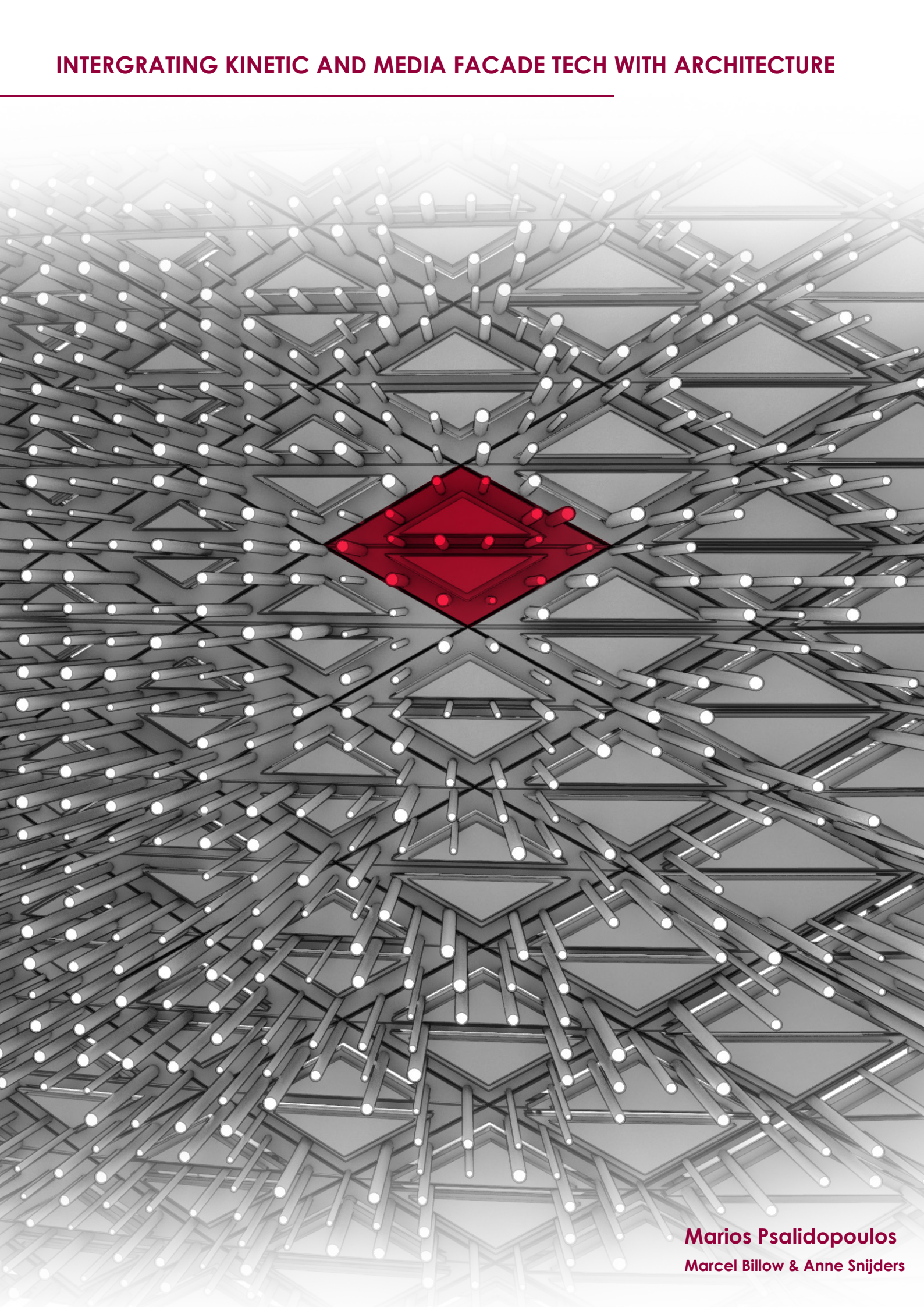
INTERGRATING KINETIC AND MEDIA FACADE TECH WITH ARCHITECTURE



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This thesis explores the integration of kinetic and media features from facades to create architectural narratives, focusing on how facades can serve not just the occupants within but also engage and captivate passersby from the outside. The primary research question investigates whether it's feasible to employ media and kinetic tools to craft facades that not only fulfill functional requirements like shading and thermal comfort but also function as dynamic mediums of aesthetic expression and storytelling.

The answer, as detailed in this report, is affirmative. The document is structured to guide you through the development process of the thesis's two main parts. A facade piece capable of being parametrized in bulk to create various architectural forms, and its application in designing a visually striking pavilion for the TU Delft Bio-Based Lab. The lab's requirement for an engaging and visually appealing structure underpins the motivation for this thesis.

This report chronicles a lengthy design journey beginning with an initial preview of the final pavilion design and the articulation of the research question. It proceeds with a summary of the pertinent literature review, followed by the evolution of design concepts—starting from the Maze, progressing through the Wave and the Flora, and culminating in the Urchin, which represents the synthesis of the explored design principles.

The document concludes with personal reflections on the project and an appendix containing extensive illustrations and sketches, which were too voluminous to include within the main body of the report.

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1.

THE INTRO

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This chapter introduces the research question and explains how the design addresses it, followed by an outline of key features from kinetic and media facades integrated into the final design.



1.1 | INTRODUCTION

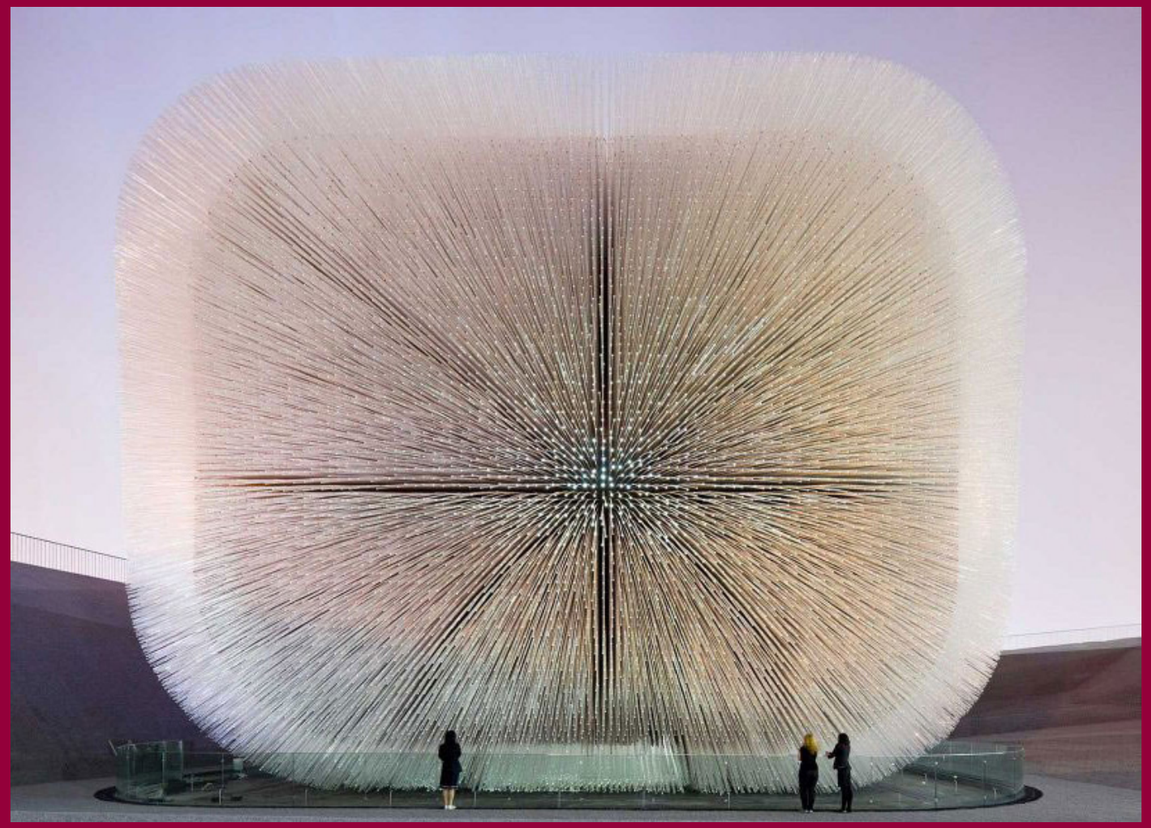
OVERVIEW OF THE RESEARCH QUESTION

The core concept of integrating facade design with media and kinetic technology focuses on creating engaging narratives for the Bio-Based Lab at TU Delft Campus, aligning with the broader theme of architectural innovation. Each design element, from the choice of materials to media mechanisms and kinetic aspects, is strategically selected to emphasize this overarching concept. Although the basic approach is mere aesthetics, the design scope extends beyond, serving functional purposes like material sustainability and enhancing public interaction, reflecting the innovative nature of the activities inside the building. However, in order to reach such a design scope, there would be the need to ponder the question:

“How can a building's facade, particularly for a pavilion, act as a functional technical innovation which satisfies its user’s basic needs on the inside, while simultaneously be an interactive tool to attract and engage the public on the outside? “

In response to the query, extensive research was conducted on kinetic and media facade designs, aiming to extract fundamental features for integration into a functional yet interactive facade. This systematic exploration led to several design iterations, each dismissed in turn until arriving at the final, most effective solution. This culmination, a facade that seamlessly blends media and kinetic elements, not only meets functional requirements but also engages the public, becoming a landmark and narrating architectural stories. This design, embodying both innovation and adaptability, stands as a direct answer to the initial research question, proving a facade can indeed satisfy interior needs while dynamically engaging its external environment.

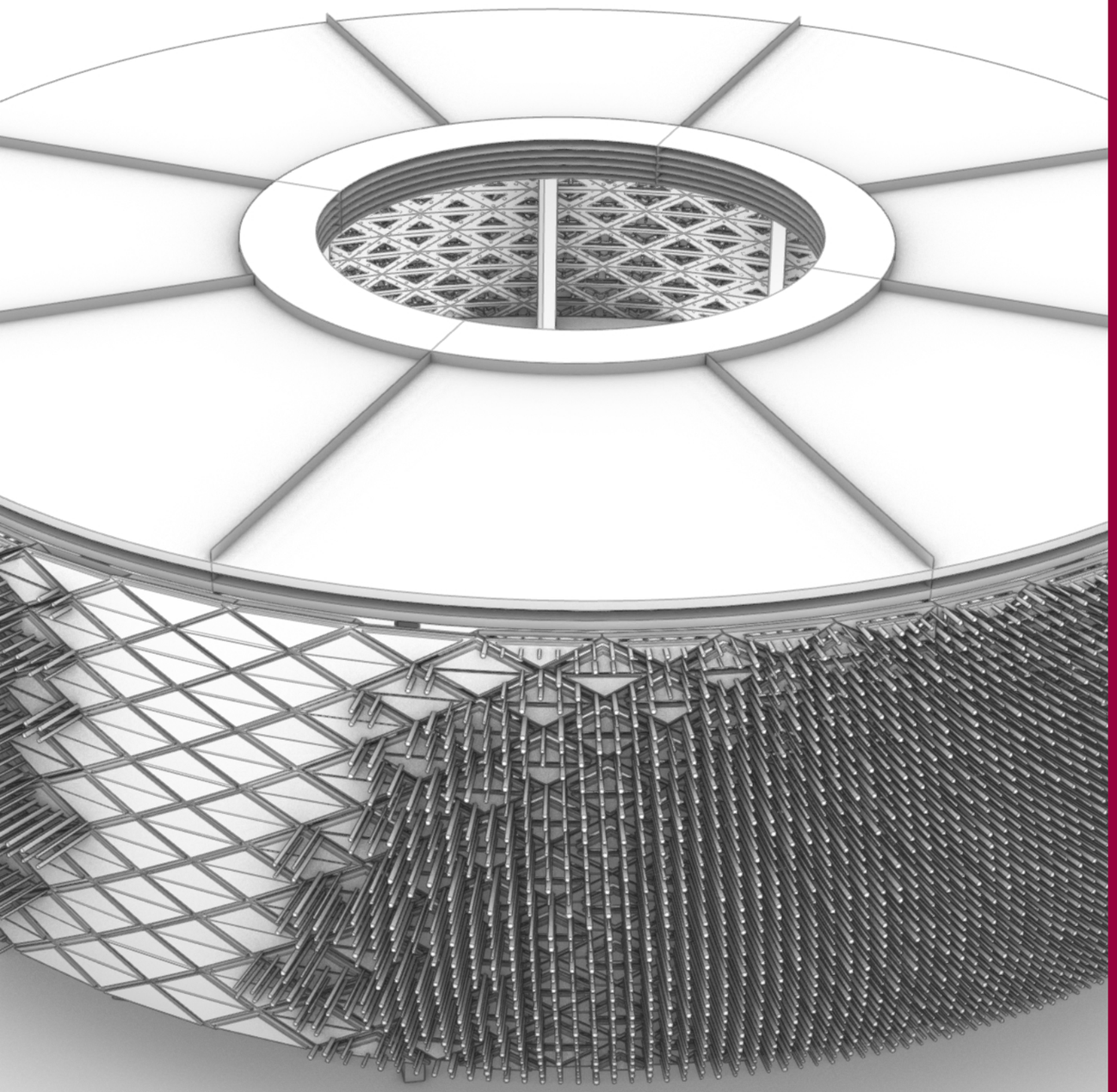
This report briefly references foundational research from P2 to illustrate kinetic and media facade principles. Notable is the Seed Pavilion, presented on the top right, which, through its static structure, creates an illusion of boundlessness, compelling visitors to explore its perimeter. Similarly, the Liliencarré Shopping Mall, presented on the bottom right exemplifies the magnetic appeal of media facades, using concealed lighting to enhance architectural presence and attract public interest. These examples are integral to understanding the applied theories and inspirations behind the facade designs discussed in this thesis.





1.2 | INTRODUCTION

IMPORTANCE OF KINETIC AND MEDIA FACADES



The comprehensive research conducted on kinetic and media facades yielded two pivotal insights that informed the development of the “Urchin” design. First, it became evident that a kinetic facade need not rely on mechanical movement facilitated by motors and electricity; rather, it can achieve a dynamic interaction with its environment through its architectural form alone. This approach not only simplifies the construction but also enhances sustainability by reducing the facade’s operational complexity.

Second, the research underscored the transformative power of lighting in media facades. Lighting, when strategically utilized, acts as a profound tool for visual communication, capable of transforming facades into captivating landmarks that draw public attention from afar. This is achieved through manipulating light to play with massing, perspective, and highlights, turning the facade into a narrative medium that tells a story visible across the urban landscape.

These two distinct principles, led to the conceptualization and iterative design process that yielded several facade prototypes, “ The Maze”, “The Wave” and the “Flora” each refined towards a more optimized solution with many sub-variations. Finally, the ultimate design, dubbed “The Urchin,” integrates kinetic and media facade features to captivate, communicate, and serve as a landmark, while maintaining functionality and adaptability.

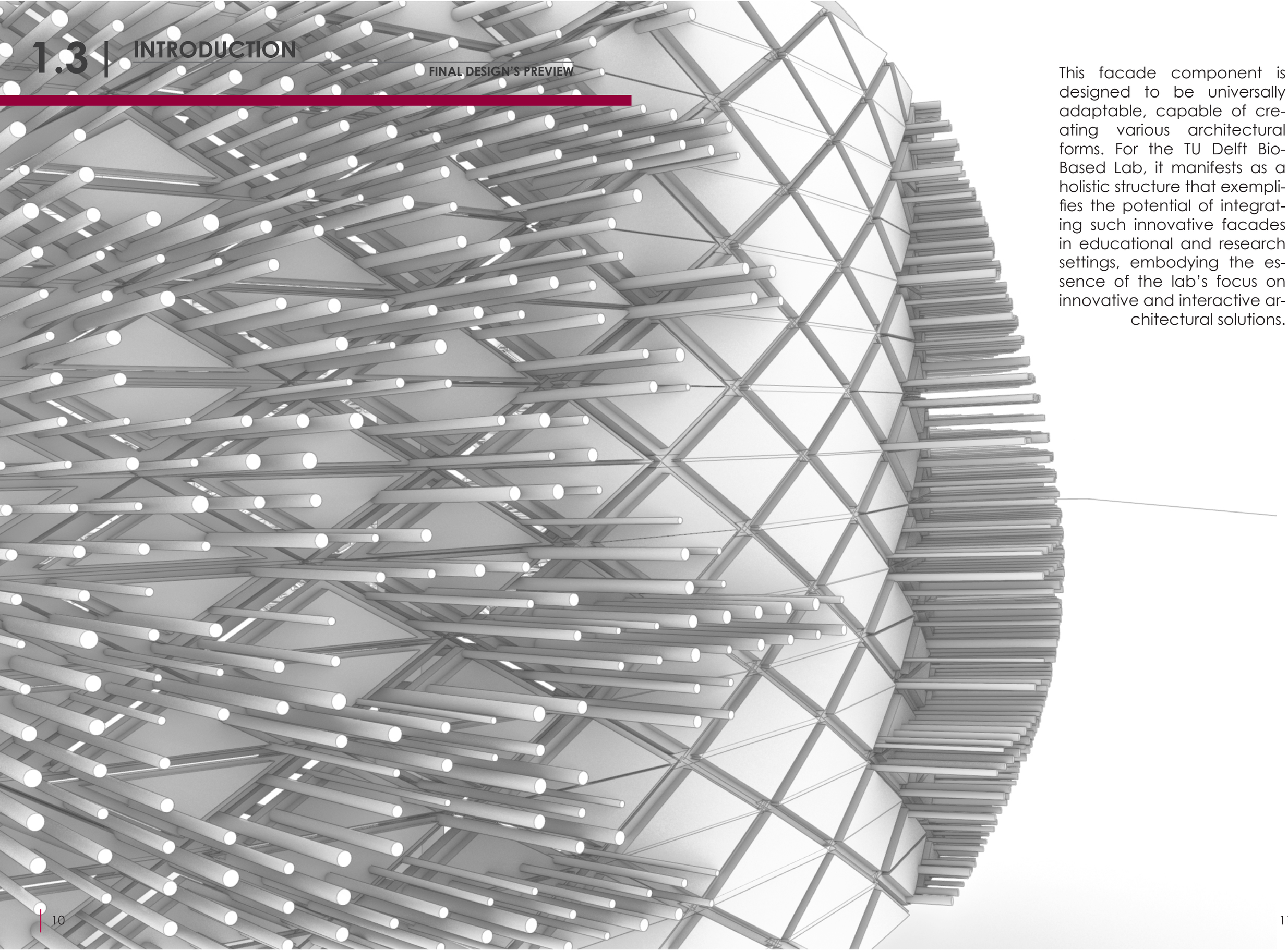
More specifically, the Urchin employs static elements that give an illusion of motion from various viewpoints, creating a visually engaging experience that draws onlookers closer, fostering curiosity about the internal workings of the pavilion. Concurrently, strategic hidden lighting variations correspond to the interior activities, turning the facade into a dynamic display that reflects the vibrancy inside.

When it comes to its innovative architectural concept, it features a spherical, organic form reminiscent of an urchin, with a skin composed of triangulated segments that vary in scale. These triangular panels create gaps that not only allow the building to breathe but also serve as niches for architectural fins, (vertical, non-structural ornamental elements that are attached to and project from the main load bearing facade fragment) enhancing the structure’s interaction with its surroundings. The strategic placement and scaling of these panels ensure that the facade offers varied views and experiences from different angles, enhancing the sense of discovery for onlookers.

From a material perspective, while initial concepts explored wood, the final design utilizes steel for its versatility and strength, allowing for organic forms that mimic natural structures. The Urchin’s design features a spherical form with a triangulated skin that not only breathes but also shields, akin to an urchin’s spines, offering protection and interaction with its environment.

1.3 | INTRODUCTION

FINAL DESIGN'S PREVIEW



This facade component is designed to be universally adaptable, capable of creating various architectural forms. For the TU Delft Bio-Based Lab, it manifests as a holistic structure that exemplifies the potential of integrating such innovative facades in educational and research settings, embodying the essence of the lab's focus on innovative and interactive architectural solutions.

1.3 | INTRODUCTION

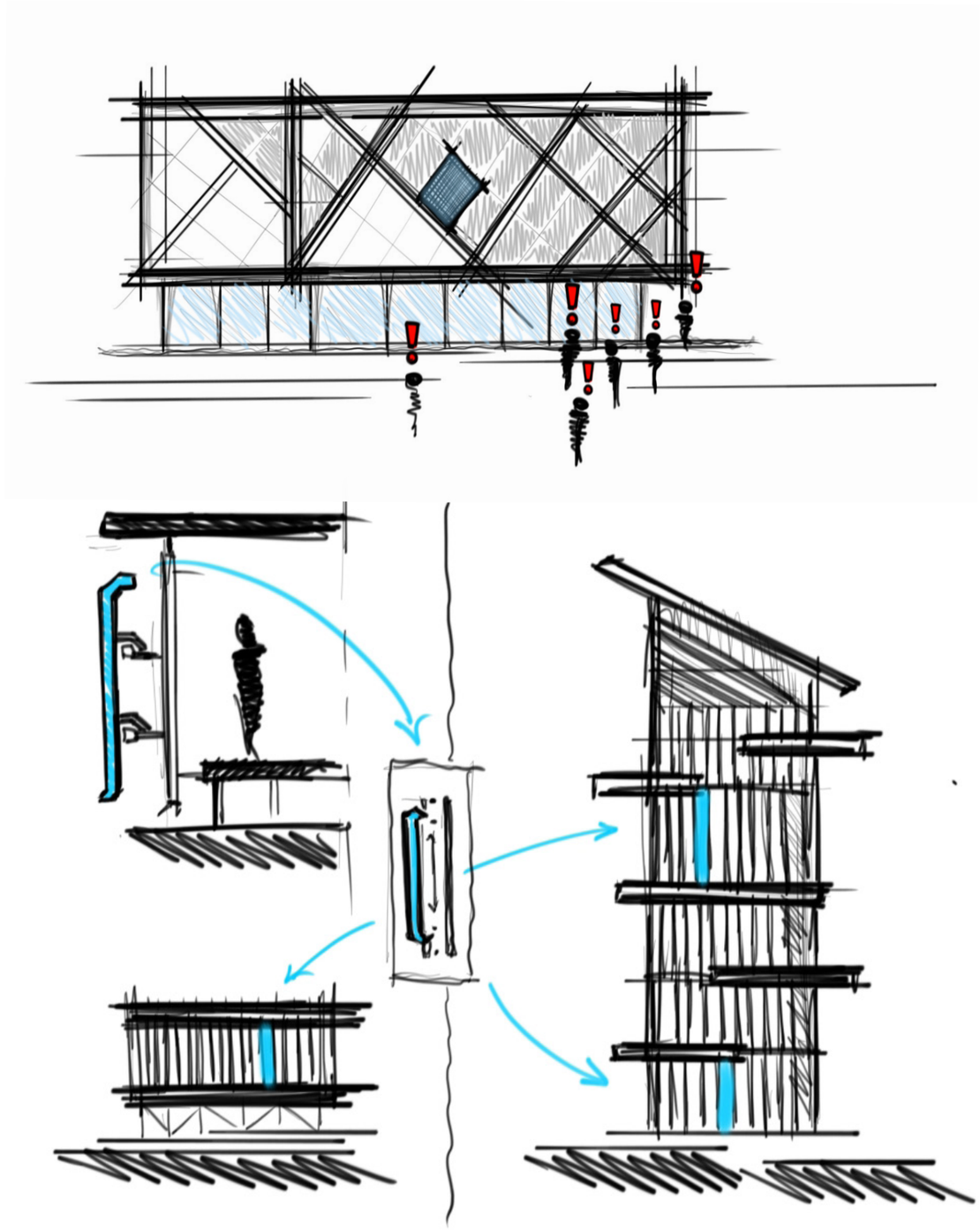
FINAL DESIGN'S PREVIEW



2.

THE STUDY の事例

This chapter summarizes the literature review, highlighting how it informed the design scope for the facade, which integrates kinetic and media elements.



LITERATURE REVIEW

2.1 Exploration of Kinetic and Media Facades

Facades not only enhance environmental performance but also foster social engagement, which is the most challenging thing to achieve when designing one, addressing the often overlooked need for interaction in modern architectural practices.

The design dynamics of kinetic facades focus on creating a seamless connection between interior and exterior spaces, using minimal yet significant movements to engage observers and integrate buildings more fully into their environments. This approach is supported by diverse control systems that allow for both subtle and substantial changes in the building's appearance and function, responding adaptively to environmental and human stimuli. Examples of such procedures are presented on the top right by kinetic structures, the Studio INI's installation Urban Imprint, a canopy, and on the bottom right, a media example, the National Art Center or Osaca Continental from the Movie John Wick, Tokyo, the comparisson of which shows how media aspects connect with the architecture and alter it.

Moreover, the influence of kinetic and media facades extends to shaping public spaces. By transforming how buildings interact with their surroundings and the people within them, these facades encourage more meaningful engagements in places like plazas and alter interaction dynamics in transit areas like walkways. The strategic design and placement of interactive elements within architectural environments enhance not only the aesthetic value of urban spaces but also their social and communicative functions. This integration of media and movement within facades marks a significant shift towards buildings that not only serve functional purposes but also actively communicate and engage with the public, fostering a new era of dynamic and interactive architecture. The Apple Central World, Bangkok, building is a great instance of how landmark design in relation to the surrounding scale and structures impact social dynamics.



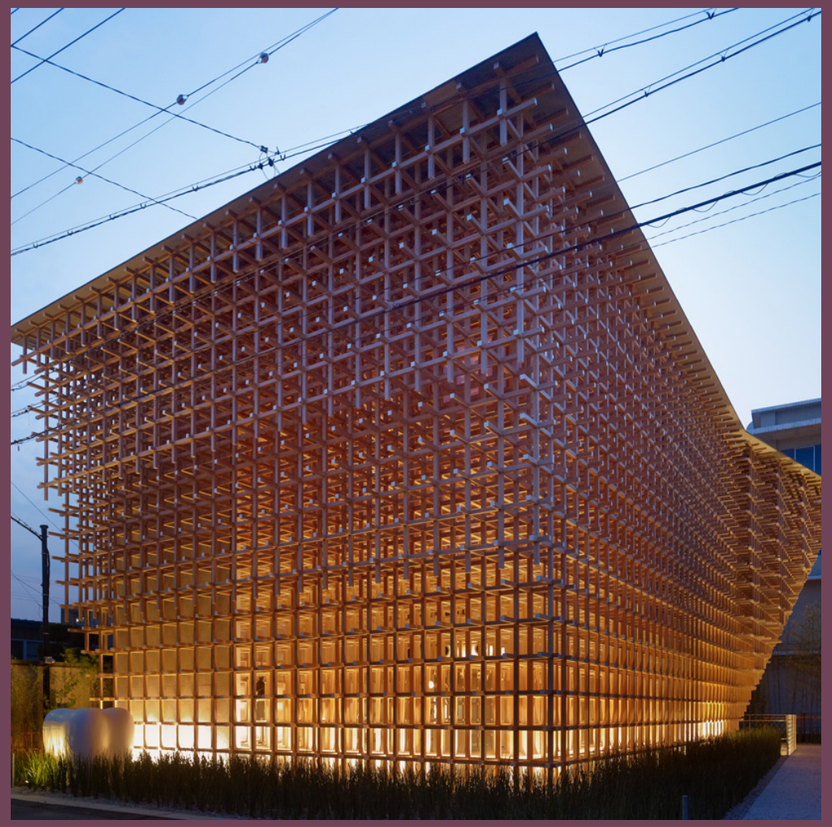


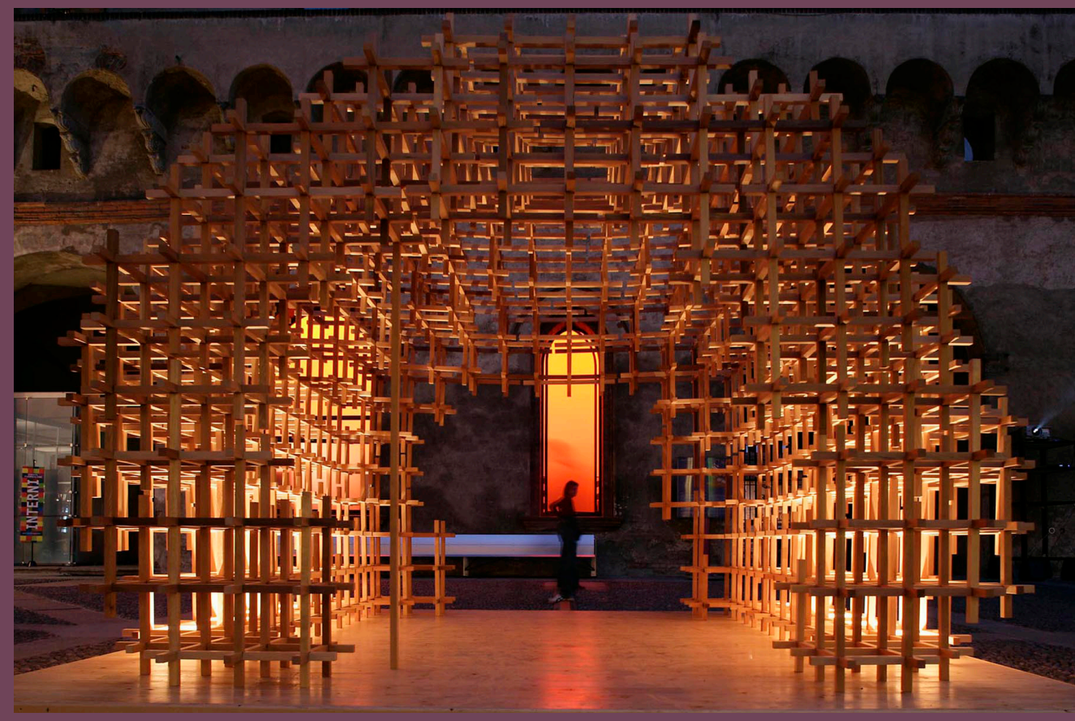










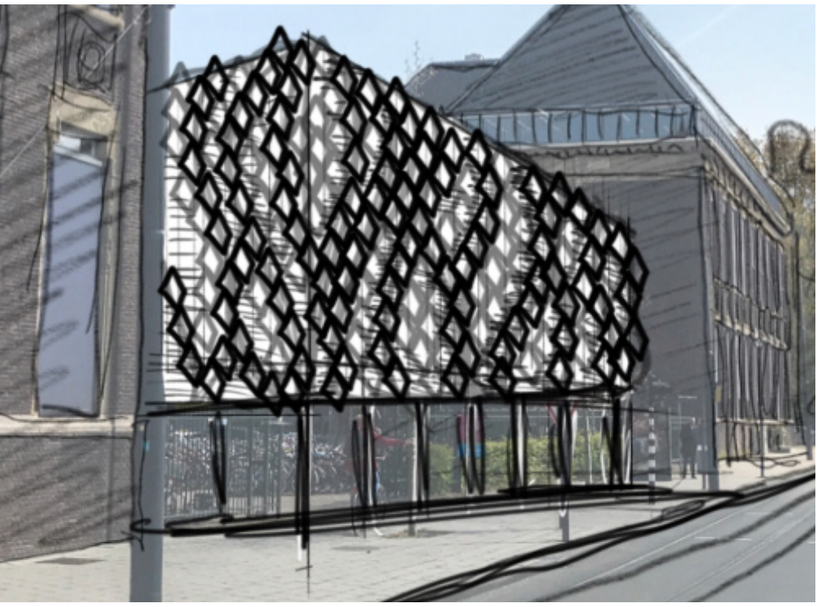


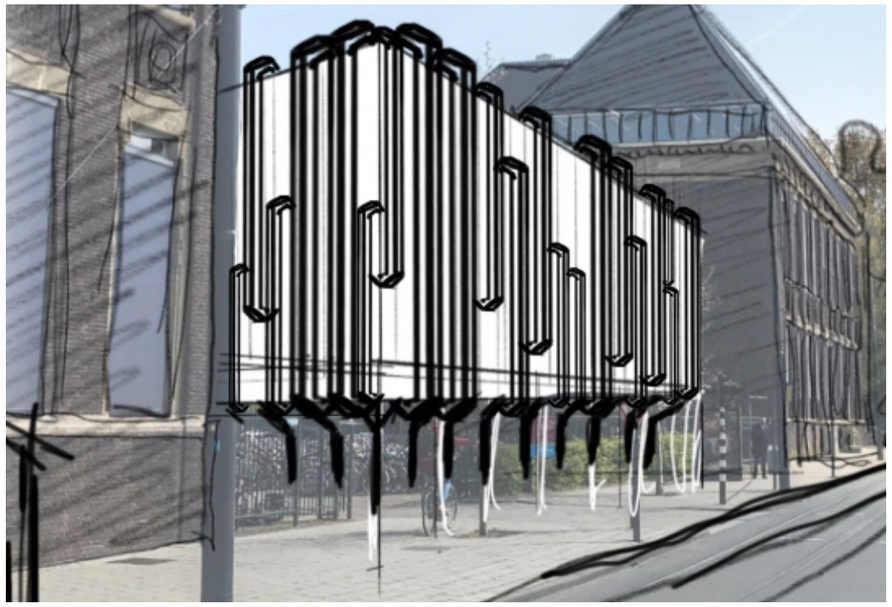


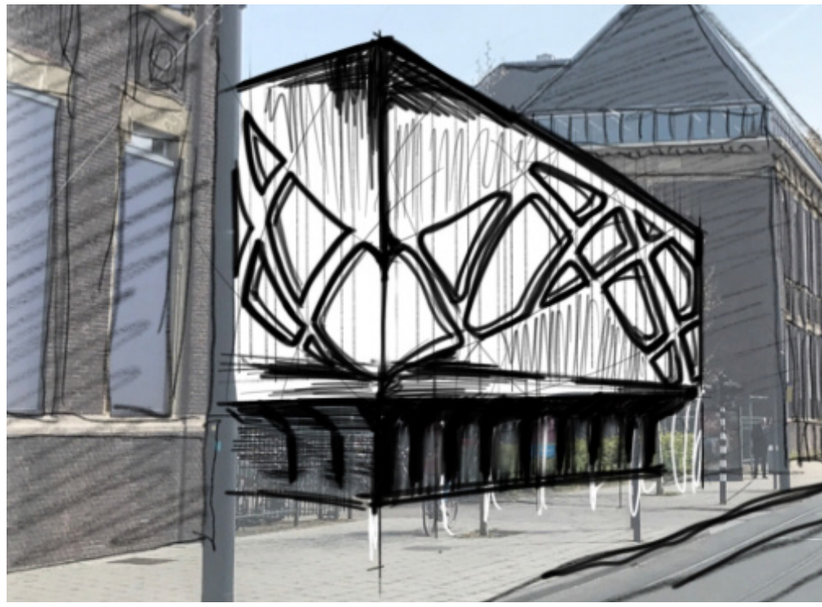
All in all, the historical and practical findings of the research oriented the focus on the use of digital and static components in the design of the Pavilion to make it responsive. These innovative materials enable the facade to adapt to environmental conditions, whether that's the sound from within or the perspective of the pedestrians passing by, and serve as a communicative display.

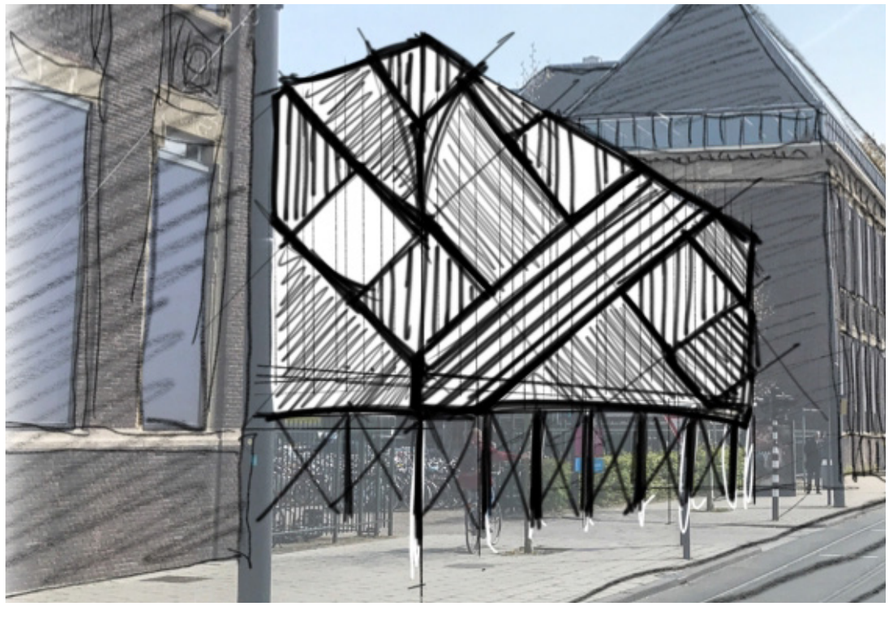
The discussion revolves around the concept of permeability in architectural skins, exploring how they can moderate the relationship between the interior and exterior of a building as well as what input, output, vocabulary and materiality needs to be considered when designing them. Therefore, after making a thorough research on the historical, theoretical, psychological and urban spectrums that concern the kinetic and media facades, it was founded that these principles are followed in many of Kengo Kuma's pavilions. Soft light as the media feature, and multi-dimentional facade layering that changes the form of the building depending on the perspective of the viewer. That is why his designs were a huge inspiration at the first stages of the design process and are presented in this pages.

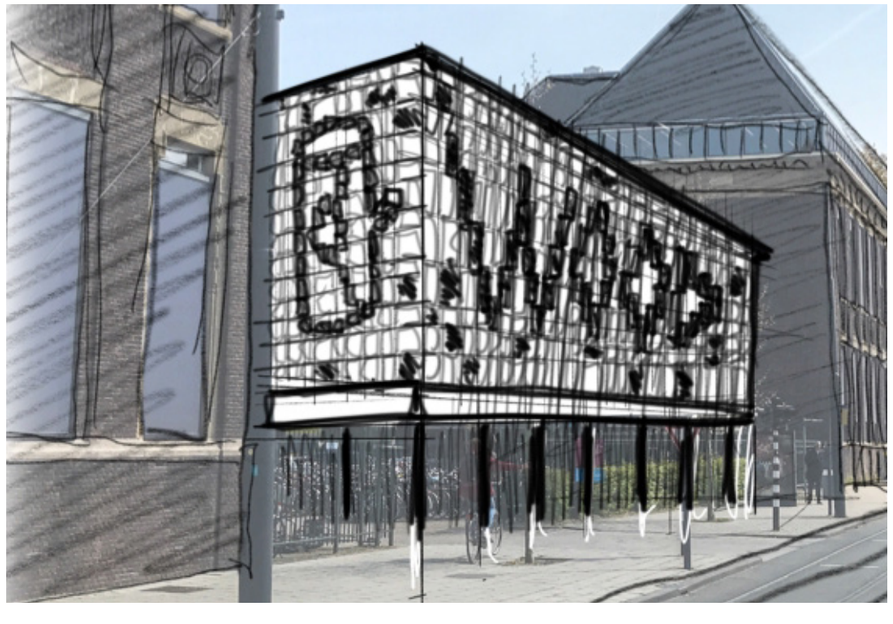
Here are preliminary concept sketches showcasing potential facade designs, integrating the insights gained from our study. These illustrations explore various ways to embody the principles of kinetic and media facades, reflecting the dynamic interaction between architectural form and its environmental context.











3.

THE MAZE

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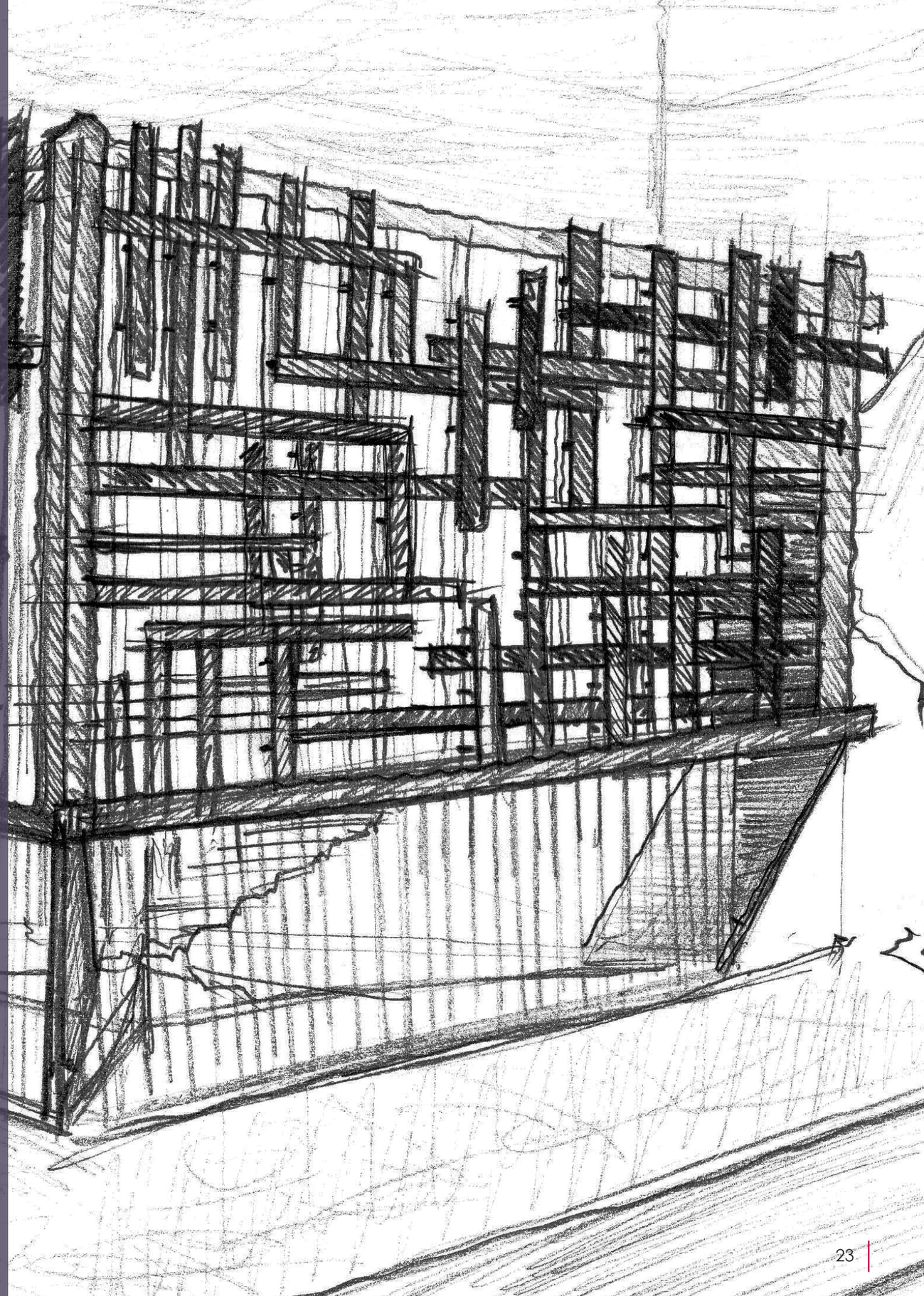
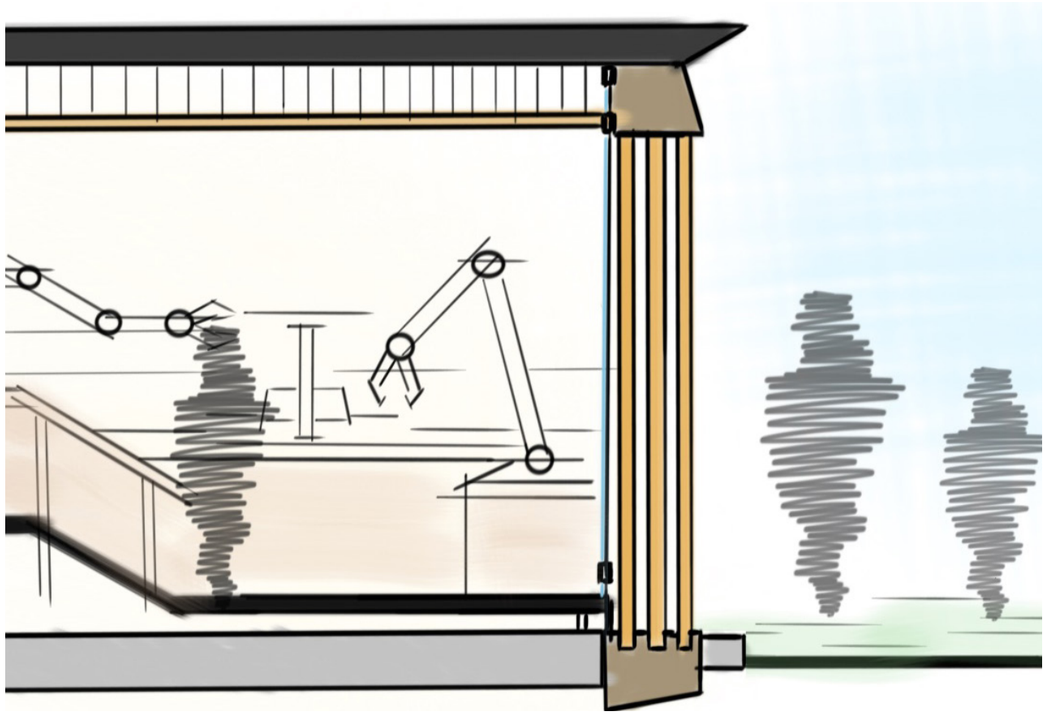
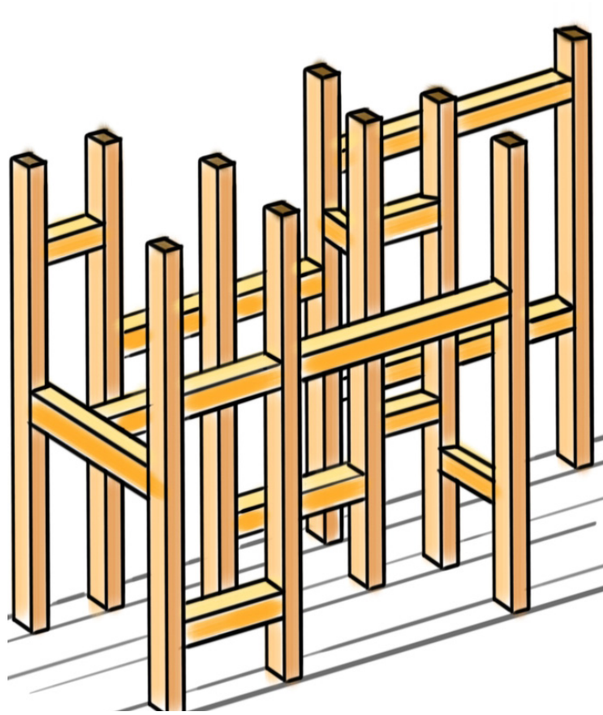
This chapter discusses "The Maze," a design inspired by Asian architecture that uses wood and strategic lighting while at the same time creating the illusion of motion. Emphasis is placed on the precise engineering of joints.

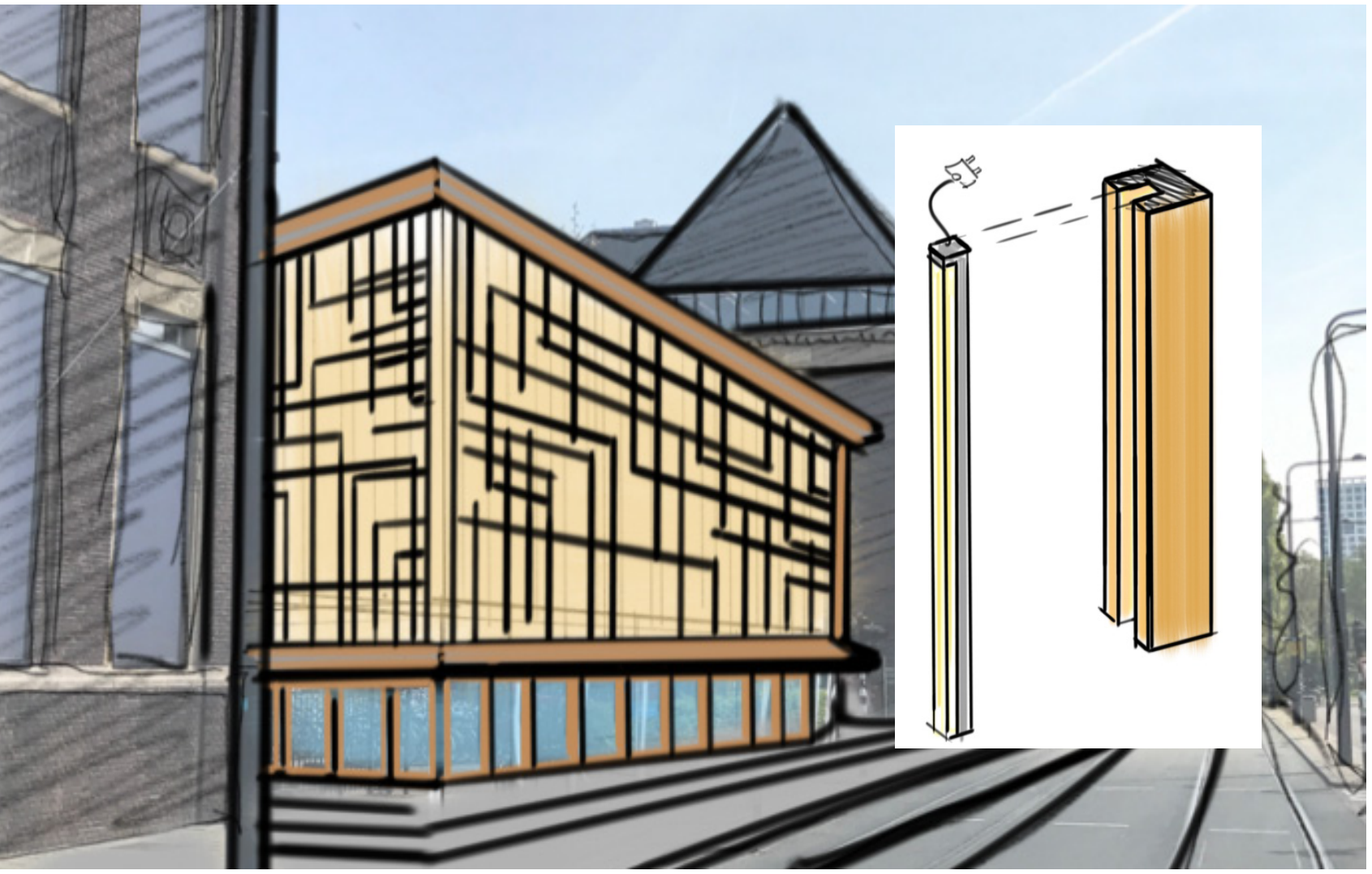


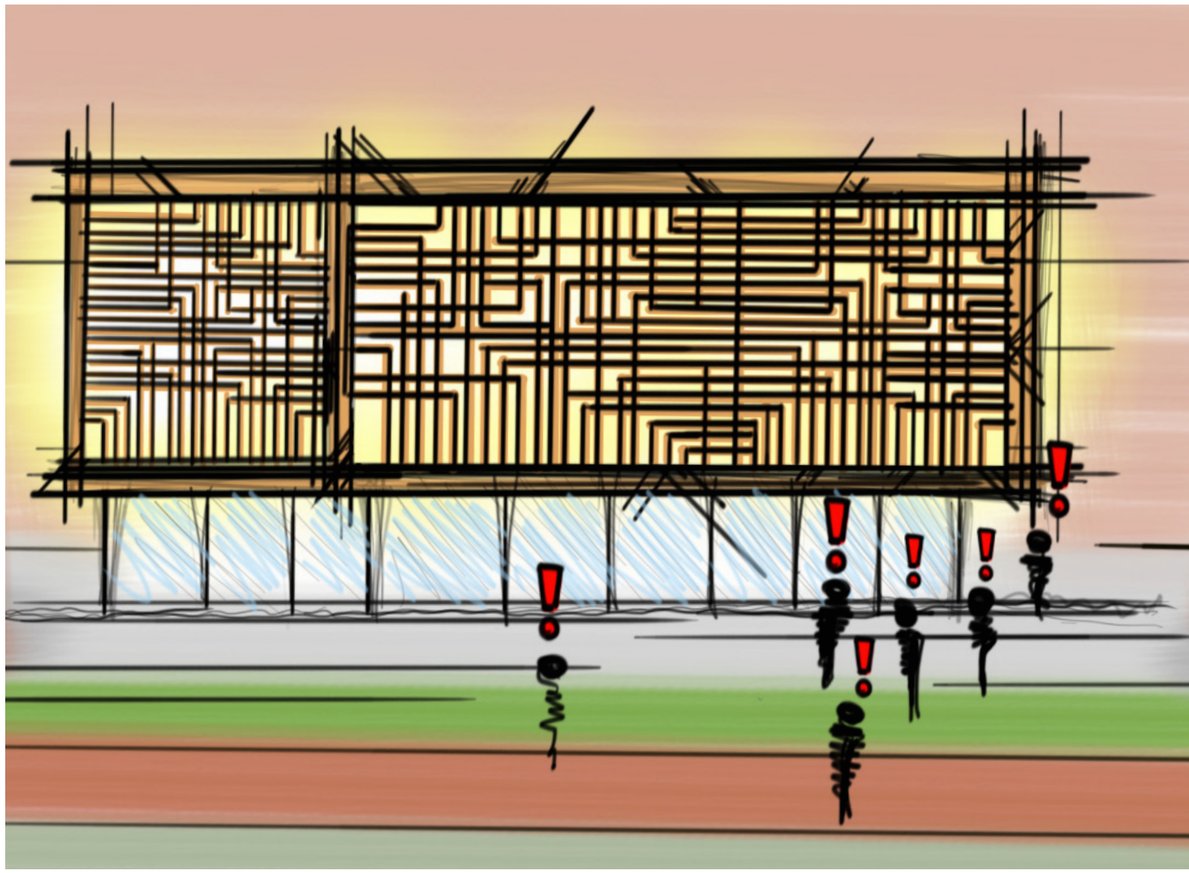
SEEKING SIMPLICITY

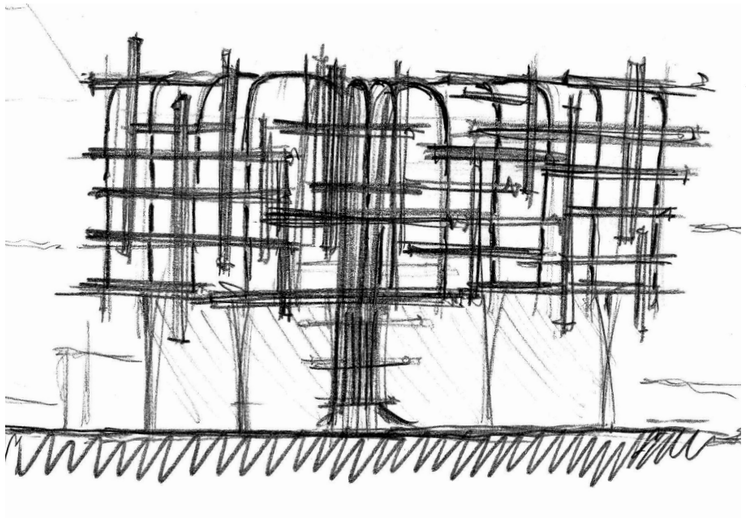
Inspired by Asian architecture and Kengo Kuma's design principles, the initial facade concept, titled "The Maze," integrated vertical and horizontal timber beams utilizing the Miyakaido technique. This design emphasized sustainability, leveraging demountable timber joints to allow component reuse and minimizing environmental impact with a low carbon footprint. Simultaneously, the strategic arrangement of beams created intriguing visual openings that encouraged visitors to alter their viewpoints to uncover what lies within, subtly integrating secret lighting to enhance the facade's interactive and mysterious appeal. This approach aligns with the thesis's focus on integrating kinetic and media facade features to create dynamic architectural narratives.



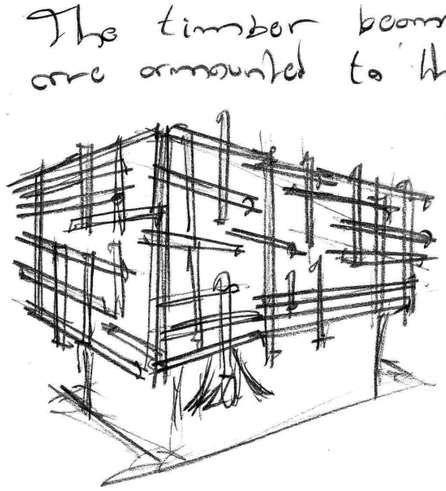


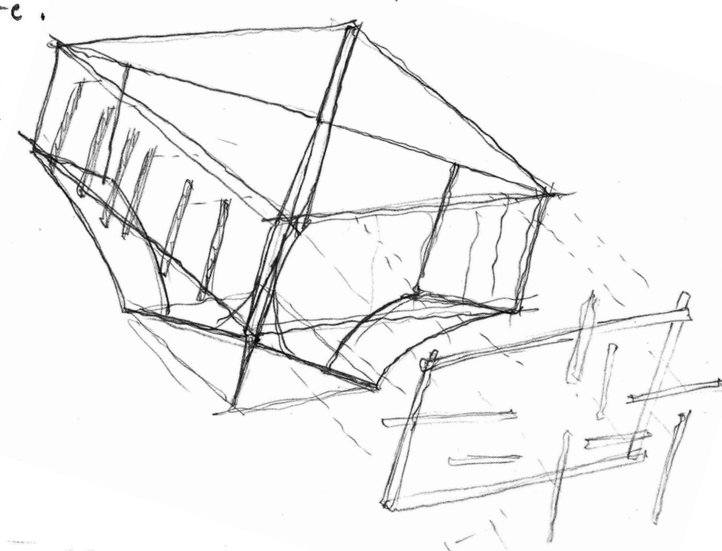






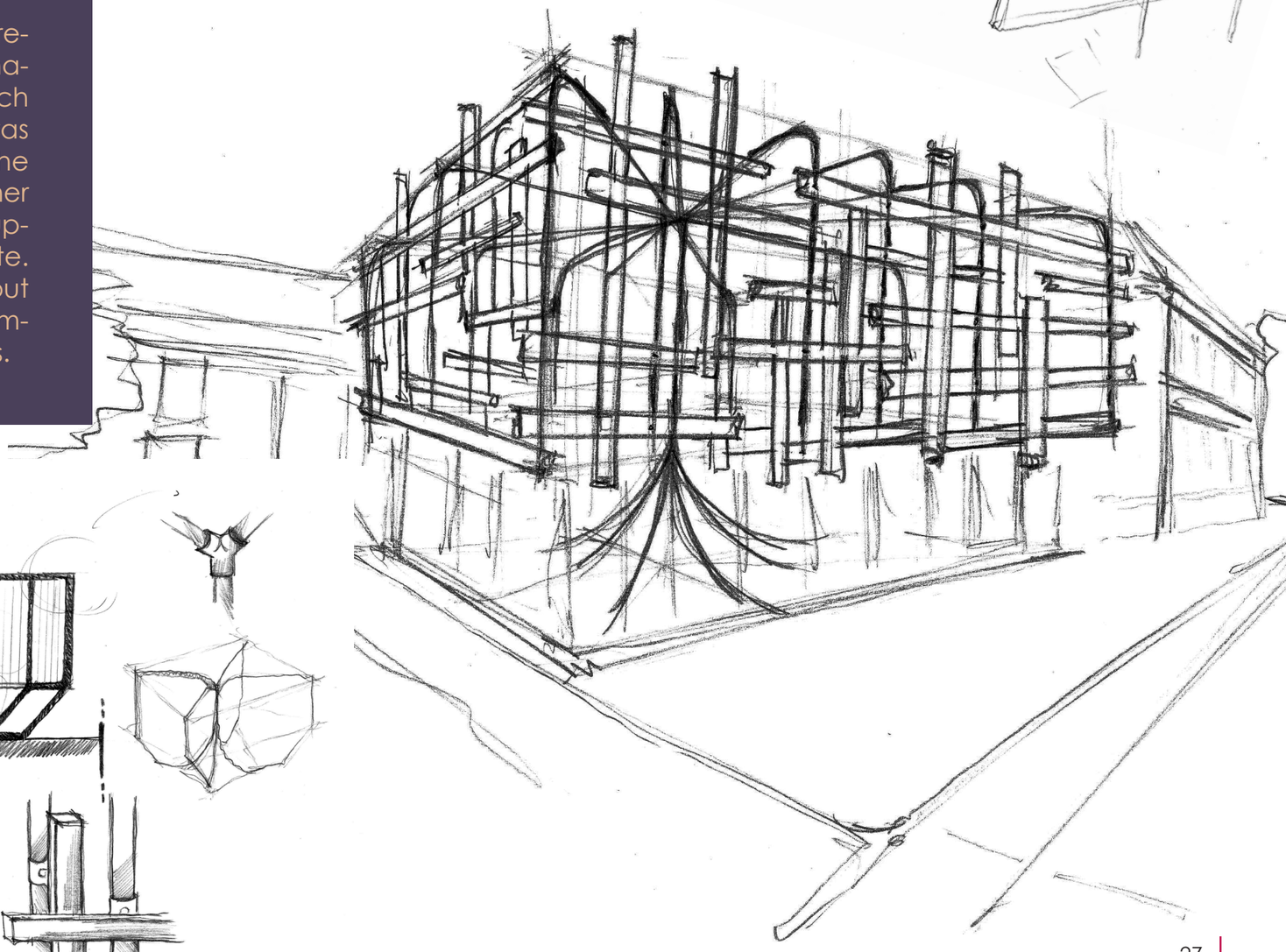


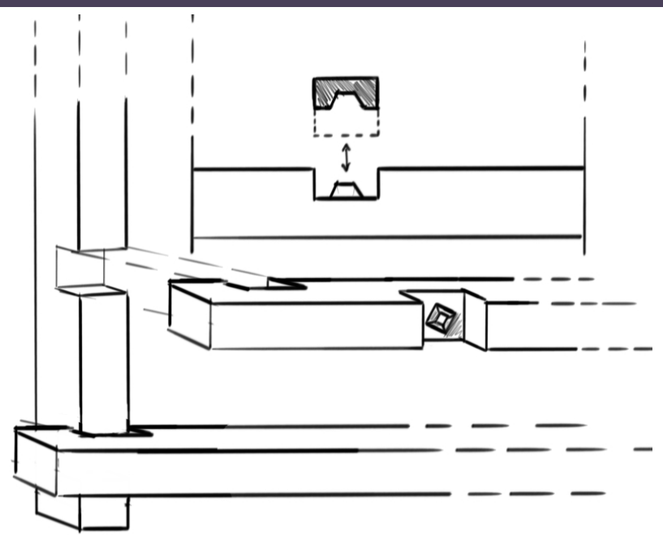


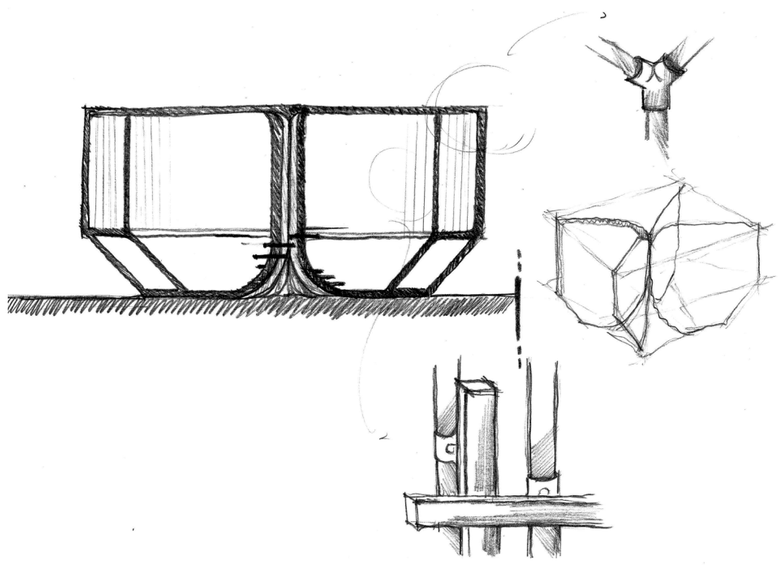


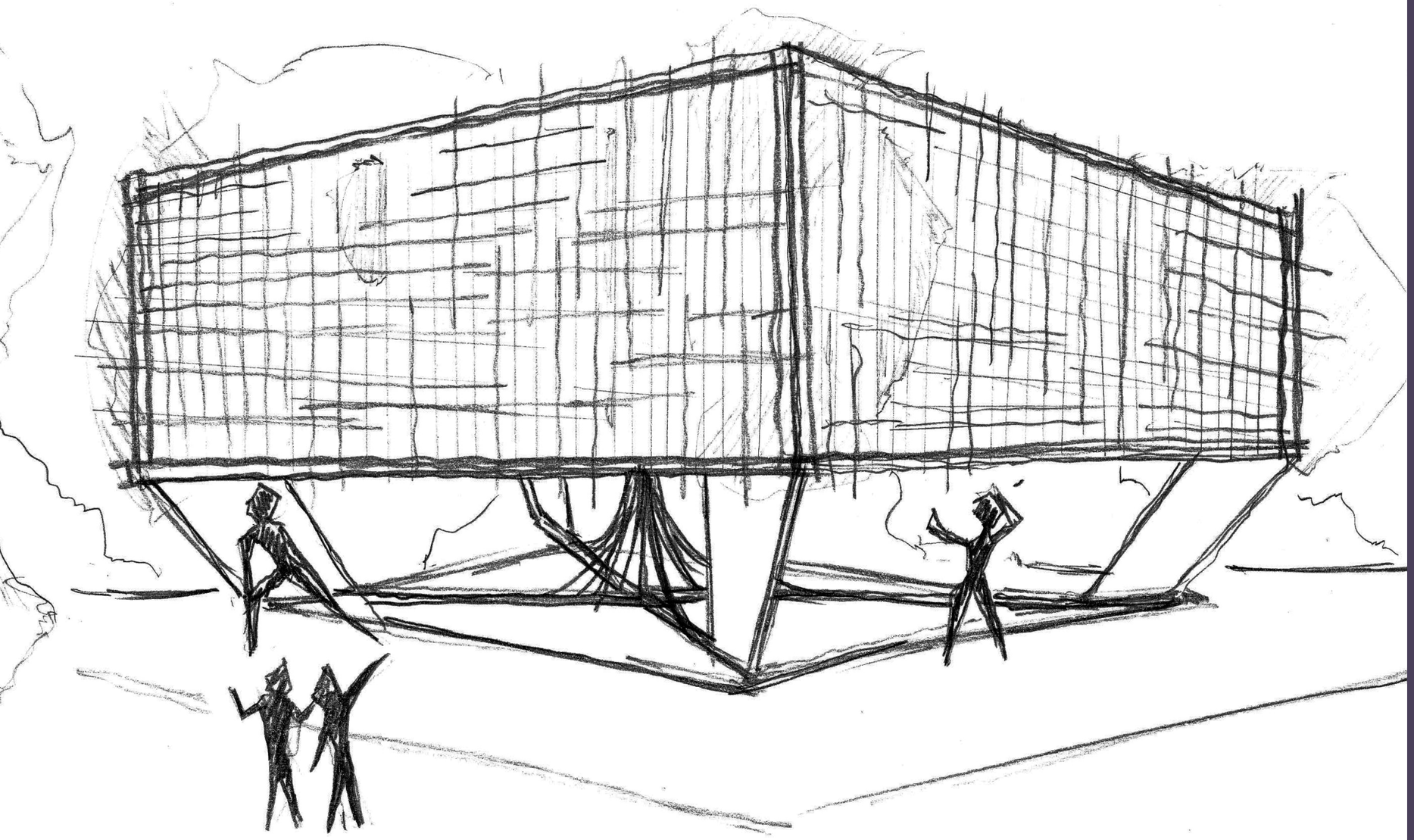
SEEKING SIMPLICITY

Evolving the project from an architectural standpoint, the concept represented a fusion of two primary materials: steel and wood. This combination reflects a harmonious blend of high-tech development with low-tech materials, embodying both modernity and naturalism. The core idea was centered around a ‘still organic spine’ that metaphorically roots into the ground and ascends towards the center, unfurling at the end in a manner reminiscent of tree leaves. This spine, constructed of steel, acts as the supporting structure from which timber beams, akin to branches, emanate. This architectural narrative not only exemplified structural ingenuity but also resonates with the theme of growth and organic development, symbolically linking the building to its educational and innovative purposes.





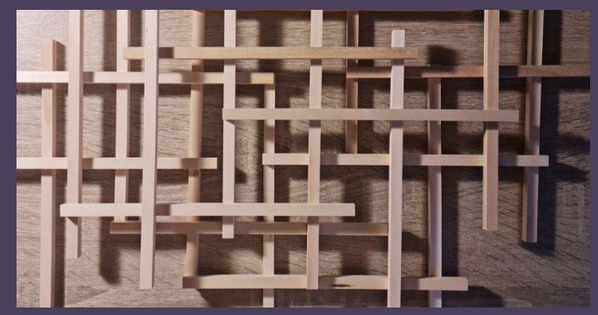


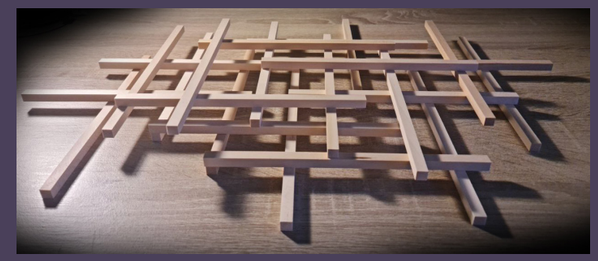


3.1 INITIAL CONCEPT AND DESIGN RATIONALE

In our research, we discussed various aspects such as input and output, but not vocabulary. For this design, the kinetic aspect's input is the viewer's perspective and positioning, while the media component responds to the internal activity levels of the lab. The inspiration, or 'vocabulary', for the wooden pattern in the sketch to your left is derived from natural woodlands, where the random placement of trees creates changing views based on the observer's location. This natural pattern influenced the design's vocabulary, guiding the creation of a facade model that embodies this principle, as illustrated in the images below.

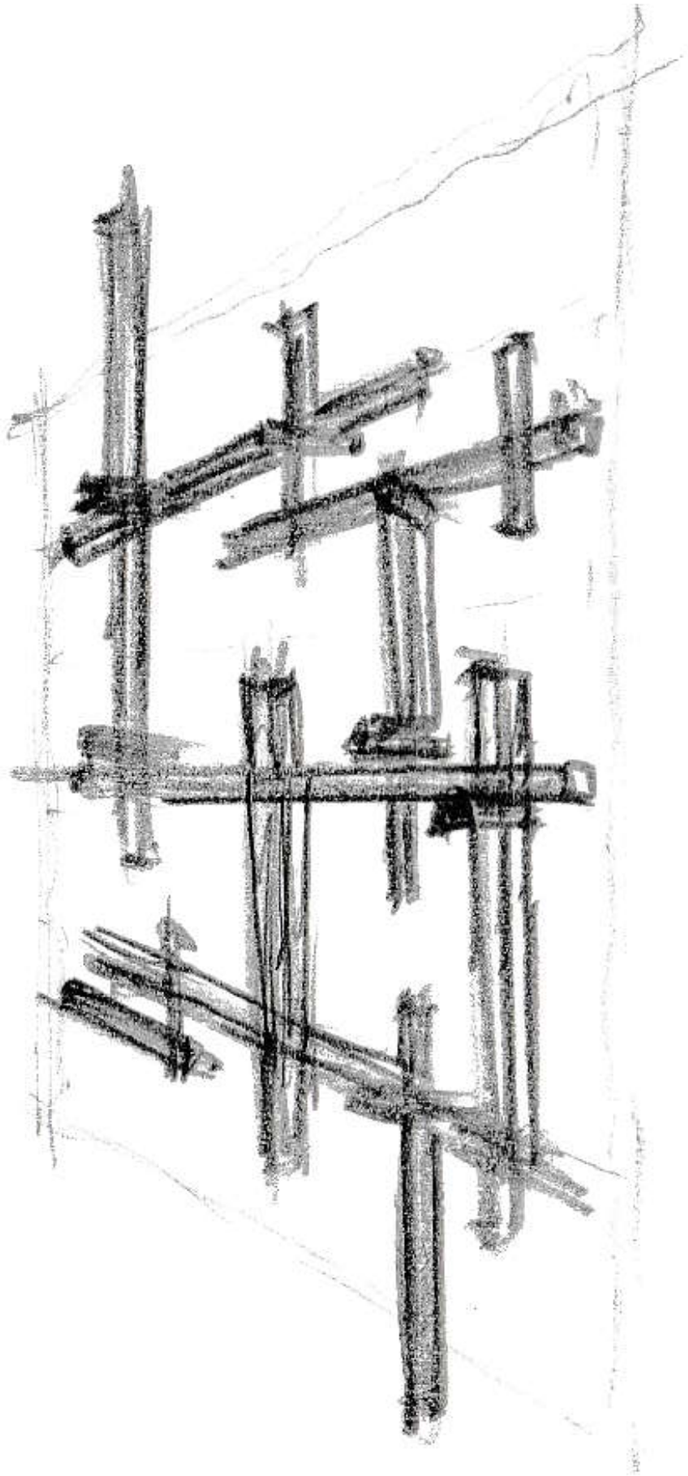






3.2 | THE MAZE

CHALLENGES AND LEARNINGS



However, throughout the design process, an apparent contradiction emerges. While the project champions innovation and technology—core values of TU Delft—the design prominently features traditional Japanese joints, an ancient technique inventeted thousands of years ago in Japan.

