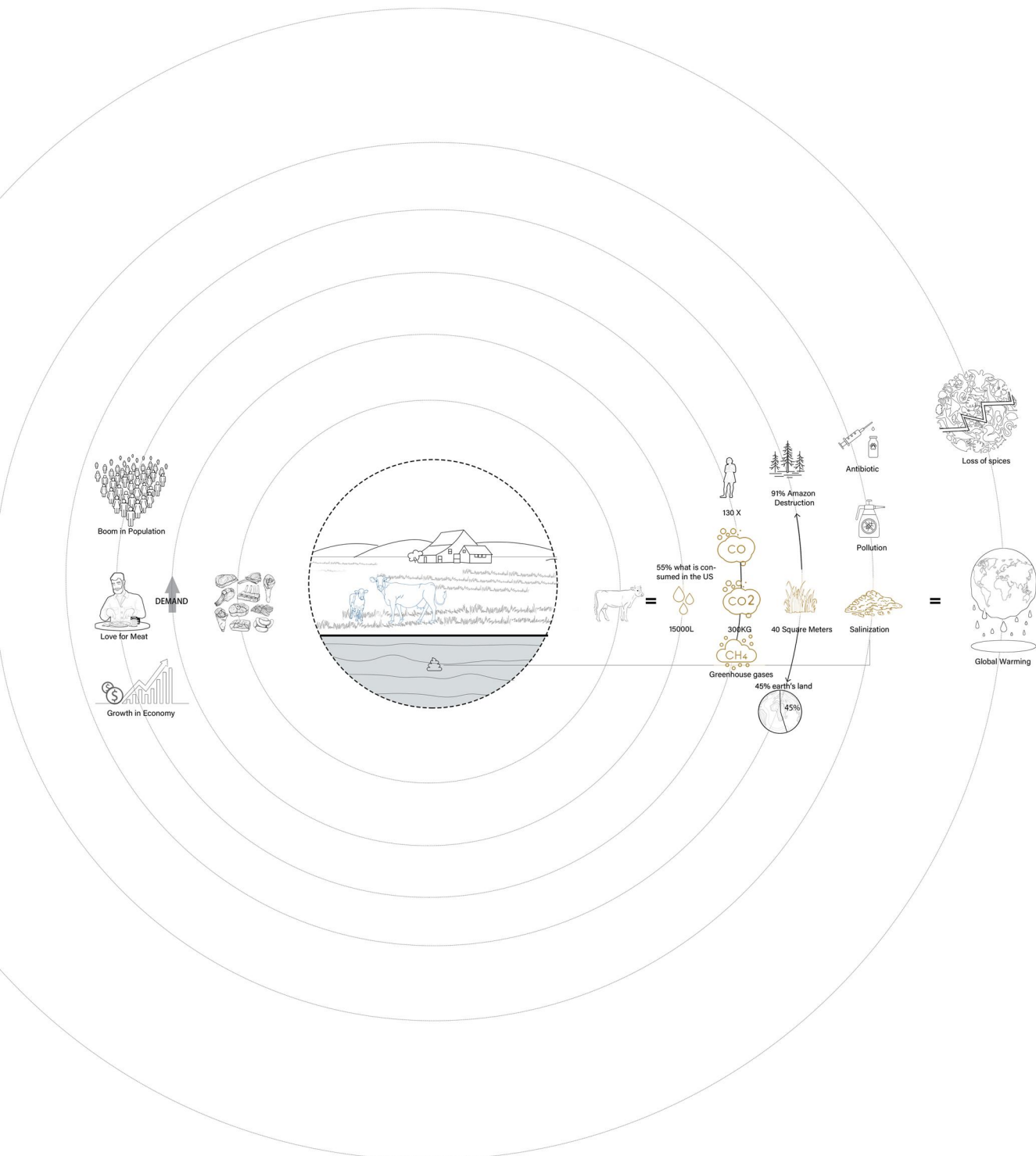


PORTFOLIO

YAO XIAO

Selected works from 2023-2024 in GSAPP

TEL: +1 6465893566
Email: yx2841@columbia.edu



01 Off The Grid Food Community

New York USA

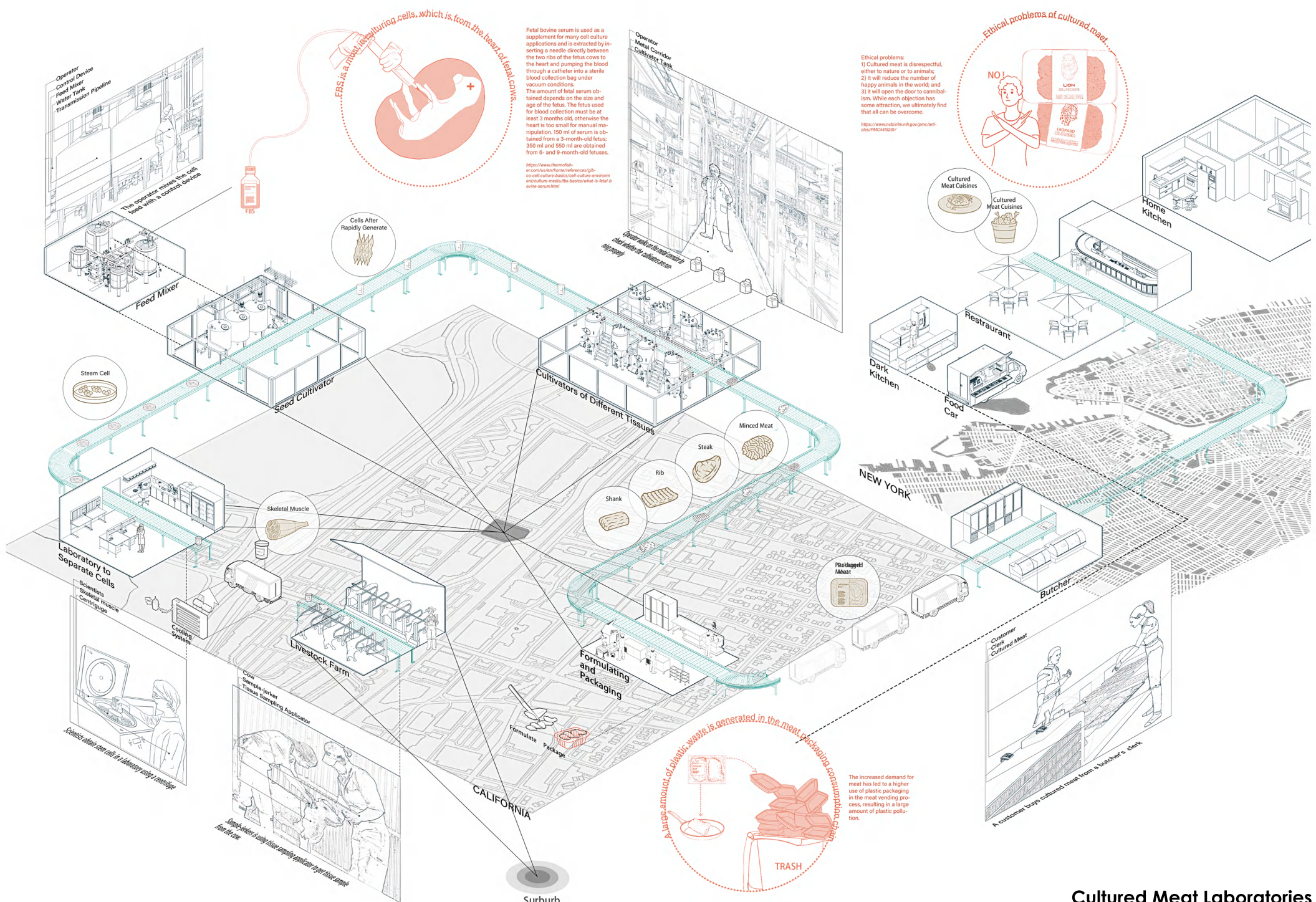
Academic/Individual Work

2023 Summer Semester

Studio 'Atlas Of Architecture For The End Of The World'

Uriel Fogue/ urielfogue@gmail.com

My proposal looks at the cultured meat industry on a community scale in New York City. To do so, I will try to divide the process into four stages. Excluding the steps, packaging and selling, the proposal is to turn the cultured meat industry into a domestic industry. This can be achieved through interventions like roof or garden ranches and public-access community bio labs integrated into various buildings. By minimizing the size of feed mixers and meat cultivators, they can be placed in residential homes or hung outside windows. Lastly, people would be able to consume cultured meat at home directly. This community industry can encourage people to take part in the culturing of meat, challenging the traditional meat industry.



FBS is a animal regenerating cells, which is from the heart of fetal cow.

Fetal bovine serum is used as a supplement for many cell culture applications and is extracted by inserting a needle directly between the two ribs of the fetus cows to the heart and pumping the blood through a catheter into a sterile blood collection bag under vacuum conditions. The amount of fetal serum obtained depends on the size and age of the fetus. The fetus used for blood collection must be at least 3 months old, otherwise the heart is too small for manual manipulation. 150 ml of serum is obtained from a 3-month-old fetus; 350 ml and 550 ml are obtained from 6- and 9-month-old fetuses.

<https://www.themodfab.eu/portal/learn/home/references/gib-co-cult-culture-basics/co-cult-culture-entwom-en/cult-culture-media/fbs-basics/what-is-fetal-bovine-serum-fbs>

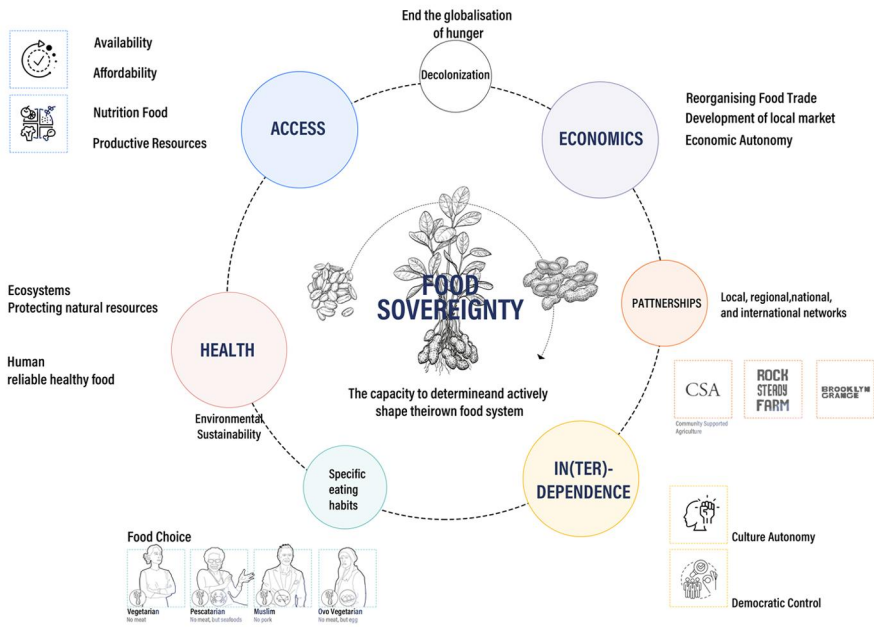
Ethical problems of cultured meat

Ethical problems:
 1) Cultured meat is disrespectful, either to nature or to animals;
 2) It will reduce the number of happy animals in the world; and
 3) It will open the door to cannibalism. While each objection has some attraction, we ultimately find that all can be overcome.

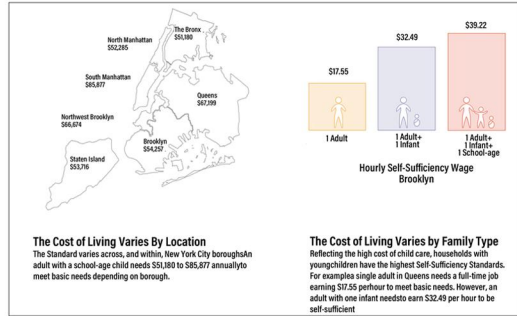
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6492217/>

A large amount of plastic waste is generated in the meat packaging consumption chain.

The increased demand for meat has led to a higher use of plastic packaging in the meat vending process, resulting in a large amount of plastic pollution.



Income in NYC



14% of households in NYC live below the official poverty threshold



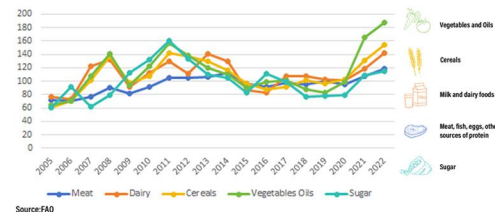
40% of households in NYC live below the Self-Sufficiency Standard



With the cost of living rising at nearly three times the rate of wages, 2.5 million working-age New Yorkers are struggling to provide food, housing, and other basic necessities for their families. United Way of New York City, The Women's Center for Education and Career Advancement, City Harvest, and The New York Community Trust are proud to release "Overlooked & Undercounted 2019: The Self-Sufficiency Standard for New York City," a study that determines the amount of income necessary to meet the basic needs of working families without public or private assistance.

This analysis is based on the "Self-Sufficiency Standard," a realistic, geographically specific, and family composition-specific measure of income adequacy determined for more than 700 family types in each of the boroughs, and thus a more accurate alternative to the official poverty measure. The standard includes the full costs of basic needs for working families, including housing, food, health care, child care, transportation, payroll taxes and tax credits, and other miscellaneous expenses. Families struggling to make ends meet live in every neighborhood in New York City. This nuanced measure reflects the higher costs facing some families and the geographic diversity of costs among boroughs.

