Sean Kamanaikaikaikaholo-ponoanaikahonua McGadden

My namesake translates from Hawaiian to mean: The powerful ability to achieve

Bedford, New Hampshire

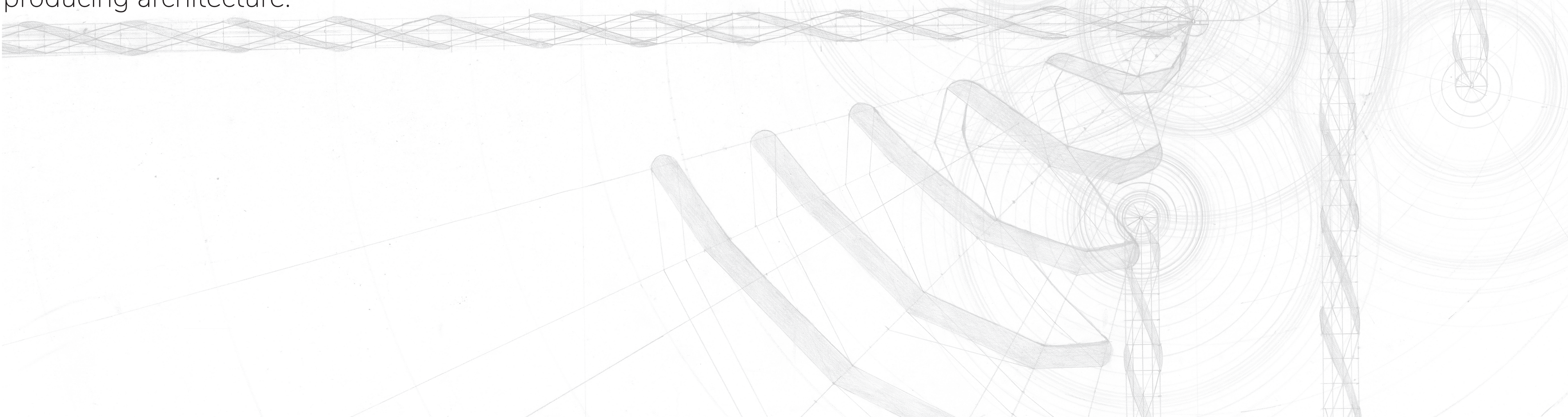
This portfolio emphasizes my passions in both poles of architectural thought. That of practice, and that of theory.

2022

Contents:

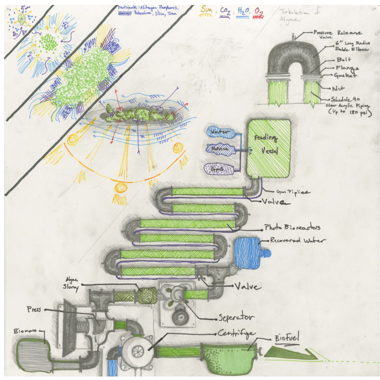
About Me

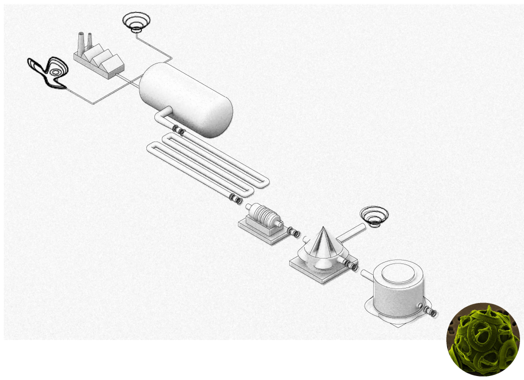
I come from a lineage of real estate developers, journeyman and general contractors. I've grown up in the woods. Living fully, bound only by the size of my hearth. I have traveled the world and seen the wonders of human acheivement. The life blood of building theory and construction practice run through my viens like fuel. I have paired my architecture education with on site training as a pipe fitters apprentice and recently a licensed journeyman. I have drawn much inspiration from the likes of Thomas Eddison, Isaih Rogers, Reynar Banham, Frank Lloyd Wright, Alvar Aalto, Ray and Charles Eames, Renzo Piano, and Lebbeus Woods. I have collaborated in designing and constructing many projects across the greater Boston area. Despite the diverse real world projects I have been involved in, the following body of works are the projects I have been most inspired by. These studies and proposals are the best examples of my attempts at formulating and curating a personal architectural language. My perspectives on architecture are as nuanced as they are violent. Sustainability, materiality, the importance of being a builder and hand drawing as the ultimate process tool are of vital importance to me. I believe deeply in the power that handiwork has on the physical realization of ideas. I am seeking a space where my broad skillsets can be most effectively utilized in the same way a many armed machine has its space in a factory producing parts for a submarine or a fighter jet or a rocket. In my case, I am producing architecture.

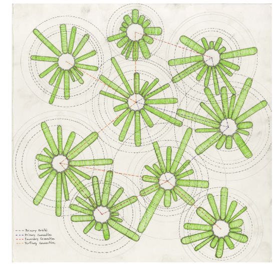


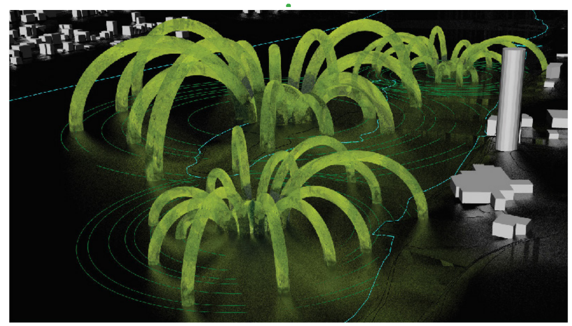
Museum of Weather: Greenfinger the Outcast

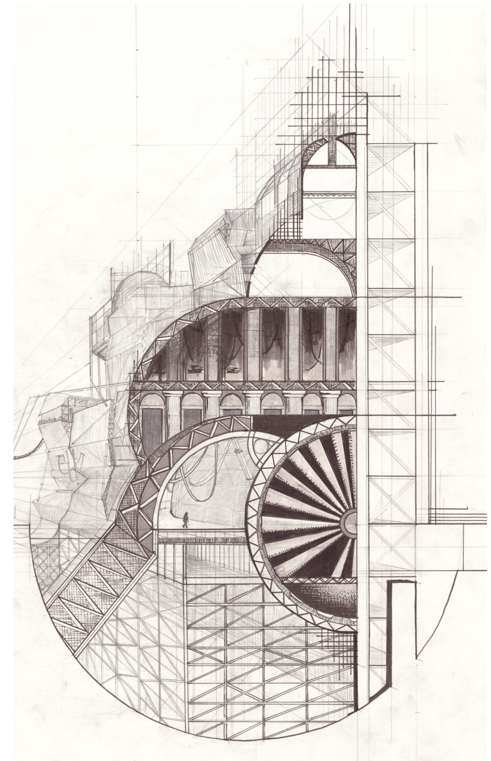
A conceptual study of dystopian futures, renewable energy and sustainability





