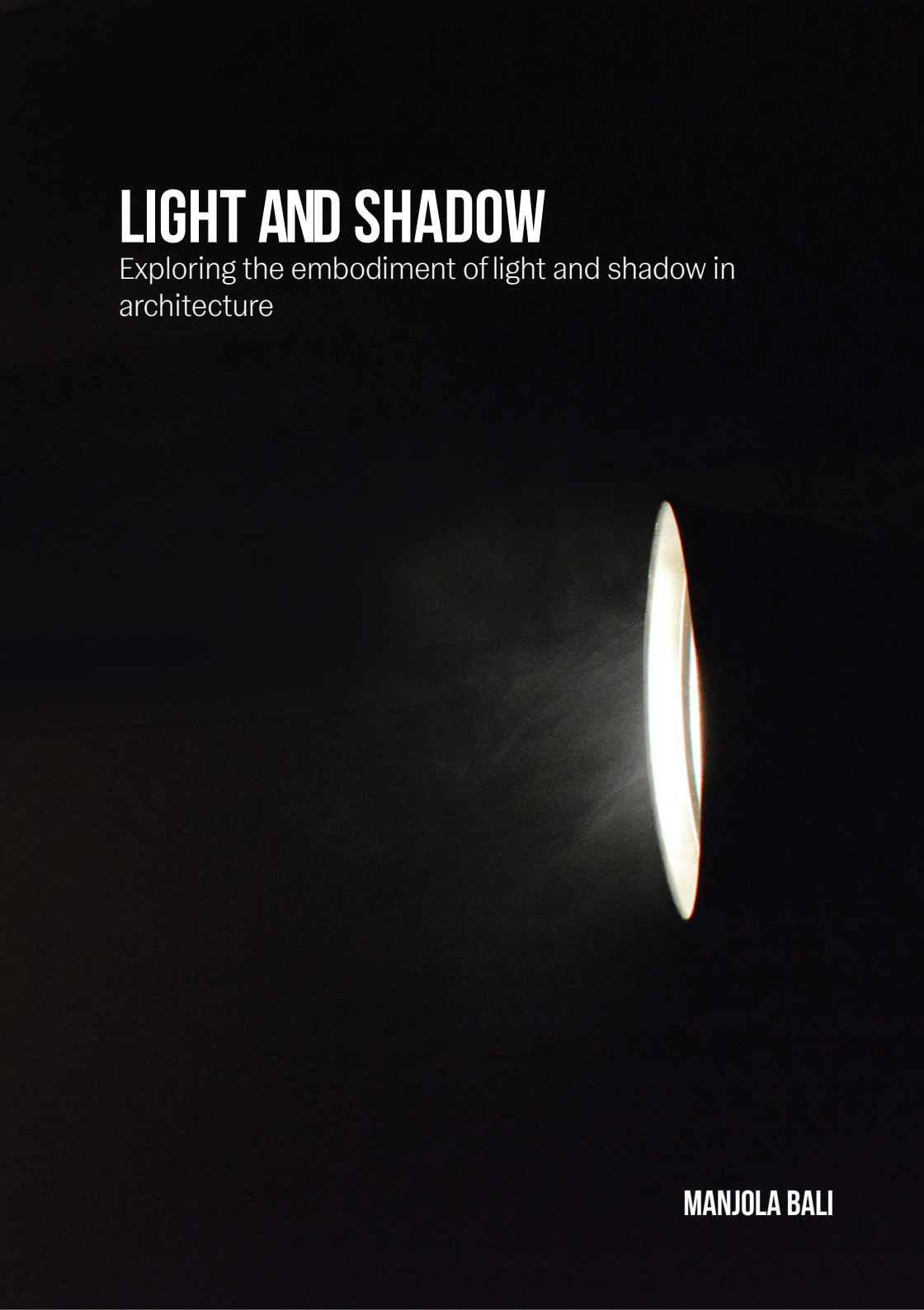
LIGHT AND SHADOW

Exploring the embodiment of light and shadow in architecture



MANJOLA BALI

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I want to extend a thank you to my thesis professors, Virginia Stanard and Claudia Bernasconi. Your guidance has been invaluable throughout this journey. And to Robert White, my external advisor, thank you for sharing your wisdom on how light is handled in real-world environments. A special shout-out to Wladek Fuchs for pushing me to explore beyond my comfort zone. And to all the other thesis professors, your inspiration and advice were crucial in completing this investigation. Thank you!

Mostly a heartfelt appreciation goes to my family, friends, and loved ones. Your support, laughter, home-cooked meals, and endless supply of coffee kept me going.

PREFACE

I have always viewed shadows as an art piece on a wall that constantly changes. You can only get that special moment during a particular time of the day, and sometimes the weather might affect that moment, and it might never appear that day. For me, my special moment is on my bedroom wall. Around the time when the sun is about to set, the room is illuminated by the beaming rays of the sun, casting sharp patterns of my blinds elongated onto the wall. The light brings warmth to the room and invites you to lie down and relax, as the shadows create a dynamic contrast that makes you keep looking at the different patterns on the wall. In this experience, I can say that shadow is not just one thing; it depends on many factors like weather, temperature, and light. With this painting shown on the right, I have learned that shadows also have depth; they are not flat, even though they may seem flat to the eye. They contain various grays, have soft or hard edges, and may still or move with the wind. Observations like this have inspired me to investigate the light and shadow we experience in architecture and the built environment. To learn about how we experience light and shadow, how it affects us, and how it differs depending on location.

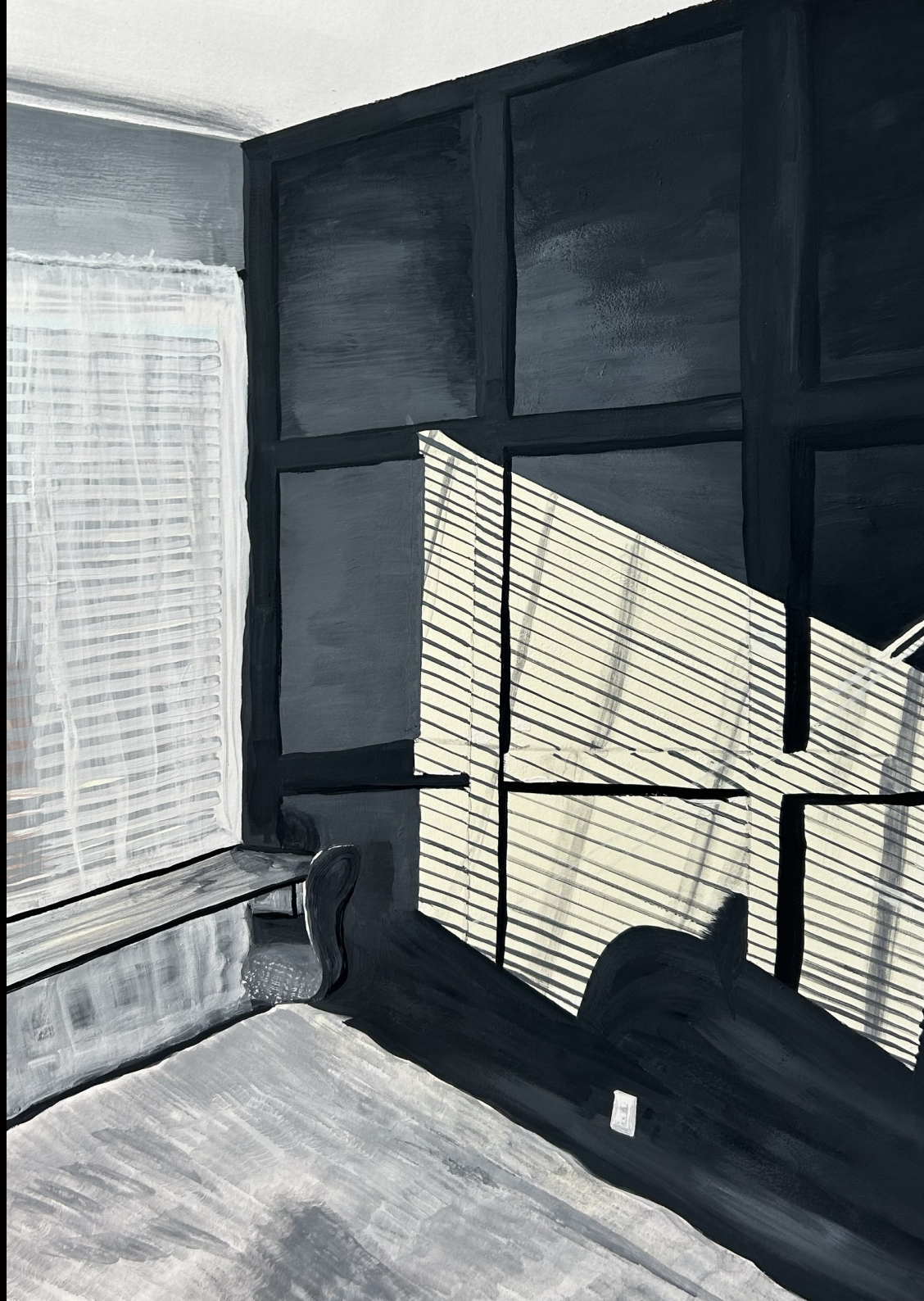

Figure 1.1. Bedroom Shadow

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ABSTRACT

This thesis focuses on the phenomenological aspects of the interplay between shadow and light in Detroit's urban fabric. Structured around four framework concepts—experience, place, time, and moment—derived from comprehensive literature reviews by Simon Unwin and precedent studies like Stonehenge and Park de La Villette, this investigation examines various types of shadows generated by architectural and natural elements. In Praise of Shadow, Jun'ichirō Tanizaki explores how these shadows not only define space but also contribute to the essence of a place. Central to this exploration are two key questions: How can the interplay of natural elements such as light and shadow be composed to craft a moment? And how can designing with light and shadow heighten the perception of a sense of place? This thesis attempts to uncover the experiential dimension of these moments, particularly within the context of the urban meadow. This investigation uses an overall qualitative methodology to create a proposal for a Light and Shadow Meadow that utilizes drawing, sketching, and photographing as site observations and creating physical models or installations to study how light interacts with its surroundings in Detroit. Two light and windowpane installations stand out for their beneficial impact on the design of user experiences within the urban environment. Through these installations, it became evident how sunlight tangibly influences the formation of shadows. Due to Detroit receiving a negative connotation of its lack of sunny days, these installations shaped the visual and atmospheric characteristics of buildings and urban landscapes. This study offers a revitalized perspective, emphasizing the importance of light and shadow within architectural and urban settings. Its overarching goal is to shift focus towards this often-neglected aspect, unveiling nuanced insights that enrich our understanding of Detroit's light and shadow.

Figure 2.1. Downtown Detroit

THESIS STATEMENT

This investigation focuses on studying how light and shadow influence the experience of time and place (space), with these findings then being applied to Detroit. This investigation broadly began through summer travels with the possibility of determining if sunlight differs in every country/ region. Olafur Eliasson, an Icelandic artist, raised this question while completing sunlight research for his artworks. He conducted a simple study where he took a photo of a blank sheet of paper in every country he visited to compare if the daylight was different. The study used a sketchbook, and the results were different, but there were a few controlled elements that needed to be included to capture these results. Although this study mainly began focusing on European regions, architecture played a significant role in how these countries have reacted to the amount of sunlight they receive. This created an identity for each specific place that has been a climate reaction, creating a sense of culture and history for those regions. Jun'ichirō Tanizaki illustrates this distinction of how light and shadow can identify cultures in his book In Praise of Shadow. Similarly, Simon Unwin analyses and identifies specific prominent shadow types in various countries that create their sense of place and identity in Shadow, the architectural power of withholding light. Combining all the findings and analysis from Eliasson, Tanizaki, Unwin, and many more brought this curiosity of identifying the sunlight in Detroit by conducting various studies, sketches, and analyses of how Detroit's light and shadow can be celebrated.

This thesis investigation comprises four framework concepts: time, place, experience, and moment, derived from precedent studies and literature reviews. Beginning this research, In Praise of Shadow, Tanizaki explains how light and shadow are viewed differently in various cultures by comparing the Japanese and Western cultures. In Japanese culture, dimmer light is preferred because it creates a softer shadow, while in contrast, in Western culture, bright lights that show every flaw and almost diminish shadow or create strong shadow lines are more preferred/ widely used. Tanizaki further describes the difference in how beauty is defined by light in the two cultures, how light can differentiate the lighting of a home, and how natural beauty can be found in the shadows.

Another literature guide for this research is Shadow, The Architectural Power of withholding light. Unwin analyses several types of shadows created by architectural and natural elements and how they can be applied to space to define a place. Unwin categorizes these shadow types into seven architectural categories. Each gives an example from a specific place or a particular type of architecture. For example, in the Ronchamp Chapel by Le Corbusier, light is admitted into the dark interior in many ways. There are shadow gradients and thresholds, framed shadows, and shadow frames. Many sizes of openings in the wall contrast the interior and exterior space by how much light penetrates the interior based on the various times of the day, seasons, and even weather conditions. However, what truly makes these small nodes visible and creates the contrast of light and dark are the shadows. Drawings of the chapel's shadows illuminate how shadow can inform the poetry and aesthetics in architecture. As masters of light, these architects also understood the music of shadows. As Tanizaki wrote, "shadows show the finer details, impurities, and textures that promote the beauty of a space, place, or thing" (18). In addition, Unwin described that "things have a shadow, but architecture contains shadow" (4).

The design intervention for this investigation references architects like Peter Zumthor, Tadao Ando, Mies Van Der Rohe, Le Corbusier, Jorn Utzon, Henry Plummer, and James Turrell, who have mastered the use of light and shadow in their works. In addition, learning from those architects, some precedents leading this design of creating a place where people can solely experience the light and shadow of Detroit are Stonehenge, Parc de La Villette, and Tom Lee Park.

How can Detroit be explored through light and shadow?

How can the interplay of natural elements such as light and shadow be composed to craft a moment?

How can designing with light and shadow heighten the perception of a sense of place?

These questions are what have been leading this thesis investigation. There needs to be a place in Detroit that celebrates light and shadow and can bring a moment to those who may then experience Earth's natural phenomena that are commonly overlooked. Light and shadow are essential because they are one of the world's basic phenomena and our existence. This design intervention will improve a currently abandoned site and provide an experiential opportunity for the user. This design intervention proposes a Light and Shadow Meadow as a thoughtfully designed landscape through the celebrations and performance of light and shadow that provides a place to experience moments.

The critical notion gathered about this thesis is that sunlight is a constant cycle and that shadow results from light being blocked by something. Investigating uses an overall qualitative methodology that utilizes drawing, sketching, photographing as site observations and creating physical models or installations to study how light reacts. From the Luminance of Sunlight Installation, the findings from the research affirm the tangible effects of sunlight on how shadows manifest in space, shaping the visual and atmospheric qualities of buildings and urban landscapes. Through the lens of photography and the interpretative medium of sketching, it can effectively capture and analyze the dynamic changes in shadow configurations. From the Shadows Unveiled Installation, the idea was the same, but mainly playing with patterns and different materials. The findings for the installation were that direct sunlight needed to cast a shadow on the white wall and that there had to be a clean surface for the shadows to have no interruptions. Trying to capture the moments through a photograph was difficult because it left some elements out or the light was overexposed, and having the color panels almost distracted the viewer from investigating how a shadow is created but more into how they can play with it. Therefore, these installations confirmed that shadows are affected by their surroundings and how strong the direct sunlight is. The surface of the shadow is essential, whether it is visible or not, and the site is another factor in how a shadow can be cast, and it is the initial part of how this investigation started.

Critiques of this investigation can go a few ways; some might need help understanding why light and shadow need to be celebrated in Detroit, and others might not see why moments of light and shadow need to be celebrated. Based on the site location, some might critique that it is far from the city center and far from naturally busy areas. This design proposal intends not to create these moments for every hour of the day; not all moments can be viewed at all times. The Light and Shadow Meadow only celebrate a few moments a few times a year, but the user can still find their moment when they meander through. Another critique might be that this proposal will be only for tourists. However, the idea is that if something else is needed, at a minimum, it is to take unused/abandoned space and rebuild it to be a used park in the new riverwalk extension.

