MSAAD PORTFOLIO
2020-2021
RISA MIMURA

STUDIO WORK

- SEPULVEDA DAM ART AND AGRICULTURE

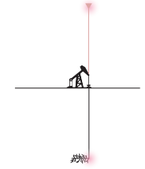
  SPRING 2022

- SEISMIC FIEILD

  FALL 2021

- WATER AFTER OIL

  SUMMER 2021



ELECTIVES

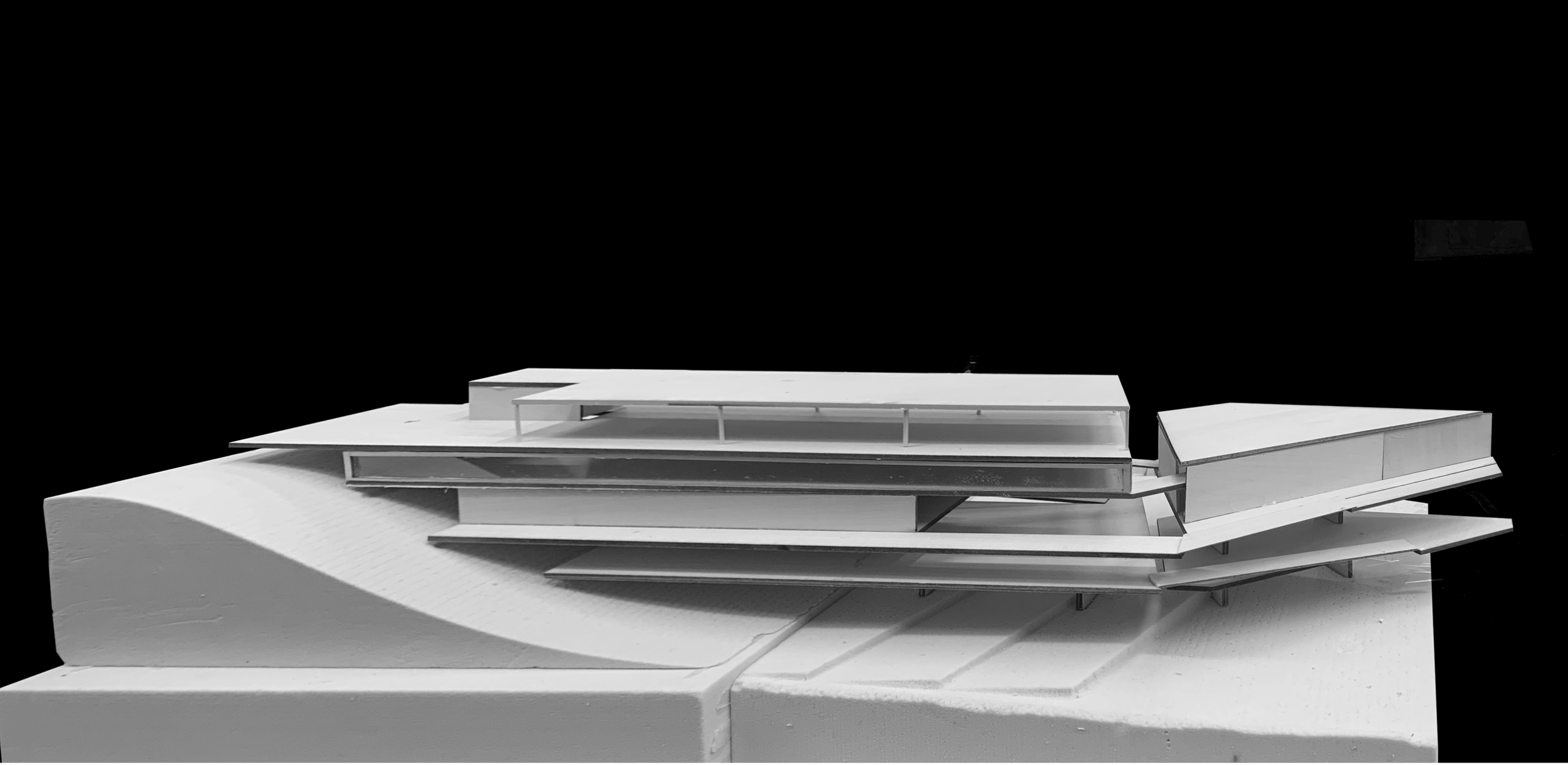
- SOLAR FOLIES-OPTIMIZATION

  GENERATIVE DESIGN

  FALL 2021

- UNDERWORLD

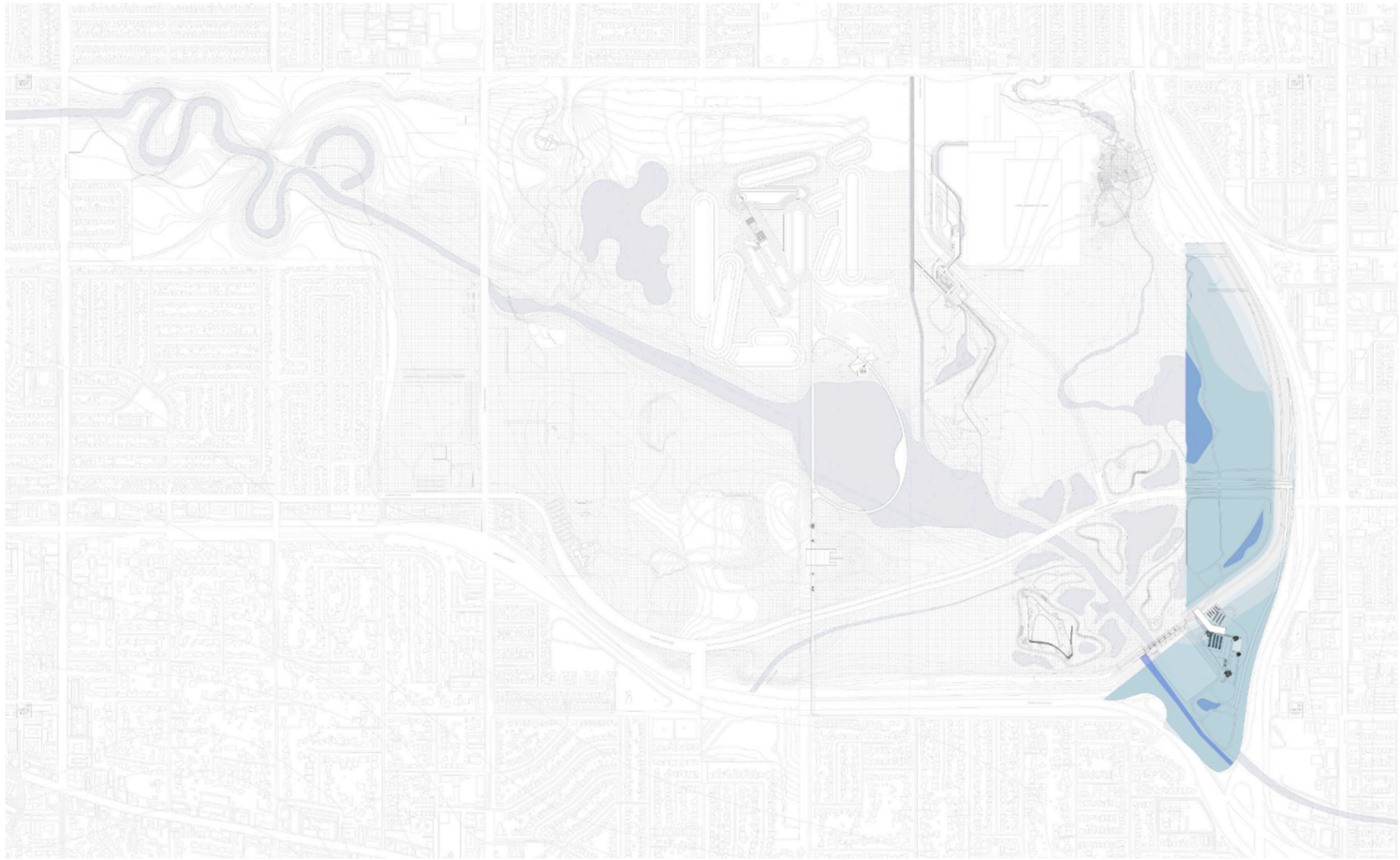
  ULTRAREAL



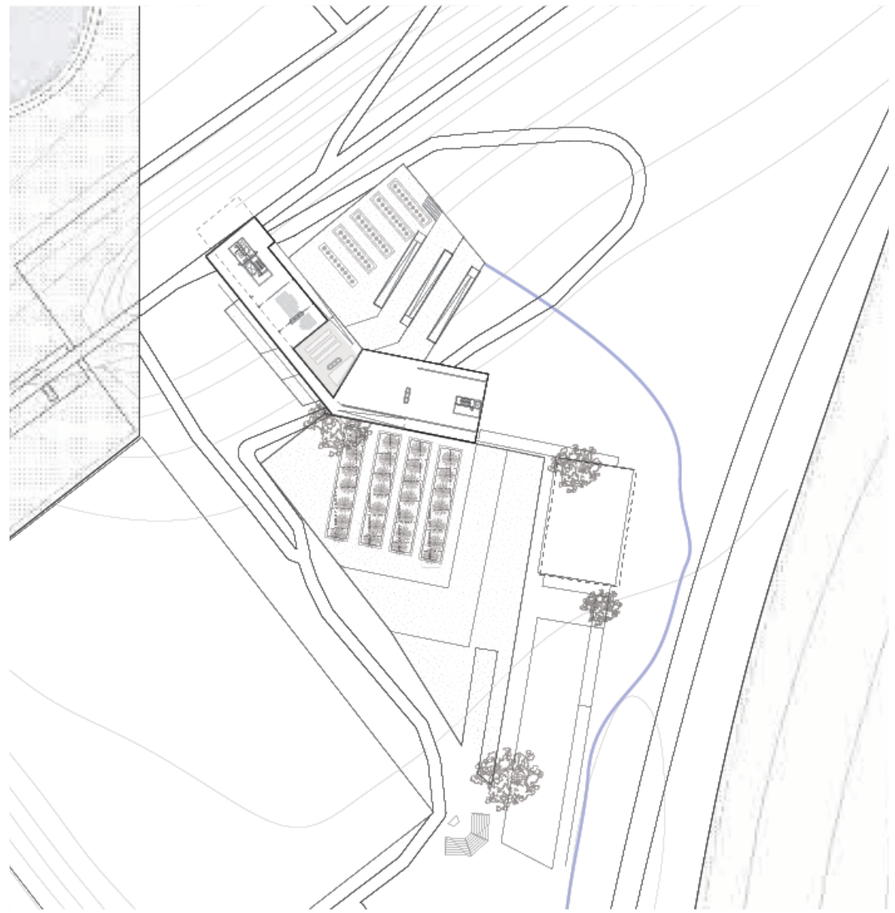
SEPULVEDA DAM ART AND AGRICULTURE

Spring 2022
Location: Sepulveda Flood Control Basin
Type: Transitional Housing and Educational
Instructor: Laurie Hawkinson
Independent Work