Furthermore, while the project aspires to embody new and fresh architectural ideas, it often resorts to concepts similar to those popularized by Kengo Kuma. In an era enriched by technological advances such as CNC machining and 3D printing, these tools allow for the creation of complex, almost surreal structures and joints. This technological prowess enables designers to explore forms and connections that challenge traditional construction limits, bringing a fresh perspective to architectural design. Something which in the case of ‘‘The Maze’’ is not happening at all.

But most of all, throughout the design process the essence of design principles was lost. The project began with a focus on integrating kinetic and media elements into facade technology to create architectural narratives. However, as the design progressed, it became unclear whether the goal was to develop a facade or a complete pavilion. The designs often featured an elevated square structure supported by a peripheral metal skeleton, which seemed detached from the original intent of designing a versatile facade component.

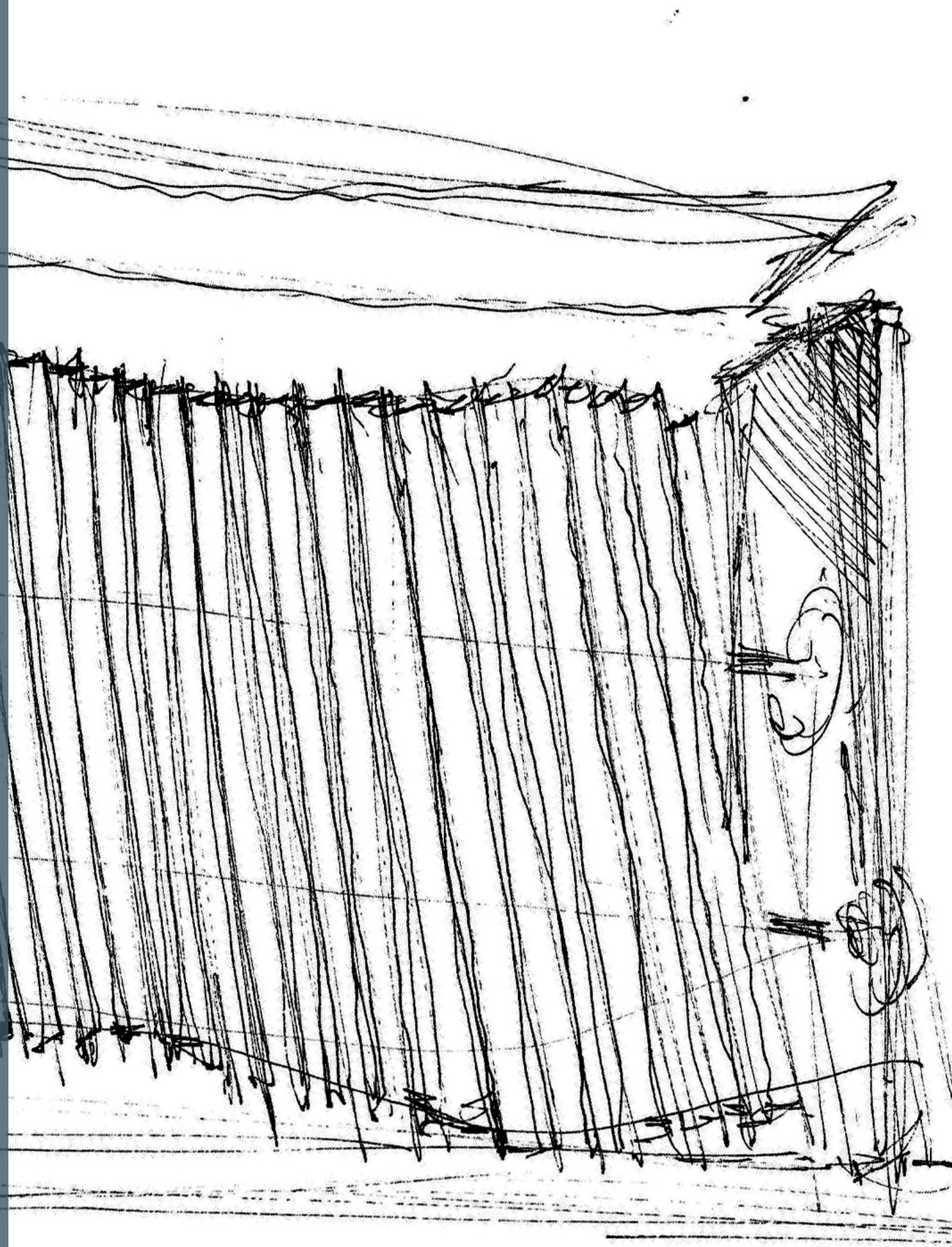
This inconsistency led to a pivot towards leveraging advanced technologies like CNC machining and 3D printing. The aim shifted to developing a universally applicable facade system, capable of being integrated into various architectural contexts, not just the Bio-Based Lab, thereby truly embracing the potential of modern construction techniques.

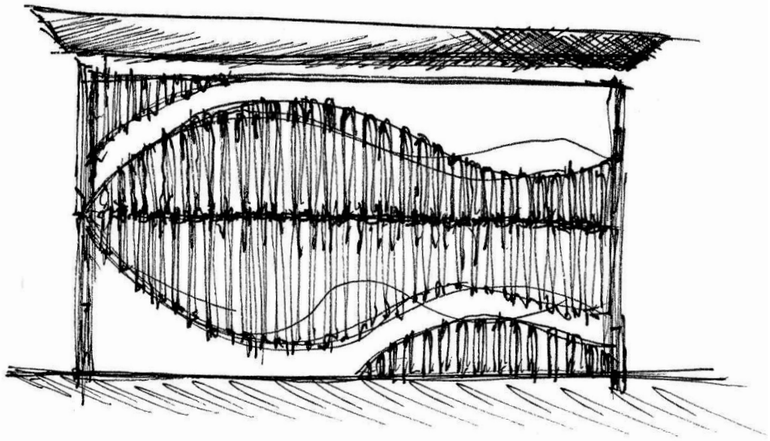
4.

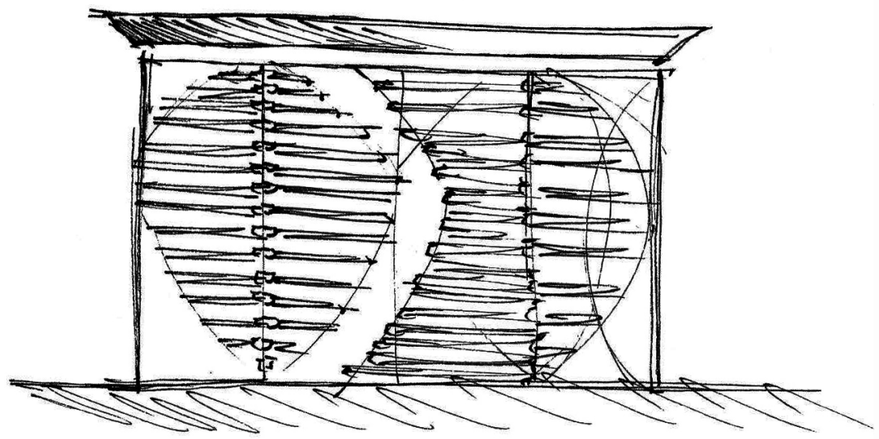
THE WAVE

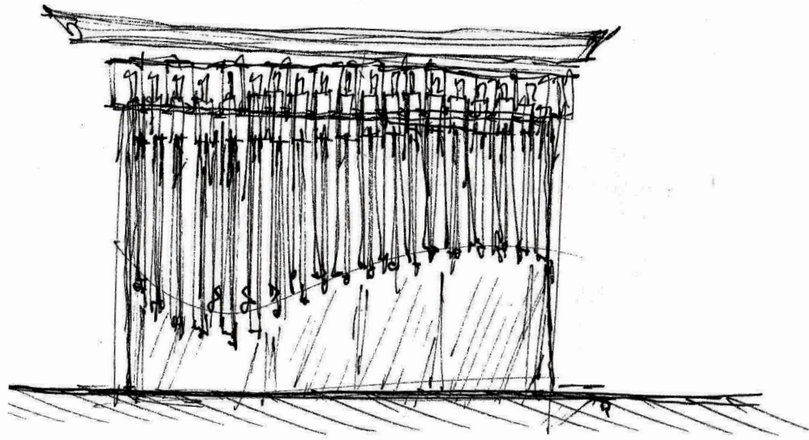
海の波

This chapter explores “The Wave,” a design focusing on motion mechanics and technical detailing, enabling the facade’s vertical elements to move in a wave-like pattern.





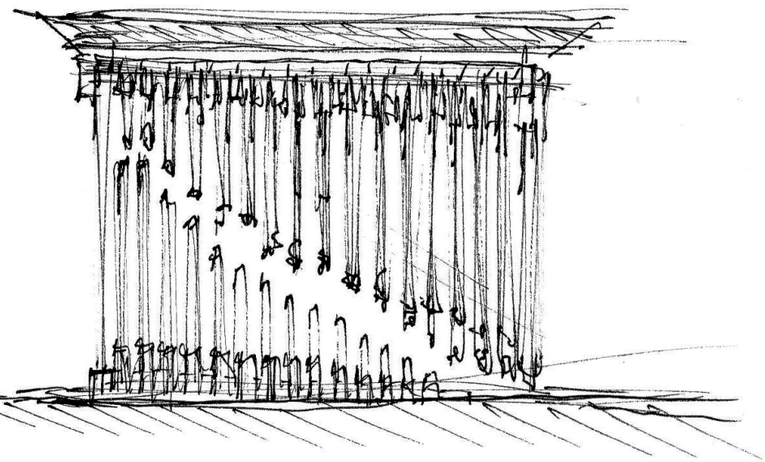


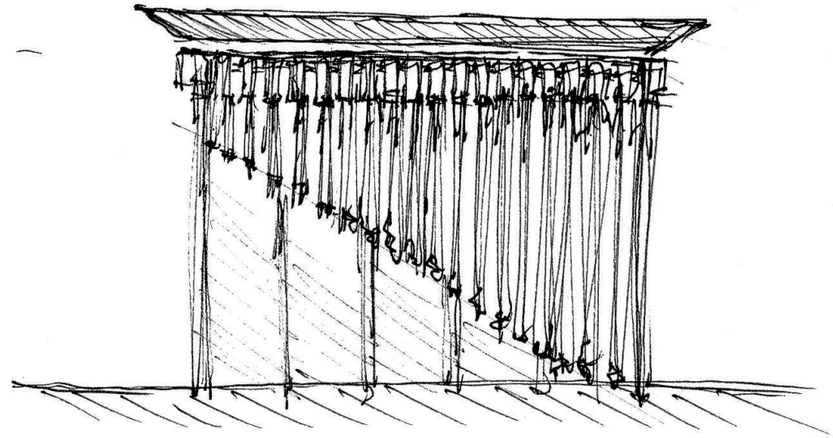


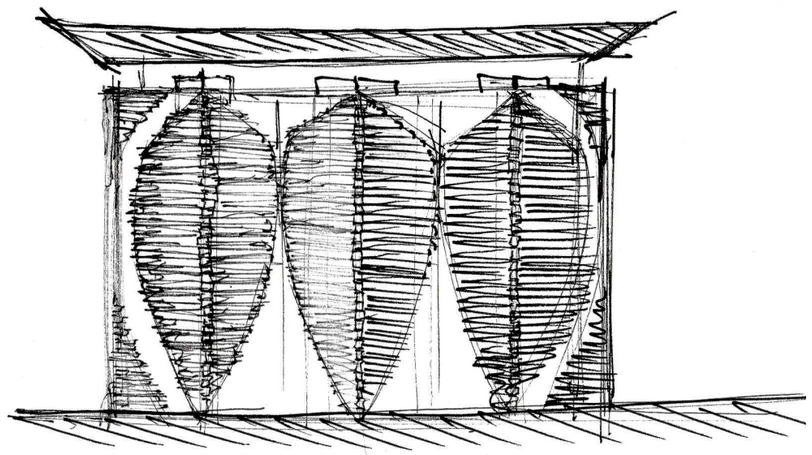
TECHNICAL REALITIES

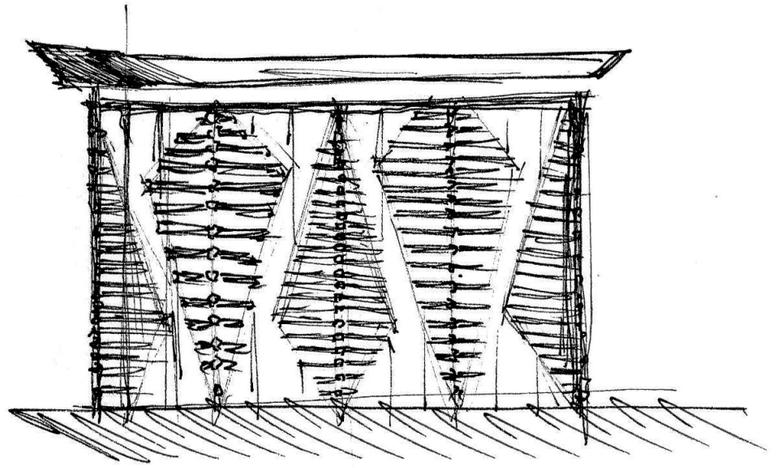
Harnessing the capabilities of CNC machining and 3D printing technologies, the design process embarked on an ambitious exploration to create a facade that mimics the organic and dynamic motion of a wave. This initiative allowed for a wide range of forms and kinetic behaviors, where the only limit was creativity. CNC technology enabled precise cutting and shaping of wood components, facilitating complex and customizable designs. Concurrently, 3D printing was employed to develop sophisticated joints and mechanical systems necessary for the facade's movement.

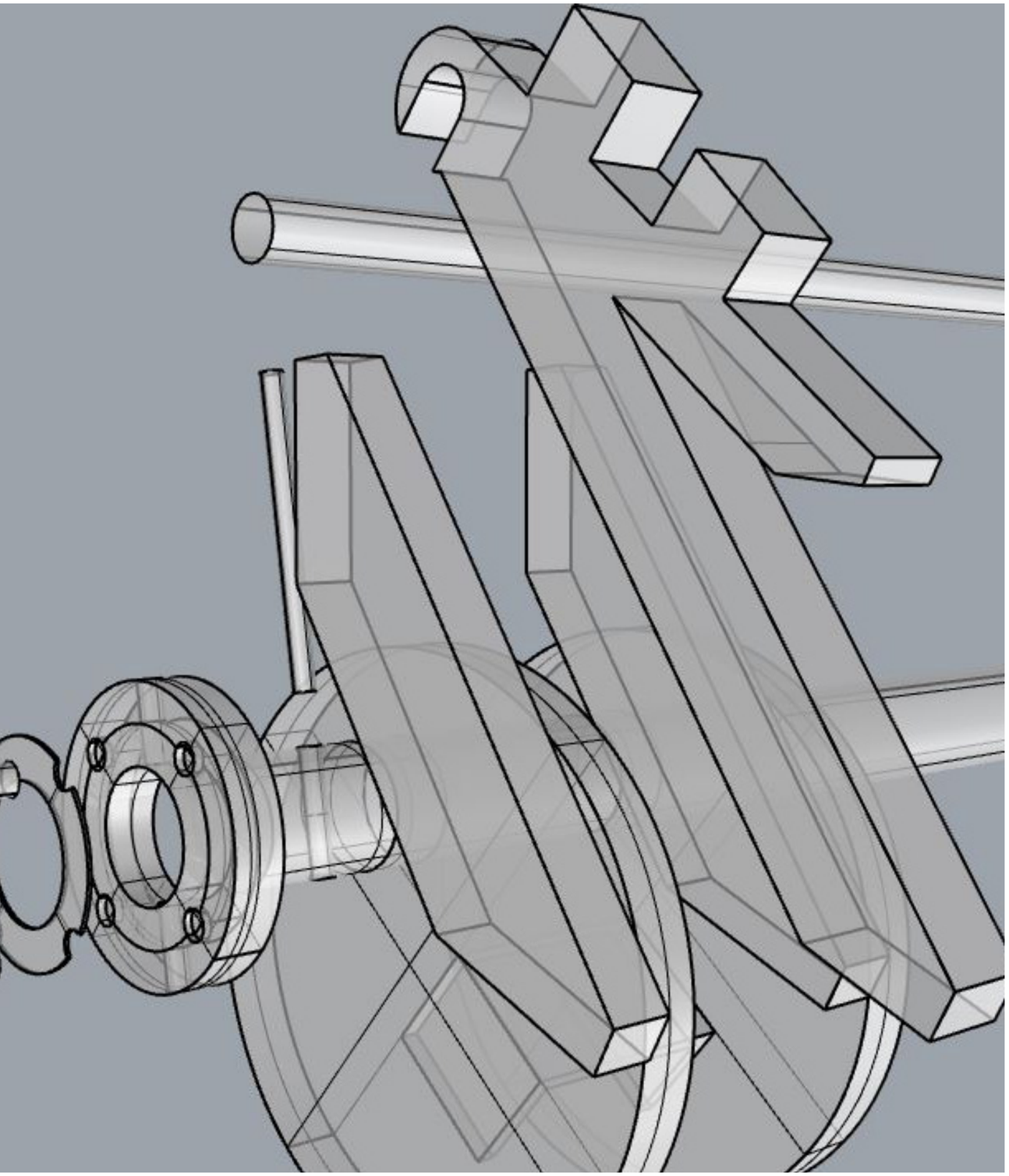
The challenge then shifted towards the practical aspects of movement—how to animate the facade elements efficiently and sustainably. Options considered included harnessing wind, solar energy, and electricity to drive the kinetic features. This phase involved intense technical scrutiny to ensure each design iteration was not only aesthetically pleasing but also functionally viable and energy-efficient. The top left model emerged as a favorite for its visual appeal and conceptual integrity, yet it raised numerous technical queries about its implementation, prompting further investigation into the detailed mechanics and materiality of the project.







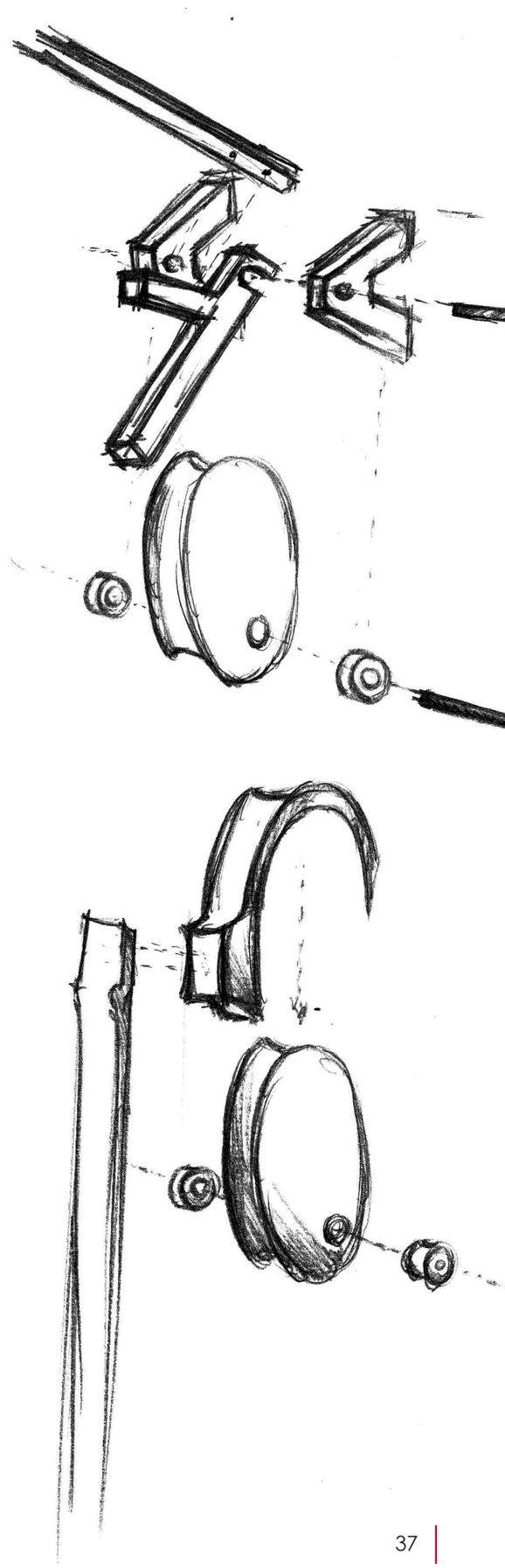




4.1 TECHNICAL EXPLORATION AND DESIGN DEVELOPEMENT

The design involves a series of vertical timber beams, each mounted on a dual-component base which is working as a support. More specifically, this support platform hosts two surfaces: one holds the base of the timber beam, while the other rests on the wheel. The lower part which rests on the wheel, features a pointed end that rests on the wheel assembly while the other end is the surface where the vertical timber beam clicks. These wheels are mounted on a central axle, each set at a specific angle to facilitate a coordinated rotational movement. As each wheel rotates, it alters the height of its peak point along the axle, which in turn adjusts the position of the connected beam support.

Due to the synchronized rotation of each wheel, the platform shifts up or down along the axle. This movement causes the vertical beams, connected at the other end of the surface, to shift correspondingly. The calculated and precise movement of each wheel in relation to its neighbors creates a dynamic, wave-like motion across the entire structure. This kinetic behavior is designed to simulate the natural undulation of waves, providing a visually captivating and interactive architectural feature.



4.2 | THE WAVE

TECHNICAL EXPLORATION AND DESIGN DEVELOPEMENT

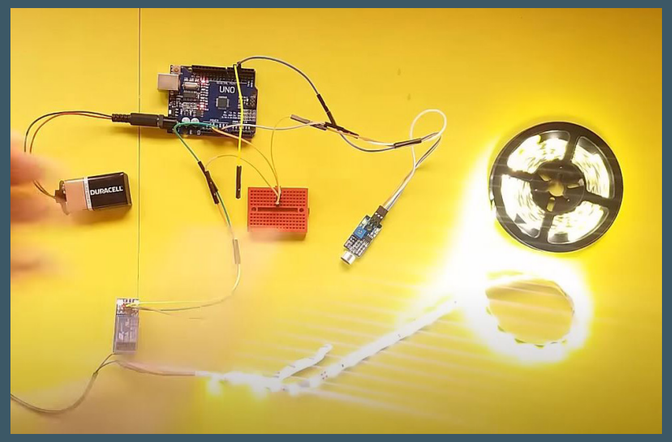
In addition to the technical and mechanical aspects, considerable attention was given to the materiality of the structure. Explorations into sustainable material options led to the consideration of mycelium for the wheel components, due to its moldability and environmental friendliness. For the vertical beam elements, the potential use of natural recycled fibers such as cotton and other natural composites was evaluated. These materials were chosen for their sustainability and the fact that they are not required to bear significant loads, making them ideal for such innovative applications in facade design.

In addition, the functionality of the lighting was meticulously planned through an integrated system. A motherboard equipped with the necessary script and an Arduino controller, along with a sound sensor, were linked to a strip of LED lights. This setup formed the basis for a proof of concept, demonstrating how the LED lighting could dynamically respond to sounds within the pavilion and change the intensity of the light depending on higher or lower volumes of the inside sounds, thereby providing a direct interaction between the interior activities and the facade's visual output.

However, the exploration into using mycelium, detailed on the top right of the following page, revealed significant challenges. The material requires specific conditions for cultivation, casting, and maintenance. Ensuring its durability to prevent breaking, melting, or rupturing under load proved overly demanding, presenting substantial practical limitations for its use in structural applications.

Moreover, the process of shaping natural fibers and composites into durable forms, while not load-bearing, requires extensive knowledge in material science—a topic substantial enough to be a thesis in itself. These fibers and their potential applications are illustrated mid-left and right of the following page. While despite the challenges with mycelium, it's important to acknowledge the unique forms it can achieve, as depicted in the image at the bottom of the following page.

Lastly, the exploration into using an Arduino robot for implementing automated lighting was halted. I was advised to refocus on the architectural aspects of the project, as it is primarily a design endeavor, not a robotics one.





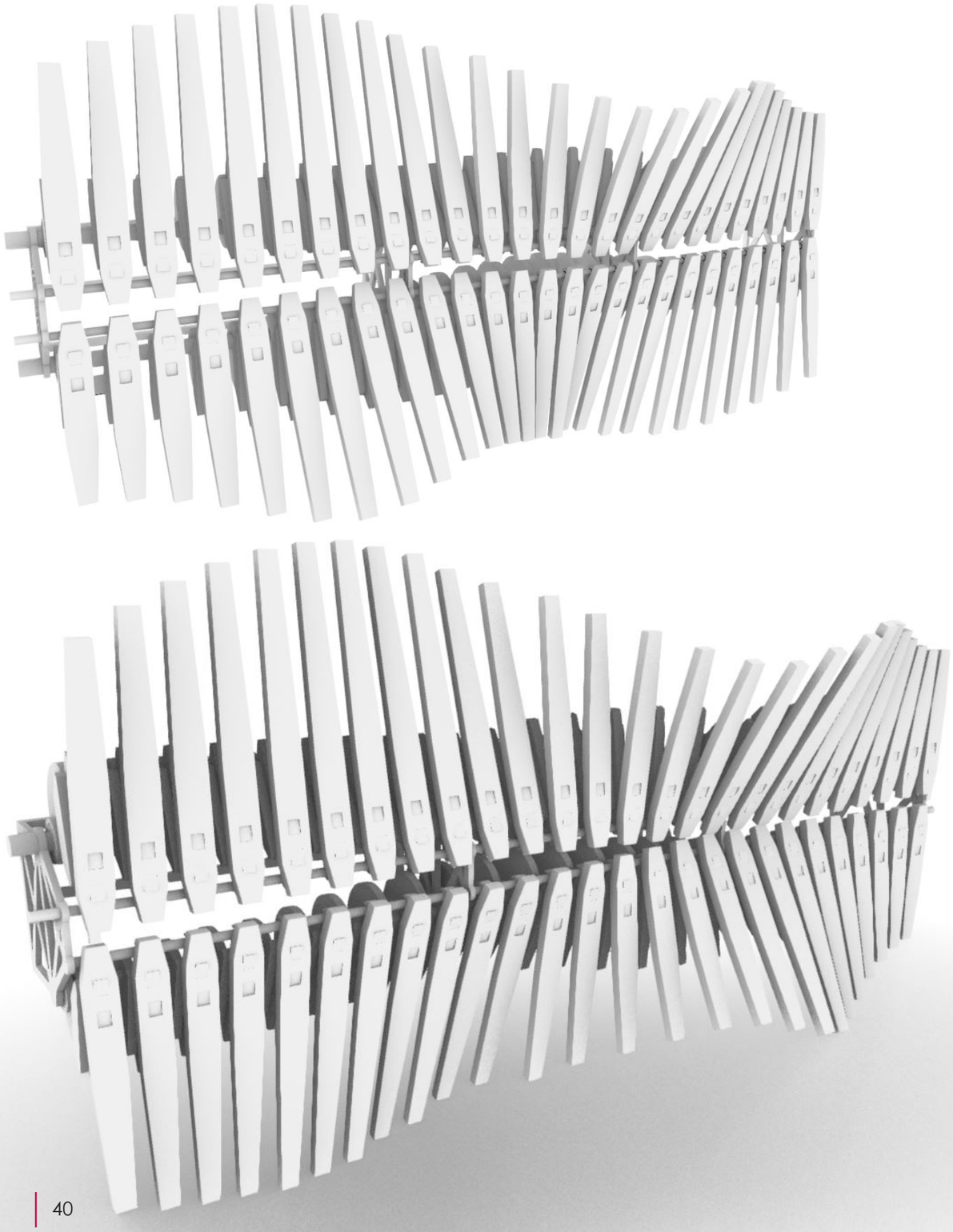




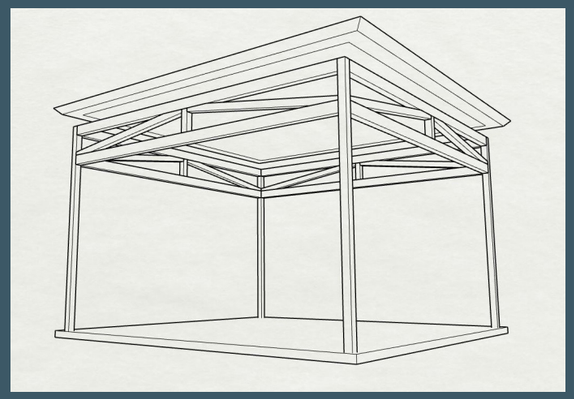


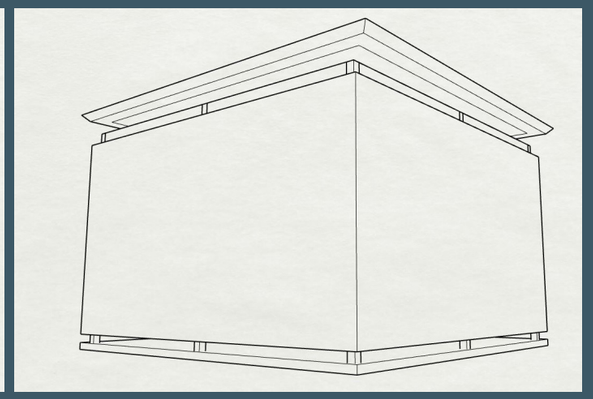
4.2 | THE WAVE

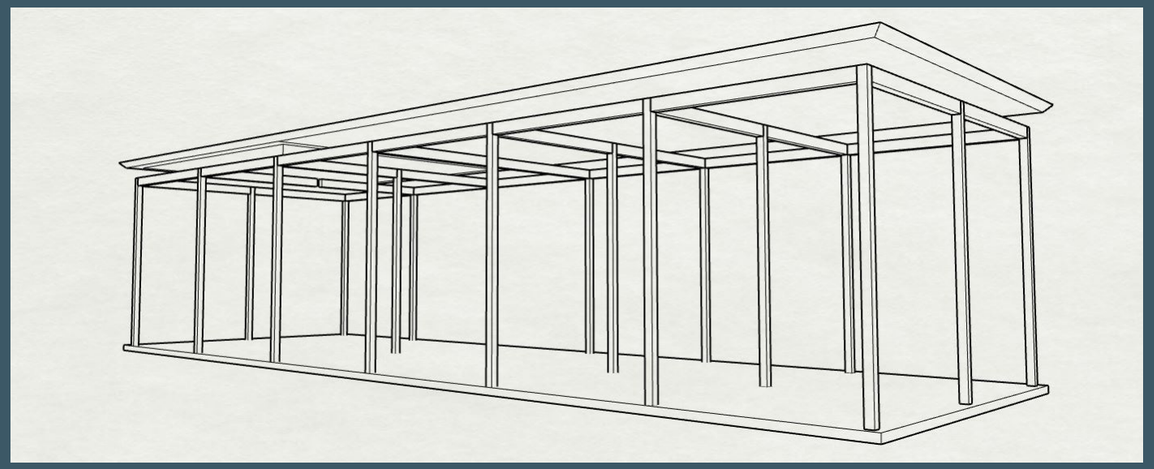
FINAL ADJUSTMENTS









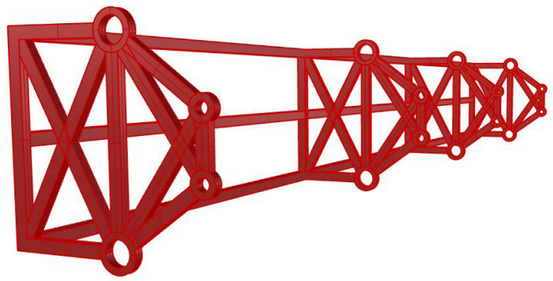


Swifting focus from the scientific aspect of the project to its more architectural, the inspiration of the design was re-evaluated. As a result, from the responsive movement of touch-me-not leaves, which react organically to environmental stimuli, the updated version of "The Wave" had been refined to resemble a leaf. This new design enhances its adaptability, allowing it to be mounted on any structural box, regardless of the material—concrete or steel—or dimensions. This concept is visually supported in the images above, including a depiction of the touch-me-not leaf, illustrating the natural inspiration behind the design.

4.2 | THE WAVE

FINAL ADJUSTMENTS

1.



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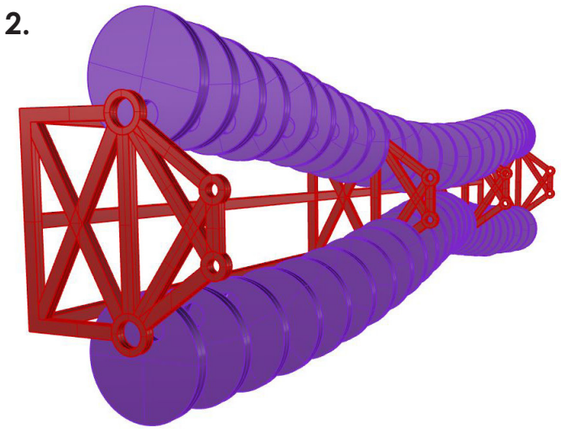

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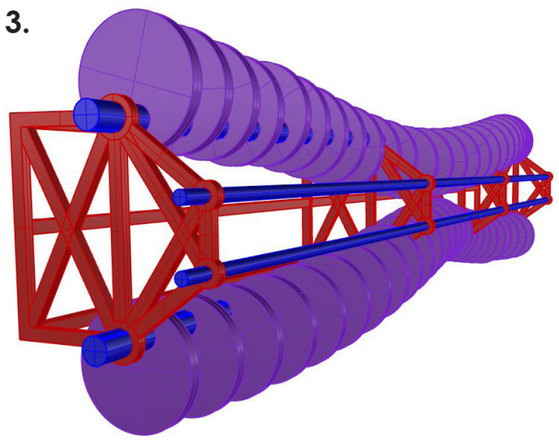

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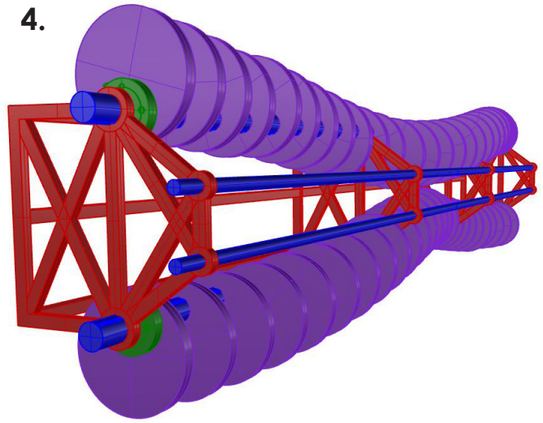

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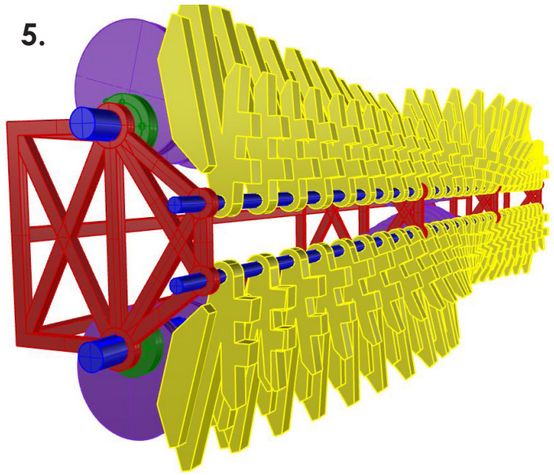

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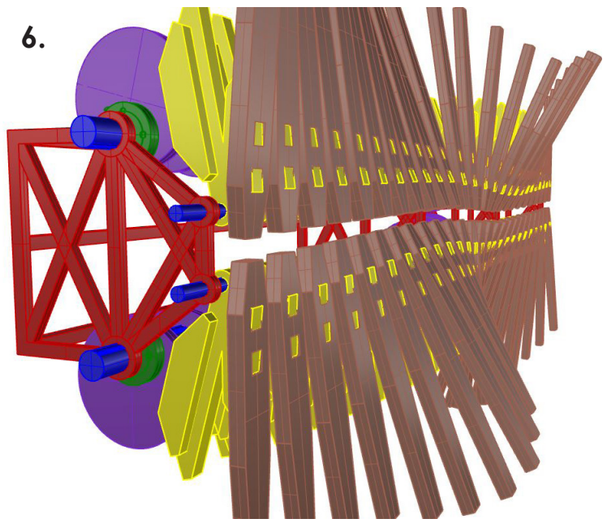
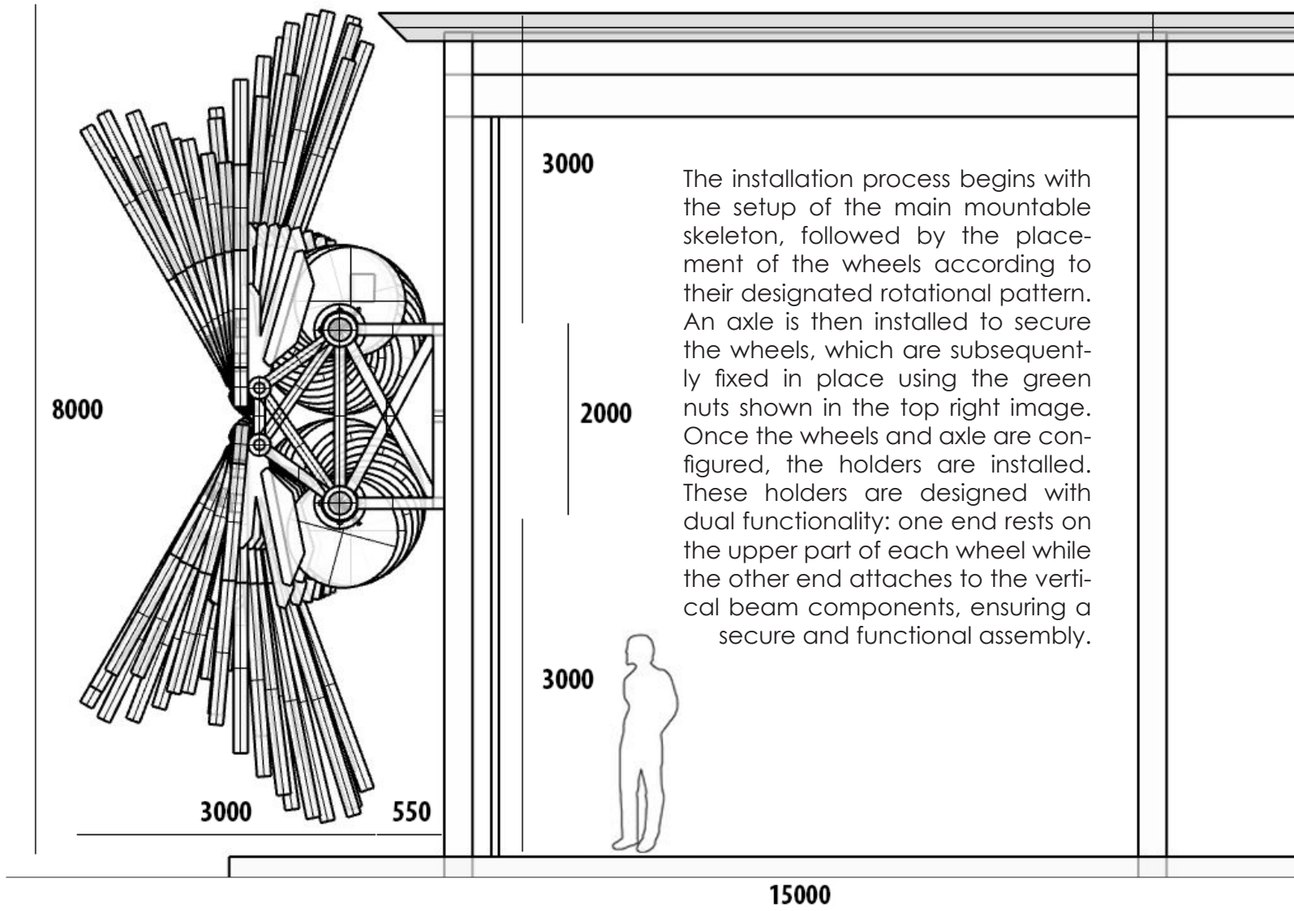
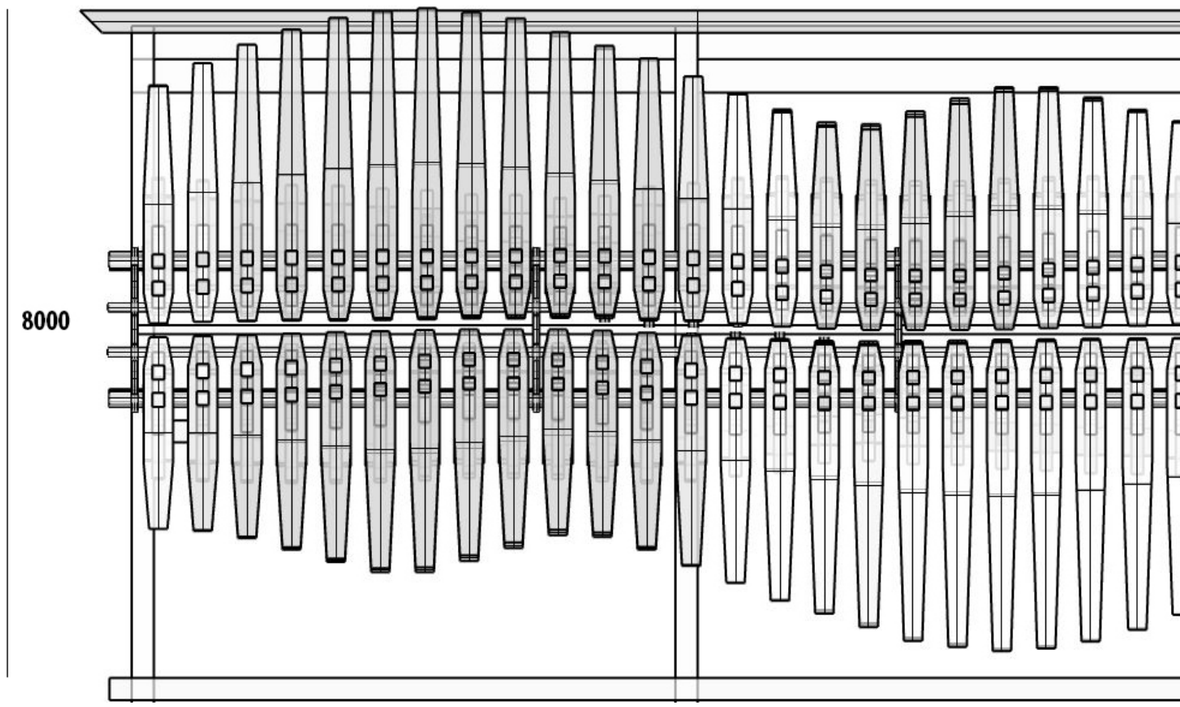




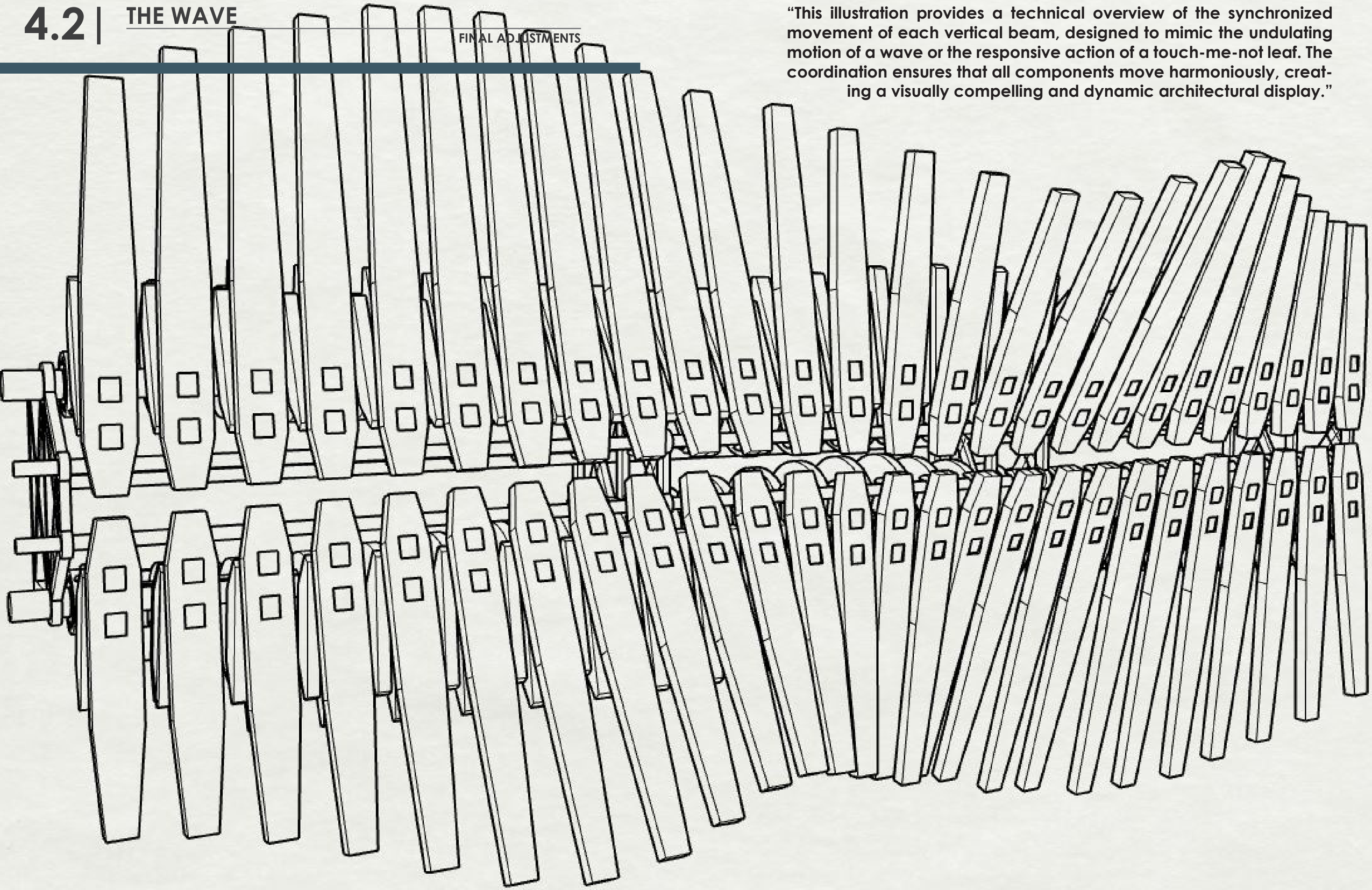
The installation process begins with the setup of the main mountable skeleton, followed by the placement of the wheels according to their designated rotational pattern. An axle is then installed to secure the wheels, which are subsequently fixed in place using the green nuts shown in the top right image. Once the wheels and axle are configured, the holders are installed. These holders are designed with dual functionality: one end rests on the upper part of each wheel while the other end attaches to the vertical beam components, ensuring a secure and functional assembly.

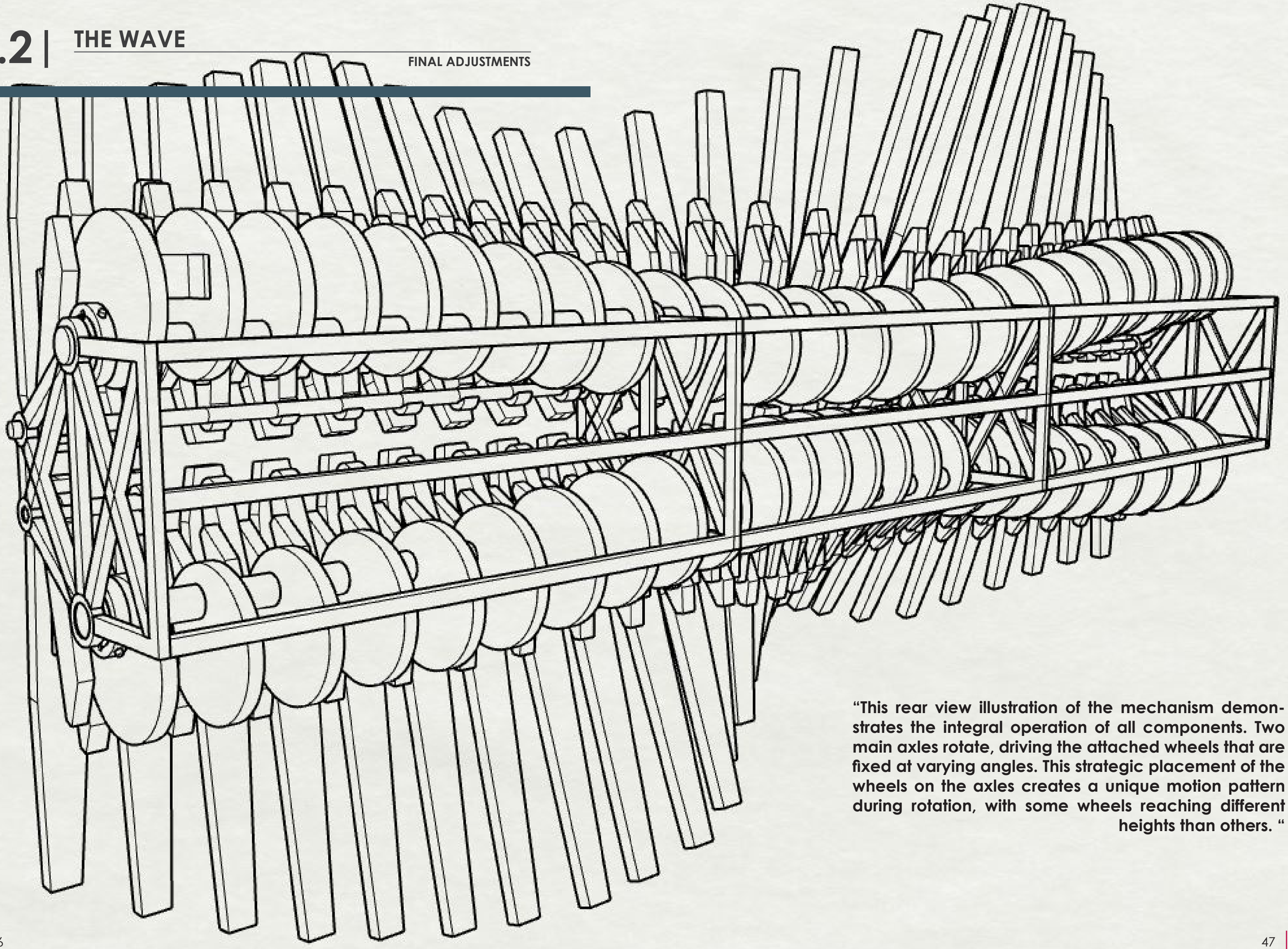


4.2| THE WAVE

FINAL ADJUSTMENTS

"This illustration provides a technical overview of the synchronized movement of each vertical beam, designed to mimic the undulating motion of a wave or the responsive action of a touch-me-not leaf. The coordination ensures that all components move harmoniously, creating a visually compelling and dynamic architectural display."



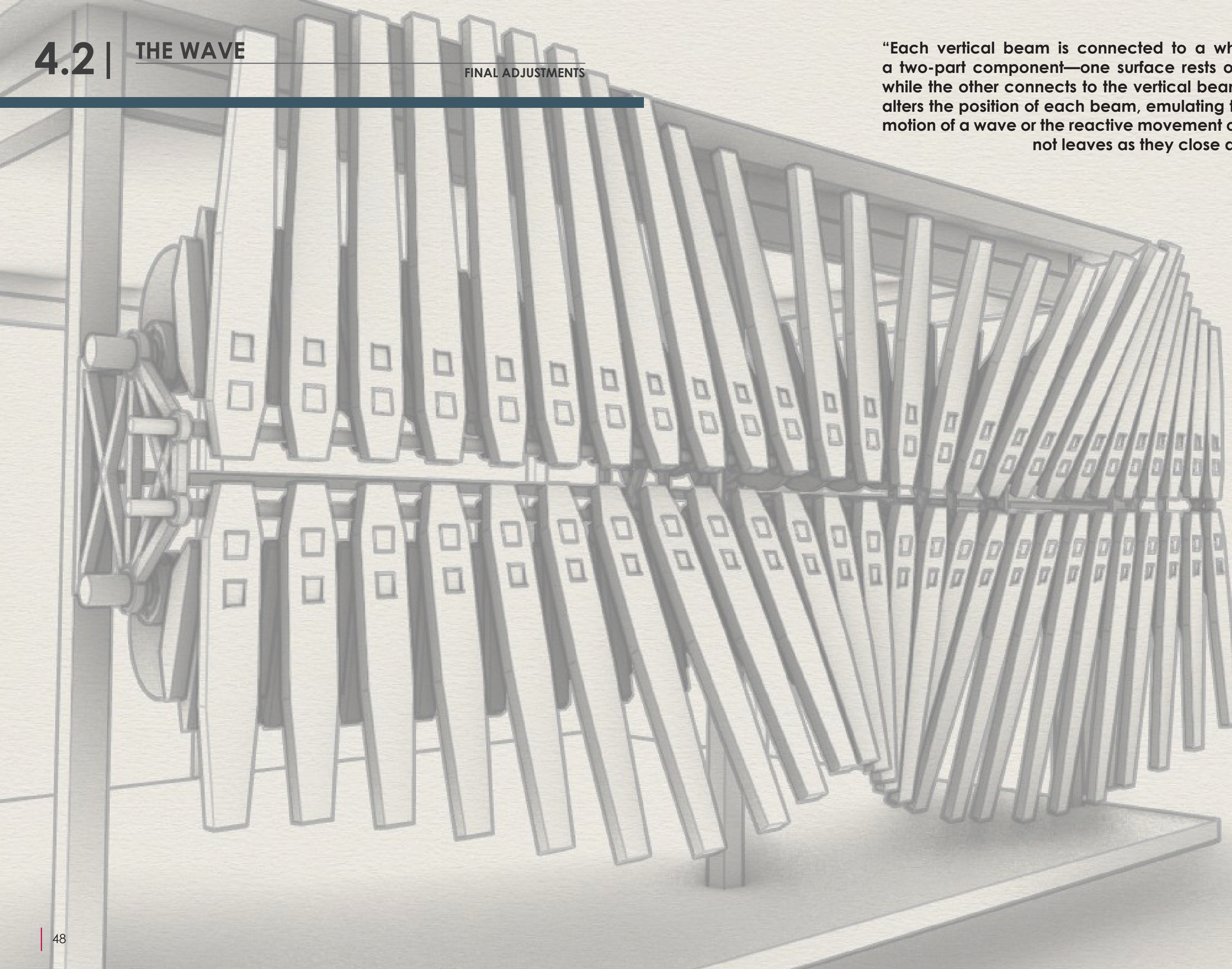


“This rear view illustration of the mechanism demonstrates the integral operation of all components. Two main axles rotate, driving the attached wheels that are fixed at varying angles. This strategic placement of the wheels on the axles creates a unique motion pattern during rotation, with some wheels reaching different heights than others. “

4.2 | THE WAVE

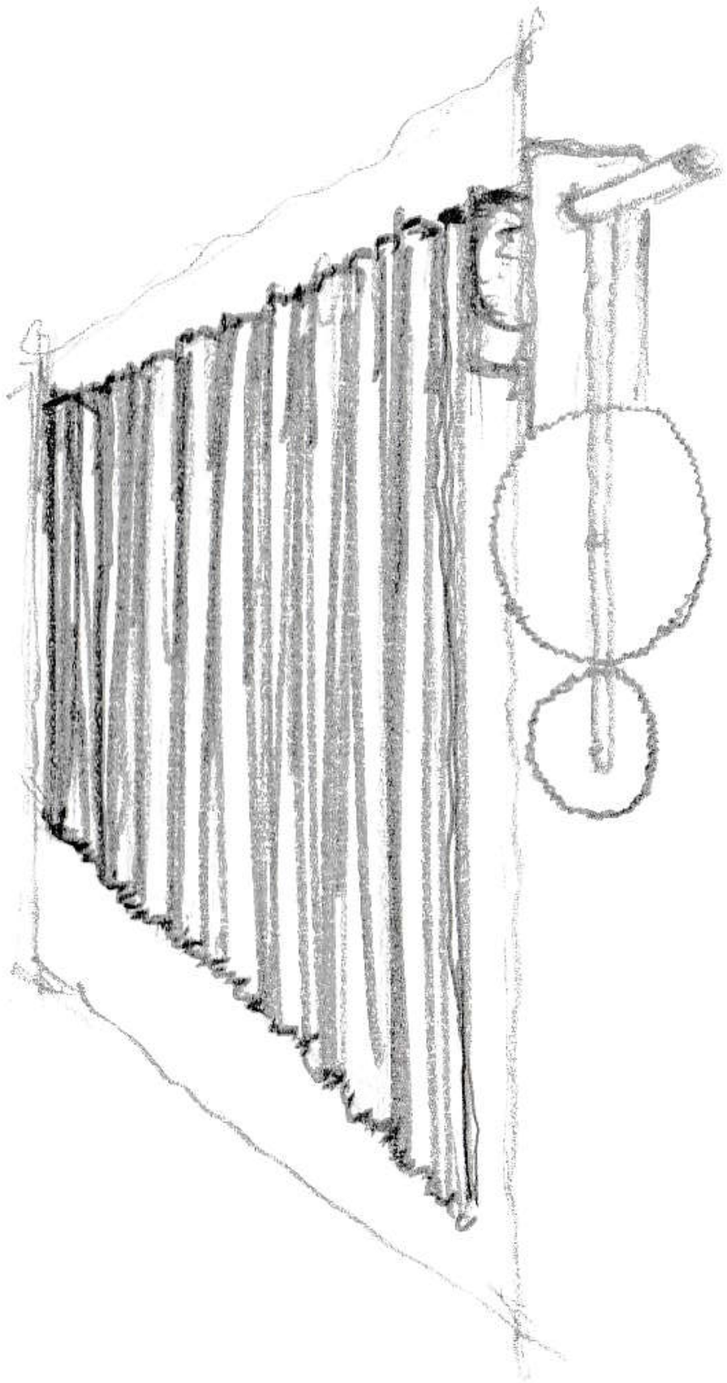
FINAL ADJUSTMENTS

“Each vertical beam is connected to a wheel through a two-part component—one surface rests on the wheel while the other connects to the vertical beam. This setup alters the position of each beam, emulating the dynamic motion of a wave or the reactive movement of touch-me-not leaves as they close and reopen.”



4.2 | THE WAVE

FINAL ADJUSTMENTS



However, the project's extensive technical complexities and mechanical intricacies ultimately led to its downfall. Initially envisioned to dazzle and impress, prioritizing aesthetics, the project's ambitious scope became its greatest challenge.

Despite the last project's oversimplification and the assumption that using 3D printing, CNC machining, steel, and motors equates to innovation, it resulted in a cumbersome and massive structure. While functional as a modular component adaptable to various building materials and sizes, it significantly lacks aesthetic appeal.

The design's focus on flat surfaces restricts its application to more organic or circular structures. Marcel critiqued the approach, noting that the project began with the mechanics—akin to assembling a car starting with the engine and its connections to the wheels and gearbox—rather than shaping the form first and then integrating the mechanical components. This method, along with the reliance on specific materials and Arduino robots, led to a technically complex yet aesthetically limited outcome.

This focus on intricate mechanics shifted attention away from the primary objective of crafting architectural narratives. The design, replete with gears and axles, resembled a Leonardo da Vinci-style weapon more than a sleek, adaptable facade. This realization led to the abandonment of this approach.

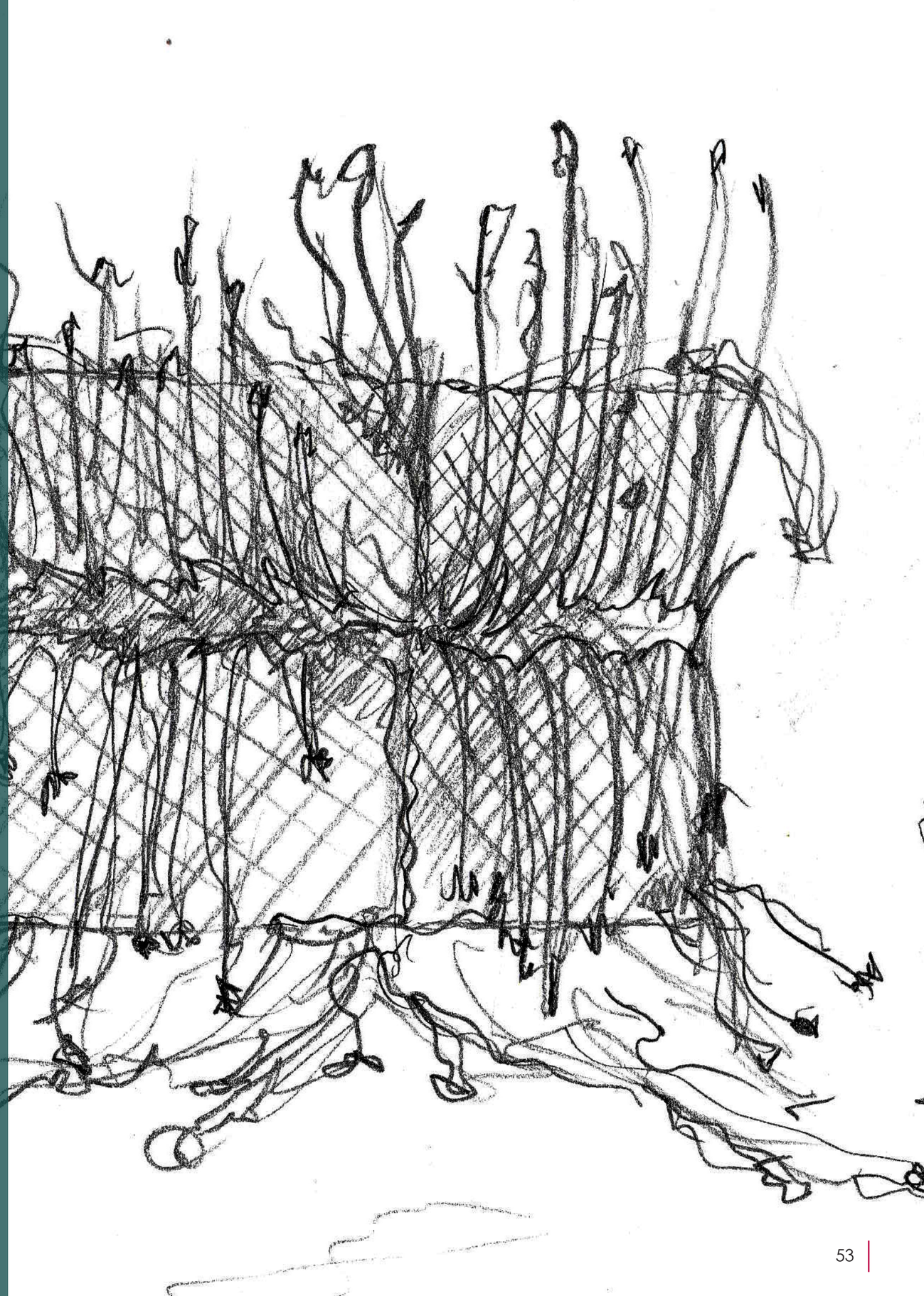
Be that as it may, the conceptual inspiration from the leaf and touch-me-not plant propelled the development of the next design iteration.

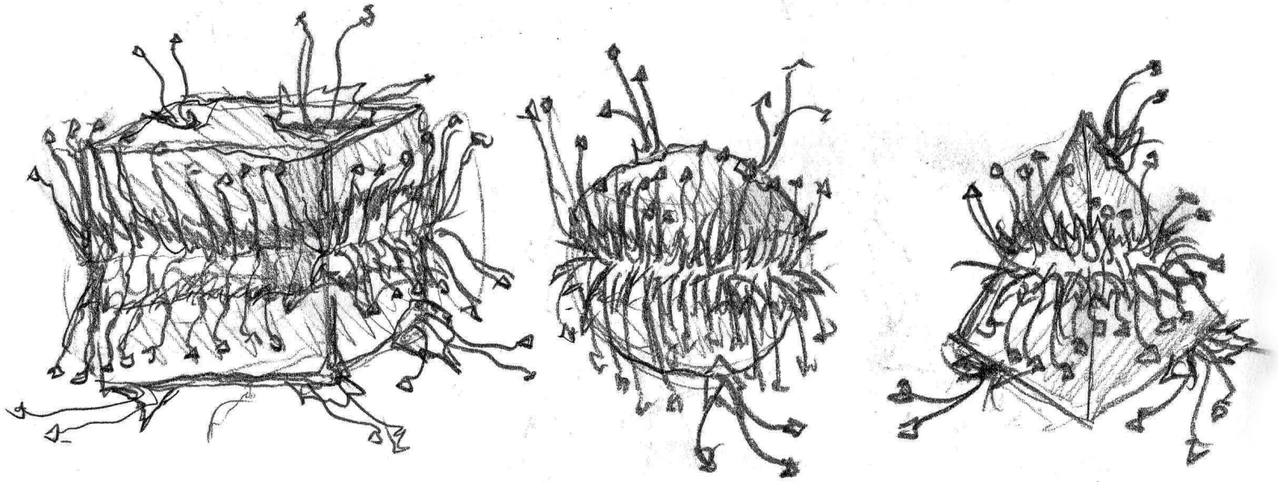
5.

THE FLORA

植生

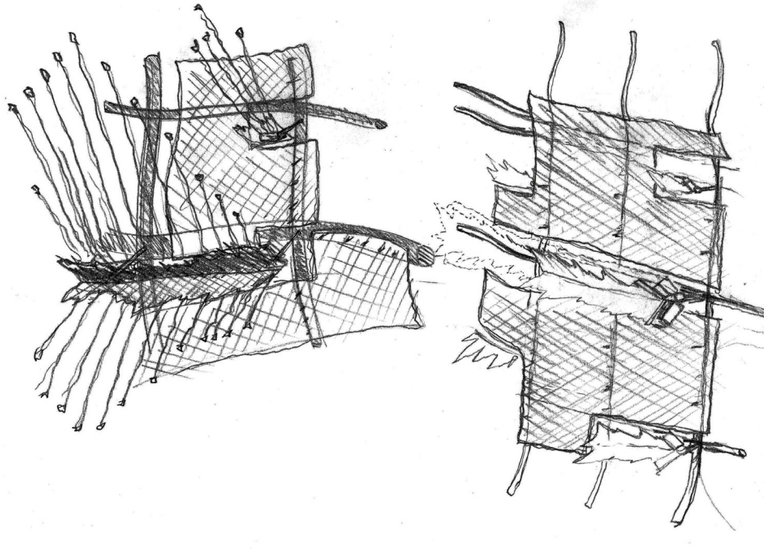
"The Flora," a design concept that disregards building technology limitations to achieve poetic expression through freeform, sculptural design, mimicking the relationship between nature and the artificial.

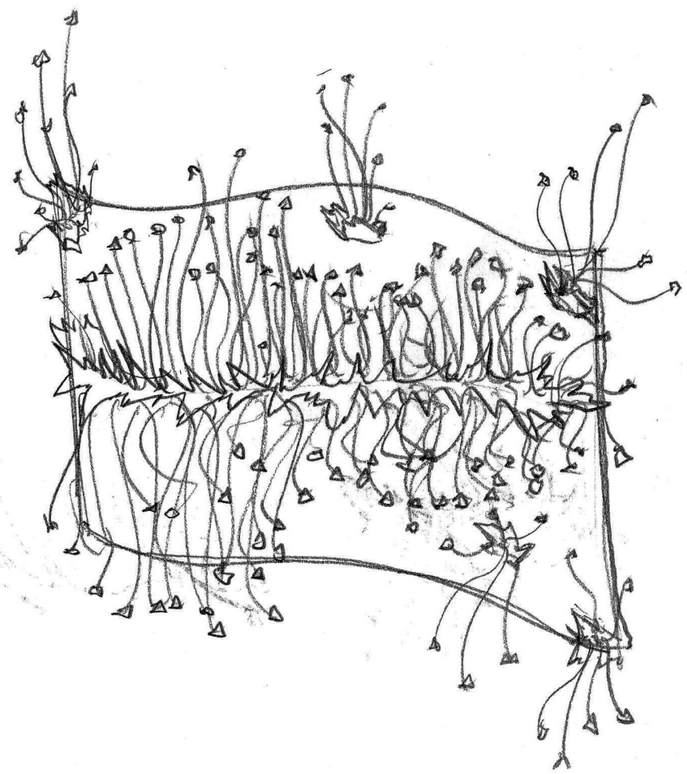


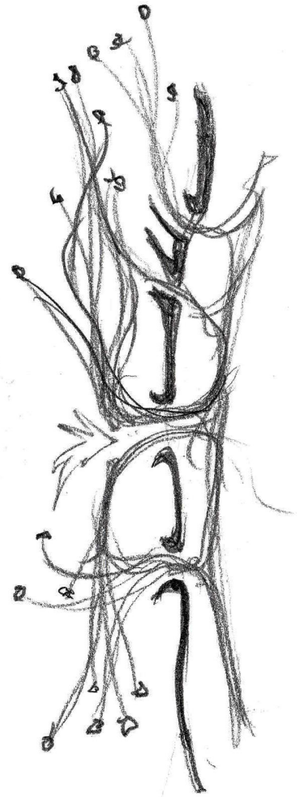


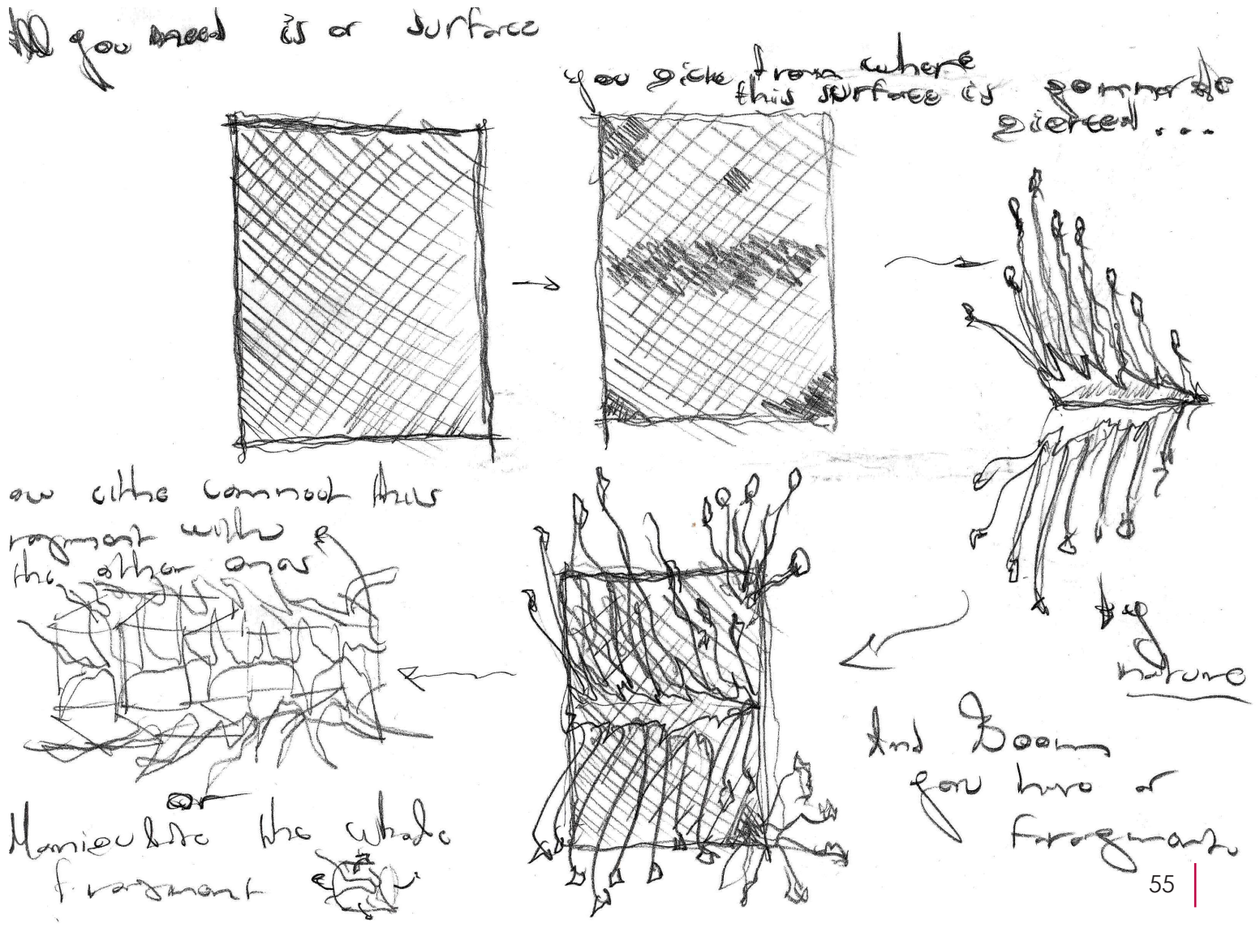
ARTISTIC EXPRESSIONS

Instructed to transcend the confines of building technology, I was encouraged to liberate myself from mechanical constraints, assembly methods, and material optimization to embrace a purely poetic approach. As I sat on a bench near my home, observing straw plants sway resiliently against the wind and rain, their collective strength and individual grace inspired me. This observation sparked a realization: nothing surpasses the poetic beauty of nature and its effortless dominion. Thus, inspired by the sublime interplay of nature's resilience and elegance, my architectural vision evolved post-P3 feedback into a design unconstrained by technicalities, celebrating an uninhibited creative process.





