Intersections In The Architecture Surface:

The Facade as an Interface for Ecological Development

A Thesis

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In partial fulfillment of

The requirements for the degree of

Master of Architecture

Department of Architecture and Interior Design

By

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Miami University

Oxford, OH

2023

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Reader____________________________________

Sam Toland

Intersections In The Architectural Surface:

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Abstract

Intersections In The Architecture Surface is an extensive inquiry into the facade and transitional interior/exterior thresholds that control the ecological conditions of the built environment and how we interact with it. This thesis constructs methods through parametric processes for controlling the built threshold and its interaction with site context, with specific emphasis on the role of the facade in communicating space, light, form, and interaction. These methods are then employed in the design process of a regional maritime museum along the Maumee riverfront in Toledo, Ohio.

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Acknowledgments

I would like to initiate this document by acknowledging my thesis committee members, Craig Hinrichs and Sam Toland for their invaluable contributions to my thesis process.

I would also like to express my deepest gratitude to my family who encouraged me to pursue my passions with vigor, it is only through your support that this document was possible.

I must also mention Nick B. and Seth M., my two best mates, I could not have done this without their support.

Lastly, I dedicate this thesis, Intersections in the Architectural Surface to Patrick Holben, the best Grandfather a grandson could ask for, you are missed, and will always be in my heart.

Ps. I never joined the bowling team, but I was for a time a proud member of the Miami University chess club!

References

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Sánchez, D. (2013, October 21). Danish National Maritime Museum / Big. ArchDaily. Retrieved May 4, 2023, from https://www.archdaily.com/440541/danish-national-maritime-museum-big?ad_source=search&ad_

At the onset of my work, I knew there exists a predisposition to the employment of parametric tools in the architectural design process. Due to this, I felt it necessary to address, as someone who has spent the better part of three years using parametric software in some capacity; to construct a means of architectural design in the parametric is by its very nature, a design process itself. Each function, every operation, every failure, and success produced by the parametric tools constructed in this thesis, were conducted in a state of design thinking. To achieve the goals I desired, I had to partake in extensive problem-solving, and abstract lateral thinking processes, and implement and re-implement countless times to reach the desired output. To the best of my understanding this is the definition of design.

I would also like to address a design competition I competed in during my senior year of high school, The AIA Toledo High School Design Competition. This competition purposed a new maritime museum for Toledo, along the southern flank of Riverside Drive in East Toledo. Roughly 200’ away from the site of my thesis, nearly seven years later. The spirit of the competition had such a positive impact on my future career in the architectural field, I felt I had unfinished business with my original design. As a graduate student, reflecting on my early work, I felt a certain sense of nostalgia, a feeling I wanted to revisit, to re-imagine. This thesis, very loosely reflects the same programmatic requirements, although extensively expanded upon, and sits very close to the original competition site. It was the beginning of a chapter and this is the ending, so it only felt right to revisit.

Competition Details and 2017 Submission:
http://hsdcaiatoledo.blogspot.com/2017/04/

Fig. 1. Max K. 2017 Competition Submission

Initial inquiries into the facade, the main focus of this thesis lead to the conception of the interior/exterior threshold within the building envelope that controls the means by which one experiences architectural surfaces. This threshold acts as the transitional tool from an exterior context and is the primary interface of an edifice. The physically manifested controlling factor of this relationship between interior and exterior, naturally, is the facade. Therefore, at the onset, understanding the means by which a facade can solicit interaction and furthermore, how it is controlled, became the objective of this thesis. In the interest of constructing a method to map and implement a means to advance the ecological condition of the built context through the facade, the thesis inquiry expanded to incorporate parametric processes to fully construct algorithmic tools to allow for advanced exploration of logic-based methods for implementation in facade design. By the nature of the tools, this thesis is an explorative process, by which the outcome is uncertain and requires extensive research and development with only a general direction guiding the process. Over the following year, using Grasshopper, logic, tools, and methods were designed and implemented in the traditional design process of a regional maritime museum which would later become "The Bridge", a 120,000sf building, with exhibit galleries, a restaurant, and a large public center for learning in the form a library along the Maumee riverfront in Toledo, Ohio.

Fig. 2. Spidernethwood in Nimes, France, 2007 by R&Sie

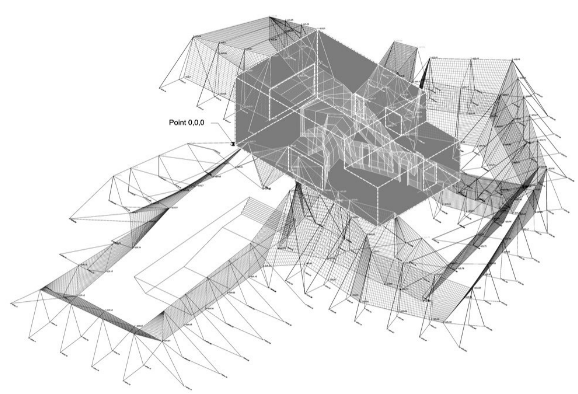


Fig. 3. Axo - Spidernethwood

The objective of this thesis is to leverage the possibilities of Grasshopper to produce a parametric tool that can supplement the traditional architectural design process of the facade. When investigating the possible avenues of intervention in the early stages of the thesis, architecture theory played a significant role. Performance Oriented Architecture by Michael Hensel began to shed light on the concept of non-discrete and discrete architectures. Non-discrete architecture as described by Michael Hensel, "architectures unfold their performative capacity by being embedded in nested orders of complexity and auxiliary to numerous conditions and processes" - pg.31, M.H. The premise requires a reconceptualization of the dynamic configuration of form and its connection to site context, through extended thresholds, layered in material, form, and spatial configuration. This premise, presented in Performance-Oriented Architecture, leads to the conclusion that architectures of non-discreteness have a sensitivity to the numerous factors engaged in design as it relates to an edifice and its connection to site and the ecological conditions that govern it. This is in opposition to an architecture of discreteness, displayed by signature architects calling attention to the composition of form over the practice of deep contextual sensitivities and integration. Whether or not signature architects are guilty of this, is of no interest to me in the pursuit of architectural thinking. However, the idea of non-discrete architectures as a mode of design carries with it the implicit desire to connect with the existing and to seamlessly integrate the natural and man-made, a mode of design I am very much interested in pursuing.

What does this look like in practice? An example that pays respect to the transitional thresholds of interior/exterior conditions and exemplifies non-discrete architecture is the Spidernethwood in Nimes, France, built in 2007 by R&Sie. This small dwelling articulates its threshold through a series of nets along the outer envelope of the building. The nets act as a diffusional device for the transition from a forested landscape to the interior spaces of the dwelling. Through the simple material application of netting, the dwelling begins to blur the lines between what is site, what is building, what is man-made, and what is natural. In this way, one is captivated by the stimulation of altering realities through the traversing of the site whereby architecture facilitates a mode of existence that is sensitive to the natural but uncompromising in its necessary programmatic functionality.

From this premise, I began to explore how this can be applied in the urban context, where architecture is the primary environment and the ability to blur what is natural and man-made is far more challenging. Given the natural is extensively removed from the urban landscape, the question then revolves around the sensation of interaction with site and form, with the express intention to intertwine these realities, where in most cases, they contradict one another- think discrete architectures.

These early investigations led me to experiment with the building threshold and the facade as a facilitator of intertwining realities along an important underutilized urban riverfront in Toledo, Ohio. However, before the design process could begin, methods for quantifying interior/exterior thresholds are necessary for the formulation of the parametric tool.

Mapping the threshold refers to the graphical quantification of the threshold that governs the interior/exterior context of the facade. The original experiment was rudimentary but formulated the underlying logic that would later become integral to the parametric work. The experiment works by applying X intersections on a grid overlaid on a section drawing. These X intersections represent moments of activation governed by the facade. In areas of activation, the X intersections are displayed in high opacity, and in areas of low activation, the X intersections are displayed as partially transparent. Once the sectional threshold was mapped, the highest points of intensity along the length of the grid were connected to create a control curve that represents the evolution of the threshold. The control curve aims to summarize the characteristics of the threshold in such a manner as to allow for interpretation by parametric tools, which will be demonstrated in later illustrations. If this process of manually constructing grids and mapping thresholds can lead to the production of a cumulative control curve, then the inverse is also true, a control curve can be designed to meet specific requirements per site and programmatic conditions throughout and be applied in the parametric process.

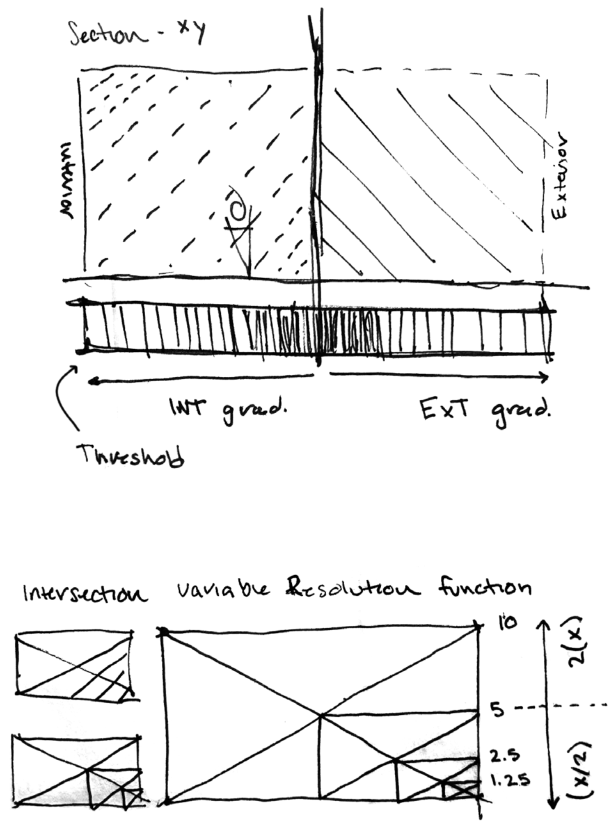


Fig. 4. Initial Threshold/Intersection Mapping Devices

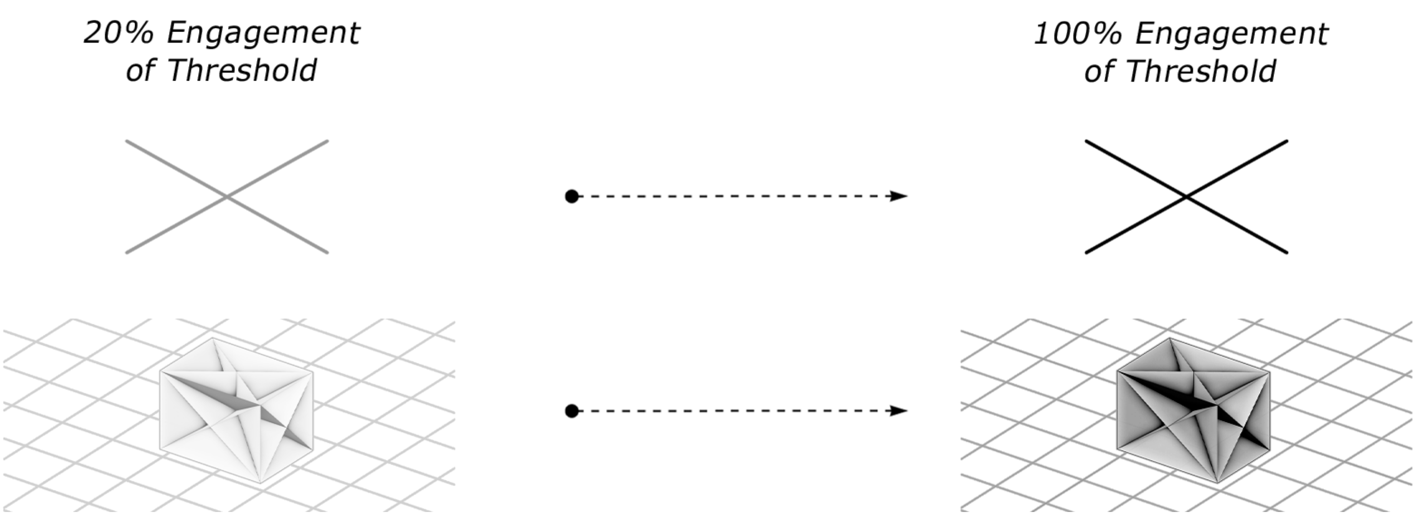


Fig. 5. Threshold/Intersection Mapping Devices 2d/3d

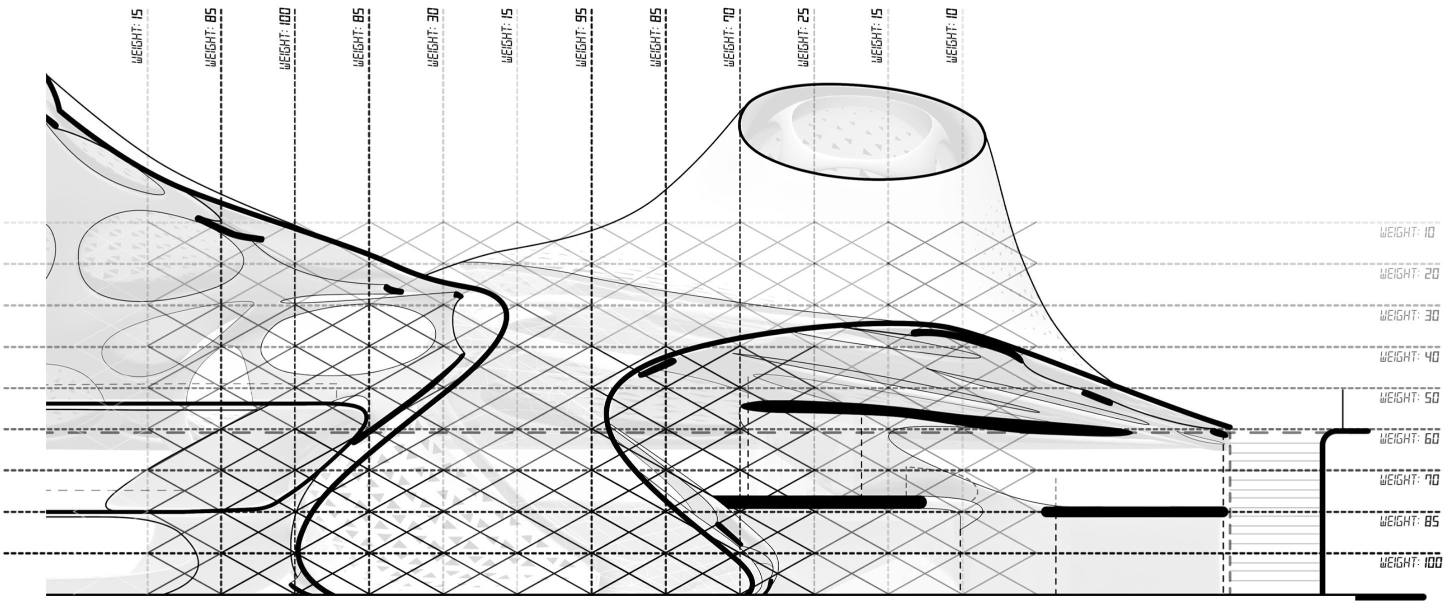


Fig. 6. Volcano 2 - MDK(2021) Example Threshold Mapping

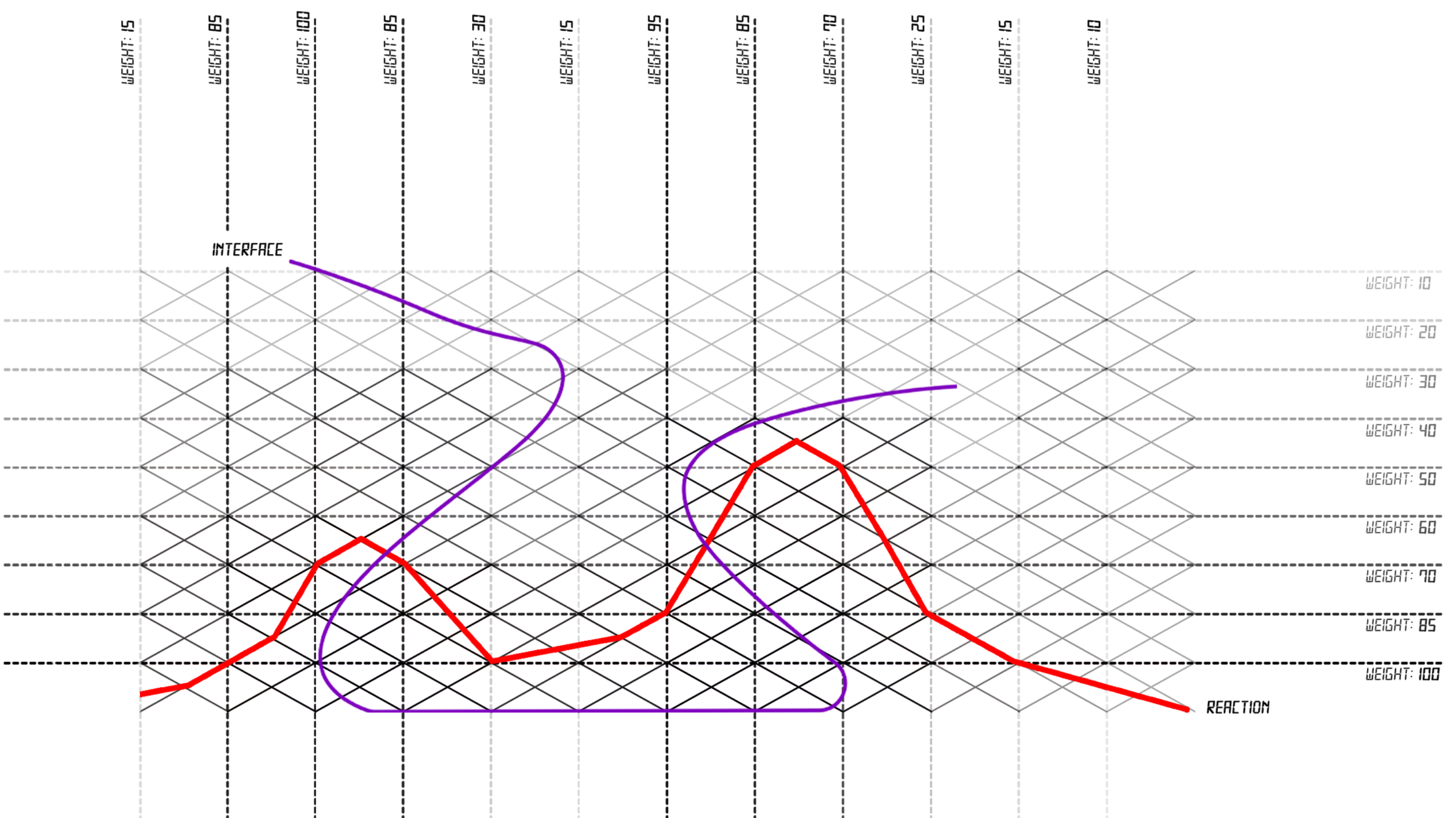
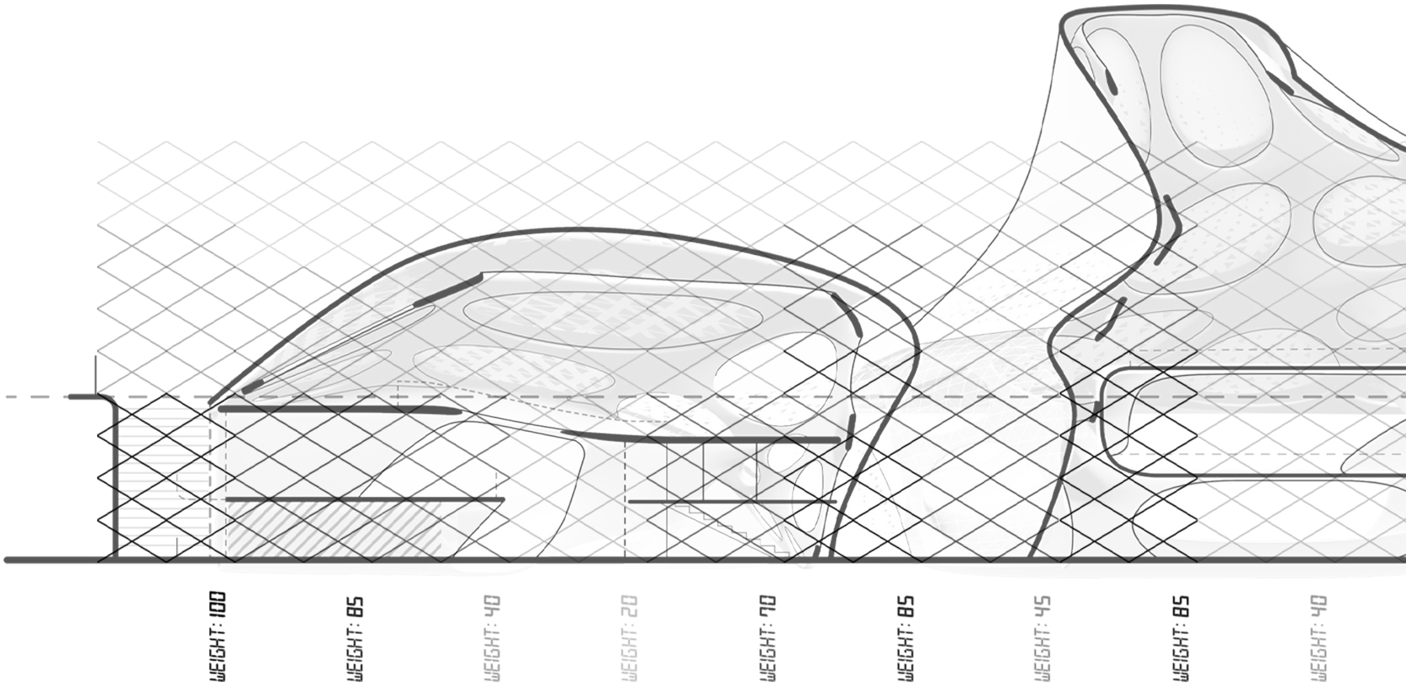


Fig. 7. Volcano 2 - MDK(2021) Threshold Mapping Control Curve Output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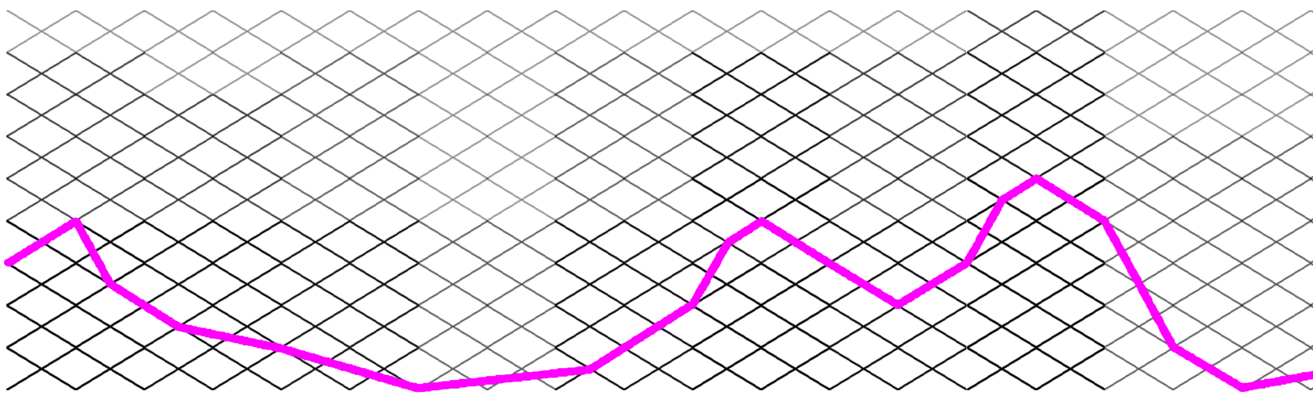
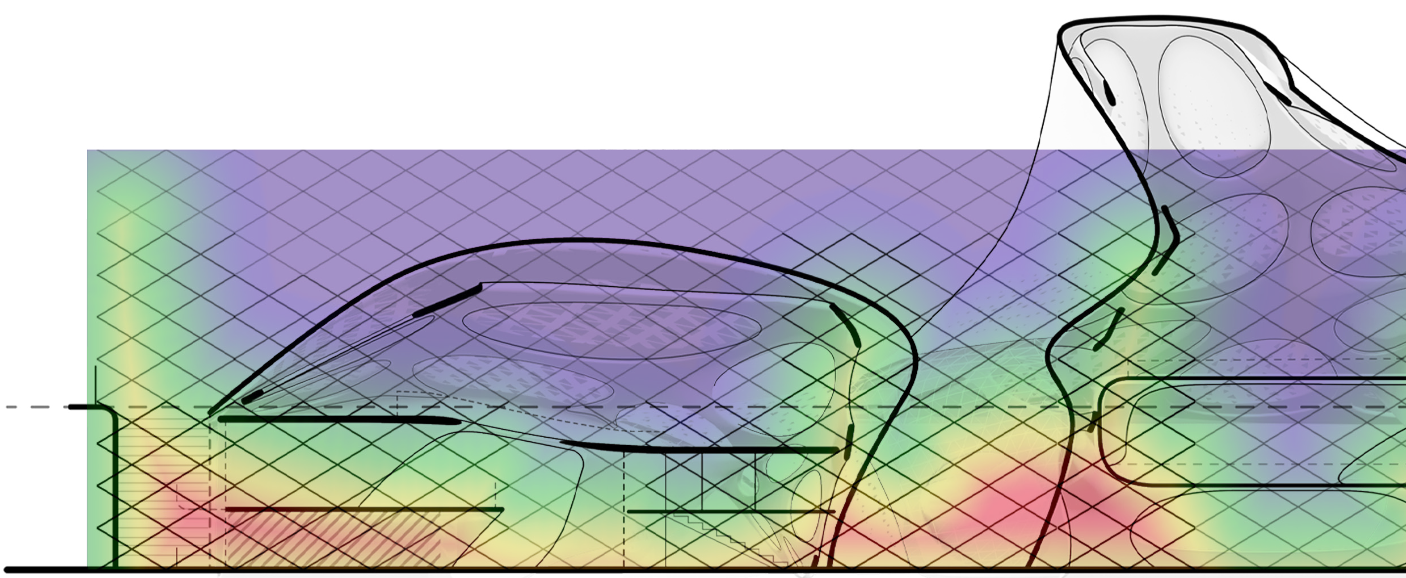