The limitations of this study are that it consists mainly of personal observations of the current existing sunlight conditions in Detroit and how other cultures have dealt with light through literature reviews. Even though this research is backed up by scholarly articles and literature by world-renowned architects, it may not be the most beneficial design proposal to apply to one site in Detroit.

This investigation provides fresh perspectives and draws attention to the significance of light and shadow in architectural and urban contexts. The goal is to shift our gaze into the often-overlooked realm of light and shadow, uncovering nuanced insights that contribute to a deeper understanding of the built environment in Detroit. Utilizing a varied approach that includes on-site photography, sketching, and extensive literature reviews on shadow dynamics, this research captures the strong impact of sunlight on the formation and behavior of shadows within urban spaces. This comprehensive methodology allows us to analyze the intricate interplay between sunlight, structures, and the resulting shadow patterns. This investigation has enabled a discerning understanding of shadow thresholds. This newfound knowledge has empowered the author to recognize and distinguish subtle variations in light and shadow effects. For instance, a heightened awareness of shadow thresholds from Simon Unwin has equipped a discernment and appreciation of the subtle differences that may have gone unnoticed.

In conclusion, this research sheds light on the intricate relationship between light and shadow in Detroit and other countries. It equips observers with a heightened sensitivity to the subtle yet impactful nuances within the landscape. By delving into the shadow, a new perspective is uncovered that contributes to a more distinct and informed appreciation of architectural places and their dynamic interactions with light and shadow.

INTRODUCTION

This thesis explores the interplay between light and shadow in architecture, focusing on their phenomenological and contextual aspects. This investigation aims to develop a design intervention that implements light and shadow in Detroit. This investigation's core concepts are that light is universal, while shadow is localized and distinct. Architecture can be perceived as a structure that blocks sunlight and casts shadow, and time is a constant variable that perpetually moves forward and encompasses events. Moments occur when specific factors align to create an observed experience over time. The investigation initially begins with an interest in studying how sunlight is perceived differently in various locations and how different cultures respond to it. By documenting and comparing the architecture and photographs from previous travels, it is discovered that shadows are also different. To ground the topic and provide a personal experience, the author uses different qualitative methods to document these findings in Detroit, including light installations that involve sunlight and gathering stories of how people feel in those spaces. Developing constructs to guide what needs to be researched and measured, the author looks into aspects such as the impermanent aspects of light and shadow, the spatial and temporal aspects of light and shadow, and the effects of materiality on light and shadow. As the reader delves into the chapters, the author discusses how these constructs were tested. Unwin's perspective identifies shadow into many different forms, and there are seven distinctive architectural shadow types - shadow threshold, shadow container, dark side, contained shadow, shadow frame, framed (deep) shadow, and framed shadow frame. These distinctive types have made comparing how shadows vary in different cultures and places easier. The understandings derived from this research resulted in how architecture can manipulate direct sunlight and the reactions people may have towards these events.

SHADOW CONTAINER
Shadow casted by the canopy that creates “walls” around the canopy.

DARK SIDE
A primary (attached) shadow that is aligned with a derived (cast) shadow.

CONTAINED SHADOW
Shadow that is contained within an enclosed room. Room with walls, roof, and floors.

SHADOW THRESHOLD
A shadow line that is created when passing from one place to another. Plays a role in visual appearance.

FRAMED (DEEP) SHADOW
Shadow seen through a hole on a brightly lit wall. The contained shadow can seem to have no end.

SHADOW FRAME
Created when there is a hole looking out to the outside. The bright light, the hole is framed by the shadow.

FRAMED SHADOW FRAME
A framed shadow that may also be a shadow frame.

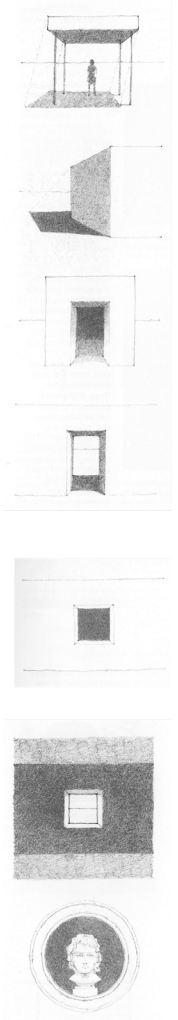
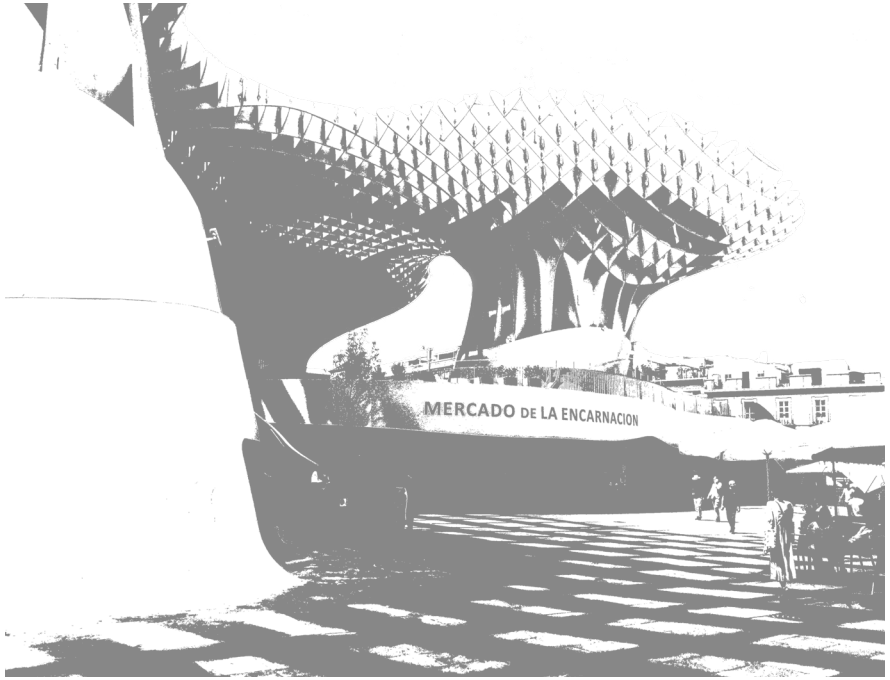
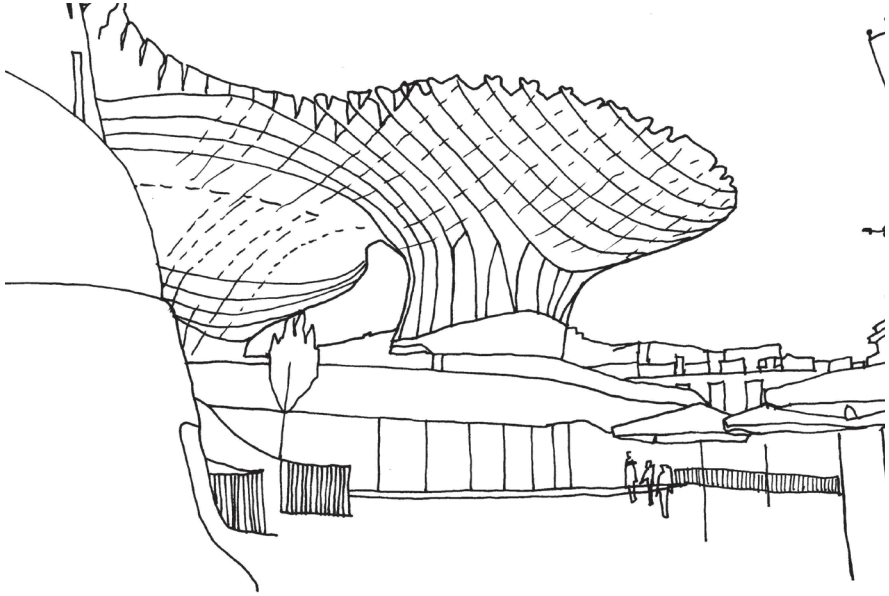


Figure 4.1. Shadow Types, by Simon Unwin.



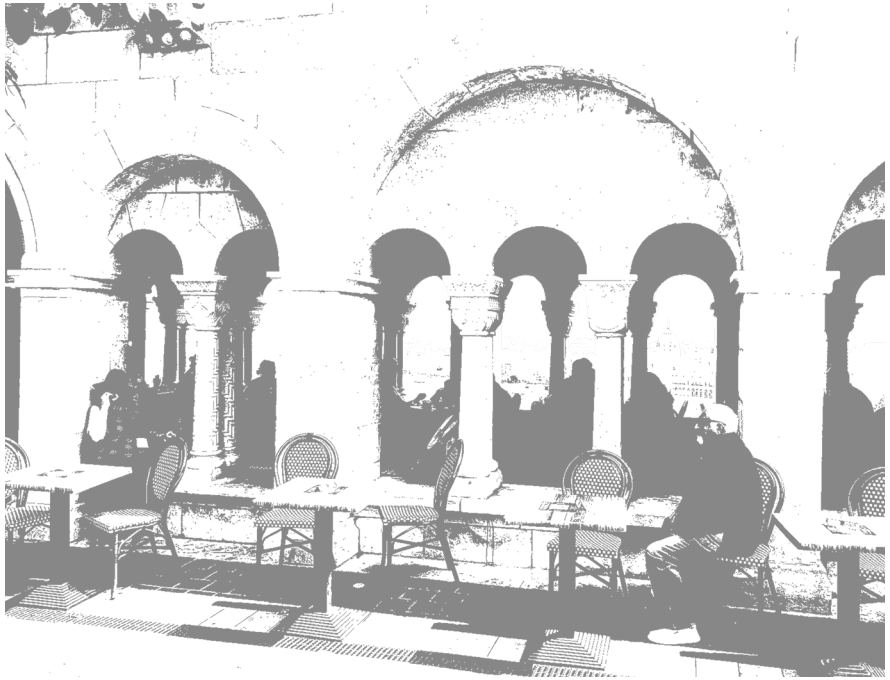
Seville, Spain

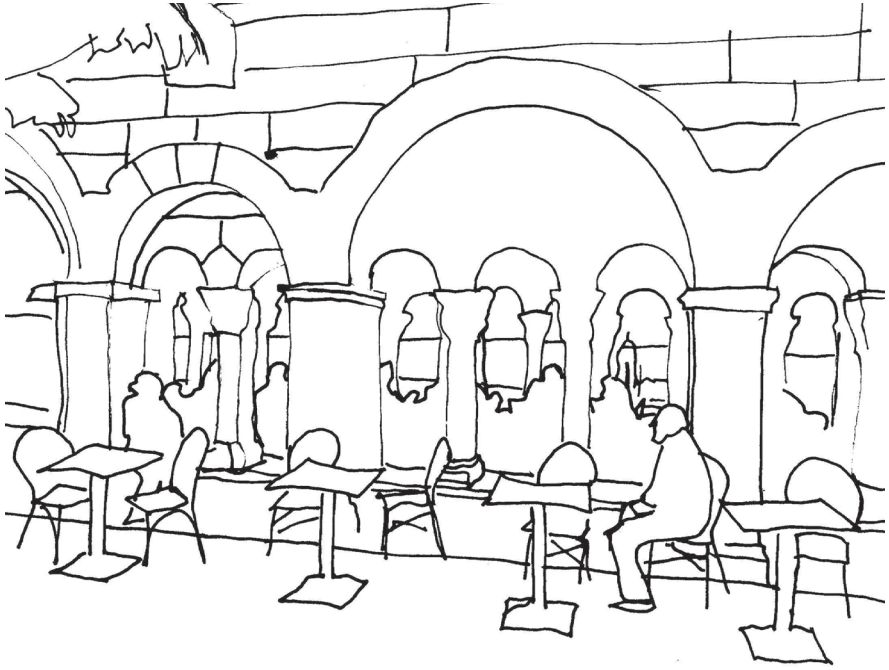
Figure 4.2. Seville Shadow.



What if we lived in a world without shadows?

Figure 4.3. Seville Lines.





What if we lived in a world without shadows?

Budapest, Hungary

Figure 4.4. Budapest Shadow.

Figure 4.5. Budapest Lines

BACKGROUND

The inspiration from whom one would identify as the masters of illustrating light and shadow has immensely helped with the direction of this thesis investigation. The reoccurring books that have offered main precedents that have influenced the approach to this research and the framing concepts are In Praise of Shadow written by Tanizaki, Shadow: The Architectural Power of Withholding Light by Simon Unwin, and In Stillness and Light: The Silent Eloquence of Sharker Architecture by Henry Plummer. In In Praise of Shadow, Tanizaki explains how light and shadow are viewed differently in various cultures by comparing Japanese and Western cultures. Japanese culture prefers dimmed light that creates a softer shadow, while Western culture is known for using very bright lights that show every flaw and almost diminish shadow or create strong shadow lines. Further, he describes the difference in how beauty is defined by light in the two cultures and how lighting can differentiate lighting in a home. One example he illustrates is that in dimmed light, shadows are more prominent and bring out more shadows that can cover any impurities, stating that natural beauty can be found in the shadows.

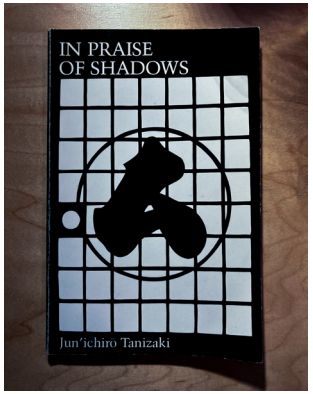


Figure 5.1. In Praise of Shadows.

Similarly, in Shadow: The Architectural Power of Withholding Light Unwin studies different types of shadows and how they can be applied to space, explicitly defining a place. For example, he categorizes shadow into seven architectural types: shadow threshold, shadow container, dark side, contained shadow, shadow frame, framed (deep) shadow, and framed shadow frame. Each is given an example from a specific place or a particular type of architecture. For example, in Ronchamp Chapel by Le Corbusier, light is admitted into the dark interior in many ways. There are shadow gradients and thresholds, framed shadows, and shadow frames. Drawings of the chapel's shadows illuminate how shadows can inform the poetry and aesthetics in architecture.

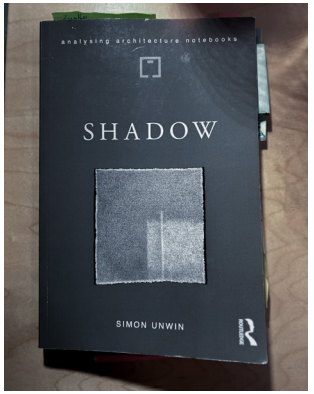


Figure 5.2. Shadow, the architectural power of withholding Light.

Plummer's Stillness and Light book demonstrates how sunlight filters through a home throughout the day while capturing the illuminations of different rooms from morning to night. Further, the book displays how sunlight can illuminate a space and capture a different mood, whether in the entrance, hallway, or bedroom. Plummer introduces multiple concepts about the play of light, space, materials, and movement, such as transcendence, procession, veiling, atomization, silence, and luminescence. These concepts are applied to precedents across cultures and test if the framing concept is universal. Similarly, in Realization of Vertical Light for Le Corbusier's Synthesis of the Arts at the National Museum of Western Art in Tokyo, Shoichiro Sendai analyzed Corbusier's design process of how to incorporate natural daylighting into the museum to enhance the space within. Compared to how Corbusier used Vertical lighting, a skylight needs translucent glass to diffuse light within a space and not compromise internal heat gain loads. These case studies share similar ideas that daylight should be maximized to benefit human health and that too much artificial light with no sunlight is deficient for human health. Thus, there must be a balance between total daylight exposure and artificial light. Although these literature reviews were conducted at the beginning of the research, the focus was on what design decisions were created that affected the spatial aspect rather than the technical and quantitative aspects of place. What helped in this pivot of the research was using a Photovoice research, where there was a prompt asking people to send a photograph of a space in their home where they spend the most time and to describe the light conditions and if/why they like it or what they would change.