World food price comparison



Food Comparison

Organic food



Rich in vitamins, proteins, minerals, calcium

Expensive, tasteless

Loss of weight, better sleep, increase energy

vs

Junk food



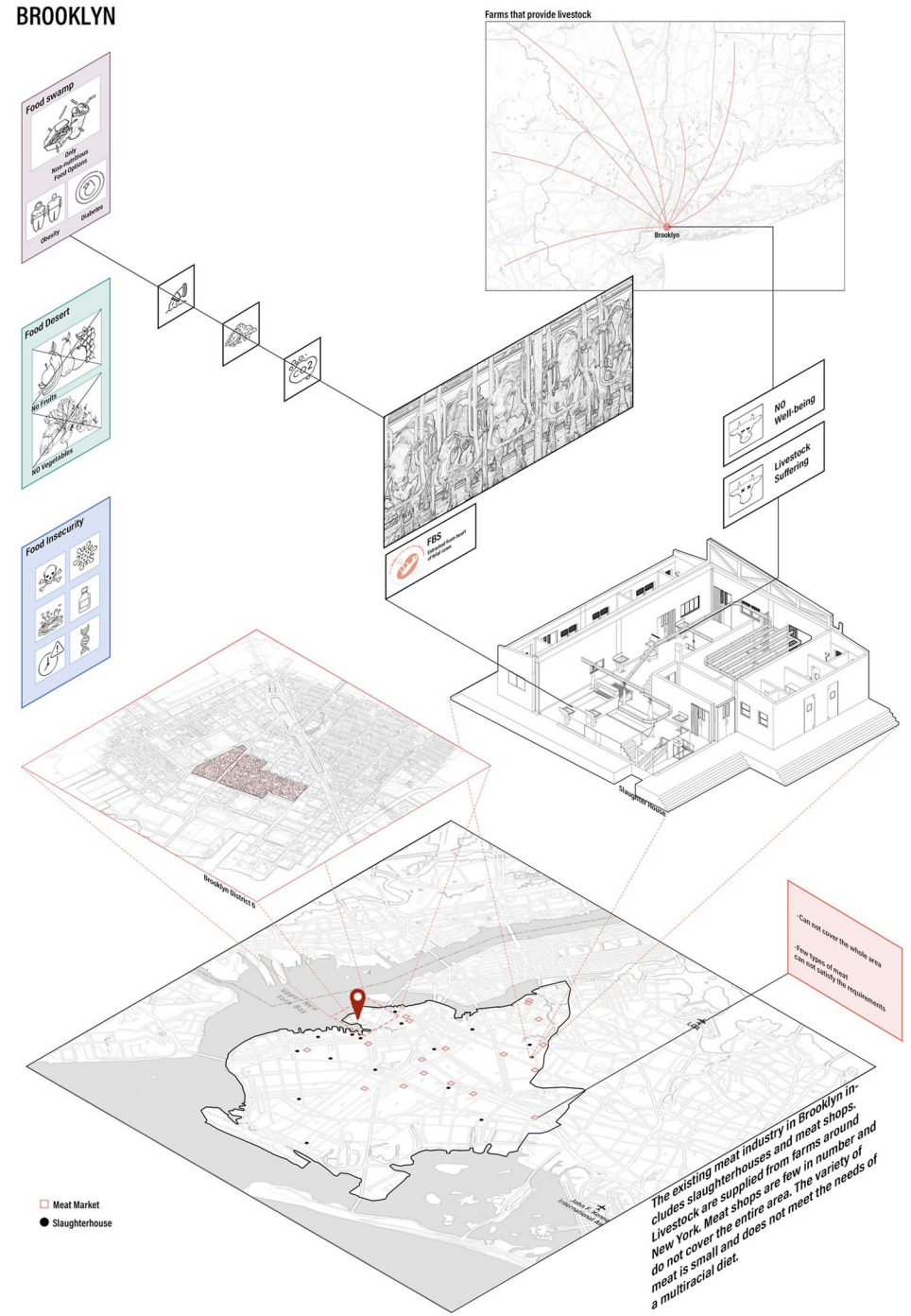
High in salt, sugar, fat, calories

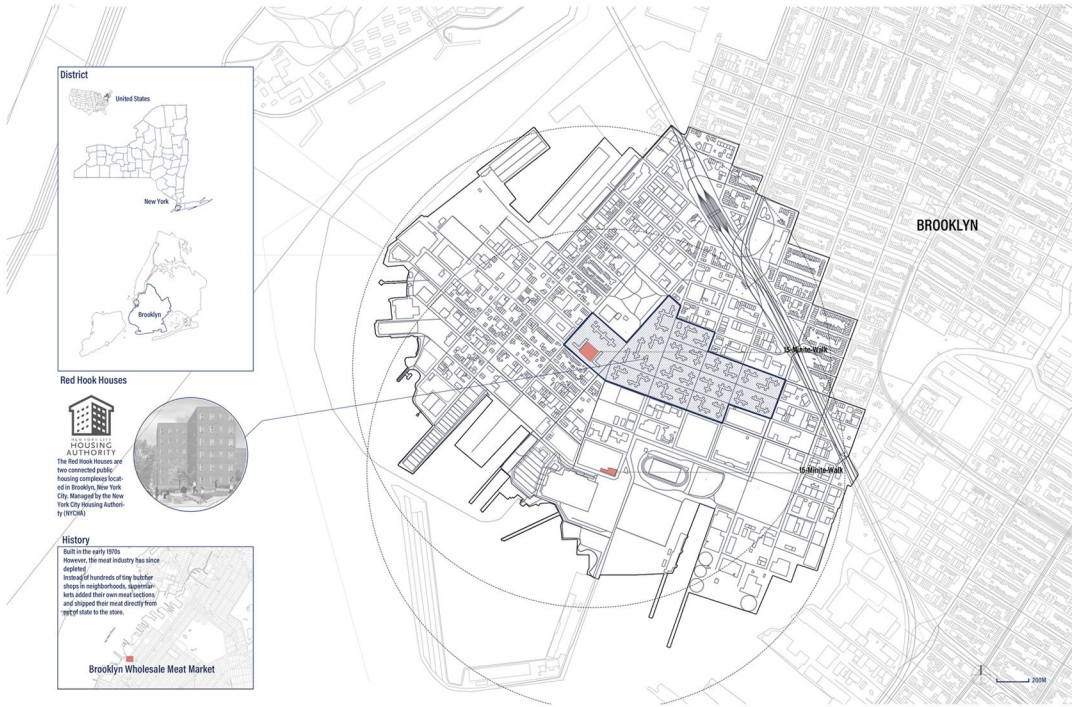
Easy to prepare, tasty, affordable

Obesity, heart diseases, liver failure

Nutritional value
People's opinion
Health

BROOKLYN





Calculation For The Autonomous System

Population:5912

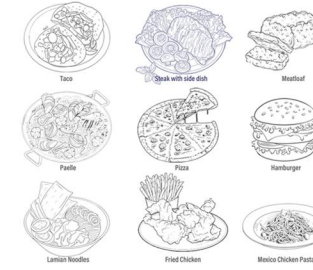


Area where vegetables can be planted:27050 m²

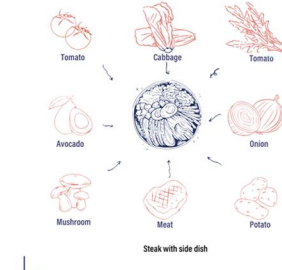


Feed 1/3 of the community

Local Food Recipe



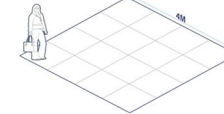
RECIPE



One-person's Daily Intake



Meat produced by 2 bioreator can feed 12 people
10 kilograms of cultivated meat mass with just a 35-liter bioreactor



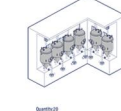
One person need 14-18 m² to Provide the vegetables

Way to meats

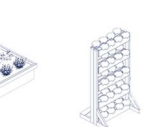


2 Bioreators-Scale

Way to vegetables



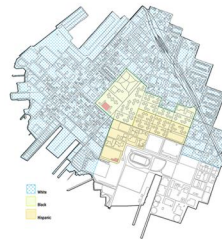
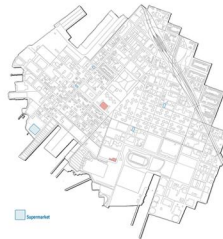
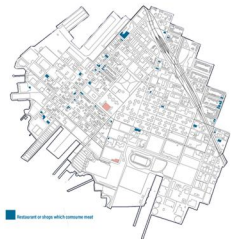
6 Bioreators-Scale



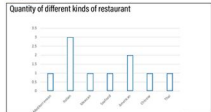
20 Bioreators-Scale



About Food In Brooklyn District-6



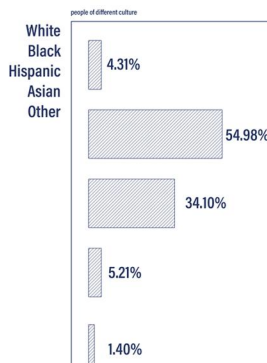
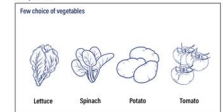
Restaurants



8 quick food restaurant



Food provided



Work with local alliance

NYCHA
HOUSING AUTHORITY

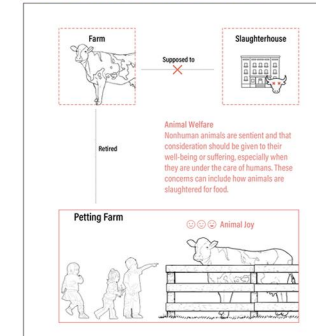
Green City Force
GREEN CITY FORCE

Low-income people
Low-price houses

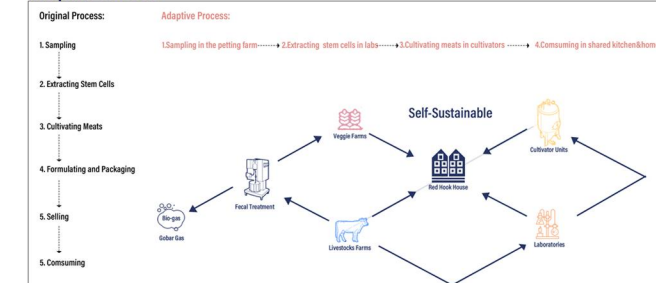
Offer positions to the people from the community

Offer some vegetables weekly or lower the rent as a exchange for the staff's labour

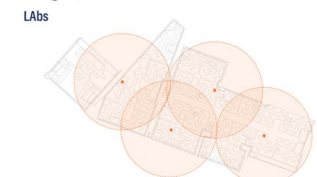
Retirement house for livestock



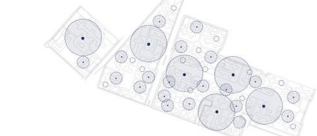
Adaptive Process



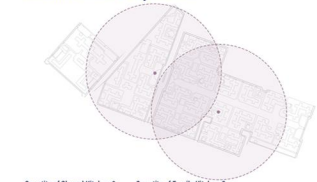
Range of different function LABS



Cultivators



Shared Kitchen&Family Kitchen



Catalogue

Farms Unit-1

Units Map

Farm House

Interactive Fence

Storage

Sampling Room

Interactive Space
Walking over livestock care

Community Farm Unit-1 is set at ground level, making it more convenient to provide cells for cultured meat, while providing a place for livestock to retire and save them from slaughter.

Farms Unit-2

Units Map

Traffic Core

Farm House

Interactive Fence

Storage

Sampling Room

Community Farm Unit-2 is set on a rooftop. At the same time, attracting children to interact with the livestock draws more people into the autonomous system.

Garden Unit

Units Map

Inflatable Cover

Vertical Planter

The garden unit is a specially designed greenhouse space for hydroponics or counter-seasonal vegetables and fruits, and works with other planters to grow plants to meet the residents' vegetable needs.

Cultivators&Labs Unit

Units Map

Cultivators

Lab Equipments

Lab&Cultivator Box

Intervention Space

Stairs

Insertion of the intervention space into the existing building as a laboratory or meat-cultivating space, which can accommodate 3 small laboratory spaces and 20 bio-reactors.

Cultivators Unit-1

Units Map

Inflatable Cover

Prefabricated Unit

Cultivators

Support Structure

The cultivator unit is a prefabricated unit that can carry 2 bio-reactors individually, but connects 2 or 3 units to form a unit that can carry 4 or 6 bio-reactors.

Cultivators Unit-2

Units Map

Coverage

2 bio-reactor-scale Cultivators

Platform

Triangular support structure

It hangs directly outside the windows of the original building, allowing residents to access the production of cultured meat. There are two bio-reactors in a single unit.

Shared Kitchen

Units Map

Chimney

Entrance

Coverage

Indoor dining area

Kitchen

Outdoor dining area

Shared kitchen provide a space for residents within the system to make their own harvested food and share their own food! It also serves as a space for communication.

