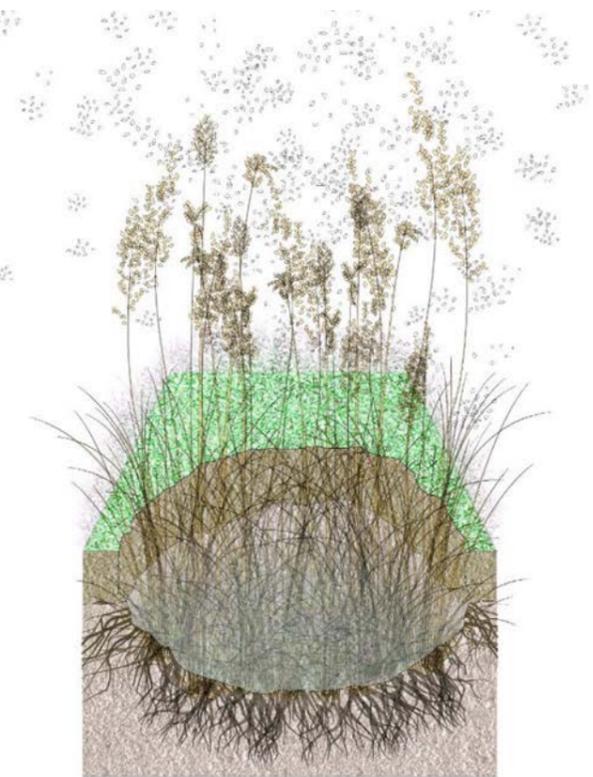
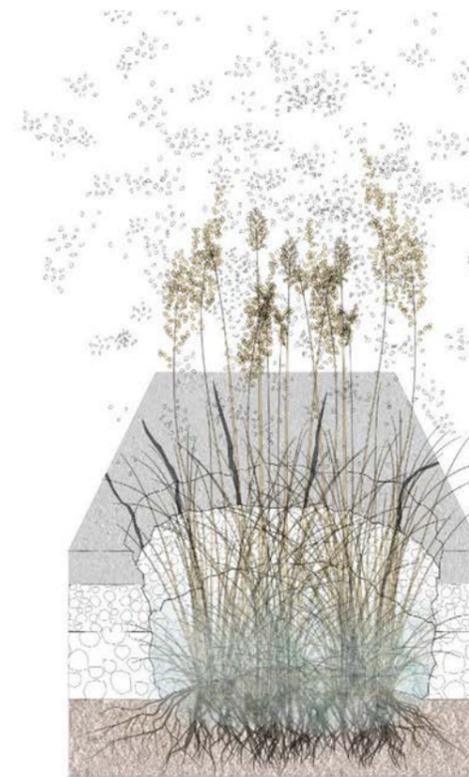
PERFORATED

The first step of the project is perforating the grounds by destroying the hard surfaces.



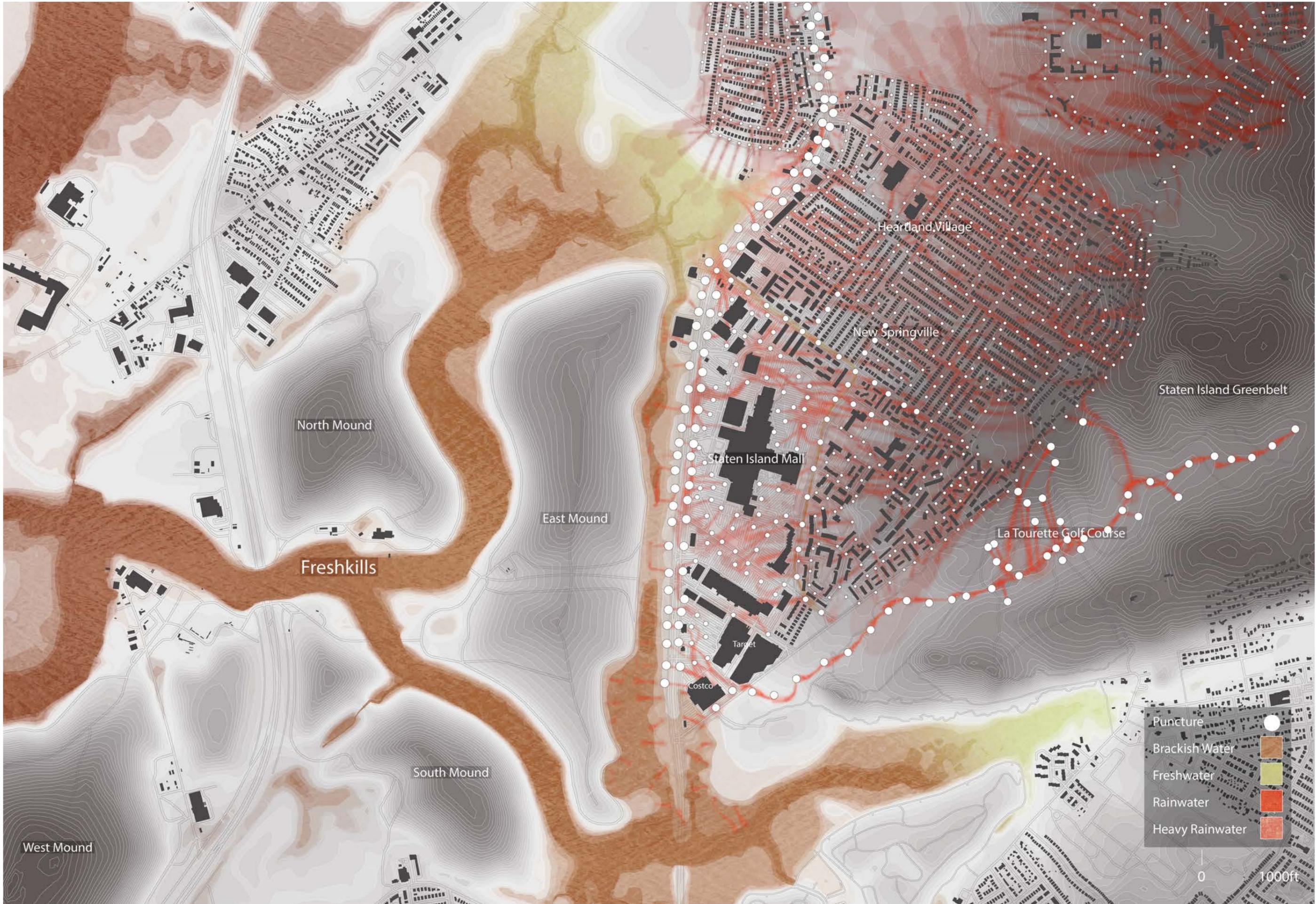
SPREAD

The increasing storms in hurricane season, which coincides with the phragmites' seed dispersal period, will intensify their spread.



OVERTAKEN

The phragmites' expansive root structure and periodical harvest done on our part will help break down the hard surfaces further.