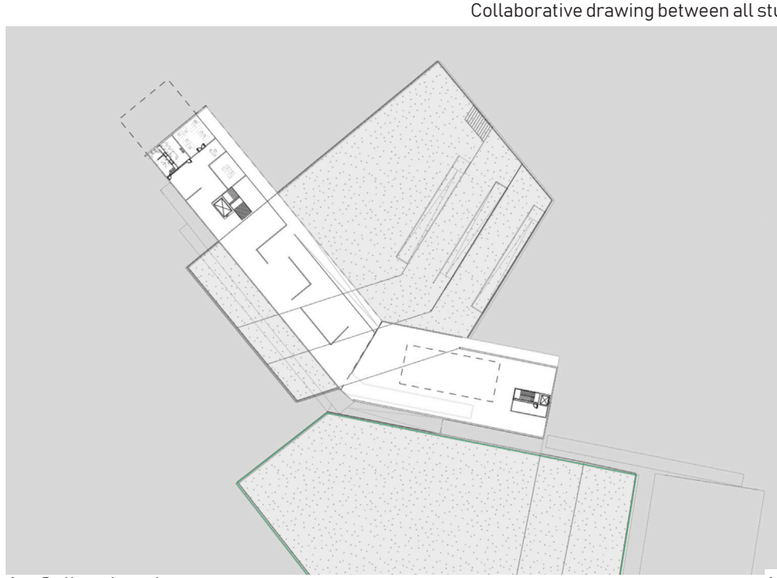
Sepulveda flood basin is a 2400 acre flood control basin located in San Fernando Valley that currently that consisits of a series of program, recreational areas, a water reclamation plant and wild life reserve . Sepulveda Dam is the threashold that is located at the lowest point of the basin that controls the water level and protect surroudings during a flood, but due to its operational purpose and flooding risk, the surrounding of the dam is left as vacant spaces. This proposal aim to bring an opportunity for residents and visitors to occupy this area. The program includes transitional housing program, art center and agriculture center on the embankment next to Sepulveda Dam spillway.



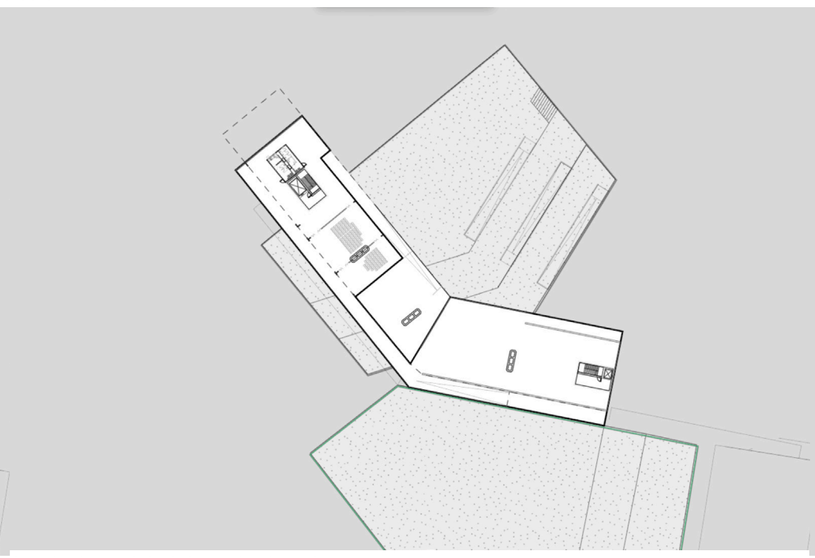
Master Plan of Sepulveda Flood Control Basin Proposal with 100 year flood level indicated
Collaborative drawing between all studio members



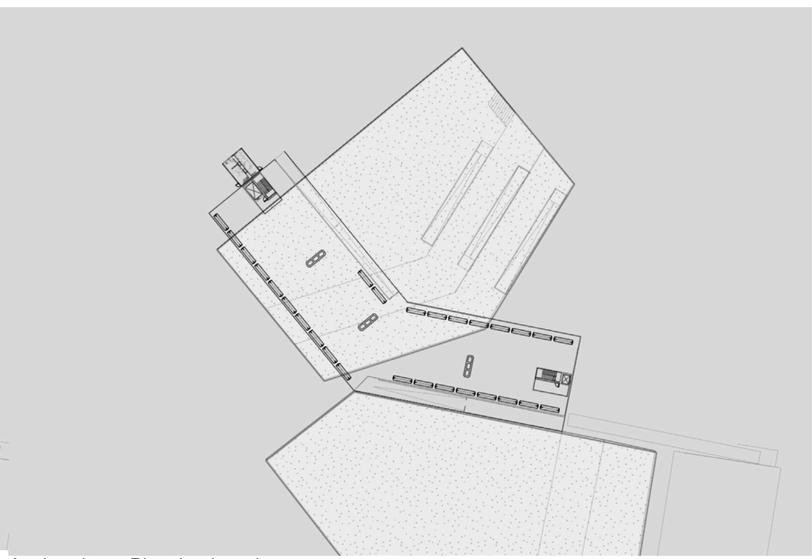
Detail Plan
The surrouding ground near the building is transformed into leveld agriculture field



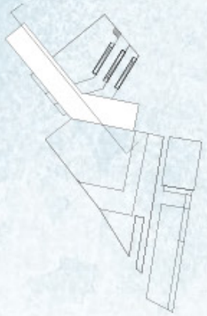
Art Gallery Level

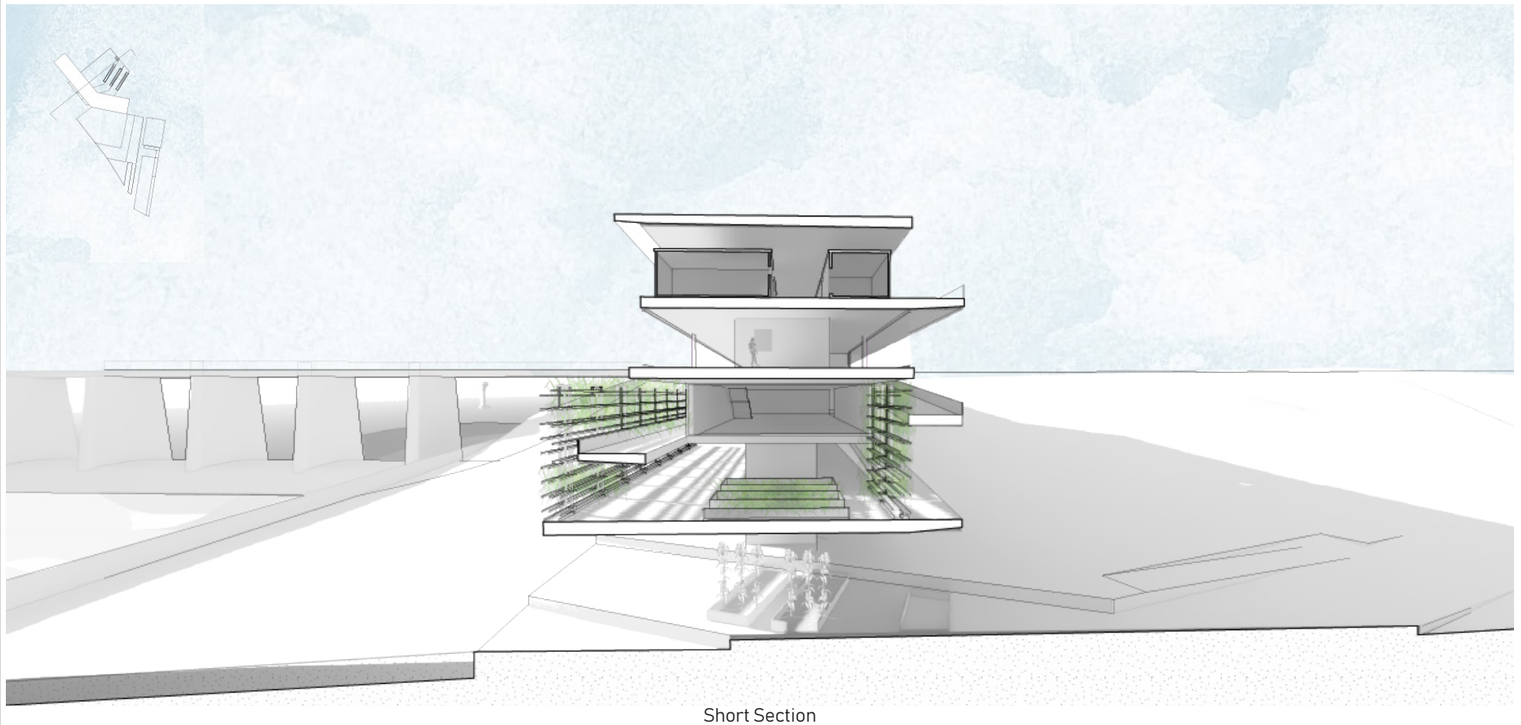


Argriculture Administrative Level

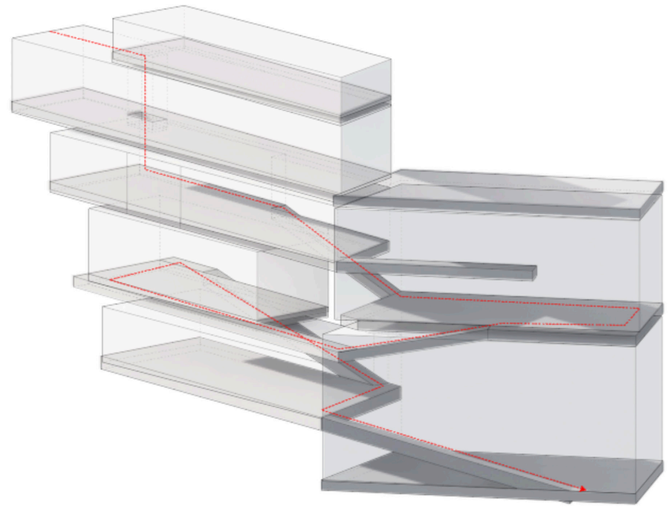


Agricuulture Planting Level

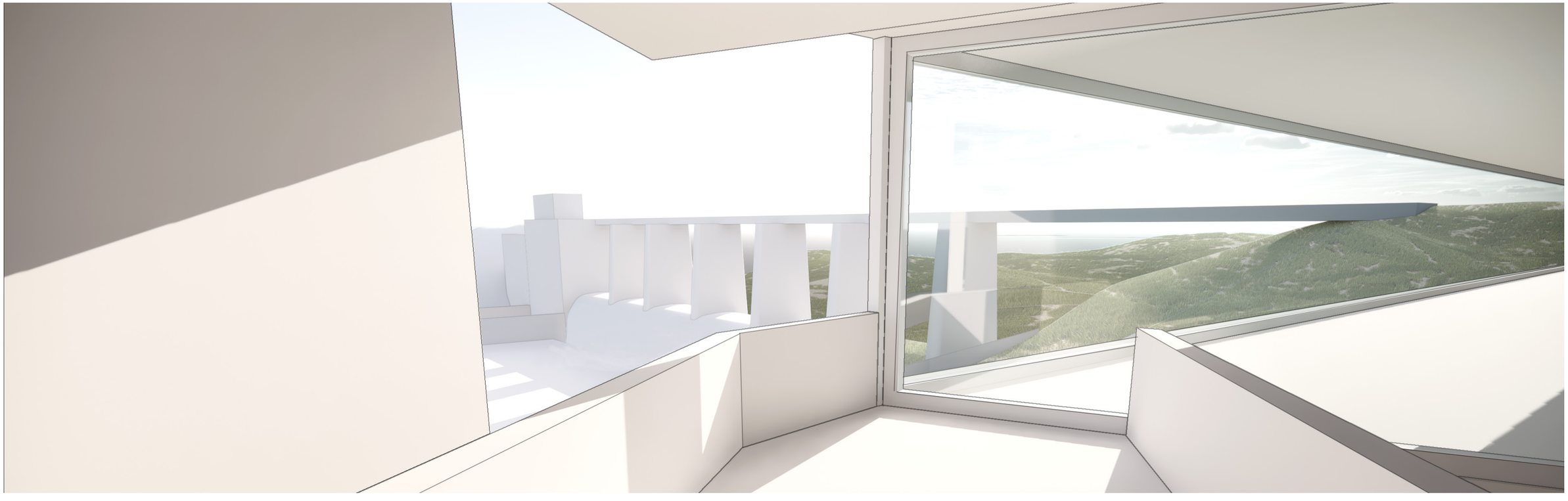




Short Section
The narrow width of the buidling allows visual access to the dam area and wild life reservation



Circulation Diagram
The Argricutlre Center located on the lower level has ramp access to maximize access when carrying seeds and product



SEISMIC FIELD

Fall 2021
Location: Pier 84 at Hudson River
Type: Artificial Island
Instructor: Bernard Tschumi, Valeria Paez Cala
Collaborateve work with Zihan Sun, Enfeng XIe, Haozhen Yang

Earthquakes as a catastrophic event are defined by human perception, when every step we make is causing the Earth to vibrate.