Recreation Facility

Units Map

Coverage

Interaction Holes

Stairs

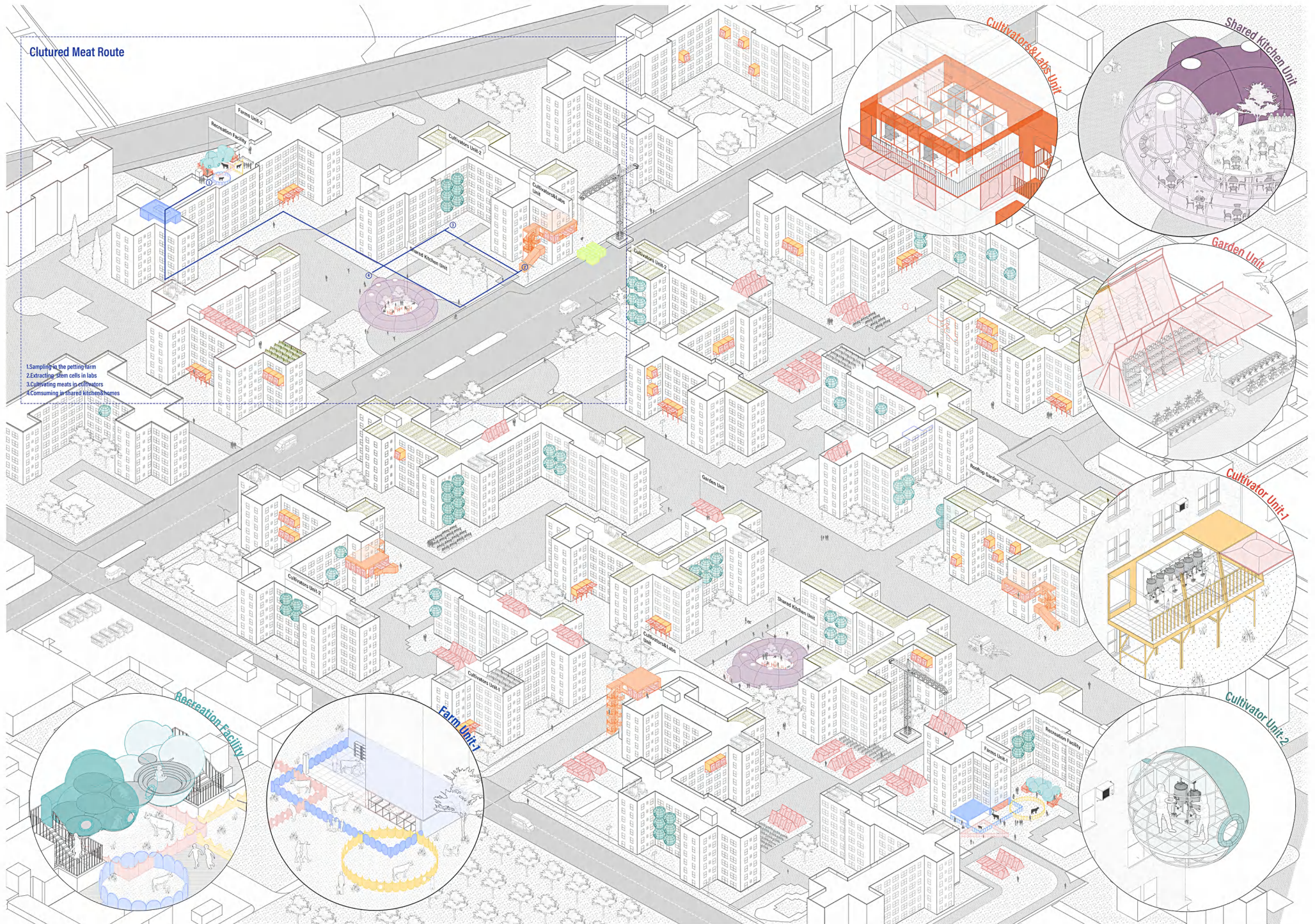
Platform

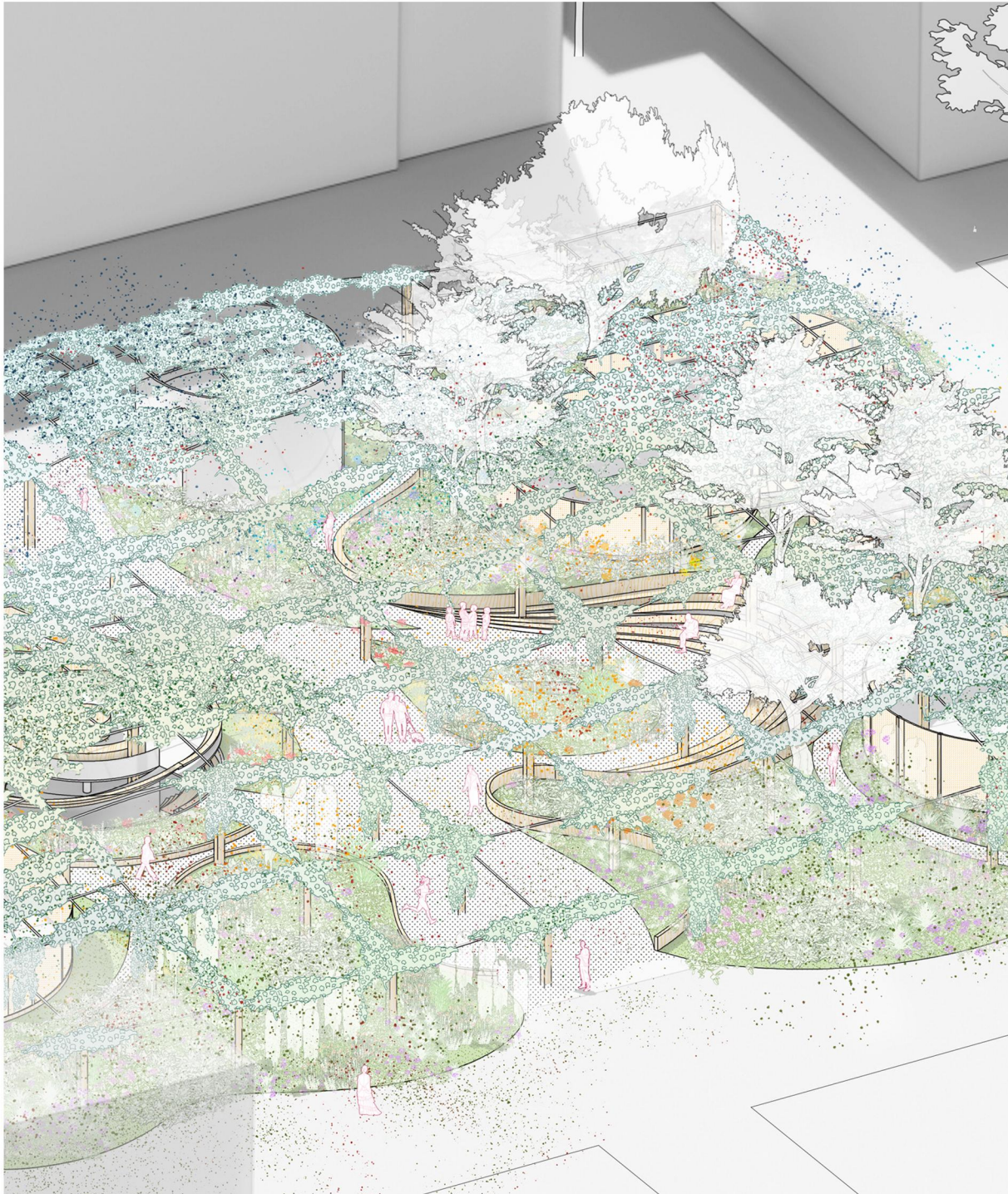
Support Frame

The recreation facility attracts children to play through its cute appearance, with curved flat surfaces for children to crawl through and interact with the farm's livestock on lacus vel facilis.

Clutured Meat Route

- 1. Sampling in the petting farm
- 2. Extracting stem cells in labs
- 3. Cultivating meats in cultivators
- 4. Consuming in shared kitchen themes





02 Arctic Scentoria

New York USA

Academic/Individual Work

2023 Fall Semester

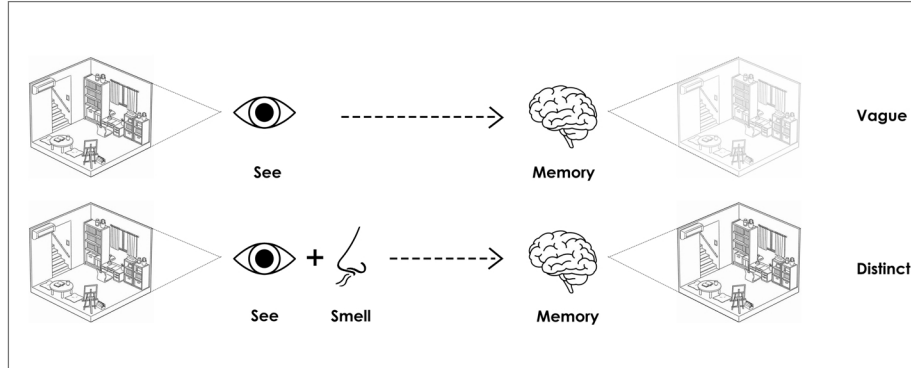
Studio 'Mountain Aven House'

Philippe Rham, Mariami Maghlakelidze/

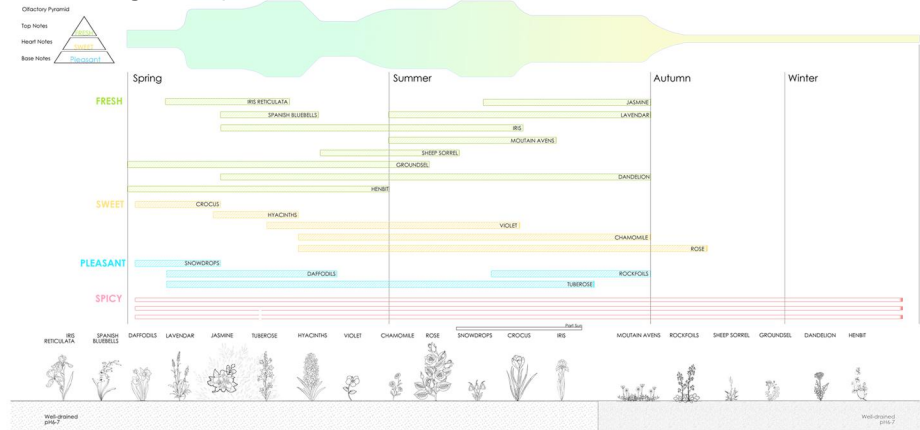
rham@philipperahm.com, mm5755@columbia.edu

The project was designed to create a design that protects arctic plants and allows for increased species diversity. The site is located on the Columbia University campus. The design builds on the theme of aroma, thermal effusivity, by using the aroma produced by different plants to create a unique aroma that is representative of Columbia University, and to enhance the impression of the space. The three-deck system, based on thermal effusivity, creates a perfectly adapted space for arctic plants.

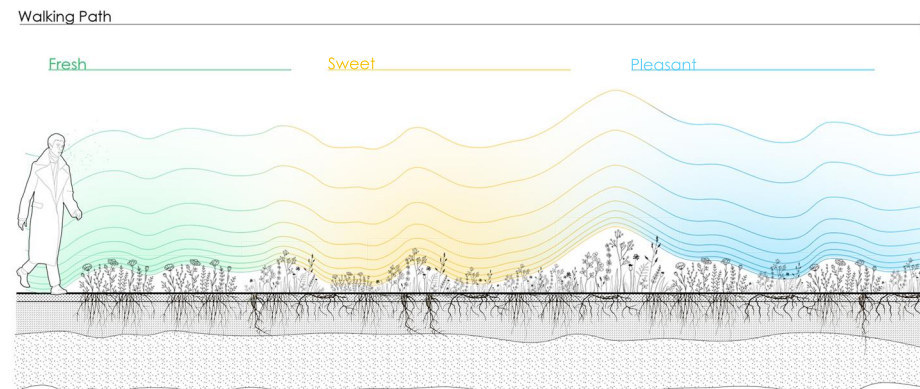
Scents enhance visual effects



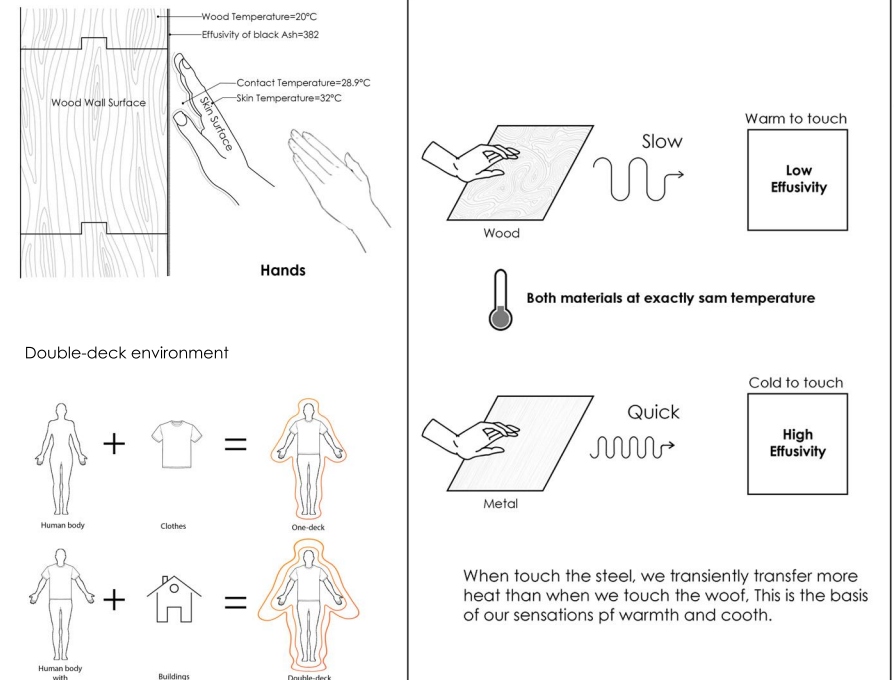
Blooming Analysis



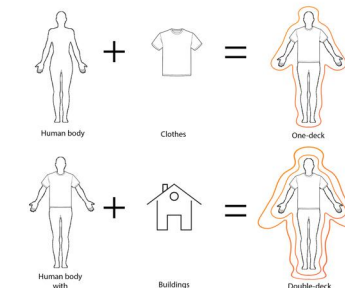
The Aroma Trail



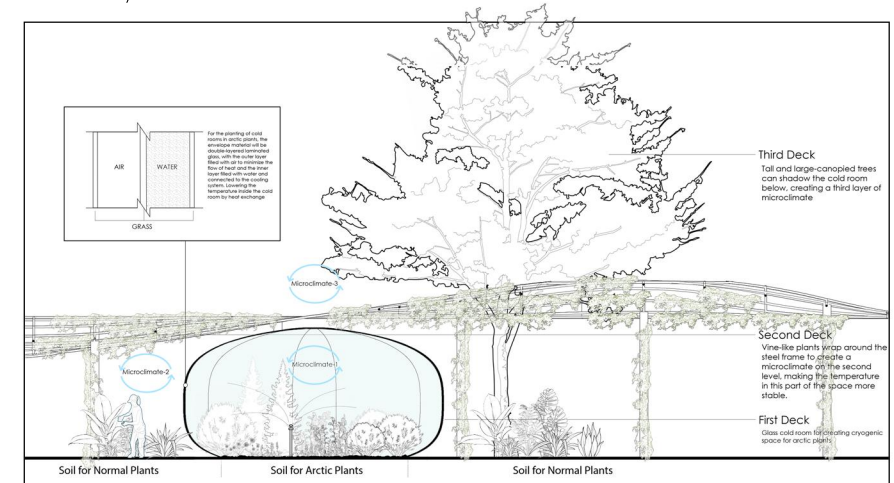
Thermal Effusivity



Double-deck environment

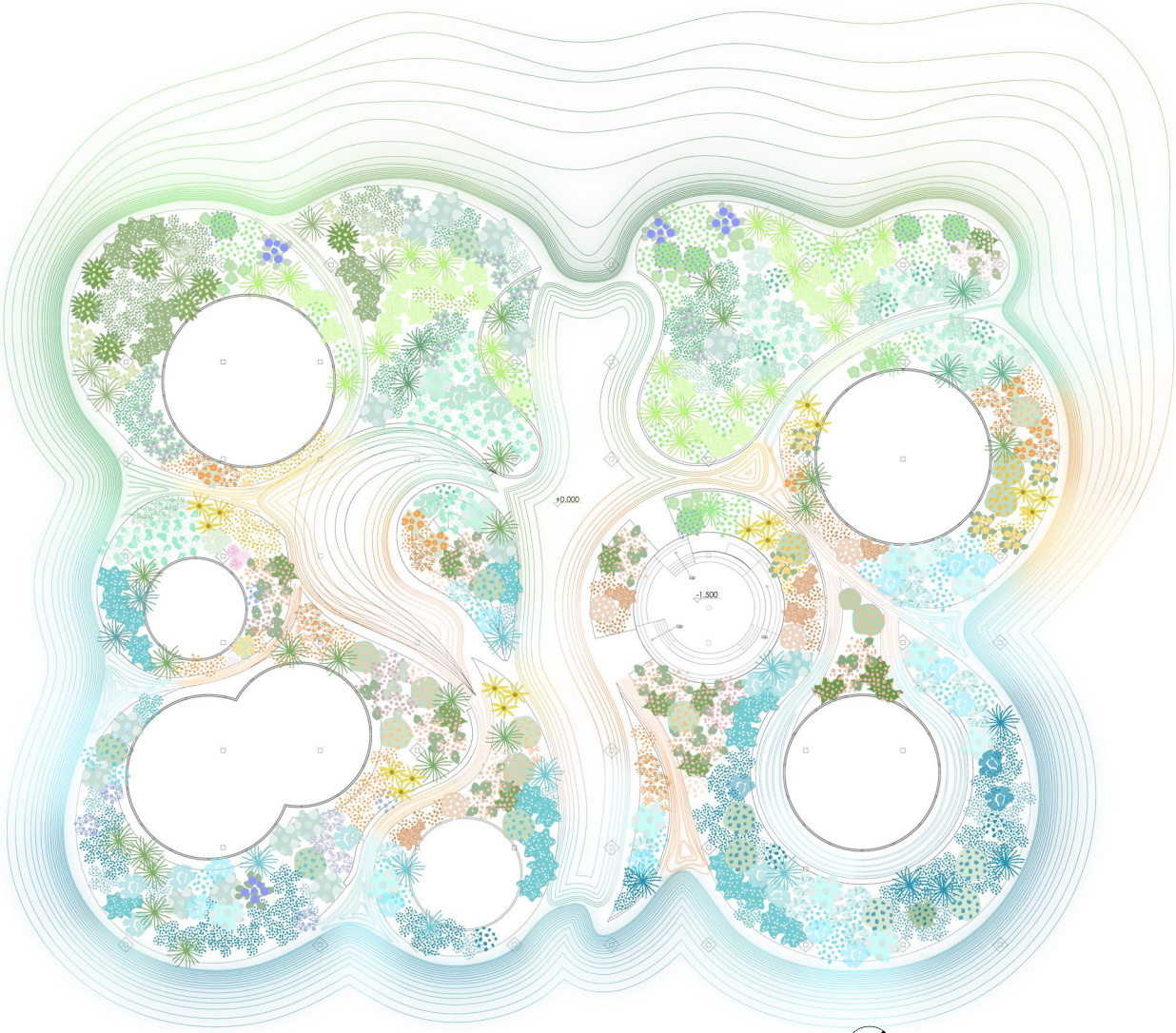


Proposal of Section Three-deck System

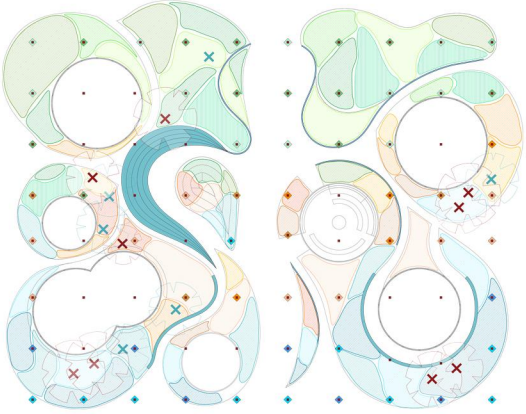


Designing Memories through A Fragrant Flora Journey

Smelling Map & Planting Map(tropical species)