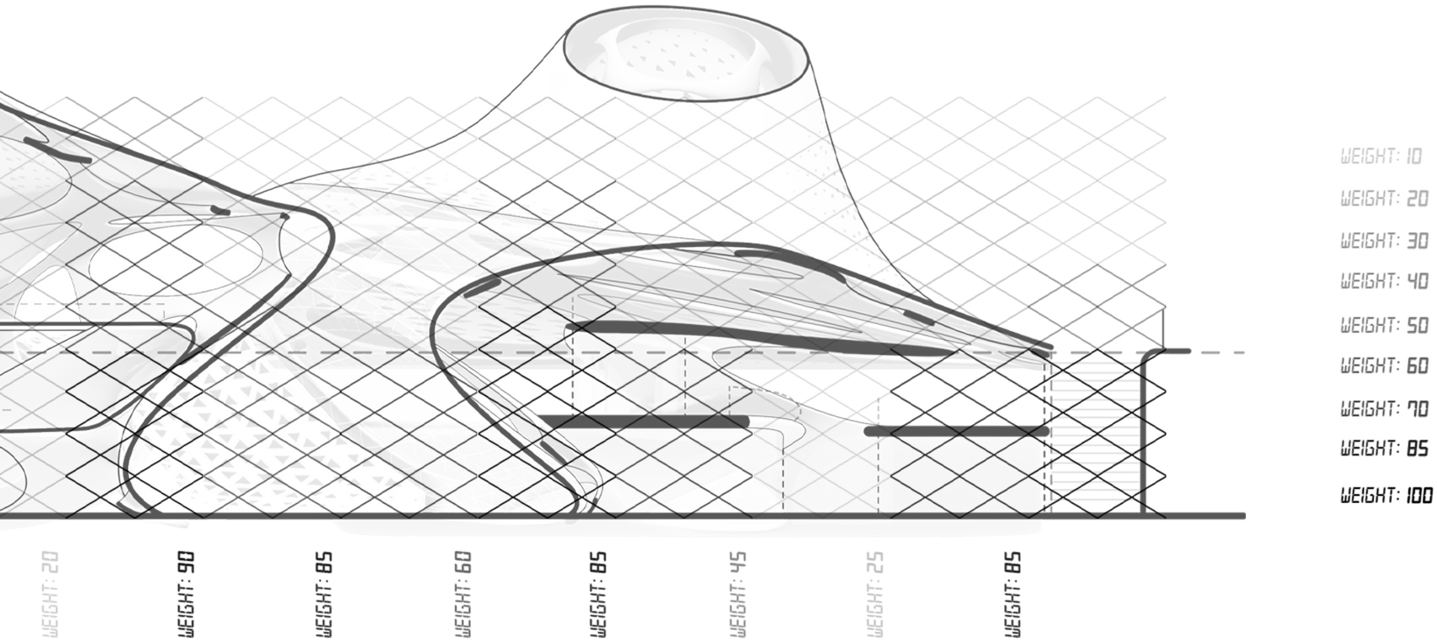


Fig. 8. Volcano 2 - MDK(2021) Threshold Mapping

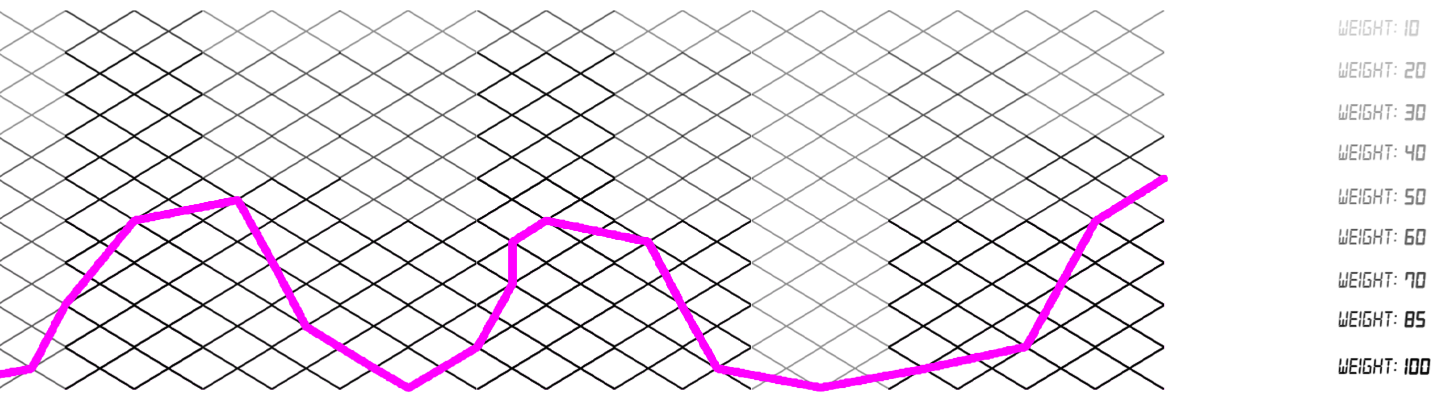


Fig. 9. Volcano 2 - MDK(2021) Threshold Mapping Control Curve

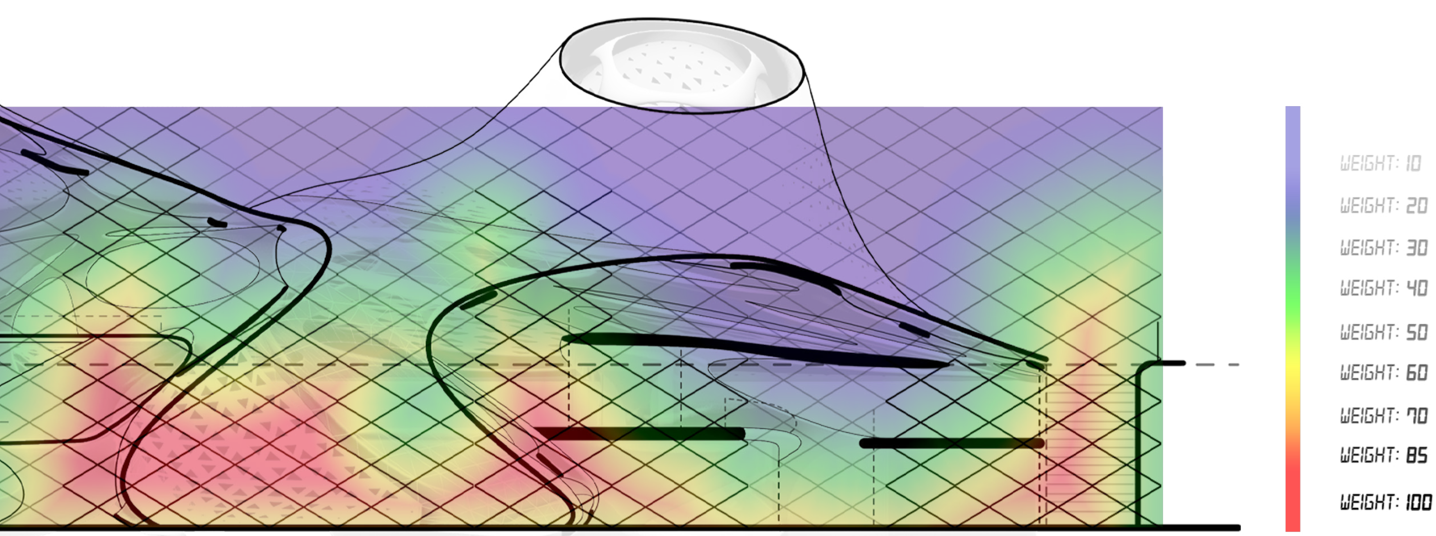


Fig. 10. Volcano 2 - MDK(2021) Threshold Heat Mapping

The central body of thesis work took place in the parametric, Grasshopper was used to facilitate the conception of an augment-able tool for the design process of the facade. In order to realize the idea of designing facade integration through thresholds, a means of analyzing spatial qualities was necessary. In the search for an algorithmic method to do so, I was re-familiarized with an algorithm I learned about in my high school years. A mathematical experiment called Conways Game of Life. The experiment, first conducted in the early '70s by John Horton Conway was designed as a cellular automaton governed by a few simple rules:

1. Any live cell with fewer than two live neighbors dies, as if by underpopulation.
2. Any live cell with two or three live neighbors lives on to the next generation.
3. Any live cell with more than three live neighbors dies, as if by overpopulation.
4. Any dead cell with exactly three live neighbors becomes a live cell, as if by reproduction.

The rules are simple enough to allow for relatively easy replication in software such as Grasshopper and could serve as the basic logic moving forward. I realized the potential to re-purpose this experiment because of its intrinsic ability to detect when a region in space was inactive and lifeless and its evolutionary abilities in areas of life and activation. The experiment takes place on an infinite 2d grid and cells can be spawned at random or placed manually. Once initiated, the cells then check each of the four rules, if any one rule applies to that particular cell, a corresponding action takes place, thus, the evolution of life and death of the cells plays out. In certain cases, the cells seem to evolve infinitely, in other cases, the cells die off instantly. By re-characterizing the wordage of the rules, using the same basic math, the experiment can take on a new meaning and application:

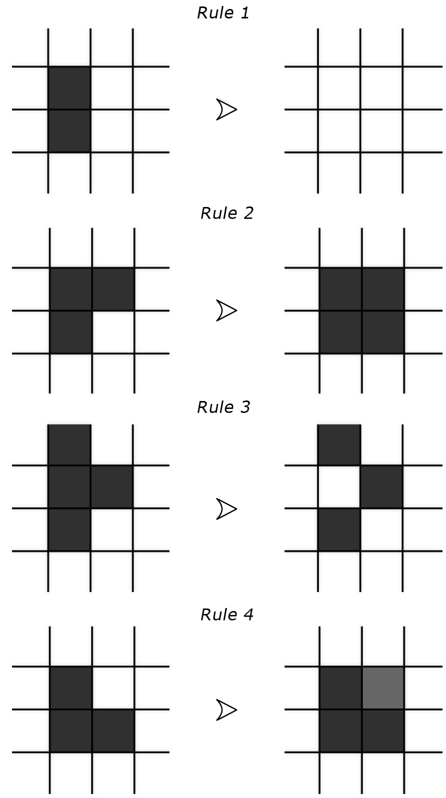
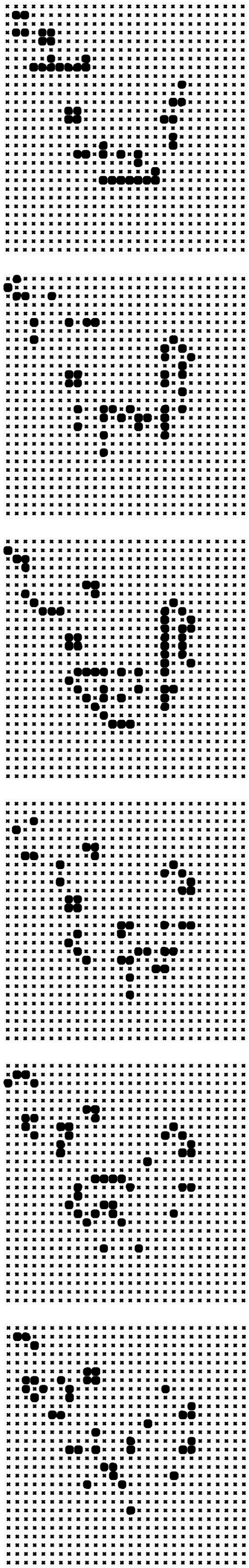


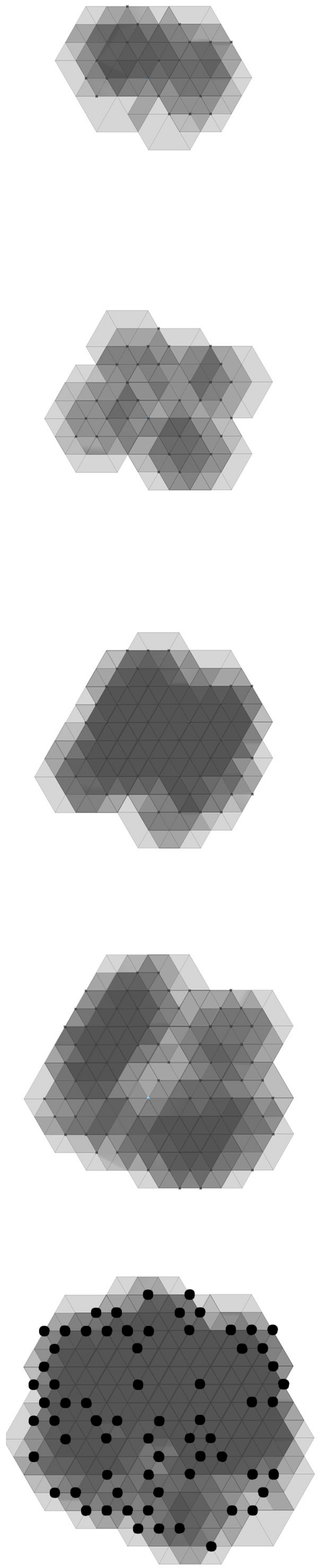
Fig. 11. G.O.L Rules

Adjusted Rules

1. Any active cell with fewer than two active neighboring cells dies, as if by a lack of activity.
2. Any active cell with two or three active neighbors continues on to the next iteration.
3. Any active cell with more than three active neighbors dies, as if by over-stimulation.
4. Any inactive cell with exactly three active neighbors becomes an active cell, as if by contextual evolution.

By restating the basic rules, the underlying logic does not change, rather, is disconnected from the assertions that the experiment is about "life". Instead, the experiment is now referring to active and inactive space evolution, divided along an infinite 2d grid. This works for the same reason architects typically design in plan and section with grids, set with nominal spacing (i.e. four feet, eight feet, etc...), and space referred to as active, is to suggest a state of ecological connectivity and the intention of regular use by inhabitants for a variety of possible reasons such as key site views, programmatic use cases, main circulatory systems, and so on.





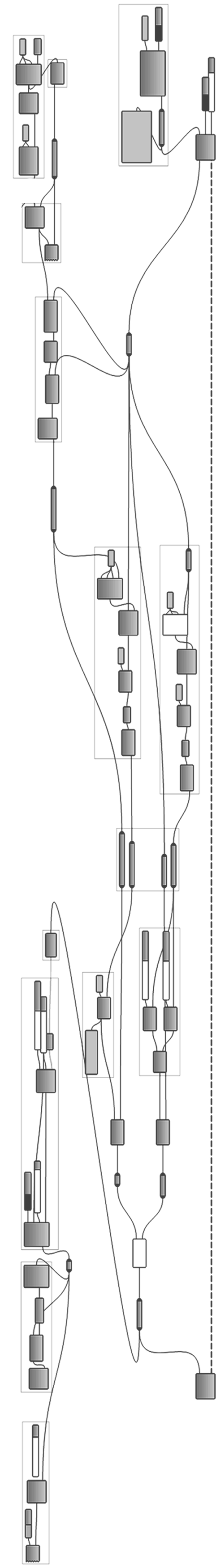


Fig. 12. G.O.L - (2D) 0-5 Iterations in Grasshopper

Fig. 13. G.O.L - (3D) 0-5 Iterations in Grasshopper

Fig. 14. G.O.L - (3D) Grasshopper Definition

To control what is desired in active and inactive space, the Grasshopper definition would need a method of accounting for all cells, active and inactive. This comes in the form of an array of points along a 3d grid that exists simultaneously and can be called upon to be active when necessary. To control this process, the control curve, first mentioned in the mapping of the threshold, will be instituted as the means by which a designer can influence the outcome of the spatial analysis. This works by interpreting the peaks and valleys of a curve along the grid as levels of intensity. When the curve increases in intensity(a higher peak), it communicates to the simulation that the corresponding area, represented in 3d space, will have a higher initial cell start count. The result of this is that with more cells concentrated in an area, a larger degree of new cells will spawn, per the rules of the algorithm, and produce a representative space of higher activation. The result of this will be demonstrated later in the process. There exist two control curves, designed to represent the thresholds of the greater edifice, a plan and section curve. Through the Grasshopper definition, these curves are interpolated to create a master control curve with the necessary input for both the sectional and plan qualities of the designer’s making and work as described in the mapping threshold stage.

Once the control curve is produced, the peaks and valleys are assigned stages of values corresponding to their frequency and input directly into the spawn characteristics of the first iteration of the simulation. After this, the simulation runs based on the aforementioned rules, analyzing the spatial context and producing an outcome for later interpretation in the form of surfaces. Lastly, control volumes are incorporated into the process to inform the simulation of key moments along the site where important program exist. Where the control curve intersects with these volumes, an additional mathematical operation takes place to account for an increase in activation as desired by the designer. The final simulation outcome is a 1:1 point cloud, superimposed on the chosen site, with the necessary design characteristics pertinent to the building type and circulatory means built into the outcome.

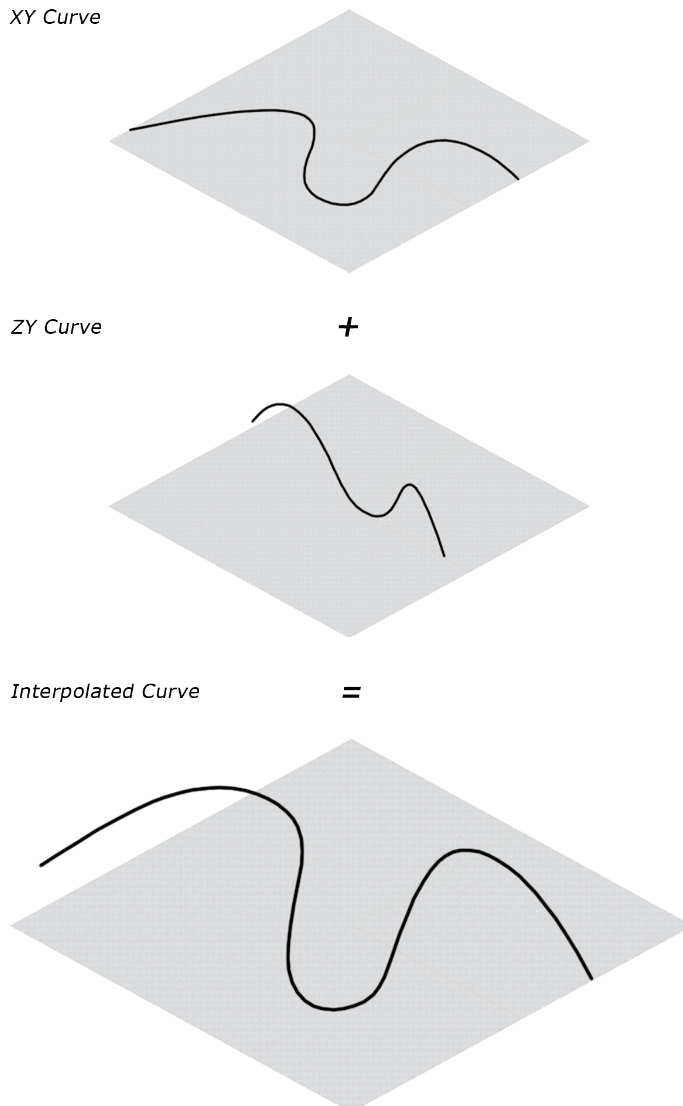
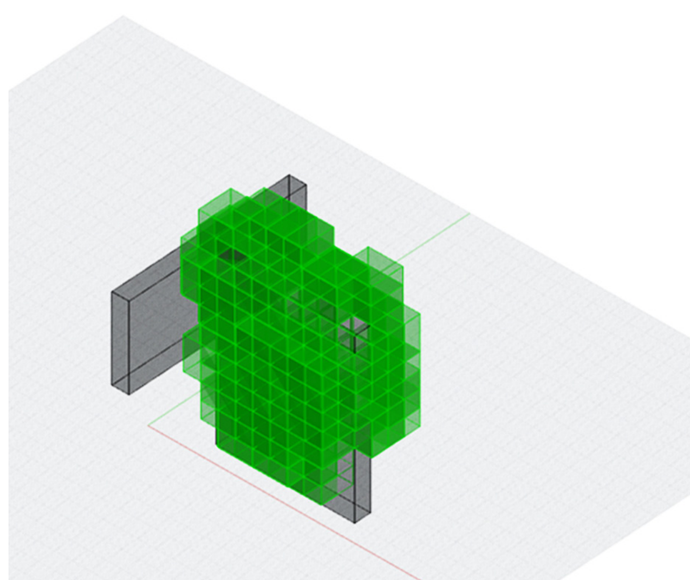


Fig. 15. Simulation Control Curves

Fig. 16. Control Volume Interaction With Cells



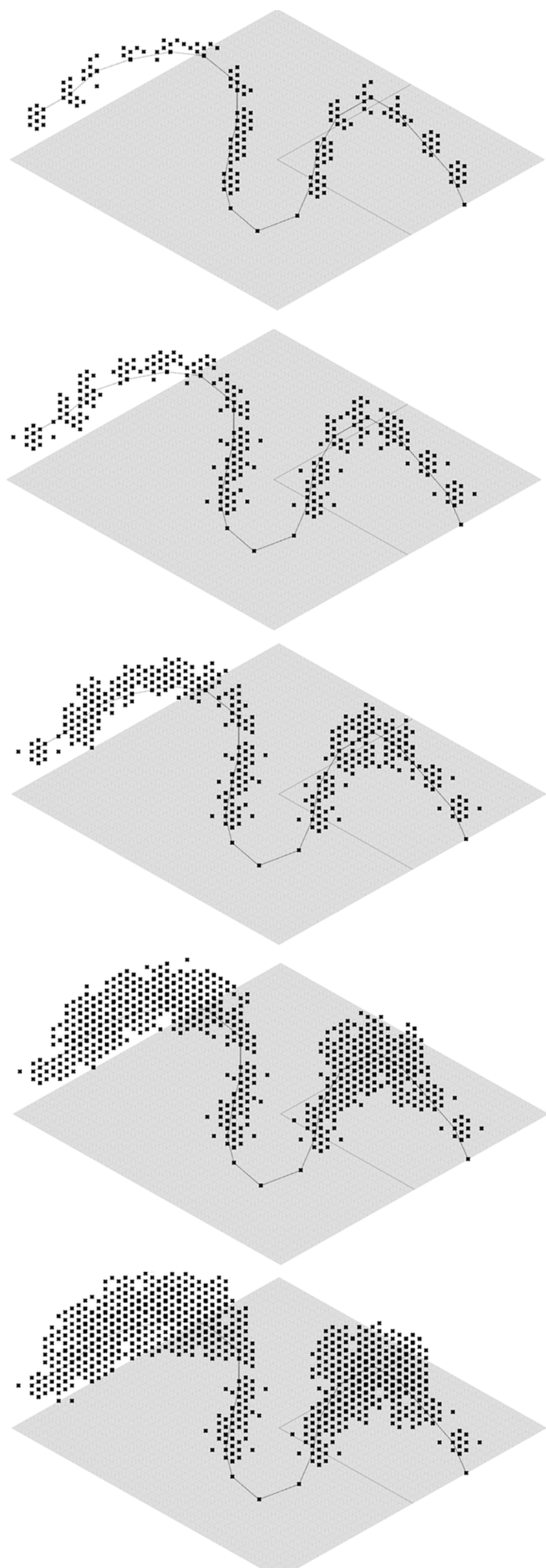


Fig. 17. Control Curve Simulation Iterations 1-5

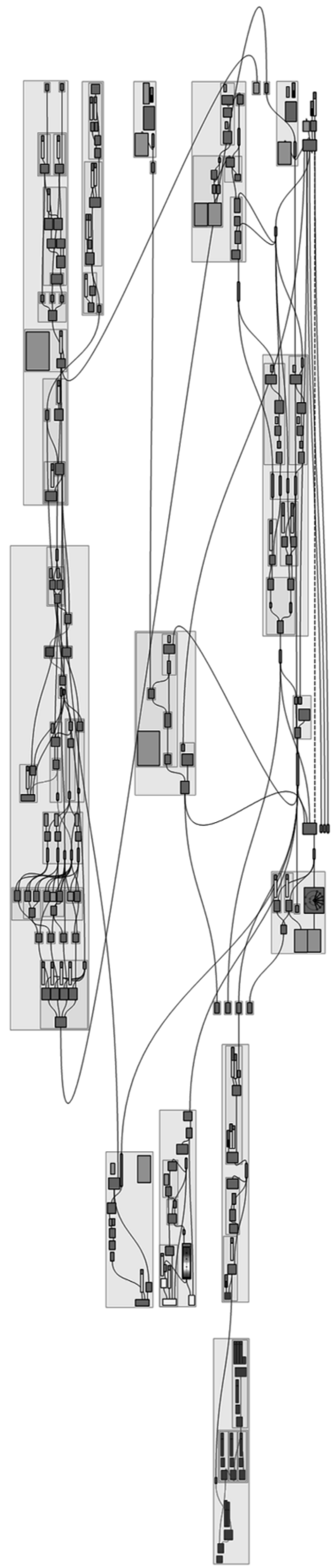


Fig. 18. Grasshopper Definition With Control Vol.+Curves

The simulation process, once given a control curve and secondary influencer evolves along the site condition. After this process, the point cloud is exported and the spatial qualities of the evolution are interpreted and formulated into a 3d mass, the designed envelope.