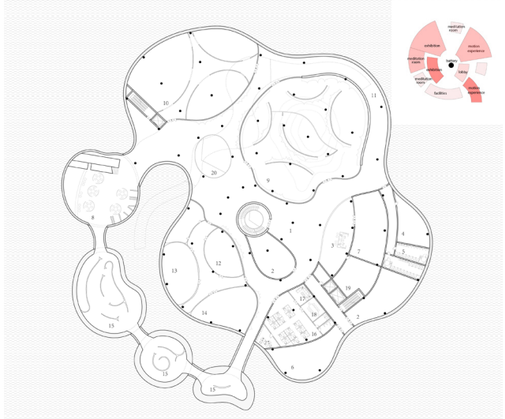
Seismic field will utilize the motion of people as a new way to generate energy and to experience earthquakes. Kinetic floors and motion sensitive membranes are placed throughout the island to enhance visitor's perception of earth not as an element but also as a part of the dynamic structure of the island. With visitors entering the island, the static ground plane will be activated and form an interactive experience that will enhance the percetion of earth and earthquake.

Programs arrangement is inspired by the concentric form of seismic waves of earthquake, battery exhibition which is the energy core is at the center, simulating epicenter of earthquake.

The most motion intensive programs such as gathering space and motion experience arena are within in the inner circle, and the motionless activities are at the outskirts of the island

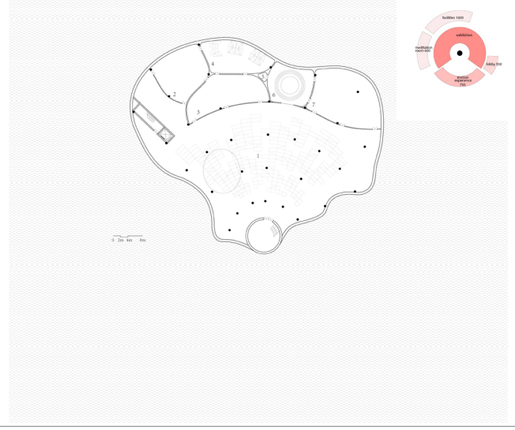
Abovewater Level

Recreational area that consists a large scale gathering hall for public use, exterior walk way, and administrative area

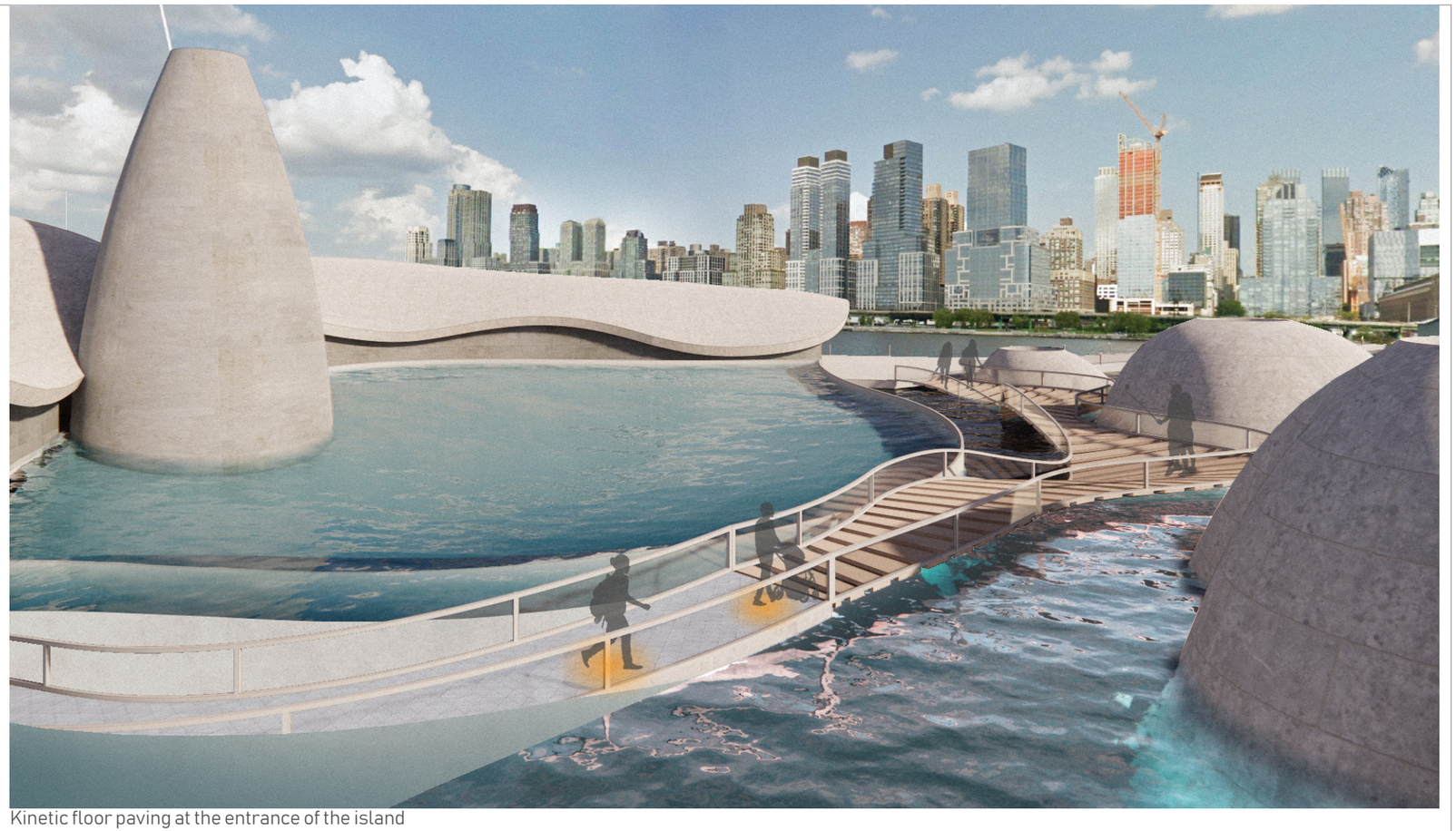


Below water Level

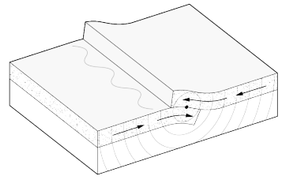
Level 2 is the Earthquake Museum level that consists the motion experience caves and AR/VR rooms.



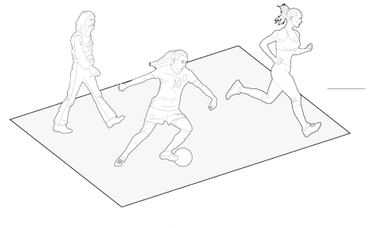
Level 3 is the Earthquake education level for rescue simulations and precaution training.



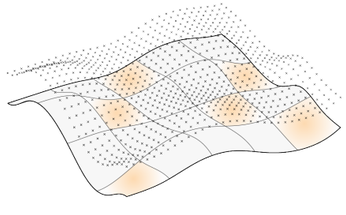
Kinetic floor paving at the entrance of the island