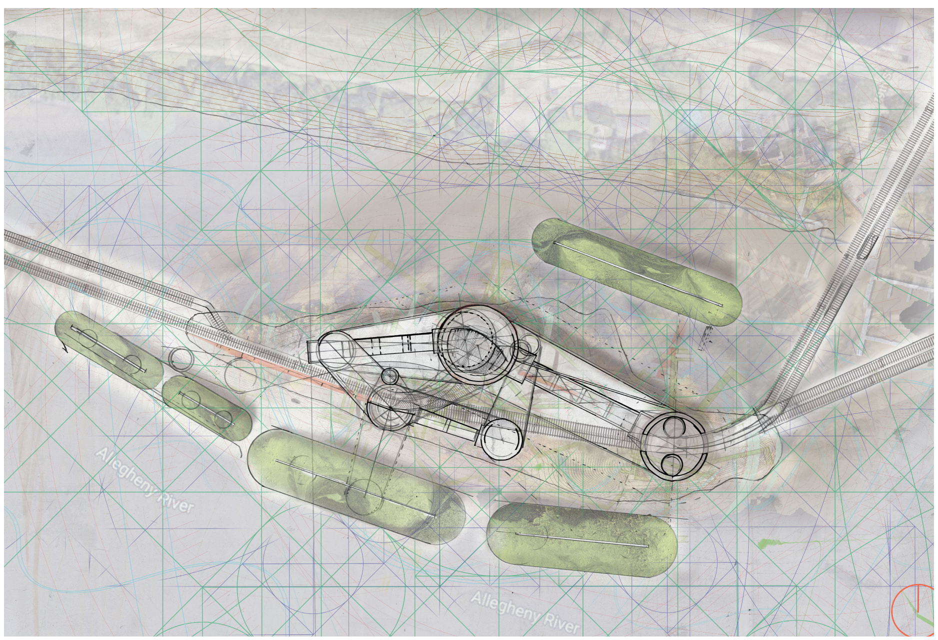


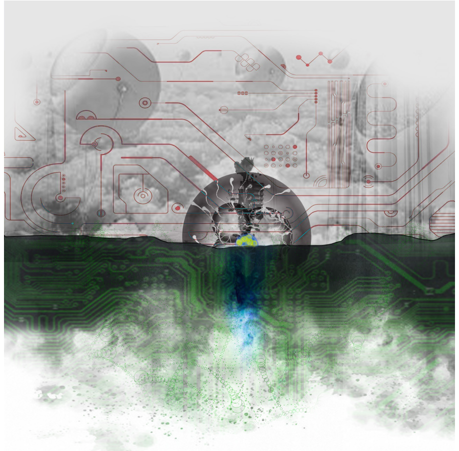


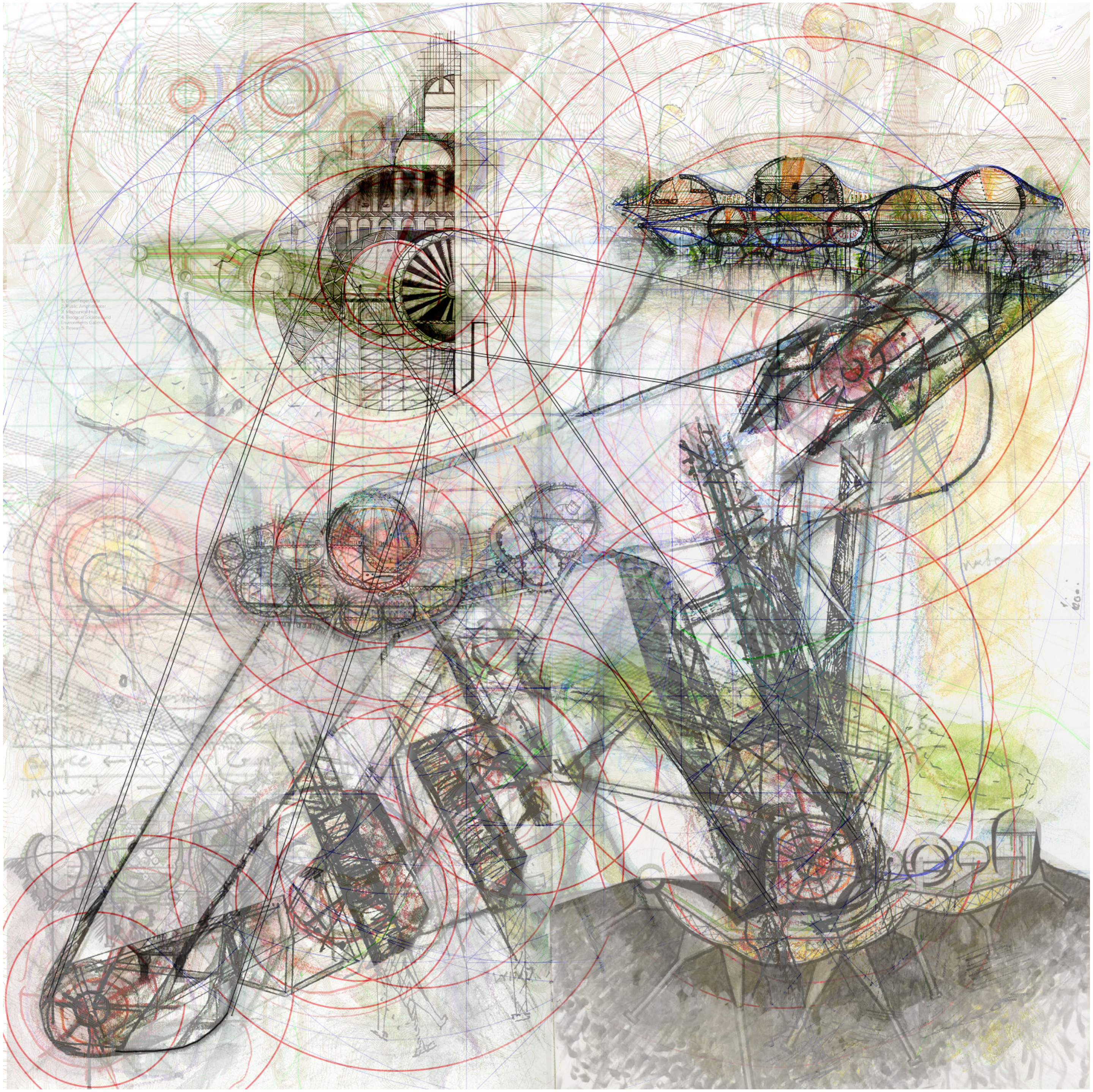


Greenfinger is a brilliant outcast of society, forced to leave the natural and scientific splendor of Baton Rouge and the Gulf Coast due to the devastation of rising tides and flooding. He travels upstream to reach an island on Mile 6 of the Allegheny River. Our architect of humanity establishes a weather station and laboratory built from the remanence of a society that disregarded its own affordances. His facility sequentially evolved over a 20 year period to research alternative energy in a resource strapped world as well as monitor and forecast weather patterns. He would attempt to build a new city focused on sustainable practices and create reenergized institutions of education, research, live-lihood, and community that could adapt and recycle its knowledge and waste. He pursues a brighter future, one without denying destruction and its aftermath but instead engaging the waste as productive.