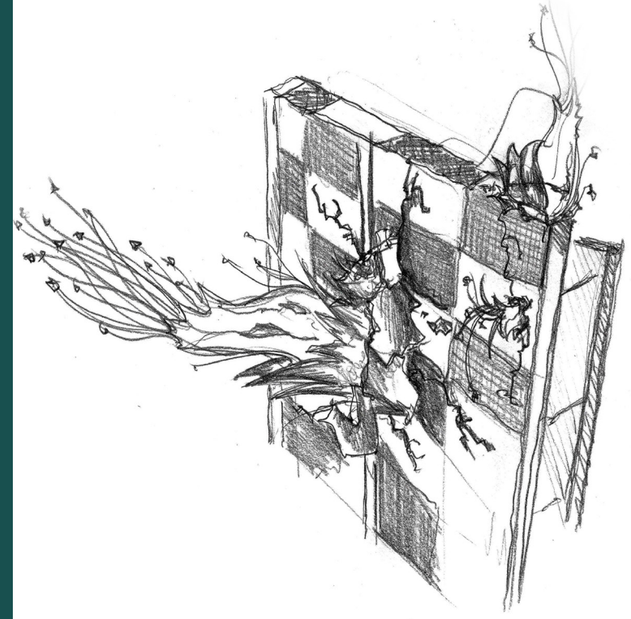






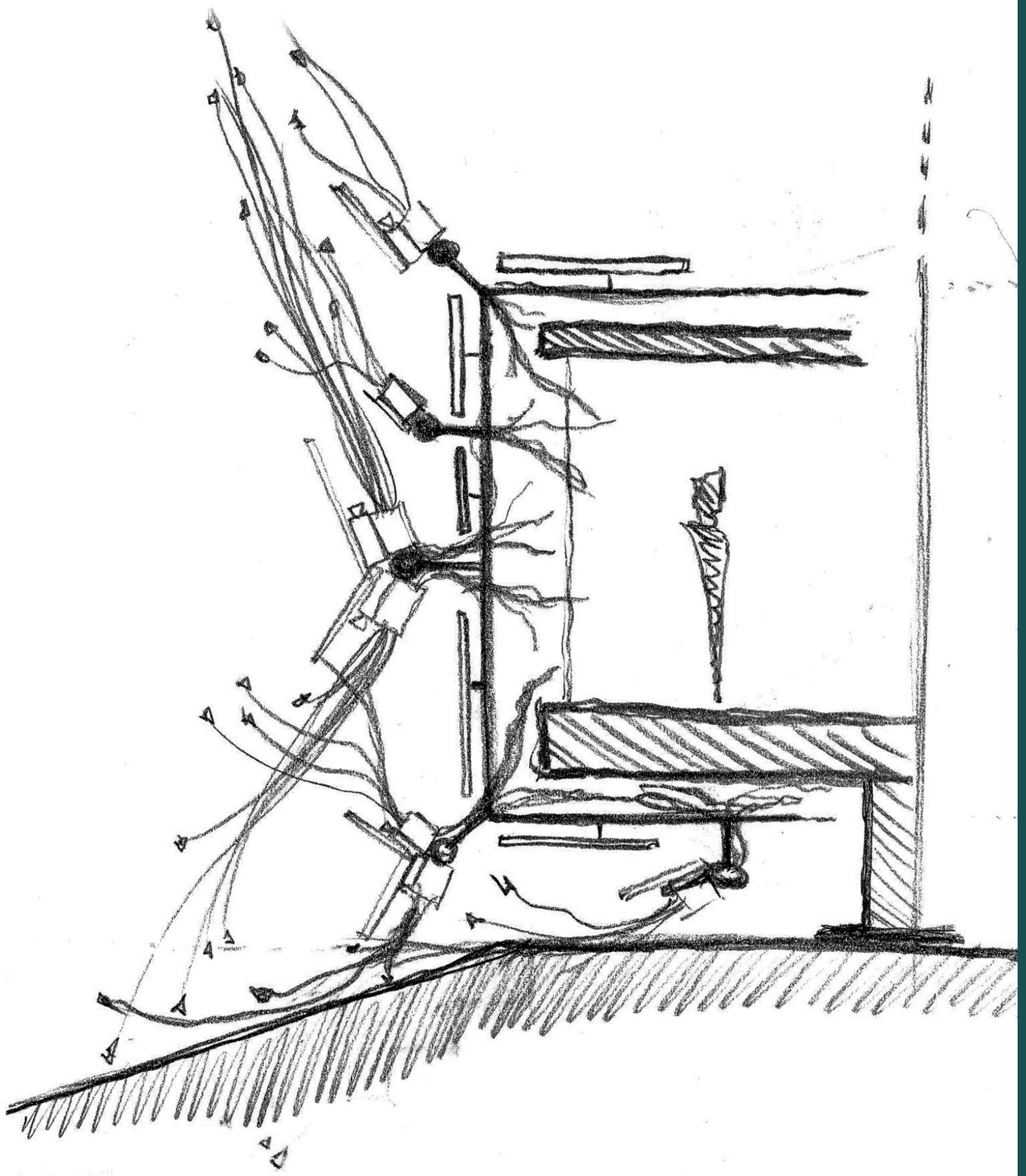
5.1 ARTISTIC INTERPETATION AND CONCEPTUALIZATION

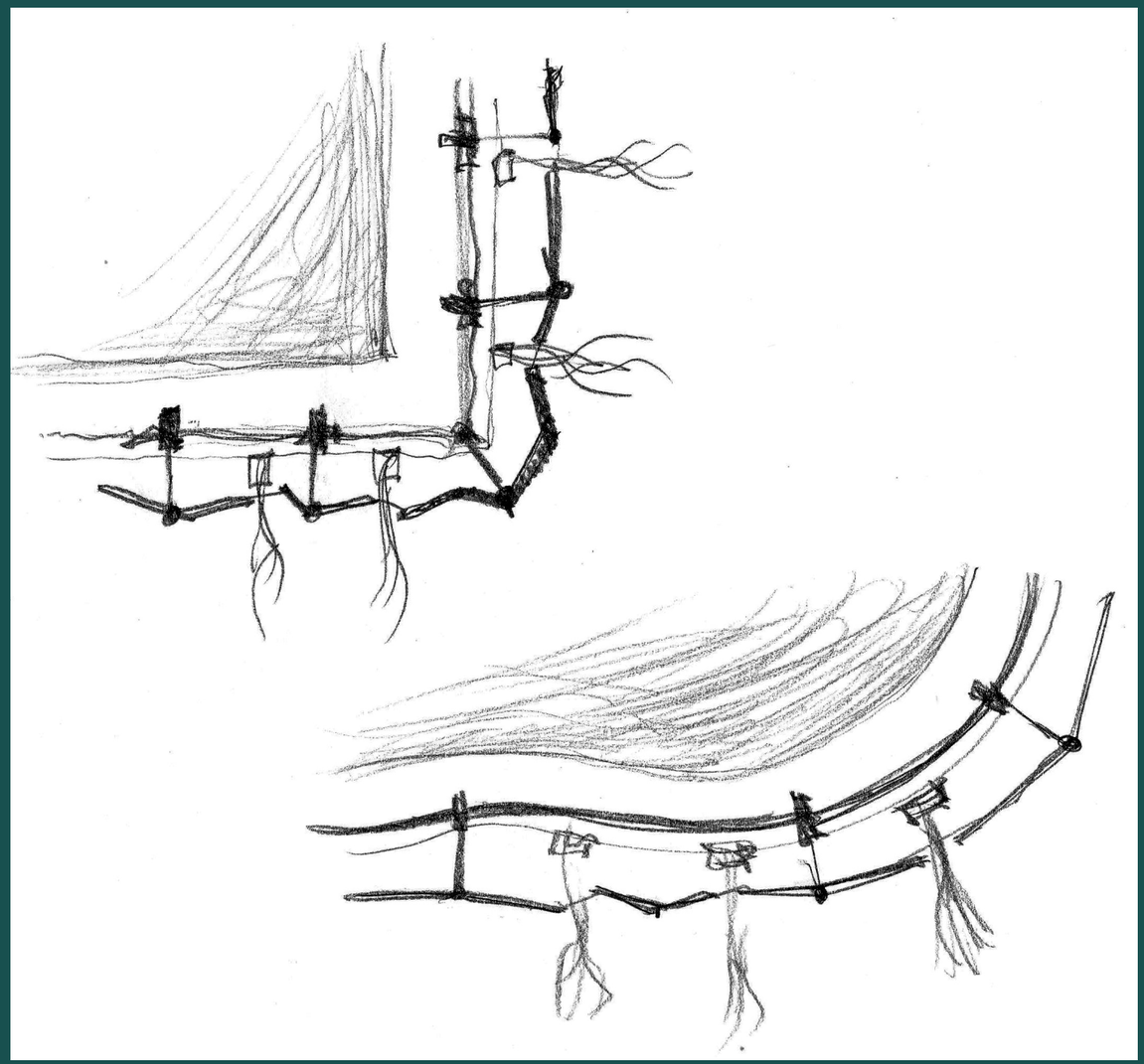
In a way, it demonstrates how nature can grow and evolve over any surface, rooting within any domain, and creating this beautiful contradiction between the artificial hand-made structures over its rise of greenary. This contradiction, also coaligns with the bio-based lab essence, since we are talking about a place where advanced technologies are used, in order to harvest natural resources. So having this idea, concept arts were created to vizualize the vision of nature taking over any structure, in its path.



5.2 | THE FLORA

REFLECTIONS ON AESTHETIC AND FUNCTIONALITY



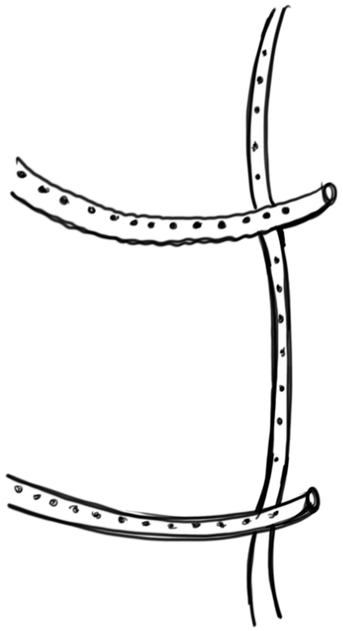


Consequently, this is what I came to. The previous design, stripped from all its gears and heaviness, while keeping the smooth flowie form of a leaf, as well as its “touch me not” movement. However, this design, should also be turned into a facade, which should almost work as a stand-alone structure creating the areas from where its placed. The idea was to create a multi-layered facade surface with patterns of cracked places where from the ‘leaf blades’ would rise.

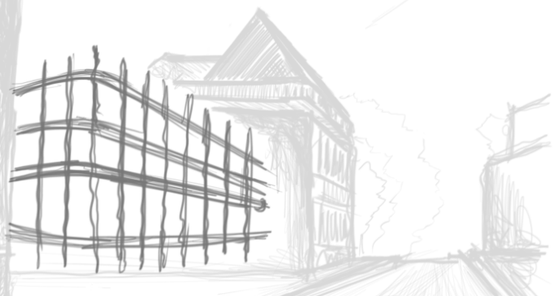
The facade section sketch on the left illustrates our anticipated outcome: a facade that exists as a self-contained, fully equipped surface, with all elements pre-attached, supported only by the floor and ceiling onto which it is mounted.

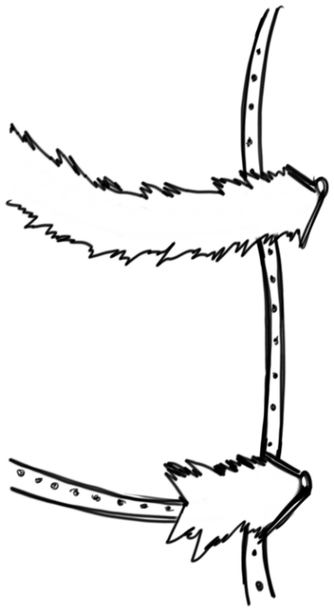
5.2| THE FLORA

REFLECTIONS ON AESTHETIC AND FUNCTIONALITY

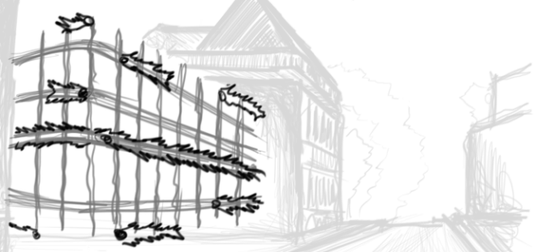


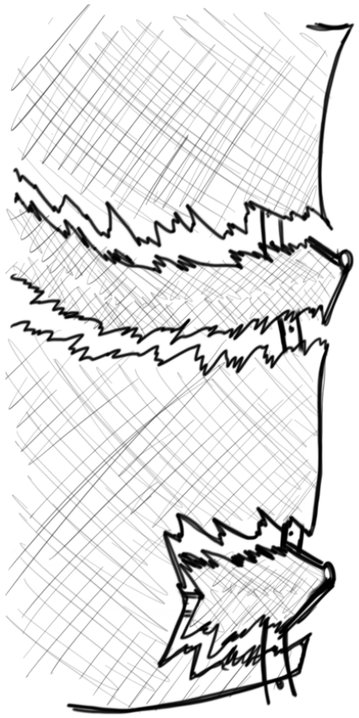
This system can be replicated sequetialy to generate the necessary space for the bio-based lab. Furtermore, Its material's elasticity allows for the desired shape to be achieved. Here, we outline the steps detailing the facade's structural framework. It begins with elastic pipes serving as the primary load-bearing skeleton, featuring holes or inserting the leaf blades.



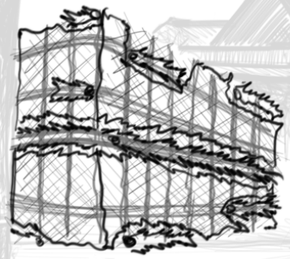


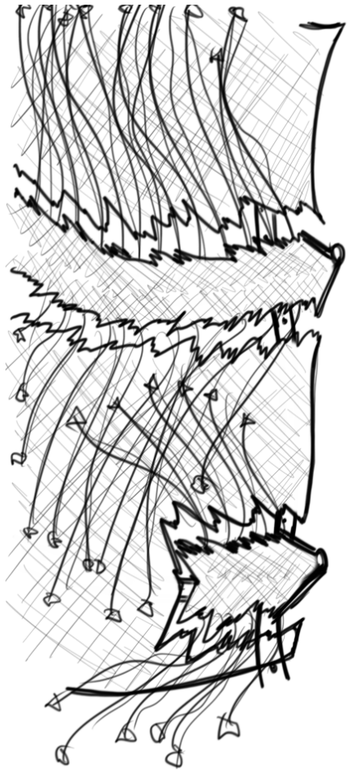
In various locations, sections of the facade's material appear "cracked," revealing hidden lighting and the mechanisms for tilting the leaf blades, all discreetly concealed behind these surface pieces.



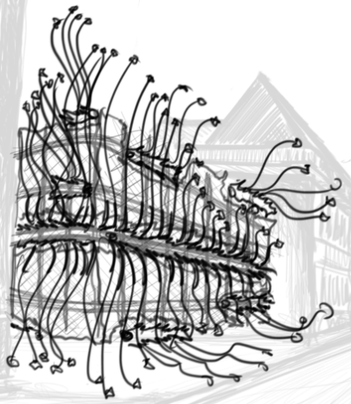


Subsequently, the remaining surface area is covered with the same elastic material which on the previously mentioned segments appeared as cracked.





Then the leaf blades are introduced, which as mentioned before, could be either straws or light artificial vein-like bodies

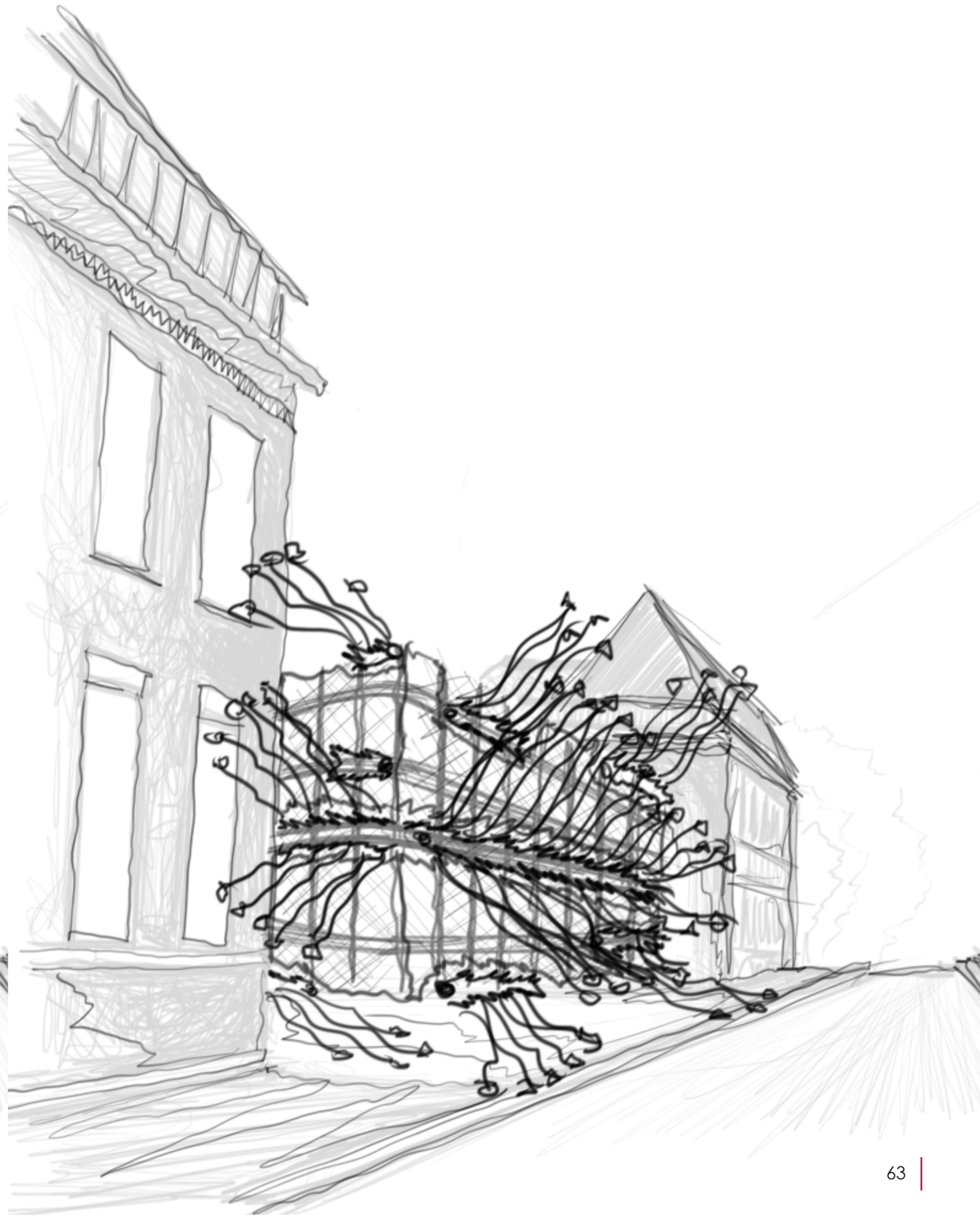


5.2 | THE FLORA

REFLECTIONS ON AESTHETIC AND FUNCTIONALITY

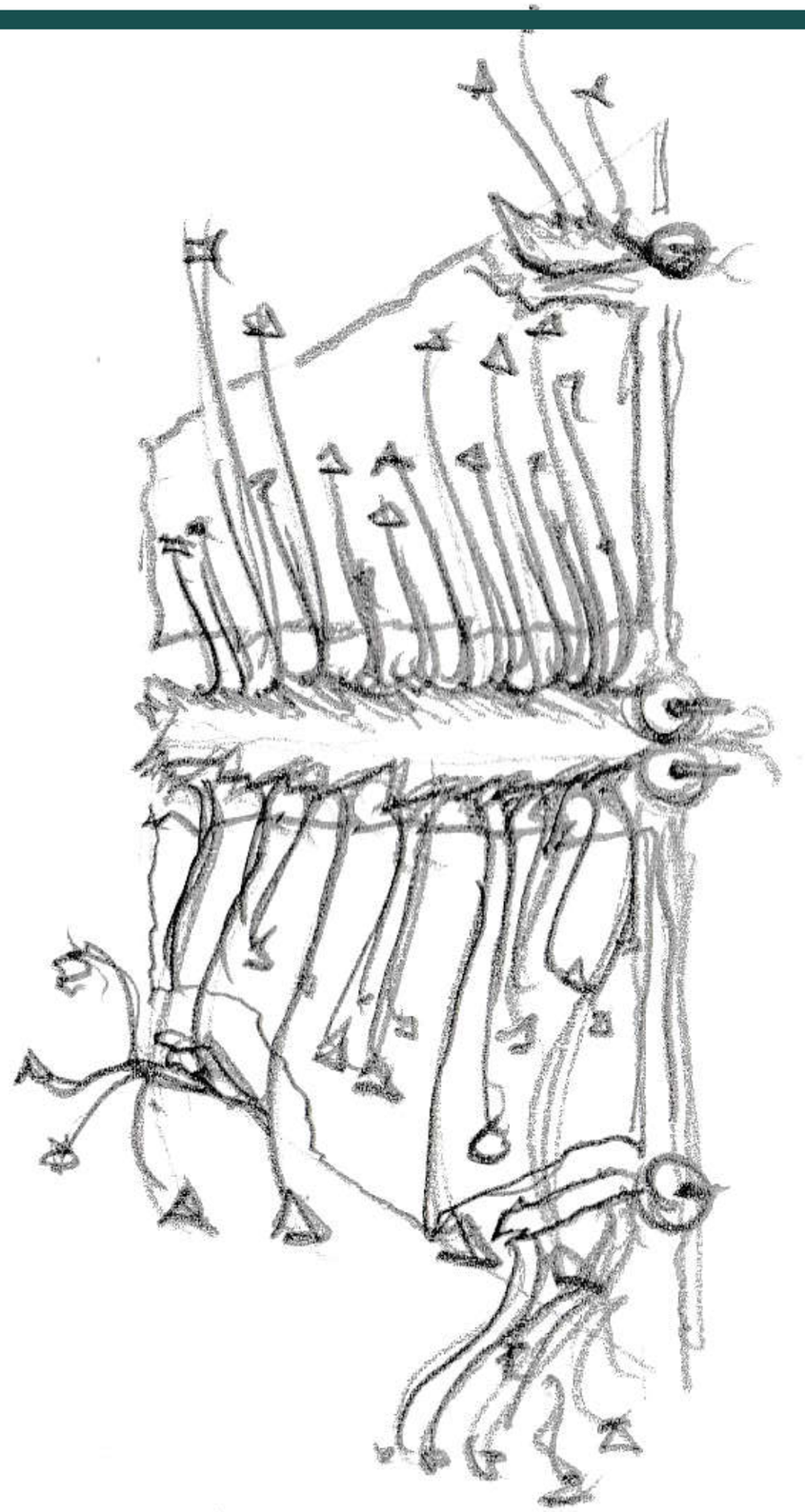
The motion of the facade, reminiscent of the reactive movements of touch-me-not leaves upon stimulation, is illustrated in the two frames presented below.





5.2 | THE FLORA

REFLECTIONS ON AESTHETIC AND FUNCTIONALITY



Unfortunately, this design ultimately proved unsustainable. Beginning with such an abstract, artistic concept posed significant challenges in scaling, material selection, and integration of practical mechanisms. As the project progressed, it became apparent that selecting unconventional materials solely for their flexibility was impractical. These materials often lacked structural integrity, rendering them unsuitable for load-bearing applications. This realization prompted a shift in approach: instead of relying on flexible materials, the design incorporated rigid elements linked by flexible joints. This led to the development of a triangular design for the next project phase, where the inherent rigidity of triangles, combined with flexible connections, allowed for versatile structural configurations.

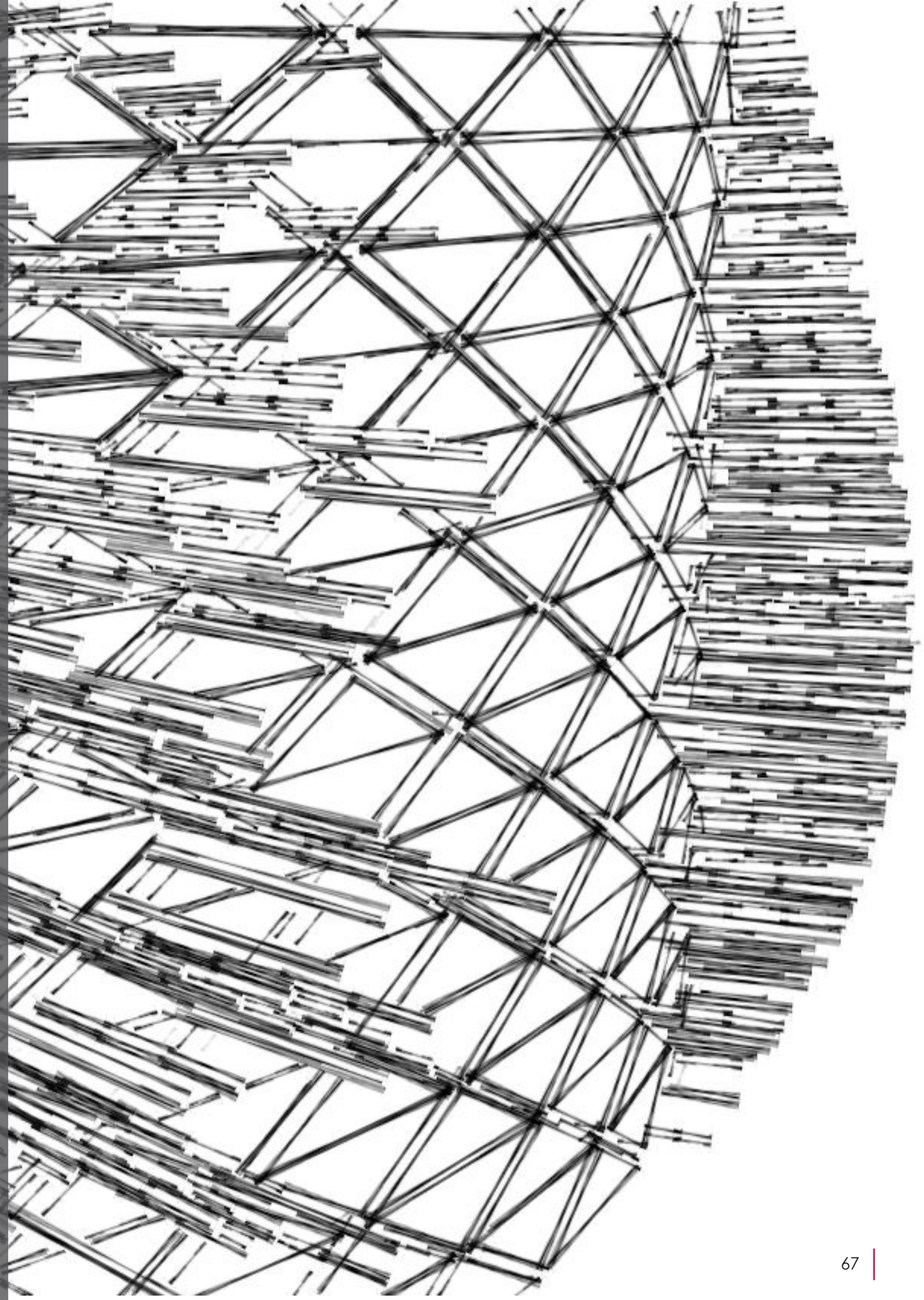
Additionally, integrating architectural solutions with such designs presented a significant challenge. The strong central spine and the random distribution of openings, which lacked controlled design elements, made it difficult to adapt the facade to various building forms. Essentially, the project struggled to conceptualize how this facade could be used to construct a pavilion, as the initial goal was to develop a facade system capable of forming a pavilion, rather than a pavilion defined by this specific facade style. This realization highlighted the need for a design approach that could more flexibly integrate with diverse architectural applications.

6.

THE URCHIN

雲丹

"The Urchin," the final design featuring a versatile facade component that supports various forms while adhering to core principles of media-enhanced lighting and kinetic motion effects based on viewer perspective. It explores multiple variations that stem from this adaptable facade, culminating in the definitive design.

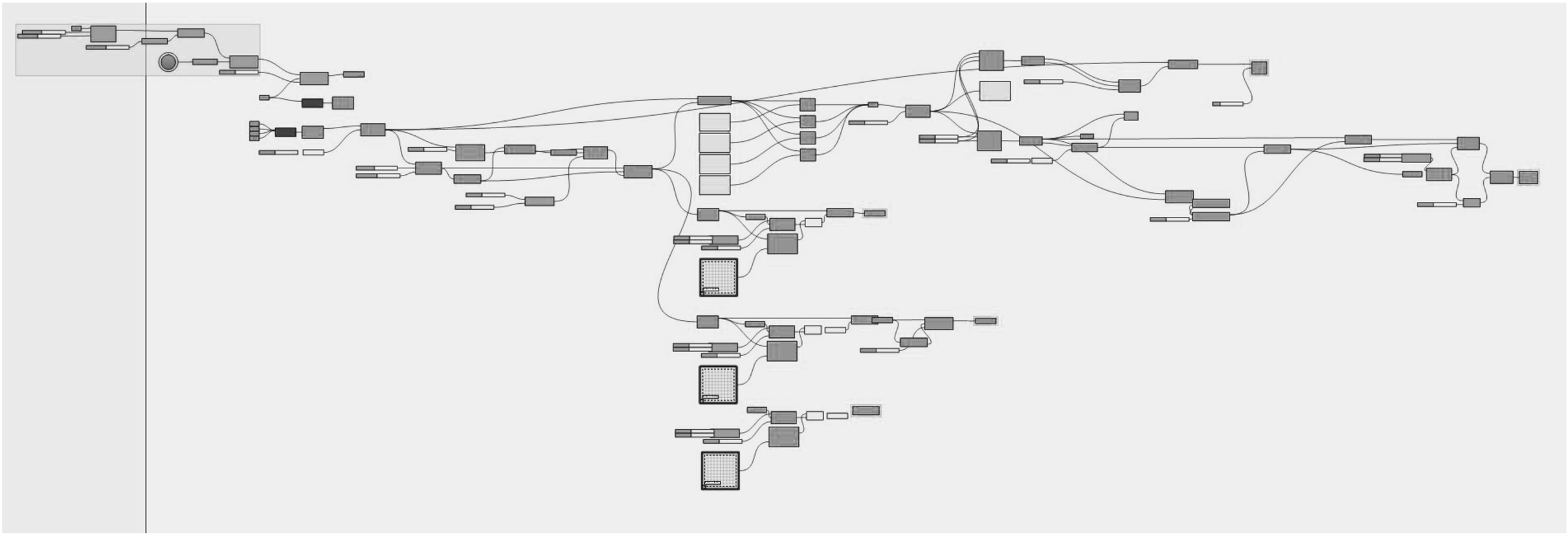


6.1 | THE URCHIN

COMPREHENSIVE OVERVIEW OF THE FINAL DESIGN

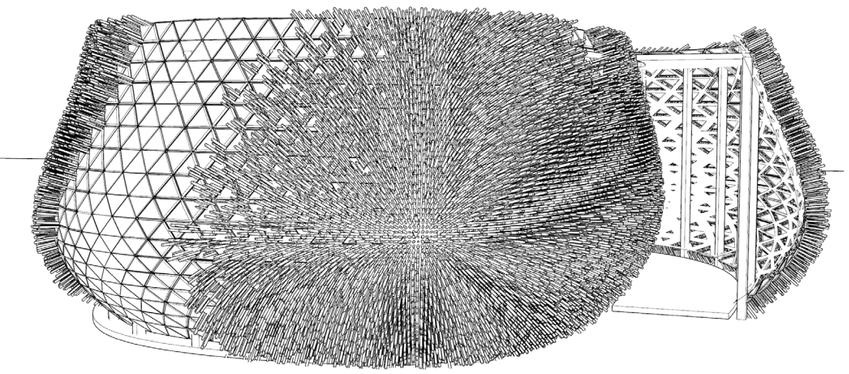
This thesis emphasizes architectural values suited for a bio-based lab, intertwining the design with the concept of biology, which is inherently limitless and unprincipled. The lab's design captures this essence of biology, showcasing a structure where placement and structure are fluid—doors and structural elements don't have fixed positions; instead, the design features dynamically varying elements where larger triangles impose more visual weight and smaller ones, intermixed with rods, add intricacy. This fluid arrangement mirrors biological processes, emphasizing that just like cellular components, architectural elements like rods and triangles coexist without hierarchical constraints, adapting and shifting in harmony.

This approach led to a design that, while a definitive construction in itself, originates from a framework that could spawn numerous other forms and functions. As an architect, the responsibility fell to me to decide the best application for this project, guided by specific needs and design goals. However, the underlying computational tool developed—a Grasshopper script that parametrizes the facade—represents the project's core philosophy. It enables the creation of diverse architectural forms, embodying the limitless potential of the design. Discussing this tool in detail extends beyond this thesis's focus on physical architecture, yet it is crucial to mention as it illustrates the foundational flexibility of the design approach. Just as I tailored the lab to specific requirements, another designer could use the same tool to forge a completely different structure, each unique yet stemming from the same seed of limitless potential.

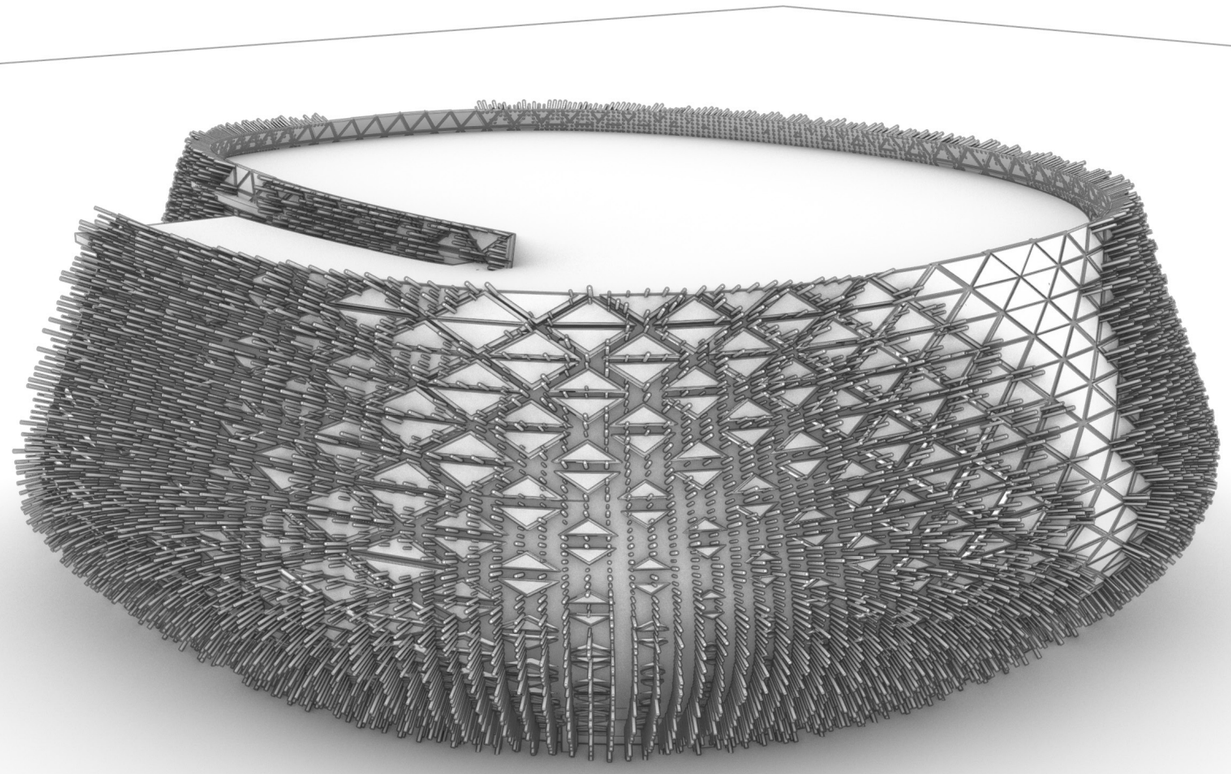


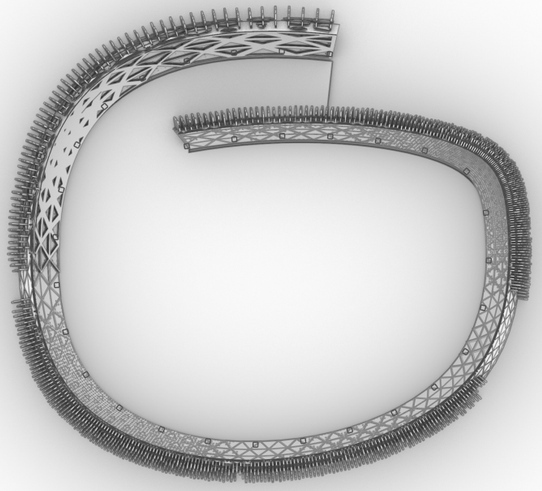
6.2 | THE URCHIN - 1.0 CIRCULAR VARIANT

INTERGRATION OF FUNCTIONAL AND INTERACTIVE ELEMENTS

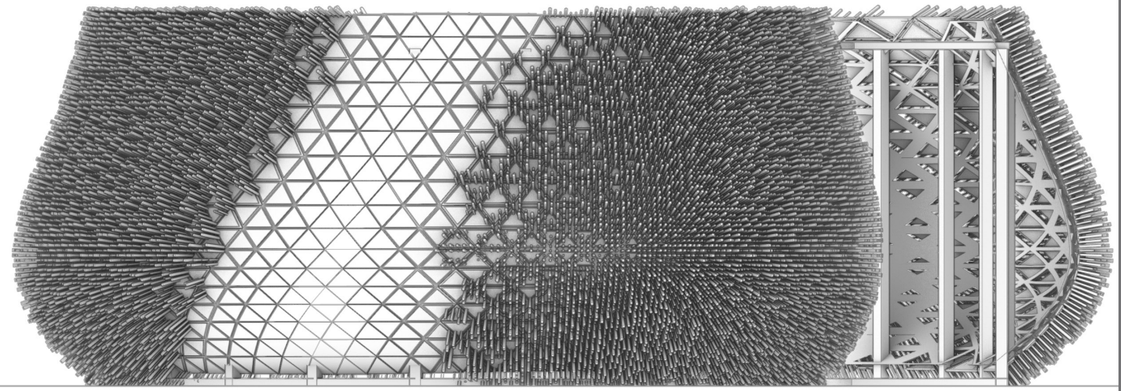


“First, we have an example of how this facade piece could create a circular form.”

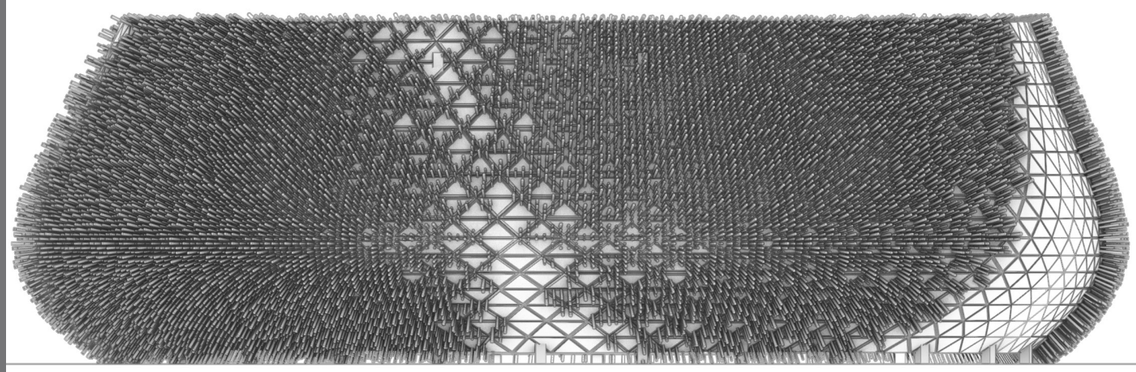




Top Plan



Right Elevation

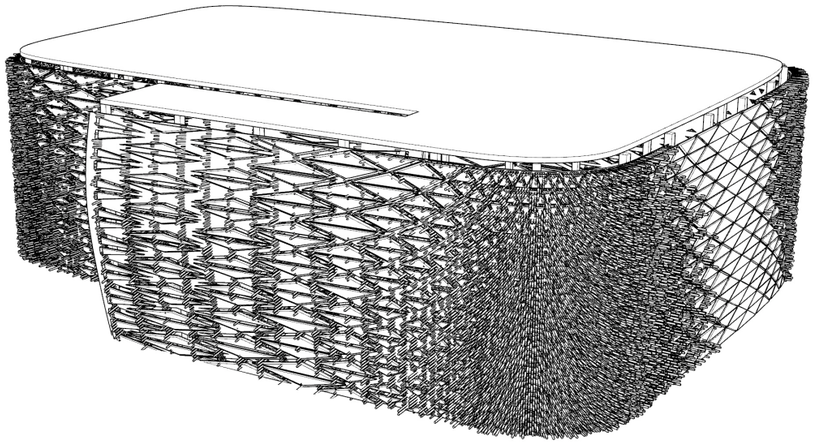


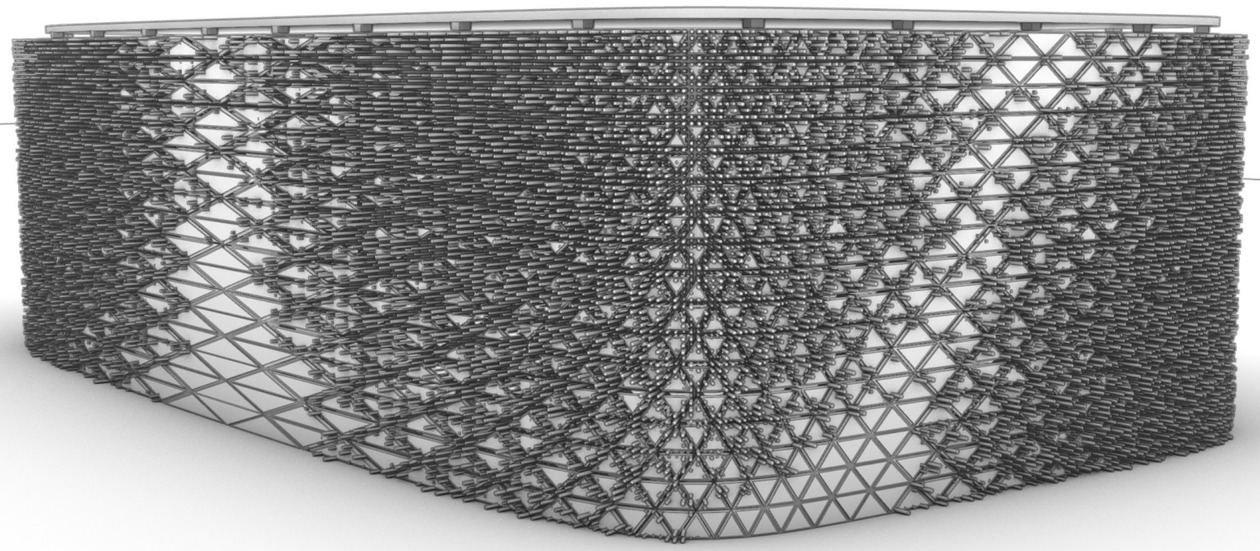
Left Elevation

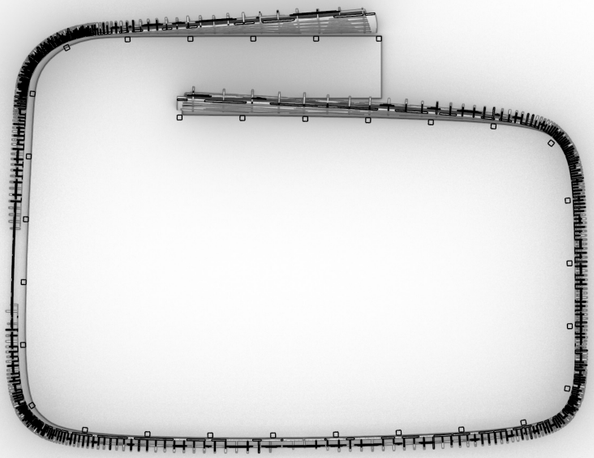
6.2| THE URCHIN - 1.1 RECTANGULAR VARIANT

INTERGRATION OF FUNCTIONAL AND INTERACTIVE ELEMENTS

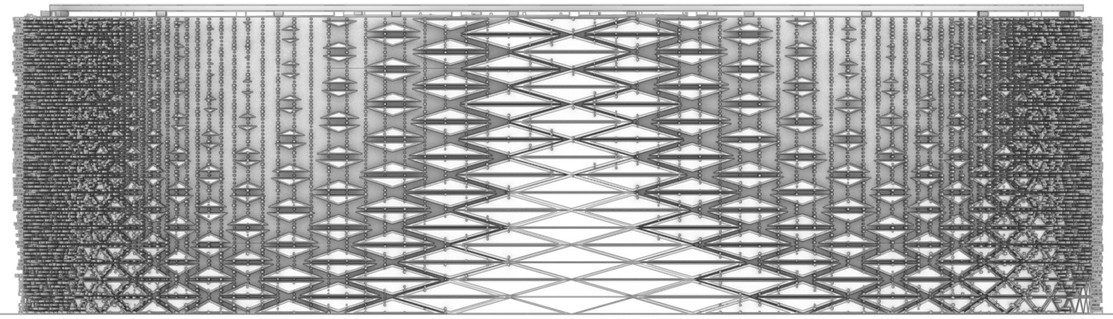
"Secondly, an illustration is provided to demonstrate how this facade component can be utilized to construct a rectangular form."



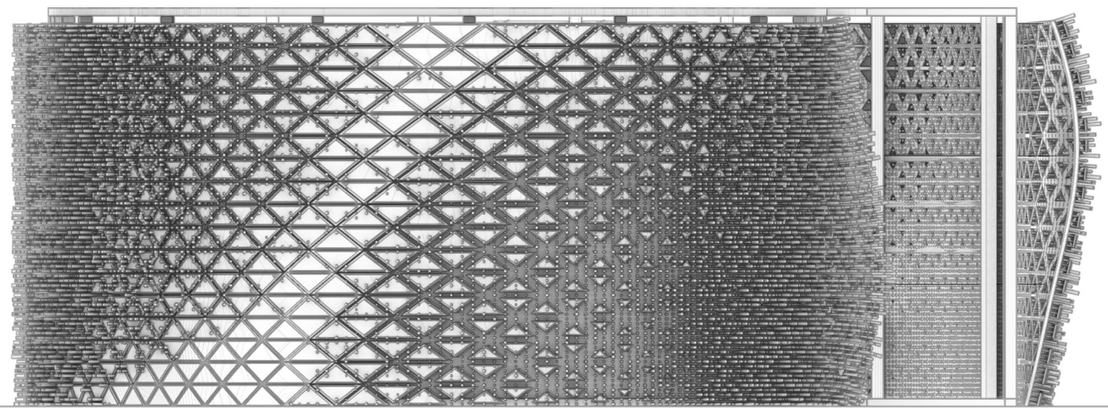




Top Plan



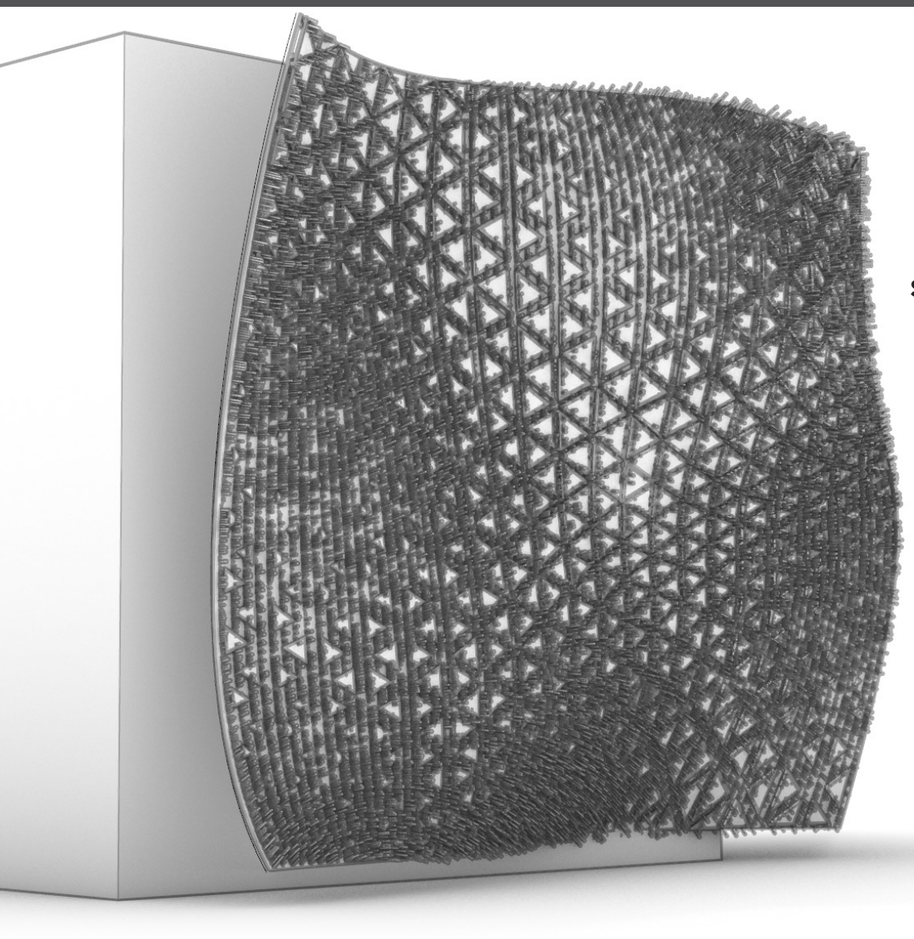
Right Elevation



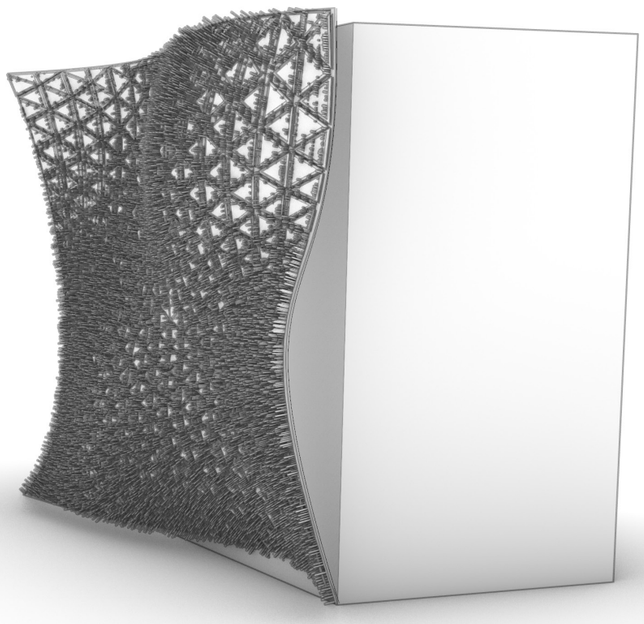
Left Elevation

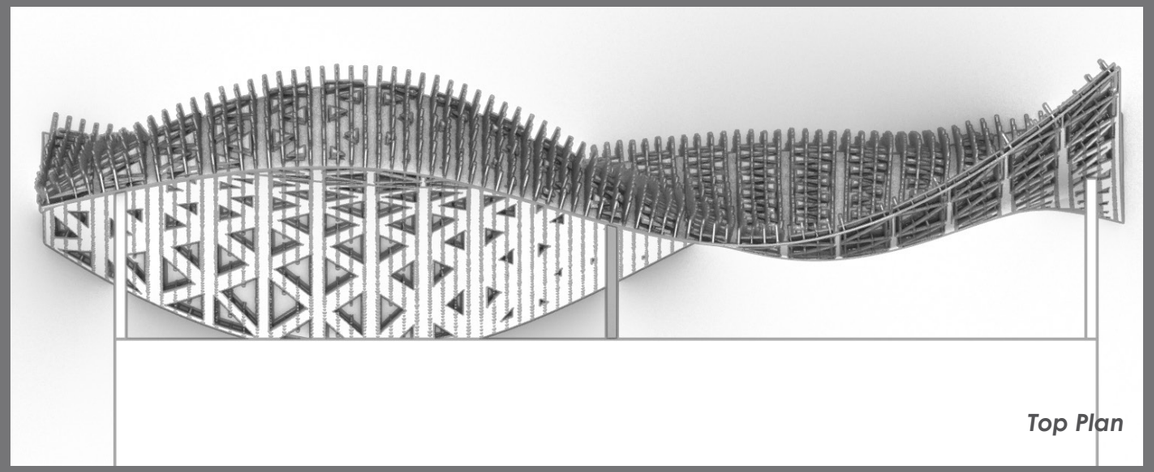
6.2 | THE URCHIN - 1.3 FREEFORM VARIANT

INTERGRATION OF FUNCTIONAL AND INTERACTIVE ELEMENTS

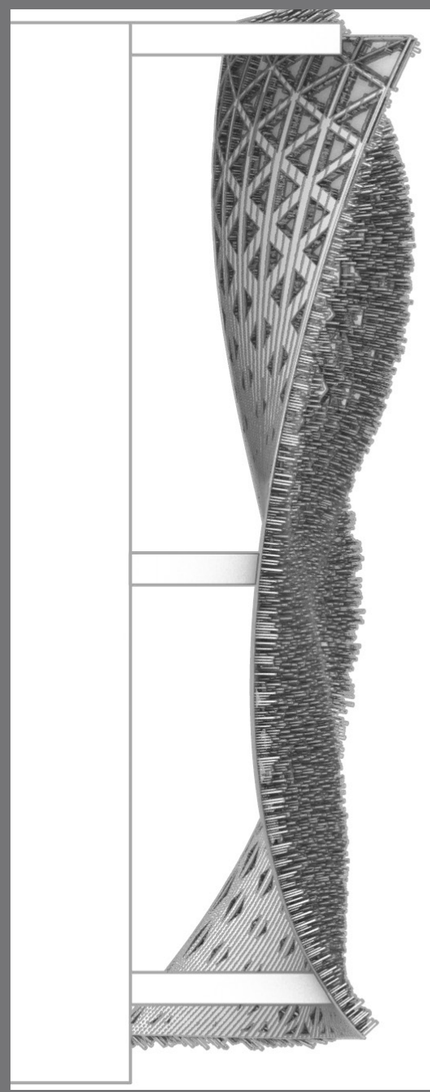


“Next, an example showcases how this facade component can be adapted to create a freeform surface, designed to be suspended in a specific location.”





Top Plan

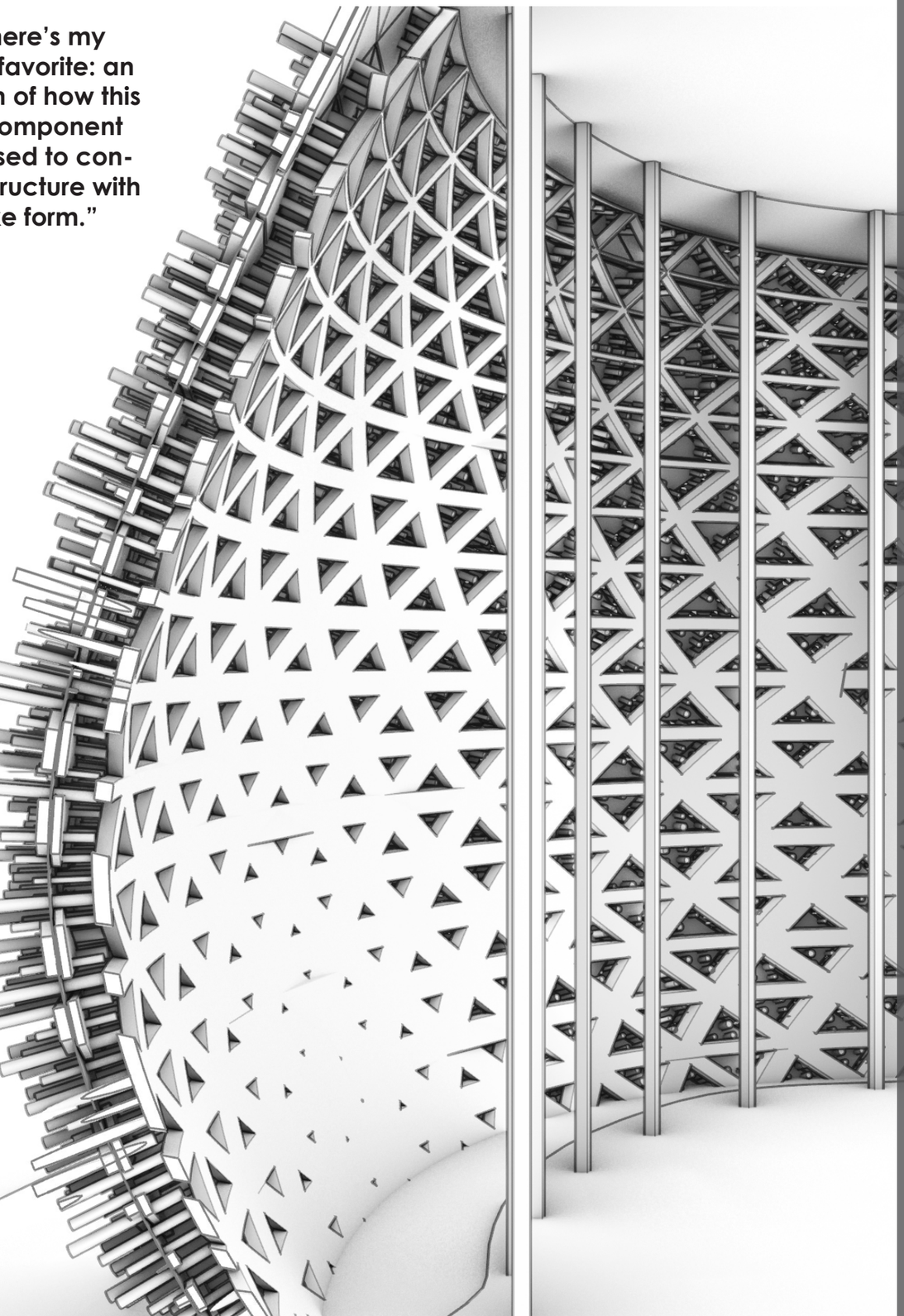


Left Elevation

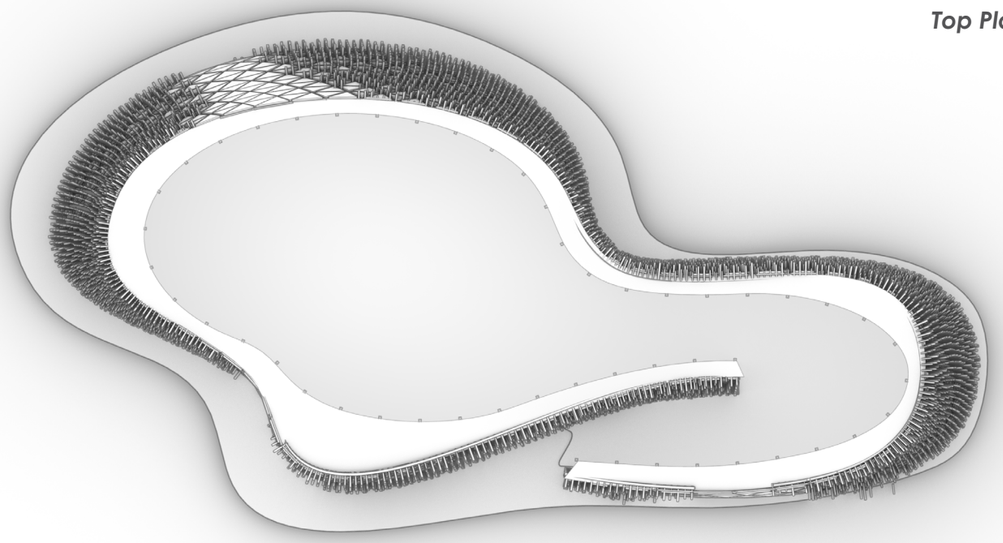
6.2 | THE URCHIN - 1.4 BLOB VARIANT

INTERGRATION OF FUNCTIONAL AND INTERACTIVE ELEMENTS

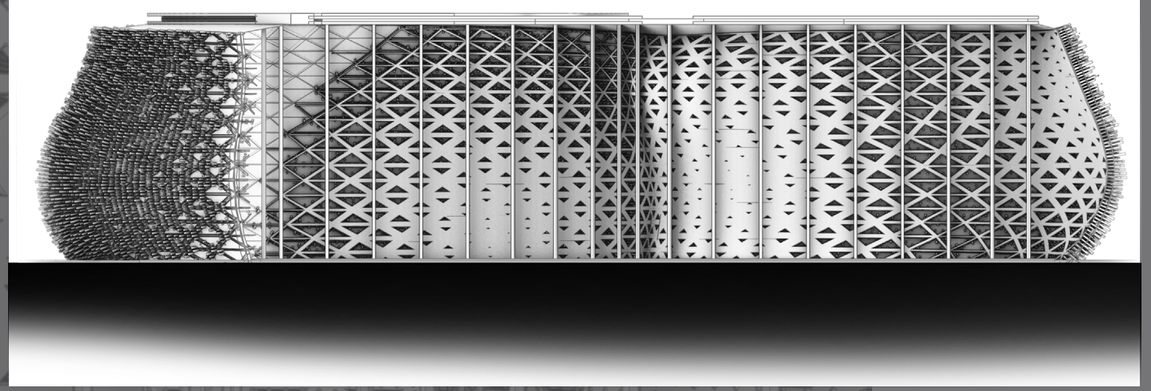
"Finally, here's my personal favorite: an illustration of how this facade component can be used to construct a structure with a blob-like form."



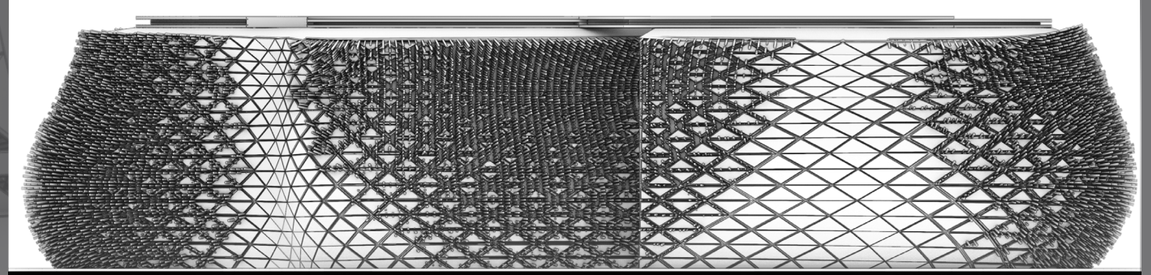
Top Plan



Right Section



Front Elevation

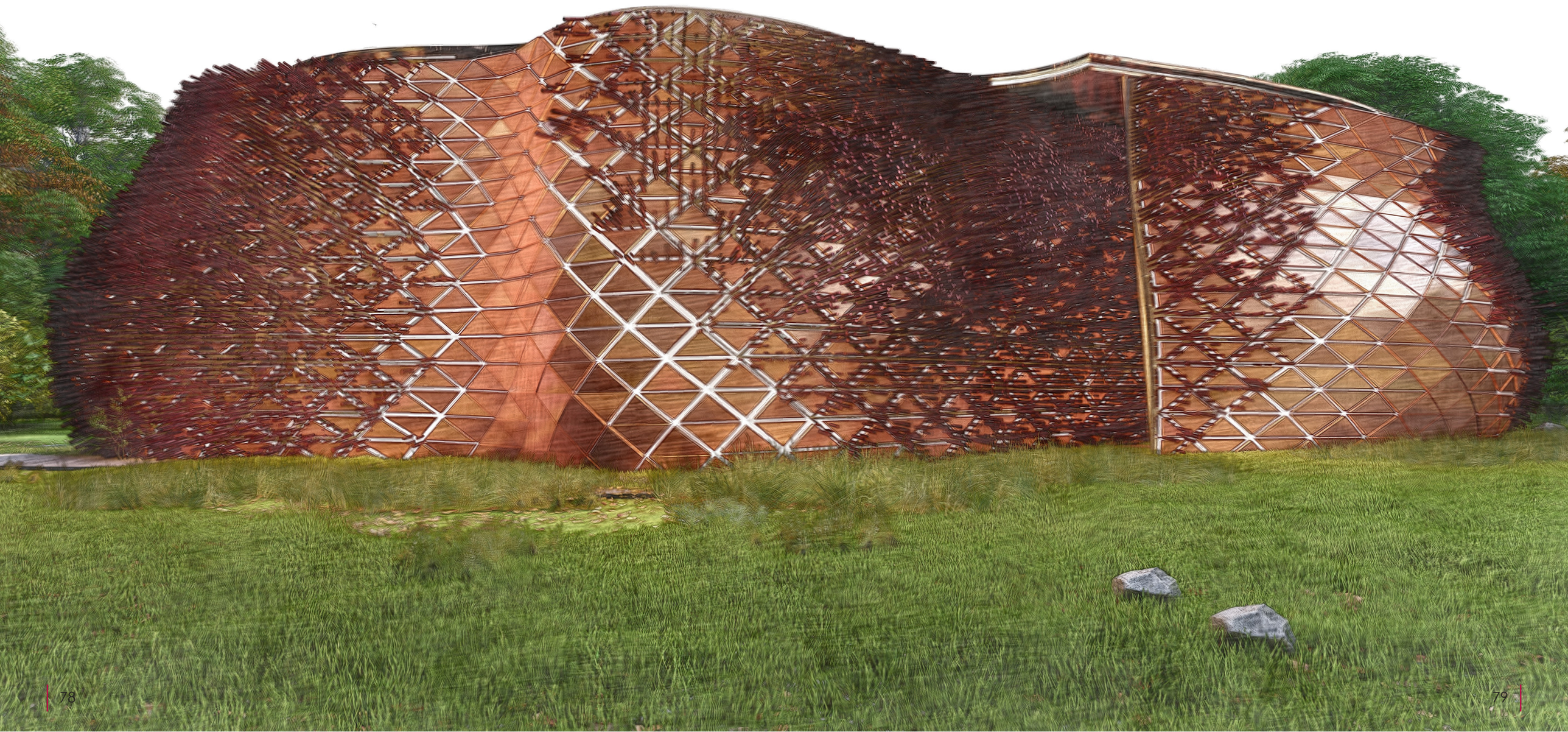




"I was so inspired by this concept that I decided to create several renders to visually explore its potential."