Location of different plants (tropical species)

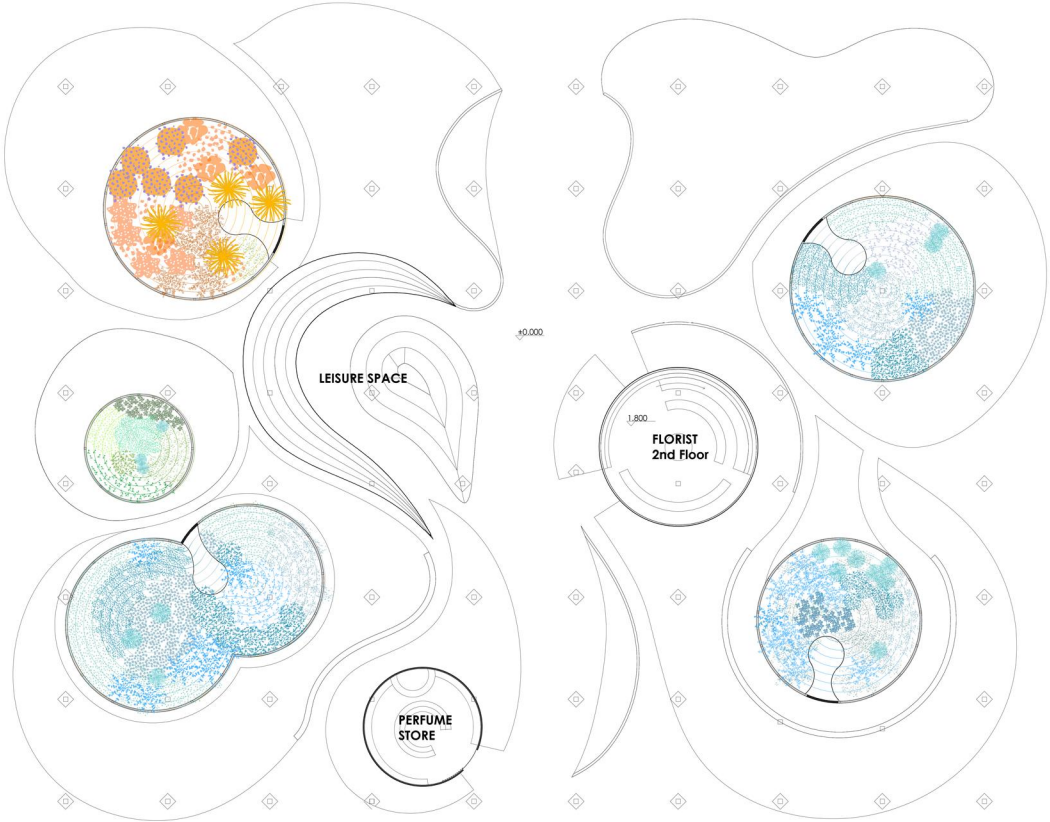


Plants & Smell Legend

● RIG RETICULATE	● SPANISH BLUEBELLS	● JASVINE	● LAVENDAR	● RIG	● DACHM CROPS	● TUBEROSE	● DAFFODILS
● CROCUS	● HYACINTHS	● VIOLET	● CHAMDMLE	● ROSE	● MINT	● ROSEMARY	
◆ CLIMBING HYDRANGEA	◆ ACTINIDIA ARGUTA	◆ WISTERIA	◆ CLIMBING ROSE	◆ HONEYSOCKLE	◆ CAROLINE JASVINE	◆ STAR JASVINE	

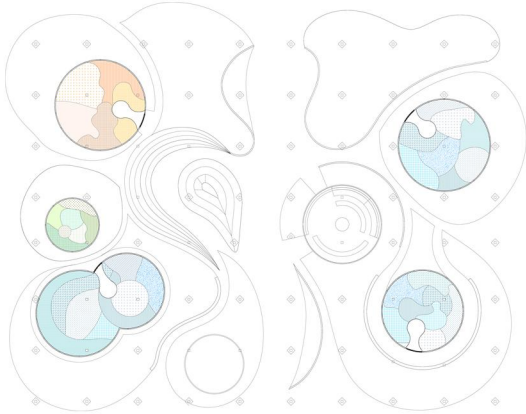
Designing Memories through A Fragrant Flora Journey

Smelling Map & Planting Map(tropical species)



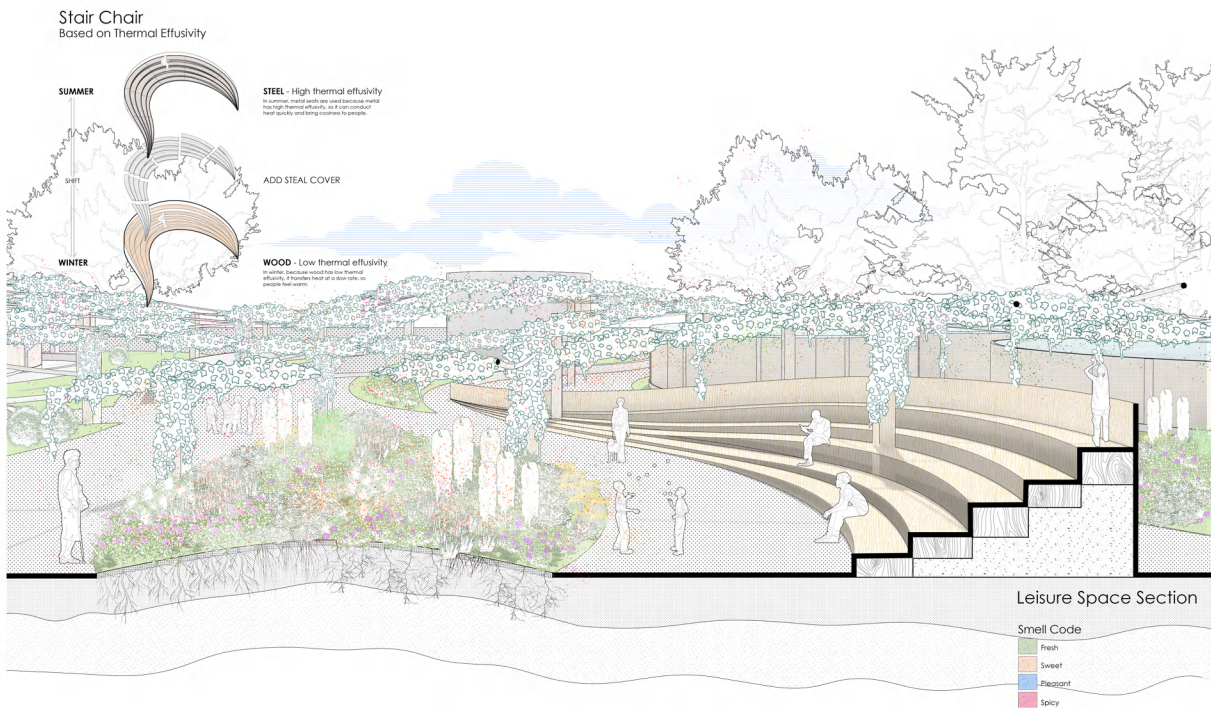
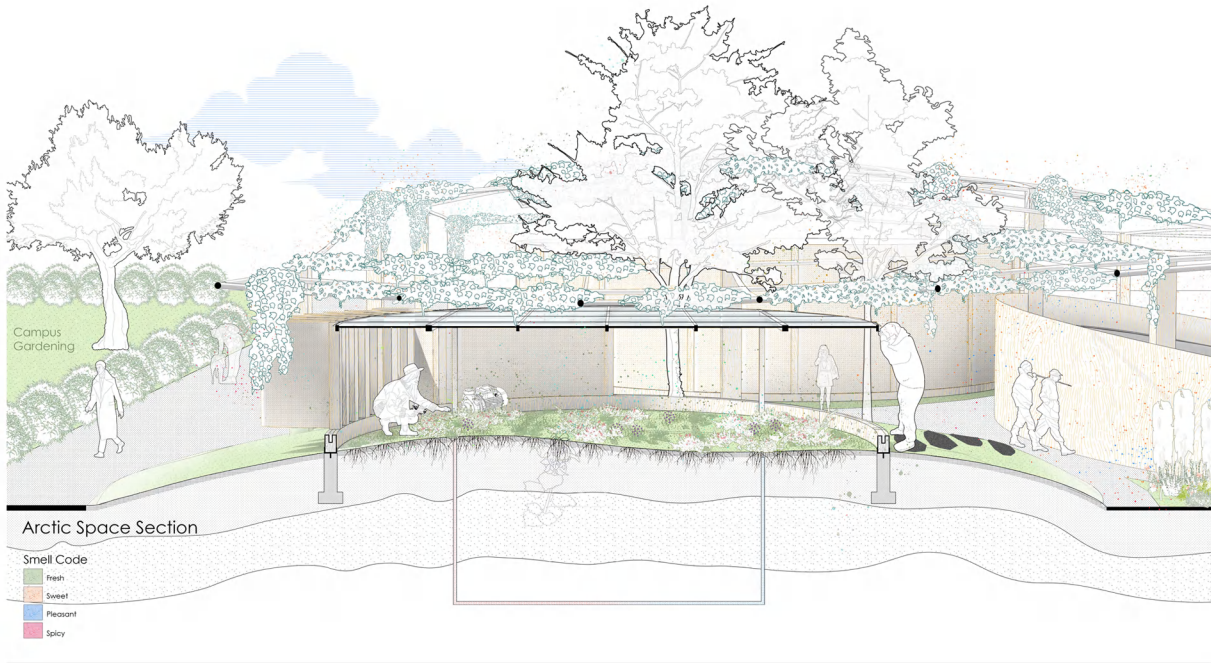
1: 500

Location of different plants (arctic species)

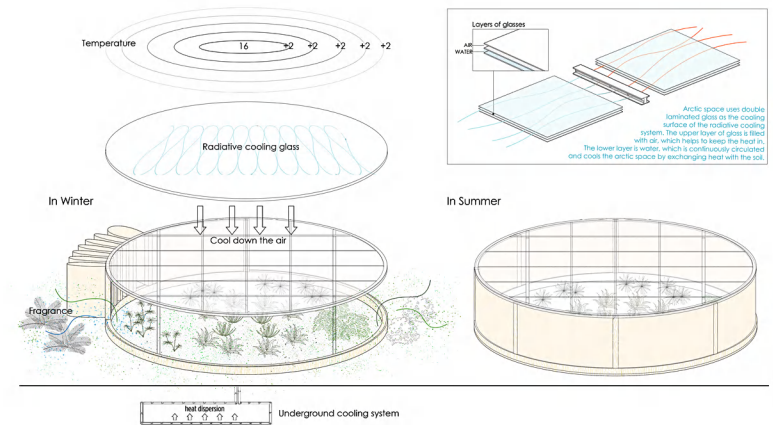


Plants & Smell Legend

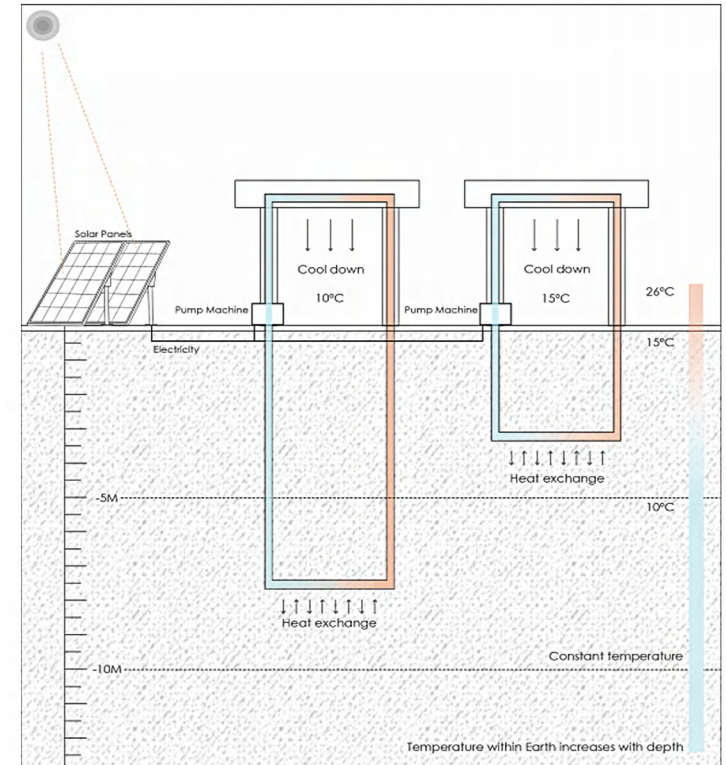
DWARF BIRCH	ARCTIC WILLOW	ARCTIC ALDER	LARKSPUR	ARCTIC RUBUS	ARCTIC RUBUS	ARCTIC HEATHER
ARCTIC YEW	SAXIFRAGE	SHEEP DOGSKIN	HIBISCUS	GROUNDSEL		
SIBERIAN PINE	LICHSTEIN PINE	GREEN ALDER	RUDAL PINE	LARGE LARKSPUR		



Details of Arctic Space



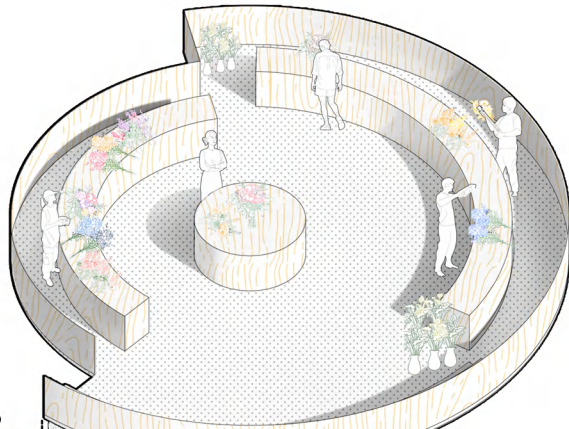
Cooling radiative system in architecture