Additionally, this investigation references several architects that focus on how light can be used as the focal point of space or as the main component of design. These include Peter Zumthor, Tadao Ando, Mies Van Der Rohe, Le Corbusier, Jorn Utzon, Henry Plummer, and James Turrell. For example, the Ronchamp, as mentioned above, Chapel by Le Corbusier is one of his iconic buildings that has many sizes of small openings in the wall that contrast the interior and exterior space by how much light penetrates the interior based on the various times of the day, seasons, and even weather conditions. However, what truly makes these small nodes visible and creates the contrast of light and dark are the shadows. As masters of light, these architects also understood the music of shadows. As Tanizaki wrote, "shadows show the finer details, impurities, and textures that promote the beauty of a space, place, or thing" (18).

Furthermore, in addition to the literature and precedents discussed earlier, seven particular case studies have profoundly influenced the design process of this investigation. Stonehenge in England exemplifies the timeless relationship between the sun and the seasons. Parc de la Villette in Paris, designed by Bernard Tschumi, employs a grid layout where 'folies' disrupt the grid's rigidity. Tom Lee Park in Tennessee, envisioned by SCAPE Studio, features meandering pathways along the riverfront. The Vietnam Veterans Memorial in Washington, DC, crafted by Maya Lin, communicates a powerful message through a single design gesture. The Ghost Forest Exhibition in New York showcases deceased cedar trees, symbolizing the impacts of climate change. Tadao Ando's Water Temple in Japan provides a sensorial experience through the interplay of compression and expansion. Finally, the Vieux Port Pavilion in Marseille, designed by Foster + Partners, captivates viewers with reflective elements while delicately treating thin edges.

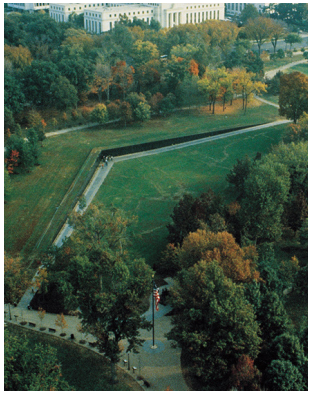


Figure 5.3. Vietnam Memorial. Credit: University of Washington Magazine

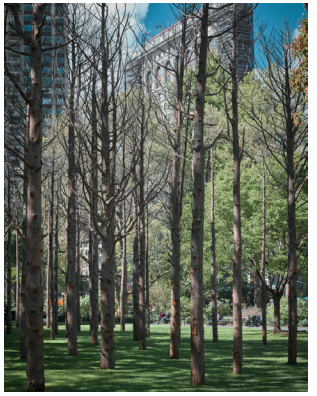


Figure 5.4. Ghost Forest. Credit: Madison Square Park Conservancy

Figure 5.5. Everyday Moments.

TOPIC AND SCOPE

This thesis investigates how moments can be created and the various factors involved in composing this phenomenon, or at least in creating a space capable of experiencing it. For instance, a solar eclipse, occurring once every several years for a few seconds, is an astronomical event considered a phenomenon. People gather and plan for this precise moment, as it cannot be fully explained or captured except by physically being present. However, moments can also be smaller, like experiencing a beautiful sunset or witnessing a perfect sun alignment on a henge. There are places around the world designated to celebrate these moments. Stonehenge, for example, was created to align with the summer solstice, while the City of Petra is aligned with the sun, with its most important buildings aligned with the solstice. Many more monuments exist worldwide to celebrate the sun. Despite Detroit's many attributes, it lacks a designated place for such moments to occur or be celebrated.

On the next page *Figure 6.3 Conceptual Diagram* illustrates the assumptions and framing concepts driving this thesis investigation. The research aims to create a place identified by light and shadow, specifically within Detroit, where moments can be celebrated. Establishing a designated space encourages people to slow down and discover their moments.

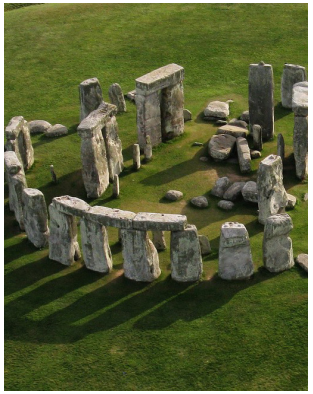


Figure 6.1. Stonehenge. Credit: english-heritage.org.uk

Guiding the thesis investigation, three research questions have been posed:

How can Detroit as a place be explored through light and shadow?

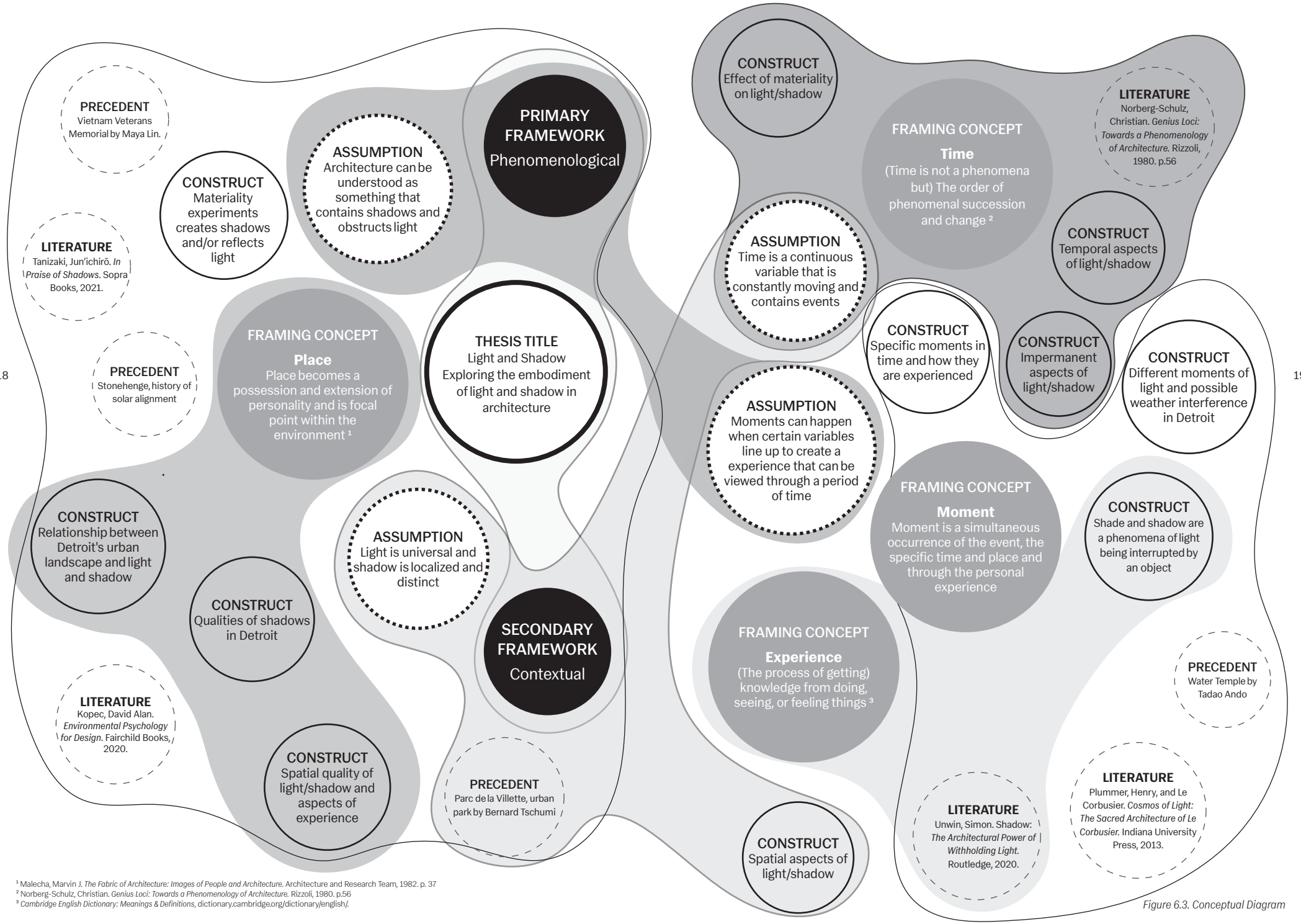
How can designing with light and shadow heighten the perception of a sense of place?

How can the interplay of natural elements such as light and shadow be composed to craft a moment?

These questions are intended to explore what it takes for a space to be considered a place and possibly identify the most beneficial site for exploring this concept. The design proposal involves creating an urban space to celebrate Detroit's light and shadow, whether by enhancing an existing space or proposing changes to improve it.

The aim is to design the site as a place where light and shadow are celebrated, allowing users to walk through and discover them independently. This exploration involves investigating urban layouts and parks where nature can contribute to creating dynamic shadows.

Figure 6.2. Collage of Detroit.



[1] Malecha, Marvin J. *The Fabric of Architecture: Images of People and Architecture*. Architecture and Research Team, 1982. p. 37
[2] Norberg-Schulz, Christian. *Genius Loci: Towards a Phenomenology of Architecture*. Rizzoli, 1980. p.56
[3] *Cambridge English Dictionary: Meanings & Definitions*, dictionary.cambridge.org/dictionary/english/.

Figure 6.3. Conceptual Diagram

METHODS AND PROCESS

Luminance of Sunlight Installation

The focus of this installation lies in the exploration of the colors produced or reflected by daylight. It aims to illustrate the varying hues of daylight from different global locations in abstract forms. In addition to visually indicating these locations with pins on a white sphere representing Earth, instances of media capturing and reflecting light to evoke sunlight are identified and selected. This installation comprises a composite of representations that may influence people's perceptions by simulating different times of the day and capturing the sky's varying colors and reflections.

The concept involves showcasing different locations worldwide on a white sphere and representing light with the colors of acrylic glass. The blank Earth is intended to prompt viewers to imagine the general areas of the Earth and how sunlight varies across longitudinal and latitudinal zones. Panels of acrylic sheets displaying various colors are derived from research on different countries, their cultures, and their perceptions of daylight based on their geographic locations. For instance, as a northern country, Alaska exhibits cooler tones with hints of yellows and warmer colors near summer due to its latitude and cold, snowy weather.

Inspired by Icelandic artist Olafur Eliasson, particularly his work "The Slow Life of Sunlight," which features arrangements of colored glass and layered materials to mimic sunlight movements in an enclosed interior space, new findings are sought to understand the significance of shadows. Shadows, it is realized, play a pivotal role beyond light itself, influencing how we perceive our surroundings. This realization expands the thesis to delve deeper into how shadows are created and controlled differently based on location and cultural influences, highlighting their essential role in shaping our perception of light and space.

Feedback received from the exhibit and review was very well received. Most comments focused on the colored acrylic installation being the main attraction, suggesting that the white sphere seemed not to fit or may have distracted viewers from fully observing the light reflections of the acrylic panels. Initially, the plan was to extend efforts towards further experimenting with colored acrylic sheets to see how to mimic or replicate colors of other countries and understand how and why they evoke different emotions in viewers when looking through a scene. However, upon reflection, a deeper inspiration emerged from the white sphere installation. It helps to comprehend how there needs to be a shadow with light and how essential shadows can be to understand our surroundings and reveal the true beauty of light.

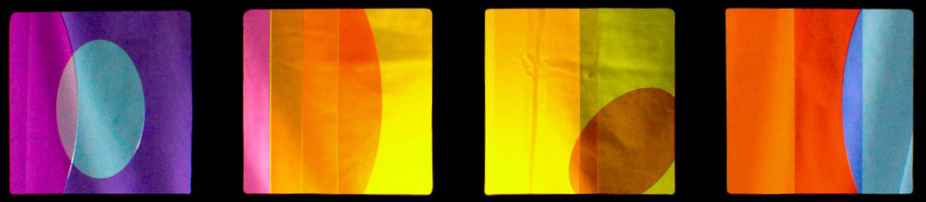


Figure 7.1. Luminance of Sunlight Installation

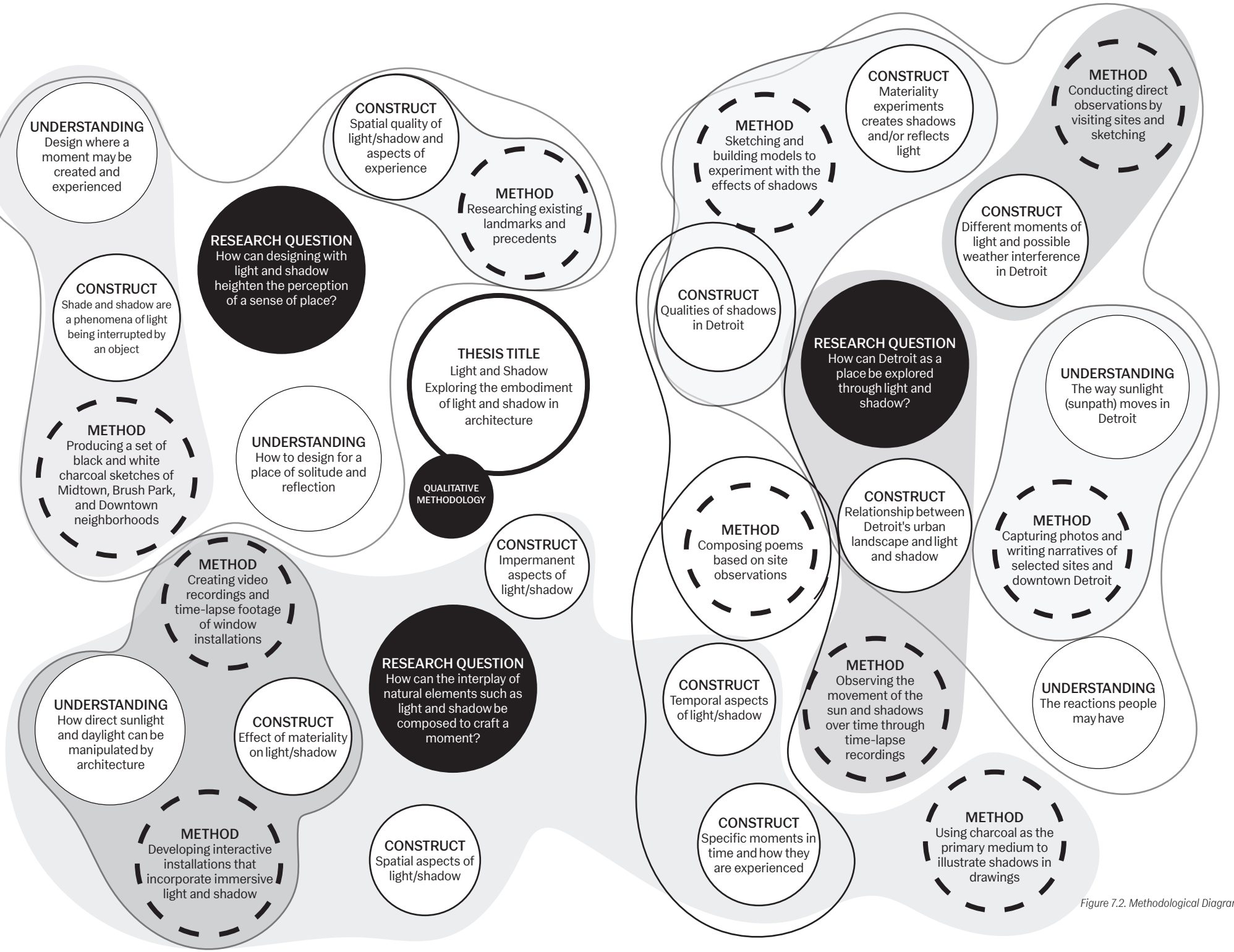


Figure 7.2. Methodological Diagram

Overall, this thesis investigation uses a qualitative methodology. *Figure 7.2 Methodological*, on the previous page shows how this research was conducted by stating the research questions and the methods used to obtain these results.