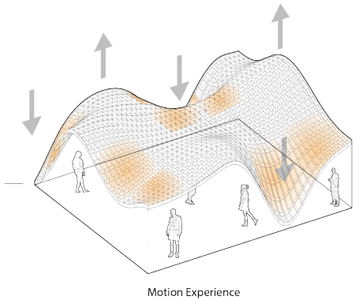
Motion of Earth



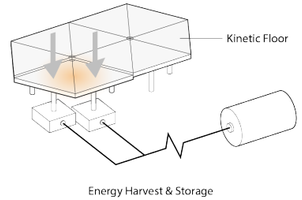
Motion of People



Vibration of Ground
Seismic Field



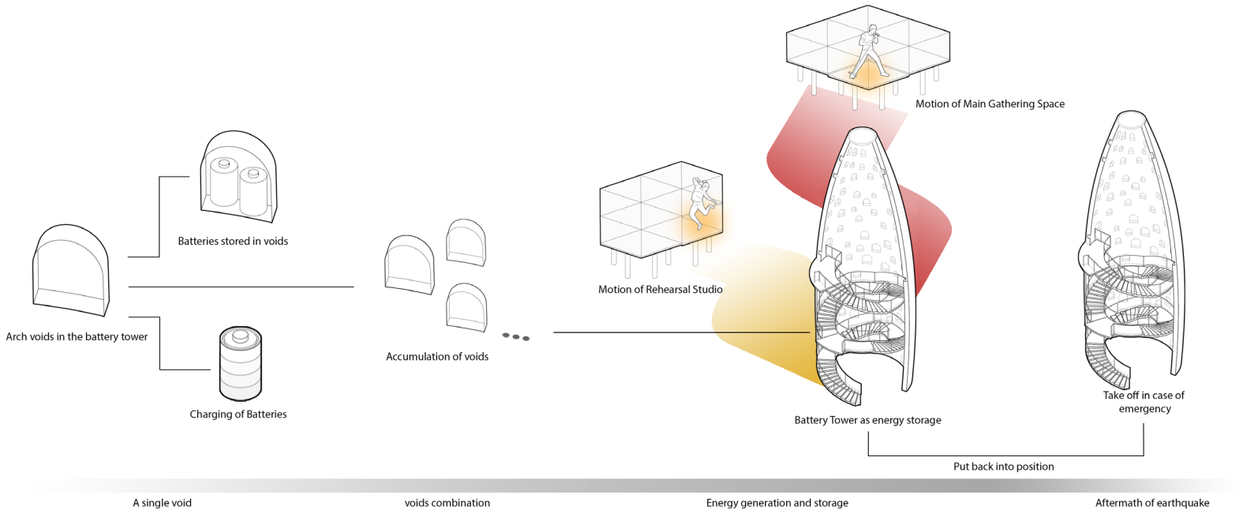
Motion Experience

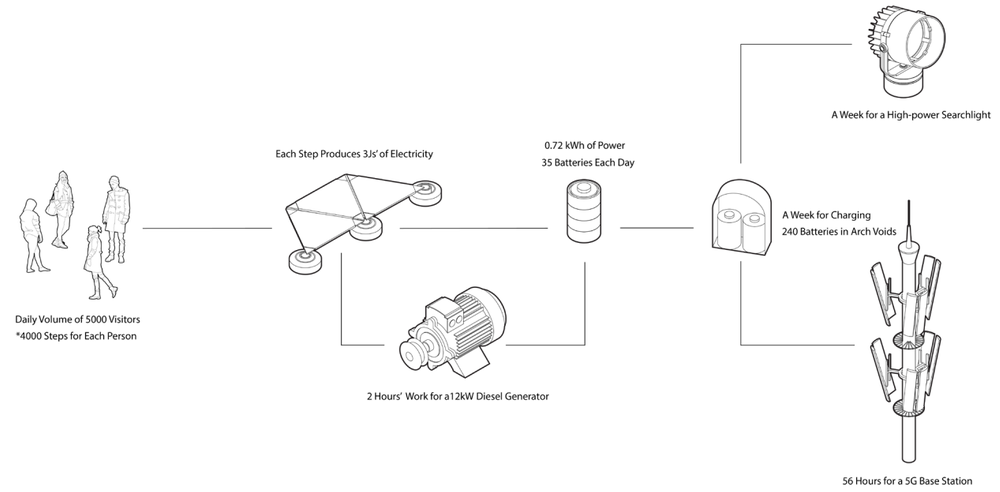


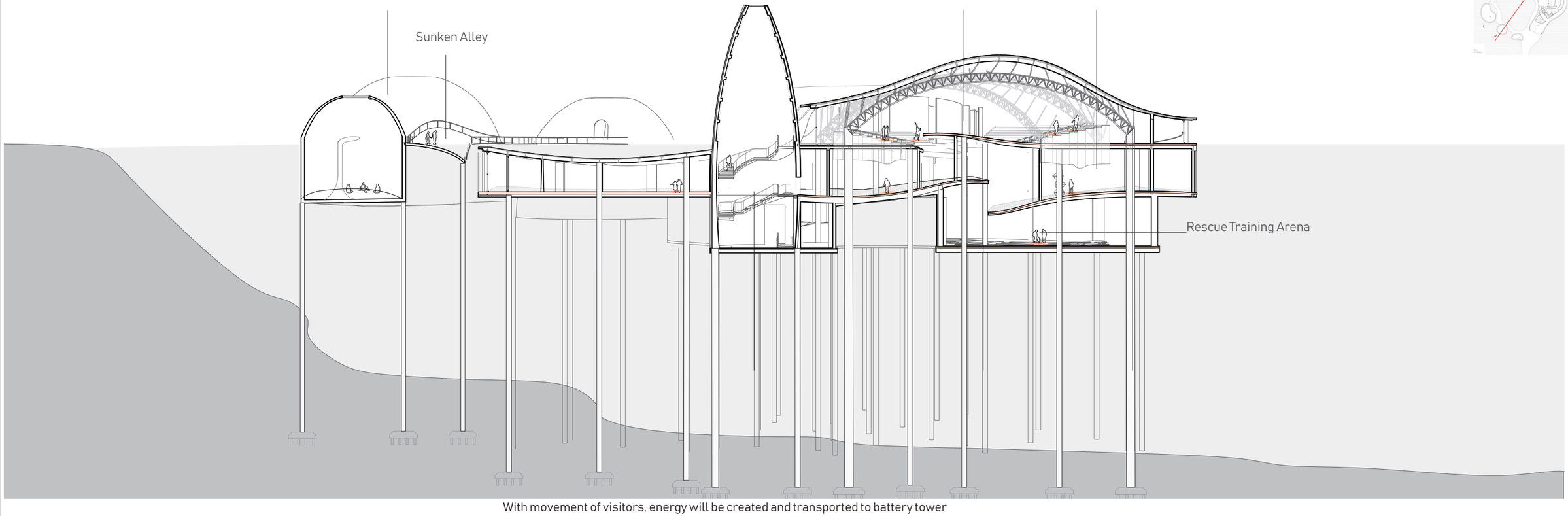
Energy Harvest & Storage

Interior of Battery Tower with battery storage spaces

Seismic Field consists of three notions, the above water field that represents the creation aspect of earth, a field where motion and energies are created. The below water field that recollects the destruction of past earthquakes, and the battery tower that harvest and store the energy.

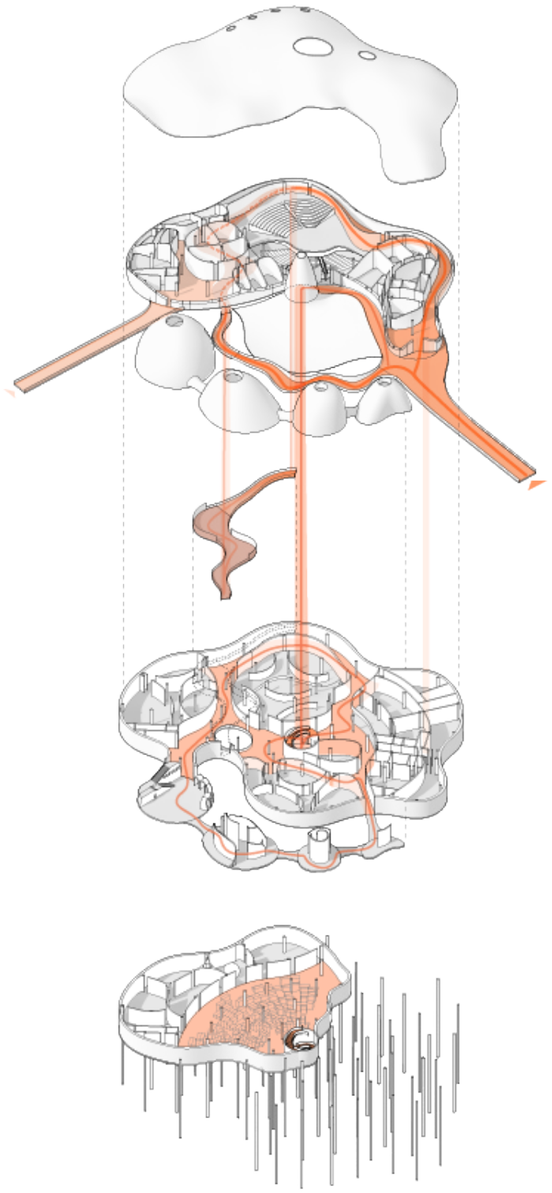






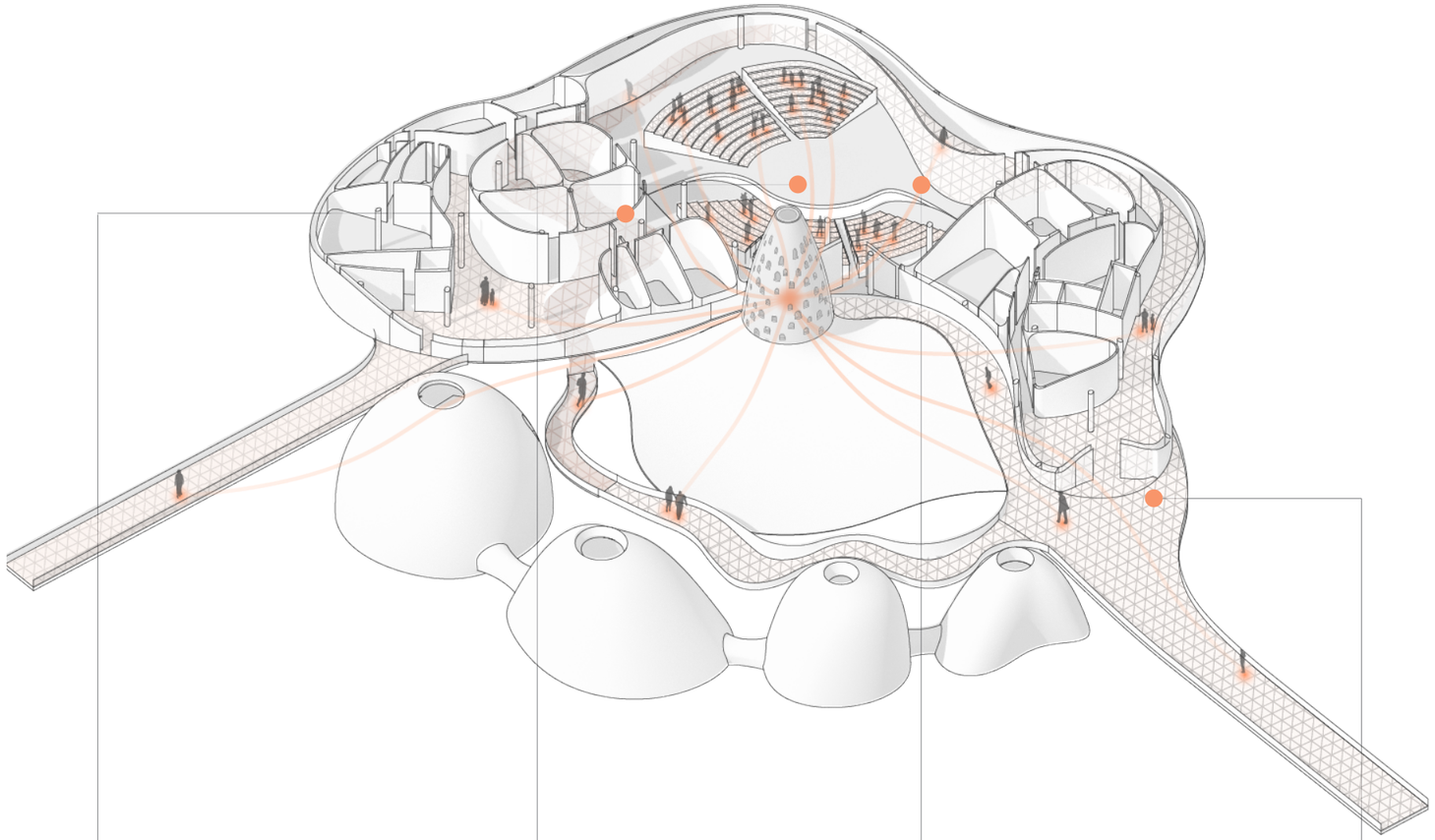
With movement of visitors, energy will be created and transported to battery tower

The orange area shown in the axon are paved with kinetic flooring to maximize energy harvested, including circulation and museum and gathering programs within the island.



Earth is not only seen as building material in this island, it's also a living element that moves according to the activities of people.Spatial configuration that floors and ceilings are together lead people to experience a more fluent and flexible way of visiting, which means earth plays multiple roles of guidance, structure and support.

The island let people become the main body of the earthquake-the motion of earth. They are not only led to experience the motion, but also encouraged to produce motion, and then, energy. People are more close to the earth element in this island than anywhere in NYC.



