Mi

DockBay Zone 1 (DBZ 1)
J-Zone

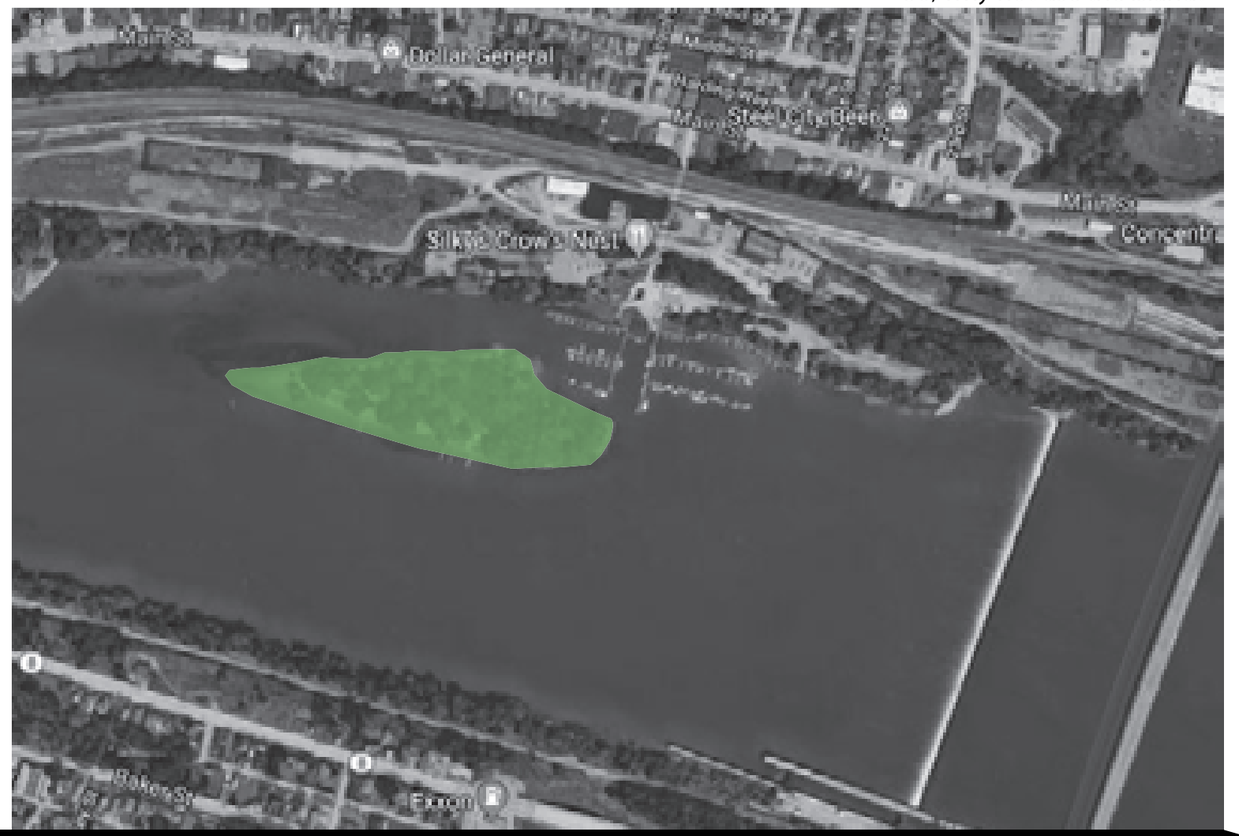
DockBay Zone 2 (
C-Zone

Environment Form and Feedback
Architectural Studio: Elaboration I

Fall 2018 Portfolio

Takumi Jordan Davis
Dana Cupkova | Marantha Putu Dawkins

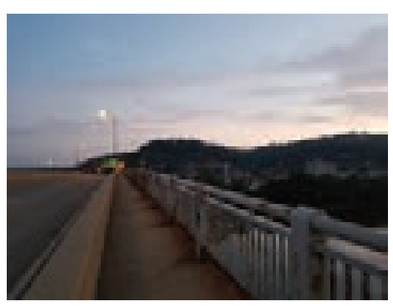
Sixmile Island is in an advantageous, yet unusually underutilized area.
To the north, the dense suburb and historical foundation of Heinz, Sharpsburg.
To the south, the economical, cultural, and social node, Pittsburgh.
So, why is it that the “clump of dirt,” a potential bridge between the two sides, besides the literal bridge (Highland Park Bridge in the east) so neglected?
The docks of Silky’s Crow’s Nest, a major Sharpsburg node, are just meters away from the island.
So, why not use the island?

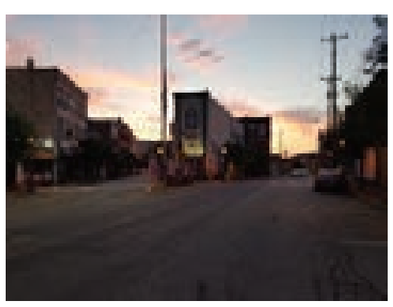


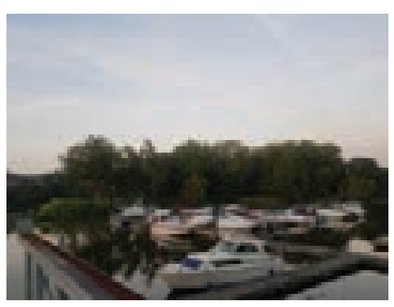
Above:
Topography range of the Allegheny River (generally blue)
The dramatically lower elevation of the surrounding hills are indicative of elemental issues that await any settlement of the island.

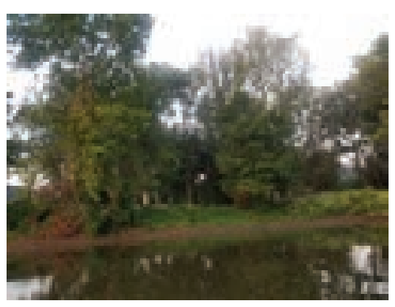
Right:
One of my inital views of the Sixmile Island neighboring the town of Sharpsburg
The docks of the Silky’s Crow’s Nest are practically begging to set foot on the island.
And so was I.

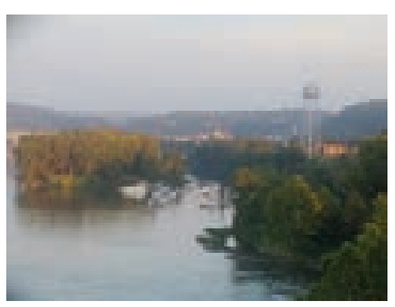
The challenge was the site itself; the lonesome Sixmile Island just south of Sharpsburg and north of Pittsburgh’s Highland Park, has been relatviely underutilized for decades. A temporary sanctuary for the homeless and adventurous, the island has lacked a permanent niche. The mission of the project was to establish such a niche by developing a housing complex that adapts to the island’s landscape. One of the crucial initial steps was to investigate what environmental and social factors affect the island. What better way to learn about the site is there than paying a visit?