Shadows Unveiled Installation

For this installation, the idea stems from further exploration of one of the research questions: how can the interplay of natural elements such as light and shadow be composed to craft a moment? The primary aim is to captivate the viewer, fostering moments of inspiration within the space. A set of panels can be added to a window where natural light is selectively obstructed, allowing certain exposed spots to be illuminated by intricate patterns. The patterns chosen for each panel represent a set of materials that can be explored regarding how they react to light. In contrast, others are designed to represent common patterns used by architects like Tadao Ando and Corbusier to create strong shadows. The entire making process is informed by research. It effectively serves as a light and shadow study of various pattern types that materials could exhibit. Each pattern is inspired by nature, architectural works, and/or explorations of reflection, color, and refraction. New findings emerge

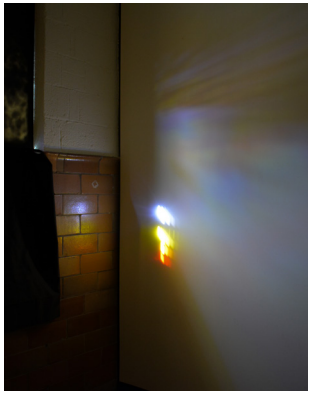


Figure 7.3. Color reflection and shadow.

from the installation, indicating that while some patterns successfully create a dramatic change in the space, others do not. The most significant implication is the necessity of direct sunlight for the visibility of the shadows; without it, the shadows are barely visible.Moreover, the space's indoor location limits its "active" period to the afternoon sun, as the window faces west. These insights underscore the importance of considering uncontrollable factors like weather when designing outdoor spaces. Constant documentation and observation of people's experiences in the space reveal that some enjoy watching the shadows or reflections move across the wall, perceiving a sense of time. With this in mind, the focus shifts to how the installation can function as a sundial, casting eye-catching shadows regardless of weather conditions. This problem aids in determining the materials to be used on the site.

Figure 7.4. Shadow Unveiled Installation

Urban Shadow: Analyzing the Interplay of Density, Daylight, and Perception in Detroit

Collaborator: Mikayla Dawber

The research delves into perceptions of the built environment, highlighting the interplay between building quantity against the backdrop of the sky and the extent of daylight exposure versus shadow in space. Findings suggest a correlation between high population density and downtown areas, characterized by increased shadow coverage due to larger-scaled buildings. Conversely, regions with low-density experience less shadow coverage. Shadows serve functional purposes while contributing to the differentiation between urban and suburban areas in Detroit. Suburban neighborhoods like Corktown exhibit dynamic shadows cast by surrounding trees, while downtown areas feature more substantial shadows from more significant structures. Brush Park is a unique blend, showcasing blocking-type shadows in smaller sections within a newly developed neighborhood. This observation implies that individuals may perceive denser environments similarly to spaces with more significant shadow presence, associating them with negative connotations such as crowdedness or noise. This investigation has revealed insights regarding the ideal location for the site in Detroit.

Downtown is deemed unsuitable because tall buildings cast shadows on the ground by early afternoon. The desired site should have ample open space and access to direct sunlight as much as possible.

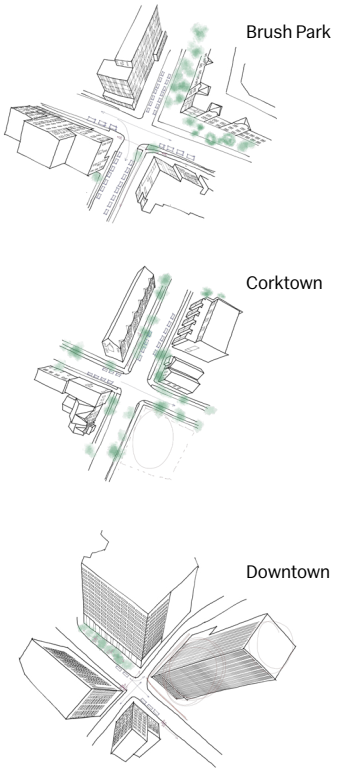


Figure 7.5. Density in Detroit, by Mikayla Dawber. (above)
Figure 7.6. Shadow Analysis Photographs. (right)


12:36 pm


2:28 pm


12:40 pm


3:44 pm


1:49 pm


3:54 pm


2:21 pm


4:05 pm

Embrace fleeting light,
In shadows, find joy's delight,
Small moments shine bright.

Figure 7.7. Downtown Detroit Sketch I

Detroit's skyline gleams,
Half in sun, half in shadow,
Beauty in balance.

Figure 7.8. Downtown Detroit Sketch II

Deep shadows embrace,
Detroit's sorrows in the clouds,
Beauty in shadow.

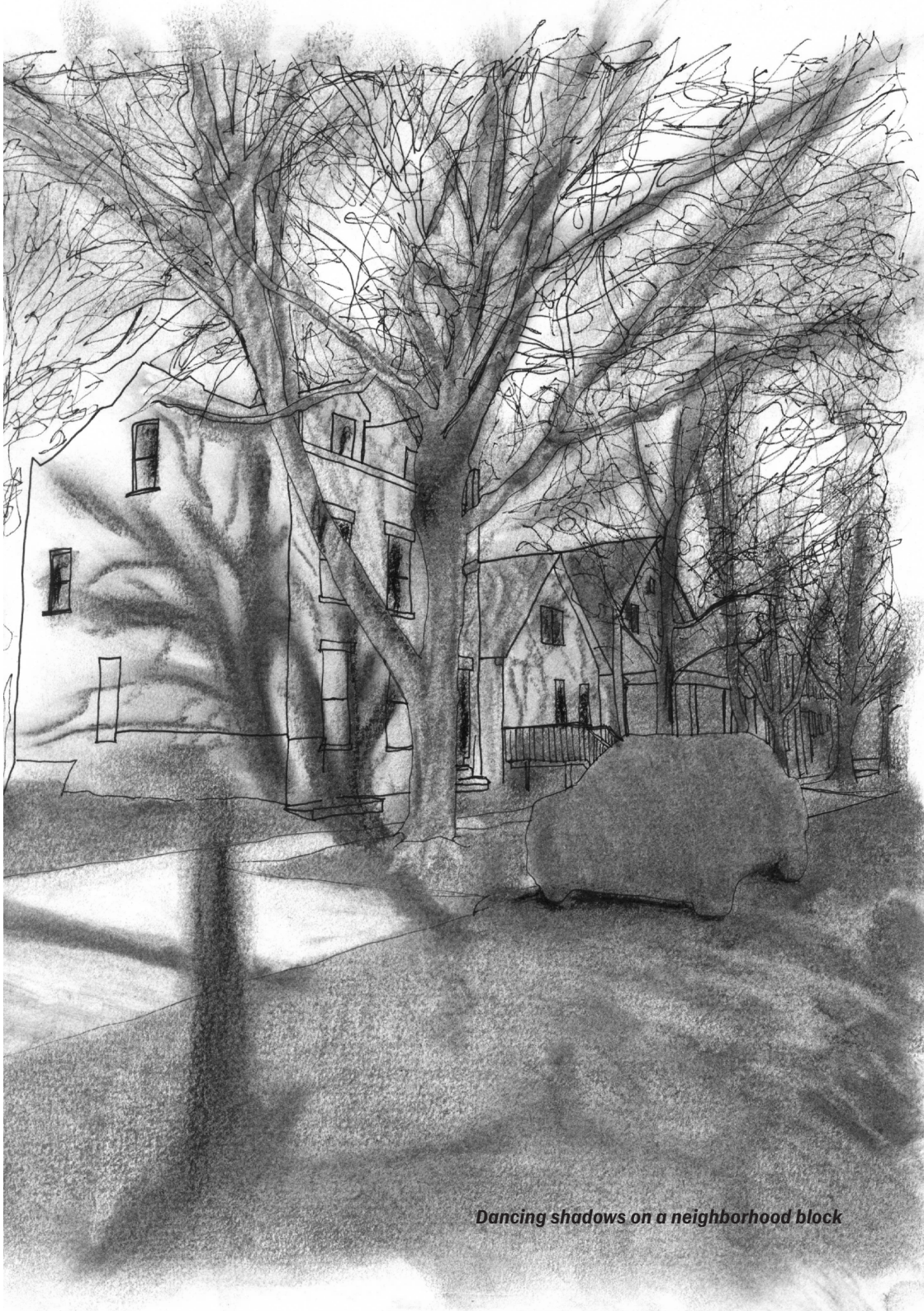


Figure 7.9. Corktown Sketch

Site

While researching a site in Detroit, following the shadow analysis study, the researcher identifies the river edge as the ideal location. Examination of old maps of Detroit reveals the development history of specific areas, with the main roads of downtown remaining primarily unchanged. The selected site for this design intervention was formerly a stove factory. It played a significant role in Detroit's economy, benefiting from its proximity to the water for shipping access and having a belt line for transporting goods. *Figure 7.10* depicts a map of the French Ribbon farms, illustrating how farmland was strategically planned to have access to the river for goods transportation. The subsequent *Figure 7.11 Map of Detroit 1968*, depicts the site as a stove factory with rail lines passing through it.

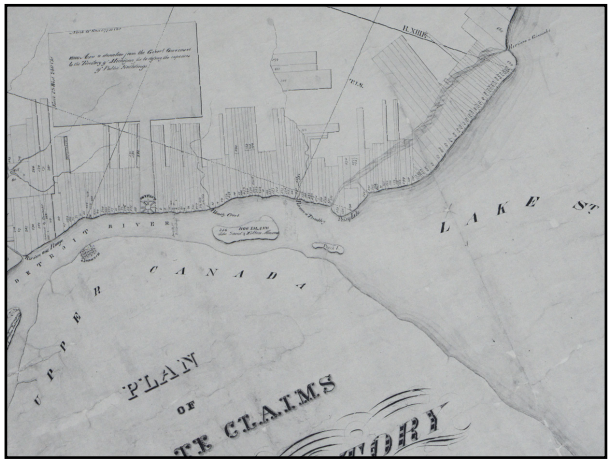


Figure 7.10. French Ribbon Farms, 1810.

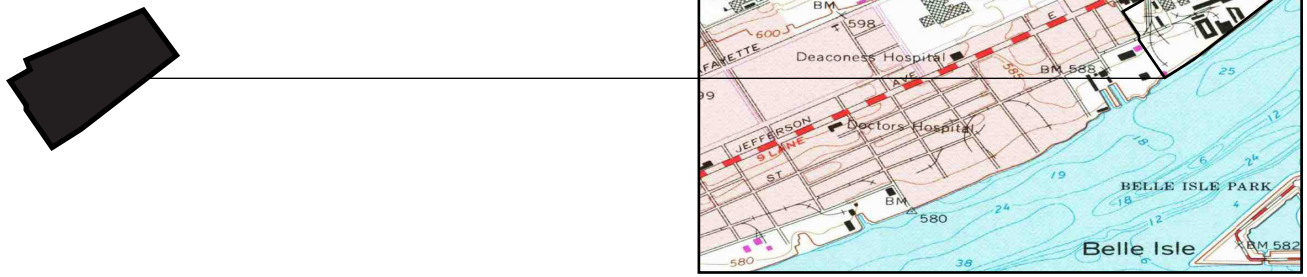


Figure 7.11. Map of Detroit, 1968.

Existing Conditions

Figure 7.14 Site Analysis Diagram depicts the current site conditions. It is the only open "green space" area that has not been developed yet due to its identification as a brown-field site from previous factories. This site offers numerous opportunities to enhance Detroit's Riverwalk, especially considering the recent completion of the sidewalk extension in 2023, allowing people to walk from downtown to the east side of Detroit. *Figure 7.14 Site Analysis Diagram,* illustrates the existing site conditions, highlighting areas such as ideal viewpoints, including views toward the river and Belle Isle across it, existing vegetation, and access points into the site.

Figure 7.12. Site Photo

Figure 7.13. Uniroyal Riverwalk Extension

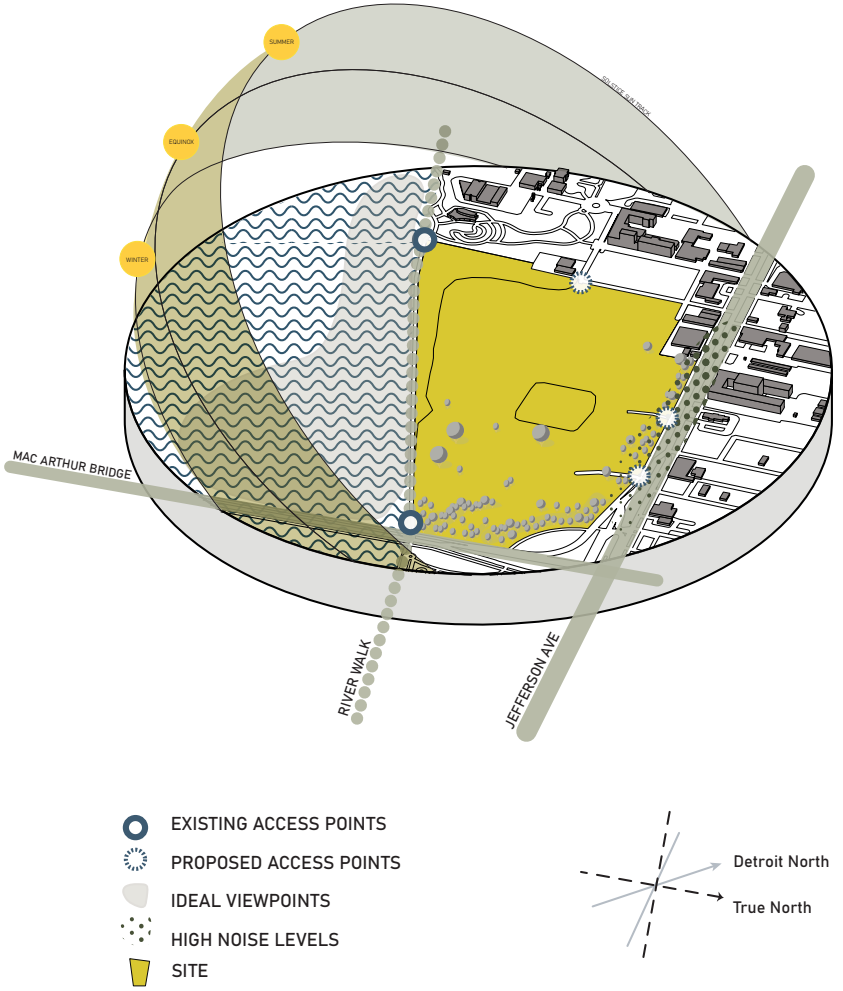


Figure 7.14. Site Analysis Diagram

RESULTS

Shadow Framework

From literature reviews and precedent analysis, Figure 8.2. on the next page illustrates the Criteria framework model of how a basic form of shadow is created and experienced.

Fundamental diagram: The sun is crucial in generating light that brings a moment to life. The surroundings of the moment affect how light is perceived. When an object obstructs light, it creates a shadow. Light, object, and surface interplay influence the shadow's shape. The surface acts as a blank canvas, displaying the shadow's appearance and forming a part of materiality analysis. The sun is an essential component that brings to light our movement and time. People can experience all of these elements coming together. Understanding that light and shadow depend on one another to craft a place.

Figure 8.1. Uniroyal Riverwalk Extension

1 **SUNLIGHT**
Sun is the key component to produce light in what is creating a moment.

2 **SITE**
Site is part of the component that changes how light is viewed.

3 **OBJECT**
The object is what blocks the light in which causes a shadow.

4 **SHADOW**
The shadow is the result of the object blocking light. Creating a volume of shadow influenced by light, object, and surface.

5 **SURFACE**
Surface is the blank canvas that can show how the shadow appears. Part of materiality analysis.

6 **TIME**
The sunlight is what displays movement and time that we live in.