Sunken Alley

Motion Experience Hall

Main Gathering Area

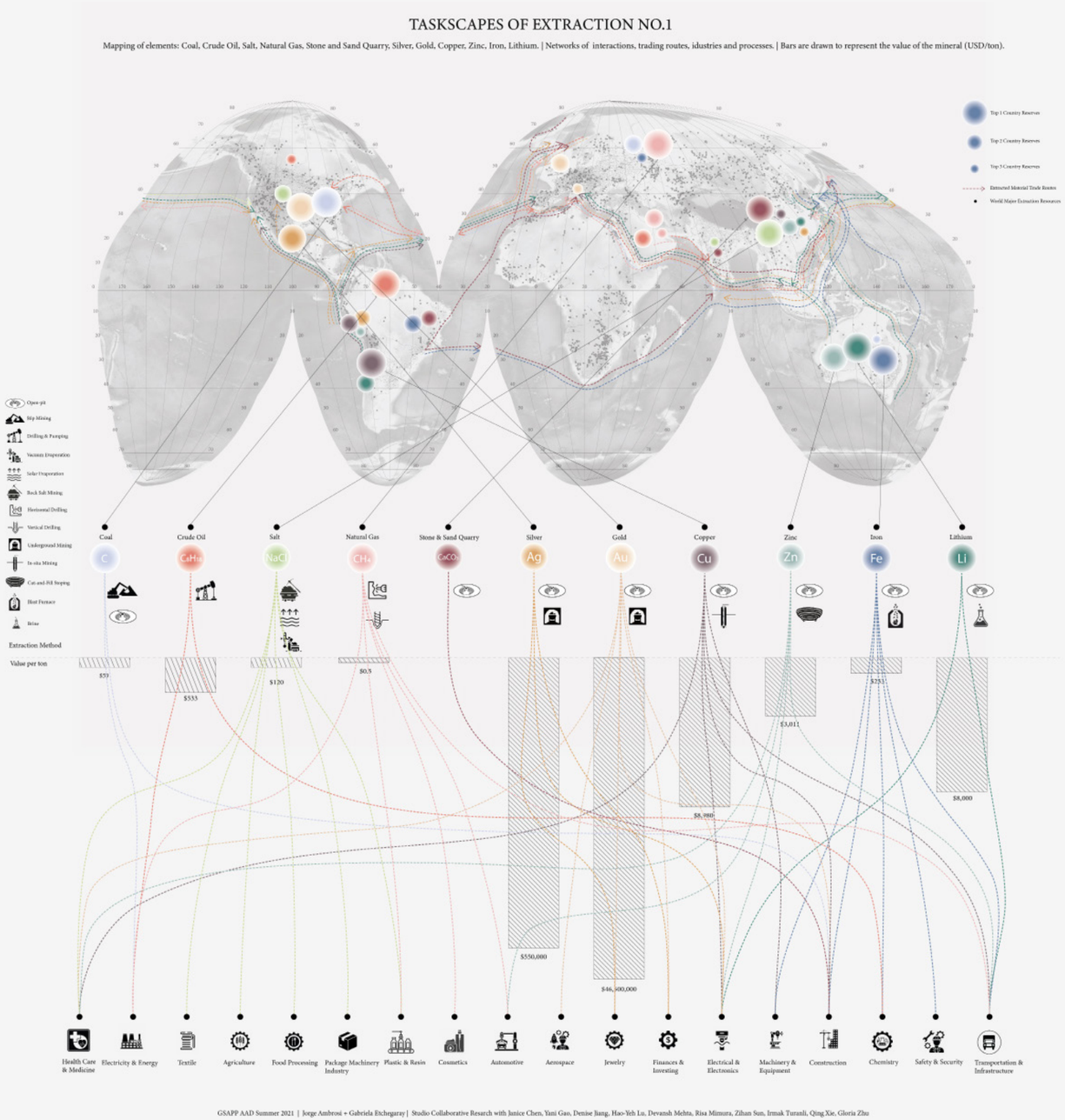
Exterior Walkway

WATER AFTER OIL

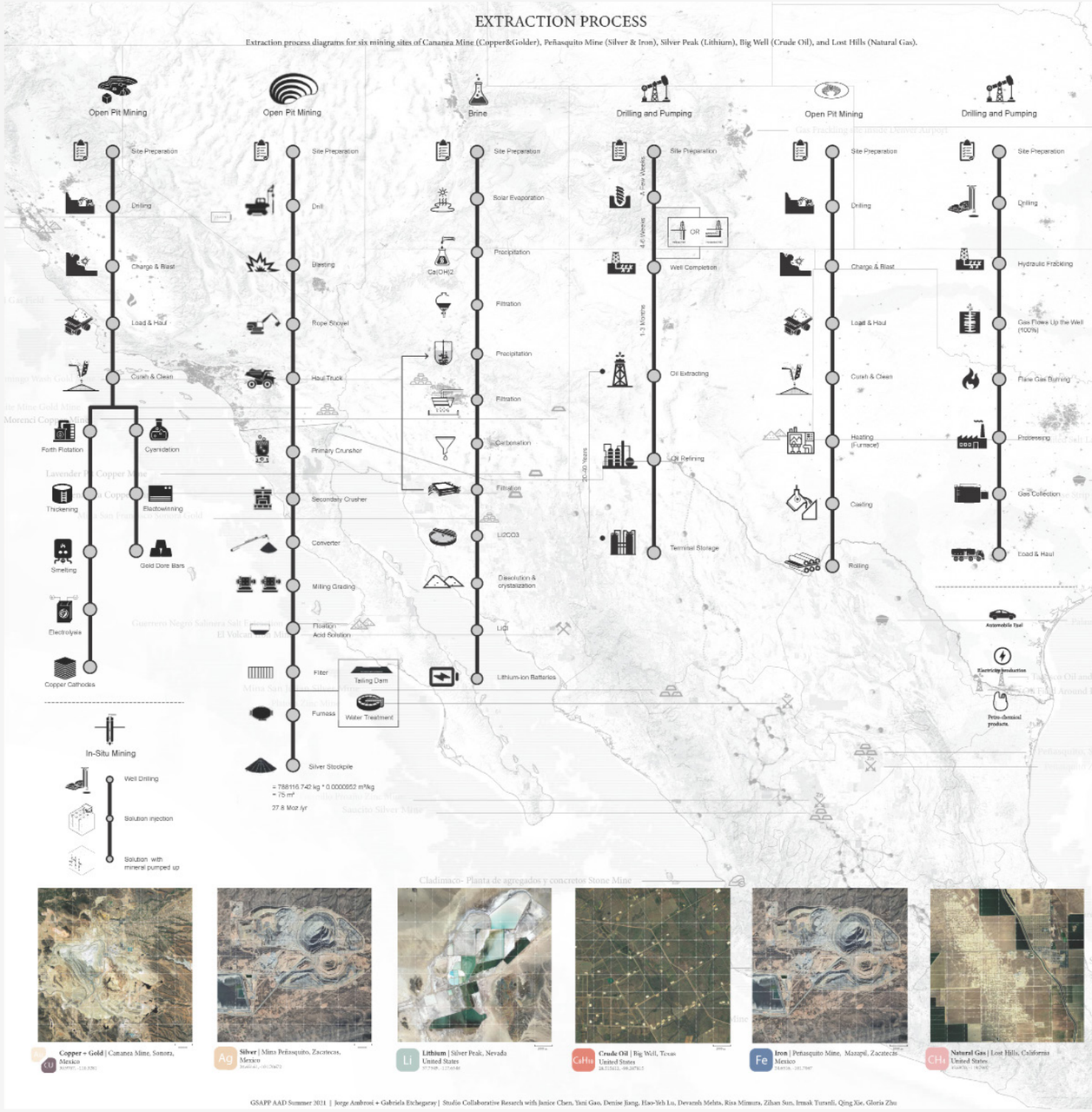
Summer 2021
Location: Bigwell, Texas
Type: Landscape Design
Instructor: Jorge Ambrosi, Gabriela Etchegaray
Collaborateve work with Gejin Zhu

Crude oil, as one of the most dominating extraction industries in the world, exploits tremendous amount of water daily for the extraction and production process. By exploring the intricate water cycle behind the crude oil extraction taskscape, this proposal is trying to visualize the invisble relationship between water and oil in order to evoke awareness of the current water crisis.

Before oil extraction, a process called hydraulic fracturing that extend the lifespan and flow rate of oil wells takes place for each well. This process contaminates the underground water reservoirs and transforms the surrounding lifes and landscape. By analyzing existing data and focusing on the water cycle impacts caused by the hydraulic fracturing process at multiple scales, our approach and evoke awareness of this water crisis.



11 most common extracted resources and their extraction methods, world reserves, flow of trading routes, interrelated industries and market values.



Most common methods and processes for six of the elements that were selected and explored in detail

The map has an underlay of general mineral resources around the world, with colored dots representing top 3 countries with most reserves corresponding to each element. There is an accumulations of mineral resources in countries that have more complex geological compositions.
The flow lines are following trading routes of the top 3 producing countries to top 3 importing countries for each element. The map suggests that the distribution of extracted materials is highly dependent on the producing countries and the shipping industry.

Most extraction methods involve excavating the earth surface, blasting and alternating the original landscape. The extracted ore, liquid or gas is then refined through various methods until it reaches the purity required for production.The refining process of resources often takes place in large scale factories off site and involves input from many professions and companies. For mineral and metal extraction, open pit mining is the most common and conventional. For oil and natural gas, wells are drilled a few thousand feet deep underground to reach oil and gas shale formed millions of years ago.

The highlighted dots each represent an oil well; there are three urban areas that depend on this water source within the range, Bigwell City,Dilly and Cotulla. Each doted circle is a simulation of possible contamination to the water source from the oil well taskscape in the area.

We approached this invisible relationship of water after oil by putting these invisible contamination that occurs underground into a more visible form that highlights the consequence of each oil well.

Hydraulic Fracling Water Cycle

50% Surface Water

50% Ground Water

Fresh Water Supplier

52,000 Gallons of Water
90%

289 Gallons of Chemical Elements
0.5%

Transportation

Chemical Supplier

Stepan
Dow
Flotek
Parchem
BASF
Solvay

5,488 Gallons of Frac Sand
9.5%

Chemical Mixing
57,777 Gallons

carry out mineral from subsurface

Mg Magnesium 24.305
Ba Barium 137.327
Br Bromine 79.904
Cl Chlorine 35.453
K Potassium 39.098
Ra Radium (226)
Na Sodium 22.989

Slab Gate Valve for Fracking
Production Company: TVC
working pressure: 10,000psi--20,000psi

Fracking Liquid Injection
57,777 + 2,167 Gallons

Reinjection
2,167 Gallons

proppant : Sand[Sintered bauxite, zirconium oxide, ceramic beads]

Acid: Hydrochloric acid (HCl, 3% to 28%) or muriatic acid

Breaker: Peroxydisulfates

Bactericide / Biocide: Gluteraldehyde; 2-Bromo-2-nitro-1,2-propanediol

Buffer / pH Adjusting Agent: Sodium or potassium carbonate; acetic acid

Clay Stabilizer / Control: Salts (e.g., tetramethyl ammonium chloride) [Potassium chloride]

Corrosion Inhibitor: Methanol; ammonium bisulfate for Oxygen Scavengers

Crosslinker: Potassium hydroxide; borate salts

Friction Reducer: Sodium acrylate-acrylamide copolymer;polyacrylamide (PAM); petroleum distillates