02

EELS & EBB

RESTORING ENDANGERED HABITATS

Course: Seed Bombs (Building Technology)

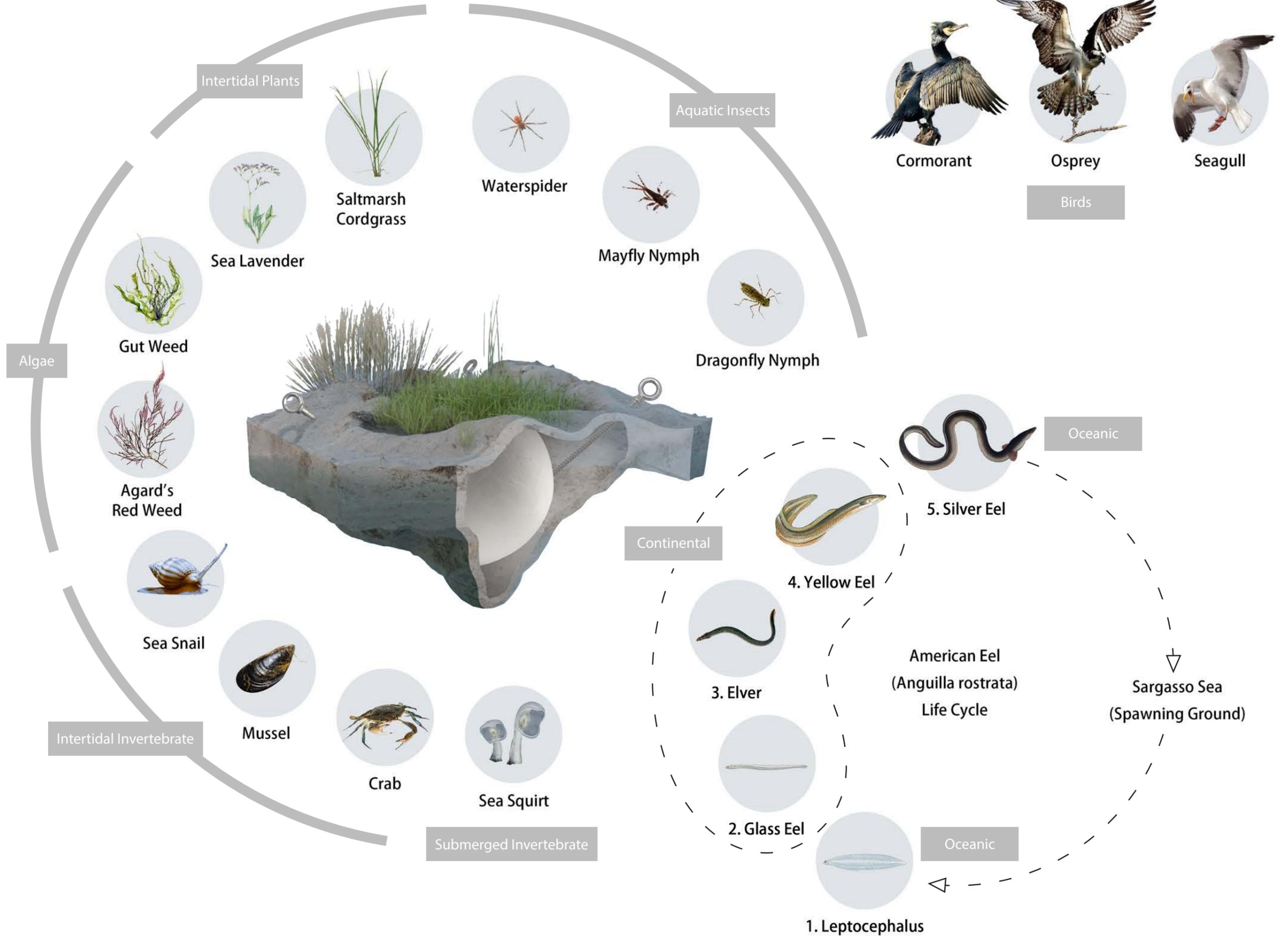
Professor: Emily Bauer

Location: Red Hook, Brooklyn, NY

American eel is an endangered migratory species found along the Atlantic Coast. This project aims to soften the water edge condition of New York City, which have been transformed over time into hard edges that are not suitable for the eels to propagate, by deploying floats that the eels can reside in.

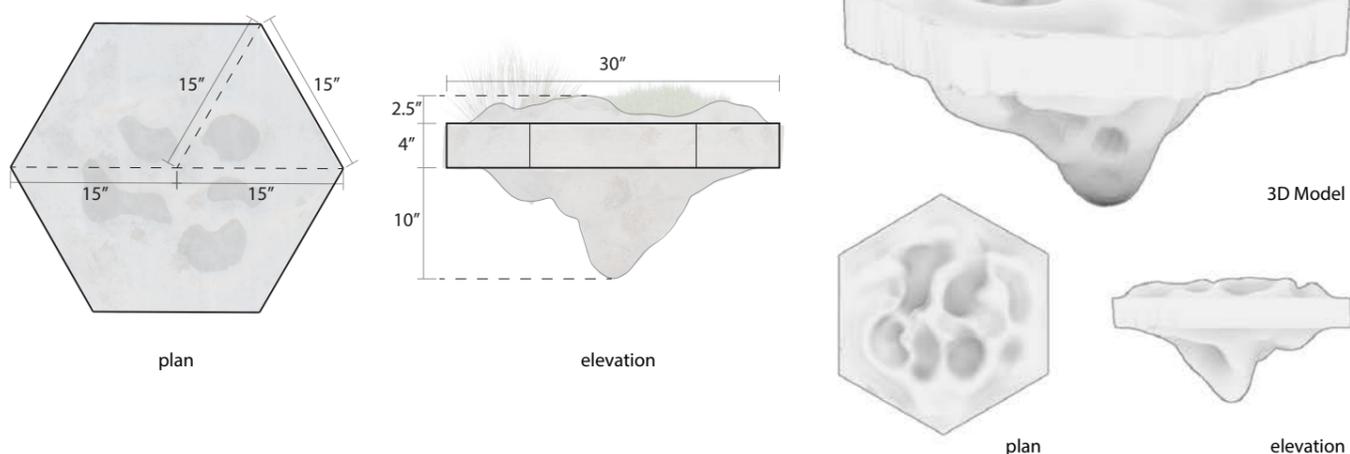
American eels' role in the small bay area at Red Hook, Brooklyn is complimentary with the local mussel populations, which we will utilize in creating concrete for our float.