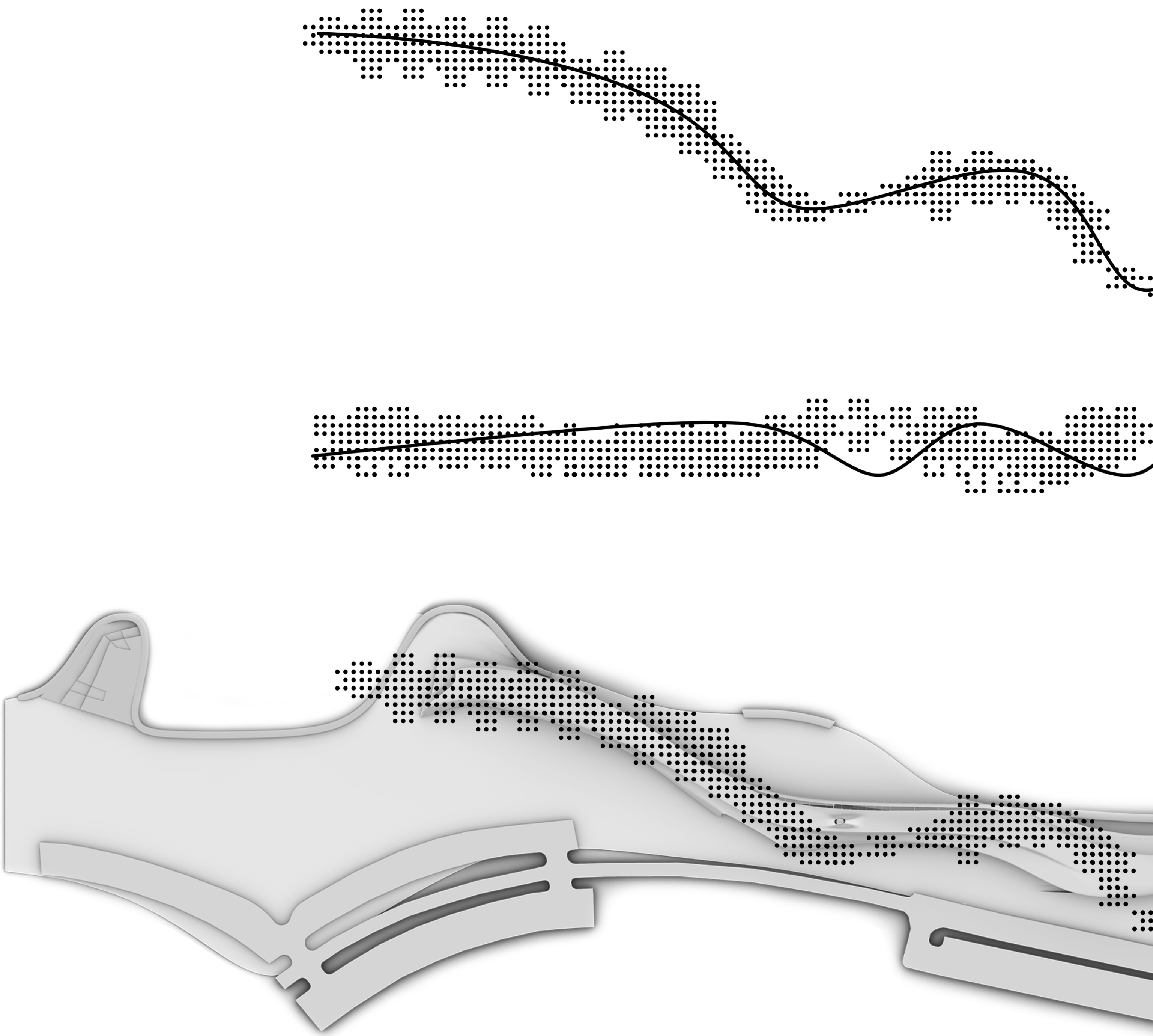
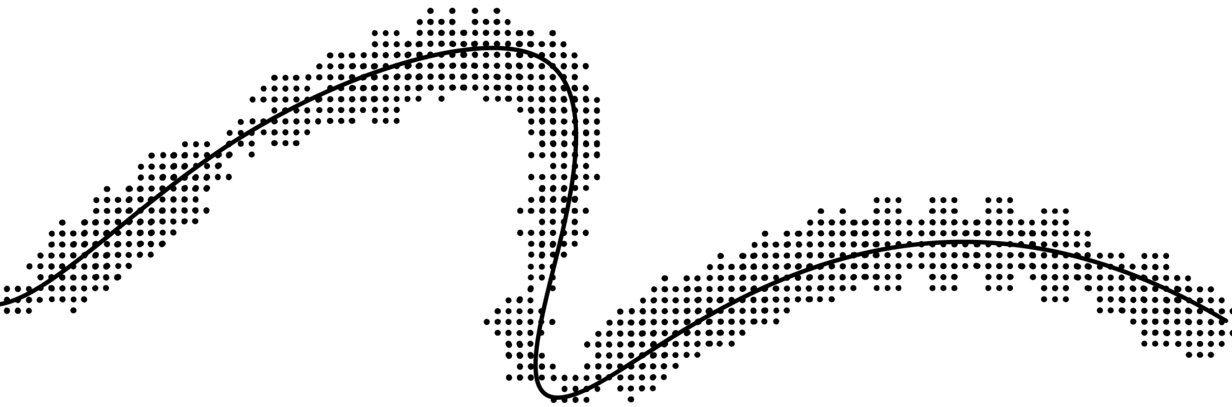


Fig. 21. Final Simulation Outcome Superimposed On Site

Fig. 19. Simulation Plan Result



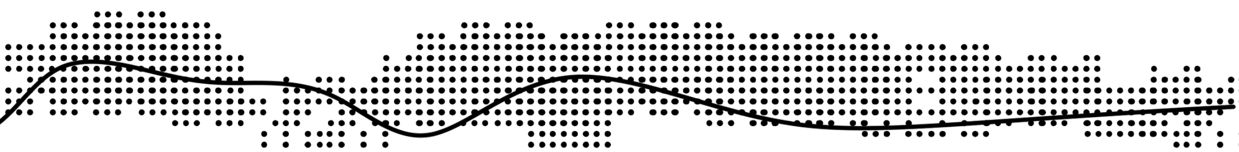
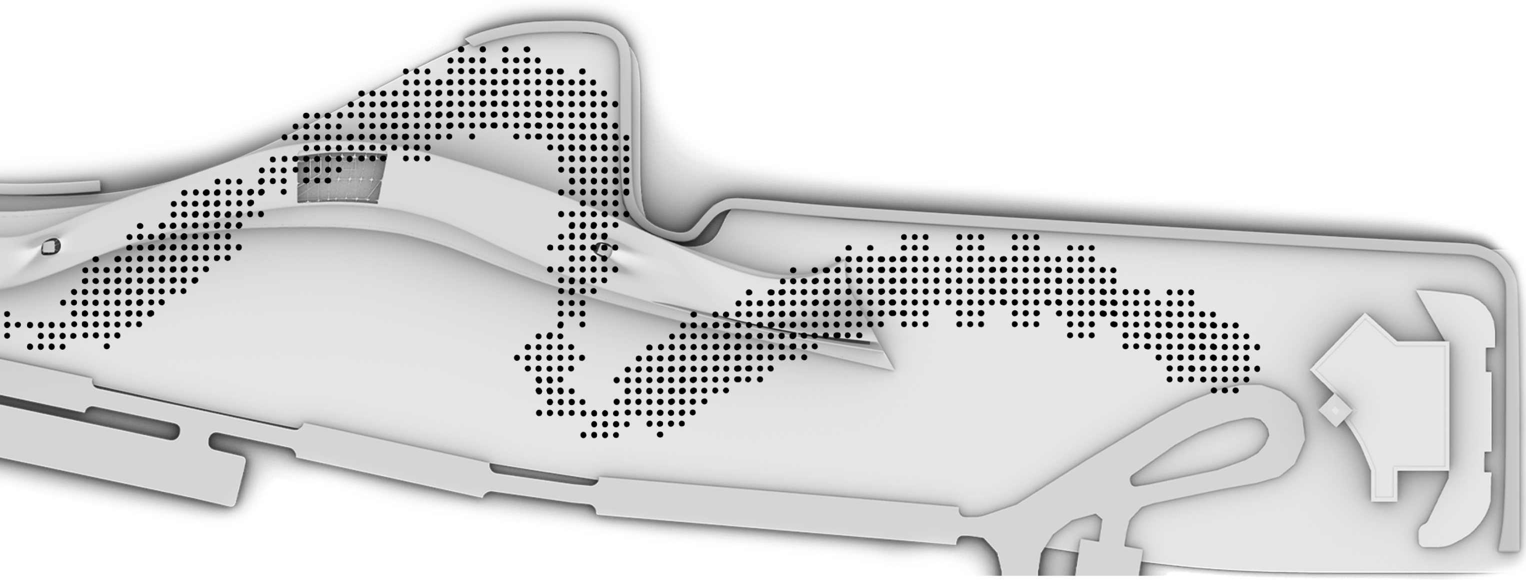


Fig. 20. Simulation Sectional Result

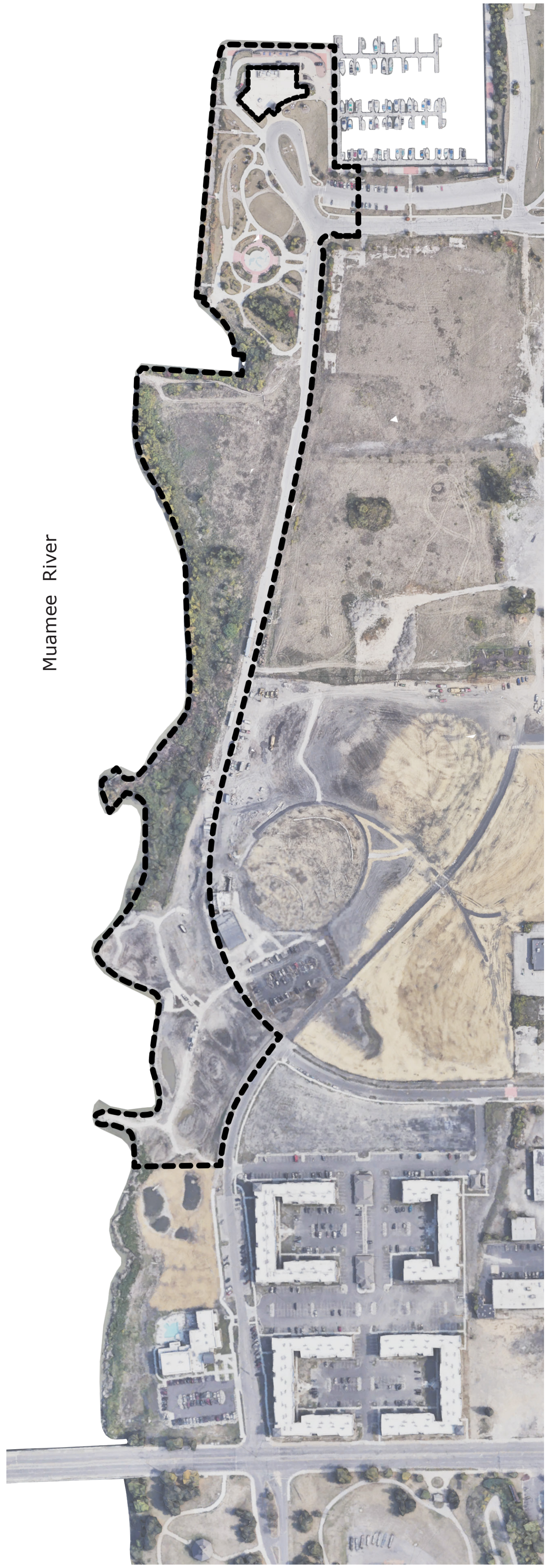


Toledo, Ohio

Fig. 22. Toledo Macro

The site chosen for this thesis sits parallel to Riverside Drive road, along a half-mile stretch of the Muamee riverfront in downtown Toledo, Ohio. The site was historically an industrial park with factories along the bank of the river. Since then, the factories have been demolished and the site exists, baron, with only the National Museum of The Great Lakes on its farthest Eastern boundary. The existing museum fails to utilize the abundance of opportunities on the site to activate the riverfront, the scale, or the possibility of large interactive exhibit spaces with full-scale ships or other desirable historic objects related to the rich history of maritime activity on the Great Lakes. Because of these shortcomings, and the vast unused site along the riverfront, I saw the opportunity to propose a new regional maritime museum of the Great Lakes, that could bring to Toledo a rich educational and community experience, reactivating a forgotten history and geography.

Toledo is divided along the banks of the Maumee River, East, and West. West Toledo has historically seen investment in infrastructure, architecture, and public parks, while East Toledo, an area of low-density urban sprawl, has been neglected. The outright neglect of East Toledo is observable in the condition of the built environment, but also socially, culturally, and economically. The River's divisionary qualities have instilled resentment between the two sides of Toledo. Throughout a large part of my life, I have lived near the city of Toledo, worked in it, known people from both sides of the river, and seen firsthand the urban dichotomy that makes up the city today. The proposed museum, called The Bridge, is a proposal to revitalize the riverfront connection to East Toledo, providing new opportunities for education through the community center, an elevated restaurant, and a maritime museum.



Scale: 1/400" = 1'
Fig. 23. Site Selection

Fig. 24. Initial Context Investigations

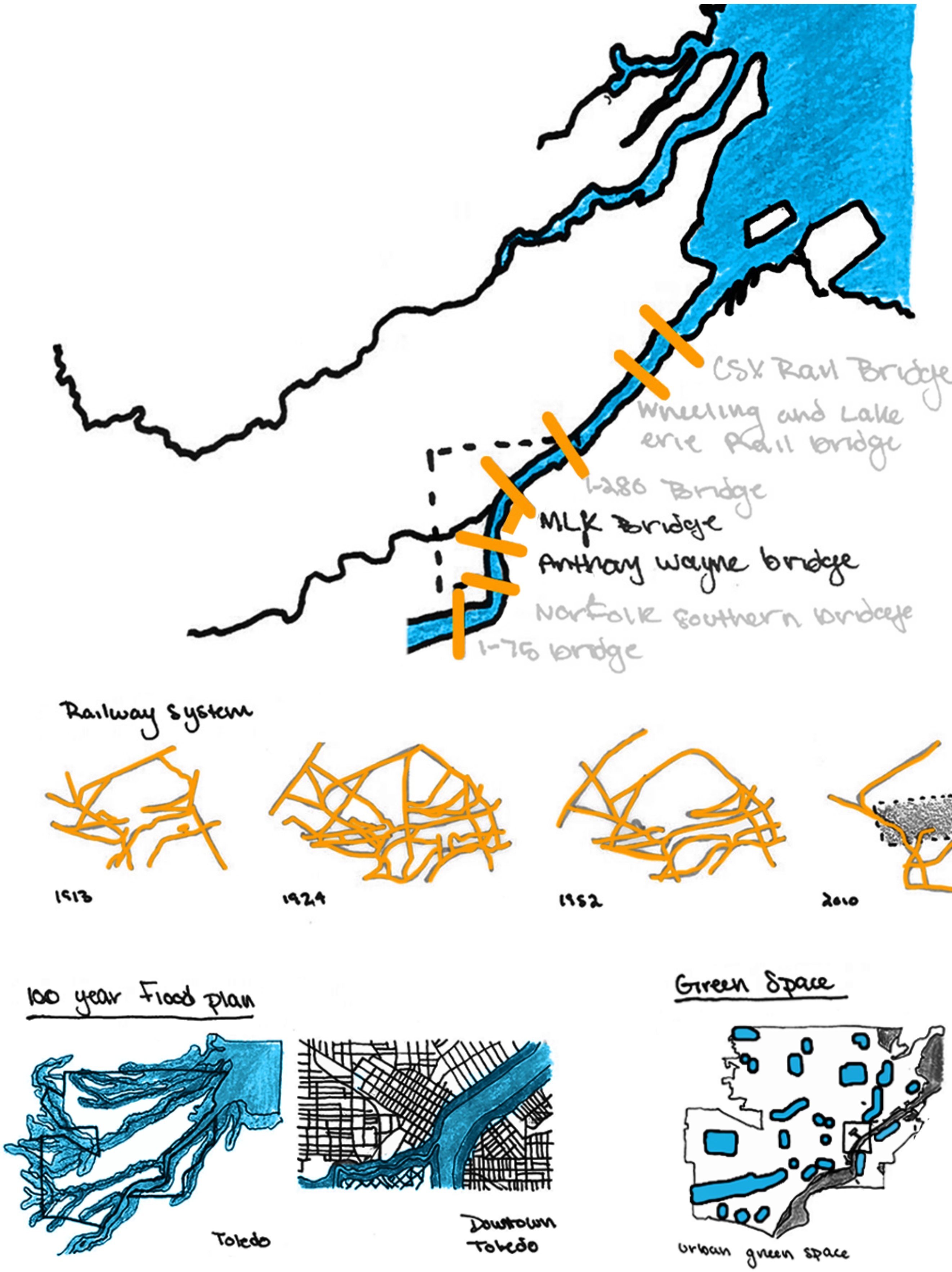


Fig. 25. Existing Museum/Marina

Fig. 26. Site Looking Toward Maumee River

Löyly / Public Sauna Culture: Findland

Architects: Avanto Architects
Location: Hernesaarenranta, Helsinki, Findland
Area: 1071 sf
Year: 2016

The riverfront design by Avanto Architects acts dually as a sauna and a restaurant. The sauna is less than two kilometers from the city center of Helsinki. The lot is situated in a future coastal park master plan "Helsinki Park"- an attempt to bring Helsinki closer to the coastal waters. The structure is a thin strip on the waterfront, designed to avoid cutting the central park strip that acts as the major connection to Helsinki. The outer shell is made in wood and undulates sharply along the site, cutting voids where moments, views, or access is necessary. The topological nature of the outer envelope acts as an interactive gesture, persuading one to explore the various levels of the building. The interior sits carefully within the building envelope, with a simple rectilinear seem that juxtaposes the abstraction of the exterior. This relationship allows for functionality without the loss of integrity of the envelope.

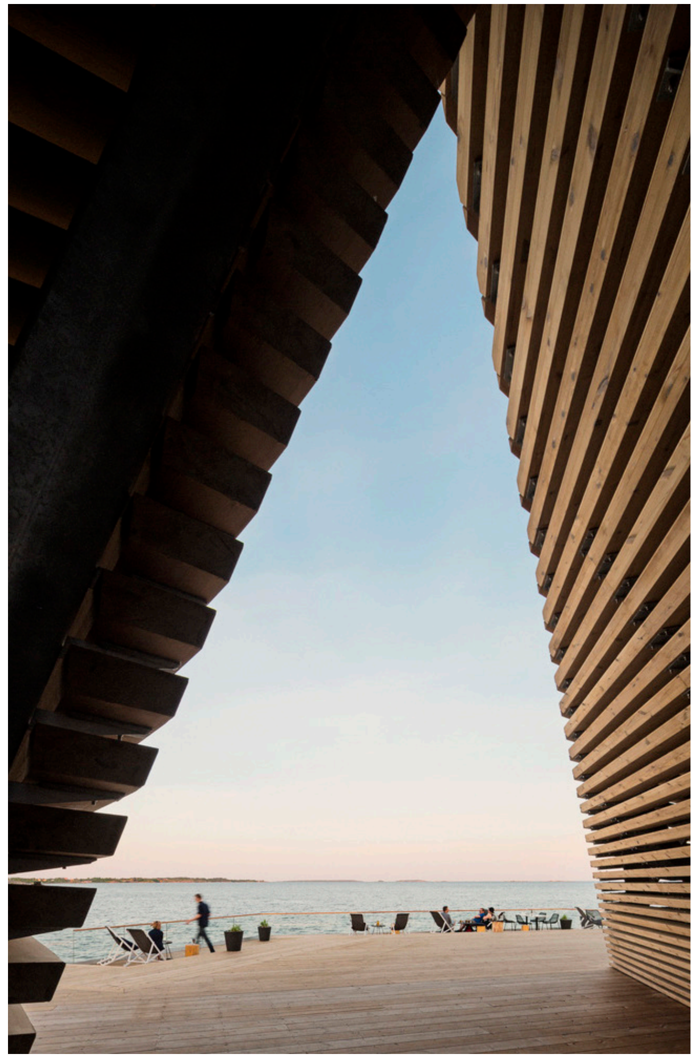
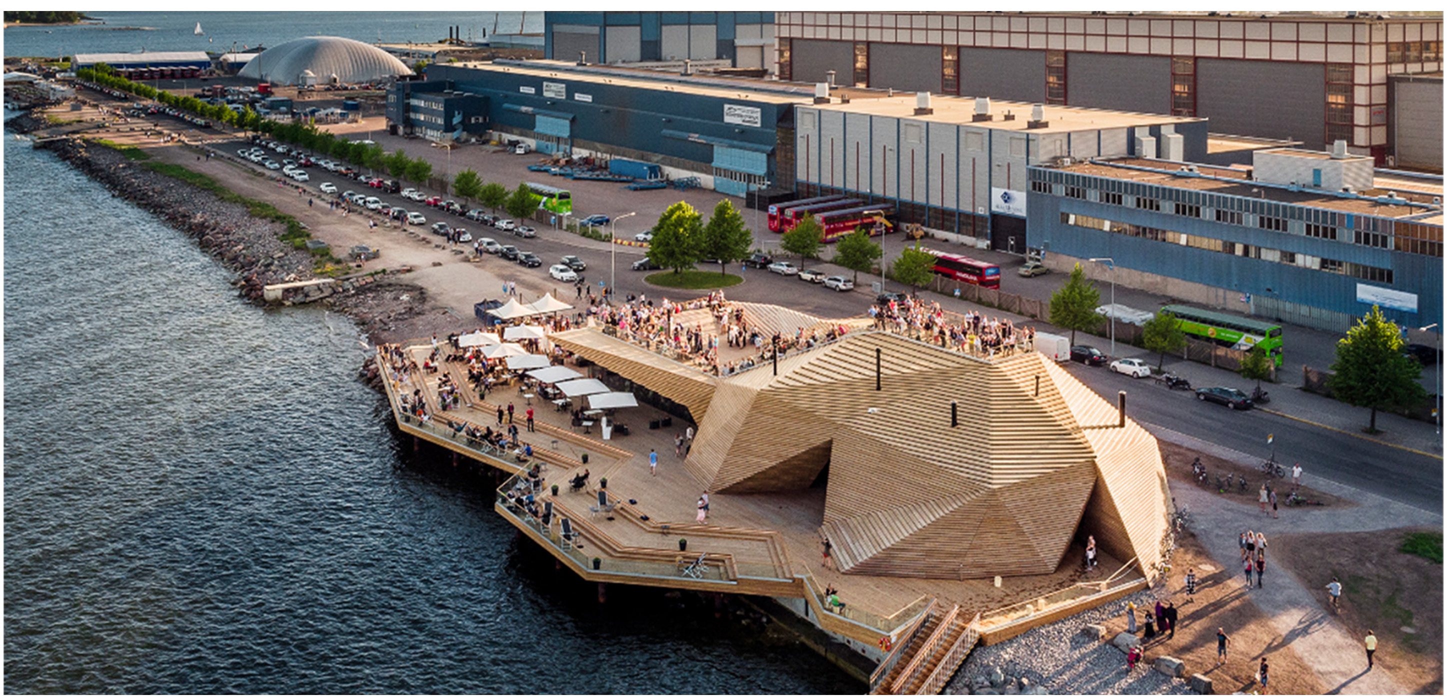