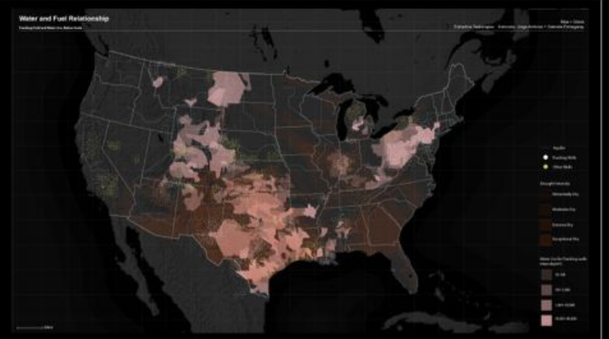
Gelling Agent: Guar gum; petroleum distillate

Iron Control: Ammonium chloride; ethylene glycol; polyacrylate

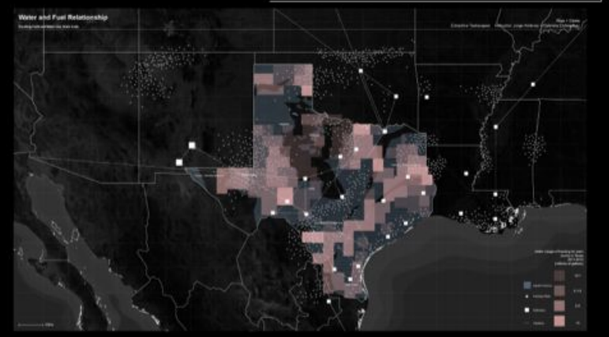
Solvent: Various aromatic hydrocarbons

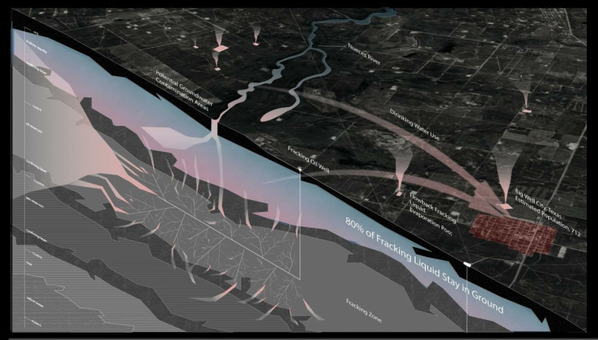
Surfactant: Methanol; isopropanol; ethoxylated alcohol

Fresh Water Usage for Fracking in USA



Fresh Water Usage for Fracking in TX





Fresh Water Usage for Fracking in TX

Fracking Water Use VS Daily Water Use

80%
47,955 Gallons
Fracking Liquid
Remain in Ground

WasteWater Used
in Urban Fabric

Total Liquids in Well
59,944 Gallons

20%
Flowback Liquids Collection
11,989 Gallons

Stored in Tanks

Stored in Pits

Evaporation Pool

Wastewater Treatment Facilities

?

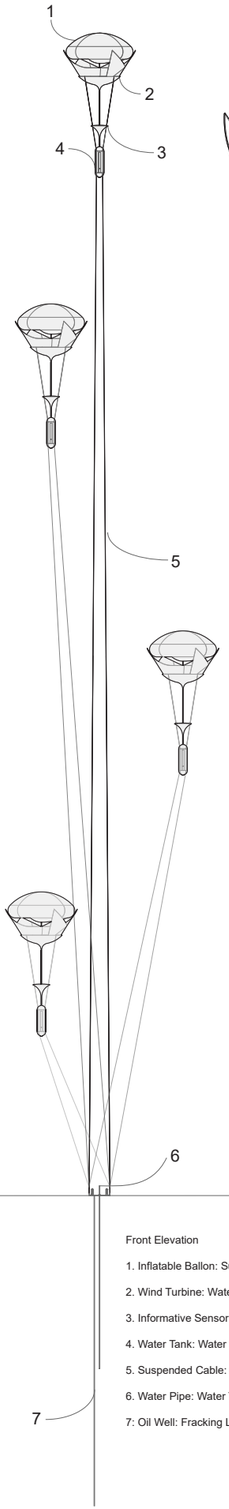
Waste Disposals
9,822 Gallons

Discharge
During Treatment

Clean Water
Used in Urban
Fabric

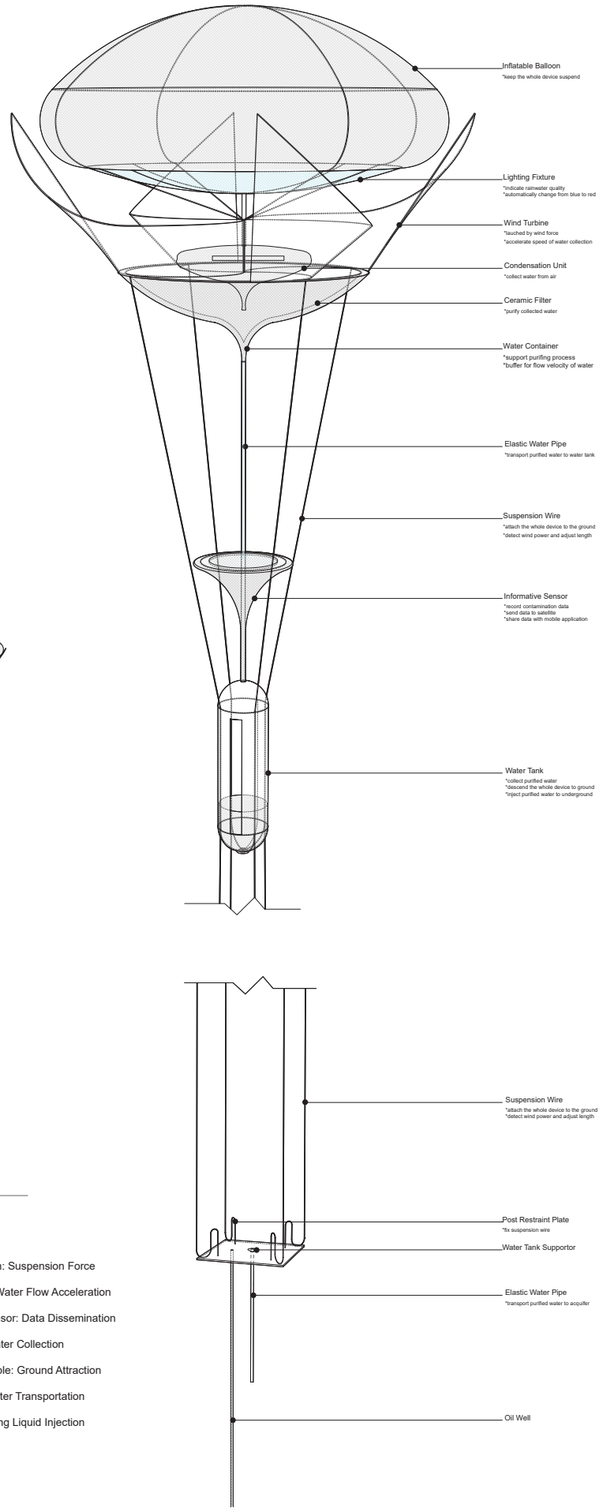
Hydraulic Fracturing Water Process
Crude Oil Processing
Hydraulic Fracturing Hazardous Process
Contamination caused by water usage

+7,250'
+7,000'
+6,750'
+6,500'
Average Depth of Oil Well in Dimmit County, TX
+6,250'
+6,000'
+5,750'
+5,500'
+5,250'
+5,000'
+4,750'
+4,500'
+4,200'
Waterfowl
+4,000'
+3,750'
+3,500'
+3,250'
+3,000'
+2,722'
Burj Khalifa
+2,500'
+2,250'
+2,000'
+1,750'
+1,500'
+1,250'
Empire State
+1,000'
+750'
+500'
+250'
+0'
-250'
-500'
-750'
-1,000'
Underground Aquifer
-1,250'
-1,500'
-1,750'

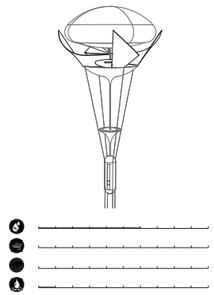


Front Elevation

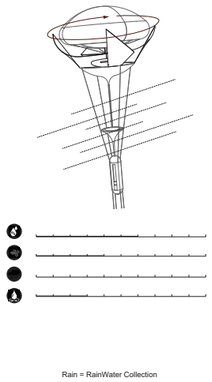
1. Inflatable Ballon: Suspension Force
2. Wind Turbine: Water Flow Acceleration
3. Informative Sensor: Data Dissemination
4. Water Tank: Water Collection
5. Suspended Cable: Ground Attraction
6. Water Pipe: Water Transportation
7. Oil Well: Fracking Liquid Injection



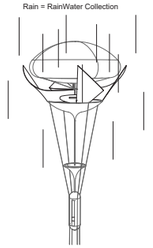
Moist = Air Condensed Water



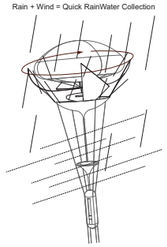
Moist + Wind = Quick Air Condensed Water