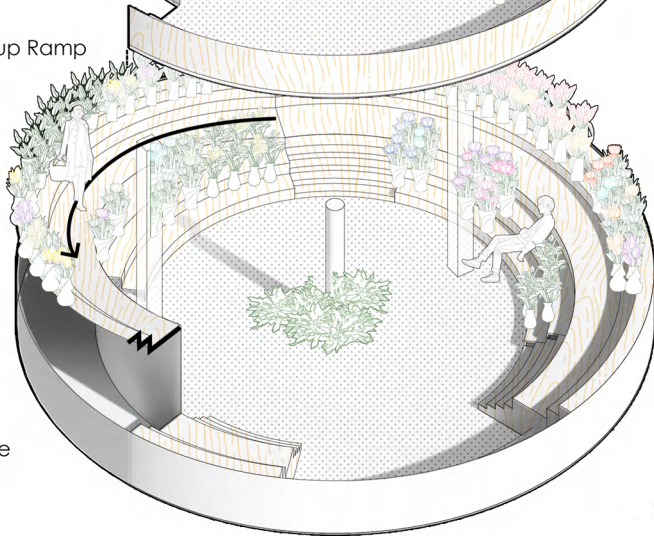


Florist Space

Bouquet DIY Space

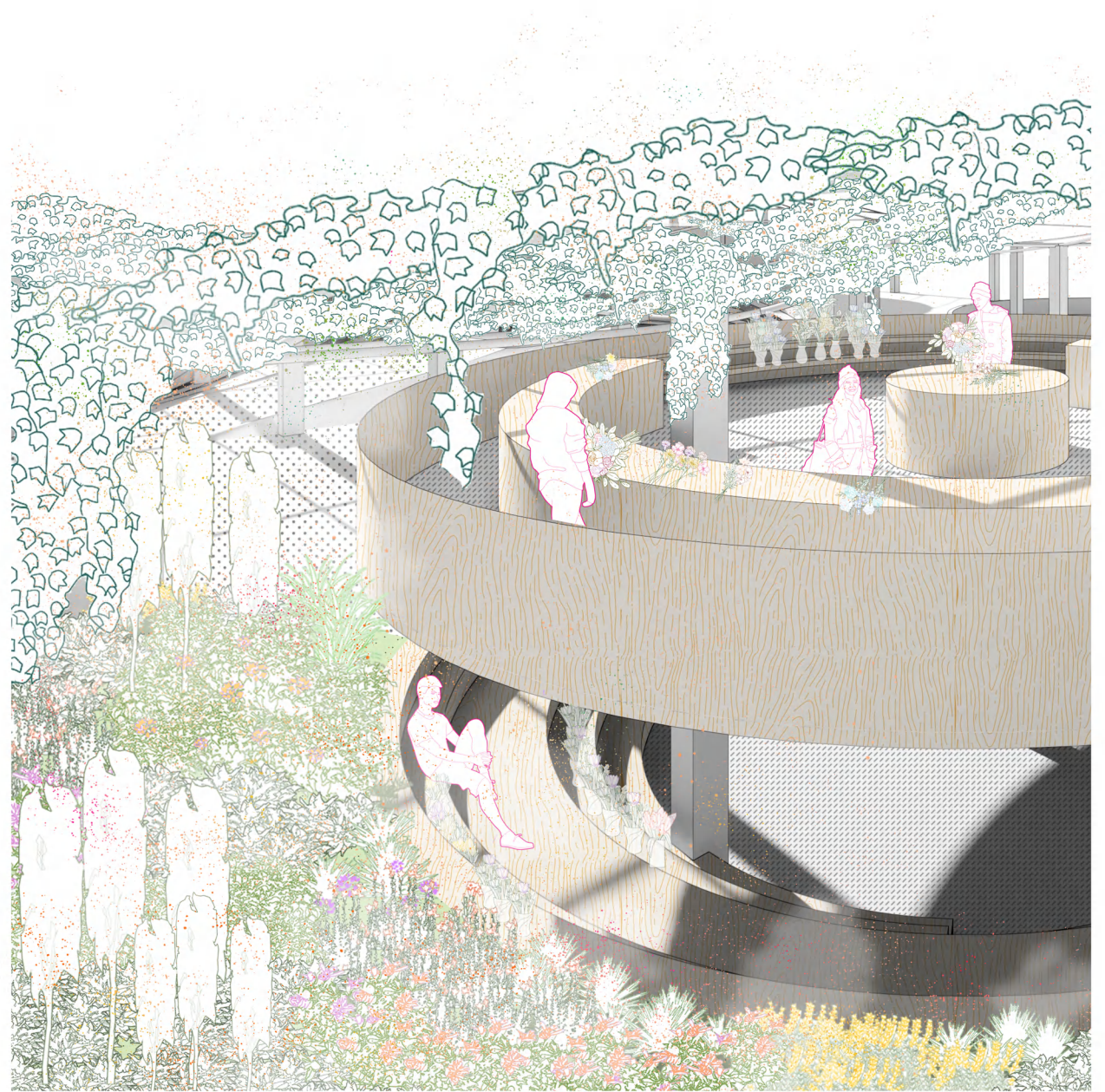


Flowers Pick-up Ramp



Display Space

People can pick out their favorite flowers on the first floor and bring them to the second floor to have their bouquets designed and wrapped. At the same time, they can have a close contact with the plants on the structure.



Florist Perspective Drawing



03

Whispers from the Hiddens : A Dirge in Shadows

New York USA

Academic/Team Work with Kainan Zhang

2024 Spring Semester

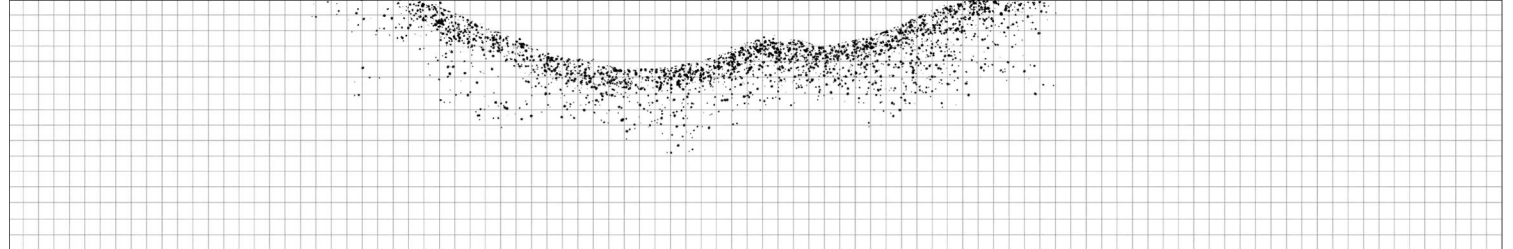
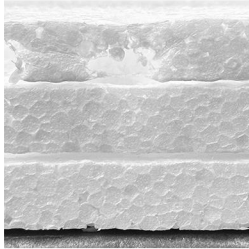
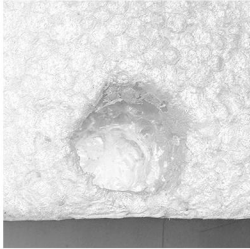
Studio 'Impermanent Archives'

Karla Rothsteins / kmr16@columbia.edu

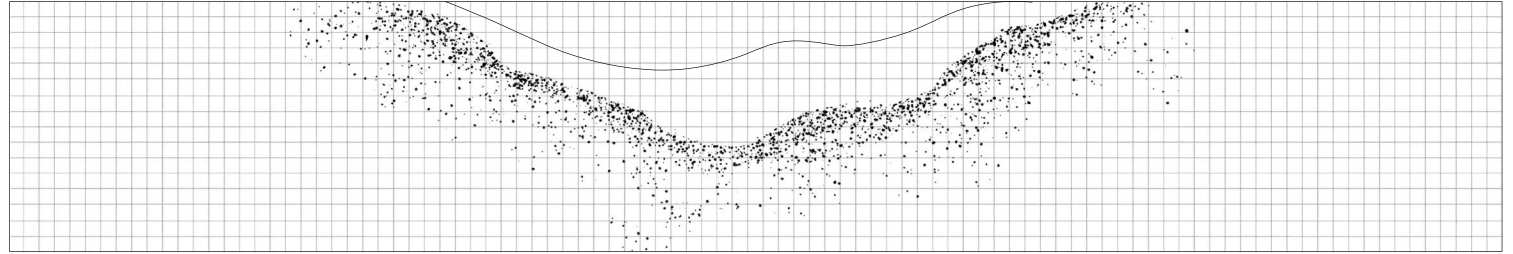
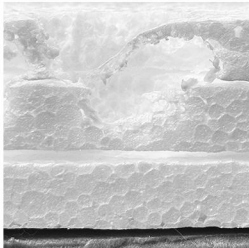
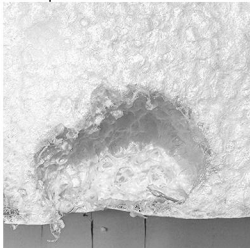
Our project redefines the relationships among forgotten spaces, memory, and urban development, focusing on New York's Hart Island. Historically a burial ground for the marginalized, our vision transforms it into a space of renewal and reconciliation. We employ a dual-layered protective approach against environmental degradation: an inner layer comprising sea walls and a multifunctional ferry terminal, and an outer layer of breakwaters integrated with memorial spaces. This initiative not only preserves the island's physical integrity but also enhances its historical and cultural significance. By intertwining protective measures with commemorative elements, we aim to foster a dynamic "Impermanent Archive" that continuously collects and disseminates shared memories, thereby redefining Hart Island's role within the urban fabric and promoting inclusivity and resilience.

Material Study

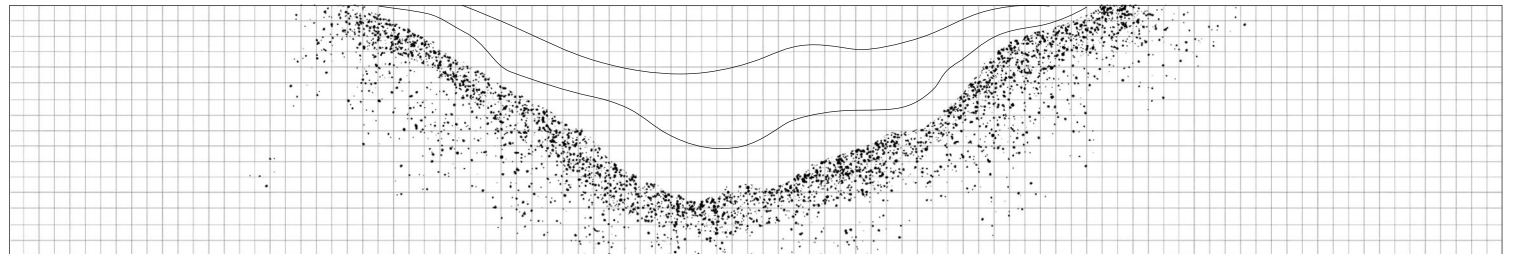
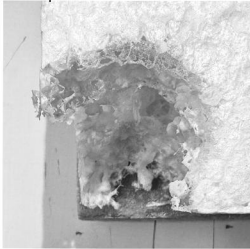
5 Drops



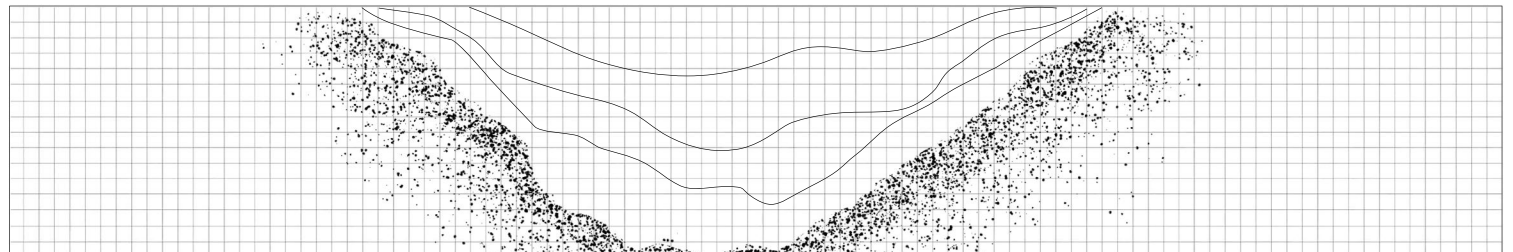
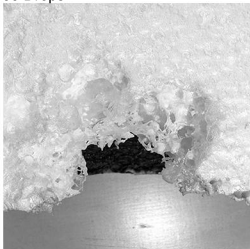
10 Drops



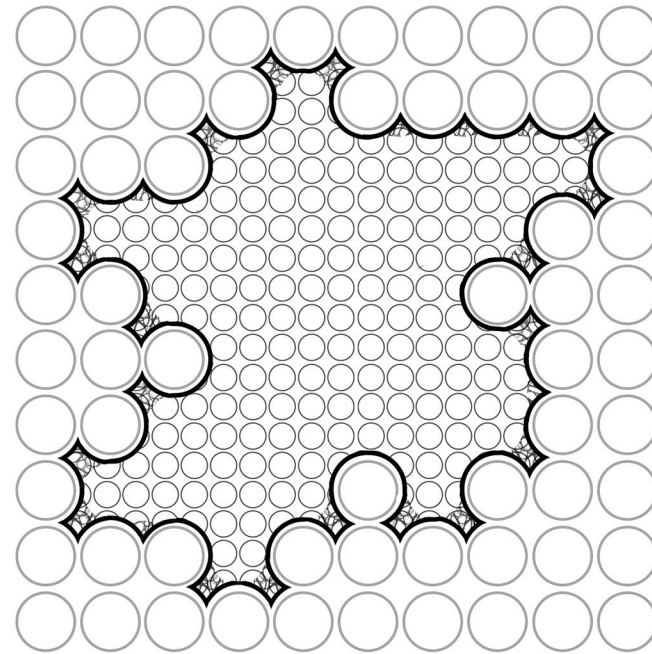
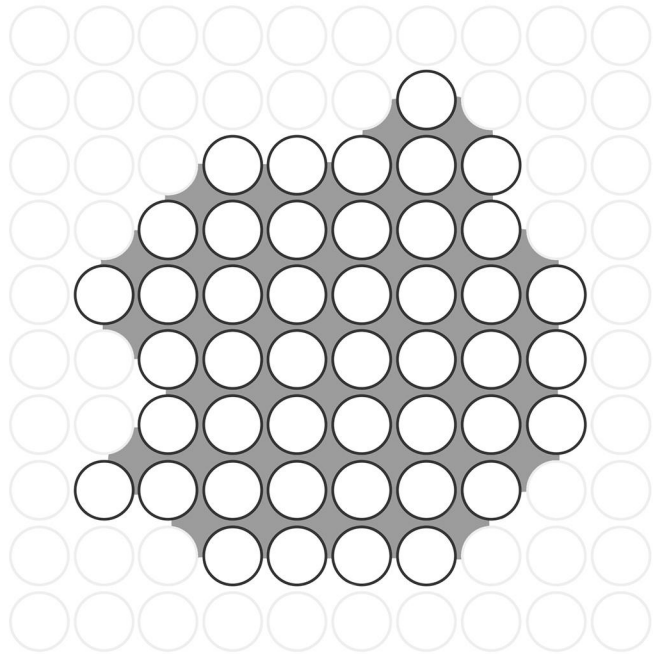
20 Drops