Fig. 27. Löyly Riverfront View Looking Inland (Arch Daily)

Fig. 28. Löyly Framed Riverfront View (Arch Daily)



Photos: Arch Daily
https://www.archdaily.com/790432/loyly-avanto-architects

Fig. 29. Löyly Section - Engagement With River (Arch Daily)

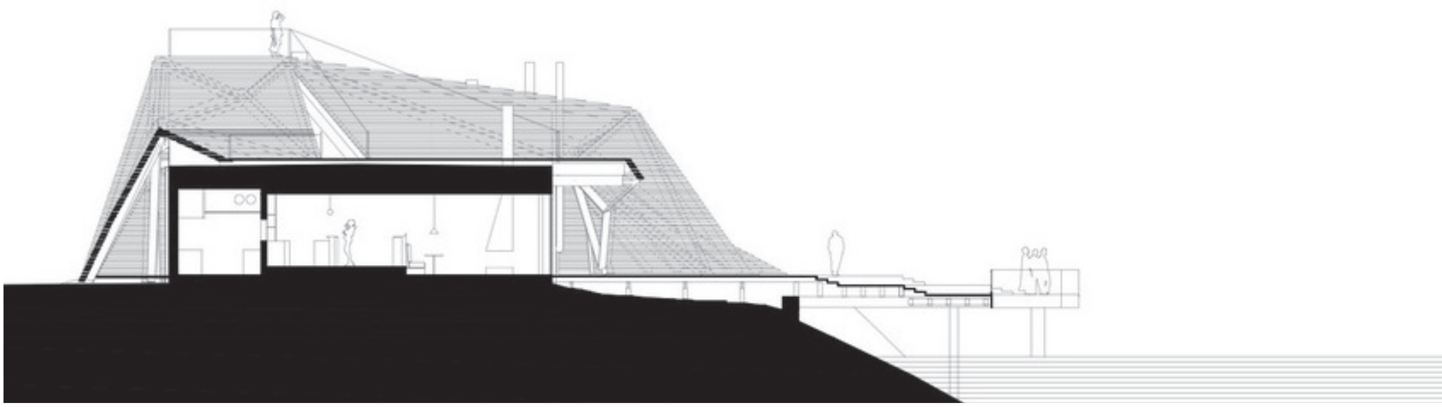
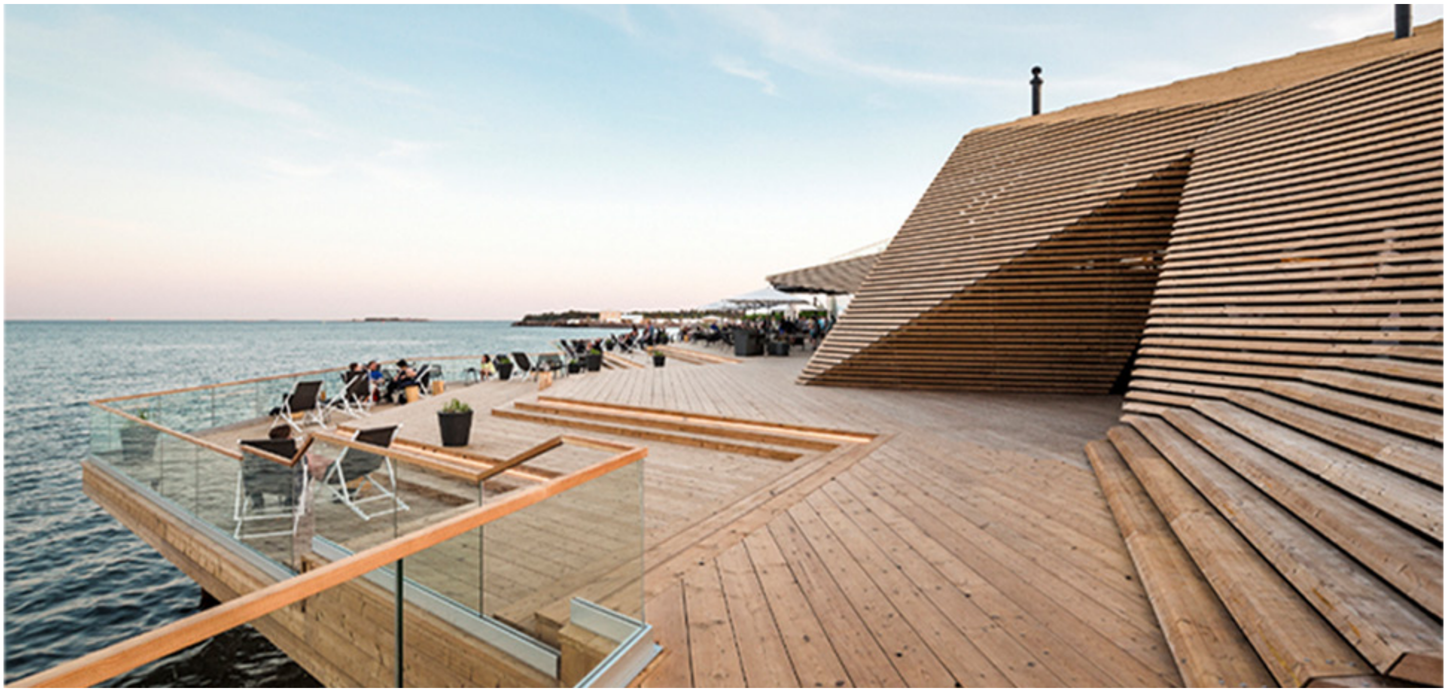


Fig. 30. Löyly Riverfront Deck View (Arch Daily)



Shanghai Binjiang Avenue:
Riverfront Revitalization

Architects: Original Design Studio
Location: Binjiang Avenue, Shanghai, China
Type: Riverfront Masterplan
Year: 2021

The Shanghai Binjiang Avenue Riverfront Revitalization project is a reflection of the rich history and culture of Shanghai, with a rapidly growing population. The masterplan attempts to set a precedent for the reconceptualization of a 45km stretch of riverfront.

““If you plan cities for cars and traffic, you get cars and traffic. If you plan for people and places, you get people and places.”- Fred Kent (Arch Daily)

The quote above demonstrates the state of mind of the planners responsible for the masterplan. To bring forth pedestrian priorities, reflected in the design, and move away from the dominance of the car in the urban context. The sequence of riverfront spaces hosts a variety of program designed to activate the pedestrian parks, with adaptive reuse of large industrial complex as museums and mixed use programs. The masterplan shares a collective mission with teams of architects developing all along the riverfront with numerous large developments attempting to aid in the revitalization project.

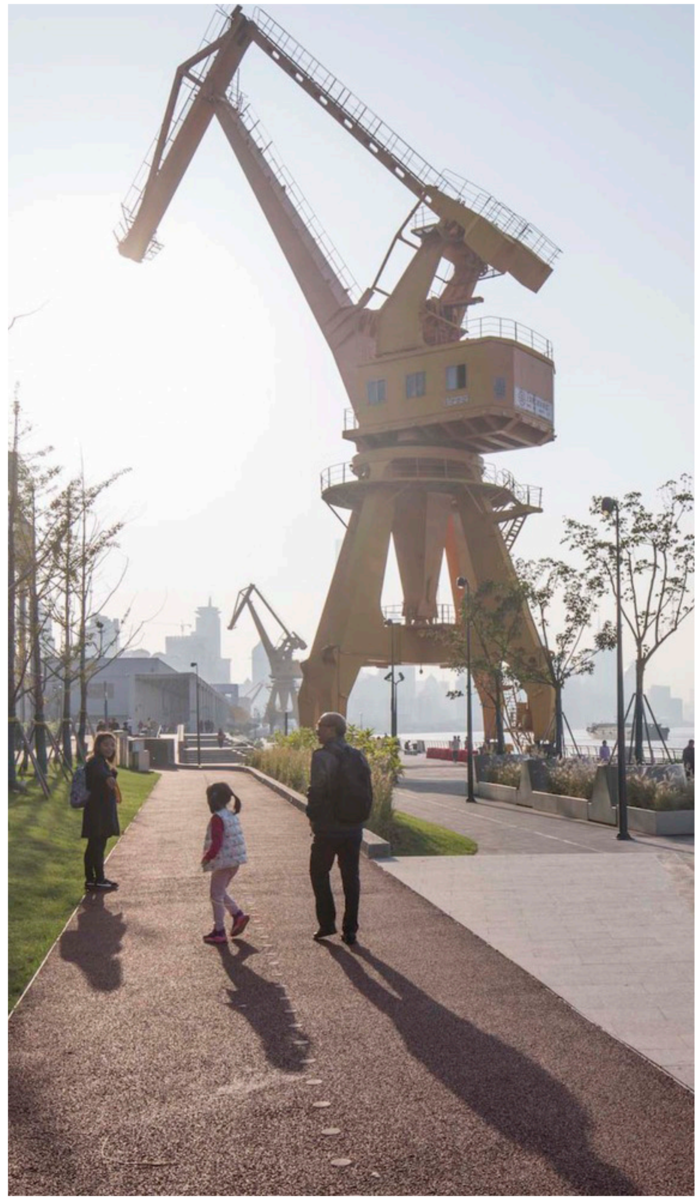


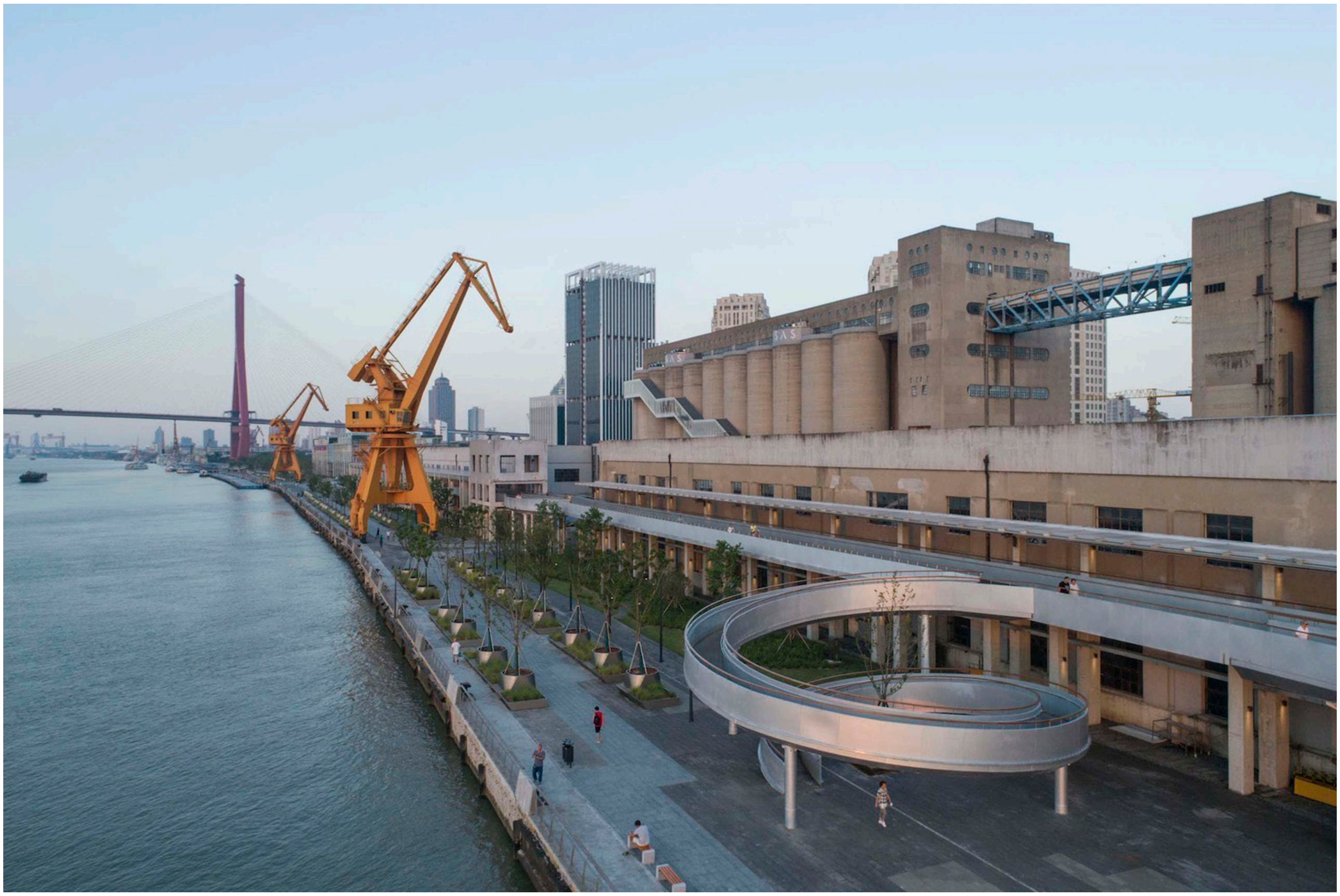
Fig. 31. S.B.A View Toward River (Arch Daily)

Fig. 32. S.B.A Riverfront Promenade (Arch Daily)

Photos: Arch Daily
https://www.archdaily.com/959061/shanghai-binjiang-avenue-revitalizing-the-historic-riverfront-with-a-human-centered-design-approach

Fig. 33. Long Museum West Bund By Atelier Deshaus along S.B.A Masterplan (Arch Daily)

Fig. 34. Long Museum West Bund Integration With S.B.A Masterplan



Danish National Maritime Museum

Architects: BIG - Bjarke Ingels Group
Location: Denmark
Type: Maritime Museum
Year: 2013
MS: 17500

The Danish Maritime Museum was located in a nestled context, a historic dry dock, becoming a fitting envelope for the National Maritime Museum. The historic dry dock walls are left in their existing condition, with program wrapped around the outer bounds with bridging connecting the various sequence of spaces. The drawings demonstrate the dynamic positive and negative space governed by the pre-existing dry dock, which the building its integrated into. The gallery spaces loop the perimeter of the negative shape of the dry dock, creating a physical threshold and circulatory logic.

The site map suggests little direct interaction to the waterfront surrounding the dry dock. This gesture or lack there of is conditional to a parti of the boat dock being the space in which the building occupies. However, it is worth noting this indifference to the waterfront and why that may be a missed opportunity.

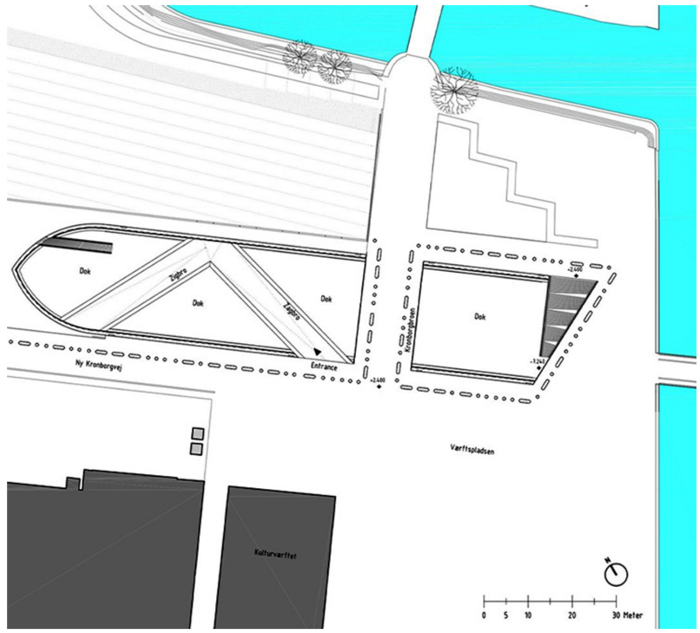


Fig. 36. Site Map (Arch Daily)

Fig. 35. BIG Maritime Museum From Ground Level (Arch Daily)

Photos: Arch Daily
https://www.archdaily.com/440541/danish-national-maritime-museum-big?ad_source=search&ad_medium=projects_tab

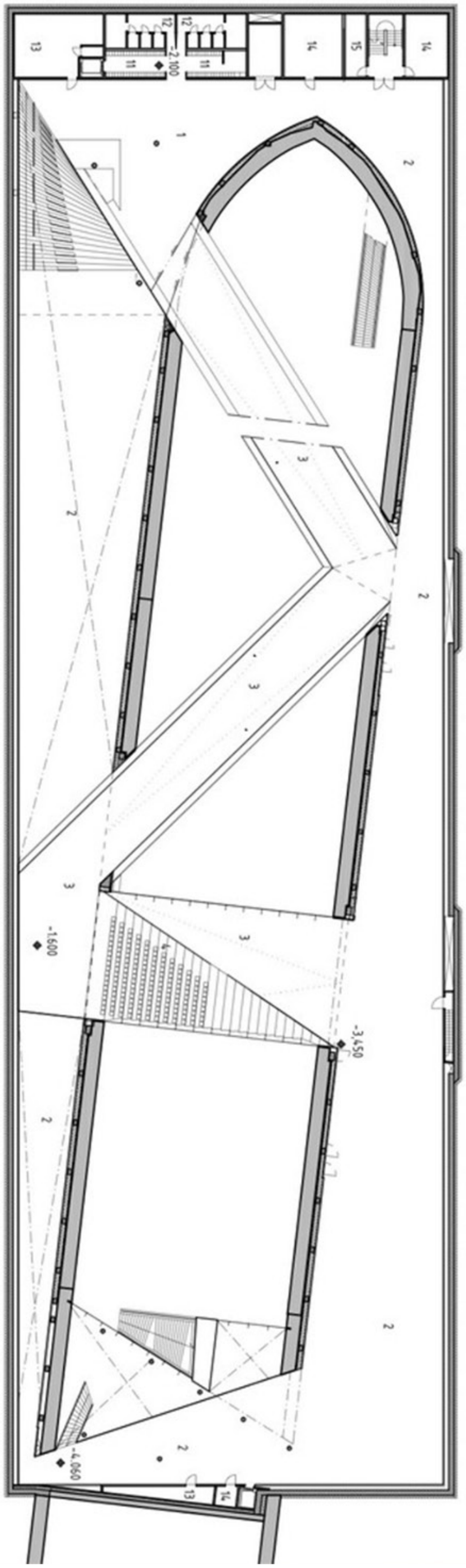


Fig. 37. Plan One (Arch Daily)

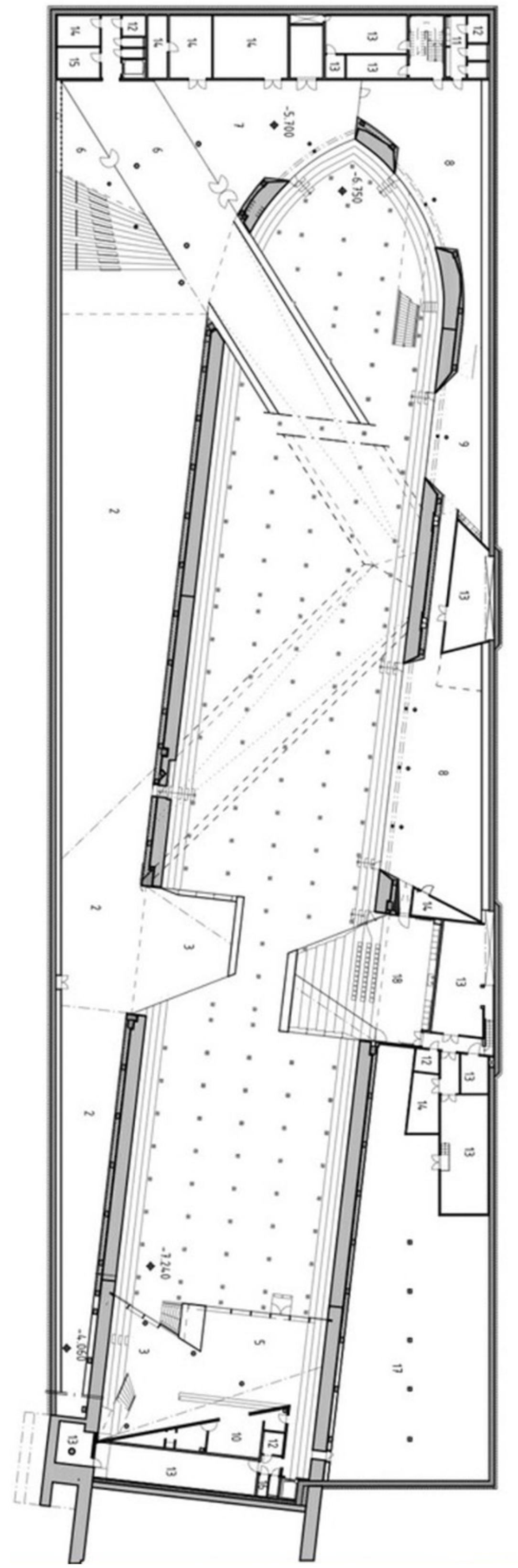


Fig. 38. Plan Two (Arch Daily)

Looking at the extent of the site, being over half a mile, it is necessary to understand how the program can be applied in one long linear scheme. The parti drawing narrates the sectors of the site and their program requirements. Following this, simple spatial programming schemes aided in the initial sequencing of spaces. These sketches were translated in the parametric process and became the driving factor for the configuration of the simulation.

The activation line is a direct representation of the significant elements of the building. Taking this guide curve and exploding its internal data, the mountains and valleys have sectional qualities responding to site and program.