7 **PERSON**
The person is who has the experiential view of all these elements coming together.

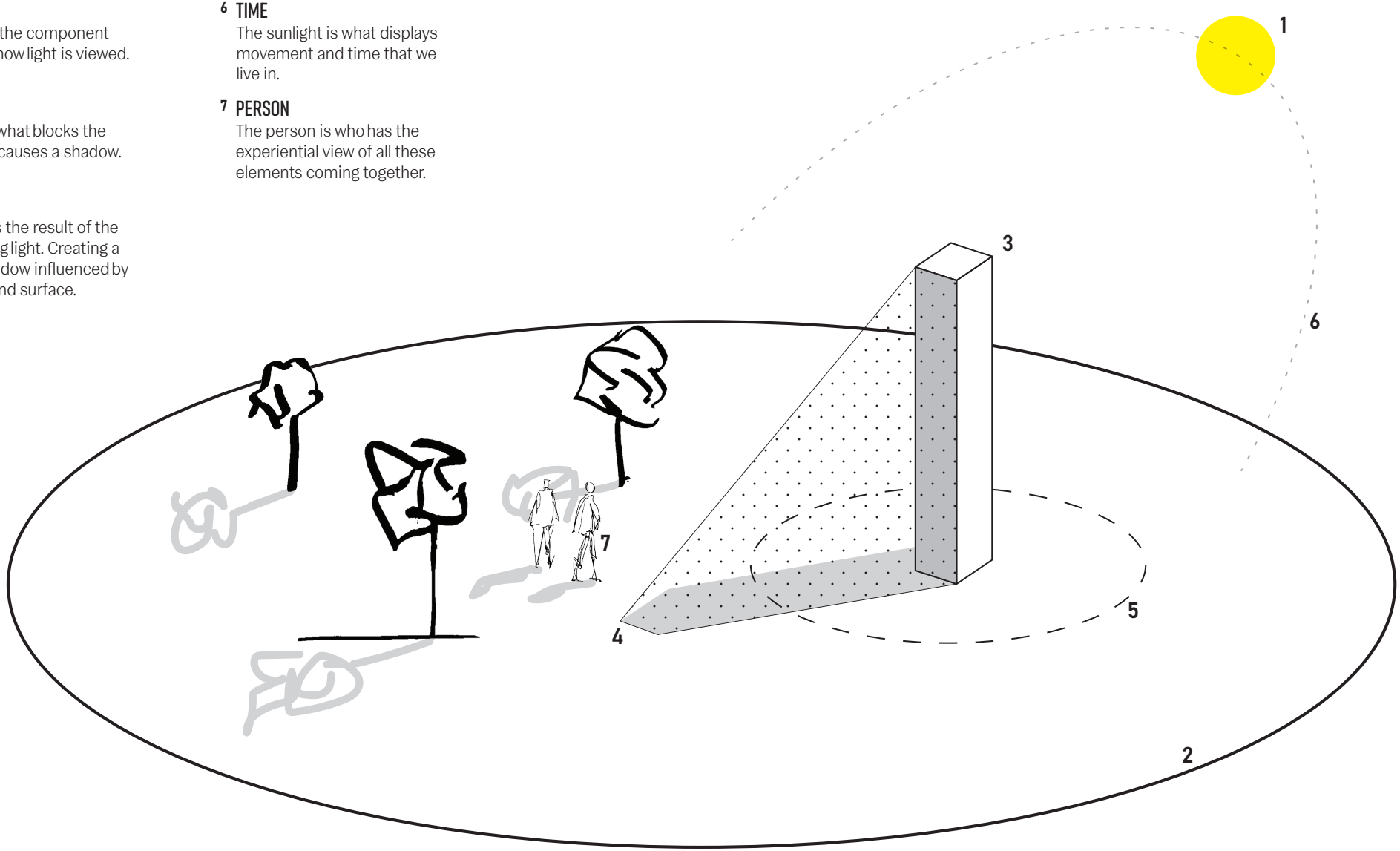


Figure 8.2. Criteria Framework Model

Design Strategies

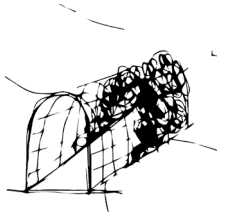
The precedents mentioned in the Background section serve as significant sources of inspiration, each offering an aspect that informs the design of the Light and Shadow Meadow. Creating a design reminiscent of a monument stems from Stonehenge, where simplicity embodies strength. Thus, the proposed landscape design centers around one main attraction, drawing inspiration from Stonehenge's singular focus. Similarly, Maya Lin's landscape designs emphasize a single move that conveys a powerful message, as seen in her design for the Veterans Memorial. Incorporating this approach, the design aims to make a significant impact with a simple gesture. Tadao Ando's Water Temple inspires the creation of a serene and holistic environment, reflecting the spiritual significance historically associated with the sun. Drawing from Ando's concept, the design includes elements such as a hidden temple with a single entrance, evoking a sense of sacredness. This concept extends to the Light and Shadow Meadow, featuring a single entrance surrounded by trees that obscure the mound from a distance.

Mound / Hill

Hilltop Plateau Retaining Wall

Grove/ Structure below surface

Upon entering the tunnel, visitors encounter speckled light shining on the ground, filtered through the thin gabion wall. Returning to the mound's inner circle, visitors experience a sense of expansiveness after traversing the compressed tunnel. The space is characterized by serenity, with water lining the edge of the inner wall. When illuminated by light, the gabion wall supporting the mound's opening adds a soft texture. At the center of the circle stands a metal disc suspended from four large wooden posts atop the mound. Inspired by Vieux Port Pavilion, the mirrored surface of the disc reflects its surroundings, creating moments of reflection for visitors. The disc serves as a sundial, with the wooden posts aligned with the cardinal directions to provide orientation. The choice of materials aims to enhance the visitor experience, offering opportunities for introspection and engagement with the environment.



Gabion wall used for structure of tunnel

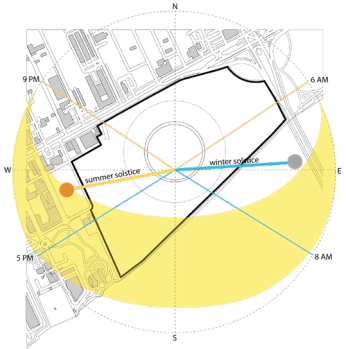


Figure 8.3. Sun Path Diagram

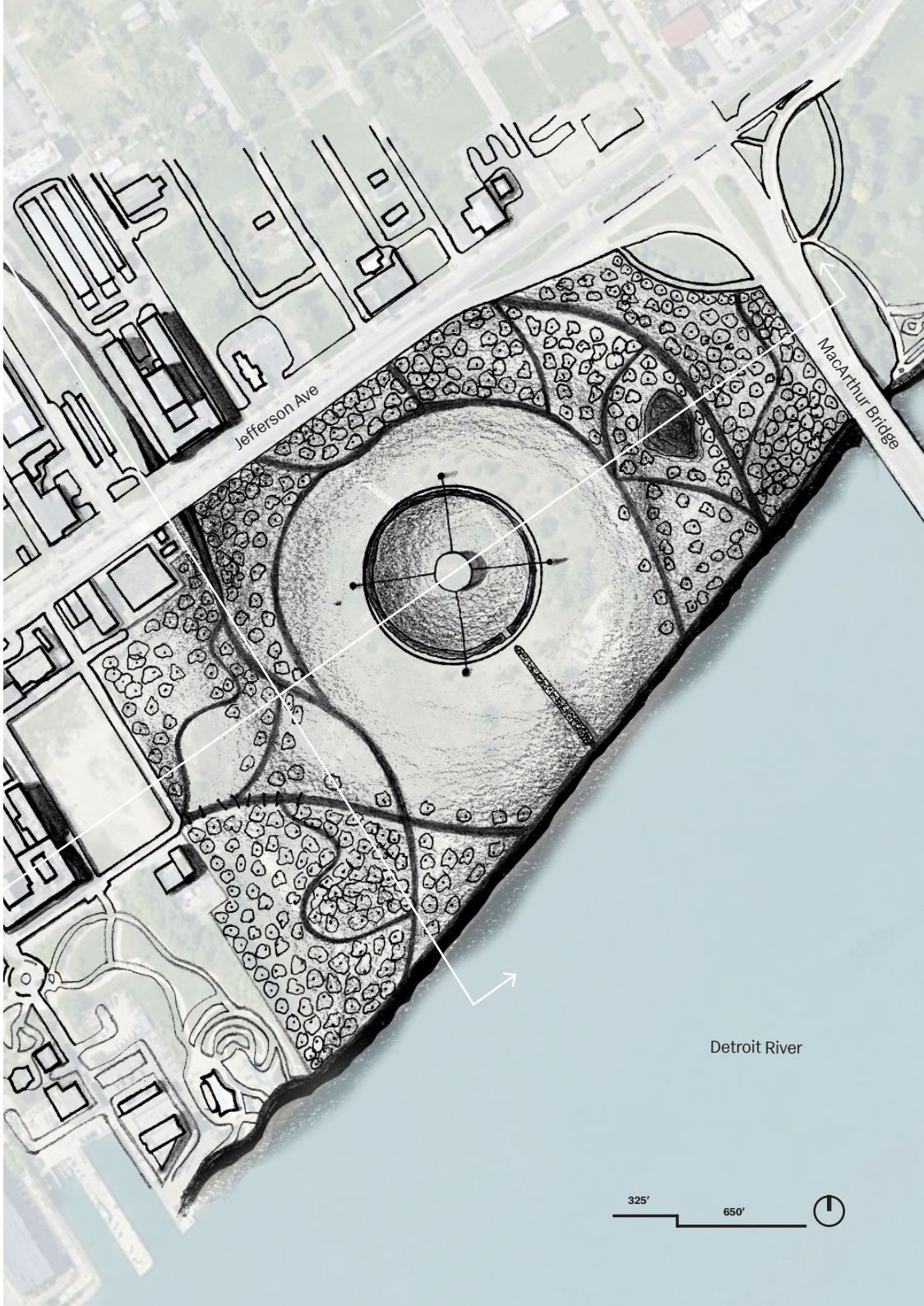
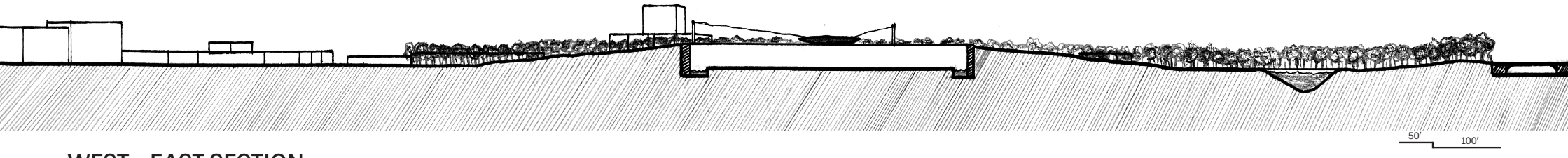
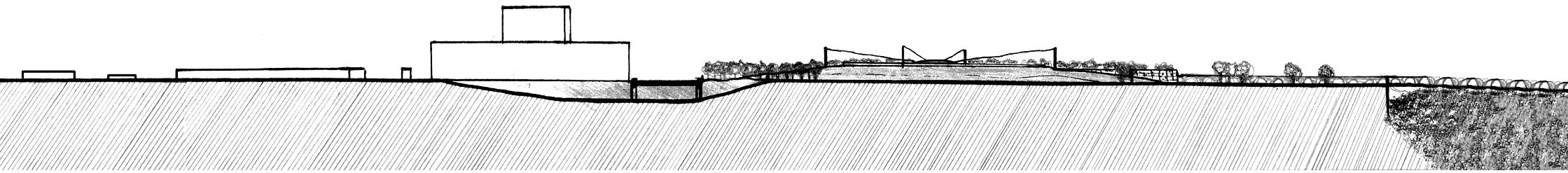


Figure 8.4. Site Plan



WEST - EAST SECTION

Figure 8.5. West – East Section



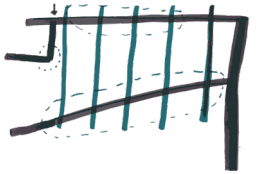
NORTH - SOUTH SECTION

Figure 8.6. North – South Section

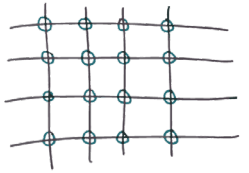
The ground of the Light and Shadow Meadow consists of concrete, providing a smooth surface for the shadow cast by the disc to be visible throughout the day. This material ensures accessibility for visitors regardless of weather conditions, allowing them to engage with the space actively. Even on rainy days, the disc transforms into a floating umbrella, with a waterfall effect along the mound's edge. Exiting the meadow, visitors emerge from the tunnel facing the river, offering a serene view of the water and surrounding greenery. Various meandering pathways around the mound invite exploration, with the main path accessible to all and additional trails weaving through the trees.

Ascending the side of the mound offers panoramic views of the Light and Shadow Meadow, while peaceful strolls along the pathways provide opportunities for further exploration. The tree posts above the mound symbolize clear-cut logging practices that once prevailed in Michigan, adding layers of meaning to the site. Ten access points allow visitors to enter the park, with pathways designed to accommodate pedestrians, cyclist, etc. Reimagining historical elements, such as railways and belt line structures, enriches the visitor experience, connecting them with Detroit's past. The grid layout of the site, inspired by the French ribbon farms, aligns with existing streets, creating a cohesive urban fabric. Using cues from Bernard Tschumi's Parc de la Villette design, the grid layout organizes access points and pathways, fostering a sense of order within the park.

Ultimately, the Light and Shadow Meadow is designed for visitors to explore freely, encouraging them to discover its various facets at their own pace. Embracing the concept of "planning for the unplanned," the meandering paths allow for spontaneous exploration, echoing the design principles of Tom Lee Park. By prioritizing accessibility and connectivity, the design aims to create an inclusive and immersive experience for all visitors.

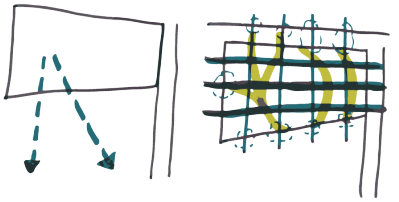


Grid application to connect main road with riverfront

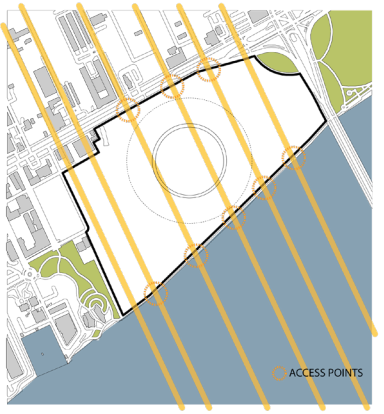


Multiple moments vs. one moment

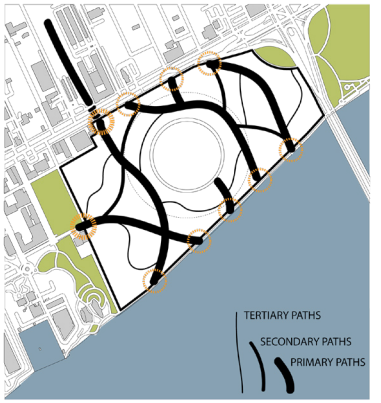
Connection points can be a way to introduce “moments”



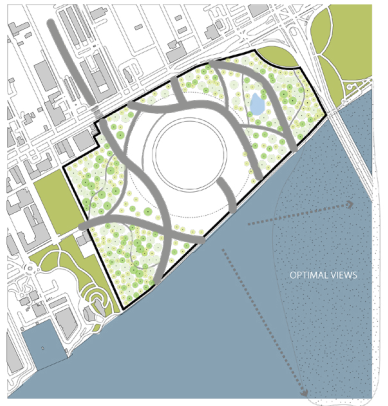
Optimizing views with interest points



GRID



PATHWAYS



VEGETATION AND VIEWS

Figure 8.7. Site plan layout diagrams

As you embark on this journey through the next few vignettes, envision the myriad moments awaiting your discovery as you traverse the site. Consider the hidden gems, the unexpected treasures, and the delightful surprises that await around every corner. Immerse yourself in the adventure of exploration, and let your imagination guide you as you uncover the rich tapestry of experiences that await.