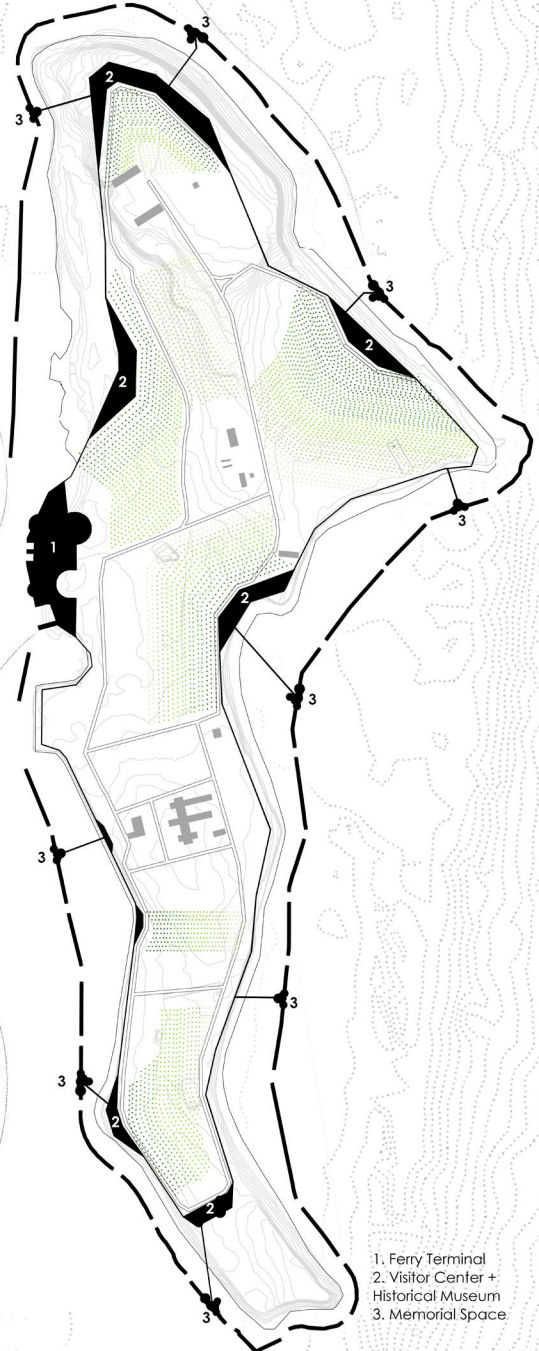
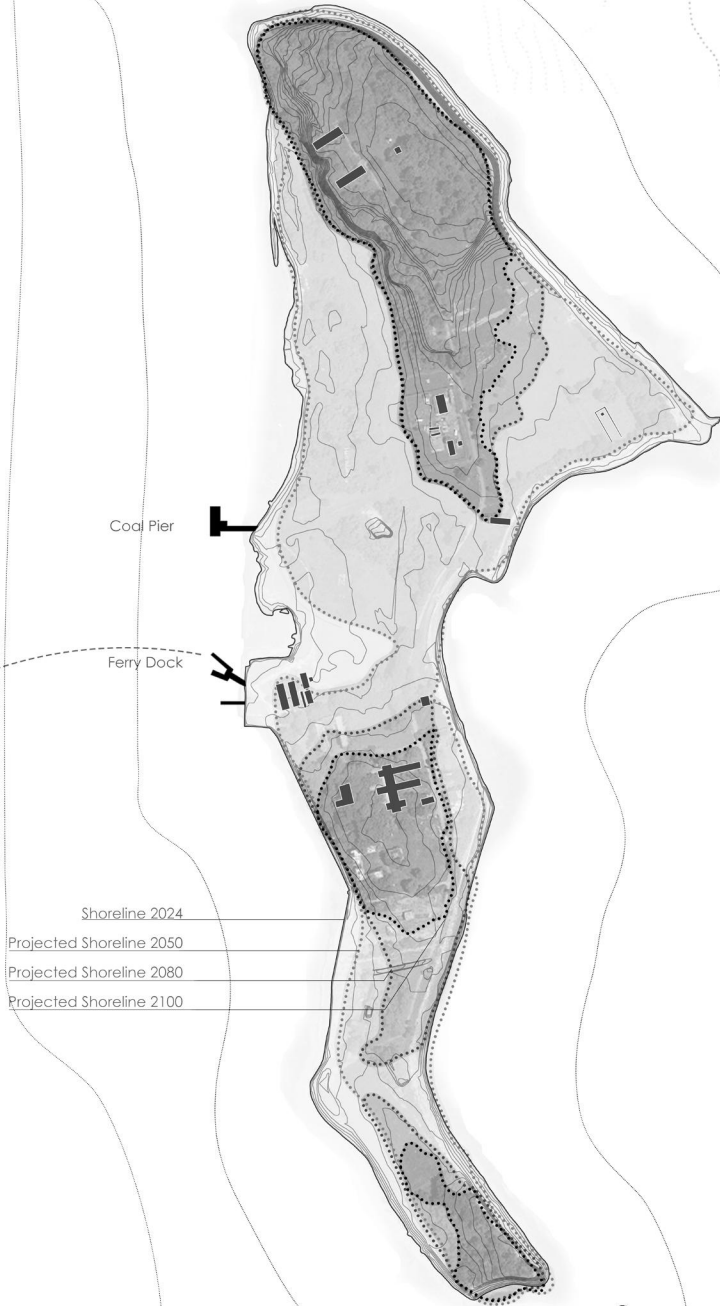
35 Drops



Material Study



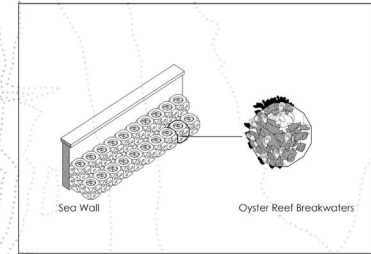
Double-Layer Protective System



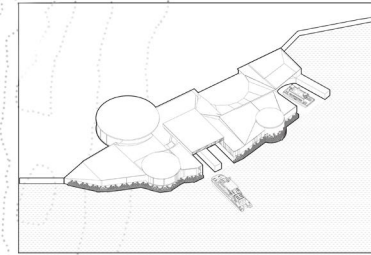
Double-Layer System

First Protective Layer

Sea Walls

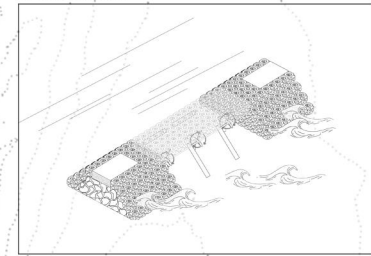


Ferry Terminal

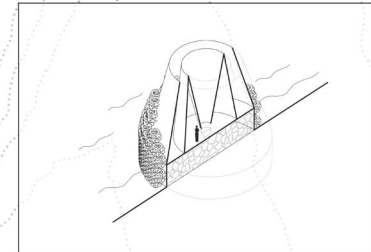


Second Protective Layer

Breakwaters



Memorial Spaces



Plan

Ferry Terminal



- 1. Ferry Dock
- 2. Waiting Area
- 3. Information Center
- 4. Office-1
- 5. Office-2
- 6. Restroom
- 7. Greenhouse
- 8. Cafe
- 9. Kitchen
- 10. Office-3
- 11. Cargo Ferry Dock

Visitor Center
+
Historical Museum

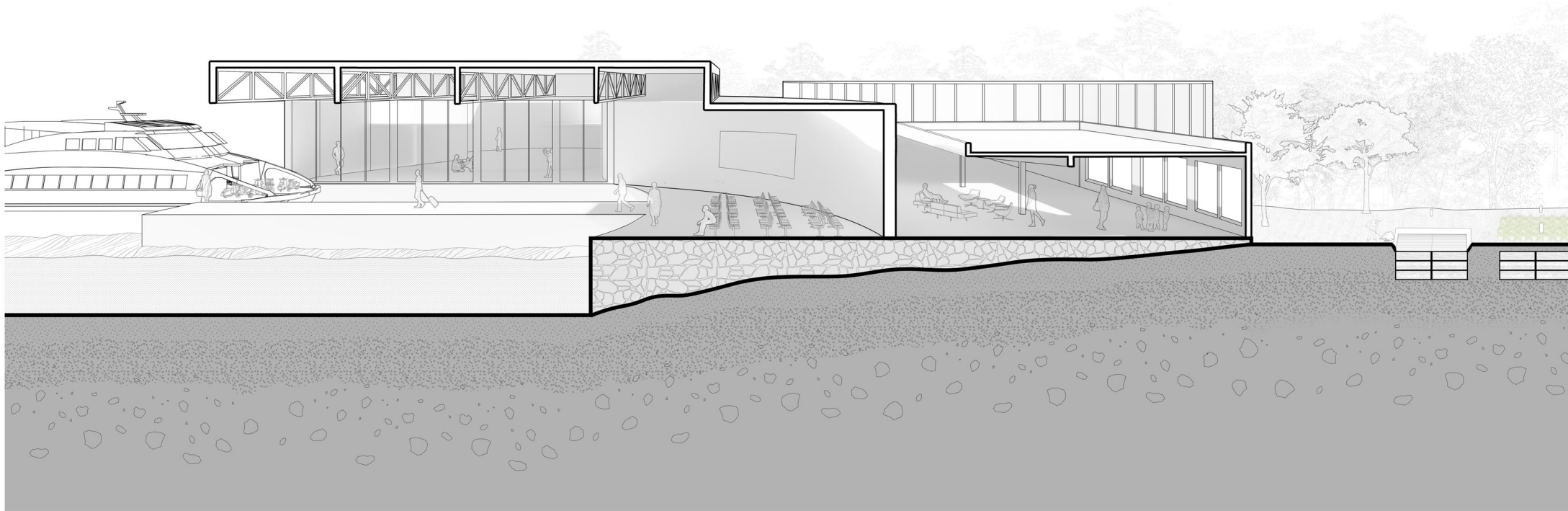


Memorial Space

- 12. AIDS Historical Museum Exhibition Hall
- 13. Gathering Space
- 14. Memorial Space-1
- 15. Memorial Space-2
- 16. Memorial Space-3
- 17. Memorial Space-4
- 18. Memorial Space-5
- 19. Restroom
- 20. Memorial Space with Breakwaters