Exploration: (Trying to) Set Foot on the Island

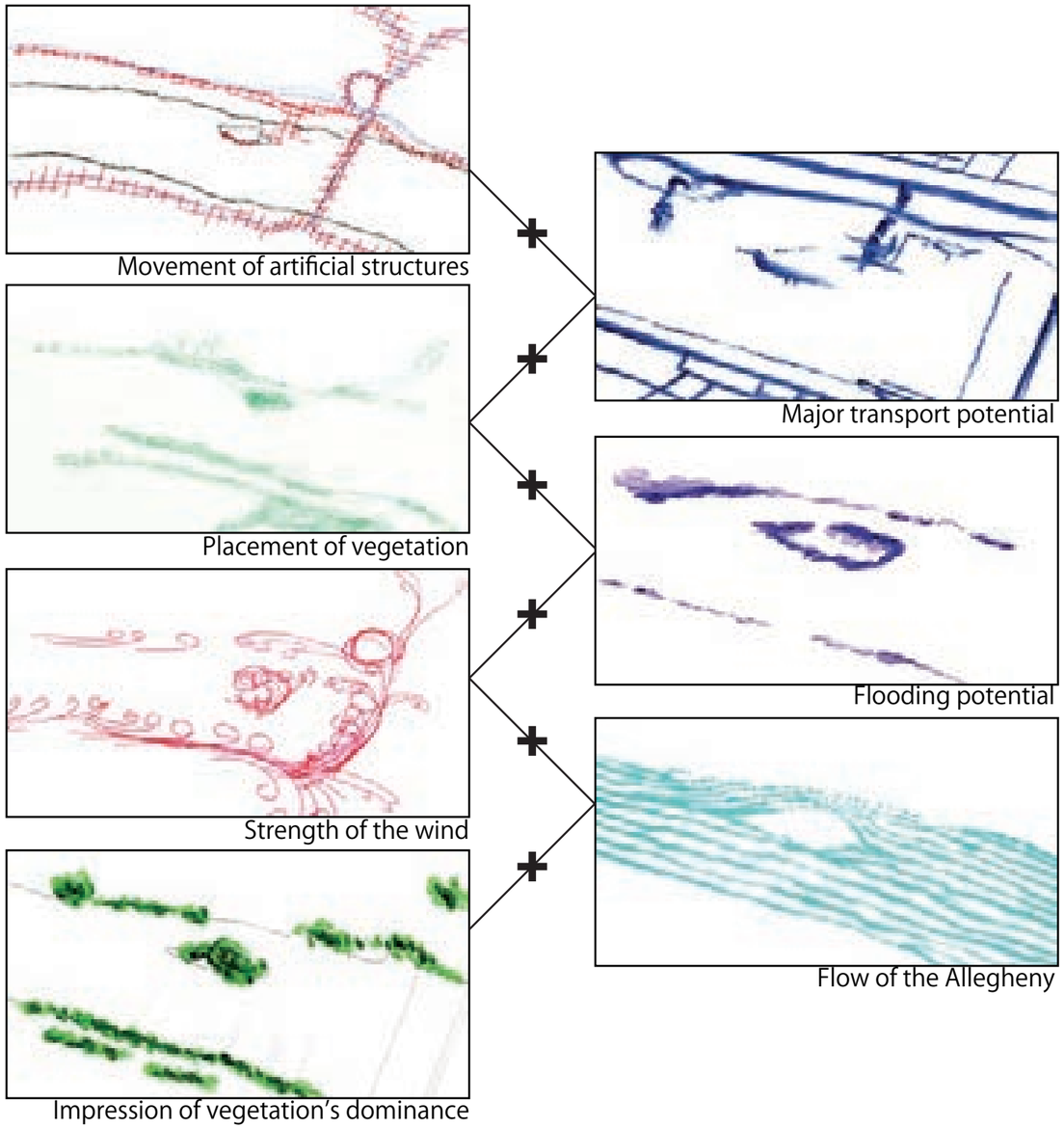
The first step of the project was to get a look at Sixmile Island itself. A rather intimate one, no less. The annual tradition is to excavate the island via rental kayaks. However, issues with rain and unpredictably fast river currents had prevented the kayak excursion. Ergo, I took it in my own hands and jogged to the island and its surroundings, twice. The atmosphere independent of Pittsburgh stood out to me as a significant part of the Sixmile and its surroundings. This became my first real impression of the site context, captured as a collage on the next page. The blue path represents my initial jog to the site, whilst the red represents my second jog.

Sharpsburg

Sixmile Island

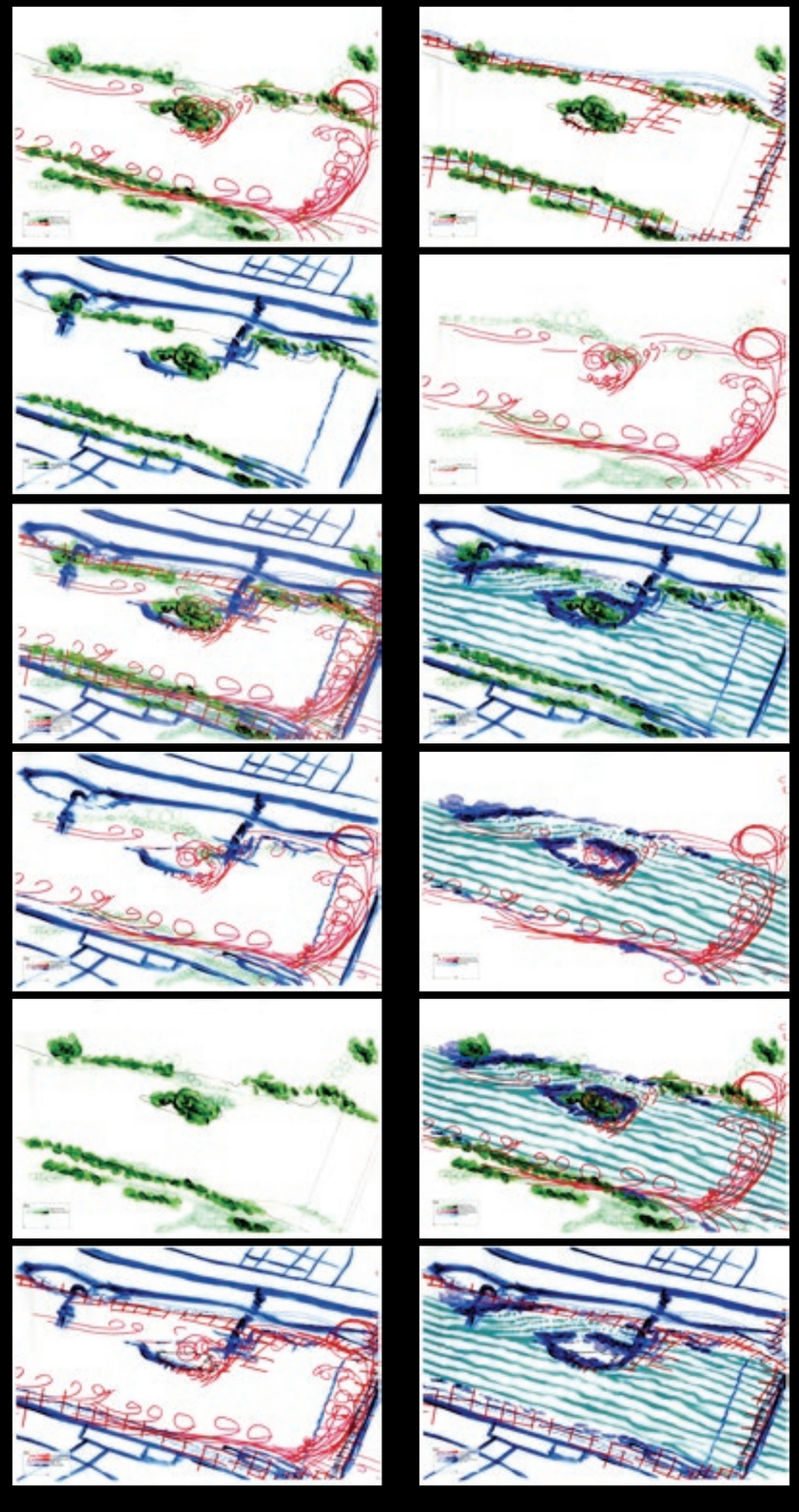
Highland Park Bridge

Homes , Potential Visitors



=

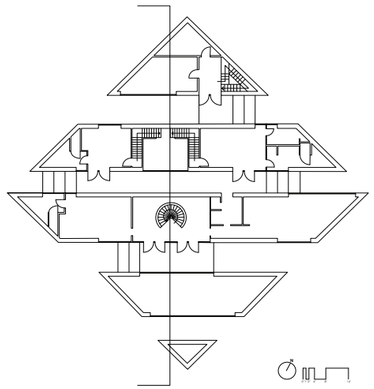
Right:
Using various impressions I had taken from the island, I charted a series of maps to find relationships between said impressions. The main roads could align with the harsh riverside winds from the west, etc. These elements come together to form illustrations of Sixmile Island and as the factors that would influence the project design, architecture, and landscaping.

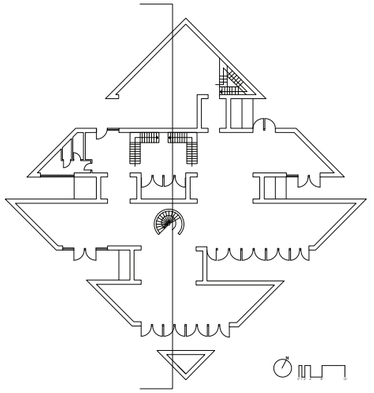


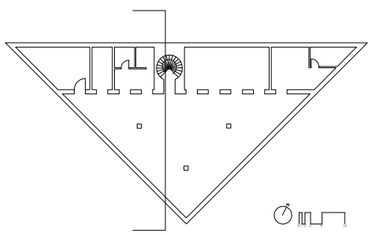
Drawing the Feeling: Sixmile's Impression

Lessons from Precedent

Another exercise of the project was a precedent study of an modular or semi-modular housing unit. Featured in my research was Villa #21, designed by the firm Productora for the unrealized Ai Weiwei project *Ordos 100*. Because this was an unfulfilled project, my precedent was primarily speculation and exploration of how the building would interact with its intended environment, the Gobi Desert city of Ordos, China. The research developed into a miniature thesis as to how its occupancy and architecture could spawn beyond the desert and onto Sixmile Island.