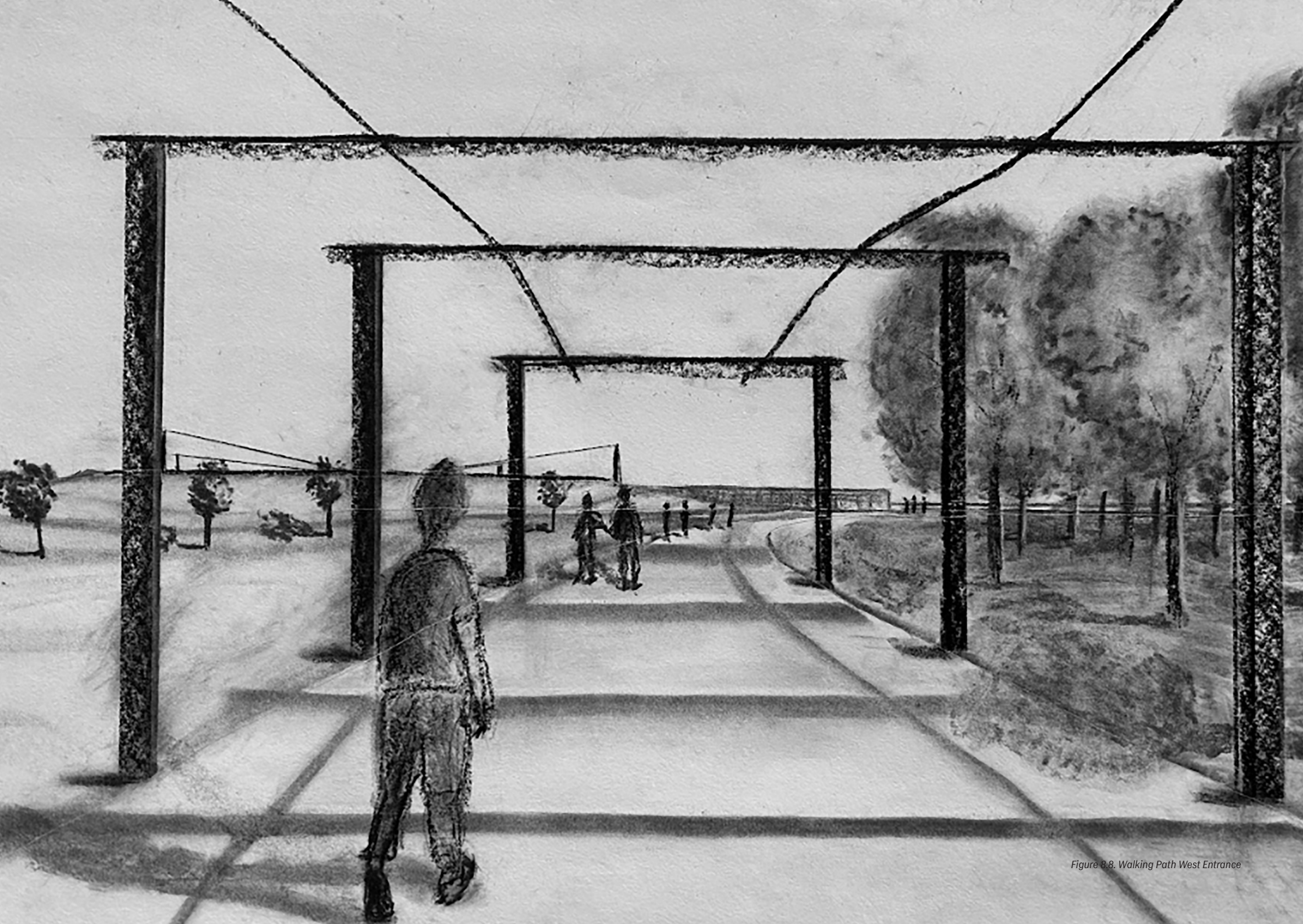


Figure 8.8. Walking Path West Entrance

Figure 8.9. Views from the top

Figure 8.10. Walking through tree canopy

SHADOW THRESHOLD
Each drawing presented illustrates a type of shadow. Look to see how many different shadow types you can find.

Figure 8.11. Looking through tunnel

In Detroit's embrace, by riverside I roam,
Where whispers of history and future converge. Beneath a canvas of sky, my spirit finds home, In the dance of light upon the river's verge.

Figure 8.12. Walking along the riverside

In the tunnel's embrace,
where shadows dance,
I tread, catching glimpses of
sunlight's chance.
Amidst the darkness, a beacon of grace,
I follow the radiance, quickening pace.

Figure 8.13. Walking through the tunnel

As I bathe in the glow, feeling so small,
Beneath the tree's tips, city forgotten, I recall.
In the shadow's path, a journey unfolds,
And upon gazing upward, a reflection beholds.

Figure 8.14. The sacred place

A mirror in the heavens, a shimmering sight,
Reminds me of light, where all begins bright.
In Detroit's magic, this moment's refrain,
I journey on, in the glow, free from the chain.

Figure 8.15. Reflection of shadow

Understandings

It is understood that not all moments can be curated; hence, the principle of planning for the unplanned guides the design process. The expansive space is meticulously designed with light and shadow experiences in mind yet remains open to accommodate various events and activities. For instance, the hilly side facing the river can serve as an excellent vantage point for viewing the annual fireworks display or witnessing rare astronomical events like the solar eclipse this year, positioning Detroit near the totality line.

The shape of the site holds significance, with the decision to create a circle within the inner space of the Meadow driven by symbolic and practical considerations. A circle symbolizes unity, completion, and protection, while in a three-dimensional perspective, a sphere represents the sublime figure. This intentional design choice aims to evoke a sense of harmony and cohesion within the space, fostering a welcoming and immersive environment for visitors.

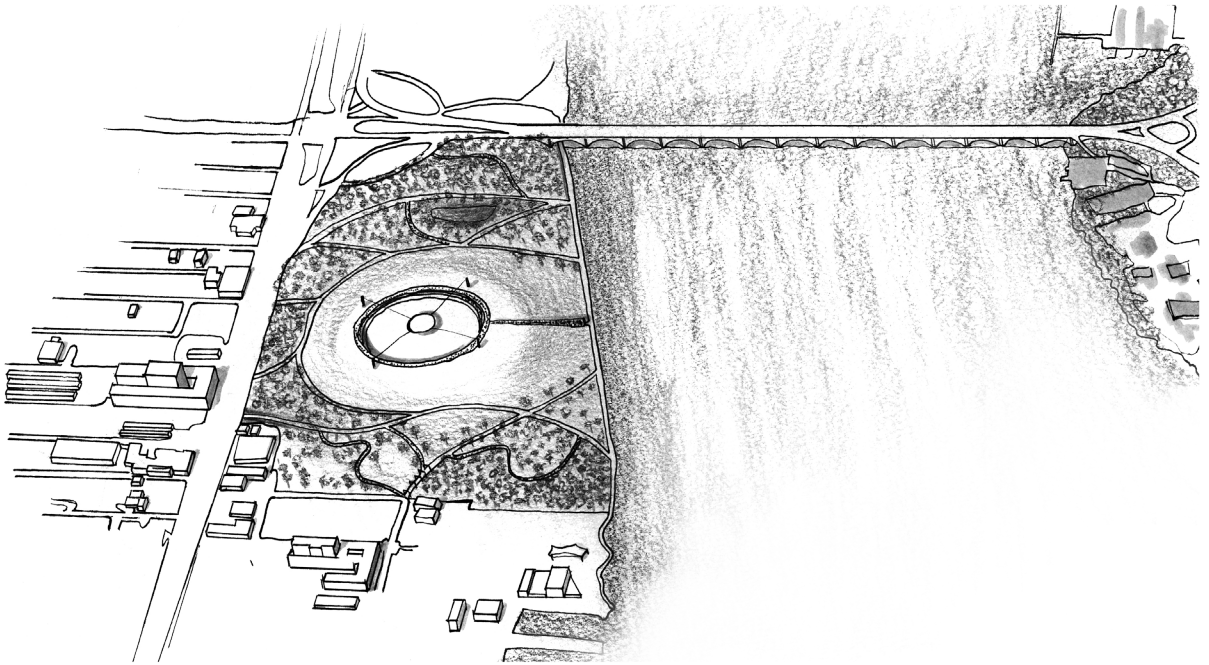


Figure 8.16. Site Axon

DISCUSSION

Throughout the investigation, some critique emerged regarding the absence of a physical model capturing real-world light conditions at the site, attributed to time constraints. However, efforts are ongoing to explore and develop this aspect further. Additionally, findings are illustrated through renderings depicting the movement of shadows from sunrise to sunset.

One reviewer drew attention to the connection between ribbon farms to access limited resources, suggesting parallels with shadows as a limited resource and access to sunlight. This insight may inform future designs, particularly along the water's edge, to better integrate the site with the Detroit River.

Another reviewer noted, "It reminds me of slowing down and being aware of time, like watching the recent eclipse and all slowing together." They emphasized the interdependence of light and shadow in understanding space, underscoring the thesis's purpose to encourage mindfulness and appreciation of small details.

While the investigation predominantly focuses on shadows' positive aspects, it acknowledges their potential negative associations, such as fear and insecurity. The drawings and renderings aim to provide security, challenge cultural perceptions of shadow, and present the site as a safe and sacred space. Despite the emphasis on positive shadows, there are varied interpretations and forms of shadows, including negative connotations such as being overshadowed or perceiving reality only through shadows. The thesis acknowledges the complexity of light and shadow phenomena and their cultural significance.

The importance of creating spaces celebrating light and shadow is highlighted, drawing parallels with events like the total solar eclipse, which gathers people to experience natural phenomena. The Light and Shadow Meadow aims to provide a place for such moments of reflection and discovery, inviting visitors to pause, observe, and appreciate the interplay of light and shadow.

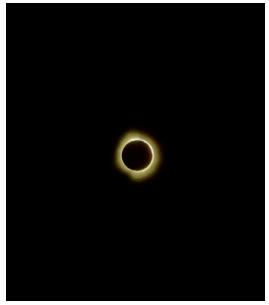


Figure 9.1. Total Solar Eclipse. Credit: Agata Kulawińska.
Figure 9.2. Downtown Riverside.

CONCLUSIONS

This investigation aims to provide new perspectives and draw attention to the significance of shadows in architectural and urban contexts. The goal is to shift the focus towards the often-overlooked realm of shadows and uncover nuanced insights that contribute to a deeper understanding of Detroit's built environment. A varied approach includes on-site photography, sketching, and extensive literature reviews on shadow dynamics to capture the strong impact of sunlight on the formation and behavior of shadows within urban spaces. This comprehensive qualitative methodology allows for analyzing the intricate interplay between sunlight, architecture, and the resulting shadow patterns. By incorporating insights from scholarly sources dedicated to the study of shadows, shadow thresholds are discerned, and a Light and Shadow Meadow proposal is designed for Detroit's riverfront. This proposal will create a place that celebrates the light and shadows of Detroit, using multi-faced techniques of shadow types and sunlight studies to encourage users to explore and uncover their moments. For instance, a heightened awareness of shadow thresholds from Unwin's book equips researchers to discern and appreciate the nuanced differences that may have gone unnoticed.

In conclusion, this research sheds light on the intricate relationship between sunlight and shadows in downtown Detroit. It equips observers with a heightened sensitivity to the subtle yet impactful nuances within the urban environment. By delving into the shadows, a fresh perspective is uncovered that contributes to a more nuanced and informed appreciation of architectural spaces and their dynamic interactions with natural light.

Figure 10.1 Water reflections.

GLOSSARY

Ephemeral – Something that lasts for a very short time.

Equinox – The two times each year (as about March 21 and September 23) when the sun crosses the equator and day, and night are everywhere on earth of approximately equal length.

Experience – (The process of getting) knowledge from doing, seeing, or feeling things.

Henge – A prehistoric circular or oval earthen enclosure.

Light – Intangible natural phenomena that gives the ability to see things.

Meadow – A piece of land found along a river.

Moment – A particular moment is the point in time at which something happens.

Phenomenology – A form of qualitative research that focuses on the study of an individual's lived experiences within the world.

Place – Place becomes a possession and extension of personality and is focal point within the environment .

Refraction – The bending of a ray when it passes at an angle from one medium into another in which its speed is different (as when light passes from air into water).

Reflection – Deflection from a straight path undergone by a light ray.

Shadow – A dark shape that appears on a surface when someone or something moves between the surface and a source of light.

Shade – Shade is being in the shadow. Refers to an area or a person that is encompassed by shadow.

Solstice – Either of the two points on the ecliptic at which its distance from the celestial equator is greatest and which is reached by the sun each year about June 21 and December 21.

Space – A boundless, three-dimensional extent in which objects and events occur and have relative position and direction. (Encyclopedia Britannica)

Sublime – Something that is very beautiful or good : something that is extraordinary.

Time – Time is not a phenomena but) The order of phenomenal succession and change.

LIST OF FIGURES

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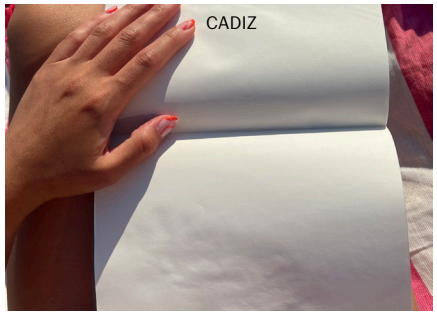
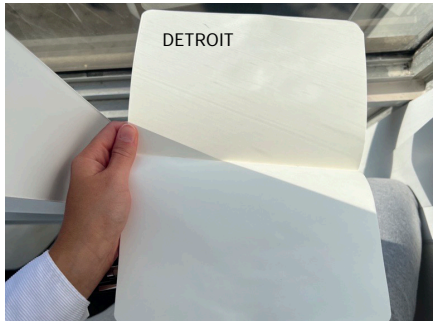
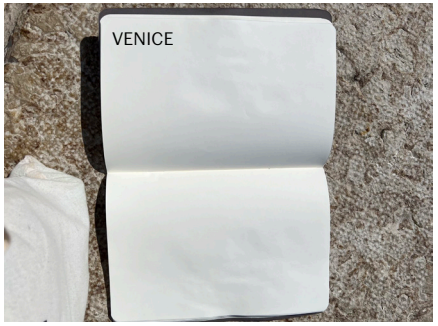
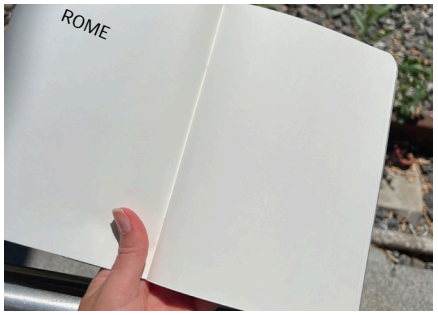
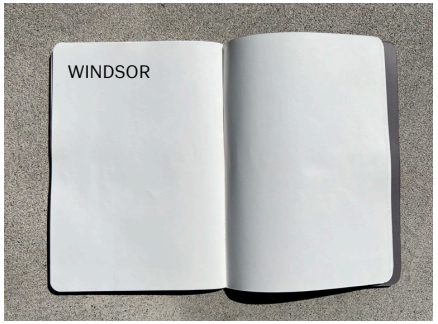
APPENDIX A *Summer sketchbook light study*