Ferry Terminal

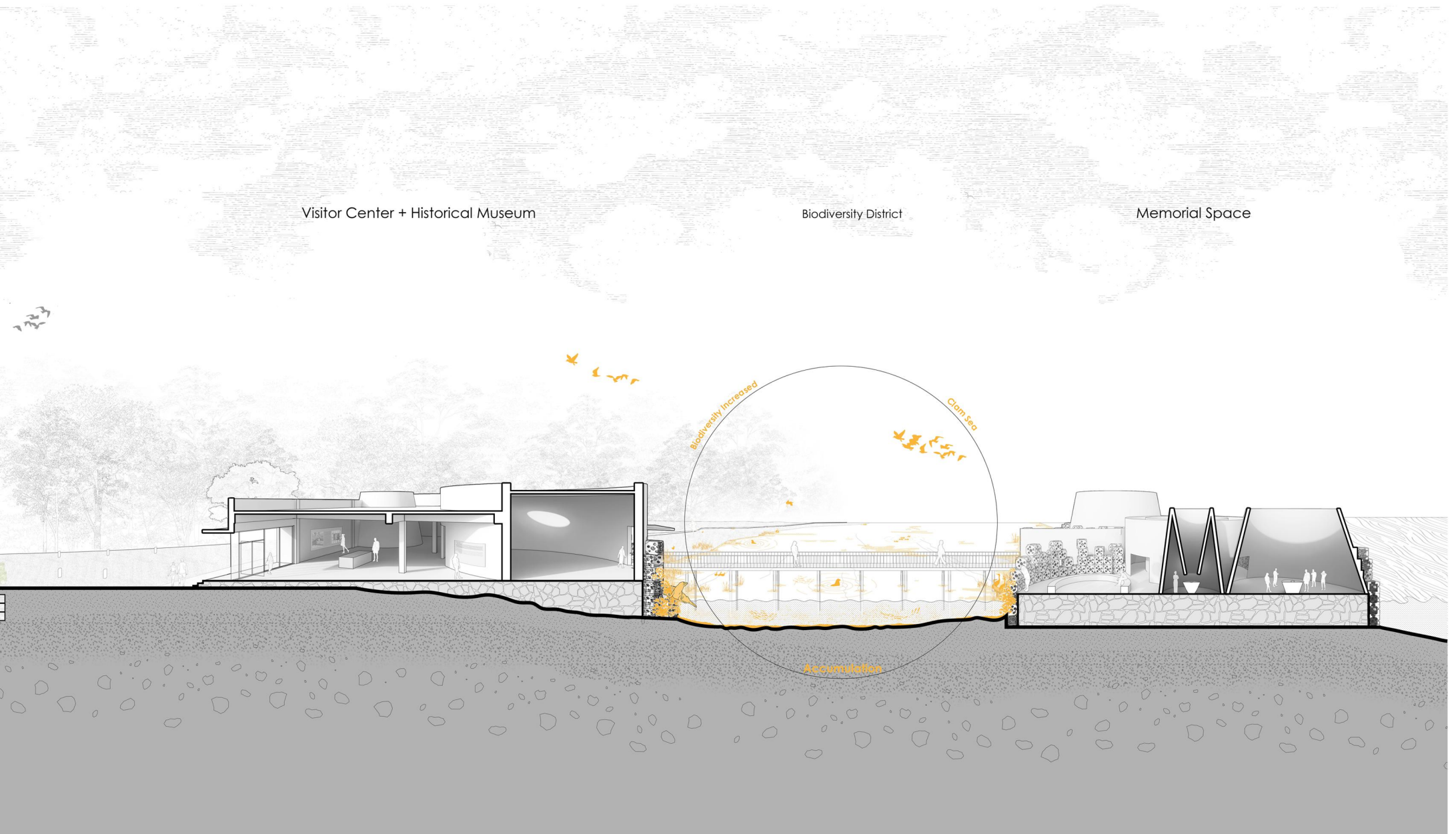
Burial Area



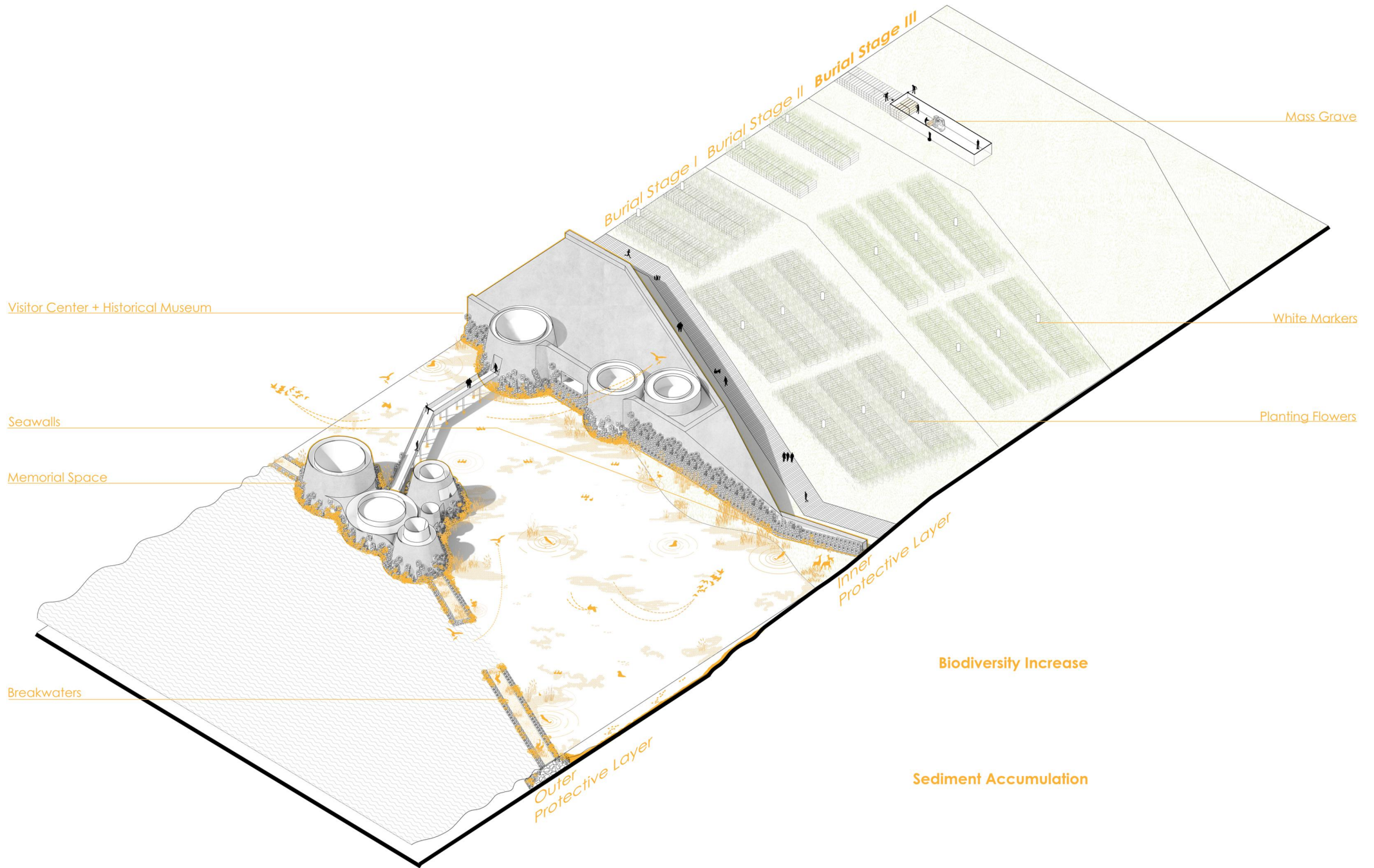
Visitor Center + Historical Museum

Biodiversity District

Memorial Space



Double-Layer Protective System Axonometric Drawing





EmoLink

04 EmoLink

New York USA

Academic/Team Work with Xiaoyu Kang, Xinyu Li

2023 Fall Semester

Elective Course: Spatial UX

Violet Whitney / vw2205@columbia.edu

Our project is based on emotional numbing and uses J5.ps, a web programming system, as a vehicle. The goal is to activate the user's brain numbness by detecting the emotions contained in the posts and generating corresponding emotional emoji to interact with the user in the specific space where the user is using the Reddit app, and immersing him/her in it and generating a certain degree of resonance.

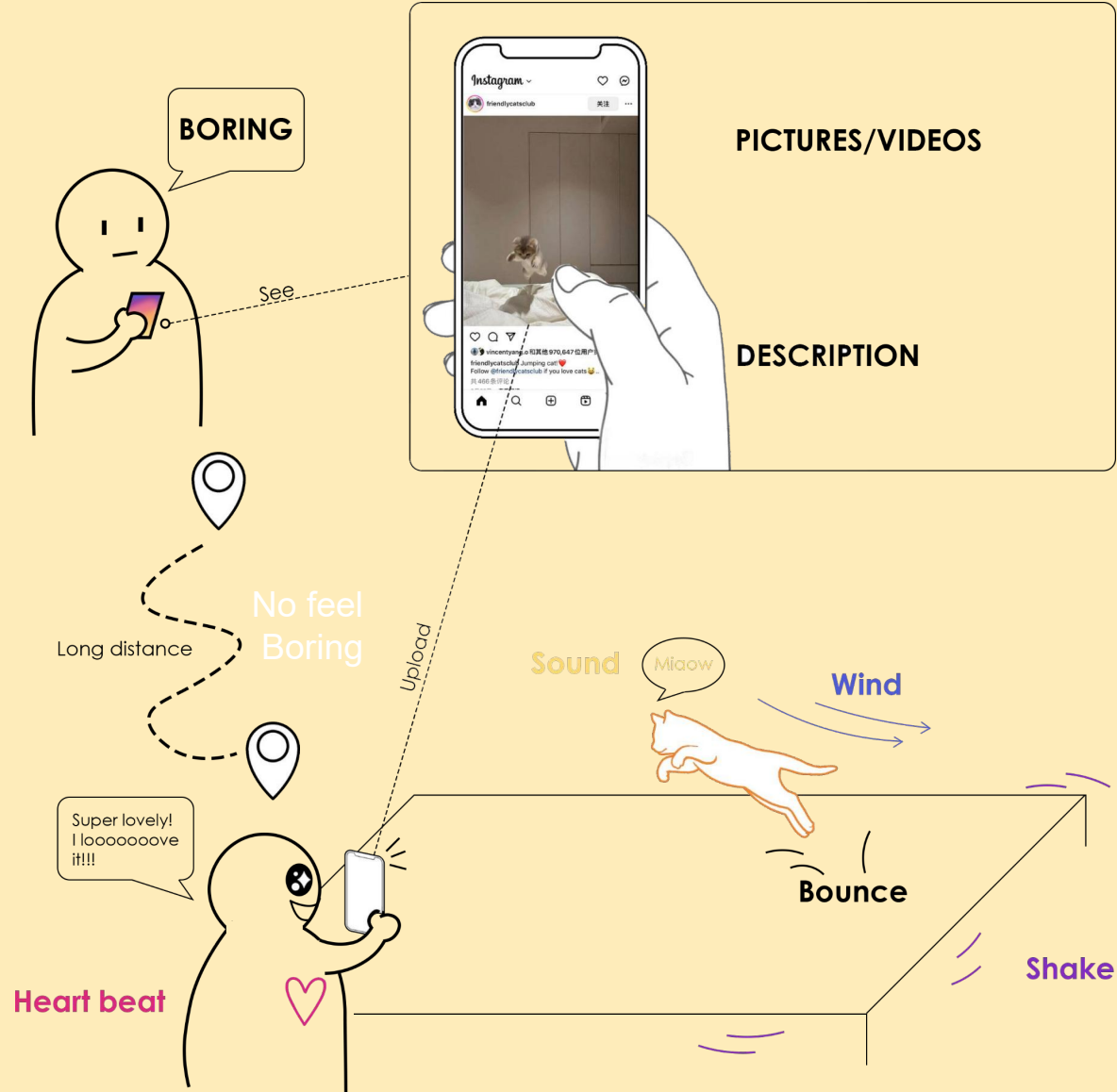
Background





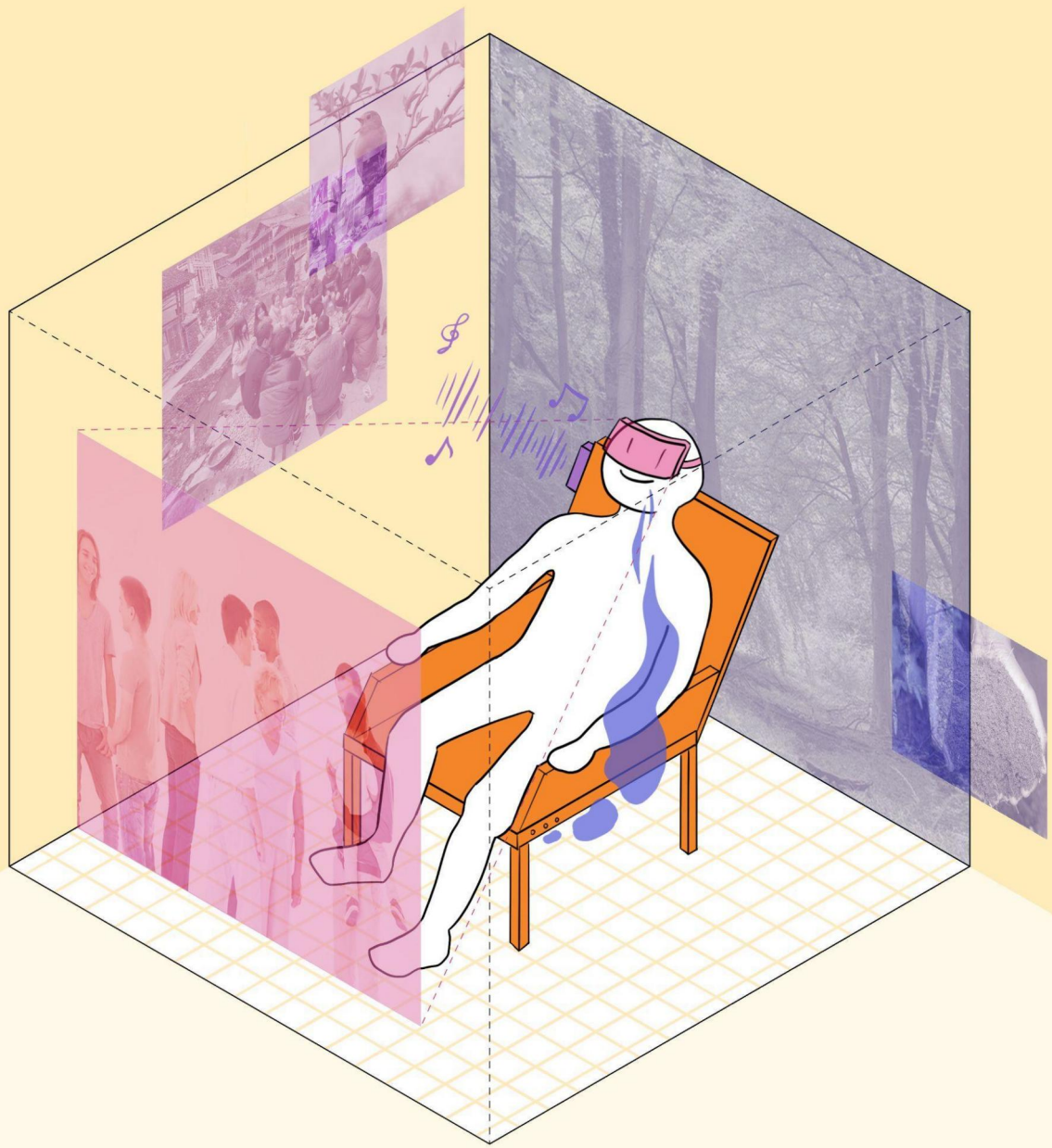
Emotional numbness

A REAL CASE



Bring
Virtual world

to
Physical environment



Recreate
FIVE SENSES

in
Physical World

We created our own
Reddit page to test
emotion recognition

r/ourspatiallux

Home

Popular

RECENT

r/ourspatiallux

r/comics

r/askscience

TOPICS

Gaming

Sports

Business

Crypto

Television

Celebrity

See more

RESOURCES

About Reddit



Create a post

u/BodyBroad3880 • 13 days ago

depressed

nonononono

1 0 Share

u/BodyBroad3880 • 13 days ago

Angry!

Lalalala

1 0 Share

u/BodyBroad3880 • 13 days ago

I am so happy today!HBD!

Today is my bestie's birthday. We are friends for 10 years!

1 0 Share

```
function loadURL() {  
  loadJSON("https://www.reddit.com/r/ourspatiallux/new.json?limit=5", gotData); //  
  Fetch only one post  
}
```

The Reddit page is loaded into p5.js

ourspatiallux

1

Members

5

Online

```
function gotData(data) {  
  // Extracting the title from the fetched data (first post only)  
  latestPost = data.data.children[0].data.title;  
  checkEmotion();  
}
```

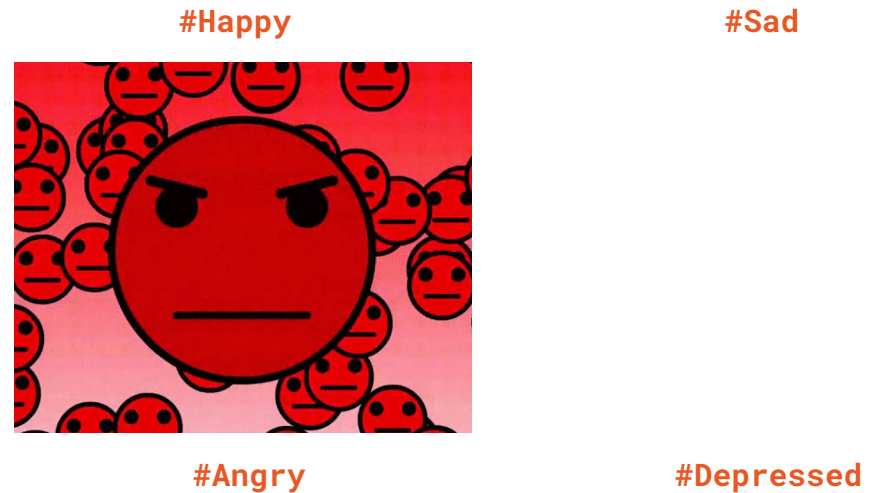
The latest post title is fetched

Detects emotion from the title

```
function loadURL() {  
  loadJSON("https://www.reddit.com/r/ourspatialux/new.json?limit=5", gotData); //  
  Fetch only one post  
}  
  
function gotData(data) {  
  // Extracting the title from the fetched data (first post only)  
  latestPost = data.data.children[0].data.title;  
  checkEmotion();  
}
```

Finds corresponding filter

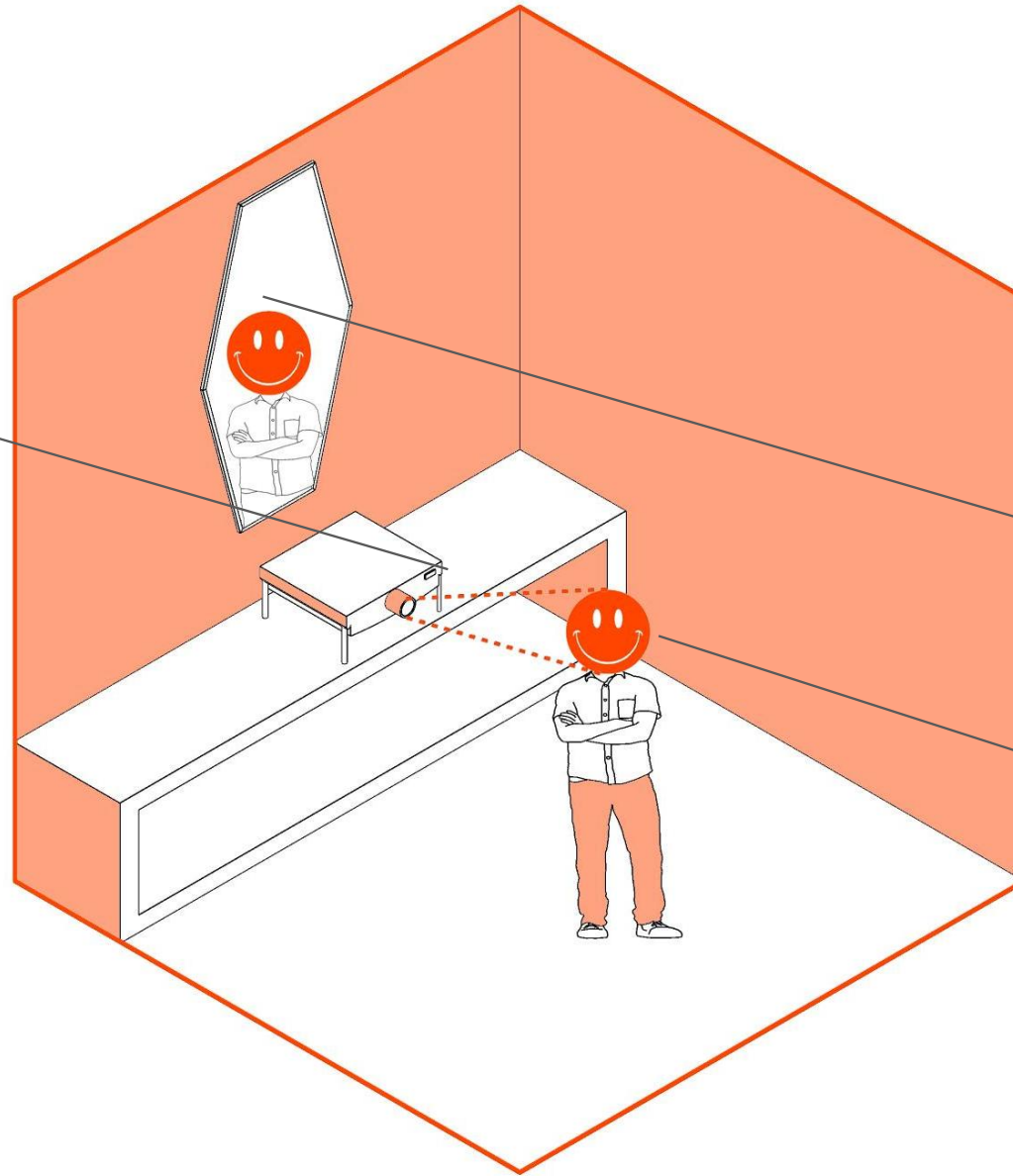
```
function checkEmotion() {  
  let detectedEmotion = detectEmotion(latestPost);  
  
  // Set the emotions based on detected emotion  
  smileyFace = detectedEmotion.includes("happy");  
  sadFace = detectedEmotion.includes("sad");  
  angryFace = detectedEmotion.includes("angry");  
  depressedFace = detectedEmotion.includes("depressed");  
  
  // Clear the input field  
  url = "";  
  
  draw();  
}
```