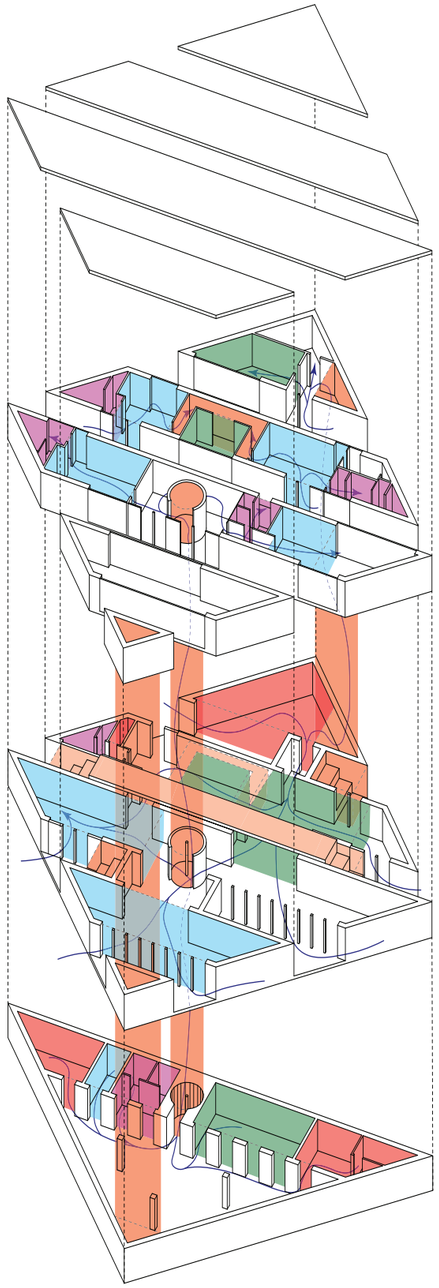
Programmatic and Volumetric Circulation

- Vertical Circulation
- Dwelling
- Meeting
- Restrooms
- Storage

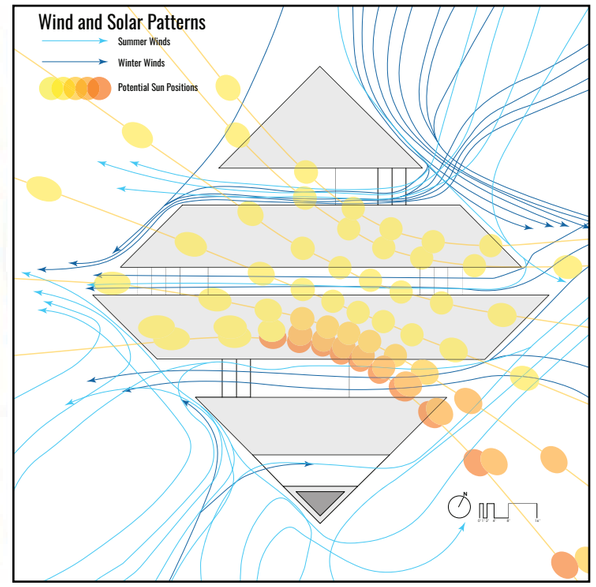
Floor 2

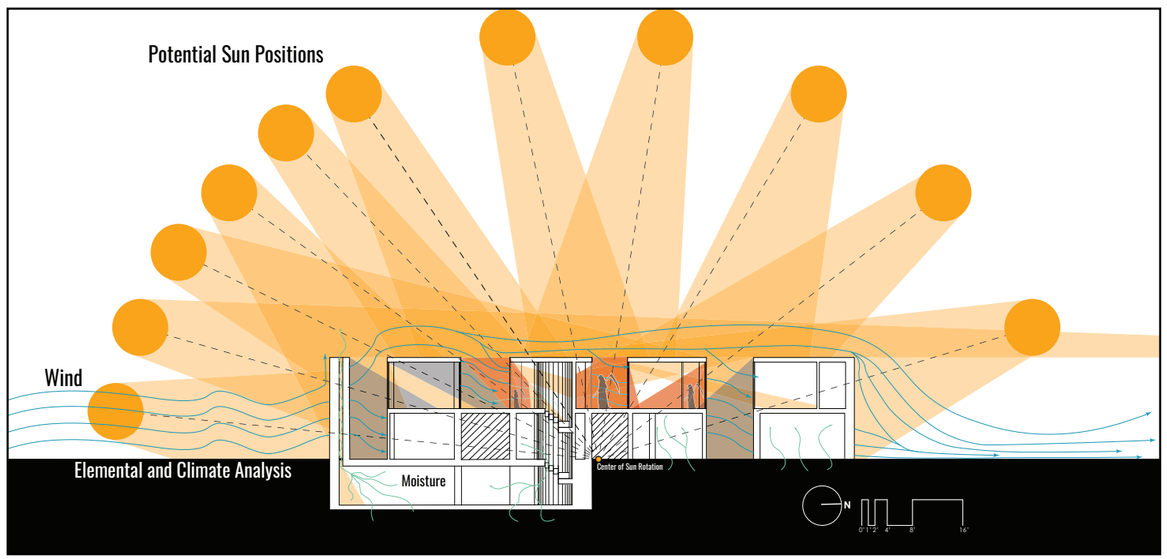
Floor 1

Floor -1



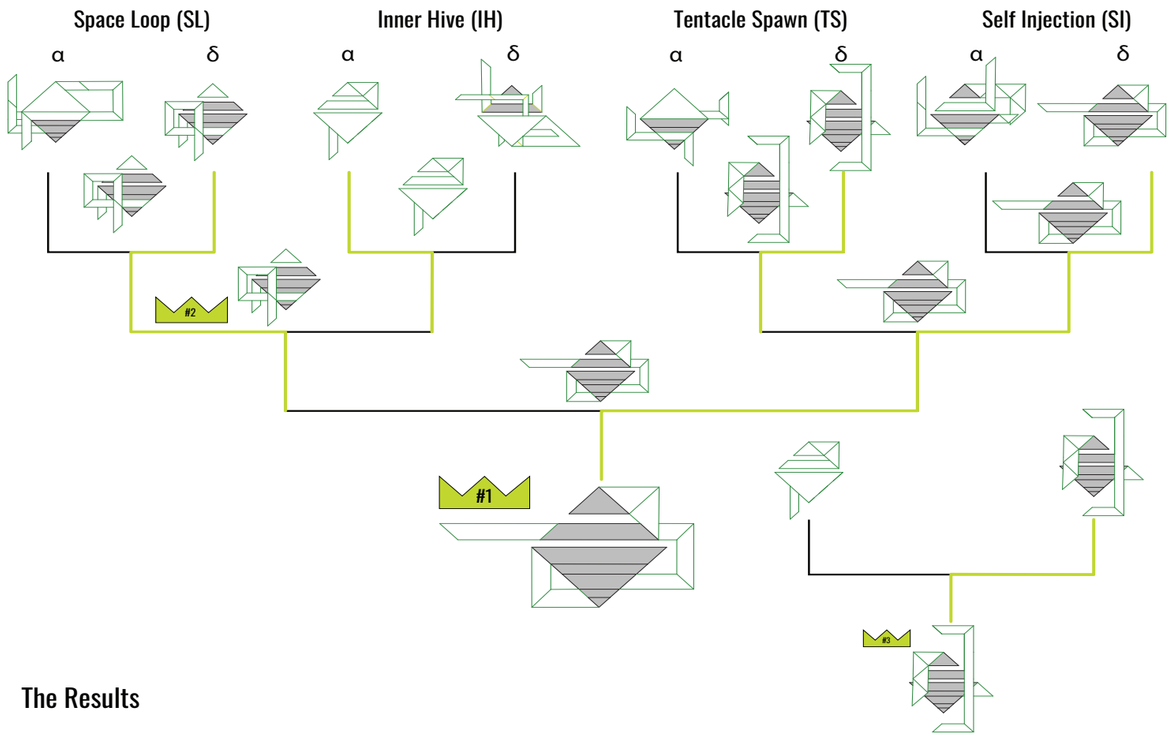
Radiation map of Ordos Villa #21
Yellow representing maximum intensity, violet representing little radiation



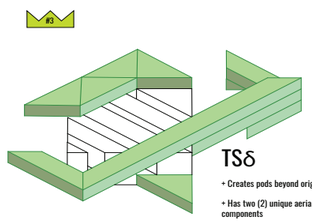


To continue the research on Ordos into a unique project, I simply used what was available. I ultimately stretched the morphology of the Ordos Villa and reused its triangular and parallelogrammatic forms to create new organisms. The DNA of the original Ordos Villa #21 lived in these competitors, which battled each other in a tourney of aesthetics and programmatic spread. Each of these forms also deal with manipulating the water of the Gobi Desert, also known as wind. Ultimately, the winner was Self Injection δ (read as "Delta").