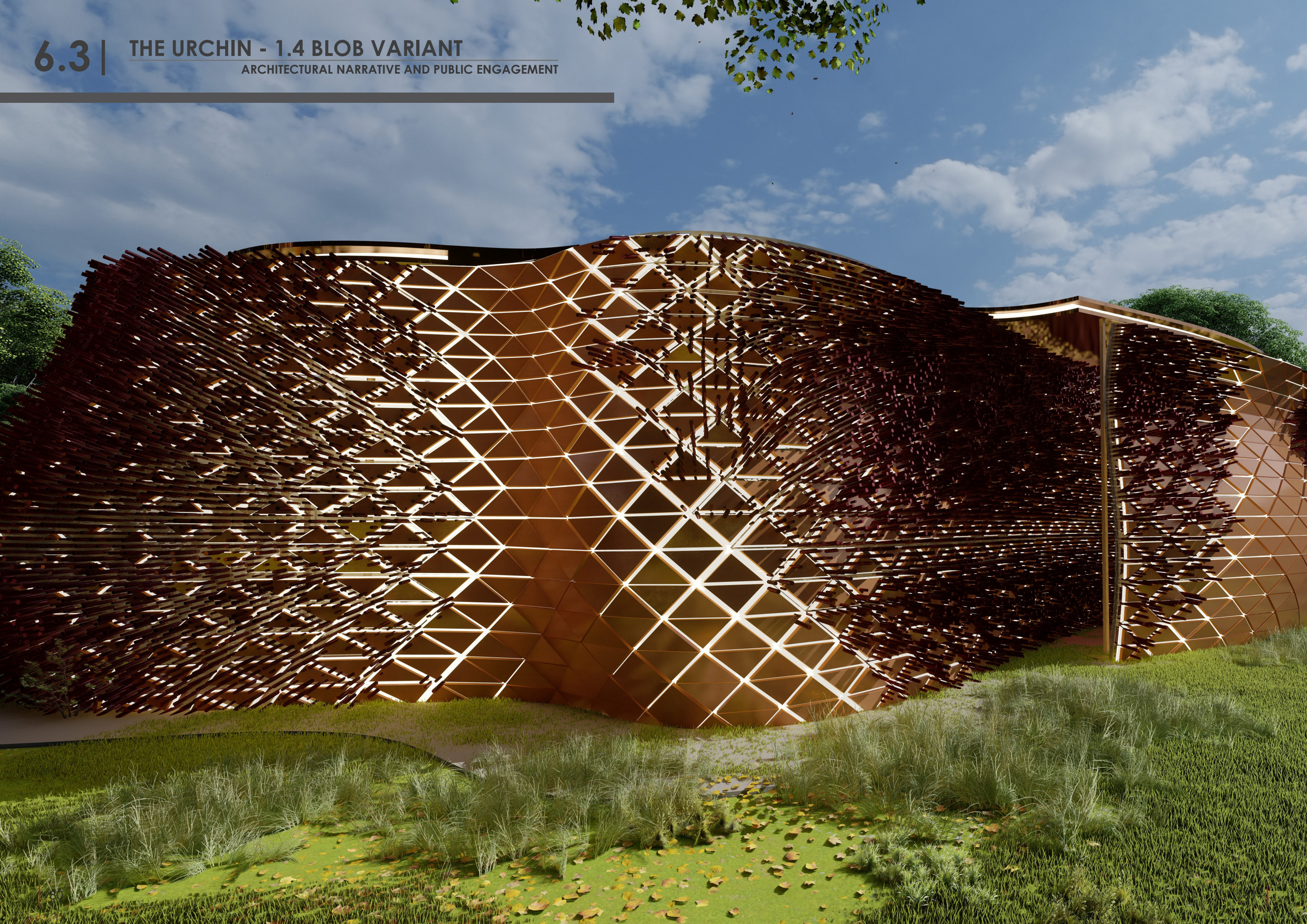
6.3 | THE URCHIN - 1.4 BLOB VARIANT

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT



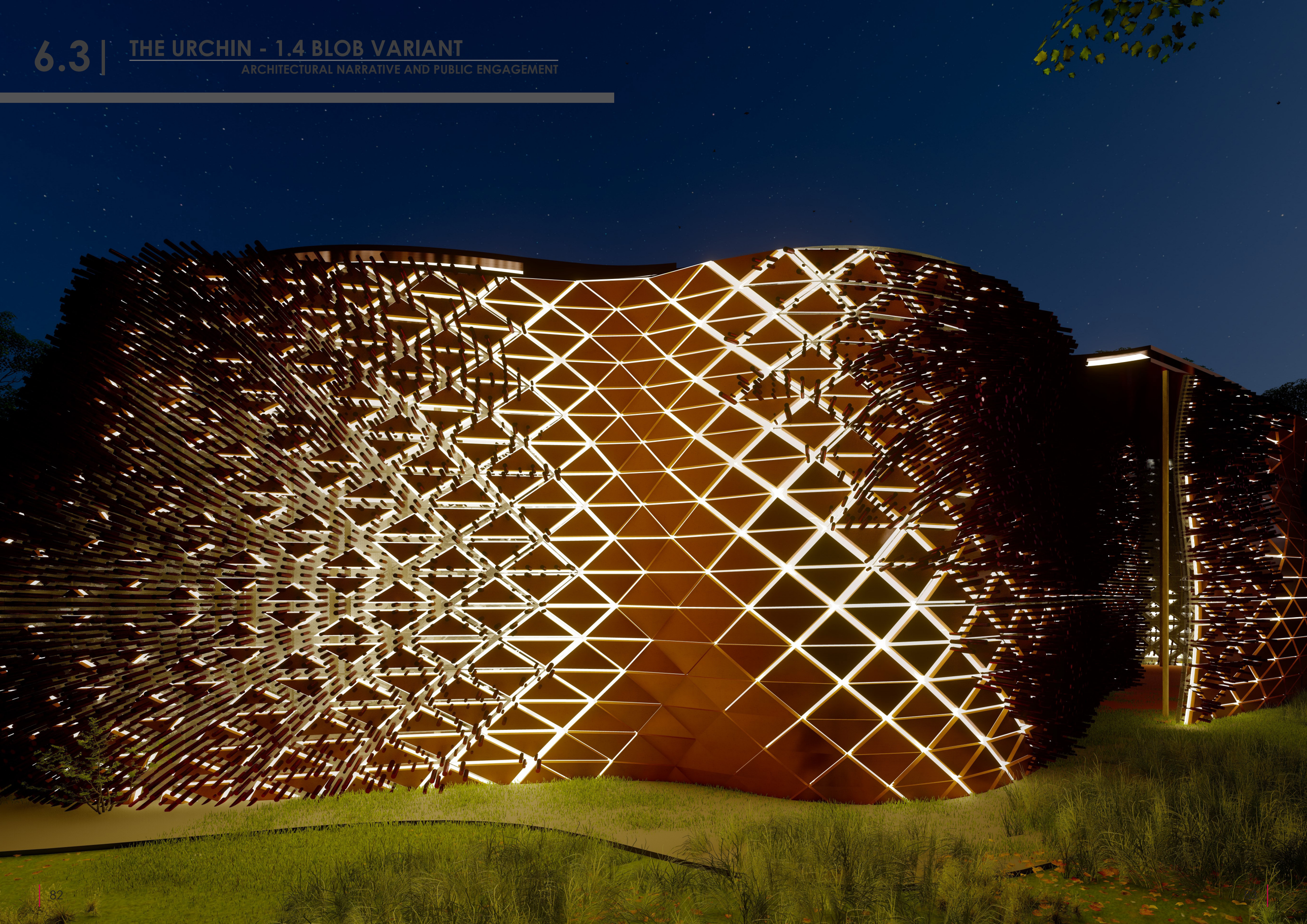
6.3 | THE URCHIN - 1.4 BLOB VARIANT

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT



6.3 | THE URCHIN - 1.4 BLOB VARIANT

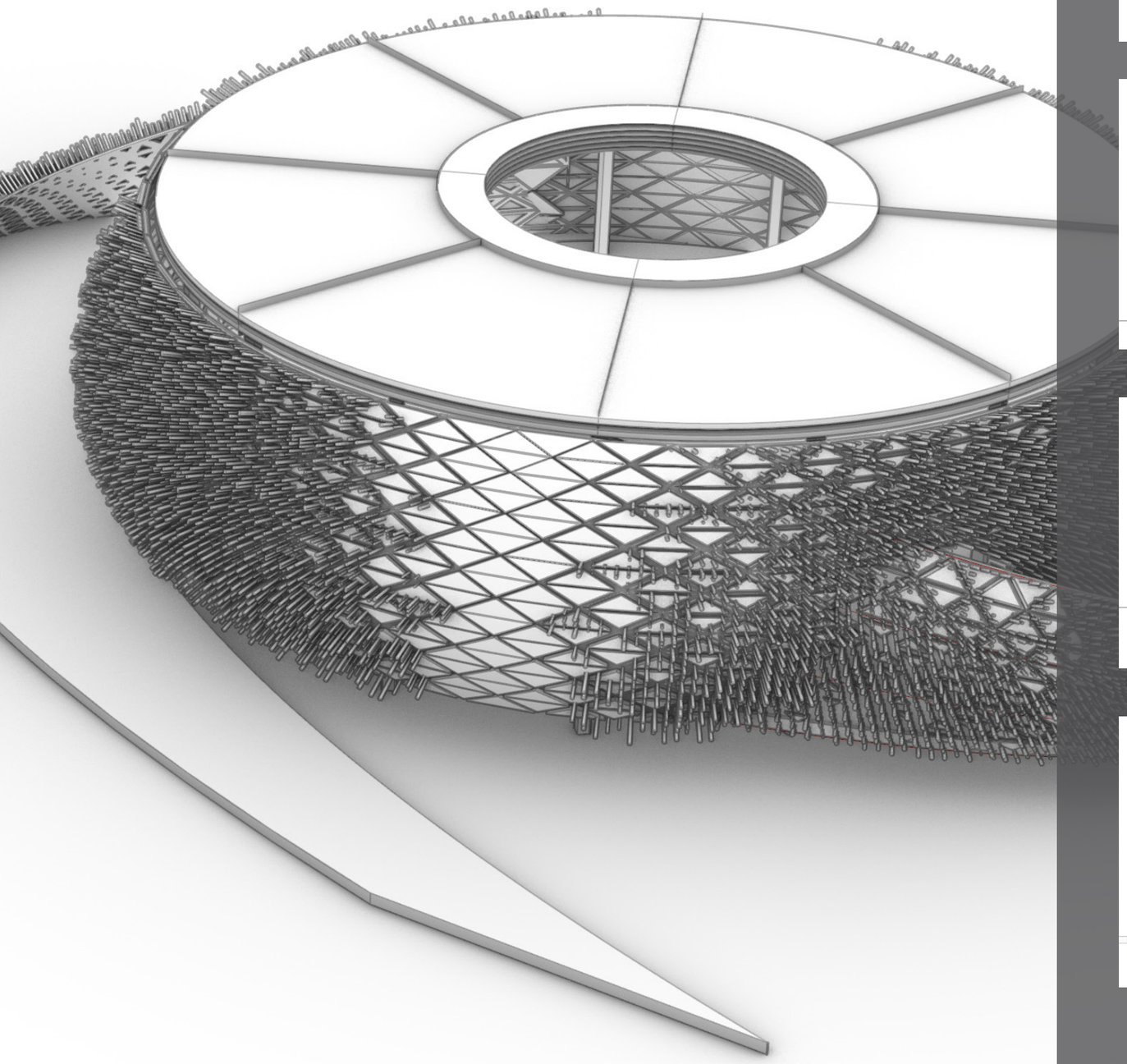
ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT



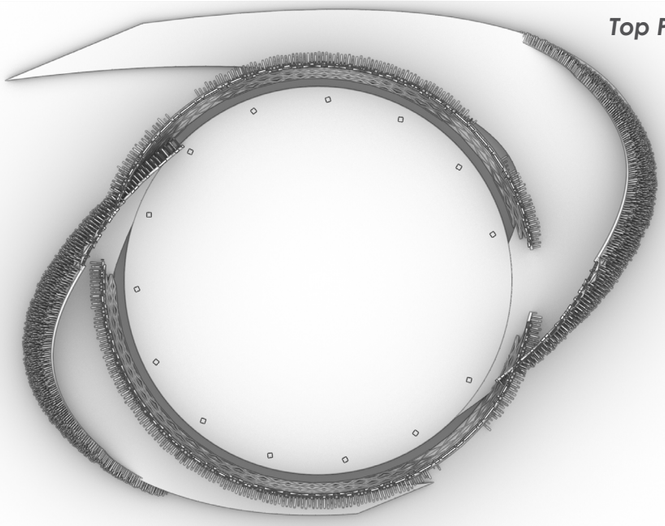
6.3 | THE URCHIN - 2.0 OVERDESIGNED VARIANT

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

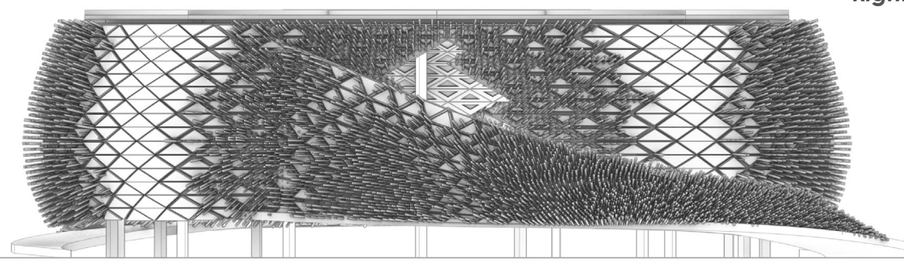
The secondary objective of this thesis, beyond developing a versatile facade component, is to design a specific pavilion for TU Delft's bio-based lab. Unlike the previous conceptual variations, this design requires a defined program of requirements and precise dimensions. The directive is to create a circular structure featuring two doors, standing 4.5 meters tall atop a 1-meter base, with a total utilized area of 223 square meters.



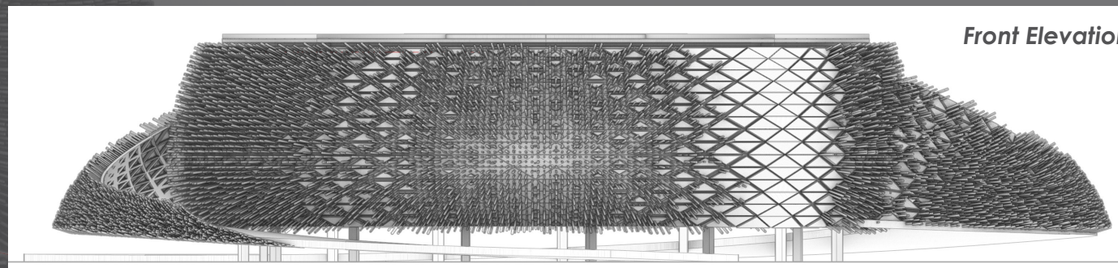
Top Plan



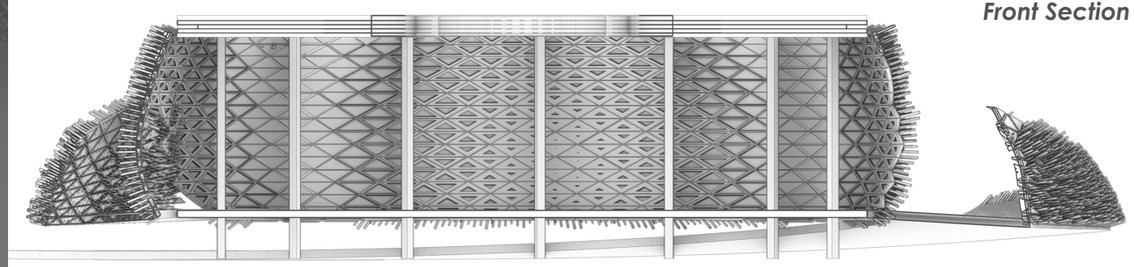
Right Section



Front Elevation



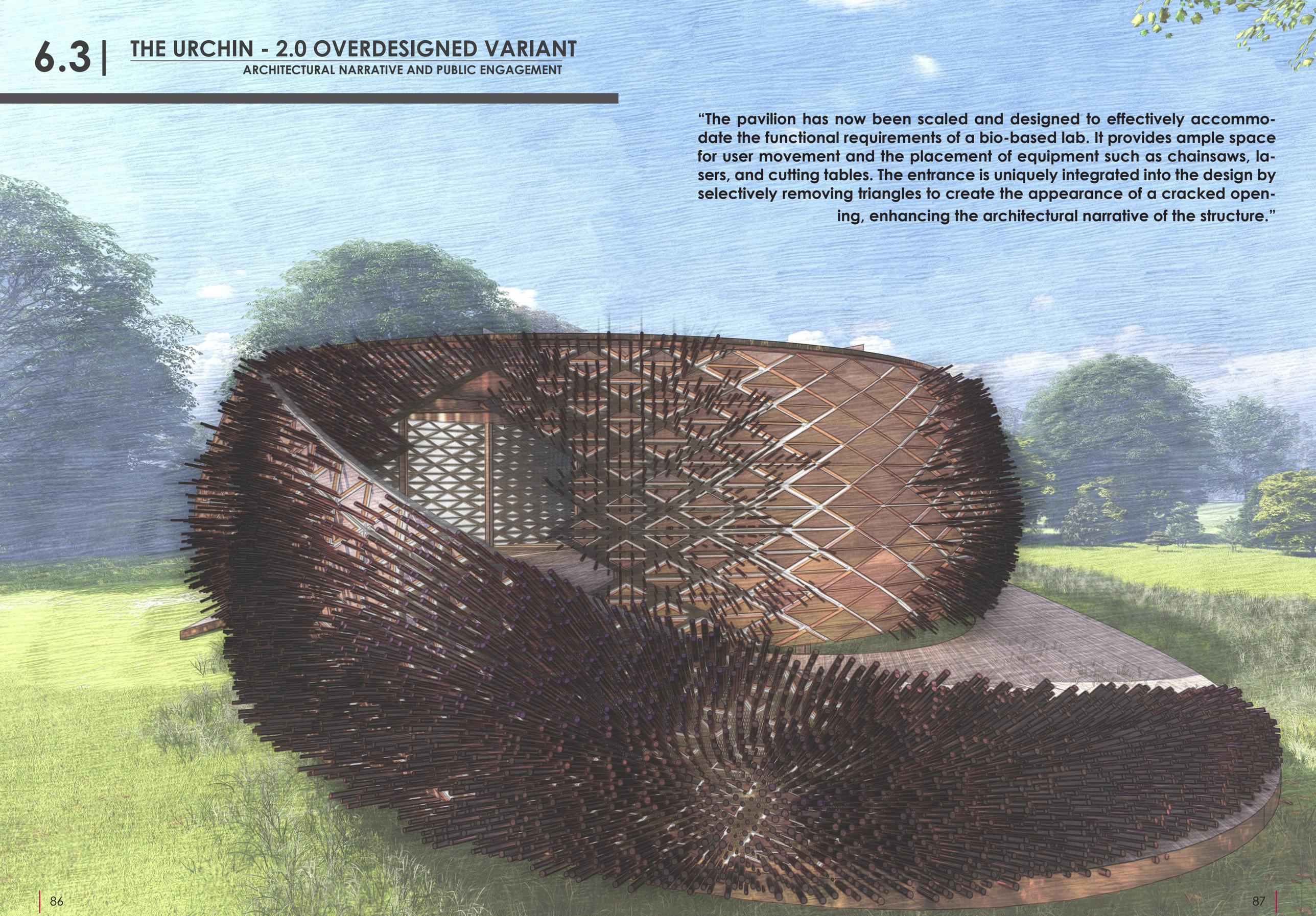
Front Section



6.3 | THE URCHIN - 2.0 OVERDESIGNED VARIANT

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

“The pavilion has now been scaled and designed to effectively accommodate the functional requirements of a bio-based lab. It provides ample space for user movement and the placement of equipment such as chainsaws, lasers, and cutting tables. The entrance is uniquely integrated into the design by selectively removing triangles to create the appearance of a cracked opening, enhancing the architectural narrative of the structure.”



6.3 | THE URCHIN - 2.0 OVERDESIGNED VARIANT

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

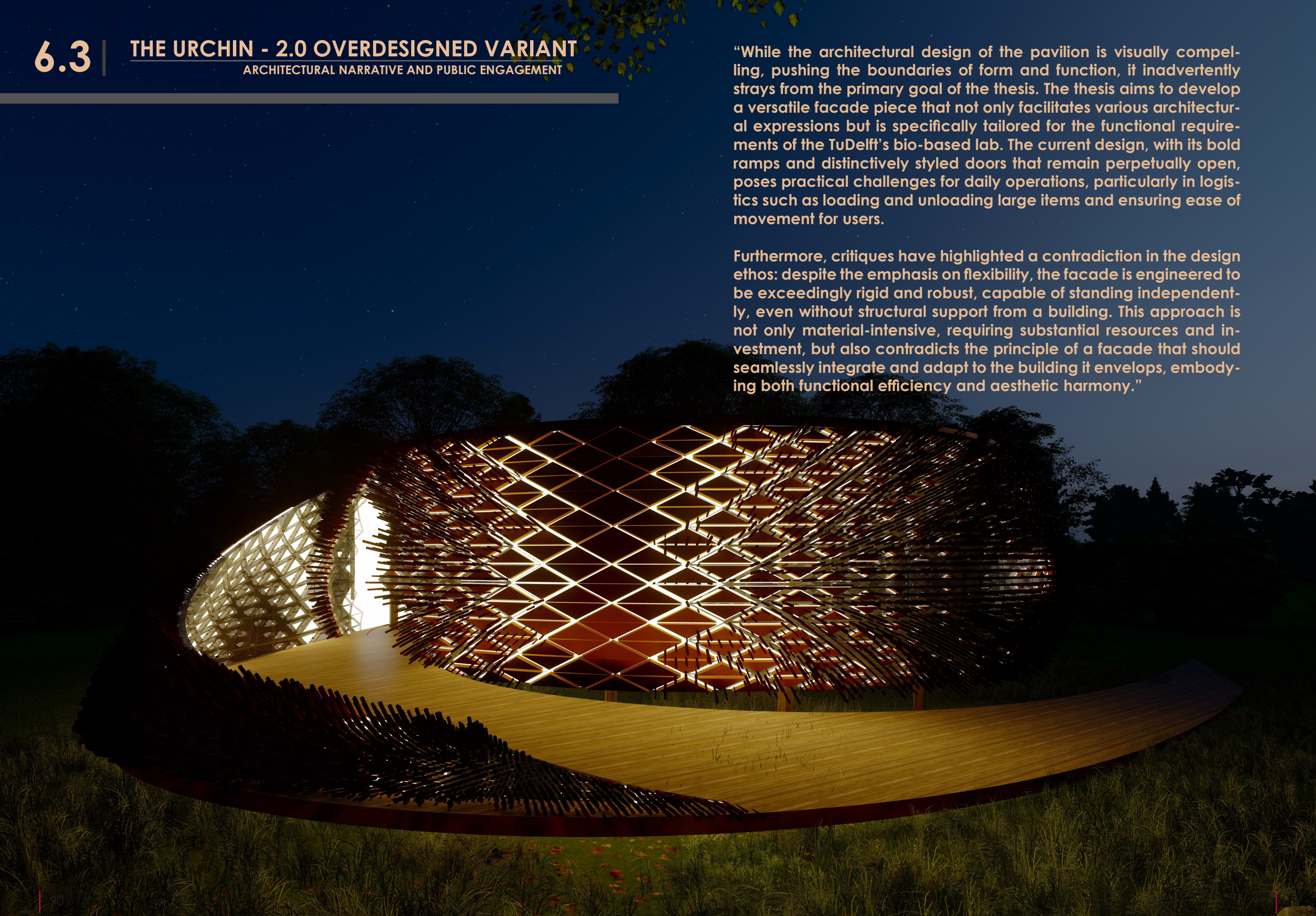
“The pavilion design features two distinct entrances, with the primary entrance being significantly larger than the secondary. These entrances are linked by ramps that ascend in an arched form, elevated by one meter. This architectural choice is intentional, guiding visitors along a peripheral route around the pavilion. This journey is designed to immerse them in the dynamic interplay of the facade’s kinetic and media elements. As visitors move, they encounter varying scales and a sense of motion; architectural fins, strategically painted in deep purple brass, play with visual perception. These fins accentuate the mass from a distance while camouflaging the triangular components of the facade based on viewing angles, enriching the interactive facade experience.”

6.3 | THE URCHIN - 2.0 OVERDESIGNED VARIANT

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

“While the architectural design of the pavilion is visually compelling, pushing the boundaries of form and function, it inadvertently strays from the primary goal of the thesis. The thesis aims to develop a versatile facade piece that not only facilitates various architectural expressions but is specifically tailored for the functional requirements of the TuDelft’s bio-based lab. The current design, with its bold ramps and distinctively styled doors that remain perpetually open, poses practical challenges for daily operations, particularly in logistics such as loading and unloading large items and ensuring ease of movement for users.

Furthermore, critiques have highlighted a contradiction in the design ethos: despite the emphasis on flexibility, the facade is engineered to be exceedingly rigid and robust, capable of standing independently, even without structural support from a building. This approach is not only material-intensive, requiring substantial resources and investment, but also contradicts the principle of a facade that should seamlessly integrate and adapt to the building it envelops, embodying both functional efficiency and aesthetic harmony.”



Introducing the final design—the TRUE URCHIN. This design evolution transforms the triangular elements into functional components of a sliding door mechanism, akin to those found in buses and trains. This integration allows the pavilion doors to blend seamlessly into the facade when closed, enhancing the structure's mystique and allure to onlookers.

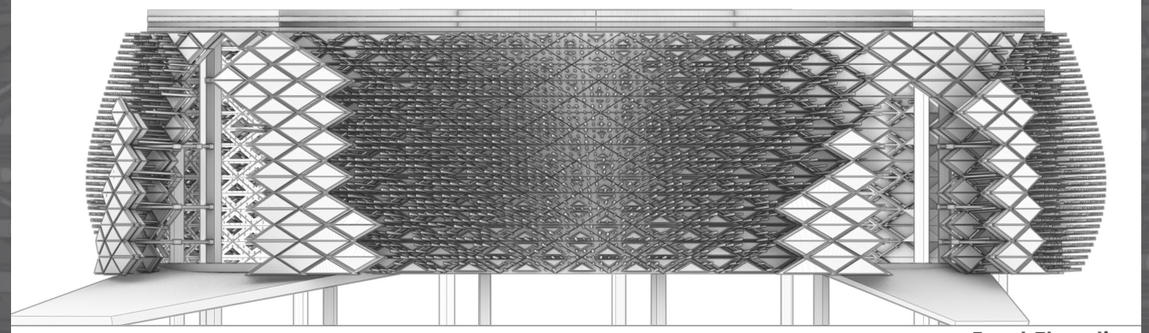
A significant modification in this iteration is the role of architectural fins or brass rods, which now dictate the curvature of the pavilion. This adjustment ensures that the primary structure, composed of interconnected triangles, is lighter and more adaptable, able to conform to the contours of any building it accompanies. Unlike previous versions, which were more rigid and uniform, this design emphasizes flexibility and adaptability, allowing the facade to dynamically adjust to varying architectural forms without the need for a heavy, inflexible skeleton. This approach not only enhances aesthetic integration but also optimizes material efficiency and functional versatility.

6.3| THE URCHIN - 2.1 THE FINAL DESIGN

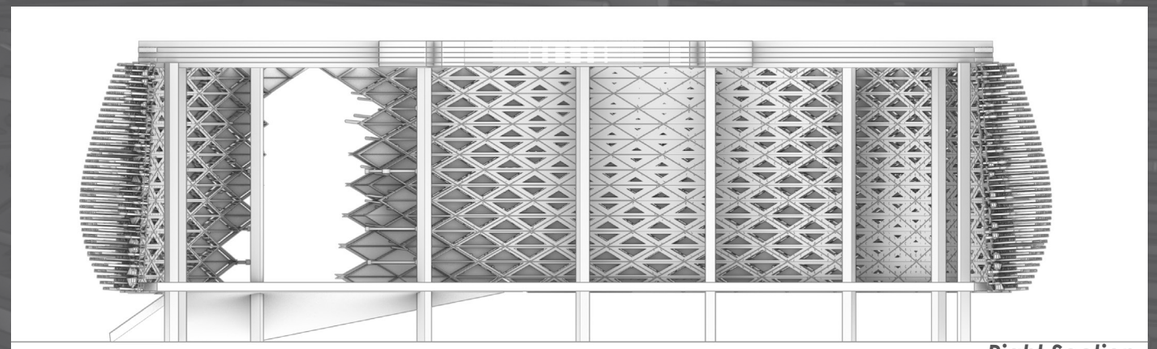
ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

Top Plan

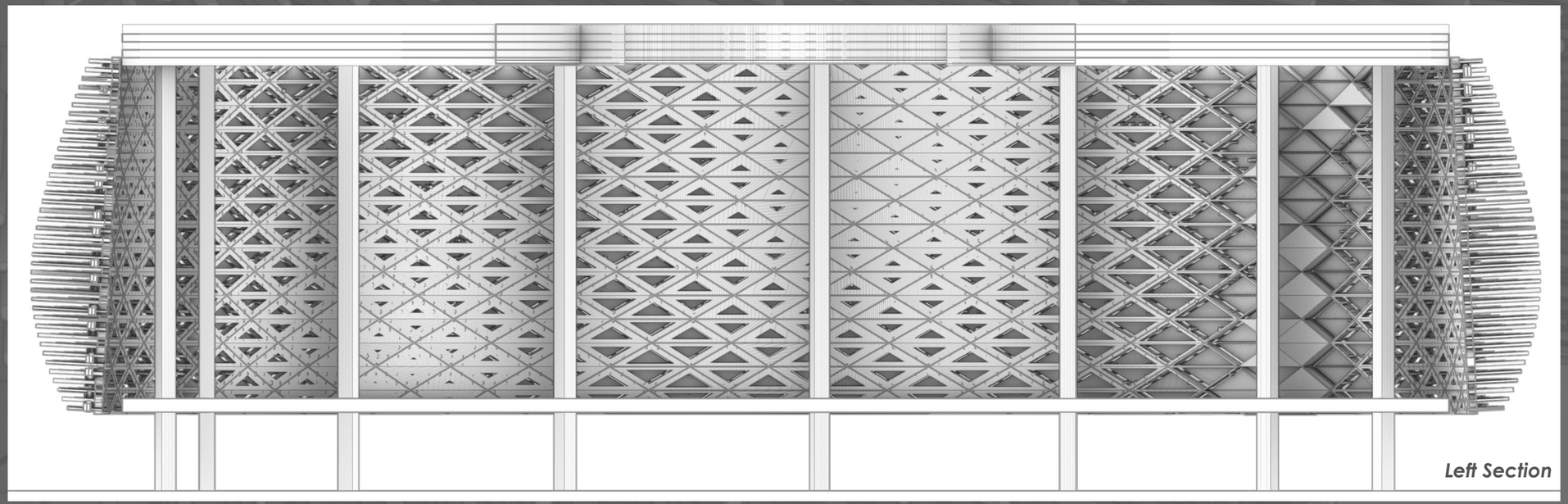




Front Elevation



Right Section

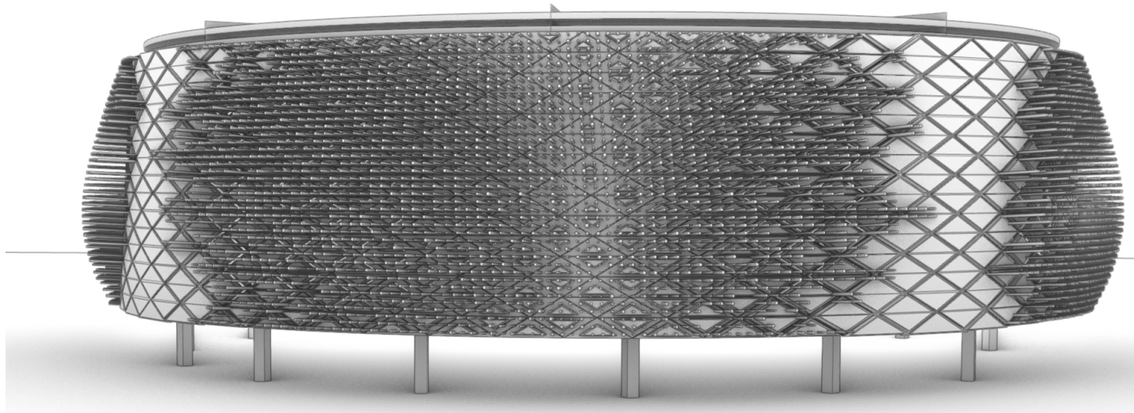


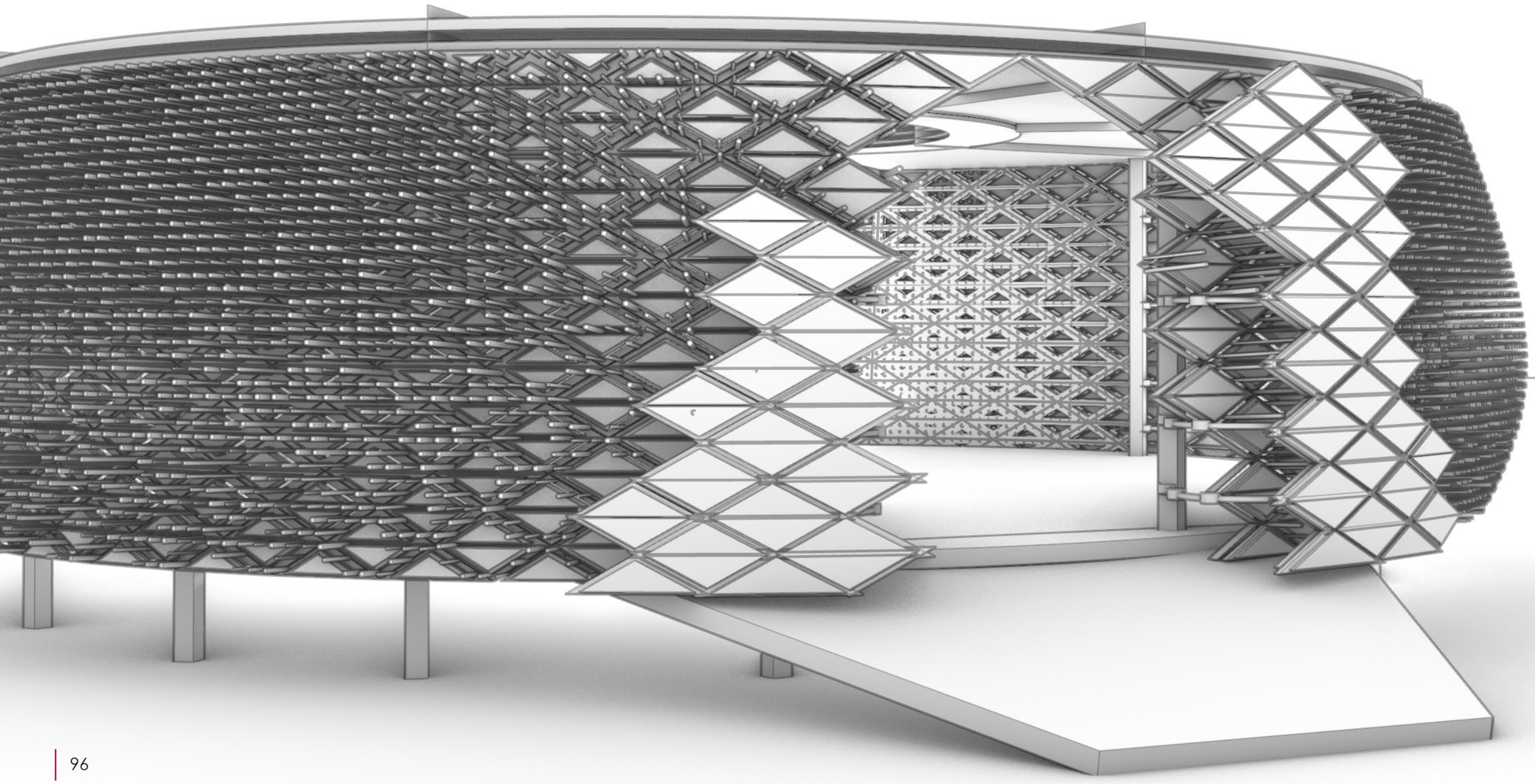
Left Section

6.3 | THE URCHIN - 2.1 THE FINAL DESIGN

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

The remainder of the design is eloquently illustrated through the images presented below, each visually articulating the nuanced details and innovative concepts that define the final design of the facade. These visuals serve as a testament to the transformative architectural approach embodied in the TRUE URCHIN, highlighting its adaptive and dynamic nature.

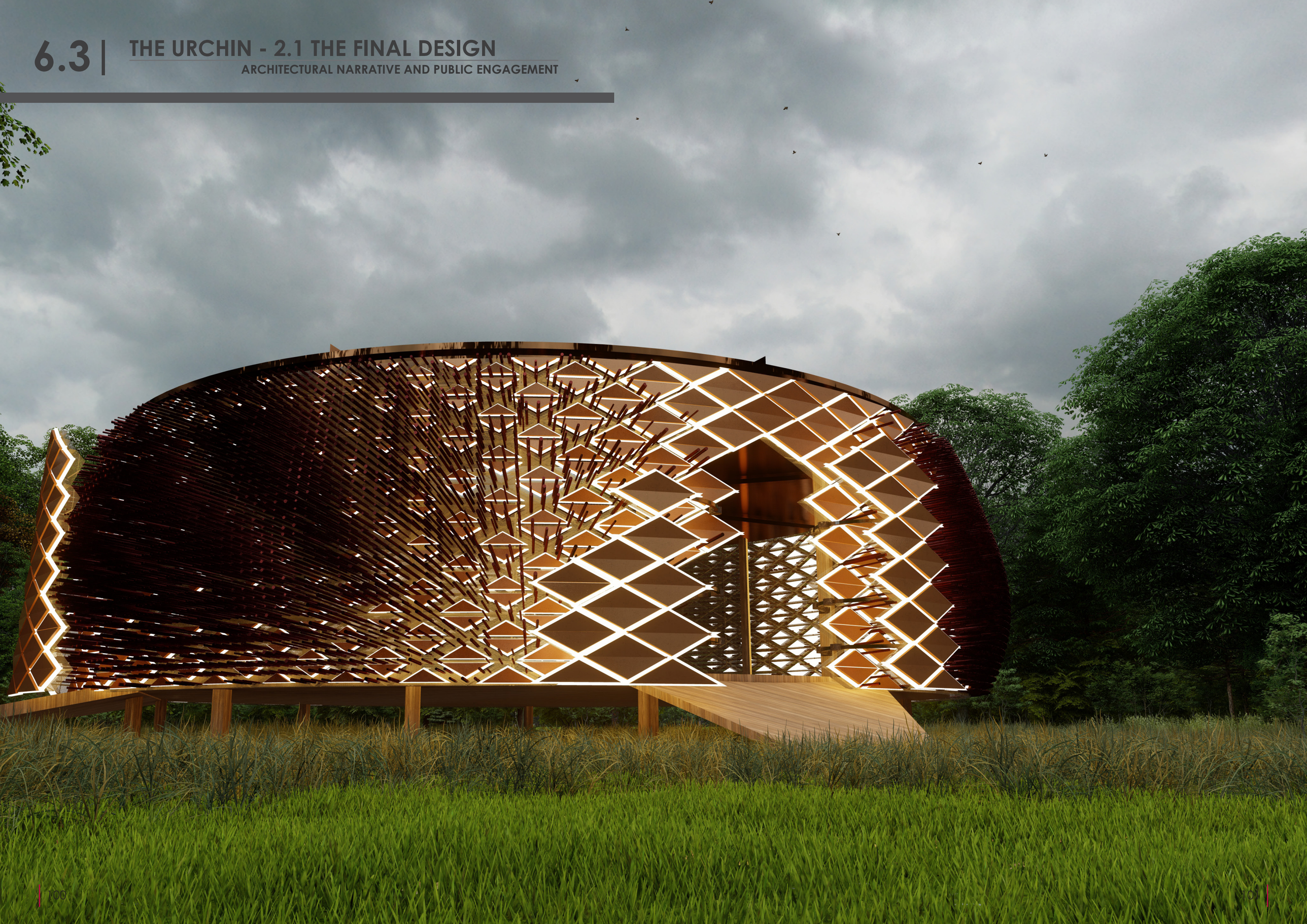




6.3 | THE URCHIN - 2.1 THE FINAL DESIGN

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT





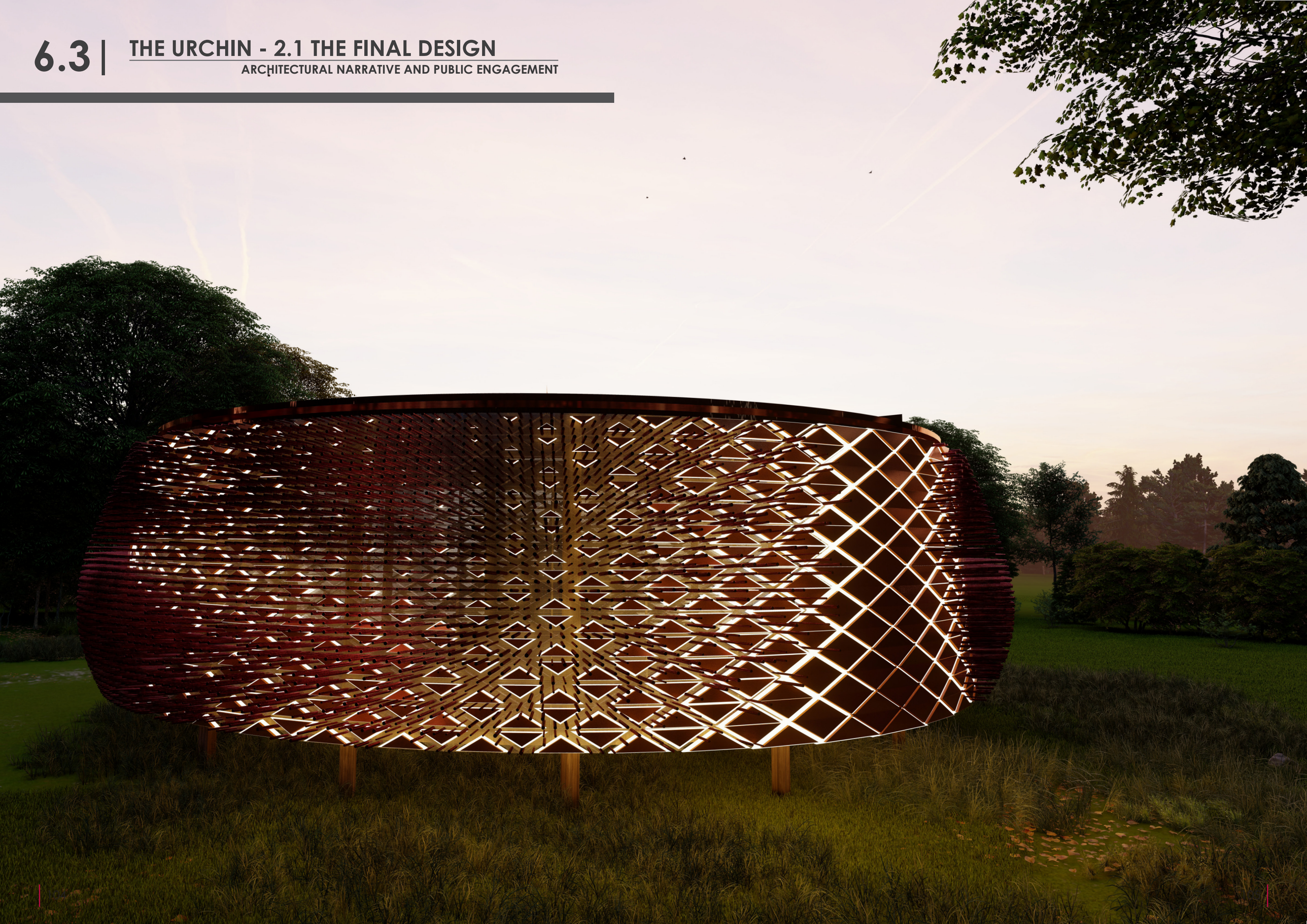
6.3 | THE URCHIN - 2.1 THE FINAL DESIGN

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT



6.3 | THE URCHIN - 2.1 THE FINAL DESIGN

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT



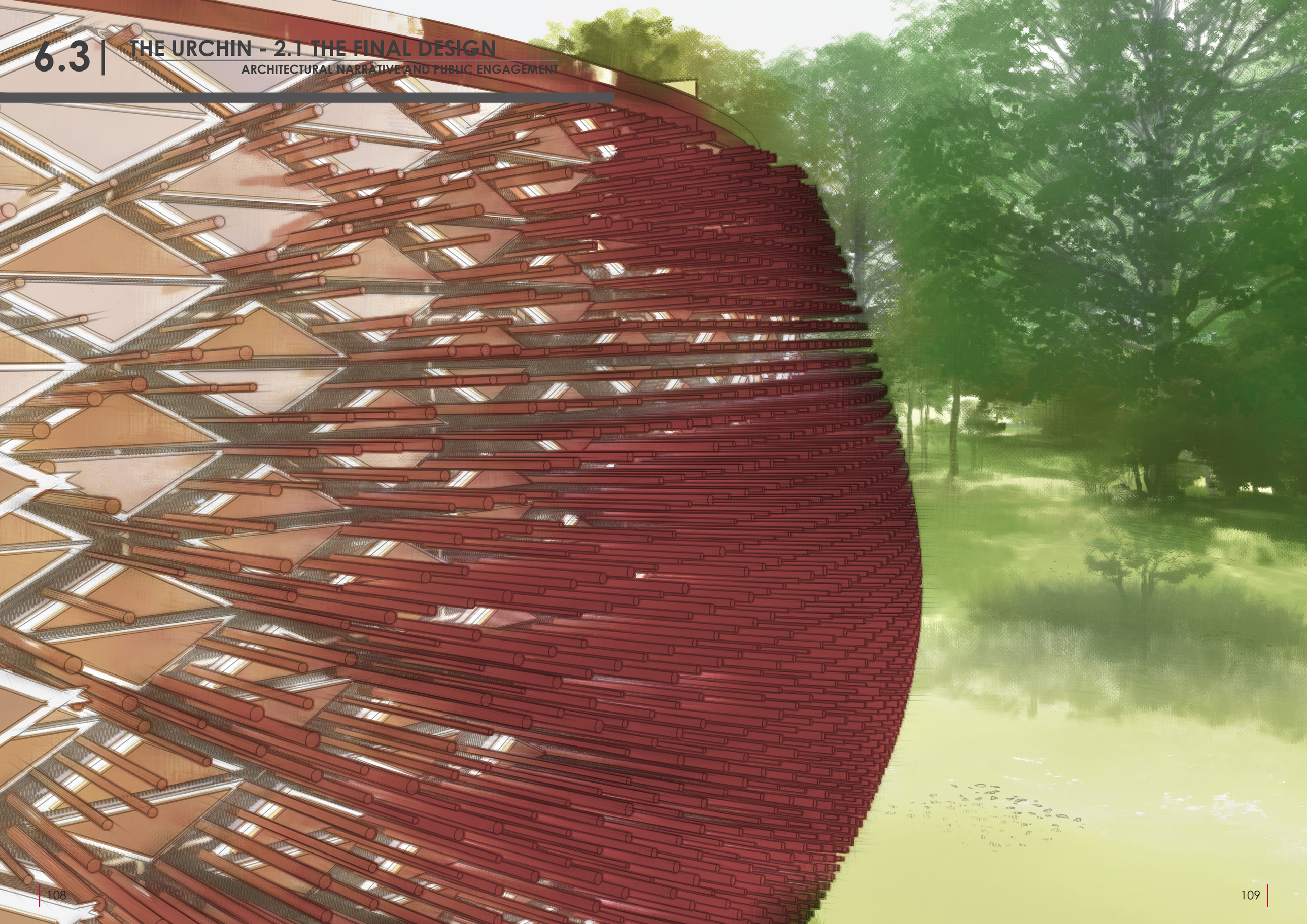
6.3 | THE URCHIN - 2.1 THE FINAL DESIGN

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT



6.3 | THE URCHIN - 2.1 THE FINAL DESIGN

ARCHITECTURAL NARRATIVE AND PUBLIC ENGAGEMENT

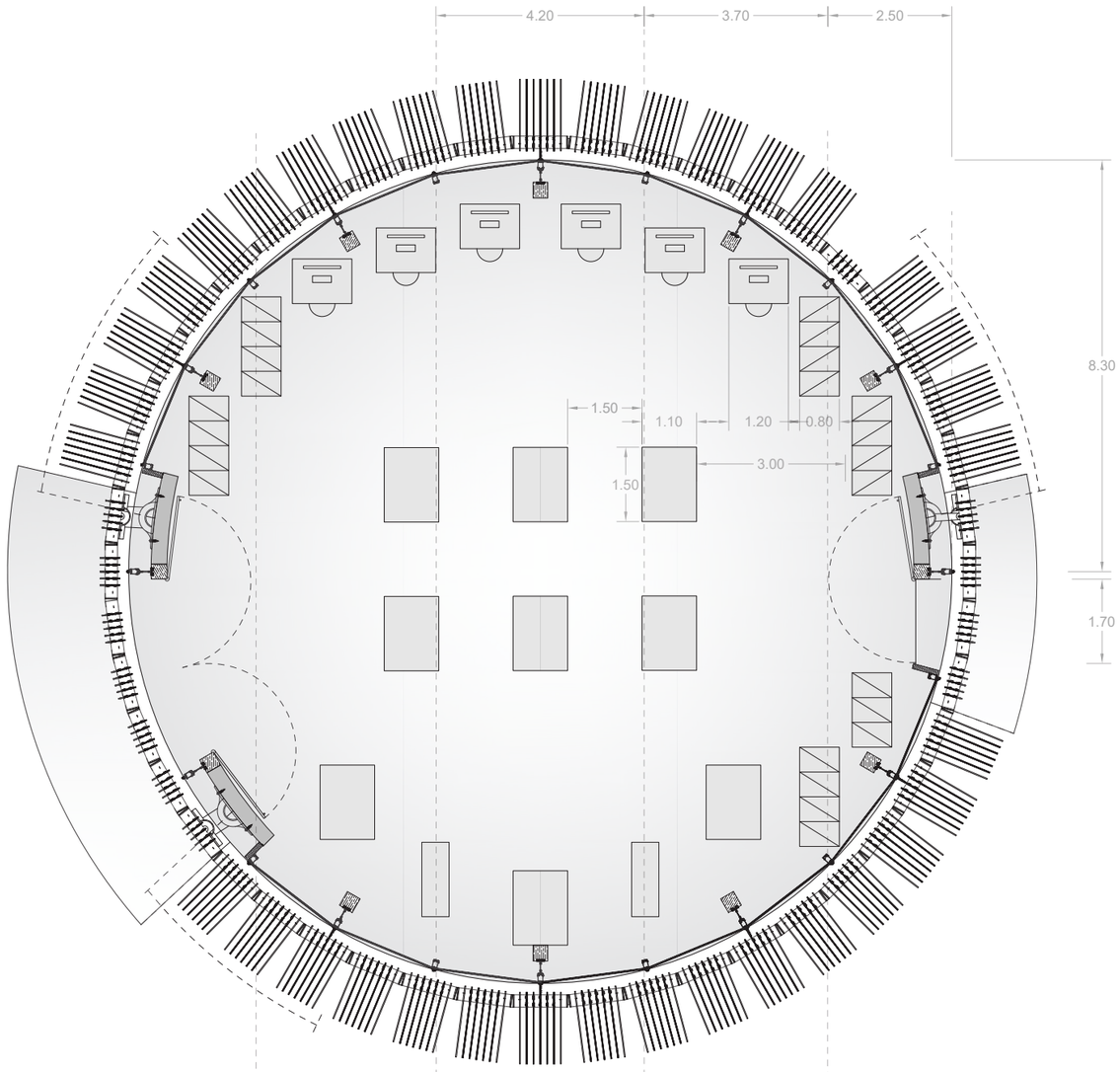


7.

THE TECH

終わり

How everything is built

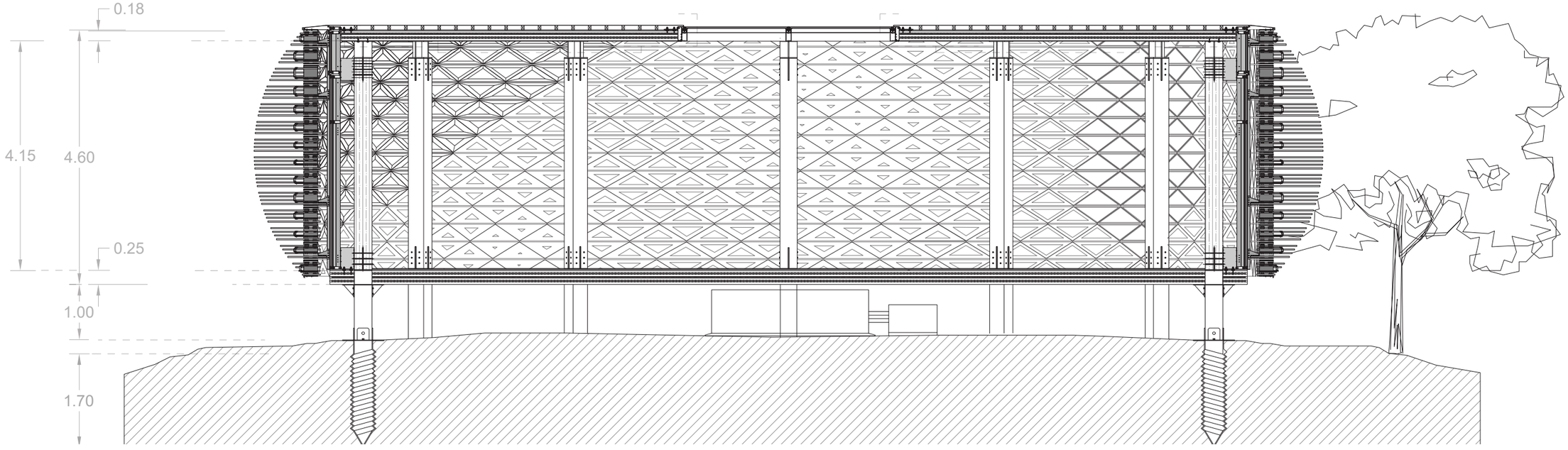


TThe floor plan is strategically designed to facilitate easy assembly and disassembly of both the lab's interior furnishings and the main structure itself. Upon entry, there are two doors: a 4-meter wide entrance for trucks and a 1.5-meter wide pedestrian entrance. Central to the lab layout are the work tables, spaced 1.5 meters apart and positioned nearly 3 meters from the main entrances to maximize mobility. The upper section of the lab houses support areas including computer stations, shelving, and toolboxes, while the lower section features tables equipped for heavy-duty tools like chainsaws and lasers, essential for woodworking in the bio-based lab. All furnishings are standard, everyday items, selected for their functionality and cost-effectiveness within the lab setting.

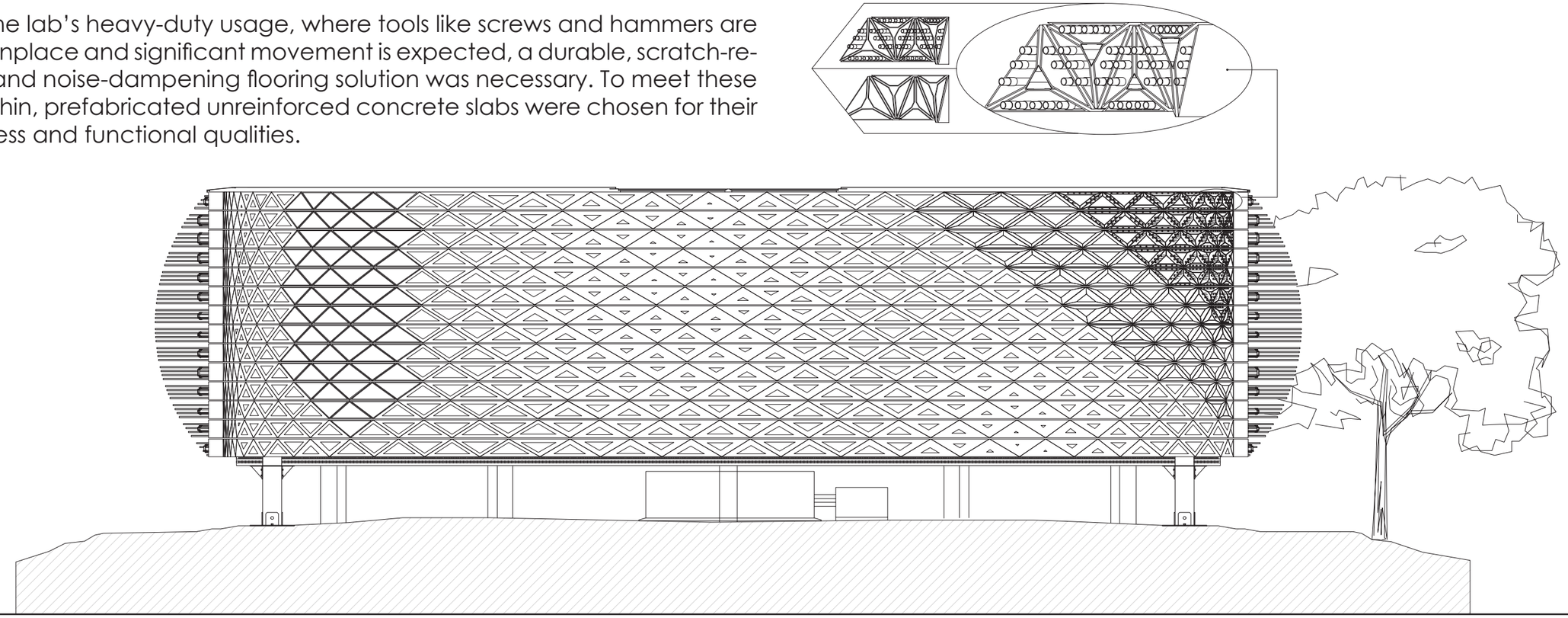
7.1 | THE URCHIN - TECHNICAL DRAWINGS

SECTION AND ELEVATION - SCALE 1.20

In the section and elevation views, the materiality of the structure is clearly highlighted, along with the varying scales of the exterior facade. The construction utilizes glulam timber beams, which are reinforced at both ends with steel brackets: the lower brackets support the floor, while the upper brackets secure the roof, both constructed from CLT (cross-laminated timber) slabs.



Given the lab's heavy-duty usage, where tools like screws and hammers are commonplace and significant movement is expected, a durable, scratch-resistant, and noise-dampening flooring solution was necessary. To meet these needs, thin, prefabricated unreinforced concrete slabs were chosen for their robustness and functional qualities.

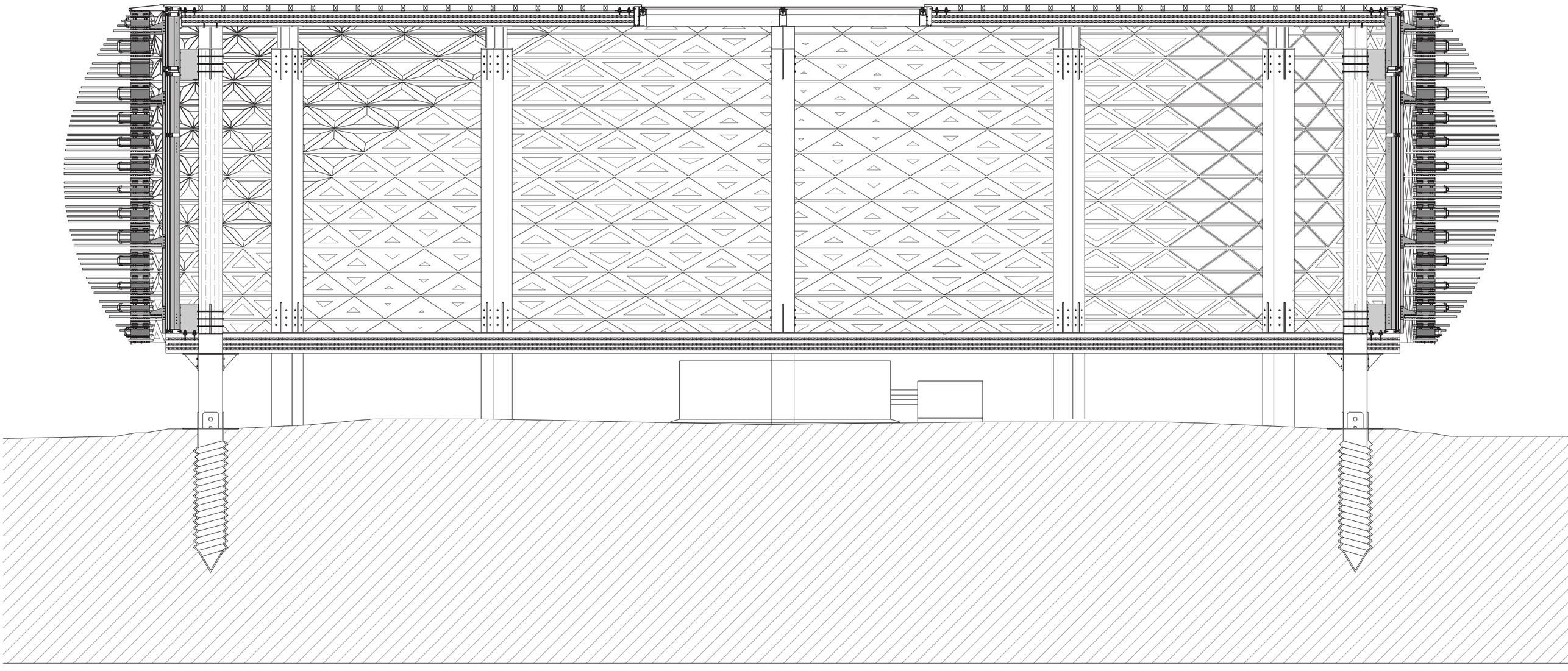


7.1 | THE URCHIN - TECHNICAL DRAWINGS

SECTION - SCALE 1.50

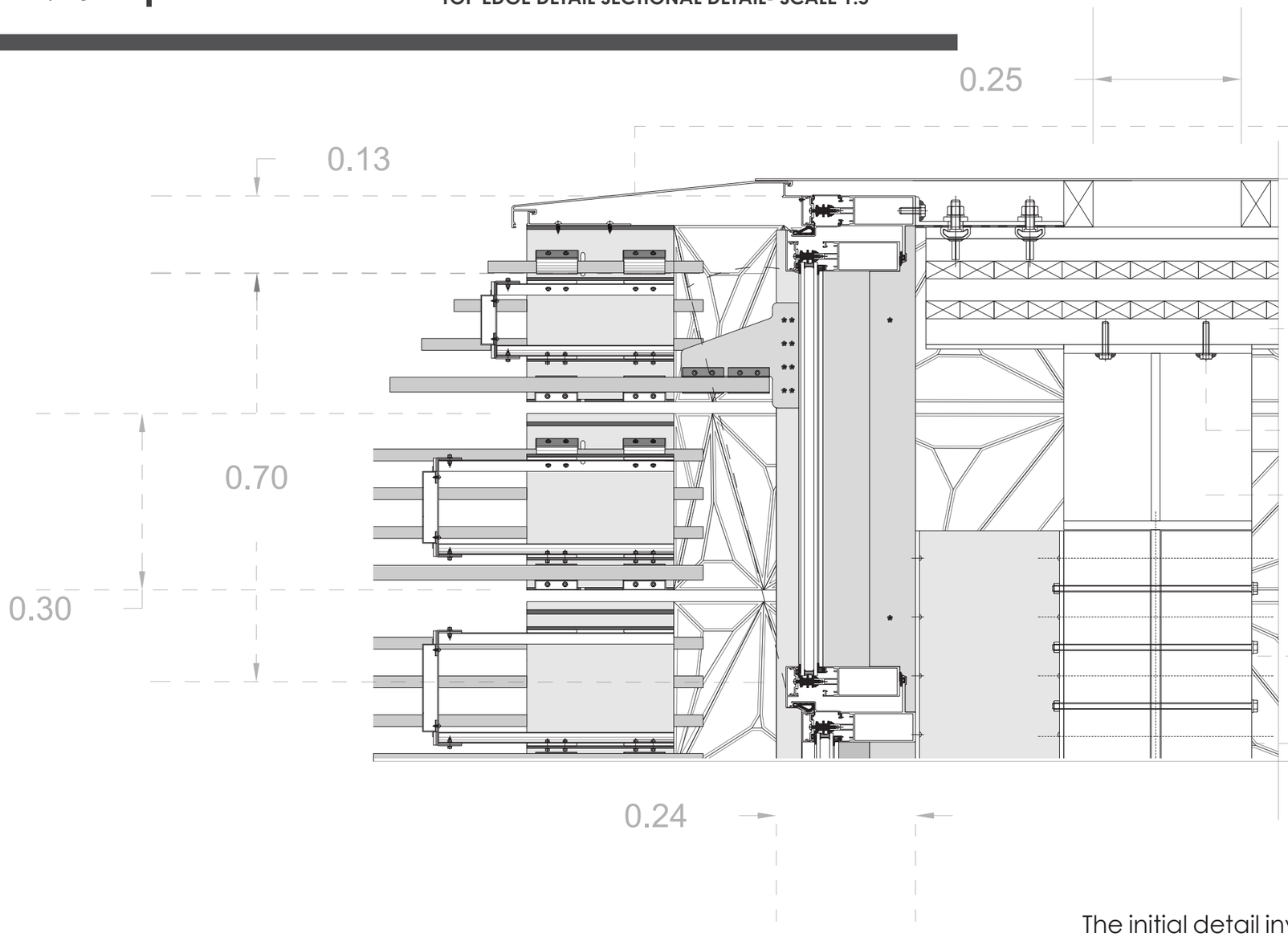
Zooming in reveals the dual-layer facade design of the building: an outer facade for aesthetic appeal and an inner layer for environmental protection. The exterior, composed of triangles and rods, isn't designed to shield against the elements like rain or wind. However, it is structurally sound, efficiently transferring loads to the building's internal aluminum framework, which supports the mullions of the glass and insulation layers.

The inner facade, primarily constructed from aluminum, features acrylic blocks that serve as barriers against water and wind. These blocks also prevent torsional stress within the structure by accommodating tolerances, ensuring the facade's functional integrity while the outer layer captivates onlookers.



7.1 | THE URCHIN - TECHNICAL DRAWINGS

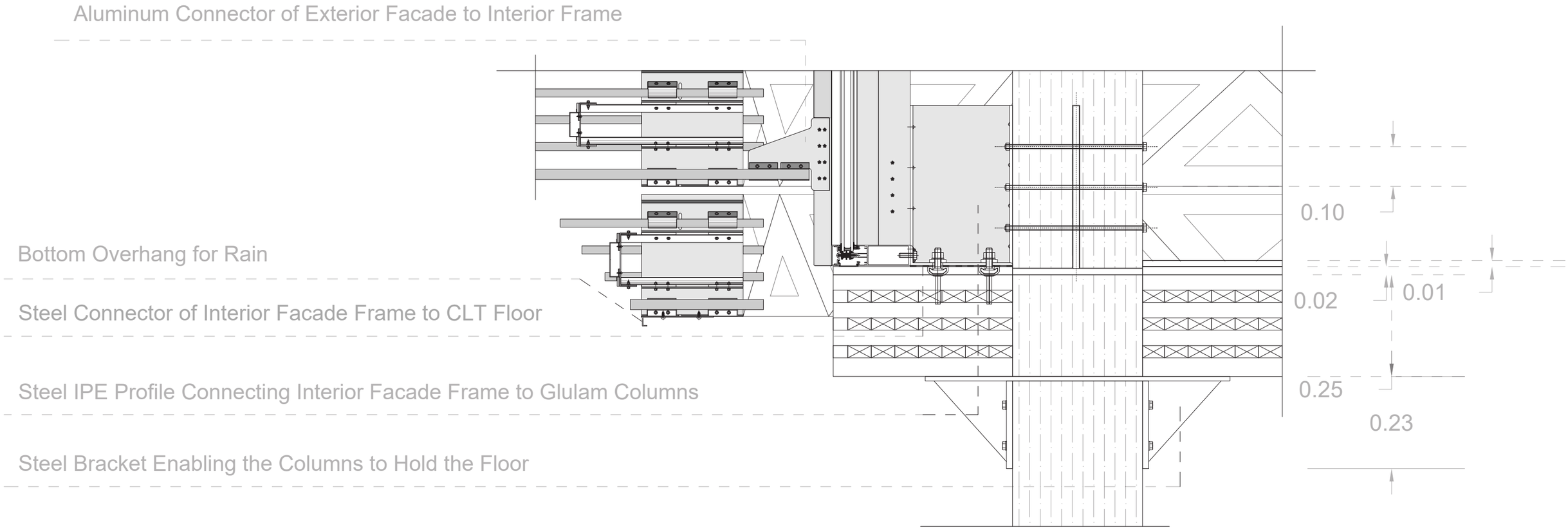
TOP EDGE DETAIL SECTIONAL DETAIL- SCALE 1.5



The initial detail involves the aluminum frame at the building's top edge, where the vertical aluminum mullion terminates at the peak of the CLT floor slab. Here, a horizontal mullion, reinforced with a steel bracket, securely anchors to the main structure. Additionally, a triangular-shaped extension fastened with four screws on each side extends from the vertical mullion. This crucial component supports the extended master rod, which projects further than others, allowing the triangular extension to maintain the outer facade's triangular elements suspended and securely attached to the building. Intriguingly, this arrangement appears as if two mullions are stacked—one fixed to the frame and the other adjustable, enabling the window to open, blending structural integrity with functional flexibility.

7.1 | THE URCHIN - TECHNICAL DRAWINGS

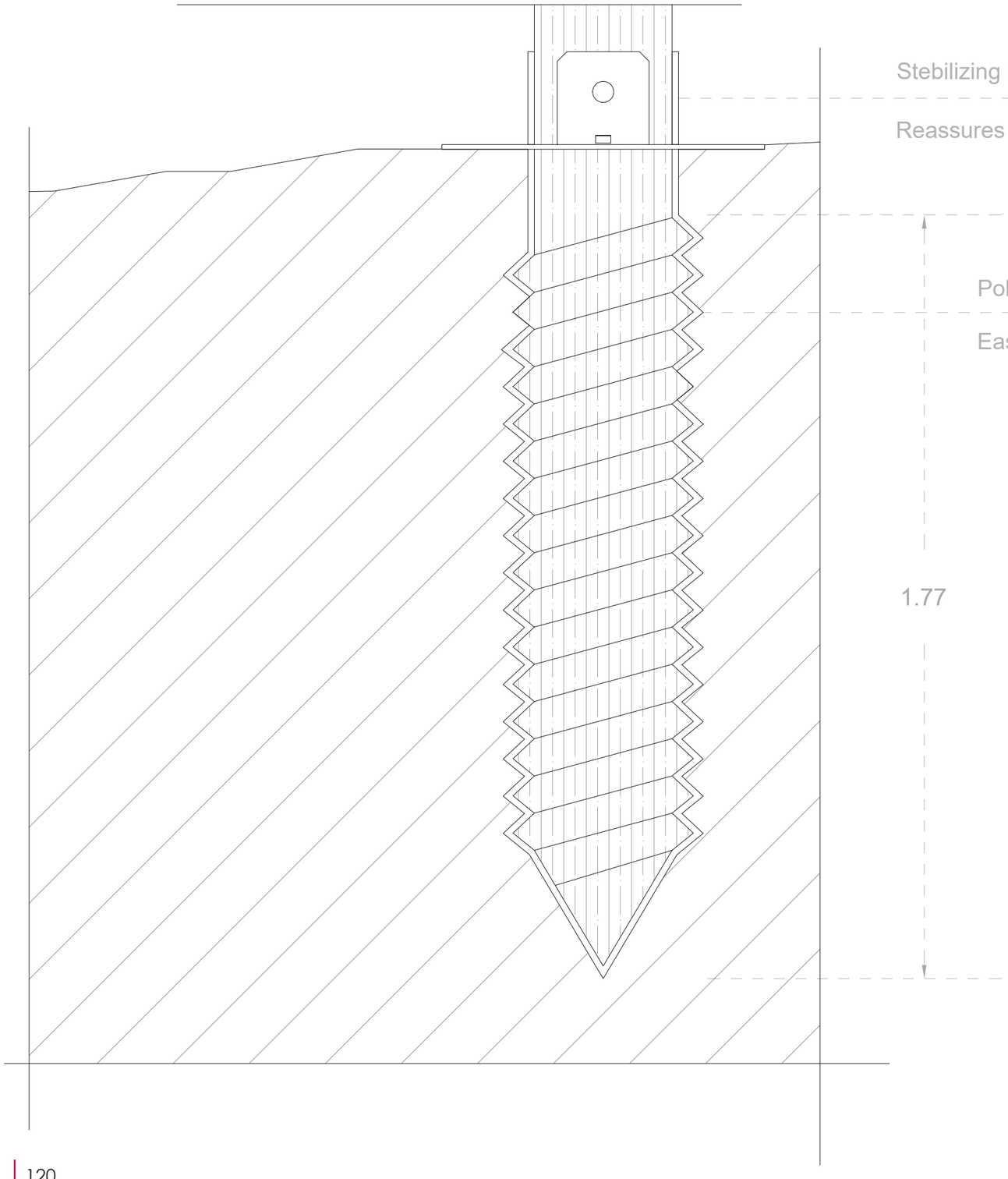
BOTTOM EDGE SECTIONAL DETAIL - SCALE 1.5



In the sectional detail at the floor level, the focus extends beyond the dimensions and materiality of the mullions to include a closer examination of the structural nuances at critical points, such as where the floor begins. Steel brackets are strategically placed on the underside of the floor slab, affixed to either side of the vertical timber beam, which supports surfaces shaped by triangular configurations that sustain the floor slabs. Additionally, a crucial connection exists between the interior façade and the glulam beams, facilitated not only at the floors but also through precisely laser-cut IPE beams tailored to fit the specific structure. These beams are attached to the vertical mullions of the aluminum frame, which are inherently more robust than their horizontal counterparts, ensuring a secure and durable assembly

7.1 | THE URCHIN - TECHNICAL DRAWINGS

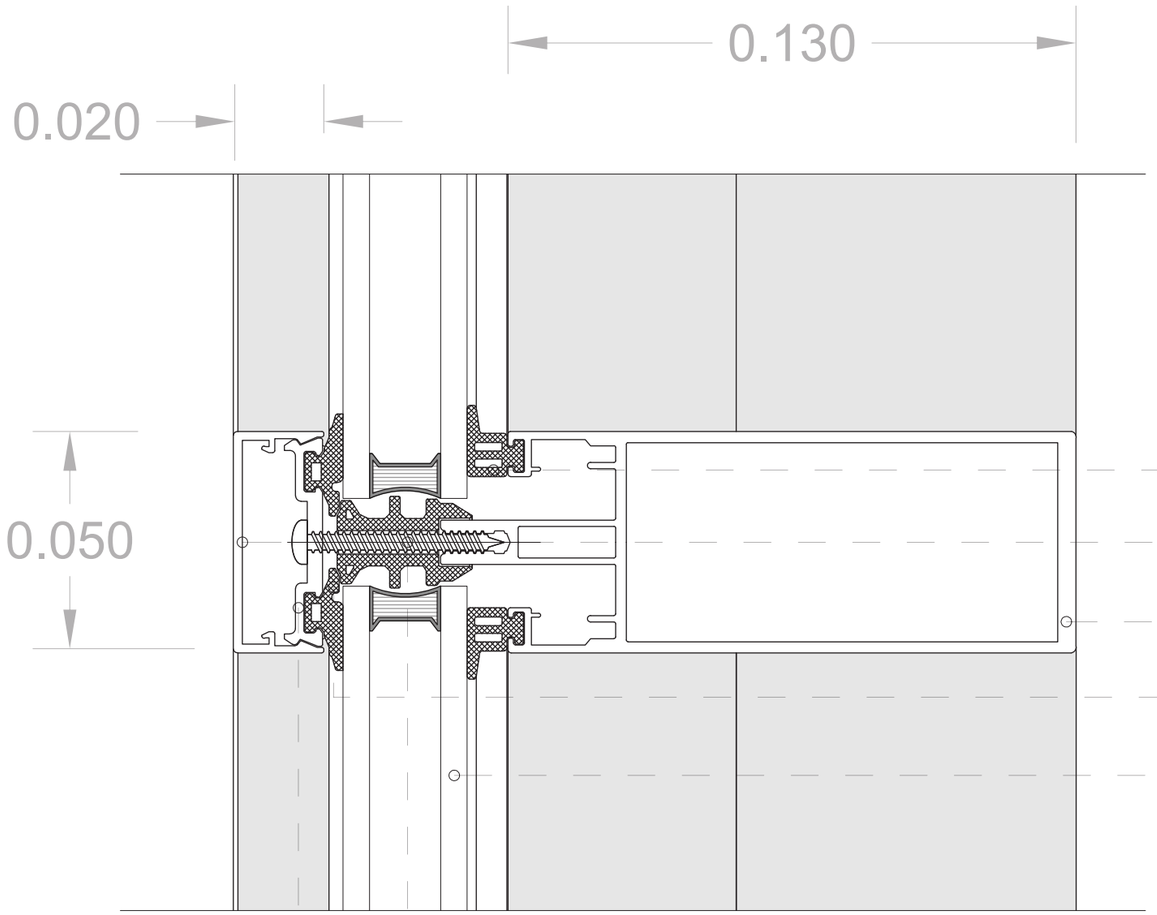
FOUNDATION SECTIONAL DETAIL - SCALE 1.5



For the foundation, considering the relatively soft terrain around the Green Village, a robust and rigid solution was essential. Initially considered concrete foundations were discarded due to their non-recyclability and cumbersome nature. Instead, a design based on torsional interaction between the structure and the terrain was developed. This approach involves driving poles 1.77 meters deep into the ground to firmly anchor the building at each required point. At the top of these poles, steel brackets with vertical extensions ensure that the beams are precisely aligned at a 90-degree angle relative to the surface, ensuring structural integrity and correct load distribution.

7.1 | THE URCHIN - TECHNICAL DRAWINGS

BASIC MULLION DETAIL - SCALE 1.1



Zooming into the main horizontal mullion reveals the sophisticated engineering of the aluminum façade frame used to secure the windows. At the core of this system is a central screw that tightly binds the interior micro mullion component with the external pressure plate. This setup allows for the finishing cap to seamlessly click into place, concealing the assembly components. The arrangement compresses the insulation blocks and glass between these elements, forming a tightly sealed and structurally robust unit. This design not only enhances the facade's aesthetic but also ensures durability and weather resistance.