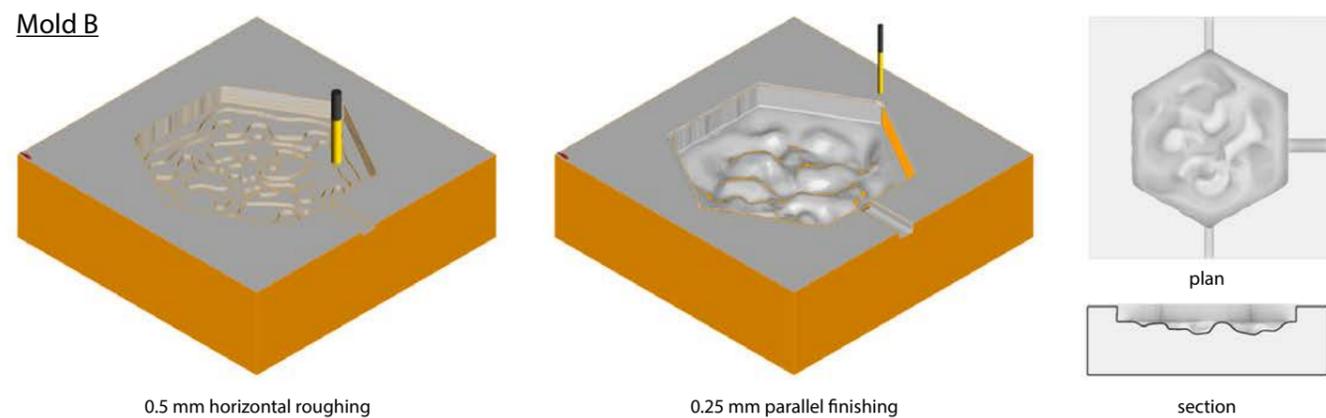
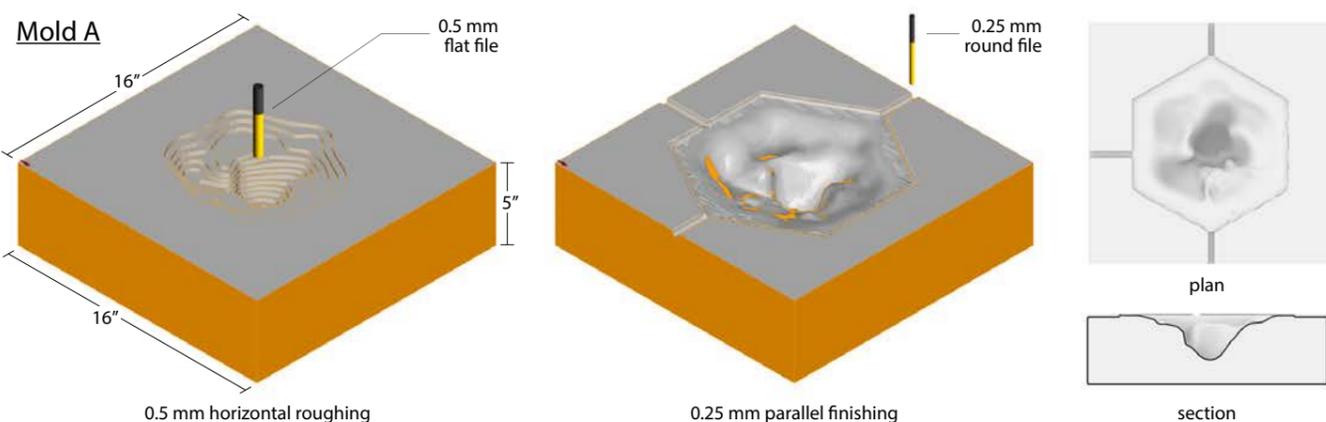
1 Concept + 3D Modeling (Rhino3D + Blender)

Idealized Dimensions



2 3D CNC Model (Rhino3D + RhinoCAM)

CNC = computer numerical control



Lessons Learned :

- CNC machine limitations
 - 5 inch material depth
 - 3 inch file depth
- Concrete limitation + model adjustment
 - Consequently, the float's crust had to be thickened disproportionately to meet 2-inch thickness to prevent the concrete from snapping.
 - The float had to be scaled down to match these CNC machine limitations.

Future Considerations :

- If a larger float is more desirable, consider dividing the mold into multiple parts before reassembling them in further steps.

3 CNC Process



Lessons Learned :

- Wood block made from glued wood scraps is usable, but can result in uneven surfaces
- Wood scraps used for this project are mixed between plywood and hardwood, which required consultation with the shop manager to adjust CNC file setting
- Glued wood should be dried for 2-3 days before entering the CNC machine to prevent delamination
- Small, thin scraps of wood can be torn off by the CNC file despite wood glue application

Future Considerations :

- Identify and separate plywood from hardwood scraps when making glued wood boxes
- Avoid using small wood scraps
- Potential experimentation on how different wood qualities can affect the surface finishes

4 Preparing the Mold before Concrete Casting



step 1 : apply tape

step 2 : apply vaseline



step 3 : add top layer materials

step 4 : position wood frame + foams

Lessons Learned :

- Applying tape and vaseline helps preventing concrete from seeping into the wood mold
- plastic / trash bags can also be used, but might be difficult to hold the desired shape
- The shrunk size and thinness of the float limited sufficient use of wood and foam to increase the float's overall buoyancy

Future Considerations :

- Different textures of tapes can create different effects on the float's texture
- Larger and thicker float should be less limited by the required minimum thickness needed by concrete to maintain integrity

5 Concrete Mix



Concrete Mix Ratio :

- Rockite cement 12.75 lb
- crushed mussel shells (sand substitute) 1.125 lb
- crushed mussel shells (gravel substitute) 1.125 lb
- water 7.5 lb

Future Considerations :

- More testing of concrete mix ratio is needed
- Rockite made the float considerably heavy, so other cement should be tested
- Water ratio can perhaps be increased, depending on qualities of other materials

6 Concrete Casting



Lessons Learned :

- The mold needs to be clamped evenly and placed on a plate to contain any spilled concrete
- Concrete should be poured into the mold while it is still runny after being stirred for about 12 minutes
- Concrete can dry really fast and waiting for it to feel stickier can result in late pouring and ruin the casting
- Water ratio can perhaps be increased, depending on

Failures :

Attempt #1 :

- In our initial attempt, we misjudged the amount of concrete required for our float
- We also failed to properly evenly clamp the sides of the mold, which resulted in some concrete leaking out

Attempt #2 :

- In our second attempt, we waited too long to pour the concrete, which started to dry during the pouring process