Competition: A New Model



The Results



TSδ

+ Creates pods beyond original building threshold

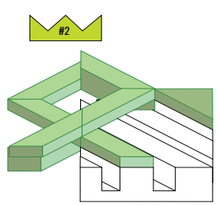
+ Has two (2) unique aerial wings that connect the original building components

+Wings oriented in pseudo-north-south expansions with 90º turns, ready for more

+Begins to explore the subterranean possibilities of the building

+Original building components remain relatively isolated

+Remains unambitious: could be further explored



SLδ

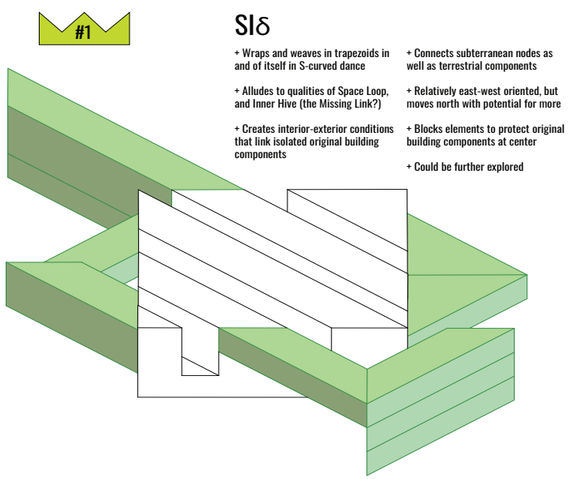
+ Has distinctive 9-shaped aperature akin to original spiral staircase

+ Focuses solely on vertical ascension akin to spiral staircase (again)

+ Ends of the 9-shaped aperature may extend farther in respective directions, even alter course

+Original building components remain relatively isolated

+9-shaped aperature may evolve into 3s, 4s, 8s, etc.: could be further explored



SIδ

+ Wraps and weaves in trapezoids in and of itself in S-curved dance

+ Alludes to qualities of Space Loop, and Inner Hive (the Missing Link?)

+ Creates interior-exterior conditions that link isolated original building components

+ Connects subterranean nodes as well as terrestrial components

+ Relatively east-west oriented, but moves north with potential for more

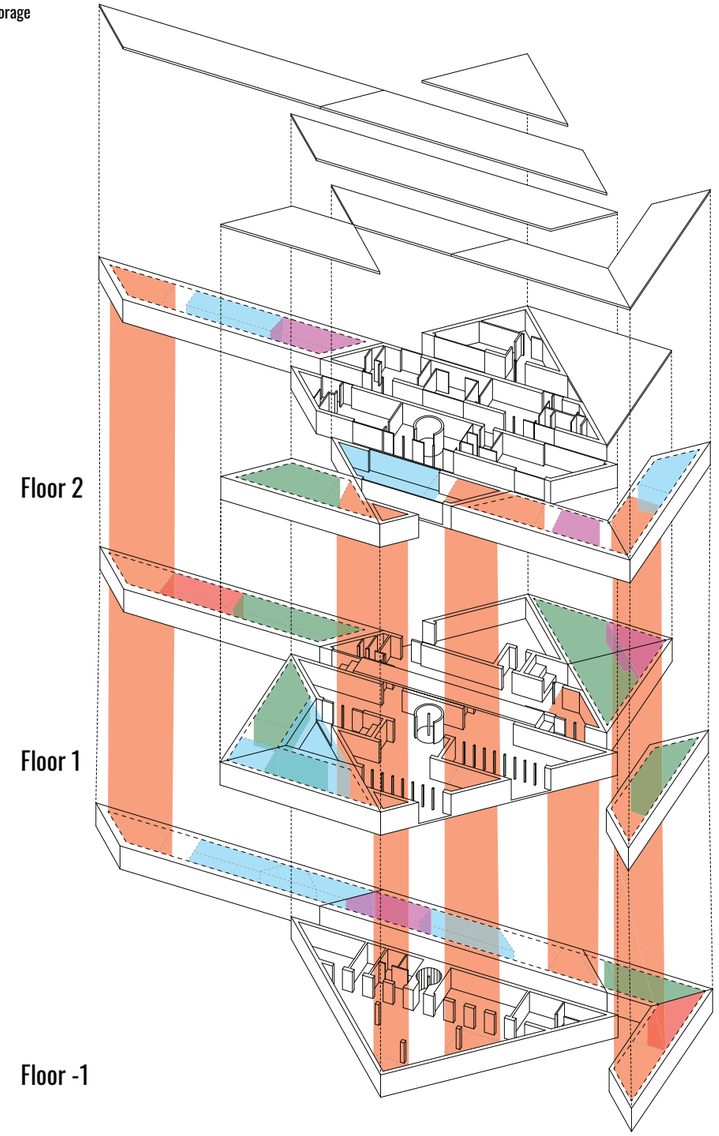
+ Blocks elements to protect original building components at center

+ Could be further explored

Self Injection δ was chosen for its unique understanding of expanding the program and accessibility of the original Ordos Villa #21. It would be this design that would partially be permitted into the haven of Sixmile Island. With the morphology of Ordos, Self Injection δ would also attempt to manipulate wind on the auspicious island. This would prove to be a strange calamity.

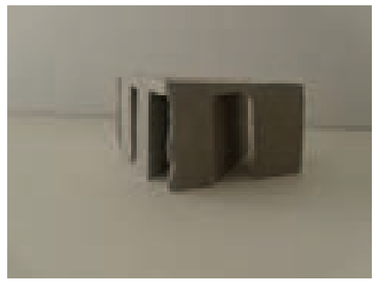
Self Injection δ

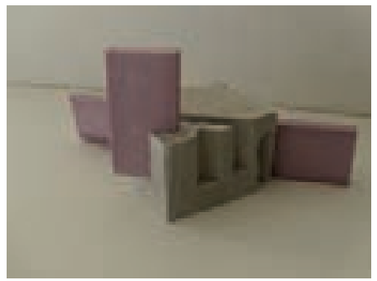
- Vertical Circulation
- Dwelling
- Meeting
- Restrooms
- Storage

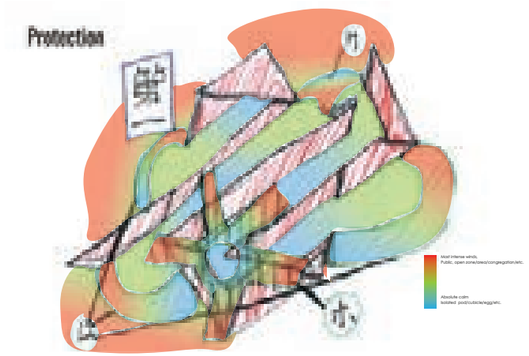


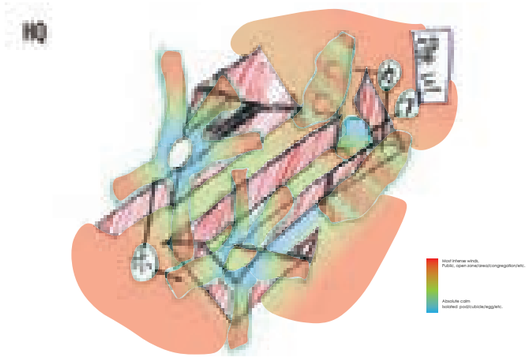
Transition to the Final Stretch

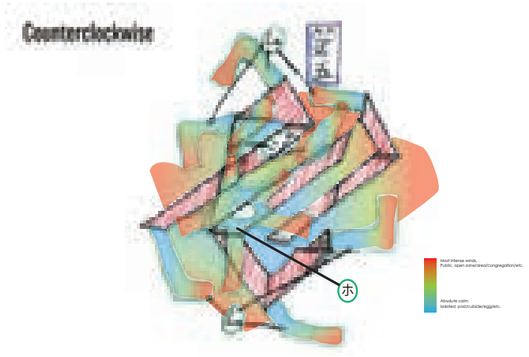
Ordos Villa #21 was also studied in model form. Using cement and foam highlights, I sought to understand why the incisions of the structure were made where they were. While I never found an answer, I did make a few handy paperweights that informed me of how architecture can respond the wind and, in the case of Sixmile Island, water.



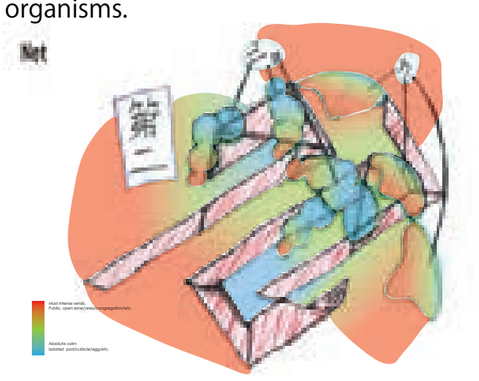


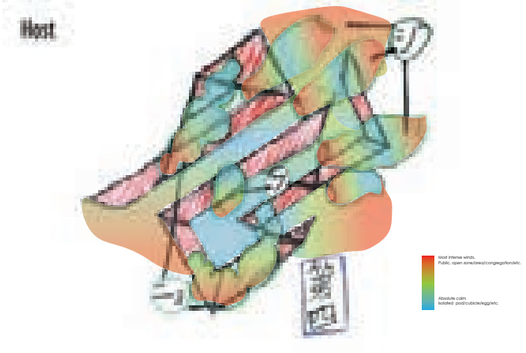


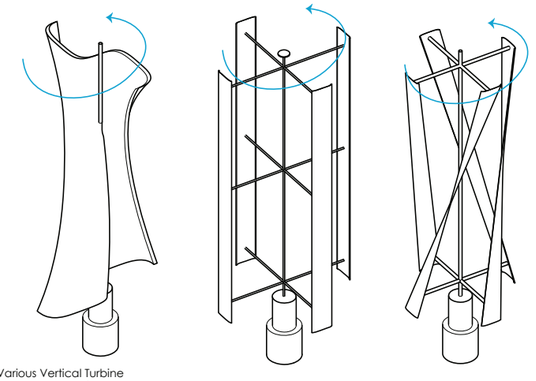




Following the victory of Self Injection δ, I questioned how to allow the desert-based animal adapt to the swamp and wet Sixmile Island. This took on a flexible approach to wind capturing technology, namely balloons. These amorphous units were intended for directing wind, but failed to bring a very potent response, even after a second competition between these new organisms.