Thermal insulation spacer - minimizes thermal bridges

Cover cap - Clicks with the rest of the components

Mullion - T mm - Tightens the pressure from the spacers to the glass

Acrylic gasket - Allows for tolerance

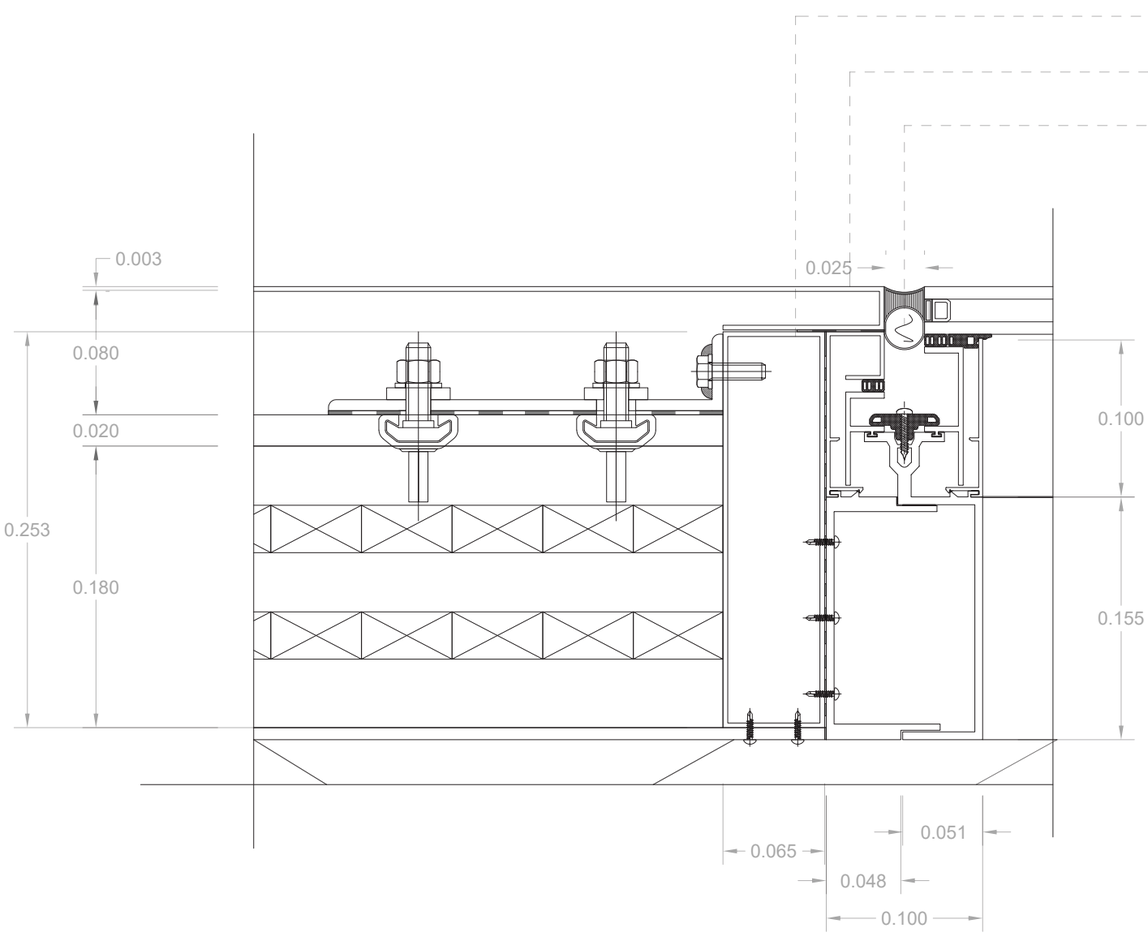
Double glazed glass - T 6mm

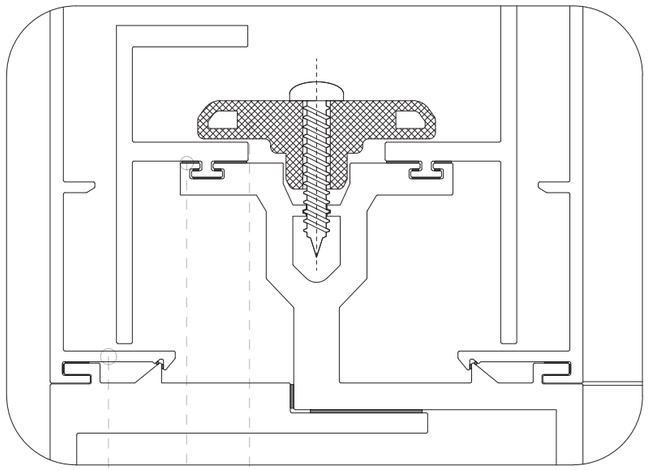
Tapping screw - Fastens all the parts of the frame together

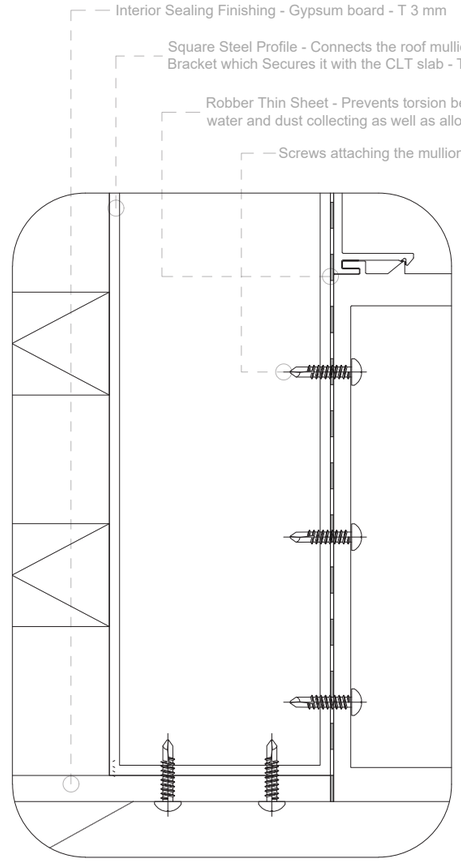
Pressure plate - Tightens the pressure from the acrylic to the glass

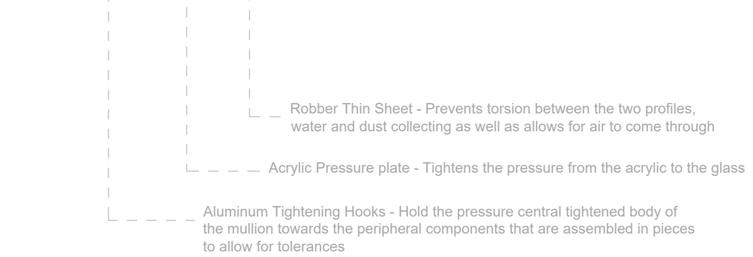
7.1 | THE URCHIN - TECHNICAL DRAWINGS

ROOF MULLION DETAIL - SCALE 1.2







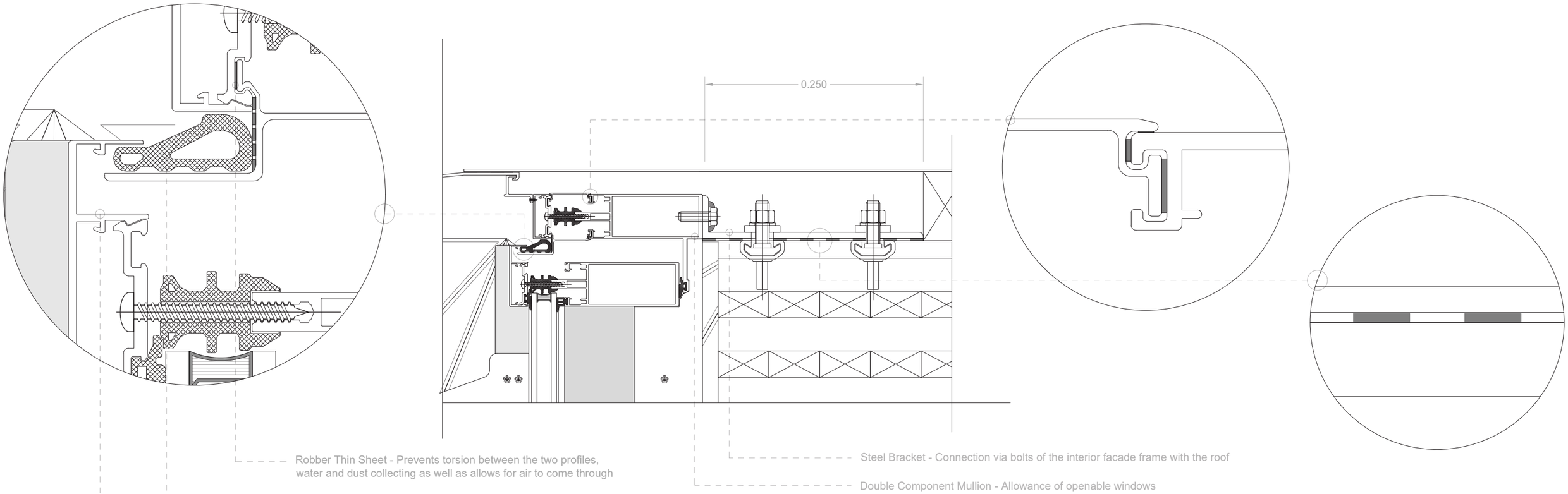


For the rooftop mullion, which supports the central circular glass, a specialized design was necessary due to its horizontal orientation. This mullion is crafted to avoid extensions beyond the glass edge, preventing water accumulation. It features a strong weather-resistant sealant made of acrylic, similar in tolerance to standard acrylic but capable of securely compressing the glass at both ends. This ensures a tight seal, preventing any movement or leakage, and maintains the glass firmly in place against compressive forces.

Interestingly, the installation method for this mullion differs to accommodate its smaller size. It is first attached to a square steel profile, which is then connected to the main structure using a steel bracket and secured to the floor. This multi-step assembly ensures robust attachment and alignment with the building's structural requirements, optimizing both the mullion's functionality and its integration with the overall architectural design.

7.1 | THE URCHIN - TECHNICAL DRAWINGS

TOP EDGE MULLION DETAIL - SCALE 1.2

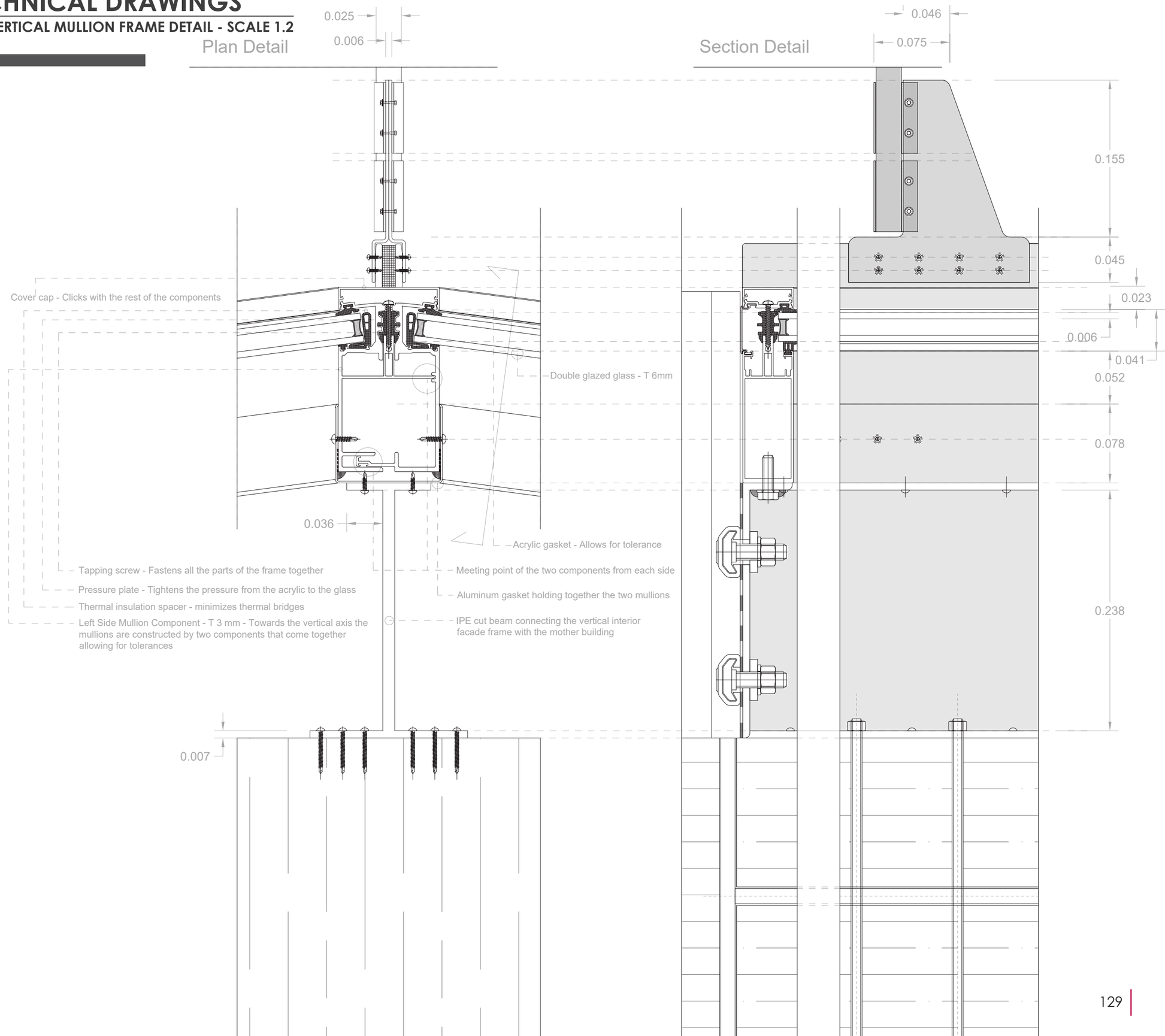


This detail of the top mullion on the upper side of the frame illustrates a critical aspect of our design: it is constructed from layers of aluminum sheets that are either screwed or clicked together. At every connection point, thin rubber sheets or acrylic blocks are inserted between the aluminum layers. These materials are essential in our construction process as they act as buffers, preventing torsion that can weaken or damage the structure. Additionally, they block the accumulation of water and dust in crevices, ensuring the integrity and longevity of the façade system.

7.1 | THE URCHIN - TECHNICAL DRAWINGS

VERTICAL MULLION FRAME DETAIL - SCALE 1.2

n the design of the vertical mullion, it is connected to the glulam beam via the IPE profile previously discussed, illustrating the integration of vertical and horizontal frame components. This mullion is designed with two primary micro components that join together, allowing for tolerances and necessary movement. This flexibility is crucial, particularly in seismic activity; while the notion of a trembling building during an earthquake may be daunting, the ability for these components to move is essential for absorbing and distributing seismic forces effectively, ensuring structural safety.

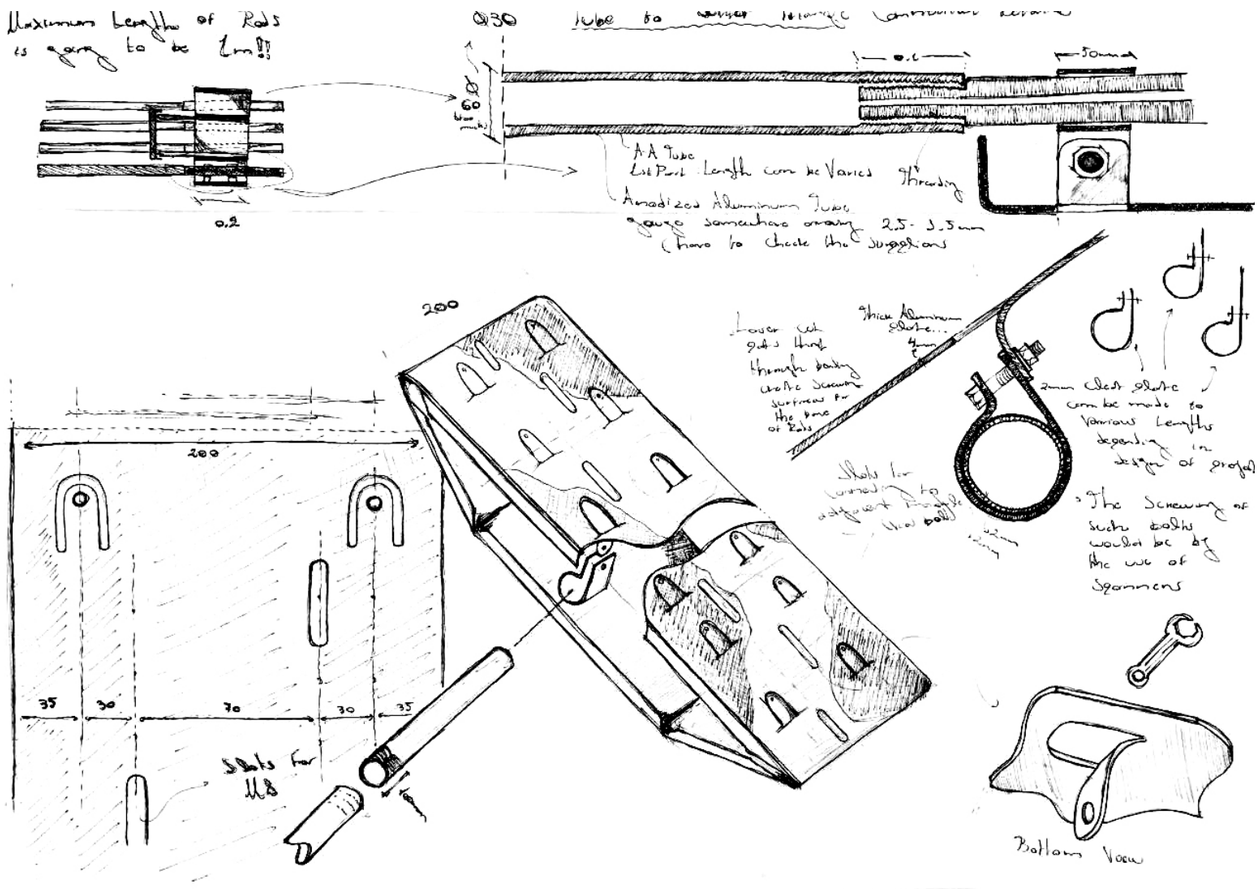


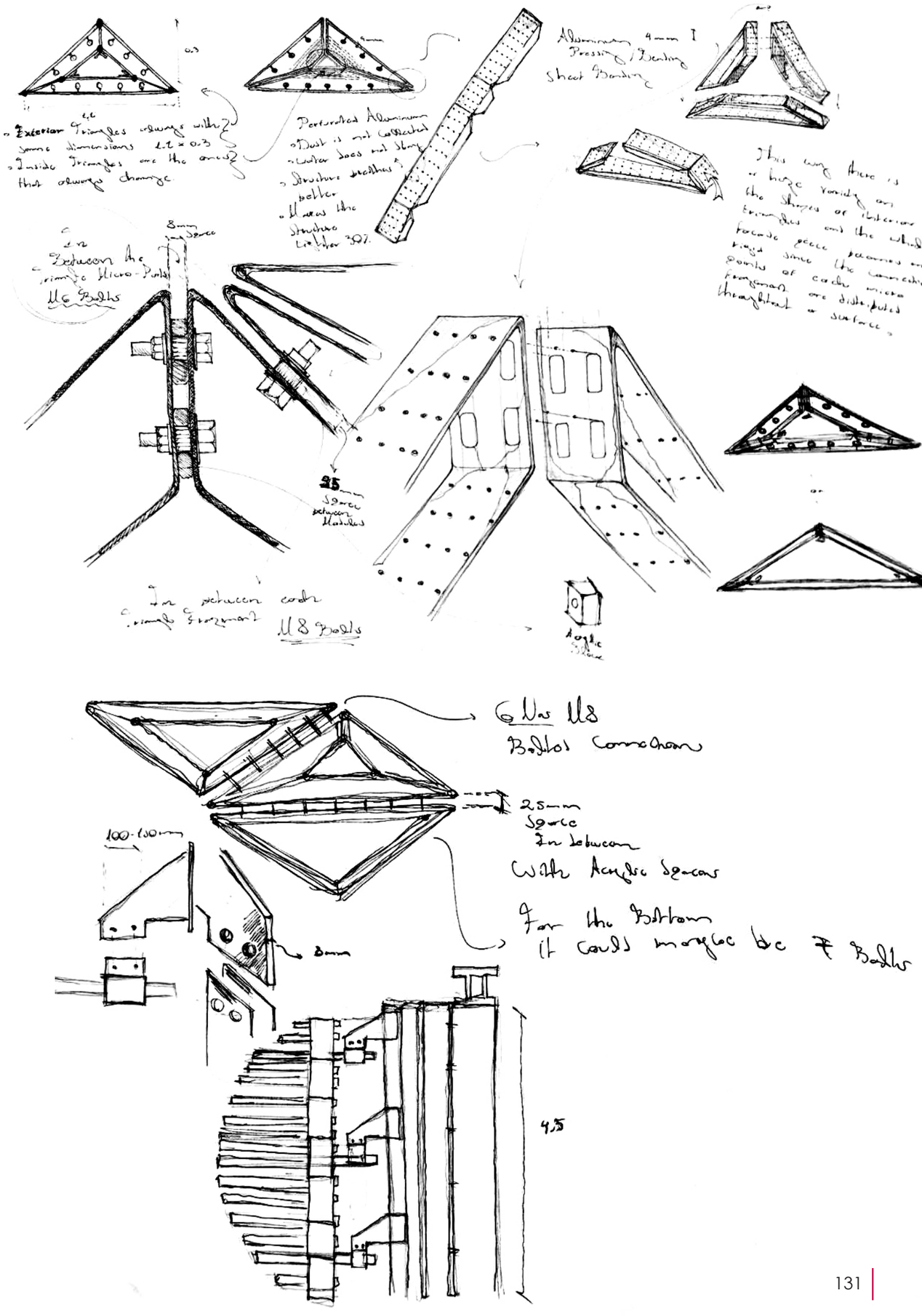
7.1 | THE URCHIN - TECHNICAL DRAWINGS

CONSTRUCTION DETAIL OF TRIANGLE

Let's explore the exterior facade, composed of the repeated use of a specific triangular form. This triangle, crafted from 4mm thick perforated aluminum sheets, is bent to create three distinct segments. The assembly and dimensions of these segments dictate the size of the inner triangle, which is the variable element in the design. One face of the triangle maintains consistent dimensions for simplicity and uniformity in construction, facilitating the interconnection of each triangular unit.

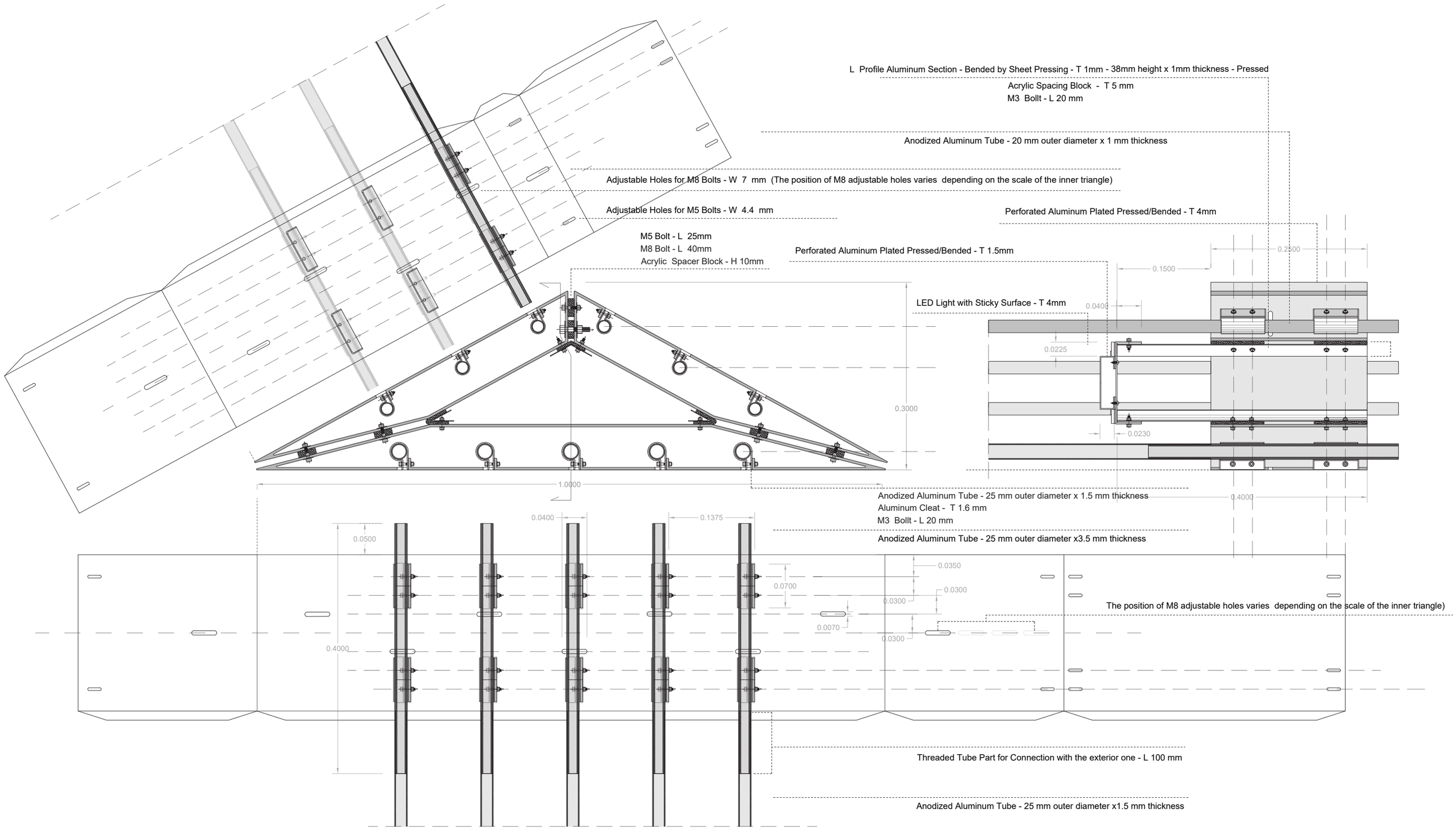
Why perforated aluminum? This material choice enhances breathability, allowing air to flow freely, reducing water and dust accumulation, and significantly lightening the structure by up to 30% without compromising its strength. The aluminum sheets are not only laser-cut to form bolt holes but also to create tongue-shaped extensions. These extensions provide a foundation for aluminum cleats, which secure the rods integral to the facade's structure. This meticulous design ensures a robust yet adaptable exterior facade system.





7.1 | THE URCHIN - TECHNICAL DRAWINGS

CONSTRUCTION DETAIL OF TRIANGLE

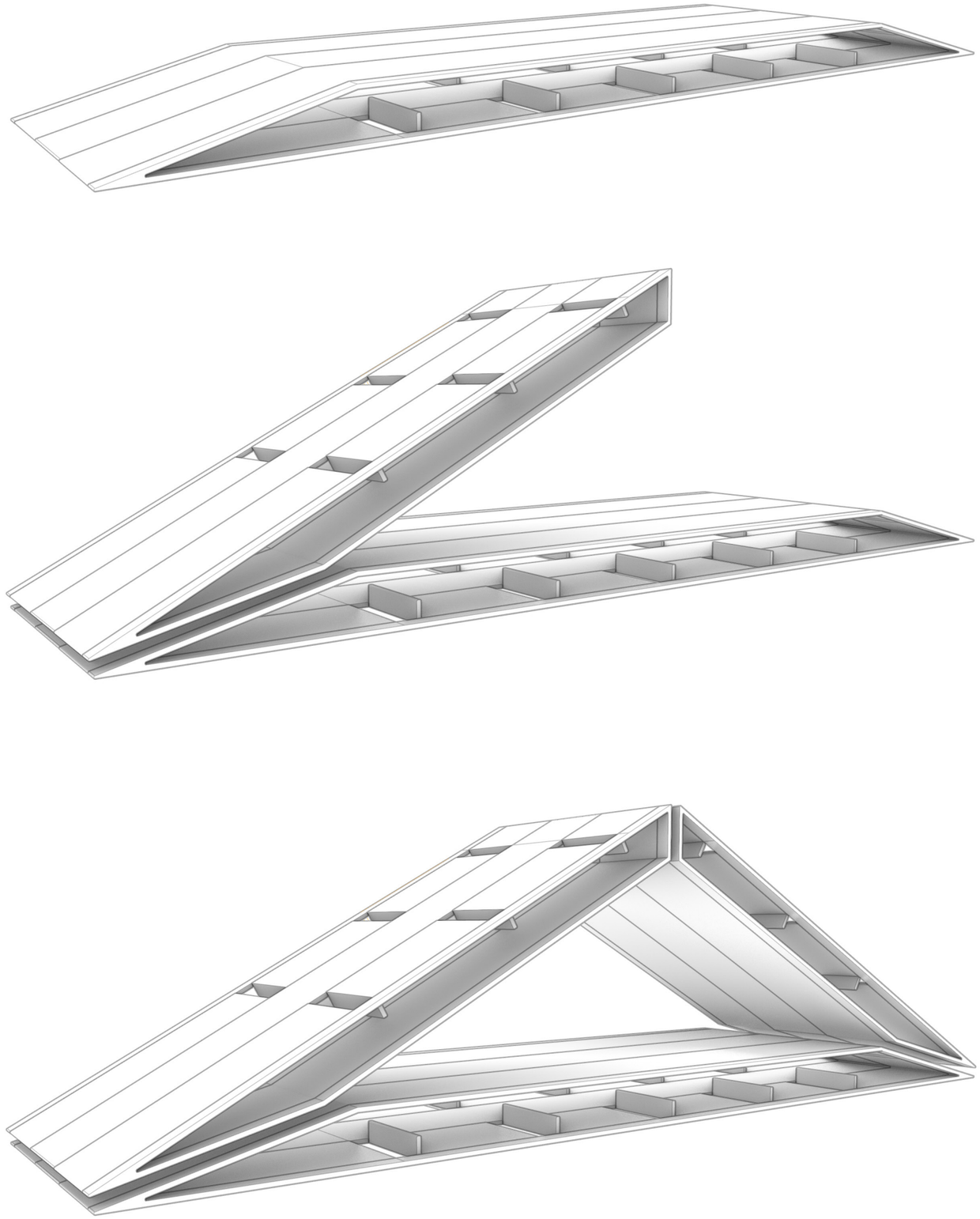


7.1 | THE URCHIN - TRIANGLE ASSEMBLY

CONSTRUCTION SEQUENCE

STEP 1

- Aluminum sheet is bended in order to create the 3 distinct fragments.
- Then these 3 fragments are bolted together using M8 bolts in 5 different spots in the surface of the outside face of the whole triangle.
- Lastly, once all fragments are attached, the final shapoe of the the triangle is formed.

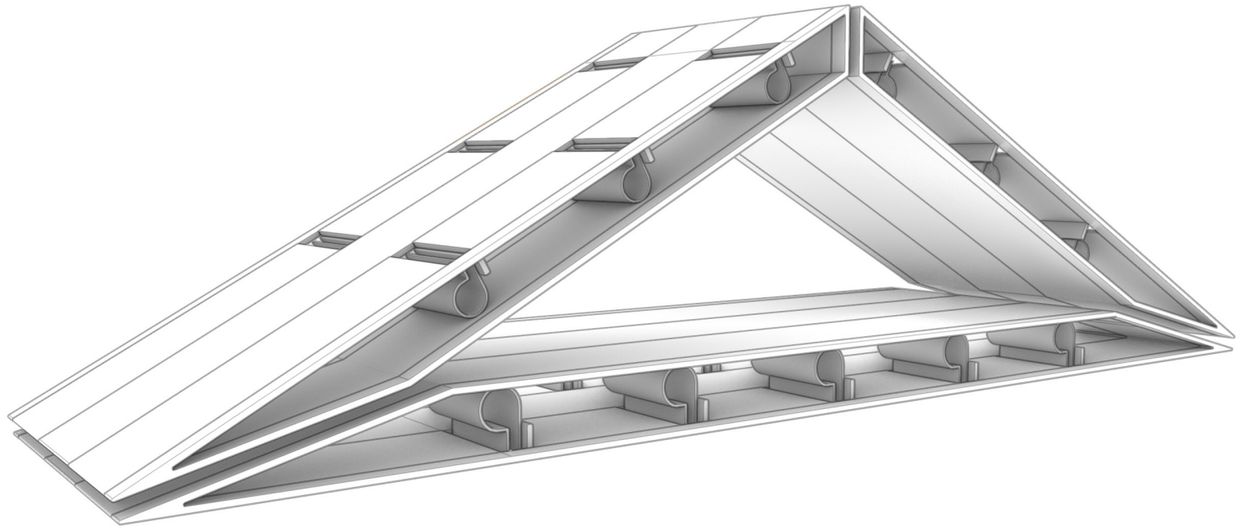


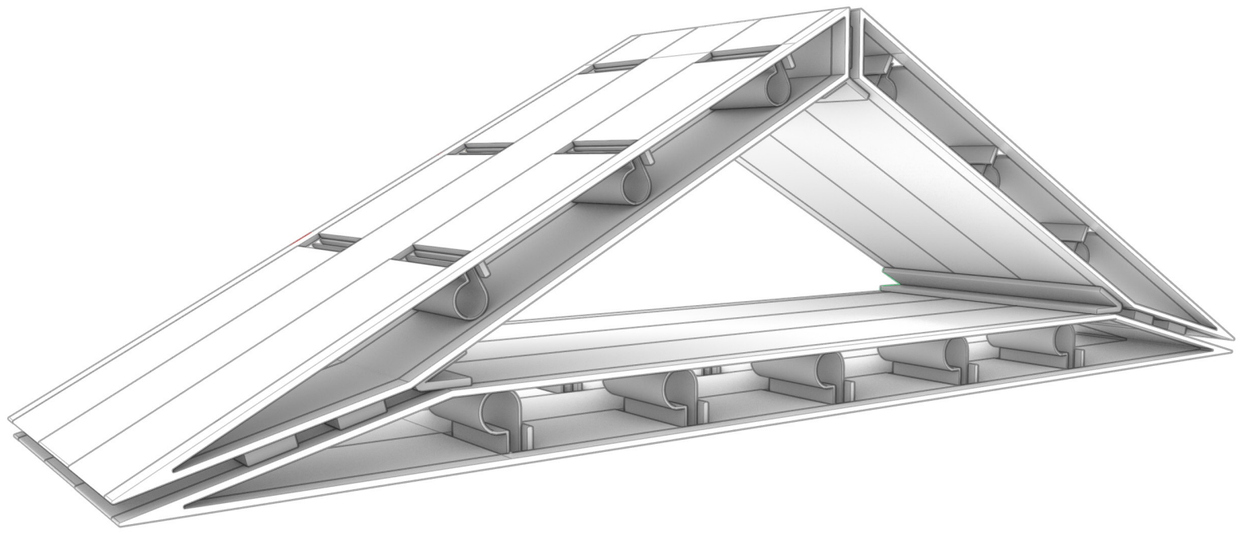
7.1 | THE URCHIN - TRIANGLE ASSEMBLY

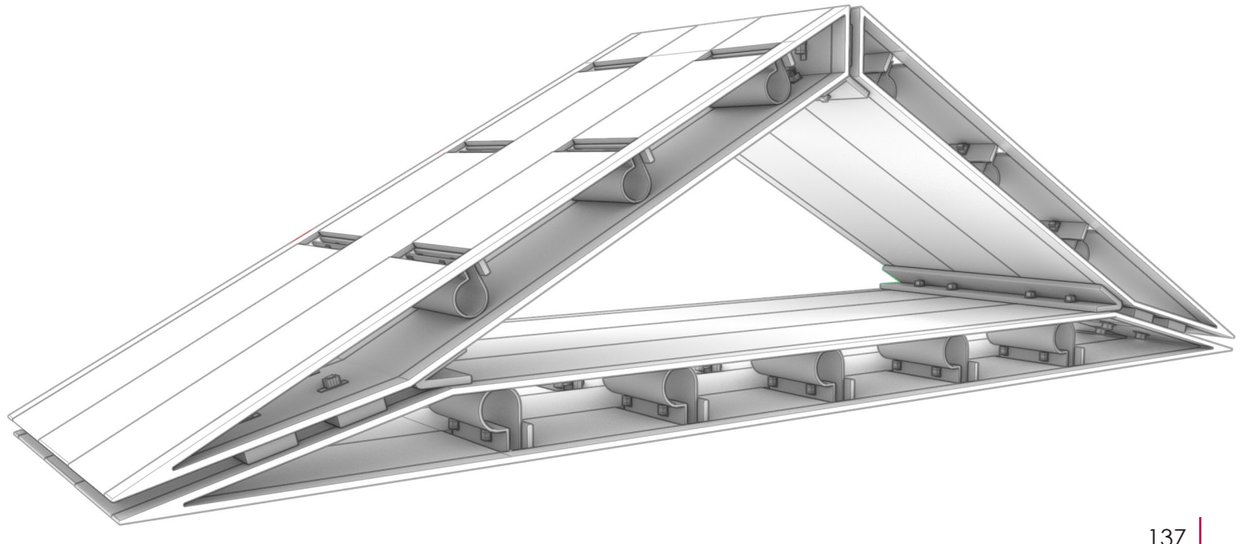
CONSTRUCTION SEQUENCE

STEP 2

- Then the aluminum cleats that would hold the rods are bolted in the laser cuted bended extensions of the triangle.
- Simultaneously, there comes the placement of the acrylic blocks that leave the necessary space between each component.







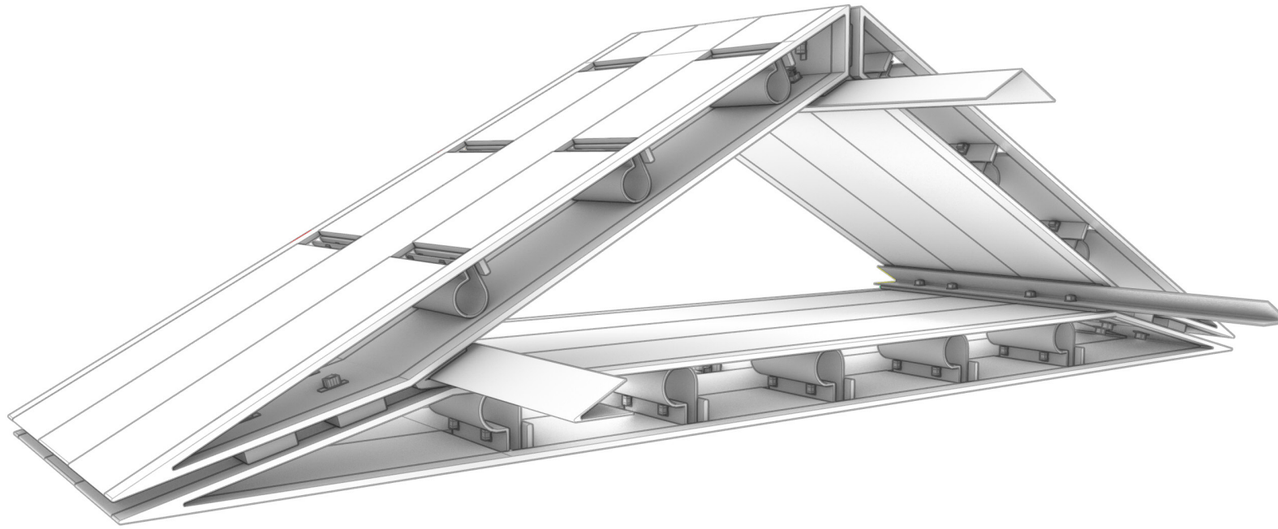
7.1 | THE URCHIN - TRIANGLE ASSEMBLY

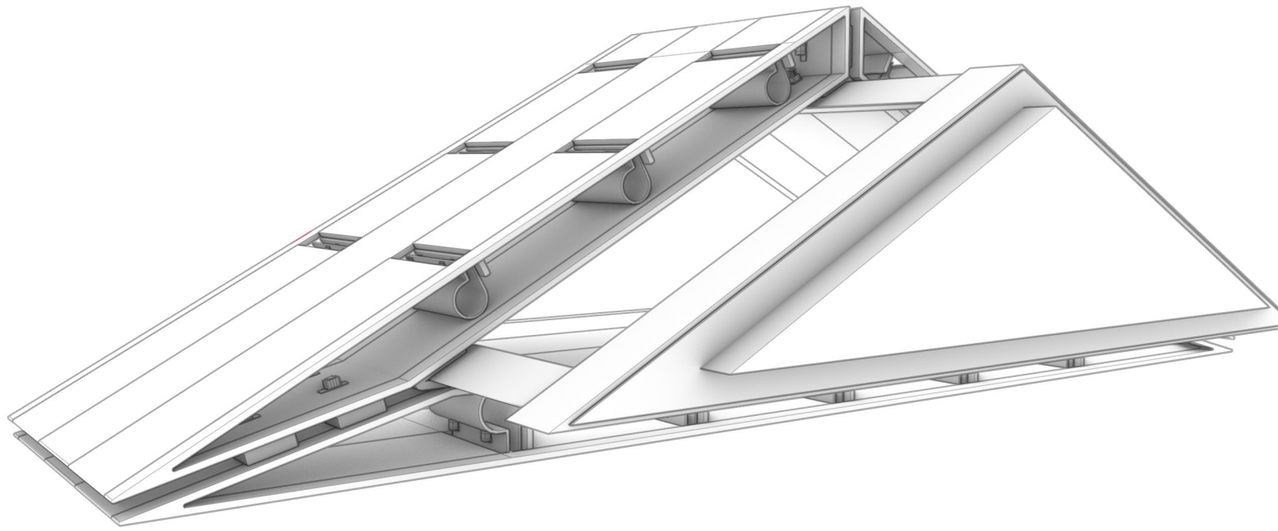
CONSTRUCTION SEQUENCE

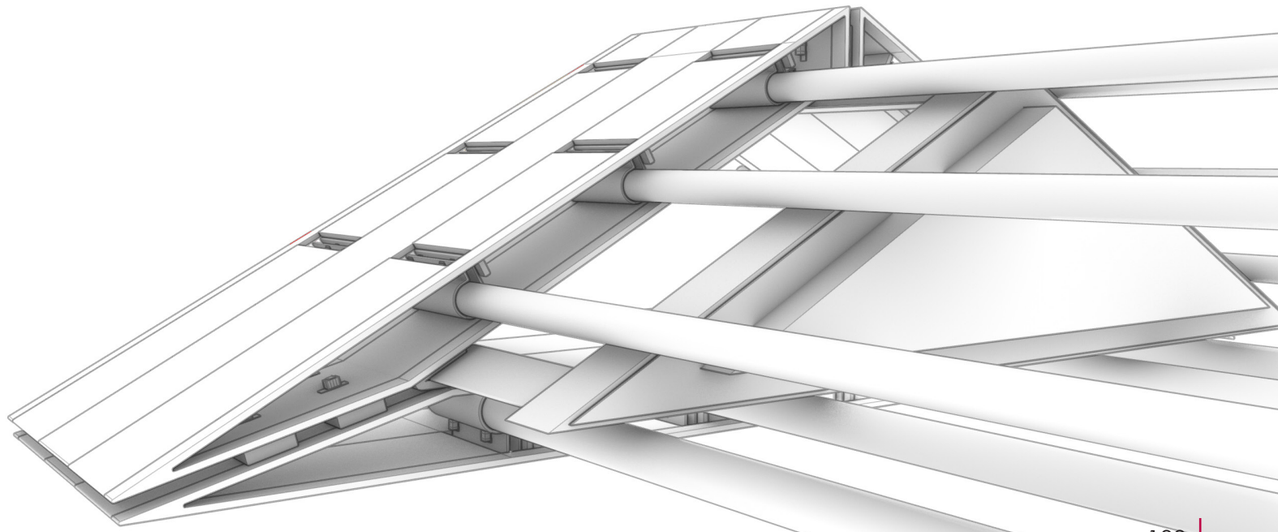
STEP3

- The finishing touches, include the fixing of thin L shaped profiles, (whose 1mm thickness allows for bending in narrow angles and wide), in the edges of the inside triangle.
- From there comes the finishing panel, made out of corten steel. a group of steel alloys which were developed to eliminate the need for painting, and form a stable rust-like appearance after several years' exposure to weather, known for their resilience and tensile strength
- Finally, the rods are also installed.

The result of which, in its more hollistic approach, is presented in the following pages.

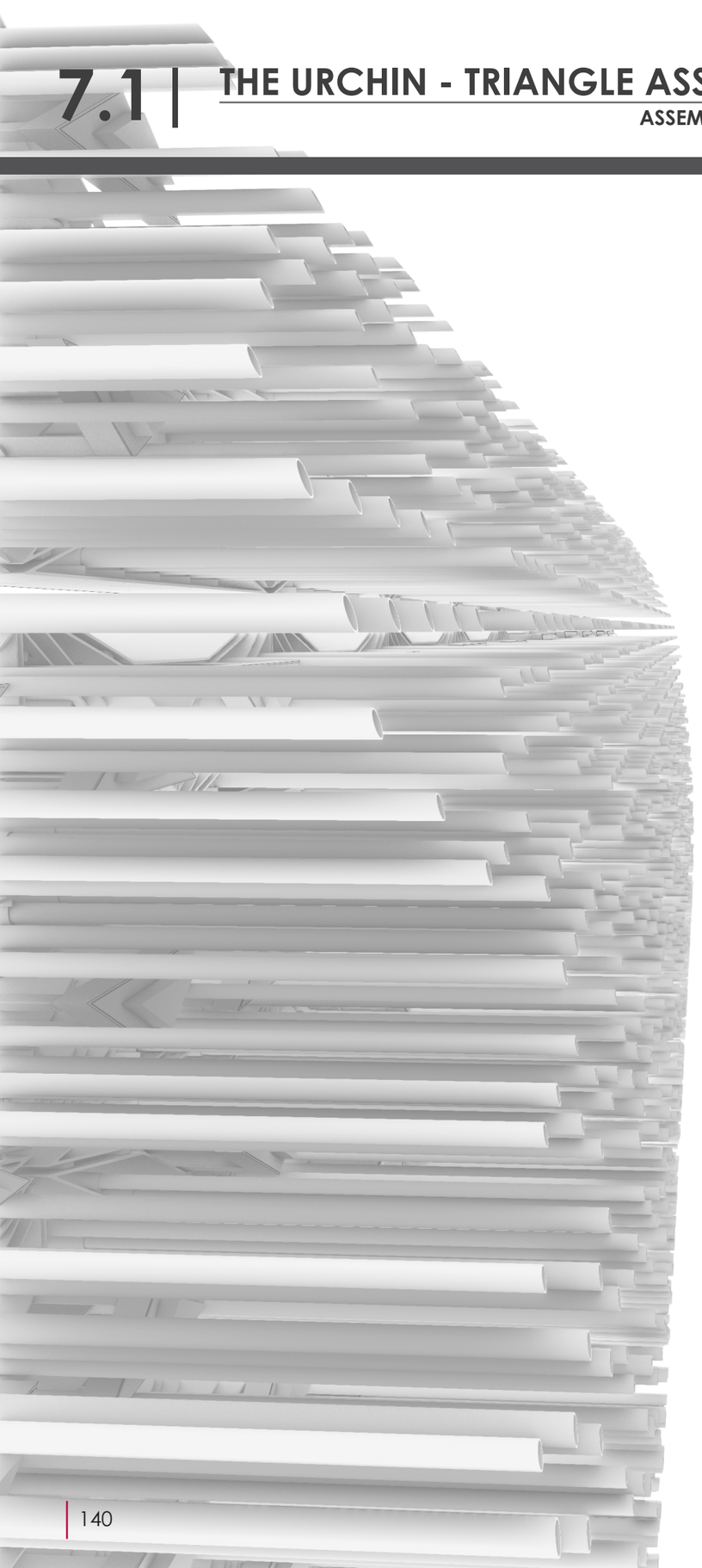


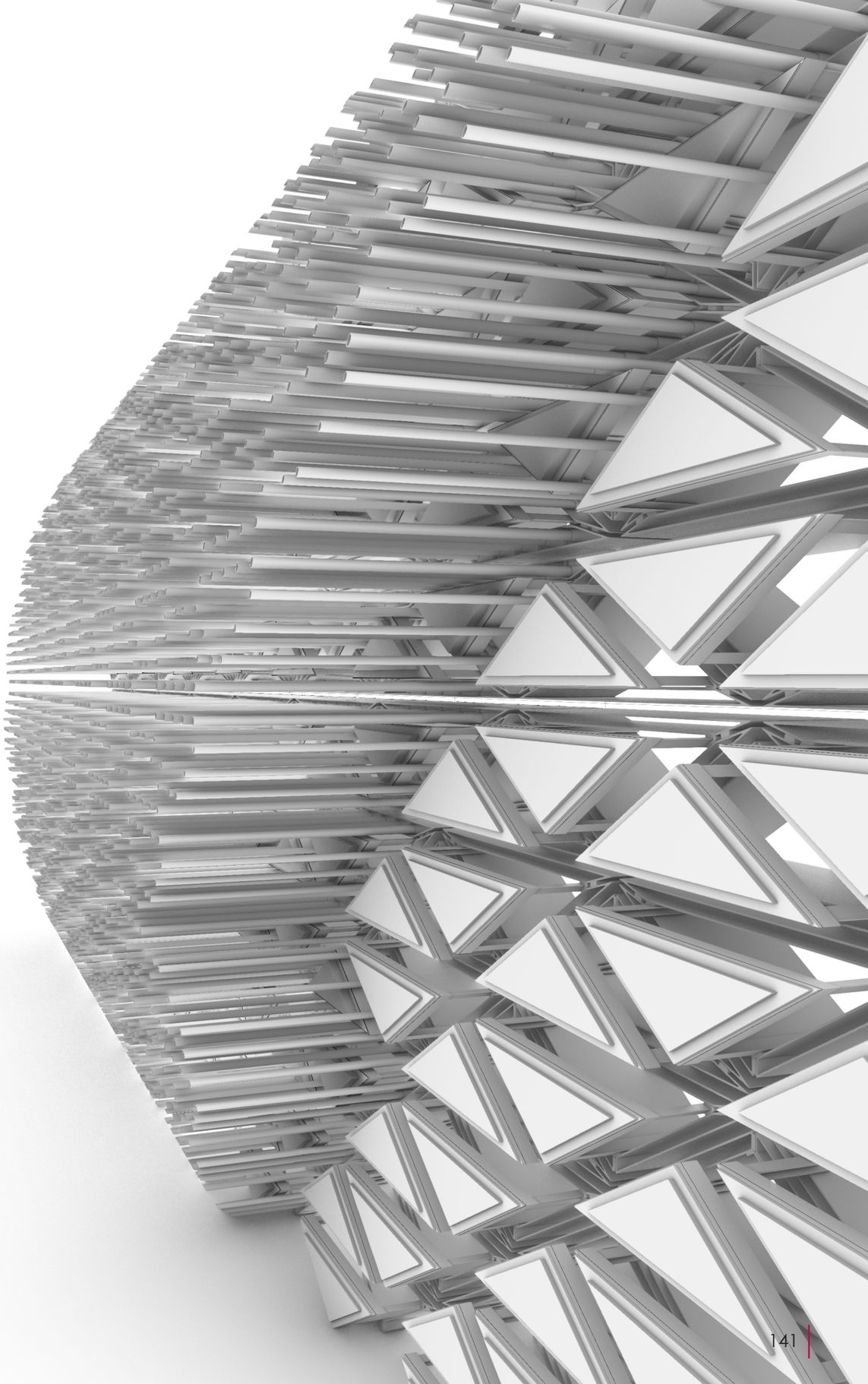




7.1 | THE URCHIN - TRIANGLE ASSEMBLY

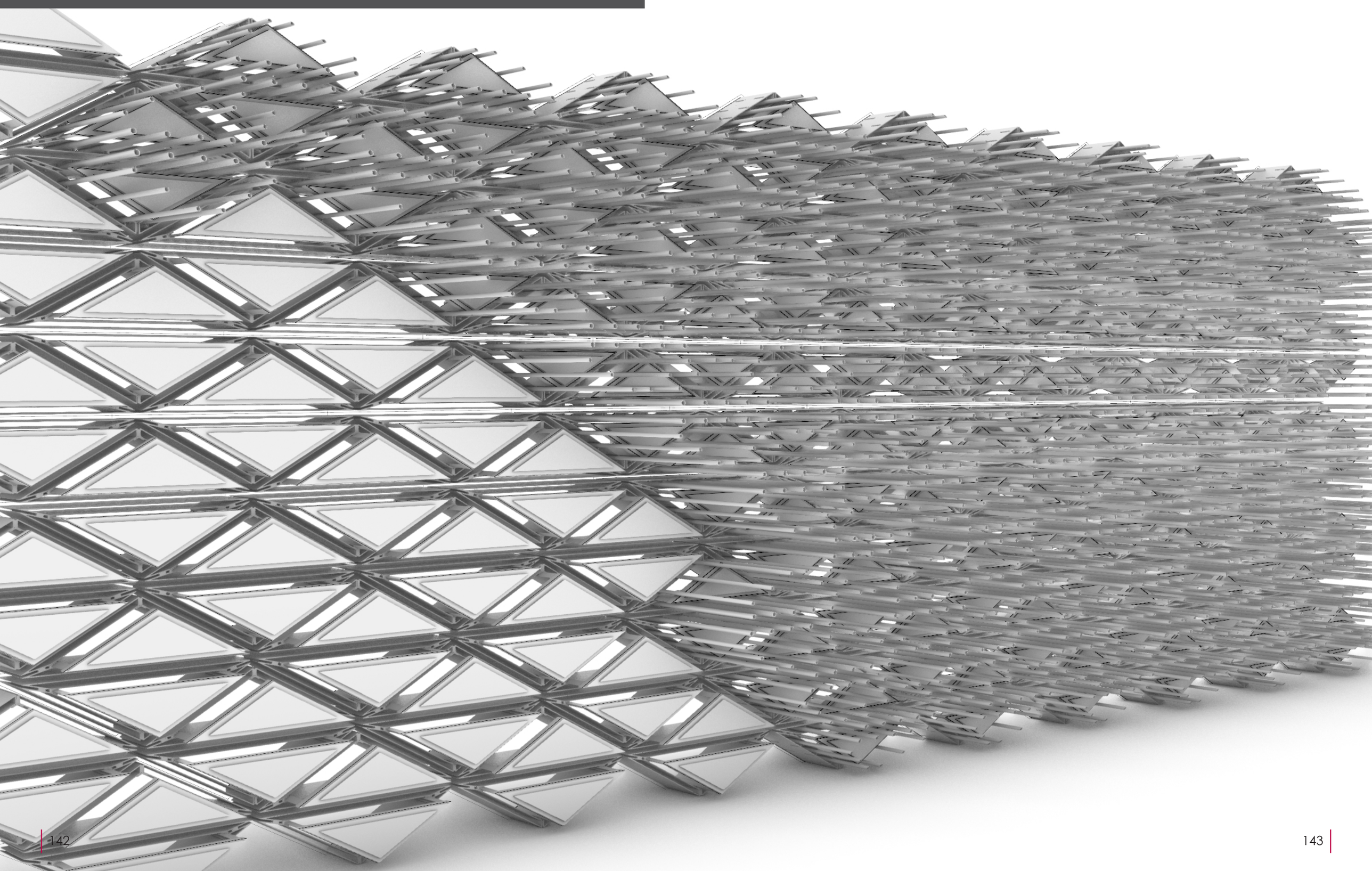
ASSEMBLED FACADE OVERVIEW





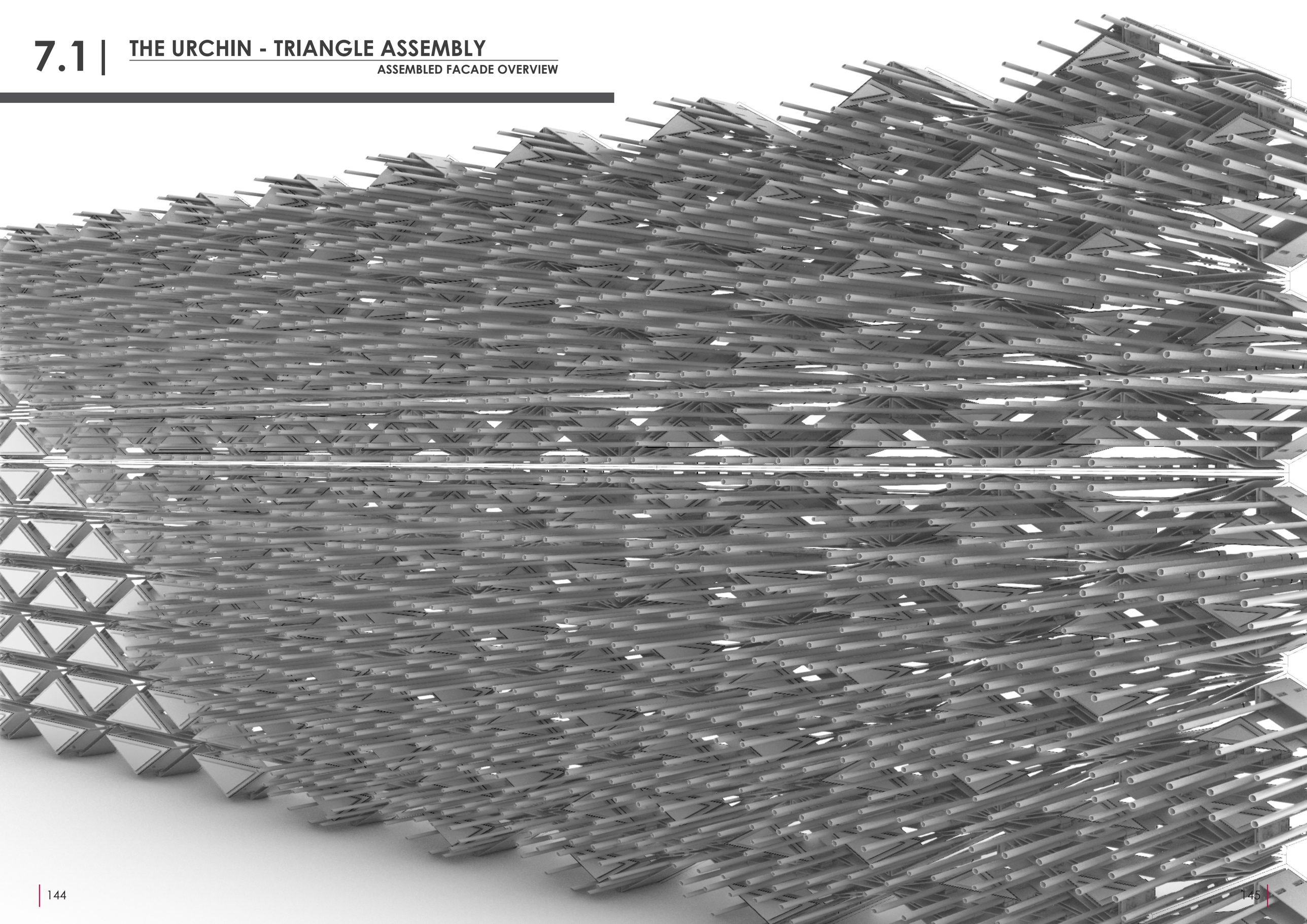
7.1 | THE URCHIN - TRIANGLE ASSEMBLY

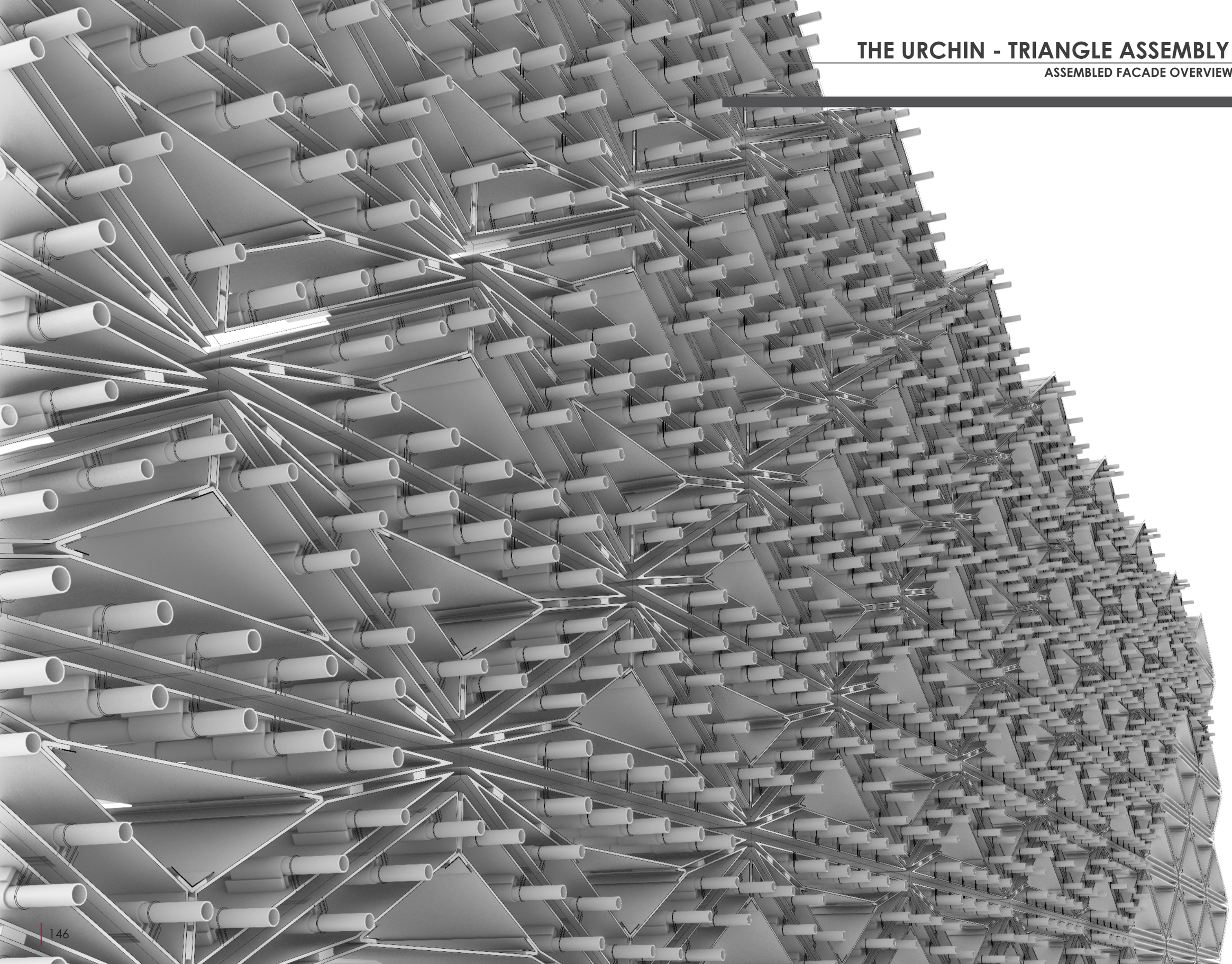
ASSEMBLED FACADE OVERVIEW



7.1 | THE URCHIN - TRIANGLE ASSEMBLY

ASSEMBLED FACADE OVERVIEW



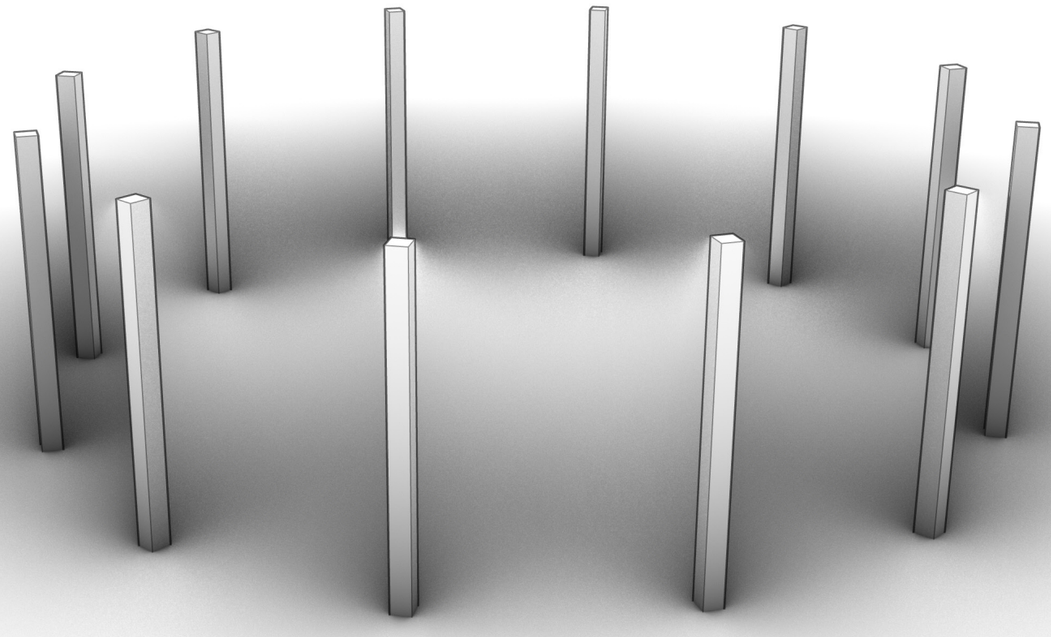


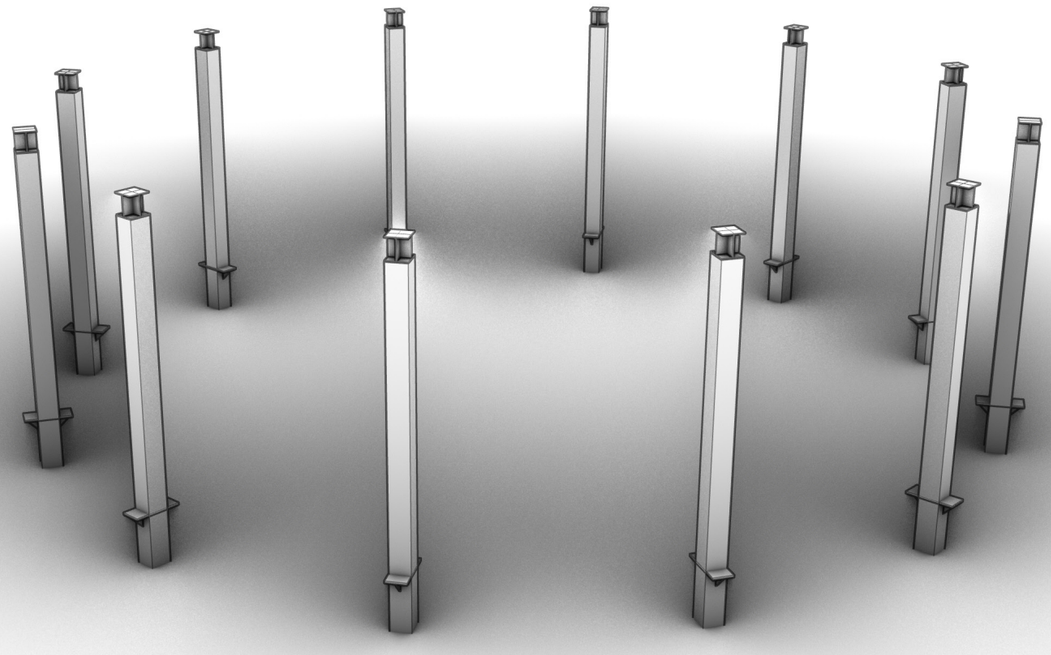
7.2 | THE URCHIN - MAIN BUILDING ASSEMBLY

CONSTRUCTION SEQUENCE

STEP 1

- Placement of Glulam beams
- Installment of the steel brackets that hold the roof and the floor.



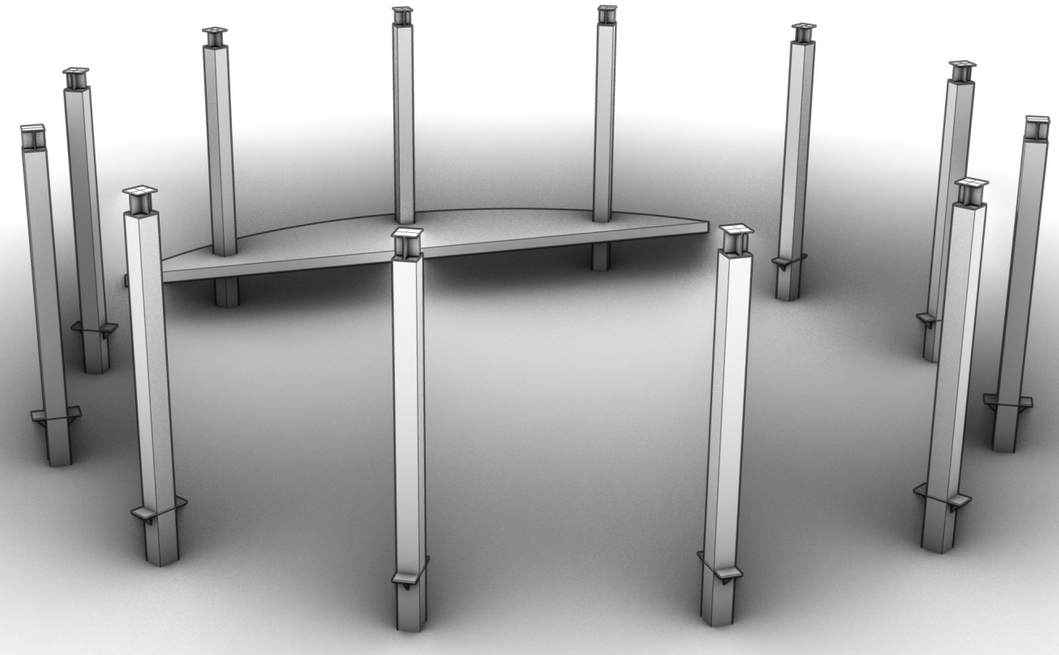


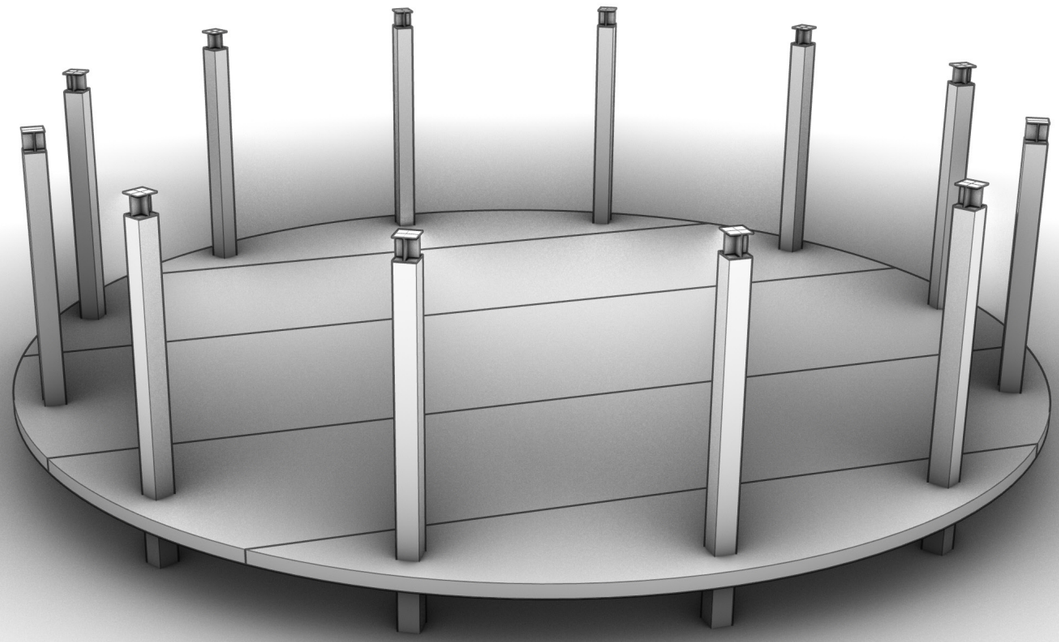
7.2 | THE URCHIN - MAIN BUILDING ASSEMBLY

CONSTRUCTION SEQUENCE

STEP 2

- Placement of the 5 CLT timber floor slabs. According to supplier charts there are slabs that are expanded to 16 meters.



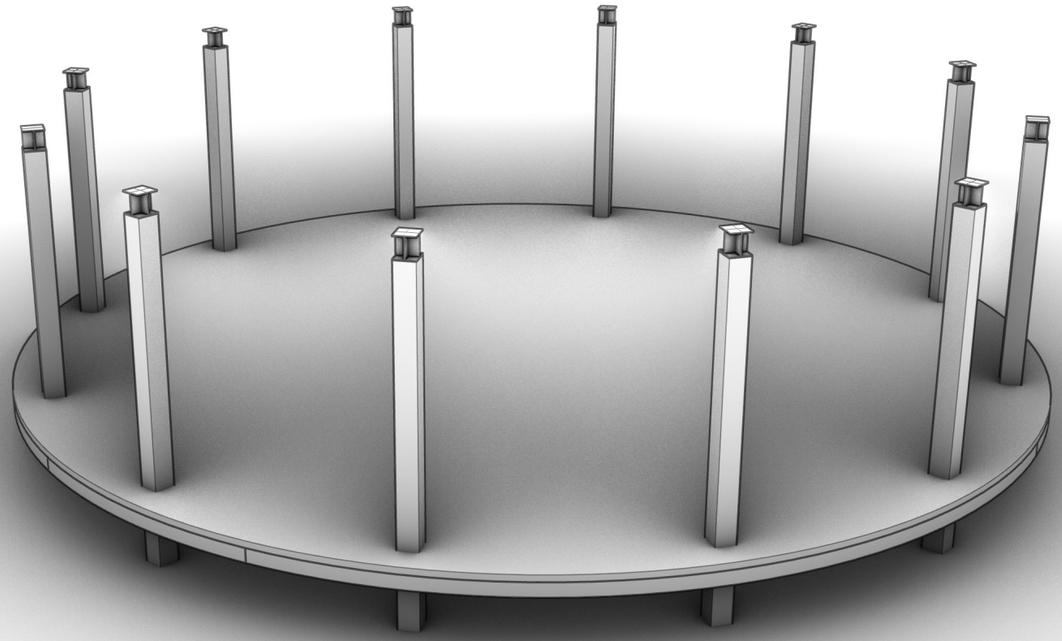


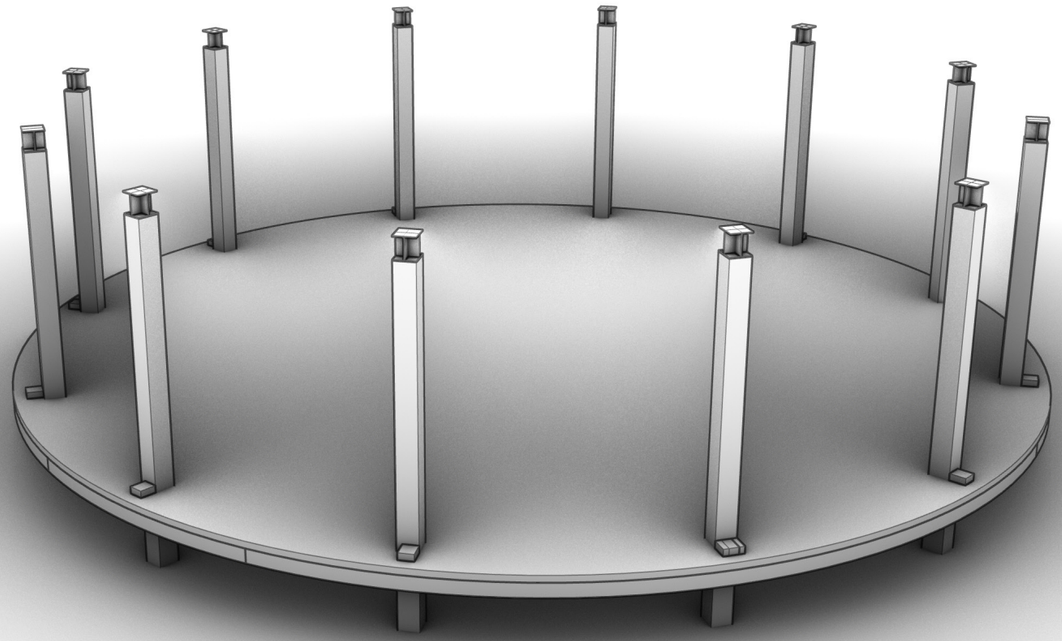
7.2 | THE URCHIN - MAIN BUILDING ASSEMBLY

CONSTRUCTION SEQUENCE

STEP 3

- Placement of unreinforced concrete thin plates on top of the clt flooring.
- Fixing of the brackets upon which the interior facade frame is going to be fixed to the slab.