Plan (below) / Section (right)



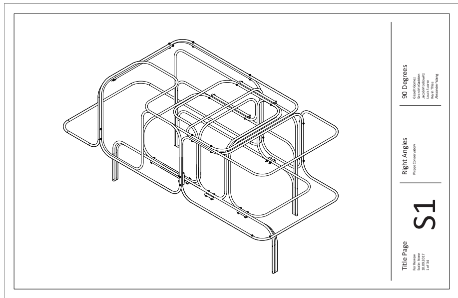


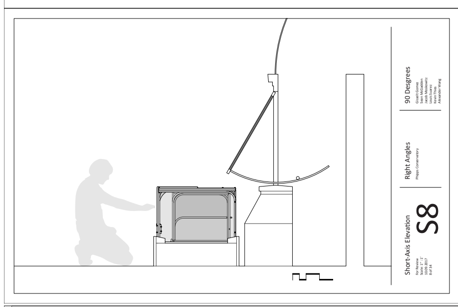


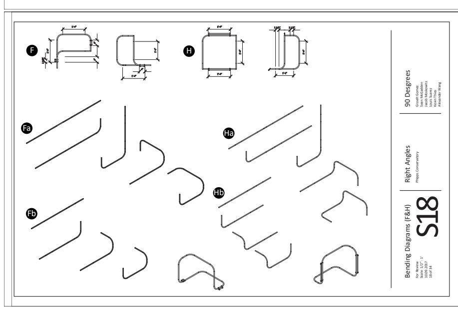
Hoop House

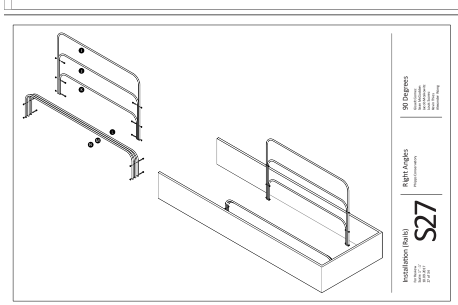
A mechanically interactive green-house with different environmental spaces within.

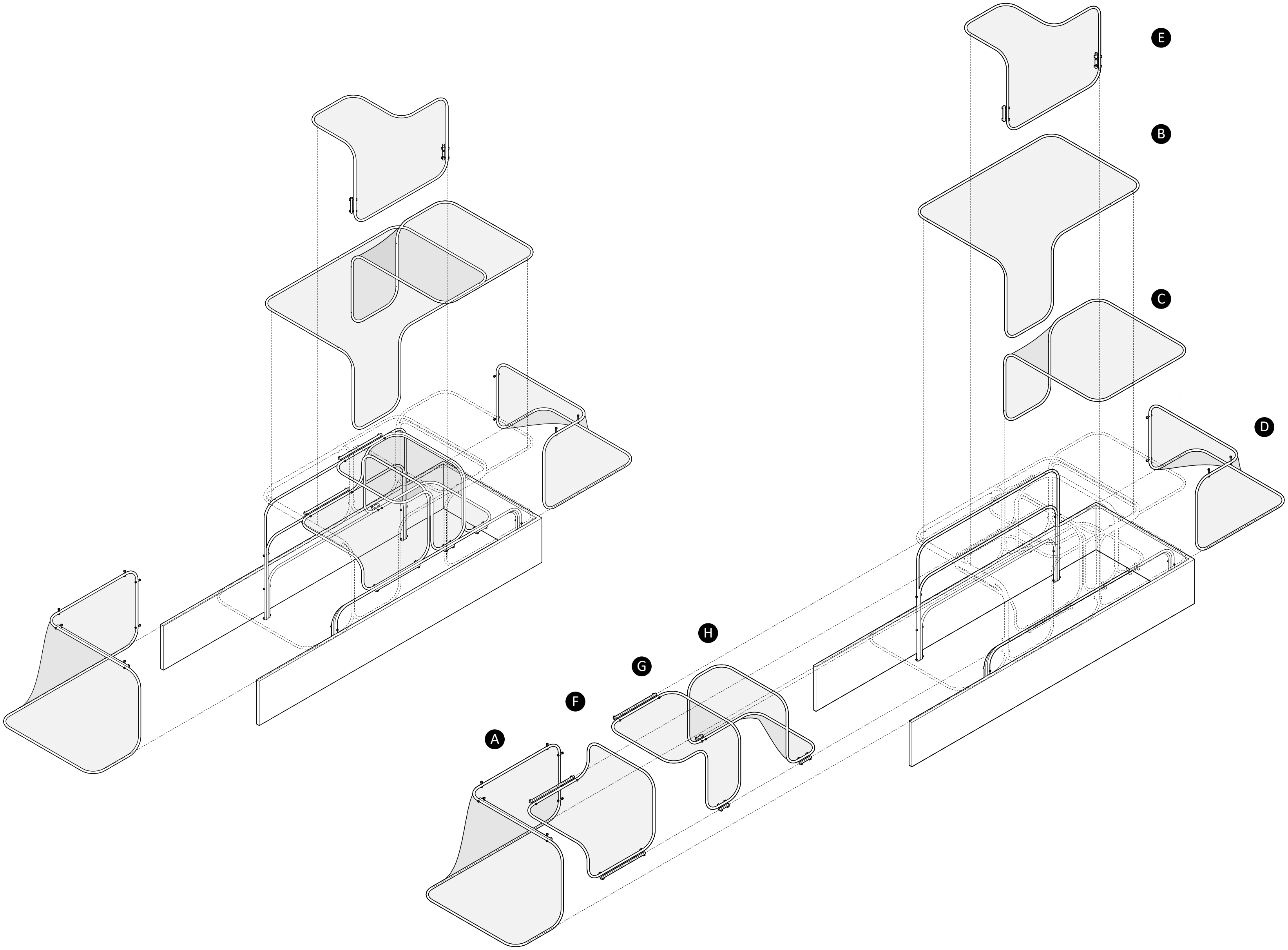
Please find the full drawing set, the installation drawings,` fabrication video and the team I worked with at this link: https://www.seanmcgadden.com/public