APPENDIX B *Light and Shadow models*

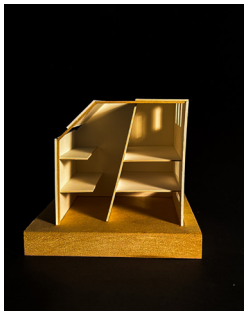
sunlight

sunlight

sunlight

sunlight

artificial light

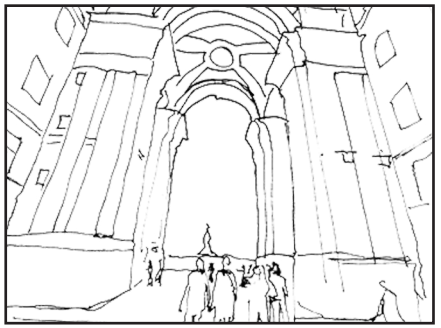
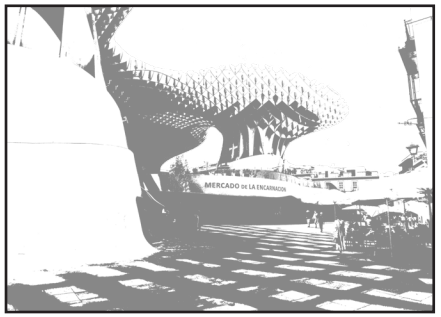


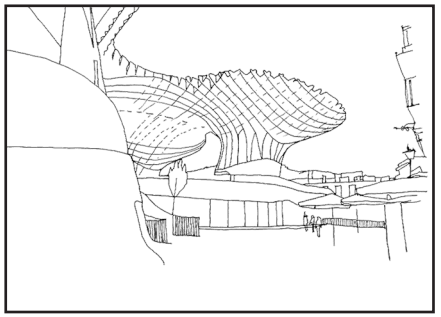
artificial light

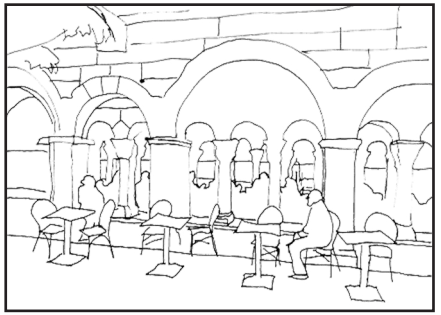
artificial light

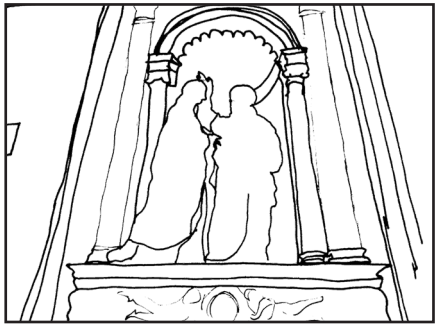
artificial light

APPENDIX B *What is shadows did not exist - sketches*

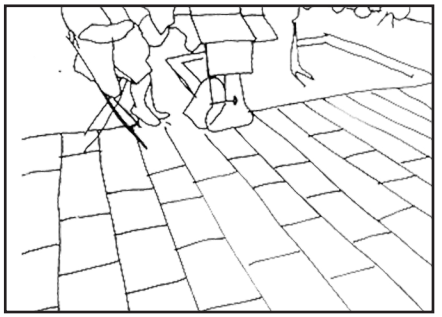












APPENDIX C *Photo-voice Activity - Survey*

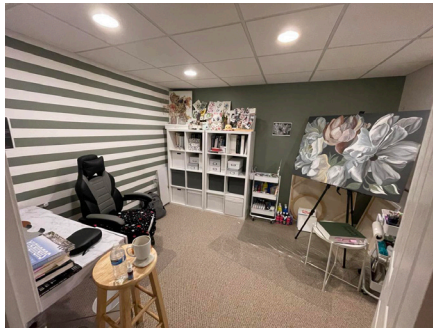
Prompt given:

Take a photo of a space in your home, and give a brief explanation of the lighting condition in that space and how you spend your time there. Whether you enjoy the space during the day or at night or even if the space has poor lighting, please explain what you would change.

Responses from 6 participants:

Participant 1

" I do face south so in the morning the apartment is very hot with the direct heat. **I like having the curtains open as much as possible to see the sky**. I could also send you a photo of my kitchen in the evening after it's dark outside and the artificial light above is situated behind me which gives a shadow on the counter that gets annoying."



Participant 2

"While I truly value the privacy and productivity I experience in this space, the **absence of natural daylight is a drawback**. To counter this, I often find myself migrating to the kitchen, where I can bask in the fresh sunlight while working. Fun fact, I never anticipated how much I'd miss natural light until I immersed myself in this work environment."

Participant 3

"I'd say it gets a good amount of daylight through all hours of the day and I feel most comfortable in here. The only downfall is that big engineering building that blocks my view, but I get lots of sun and heat in my room. I think a **bigger window would make it even better** for more daylight, but beggars can't be choosers lol!"

Participant 4

"I spend most of my time here as it has the most space. I prefer it during the day as there is no overhead light and **I have to use lamps that disperse light unevenly.**"

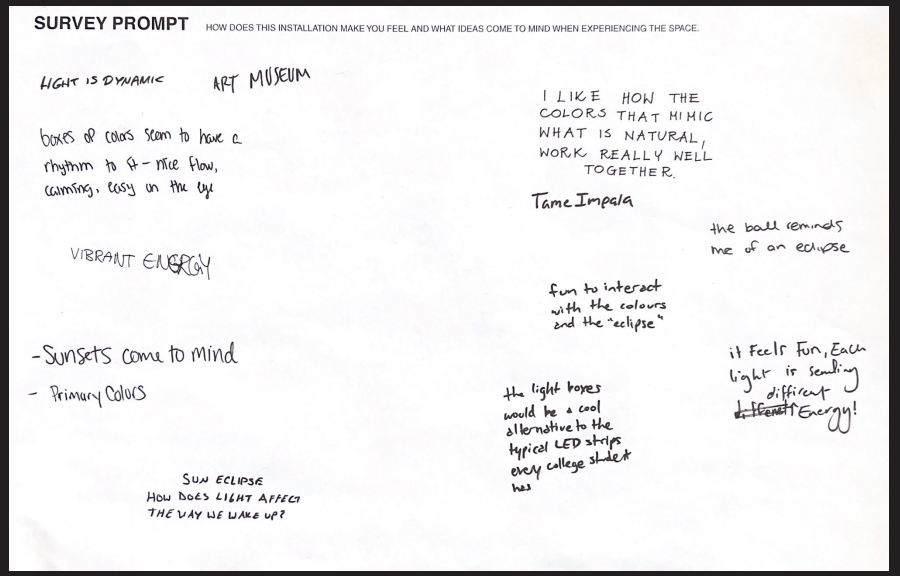
Participant 5

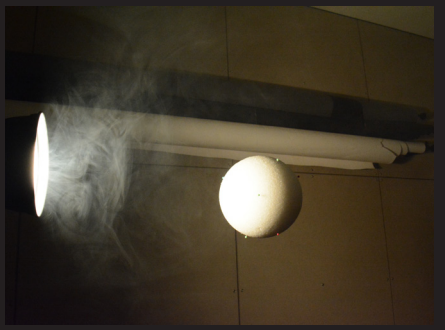
" The natural light and expansive views of greenery in both spaces make me happy. I prefer to work in my dining room rather than my university office for the view to nature, the easily operable windows and fresh air, and the lack of traffic noise. **I often have my front door open as well for extra light**. Per the bedroom space, I **enjoy waking up to the natural light** and view to nature."

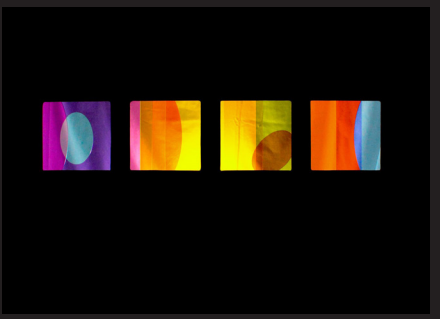
Participant 6

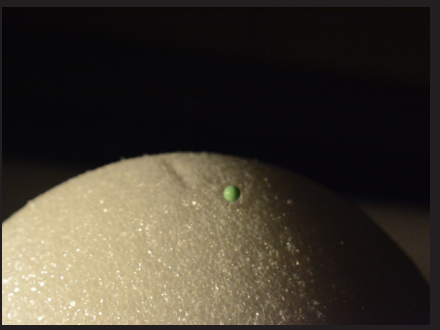
" I work at the kitchen table very often. **I like how the light is cast on the horizontal sill of the bow window** and the white table."

APPENDIX D *Luminance of Sunlight Installation*

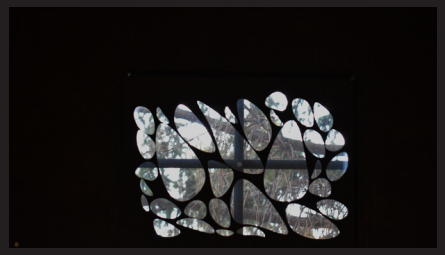


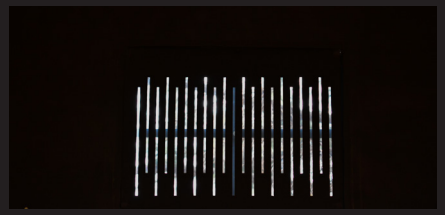


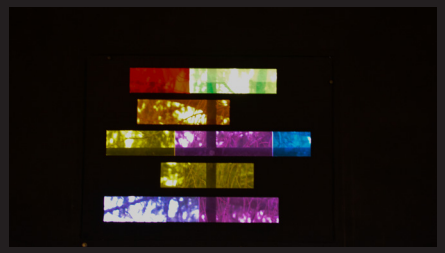


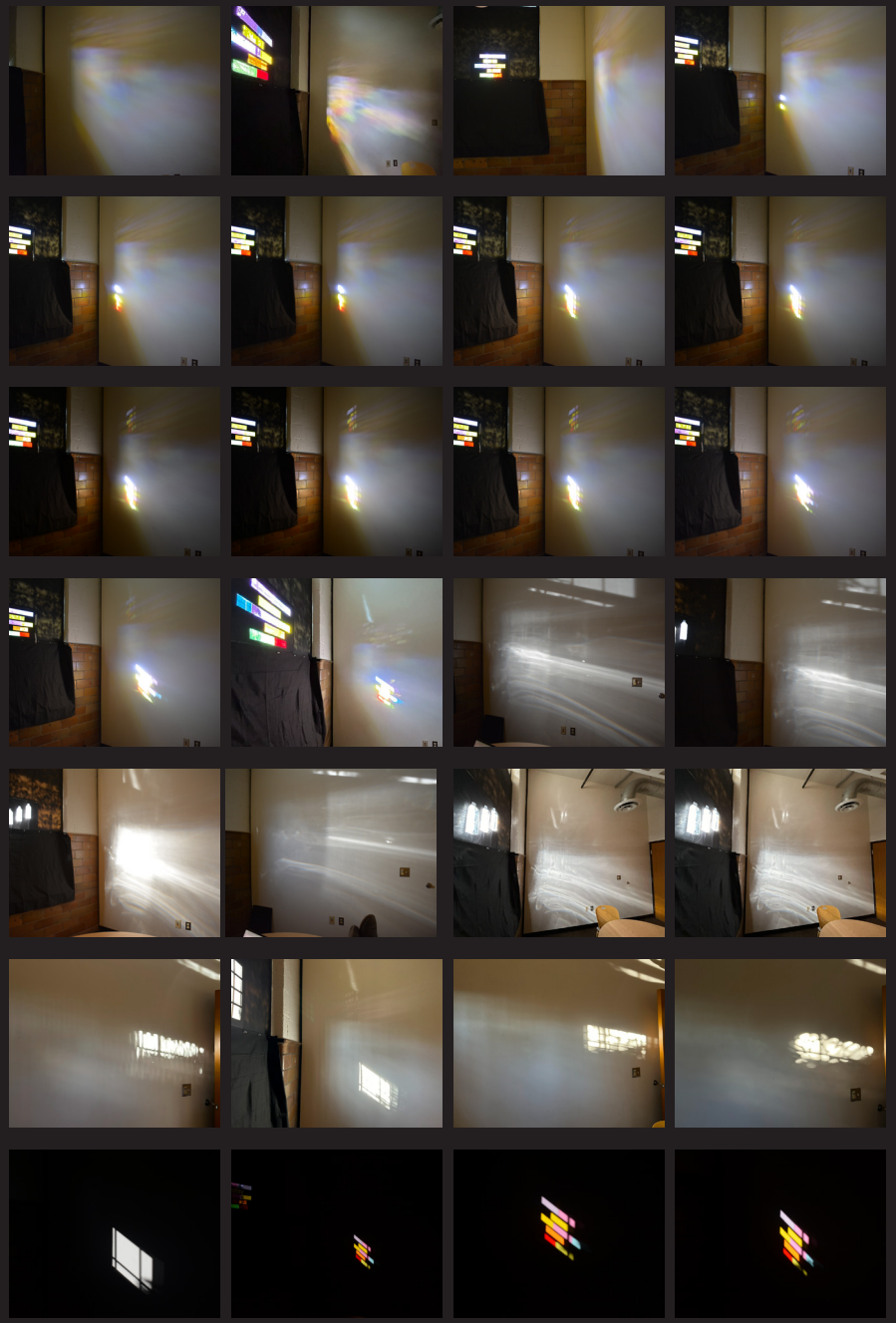


APPENDIX E *Shadow Unveiled Installation*



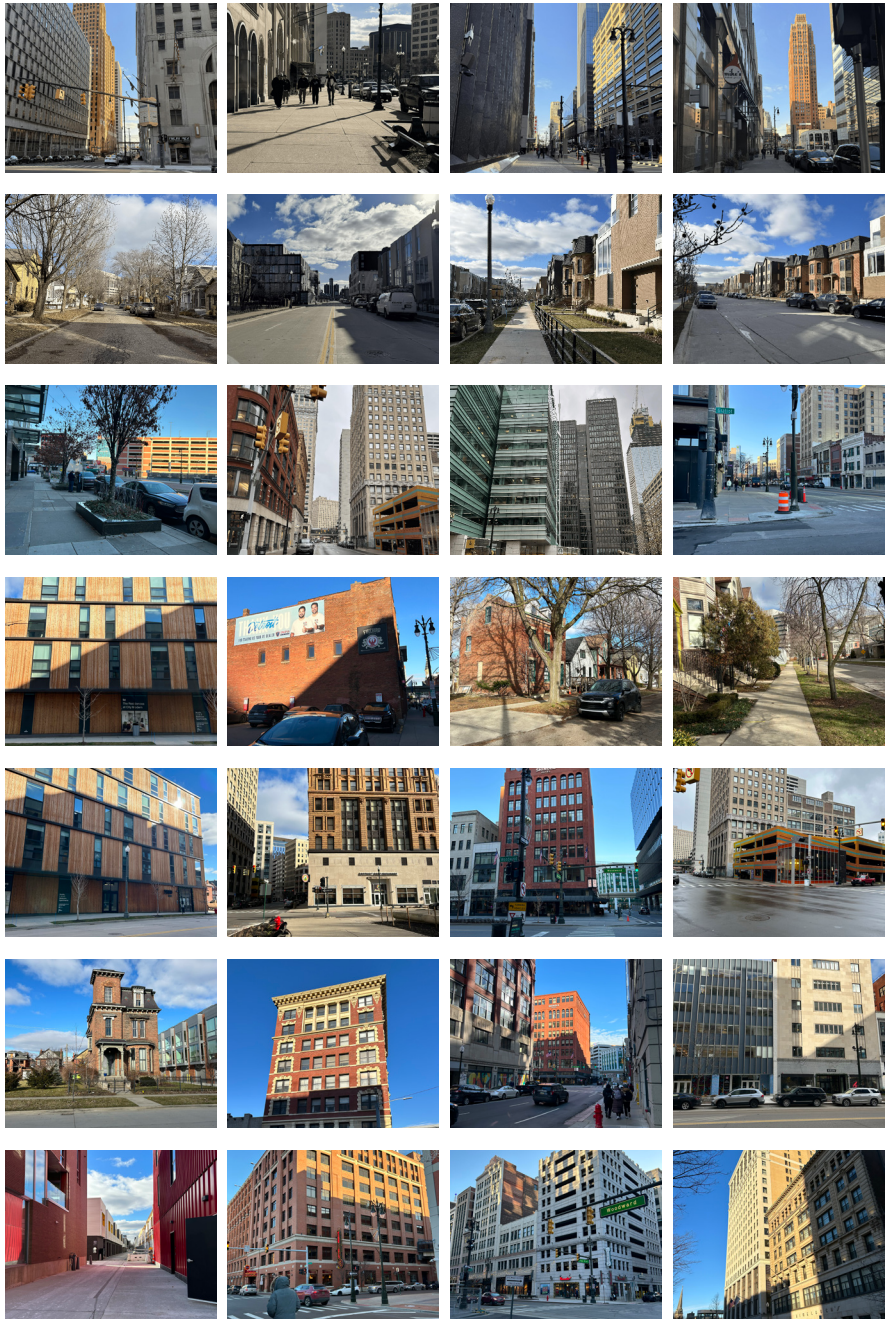


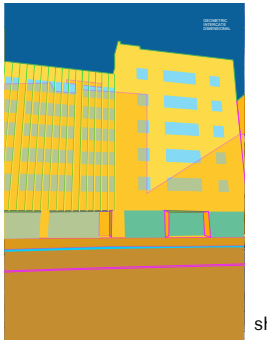




APPENDIX F

Urban Shadow: Analyzing the interplay of Density, Daylight, and Perception, in collaboration with Mikayla Dawber