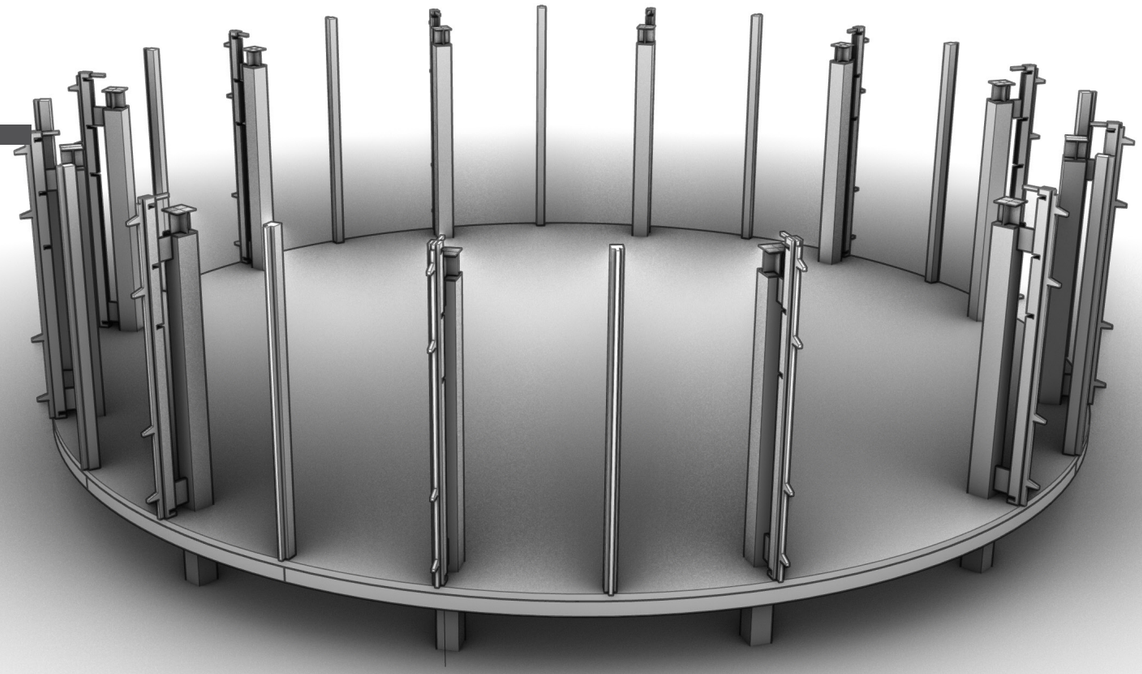


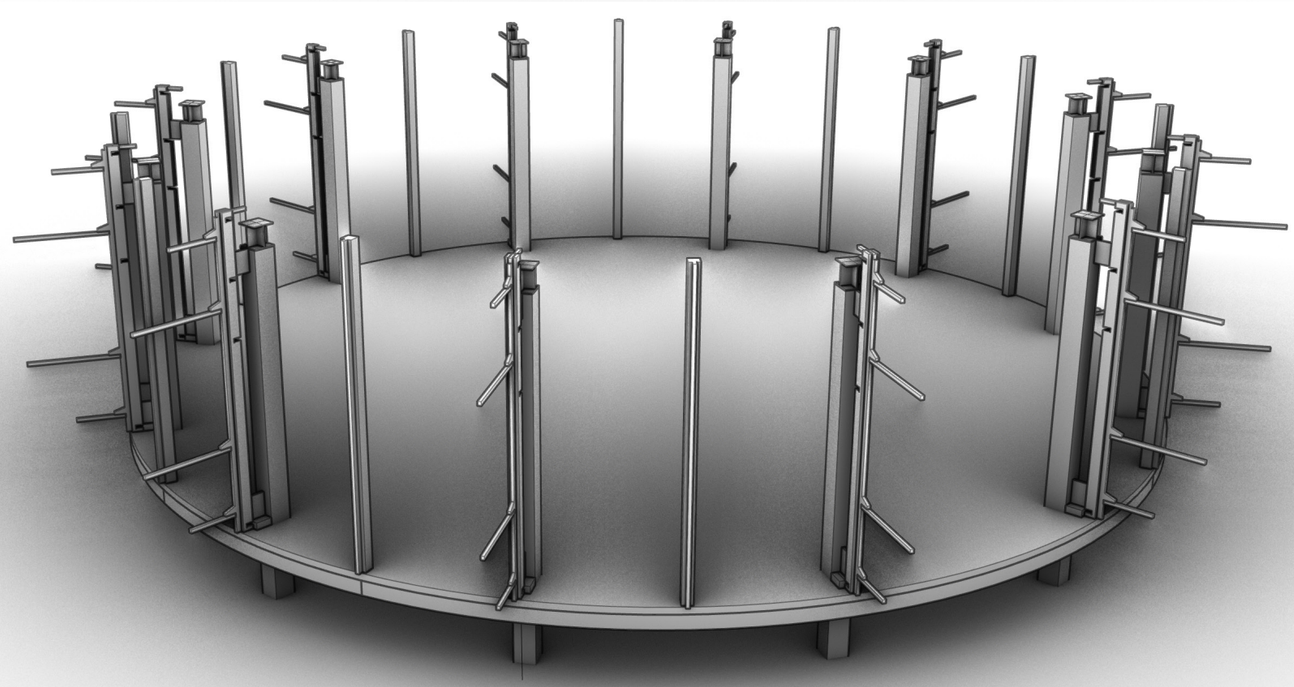
7.2 | THE URCHIN - MAIN BUILDING ASSEMBLY

CONSTRUCTION SEQUENCE

STEP 4

- The vertical components of the interior facade frame are isntalled.
- The rods that are designed to be holden by the triangular extensions are tightened on there spot so that the exterior facade panel could be introduced later on.





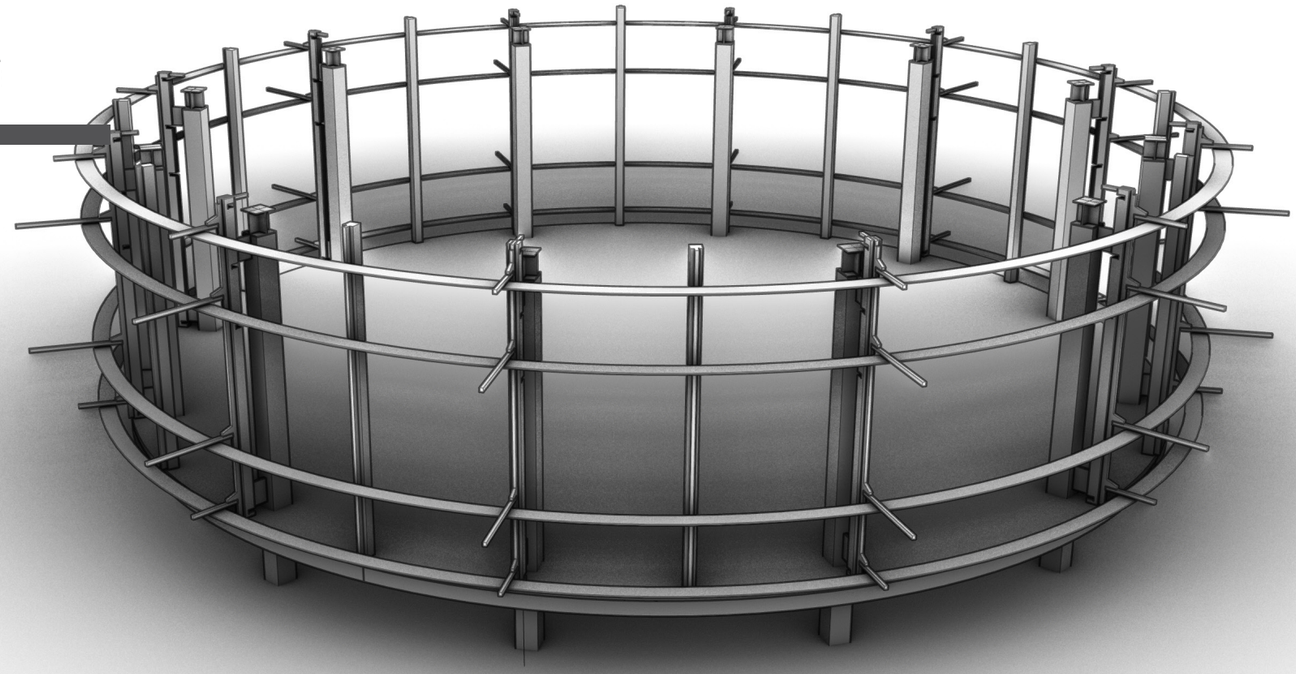
7.2 | THE URCHIN - MAIN BUILDING ASSEMBLY

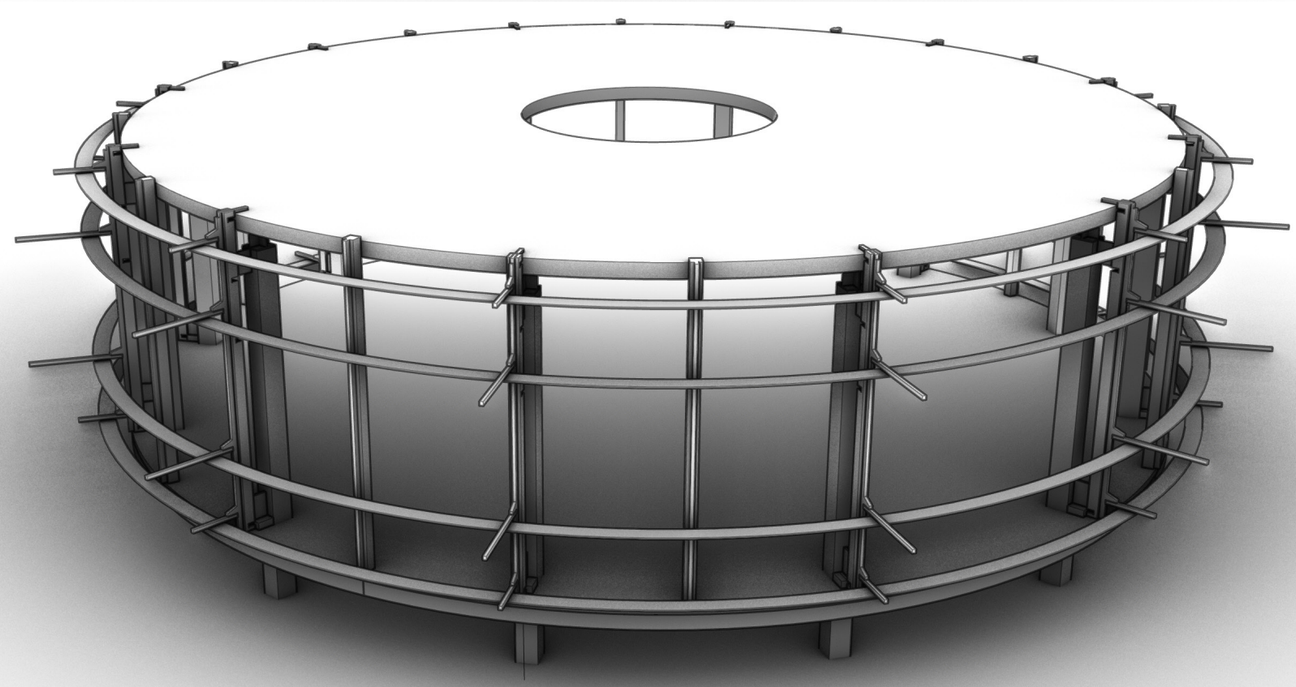
CONSTRUCTION SEQUENCE

STEP 5

- Afterwards, the horizontal mullions are fixed to the veritcal frame and the roof is installed.

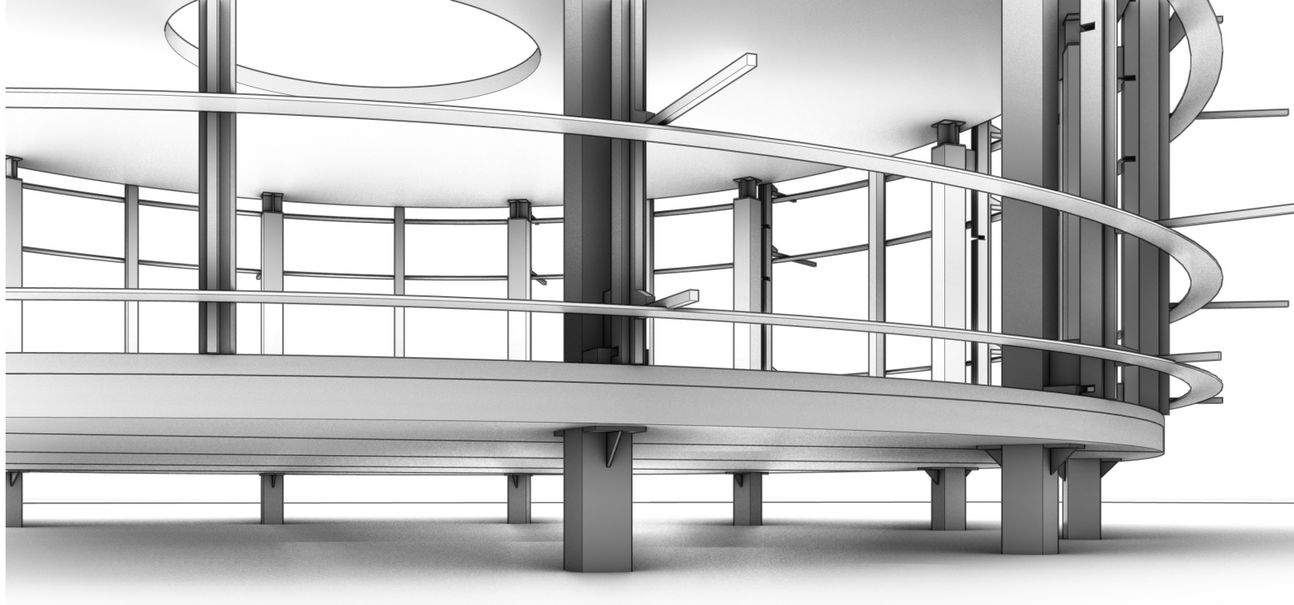
The result of which, in its more hollistic approach, is presented in the following pages.

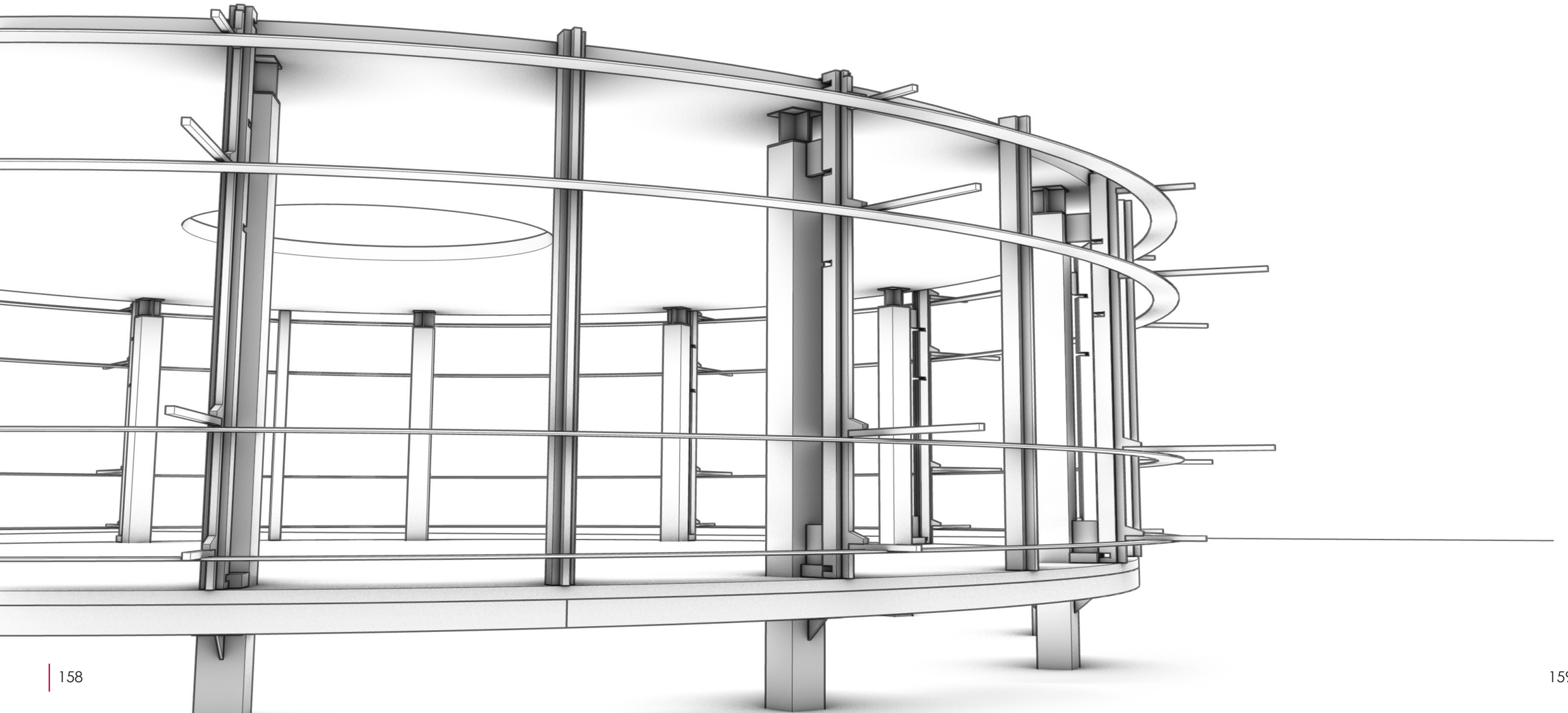




7.2 | THE URCHIN - MAIN BUILDING ASSEMBLY

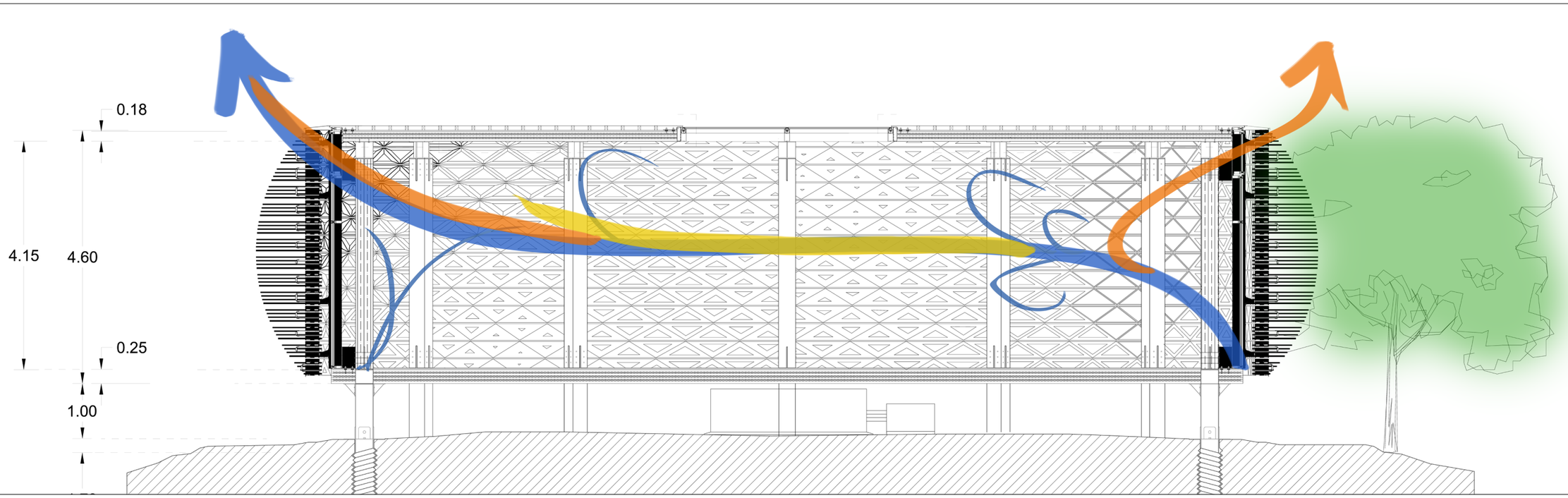
CONSTRUCTION SEQUENCE





7.3 | THE URCHIN - BUILDING PHYSICS

HVAC



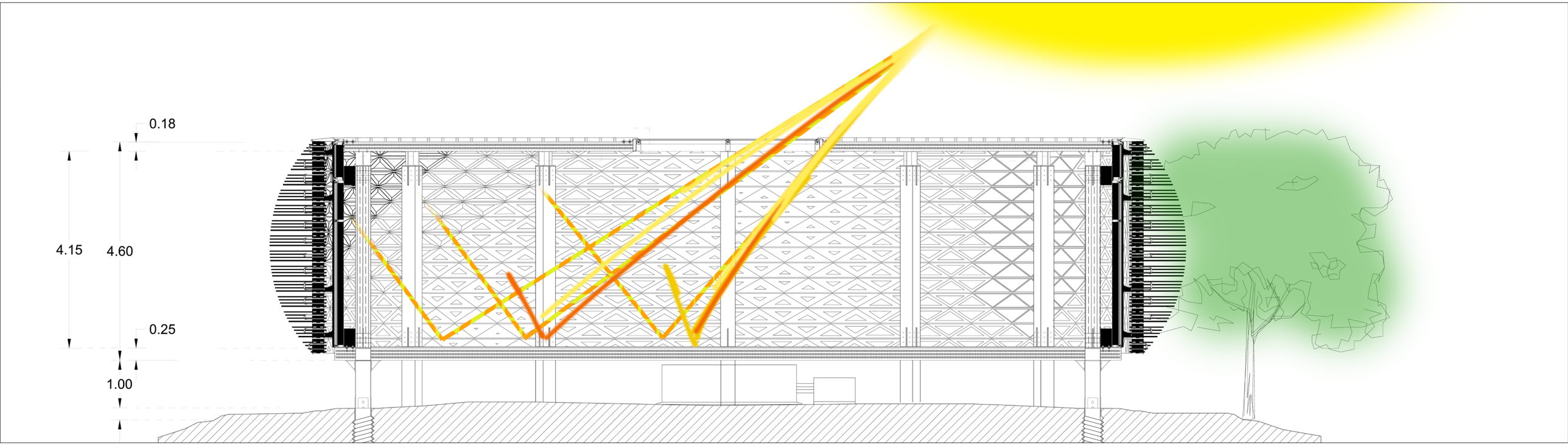
For the building physics of the lab, a hybrid approach combining mechanical and natural ventilation is considered essential. This strategy addresses the need to mitigate dust and manage internal heat gain in a space frequented by people and mechanical activity.

Natural ventilation would be facilitated through strategically placed vented openings at the base of the slab, drawing in fresh air from outside. This air would naturally circulate from the bottom to the top of the lab, exiting through windows that can be opened to release warm air.

Mechanical ventilation would be discretely integrated, with supply and exhaust fans housed beneath the building, separated by a distance of three meters for optimal functionality. The one-meter clearance under the pavilion not only accommodates these units but also protects them from rain, snow, and wind. The design routes supply ducts from the bottom and exhaust ducts towards the top, leveraging the natural rise of warm air to enhance ventilation efficiency. This setup ensures a continuous flow of fresh air, maintaining a healthy and comfortable environment inside the lab.

7.3 | THE URCHIN - BUILDING PHYSICS

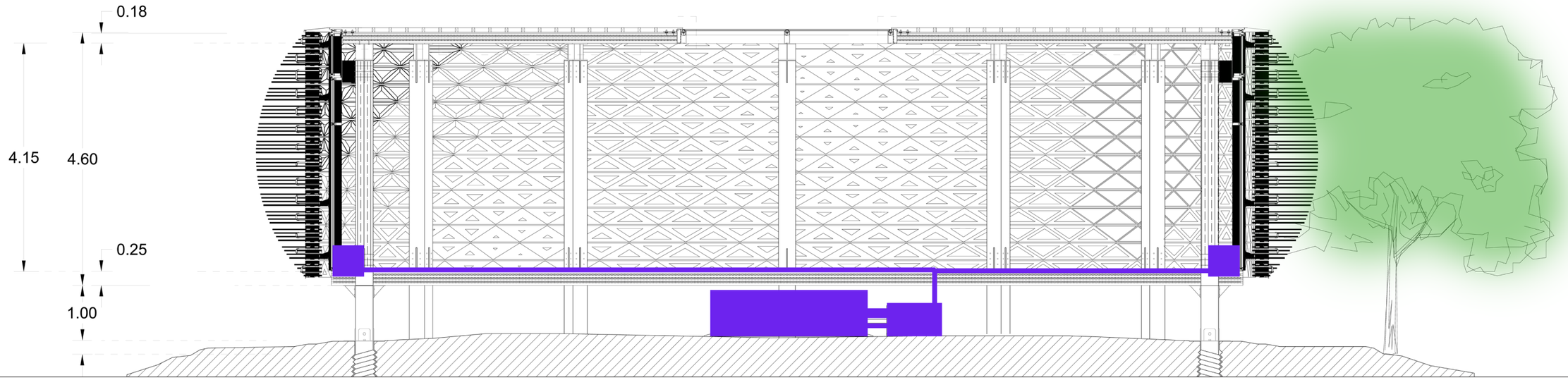
SOLAR GAIN



To maximize natural sunlight within the building, the exterior façade is designed with a degree of transparency through its triangular structure. However, to meet the high lighting demands typical of a laboratory environment, an additional architectural feature has been integrated. A strategically placed opening in the roof allows sunlight to enter directly, enhancing internal illumination. This design not only reduces reliance on artificial lighting, which is less desirable in lab settings, but also ensures that natural light can effectively permeate and enrich the workspace, bouncing around to increase overall luminance.

7.3 | THE URCHIN - BUILDING PHYSICS

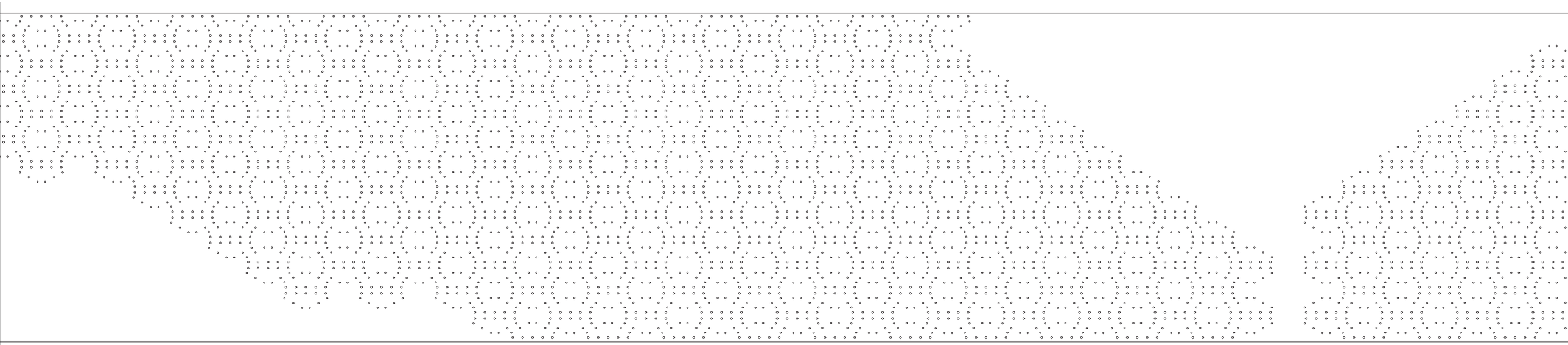
ELECTRONICS

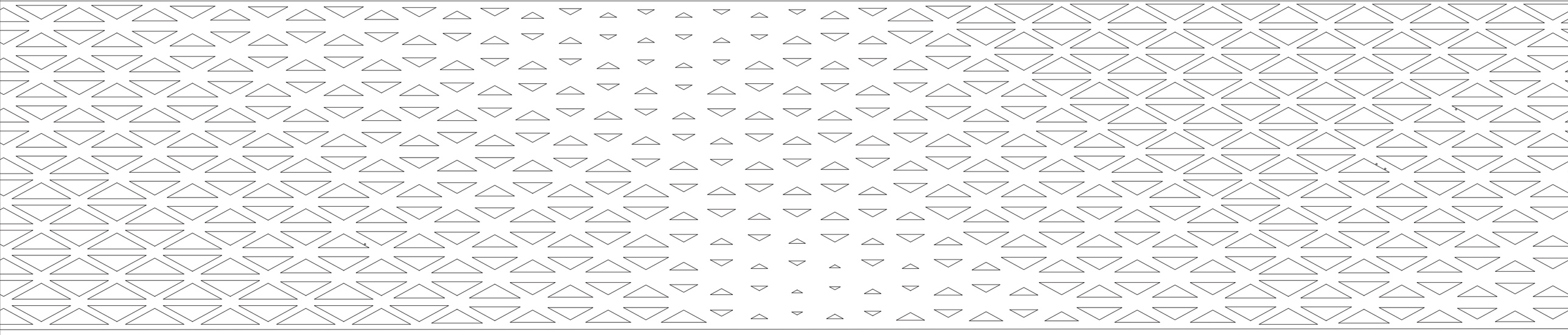


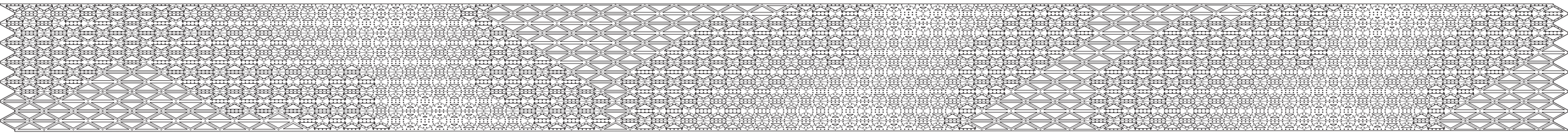
To accommodate the high energy demands of a bio-based lab, a strategic design has been implemented for efficient power management. Recognizing the need for continuous power supply for various devices including battery stations for screwdrivers, a laser, three chainsaw tables, and a sanding machine, the space beneath the building has been designated to house a transformer. This transformer is essential for distributing electricity to a switchgear that regulates the voltage. The power is then distributed through feeder cables routed perimetrically around the building. Conveniently, the aluminum panel concealing the brackets that connect the interior façade frame to the floor also serves as a discrete storage space, accommodating both the ventilation ducts and electrical cables, ensuring a clean and organized setup.

7.3 | HOW EVERYTHING COMES TOGETHER

THE HOLITIC VIEW OF FACADE PATTERN





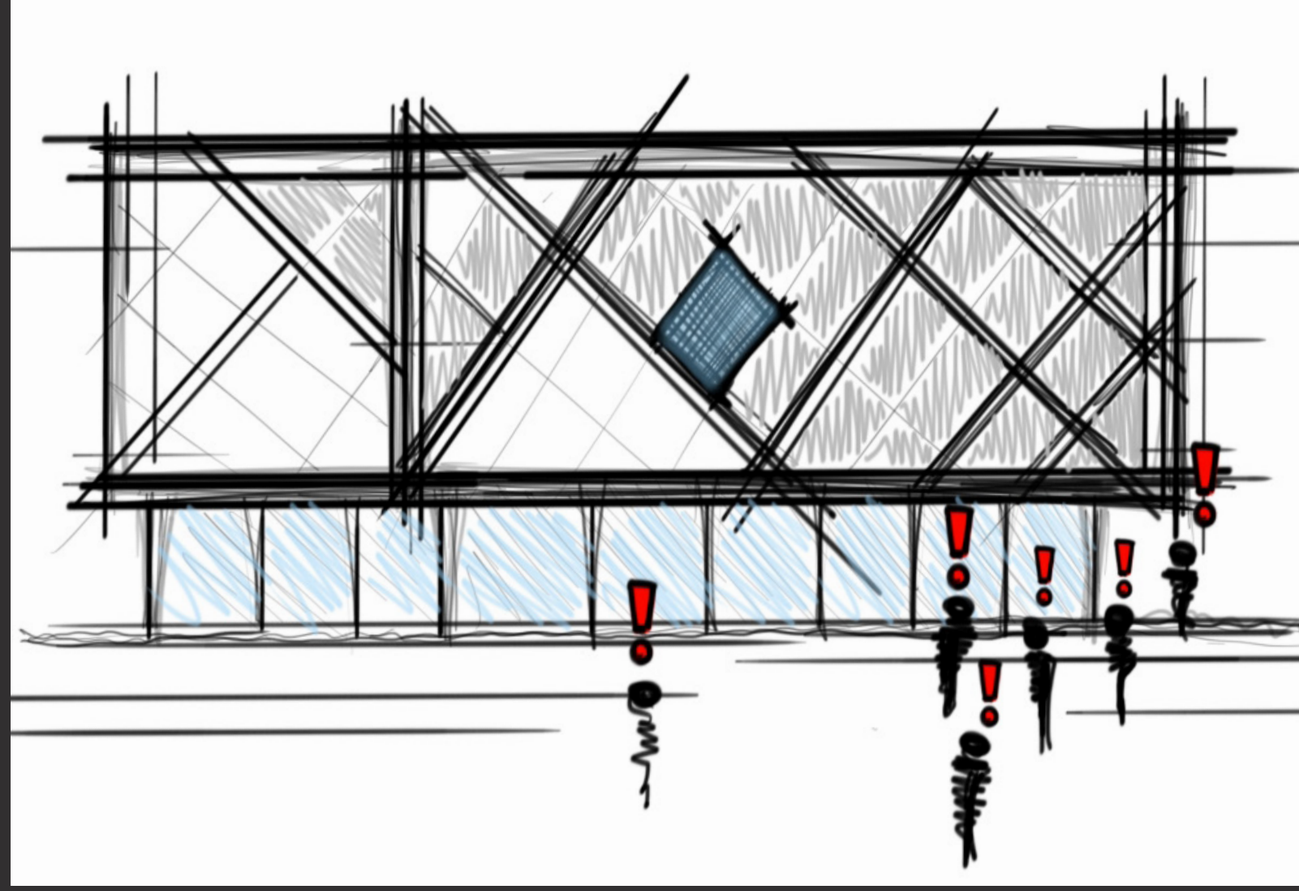


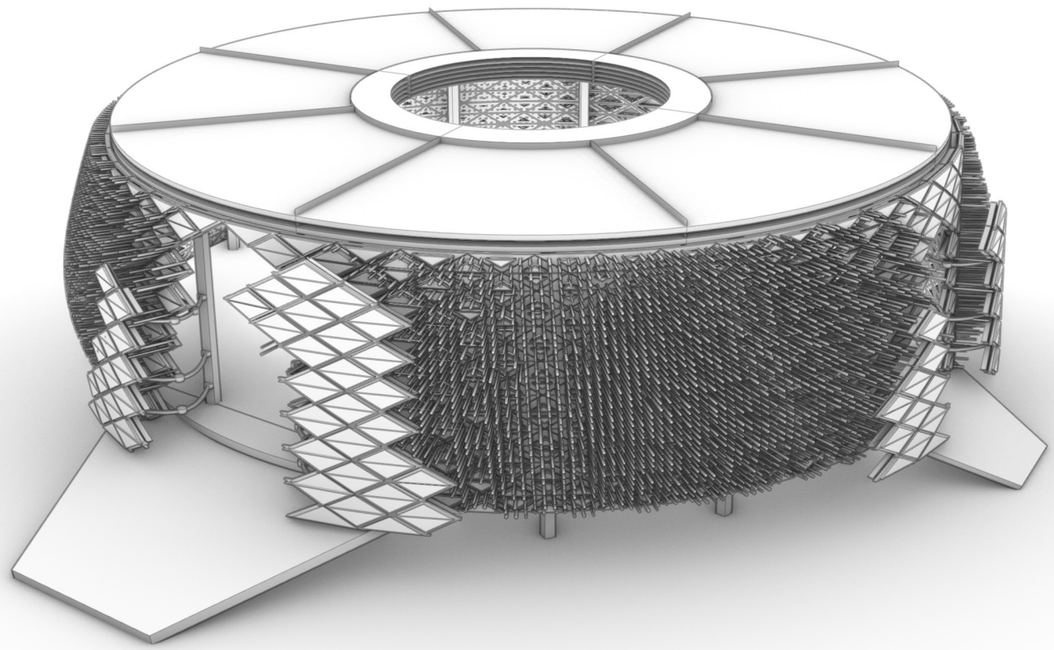
8.

THE END

終わり

A SHORT EXPLAINARION OF THE PROJECT AND WHAT WE MAY SEE IN HERE





CONCLUSIONS

The thesis set out to explore how a building's facade, specifically for a pavilion, can serve both as a functional innovation fulfilling interior needs and as a dynamic interface engaging the public.

Addressing the architectural facets of the project, the design effectively captures the essence of a bio-based lab. Drawing inspiration from biology, the facade embodies fluidity and adaptability, with no fixed limits on design elements such as door placements or the scaling of triangular components. In this design, the size and positioning of triangles and rods vary, illustrating the concept of organic growth and change—elements coexist and interact without a predetermined hierarchy, much like cellular components within a living organism. This design philosophy not only mirrors the limitless potential of biological systems but also enhances the facade's interactive appeal. The variable scale and mass of the structural elements dynamically alter the viewer's perception, creating a visually captivating experience that actively engages the public. This architectural approach, characterized by flexibility and the harmonious integration of design elements, effectively encapsulates the dynamic and evolving nature of the bio-based lab, making the facade not just a boundary but an active participant in the architectural narrative.

While the functional integration of the design elements presents a more complex challenge, I have made significant progress in demonstrating the feasibility of the key components individually. The project explores the practical assembly of an exterior façade crafted from triangular elements, an internal frame, and the overall structural integrity of the building. My construction drawings and models substantiate the viability of these components standing alone. However, the seamless integration of these elements into a cohesive system remains partially unexplored due to time constraints and initial design strategies.

For example, further optimizations could enhance the efficiency and cost-effectiveness of these components, such as refining the vertical mullions of the interior frame. Additionally, the architectural design could be further tailored to the specific environmental and urban context of the lab, considering factors like sunlight orientation and local infrastructure.

While I have not fully demonstrated the complete integration of all components into a unified structure, I am confident that the groundwork laid provides a solid framework for future exploration. This work sets the stage for building technologists and architects to refine and realize the full potential of this design, affirming the project's foundational principles and its potential for real-world application.

REFLECTIONS

At the outset of my journey toward completing my Master's degree in Building Technology, I approached my thesis with a blend of anticipation and apprehension. My profound appreciation for the technical aspects of building technology has always driven my desire to fuse this knowledge seamlessly with architectural design practices. This endeavor posed a significant challenge: selecting a thesis topic that harmonized aesthetic design with functional practicality—a pursuit often perceived as overly technical for architects and excessively artistic for engineers.

This interdisciplinary path I chose aimed to encapsulate the essence of both fields. Marcel not only endorsed this integrative approach but also provided enthusiastic support, encouraging my exploration into innovative architectural solutions. Simultaneously, Anne's invaluable guidance was instrumental in refining my design process to achieve the high-quality architectural outcomes I aspired to deliver. This support profoundly shaped my educational journey, equipping me with a comprehensive toolkit to bridge the gap between engineering precision and architectural creativity as I advance in my professional career.

Embarking on my thesis was a journey much like any architectural design process, where each idea is tested and often discarded until one strong concept prevails. This experience was eye-opening, as it taught me how the focus of a project can evolve dramatically. 'The Maze' immersed me in traditional Asian architecture and simple wooden joints, while 'The Wave' shifted my focus towards the mechanics of movement, modern technologies, and bio-composite materials. 'The Flora' allowed me to explore architectural expression and conceptual design.

Each project phase introduced me to different elements and methodologies, enriching my understanding and skills in diverse aspects of architectural design. The final design, 'The Urchin', synthesized these learnings with advanced parametric design and detailed technical planning. Though the vast scope of the topic sometimes overwhelmed me, the consistent guidance from my mentors was pivotal. Marcel enriched my perspective with deep insights into material science, innovative building methods, and significant architectural references. Anne kept me aligned with the core principles of the project, ensuring my focus remained clear and pushed each project to each limits with her architectural feedback which resulted in all designs being the best version of themselves at their very end.

Be that as it may, whether I managed to succeed in answering the research question though is explained in the conclusions. Under the more personal touch the frame of refelctions allow, I am just expressing the feeling of pride of the final result, which feels like a collective achievement alongside my professors, Marcel and Anne. This project fostered a team environment rather than a conventional student-mentor relationship. The success of this endeavor is especially meaningful because it represents the culmination of reaching and pushing ones limits. There were numerous occasions when I had to discard my progress and start anew, but these restarts revealed the true potential of perseverance in design. Reflecting on where I started and where I have arrived, I genuinely appreciate the journey and the final outcome—it's rewarding to see how much can be accomplished through resilience and collaborative effort.

KEY INSIGHTS AND FUTURE DIRECTIONS

- Frame optimazation
- How everything comes together
- Site principle intergration to the design

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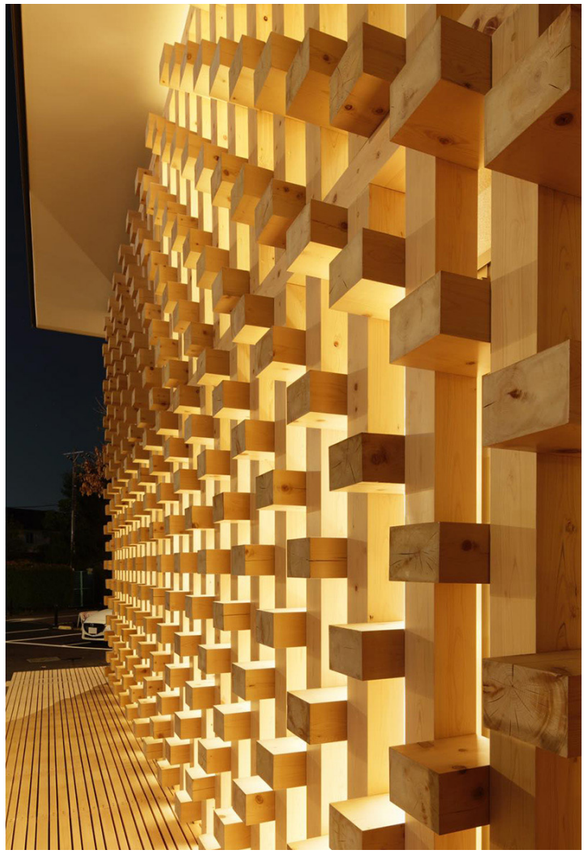
9.

APPENDIX

付録

Everything that we god inspired from as well as more content for each chapter



House of Wooden Lattice.



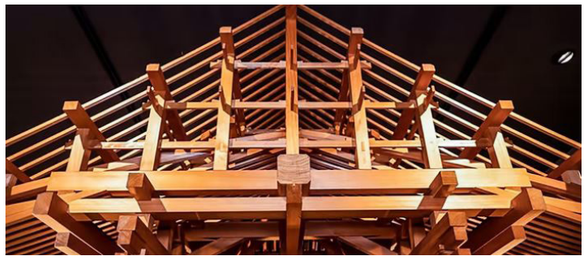
Taketa history and cultural museaum.



Japanese Lantern.



GC Prostho Museum Research Center.



Exhibits at Kongo Gumi's processing center in the Osaka Prefecture city of Sakai show traditional construction methods for temples and shrines.

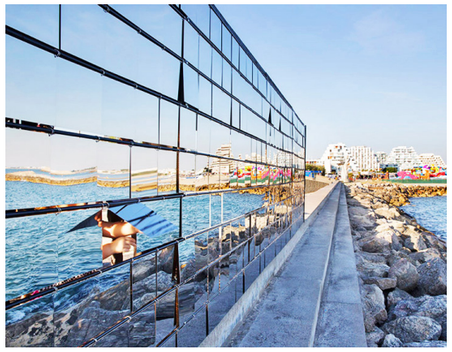




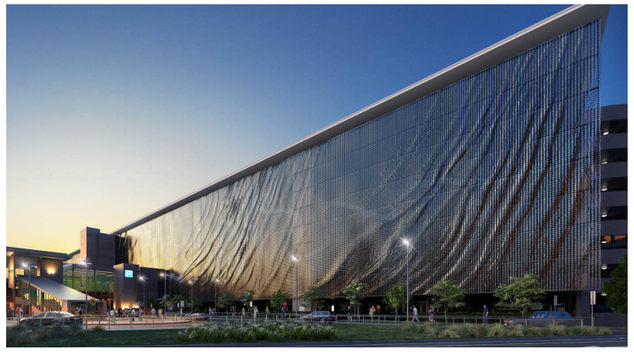
Model pieces of wood to explain tsugite joints.



Jew museum, Germany.



Breath Box, France.



Brisbane Airport, Australia.



Bund Finance Center, China.



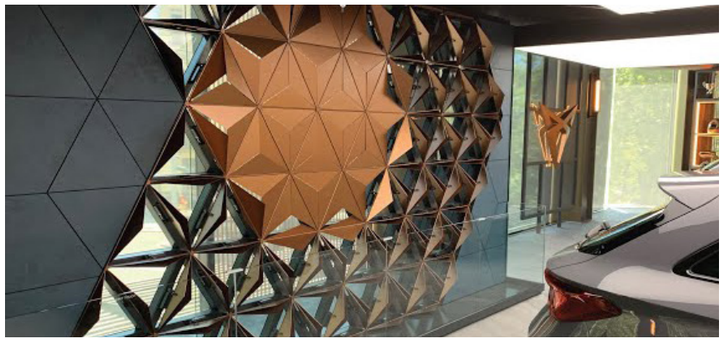
Kiefer Technic Showroom, Austria.



Galleria Centercity, South Korea.



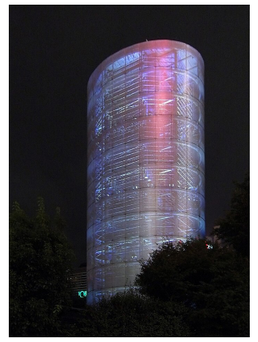
Iluma Building, Singapore.



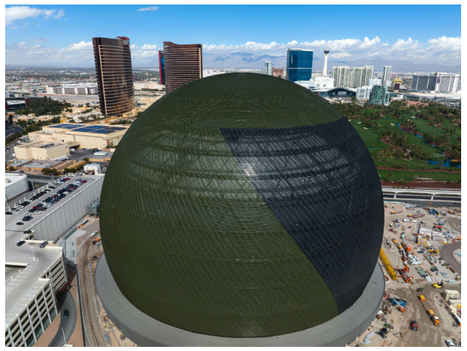
Kinetic Wall, Casa Seat.



Las Vegas Sphere, Las Vegas.



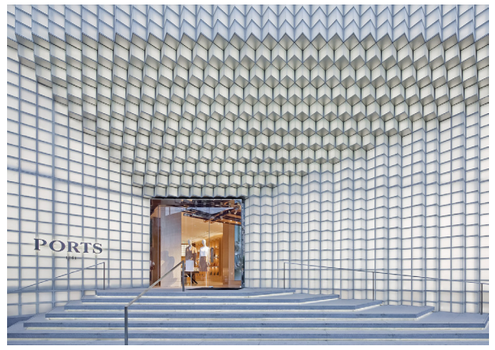
Tower of Winds, Japan.



Las Vegas Sphere, Las Vegas.



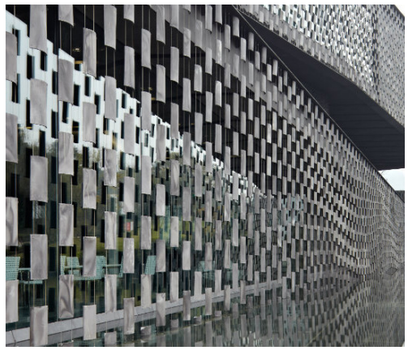
One Ocean Pavilion, South Korea.



Port 1961, Shanghai.



Xicui Entertainment Complex, Beijing.



Xinjin Zhi Museum, China.



YAS Hotel, Abu Dhabi.



Metal that Breaths.



U:up Yotsuya, Japan.



U:up Yotsuya, Japan.



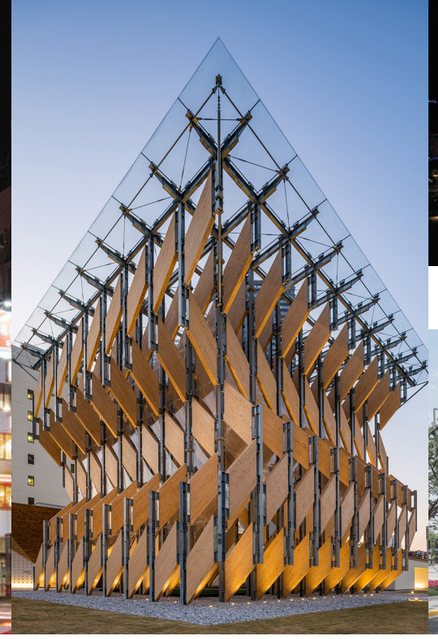
Chidori, Japan.



EQ Teaser, SOLIDSENSE, Example of facade merginf media and kinetics and interacting with the users.



Asakusa Culture Center, Tokyo, KKAA, Version of a facade showcasing how simple and calm can media facades be.



CLT Park Harumi,Tokyo, KKAA, Version of a facade showcasing how minimal and static can kinetic facades be.



The Sphere, Las Vegas, Example of extreme media facade advertisment.



Time Square, Example of how big flashy screens and lights overshadow the design behind them.



Fosun Foundation, kinetic facade example.



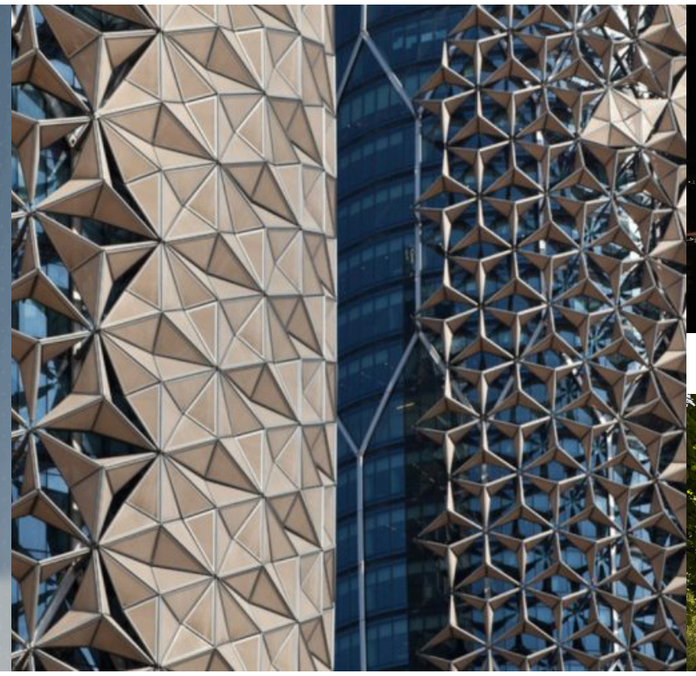
The John Wick Continental leveraging media features to change appearence.



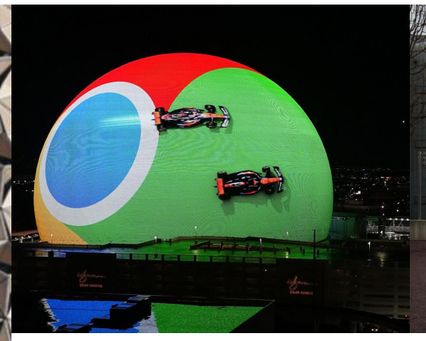
Twinset Headquarters, Italy, an example of hidden lighting working as a media facade tool.



MegaFaces Pavilion, become the face of the Olympics 2014, Asif Khan, SEGD, Designers of Experiences.



Al Bahr Towers, UAE, The project has little to do with sustainability and occupant satisfaction. Dazzle, Sand noises and poor mentainance.



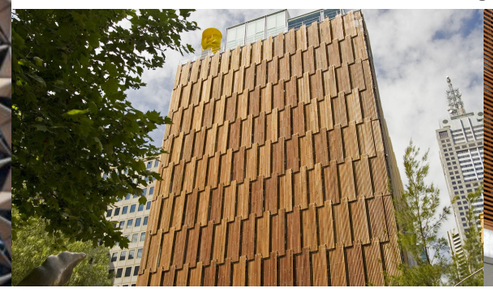
Yet another, example of extreme media facade advertisment.



Jewish Museum, Berlin,Example of how a building's facade can captivate emotions.



Damiani-Holz & Ko, Modus Architects, Example of how a facade's texture can hide or reveal.



Counsil House 2, Melbourn.



Rabel systems, engineering your architecture, Example of kinetic facade.



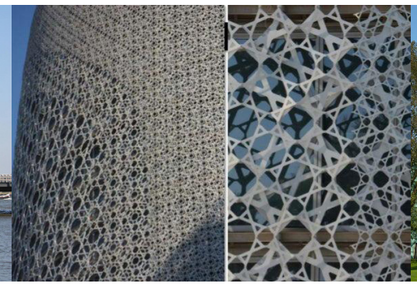
The Da Vinci Tower, Dubai, David Fisher, example of dynamic architecture.



Twinset Headquarters, Italy, with no lights.



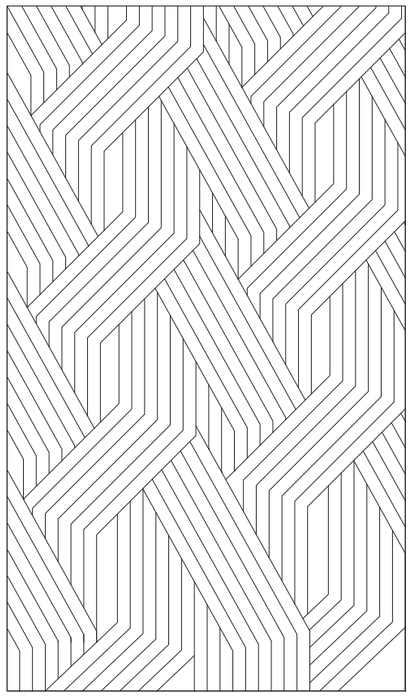
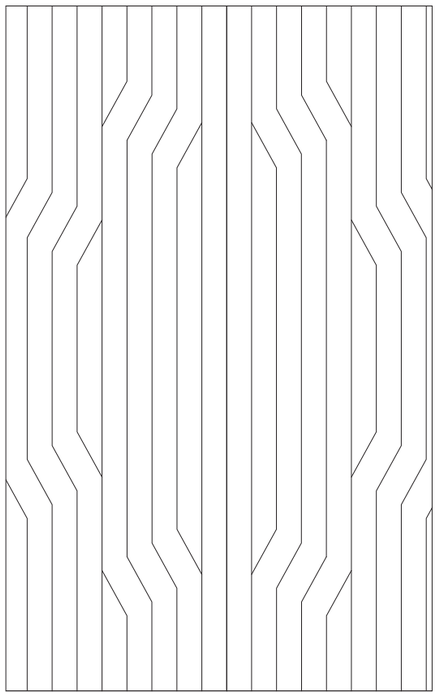
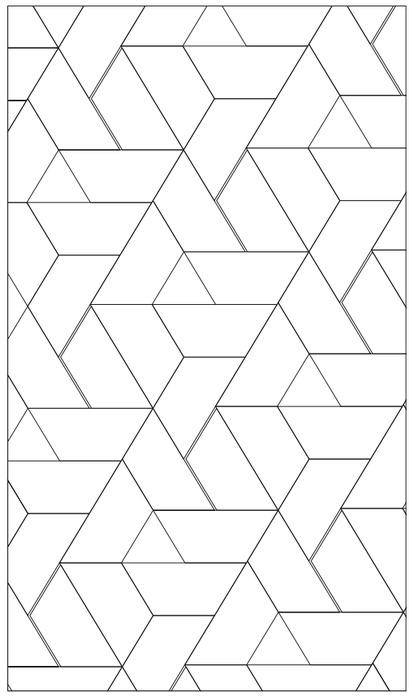
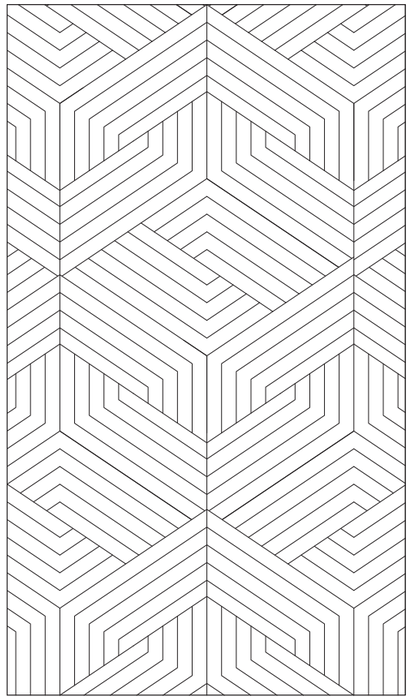
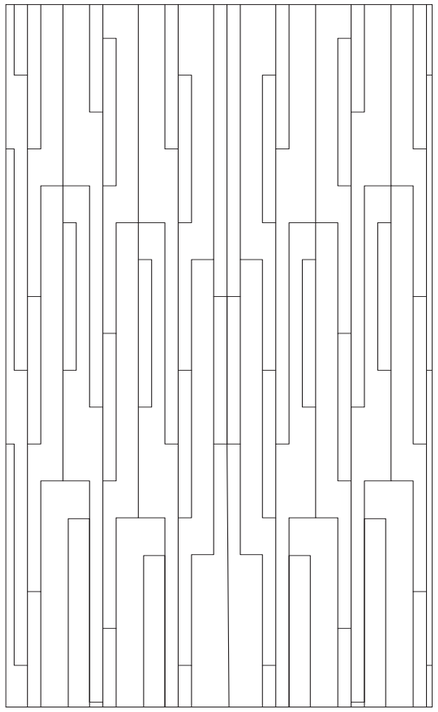
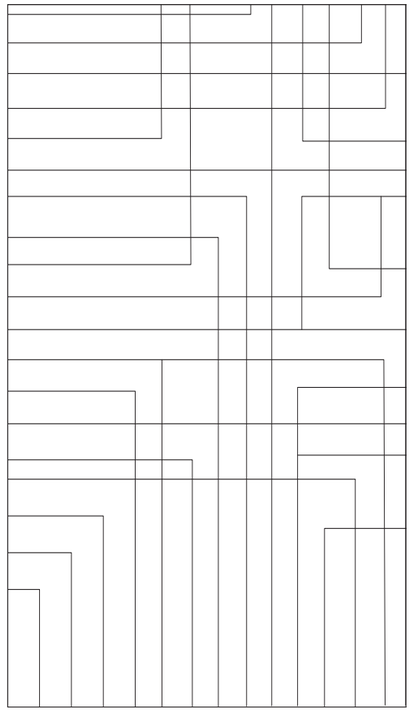
Café-restaurant OPEN, Amsterdam, Architekten Cie, John Lewis Marshall, Rob Hoekstra.

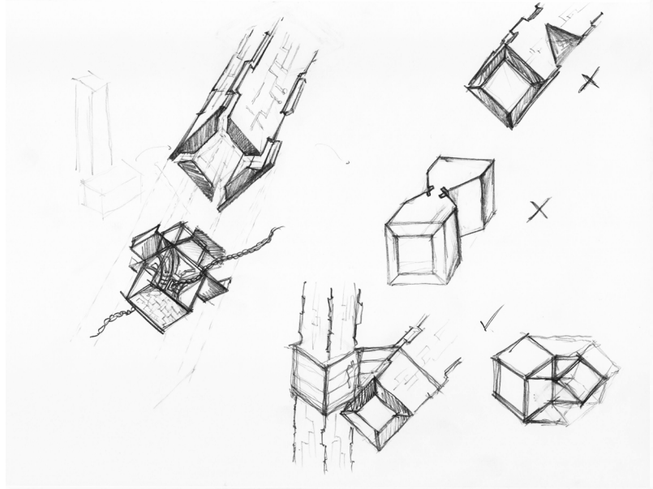
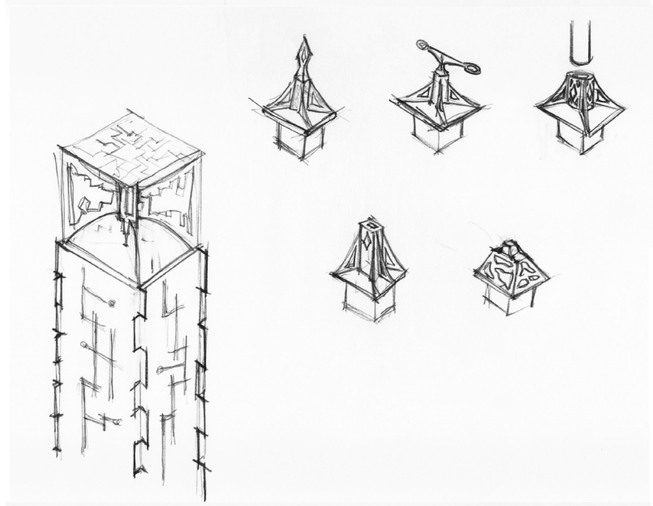
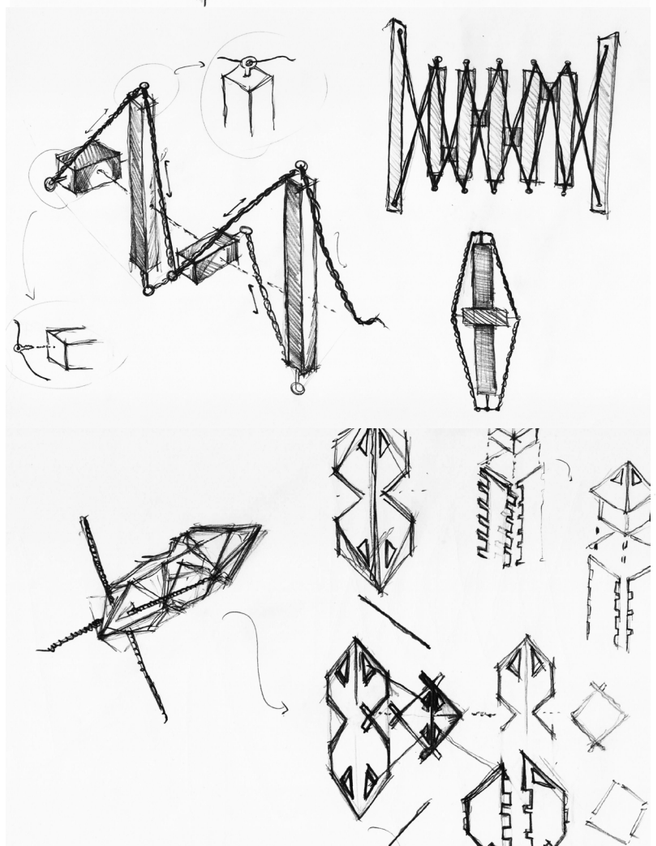
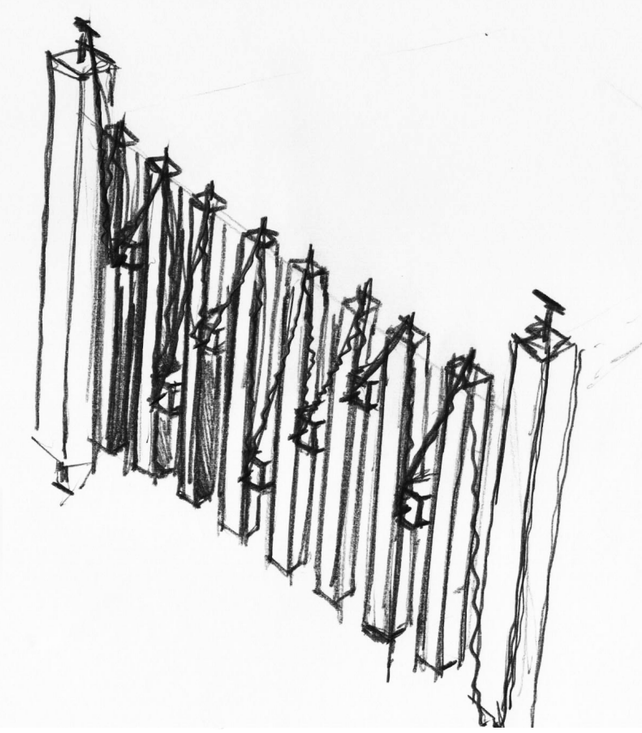
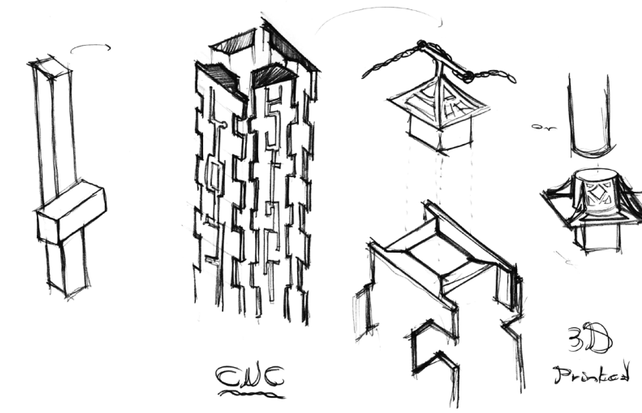


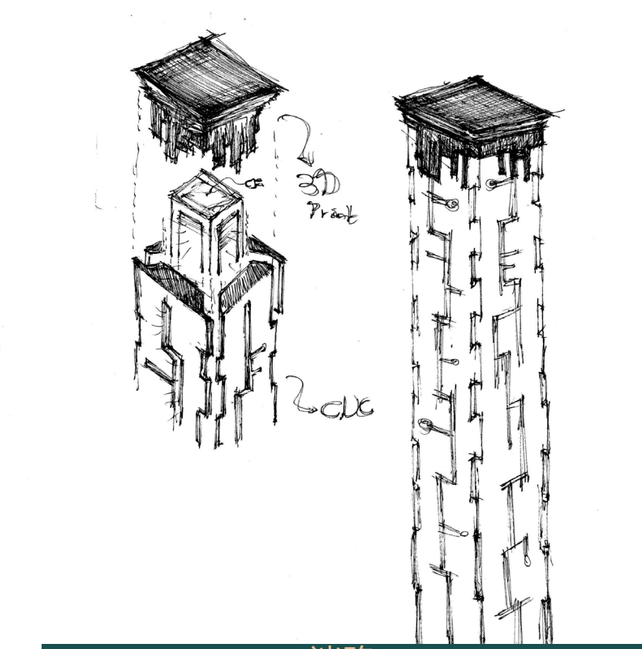
Mashrabiya, example perception of kinetic ornamentation in Architecture.



Nordic Embassy, Berlin.