MECHANISM DIAGRAM

Projector

projecting different emoji on user's face to let them sympathize with the crowd

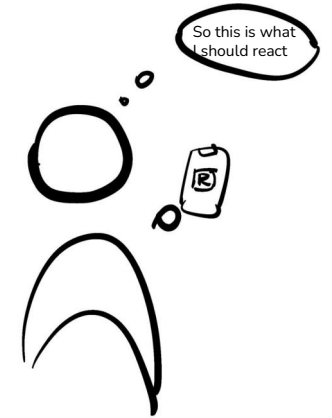


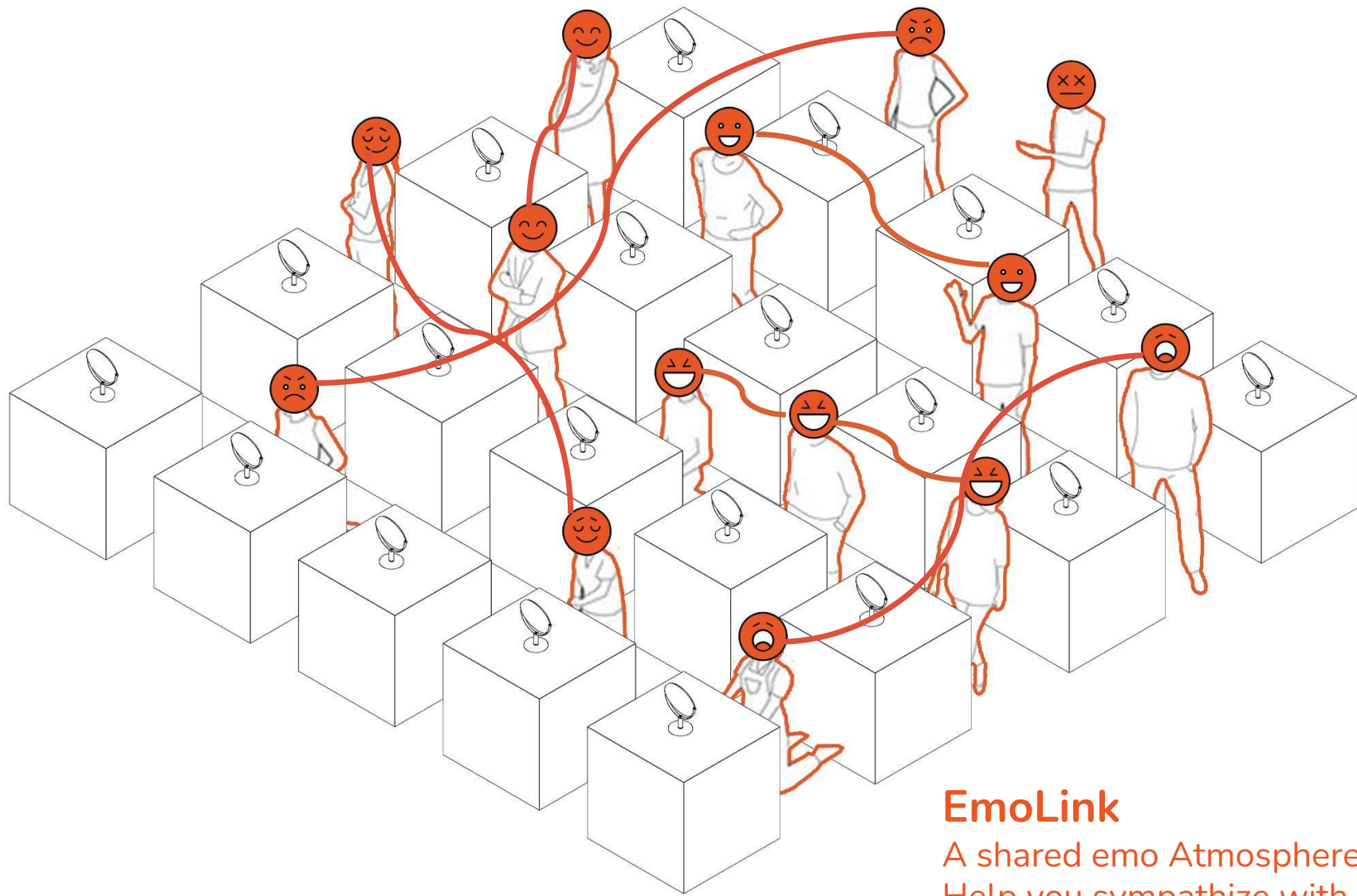
Mirror

Reflection of the online world

Your face

As screen





EmoLink

A shared emo Atmosphere
Help you sympathize with the world



05 Galactic Escape

New York USA

Academic/Team Work with Xiaoyu Kang, Yiyang Liao

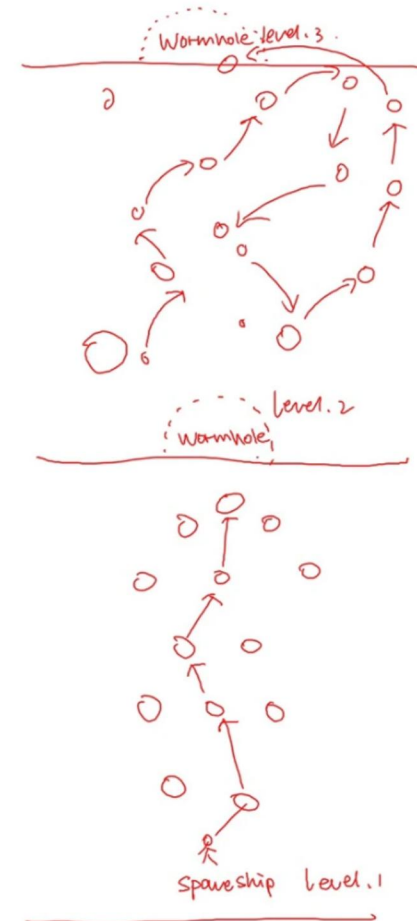
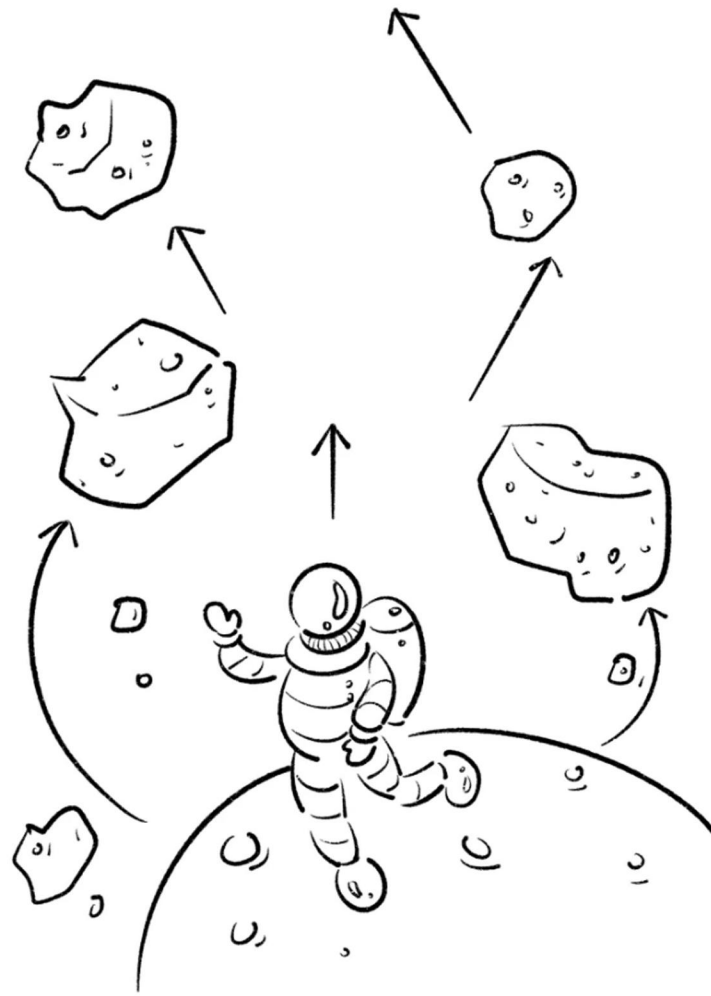
2024 Spring Semester

Elective Course: Virtual Architecture

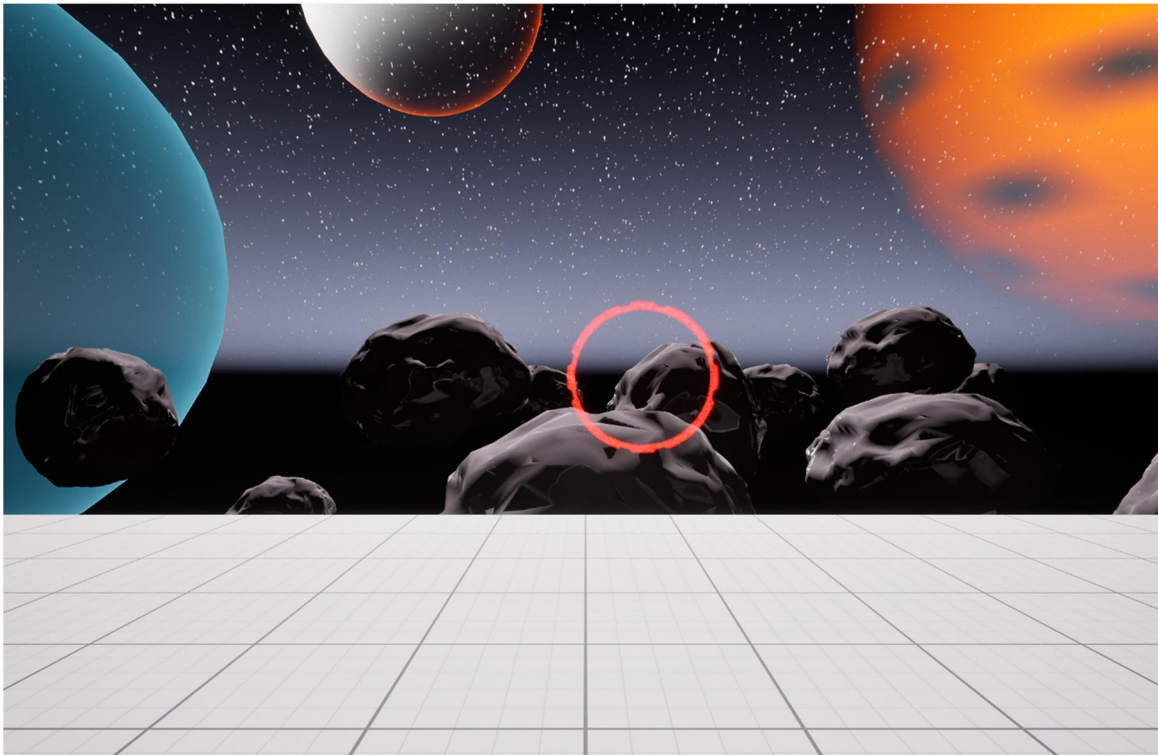
Nitzan Bartov / nb2922@columbia.edu

Our project will invite players to embark on a heart-pounding adventure as they take on the role of a daring space explorer fleeing from a hostile alien invasion. Utilizing the intuitive jumping and moving mechanisms popularized by Temple Run and Subway Surfers, players will navigate through dynamic environments and evade obstacles while racing against the clock.

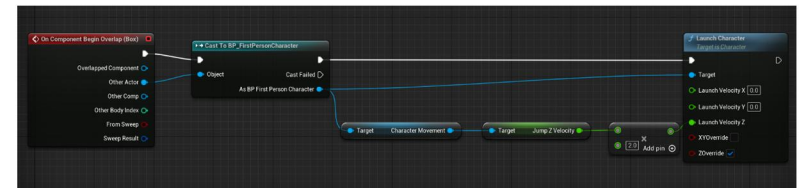
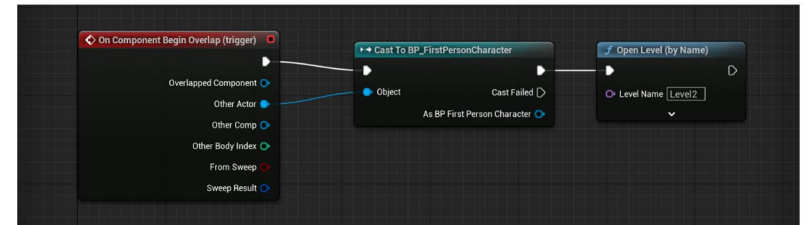
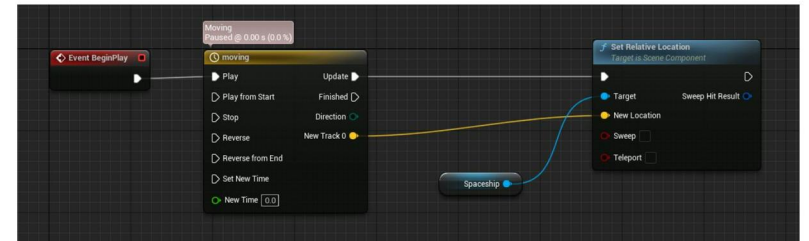
Initial Sketches



Scenario of Game



Blueprint





06 Photography

New York USA

Academic/Individual Work

2024 Spring Semester

Elective Course: Architectural Photography

Michael J. Vahrenwald/ nb2922@columbia.edu