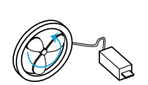






Various Vertical Turbine Designs

Each Around 1.5 meters to 4.0 meters



WaterLily Turbine©

Around 16 cm. in diameter, 5-6 cm. in thickness

Can produce energy from water, wind, and physical power

Up to 15 W of power

Source: https://en.wikipedia.org/wiki/Small_wind_turbine

https://www.popularmechanics.com/science/energy/a4428/4324331/

http://www.solar-constructions.com/wordpress/vertical-windturbine-vawt/

https://waterlilyturbine.com/products/waterlily-turbine

Diagram キ: Wind Machine Morphologies

During the exploration of the forms of the Ordos Villa, I conducted research into a specific eco-machine, a type of device or phenomenon that can be manipulated in design to make use of a specific characteristic to complement architecture. My eco-machine, wind energy and power, was nearly as fluid and difficult to grasp as much as the the wind itself. To depict certain qualities of the eco-machine, I created myriad diagrams, the three shown here being the most successful.

The most intriguing of the wind machine studies was that of morphology. Simultaneously studied with the second awkward Ordos Villa competition, architectural morphology took its helm on my pedestal of interest for the Sixmile Island project. Nature, depicted by Diagram ウ (u) can just as well manipulate forces of nature such as wind or water. The future development of Sixmile Island should be able to act similarly to the structures of Diagram エ (e) and adopt to the localized conditions of the island.

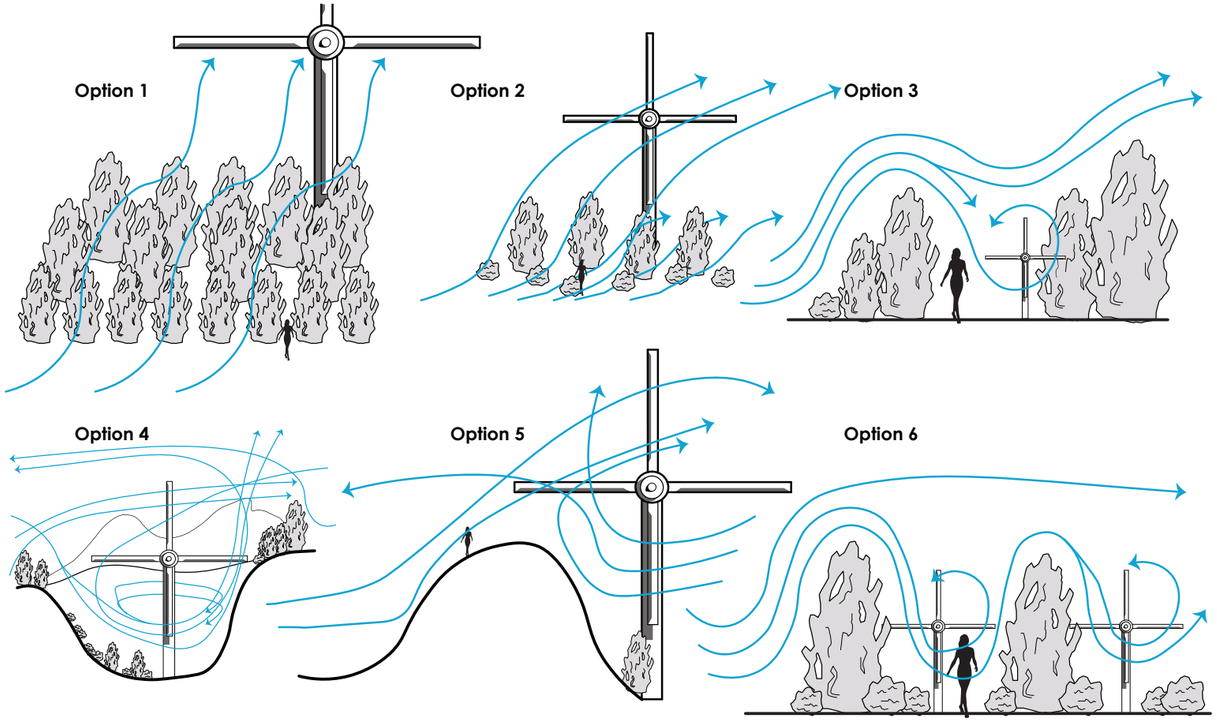


Diagram ウ: Morphology (“Natural”)

Source: *City and Wind: Climate as an Architectural Instrument* by Krautheim, Pasel, Pfeiffer, & Schultz-Granberg, 2014

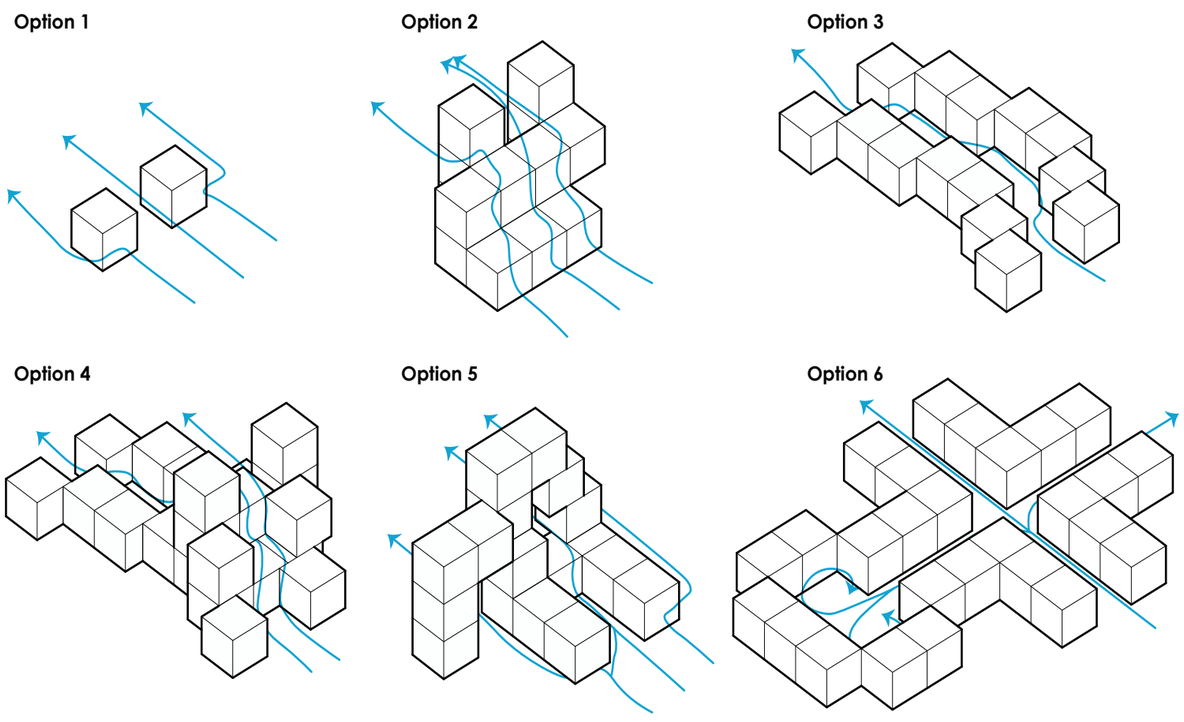
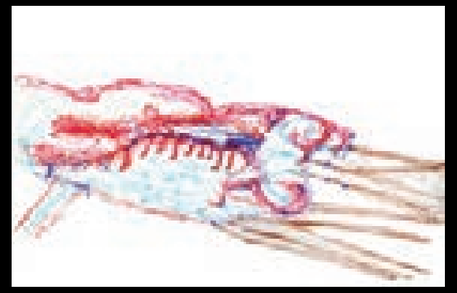