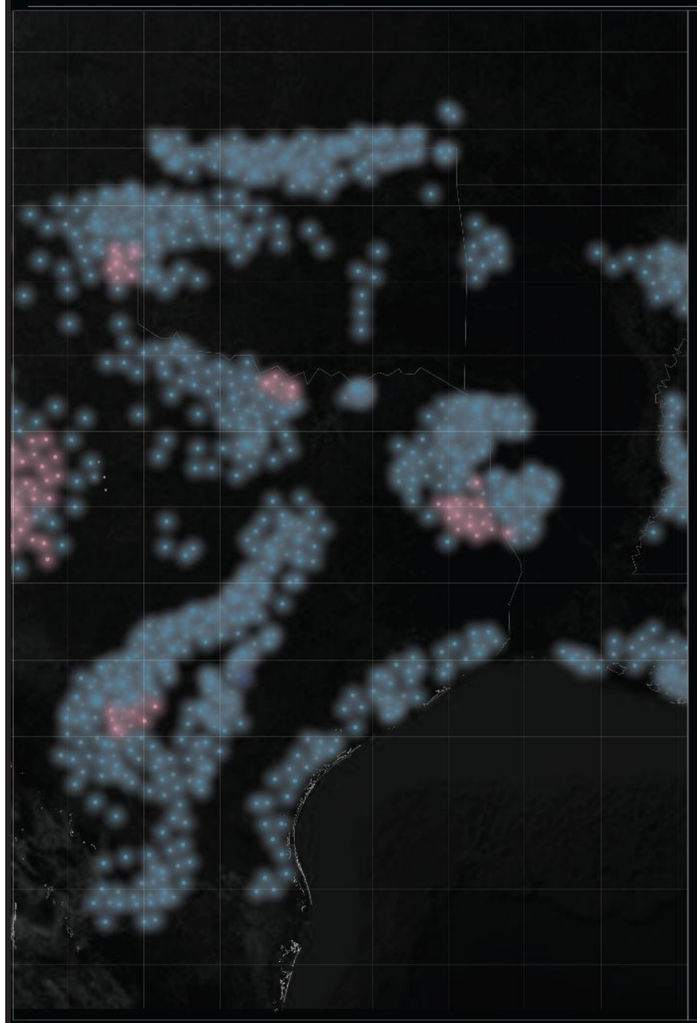


Rain = RainWater Collection

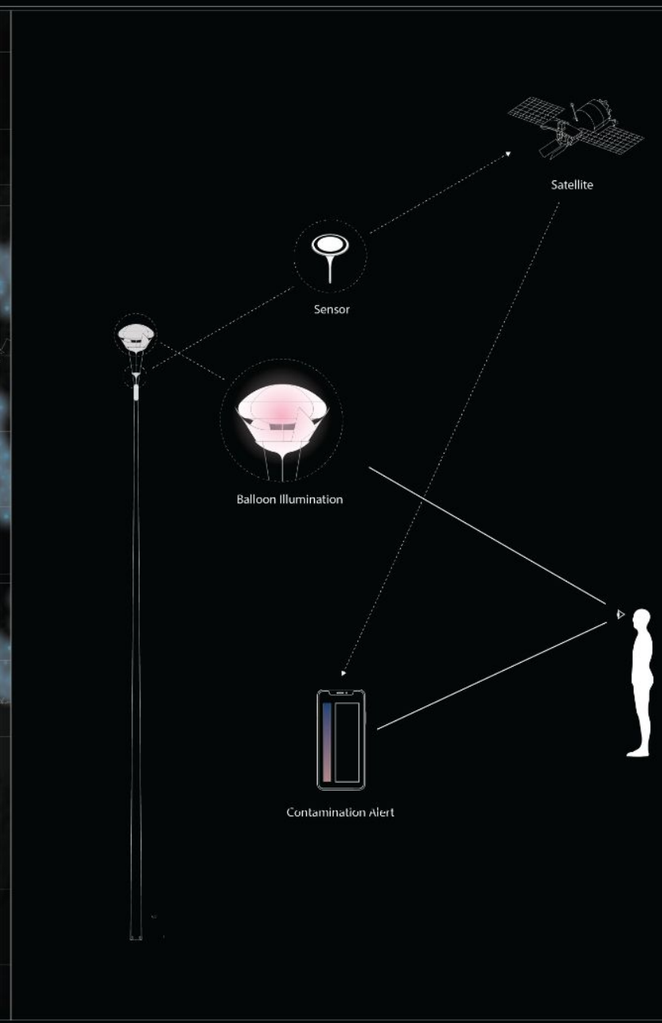


Rain + Wind = Quick RainWater Collection

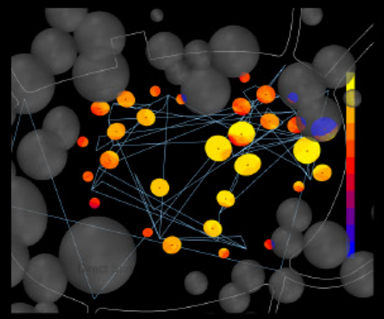




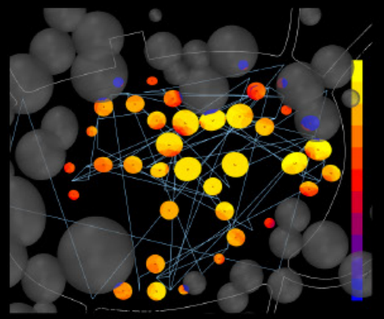
Ground Water Contamination Simulation



Water Quality Awareness



Design 4



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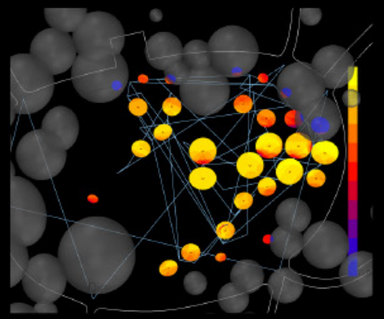

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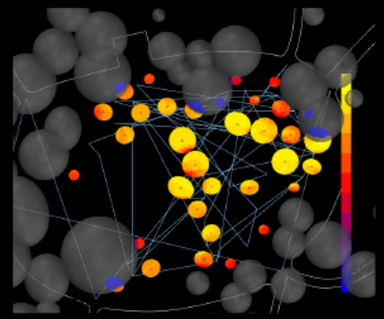

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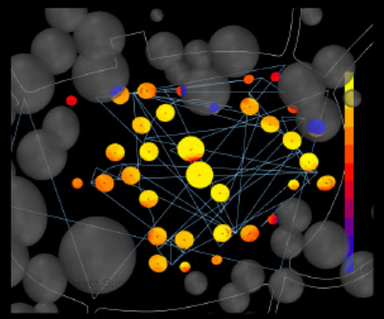

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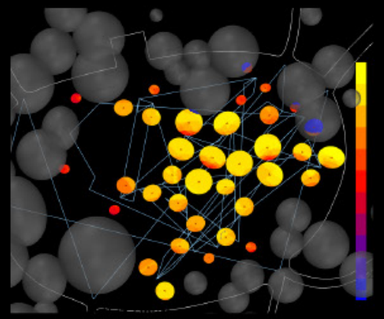

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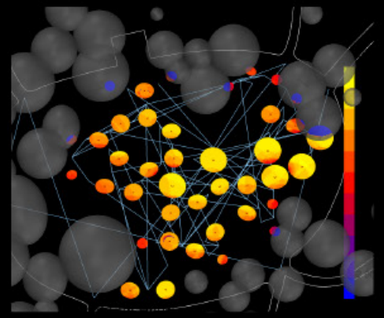

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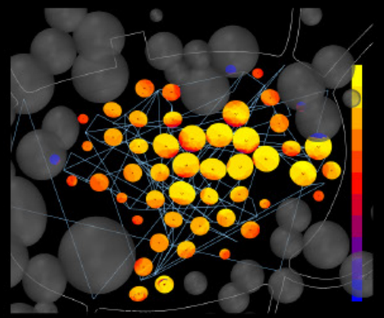

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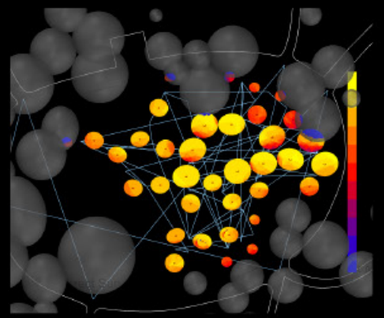

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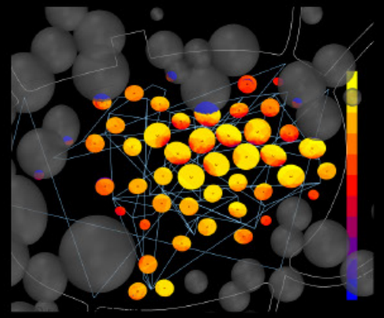

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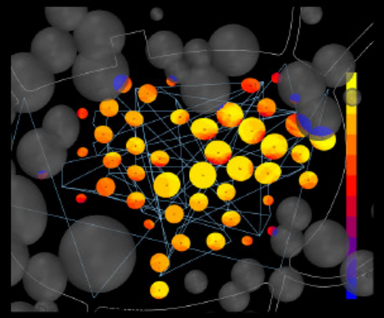

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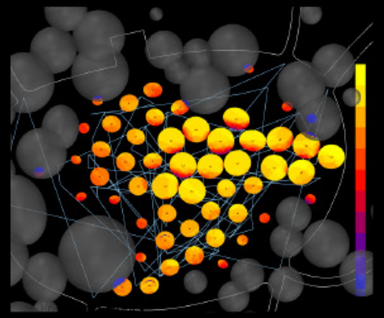

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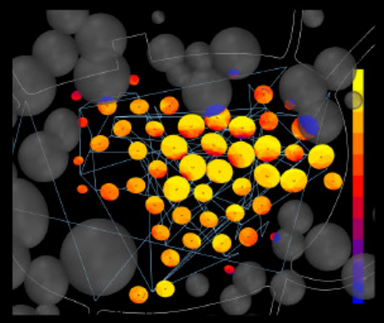

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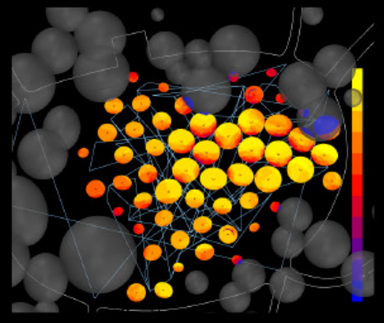

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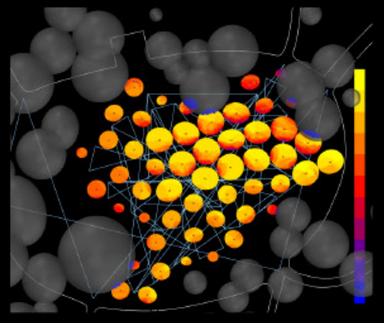
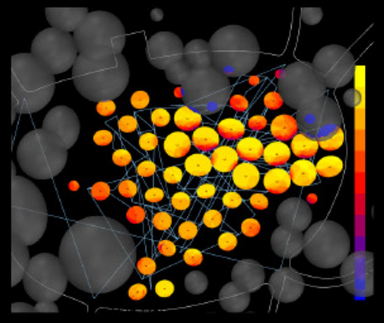


Design 1302



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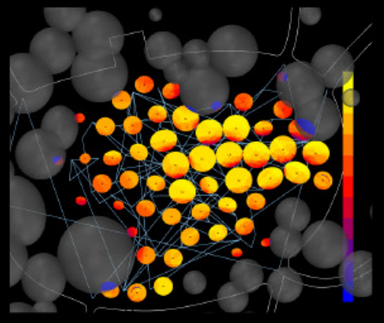

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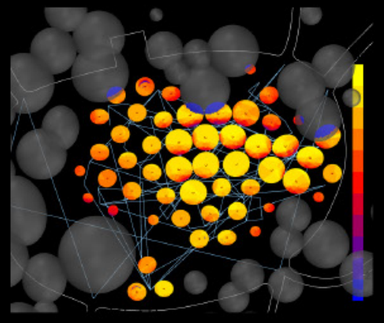


Design 2260

SOLAR FOLIES-OPTIMIZATION

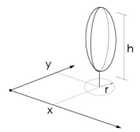
Fall 2021
Location: Pier 84 at Hudson River
Type: Artificial Island
Instructor: Bernard Tschumi, Valeria Paez Cala
Collaborateve work with Zihan Sun, Enfeng XIe, Haozhen Yang

"Central Park Solar Folies" is a design proposal to suggest a possibility to make better use of the abundant sunlight that shines on Central Park. More specifically, we are introducing a multi-layer system of single column supported solar panels in the meadows located in Central Park. Great Hill, one of the highest points located at the northwest corner of the park, is selected as the site for this study.