Exploded Axonometrics

For Review
Scale: 1/2" : 1'
10.09.2017
21 of 34

S21

Right Angles

Phipps Conservatory

90 Degrees

Gisselt Gomez
Sean McGadden
Jacob Moskowitz
Louis Suarez
Kevin Thies
Alexander Wang

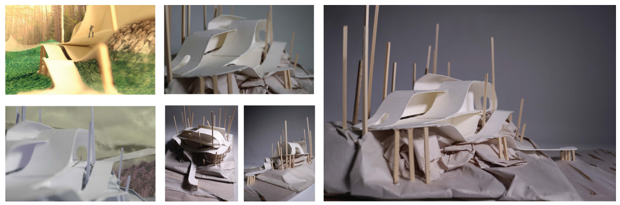
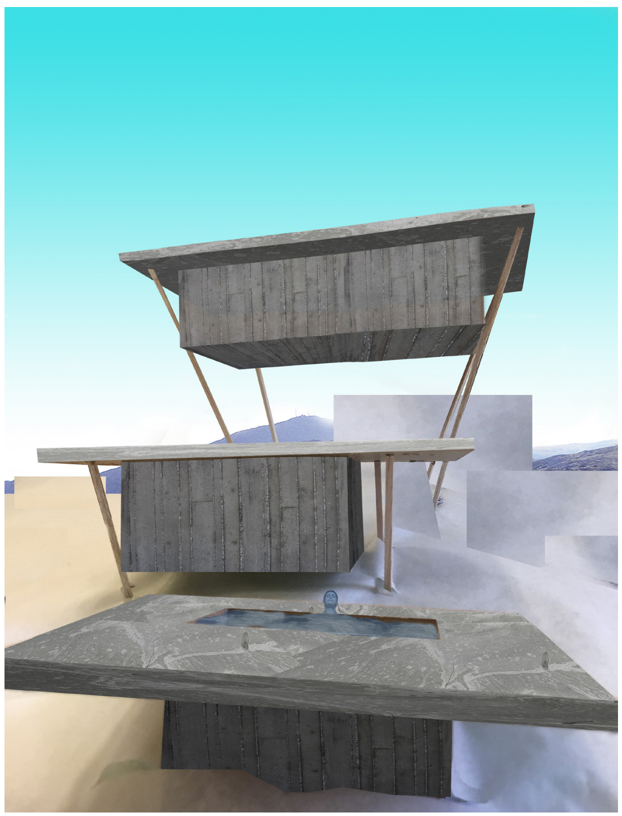
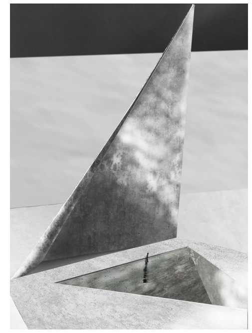
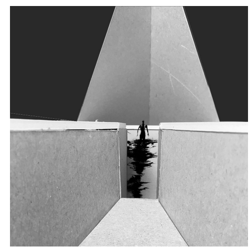
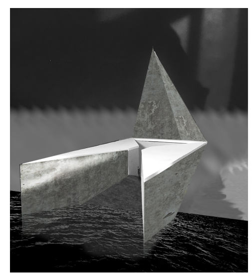
Saco Lake Bath House, Saco NH

Process work studying notions of heaviness and lightness in a bath house with three temperatures of water. (Below)

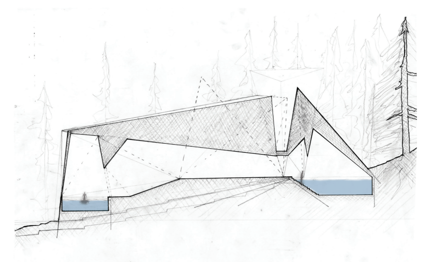
Advanced iteration of a bath house being of the earth and having the qualities of heavyness like a geode. (Right)

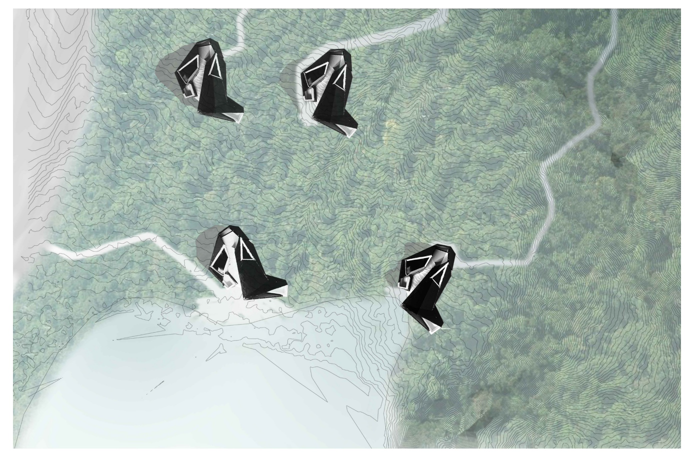
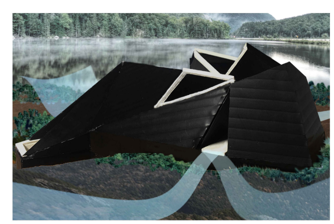