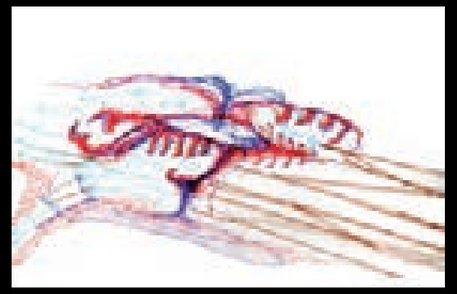
Diagram エ: Morphology (“Humanmade”)

Source: *City and Wind: Climate as an Architectural Instrument* by Krautheim, Pasel, Pfeiffer, & Schultz-Granberg, 2014

Enter Schtacken

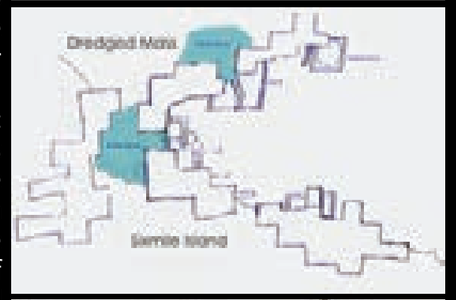
Taking to mind the eco-machine and the organisms created previously, I took the ideas and placed them onto Sixmile Island. Particularly the idea of different organisms functioning on Sixmile Island, a landform of different regions, took hold. These modules, these organisms would have a dialogue with each other. They would embrace the island of Sixmile Island as their home, but under differing circumstances. One creature could be amphibious, one could endure the fastest currents of the Allegheny, one could be entirely on land, and so forth. They would connect and thrive together, taking the collective name, *Schtacken*, based on the word "stack" and the German word for "chat," *Schnacken*.

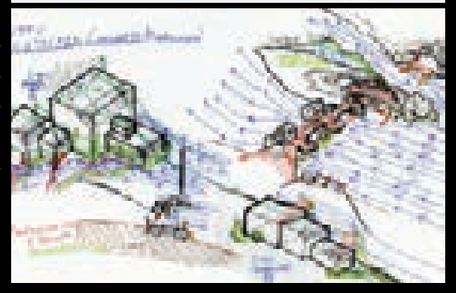


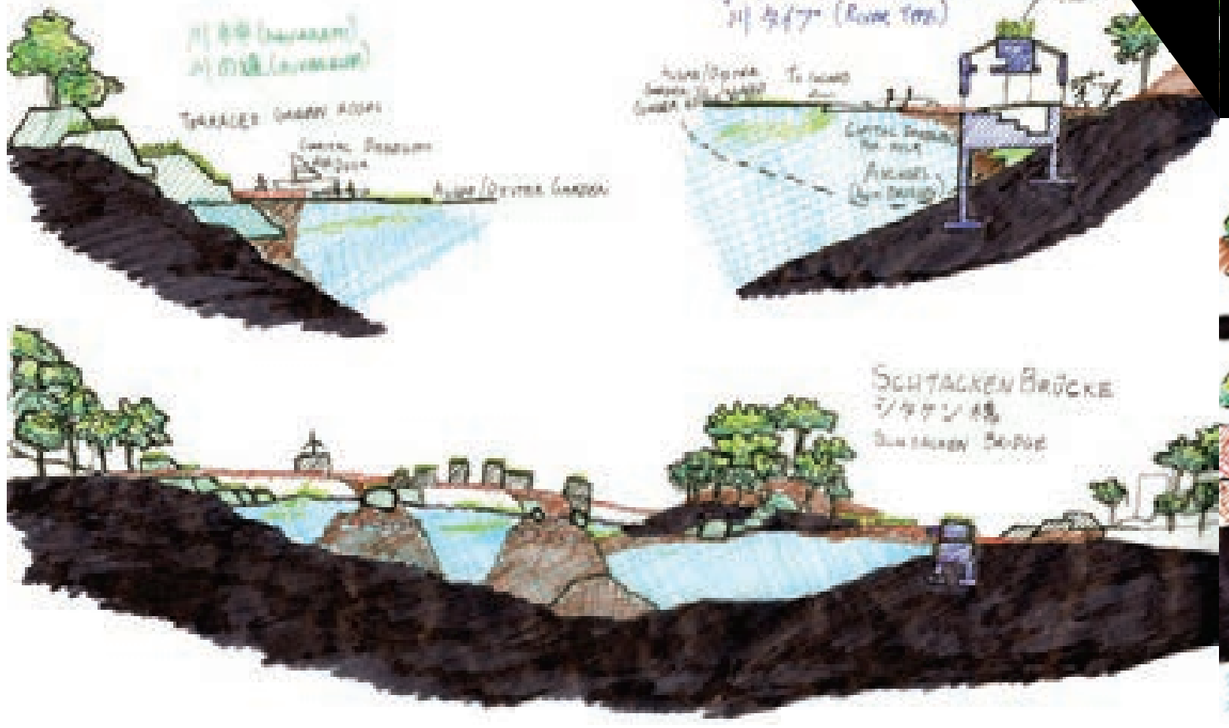


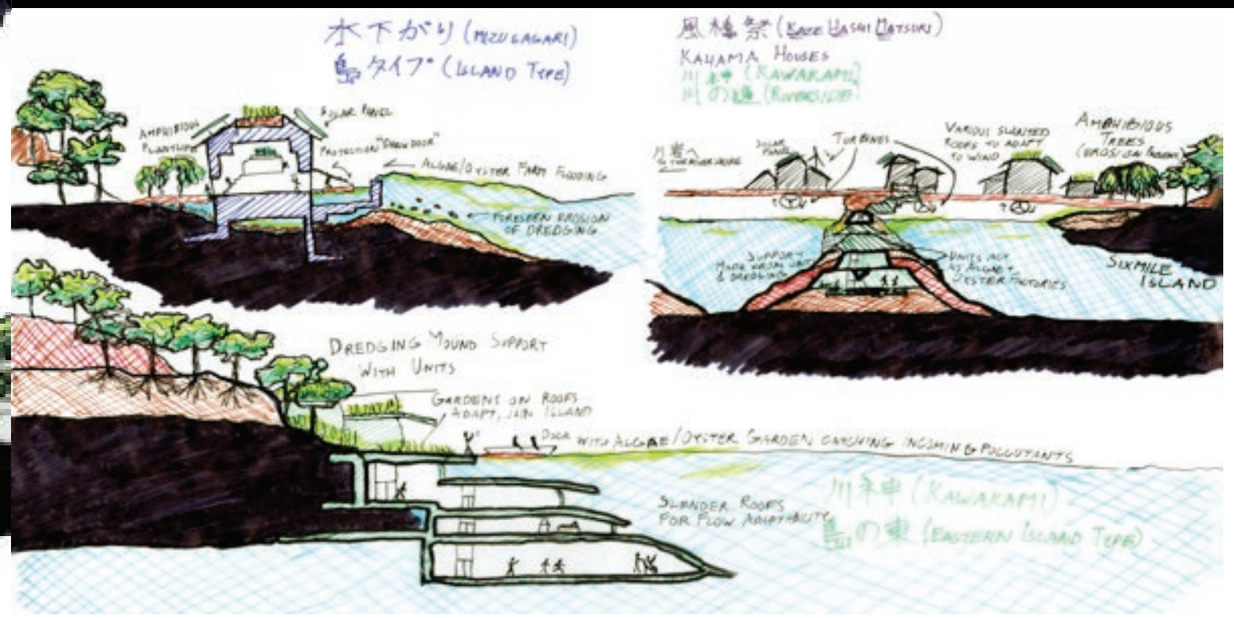
Left:
More mapping exercises of showing just how the Schtacken can interact with the polluted Allegheny, forming lobster-like forms like zooplankton to potentially filter the water