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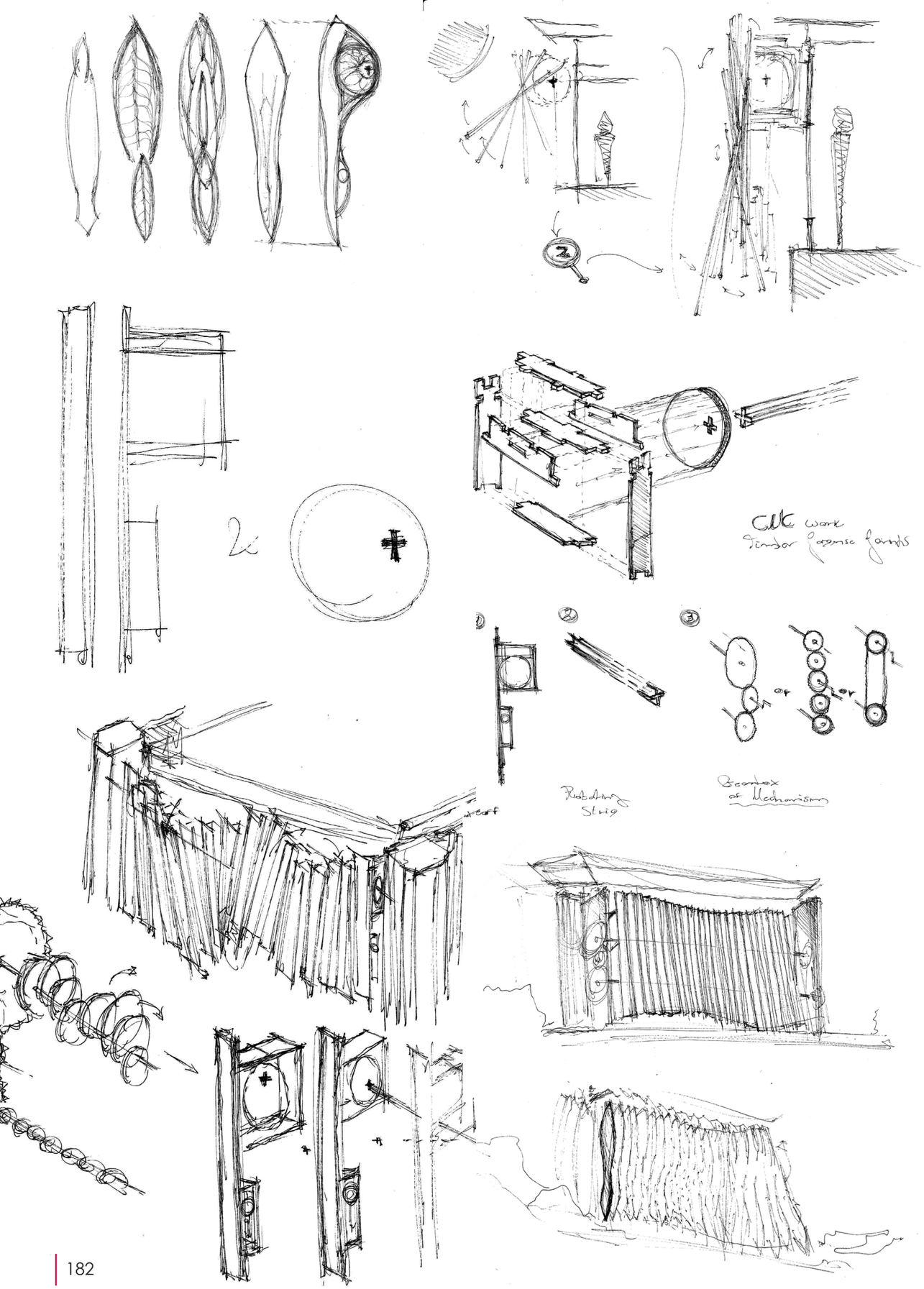
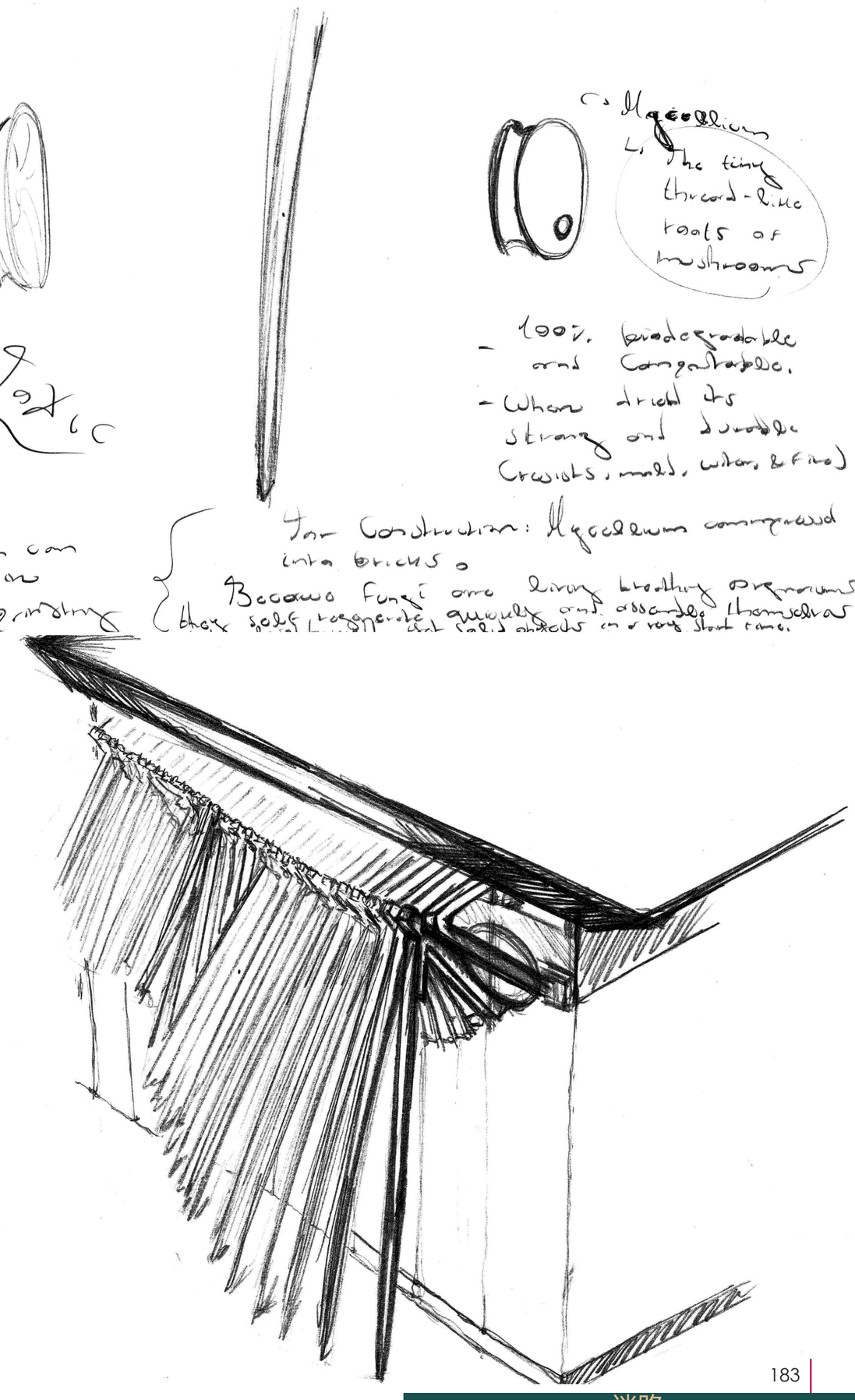
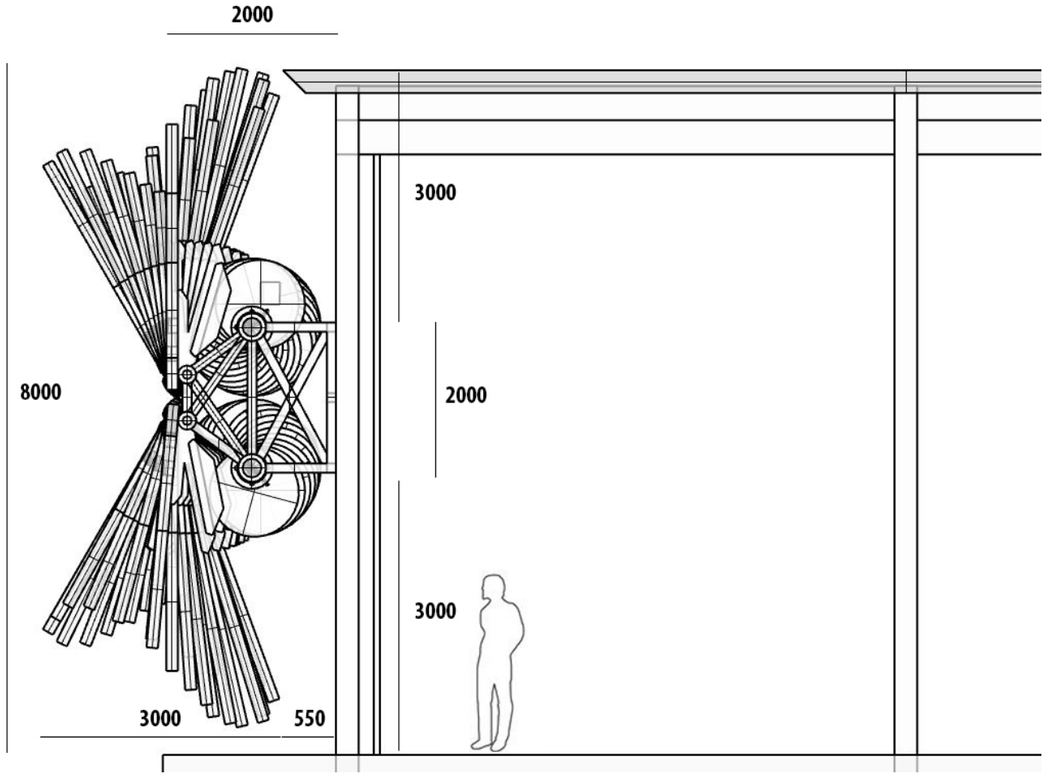




Mycelium
The tiny thread-like roots of mushrooms

- 100% biodegradable and compostable.
- When dried its strong and durable (resists, mold, water, & fire)

For Construction: Mycelium compressed into bricks.
Because fungi are living breathing organisms they self regenerate quickly and assemble themselves [illegible] solid objects in a very short time.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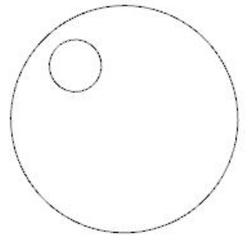

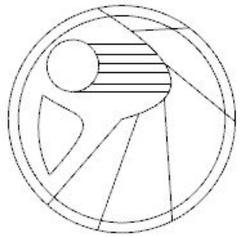



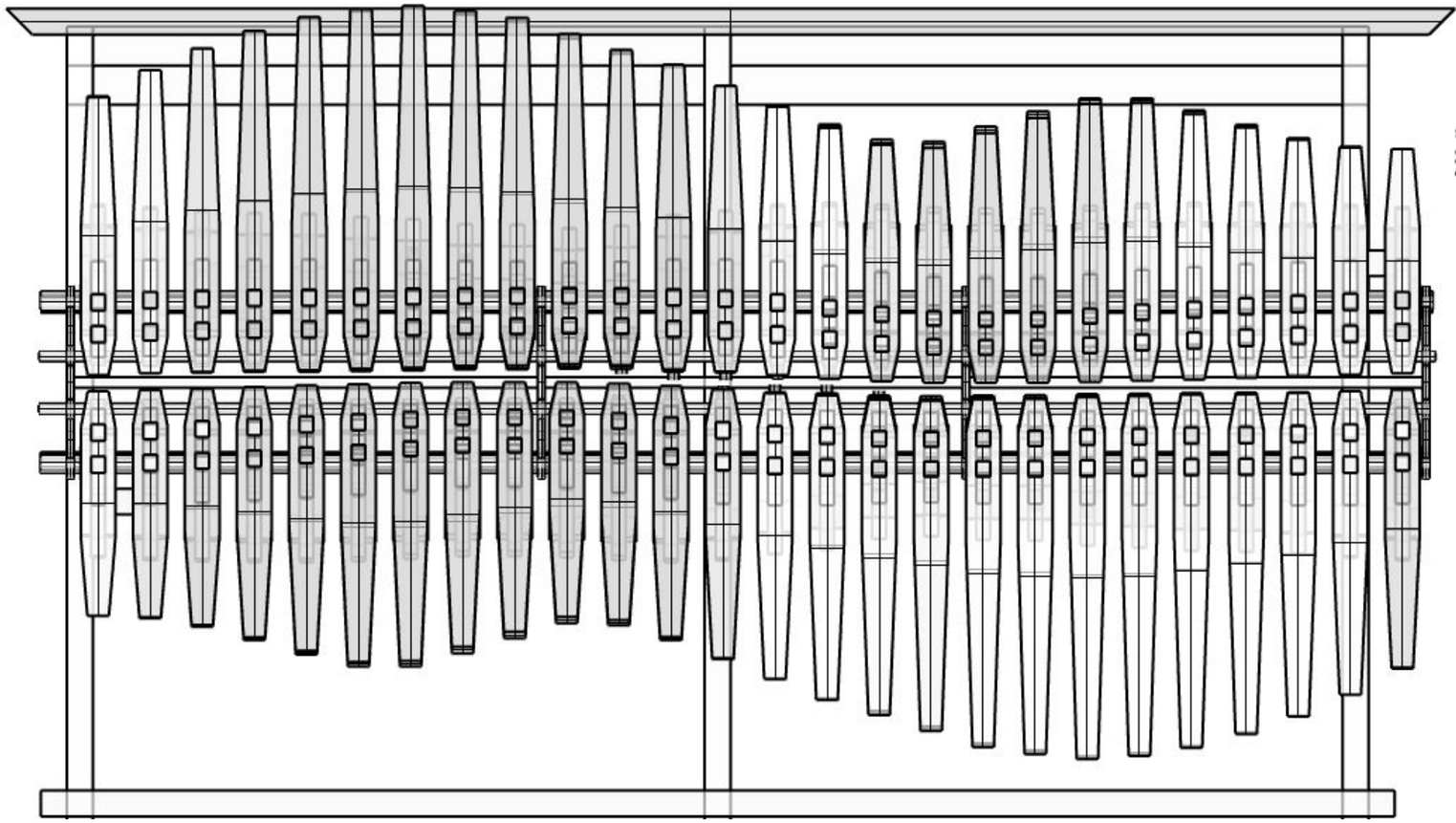
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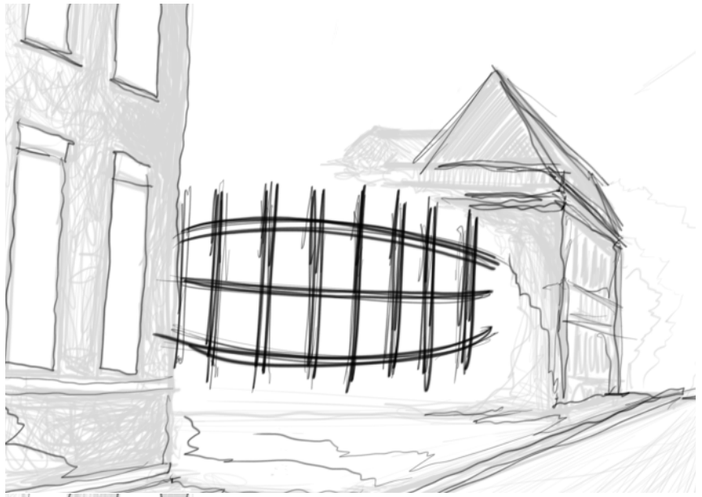