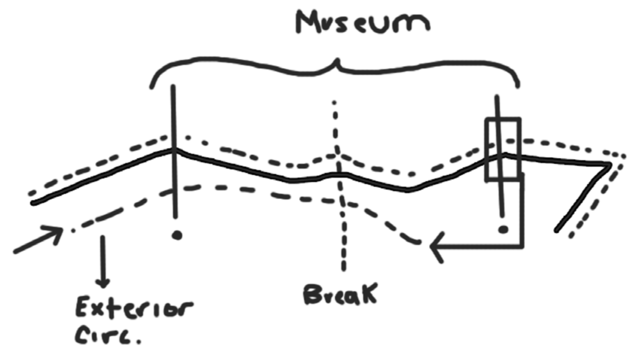


Fig. 39. Masterplan Parti

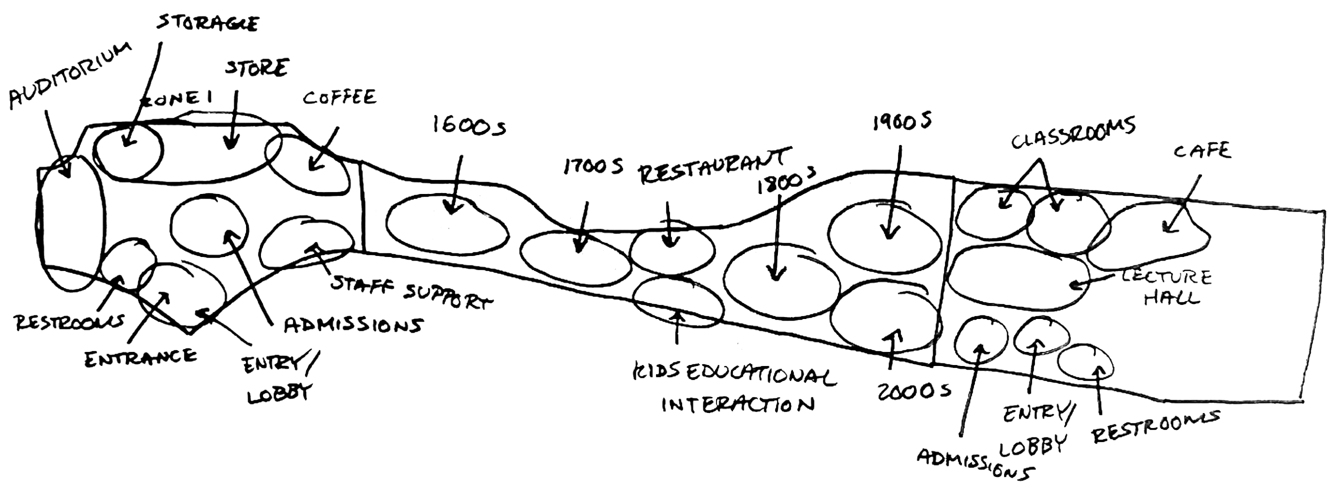


Fig. 40. Masterplan Program Sequence

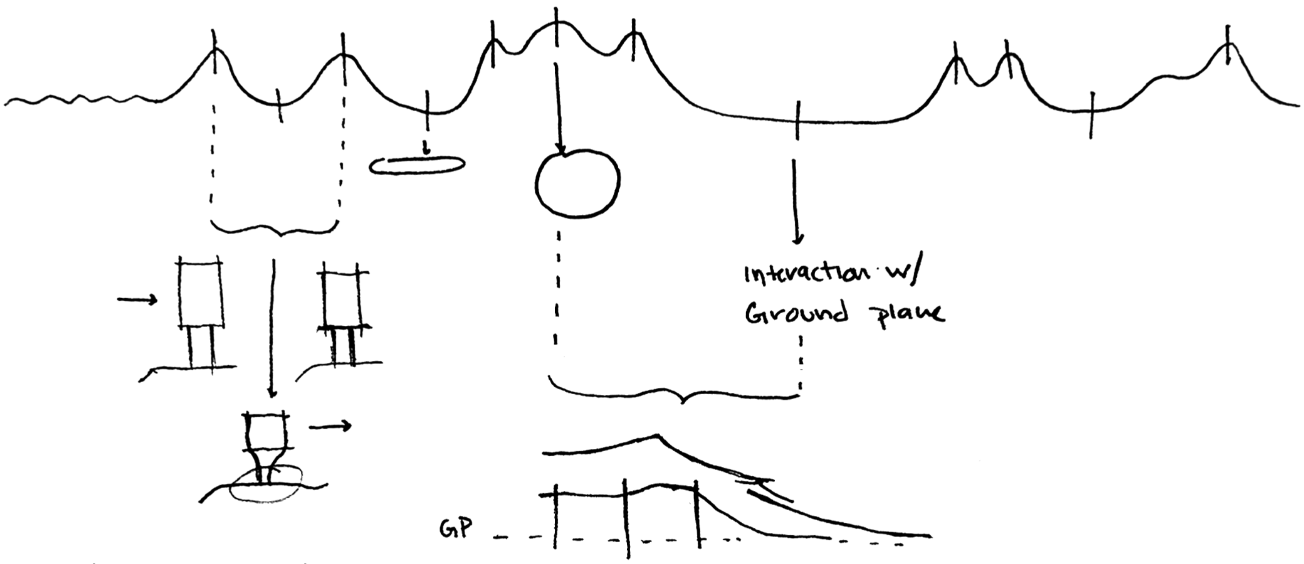


Fig. 41. Masterplan Program Control Curve

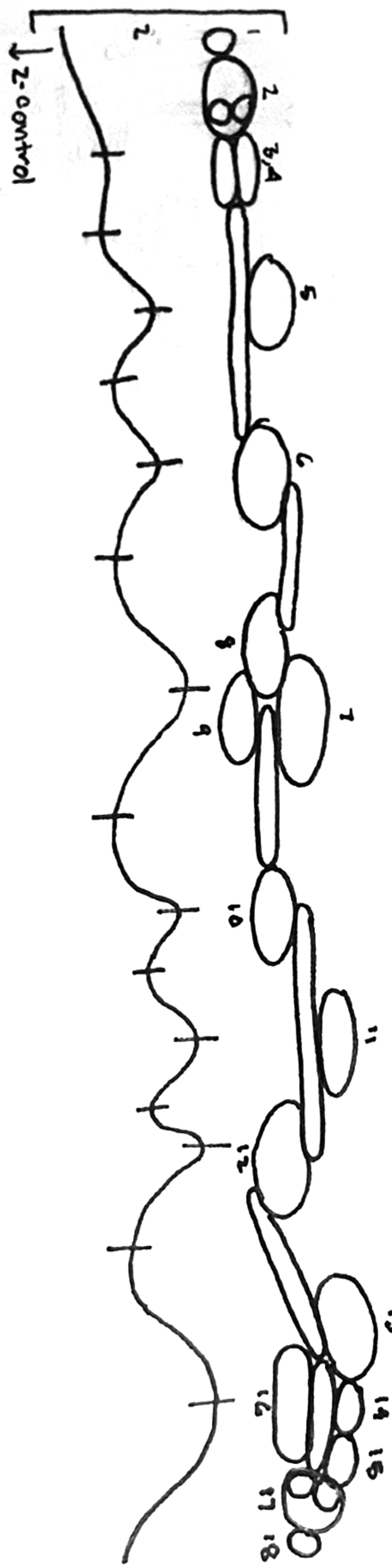


Fig. 42. Masterplan Program Sequence/Control Curve One

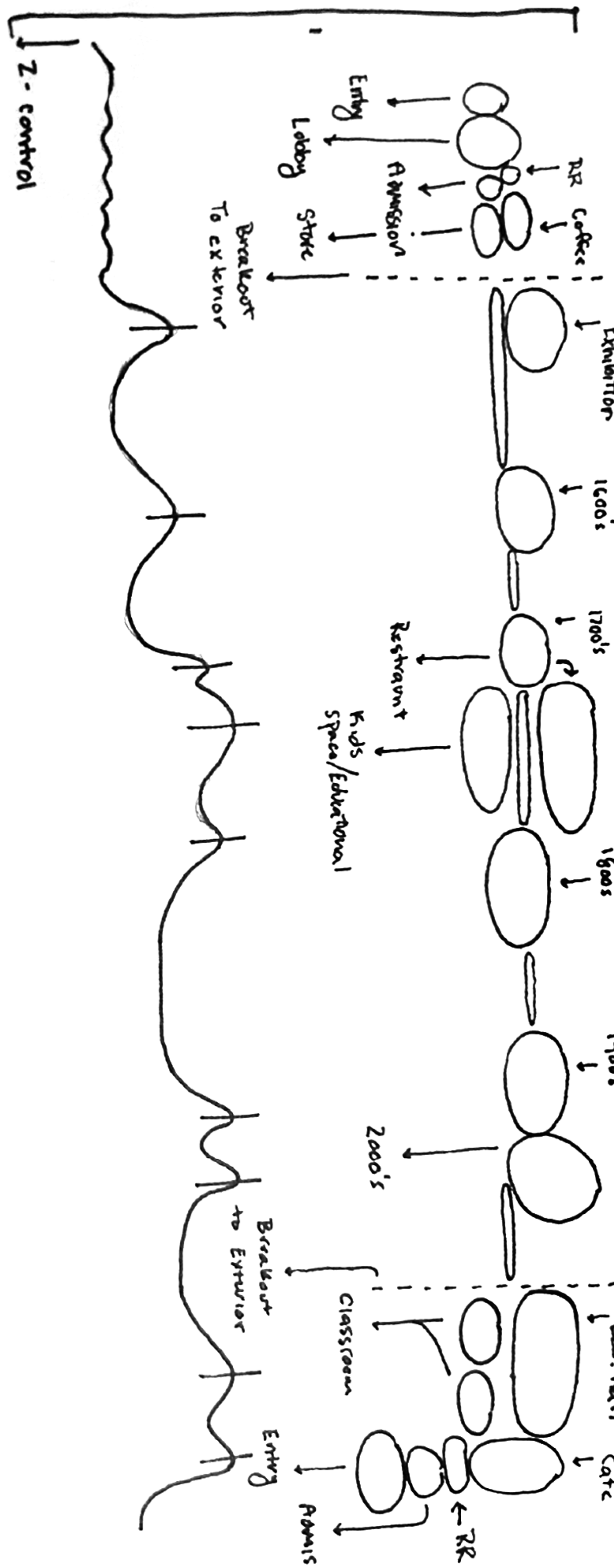
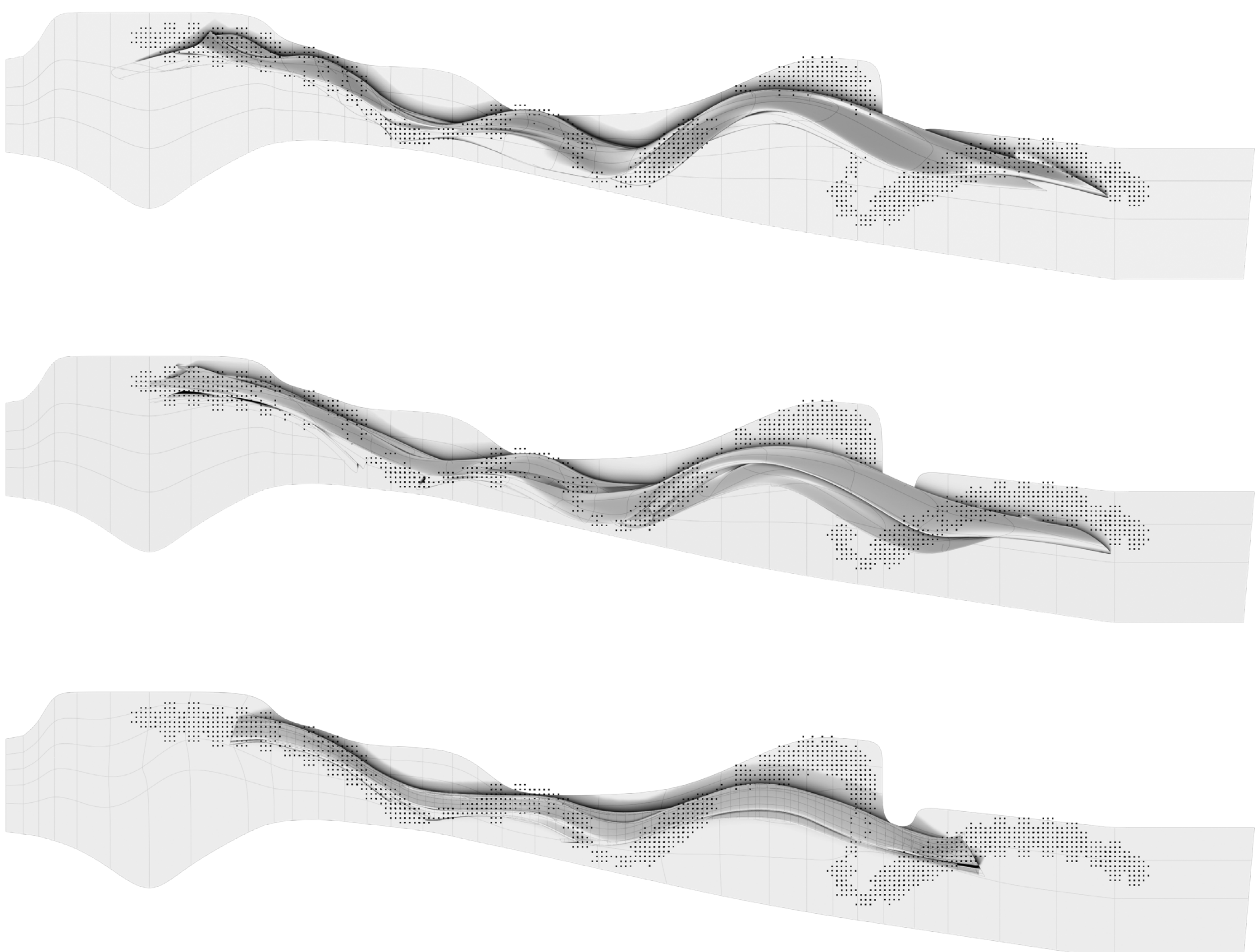


Fig. 43. Masterplan Program Sequence/Control Curve Two

After the completion of the simulation and the desired outcome is reached, the point cloud is then imported into Blender 3d and uses a shrinkwrap modifier to bind surfaces to the point cloud. These surfaces are then sculpted within the bounds of the point cloud to produce a form. This process is the first point where design work diverges from mathematical operations(however, no less a design process than any following stage) and begins to take shape in the form of surfaces along the site context. The sculpted outcome is carefully constructed to account for desirable spatial conditions, contextual relationships such as views, entry and exit sequences, and programmatic layouts.

Fig. 44. Architectural Surfaces Sculpted From Point Cloud 1-3



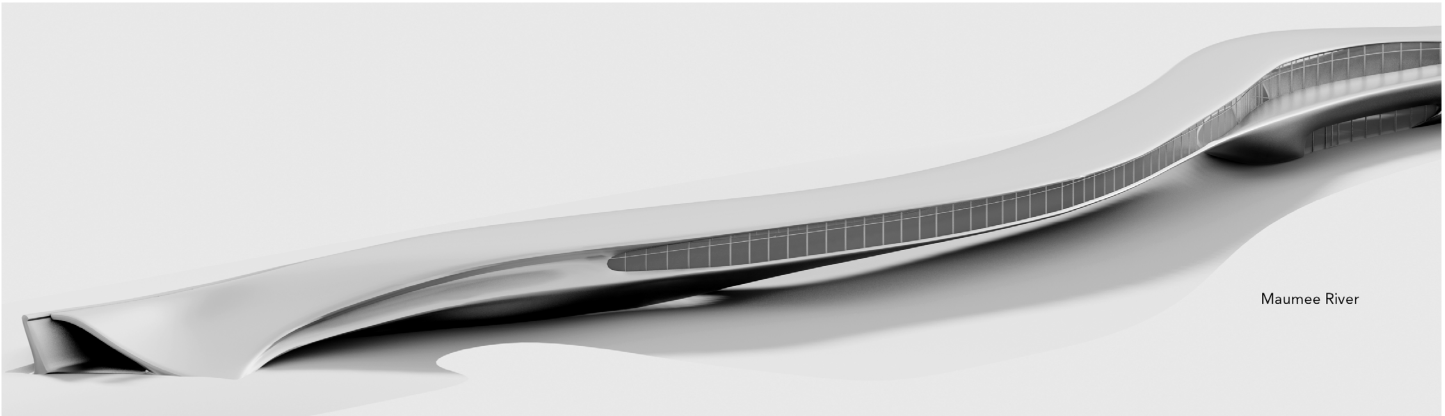


Fig. 45. Iteration 3 Looking Towards Toledo, Educational Wing

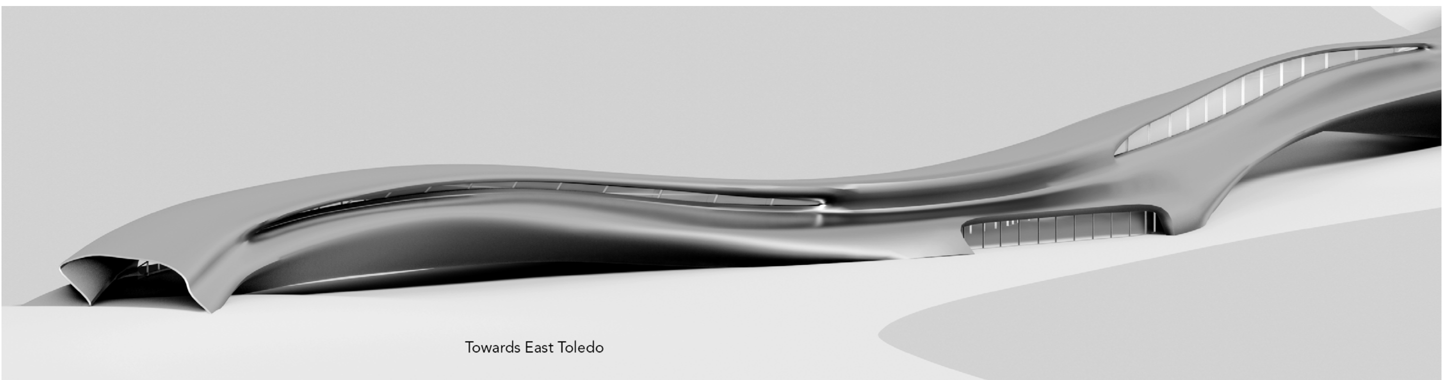


Fig. 46. Iteration 3 Looking Towards Maumee River, Museum Entry

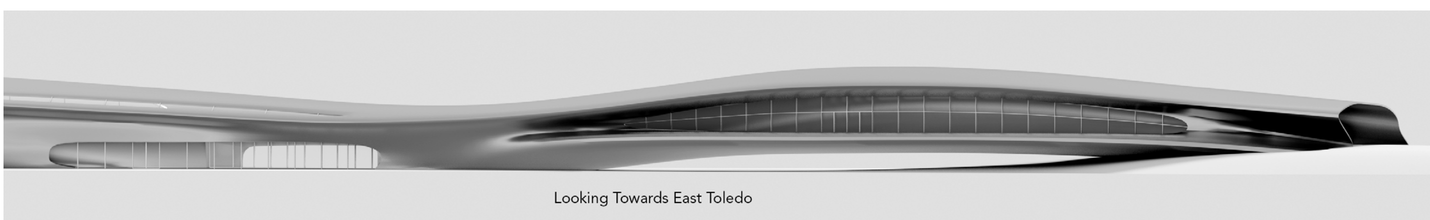


Fig. 47. Iteration 3 Looking Towards Toledo, Museum Wing

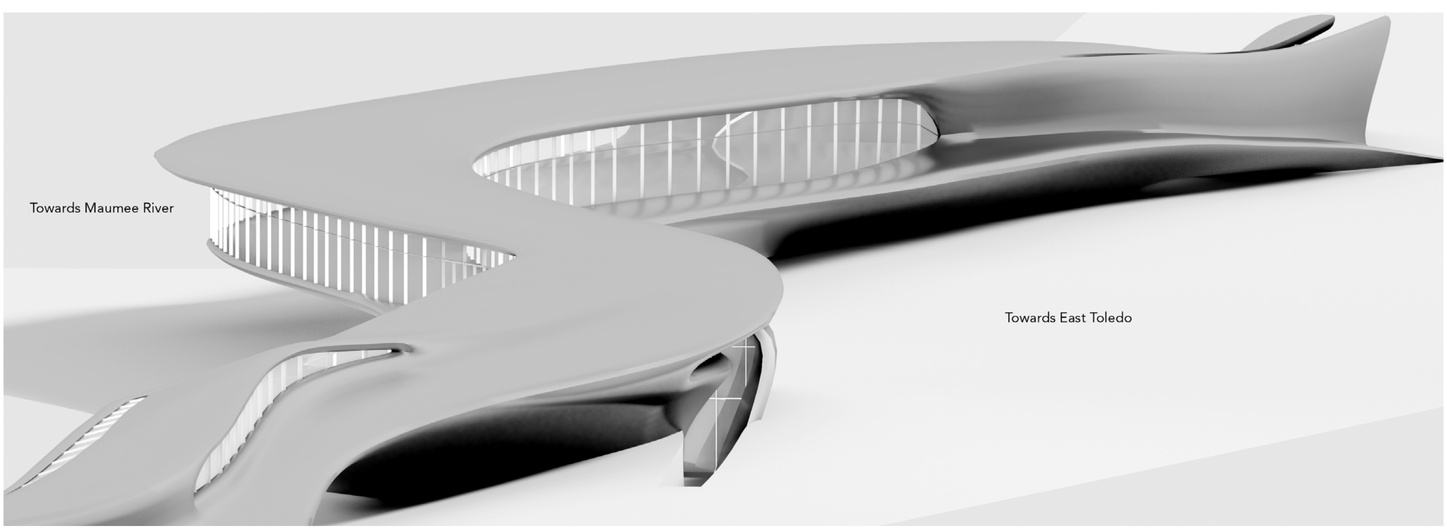


Fig. 48. Iteration 3 Looking Towards Toledo, Restaurant/Education Wing

After the completion of the parametric tool and the final outcome was sculpted along the bounds of the point cloud, the topography of the site was sculpted to reflect a symbiotic relationship to the undulations of the building surfaces. The two factors act in tandem to rely on their form to construct circulatory systems, frame views, and allow for key moments along the site to be activated. Once both the general surfaces of the design were complete and the site was sculpted, the fenestration of the surfaces began to take place. The orientation of the form allows for a large degree of perforation where desired. The key facade interfaces look East and West, avoiding most direct sunlight. This unique characteristic of the site orientation allowed for fenestration along large sections of the facade, while also creating the opportunity for clear story windows and skylights in the main galleries.

Program:

1.1 - Entry/Lobby
1.2 - Admissions
1.3 - Store
1.4 - Store Storage
1.5 - Coffee shop

2.1 - Exhibit Galleries 1, 2, 3
2.3 - Exhibit Material - Ulster (1874),
Rouse Simmons (1868)

3.1 - Classroom / Kids Activity space
3.2 - Lecture Hall
3.3 - Community and student Cafeteria
3.4 - Digital and Physical Media Libraries

Program and Circulation

Due to the large number of programmatic uses within the master plan, the design scheme of the building followed the long linear condition of the site. Along the bounds of the site, the average width is less than 100’, therefore, it was necessary to make the form as thin as possible. This allows for a unique means of circulating the form, by employing ramps along a large portion of the museum galleries and entry sequences to the museum, restaurant, and educational center. The undulating nature of the site means one can explore the sequences of interior and exterior spaces seamlessly, with views of the river and broader city emerging along these circulatory systems.

The process is concluded at this stage and the final production drawings follow as the conclusionary outcome of this thesis.

The process I created to produce an architectural surface that defines the interior and exterior conditions of the building threshold was a process of intense trial and error. Many iterations of the parametric tool were produced, reaching as far as employing machine learning algorithms and neural networks to interpret the vast data outputs. However, it was through a traditional method of sculpting and sketching that eventually translated the final parametric output into viable architectural surfaces. From that point, the project scope transitioned from an exploratory investigation into a building design process, after all, implying a tool is meant for the design process means one must also attempt to apply it in the ways envisioned. This is the case and pushed my understanding of space and form, site and context, structure and material to its limits. Reflecting on the process and outcome, although I designed the very tool that aided in the design of the building, as well as the intense design process for the building itself, I must confess that without the parametric input, I would not have reached the final design as it is represented in this thesis. Because of this, I believe the goal of the thesis was reached, although I could have never envisioned the particular form my thesis would conclude in.