Attempt #1



Attempt #2

7 Float Testing (Failed)

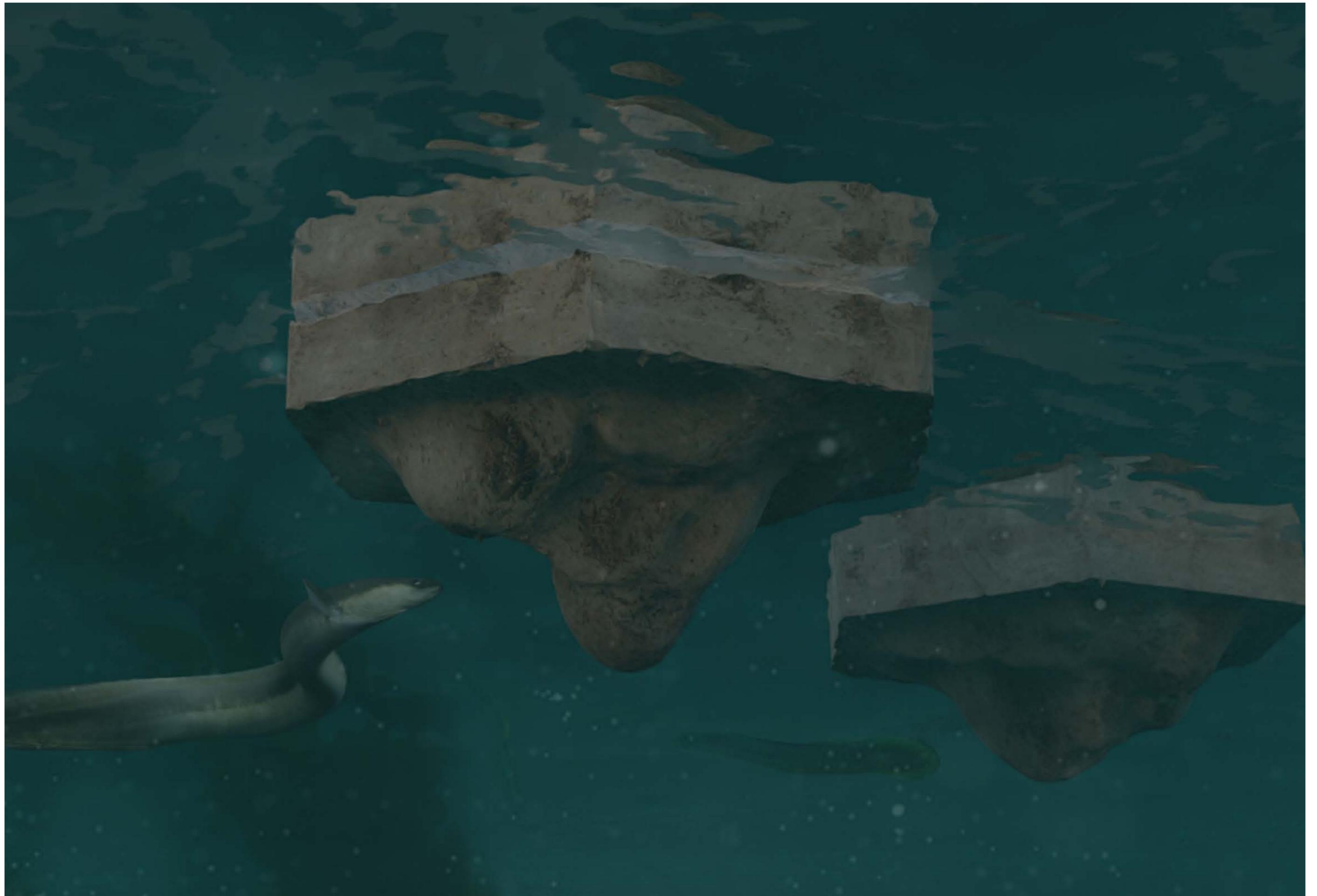


Lessons Learned (Summary) :

- Our current combination of concrete mix and amount of buoyancy provided by foams was not enough to keep the float afloat
- The shrunk scale of the actual float also prevented more positions where the foam to be inserted, because of the minimum thickness required for a concrete layer
- CNC machine had more restriction than we actually thought and any future work should be consulted with the shop manager early on
- Wood scraps worked well as base materials for the mold, but plywood and hardwood should be separated to not create problems with the CNC file settings
- Applying tape and vaseline on the mold helped prevent concrete from seeping into the wood
- The current mold can still be used to cast and test other materials or different concrete mix in the future

Future Considerations (Summary) :

- Larger molds should be separated into more smaller parts to meet the CNC machine's restriction before assembled together later
- Different brands of cement should be tested, because Rockite is very heavy
- Different mix ratio should also be tested
- Plastic / trash bags can be used in place of tape and be reused again multiple times, depending on their individual durability
- Even smaller molds can be made and used for testing inherent buoyancy of casted materials



03

ALGAE+EGGS
and ARCTIC

CHICKEN FARM + RESEARCH CENTER

Course: Advanced Studio V

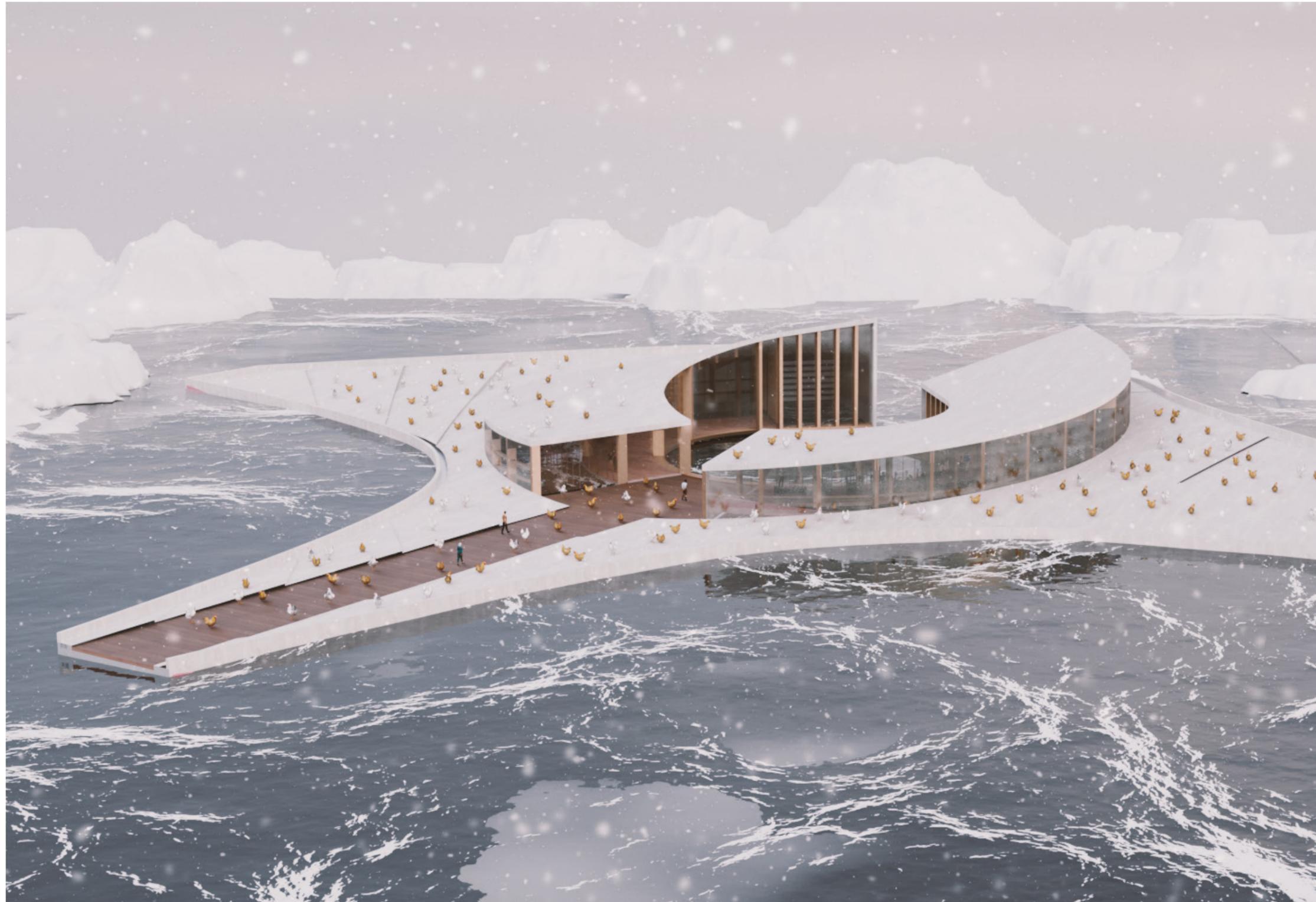
Professors: Leslie Gill & Khoi Nguyen

TA: Kriti Shivagunde

Location: Uummannaq, Greenland

This project aims to tackle a chain of ongoing problems in the Arctic Region by focusing on different types of algae within the region as indicators for the ongoing transformation of the landscape. The decline of sea ice algae and kelps, as well as the rise of pink snow algae are all connected to each other and the Arctic Region at large.