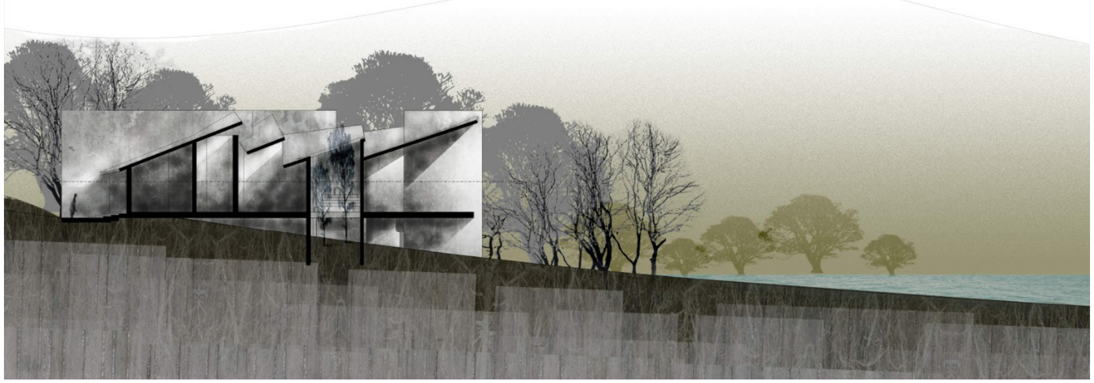






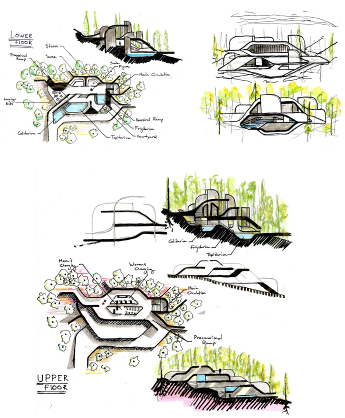


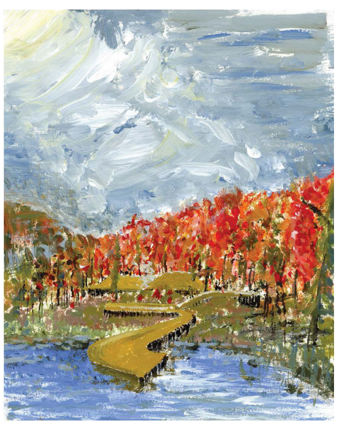


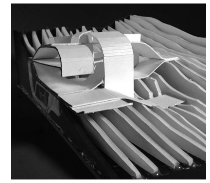



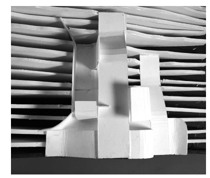

Saco Lake Bath House
Concerning a Threshold
Sean McGadden

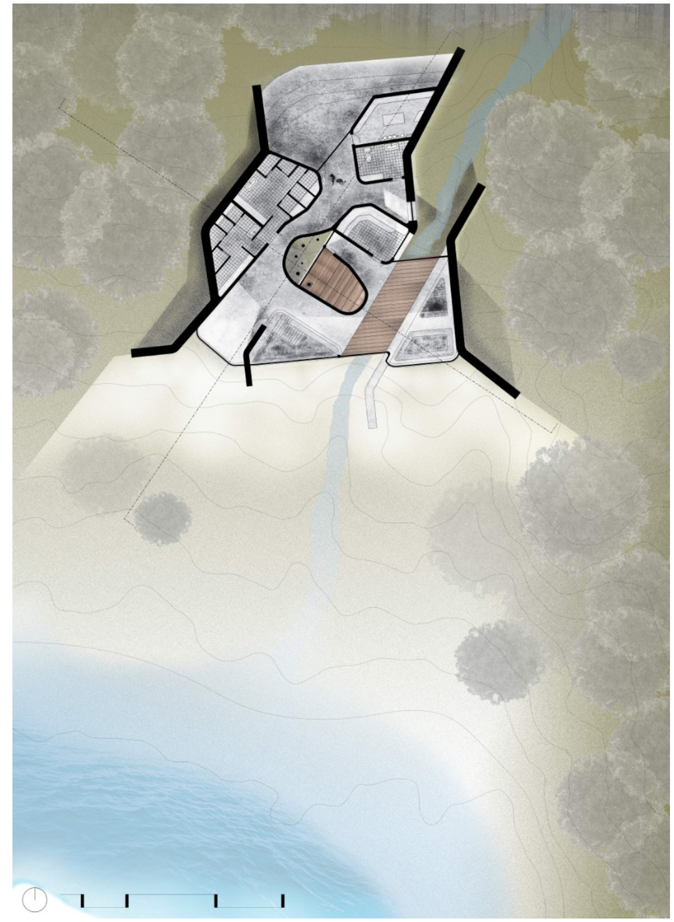


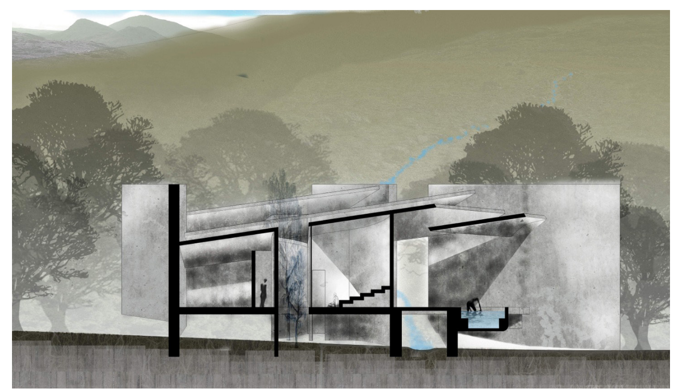




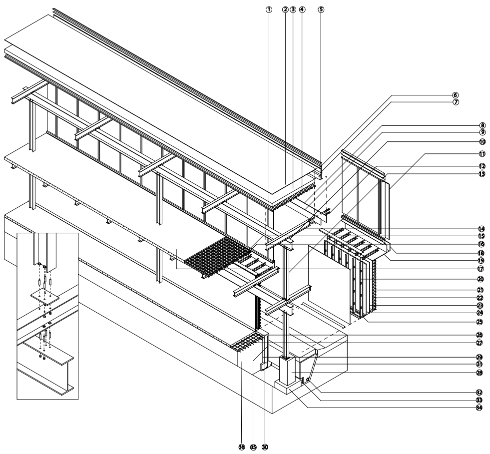






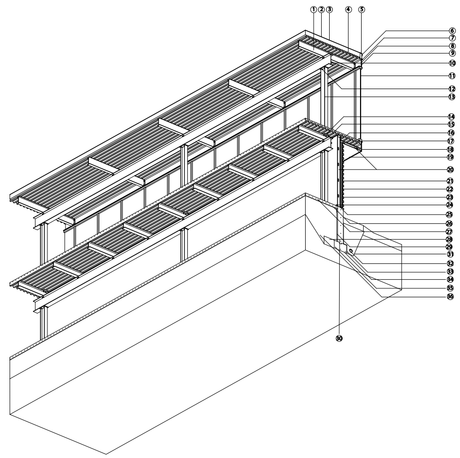


Children's Institute Inclusive Learning Center



CONSTRUCTION MATERIAL KEY:

1. STEEL SECONDARY BEAMS W10X19 @ 12'-0" CENTERS
2. EPDM ROOFING
3. RIGID INSULATION
4. STEEL DECKING
5. TREATED WOOD BLOCKING
6. STAINLESS FLASHING
7. STAINLESS DRIP FLASHING
8. 3/4" THICK ANODIZED ALUMIMUM FASCIA
9. THERMAL BREAK
10. STEEL PRIMARY BEAM W16X45
11. KAWNEER WINDOW 451T SPACED 4'-0" O.C.
12. 3/4" DIA. ASTM 325 BOLTS
13. STEEL COLUMN W8X24 @ 24'-0" O.C.
14. STEEL SECONDARY BEAMS W8X21 @ 12'-0" CENTERS
15. STEEL DECKING
16. WELDED WIRE MESH
17. POLISHED CONCRETE SLAB
18. 3/4" THICK ANODIZED ALUMIMUM FASCIA
19. 1/2" TK. FIBER CEMENT PANEL
20. COLD ROLLED METAL FRAMING @ 16" O.C. SPACING
21. CORRUGATED METAL SIDING
22. VAPOR BARRIER
23. RIGID INSULATION
24. 5/8" DENSGLASS GYPSUM BOARD SHEATHING
25. STAINLESS STEEL FLASHING W/ SILL SEAL
26. VAPOR BARRIER
27. CONCRETE SLAB W/ WELDED WIRE MESH
28. 18" WIDE CONCRETE PIER
29. 1 1/2" TK. RIGID INSULATION
30. 10" TK. CAST IN PLACE CONCRETE FOUNDATION WALL
31. GRAVEL BACKFILL
32. FOUNDATION DRAIN
33. WATERPROOFING
34. REINFORCED CONCRETE FOOTING
35. #4 REINFORCING STEEL (VERTICALLY PLACED AT 6' CENTERS AND HORIZONTALLY AS SHOWN)
36. GRAVEL BACKFILL



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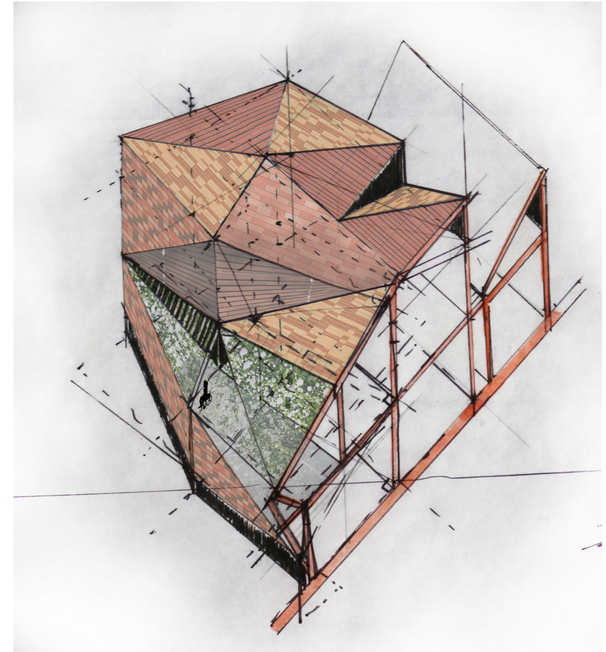
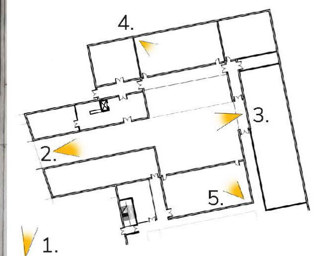


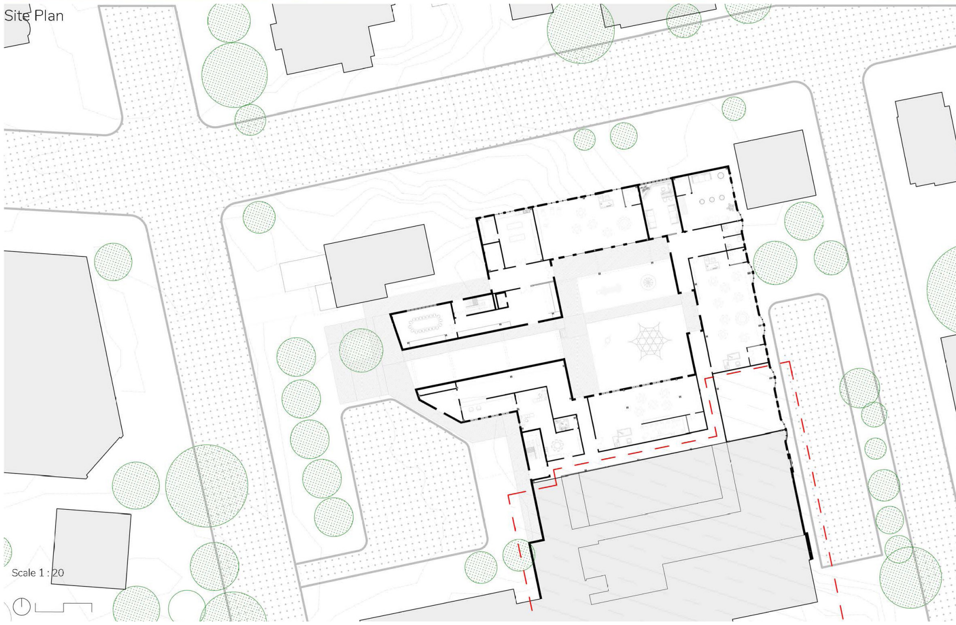
Exterior Perspectives

1.

3.



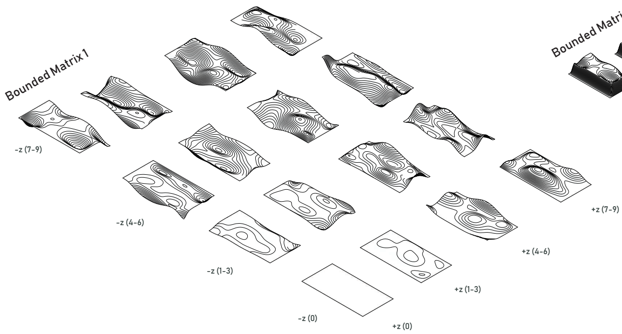
Site Plan

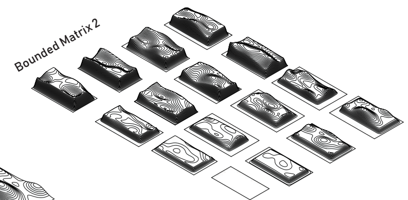


DRAPE
Digital to Material Workflow

Design and Material Parameters and 'Design Space'

Boundary Matrix





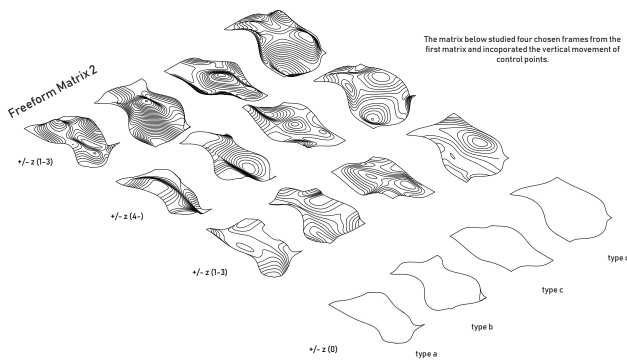
This first parametric matrix starts as a 2'x4' frame. The form is manipulated based on the shifting of the z direction of different points the U and V grid.