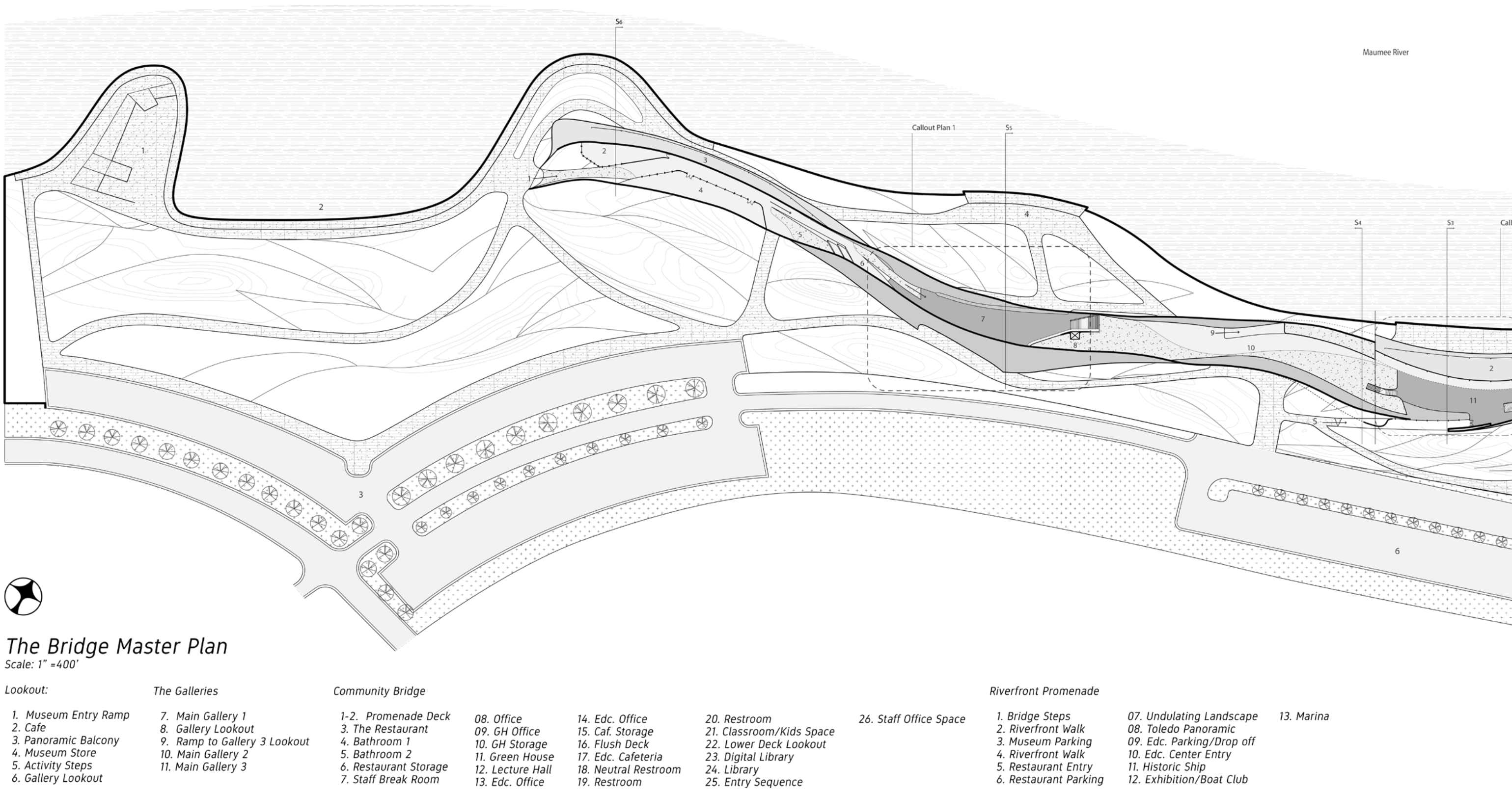
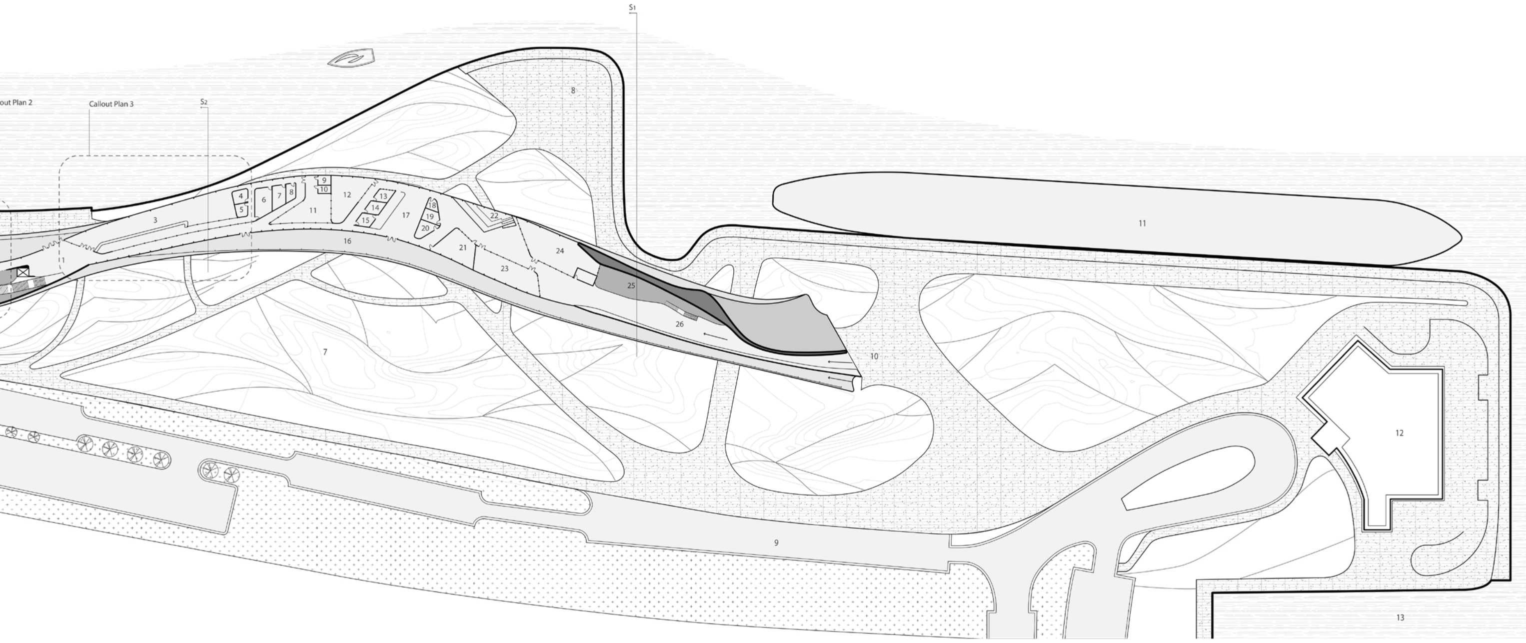


Fig. 49. The Bridge Master Plan

Fig. 50. The Bridge Final Render


Callout Plan 3
3
7
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16

Gallery One Plan
Scale: 3/32” = 1’

1. Entry Ramp
2. Gallery Floor
3. ULSTER (1874) Exhibit Ship
4. Ulster Mast Deconstructed
5. Loading Bay

The Ulster, built in 1874 at Milwaukee, and renamed the Helen in 1881, had a bow that was similar to the conventional schooner’s in appearance. Two-masted, she measured 90’ by 23’ by 7’, and 119 tons. The Ulster replica sits almost level with the gallery floor as to suggest the ability to walk on and in the vessel. The mast assembly is deconstructed and placed separately along the gallery floor.

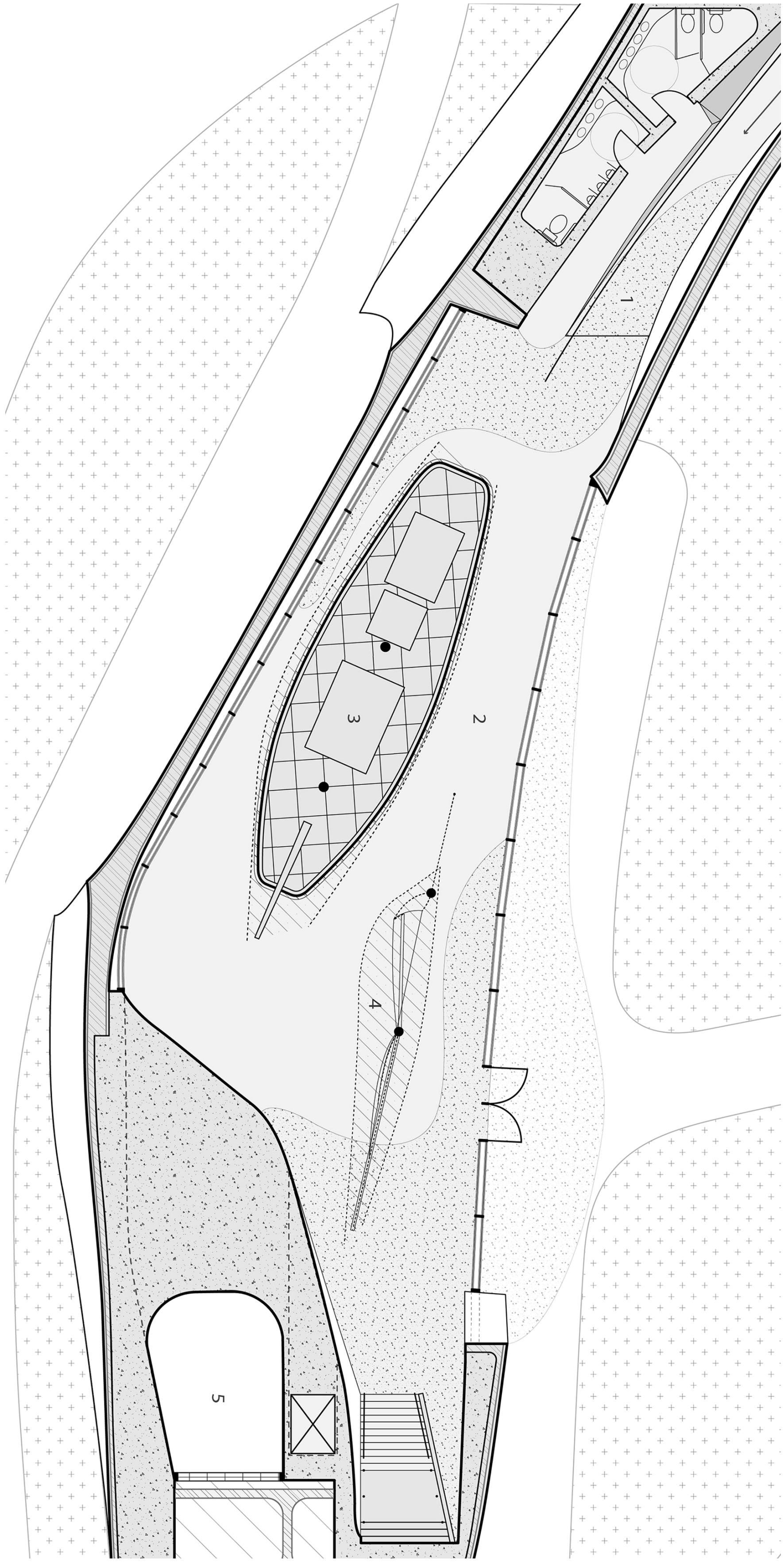


Fig. 52. Gallery One Plan (Flip To # Orientation)

Fig. 51. Ulster, 1874, Replica Exhibit Ship

Fig. 53. Gallery One Interior Vignette

Gallery One Section
(S5) NTS

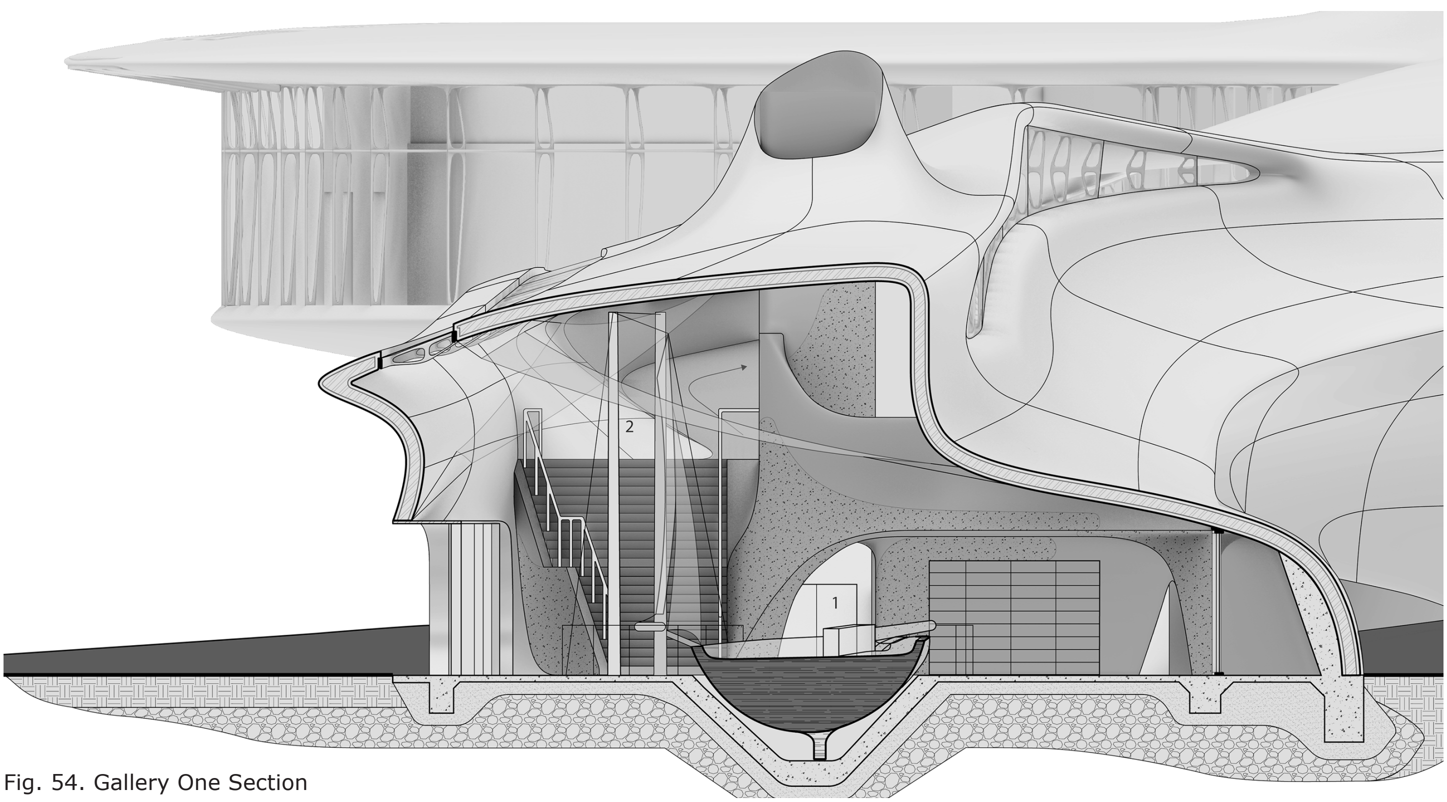


Fig. 54. Gallery One Section

Gallery Three Plan
Scale: 3/32″ = 1′

1. Gallery Floor
2. Rouse Simmons Shipwreck Reconstruction (1868-1912)
3. Restaurant Entry
4. Loading Bay

Rouse Simmons, built in 1868 and was a Schooner that sank in the Great Lakes with all hands lost in 1912. The historic ship replica aims to education viewers of the rich history of shipwrecks on the Great Lakes.

Fig. 55. Rouse Simmons, Replica Exhibit Ship

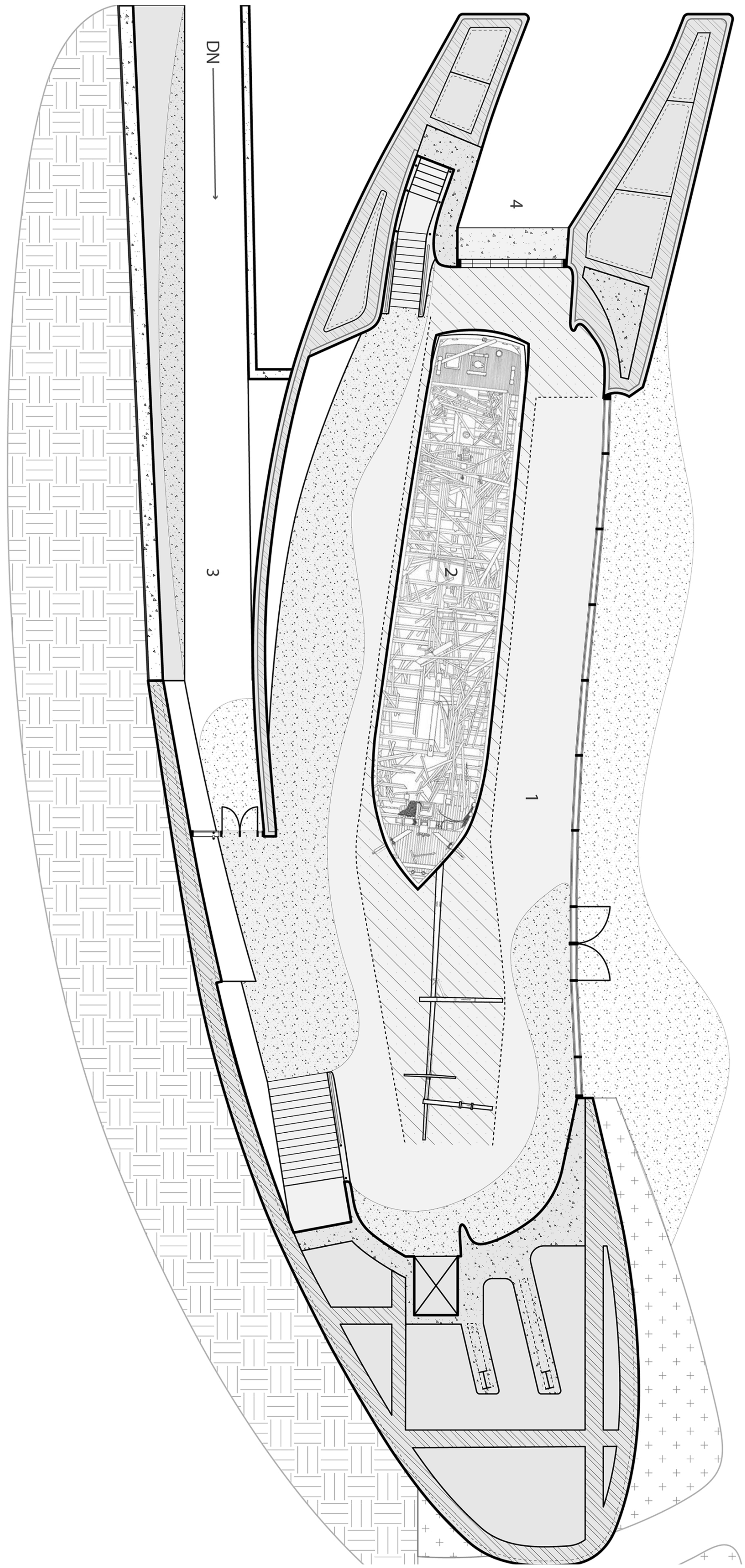


Fig. 56. Gallery Three Plan (Flip To # Orientation)

Fig. 57. Gallery Three Interior Vignette

Gallery Three Section
(S3) NTS

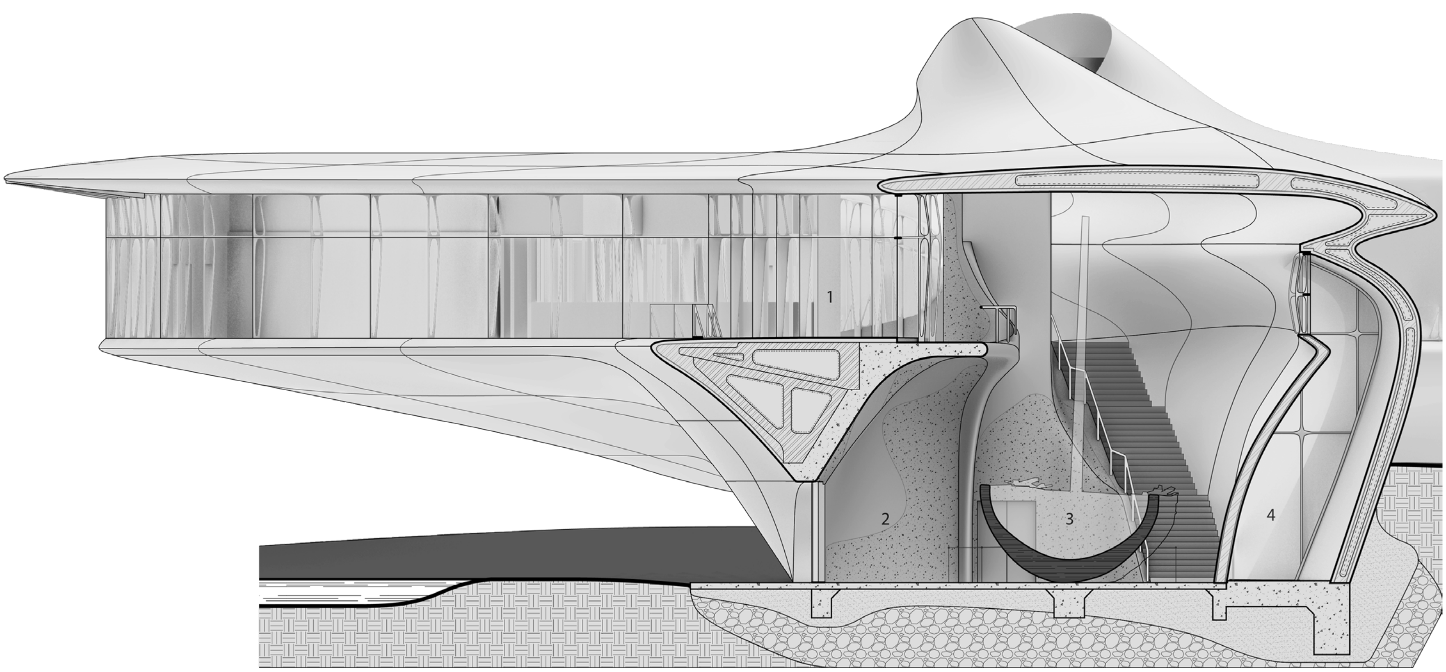


Fig. 58. Gallery Three Section

Restaurant Plan
Scale: 3/32” = 1’

1. Promenade Deck
2. Promenade Deck/Restaurant Entry
3. Restaurant Seating
4. Kitchen
5. Flush Deck
6. Riverfront Promenade

The Restaurant cantilevers over the sight and the Maumee River, overlooking the entire downtown Toledo skyline. As a spacial transition and fresh in house produce, the greenhouse(on right) serves both the restaurant and educational center cafeteria.

Fig. 59. Greenhouse

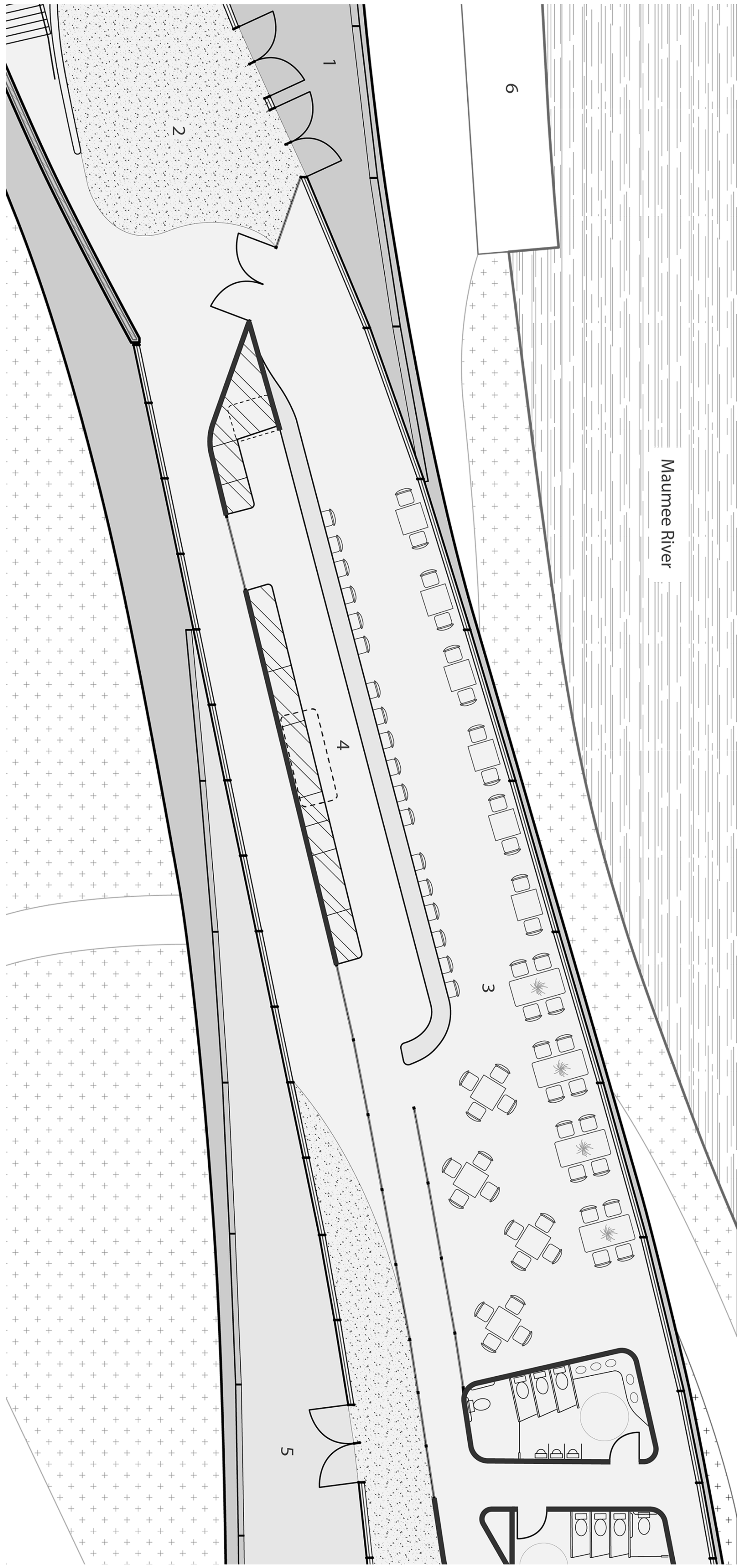


Fig. 60. Restaurant Plan (Flip To # Orientation)