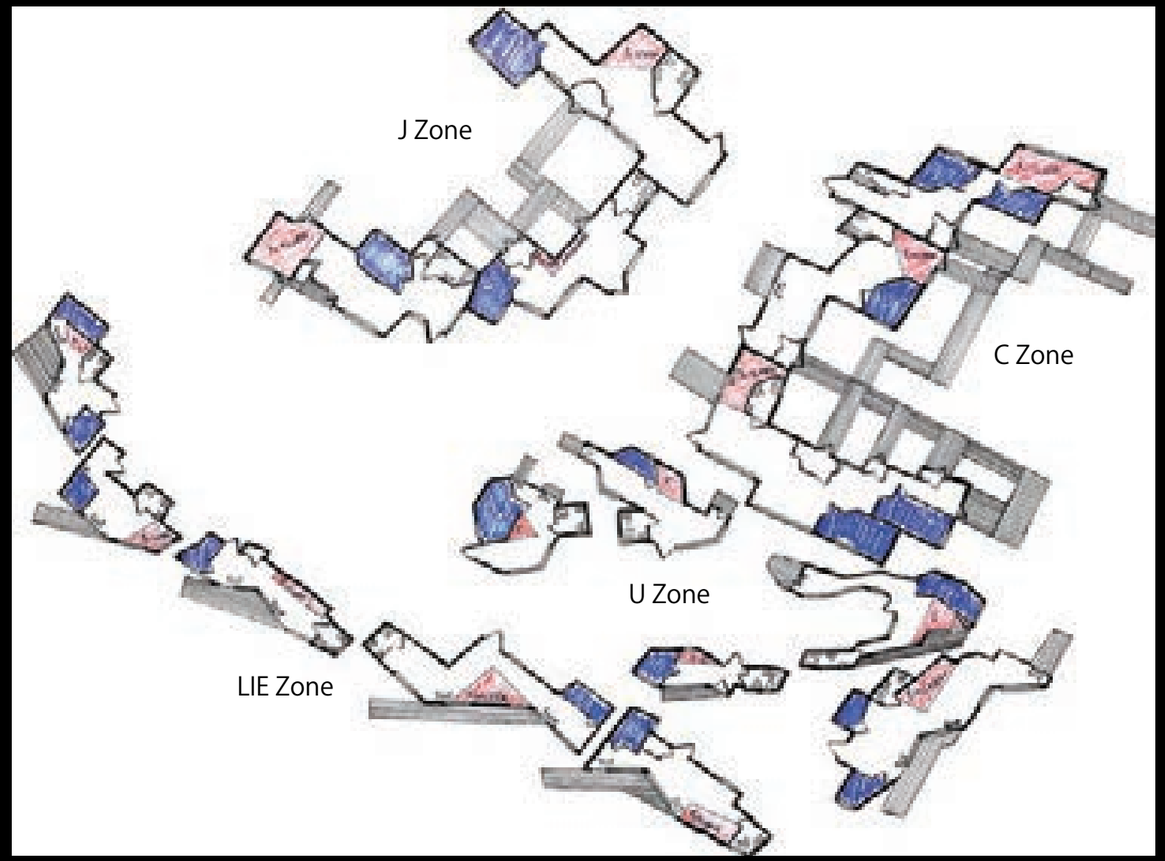
Right:
Various concepts of laying out the Schtacken
This was the foundation of their established ecological regions, or zones and, consequently, their architectural morpohologies.

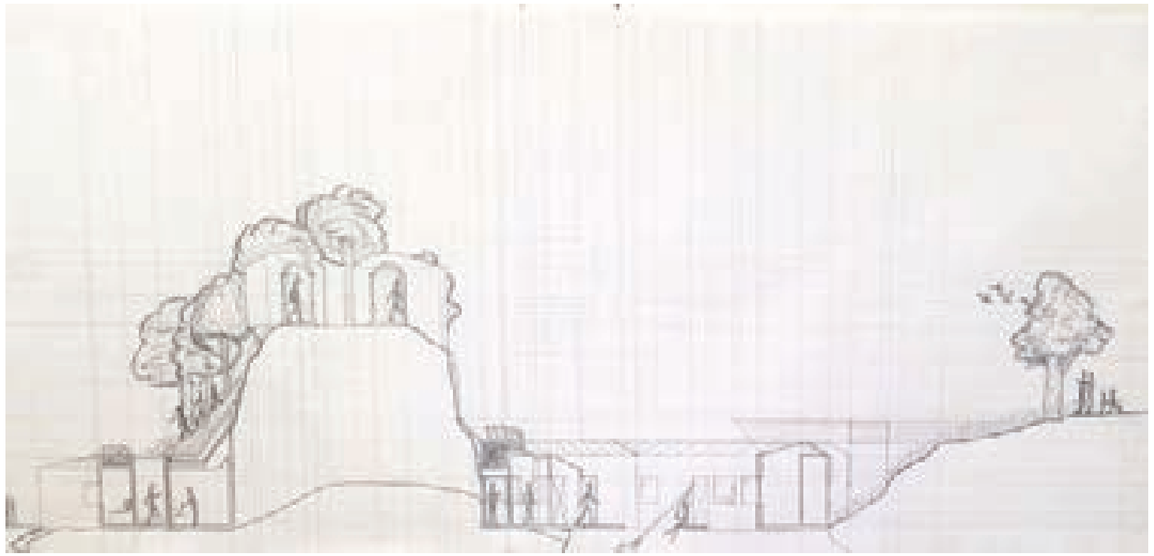










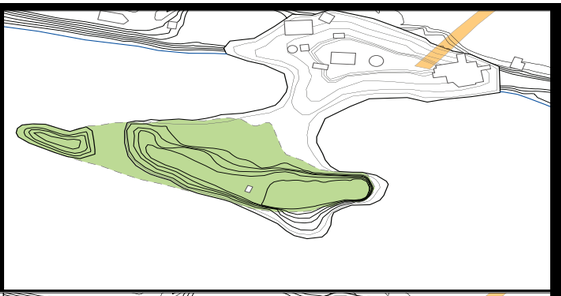


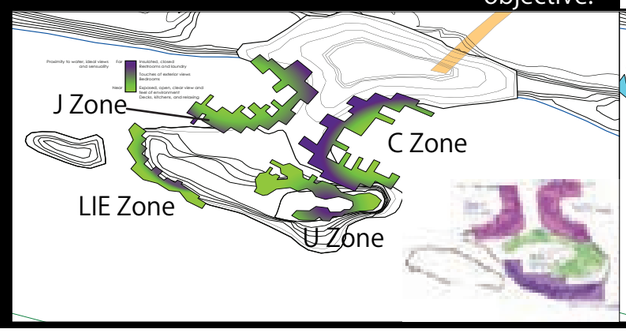
The next question arose: how would people access Sixmile Island? My response was dredging. As done with engineering operations such as the Dike 14 Nature Reserve in Cleveland, Ohio, (right), land from riverbeds can be remediated and stacked onto pre-existing structures to articulate landforms. Though not as fantastically as my section above, the dredging can still provide extra elevation to Sixmile Island to reduce flooding and even shelter the Schtacken.

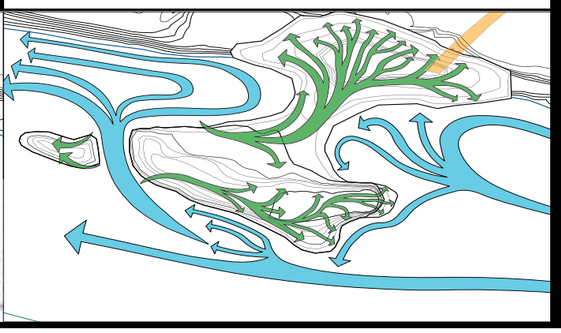
Depending on their zone, their architecture is formed to interact with their most relevant natural feature. The top image can act as a basic map to understand this. The J and C Zones are meant to slow down the flow of the river and have docks that repel the flow, the U Zone is formed to funnel wind into the crux of the ring form, and the LIE Zone is formed to go with the river's natural flow.

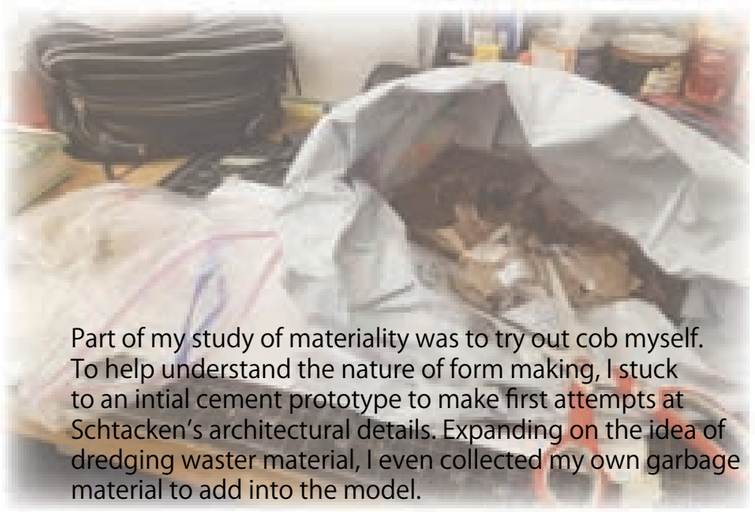
Program also became imperative to the design. The image at left is a diagram of two of the LIE Zone Schtacken units, yellow representing the most public, open areas (living rooms and the docks) and red representing the most private and enclosed areas (restrooms and laundry rooms). As one enters from the broader open areas, they can be funneled into privatized alveoli.

The dredging formation, as part of the Schtacken Project, would extend the landmass and docking potential of the Allegheny's northern coast. As noted in the bottom right diagram, this is the cause of even more uniqueness of the ecological regions. Consequently, the varying zones of Schtacken would have the same programmatic objective, but alternate ways of fulfilling said objective.