After researching these algae and other related actors, I proposed that introducing chickens to Arctic may help deal with ongoing issues within the region through the chickens' interactions with these algae and a larger ecosystem.





Mercury in the soil from 0 to 300 cm (mg Hg/m²)

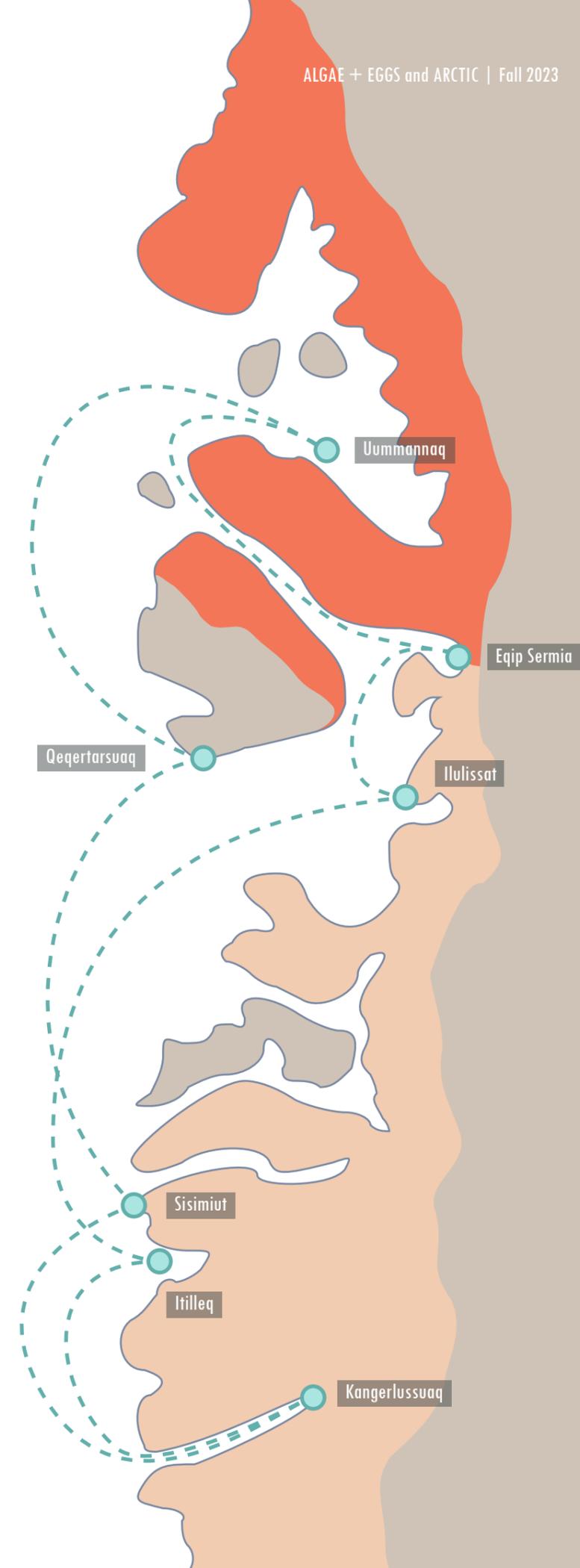


With the Arctic region's temperature warming up, the sea ice which covers the northern ocean year-round is decreasing at an astounding speed. Many nations see this defrosting of the Arctic region as an opportunity to secure natural resources and further expand the range of human activities, which were once prevented by the Arctic's harsh environment.

However, what the melting of the Arctic will reveal aren't exclusively promised riches and opportunities, but also harmful elements, such as a large quantity of mercury stored within the permafrost layer, which will only be released faster with the projected rise in human activities in the region.

Within Greenland, the Uummannaq Fjord region, where the country's northernmost ferry terminal is located, has the largest amount of stored mercury in its permafrost layer.