Fig. 61. Restaurant Interior Vignette Looking Towards Downtown Toledo

Restaurant Section
(S2) NTS

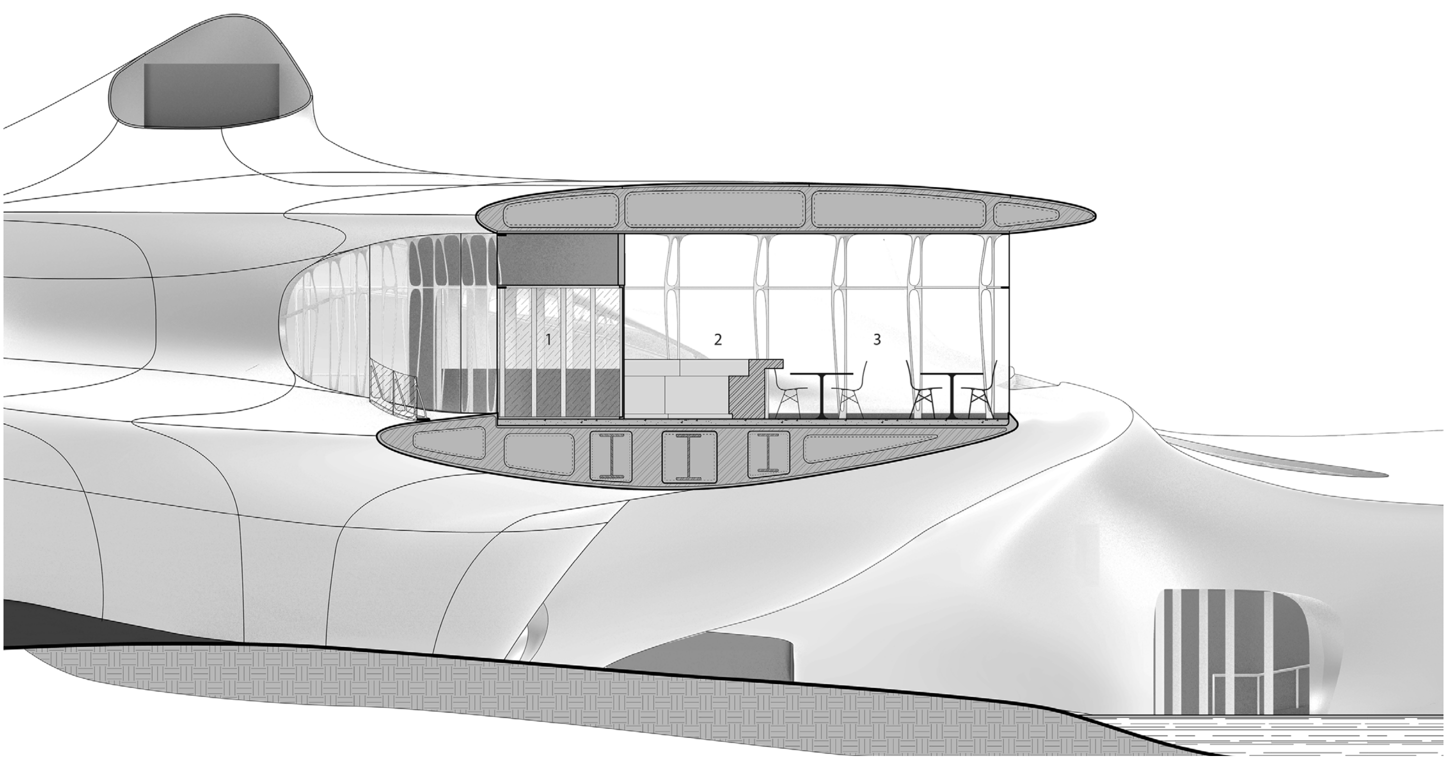


Fig. 62. Restaurant Section

Gallery Two Section
(S4) NTS

1. Gallery Two
2. Ramp To Gallery Three
3. Loading Bay Gallery Two

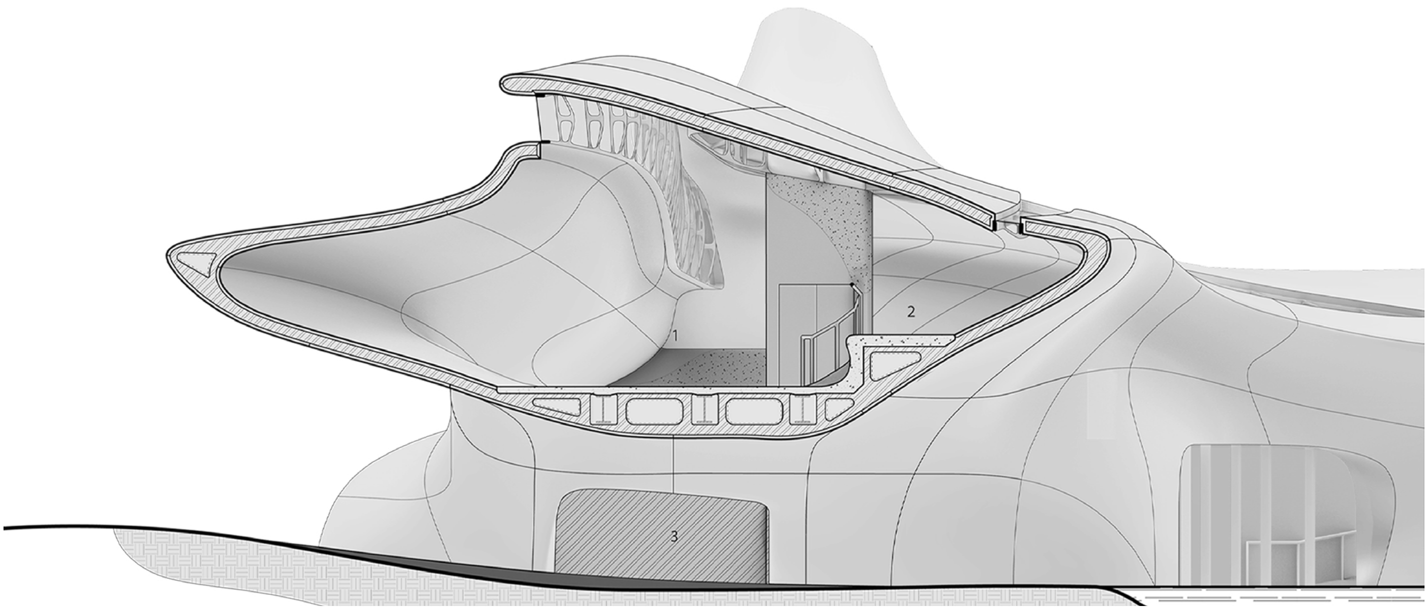


Fig. 63. Gallery Two Section

Museum Entry Section
(S6) NTS

1. Panoramic Balcony
2. Coffee Shop

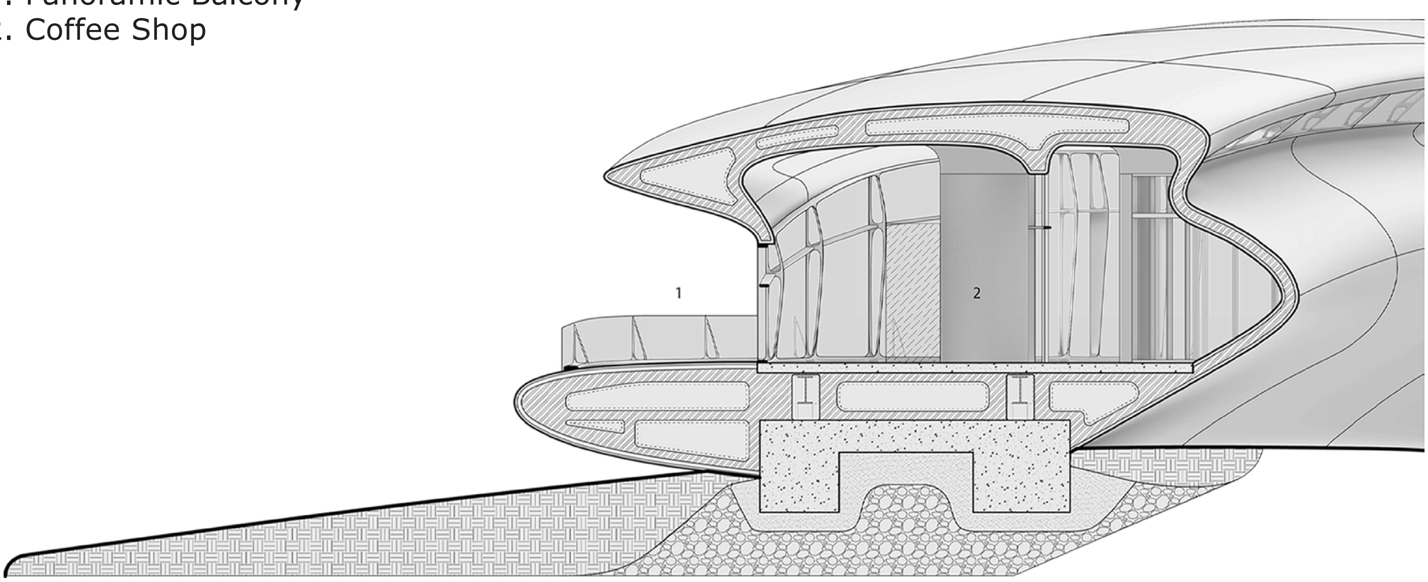


Fig. 64. Museum Entry Section

Educational Staff Wing Section
(S1) NTS

1. Flush Deck
2. Ramp To Educational Wing
3. Staff Office Space

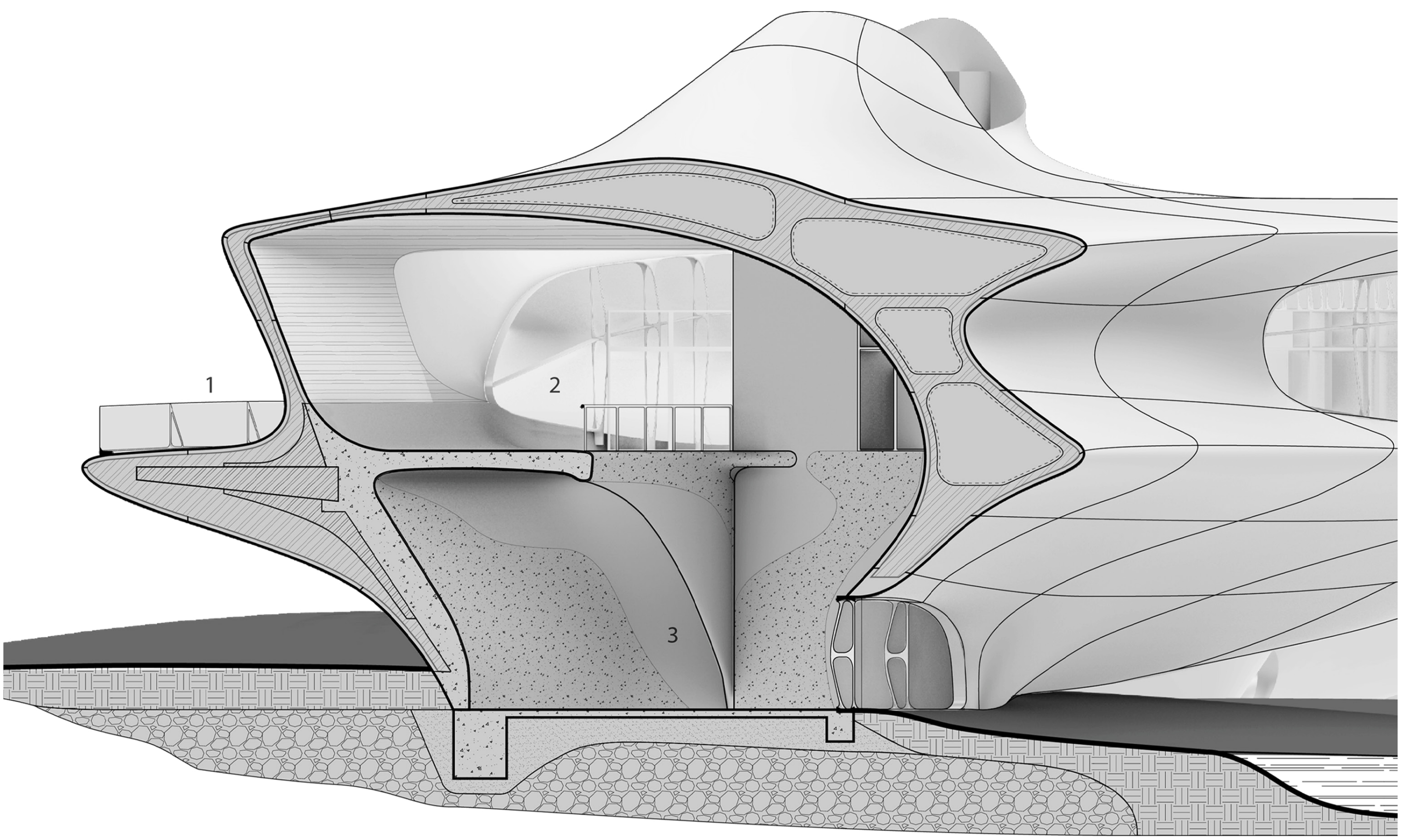


Fig. 65. Educational Staff Wing Section

Elevation North
NTS

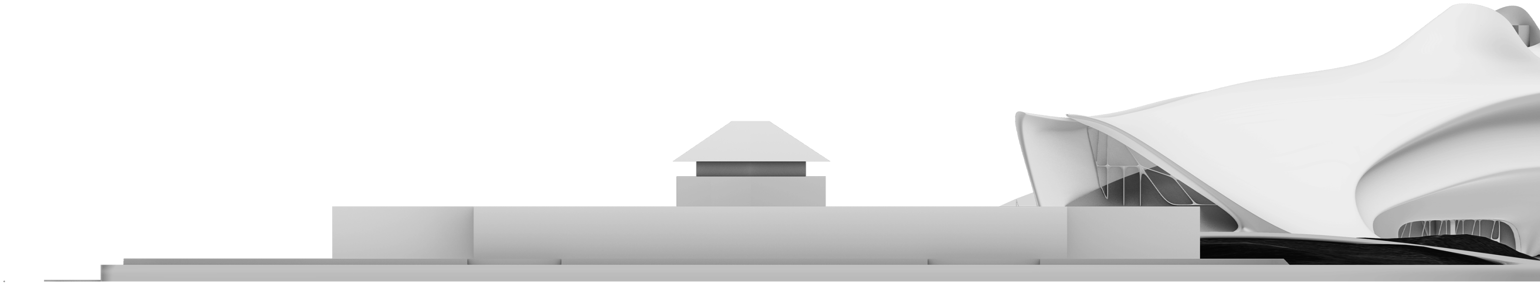


Fig. 66. Elevation North

Elevation South
NTS

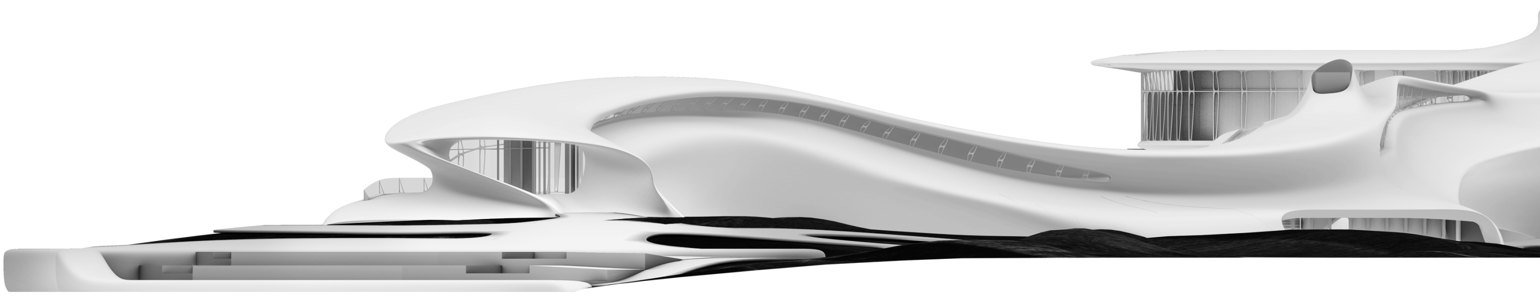


Fig. 67. Elevation South

Elevation East
NTS

Fig. 68. Elevation East

Elevation West
NTS

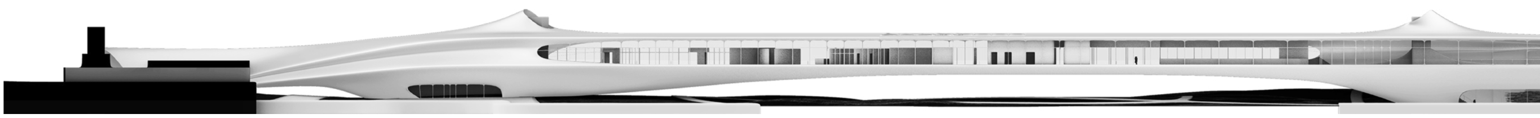
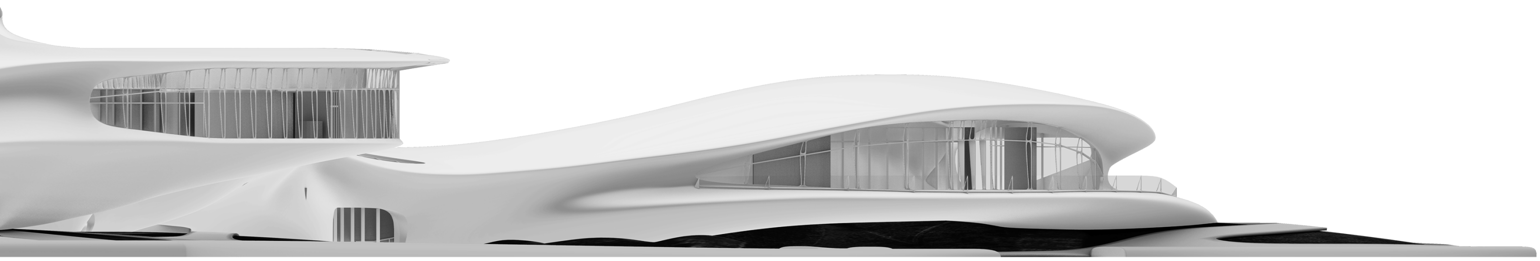
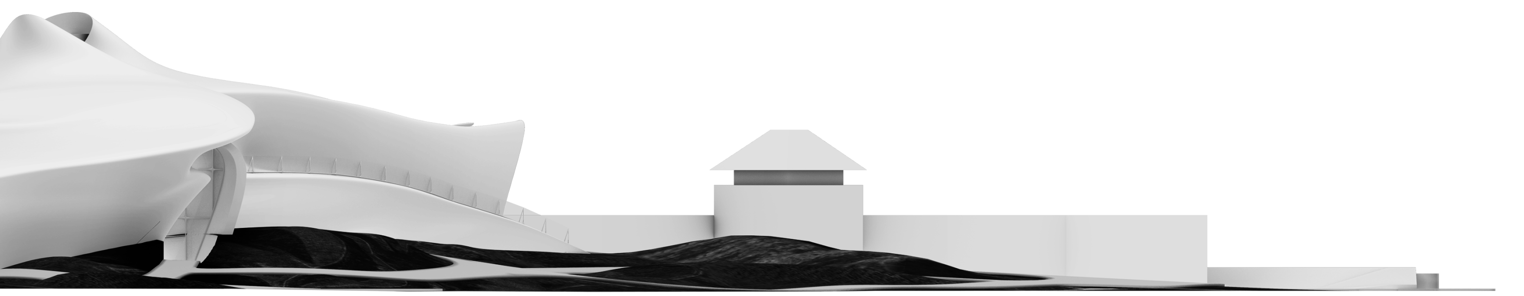
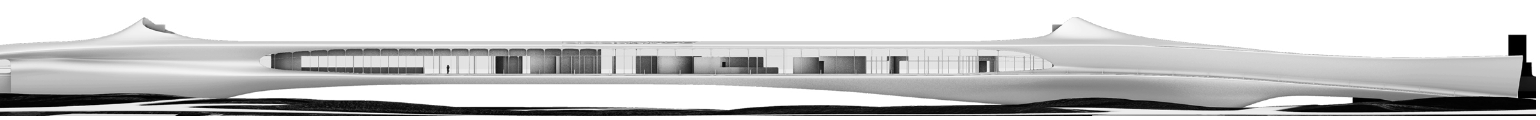


Fig. 69. Elevation West







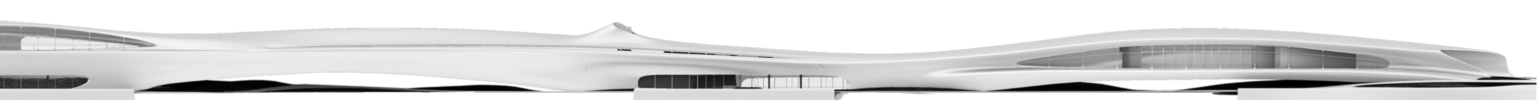
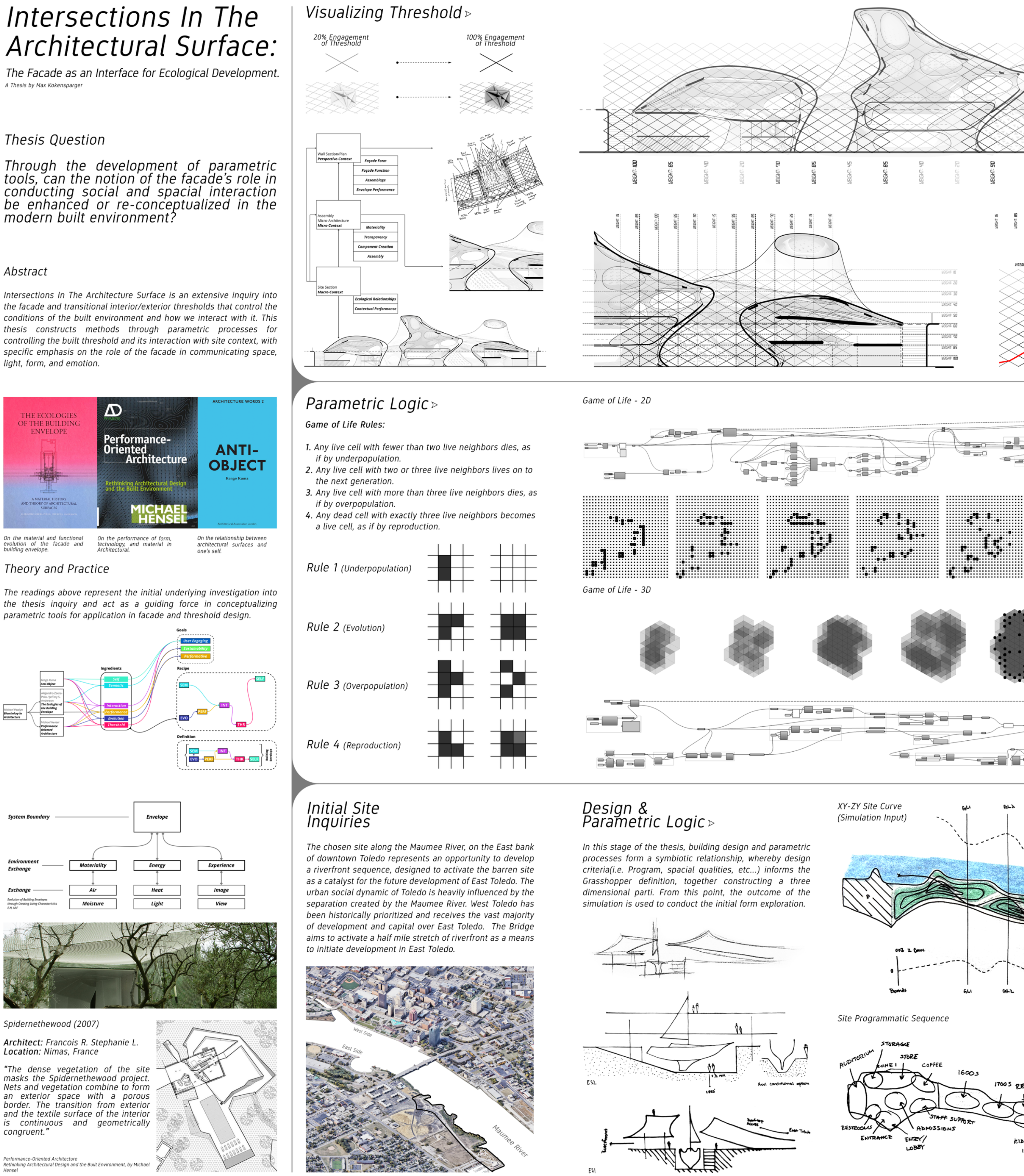
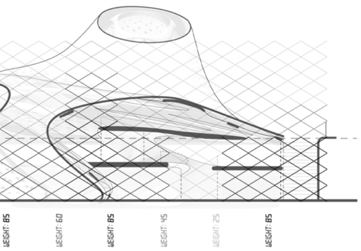
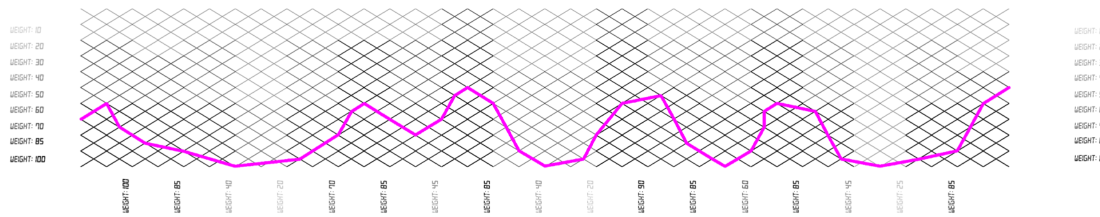
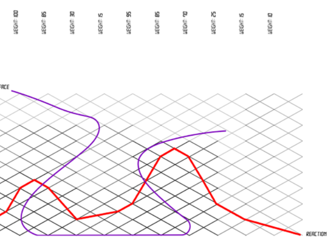