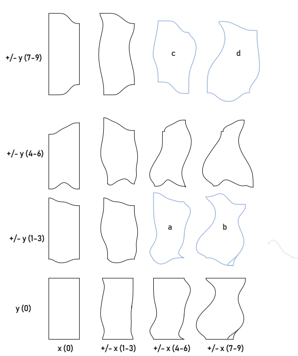
The matrix above shows the different iterations draped over with a surface.

Freeform Matrices

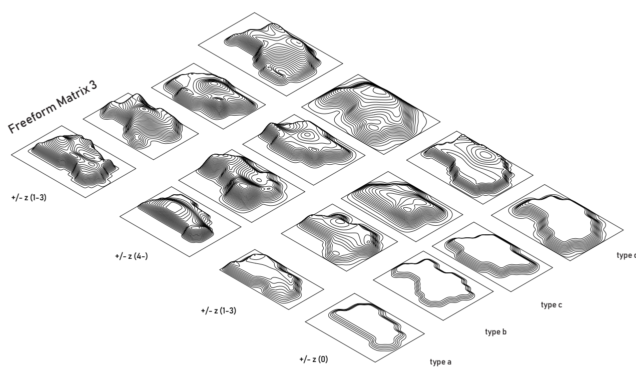
These freeform matrices were some further explorations that built off of the previous bounded matrices. Rather than working off of the base of the 2'x4' mold, these matrices add a new layer of information where both the x and y locations of the control points vary. Although these studies were not completely used in the final form of our project, it was a study in which we thought was interesting to further explore for more freeform facades that are not bound to rectilinear tiles.

The matrix below studied four chosen frames from the first matrix and incoporated the vertical movement of control points.





The matrix above studies the manipulation of the base frame in the x and y direction.



The matrix above shows the different iterations draped over with a surface

Conclusion

Through the manipulation of the control points, we were able to test the different draping patterns the fiberglass could form. These matrices were created mainly to see how the draping would be affected by the different peaks and troughs formed from the wrinkling of a surface.

Although these forms were modified artificially via the movement of control points, we were able to see how the variation of the curvature of a surface would affect spatial qualities. These digital tests informed our decisions of how much to wrinkle the fabric as it dried into a stiffened entity.

In the end, in order to truly display the organic wrinkles of fabric, we strayed away from these parametric methods and went to a more computational method via 3D scanning a physical object.

DRAPE
Digital to Material Workflow

Research on Precedents, Materials, and Technologies

Precedent Studies


University of Manitoba C.A.S.T. (The Centre for Architecgtural Structures and Technology) Lab


Fabric-formed GFRC (Glass Fiber Reinforced Concrete) as a facade

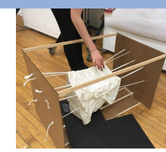

Guggenheim Helsinki Competition Entry


SFMOMA

With our project, we aimed to replicate fabric like conditions of wrinkling and folding with fiberglass and resin. The buildings and images to the left demonstrate a general look of what we attempted to execute. Through these precedents, we were inspired to create a facade that would ripple and endulate in organic ways with a rigid material. We also gathered from these precendents on how fiber reinforced polymers rested on planar walls as veneers, rather than them being load-bearing walls.

Fabrication Processes


Draping FRP from a fixture and carefully applying resin + catalyst

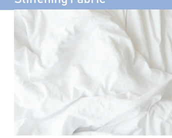

Using draped fabric as a mold for FRP -- carefully applying FRP sheets to draped fabric, then resin + catalyst


3D-scanning draped fabric and constructing a conventional mold using CNC router.

These were some processes for fabricating a wrinkled surface that we thought would be effective. The first two (draping and carefully applying and using the draped fabric as a mold) were strategies we thought were too invested in the physical realm so we chose to 3D scan the fabric and construct a mold through a CNC router.

The 3D scanning method allowed us to go back and forth between the physical and digital workspace to create a very interesting and intricate workflow. From a small scale physical model, we would generate a digital model, which we would then expand. Then, we would fabricate a physical mold which would then become the final module.

Stiffening Fabric


Initial texture of fabric


Mixing the different fabrics into glue and water solution

In the early stages of the project we did small fabric studies of how a fabric-like material could be hardened into a form that could stand on its own.

Using two different methods (fabric stiffener and glue/water solution) we tested out how the material would be affected by each solution. To further our studies, we used different fabrics such as denim, cloth, and polyester to see which fabric would form the best. The denim and cloth studies were both fairly sturdy and seemed to hold together the best.


Stiffened fabrics (denim, polyester, cloth) after one day

Resin and Acrylic

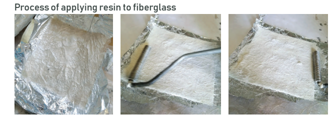

Most acrylic


Less acrylic


No acrylic

After seeing the inital color of the resin on fiberglass, we decided to try and color the resin with acrylic paint. From our tests, we found out that the more acrylic we put into the resin, the more flexible it became. Moreover, the more acrylic we put into the solution, less solution seeped all the way through the fiberglass. Through these tests, we settled on putting in less acrylic to still retain the opaque qualities we desires, but also to keep the material sturdy and solid.

Process of applying resin to fiberglass



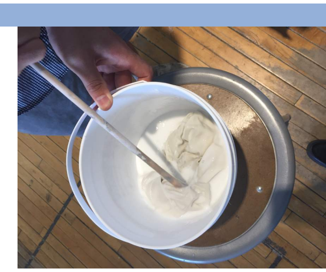
Full scale application of resin with acrylic

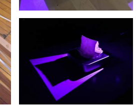
After all these studies, our final application of resin and acrylic turned out far too patchy to be considered a final product, so the method was unused.

Further Material Studies

To form these study models, we first created a wooden framework (pictured to the right), which we then looped rope in between to create an obstacle in which the fabric could sit on.

We then mixed glue and water to create a stiffening solution and soaked the fabric in the solution. Next, we draped the fabric over the rope in various configurations and let it sit to dry. The dried fabric was able to stand on its own as freestanding sculptures.