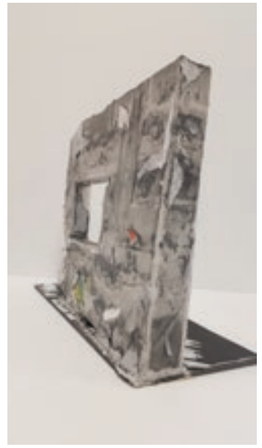




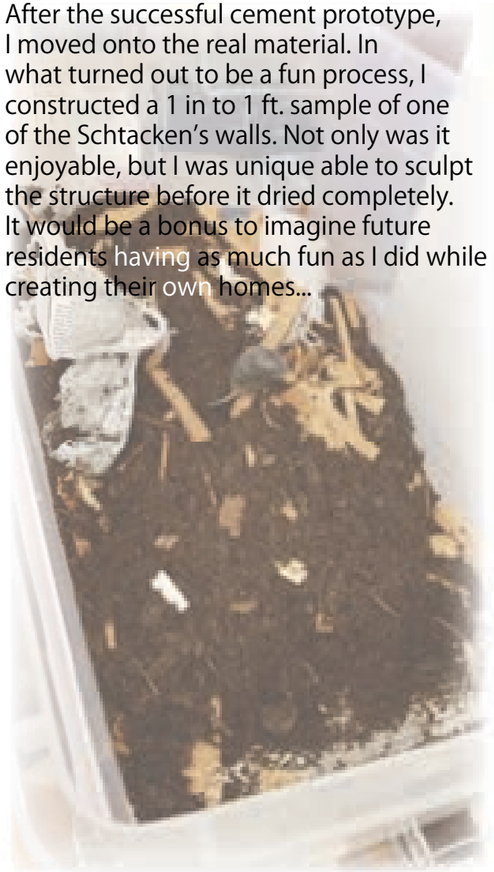




Part of my study of materiality was to try out cob myself. To help understand the nature of form making, I stuck to an intial cement prototype to make first attempts at Schtacken's architectural details. Expanding on the idea of dredging waster material, I even collected my own garbage material to add into the model.

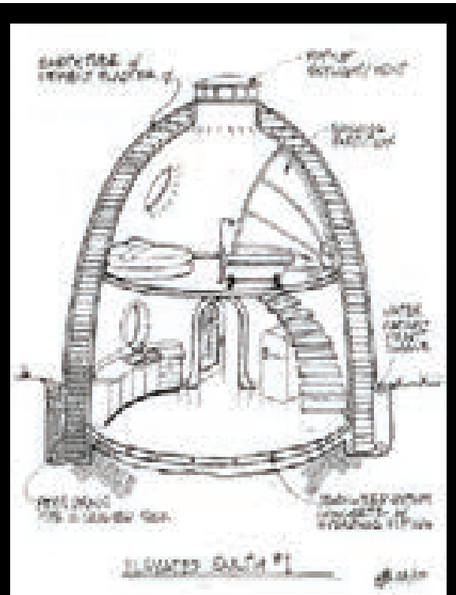


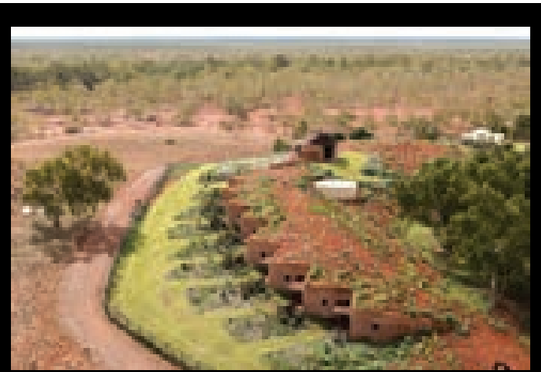
After the successful cement prototype, I moved onto the real material. In what turned out to be a fun process, I constructed a 1 in to 1 ft. sample of one of the Schtacken's walls. Not only was it enjoyable, but I was unique able to sculpt the structure before it dried completely. It would be a bonus to imagine future residents having as much fun as I did while creating their own homes...



At this point, Schtacken lacked materiality. Further research intrigued me, and soon waste and cob came to mind. The latter is made of earth, clay, sand, and straw to form basically earthen cement. The former is an additive unique to Schtacken, but not unattempted in other projects. Particularly water bottles (above) and other containers have been used as durable building materials prior.

Making Use of Wasted Potential

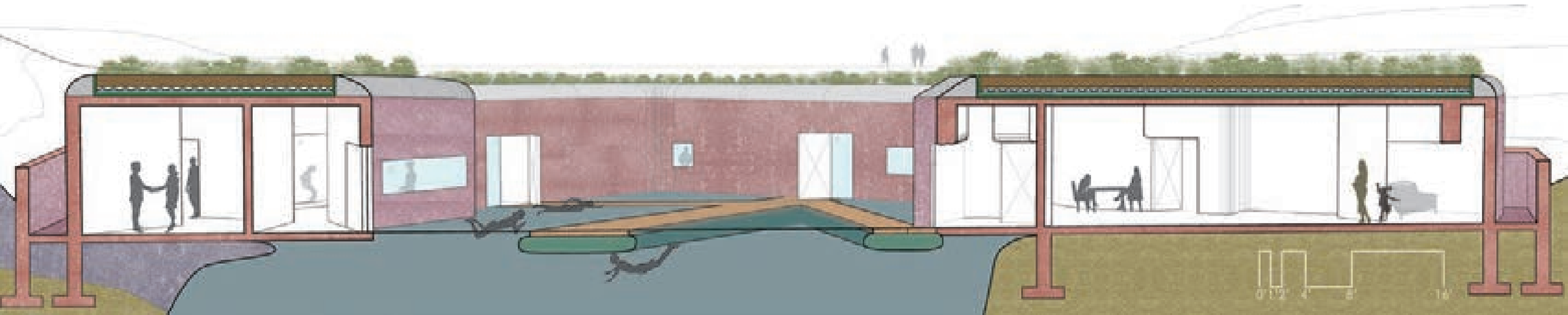


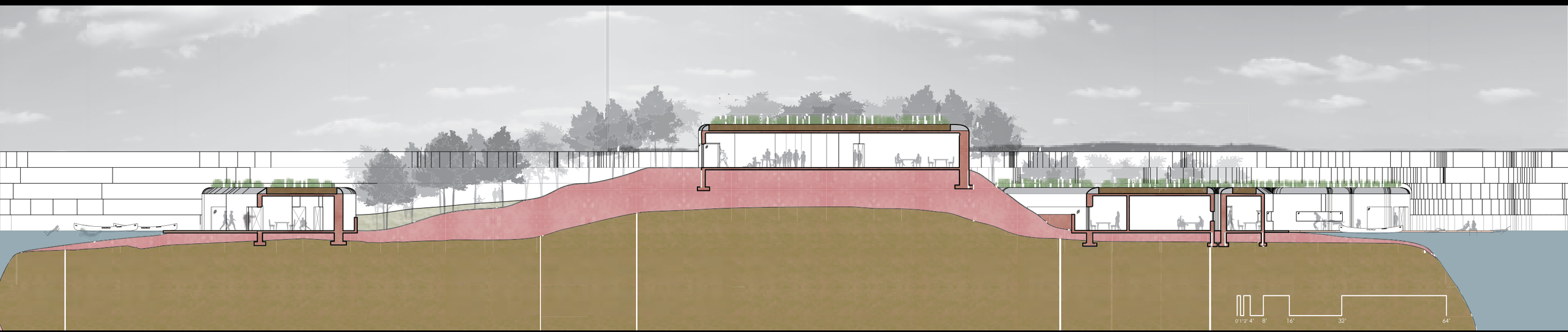


Left:
A centuries-old cob cottege in northern England was a primary inspiration for cob in the Schtacken. The British Isles are notorious for their inclement and wet conditions, so the materiality has proven its worth in Europe. So, why not in the muggy marsh of Sixmile Island?
Right: Luigi Rosselli Architects' The Great Wall of WA in Western Australia served as strong example of adapting rammed earth and cob to a given landscape.

Putting together the harmonious taxonomy of creatures, the landforms of unique regions, and not-so-wasteful dredging, I finally approached the real Schtacken. The dredged land of the Allegheny River and a good amount of garbage create a land bridge connecting the urban node of Sharpsburg to the natural retreat of Sixmile Island. Each of the Schtacken zones have their unique form accustomed to their respective areas of the Schtacken dredging. The open forest retreat of Sixmile Island, a much-needed contrast from the cityscapes of Sharpsburg and Pittsburgh, is then funneled into gradually privatized rooms for personal enjoyment and comfort. Recreation and atmospheric sights, smells, and sounds would radiate about the island sanctuary. Complementing the atmosphere is the scent of the earth, provided by the cob material to construct the the Schtacken units, topped with green roofs for repurposing the inclement weather.

That is truly making use of wasted potential.





Inhabiting the Island

シタケンの住み

Shi Ta Ke N No Su Mi

DockBay Zone 1 (DBZ 1)
J-Zone

DockBay Zone 2 (DBZ 2)
C-Zone

FastFlow Zone 2 (FFZ)
LIE-Zone

Lando Cal Zone (LCZ)
U-Zone

N

Making Landscape

シタケンの葉っぱ

Shi Ta Ken N No Ha ‘ Pa