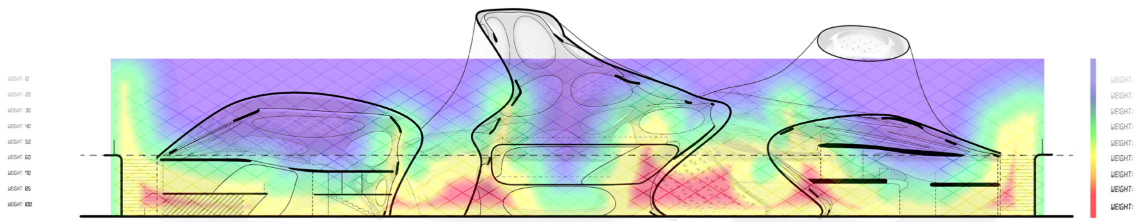
Fig. 70. Presentation Board One

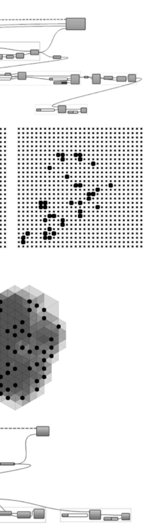






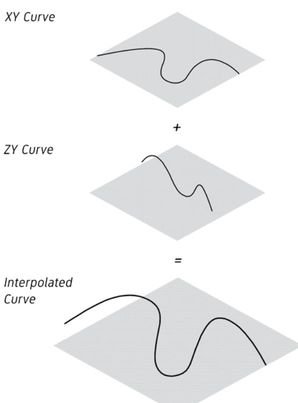


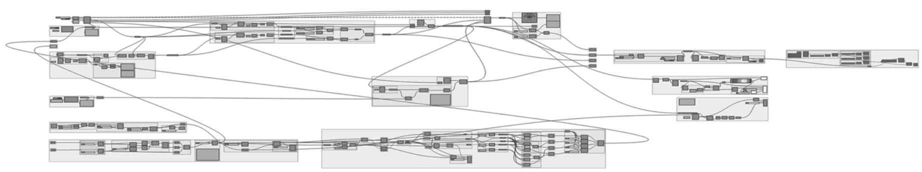




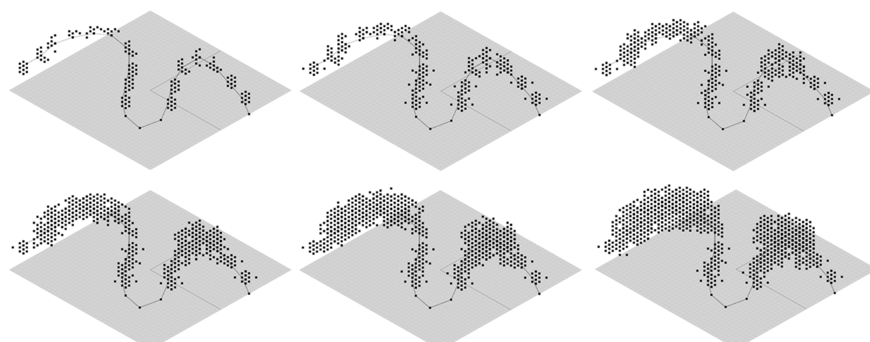
Simulation Control

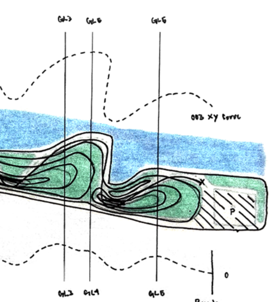
In-order to control the Game of Life simulation, the guide curve is introduced into the Grasshopper Definition. The guide curve, based on the threshold visualization process allows a plan and section curve to control the location and spawn density of the simulation.





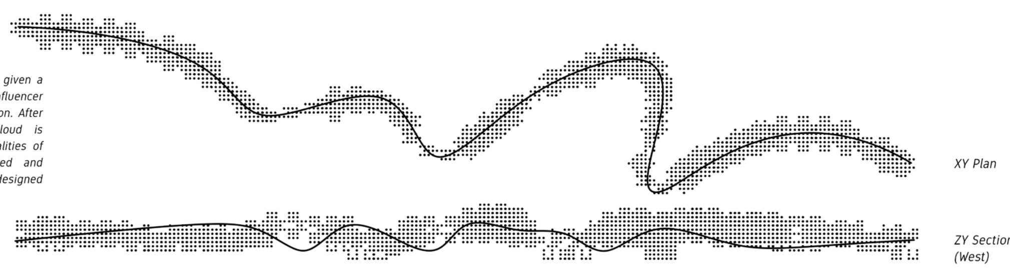
Guide Curve Controlling Simulation 1-6

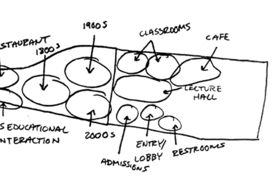


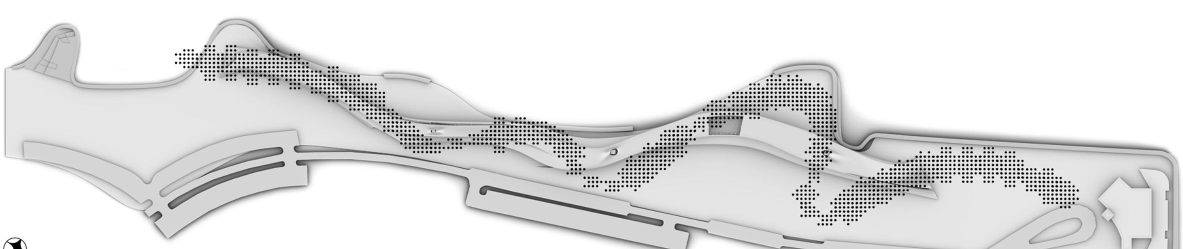


Simulation Outcome

The simulation process, once given a control curve and secondary influencer evolves along the site condition. After this process, the point cloud is exported and the spacial qualities of the evolution are interpreted and formulated in a 3d mass...The designed envelope.

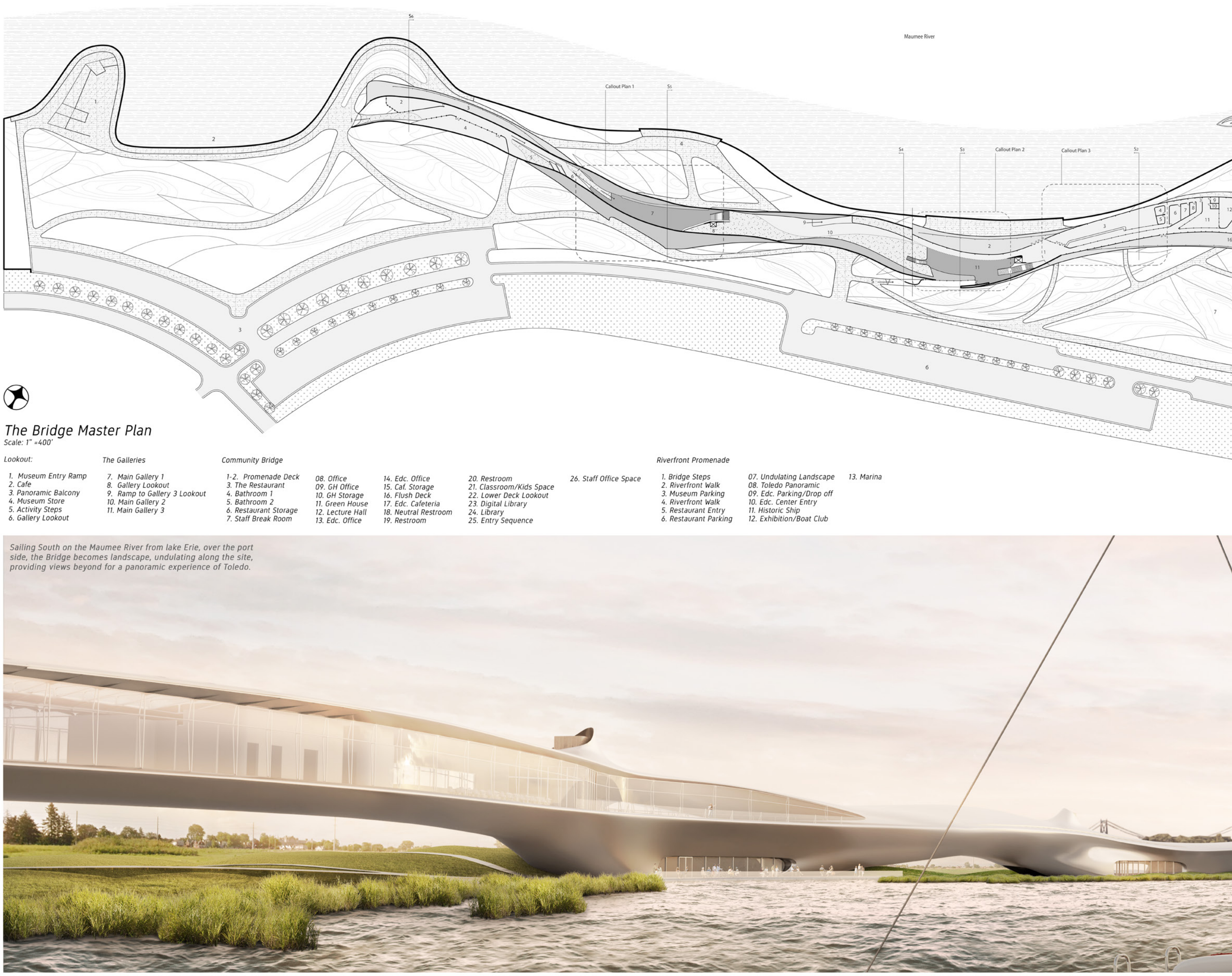






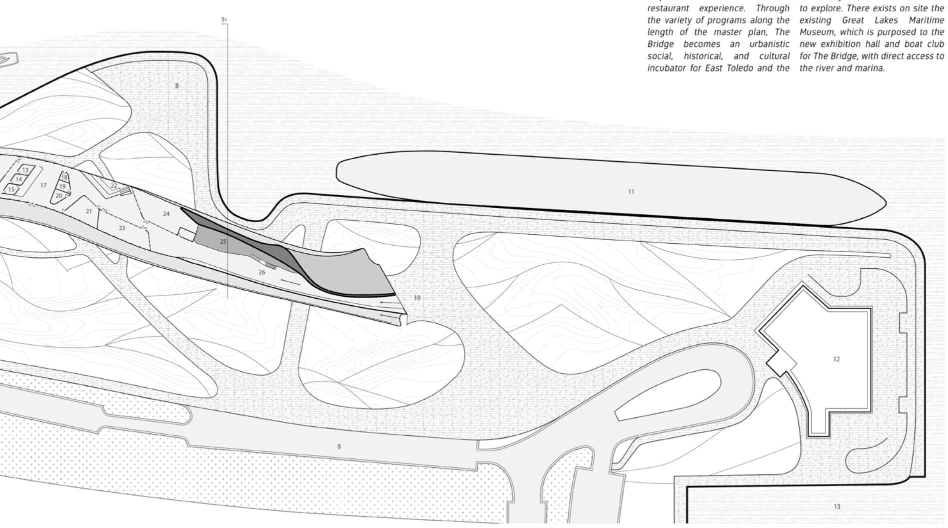
Point Cloud Output

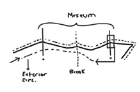
Fig. 71. Presentation Board Two



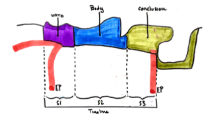
The Bridge

"The Bridge" symbolically named for its connective qualities and unmistakable resemblance is a regional maritime museum and community educational center. The Bridge also leverages its position to provide an elevated river front restaurant experience. Through the variety of programs along the length of the master plan, The Bridge becomes an urbanistic social, historical, and cultural incubator for East Toledo and the broader Great Lakes regions. The master plan stretches the length of a once abandoned riverfront industrial zone, providing walking paths, viewing decks with unparalleled exposure to the Toledo skyline, and historic vessels to explore. There exists on site the existing Great Lakes Maritime Museum, which is purposed to the new exhibition hall and boat club for The Bridge, with direct access to the river and marina.

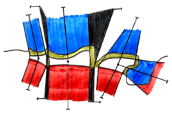




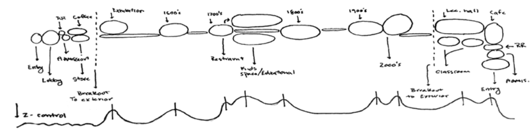
Parti



Spacial Parti



Site Interface

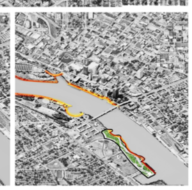


Master Plan Programming Sequence

Toledo, Ohio

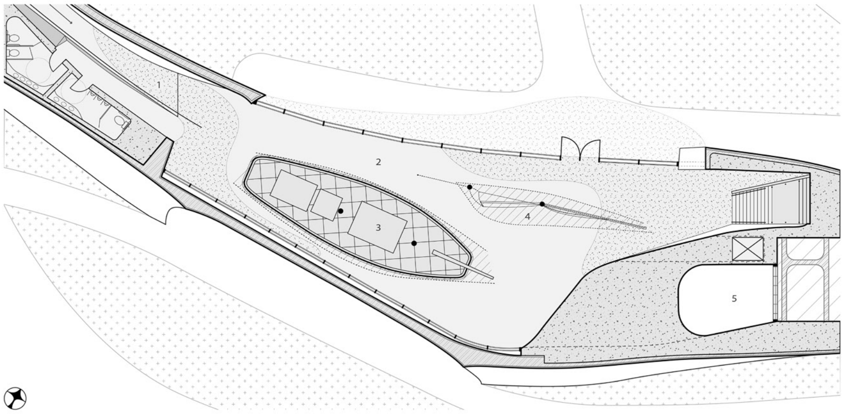
Major Connective Axis

East/West Dev.



Developed Riverfront Interface

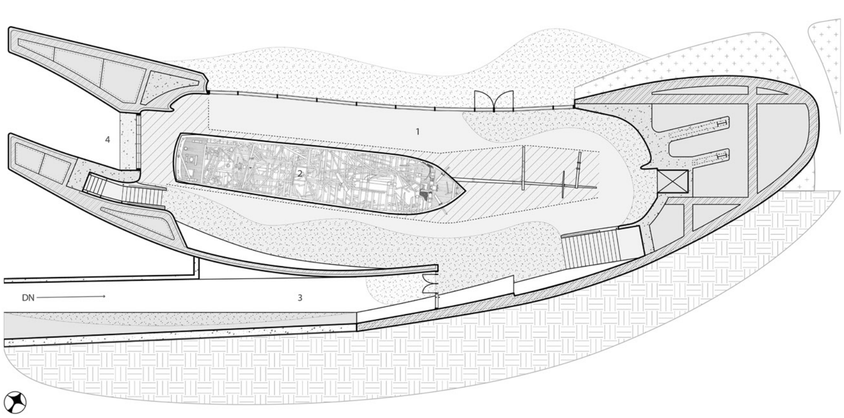
Fig. 72. Presentation Board Three



Gallery One Plan
Scale: 3/32" = 1'

1. Entry Ramp
2. Gallery Floor
3. ULSTER (1874) Exhibit Ship
4. Ulster Mast Deconstructed
5. Loading Bay

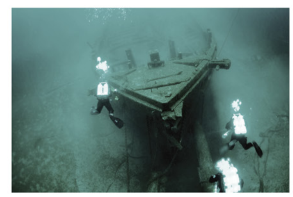
The Ulster, built in 1874 at Milwaukee, and renamed the Helen in 1881, had a bow that was similar to the conventional schooner's in appearance. Two-masted, she measured 90' by 23' by 7', and 119 tons. The Ulster replica sits almost level with the gallery floor as to suggest the ability to walk on and in the vessel. The mast assembly is deconstructed and placed separately along the gallery floor.

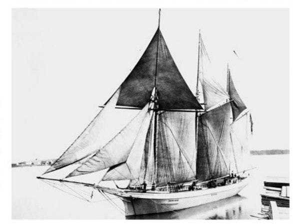


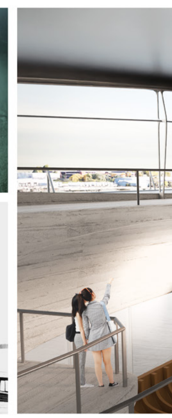
Gallery Three Plan
Scale: 3/32" = 1'

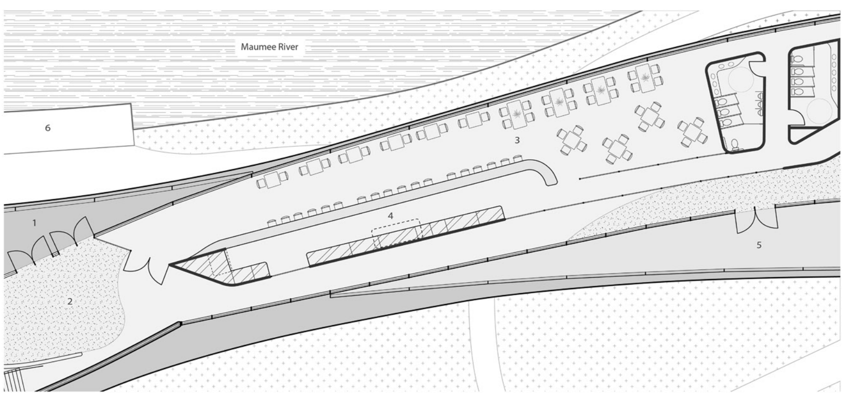
1. Gallery Floor
2. Rouse Simmons Shipwreck Reconstruction (1868-1912)
3. Restaurant Entry
4. Loading Bay

Rouse Simmons, built in 1868 and was a Schooner that sank in the Great Lakes with all hands lost in 1912. The historic ship replica aims to education viewers of the rich history of shipwrecks on the Great Lakes.







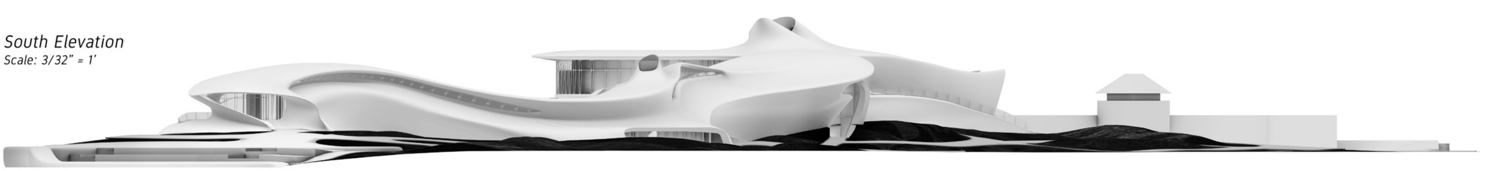


Restaurant Plan
Scale: 3/32" = 1'

1. Gallery Floor
2. Rouse Simmons Shipwreck Reconstruction (1868-1912)
3. Restaurant Entry
4. Loading Bay

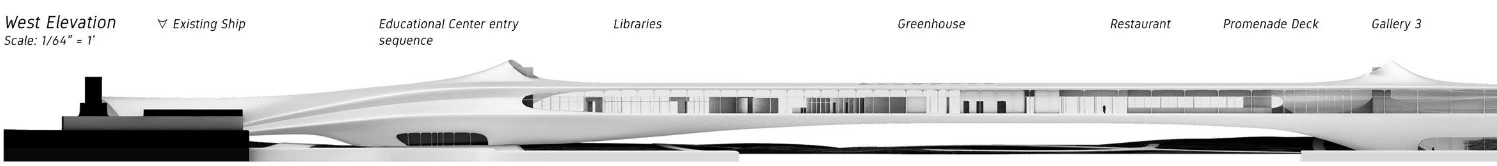
The Restaurant cantilevers over the sight and the Maumee River, overlooking the entire downtown Toledo skyline. As a spacial transition and fresh in house produce, the greenhouse(on right) serves both the restaurant and educational center cafeteria.

South Elevation
Scale: 3/32" = 1'



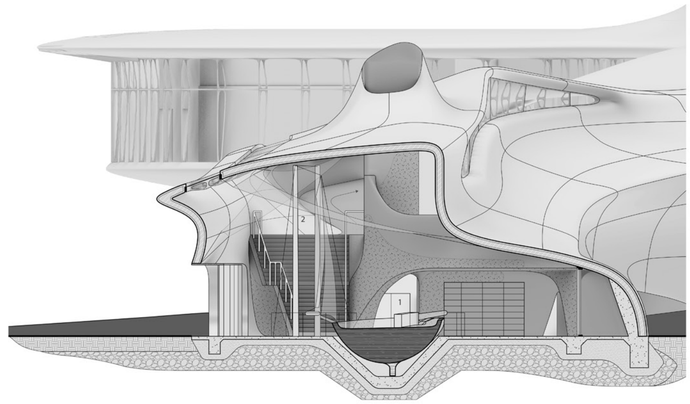
East Elevation
Scale: 1/64" = 1'

West Elevation
Scale: 1/64" = 1'



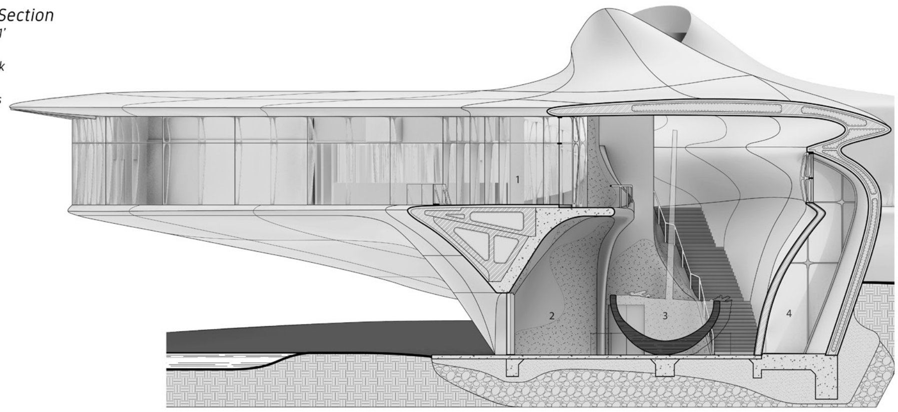
Gallery One Section
(S5) Scale: 3/16" = 1'

1. Gallery Floor
   Ulster (1874) Exhibit Ship
2. Gallery Two



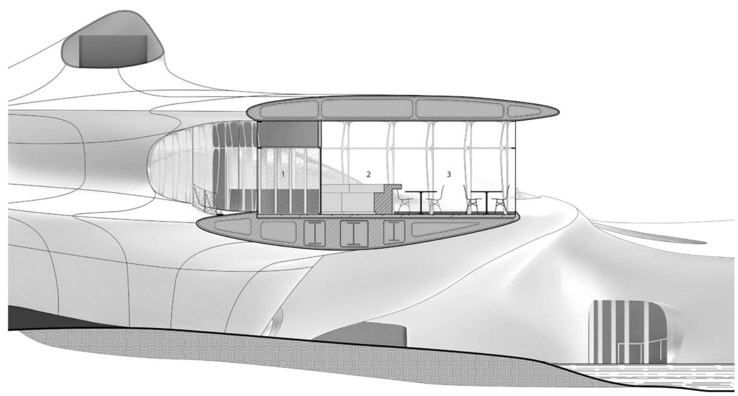
Gallery Three Section
(S3) Scale: 3/16" = 1'

1. Promenade Deck
2. Gallery Floor
3. Rouse Simmons
4. Restaurant
   Entry

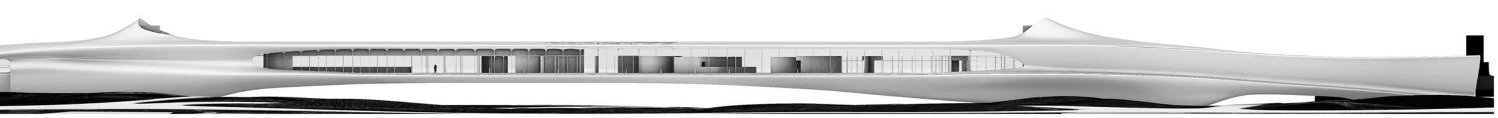


Restaurant Section
(S2) Scale: 3/16" = 1'

1. Main Hall
2. Kitchen
3. Restaurant Seating



North Elevation
Scale: 3/32" = 1'



Gallery 2 *Gallery 1* *Cafe/Store* *Museum Entry Sequence*