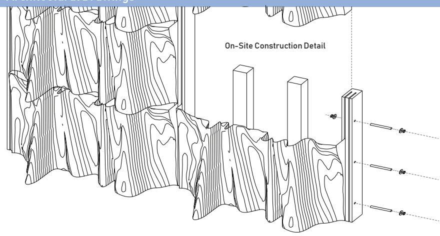
Our early attempts at prototyping indicated to us that using loose fabric as a direct mold for FRP was not feasible without losing the naturalistic draped texture that we sought. We began to gravitate toward processes that allowed us to capture these textures in a more solid mold medium such as milled foam.

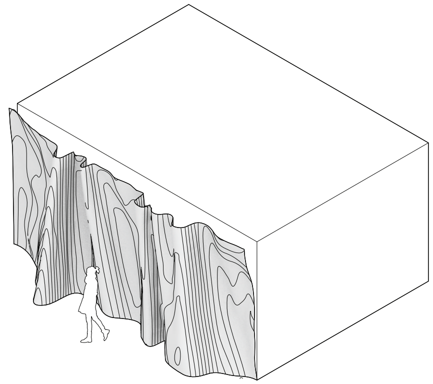
Our next step was to experiment with techniques for capturing the spatial information from our fabric form-finding experiment. We began by working with photogrammetry in Autodesk Maya, but finding this technique problematic given our elaborate framework, we switched to 3D laser scanning using stereoscopic camera equipment. The process of stiffening our fabric with adhesive solution proved beneficial for this, as the stiffened fabric allowed for extremely accurate scanning results.

DRAPE
Digital to Material Workflow

Architectural Representation and Computational Analyses

Architectural Drawings

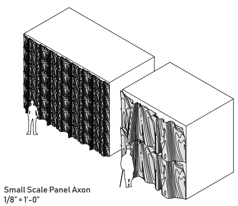




For our architectural drawings we wanted to portray how our modules and could turn into panels of different scales to provide different experiences near the veneered facades.

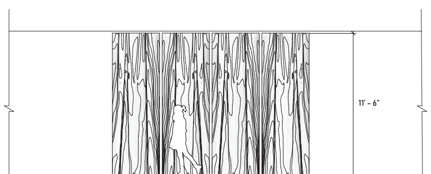
In the biggest scale, we demonstrated how the waves and endulations of the surface could possibly inform circulation, entrances, or even sightlines.

In the smaller scale drawings, the facade could act as a repeating texture on the wall that would create intriguing shadows that ripple across the surface of the facade.

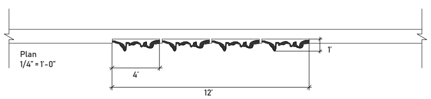


Small Scale Panel Axon
1/8" = 1'-0"

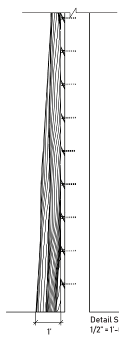
Large Scale Panel Axon
1/4"=1'-0"



Elevation
1/4" = 1'-0"



Plan
1/4" = 1'-0"



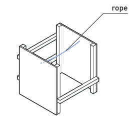
Detail Section
1/2" = 1'-0"

DRAPE
Digital to Material Workflow

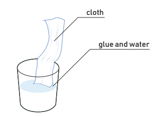
Digital to Physical Fabrication Workflow

Digital to Physical Workflow Diagram

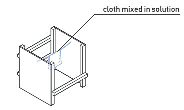
1. Attach rope to the constructed framework



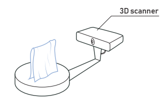
2. Drench cloth in the glue and water solution to stiffen the cloth



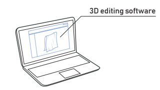
3. Hang the soaked cloth onto the frame to let dry and stiffen



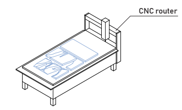
4. 3D scan the stiffened cloth



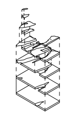
5. Edit the 3D scanned file with a 3D editing software (such as Rhino) into a CNC-able model



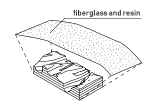
6. CNC a foam base for the final mold.



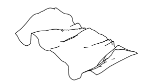
7. Attach all the cut pieces into the final mold using spray-on adhesives



8. Apply tin foil (or other covering material) over the mold, lay the fiberglass down, and apply resin (resin + catalyst solution)



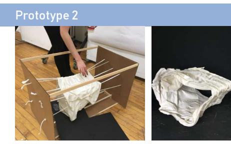
9. Remove the FRP (fiber-reinforced polymer) from the foam mold and trim/clean up the edges and spraypaint over for a clean finish



Prototype 1

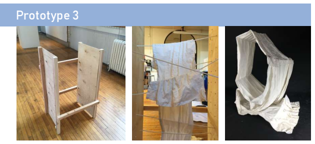
In our first iteration of this projects, we attempted to create a bench through parametric means. The form was based on parametric location of the points on a framework and the density of points on the frame. In this test we tested out both generic fabric stiffener and using school glue (Elmer's glue) mixed with water. From that, we figured out that the glue and water solution stiffened the fabric much more successfully. We also used this prototype to test the use of a 3D scanner.

Prototype 2



For our second prototype, we attemped to create a larger scale model that was simplified. The shape, we learned, was far too complicated to replicated with fiberglass and resin.

Prototype 3



After constructing our final frame, we quickly created a test form to see how this scale would affect the form of the fabric. As seen in the photograph, the form was able to stand up on its own. The past two prototypes were created for photogrammetry 3D scanning which wasn't used for the final product due to the complexity of the object not being compatible for such method.

Prototype 4

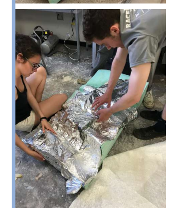
With the same frame as prototype 3, we hung pieces of cloth in a far smaller scale to be able to 3D scan the form with an actual 3D scanner. From these prototypes, the group set on creating a facade module rather than any load bearing form. In order to best portray the wrinkles and the cloth-like forms of the scanned model, we decided to use only one layer of fiberglass in attempts to keep the form as flexible as possible.

Fabrication Process

CNC Milling the Forms

Removing the mold pieces from the CNC Router

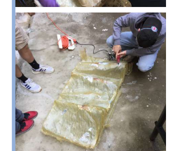
Attaching all the mold pieces together with spray-on adhesive



Laying tinfoil over the mold to prevent the resin from sticking to the mold and waxing over the foil to prevent the tinfoil from sticking to the resin and fiberglass

Soaking the fiberglass in resin and catalyst solution to coat it as evenly as possible (no resin was wasted)

Laying the soaked fiberglass over the mold as flat as possible



Cleaning up the edges of the cast and sanding the excess resin off

Spraypainting the surface black to give a nice finish

Final Module