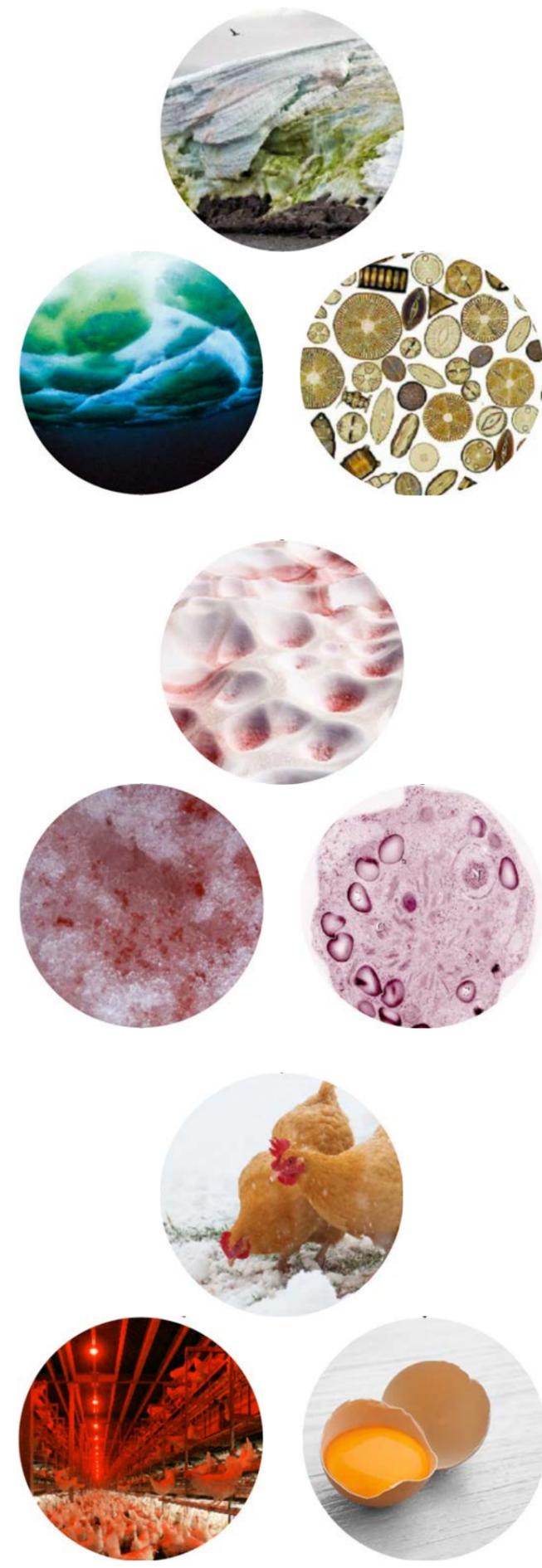
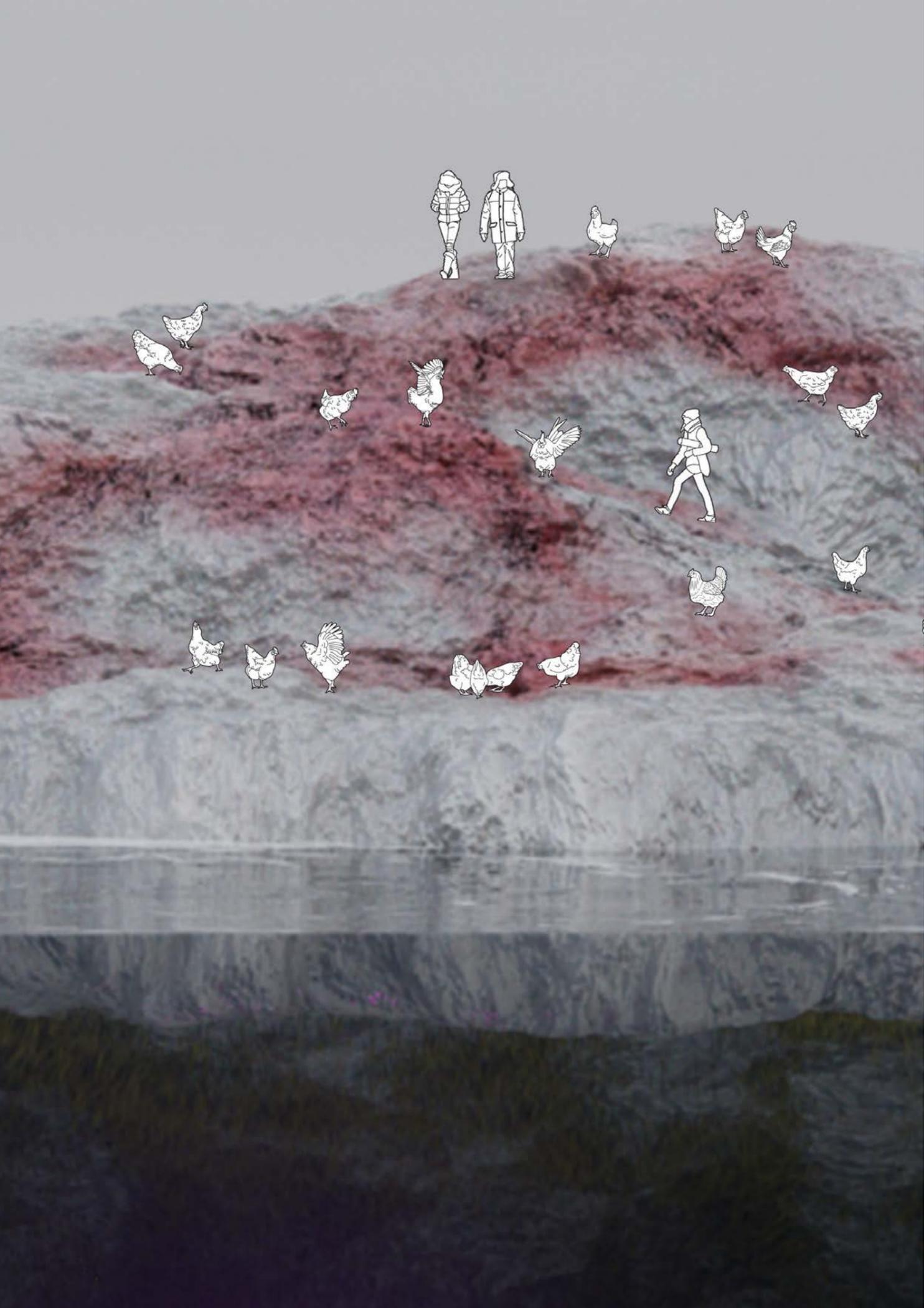
A Disko Bay - Cargo and Ferry Routes



One factor that supports this recent rise in human activities within the Arctic is many settlements' growing reliance on imported products; mainly consumer goods. This resulted in more shipping between these settlements and their suppliers.

One identified cause of this shifting trend range from gradual lost of knowledge in regards to traditional food preservation techniques, where nutritional values from needed for survival in the Arctic are found, since plants are much more harder to harvest in the region.

Another identified cause has to do with the population of animals these products are made from. Many coastal environments in the Arctic are declining in biodiversity due to the thinning out of sea ice and algae species which dwell within and underneath it.