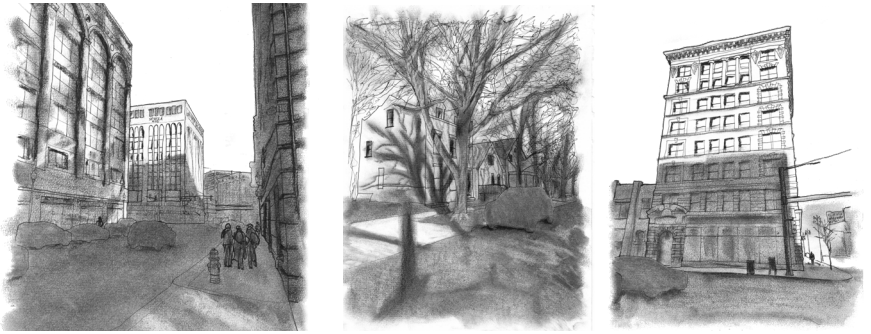


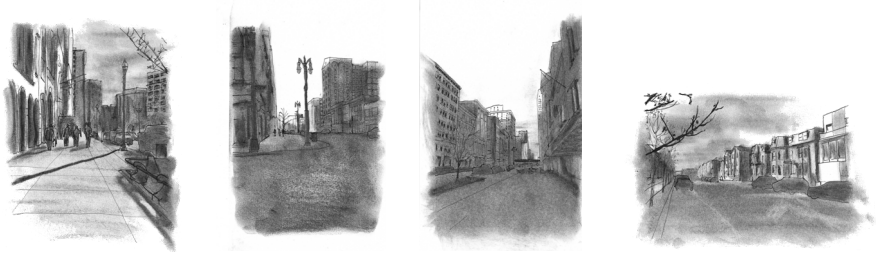
shadow color analysis

shadow color analysis

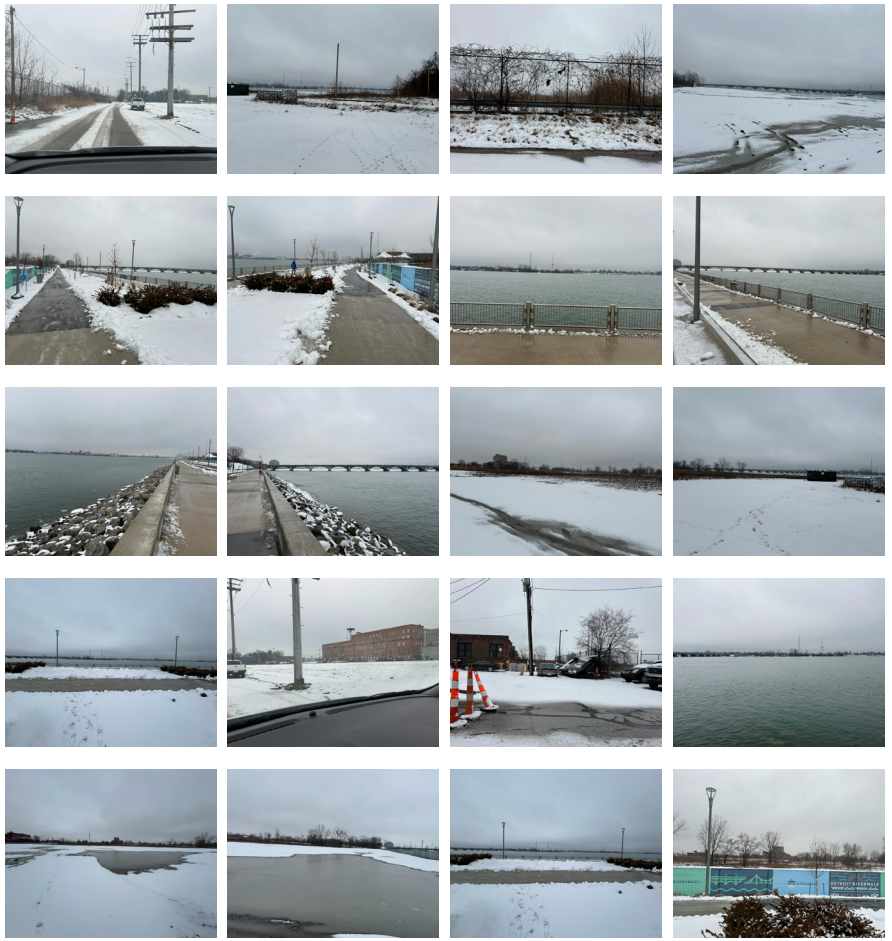
shadow analysis

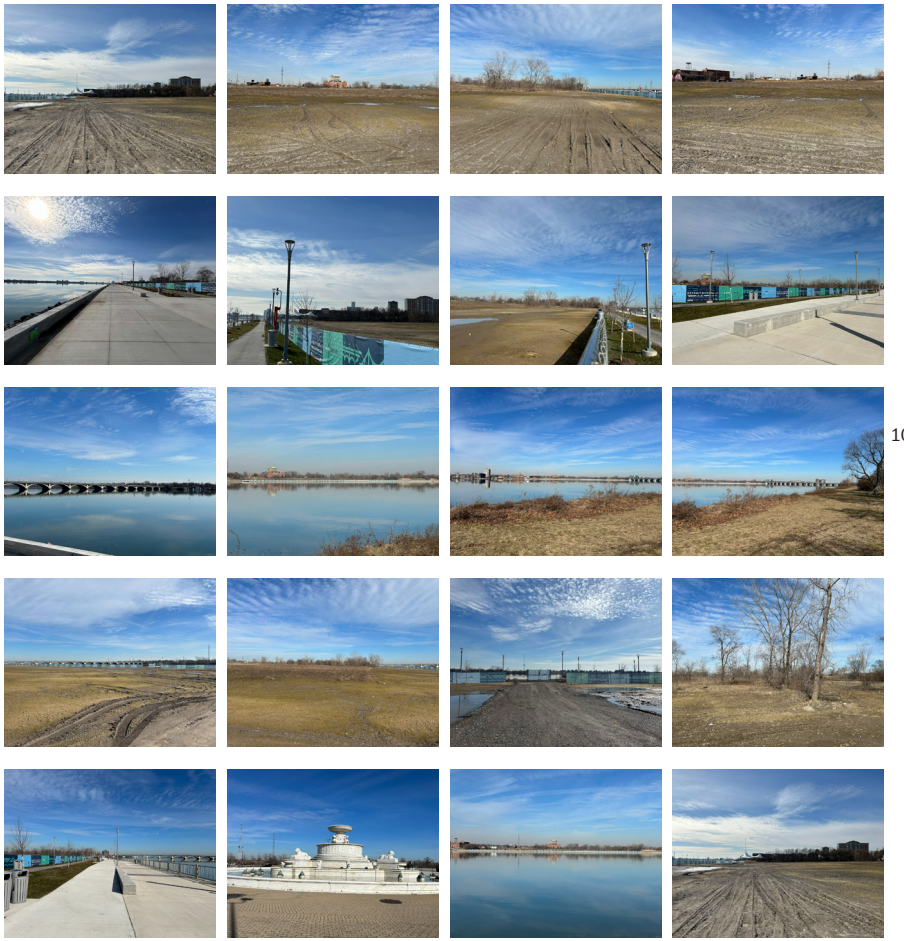
shadow analysis





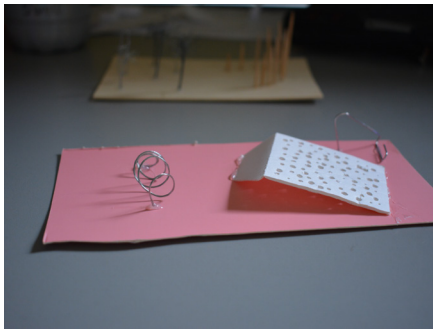
APPENDIX G *Site Visits*

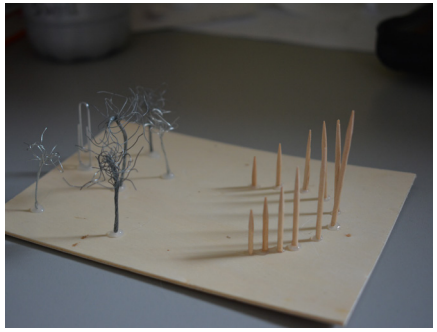


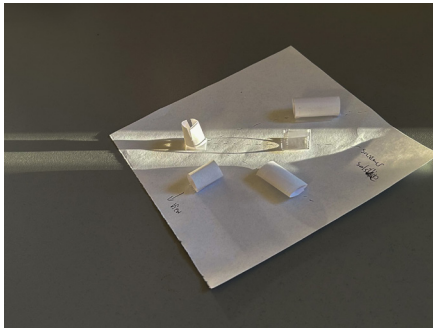


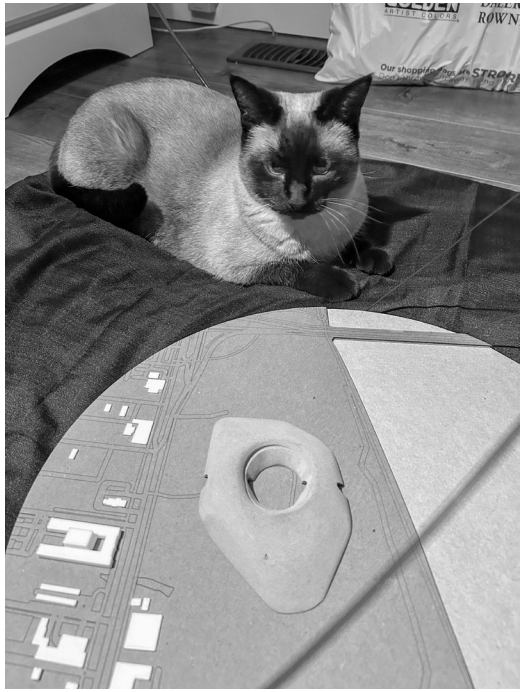
APPENDIX H *Model Studies*

testing design strategies based off of what types of shadows they create





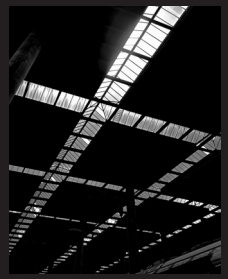
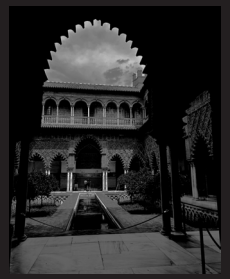




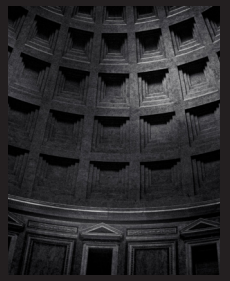
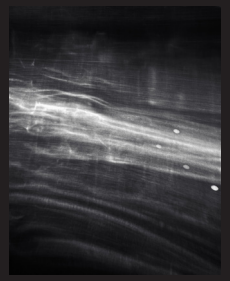
draft site model

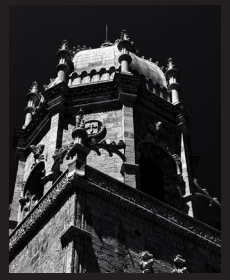
draft site model

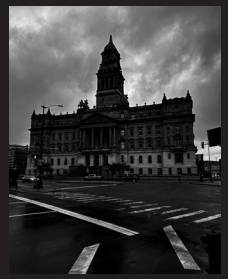
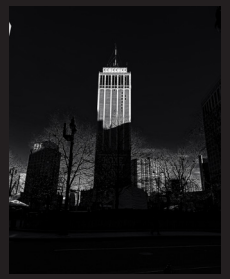
APPENDIX I *Captured Moments*

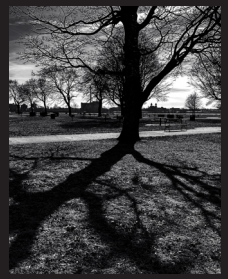
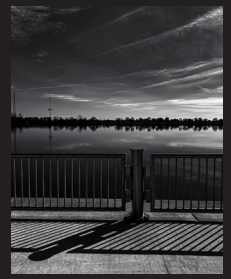
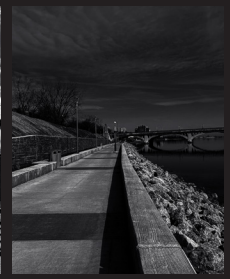
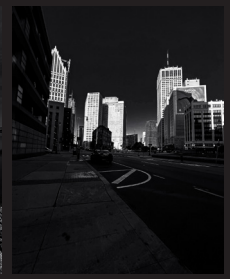





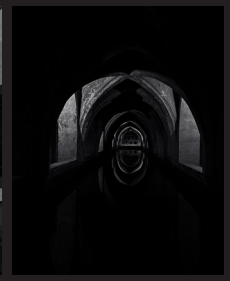




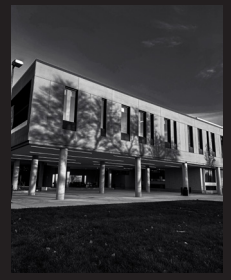


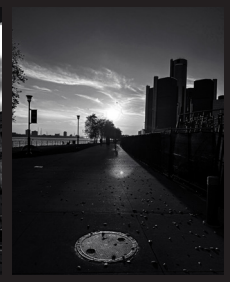




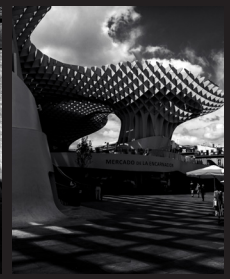












Catedral de Sevilla

Studio moment to encapsulate this experience.

LIGHT AND SHADOW

Exploring the embodiment of light and shadow in architecture

Shadow is forever intertwined with light. They are an ephemeral constant (variable) that can be manipulated by architecture and nature. Shadows are part of us, as we do not exist without shadow and architecture can be defined as something that contains shadow and obstructs sunlight. While light is universal, shadow remains localized, casting its own distinct narrative. This investigation is guided by case studies and research books that define ways we interpret and celebrate light and shadow. This thesis focuses on the phenomenological aspects of the interplay between shadow and light in Detroit's urban fabric. Through thoughtful design intervention, it seeks to immerse users in the sunlight spectacle, offering a curated glimpse into the sublime moment where light and shadow intertwine in perfect equilibrium.