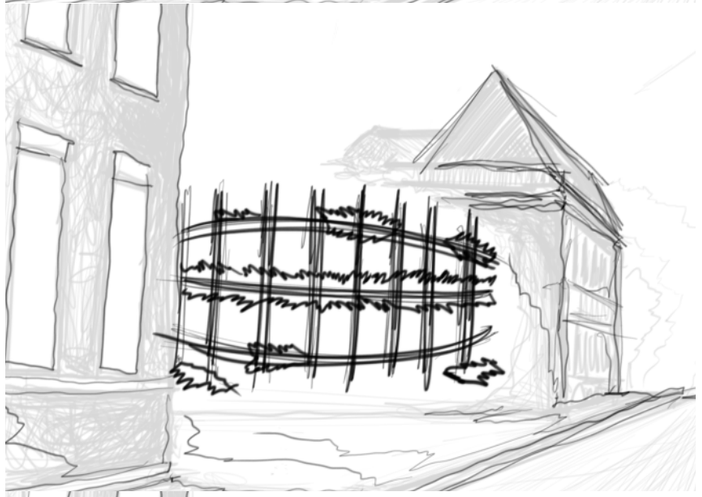

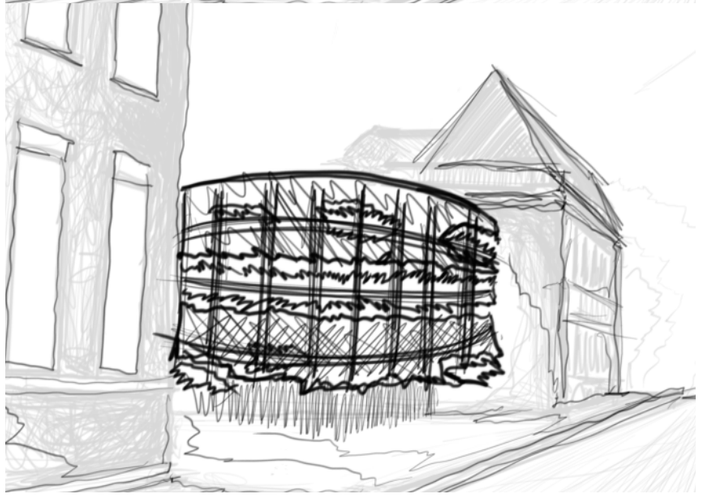



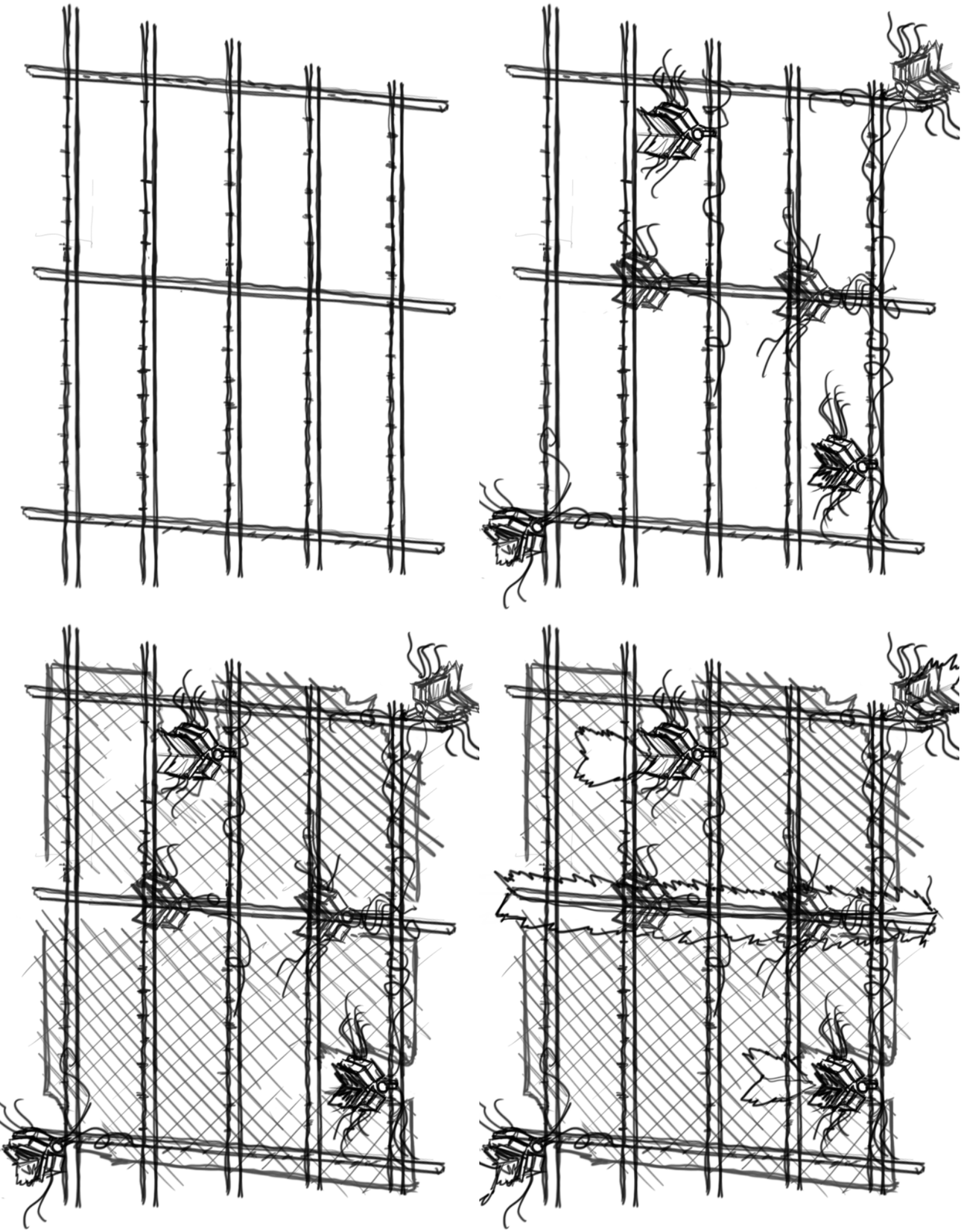

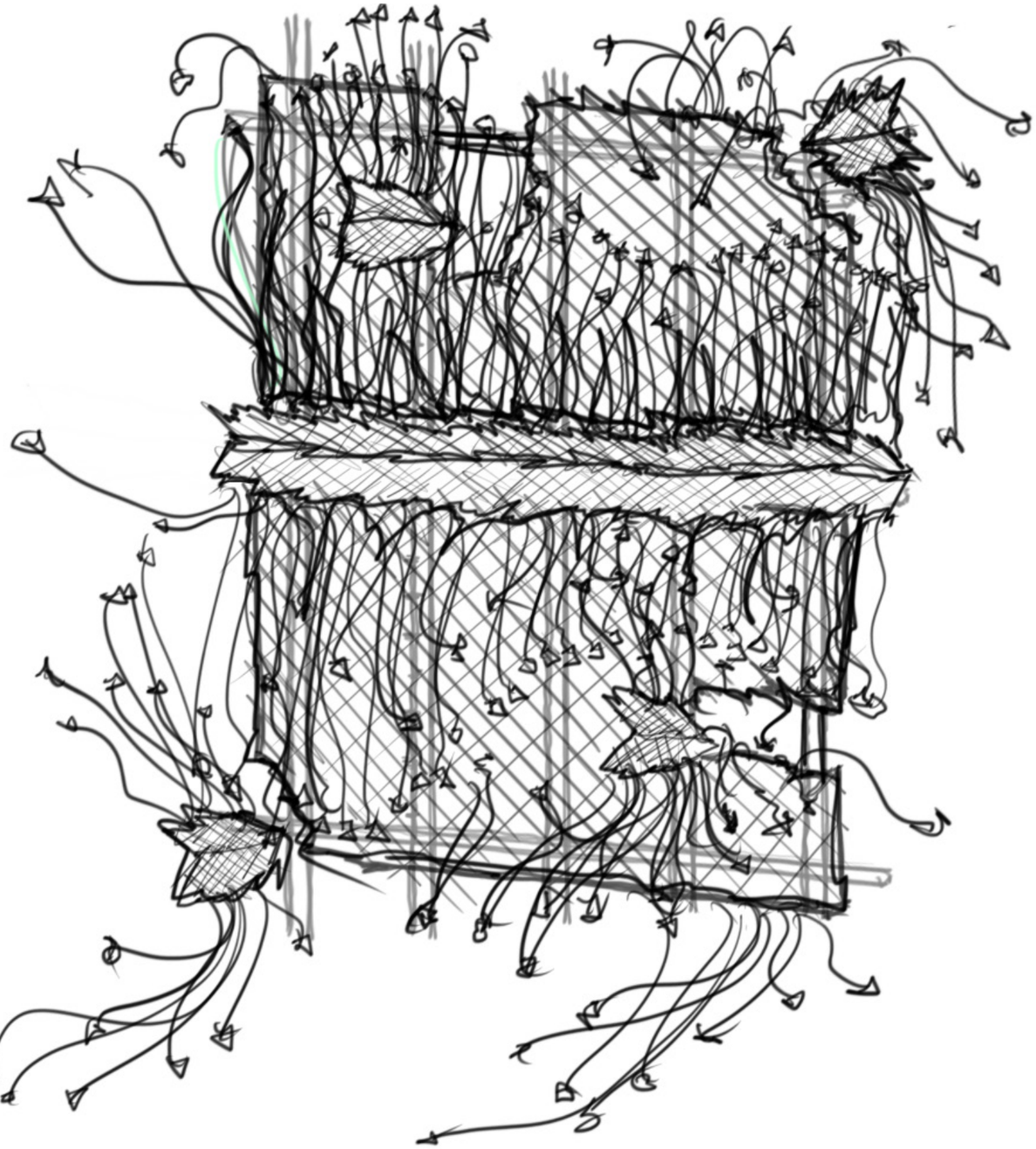

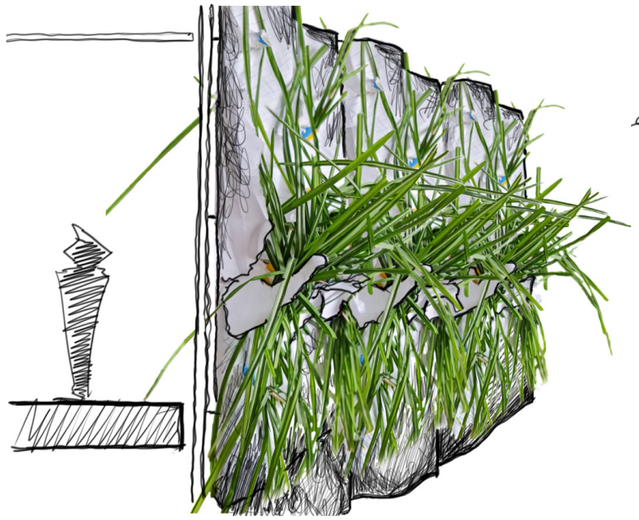

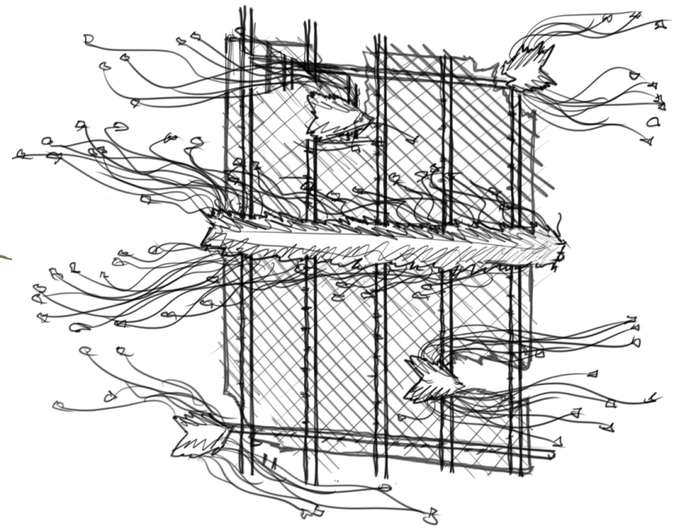



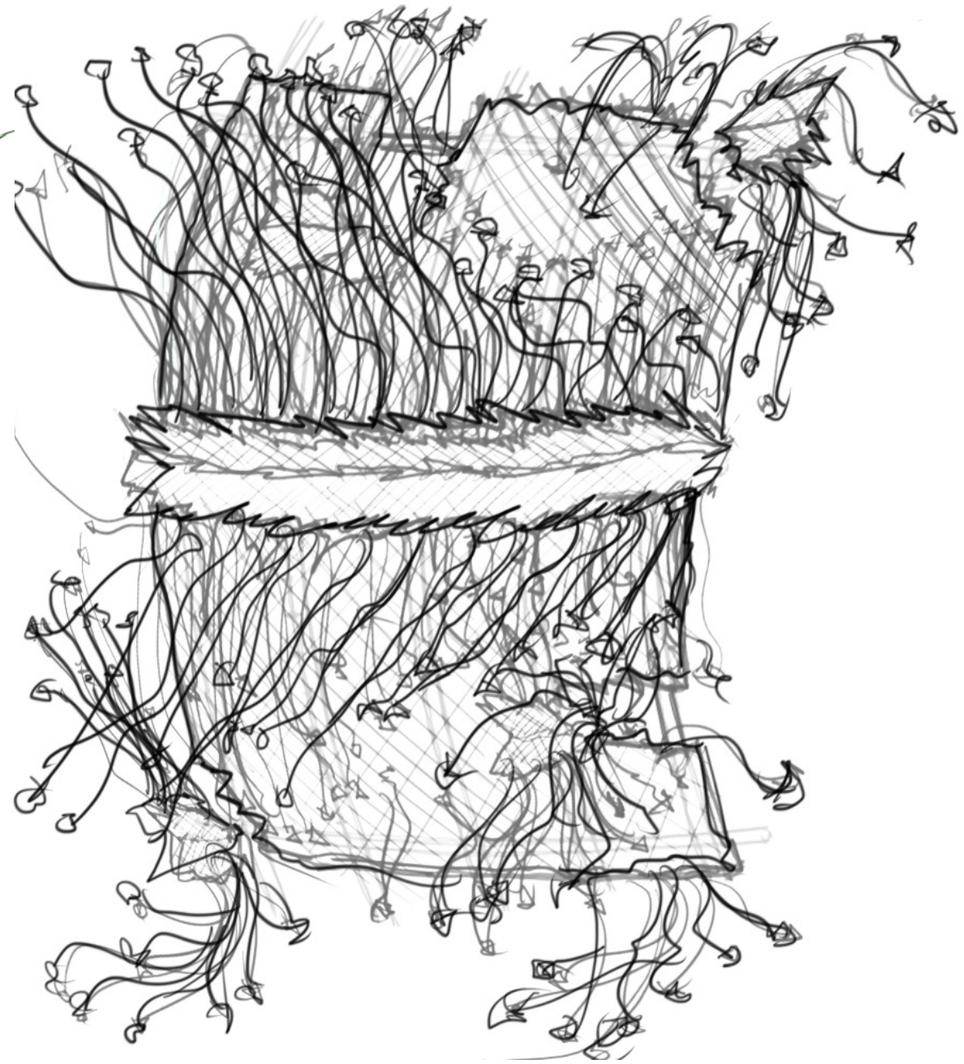

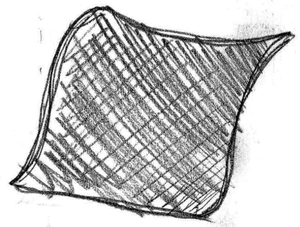

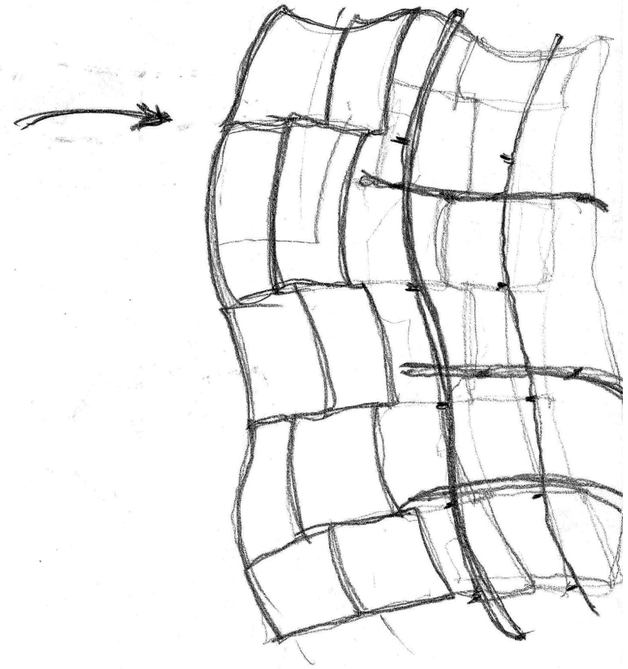

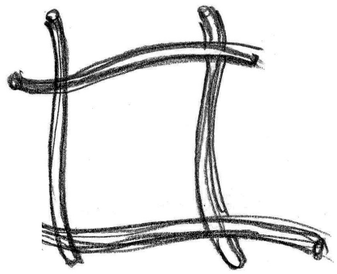

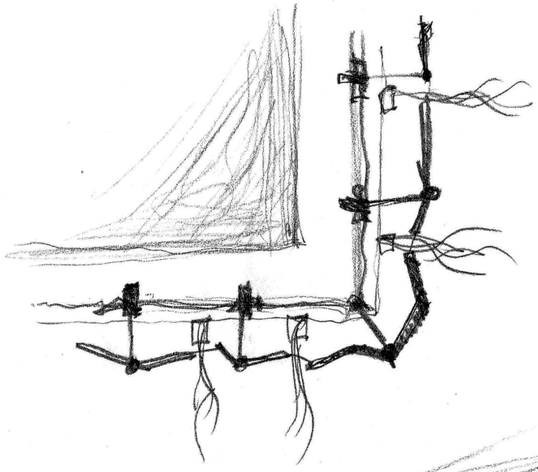

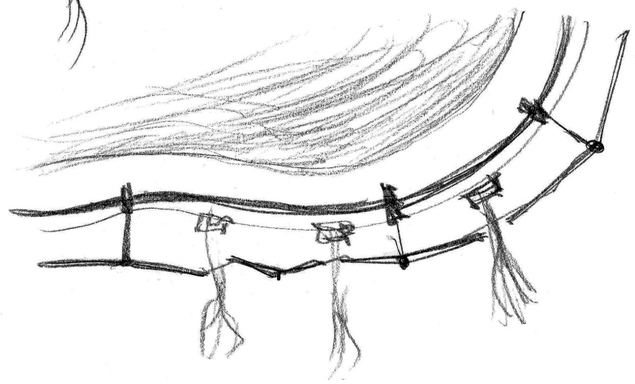

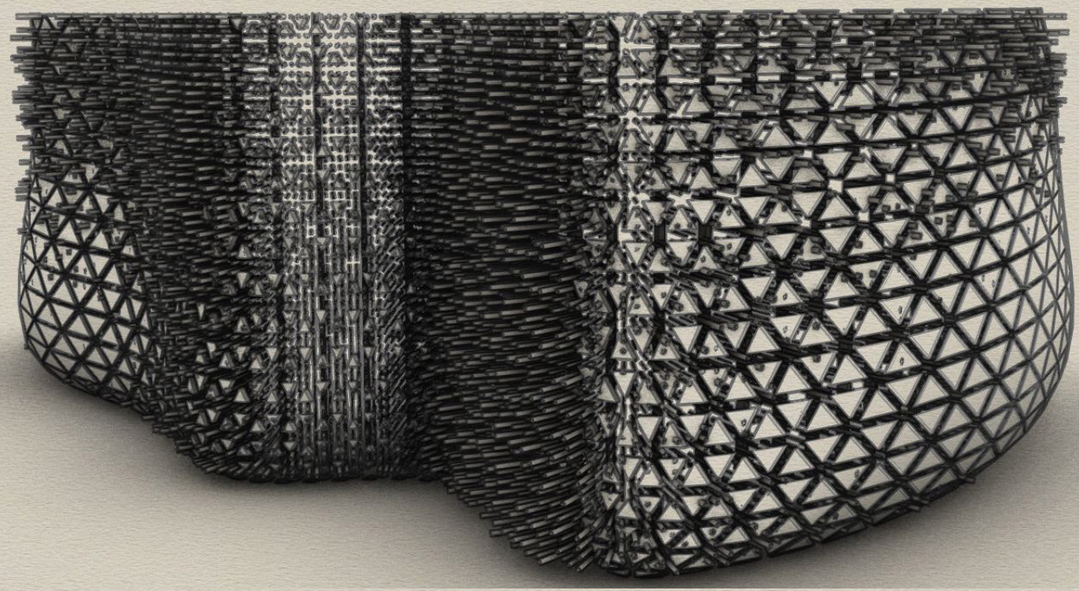

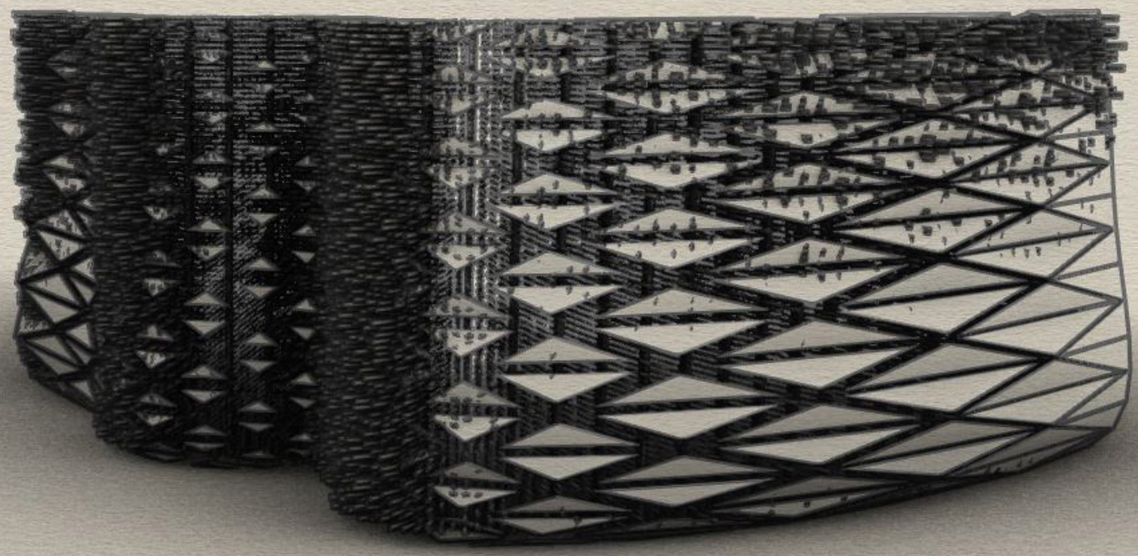

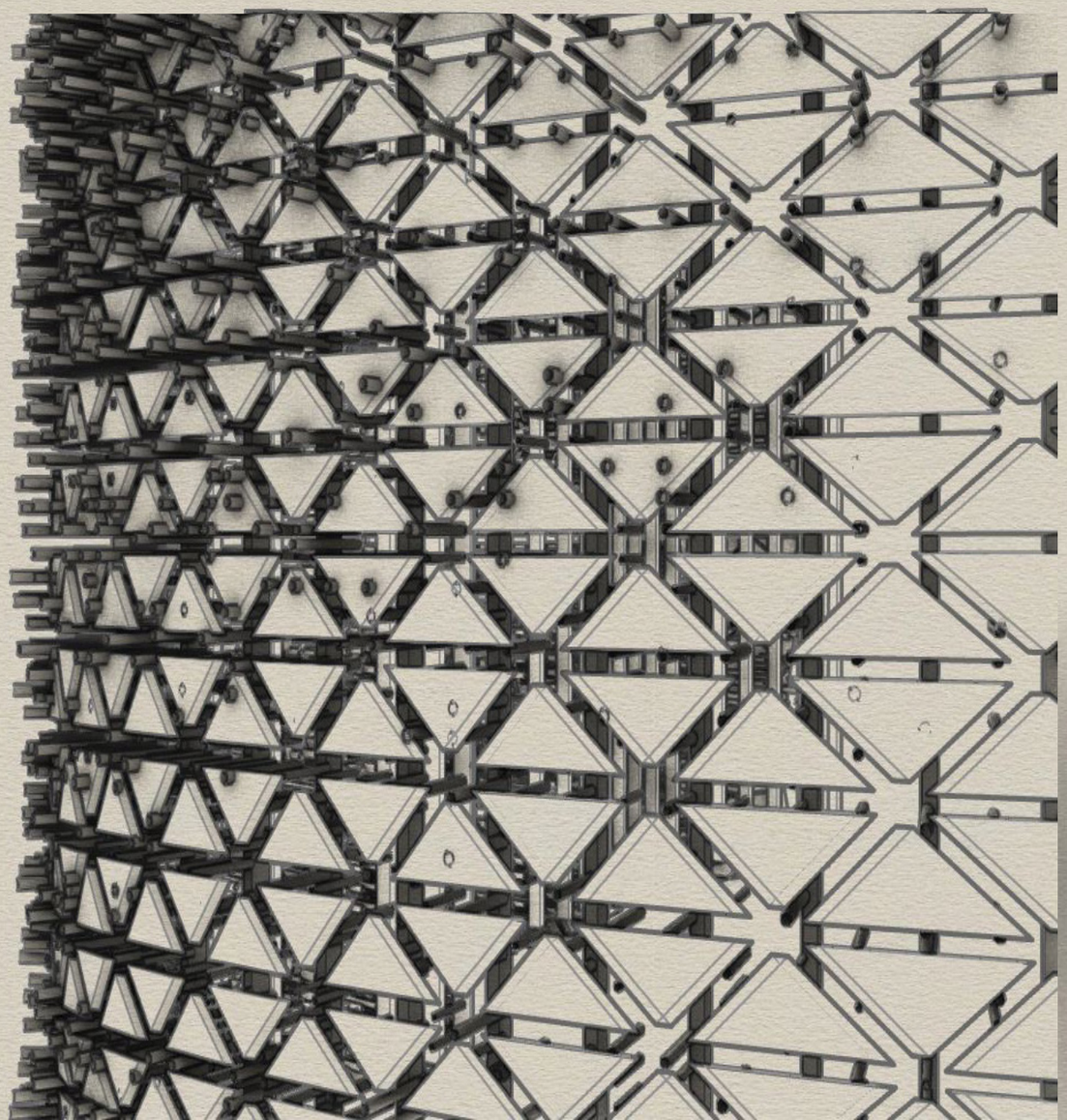

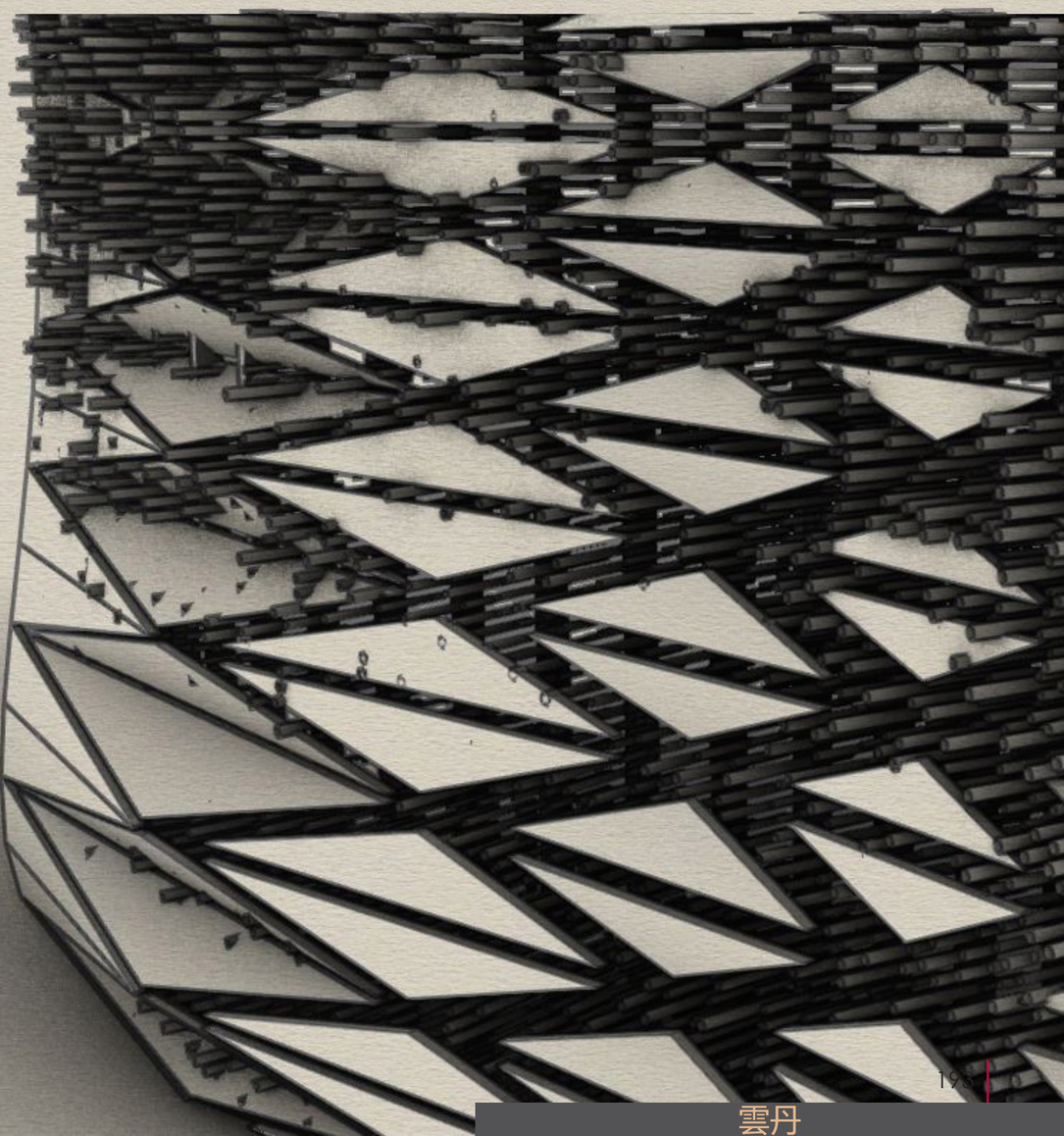

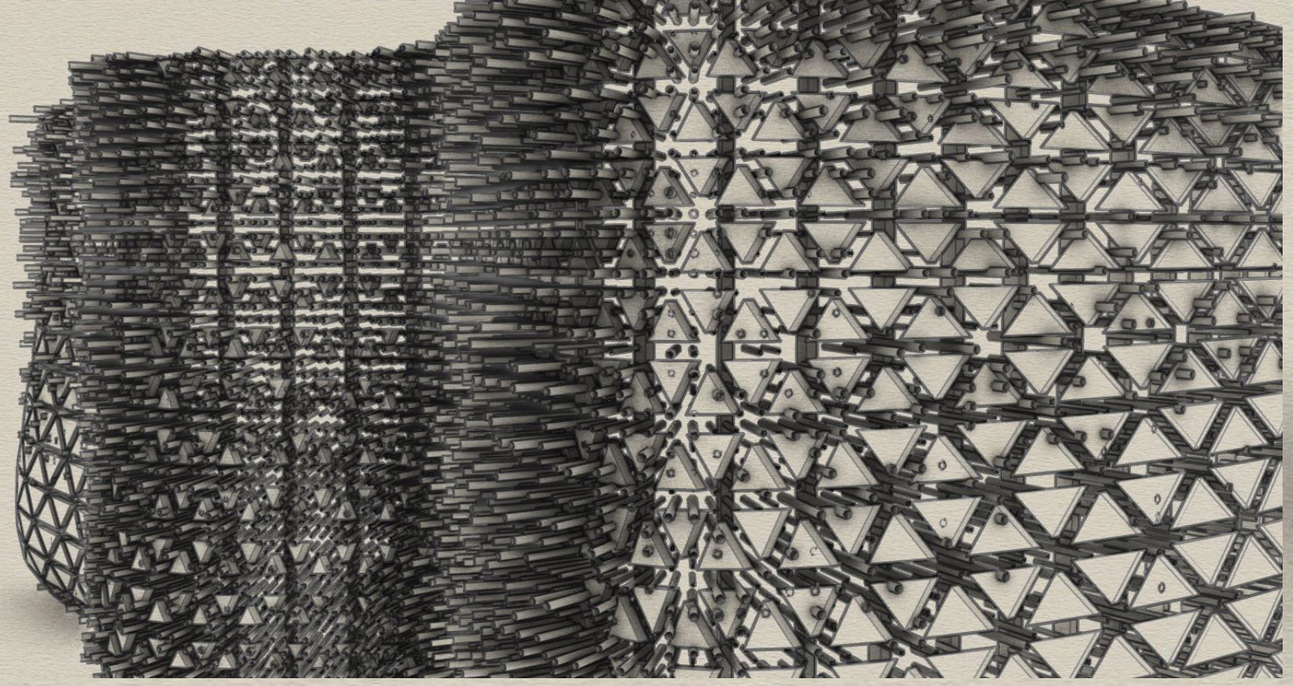

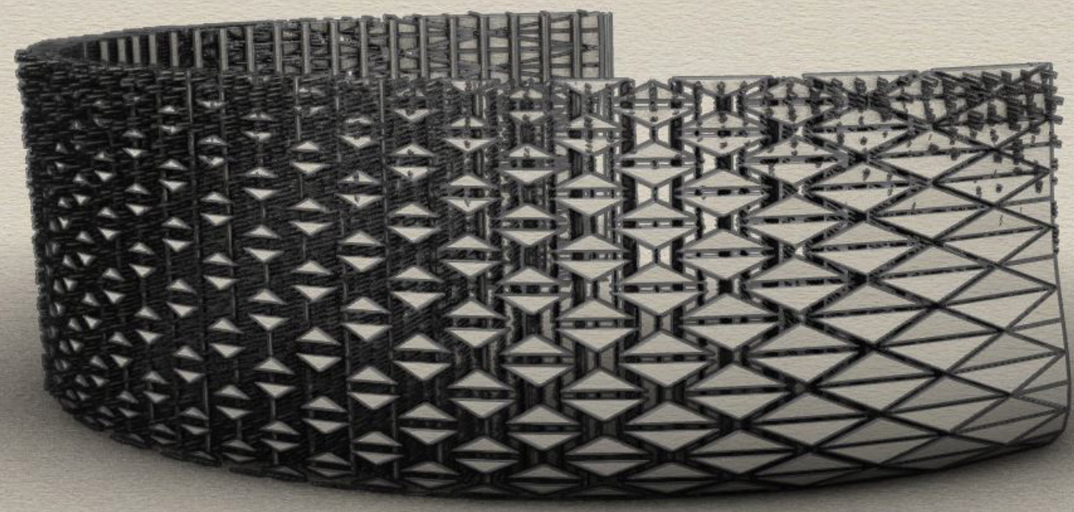



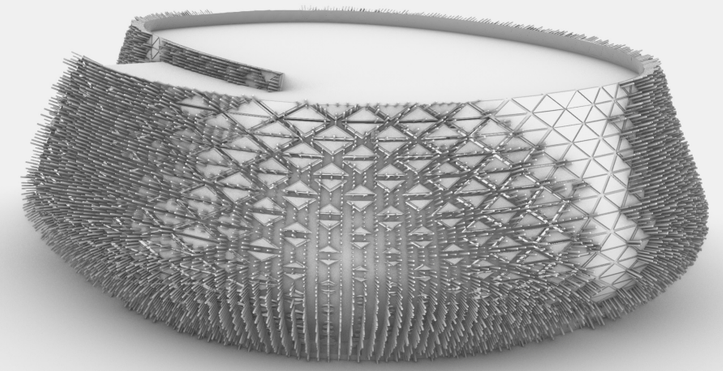

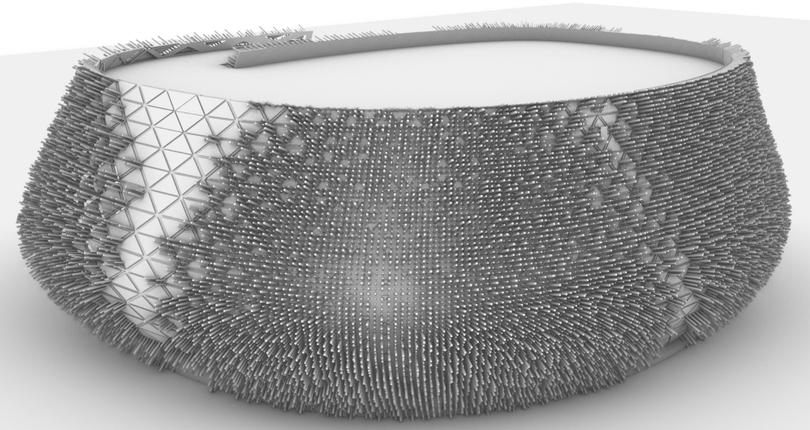

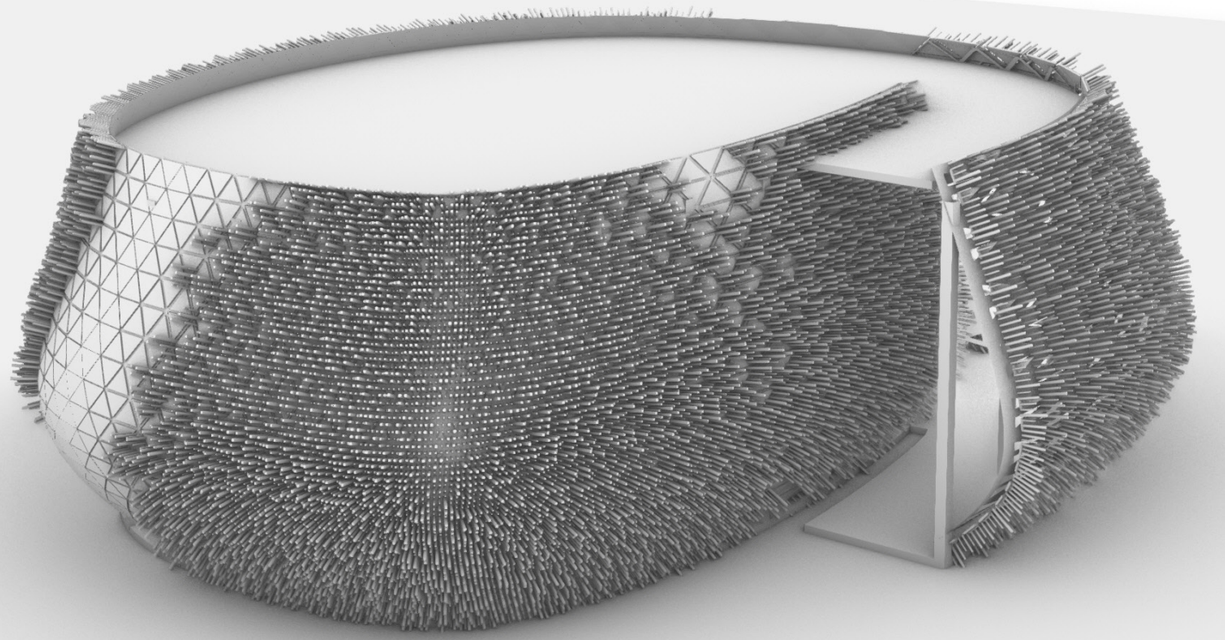

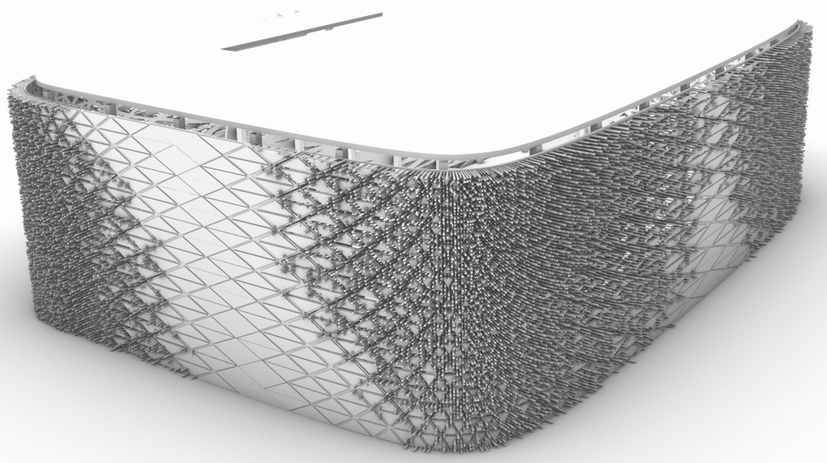

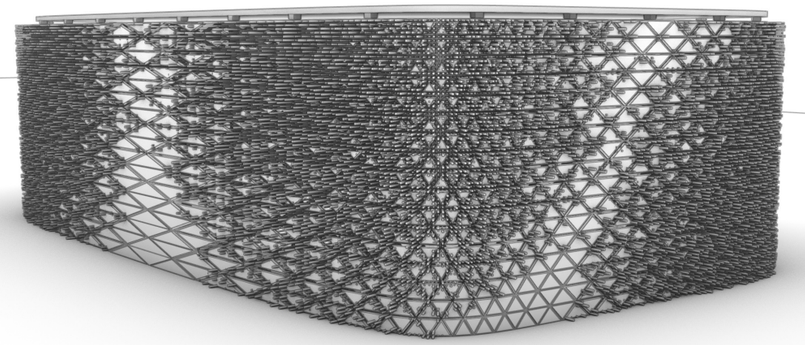

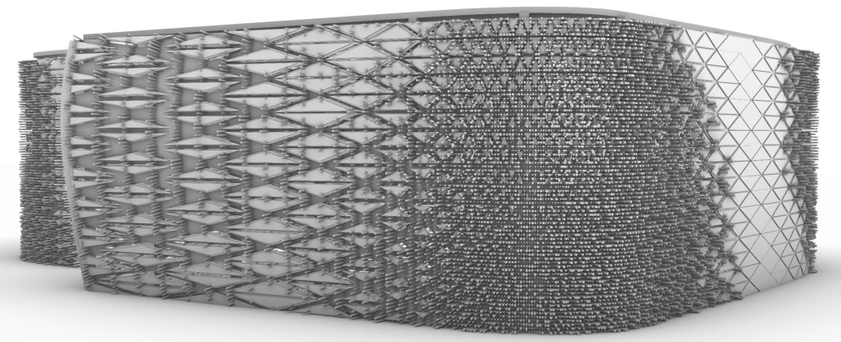

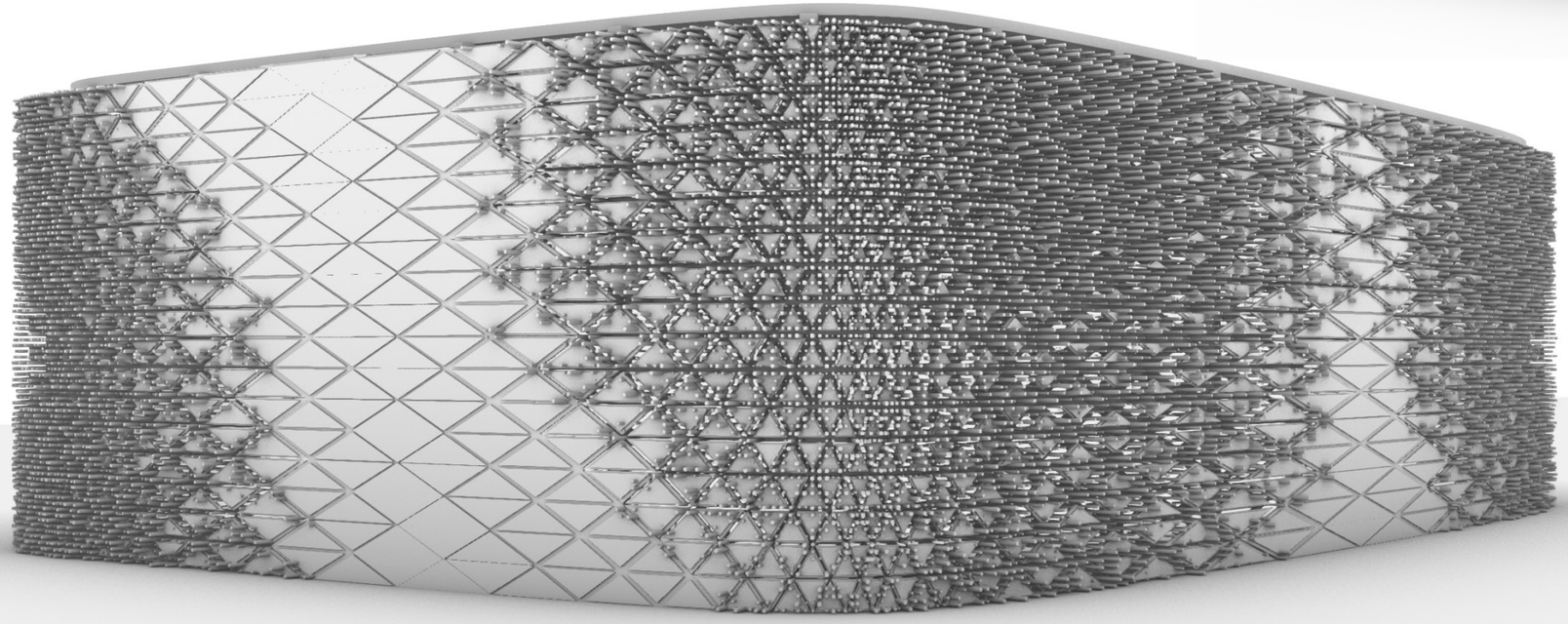

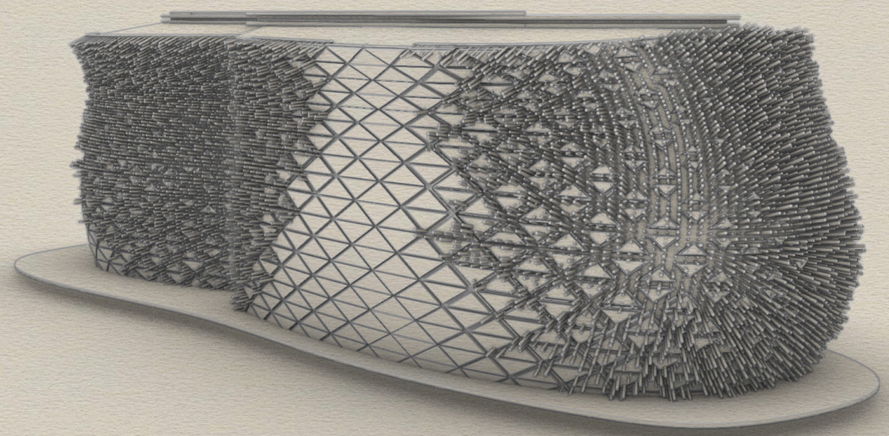

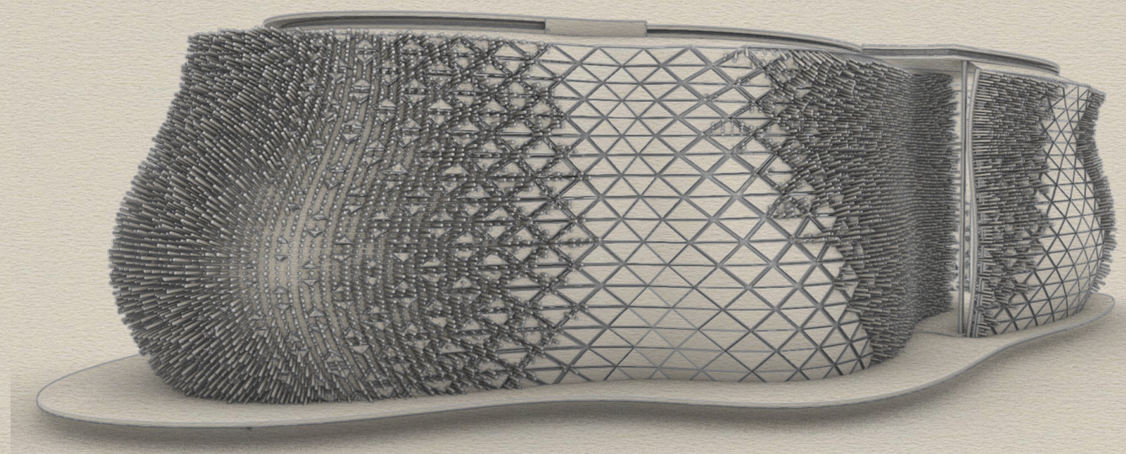

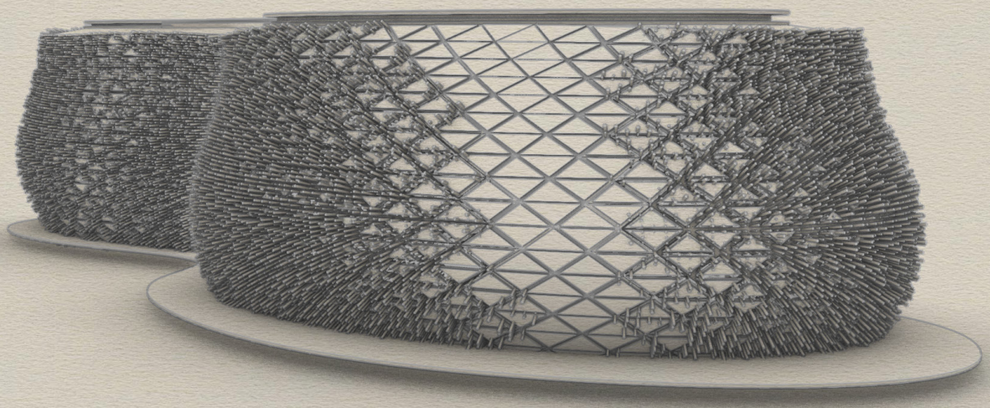

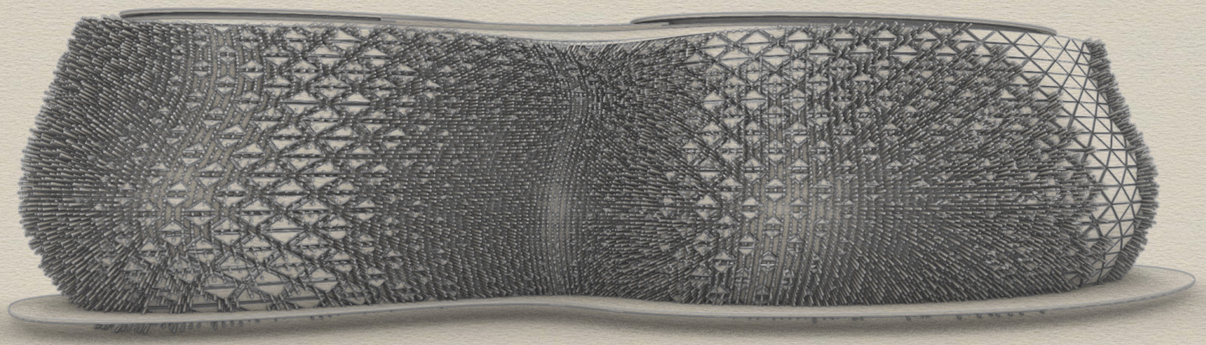

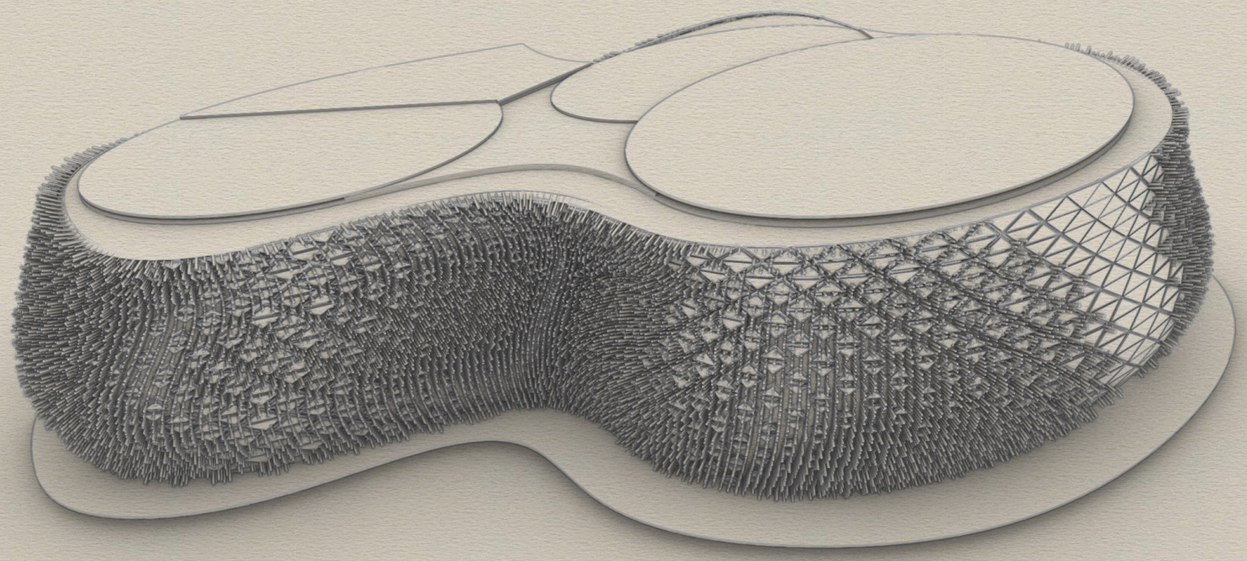

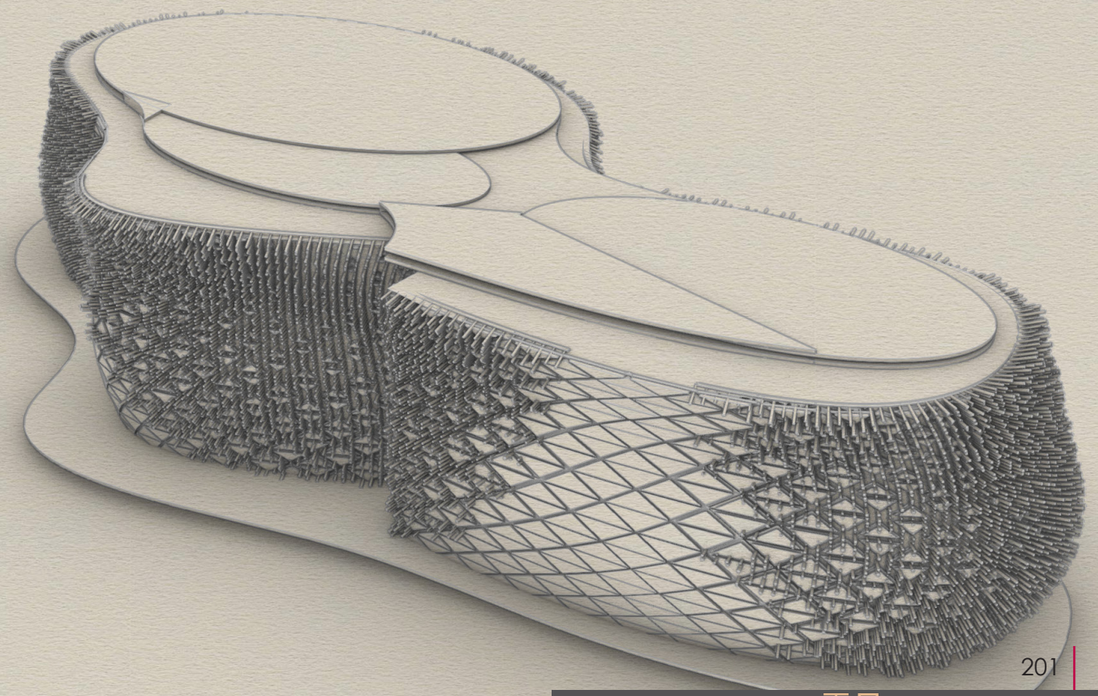

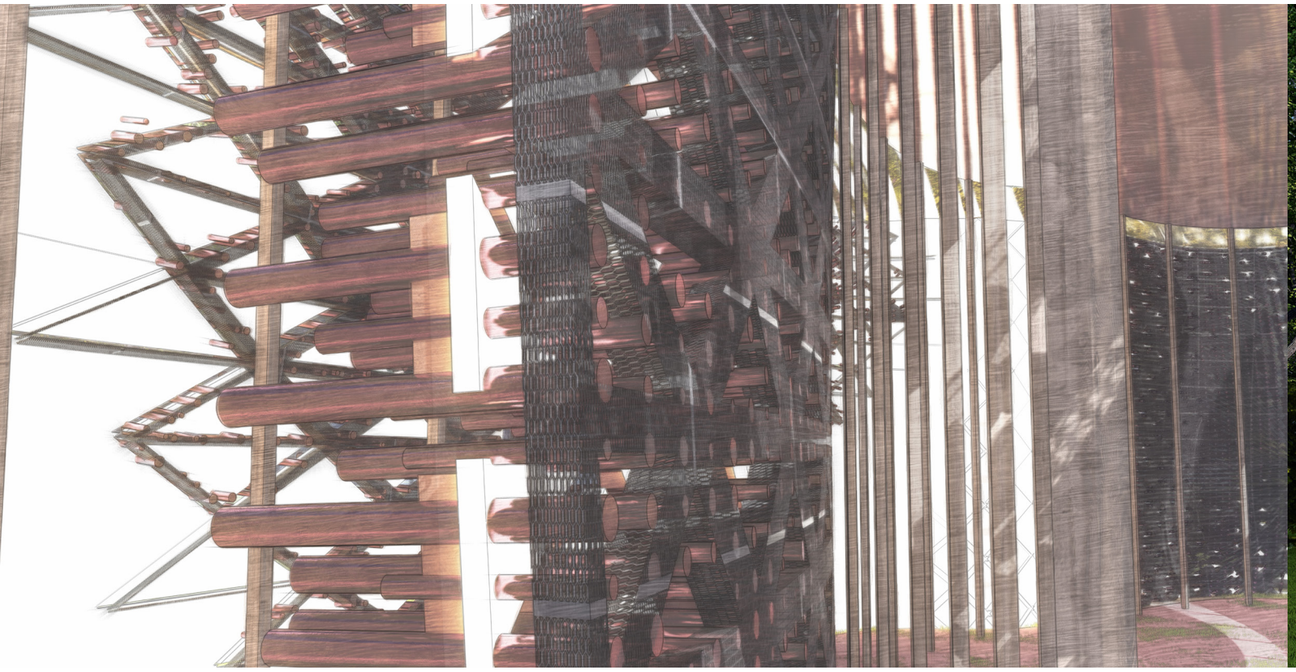

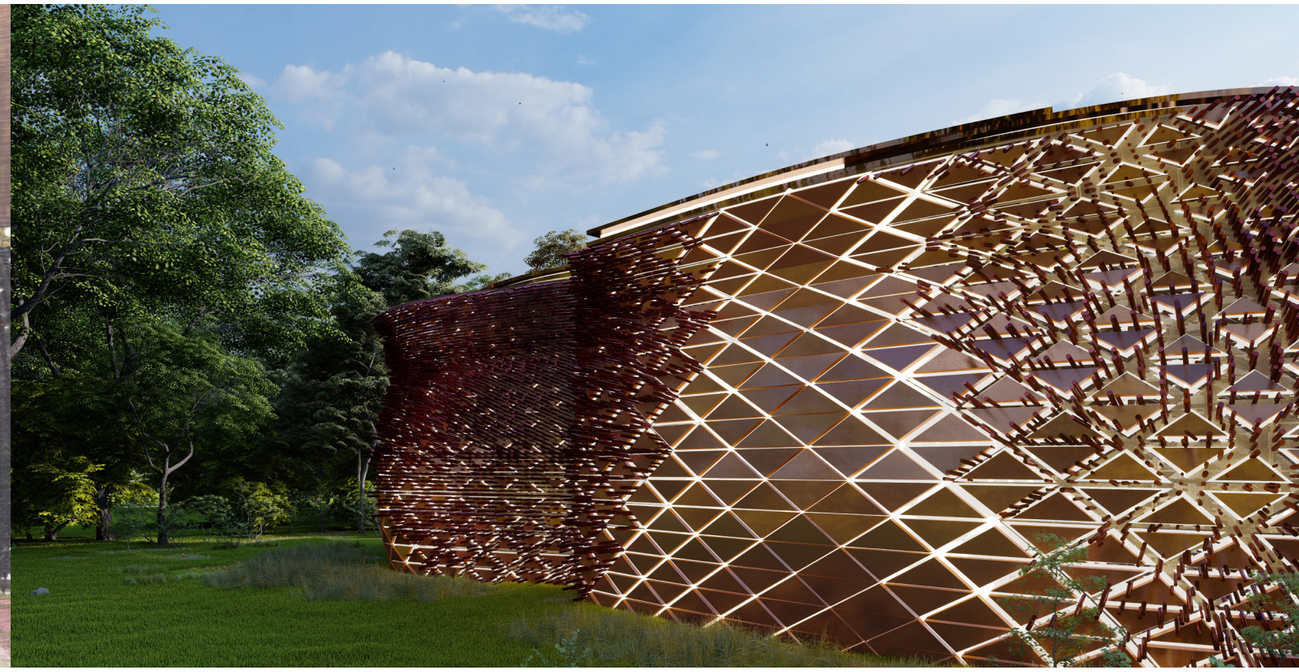

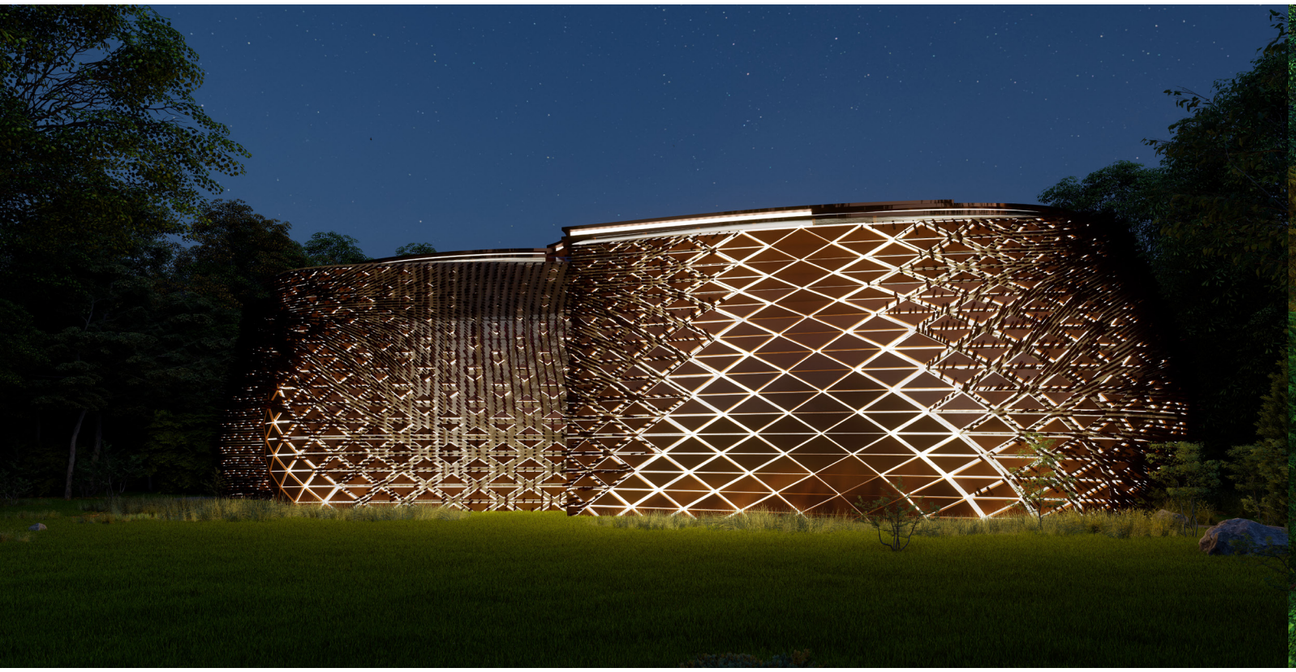





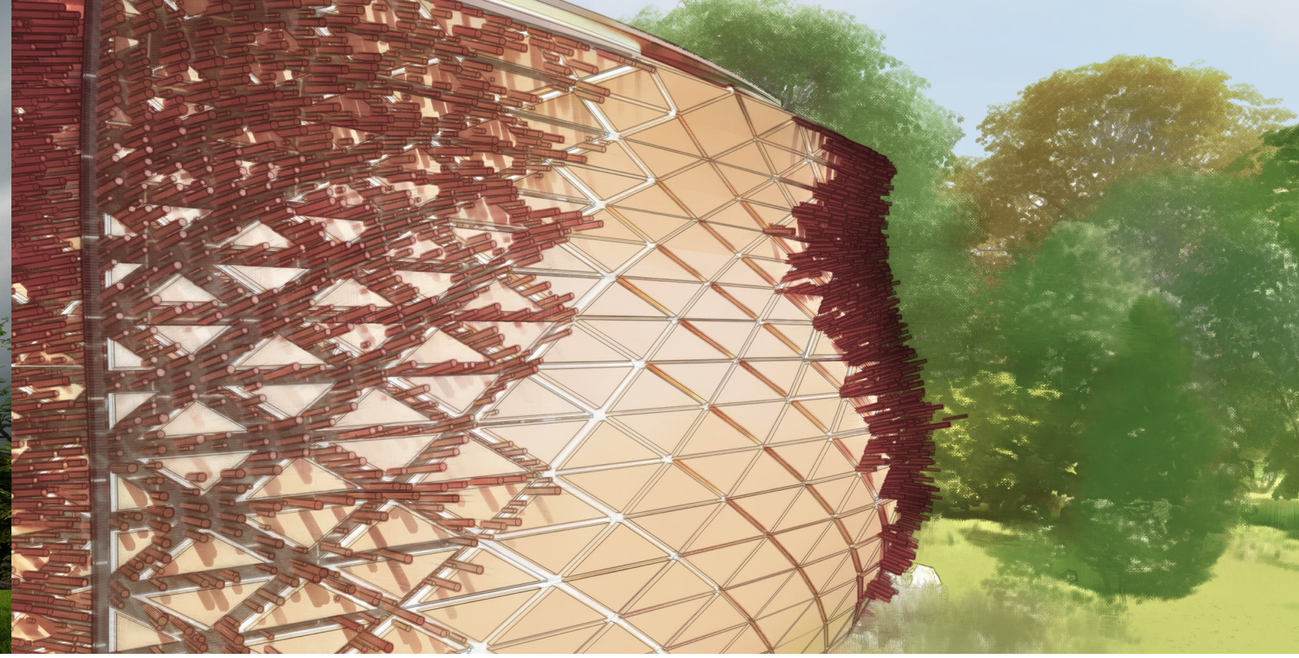

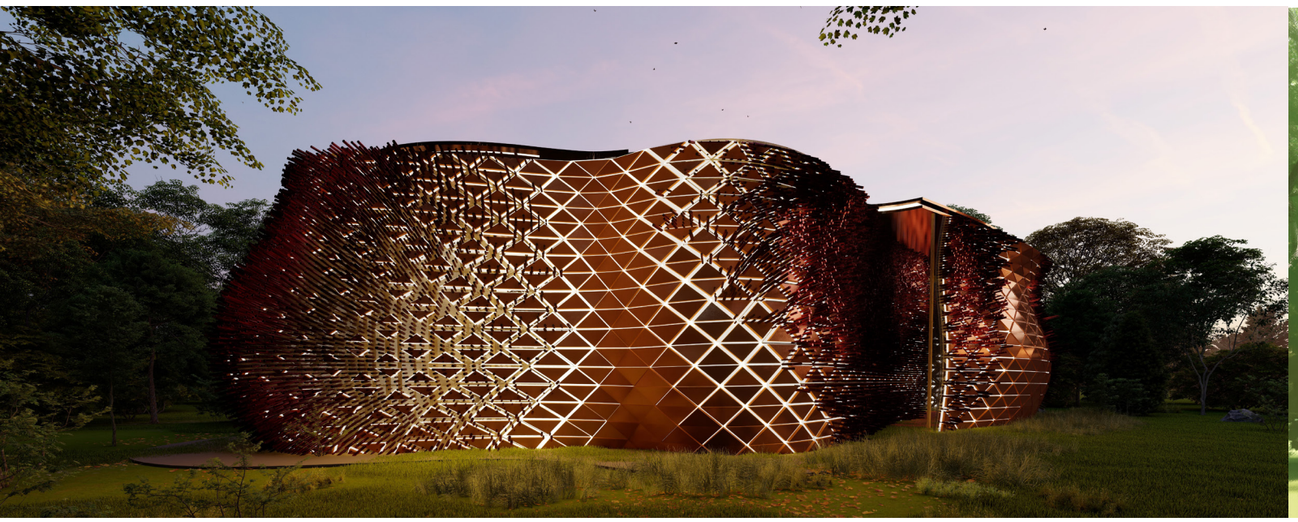

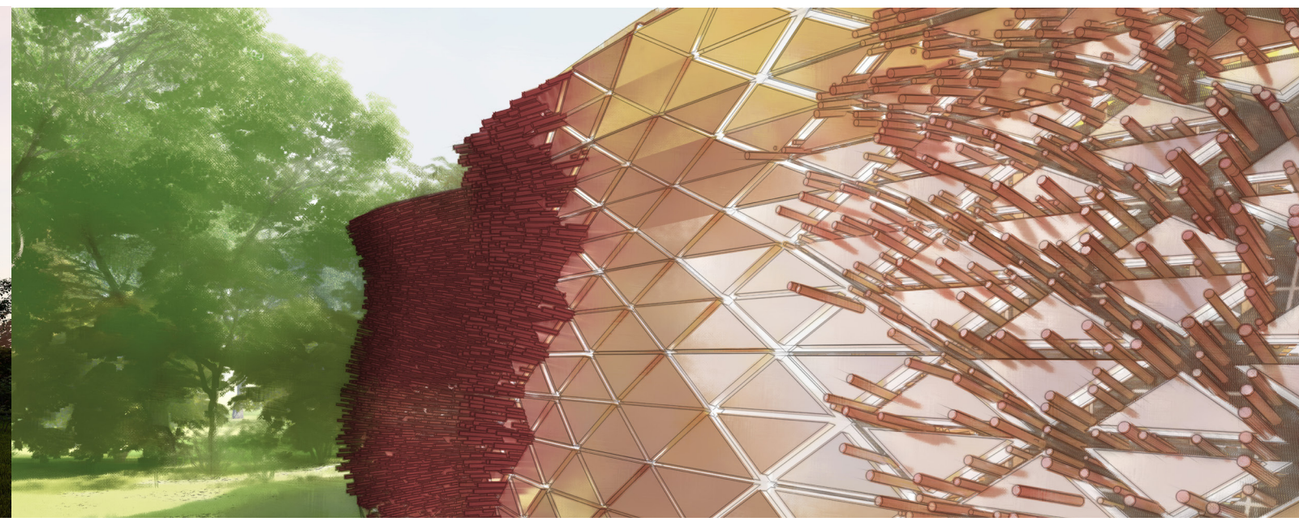



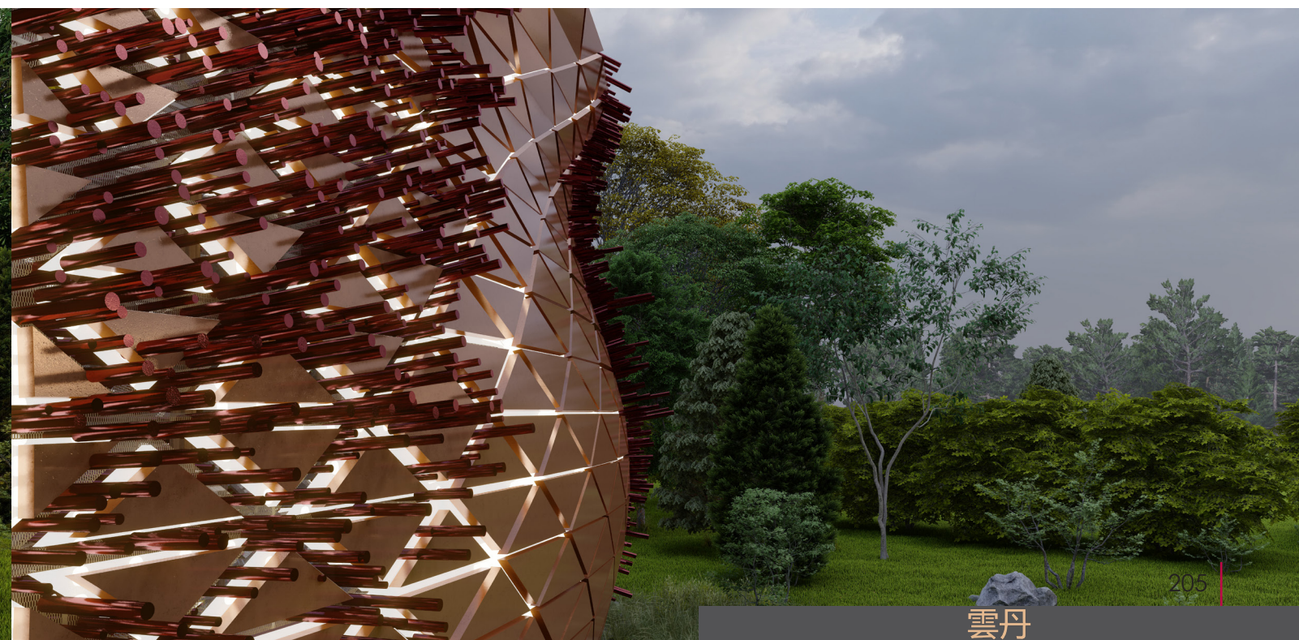

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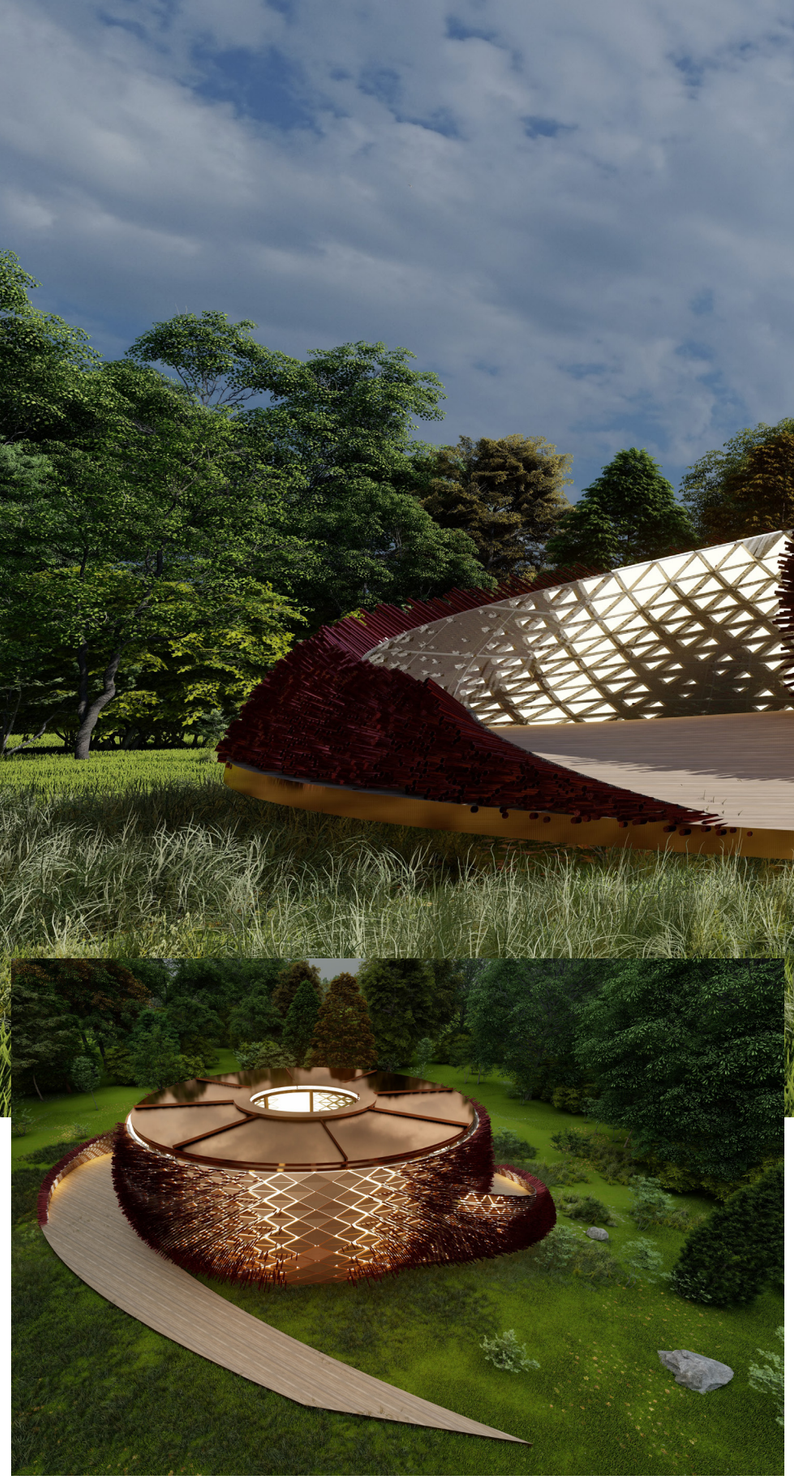



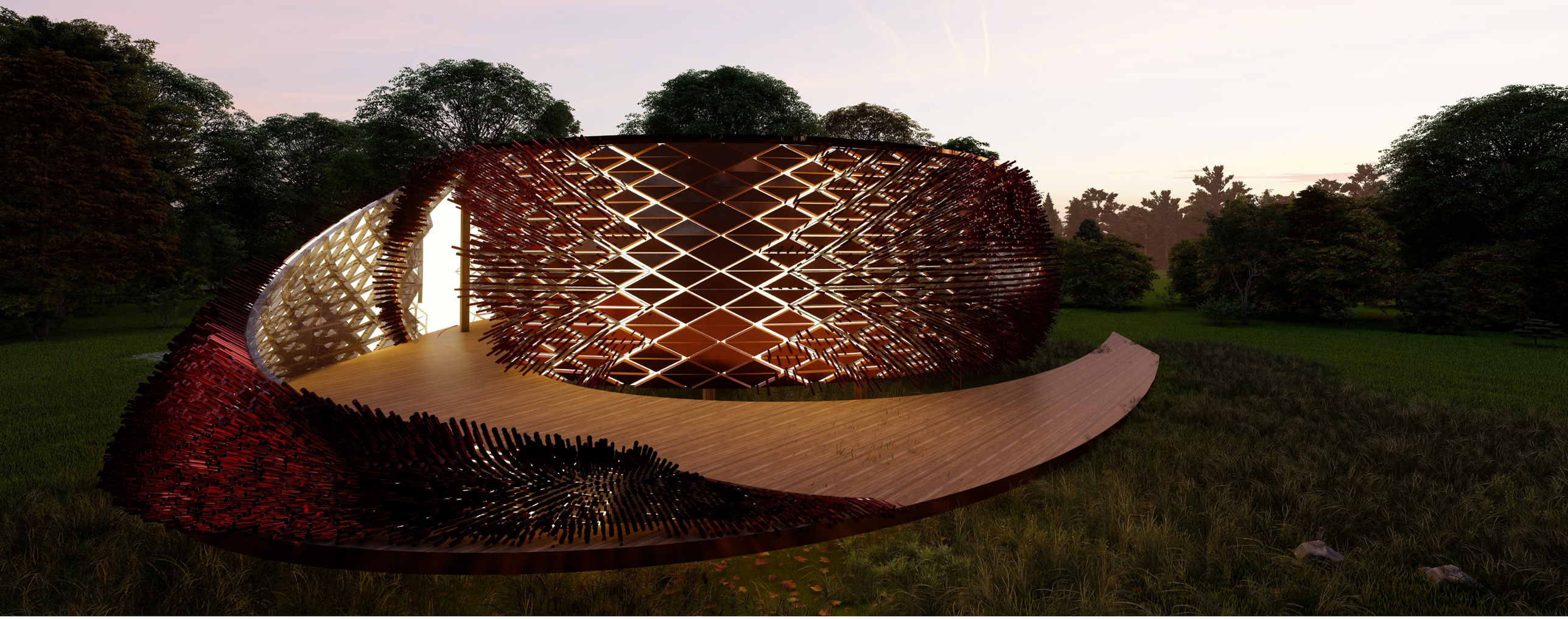

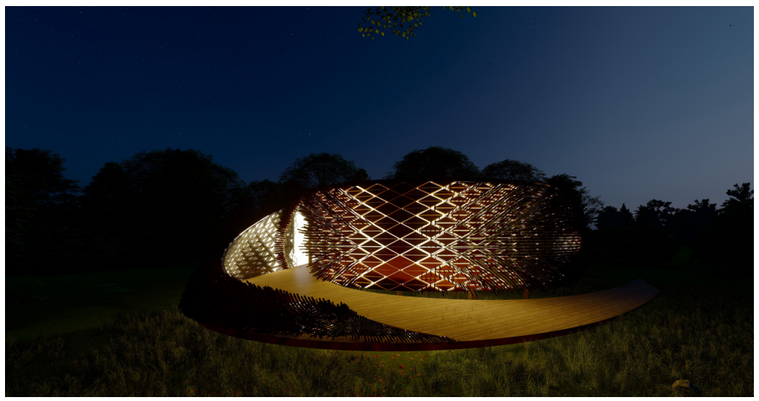

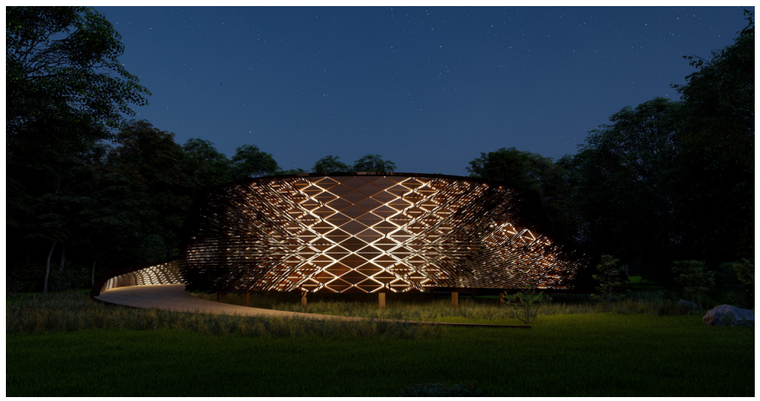

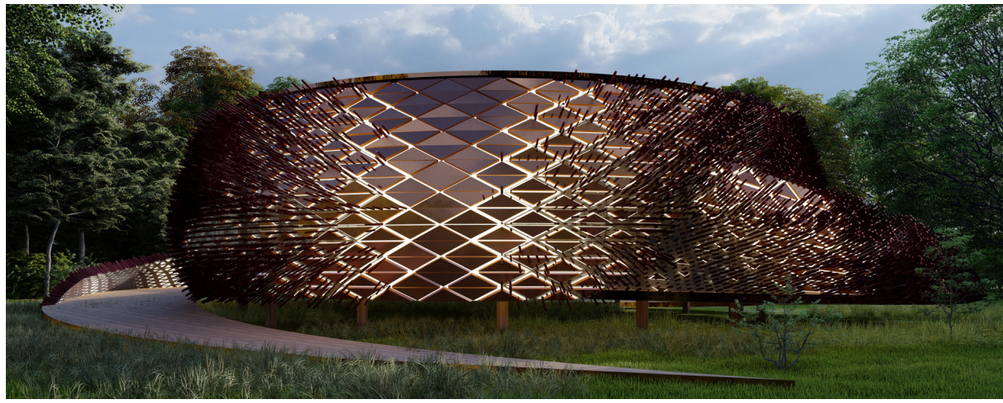

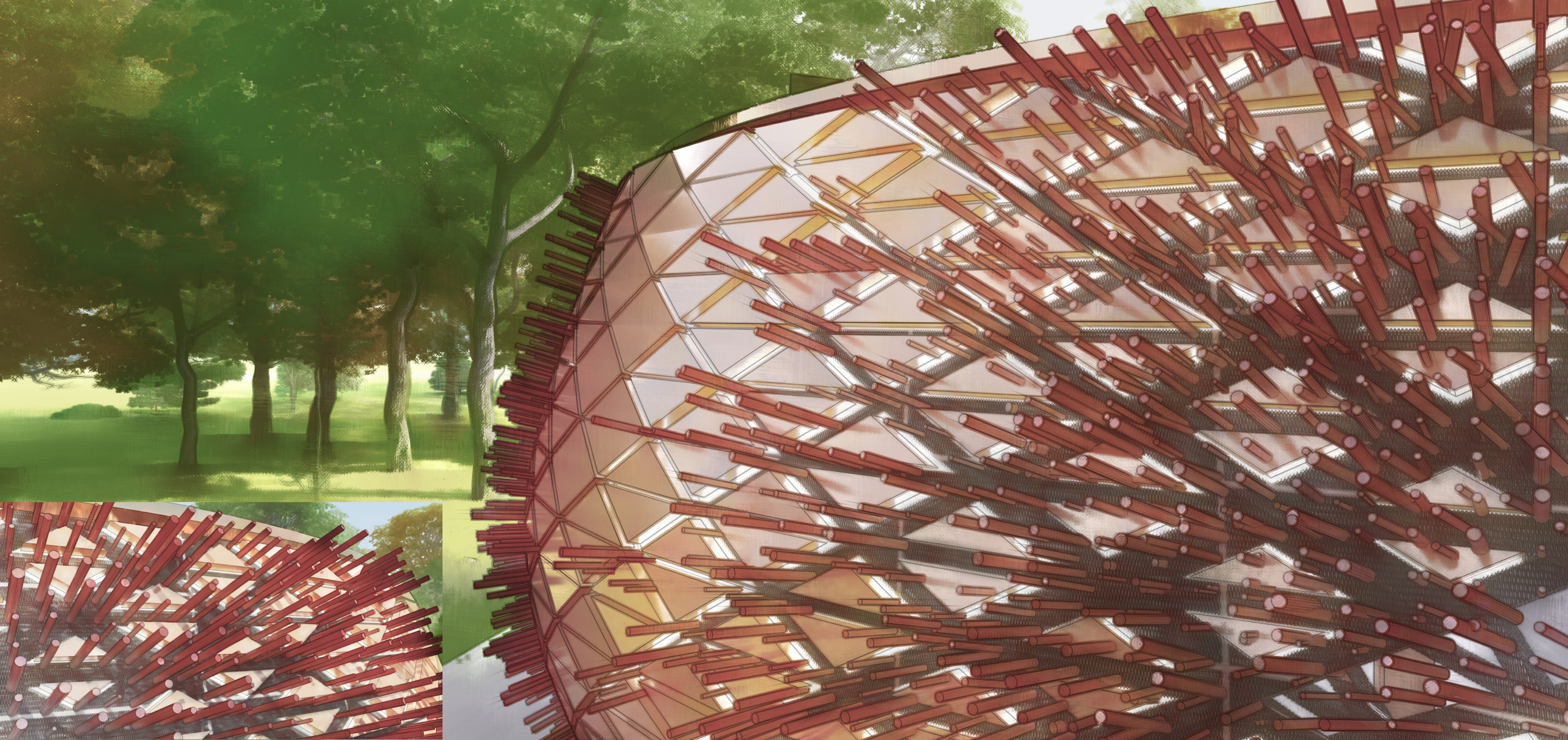

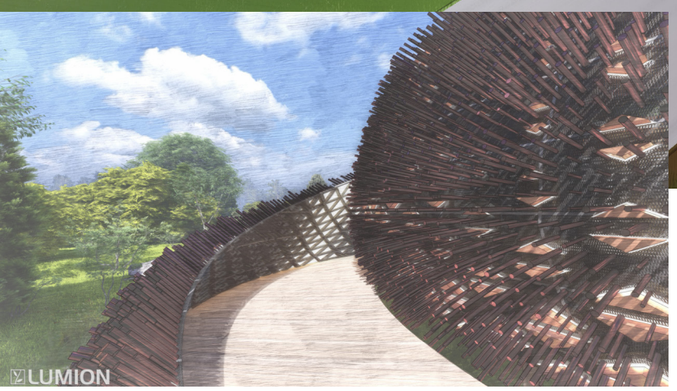
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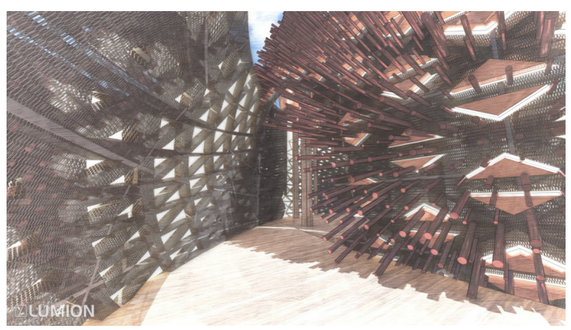
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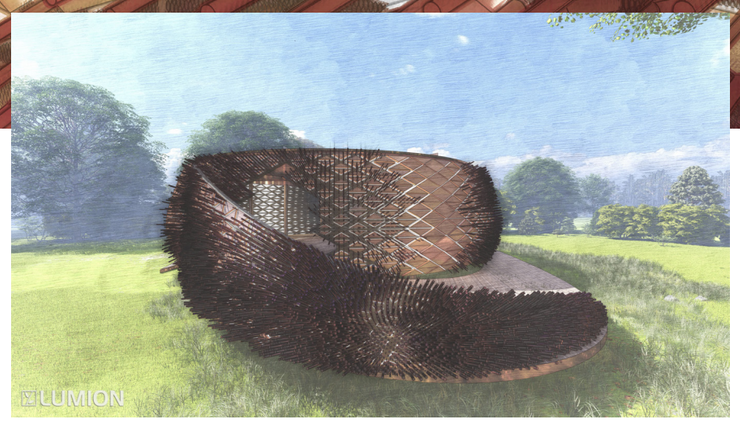
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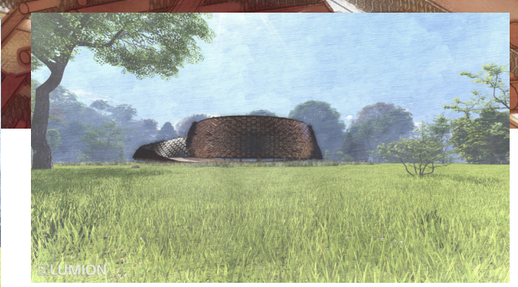
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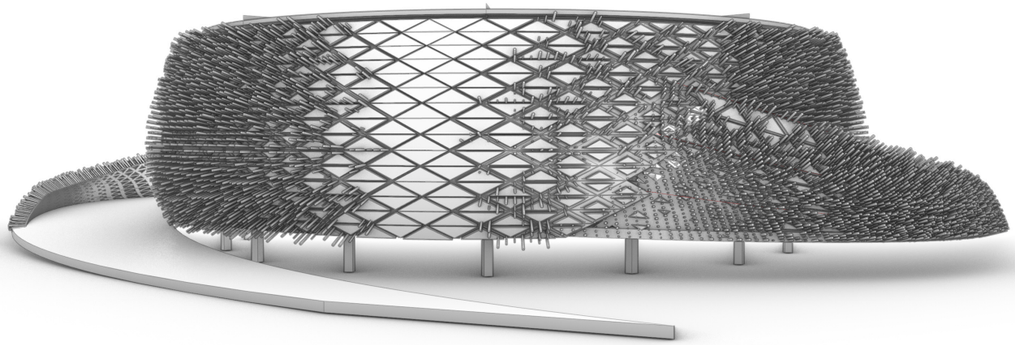

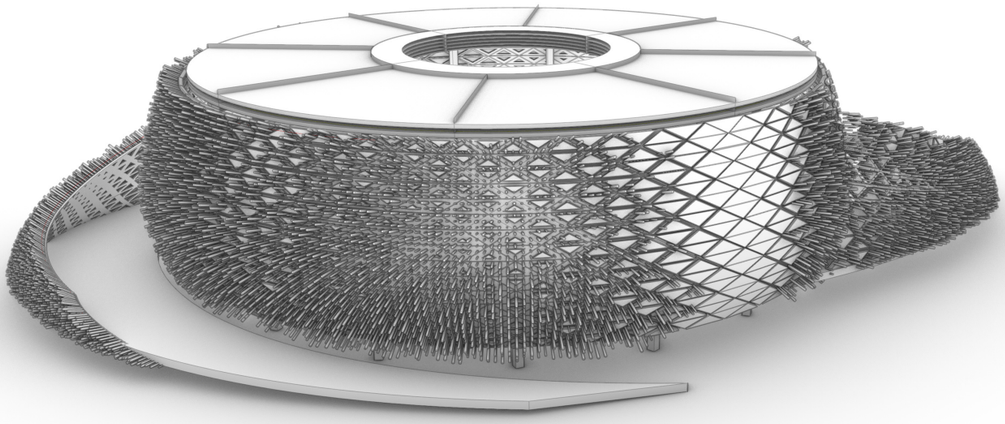

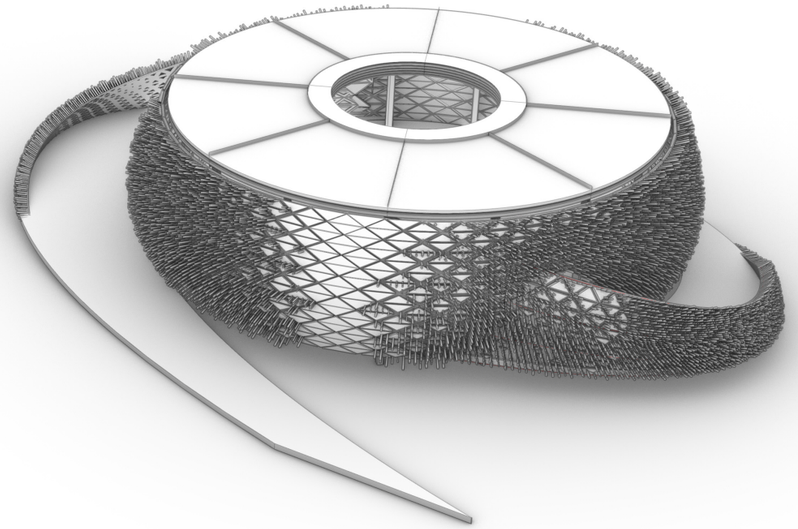

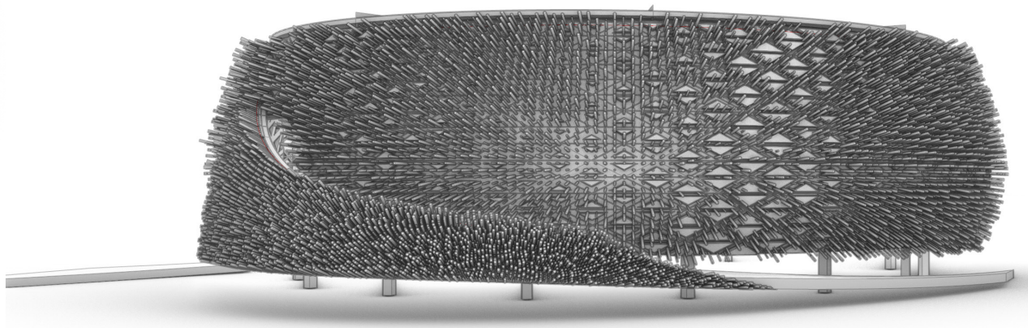

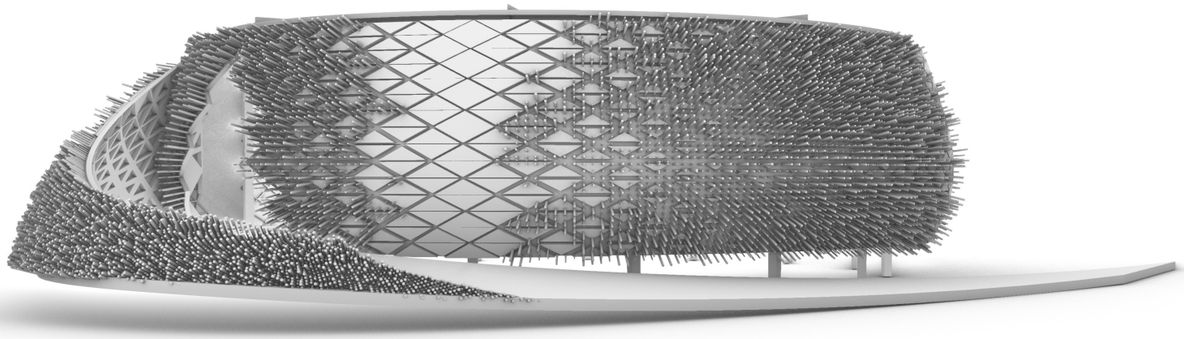

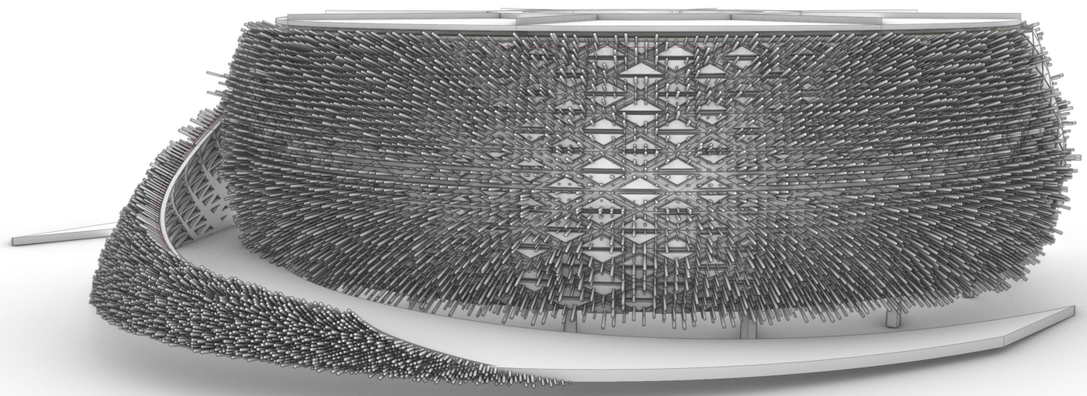

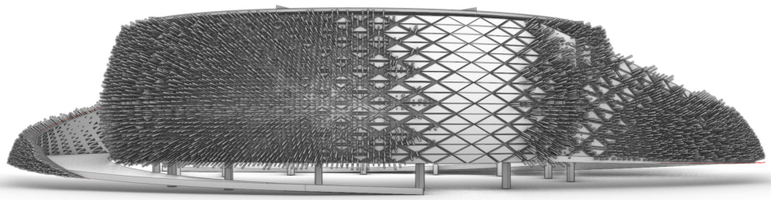

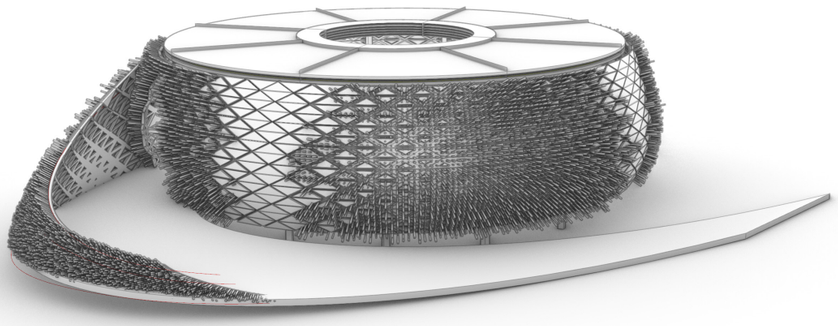

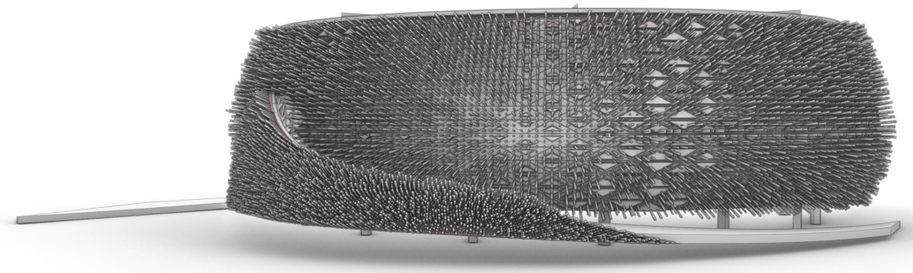

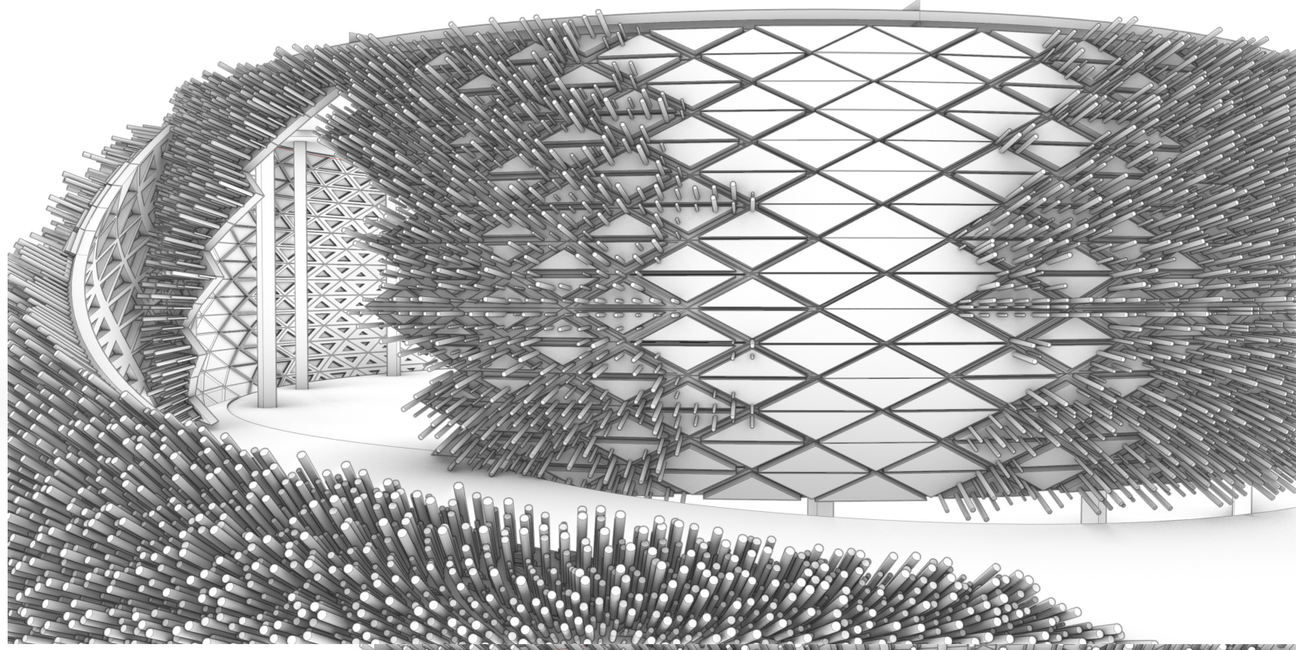

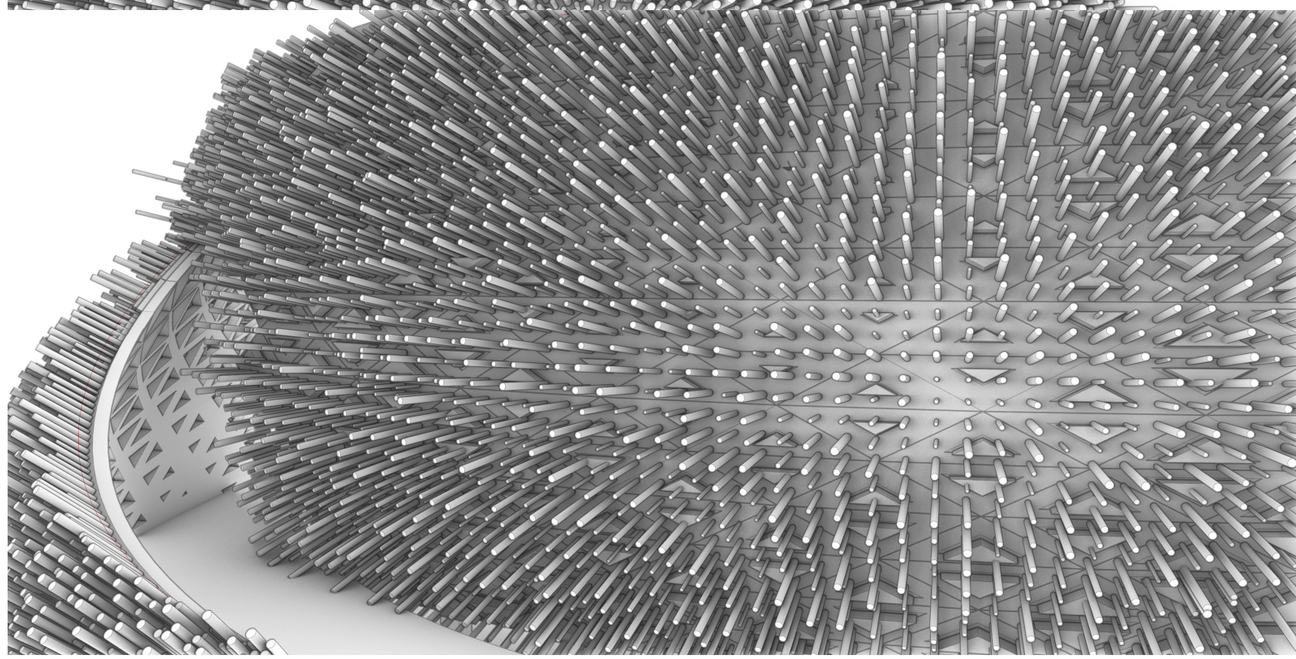

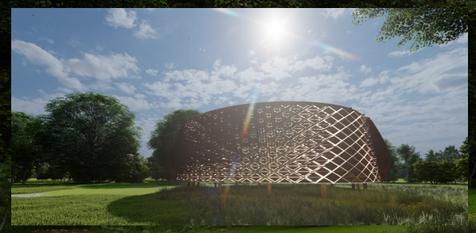

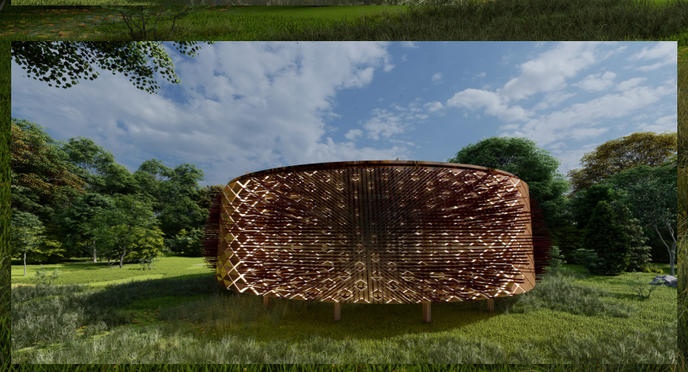



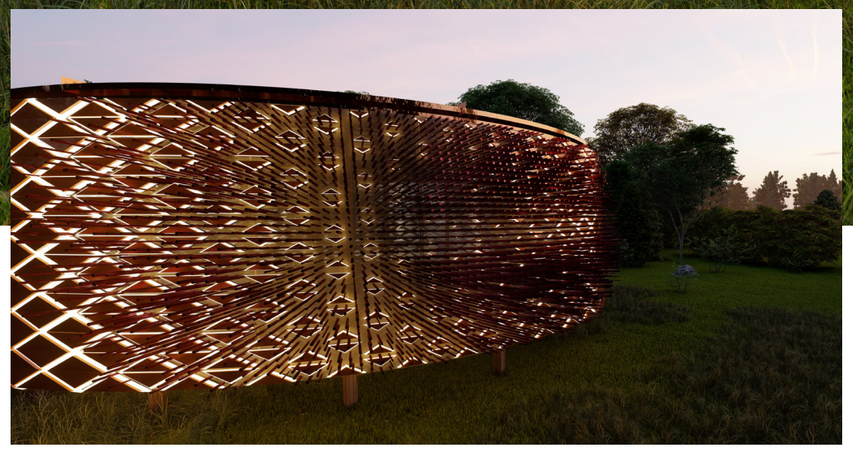

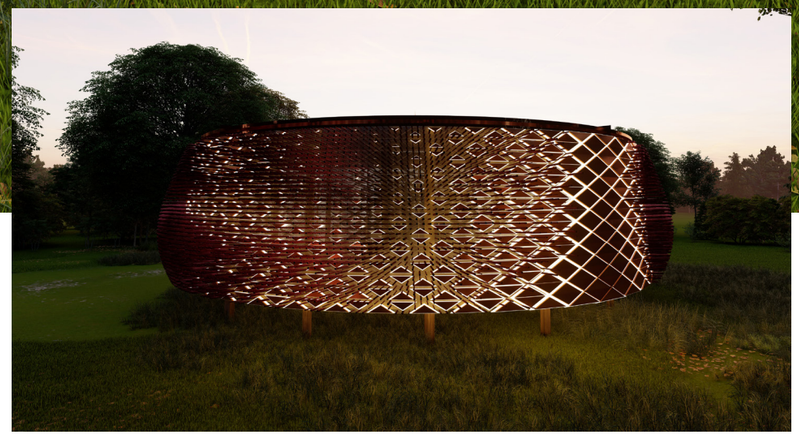

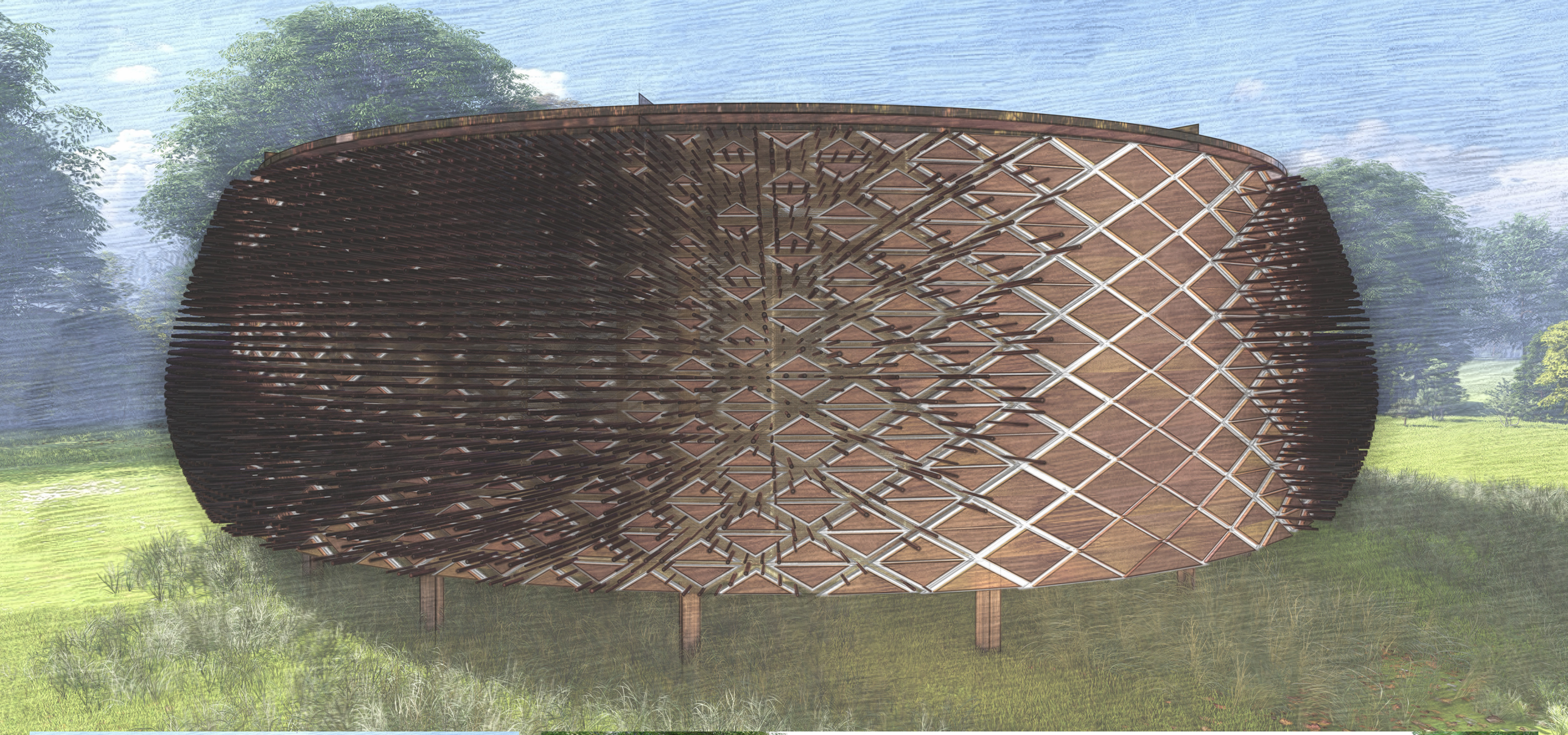

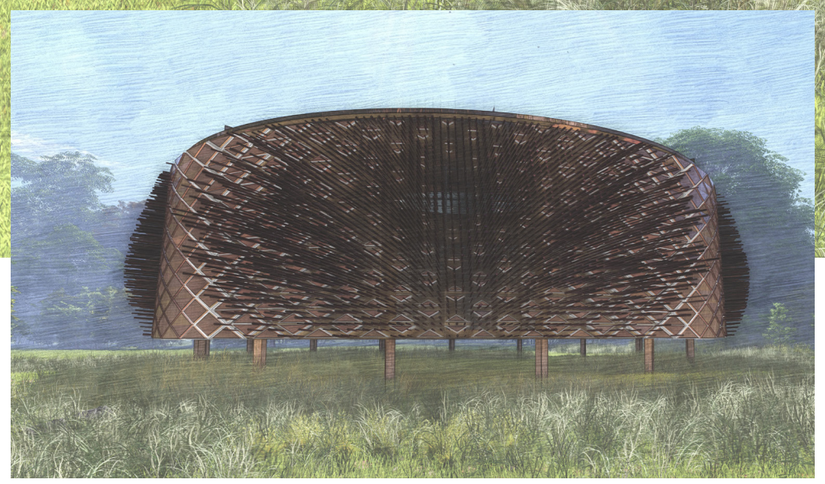

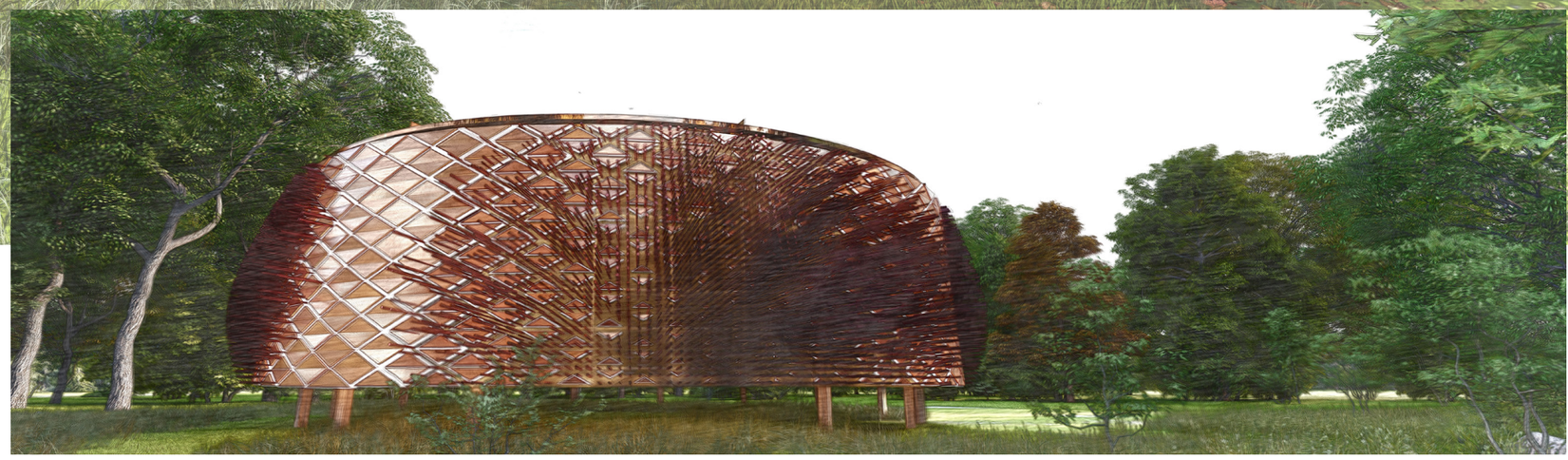

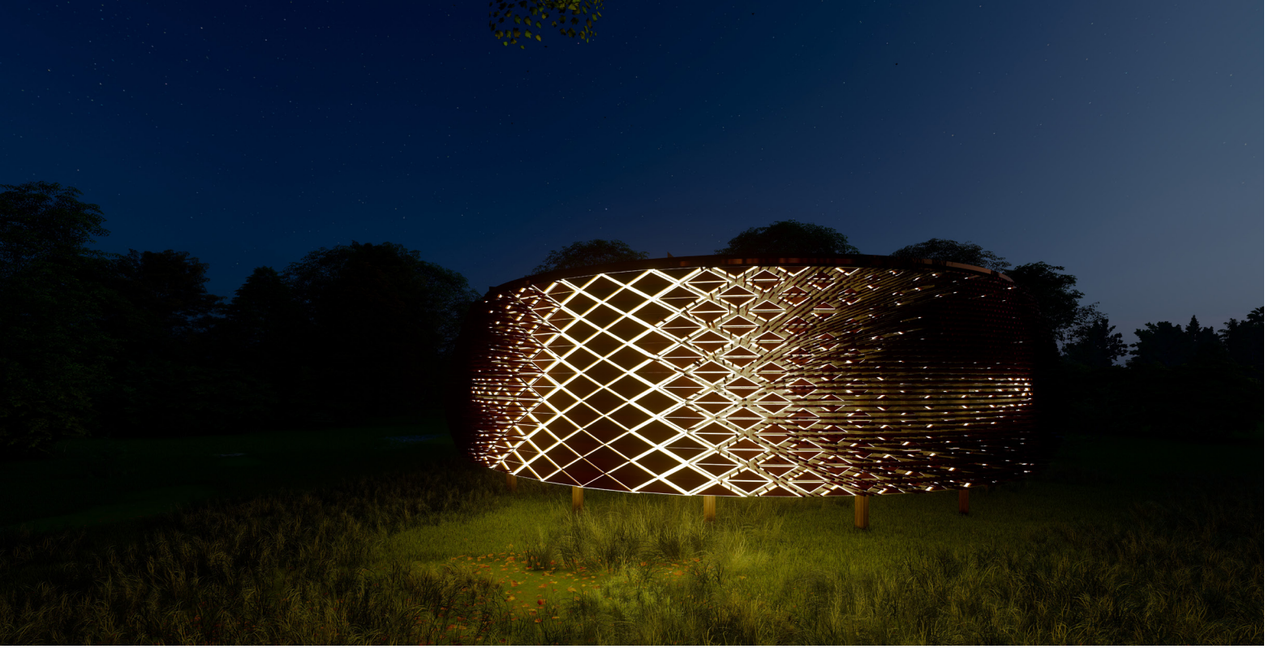

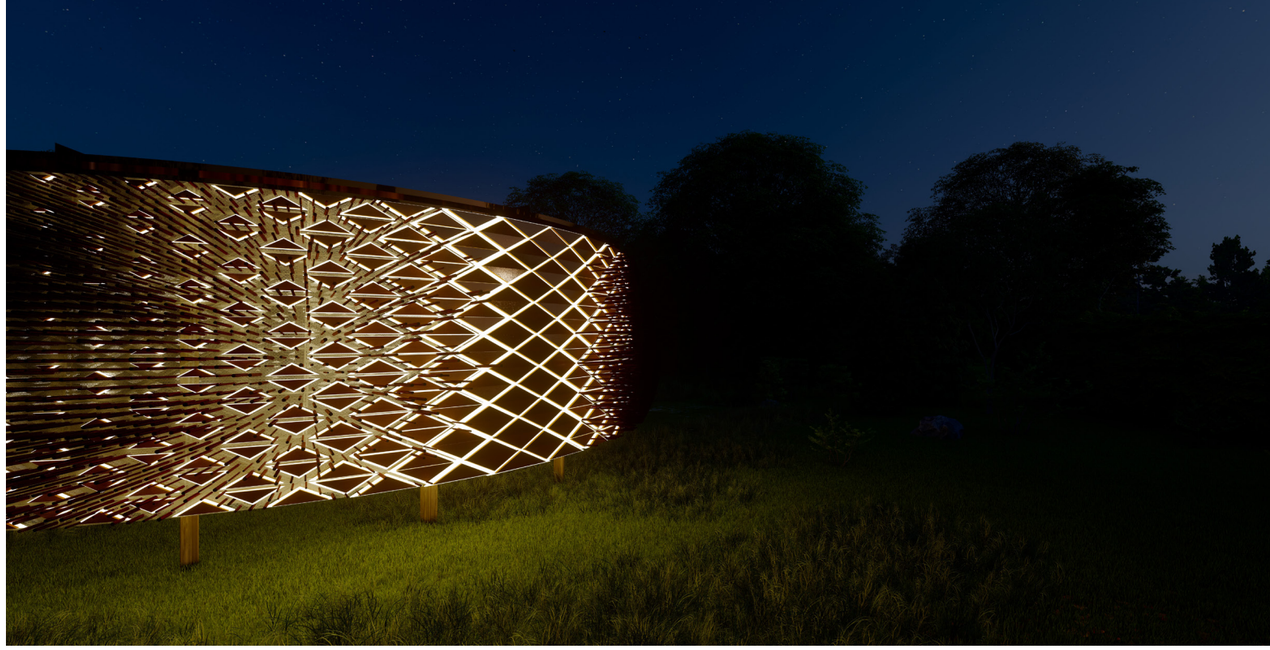



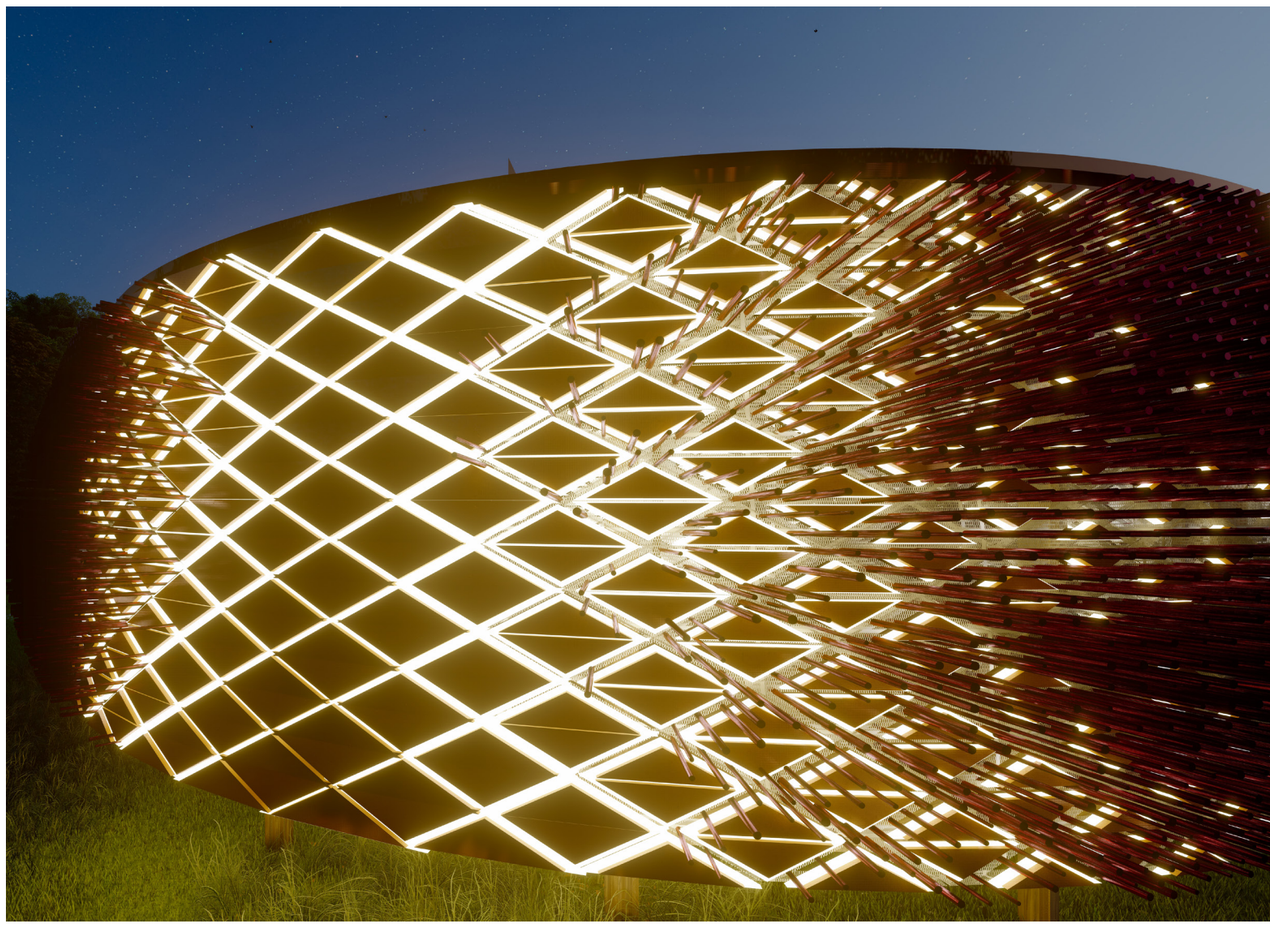

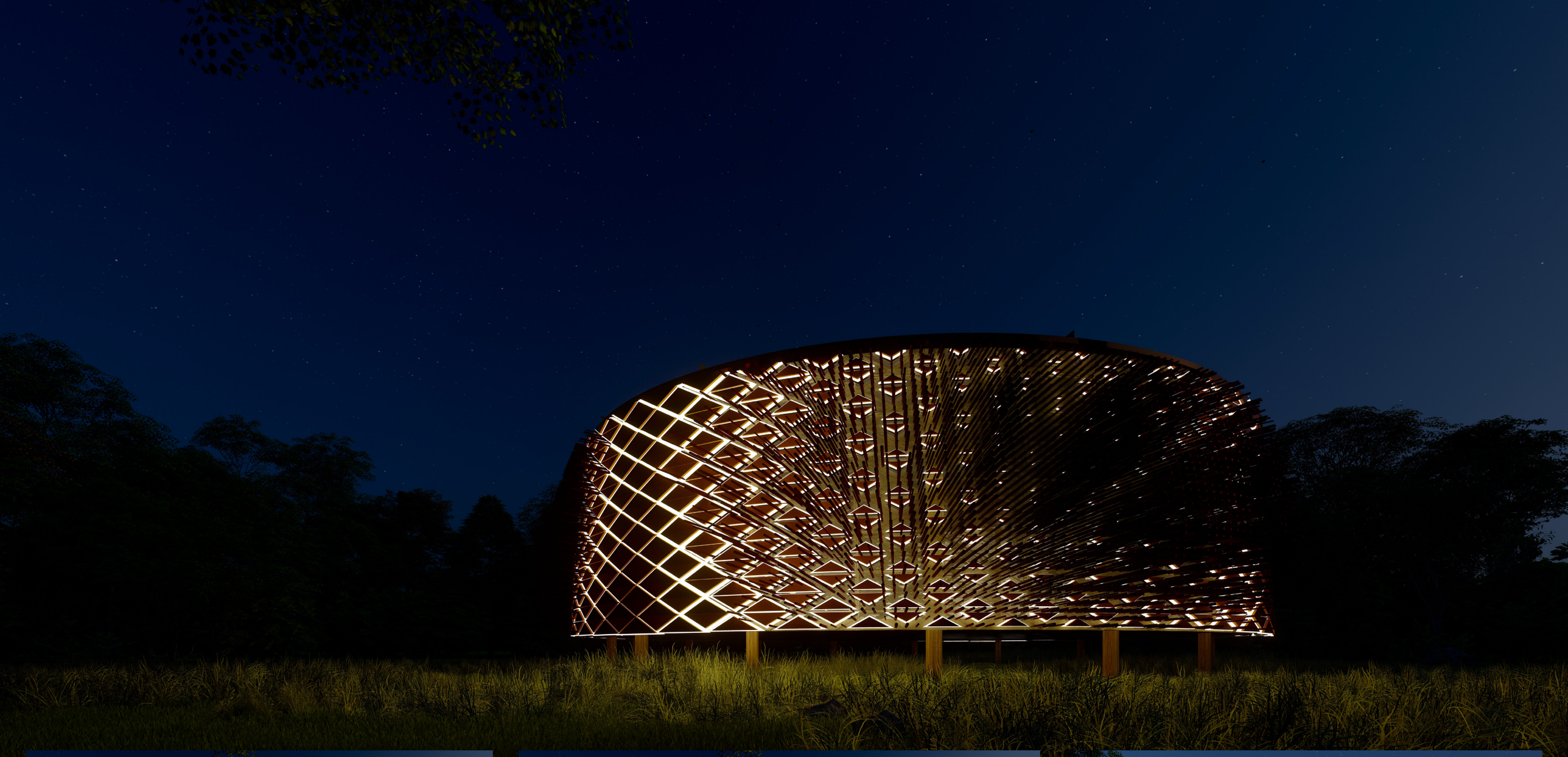



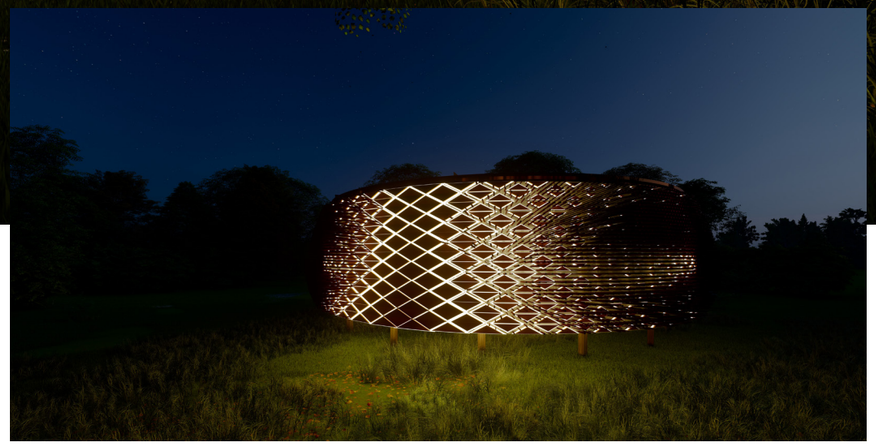

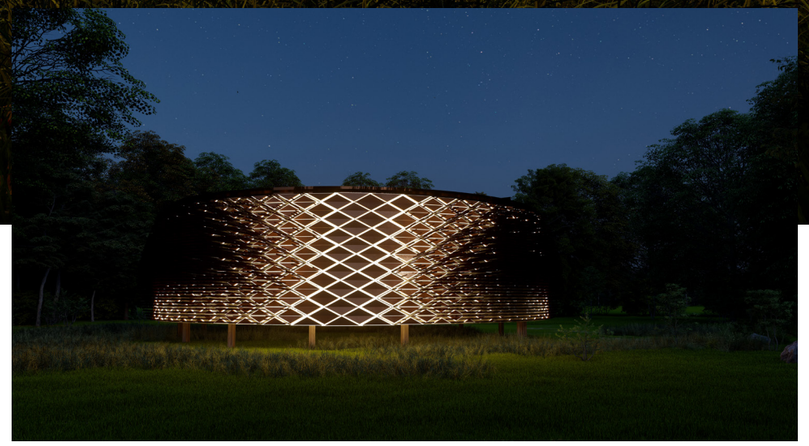

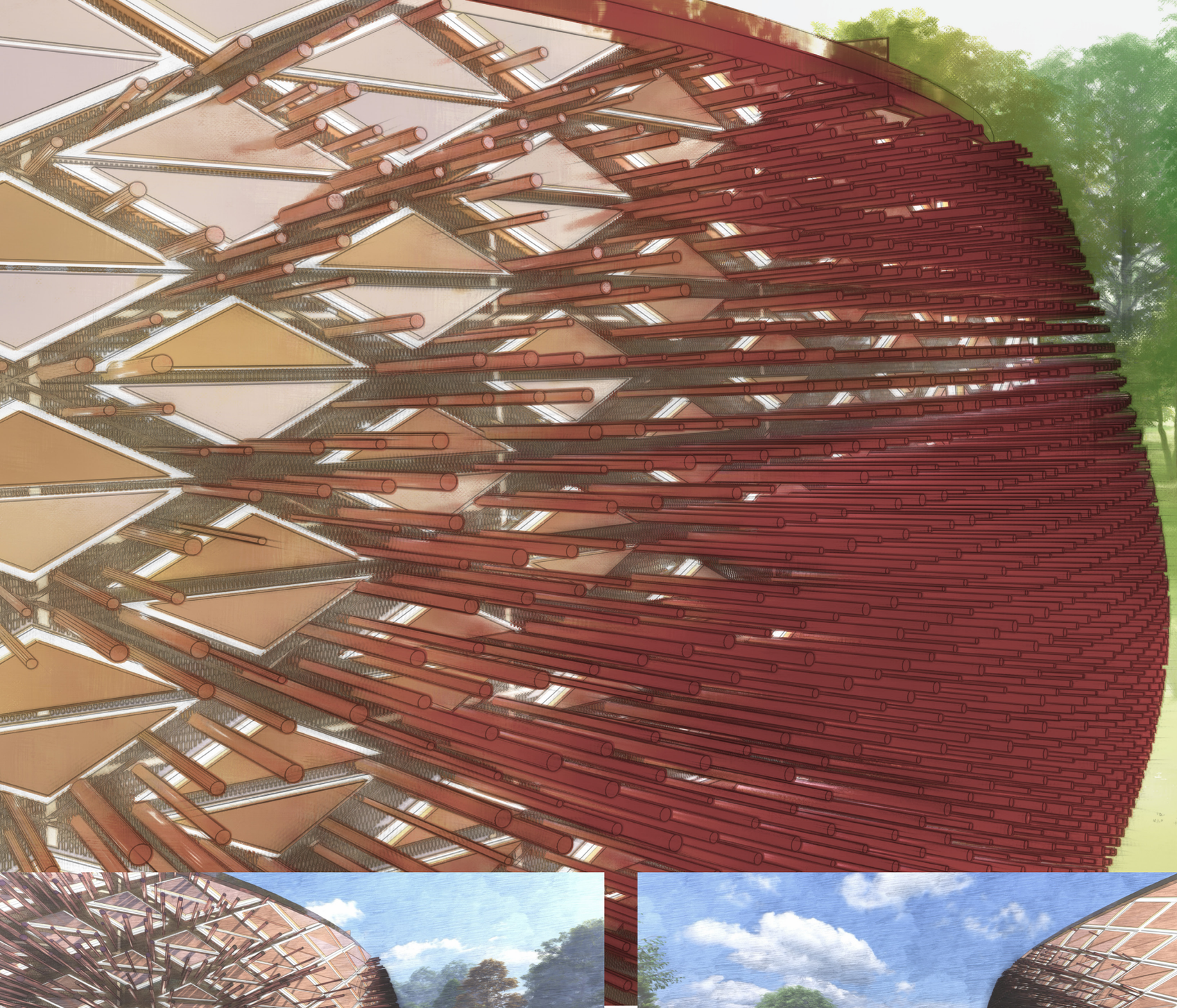

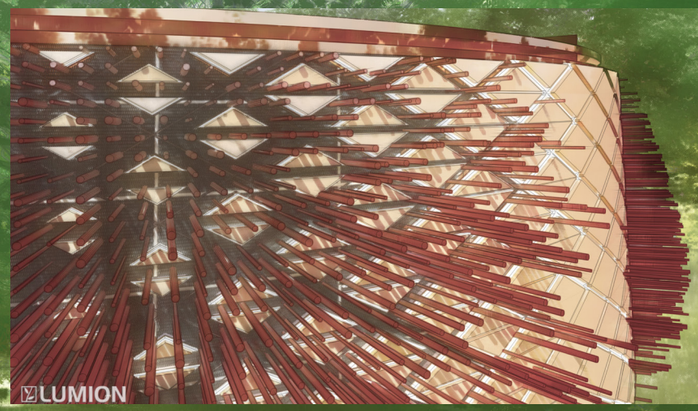
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