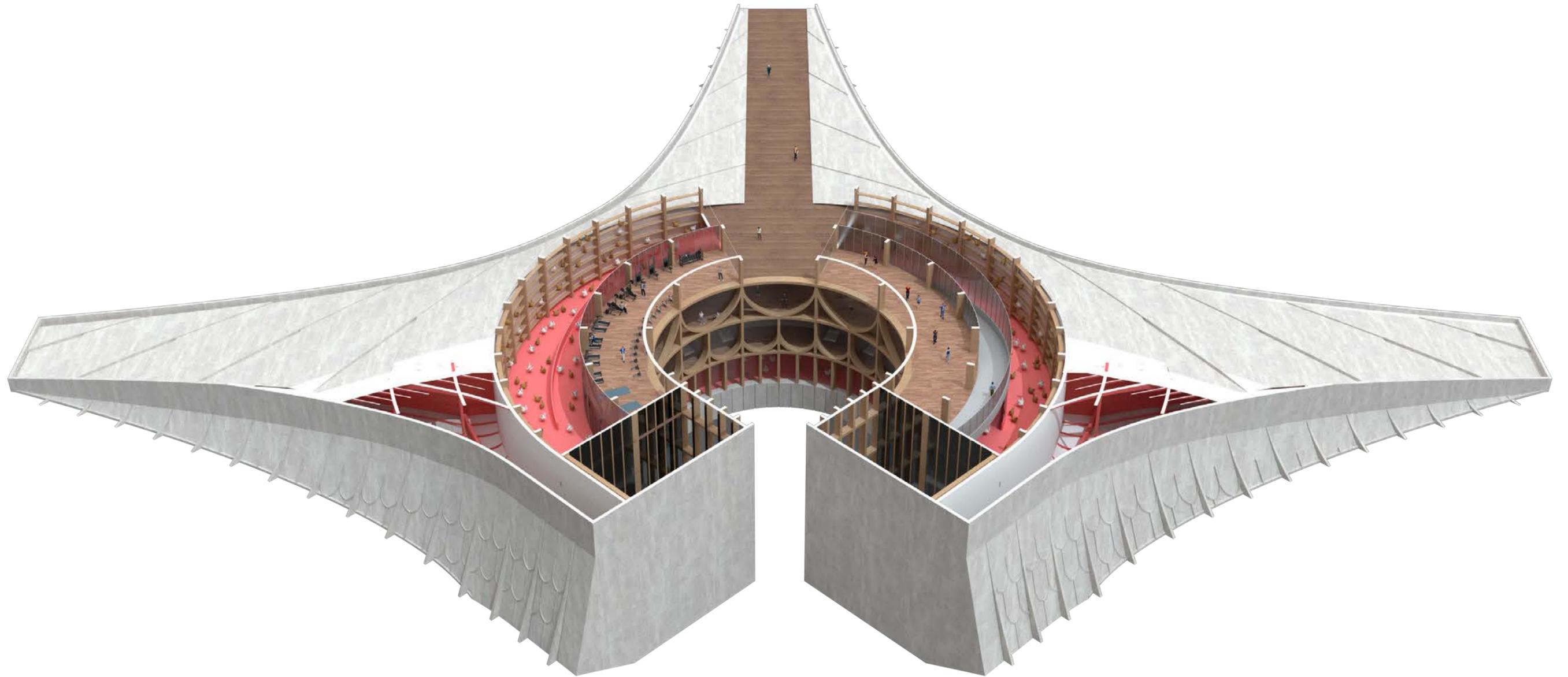


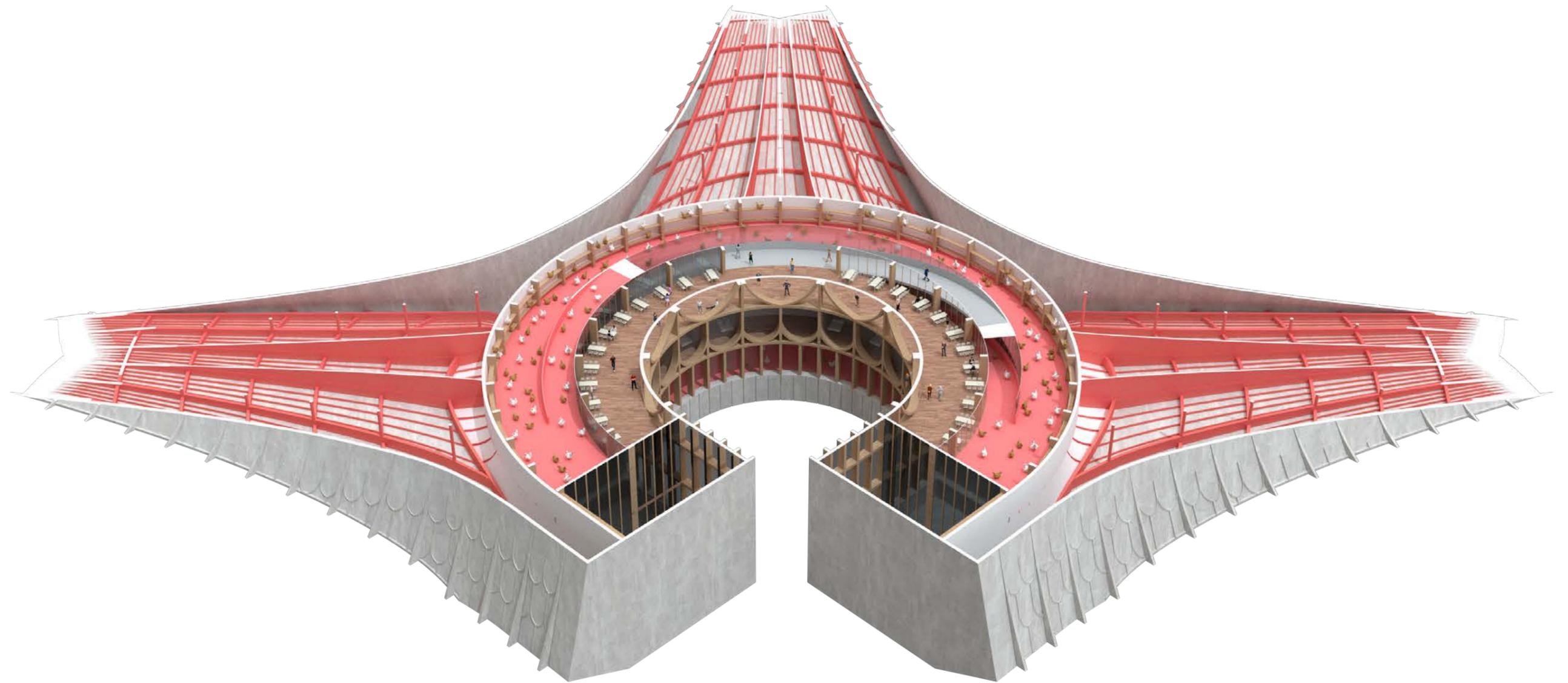
SEA ICE ALGAE (diatoms) are the primary producers of Arctic coastal environments. They can grow under and within sea ice and act as an energy source for other organisms, especially during winter months, when there is little to no sunlight for the phytoplankton to photosynthesize with. The melting of sea ice decreases the overall amount of these algae and, consequently, decreases the population of other marine species.

PINK SNOW ALGAE (*Chlamydomonas Nivalis*), grows well in moderately cold temperatures, like underneath and on snow surfaces. However, this algae can cause snow to melt even faster by lowering the surface albedo of snow, making it reflect less sunlight. The pink color is normally only exposed after a considerable amount of snow has already melted or through applied pressure on the surface, such as human footprints. Because of its widespread range and low perceptibility, this algae proves difficult to be effectively countered.

CHICKENS were specifically chosen because of their diet and other benefits they can bring to the changing arctic coastal ecosystem. The red pigmentation found in the pink snow algae comes from a protective substance called carotenoid in its cellular layer. This is a necessary nutrient for chickens to lay healthy eggs, which are rich in vitamin D.

The chickens will be roaming and feeding on the widespread algae on the snow surfaces. Meanwhile, their eggs will supplement people with vitamin D, which has become more scarce in the Arctic region due to decline in coastal marine animal population and consequently fermented products from their innards, which have been the main source of vitamin D in this region without a reliable year-round sunlight.





04

SERVED with the STAGE

FOOD, PERFORMANCE, COMMUNITY

Course: Advanced Studio V

Professors: Christoph Kumpusch & Patrice Delington

TA: Javier A. Flores Leal

Location: East Village, Manhattan, NY

With the return of the Old P.S. 64 building to the community of the East Village, many are excited to see it transformed into a community space it once was during the period after its decommission as a public school.

This project reimagines the long-unoccupied building with community access in mind, while also echoing culinary and performative identities of the East Village with a more careful look into the players behind these two industries.

From the data found, many of the workers in these two industries who reside in the East Village, have to commute long distance to work elsewhere. Furthermore, there are visible disparity between average incomes, with those working in food industries being significantly lower than those in performance industries.

Henceforth, the composition of programs within this new building will prioritize free-roaming of community members from the street to the coveted rooftop view, while also using the main performance stage as an anchor for food businesses within the building.