Environmental Elements

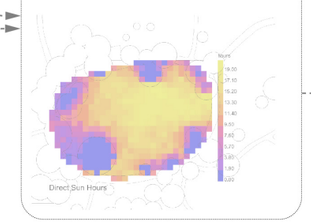
Sunlight data of New York City

The height, size and location of trees

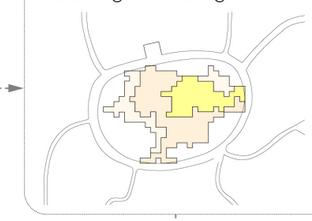


Model Generation Process

1. Sunlight analysis of site



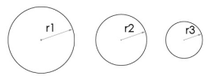
2. Divide the site into different areas according to the sunlight hours



Manual Inputs

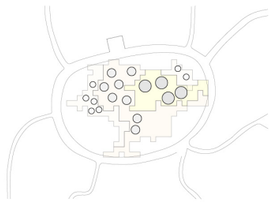
Height of solar panels

Radius of 3 types of solar panels

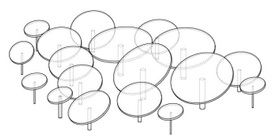


3. Center point colliding & packing

4. Distribute center points of 3 types of panels in different areas

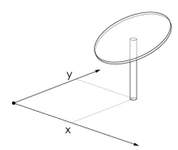


5. Generate 3 types of panels and columns



GH Parameters

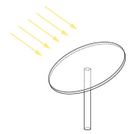
Coordinates of center of solar panels



Rotation angle of each solar panel

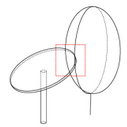
Objectives

Sunlight Hours for Solar Panels

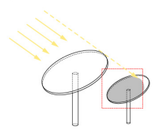


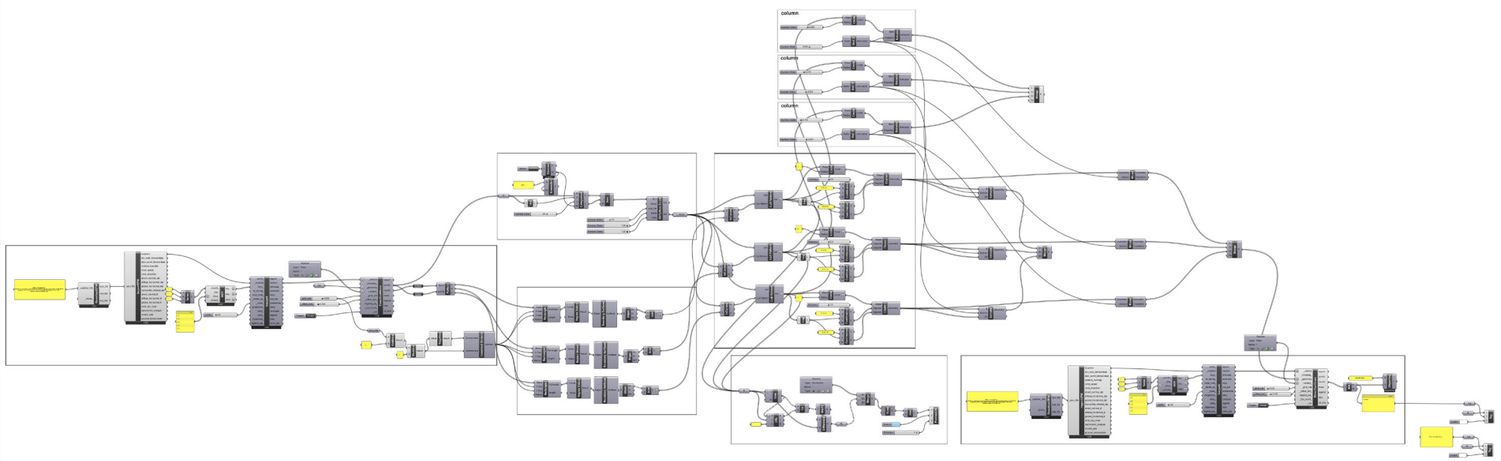
Constraints

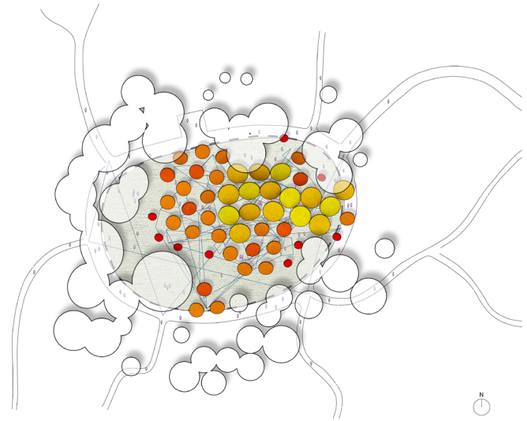
Cull panels intersected with trees

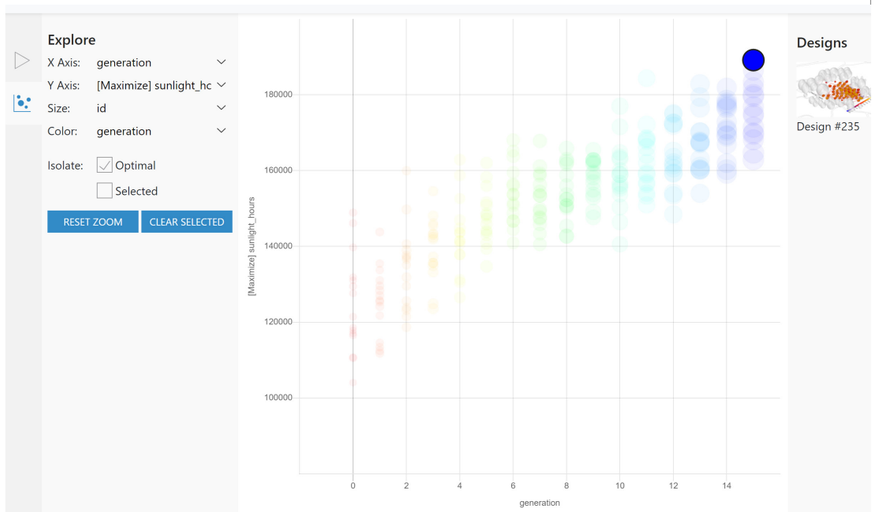


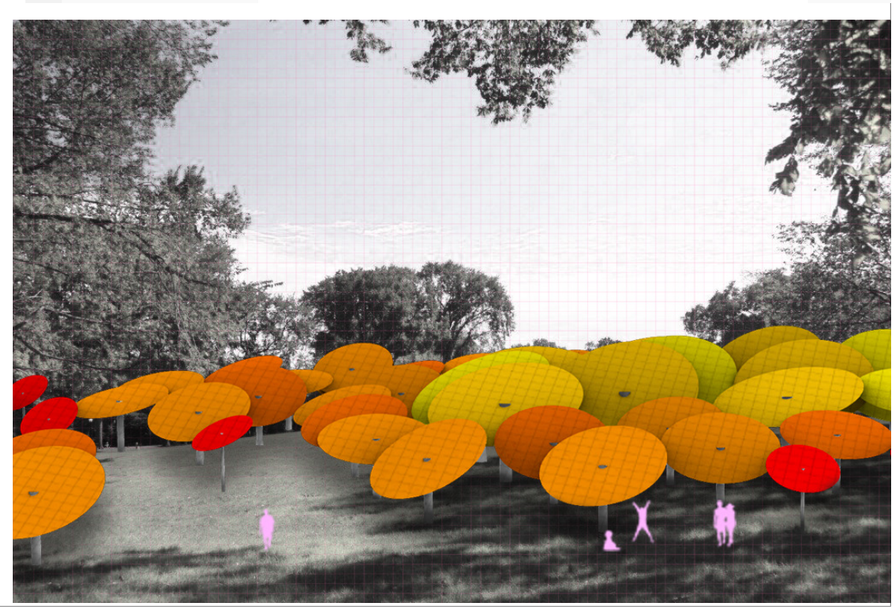
Cull panels overlapping with other panels

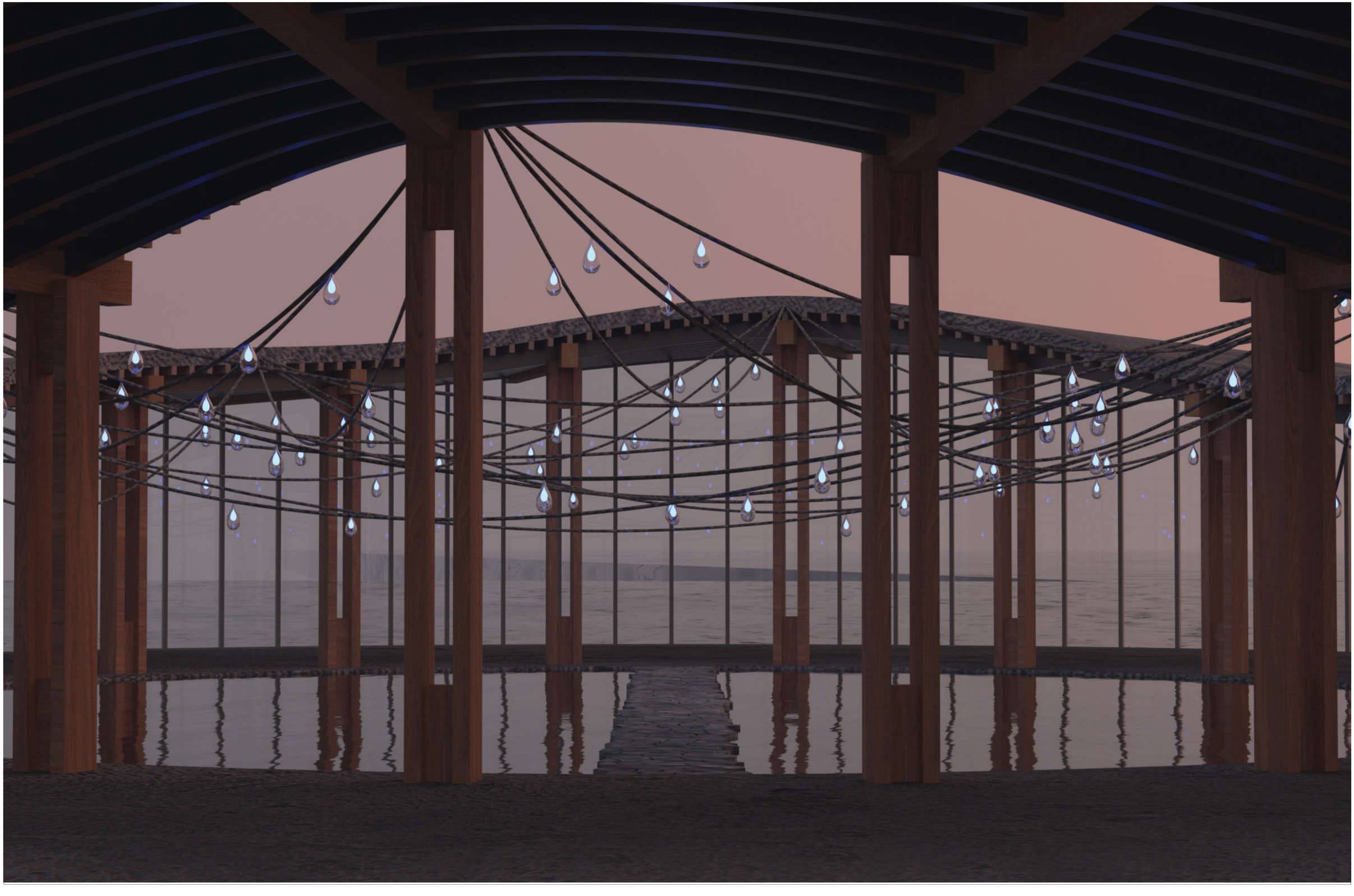










UNDERWORLD

Fall 2021
Type: Electives
Instructor: Phillip Crupi, Joe Brennan
Collaborateve work with Zihan Sun