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UPDATES



RESIDENTIAL

ATRIUM

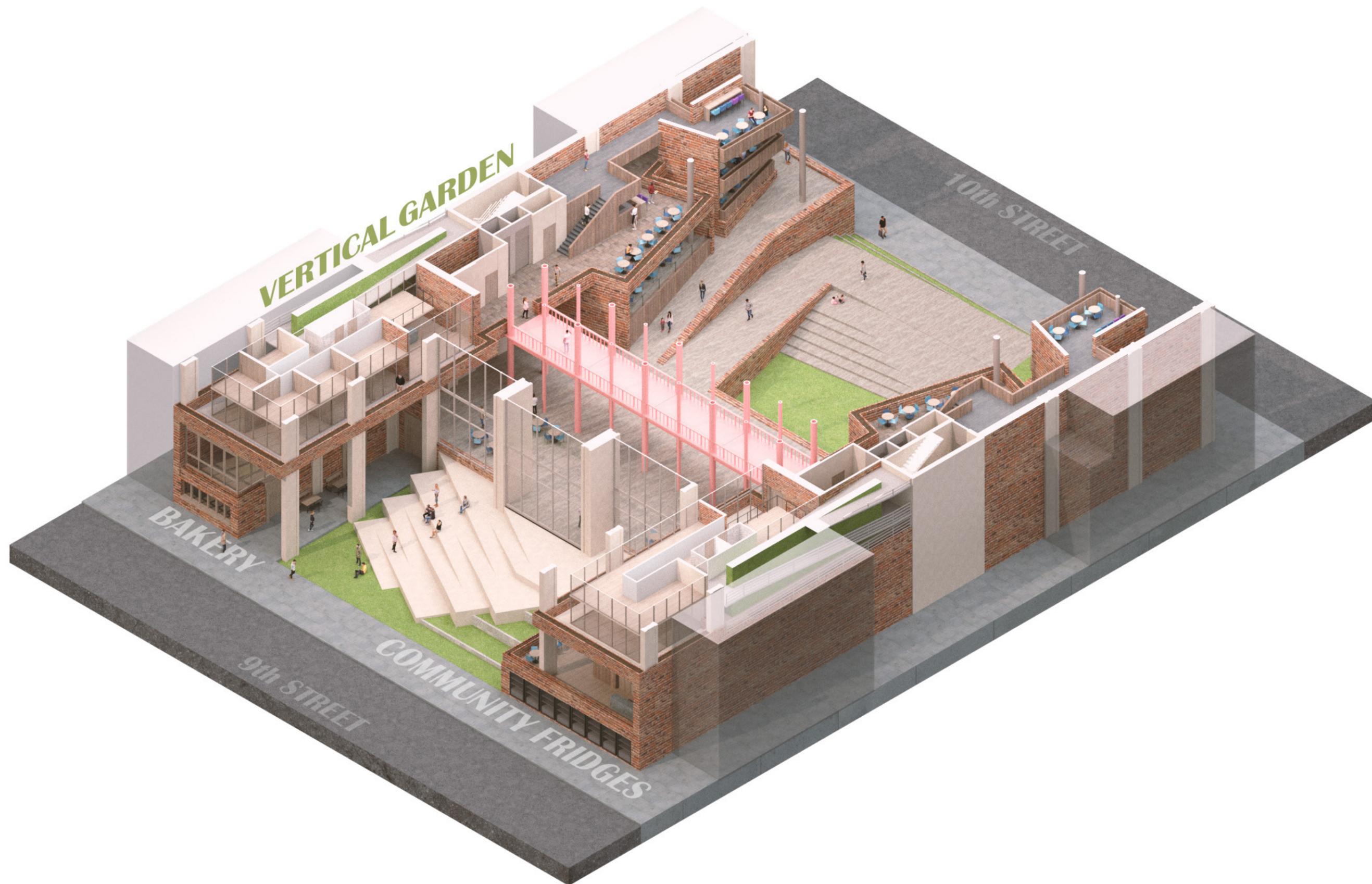
STUDIO

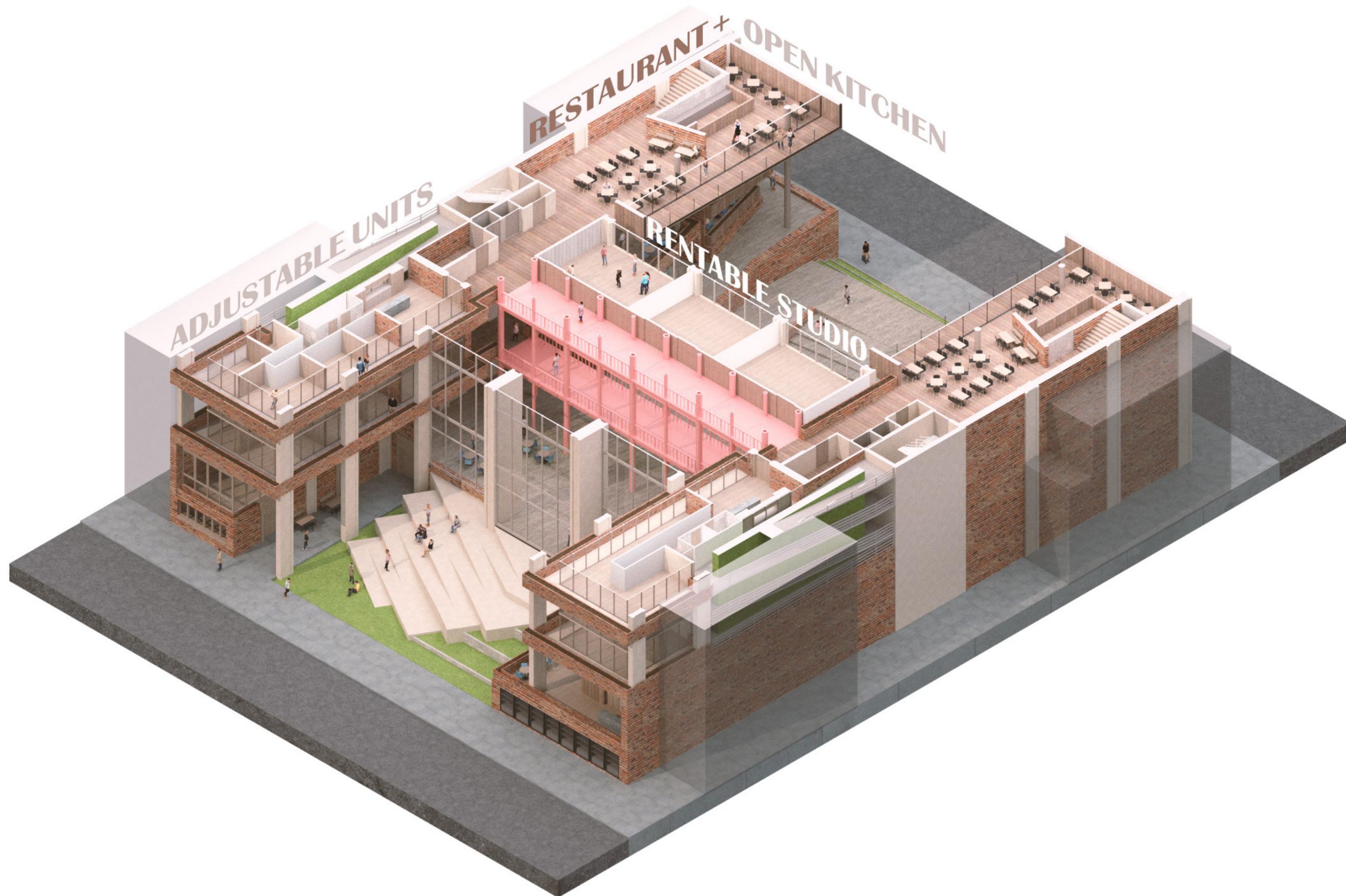
STAGE

RESTAURANT +

PERFORMANCE







THANK YOU GSAPP